

**Sri Lanka Institute of Information Technology**

**Data Warehousing and Business Intelligence**

**Assignment II**



**Student Registration Number: IT20043650**

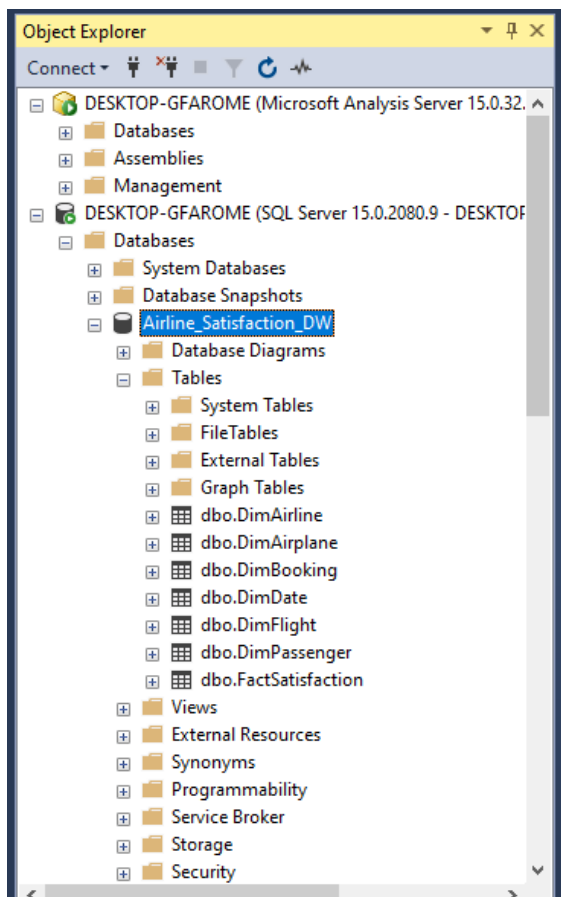
**Student Name: U.S.Dahanayake**

## Step 1 – Data Source for the Assignment

Using Airline\_Satisfaction\_DW as the data source which was created for assignment 1. In there, is the fact table and dimensions as follows,

- FactSatisfaction
- DimAirline
- DimAirplane
- DimBooking
- DimDate
- DimFlight
- DimPassenger

In addition, I used the Snowflake schema to integrate them. These data were used to generate OLAP cubes, OLAP operations in Excel, and reports in Report Builder.

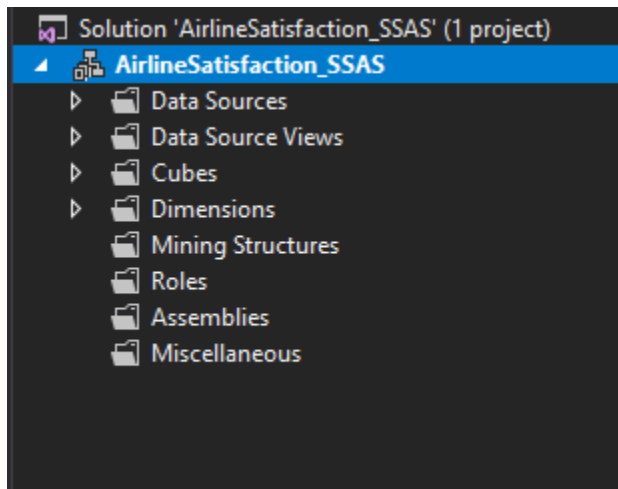


## Step 2 – SSAS Cube Implementation

Tools Used –

- SSAS
- SQL Server Management Studio
- SSDT

Before I started working on the OLAP cubes, I created an Analysis Services Multidimensional and Data Mining Project on SSDT. Then renamed it "AirlineSatisfaction\_SSAS". The folder structure is shown below.



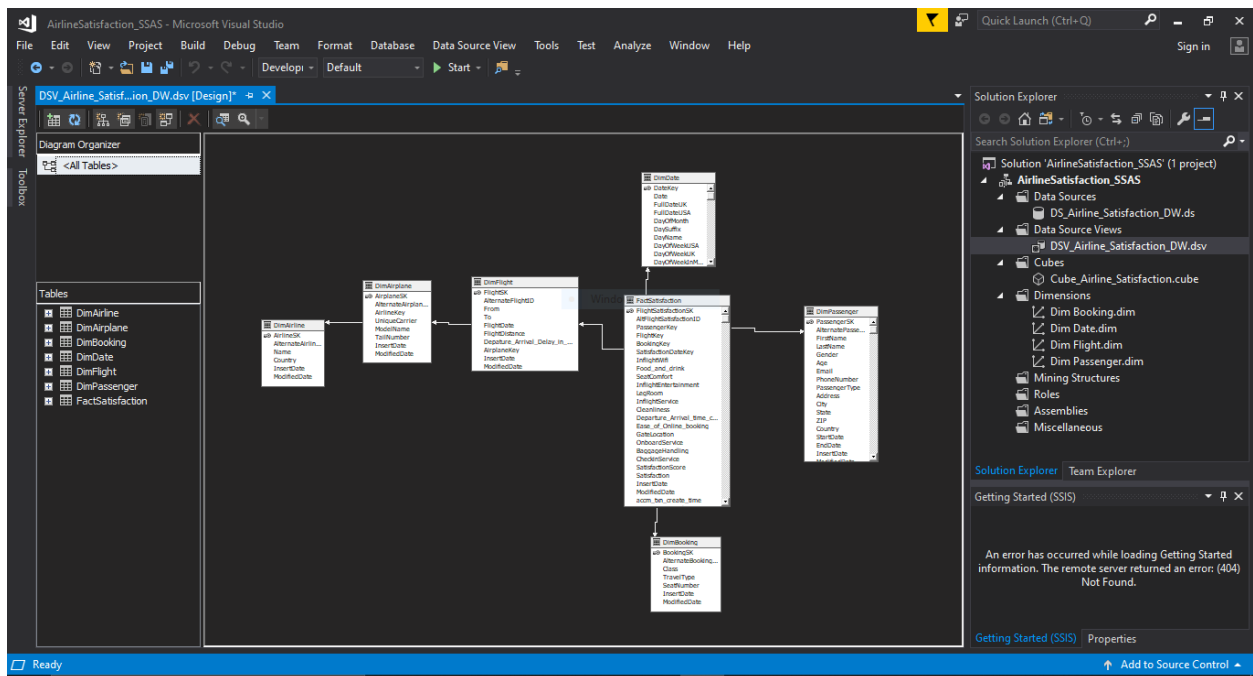
After that,

### 1. Create a Data source

A new Data Source to create a connection with my Airline\_Satisfaction\_DW is added and renamed DS\_Airline\_Satisfaction\_DW under the Data Sources folder in the above folder structure. Then connected it using SQL Server Authentication.

