Sri Lanka Institute of Information Technology

Data Warehousing and Business Intelligence

IT3021

Assignment 2

2025

Assignment 2 Report

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Contents

1. Data source

1.1 Data Source Introduction

The data warehouse, which was created and loaded using the transformed, staged data in the assignment has been used as the data source for this project (Global Fashion Retail Sales - DW)

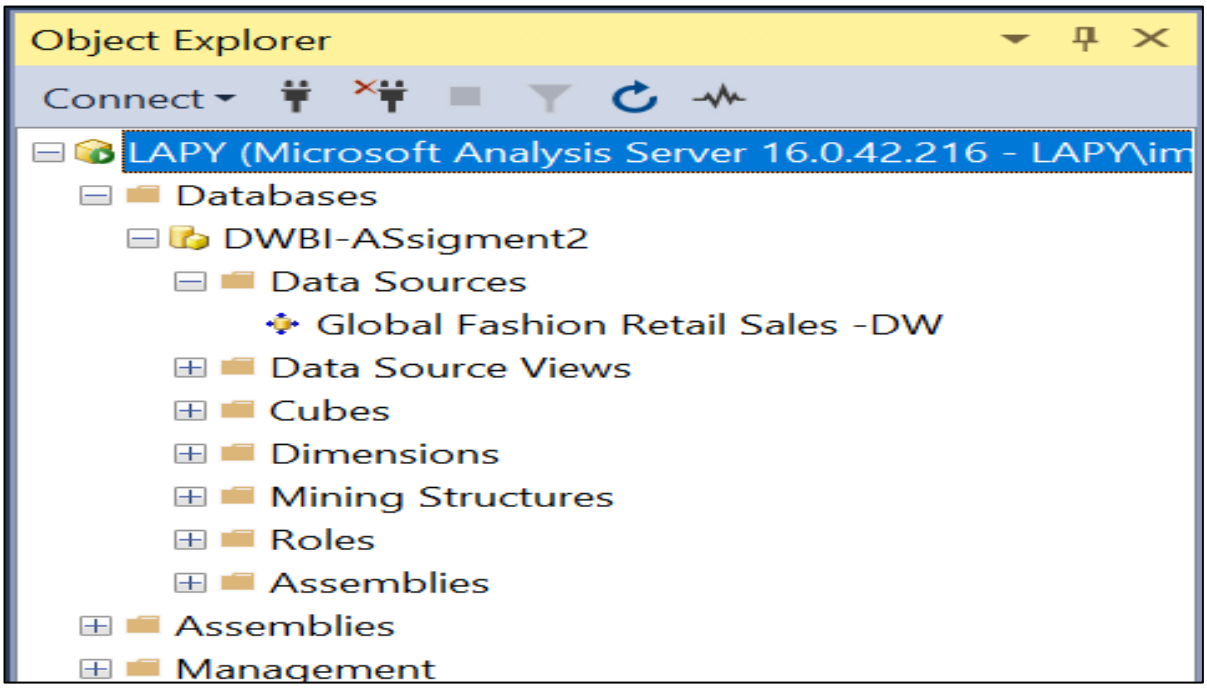


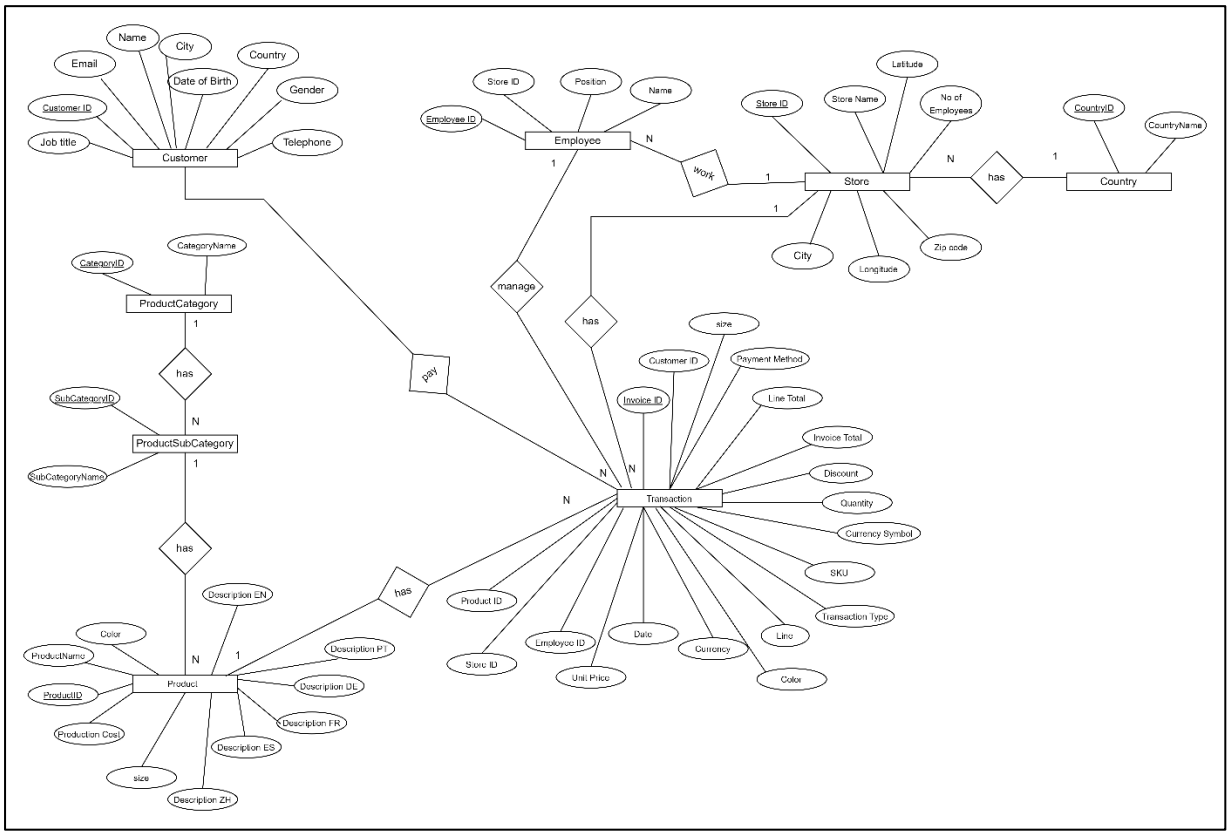
Figure 1: Data Source

The data warehouse was created using the Global Fashion Retail Sale dataset, which contains one year's worth of data about Global Fashion Retail Sale from 2024/01/01 to 2025/01/01. Snowflake schema was used, and the data warehouse contains eight-dimensional tables and a fact table.

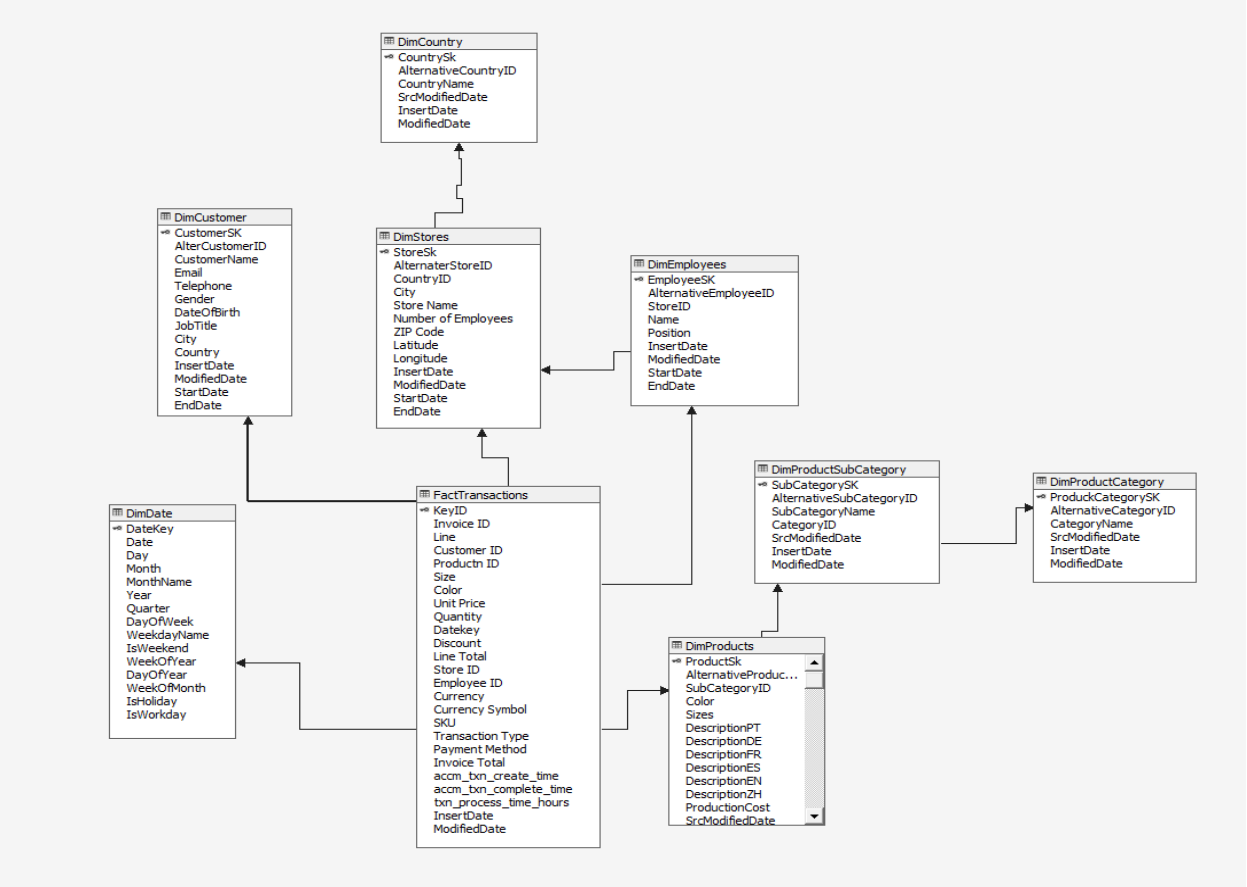
• Dimensions –

- **Country -** contains information about the Country name
- **Store** – contains information about each retail store across multiple countries.
- **Product Category** – includes the main product categories offered by the retailer.
- **Product Subcategory** – provides more specific classifications within each main category.
- **Product** – holds details of the products available for sale.
- **Customer** – includes records of customers who made purchases.
- **Employee** – contains details about staff members and their work locations.
- **Transaction** – represents the sales activities and purchasing history within the selected period.

1.1.1 ER diagram



1.1.2 Implemented DW



2. SSAS Cube Implementation

An OLAP cube, also known as a hypercube or multidimensional cube, is a data structure that enables OLAP databases to perform near-instantaneous data analysis across multiple dimensions.

The key components of a cube are **dimensions** and **measure groups**:

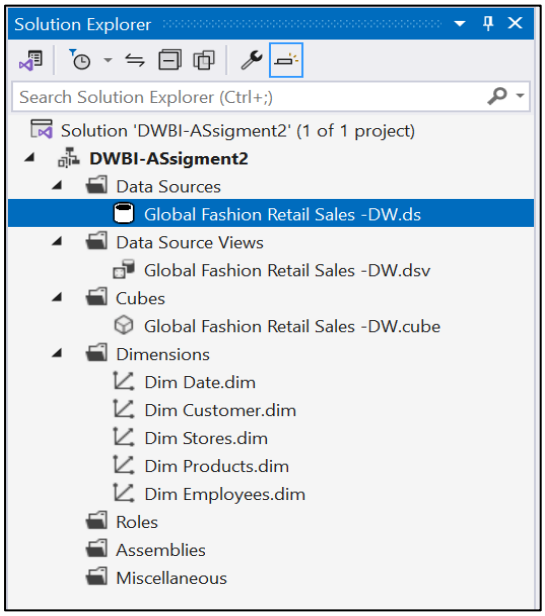
- **Dimensions** → These represent the descriptive categories or perspectives (such as time, product, customer) that come from the data source and provide context for analysis.
- **Measure Group** → This is conceptually like the fact table in a data warehouse. It contains the measures (quantitative data) used in the OLAP cube, such as sales amounts, quantities, or counts.

