Sri Lanka Institute of Information Technology

DATA WAREHOUSING AND BUSINESS INTELLIGNECE(IT3021)

Year 03 Semester 01 – 2025

ASSIGNMENT 2

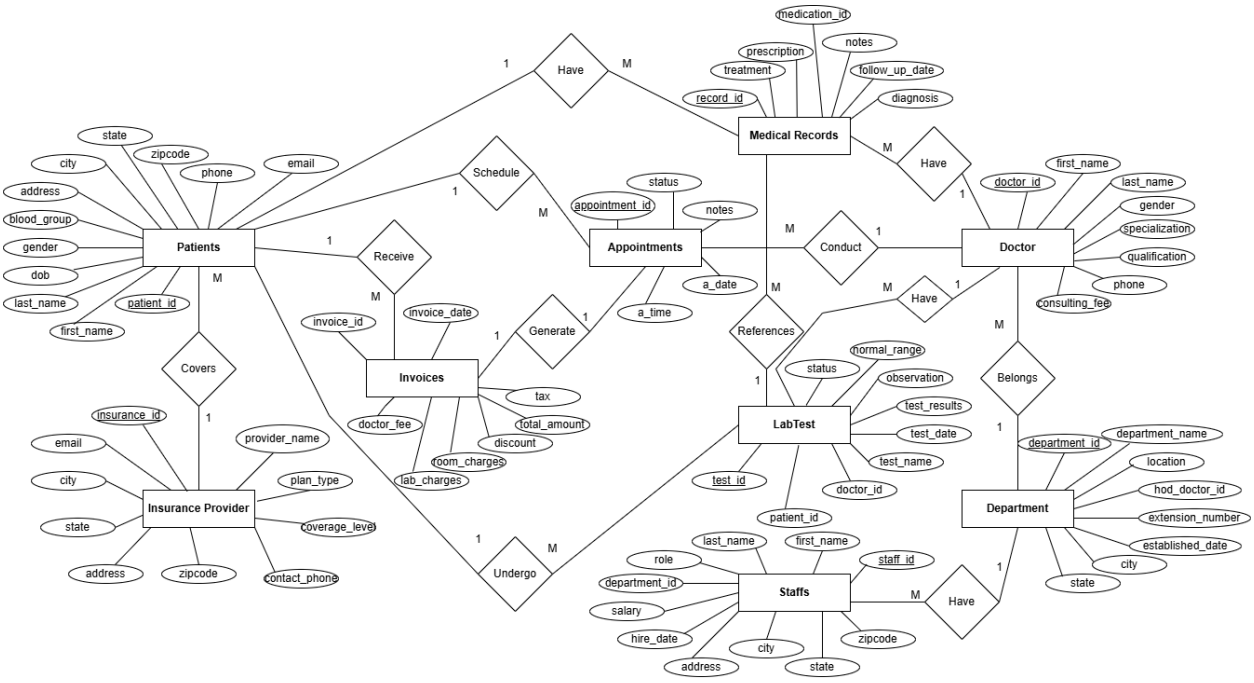
BY M.Y IQRA [IT22071620]

Step 1

1.1 Description of the DataSet

For this project, I designed and developed a simulated Healthcare operational system. Multiple files and database tables were prepared to handle healthcare transactions. The system included data for patient management, doctors, appointments, medications, lab tests, departments, and insurance providers

1.2 ER DIAGRAM



Description of the DataSources

The data was sourced from the Datawarehouse database[HospitalDW] after completing the ETL(Extract,Transform,Load) process .This ensured that the data was cleaned,standardized and optimized for analysis before importing into SSAS Cube and PowerBI

The original raw data was available in two formats:

- ✓ CSV [Comma-seperated Values] files
  - ✓ Patients.csv

- ✓ Doctors.csv
- ✓ Appointments.csv
- ✓ Medications.csv
- ✓ InsuranceProviders.csv
- ✓ LabTests.csv
- ✓ Medical.Records.csv
- ✓ Invoices.csv

- ✓ SQLdatabase tables [For Direct Extraction)

TxnUpdate

STEP 2

Created the Following Dimensions

- ✓ Patient Dimension
- ✓ Doctor Dimension
- ✓ Date Dimension
- ✓ Medication Dimension
- ✓ Insurance Dimension
- ✓ Department Dimension

Implemented Hierarchies

Date Hierarchy:

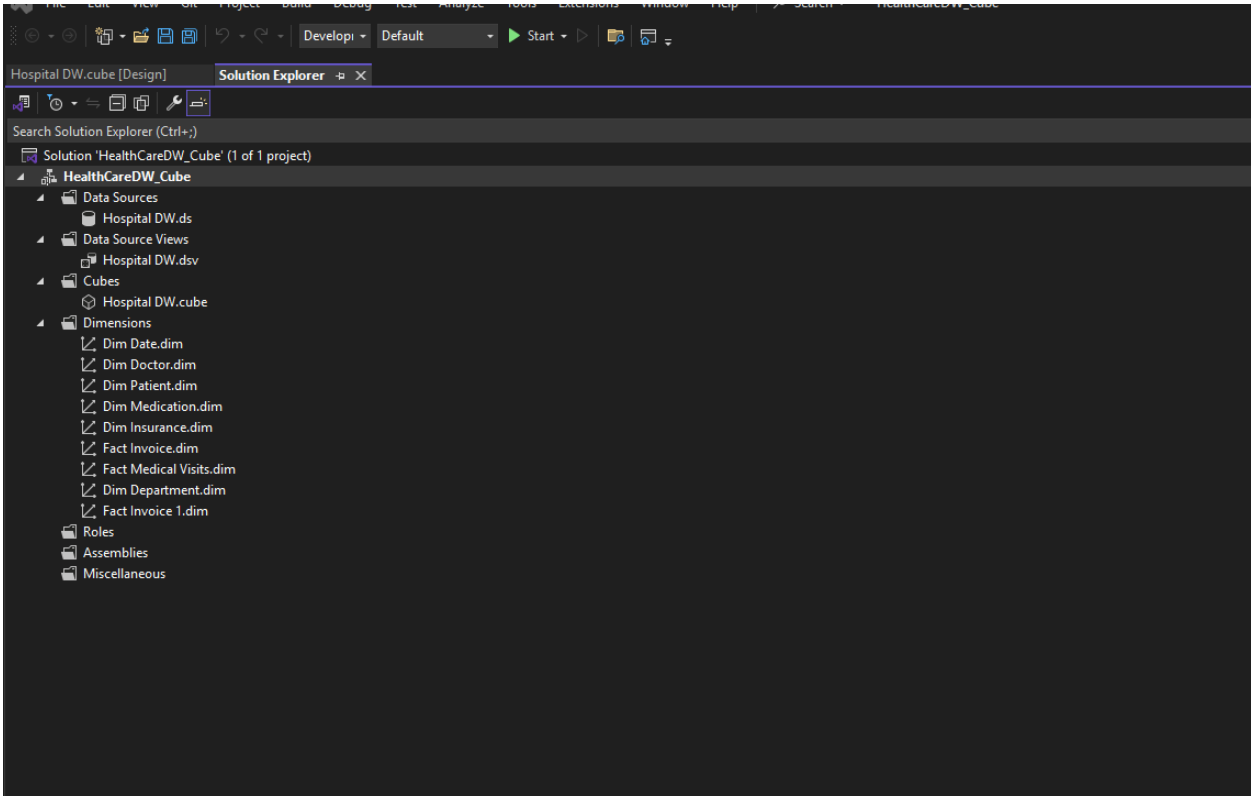
- Year -> Quarter -> Month -> Day

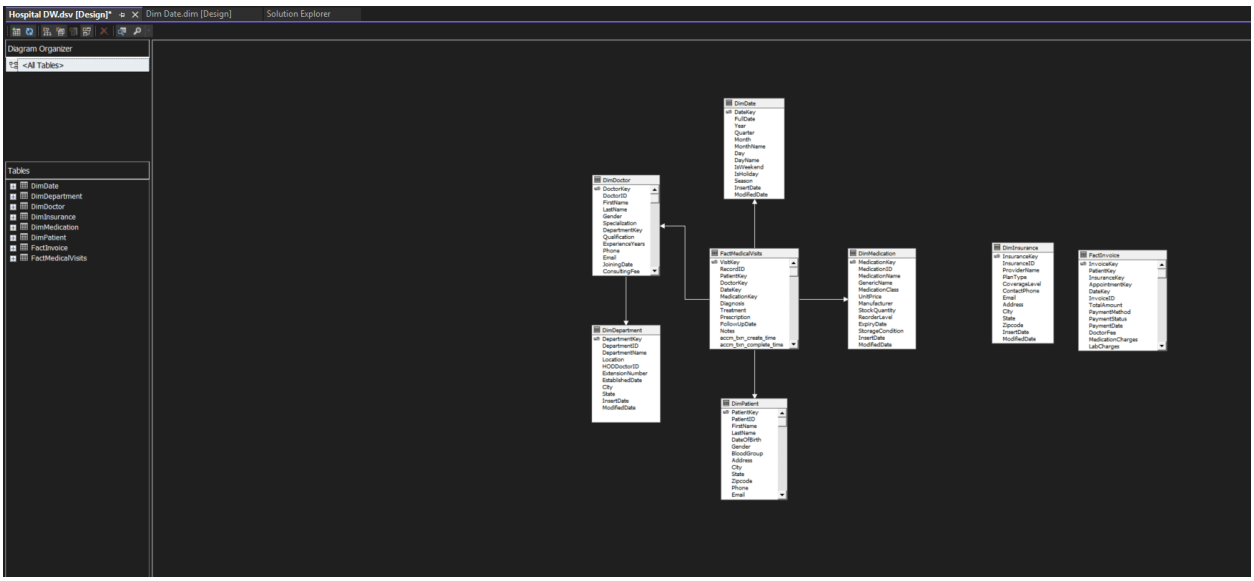
Geography Hierarchy:

- State -> City -> Zipcode

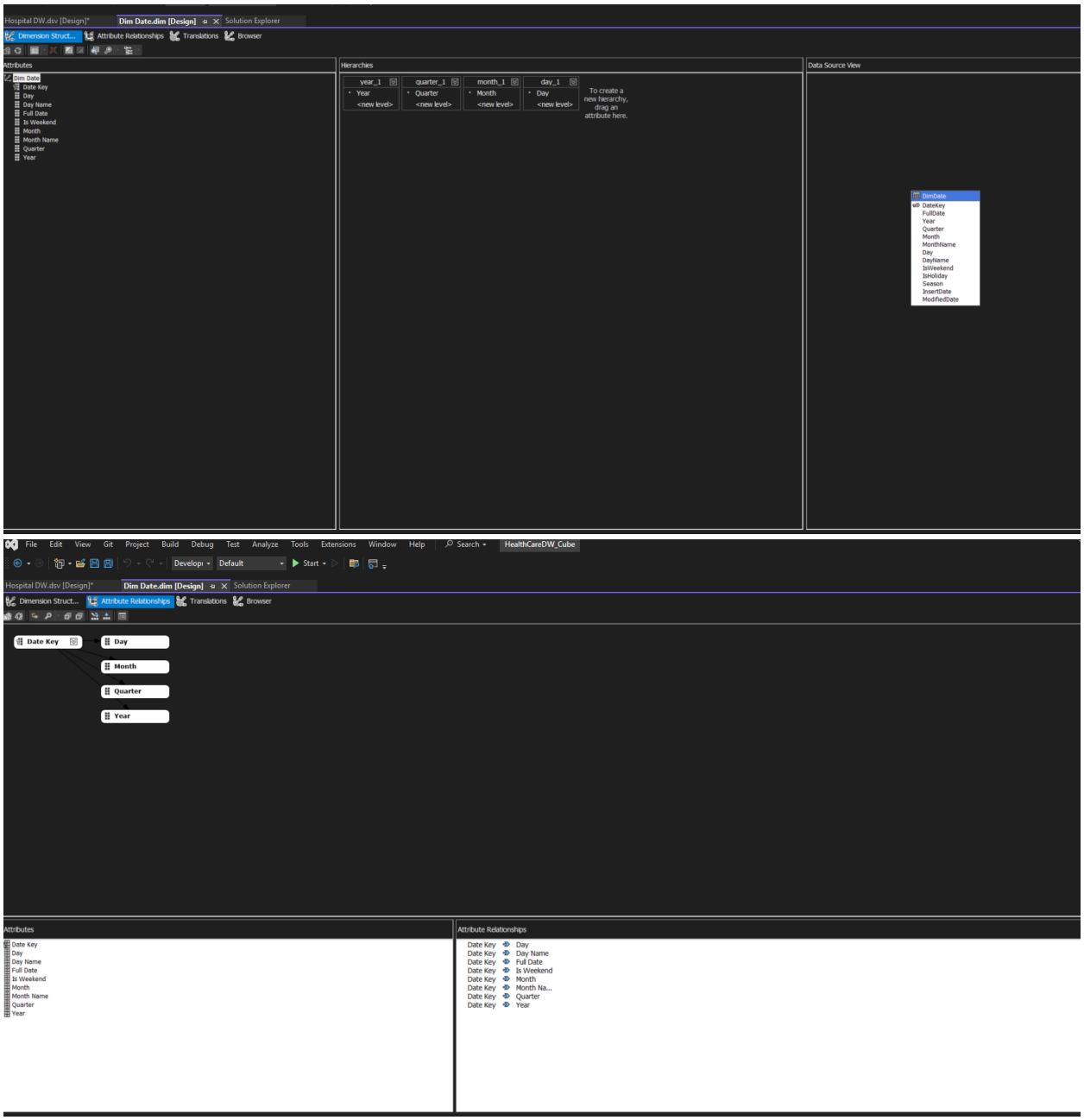
Created Measure Group

- Invoice Measures : From FactInvoice
- Medical Visit Measure : From FactMedicalVisits

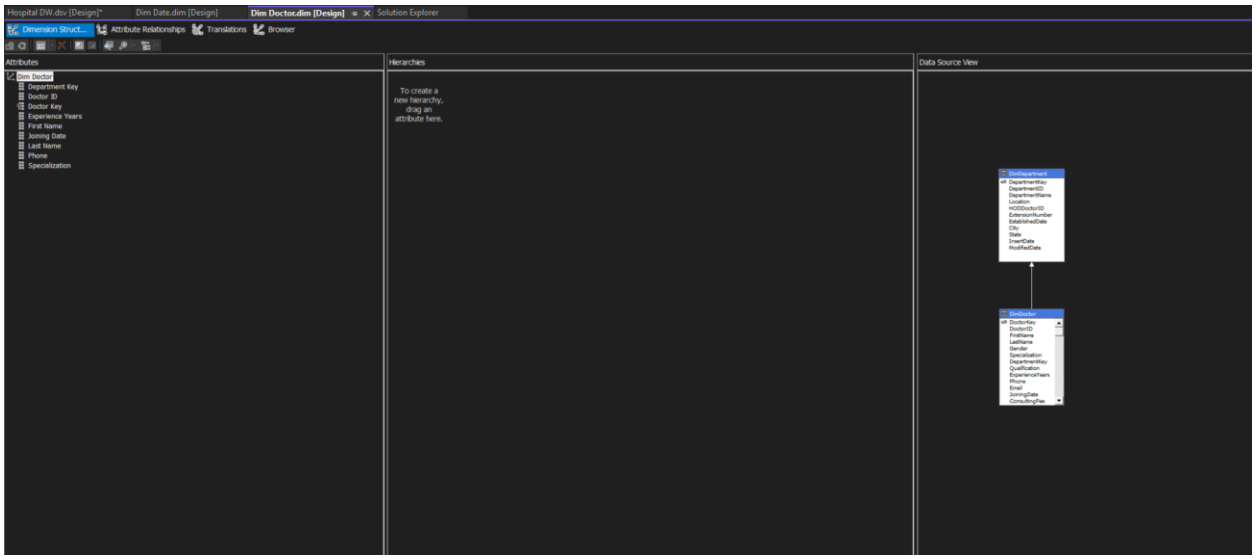

Hospital DW.cube [Design]
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'HealthCareDW_Cube' (1 of 1 project)
HealthCareDW_Cube
Data Sources
Hospital DW.ds
Data Source Views
Hospital DW.dsv
Cubes
Hospital DW.cube
Dimensions
Dim Date.dim
Dim Doctor.dim
Dim Patient.dim
Dim Medication.dim
Dim Insurance.dim
Fact Invoice.dim
Fact Medical Visits.dim
Dim Department.dim
Fact Invoice 1.dim
Roles
Assemblies
Miscellaneous

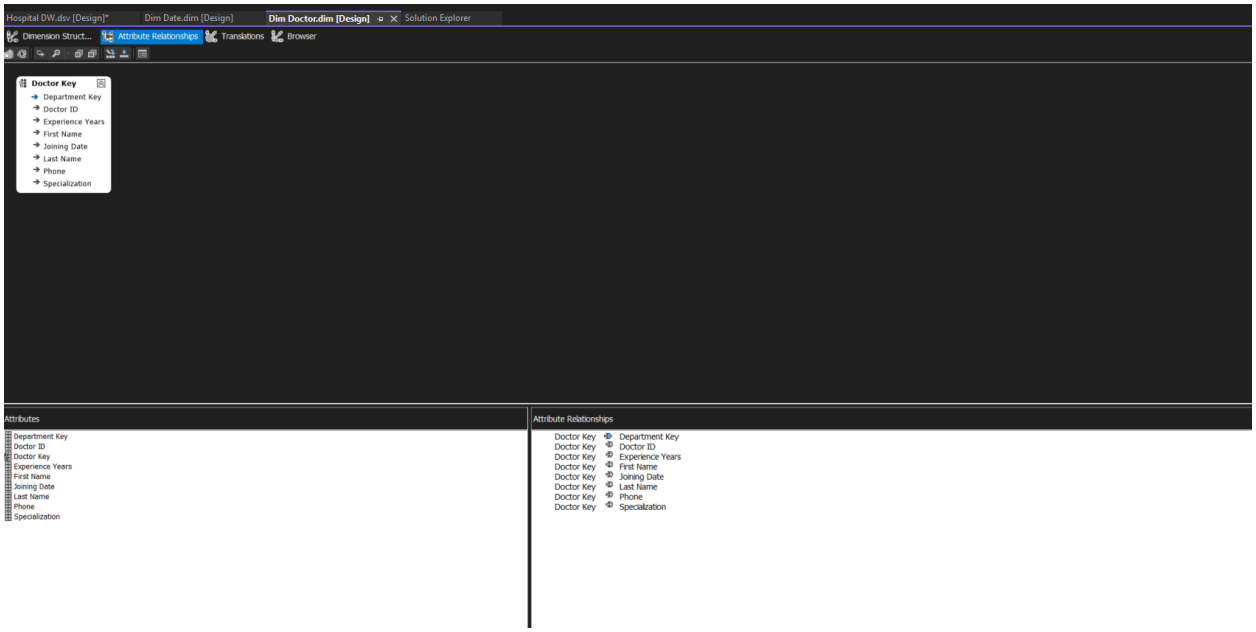

Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Solution Explorer
Diagram Organizer
<All Tables>
Tables
DimDate
DimDepartment
DimDoctor
DimInsurance
DimMedication
DimPatient
FactInvoice
FactMedicalVisits

