

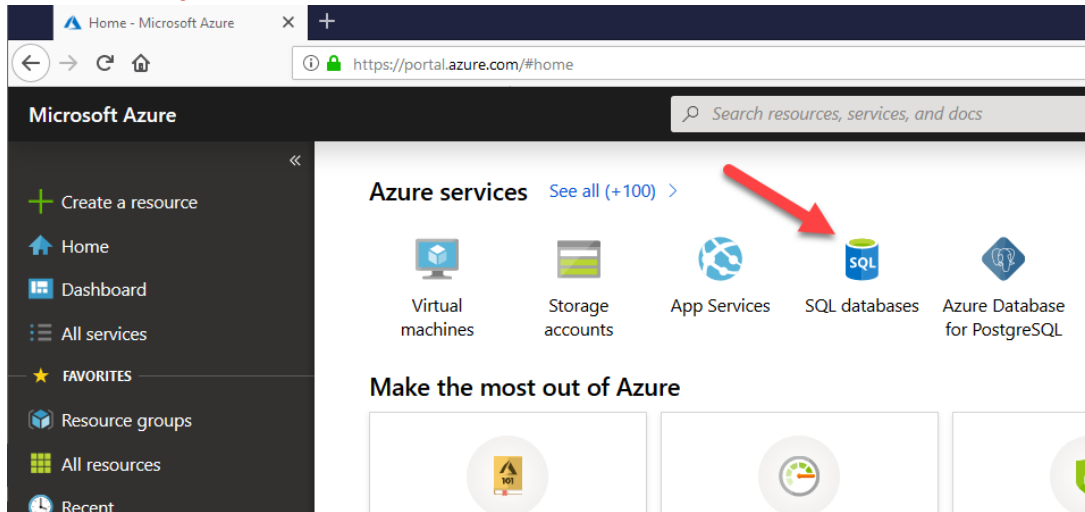
# Microsoft Azure SQL database setup

## Prerequisites

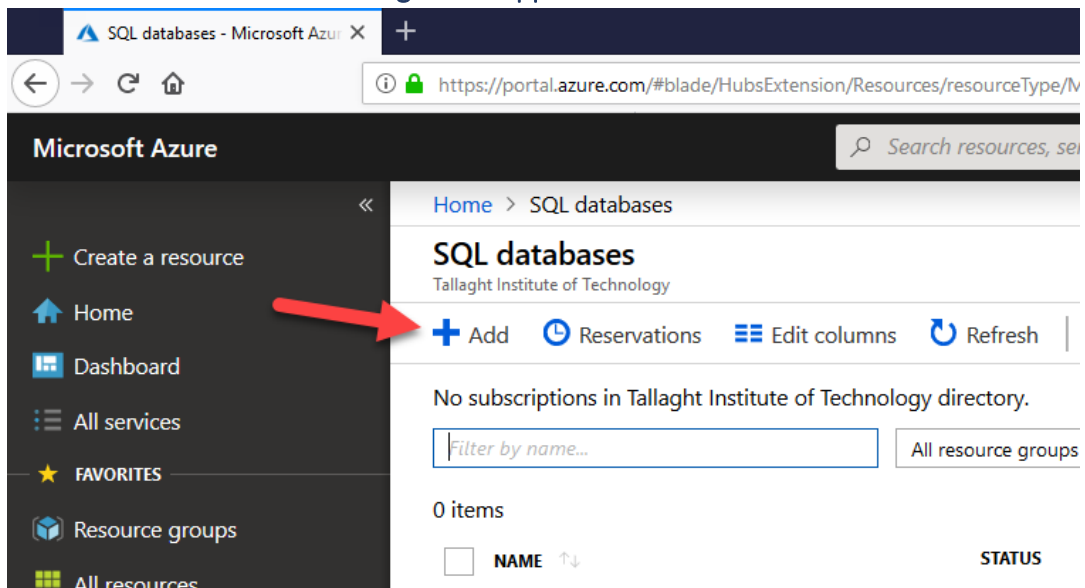
Setup an Azure for Students (not Azure for Students Starter) account. If based in Ireland at time of signup:  
<https://azure.microsoft.com/en-ie/free/students/>

## Create a new Azure SQL database

1. Login to your account: <https://portal.azure.com>
2. Click the **SQL databases** link




3. Click **+ Add** to start creating a new app



#### 4. Fill the **Create SQL Database** form

### Create SQL Database

Microsoft


 Changing basic options may reset selections you have made. Please review all options prior to creating the database.