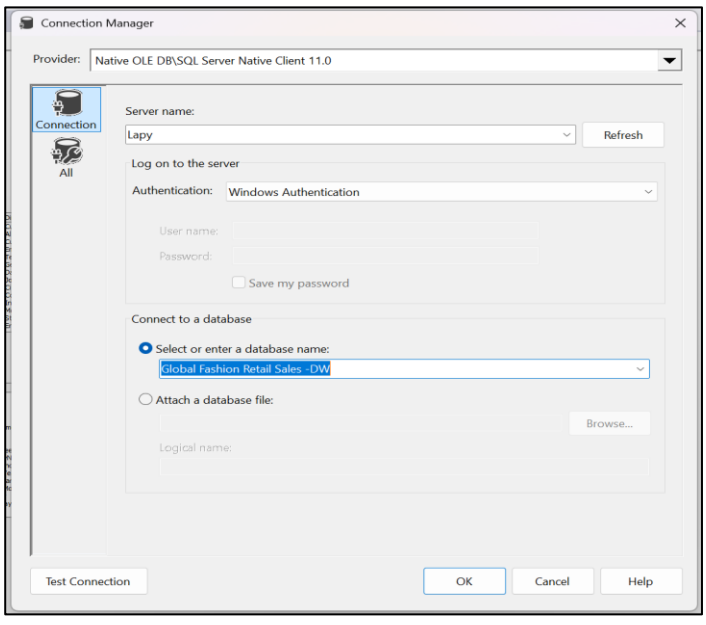
For the creation of the new project, SQL Server Data Tools was used as below:

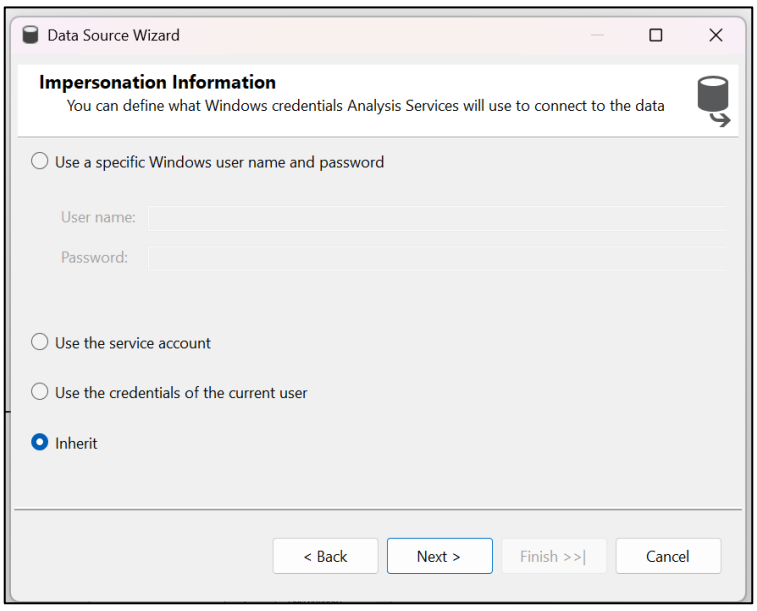
• Analysis Services -> Multidimensional -> Analysis Services Multidimensional and Data Mining Project

2.1 Cube Implementation

2.1.1 Creating the Data Source

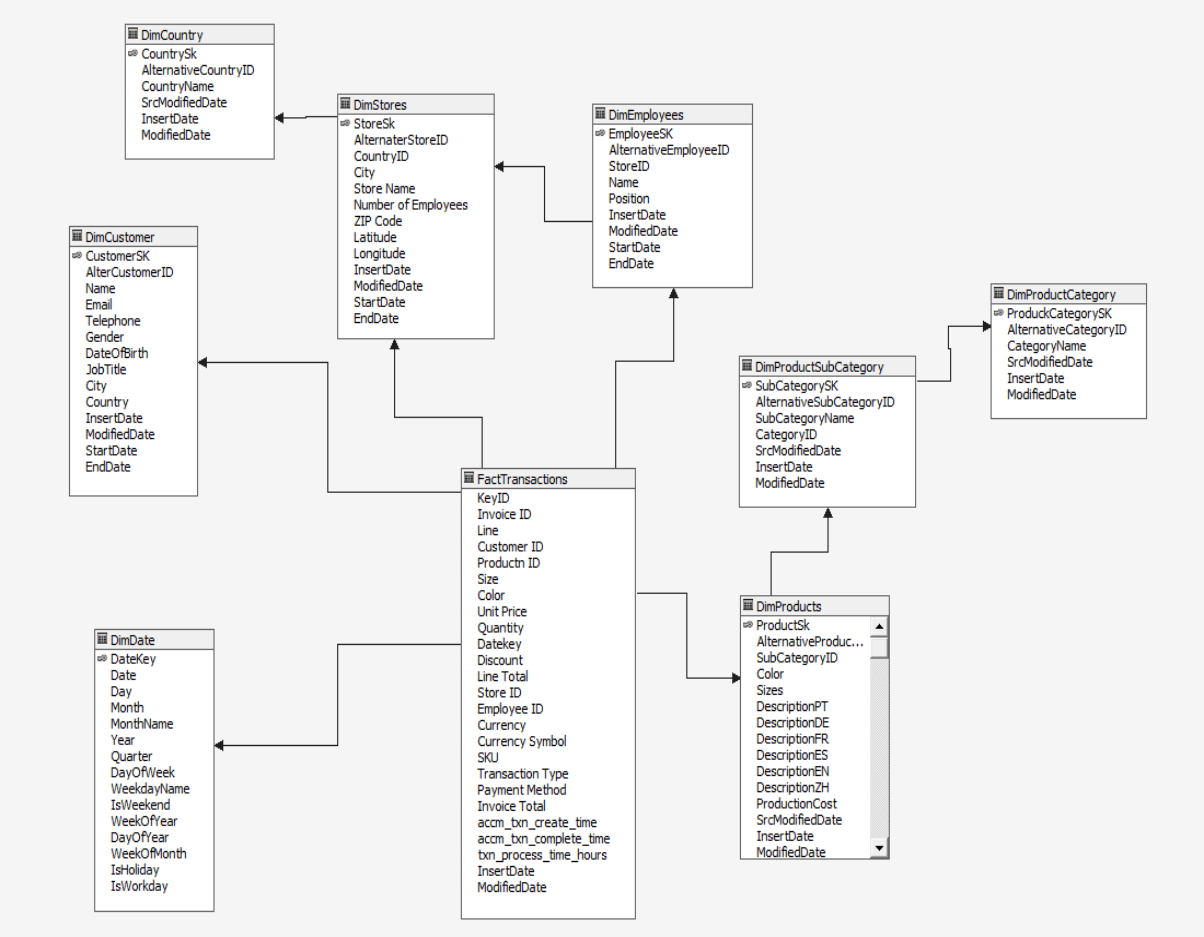


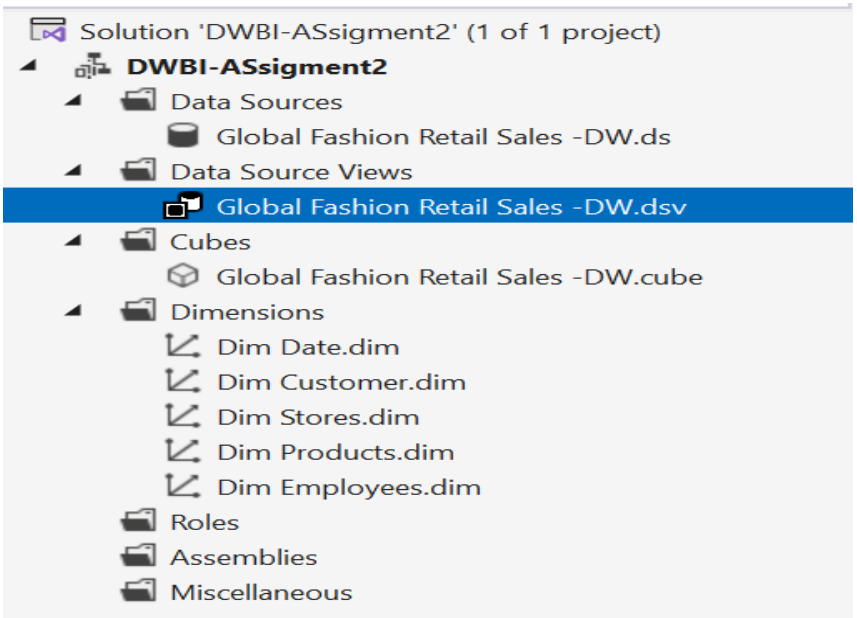




2.1.2 Creating the Data Source View

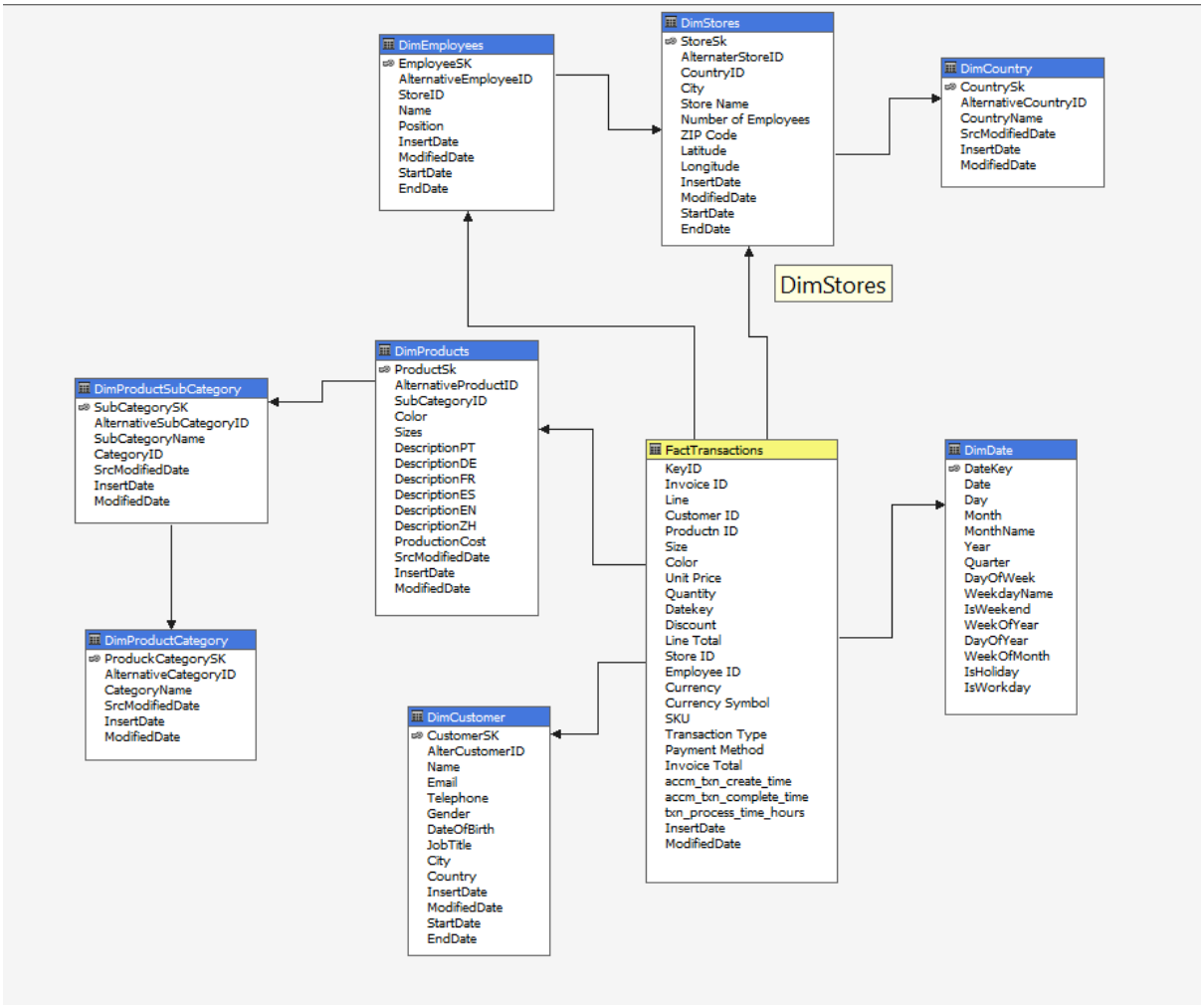
We create the Data Source View by selecting the data source, choosing the required tables and relationships, and assigning a clear name.

