Sri Lanka Institute of Information Technology

Data Warehouse and Business Intelligence
IT3021

3ʳᵈYear, 1ˢᵗSemester

Assignment 2

Weekday Batch
Y3S1.15(DS)

IT19021430
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Acknowledgement

I would like to express my special thanks of gratitude to all the lecturers in charge of the module Data Warehouse and Business Intelligence, as well as Sri Lanka Institute of Information Technology who gave me the golden opportunity to do this wonderful project on the module Data Warehouse and Business intelligence, which also helped me in doing a lot of Research and i came to know about so many new things I am really thankful to them.

Secondly, I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.
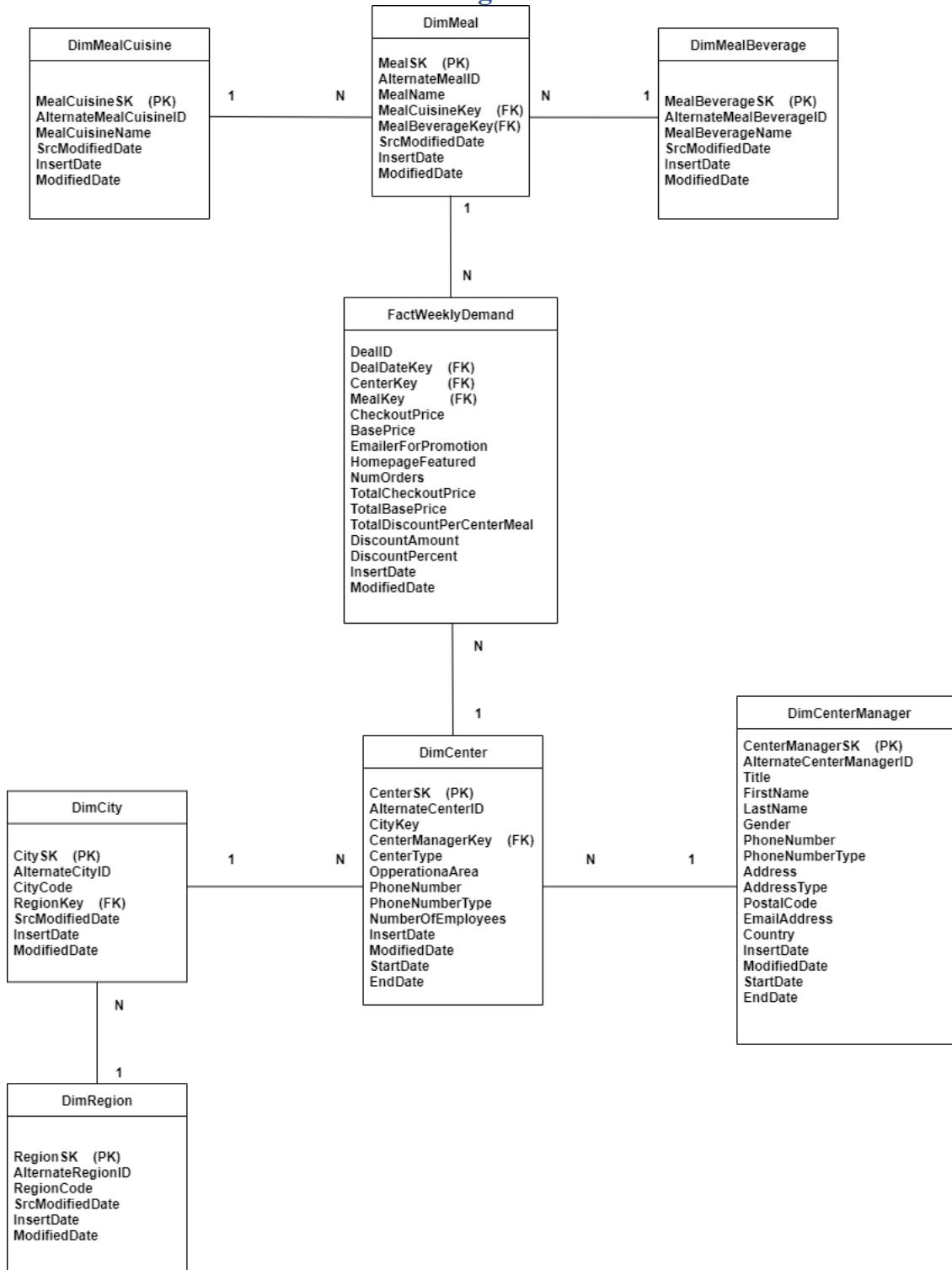
Contents

Introduction

This document contains details related to the Assignment 2 based on the implementation of the Cubes with related to the previously implemented data warehouse on the module Data Warehouse and Business Intelligence. The document also visualizes OLAP operations of the cubes. Each OLAP operations are explained with screen shots from the data retrieved from the Cube implemented. The document also includes SSRS reports and description on each operation with screen shots of the implementation.

1.0 Data source for the assignment 2
1.1 Meal Demand Data Warehouse ER Diagram

DimMealCuisine

MealCuisineSK   (PK)
AlternateMealCuisineID
MealCuisineName
SrcModifiedDate
InsertDate
ModifiedDate

DimMeal

MealSK   (PK)
AlternateMealID
MealName
MealCuisineKey   (FK)
MealBeverageKey(FK)
SrcModifiedDate
InsertDate
ModifiedDate

DimMealBeverage

MealBeverageSK   (PK)
AlternateMealBeverageID
MealBeverageName
SrcModifiedDate
InsertDate
ModifiedDate

1   N   N   1

1

N

FactWeeklyDemand

DealID
DealDateKey   (FK)
CenterKey   (FK)
MealKey   (FK)
CheckoutPrice
BasePrice
EmailerForPromotion
HomepageFeatured
NumOrders
TotalCheckoutPrice
TotalBasePrice
TotalDiscountPerCenterMeal
DiscountAmount
DiscountPercent
InsertDate
ModifiedDate

N

1

DimCenterManager

CenterManagerSK   (PK)
AlternateCenterManagerID
Title
FirstName
LastName
Gender
PhoneNumber
PhoneNumberType
Address
AddressType
PostalCode
EmailAddress
Country
InsertDate
ModifiedDate
StartDate
EndDate

DimCenter

CenterSK   (PK)
AlternateCenterID
CityKey
CenterManagerKey   (FK)
CenterType
OpperationaArea
PhoneNumber
PhoneNumberType
NumberOfEmployees
InsertDate
ModifiedDate
StartDate
EndDate

DimCity

CitySK   (PK)
AlternateCityID
CityCode
RegionKey   (FK)
SrcModifiedDate
InsertDate
ModifiedDate

1   N   N   1

N

1

DimRegion

RegionSK   (PK)
AlternateRegionID
RegionCode
SrcModifiedDate
InsertDate
ModifiedDate

1.2 Data Set Selection

The selected data source is a collection of transactional data. The link to the source data set is mentioned below:

Link to chosen data set
https://www.kaggle.com/ghoshsaptarshi/av-genpact-hack-dec2018

The select data set is based on a meal delivery company which operates in multiple cities. The data set consists of various fulfillment centers in these cities for dispatching meal orders to their customers. Through the data set can be used to help these centers with demand forecasting for upcoming weeks so that these centers will plan the stock of raw materials accordingly.

Aim of the data set
The source data set is been provided to predict the demand for the next 10 weeks based on the history of 145 weeks for the center meal combinations.
Staffing of centers based on demand
Procurement planning – Raw materials (raw materials are perishable)

The source data set consists
- Historical data of demand for a product-center combination (Weeks: 1 to 145)
- Product (Meal) features such as category, sub-category, current price and discount
- Information for fulfillment center like center area, city information etc.

More details about the Data warehouse implemented are given in the below chart.

## 1.3 Meal Demand Datawarehouse Data Description

Dimension Name	Dimension Attributes	Derived	DataType		Key	Derived Logic
DimMeal	**MealSK**	Y		Not Null	PK	Auto incrementing
	AlternateMealID	N	Int	Not Null		
	MealName	N	Nvarchar(50)			
	MealCuisineKey	N	Int		FK	
	MealBeverageKey	N	Int		FK	
	SrcModifiedDate	N	DateTime			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime
DimMealCuisine	**MealCuisineSK**	Y	Int	Not Null	PK	Auto incrementing
	AlternateMealCuisineID	N	Int	Not Null		
	MealCuisineName	N	Nvarchar(50)			
	SrcModifiedDate	N	DateTime			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime
DimMealBeverage	**MealBeverageSK**	Y	Int	Not Null	PK	Auto incrementing
	AlternateMealBeverageID	N	Int	Not Null		
	MealBeverageName	N	Nvarchar(50)			
	SrcModifiedDate	N	DateTime			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime

DimCenterManager	CenterManagerSK	Y	Int	Not Null	PK	Auto incrementing
	AlternateCenterManagerID	N	Int	Not Null		
	Title	N	Nvarchar(8)			
	FirstName	N	Nvarchar(50)			
	LastName	N	Nvarchar(50)			
	Gender	N	Nvarchar(1)			
	PhoneNumber	N	Nvarchar(25)			
	PhoneNumberType	N	Nvarchar(50)			
	Address	N	Nvarchar(50)			
	AddressType	N	Nvarchar(50)			
	PostalCode	N	Nvarchar(50)			
	EmailAddress	N	Nvarchar(50)			
	Country	N	Nvarchar(50)			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime
	StartDate	Y	datetime			SysDateTime
	EndDate	Y	datetime			SysDateTime
DimCity	CitySK	Y	Int	Not Null	PK	Auto incrementing
	AlternateCityID	N	Int	Not Null		
	CityCode	N	Int			
	RegionKey	N	Int		FK	
	SrcModifiedDate	N	DateTime			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime
DimRegion	RegionSK	Y	Int	Not Null	PK	Auto incrementing
	AlternateRegionID	N	Int	Not Null		
	RegionCode	N	Int			
	SrcModifiedDate	N	DateTime			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime

				Not Null	PK	
DimCenter	**CenterSK**	Y	Int	Not Null	PK	Auto incrementing
	AlternateCenterID	N	Int	Not Null		
	CityKey	N	Int		FK	
	CenterManagerKey	N	Int		FK	
	CenterType	N	Nvarchar(50)			
	OpperationaArea	N	Nvarchar(50)			
	PhoneNumber	N	Nvarchar(25)			
	PhoneNumberType	N	Nvarchar(50)			
	NumberOfEmployees	N	Int			
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime
	StartDate	Y	datetime			SysDateTime
	EndDate	Y	datetime			SysDateTime
FactWeeklyDemand	**DealID**	N	Int	Not Null		
	DealDateKey	N	int		FK	
	CenterKey	N	Int		FK	
	MealKey	N	int		FK	
	CheckoutPrice	N	Money			
	BasePrice	N	Money			
	EmailerForPromotion	N	Int			
	HomepageFeatured	N	Int			
	NumOrders	N	Int			
	TotalCheckoutPrice	Y	Money			([CheckoutPrice]*[NumOrders])
	TotalBasePrice	Y	Money			([BasePrice]*[NumOrders])
	TotalDiscountPerCenterMeal	Y	Money			(([BasePrice]*[NumOrders]) - ([CheckoutPrice]*[NumOrders]))
	DiscountAmount	Y	Money			([BasePrice] – [CheckoutPrice])
	DiscountPercent	Y	Money			((([BasePrice] – [CheckoutPrice])/[BasePrice])* 100)
	InsertDate	Y	datetime			SysDateTime
	ModifiedDate	Y	datetime			SysDateTime

