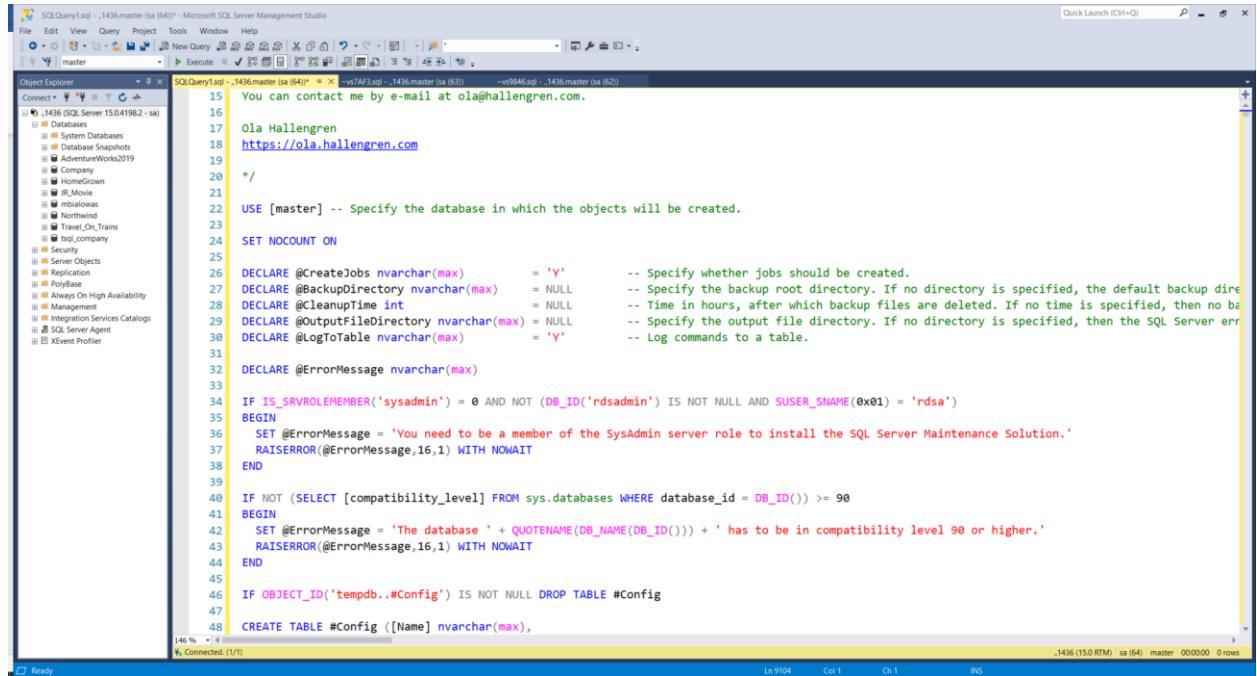


# Ola Hallengren Scripts Setup

## Procedure

1. Download MaintenanceSolution.sql from [SQL Server Maintenance Solution Downloads \(hallengren.com\)](https://ola.hallengren.com/)
2. Open MaintenanceSolution.sql inside SSMS



The screenshot shows the Microsoft SQL Server Management Studio (SSMS) interface. The Object Explorer on the left shows a connection to 'sa (64)' on '1436.master'. The main window displays the 'MaintenanceSolution.sql' script. The script is a SQL batch designed to install the Ola Hallengren Maintenance Solution. It includes comments explaining variables like @CreateJobs, @BackupDirectory, @CleanupTime, @OutputFileDirectory, and @LogToTable. It checks for sysadmin privileges and compatibility levels, and creates a temporary table #Config.

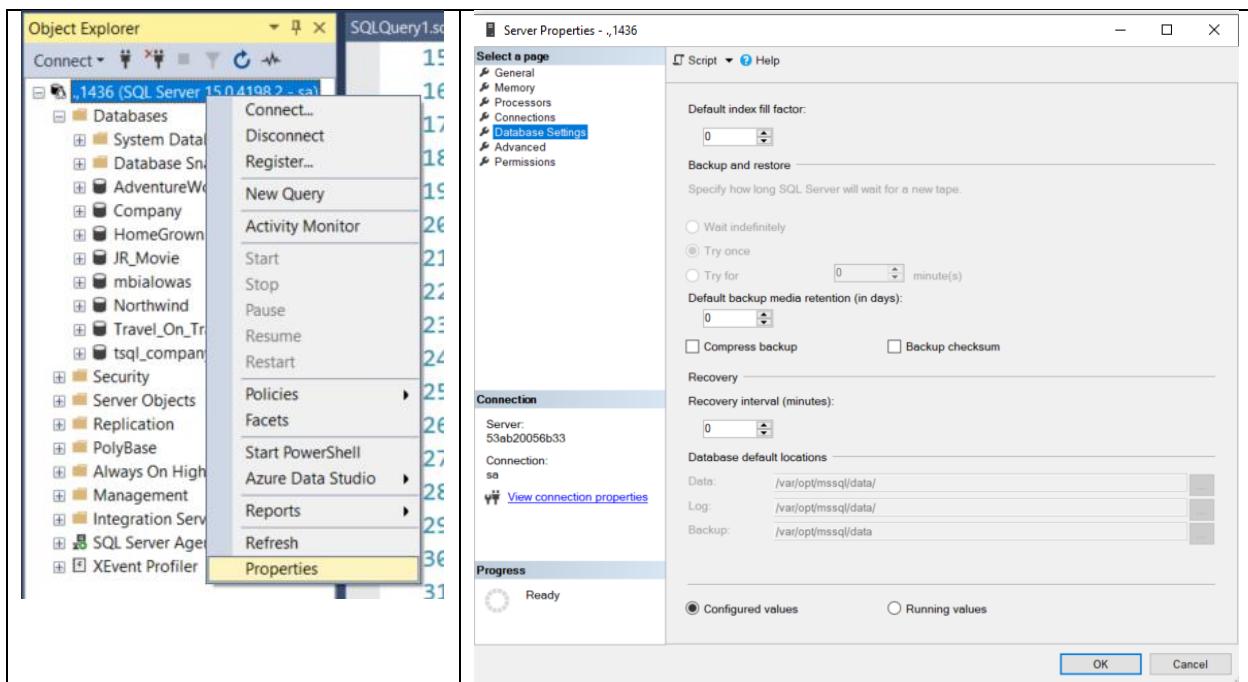
```
15 You can contact me by e-mail at ola@hallengren.com.
16
17 Ola Hallengren
18 https://ola.hallengren.com
19
20 */
21
22 USE [master] -- Specify the database in which the objects will be created.
23
24 SET NOCOUNT ON
25
26 DECLARE @CreateJobs nvarchar(max) = 'Y' -- Specify whether jobs should be created.
27 DECLARE @BackupDirectory nvarchar(max) = NULL -- Specify the backup root directory. If no directory is specified, the default backup direc
28 DECLARE @CleanupTime int = NULL -- Time in hours, after which backup files are deleted. If no time is specified, then no ba
29 DECLARE @OutputFileDirectory nvarchar(max) = NULL -- Specify the output file directory. If no directory is specified, then the SQL Server err
30 DECLARE @LogToTable nvarchar(max) = 'Y' -- Log commands to a table.
31
32 DECLARE @ErrorMessage nvarchar(max)
33
34 IF IS_SRVROLEMEMBER('sysadmin') = 0 AND NOT (@DB_ID('rdsadmin') IS NOT NULL AND SUSER_SNAME(0x01) = 'rdsa')
35 BEGIN
36     SET @ErrorMessage = 'You need to be a member of the SysAdmin server role to install the SQL Server Maintenance Solution.'
37     RAISERROR(@ErrorMessage,16,1) WITH NOWAIT
38 END
39
40 IF NOT (SELECT [compatibility_level] FROM sys.databases WHERE database_id = DB_ID()) >= 90
41 BEGIN
42     SET @ErrorMessage = 'The database ' + QUOTENAME(DB_NAME(DB_ID())) + ' has to be in compatibility level 90 or higher.'
43     RAISERROR(@ErrorMessage,16,1) WITH NOWAIT
44 END
45
46 IF OBJECT_ID('tempdb..#Config') IS NOT NULL DROP TABLE #Config
47
48 CREATE TABLE #Config ([Name] nvarchar(max),
```

