Activity No. 8.1 - Securing Databases	
Name: Efa, Christian Guevarra, Hans Angelo Mendoza, John Renzo Nicolas, Sean Julian Vinluan, Armando	**Date:** 21/10/2022
Section: CPE21S3	**Instructor:** Dr. Jonathan Vidal Taylar

Objectives:

This activity aims to secure databases using different methodologies.

Intended Learning Outcomes (ILOs):

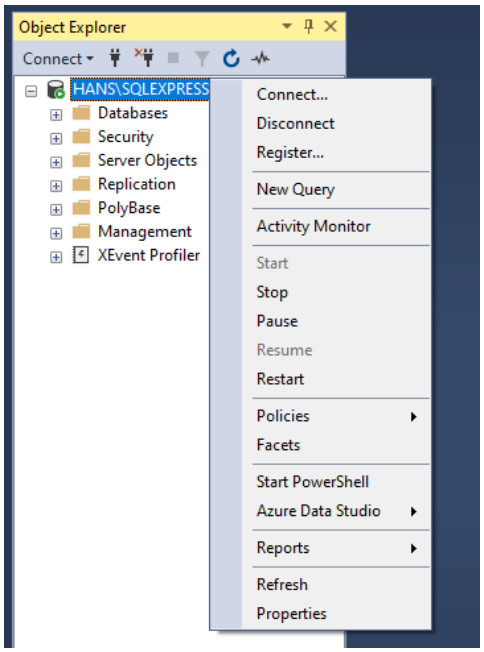
The students should be able to:

1. Configure authentication and authorization of database users.
2. Assign appropriate server and database roles to the users.

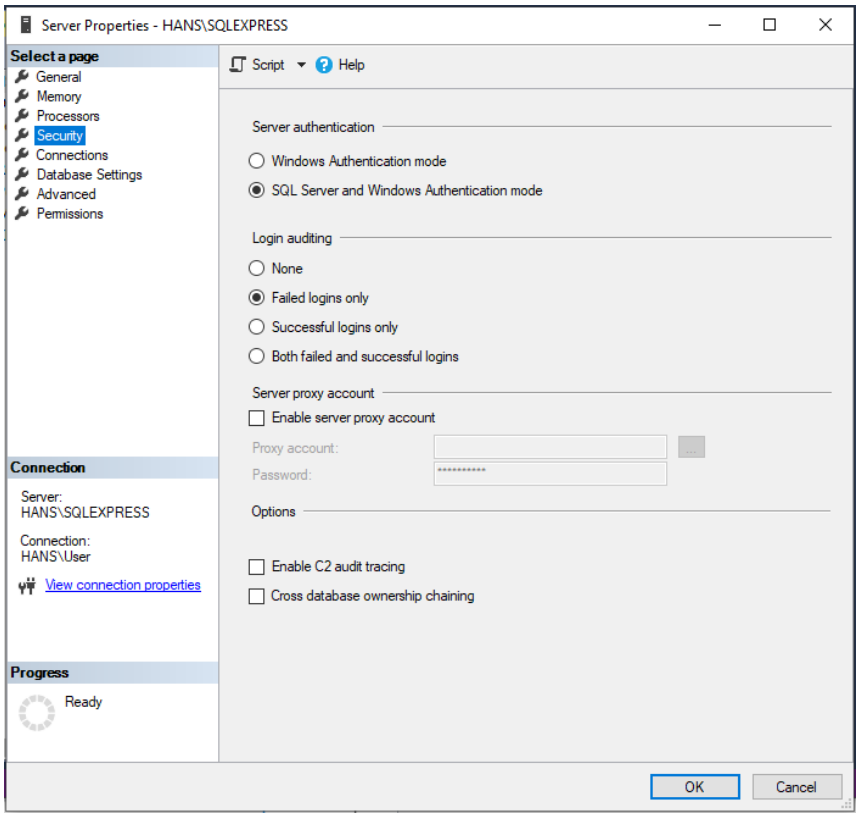
Database Output

To change security authentication mode

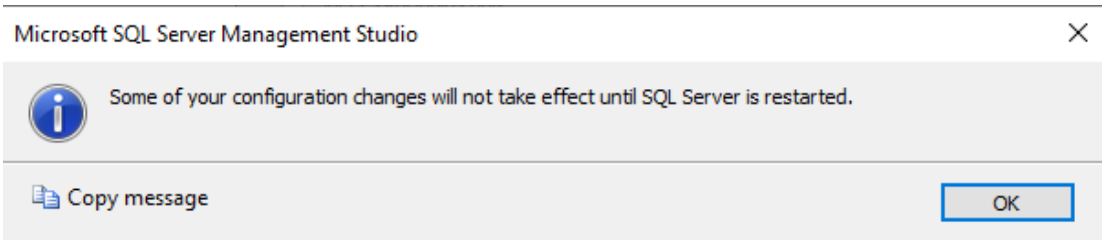
1. In SQL Server Management Studio Object Explorer, right-click the server, and then click Properties.



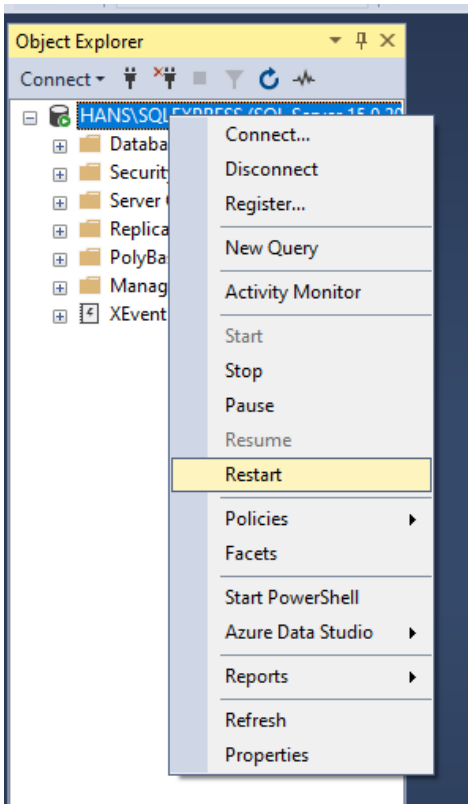
2. On the Security page, under Server authentication, select the new server authentication mode, and then click OK.



3. In the SQL Server Management Studio dialog box, click OK to acknowledge the requirement to restart SQL Server.

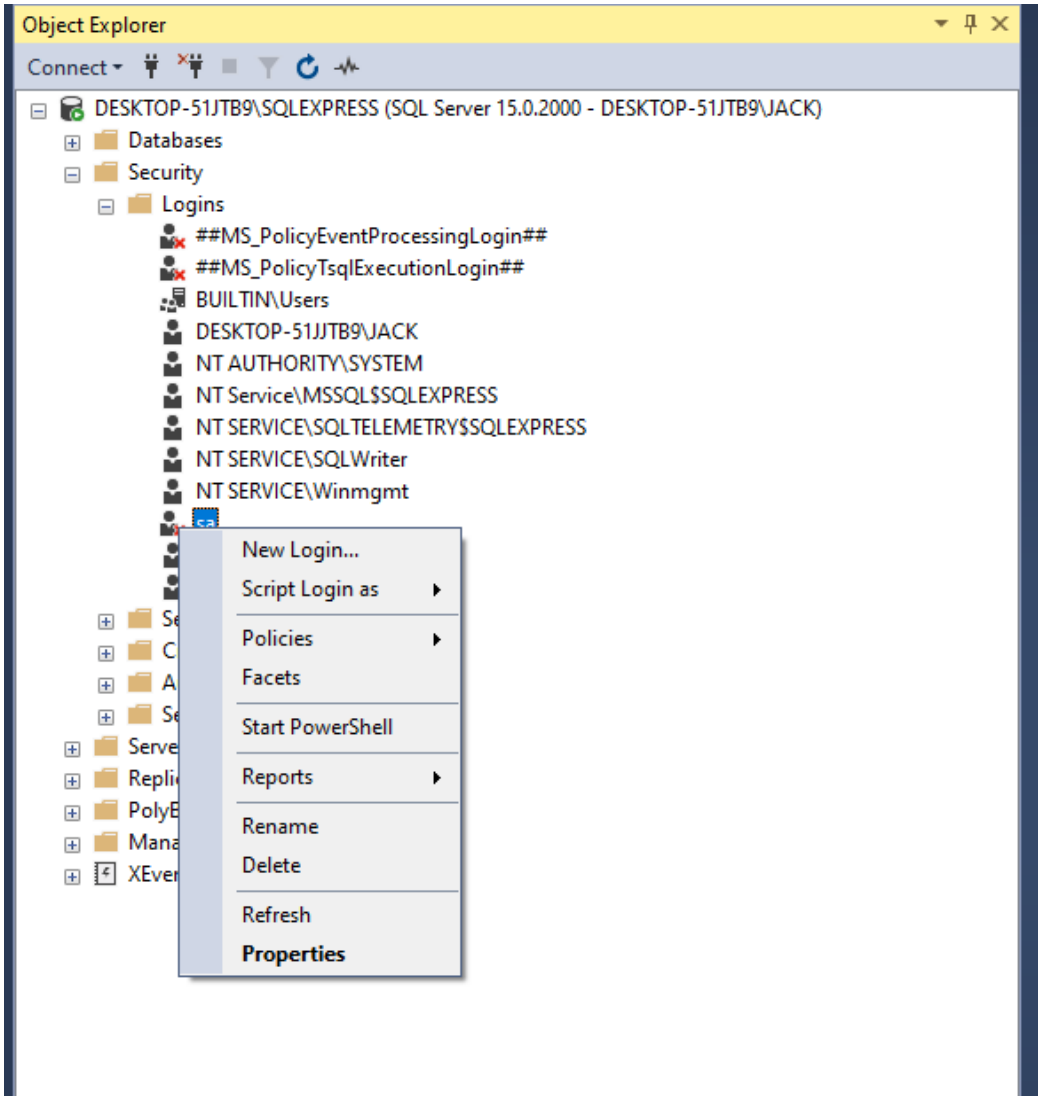


4. In Object Explorer, right-click your server, and then click Restart. If SQL Server Agent is running, it must also be restarted.