1.4 High-Level BI Solution Architecture

The basic concept of a Data Warehouse is to facilitate a single version of truth for a company for decision making and forecasting. A Data warehouse is an information system that contains historical and commutative data from single or multiple sources. Data Warehouse Concepts simplify the reporting and analysis process of organizations.
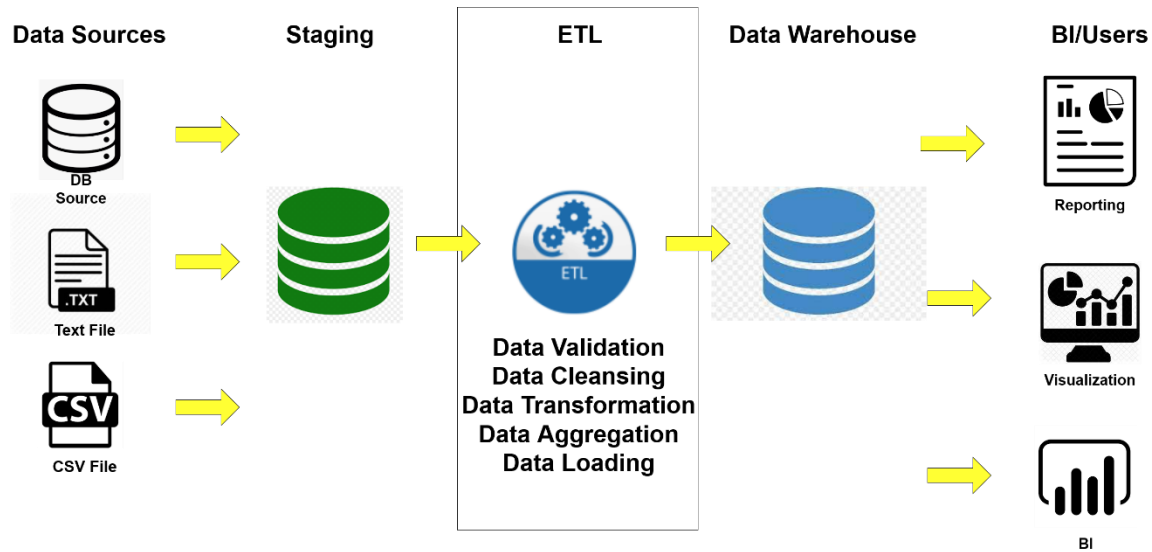
BI Layer

In business intelligence, data warehouses serve as the backbone of data storage. Business intelligence relies on complex queries and comparing multiple sets of data to inform everything from everyday decisions to organization-wide shifts in focus.

This layer includes

BI Applications - web applications, mobile applications, self-service BI tools, other data mining and modelling tools.

2.0 SSAS Cube implementation

Tools Required
- SQL Server Data Tools
- SQL Server Management Studio

Creating a new SSAS Project
- Create a 'Business Intelligence'
- Under 'Analysis Services' create a project 'Analysis Services Multidimensional and Data Mining Project.'
- Project Name Given – 'MealDemand_SSAS'

Configuring Data Sources.
- Connected to the Data warehouse previously done – 'MealDemand_DW'
- Provided the windows specific user name and password when configuring the data source
- Data Source Name – 'DS_MealDemand_DW'
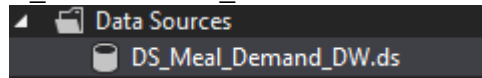
Configuring Data Source Views
- Created the connection to the relational data source previously created 'DS_MealDemand_DW'
- Create logical relationships by matching columns SK (Primary Keys) and the Alternative Key (Foreign Keys), created the mapping between tables.
- Source View Name – 'DSV_MealDemand_DW'
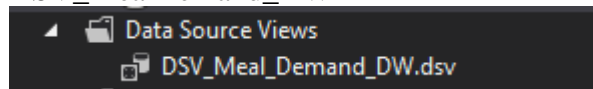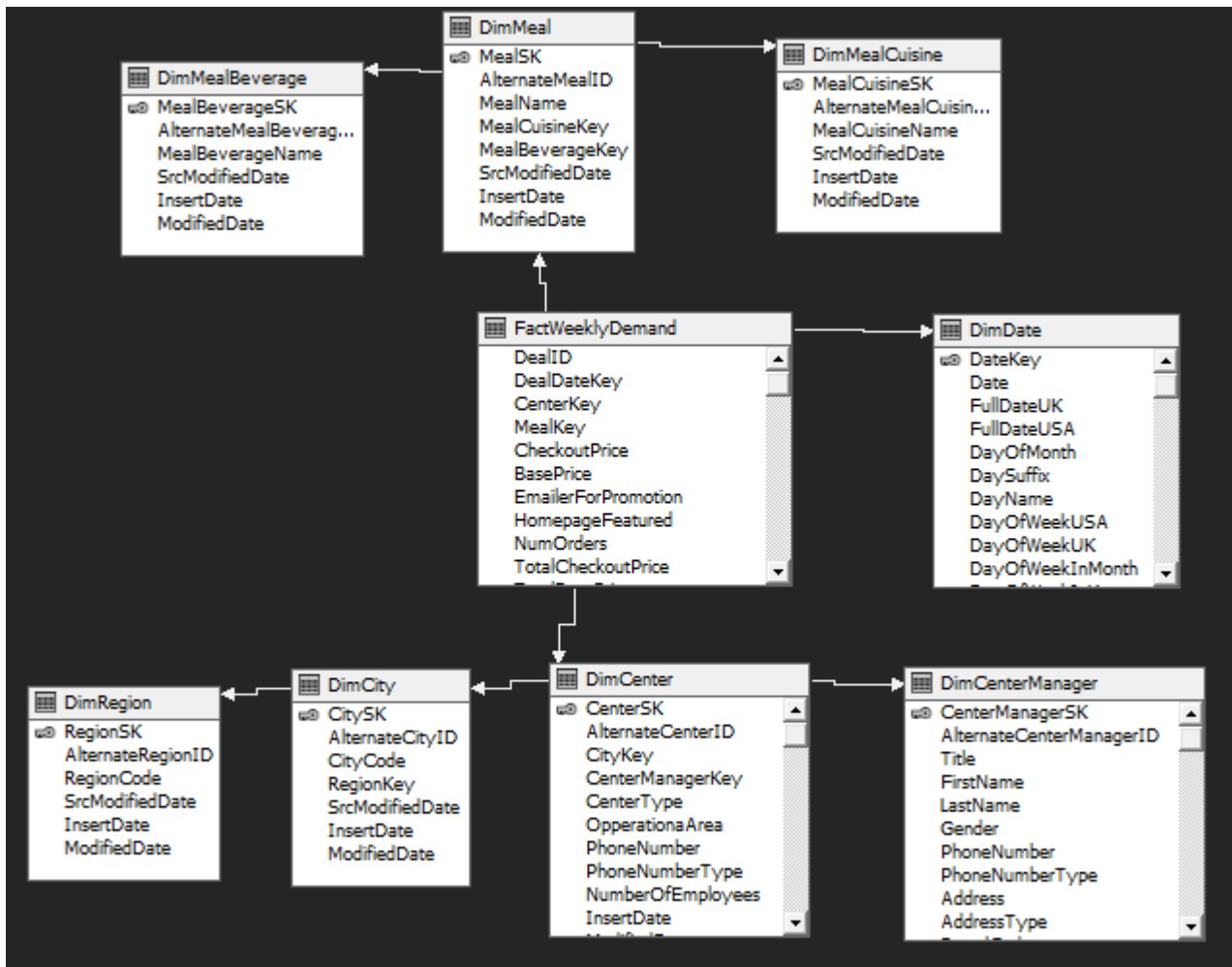
Cube Creation

- The data source view had created with the relevant tables in the previous section. We can use this existing data source to create the Cube.
- From the "Cube wizard" select all the measures from the "FactWeeklyDemand" fact table which is needed to include in the cube.
- Select the dimensions "DimMeal", " DimMealCuisine", " DimMealBeverage", "DimCenter", "DimCenterManager", "DimCity", "DimRegion", "DimDate" from the "Cube wizard".
- Name of Cube – 'Cube_Meal_Demand.cube'
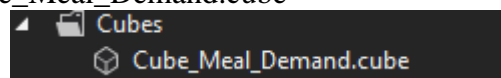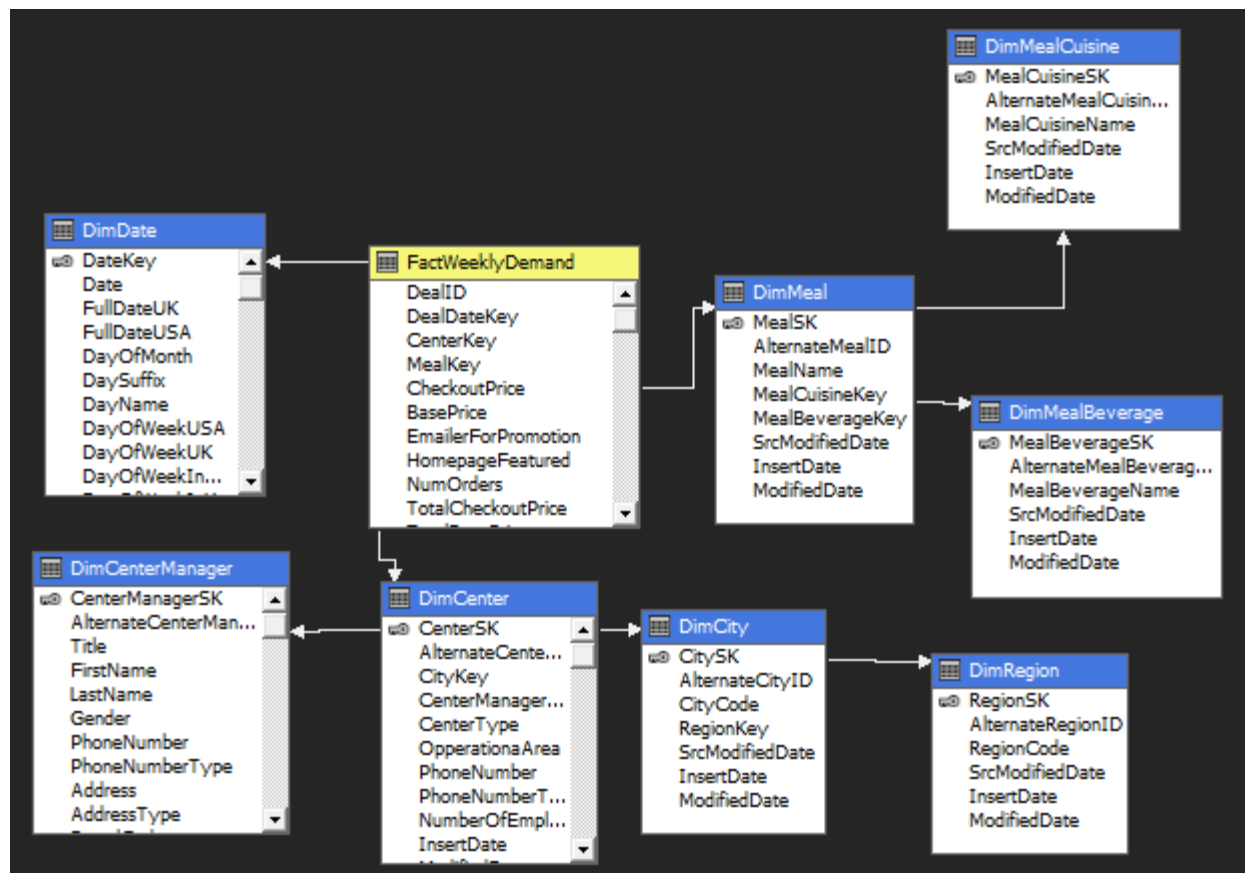
Configuring Dimensions
- Implementing necessary hierarchies in each dimension
- Inserting the necessary attributes needed in the cube in each dimension

