Data Warehousing & Business Intelligence

Assignment 2

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1. Data Source used to create cubes and Reports.

In Assignment one, I created a Data warehouse named SourceDB_DW.I used that Data Warehouse (SourceDB_DW) as the data source used to create and deploy the cubes in this Assignment two. When creating OLAP cubes and to the Excel work sheets and to SSRS reports SourceDB_DW Data Warehouse is used as the Data source.

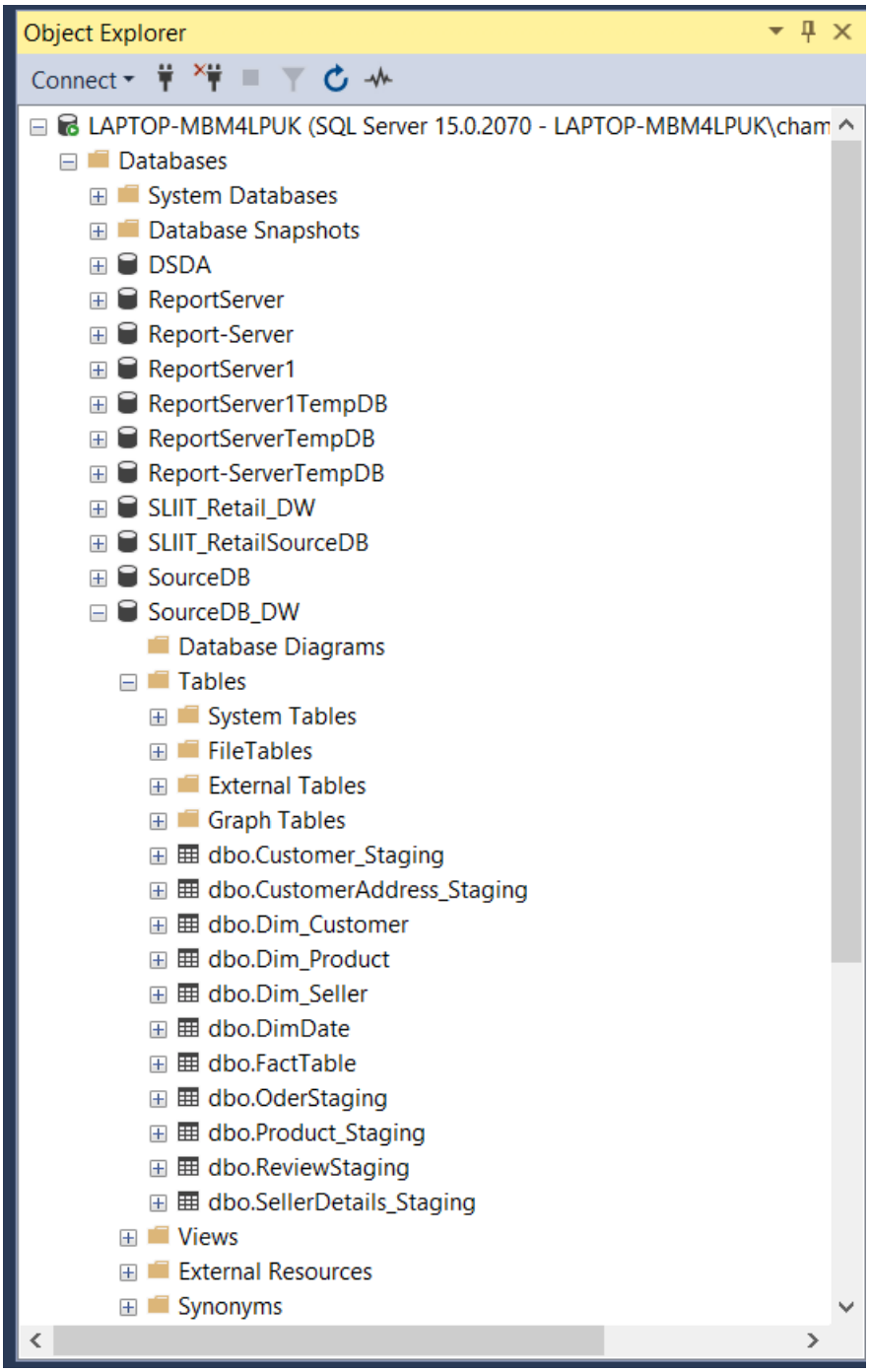


Figure 1.1

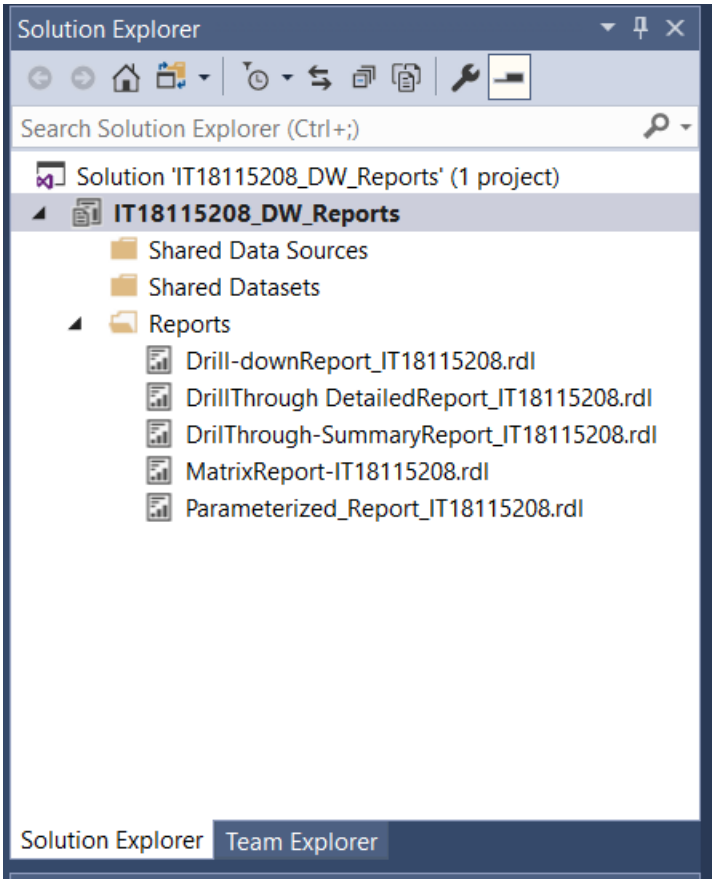


Figure 1.2

As shown in the Figure 1.2 I have created a new SSAS project in Analysis Services Multidimensional and Data Mining Project (SSDT).
As the first step I have Configured my data source. Then the Data source view and the OLAP cubes needed for the reports to analyze the data.

Once the wizard is complete, I can see the data cube I just created as shown in the figure 1.3 below

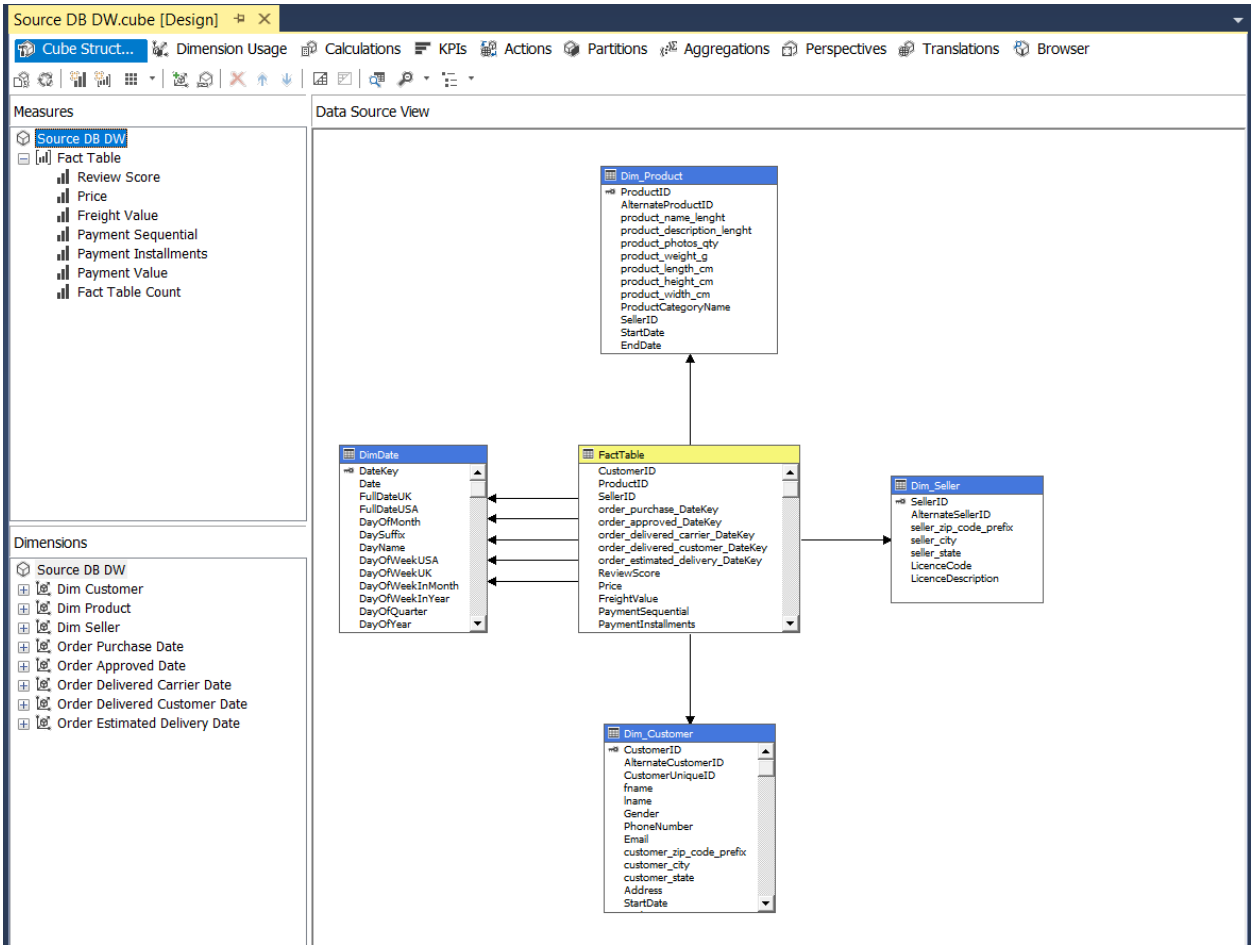


Figure 1.3

2. Hierarchy in the OLAP cube

As shown in the Figure 2.1 and 2.2 I have created a hierarchy in the cube for Customer dimension table including customer state and city and deployed it.

