

# Exercise II - SQL

## Part 2 – Import Tables into SQL Server

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CEE412/CET522

Transportation Data Management and Visualization

WINTER 2020



# Outline

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The objective of this exercise is to learn how to import Excel worksheets to SQL Server as database relations.

Final product: three loop data tables in a SQL Server database.

# Step 1: Download Data

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Download E2\_Loopdata.xlsx from Canvas, which can be found under **Files → Exercises → Exercise 2**.

Take a look at the downloaded data.

The Excel file has three spreadsheets, each contains data collected from one loop detector:

- Data in *I5\_145M2* and *I5\_145S2* are readings from two single loop detectors.
- *I5\_145T2* contains data from a dual loop detector.

# Step 2: Log on Your Database Account

You can omit this step if you didn't disconnect from your database.

Input the class server IP address: 128.95.29.72

Input your account name and your password

Use **SQL Server Authentication**

Connect to Server

## SQL Server

Server type: Database Engine

Server name: 128.95.29.72

Authentication: SQL Server Authentication

Login: W20\_Zhiyong

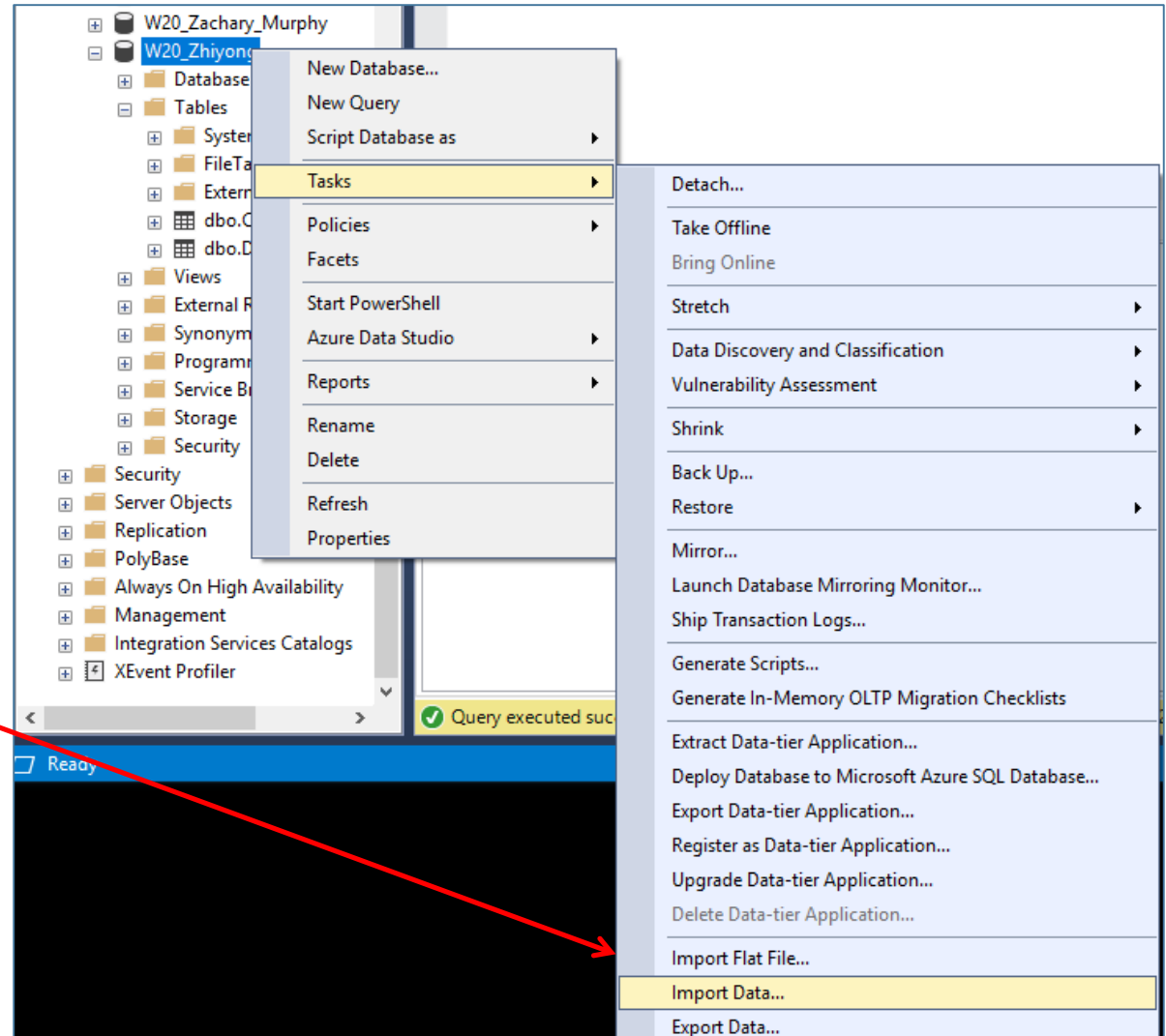
Password: \*\*\*\*\*

☐ Remember password

Connect Cancel Help Options >>

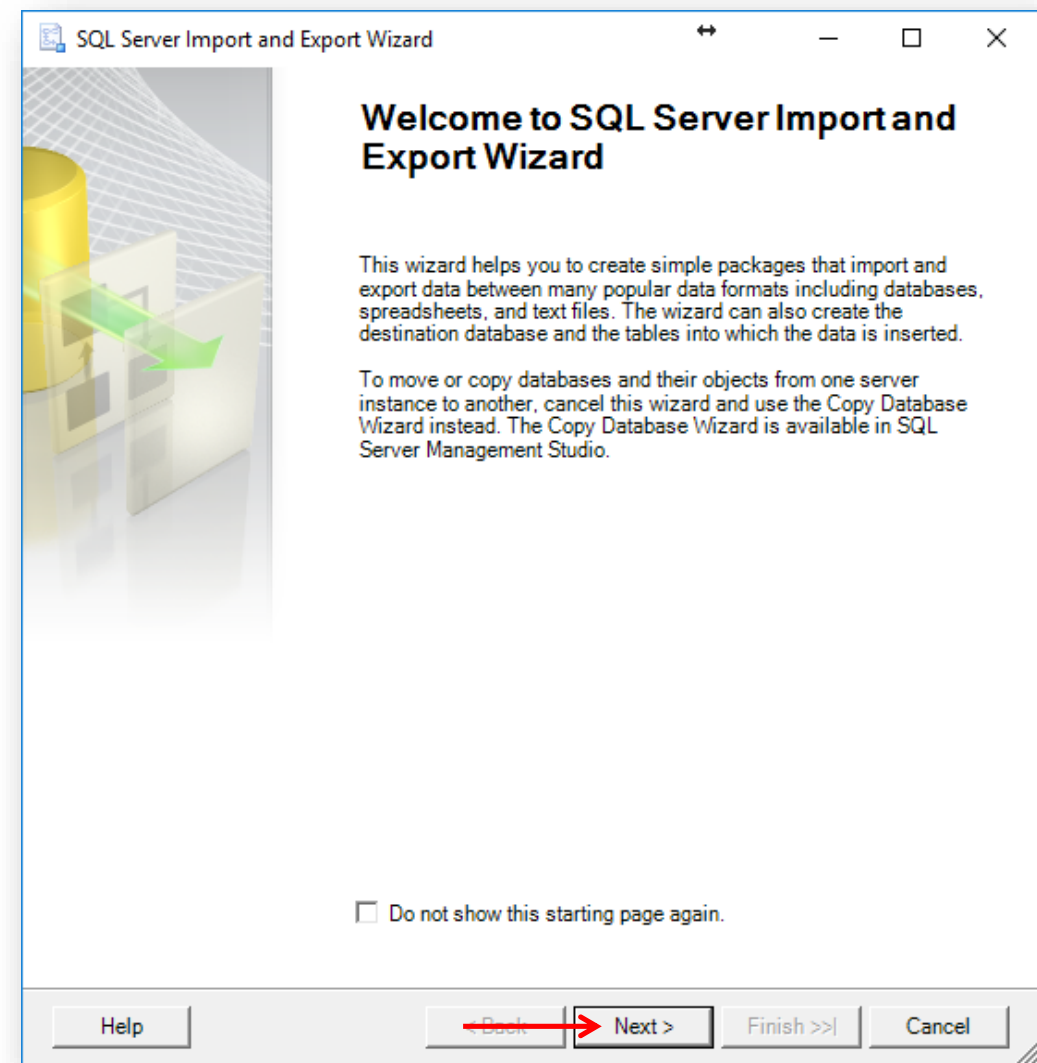
# Step 3: Activate the Import/Export Wizard

- Locate to the database you want to import the Excel worksheet to (your own database).
- To activate the Import/Export Wizard, right click on your database and click **Tasks** → **Import Data**.



# Step 3: Activate the Import/Export Wizard

You will see a welcome window, click **Next** to proceed.



# Step 4: Choose a Data Source

Select “Microsoft Excel” from the **Data Source** combo list and locate your Excel file for data import in the file path. Then click **Next**.

