

Data Warehousing and Business Intelligence

Assignment 02
IT22550262

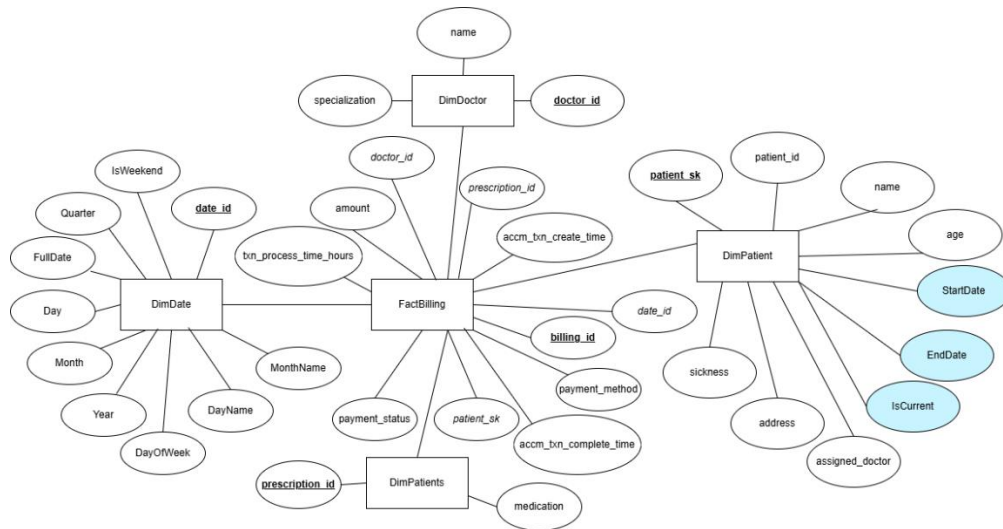


Table of Contents

Data Source for the Assignment.....	2
SSAS Cube Implementation	2
Demonstration of OLAP Operations	17
Roll-Up	21
Drill-Down	22
Slicing	23
Dicing.....	23
Pivoting – Changing perspective of analysis.....	24
Power BI Reports	25
Report 1	26
Report 2.....	27
Report 3.....	28
Report 4.....	29

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.

Configure your new project

Analysis Services Multidimensional Project

Project name

HelathCareCube

Location

C:\Users\himak\Desktop\dwbi-project

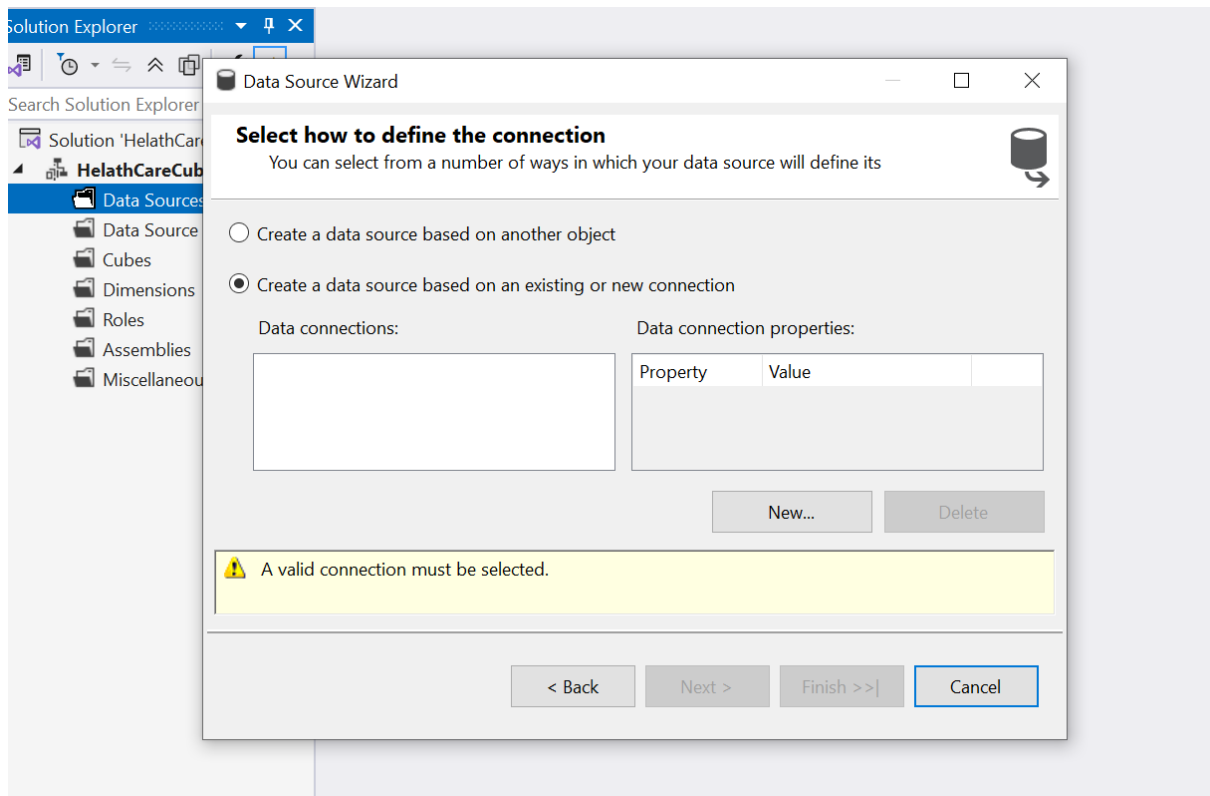
Solution name

HelathCareCube

☒ Place solution and project in the same directory

Project will be created in "C:\Users\himak\Desktop\dwbi-project\HelathCareCube"


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




(Adding connection details)

Connection Manager X

Provider: Native OLE DB\Microsoft OLE DB Driver for SQL Server ▼


Connection


All

OLE DB Provider:
Microsoft OLE DB Driver for SQL Server ▼ Data Links...

Enter a server or file name

Server or file name: DESKTOP-VBPGOCS

Location:

Log on to the server

☒ Use Windows NT Integrated Security

☐ Use a specific user name and password:

User name:

Password:

☐ Blank password

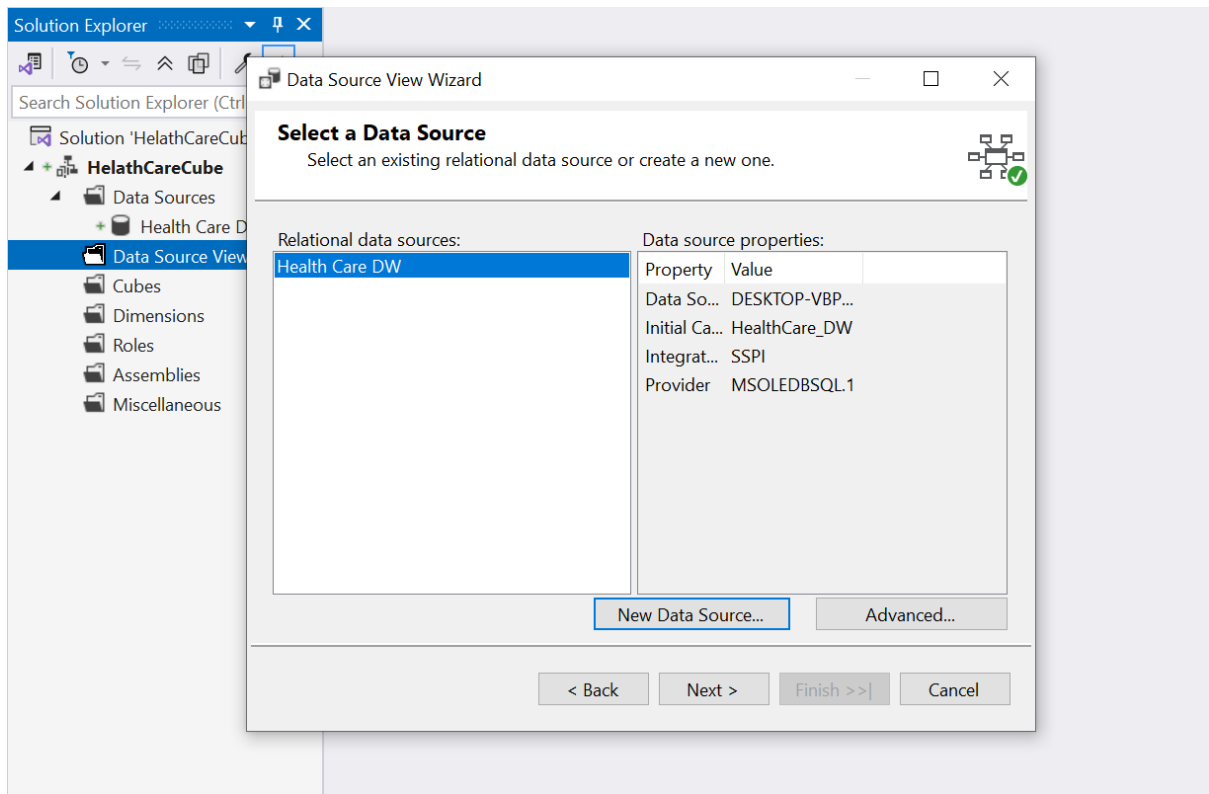
☐ Allow saving password

Initial catalog:
HealthCare_DW ▼

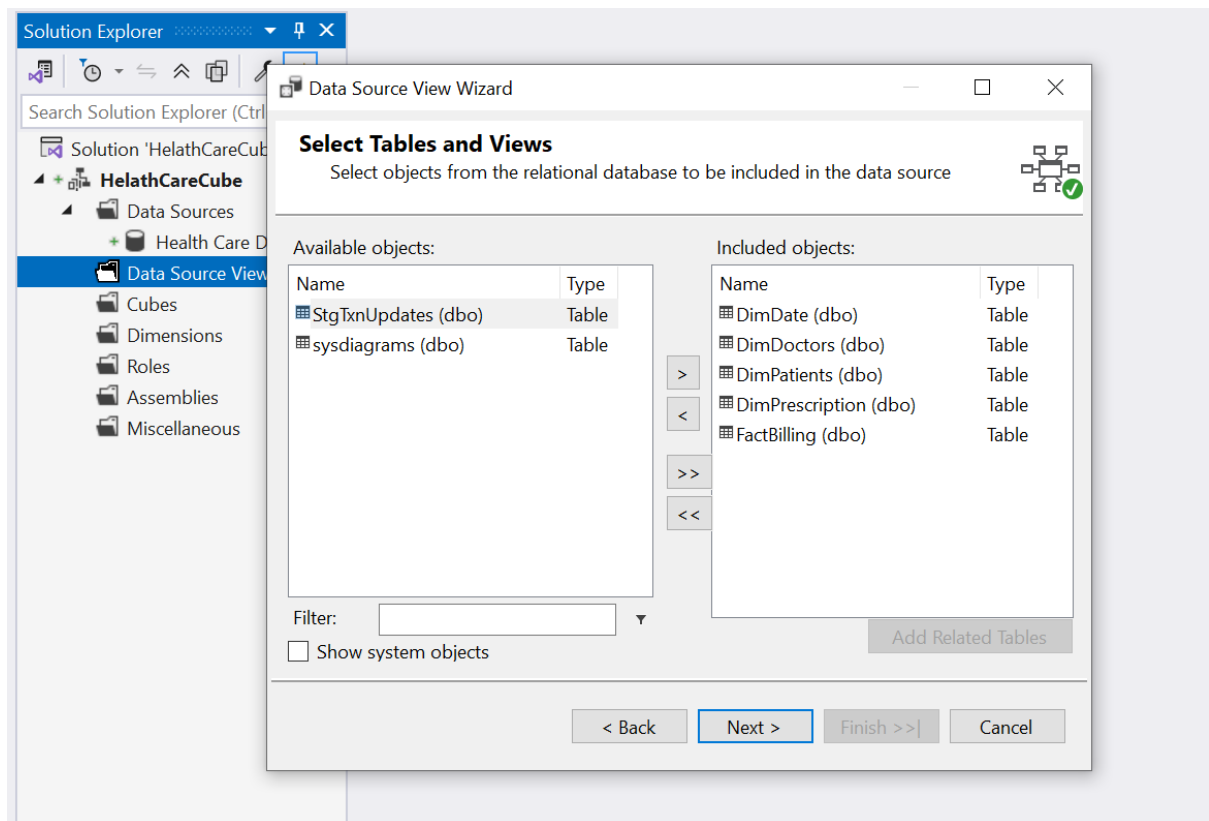
Test Connection OK Cancel Help

Then tested out connection to ensure it connected successfully

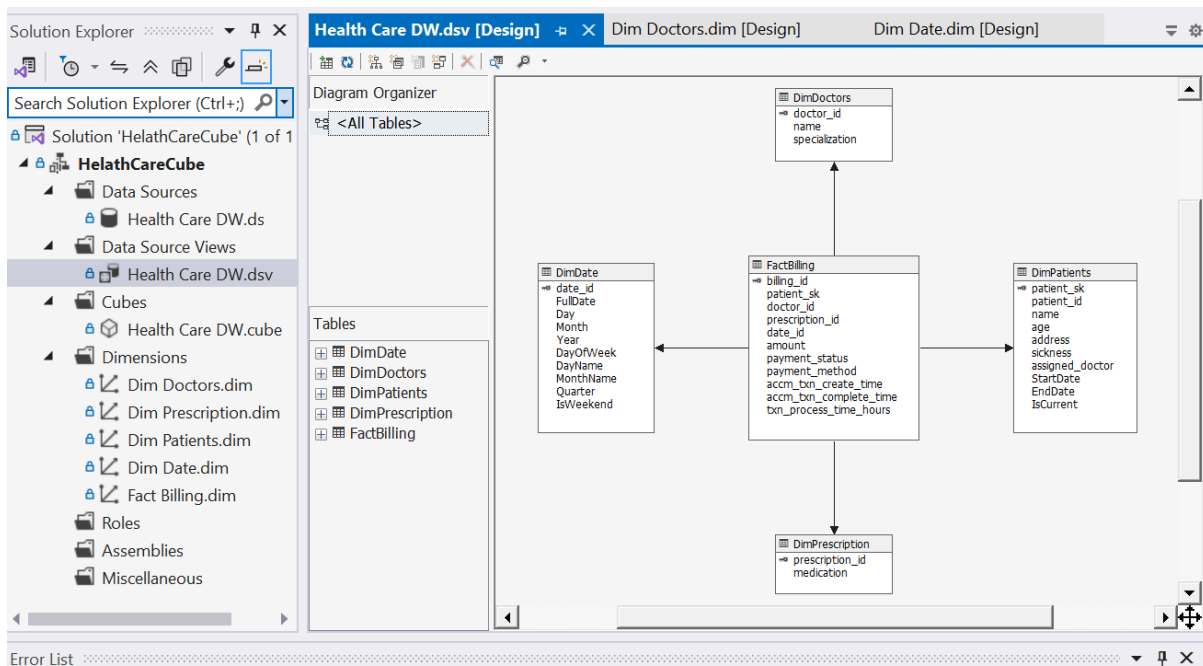
Next in Data Source view, added all the tables from the Warehouse Database. These are the underlying resources which cube is fed on.



