😊 Mapping data flow (creating fact table)

Mapping Data Flows in **Azure Data Factory (ADF)** are a visual and data-transformation tool designed to enable scalable and reusable data transformations without requiring extensive code. They are particularly useful for ETL (Extract, Transform, Load) and ELT (Extract, Load, Transform) scenarios. Here's a detailed overview:

Key Features

1. **No-Code Visual Design**:
    - Mapping Data Flows provide a drag-and-drop interface for designing data transformations.
    - Users can build data transformation logic without writing code, making it accessible to non-developers.
2. **Integration with Azure Data Factory Pipelines**:
    - Data flows are part of ADF pipelines and can be triggered and monitored alongside other pipeline activities.
3. **Scalable Execution**:
    - Transformations are executed on a managed Spark cluster provided by ADF, allowing for distributed and high-performance processing.
4. **Wide Range of Transformation Options**:
    - **Filter**: Remove rows based on conditions.
    - **Derived Columns**: Add or modify columns.
    - **Aggregate**: Perform aggregation operations like sum, average, etc.
    - **Join**: Combine data from multiple sources.
    - **Lookup**: Enrich data by looking up values from another dataset.
    - **Pivot and Unpivot**: Reshape data structures.
    - **Sort, Split, and Conditional Split**: Organize and divide data.
5. **Connectors for Diverse Data Sources**:
    - Supports integration with various data sources such as Azure Blob Storage, SQL databases, Data Lake Storage, and more.
6. **Parameterization**:

    - Mapping Data Flows can be parameterized, making them reusable for different datasets or scenarios.

7. **Data Preview**:
    - Allows users to preview data transformations at different stages without executing the full pipeline.

Use Cases

1. **Data Cleansing**:
    - Remove duplicates, filter out unwanted data, or standardize formats.
2. **Data Enrichment**:
    - Join and enrich datasets from multiple sources.
3. **Data Aggregation**:
    - Summarize or group data for analytics or reporting.
4. **ETL/ELT Workflows**:
    - Extract, transform, and load data into a data warehouse or data lake.

Execution and Monitoring

- Mapping Data Flows are executed using Azure Data Factory's integration runtime with Spark clusters.
- Users can monitor performance and debug issues using the **ADF Monitoring** dashboard, which provides insights into data flow execution status, duration, and errors.

Advantages

- **Ease of Use**: No need for Spark expertise; transformations are visual.
- **Scalability**: Handles large-scale data processing with Spark.
- **Integration**: Seamlessly works with Azure ecosystem services.
- **Flexibility**: Customizable with parameterization and branching.

Limitations

- **Dependency on Spark**: Execution relies on Azure's Spark infrastructure, which may introduce latency in certain scenarios.
- **Cost**: Running Spark clusters incurs additional costs, especially for complex or large-scale transformations.

Mapping Data Flows is ideal for organizations looking to simplify complex data transformation workflows without heavy coding.

😄 To begin with the Lab:

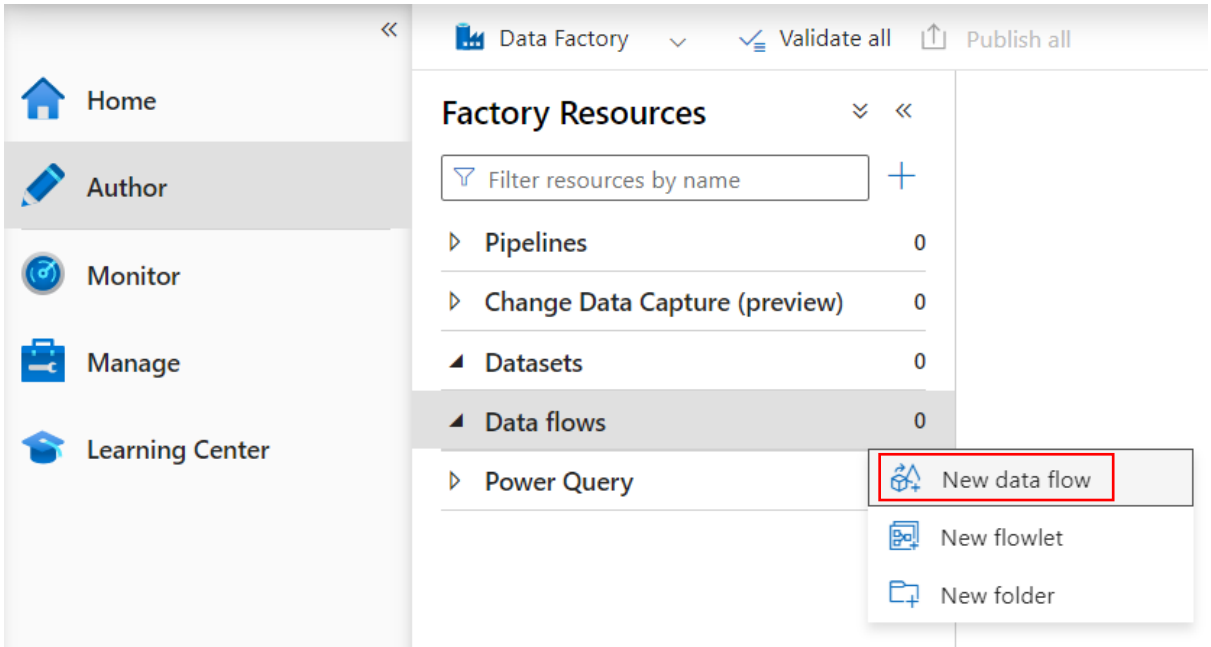
1. In this lab we are going to create a mapping data flow for the fact table. Also, we'd seen how to create a fact table while working with Azure Synapse. The approach is the same we will use the same script to create the data flow but here we will just use the column names to add and remove columns while working which you will see by completing this lab.
2. Also, we can only create fact and dimension tables using the **sample database** from **Azure SQL Database**. So, if you have deleted your SQL database then create one.
3. Below is the script that we are using to choose columns for both tables.

```
SELECT
hd.[SalesOrderID],hd.[OrderDate],hd.[CustomerID],hd.[SubTotal],hd.[TaxAmt],hd.[Freight],hd.[TotalDue],
dt.[OrderQty],dt.[ProductID],dt.[UnitPrice],dt.[UnitPriceDiscount],dt.[LineTotal]
FROM [SalesLT].[SalesOrderHeader] hd INNER JOIN [SalesLT].[SalesOrderDetail] dt
ON hd.[SalesOrderID]=dt.[SalesOrderID];
```