Choose Excel here

Choose Excel Version

Make sure this is checked

SQL Server Import and Export Wizard

**Choose a Data Source**  
Select the source from which to copy data.

Data source: **Microsoft Excel**

Excel connection settings

Excel file path: E:\CEE412\_2020\Exercises\Exercise 2\E2\_Loopdata.xlsx **Browse...**

Excel version: Microsoft Excel 2007-2010

☒ First row has column names

Help < Back Next > Finish >> Cancel

Click **Browse...** and find your excel file

# Step 5: Choose a Destination

Select “SQL Server Native Client 11.0” from the **Destination** combo list and specify our server name or in the Server text field. Type your user name and password for SQL Server authentication. Then click **Next**.

Use this option and type in your SQL server login information

The screenshot shows the 'SQL Server Import and Export Wizard' window, specifically the 'Choose a Destination' step. The window title is 'SQL Server Import and Export Wizard'. The subtitle is 'Choose a Destination' with the instruction 'Specify where to copy data to.' Below this, there are several fields and options:

- Destination:** A dropdown menu showing 'SQL Server Native Client 11.0'.
- Server name:** A text field containing '128.95.29.72'.
- Authentication:** Two radio buttons: 'Use Windows Authentication' (unselected) and 'Use SQL Server Authentication' (selected).
- User name:** A text field containing 'W20\_Zhiyong'.
- Password:** A text field with masked characters (dots).
- Database:** A dropdown menu showing 'W20\_Zhiyong'.
- Buttons:** 'Refresh' and 'New...' buttons next to the Database dropdown.
- Navigation:** 'Help', '< Back', 'Next >', 'Finish >>', and 'Cancel' buttons at the bottom.

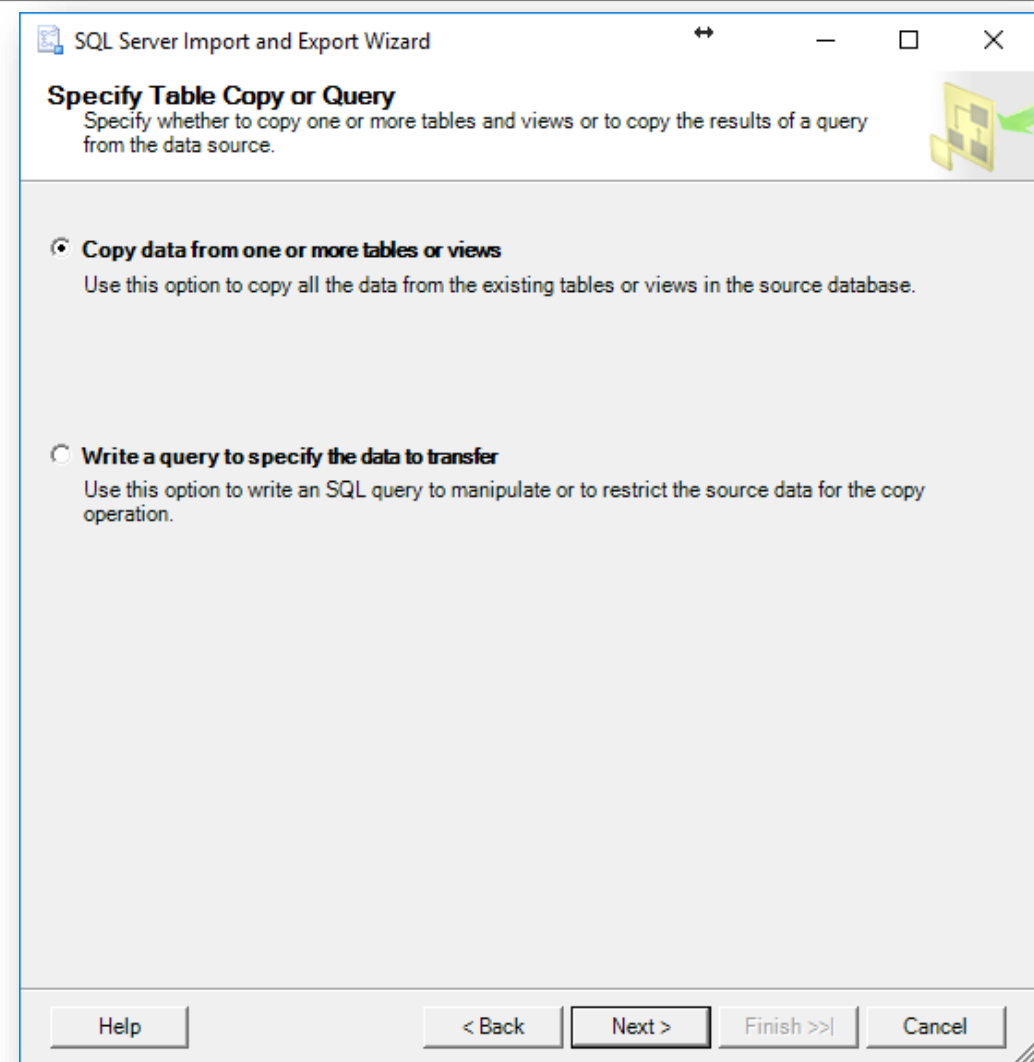
Red annotations highlight specific parts of the form:

