Sri Lanka Institute of Information Technology

Data Warehousing & Business Intelligence

Assignment 2

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Step 1: Data source for the assignment 2

- DataWarehouse: Assignment_Retail_DW
- There are six-dimension tables. They are,
  - ✓ DimDate
  - ✓ DimAccident
  - ✓ DimAircraft
  - ✓ DimAirport
  - ✓ DimLocation
  - ✓ DimPilot

- There is a Fact table called FactFLight.
- The data in each dimension in the data warehouse are as follows.

```
SQLQuery1.sql - GA...Retail_DW (sa (70))*   Cube_Assignment_ Retail [Browse]
select count (*) from DimDate;

select count (*) from DimAccident;

select count (*) from DimAircraft;

select count (*) from DimAirport;

select count (*) from DimLocation;

select count (*) from DimPilot;

select count (*) from FactFlight;
```
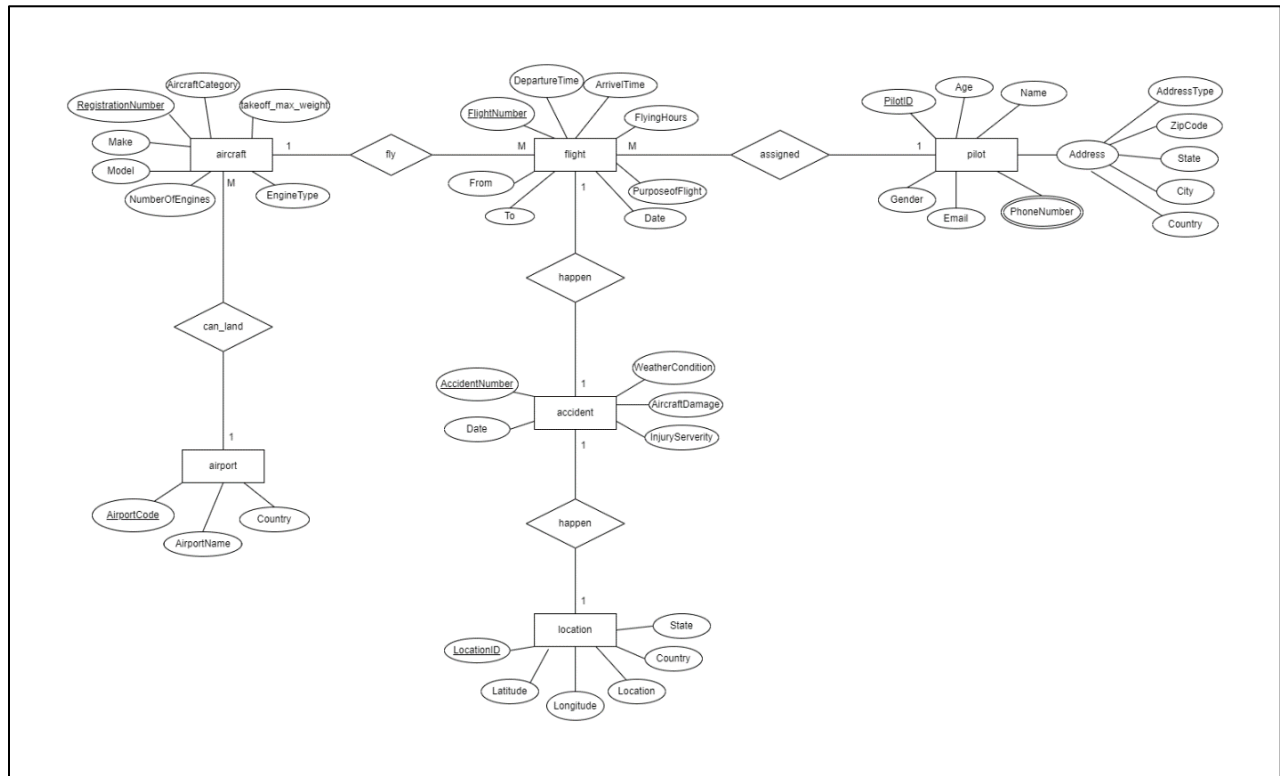
90 %

▦ Results ▤ Messages

	(No column name)
1	39812

	(No column name)
1	10011

	(No column name)
1	7965

	(No column name)
1	8034

	(No column name)
1	10011

	(No column name)
1	6131

	(No column name)
1	60066

ER Diagram

Step 2: SSAS Cube implementation

First, Open the SQL Server Data Tools.

Create Analysis Services Multidimensional and Data Mining Project named 'Assignment2_SSAS'.