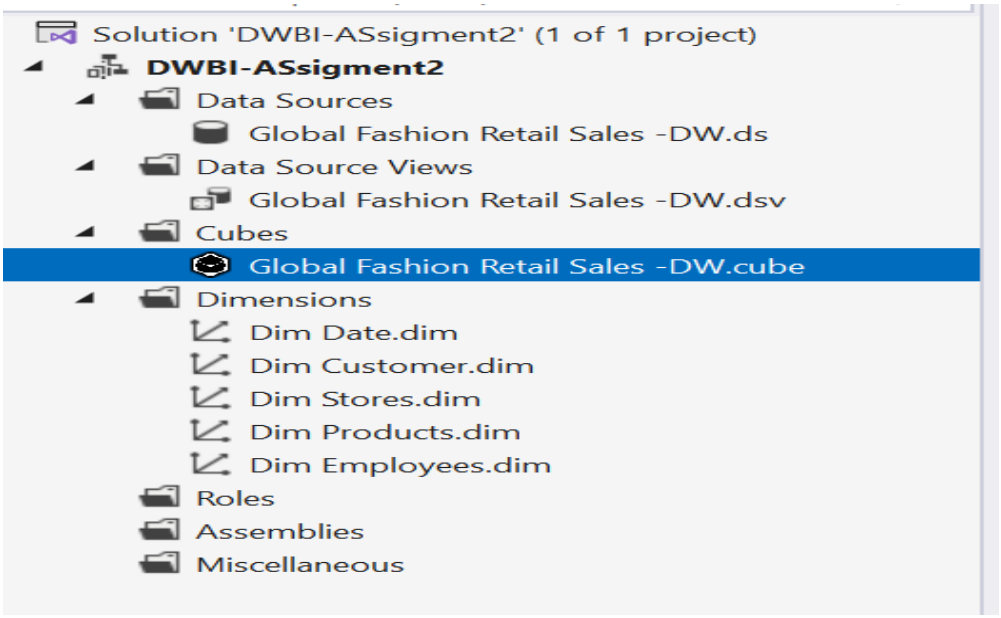




2.1.3 Creating the Cube

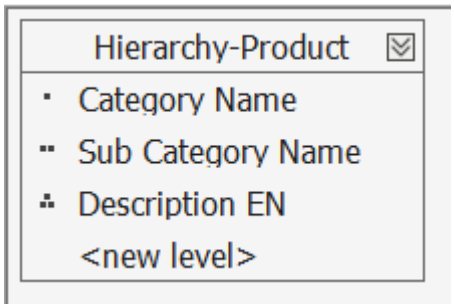
Using the data source view created earlier, the cube was built through the Cube Wizard. The data source view was selected first, followed by choosing the fact table as the measure group table. Next, the required measures and available dimensions were selected.



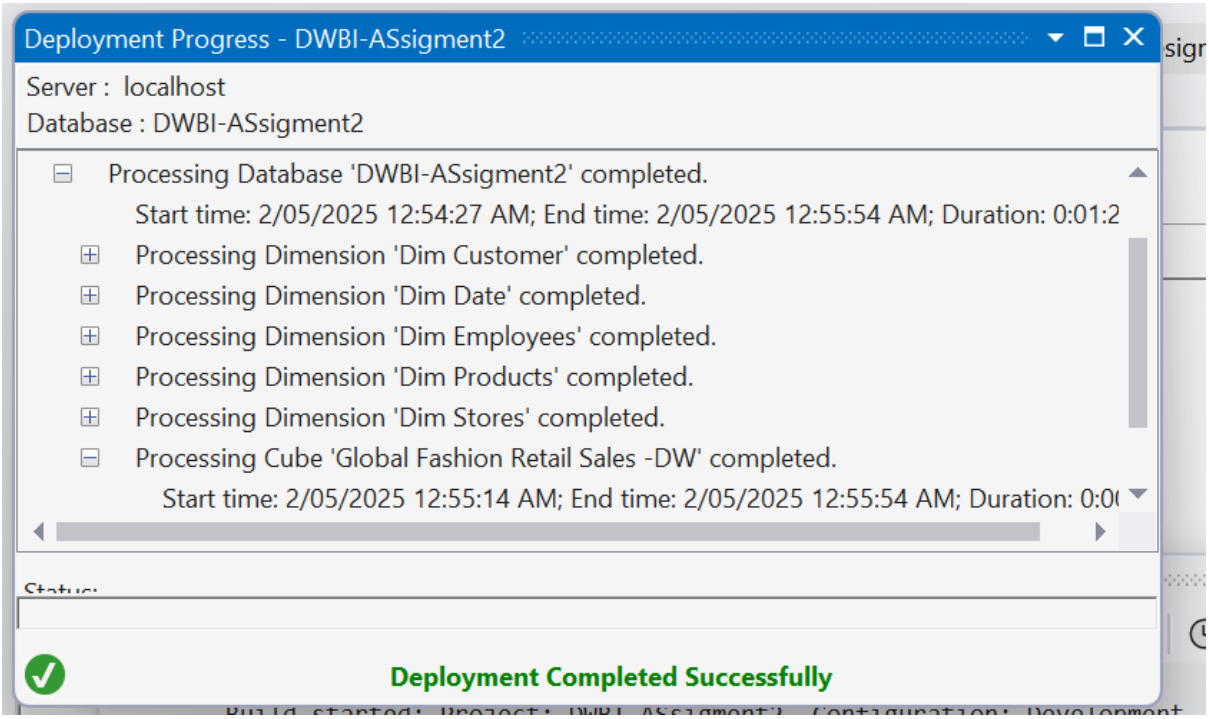


2.1.4 Creating Hierarchies and Dimension Structures

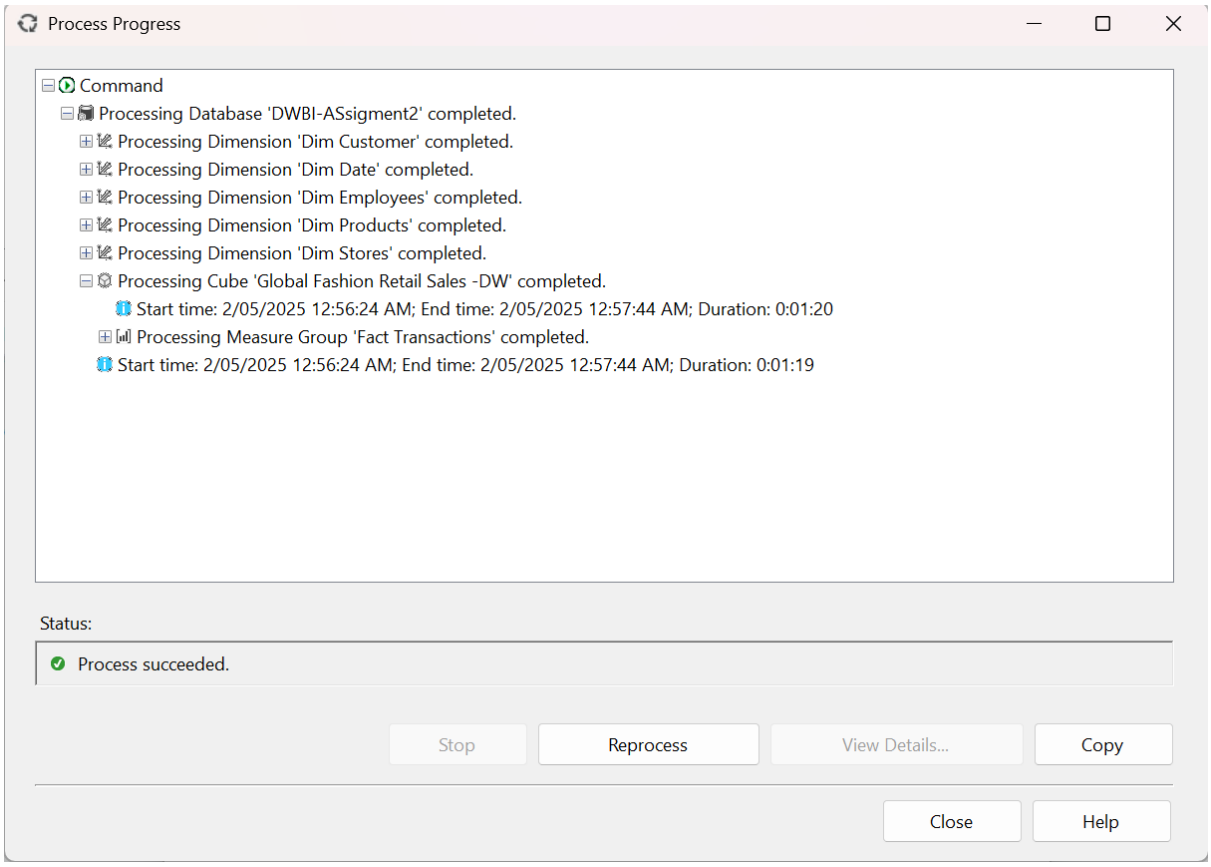
The attributes of the dimensions can be selected by dragging them from the Data Source View column and dropping them into the Attributes column. Similarly, to set up hierarchies, you can drag the desired hierarchy attributes from the Attributes column and drop them into the Hierarchy column within the same window.



