



IIS404_S23_Assignment

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≡ Class	C2
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The SQL Server stand alone Installation steps :

1-Creating the database with filegroup :

1-1Creating schemas :

-Creating tables :

-1 creating table ENTRY.invoice :

-2 creating table MASTER.Category :

-3 creating table ENTRY.Product:

-4 creating junction table invoiceproduct :

1.2. Create the calculated field [Total] as a functions.

1.3. Generate the database diagram.

2. Replication:

2.1. Install another instance of SQL Server called “Replica” will be a read-write replica as well, choose

replication type and justify your choice.

installation steps of replica instance :

the replication feature should be selected :
ready to install :

Configure the replication distribution :

setting new publication :

Choosing the replication type :

creating a subscriber for the new instance :

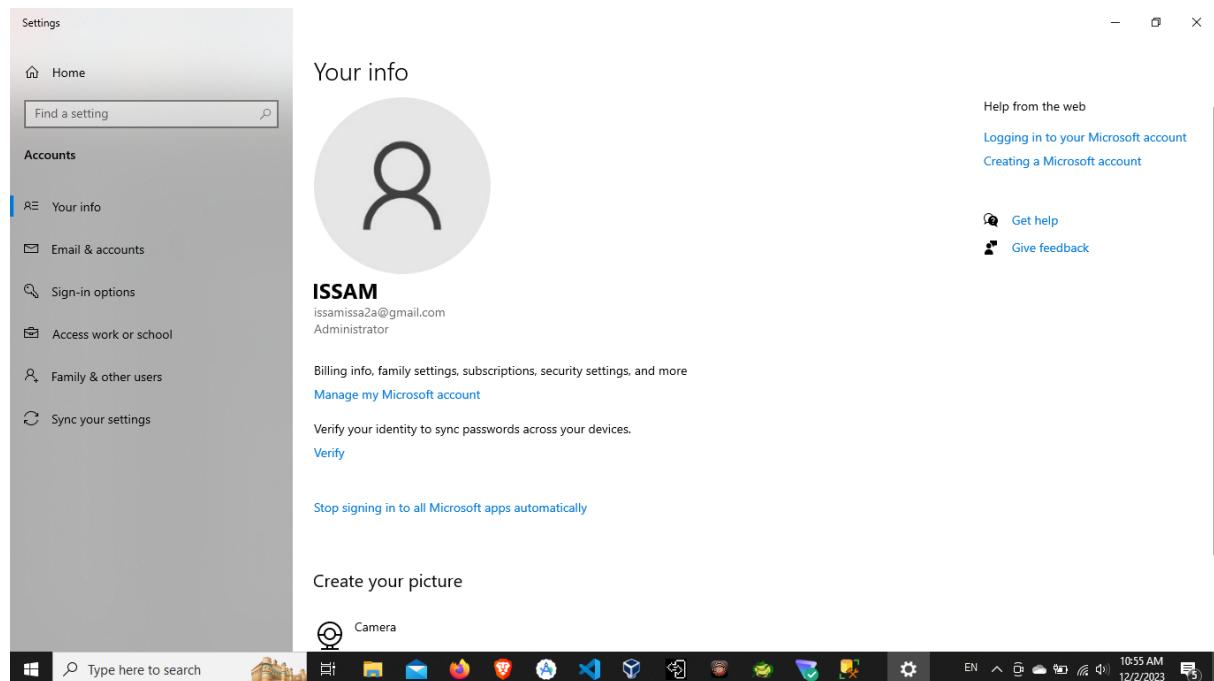
2-2.Implement the replication

2.3.Test the replication showing and proving that it works (data transferred, replication monitor, log):

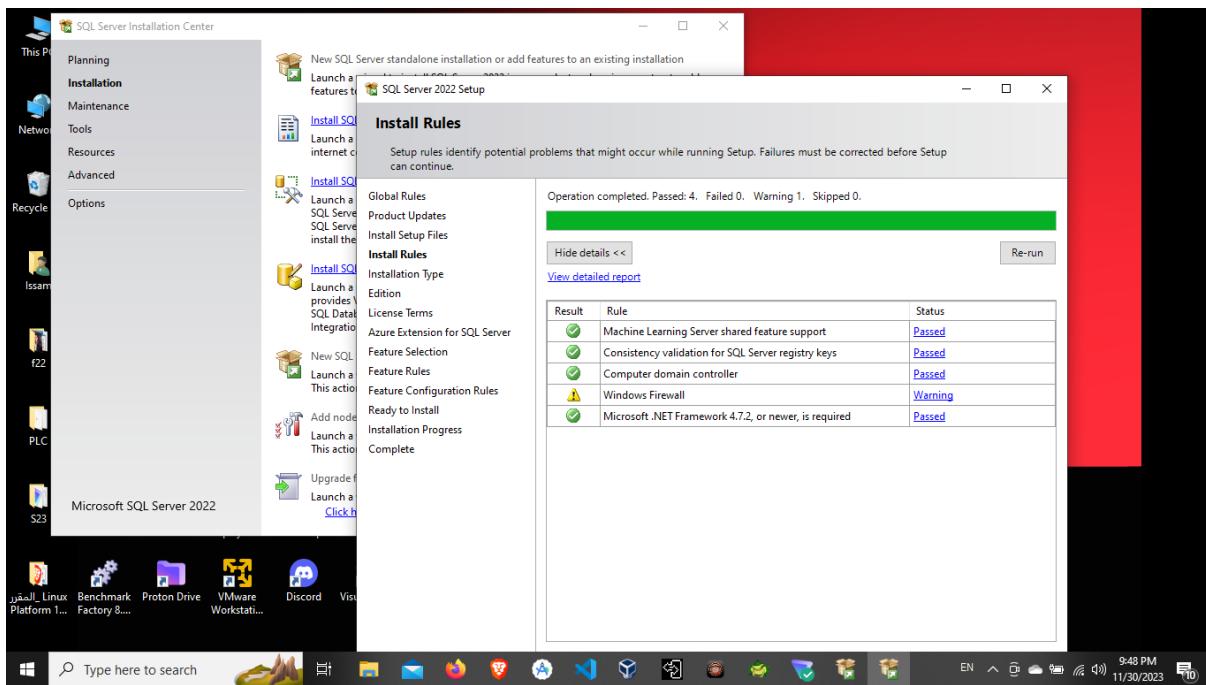
1-data transfer :

2-replication monitor

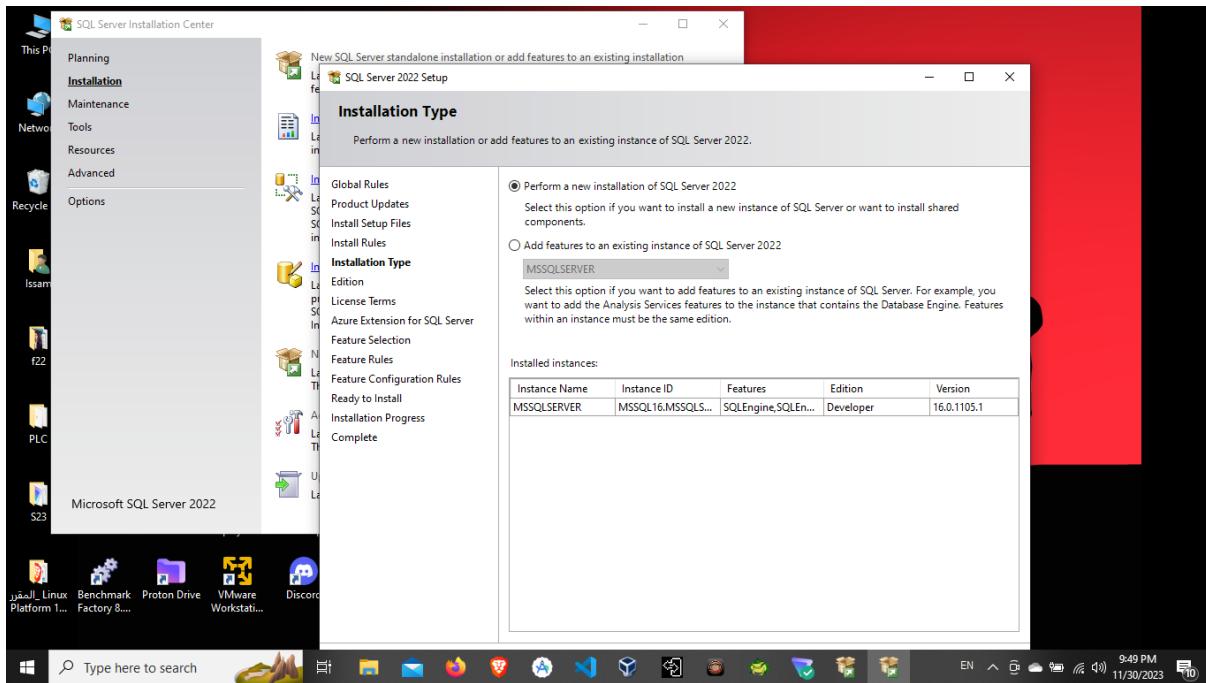
3-Log



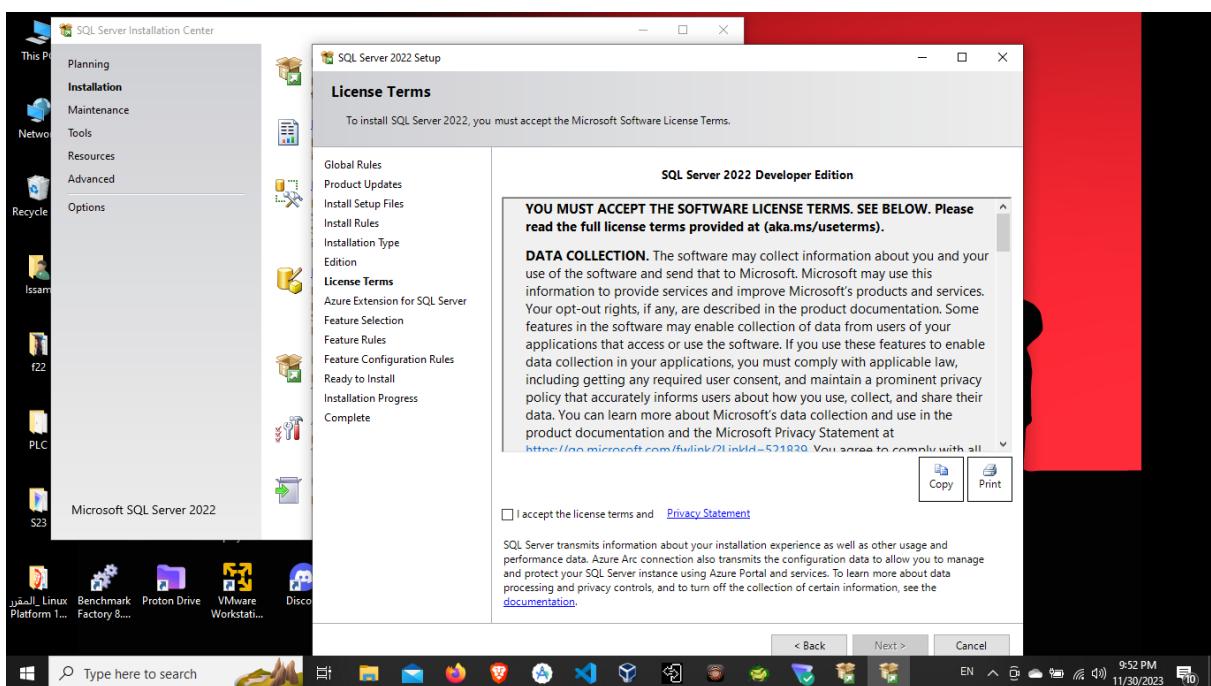
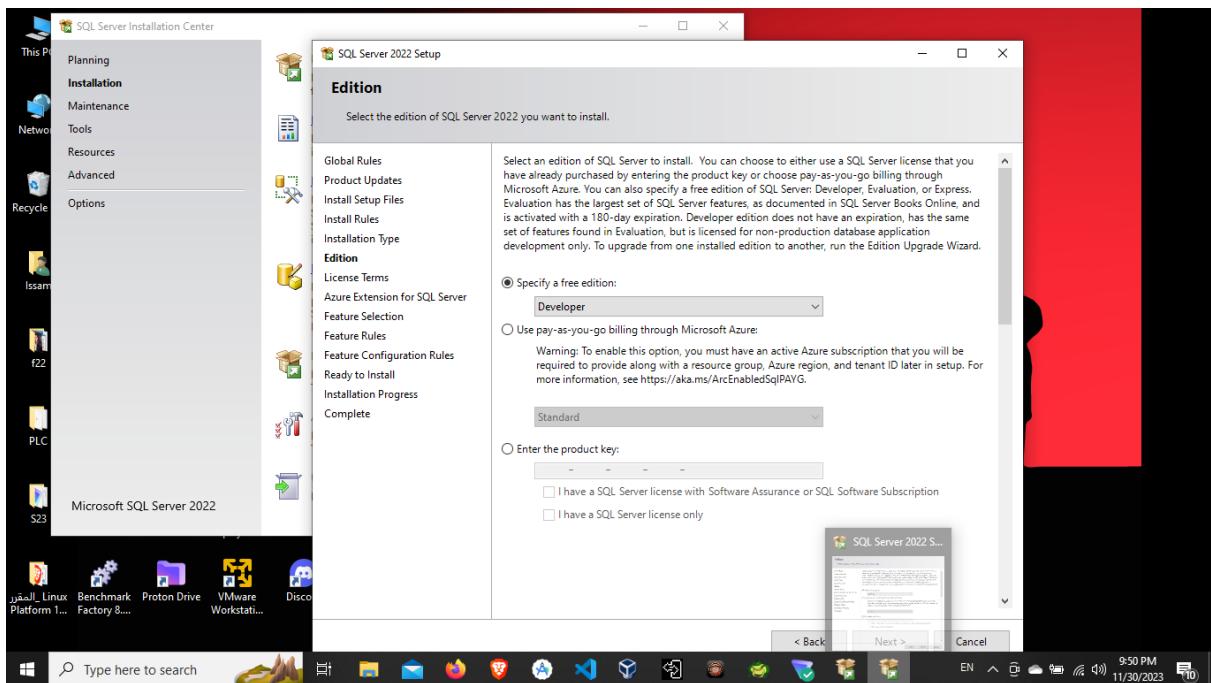
The SQL Server stand alone Installation steps :

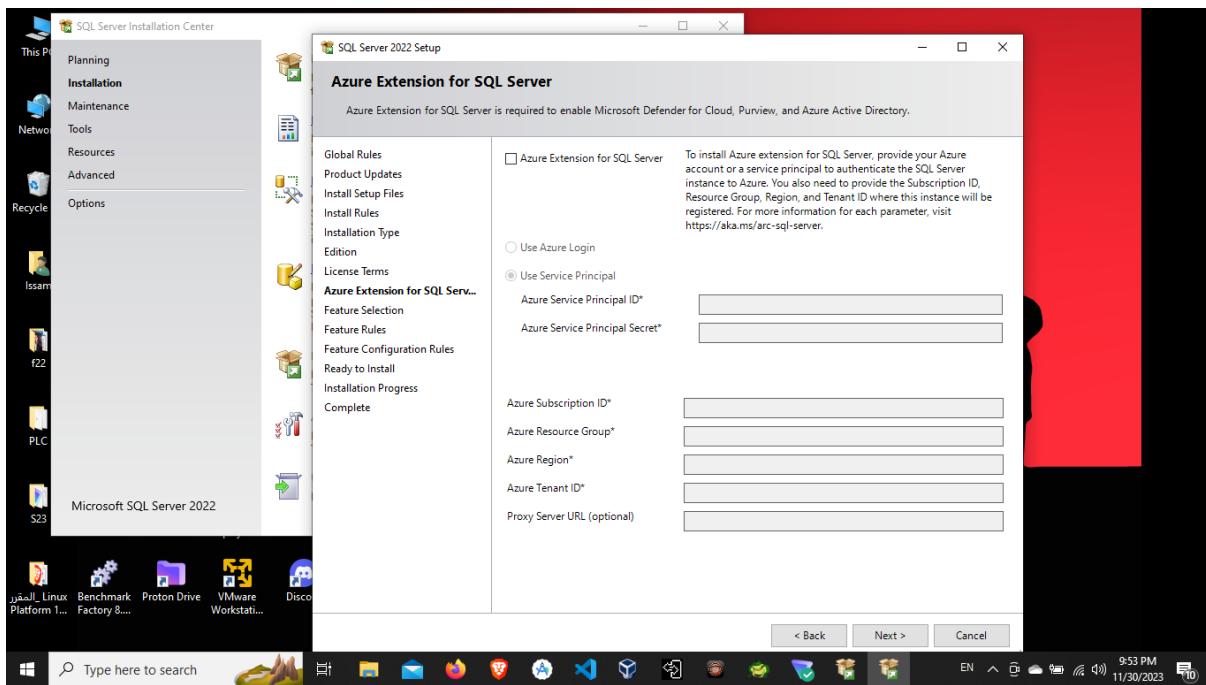


Preforming a new installation of the new sql server instance

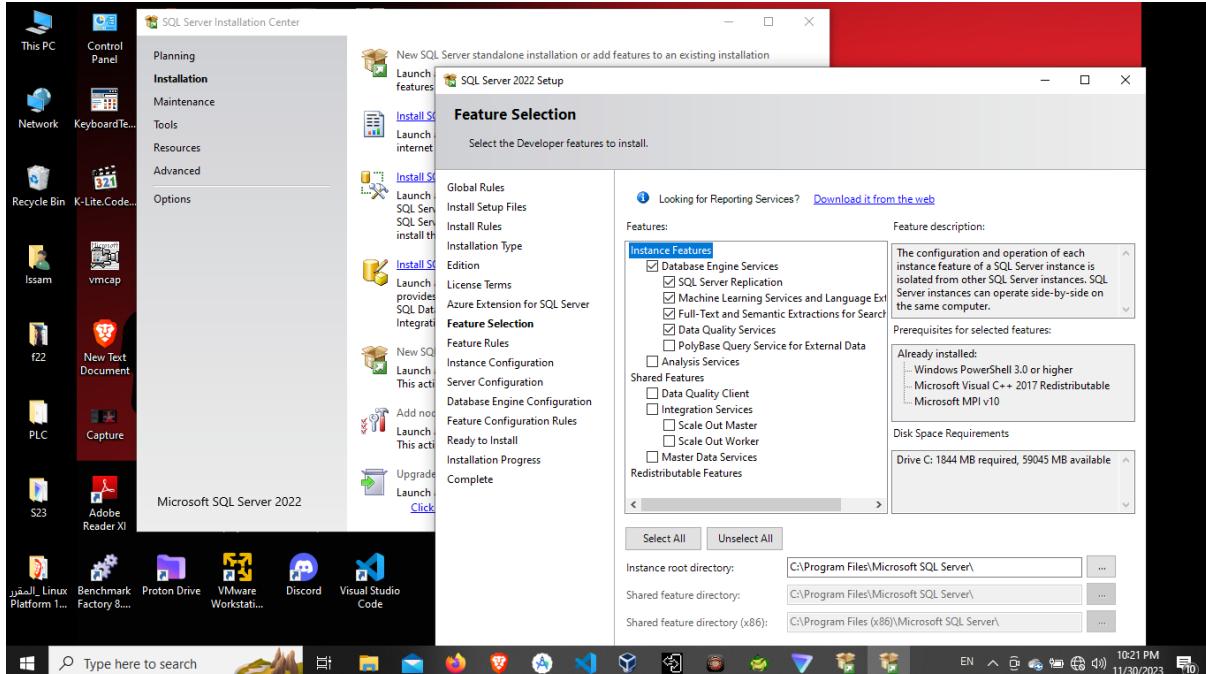


Choosing sql server Edition : Developer





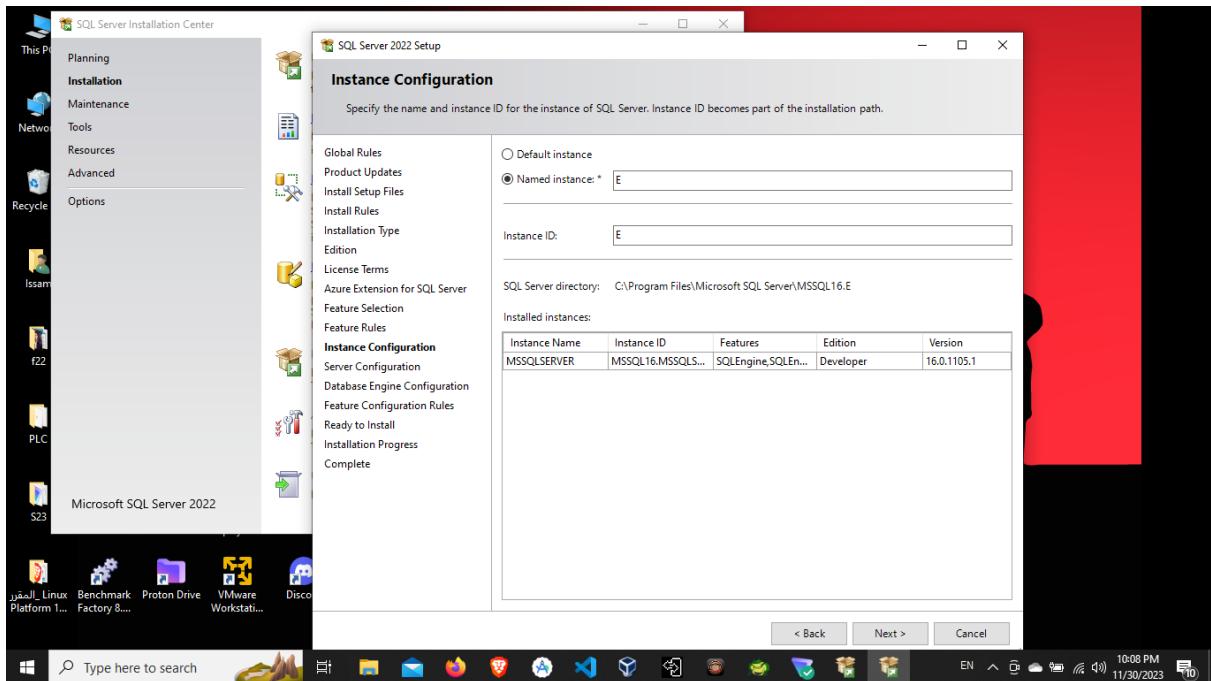
Selecting "Database Engine Services", "SQL Server Replication", and any other desired features.