Create Data Source
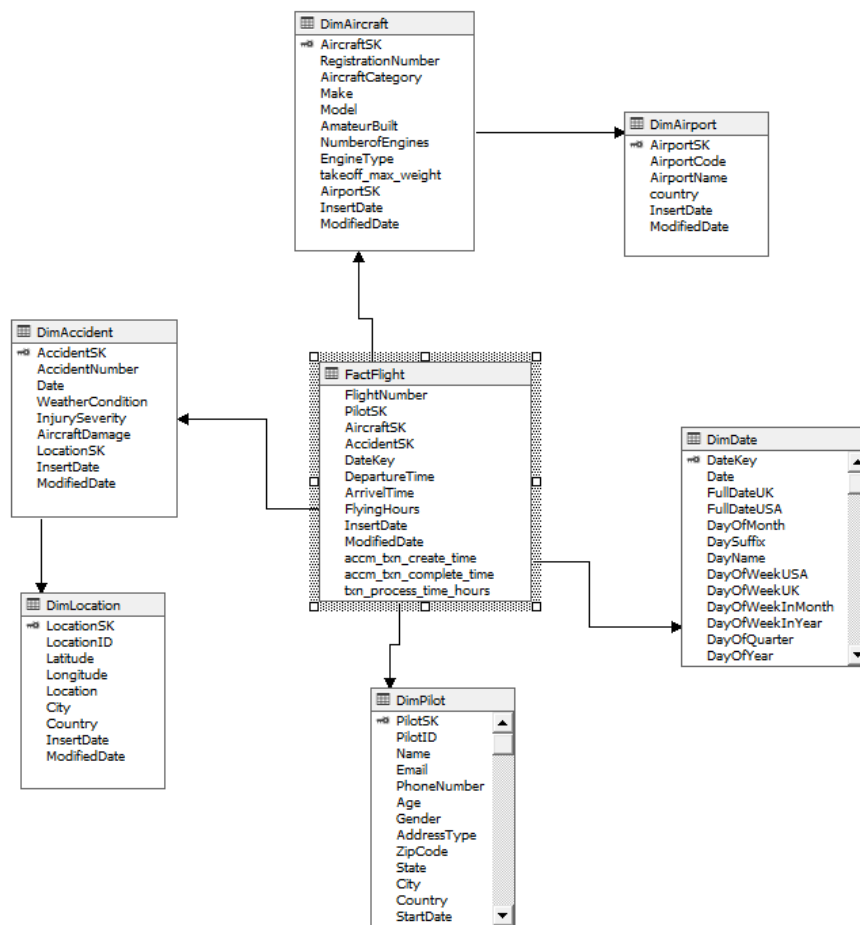
- Right Click on the Data Sources and select Add New Data Source. Then it will prompt a Data Source Wizard and click on next to continue.
- Select the previously created Data warehouse to create a cube in SSAS.
- Give the data source name; 'DS_Assignment_ Retail_DW' and finish the process.

Create Data Source View

- Right click on Data Source Views and select New Data Source View.

- In the Select a Data Source page, select the data source that created under the Data source.
- Select the Same key as primary key option and click on Next.
- In the Select Tables and Views page, first click on 'FactFlight (dbo)'and click on "<" button to move it to the Included objects window. Then click on "Add Related Tables" button.
- Provide a data source view name; 'DSV_Assignment_ Retail_ DW' and click Finish.
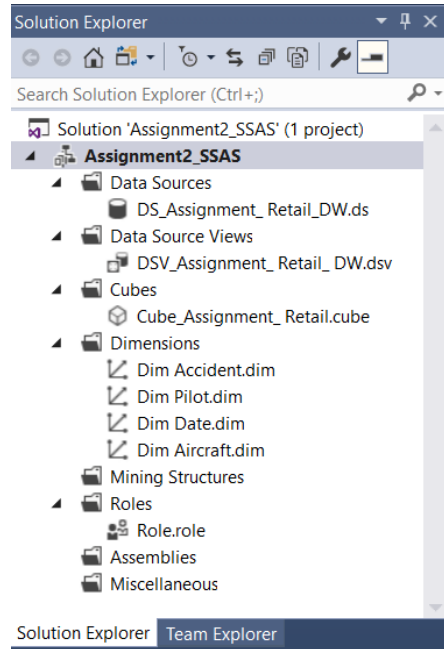
Create Cube

- Right click on Cubes and select New Cube.
- In the Cube Wizard, click on the Next.
- In the Select Creation Method page, select Use existing tables option and click Next.
- In the Select Measure Group Tables page, select the data source view called
  - 'DSV_Assignment_ Retail_ DW' from the dropdown list.
- Select 'FactFlight' and click Next.
- In the Select Measures page, select all the Measure fields and click Next.