3. Some configurations can be changed(see Lines 26-30). We will just accept the default settings.

## Notes:

### Default locations

1. right mouse the **server** instance
2. then click properties
3. last click Database settings – see database default locations



You can change the settings as follows or leave them as the default:

Linux Path	Windows Path
Data: /var/opt/mssql/data/	C:\SQL\data
Log: /var/opt/mssql/data/	C:\SQL\log
Backup: /var/opt/mssql/data/	C:\SQL\backups

Recall we are running SQL Server in Linux and we mapped the linux paths above to windows equivalents

This PC > Windows (C:) > SQL >				
	Name	Date modified	Type	Size
s	backups	5/30/2022 3:58 PM	File folder	
s	data	5/20/2022 6:08 PM	File folder	
s	log	5/31/2022 8:26 AM	File folder	
s	secrets	4/5/2022 8:41 AM	File folder	

Going back to Ola script in SSMS

**NOTE:** each time script is run it will recreate any jobs unless you change the value of @CreateJobs variable to N instead of Y.

**Note:** Ensure your SQL Server Agent is started. It's located at the bottom of the object explorer in the left pane. Right click to start if needed.

Let's now run the Ola script to create sprocs and jobs, the sprocs will be created in master database.

Before	After
<ul style="list-style-type: none"> <li>SQL Server Agent           <ul style="list-style-type: none"> <li>Jobs               <ul style="list-style-type: none"> <li>BackupAW</li> <li>Job Activity Monitor</li> </ul> </li> <li>Alerts</li> <li>Operators</li> <li>Error Logs</li> </ul> </li> <li>XEvent Profiler</li> </ul>	<ul style="list-style-type: none"> <li>Integration Services Catalogs</li> <li>SQL Server Agent           <ul style="list-style-type: none"> <li>Jobs               <ul style="list-style-type: none"> <li>BackupAW</li> <li>CommandLog Cleanup</li> <li>DatabaseBackup - SYSTEM DATABASES - FULL</li> <li>DatabaseBackup - USER DATABASES - DIFF</li> <li>DatabaseBackup - USER DATABASES - FULL</li> <li>DatabaseBackup - USER DATABASES - LOG</li> <li>DatabaseIntegrityCheck - SYSTEM DATABASES</li> <li>DatabaseIntegrityCheck - USER DATABASES</li> <li>IndexOptimize - USER DATABASES</li> <li>sp_delete_backuphistory</li> <li>sp_purge_jobhistory</li> </ul> </li> <li>Job Activity Monitor</li> </ul> </li> <li>Alerts</li> <li>Operators</li> <li>Error Logs</li> <li>XEvent Profiler</li> </ul>

Ola script created 10 jobs and 4 sprocs:

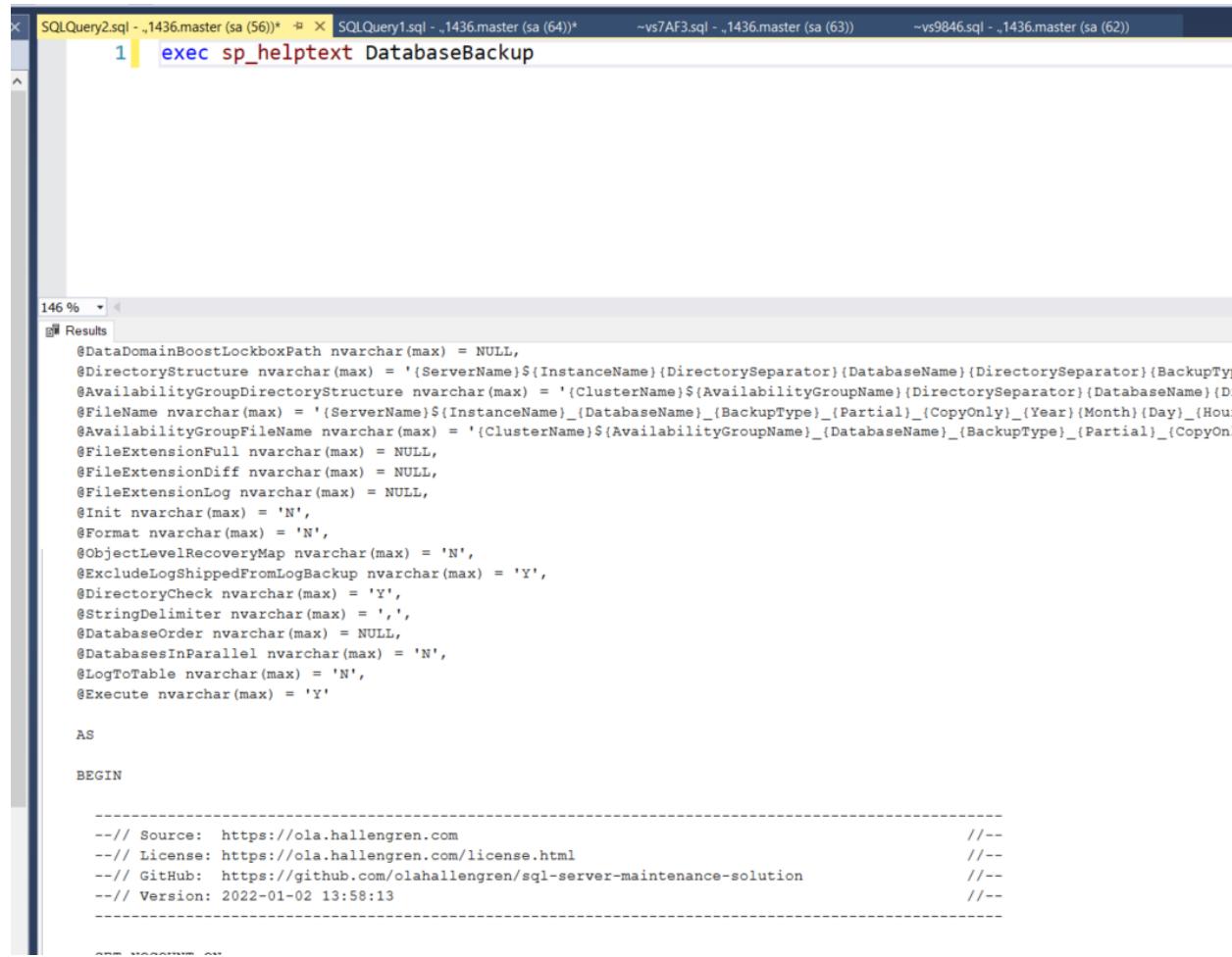
<ol style="list-style-type: none"> <li>1. CommandExecute</li> <li>2. DatabaseBackup</li> <li>3. DatabaseIntegrityCheck</li> <li>4. IndexOptimize</li> </ol>	<ul style="list-style-type: none"> <li>„1436 (SQL Server 15.0.4198.2 - sa)</li> <li>Databases           <ul style="list-style-type: none"> <li>System Databases               <ul style="list-style-type: none"> <li>master                   <ul style="list-style-type: none"> <li>Tables</li> <li>Views</li> <li>Synonyms</li> </ul> </li> <li>Programmability                   <ul style="list-style-type: none"> <li>Stored Procedures                       <ul style="list-style-type: none"> <li>System Stored Procedures                           <ul style="list-style-type: none"> <li>dbo.CommandExecute</li> <li>dbo.DatabaseBackup</li> <li>dbo.DatabaseIntegrityCheck</li> <li>dbo.IndexOptimize</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li></ul>
---	---