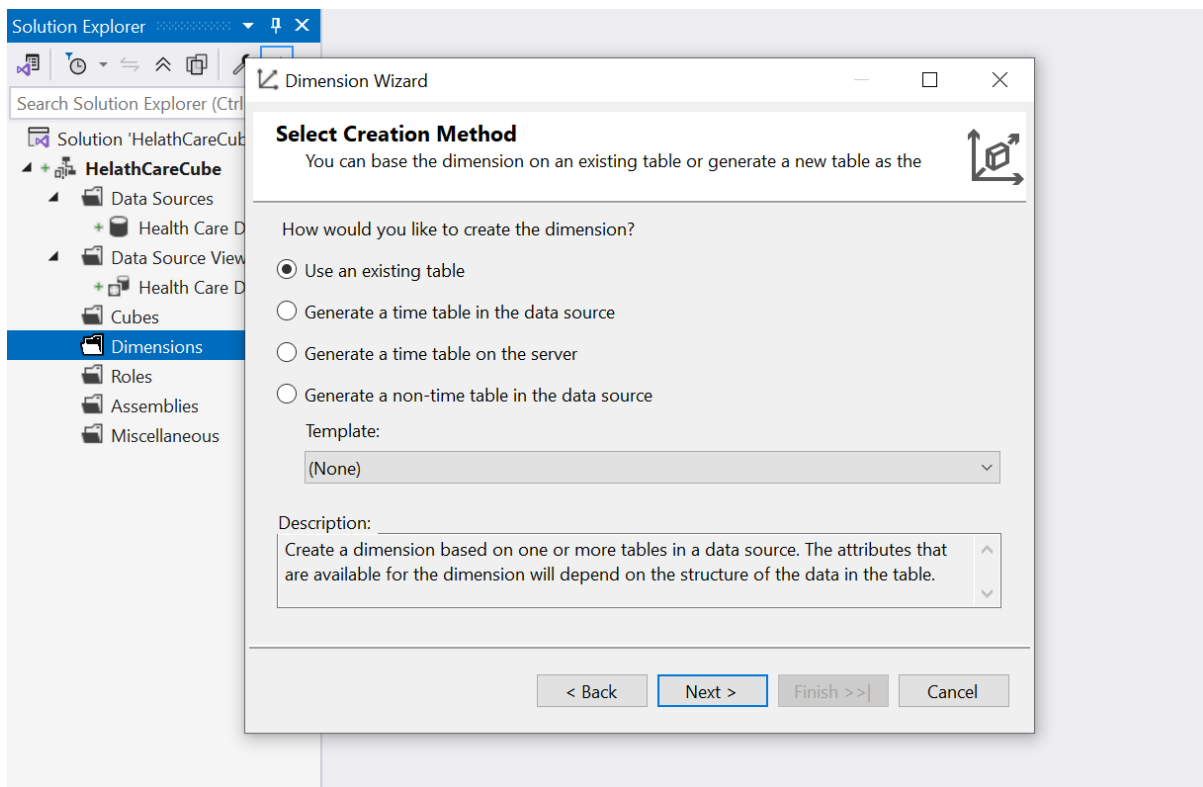
Selected the Data warehouse database and all the Dimension & Fact tables



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

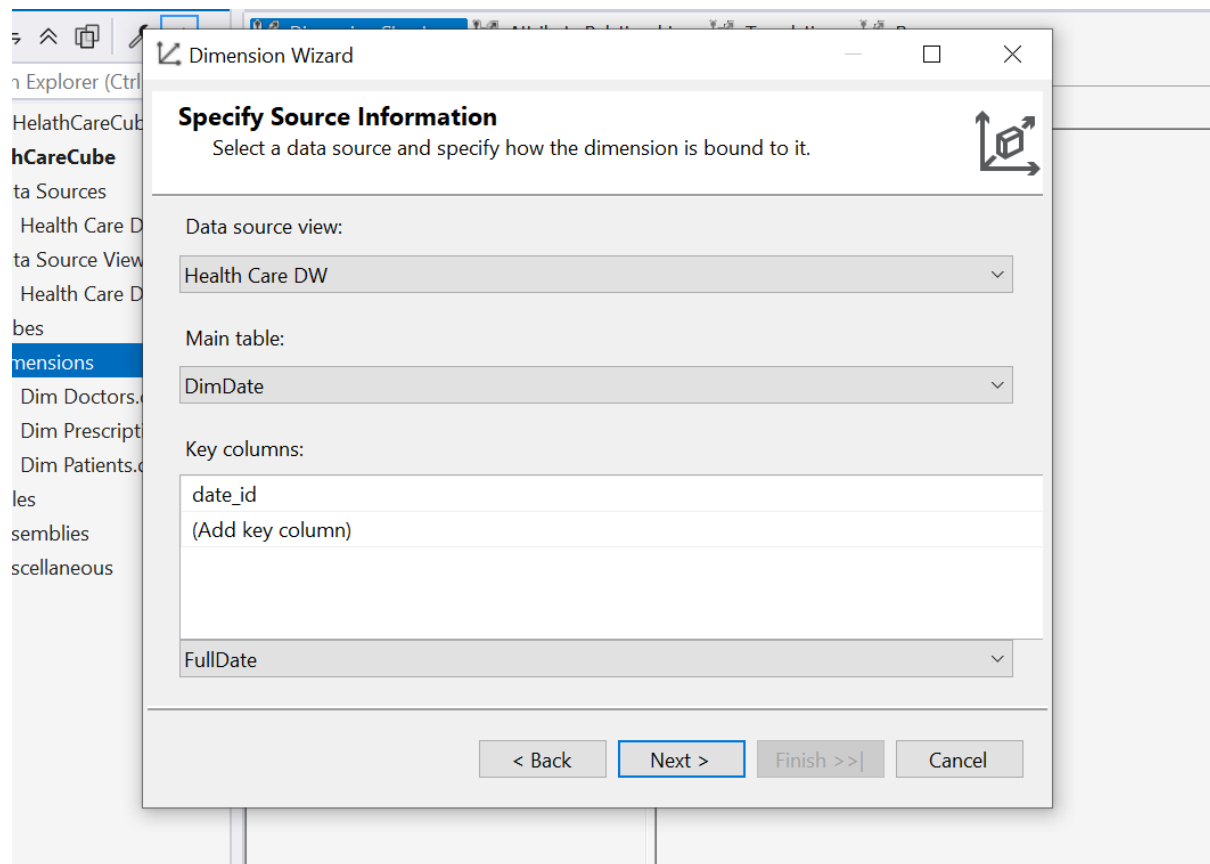


Then created dimensions from the tables. These are the descriptive, categorical data which can be used to analyse and slice measures.

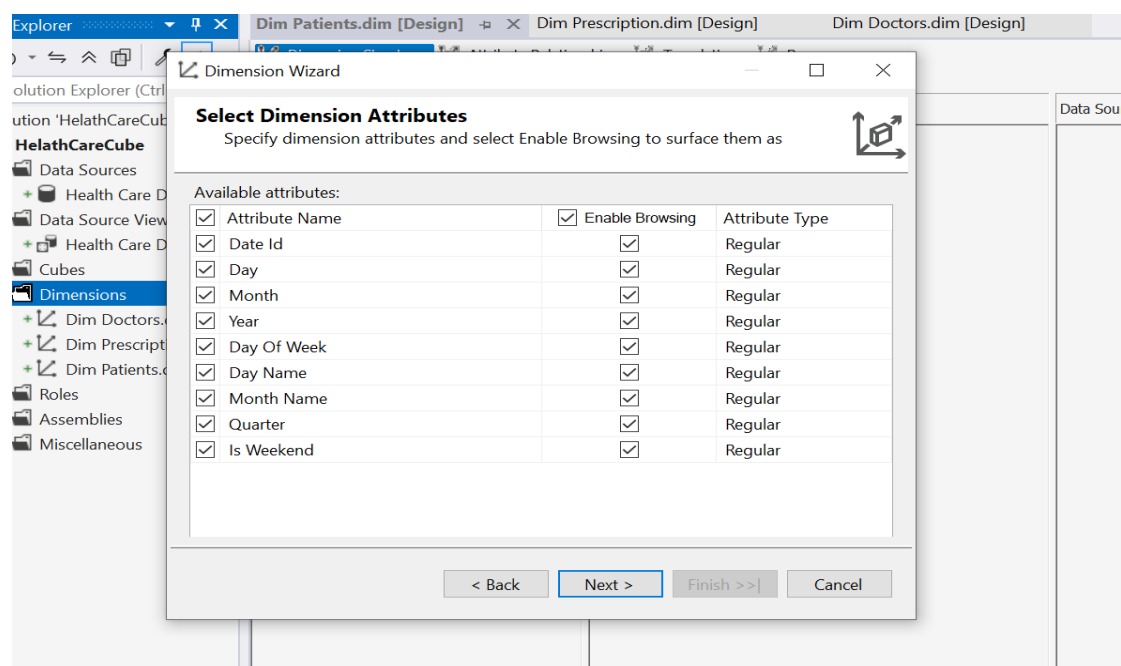


Added the necessary configurations

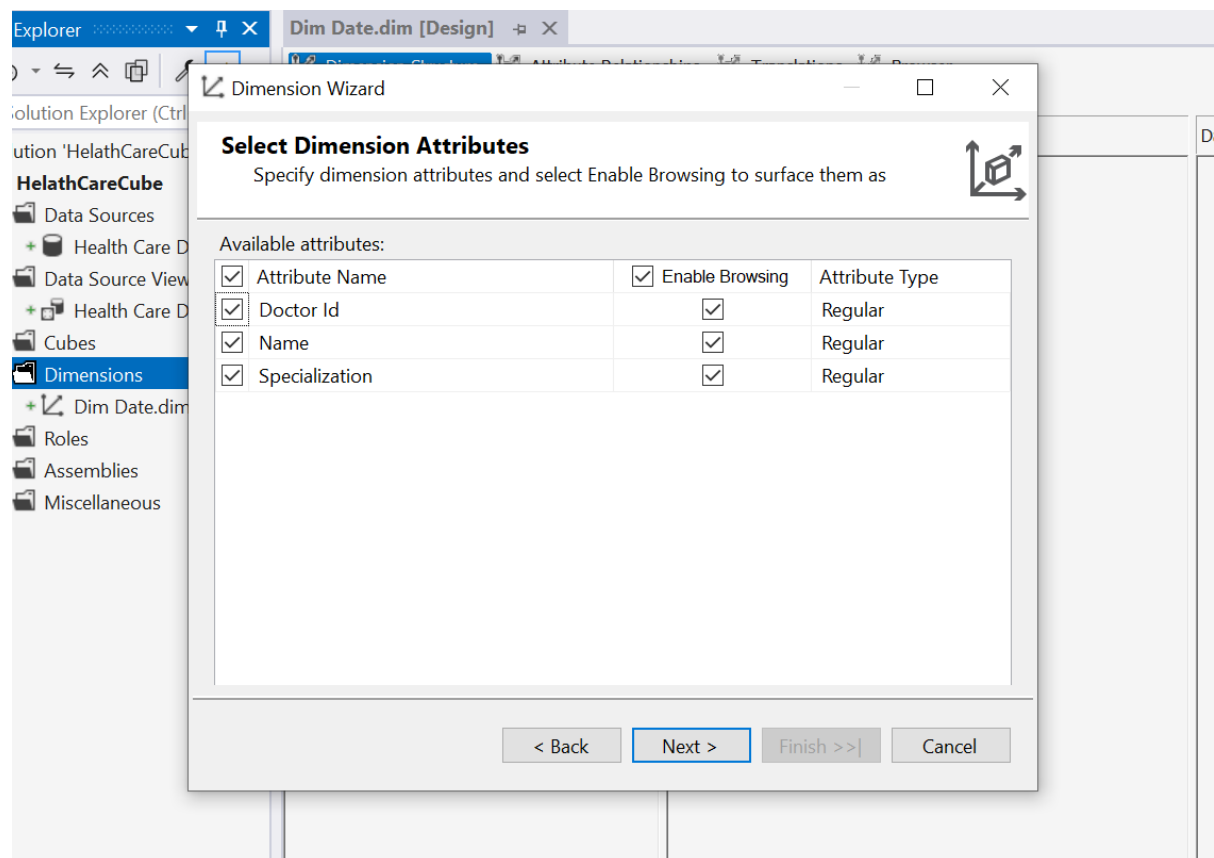
For the DimDate Dimension, I selected FullDate as showing value referring the date_id



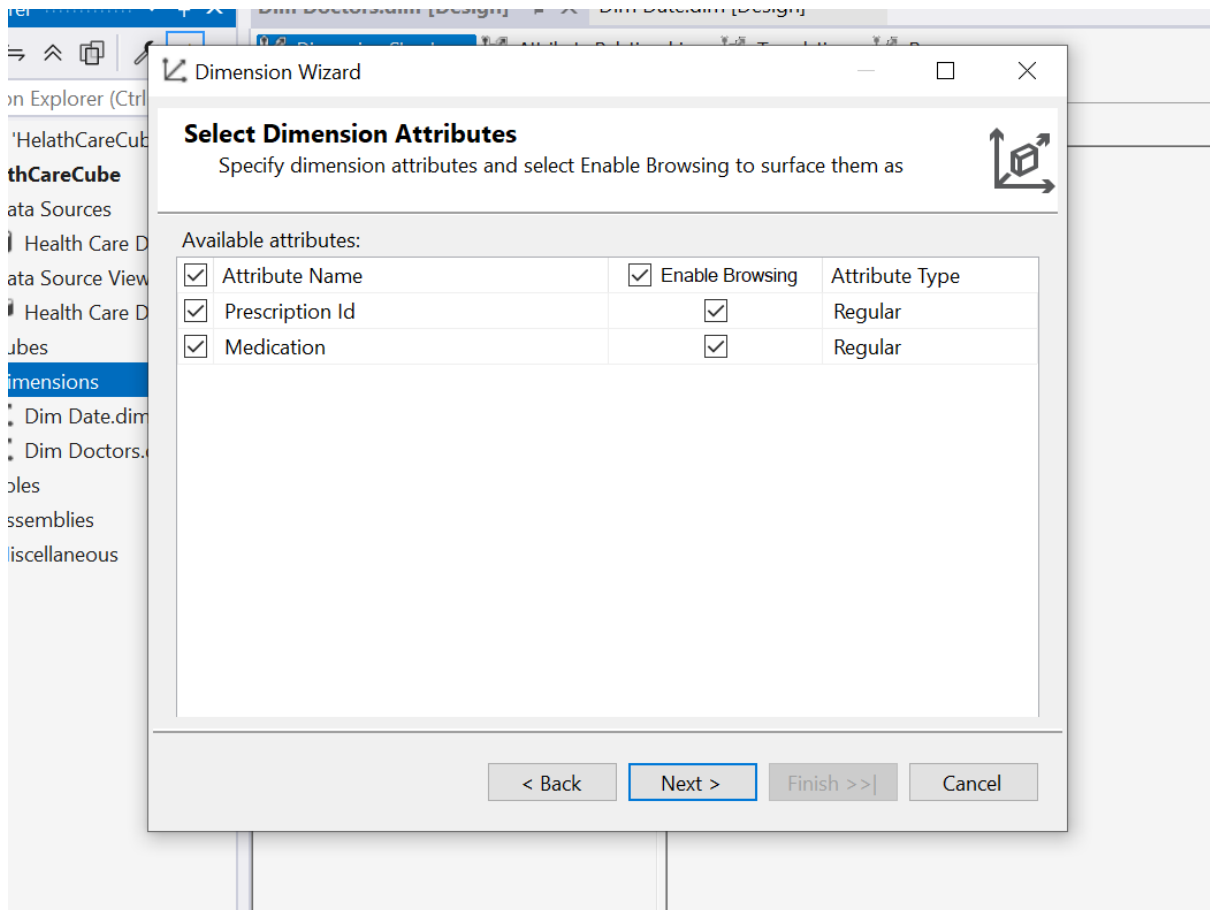
then selected all dimensions attributes as they will be important for decision making purposes.



