

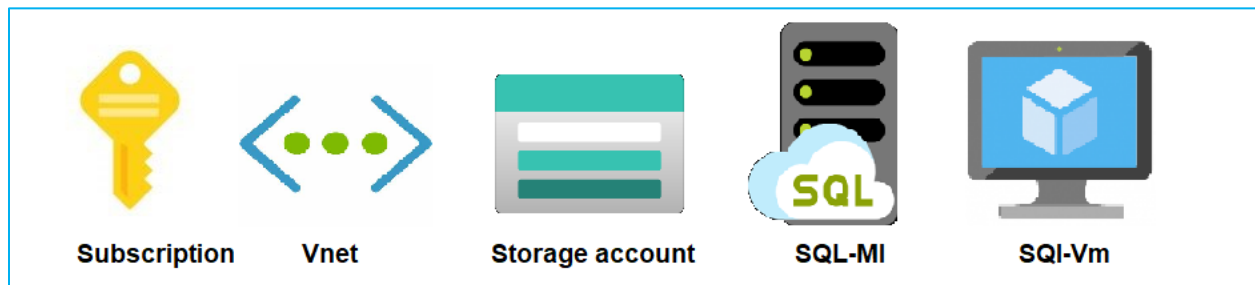
Database migration from Managed Instance to SQL Server with transactional replication

Transactional replication setup

We will set up a transactional replication for migrating the database from Managed Instance to SQL Server 2017 hosted on Azure VM.

- Managed Instance will be both Publisher and Distributor,
- SQL Server will be Subscriber.

1



Prerequisites:

Need Azure Subscription.

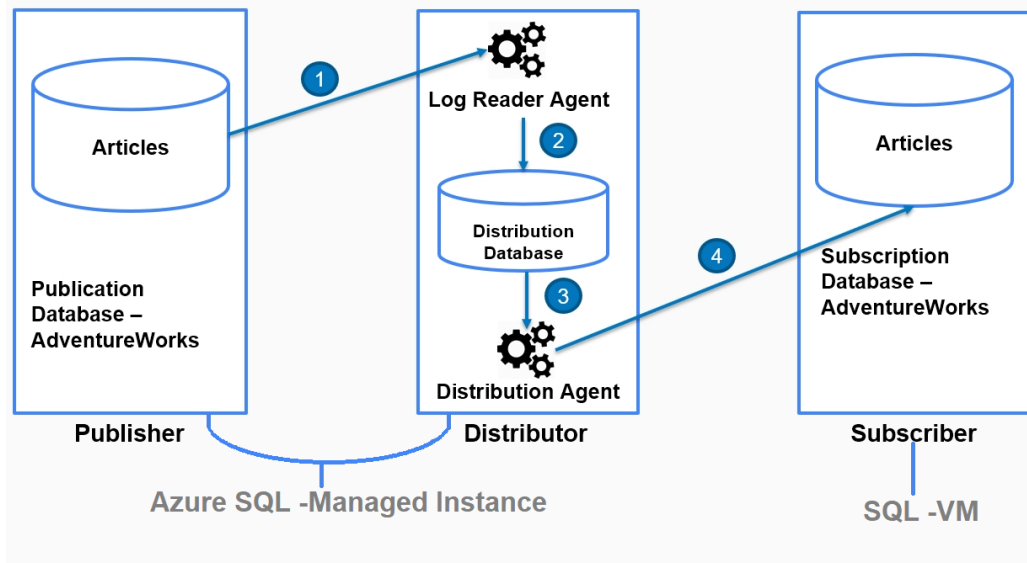
Storage account with one file share in it (Create using azure portal).

Need a Vnet Peering (you need this only if your SQL-MI & SQL-VM are in different network)

One Azure Managed Instance (Create using azure portal).

One SQL VM (Create using azure portal).

2



Requirements

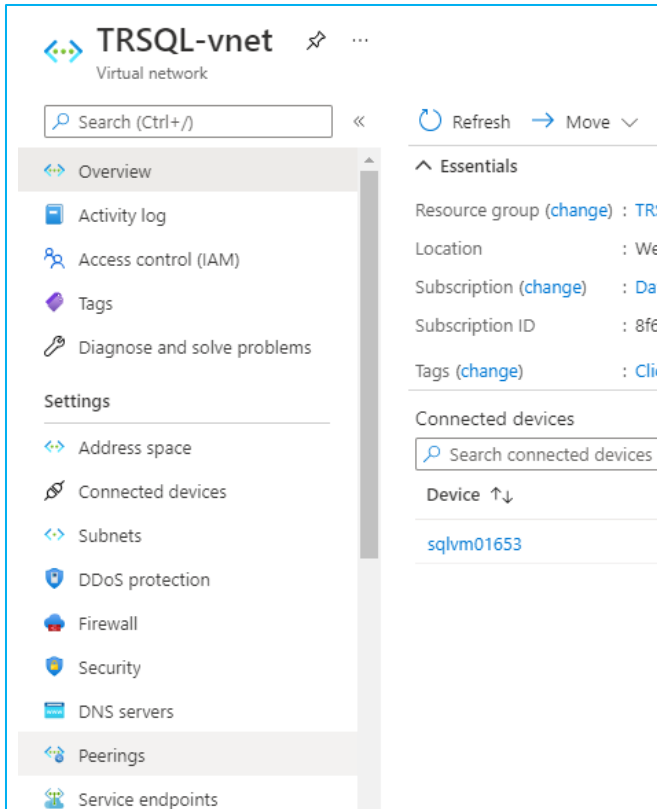
VNET PEERING:

For replication to work, there must be a network connectivity between SQL-MI and SQL Server. ensured by having both servers on the same VNET. If that were not the case then VNET peering setup would be required.

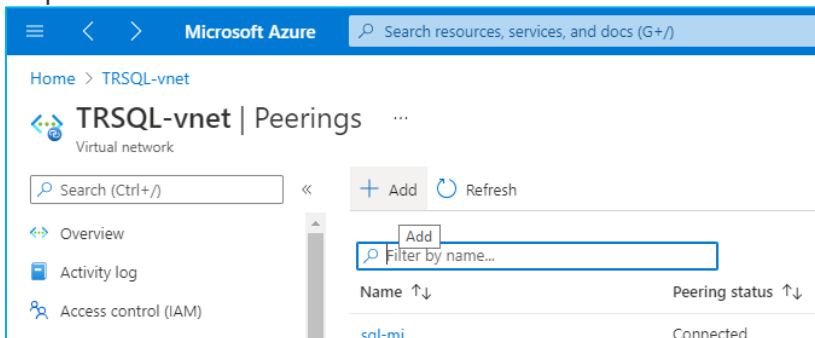
In my case I do not have my SQL-MI & SQL-VM on same network I have done a VNET Peering to get them on same network below are steps with Screenshots.

1: VNET Peering. Form sql-vm to sql-mi.

Step1 Open Vnet of Sql-vm you can get this from Resource group where you have your Sql-vm Click on Peering's option in left bar.



Step 2 Click on add button.



Step 3 Add name and select subscription and SQL-MI VNET from dropdown.

Home > TRSQL-vnet >

Add peering

TRSQL-vnet

Remote virtual network

Peering link name *

sql-mi

Virtual network deployment model ⓘ

☒ Resource manager

☐ Classic

☐ I know my resource ID ⓘ

Subscription * ⓘ

Data - Common 3

Virtual network *

vnet-sqlmitest21

Traffic to remote virtual network ⓘ

☒ Allow (default)

☐ Block all traffic to the remote virtual network

Traffic forwarded from remote virtual network ⓘ

☒ Allow (default)

Add

Step 4 Check Peering status

TRSQL-vent = I have sql-vm in this vnet.

Vnet-sqlmitest21 = I have sql-mi in this vnet.

TRSQL-vnet | Peerings

Virtual network

Search (Ctrl+/) << + Add Refresh

Filter by name...

Name ↑↓	Peering status ↑↓	Peer ↑↓
sql-mi	Connected	vnet-sqlmitest21

Overview

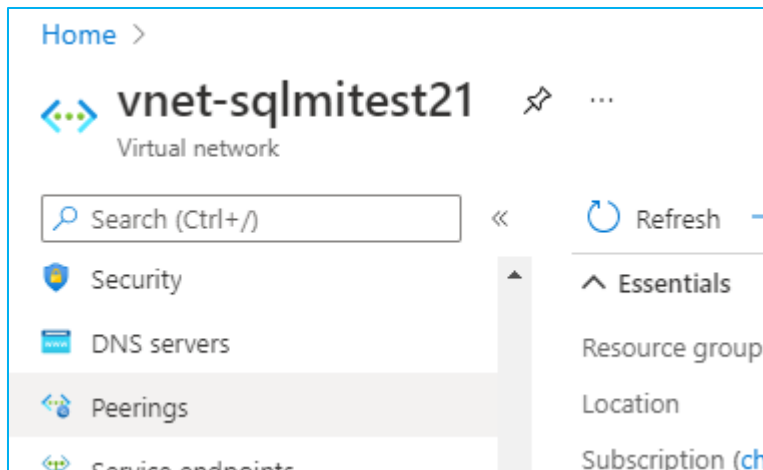
Activity log

Access control (IAM)

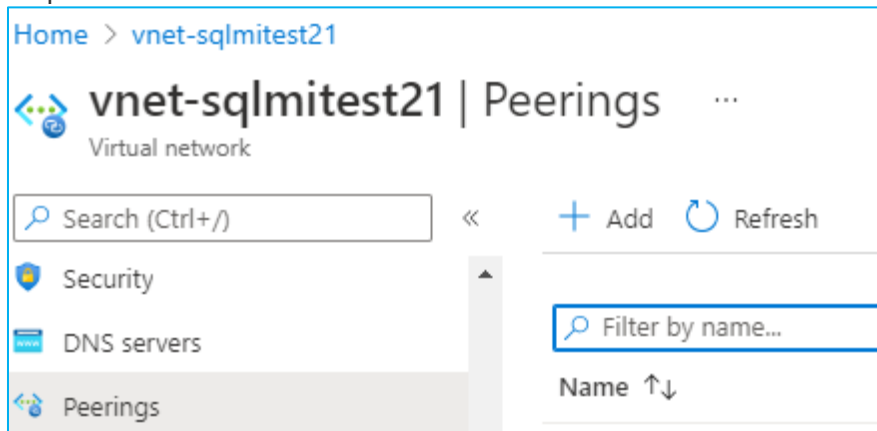
Tags

2: VNET Peering .Form sql-mi to sql-vm.

Step1 Open Vnet of Sql-mi you can get this from Resource group where you have your Sql-mi Click on Peering's option in left bar.



Step 2 Click on add button.



Step 3 Add name and select subscription and SQL-VM VNET from dropdown.