DimDate

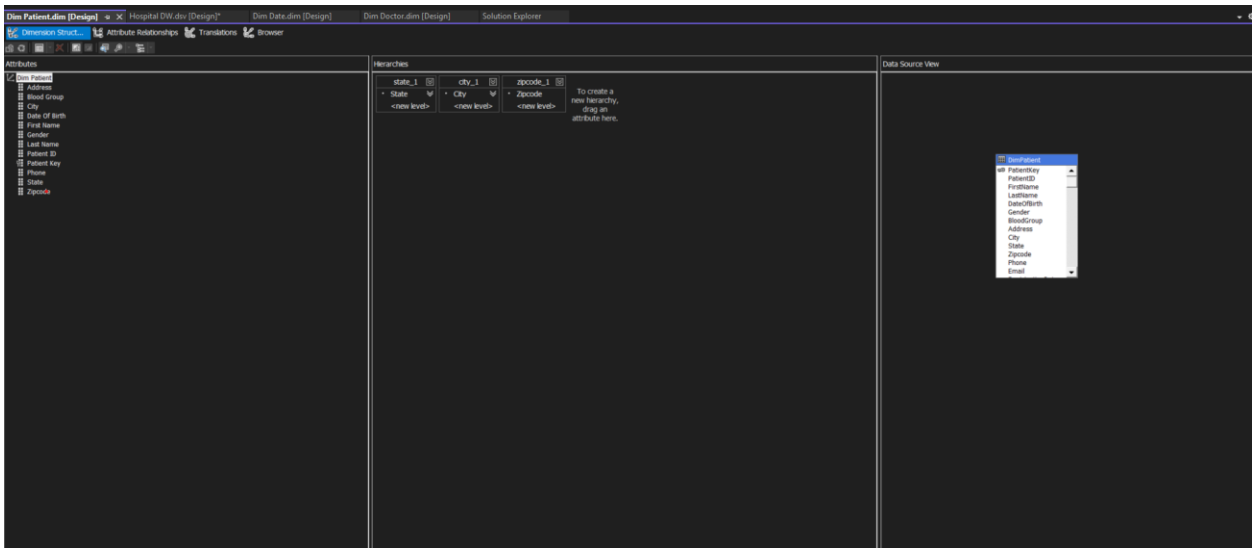

Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Attributes
Dim Date
Date Key
Day
Day Name
Full Date
Is Weekend
Month
Month Name
Quarter
Year
Hierarchies
year_1
quarter_1
month_1
day_1
Year
Quarter
Month
Day
<new level>
To create a new hierarchy, drag an attribute here.
Data Source View
DimDate
DateKey
FullDate
Year
Quarter
Month
MonthName
Day
DayName
IsWeekend
IsHoliday
Season
InsertDate
ModifiedDate
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search
HealthCareDW_Cube
Start
Default
Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Date Key
Day
Month
Quarter
Year
Attributes
Attribute Relationships

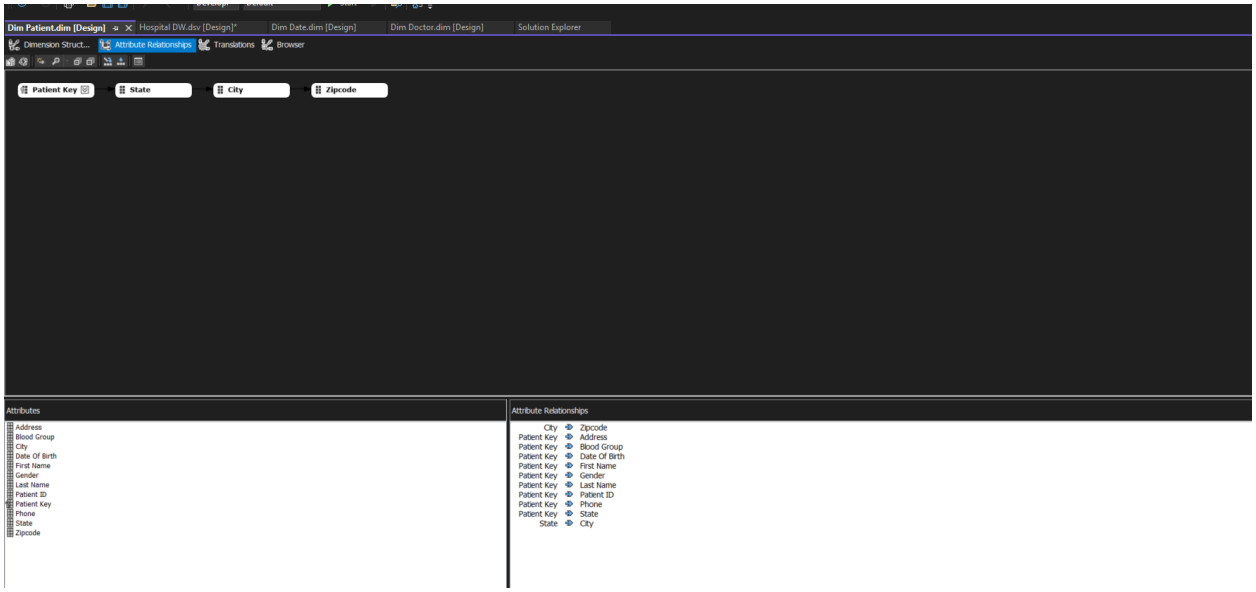
DimDoctor


Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Dim Doctor.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Attributes
Dim Doctor
Department Key
Doctor ID
Doctor Key
Experience Years
First Name
Joining Date
Last Name
Phone
Specialization
Hierarchies
To create a new hierarchy, drag an attribute here.
Data Source View
DimDepartment
DimDoctor

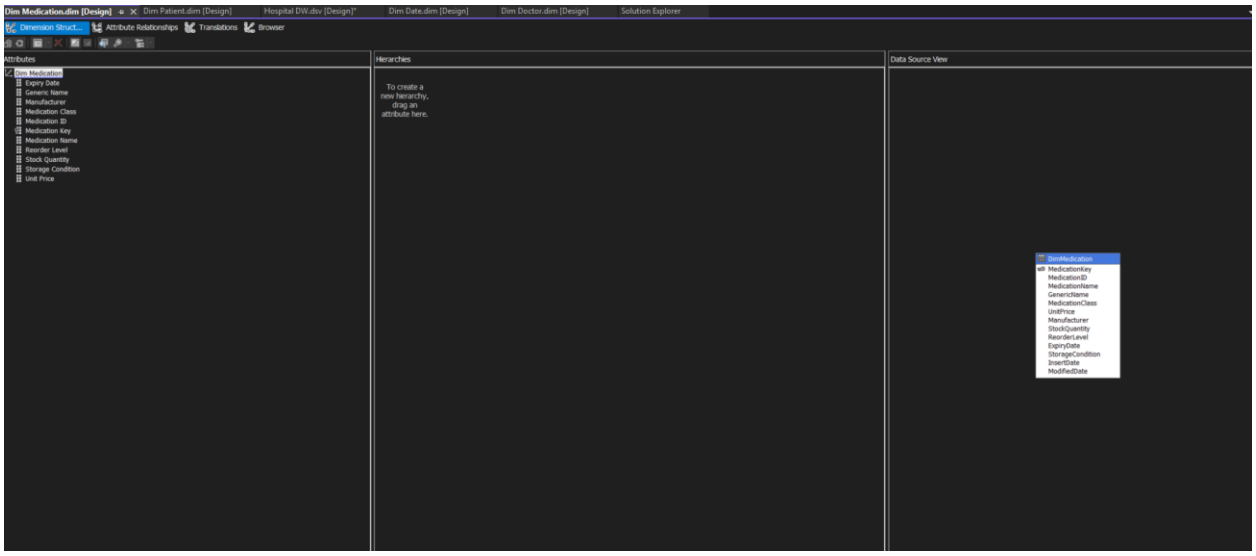

Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Dim Doctor.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Doctor Key
Department Key
Doctor ID
Experience Years
First Name
Joining Date
Last Name
Phone
Specialization
Attributes
Department Key
Doctor ID
Doctor Key
Experience Years
First Name
Joining Date
Last Name
Phone
Specialization
Attribute Relationships
Doctor Key Department Key
Doctor Key Doctor ID
Doctor Key Experience Years
Doctor Key First Name
Doctor Key Joining Date
Doctor Key Last Name
Doctor Key Phone
Doctor Key Specialization

