Sri Lanka Institute of Information Technology

Assignment 2

Data Warehouse & Business Intelligence – IT3021

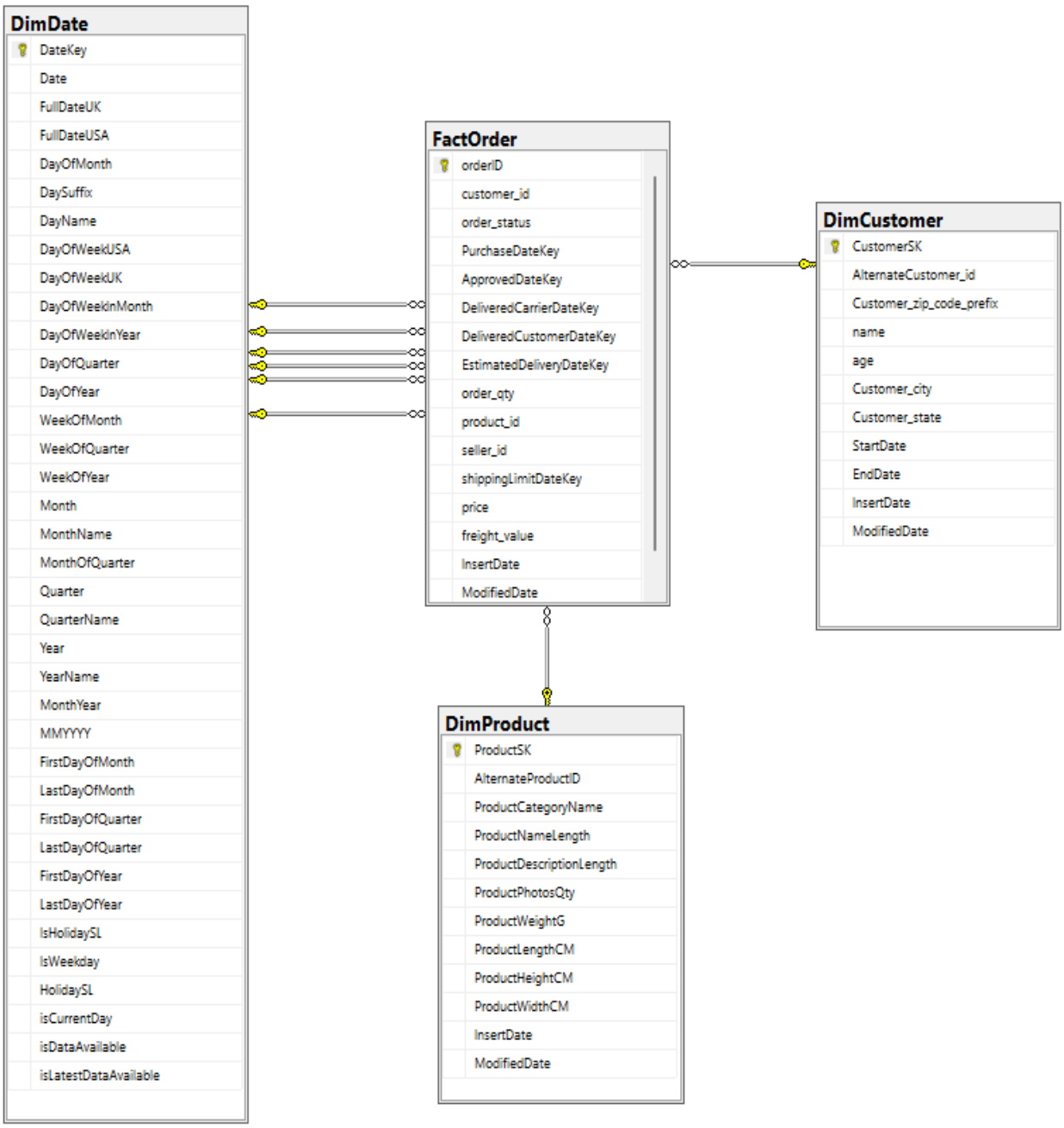
B.Sc. (Hons) in Information Technology

IT22584854

Rashmika S.E.S

1. Data source for the assignment 2

ER Diagram



The warehouse implements a star schema

- FactOder Table
  - Captures every line-item of every order as one row
  - Primary key : OrderID
  - FKs to six date keys in **DimDate** (purchase, approval, carrier pickup, customer delivery, estimated delivery, shipping-limit)
  - FKs to **DimCustomer** (CustomerSK) and **DimProduct** (ProductSK)
  - Measures: Order_Qty, Price, Freight_Value

- **DimCustomer**
  - stores customer demographics and location attributes along with effective date stamps.
  - Surrogate key: CustomerSK
  - implements a Type 2 slowly-changing dimension(Customer_city, Customer_state)

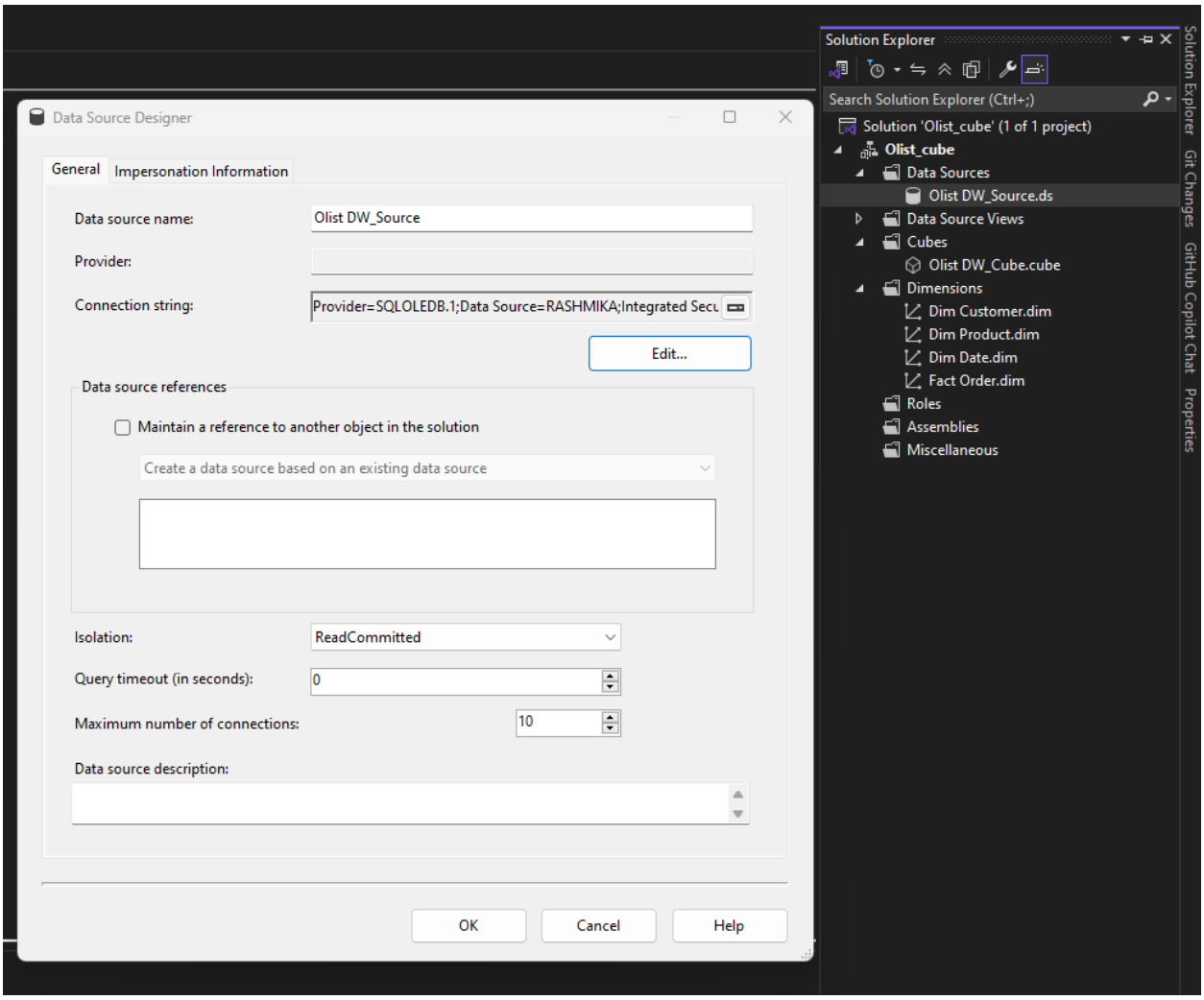
- DimProduct
  - Contains product metadata: category name, textual metrics (name-length, description-length, photo count) and physical specifications (weight, dimensions).
  - Surrogate key: ProductSK