We already learnt about creating user-defined stored procedures. Have a look at sprocs used in ola scripts!

Run the following TSQL command to see how something is implemented:

E.g

Exec sp\_helptext DatabaseBackup



The screenshot shows a SQL Server Management Studio window with multiple tabs at the top: SQLQuery2.sql (~1436.master (sa (56)), SQLQuery1.sql (~1436.master (sa (64))), ~vs7AF3.sql (~1436.master (sa (63))), and ~vs9846.sql (~1436.master (sa (62))). The main pane displays the results of the query `exec sp_helptext DatabaseBackup`. The results show the definition of the DatabaseBackup stored procedure, which is a long script of T-SQL code. The output includes parameters like @DataDomainBoostLockboxPath, @DirectoryStructure, and various backup-related options and settings. At the bottom of the results, there is a copyright notice from ola.hallengren.com.

```
1 exec sp_helptext DatabaseBackup

Results
@DataDomainBoostLockboxPath nvarchar(max) = NULL,
@DirectoryStructure nvarchar(max) = '(ServerName)${InstanceId}{DirectorySeparator}{DatabaseName}{DirectorySeparator}{BackupType}'
@AvailabilityGroupDirectoryStructure nvarchar(max) = '{ClusterName}${AvailabilityGroupName}{DirectorySeparator}{DatabaseName}{Di
@FileName nvarchar(max) = '{ServerName} ${InstanceId}_{DatabaseName}_{BackupType}_{Partial}_{CopyOnly}_{Year}_{Month}_{Day}_{Hour}
@AvailabilityGroupFileName nvarchar(max) = '{ClusterName}${AvailabilityGroupName}_{DatabaseName}_{BackupType}_{Partial}_{CopyOn}
@FileExtensionFull nvarchar(max) = NULL,
@FileExtensionDiff nvarchar(max) = NULL,
@FileExtensionLog nvarchar(max) = NULL,
@Init nvarchar(max) = 'N',
@Format nvarchar(max) = 'N',
@ObjectLevelRecoveryMap nvarchar(max) = 'N',
@ExcludeLogShippedFromLogBackup nvarchar(max) = 'Y',
@DirectoryCheck nvarchar(max) = 'Y',
@StringDelimiter nvarchar(max) = ',',
@DatabaseOrder nvarchar(max) = NULL,
@DatabasesInParallel nvarchar(max) = 'N',
@LogToTable nvarchar(max) = 'N',
@Execute nvarchar(max) = 'Y'

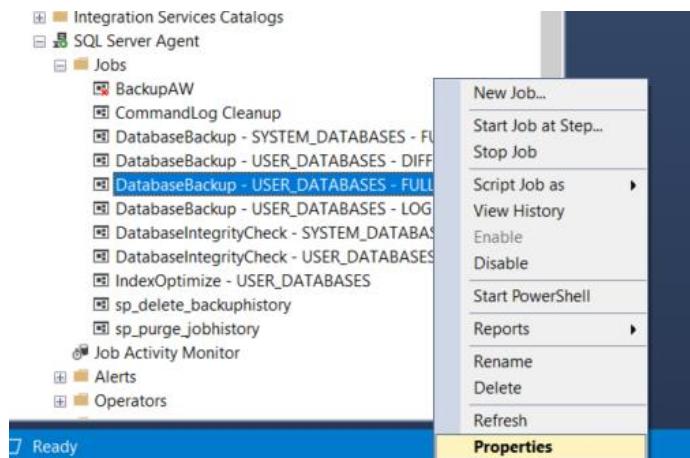
AS
BEGIN
-----
-- Source: https://ola.hallengren.com
-- License: https://ola.hallengren.com/license.html
-- GitHub: https://github.com/olahallengren/sql-server-maintenance-solution
-- Version: 2022-01-02 13:58:13
-----
```