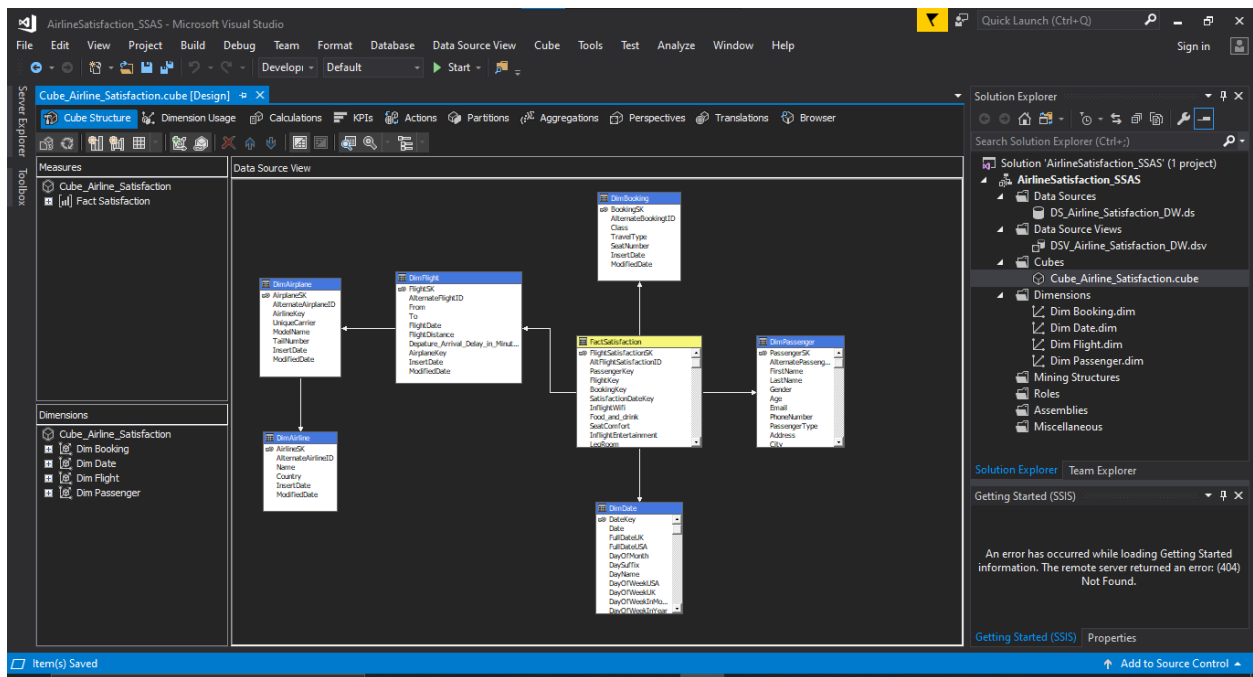
### 2. Create a Data Source View

Under the Data Source Views folder, add new data source view called DSV\_Airline\_Satisfaction\_DW.

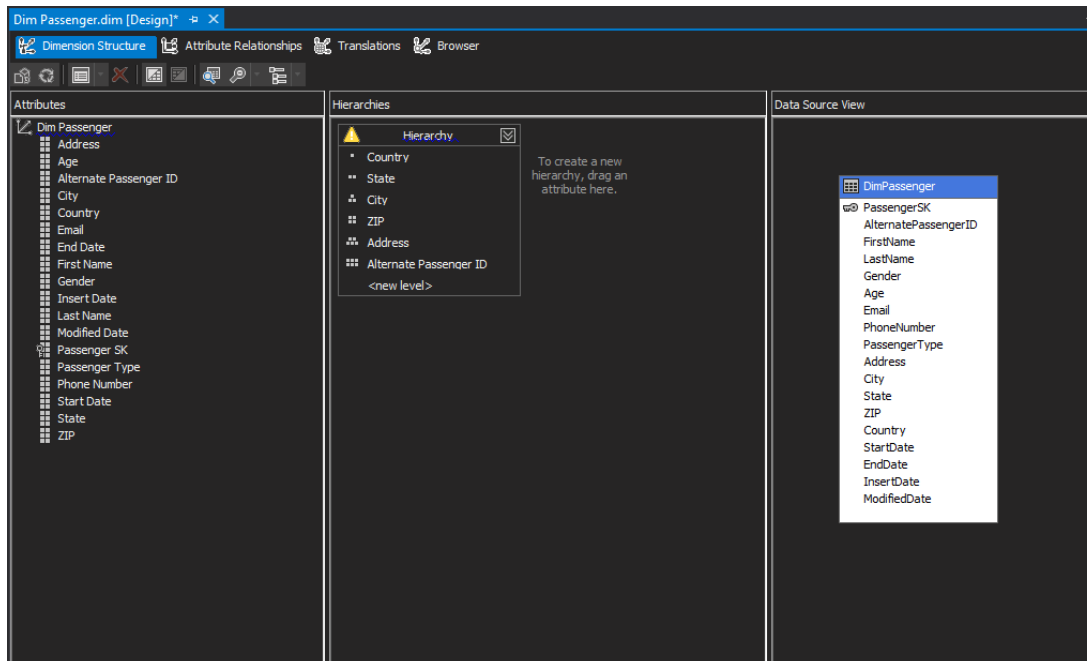
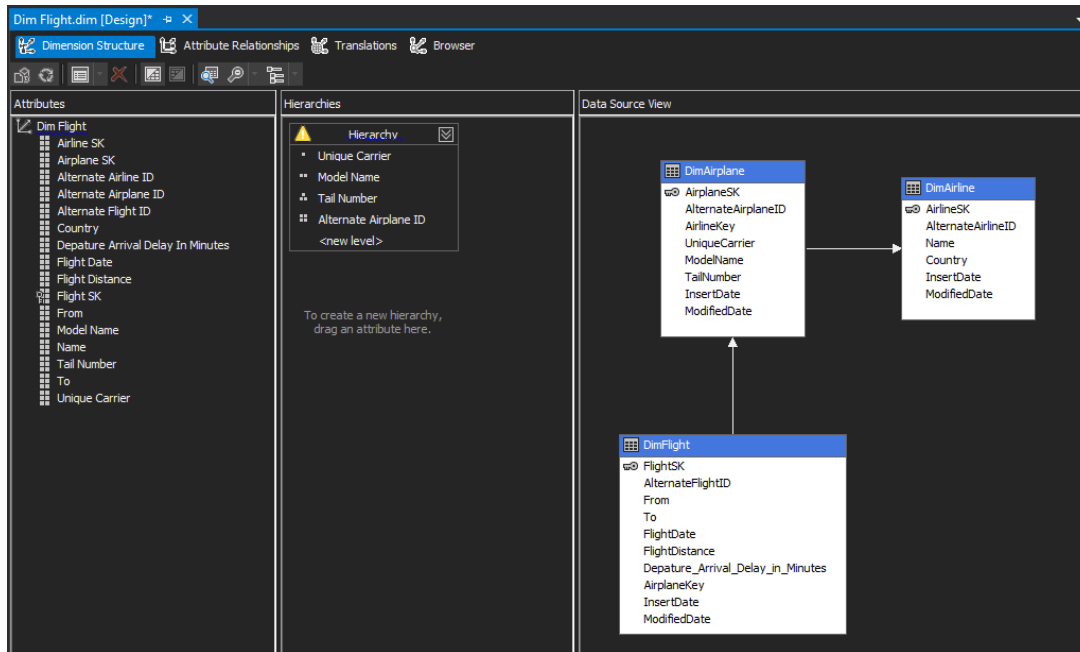