DimDate - Implementing Hierarchies

1. Year → Month → Date
2. Year → Month → Week Of Month → Date
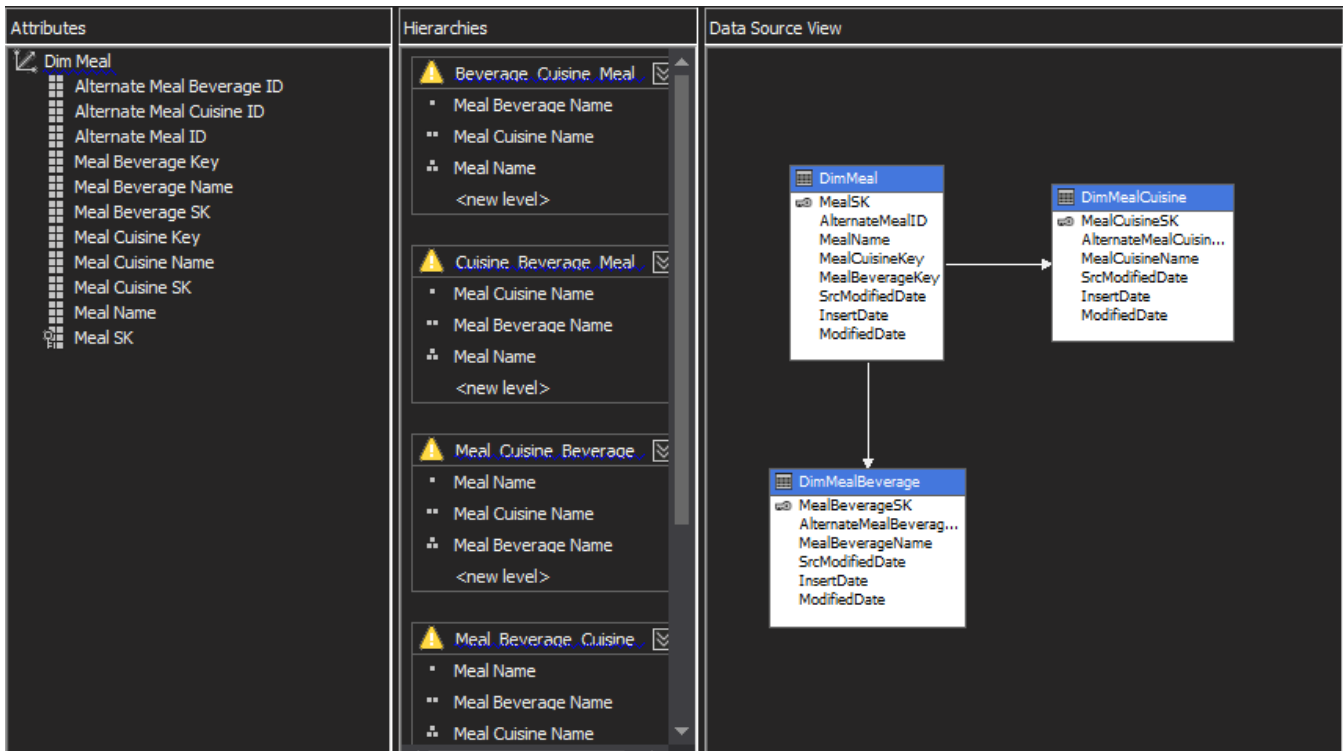3. Year → Month Of Quarter → Month Name → Week Of Month → Date

DimCenter – Implementing Hierarchies

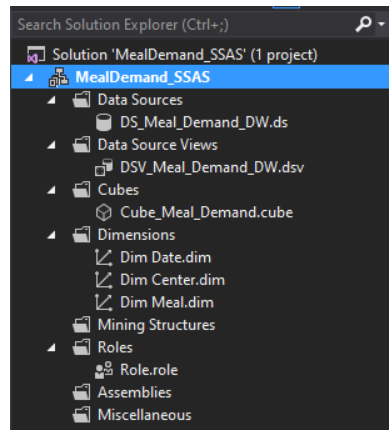1. Center Type → Region Code → City Code
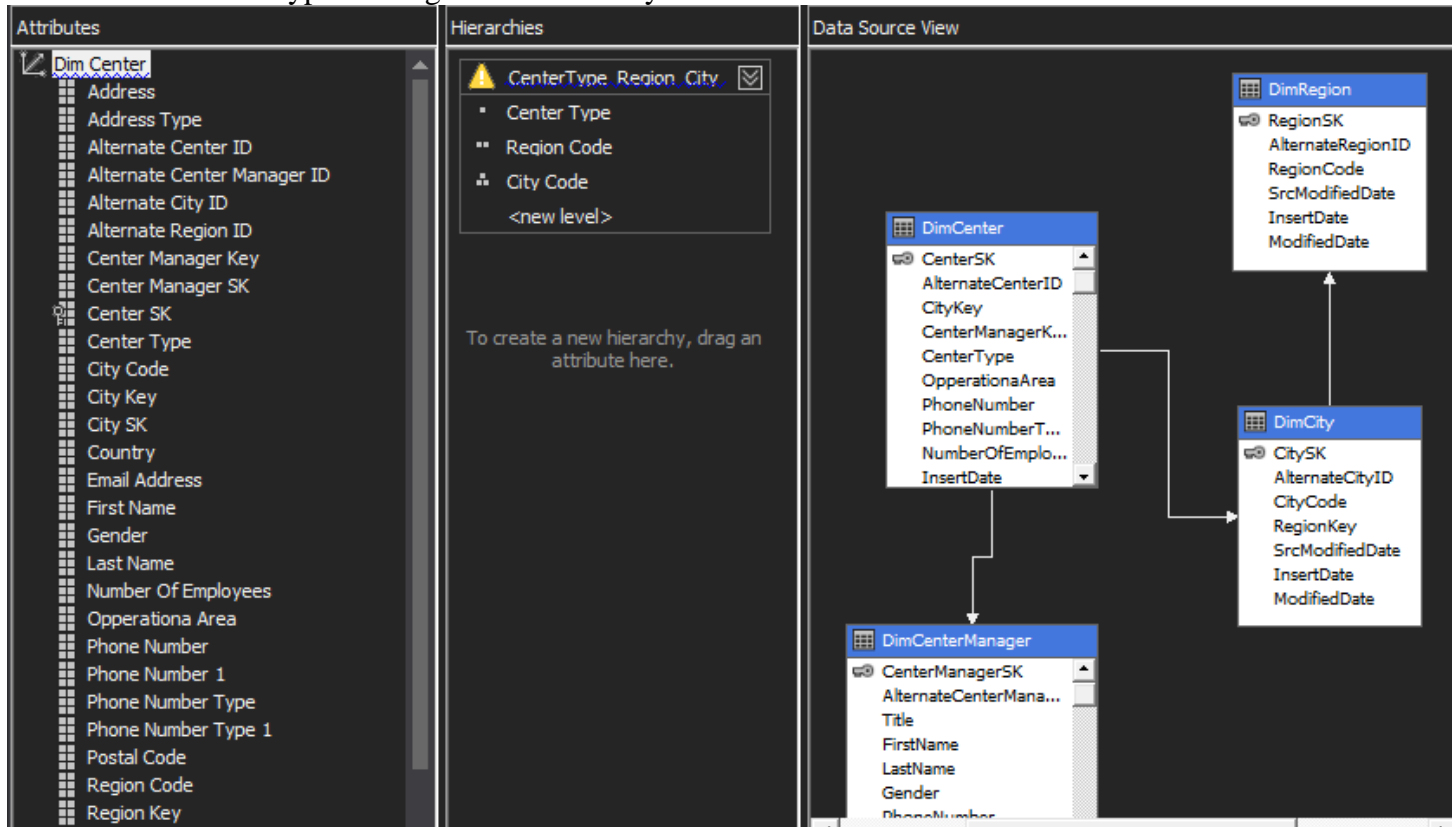
DimMeal – Implementing Hierarchies

1. Meal Cuisine Name → Meal Beverage Name → Meal Name
2. Meal Beverage Name → Meal Cuisine Name → Meal Name

Deploying the Cube after the Configuration of Cube
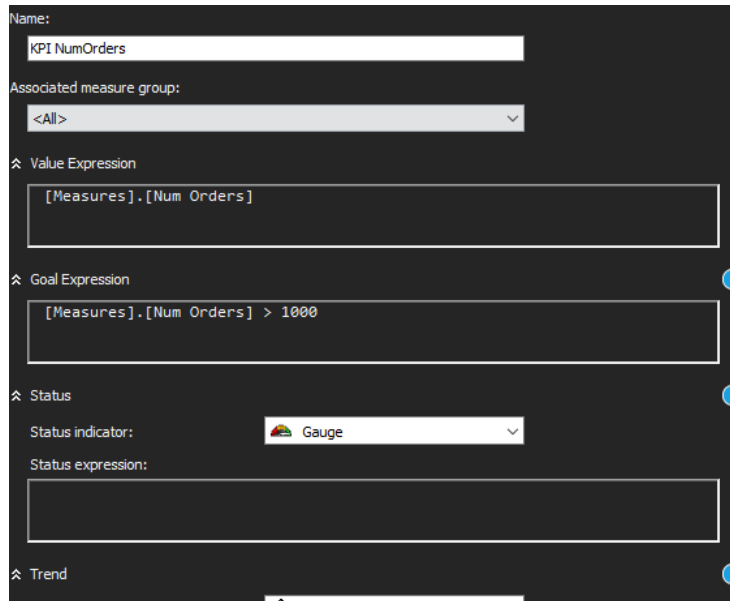
Cube Deployed in SQL Server Management Studio
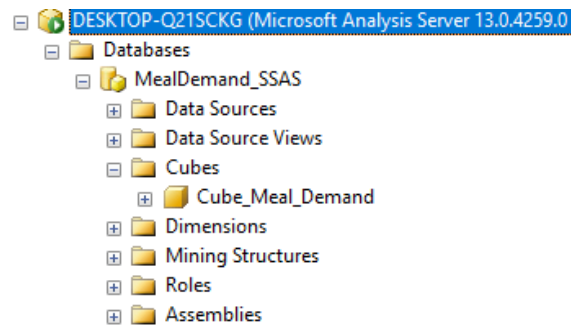
Creating KPI
1. KPI NumOrders

Create KPI to measure

Create KPI to measure the Number of orders If the KPI gets more than 1000 then it means that Meal has sold above the target. So, based on that Client can decide that in that particular KPI value there is more.

2. KPI Discount Amount

If the KPI Discount Amount > 0 that means there has been a discount offered to the customer in that particular purchase, else there has not been a discount offered.

