

Sri Lanka Institute of Information Technology



Data warehousing and Business Intelligence

Assignment 2

Student Registration No: IT20762186

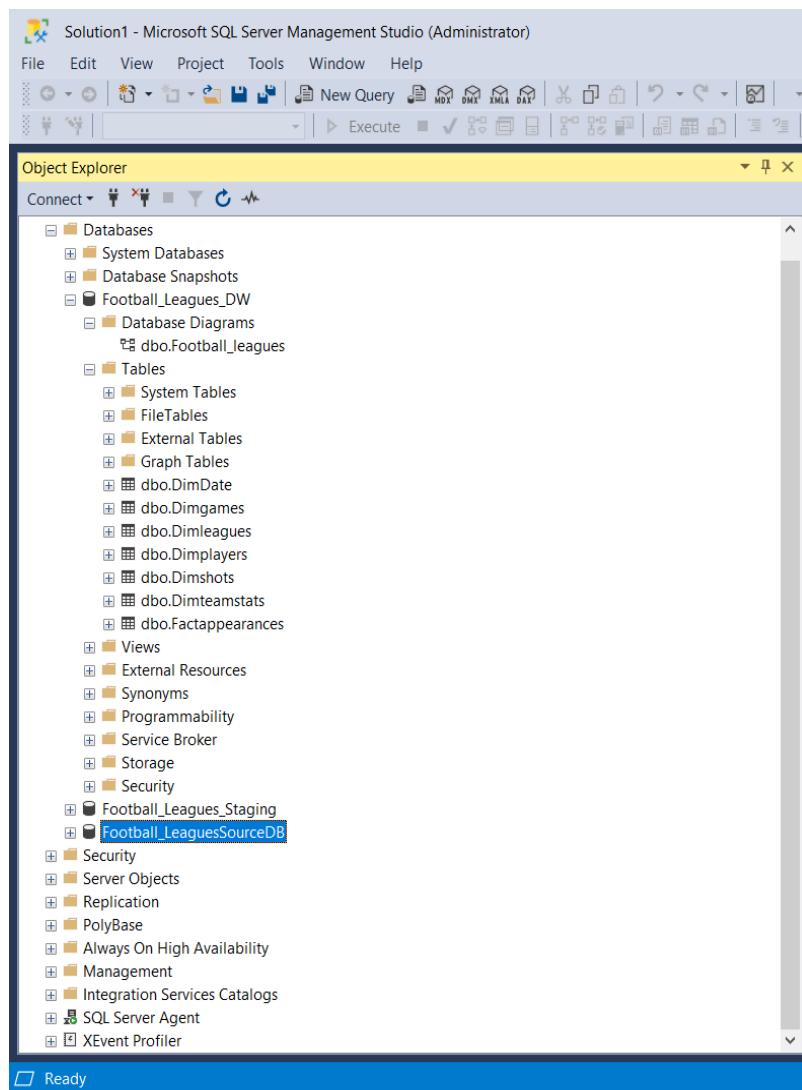
Student Name: Gunasekara B.A.J.C.

Step 1 – Data Source for the Assignment

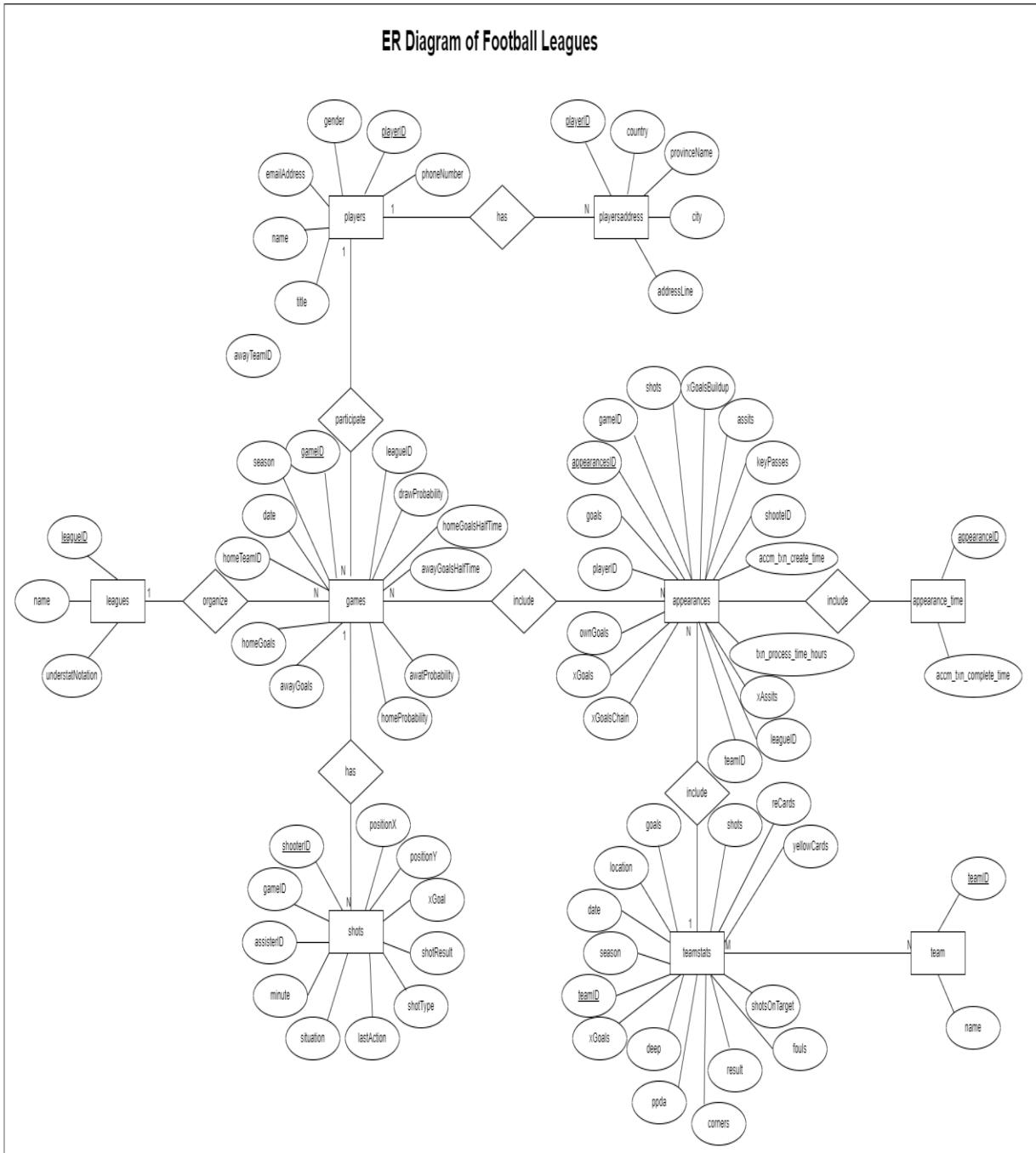
I used data warehouse database (Football_Leagues_DW) as the data source which I created in Assignment 1. In there, is the fact table and dimensions as follows,

- 1) dbo.Factappearances
- 2) dbo.DimDate
- 3) dbo.Dimgames
- 4) dbo.Dimleagues
- 5) dbo.Dimplayers
- 6) dbo.Dimshots
- 7) dbo.Dimteamstats

Also, I used snowflake schema to integrate them. I used these data to create OLAP cubes and to generate OLAP operations in Excel and prepare reports in Report Builder.



Following ER- diagram will describe the scenario of the selected dataset.



Step 2 – SSAS Cube Implementation

Used Tools: -

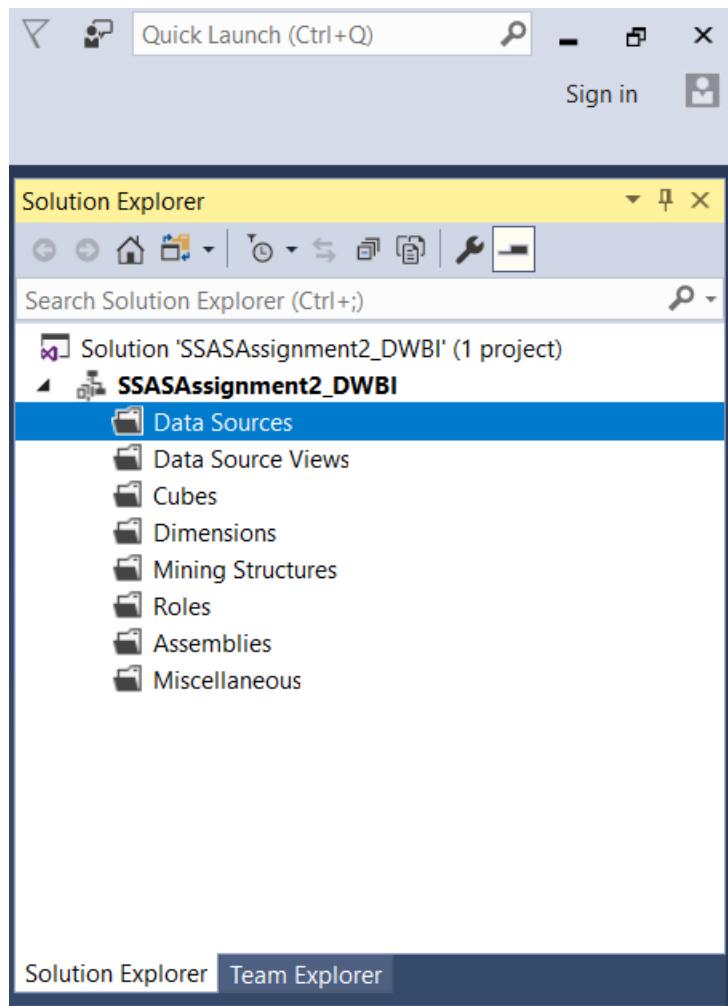
SSAS - SQL Server Analysis Service

SQL Server Management Studio

SSDT - SQL Server Data Tool

When creating the OLAP cubes first I created Analysis Services Multidimensional and Data Mining Project on SSDT.

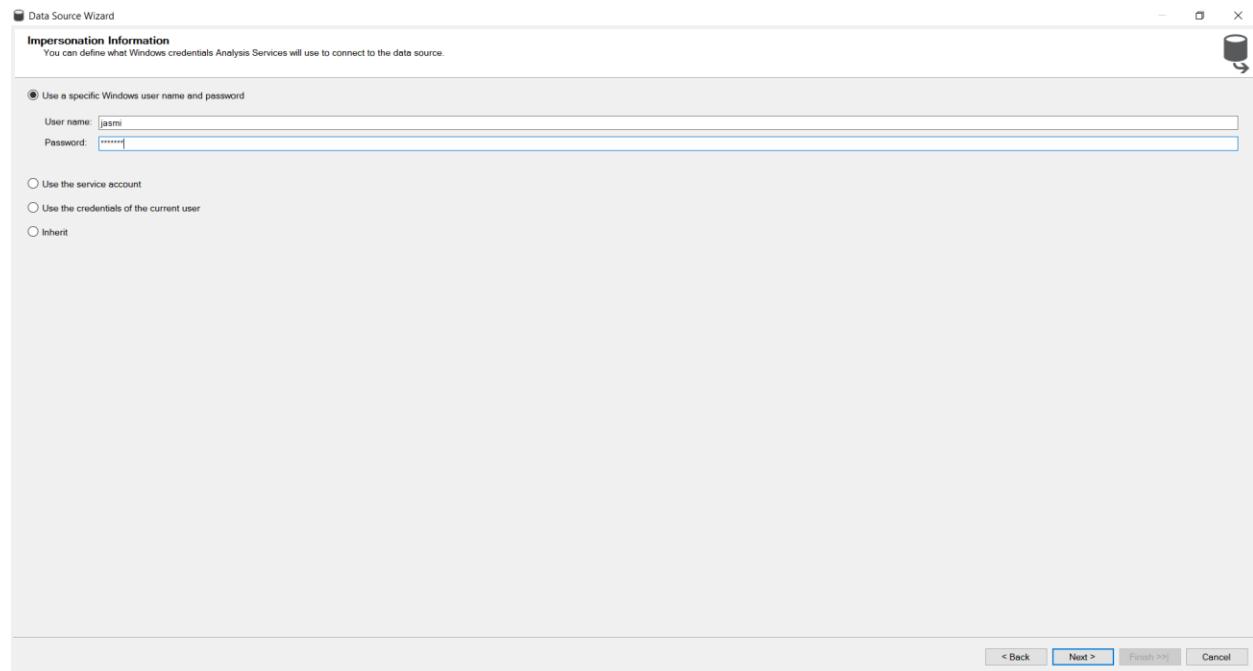
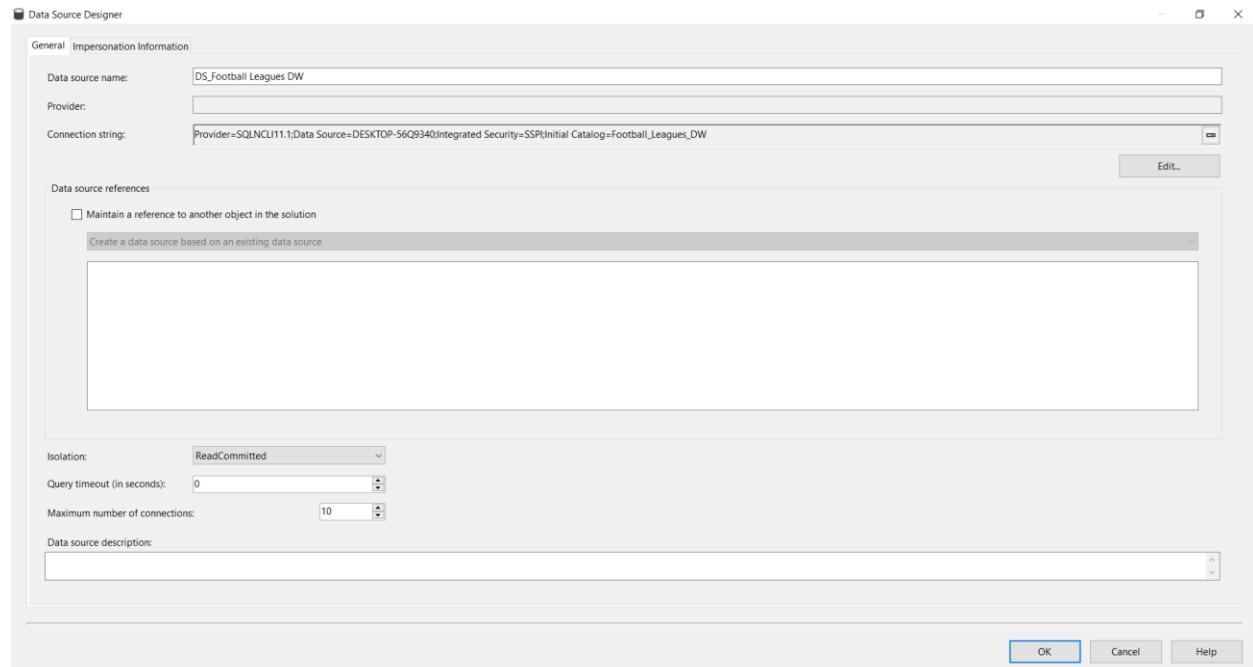
Then I renamed it as “SSASAssignment2_DWBI”. Then we can see folder structure as follow,