Selecting Instance Configuration:

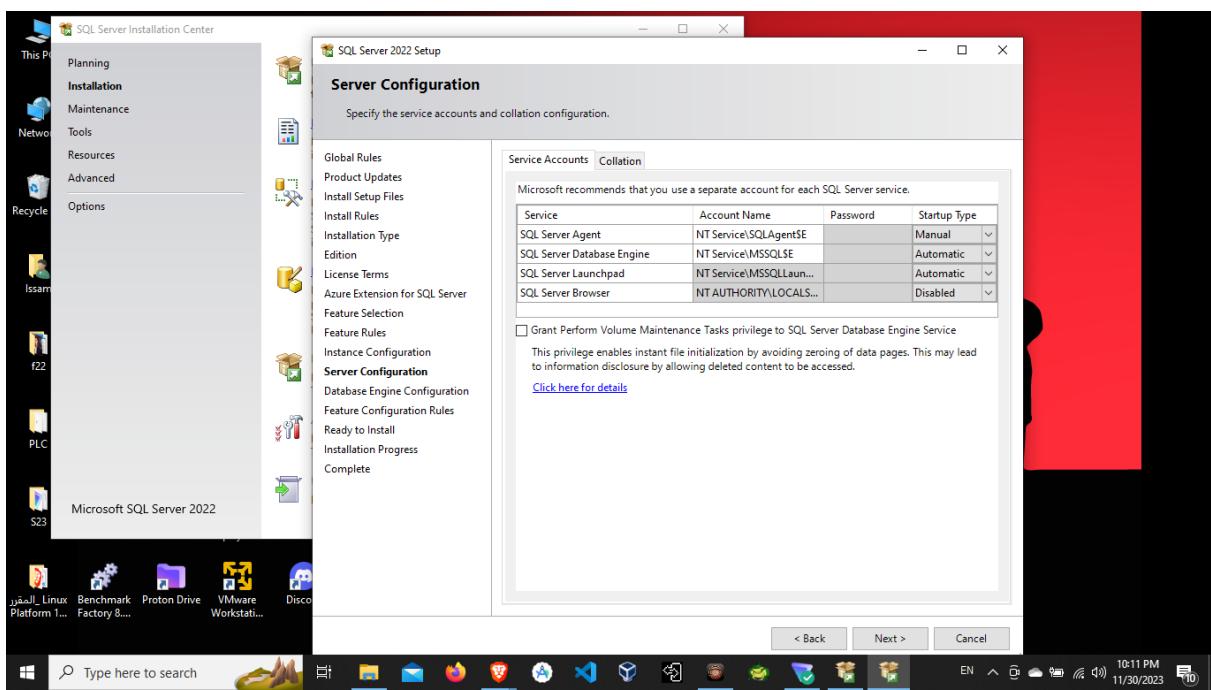
- Choosing the instance name

- since there's only me on the assignment and according to the requirement the instance name would be " E "



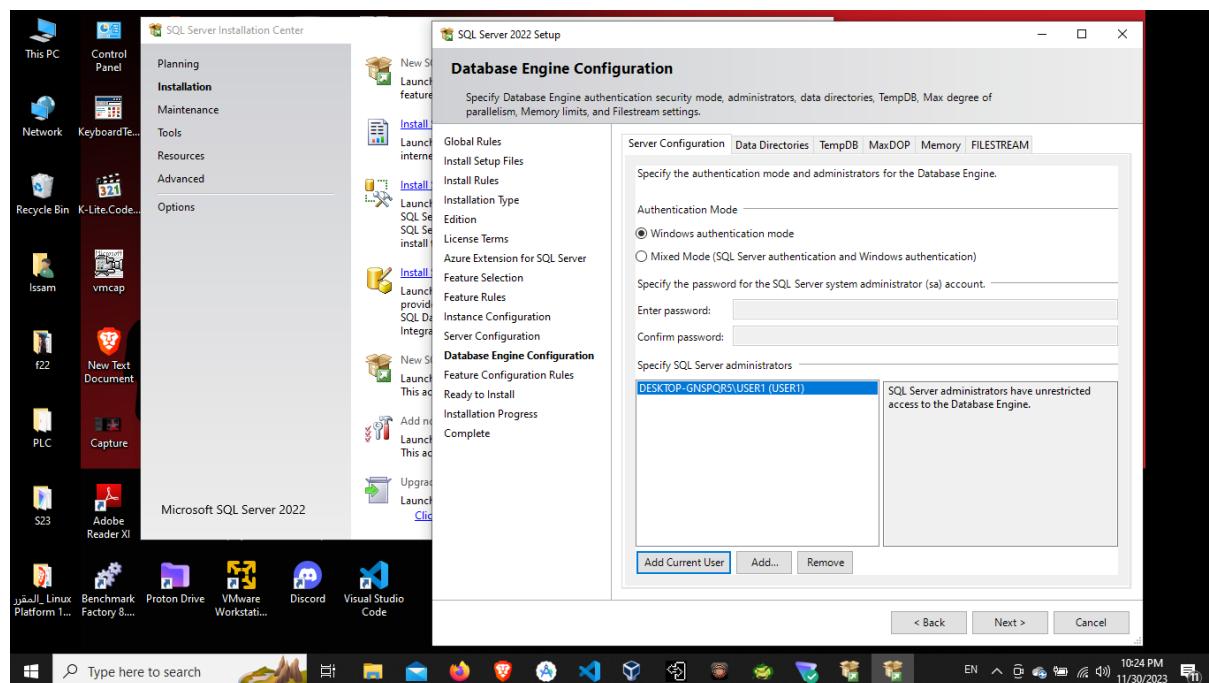
server configuration :

specifying the service accounts that SQL Server services will run under.

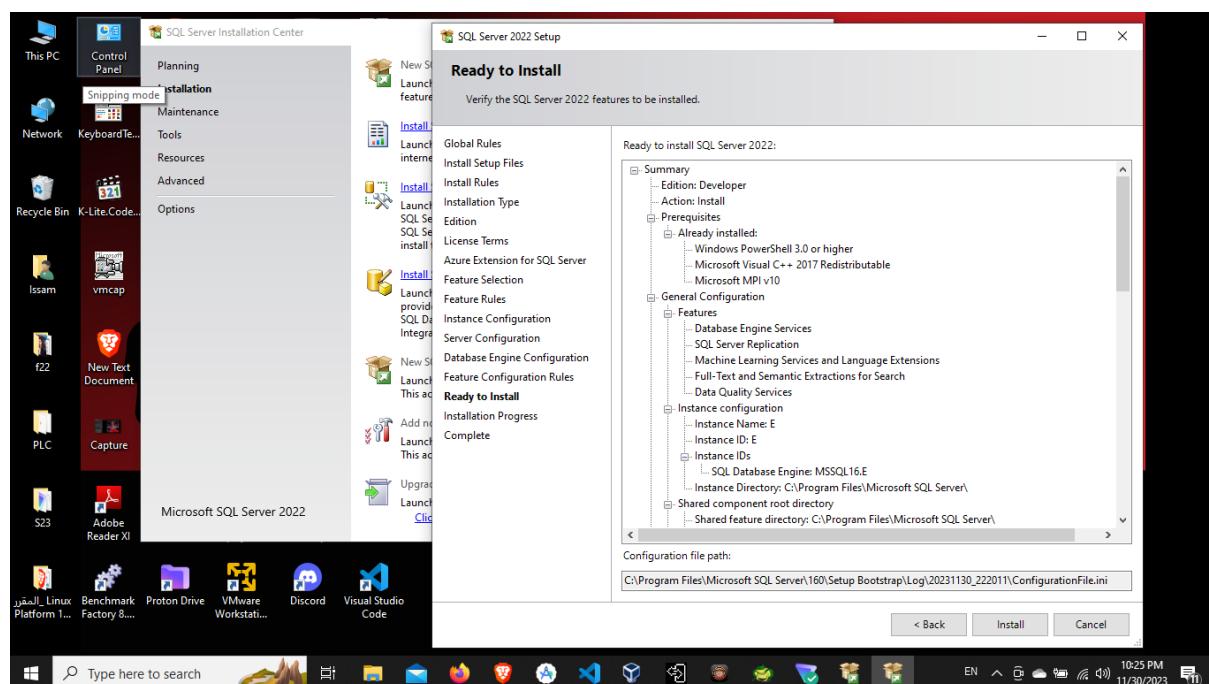


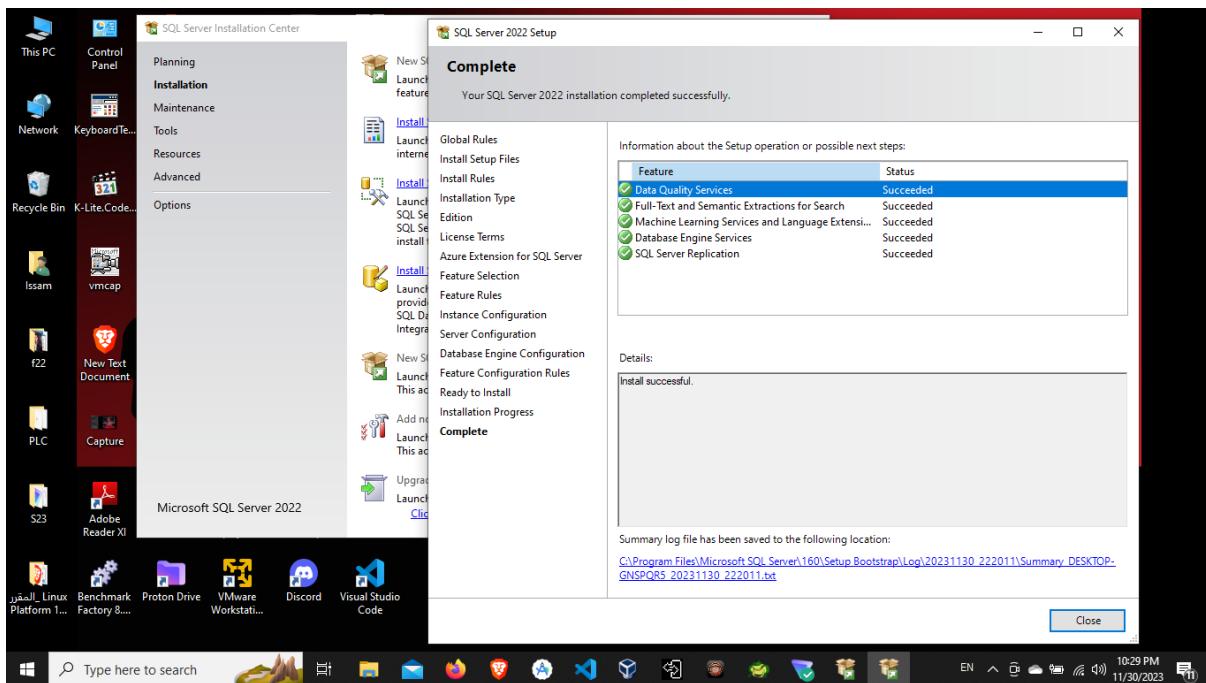
Selecting Database Engine Configuration:

- Specifying SQL Server administrators and service accounts.



Ready to install

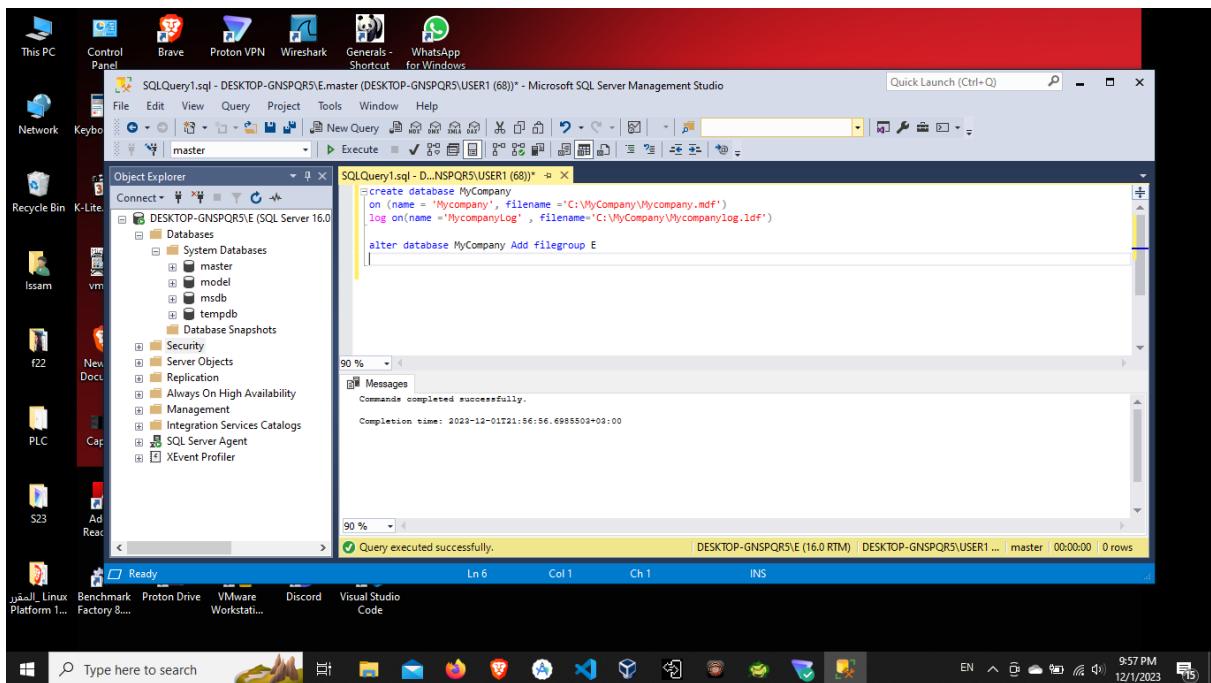




1-Creating the database with filegroup :

What this code does:

- It adds a new filegroup named "E" to the existing database "Mycompany".
- A filegroup is a logical container for data files in a database.
- Adding a filegroup allows subsequently adding more physical data files to help partition/distribute data across files.
- It also enables features like partitioning, compression at the filegroup level.
- this ALTER DATABASE statement simply adds a new empty filegroup called "E" to the given database, which can then be utilized as needed for various data management purposes.



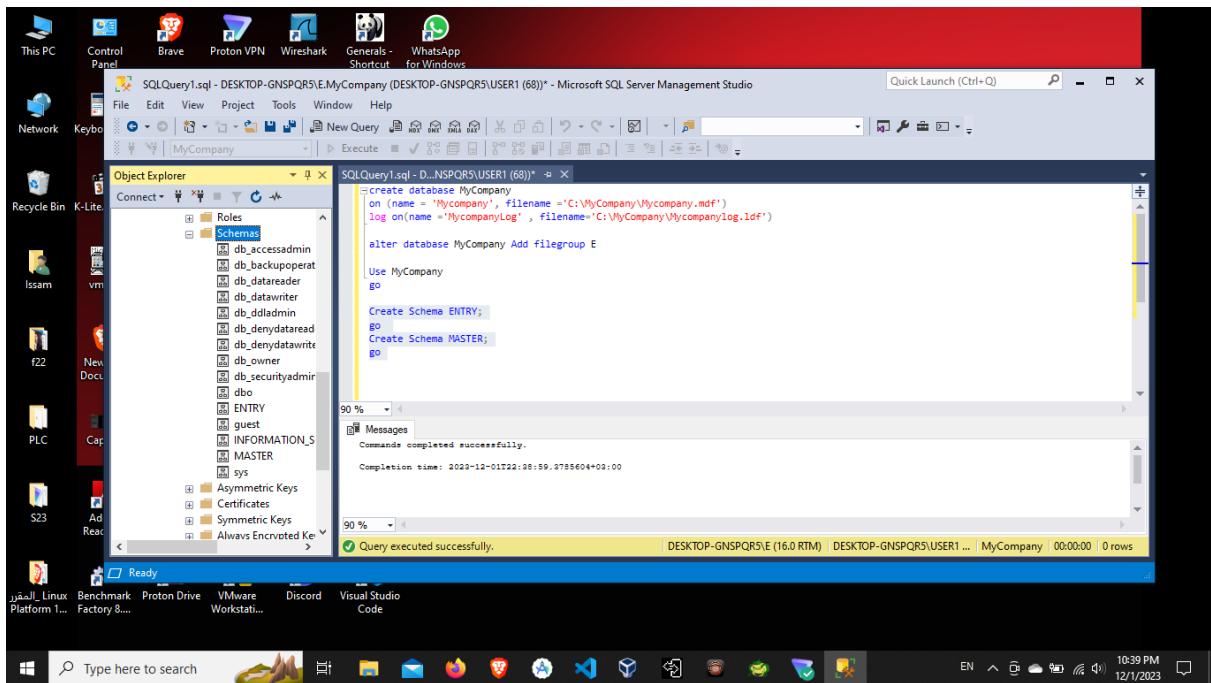
This screenshot shows the Microsoft SQL Server Management Studio (SSMS) interface. The Object Explorer on the left shows the connection to 'DESKTOP-GNSPQR5\SQL Server 16.0'. In the center, the 'master' database is selected in the dropdown. The 'SQLQuery1.sql' query window contains the following T-SQL code:

```
CREATE DATABASE MyCompany
ON (name = 'Mycompany', filename = 'C:\MyCompany\Mycompany.mdf')
LOG ON (name = 'MycompanyLog', filename = 'C:\MyCompany\Mycompanylog.ldf')

ALTER DATABASE MyCompany ADD FILEGROUP E
```

The 'Messages' pane at the bottom shows the command was completed successfully with a completion time of 2023-12-01T21:56:56.6955503+00:00.

1-1Creating schemas :



This screenshot shows the Microsoft SQL Server Management Studio (SSMS) interface. The Object Explorer on the left shows the connection to 'DESKTOP-GNSPQR5\USER1 (68)'. In the center, the 'MyCompany' database is selected in the dropdown. The 'SQLQuery1.sql' query window contains the following T-SQL code:

```
CREATE DATABASE MyCompany
ON (name = 'Mycompany', filename = 'C:\MyCompany\Mycompany.mdf')
LOG ON (name = 'MycompanyLog', filename = 'C:\MyCompany\Mycompanylog.ldf')

ALTER DATABASE MyCompany ADD FILEGROUP E

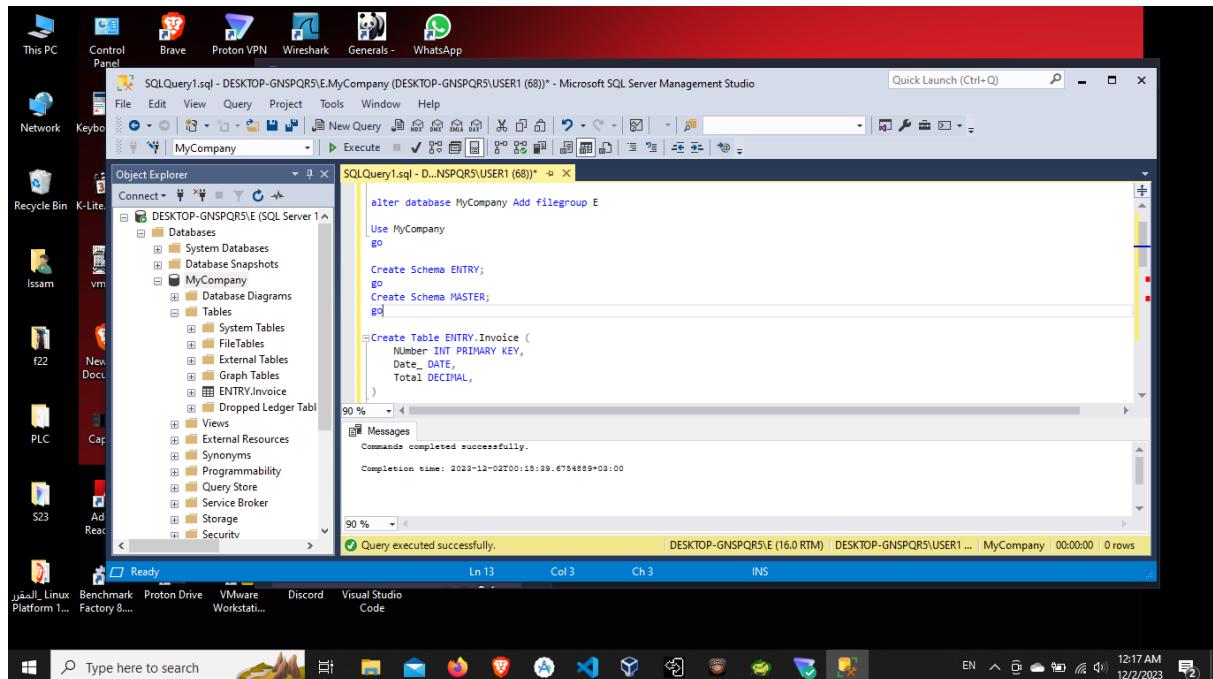
USE MyCompany
GO

CREATE SCHEMA ENTRY;
GO
CREATE SCHEMA MASTER;
GO
```

The 'Messages' pane at the bottom shows the command was completed successfully with a completion time of 2023-12-01T22:08:59.2785604+03:00.