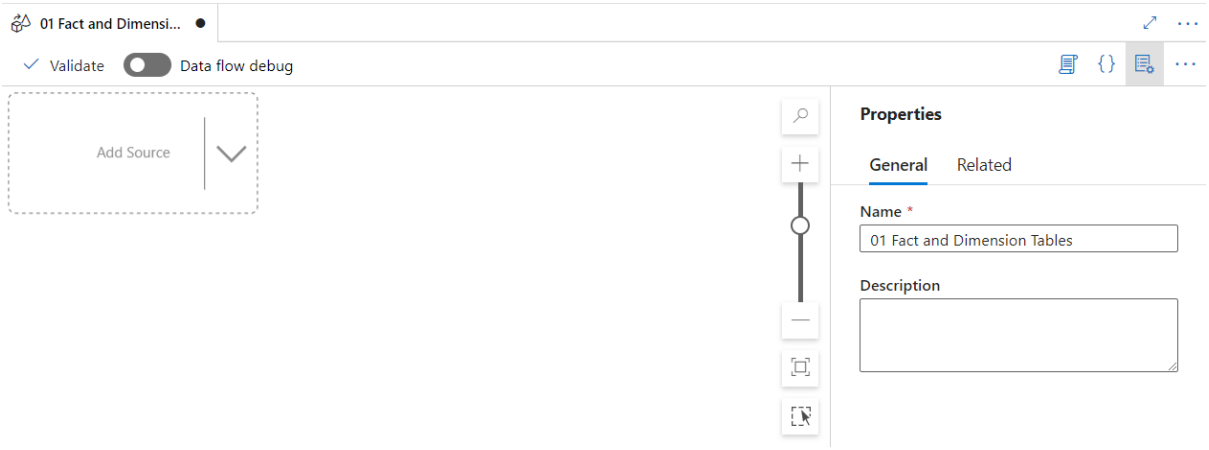
4. Now before creating our table using mapping data flow first, we have to create a fact table inside our dedicated SQL Pool, like we did while working with pipelines in Azure Synapse.
5. Also, from **GitHub** you can download the scripts that we are using for the labs.

```
CREATE TABLE factSales
(
    SalesOrderID int NOT NULL,
    OrderDate datetime NOT NULL,
    CustomerID int NOT NULL,
    SubTotal money NOT NULL,
    TaxAmt money NOT NULL,
    Freight money NOT NULL,
    TotalDue money NOT NULL,
    OrderQty int,
    ProductID int NOT NULL,
    UnitPrice money NOT NULL,
    UnitPriceDiscount money NOT NULL,
    LineTotal decimal NOT NULL
)
WITH
(
    DISTRIBUTION=HASH(ProductID)
)
```

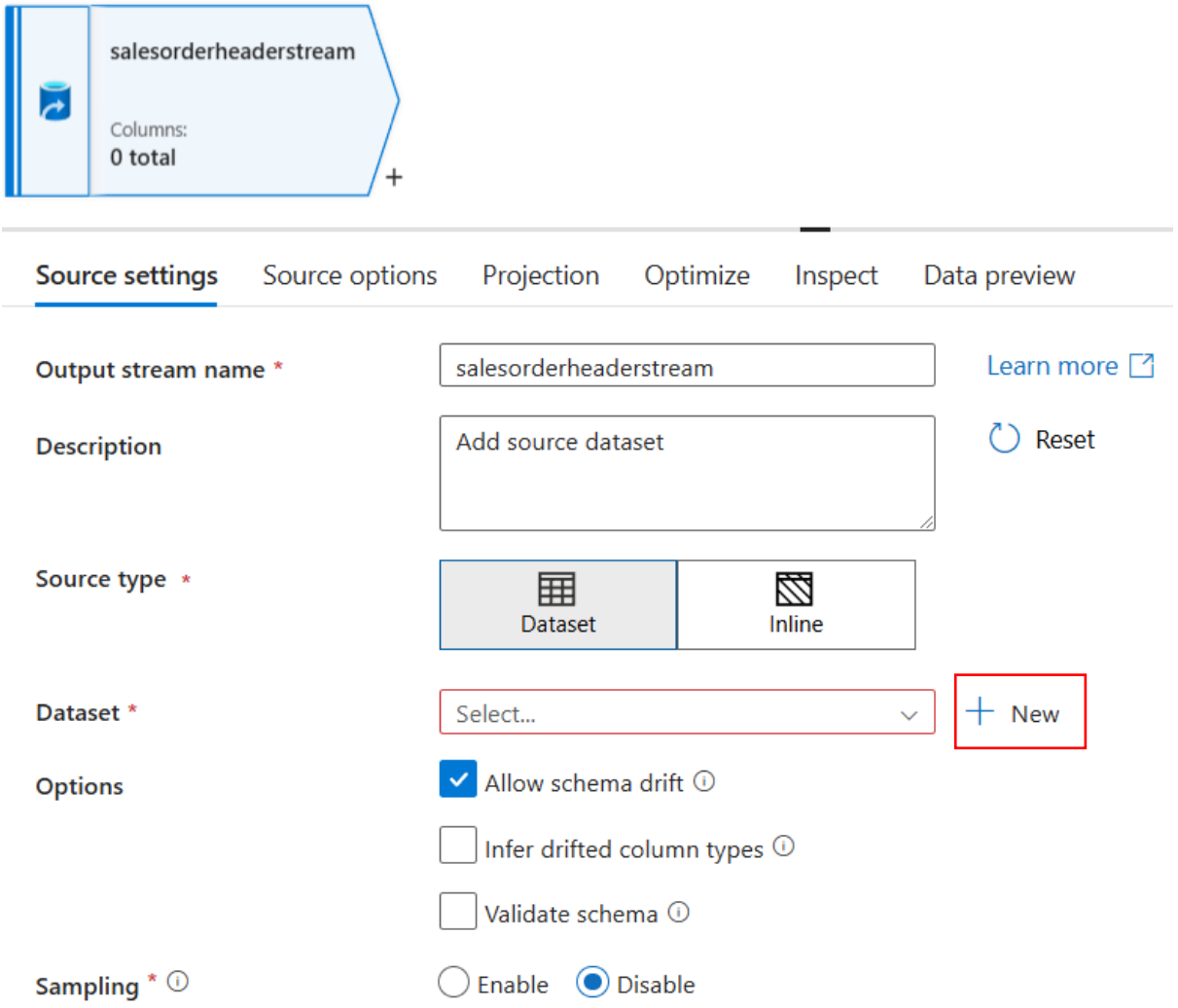
6. So, to create a mapping data flow in Azure Data Factory, go to the author tab and choose data flows then click on new data flow to create one.