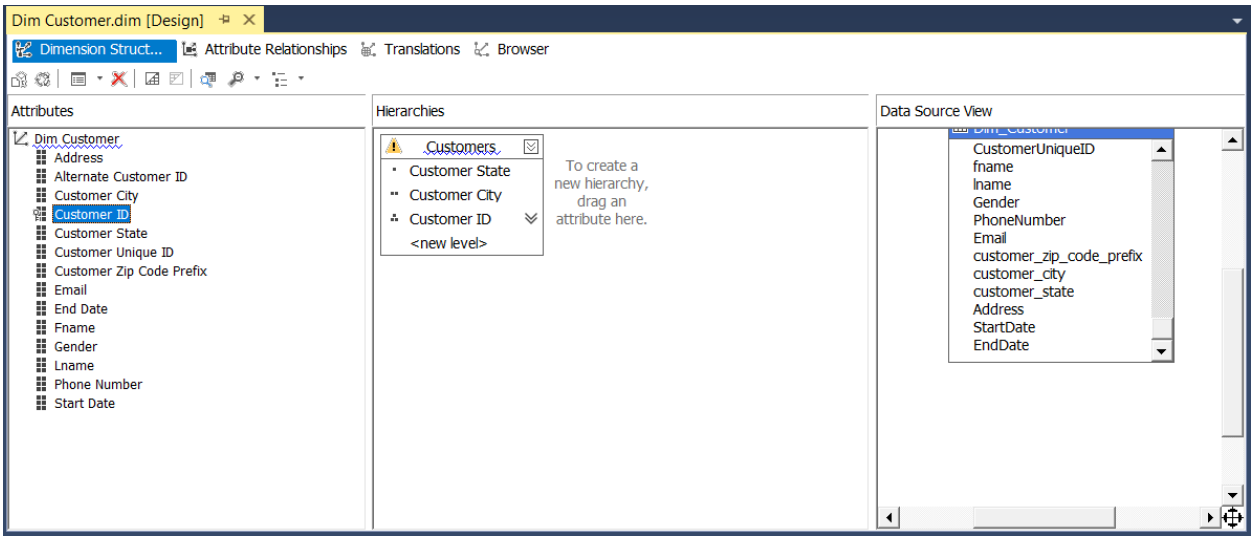


Figure 2.1

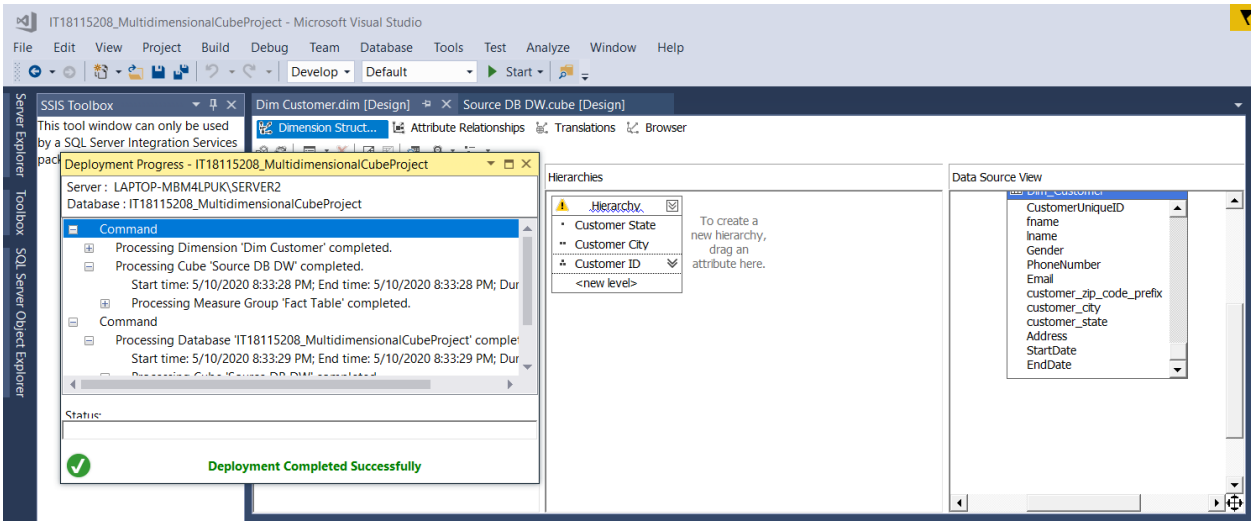


Figure 2.2

After deployed it and then browsed it, the created hierarchy will be shown as flowing figure 2.3

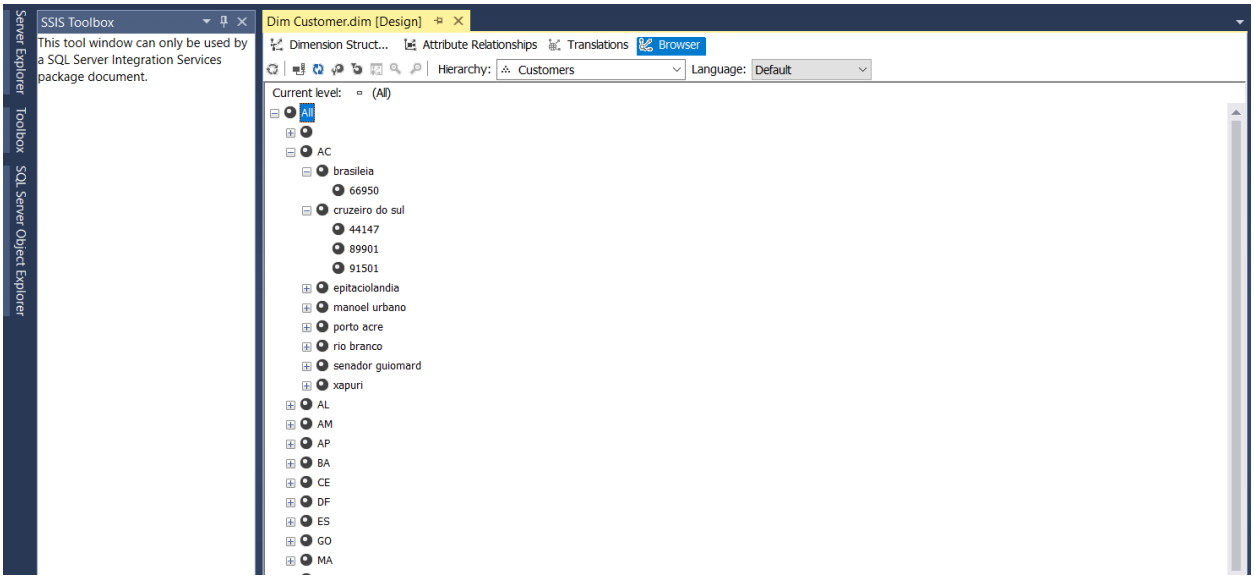
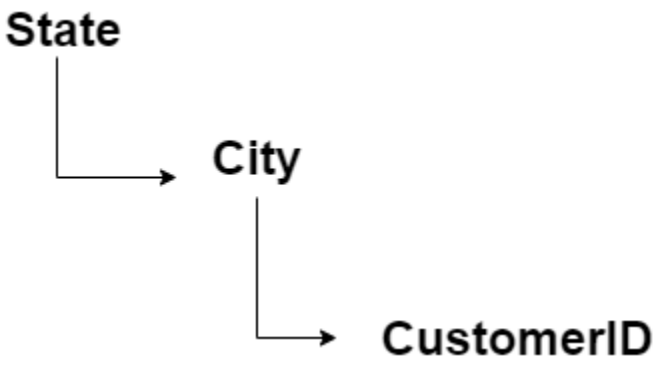


Figure 2.3

In this hierarchy, one child has only a one parent.



3. Demonstration of OLAP operations using the Excel workbook

After created the data cube, I created a report in Excel using the data in the cube. To access data in that cube, I used MDX queries.

Following figure shows the Object Explorer after connecting to the Analysis Sever in Microsoft SQL server management studio.

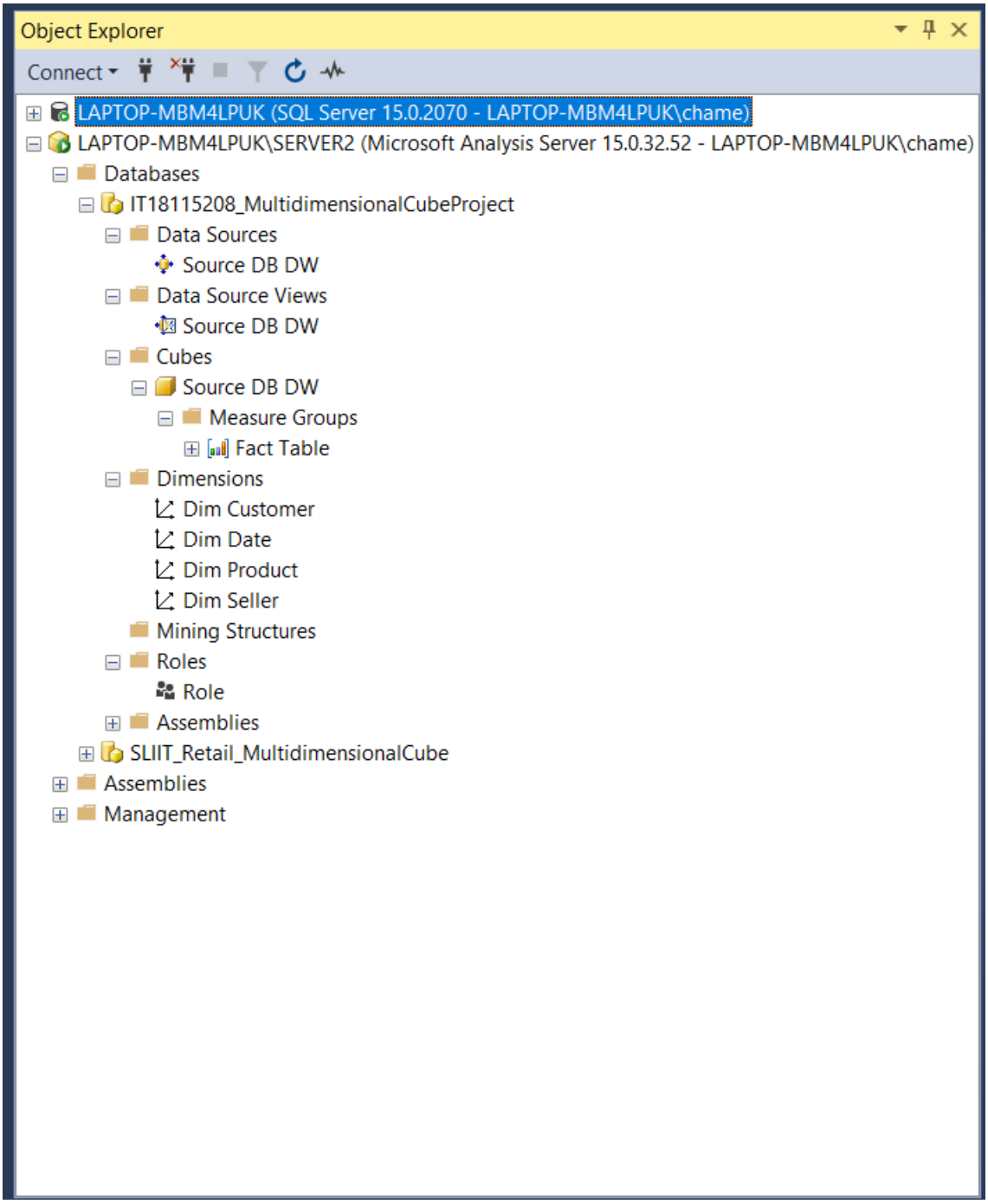


Figure 3.1

KPI's (Key Performance Indicator) are created based on the business requirements. It is a measurable value which demonstrates how effectively a company is achieving key business objectives. Organizations uses KPIs to evaluate their success to reaching targets.