- A red box around the 'Use SQL Server Authentication' radio button with an arrow pointing to it from the text 'Use this option and type in your SQL server login information'.
- A red box around the 'Server name' field containing '128.95.29.72' with an arrow pointing to it from the text 'The IP of our class server'.
- A red box around the 'Database' dropdown menu showing 'W20\_Zhiyong' with an arrow pointing to it from the text 'Choose your database to import the data into.'



# Step 6: Specify Table Copy or Query

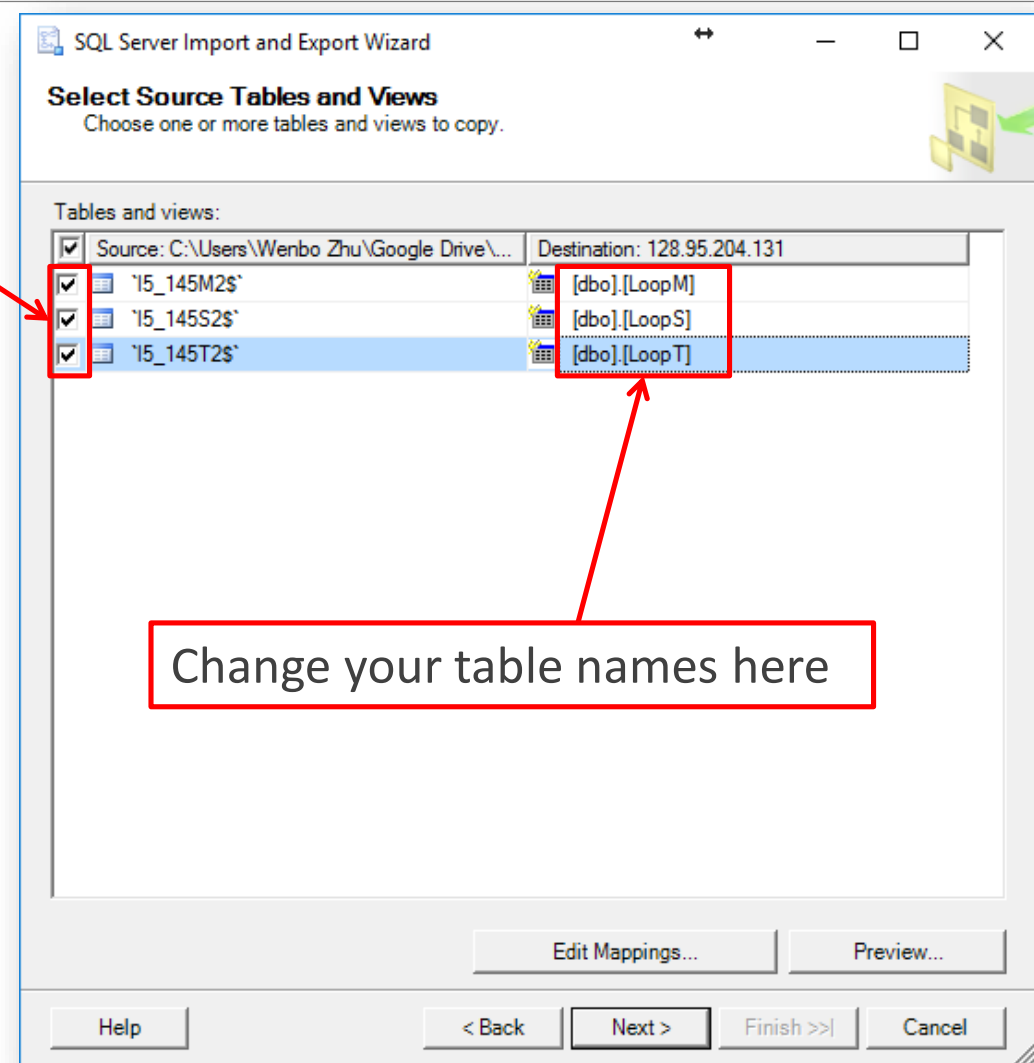
Choose **Copy data from one or more tables or views** and click **Next**.



# Step 7: Select Source Tables and Views

Select all worksheets

- Note that a new table is created in SQL server for each of the imported tables
- You can rename the resulting tables in your database. Here I used “LoopM”, “LoopS”, and “LoopT” for simplicity.