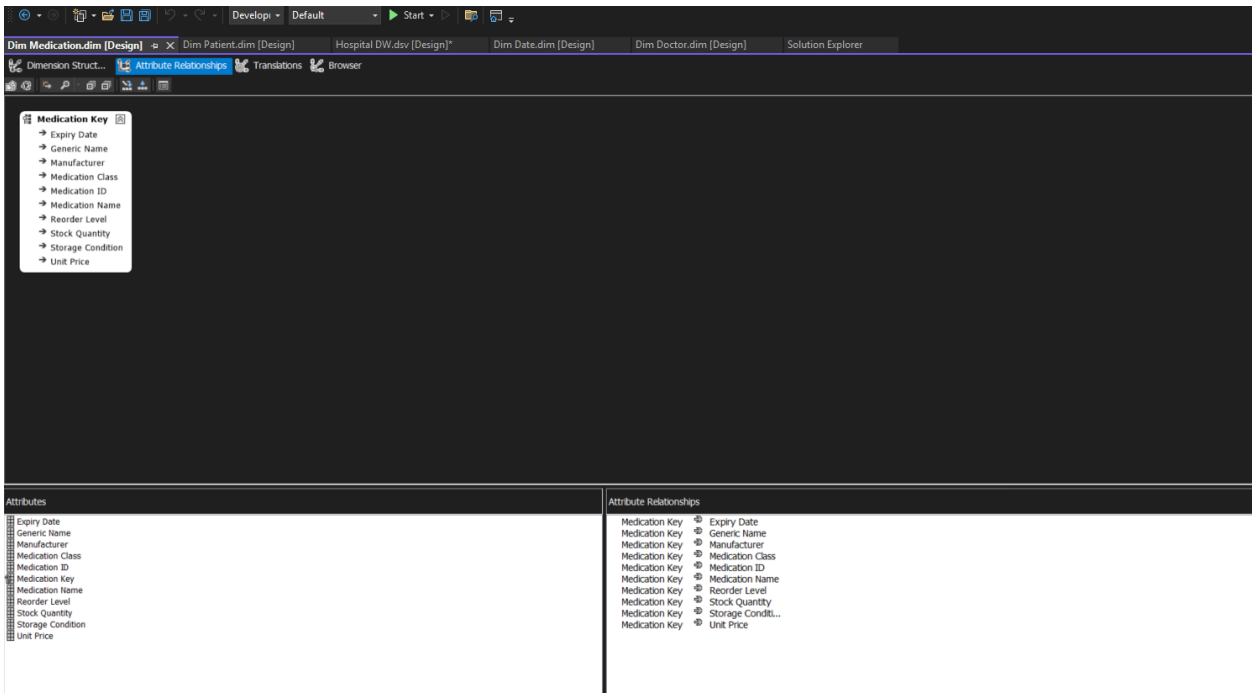
DimPatient


Dim Patient.dim [Design]
Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Dim Doctor.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Attributes
Dim Patient
Address
Blood Group
City
Date Of Birth
First Name
Gender
Last Name
Patient ID
Patient Key
Phone
State
Zipcode
Hierarchies
state_1
State
<new level>
city_1
City
<new level>
zipcode_1
Zipcode
<new level>
To create a new hierarchy, drag an attribute here.
Data Source View
DimPatient
PatientKey
PatientID
FirstName
LastName
DateOfBirth
Gender
BloodGroup
Address
City
State
Zipcode
Phone
Email

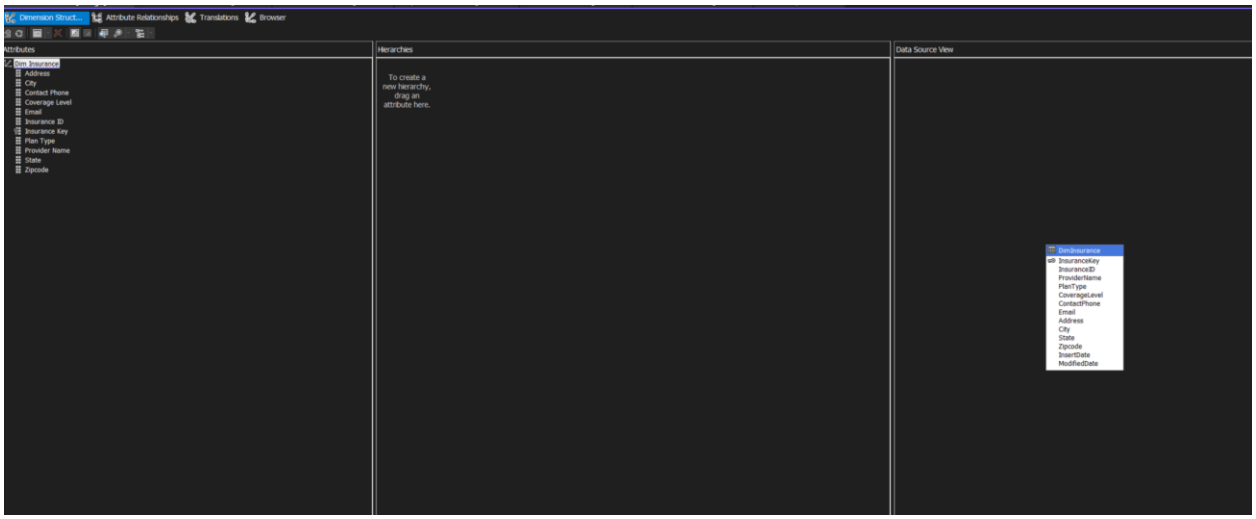

Dim Patient.dim [Design]
Hospital DW.dsv [Design]*
Dim Date.dim [Design]
Dim Doctor.dim [Design]
Solution Explorer
Dimension Struct...
Attribute Relationships
Translations
Browser
Patient Key
State
City
Zipcode
Attributes
Address
Blood Group
City
Date Of Birth
First Name
Gender
Last Name
Patient ID
Patient Key
Phone
State
Zipcode
Attribute Relationships
City → Zipcode
Patient Key → Address
Patient Key → Blood Group
Patient Key → Date Of Birth
Patient Key → First Name
Patient Key → Gender
Patient Key → Last Name
Patient Key → Patient ID
Patient Key → Phone
Patient Key → State
State → City