Creating a Role
- Create a Role with full control

Specify "USER" as the user

Deployed Data Cube
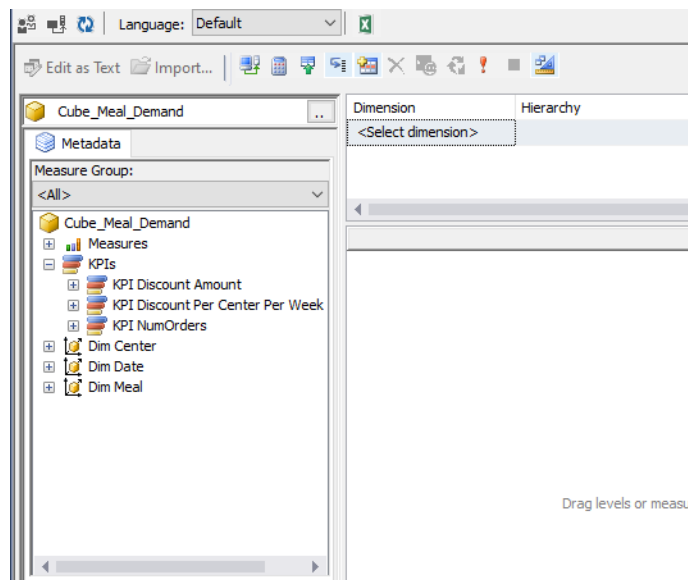
3.0 Demonstration of OLAP operations
3.1 Drill Down & Roll Up
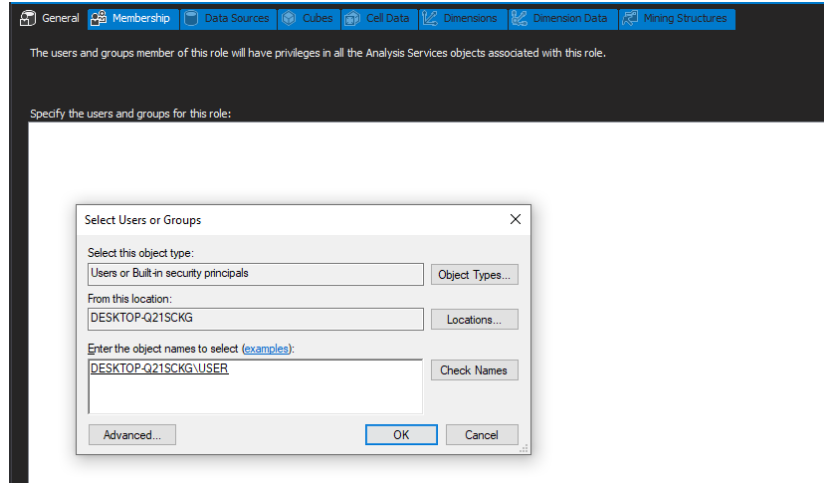In drill-down operation, the less detailed data is converted into highly detailed data

Drill down & Roll up, based on MealCusine wise MealBeverage wise and Meal wise on Number of order sold per month

| CenterType_Region_City	(Multiple Items)										
Num Orders	**Column Labels**										
Row Labels	**April**	**August**	**February**	**January**	**July**	**June**	**March**	**May**	**October**	**September**	**Grand Total**
⊟ Continental											
⊟ Beverages											
Crispy Calamari	8,026.00	3,622.00	2,803.00	10,639.00	2,128.00	2,913.00	3,610.00	4,003.00	256.00	1,607.00	39,607.00
Prawn Pie	10,947.00	6,122.00	4,884.00	16,018.00	3,885.00	4,758.00	5,420.00	6,056.00	502.00	2,713.00	61,305.00
Sweet Potato Pie	6,704.00	3,323.00	3,163.00	8,757.00	2,477.00	3,194.00	3,133.00	3,574.00	109.00	1,711.00	36,145.00
⊟ Pizza											
Detroiter	3,290.00	1,393.00	3,046.00	5,396.00	4,004.00	5,665.00	6,254.00	3,827.00	2,903.00	12,490.00	48,268.00
Margherita	1,517.00	1,065.00	1,952.00	2,936.00	2,244.00	3,469.00	3,016.00	2,313.00	2,293.00	10,429.00	31,234.00
White Clam	5,352.00	3,026.00	4,499.00	8,783.00	6,692.00	8,797.00	9,717.00	6,599.00	4,374.00	20,685.00	78,524.00
⊟ Seafood	3,327.00	7,835.00	11,097.00	3,640.00	4,713.00	5,113.00	22,001.00	2,923.00	4,448.00	3,548.00	68,645.00
⊟ Indian											
⊟ Beverages											
Jal-jeera	4,625.00	2,115.00	1,596.00	8,581.00	1,783.00	3,364.00	946.00	2,004.00	610.00	3,644.00	29,268.00
Rooh Afza	174.00	876.00	271.00	1,118.00	952.00	1,164.00	1,270.00	449.00	260.00	1,106.00	7,640.00
Sugarcane juice	5,676.00	1,953.00	2,132.00	8,510.00	1,839.00	3,357.00	1,043.00	2,261.00	715.00	2,928.00	30,414.00
⊟ Biryani											
Bombay Biryani	673.00	682.00	789.00	1,138.00	599.00	836.00	805.00	617.00	204.00	805.00	7,148.00
Calcutta Biryani	609.00	408.00	668.00	906.00	519.00	561.00	652.00	530.00	125.00	611.00	5,589.00
Sindhi Biryani	469.00	343.00	975.00	1,378.00	474.00	442.00	537.00	415.00	54.00	573.00	5,660.00
⊟ Desert											
Gulab jamun	1,839.00	1,237.00	1,698.00	1,224.00	3,230.00	1,894.00	2,094.00	1,636.00	178.00	673.00	15,703.00
Laddu	505.00	1,587.00	1,859.00	1,641.00	793.00	1,297.00	1,075.00	1,135.00	230.00	1,170.00	11,292.00
Rasgulla	857.00	2,222.00	1,499.00	2,024.00	666.00	1,385.00	1,382.00	1,718.00	272.00	1,906.00	13,931.00
⊟ Rice Bowl											
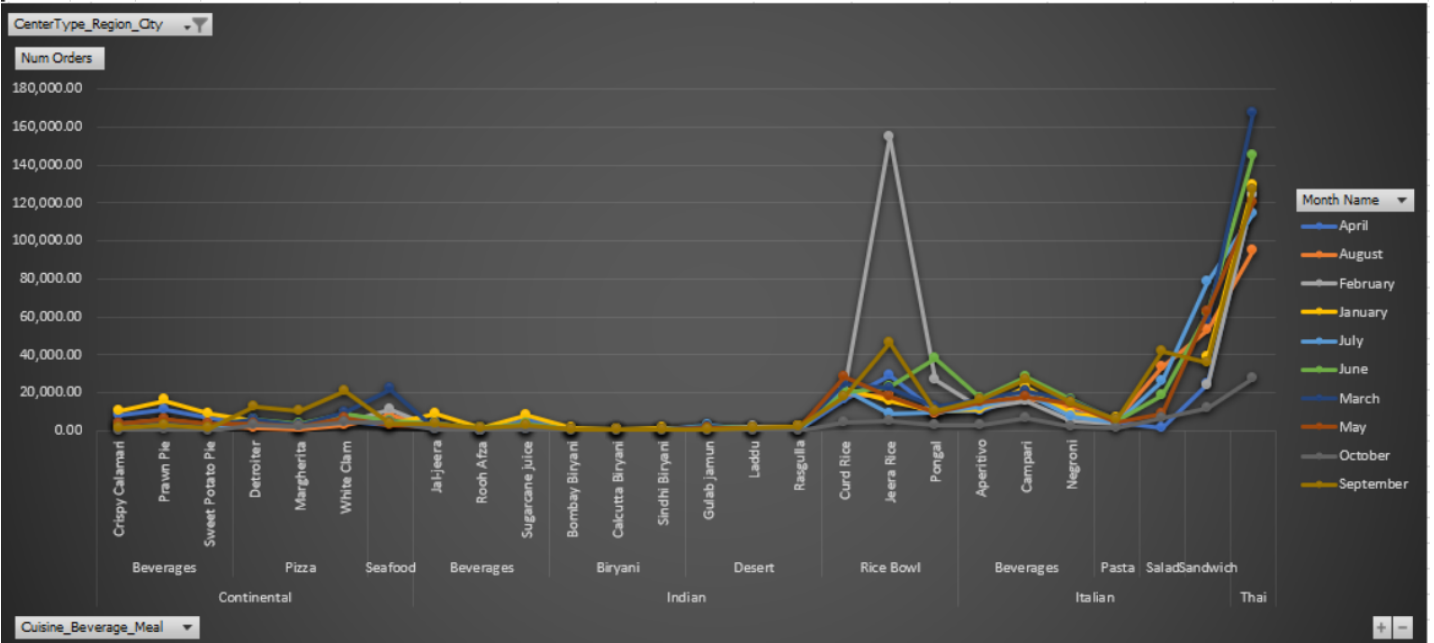
Drill down can be done by:
Moving down in the concept hierarchy
Adding a new dimension
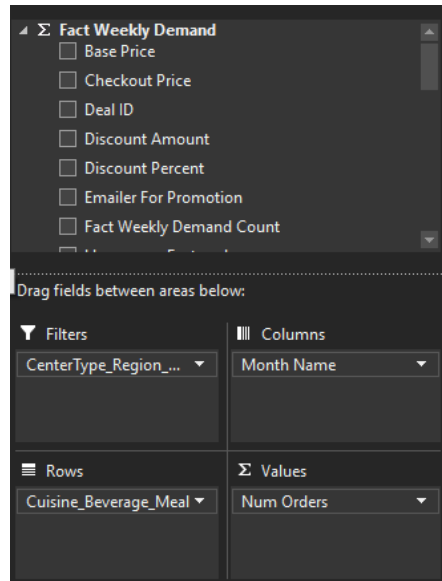
DimMeal, DimDate, DimCenter and Fact for Num Orders are the main dimensions used here.

Here Line chart has been chosen to show the variations of number or orders Cuisine wise, Beverage wise and Meal wise over Month as the time.

Filters has been added to the hierarchy CenterType_Region_City (CenterType → Region → City)

In the rows

In the Rows of the table Cuisine_Beverage_Meal hierarchy has been used (Meal Cuisine Name → Meal Beverage Name → Meal Name)

For the Values Number of orders has been taken.

So, through this table it is possible to find the number of orders sold per Cuisine_Beverage_Meal based on a particular CenterType_Region_City. The graph shows the variation over the months.

4.2 Roll Up

It is just opposite of the drill-down operation. It performs aggregation on the OLAP cube. It can be done by:
Climbing up in the concept hierarchy
Reducing the dimensions

Month Name	April													
Week Of Month	2													
Base Price	**Column Labels**													
	⊟Continental									⊟Indian			⊟Biryani	
	⊟Beverages			⊟Pizza			⊟Seafood			⊟Beverages				
Row Labels	**Crispy Calamari**	**Prawn Pie**	**Sweet Potato Pie**	**Detroiter**	**Margherita**	**White Clam**	**Mixed fish**	**Nasigurang**	**Suschi**	**Jal-jeera**	**Rooh Afza**	**Sugarcane juice**	**Bombay Biryani**	**Calcutta Biryani**
⊟TYPE_A														
⊟23														
698	$388.00	$385.09	$389.00	$612.13	$611.13	$612.13	$0.00	$620.86	$620.86	$253.23	$0.00	$251.23	$416.13	$418.13
⊟34														
461	$322.04	$325.98	$321.07	$641.23	$640.23	$641.23	$0.00	$0.00	$659.63	$250.32	$441.41	$262.93	$0.00	$0.00
526	$962.36	$957.45	$948.72	$1,919.69	$1,921.69	$1,862.49	$1,318.26	$1,978.89	$1,979.89	$785.79	$455.93	$780.00	$1,385.19	$913.86
576	$319.13	$321.13	$306.58	$639.23	$641.23	$640.23	$0.00	$0.00	$660.63	$262.93	$432.62	$262.93	$455.93	$454.93
602	$320.10	$320.10	$321.07	$641.23	$640.23	$639.23	$659.63	$659.63	$660.63	$260.93	$456.93	$261.93	$455.93	$0.00
648	$323.07	$322.04	$321.10	$639.23	$641.23	$639.23	$660.63	$659.63	$659.63	$250.32	$0.00	$262.93	$454.93	$455.93
649	$323.01	$319.16	$311.37	$639.23	$639.23	$640.23	$659.63	$0.00	$658.63	$261.93	$456.93	$260.93	$0.00	$456.93
675	$381.24	$385.15	$387.03	$583.03	$583.03	$641.23	$0.00	$0.00	$663.48	$255.14	$0.00	$260.93	$454.93	$0.00
676	$325.01	$323.98	$319.19	$639.23	$639.23	$640.23	$0.00	$0.00	$658.63	$262.93	$0.00	$260.93	$0.00	$0.00
⊟35														
702	$321.10	$319.19	$311.40	$641.23	$641.23	$639.23	$659.63	$658.63	$658.63	$258.05	$454.93	$260.93	$0.00	$456.93
⊟56														
456	$379.33	$381.21	$382.18	$611.13	$611.13	$610.13	$619.86	$618.86	$618.86	$253.23	$437.53	$253.23	$418.13	$417.13
517	$384.12	$380.27	$381.24	$583.94	$610.13	$0.00	$0.00	$619.86	$618.86	$252.23	$437.53	$252.23	$417.13	$417.13
522	$766.39	$750.84	$695.61	$1,222.26	$1,222.26	$1,220.26	$1,237.72	$1,239.72	$1,239.72	$502.46	$437.53	$504.46	$833.26	$834.26
577	$385.12	$389.00	$388.00	$612.13	$611.13	$612.13	$620.86	$0.00	$619.86	$247.38	$437.53	$253.23	$418.13	$417.13