Following Figure shows the KPI which I created after the deploying cube.
These are the KPI values which created for Super store.

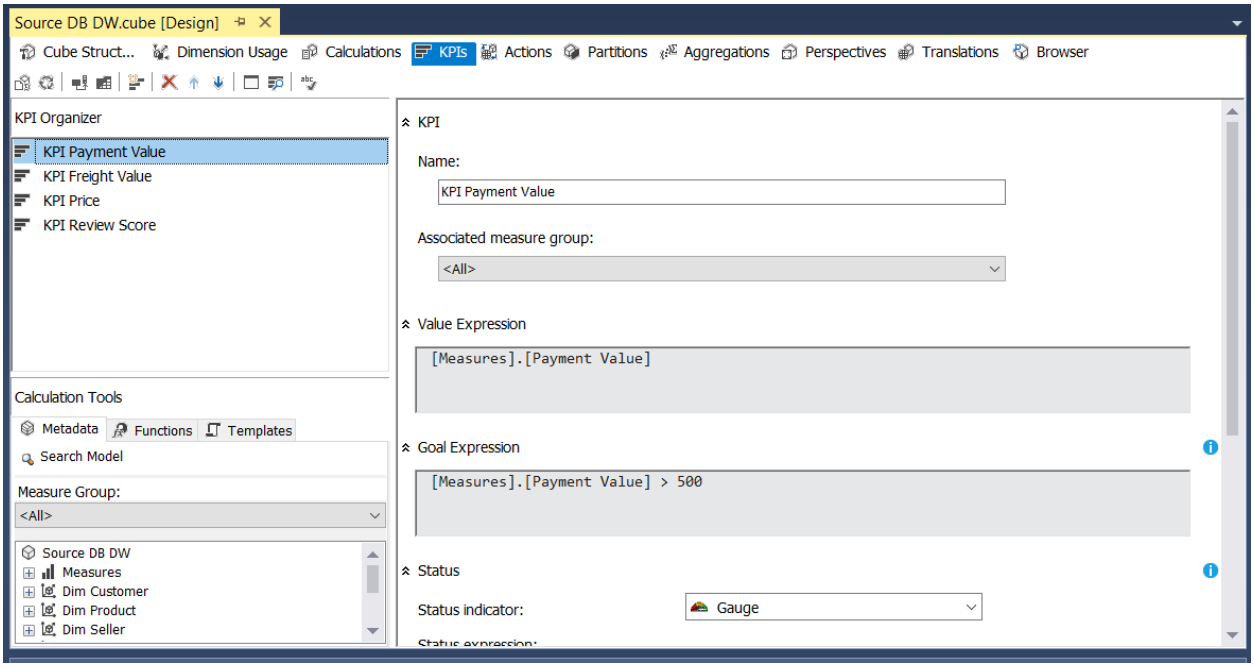


Figure 3.2

Following figure how I connect Microsoft SQL Sever Analysis Service to Excel workbook.

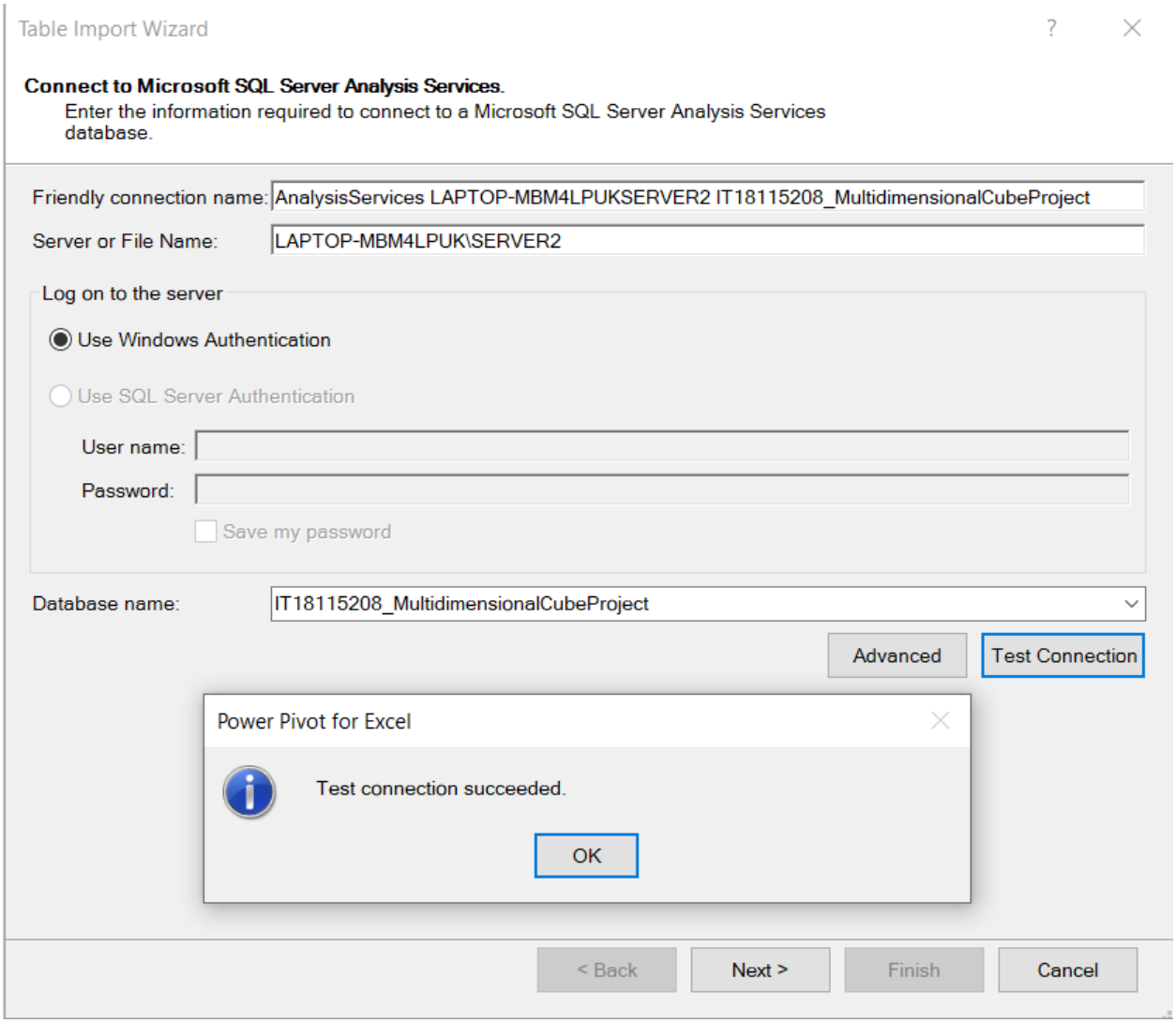
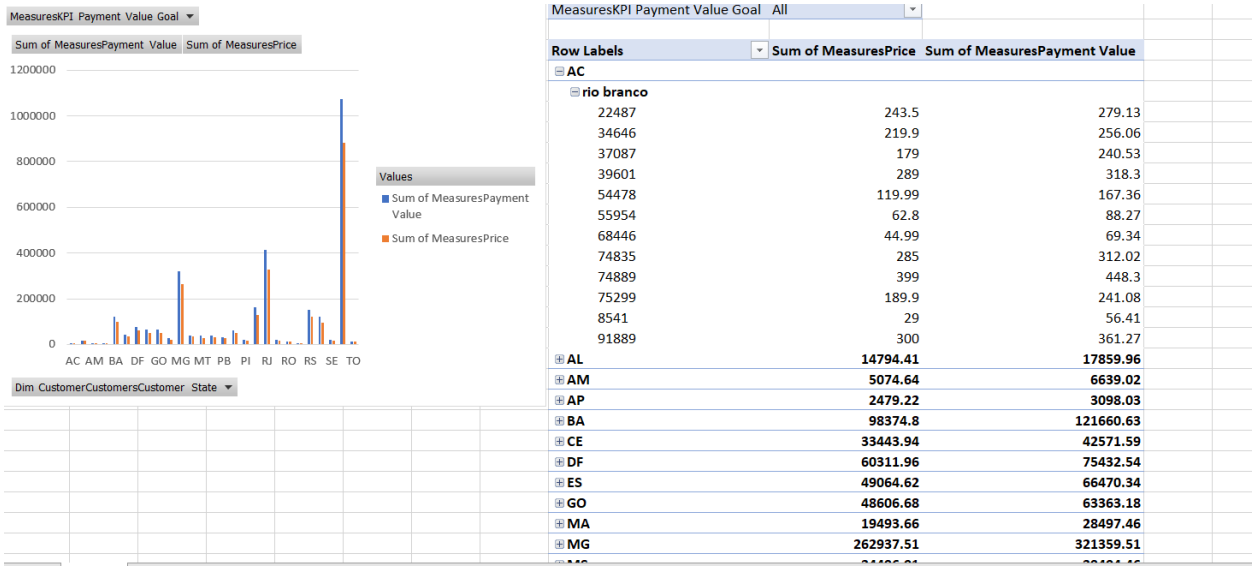


Figure 3.3

- **Roll-up**

  The Roll up OLAP operation in cubes means climbing up a hierarchy of a dimension to aggregate data.

  In this following excel sheet shows the Payment value and the product price of the customers. I have included a hierarchy (State -- >City-->CustomerID) which is an un-natural hierarchy in this case so I can view the report details state wise state wise city wise customer details.