[Basics](#) [Additional settings](#) [Tags](#) [Review + Create](#)

Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to 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  1 Azure for Students Choose your student subscription


\* Resource group  2 java-app2019 The Java APP and SQL DB should share the same resources 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 3 java-app-db Choose a unique name for the new DB

\* Server  4 [Create new](#) Create a new server for the DB (see below)


\* Want to use SQL elastic pool?  5 ☐ Yes ☒ No Used to scale the DB for performance - not required for this example

\* Compute + storage  6 **Standard 50**  
10 DTUs, 250 GB Configure database

Create the DB

7 [Review + Create](#) [Next : Additional settings >>](#) [Download a template for automation](#)

Create new server options:

**New server** 


\* Server name ✓ sql-web DB server name

\* Server admin login ✓ dbAdmin Create a database administrator account

\* Password ✓ .....

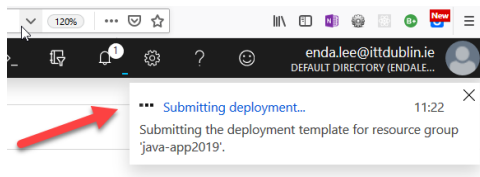
\* Confirm password ✓ .....

\* Location ✓ North Europe Choose North Europe (Ireland)

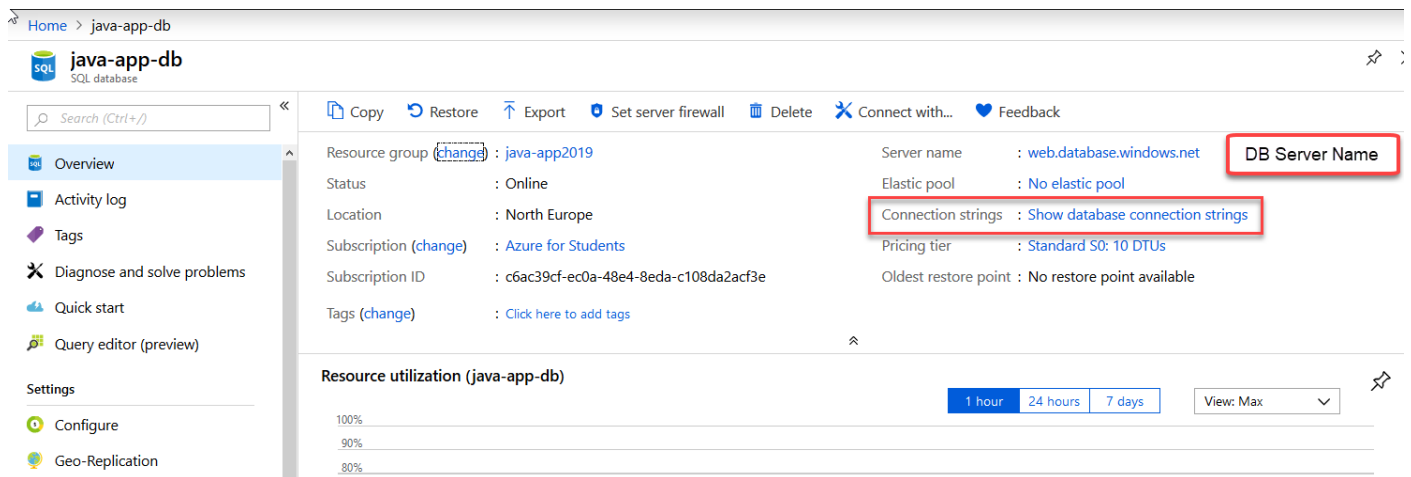
☒ Allow Azure services to access server 

## 5. Review and Create

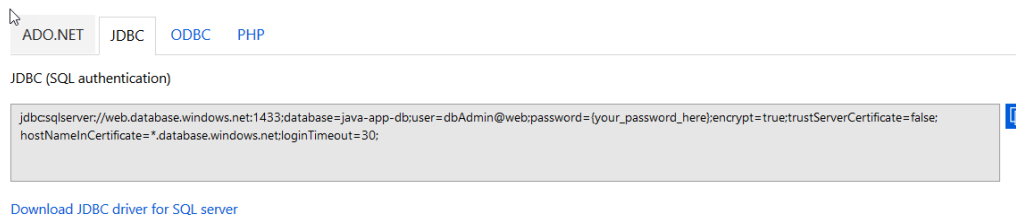
A summary, based on your chosen options, will be displayed. If correct, click the create button. It will take a few minutes to deploy the new database.