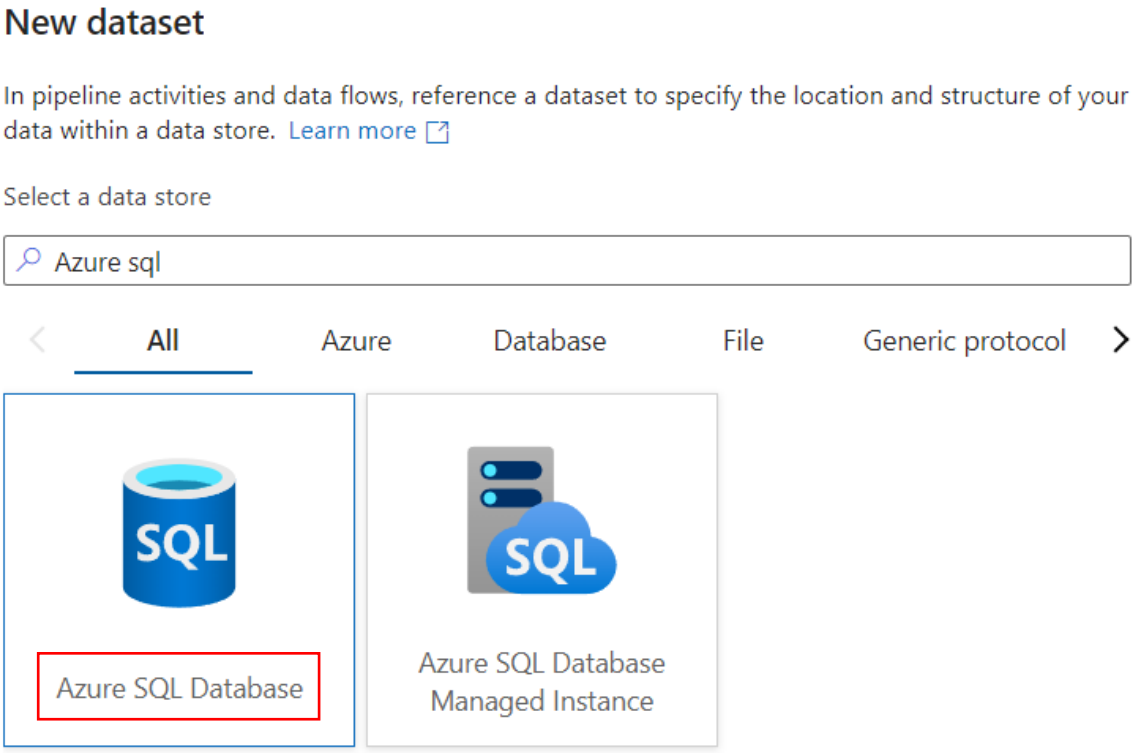
7. You'll be on the canvas where you can add a source. Directly click on it to add a source. Also, you can change the name of your data flow using the properties tab.



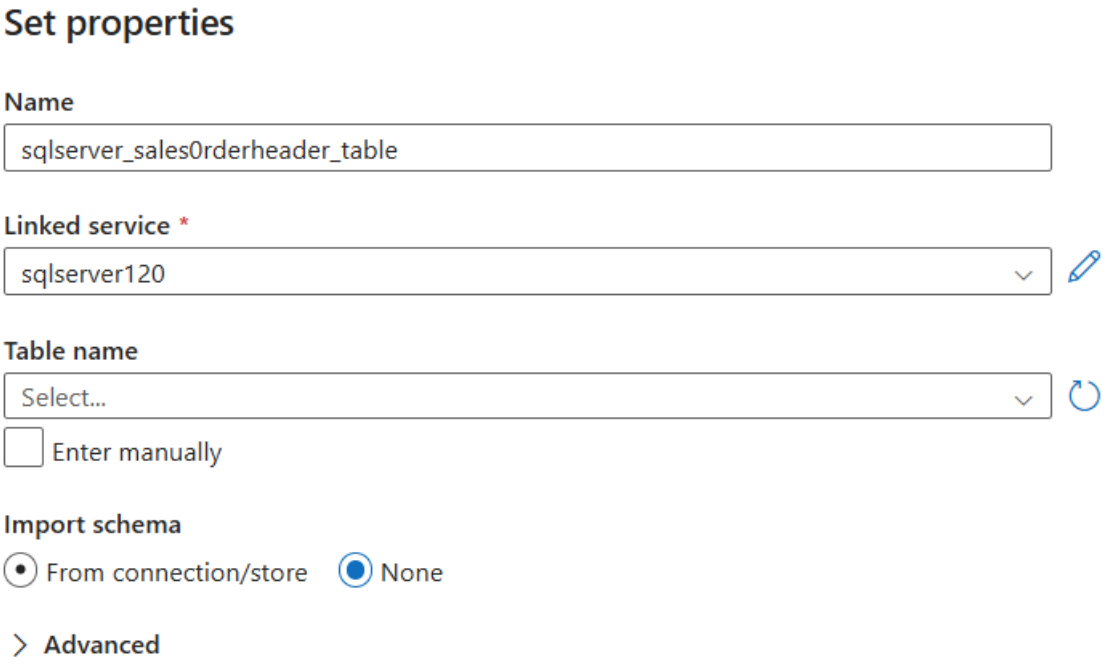
8. Here we need to choose the source. So, to create a fact table, our data comes from two tables: sales order detail and sales order header table. So, we need to make two sources.
9. The first source will be for the sales order header and the second for the sales order detail table.
10. In the source settings we will change the name of the output stream then we have to create a new dataset.



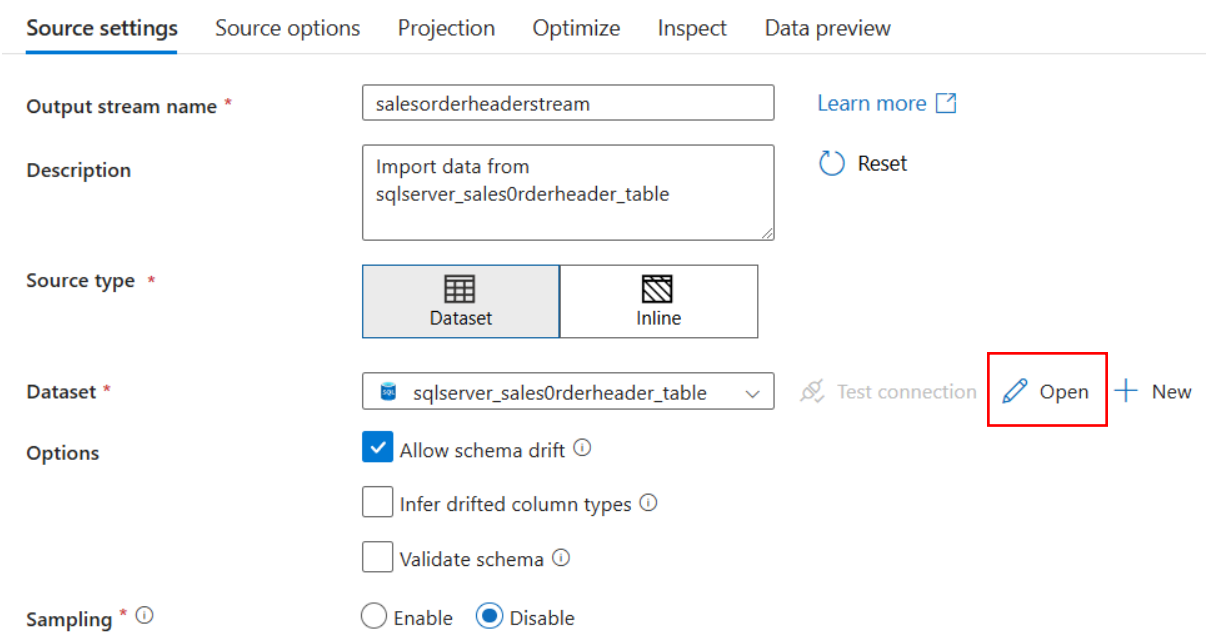
11. Then click on new to create a new dataset choose Azure SQL database.