[Home](#) > [vnet-sqlmitest21](#) >

Add peering

vnet-sqlmitest21

☐ I know my resource ID ⓘ

Subscription * ⓘ

Data - Deepak & Ashfaq

Virtual network * ⓘ

TRSQL-vnet

Traffic to remote virtual network ⓘ

☒ Allow (default)

☐ Block all traffic to the remote virtual network

Traffic forwarded from remote virtual network ⓘ

☒ Allow (default)

☐ Block traffic that originates from outside this virtual network

Virtual network gateway or Route Server ⓘ

☐ Use this virtual network's gateway or Route Server

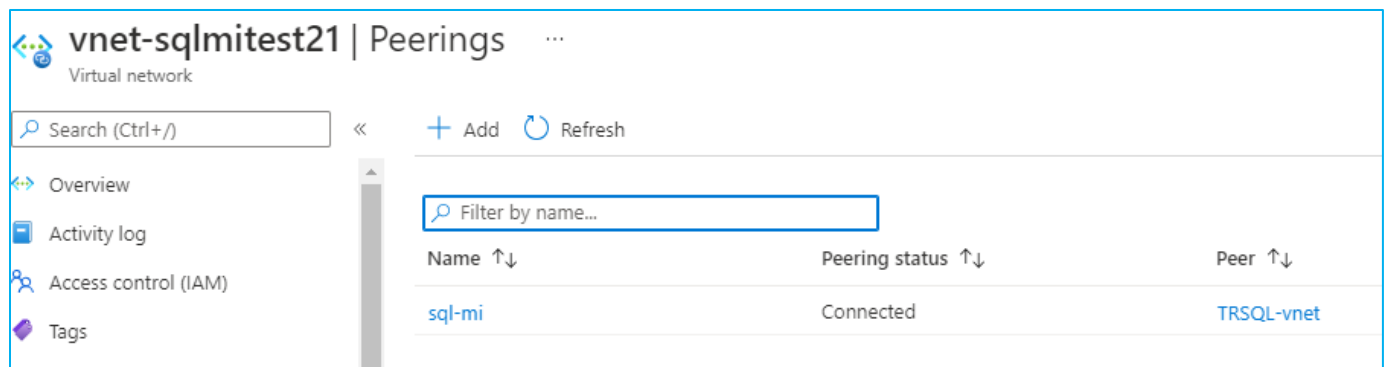
☐ Use the remote virtual network's gateway or Route Server

☒ None (default)

[Add](#)

Step 4 Check Peering status

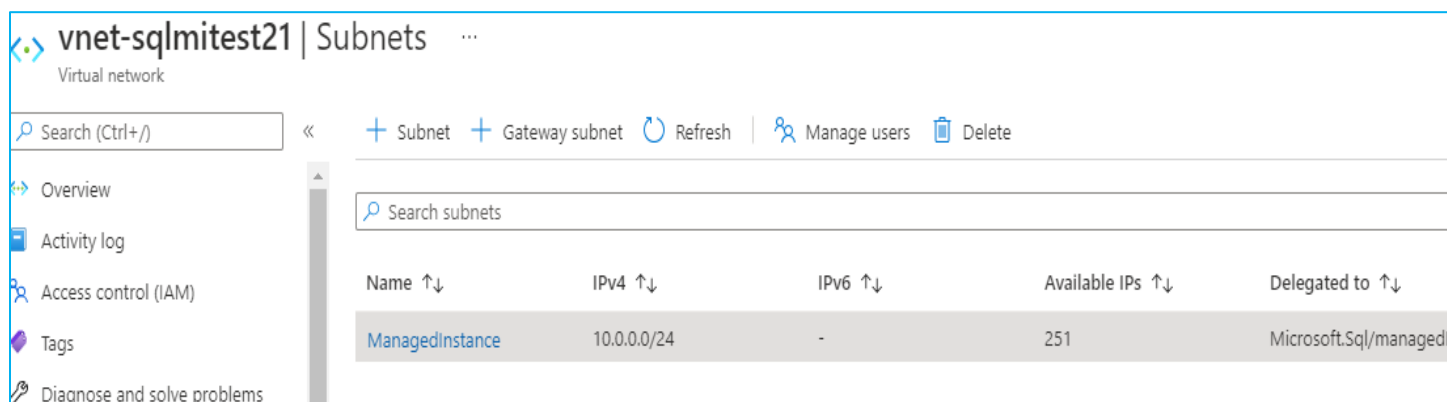
Vnet-sqlmitest21 = I have sql-mi in this vnet.
TRSQL-vent = I have sql-vm in this vnet.



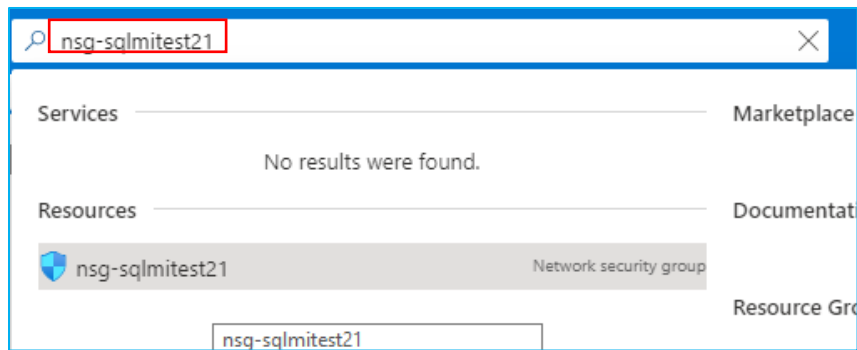
ADD Outbound Port Rule:

Outbound TCP port 445 needs to be open for transactional replication, so in case you have NSG make sure this port is allowed. Allowing this port will enable Managed Instance to access Azure Storage account, which will be covered a bit later. To allow the port, go to the virtual network of your Managed Instance and identify the security group name.

Step1: get the Security group name.



Step2 Open NSG search that in portal and open it.



Step3 Add Port 455 in outbound security rules.

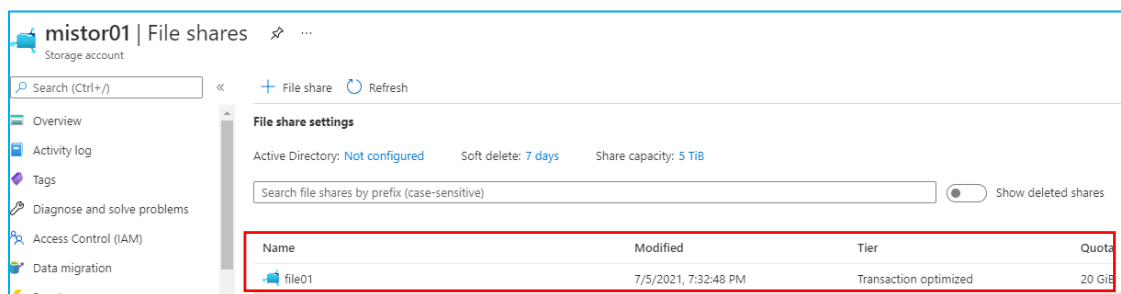
<input type="checkbox"/>	102	3342	3342	Any	Any	Any	✓ Allow
<input type="checkbox"/>	1000	allow_linkedserver_out...	1433	Tcp	10.0.0.0/24	VirtualNetwork	✓ Allow
<input checked="" type="checkbox"/>	1001	Port_445	445	TCP	VirtualNetwork	Any	✓ Allow

Storage account:

Transactional replication will require a storage account, so if you don't have one yet, use the Azure Portal to create it. Alternatively, you can use one of your existing storage accounts. Within the Storage account, create a File Share with quota of 20 GiB.

Go to the File share Properties and copy the storage **URL** because this value will be needed in the following T-SQL script.

Step1 Open Storage account add new File share and open it.



Step2 Copy URL from File share properties. Ex: https://edfffsdf/asdsda/as

The screenshot shows the 'file01 | Properties' page in the Azure portal. The left sidebar contains navigation links: Overview, Diagnose and solve problems, Access Control (IAM), Settings, and Properties (which is selected). The main content area displays the following information:

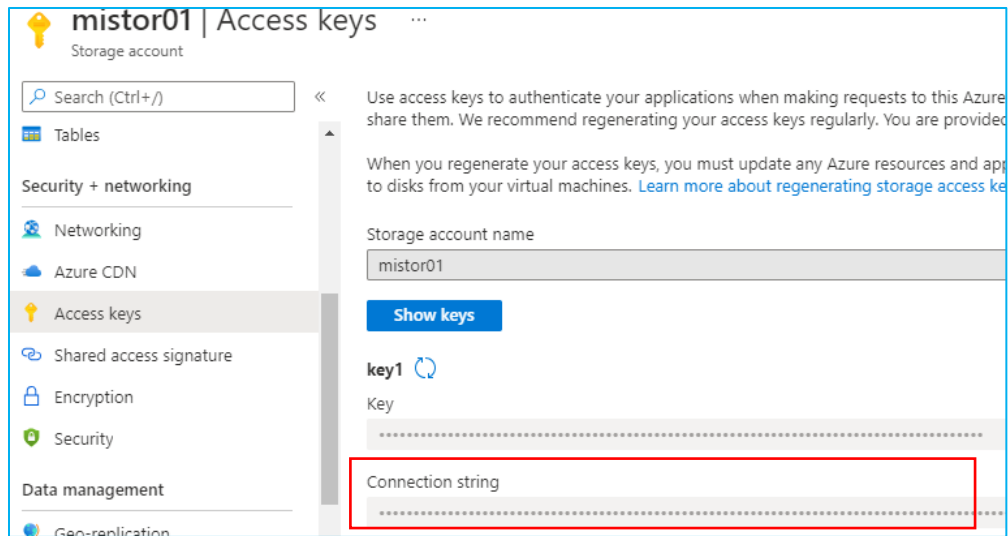
NAME
file01

URL
[Redacted URL]

LAST MODIFIED
7/5/2021, 7:32:48 PM

The 'URL' field is highlighted with a red rectangular box.

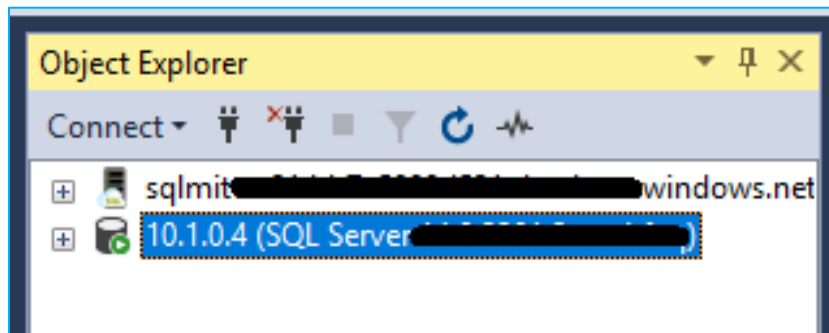
Step 3 Copy key for that go to Storage account > Access key > Connection string.



Important: From Storage account we need 2 things URL Path & Connection String

Configure replication.