-Creating tables :

-1 creating table ENTRY.invoice :



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left shows a database named 'MyCompany' containing various objects like tables, views, and stored procedures. The central pane displays a SQL query window with the following code:

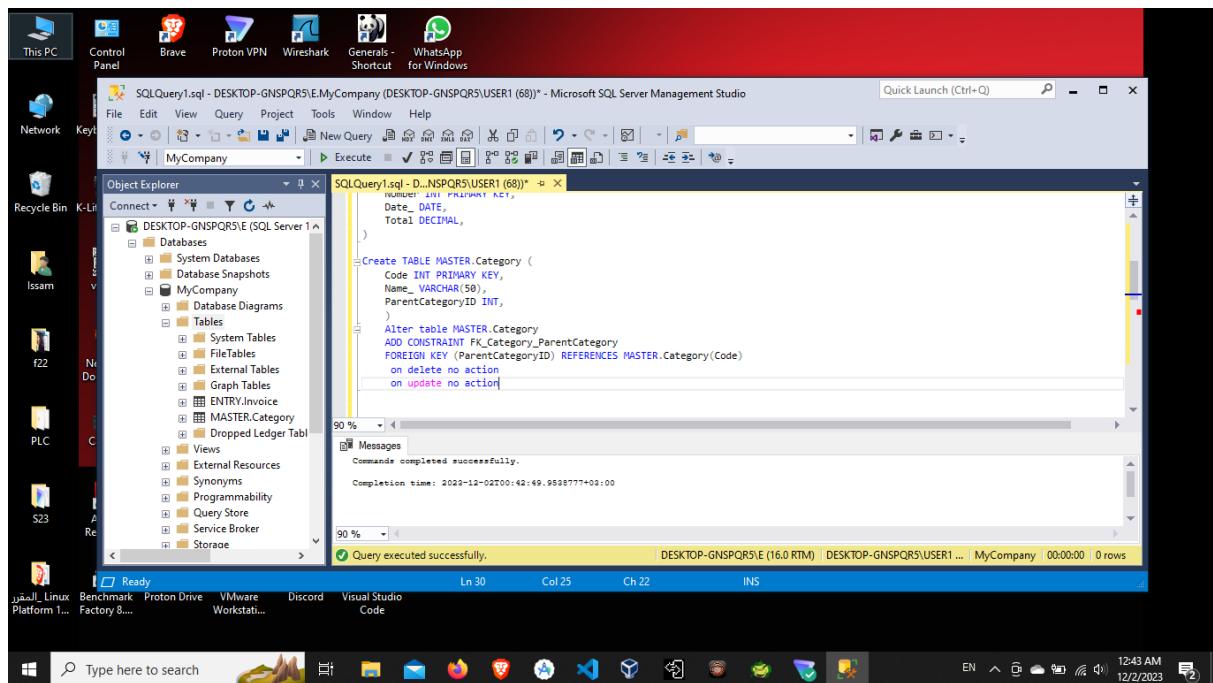
```
alter database MyCompany Add filegroup E
Use MyCompany
go
Create Schema ENTRY;
go
Create Schema MASTER;
go

Create Table ENTRY.Invoice (
    Number INT PRIMARY KEY,
    Date_DATE,
    Total DECIMAL,
)

```

The 'Messages' pane at the bottom indicates that the command completed successfully with a completion time of 2023-12-02T00:15:39.6754889+03:00.

-2 creating table MASTER.Category :



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left shows a database named 'MyCompany' containing various objects like tables, views, and stored procedures. The central pane displays a SQL query window with the following code:

```
CREATE TABLE MASTER.Category (
    Code INT PRIMARY KEY,
    Name_VARCHAR(50),
    ParentCategoryID INT,
)

ALTER TABLE MASTER.Category
ADD CONSTRAINT FK_Category_ParentCategory
FOREIGN KEY (ParentCategoryID) REFERENCES MASTER.Category(Code)
ON DELETE no action
ON UPDATE no action

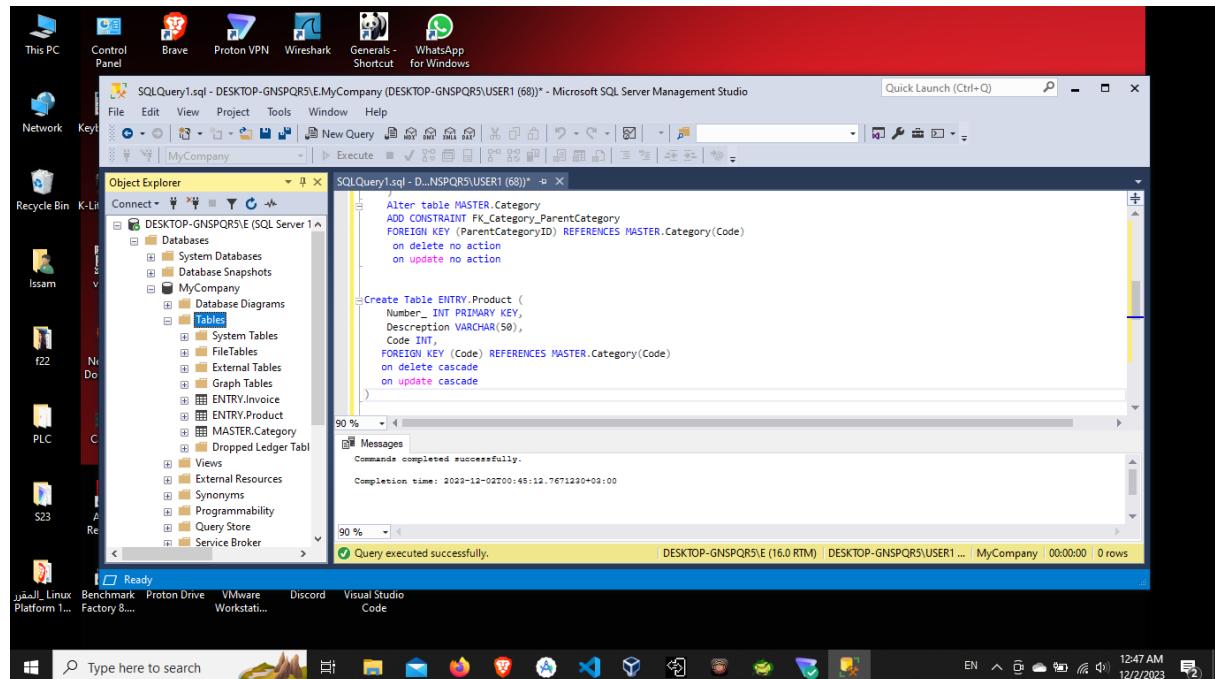
```

The 'Messages' pane at the bottom indicates that the command completed successfully with a completion time of 2023-12-02T00:42:49.9598777+02:00.

the "Category" table has a foreign key column called "ParentCategoryID" that references the primary key column "Code" of the same table. This self-referencing

foreign key establishes the hierarchical relationship between categories.

-3 creating table ENTRY.Product:



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer sidebar shows a connection to 'DESKTOP-GNSPQR5\SQL Server 1' with the database 'MyCompany' selected. The 'Tables' node under 'MyCompany' is expanded, showing 'ENTRY.Product' as a child node. The 'SQLQuery1.sql' query editor window contains the following SQL code:

```
Alter table MASTER.Category
ADD CONSTRAINT FK_Catgeory_ParentCategory
FOREIGN KEY (ParentCategoryID) REFERENCES MASTER.Category(Code)
on delete no action
on update no action

Create Table ENTRY.Product (
    Number_ INT PRIMARY KEY,
    Description VARCHAR(50),
    Code INT,
    FOREIGN KEY (Code) REFERENCES MASTER.Category(Code)
on delete cascade
on update cascade
```

The 'Messages' pane at the bottom right indicates that the commands completed successfully with a completion time of 2023-12-02T00:45:12.7671230+02:00 and 0 rows affected. The status bar at the bottom shows the system is ready, the date and time as 12/2/2023 12:47 AM, and the user as DESKTOP-GNSPQR5\USER1.

-4 creating junction table invoiceproduct :

The "InvoiceProduct" table is a junction table that facilitates the many-to-many relationship between the "Invoice" and "Product" tables.

```

Create Table ENTRY.InvoiceProduct (
    Number INT,
    Number_ INT,
    Quantity varchar(50),
    Price DECIMAL(10,2),
    CONSTRAINT PK_InvoiceProduct PRIMARY KEY (Number, Number_),
    CONSTRAINT FK_InvoiceProduct_Invoice FOREIGN KEY (Number) REFERENCES ENTRY.Invoice (Number)
        on delete cascade
        on update cascade,
    CONSTRAINT FK_InvoiceProduct_Product FOREIGN KEY (Number_) REFERENCES ENTRY.Product (Number_)
        on delete cascade
        on update cascade
)

```

Messages

Commands completed successfully.

Completion time: 2023-12-02T00:48:20.5770513+02:00

Query executed successfully.

the "Category" table is part of the "MASTER" schema, and the "Product" table has a foreign key relationship with the "Category" table

```

ALTER TABLE ENTRY.Product ADD CONSTRAINT FK_Product_Category FOREIGN KEY (Code) REFERENCES MASTER.Category (Code);

```

Messages

Commands completed successfully.

Completion time: 2023-12-02T00:58:42.1598427+02:00

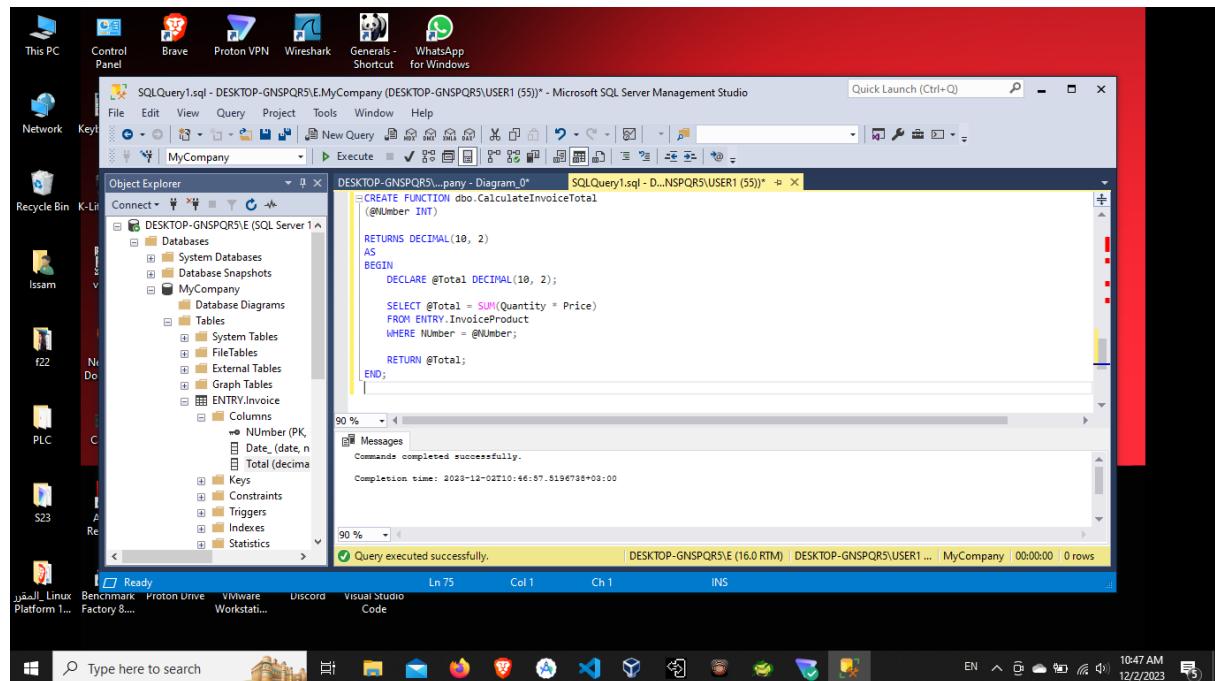
Query executed successfully.

1.2. Create the calculated field [Total] as a functions.

This function takes an `@ Number` parameter and uses it to filter the related products in the "InvoiceProduct" table. It calculates the sum of each product's total using the

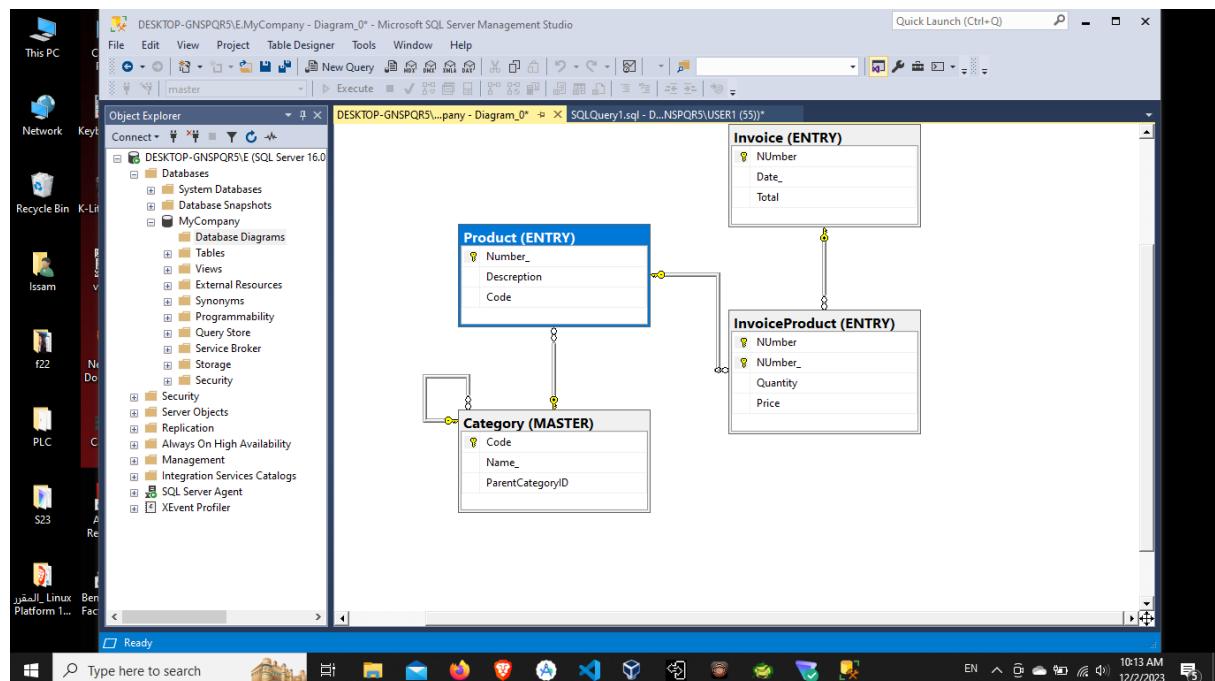
formula

Quantity * Price and returns the overall Total for the invoice.



```
SELECT dbo.CalculateInvoiceTotal(NUmber) AS Total
FROM ENTRY.InvoiceProduct;
```

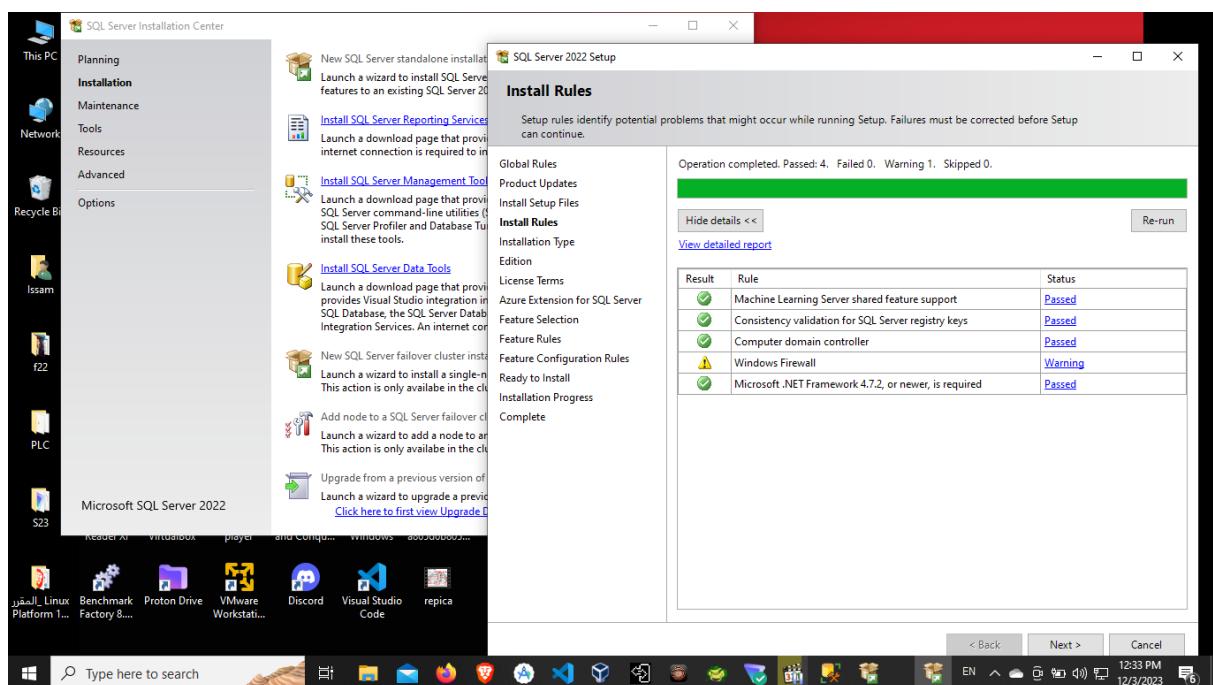
1.3. Generate the database diagram.

