BSc (Hons) in Information Technology
Specializing in Data Science

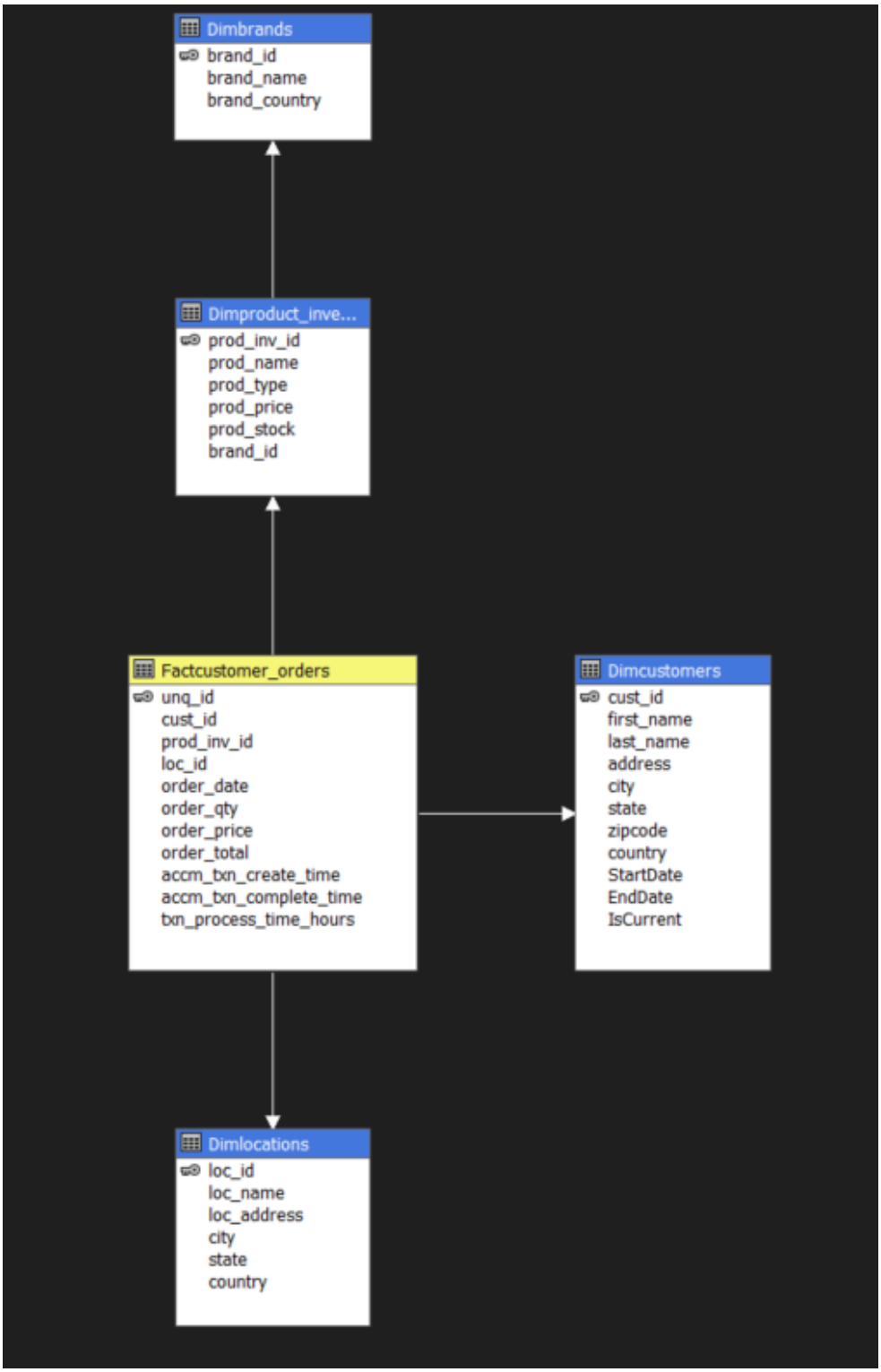
IT3021 – Data Warehousing and Business Intelligence
Year 3

Assignment 2 Semester 1, 2025

IT Number: IT22060594

Name: Soyza W W K

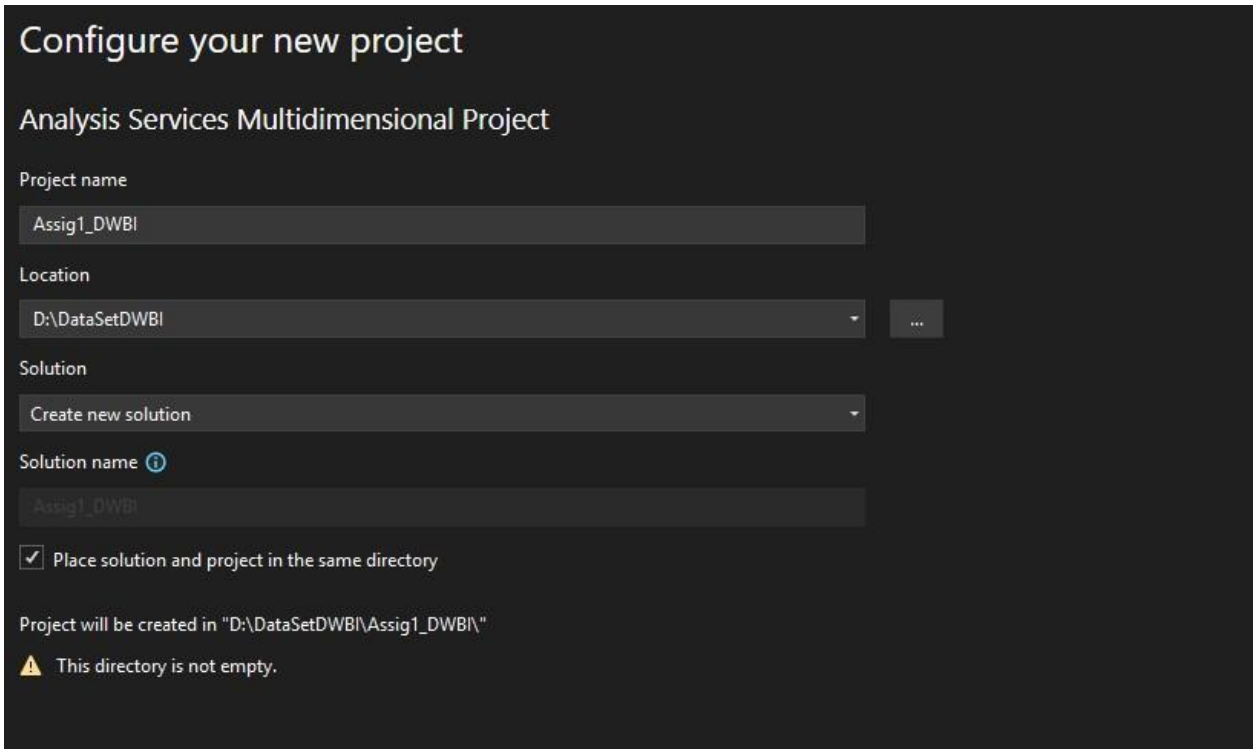
Overall System Diagram



Step 2: SSAS Cube implementation

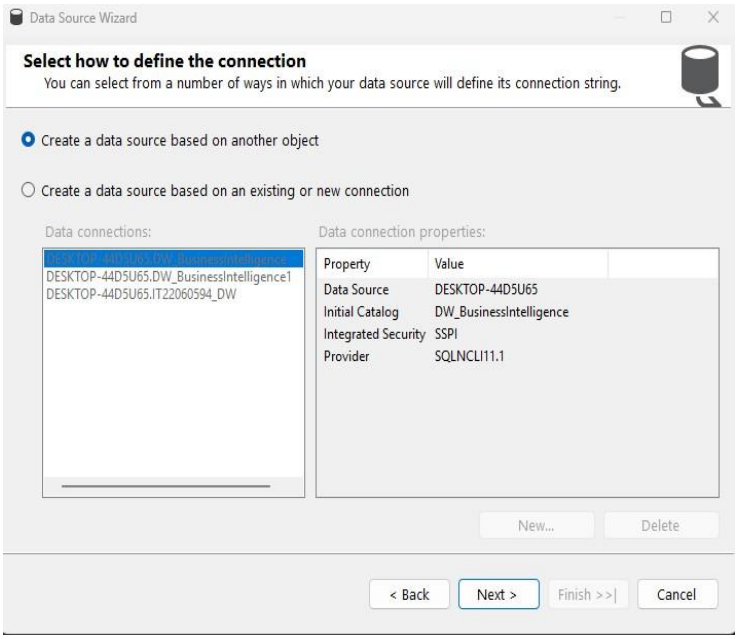
1. Creating the SSAS Project

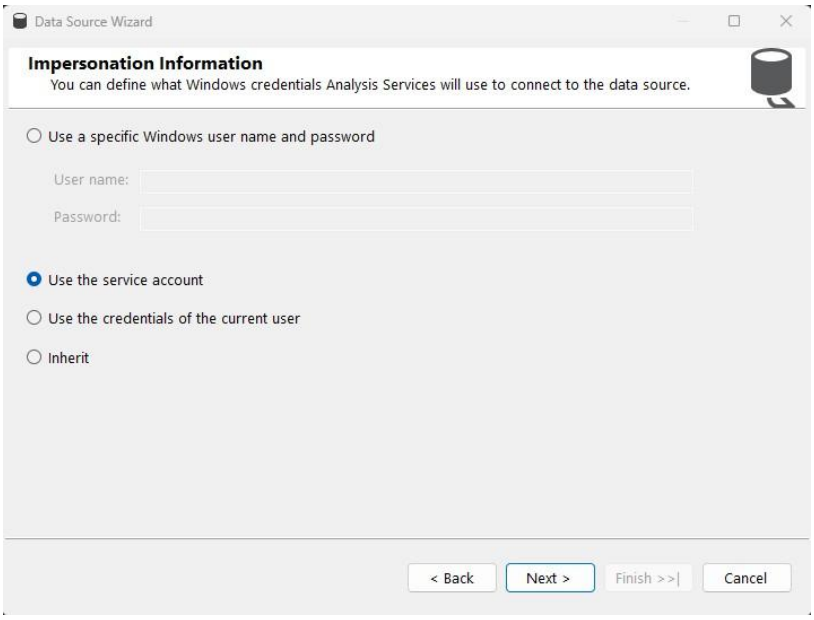
- Opened Visual Studio.
- Created a new project:
    - Project Type: Analysis Services Multidimensional and Data Mining Project
    - Project Name: Assig1_DWBI_CUBE
- Clicked OK to create the SSAS project workspace.

