Sri Lanka Institute of Information Technology

Data Warehousing and Business Intelligence - IT3021

B.Sc. (Hons) in Information Technology

Data Science Specialization

2025

DWBI Assignment 02

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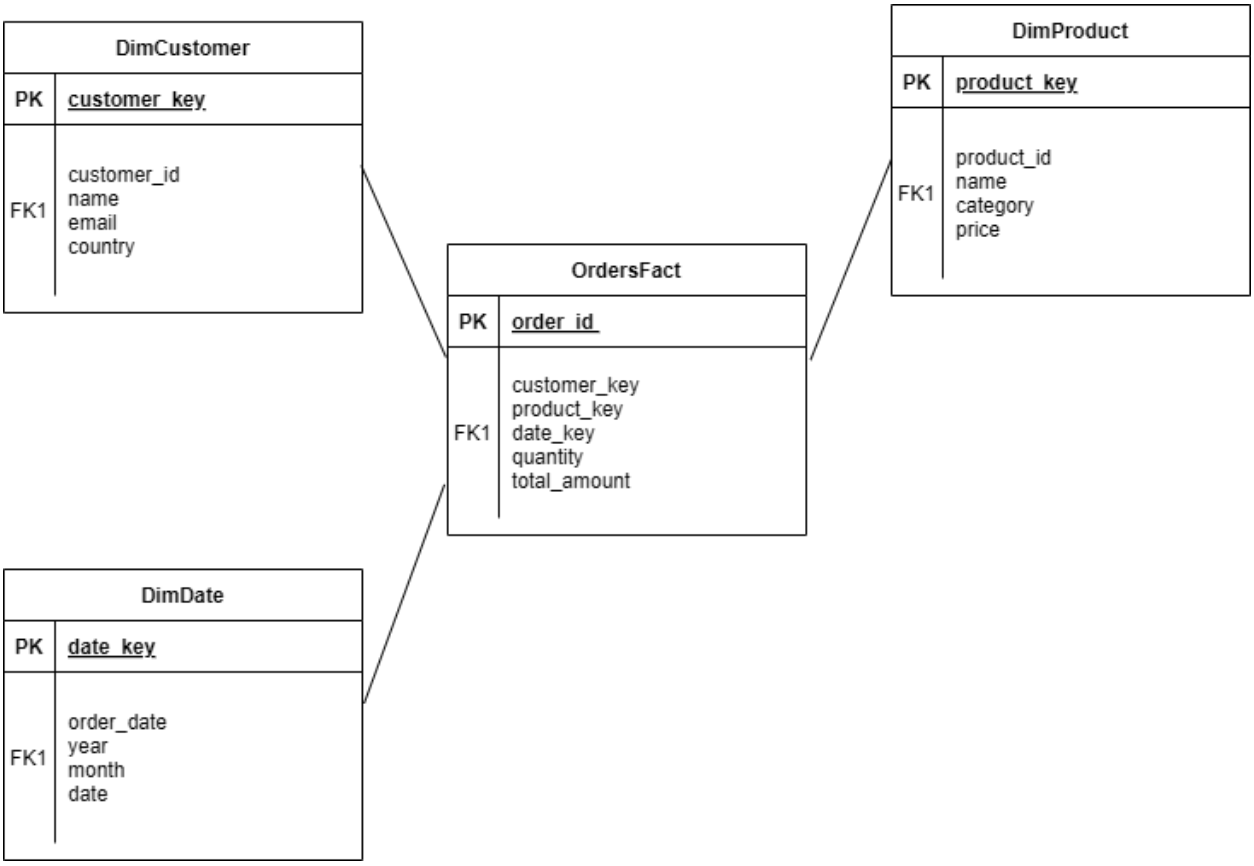
Step 1: Data source for the assignment 2



The core entities of the data warehouse include Customers, Orders and Products. The key attributes for each entity are included in the ER diagram above. The primary keys (customer_id in Customers, order_id in Orders, product_id in Products) are marked with "PK". The foreign keys establishing relationships are identified with "FK1": The lines connecting the tables visually represent the relationships such as”

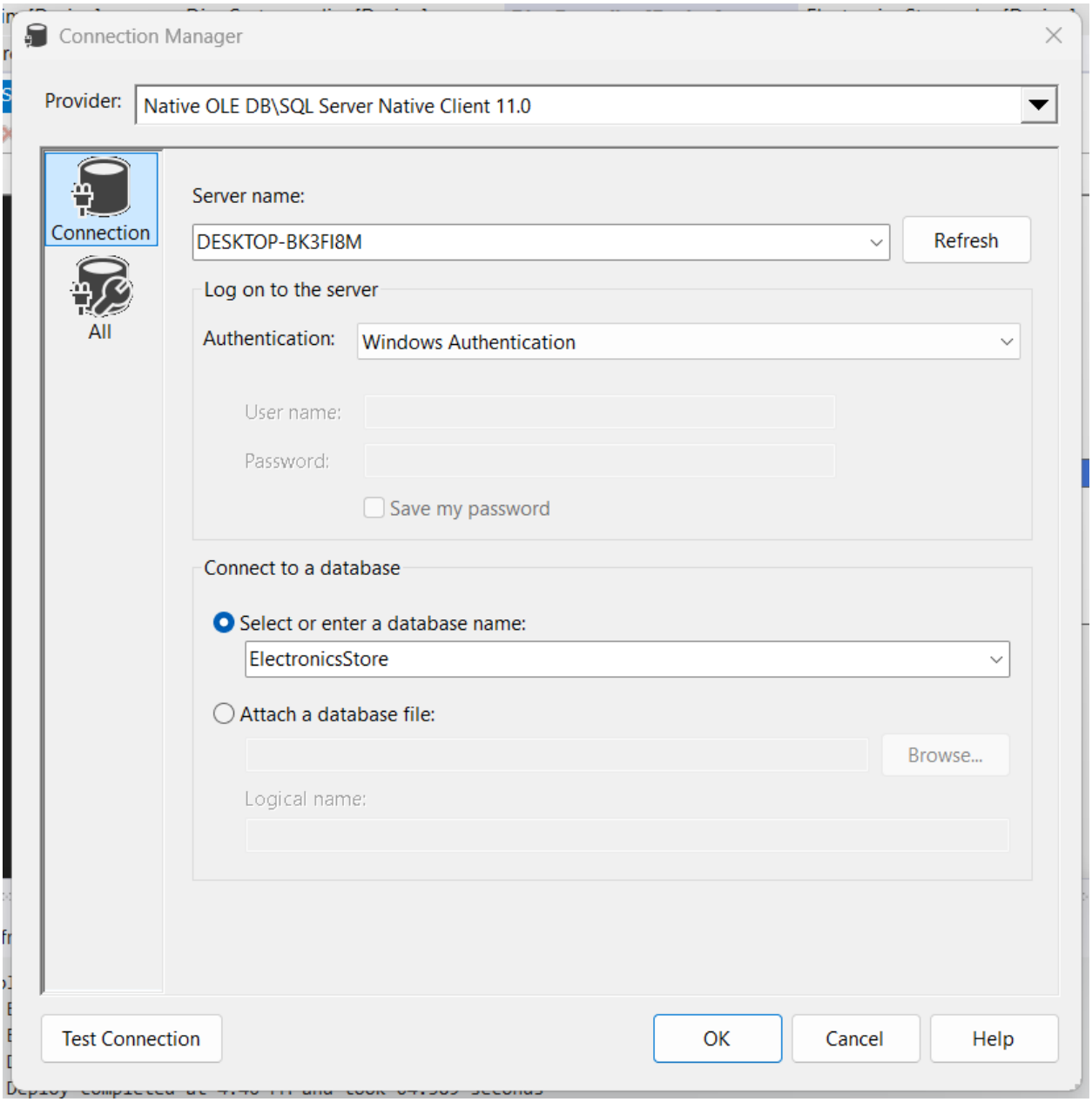
- A customer can have many orders (one-to-many from Customers to Orders).
- A product can be on many orders (one-to-many from Products to Orders).

Customer and product data are stored in CSV files while order data is stored in an SQL table in the data warehouse used.