2.1.5 Deploying the Cube



2.1.6 Process the cube

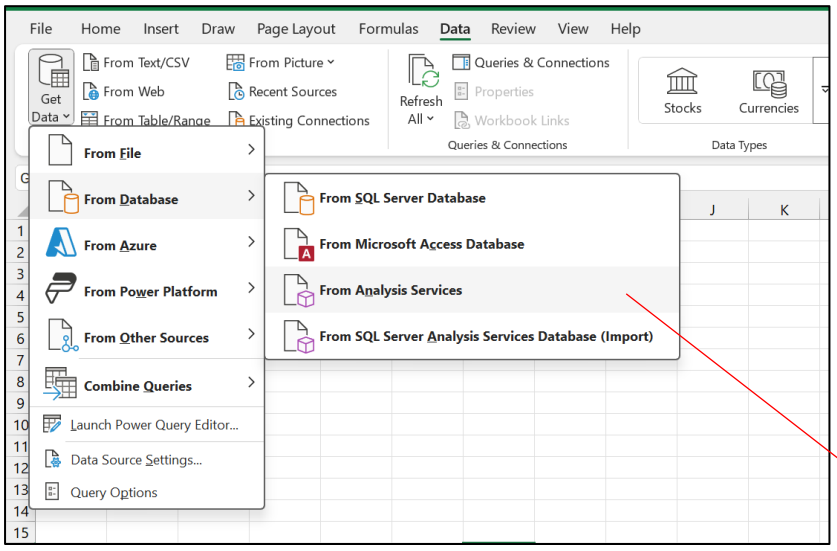


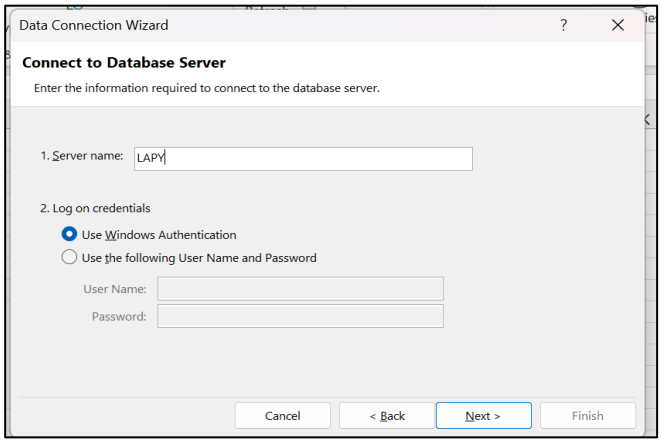
3. Demonstration of OLAP operations

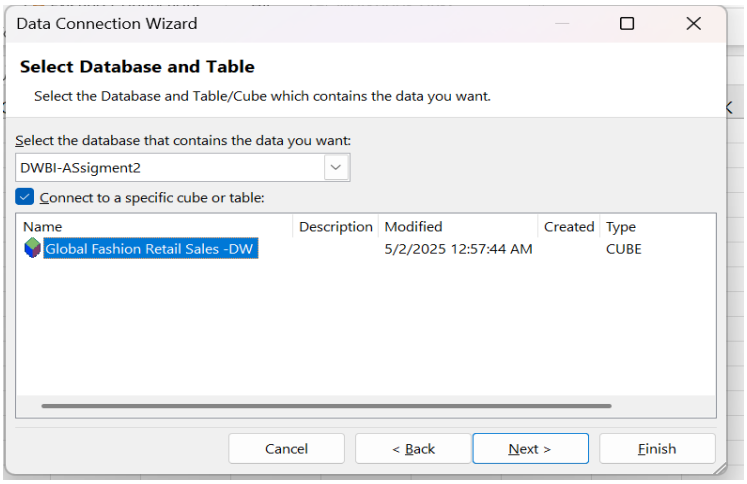
3.1. Connecting Excel to the Cube

I connected an Excel workbook to the SSAS cube using the following approach:

- Opened Excel and navigated to the **Data** tab.
- Selected **Get Data → From Analysis Services** (or used PowerPivot → Manage → From Database → From Analysis Services or PowerPivot).
- Entered the server's name, selected the appropriate cube, and imported the data connection.







Aggregated data to a higher level (e.g., summarized sales from product level to category level) using the grouping features in the Pivot Table

Row Labels	Quantity	Fact Transactions Count	Invoice Total
Children	601141	546956	63349134.21
"Girl and Boy (1-5 years	68120	61988	2864384.34
Accessories	74526	67849	8120091.99
Baby (0-12 months)	58898	53640	4081155.92
Coats	67174	61132	5892755.68
Pajamas	172268	156505	19092686.76
Sweaters	160155	145842	23298059.52
Feminine	1324883	1203105	151223741.3
Accessories	107787	98036	9383667.46
Coats and Blazers	183484	166333	16183164.88
⊞ Pants and Jeans	167521	152135	19428386.35
⊞ Shirts	185202	167825	26869810.4
⊞ Sportswear	77966	70656	5591554.5
⊞ Suits and Blazers	155578	141186	33580096.05
⊞ Sweaters and Sweatshirts	77945	70819	3239926.25
⊞ T-shirts and Polos	181380	165042	14555152.81
⊞ Underwear and Pajamas	188020	171073	22391982.59
⊟ Masculine	1540742	1400900	168334253.3
⊞ Accessories	51708	46957	3789964.7
⊞ Coats and Blazers	157405	143324	39964893.45
⊞ Dresses and Jumpsuits	78095	70990	3036082.75
⊞ Lingerie and Pajamas	162397	147774	28694390.34
⊞ Pants and Jeans	77885	70749	5515878.7
⊞ Shirts and Blouses	189474	172295	12834513.38
⊞ Skirts and Shorts	161702	146997	9612232.25
⊞ Sportswear	173165	157310	10764710.97
⊞ Suits and Sets	154508	140421	21639559.3
⊞ Sweaters and Knitwear	164120	149392	15834405.1
⊞ T-shirts and Tops	170283	154691	16647622.32
Grand Total	3466766	3150961	382907128.8

3.2.2 Drill-Down

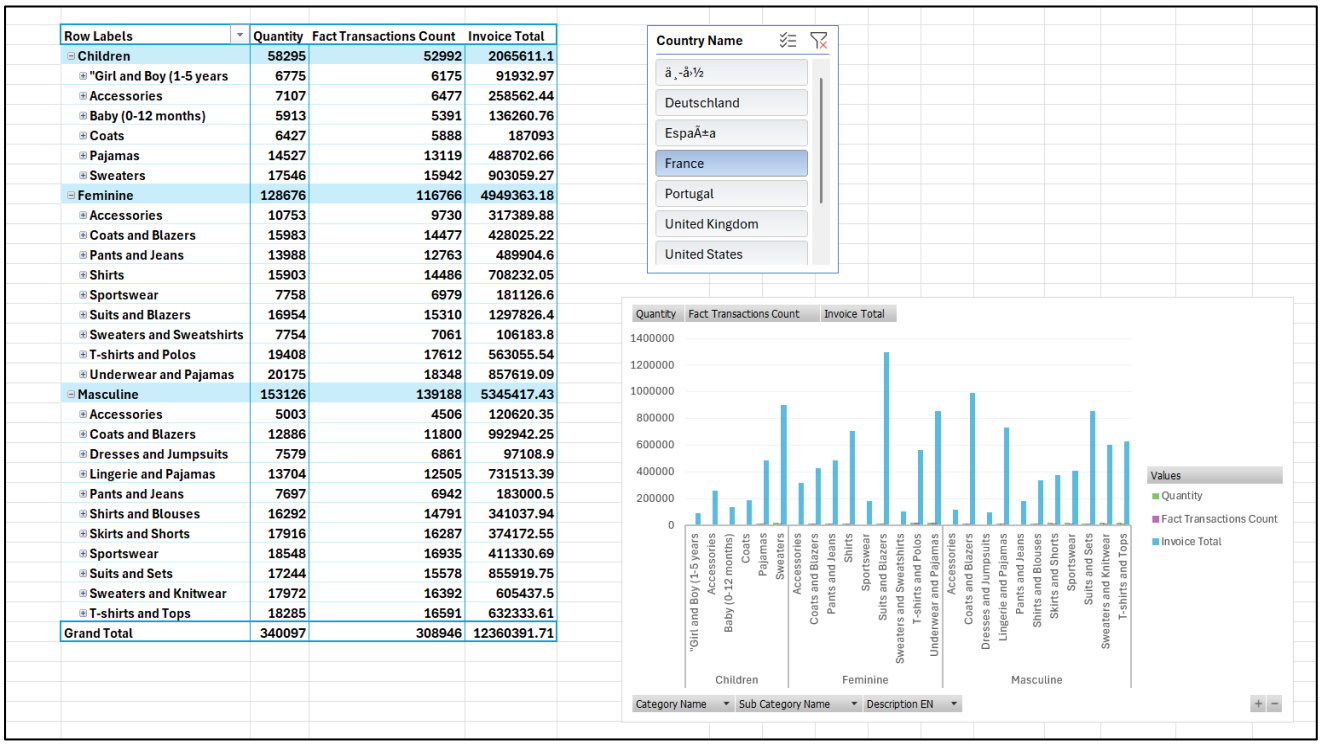
Expanded a summarized figure to reveal more detailed levels (e.g., drilling from year → quarter → month) by double-clicking or using the expand (+) buttons in the Pivot Table

.

Row Labels	Quantity	Fact Transactions Count	Invoice Total
Children	**601141**	**546956**	**63349134.21**
"Girl and Boy (1-5 years	**68120**	**61988**	**2864384.34**
Adjustable And Reflective Children'S Backpack	335	299	10653.5
Animal -Shaped Children'S Hair Brush	249	222	6470.37
Baby Accessory Kit	44	41	1467.7
Baby Support For Seat Belt	221	198	16293.44
Bag For Dirty Children With Fun Print	303	291	18472.6
Bag Of Children'S Toys With Colorful Print	245	213	17923.63
Bicycle Children'S Arm Protector	48	44	707.75
Bird -Themed Children'S Sleep Mask	223	192	3747.87
Butterfly -Shaped Children'S Hairpin	308	281	16644
Child Identification Bracelet	32	30	722.1
Child Identification Card For Tours	250	216	9482.8
Child Judgment Collects With Safety Picks	295	271	21145.3
Child Judgment Vest With Colored Stamp	233	212	4334.41
Child Jumping Rope With Pompom At The Ends	230	214	11518.35
Child Nail Stickers	45	43	2531.5
Child Sunglasses With Mirrored Lenses	223	201	9172.6
Child Sunscreen With Animal Applicator	338	304	6198.55
Child Swimming Glasses	47	46	1410
Child Swimming Glasses With Adjustable Silicone Top	323	301	18942.75
Child Swimming Glasses With Silicone Top	198	184	11335.11
Child Toothbrush With Mouth Protector	216	191	4102.8
Child Water Bottle With Animal Design	212	198	4806.07
Child Water Bottle With Retractable Straw	362	334	21754.45
Children'S Apron For Kitchen	341	316	13533.6
Children'S Apron For Kitchen Play	234	214	7871.35
Children'S Arm Protector For Safety	245	220	6031.73
Children'S Arm Protector For Sports Activities	308	281	19177.35
Children'S Backpack Straps With Panther Design	354	326	19822.1
Children'S Backpack Straps With Shoulder Adjustment	212	193	6638.12
Children'S Backpack With Cat Print	215	198	9537.86
Children'S Backpack With Fun Characters	384	356	17472.25
Children'S Backpack With Movie Characters	224	205	15127.19
Children'S Backpack With Wheels And Adjustable Strap	216	202	13157.46
Children'S Backpack With Wheels And Adventure Characters	298	274	15269.45

3.2.3 Slice

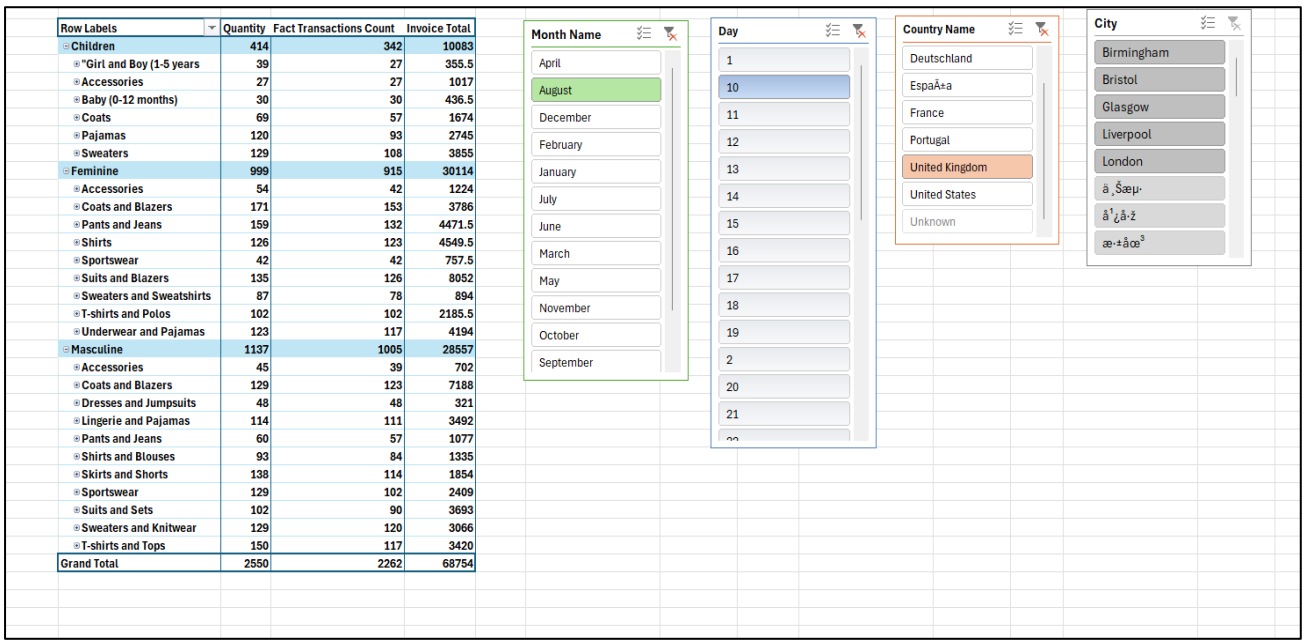
Filtered the dataset by adding a **Slicer** to the Pivot Table