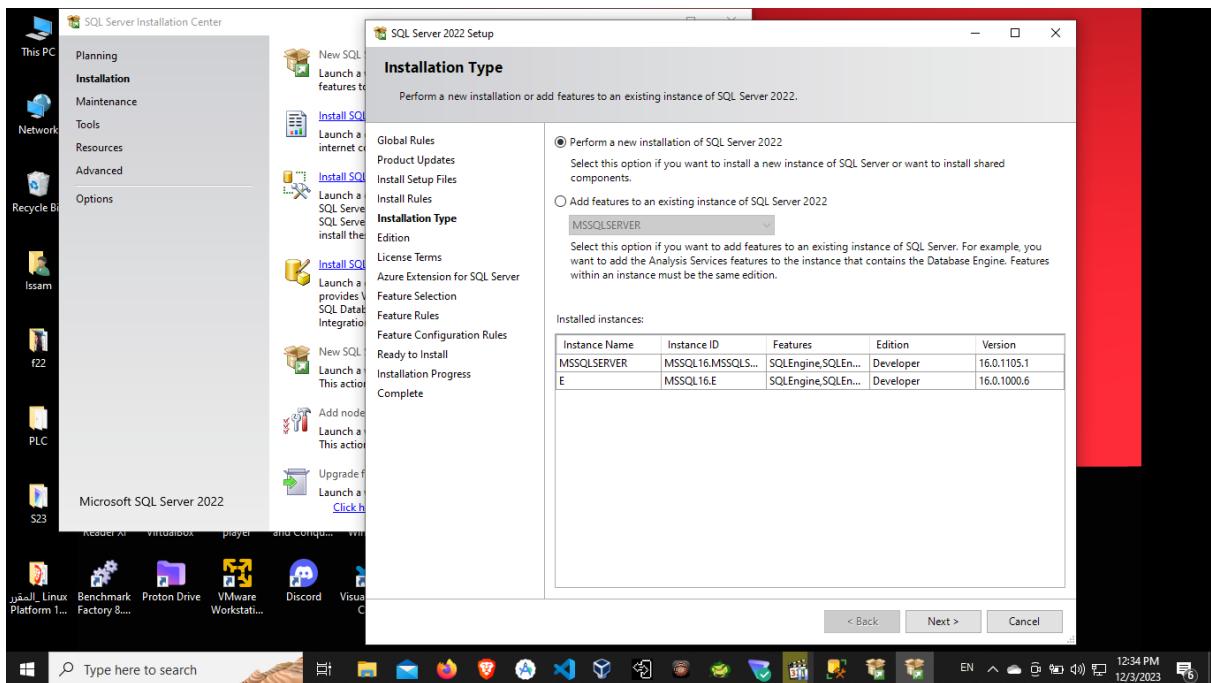


2. Replication:

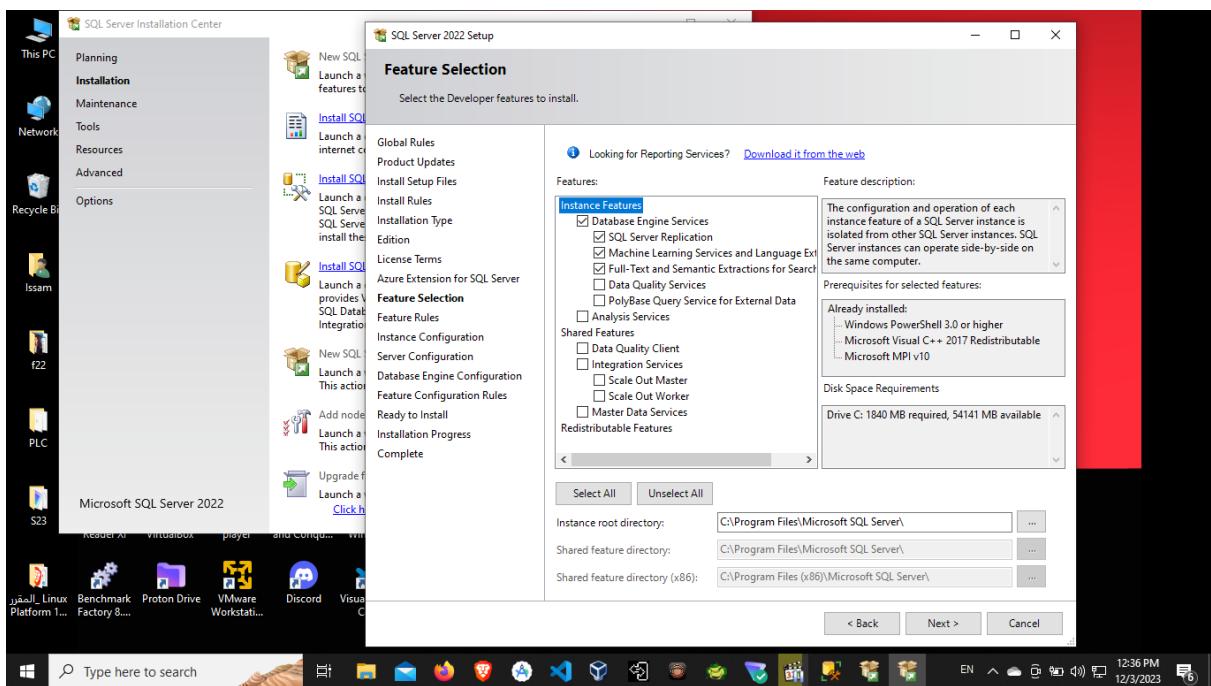
2.1. Install another instance of SQL Server called “Replica” will be a read-write replica as well, choose replication type and justify your choice.

installation steps of replica instance :

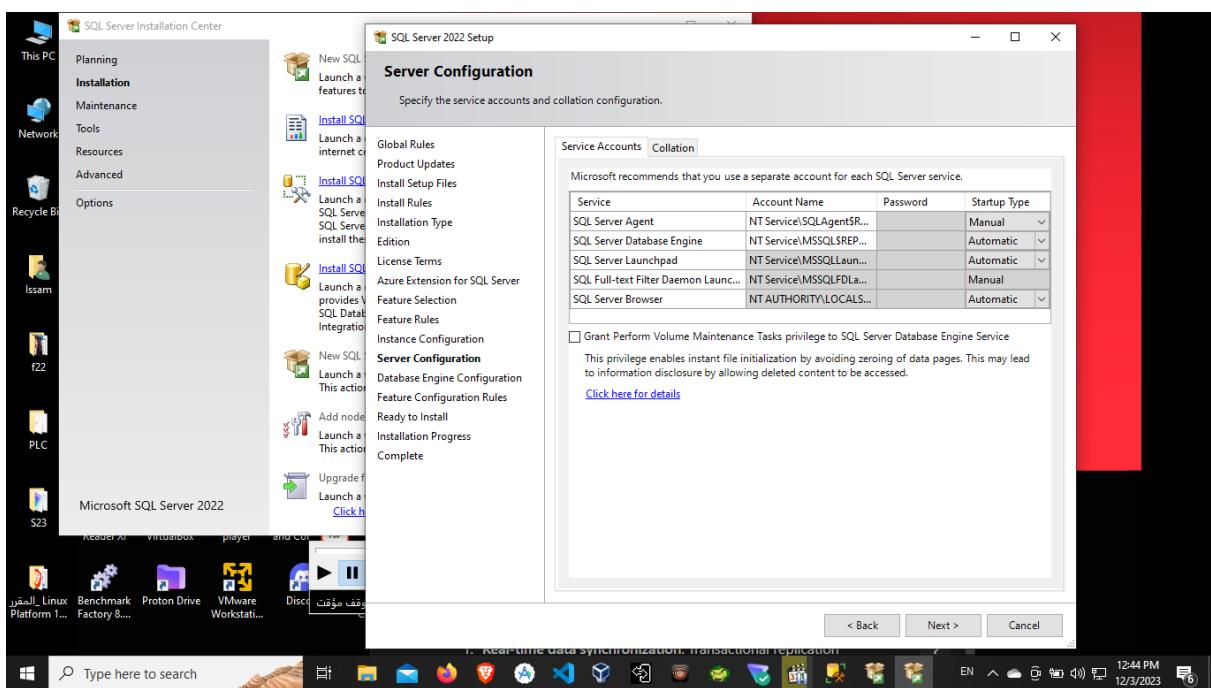
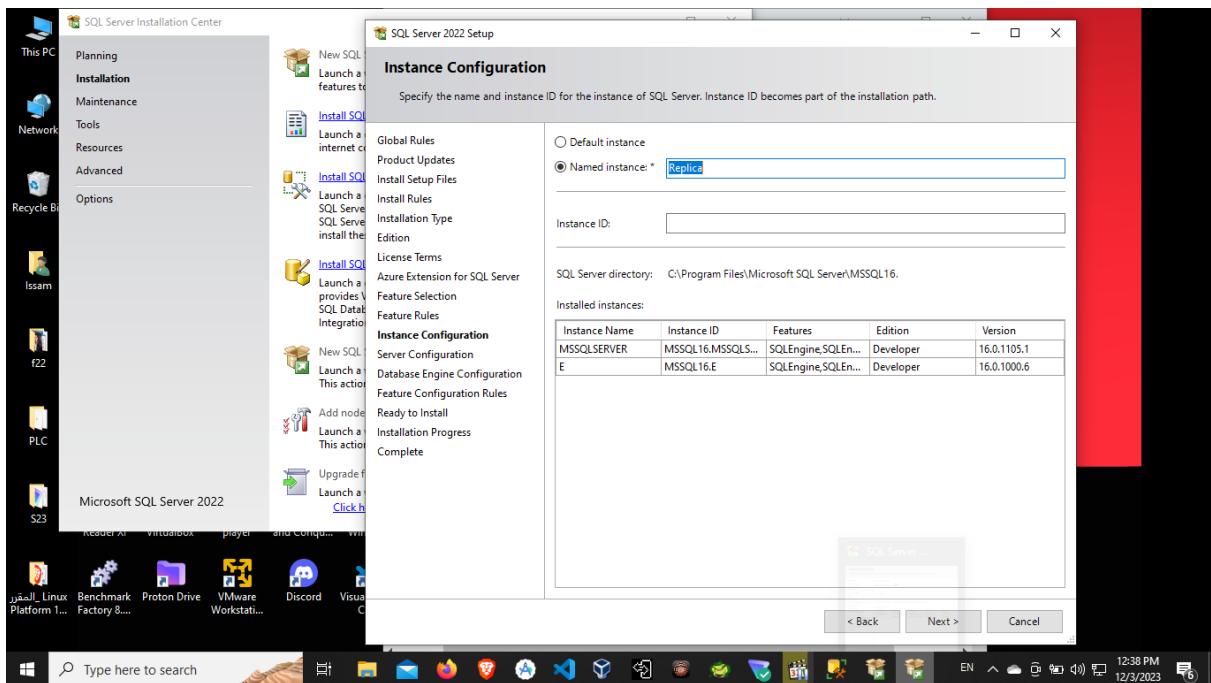


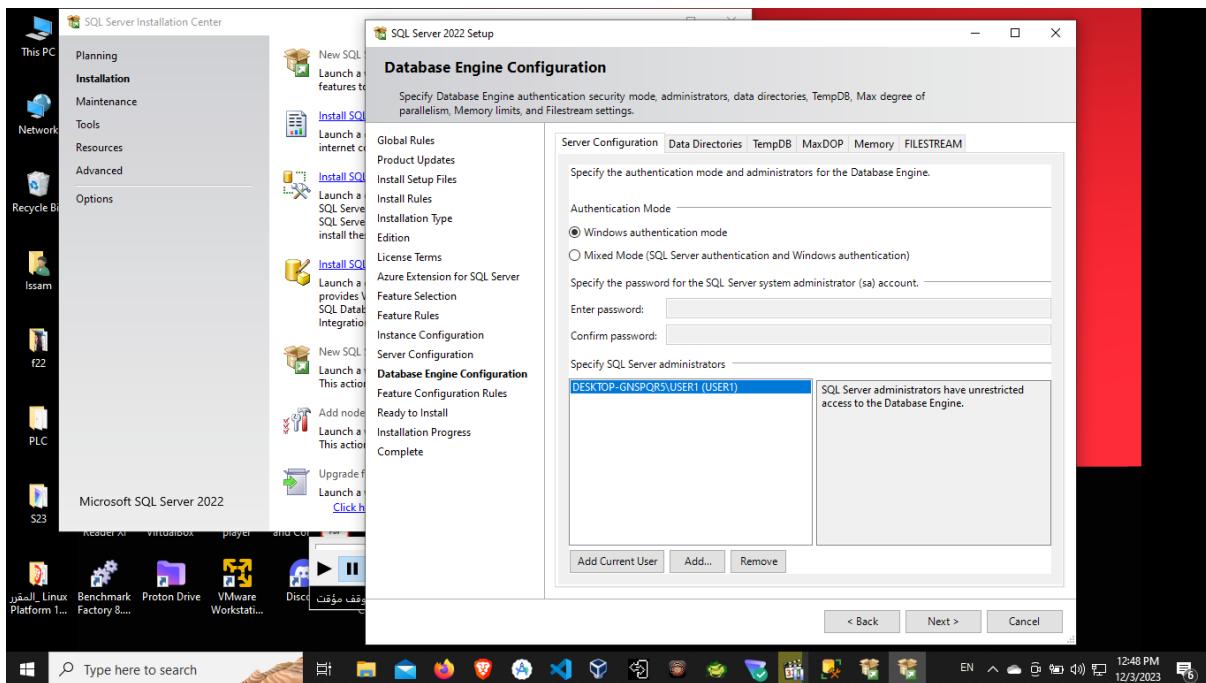


the replication feature should be selected :

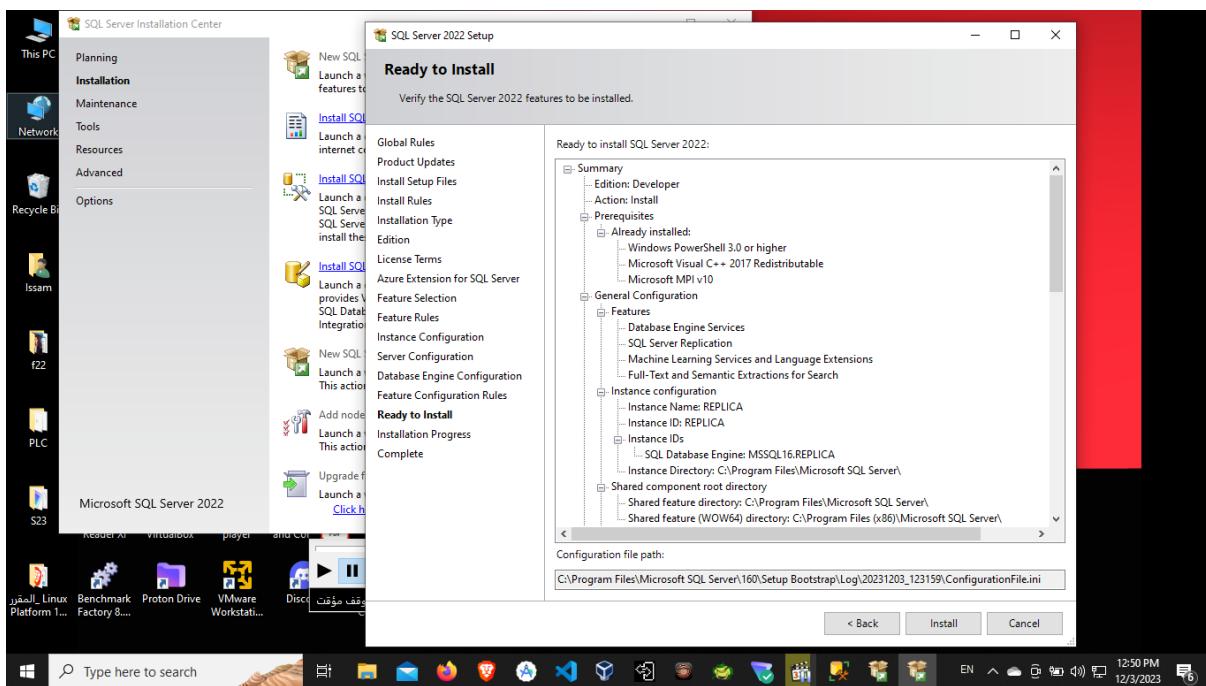


naming the instance :





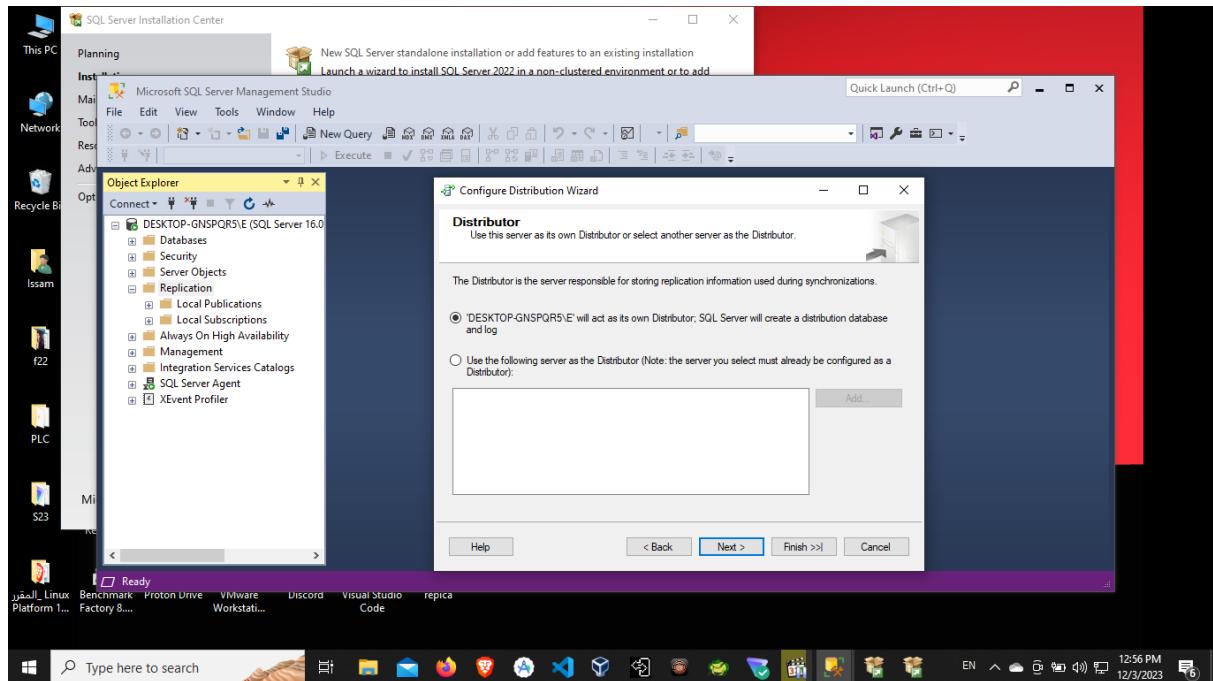
ready to install :



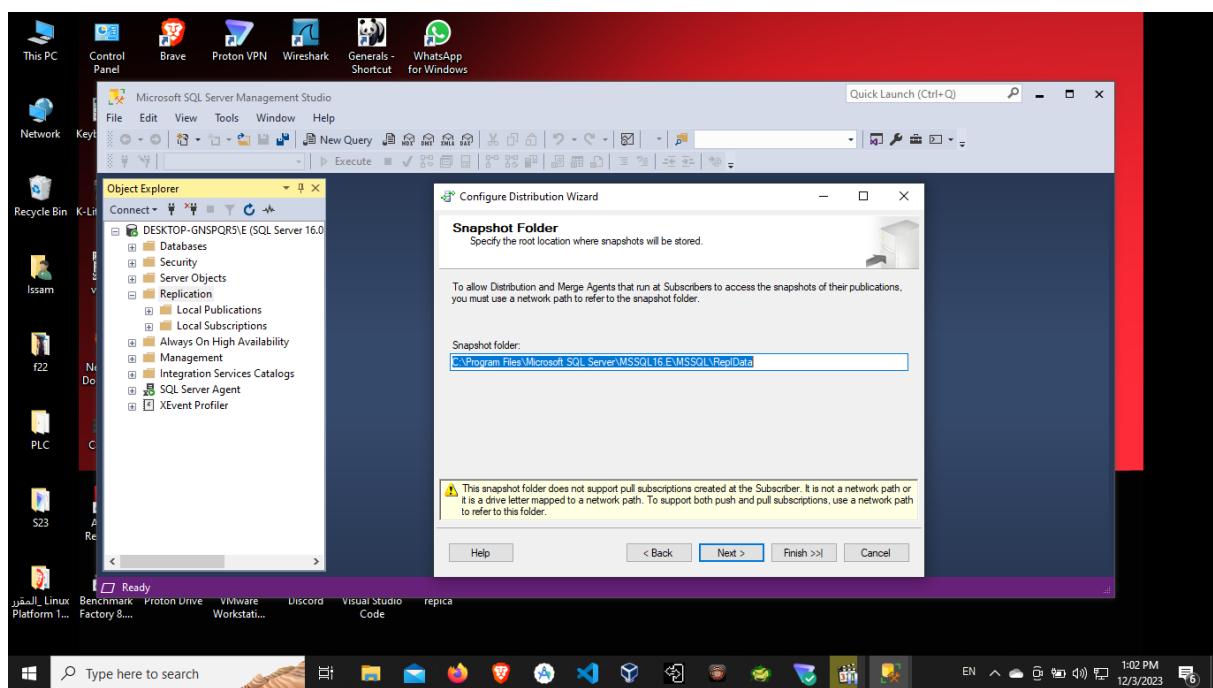
Configure the replication distribution :

Determine the SQL Server instance that will act as the distributor. The distributor manages the replication metadata and coordinates the delivery of changes to subscribers.