Then the following steps are done,

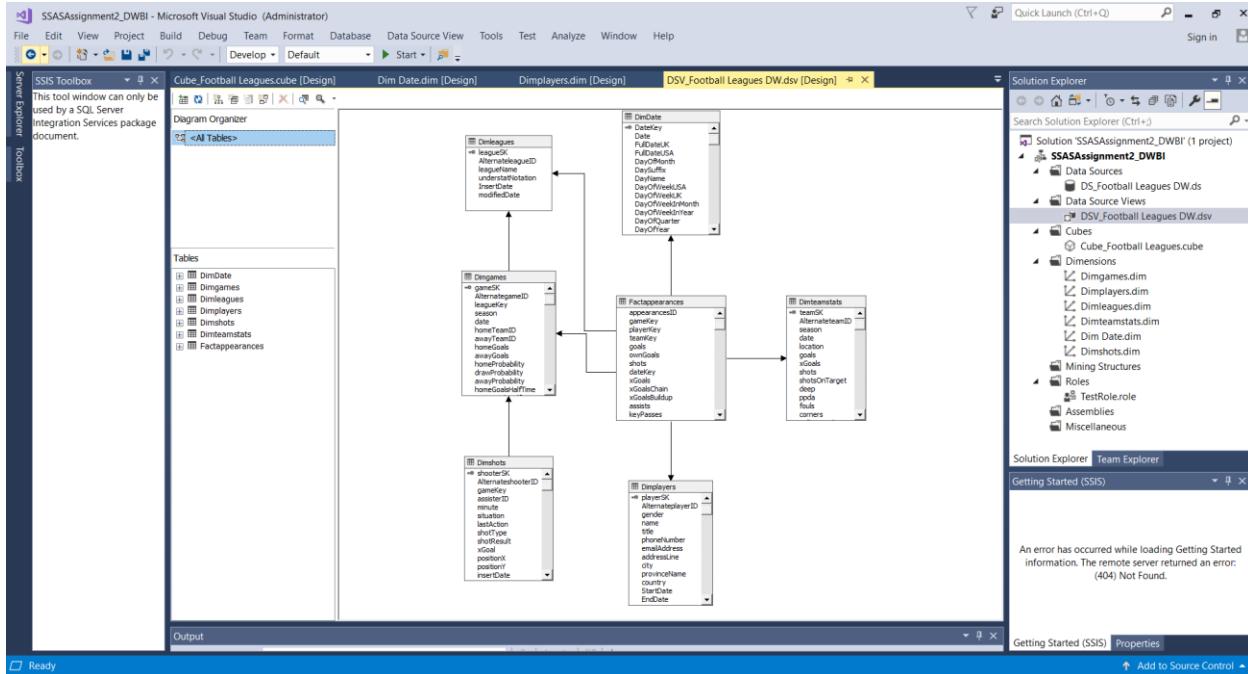
1. Create a Data source

Under the Data Sources folder in above folder structure, and a new Data Source to create connection with my Football_Leagues_DW is added and renamed as DS_Football_Leagues_DW .I used windows login credentials to connect it.



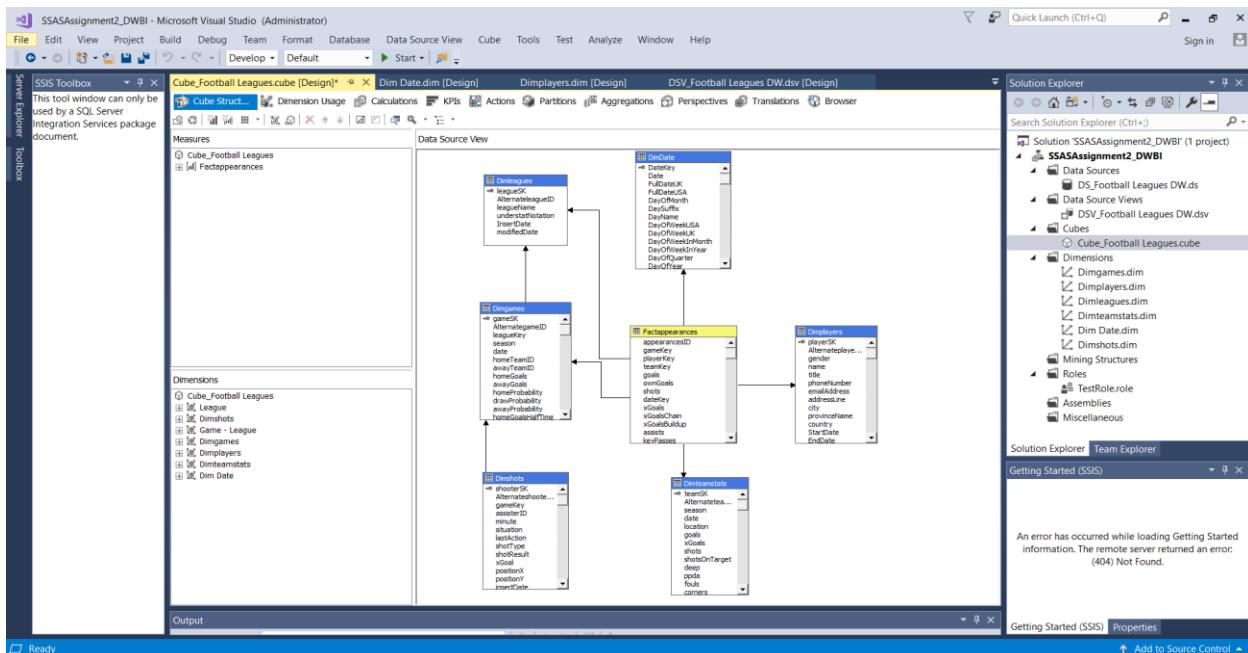
2. Create a Data Source View

Under the Data Source Views folder, I added new data source view called DSV_Football_Leagues_DW.

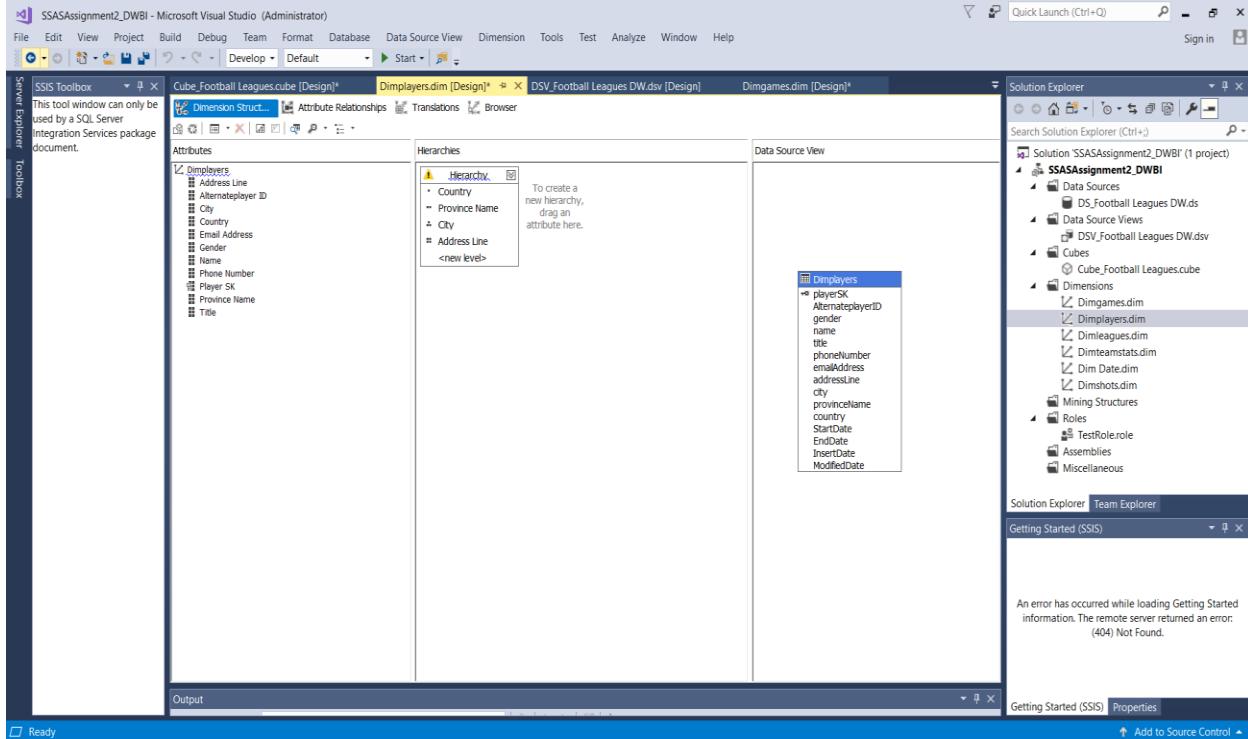
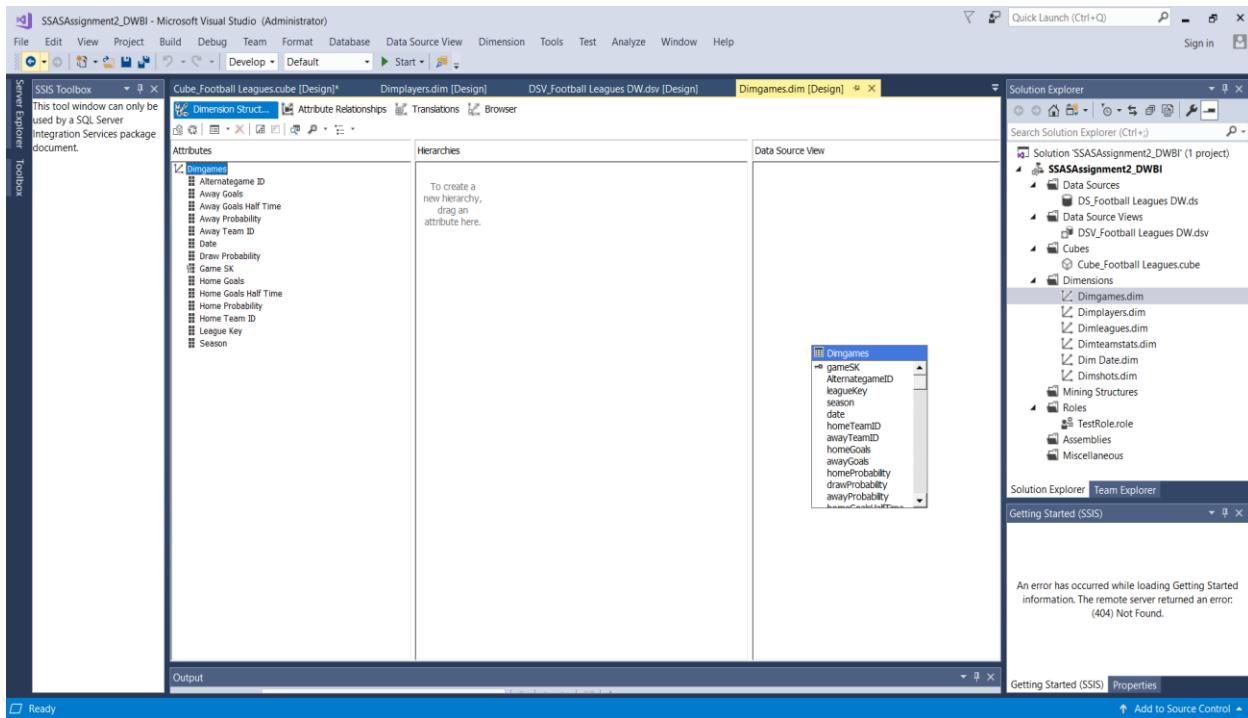


