Sri Lanka Institute of Information Technology

Assignment 2 - Report

Data Warehousing & Business Intelligence (IT 3021)

2021

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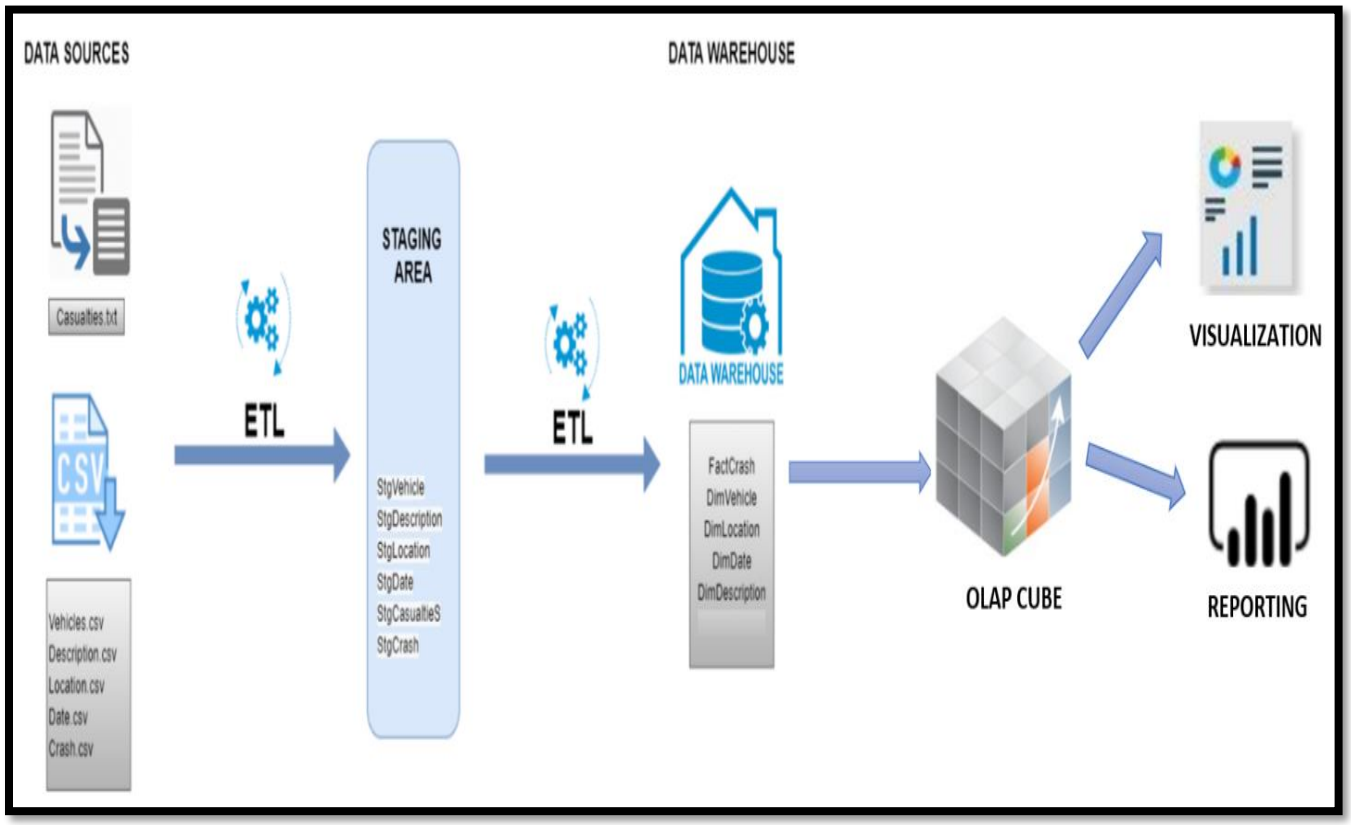
Step 1: Data source for the assignment 2