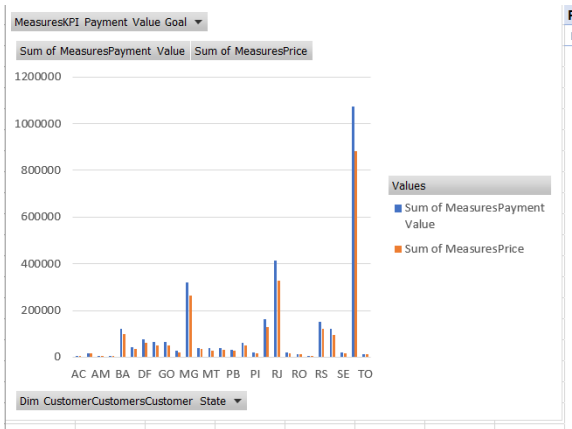
Row Labels	Sum of MeasuresPrice	Sum of MeasuresPayment Value
AC		
rio branco		
22487	243.5	279.13
34646	219.9	256.06
37087	179	240.53
39601	289	318.3
54478	119.99	167.36
55954	62.8	88.27
68446	44.99	69.34
74835	285	312.02
74889	399	448.3
75299	189.9	241.08
8541	29	56.41
91889	300	361.27
AL	**14794.41**	**17859.96**
AM	**5074.64**	**6639.02**
AP	**2479.22**	**3098.03**
BA	**98374.8**	**121660.63**
CE	**33443.94**	**42571.59**
DF	**60311.96**	**75432.54**
ES	**49064.62**	**66470.34**
GO	**48606.68**	**63363.18**
MA	**19493.66**	**28497.46**
MG	**262937.51**	**321359.51**

Figure 3.4

- **Drill-down**

  The Drill down OLAP operation in cubes means stepping down a hierarchy of a dimension allowing navigation through details.

  Following Figure shows state can drill down to cities. So, we can view the Payment value and product price state wise and city wise. Here we can roll-up CustomerID into City, and from city into state to view the report details.



Row Labels	Sum of MeasuresPrice	Sum of MeasuresPayment Value
False		
AC		
rio branco		
22487	243.5	279.13
34646	219.9	256.06
37087	179	240.53
39601	289	318.3
54478	119.99	167.36
55954	62.8	88.27
68446	44.99	69.34
74835	285	312.02
74889	399	448.3
75299	189.9	241.08
8541	29	56.41
91889	300	361.27
AL		
anadia		
71515	349.9	398.46
arapiraca		
21771	110	146.09
23305	15	35.8
49204	34.99	59.83
53732	206.57	451.75
60255	59.9	94.12
77399	19.99	54.14
77446	239	320.05

Figure 3.5

- **Slice**

  Slices are visual filters which we can use for filtering the pivot table or pivot chart data. Here I used two slices separately for pivot table and pivot chart. (If we want, we can use one slice to pivot table and pivot chart to filter the data)

  Following figure shows the slices I used to filter my pivot table and pivot char. In this excel sheet I add slices on region, when I click “CE” region, I can get the total payment values and prices according to “CE” region.

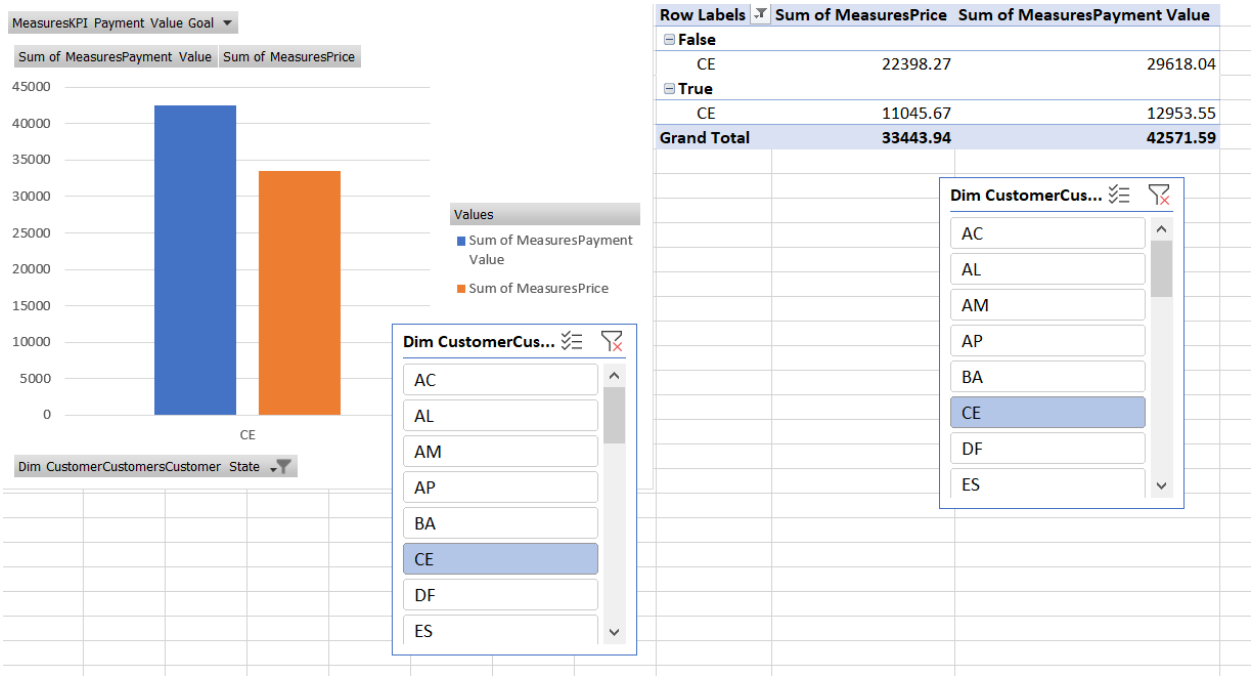


Figure 3.6

And, if want to choose multiple states, Figure 3.7 shows how it display,

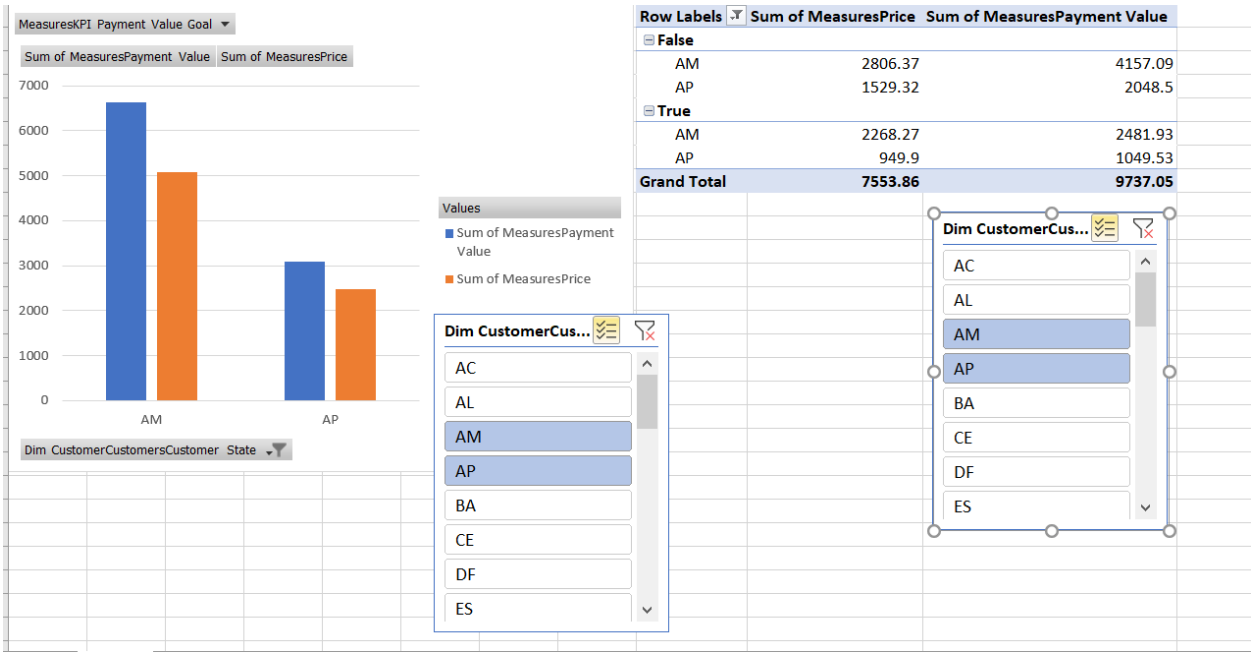


Figure 3.7

- **Dice**

  Dicing the data refers to selecting which attributes we are grouping the data by.

  Here I used two slicers to analyze the data in pivot table and pivot chart.