Step 2: SSAS Cube implementation

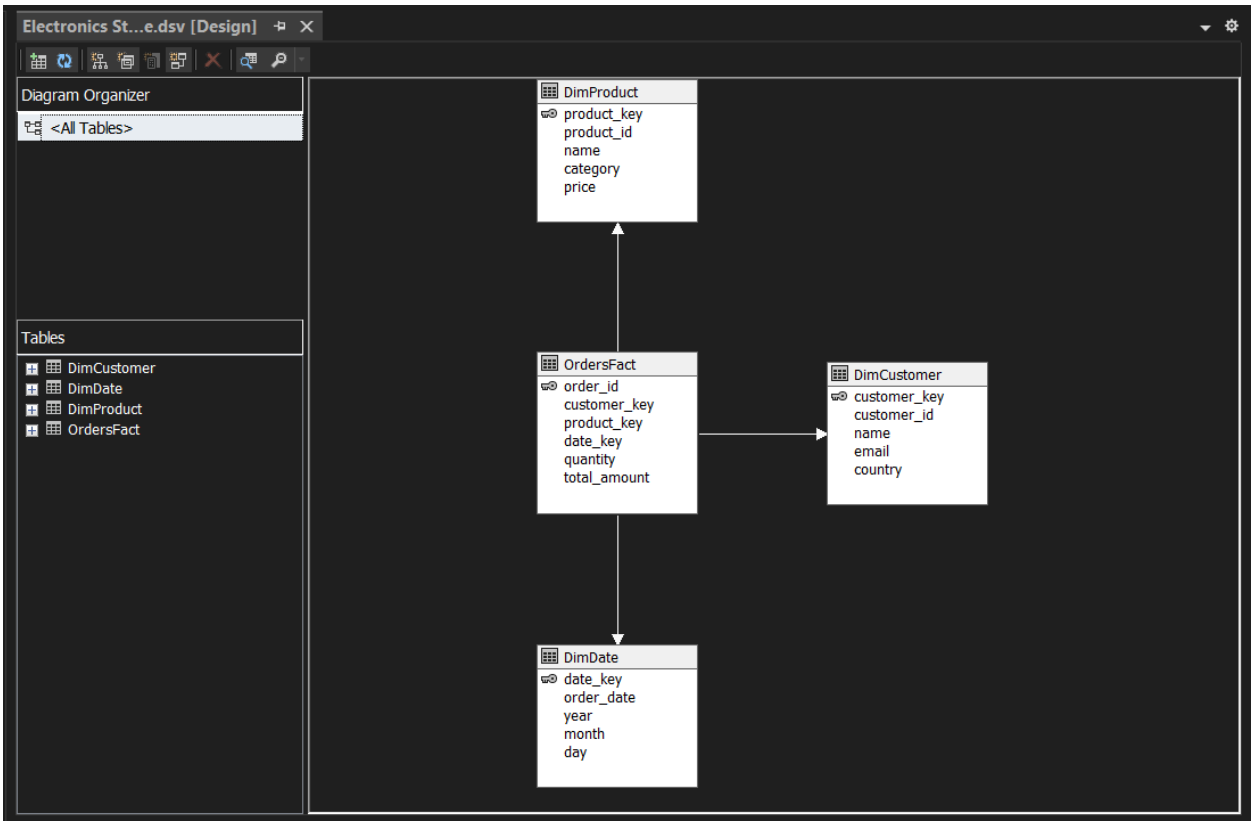
A new “Analysis Services Multidimensional and Data Mining Project” needs to be created on Visual Studio.

A new Data Source connection is added with the following configs.

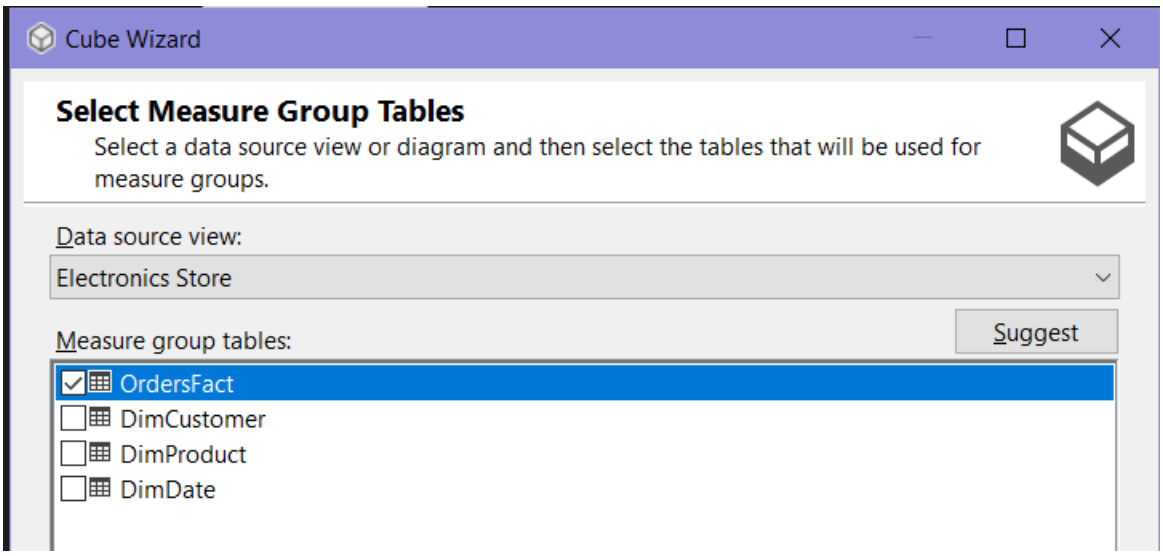


A new Data Source Views (ElectronicsStore.dsv) was then created selecting the previously created Data Source including the fact table(s) and dimension tables. The

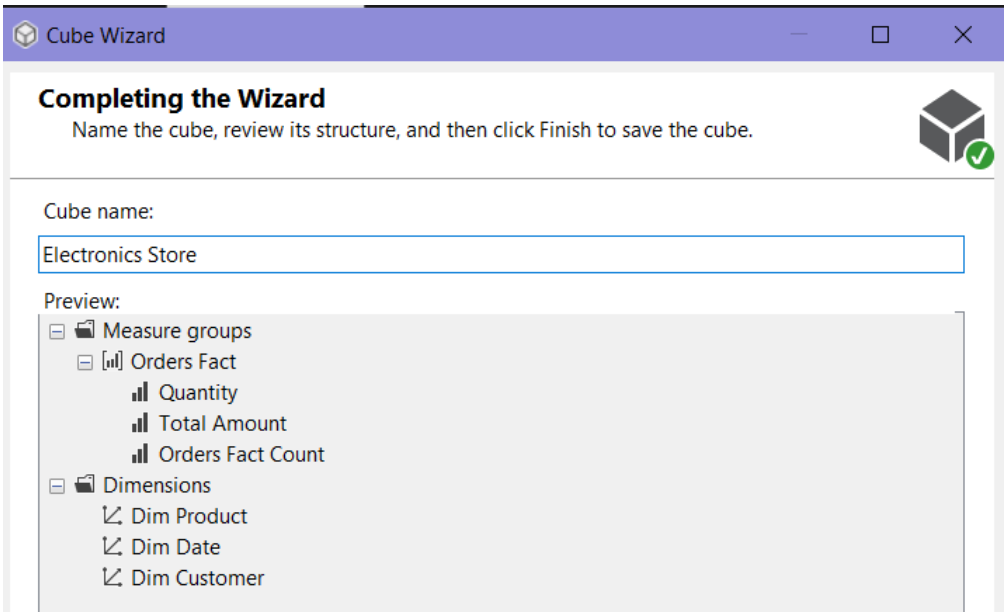
image below shows the tables and their relationships graphically in the DSV designer of the created .dsv file.



