Sri Lanka Institute of Information Technology

Data Warehousing and Business Intelligence (IT3021)

Assignment 2 – 2025, Semester 1

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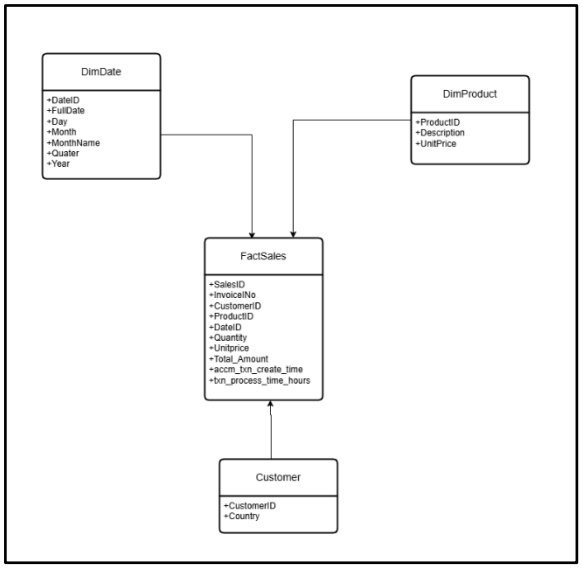
Data Source

The data source used in Assignment 2 is the data warehouse developed in Assignment 1. The data warehouse follows a **Star Schema** model and includes one fact table and three dimension tables:

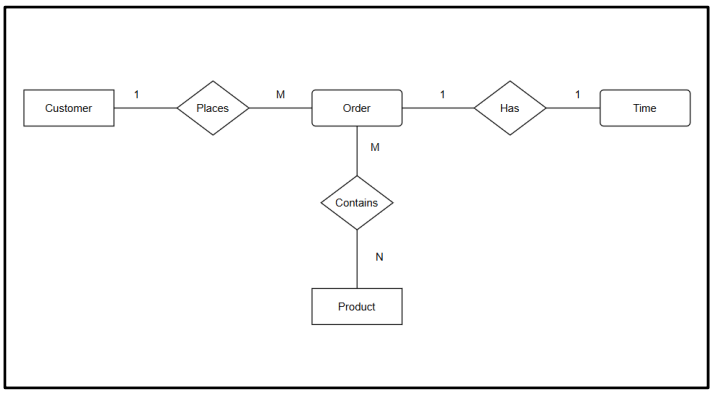
- **FactSales**: SalesID (PK), ProductID (FK), CustomerID (FK), DateID (FK), Quantity, UnitPrice, TotalAmount
- **DimProduct**: ProductID (PK), StockCode, Description, UnitPrice
- **DimCustomer**: CustomerID (PK), Country
- **DimDate**: DateID (PK), FullDate, Day, Month, MonthName, Quarter, Year

The fact table captures transactional sales data. The dimension tables provide context for analyzing the sales, including product information, customer demographics, and time data.