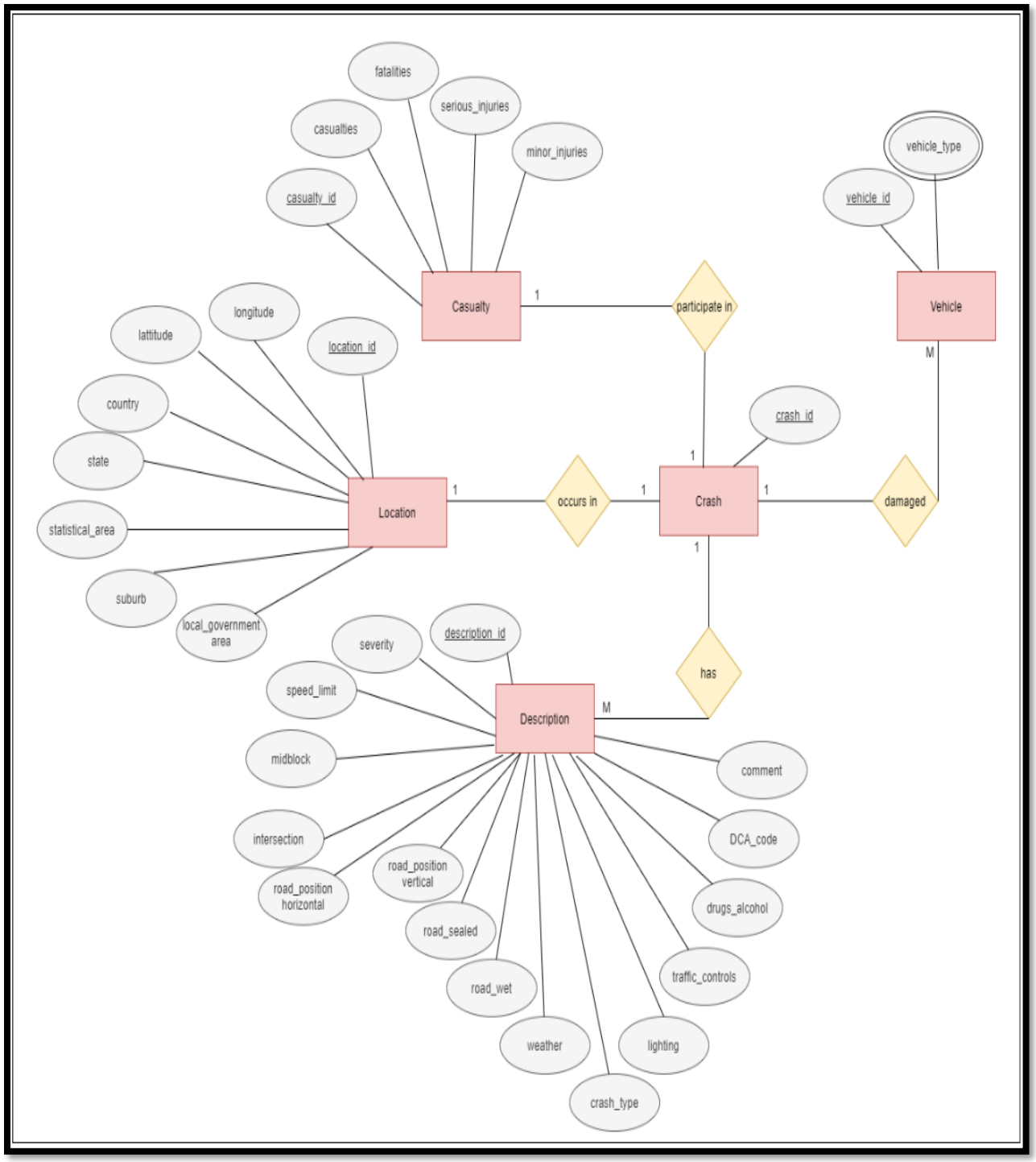
DATA SOURCE

Australia & New Zealand Road Crash Dataset is a dataset based on where , on what conditions accidents occur and data on casualties who were victims in the accidents. This dataset contains 6 CSV tables where I converted the Casualties csv file to a text file in order to extract data from multiple sources in staging level. In staging level, when extracting data to Data Warehouse from SSIS, I used derived columns to replace Null values with N

