

MS Sql Server Main Project

<3/28/2023>

Prepared by

<Vijay Laxmi Tyagi>

<A01317295>

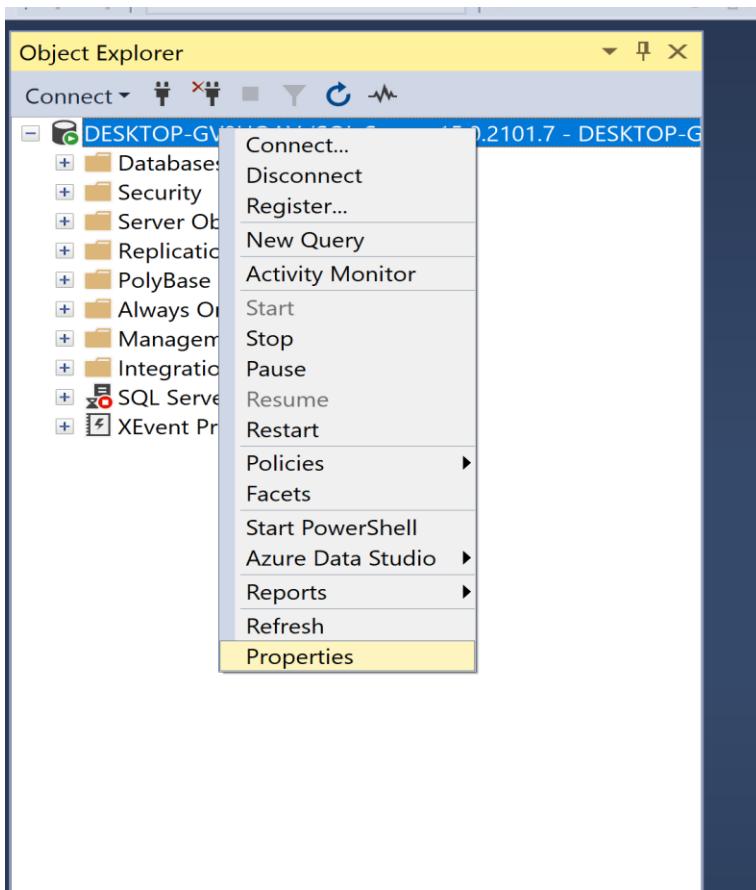
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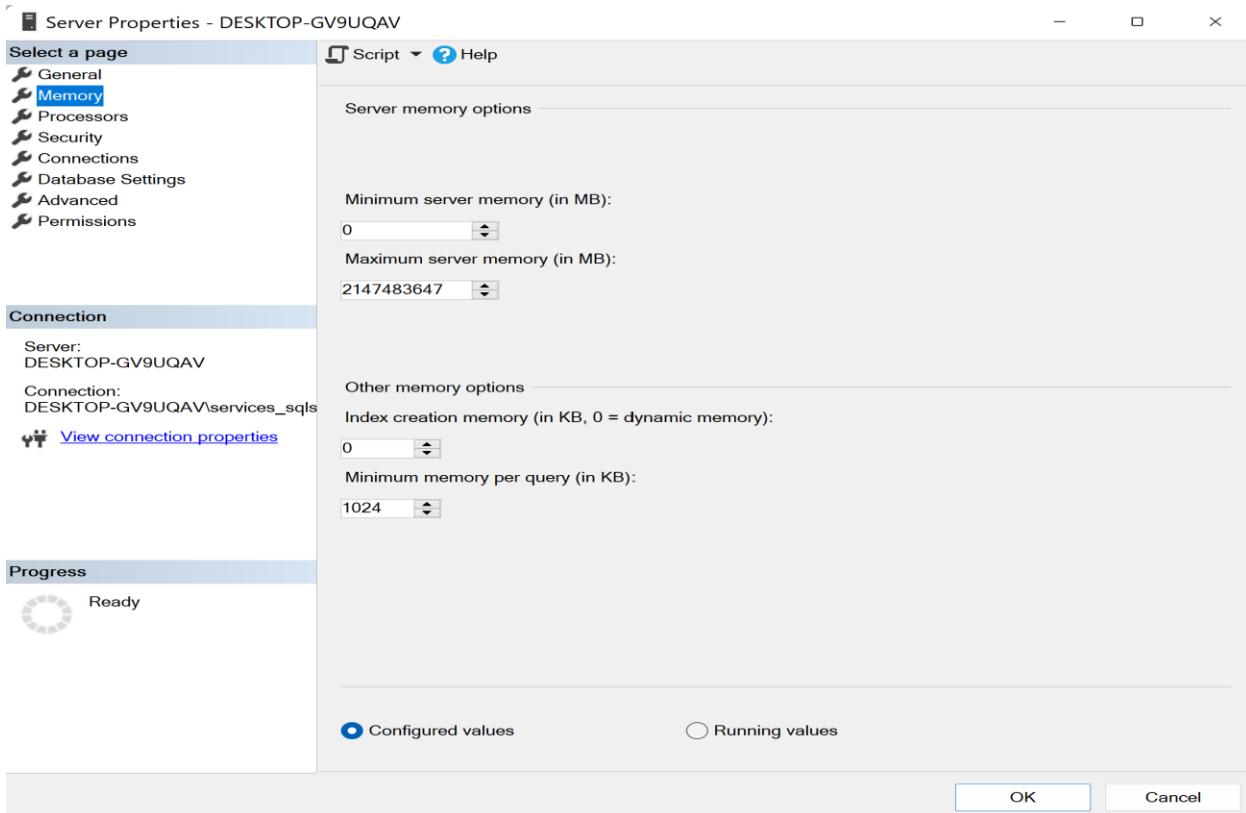
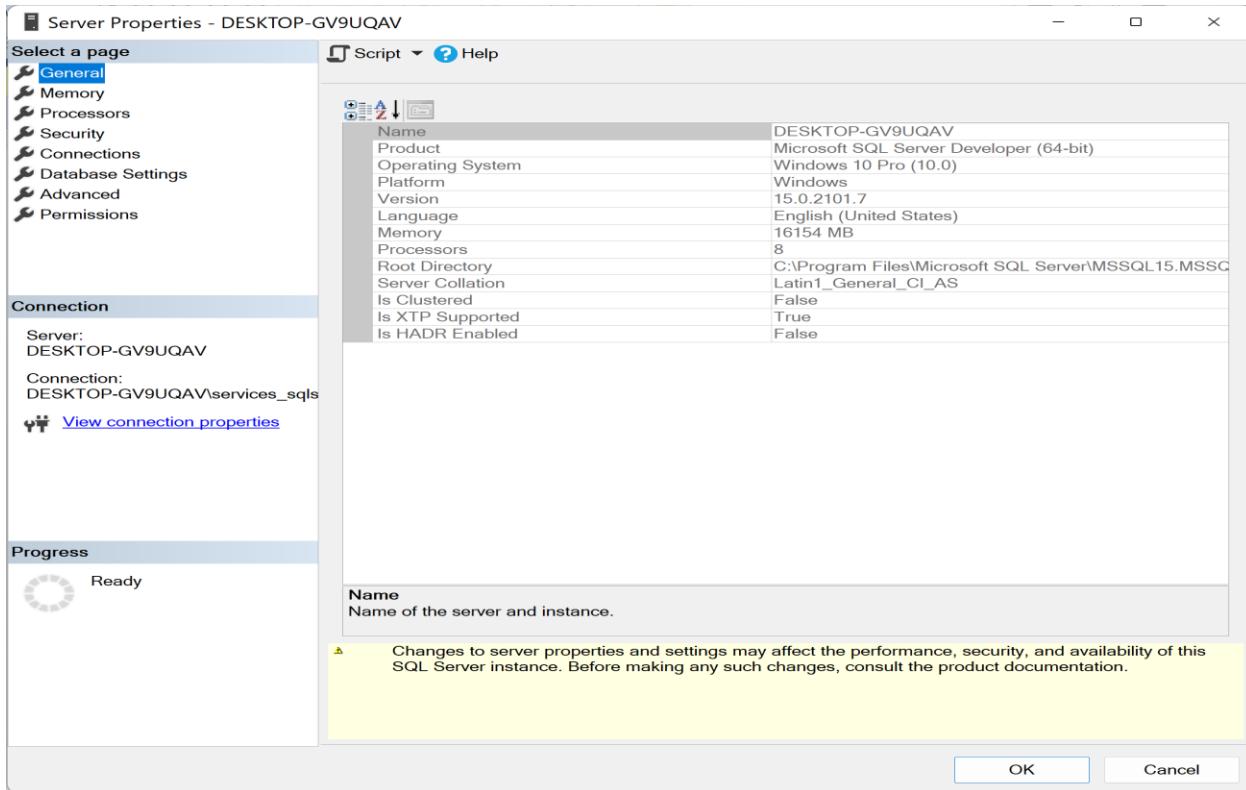
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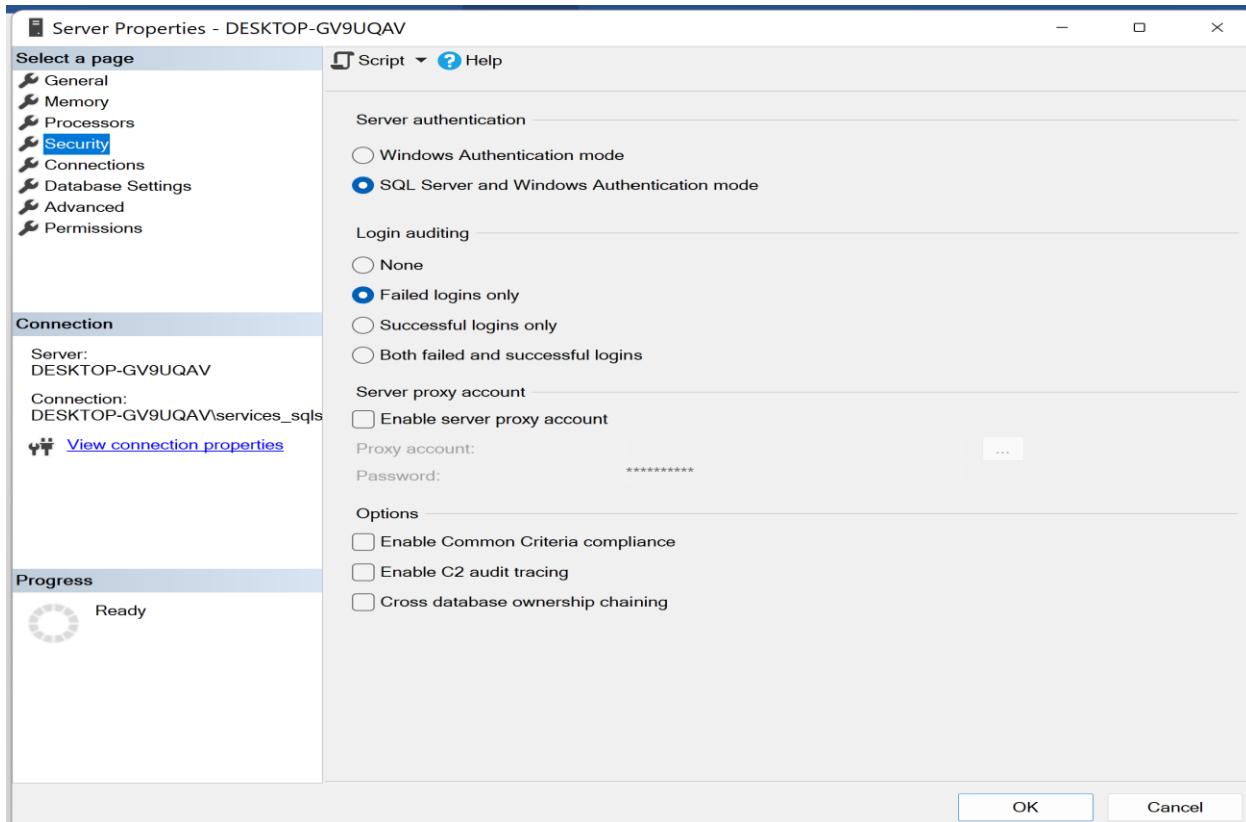
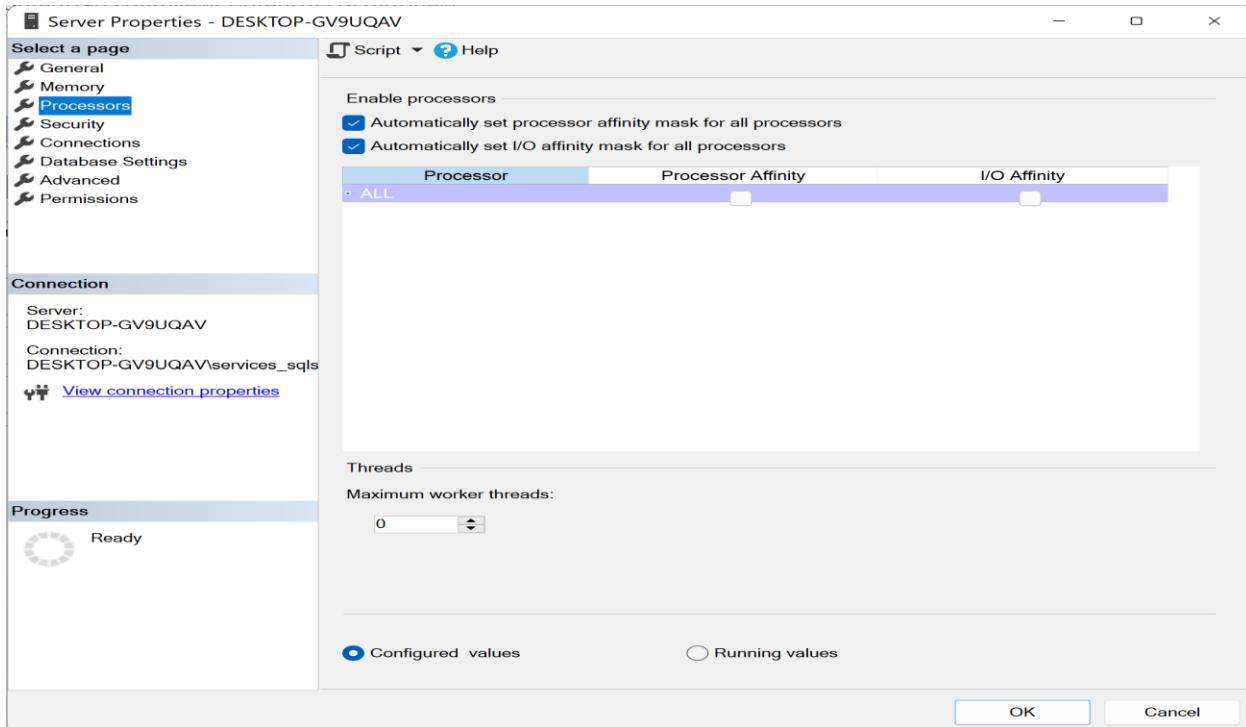
Proper SQL server and database configuration

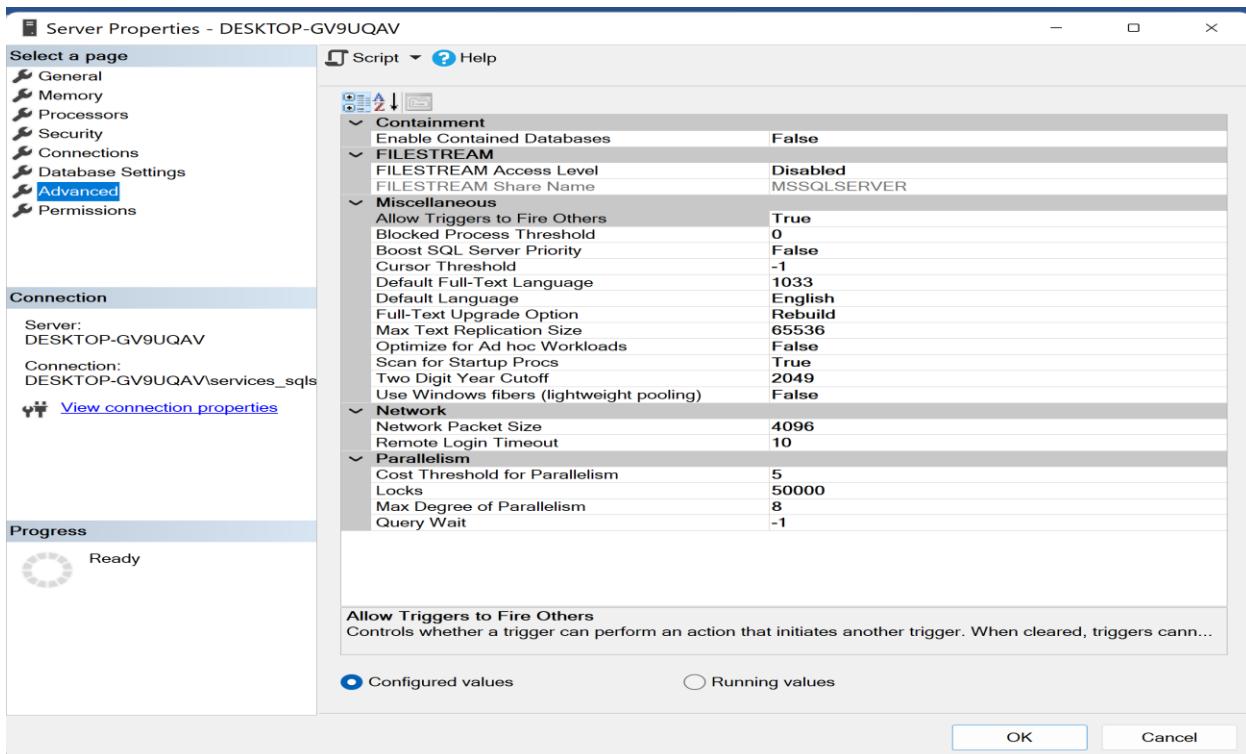
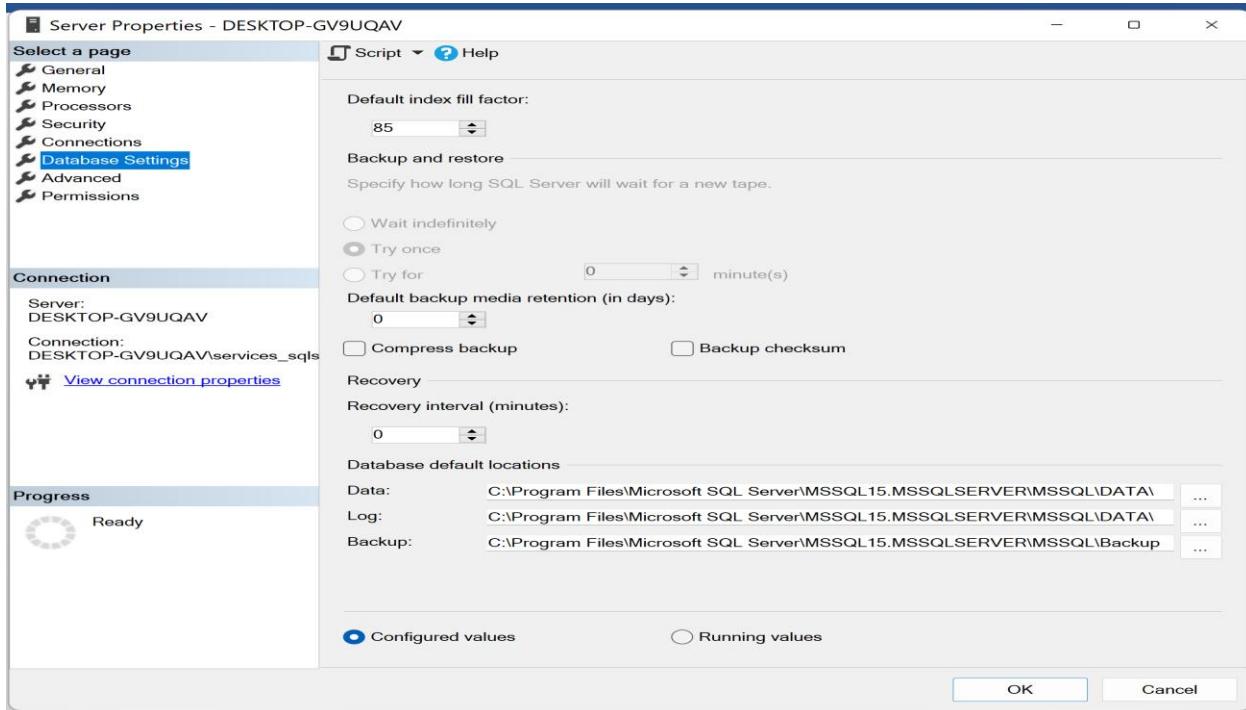
Sql Server Configuration:-

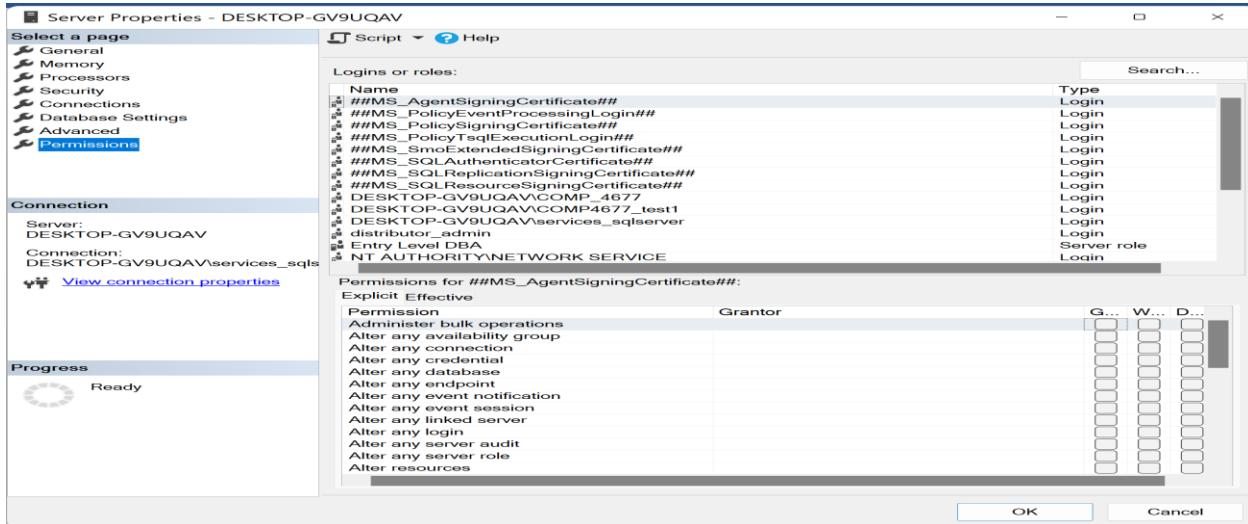
Right Click on the Server Name and select properties.