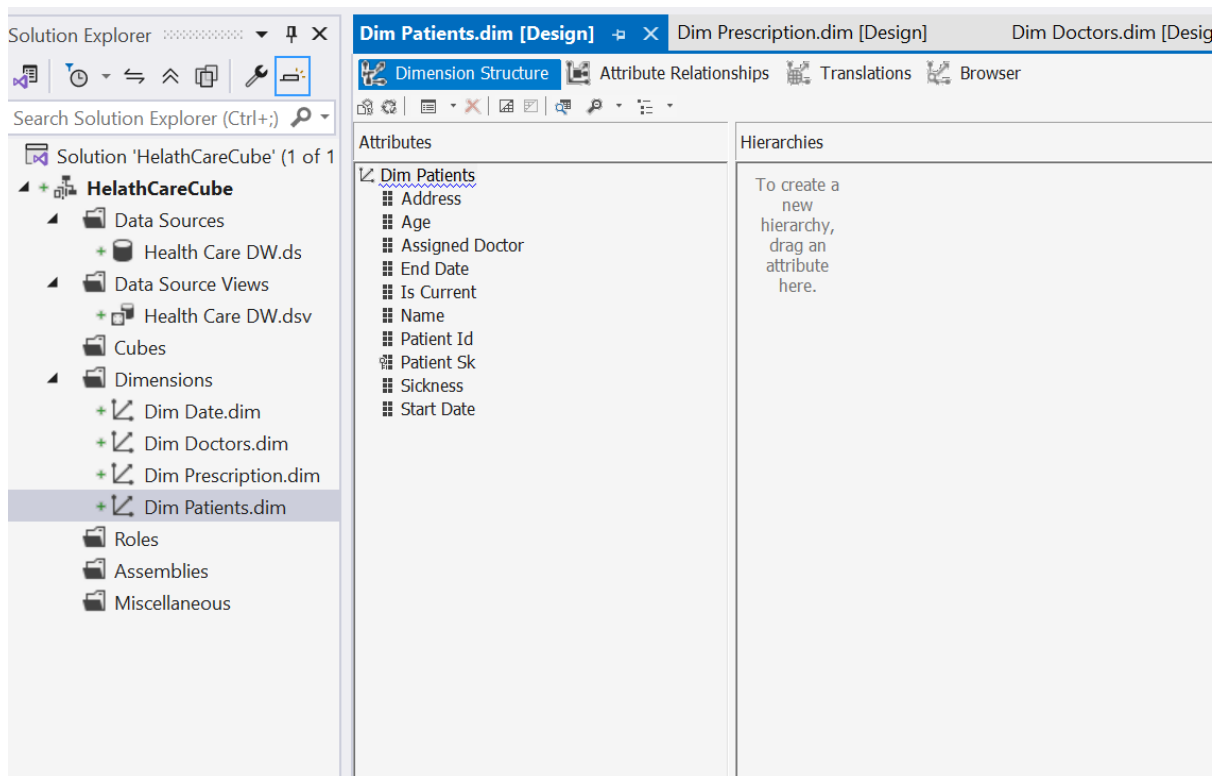
Likewise selected all in DimDoctors



Selected all from DimPrescription

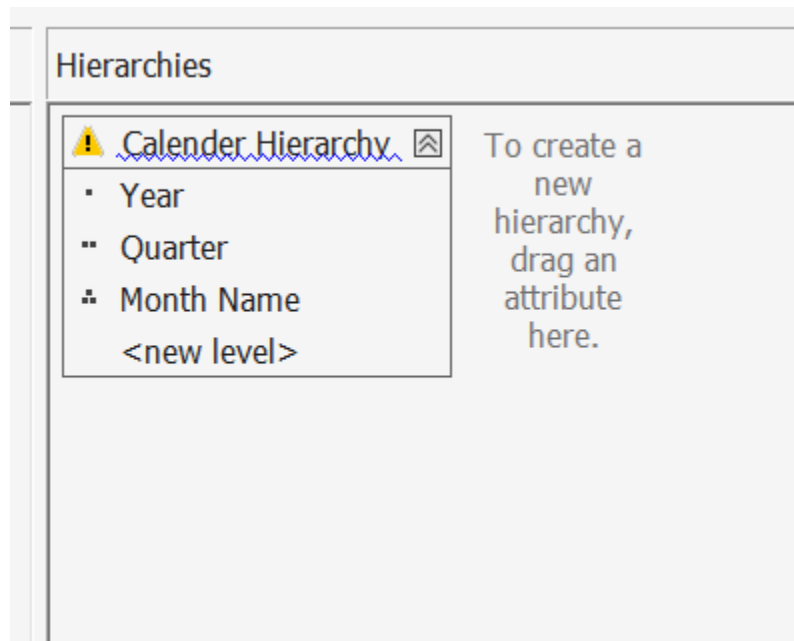


Selected all for DimPatients

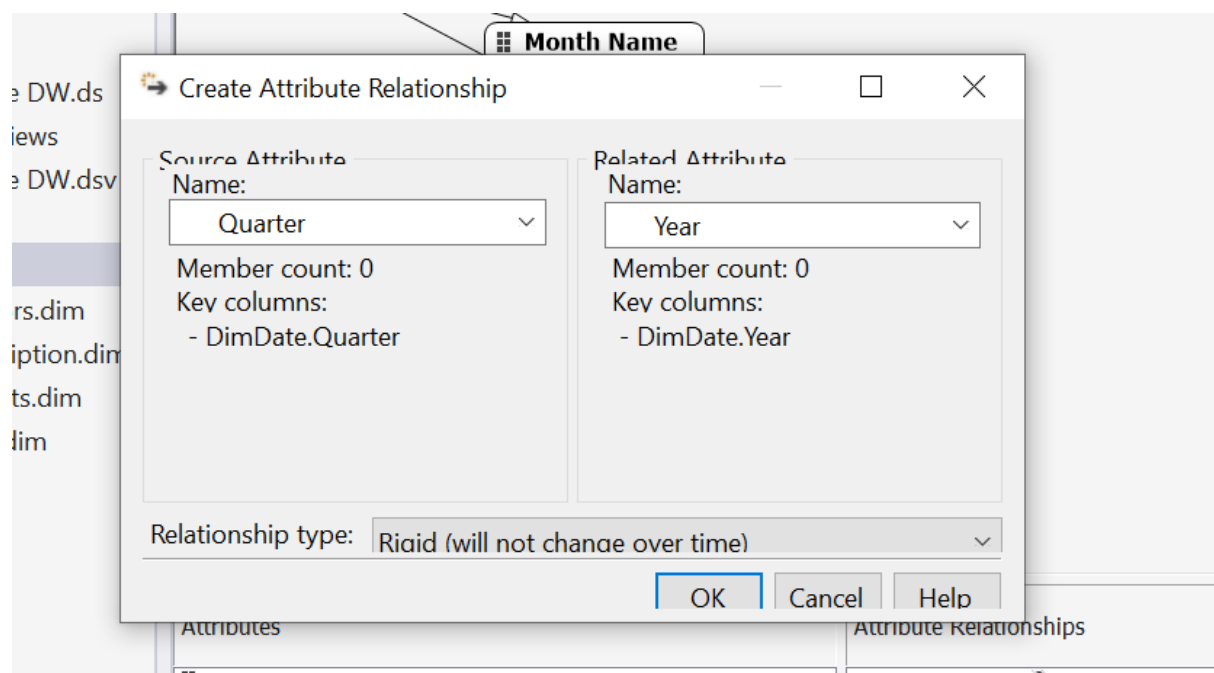


Then built a user hierarchy using DimDate

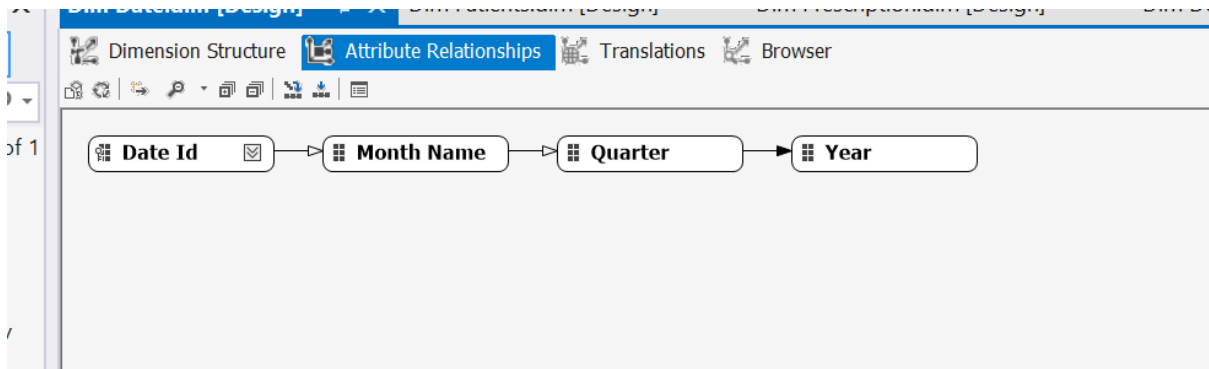
1. Year
2. Quarter
3. Month (Month name)



had to configure attribute relationships



In attribute relationships configured it as needed.



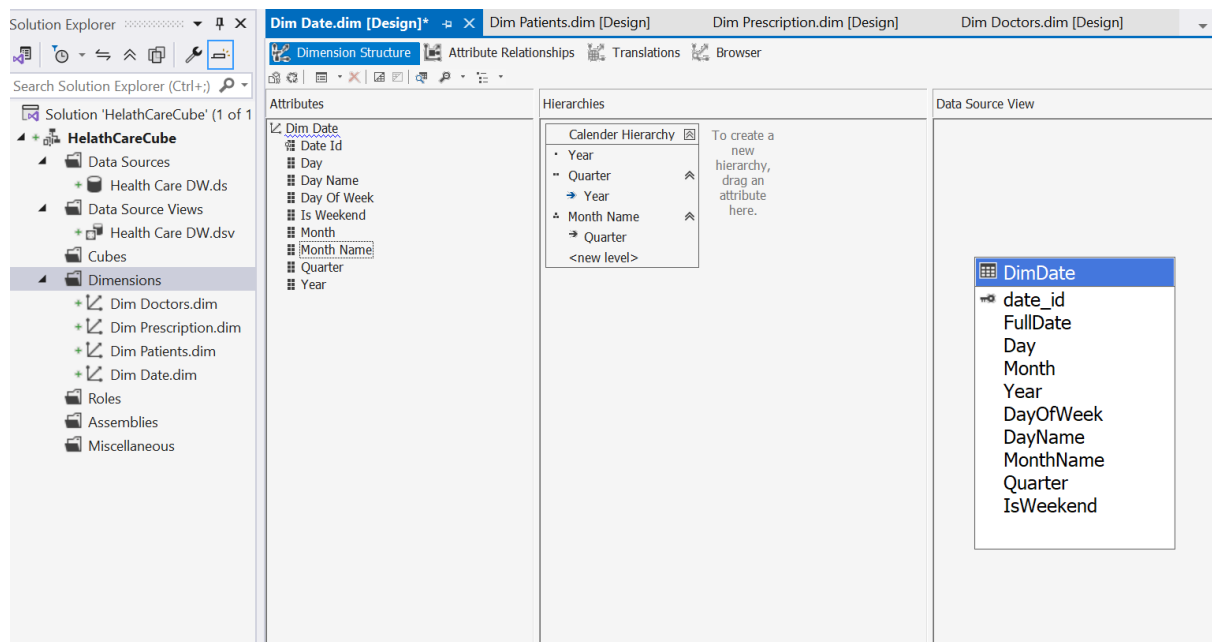
Since month name maybe ordered by alphabetical order, selected it to order by attribute key.

The screenshot shows the 'Properties' window for the 'Month Name' dimension attribute. The window displays various properties and their values. The 'Name' property is set to 'Month Name' and the 'OrderByAttribute' property is set to 'Quarter'.