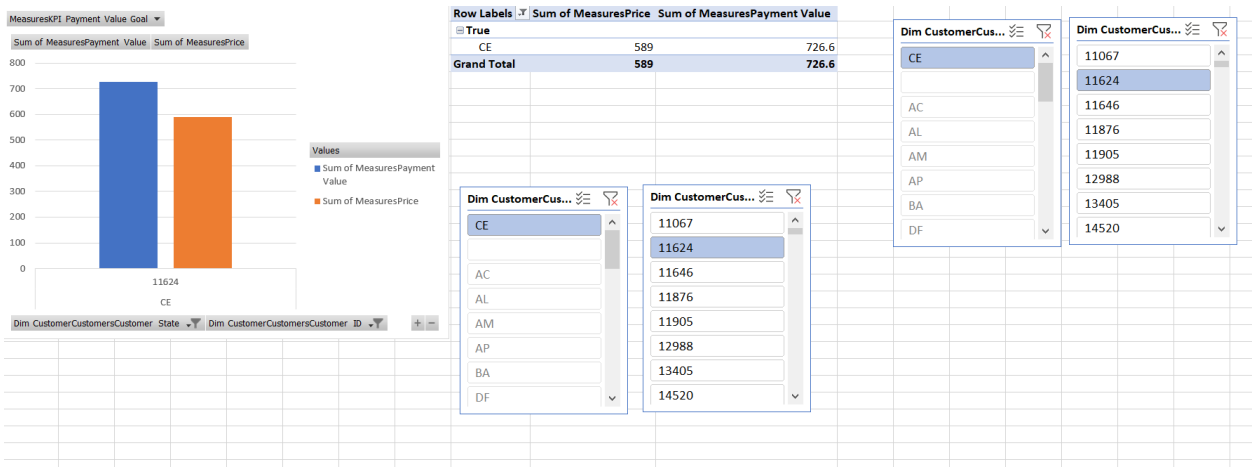


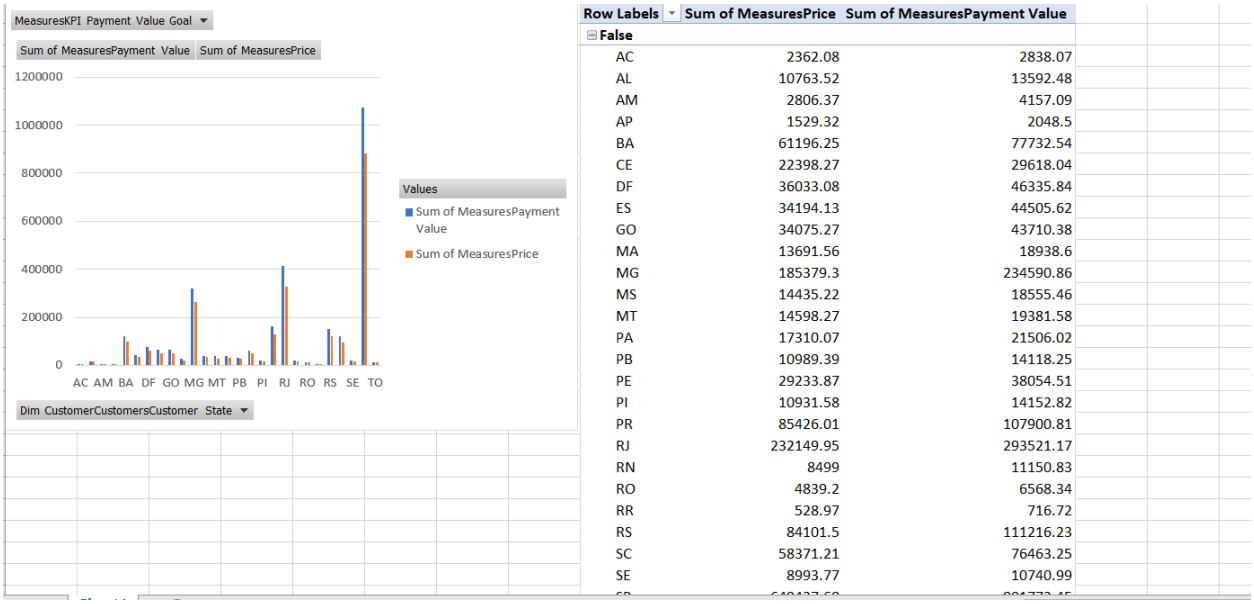
Figure 3.8

- **Pivot**

  A PivotTable is a powerful tool to summarize, analyze, explore, and present summary data. Pivot Charts complement PivotTables by adding visualizations to the summary data in a PivotTable.

  Here I used pivot table and pivot chart to display the customer payment values and product price done by customer.

  When I clicked state name in pivot table, then pivot chart will shows the data in visualization.



Row Labels	Sum of MeasuresPrice	Sum of MeasuresPayment Value
False		
AC	2362.08	2838.07
AL	10763.52	13592.48
AM	2806.37	4157.09
AP	1529.32	2048.5
BA	61196.25	77732.54
CE	22398.27	29618.04
DF	36033.08	46335.84
ES	34194.13	44505.62
GO	34075.27	43710.38
MA	13691.56	18938.6
MG	185379.3	234590.86
MS	14435.22	18555.46
MT	14598.27	19381.58
PA	17310.07	21506.02
PB	10989.39	14118.25
PE	29233.87	38054.51
PI	10931.58	14152.82
PR	85426.01	107900.81
RJ	232149.95	293521.17
RN	8499	11150.83
RO	4839.2	6568.34
RR	528.97	716.72
RS	84101.5	111216.23
SC	58371.21	76463.25
SE	8993.77	10740.99

Figure 3.9

4. SSRS Reports using the Report builder

SSRS is a powerful tool for data visualization platform, which can create, publishing, managing reports. Then we can deliver them to the right users in different ways like email, via a web browser, mobile device etc.

SSRS components,

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

Here I generated few reports using the Data warehouse, and cube. Firstly, I configured the SQL Server Reporting Services and then created a new SSRS project in Report Server Project Wizard.

Following Figure show the SQL Sever Report Service web portal where I saved my created reports.

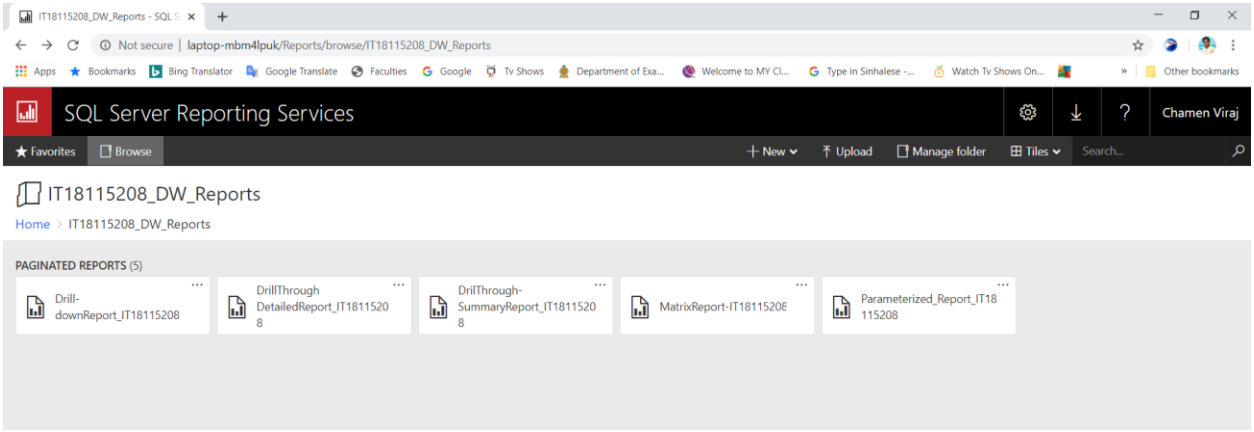


Figure 4.1

- **Report 1 – Report with matrix**

Following Figure shows how I designed my matrix report.

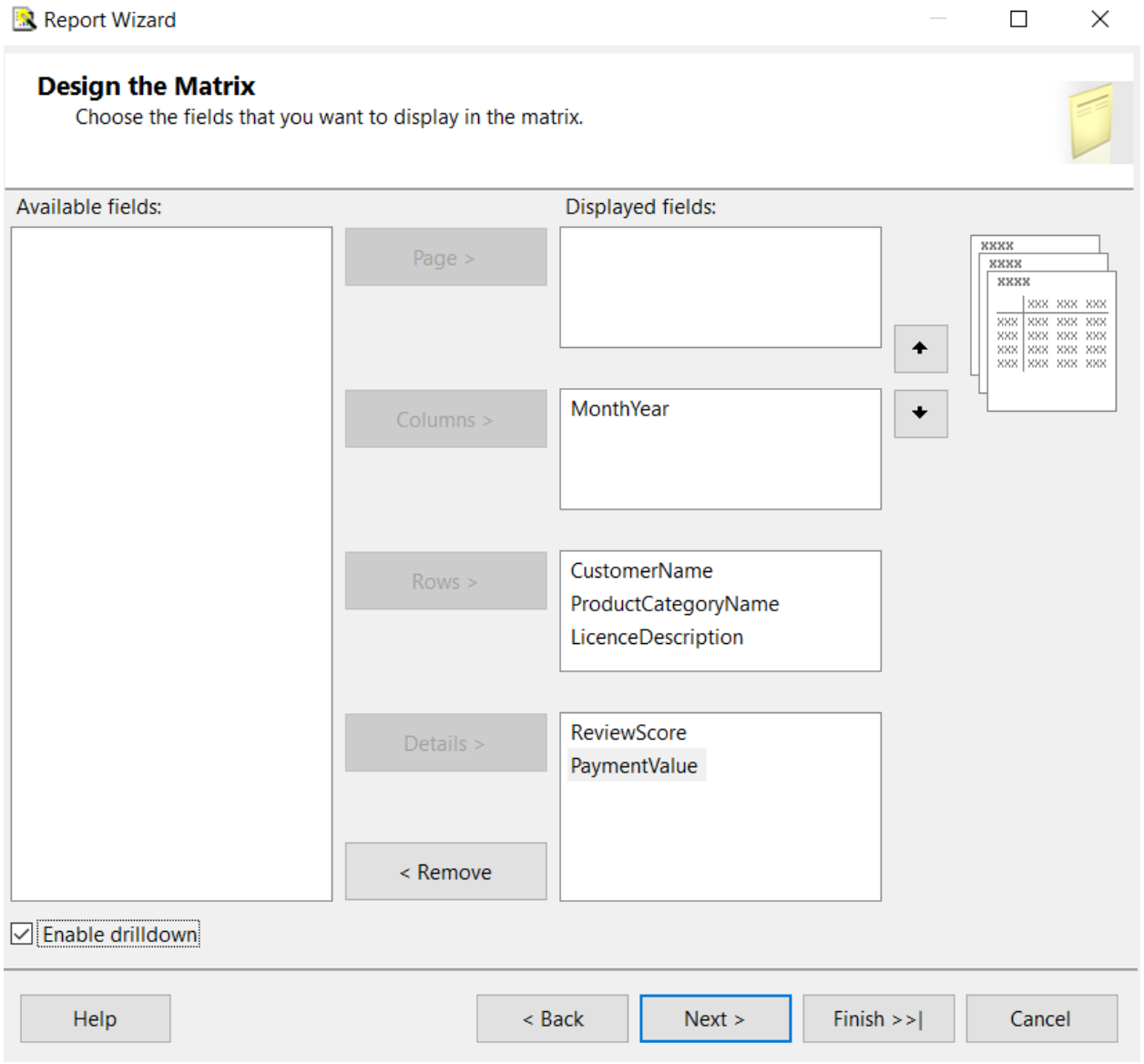
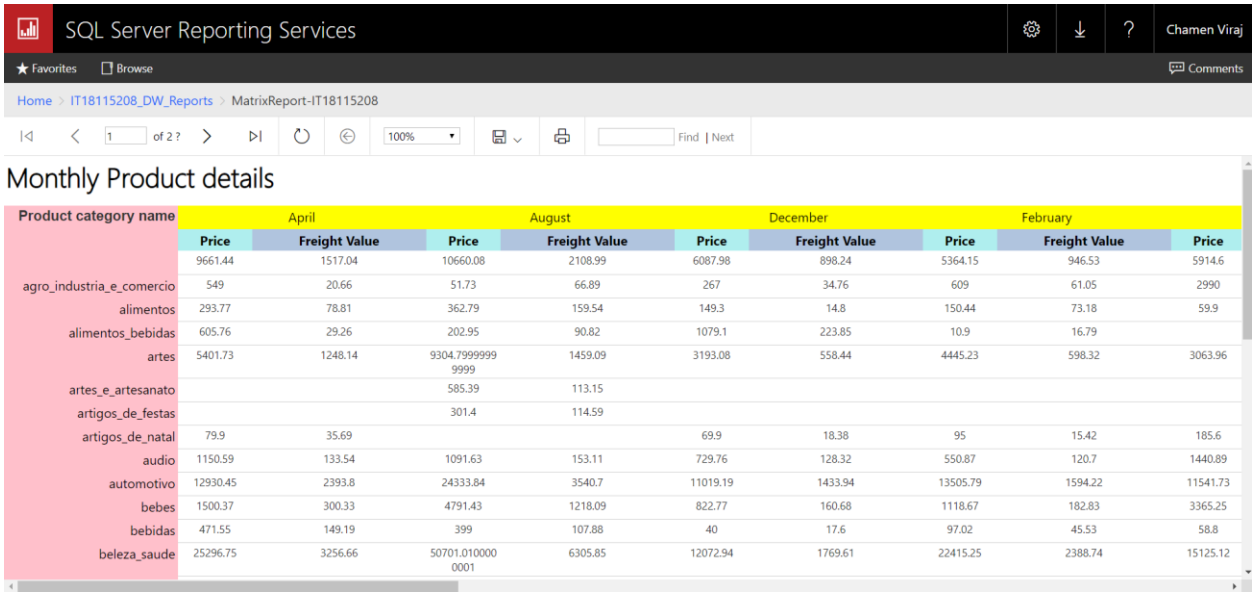


Figure 4.2

Following Figure shows the Matrix report which created in SSRS project and after deplyed.