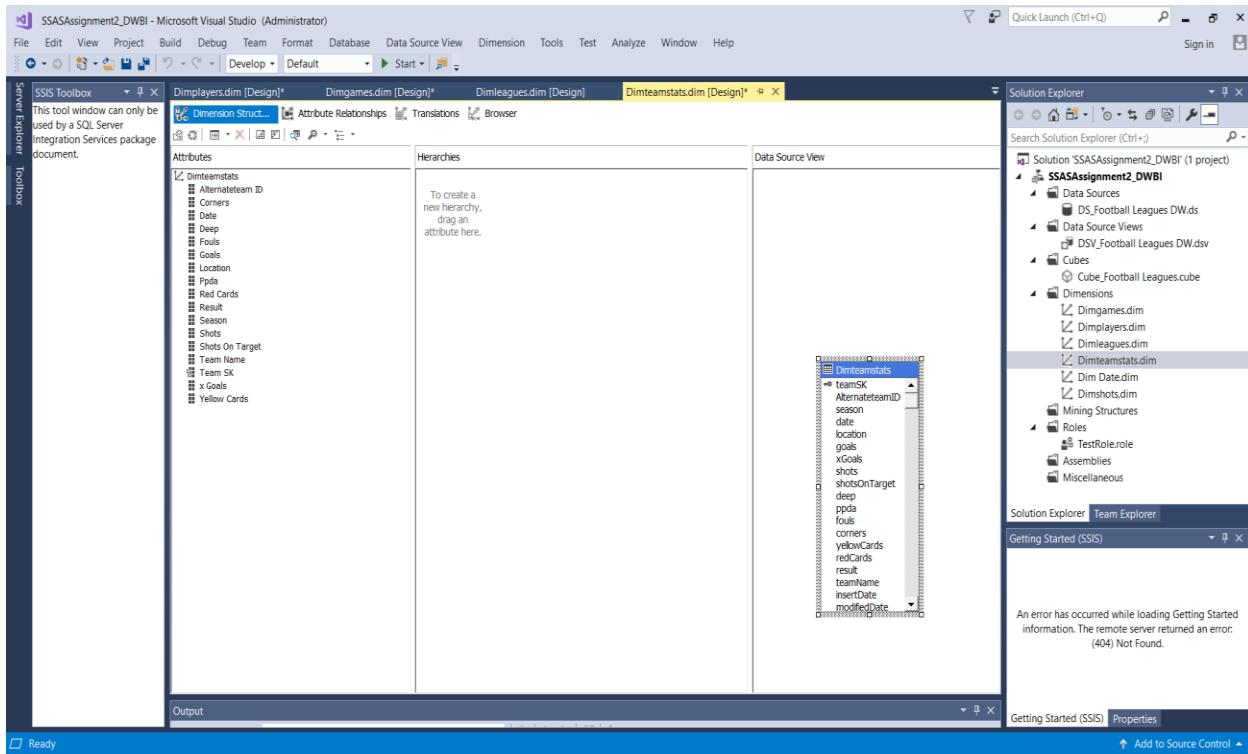
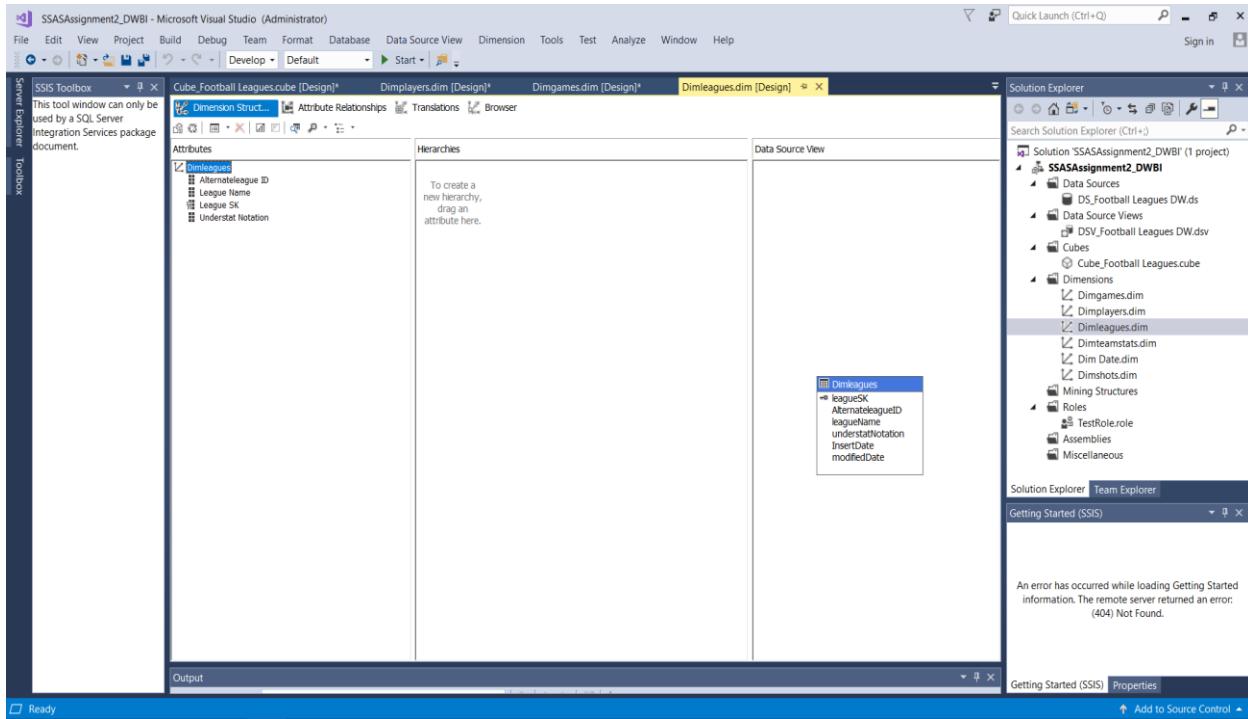
3. Create a Cube

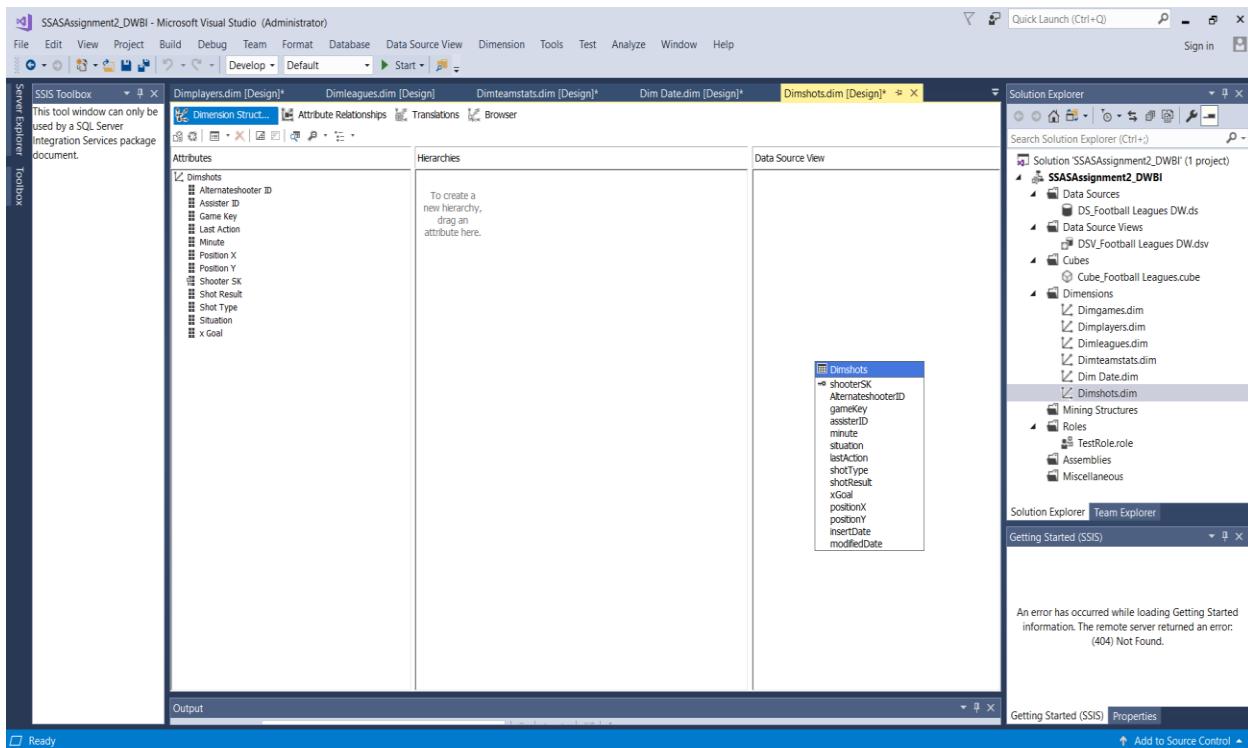
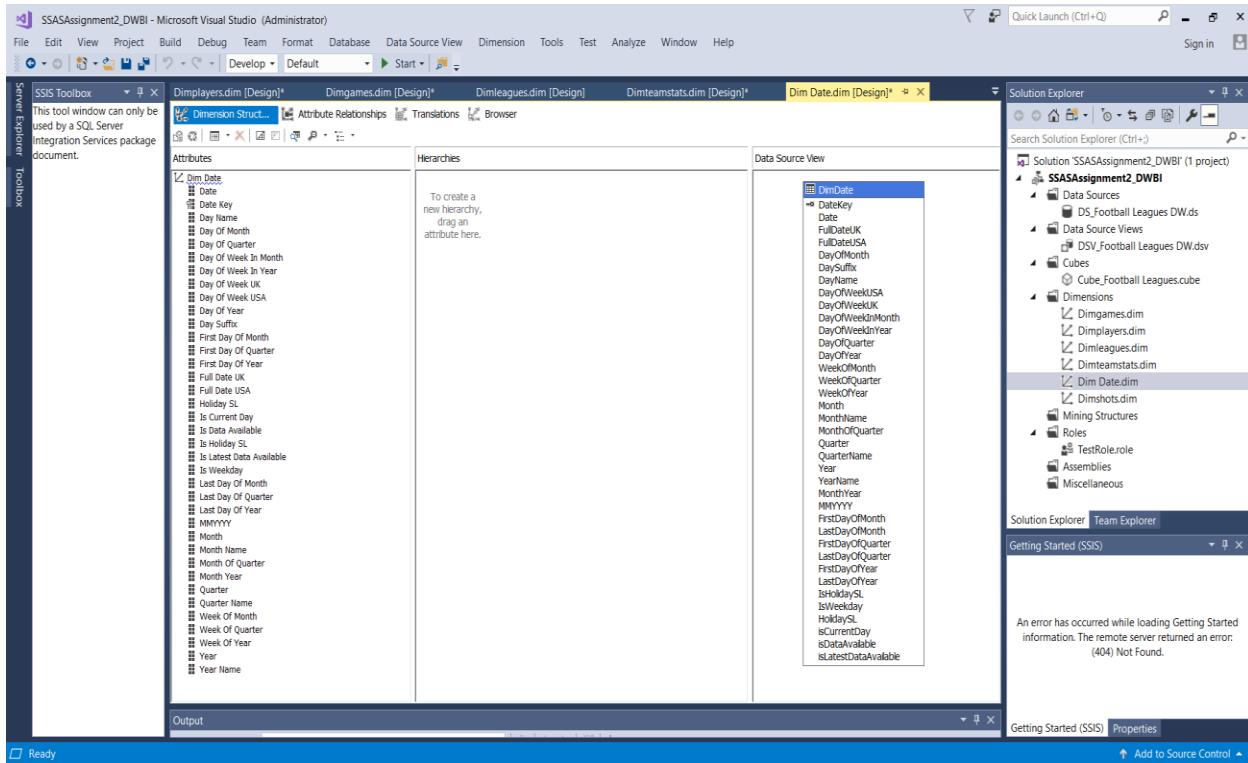
Under the Cubes folder I created new cube using above data source view called Cube_Football_Leagues.



Then I added attributes to all dimensions and created hierarchy to relevant dimensions.







These are the 2 hierarchies that was created,

The screenshot shows the Microsoft Analysis Services Dimension Studio interface. The top menu bar includes tabs for 'Dimplayers.dim [Design]*', 'Dimleagues.dim [Design]', 'Dimteamstats.dim [Design]*', 'Dim Date.dim [Design]*', and 'Dimshots.dim [Design]*'. Below the menu, there are tabs for 'Dimension Structure...', 'Attribute Relationships', 'Translations', and 'Browser'. The main window is divided into three panels: 'Attributes' on the left, 'Hierarchies' in the center, and 'Data Source View' on the right.

- Attributes Panel:** Shows a tree view of attributes for the 'Dimplayers' dimension, including Address Line, Alternateplayer ID, City, Country, Email Address, Gender, Name, Phone Number, Player SK, Province Name, and Title.
- Hierarchies Panel:** Shows a 'Hierarchy' node with a tooltip: 'To create a new hierarchy, drag an attribute here.' Below it is a list of attributes: Country, Province Name, City, Address Line, and <new level>.
- Data Source View Panel:** Shows the structure of the 'Dimplayers' data source view, listing columns: playerSK, AlternateplayerID, gender, name, title, phoneNumber, emailAddress, addressLine, city, provinceName, country, StartDate, EndDate, InsertDate, and ModifiedDate.

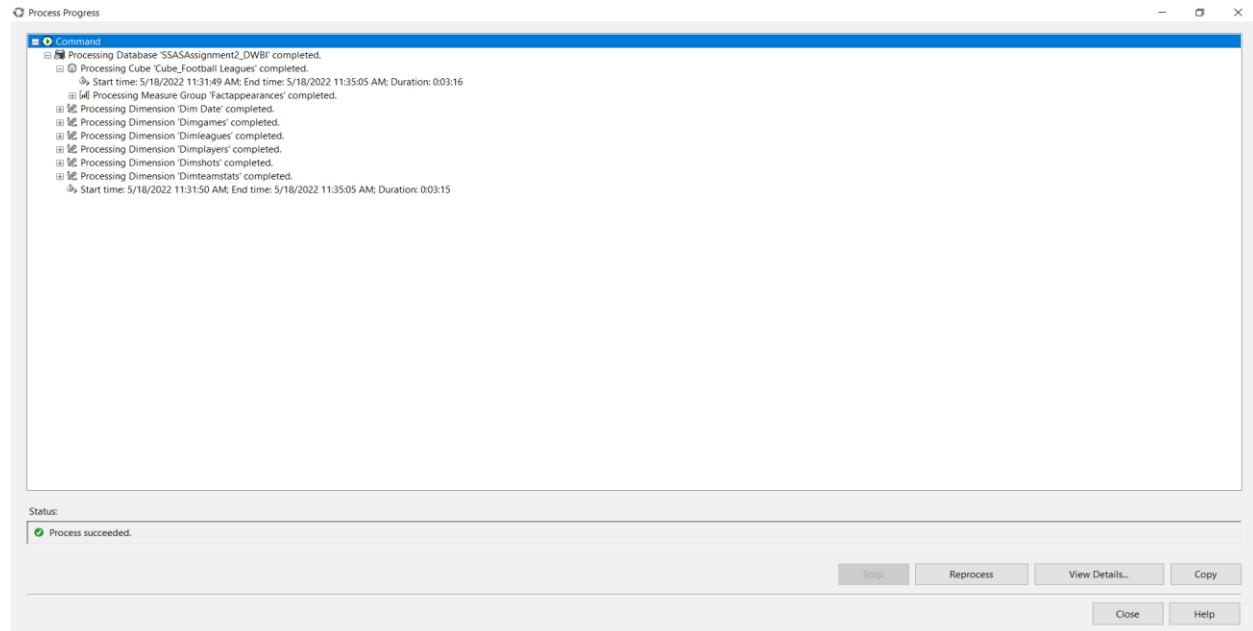
After been deployed folder structure is shown as below,

The screenshot shows the Microsoft Visual Studio Solution Explorer window. The tree view displays the deployed folder structure for the project 'SSASAssignment2_DWBI'.