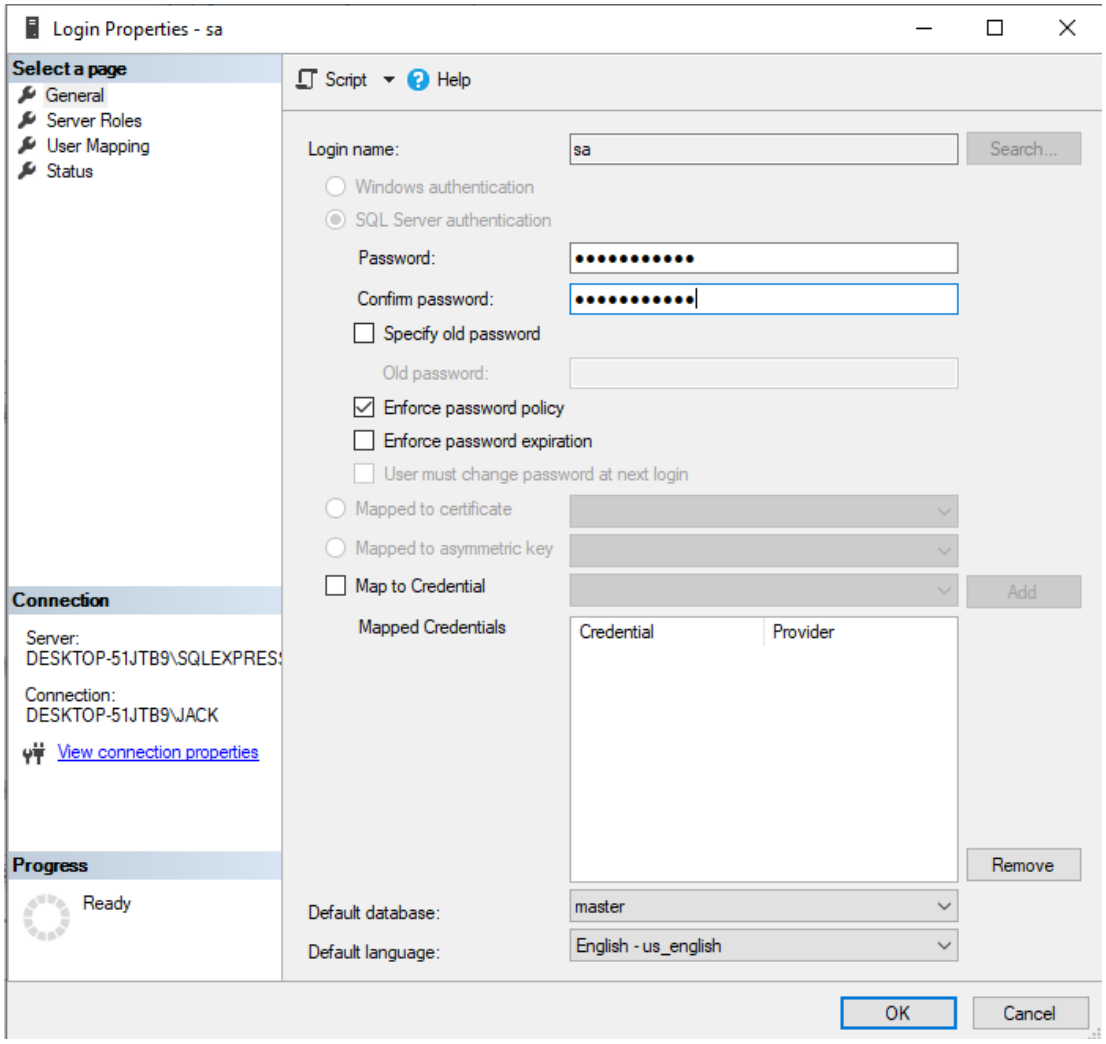


To enable the sa login

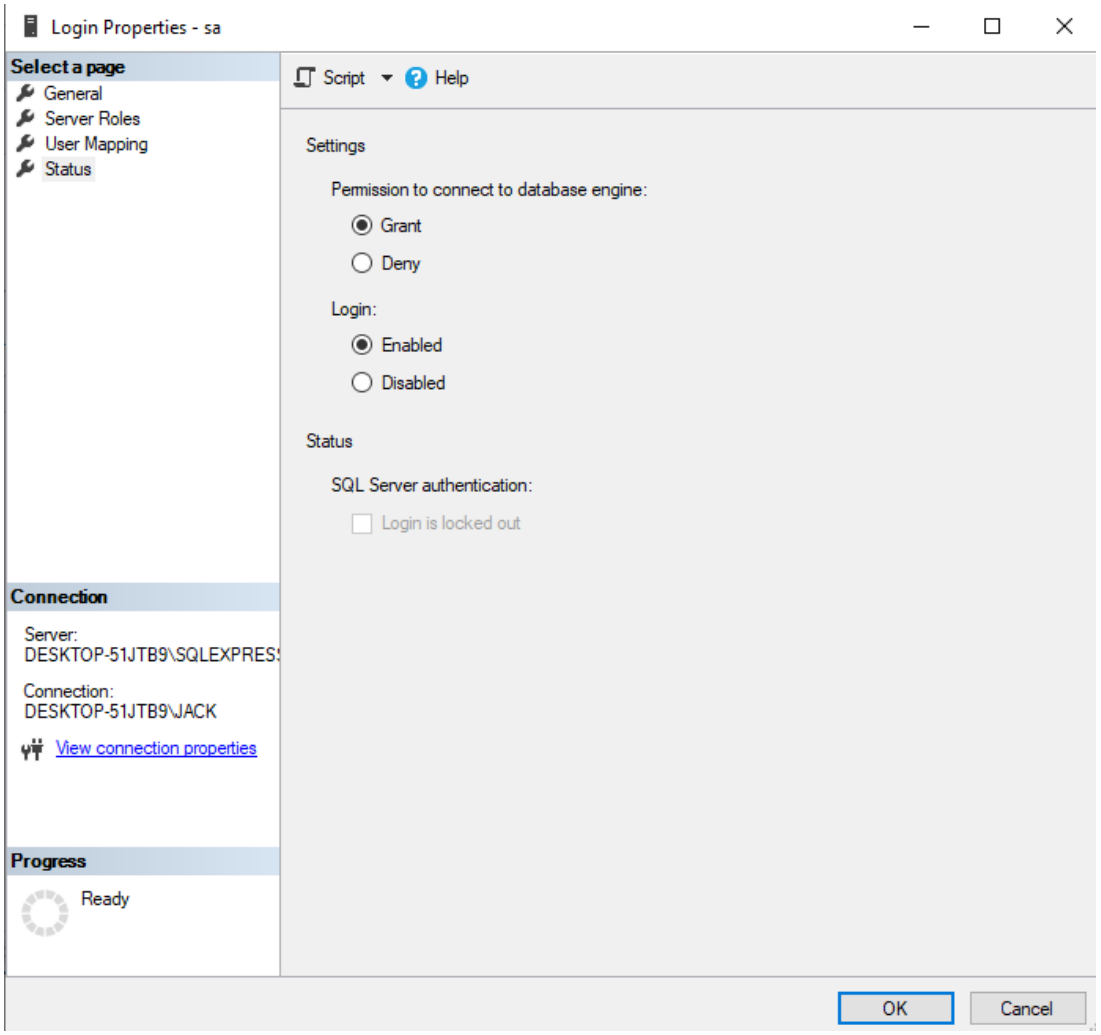
Step 1. In Object Explorer, expand Security, expand Logins, right-click sa, and then click Properties.



Step 2. On the General page, you might have to create and confirm a password for the login.

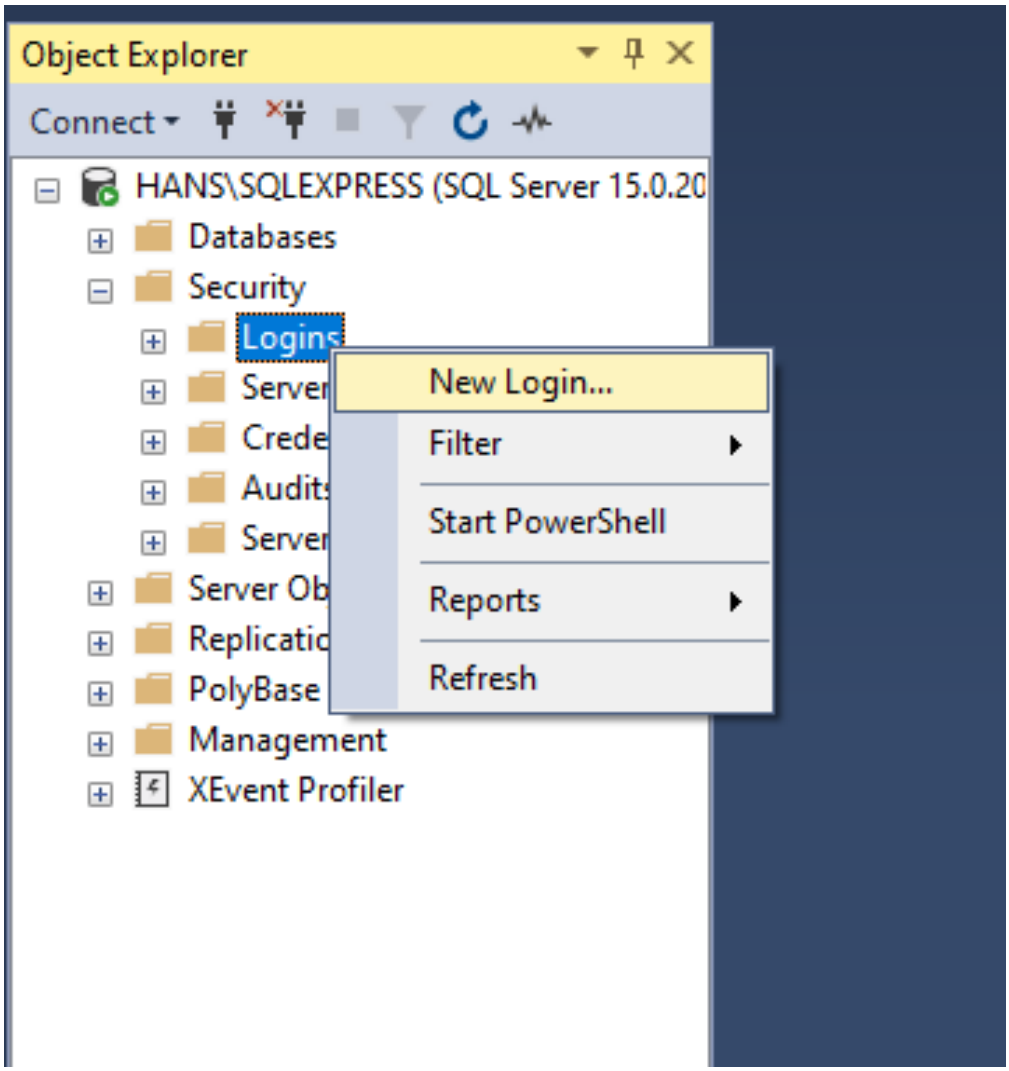


Step 3. On the Status page, in the Login section, click Enabled, and then click OK.



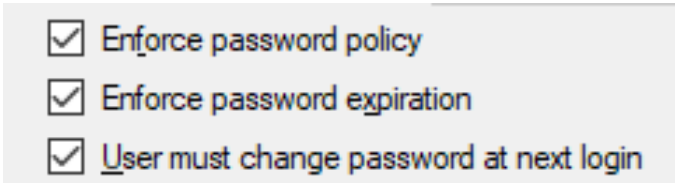
To create a user login

Step 1. Object Explorer, expand Security, expand Logins, right-click and then choose new Login.

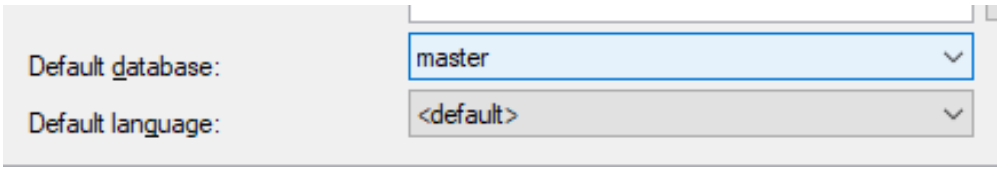


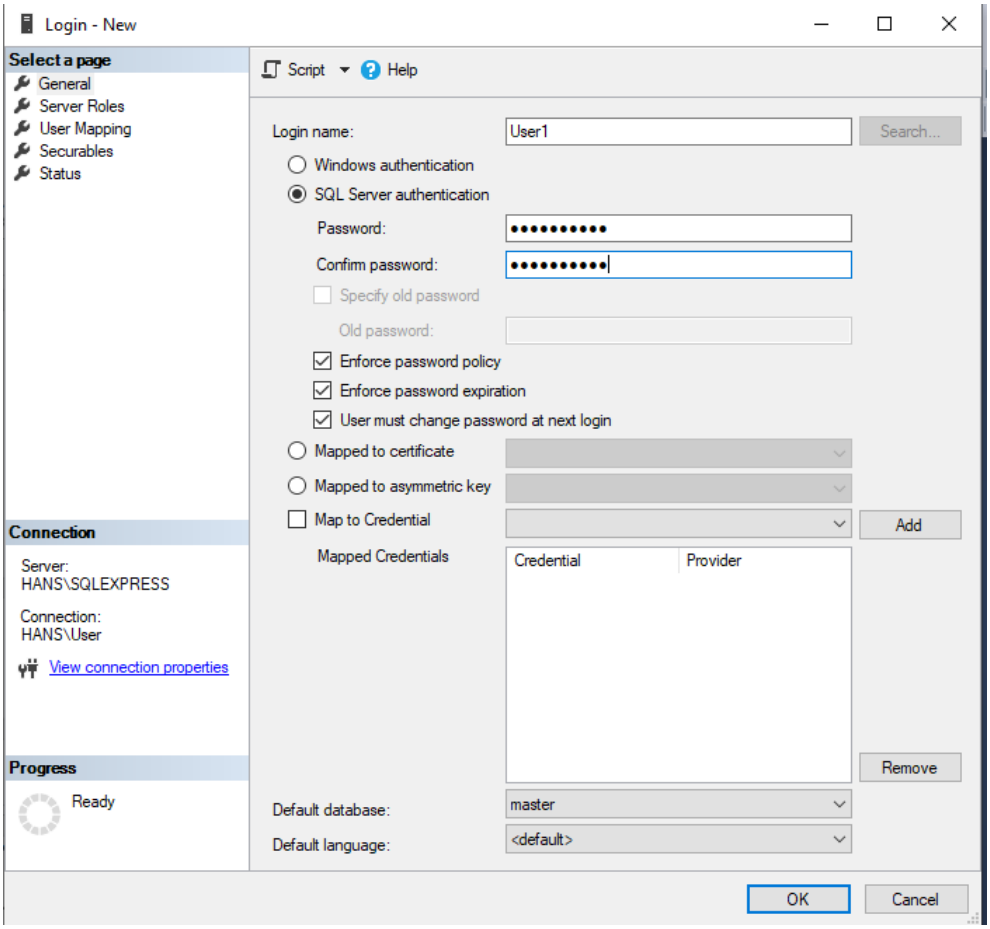
Step 2. On the General page, type the login name and the authentication. Type the password.

Check the three options under SQL server authentication



Choose master as default database.



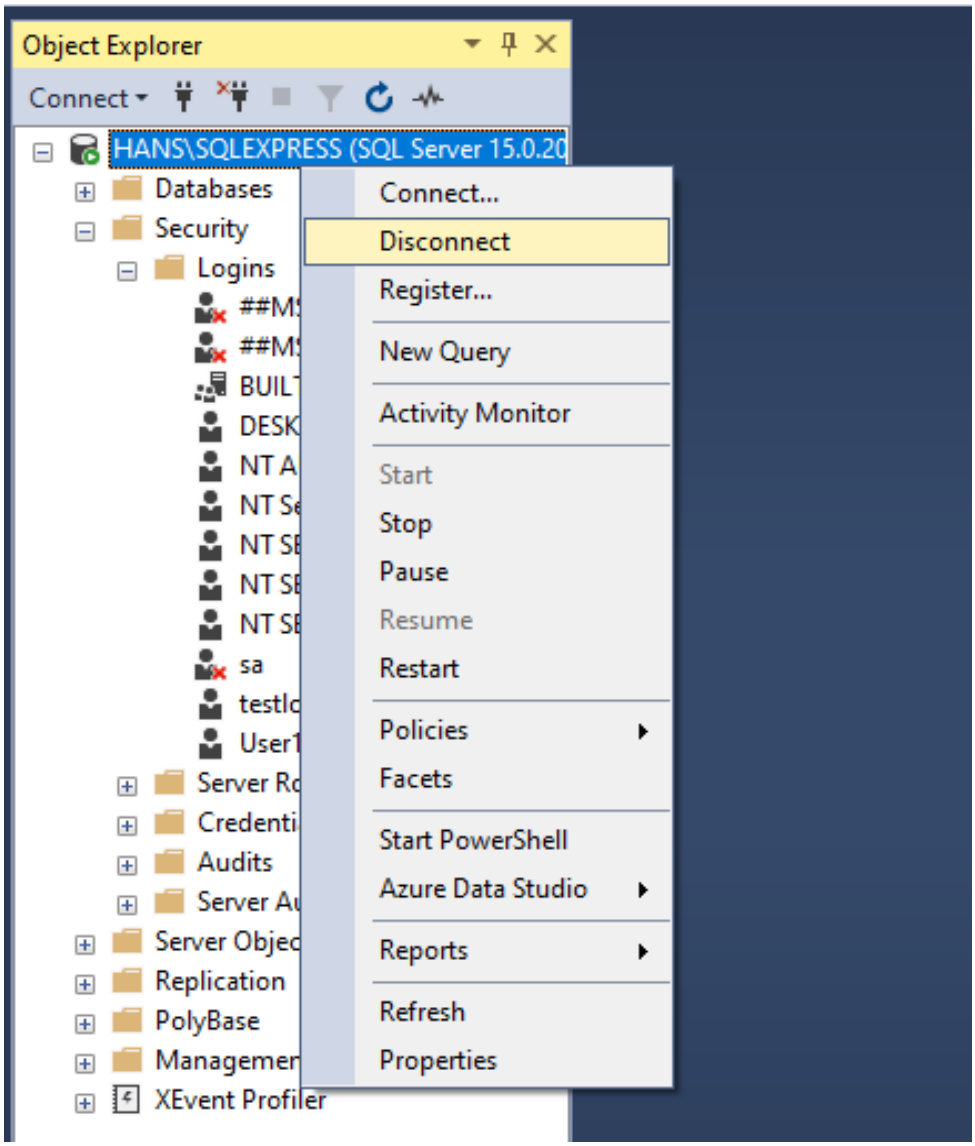


Have you successfully connected to the database engine? (Yes / No). If No, Explain the procedures to troubleshoot

Observation:

We successfully connected to the database engine. Since the current login has access with security settings, thus, able to create new logins.