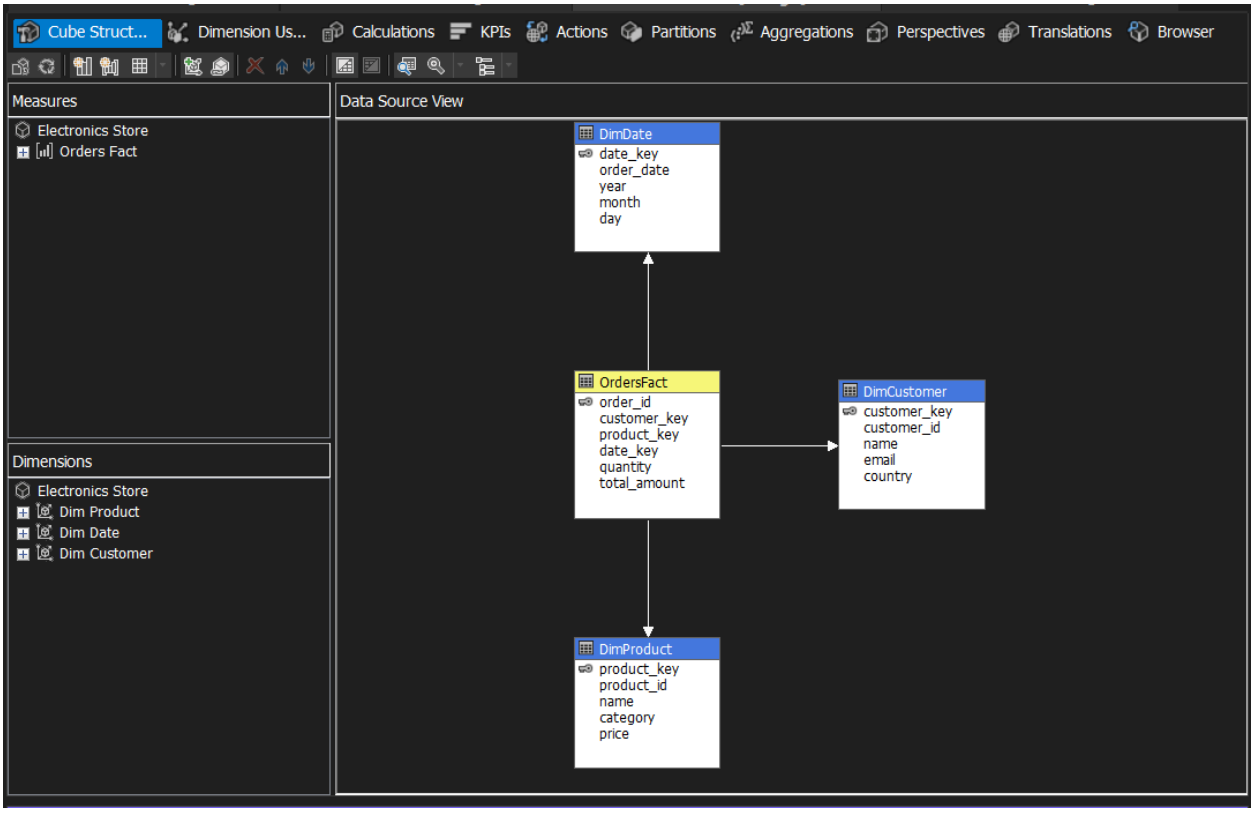
Next a cube was created by right clicking on the ‘Cubes’ folder in the Solution Explorer. Existing tables were used, and OrdersFact selected as the Measures Table.



Appropriate measures and dimensions were selected



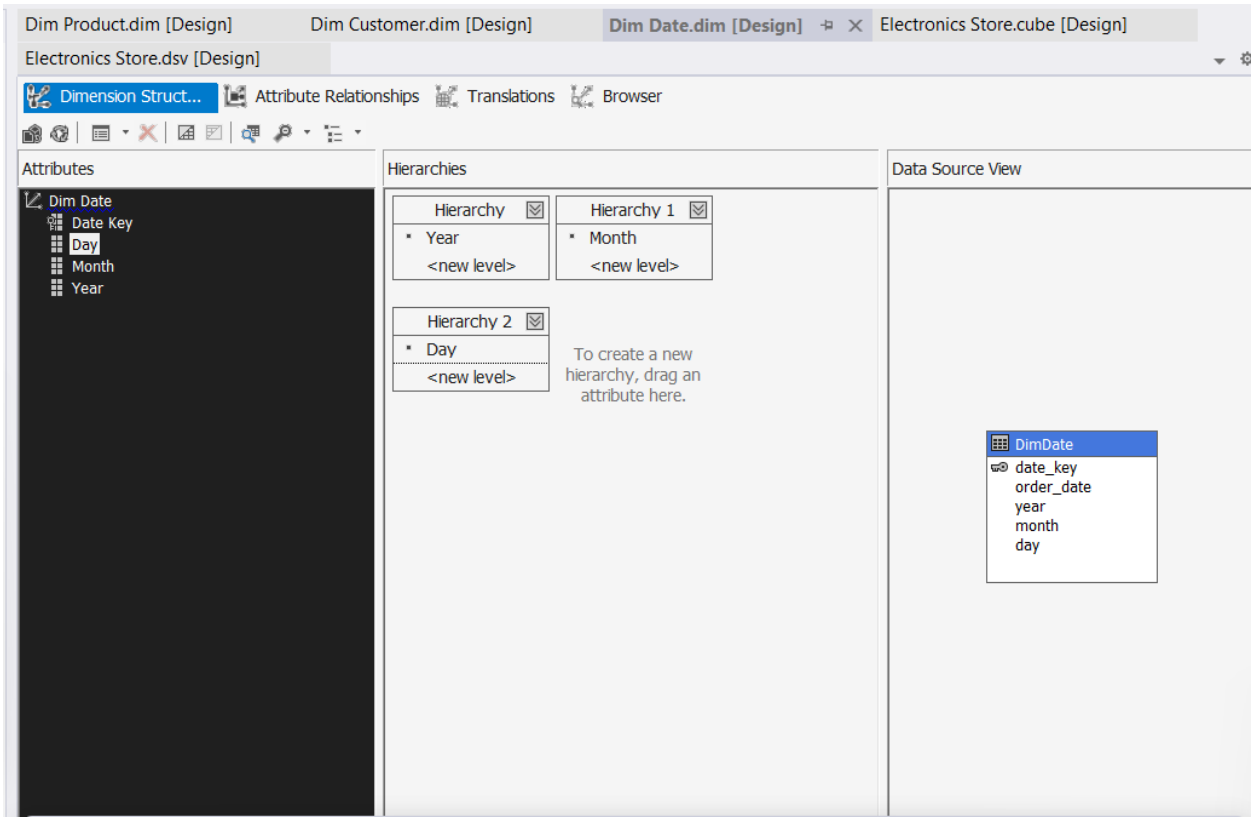
Structure of cube created



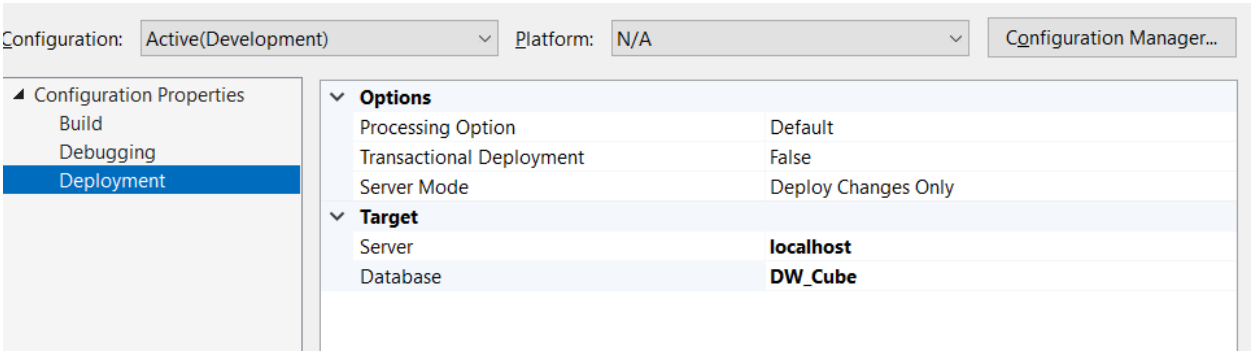
The "FormatString" property for each measure was set to the appropriate format (e.g., "Currency" for total amount and "Number" for quantity) using the "Properties" window.

A hierarchy was created for the dimension DimDate.

Attributes from the "Attributes" pane were dragged into the hierarchy levels in the desired order (e.g., `Year` -> `Month` -> `Day`).