- Solution 'SSASAssignment2_DWBI' (1 project)**
 - SSASAssignment2_DWBI**
 - Data Sources**
 - DS_Football Leagues DW.ds
 - Data Source Views**
 - DSV_Football Leagues DW.dsv
 - Cubes**
 - Cube_Football Leagues(cube)
 - Dimensions**
 - Dimgames.dim
 - Dimplayers.dim** (highlighted in gray)
 - Dimleagues.dim
 - Dimteamstats.dim
 - Dim Date.dim
 - Dimshots.dim
 - Mining Structures**
 - Roles**
 - TestRole(role)
 - Assemblies**
 - Miscellaneous**

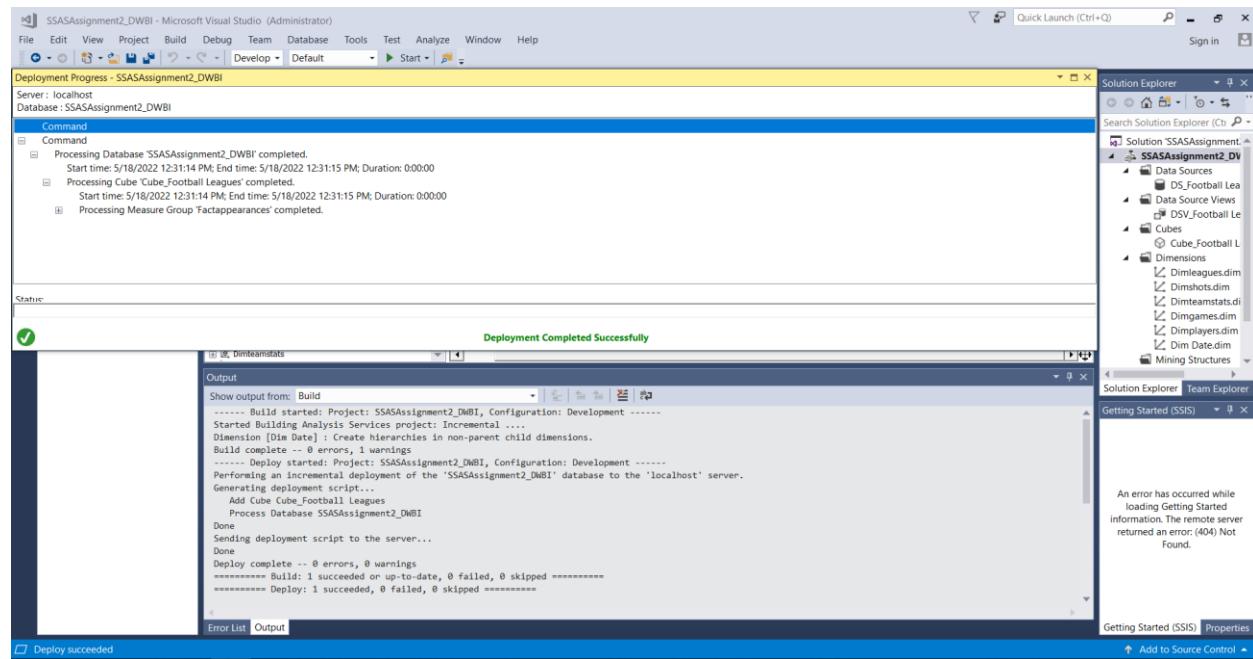
4. Process the Cube

After finishing all the above steps, the cube is processed. If it is successfully processed a message is displayed signifying process succeeded as shown below.



5. Deploy the Cube

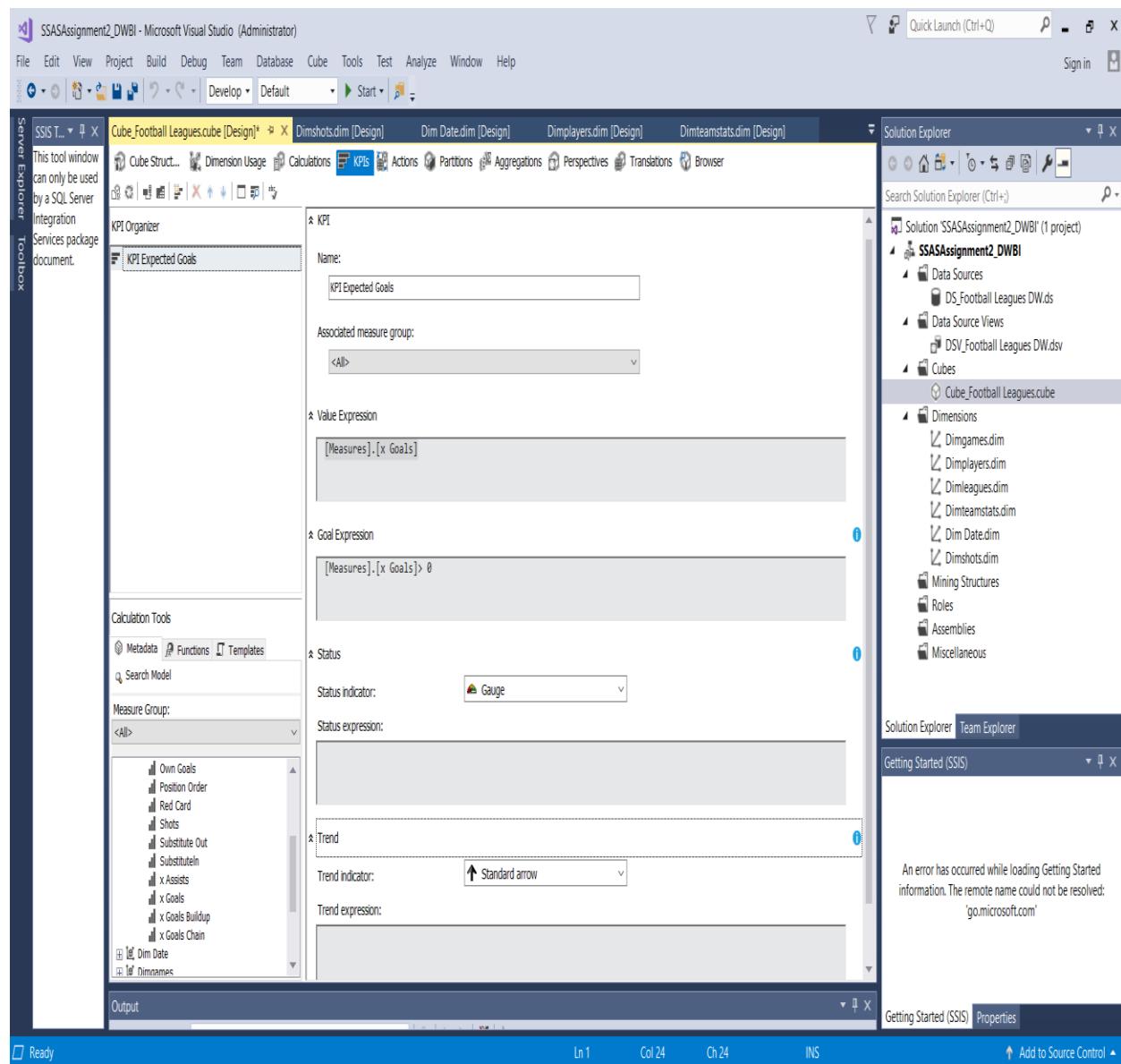
After finishing the process step, the cube is deployed. If it is successfully deployed a message is displayed signifying Deployment Completed Successfully as shown below.



6. Create KPI

KPIs are developed based on the needs of the organization. It is a measurable value that shows how well an organization accomplishes essential business objectives. KPIs are used by businesses to assess their progress toward achieving their objectives.

Following Figure shows the KPI which I created after the deploying cube. These are the KPI values which created for Appearances. It can be used for determining how much of expected goals took more than 0.



7. Browse Cube Data

Browsing data is done via using SSMS. By connecting SSAS to SSMS using instance and MDX queries can generated by selecting the relevant fields from the dimensions.

When browsing cube data, a KPI value or measurement value is compulsory .Otherwise it will not be executed.

Below figure shows how to browse data in SSMS,

The screenshot shows the Microsoft SQL Server Management Studio (SSMS) interface. The title bar reads "Cube_Football Leagues [Browse] - Microsoft SQL Server Management Studio (Administrator)". The menu bar includes File, Edit, View, Project, Cube, Tools, Window, Help. The toolbar has various icons for file operations like New Query, Save, Print, etc. The Object Explorer on the left shows the database structure: DESKTOP-56Q9340 (Microsoft Analysis Server 15), Databases (SSASAssignment2_DWBI), Data Sources (DS_Football Leagues DW), Data Source Views (DSV_Football Leagues DW), Cubes (Cube_Football Leagues), Dimensions (Dim Date, Dimgames, Dimleagues, Dimplayers, Dimshots, Dimentteamstats), Mining Structures, Roles, Assemblies, Management. The Cube_Football Leagues node is expanded, showing Measures, KPIs, KPI Expected Goals (Value, Goal), and Dim Date, Dimgames, Dimplayers, Dimshots, Dimentteamstats, Game - League, League. The Results pane displays the data from the cube. The top part of the Results pane has columns for Dimension, Hierarchy, Operator, Filter Expression, and Parameters. Below this is a table with columns: Email Address, Shot Result, Location, League Name, Position X, KPI Expected Goals Value, and KPI Expected Goals Goal. The data shows various shots across different leagues and locations, with most values being null or false for the KPI columns.

Email Address	Shot Result	Location	League Name	Position X	KPI Expected Goals Value	KPI Expected Goals Goal
d.m.lang@...	BlockedShot	a	Bundesliga	1	(null)	False
d.m.lang@...	BlockedShot	a	La Liga	1	(null)	False
d.m.lang@...	BlockedShot	a	Ligue 1	1	(null)	False
d.m.lang@...	BlockedShot	a	Premier Leag...	1	(null)	False
d.m.lang@...	BlockedShot	a	Serie A	1	(null)	False
d.m.lang@...	BlockedShot	a	Unknown	1	(null)	False
d.m.lang@...	BlockedShot	h	Bundesliga	1	(null)	False
d.m.lang@...	BlockedShot	h	La Liga	1	(null)	False
d.m.lang@...	BlockedShot	h	Ligue 1	1	(null)	False
d.m.lang@...	BlockedShot	h	Premier Leag...	1	(null)	False
d.m.lang@...	BlockedShot	h	Serie A	1	(null)	False
d.m.lang@...	BlockedShot	h	Unknown	1	(null)	False
d.m.lang@...	BlockedShot	h	Bundesliga	1	(null)	False
d.m.lang@...	BlockedShot	h	La Liga	1	(null)	False
d.m.lang@...	BlockedShot	h	Ligue 1	1	(null)	False
d.m.lang@...	BlockedShot	h	Premier Leag...	1	(null)	False
d.m.lang@...	BlockedShot	h	Serie A	1	(null)	False
d.m.lang@...	BlockedShot	h	Unknown	1	(null)	False
d.m.lang@...	Goal	a	Bundesliga	1	(null)	False
d.m.lang@...	Goal	a	La Liga	1	(null)	False
d.m.lang@...	Goal	a	Ligue 1	1	(null)	False
d.m.lang@...	Goal	a	Premier Leag...	1	(null)	False
d.m.lang@...	Goal	a	Serie A	1	(null)	False
d.m.lang@...	Goal	a	Unknown	1	(null)	False
d.m.lang@...	Goal	h	Bundesliga	1	(null)	False