Step1: Start VM an open SSMS and connect SQL-MI with Private endpoint & SQL-VM with Private IP.

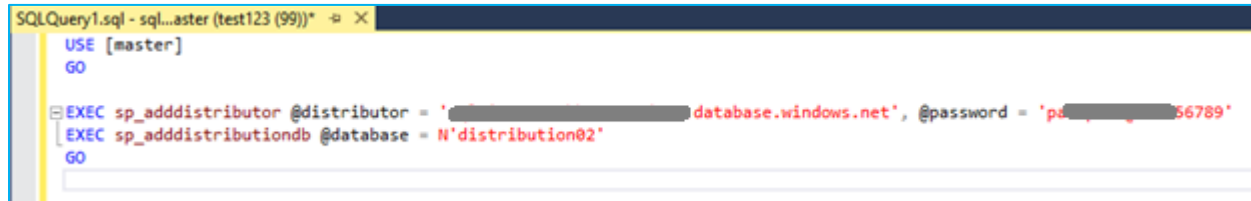


Step2 Configure distribution

Connect to your sql-mi managed instance using SQL Server Management Studio and run the following T-SQL code to configure your distribution database.

```
USE [master]
GO
```

```
EXEC sp_adddistributor @distributor = 'Sql-mi.database.windows.net', @password = 'xyz123456789'
EXEC sp_adddistributiondb @database = N'distribution02'
GO
```



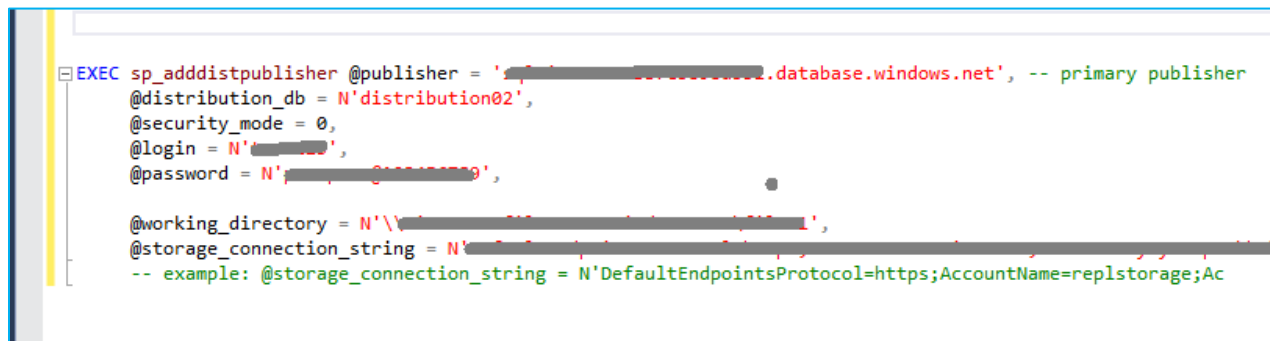
```
SQLQuery1.sql - sql...aster (test123 (99)) *
USE [master]
GO
EXEC sp_adddistributor @distributor = 'Sql-mi.database.windows.net', @password = 'xyz123456789'
EXEC sp_adddistributiondb @database = N'distribution02'
GO
```

Step3 Configure publisher to use distributor.

On your publisher SQL Managed Instance sql-mi, run the following code to register the new distributor with your publisher.

```
EXEC sp_adddistpublisher @publisher = 'sql-mi.database.windows.net', -- primary publisher
    @distribution_db = N'distribution02',
    @security_mode = 0,
    @login = N'user123',
    @password = N'password@123456789',

    @working_directory = N'\\storage-account-name.file.core.windows.net\file_share_name',
    @storage_connection_string = N'Connection-string'
-- example: @storage_connection_string
=N'DefaultEndpointsProtocol=https;AccountName=replstorage;Ac
```

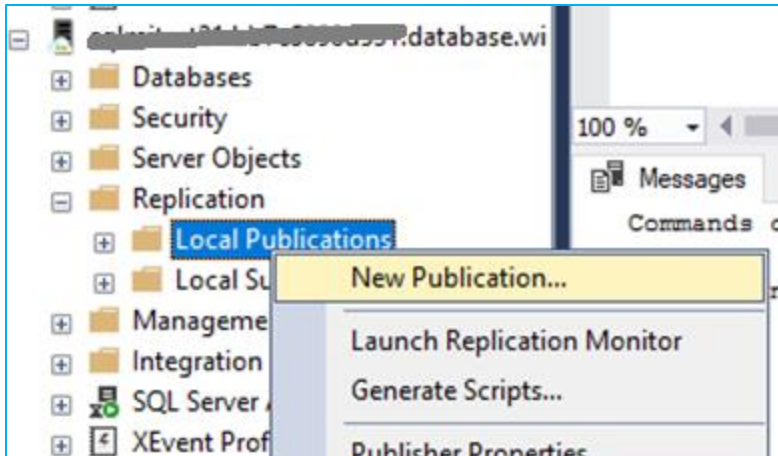


```
EXEC sp_adddistpublisher @publisher = 'sql-mi.database.windows.net', -- primary publisher
    @distribution_db = N'distribution02',
    @security_mode = 0,
    @login = N'user123',
    @password = N'password@123456789',

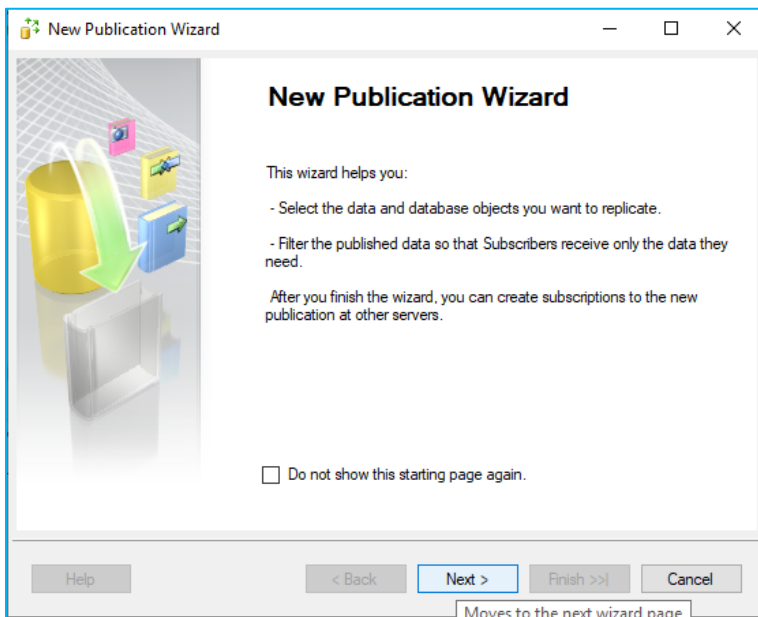
    @working_directory = N'\\storage-account-name.file.core.windows.net\file_share_name',
    @storage_connection_string = N'Connection-string'
-- example: @storage_connection_string = N'DefaultEndpointsProtocol=https;AccountName=replstorage;Ac
```

Step4 Create publication.

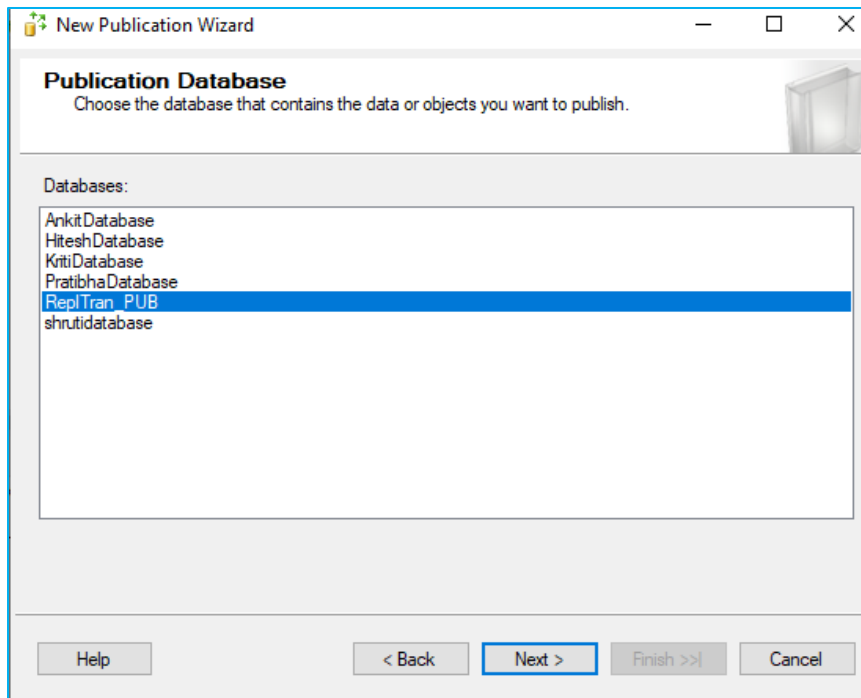
Step 4.1 SQL-MI > Replication > Local Publications > Right Click Create New Publication.



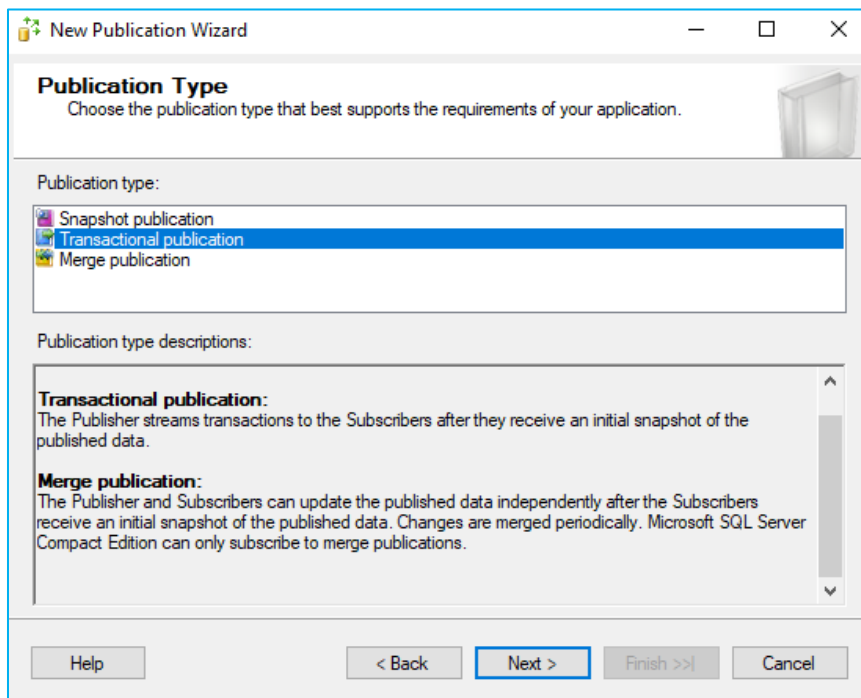
Step 4.2 Click on Next Button.