Row Labels	Quantity	Fact Transactions Count	Invoice Total
Children	58295	52992	2065611.1
"Girl and Boy (1-5 years	6775	6175	91932.97
Accessories	7107	6477	258562.44
Baby (0-12 months)	5913	5391	136260.76
Coats	6427	5888	187093
Pajamas	14527	13119	488702.66
Sweaters	17546	15942	903059.27
Feminine	128676	116766	4949363.18
Accessories	10753	9730	317389.88
Coats and Blazers	15983	14477	428025.22
Pants and Jeans	13988	12763	489904.6
Shirts	15903	14486	708232.05
Sportswear	7758	6979	181126.6
Suits and Blazers	16954	15310	1297826.4
Sweaters and Sweatshirts	7754	7061	106183.8
T-shirts and Polos	19408	17612	563055.54
Underwear and Pajamas	20175	18348	857619.09
Masculine	153126	139188	5345417.43
Accessories	5003	4506	120620.35
Coats and Blazers	12886	11800	992942.25
Dresses and Jumpsuits	7579	6861	97108.9
Lingerie and Pajamas	13704	12505	731513.39
Pants and Jeans	7697	6942	183000.5
Shirts and Blouses	16292	14791	341037.94
Skirts and Shorts	17916	16287	374172.55
Sportswear	18548	16935	411330.69
Suits and Sets	17244	15578	855919.75
Sweaters and Knitwear	17972	16392	605437.5
T-shirts and Tops	18285	16591	632333.61
Grand Total	340097	308946	12360391.71

3.2.4 Dice

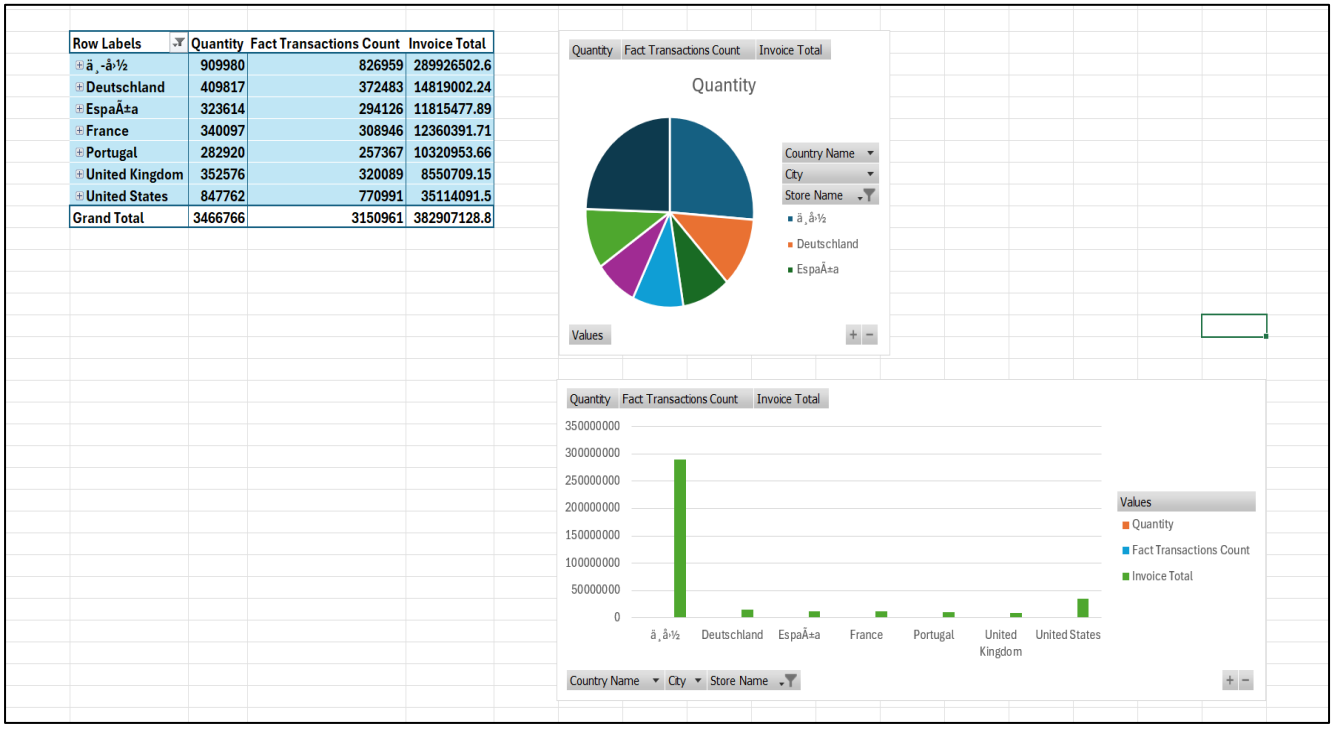
Selected and analysed a specific sub-cube by adding multiple dimensions to rows and columns and applying filters



Row Labels	Quantity	Fact Transactions Count	Invoice Total
Children	414	342	10083
"Girl and Boy (1-5 years	39	27	355.5
Accessories	27	27	1017
Baby (0-12 months)	30	30	436.5
Coats	69	57	1674
Pajamas	120	93	2745
Sweaters	129	108	3855
Feminine	999	915	30114
Accessories	54	42	1224
Coats and Blazers	171	153	3786
Pants and Jeans	159	132	4471.5
Shirts	126	123	4549.5
Sportswear	42	42	757.5
Suits and Blazers	135	126	8052
Sweaters and Sweatshirts	87	78	894
T-shirts and Polos	102	102	2185.5
Underwear and Pajamas	123	117	4194
Masculine	1137	1005	28557
Accessories	45	39	702
Coats and Blazers	129	123	7188
Dresses and Jumpsuits	48	48	321
Lingerie and Pajamas	114	111	3492
Pants and Jeans	60	57	1077
Shirts and Blouses	93	84	1335
Skirts and Shorts	138	114	1854
Sportswear	129	102	2409
Suits and Sets	102	90	3693
Sweaters and Knitwear	129	120	3066
T-shirts and Tops	150	117	3420
Grand Total	2550	2262	68754

3.2.5 Pivot

Rearranged the dimensions between rows and columns



Row Labels	Quantity	Fact Transactions Count	Invoice Total
ä¸-å›½	909980	826959	289926502.6
Deutschland	409817	372483	14819002.24
EspaÃ±a	323614	294126	11815477.89
France	340097	308946	12360391.71
Portugal	282920	257367	10320953.66
United Kingdom	352576	320089	8550709.15
United States	847762	770991	35114091.5
Grand Total	3466766	3150961	382907128.8

4. Power BI Reports

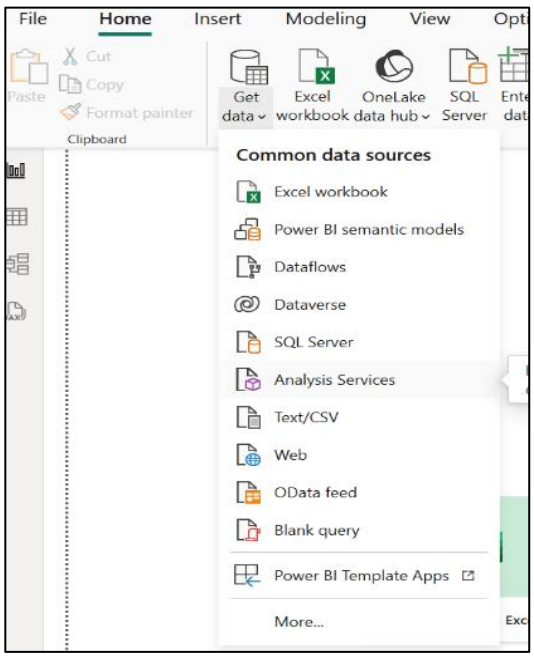
I developed and published the following reports in **Power BI Service** and demonstrated them by opening and interacting with them online.