DimMedication

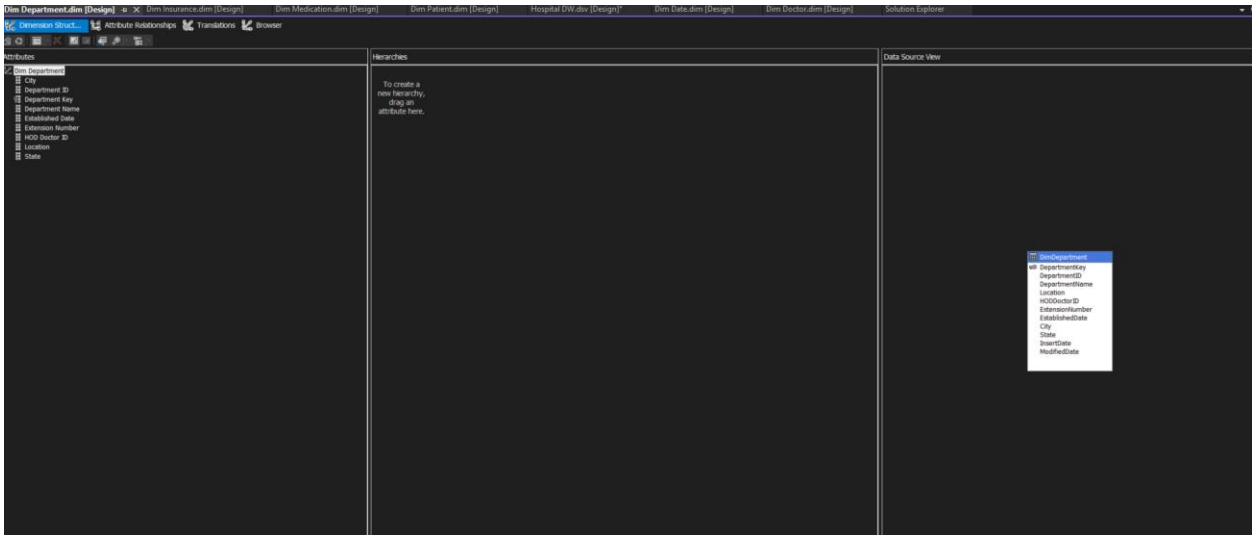


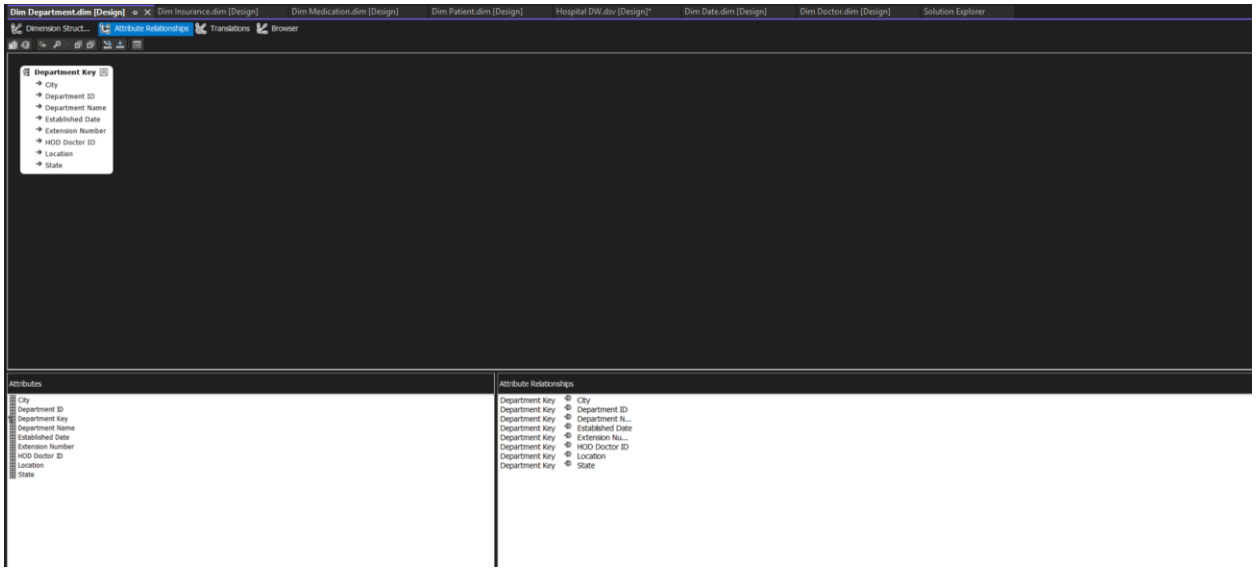


Dim Insurance

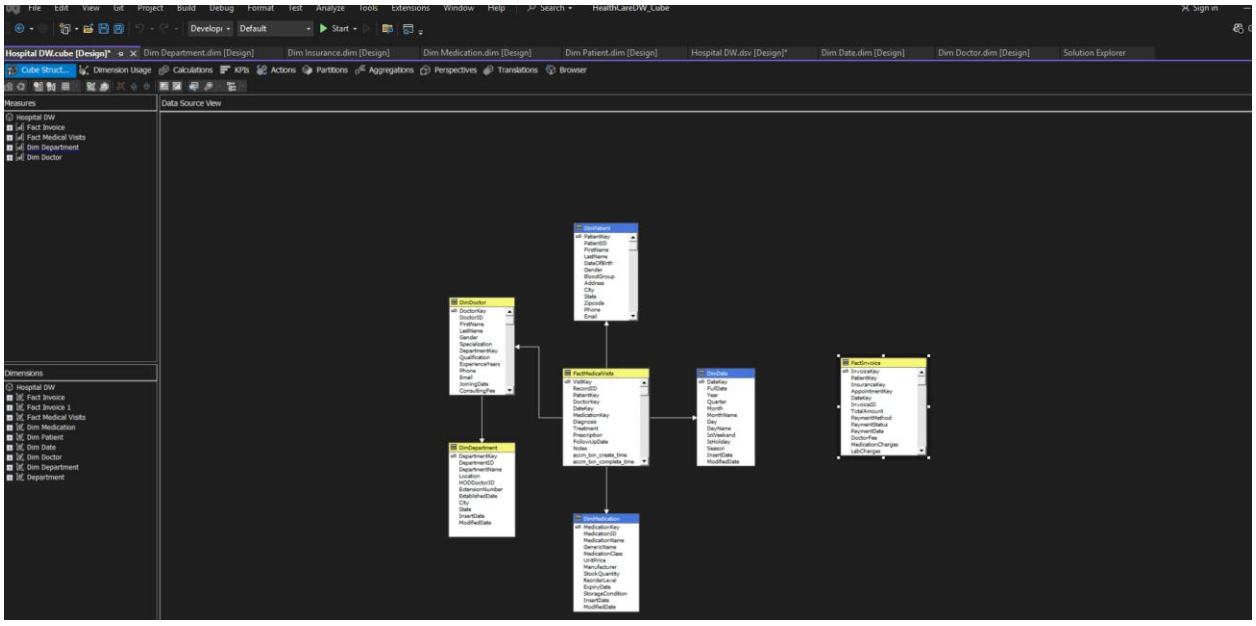


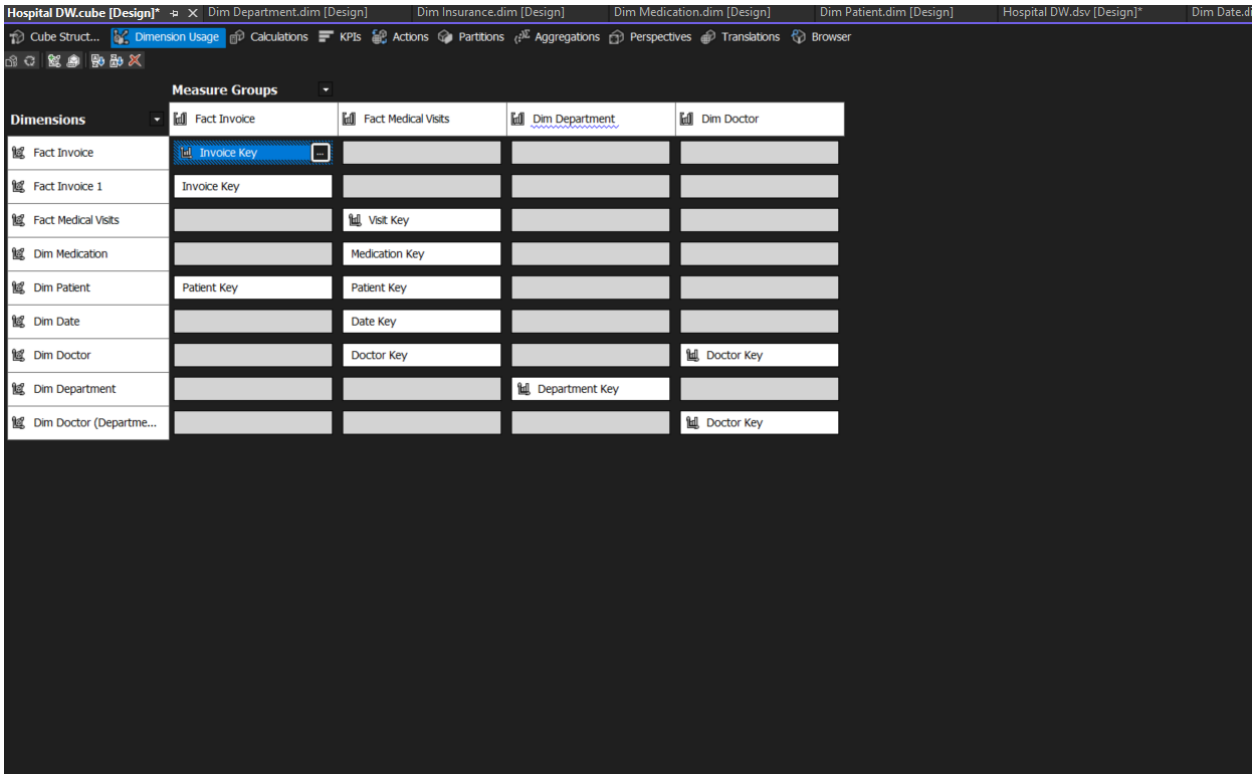
DimDepartment





SSAS CUBE STRUCTURE





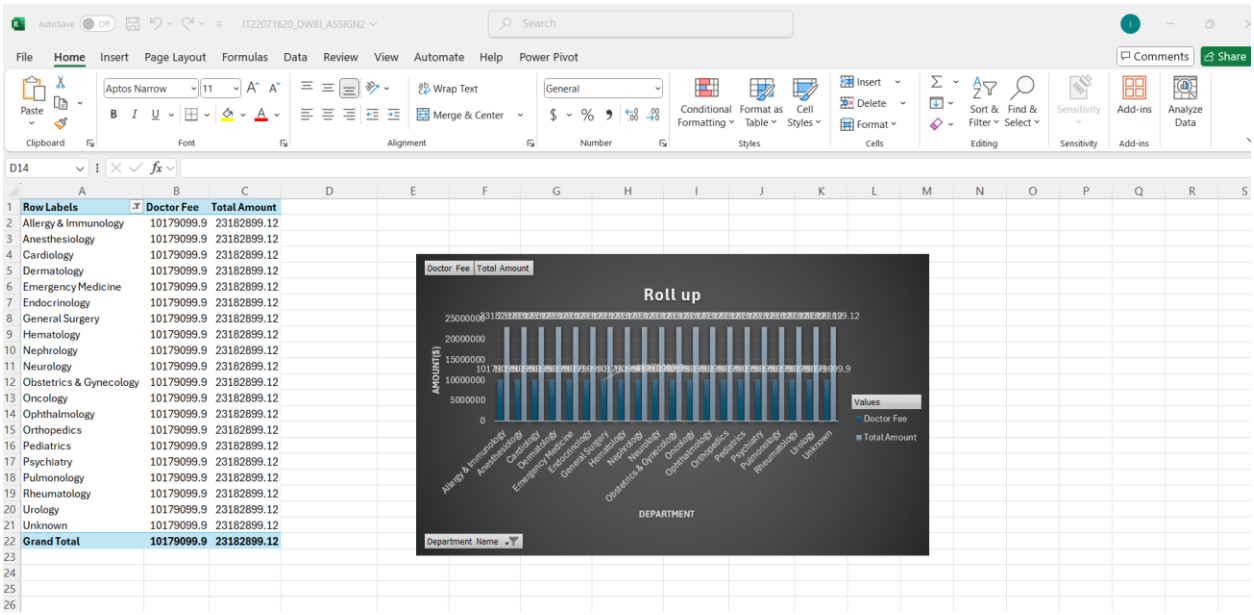
STEP 3

3.1 Demonstration of OLAP Operations

For this Assignment 2 , I Connected Excel to the SSAS cube using the Datatab and POWERPIVOT mode . I created the Multiple Pivot tables and Pivot charts to Demonstrate the OLAP operations