- In the Select New Dimensions page, select all the dimension tables and click Next.
- Provide a cube name; 'Cube_Assignment_ Retail' and click Finish.
- It displays the same snowflake schema is built as a cube.
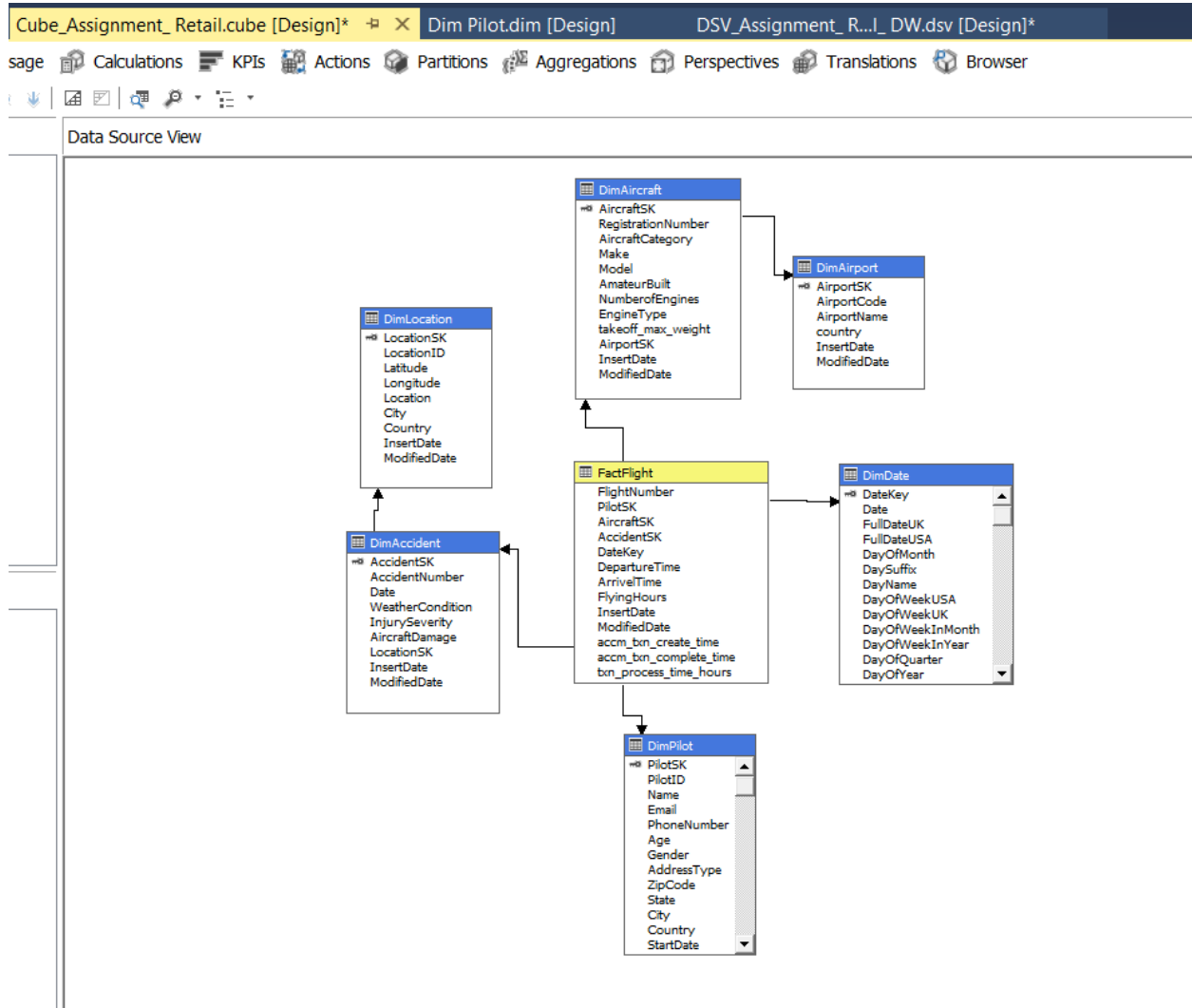
Create Hierarchy