When complete, the new DB can be opened. Note the server name. Choose configure (under settings) to change the DB plan.

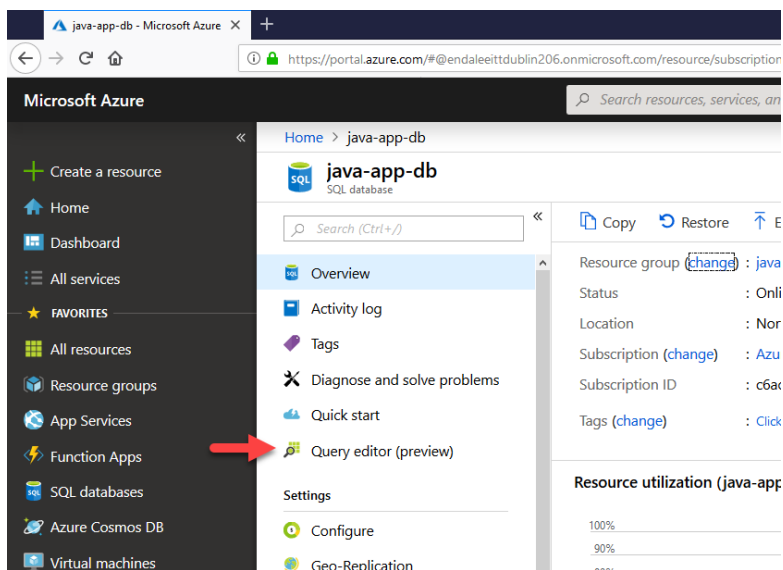


See connection strings for details of how to connect to the DB from applications – e.g.