- **DimDate**

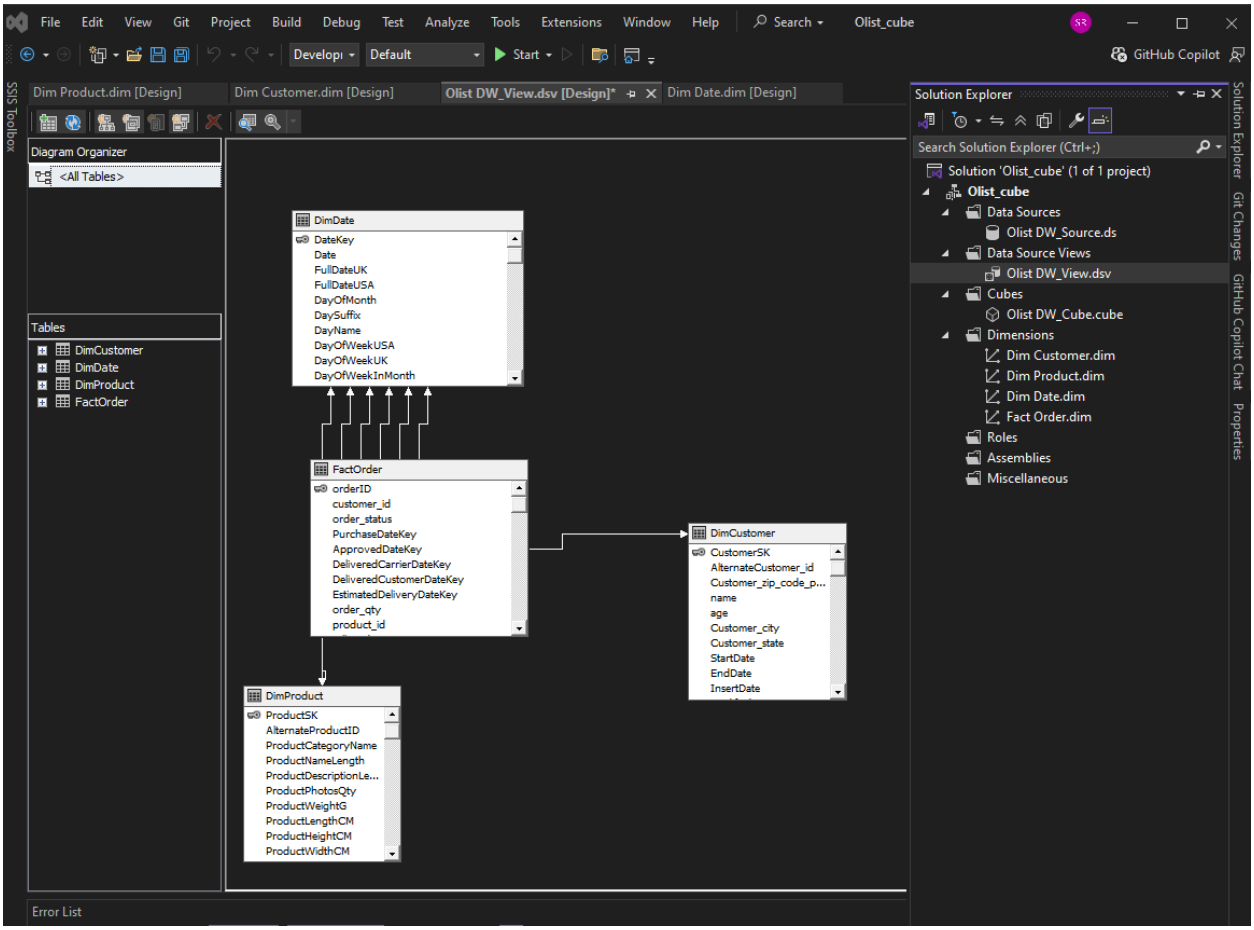
  - provides a full calendar hierarchy—day, week of month/quarter/year, month name, quarter, year—and common flags such as IsWeekday, IsHolidaySL and IsCurrentDay
  - Surrogate key: DateKey