Roll-up

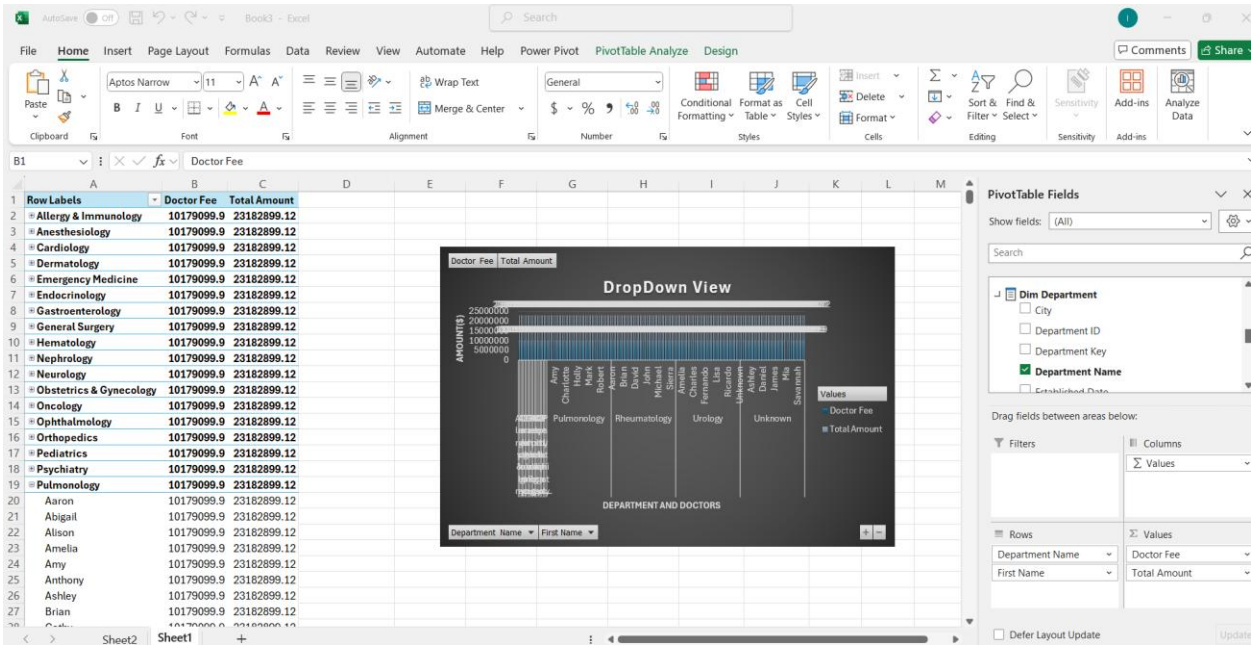
- Roll-up Operation aggregates data from a detailed level to more summarized level in a Dimensional Hierarchy



Row Labels	Doctor Fee	Total Amount
Allergy & Immunology	10179099.9	23182899.12
Anesthesiology	10179099.9	23182899.12
Cardiology	10179099.9	23182899.12
Dermatology	10179099.9	23182899.12
Emergency Medicine	10179099.9	23182899.12
Endocrinology	10179099.9	23182899.12
General Surgery	10179099.9	23182899.12
Hematology	10179099.9	23182899.12
Nephrology	10179099.9	23182899.12
Neurology	10179099.9	23182899.12
Obstetrics & Gynecology	10179099.9	23182899.12
Oncology	10179099.9	23182899.12
Ophthalmology	10179099.9	23182899.12
Orthopedics	10179099.9	23182899.12
Pediatrics	10179099.9	23182899.12
Psychiatry	10179099.9	23182899.12
Pulmonology	10179099.9	23182899.12
Rheumatology	10179099.9	23182899.12
Urology	10179099.9	23182899.12
Unknown	10179099.9	23182899.12
Grand Total	**10179099.9**	**23182899.12**

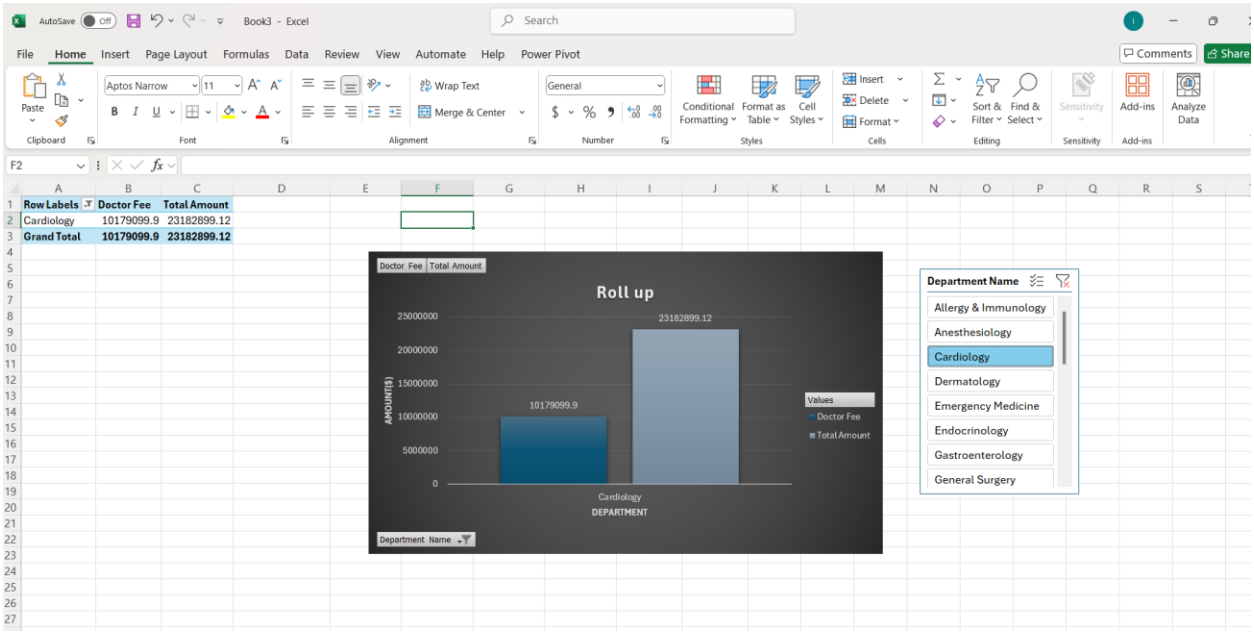
Drill-Down

- Drill-Down Operation navigated from summarized data to more detailed data within a hierarchy



Slice

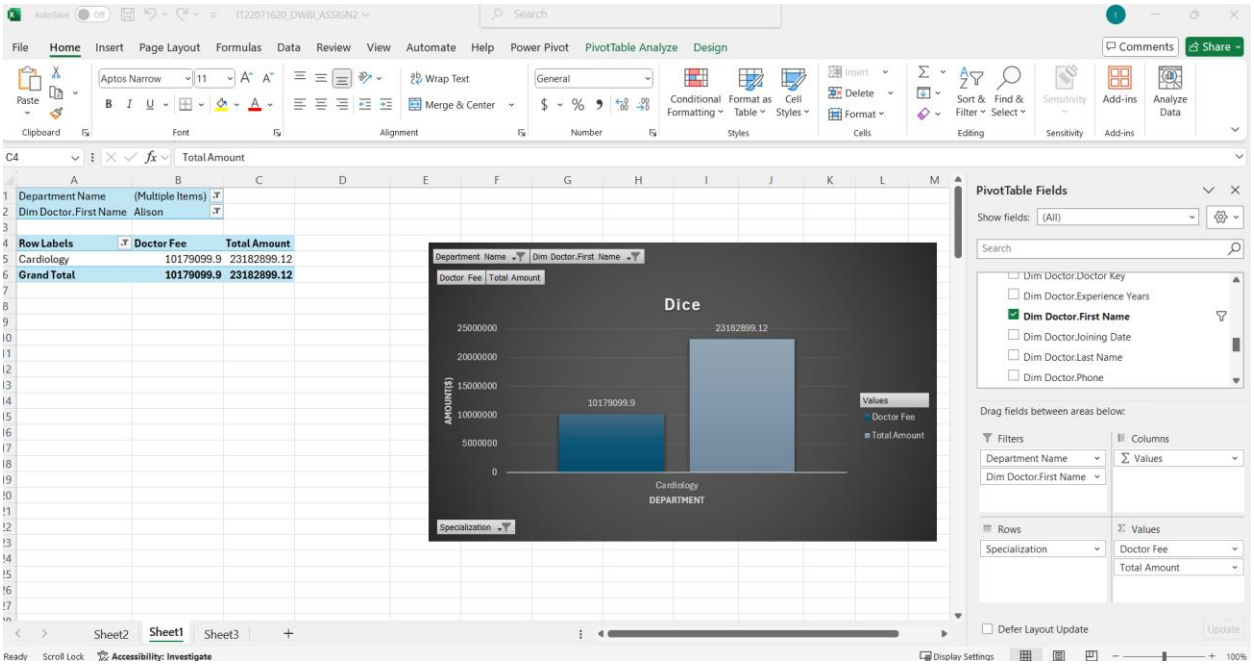
- Slice Operation reduces the dimensionality of the data by fixing one dimension to a specific value