Sp_configure:- To check the available advanced options configured at instance level in SQL Server, you need to use the `sp_configure` system stored procedure.

```
-- Execute sp_configure

exec sp_configure;
```

Results

	name	minimum	maximum	config_value	run_value
1	allow polybase export	0	1	0	0
2	allow updates	0	1	0	0
3	backup checksum default	0	1	0	0
4	backup compression default	0	1	0	0
5	clr enabled	0	1	0	0
6	column encryption enclave type	0	2	0	0
7	contained database authentication	0	1	0	0
8	cross db ownership chaining	0	1	0	0
9	default language	0	9999	0	0
10	external scripts enabled	0	1	0	0
11	filestream access level	0	2	0	0
12	hadoop connectivity	0	7	0	0
13	max text repl size (B)	-1	2147483647	65536	65536
14	nested triggers	0	1	1	1
15	polybase enabled	0	1	0	0
16	polybase network encryption	0	1	1	1
17	remote access	0	1	1	1

Query executed successfully.

```
-- Execute sp_configure
exec sp_configure;
--To show all the advanced options need to run the following query:
exec sp_configure 'show advanced options', 1;
Reconfigure;
exec sp_configure;
```

name	minimum	maximum	config_value	run_value
access check cache bucket count	0	65536	0	0
access check cache quota	0	2147483647	0	0
Ad Hoc Distributed Queries	0	1	0	0
Ado cleaner retry timeout (min)	0	32767	0	0
ADR Reclamation Factor	0	32767	0	0
affinity I/O mask	-2147483648	2147483647	0	0
affinity mask	-2147483648	2147483647	0	0
affinity64 I/O mask	-2147483648	2147483647	0	0
affinity64 mask	-2147483648	2147483647	0	0
Agent XPs	0	1	1	1
allow filesystem enumeration	0	1	1	1
allow polybase export	0	1	0	0
allow updates	0	1	0	0
automatic soft-NUMA disabled	0	1	0	0
backup checksum default	0	1	0	0
backup compression default	0	1	0	0
block size threshold (B)	0	86400	0	0

Query executed successfully. DESKTOP-GV9UQAV (15.0 RTM) DESKTOP-GV9UQAV\service... master 00:00:00 83 rows

We have to be extremely careful enabling this command, and remember to disable right after using it, because any user have access to the sp_configure command, and you will expose advanced configuration parameters to an untrusted user.

```
-- Execute sp_configure
exec sp_configure;
--To show all the advanced options need to run the following query:
exec sp_configure 'show advanced options', 1;
Reconfigure;
exec sp_configure;

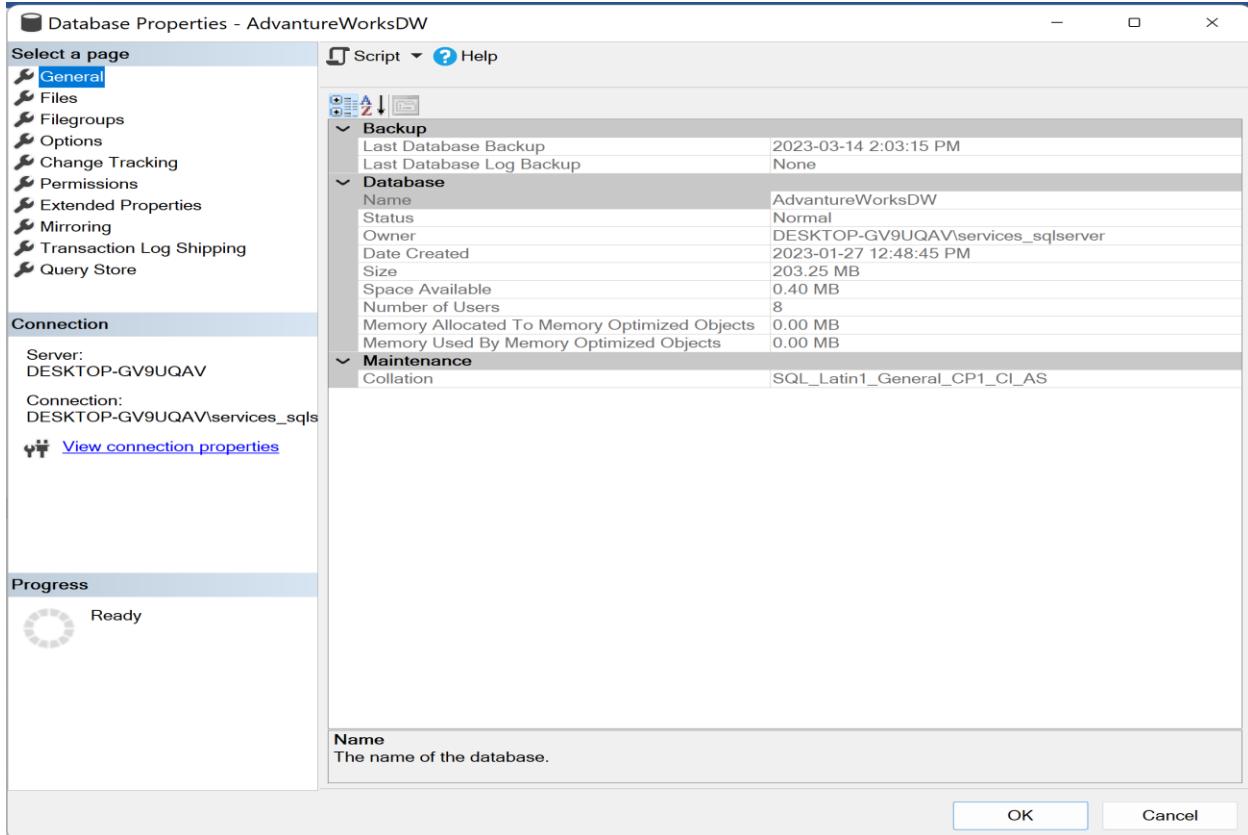
--Set advanced options to 0
exec sp_configure 'show advanced options', 0;
Reconfigure;
exec sp_configure;
```

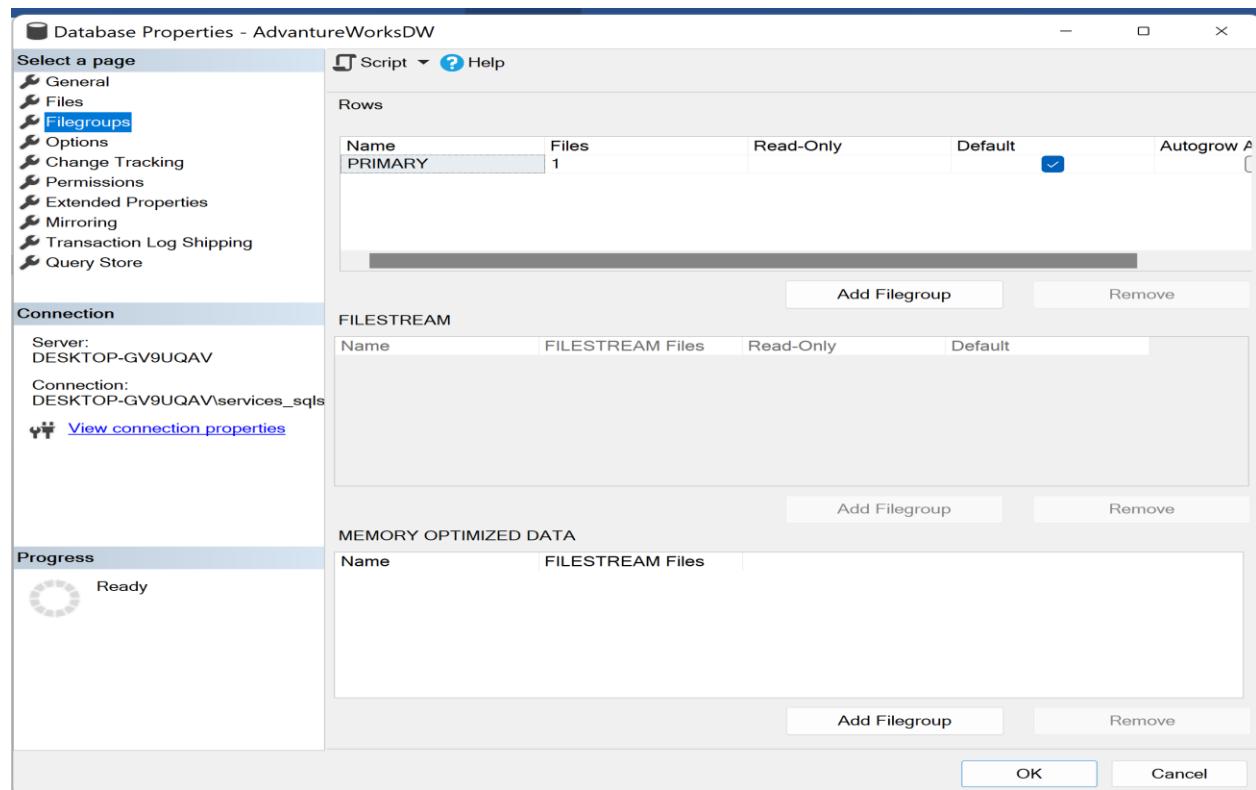
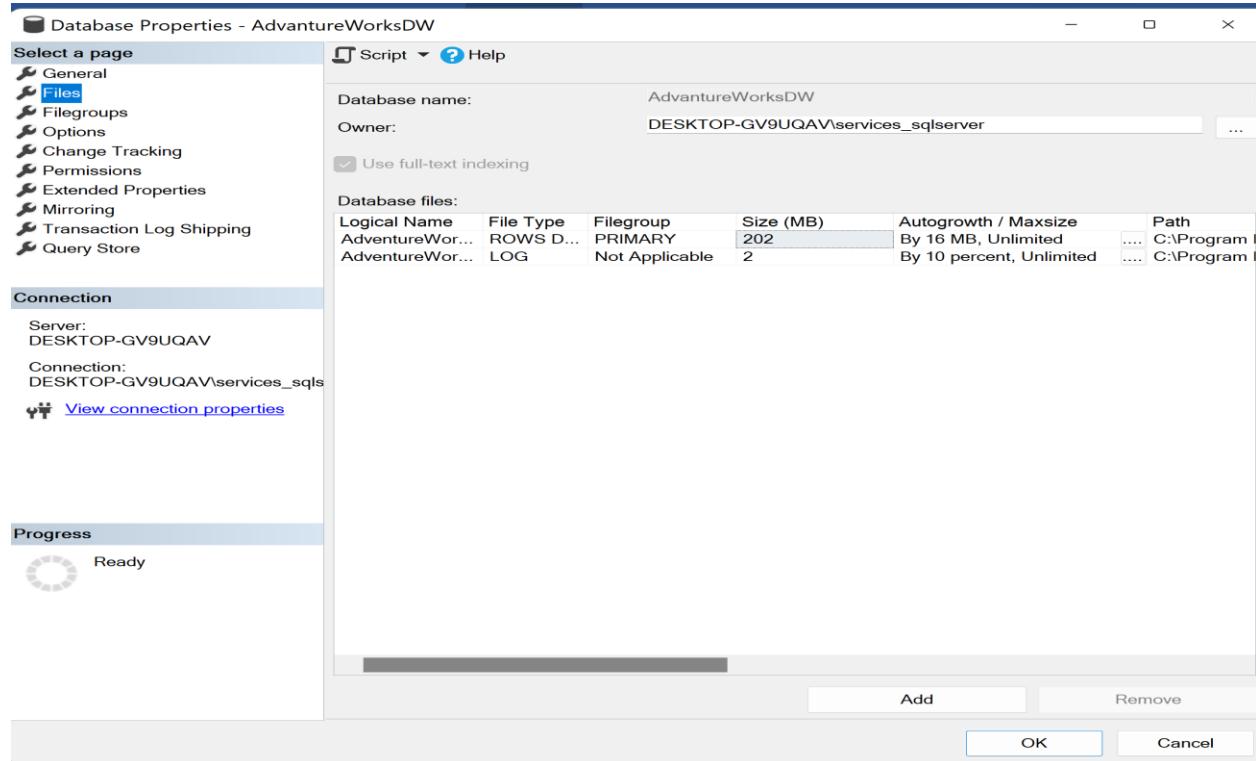
name	minimum	maximum	config_value	run_value
allow polybase export	0	1	0	0
allow updates	0	1	0	0
backup checksum default	0	1	0	0
backup compression default	0	1	0	0
clr enabled	0	1	0	0
column encryption enclave type	0	2	0	0
contained database authentication	0	1	0	0
cross db ownership chaining	0	1	0	0
default language	0	9999	0	0
external scripts enabled	0	1	0	0
filestream access level	0	2	0	0
hadoop connectivity	0	7	0	0
max text rep size (B)	-1	2147483647	65536	65536
nested triggers	0	1	1	1
polybase enabled	0	1	0	0
polybase network encryption	0	1	1	1
remote access	0	1	1	1

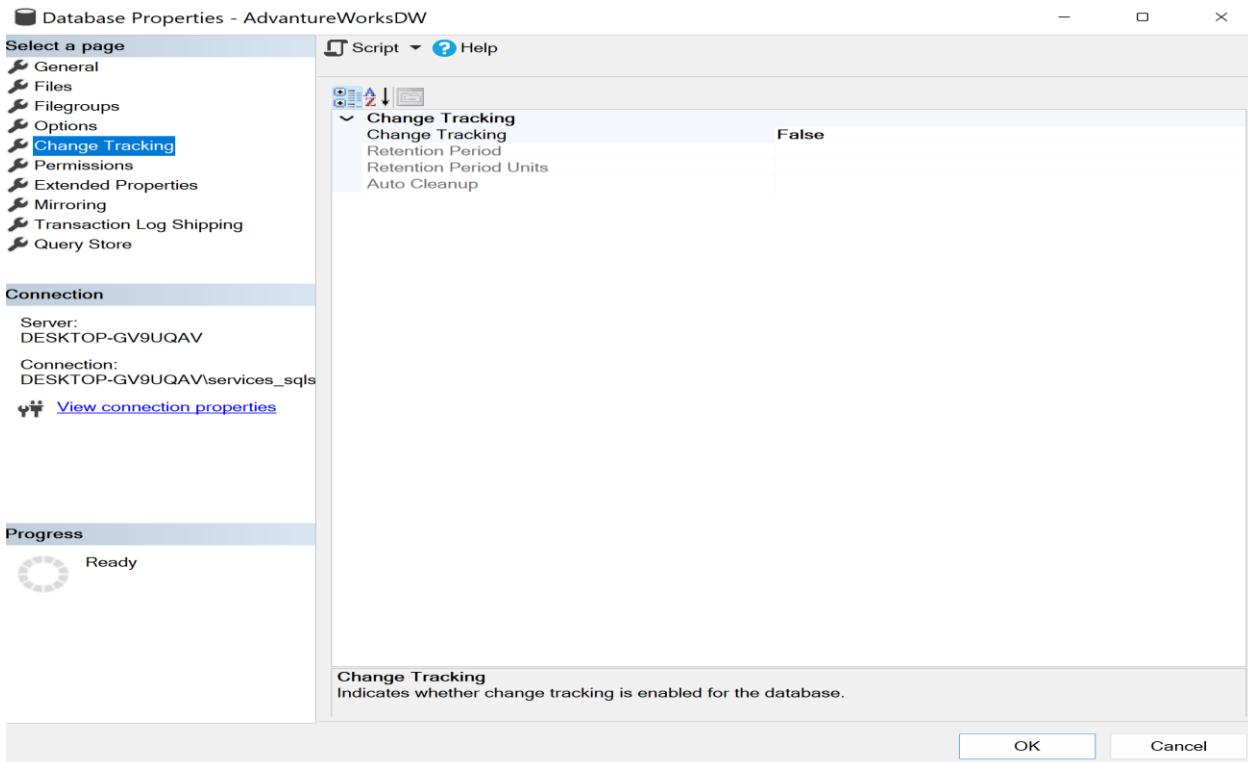
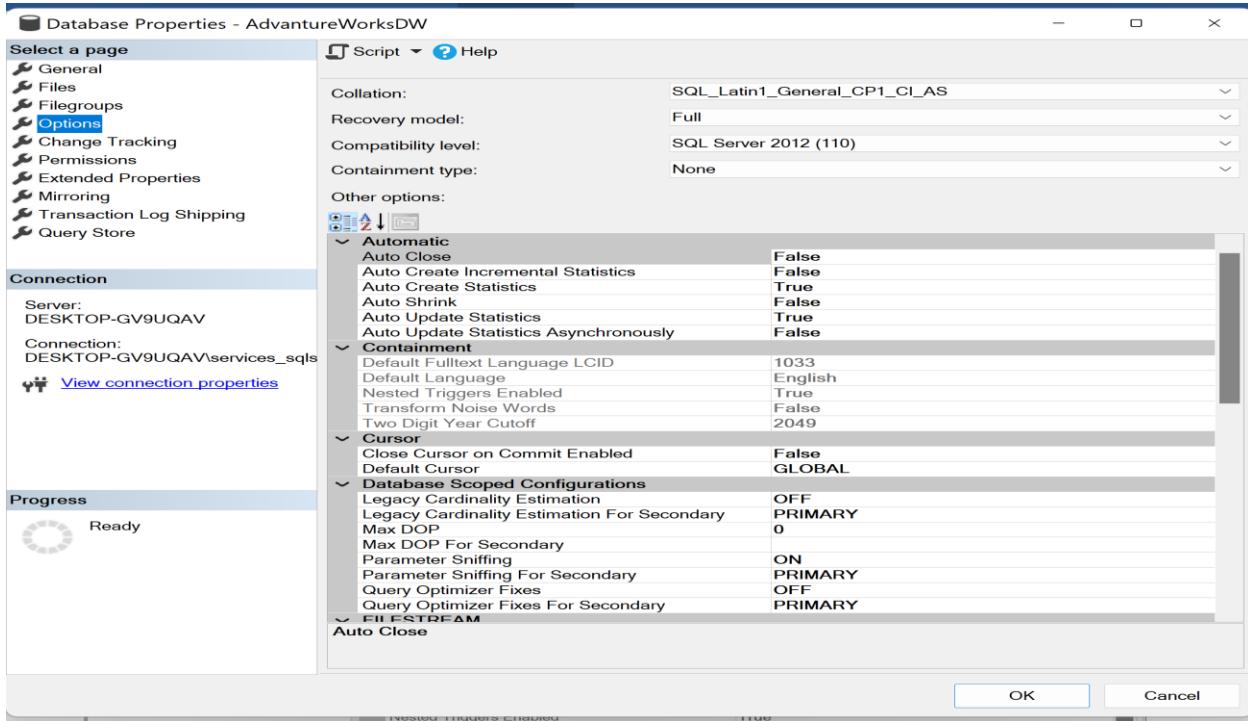
Query executed successfully. DESKTOP-GV9UQAV (15.0 RTM) DESKTOP-GV9UQAV\service... master 00:00:00 25 rows

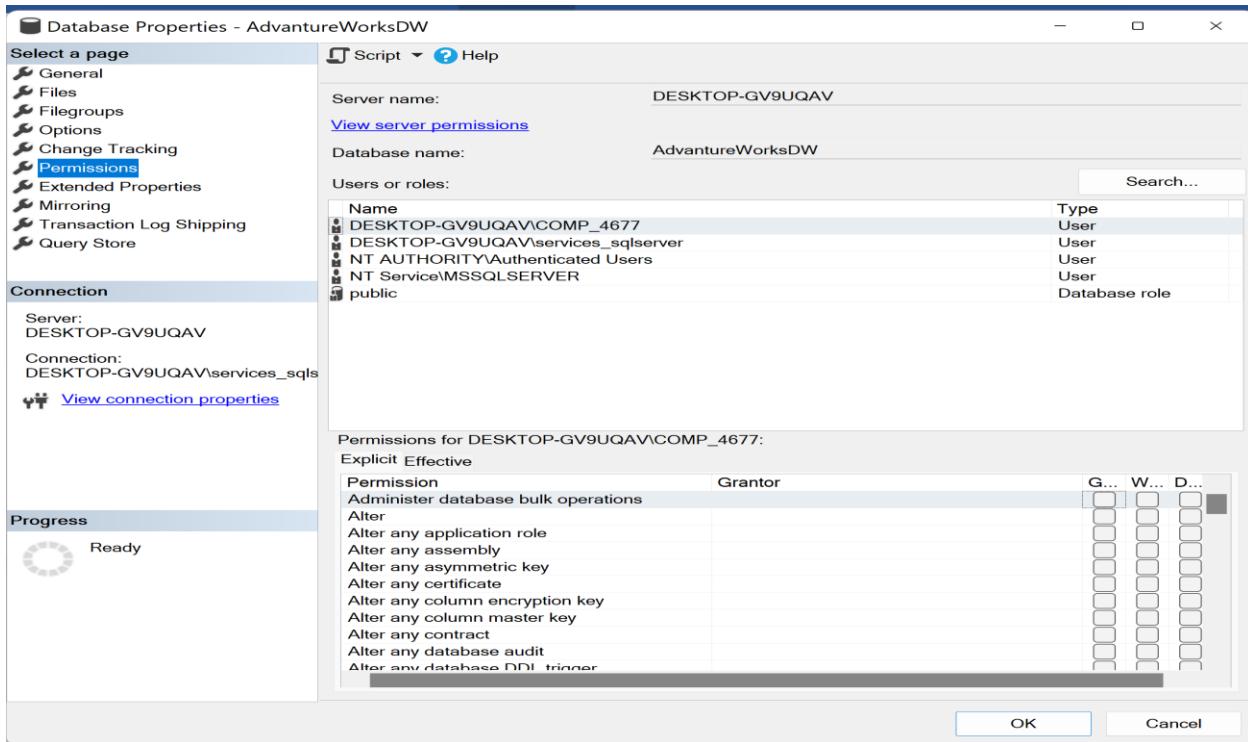
Configuration settings of a database

1. In Object Explorer, connect to a Database Engine instance, expand the server, expand Databases, right-click a database, and then click Properties.
2. In the Database Properties dialog box, click Options to access configuration settings.