Star Schema



ER Diagram

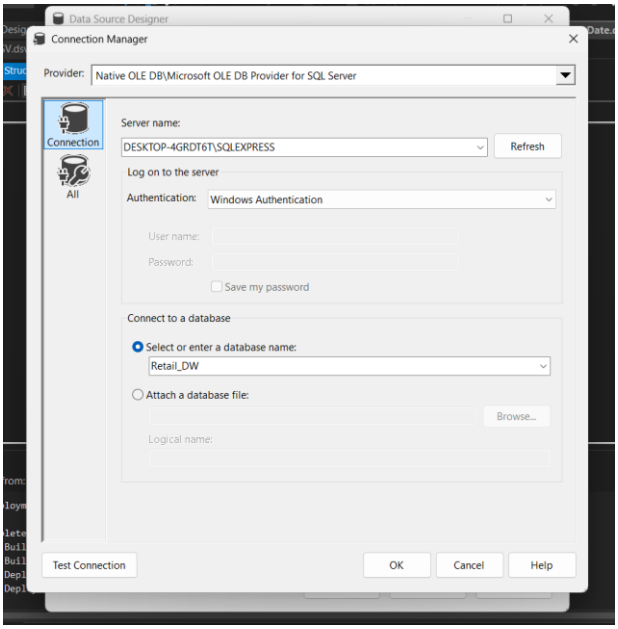


SSAS Cube Implementation

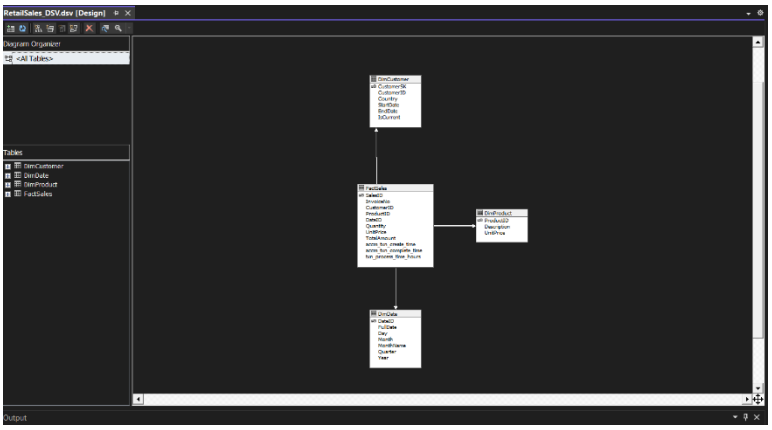
created an SSAS project named RetailSalesCube using SQL Server Data Tools (SSDT). The following steps were followed:

- **Data Source**: Configured to connect with the Retail_DW database.
- **Data Source View**: Included FactSales, DimProduct, DimCustomer, and DimDate tables with established foreign key relationships.
- **Cube Design**:
    - Added **FactSales** as the measure group.
    - Added **measures**: Quantity, UnitPrice, TotalAmount
    - Added **dimensions**: Product, Customer, Date
    - Implemented **one hierarchy** in DimDate: Year > Quarter > Month > Day

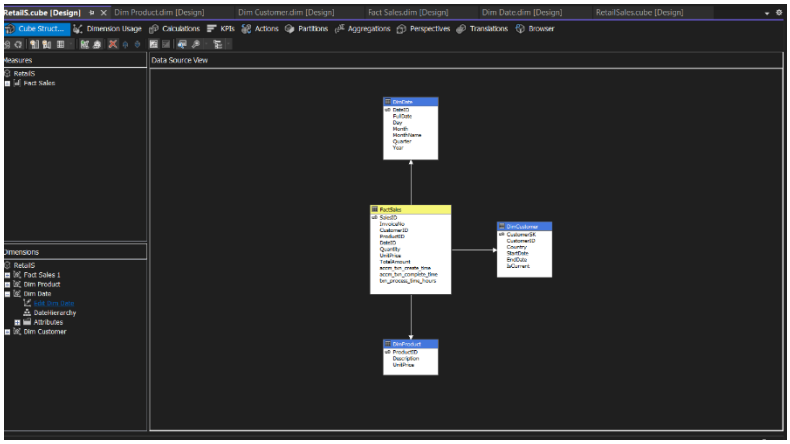
The cube was successfully deployed and processed.



