Data Warehousing and Business Intelligence

Assignment 02
IT22550262

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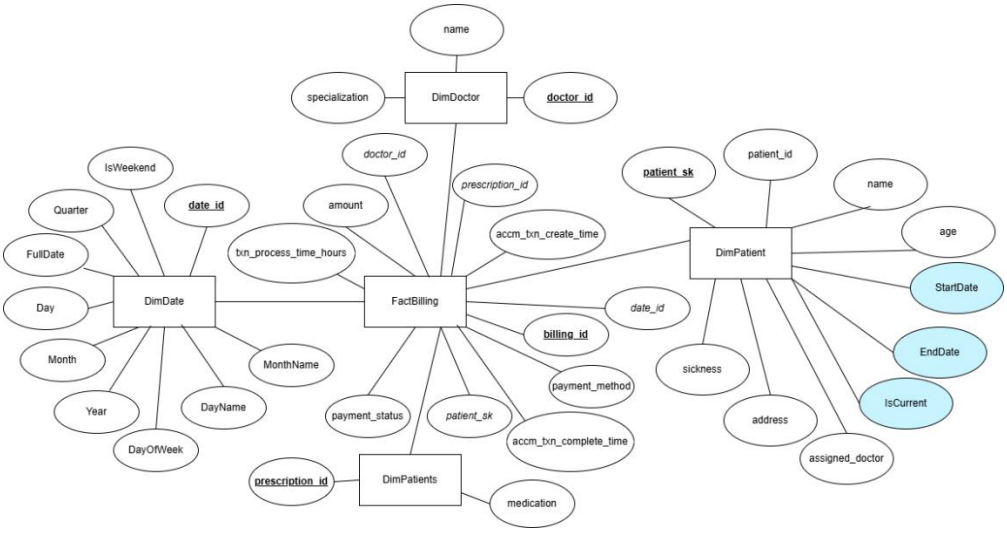
Data Source for the Assignment

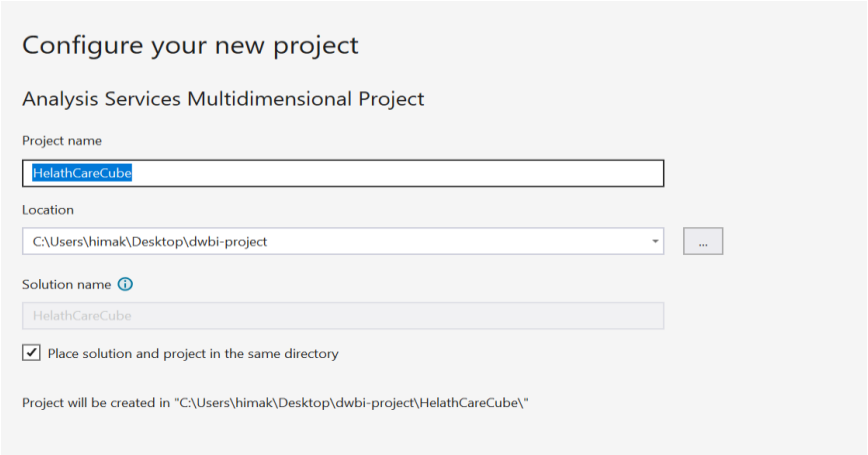
The Data warehouse is based on a Hospital Management System, it has four Dimensions tables and a Fact table. The fact table quantifies the billing of patients. The Dimension tables include: DimPatients, DimDoctors, DimPrescription, DimDate which assist in FactBilling Fact table. These Dimension tables include most important attributes that are required to Analysis tasks in this scenario. Below Entity Relational diagram shows how they interact with each other.



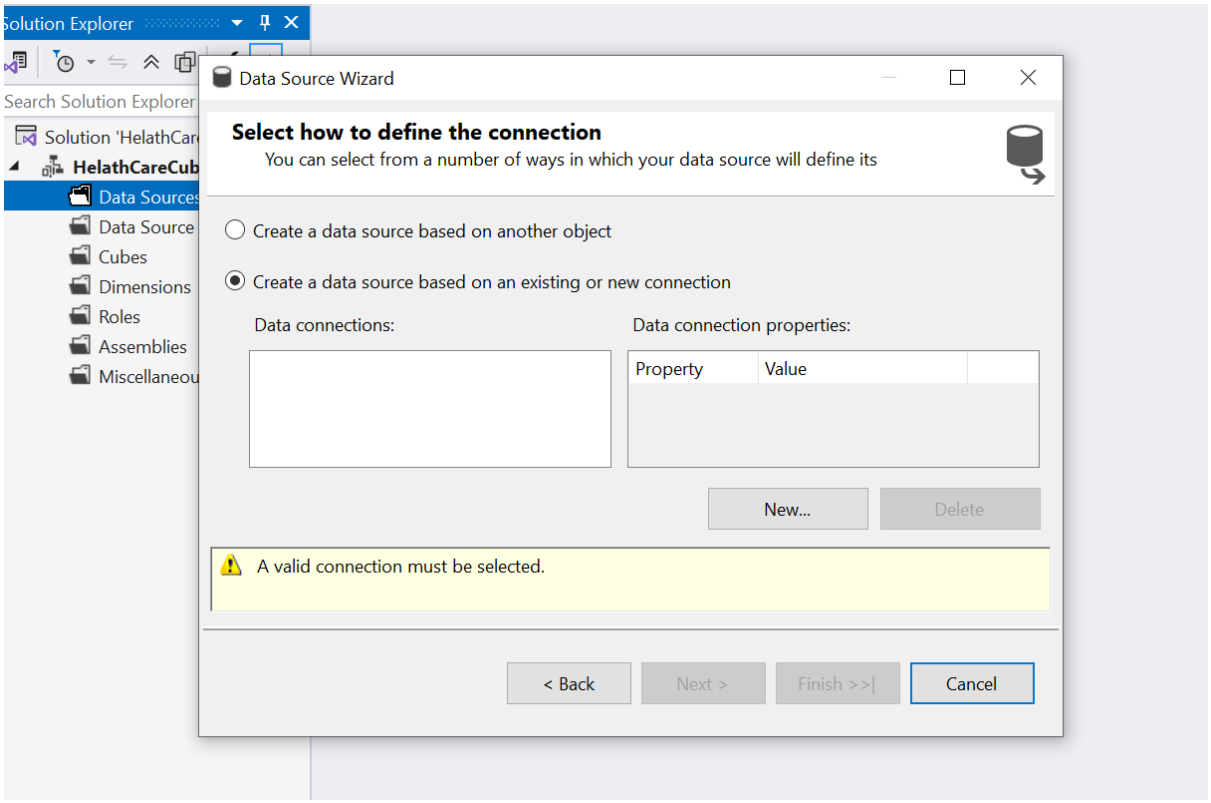
The blue coloured attributes are related to SCD (Slowly Changing Dimension). The measurable attributes are Billing amount and txn_processing_hours.

SSAS Cube Implementation

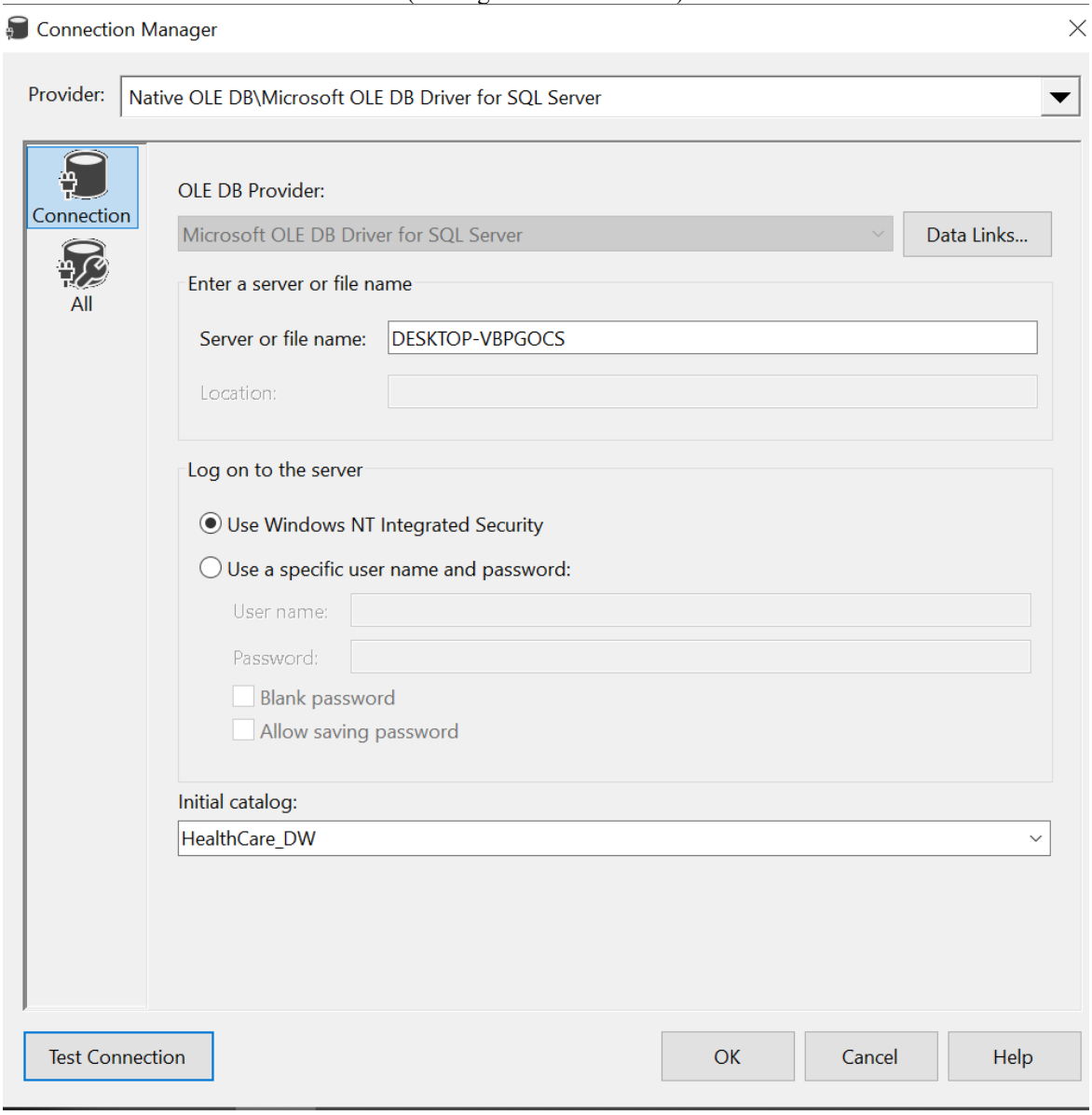
In Visual Studio I created an Analysis and Multidimensional Project named HelathCareCube
The main objective of creating a cube is to pre-aggregate and organize datasets into multidimensional structures which facilitate fast decision making.



First, in Data Sources of the project, pointed it to the Data Warehouse

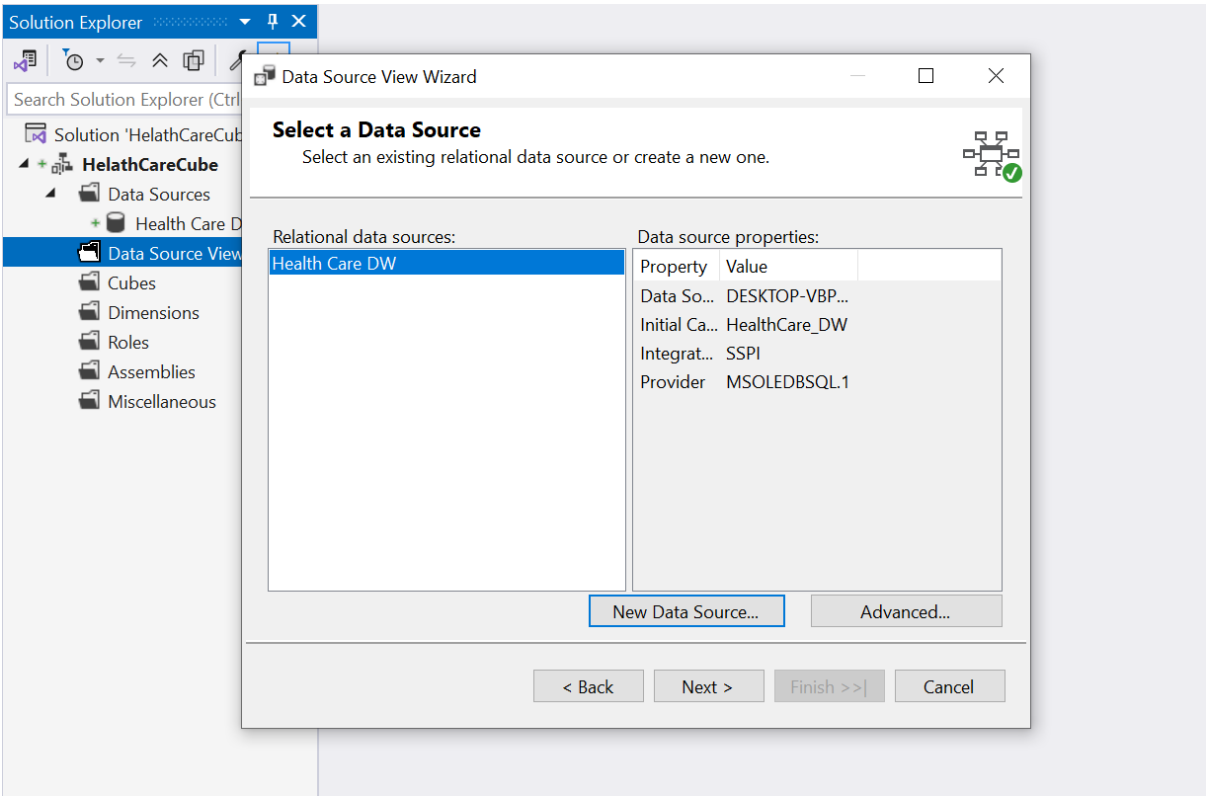


(Adding connection details)

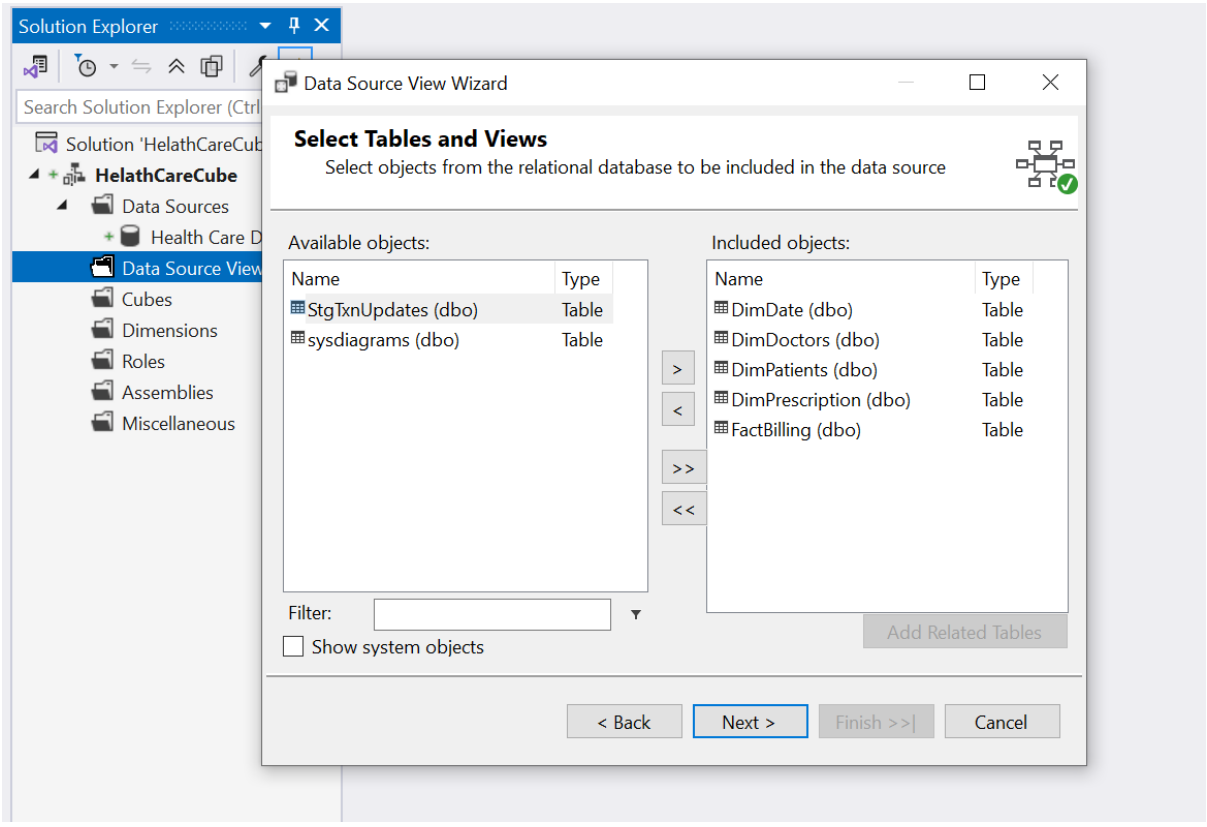


Then tested out connection to ensure it connected successfully

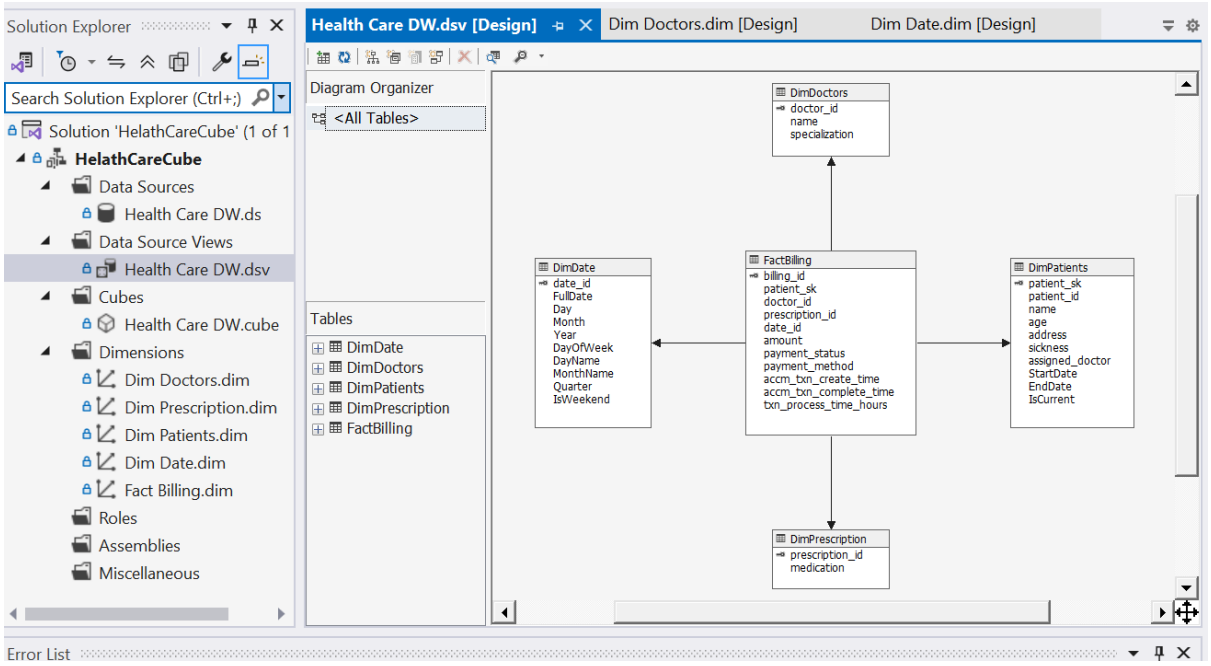
Next in Data Source view, added all the tables from the Warehouse Database. These are the underlying resources which cube is fed on.