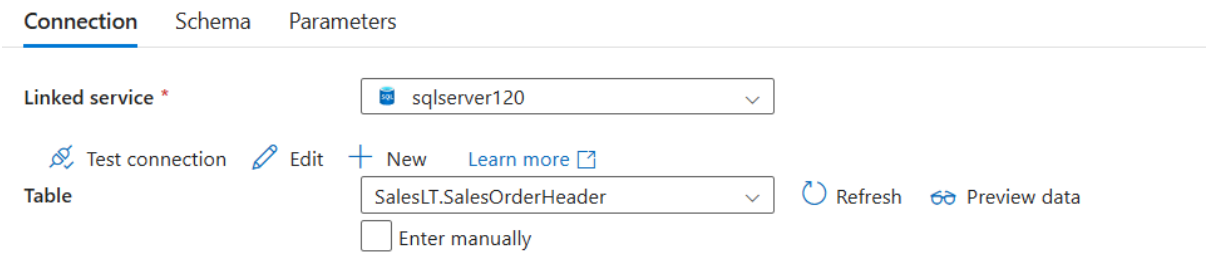
12. Then choose the same settings which you can see below. Also, you have to create a new linked service for SQL Database.



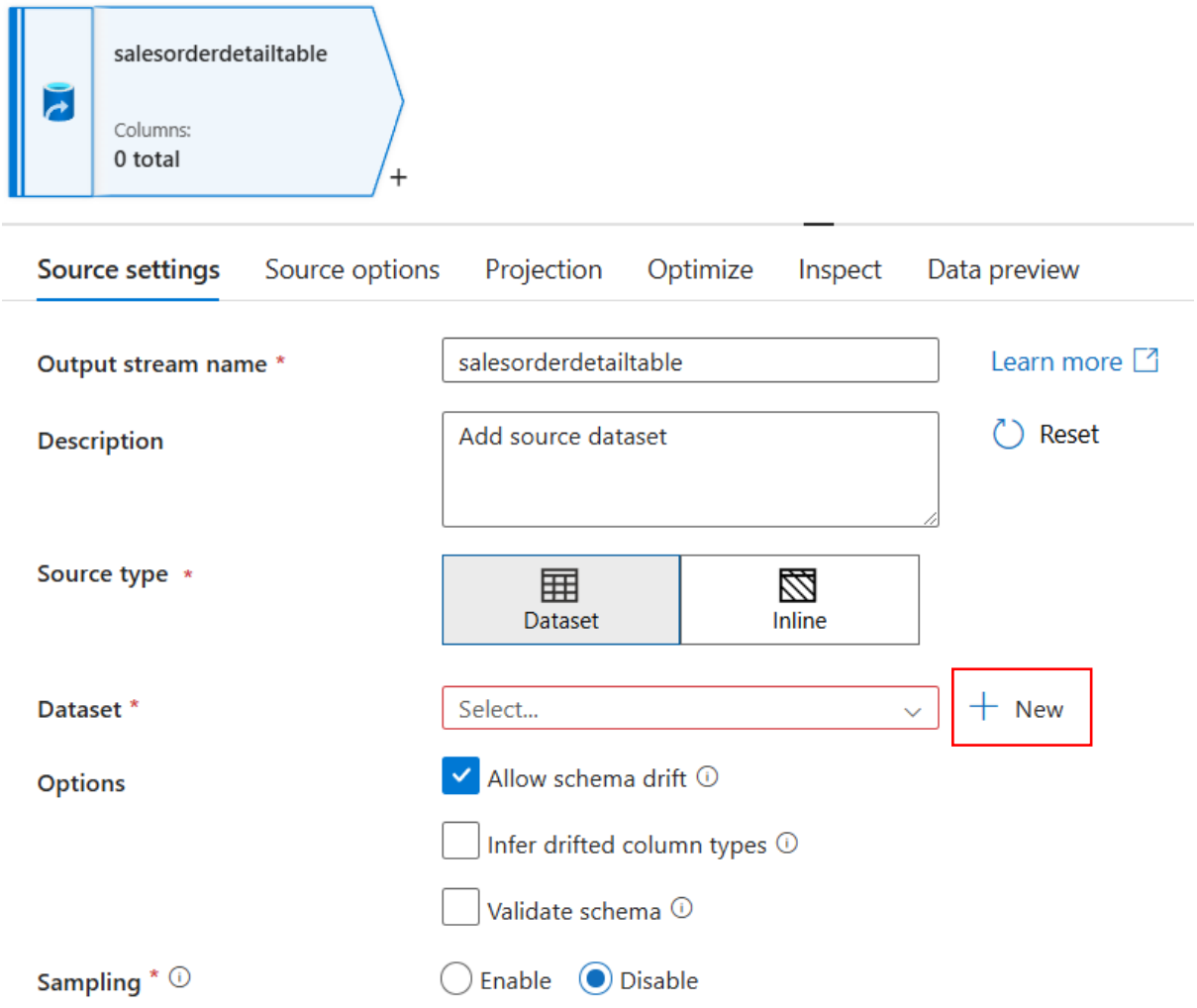
13. Once the connection is created, you will see it in the dataset section, open it.



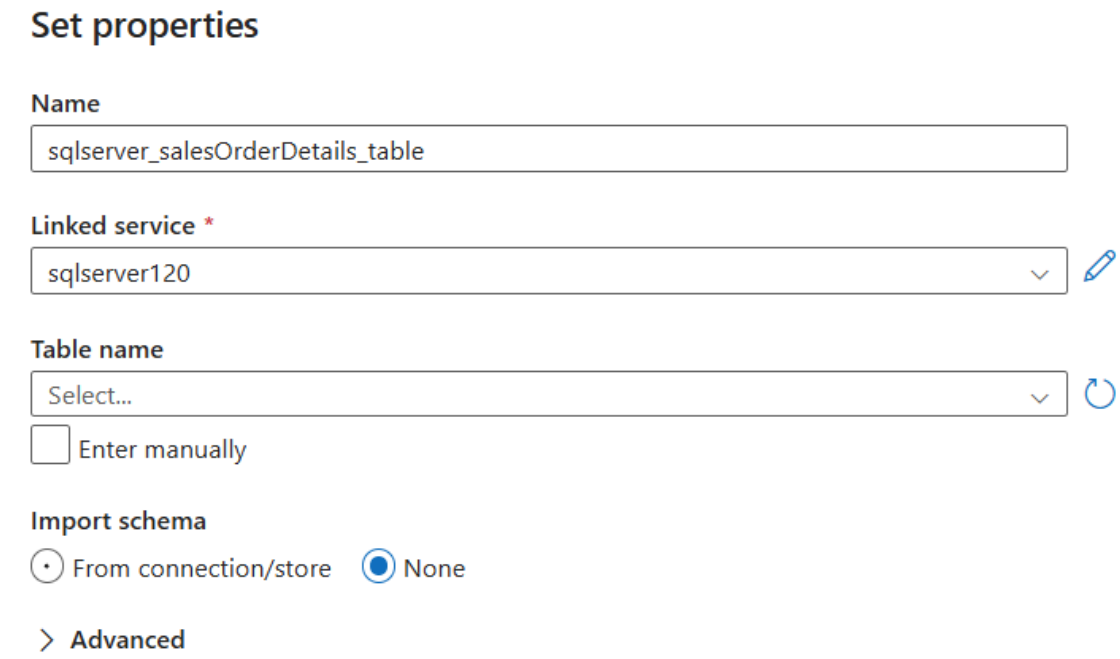
14. Choose the sales **order header table**, go to **Schema**, and click on **Import Schema**.