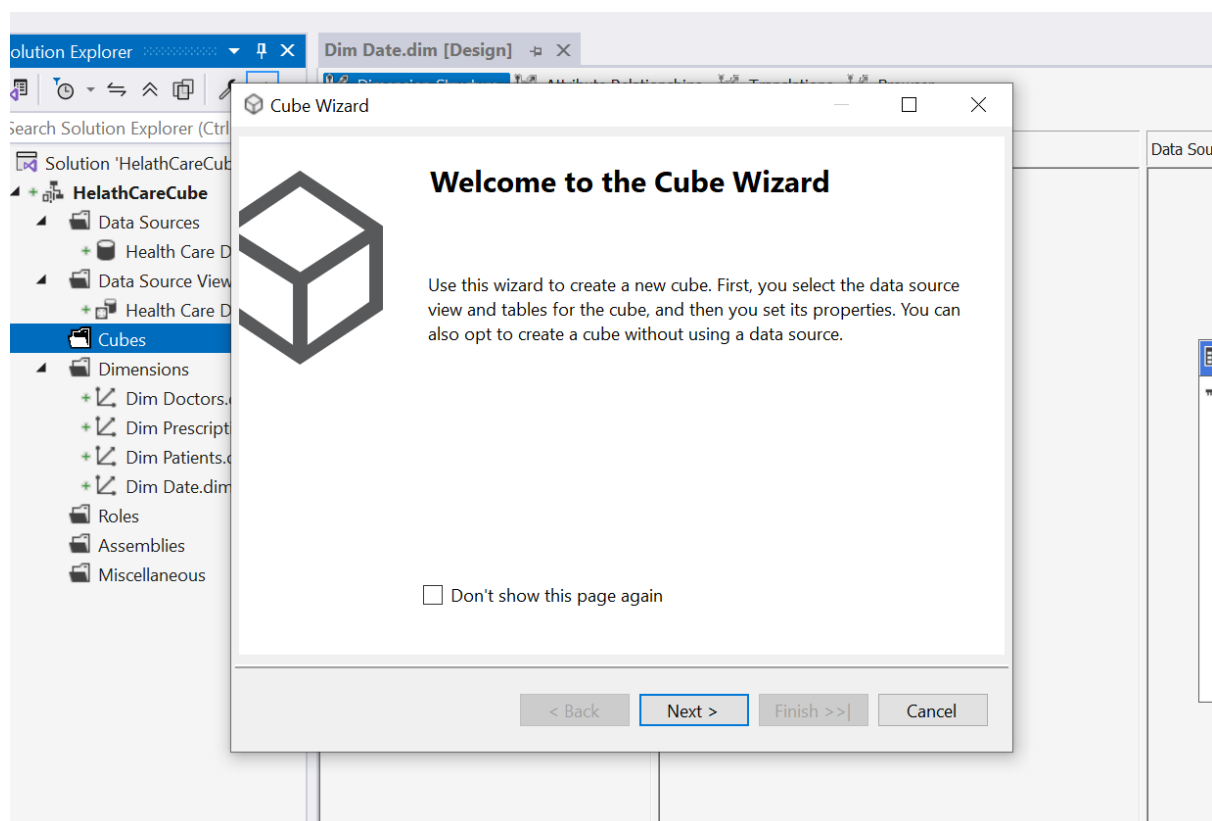
Property	Value
ExtendedType	
FormatString	
GroupingBehavior	EncourageGrouping
HasLineage	False
ID	Month Name
InstanceSelection	None
IsAggregatable	True
KeyColumns	DimDate.MonthName (WChar)
MemberNamesUnique	False
MembersWithData	NonLeafDataVisible
MembersWithDataCaption	
Name	Month Name
NameColumn	(none)
NamingTemplate	
OrderBy	AttributeKey
OrderByAttribute	Quarter
ProcessingState	Unprocessed
RootMemberIf	ParentIsBlankSelfOrMissing
TokenizationBehavior	TokenizationNone
Type	Regular
UnaryOperatorColumn	(none)
Usage	Regular
UserEditFlag	0
ValueColumn	(none)

Name
Specifies the name of the object.

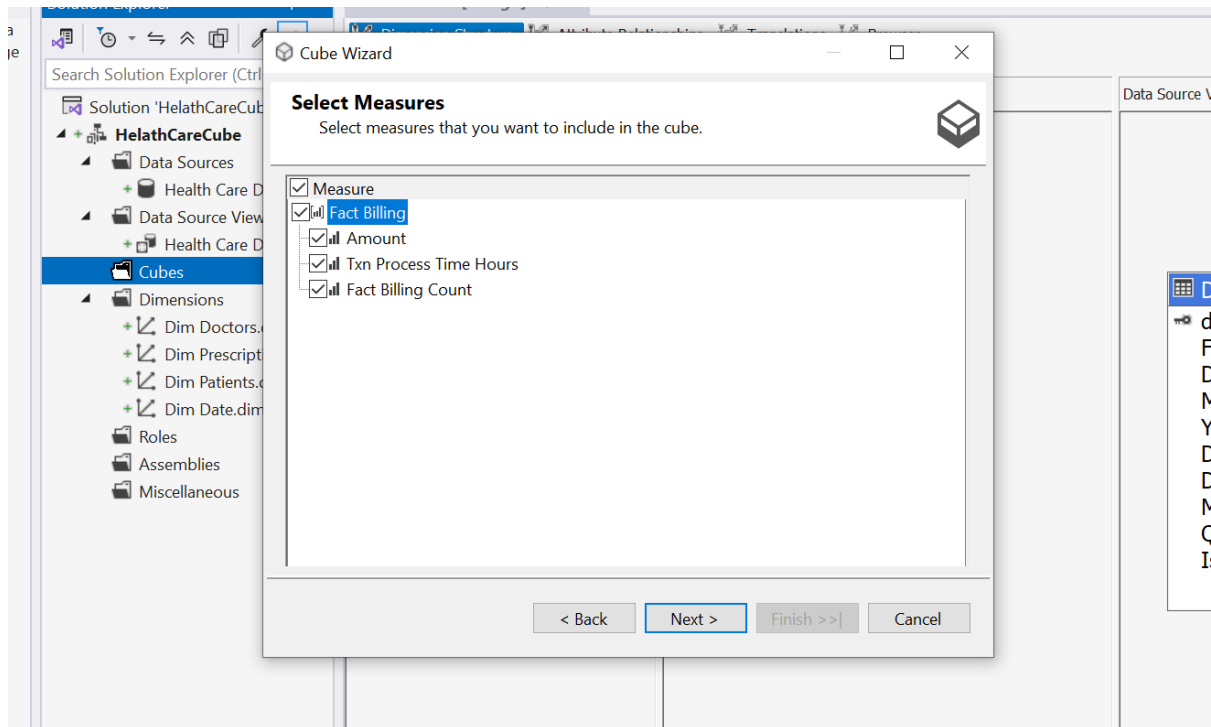
Final DimDate dimensions looked like this 📌



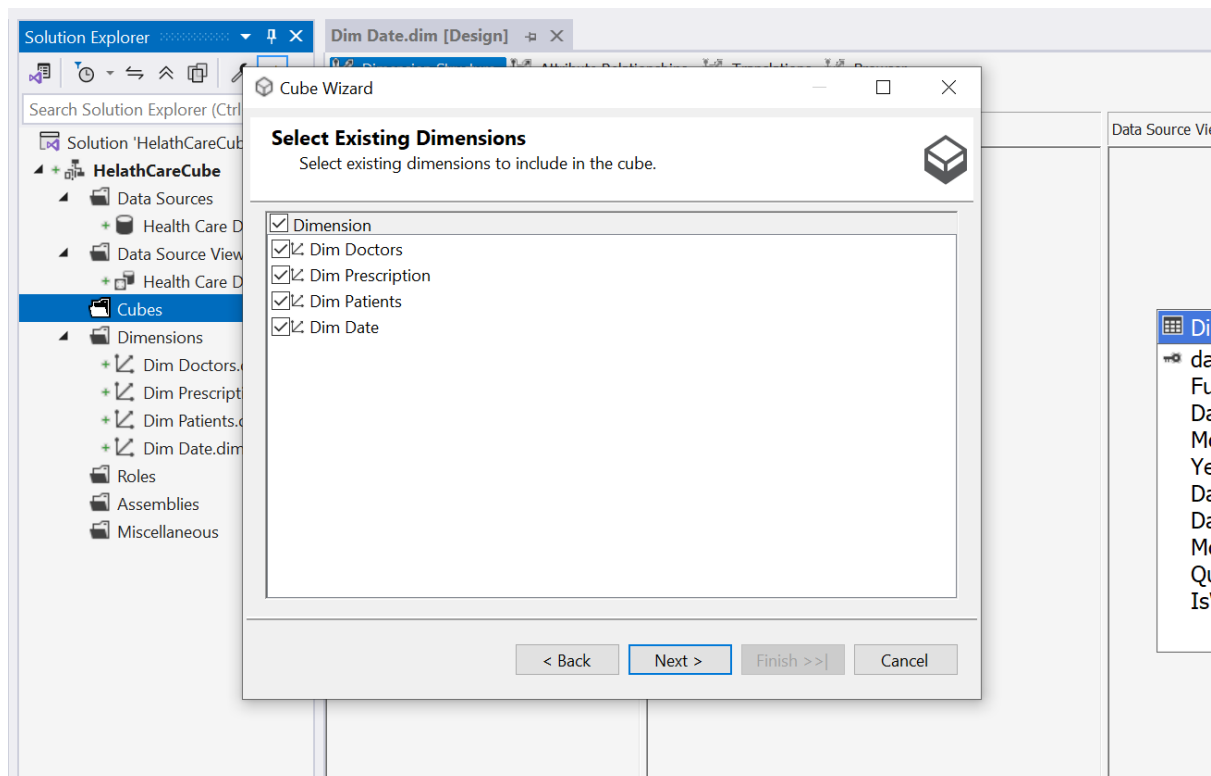
Then I started defining a cube using Cube Wizard.



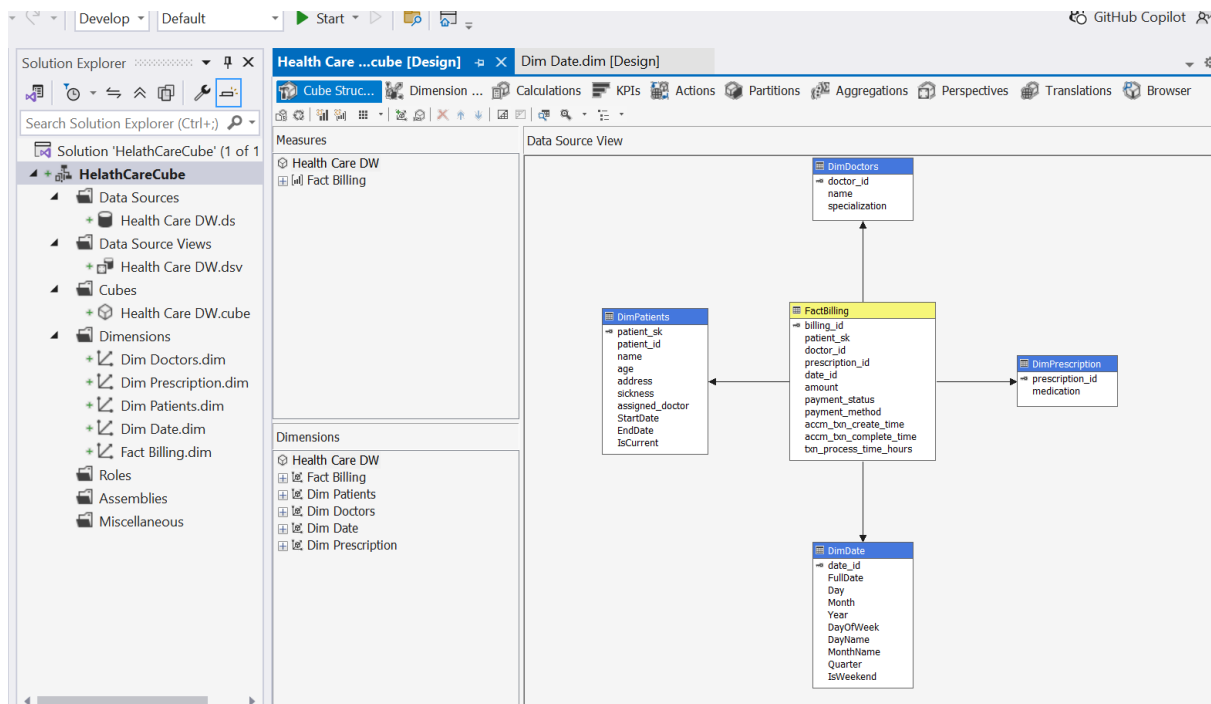
Selected appropriate measures from the fact table (FactBilling)



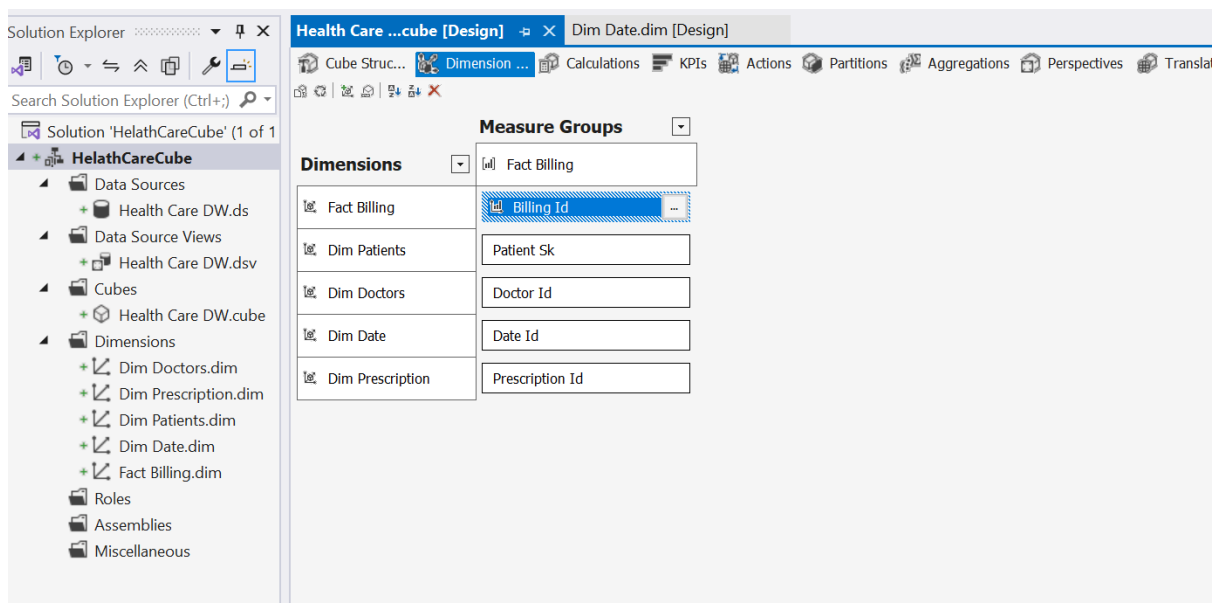
Added dimensions including previously created Date Hierarchy as needed