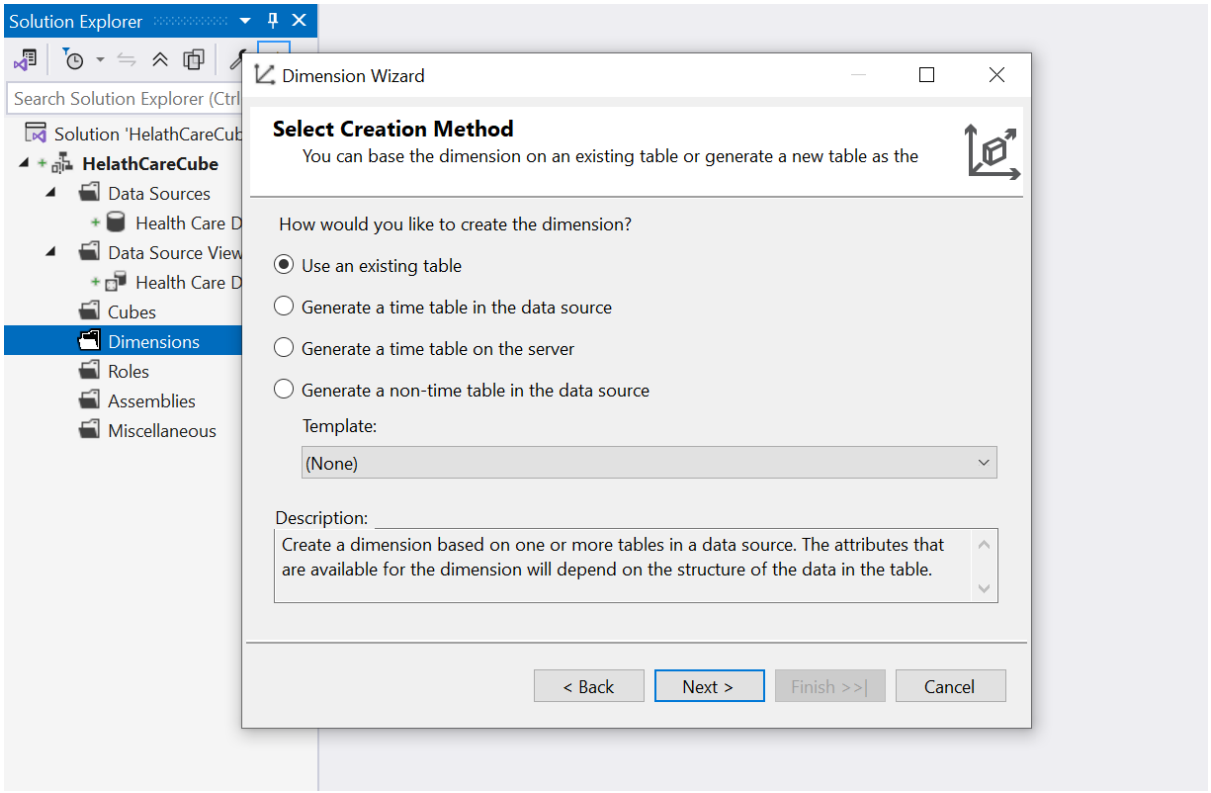
Selected the Data warehouse database and all the Dimension & Fact tables



Then all the data sources could be observed as loaded successfully.

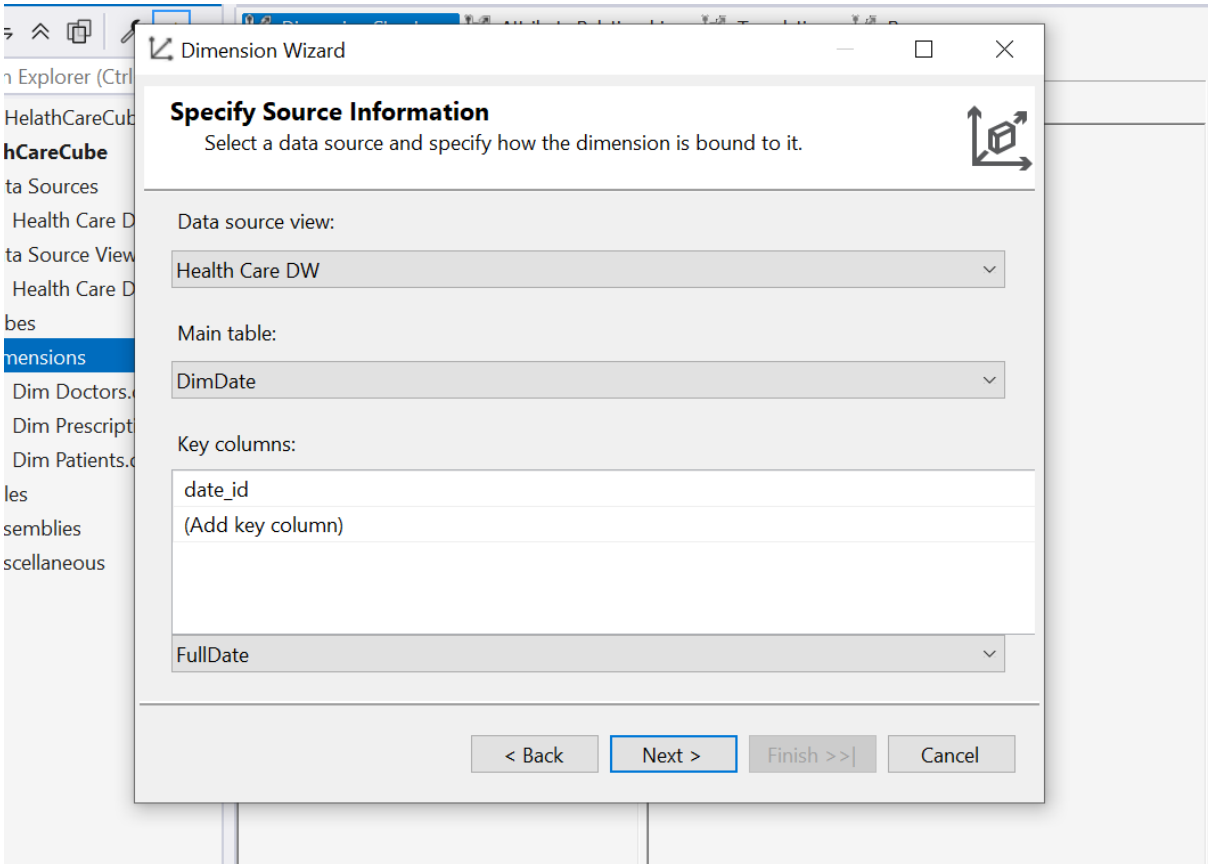


Then created dimensions from the tables. These are the descriptive, categorical data which can be used to analyse and slice measures.

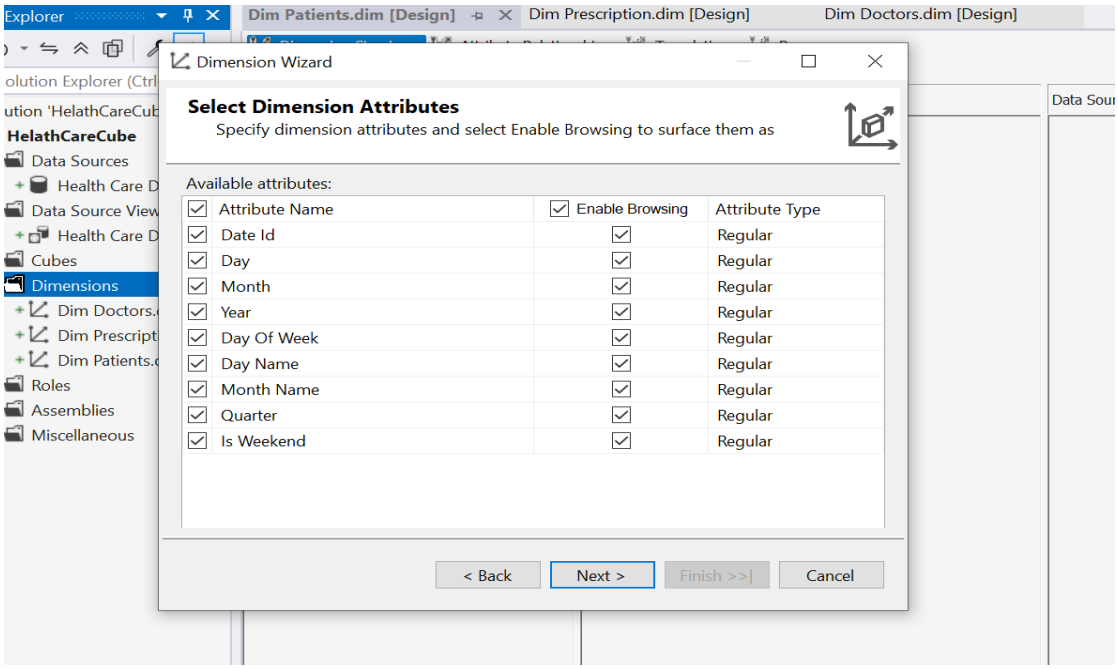


Added the necessary configurations

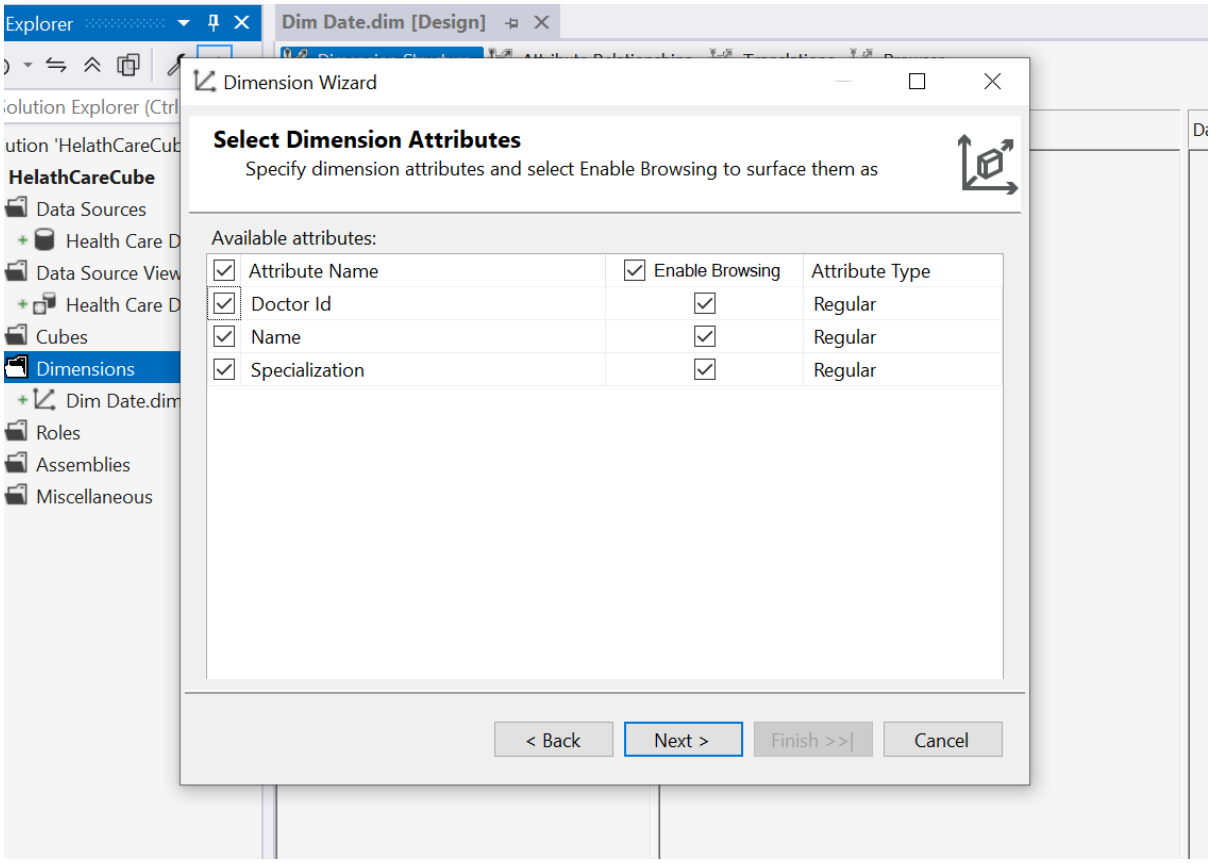
For the DimDate Dimension, I selected FullDate as showing value referring the date_id



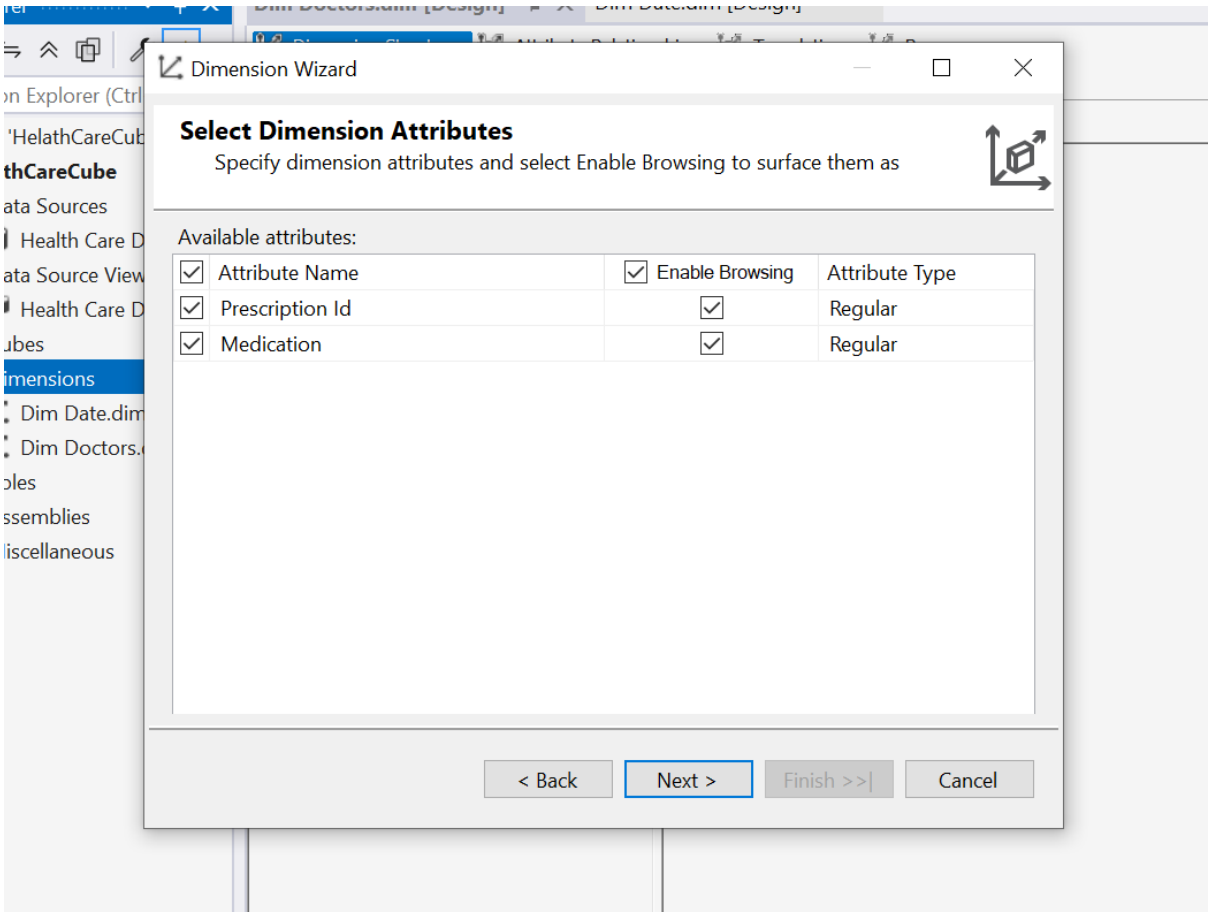
then selected all dimensions attributes as they will be important for decision making purposes.