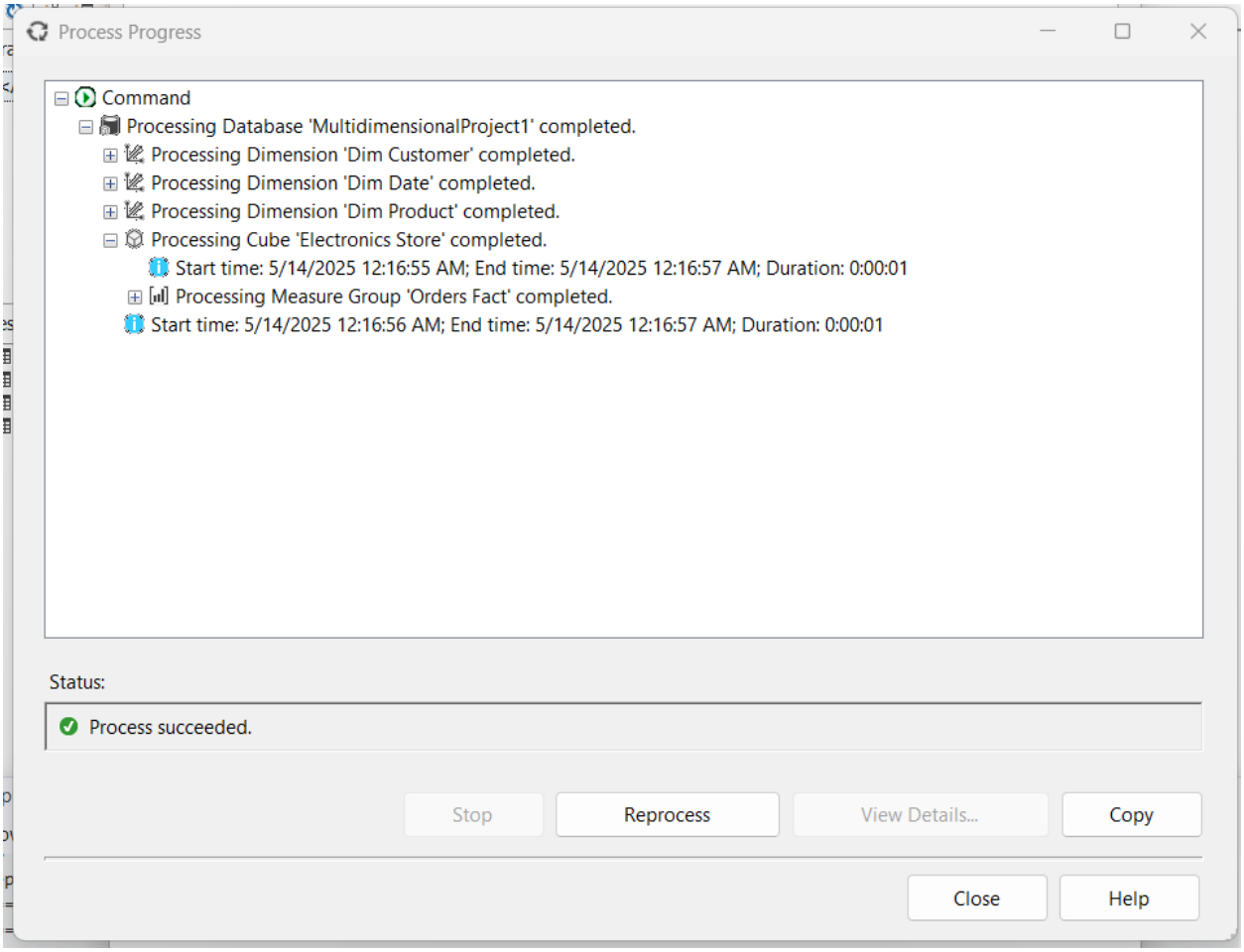


Next right click on the project in solution explorer >> properties >> deployment



Verify the configurations and deploy the cube. You will see a similar window once it is deployed.


Deployment Progress - DW_Cube
Server : localhost
Database : DW_Cube
Status:

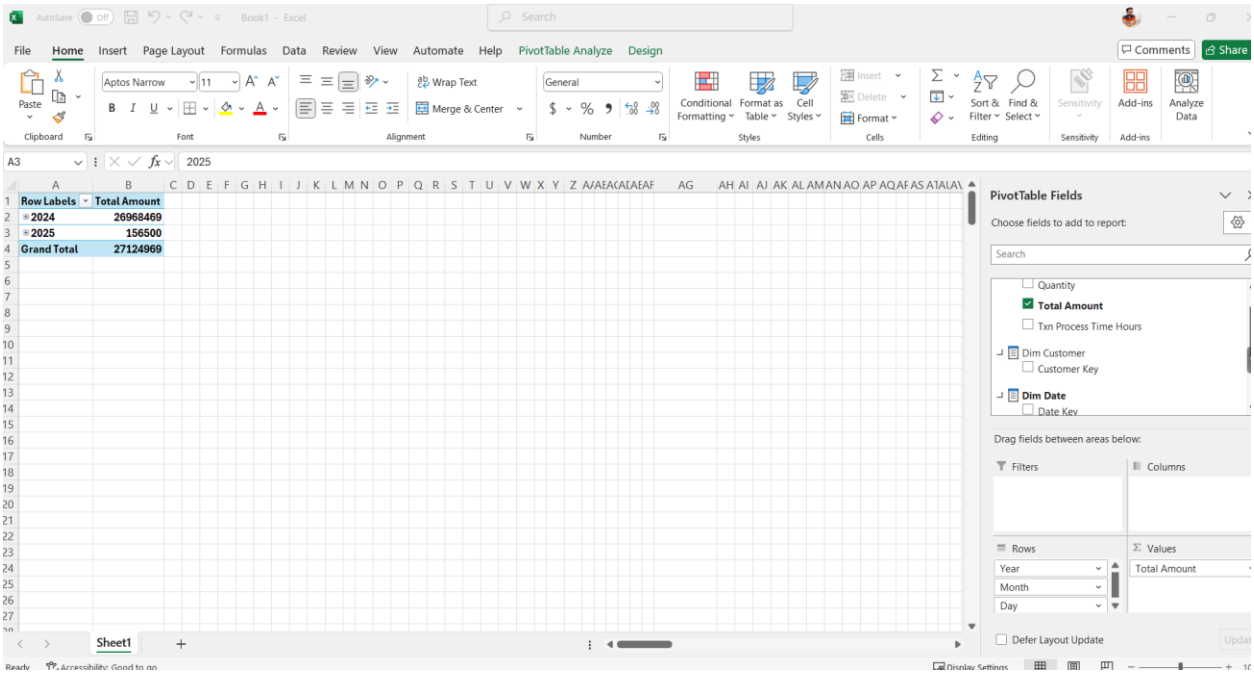

Process Progress
Command
Processing Database 'MultidimensionalProject1' completed.
Processing Dimension 'Dim Customer' completed.
Processing Dimension 'Dim Date' completed.
Processing Dimension 'Dim Product' completed.
Processing Cube 'Electronics Store' completed.
Start time: 5/14/2025 12:16:55 AM; End time: 5/14/2025 12:16:57 AM; Duration: 0:00:01
Processing Measure Group 'Orders Fact' completed.
Start time: 5/14/2025 12:16:56 AM; End time: 5/14/2025 12:16:57 AM; Duration: 0:00:01
Status:
Process succeeded.
Stop
Reprocess
View Details...
Copy
Close
Help