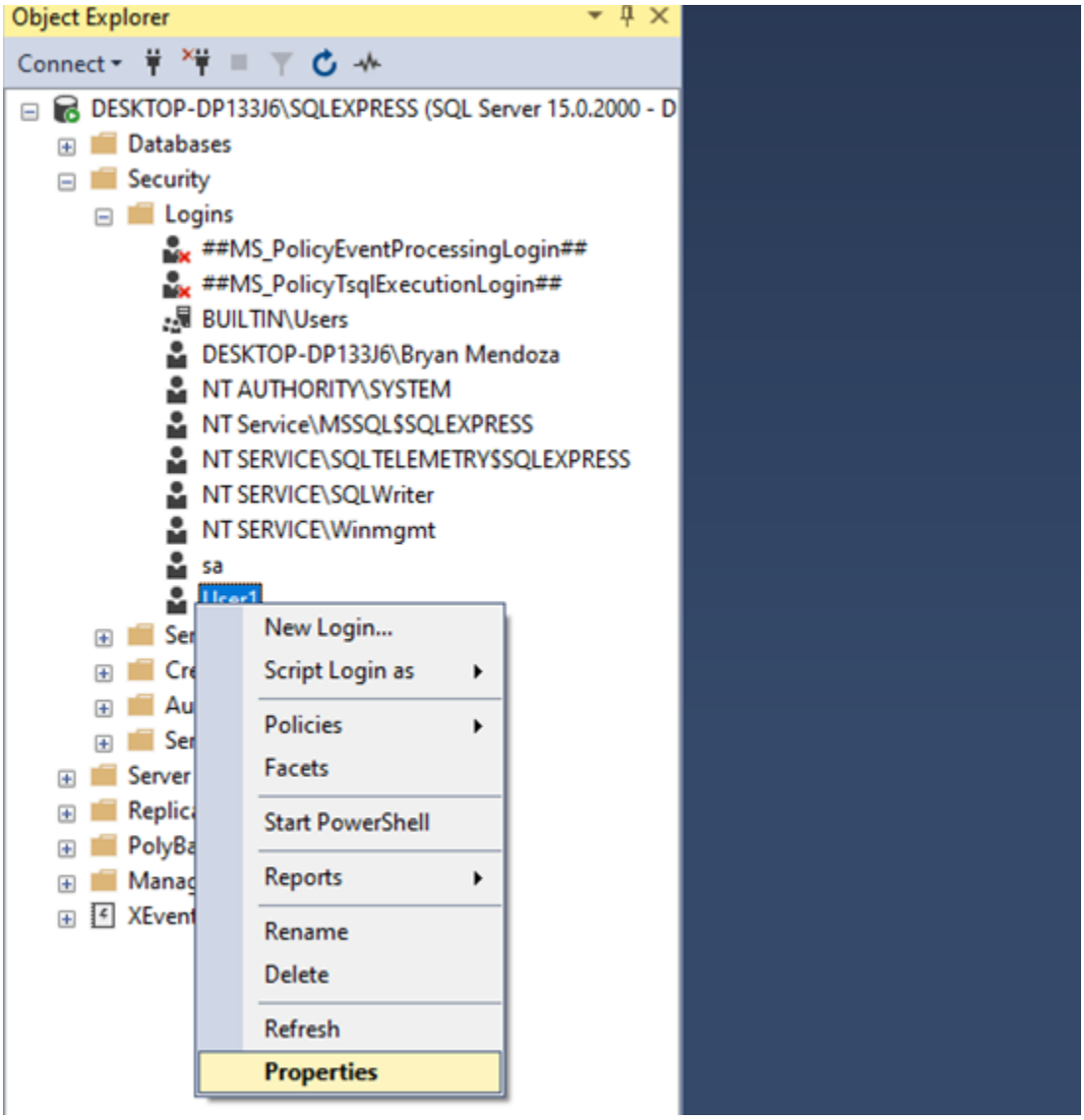
Step 3. Disconnect and reconnect the SQL server database engine to test the User1 user login.



Observation: Upon Disconnecting, we tried to login to the server using the created user “User1”. The login was successful.

To change the server role of a user

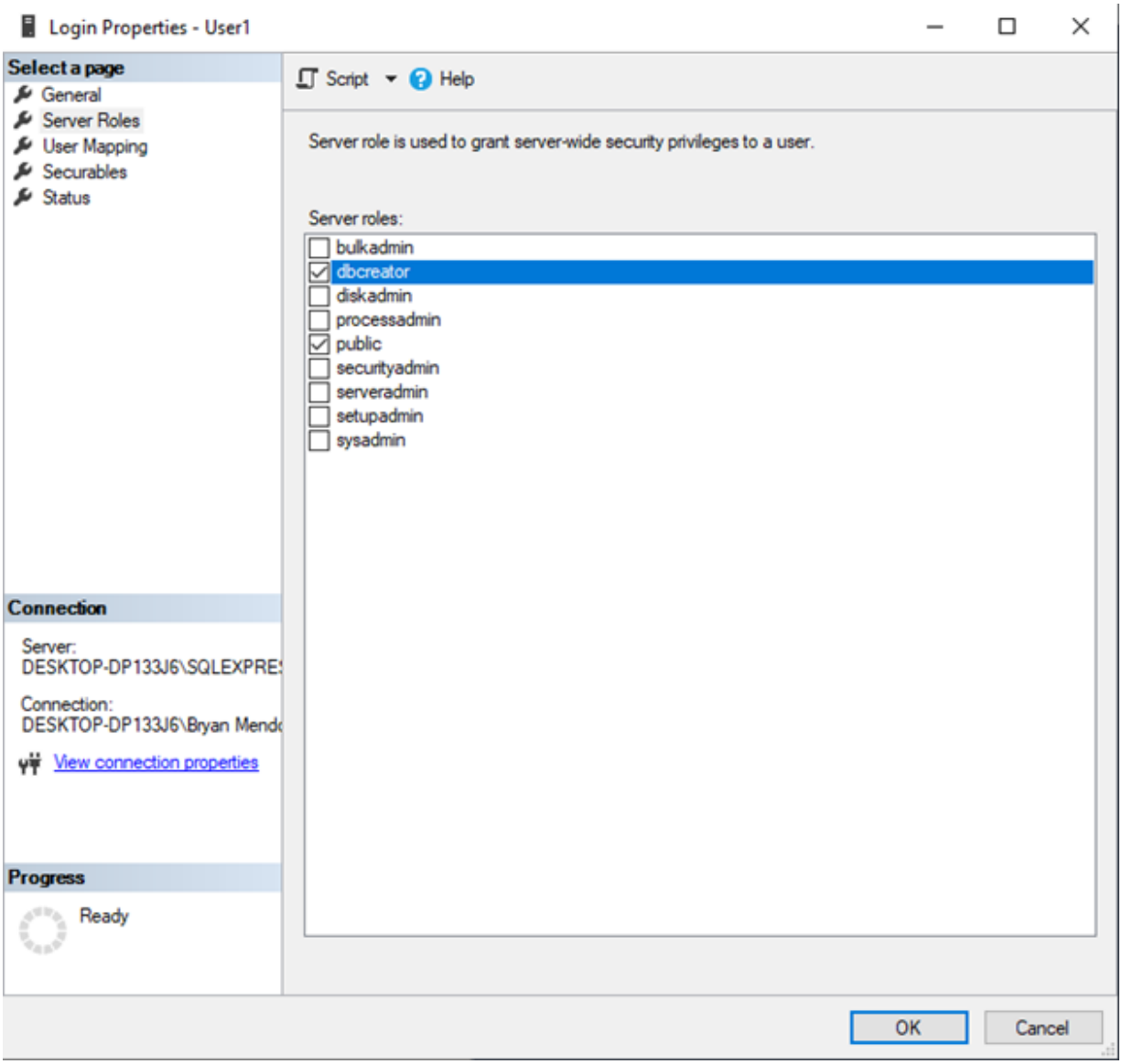
Step 1. In Object Explorer, expand Security, expand Logins, right-click a desired user, and then click Properties.



Observation: We choose the login or the user we created wherein we will be changing its server roles.

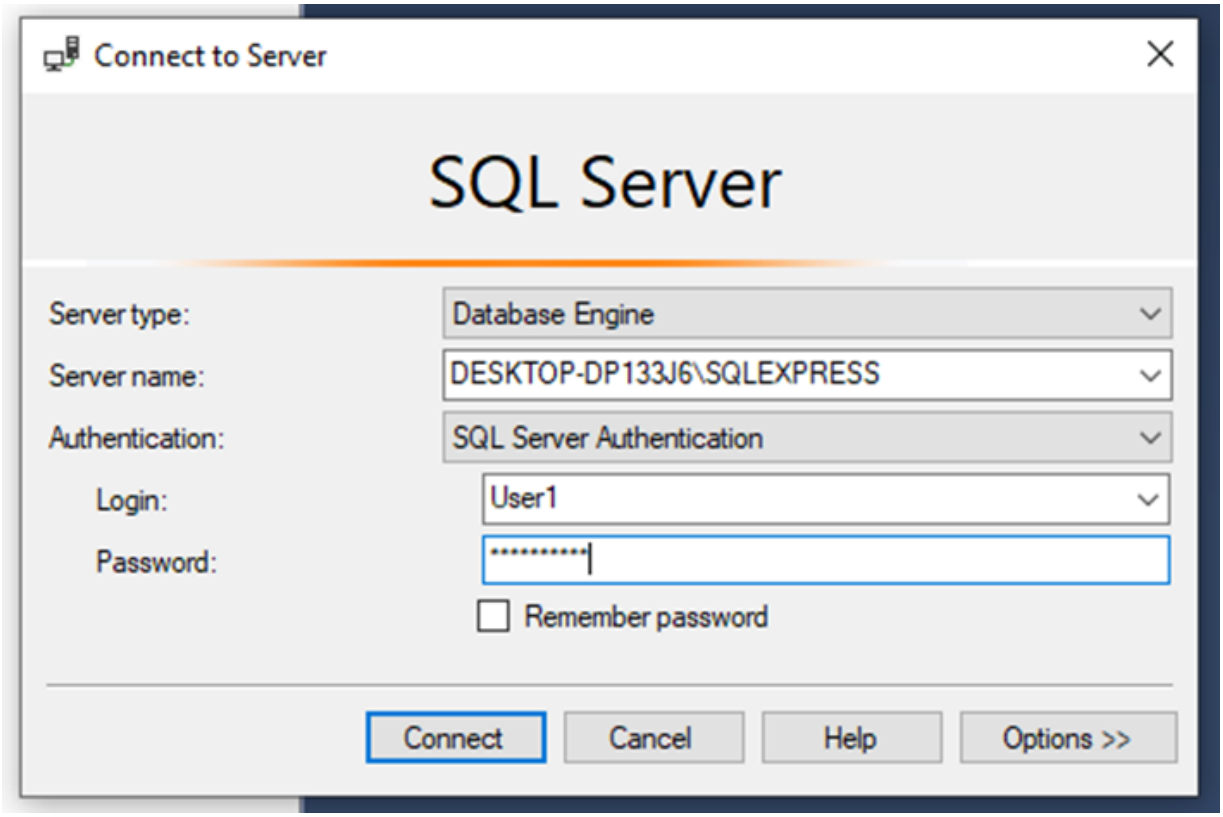
Step 2. On the Server Roles page, check the appropriate server role according to the permission allowed to the user and then click OK.

- Use dbcreator for this activity



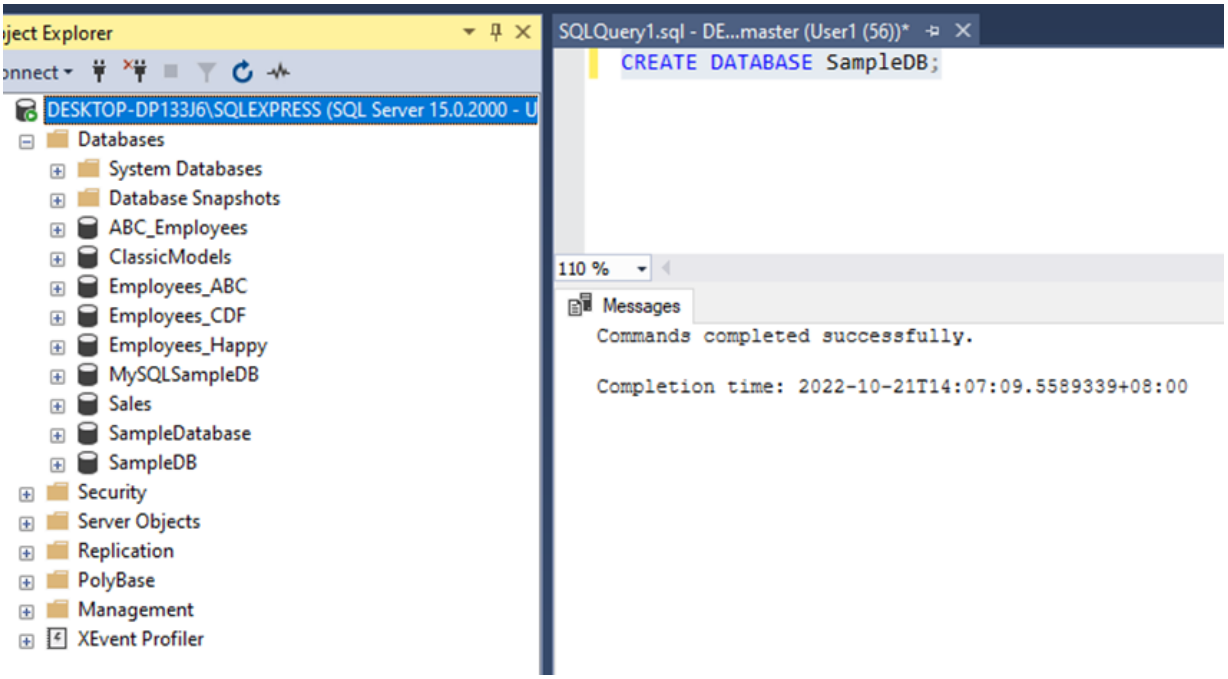
Observation: On the server roles of the selected user or login, we tick the box dbcreator. This server role will enable the user or login to manage databases.

Step 3. Disconnect and reconnect to the SQL server. Choose the user account you previously changed as login. Type the password and then click Connect.



Observation: Disconnecting and Connecting using the newly created User “User1” with the server role dbcreator.