**Note:** Ola scripts don't automatically set the schedule for the jobs. We will do that next.

Scheduling jobs

Full Back up of User Databases

1. Right click on job--> Full Back up of User Databases, click properties



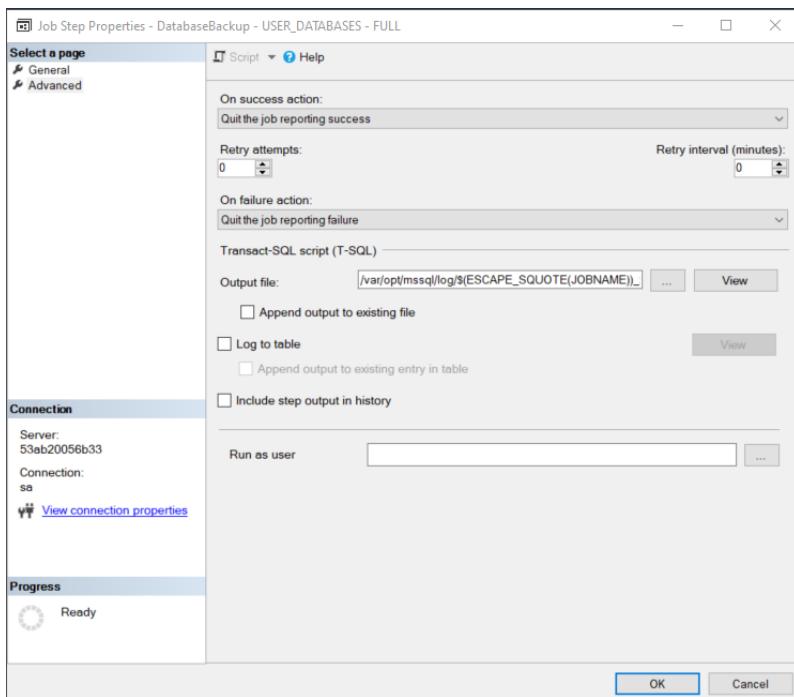
2. Under steps click on step

The screenshot shows the 'Job Properties' dialog for the 'DatabaseBackup - USER\_DATABASES - FULL' job. The 'Steps' tab is selected. The 'Job step list' table contains one row:

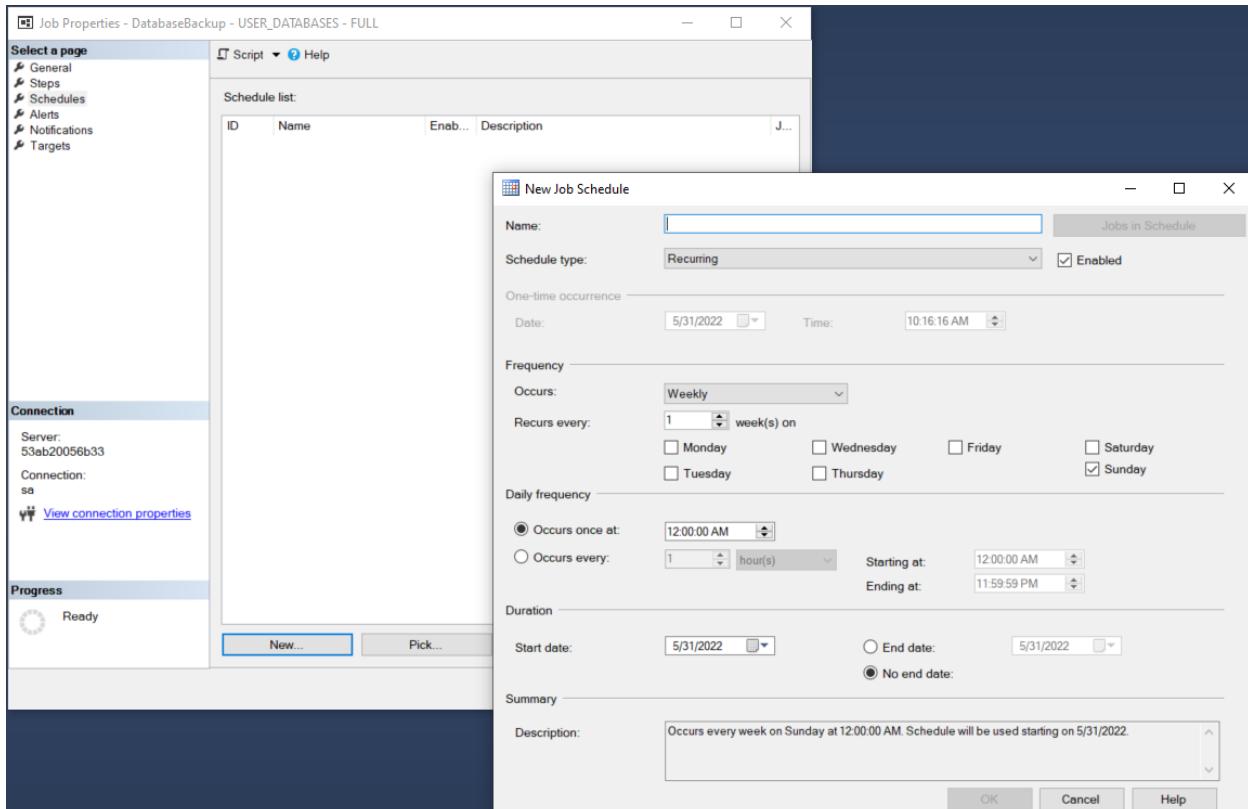
Step	Name	Type	On Success	On Failure
1	DatabaseBackup - USER_DATABASES - FULL	Transact-S...	Quit the jo...	Quit the job...

Below the table, there are buttons for 'Move step...', 'Start step:', 'New...', 'Insert...', 'Edit...', and 'Delete'. The 'Edit...' button is highlighted with a blue border.

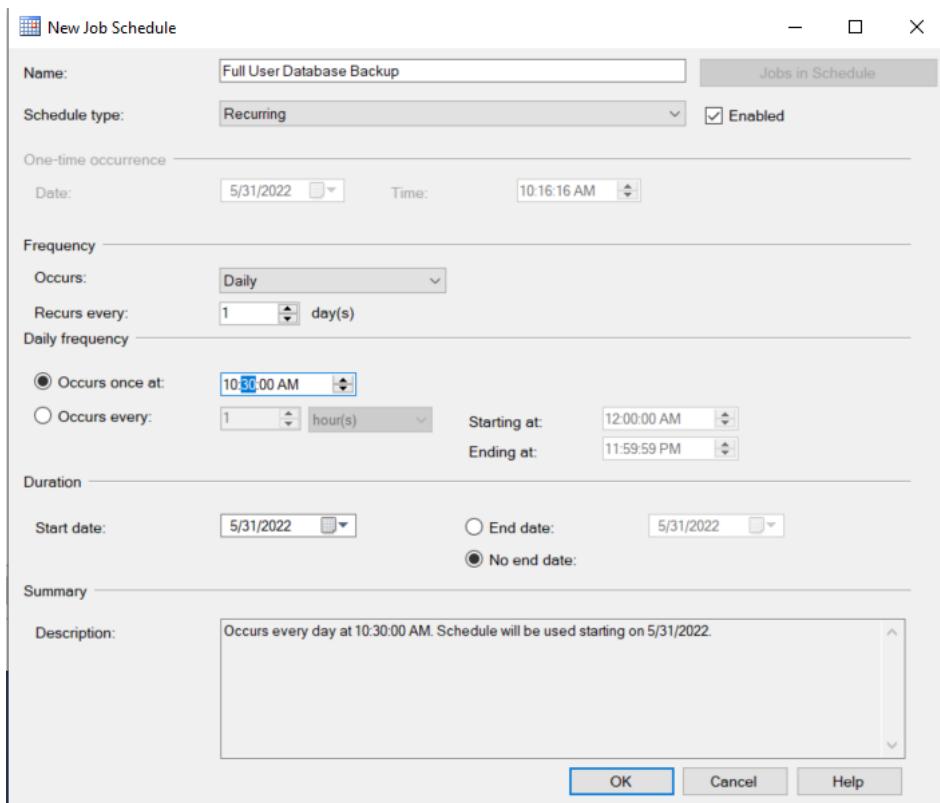
3. Then click on **Edit** then **Advanced** to ensure there is an output file. Click cancel.