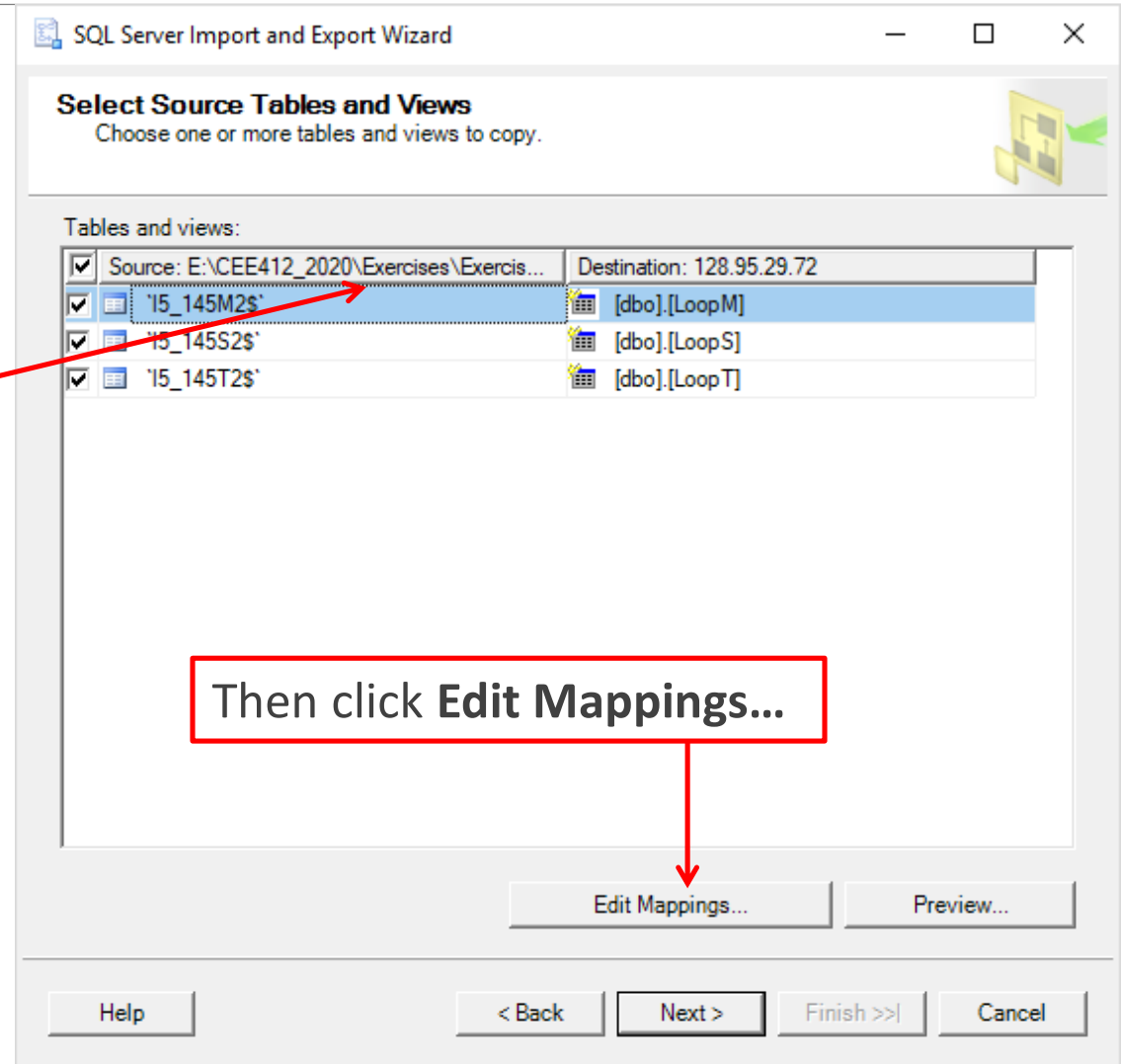


Change your table names here

# Step 8: Edit Mappings

It's important to define the data type for the imported table columns, as SQL is statically (strongly) typed.

Click to highlight the first table



# Step 8: Edit Mappings

- This is where you set the data types and names for each imported column.
- Leave SENSOR\_ID unchanged, and set DATA\_TIME to “bigint”.
- Change the type for the remaining attributes to int.
- Click **OK**.

Column Mappings

Source: 'I5\_145M2S'

Destination: [dbo].[LoopM]

☒ Create destination table ☐ Delete rows in destination table ☐ Append rows to the destination table

☐ Drop and re-create destination table ☐ Enable identity insert

Mappings:

Source	Destination	Type	Nullable	Size	Precision	Scale
SENSOR_ID	SENSOR_ID	nvarchar	<input checked="" type="checkbox"/>	255		
DATA_TIME	DATA_TIME	bigint	<input checked="" type="checkbox"/>			
VOLUME	VOLUME	int	<input checked="" type="checkbox"/>			
SCAN_COUNT	SCAN_COUNT	int	<input checked="" type="checkbox"/>			
FLAG	FLAG	int	<input checked="" type="checkbox"/>			
LANE_COUNT	LANE_COUNT	int	<input checked="" type="checkbox"/>			
INCIDENT_DE...	INCIDENT_DE...	int	<input checked="" type="checkbox"/>			

Source column: INCIDENT\_DETECT Double (15)

# Step 8: Edit Mappings

- Repeat the previous step for the 2<sup>nd</sup> table (I5\_145S2).
- The 3<sup>rd</sup> table (I5\_145T2) contains dual loop detector data, which have slightly different data types.
- For the 3<sup>rd</sup> table, set the data types as shown. You should keep using “float” type for SPEED and LENGTH fields.

Column Mappings

Source: 'I5\_145T2\$'

Destination: [dbo].[LoopT]

☒ Create destination table ☐ Delete rows in destination table ☐ Append rows to the destination table