- In Dimension editor window for 'DimDate', drag and drop the attributes to Hierarchy window to create hierarchies.
- In 'DimDate' Created Two hierarchies,
    - Year => Quarter => Month => Date
    - Year => Month => Date
- Rename that hierarchies as 'Y-Q-M-D' and 'Y-M-D'.
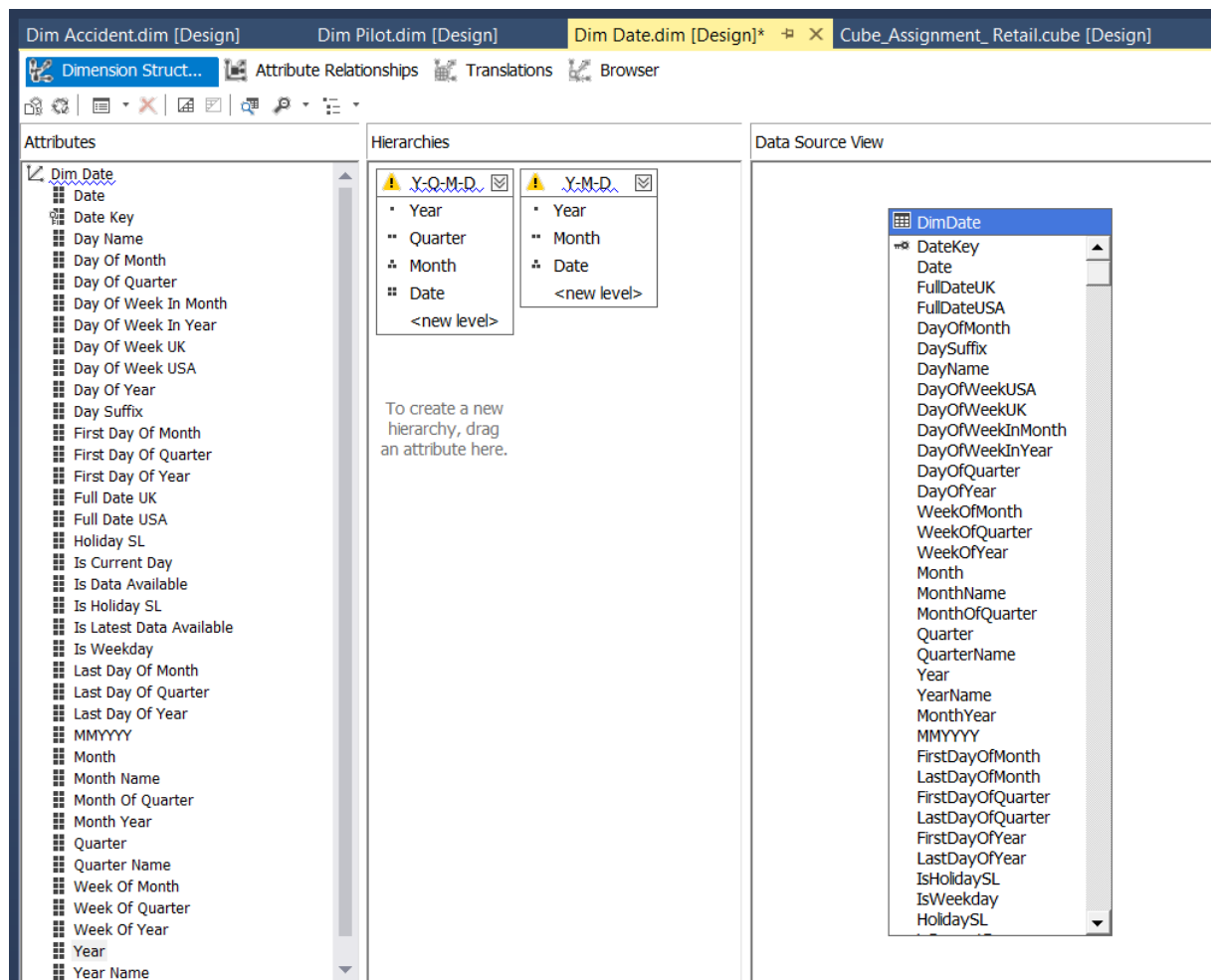
- In Dimension editor window for 'DimAccident', drag and drop the attributes to Hierarchy window to create hierarchies.
- In 'DimAccident' Created a hierarchy,
  - Latitude => Longitude => Location => City => Country
- Rename that hierarchy as 'AccLocation'.
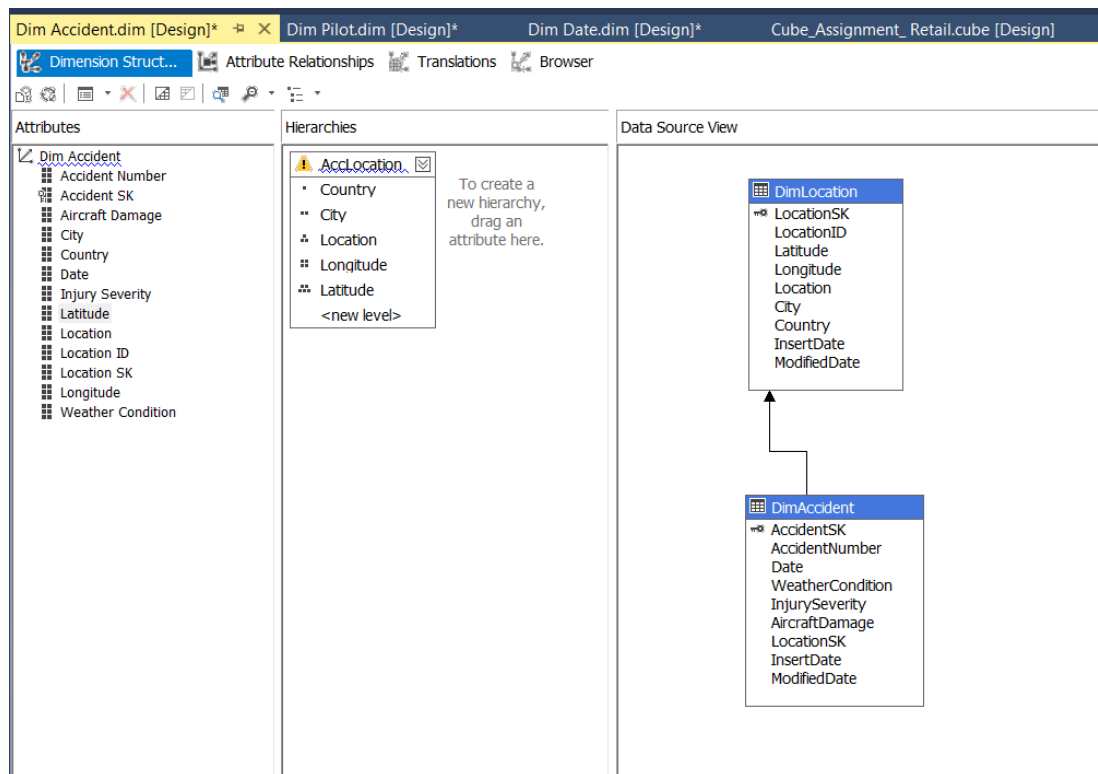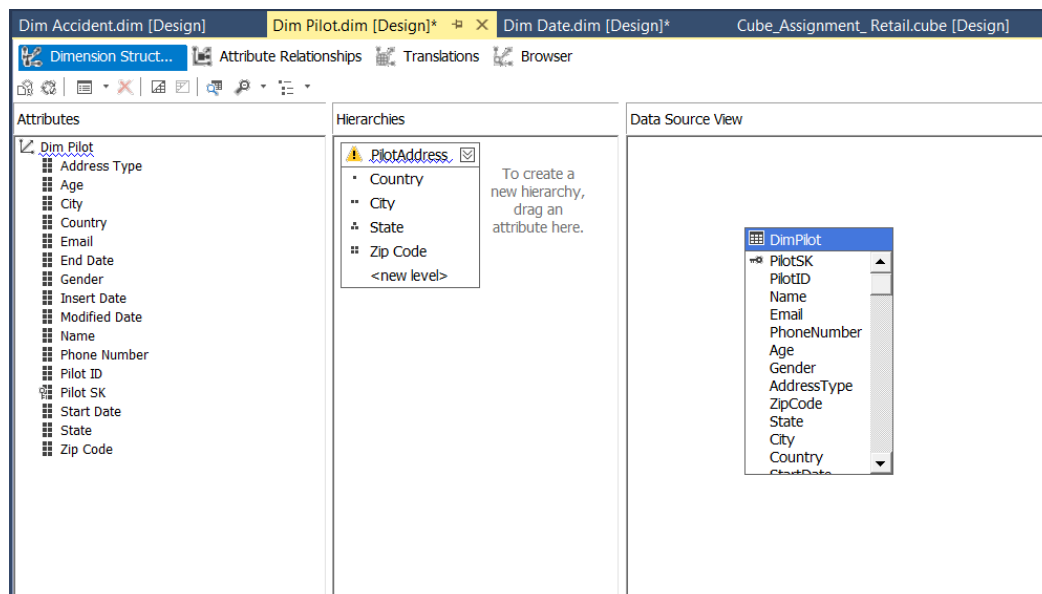
- In Dimension editor window for 'DimPilot', drag and drop the attributes to Hierarchy window to create hierarchies.
- In 'DimPilot Created a hierarchy,
  - ZipCode => State => City => Country
- Rename that hierarchy as 'PilotAddress'.