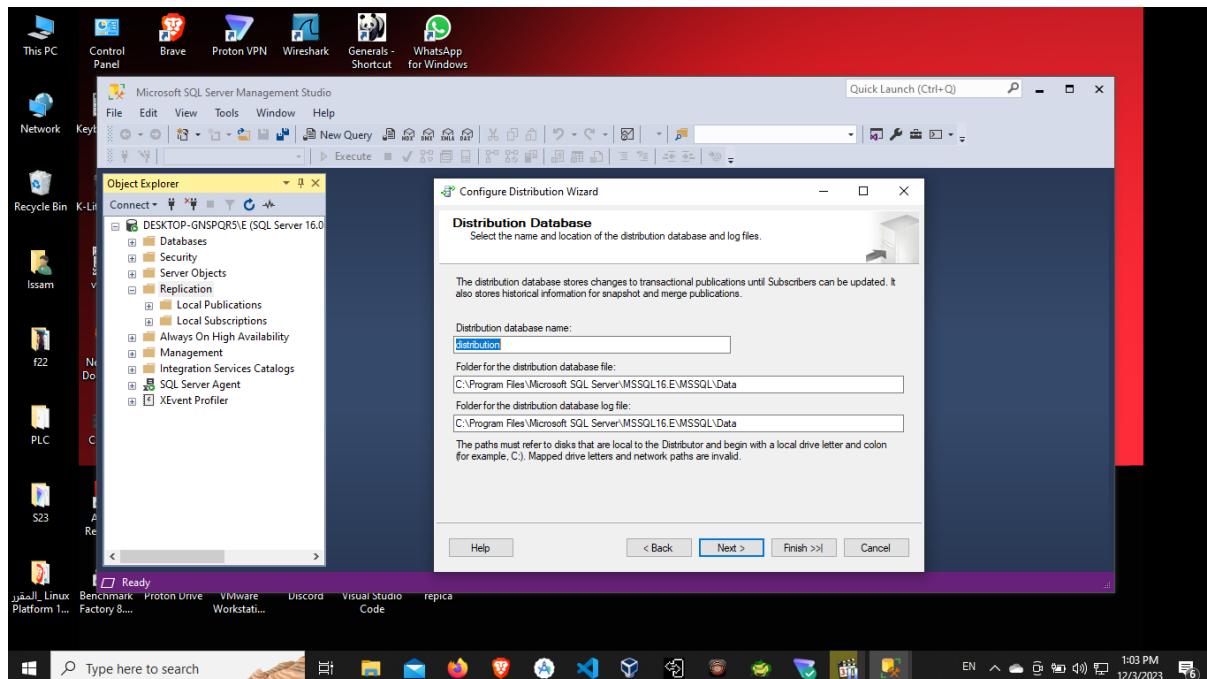
in my case it would be **DESKTOP-GNSPQR5\Е**



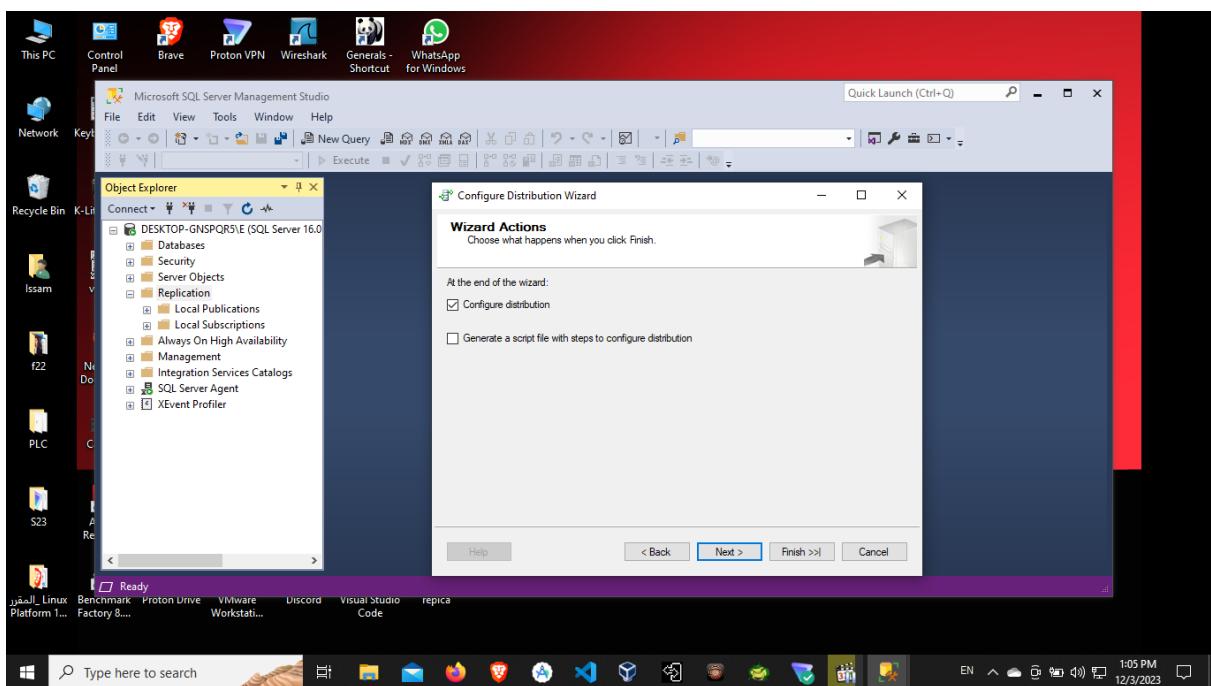
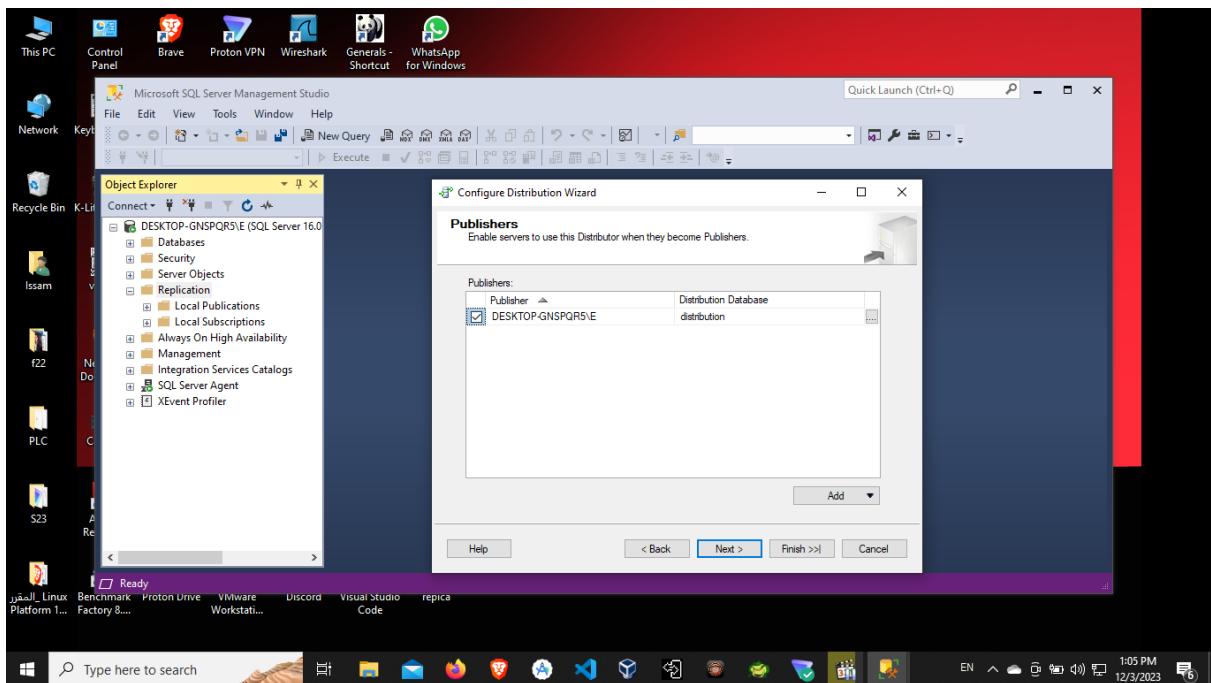
specifying the root location where snapshot will be stored :

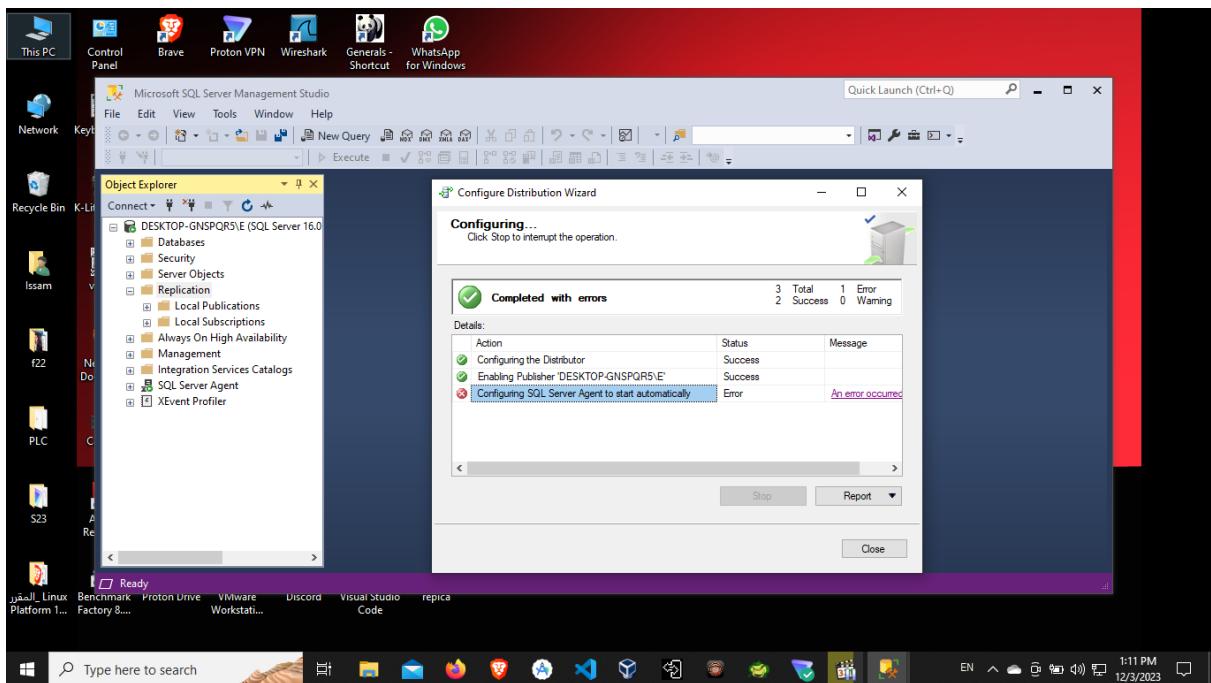


Creating the distribution database on the distributor server. The distribution database stores metadata and transactional information for replication.



Configure the SQL Server instances that will act as publishers. In the publisher configuration, I will specify the distributor and the distribution database. This allows publishers to communicate with the distributor and use the distribution database for replication.

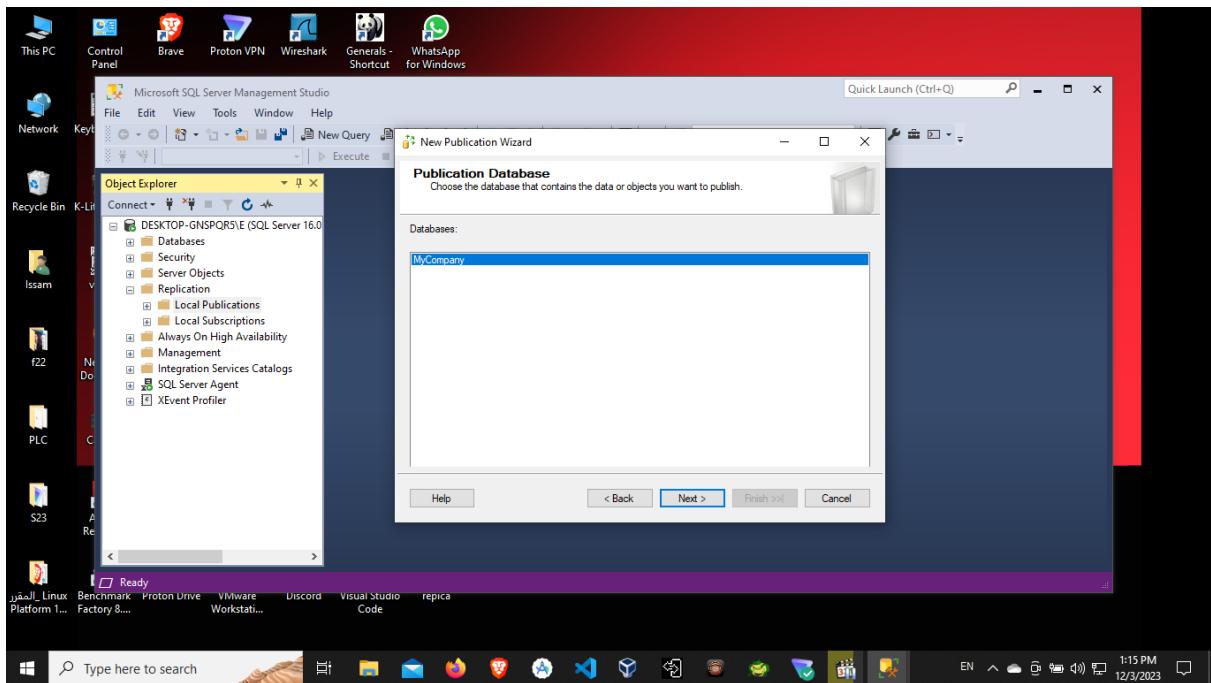




NOTE :

I configured SQL Server Agent to start automatically from SQL server configuration manager immediately after I finished this step so there's no problem

setting new publication :



Choosing the replication type :

NOTE:

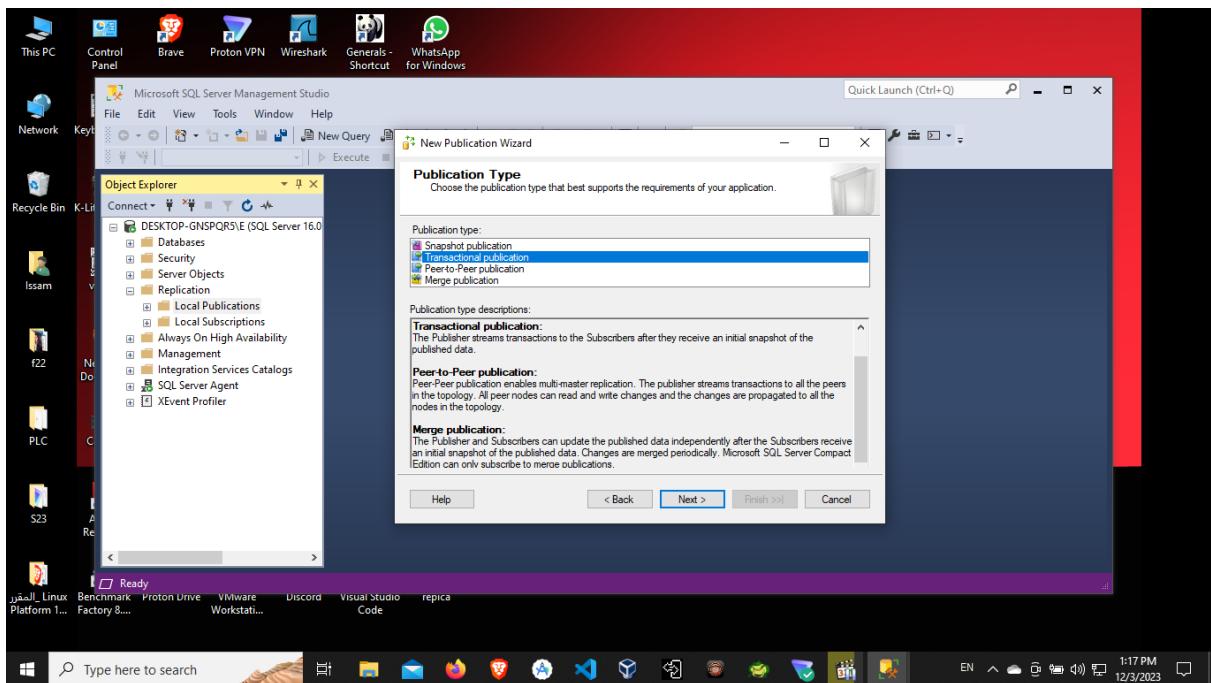
it's important to consider the specific requirements and constraints of our retail sales system. Factors such as network bandwidth, system performance, and the need for bidirectional synchronization may influence the choice of replication type.

In our case the replication type recommended to choose is **Transactional Replication**. Where real-time data availability and synchronization are crucial

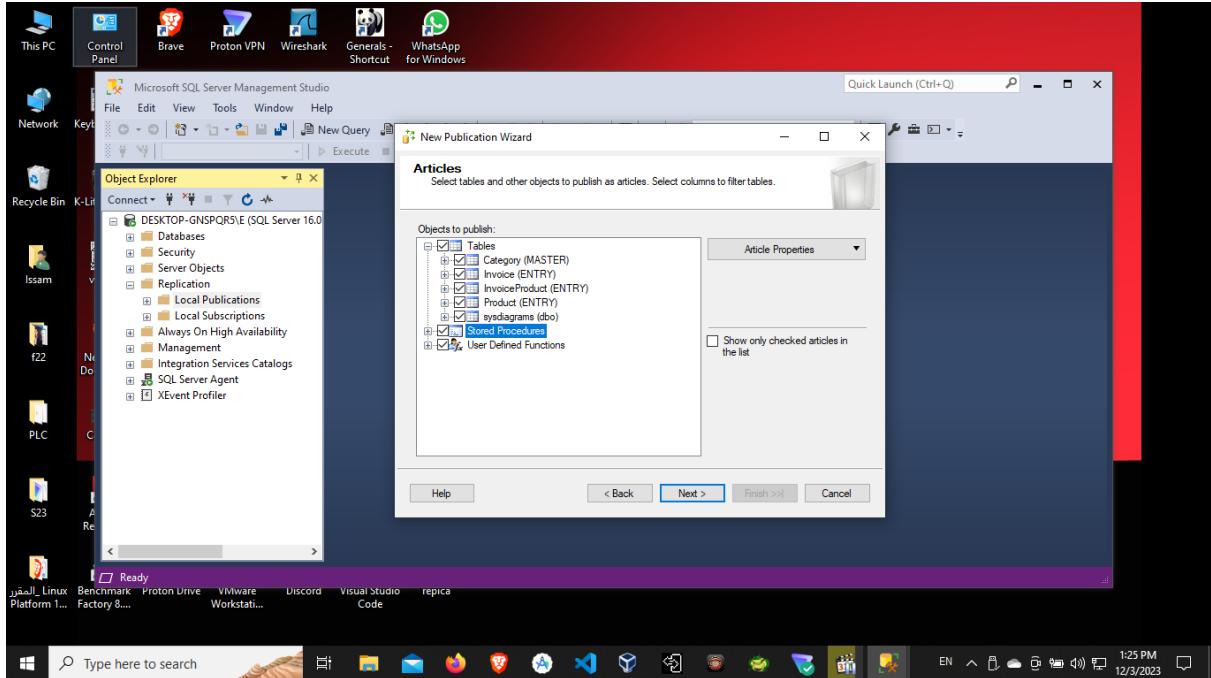
Here's why:

1. **Real-time data synchronization:** Transactional replication provides near real-time synchronization of individual transactions or batches of transactions. This ensures that changes made in the publisher database, such as sales transactions, inventory updates, or price changes, are quickly propagated to the subscriber databases. Real-time data availability is vital for accurate inventory management, order processing, and reporting in a retail sales system.
2. **Selective replication:** Transactional replication allows you to choose specific database objects or tables to replicate, enabling us to focus on the most critical data for our retail sales system. I can replicate transactional data related to sales, inventory, and customer information while excluding non-essential or sensitive data.
3. **Scalability:** Transactional replication is well-suited for scenarios where the data changes frequently. In a retail sales system, transactions occur frequently, such as new sales, returns, or inventory updates. Transactional replication efficiently handles high transaction rates and scales well as the system grows.
4. **Minimal latency:** Transactional replication minimizes the latency between changes made in the publisher database and their replication to the subscriber databases. This ensures that the distributed databases are kept up to date, providing accurate and timely information to the retail sales system users.

process steps :

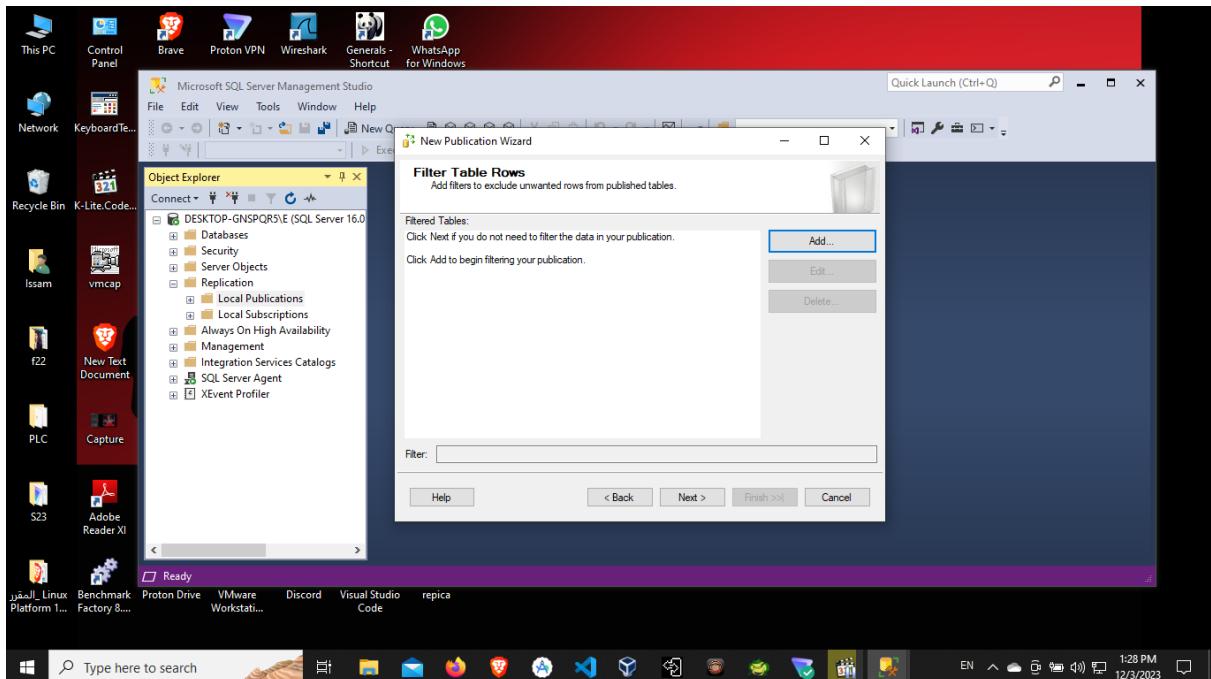


A publication represents a set of articles (tables, views, stored procedures) that will be replicated.



