Building Advanced Data Analytics Applications with Cloud

Module 4 - Azure SQL Database, Microsoft Azure Cloud for Data Analytics Managed Services

Lab Practical Manual

Unit 3 – Create & Setup Azure SQL Database

Topic: Azure SQL Database – Solved Question

Learning objective

- Describe the evolution of SQL Server in Azure
- Determine which deployment option is best for workloads in your organization.
- Select the purchasing models, service tiers, and hardware that best fit a workload.

Ex.1 This practical activity makes learner create a SQL database in Azure cloud and perform interaction from local terminal for creation and management of SQL database using local terminal window.

Design a relational database in Azure SQL Database using SSMS

Prerequisites

To complete this tutorial, make sure you've installed:

1. SQL Server Management Studio (latest version)
2. BCP and SQLCMD (latest version)

Sign in to the Azure portal

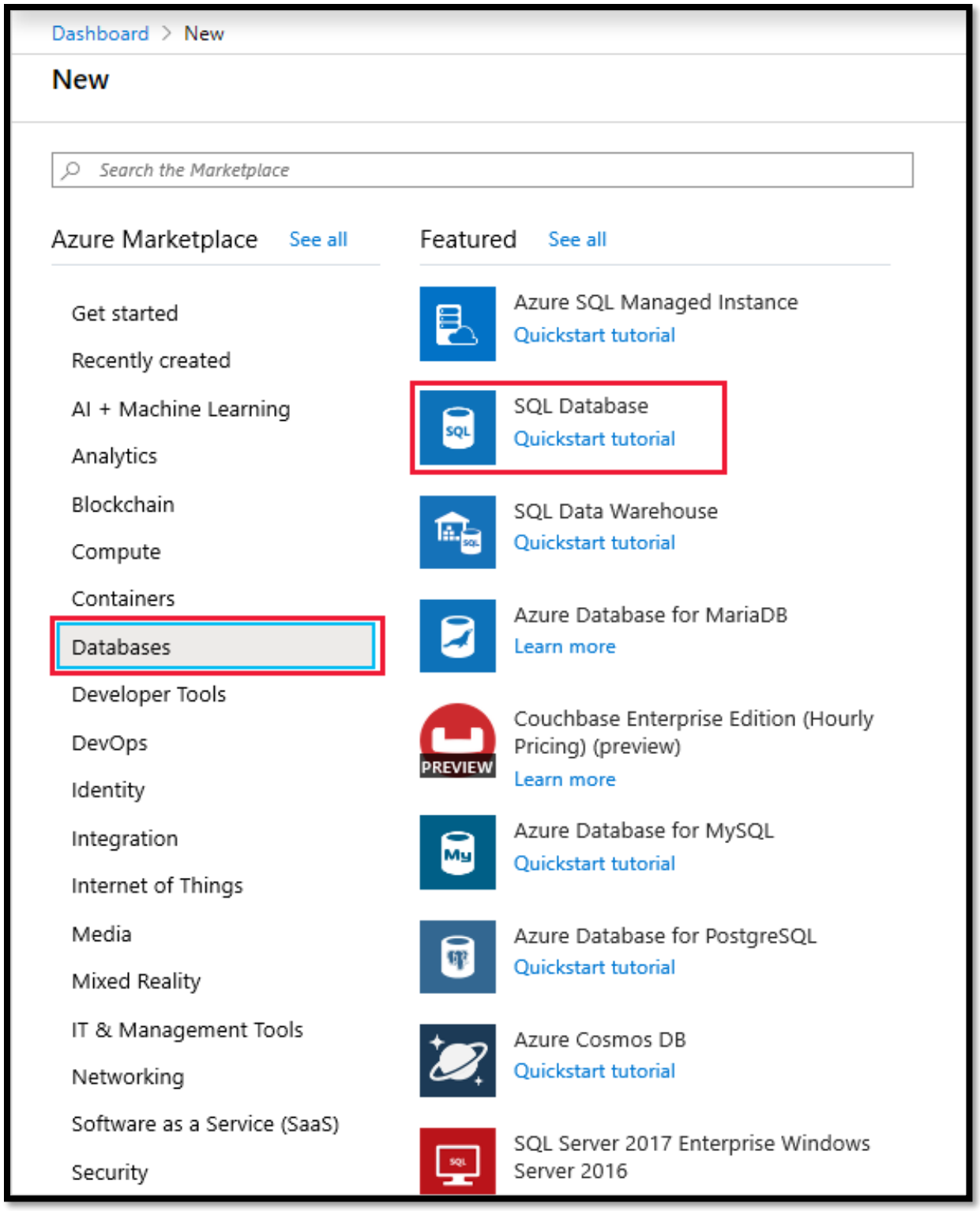
Sign in to the Azure portal.