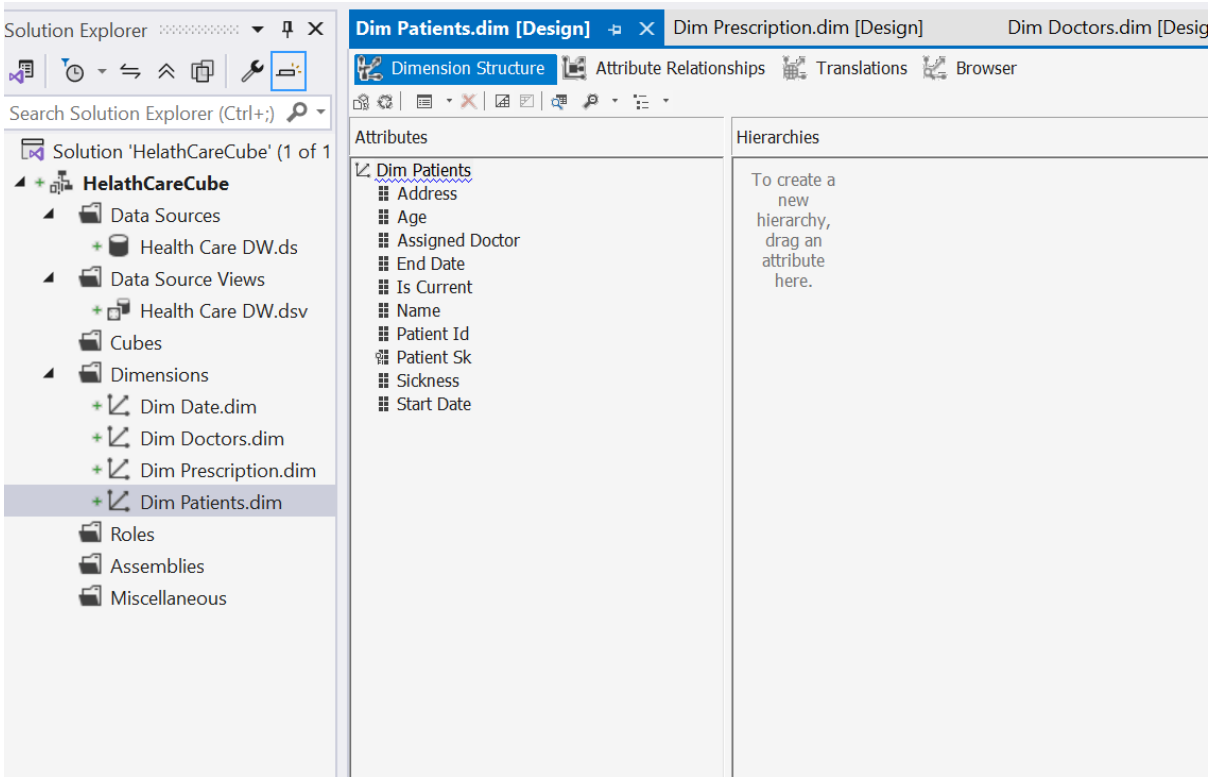
Likewise selected all in DimDoctors



Selected all from DimPrescription

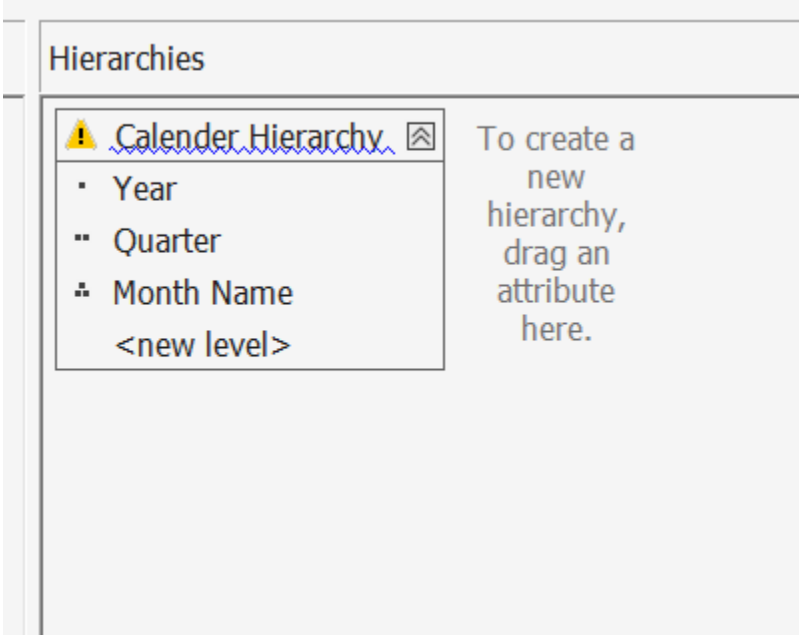


Selected all for DimPatients

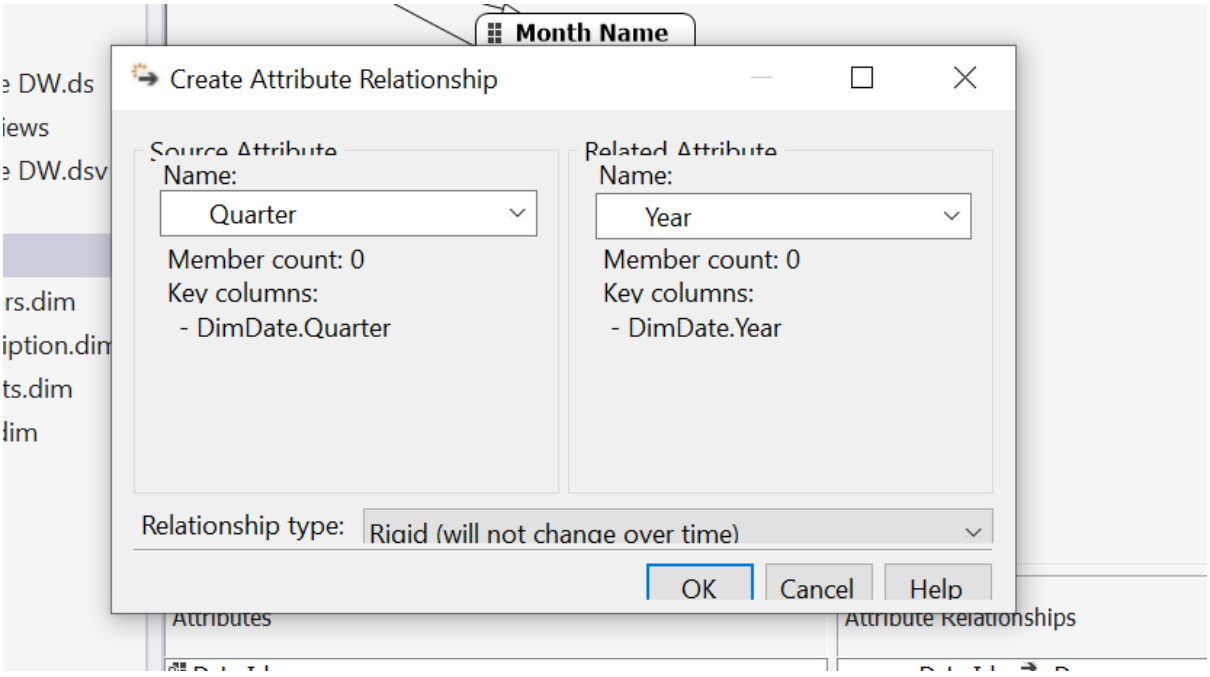


Then built a user hierarchy using DimDate

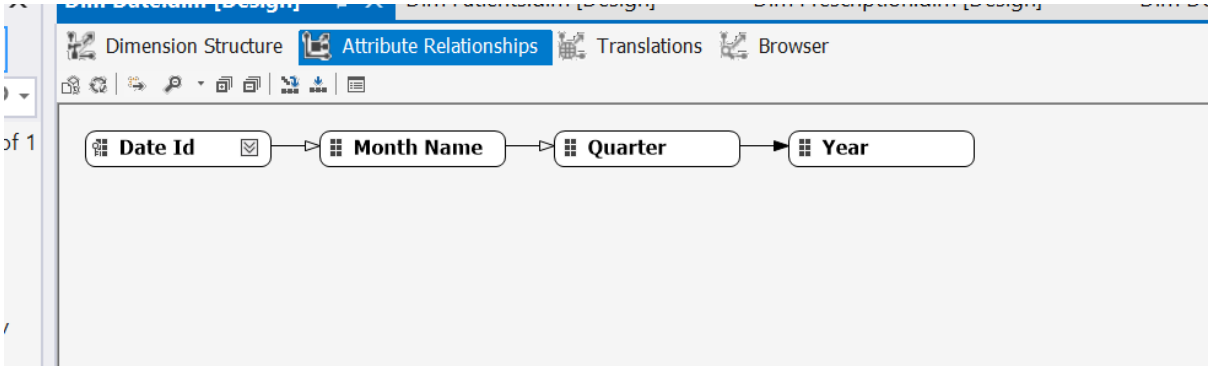
1. Year
2. Quarter
3. Month (Month name)



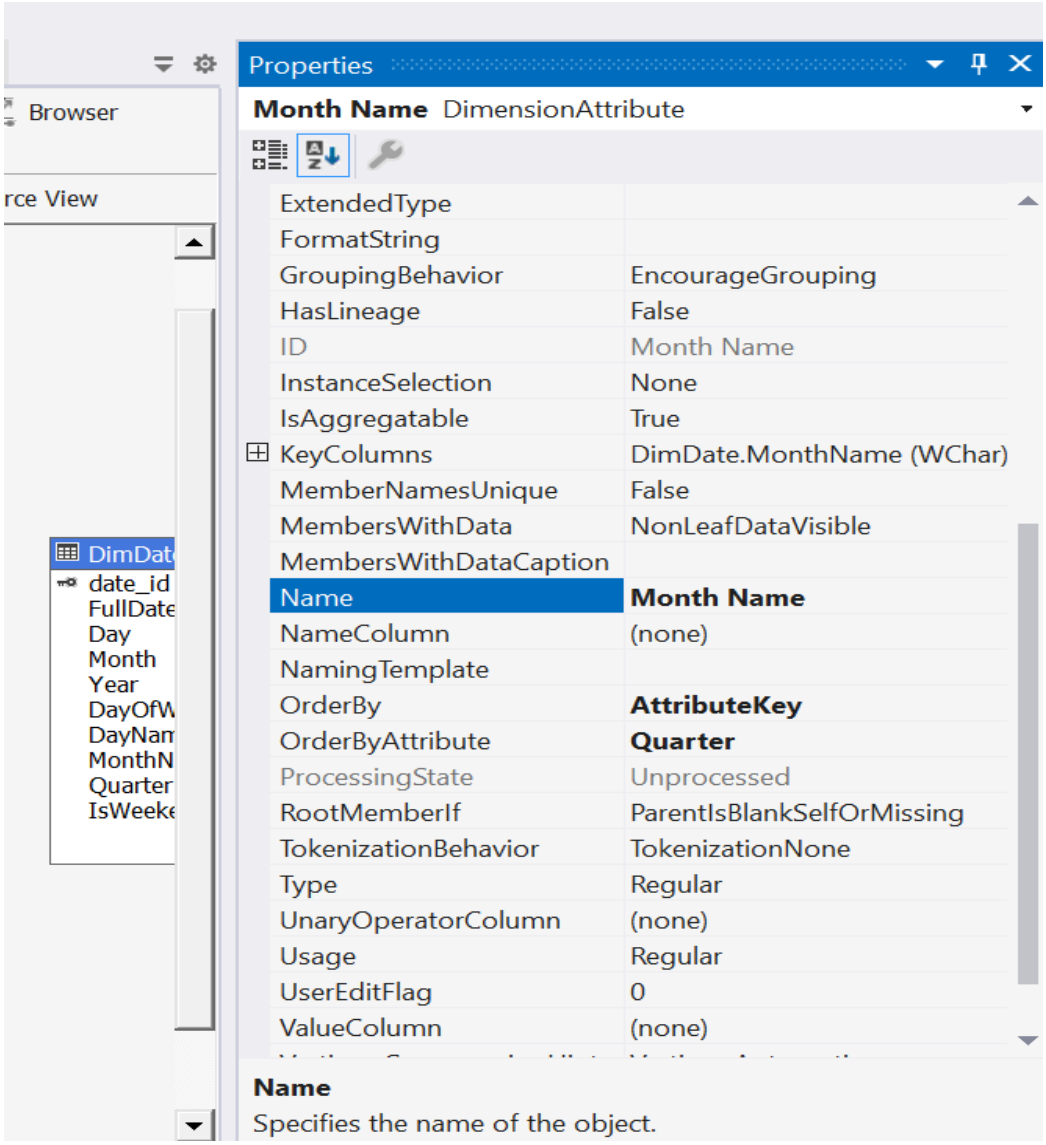
had to configure attribute relationships



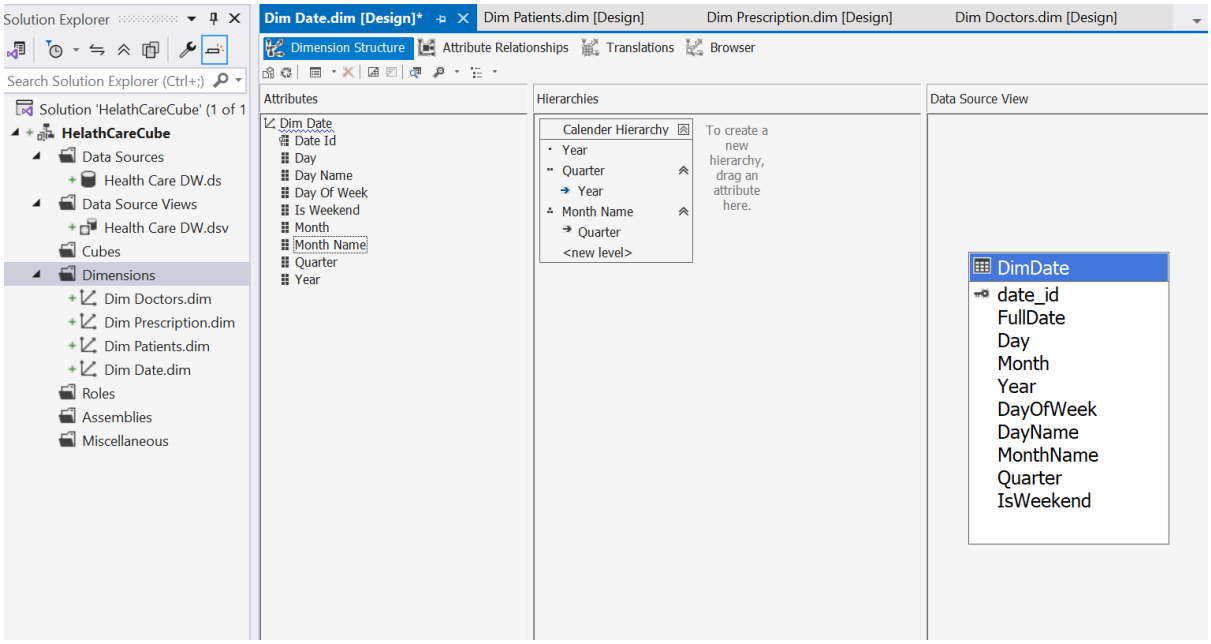
In attribute relationships configured it as needed.



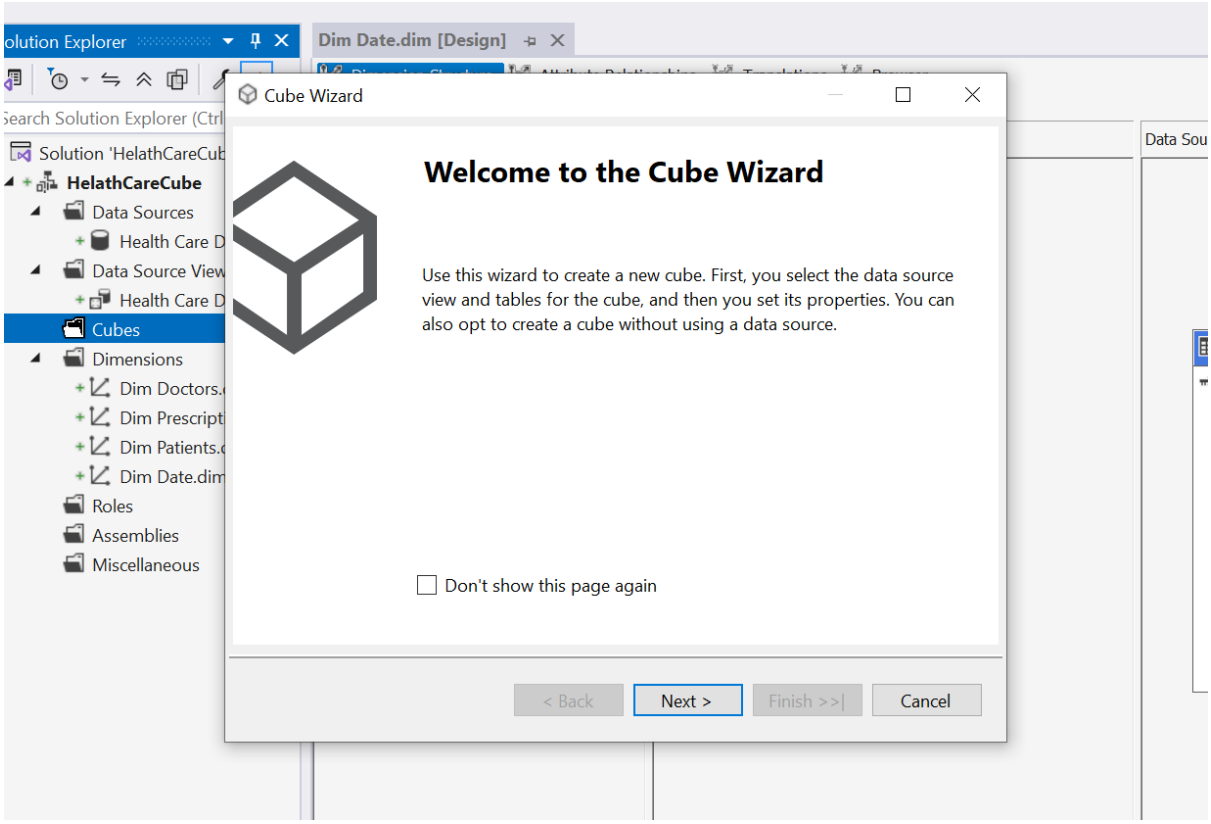
Since month name maybe ordered by alphabetical order, selected it to order by attribute key.