Base Price	Column Labels				
Row Labels	⊞Continental	⊞Indian	⊞Italian	⊞Thai	Grand Total
⊞TYPE_A	$190,750.48	$170,623.71	$116,842.32	$104,029.05	$582,245.56
⊞TYPE_B	$66,633.81	$60,207.37	$37,752.36	$34,535.50	$199,129.04
⊞TYPE_C	$75,679.84	$61,779.58	$47,003.00	$37,373.74	$221,836.16
Grand Total	$333,064.13	$292,610.66	$201,597.68	$175,938.29	$1,003,210.76

Drag fields between areas below:

▼ Filters
Month Name ▼
Week Of Month ▼

Ⅲ Columns
Cuisine_Beverage_Meal ▼

≡ Rows
CenterType_Region_... ▼

Σ Values
Base Price ▼

DimDate, DimMeal and DimCenter are the dimensions mainly considered here
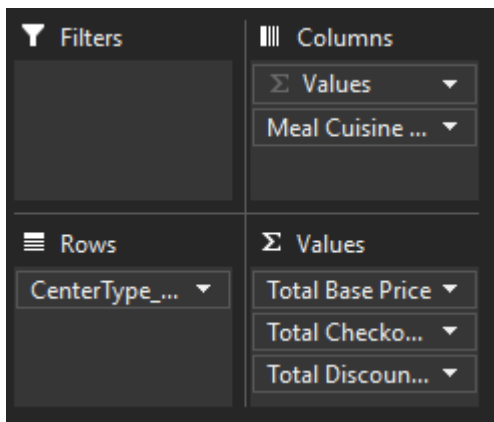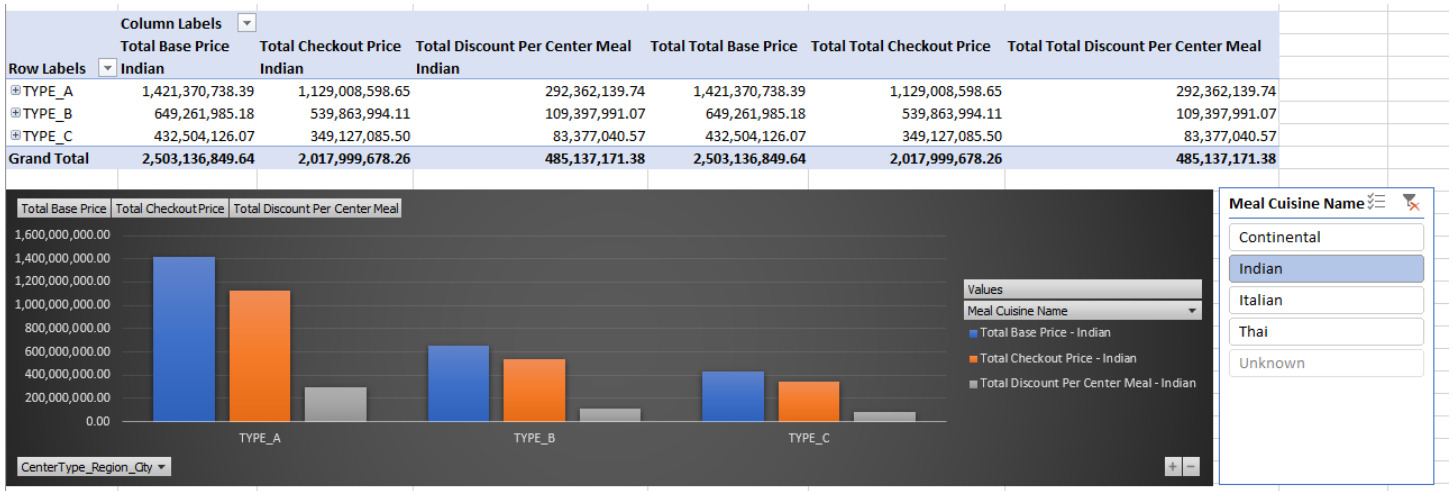Here in the Row wise Center Type → Region → City hierarchy has been used.
In the column Meal Cuisine → Meal Beverage → Meal hiereachy has beed used
These shows hierarchies shows the drill down and drill thorugh operations on the above chart
To filter the table folders has been added Month wise and Week of Month wise.

3.3 Slice

This selects a single dimension from the OLAP cube which results in a new sub-cube creation.
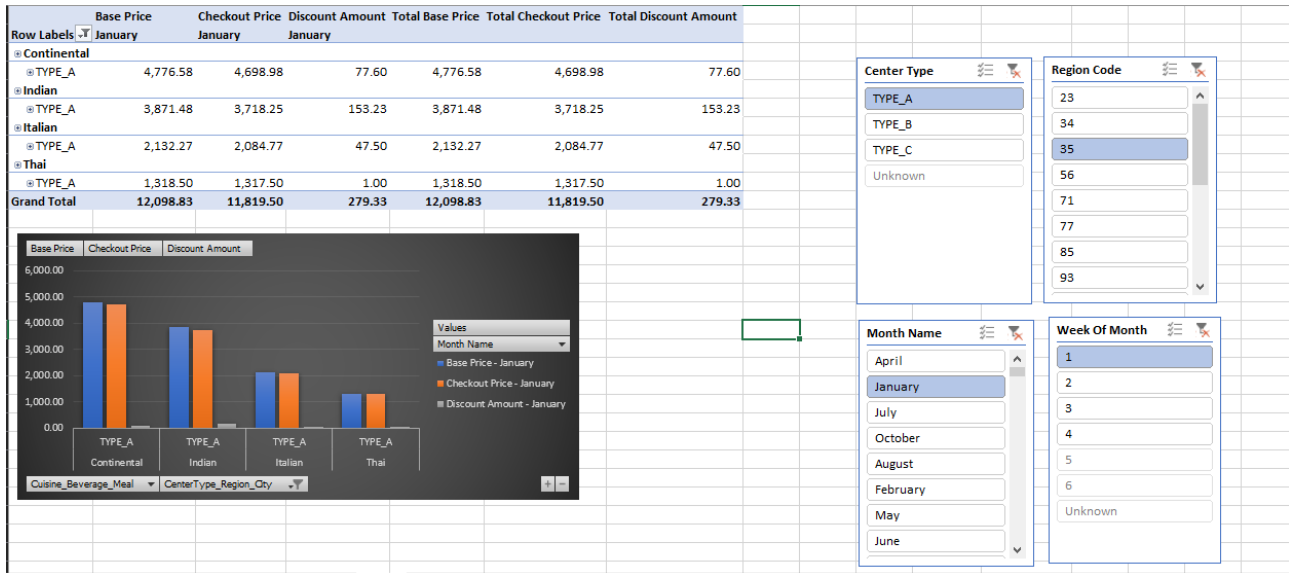
Row Labels	Column Labels					
	Total Base Price	Total Checkout Price	Total Discount Per Center Meal	Total Total Base Price	Total Total Checkout Price	Total Total Discount Per Center Meal
	Indian	Indian	Indian			
⊞ TYPE_A	1,421,370,738.39	1,129,008,598.65	292,362,139.74	1,421,370,738.39	1,129,008,598.65	292,362,139.74
⊞ TYPE_B	649,261,985.18	539,863,994.11	109,397,991.07	649,261,985.18	539,863,994.11	109,397,991.07
⊞ TYPE_C	432,504,126.07	349,127,085.50	83,377,040.57	432,504,126.07	349,127,085.50	83,377,040.57
Grand Total	2,503,136,849.64	2,017,999,678.26	485,137,171.38	2,503,136,849.64	2,017,999,678.26	485,137,171.38

Dim Meal, Dim Center and the Measure from the Fact are used here

Values that are been considered on this chart are Total Base Price, Total Checkout Price, Total Discount Per Center Per Meal.

In the Columns Meal Cuisine is been considered

Where the slices act as a filter over a particular Meal Cuisine.

3.4 Dice

Row Labels	Base Price January	Checkout Price January	Discount Amount January	Total Base Price	Total Checkout Price	Total Discount Amount
⊞Continental						
⊕TYPE_A	4,776.58	4,698.98	77.60	4,776.58	4,698.98	77.60
⊞Indian						
⊕TYPE_A	3,871.48	3,718.25	153.23	3,871.48	3,718.25	153.23
⊞Italian						
⊕TYPE_A	2,132.27	2,084.77	47.50	2,132.27	2,084.77	47.50
⊞Thai						
⊕TYPE_A	1,318.50	1,317.50	1.00	1,318.50	1,317.50	1.00
Grand Total	12,098.83	11,819.50	279.33	12,098.83	11,819.50	279.33

It selects a sub-cube from the OLAP cube by selecting two or more dimensions.
Here DimCenter, DimDate has been mainly considered.
These dimensions and its attributes are used to create the Dice.

3.5 Pivot

Month Name	April
Week Of Month	2

Total Base Price	Column Labels			
Row Labels	⊞TYPE_A	⊞TYPE_B	⊞TYPE_C	Grand Total
⊞Continental	$26,518,824.59	$9,504,871.53	$9,595,031.75	$45,618,727.87
⊞Indian	$29,872,074.49	$15,149,894.27	$9,197,767.35	$54,219,736.11
⊞Italian	$24,269,148.20	$11,105,431.96	$7,157,166.05	$42,531,746.21
⊞Thai	$24,504,280.62	$12,129,262.68	$4,331,996.67	$40,965,539.97
Grand Total	$105,164,327.90	$47,889,460.44	$30,281,961.82	$183,335,750.16

Month Name	April
Week Of Month	2

Base Price	Column Labels				
Row Labels	⊞Continental	⊞Indian	⊞Italian	⊞Thai	Grand Total
⊞TYPE_A	$190,750.48	$170,623.71	$116,842.32	$104,029.05	$582,245.56
⊞TYPE_B	$66,633.81	$60,207.37	$37,752.36	$34,535.50	$199,129.04
⊞TYPE_C	$75,679.84	$61,779.58	$47,003.00	$37,373.74	$221,836.16
Grand Total	$333,064.13	$292,610.66	$201,597.68	$175,938.29	$1,003,210.76

It is also known as rotation operation as it rotates the current view to get a new view of the representation.

Mainly DimMeal, DimCenter are considered dimensions here.