ARCHITECTURAL DIAGRAM

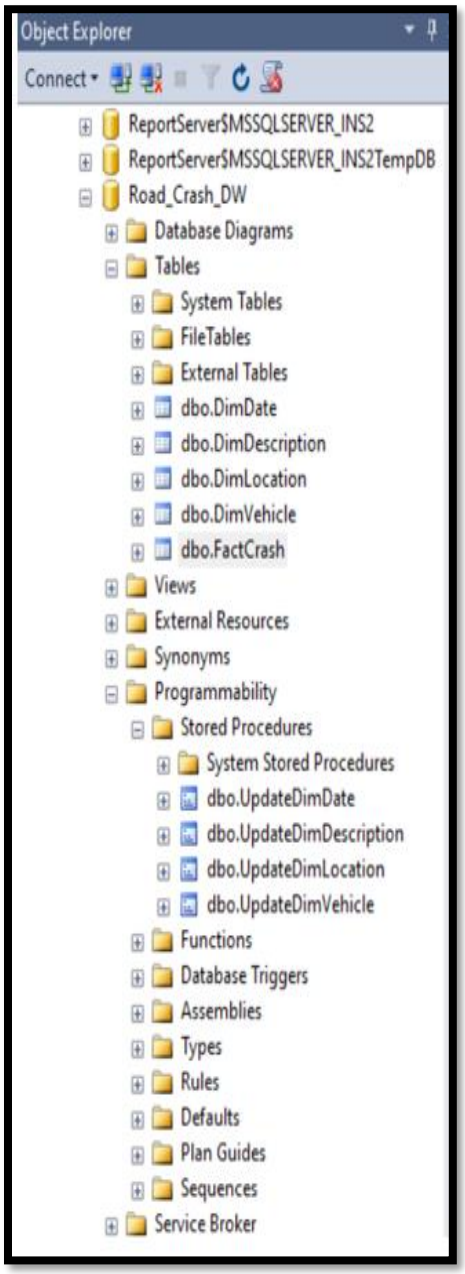


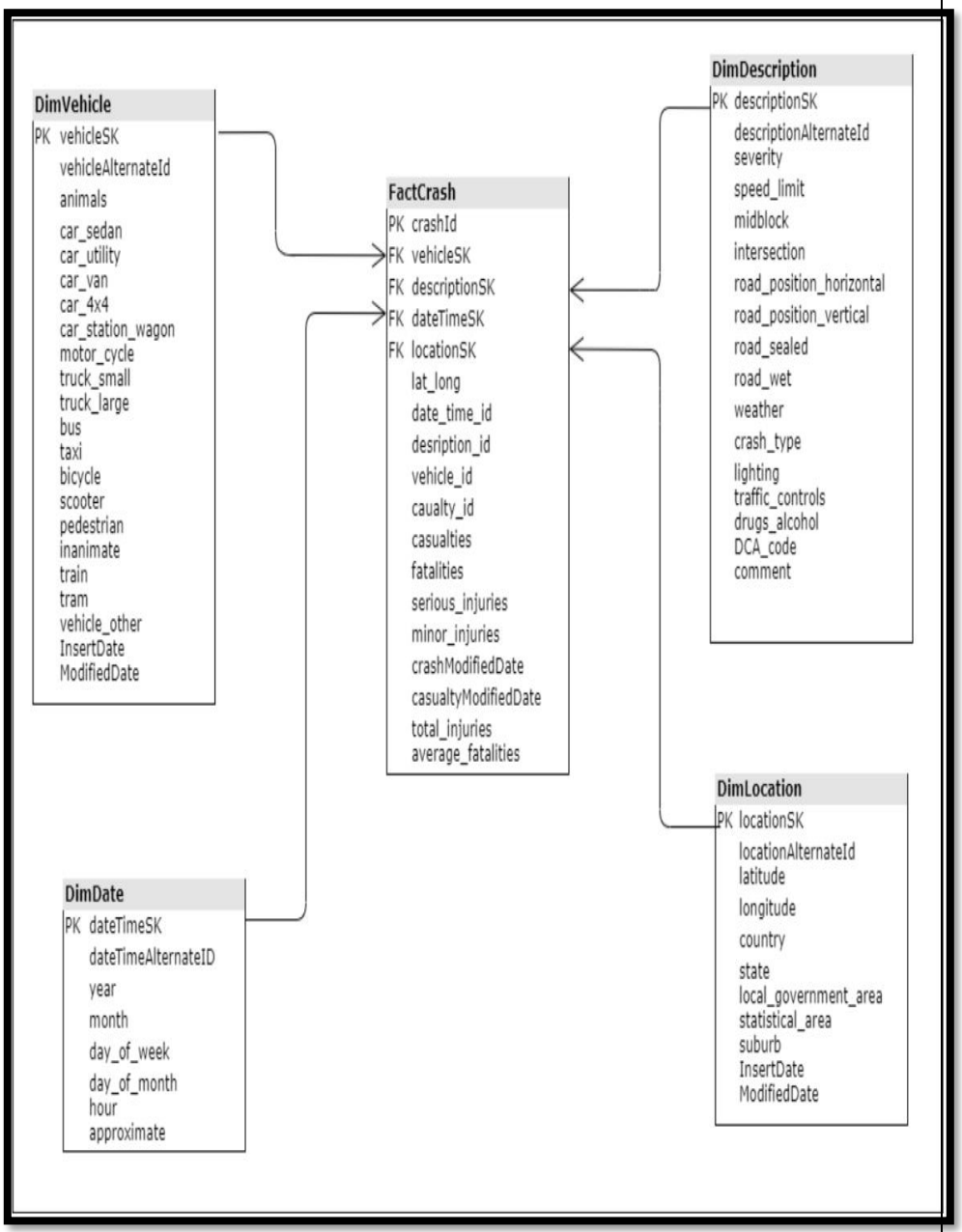
ER DIAGRAM


fatalities
serious_injuries
casualties
minor_injuries
casualty_id
vehicle_type
vehicle_id
Casualty
1
participate in
Vehicle
M
longitude
lattitude
location_id
country
crash_id
state
1
Location
1
occurs in
1
Crash
1
damaged
statistical_area
1
suburb
local_government area
severity
description_id
has
speed_limit
Description
M
midblock
comment
intersection
DCA_code
road_position vertical
road_position horizontal
drugs_alcohol
road_sealed
traffic_controls
road_wet
weather
lighting
crash_type

DATA WAREHOUSE

After extracting data to Staging area and then in data warehouse, I have implemented a star schema where fact table is the FactCrash and the DimensionTables are DimVehicle, DimLocation, DimDescription, DimDate where DimDescription was considered a slowly changing dimension . Implemented up to the data warehouse in Assignment 1 as follows.