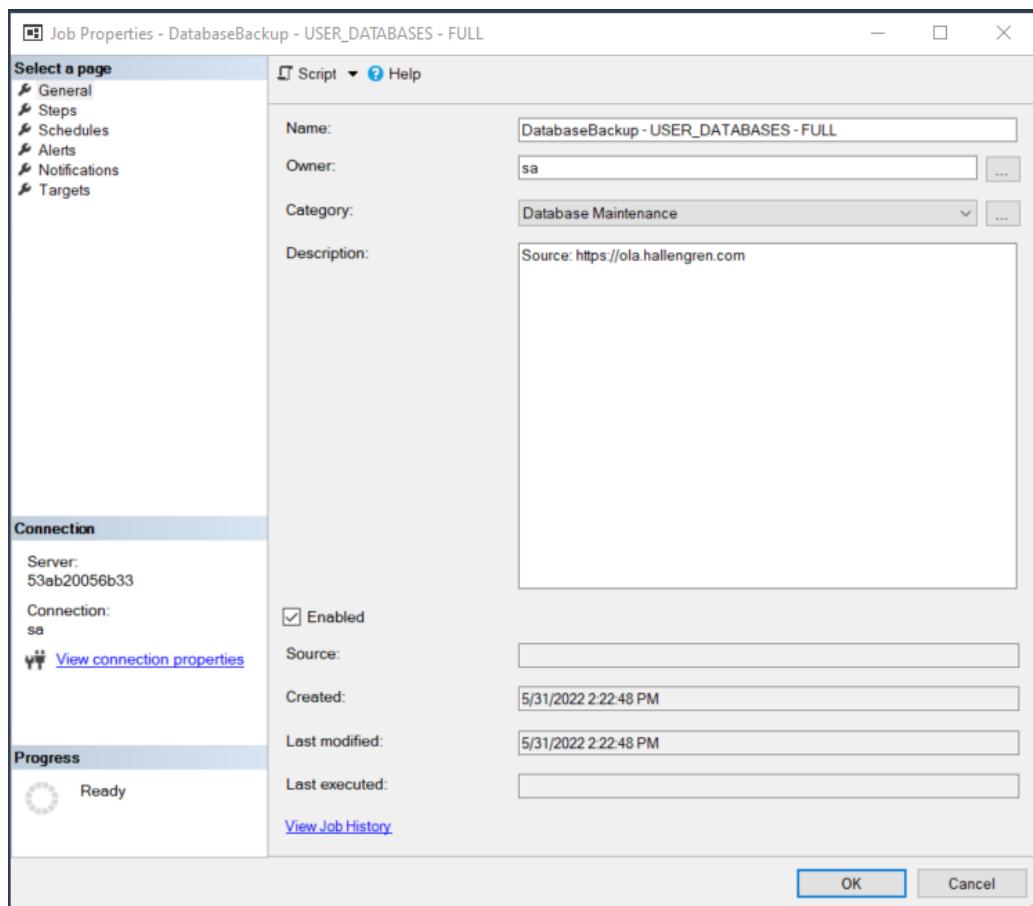
4. Click on schedules and click on new



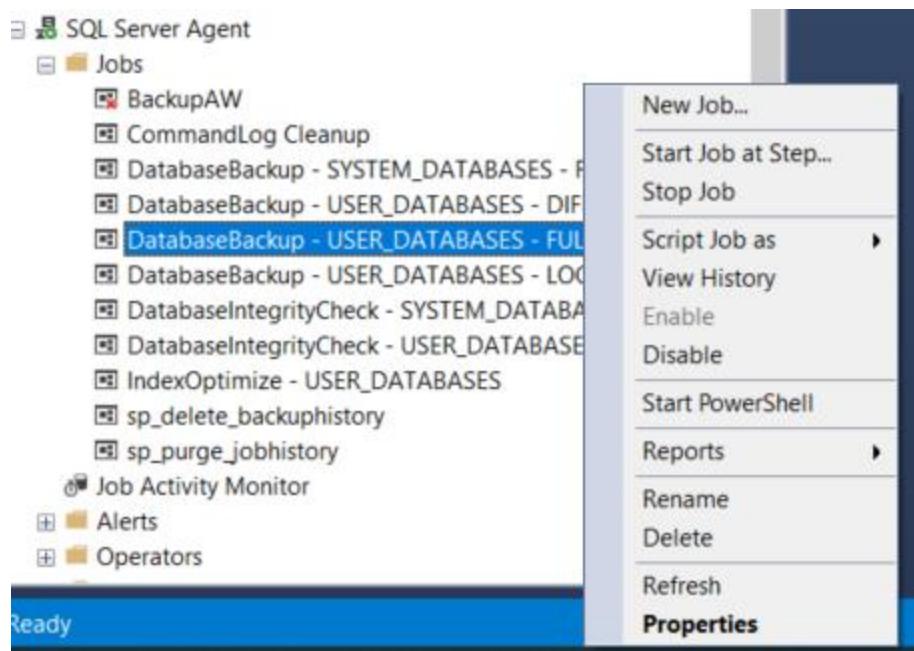
5. Give the job a name and set when the backup should run. Click Ok.