### 3. Create a Cube

Under the Cubes folder create a new cube called Cube\_Airline\_Satisfaction.



Add attributes to all dimensions and create hierarchy to relevant dimensions.



Dim Booking.dim [Design] X

Dimension Structure Attribute Relationships Translations Browser

Attributes

- Dim Booking
  - Alternate Booking ID
  - Booking SK
  - Class
  - Seat Number
  - Travel Type

Hierarchies

To create a new hierarchy, drag an attribute here.

Data Source View

DimBooking

- BookingSK
- AlternateBookingID
- Class
- TravelType
- SeatNumber
- InsertDate
- ModifiedDate

Dim Date.dim [Design] X

Dimension Structure Attribute Relationships Translations Browser

Attributes

- Dim Date
  - Date
  - Date Key
  - Day Name
  - Day Of Month
  - Day Of Quarter
  - Day Of Week In Month
  - Day Of Week In Year
  - Day Of Week UK
  - Day Of Week USA
  - Day Of Year
  - Day Suffix
  - First Day Of Month
  - First Day Of Quarter
  - First Day Of Year
  - Full Date UK
  - Full Date USA
  - Holiday SL
  - Is Current Day
  - Is Data Available
  - Is Holiday SL
  - Is Latest Data Available
  - Is Weekday
  - Last Day Of Month
  - Last Day Of Quarter
  - Last Day Of Year
  - MMYYYY
  - Month
  - Month Name
  - Month Of Quarter
  - Month Year
  - Quarter

Hierarchies

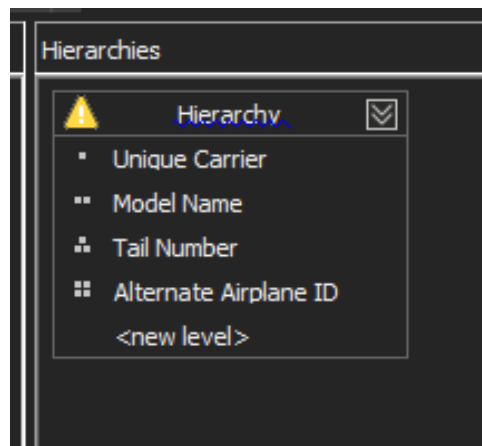
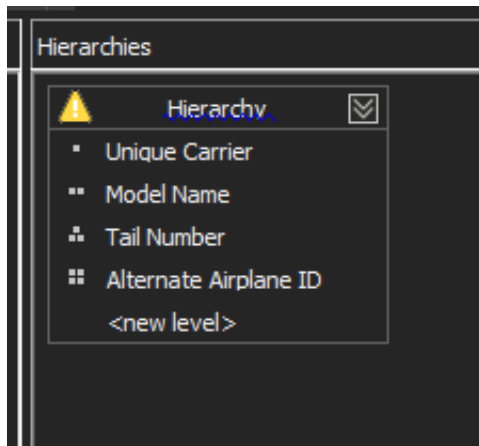
To create a new hierarchy, drag an attribute here.