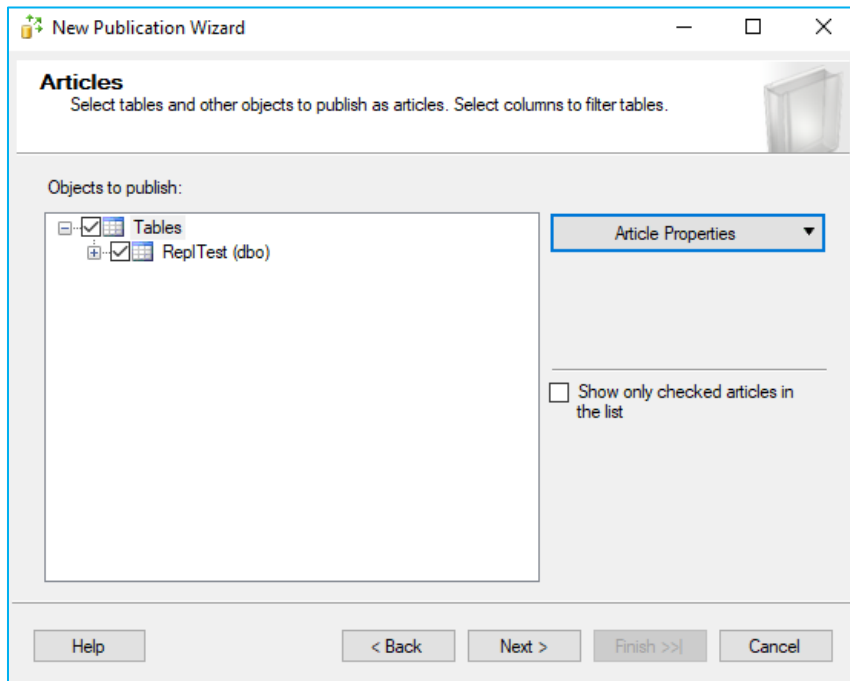
Step 4.3 Select the database you want to publish and again click Next.



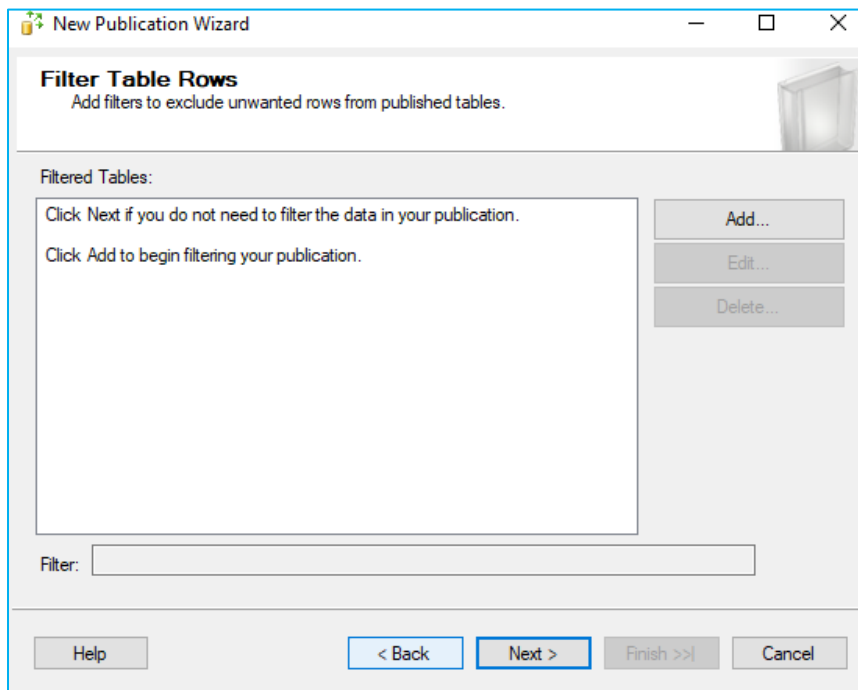
Step 4.4 As on the screenshot below, for Publication Type chose Transactional publication and click Next.



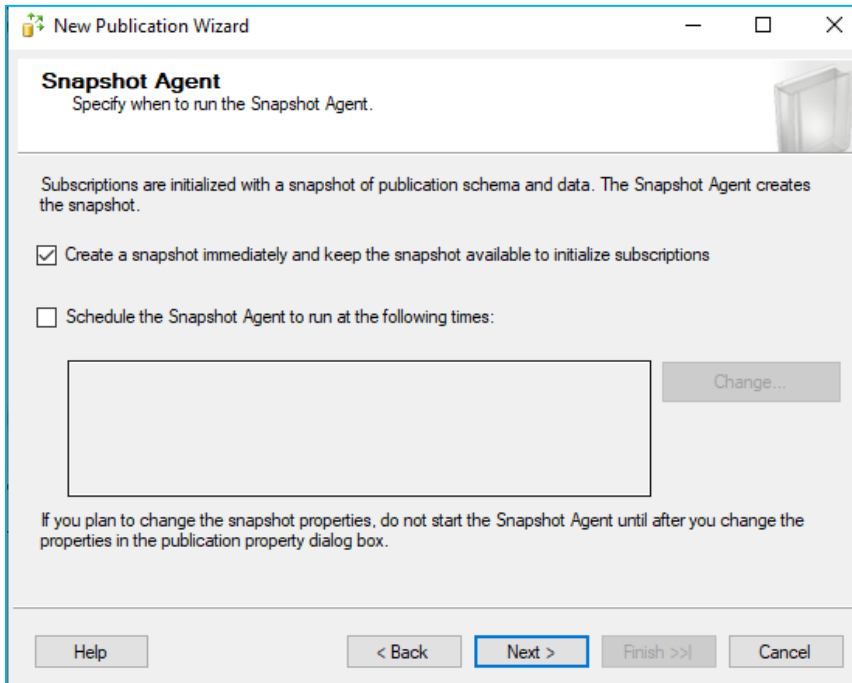
Step 4.5 Then on the Articles window, choose objects you want to replicate. In this example we will chose all Tables and click Next button.



Step 4.6 On the **Filter Table Rows** window we don't add any filters, just click Next.

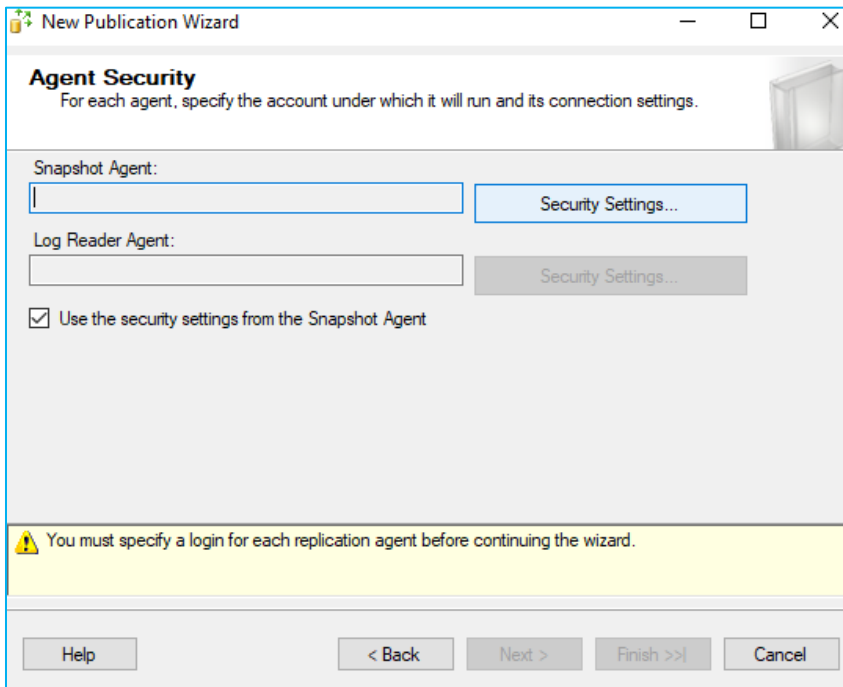


Step 4.7 On **Snapshot Agent** windows check “Create a snapshot immediately...” and click Next.



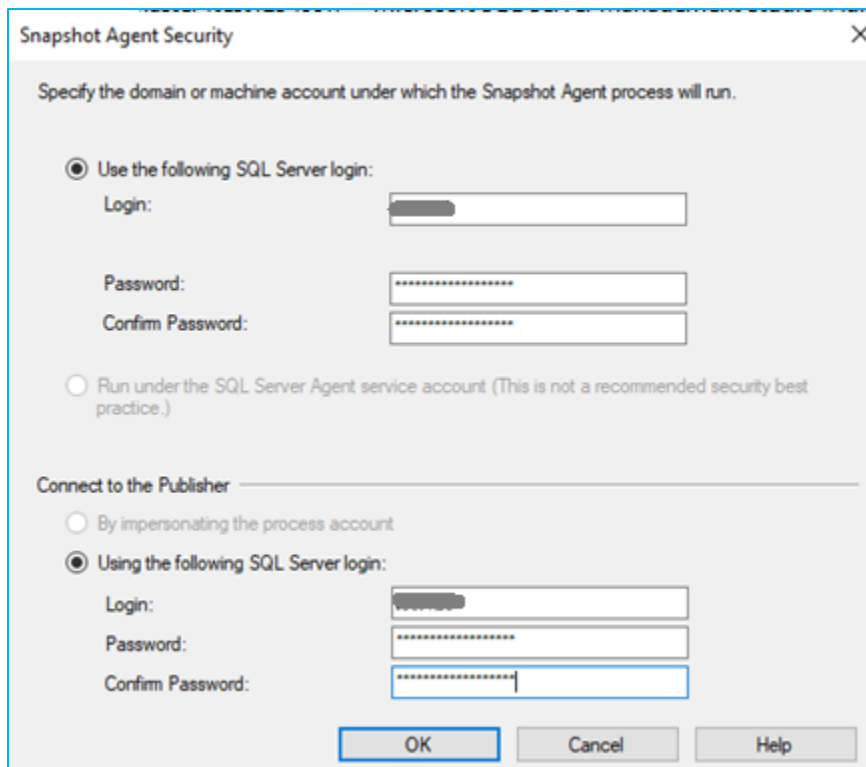
The screenshot shows the 'New Publication Wizard' window with the 'Snapshot Agent' step selected. The title bar reads 'New Publication Wizard'. The main heading is 'Snapshot Agent' with the subtitle 'Specify when to run the Snapshot Agent.' Below this, a text block states: 'Subscriptions are initialized with a snapshot of publication schema and data. The Snapshot Agent creates the snapshot.' There are two radio button options: the first is 'Create a snapshot immediately and keep the snapshot available to initialize subscriptions' (which is selected), and the second is 'Schedule the Snapshot Agent to run at the following times:'. Below the second option is an empty rectangular box and a 'Change...' button. A note at the bottom of the main area says: 'If you plan to change the snapshot properties, do not start the Snapshot Agent until after you change the properties in the publication property dialog box.' The bottom of the window contains a navigation bar with buttons: 'Help', '< Back', 'Next >' (highlighted with a blue border), 'Finish >>', and 'Cancel'.