3.6 Power View Visualization

MDX Query

```
SELECT NON EMPTY
{ KPIValue("KPI NumOrders"), KPIGoal("KPI NumOrders") }
 ON COLUMNS, NON EMPTY
{   ([Dim    Meal].[Beverage_Cuisine_Meal].[Meal    Name].ALLMEMBERS    *    [Dim
Center].[CenterType_Region_City].[City Code].ALLMEMBERS )
}
 DIMENSION PROPERTIES MEMBER_CAPTION, MEMBER_UNIQUE_NAME ON ROWS
FROM [Cube_Meal_Demand] CELL PROPERTIES VALUE, BACK_COLOR, FORE_COLOR,
FORMATTED_VALUE, FORMAT_STRING, FONT_NAME, FONT_SIZE, FONT_FLAGS
```
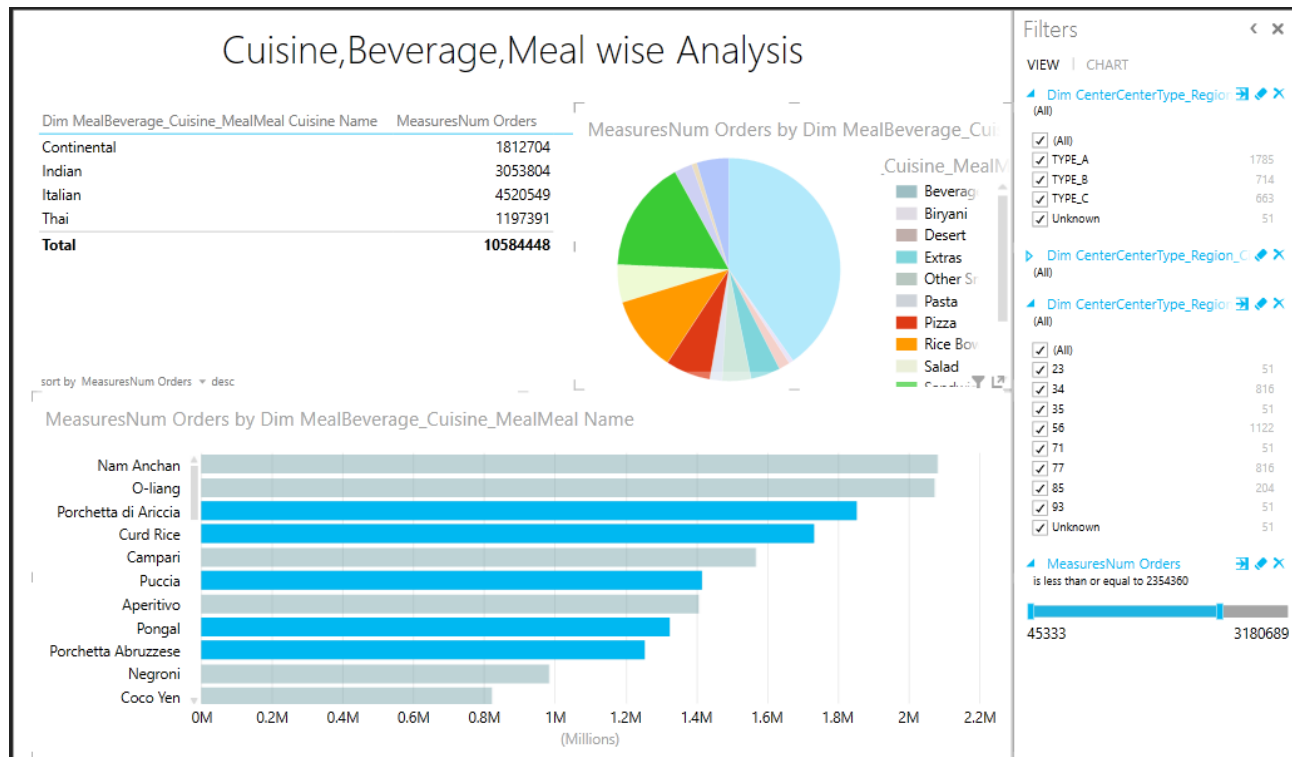

This visualization is based on Meal Cuisine wise, Meal Beverage wise, Meal analysis based on the number of orders sold from the whole data set.

Filtering has been applied for Center Type, Region and City, also for the number of orders.

Cuisine,Beverage,Meal wise Analysis

Dim MealBeverage_Cuisine_MealMeal Cuisine Name	MeasuresNum Orders
Continental	627126
Indian	1731423
Italian	3642249
Thai	5009913
Total	**11010711**

sort by MeasuresNum Orders ▾ desc

MeasuresNum Orders by Dim MealBeverage_Cuisine_MealMeal Name

MeasuresNum Orders by Dim MealBeverage_Cui

_Cuisine_MealM

- Beverag
- Biryani
- Desert
- Extras
- Other Sr
- Pasta
- Pizza
- Rice Bow
- Salad

Cuisine,Beverage,Meal wise Analysis

Dim MealBeverage_Cuisine_MealMeal Cuisine Name	MeasuresNum Orders
Continental	4172484
Indian	7496540
Italian	10501677
Thai	8845097
Total	**31015798**

sort by MeasuresNum Orders ▾ desc

MeasuresNum Orders by Dim MealBeverage_Cui

MeasuresNum Orders by Dim MealBeverage_Cuisine_MealMeal Name

_Cuisine_MealM

- Beverag
- Biryani
- Desert
- Extras
- Other Sr
- Pasta
- Pizza
- Rice Bow
- Salad

4.0 SSRS Reports

Accessed the SSRS web portal through the 'Reporting Service Configuration Manager' Web Portal URL.
Configured authorization for user.
Created a folder "SSRS_MealDemand".
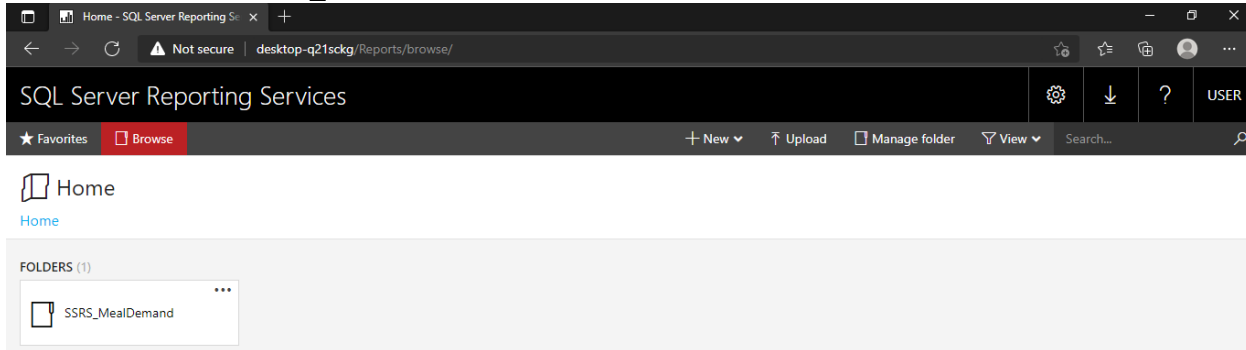
The SSRS reports were built using the 'Report Builder' tool.
Created a data source 'DS_MealDemand_DW'
- Used the connection embedded only to this report
- Using SQL Server as the data base
- Connected to the 'MealDemand_DW' Datawarehouse which was created previously.
- Use Current windows user

Created a data set 'DataSet1'
- Used a dataset embedded in the report
- Created a connection to the previously created data source
- Passed a query to retrieve most important data

```sql
Select
fwd.BasePrice,fwd.CheckoutPrice,fwd.DiscountAmount,fwd.NumOrders,fwd.TotalBasePrice,fwd.To
talCheckoutPrice,
fwd.TotalDiscountPerCenterMeal, dmb.MealBeverageName,dmc.MealCuisineName,dm.MealName,
dc.CenterType, dc.NumberOfEmployees,
dcc.CityCode,dr.RegionCode, dd.MonthName,dd.WeekOfMonth
from [dbo].[FactWeeklyDemand] fwd INNER JOIN [dbo].[DimMeal] dm ON fwd.[MealKey] =
dm.[MealSK]
INNER JOIN    [dbo].[DimMealBeverage] dmb ON dm.MealBeverageKey =  dmb.MealBeverageSK
        INNER JOIN [dbo].[DimMealCuisine] dmc ON dm.MealCuisineKey = dmc.MealCuisineSK
        INNER JOIN [dbo].[DimCenter] dc ON fwd.CenterKey = dc.CenterSK
        INNER JOIN [dbo].[DimCity] dcc ON dc.CityKey = dcc.CitySK
        INNER JOIN [dbo].[DimRegion] dr ON dcc.RegionKey = dr.RegionSK
        INNER JOIN [dbo].[DimDate] dd ON fwd.DealDateKey = dd.DateKey
```

Report 1: Report with a matrix

Creating a report matrix
- Row groups – 'MealCuisineName', 'MealBeverageName', 'MealName'
- Column groups – 'NumberOfOrders'
- Values – 'MonthName', 'WeekOfMonth'

Cuisine - Beverage - Meal wise Number of orders sold per month

| Meal Cuisine Name	Meal Beverage Name	Meal Name	April 1	2	3	4	Total	August 1	2	3	4	Total	1
Continental	Beverages	Crispy Calamari	74	75	75	75	299	74	75	75	76	300	73
		Prawn Pie	76	76	76	76	304	77	76	76	76	305	75
		Sweet Potato Pie	74	74	76	76	300	76	74	75	75	300	72
		Total	224	225	227	227	903	227	225	226	227	905	220
	Pizza	Detroiter	76	76	76	75	303	76	74	75	75	300	75
		Margherita	74	75	72	75	296	77	76	70	72	295	71
		White Clam	76	75	76	76	303	77	76	76	76	305	76
		Total	226	226	224	226	902	230	226	221	223	900	222
	Seafood	Mixed fish	43	49	42	48	182	47	41	53	51	192	50
		Nasigurang	57	56	55	58	226	53	54	61	64	232	65
		Suschi	66	71	64	66	267	73	67	75	73	288	74
		Total	166	176	161	172	675	173	162	189	188	712	189
	Total		616	627	612	625	2480	630	613	636	638	2517	631
Indian	Beverages	Jal-jeera	63	75	76	74	288	74	74	75	74	297	74
		Rooh Afza	43	41	43	36	163	66	62	60	57	245	46
		Sugarcane juice	62	71	73	71	277	65	68	69	71	273	71
		Total	168	187	192	181	728	205	204	204	202	815	191
	Biryani	Bombay Biryani	54	53	52	59	218	45	48	56	46	195	54
		Calcutta Biryani	43	51	51	40	185	40	44	49	45	178	53
		Sindhi Biryani	41	32	43	46	162	49	47	43	33	172	47
		Total	138	136	146	145	565	134	139	148	124	545	154
	Desert	Gulab jamun	64	69	67	61	261	70	62	53	59	244	70
		Laddu	65	69	59	71	264	66	74	67	63	270	68
		Rasgulla	69	73	69	73	284	65	73	63	69	270	69
		Total	198	211	195	205	809	201	209	183	191	784	207
	Rice Bowl	Curd Rice	76	76	76	76	304	77	77	77	77	308	76
		Jeera Rice	76	76	76	76	304	77	77	77	76	307	76

The above visualization shows the number of orders sold per month, based on the Meal Cuisine wise, Meal Beverage wise, and Meal wise in any given center.

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Report 2: Report with more than one parameter.