Step 3: Demonstration of OLAP Operations

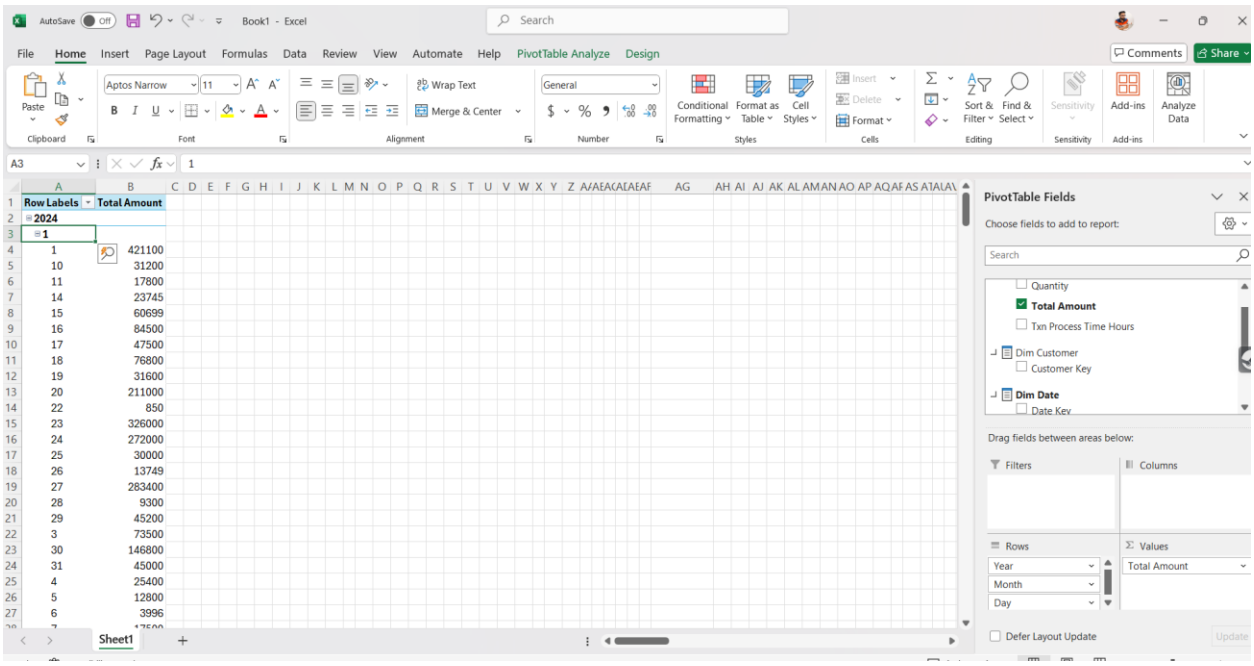
An excel workbook was created and data was exported using the following steps

- Data tab >> Get & Transform Data group >> Get Data >> Select "From Database" >> "From Analysis Services Database"
- The "Data Connection Wizard" will open.
- Connect to Database >> Enter the name of your SSAS server (localhost)
- Under "Log on credentials," choose how to authenticate with the SSAS server (usually "Use Windows Authentication").
- Click "Select a database or cube" >> Select the SSAS database containing your cube.
- Select your cube >> Next >> Save Data Connection File
- Click Finish to proceed
- Import Data >> "PivotChart" to create a visualization.