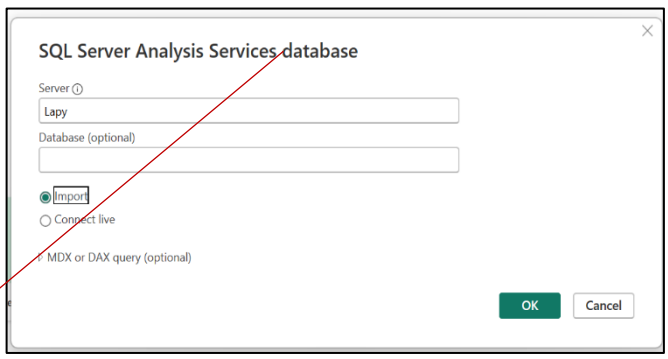
4.1. Connecting Power BI to the Cube

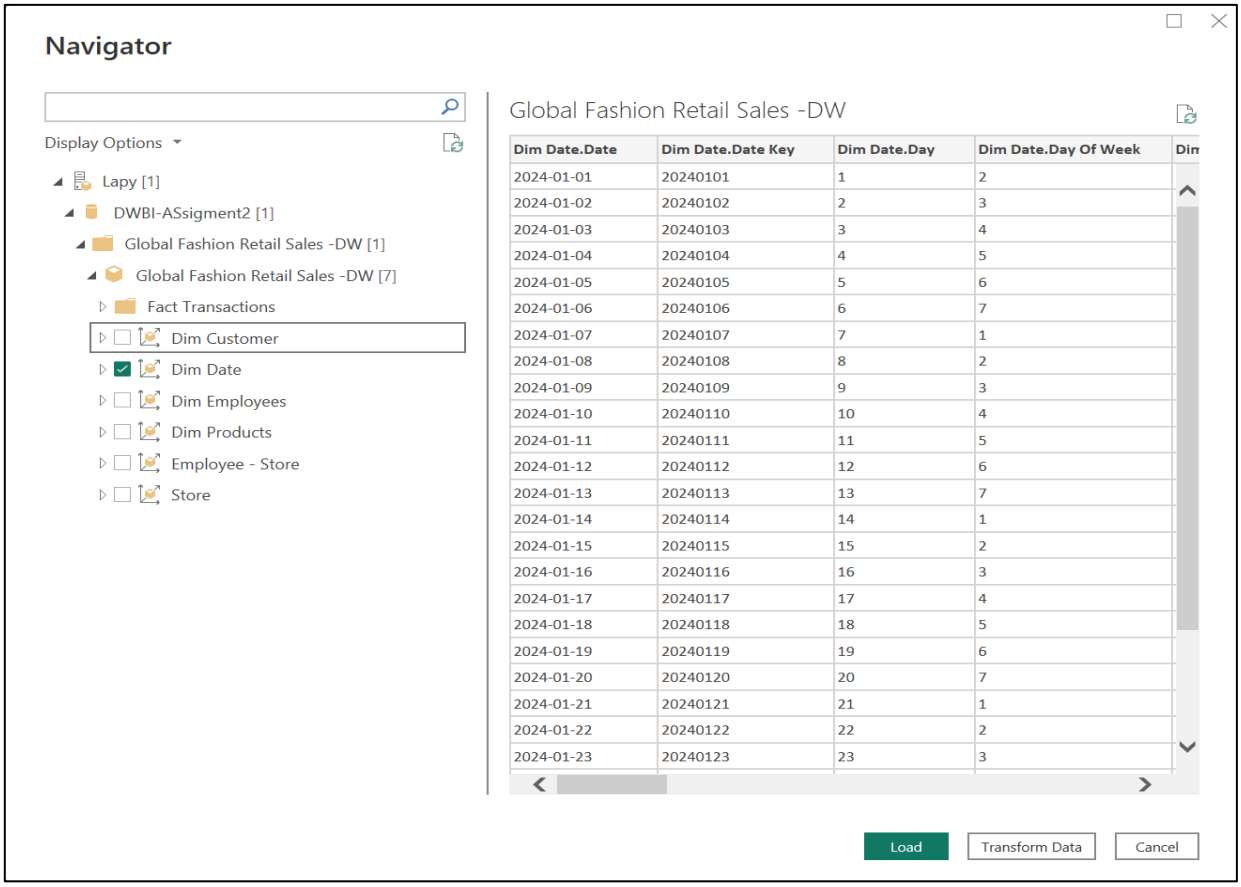
To create the Power BI reports, I connected Power BI Desktop to the SSAS cube using the **Import** mode (instead of Live Connect).
Here are the steps I followed:

- Opened **Power BI Desktop**.
- Selected **Get Data → Analysis Services**.
- Entered the server's name and selected the appropriate cube.
- Choose the **Import** option to load the cube data into Power BI, allowing me to perform additional data modelling and transformations directly in Power BI Desktop.
- Selected the necessary tables, measures, and dimensions from the cube to import into the Power BI model.
- Loaded the data and confirmed that relationships were set up correctly in the **Model view**.

By using the **Import** option, I was able to leverage Power BI's full modelling capabilities (such as adding calculated columns, measures, and custom hierarchies) and ensure optimal performance when publishing the reports to the Power BI Service.





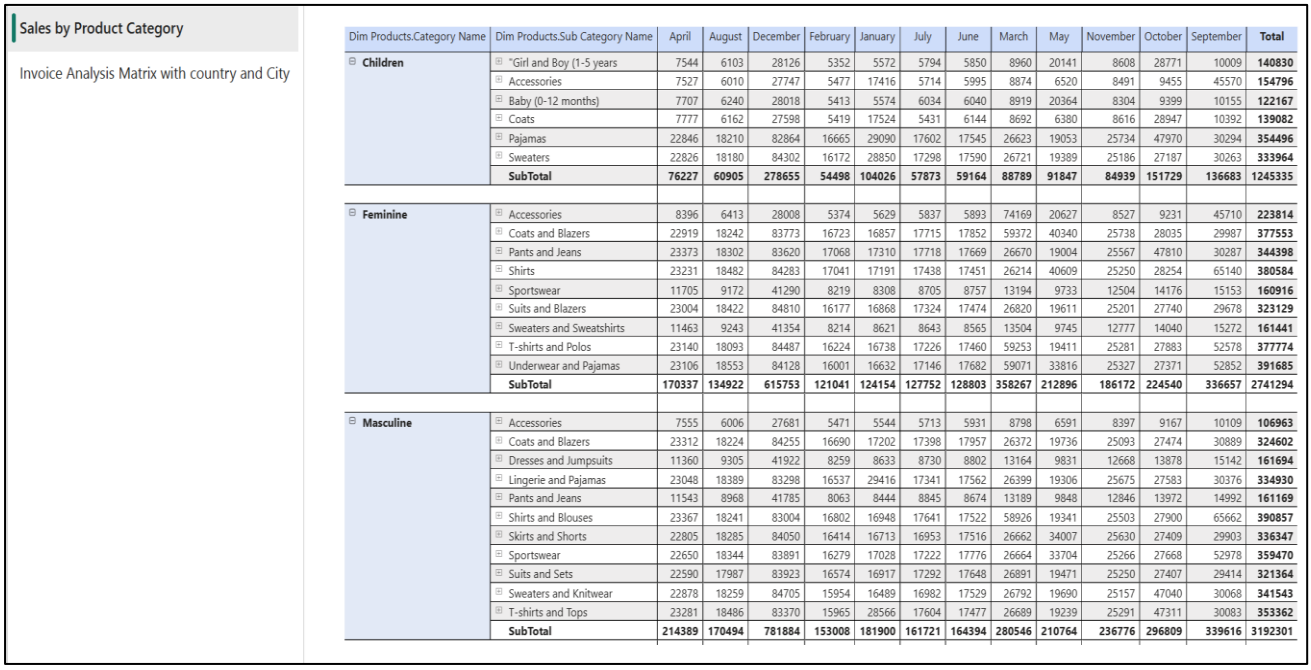


Dim Date.Date	Dim Date.Date Key	Dim Date.Day	Dim Date.Day Of Week	Dim
2024-01-01	20240101	1	2	
2024-01-02	20240102	2	3	
2024-01-03	20240103	3	4	
2024-01-04	20240104	4	5	
2024-01-05	20240105	5	6	
2024-01-06	20240106	6	7	
2024-01-07	20240107	7	1	
2024-01-08	20240108	8	2	
2024-01-09	20240109	9	3	
2024-01-10	20240110	10	4	
2024-01-11	20240111	11	5	
2024-01-12	20240112	12	6	
2024-01-13	20240113	13	7	
2024-01-14	20240114	14	1	
2024-01-15	20240115	15	2	
2024-01-16	20240116	16	3	
2024-01-17	20240117	17	4	
2024-01-18	20240118	18	5	
2024-01-19	20240119	19	6	
2024-01-20	20240120	20	7	
2024-01-21	20240121	21	1	
2024-01-22	20240122	22	2	
2024-01-23	20240123	23	3	

4.2 Report 1: Matrix Visual Report

- Created a report using the **Matrix visual** to display detailed tabular data.
- Configured row and column groupings to summarize data at different levels (e.g., product category → subcategory → product).
- Enabled totals and subtotals for clear hierarchical reporting.

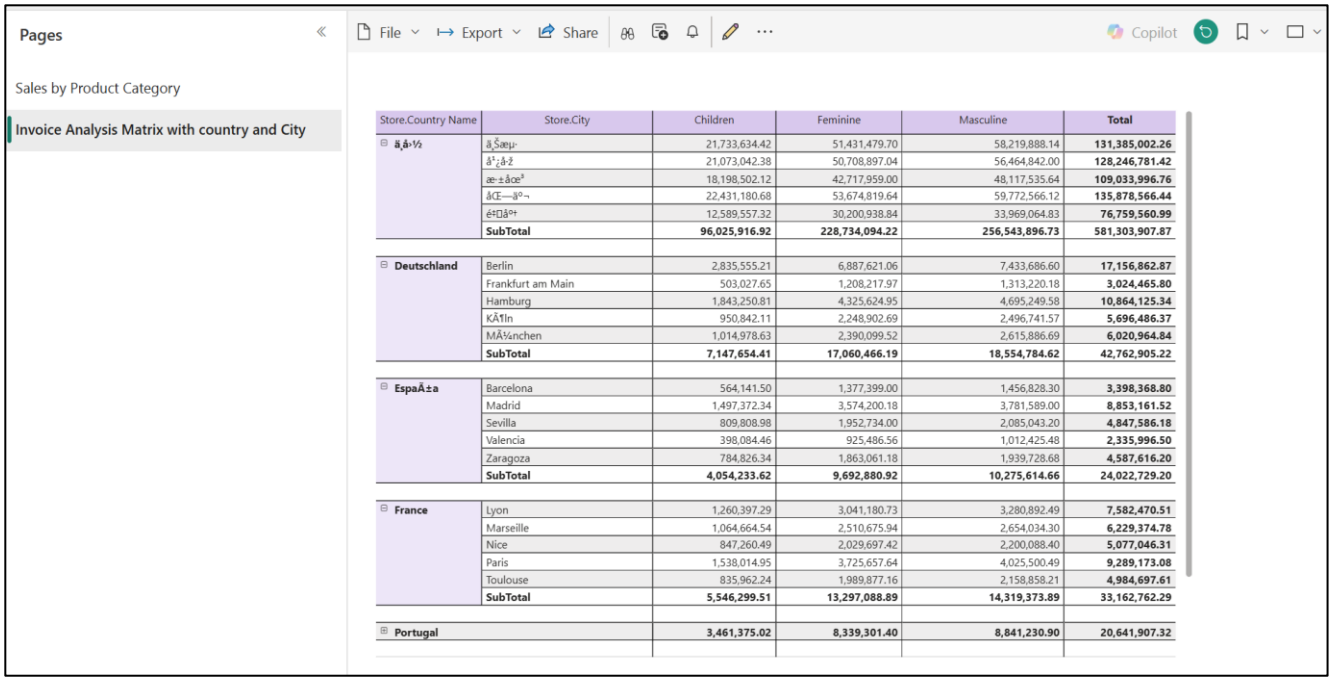
Link: https://app.powerbi.com/links/U9xKEgK_u3?ctid=44e3cf94-19c9-4e32-96c3-14f5bf01391a&pbi_source=linkShare



Sales by Product Category

Invoice Analysis Matrix with country and City

Dim Products.Category Name	Dim Products.Sub Category Name	April	August	December	February	January	July	June	March	May	November	October	September	Total
Children	*Girl and Boy (1-5 years	7544	6103	28126	5352	5572	5794	5850	8960	20141	8608	28771	10009	**140830**
	Accessories	7527	6010	27747	5477	17416	5714	5995	8874	6520	8491	9455	45570	**154796**
	Baby (0-12 months)	7707	6240	28018	5413	5574	6034	6040	8919	20364	8304	9399	10155	**122167**
	Coats	7777	6162	27598	5419	17524	5431	6144	8692	6380	8616	28947	10392	**139082**
	Pajamas	22846	18210	82864	16665	29090	17602	17545	26623	19053	25734	47970	30294	**354496**
	Sweaters	22826	18180	84302	16172	28850	17298	17590	26721	19389	25186	27187	30263	**333964**
	SubTotal	**76227**	**60905**	**278655**	**54498**	**104026**	**57873**	**59164**	**88789**	**91847**	**84939**	**151729**	**136683**	**1245335**
Feminine	Accessories	8396	6413	28008	5374	5629	5837	5893	74169	20627	8527	9231	45710	**223814**
	Coats and Blazers	22919	18242	83773	16723	16857	17715	17852	59372	40340	25738	28035	29987	**377553**
	Pants and Jeans	23373	18302	83620	17068	17310	17718	17669	26670	19004	25567	47810	30287	**344398**
	Shirts	23231	18482	84283	17041	17191	17438	17451	26214	40609	25250	28254	65140	**380584**
	Sportswear	11705	9172	41290	8219	8308	8705	8757	13194	9733	12504	14176	15153	**160916**
	Suits and Blazers	23004	18422	84810	16177	16868	17324	17474	26820	19611	25201	27740	29678	**323129**
	Sweaters and Sweatshirts	11463	9243	41354	8214	8621	8643	8565	13504	9745	12777	14040	15272	**161441**
	T-shirts and Polos	23140	18093	84487	16224	16738	17226	17460	59253	19411	25281	27883	52578	**377774**
	Underwear and Pajamas	23106	18553	84128	16001	16632	17146	17682	59071	33816	25327	27371	52852	**391685**
	SubTotal	**170337**	**134922**	**615753**	**121041**	**124154**	**127752**	**128803**	**358267**	**212896**	**186172**	**224540**	**336657**	**2741294**
Masculine	Accessories	7555	6006	27681	5471	5544	5713	5931	8798	6591	8397	9167	10109	**106963**
	Coats and Blazers	23312	18224	84255	16690	17202	17398	17957	26372	19736	25093	27474	30889	**324602**
	Dresses and Jumpsuits	11360	9305	41922	8259	8633	8730	8802	13164	9831	12668	13878	15142	**161694**
	Lingerie and Pajamas	23048	18389	83298	16537	29416	17341	17562	26399	19306	25675	27583	30376	**334930**
	Pants and Jeans	11543	8968	41785	8063	8444	8845	8674	13189	9848	12846	13972	14992	**161169**
	Shirts and Blouses	23367	18241	83004	16802	16948	17641	17522	58926	19341	25503	27900	65662	**390857**
	Skirts and Shorts	22805	18285	84050	16414	16713	16953	17516	26662	34007	25630	27409	29903	**336347**
	Sportswear	22650	18344	83891	16279	17028	17222	17776	26664	33704	25266	27668	52978	**359470**
	Suits and Sets	22590	17987	83923	16574	16917	17292	17648	26891	19471	25250	27407	29414	**321364**
	Sweaters and Knitwear	22878	18259	84705	15954	16489	16982	17529	26792	19690	25157	47040	30068	**341543**
	T-shirts and Tops	23281	18486	83370	15965	28566	17604	17477	26689	19239	25291	47311	30083	**353362**
	SubTotal	**214389**	**170494**	**781884**	**153008**	**181900**	**161721**	**164394**	**280546**	**210764**	**236776**	**296809**	**339616**	**3192301**