Step 3 – Demonstration of OLAP Operations

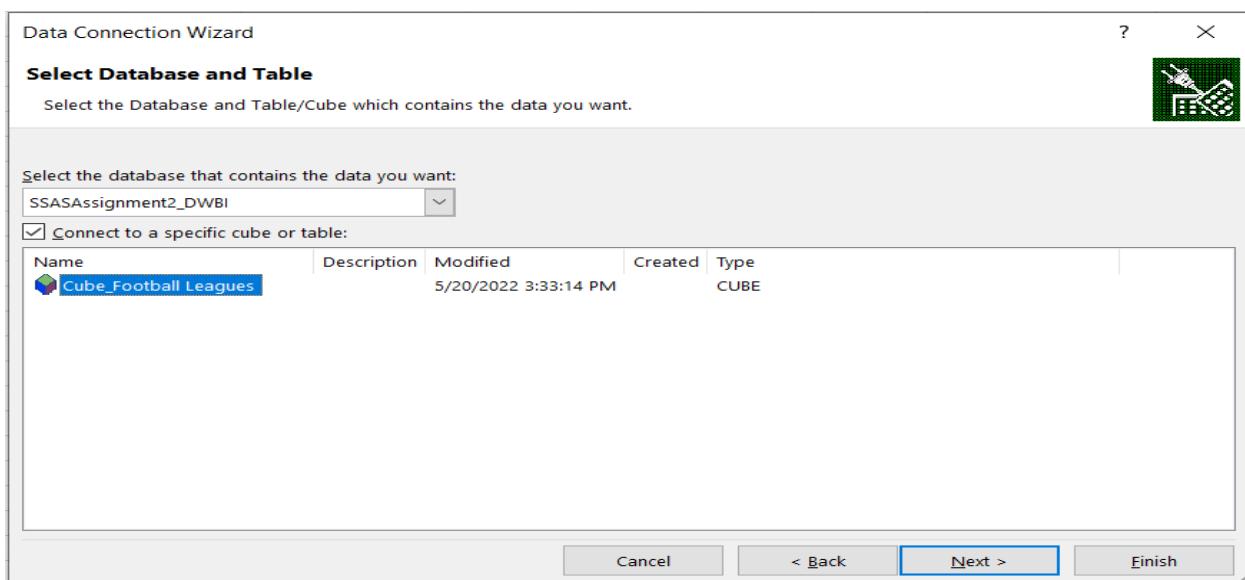
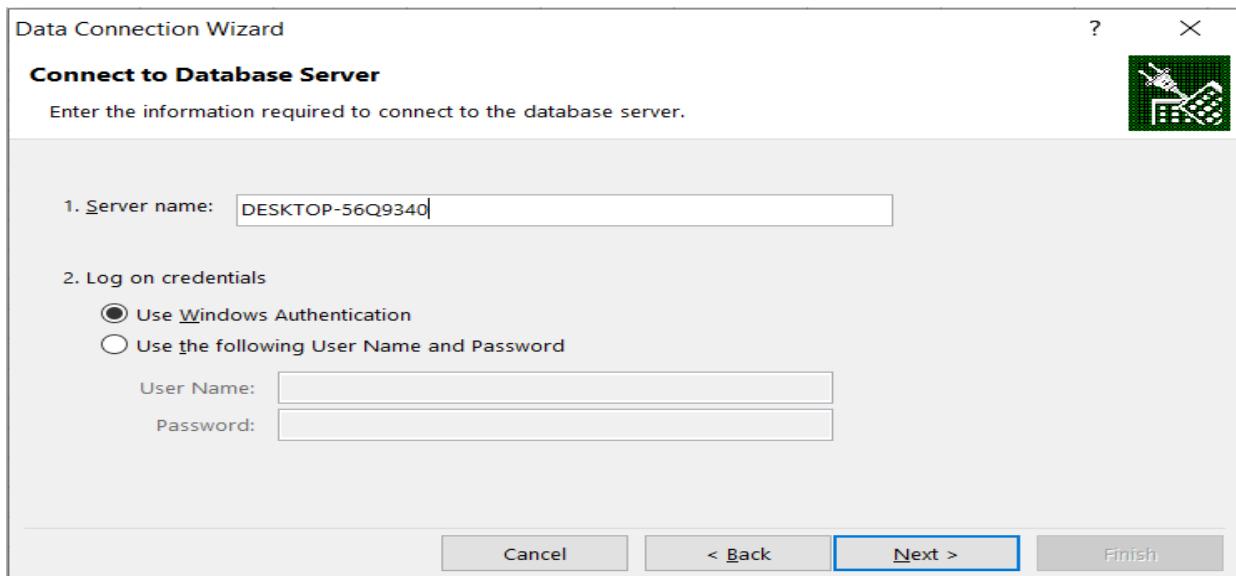
Used Tools:-

Microsoft Excel

SQL Server Management Studio

SSAS – SQL Server Analysis Services

To display the OLAP operation first, the Excel to SSAS Cube without using MDX queries. In this way, I connected with the whole set of fact and dimension tables. And below picture show how to connect the Excel to SSAS Cube successfully.



Data Connection Wizard

Save Data Connection File and Finish

Enter a name and description for your new Data Connection file, and press Finish to save.

File Name: DESKTOP-56Q9340 SSASAssignment2_DWBI Cube_Football Leagues.odc

Save password in file

Description: (To help others understand what your data connection points to)

Friendly Name: DESKTOP-56Q9340 SSASAssignment2_DWBI Cube_Football Leagues

Search Keywords:

Always attempt to use this file to refresh data

Excel Services: Authentication Settings...

Existing Connections

Select a Connection or Table

Show: All Connections

Connections in this Workbook
<No connections found>

Connection files on the Network
<No connections found>

Connection files on this computer

 DESKTOP-56Q9340 SSASAssignment2_DWBI Cube_Football Leagues
[Blank]

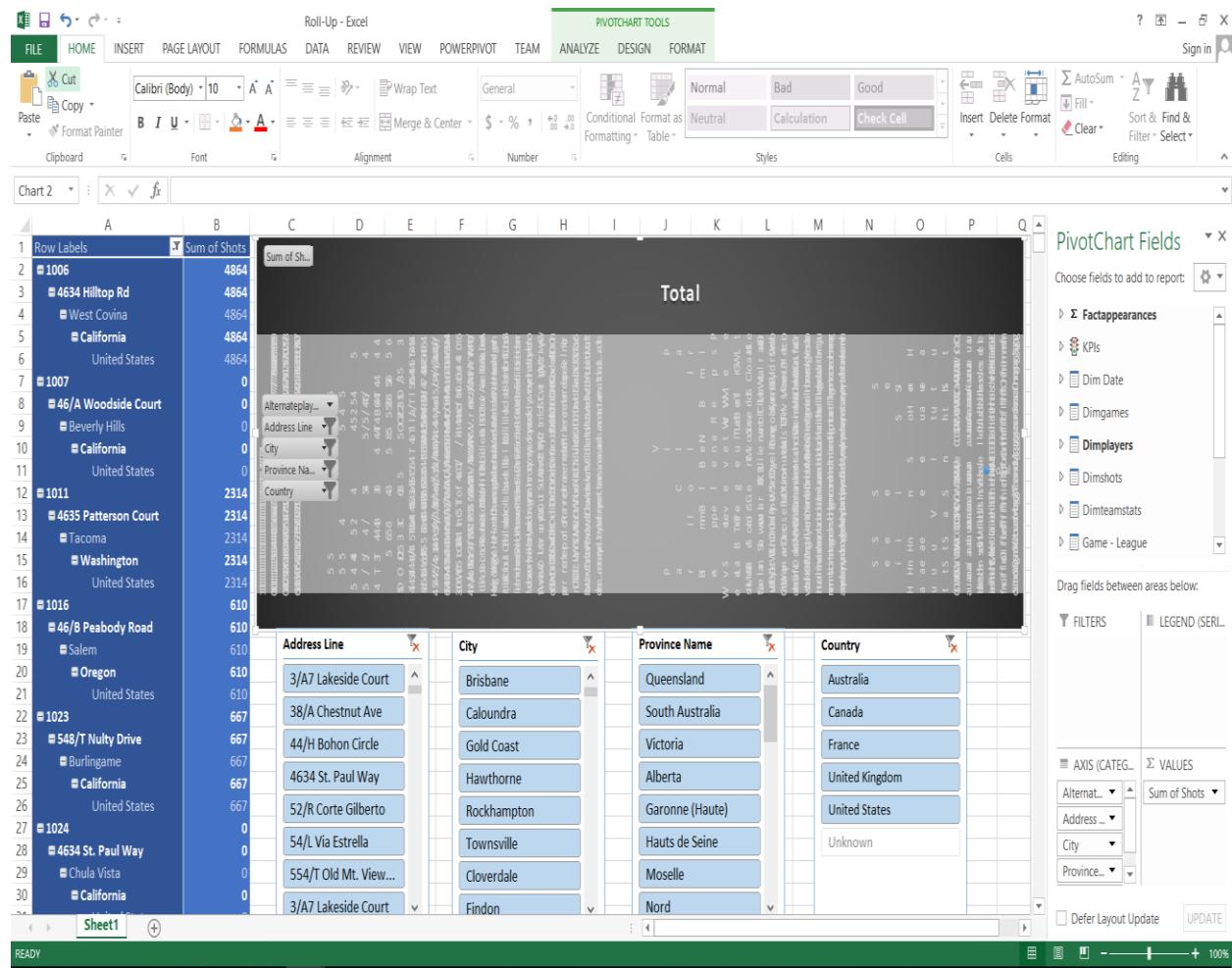
1. Roll-up

Climbing up a hierarchy of a dimension to aggregate data is what the Roll up OLAP function in cubes signifies.

In this following excel sheet shows shots of the appearances.

I have included a hierarchy (Country → Province Name → City → Address Line → playerID) below chart shows the patient's address details climbing up from a lower stage to higher stage.

In the graph I showed the sum of sots.



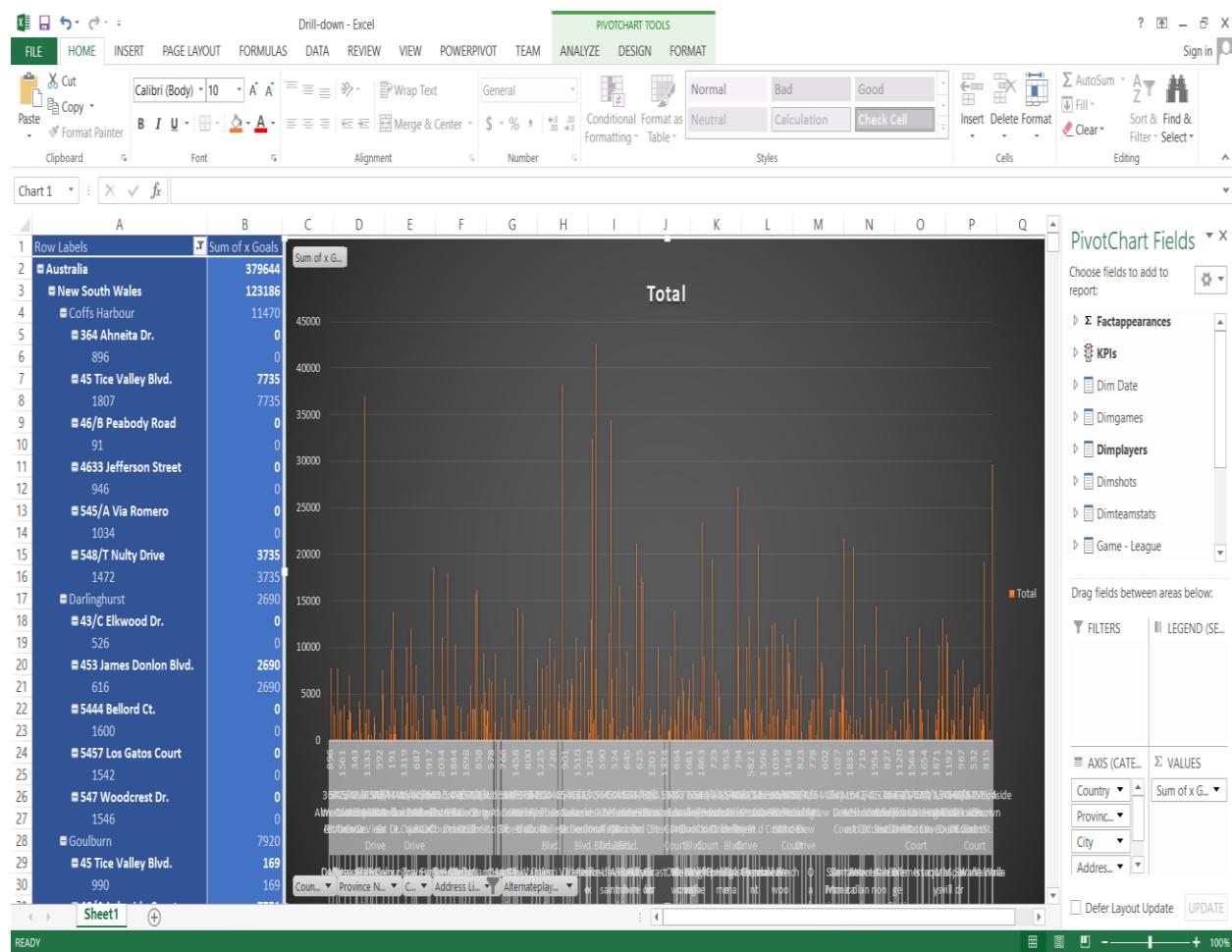
2. Drill-Down

In cubes, the drill down OLAP function entails navigating through details by moving down a hierarchy of a dimension.

Following Figure shows country can be drilled down to province name and province name can be drilled down to cities, then cities can be drilled down to address line and from that we can find relevant playerID.

So, we can view the sum of xGoals player wise. This process is the opposite of the roll up operation.

And the graph shows country wise sum of xGoals.