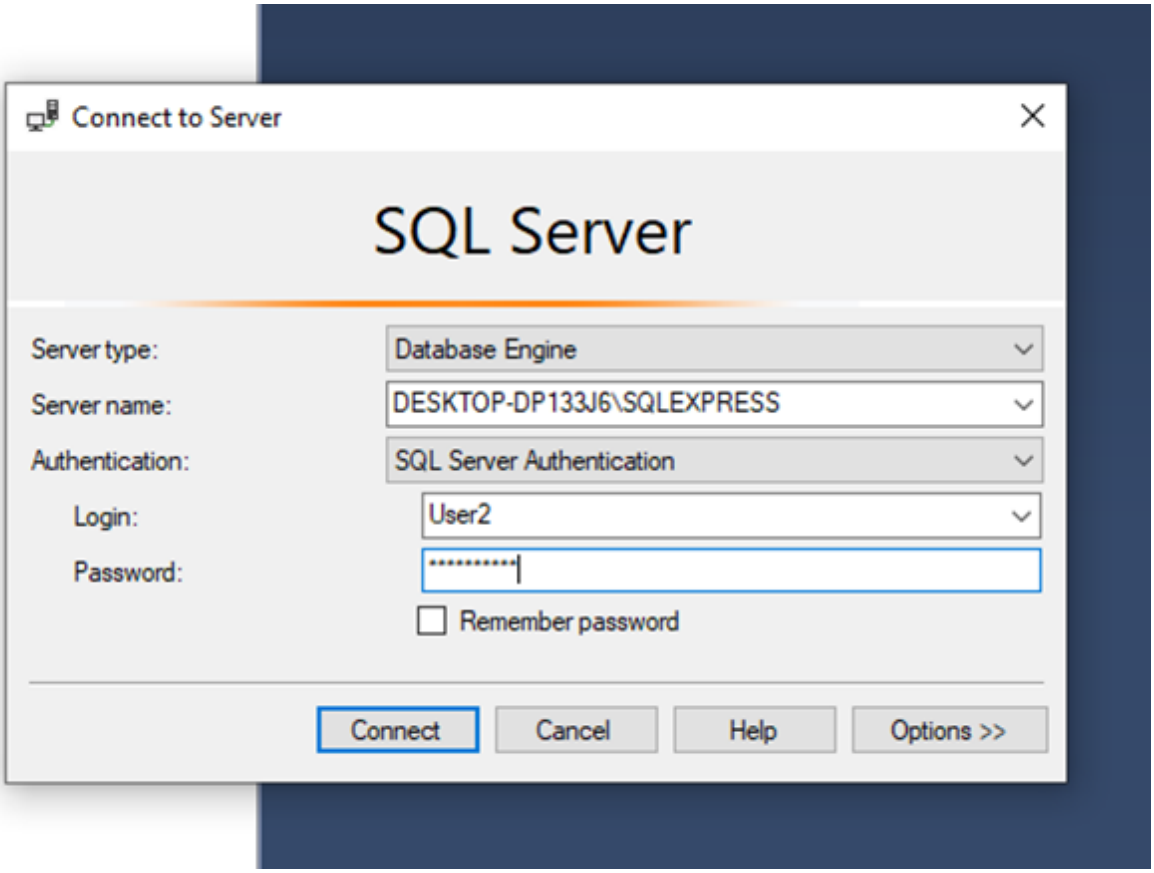
Step 4. Create a new database SampleDB



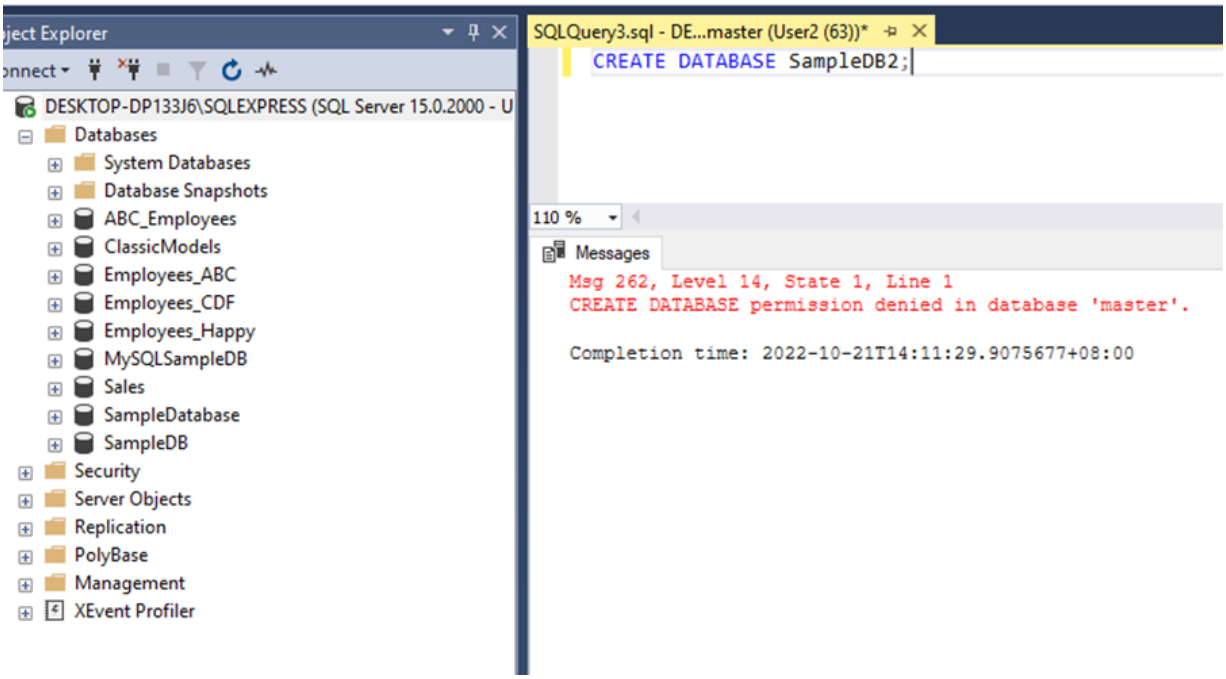
Have you successfully created a database? (Yes / No). **Yes**
If yes, explain why.

Observation: We are able to create the database using this login because we assigned a server role dbcreator to this user or login.

Step 5. Create a new user login.



Observation: Using the main user of the SQL Server, we created another user “User2” which has the same properties as “User1”, except that this user “User2” does not have a server role dbcreator.

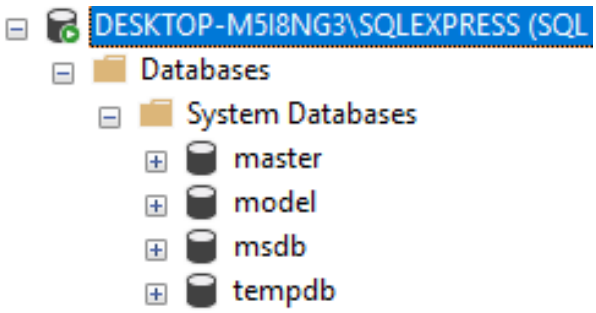


Have you successfully created a user login? (Yes / No). **No**
If No, explain why.

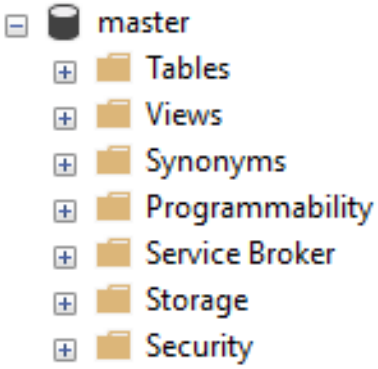
Observation: We are unable to create a database using this login since we only created this login or user but not assigned with a role. Therefore, this login lacks roles in order to create a database.

To create a database user

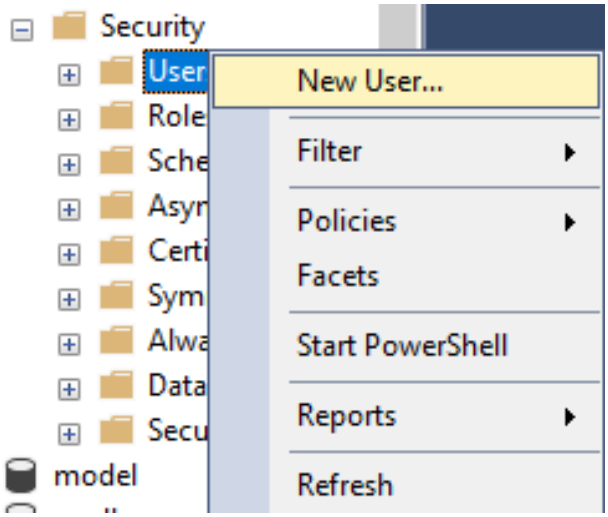
Step 1. In Object Explorer, expand the Databases folder.



Step 2. Expand the database in which to create the new database user.

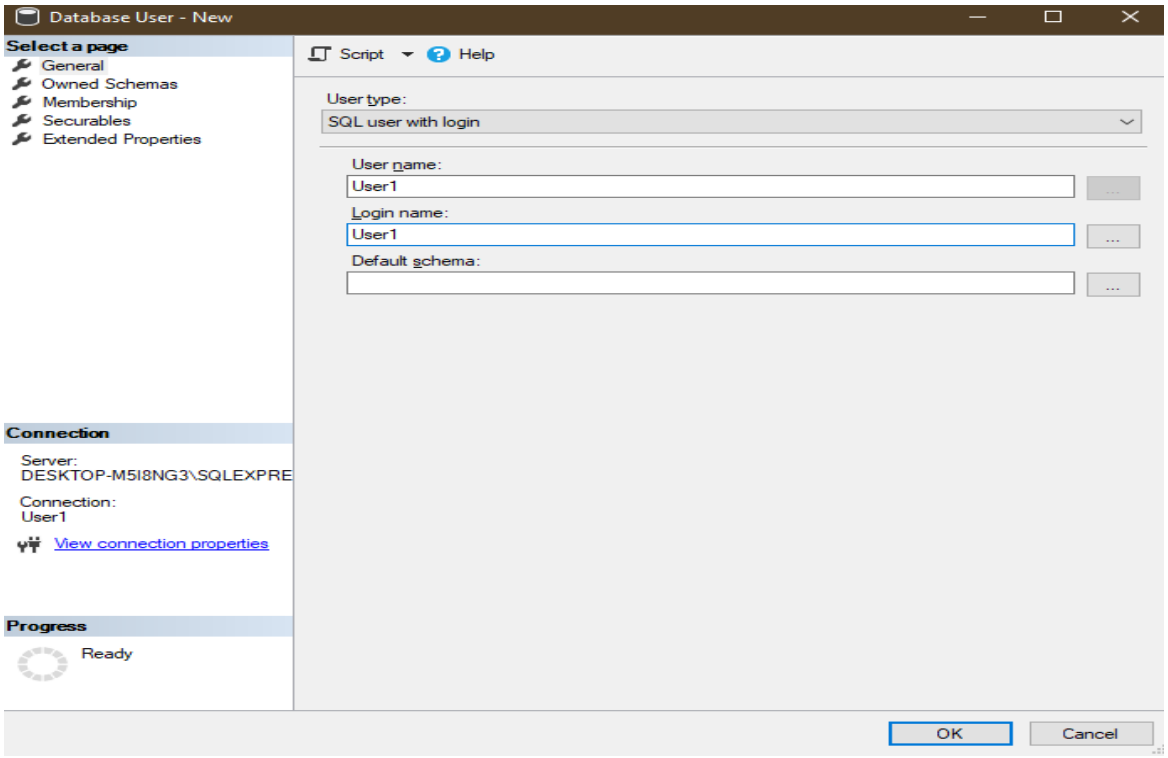


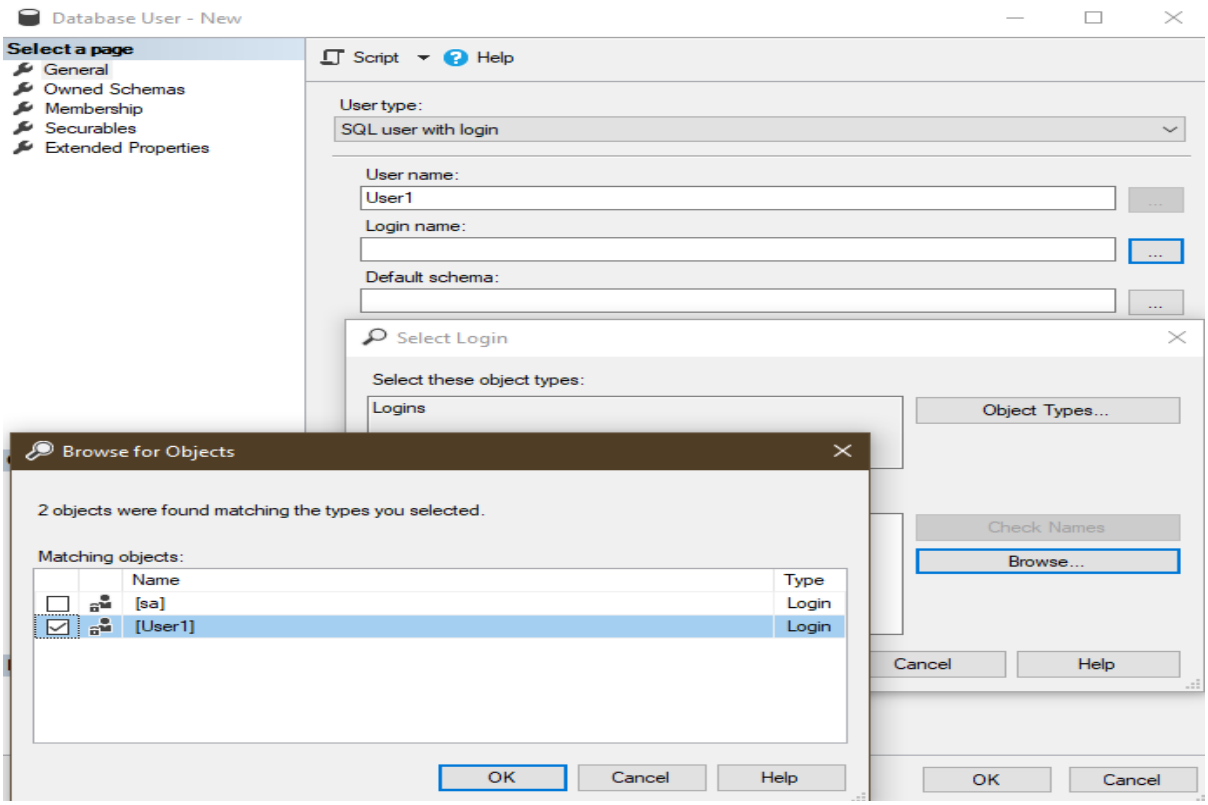
Step 3. Right-click the Security folder, point to New and Select User



Step 4. On the General page of the Database User- New window, choose one of the user type options from the User type list.
For this activity, use the following options:

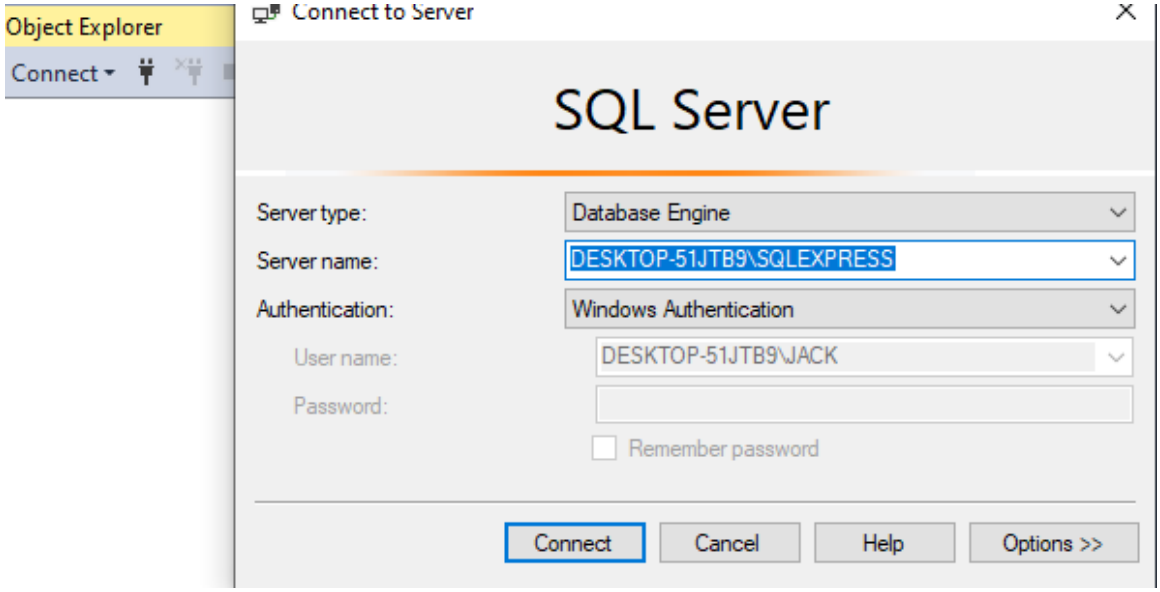
- User type: SQL Server with login
- User name: User1
- Login name: User1