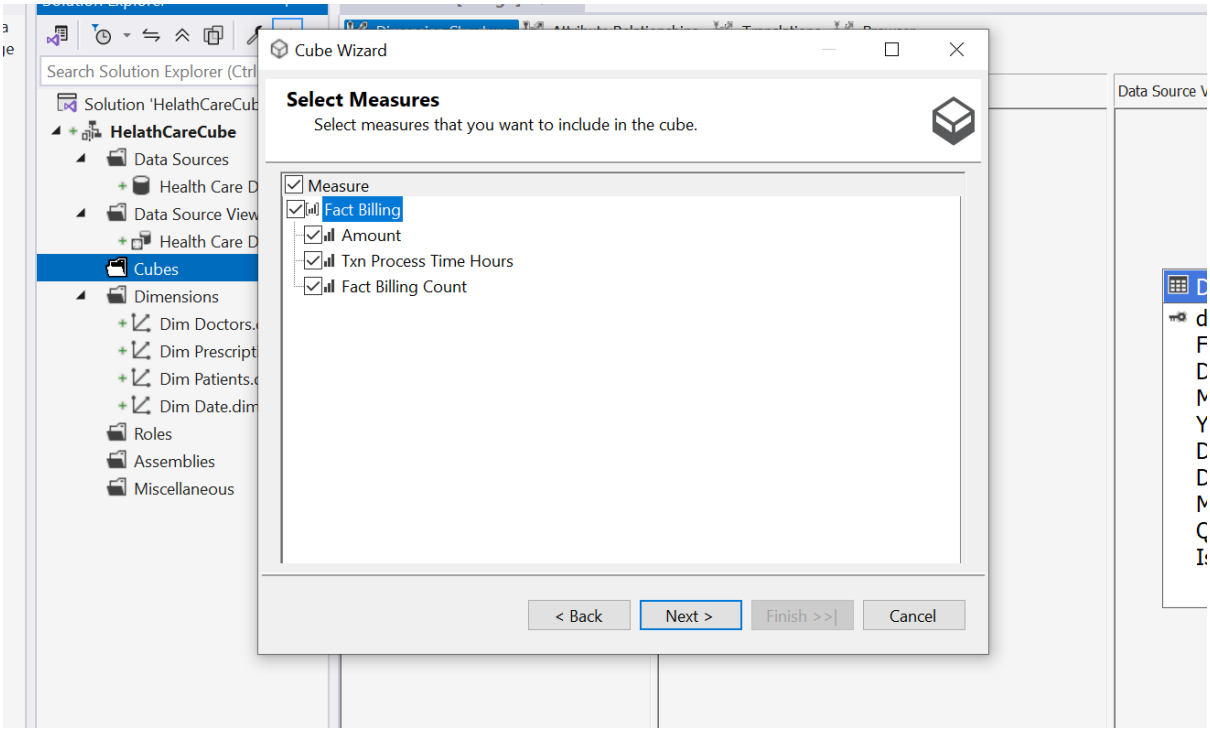
Final DimDate dimensions looked like this 👇



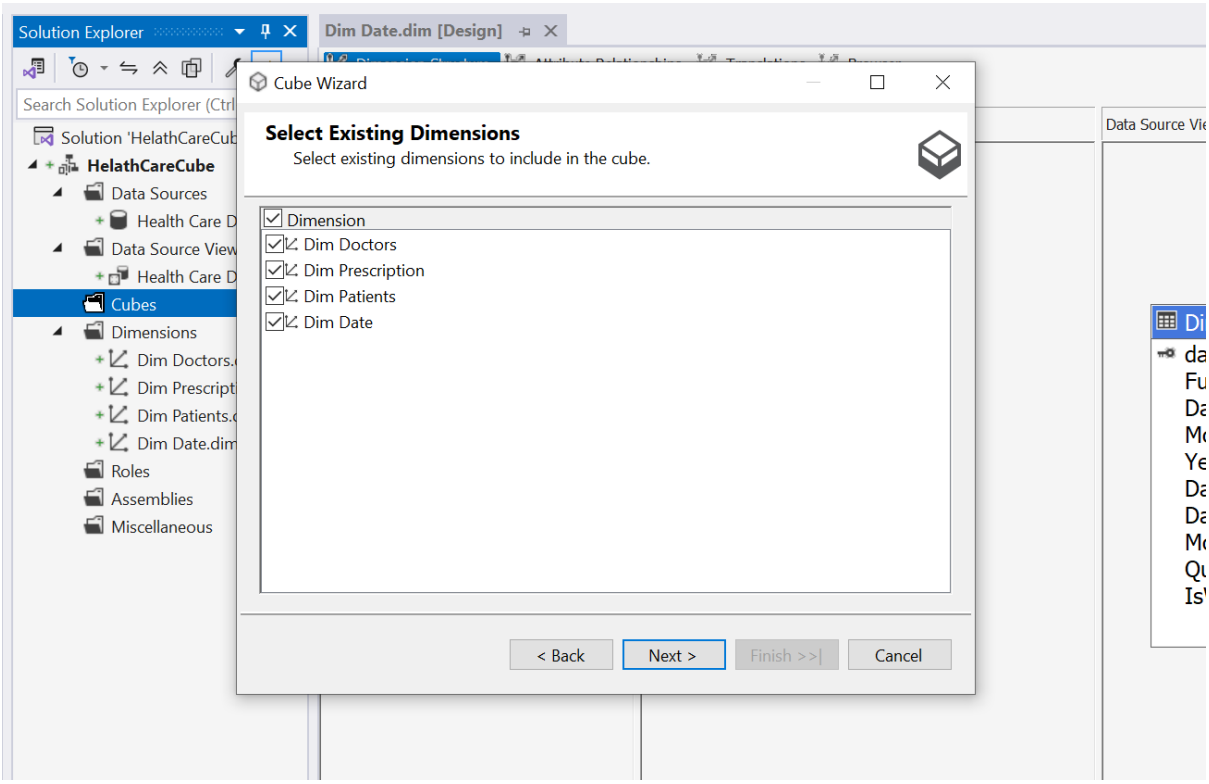
Then I started defining a cube using Cube Wizard.



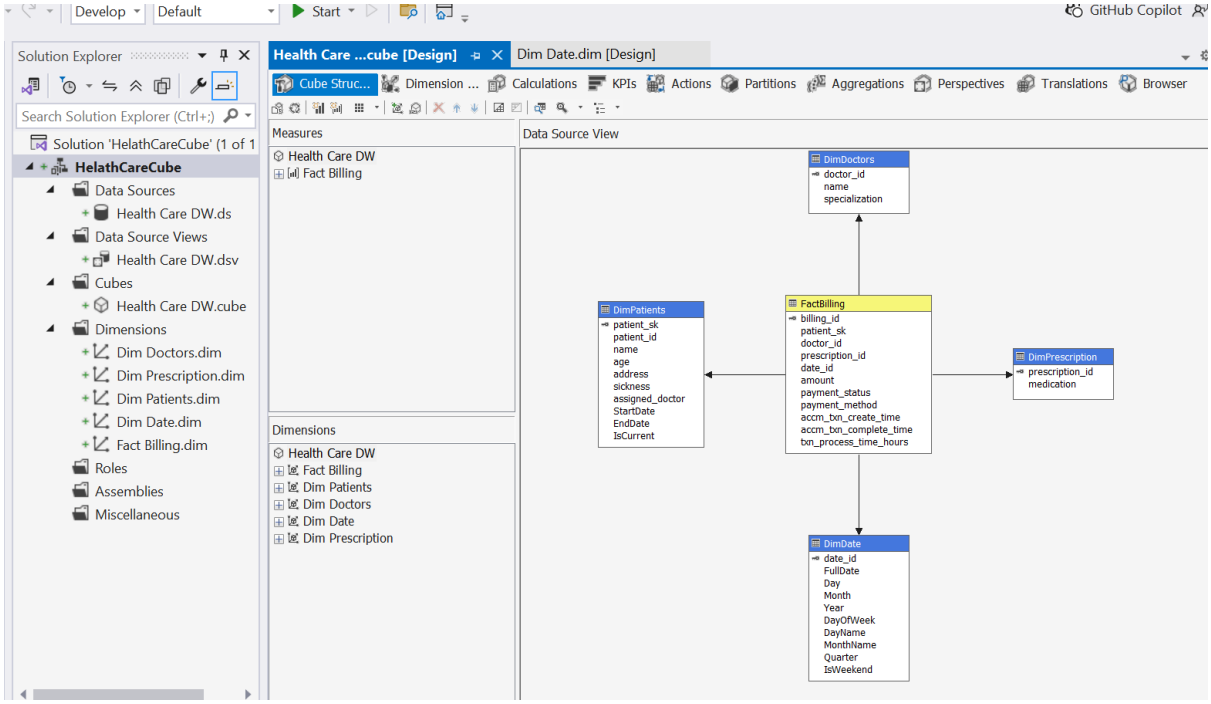
Selected appropriate measures from the fact table (FactBilling)



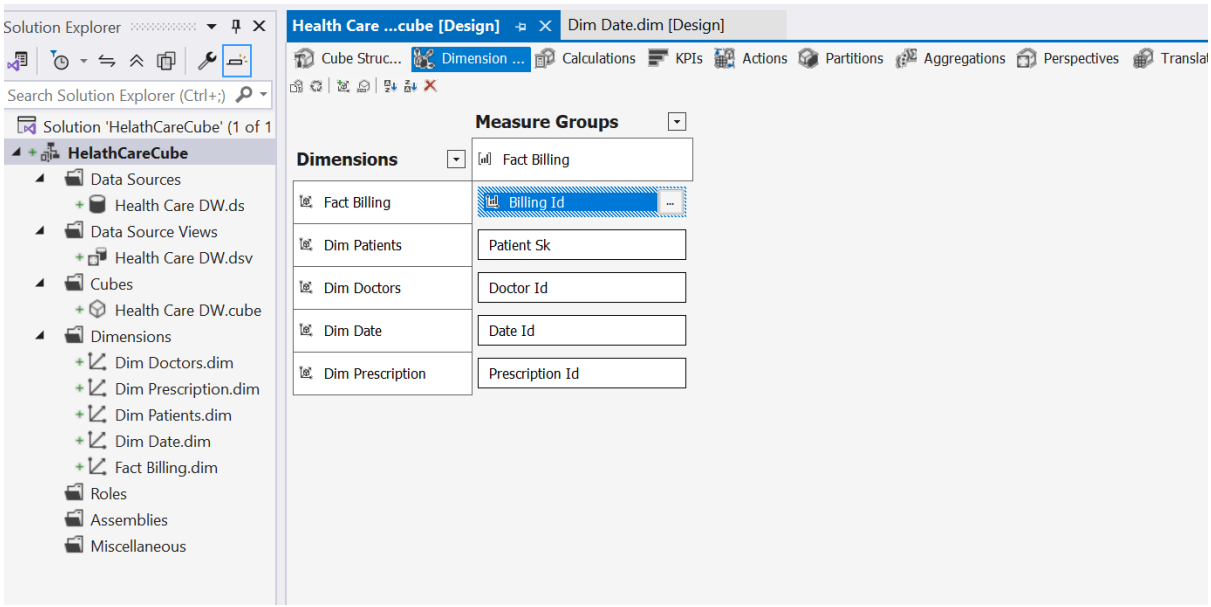
Added dimensions including previously created Date Hierarchy as needed



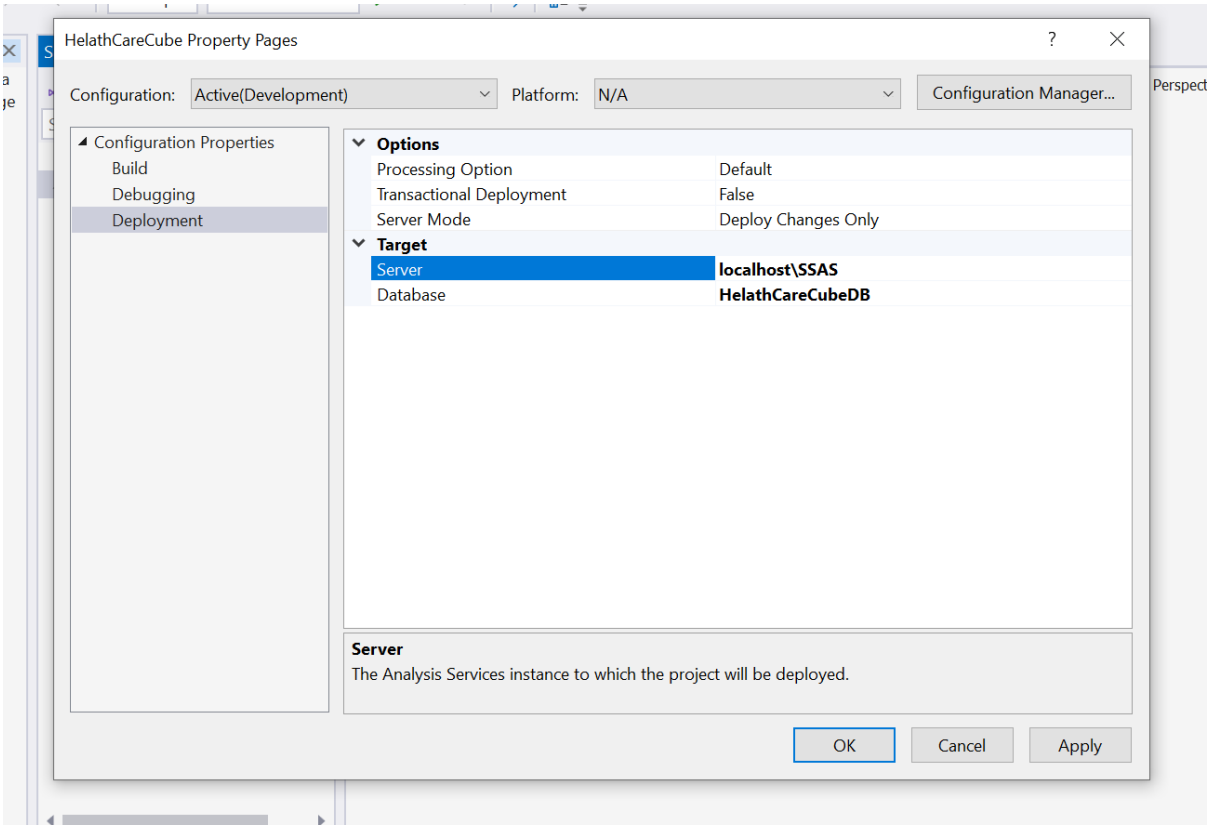
The cube view looked like this 👇



Verified and configured relationships between fact and dimension tables using the dimension usage tab.

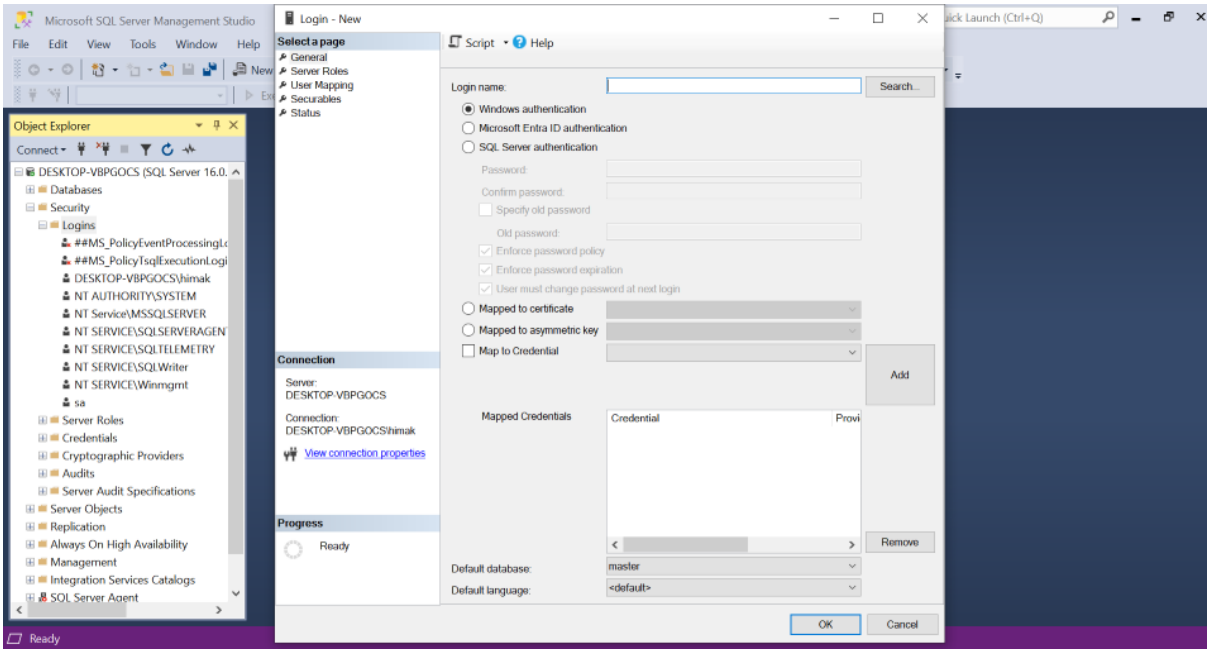


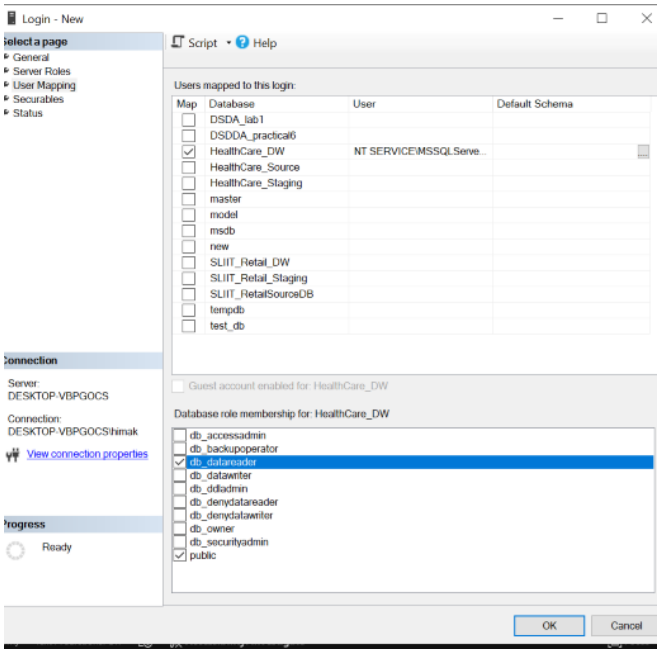
Configured deployment properties including target server and database settings



Then built the cube and started debugging, had an issue due to missing SQL Server Analysis Services (SSAS) instance, resolved it by installing required service.