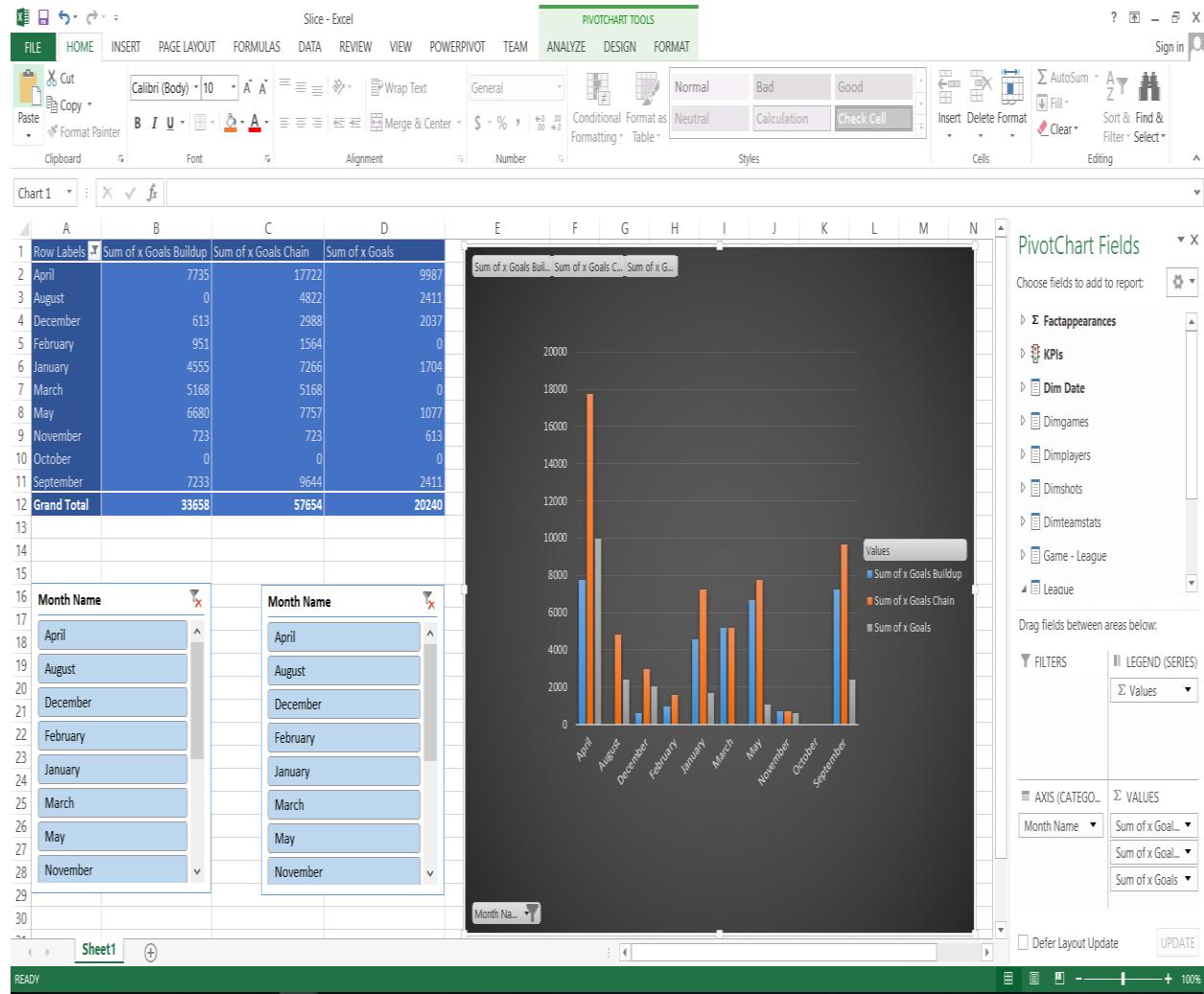
3. Slice

Slices are visual filters that can be used to filter data in a pivot table or chart. For the pivot table and pivot chart, I utilized two slices, one for each.

The slices I used to filter my pivot table and pivot chart are shown in the diagram below.

In this excel sheet I added the slicers on Month, when I clicked the Month, I can get the sum of xGoals, sum of xGoals Chain and sum of xGoals Build up according of the selected year. Also, I select more than one year and get details from multiple selections.

And the chart showed month-wise, sum of xGoals, sum of xGoals Chain and sum of xGoals Build up.

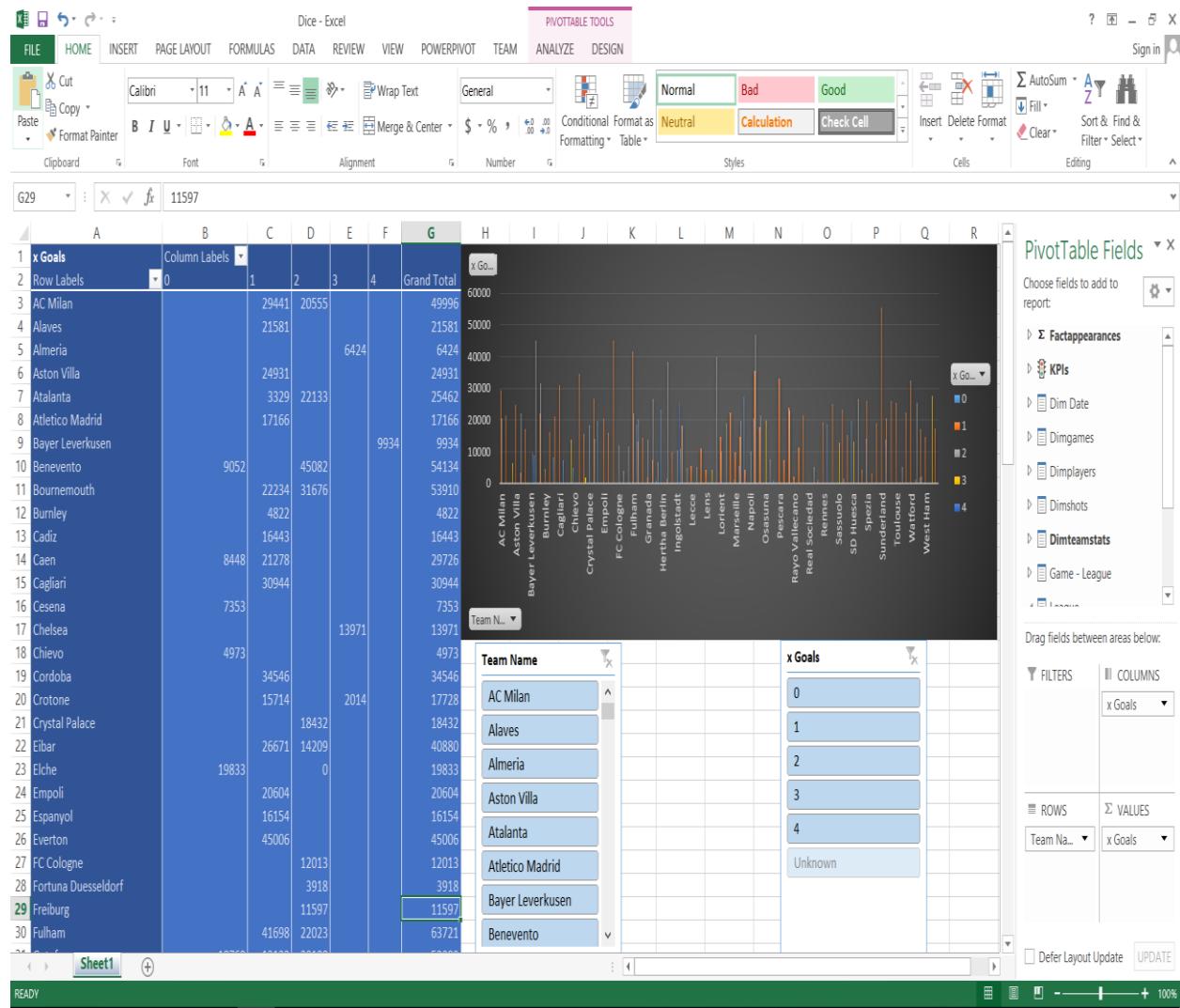


4. Dice

Selecting appropriate qualities to group the data by is referred to as dicing the data.

To analyze the data in the pivot table and pivot chart, I utilized two slicers. Those are teamstats slicer and appearances slicer. Then, I grouped data according to team name and xGoals.

After that, I can get goals-wise xGoals count of teams according to team name. And the graph show team name-wise count of xGoals has taken.

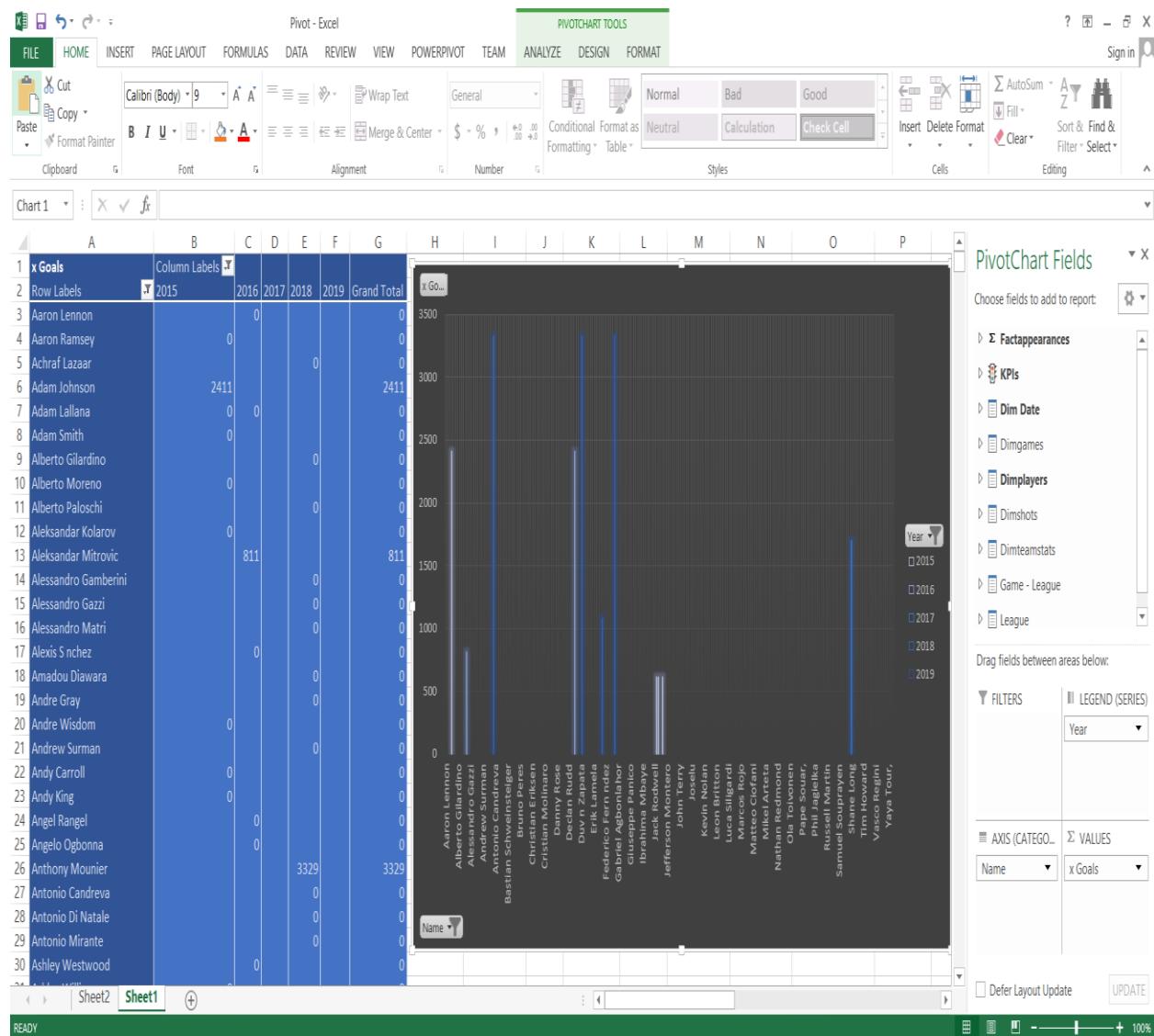


5. Pivot

A PivotTable is a useful tool for summarizing, analyzing, and presenting data in a visual format. Pivot Charts offer visualizations to the summary data in a PivotTable, making them more useful.

Here I used pivot table and pivot chart to display the players expected goals of year wise.

The graph shows xGoals count of players name according to the year.



Step 4 – SSRS Reports

Used Tools:-

Report Builder

SSRS web portal

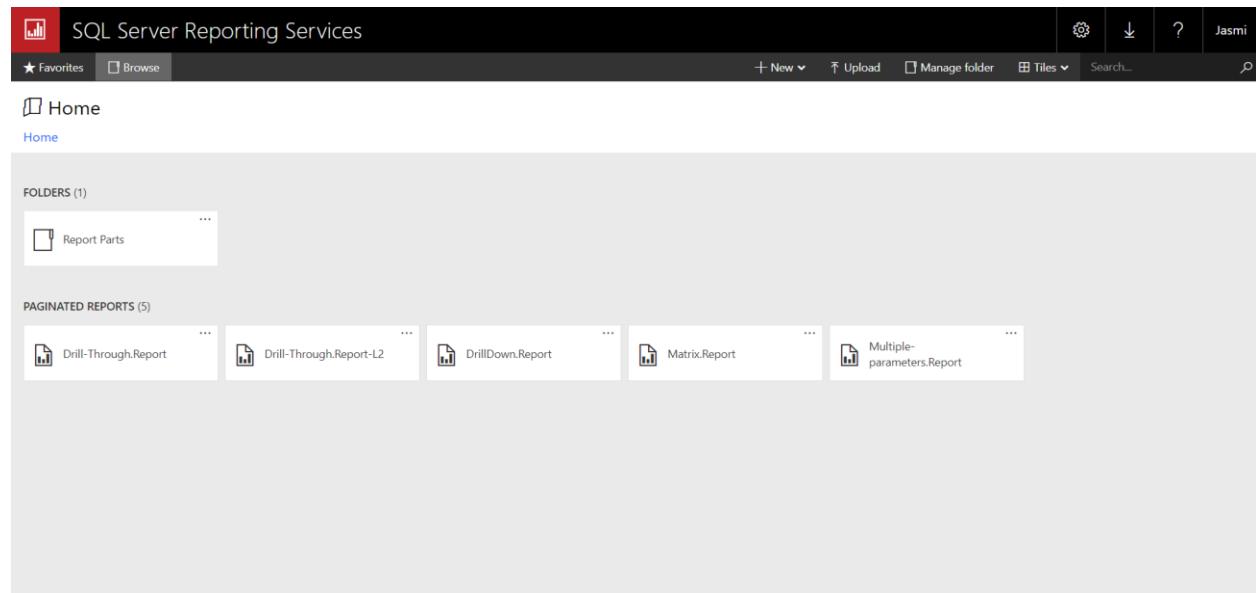
Reporting Service Configuration Manager

SQL Server Management Studio

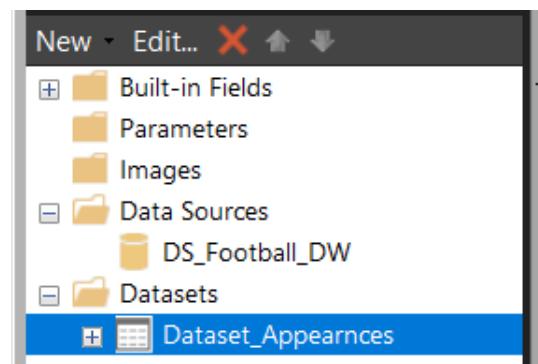
Report Server database

SQL Server Reporting Services

Below figure show the web portal view. In there, the created paginated reports and SSRS folder is displayed.