Database User - New
Select a page
General
Owned Schemas
Membership
Securables
Extended Properties
Script
Help
User type:
SQL user with login
User name:
User1
Login name:
Default schema:
Select Login
Select these object types:
Logins
Object Types...
Check Names
Browse...
Cancel
Help
OK
Cancel
Browse for Objects
2 objects were found matching the types you selected.
Matching objects:
Name
Type
[sa]
Login
[User1]
Login
OK
Cancel
Help

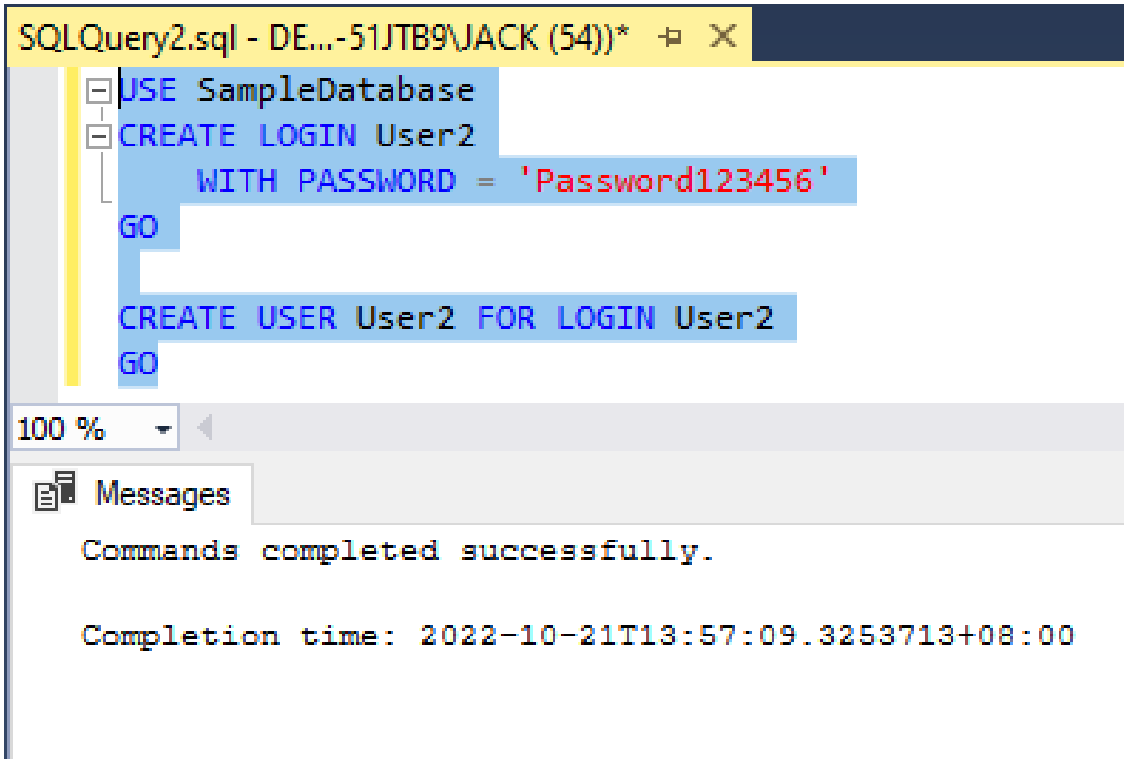
To create a user using T-SQL

Step 1. In the Object Explorer, connect to an instance of Database Engine.



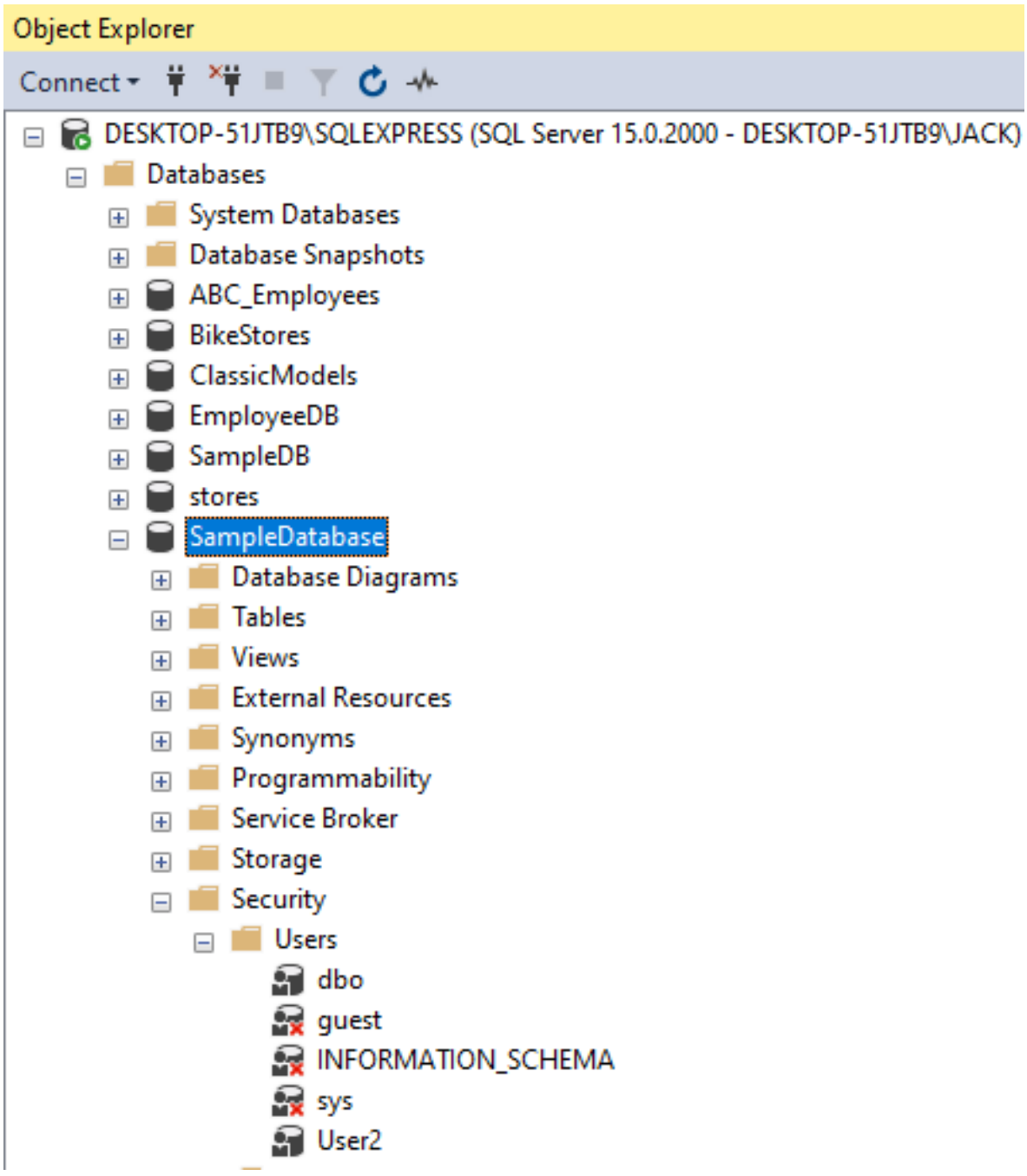
Step 2. On the Standard bar, click New Query.

Step 3. Copy and paste the following example into the query window and click execute.



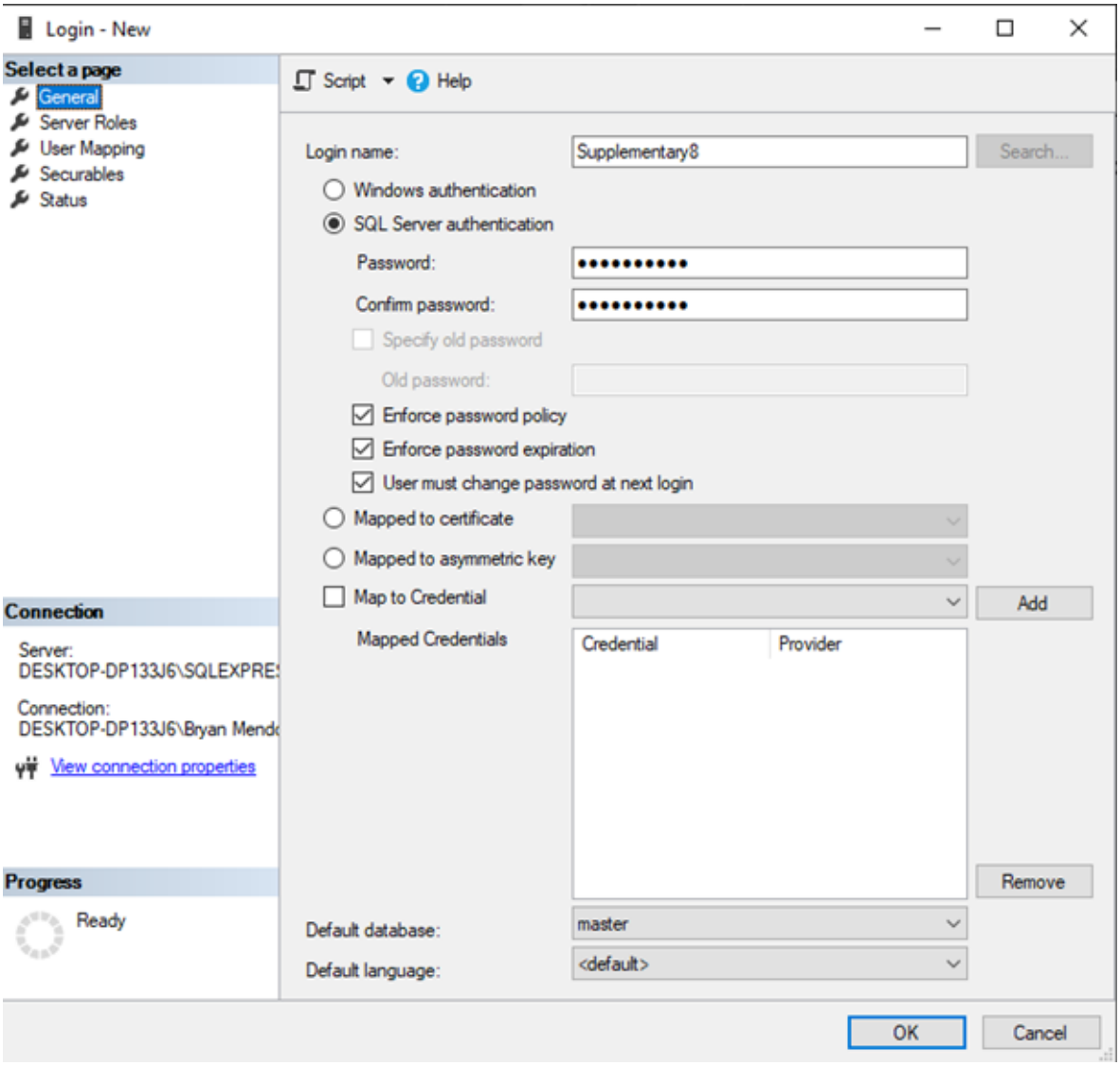
Observations: Using the syntax given in the procedure, we were able to create a user login via a query window.

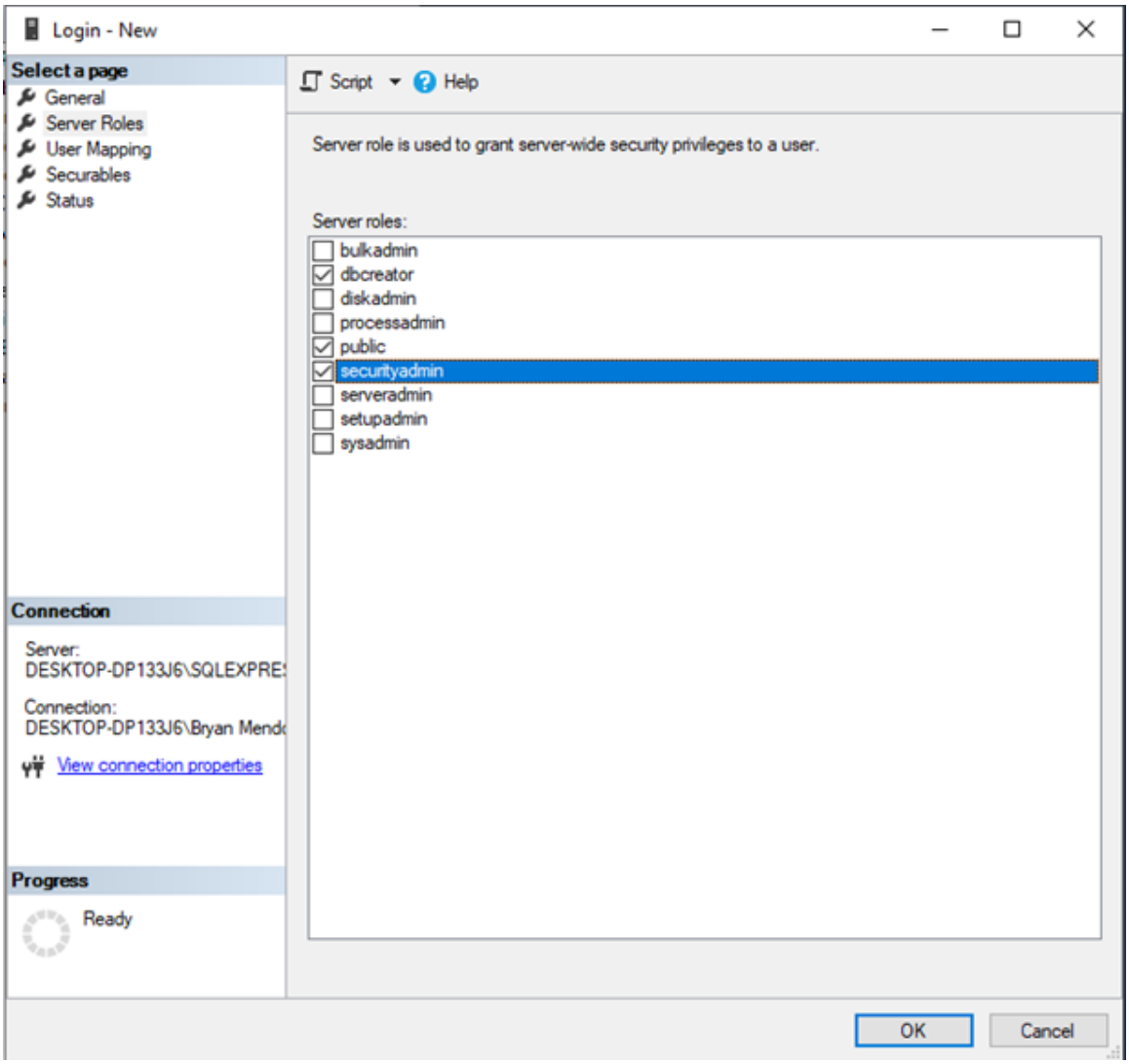
Step 4. Verify the database user and login. In Object Explorer, expand SampleDatabase. Choose Security and expand Users. Check if User2 exists.