2: SSAS Cube implementation

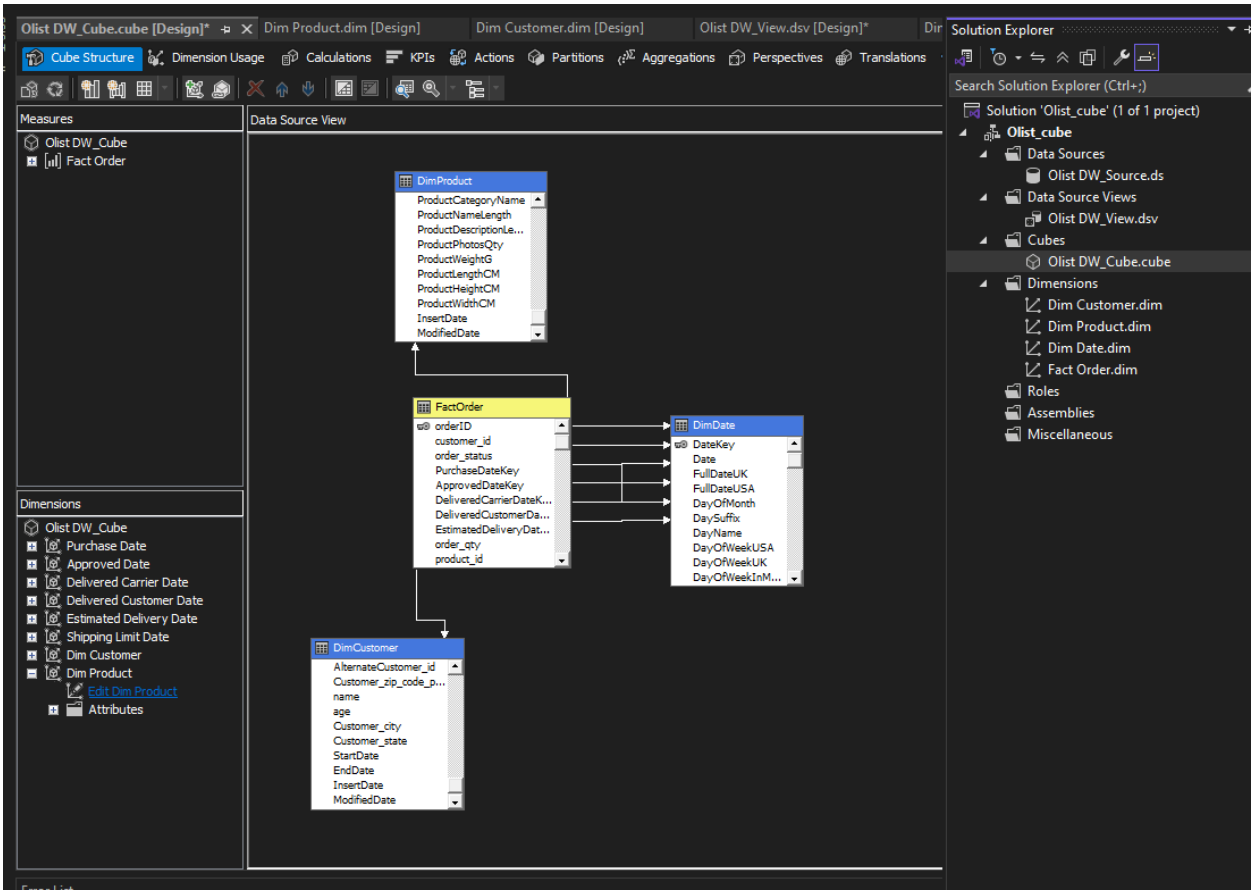
1. Created data source file. Choose data source as Data warehouse