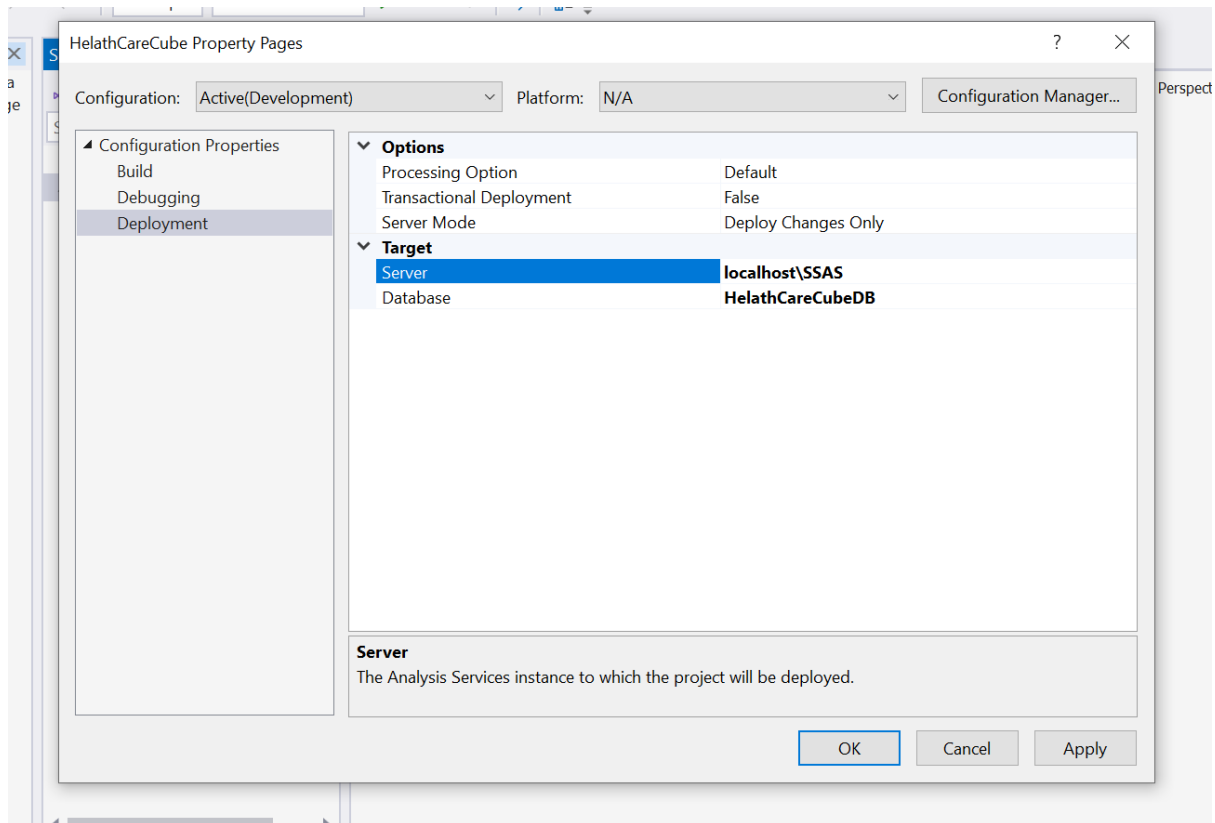
The cube view looked like this 📍



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

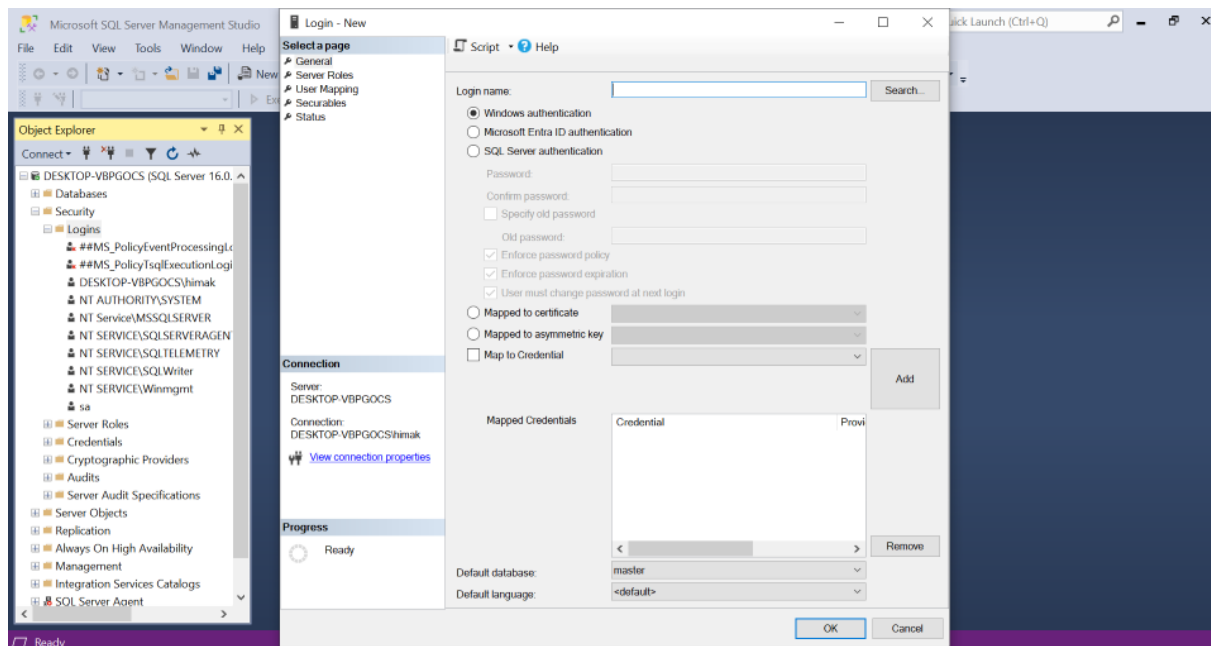


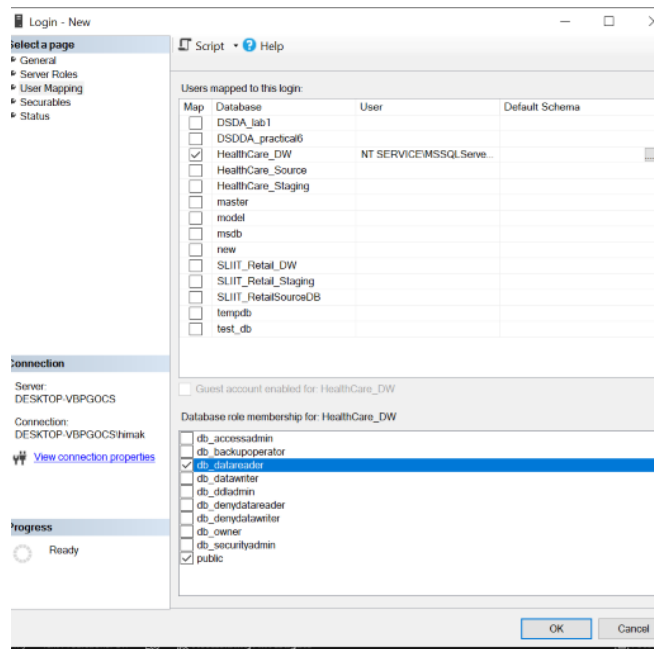
Configured deployment properties including target server and database settings



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.

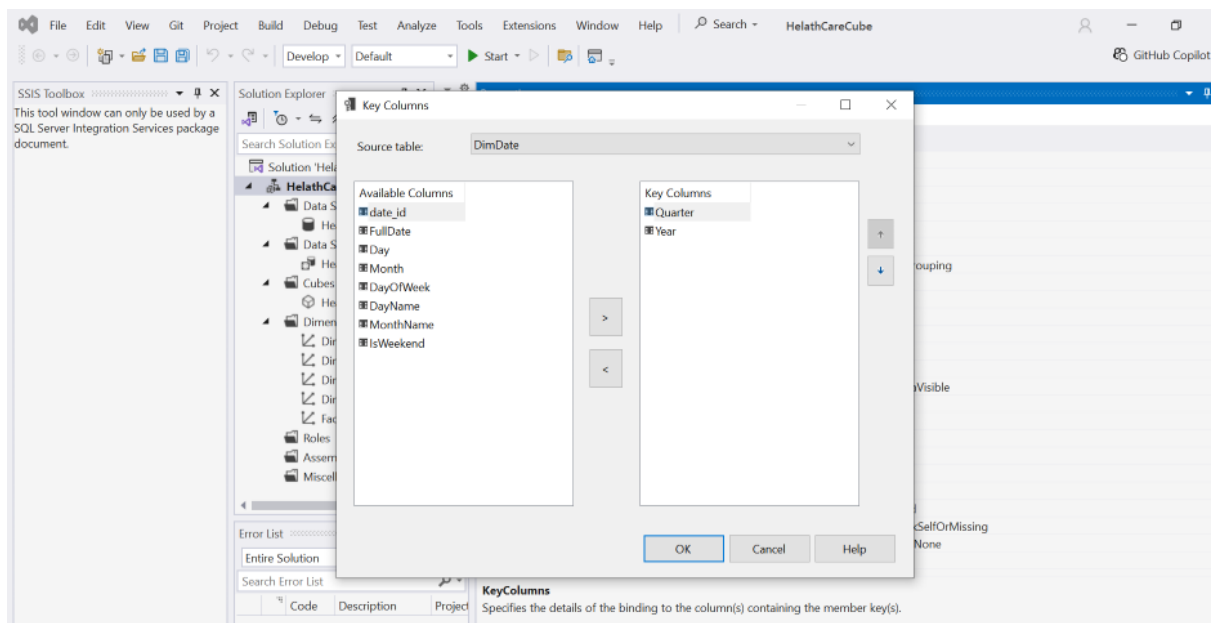
Faced a connection issue due to access limitation, created a new SQL server login using windows authentication via SSMS to enable SSAS to communicate with SSMS

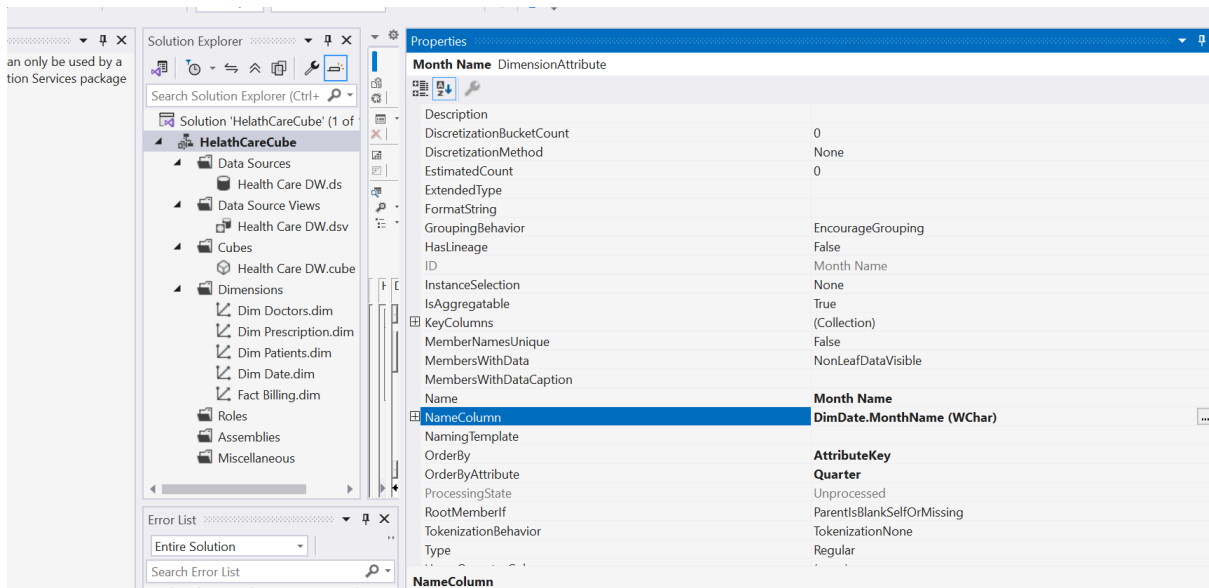




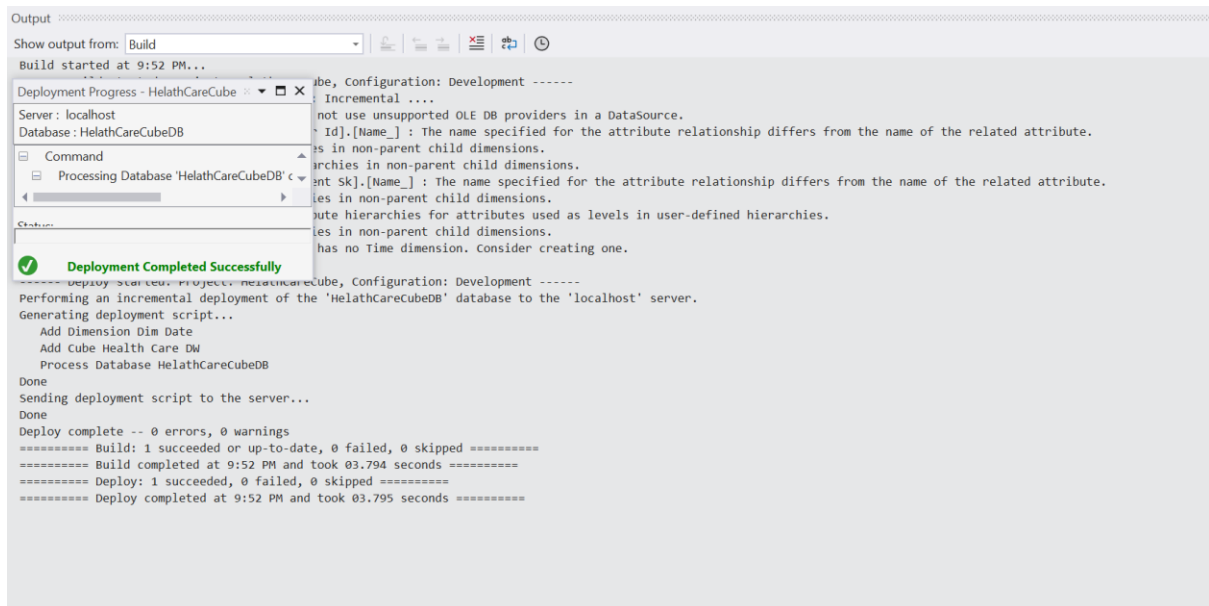
An error detected when deploying due to duplicate Quarter and Month Names (Q1 as 1 appearing in two different years, 'January' in two different years)