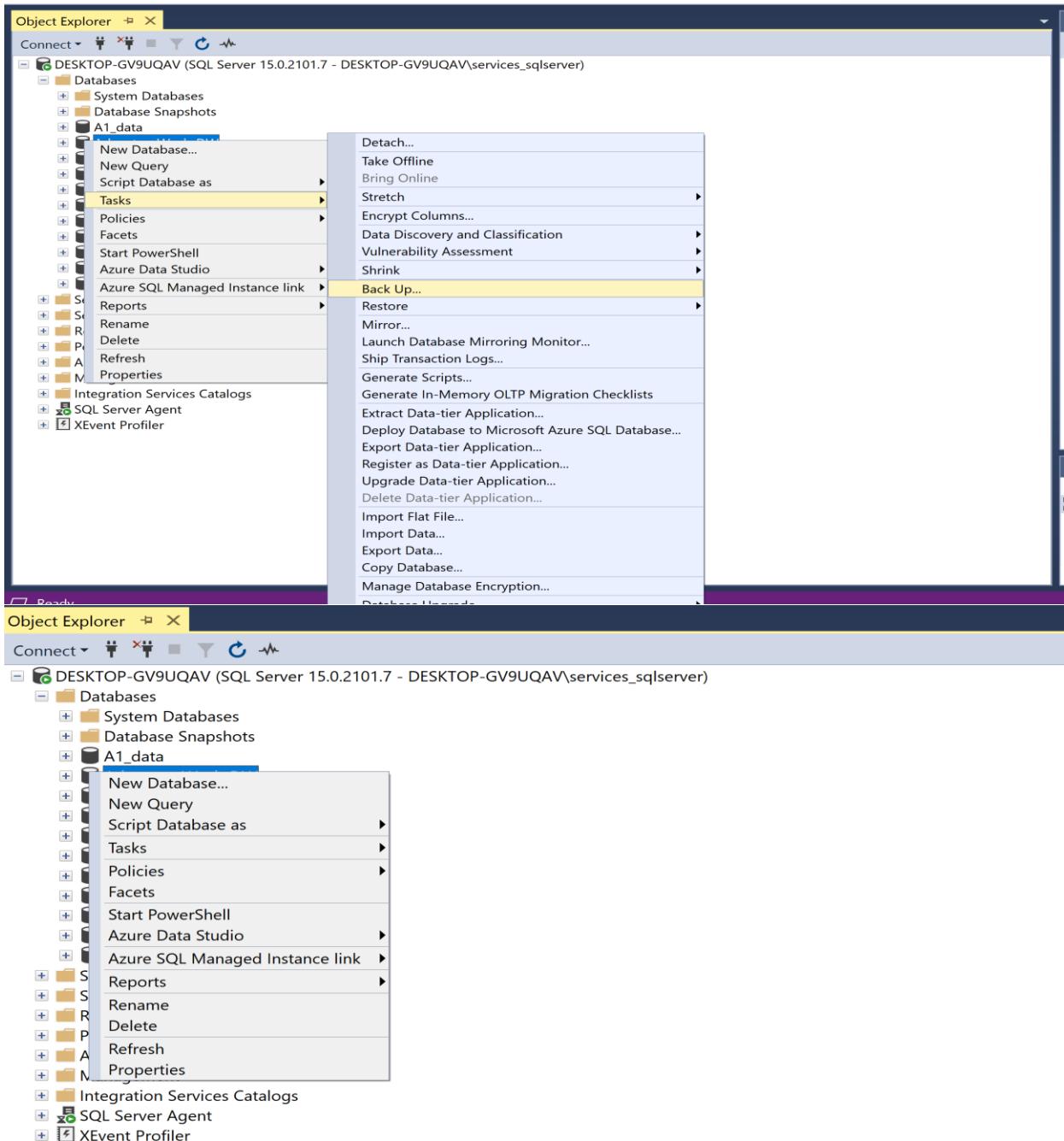


AdventureWorks database backup strategy – Do NOT use Maintenance Plans

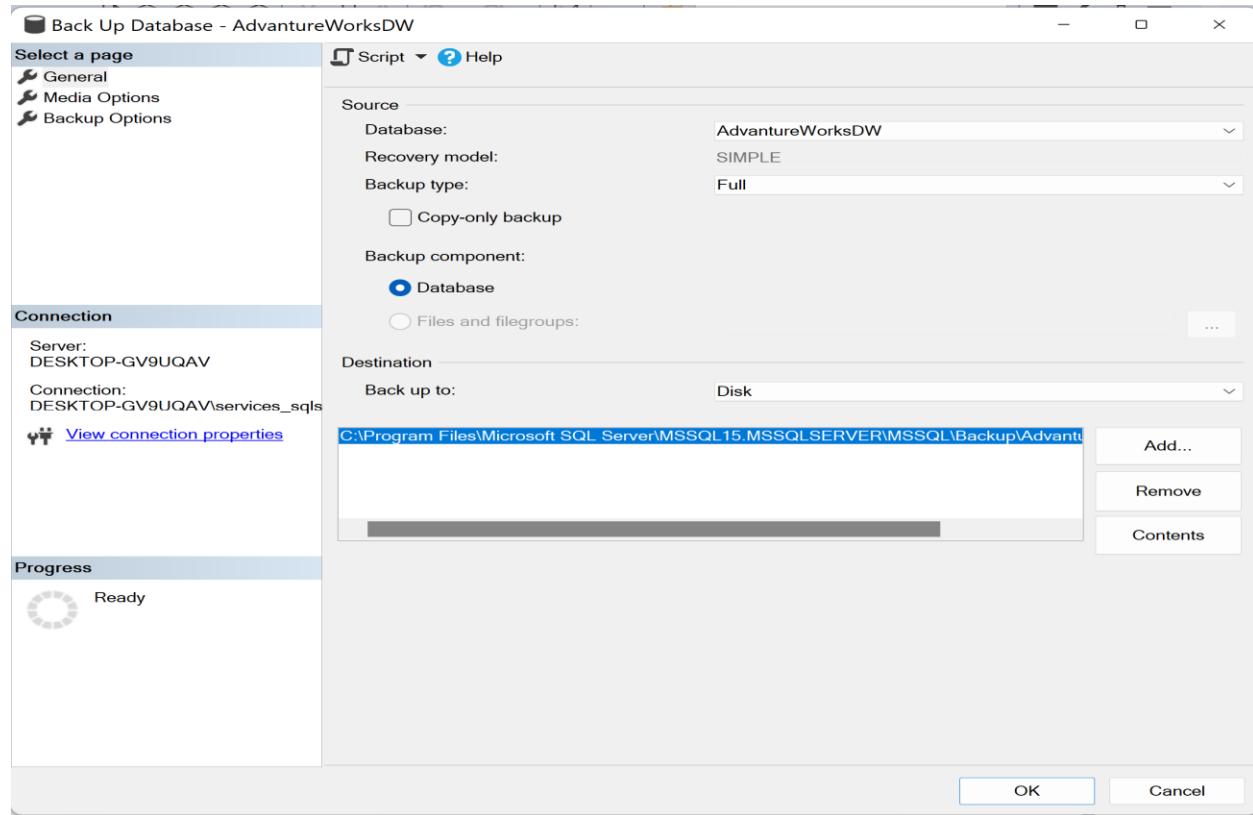
Use the Script Action to Job option to back up databases

To schedule a database backup using the Script Action to Job option in SSMS, follow these steps:

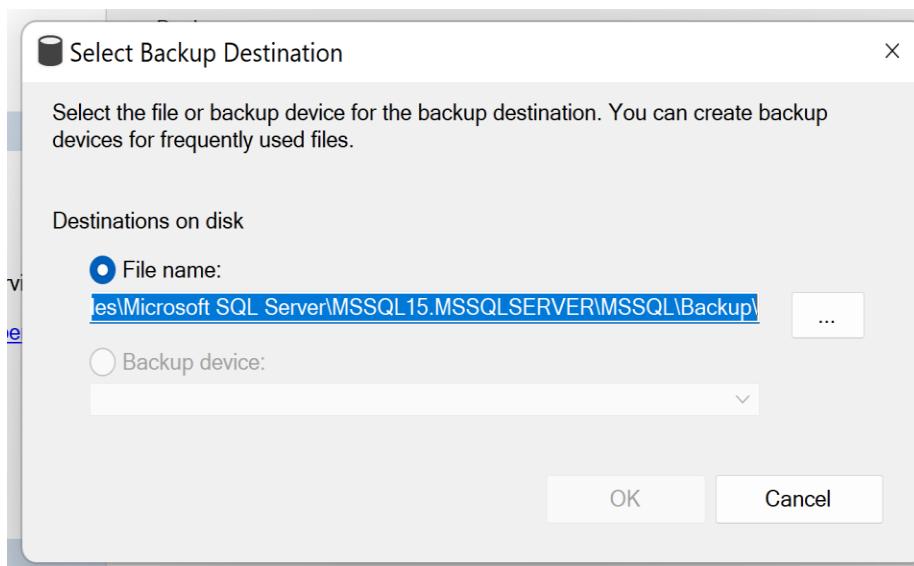
1. Start SQL Server Management Studio and select Connect > Database Engine.
2. In the Connect to Server dialog box, select the appropriate values in the Server type list, in the Server name list, and in the Authentication list.
3. Select Connect.
4. In Object Explorer, expand Databases.
5. Right-click the database you want to back up, select Tasks, and then select Back Up.



6. In the Back Up Database - <DatabaseName> dialog box, make sure that Backup type is set to Full and Backup component is set to Database.



7. Under Destination, select Disk for the Back up to option and then select Add. For other options on this page, see Backup Database.
8. In the Select Backup Destination dialog box, enter a path and a file name in the Destinations on disk box, and then select OK.

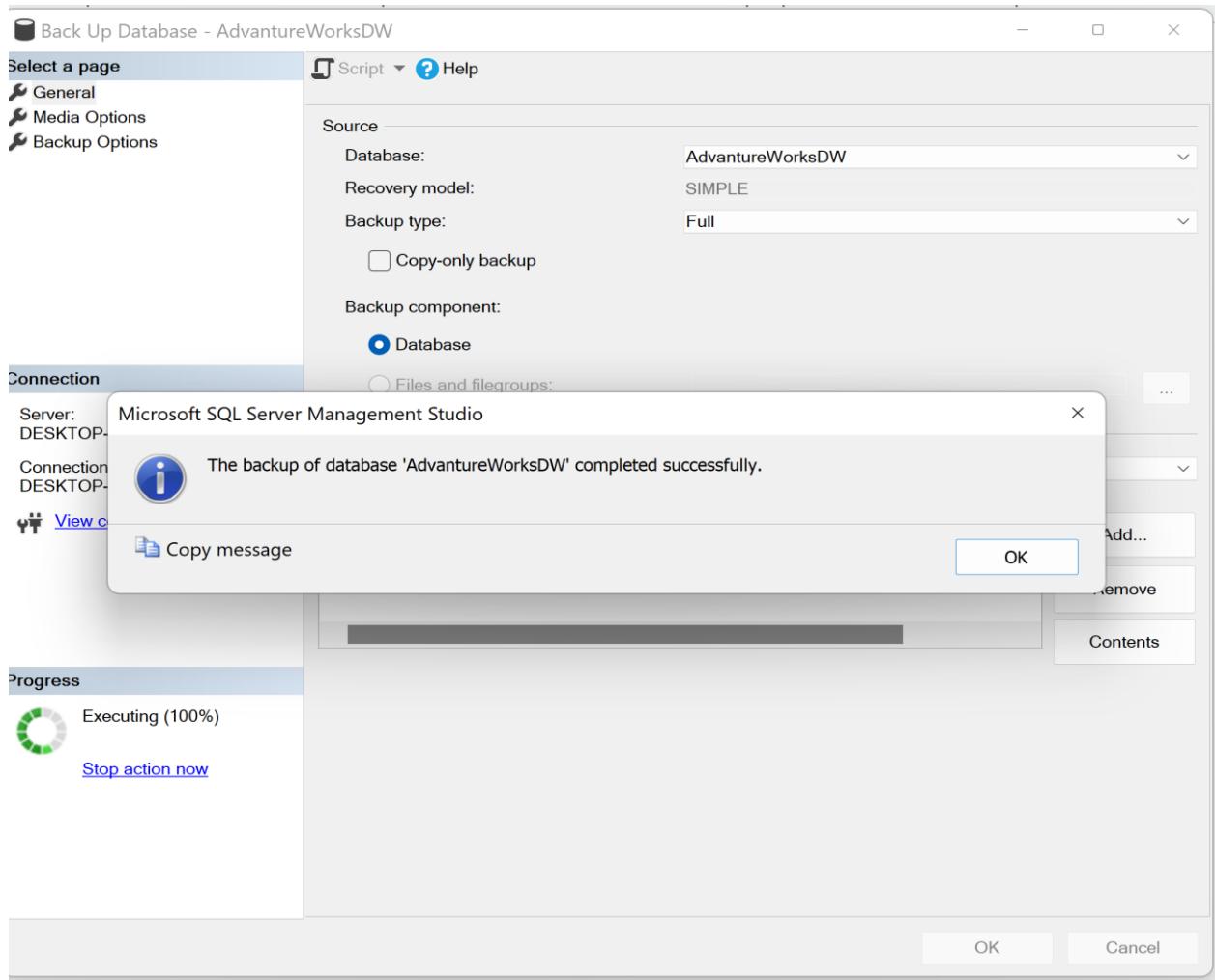


9. In the Script list, select Script Action to Job.

10. In the New Job dialog box, select Steps under Select a page, and then select Edit if you want to change the job parameters.
11. Under Select a page, select Schedules, and then select New.
12. In the New Job Schedule dialog box, enter the job name in the Name box, specify the job schedule, and then select OK.
13. Select OK two times.

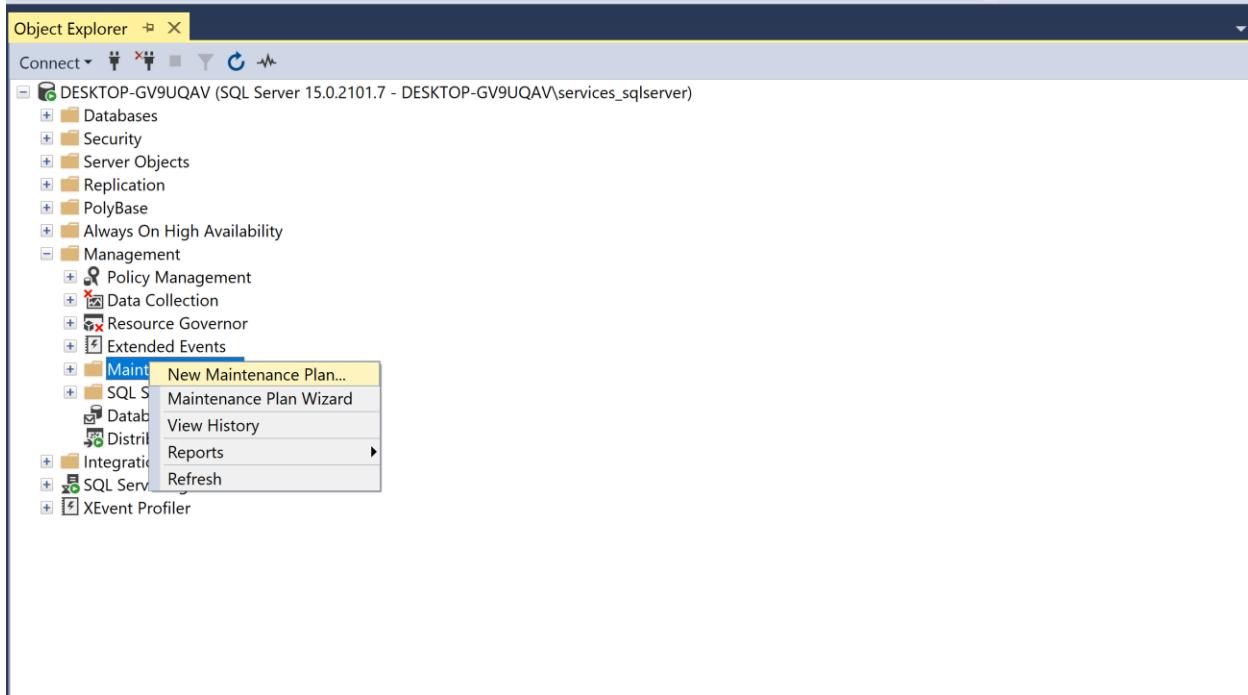
You receive the following message:

The backup of database '<DatabaseName>' completed successfully.

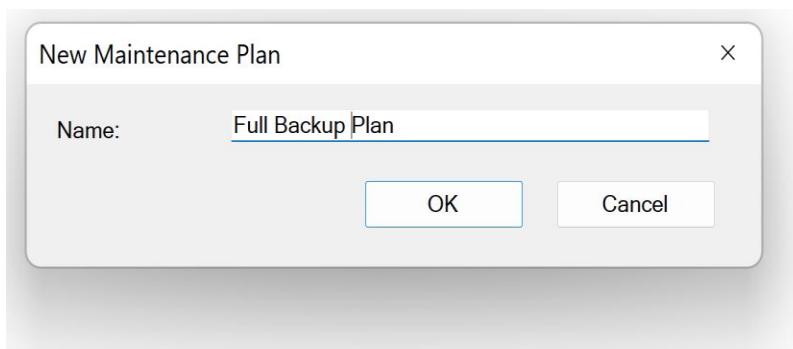


Full backup every day at 02:00

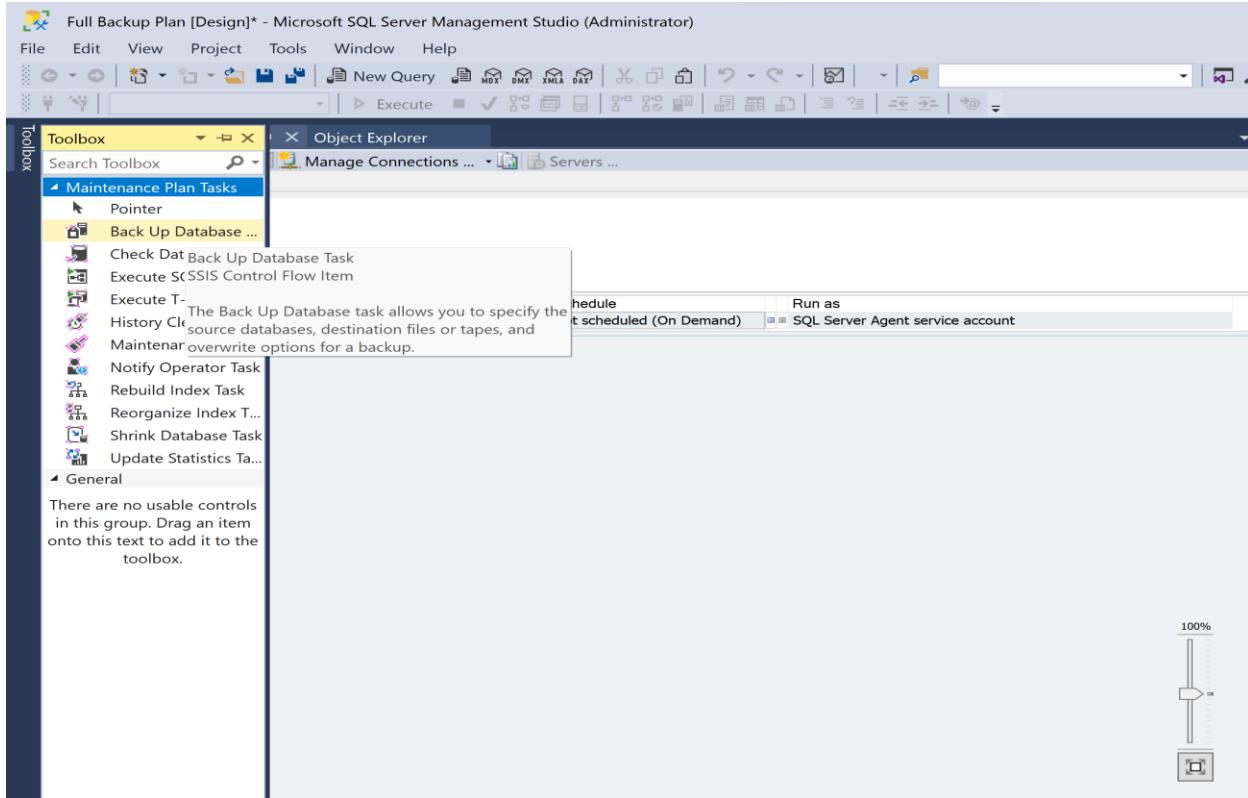
Open SQL Server Management Studio (SSMS) and connect to the SQL Server instance. Once connected to the instance, expand Management Right-click on the Maintenance Plans Select New Maintenance Plan.