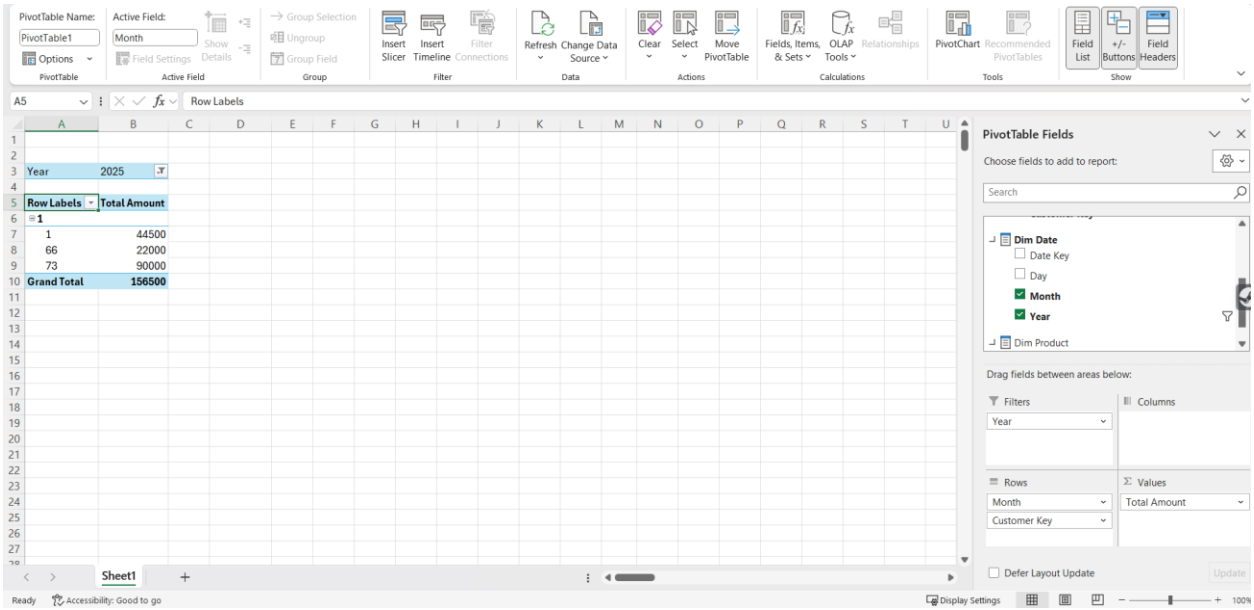
Roll up



Drilldown

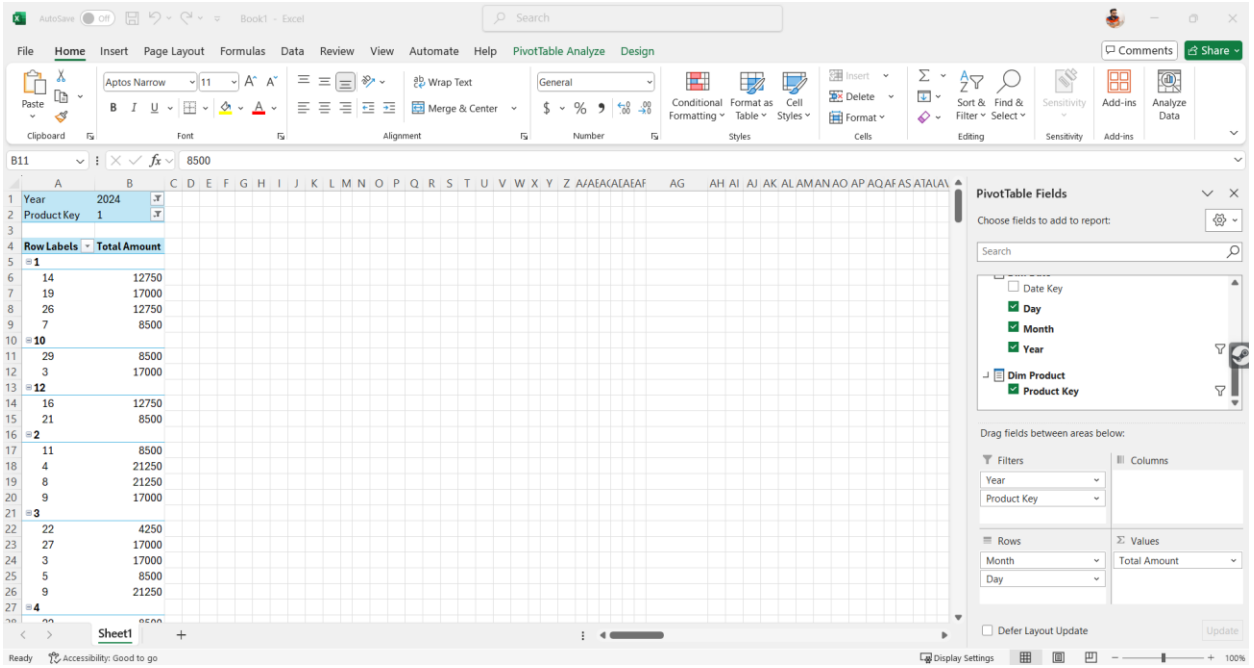


Slice – Year



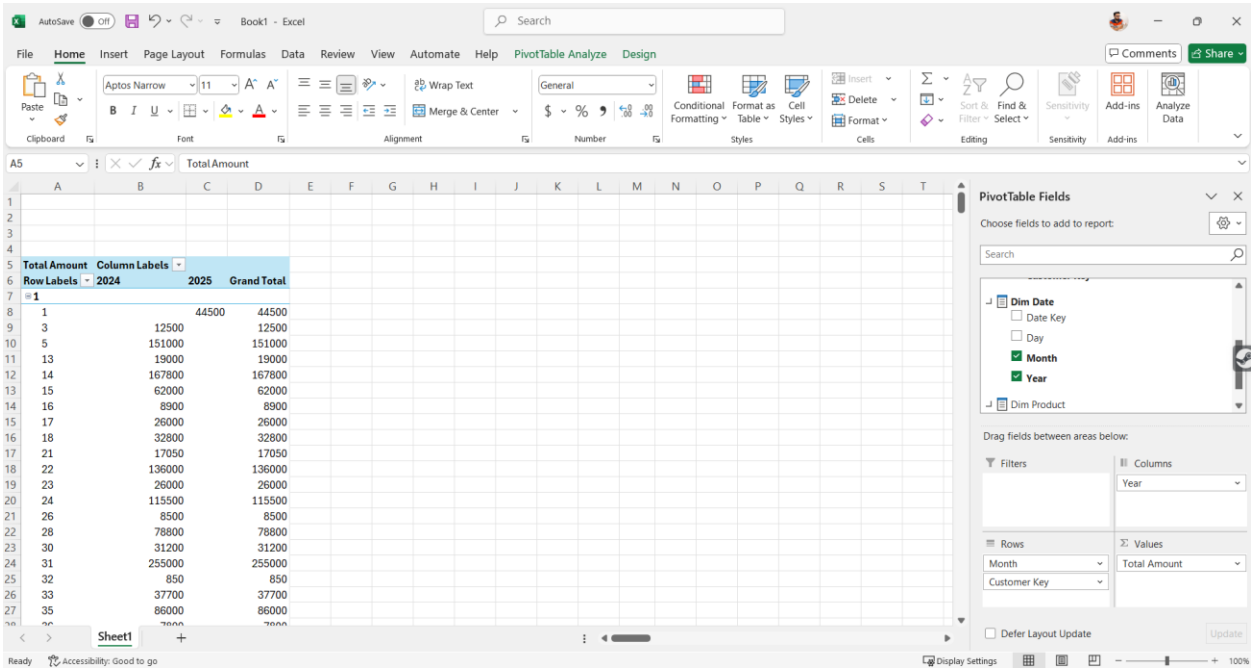
Year	2025
Row Labels	Total Amount
1	
1	44500
66	22000
73	90000
Grand Total	156500

Dice – Year,ProductKey



Year	2024
Product Key	1
Row Labels	Total Amount
1	
14	12750
19	17000
26	12750
7	8500
10	
29	8500
3	17000
12	
16	12750
21	8500
2	
11	8500
4	21250
8	21250
9	17000
3	
22	4250
27	17000
3	17000
5	8500
9	21250
4	

Pivot – Category Year

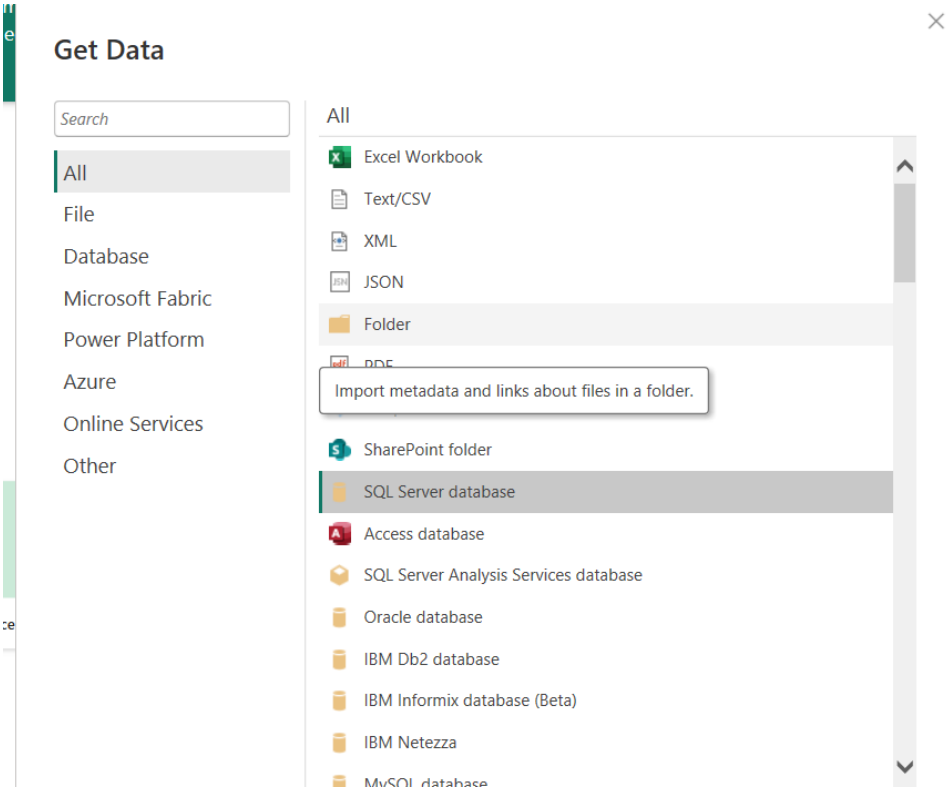


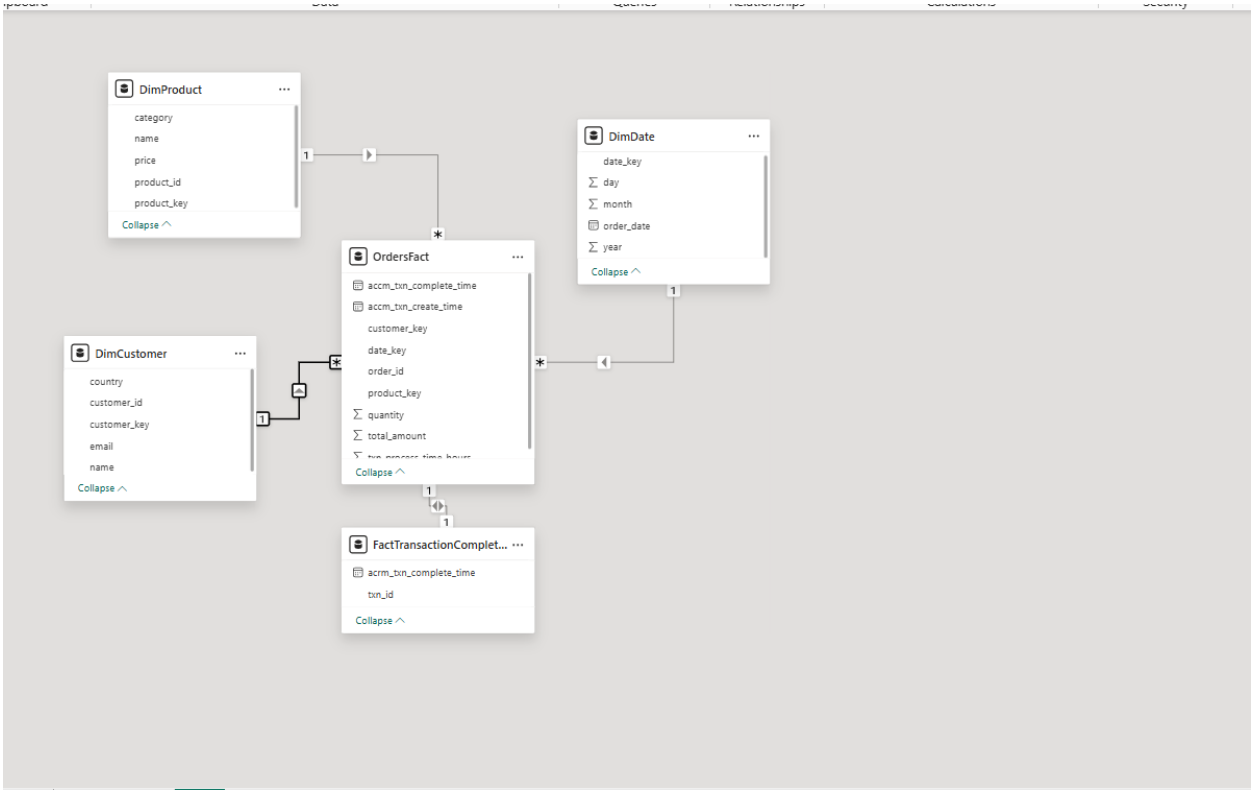
Total Amount	Column Labels		
Row Labels	2024	2025	Grand Total
1			
1		44500	44500
3	12500		12500
5	151000		151000
13	19000		19000
14	167800		167800
15	62000		62000
16	8900		8900
17	26000		26000
18	32800		32800
21	17050		17050
22	136000		136000
23	26000		26000
24	115500		115500
26	8500		8500
28	78800		78800
30	31200		31200
31	255000		255000
32	850		850
33	37700		37700
35	86000		86000