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



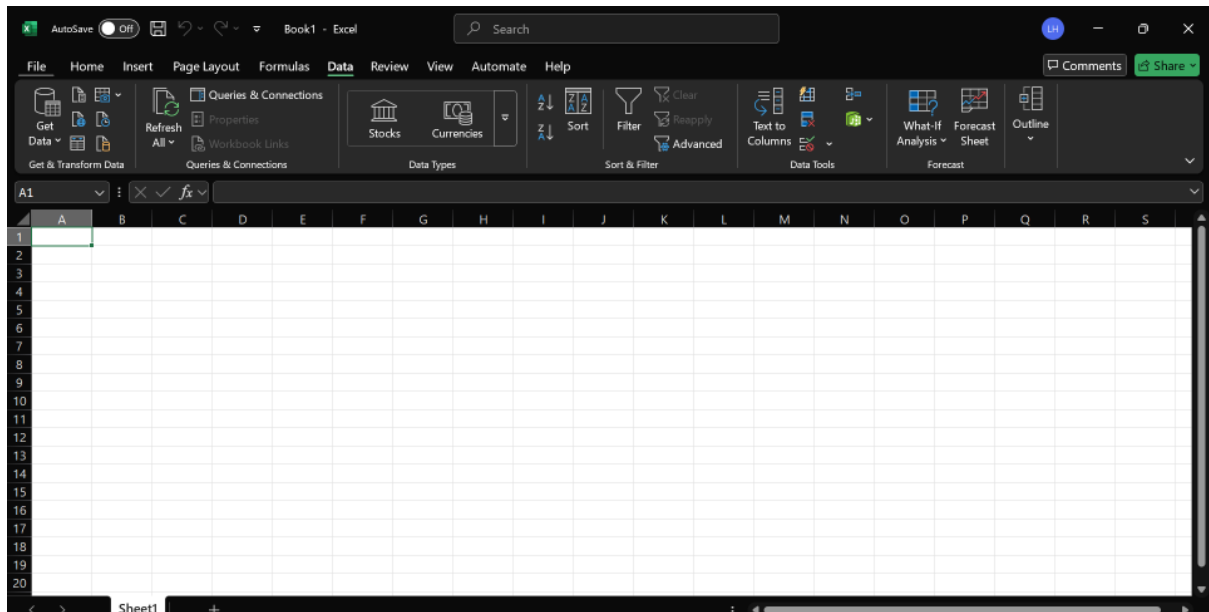


Then a successful deployment happend



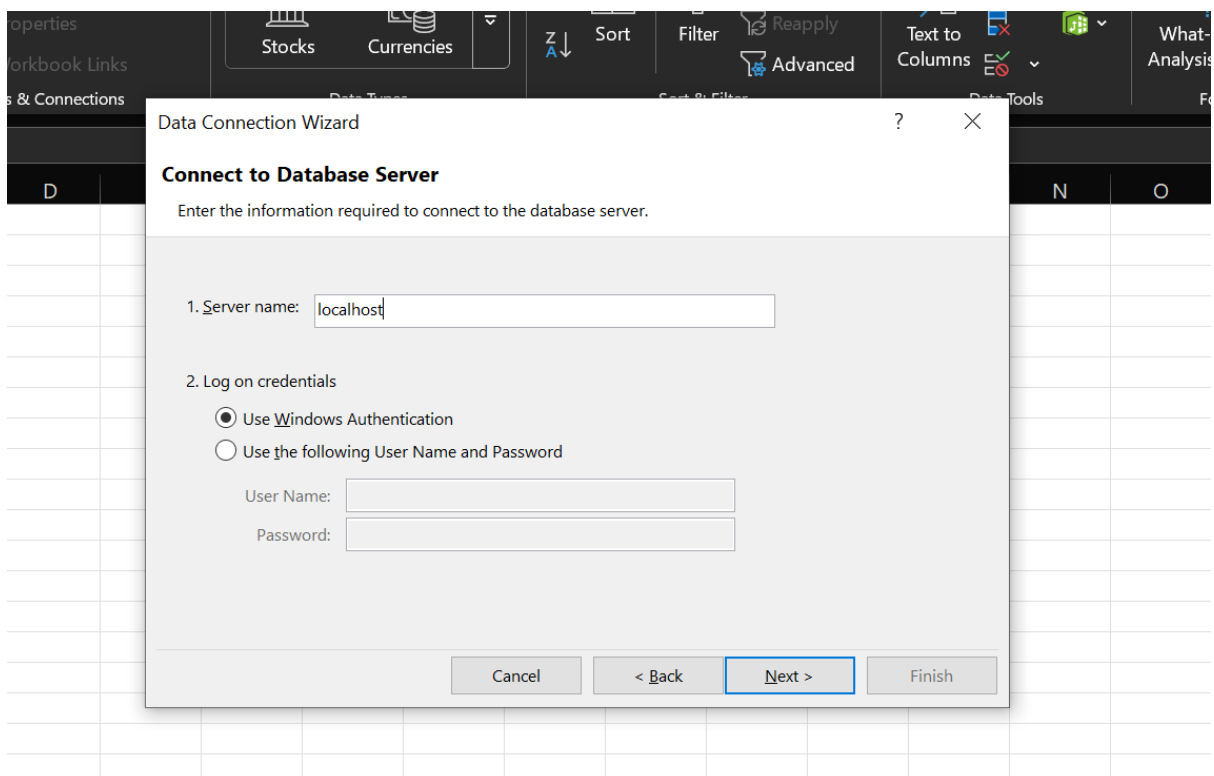
Demonstration of OLAP Operations

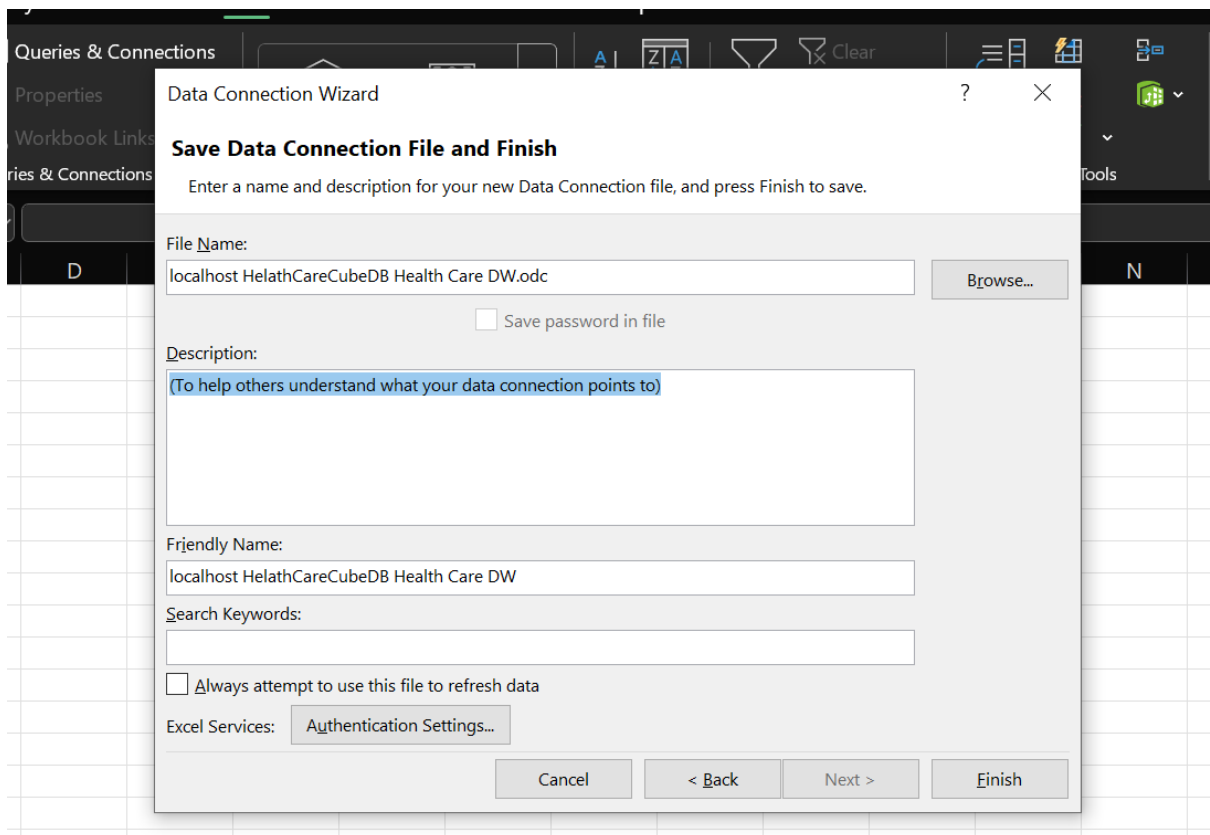
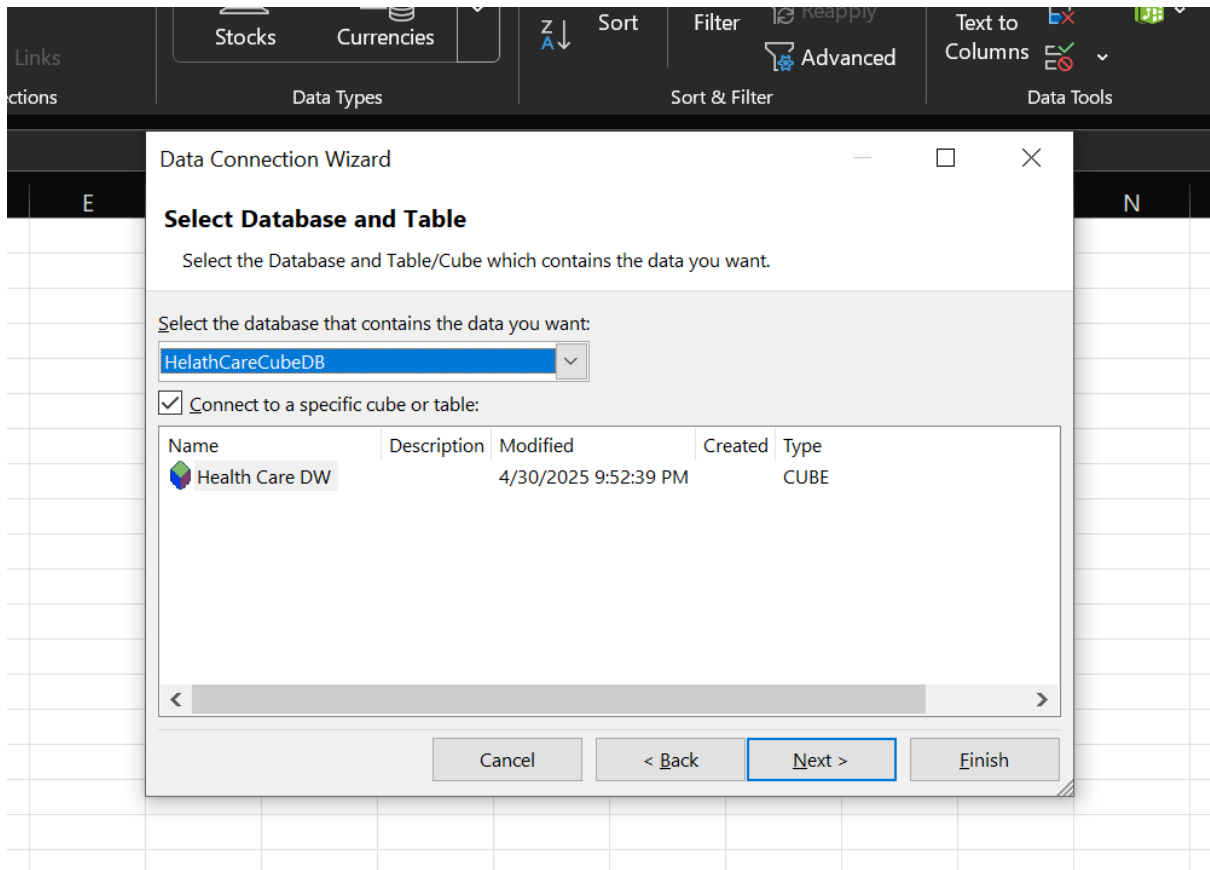
Here I opened a blank Excel file

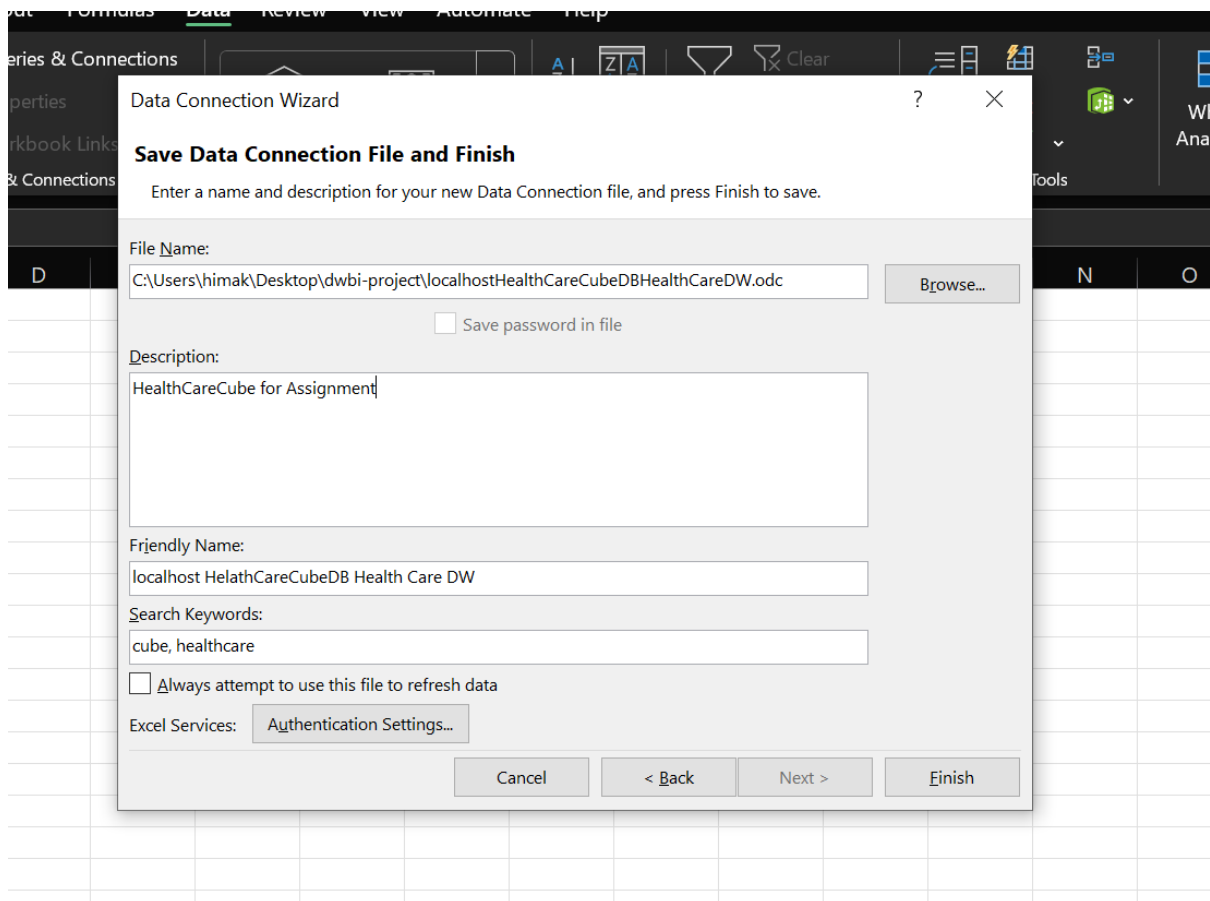


Then in Data tab > Get Data function to connect to SSAS cube via the Analysis Services