Step 4.8 On **Agent Security** windows click on Security Settings to provide credentials for both Snapshot Agent and connection to the Publisher.



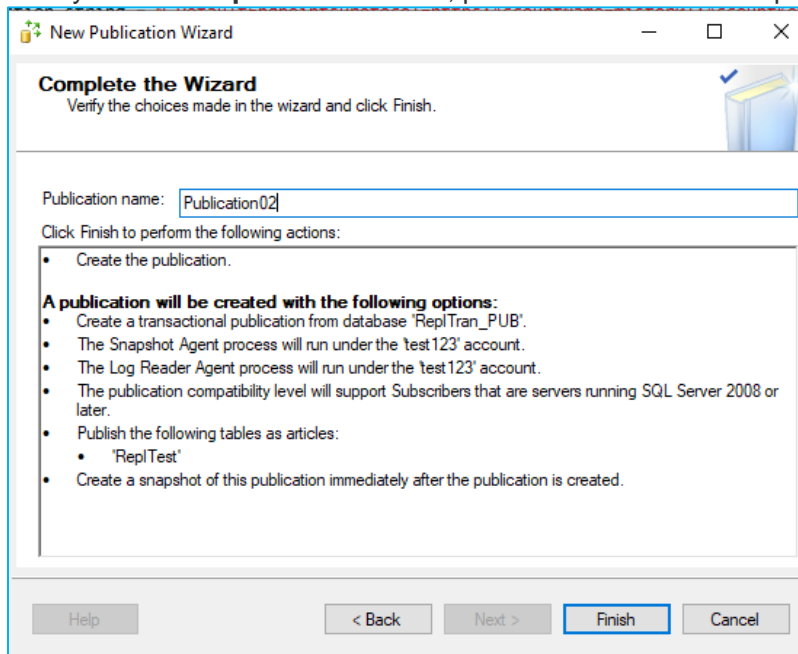
The screenshot shows the 'New Publication Wizard' window with the 'Agent Security' step selected. The title bar reads 'New Publication Wizard'. The main heading is 'Agent Security' with the subtitle 'For each agent, specify the account under which it will run and its connection settings.' Below this, there are two input fields: 'Snapshot Agent:' and 'Log Reader Agent:'. To the right of the 'Snapshot Agent' field is a 'Security Settings...' button. To the right of the 'Log Reader Agent' field is a disabled 'Security Settings...' button. Below these fields is a checked checkbox labeled 'Use the security settings from the Snapshot Agent'. At the bottom of the main area is a yellow warning box with a yellow triangle icon and the text: 'You must specify a login for each replication agent before continuing the wizard.' The bottom of the window contains a navigation bar with buttons: 'Help', '< Back', 'Next >' (disabled), 'Finish >>' (disabled), and 'Cancel'.

Step 4.9 add user & password of SQL-MI and click on ok.



The 'Snapshot Agent Security' dialog box is shown. It has a title bar with a close button. The main text says 'Specify the domain or machine account under which the Snapshot Agent process will run.' There are two radio buttons. The first is selected and labeled 'Use the following SQL Server login:'. Below it are three text boxes: 'Login:', 'Password:', and 'Confirm Password:'. The second radio button is labeled 'Run under the SQL Server Agent service account (This is not a recommended security best practice.)'. Below this is a section titled 'Connect to the Publisher' with two radio buttons. The second is selected and labeled 'Using the following SQL Server login:'. Below it are three text boxes: 'Login:', 'Password:', and 'Confirm Password:'. At the bottom are three buttons: 'OK', 'Cancel', and 'Help'.

Step 4.10 On the **Wizard Actions** window check **Create the Publication** and click Next. Finally in the **Complete the Wizard**, provide the name for the publication and click Finish.



The 'New Publication Wizard' dialog box is shown, specifically the 'Complete the Wizard' step. The title bar says 'New Publication Wizard'. The main text says 'Complete the Wizard' and 'Verify the choices made in the wizard and click Finish.' There is a 'Publication name:' label followed by a text box containing 'Publication02'. Below this is a section titled 'Click Finish to perform the following actions:' followed by a list of actions. A sub-section titled 'A publication will be created with the following options:' lists several options. At the bottom are four buttons: 'Help', '< Back', 'Next >', and 'Finish'.

Publication name:

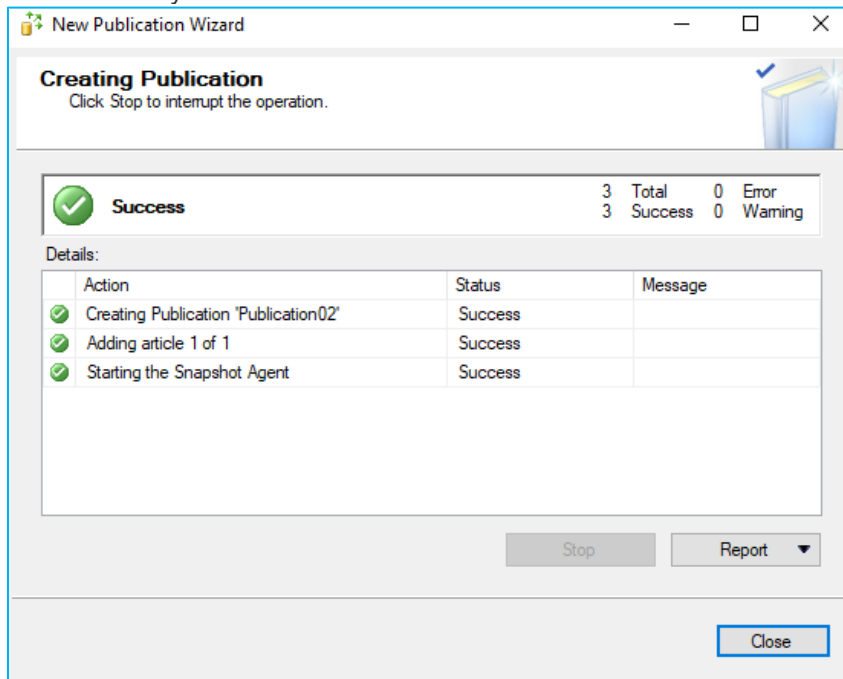
Click Finish to perform the following actions:

- Create the publication.

A publication will be created with the following options:

- Create a transactional publication from database 'ReplTran_PUB'.
- The Snapshot Agent process will run under the 'test123' account.
- The Log Reader Agent process will run under the 'test123' account.
- The publication compatibility level will support Subscribers that are servers running SQL Server 2008 or later.
- Publish the following tables as articles:
 - 'ReplTest'
- Create a snapshot of this publication immediately after the publication is created.

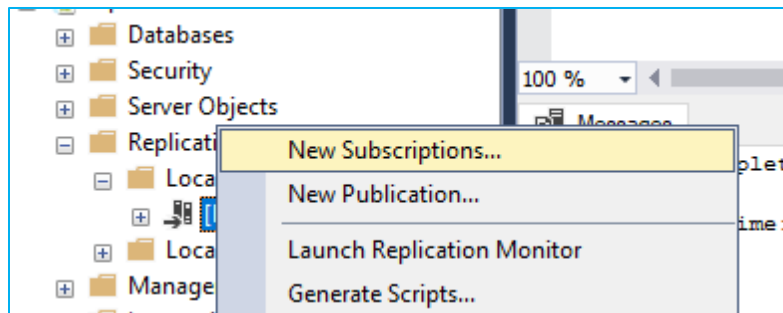
Step 4.11 This Wizard will show progress and once the process is done you should see a Success sign with 0 Errors and 0 Warnings. Click the Close button. With this the publication is successfully created.



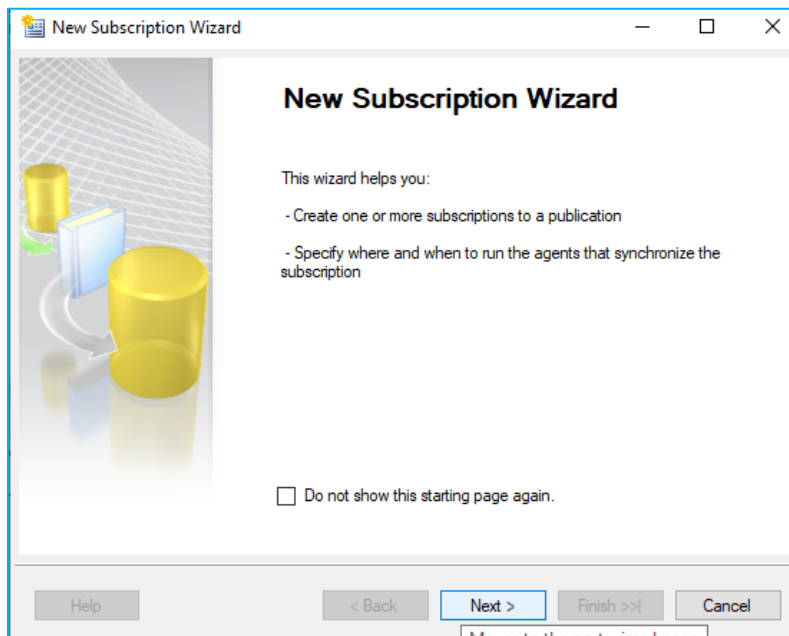
To check the status of the publication, refresh the Local Publications in SSMS and you will find newly created publication. From the context menu of the newly created Publication, click Launch Replication Monitor and find the publisher that has been just created. On the Agents tab you can monitor the progress of the Snapshot Agent and Log Reader Agent. Time needed for a snapshot to be created varies and depends on the size of data that's participating in the replication. Once Snapshot Agent's Last Action is "[100%] A snapshot of x article(s) was generated." the publication is ready.

Step5 Configure replication subscription.