Create a blank database in Azure SQL Database

A database in Azure SQL Database is created with a defined set of compute and storage resources. The database is created within an Azure resource group and is managed using a logical SQL server.

Follow these steps to create a blank database.

1. On the Azure portal menu or from the Home page, select Create a resource.
2. On the New page, select Databases in the Azure Marketplace section, and then click SQL Database in the Featured section.



3. Fill out the SQL Database form with the following information, as shown on the preceding image:

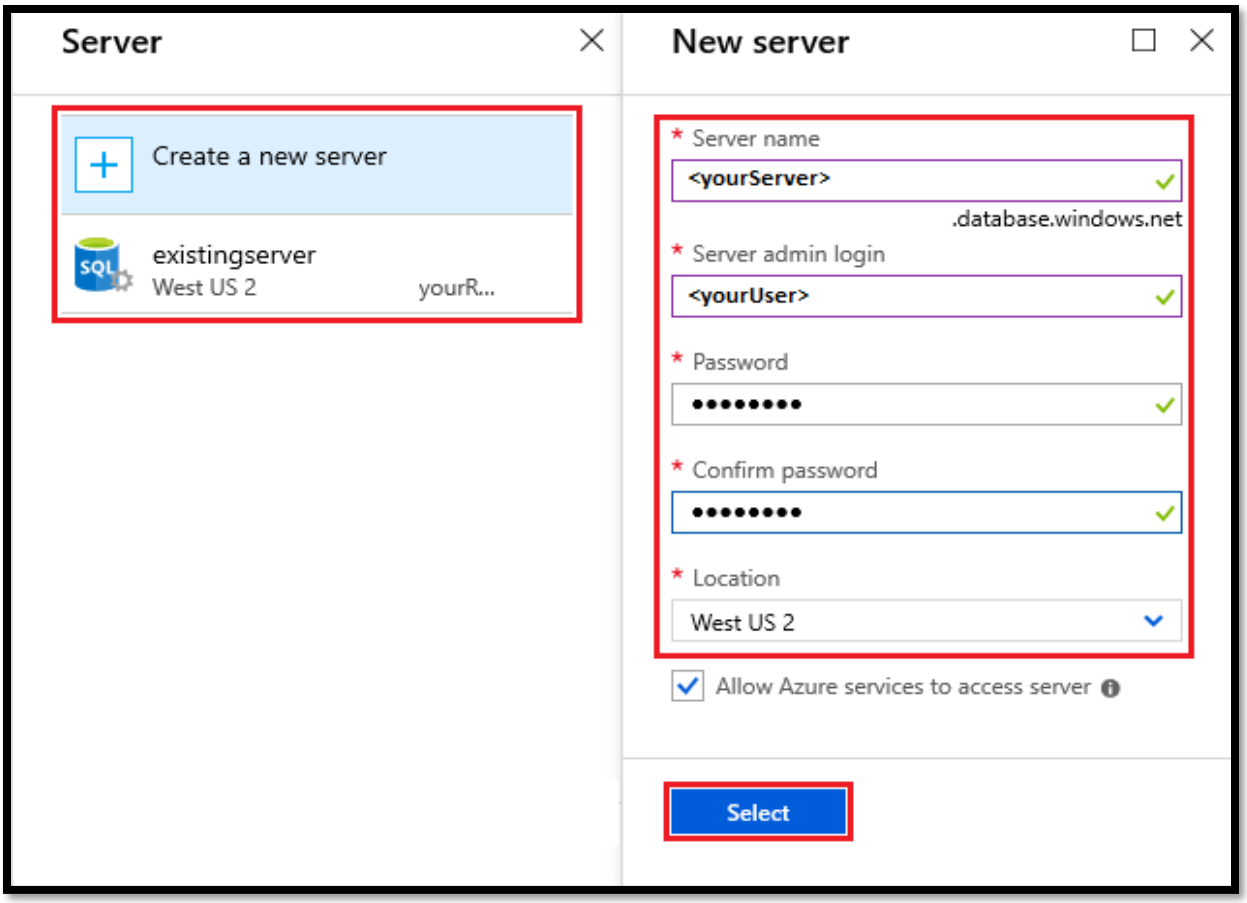
TABLE 29

Setting	Suggested value	Description
Database name	yourDatabase	For valid database names, see Database identifiers.
Subscription	yourSubscription	For details about your subscriptions, see Subscriptions.
Resource group	yourResourceGroup	For valid resource group names, see Naming rules and restrictions.
Select source	Blank database	Specifies that a blank database should be created.