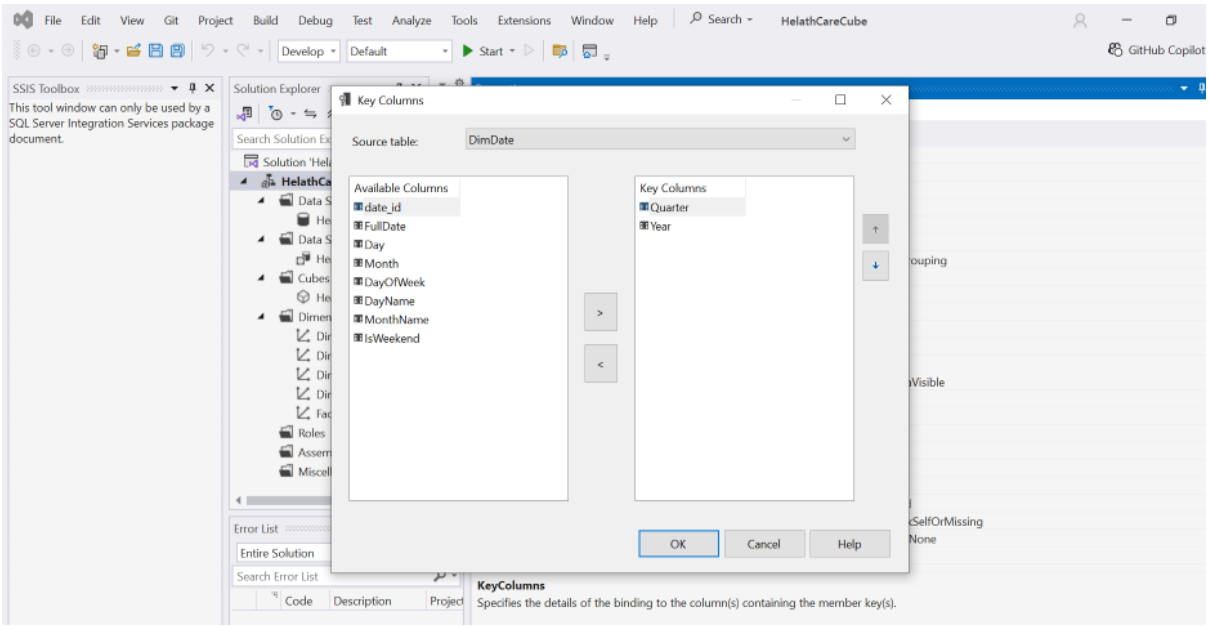
Faced a connection issue due to access limitation, created a new SQL server login using windows authentication via SSMS to enable SSAS to communicate with SSMS

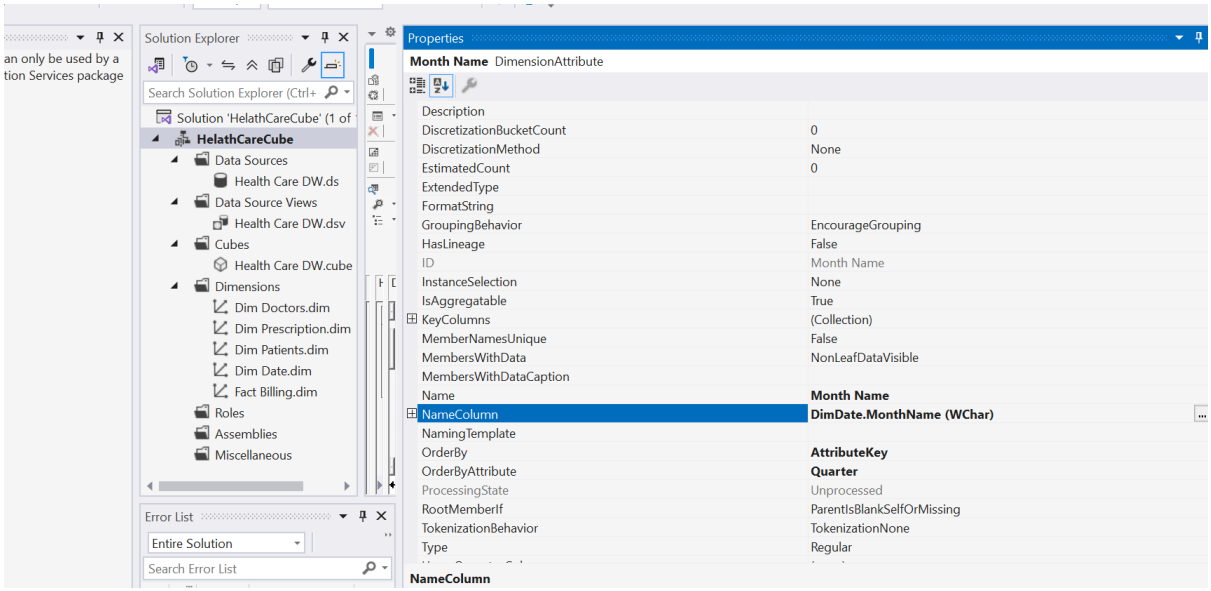




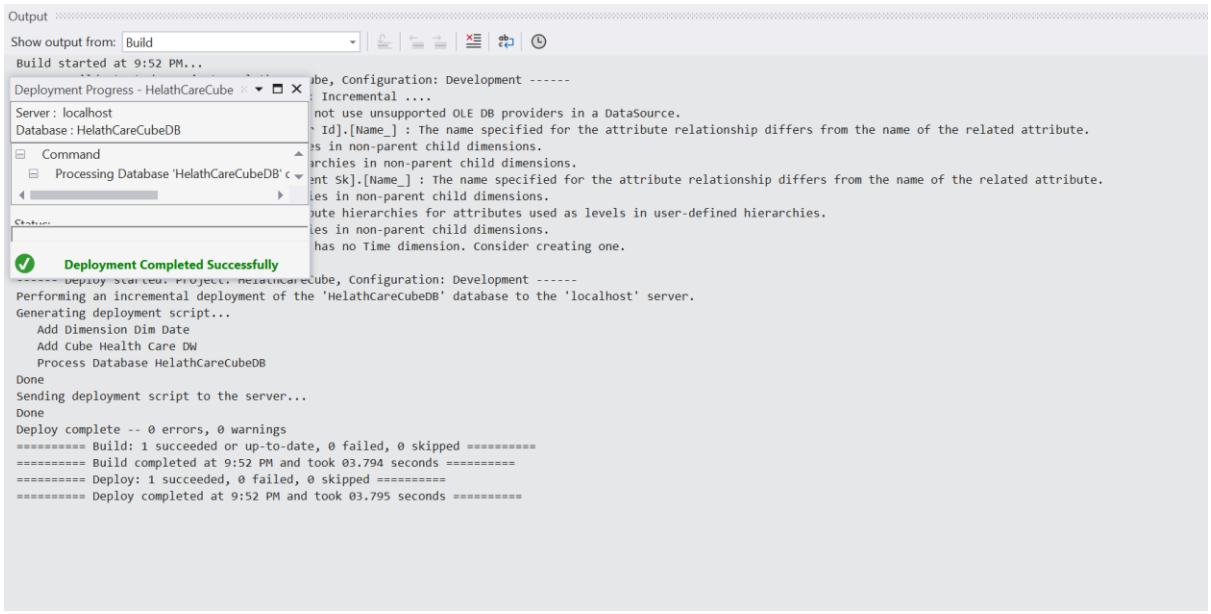
An error detected when deploying due to duplicate Quarter and Month Names
(Q1 as 1 appearing in two different years, 'January' in two different years)

Resolved it by modifying hierarchy to include Year context for Quarter and Month levels, so there will be unique scenarios