Creating a report matrix
- Row groups – 'MealCuisineName', 'MealBeverageName', 'MealName'
- Column groups – 'BasePrice', 'CheckoutPrice', 'DiscountAmount'
- Values – 'MonthName', 'WeekOfMonth'
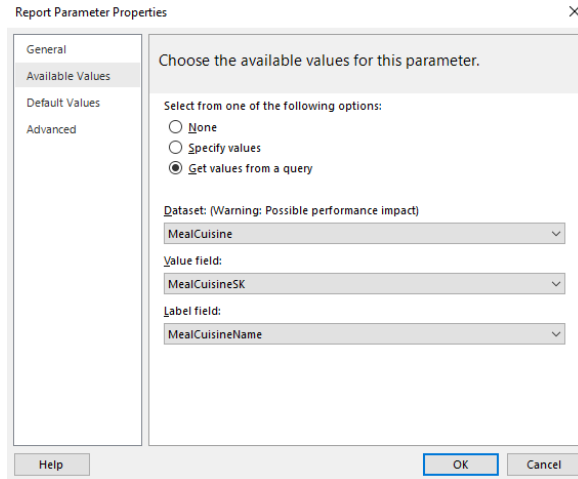
Created a new dataset 'MealCuisine'
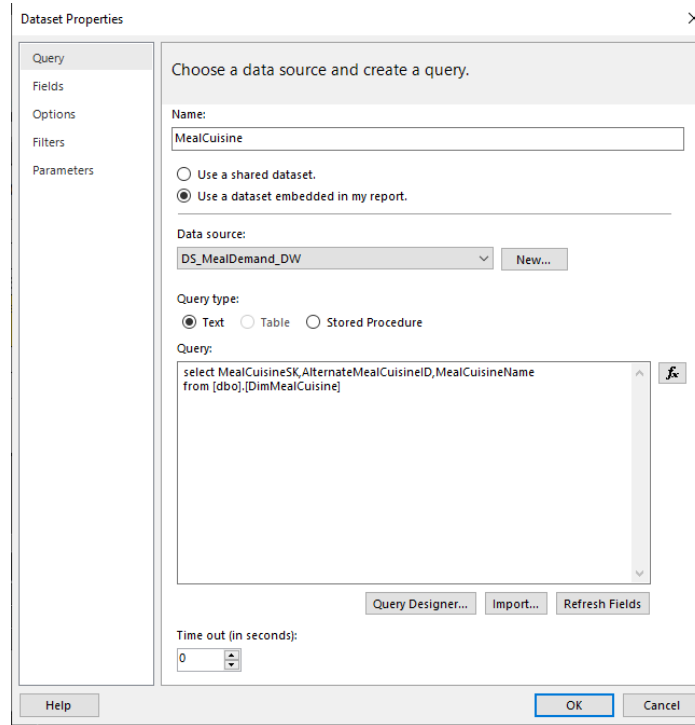
- Query passed

```
select MealCuisineSK,AlternateMealCuisineID,MealCuisineName
from [dbo].[DimMealCuisine]
```
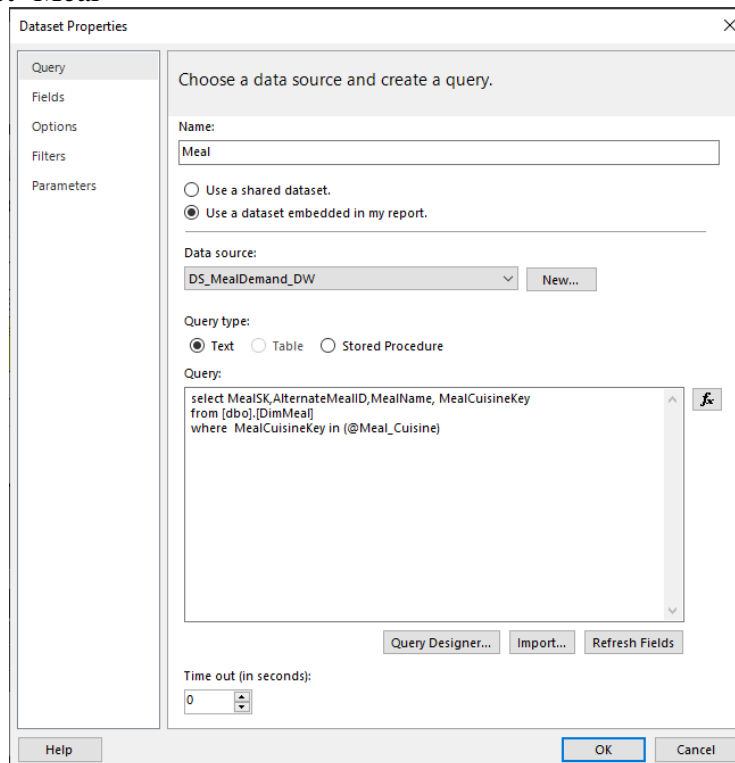
Creating multiple parameters to passed under Meal Cuisine Name.
- Creating a new parameter '@Meal_Cuisine'
- Allow multiple values

- This returns 'MealCuisineSK' when 'MealCuisineName' is passed

Created a new dataset 'Meal'

- Query passed

```
select MealSK,AlternateMealID,MealName, MealCuisineKey
from [dbo].[DimMeal]
where  MealCuisineKey in (@Meal_Cuisine)
```

Creating multiple parameters to passed under Meal Name.
- Creating mew parameter '@Meal'
- Allow multiple values

- This returns 'MealName' when 'MealName' is passed.

The DataSet1 which was created previously will be modified as below in order to retrieve the required field (Meal Name).

```
Select
fwd.BasePrice,fwd.CheckoutPrice,fwd.DiscountAmount,fwd.NumOrders,fwd.TotalBasePrice,fwd.To
talCheckoutPrice,
fwd.TotalDiscountPerCenterMeal, dmb.MealBeverageName,dmc.MealCuisineName,dm.MealName,
dc.CenterType, dc.NumberOfEmployees,
dcc.CityCode,dr.RegionCode, dd.MonthName,dd.WeekOfMonth
from [dbo].[FactWeeklyDemand] fwd INNER JOIN [dbo].[DimMeal] dm ON fwd.[MealKey] =
dm.[MealSK]
            INNER JOIN   [dbo].[DimMealBeverage] dmb ON dm.MealBeverageKey =
dmb.MealBeverageSK
            INNER JOIN [dbo].[DimMealCuisine] dmc ON dm.MealCuisineKey =
dmc.MealCuisineSK
            INNER JOIN [dbo].[DimCenter] dc ON fwd.CenterKey = dc.CenterSK
            INNER JOIN [dbo].[DimCity] dcc ON dc.CityKey = dcc.CitySK
            INNER JOIN [dbo].[DimRegion] dr ON dcc.RegionKey = dr.RegionSK
            INNER JOIN [dbo].[DimDate] dd ON fwd.DealDateKey = dd.DateKey
where dm.MealName in (@Meal)
```

Meal Cuisine `Thai, Indian` ▾   Meal `O-liang, Tom Yum Goong, Curd R` ▾   [View Report]

|◁ < `1` of 1 > ▷| ↻ ⊖ `100%` ▾ 💾▾ 🖨 ☐ Find | Next

Base_Checkout_Price Based on Cuisine and Meal name Parameters passed Monthly Report

Meal Cuisine Name	Meal Beverage Name	Meal Name	April										
			1			2			3			4	
			Base Price	Checkout Price	Discount Amount	Base Price	Checkout Price	Discount Amount	Base Price	Checkout Price	Discount Amount	Base Price	Checkout Price
⊟ Indian	⊟ Biryani	Bombay Biryani	$24,915.95	$24,918.95	($3.00)	$23,262.19	$23,280.19	($18.00)	$22,736.36	$22,739.36	($3.00)	$25,898.80	$25,898.8
		Calcutta Biryani	$19,825.76	$19,830.76	($5.00)	$22,268.06	$22,260.06	$8.00	$22,220.59	$22,221.59	($1.00)	$17,513.55	$17,511.5
		Sindhi Biryani	$19,881.23	$19,879.23	$2.00	$15,529.96	$15,513.96	$16.00	$20,720.28	$19,982.29	$737.99	$22,276.58	$18,732.0
		Total	$64,622.94	$64,628.94	($6.00)	$61,060.21	$61,054.21	$6.00	$65,677.23	$64,943.24	$733.99	$65,688.93	$62,142.4
	⊟ Rice Bowl	Curd Rice	$21,462.74	$20,412.14	$1,050.60	$21,430.73	$20,591.53	$839.20	$23,424.93	$23,414.93	$10.00	$23,329.30	$22,676.0
		Jeera Rice	$22,874.58	$22,700.25	$174.33	$22,995.98	$22,780.64	$215.34	$23,411.35	$23,253.15	$158.20	$23,408.35	$14,874.2
		Total	$44,337.32	$43,112.39	$1,224.93	$44,426.71	$43,372.17	$1,054.54	$46,836.28	$46,668.08	$168.20	$46,737.65	$37,550.3
	Total		$108,960.26	$107,741.33	1,218.93	$105,486.92	$104,426.38	1,060.54	$112,513.51	$111,611.32	902.19	$112,426.58	$99,692.7
⊟ Thai	⊟ Beverages	O-liang	$9,807.19	$9,852.99	($45.80)	$9,812.83	$9,525.80	$287.03	$9,831.56	$9,532.65	$298.91	$9,812.10	$9,522.9
		Total	$9,807.19	$9,852.99	($45.80)	$9,812.83	$9,525.80	$287.03	$9,831.56	$9,532.65	$298.91	$9,812.10	$9,522.9
	⊟ Extras	Tom Yum Goong	$5,818.66	$4,935.32	$883.34	$6,489.20	$5,430.93	$1,058.27	$6,505.60	$5,461.06	$1,044.54	$6,216.75	$5,292.2
		Total	$5,818.66	$4,935.32	$883.34	$6,489.20	$5,430.93	$1,058.27	$6,505.60	$5,461.06	$1,044.54	$6,216.75	$5,292.2
	Total		$15,625.85	$14,788.31	837.54	$16,302.03	$14,956.73	1,345.30	$16,337.16	$14,993.71	1,343.45	$16,028.85	$14,815.1
Total			$124,586.11	$122,529.64	$2,056.47	$121,788.95	$119,383.11	$2,405.84	$128,850.67	$126,605.03	$2,245.64	$128,455.43	$114,507.9

DESKTOP-Q21SCKG\USER   6/25/2021 11:31:00 AM

Report 3: Create an SSRS drill-down report.

Here DimMeal and DimCenter Dimensions are mainly considered.
Drilldown can be Done Meal Cuisine wise, Meal Beverage wise and Meal wise also it can be done CenterType wise, Region wise and City wise.

Report 4: Create an SSRS drill-through report.