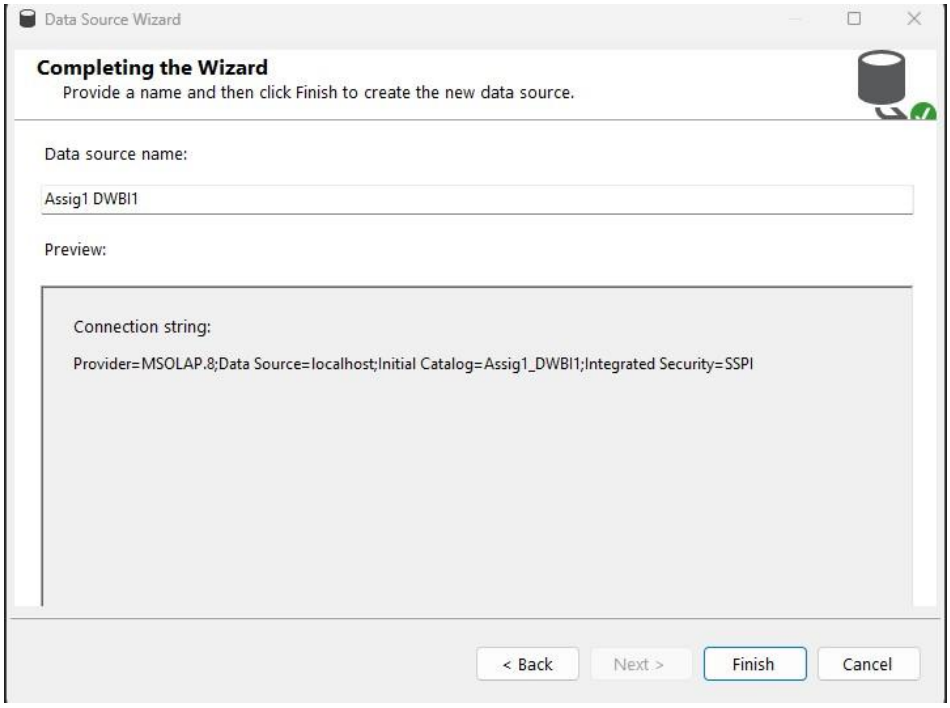


2. Setting up Data Source

- Right-clicked on **Data Sources** → **New Data Source**.
- Selected existing **Data Warehouse** database as source.
- Chose the connection:
    - Database: DW_BusinessIntelligence
- Selected Use the service account.
- Completed the Data Source wizard.



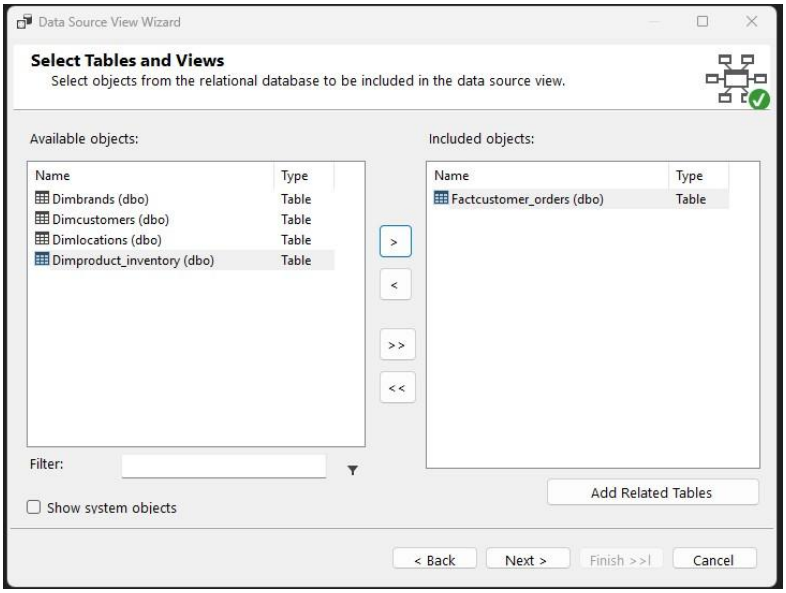


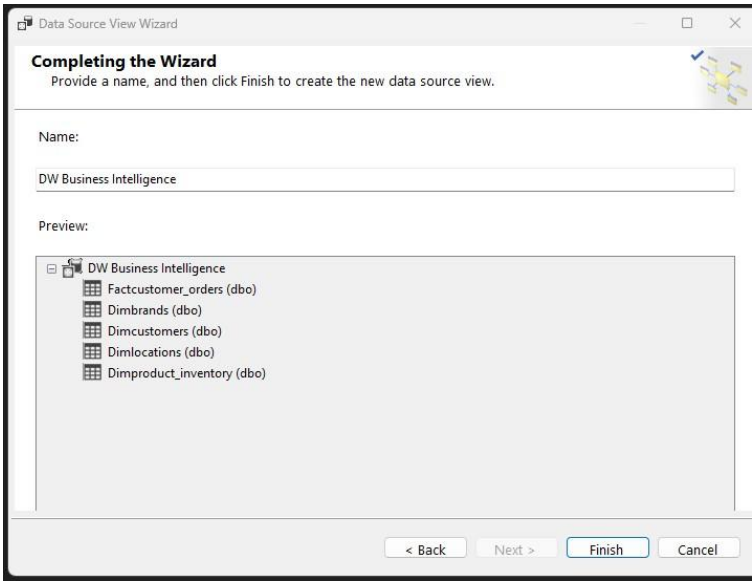


3. Setting up Data Source View (DSV)

- Right-clicked on **Data Source Views** → **New Data Source View**.
- Added relevant tables:
  - **Fact Table** (Factcutomer_orders)
  - **Dimension Tables** (Dimcustomers, Dimbrands, Dimlocations, DImproduct_inventory1)

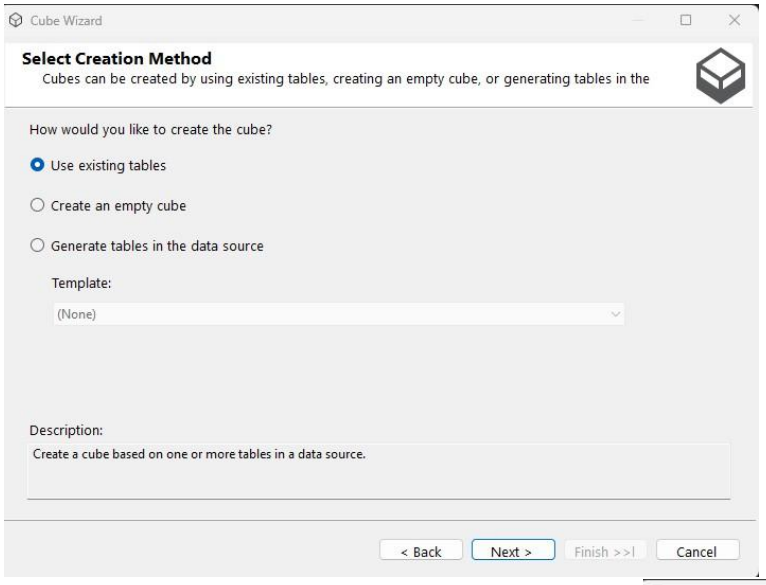
- Verified relationships were automatically detected (Fact Table foreign keys to Dimension primary keys).