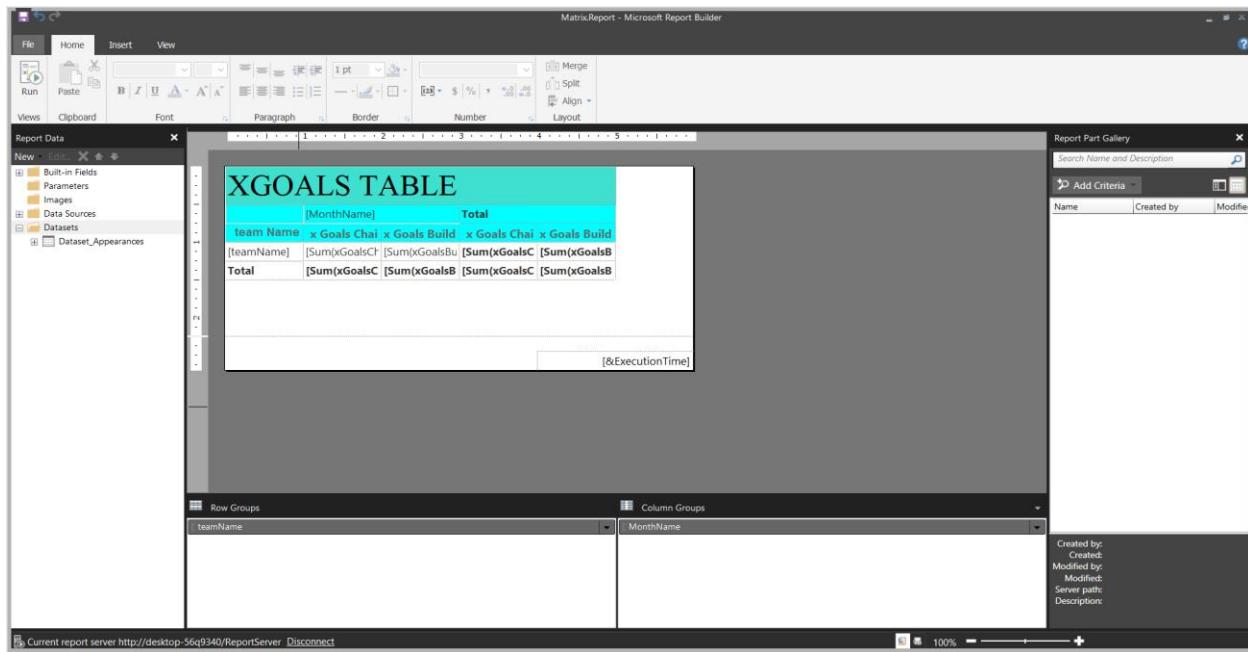


This is the main structure of the SSRS in Report Builder.

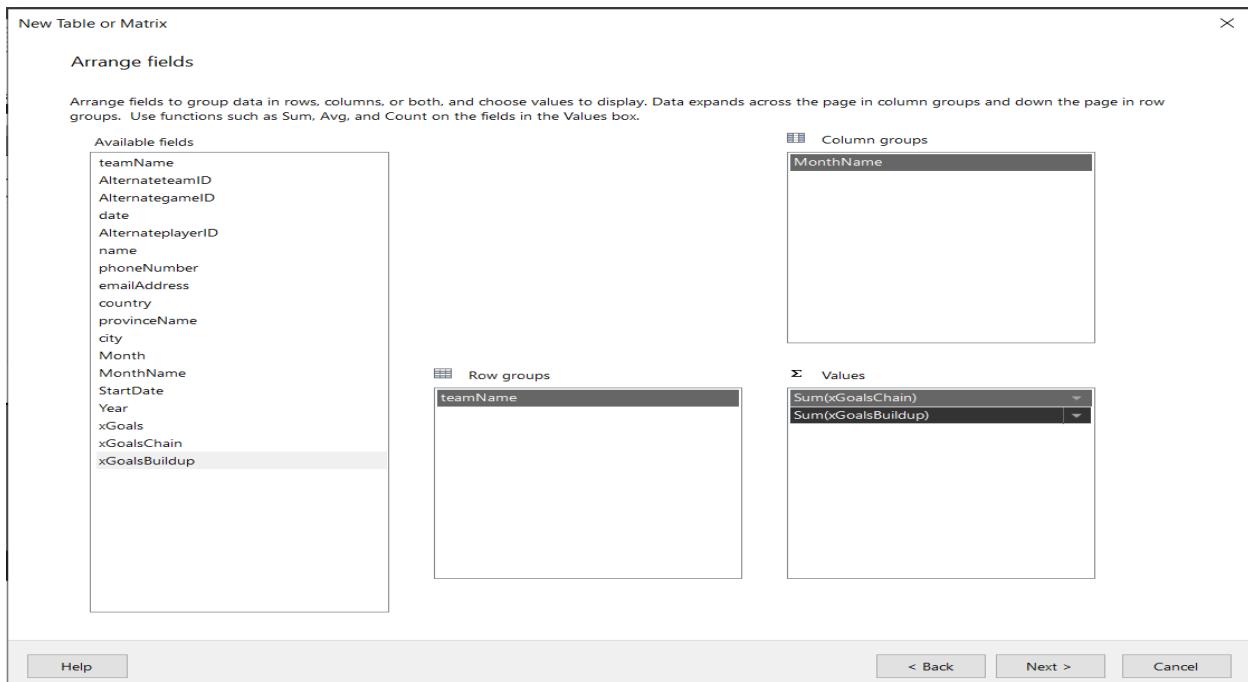


1. Report 1 : Report with a matrix

This is the structure of the SSRS in Report Builder in report with a matrix. My SSRS project is named as Matrix.Report and the created report can be seen as the figure.



Below figure shows how to add columns according to the report,



Below report shows month wise expected goals chain and expected goals buildup according to team name. And the pie chart shows month wise xGoals percentages.

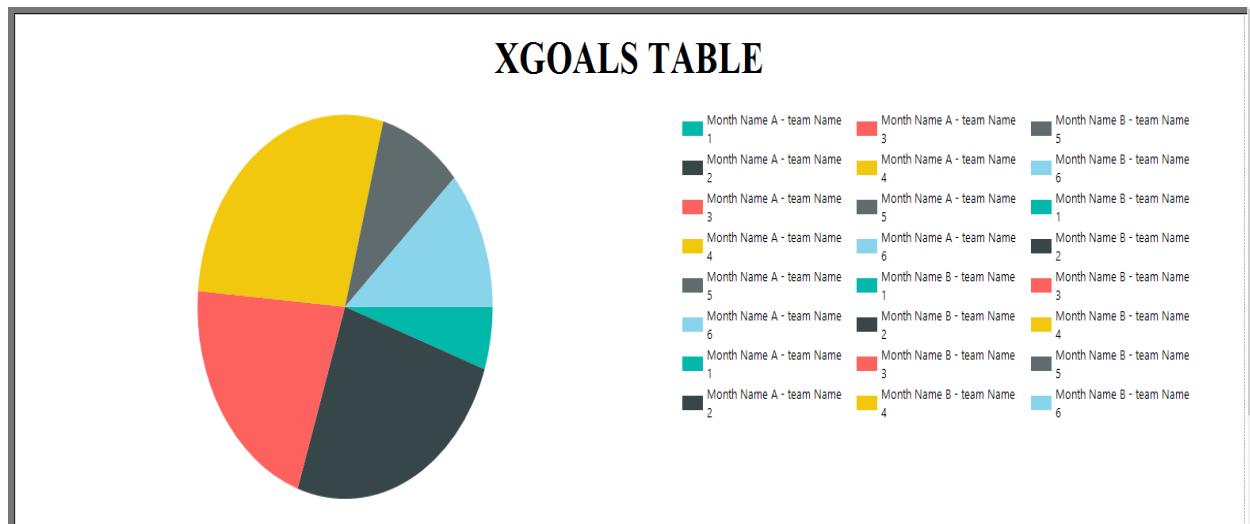
SQL Server Reporting Services

Home > Matrix Report

1 of 2? Find | Next

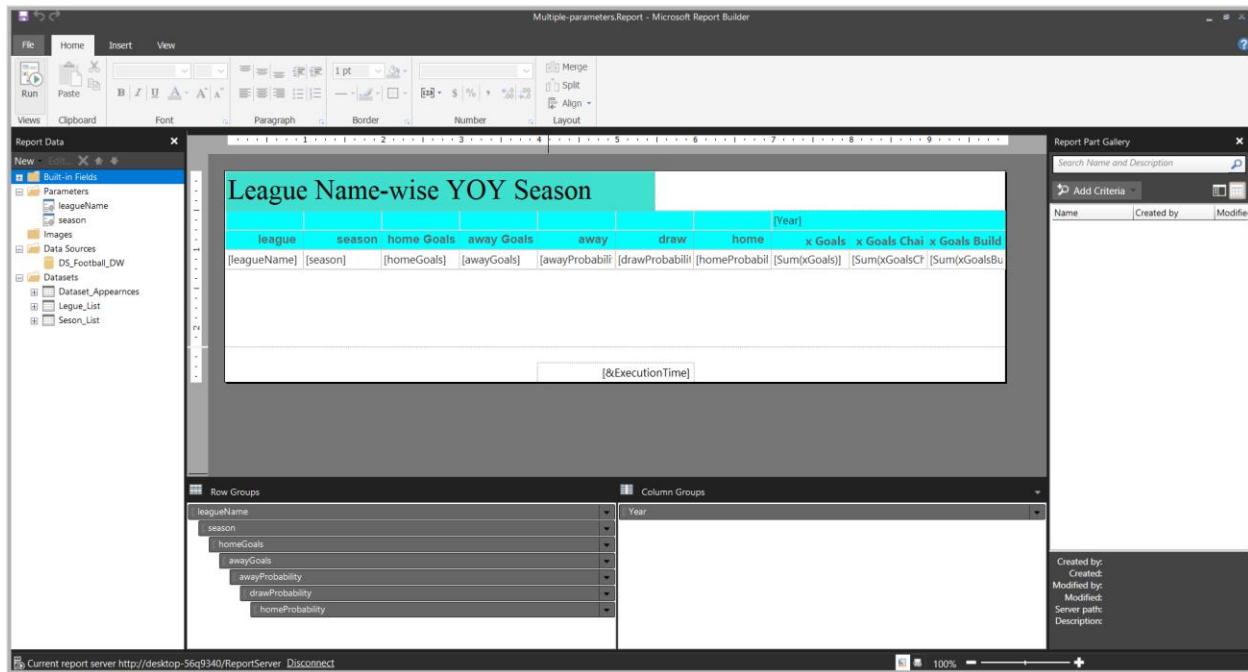
XGOALS TABLE

	April	August	December	February	January	March	May	November
team Name	x Goals Chain	x Goals Buildup						
AC Milan						1007	0	613
Alaves	0	0		0	0	0	613	1077
Almeria	0	0		0	613	613	0	613
Atlanta	6658	3329		0	613	0	0	0
Atletico Madrid				0	0			
Benevento				0	0		0	
Bournemouth	0	0		613	0	0	613	3329
Cadiz	0	0	0	0				1077
Caen	0	0					0	0
Cesena								2263
Cordoba	1077	1077	0	0		0	0	
Crotone	0	0		0	0	0	0	0
Crystal Palace				0	0	0	0	
Elbar	0	0				0	0	0
Elche				0	0			1
Everton				0	0			
Fortuna								



2. Report 2 : Report with more than one parameter

This is the structure of the SSRS in Report Builder in report with more than one parameter. My SSRS project is named as Multiple-parameters.Report and the created report can be seen as the figure.



In this report I used two parameters of league name and season. And multiple options can be selected in the parameter.

Then, it can be can selected values from league name drop down and season drop down and then relevant details related to parameter values is displayed.

Below figures shows two parameters and the result reports of them.



The screenshot shows the SQL Server Reporting Services interface. At the top, there's a navigation bar with icons for Home, Favorites, Browse, and Comments, and a user name 'Jasmi'. Below the navigation bar, the title 'Multiple-parameters.Report' is displayed. The main content area shows a report form with a 'League Name' input field containing 'Premier League,Serie A' and a 'Season' dropdown menu. The 'Season' dropdown contains several entries for the year 2016, indicating a parameter issue where the same value appears multiple times.