- In Dimension editor window for 'DimAircraft'.
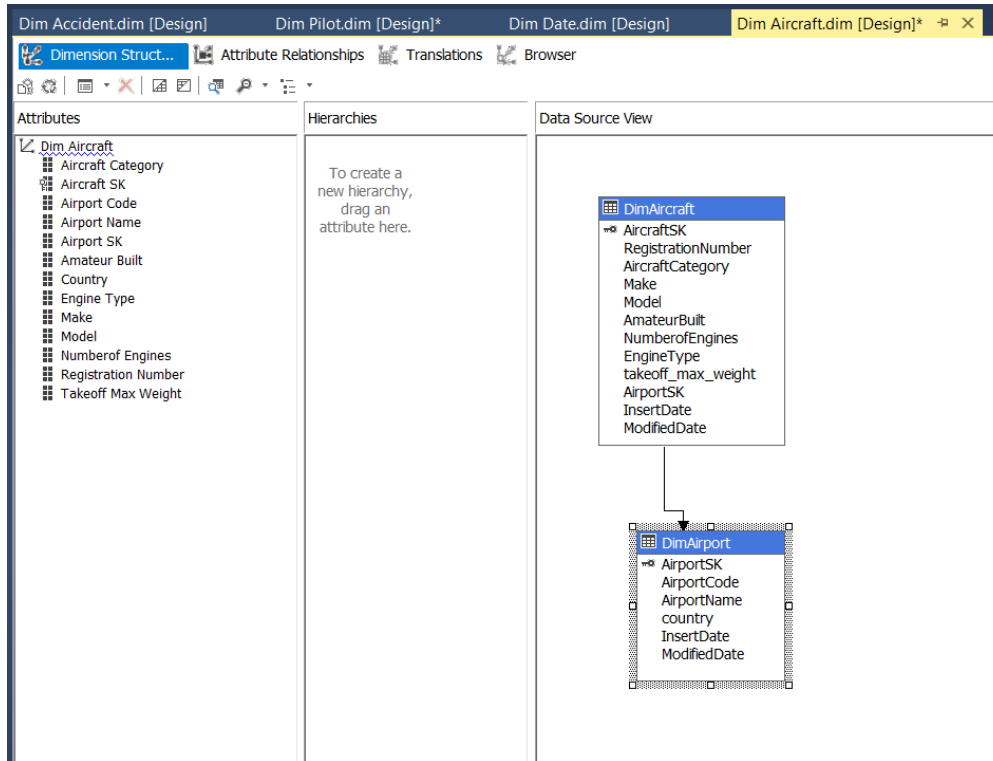
Deploy The Cube
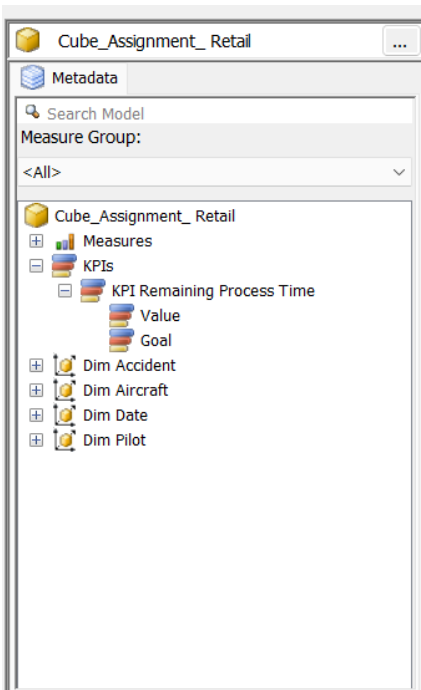
- The Cube must be deployed to be used for analysis.
- Right click on the project name, 'Assignment2_SSAS' in solution explorer and click on Deploy.
- It will generate a pop-up window displaying the progress of the deployment.
- To check the deployment in SSMS, open SQL Server Management Studio, select Analysis Service and click on Connect.

Create KPI

- Create the KPI. Name the KPI as "KPI Remaining Process Time" .
- Then select "FactFlight" as the Associated Measure Group. In the Measure Group on the lower left side panel, expand Measures and the expand "FactFlight". Drag and drop '**Txn Process Time Hours'** attribute to Global Expression area and modify the expression as flows:

<p align="center">[Measures].[Txn Process Time Hours] > 100</p>

- Then I save the all the changes. After processing the cube we can see like this,

Dimension	Hierarchy	Operator	Filter Expression
<Select dimension>			

Date Key	KPI Remaining Process Time Value	KPI Remaining Process Time Goal
20031112	1696	True
20031113	3112	True
20031114	840	True
20031115	1984	True
20031116	2544	True
20031117	-8	False
20031118	2544	True
20031119	848	True
20031120	1704	True
20031121	3104	True
20031122	1976	True
20031123	1704	True
20031124	1408	True
20031125	1984	True
20031126	1696	True
20031127	568	True
20031128	840	True
20031129	2824	True
20031130	1704	True
20031201	560	True
20031202	1976	True
20031203	2544	True
20031204	2272	True
20031205	272	True