Supplementary Activity

1. Create a desired SQL user with login. Make sure that the user login can create another database user and login.
   - Choose a strong password



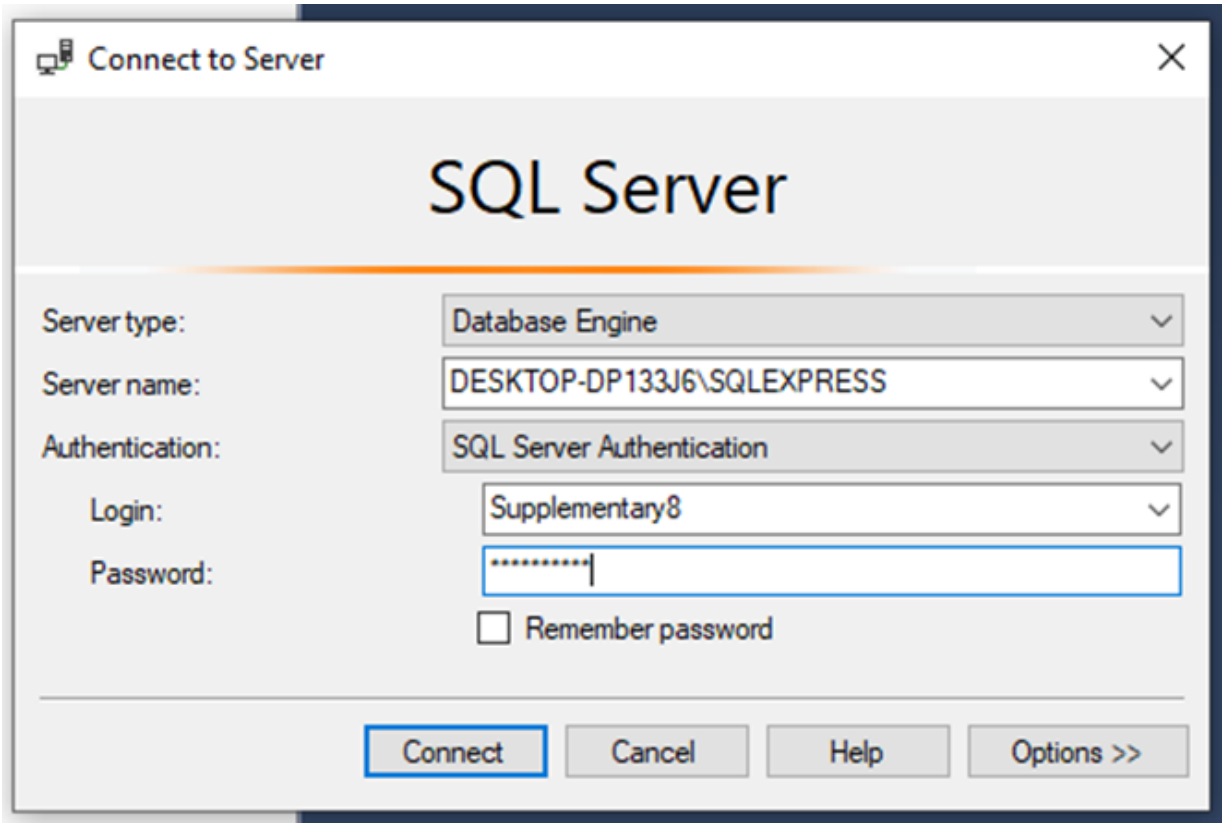


Details:

Login Name used: Supplementary8
Password used: u5erSupp13
Server Roles: dbcreator
Securityadmin

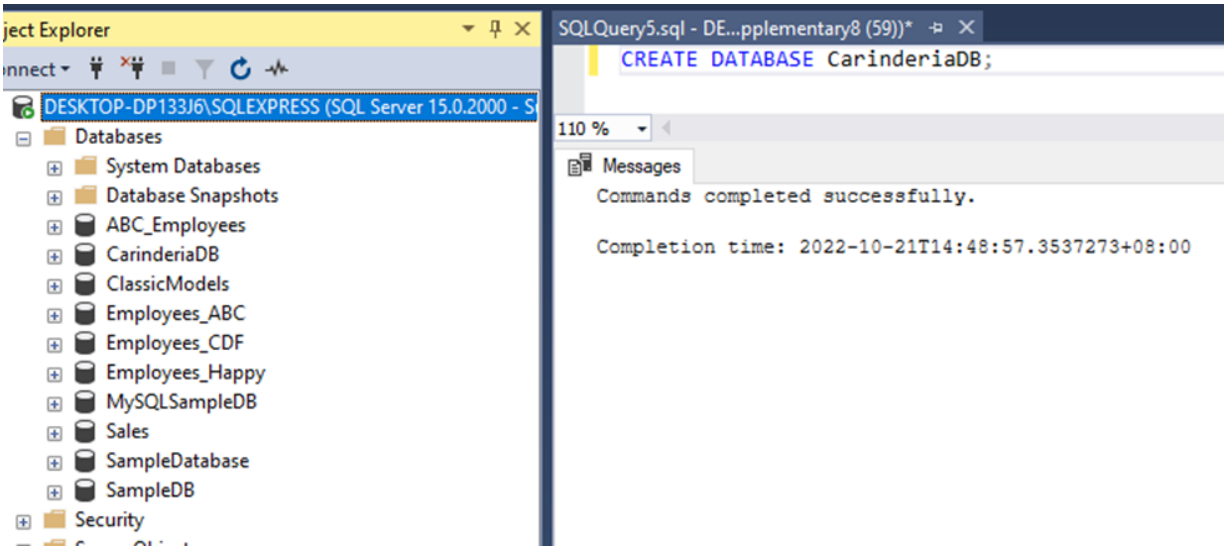
Observation: We created a new user login named “Supplementary8” having a password “u5erSupp13”. The login has been given a role of “dbcreator” and “securityadmin” in order for the login or the user to have access with creating, and managing databases as well as making changes with the logins.

2. Connect to the database engine using the created user login.



Observation: Disconnected with the previous login, and reconnected using the created user “Supplementary8”.

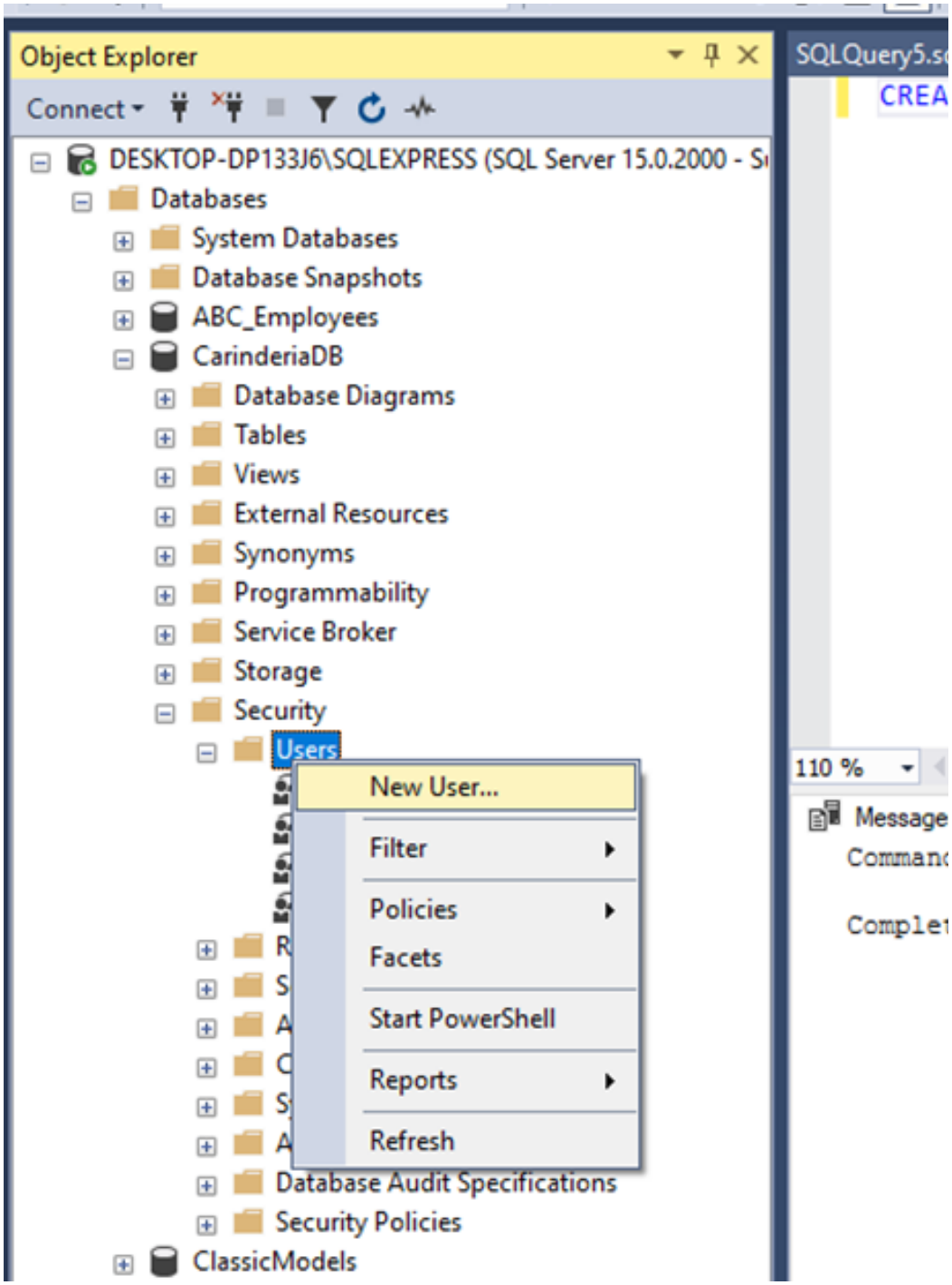
3. Create a database CarinderiaDB.

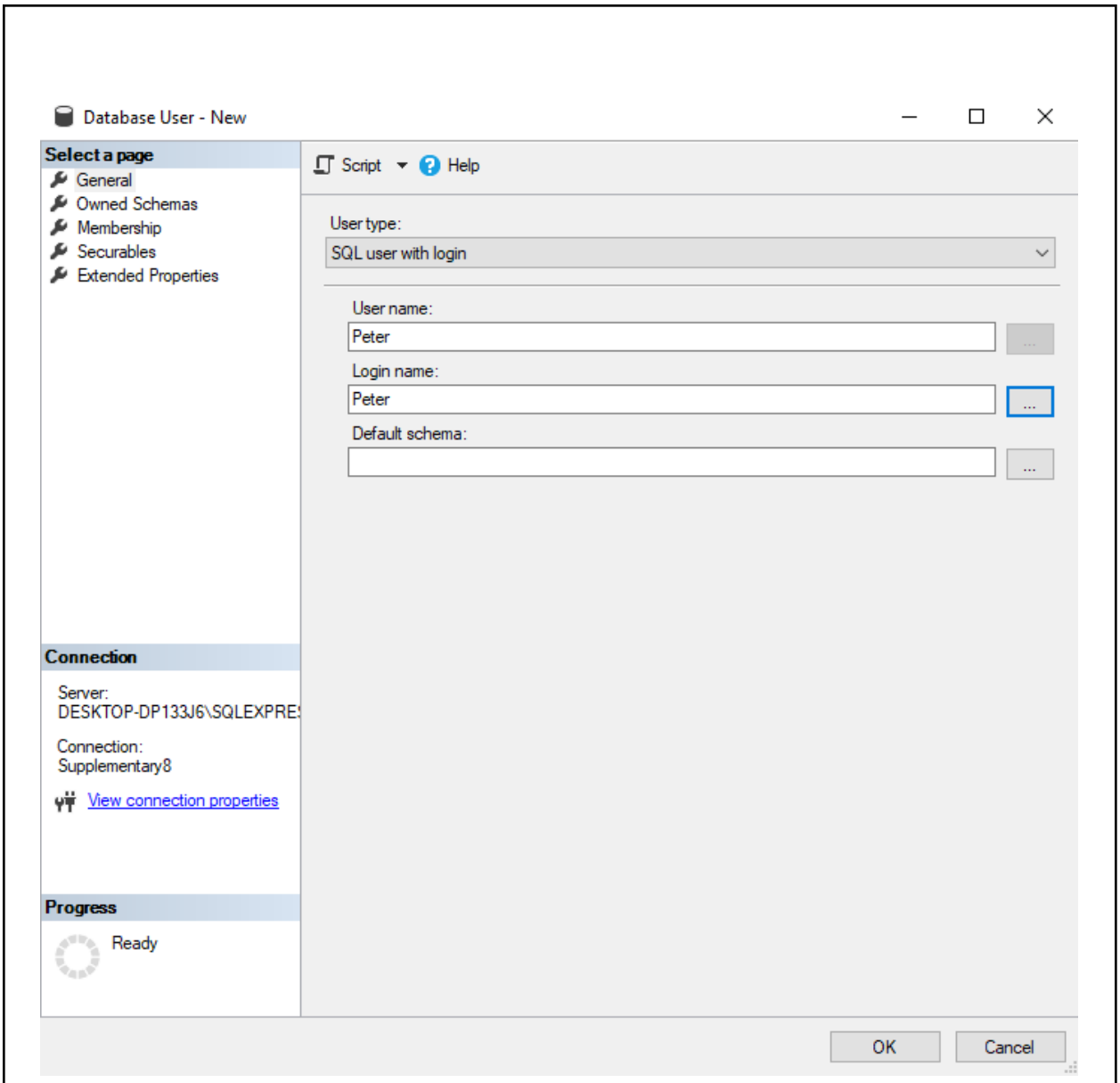


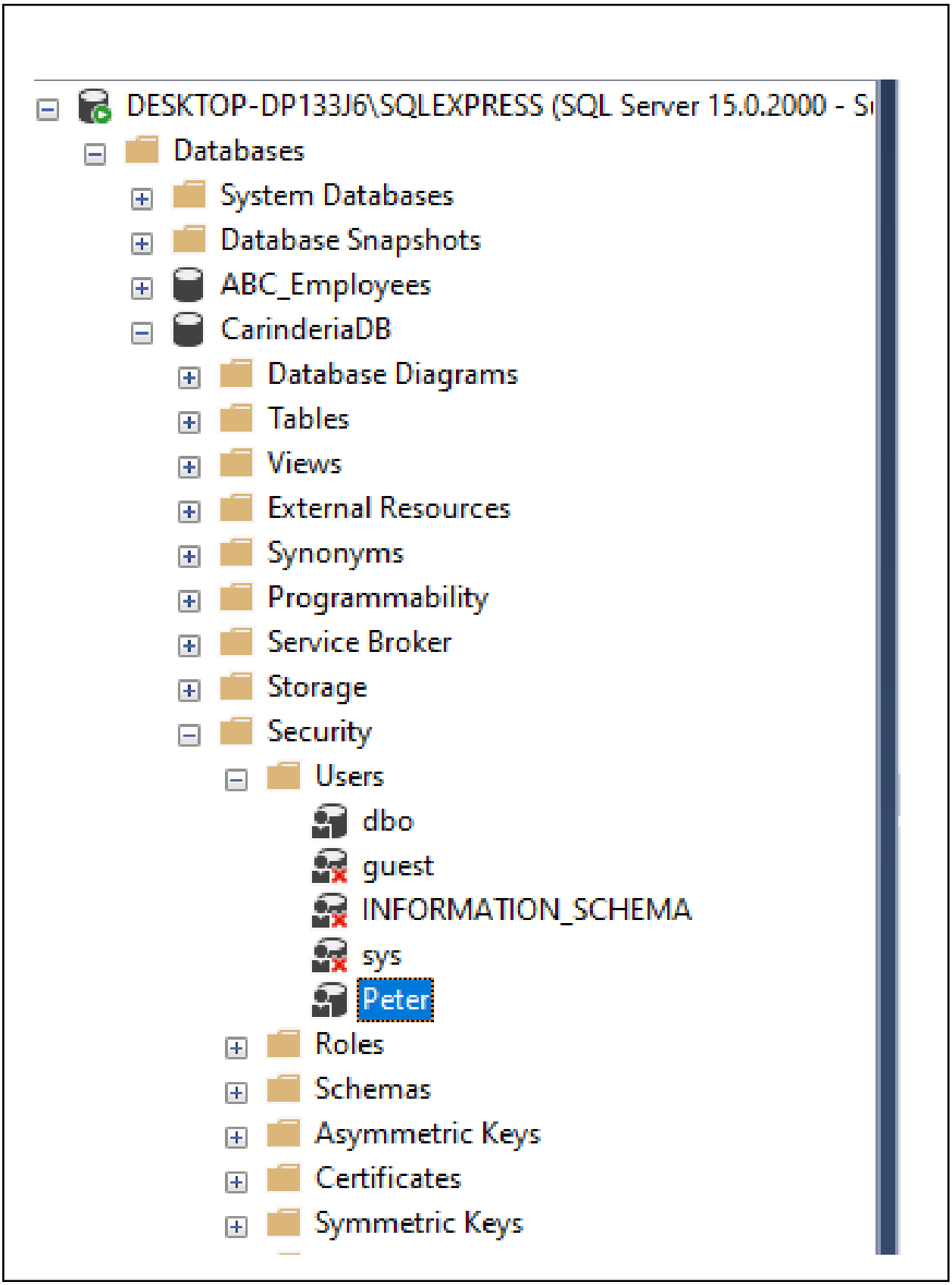
Observation: Using a new query under the new login, we created a new database “CarinderiaDB”. This creation of the database proves that the new login “Supplementary8” has access to modifying, managing, creating and deleting Databases.