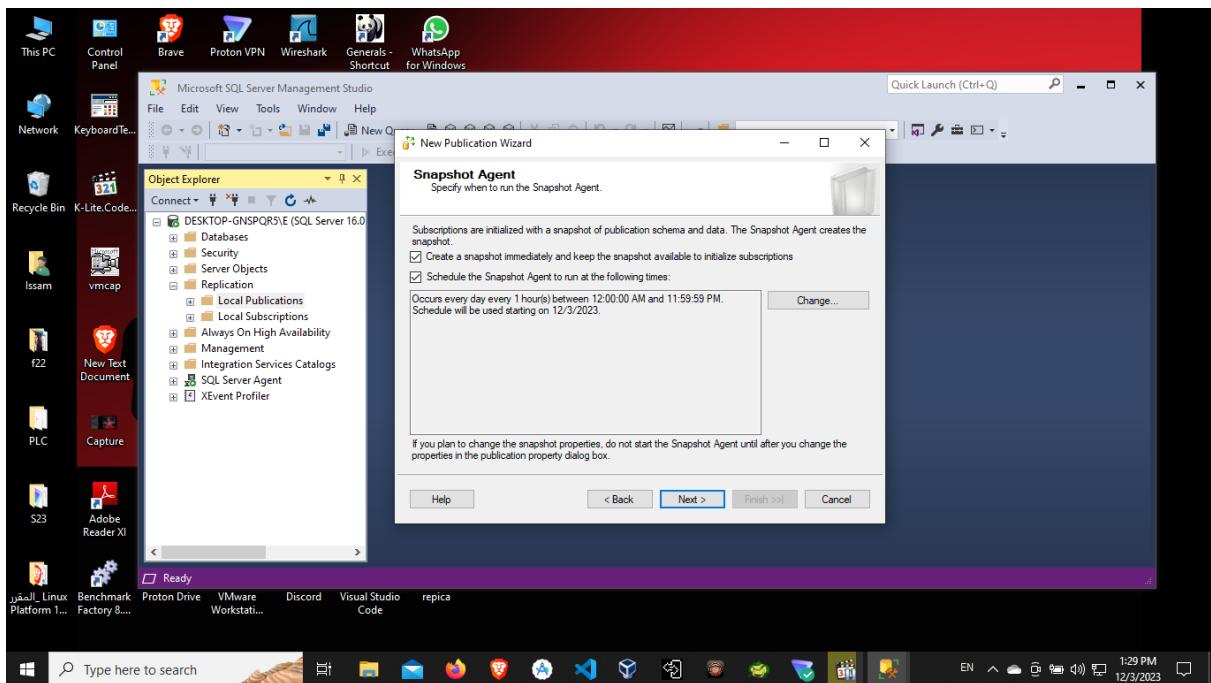
Filtering tables in a replication flow involves selecting a subset of data from a table to be replicated to the subscriber databases. This allows us to replicate only the

relevant data rather than replicating the entire table. But I'm not going to use it here cause it's not needed ..So Next ⇒

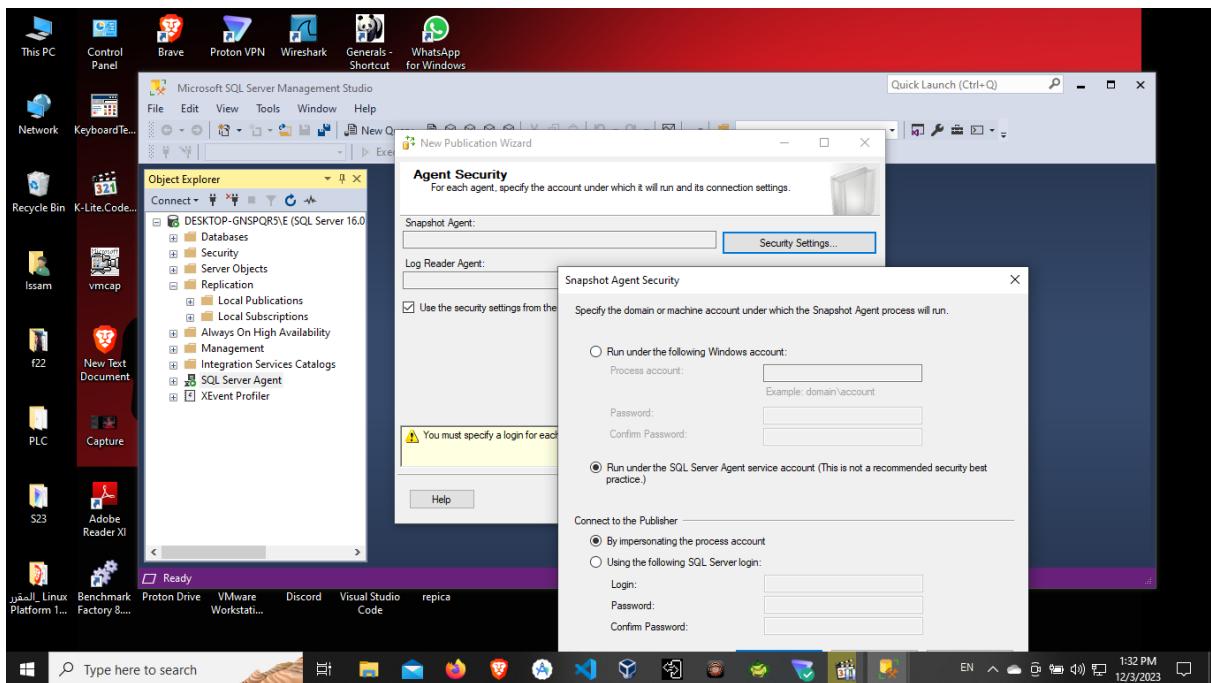


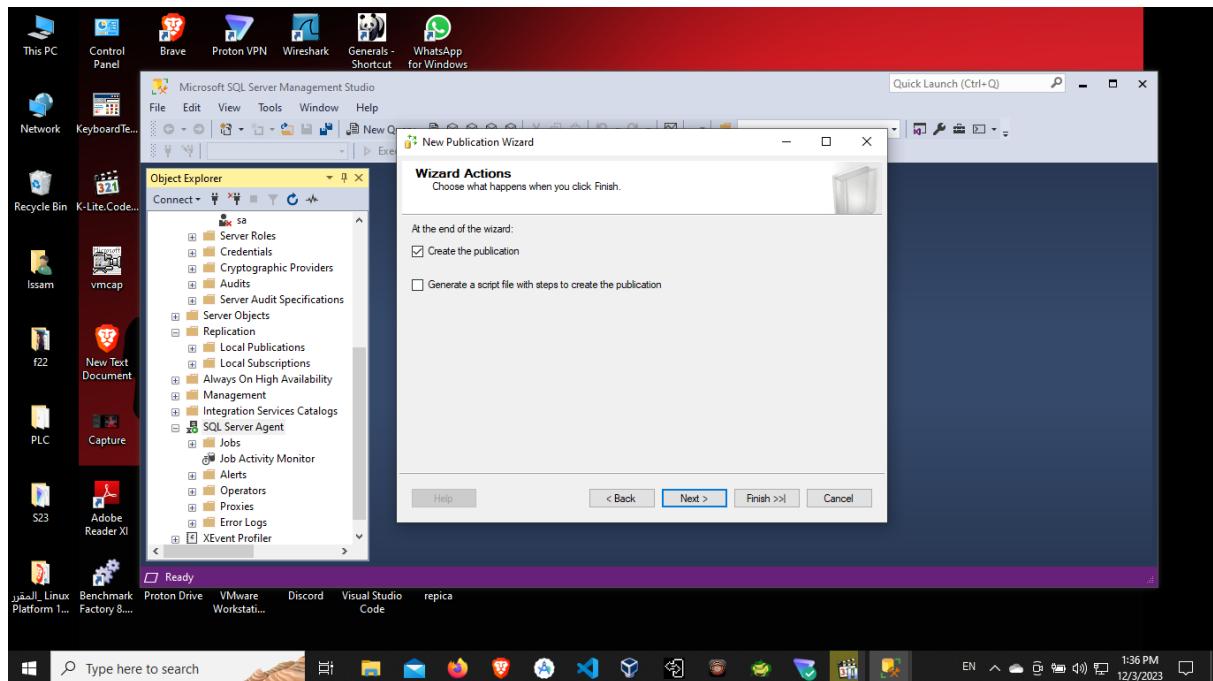
specifying when to run snapshot agent

- Run immediately after the wizard finishes: I Selected this option because I want the Snapshot Agent job to be executed immediately after completing the publication setup in the wizard.
- Schedule the Snapshot Agent to run at the following times: I Selected this option to define a specific schedule for the Snapshot Agent job. I can Click the "Change" button to configure the schedule. I can specify the frequency (daily, weekly, monthly), the time of day, and the specific days on which the job should run.

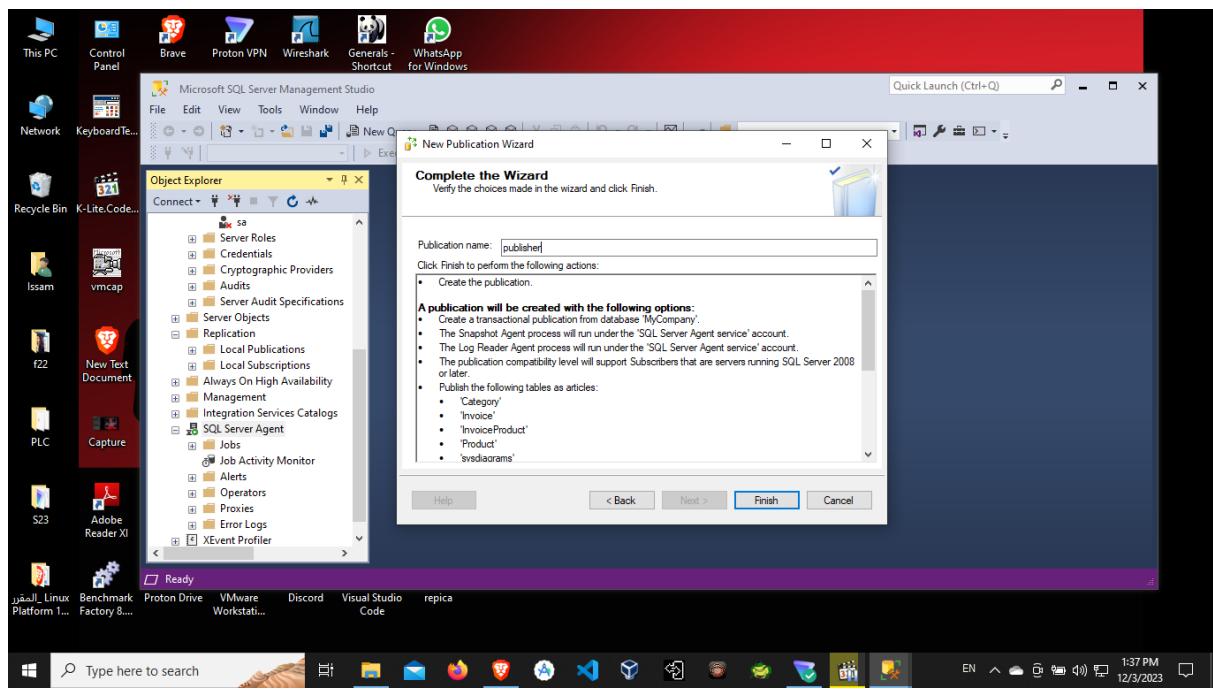


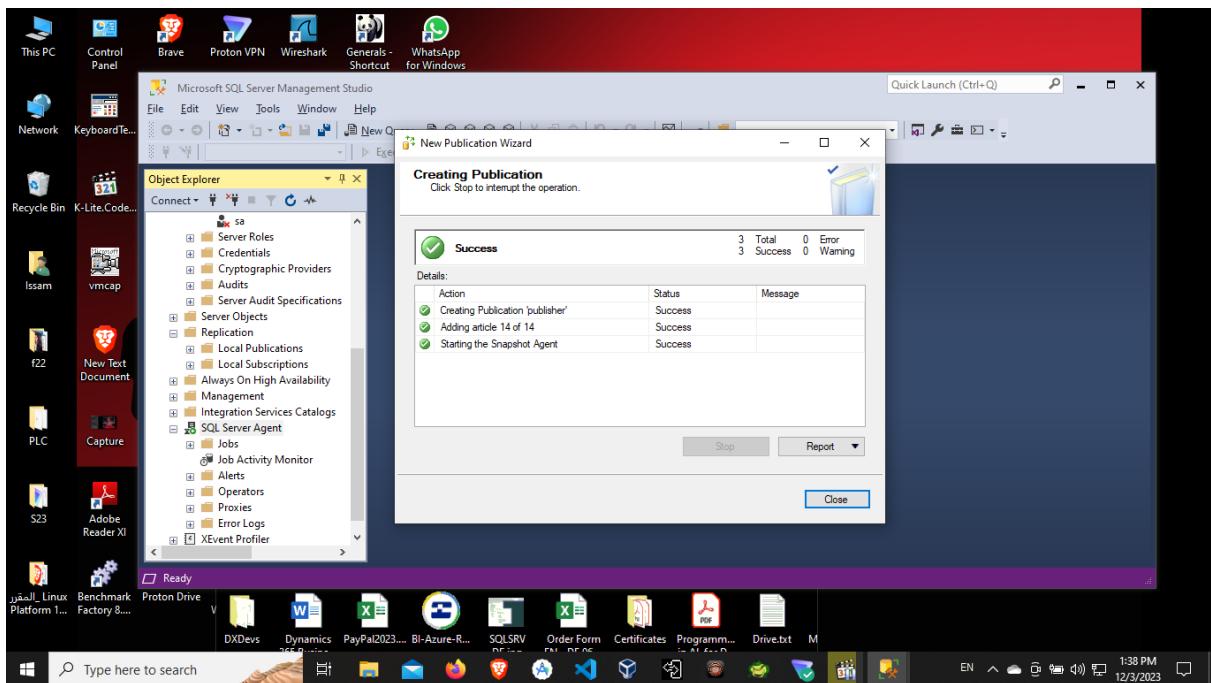
- Run under the following Windows account: I would select this option if I want to use a Windows account as the security context for the Snapshot Agent job. I can specify the Windows account and its password.
- Run under the SQL Server Agent service account: I Selected this option because I want to use the SQL Server Agent service account as the security context for the Snapshot Agent job. This option uses the credentials of the SQL Server Agent service account to run the job.



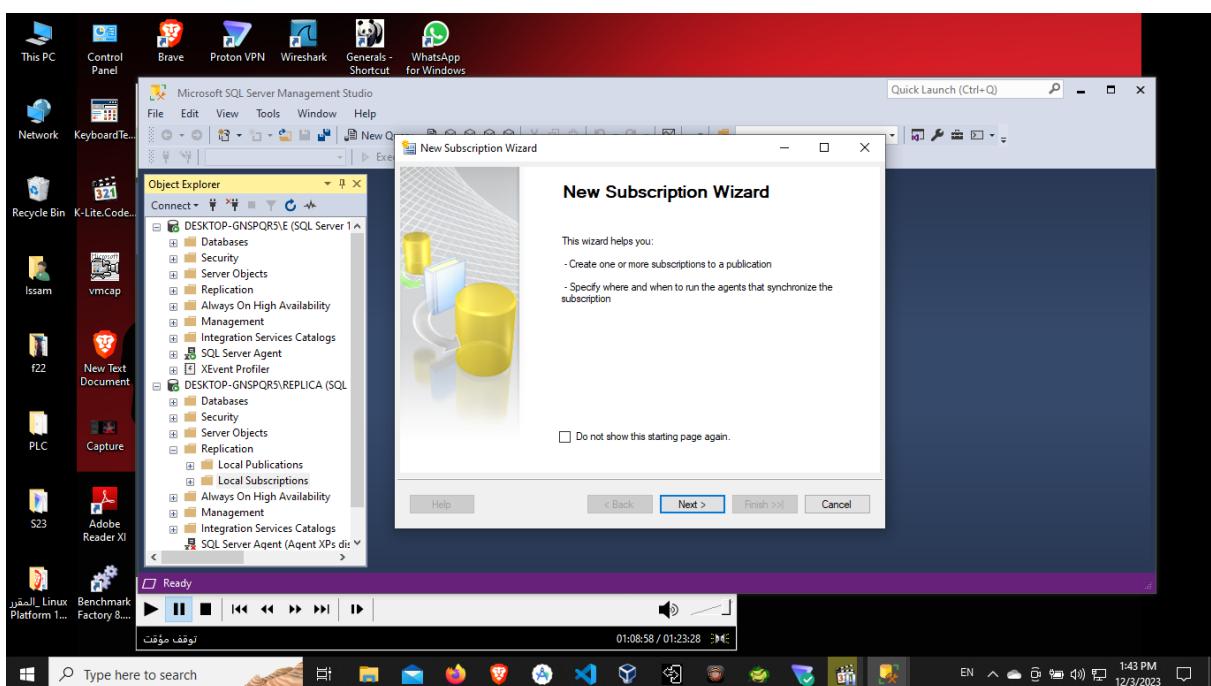


Naming the publication

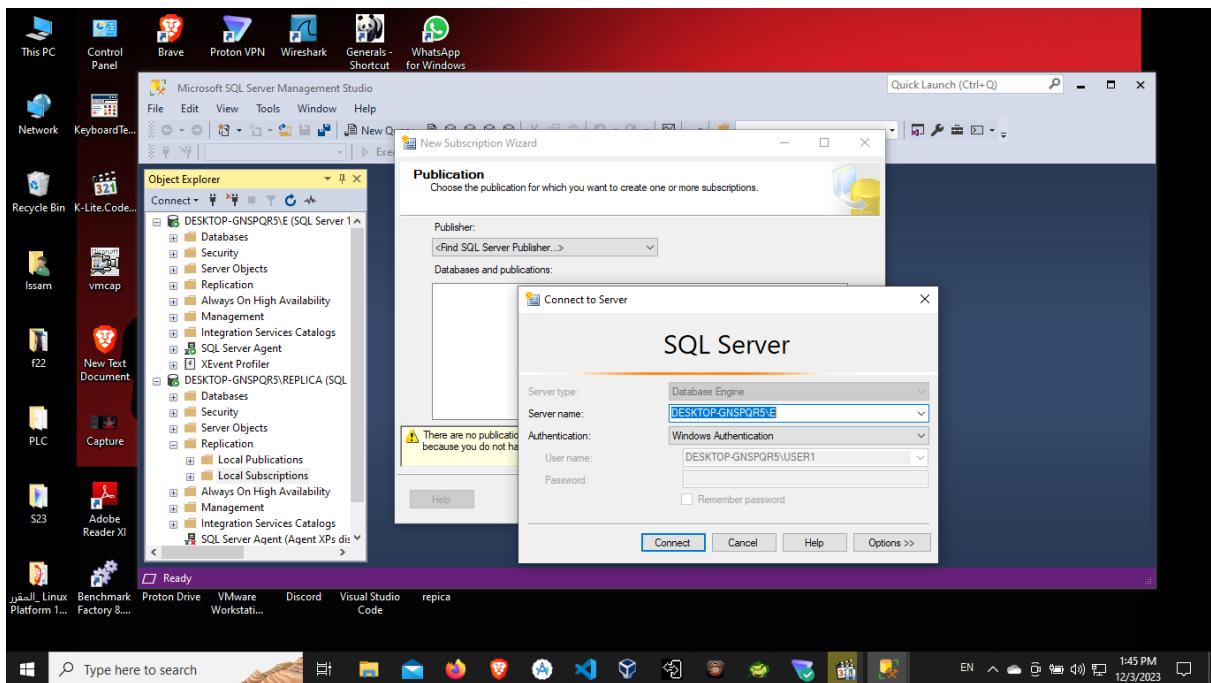




creating a subscriber for the new instance :



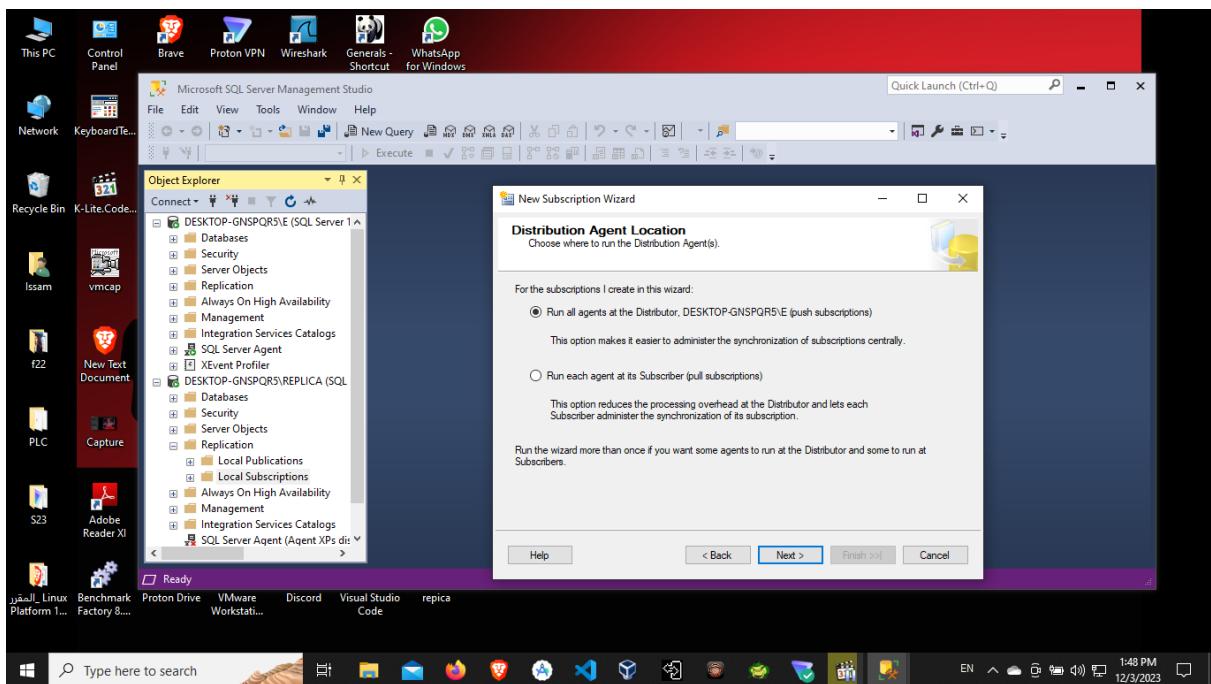
specifying the publication to the new subscriber



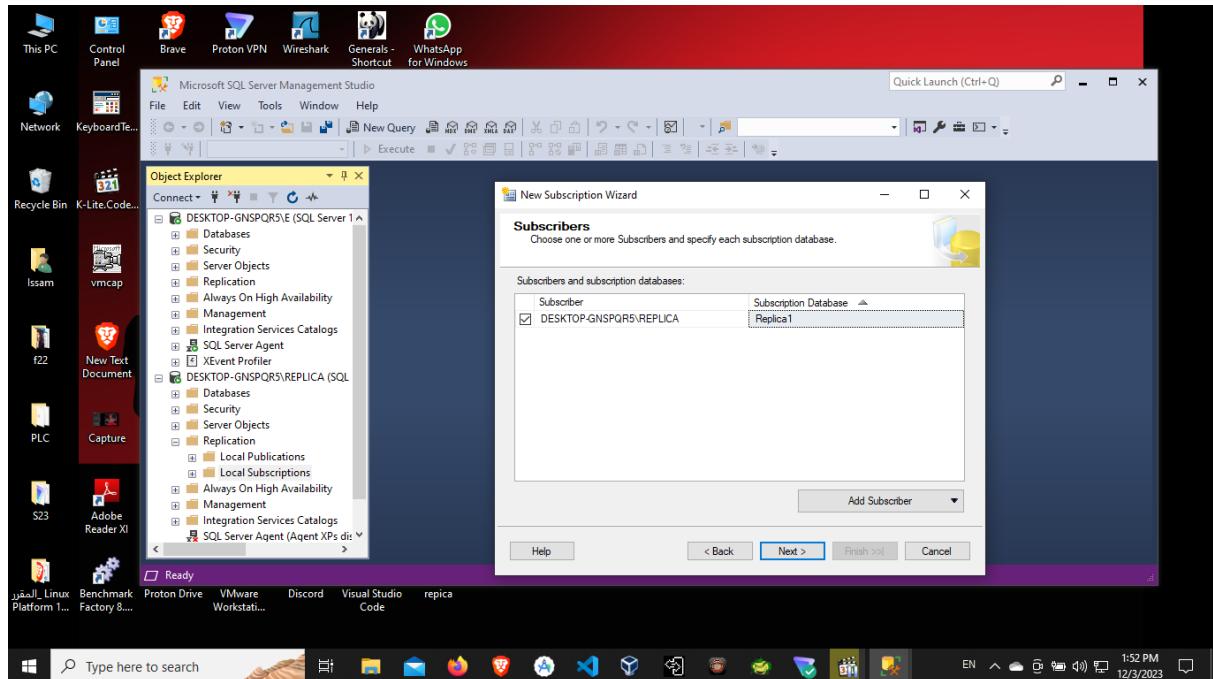
Selecting the Subscription Type:

- Push: With push subscriptions, the distribution agent pushes the changes from the Publisher to the Subscriber.
- Pull: With pull subscriptions, the subscriber connects to the distributor and pulls the changes at its own schedule.