Step 4: PowerBI Reports

Open Power BI >> Get Data >> SQL Server Database >> Connect your Data Warehouse

Once the data is imported, view to verify the relationships

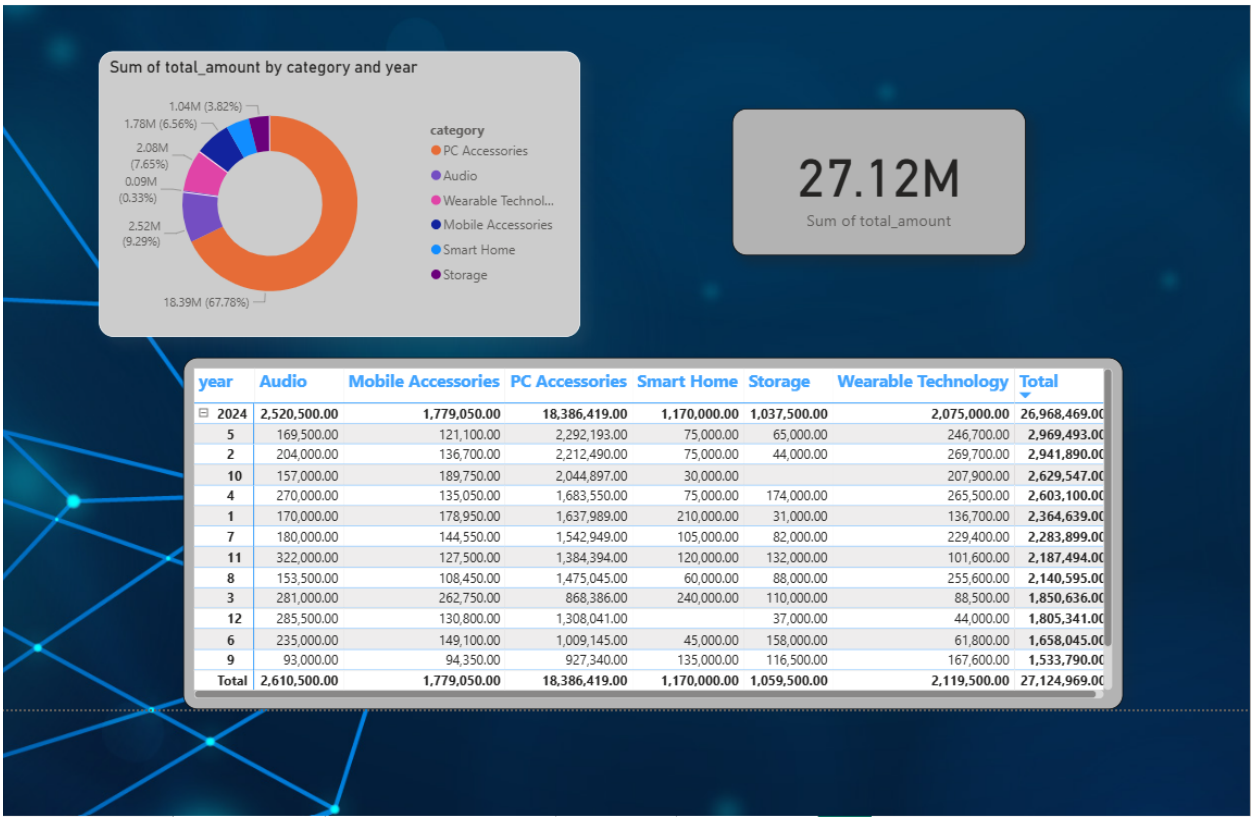




Report 1: Matrix Visual

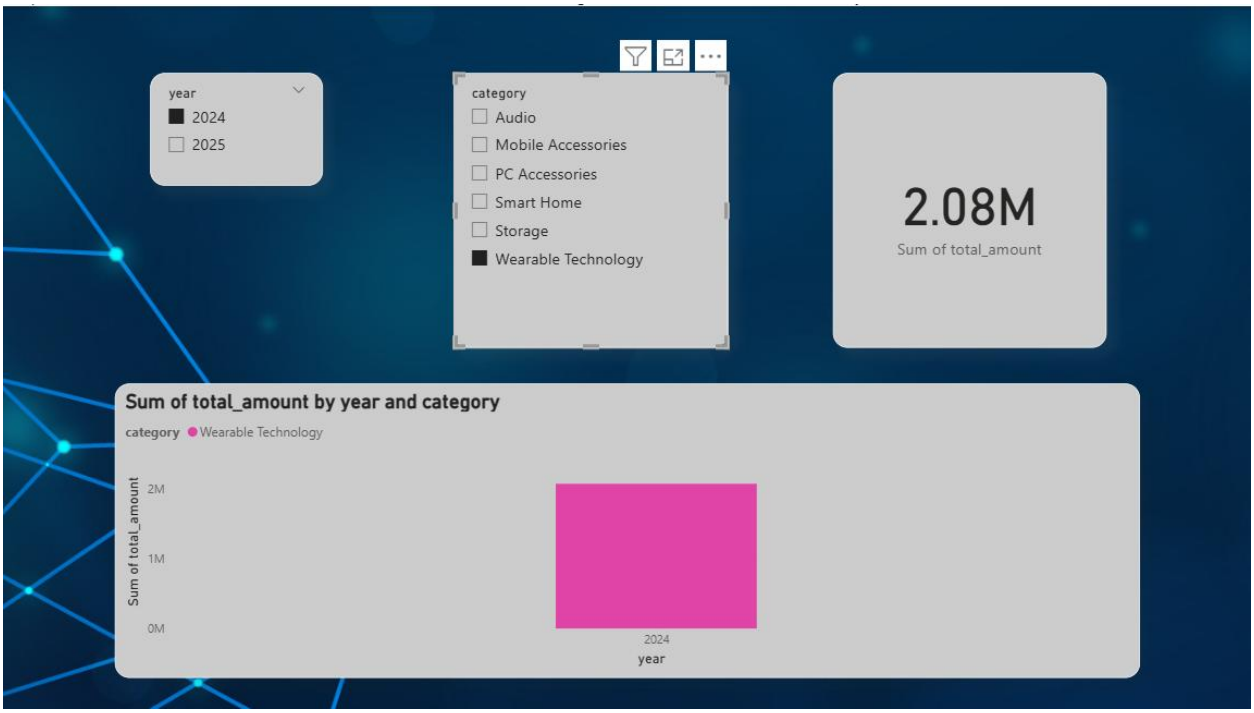
A matrix visual chart needs to be selected and added to the canvas.