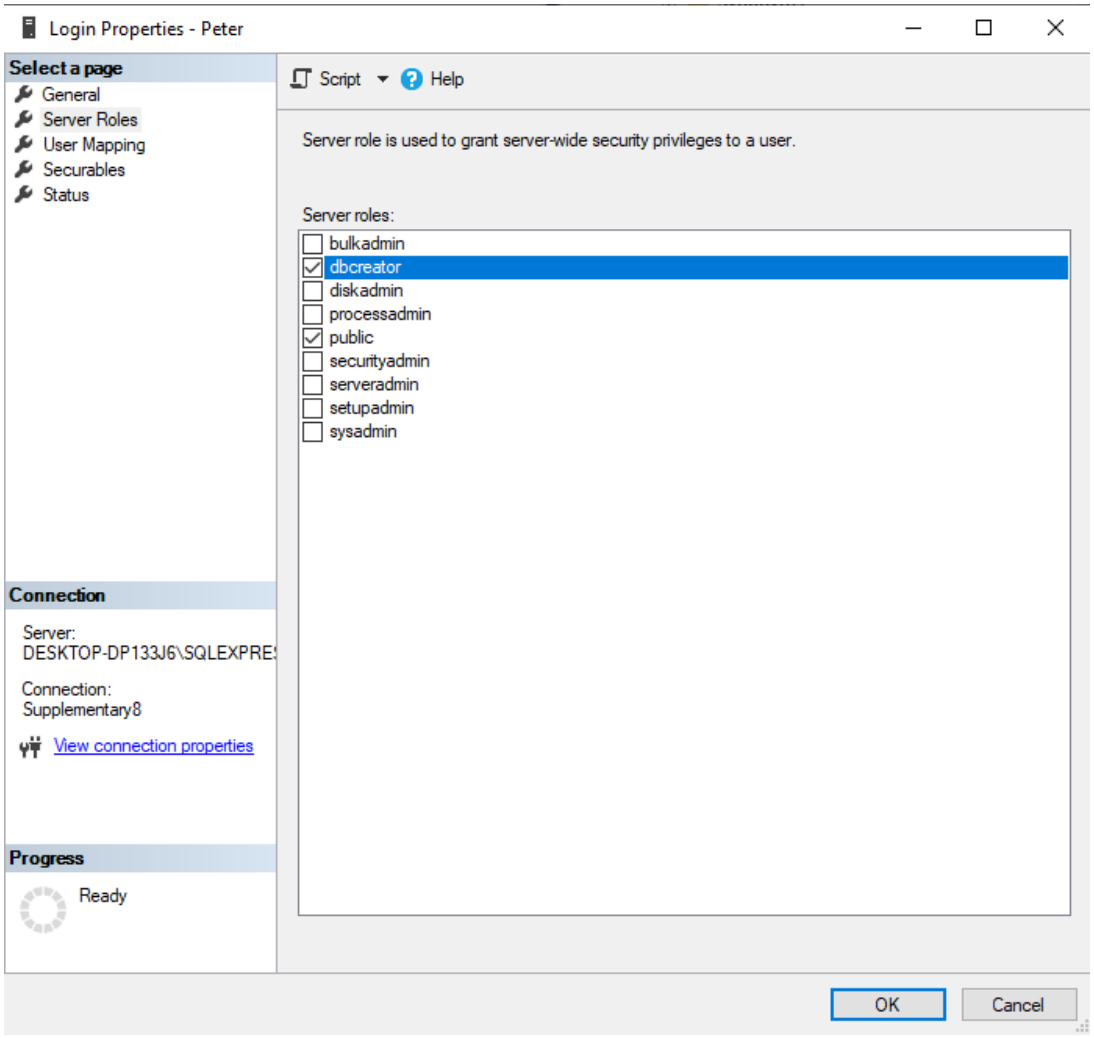
After refreshing the Server (without disconnecting), the created database appeared on the object explorer tab of the Microsoft SQL Server.

4. Create a user peter that can only create, modify and delete databases.



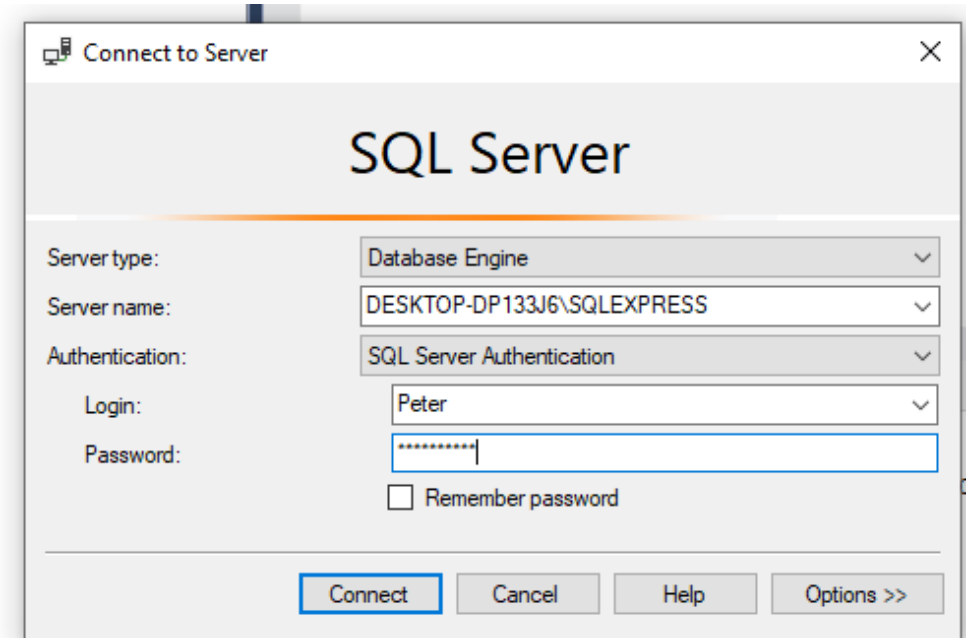

Database User - New
Select a page
General
Owned Schemas
Membership
Securables
Extended Properties
Script
Help
User type:
SQL user with login
User name:
Peter
Login name:
Peter
Default schema:
Connection
Server:
DESKTOP-DP133J6\SQLEXPRE
Connection:
Supplementary8
View connection properties
Progress
Ready
OK
Cancel

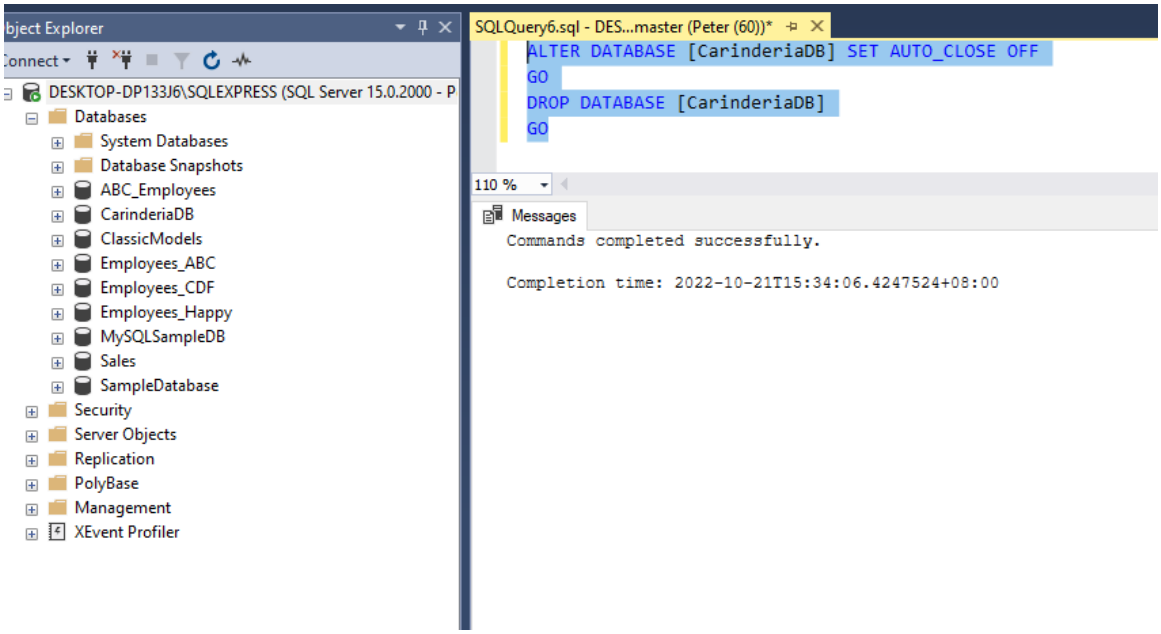

DESKTOP-DP133J6\SQLEXPRESS (SQL Server 15.0.2000 - S
Databases
System Databases
Database Snapshots
ABC_Employees
CarinderiaDB
Database Diagrams
Tables
Views
External Resources
Synonyms
Programmability
Service Broker
Storage
Security
Users
dbo
guest
INFORMATION_SCHEMA
sys
Peter
Roles
Schemas
Asymmetric Keys
Certificates
Symmetric Keys

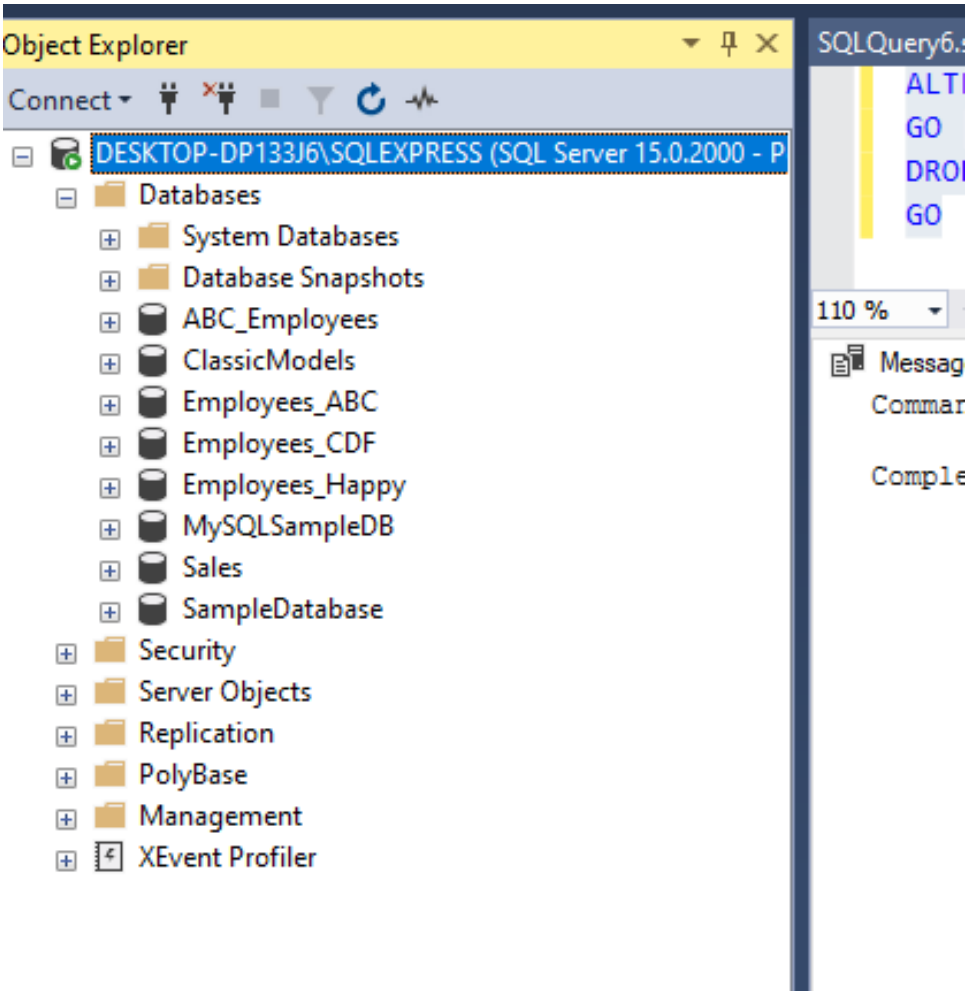


Observation: Under the created database “CarinderiaDB”, we added a new user “Peter” which has server roles dbcreator which enables the user create, modify and delete databases.