2. Created data source view and map dimension tables and measure (fact) tables.

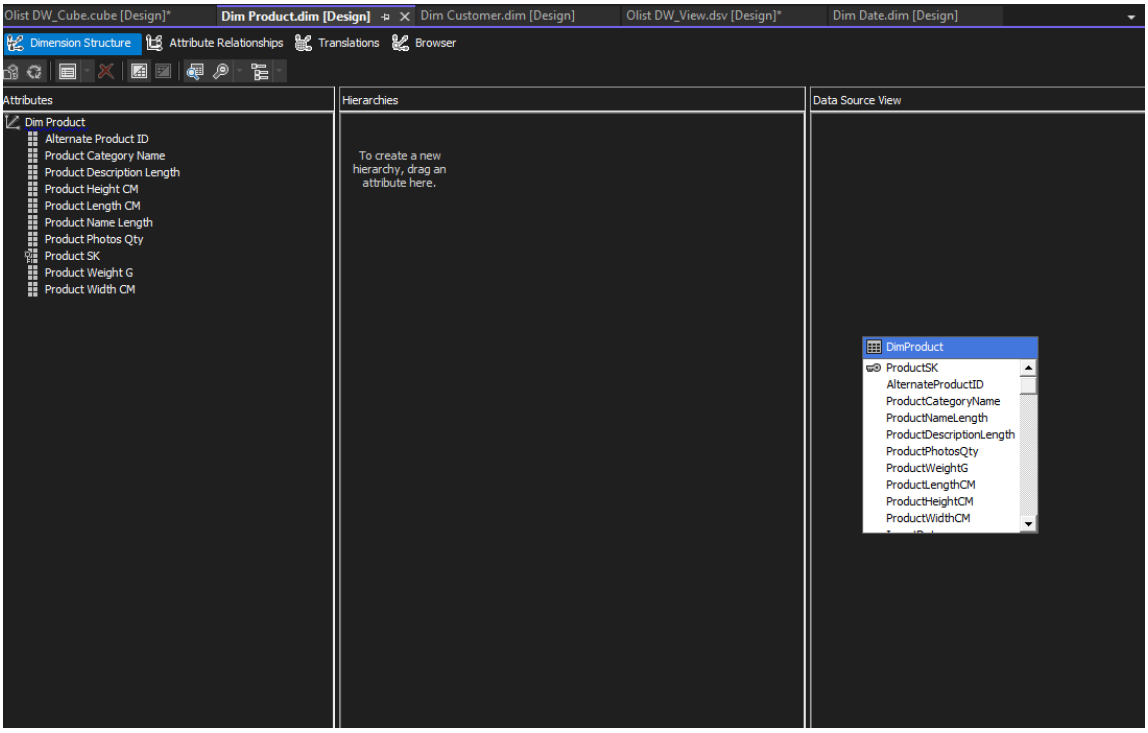


3. Create the cube

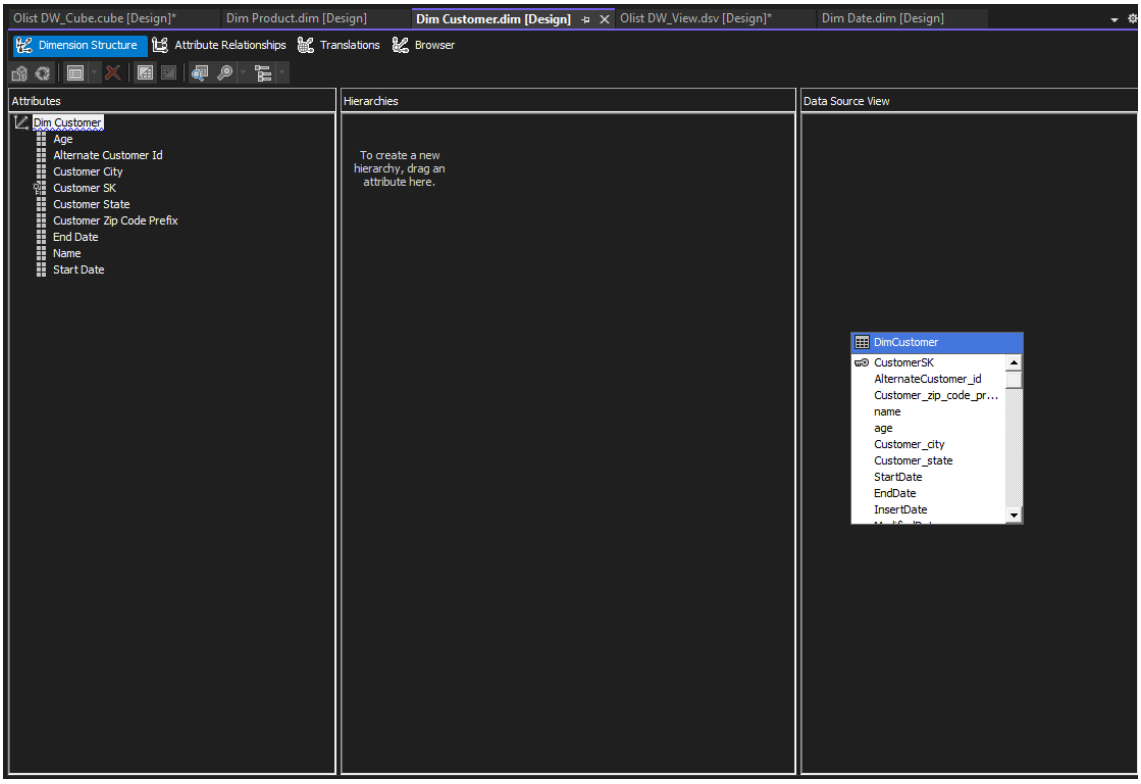


4. Select all the fields (except for Surrogate Key) in Dimensional tables visible in Data Source View pane on right, drag and drop them on the Attribute pane on the left side.