4. Click Server to use an existing server or create and configure a new server. Either select an existing server or click Create a new server and fill out the New server form with the following information:

TABLE 30

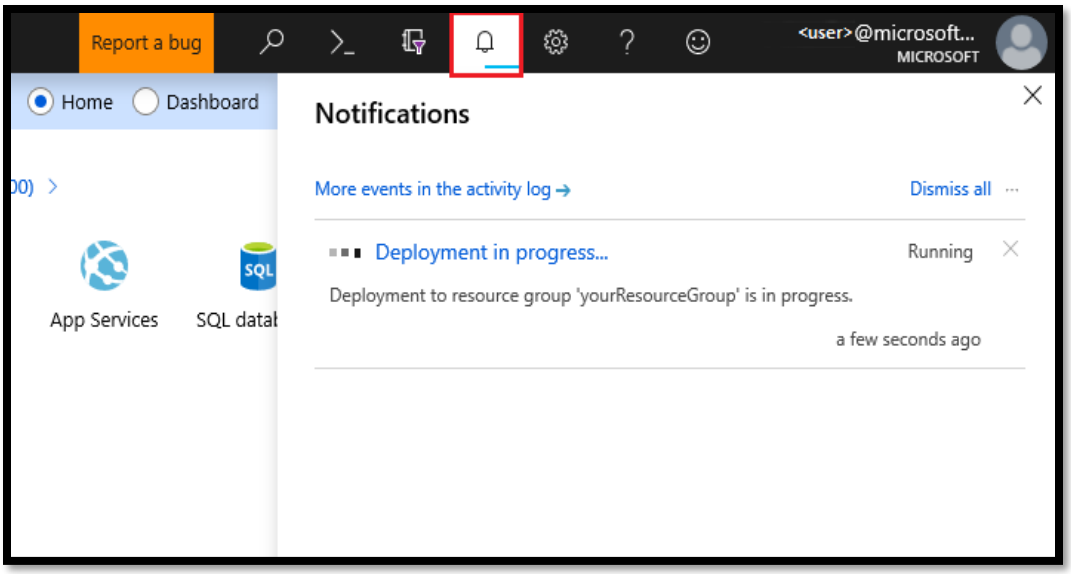
Setting	Suggested value	Description
Server name	Any globally unique name	For valid server names, see Naming rules and restrictions.
Server admin login	Any valid name	For valid login names, see Database identifiers.
Password	Any valid password	Your password must have at least eight characters and must use characters from three of the following categories: upper case characters, lower case characters, numbers, and non-alphanumeric characters.
Location	Any valid location	For information about regions, see Azure Regions.



5. Click Select.
6. Click Pricing tier to specify the service tier, the number of DTUs or vCores, and the amount of storage. You may explore the options for the number of DTUs/vCores and storage that is available to you for each service tier.

After selecting the service tier, the number of DTUs or vCores, and the amount of storage, click Apply.

7. Enter a Collation for the blank database (for this tutorial, use the default value). For more information about collations, see Collations
8. Now that you've completed the SQL Database form, click Create to provision the database. This step may take a few minutes.
9. On the toolbar, click Notifications to monitor the deployment process.


Report a bug
<user>@microsoft...
MICROSOFT
Home
Dashboard
Notifications
More events in the activity log
Dismiss all
Deployment in progress...
Running
Deployment to resource group 'yourResourceGroup' is in progress.
a few seconds ago
App Services
SQL datal

Aim: Setting up Azure SQL DB Firewall

Learning Objective

In this you will:

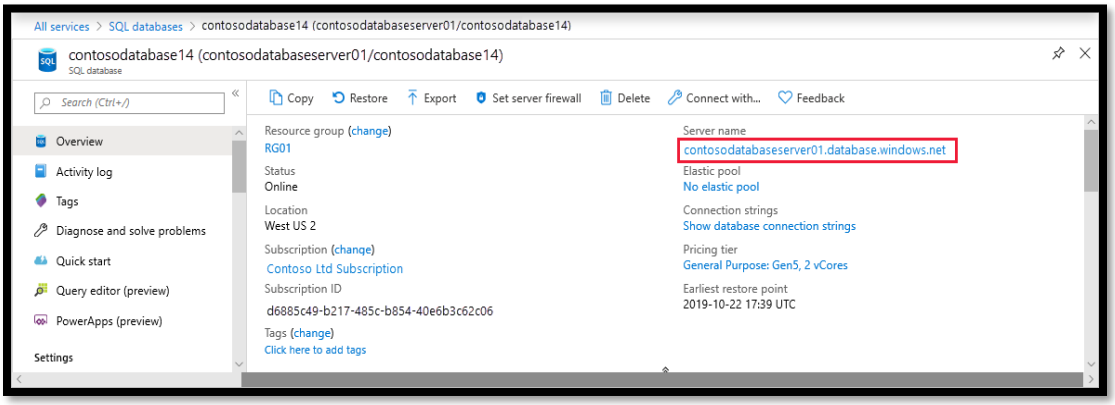
- Learn the concept of firewall.
- To understand how to setup the DB firewall in Azure Portal.