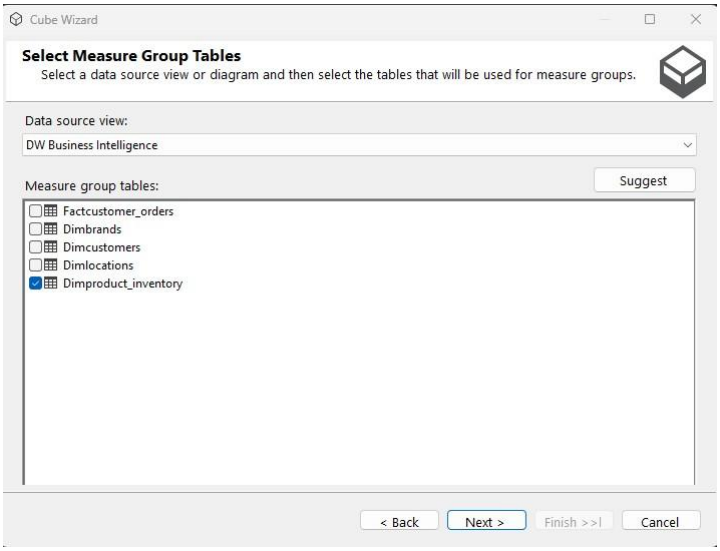


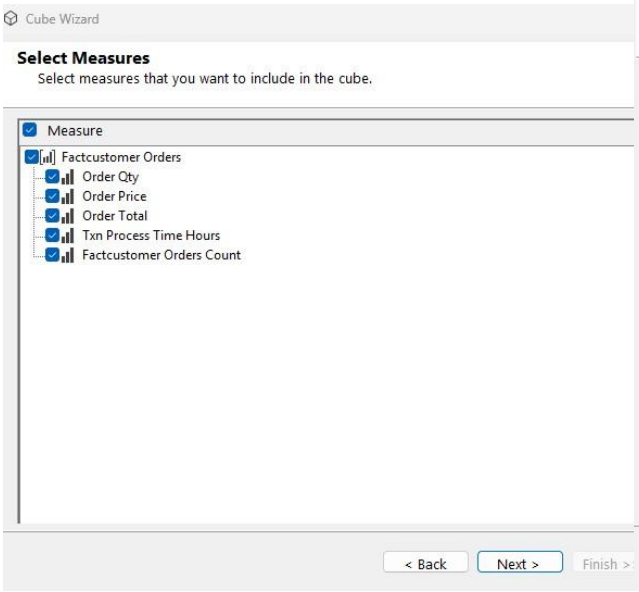


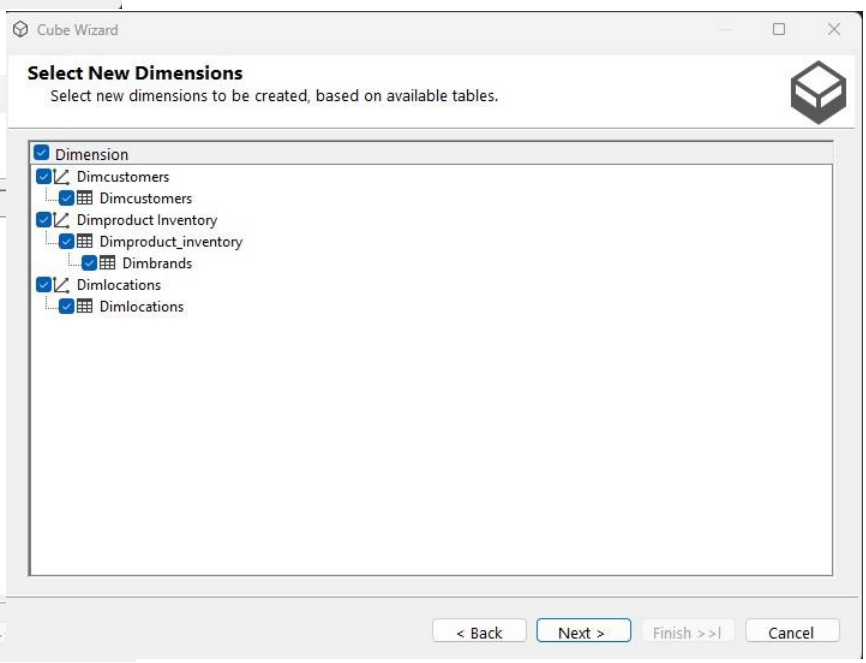
4. Creating the Cube

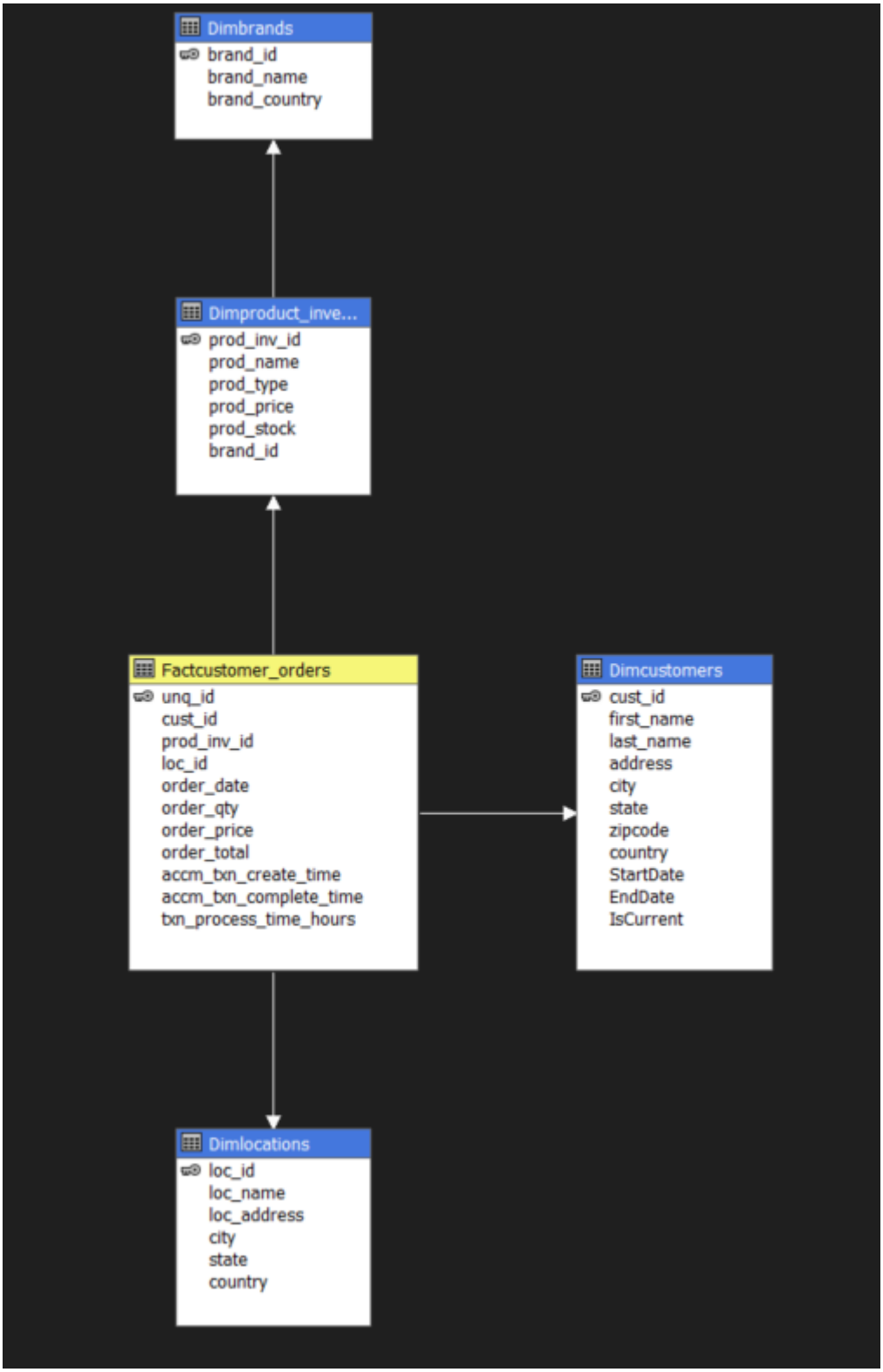
- Right-clicked on **Cubes** → **New Cube** → **Cube Wizard**.
- Selected **Use Existing Tables**.
- Chose the **Fact Table** (Factcutomer_orders).
- Selected measures automatically detected by the wizard.
- Added related dimensions (already connected in DSV).
- Completed the Cube Wizard.


Cube Wizard
Select Creation Method
Cubes can be created by using existing tables, creating an empty cube, or generating tables in the
How would you like to create the cube?
Use existing tables
Create an empty cube
Generate tables in the data source
Template:
(None)
Description:
Create a cube based on one or more tables in a data source.
< Back
Next >
Finish >>I
Cancel


Cube Wizard
Select Measure Group Tables
Select a data source view or diagram and then select the tables that will be used for measure groups.
Data source view:
DW Business Intelligence
Measure group tables:
Suggest
Factcustomer_orders
Dimbrands
Dimcustomers
Dimlocations
Dimproduct_inventory
< Back
Next >
Finish >>I
Cancel


Cube Wizard
Select Measures
Select measures that you want to include in the cube.
Measure
Factcustomer Orders
Order Qty
Order Price
Order Total
Txn Process Time Hours
Factcustomer Orders Count
< Back
Next >
Finish >

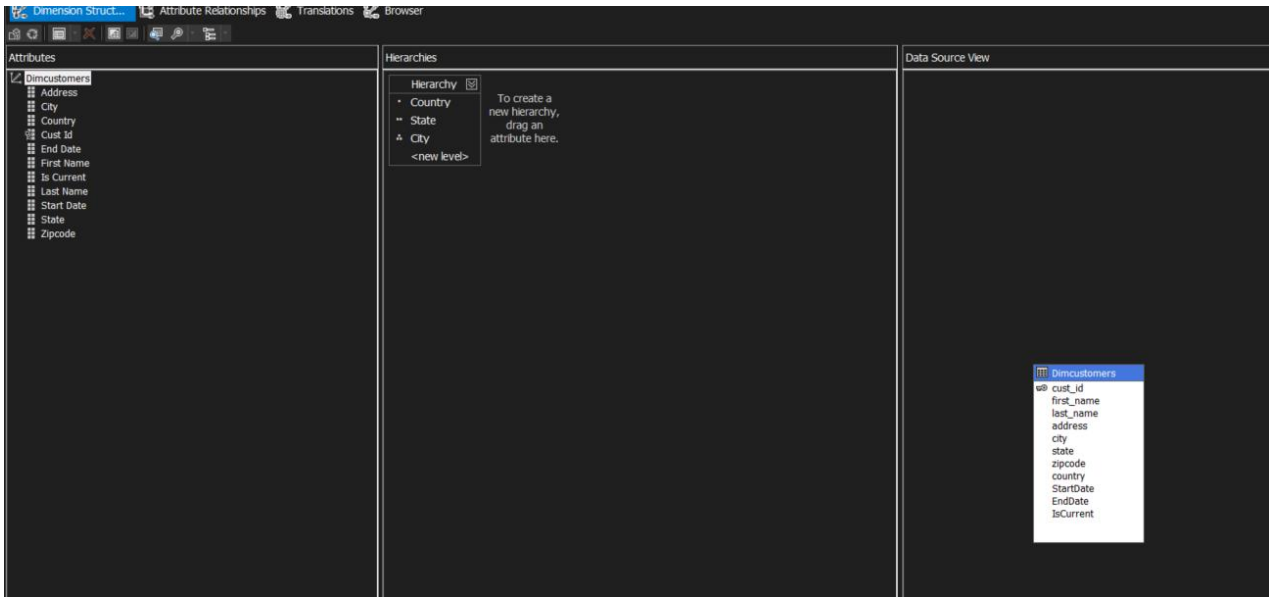

Cube Wizard
Select New Dimensions
Select new dimensions to be created, based on available tables.
Dimension
Dimcustomers
Dimcustomers
Dimproduct Inventory
Dimproduct_inventory
Dimbrands
Dimlocations
Dimlocations
< Back
Next >
Finish >>I
Cancel


Dimbrands
brand_id
brand_name
brand_country
Dimproduct_inve...
prod_inv_id
prod_name
prod_type
prod_price
prod_stock
brand_id
Factcustomer_orders
unq_id
cust_id
prod_inv_id
loc_id
order_date
order_qty
order_price
order_total
accm_txn_create_time
accm_txn_complete_time
txn_process_time_hours
Dimcustomers
cust_id
first_name
last_name
address
city
state
zipcode
country
StartDate
EndDate
IsCurrent
Dimlocations
loc_id
loc_name
loc_address
city
state
country

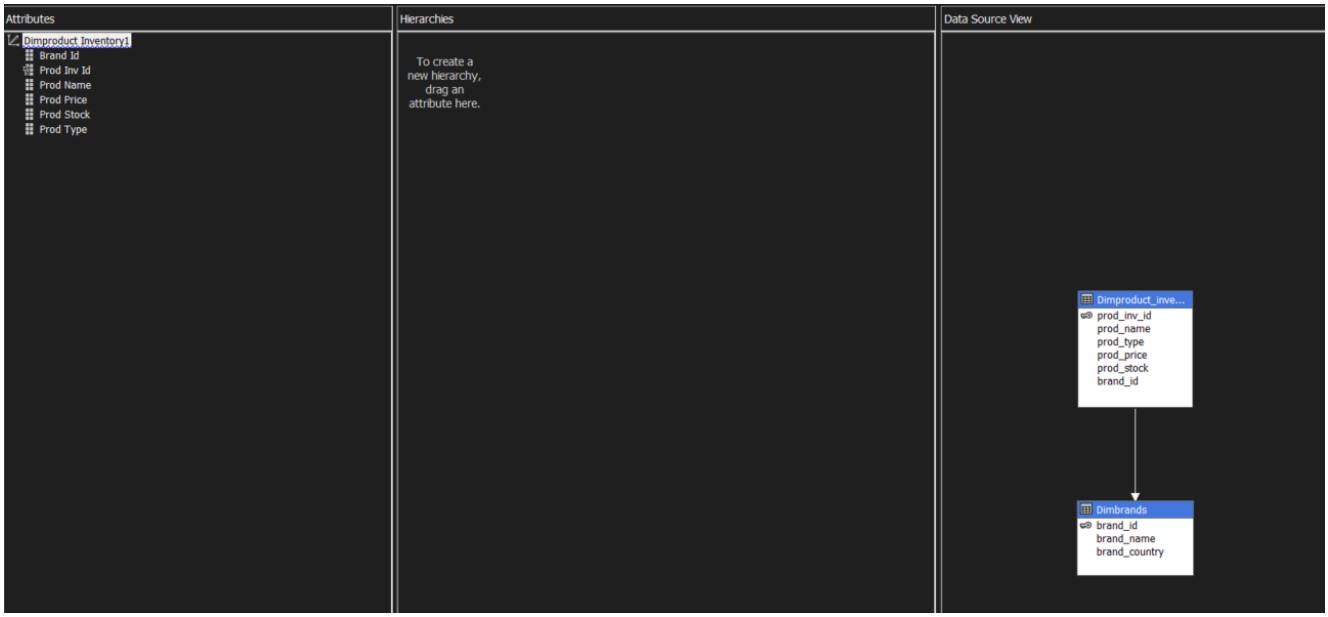
5. Designing Measures and Dimensions

- Verified that Measures were correctly created under the Measure Group.
- Configured dimension properties:

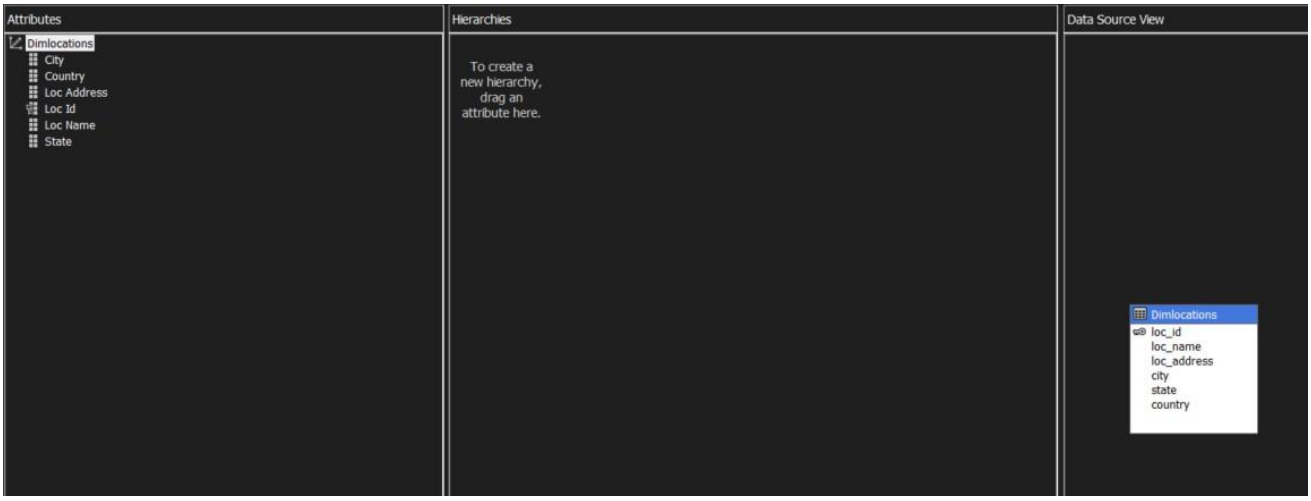
Dimcustomers



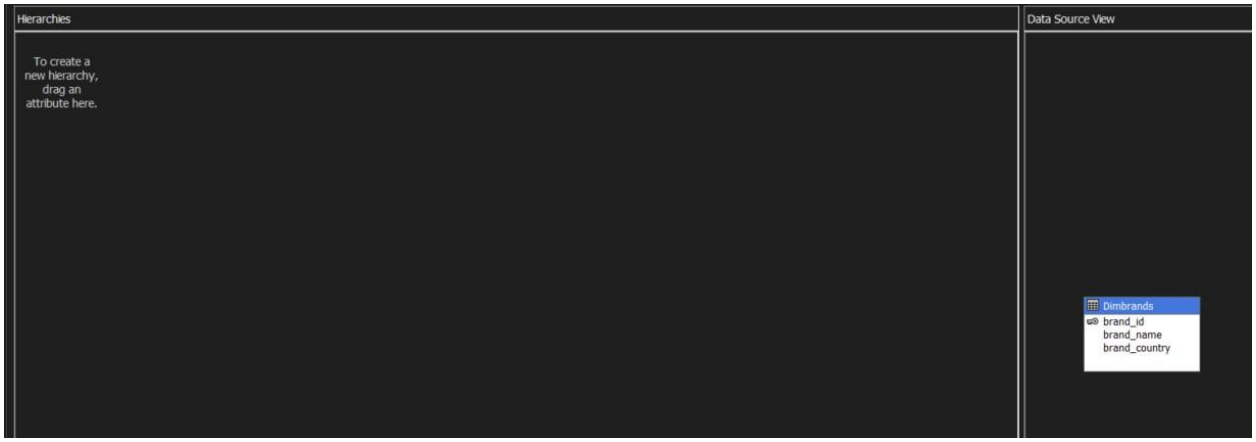
Dimproduct_Inventory



Dimlocations



Dimbrands



6. Deploying and Processing the Cube

- Right-clicked the project → **Properties**.
- Set **Deployment Target Server**.
- Clicked **Deploy** to deploy cube to SSAS server.
- After successful deployment, **processed** the cube:
    - Right-click Cube → **Process** → Start.

Verified cube data loaded successfully.

8. Testing Cube

- Opened **Cube Browser** in Visual Studio.
- Dragged measures and dimensions into the browser to test:

Step 3: Demonstration of OLAP Operations in Excel

In this step, I connected Microsoft Excel to the OLAP Cube and used PivotTables to demonstrate various OLAP operations: Roll-up, Drill-down, Slice, Dice, and Pivot. The connection was established using PowerPivot in Excel.

Step 1: Connecting Excel to the OLAP Cube

1. Open Microsoft Excel.
2. Go to the **Data** tab → Click **Get Data** → **From Database** → **From Analysis Services**.
3. Enter the server name where the cube is deployed (DESKTOP-44D5U65).
4. Select the cube from the available list.
5. Import the cube data into a **PivotTable Report**.

1. Roll-Up

What it means: Aggregating data to a higher level in a hierarchy.

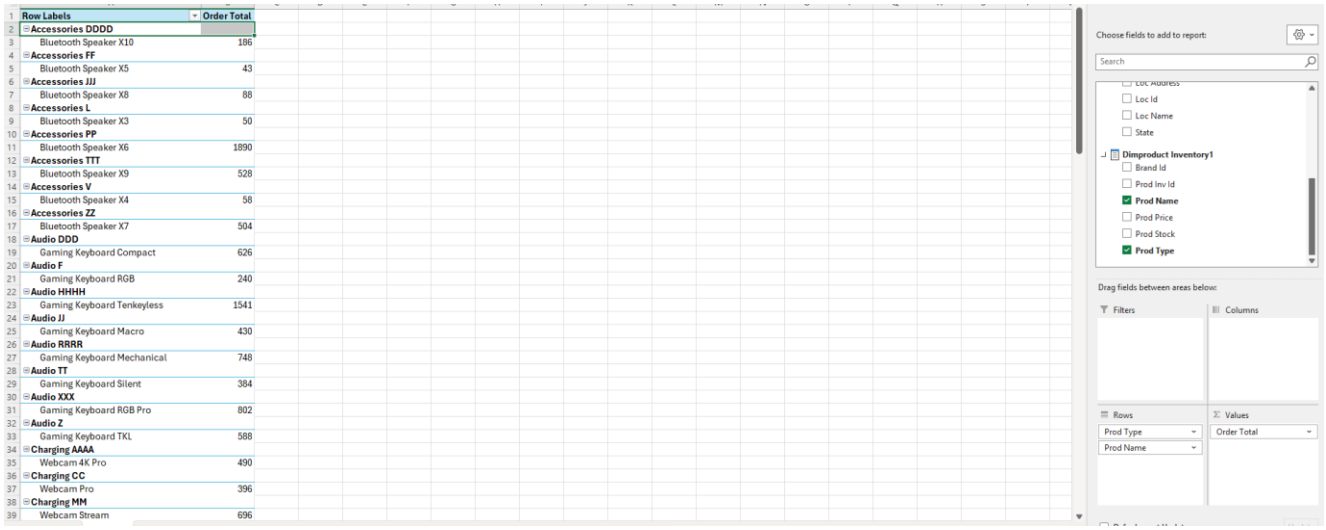
What I did:

- In the **Rows**, I added **Product Name**.
- In the **Values**, I added **Order Total**.
- Then, I replaced **Product Name** with **Product Type** (a higher-level category).

This rolls up the data from individual products to a summary by product type.

Definition: Roll-up summarizes the data by climbing up a hierarchy or by reducing the dimensions (e.g., from Product → Product Type).

2. Drill-Down



Row Labels	Order Total
Accessories DDDD	
Bluetooth Speaker X10	186
Accessories FF	
Bluetooth Speaker X5	43
Accessories JJJ	
Bluetooth Speaker X8	88
Accessories L	
Bluetooth Speaker X3	50
Accessories PP	
Bluetooth Speaker X6	1890
Accessories TTT	
Bluetooth Speaker X9	528
Accessories V	
Bluetooth Speaker X4	58
Accessories ZZ	
Bluetooth Speaker X7	504
Audio DDD	
Gaming Keyboard Compact	626
Audio F	
Gaming Keyboard RGB	240
Audio HHHH	
Gaming Keyboard Tenkeyless	1541
Audio JJ	
Gaming Keyboard Macro	430
Audio RRRR	
Gaming Keyboard Mechanical	748
Audio TT	
Gaming Keyboard Silent	384
Audio XXX	
Gaming Keyboard RGB Pro	802
Audio Z	
Gaming Keyboard TKL	588
Charging AAAA	
Webcam 4K Pro	490
Charging CC	
Webcam Pro	396
Charging MM	
Webcam Stream	696

What it means: Navigating from summarized (higher-level) data to more detailed (lower level) data.

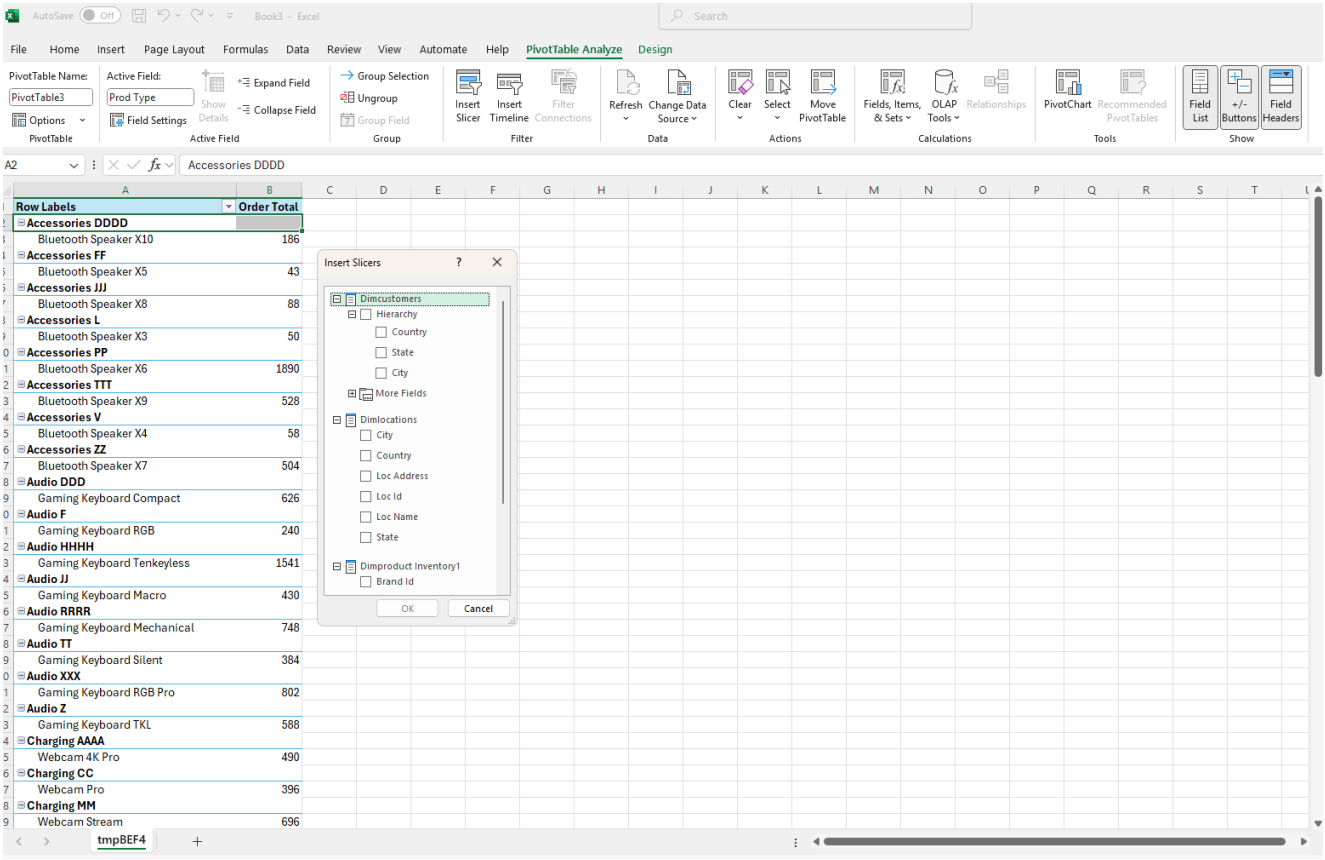
What I did:

- Started with Product Type in the rows.
- Then added Product Name below it in the Pivot Table hierarchy.