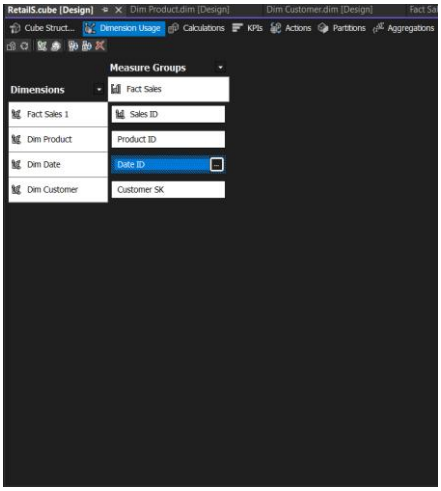
Data Source Connection



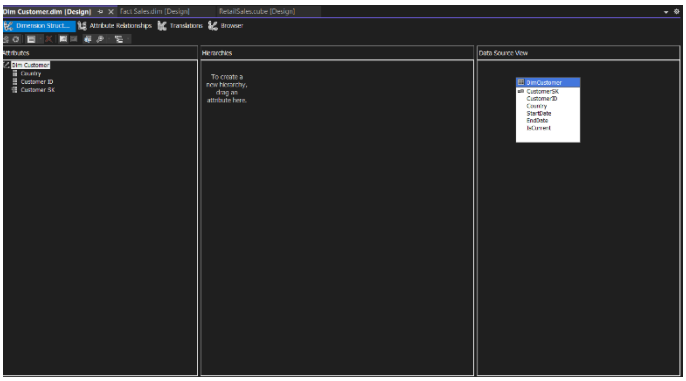
Data Source View



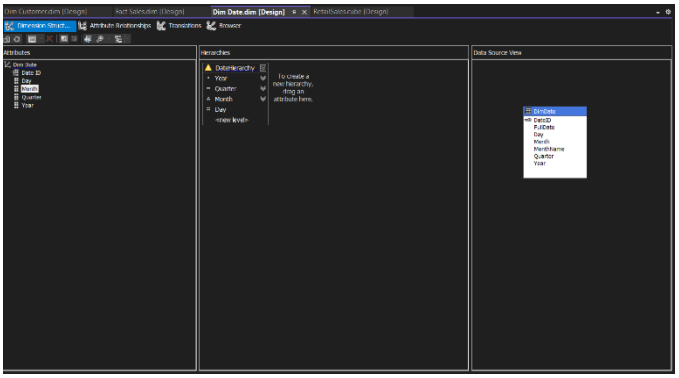
Cul **Cube Structure**



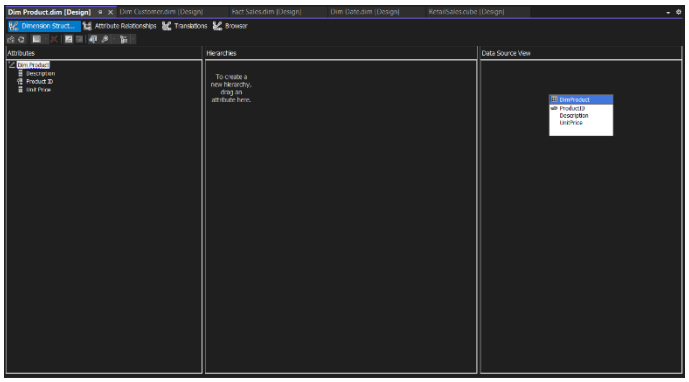
Cube-Dimension Usage



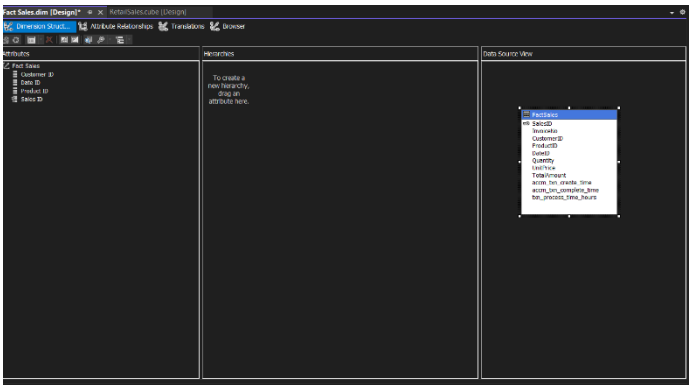
DimCustomer.dim



DimDate.dim



DimProduct.dim



FactSales.dim

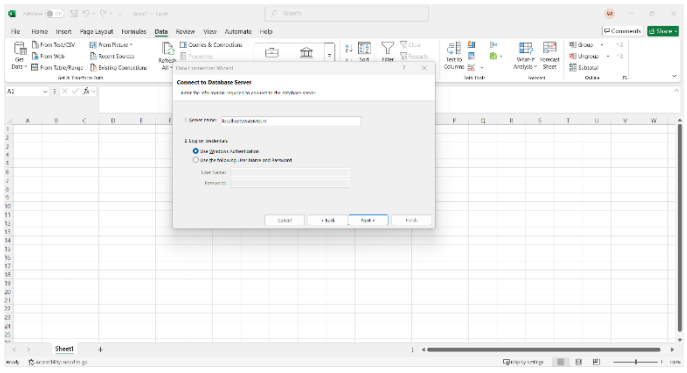
OLAP Operations in Excel

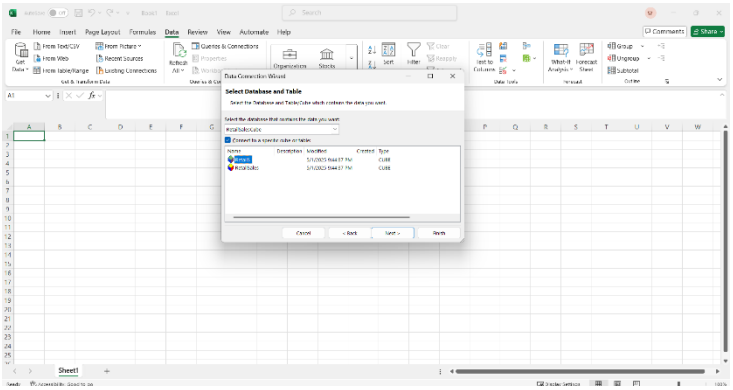
demonstrated OLAP operations using a Pivot Table in Excel connected to the SSAS Cube.

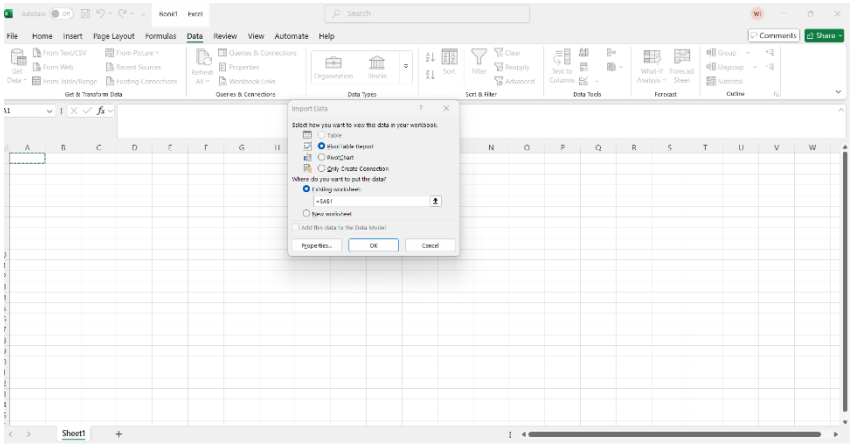