Pages

Sales by Product Category

Invoice Analysis Matrix with country and City

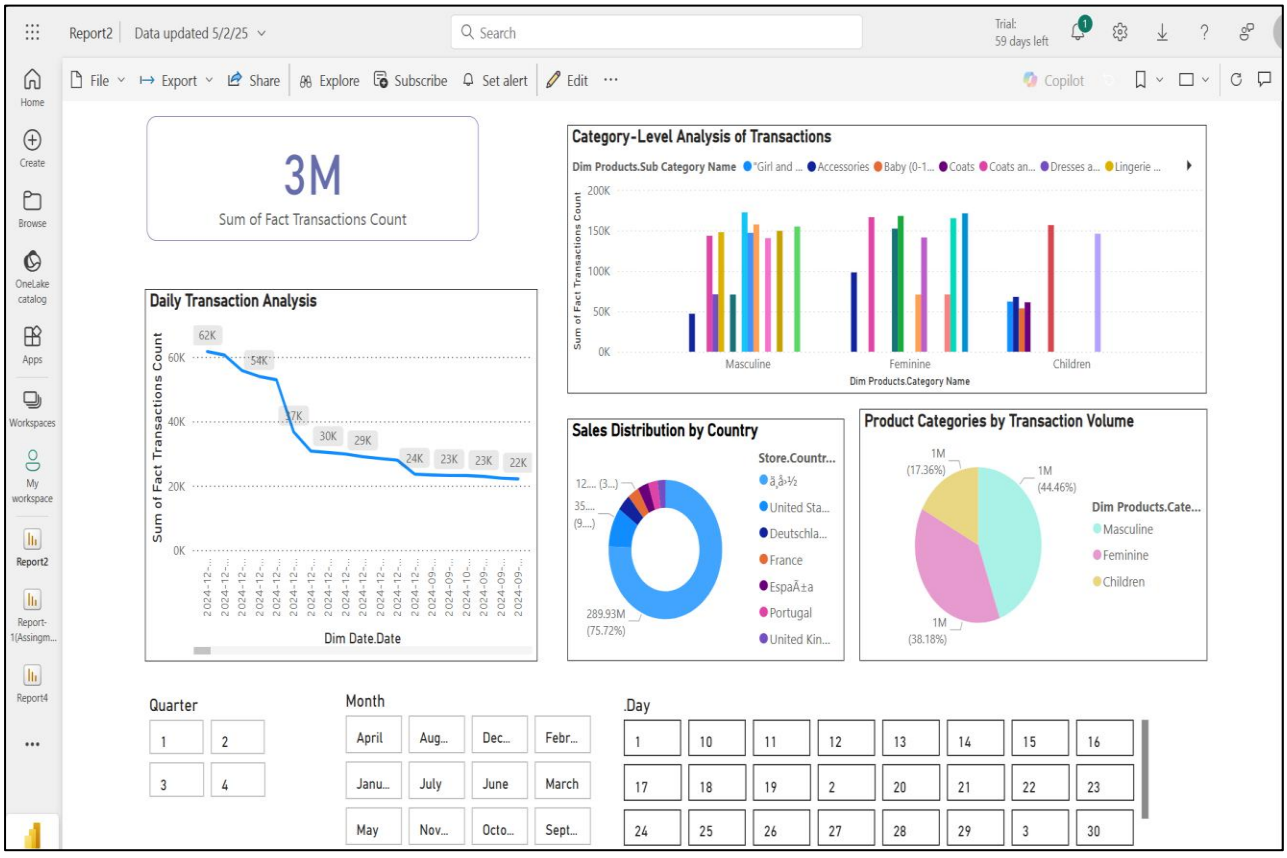
File Export Share Copilot

Store.Country Name	Store.City	Children	Feminine	Masculine	Total
ä‚å•½	ã‚Šæµ·	21,733,634.42	51,431,479.70	58,219,888.14	**131,385,002.26**
	å¹¿å·ž	21,073,042.38	50,708,897.04	56,464,842.00	**128,246,781.42**
	æ·±åœ³	18,198,502.12	42,717,959.00	48,117,535.64	**109,033,996.76**
	åŒ—äº¬	22,431,180.68	53,674,819.64	59,772,566.12	**135,878,566.44**
	é¢Œã°³	12,589,557.32	30,200,938.84	33,969,064.83	**76,759,560.99**
	SubTotal	**96,025,916.92**	**228,734,094.22**	**256,543,896.73**	**581,303,907.87**
Deutschland	Berlin	2,835,555.21	6,887,621.06	7,433,686.60	**17,156,862.87**
	Frankfurt am Main	503,027.65	1,208,217.97	1,313,220.18	**3,024,465.80**
	Hamburg	1,843,250.81	4,325,624.95	4,695,249.58	**10,864,125.34**
	KÃ¶ln	950,842.11	2,248,902.69	2,496,741.57	**5,696,486.37**
	MÃ¼nchen	1,014,978.63	2,390,099.52	2,615,886.69	**6,020,964.84**
	SubTotal	**7,147,654.41**	**17,060,466.19**	**18,554,784.62**	**42,762,905.22**
EspaÃ±a	Barcelona	564,141.50	1,377,399.00	1,456,828.30	**3,398,368.80**
	Madrid	1,497,372.34	3,574,200.18	3,781,589.00	**8,853,161.52**
	Sevilla	809,808.98	1,952,734.00	2,085,043.20	**4,847,586.18**
	Valencia	398,084.46	925,486.56	1,012,425.48	**2,335,996.50**
	Zaragoza	784,826.34	1,863,061.18	1,939,728.68	**4,587,616.20**
	SubTotal	**4,054,233.62**	**9,692,880.92**	**10,275,614.66**	**24,022,729.20**
France	Lyon	1,260,397.29	3,041,180.73	3,280,892.49	**7,582,470.51**
	Marseille	1,064,664.54	2,510,675.94	2,654,034.30	**6,229,374.78**
	Nice	847,260.49	2,029,697.42	2,200,088.40	**5,077,046.31**
	Paris	1,538,014.95	3,725,657.64	4,025,500.49	**9,289,173.08**
	Toulouse	835,962.24	1,989,877.16	2,158,858.21	**4,984,697.61**
	SubTotal	**5,546,299.51**	**13,297,088.89**	**14,319,373.89**	**33,162,762.29**
Portugal		**3,461,375.02**	**8,339,301.40**	**8,841,230.90**	**20,641,907.32**

4.3 Report 2: Report with Multiple Slicers

- Added multiple **slicers** to the report: **Quarter**, **Month Name**, and **Day**.
- Implemented **cascading filters** so that selecting a **Quarter** dynamically filters the available **Month Names**, and selecting a **Month Name** filters the **Days** shown in the third slicer.
- Used multiple visuals (such as bar charts, line charts, and pie charts) to present key insights from the dataset, making it easy to analyse data trends across different periods.

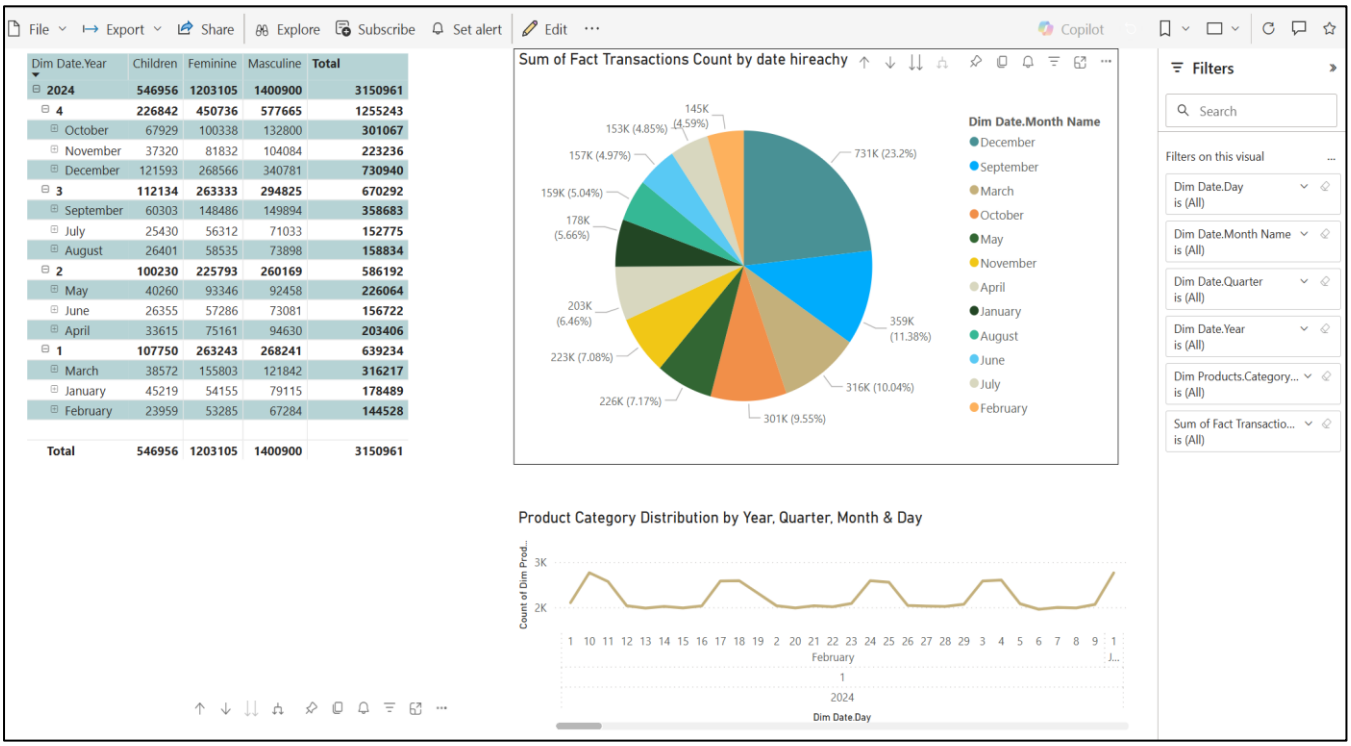
Link: https://app.powerbi.com/links/BPH0ptYoVs?ctid=44e3cf94-19c9-4e32-96c3-14f5bf01391a&pbi_source=linkShare



4.4 Report 3: Drill-Down Report

- Created visuals (e.g., column chart) with a **hierarchical field structure** (e.g., year → quarter → month).
- Enabled **drill-down** so users can click on data points to explore trends at increasingly detailed levels.