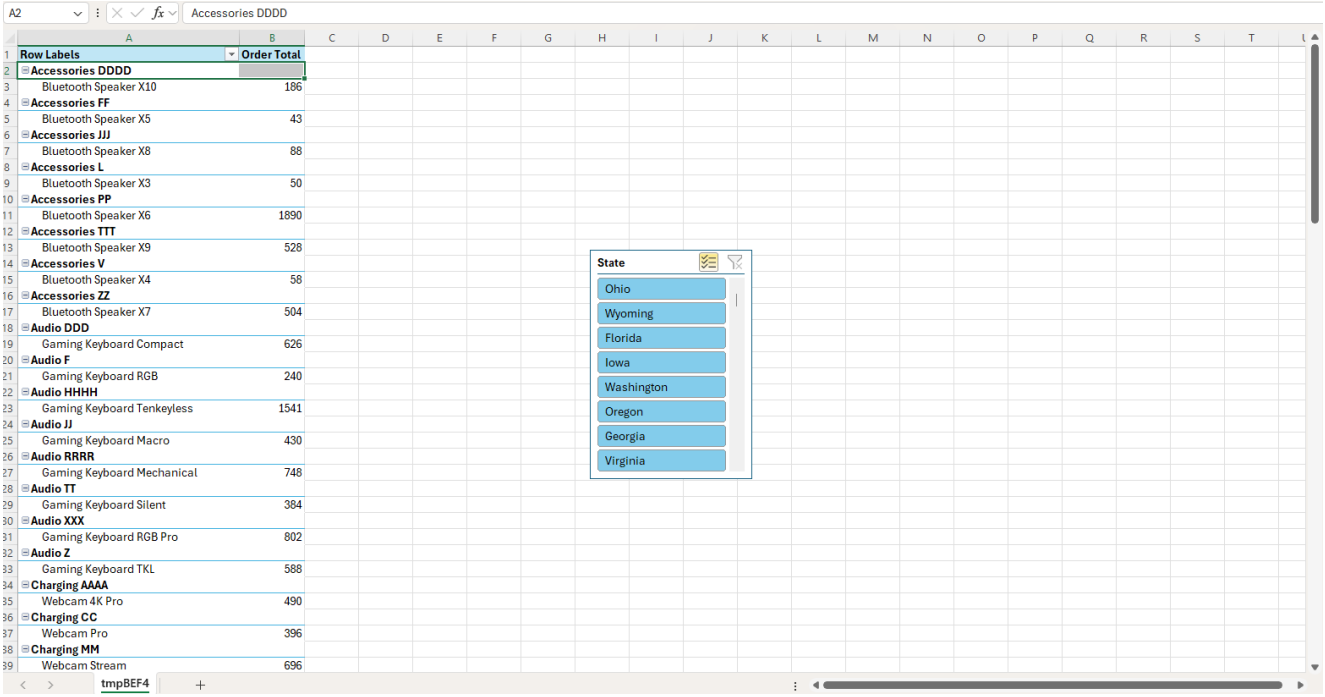
This drills down from product types into individual product-level data.

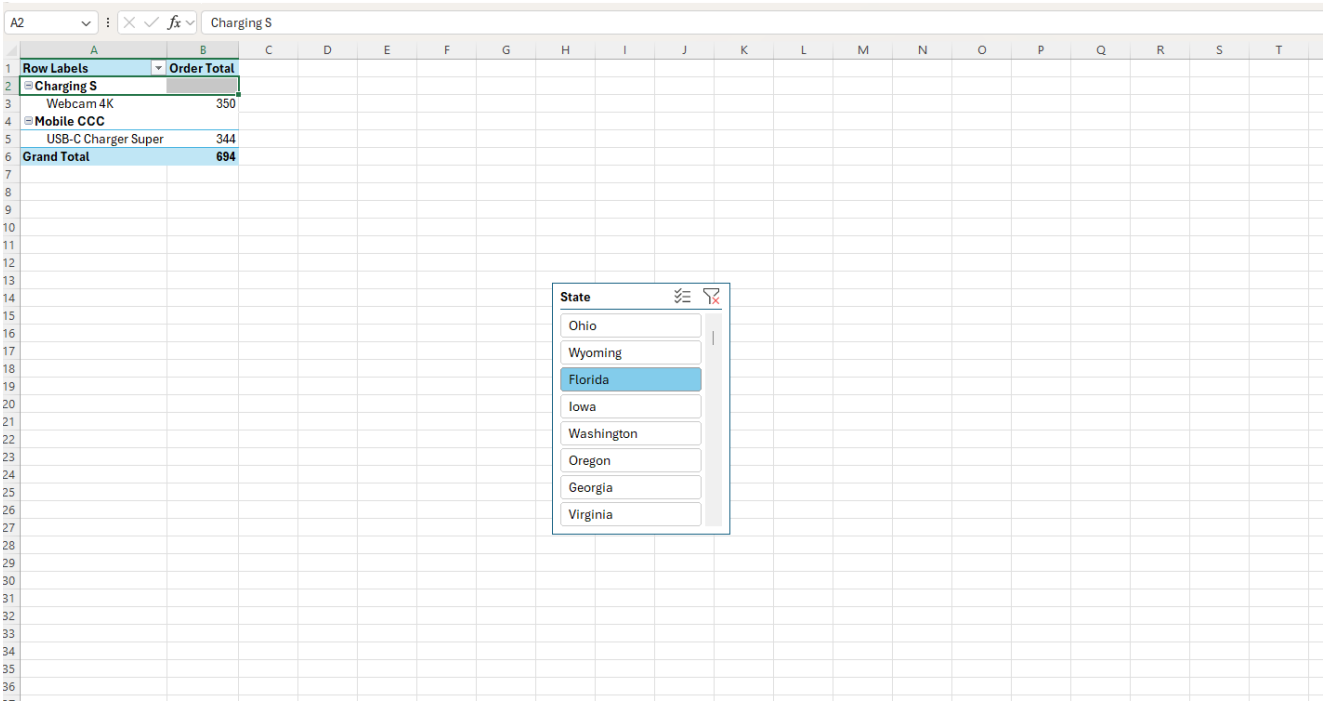
Definition: Drill-down allows you to go from summarized data to more detailed data (e.g., Product Type → Product Name)

3. Slice



Row Labels	Order Total
Accessories DDDD	
Bluetooth Speaker X10	186
Accessories FF	
Bluetooth Speaker X5	43
Accessories JJJ	
Bluetooth Speaker X8	88
Accessories L	
Bluetooth Speaker X3	50
Accessories PP	
Bluetooth Speaker X6	1890
Accessories TTT	
Bluetooth Speaker X9	528
Accessories V	
Bluetooth Speaker X4	58
Accessories ZZ	
Bluetooth Speaker X7	504
Audio DDD	
Gaming Keyboard Compact	626
Audio F	
Gaming Keyboard RGB	240
Audio HHHH	
Gaming Keyboard Tenkeyless	1541
Audio JJ	
Gaming Keyboard Macro	430
Audio RRRR	
Gaming Keyboard Mechanical	748
Audio TT	
Gaming Keyboard Silent	384
Audio XXX	
Gaming Keyboard RGB Pro	802
Audio Z	
Gaming Keyboard TKL	588
Charging AAAA	
Webcam 4K Pro	490
Charging CC	
Webcam Pro	396
Charging MM	
Webcam Stream	696





- **What it means:** Filtering data based on a single dimension.
- **What I did:**
- Added a Slicer for State.
- Selected a specific state like “California”.

This sliced the data to show only records related to the selected state.

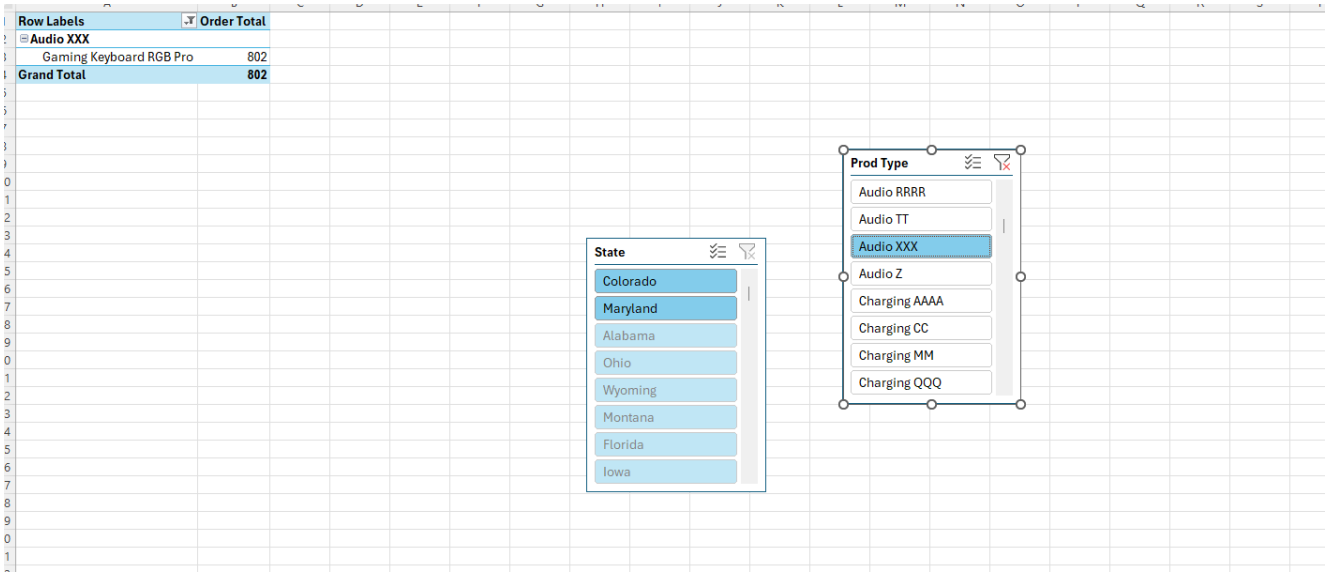
4. **Dice**

   What it means: Filtering data on multiple dimensions to form a sub-cube.

   What I did:

- Added multiple Slicers: State and Product Type.
- Selected specific combinations

  This diced the data to a focused segment across multiple dimension.