I selected Push

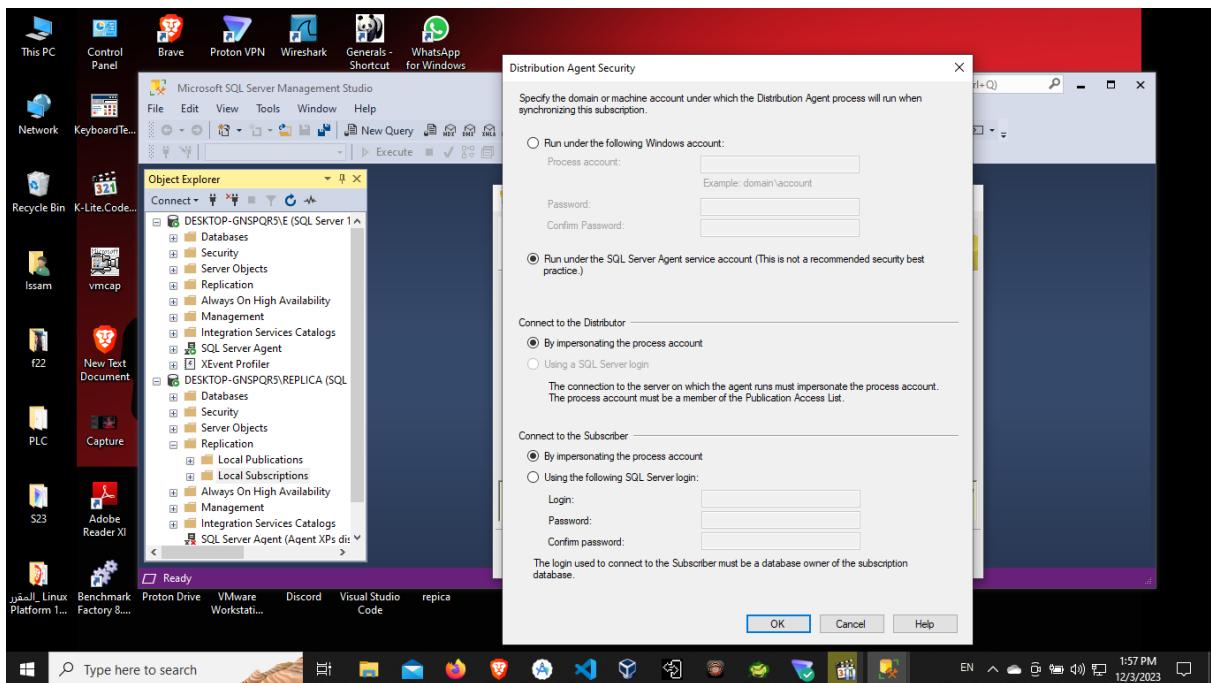


choosing the subscriber database to which I want to replicate data. I can select an existing database or create a new one . Here I created a new one and named it REPLICA1



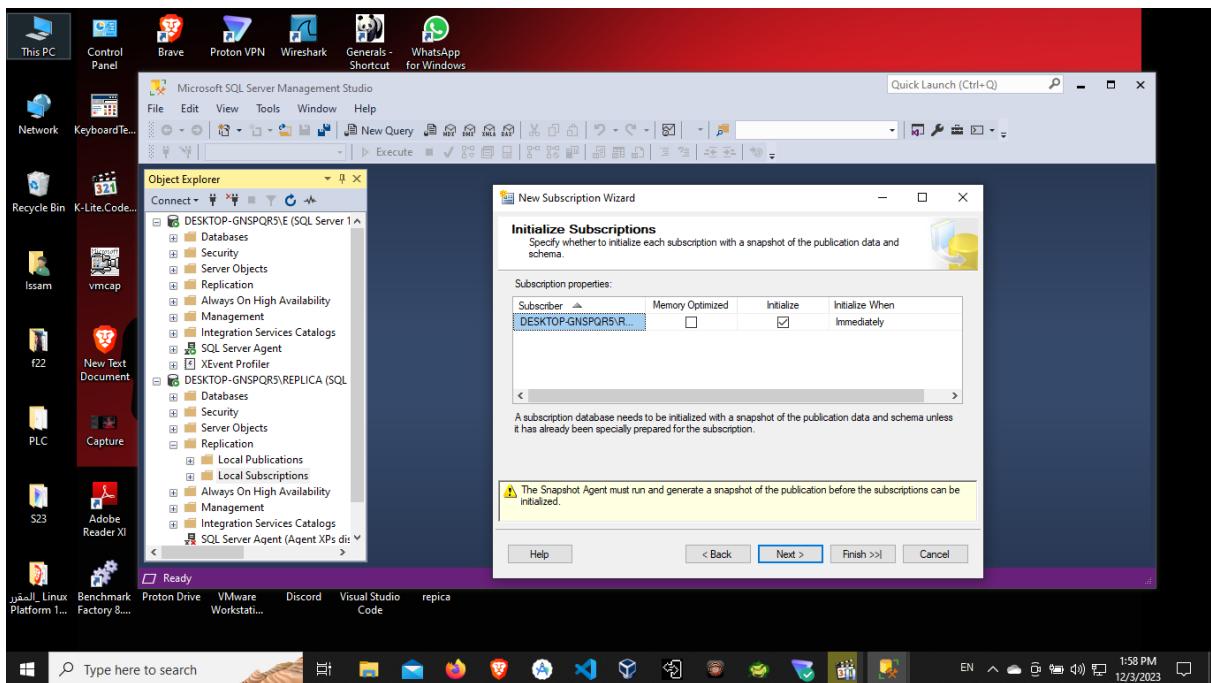
1. Configure the Distribution Agent Security Settings:

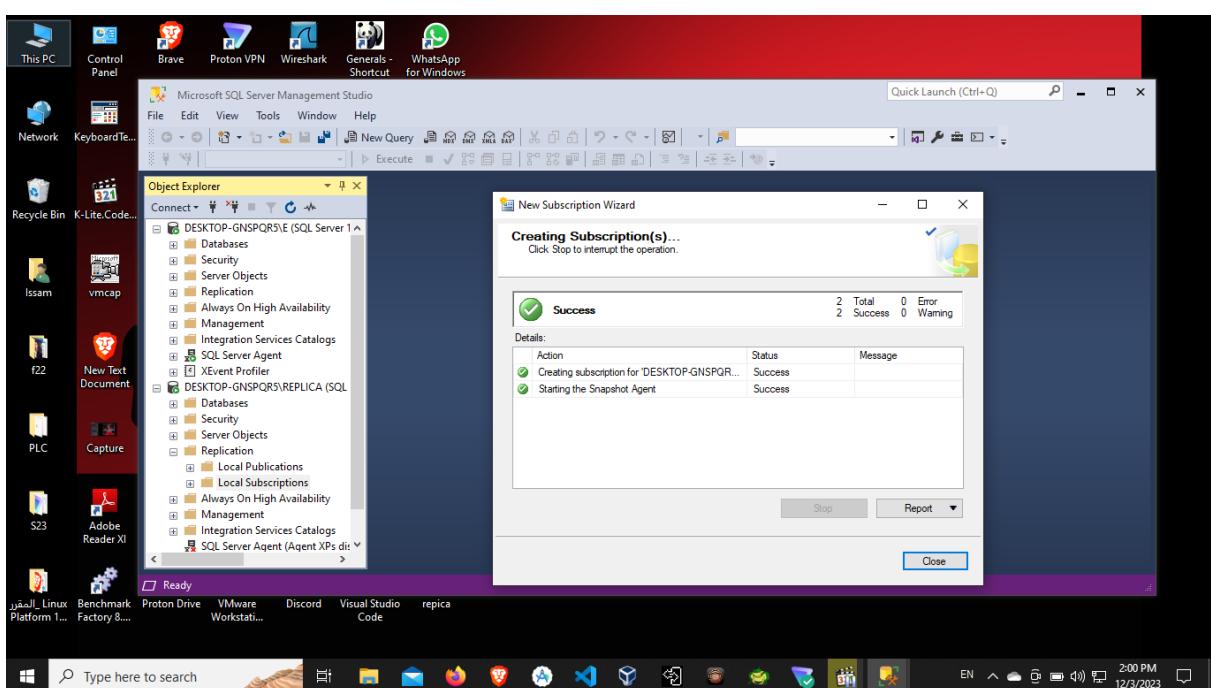
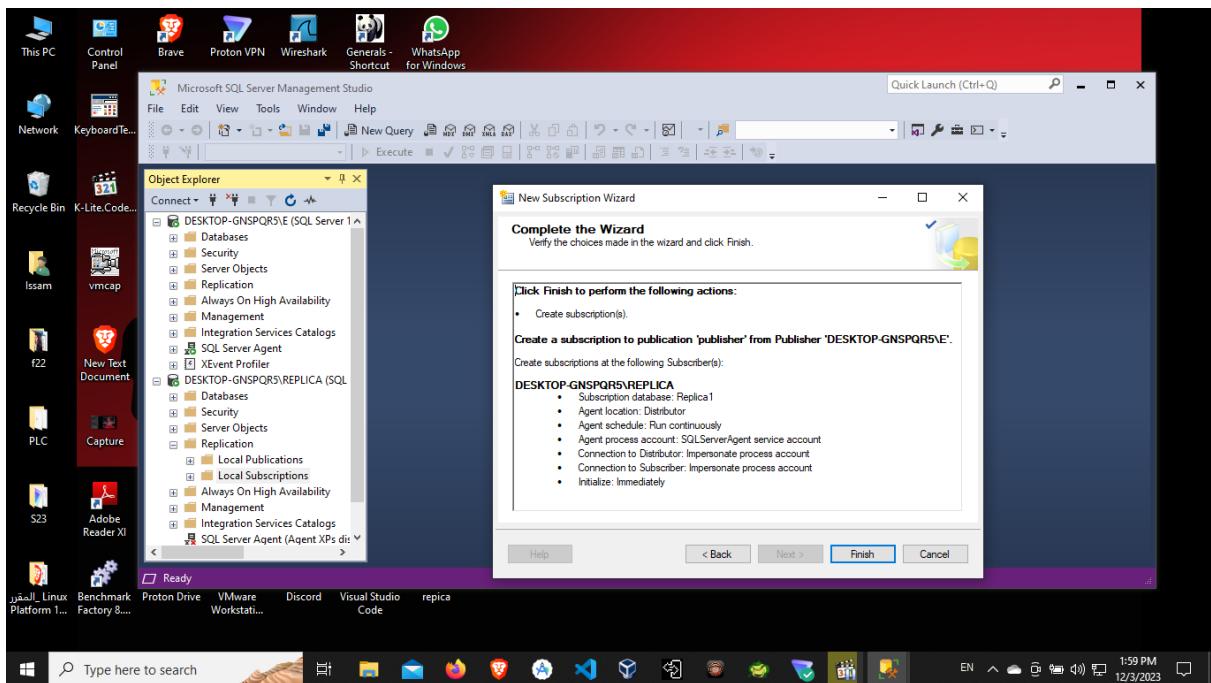
- Run under the following Windows account: I would Select this option if I want to use a Windows account as the security context for the Distribution Agent job. Provide the necessary credentials.
- Run under the SQL Server Agent service account: I Choose this option because I want to use the SQL Server Agent service account as the security context for the Distribution Agent job.



1. Initialize Subscription:

- Initialize immediately: I Choose this option because I want to generate and apply the initial snapshot immediately after creating the subscription.
- Initialize using a backup: I would Select this option if I have a backup of the publication database snapshot that I want to use to initialize the subscription.





2-2.Implement the replication

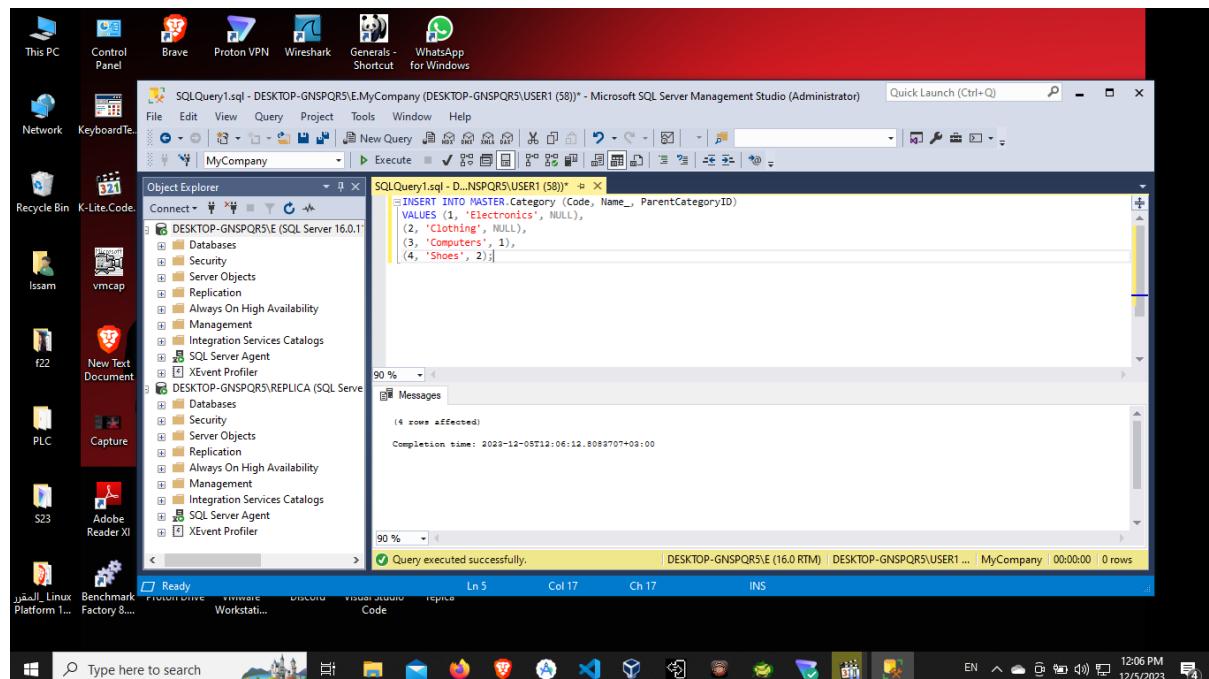
first I'm going to insert some data into the tables of the Mycompany database

1. Insert data into the `MASTER.Category` table:

```

INSERT INTO MASTER.Category
(Code, Name_, ParentCategoryID)
VALUES (1, 'Electronics', NULL),
(2, 'Clothing', NULL),
(3, 'Computers', 1),
(4, 'Shoes', 2);

```



1. Insert data into the `ENTRY.Invoice` table:

```

INSERT INTO ENTRY.Invoice
(Number, Date_, Total)
VALUES (1, '2023-12-01', 100.50),
(2, '2023-12-02', 75.25);

```

1. Insert data into the `ENTRY.Product` table:

```

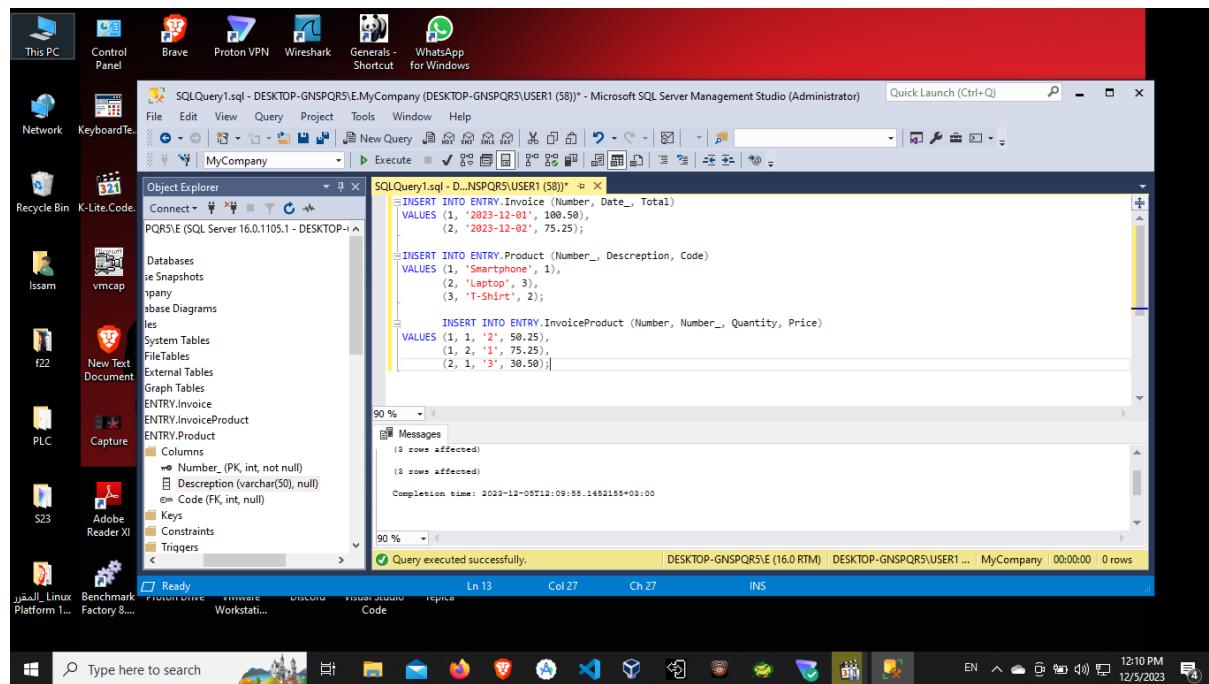
INSERT INTO ENTRY.Product
(Number_, Description, Code)
VALUES (1, 'Smartphone', 1),

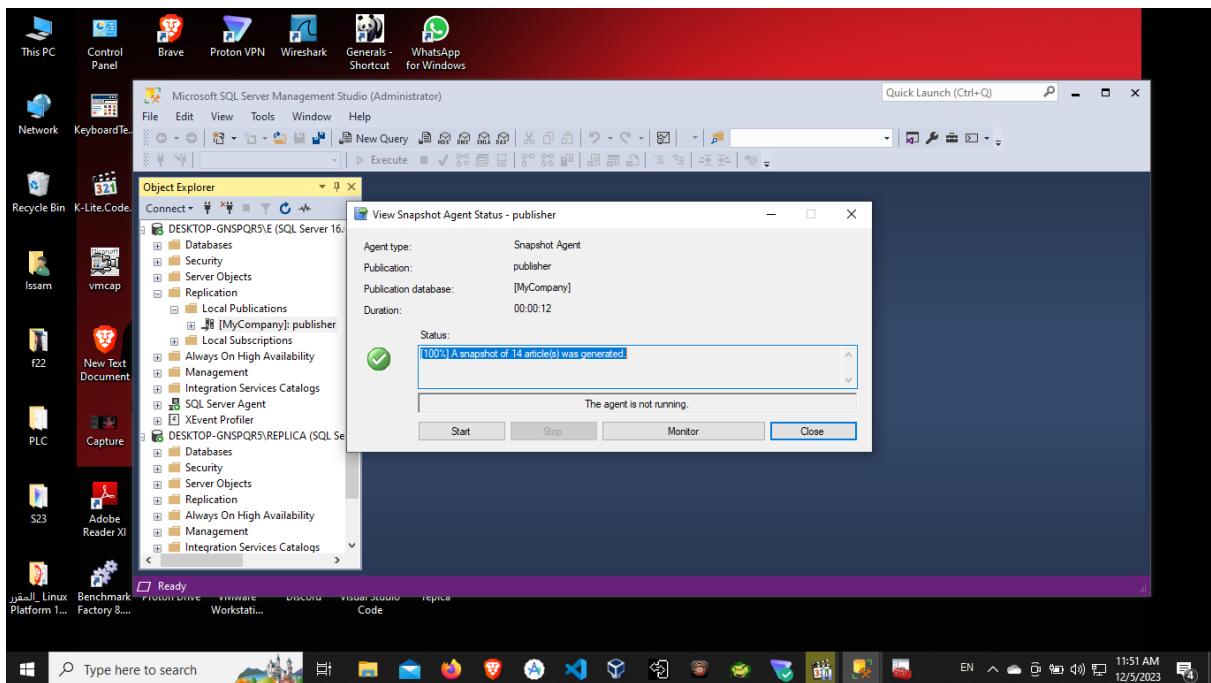
```

```
(2, 'Laptop', 3),  
(3, 'T-Shirt', 2);
```