SQL Server Reporting Services

Favorites Browse Comments

Home > Multiple-parameters.Report

League Name: Premier League,Serie A Season: 2015,2016

View Report

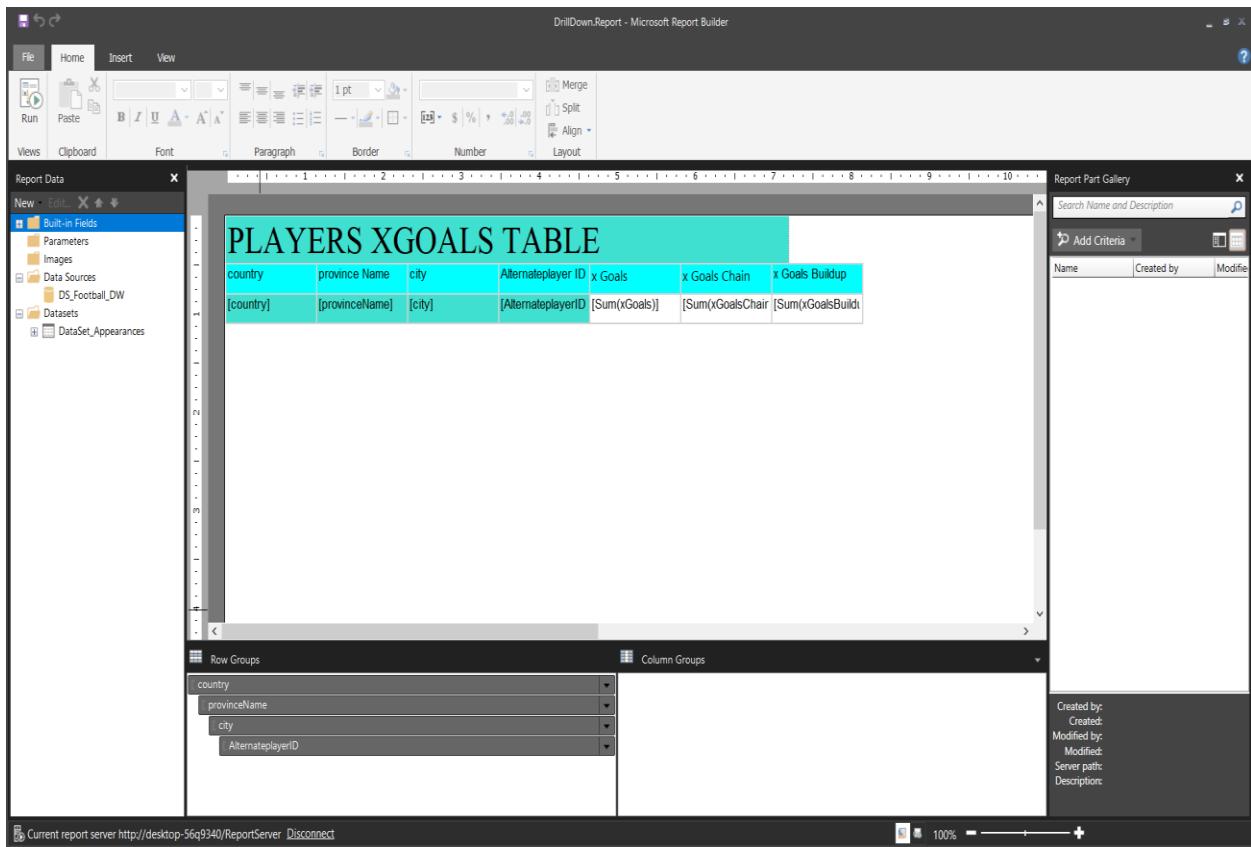
1 of 2? Find | Next

League Name-wise YOY Season

league Name	season	home Goals		away Goals		draw Probability	home Probability	2015		2016		2017	
		Goals	Probability	Goals	Probability			x Goals	x Goals Chain	x Goals	x Goals Buildup	x Goals	x Goals Chain
Premier League	2015	0	0	0	0	0	0	0	0	0	0	0	0
						1			0	0	0	0	0
						1	0	0	0	0	0	0	0
						1	0	0	0	0	0	0	0
						1	0	0	0	0	0	0	0
						1	0	0	0	0	0	0	0
						2	0	0	1	0	0	0	0
						3	0	0	0	0	0	0	0
						1	0	0	613	613	613	613	613
						1	0	0	613	0	2411	9644	7233
						1	0	0	613	1226	0	0	1704
						1	0	0	0	0	0	1226	613
						1	0	0	0	613	0	1226	1226
						2	0	0	0	0	0	0	0
						1	0	0	0	0	0	0	0
						1	0	0	0	0	0	338	338

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

This is the structure of the SSRS in Report Builder in drill-down report. My SSRS project is named as DrillDown.Report and the created report can be seen as the figure.



Drill Down Reports allow users to Show or Hide Column Data by using plus and minus symbols.

In here we can view players' address details are hidden by providing a plus sign. It can be expanded by clicking plus sign to see other hidden fields. In this table, we can find a particular xGoals, xGoals chain and xGoals buildup of the player by clicking the relevant country and dropping down the correct information from the hierarchy.

In the bar chart shows city wise xGoals, xGoals chain and xGoals buildup count.

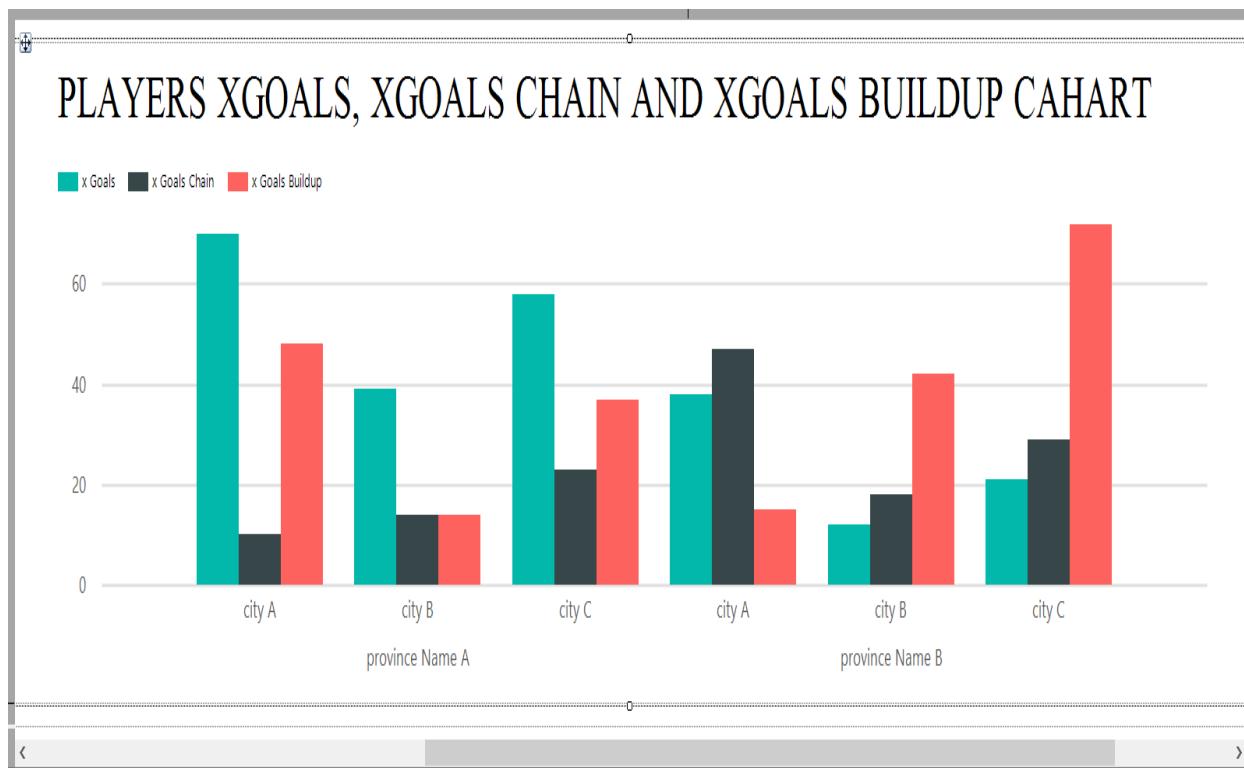
SQL Server Reporting Services

Favorites Browse Home DrillDown.Report 1 of 1 100% Find | Next

PLAYERS XGOALS TABLE

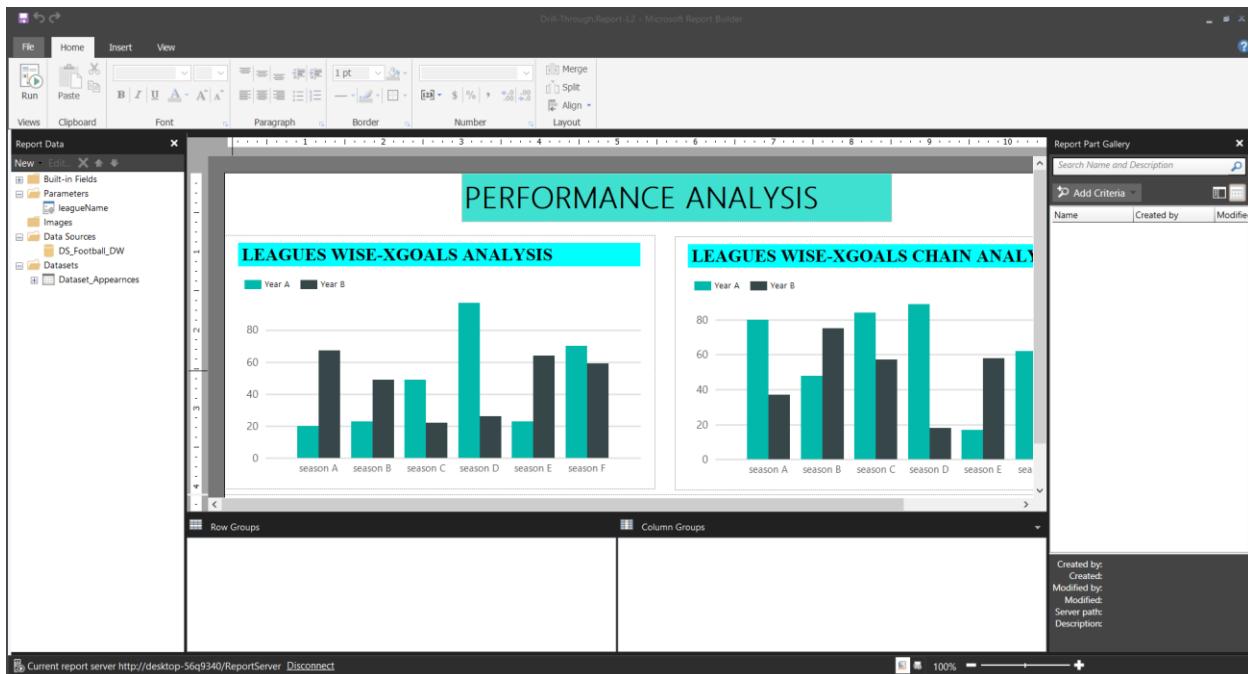
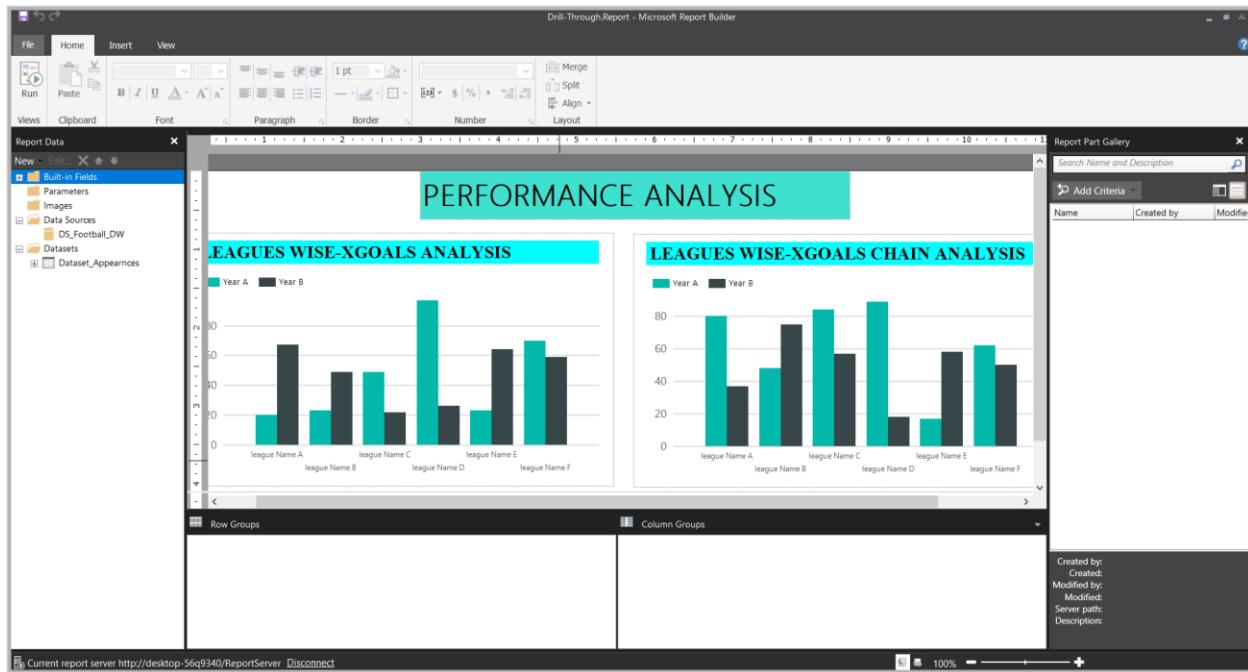
country	province Name	city	Alternateplayer ID	x Goals	x Goals Chain	x Goals Buildup
Australia	New South Wales			0	6966	6966
	Queensland	Brisbane		0	0	0
		Caloundra		0	0	0
		East Brisbane	607	0	0	0
			1319	0	0	0
		Gold Coast		0	613	613
		Rockhampton	687	0	2411	0
			1243	0	0	0
		Townsville		0	3329	3329
	South Australia	Findon	529	0	0	0
Canada	Tasmania			0	0	0
	Victoria			0	3024	2411
United States				0	613	613
France				3394	10371	5179
United Kingdom				3942	3329	0
United States				12904	26660	14547

5/22/2022 9:40:45 AM



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

This is the structure of the SSRS in Report Builder in drill-through report. My SSRS project is named as Drill-Through.Report and Drill-Through.Report-L2 the created report can be seen as the figure.



A drill-through report is one that a user accesses by following a link from another report.

Drilling down through a report opens a new window with an entirely different visualization or report. In this report is visualized leagues wise xgoals and leagues wise xgaols chain.

Below figures shows that graphs and detailed reports of league wise xgoals and league wise xgaols chain.