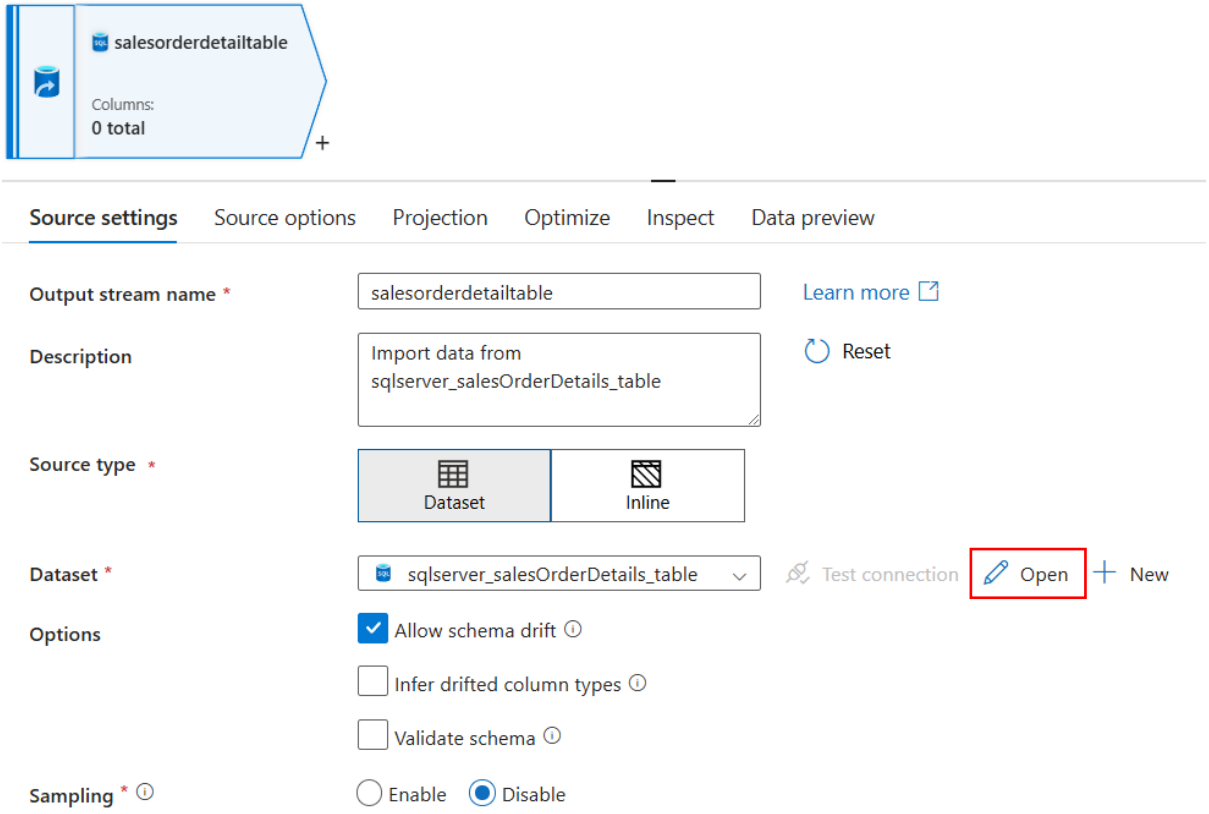
15. Then we will create another source for the sales order detail table and choose to create a new dataset.



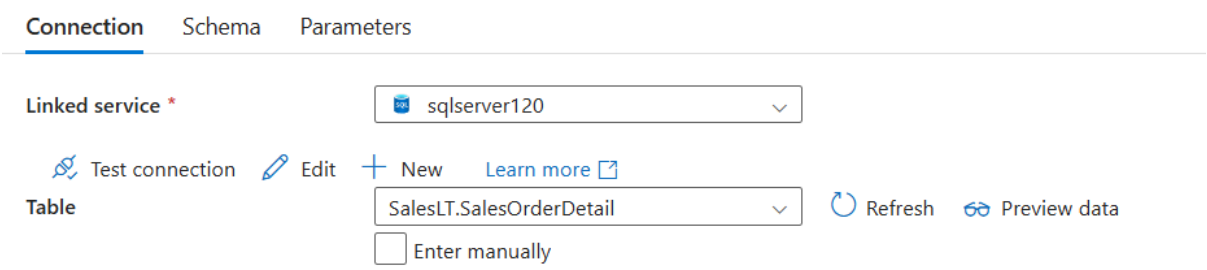
16. Here, give a name to your dataset, choose the linked service, and click Ok to create it.