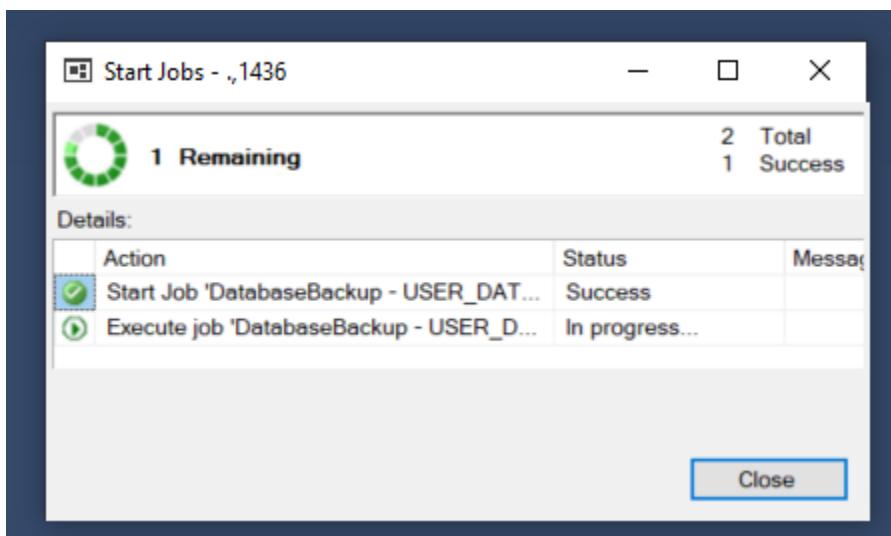
6. Last ensure job is enabled on general tab of job properties



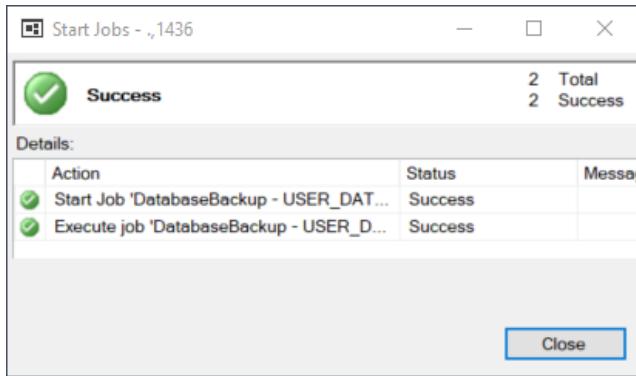
This job can be run manually the first time to see if it runs. Just right mouse click it and click **Start Job at Step**



As job runs, a window will appear as depicted below



If a job ran successful, you would receive a message stating so.



## Confirm backups are located in mapped paths

The screenshot shows a Windows File Explorer window. The left sidebar shows 'This PC > Windows (C) > SQL > log'. The main pane displays a file named 'DatabaseBackup - USER\_DATABASES - FULL\_1\_20220531\_152113.txt'. To the right, a Notepad window is open showing the contents of this file, which is a T-SQL script for a full database backup.

```

DatabaseBackup - USER_DATABASES - FULL_1_20220531_152113.txt - Notepad
File Edit Format View Help
Job 'DatabaseBackup - USER_DATABASES - FULL' : Step 1, 'DatabaseBackup - USER_DATABASES - FULL' : Began Executing 2022-05-31 15:21:13
Date and time: 2022-05-31 15:21:14 [SQLSTATE 01000]
Server: 53ab20056b33 [SQLSTATE 01000]
Version: 15.0.4198.2 [SQLSTATE 01000]
Edition: Developer Edition (64-bit) [SQLSTATE 01000]
Platform: Linux [SQLSTATE 01000]
Procedure: [master].[dbo].[DatabaseBackup] [SQLSTATE 01000]
Parameters: @databases = 'USER_DATABASES', @dirName = NULL, @backupType = 'FULL', @Verify = 0, @CleanupType = NULL, @CleanupMode = 'AFTER_BACKUP', @Compress = 0, @CopyOnly = 0, @ChangeBackupType = 'N', @BackupSoftware = NULL, @CheckSum = 1, @BlockSize = 8192, @NumFiles = NULL, @MaxSize = NULL, @MinBackupSizeForMultipleFiles = NULL, @MaxFileSize = NULL, @NumberofFiles = NULL, @MinBackupSizeForMultipleFiles = NULL, @MaxFileSize = NULL, @CompressionLevel = NULL, @Description = NULL, @Threads = NULL, @Throttle = NULL, @Encrypt = 'N', @EncryptionAlgorithm = NULL, @ServerCertificate = NULL, @ServerAsymmetricKey = NULL, @EncryptionKey = NULL, @ReadWriteFileGroups = 'N', @OverwriteBackupPreference = 'N', @NoRecovery = 'N', @URL = NULL, @Credential = NULL, @MirrorDirectory = NULL, @MirrorCleanupTime = NULL, @MirrorCleanupMode = 'AFTER_BACKUP', @MirrorURL = NULL, @AvailabilityGroups = NULL, @Updateability = 'ALL', @AdaptiveCompression = NULL, @ModificatioLevel = NULL, @LogSizeSinceLastLogBackup = NULL, @TimeSinceLastLogBackup = NULL, @DataDomainBoostHost = NULL, @DataDomainBoostUser = NULL, @DataDomainBoostDevicePath = NULL, @DataDomainBoostLockboxPath = NULL, @InventoryStructure = '{ServerName}\{InstanceName}\{DirectorySeparator}\{DatabaseName}\{DirectorySeparator}\{BackupType}\_{Partial}\_{CopyOnly}', @
Ln 1, Col 1 | 100% | Windows (CRLF) | UTF-16 LE

```

Each of the user databases was fully backed up

The screenshot shows a Windows File Explorer window. The left sidebar shows 'This PC > Windows (C) > SQL > data'. The main pane displays a folder named '4474314076cb' containing several sub-folders, each representing a user database backup. The folder structure is as follows:

```

4474314076cb
    - AdventureWorks2019
    - Company
    - HomeGrown
    - JR_Movie
    - mbialowas
    - Northwind
    - Travel_On_Trains
    - tsql_company

```

File Explorer View					
	Name	Date modified	Type	Size	
Quick access					
Desktop					
Downloads					
Documents					
Pictures					
A2-Book Repo					
	4474314076cb_JR_Movie_FULL_20220531_152136.bak	5/31/2022 10:21 AM	BAK File	5,496 KB	