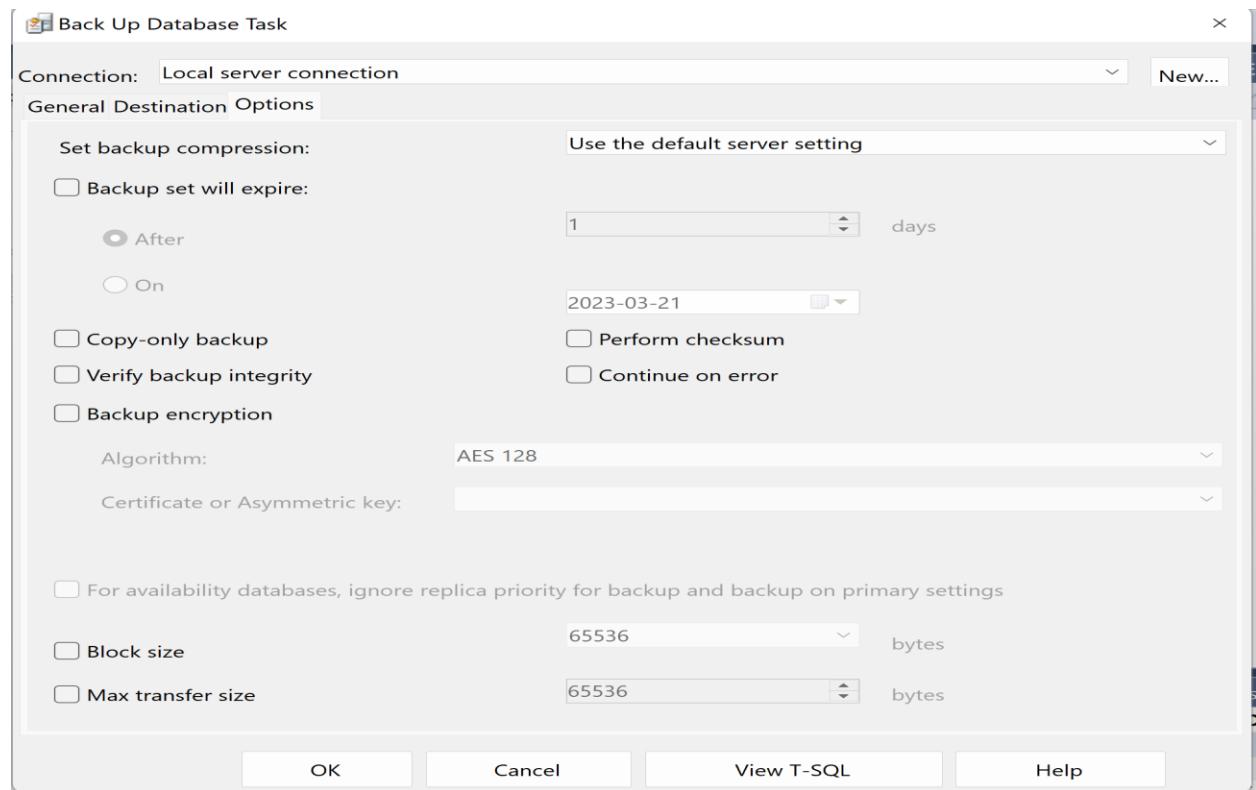
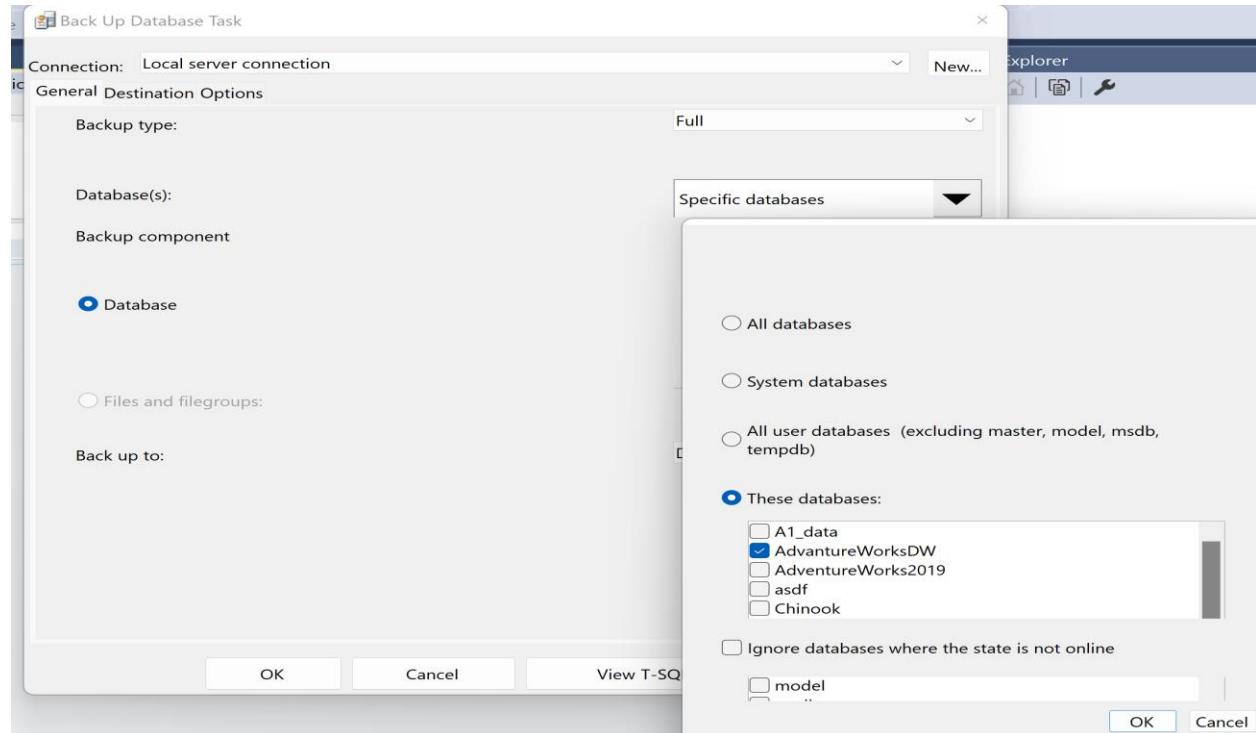


In the New Maintenance Plan dialog box, specify the name of the maintenance plan.

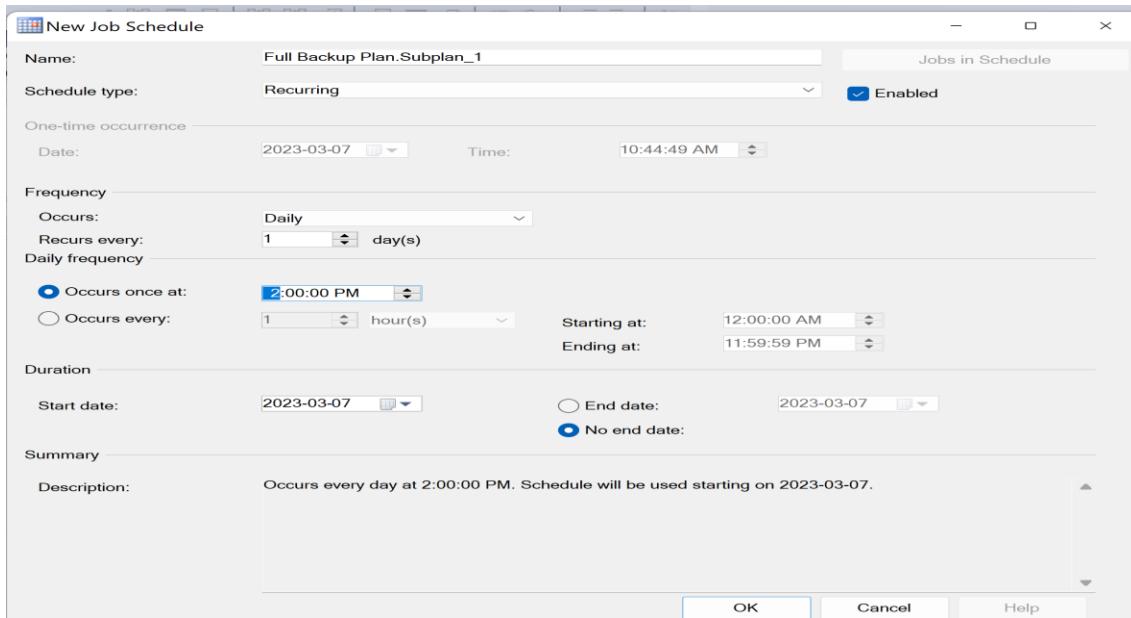


In the Maintenance plan configuration pan, drag and drop Back up Database Task from the toolbox and double-click to Edit it.





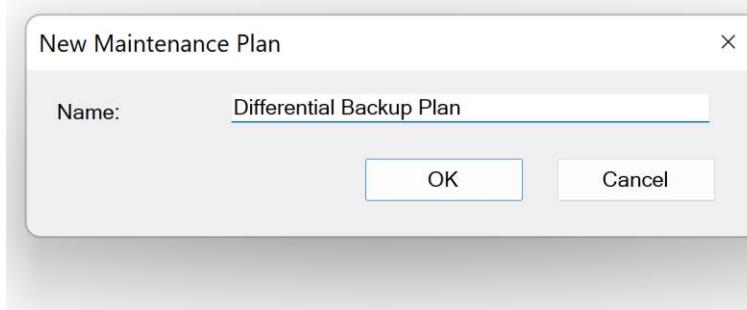
A dialog box, New Job Schedule, opens. The Full backup should be generated every day at 02:00 p.m so, I have chosen daily and specified 2:00:00 p.m in the textbox named Occurs once and saved the schedule.

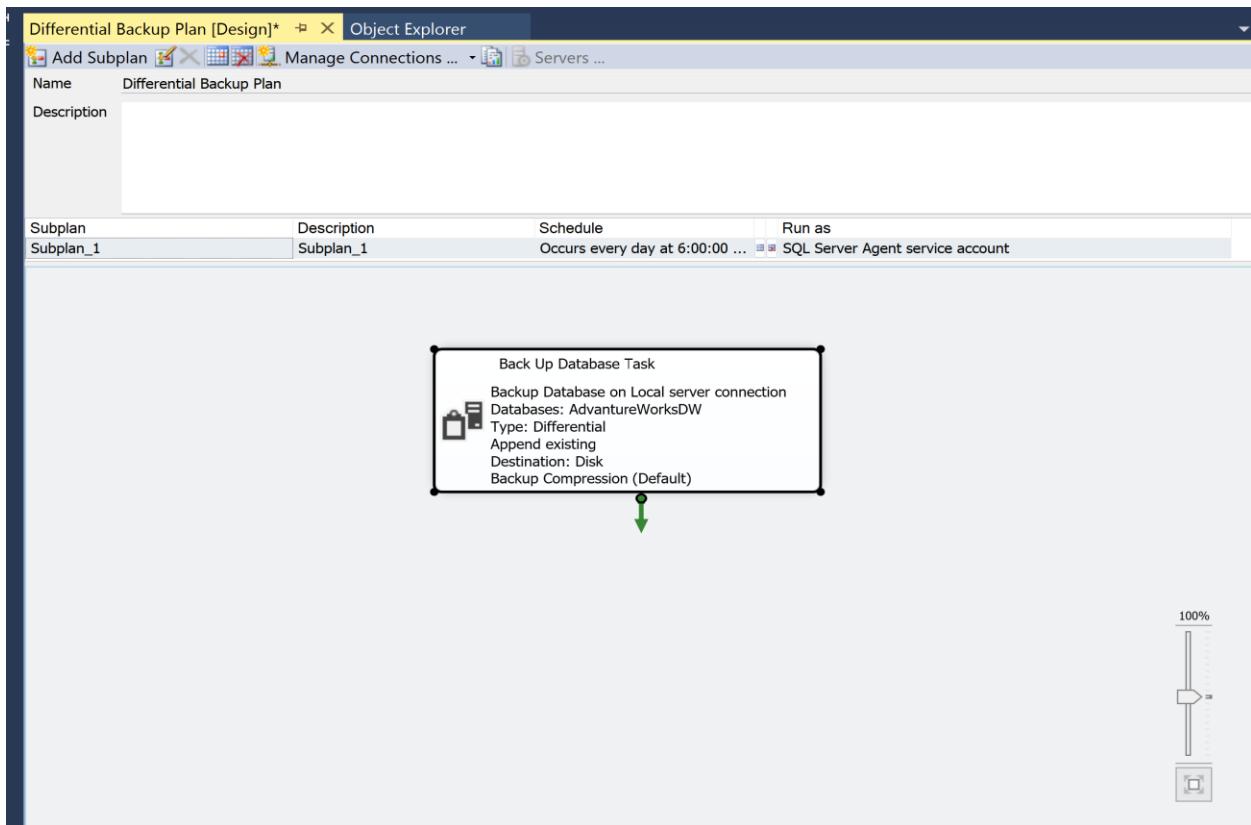
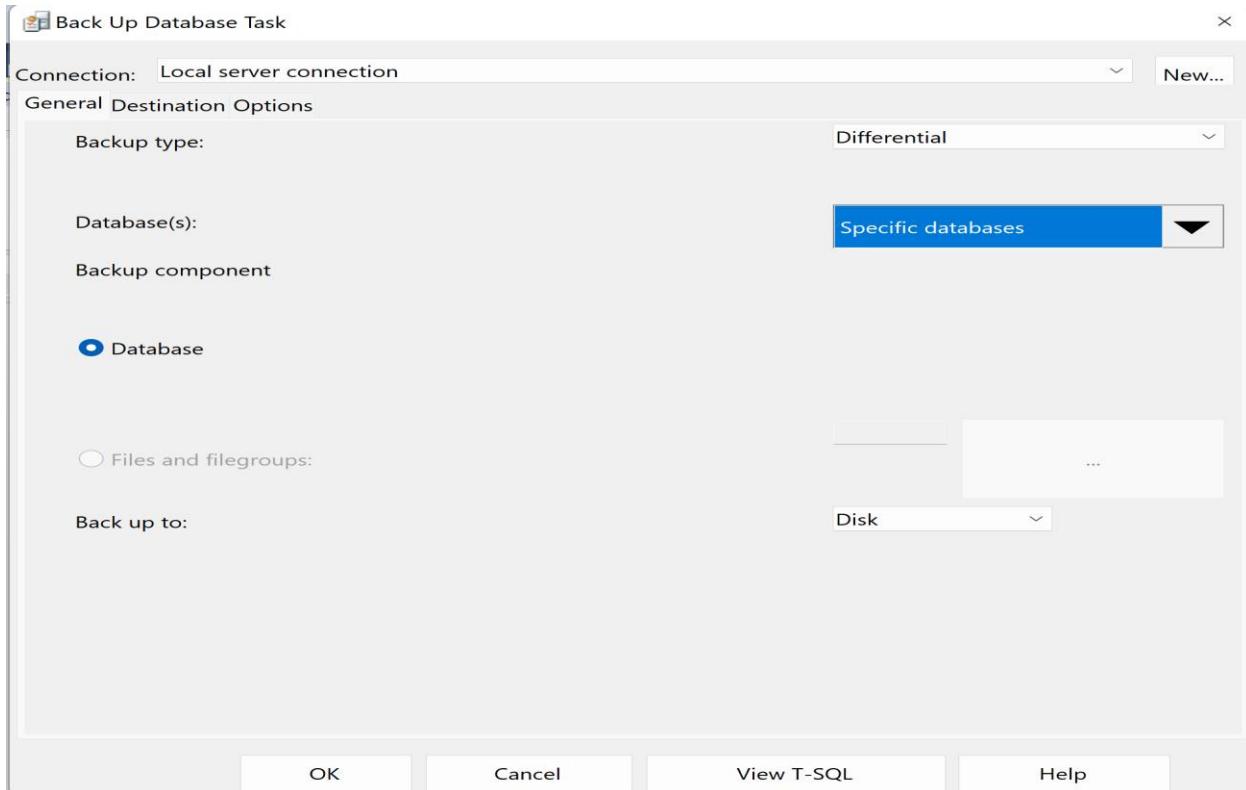


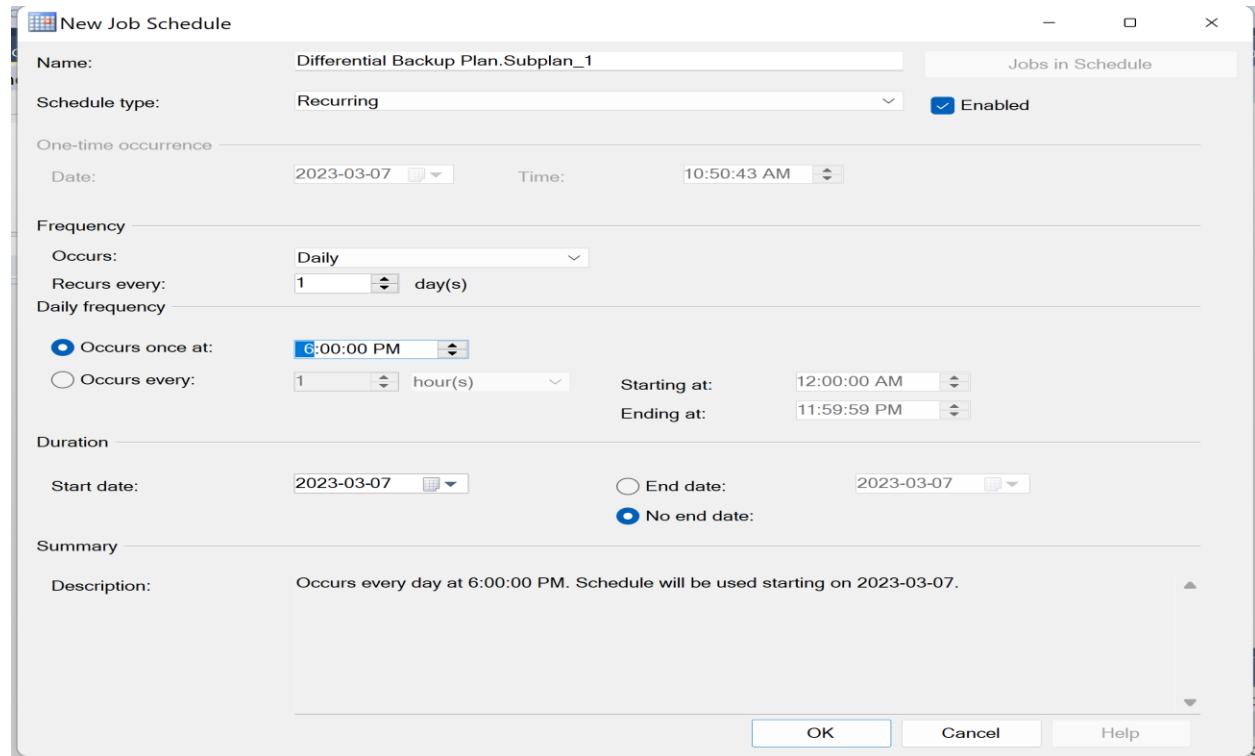
Differential backup every 4 hours after full backup

Create a Maintenance Plan for Differential backups

To create a maintenance plan for differential backup, I have followed the same process that I used to create a maintenance plan to generate Full backup. The changes that I made in the configuration are the following: In the General tab, chosen Differential from the backup type drop-down box.



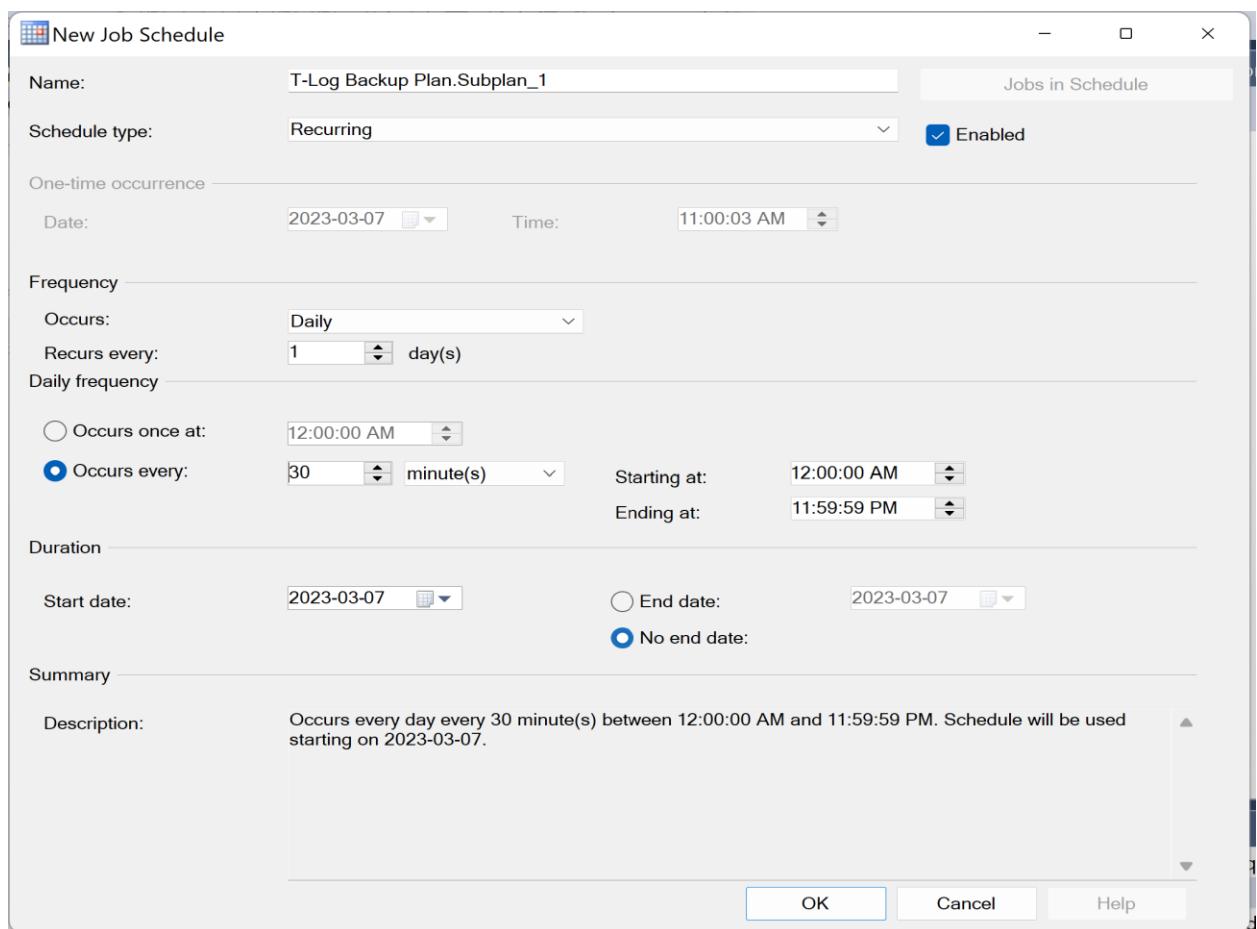
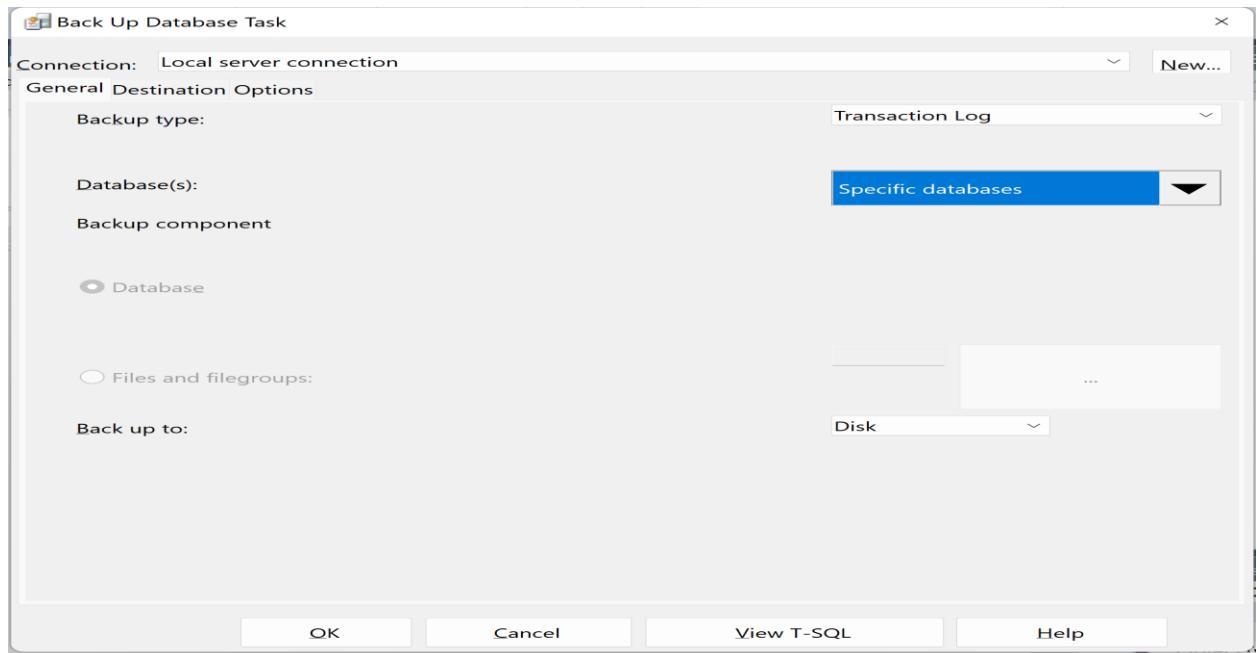