17. Once it is created you will see it in the dataset section click on open.

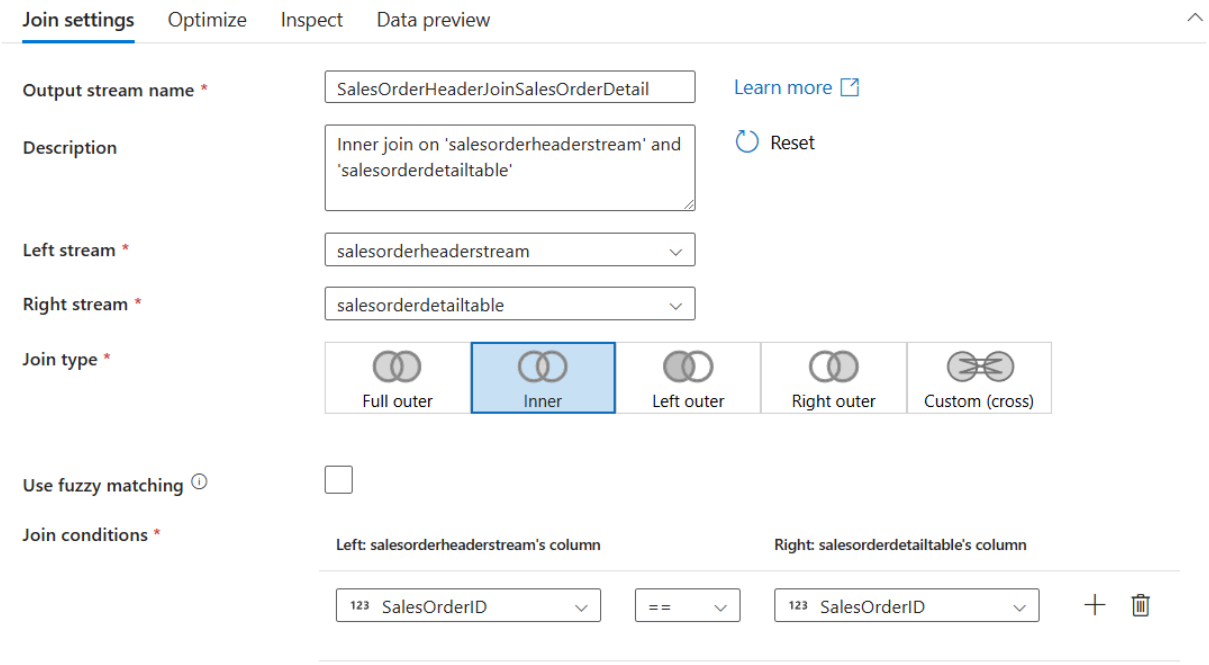


18. Choose the **sales order detail table** go to **Schema**, and click on **Import Schema**.

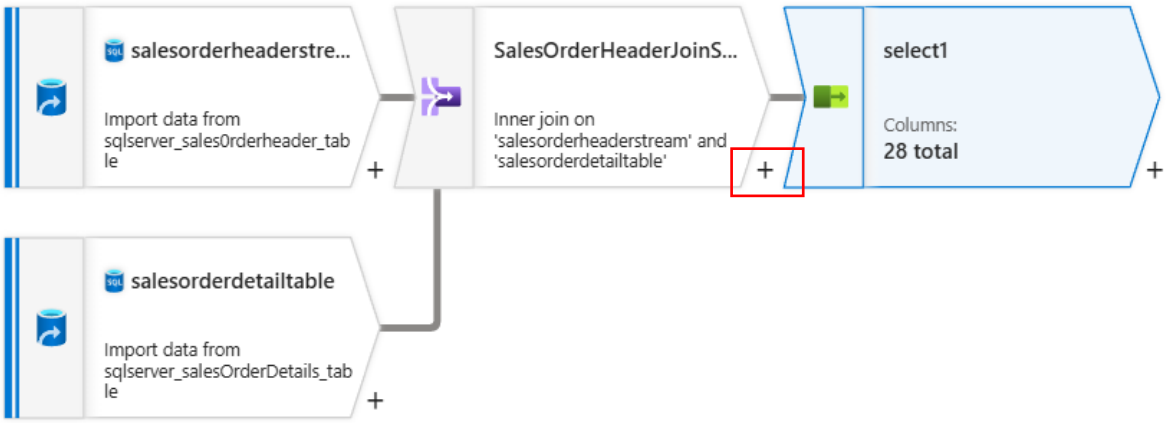


19. Then we need to perform the join between the sales order header and sales order detail table. Click on the plus icon and choose the join.

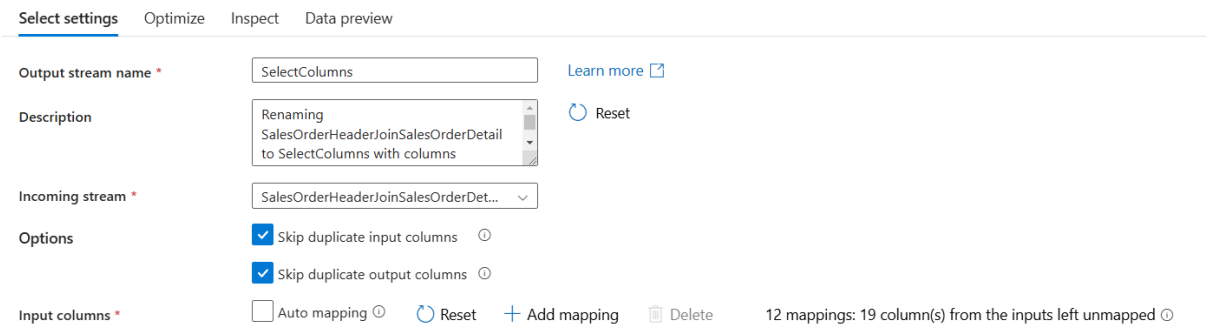
20. Then choose the same JOIN settings as shown below. Choose the right stream as sales order detail and for join type select Inner join.

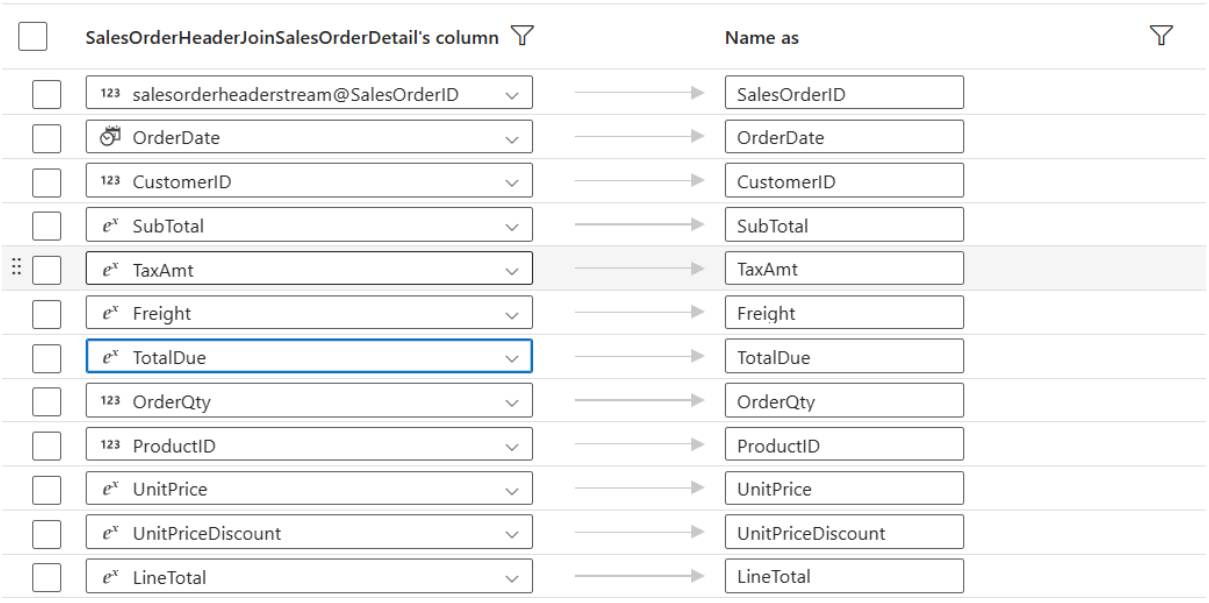


21. Then we will click on the plus icon from our join and from the schema modifier choose the **Select** function to select the columns of our choice.