Product category name	April		August		December		February		
	Price	Freight Value	Price	Freight Value	Price	Freight Value	Price	Freight Value	Price
	9661.44	1517.04	10660.08	2108.99	6087.98	898.24	5364.15	946.53	5914.6
agro_industria_e_comercio	549	20.66	51.73	66.89	267	34.76	609	61.05	2990
alimentos	293.77	78.81	362.79	159.54	149.3	14.8	150.44	73.18	59.9
alimentos_bebidas	605.76	29.26	202.95	90.82	1079.1	223.85	10.9	16.79	
artes	5401.73	1248.14	9304.799999999999	1459.09	3193.08	558.44	4445.23	598.32	3063.96
artes_e_artesanato			585.39	113.15					
artigos_de_festas			301.4	114.59					
artigos_de_natal	79.9	35.69			69.9	18.38	95	15.42	185.6
audio	1150.59	133.54	1091.63	153.11	729.76	128.32	550.87	120.7	1440.89
automotivo	12930.45	2393.8	24333.84	3540.7	11019.19	1433.94	13505.79	1594.22	11541.73
bebes	1500.37	300.33	4791.43	1218.09	822.77	160.68	1118.67	182.83	3365.25
bebidas	471.55	149.19	399	107.88	40	17.6	97.02	45.53	58.8
beleza_saude	25296.75	3256.66	50701.010000000001	6305.85	12072.94	1769.61	22415.25	2388.74	15125.12

Figure 4.3

- **Report 2 – Report with more than one parameter**

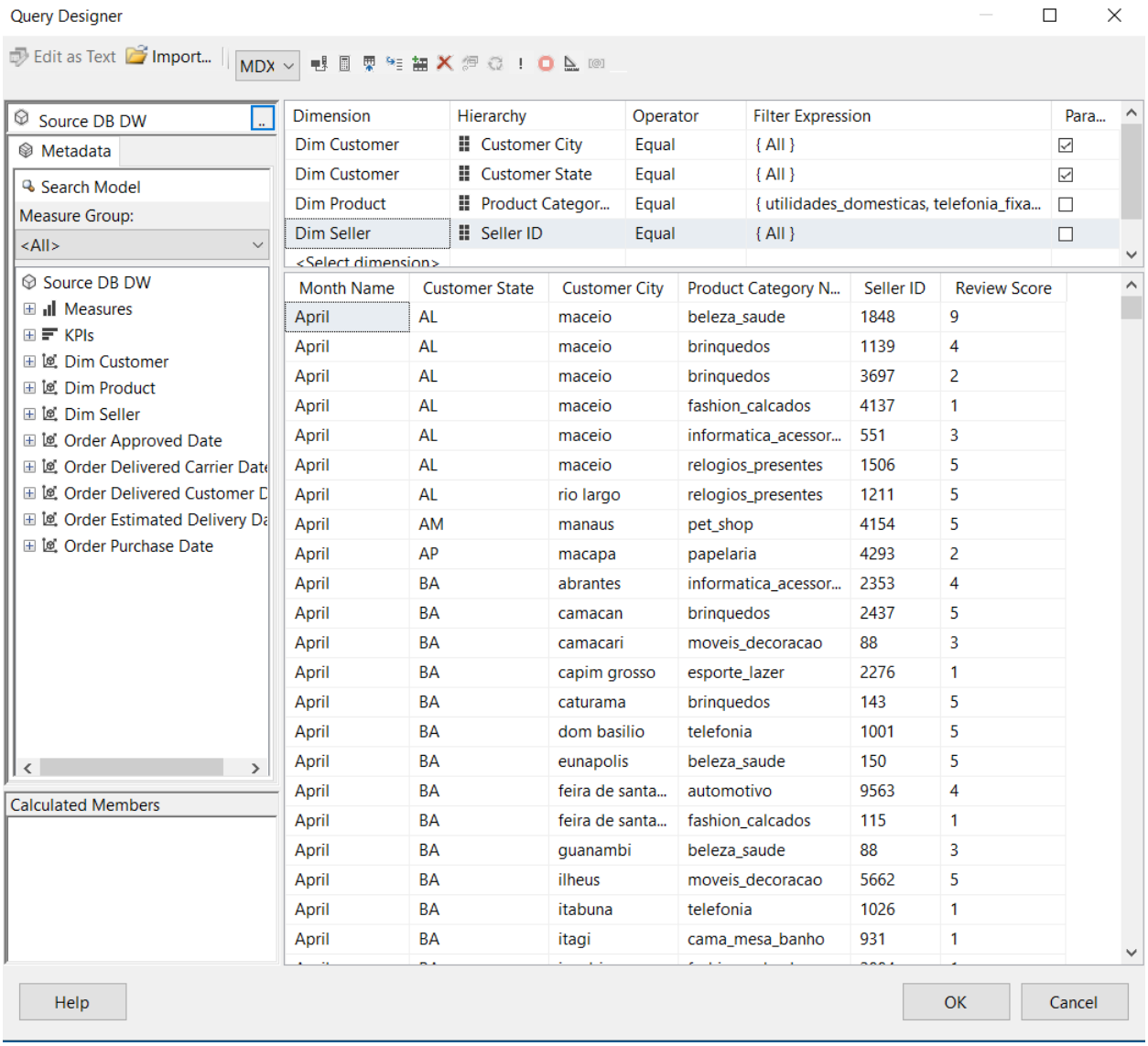


Figure 4.4

Above Figure shows how I designed data fields in parameterized report, which includes state and city as parameters.

When you select the first parameter (State) from the dropdown list, then the second parameter (City) will display values which are relevant to selected state. Because of that selection of the value of first parameter, will change the list of available values in the second parameter.

Figure 4.5 shoes the how first parameter will change the list of available values in the second parameter.