Data Source View

DimDate

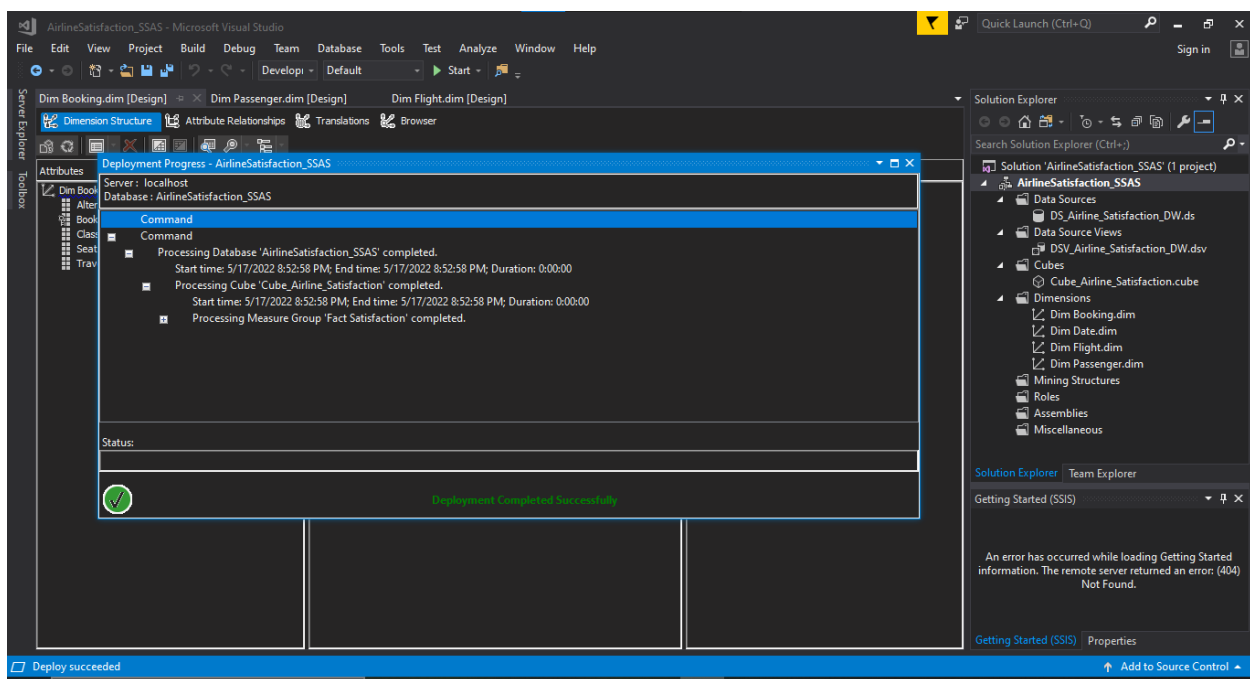
- DateKey
- Date
- FullDateUK
- FullDateUSA
- DayOfMonth
- DaySuffix
- DayName
- DayOfWeekUSA
- DayOfWeekUK
- DayOfWeekInMonth
- DayOfWeekInYear

Two hierarchies were created for DimPasenger and DimFlight,



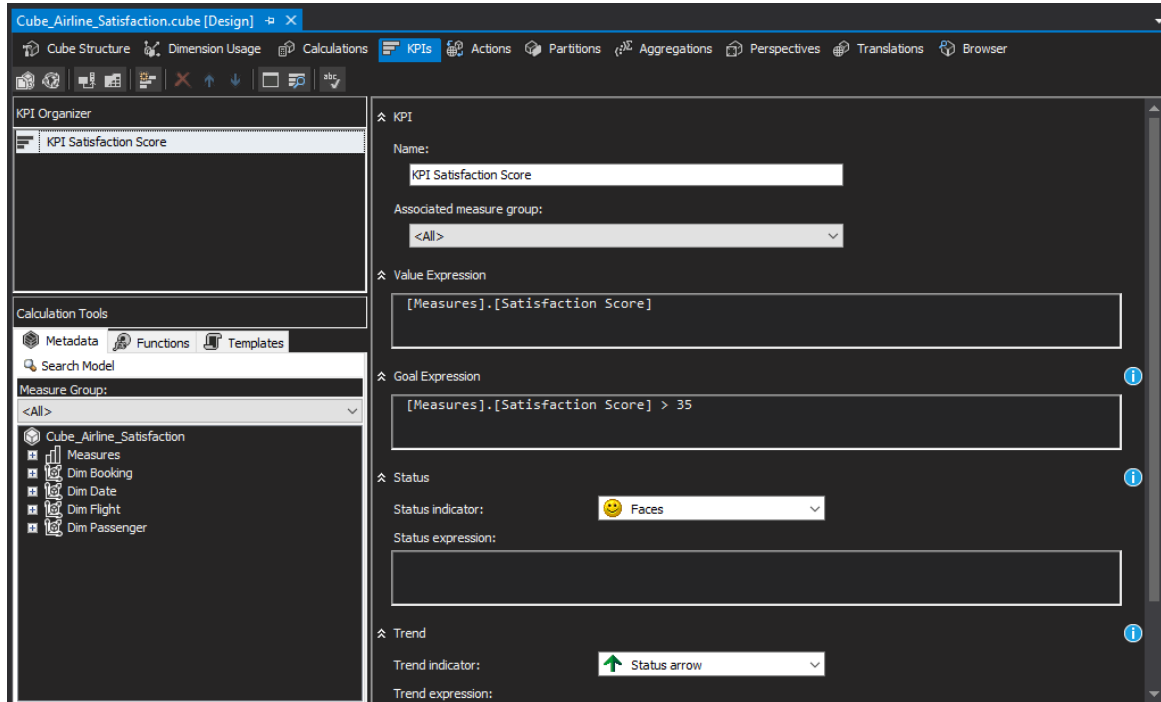
#### 4. Deploy the Cube

The cube is deployed once all the previous steps have been completed. If it is successfully deployed, a message stating deployment success is displayed, as shown below.



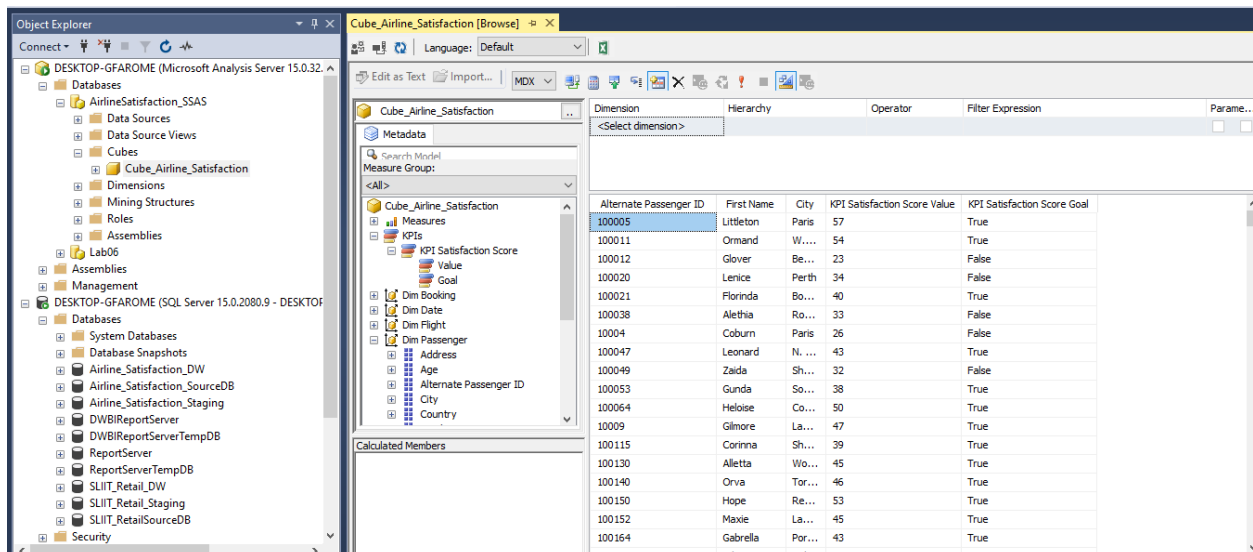
## 5. Create KPI

The figure below depicts the KPI that I created after deploying the cube. These are the KPI values that were developed for stating whether the customer is satisfied or dissatisfied with the service. It returns true if the customer is satisfied at an value greater than 35.