- **Connection**: Excel connected to the RetailSalesCube using Data → Get External Data → From Analysis Services.

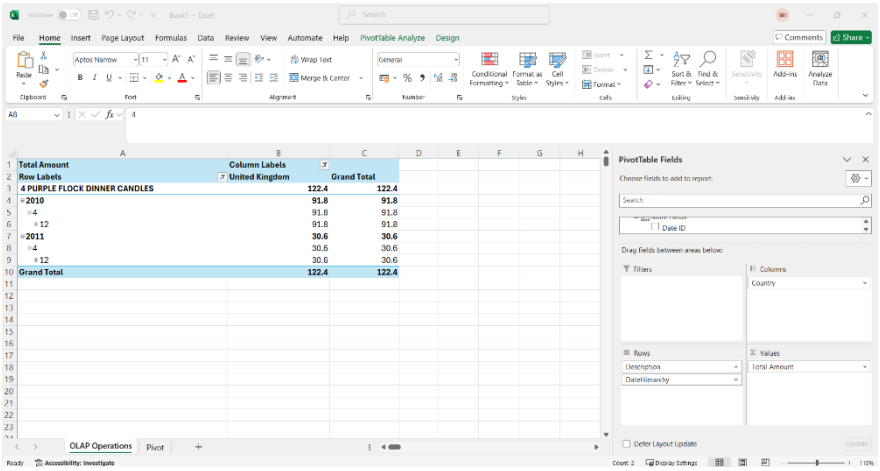
OLAP Operations:

- **Roll-up**: TotalAmount aggregated by Year using the Date hierarchy.
- **Drill-down**: Expanded Year to Quarter and then to Month for detailed analysis.
- **Slice**: Filtered data using a single Country (e.g., Germany) in the Customer dimension.
- **Dice**: Applied multiple filters (e.g., Country = Germany, Product Description = 'WHITE METAL LANTERN').
- **Pivot**: Changed rows and columns to switch between Country and Product.