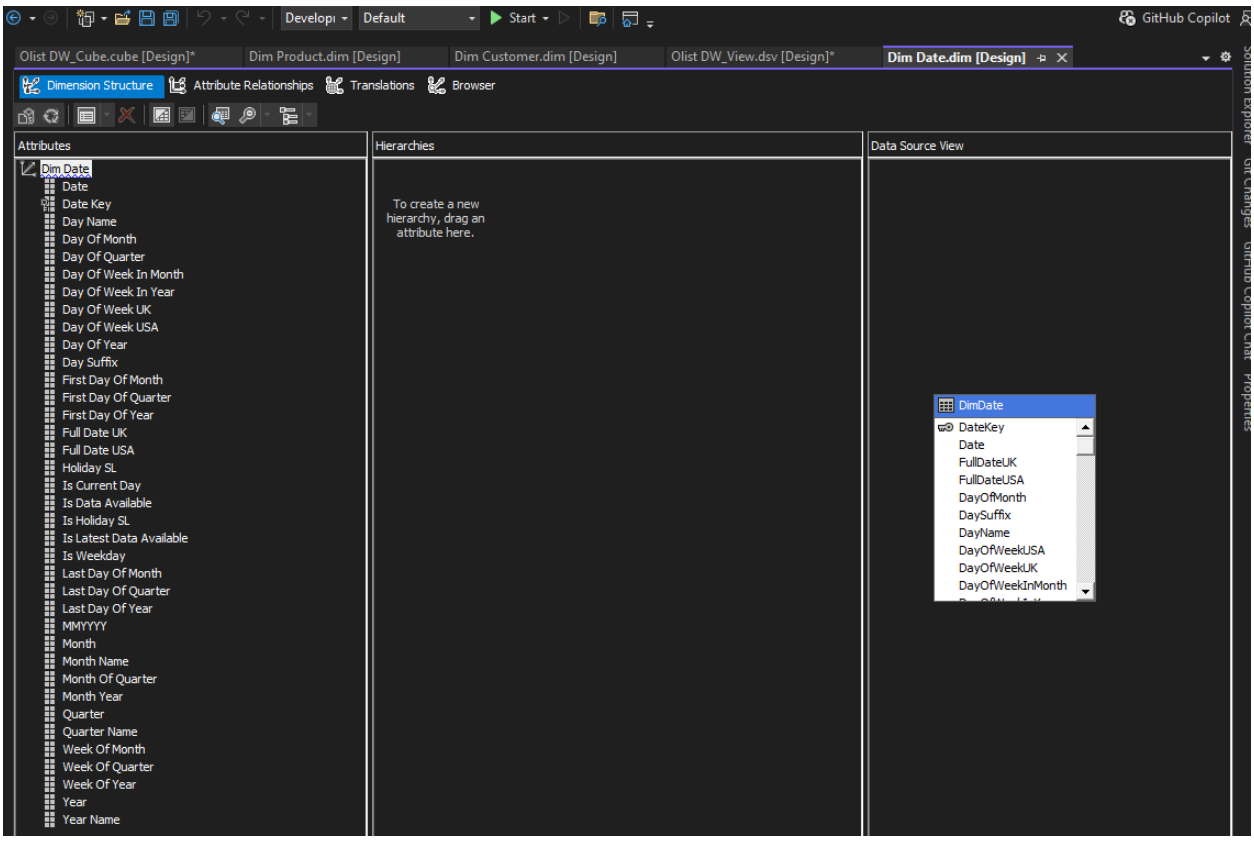
DimProduct



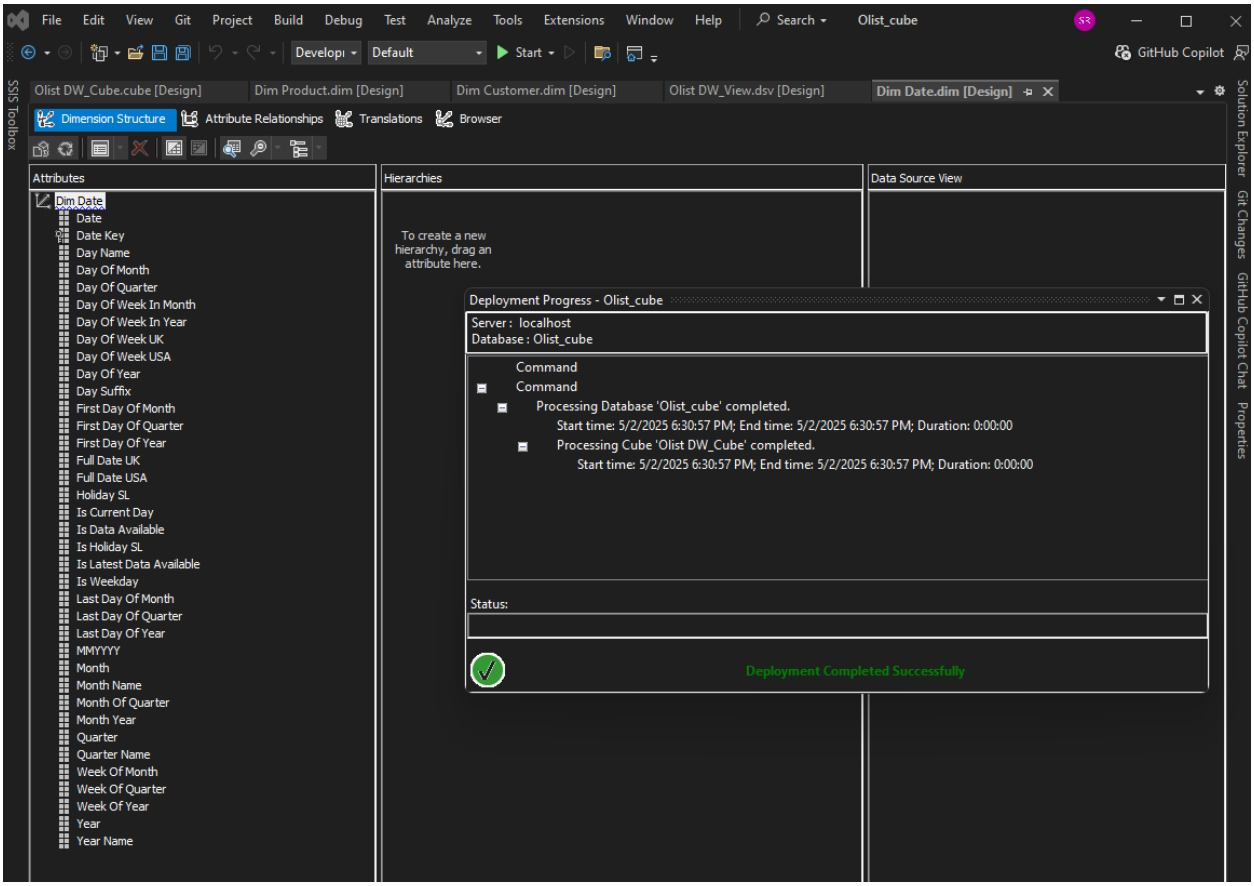
DimCustomer



DimPurchaseDate

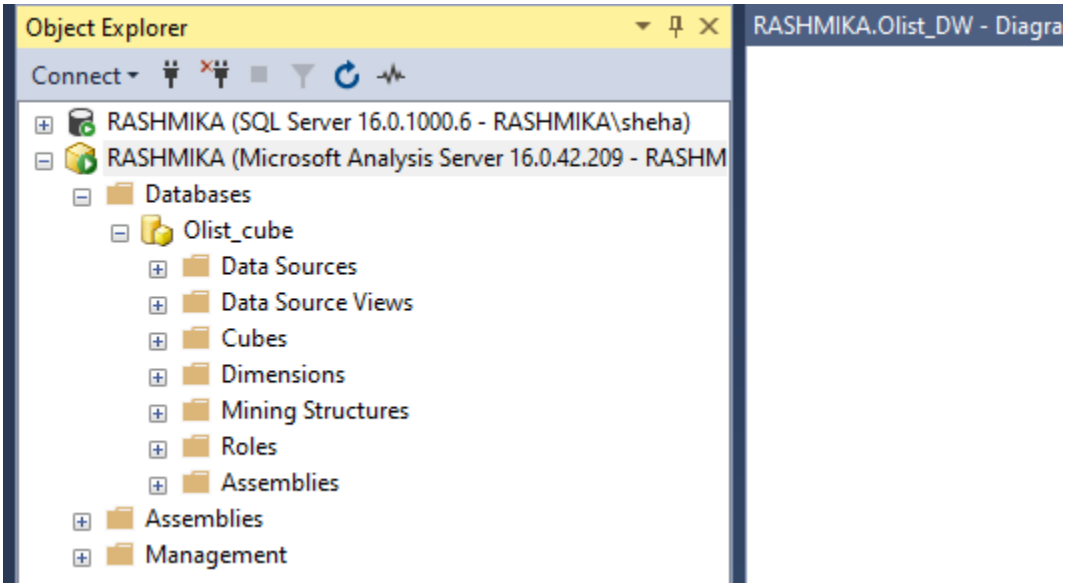


5. Deploy the cube



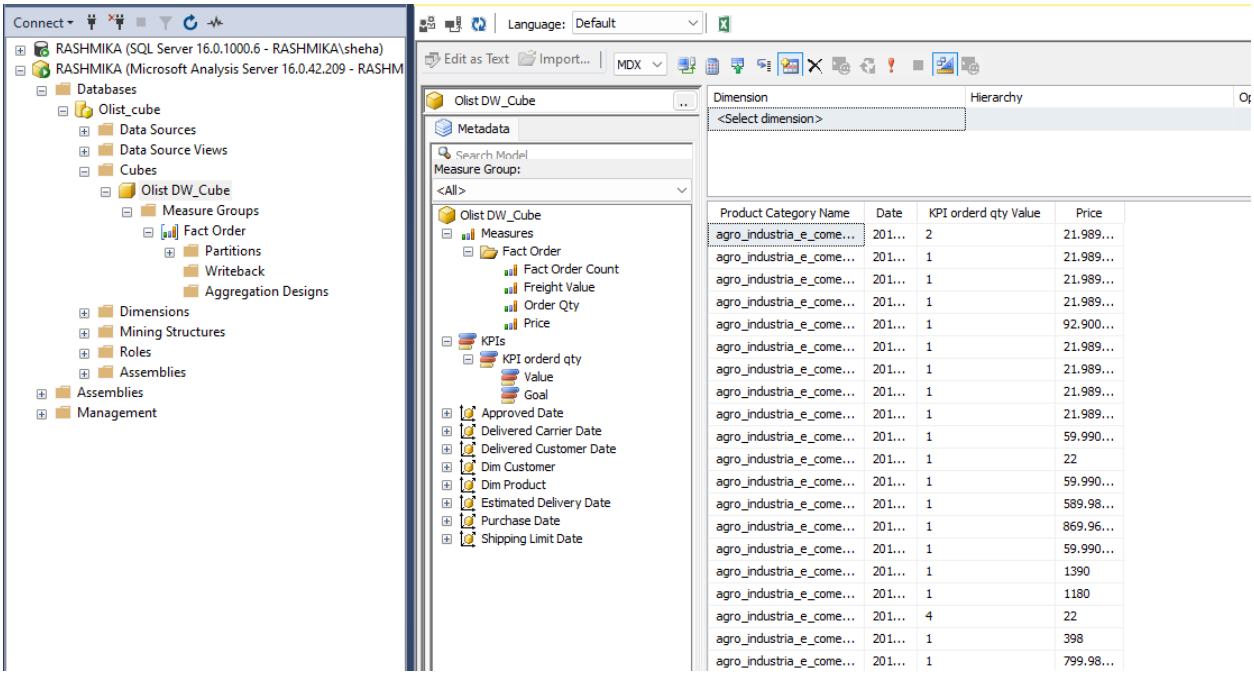
3: Demonstration of OLAP operations

1. Connect to ‘Analysis service’ in SQL server. Then the deployed SSAS project is displayed.

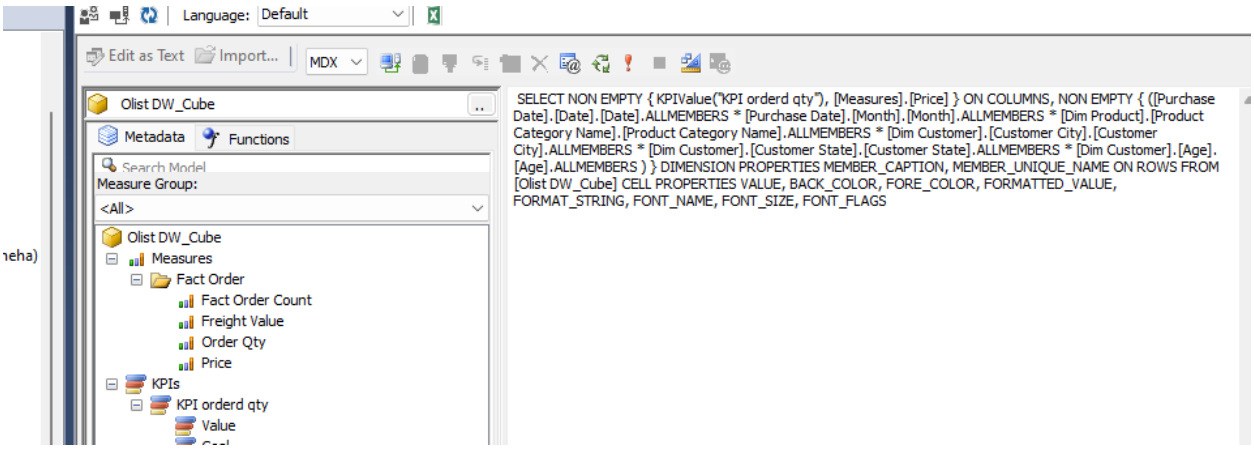


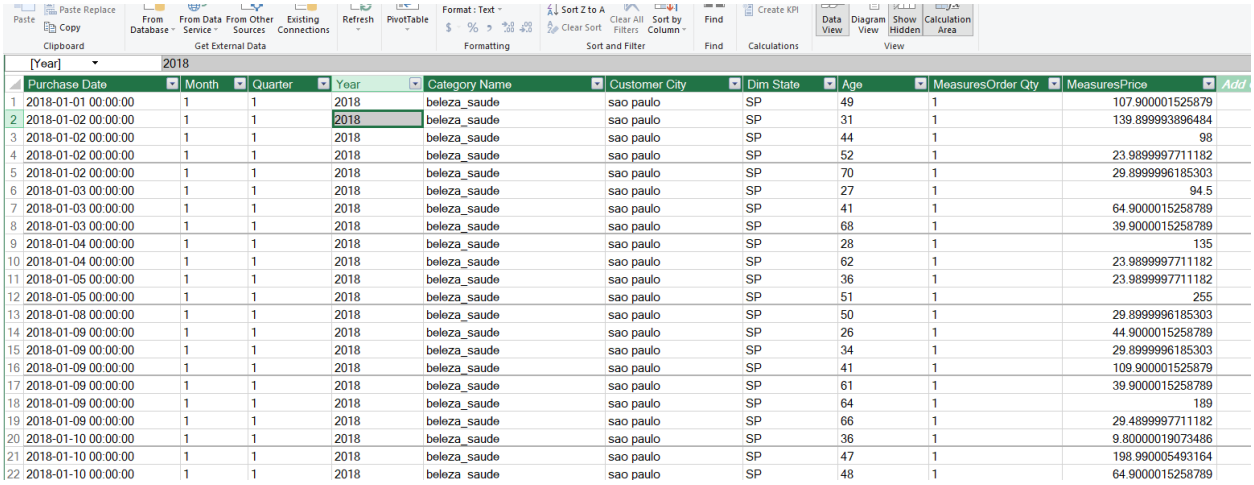
2. Locate the cube that created, open Brower window and drag and drop following columns.

   - [Dim Product].[Product Category Name]
   - [Purchase Date].[Date]
   - KPIValue("KPI orderd qty")
   - [Measures].[Price]



3. Get the MDX query from SQL server and passed to the backend of the Excel Power Pivot service.

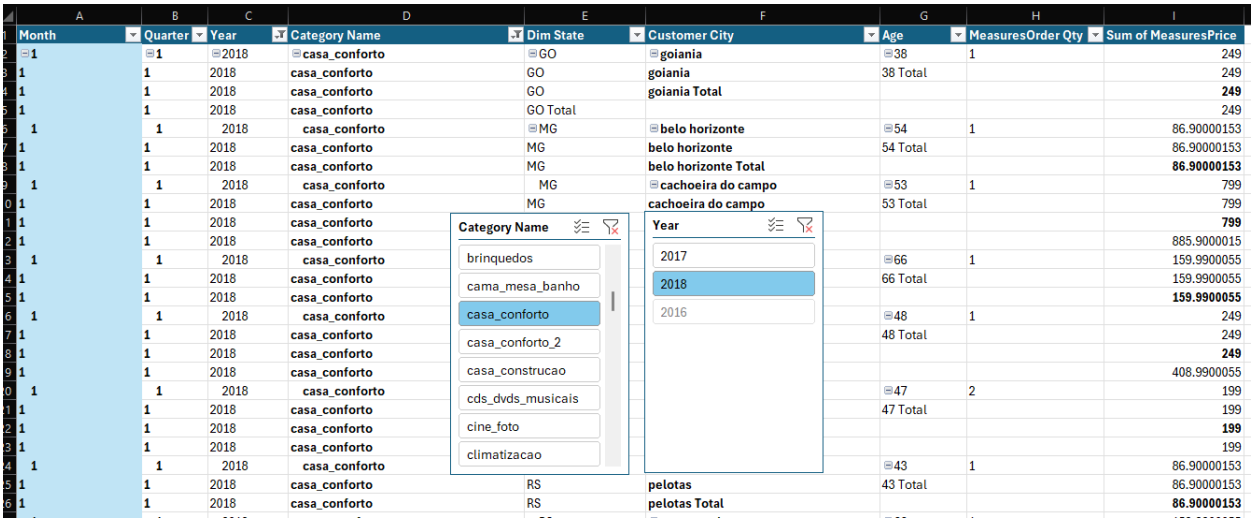




[Year] 2018

	Purchase Date	Month	Quarter	Year	Category Name	Customer City	Dim State	Age	MeasuresOrder Qty	MeasuresPrice
1	2018-01-01 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	49	1	107.900001525879
2	2018-01-02 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	31	1	139.899993896484
3	2018-01-02 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	44	1	98
4	2018-01-02 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	52	1	23.9899997711182
5	2018-01-02 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	70	1	29.8999996185303
6	2018-01-03 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	27	1	94.5
7	2018-01-03 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	41	1	64.9000015258789
8	2018-01-03 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	68	1	39.9000015258789
9	2018-01-04 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	28	1	135
10	2018-01-04 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	62	1	23.9899997711182
11	2018-01-05 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	36	1	23.9899997711182
12	2018-01-05 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	51	1	255
13	2018-01-08 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	50	1	29.8999996185303
14	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	26	1	44.9000015258789
15	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	34	1	29.8999996185303
16	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	41	1	109.900001525879
17	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	61	1	39.9000015258789
18	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	64	1	189
19	2018-01-09 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	66	1	29.4899997711182
20	2018-01-10 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	36	1	9.80000019073486
21	2018-01-10 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	47	1	198.990005493164
22	2018-01-10 00:00:00	1	1	2018	beleza_saude	sao paulo	SP	48	1	64.9000015258789