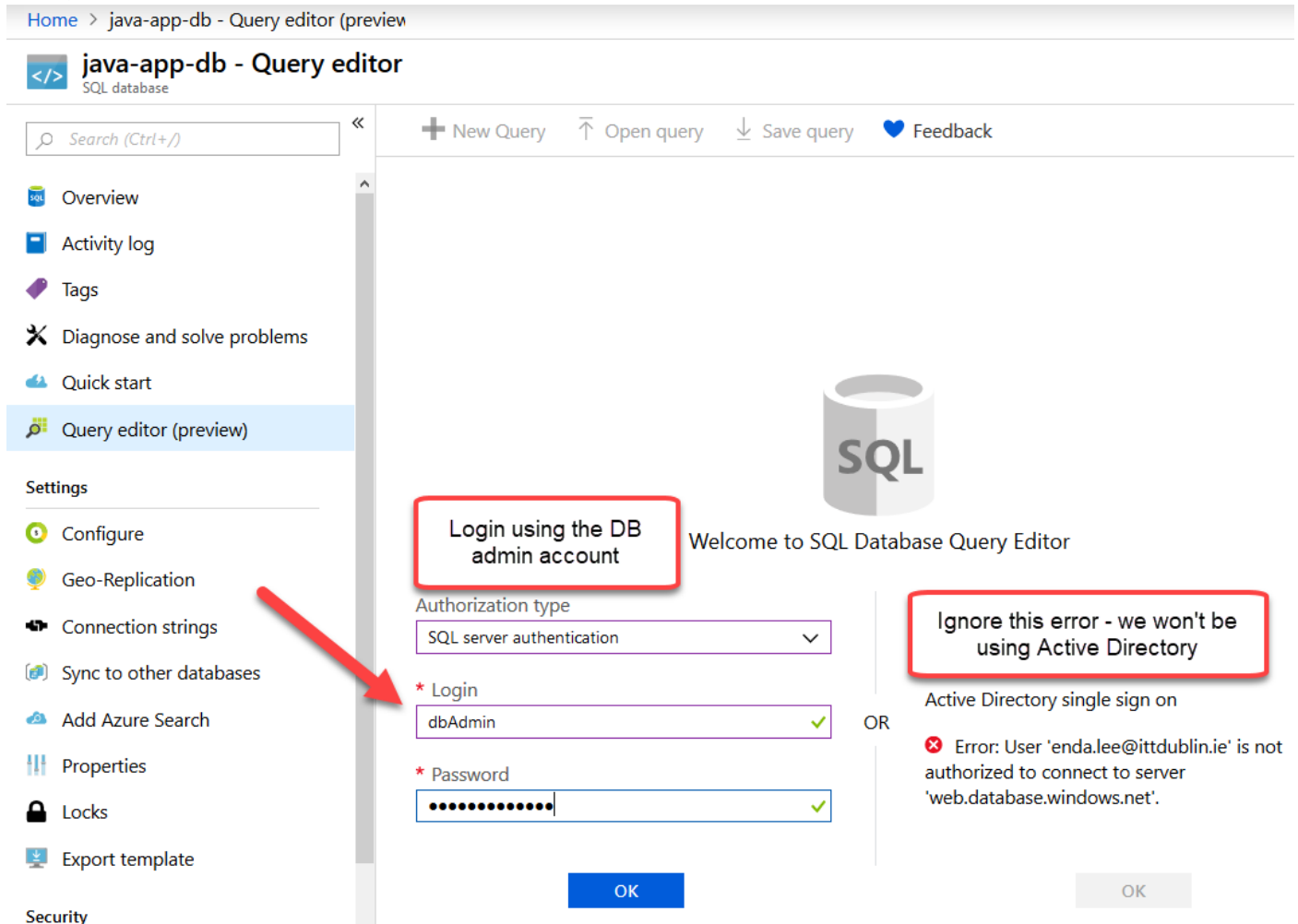


## Adding tables and data

We will use the built in **Query Editor**, available from the database management links in Azure. The query editor provides basic features, for more advanced tools see the bibliography.

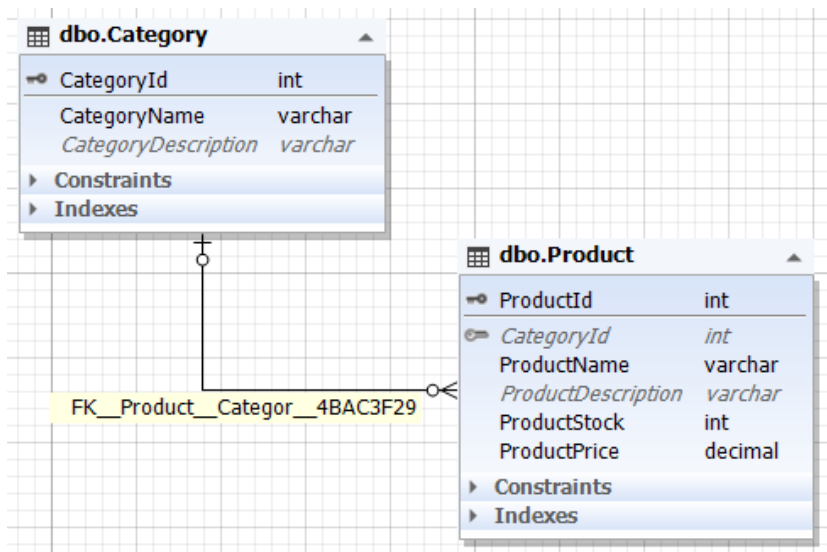


### 1. Login



## 2. Database Tables and data

We will create two tables, **Category** and **Product**, with a **one-to-many** relationship



here is also sample data for each table. Get the SQL from

<https://github.com/COM673/2019-Week3-SQLDB/blob/master/db.sql>

### Execute queries

MS SQL Server uses an SQL dialect called Transact-SQL (or T-SQL). See the Bibliography section for links to a tutorial and reference.

1. Paste the SQL in the Query window.
2. Click Run to execute the query.
3. View results.

Home > java-app-db - Query editor (preview)

java-app-db - Query editor (preview)  
SQL database

Search (Ctrl+/)

Overview  
Activity log  
Tags  
Diagnose and solve problems  
Quick start  
Query editor (preview)  
Settings  
Configure  
Geo-Replication  
Connection strings  
Sync to other databases  
Add Azure Search  
Properties  
Locks  
Export template

Login Edit Data (Preview) + New Query ↑ Open query ↓ Save query ♥ Feedback

java-app-db (dbAdmin)

Showing limited object explorer here. For full capability please open SSDT.