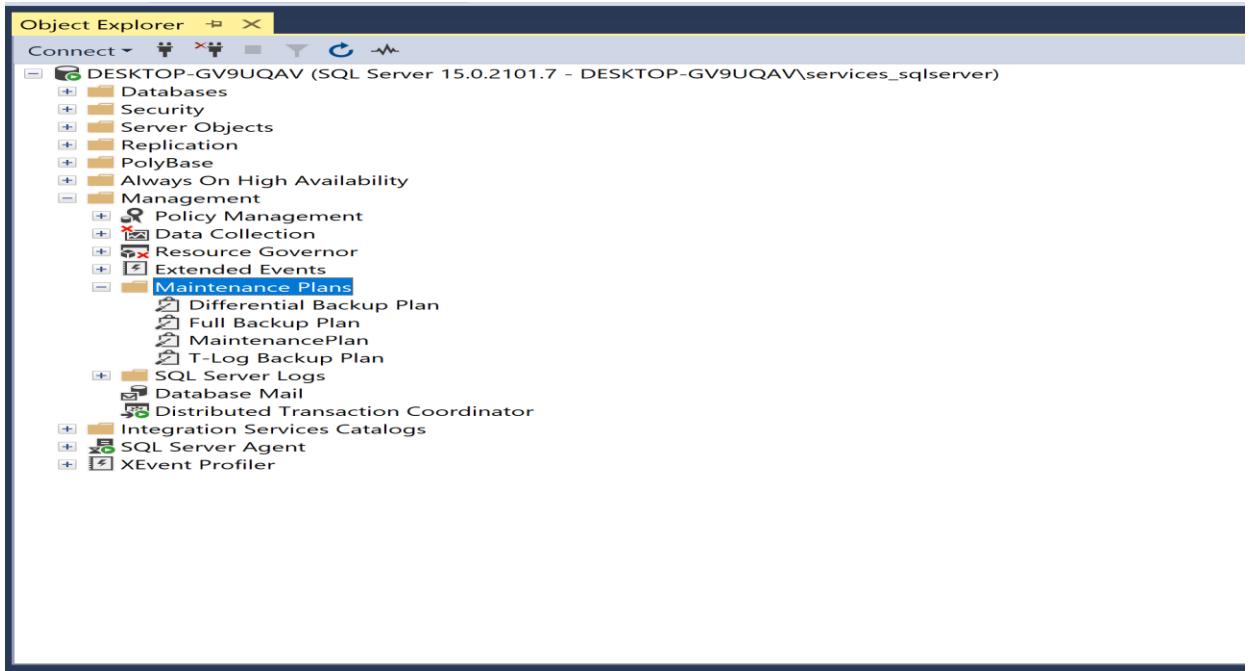


T-Log backup every 30 minutes

To create a maintenance plan for Transaction Log Backup, I have followed the same process that I used to create a maintenance plan to generate Full and differential backup. The changes that I made in the configuration are the following:

In the General tab, chosen Transaction Log from the backup type drop-down box.





Restore (next day) AdventureWorks database with data as of previous day at 14:00

To restore a database to a point in time

1. In Object Explorer, connect to the appropriate instance of the SQL Server Database Engine, and expand the server tree.
2. Expand Databases. Depending on the database, either select a user database or expand System Databases, and then select a system database.
3. Right-click the database, point to Tasks, point to Restore, and then click Database.
4. On the General page, use the Source section to specify the source and location of the backup sets to restore. Select one of the following options:
 - Database

Select the database to restore from the drop-down list. The list contains only databases that have been backed up according to the msdb backup history.

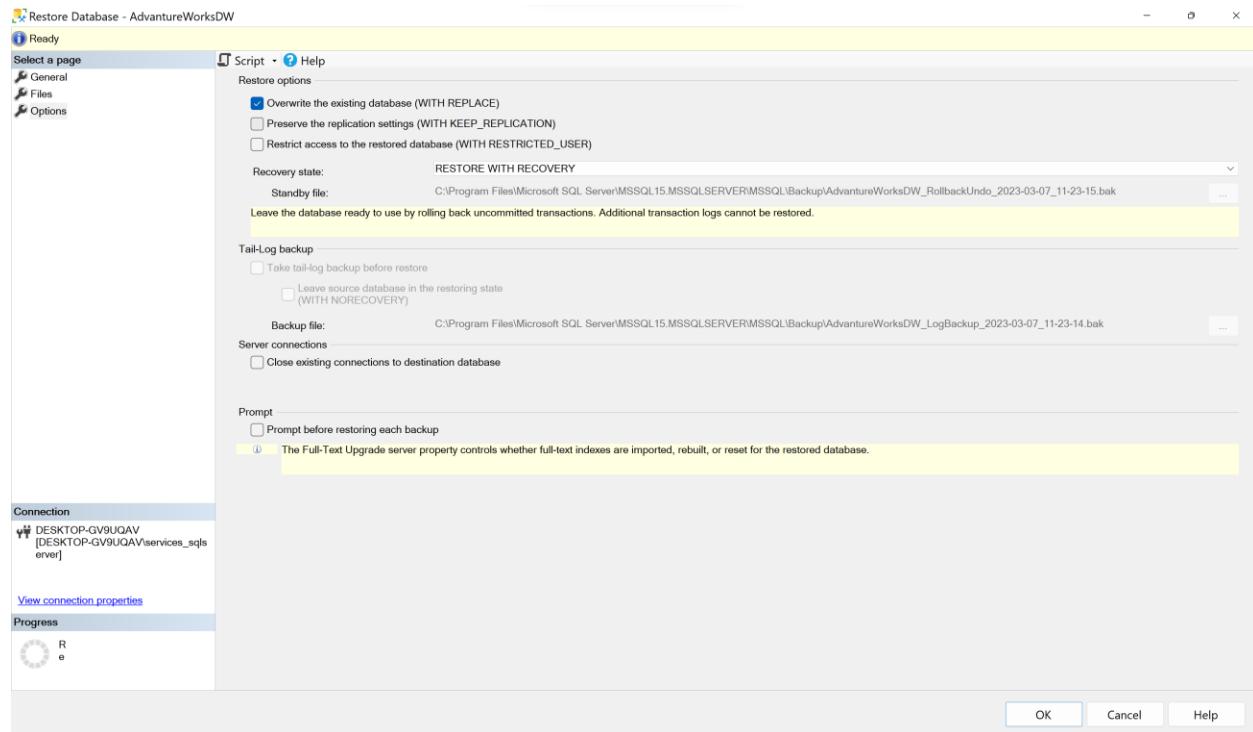
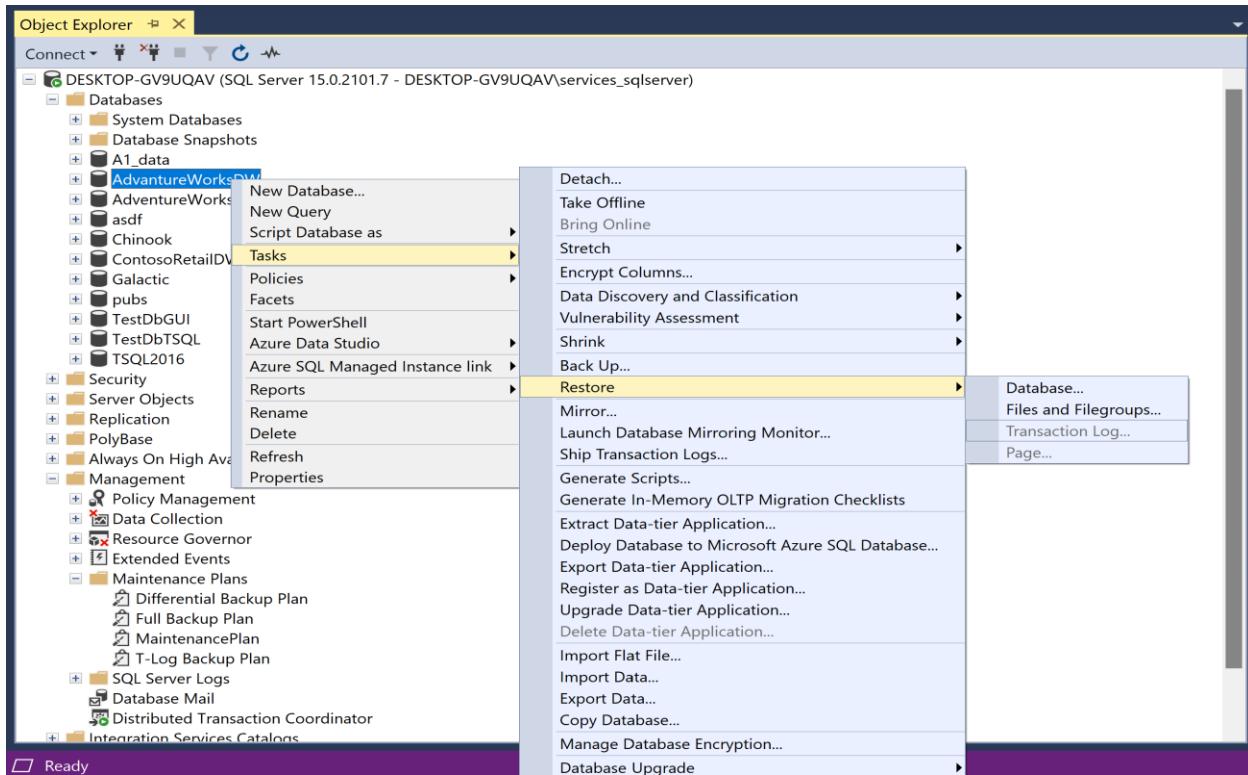
5. If the backup is taken from a different server, the destination server will not have the backup history information for the specified database. In this case, select Device to manually specify the file or device to restore.
 - Device

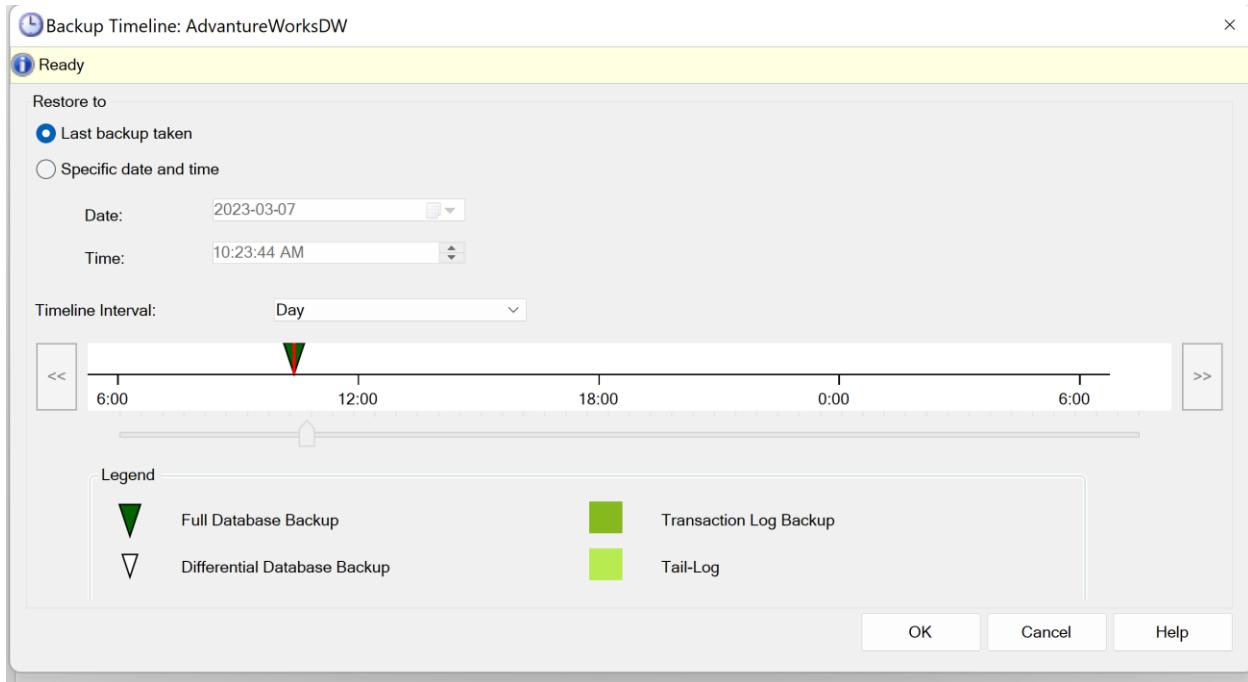
Click the browse (...) button to open the Select backup devices dialog box. In the Backup media type box, select one of the listed device types. To select one or more devices for the Backup media box, click Add.

After you add the devices you want to the Backup media list box, click OK to return to the General page.

In the Source: Device: Database list box, select the name of the database which should be restored.

6. In the Destination section, the Database box is automatically populated with the name of the database to be restored. To change the name of the database, enter the new name in the Database box.
7. Click Timeline to access the Backup Timeline dialog box.
8. In the Restore to section, click Specific date and time.
9. Use either the Date and Time boxes or the slider bar to specify a specific date and time to where the restore should stop. Select OK.
10. After you have specified a specific point in time, the Database Recovery Advisor ensures that only backups that are required for restoring to that point in time are selected in the Restore column of the Backup sets to restore grid. These selected backups make up the recommended restore plan for your point-in-time restore. You should use only the selected backups for your point-in-time restore operation.
11. On the Options page, in the Restore options panel, you can select any of the following options, if appropriate for your situation:
 - Overwrite the existing database (WITH REPLACE)
 - Preserve the replication settings (WITH KEEP_REPLICATION)
 - Restrict access to the restored database (WITH RESTRICTED_USER)
12. Take tail-log backup before restore will be selected if it is necessary for the point in time that you have selected. You do not need to modify this setting, but you can choose to backup the tail of the log even if it is not required.
13. Restore operations may fail if there are active connections to the database. Check the Close existing connections option to ensure that all active connections between Management Studio and the database are closed. This check box sets the database to single user mode before performing the restore operations, and sets the database to multi-user mode when complete.
14. Select Prompt before restoring each backup if you wish to be prompted between each restore operation. This is not usually necessary unless the database is large and you wish to monitor the status of the restore operation.





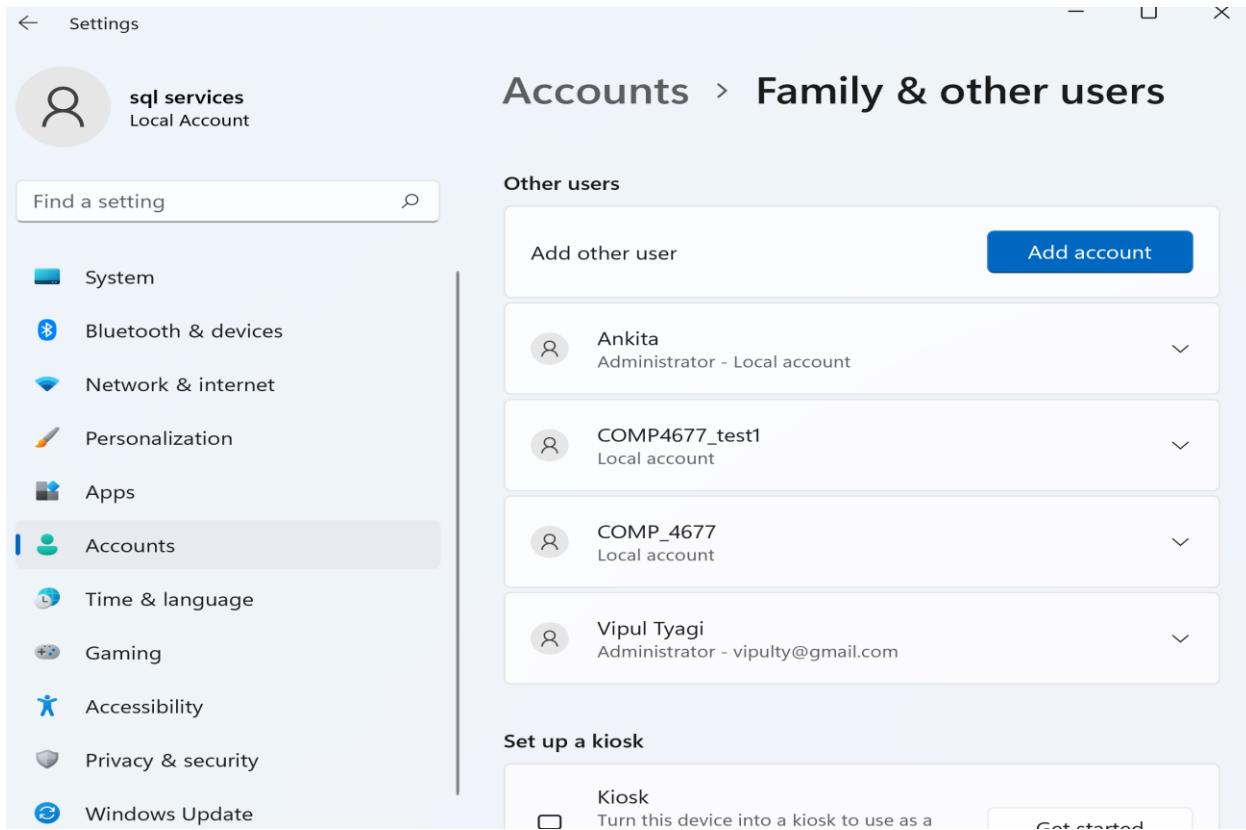
Server and database security and auditing recommendations and implementation

Create new Windows User

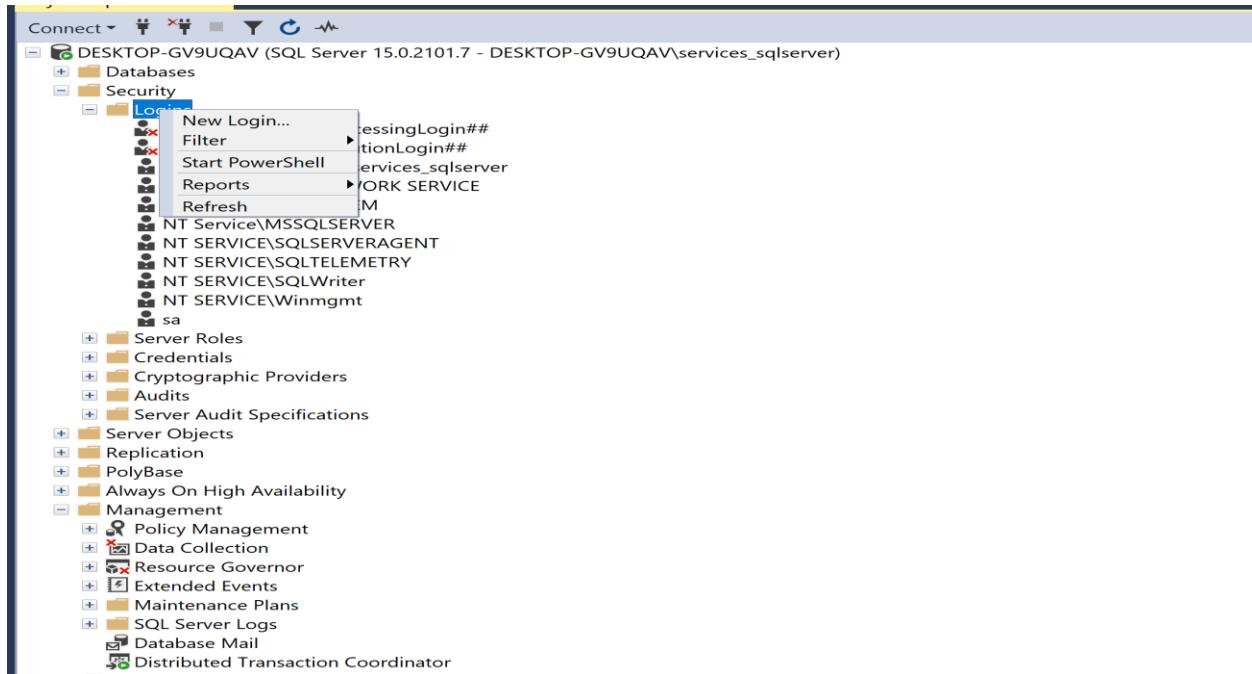
Use <Your machine name>\COMP4677_test1

[Create a local user account](#)

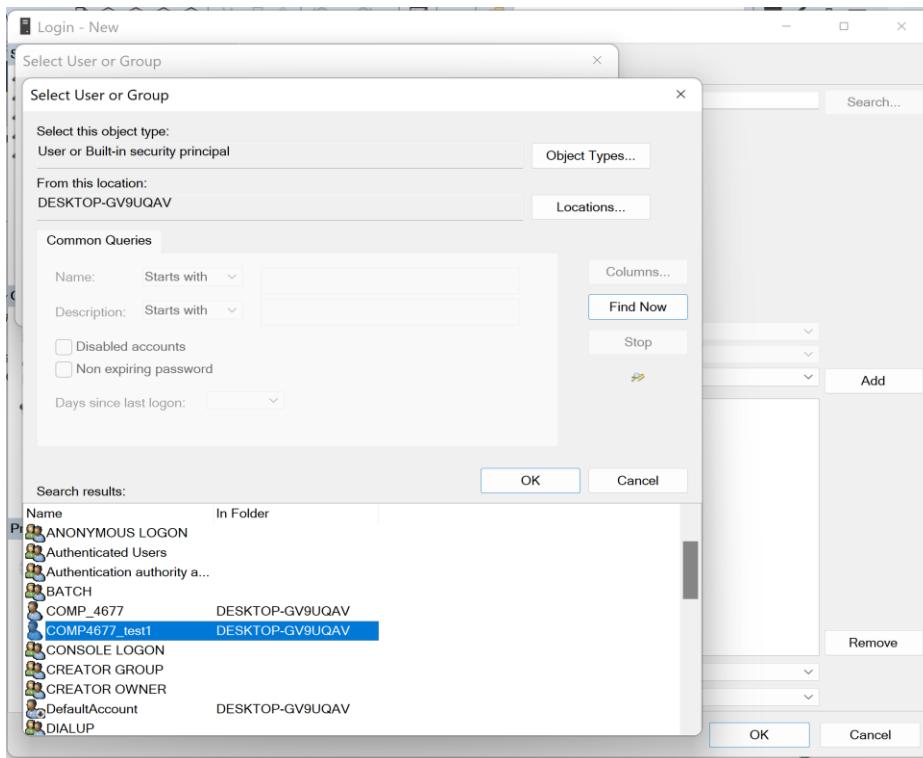
1. Select Start > Settings > Accounts and then select Family & other users. (In some versions of Windows you'll see Other users.)
2. Next to Add other user, select Add account.
3. Select I don't have this person's sign-in information, and on the next page, select Add a user without a Microsoft account.
4. Enter a user name, password, or password hint—or choose security questions—and then select Next.