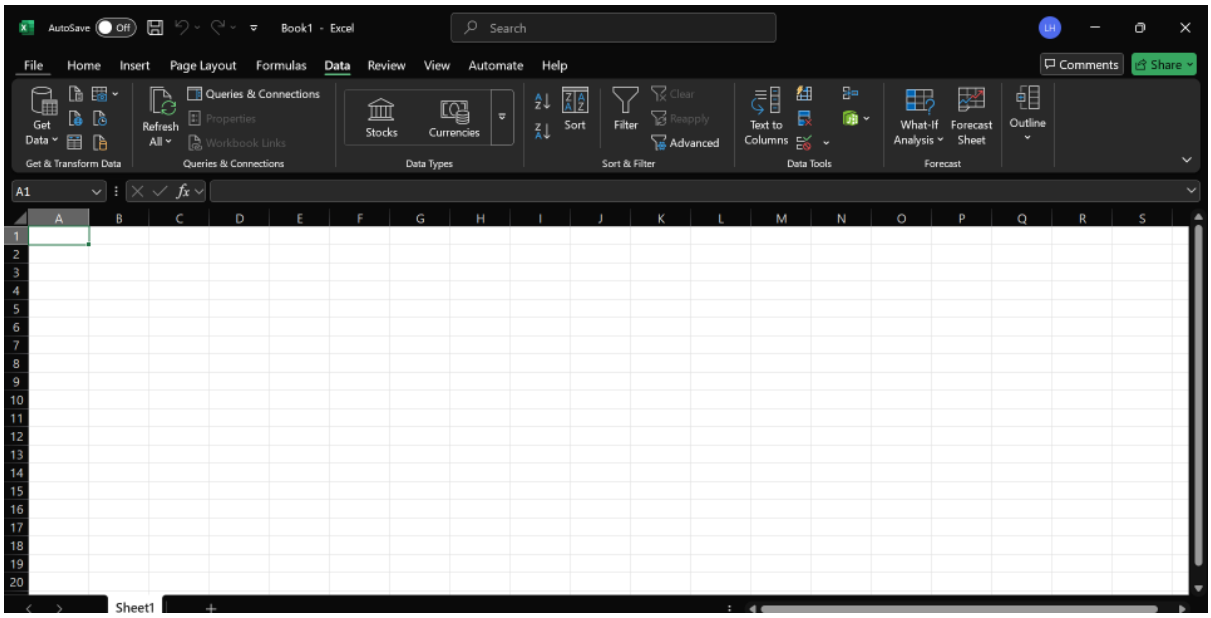


Then a successful deployment happend



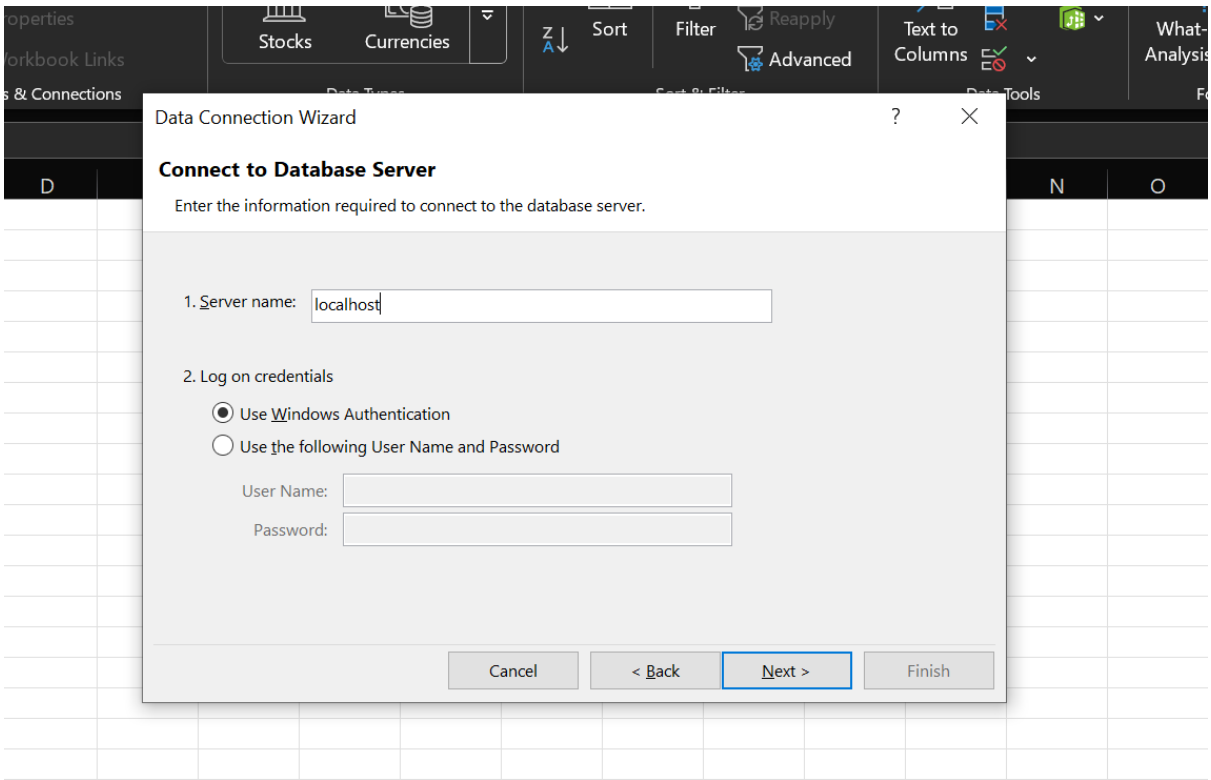
Demonstration of OLAP Operations

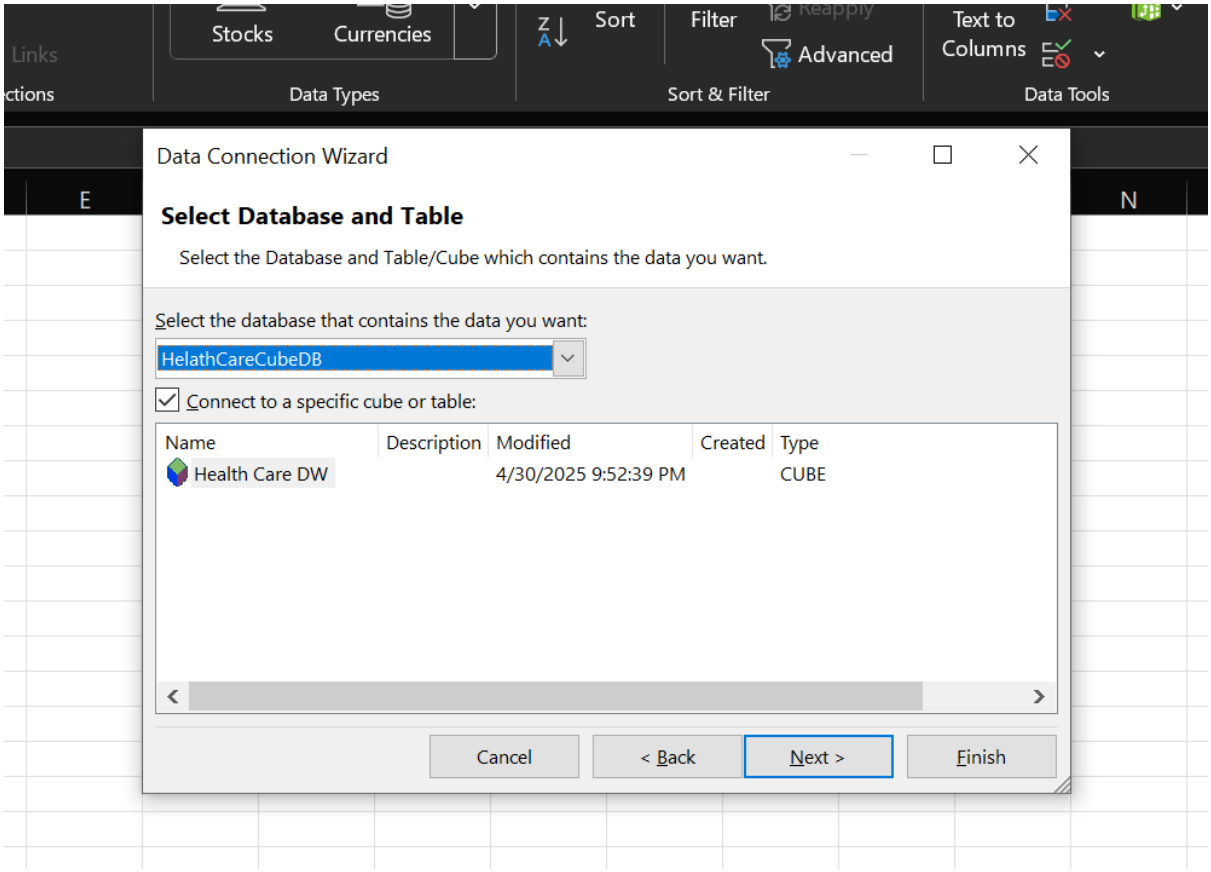
Here I opened a blank Excel file

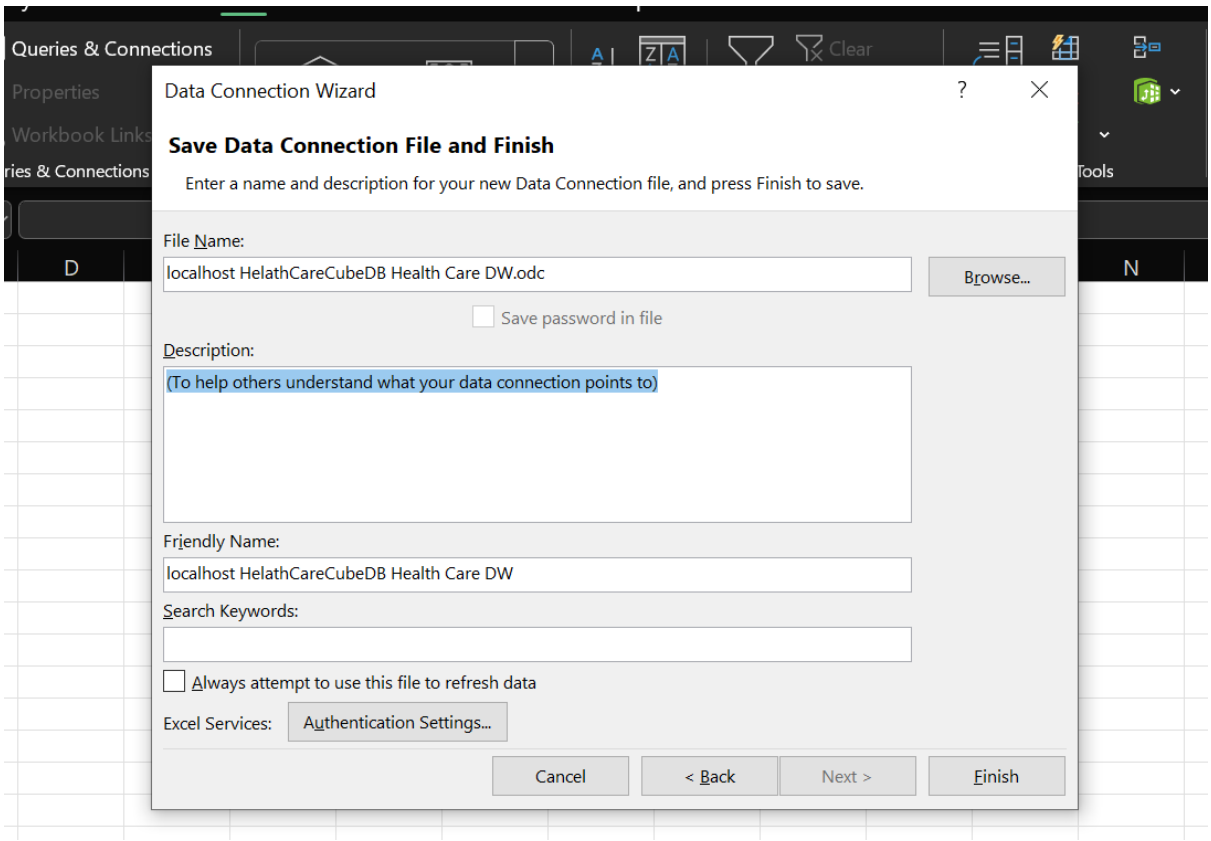


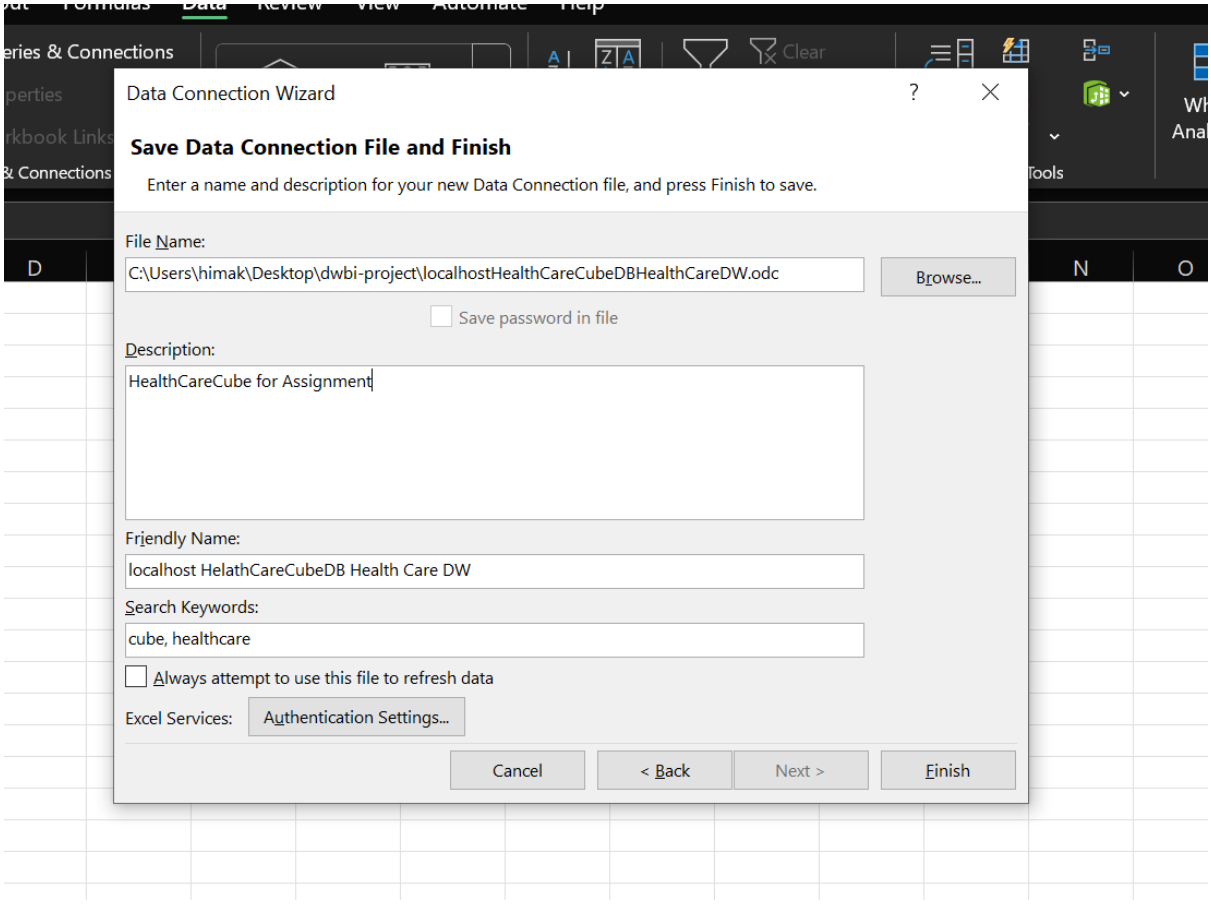
Then in Data tab > Get Data function to connect to SSAS cube via the Analysis Services

Entered relevant data server and database details, selected the cube and loaded the data

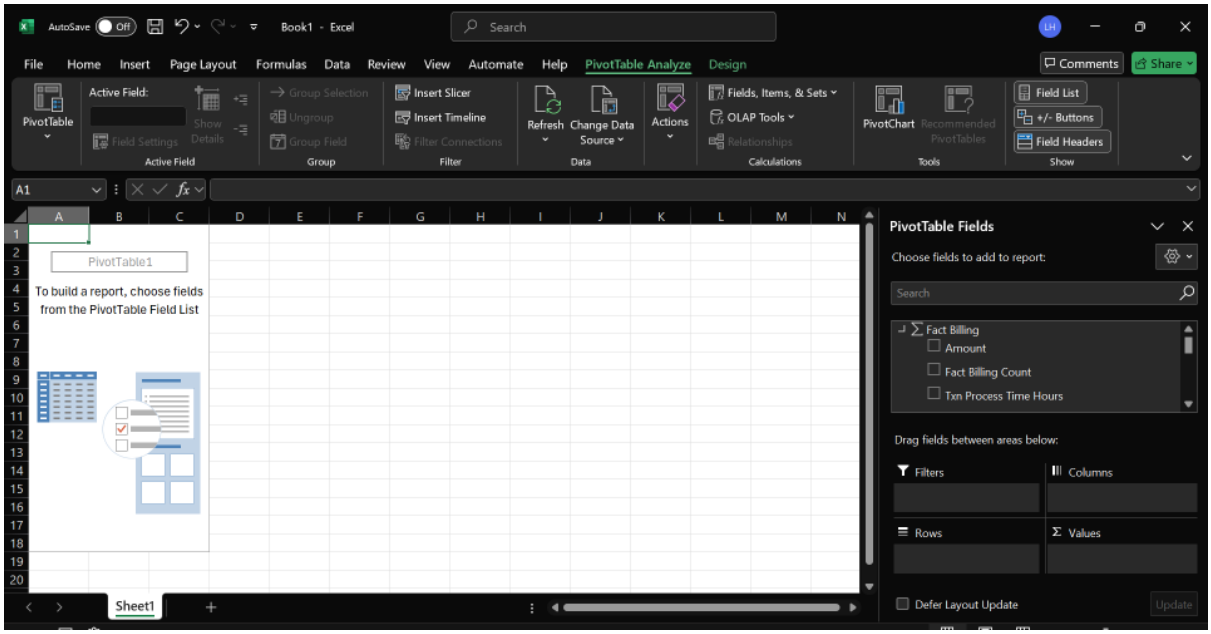



Stocks
Currencies
Data Types
Sort
Filter
Advanced
Sort & Filter
Text to Columns
Data Tools
Data Connection Wizard
Select Database and Table
Select the Database and Table/Cube which contains the data you want.
Select the database that contains the data you want:
HelathCareCubeDB
Connect to a specific cube or table:
Name
Description
Modified
Created
Type
Health Care DW
4/30/2025 9:52:39 PM
CUBE
Cancel
< Back
Next >
Finish


Queries & Connections
Properties
Workbook Links
Clear
Data Connection Wizard
Save Data Connection File and Finish
Enter a name and description for your new Data Connection file, and press Finish to save.
File Name:
localhost HelathCareCubeDB Health Care DW.odc
Browse...
Save password in file
Description:
(To help others understand what your data connection points to)
Friendly Name:
localhost HelathCareCubeDB Health Care DW
Search Keywords:
Always attempt to use this file to refresh data
Excel Services:
Authentication Settings...
Cancel
< Back
Next >
Finish

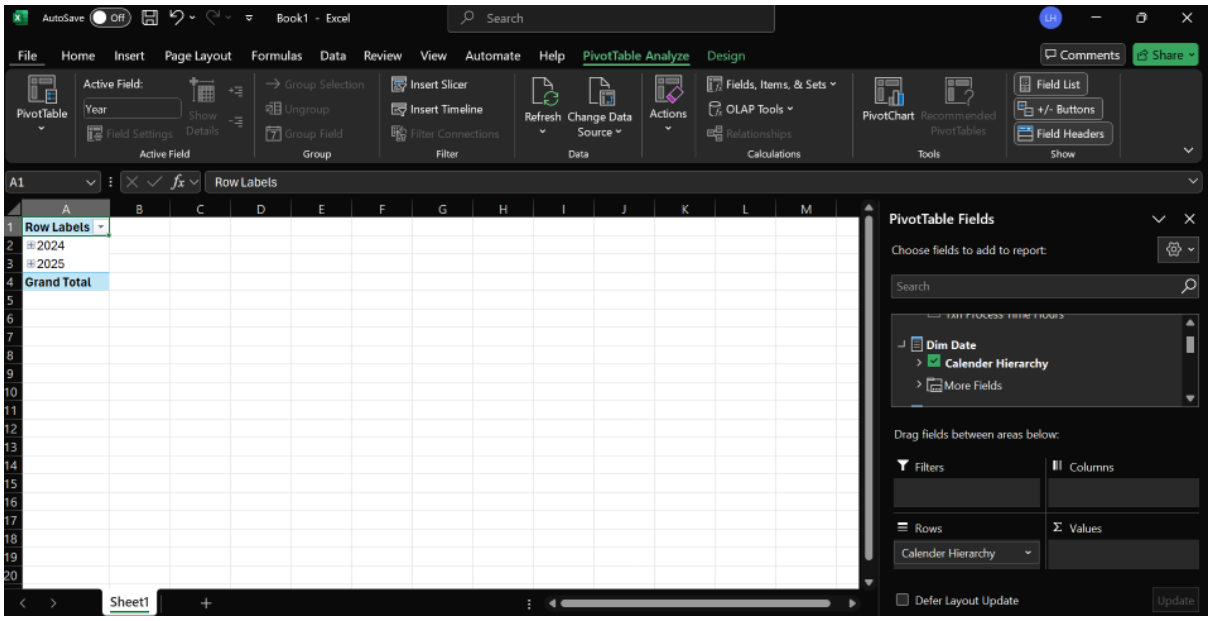


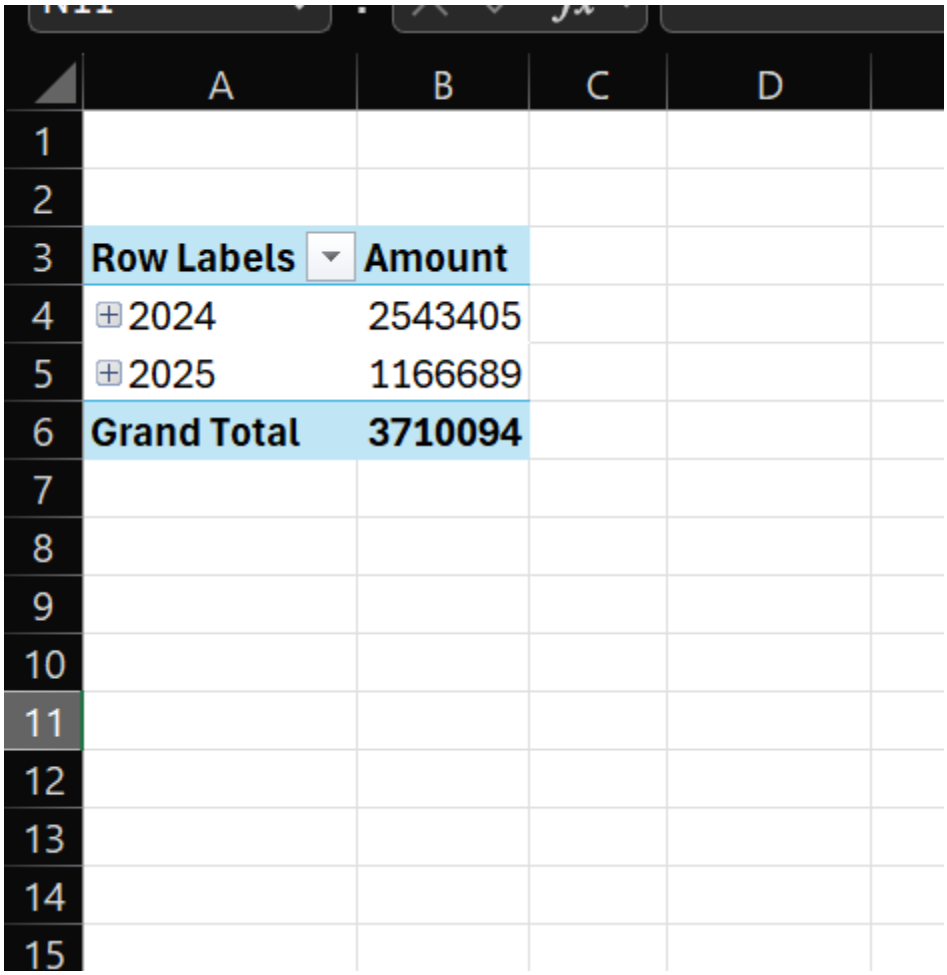
Then started demonstrating OLAP operations, created a Pivot table using the connected cube to enable multi-dimensional analysis



Roll-Up

Demonstrated roll-up using Date hierarchy (Year > Quarter > Month) to aggregate values at higher levels





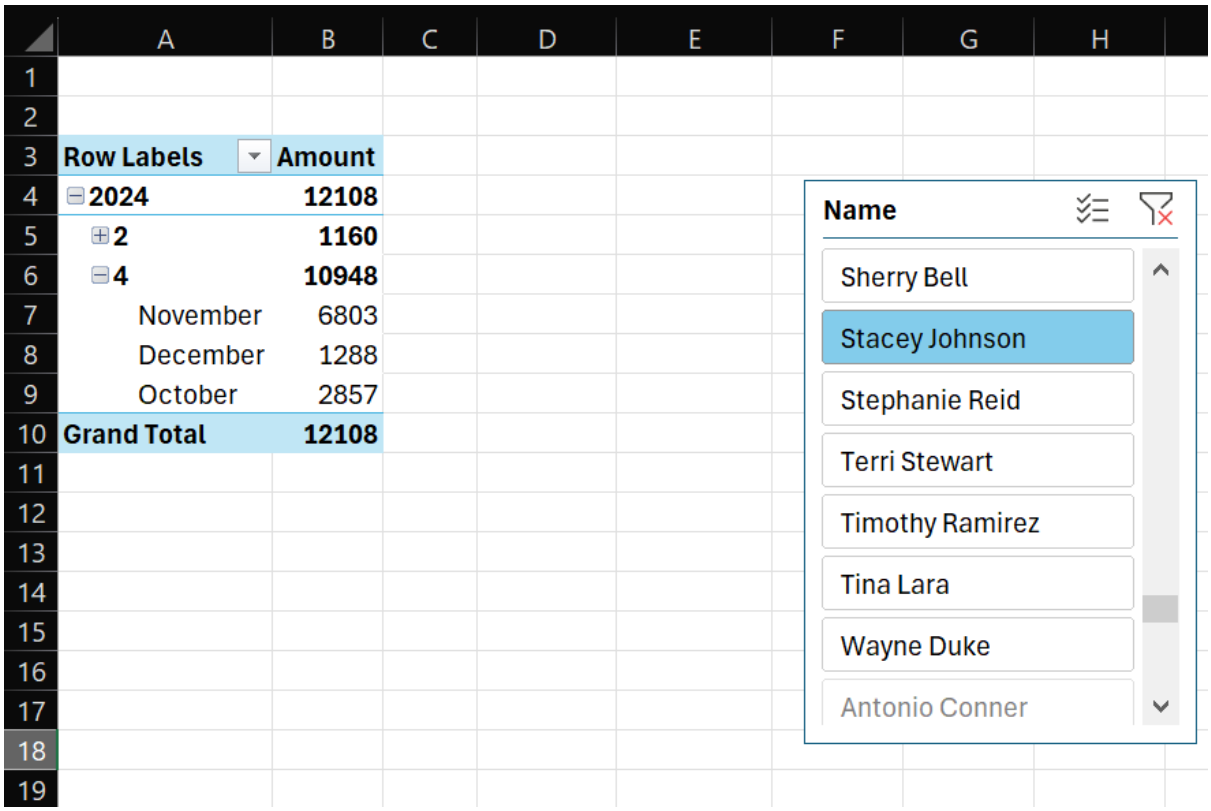
Drill-Down

Expanded the Date hierarchy to explore detailed data at the Month and Quarter levels

Row Labels	Amount
⊟2024	2543405
⊞2	727256
⊟3	884621
August	300884
September	256568
July	327169
⊟4	931528
November	333739
December	272219
October	325570
⊟2025	1166689
⊟1	926830
February	248223
January	319050
March	359557
⊞2	239859
Grand Total	3710094