Step 3: Demonstration of OLAP operations

- First, generate the MDX query using the cube's browser.
- Then click on execute button. In order to get MDX query click on Design Mode button.
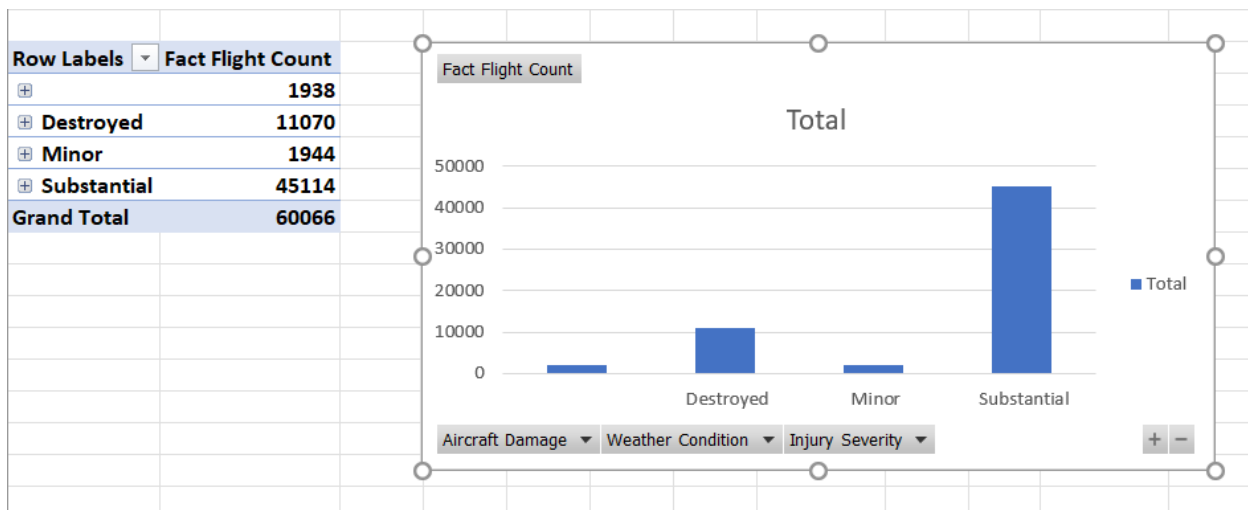
```
SELECT NON EMPTY { KPIValue("KPI Remaining Process Time"), KPIGoal("KPI Remaining Process Time") } ON COLUMNS, NON EMPTY { ([Dim Aircraft].[Model].[Model].ALLMEMBERS * [Dim Aircraft].
[Takeoff Max Weight].[Takeoff Max Weight].ALLMEMBERS ) } DIMENSION PROPERTIES MEMBER_CAPTION, MEMBER_UNIQUE_NAME ON ROWS FROM [Cube_Assignment_ Retail] CELL PROPERTIES
VALUE, BACK_COLOR, FORE_COLOR, FORMATTED_VALUE, FORMAT_STRING, FONT_NAME, FONT_SIZE, FONT_FLAGS
```

Model	Takeoff Max Weight	Txn Process Time Hours	KPI Remaining Process Time Goal
1.13...	1697	284	True
100...	3600	-148	False
101A	3600	-148	False
101C	2649	-4	False
104 ...	5989	572	True
105A	6283	-4	False
108-1	1455	572	True
108-1	2400	-4	False
108-1	2500	140	True
108-1	2550	140	True
108-2	1146	284	True
108-2	11699	572	True
108-2	1697	428	True
108-2	2299	-4	False
108-2	2649	284	True
108-2	2899	568	True
108-2	3600	284	True
108-2	9479	280	True
108-3	1697	140	True
108-3	2550	-4	False
108-3	8750	140	True
109E	4629	140	True
10-A	1653	140	True
110 ...	4750	-4	False

▪ But I continue this process without MDX Query.

1. Roll Up

▪ The roll-up operation performs aggregation on a data cube, either by climbing up a hierarchy or by climbing down a hierarchy.

Row Labels ▼	Fact Flight Count
⊞	1938
⊞ **Destroyed**	11070
⊞ **Minor**	1944
⊞ **Substantial**	45114
Grand Total	60066

2. Drill-Down

- The Drill down operation is the reverse of roll up. It navigates from less detailed data to more detailed data.