DICE

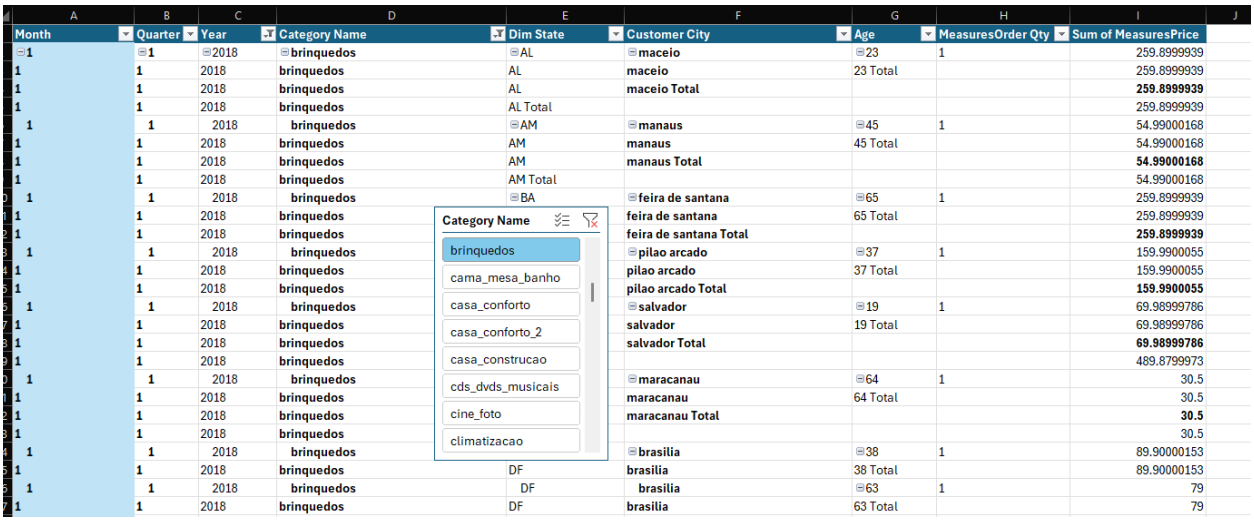


Month	Quarter	Year	Category Name	Dim State	Customer City	Age	MeasuresOrder Qty	Sum of MeasuresPrice
1	1	2018	casa_conforto	GO	goiania	38	1	249
1	1	2018	casa_conforto	GO	goiania	38 Total		249
1	1	2018	casa_conforto	GO	goiania Total			249
1	1	2018	casa_conforto	GO Total				249
1	1	2018	casa_conforto	MG	belo horizonte	54	1	86.90000153
1	1	2018	casa_conforto	MG	belo horizonte	54 Total		86.90000153
1	1	2018	casa_conforto	MG	belo horizonte Total			86.90000153
1	1	2018	casa_conforto	MG	cachoeira do campo	53	1	799
1	1	2018	casa_conforto	MG	cachoeira do campo	53 Total		799
1	1	2018	casa_conforto	MG	cachoeira do campo Total			799
1	1	2018	casa_conforto	MG Total				885.9000015
1	1	2018	casa_conforto	RS	pelotas	66	1	159.9900055
1	1	2018	casa_conforto	RS	pelotas	66 Total		159.9900055
1	1	2018	casa_conforto	RS	pelotas Total			159.9900055
1	1	2018	casa_conforto	SC	florianopolis	48	1	249
1	1	2018	casa_conforto	SC	florianopolis	48 Total		249
1	1	2018	casa_conforto	SC	florianopolis Total			249
1	1	2018	casa_conforto	SC Total				408.9900055
1	1	2018	casa_conforto	SP	sao paulo	47	2	199
1	1	2018	casa_conforto	SP	sao paulo	47 Total		199
1	1	2018	casa_conforto	SP	sao paulo Total			199
1	1	2018	casa_conforto	SP Total				199
1	1	2018	casa_conforto	TO	palmas	43	1	86.90000153
1	1	2018	casa_conforto	TO	palmas	43 Total		86.90000153
1	1	2018	casa_conforto	TO	palmas Total			86.90000153

Category Name: brinquedos, cama_mesa_banho, casa_conforto, casa_conforto_2, casa_construcao, cds_dvds_musicais, cine_foto, climatizacao