☐ Drop and re-create destination table ☐ Enable identity insert

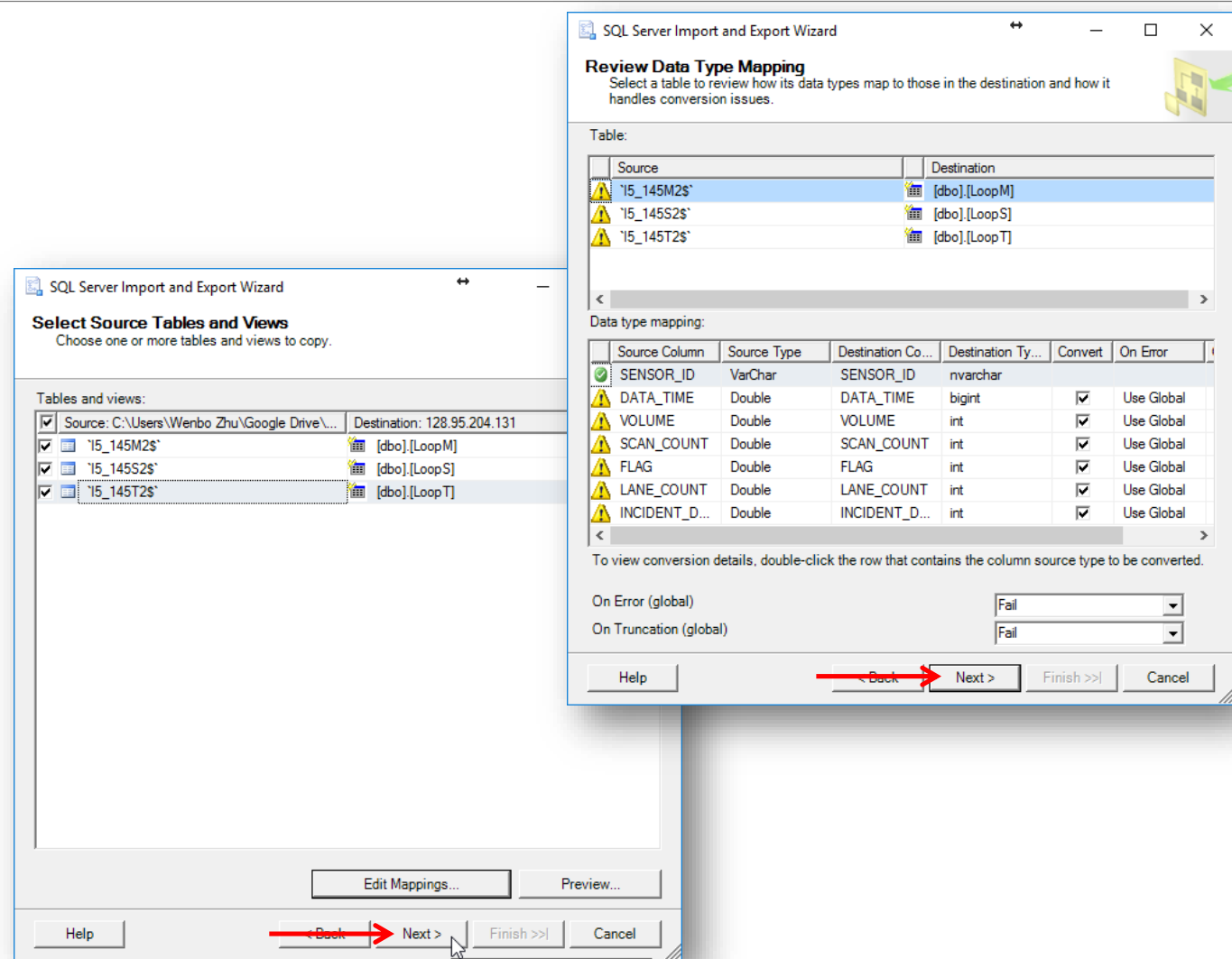
Mappings:

Source	Destination	Type	Nullable	Size	Precision	Scale
SENSOR_ID	SENSOR_ID	nvarchar	<input checked="" type="checkbox"/>	255		
DATA_TIME	DATA_TIME	bigint	<input checked="" type="checkbox"/>			
SPEED	SPEED	float	<input checked="" type="checkbox"/>			
LENGTH	LENGTH	float	<input checked="" type="checkbox"/>			
FLAGS1	FLAGS1	int	<input checked="" type="checkbox"/>			
FLAGS2	FLAGS2	int	<input checked="" type="checkbox"/>			
BIN1	BIN1	int	<input checked="" type="checkbox"/>			
BIN2	BIN2	int	<input checked="" type="checkbox"/>			
BIN3	BIN3	int	<input checked="" type="checkbox"/>			

Source column: BIN4 Double (15)