## 6. Browse Cube Data

SSMS is used for data browsing. A KPI or measurement value is required when browsing cube data. Otherwise, it will not execute.





## Step 3 – Demonstration of OLAP Operations

Used Tools –

- Excel
- PowerBI
- SQL Server Management Studio
- SSAS

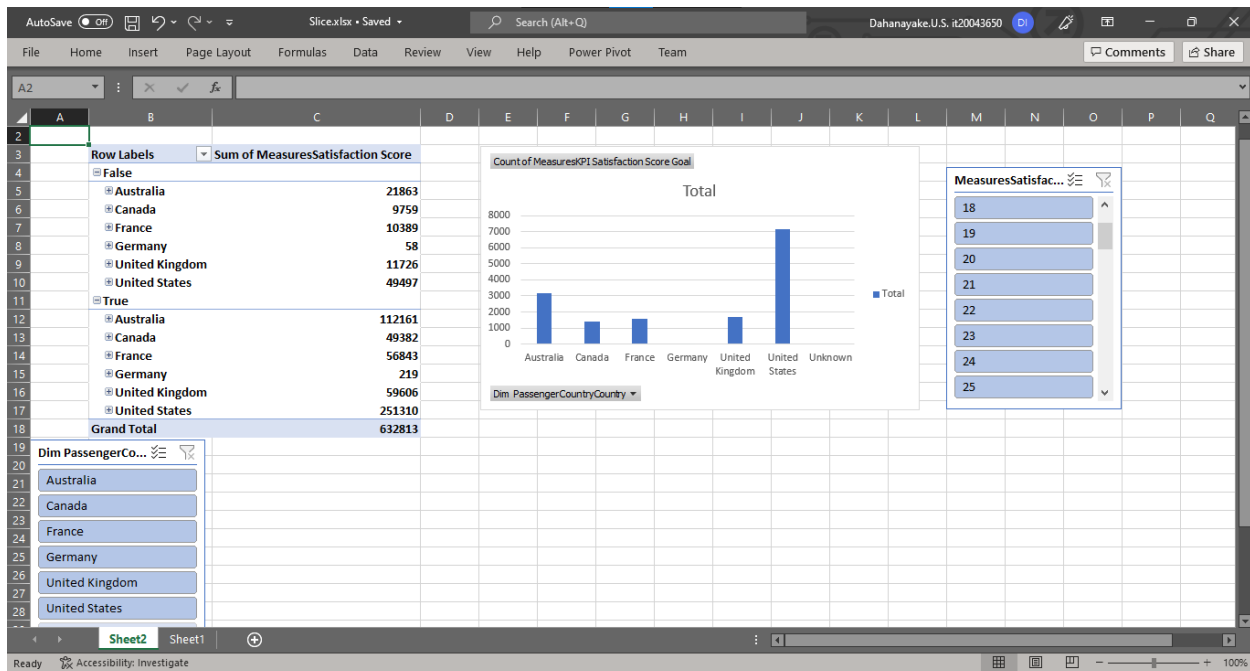
The Excel is connected to the SSAS cube via MDX query to display the OLAP operation.

### 1. Slice

Slices are visual filters for filtering data in a pivot table or chart. I used two slices, one for each, for the pivot table and pivot chart.

The diagram below depicts the slices I used to filter my pivot table and pivot chart.

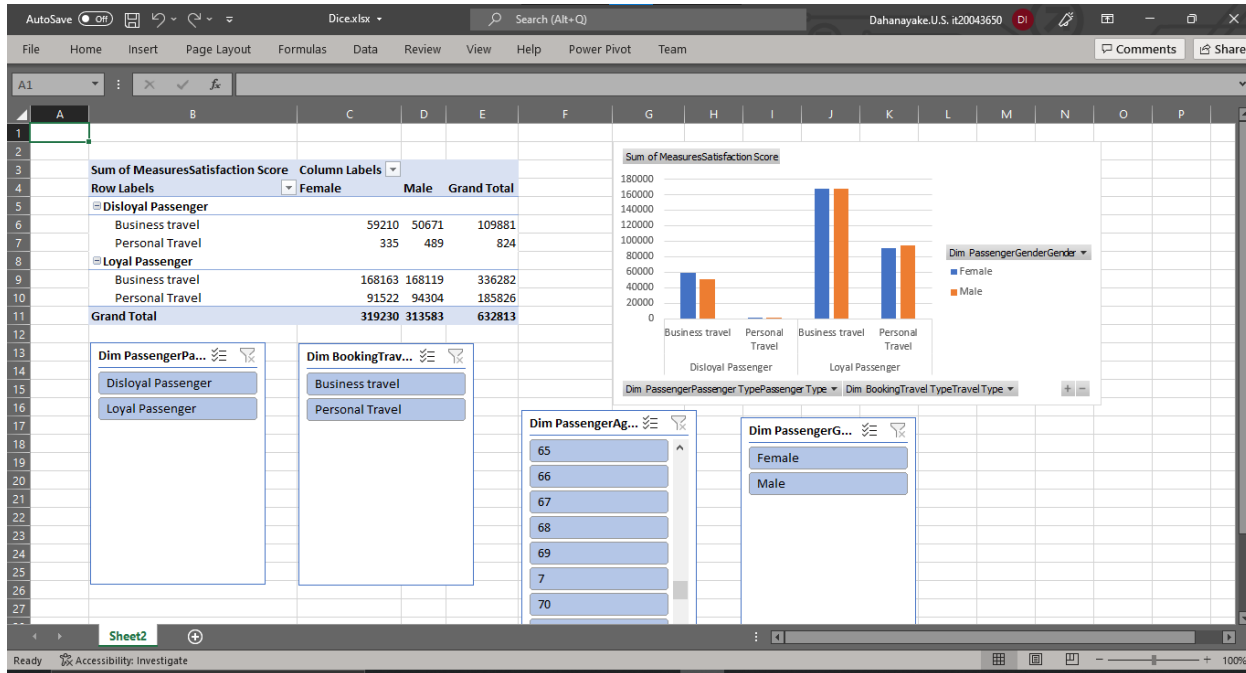
When I click the country slicer in this excel sheet, I get a list of passengers from that country and their respective satisfactory scores. And from satisfaction score we get passengers of different countries who had rated in a similar manner.