1. Insert data into the `ENTRY.InvoiceProduct` table:

```
INSERT INTO ENTRY.InvoiceProduct  
(Number, Number_, Quantity, Price)  
VALUES (1, 1, '2', 50.25),  
       (1, 2, '1', 75.25),  
       (2, 1, '3', 30.50);
```





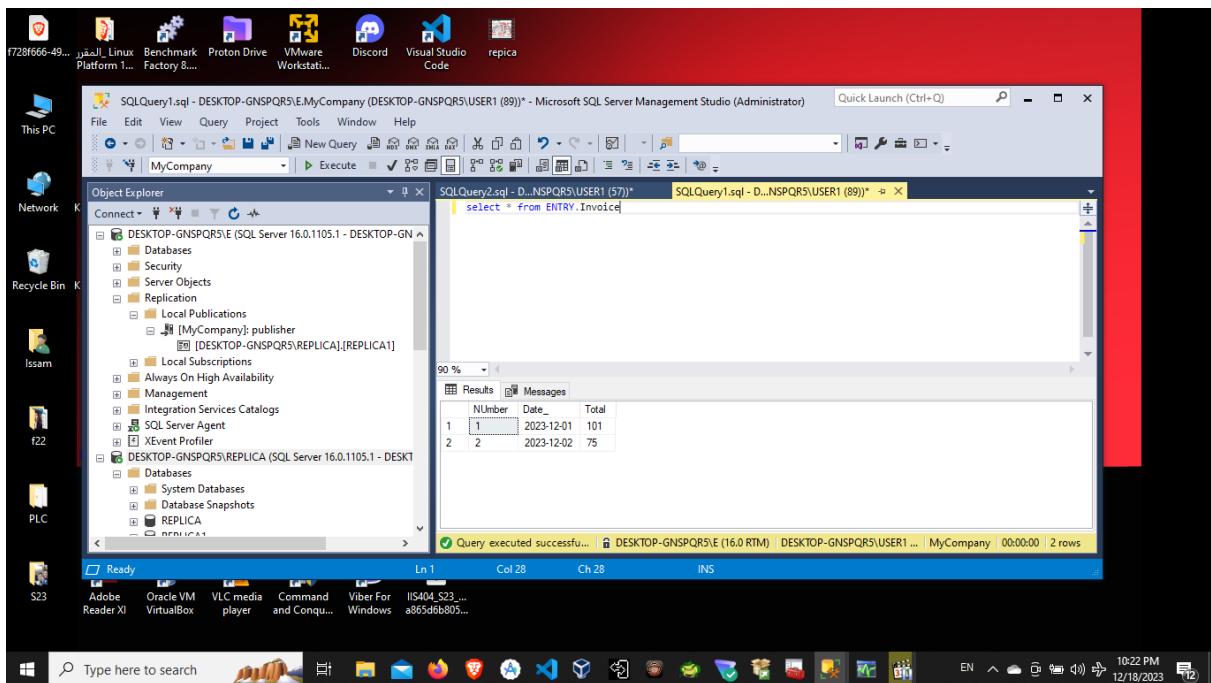
Initialize the subscription :

For transactional the initial snapshot is typically generated automatically during the first synchronization.

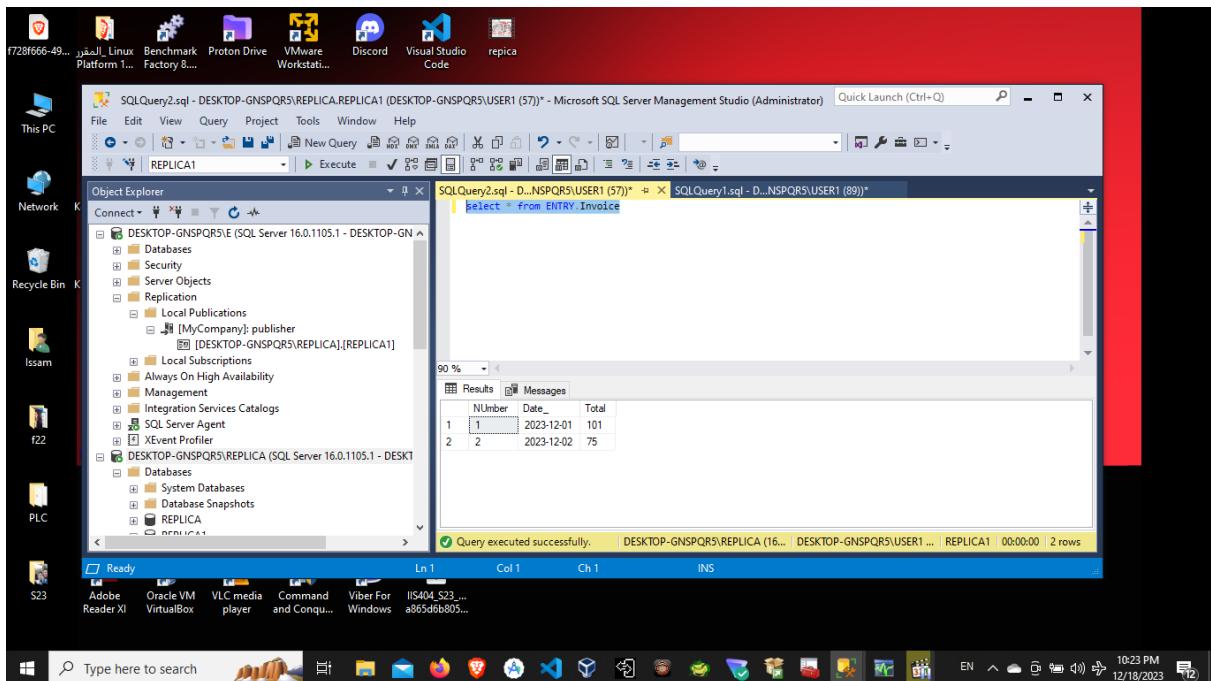
2.3. Test the replication showing and proving that it works (data transferred, replication monitor, log):

1-data transfer :

on publisher

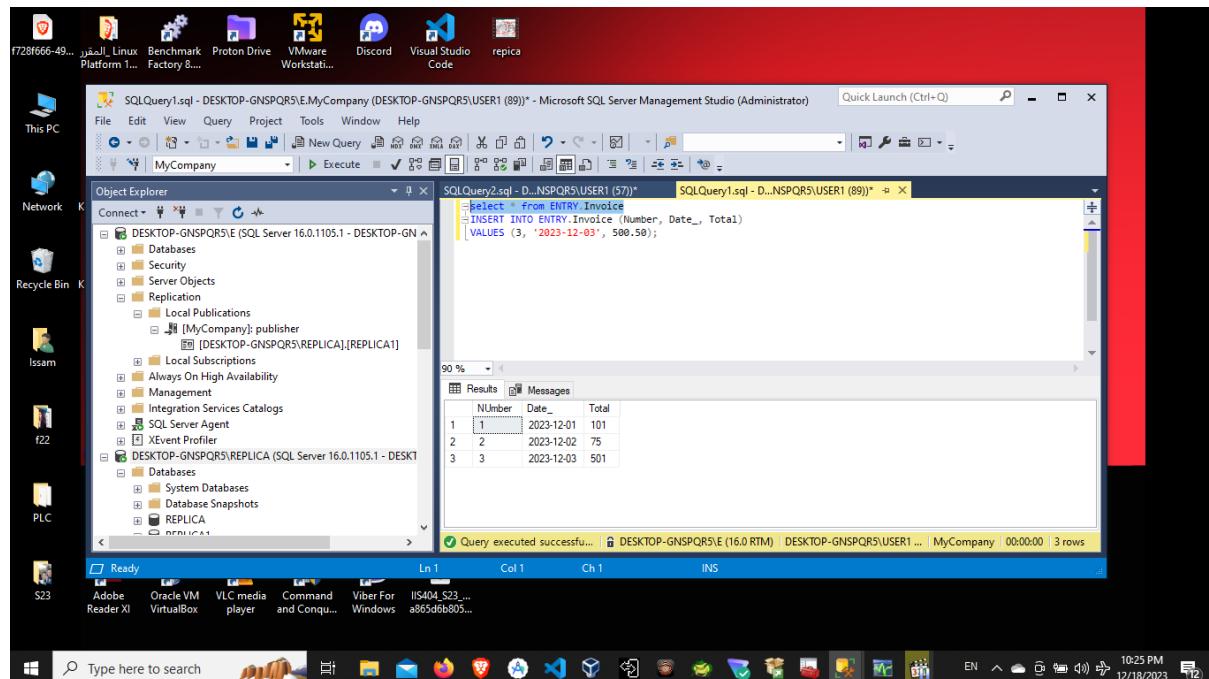


on subscriber



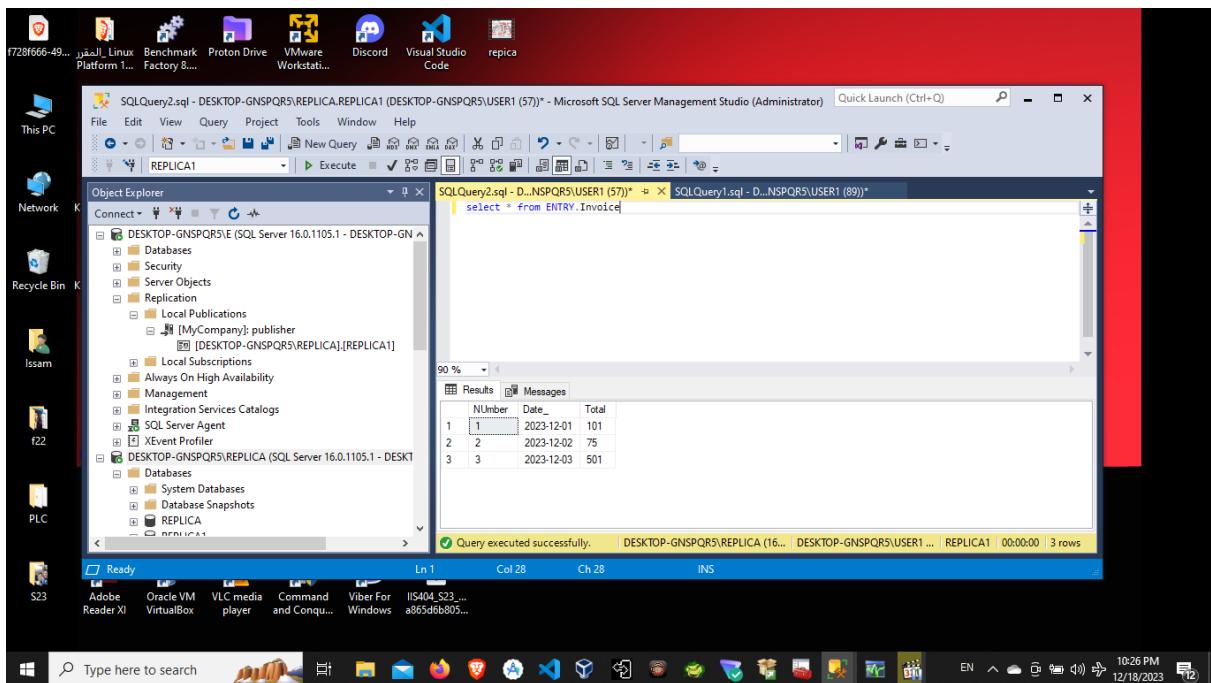
1. On publisher Insert data into the `ENTRY.Product` table:

```
INSERT INTO ENTRY.Invoice  
(Number, Date_, Total)  
VALUES (3, '2023-12-03', 500.50);
```

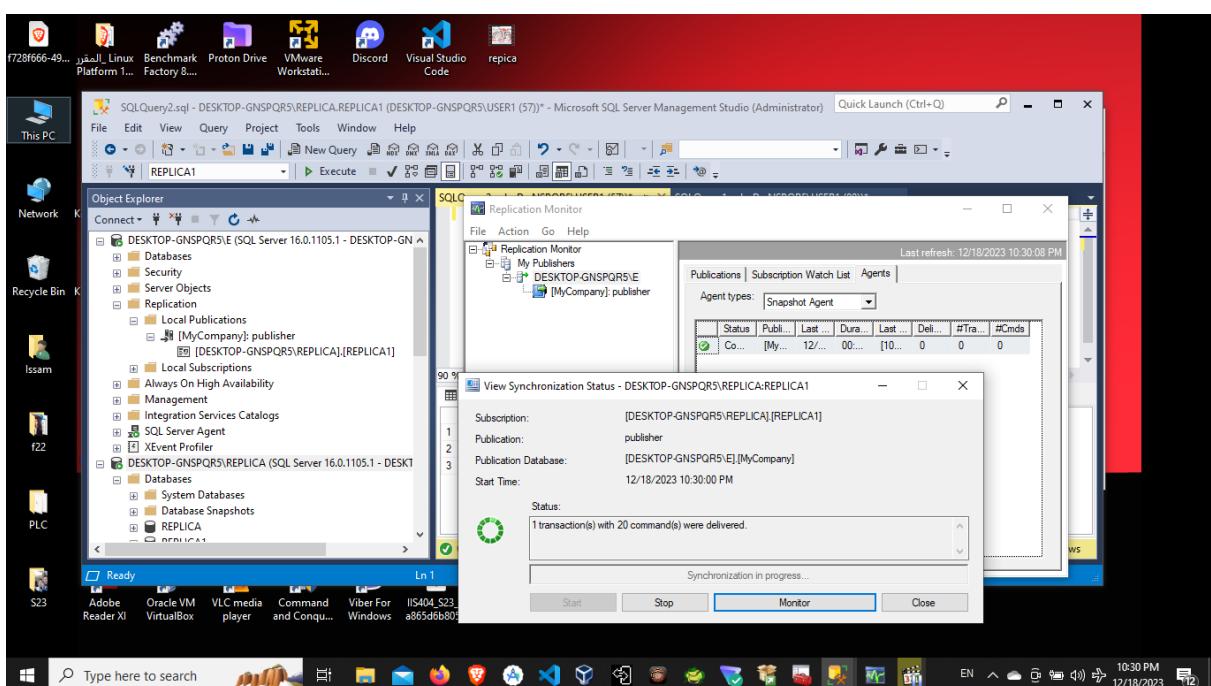


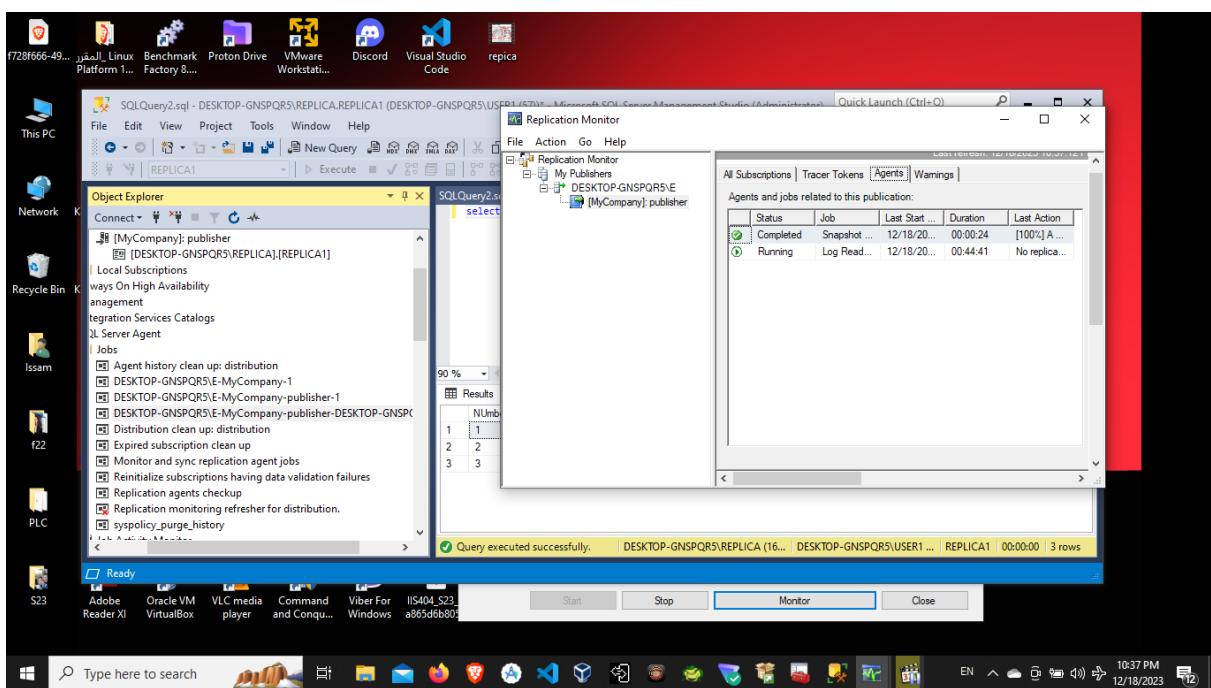
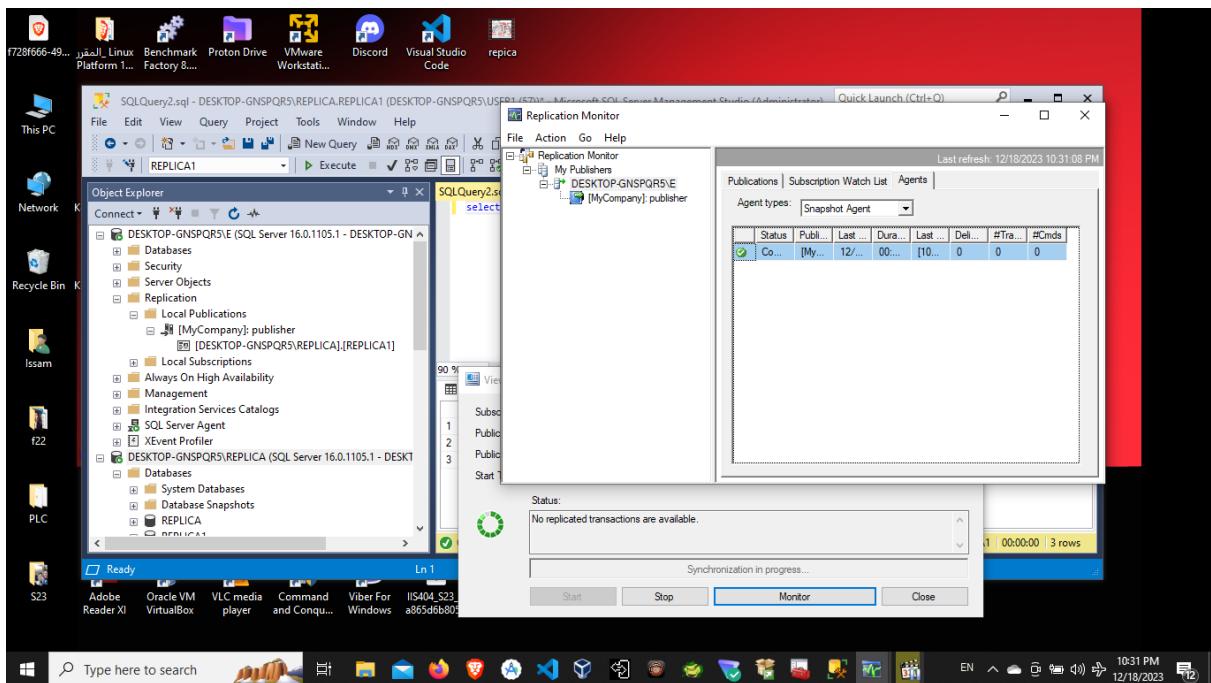
2. On subscriber :

```
SELECT * FROM ENTRY.Invoice
```



2-replication monitor





3-Log