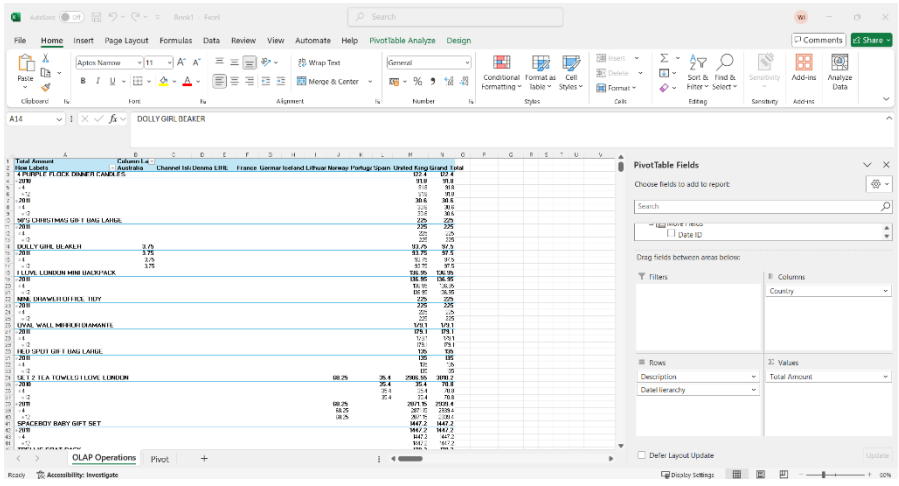




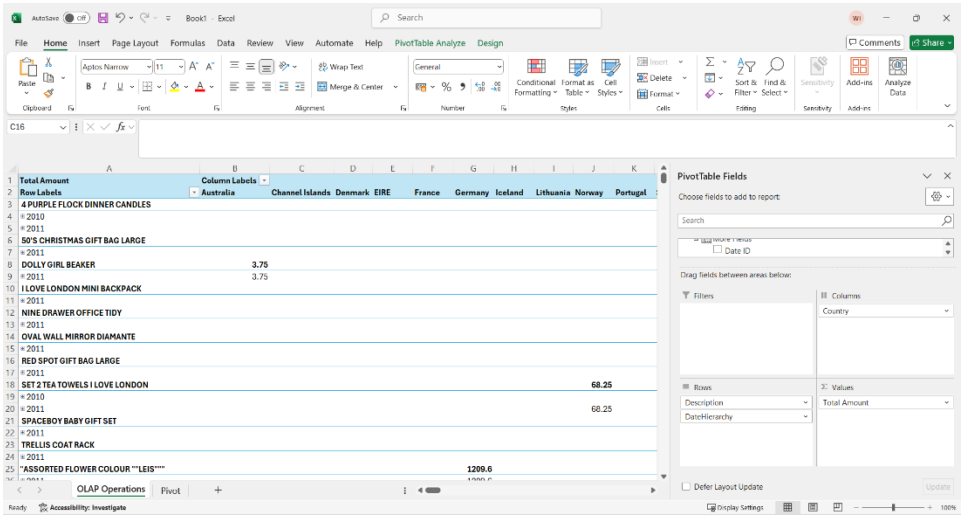




dice

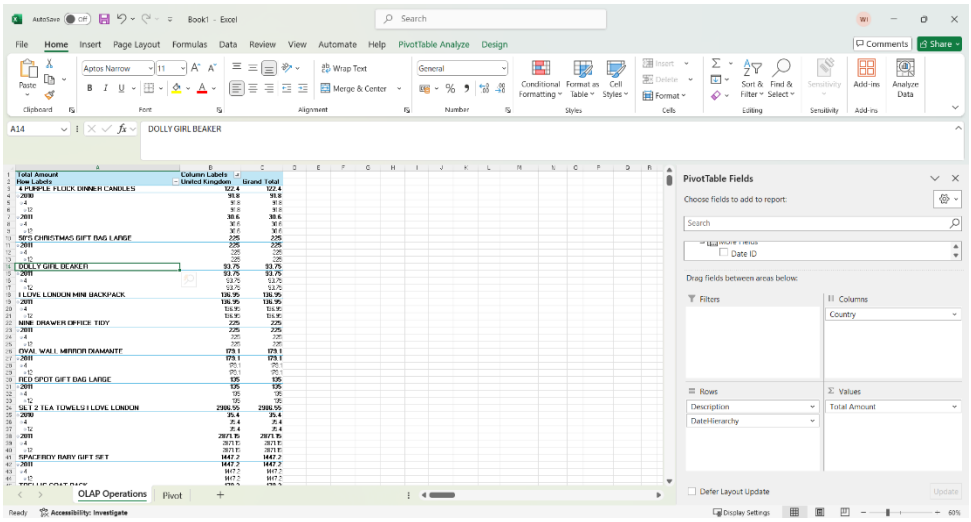


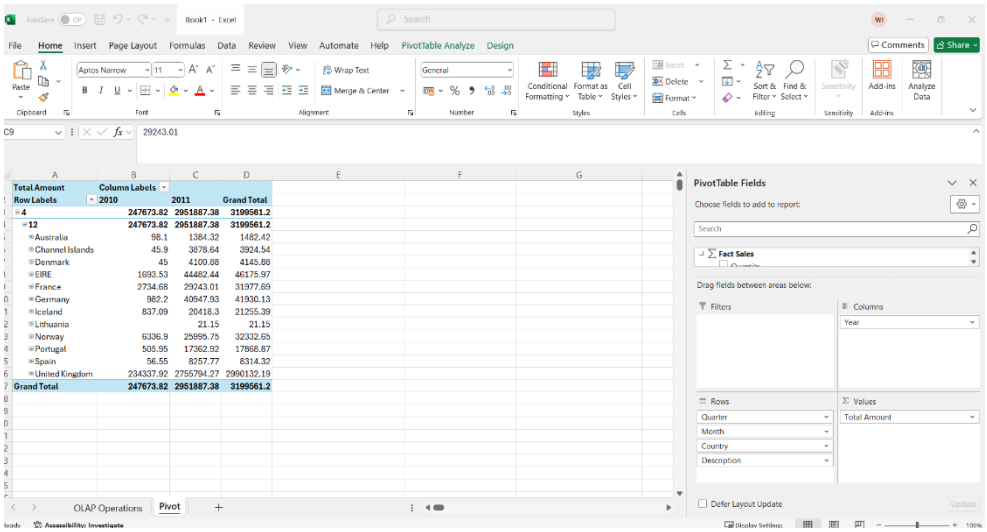
Drill down



Total Amount	Column Labels									
Row Labels	Australia	Channel Islands	Denmark	EIRE	France	Germany	Iceland	Lithuania	Norway	Portugal
4 PURPLE FLOCK DINNER CANDLES										
⊞2010										
⊞2011										
50'S CHRISTMAS GIFT BAG LARGE										
⊞2011										
DOLLY GIRL BEAKER		3.75								
⊞2011		3.75								
I LOVE LONDON MINI BACKPACK										
⊞2011										
NINE DRAWER OFFICE TIDY										