Azure SQL Database creates an IP firewall at the server-level. This firewall prevents external applications and tools from connecting to the server and any databases on the server unless a firewall rule allows their IP through the firewall. To enable external connectivity to your database, you must first add an IP firewall rule for your IP address (or IP address range). Follow these steps to create a server-level IP firewall rule.

Important

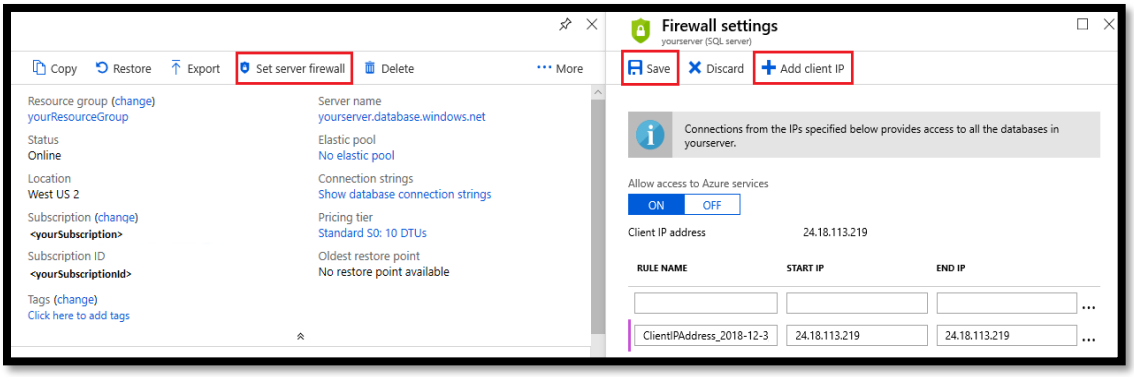
Azure SQL Database communicates over port 1433. If you are trying to connect to this service from within a corporate network, outbound traffic over port 1433 may not be allowed by your network's firewall. If so, you cannot connect to your database unless your administrator opens port 1433.

1. After the deployment completes, select SQL databases from the Azure portal menu or search for and select SQL databases from any page.
2. Select yourDatabase on the SQL databases page. The overview page for your database opens, showing you the fully qualified Server name (such as contosodatabaseserver01.database.windows.net) and provides options for further configuration.



3. Copy this fully qualified server name for use to connect to your server and databases from SQL Server Management Studio.

4. Click Set server firewall on the toolbar. The Firewall settings page for the server opens.



5. Click Add client IP on the toolbar to add your current IP address to a new IP firewall rule. An IP firewall rule can open port 1433 for a single IP address or a range of IP addresses.
6. Click Save. A server-level IP firewall rule is created for your current IP address opening port 1433 on the server.
7. Click OK and then close the Firewall settings page.

Important

By default, access through the SQL Database IP firewall is enabled for all Azure services. Click OFF on this page to disable for all Azure services.

Aim: Installing the SQL Server Management Studio

Learning Objective

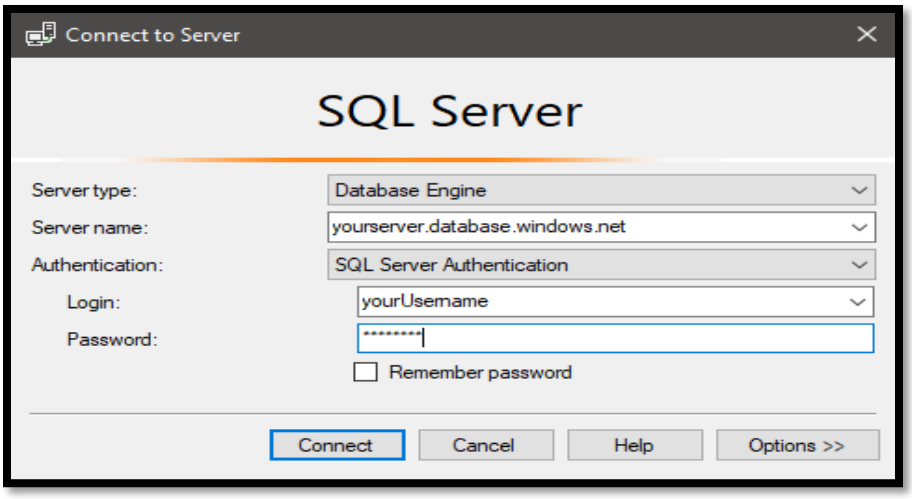
- To install SQL server management studio and connect to server.