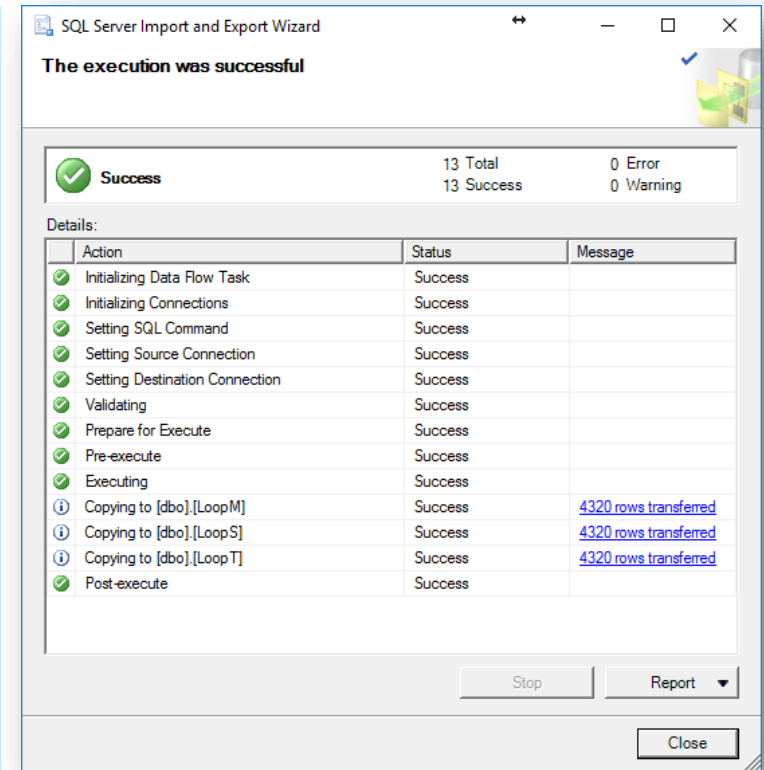
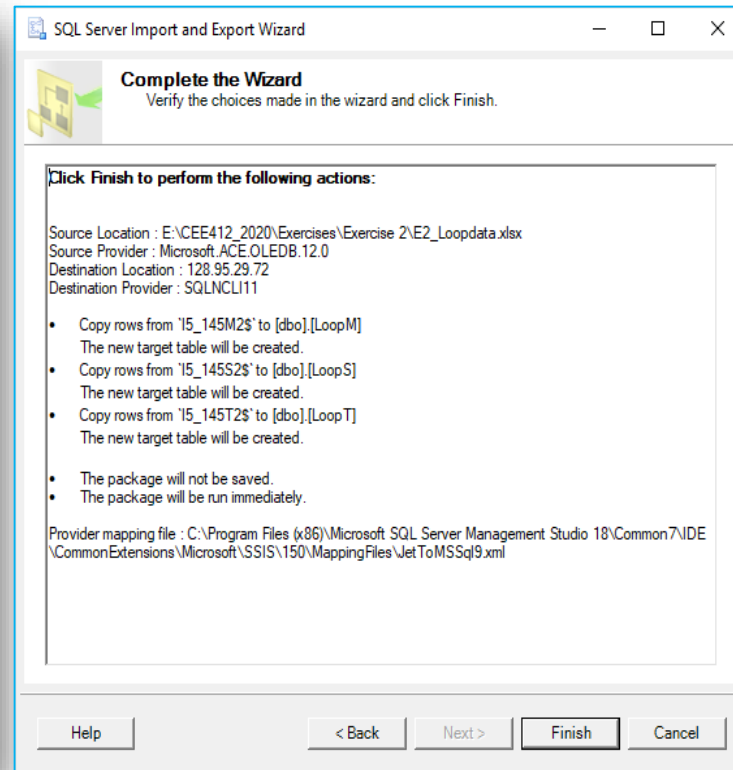
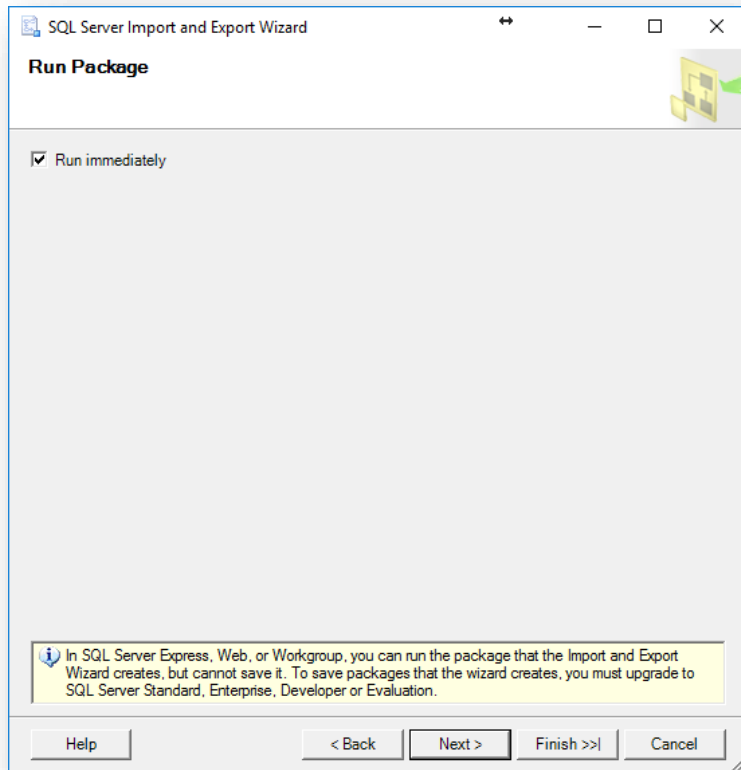
# Step 8: Edit Mappings

- After all data mappings are set, click **Next**.
- You can review the data type conversions you just defined. Click **Next** to proceed.



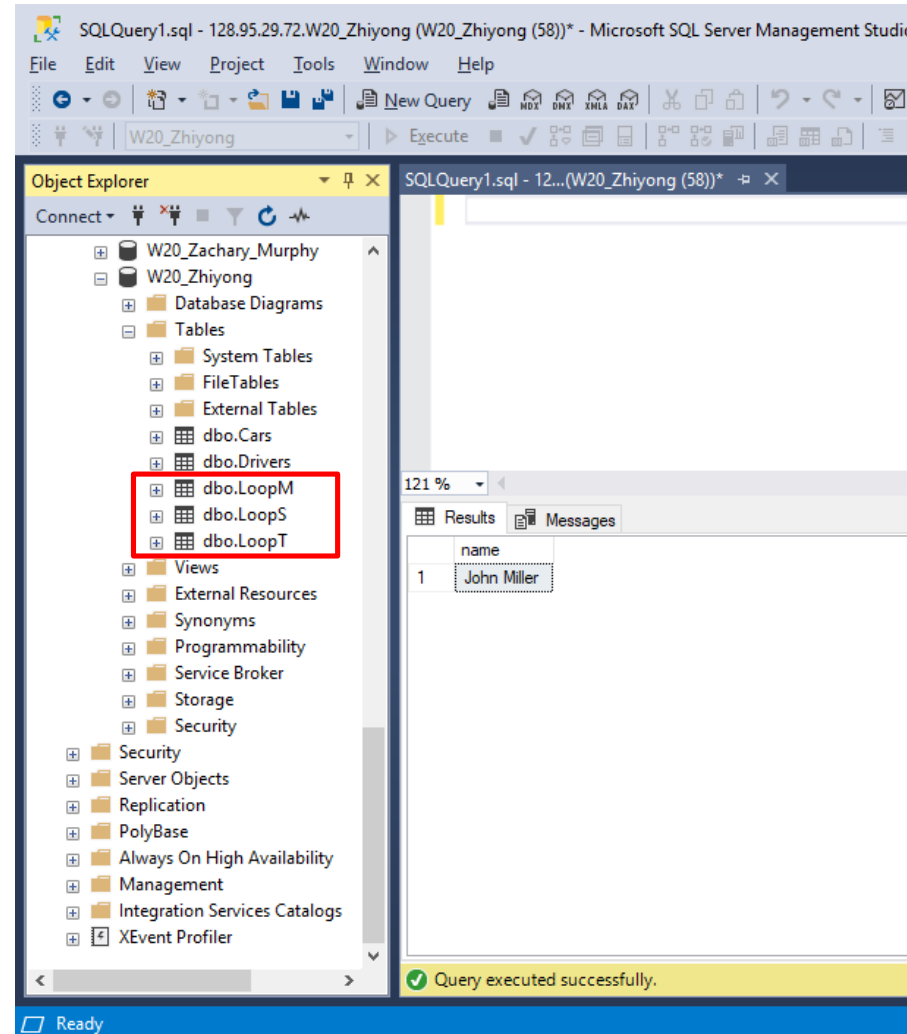
# Step 9: Import Data

- Click **Next** to run immediately.
- Click **Finish**.
- Click **Close** after all the tasks are completed.