Slicing

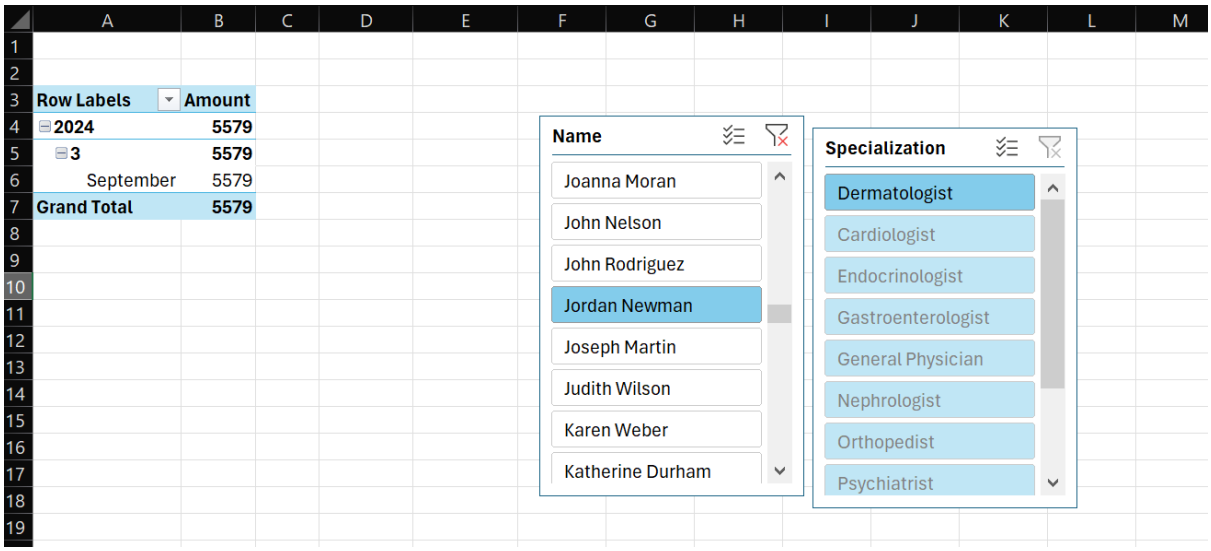
Inserted a slicer and added doctor name to it view metrics specified to each doctor



Row Labels	Amount
2024	12108
2	1160
4	10948
November	6803
December	1288
October	2857
Grand Total	12108

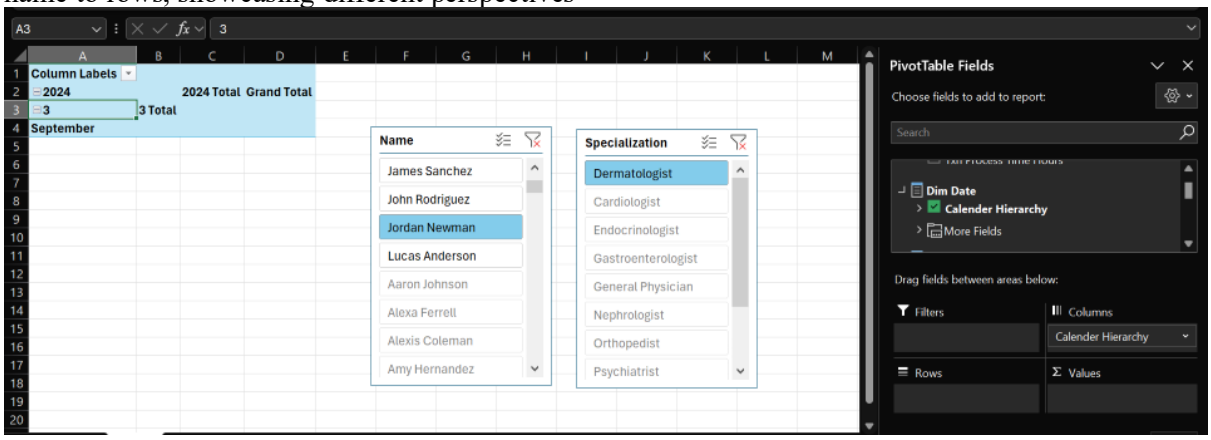
Dicing

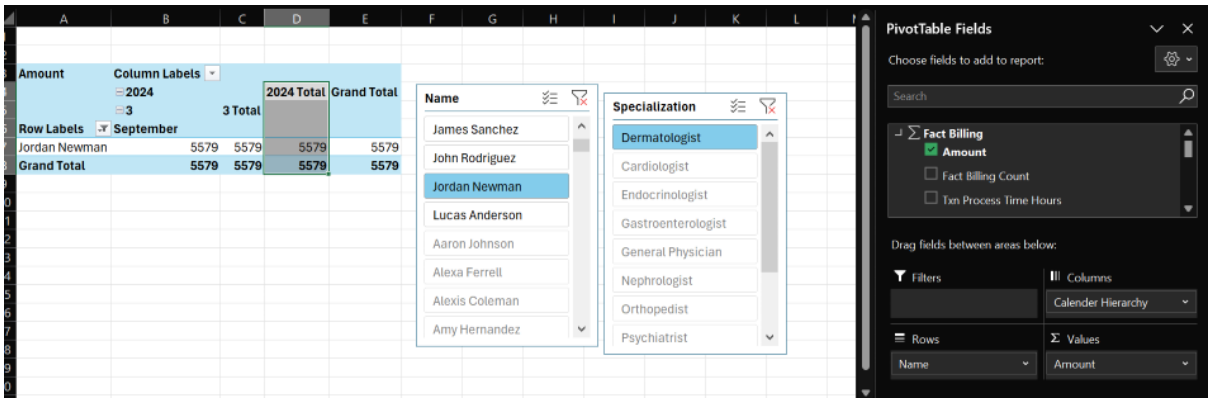
included both Doctor name and Specialization in rows/columns to analyse combined dimensions



Pivoting – Changing perspective of analysis

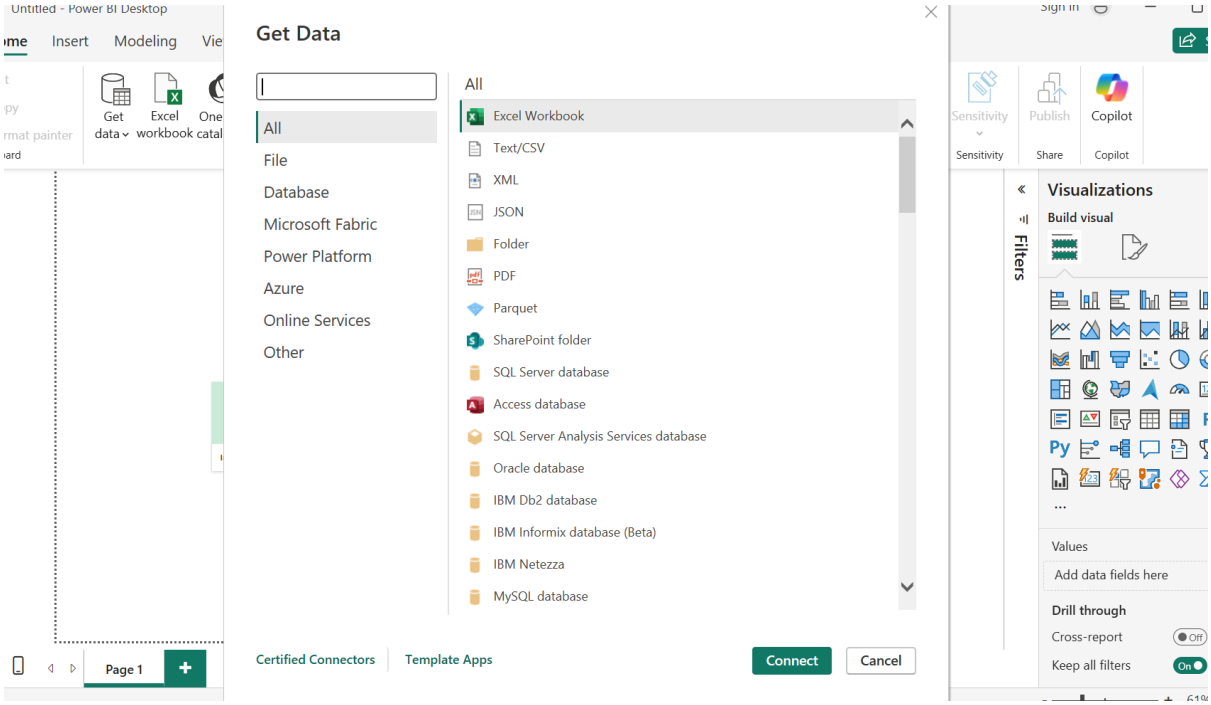
Rearranged the Pivot table by switching the Data hierarchy from rows to columns and added Doctor name to rows, showcasing different perspectives



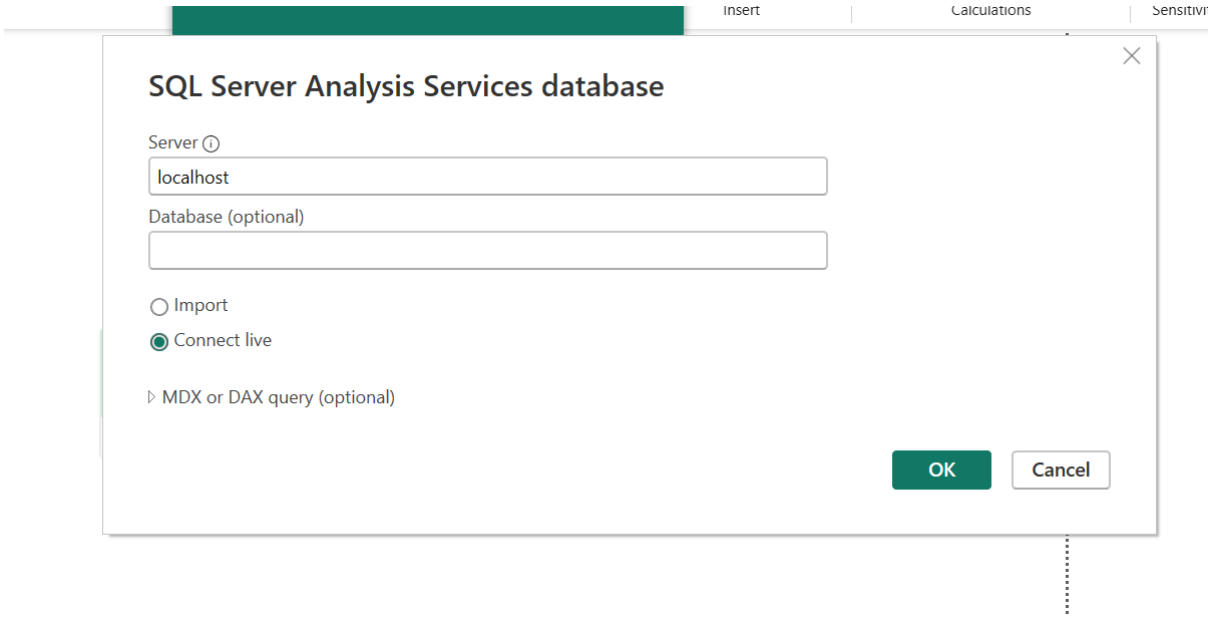


Power BI Reports

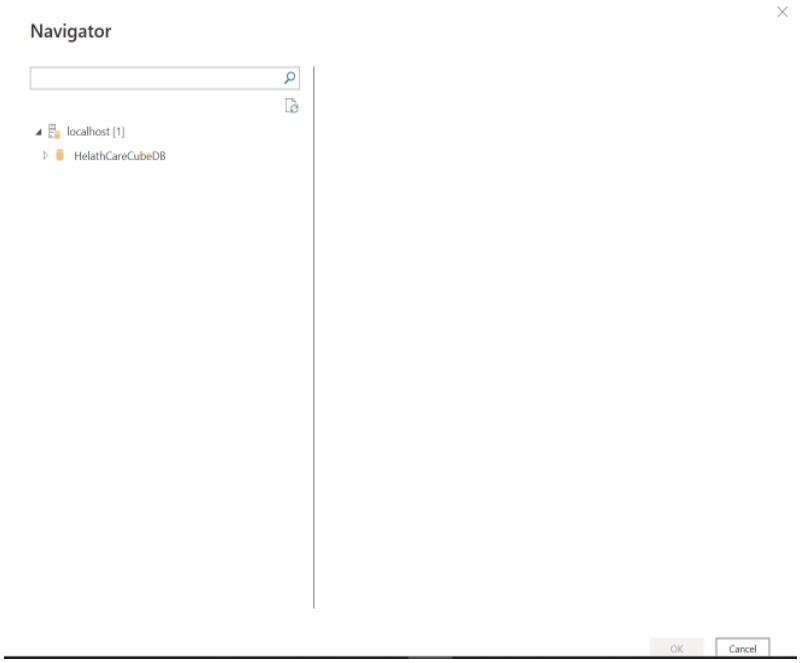
Launched Power BI Desktop and selected Get Data and selected SQL Server Analysis services

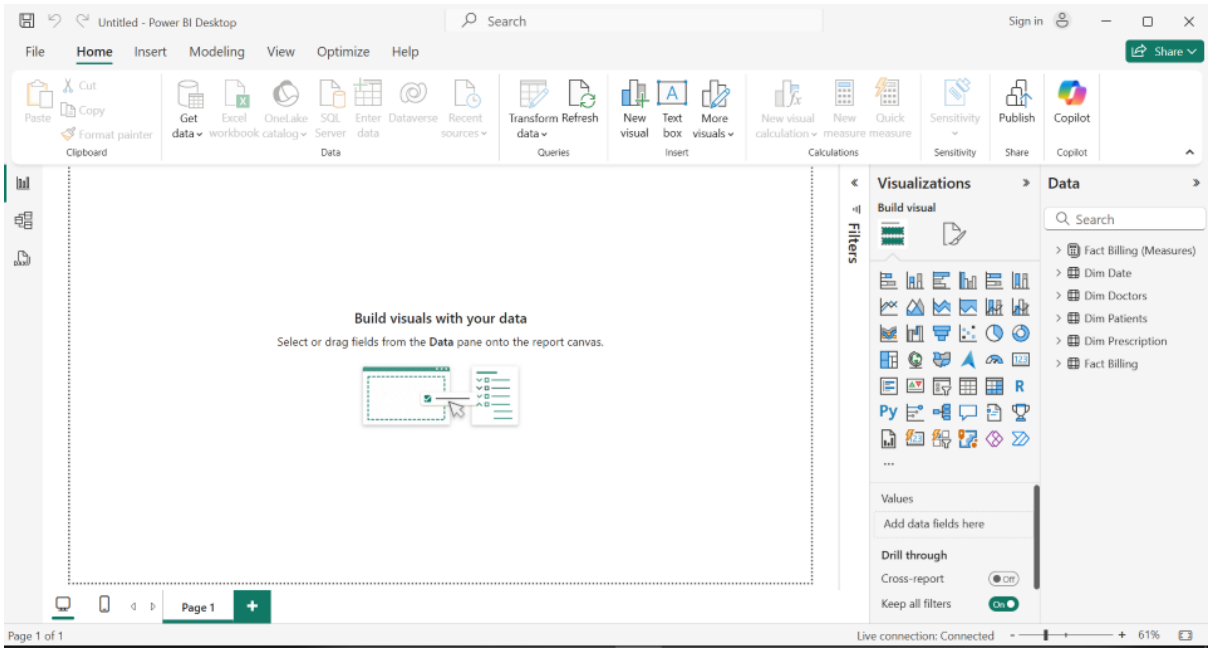


Configured necessary server and database connection settings



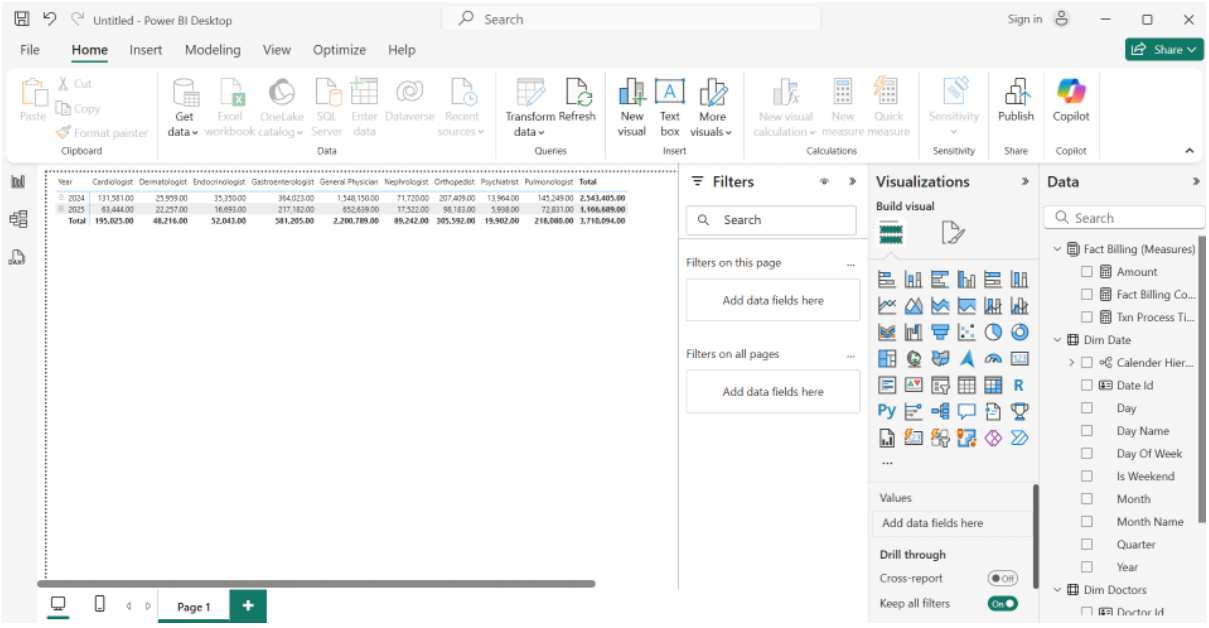
Successfully loaded the SSAS cube data into Power BI for analysis