The required data can then be selected from the left data panel.



year	Audio	Mobile Accessories	PC Accessories	Smart Home	Storage	Wearable Technology	Total
⊟ 2024	2,520,500.00	1,779,050.00	18,386,419.00	1,170,000.00	1,037,500.00	2,075,000.00	26,968,469.00
5	169,500.00	121,100.00	2,292,193.00	75,000.00	65,000.00	246,700.00	2,969,493.00
2	204,000.00	136,700.00	2,212,490.00	75,000.00	44,000.00	269,700.00	2,941,890.00
10	157,000.00	189,750.00	2,044,897.00	30,000.00		207,900.00	2,629,547.00
4	270,000.00	135,050.00	1,683,550.00	75,000.00	174,000.00	265,500.00	2,603,100.00
1	170,000.00	178,950.00	1,637,989.00	210,000.00	31,000.00	136,700.00	2,364,639.00
7	180,000.00	144,550.00	1,542,949.00	105,000.00	82,000.00	229,400.00	2,283,899.00
11	322,000.00	127,500.00	1,384,394.00	120,000.00	132,000.00	101,600.00	2,187,494.00
8	153,500.00	108,450.00	1,475,045.00	60,000.00	88,000.00	255,600.00	2,140,595.00
3	281,000.00	262,750.00	868,386.00	240,000.00	110,000.00	88,500.00	1,850,636.00
12	285,500.00	130,800.00	1,308,041.00		37,000.00	44,000.00	1,805,341.00
6	235,000.00	149,100.00	1,009,145.00	45,000.00	158,000.00	61,800.00	1,658,045.00
9	93,000.00	94,350.00	927,340.00	135,000.00	116,500.00	167,600.00	1,533,790.00
Total	2,610,500.00	1,779,050.00	18,386,419.00	1,170,000.00	1,059,500.00	2,119,500.00	27,124,969.00

Report 2: Slicer

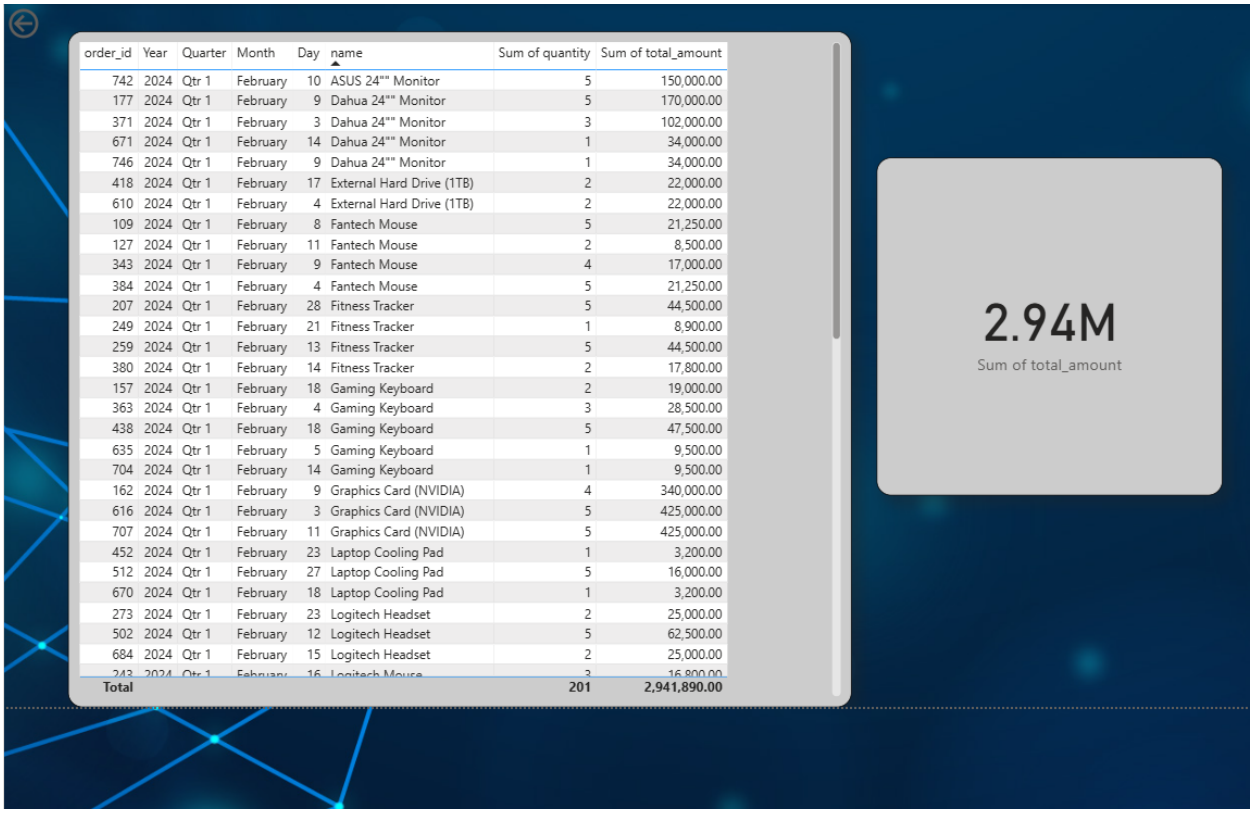


The 'category' slicer is included to show the scope of the product data. The slicer only displays in chart and card sum of total_amount 2024, Wearable technology . This is not a design error but reflects the data present in the data warehouse.

Report 3: Drill-down

The drill-down functionality was implemented using a hierarchical date structure (Year → Month → Day) in Power BI. A matrix visual displays aggregated sales totals at the yearly level. Proper date sorting was ensured through a month column, and the filters panel confirms unrestricted data exploration. This interactive feature enables stakeholders to seamlessly navigate from high-level annual trends to granular monthly details within the same visualization.

Report 4: Drill-through



order_id	Year	Quarter	Month	Day	name	Sum of quantity	Sum of total_amount
742	2024	Qtr 1	February	10	ASUS 24"" Monitor	5	150,000.00
177	2024	Qtr 1	February	9	Dahua 24"" Monitor	5	170,000.00
371	2024	Qtr 1	February	3	Dahua 24"" Monitor	3	102,000.00
671	2024	Qtr 1	February	14	Dahua 24"" Monitor	1	34,000.00
746	2024	Qtr 1	February	9	Dahua 24"" Monitor	1	34,000.00
418	2024	Qtr 1	February	17	External Hard Drive (1TB)	2	22,000.00
610	2024	Qtr 1	February	4	External Hard Drive (1TB)	2	22,000.00
109	2024	Qtr 1	February	8	Fantech Mouse	5	21,250.00
127	2024	Qtr 1	February	11	Fantech Mouse	2	8,500.00
343	2024	Qtr 1	February	9	Fantech Mouse	4	17,000.00
384	2024	Qtr 1	February	4	Fantech Mouse	5	21,250.00
207	2024	Qtr 1	February	28	Fitness Tracker	5	44,500.00
249	2024	Qtr 1	February	21	Fitness Tracker	1	8,900.00
259	2024	Qtr 1	February	13	Fitness Tracker	5	44,500.00
380	2024	Qtr 1	February	14	Fitness Tracker	2	17,800.00
157	2024	Qtr 1	February	18	Gaming Keyboard	2	19,000.00
363	2024	Qtr 1	February	4	Gaming Keyboard	3	28,500.00
438	2024	Qtr 1	February	18	Gaming Keyboard	5	47,500.00
635	2024	Qtr 1	February	5	Gaming Keyboard	1	9,500.00
704	2024	Qtr 1	February	14	Gaming Keyboard	1	9,500.00
162	2024	Qtr 1	February	9	Graphics Card (NVIDIA)	4	340,000.00
616	2024	Qtr 1	February	3	Graphics Card (NVIDIA)	5	425,000.00
707	2024	Qtr 1	February	11	Graphics Card (NVIDIA)	5	425,000.00
452	2024	Qtr 1	February	23	Laptop Cooling Pad	1	3,200.00
512	2024	Qtr 1	February	27	Laptop Cooling Pad	5	16,000.00
670	2024	Qtr 1	February	18	Laptop Cooling Pad	1	3,200.00
273	2024	Qtr 1	February	23	Logitech Headset	2	25,000.00
502	2024	Qtr 1	February	12	Logitech Headset	5	62,500.00
684	2024	Qtr 1	February	15	Logitech Headset	2	25,000.00
243	2024	Qtr 1	February	16	Logitech Mouse	3	16,800.00
Total						**201**	**2,941,890.00**

This visual demonstrates a drill-through feature in Power BI, allowing users to navigate from a cascading slicers report page chart to a detailed order view. When a user right-clicks on a specific year (e.g., 2024) in the summary chart, they are redirected to the "Order Details" page, which shows a detailed table filtered for that year. This table includes fields like order_id, order_date, name (product name), quantity, and total_amount. The drill-through filter (Year) is applied on the detailed page to ensure only relevant records are shown, enhancing interactivity and enabling deeper data exploration.