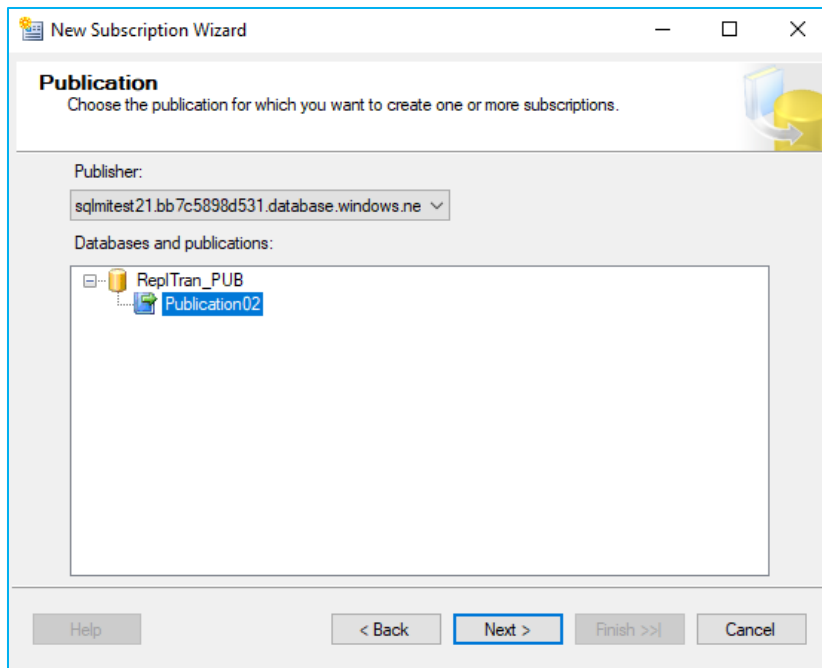
Now when distribution and publication are configured, we need to create a subscription as the last piece of transactional replication setup. In the context menu of the Publication we've created, we are going to click on New Subscriptions. New Subscription Wizard will open. Let's follow its steps.



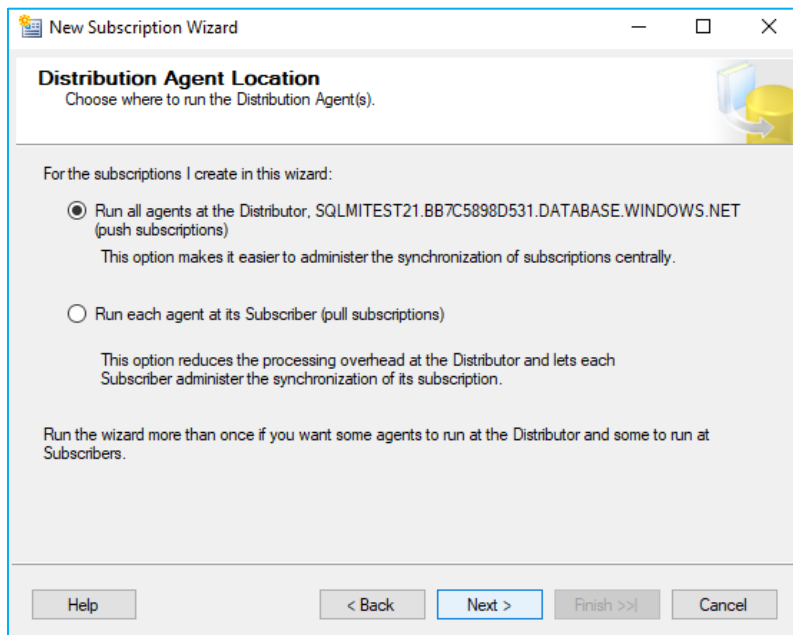
Step 5.2 New Subscription Wizard will open click on Next button.



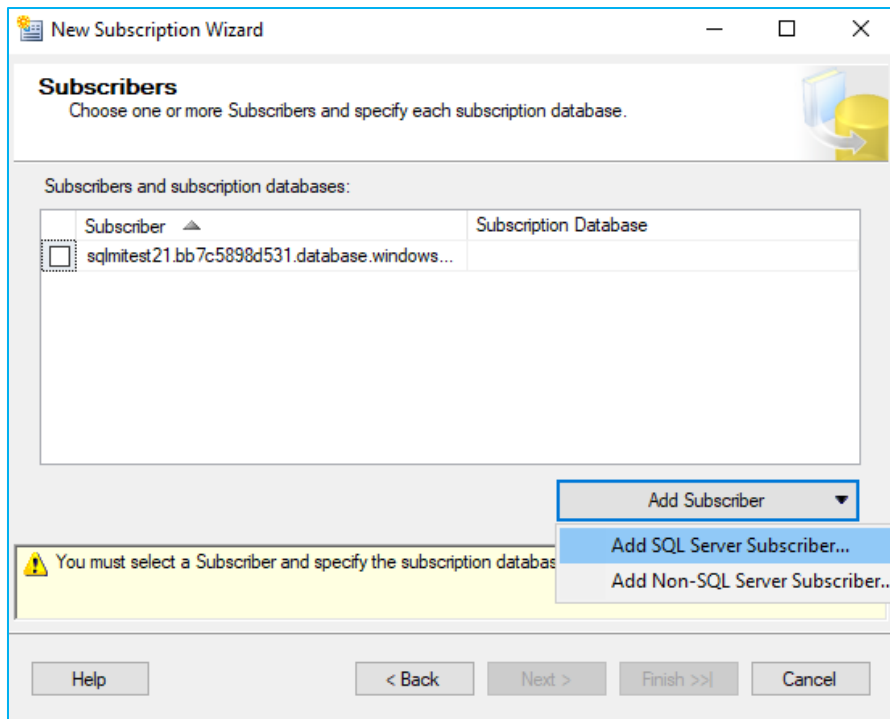
Step 5.3 On the **Publication** window, select the **Publisher**, database and the publication and click Next.



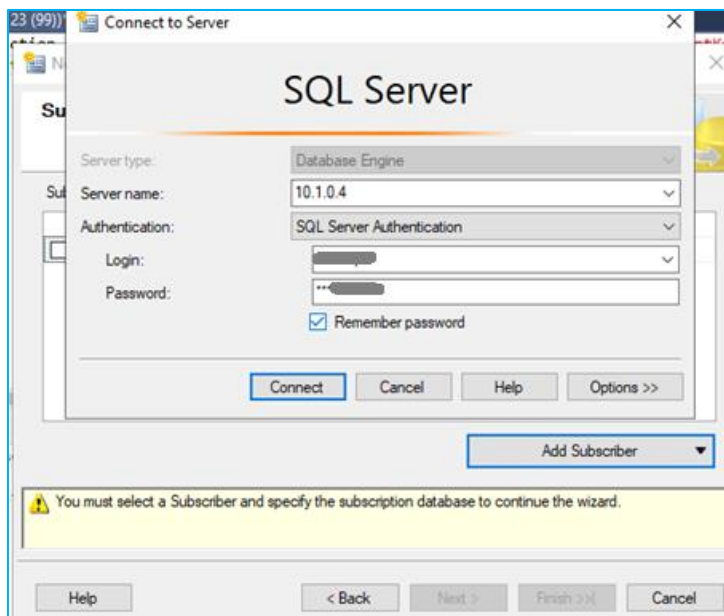
Step 5.4 Distribution Agent Location select option to **Run all agents at the Distributor** and click Next.



Step 5.5 On the Subscriber window, click on **Add Subscriber** and then **Add SQL Server Subscriber**.

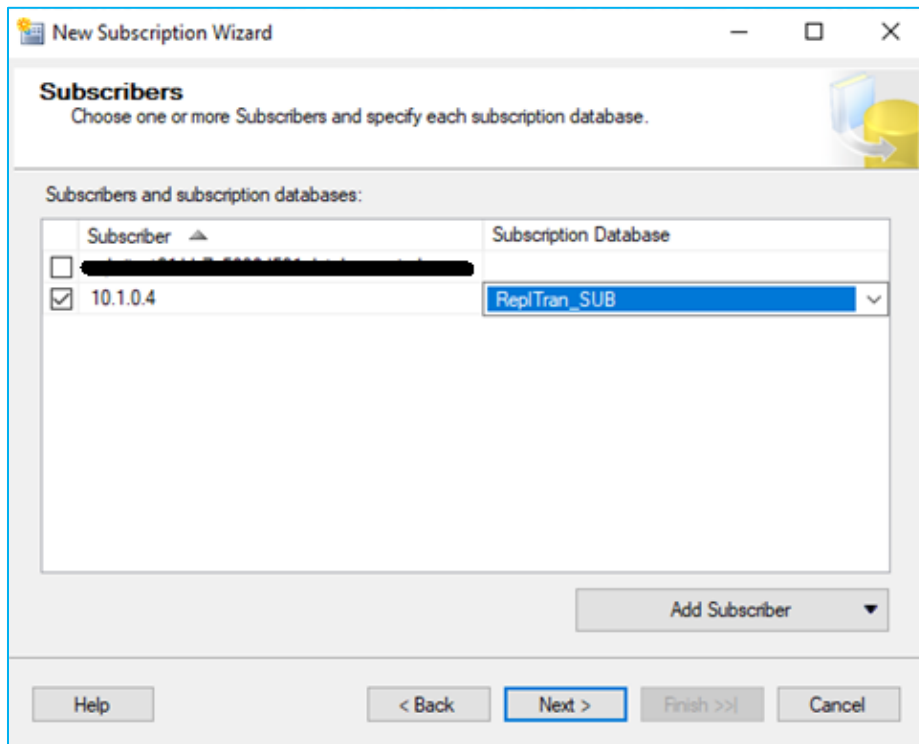


Step 5.6 hen connect to the SQL Server that will be the Subscriber. This SQL Server will be the target for the database migration. Use the server's local IP address for this connection.



Step 5.7 For the newly added **Subscriber**, for the **Subscription Database** chose **New database** option from the drop down menu, and in the **New Database** window, provide the

Database name. This will be the name of the target database for the migration. Then click OK and then Next.



Step 5.8 On the **Distribution Agent Security** window, click on the button with three dots,

New Subscription Wizard

Distribution Agent Security
Specify the process account and connection options for each Distribution Agent.

Subscription properties:

Agent for Subscriber	Connection to Distributor	Connection to Subscriber
10.1.0.4	Click (...) to set security op...	Click (...) to set security opti... ..

You must specify the security information for all subscriptions before continuing the wizard. Click (...) to set the security options.

Help < Back Next > Finish >> Cancel

Step 5.9 **Distribution Agent Security** window provide login and password for Distributor and Subscriber.

Distribution Agent Security

Specify Distributor SQL Server login.

☒ Use the following SQL Server login:

Login: test123

Password:

Confirm Password:

☐ Run under the SQL Server Agent service account (This is not a recommended security best practice.)

Connect to the Distributor

☐ By impersonating the process account

☒ Using a SQL Server login

The connection to the server on which the agent runs must impersonate the process account. The process account must be a member of the Publication Access List.