Use SQL Server Management Studio to establish a connection to your database.

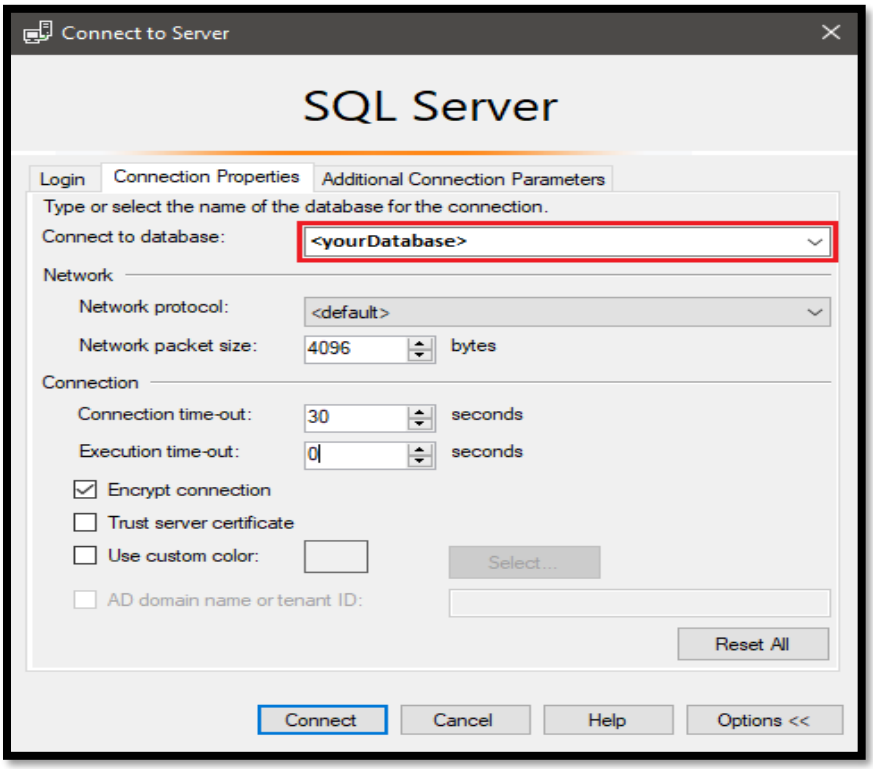
1. Open SQL Server Management Studio.
2. In the Connect to Server dialog box, enter the following information:

TABLE 31

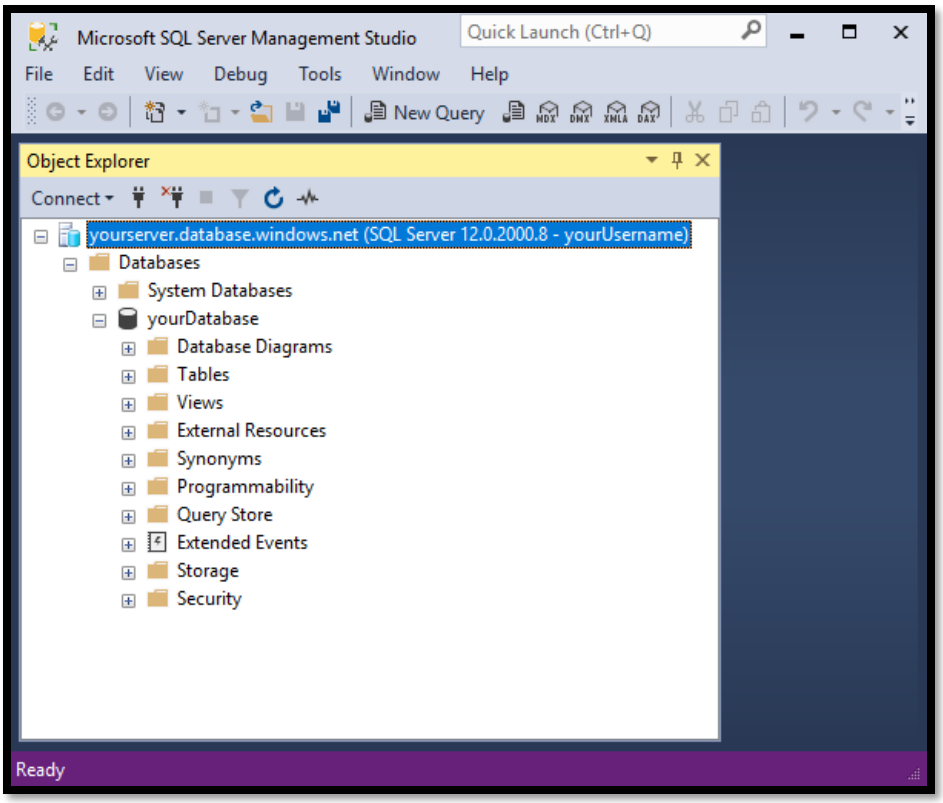
Setting	Suggested value	Description
Server type	Database engine	This value is required.
Server name	The fully qualified server name	For example, yourserver.database.windows.net.
Authentication	SQL Server Authentication	SQL Authentication is the only authentication type that we've configured in this tutorial.
Login	The server admin account	The account that you specified when you created the server.
Password	The password for your server admin account	The password that you specified when you created the server.