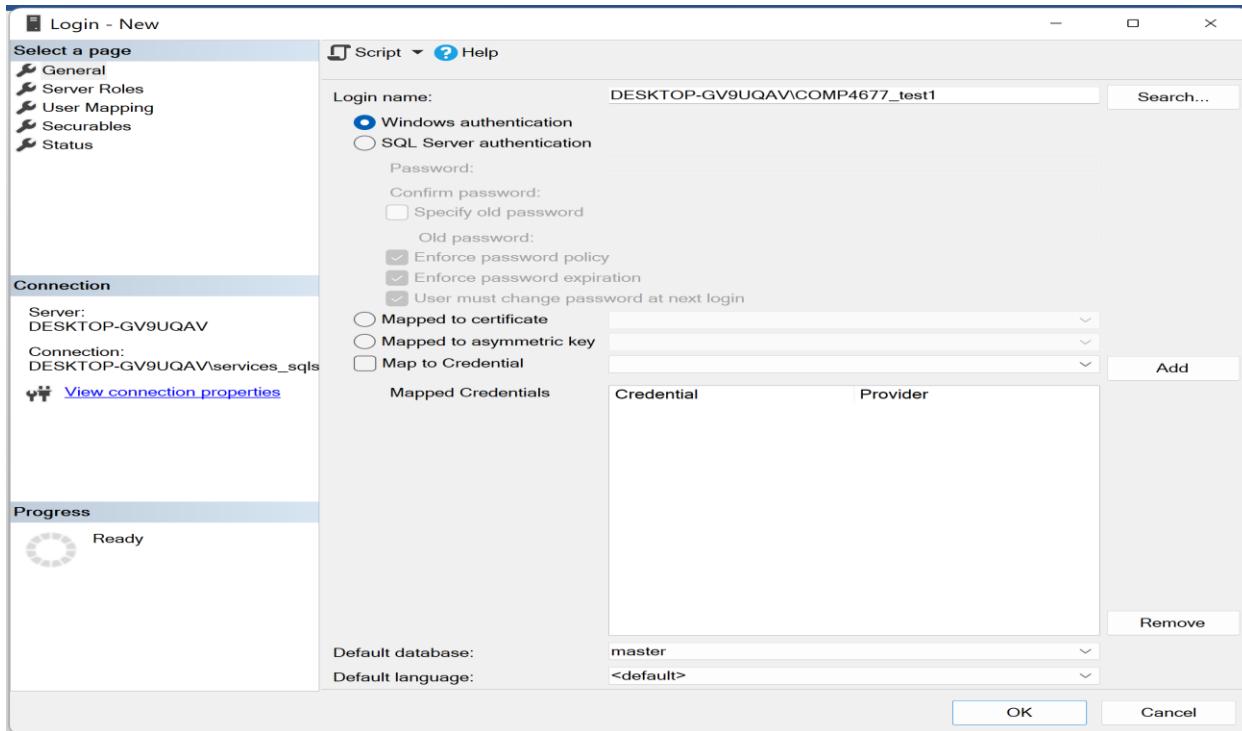


1. Add new Login to Instance, use windows user from step 2.
 1. In Object Explorer, expand the folder of the server instance in which you want to create the new login.
 2. Right-click the Security folder, point to New, and select Login....

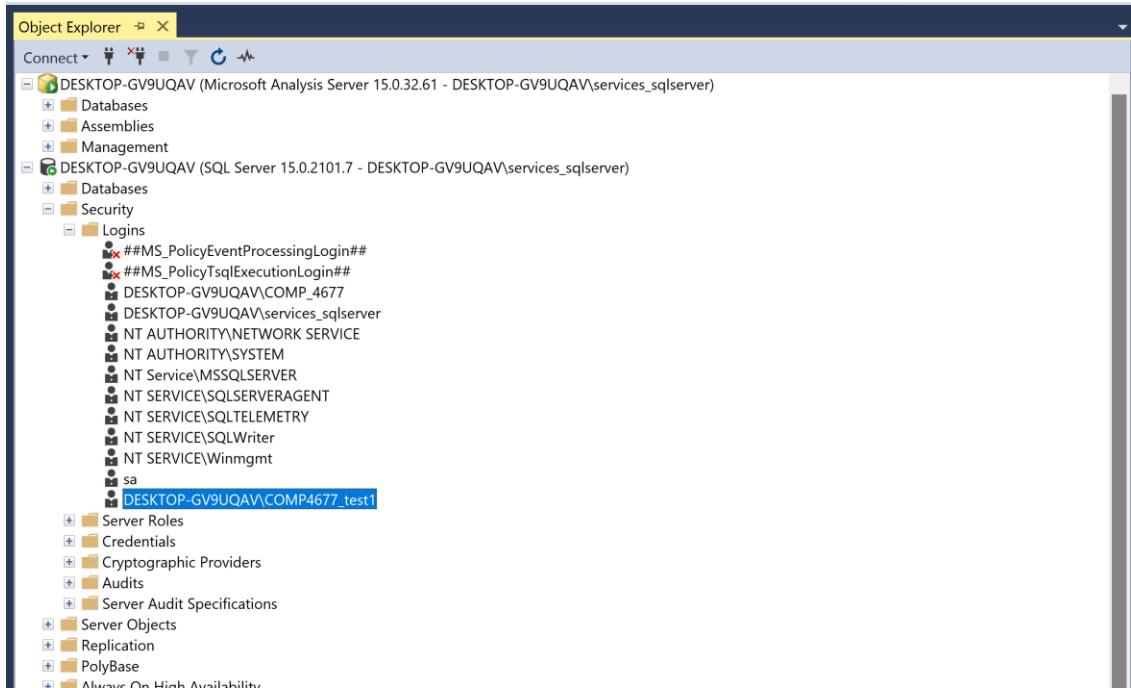


3. In the Login - New dialog box, on the General page, enter the name of a user in the Login name box. Alternately, select Search... to open the Select User or Group dialog box.



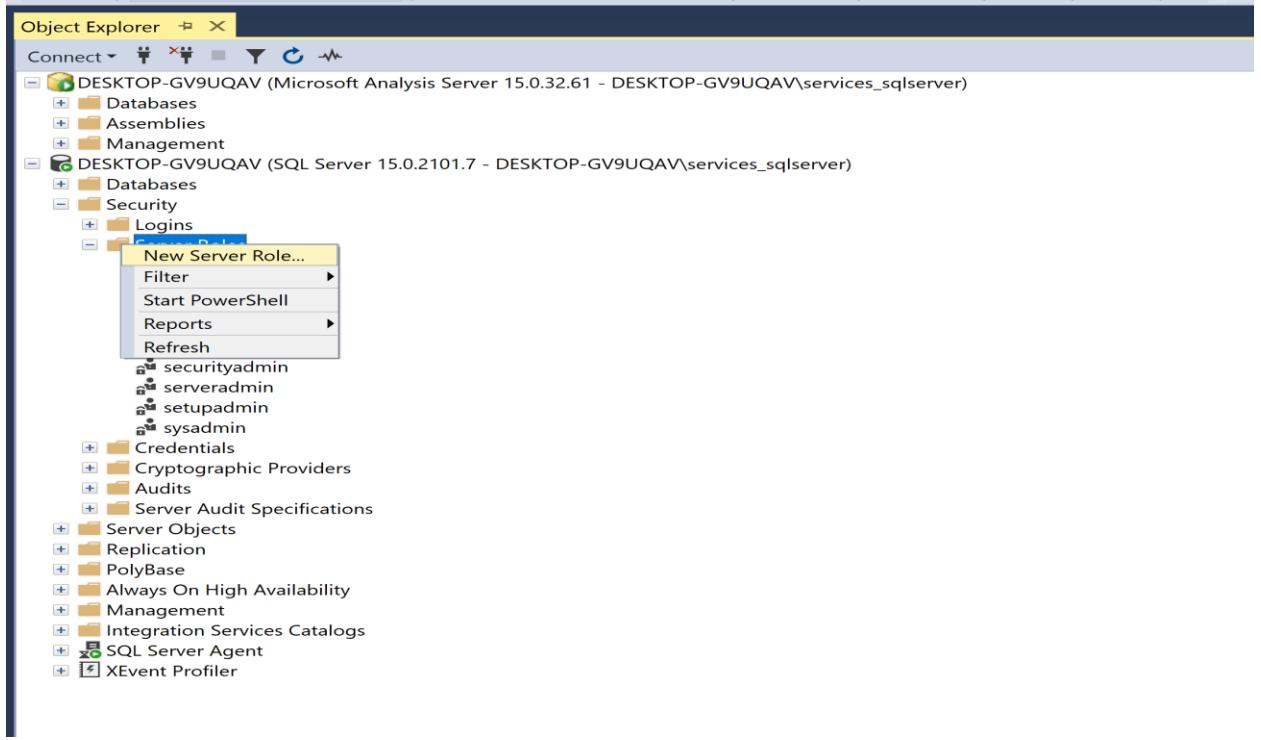


4. Select OK.

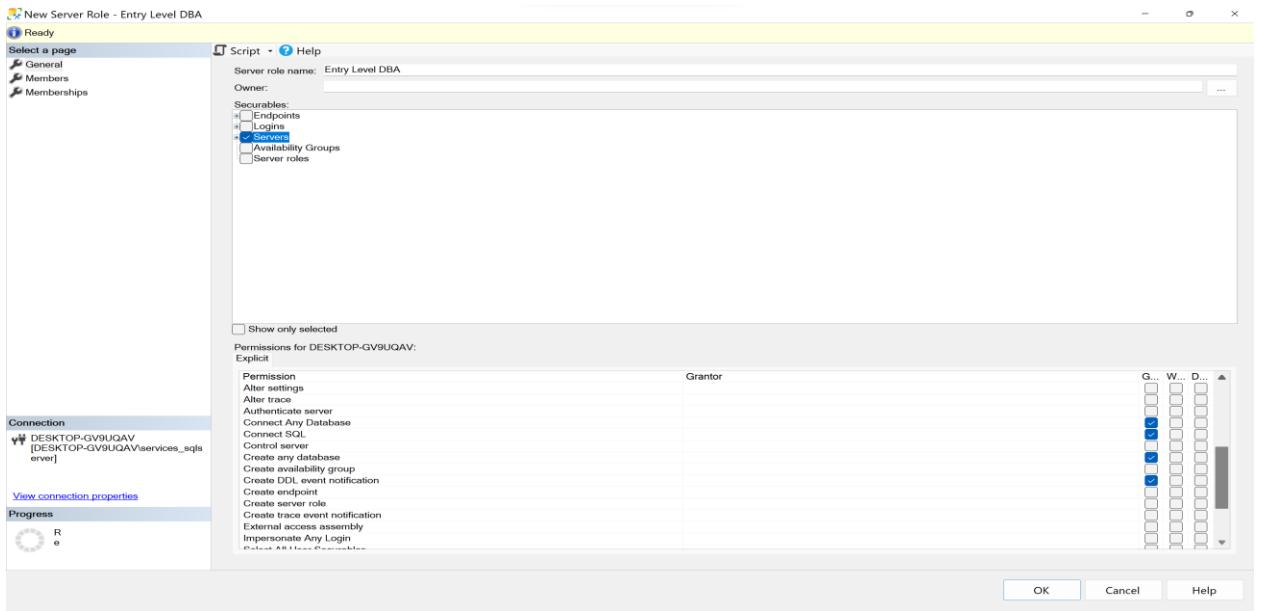


Create custom database role

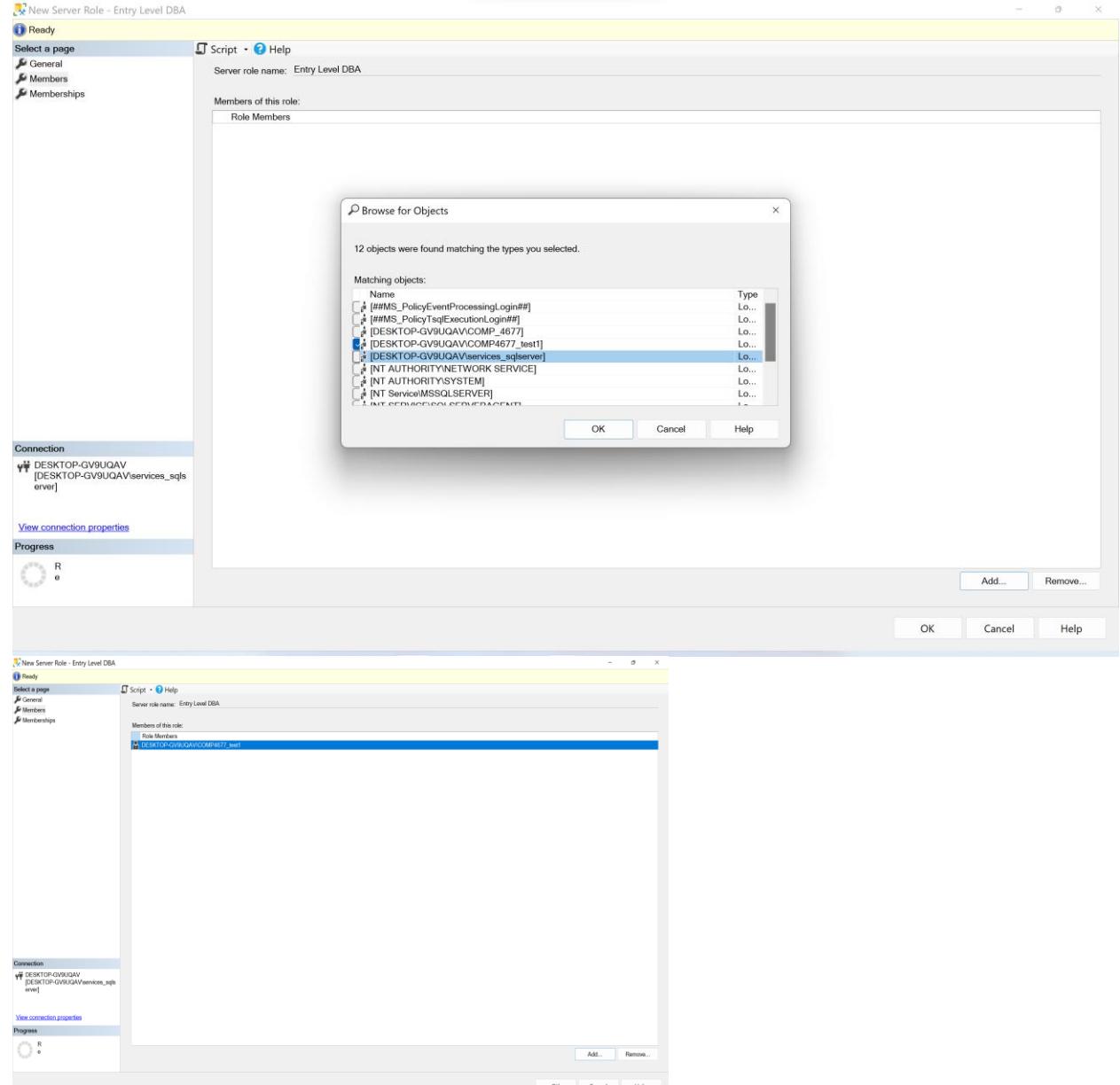
- In Object Explorer, expand the server where you want to create the new server role.
- Expand the Security folder.
- Right-click the Server Roles folder and select New Server Role....



- In the New Server Role -server_role_name dialog box, on the General page, enter a name for the new server role in the Server role name box.

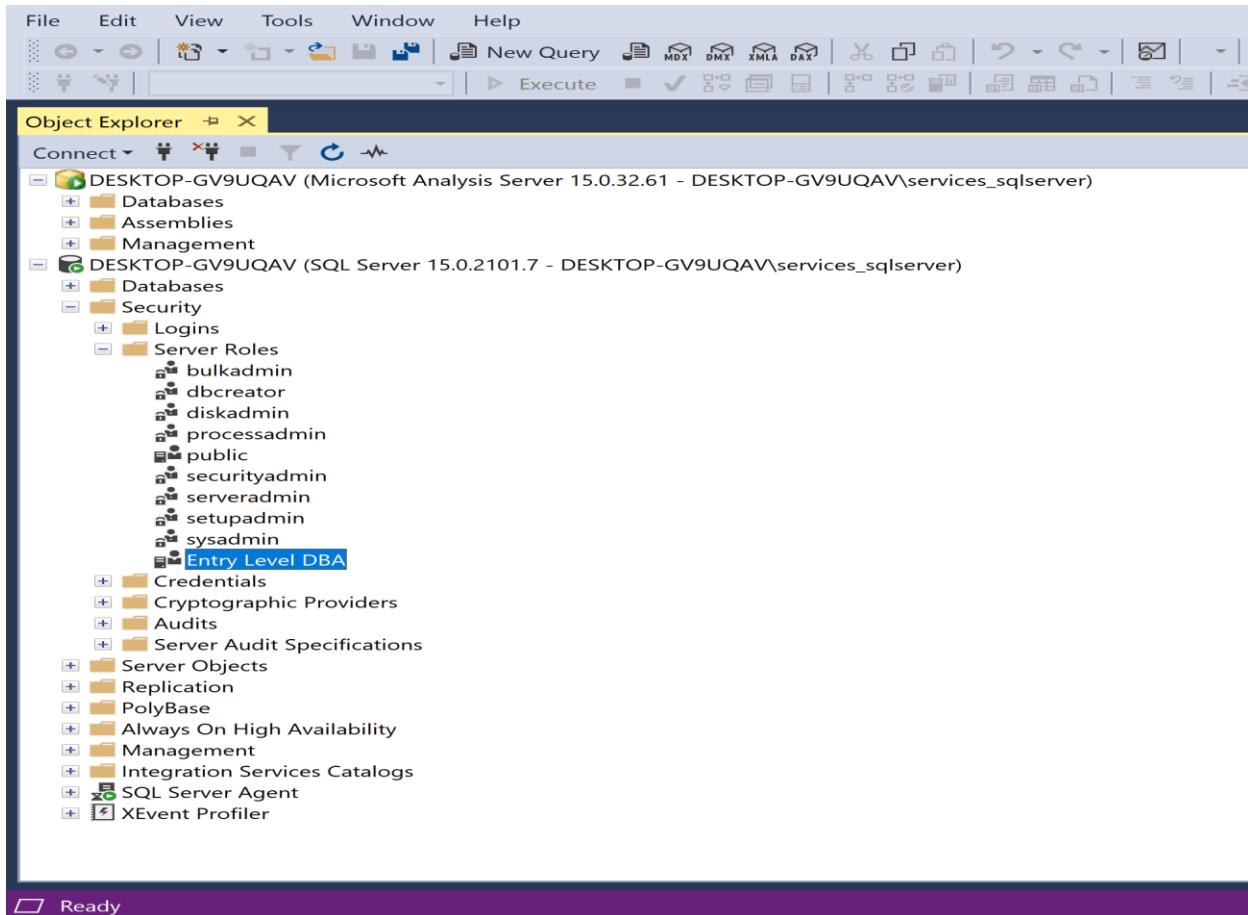


- In the Owner box, enter the name of the server principal that will own the new role. Alternately, click the ellipsis (...) to open the Select Server Login or Role dialog box.
- Under Securables, select one or more server-level securables. When a securable is selected, this server role can be granted or denied permissions on that securable.
- In the Permissions: Explicit box, select the check box to grant, grant with grant, or deny permission to this server role for the selected securables. If a permission cannot be granted or denied to all of the selected securables, the permission is represented as a partial select.
- On the Members page, use the Add button to add logins that represent individuals or groups to the new server role.