## 2. Dice

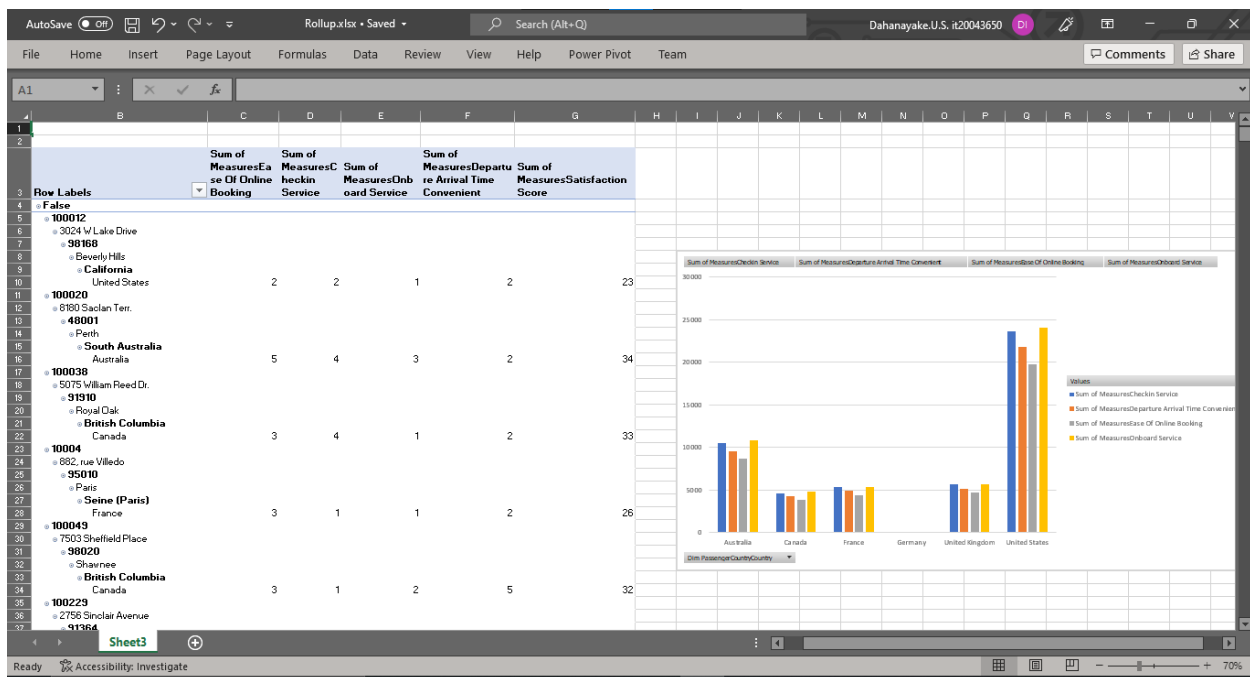
Dicing the data is the process of selecting appropriate qualities to group the data.

I used four slicers to analyze the data in the pivot table and pivot chart. Namely passenger type, travel type, age and gender.



## 3. Roll-up

The Roll up OLAP function in cubes represents climbing up a dimension hierarchy to aggregate data. The following excel sheet displays the passenger rating on flight facilities based on passenger country. Hierarchy being Passenger ID → Address → ZIP → City → State → Country

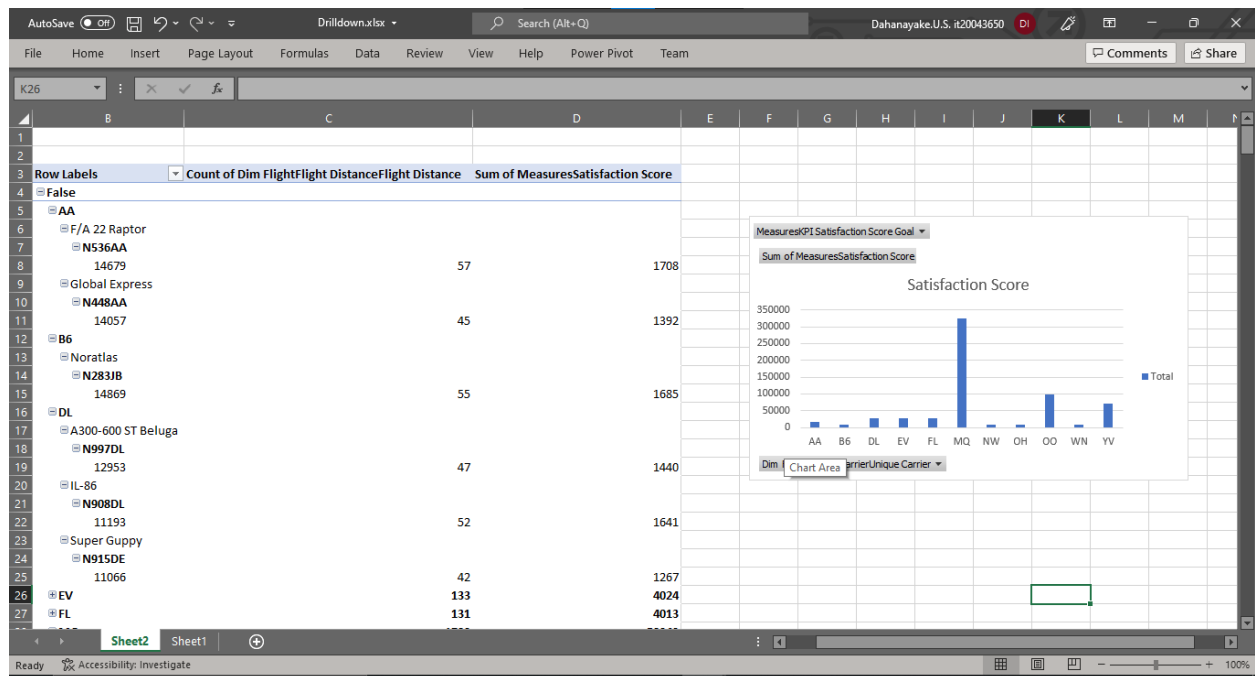


#### 4. Drill-down

The drill down OLAP function in cubes entails navigating through details by moving down a dimension hierarchy.