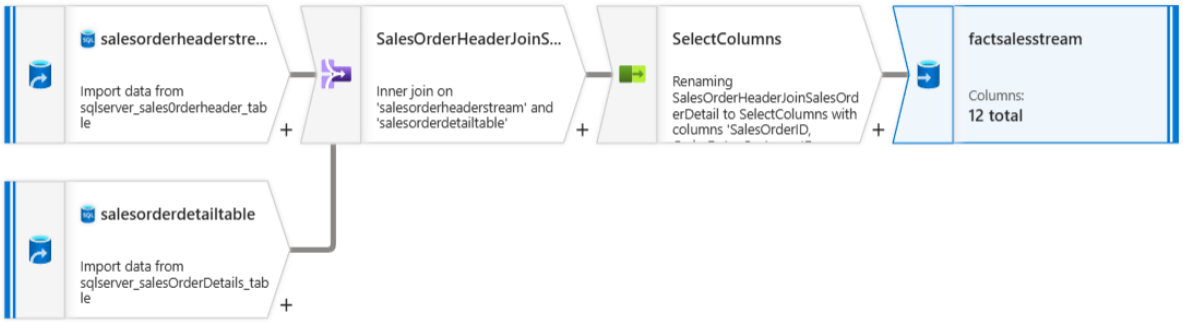


22. Then what we need to do is delete the columns that are not needed. You can make use of the script and remove the columns.

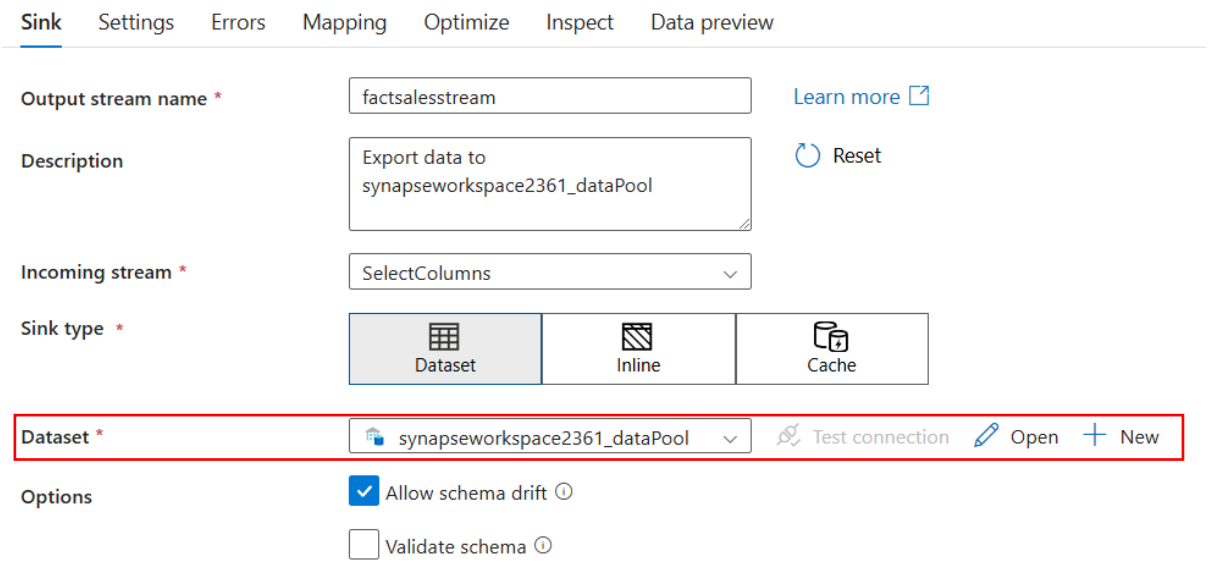




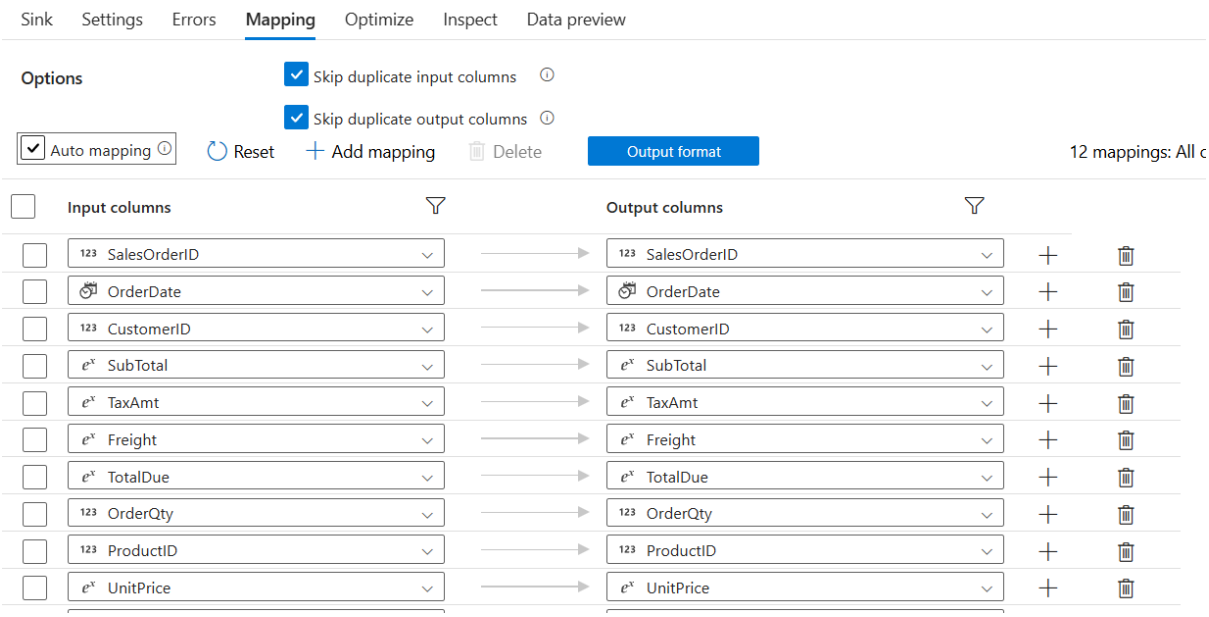
23. Now choose Sink or the destination from the select column area. Click on the plus icon from the select column function and choose the sink.



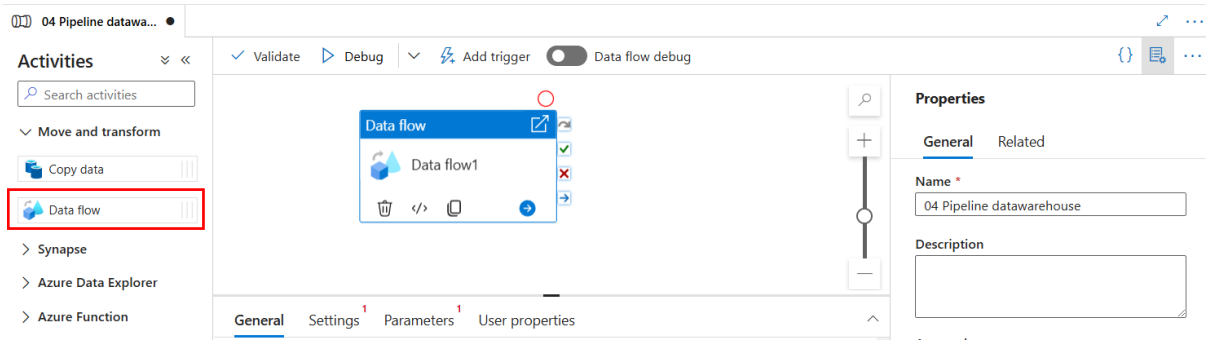
24. For the sink give it a name and, in the dataset, click on new to create a new linked service for your dedicated SQL Pool and if you already have one then you can choose it.
25. After that click on Open to go inside the dataset and choose your fact sales table.