Dice

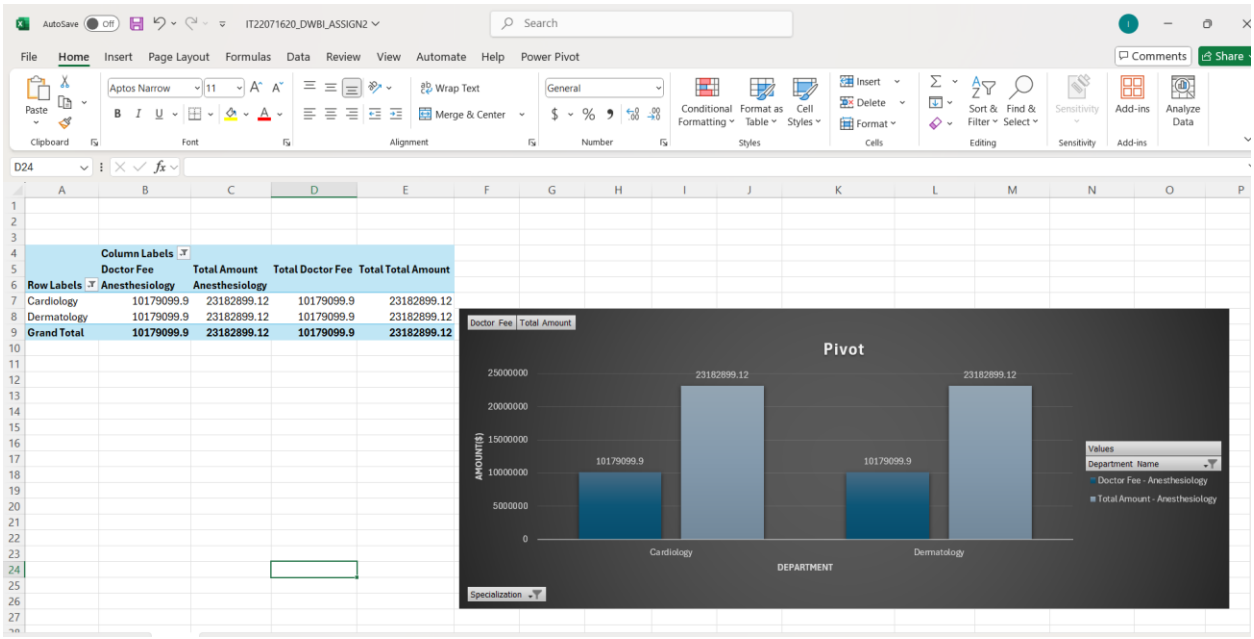
- Dice Operation created a subcube by selecting specific values from multiple dimensions simultaneously

`



Pivot

- Pivot operations rotates the data perspective by swapping the dimensional orientations



Row Labels	Column Labels: Doctor Fee Anesthesiology	Total Amount Anesthesiology	Total Doctor Fee	Total Total Amount
Cardiology	10179099.9	23182899.12	10179099.9	23182899.12
Dermatology	10179099.9	23182899.12	10179099.9	23182899.12
Grand Total	**10179099.9**	**23182899.12**	**10179099.9**	**23182899.12**

Step 4 :PowerBI Reports

Based on the DatawareHouse database Tables I prepared the Data for Visualization

Importing the Following Tables into PowerBI

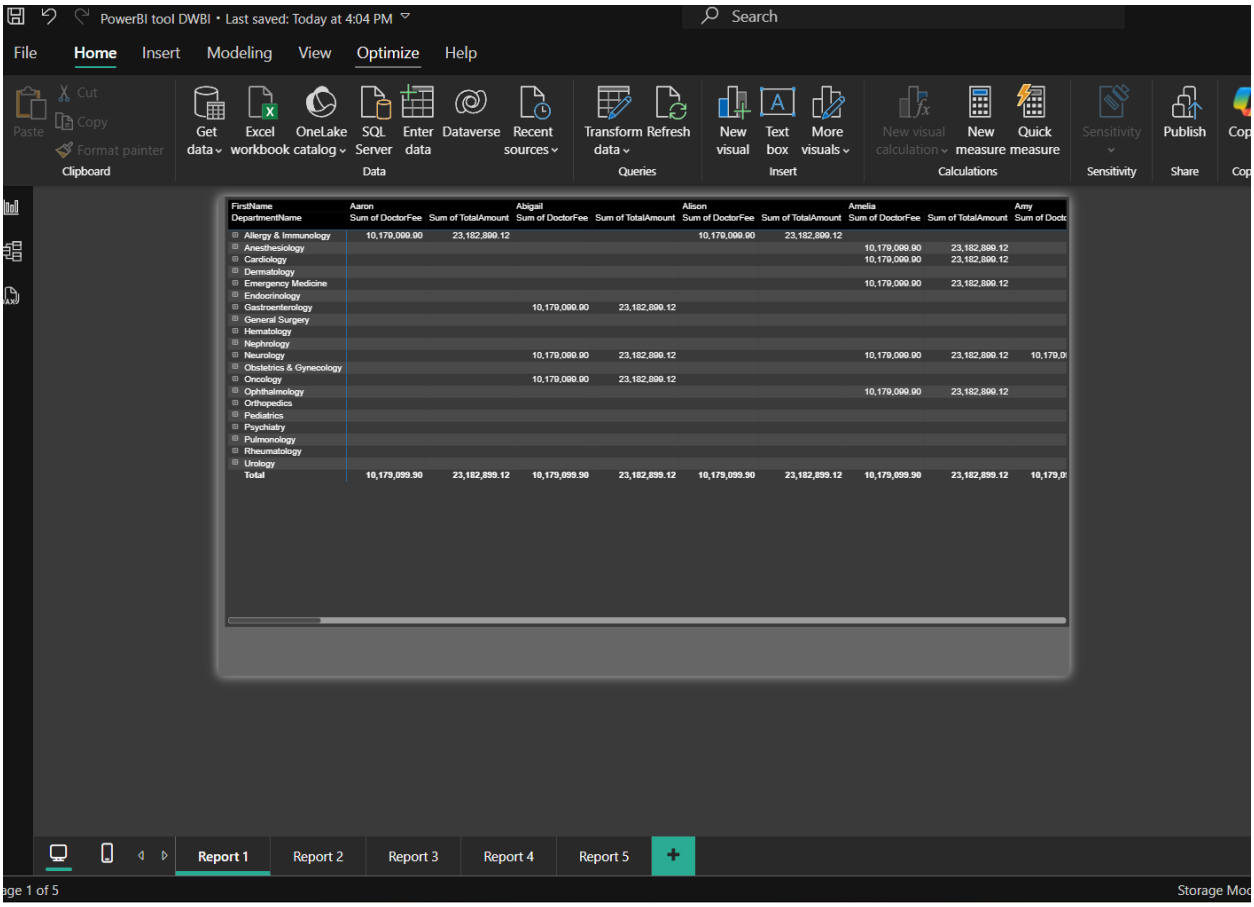
- ✓ DimPatients
- ✓ DimDoctors
- ✓ DimDepartment
- ✓ FactInvoice
- ✓ FactMedicalVisit

Created Calculated Columns and measures using DAX

- ✓ Sum of DoctorFee = SUM(Invoice[doctor_fee]
- ✓ Sum of TotalAmount = Sum(Invoice[total_amount]
- ✓ Count of DoctorID = DISTINCTCOUNT(Doctors[doctor_id]
- ✓ Total Patients = DISTINCTCOUNT(Patients[patient_id]
- ✓ Total Department = DISTINCTCOUNT(Department[department_id]

Report 1: Matrix Visual for Tabular Data

- This report allows users to see detailed information about doctorfee and total amounts across different departments and doctors , making it easy to identify the pattern and outliers



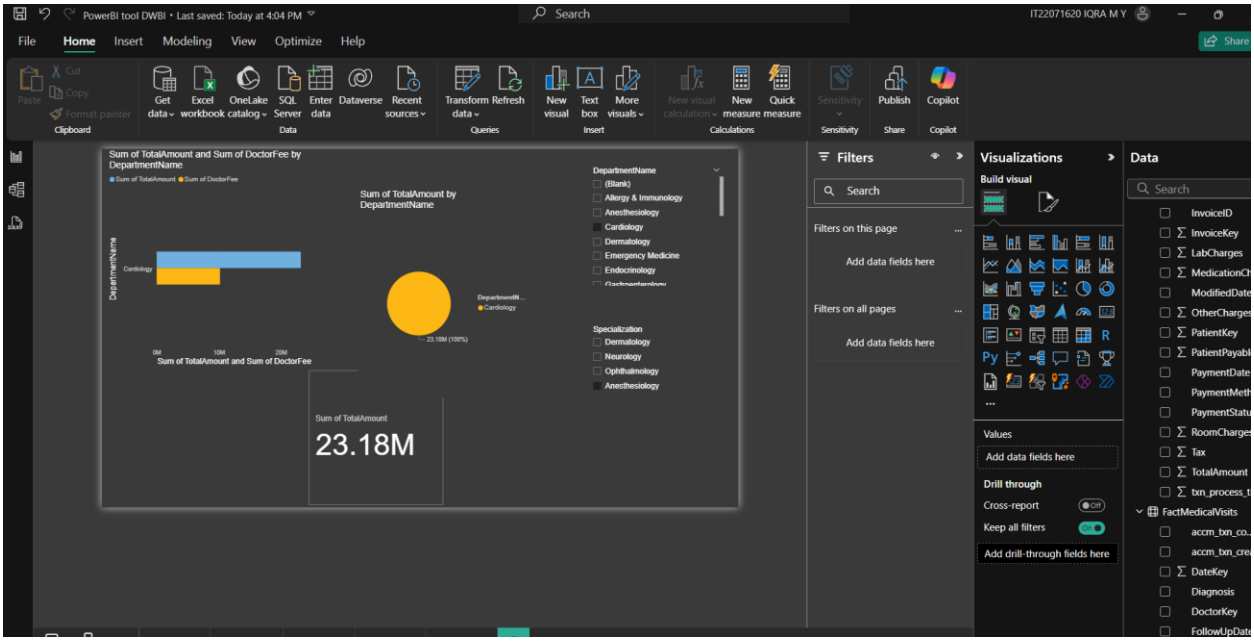
FirstName	Aaron		Abigail		Alison		Amelia		Amy
DepartmentName	Sum of DoctorFee	Sum of TotalAmount	Sum of DoctorFee	Sum of TotalAmount	Sum of DoctorFee	Sum of TotalAmount	Sum of DoctorFee	Sum of TotalAmount	Sum of Doctr
Allergy & Immunology	10,179,099.90	23,182,899.12			10,179,099.90	23,182,899.12			
Anesthesiology							10,179,099.90	23,182,899.12	
Cardiology							10,179,099.90	23,182,899.12	
Dermatology									
Emergency Medicine							10,179,099.90	23,182,899.12	
Endocrinology									
Gastroenterology			10,179,099.90	23,182,899.12					
General Surgery									
Hematology									
Nephrology									
Neurology			10,179,099.90	23,182,899.12			10,179,099.90	23,182,899.12	10,179,0
Obstetrics & Gynecology									
Oncology			10,179,099.90	23,182,899.12					
Ophthalmology							10,179,099.90	23,182,899.12	
Orthopedics									
Pediatrics									
Psychiatry									
Pulmonology									
Rheumatology									
Urology									
Total	10,179,099.90	23,182,899.12	10,179,099.90	23,182,899.12	10,179,099.90	23,182,899.12	10,179,099.90	23,182,899.12	10,179,0