3. Click Options in the Connect to server dialog box. In the Connect to database section, enter yourDatabase to connect to this database.
4. Click Connect. The Object Explorer window opens in SSMS.



5. In Object Explorer, expand Databases and then expand yourDatabase to view the objects in the sample database.


Microsoft SQL Server Management Studio
Quick Launch (Ctrl+Q)
File
Edit
View
Debug
Tools
Window
Help
New Query
Object Explorer
Connect
yourserver.database.windows.net (SQL Server 12.0.2000.8 - yourUsername)
Databases
System Databases
yourDatabase
Database Diagrams
Tables
Views
External Resources
Synonyms
Programmability
Query Store
Extended Events
Storage
Security
Ready

Aim: Data Analytics on Microsoft Azure Cloud

Learning Objectives:

In this you will:

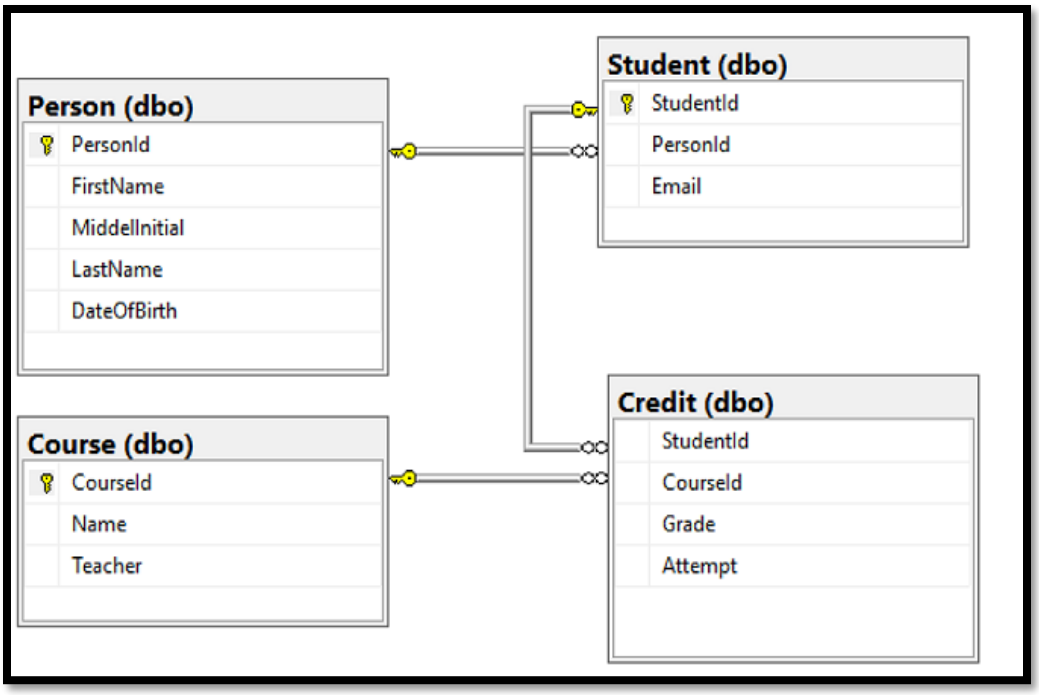
- Create a database schema
- Understand perform Data Analytics on Microsoft Azure Cloud

Create a database schema with four tables that model a student management system for universities using Transact-SQL:

- Person
- Course
- Student
- Credit

The following diagram shows how these tables are related to each other. Some of these tables reference columns in other tables. For example, the Student table references the PersonId column of the Person table. Study the diagram to understand how the tables in this tutorial are related to one another. For an in-depth look at how to create effective database tables, see Create effective database tables. For information about choosing data types, see Data types.