- A user-defined server role can be a member of another server role. On the Memberships page, select a check box to make the current user-defined server role a member of a selected server role.

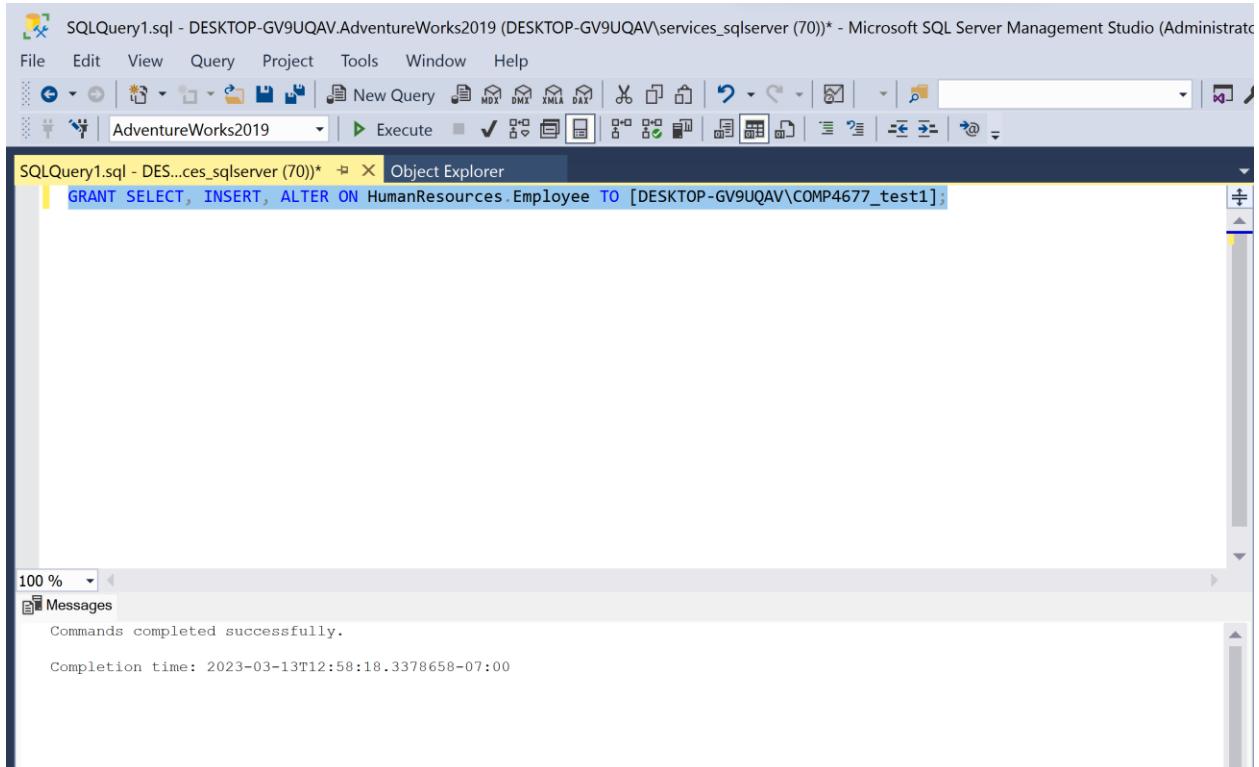
- Select OK.



Grant role privileges

The GRANT statement provides access and permissions on database objects to the user. The basic syntax is as follows: GRANT privileges ON database_name.object TO {user_name |PUBLIC |role_name} [WITH GRANT OPTION];

The table above describes the arguments used in the GRANT statements.



```
SQLQuery1.sql - DESKTOP-GV9UQAV\AdventureWorks2019 (DESKTOP-GV9UQAV\services_sqserver (70))* - Microsoft SQL Server Management Studio (Administrator)

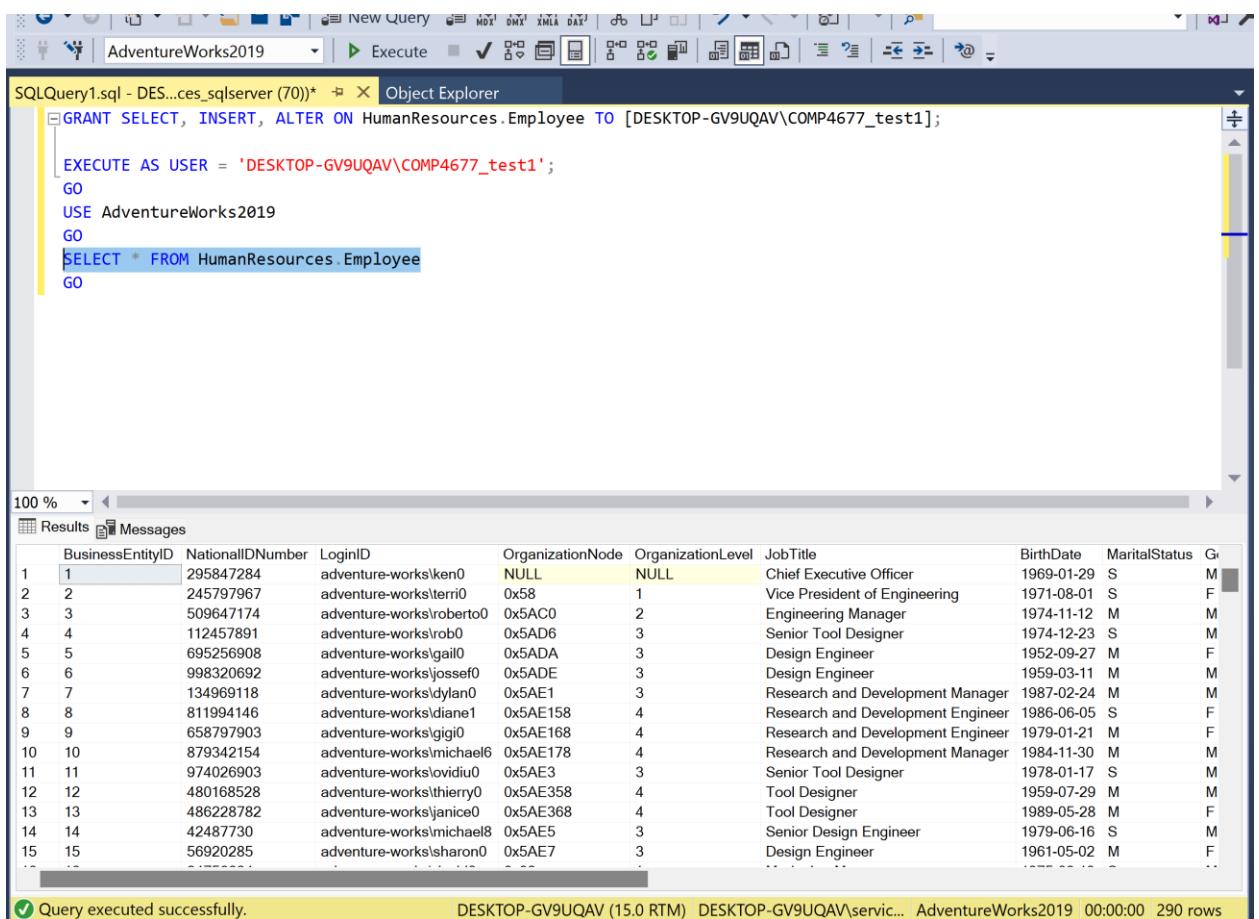
File Edit View Query Project Tools Window Help
New Query MDX DMX XML DAX
AdventureWorks2019 Execute ✓
GRANT SELECT, INSERT, ALTER ON HumanResources.Employee TO [DESKTOP-GV9UQAV\COMP4677_test1];
```

100 %

Messages

Commands completed successfully.

Completion time: 2023-03-13T12:58:18.3378658-07:00



```
SQLQuery1.sql - DESKTOP-GV9UQAV\AdventureWorks2019 (DESKTOP-GV9UQAV\services_sqserver (70))* - Microsoft SQL Server Management Studio (Administrator)

GRANT SELECT, INSERT, ALTER ON HumanResources.Employee TO [DESKTOP-GV9UQAV\COMP4677_test1];
EXECUTE AS USER = 'DESKTOP-GV9UQAV\COMP4677_test1';
GO
USE AdventureWorks2019
GO
SELECT * FROM HumanResources.Employee
GO
```

100 %

Results

BusinessEntityID	NationalIDNumber	LoginID	OrganizationNode	OrganizationLevel	JobTitle	BirthDate	MaritalStatus	Gender
1	295847284	adventure-works\ken0	NULL	NULL	Chief Executive Officer	1969-01-29	S	M
2	245797967	adventure-works\terri0	0x58	1	Vice President of Engineering	1971-08-01	S	F
3	509647174	adventure-works\roberto0	0x5AC0	2	Engineering Manager	1974-11-12	M	M
4	112457891	adventure-works\rob0	0x5AD6	3	Senior Tool Designer	1974-12-23	S	M
5	695256908	adventure-works\gail0	0x5ADA	3	Design Engineer	1952-09-27	M	F
6	998320692	adventure-works\jossef0	0x5ADE	3	Design Engineer	1959-03-11	M	M
7	134969118	adventure-works\dylan0	0x5AE1	3	Research and Development Manager	1987-02-24	M	M
8	811994146	adventure-works\diane1	0x5AE158	4	Research and Development Engineer	1986-06-05	S	F
9	658797903	adventure-works\gigi0	0x5AE168	4	Research and Development Engineer	1979-01-21	M	F
10	879342154	adventure-works\michael6	0x5AE178	4	Research and Development Manager	1984-11-30	M	M
11	974026903	adventure-works\ovidiu0	0x5AE3	3	Senior Tool Designer	1978-01-17	S	M
12	480168528	adventure-works\thierry0	0x5AE358	4	Tool Designer	1959-07-29	M	M
13	486228782	adventure-works\janice0	0x5AE368	4	Tool Designer	1989-05-28	M	F
14	42487730	adventure-works\michael8	0x5AE5	3	Senior Design Engineer	1979-06-16	S	M
15	56920285	adventure-works\sharon0	0x5AE7	3	Design Engineer	1961-05-02	M	F

Query executed successfully.

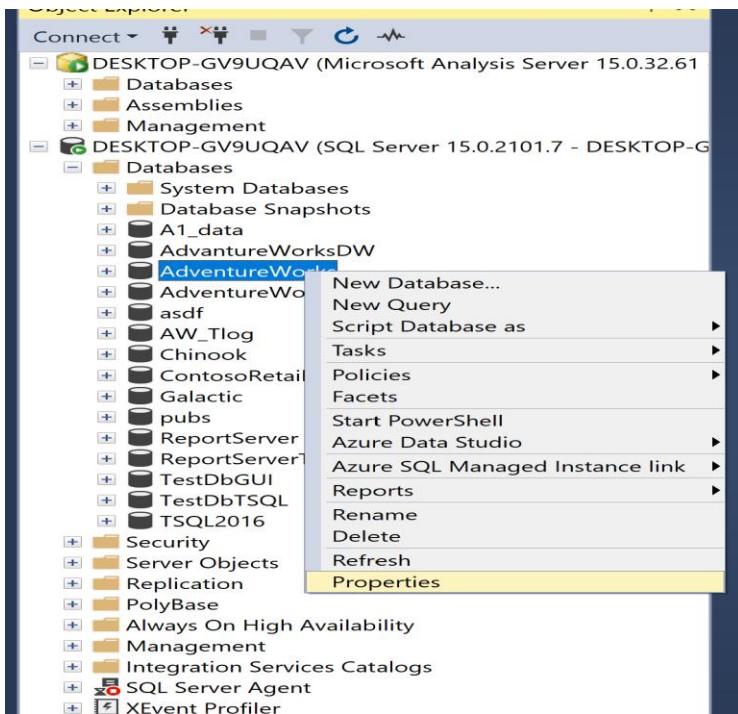
Argument	Description
privileges	Permissions you want to grant. They include the SELECT, INSERT, UPDATE, DELETE, REFERENCES, ALTER, or ALL statements.
database_name	Name of the database to which the database object belongs.
object	Database object on which the specified privileges will be assigned.
user_name	Name of the user whom the privileges will be granted.
PUBLIC	Used to grant permissions to all users.
role_name	Set of privileges grouped in one category.
WITH GRANT OPTION	Used to grant permissions to other users.

Implement transaction log shipping for AdventureWorks database

- Ship logs to second server instance
- Use second server instance for Log Shipping monitoring

Configure log shipping

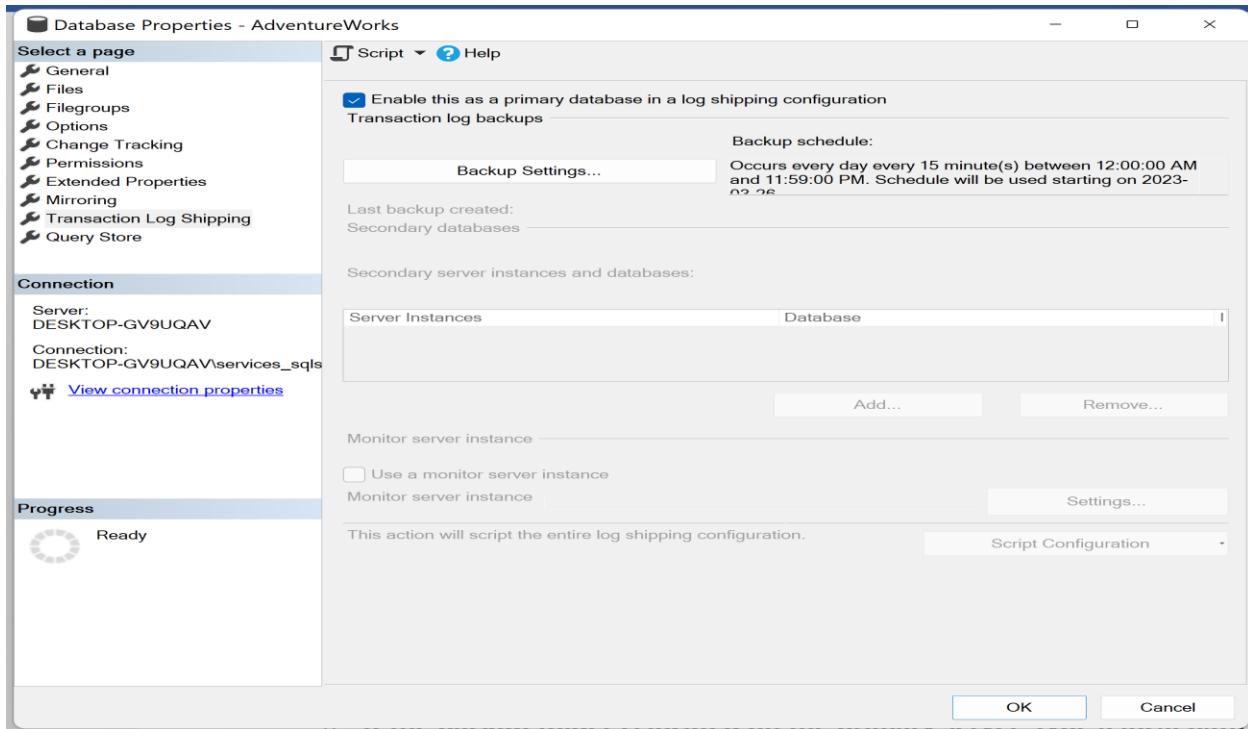
1. Right click the database you want to use as your primary database in the log shipping configuration, and then click Properties.



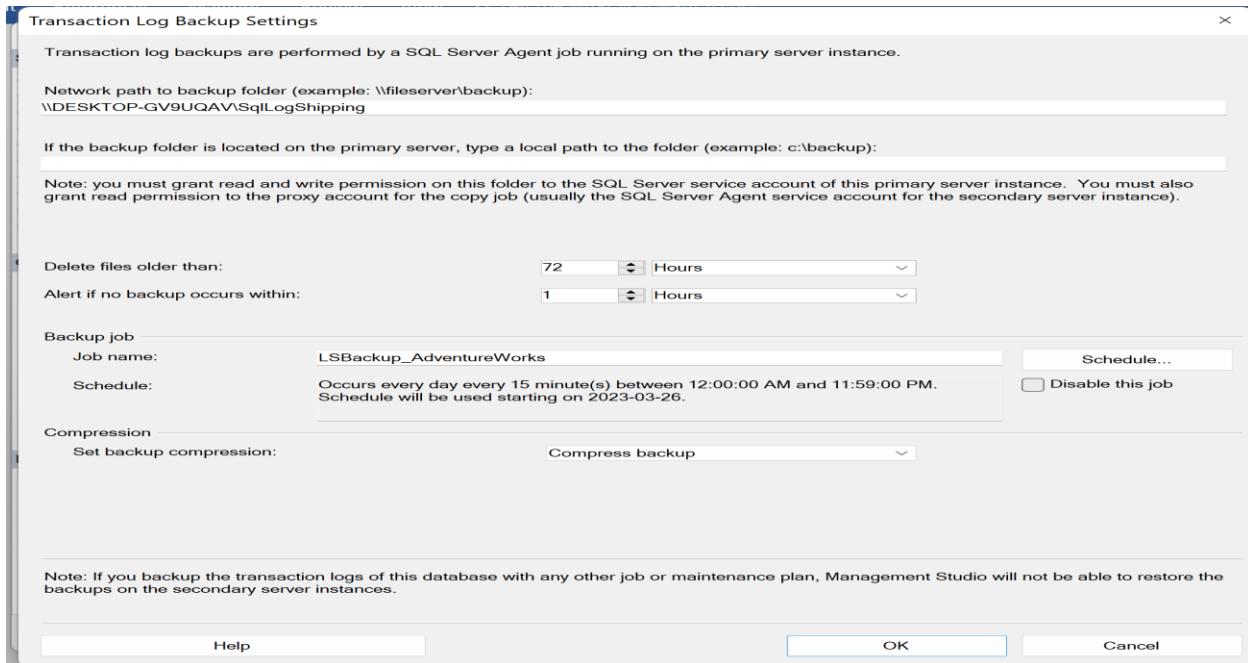
2. Under Select a page, click Transaction Log Shipping.

Name	Value
Name	AdventureWorks
Status	Normal
Owner	DESKTOP-GV9UQAV\services_sqlserver
Date Created	2023-03-20 4:30:22 PM
Size	716.00 MB
Space Available	11.67 MB
Number of Users	4
Memory Allocated To Memory Optimized Objects	0.00 MB
Memory Used By Memory Optimized Objects	0.00 MB
Collation	SQL_Latin1_General_CI_AS

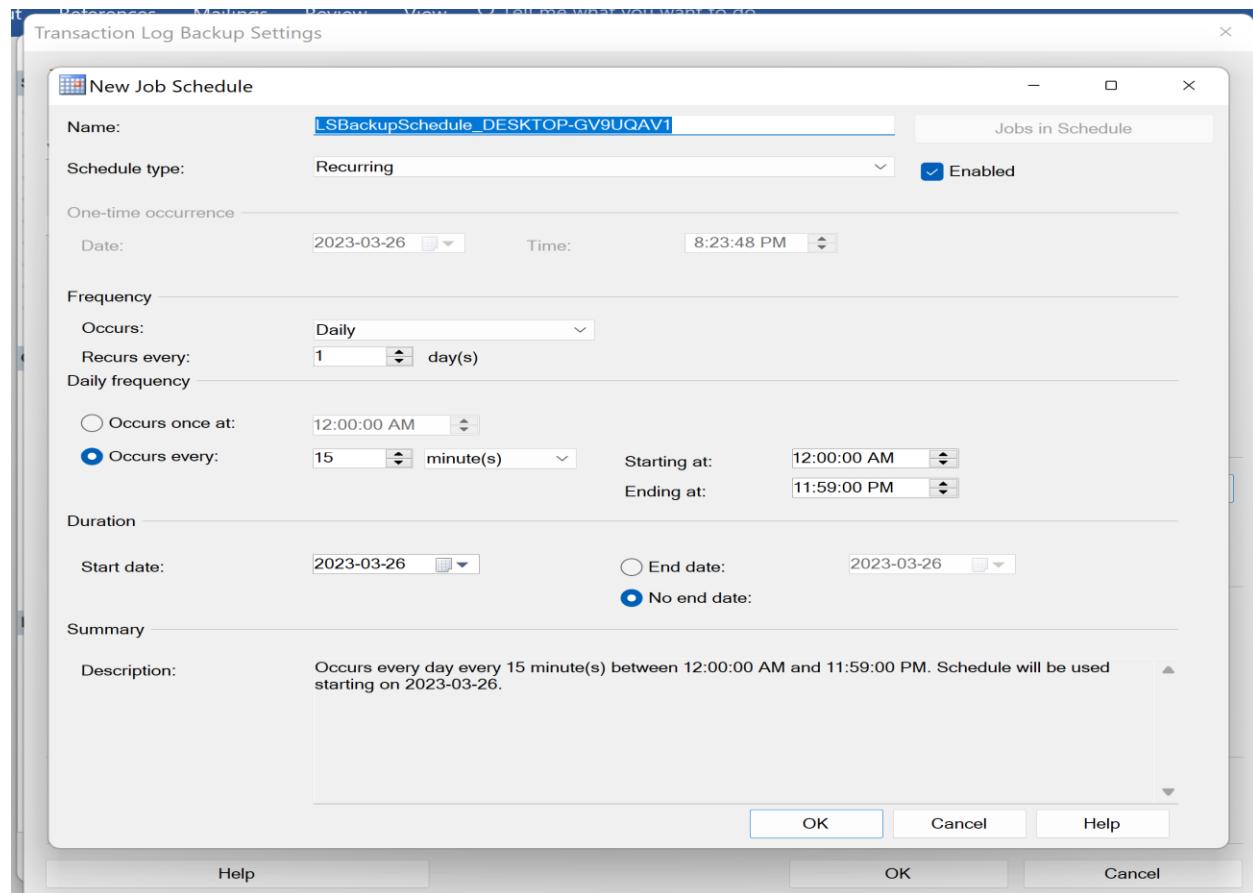
3. Select the Enable this as a primary database in a log shipping configuration check box.