⊞2011										
OVAL WALL MIRROR DIAMANTE										
⊞2011										
RED SPOT GIFT BAG LARGE										
⊞2011										
SET 2 TEA TOWELS I LOVE LONDON									68.25	
⊞2010										
⊞2011									68.25	
SPACEBOY BABY GIFT SET										
⊞2011										
TRELLIS COAT RACK										
⊞2011										
"ASSORTED FLOWER COLOUR ""LEIS"""						1209.6				

Roll up





Power BI Reports

Power BI Desktop was used to create and publish four reports.

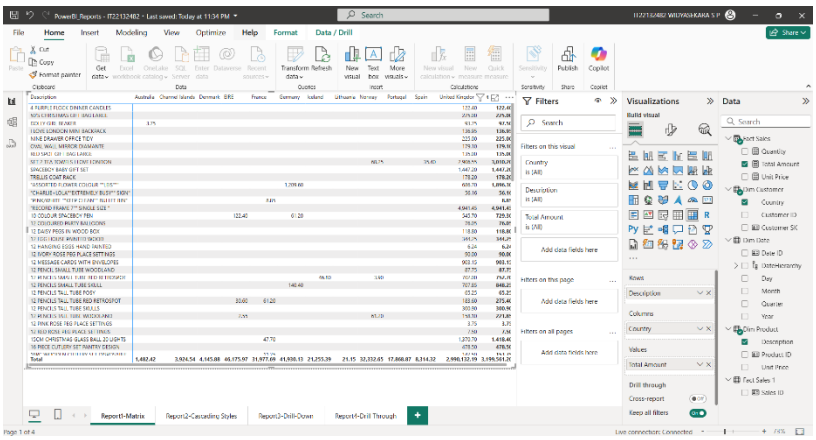
Report 1: Matrix Visual – Product Sales by Country

This report uses a **Matrix visual** to display detailed tabular sales data.