5. Connect using user peter and delete CarinderiaDB.



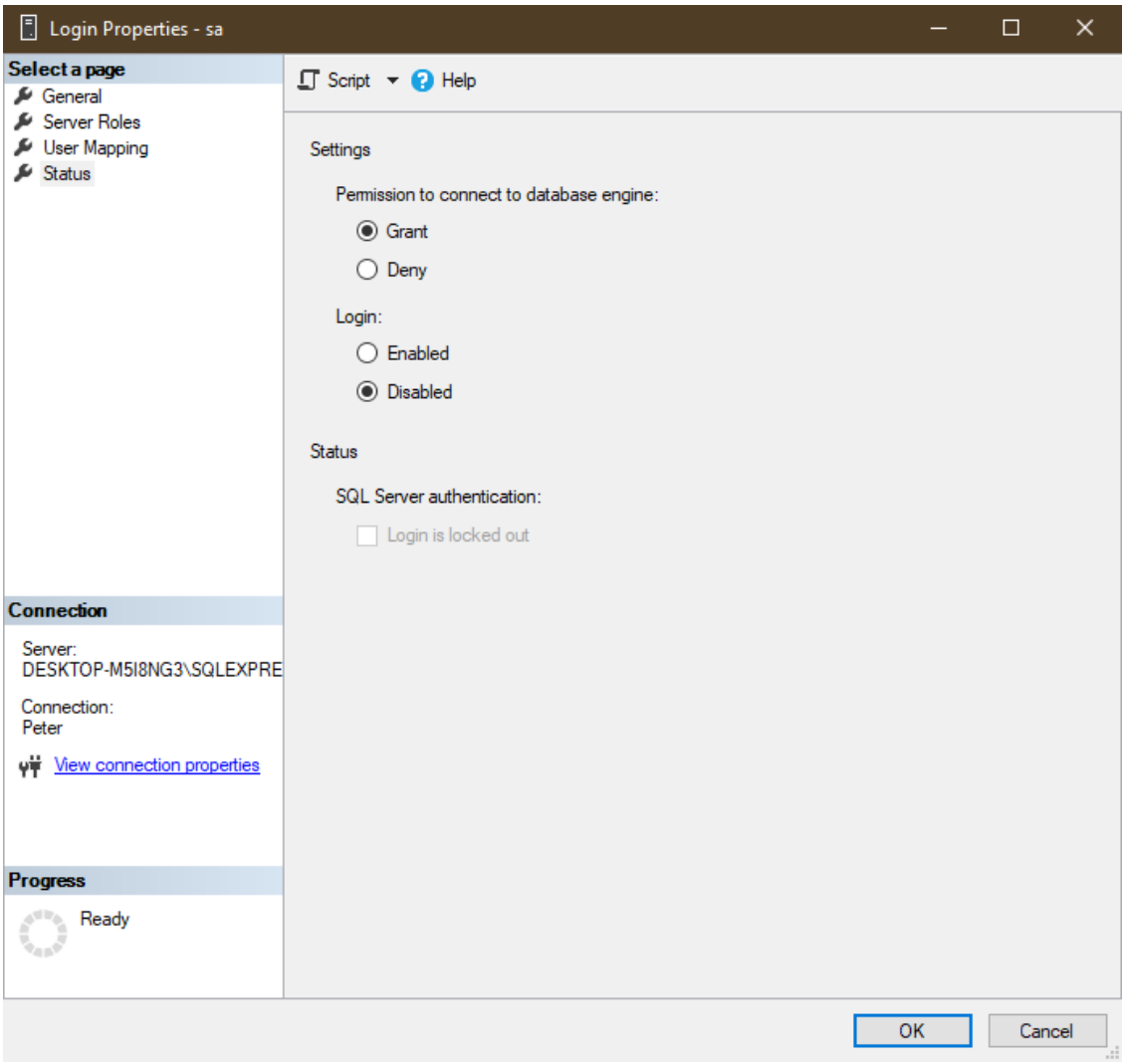




Observation: Using the user “Peter” we are able to drop the database since the user “Peter” has a server role dbcreator which enables the user to create, modify, and delete databases. Since this user is only on CarinderiaDB, he is only able to create, modify, and delete the same database.

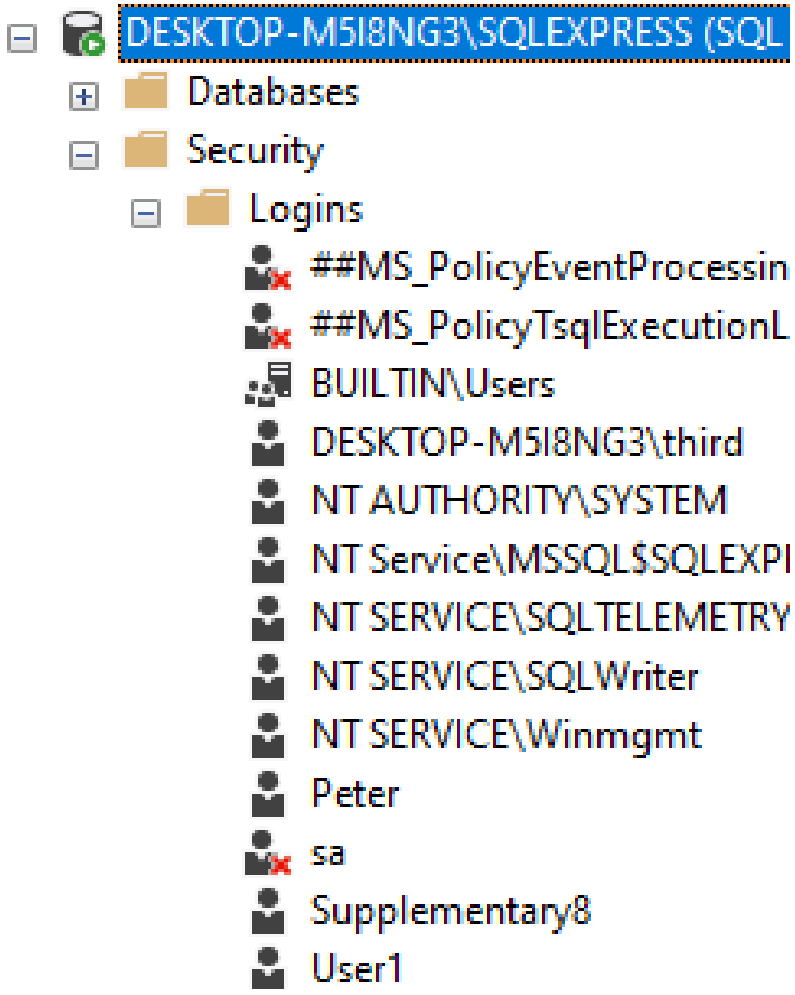
We used a query in order to perform deletion of the database. The images provided above shows the before and after images which shows what happened before and after the query.

6. Disable the user sa login.



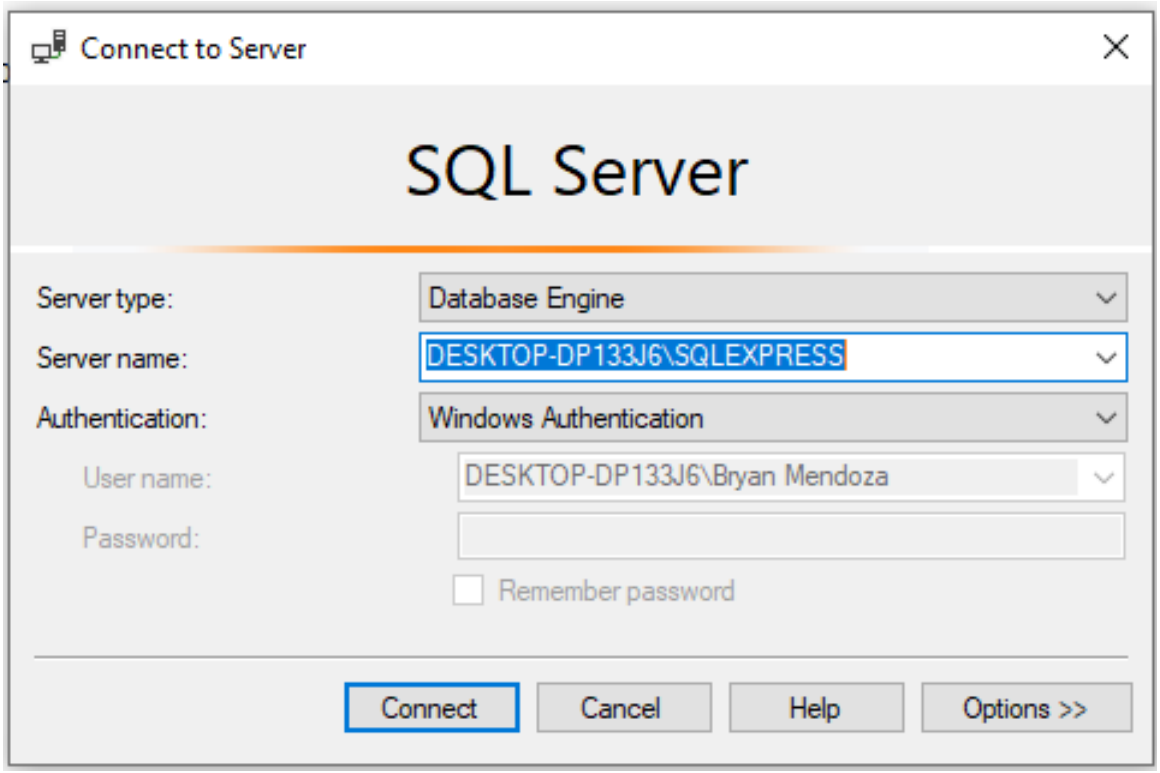
Observation: In order to disable the sa login, we should use a login that has access with the security settings.

7. Change the authentication to Windows only.



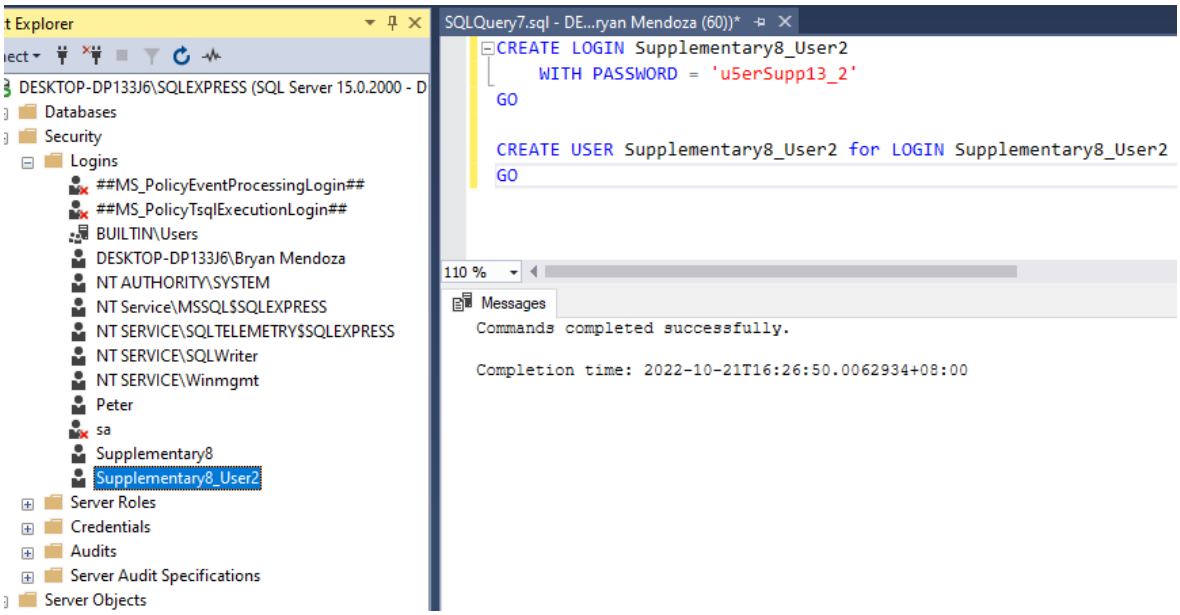
Observation: Using the Windows Authentication, we are able to see all of the logins available in the server since this authentication has the main role.

8. Connect to the database engine using the Windows authentication.



Observation: Logging to the SQL Server using Windows Authentication.

9. Create a desired SQL user with login using T-SQL.



Observation: Using a new query, we are able to add a new login and user to our server. This created user does not exist on a specific database, this user exists in the server since we have not included a specific database for it to be included in our query.

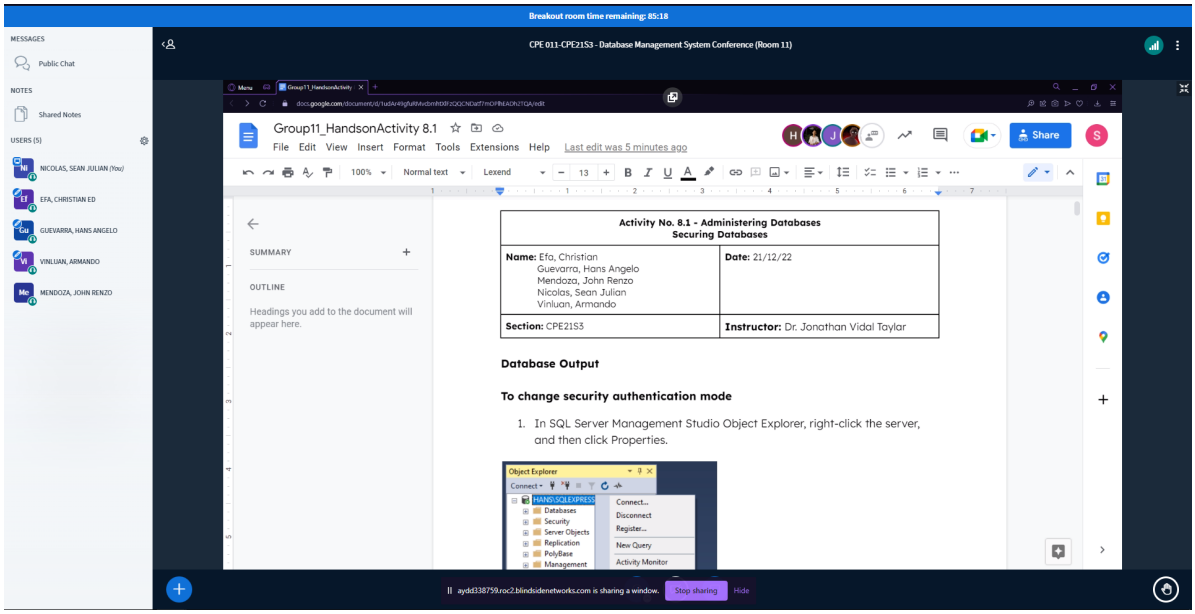
Conclusion

In this laboratory activity, the students were introduced with the security settings of databases using Microsoft SQL Studio. The security settings differ on the level of its capabilities. There are security settings which is server-level security wherein the user can access the data in the server as well as create log-ins, implement server settings and other users. In contrast with database-level security, it only enables the user to access the data within the database only. We observed database-level security with the supplementary activity wherein the user can only access the database in which he is assigned and not the other databases outside of its scope.

Moreover, there are also roles which dictate the capabilities of the user or the login. There are fixed-roles which are already predefined by the Microsoft SQL Server wherein it grants the user an access to specific functions. There are also user-defined roles wherein we, the user of the server defines what capabilities the created user should have. The user-defined role has been observed throughout this laboratory, wherein we added a dbcreator server role to our created user, and this role enabled the user to create, modify, and delete databases.

Administering Databases Securing Databases restricting access to certain users, controlling what each user can do and running anti-virus software. We conclude that databases are the foundation of all applications. A database may be attacked because it includes sensitive and significant information. This document discusses several database hacks.

Proof of Collaboration



Honor Pledge

“I accept responsibility for my role in ensuring the integrity of the work submitted by the group in which I participated.”