Row Labels	Fact Flight Count
⊞	1938
⊞ Destroyed	11070
⊟ Minor	
⊞	324
⊟ IMC	
Fatal(154)	6
Incident	102
Non-Fatal	12
⊞ VMC	1500
⊟ Substantial	
⊞	546
⊟ IMC	
Fatal(1)	282
Fatal(2)	192
Fatal(3)	84
Fatal(4)	48
Fatal(6)	6
Incident	6
Non-Fatal	1086
⊞ VMC	42864
Grand Total	**60066**
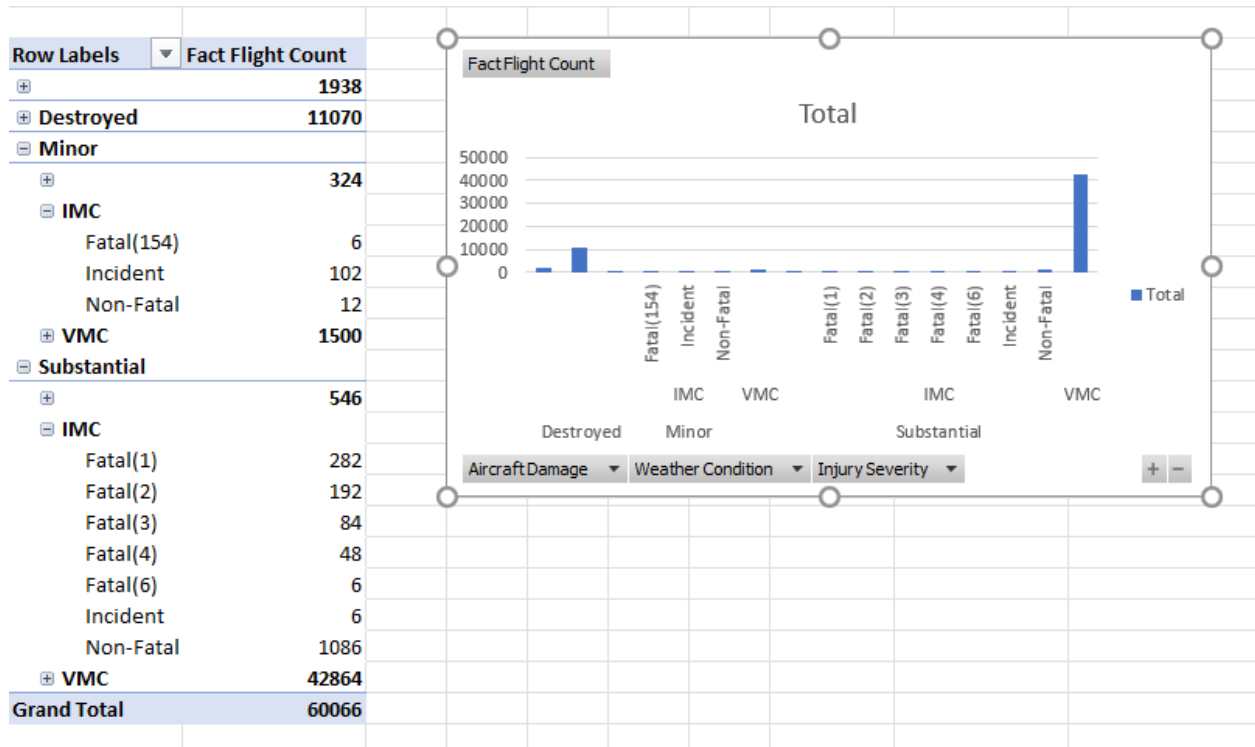
3. Slicing

- Slice performs a selection on one dimension of the given cube, thus resulting in a sub cube.
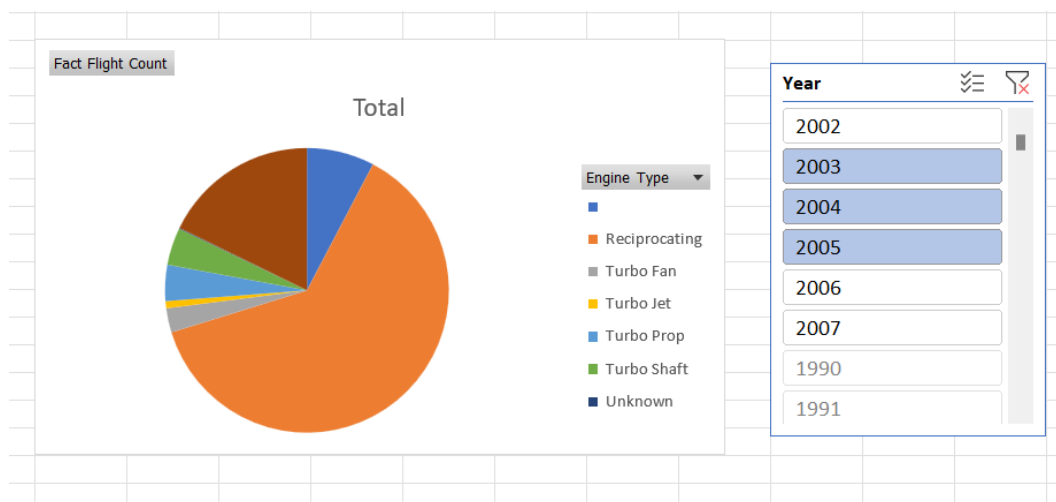
4. Dice

- The dice operation defines a sub cube by performing a selection on two or more dimensions.
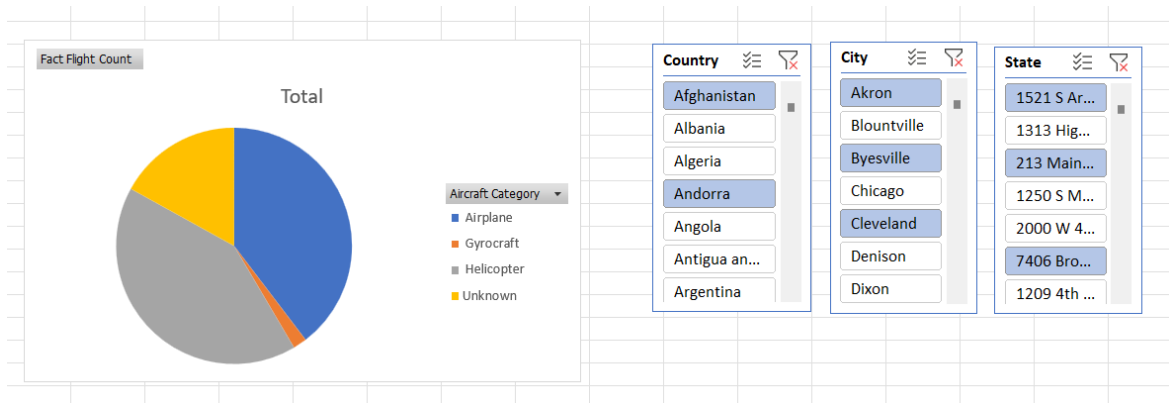
5. Pivot

- Pivot is a visualization operation which rotates the data axes to provide an alternative presentation of the data.