First created and deployed the 'Meal Cuisine Month wise analysis L2'
This Report shows the details of the month 'January' the month has been added as a filter.
By series properties → action tab we can schedule to which page the drill through report is supposed to navigate.
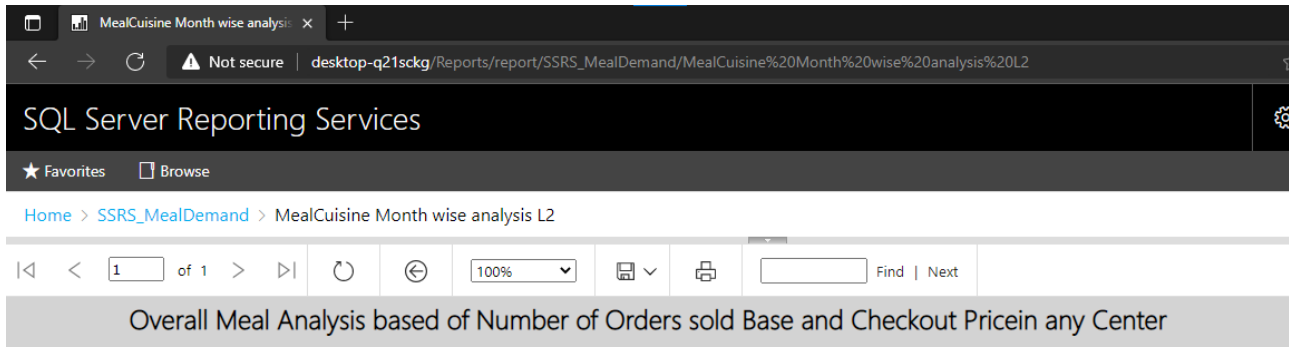
```
select
fwd.BasePrice,fwd.CheckoutPrice,fwd.DiscountAmount,fwd.NumOrders,fwd.TotalBasePrice,fw
d.TotalCheckoutPrice,
fwd.TotalDiscountPerCenterMeal,
dmb.MealBeverageName,dmc.MealCuisineName,dm.MealName,                dc.CenterType,
dc.NumberOfEmployees,
dcc.CityCode,dr.RegionCode, dd.MonthName,dd.WeekOfMonth
from [dbo].[FactWeeklyDemand] fwd INNER JOIN [dbo].[DimMeal] dm ON fwd.[MealKey] =
dm.[MealSK]
```

```
            INNER JOIN [dbo].[DimMealBeverage] dmb ON dm.MealBeverageKey =
dmb.MealBeverageSK
            INNER JOIN [dbo].[DimMealCuisine] dmc ON dm.MealCuisineKey =
dmc.MealCuisineSK
            INNER JOIN [dbo].[DimCenter] dc ON fwd.CenterKey = dc.CenterSK
            INNER JOIN [dbo].[DimCity] dcc ON dc.CityKey = dcc.CitySK
            INNER JOIN [dbo].[DimRegion] dr ON dcc.RegionKey = dr.RegionSK
            INNER JOIN [dbo].[DimDate] dd ON fwd.DealDateKey = dd.DateKey
```


Here we are passing the meal cuisine name as the parameter so that based on the Meal Cuisine, Meal details can be analyzed on the month of January.

The meal cuisine name is passed as the parameter once the user clicks on a column of specific meal cuisine.

Created and deployed the 'Meal Cuisine Month wise analysis L3'
Here we need a parameter Meal Cuisine in order to accept the Meal Cuisine Name passed from the previous Report.
The meal cuisine parameter is passed to the where clause in the query to retrieve details.

```
select
fwd.BasePrice,fwd.CheckoutPrice,fwd.DiscountAmount,fwd.NumOrders,fwd.TotalBasePrice,fw
d.TotalCheckoutPrice,
fwd.TotalDiscountPerCenterMeal,
dmb.MealBeverageName,dmc.MealCuisineName,dm.MealName,          dc.CenterType,
dc.NumberOfEmployees,
dcc.CityCode,dr.RegionCode, dd.MonthName,dd.WeekOfMonth
from [dbo].[FactWeeklyDemand] fwd INNER JOIN [dbo].[DimMeal] dm ON fwd.[MealKey] =
dm.[MealSK]
             INNER JOIN [dbo].[DimMealBeverage] dmb ON dm.MealBeverageKey =
dmb.MealBeverageSK
             INNER JOIN [dbo].[DimMealCuisine] dmc ON dm.MealCuisineKey =
dmc.MealCuisineSK
             INNER JOIN [dbo].[DimCenter] dc ON fwd.CenterKey = dc.CenterSK
             INNER JOIN [dbo].[DimCity] dcc ON dc.CityKey = dcc.CitySK
             INNER JOIN [dbo].[DimRegion] dr ON dcc.RegionKey = dr.RegionSK
             INNER JOIN [dbo].[DimDate] dd ON fwd.DealDateKey = dd.DateKey
where dmc.MealCuisineName = @MealCuisine
```

Report with Meal Cuisine Analysis
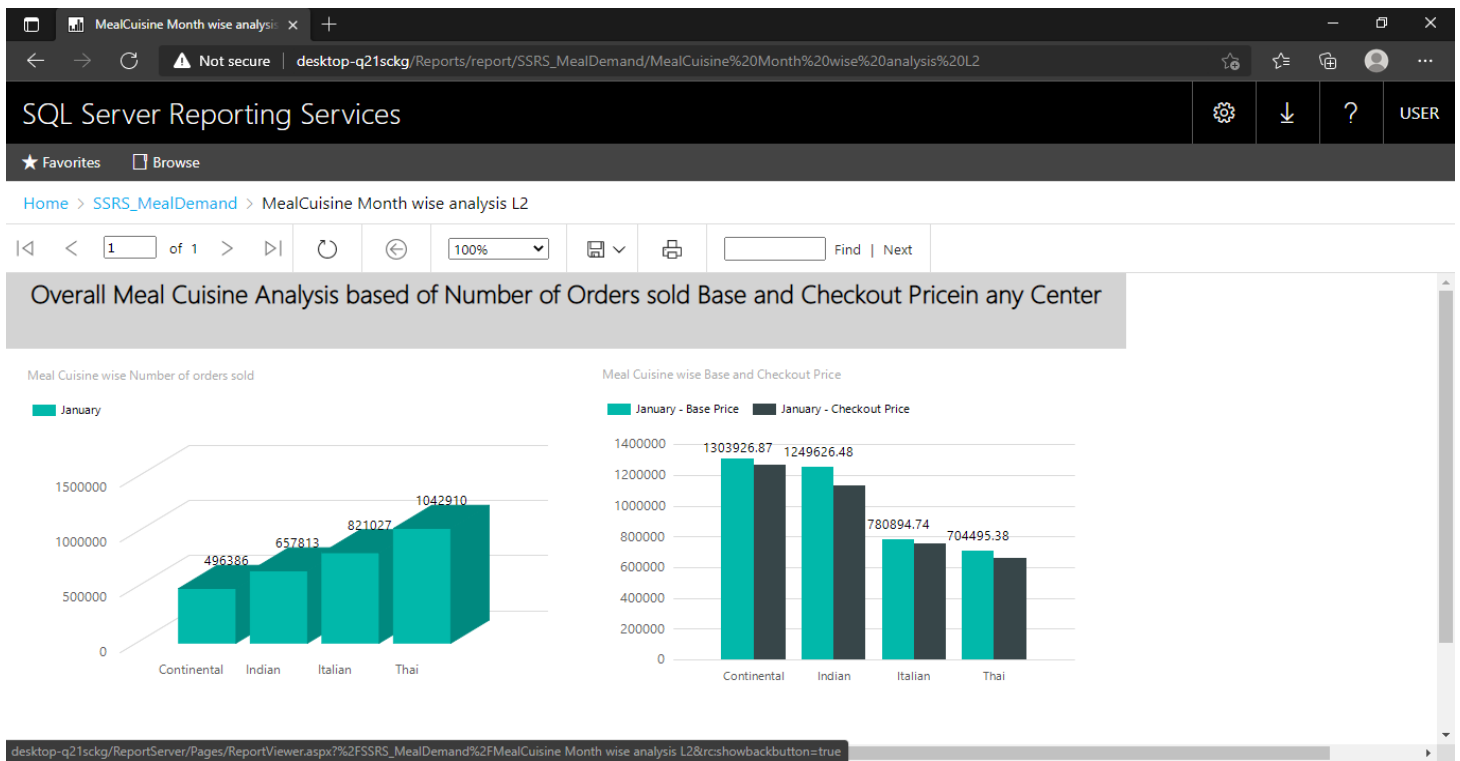
On Clicking on any Meal Cuisine, it will navigate to another page which has more details about a specific Meal in a Meal Cuisine by passing the Meal Cuisine Name as the parameter.

Report with Meal Analysis based on Meal Cuisine

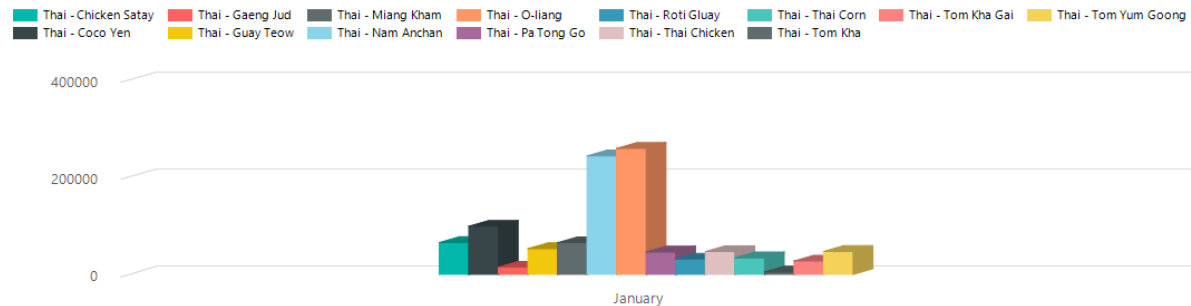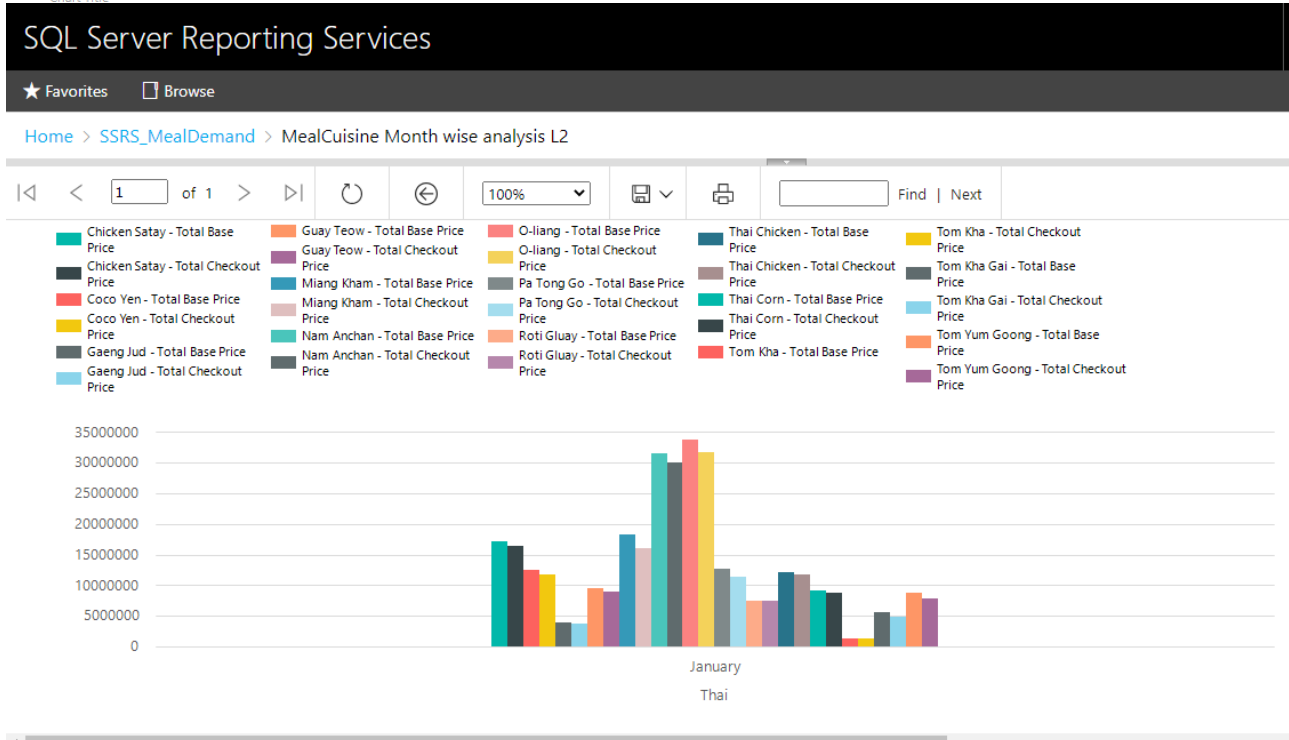## SSRS Reports deployed in SSRS Web Portal