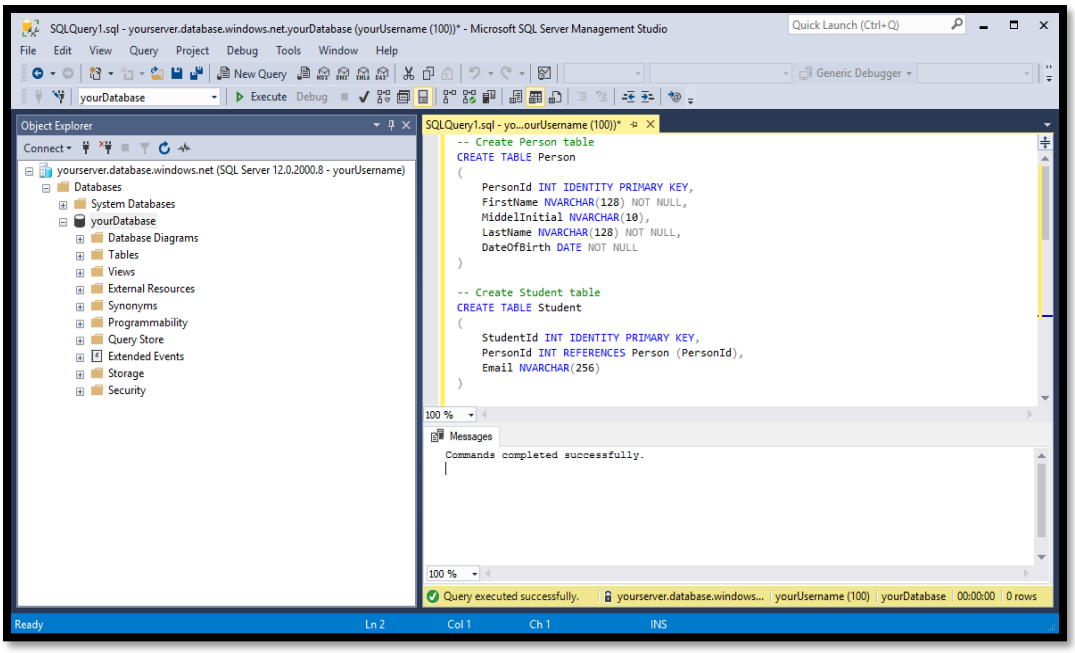
Note: You can use the table designer in SQL Server Management Studio to create and design your tables.



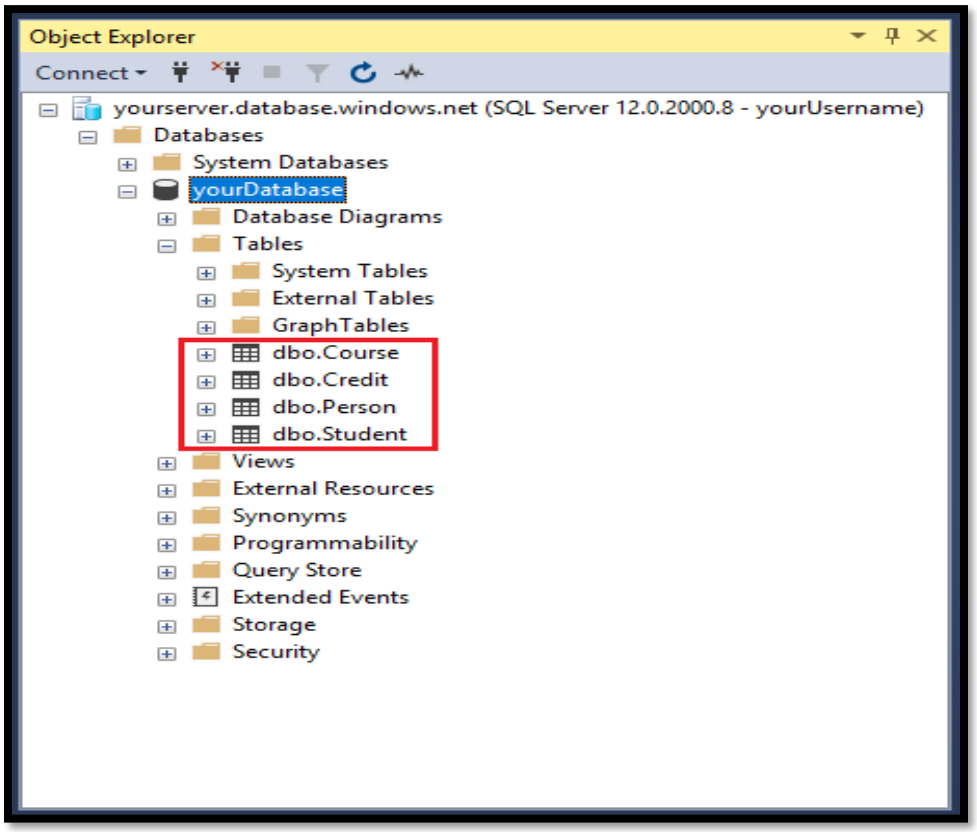
6. In Object Explorer, right-click yourDatabase and select New Query. A blank query window opens that is connected to your database.
7. In the query window, execute the following query to create four tables in your database:

```
SQLCopy

-- Create Person table

CREATETABLE Person

(

PersonIdINTIDENTITY PRIMARY KEY,

   FirstName NVARCHAR(128) NOTNULL,

MiddleInitialNVARCHAR(10),

LastNameNVARCHAR(128) NOTNULL,

DateOfBirthDATENOTNULL

)

-- Create Student table
```

```
CREATETABLE Student
(
StudentIdINTIDENTITY PRIMARY KEY,
PersonIdINTREFERENCES Person (PersonId),
    Email NVARCHAR(256)
)
-- Create Course table
CREATETABLE Course
(
CourseIdINTIDENTITY PRIMARY KEY,
NameNVARCHAR(50) NOTNULL,
    Teacher NVARCHAR(256) NOTNULL
)
-- Create Credit table
CREATETABLE Credit
(
StudentIdINTREFERENCES Student (StudentId),
CourseIdINTREFERENCES Course (CourseId),
    Grade DECIMAL(5,2) CHECK (Grade <= 100.00),
    Attempt TINYINT,
CONSTRAINT [UQ_studentgrades] UNIQUE CLUSTERED
    (
StudentId, CourseId, Grade, Attempt
    )
)
```