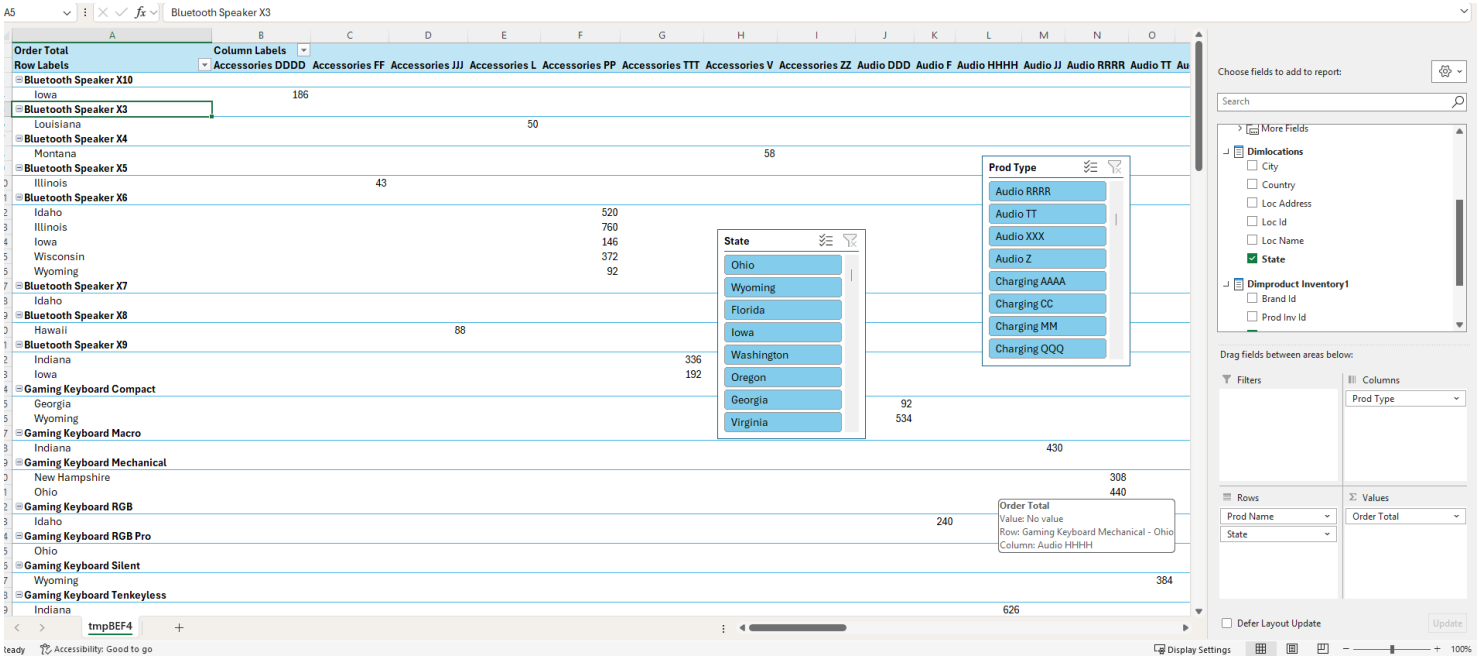


5. **Pivot**

   Definition: Pivoting means rotating the data axes — switch rows and columns to view data from different angles.

Steps:

1. Drag Product Type from the Rows area and drop it into the Columns area.
2. Now drag another dimension (State) into Rows.
3. table will now show Order Totals by State (rows) and Product Types (columns).

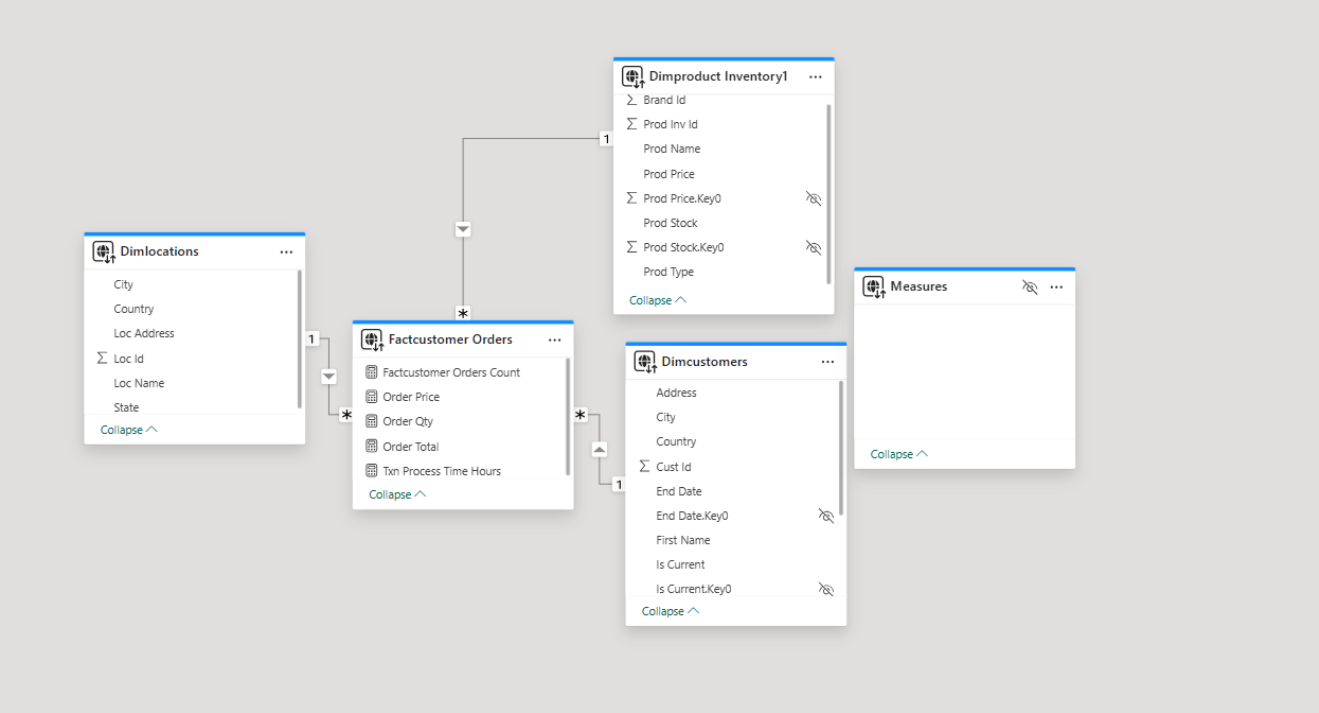

Bluetooth Speaker X3
Order Total
Row Labels
Column Labels
Accessories DDDD
Accessories FF
Accessories JJJ
Accessories L
Accessories PP
Accessories TTT
Accessories V
Accessories ZZ
Audio DDD
Audio F
Audio HHHH
Audio JJ
Audio RRRR
Audio TT
Bluetooth Speaker X10
Iowa 186
Bluetooth Speaker X3
Louisiana 50
Bluetooth Speaker X4
Montana 58
Bluetooth Speaker X5
Illinois 43
Bluetooth Speaker X6
Idaho 520
Illinois 760
Iowa 146
Wisconsin 372
Wyoming 92
Bluetooth Speaker X7
Idaho
Bluetooth Speaker X8
Hawaii 88
Bluetooth Speaker X9
Indiana 336
Iowa 192
Gaming Keyboard Compact
Georgia 92
Wyoming 534
Gaming Keyboard Macro
Indiana 430
Gaming Keyboard Mechanical
New Hampshire 308
Ohio 440
Gaming Keyboard RGB
Idaho 240
Gaming Keyboard RGB Pro
Ohio
Gaming Keyboard Silent
Wyoming 384
Gaming Keyboard Tenkeyless
Indiana 626
State
Ohio
Wyoming
Florida
Iowa
Washington
Oregon
Georgia
Virginia
Prod Type
Audio RRRR
Audio TT
Audio XXX
Audio Z
Charging AAAA
Charging CC
Charging MM
Charging QQQ
Order Total
Value: No value
Row: Gaming Keyboard Mechanical - Ohio
Column: Audio HHHH
tmpBEF4
Choose fields to add to report:
Search
More Fields
Dimlocations
City
Country
Loc Address
Loc Id
Loc Name
State
Dimproduct Inventory1
Brand Id
Prod Inv Id
Drag fields between areas below:
Filters
Columns
Prod Type
Rows
Prod Name
State
Values
Order Total
Defer Layout Update
Update
Accessibility: Good to go
Display Settings
100%

○ Step 4: PowerBI Reports

Steps:

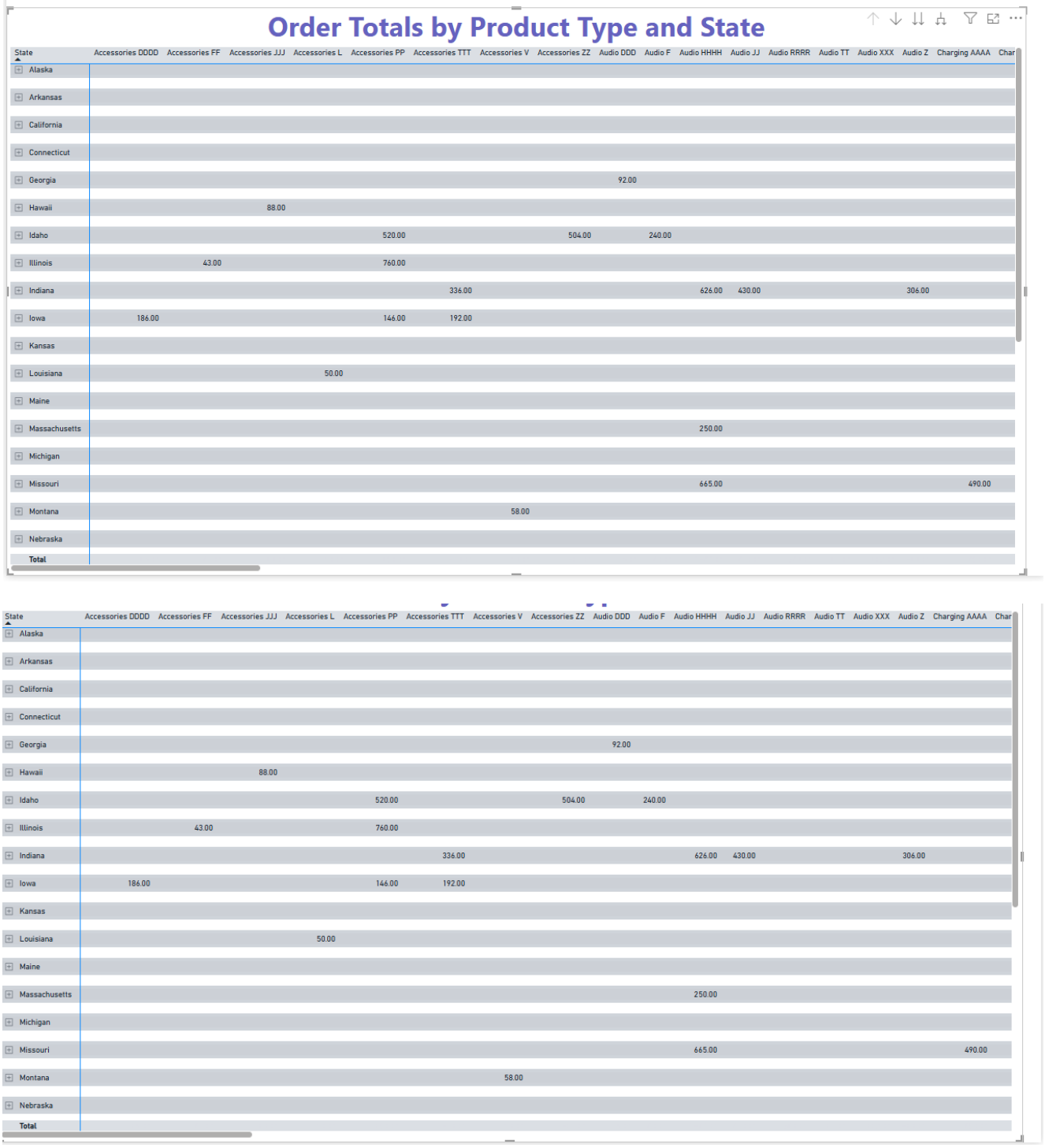
- Open Power BI Desktop.
- Load the dataset
- use Home > Get Data, select the source SQL Server
- Build Relationships between tables (use Model view).
- Save the Power BI file