Report 1

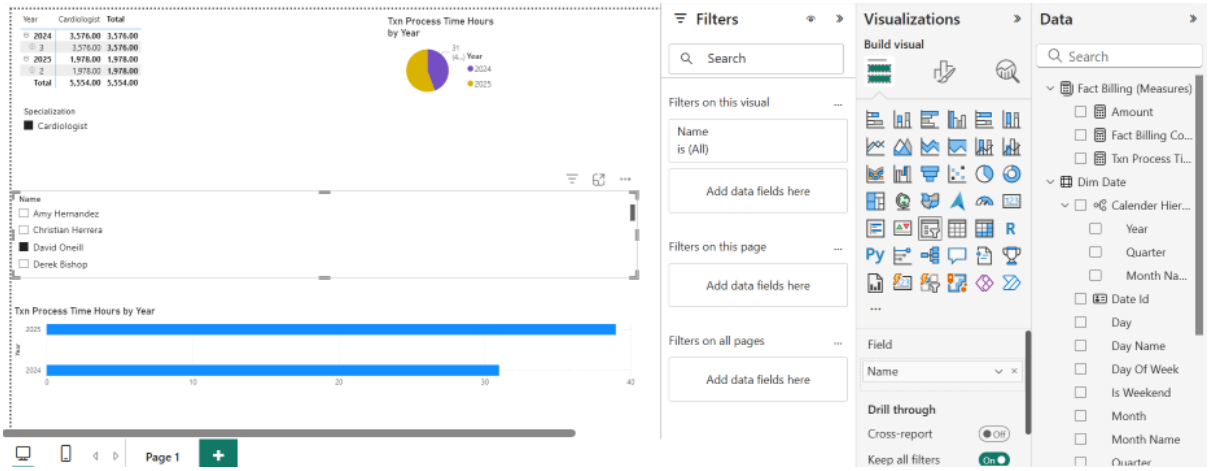
Created a Matrix visual to display detailed tabular data with row and column fields, enabling user to analyse multilevel data in structured format

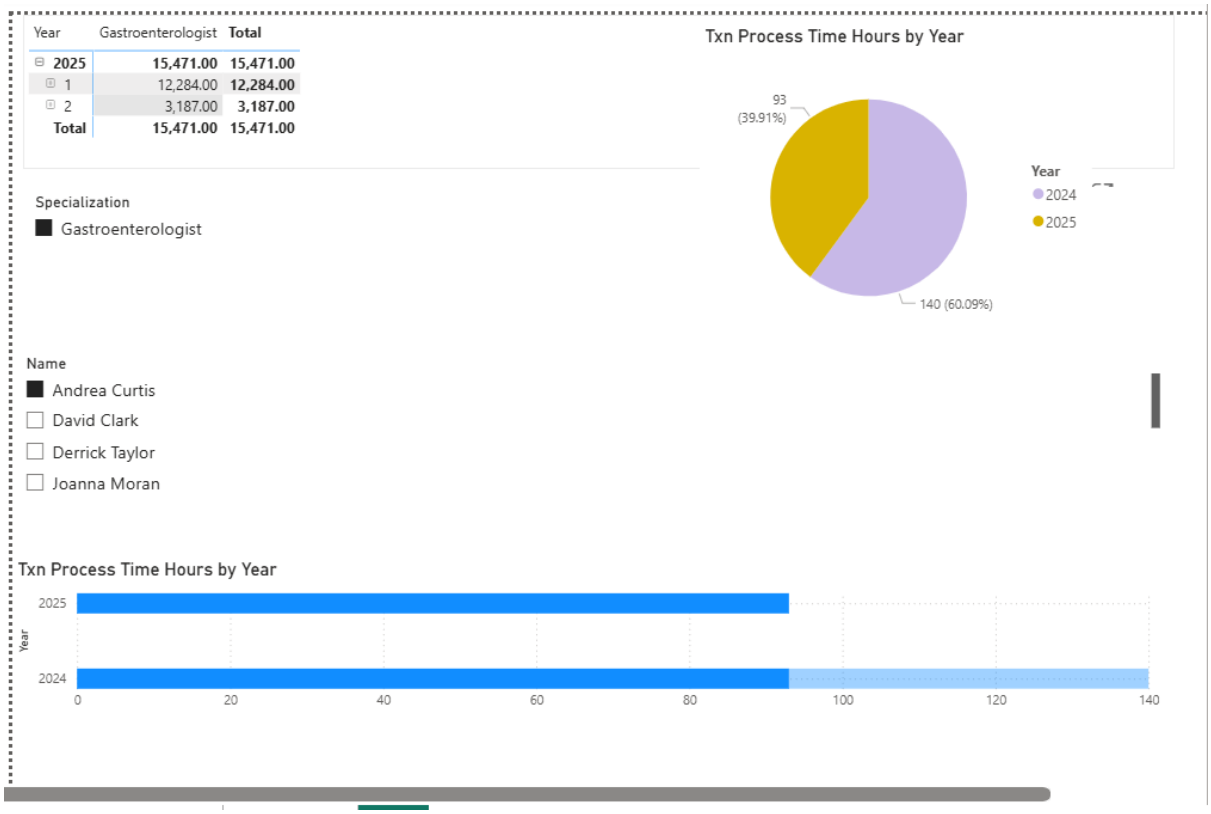


Year	Cardiologist	Dermatologist	Endocrinologist	Gastroenterologist	General Physician	Nephrologist	Orthopedist	Psychiatrist	Pulmonologist	Total
2024	**131,581.00**	**25,959.00**	**35,350.00**	**364,023.00**	**1,548,150.00**	**71,720.00**	**207,409.00**	**13,964.00**	**145,249.00**	**2,543,405.00**
2	44,095.00	9,211.00	12,772.00	93,505.00	455,151.00	18,536.00	63,773.00	10,288.00	19,925.00	**727,256.00**
3	41,282.00	14,574.00	9,929.00	112,705.00	535,252.00	33,827.00	75,282.00	3,676.00	58,094.00	**884,621.00**
4	46,204.00	2,174.00	12,649.00	157,813.00	557,747.00	19,357.00	68,354.00		67,230.00	**931,528.00**
2025	**63,444.00**	**22,257.00**	**16,693.00**	**217,182.00**	**652,639.00**	**17,522.00**	**98,183.00**	**5,938.00**	**72,831.00**	**1,166,689.00**
1	44,264.00	15,981.00	16,693.00	171,404.00	516,162.00	17,522.00	83,921.00	5,938.00	54,945.00	**926,830.00**
2	19,180.00	6,276.00		45,778.00	136,477.00		14,262.00		17,886.00	**239,859.00**
Total	**195,025.00**	**48,216.00**	**52,043.00**	**581,205.00**	**2,200,789.00**	**89,242.00**	**305,592.00**	**19,902.00**	**218,080.00**	**3,710,094.00**

Report 2

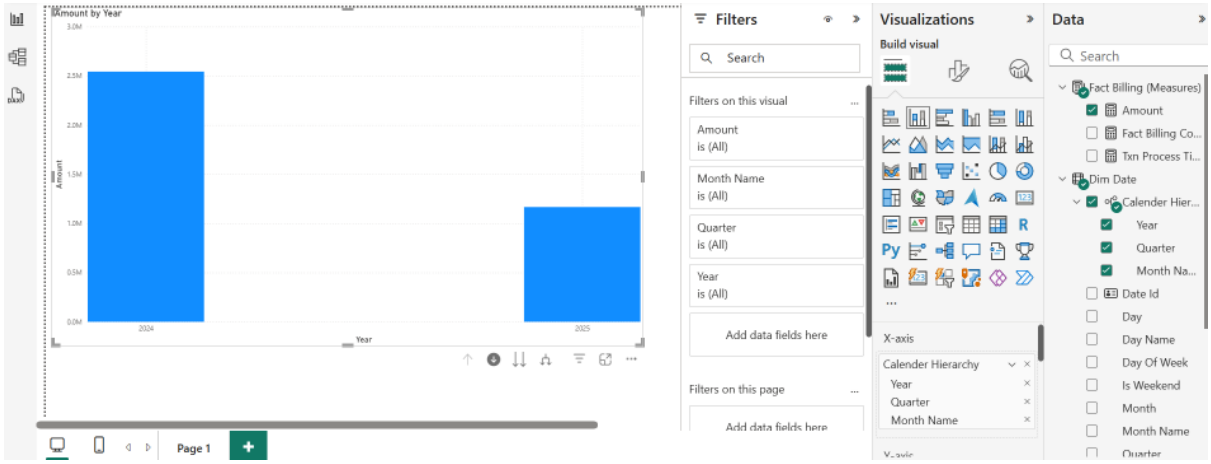
Designed Bar and Pie chart visuals
Applied cascading filters to allow dynamic interaction, where selecting one filter (Doctor or Specialization) shows relevant data on Bar chart and the Pie chart

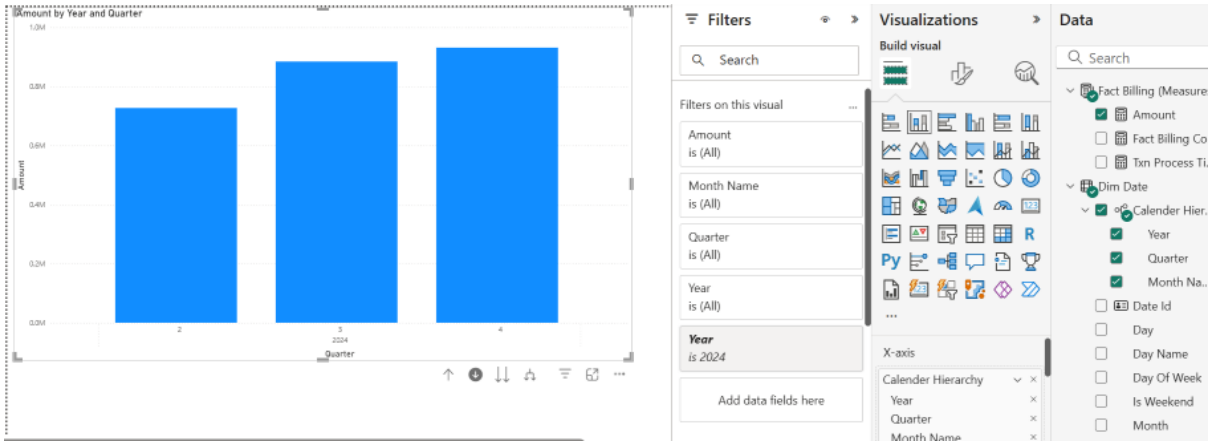


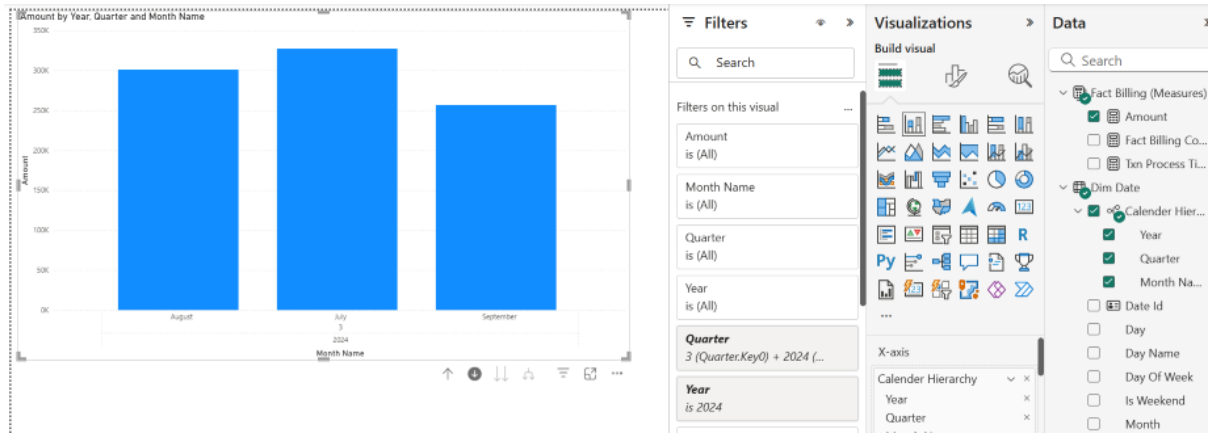


Report 3

built a Bar Chart for billing counts over time using the Date Hierarchy. Enabled Drill-Down functionality, allowing a viewer to navigate from Year > Quarter > Month to explore trends in billing cycles

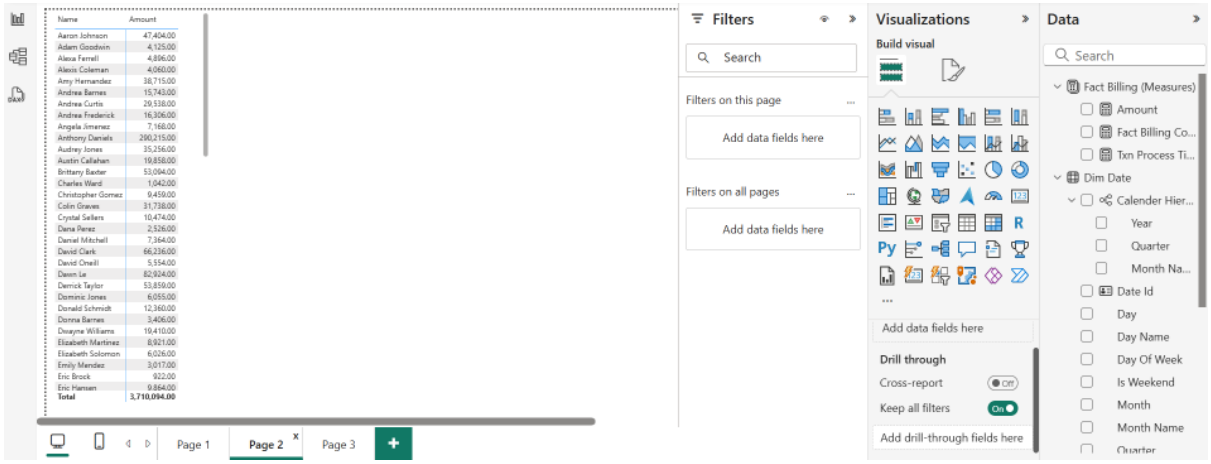


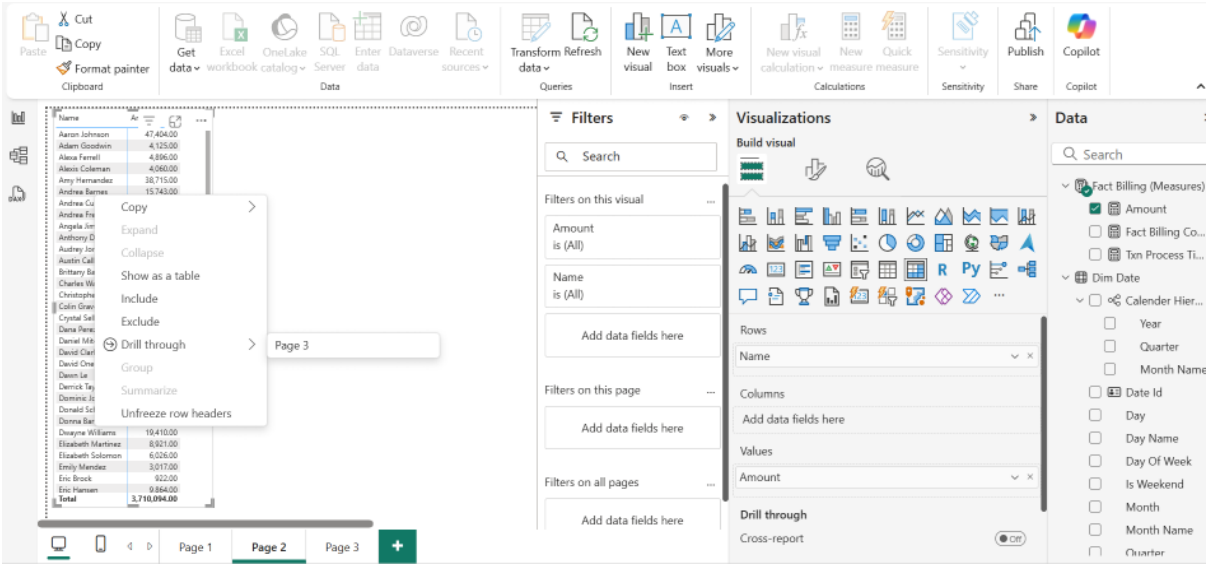


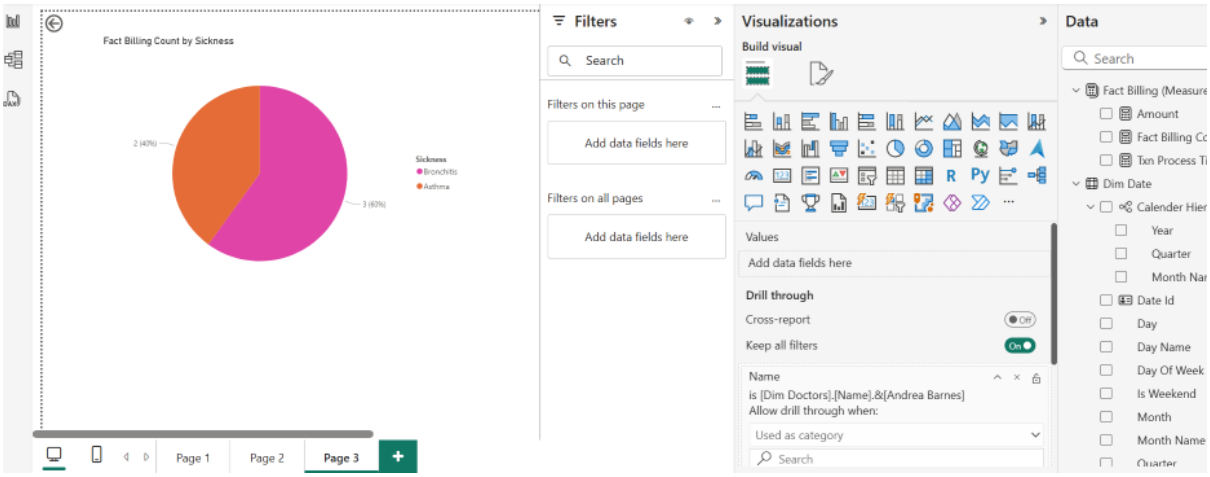


Report 4

Created a separate report page featuring a Doctor-Amount Matrix. In next page created a pie chart which shows billing count and sickness type of each doctor and added Drill through filter on Doctor name in this page.







*** End Of Report ***