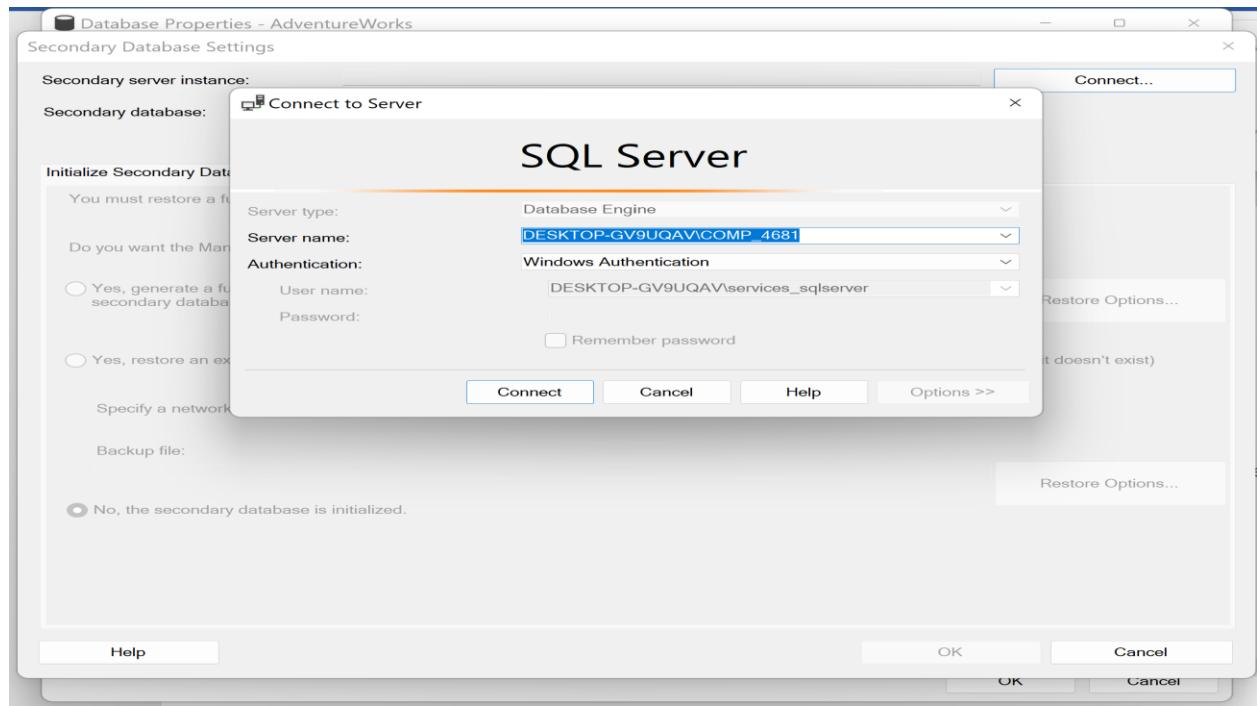
4. Under Transaction log backups, click Backup Settings.



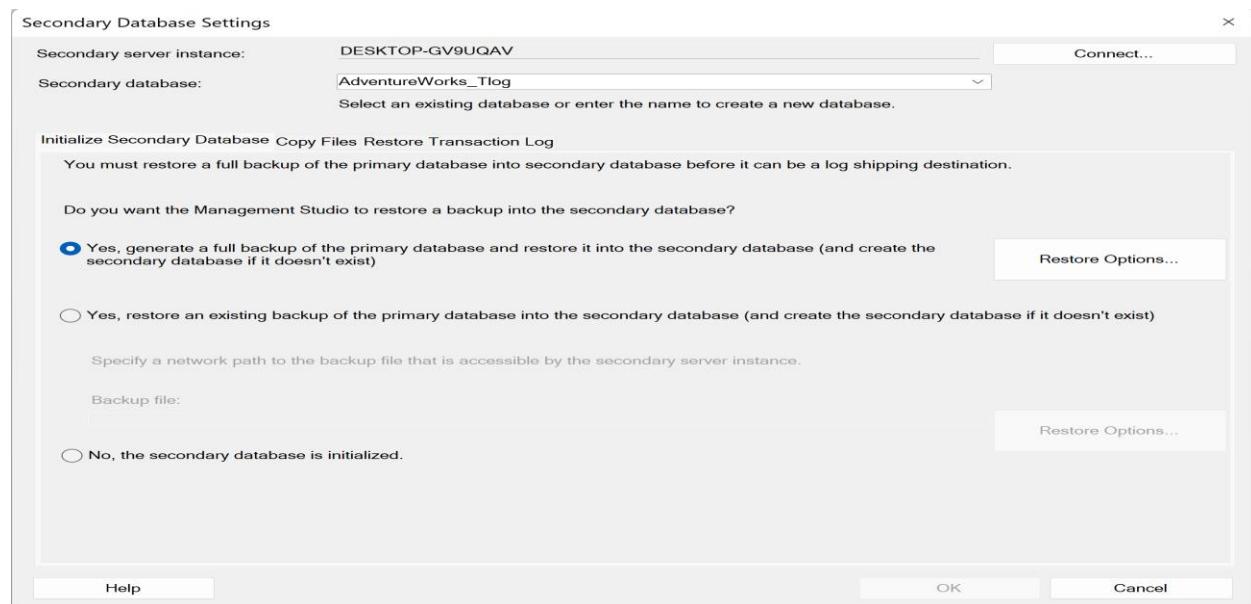
5. In the Network path to the backup folder box, type the network path to the share you created for the transaction log backup folder.
6. If the backup folder is located on the primary server, type a local path in the backup folder box. (If the backup folder is not on the primary server, you can leave this box empty.)
7. Configure the Delete files older than and Alert if no backup occurs within parameters.
8. Note the backup schedule listed in the Schedule box under Backup job. If you want to customize the schedule for your installation, then click Schedule and adjust the SQL Server Agent schedule as needed.

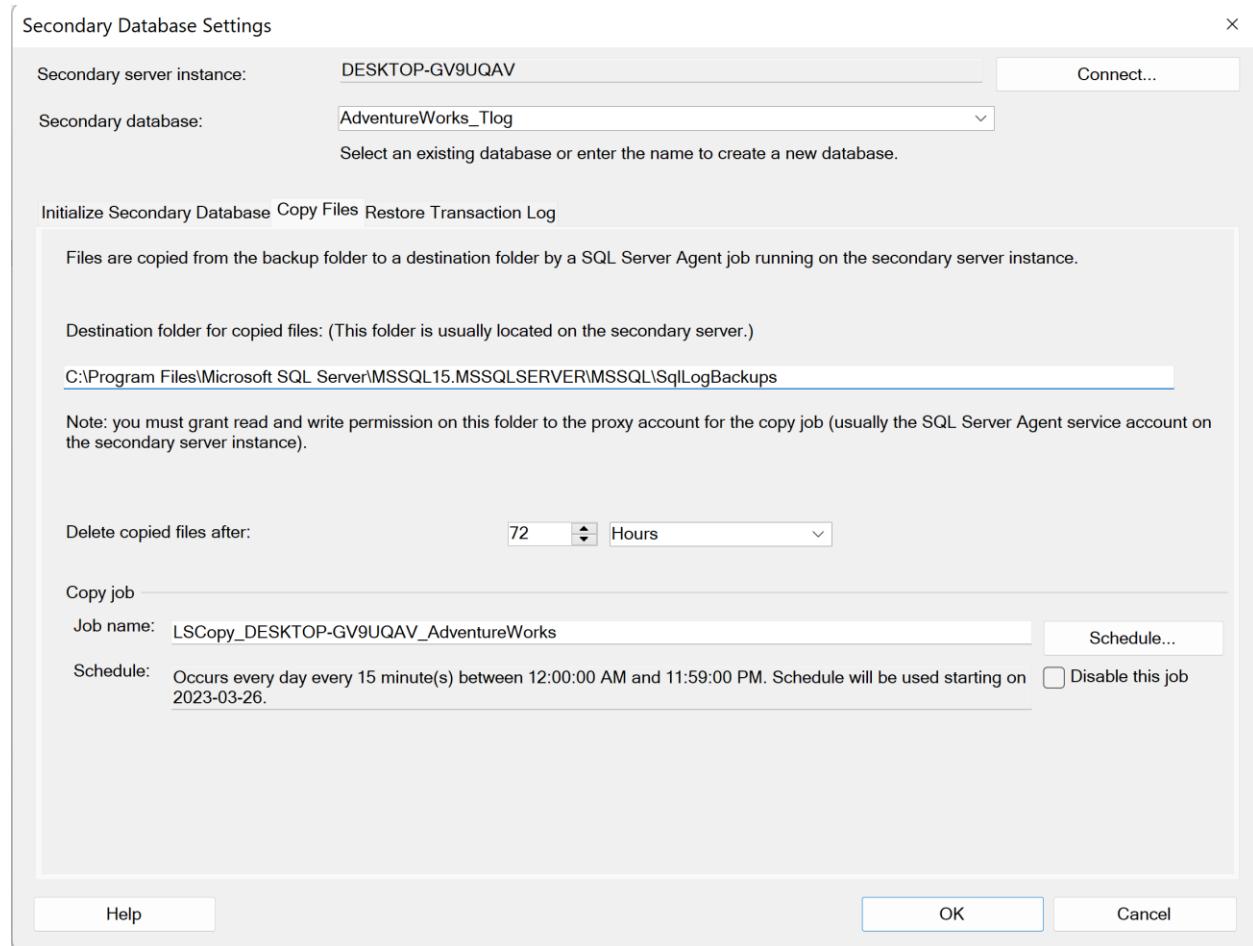


9. When creating a log shipping configuration, you can control the backup compression behavior of log backups by choosing one of the following options: Use the default server setting, Compress backup, or Do not compress backup. Click OK.
10. Under Secondary server instances and databases, click Add.

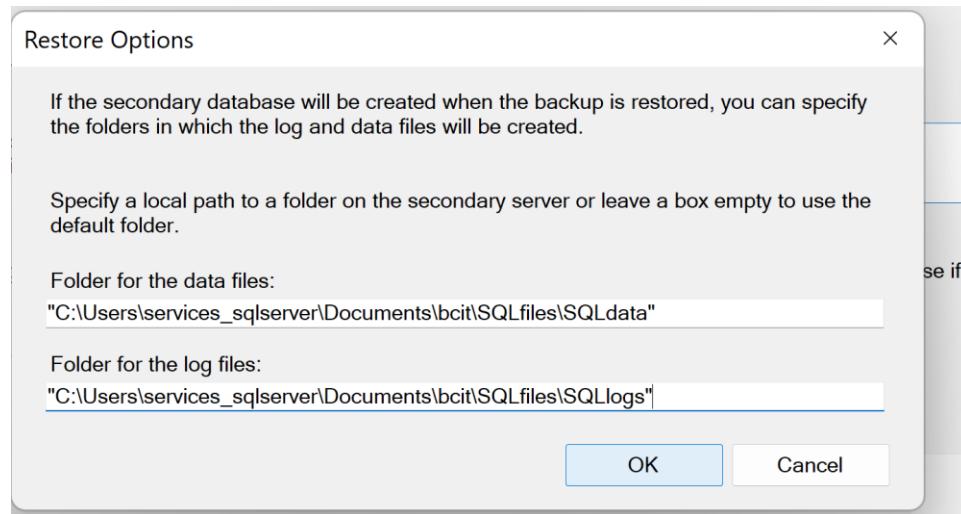


11. Click Connect and connect to the instance of SQL Server that you want to use as your secondary server.
12. In the Secondary Database box, choose a database from the list or type the name of the database you want to create.
13. On the Initialize Secondary database tab, choose the option that you want to use to initialize the secondary database.

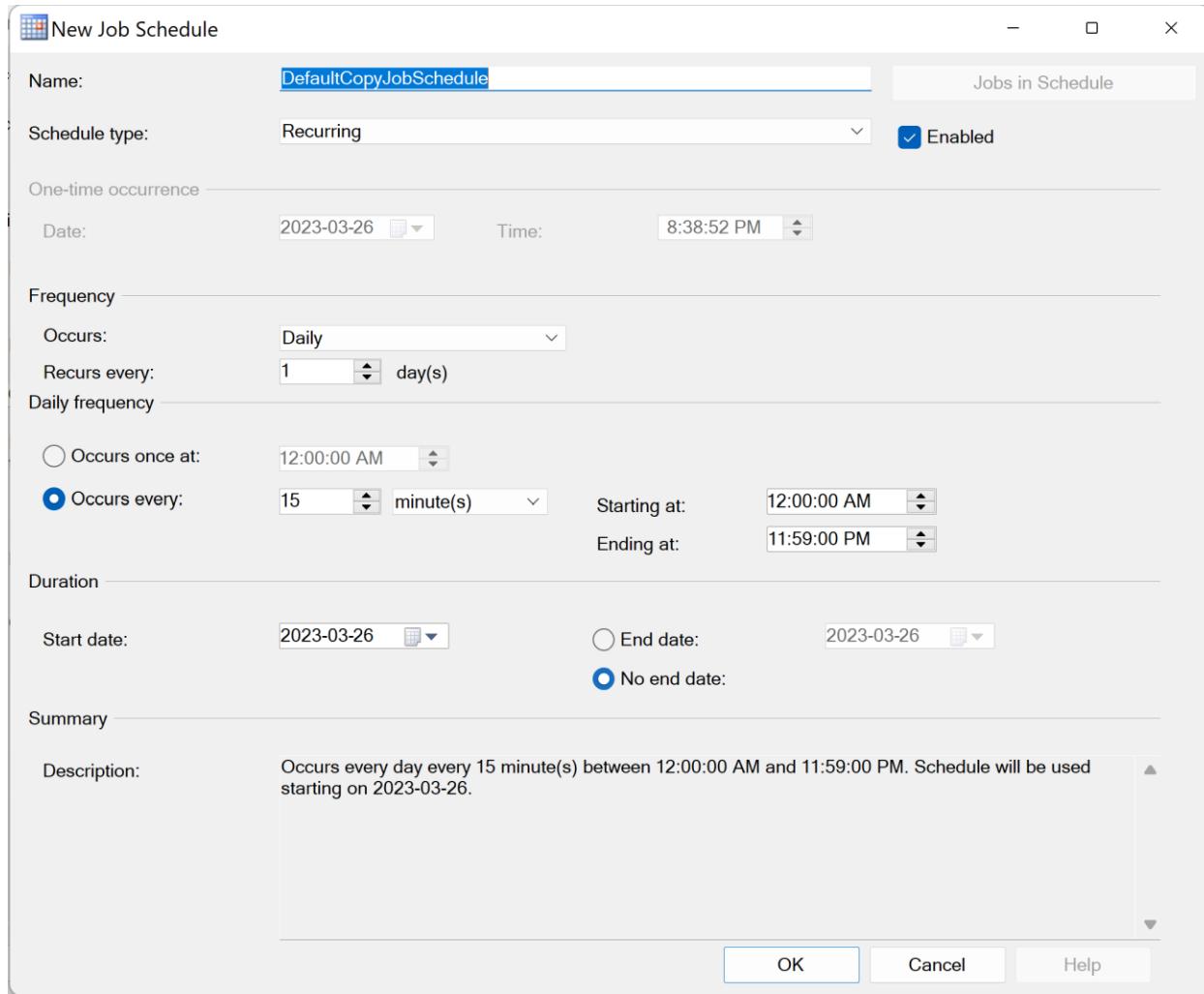




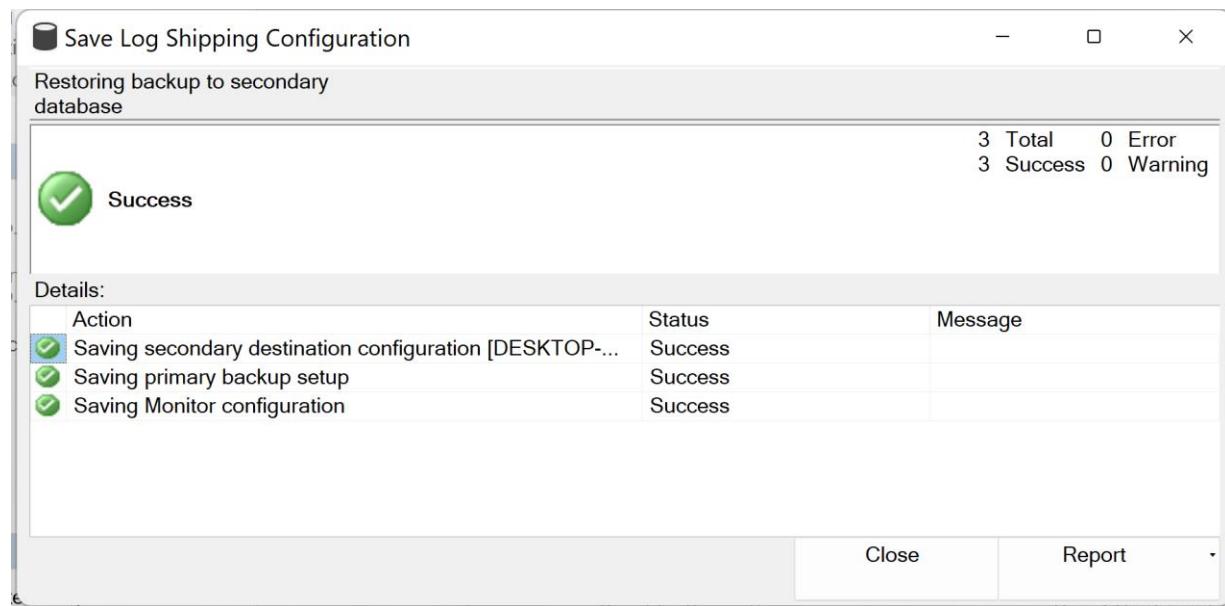
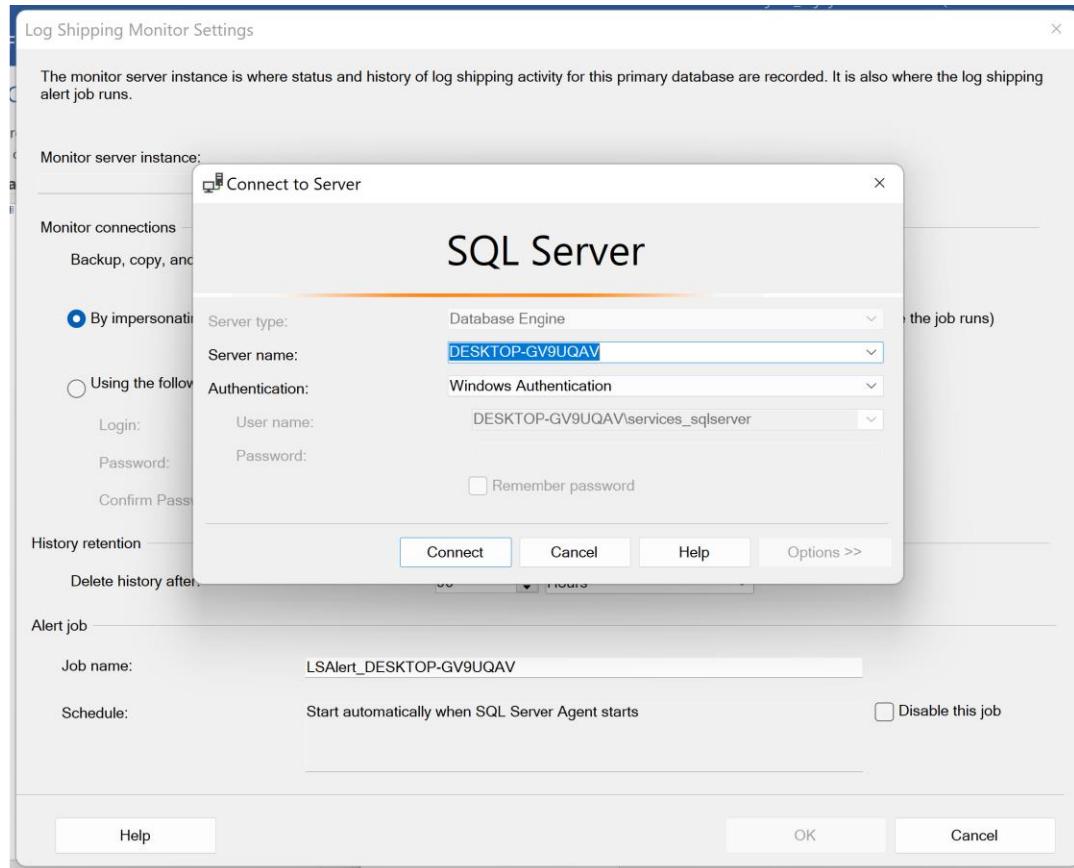
14. On the Copy Files tab, in the Destination folder for copied files box, type the path of the folder into which the transaction logs backups should be copied. This folder is often located on the secondary server.



15. Note the copy schedule listed in the Schedule box under Copy job. If you want to customize the schedule for your installation, click Schedule and then adjust the SQL Server Agent schedule as needed. This schedule should approximate the backup schedule.



16. On the Restore tab, under Database state when restoring backups, choose the No recovery mode or Standby mode option. If you chose the Standby mode option, choose if you want to disconnect users from the secondary database while the restore operation is underway.
17. If you want to delay the restore process on the secondary server, choose a delay time under Delay restoring backups at least.
18. Choose an alert threshold under Alert if no restore occurs within.
19. Note the restore schedule listed in the Schedule box under Restore job. If you want to customize the schedule for your installation, click Schedule and then adjust the SQL Server Agent schedule as needed. This schedule should approximate the backup schedule.
20. Click OK.
21. Under Monitor server instance, select the Use a monitor server instance check box, and then click Settings.



Replicate AdventureWorks database to second SQL Server instance

- All three replications should be Transactional
- All objects from HumanResources schema to AW_HR replicated database
- All Sales objects to AW_Sales database
- All other objects to AW_Rest database