Connect to the Subscriber

☐ By impersonating the process account

☒ Using the following SQL Server login:

Login: ashfaq

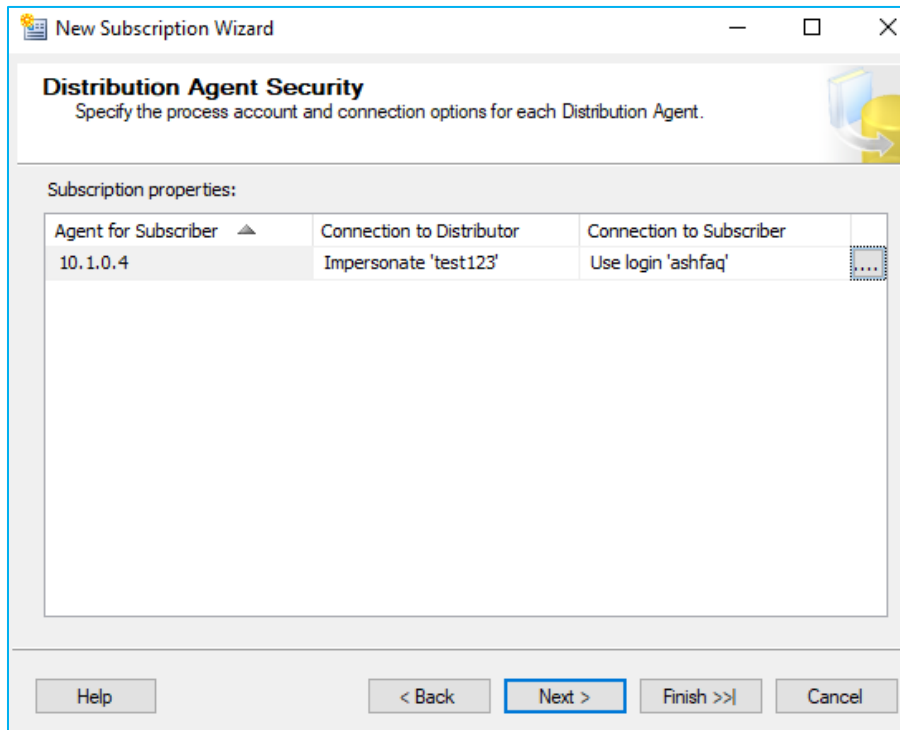
Password:

Confirm password:

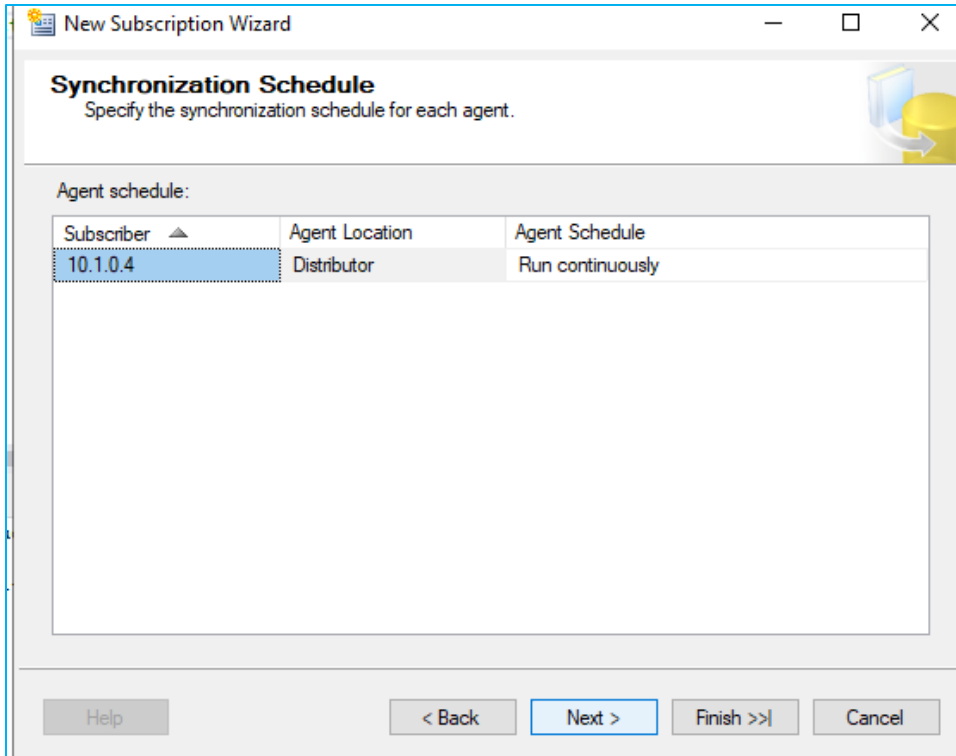
The login used to connect to the Subscriber must be a database owner of the subscription database.

OK Cancel Help

Step 5.10 Click on Next button.



Step 5.11 **Synchronization Schedule** leave the **Agent Schedule** set to **Run continuously**. This will enable continuous data flow from the source database to the destination and help with the online migration.



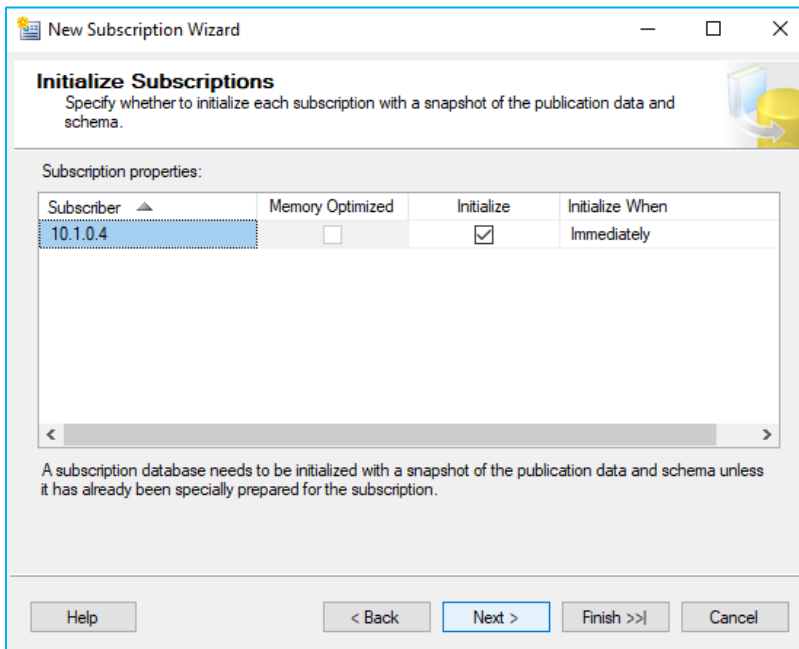
Synchronization Schedule
Specify the synchronization schedule for each agent.

Agent schedule:

Subscriber ▲	Agent Location	Agent Schedule
10.1.0.4	Distributor	Run continuously

Help < Back Next > Finish >>| Cancel

Step 5.12 On the **Initialize Subscription** window leave **Initialize When** set to **Immediately** Click on **Next**.



Initialize Subscriptions
Specify whether to initialize each subscription with a snapshot of the publication data and schema.

Subscription properties:

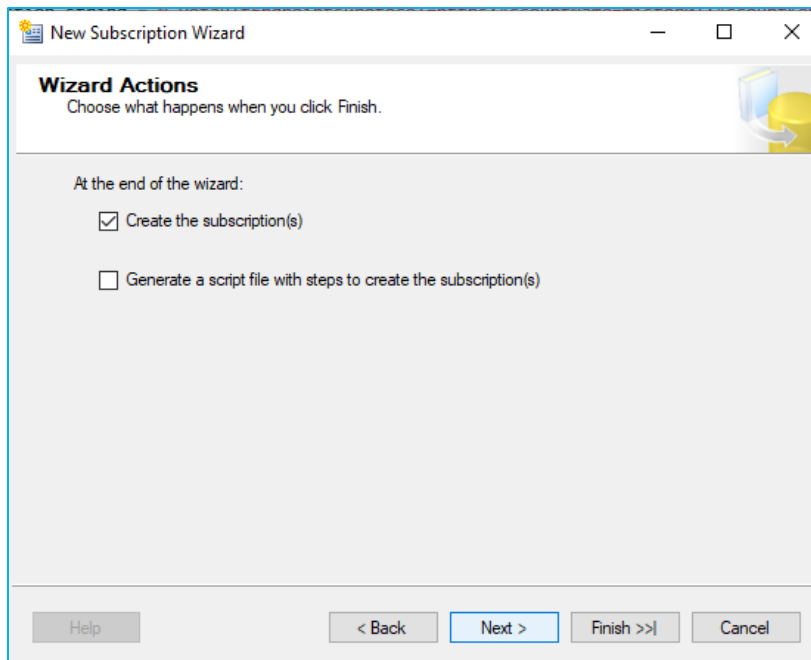
Subscriber ▲	Memory Optimized	Initialize	Initialize When
10.1.0.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Immediately

< >

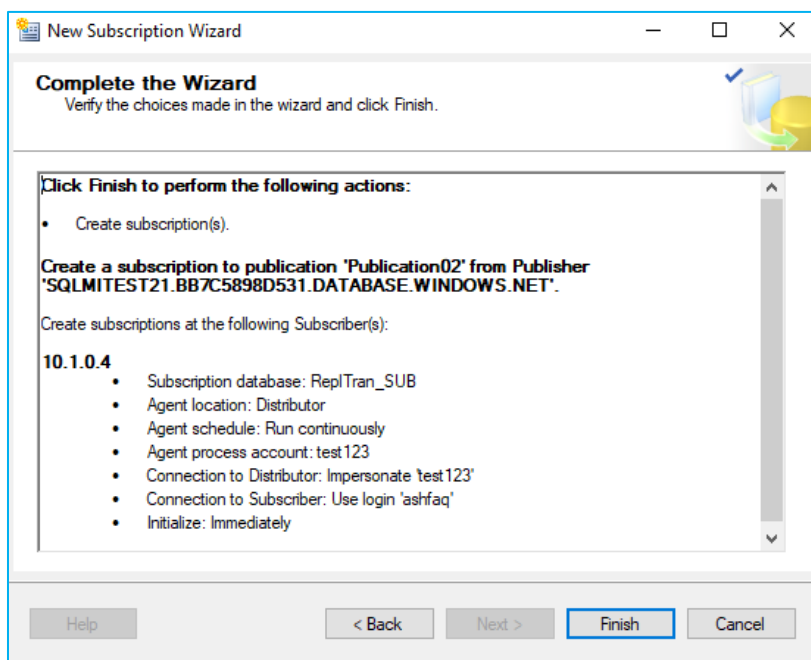
A subscription database needs to be initialized with a snapshot of the publication data and schema unless it has already been specially prepared for the subscription.