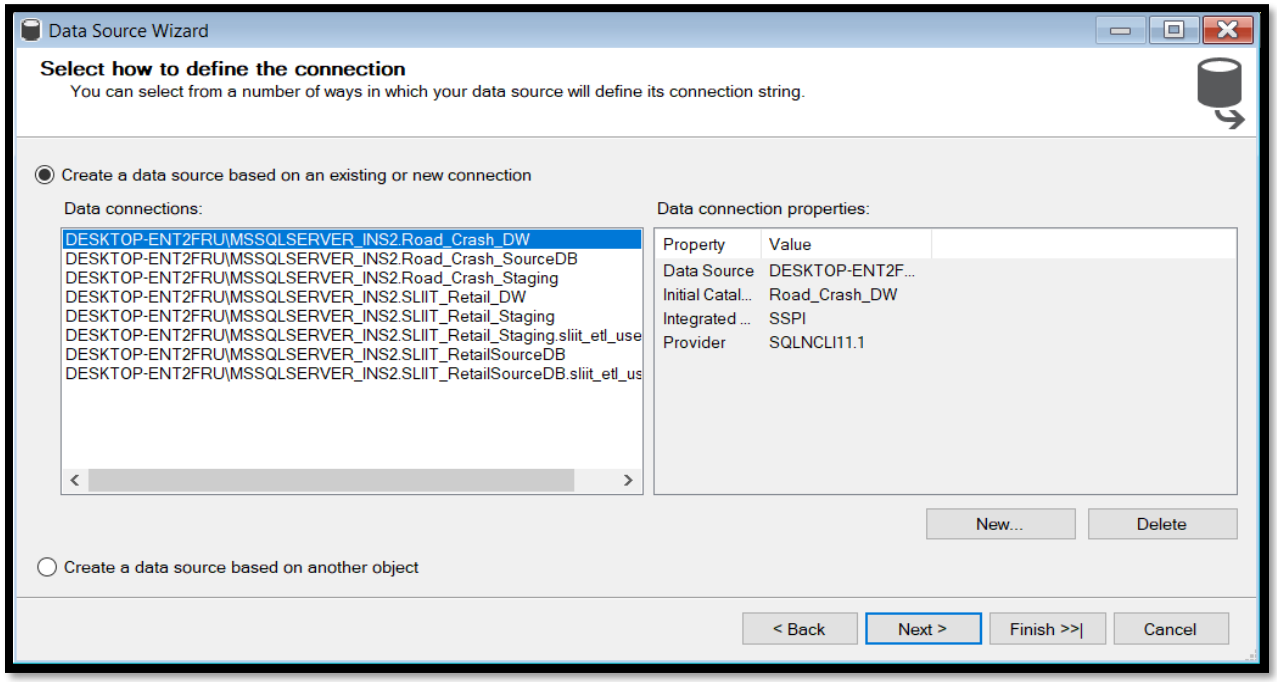


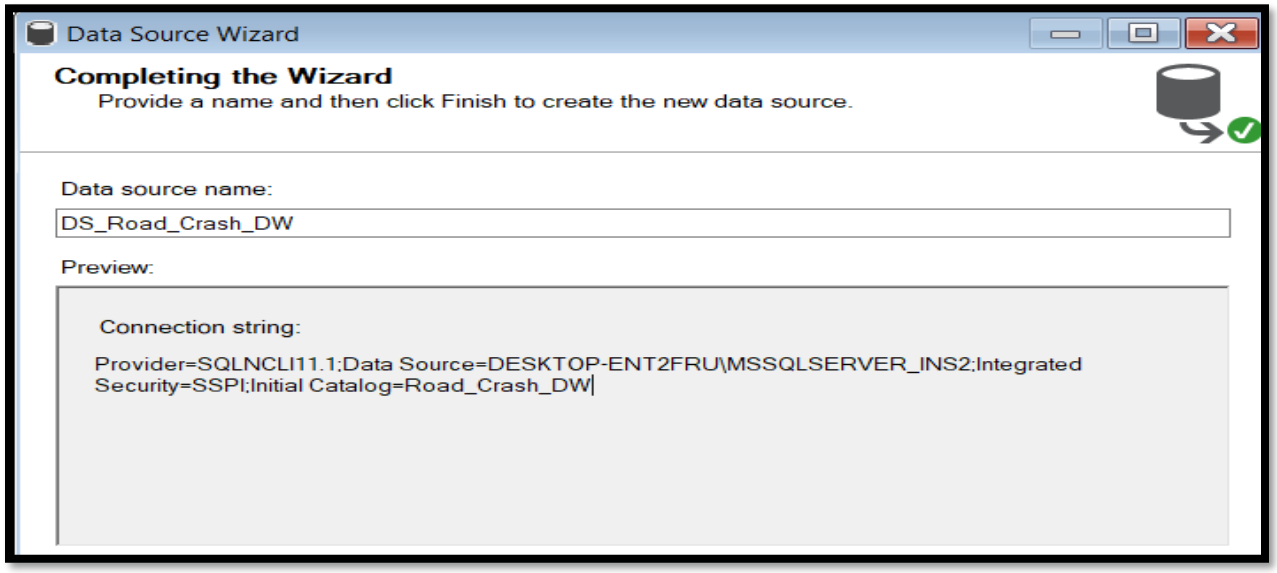


Step 2: SSAS Cube implementation

DATA SOURCE

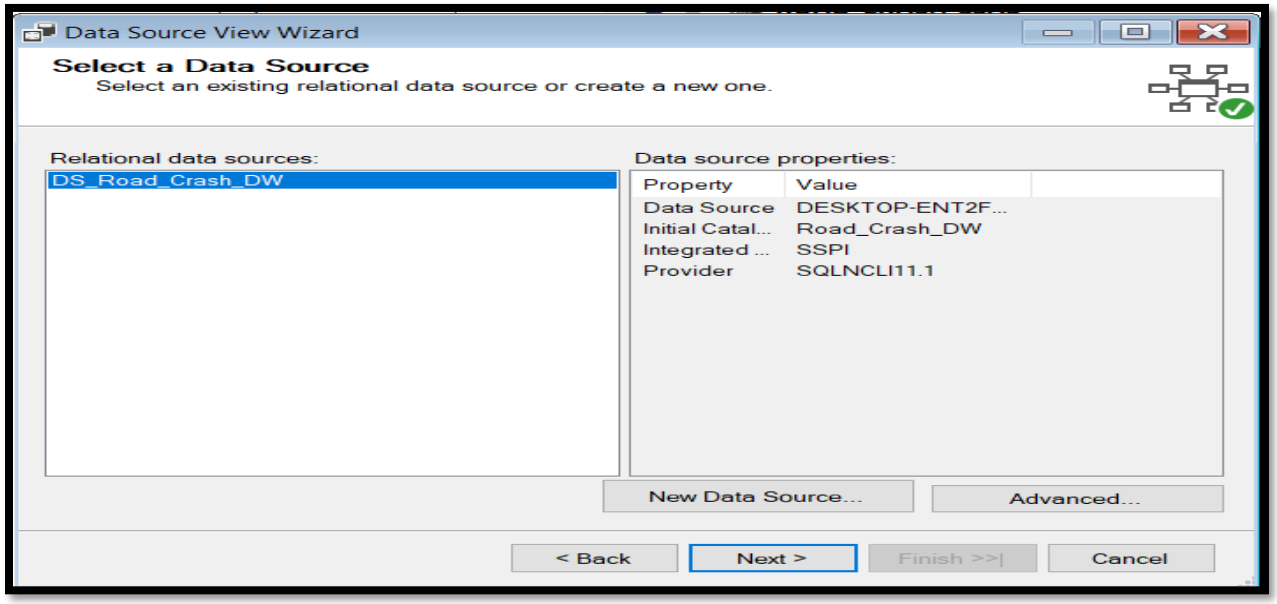
Using the connection to data warehouse, and providing the windows credentials in the Impersonation Information, I created a data source named “DS_Road_Crash_DW”