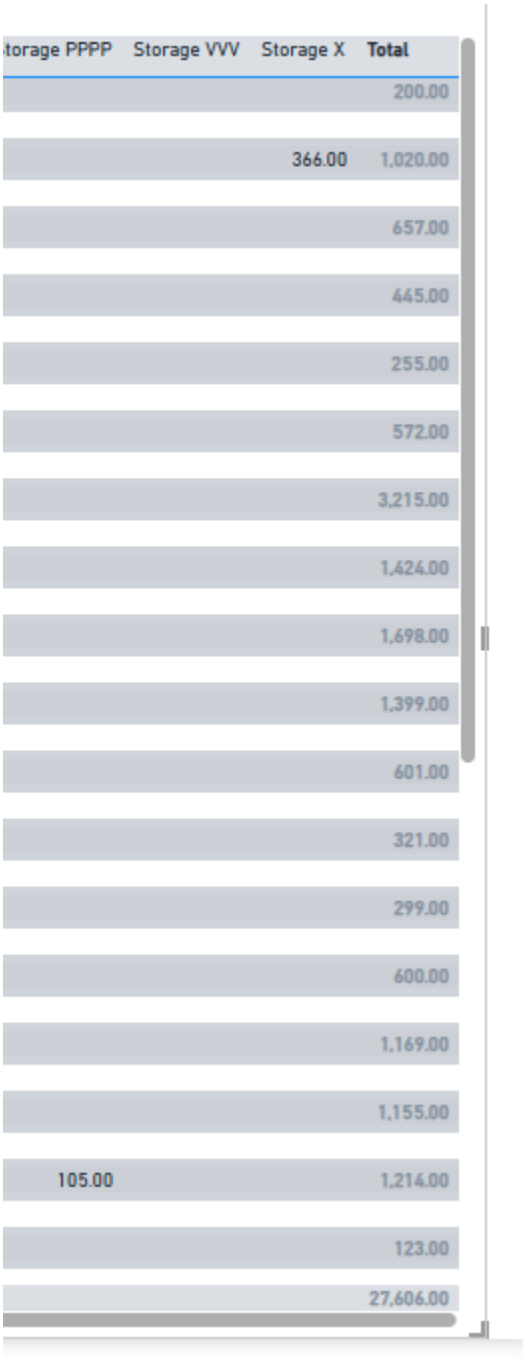
Relationships between tables (Model View)



Report 1: Matrix Visual (Tabular Data with Row & Column Groupings)

Objective: Display detailed tabular data using a Matrix visual, grouping by Product Type and State and country.





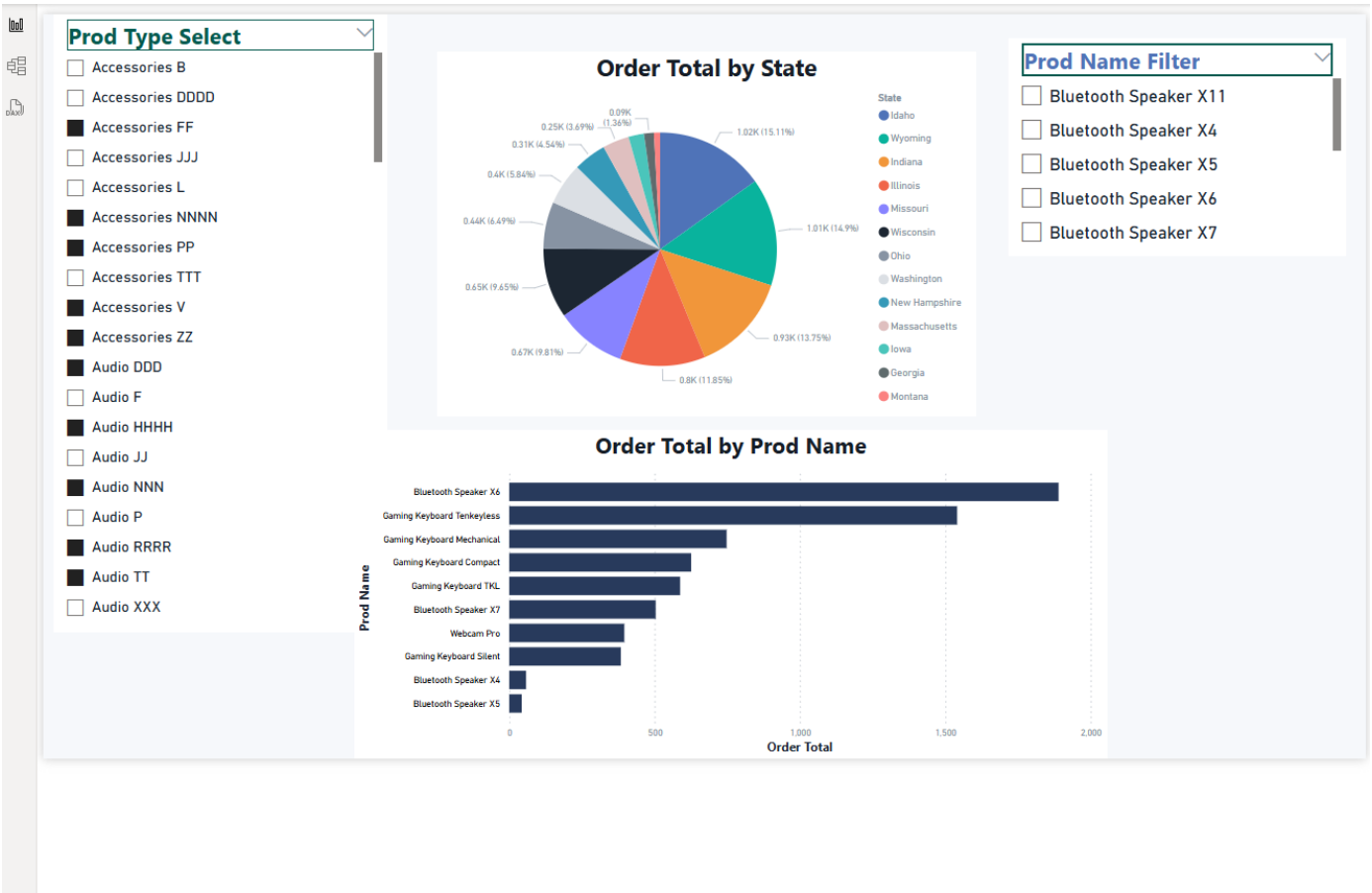
torage PPPP	Storage VVV	Storage X	Total
			200.00
		366.00	1,020.00
			657.00
			445.00
			255.00
			572.00
			3,215.00
			1,424.00
			1,698.00
			1,399.00
			601.00
			321.00
			299.00
			600.00
			1,169.00
			1,155.00
105.00			1,214.00
			123.00
			27,606.00

Report 2: Cascading Slicers with Multiple Visuals

Objective: Add slicers that dynamically filter each other (cascading) and show multiple visuals.

Steps:

1. Add a Slicer visual.
    - Drag Product Type to the first slicer.
2. Add a second Slicer and drag Product Name.
3. Make sure a relationship exists between Product Type and Product Name in the data model to enable cascading.
4. Add the following visuals:
    - Bar Chart:
        - X-Axis: Product Name
        - Y-Axis: Order Total
    - Pie Chart:
        - Legend: State
        - Values: Order Total



Report 4: Drill-Through Report (Right-click Navigation)

Objective: Navigate to a detailed page by clicking a visual.

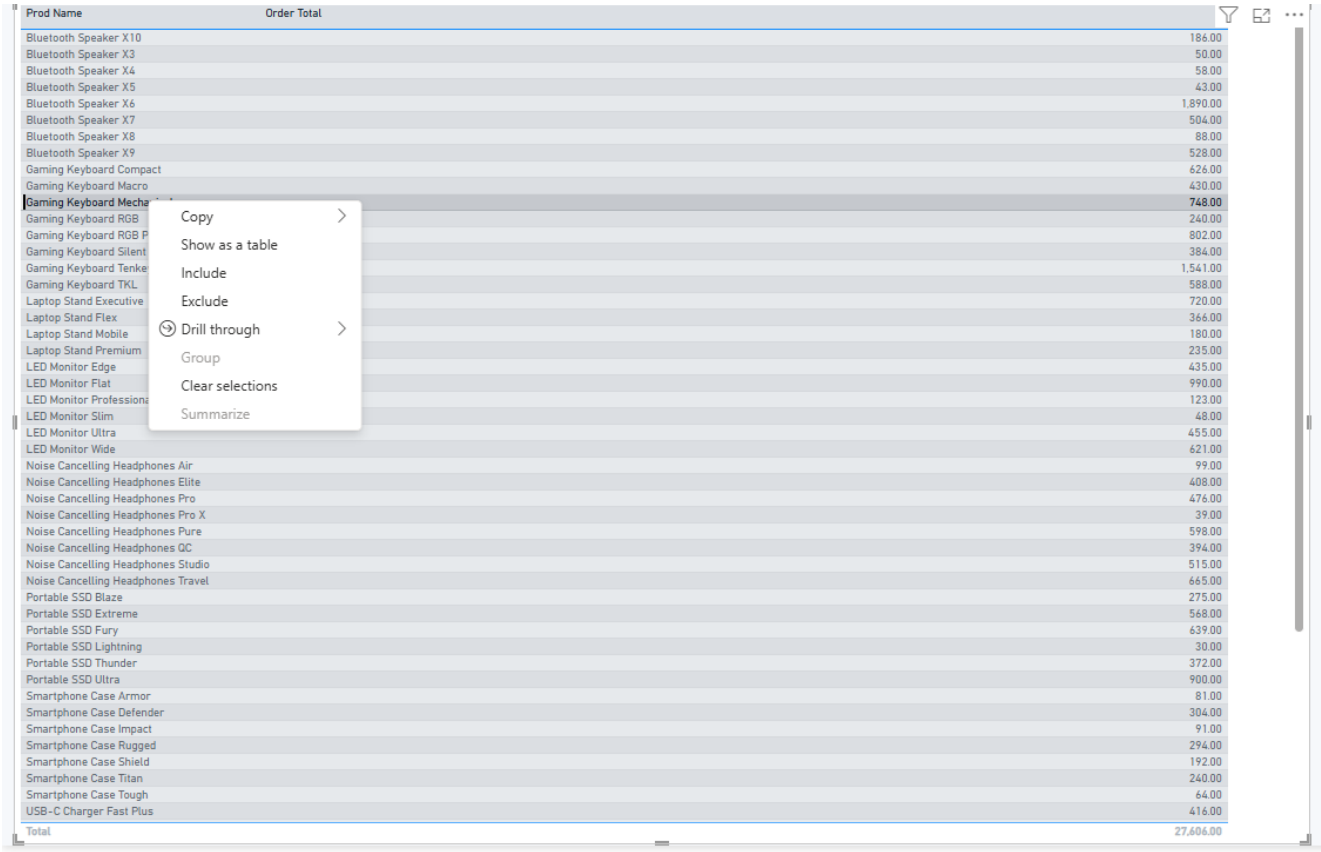
Steps:

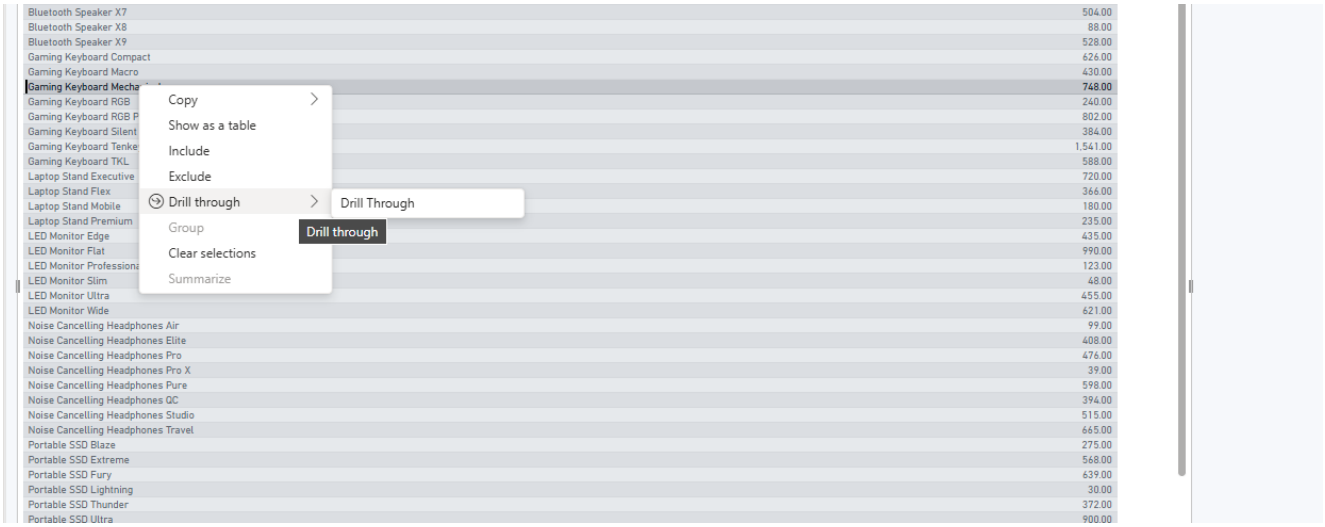
Page 1 – Main Page:

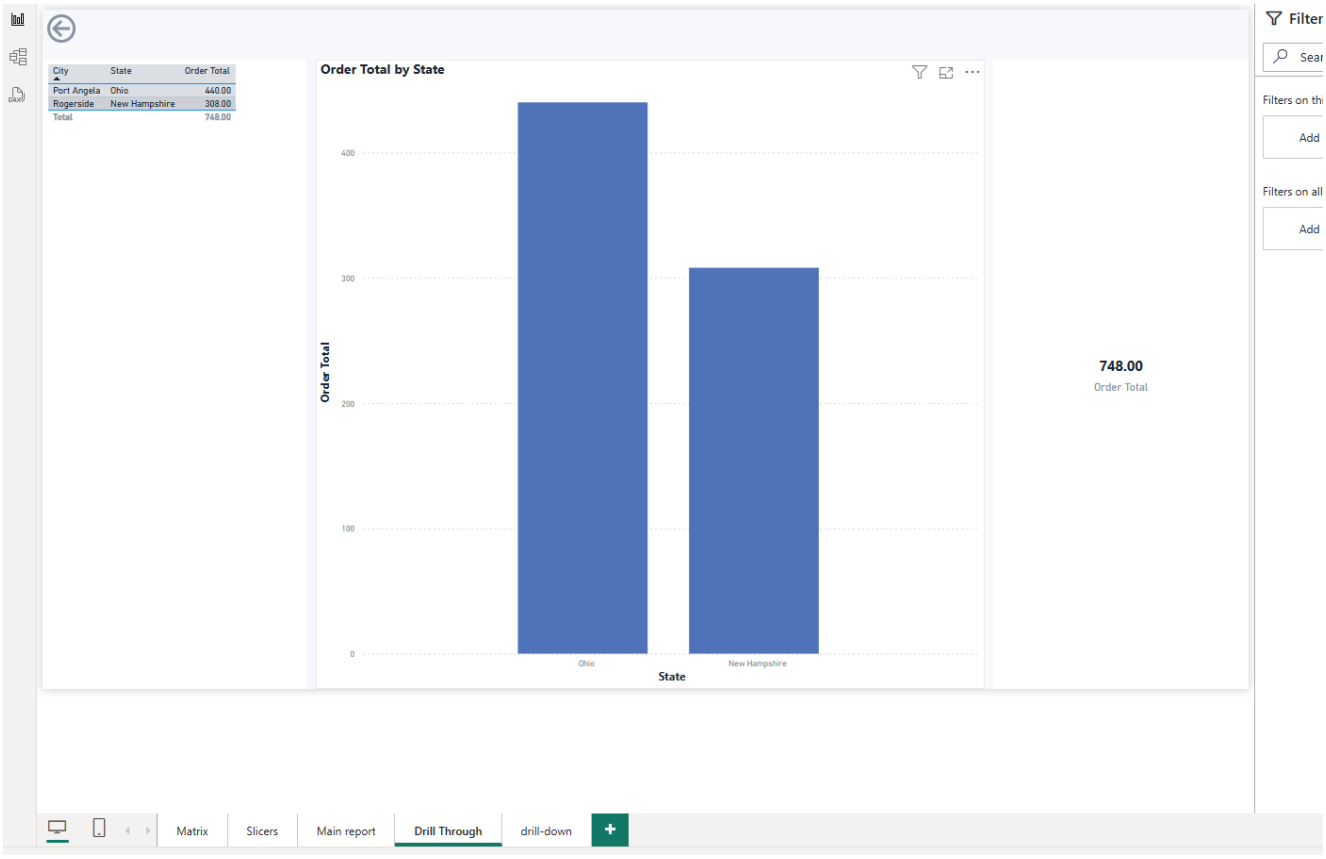
1. Create a **Bar Chart** or **Table** with:
    - Axis: Product Name
    - Values: Order Total

Page 2 – Drill-Through Page:

1. Create a new page.
2. In the **Drill-through** filters pane, drag Product Name.
3. Add:
    - A **Table**: City, State, Order Total
    - A **Bar Chart**: Sate vs. Order Total
4. Go back to Main page.
    - Right-click a product in the chart or table
    - Select **Drill-through → Drill through page**




Bluetooth Speaker X7 504.00
Bluetooth Speaker X8 88.00
Bluetooth Speaker X9 528.00
Gaming Keyboard Compact 626.00
Gaming Keyboard Macro 430.00
748.00
Gaming Keyboard RGB 240.00
802.00
384.00
1,541.00
Gaming Keyboard TKL 588.00
Laptop Stand Executive 720.00
Laptop Stand Flex 366.00
Laptop Stand Mobile 180.00
Laptop Stand Premium 235.00
LED Monitor Edge 435.00
LED Monitor Flat 990.00
123.00
LED Monitor Slim 48.00
LED Monitor Ultra 455.00
LED Monitor Wide 621.00
Noise Cancelling Headphones Air 99.00
Noise Cancelling Headphones Elite 408.00
Noise Cancelling Headphones Pro 476.00
Noise Cancelling Headphones Pro X 39.00
Noise Cancelling Headphones Pure 598.00
Noise Cancelling Headphones QC 394.00
Noise Cancelling Headphones Studio 515.00
Noise Cancelling Headphones Travel 665.00
Portable SSD Blaze 275.00
Portable SSD Extreme 568.00
Portable SSD Fury 639.00
Portable SSD Lightning 30.00
Portable SSD Thunder 372.00
900.00
Copy
Show as a table
Include
Exclude
Drill through
Group
Clear selections
Summarize
Drill Through
Drill through

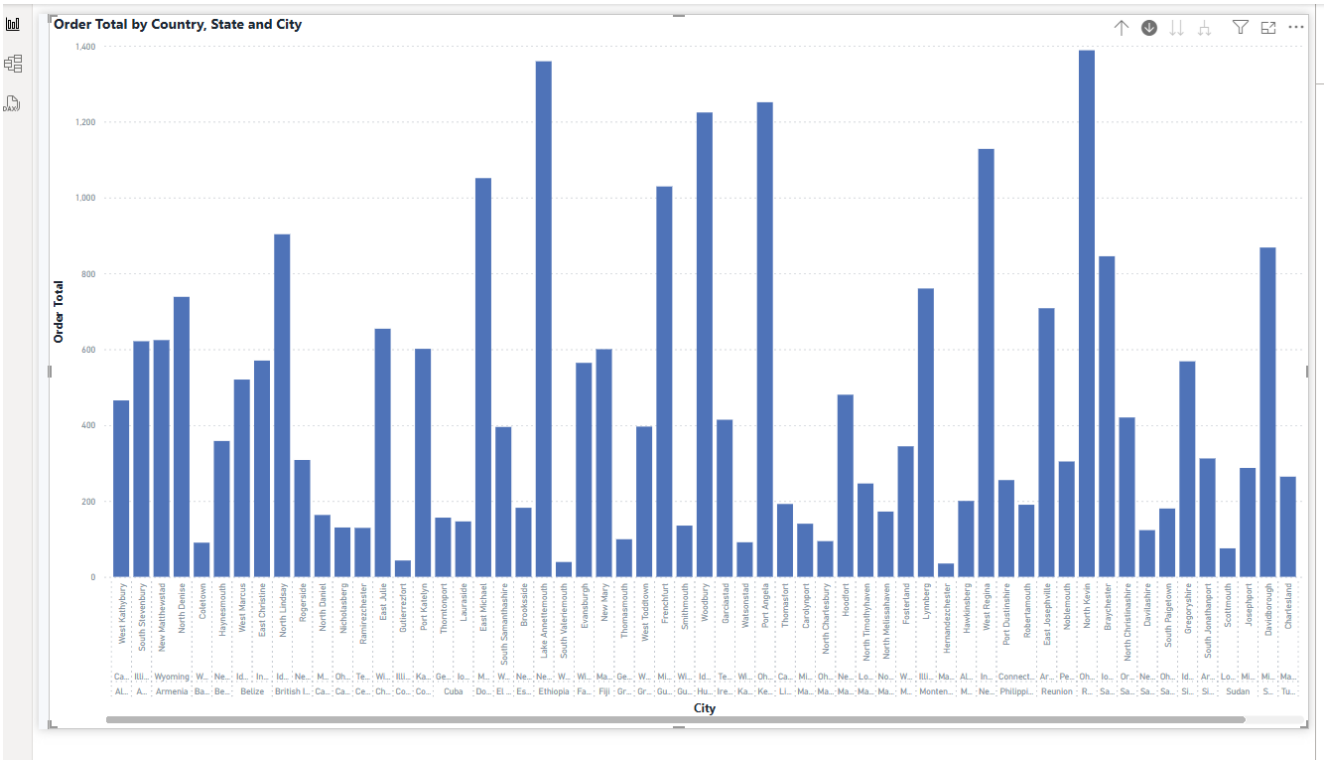

City State Order Total
Port Angela Ohio 440.00
Rogerside New Hampshire 308.00
Total 748.00
Order Total by State
Order Total
400
300
200
100
0
Ohio
New Hampshire
State
748.00
Order Total
Filter
Filters on th
Add
Filters on all
Add
Matrix
Slicers
Main report
Drill Through
drill-down

Report 3: Drill-Down Report (Without Date Hierarchy)

Objective: Allow drill-down from one level to another.

Steps:

1. Go to **Model view** and create a hierarchy manually:
    - Right-click Country and "Create hierarchy"
    - Add state and city to this hierarchy
2. Add a **Bar Chart**:
    - Axis: Your new Product Hierarchy
    - Values: Order Total
3. Enable drill:
    - Turn on Drill Mode
    - Click the bars to drill into the next level



Publishing Power BI Service

Objective: Publish the report to your Power BI workspace.

Steps:

1. Click Home > Publish in Power BI Desktop.
2. Sign into your Power BI account.
3. Choose the appropriate workspace.
4. Open Power BI Service.
5. Find your report and open it online to demonstrate interactivity.