Tables  
Views  
Stored Procedures

Query 1 X

Run Cancel query

```
1 DROP TABLE IF EXISTS dbo.Product;
2 DROP TABLE IF EXISTS dbo.Category;
3
4 CREATE TABLE dbo.Category
5 (
6   CategoryId INT IDENTITY PRIMARY KEY,
7   CategoryName VARCHAR(255) NOT NULL,
8   CategoryDescription VARCHAR(255)
9 );
10
11 CREATE TABLE dbo.Product
12 (
13   ProductId INT IDENTITY PRIMARY KEY,
14   CategoryId INT FOREIGN KEY REFERENCES dbo.Category(CategoryId),
15   ProductName VARCHAR(255) NOT NULL,
16   ProductDescription VARCHAR(255),
17   ProductStock INT NOT NULL DEFAULT 0,
18   ProductPrice DECIMAL(10,2) NOT NULL DEFAULT 0.00
```

Paste SQL here

Results Messages

Search to View result here

1. If successful, the new tables will appear in the **Tables** folder.
2. To view/ Edit table data, click a table and then the **Edit Data** link.
3. The data will be displayed (and can be edited).

java-app-db (dbAdmin)

Showing limited object explorer here. For full capability please open SSDT.

Tables

- dbo.Category
- dbo.Product
  - Productid (PK, int, not null)
  - Categoryid (int, null)
  - ProductName (varchar, not ...)
  - ProductDescription (varchar...)
  - ProductStock (int, not null)
  - ProductPrice (decimal, not ...)

Views

Query 1 X dbo.Product X

Create New Row Save Refresh Discard Delete Row

Search to filter items...

PRODUCTID	CATEGORYID	PRODUCTNAME	PRODUCTDESCRIPTION	PRODUCTSTOCK
1	4	Kettle	Steel Electric Kettle	100
2	4	Fridge freezer	Fridge + freezer large	45
3	2	Microsoft Surface Laptop 2	8GB ram, 512GB ssd	5
4	2	13inch Laptop	HP laptop,8GB RAM,250G...	45
5	6	Samsung 10inch Tablet	Android6GB ram, 128GB s...	5
6	3	60inch TV	Sony 4K,OLED,Smart TV	12
7	5	Clothes Washing Machine	1600rpm spin,A+++ rate...	50

Try a query to select all products.

dbo.Product X Query 2 X

Run Cancel query

```
1 select * from dbo.Product;
```

Results Messages

Search to filter items...

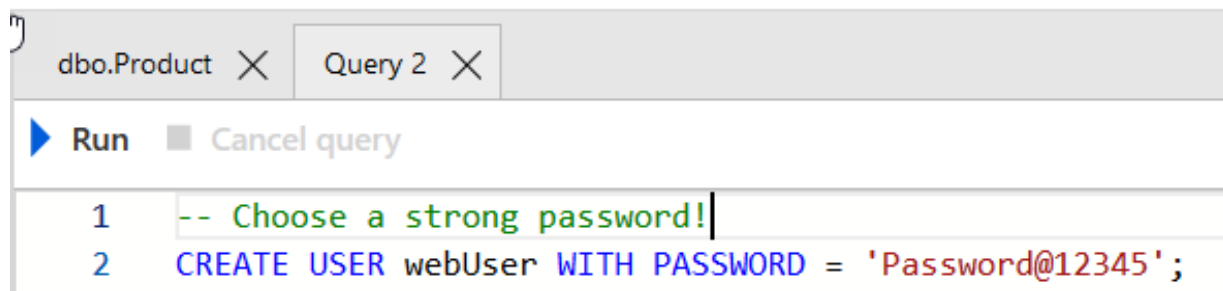
PRODUCTID	CATEGORYID	PRODUCTNAME
1	4	Kettle
2	4	Fridge freezer
3	2	Microsoft Surface Laptop 2
4	2	13inch Laptop

## Securing the database

During setup an administrative user account was configured for the database. This account has full control and misuse could lead to accidental or malicious data loss. It is good practice to enforce **Least Privilege**, i.e. only the permissions required to complete a task.

The Java application will use this database will only need **select**, **insert**, **update**, and **delete** permissions on the **Category** and **Product** tables. Using the Query Editor, add a limited access user, webUser, with minimal privileges.