Help < Back Next > Finish >>| Cancel

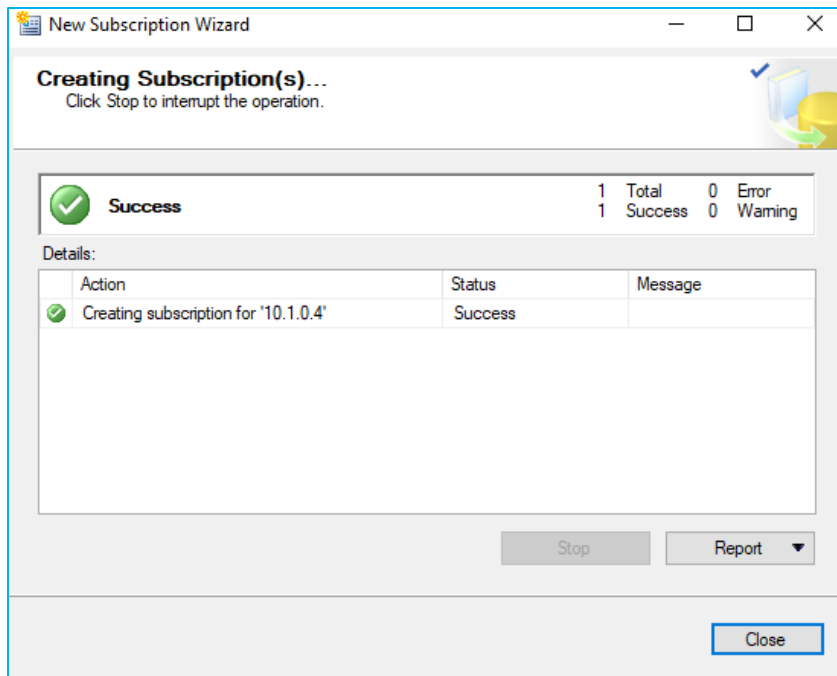
Step 5.13 **Wizard Actions**, leave Create the subscription(s) checked and click Next.



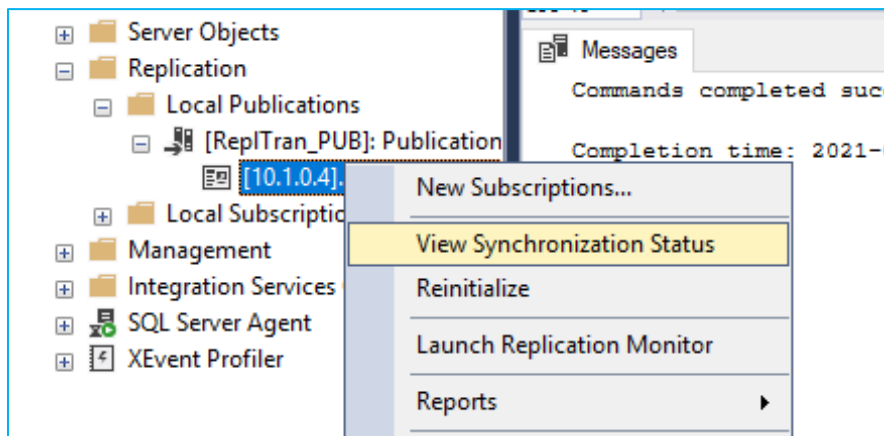
Step 5.14 Complete the Wizard click Next .

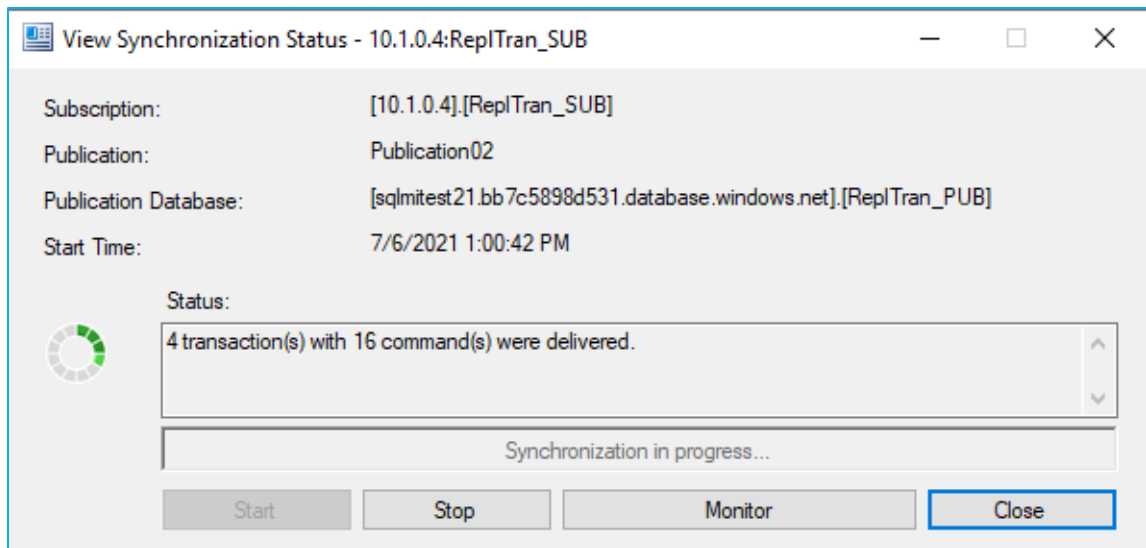


Step 5.15 Success status on the final **Creating Subscription(s)** step Click on close



Step 6 Once this is done, from the context menu of the newly created subscription, open the **View Synchronization Status**. You will see its progress and eventually all transactions will be replicated.

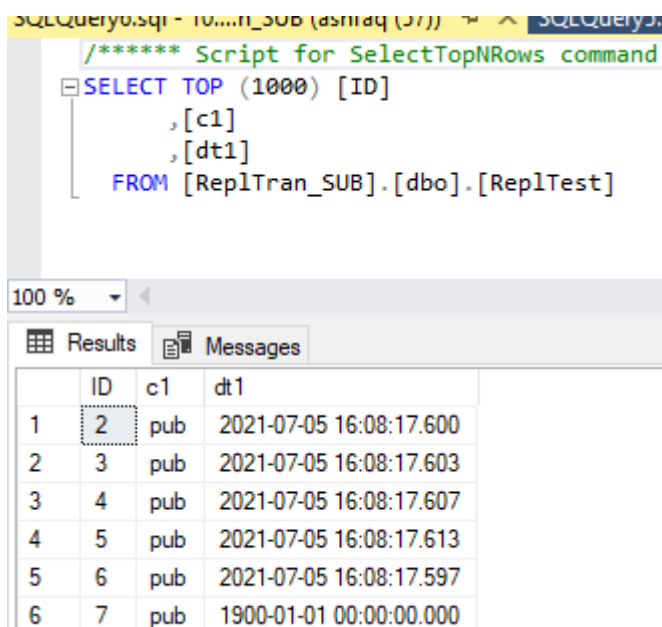




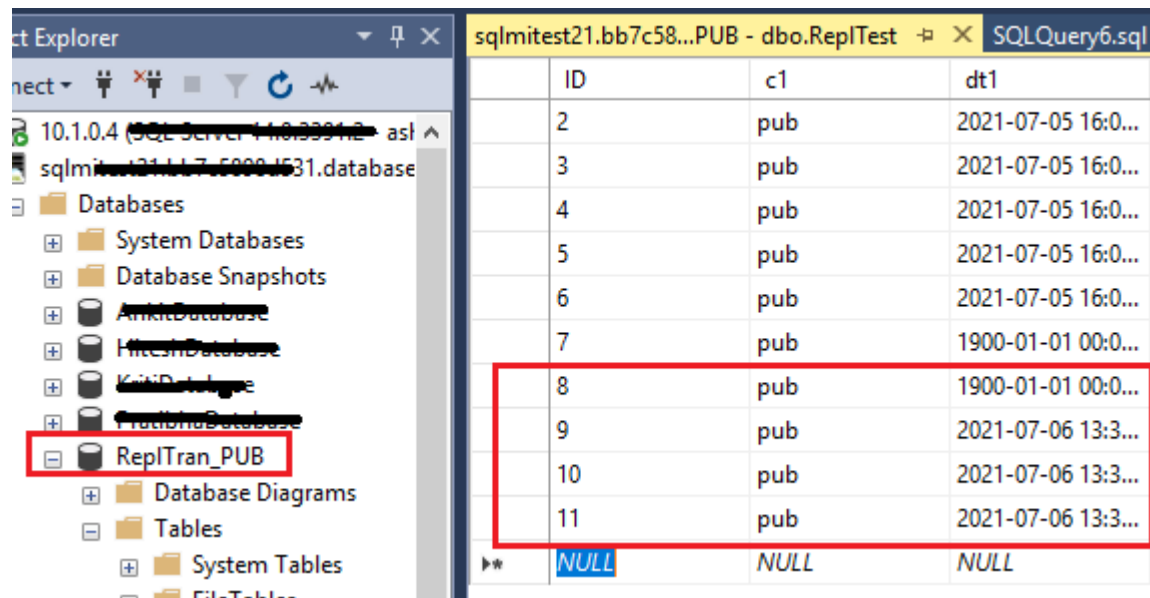
Step 7 Test replication.

Once replication has been configured, you can test it by inserting new items on the publisher and watching the changes propagate to the subscriber.

Step 7.1 **ReplTran_sub** is my Subscriber database and **ReplTest** is my table and some data.



Step 7.2 Add some more new rows to publisher table **ReplTran_PUB**.



The screenshot displays the SQL Server Enterprise Manager interface. On the left, the 'Databases' folder is expanded, and 'ReplTran_PUB' is selected. On the right, a table with columns ID, c1, and dt1 is shown. Rows 8 through 11 are highlighted with a red box.

ID	c1	dt1
2	pub	2021-07-05 16:0...
3	pub	2021-07-05 16:0...
4	pub	2021-07-05 16:0...
5	pub	2021-07-05 16:0...
6	pub	2021-07-05 16:0...
7	pub	1900-01-01 00:0...
8	pub	1900-01-01 00:0...
9	pub	2021-07-06 13:3...
10	pub	2021-07-06 13:3...
11	pub	2021-07-06 13:3...
NULL	NULL	NULL

Step 7.3 Now Check the Subscriber Table.

sqlmitest21.bb7c58...PUB - dbo.ReplTest SQLQuery6.sc

```
/****** Script for SelectTopNRows command t
```

```
SELECT TOP (1000) [ID]
```

```
    [c1]
```

```
    [dt1]
```

```
FROM [ReplTran_SUB].[dbo].[ReplTest]
```

100 %

Results Messages

	ID	c1	dt1
1	2	pub	2021-07-05 16:08:17.600
2	3	pub	2021-07-05 16:08:17.603
3	4	pub	2021-07-05 16:08:17.607
4	5	pub	2021-07-05 16:08:17.613
5	6	pub	2021-07-05 16:08:17.597
6	7	pub	1900-01-01 00:00:00.000
7	8	pub	1900-01-01 00:00:00.000
8	9	pub	2021-07-06 13:30:21.847
9	10	pub	2021-07-06 13:30:30.580
10	11	pub	2021-07-06 13:30:39.297

E . Known errors:

1 Could not connect to Subscriber: Verify your VNet peering is configured correctly. or you may using public IP.

2 Failed to connect to Azure Storage: Using a forward slash instead of a backslash in the file path for the file share can cause this error.

Ex: **\\replstorage.file.core.windows.net\replshare**

3 Windows logins are not supported: use SQL Authentication.