Link: https://app.powerbi.com/links/UxBraWWEBI?ctid=44e3cf94-19c9-4e32-96c3-14f5bf01391a&pbi_source=linkShare

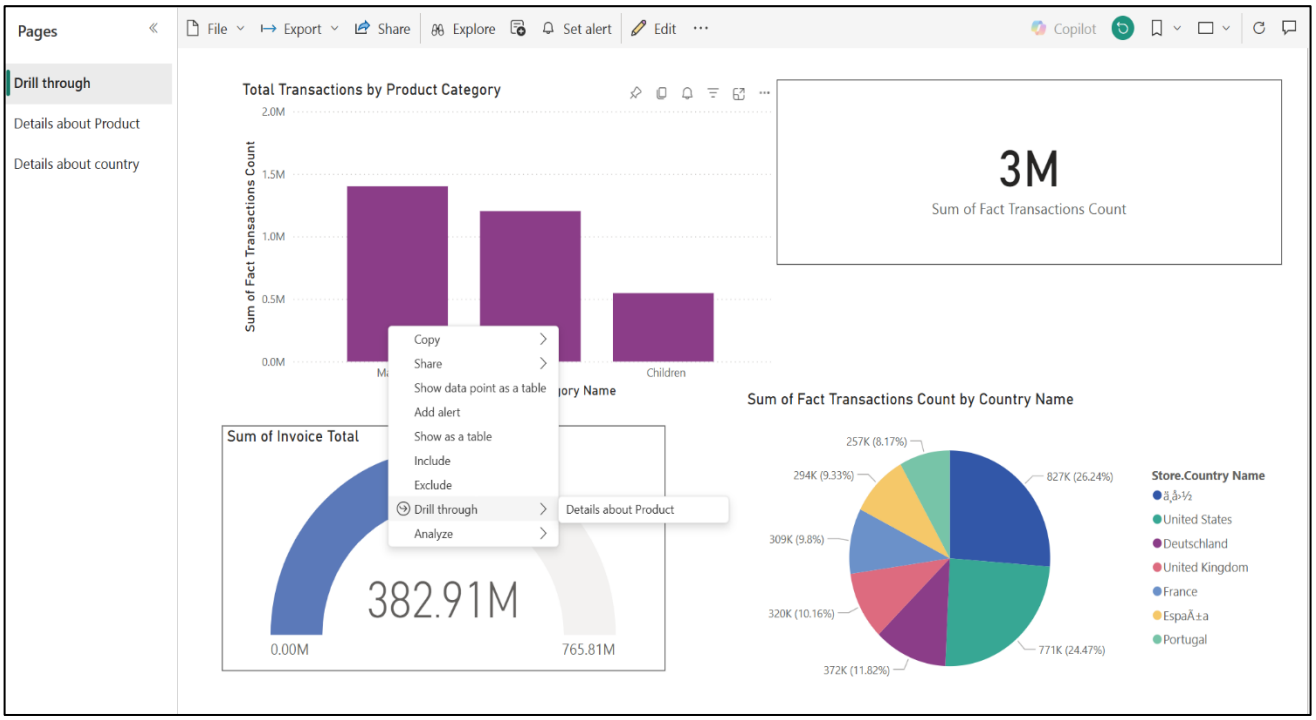


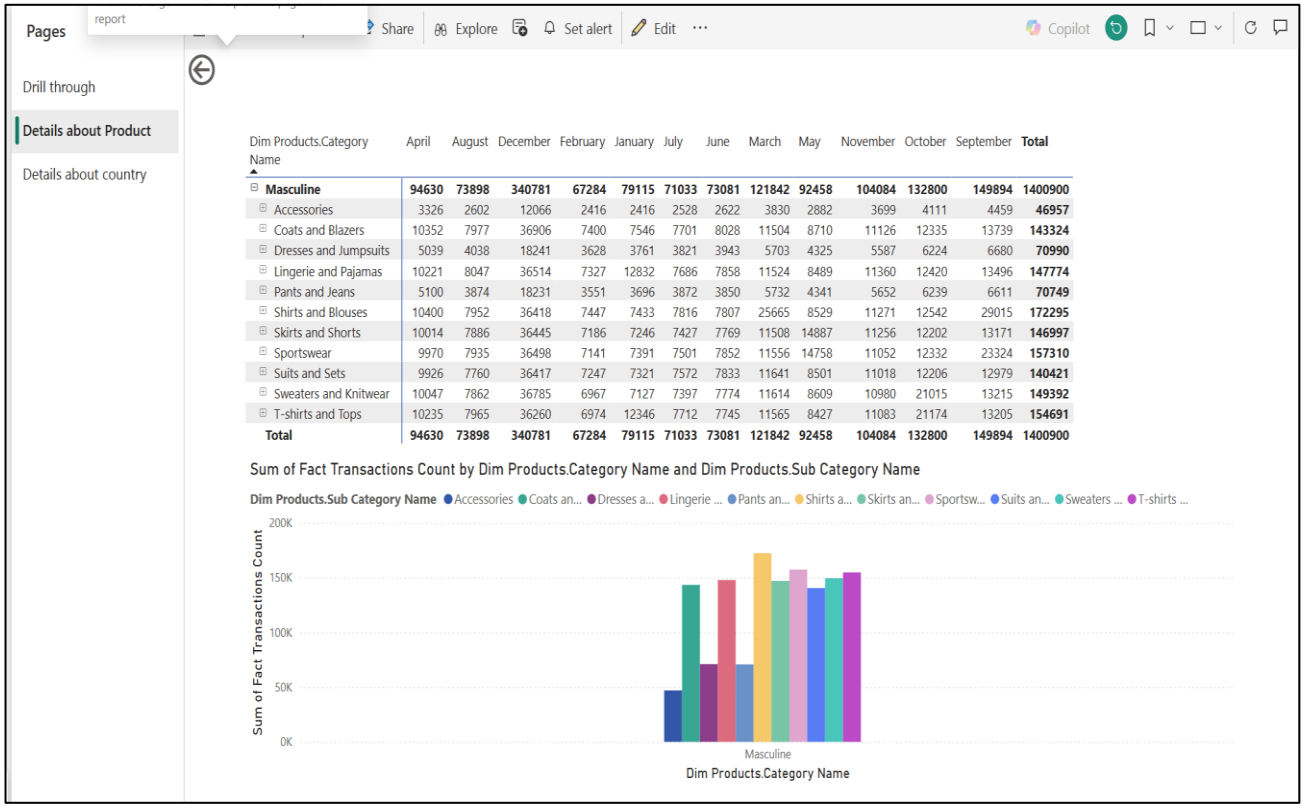
Dim Date.Year	Children	Feminine	Masculine	Total
2024	546956	1203105	1400900	3150961
4	226842	450736	577665	1255243
October	67929	100338	132800	301067
November	37320	81832	104084	223236
December	121593	268566	340781	730940
3	112134	263333	294825	670292
September	60303	148486	149894	358683
July	25430	56312	71033	152775
August	26401	58535	73898	158834
2	100230	225793	260169	586192
May	40260	93346	92458	226064
June	26355	57286	73081	156722
April	33615	75161	94630	203406
1	107750	263243	268241	639234
March	38572	155803	121842	316217
January	45219	54155	79115	178489
February	23959	53285	67284	144528
Total	546956	1203105	1400900	3150961

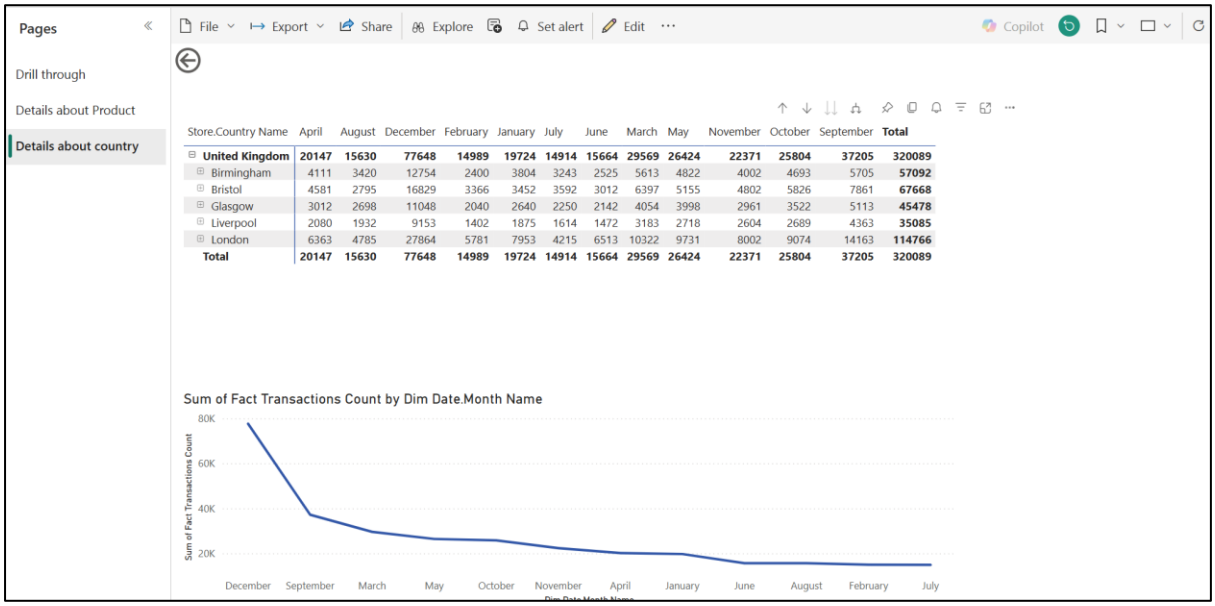
4.5 Report 4: Drill-Through Report

- Set up a **drill-through page** with detailed information.
- Configured visuals in the main report so users can right-click on a visual element and **navigate to the drill-through page** to see related details.

Link: https://app.powerbi.com/links/XoIXyQ433b?ctid=44e3cf94-19c9-4e32-96c3-14f5bf01391a&pbi_source=linkShare&bookmarkGuid=c66f805d-0ea7-4cf2-8368-e7f48947fb7f






Pages
Drill through
Details about Product
Details about country
File
Export
Share
Explore
Set alert
Edit
Copilot
Store.Country Name April August December February January July June March May November October September Total
United Kingdom 20147 15630 77648 14989 19724 14914 15664 29569 26424 22371 25804 37205 320089
Birmingham 4111 3420 12754 2400 3804 3243 2525 5613 4822 4002 4693 5705 57092
Bristol 4581 2795 16829 3366 3452 3592 3012 6397 5155 4802 5826 7861 67668
Glasgow 3012 2698 11048 2040 2640 2250 2142 4054 3998 2961 3522 5113 45478
Liverpool 2080 1932 9153 1402 1875 1614 1472 3183 2718 2604 2689 4363 35085
London 6363 4785 27864 5781 7953 4215 6513 10322 9731 8002 9074 14163 114766
Total 20147 15630 77648 14989 19724 14914 15664 29569 26424 22371 25804 37205 320089
Sum of Fact Transactions Count by Dim Date.Month Name
80K
60K
40K
20K
Sum of Fact Transactions Count
December September March May October November April January June August February July