Report 2: Multiple Slicers with Cascading Filters

- This provides interactive insights where users can select different departments and specializations to dynamically filter all visuals , enabling mult-dimensional analysis of revenue data

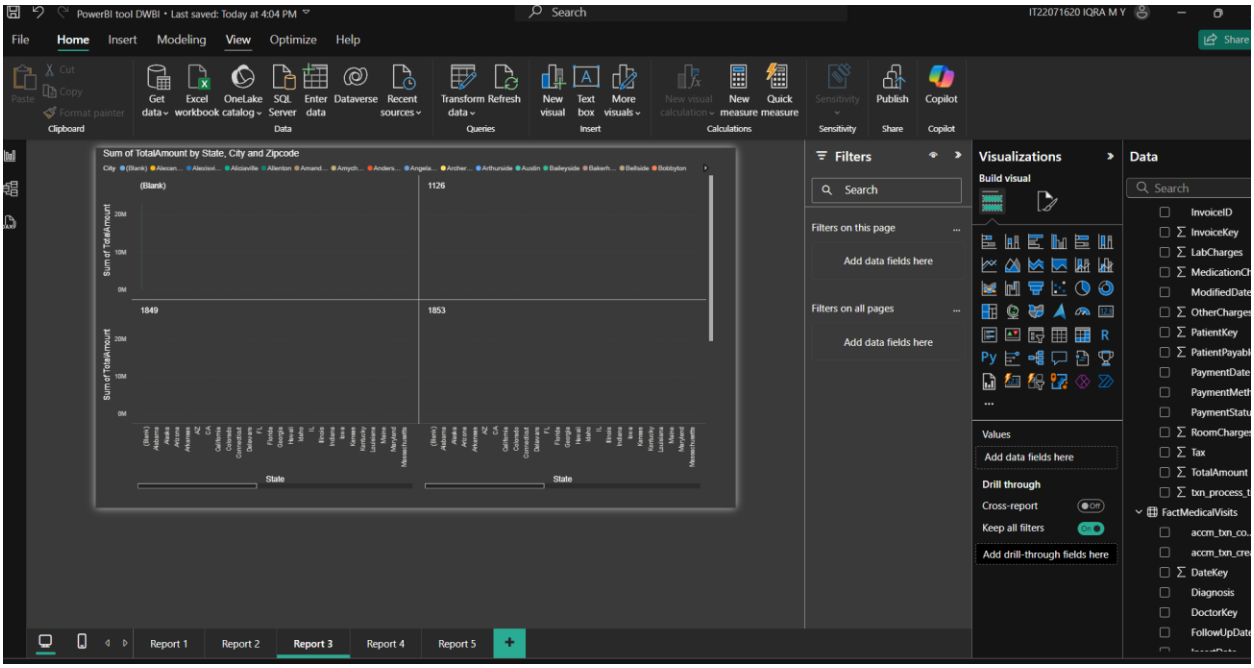
  Here I implemented

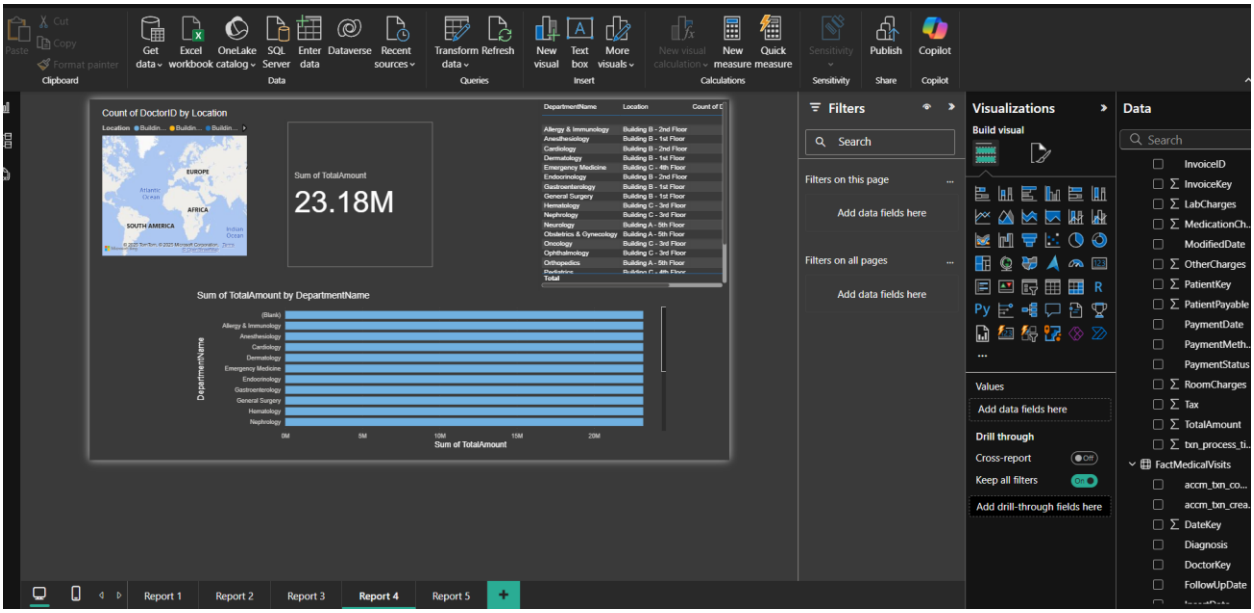
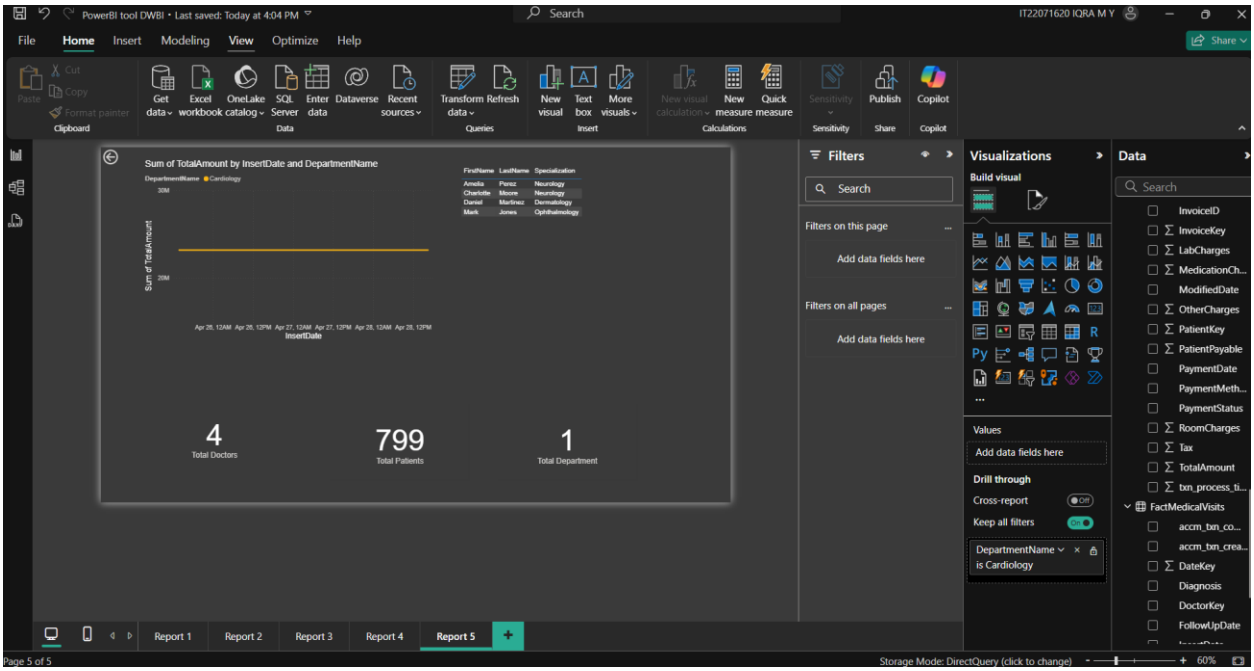
  - Slicer
  - Visual design
  - DAX



Report 3: Drill – Down Hierarchical Report

- This Report enables users to start with a high-level view (by state) and progressively drill-down more to granular levels to analyze revenue distribution geographically



Report 4:Drill-Through

- This provides users to to right-click on any department in the barchart and drill through to see detailed information about the department.allowing users to analyze the pattern in revenue,department performance , geographical distribution