Steps:

1. Connected to the SSAS cube (RetailSalesCube) via Live Connection.
2. Dragged Description from the DimProduct dimension to the **Rows** section.
3. Dragged Country from the DimCustomer dimension to the **Columns** section.
4. Dragged Total Amount from the FactSales measure group to the **Values** section.
5. Enabled subtotals to show total sales by country and overall.

This report allows viewers to analyze product-wise revenue distribution across countries in a compact format.



Report 2 – Cascading Slicers with Charts

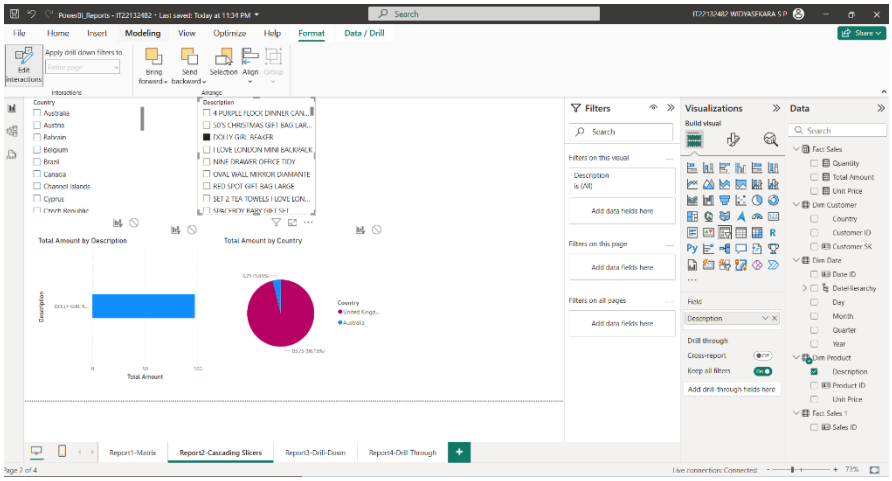
Objective:
To build an interactive report that allows users to slice data using dynamic filters and visualize insights using multiple charts.

Steps Followed:

1. **Data Import and Model Setup:**
    - Connected the Power BI report to the SSAS cube (RetailSalesCube) hosted on the localhost\SSASMULTI server.
    - Verified relationships between FactSales, DimProduct, and DimCustomer within the cube.

2. **Slicer Configuration (Cascading Filters):**
    - **Slicer 1 (Country):** Added Country from DimCustomer.
    - **Slicer 2 (Description):** Added Description from DimProduct.
    - Enabled **Edit Interactions** so that selecting a country dynamically filters available product descriptions.
    - This creates a *cascading slicer* experience for the user.
3. **Visuals Created:**
    - **Bar Chart:** Total Amount by Product Description.
        - **X-Axis:** Total Amount (aggregated measure).
        - **Y-Axis:** Description.
        - Filters based on selected country and product.
    - **Pie Chart:** Total Amount by Country.
        - Shows the proportion of sales per country based on slicer input.
4. **Formatting:**
    - Renamed slicers to user-friendly labels: Select Country and Select Product.
    - Added clear titles to visuals: Total Amount by Description, Total Amount by Country.
    - Applied consistent theme and layout for readability.

Outcome:
The report allows users to interactively select a country, which filters available product descriptions. Selecting both parameters updates both visualizations in real-time, making it a powerful exploratory tool for sales analysis by geography and product.