8. Expand the Tables node under yourDatabase in the Object Explorer to see the tables you created.



Load data into the tables

9. Create a folder called sampleData in your Downloads folder to store sample data for your database.
10. Right-click the following links and save them into the sampleData folder.
11. SampleCourseData
12. SamplePersonData
13. SampleStudentData
14. SampleCreditData
15. Open a command prompt window and navigate to the sampleData folder.
16. Execute the following commands to insert sample data into the tables replacing the values for server, database, user, and password with the values for your environment.

cmdCopy

```
bcp Course inSampleCourseData -S <server>.database.windows.net -d <database> -U <user> -P <password> -q -c -t ","

bcp Person inSamplePersonData -S <server>.database.windows.net -d <database> -U <user> -P <password> -q -c -t ","

bcp Student inSampleStudentData -S <server>.database.windows.net -d <database> -U <user> -P <password> -q -c -t ","

bcp Credit inSampleCreditData -S <server>.database.windows.net -d <database> -U <user> -P <password> -q -c -t ","
```

You have now loaded sample data into the tables you created earlier.

Query data

Execute the following queries to retrieve information from the database tables. See Write SQL queries to learn more about writing SQL queries. The first query joins all four tables to find the students taught by 'Dominick Pope' who have a grade higher than 75%. The second query joins all four tables and finds the courses in which 'Noe Coleman' has ever enrolled.

17. In a SQL Server Management Studio query window, execute the following query:

SQLCopy

```
-- Find the students taught by Dominick Pope who have a grade higher than 75%

SELECTperson.FirstName, person.LastName, course.Name, credit.Grade


FROM  PersonAS person

INNERJOIN Student AS student ONperson.PersonId = student.PersonId

INNERJOIN Credit AS credit ONstudent.StudentId = credit.StudentId

INNERJOIN Course AS course ONcredit.CourseId = course.courseId

WHEREcourse.Teacher = 'Dominick Pope'

AND Grade > 75
```

18. In a query window, execute the following query:

SQLCopy

```
-- Find all the courses in which Noe Coleman has ever enrolled

SELECTcourse.Name, course.Teacher, credit.Grade

FROM  CourseAS course

INNERJOIN Credit AS credit ONcredit.CourseId = course.CourseId

INNERJOIN Student AS student ONstudent.StudentId = credit.StudentId

INNERJOIN Person AS person ONperson.PersonId = student.PersonId

WHEREperson.FirstName = 'Noe'

ANDperson.LastName = 'Coleman'
```

Practice Questions.

1. How do you create an Azure SQL Database using the Azure Portal?
2. Explain the purpose of server-level and database-level firewall rules in Azure SQL Database.