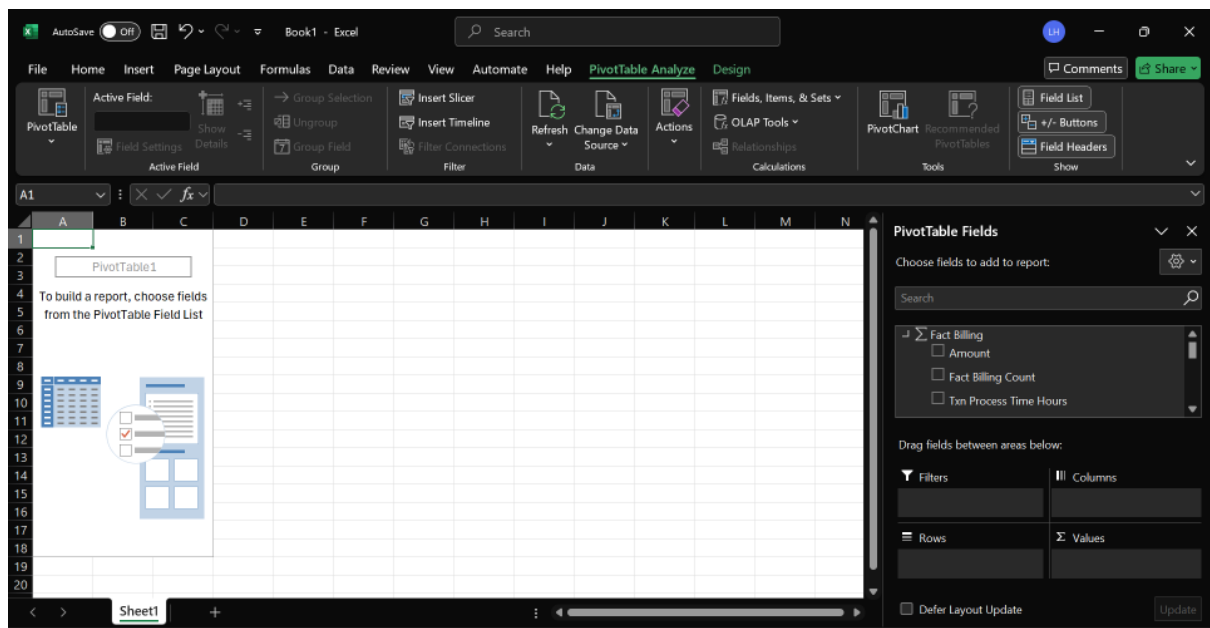
Entered relevant data server and database details, selected the cube and loaded the data





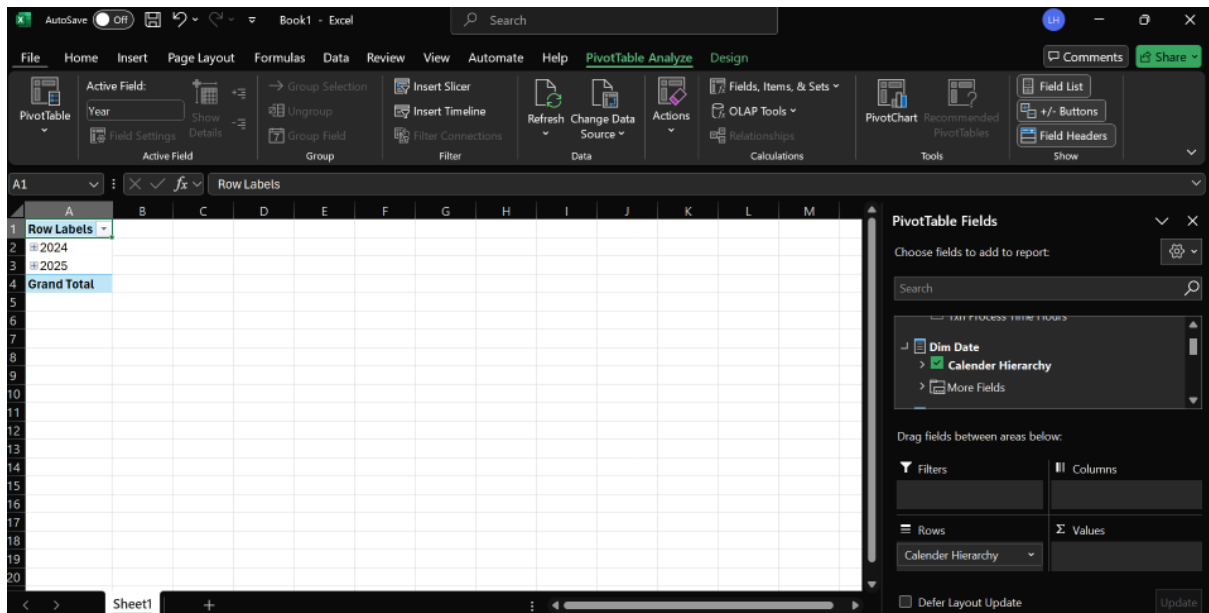


Then started demonstrating OLAP operations, created a Pivot table using the connected cube to enable multi-dimensional analysis



Roll-Up

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



	A	B	C	D
1				
2				
3	Row Labels	Amount		
4	2024	2543405		
5	2025	1166689		
6	Grand Total	3710094		
7				
8				
9				
10				
11				
12				
13				
14				
15				

Drill-Down

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

	A	B	C	D	E
1					
2					
3	Row Labels	Amount			
4	2024	2543405			
5	2	727256			
6	3	884621			
7	August	300884			
8	September	256568			
9	July	327169			
10	4	931528			
11	November	333739			
12	December	272219			
13	October	325570			
14	2025	1166689			
15	1	926830			
16	February	248223			
17	January	319050			
18	March	359557			
19	2	239859			
20	Grand Total	3710094			

Slicing

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

	A	B	C	D	E	F	G	H
1								
2								
3	Row Labels	Amount						
4	2024	12108						
5	2	1160						
6	4	10948						
7	November	6803						
8	December	1288						
9	October	2857						
10	Grand Total	12108						
11								
12								
13								
14								
15								
16								
17								
18								
19								

Name

Sherry Bell

Stacey Johnson

Stephanie Reid

Terri Stewart

Timothy Ramirez

Tina Lara

Wayne Duke

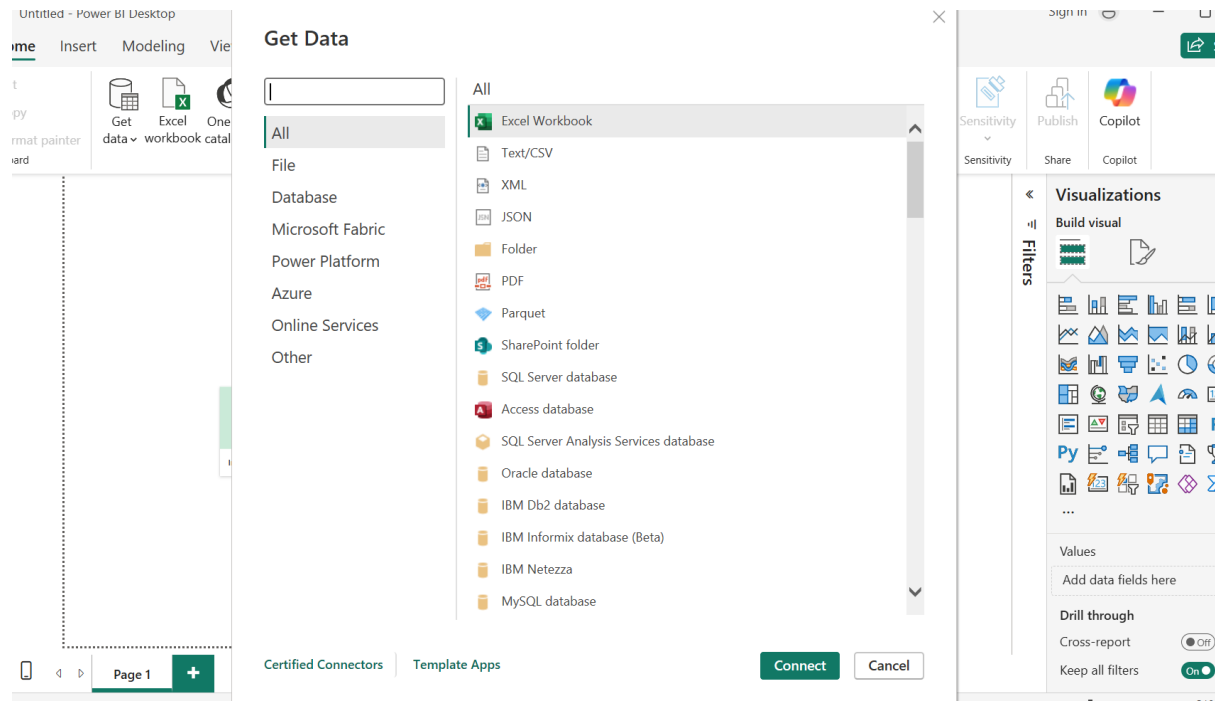
Antonio Conner

Dicing

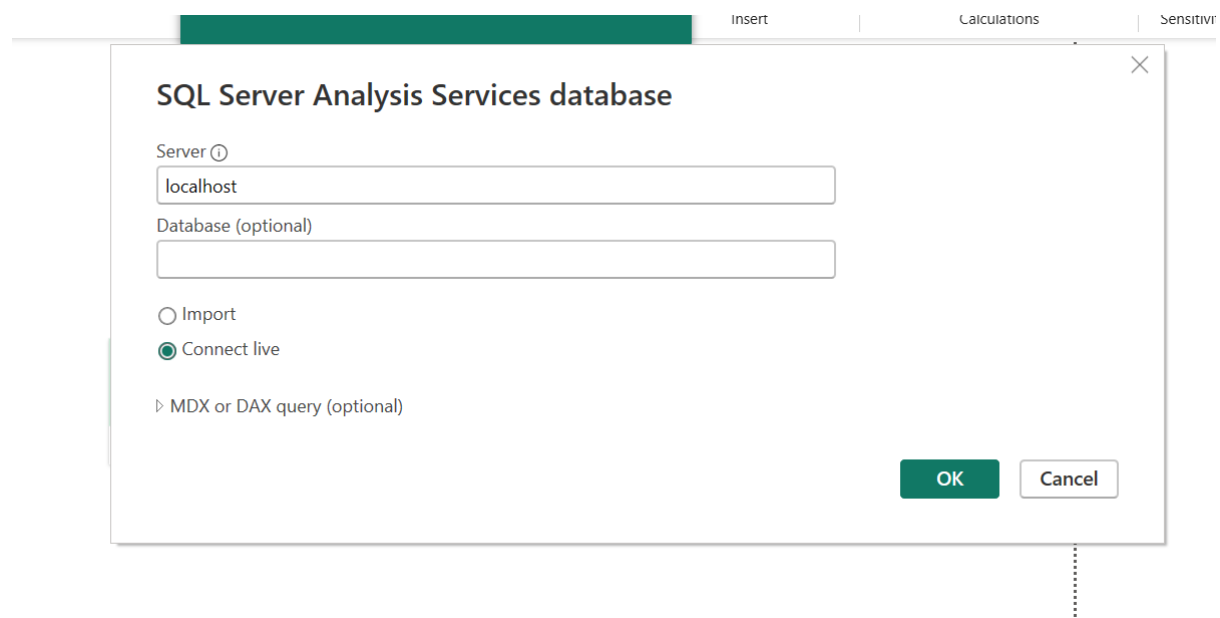
included both Doctor name and Specialization in rows/columns to analyse combined dimensions