This process can be repeated for other jobs: diff, log, and indexOptimize

To see which jobs and processes ran, please do

USE master

SELECT \* from CommandLog

ID	DatabaseName	SchemaName	ObjectName	ObjectType	IndexName	IndexType	StatisticsName	PartitionNumber	ExtendedInfo	Command	CommandType	StartTime	EndTime	ErrorNumber
1	AdventureWorks2019	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [AdventureWorks2019] TO DISK = N'AdventureWorks2019'	BACKUP_DATABASE	2022-05-31 15:21:14.8530842	2022-05-31 15:21:22.9951525	0
2	AdventureWorks2019	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:22.9951525	2022-05-31 15:21:28.5319175	0
3	Company	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [Company] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:28.6700253	2022-05-31 15:21:31.2756407	0
4	Company	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:31.2756407	2022-05-31 15:21:34.2301277	0
5	HomeGrown	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [HomeGrown] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:32.9534208	2022-05-31 15:21:35.3639989	0
6	HomeGrown	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:35.7232507	2022-05-31 15:21:38.7299126	0
7	JR_Movie	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [JR_Movie] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:36.7679081	2022-05-31 15:21:38.8187324	0
8	JR_Movie	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:38.815973	2022-05-31 15:21:39.8123202	0
9	mbialwas	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [mbialwas] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:39.8501773	2022-05-31 15:21:41.6928945	0
10	mbialwas	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:41.6928945	2022-05-31 15:21:43.72543	0
11	Northwind	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [Northwind] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:43.3593484	2022-05-31 15:21:45.5270091	0
12	Northwind	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:45.5270091	2022-05-31 15:21:46.7378895	0
13	Travel_On_Train	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [Travel_On_Train] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:46.7575321	2022-05-31 15:21:48.7560887	0
14	Travel_On_Train	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:48.7560887	2022-05-31 15:21:49.7560887	0
15	tsql_company	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	BACKUP DATABASE [tsql_company] TO DISK = N'verify'	BACKUP_DATABASE	2022-05-31 15:21:50.3105037	2022-05-31 15:21:52.2369380	0
16	tsql_company	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	RESTORE VERIFYONLY FROM DISK = N'verify'	RESTORE_VERIFYONLY	2022-05-31 15:21:52.2493919	2022-05-31 15:21:53.6843452	0

## Restoring a database

Ola scripts don't restore databases so we will perform this manually.

### Procedure

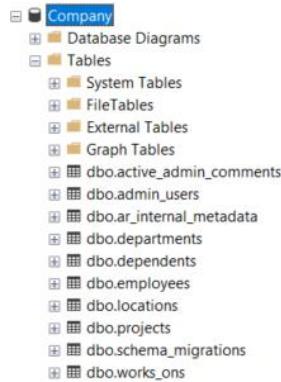
1. Check to see if you have a database backup to work from - we should as we just did a backup



File Explorer View			
	Name	Date modified	Type
diff	DIFF	5/31/2022 10:34 AM	File folder
full	FULL	5/31/2022 10:21 AM	File folder
log	LOG	5/31/2022 10:36 AM	File folder

2. Delete a database - we are going to use the Company database for this example (any database can be deleted if you have the backup)

Drop database Company



The screenshot shows the SSMS interface with two panes. The Object Explorer pane on the left shows the 'Databases' node expanded, listing various databases including 'AdventureWorks2019', 'HomeGrown', 'JR\_Movie', 'mbialowas', 'Northwind', 'Travel\_On\_Trains', and 'tsql\_company'. The SQL Query pane on the right contains the following SQL code:

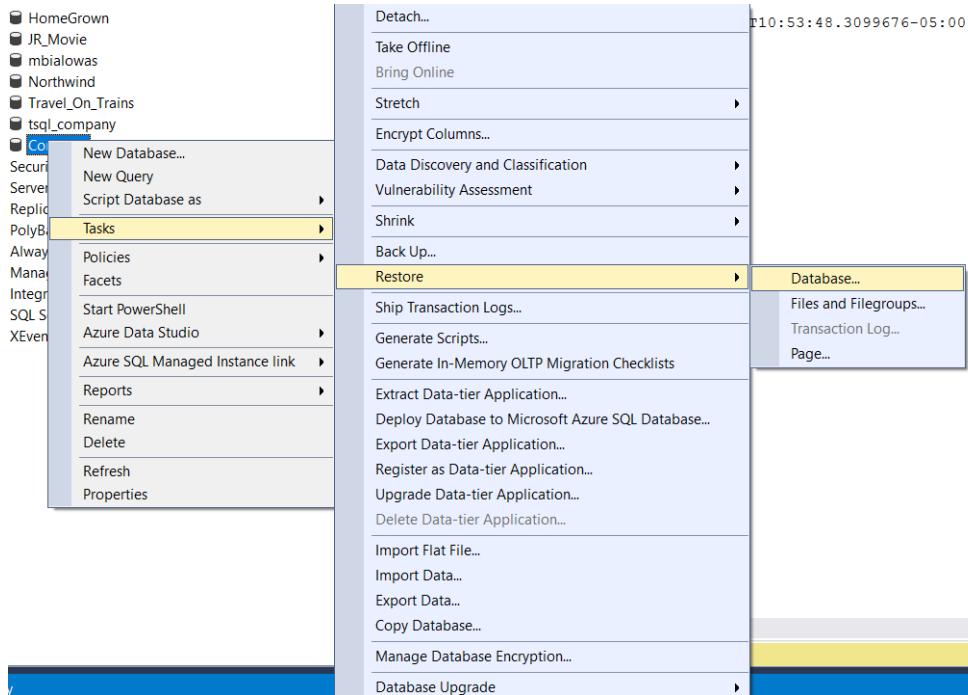
```
1 use master
2 drop database Company
```

The 'Messages' tab in the query results pane shows the output:

Commands completed successfully.  
Completion time: 2022-05-31T10:53:48.3099676-05:00

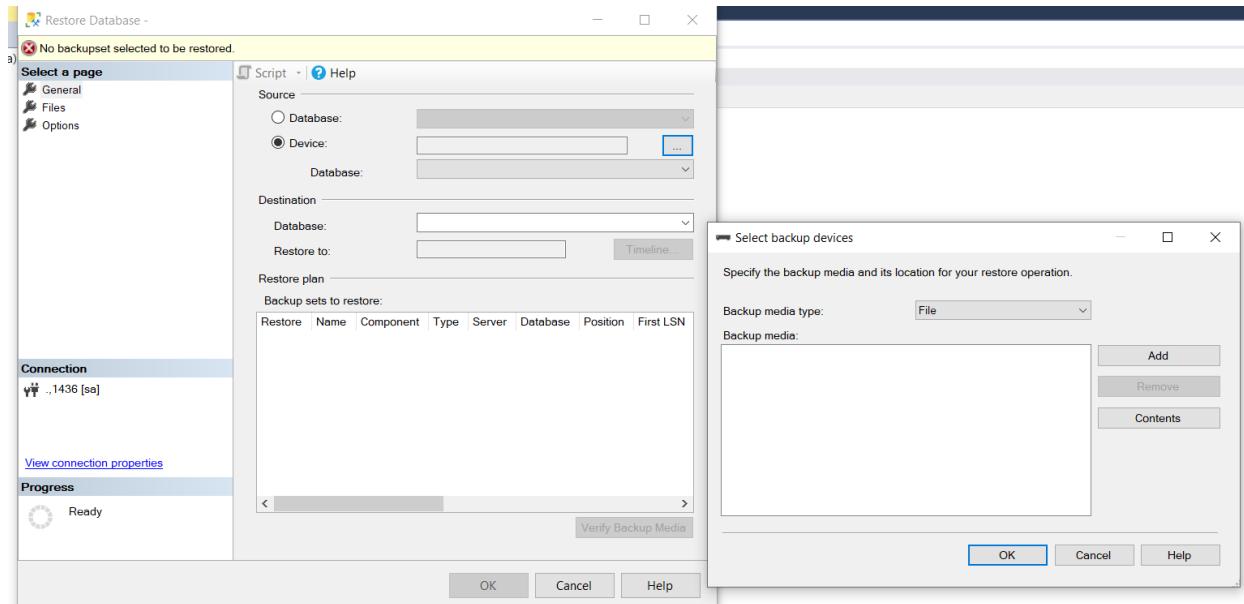
Time to restore database

1. Create a new database called Company
2. Right mouse click on Company database, then select tasks, then click on restore database