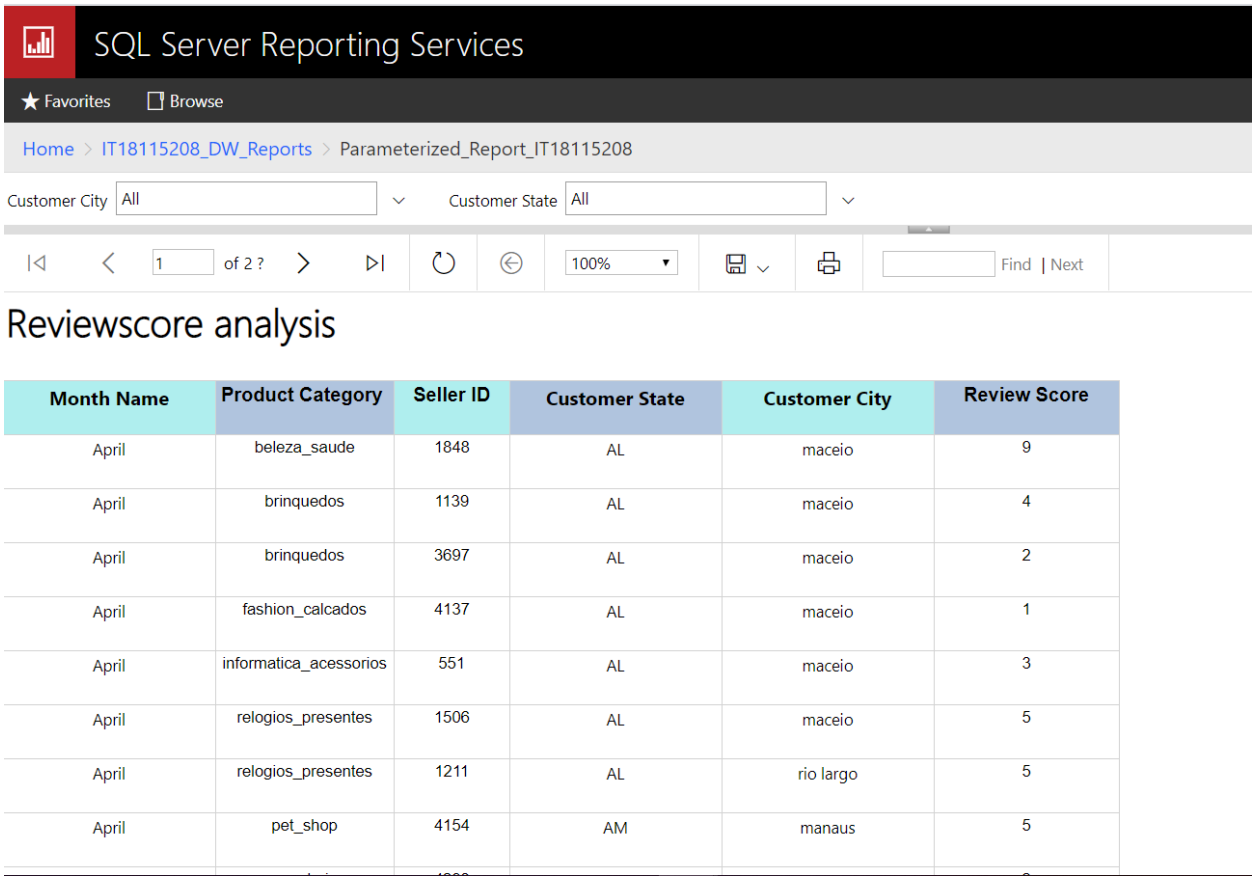


Figure 4.5

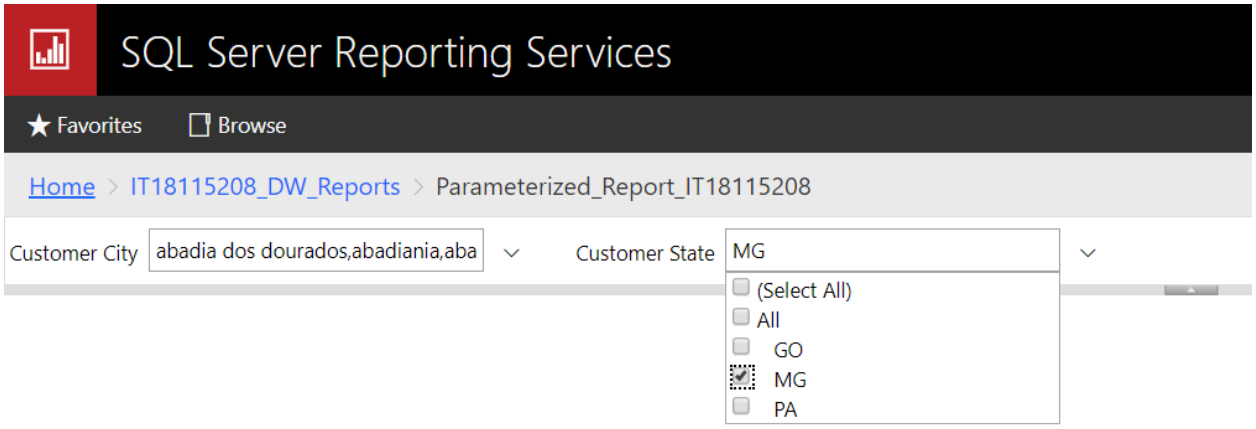


Figure 4.5

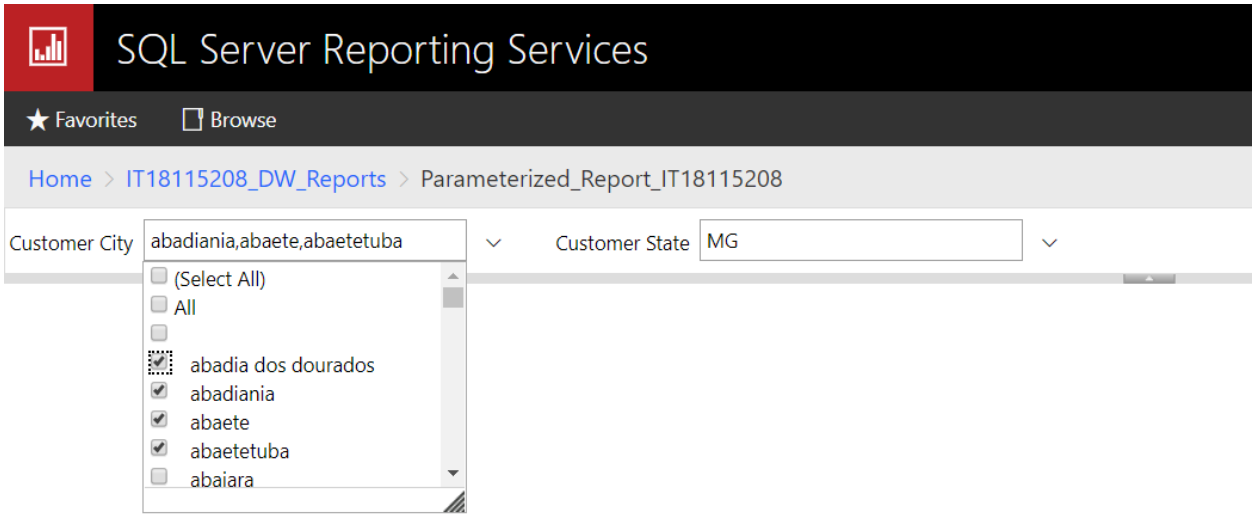


Figure 4.6

After selecting the parameters, Result will be shown as below figure 4.7.

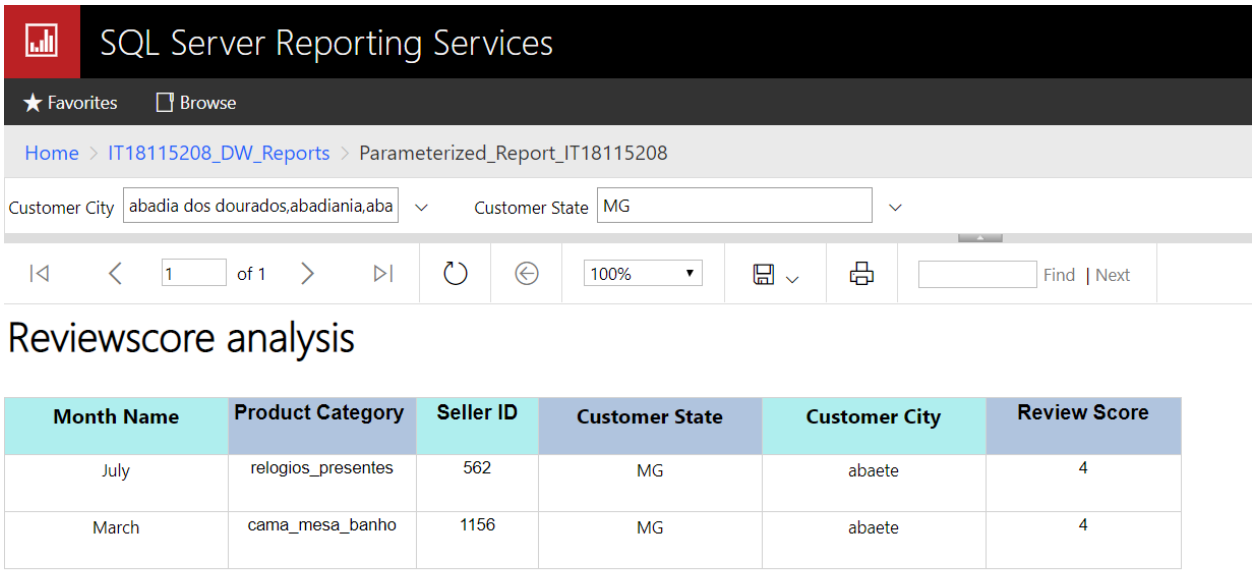


Figure 4.7

- **Report 3 – SSRS Drill-down report**

  The Drill Down Reports means allowing Users to Show or Hide the Column Data by providing plus and minus symbols.

  Following Figure shows data fields which I used in drill-down report.

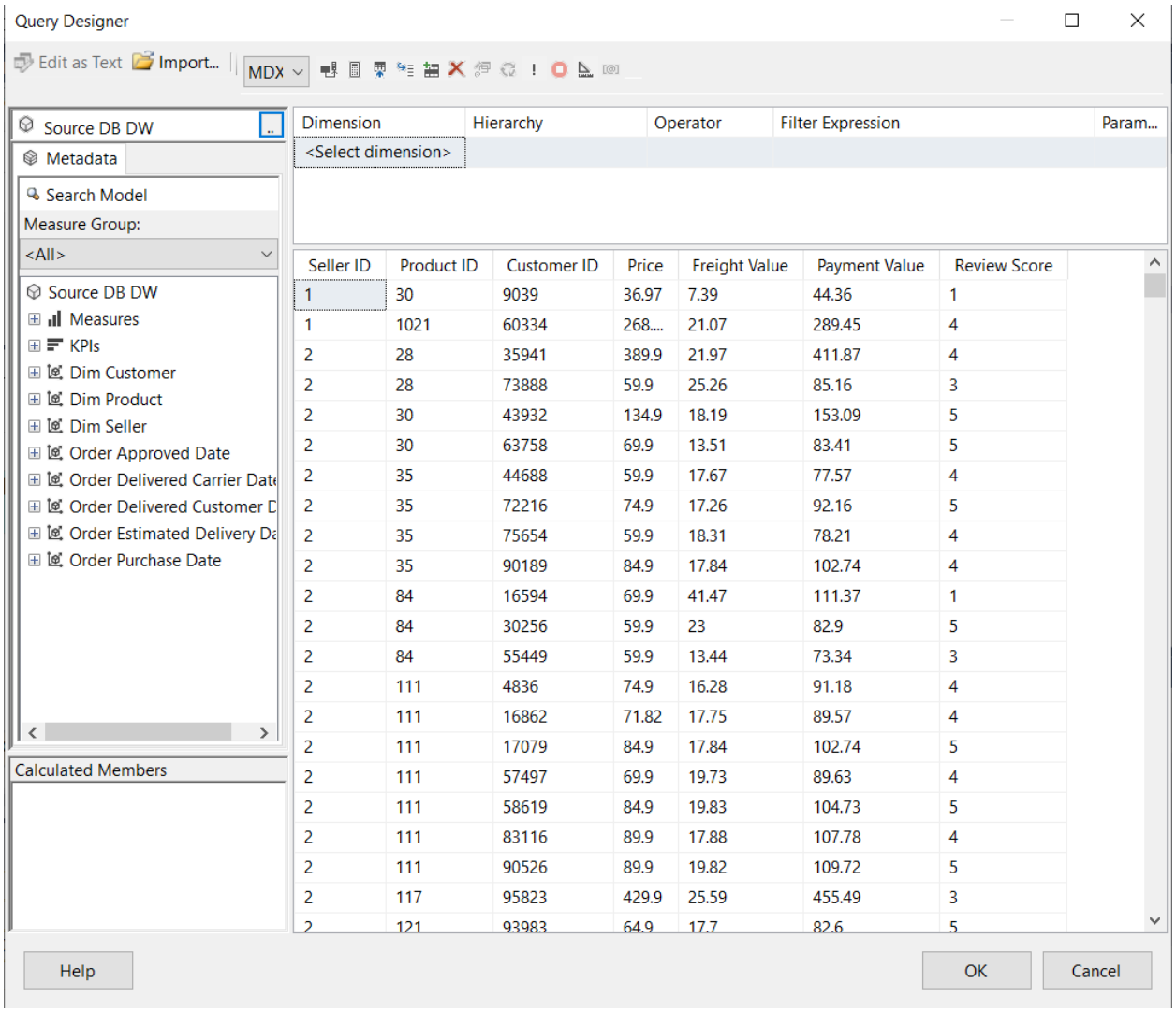


Figure 4.8

After getting the data fields, then I designed the report as shown below. (Figure 4.9)

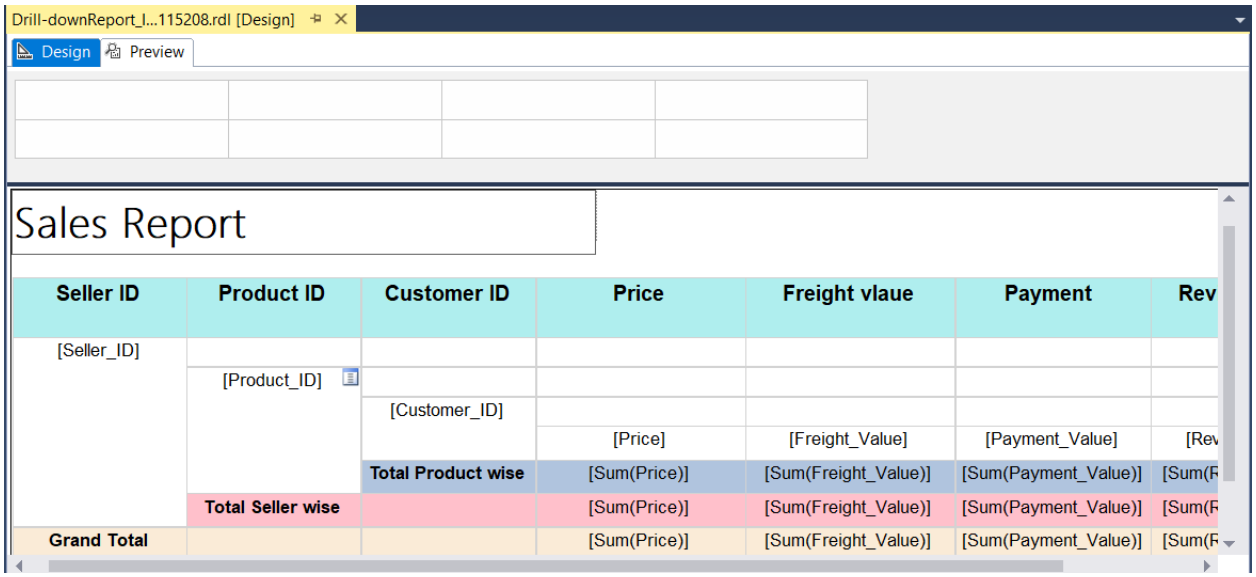


Figure 4.9

This is how it looks like in web portal after deployed. In here user can view SellerID. And ProductID and CustomerID's are hidden by providing a plus mark. User can expand it by clicking plus mark and view other hidden fields.