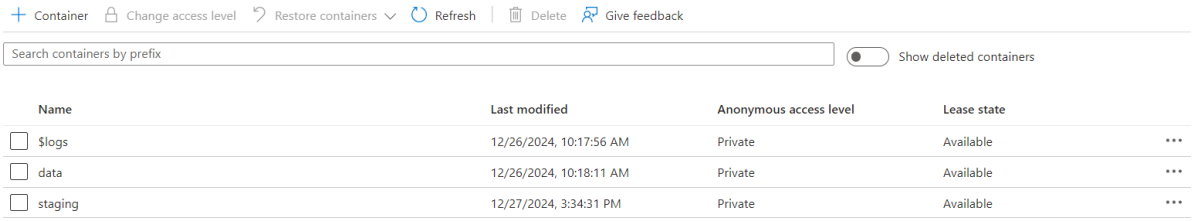
26. In the end inside your sink, go to mapping and disable auto mapping to check the mappings manually.



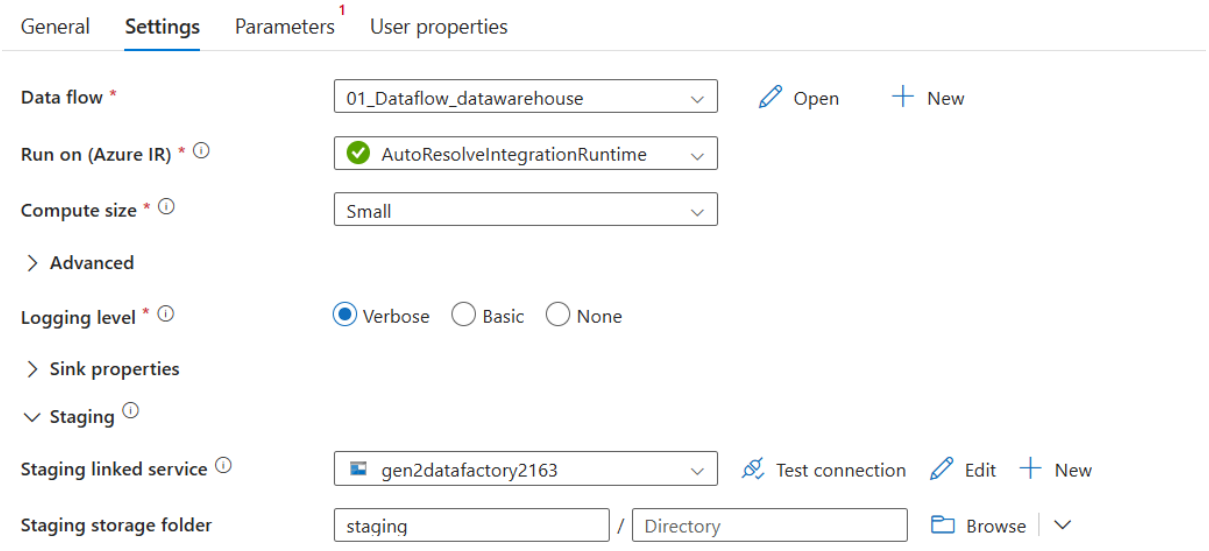
27. We have created a mapping data flow which has the visual representation of creating our fact table. How do we run mapping data flow?
28. For that we need to create a pipeline. So, we will go to move and transform the area from here we will choose Data flow.

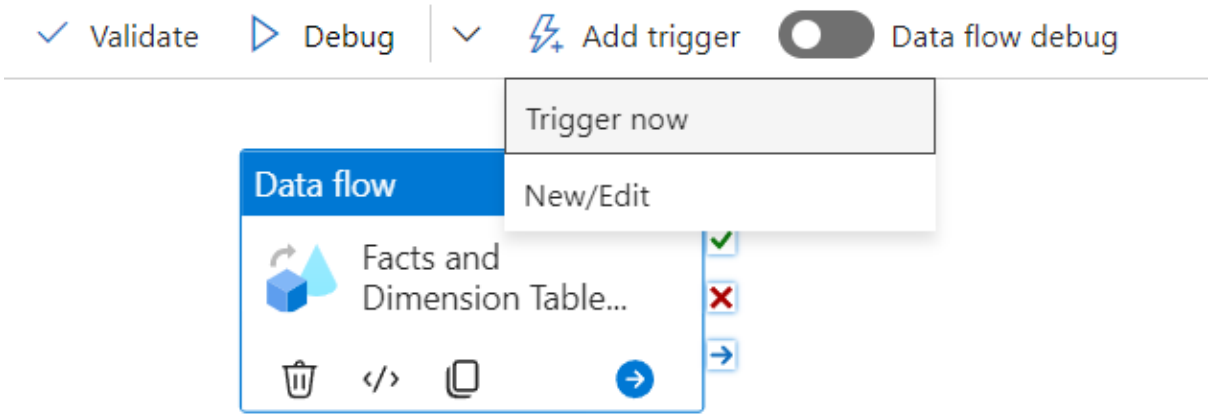


29. Here in the setting, you need to choose the same settings as shown below. First, choose your data flow name and choose a Staging folder.
30. So, for staging you have to go to the storage account and create a new container with name staging this container will be used as a staging container and it will hold the temporary data in it.

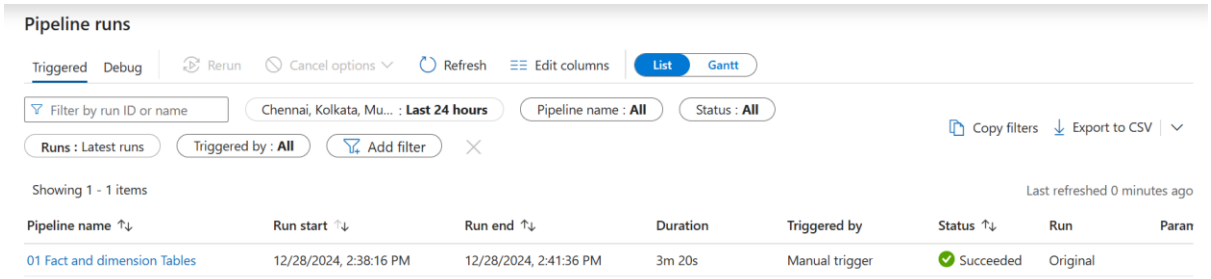


31. As you can see below, we have chosen the sating linked service which is our data lake and from it, we have the staging folder. Then publish your changes and trigger the pipeline.





32. The duration of the pipeline will take around 3-4 minutes. This is because an Apache Spark cluster will be created, the data flow will run, the pipeline will run, and, in the end, the Apache Spark cluster will be deleted because it runs for a temporary period.



33. After the pipeline run is successful, you can check the data in your table.