The diagram below shows how a Unique Carrier can be drilled down to Model Name, and Model Name can be drilled down to Airplane Tail Number, which can then be drilled down to Airplane ID, from which we can find relevant Flight ID.

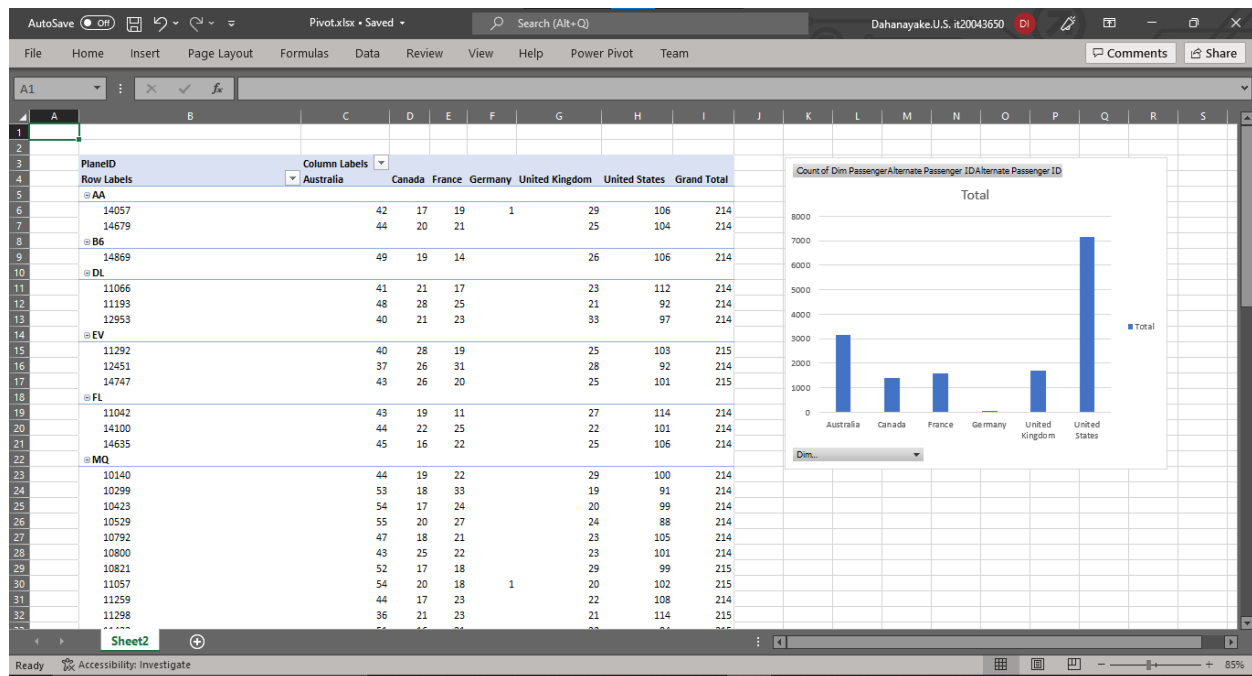
From that we can get the distance of the flight and passenger satisfaction score.



## 5. Pivot

A PivotTable is a useful tool for visually summarizing, analyzing, exploring, and presenting data. Pivot Charts make the summary data in a PivotTable more useful by visualizing it.

I used a pivot table and a pivot chart to display the country of the passengers in each flight.

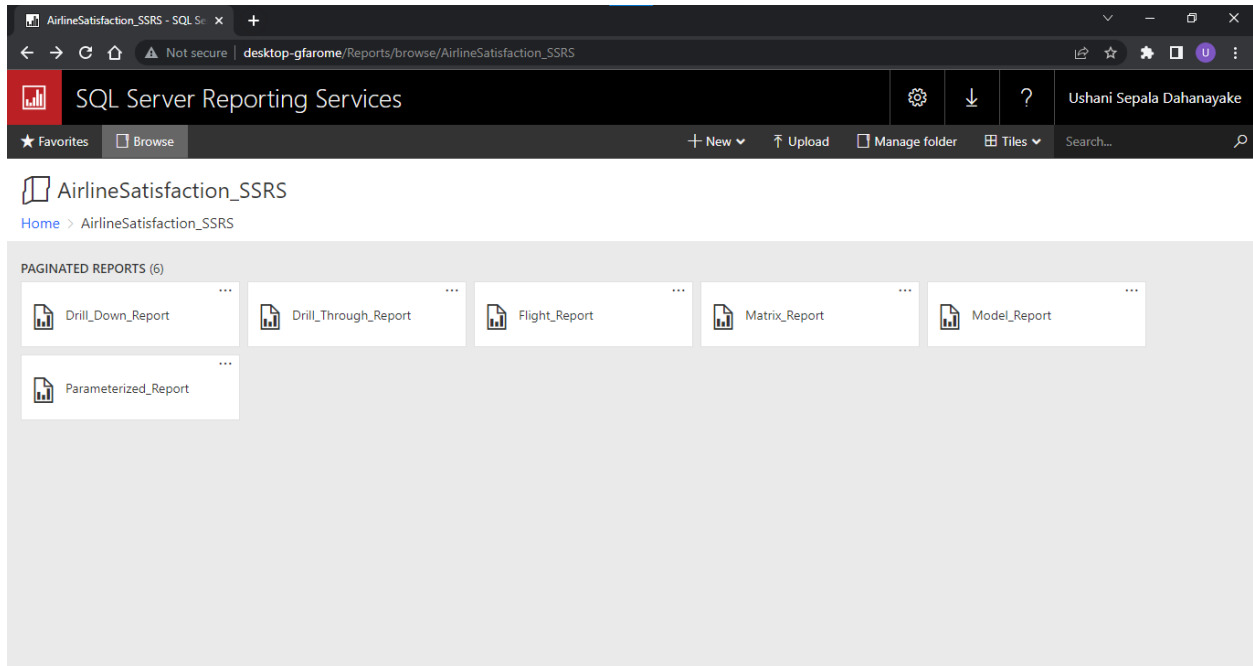


## Step 4 – SSRS Reports

Tools Used -

- Report server
- SSRS web portal
- Report Server Configuration Manager
- Report Server database

The image below shows the web portal view. The created paginated reports and SSRS folder are displayed there.