In this report I added summation of Payment value, Freight value and Review score Seller wise, Product wise and the Grand total. User can view them by expanding the hierarchy.

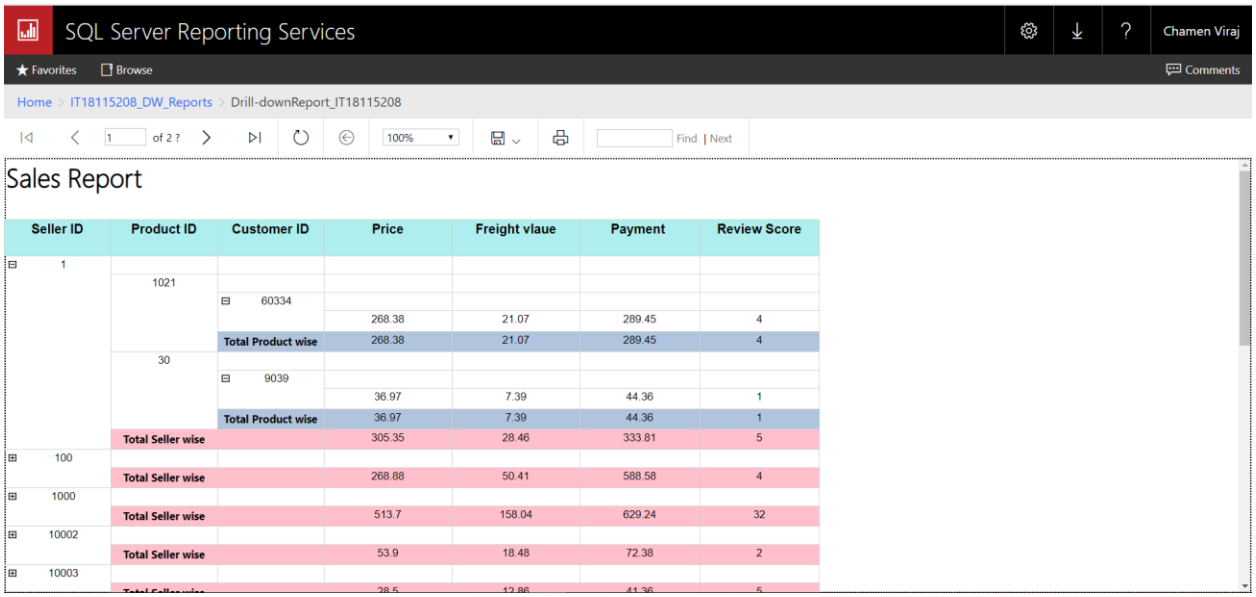


Figure 4.10

- **Report 4 – SSRS Drill-through Report**

  A drill-through report is a report that a user opens by clicking a link within another report. Drill through report allows you to navigate to a completely different visualization or report, often in a new window

  I have used the following queries to create Summary report and Detailed report.

Summary Report

```
select DISTINCT c.customer_state AS Region,f.PaymentValue,
                f.ReviewScore
from FactTable f,Dim_Customer c
```

Detailed Report

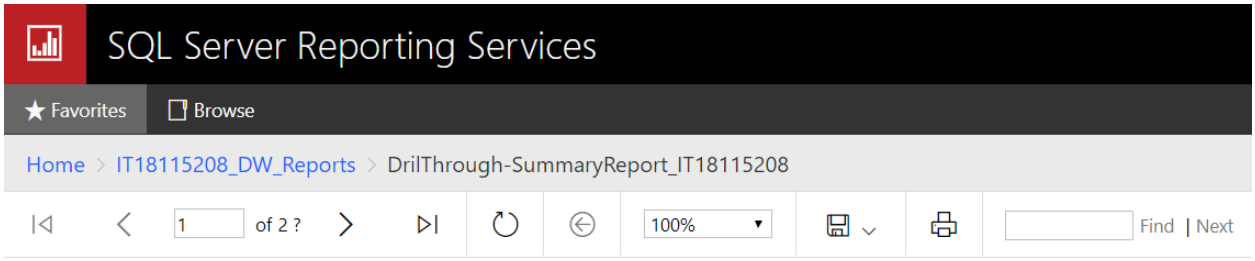
```
select DISTINCT c.customer_state AS Region,c.customer_city AS
City,f.Price,f.PaymentValue,f.ReviewScore,f.FreightValue
from Dim_Customer c,FactTable f
where  c.customer_state in (@customer_state)
```

  First user can view the Summary report, which includes summary details in the superstore.

  When user clicks a region then, the report will navigate to the detailed report which includes all the data relevant to selected region.

In this drill-through report, I used region as the parameter of Detailed report. And then connect the reports by passing the parameter from Summary report to Detailed report.

Following Figure shows the Summary report which includes the summary details in the super store.



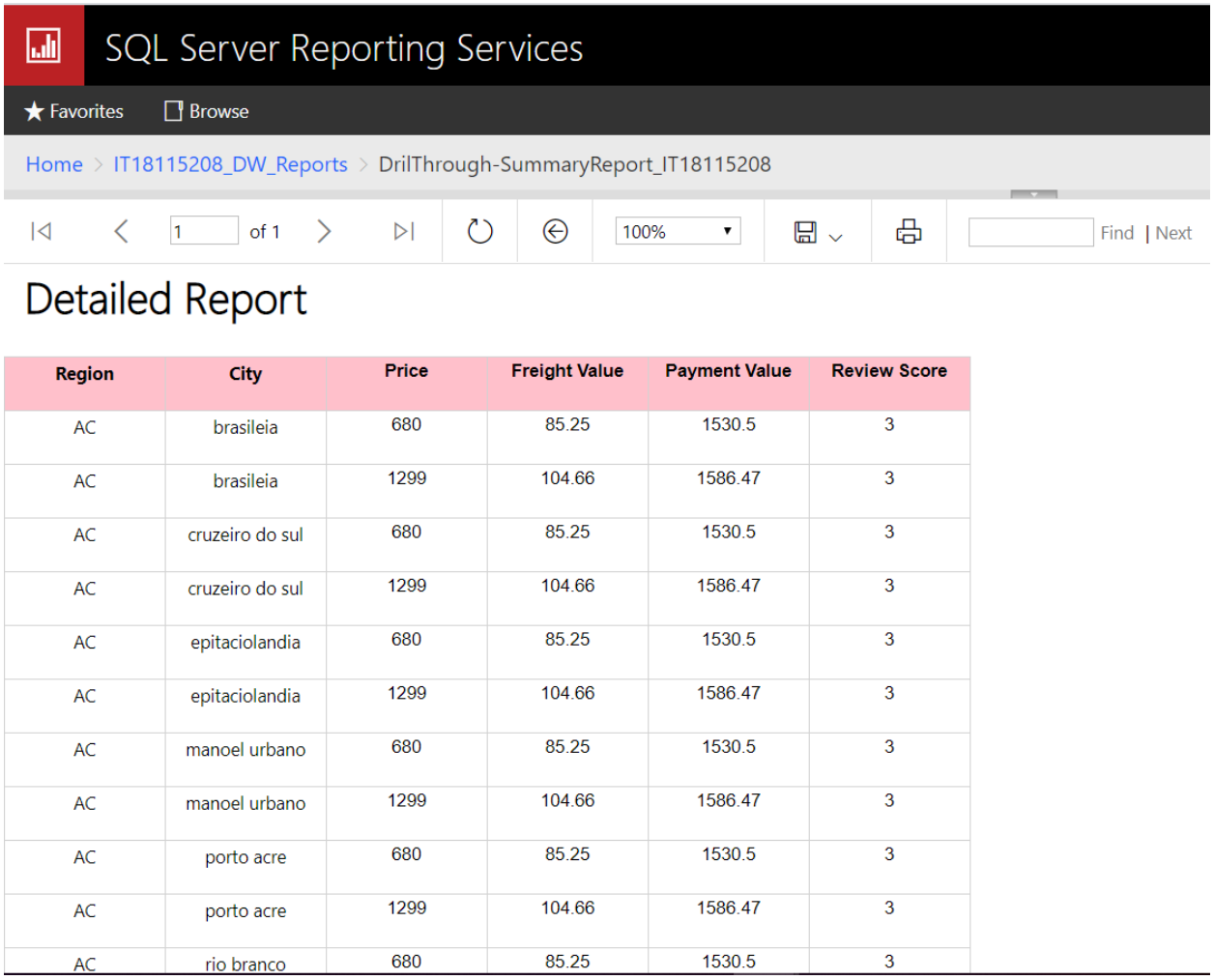
Summary Report

Region	Payment Value	Review Score
AC	1530.5	3
AC	1586.47	3
AL	1530.5	3
AL	1586.47	3
AM	1530.5	3
AM	1586.47	3
AP	1530.5	3
AP	1586.47	3
BA	1530.5	3
BA	1586.47	3
CE	1530.5	3
CE	1586.47	3
DF	1530.5	3

Figure 4.11

When user clicks the Region("AC") then the detailed report will display which includes the all the details relevant to selected region. (Figure 4.12)

Following figure shows the Detailed report which includes all the details of selected region(“AC”).



Region	City	Price	Freight Value	Payment Value	Review Score
AC	brasileia	680	85.25	1530.5	3
AC	brasileia	1299	104.66	1586.47	3
AC	cruzeiro do sul	680	85.25	1530.5	3
AC	cruzeiro do sul	1299	104.66	1586.47	3
AC	epitaciolandia	680	85.25	1530.5	3
AC	epitaciolandia	1299	104.66	1586.47	3
AC	manoel urbano	680	85.25	1530.5	3
AC	manoel urbano	1299	104.66	1586.47	3
AC	porto acre	680	85.25	1530.5	3
AC	porto acre	1299	104.66	1586.47	3
AC	rio branco	680	85.25	1530.5	3

Figure 4.12

End