Year: 2017, 2018, 2016

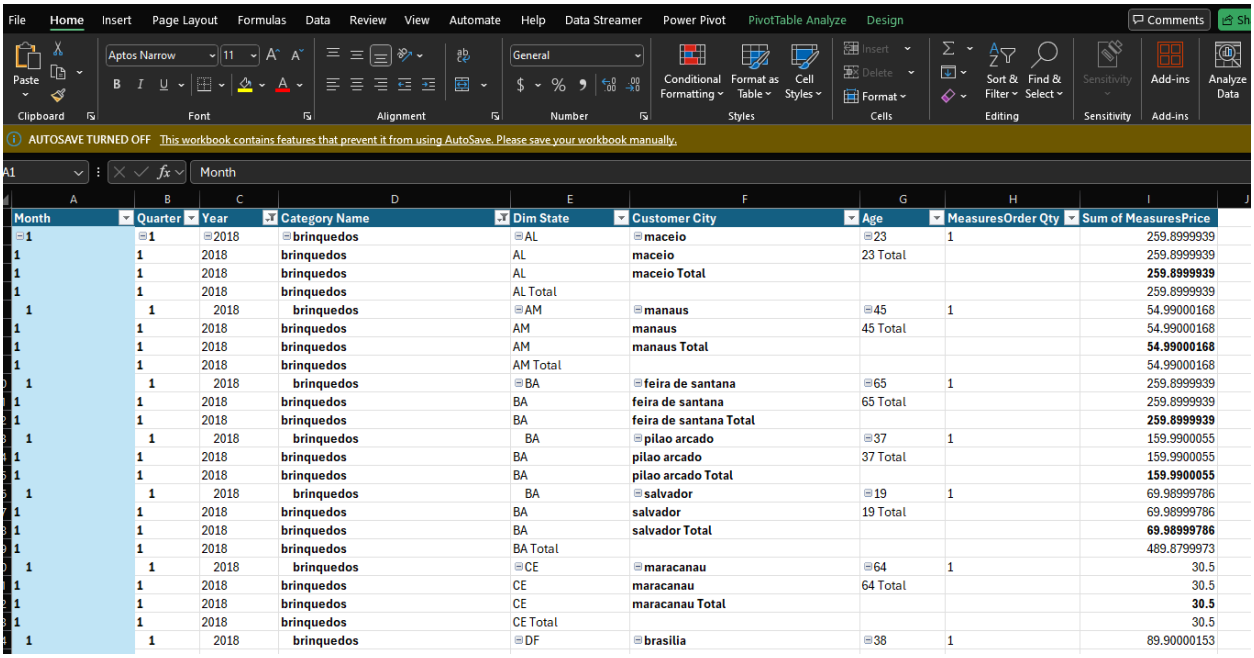
SLICE



Month	Quarter	Year	Category Name	Dim State	Customer City	Age	MeasuresOrder Qty	Sum of MeasuresPrice
1	1	2018	brinquedos	AL	maceio	23	1	259.8999939
1	1	2018	brinquedos	AL	maceio	23 Total		259.8999939
1	1	2018	brinquedos	AL	maceio Total			259.8999939
1	1	2018	brinquedos	AL Total				259.8999939
1	1	2018	brinquedos	AM	manaus	45	1	54.99000168
1	1	2018	brinquedos	AM	manaus	45 Total		54.99000168
1	1	2018	brinquedos	AM	manaus Total			54.99000168
1	1	2018	brinquedos	AM Total				54.99000168
1	1	2018	brinquedos	BA	feira de santana	65	1	259.8999939
1	1	2018	brinquedos	BA	feira de santana	65 Total		259.8999939
1	1	2018	brinquedos	BA	feira de santana Total			259.8999939
1	1	2018	brinquedos	DF	pilao arcado	37	1	159.9900055
1	1	2018	brinquedos	DF	pilao arcado	37 Total		159.9900055
1	1	2018	brinquedos	DF	pilao arcado Total			159.9900055
1	1	2018	brinquedos	MG	salvador	19	1	69.98999786
1	1	2018	brinquedos	MG	salvador	19 Total		69.98999786
1	1	2018	brinquedos	MG	salvador Total			69.98999786
1	1	2018	brinquedos	MG Total				489.8799973
1	1	2018	brinquedos	RJ	maracanau	64	1	30.5
1	1	2018	brinquedos	RJ	maracanau	64 Total		30.5
1	1	2018	brinquedos	RJ	maracanau Total			30.5
1	1	2018	brinquedos	RJ Total				30.5
1	1	2018	brinquedos	DF	brasilia	38	1	89.90000153
1	1	2018	brinquedos	DF	brasilia	38 Total		89.90000153
1	1	2018	brinquedos	DF	brasilia	63	1	79
1	1	2018	brinquedos	DF	brasilia	63 Total		79

Category Name: brinquedos, cama_mesa_banho, casa_conforto, casa_conforto_2, casa_construcao, cds_dvds_musicais, cine_foto, climatizacao

PIVOT



Month	Quarter	Year	Category Name	Dim State	Customer City	Age	MeasuresOrder Qty	Sum of MeasuresPrice
1	1	2018	brinquedos	AL	maceio	23	1	259.8999939
1	1	2018	brinquedos	AL	maceio	23 Total		259.8999939
1	1	2018	brinquedos	AL	maceio Total			259.8999939
1	1	2018	brinquedos	AL Total				259.8999939
1	1	2018	brinquedos	AM	manaus	45	1	54.99000168
1	1	2018	brinquedos	AM	manaus	45 Total		54.99000168
1	1	2018	brinquedos	AM	manaus Total			54.99000168
1	1	2018	brinquedos	AM Total				54.99000168
1	1	2018	brinquedos	BA	feira de santana	65	1	259.8999939
1	1	2018	brinquedos	BA	feira de santana	65 Total		259.8999939
1	1	2018	brinquedos	BA	feira de santana Total			259.8999939
1	1	2018	brinquedos	BA	pilao arcado	37	1	159.9900055
1	1	2018	brinquedos	BA	pilao arcado	37 Total		159.9900055
1	1	2018	brinquedos	BA	pilao arcado Total			159.9900055
1	1	2018	brinquedos	BA	salvador	19	1	69.98999786
1	1	2018	brinquedos	BA	salvador	19 Total		69.98999786
1	1	2018	brinquedos	BA	salvador Total			69.98999786
1	1	2018	brinquedos	BA Total				489.8799973
1	1	2018	brinquedos	CE	maracanau	64	1	30.5
1	1	2018	brinquedos	CE	maracanau	64 Total		30.5
1	1	2018	brinquedos	CE	maracanau Total			30.5
1	1	2018	brinquedos	CE Total				30.5
1	1	2018	brinquedos	DF	brasilia	38	1	89.90000153

4. PowerBI Reports

1. Data Preparation

Source & Import:

- Excel workbook: Sales.xlsx
- Power BI: Home → Get Data → Excel → Sales sheet → Load

Data-Type Verification & Adjustment:

- Purchase Date → Date
- Category Name, Customer City → Text
- Order Qty → Whole Number

• Price → Decimal Number

Data Cleaning:

• Removed rows where Date, Qty or Price were blank or null

• Trimmed leading/trailing spaces on all text fields

• Standardized city names (e.g. “New York City” vs. “NYC”)

• Ensured TransactionID uniqueness (no duplicates)

2. Data Modeling

Calendar Table (DAX):

```
Calendar = CALENDAR(
   MIN(Sales[Purchase Date]),
   MAX(Sales[Purchase Date])
)
```

Calendar Table Columns:

• Year

• Quarter

• Month

Relationships:

• Sales[Purchase Date] → Calendar[Date] (One-to-Many)

- Reason: Enables time-based filtering (Year/Quarter/Month slicers)

3. DAX Measures Created

Total Sales = SUM(Sales[Price])

Total Quantity = SUM(Sales[Order Qty])

Unit Price = DIVIDE([Total Sales], [Total Quantity])

Max Ordered Category Name =

CALCULATE(

  FIRSTNONBLANK(Sales[Category Name], 1),

  TOPN(1, SUMMARIZE(Sales, Sales[Category Name], "Qty", SUM(Sales[Order Qty])), [Qty], DESC)

)

Min Ordered Category Name =

CALCULATE(

  FIRSTNONBLANK(Sales[Category Name], 1),

TOPN(1, SUMMARIZE(Sales, Sales[Category Name], "Qty", SUM(Sales[Order Qty])), [Qty], ASC)

)

4. Report Design & Visualizations

Slicers:

• Purchase Date (hierarchy: Year > Month > Week)

• Product Category (dropdown)

• Customer City (searchable dropdown)

Main Visuals:

• Bar Chart: Ordered Quantity by Category

• Bar Chart: Ordered Quantity by City

• Table: Category Name + Unit Price

• KPI Cards:

– Max Ordered Category

– Min Ordered Category

– Total Sales (formatted with thousands separator)

Design Choices:

- Blue-themed corporate palette
- Conditional formatting for emphasis
- Consistent alignment using a 12-column grid

5. User Interactivity

- Date slicer filters all visuals in real time
- Changing Category or City updates charts, tables & cards
- Unit Price and category rankings adjust automatically based on slicers

6. Summary

This dashboard enables stakeholders to:

- Analyze sales trends over time and by product category or city
- Identify top- and bottom-performing categories
- Drill down from Year → Month → Week
- Compare unit pricing across categories