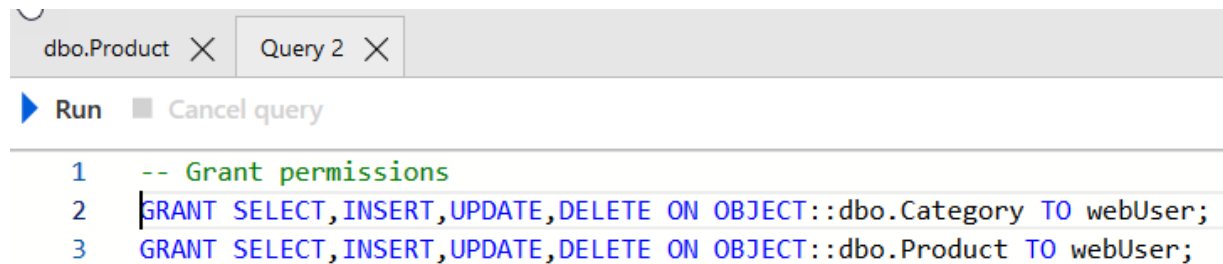
### 1. Add a user



The screenshot shows a SQL Query Editor window with two tabs: 'dbo.Product' and 'Query 2'. The 'Query 2' tab is active. Below the tabs are buttons for 'Run' (a blue play icon) and 'Cancel query' (a grey square icon). The query text is as follows:

```
1  -- Choose a strong password!
2  CREATE USER webUser WITH PASSWORD = 'Password@12345';
```

### 2. Grant permissions to the user



The screenshot shows the same SQL Query Editor window. The 'Query 2' tab is active. Below the tabs are buttons for 'Run' (a blue play icon) and 'Cancel query' (a grey square icon). The query text is as follows:

```
1  -- Grant permissions
2  GRANT SELECT,INSERT,UPDATE,DELETE ON OBJECT::dbo.Category TO webUser;
3  GRANT SELECT,INSERT,UPDATE,DELETE ON OBJECT::dbo.Product TO webUser;
```

### 3. Firewall Configuration

The firewall is used to control access to the SQL database based on IP address. To prevent authorised access, only grant access to/ from trusted addresses.

Home > java-app-db

SQL database

Search (Ctrl+ /)

Copy Restore Export **Set server firewall** Delete

Resource group (change) : java-app2019

Status : Online

Location : North Europe

Subscription (change) : Azure for Students

Subscription ID : c6ac39cf-ec0a-48e4-8eda-c108da2acf3e

Overview

Activity log

Tags

Diagnose and solve problems

In the database overview section, choose **Set server firewall**. Add your client IP

Home > java-app-db > Firewall settings

Firewall settings  
web (SQL server)

Save Discard + Add client IP

Don't forget this!

Connections from the IPs specified below provides access to all the databases in web.

Allow access to Azure services  
**ON** OFF

Allow access to azure apps and services

Client IP address 79.97.88.49

RULE NAME	START IP	END IP
ClientIPAddress_2019-4-5_18-3...	79.97.88.49	79.97.88.49

Current List of IP addresses with access

Connections from the VNET/Subnet specified below provides access to all databases in web.

Virtual networks + Add existing virtual network + Create new virtual network

RULE NAME	VIRTUAL NETW...	SUBNET	ADDRESS RANGE	ENDPOINT STAT...	RESOURCE GROUP	SUBSCRIPTION	STATE
No vnet rules for this server.							



## Bibliography

- Tutorial: Writing Transact-SQL Statements
  - <https://docs.microsoft.com/en-us/sql/t-sql/tutorial-writing-transact-sql-statements?view=sql-server-2017>
- Learn TSQL Tutorial
  - <https://www.tsql.info/>
- Database Tools
  - SQL Server Management Studio (SSMS) : <https://docs.microsoft.com/en-us/sql/ssms>
  - DB Forge (free express version): <https://www.devart.com/dbforge/sql/studio/>
  - Azure Data Studio (cross platform): <https://docs.microsoft.com/en-gb/sql/azure-data-studio>
- Database Security
  - <https://docs.microsoft.com/en-us/sql/relational-databases/security/contained-database-users-making-your-database-portable?view=sql-server-2017>
  - Database permissions - <https://docs.microsoft.com/en-us/sql/relational-databases/security/permissions-database-engine?view=sql-server-2017>