# Step 10: Look at the Data

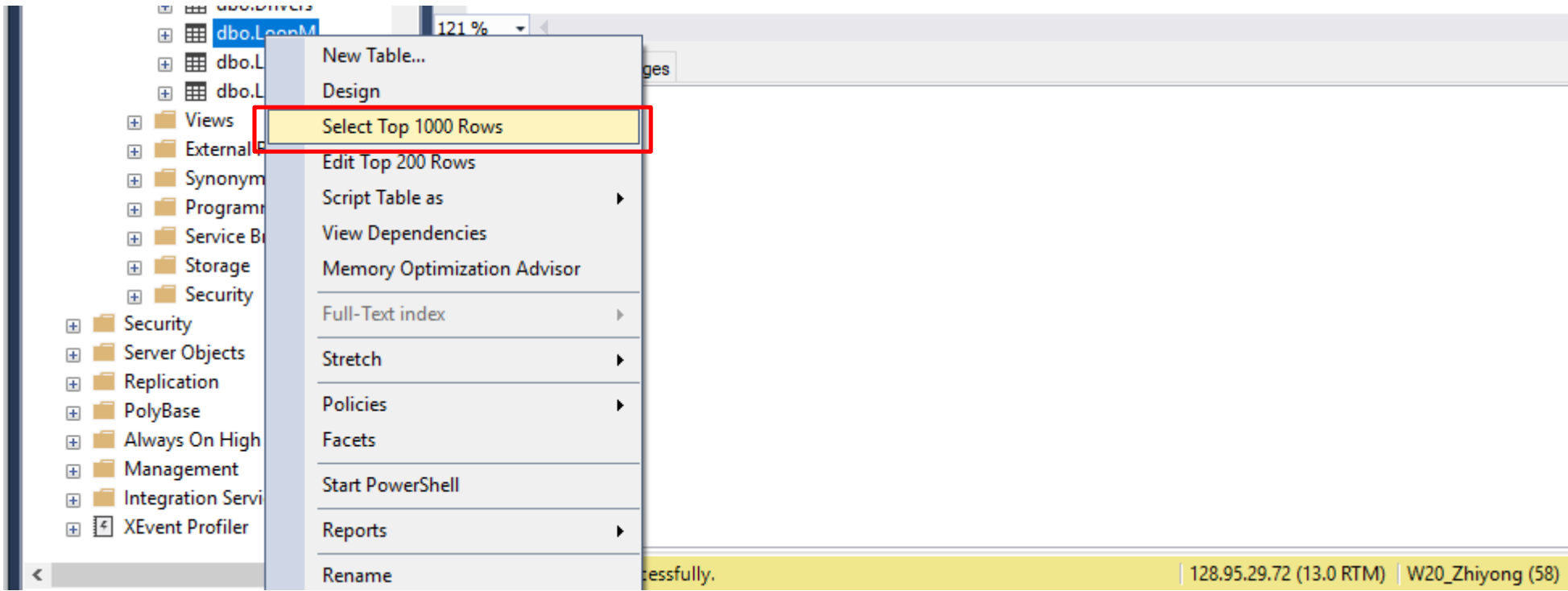
- Now you should have three new tables in your database
- If you do not see them, refresh your database by right clicking **Tables** → **Refresh**.





# Step 10: Look at the Data

- To check if your data import was successful, right click on either table, and then click **Select Top 1000 Rows**.



# Step 10: Look at the Data

- The query will be created automatically.
- The imported data should look exactly the same as those in the Excel worksheet.

The screenshot displays the SQL Server Enterprise Manager interface. The top pane shows a query window with the following SQL code:

```
/****** Script for SelectTopNRows command from SSMS *****/  
SELECT TOP (1000) [SENSOR_ID]  
    , [DATA_TIME]  
    , [VOLUME]  
    , [SCAN_COUNT]  
    , [FLAG]  
    , [LANE_COUNT]  
    , [INCIDENT_DETECT]  
FROM [W20_Zhiyong].[dbo].[LoopM]
```

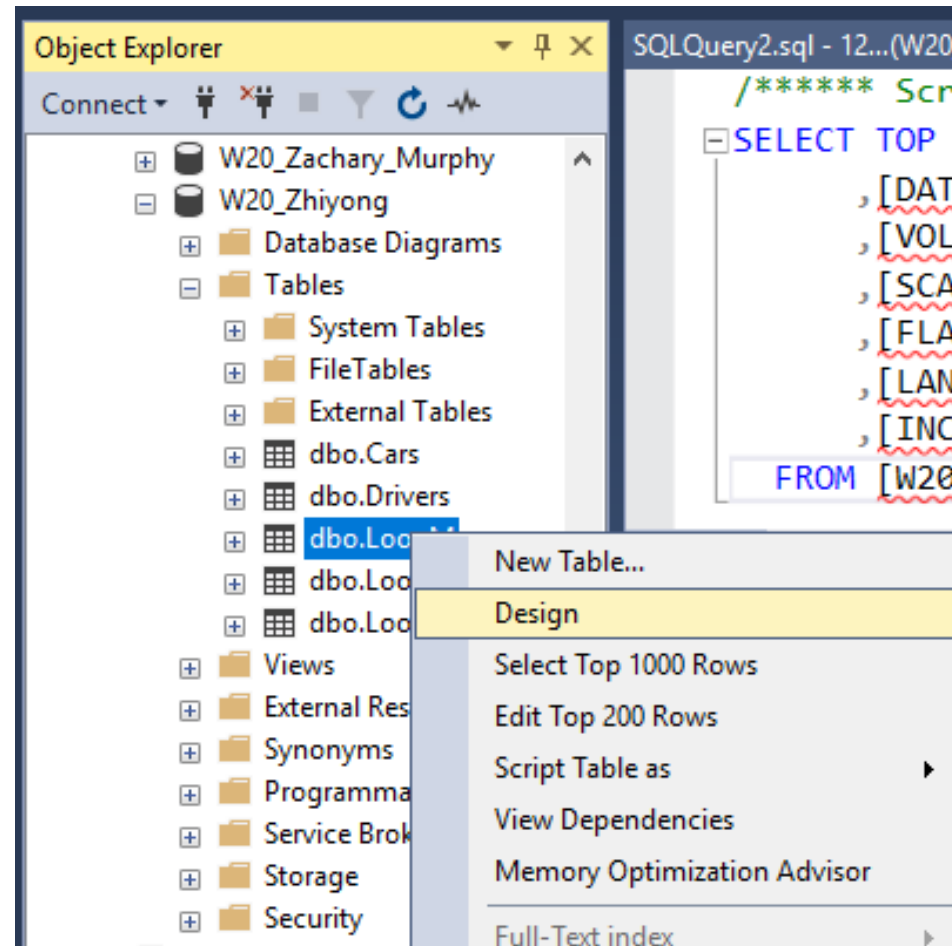
The bottom pane shows the results of the query, displaying a table with 14 rows and 7 columns. The columns are: SENSOR\_ID, DATA\_TIME, VOLUME, SCAN\_COUNT, FLAG, LANE\_COUNT, and INCIDENT\_DETECT. The data is as follows:

	SENSOR_ID	DATA_TIME	VOLUME	SCAN_COUNT	FLAG	LANE_COUNT	INCIDENT_DETECT
1	ES-167D:_MS__2	20041028000014000	0	0	0	1	0
2	ES-167D:_MS__2	20041028000034000	3	43	0	1	0
3	ES-167D:_MS__2	20041028000054000	4	56	0	1	0
4	ES-167D:_MS__2	20041028000114000	3	114	0	1	0
5	ES-167D:_MS__2	20041028000134000	3	116	0	1	0
6	ES-167D:_MS__2	20041028000154000	4	89	0	1	0
7	ES-167D:_MS__2	20041028000214000	1	51	0	1	0
8	ES-167D:_MS__2	20041028000234000	2	29	0	1	0
9	ES-167D:_MS__2	20041028000254000	2	33	0	1	0
10	ES-167D:_MS__2	20041028000314000	2	28	0	1	0
11	ES-167D:_MS__2	20041028000333000	3	116	0	1	0
12	ES-167D:_MS__2	20041028000354000	0	0	0	1	0
13	ES-167D:_MS__2	20041028000414000	2	57	0	1	0
14	ES-167D:_MS__2	20041028000434000	1	50	0	1	0

At the bottom of the results pane, a status bar indicates: "Query executed successfully. | 128.95.29.72 (13.0 RTM) | W20\_Zhiyong (60) | W20\_Zhiyong | 00:00:00 | 1,000 rows".

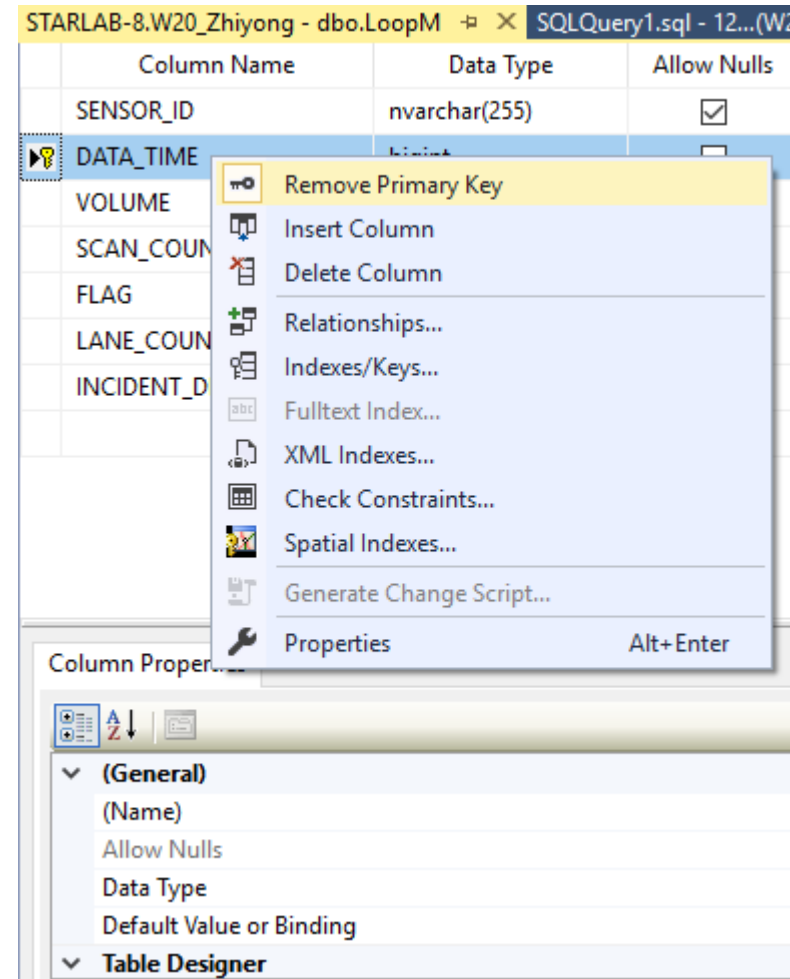
# Step 10: Define the Keys

- In order to specify a key for each table, right click on the table, then click **Design**.



# Step 10: Define the Keys

- Right click **DATA\_TIME** → **Set Primary Key** to set this attribute as the primary key of this relation.
- Notice that SQL Server does not allow null for the primary key attribute after you have defined the key.
- Close the design window and save your change.



# Step 10: Define the Keys

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- Set the same primary key (DATA\_TIME) for the other two tables using GUI or **ALTER TABLE** statement.
- The following statement shows how to set the primary key for the “LoopS” table.

```
ALTER TABLE loops
ALTER COLUMN data_time BIGINT NOT NULL

ALTER TABLE loops
    ADD CONSTRAINT pk_loops PRIMARY KEY (data_time)
```

- Note that in order to define an attribute as the key, you need to first add a NOT NULL constraint to the attribute.
- Now you have the Excel Worksheets imported to your database in the SQL Server.

# Query Practice

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Develop some queries to answer the following questions (note: the three tables can be joined based on the DATA\_TIME field).

- Find the time intervals with scan\_count > 700 from the M loop data.
- Do the same intervals have scan\_count > 700 from the S loop measurements?
- Are there any intervals with vol = 0, but scan\_count > 0 in the M loop data?
- What are the dual-loop (T loop) measured speed for intervals with M-loop measured scan\_count > 700?
- Develop your own questions and use SQL to find the results.

# Disconnect from Your Database

- Remember to disconnect from your database and close SQL Server Management Studio before leaving the lab.