## 1. Report 1: Report with a matrix

The report below shows the monthly number of flights and average satisfaction score for them.

The pie chart displays the percentages of flights by month.

Airline Name	Airplane Model Name	September		April		February	
		Total Number Of Flights	Average Satisfaction	Total Number Of Flights	Average Satisfaction	Total Number Of Flights	Average S
135 Airways	A330-300	19	44.4736842105263	33	41.3030303030303	33	40.8484
	ATR-72-200	14	41.0714285714286	23	43	32	41
11Time Airline	A380	18	42.1111111111111	37	44.4324324324324	28	41
	An-32	16	42.5	29	41.9310344827586	29	43.8965
2 Sqn No 1 Elementary Flying Training School	An-124	21	40.0476190476191	37	41.7027027027027	35	41
	An-70T	16	47.8125	30	40.8	31	42.5806

Airplane Satisfaction Chart



## 2. Report 2: Report with more than one parameter

In this report, I used two parameters: Passenger Type and Travel Class.

By selecting necessary parameters, we can derive data related to them

The figures below depict two parameters and their respective result reports.

SQL Server Reporting Services

Home > AirlineSatisfaction\_SSRS > Parameterized\_Report

Passenger Type: <Select a Value> (dropdown menu open showing: Loyal Passenger, Disloyal Passenger)

Class: <Select a Value> (dropdown menu)

SQL Server Reporting Services

Home > AirlineSatisfaction\_SSRS > Parameterized\_Report

Passenger Type: <Select a Value> (dropdown menu)

Class: <Select a Value> (dropdown menu open showing: Eco, Business)





### 3. Report 3: Create an SSRS drill-down report.

Drill Down Reports enable users to display or hide column data by using plus and minus symbols.

Airplane details are hidden in this section by providing a plus sign. It can be expanded by clicking the plus sign to reveal additional hidden fields.

We can find Unique carrier, Model name, Tail Number and Airplane ID and the distance travelled by each airplane.

Unique Carrier	Model Name	Tail Number	Airplane ID	Flight Distance
AA	F/A 22 Raptor	N536AA	14679	1011
	Global Express			100
B6				1009
DL	A300-600 ST Beluga	N997DL	12953	100
	IL-86			101
	Super Guppy			1007
EV				1008
FL				1016
MQ				1009

### 4. Report 4: Create an SSRS drill-through report

A drill-through report is one that is accessed via a link from another report. Drilling down into a report brings up a new window with a completely different visualization or report.

This report depicts Flight Details and Airplane Details depending on the carrier. The graphs and detailed reports for Flight Details and Airplane Details are shown in the figures below.

Drill\_Through\_Report - SQL Serv

desktop-gfarome/Reports/report/AirlineSatisfaction\_SSRS/Drill\_Through\_Report

SQL Server Reporting Services

Ushani Sepala Dahanayake

Home > AirlineSatisfaction\_SSRS > Drill\_Through\_Report

1 of 1

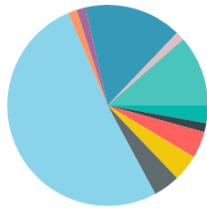
100%

Find | Next

## Airplane Satisfaction Analysis

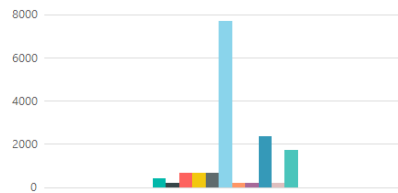
Flight Count

AA DL FL NW OO WN YV  
B6 EV MQ OH



Model Count

AA DL FL NW OO WN YV  
B6 EV MQ OH



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Drill\_Through\_Report - SQL Serv

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SQL Server Reporting Services

Ushani Sepala Dahanayake

Home > AirlineSatisfaction\_SSRS > Drill\_Through\_Report

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## Flight Details Report

Alternate Flight ID	To	From	Flight Date	Flight Distance	Depature Arrival Delay In Minutes
1	John F. Kennedy International	Austin - Bergstrom International	2020-01-21 00:00:00.000	674	53
100013	Hartsfield-Jackson Atlanta International	Kansas City International	2020-05-15 00:00:00.000	2430	2
100032	Pittsburgh International	Chicago Midway International	2020-01-22 00:00:00.000	682	27
100035	Seattle/Tacoma International	Ted Stevens Anchorage International	2020-09-22 00:00:00.000	572	1
100040	Ronald Reagan Washington National	Nashville International	2020-01-27 00:00:00.000	414	17
100050	San Francisco International	Los Angeles International	2020-08-30 00:00:00.000	746	124
100056	John Wayne Airport-Orange County	Seattle/Tacoma International	2020-06-17 00:00:00.000	258	0
100059	Pittsburgh International	Philadelphia International	2020-01-07 00:00:00.000	772	0
100060	General Mitchell International	Hartsfield-Jackson Atlanta International	2020-03-22 00:00:00.000	531	26

Drill\_Through\_Report - SQL Serv

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SQL Server Reporting Services

Home > AirlineSatisfaction\_SSRS > Drill\_Through\_Report

1 of 2 ? 100% Find | Next

Airplane Details Report

Airline ID	Model Name	Airline Name	Country	Tail Number
1076	208 Caravan	3D Aviation	Belgium	N710BR
	737-800	3D Aviation	Belgium	N680BR
1219	Mig 39 UB	Antrak Air	Argentina	N568SW
132	SPn G180	APSA Colombia	Bolivia	N495CA
1434	E-3A Sentry Awacs	Artem-Avia	Germany	N908MQ
1448	CRJ 700	Aerial Oy	Benin	N77195
	MD-90-30	Aerial Oy	Benin	N959SW
1593	Rafale	ABSA - Aerolinhas Brasileiras	Greece	N235SW