Report 3: Drill-Down Report – Total Amount by Year → Quarter → Month

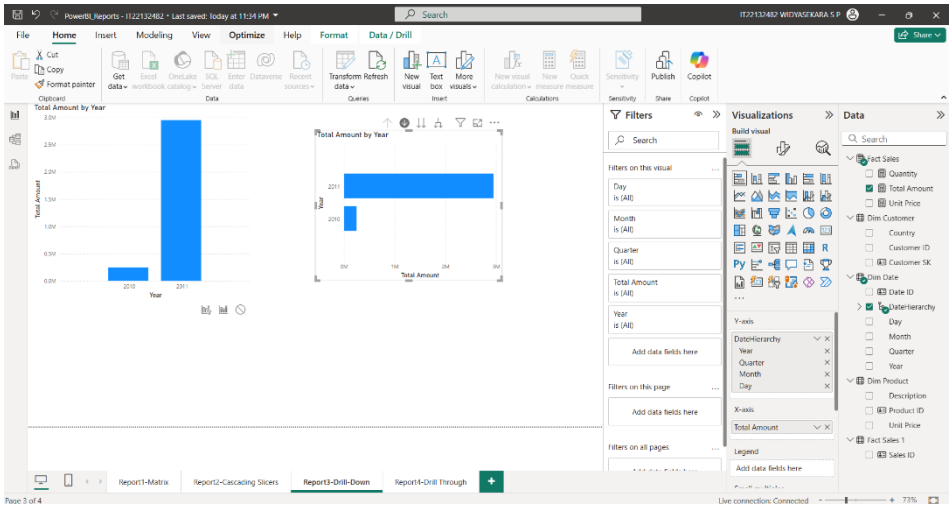
Objective:
To enable users to analyze total sales performance over time using a hierarchical time-based exploration.

Steps Followed:

1. **Data Preparation:**
    - Used the existing DimDate table containing columns: Year, Quarter, Month, and Day.
    - Verified that the date-related columns were clean and correctly populated.
    - Ensured relationships were properly set between FactSales and DimDate via DateID.
2. **Modeling:**
    - A hierarchy named DateHierarchy was already defined in DimDate, comprising:
        - Year
        - Quarter
        - Month
        - Day
    - This hierarchy was used to allow drill-down functionality.

3. **Visual Creation:**
    - Inserted a **Stacked Column Chart** from the Visualizations pane.
    - Added DateHierarchy to the **X-axis** and Total Amount from FactSales to the **Y-axis**.
    - Enabled **drill-down controls** on the visual to allow users to click and explore data from **Year → Quarter → Month → Day**.
4. **Design:**
    - Customized the title to:
      "Total Sales Amount by Date Hierarchy"
    - Applied formatting to axis titles and tooltips for clarity.
    - Tested navigation using the **drill-down** and **drill-up** buttons.

Outcome:
Users can now click on a year (e.g., 2011) to view sales broken down by quarters and further into months. This provides a clear, interactive way to analyze sales trends over time.



Report 4: Drill-Through Report (Based on Product Description)

This report enables users to explore detailed information about a product by **right-clicking on a visual and selecting "Drill Through → Product Details"**. The **drill-through filter is configured using Product Description** from the DimProduct table.

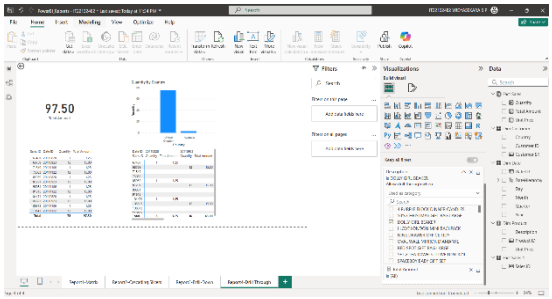
On the **main report page** (Report 2), users interact with visuals like bar charts or slicers. When a product description is selected and right-clicked, the user is directed to a **dedicated Product Details page**.

The Product Details Page Includes:

- A **Card visual** showing the Total Amount for the selected product.
- A **Bar Chart** showing Total Amount by Country.
- A **Table** with detailed fields: Date, Quantity, and Unit Price.
- A **Back button** to return to the previous report.

The entire page dynamically filters based on the selected Product Description, making it easy to analyze the sales performance and geographic distribution of a specific product.

This drill-through design improves user interaction and supports detailed data exploration starting from summarized visuals.



Reports were published to **Power BI Service** using university email credentials.