Power BI Reports

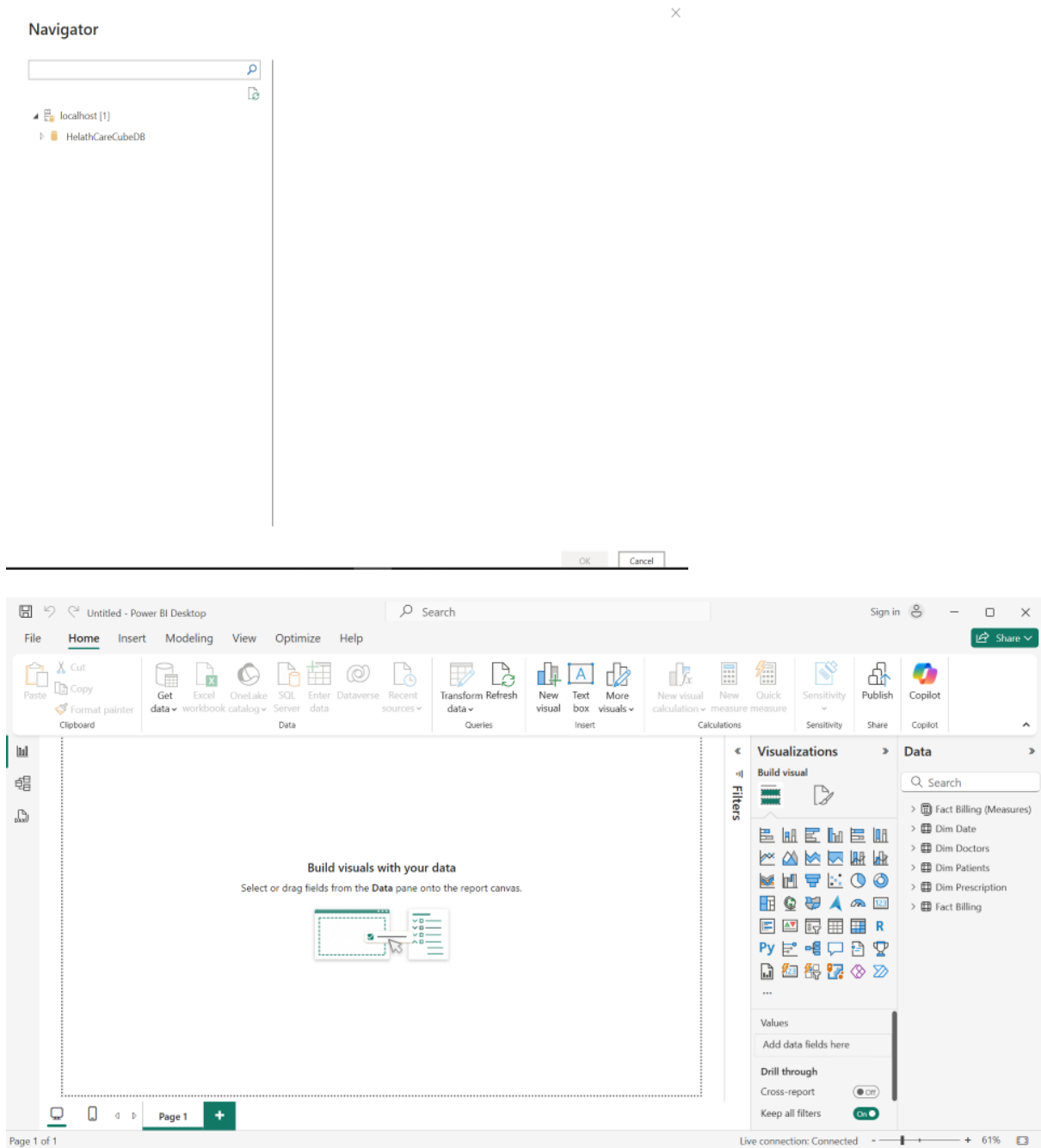
Launched Power BI Desktop and selected Get Data and selected SQL Server Analysis services



Configured necessary server and database connection settings

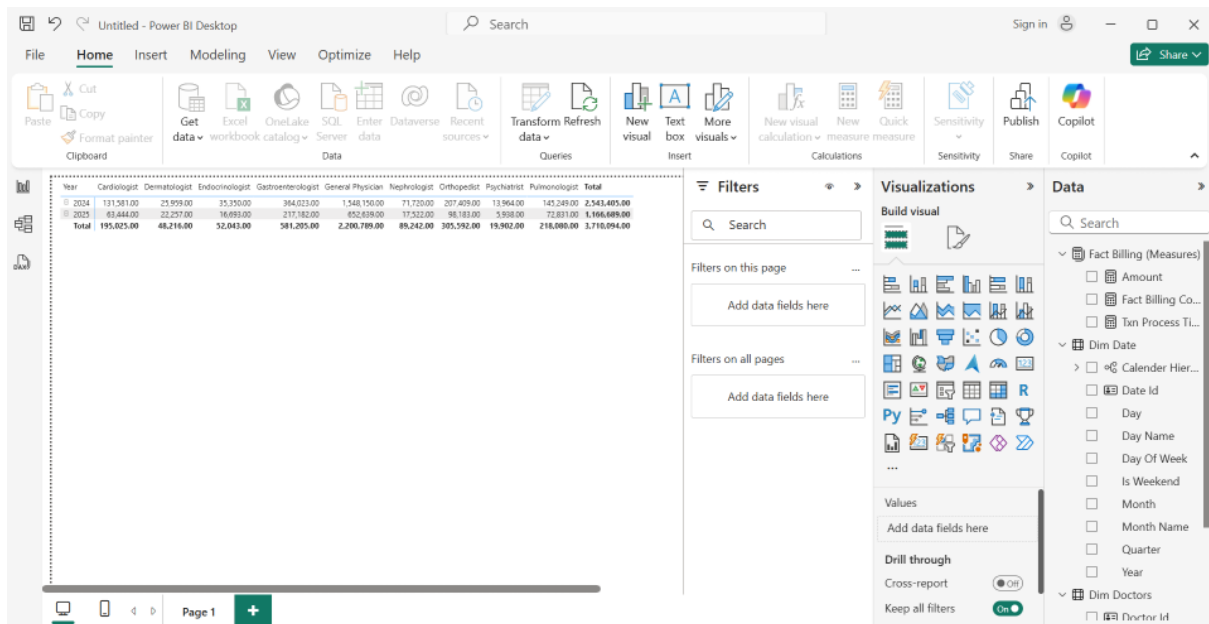


Successfully loaded the SSAS cube data into Power BI for analysis



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

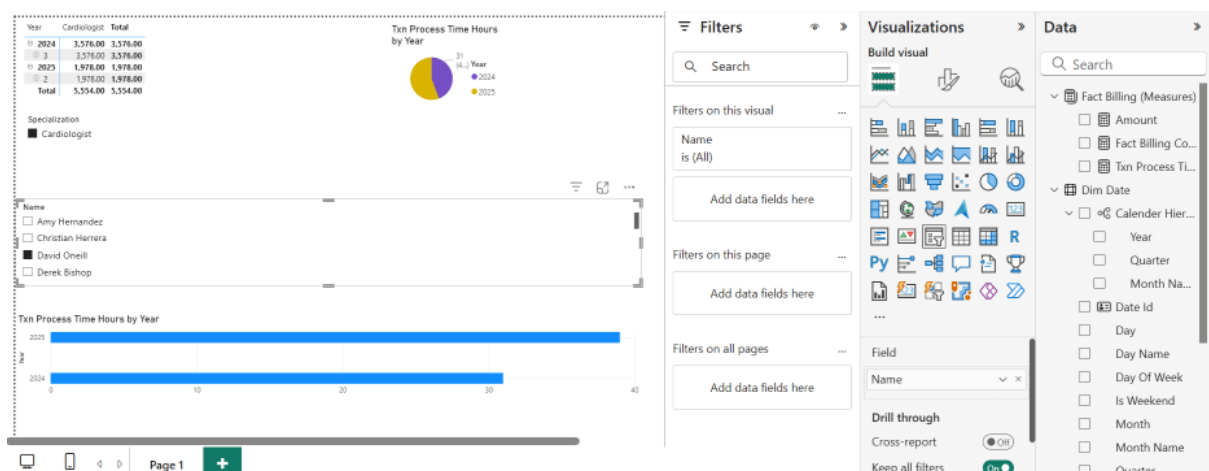


Year	Cardiologist	Dermatologist	Endocrinologist	Gastroenterologist	General Physician	Nephrologist	Orthopedist	Psychiatrist	Pulmonologist	Total
2024	131,581.00	25,959.00	35,350.00	364,023.00	1,548,150.00	71,720.00	207,409.00	13,964.00	145,249.00	2,543,405.00
2	44,095.00	9,211.00	12,772.00	93,505.00	455,151.00	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



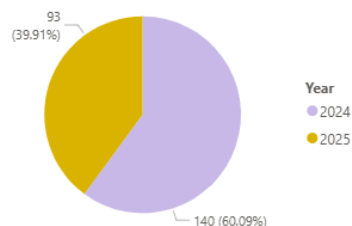
Name

☒ Andrea Curtis

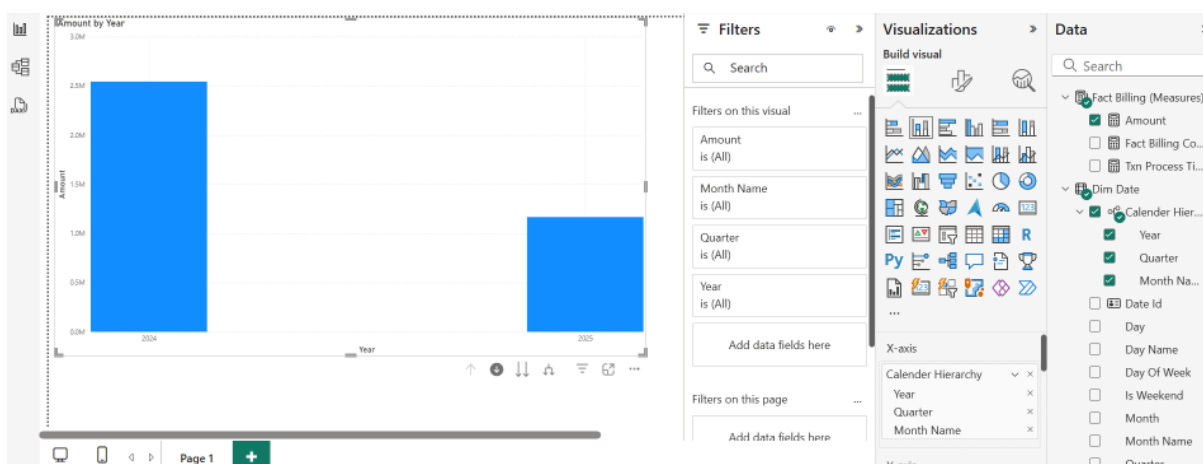
☐ David Clark

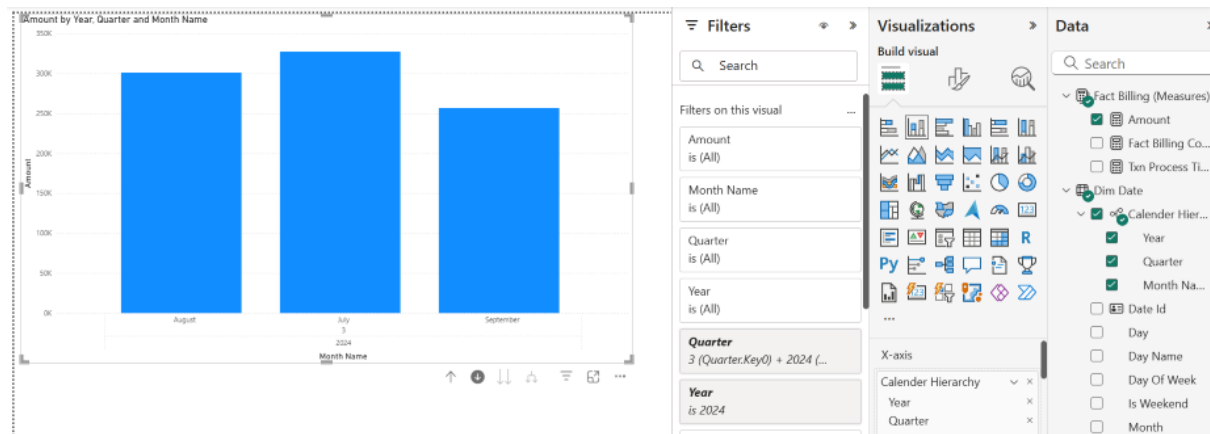
☐ Derrick Taylor

☐ Joanna Moran



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.

Doctor-Amount Matrix

Name	Amount
Aaron Johnson	47,404.00
Adem Goodwin	4,125.00
Alexa Farnell	4,896.00
Alexa Coleman	4,060.00
Amy Hernandez	38,715.00
Andrea Barnes	15,743.00
Andrew Curtis	28,538.00
Andrew Frederick	16,388.00
Angela Jimenez	7,168.00
Anthony Daniels	280,215.00
Audrey Jones	35,256.00
Austen Callahan	19,858.00
Brittany Baxter	53,064.00
Charles Ward	1,042.00
Christopher Gomez	9,459.00
Colin Graves	31,738.00
Crystal Sellers	10,474.00
Diana Renteria	2,524.00
Daniel Mitchell	7,364.00
David Clark	66,236.00
David Orrell	5,534.00
Devin Lee	85,894.00
Derrick Taylor	53,859.00
Dominic James	6,055.00
Donald Schwab	12,360.00
Donna Barnes	3,406.00
Dwayne Williams	10,410.00
Elizabeth Martinez	8,921.00
Elizabeth Solomon	6,030.00
Emily Mendez	3,017.00
Eric Brock	922.00
Eric Hansen	19,844.00
Total	3,710,094.00

Filters: Filters on this page: Add data fields here; Filters on all pages: Add data fields here.

Visualizations: Build visual, Drill through: Cross-report (Off), Keep all filters (On), Add drill-through fields here.

Data: Fact Billing (Measures): Amount, Fact Billing Co..., Txn Process Ti...; Dim Date: Calendar Hier..., Year, Quarter, Month Na..., Date Id, Day, Day Name, Day Of Week, Is Weekend, Month, Quarter.

Power BI Desktop interface showing a data table and a context menu.

Name	Amount
Aaron Johnson	47,454.00
Adam Goodwin	4,155.00
Alexa Ferrell	4,896.00
Alexis Coleman	4,060.00
Amy Hernandez	20,715.00
Andrea Barnes	15,743.00
Andrea Cu	
Andrea Fra	
Angela Lee	
Anthony D	
Audrey Jol	
Austin Call	
Bethany Ba	
Charles Wi	
Christophe	
Colin Gray	
Cristal Sell	
Dana Pene	
Daniel Mde	
David Chel	
David One	
Devin Lee	
Derrick Tay	
Dominic Ju	
Donald Sol	
Donna Bat	
Donna Williams	19,410.00
Elizabeth Martinez	8,821.00
Elizabeth Solomon	6,026.00
Emily Martinez	3,017.00
Eric Brock	922.00
Eric Hansen	9,864.00
Total	3,718,094.00

Context menu options: Copy, Expand, Collapse, Show as a table, Include, Exclude, Drill through (selected), Group, Summarize, Unfreeze row headers.

Drill through target: Page 3

Power BI Desktop interface showing a pie chart visualization titled "Fact Billing Count by Sickness".

Pie Chart Data:

Sickness	Count	Percentage
Bronchitis	2	100%
Asthma	3	150%

Visualizations pane settings:

- Visualizations:** Build visual, Rows: Name, Columns: Add data fields here, Values: Amount, Drill through: Cross-report (On), Keep all filters (On).
- Filters:** Filters on this page, Filters on all pages.
- Data:** Fact Billing (Measures) - Amount, Dim Date - Calendar Hierarchy (Year, Quarter, Month Name).

Drill through configuration:

- Name: is [Dim Doctors].[Name].&[Andrea Barnes]
- Allow drill through when: Used as category

*** End Of Report ***