Fact Flight Count	Column Labels						
	⊞2002	⊞2003	⊞2004	⊞2005	⊞2006	⊞2007	Grand Total
Row Labels							
⊞ Airplane	36	5778	11418	408	870	9438	27948
⊞ Glider				6	54		60
⊞ Gyrocraft		12				12	24
⊞ Helicopter	408	1548		11334	9786	2082	25158
⊞ Ultralight		6				6	12
⊞ Unknown		6450	60	84	90	180	6864
Grand Total	444	13794	11478	11832	10800	11718	60066
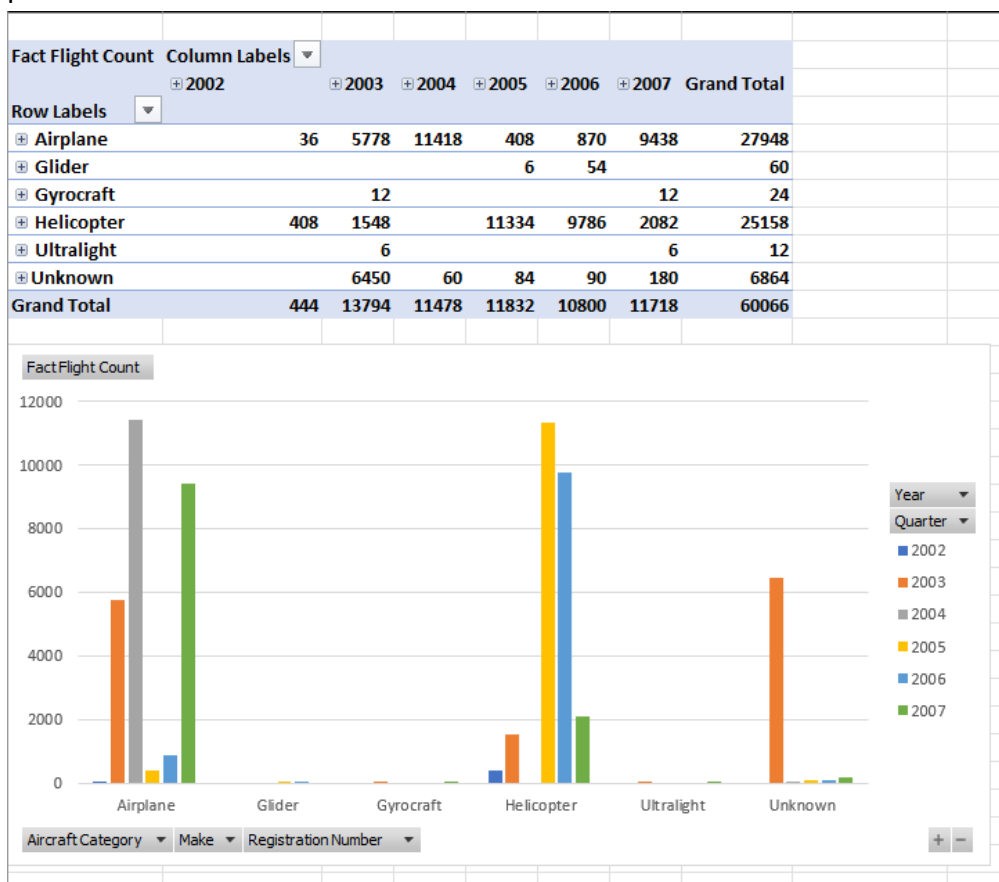
Step 4: SSRS Reports

Report 01:

Report with Matrix

```
SELECT
  FactFlight.txn_process_time_hours
  ,DimDate.[Year]
  ,DimAircraft.RegistrationNumber
  ,DimAircraft.AircraftCategory
  ,DimAircraft.takeoff_max_weight
FROM
  FactFlight
  INNER JOIN DimDate
    ON FactFlight.DateKey = DimDate.DateKey
  INNER JOIN DimAircraft
    ON FactFlight.AircraftSK = DimAircraft.AircraftSK
```

★ Favorites   ☐ Browse

Home > matrix

|◁   <   [1]   of 2 ?   >   ▷| ↻   ⊖   [100% ∨]   🖫 ∨

Accident Report

Aircraft Category	Registration Number	takeoff max weight	2005	2006	2007
Airplane	B-2477	5000			572
	C-FMKB	1697			140
	C-FTPA	2649			572
	C-FWBN	1600			-4
	CFYAR	2550			-148
	C-GFPQ	3600			-148
	C-GGAX	1157	428		
	C-GNSR	1697			-148
	C-GPIA	1697			-148
	C-GTHY	1763			-148
	C-GWWI	2899			-148
	D-ABVY	9649		140	
	DOYES	4199	428		
	G-BNLM	881			-4
	G-BSRJ	4299	-148		
	HK2277	3968			-148
	N1002W	1697	428		
	N100FC	33591			572

Report 2:

Report with more than one parameter

Home > AircraftCategory Report

AircraftCatagory | Airplane |

|◁ < | 1 | of 2 ? > ▷| ↻   ⊝   100% ⌄   🖫 ⌄   🖶

Aircraft Category	Registration Number	2005	2006
Airplane	C-GGAX	428	
	D-ABVY		140
	DOYES	428	
	G-BSRJ	-148	
	N1002W	428	
	N1022J		-4
	N102H		-148
	N107TM		140
	N1096W		-148
	N109HP		284
	N115SE		572
	N1198N		284
	N121LD		140
	N12625	428	
	N130SV	140	
	N1374F		-148