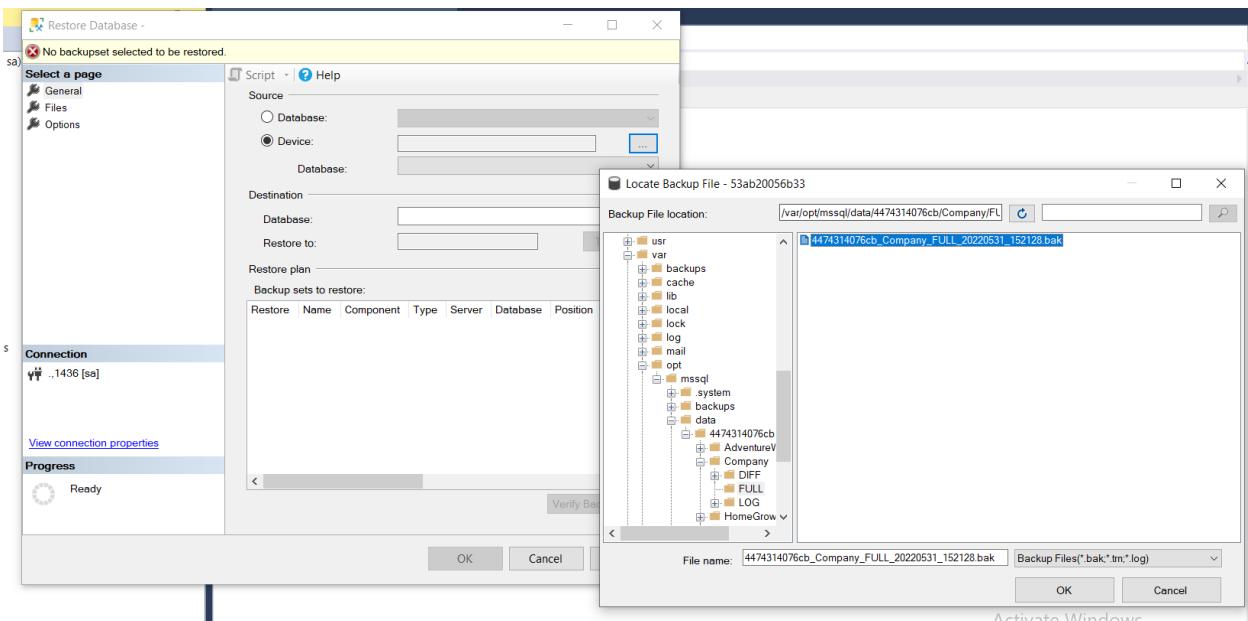


### 3. Select Device then click on 3 ellipsis ...

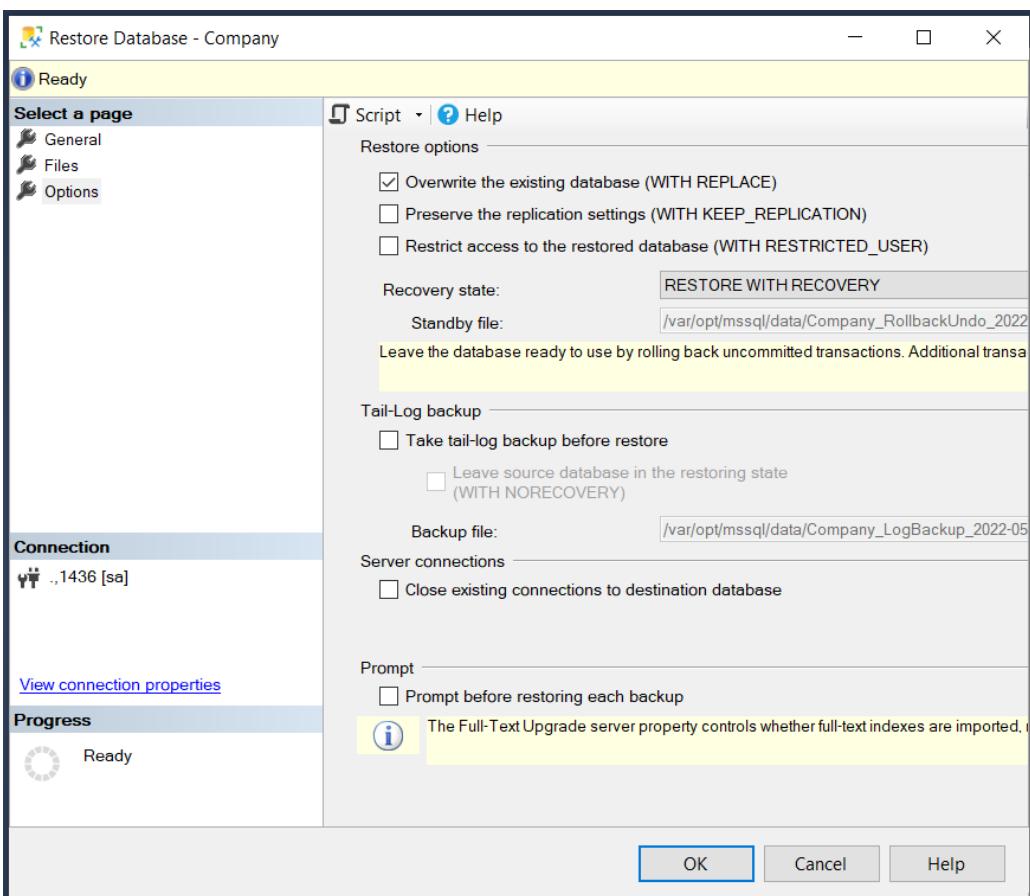
Click Add



### 4. Select Full backup, click OK.



5. Then click OK, then click on Options, check off Overwrite the existing database (WITH REPLACE) and uncheck Take Tail-log backups before restore



Both DIFF and log backup don't require replace option to be checked off when restoring