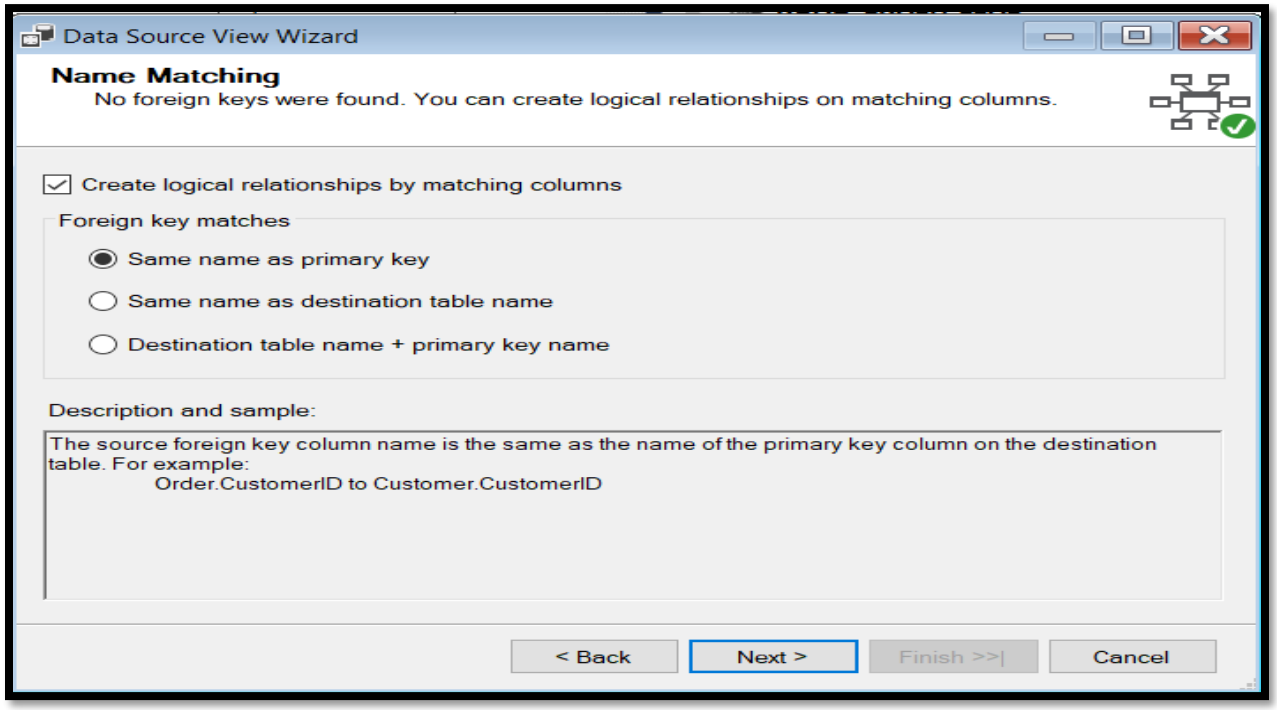




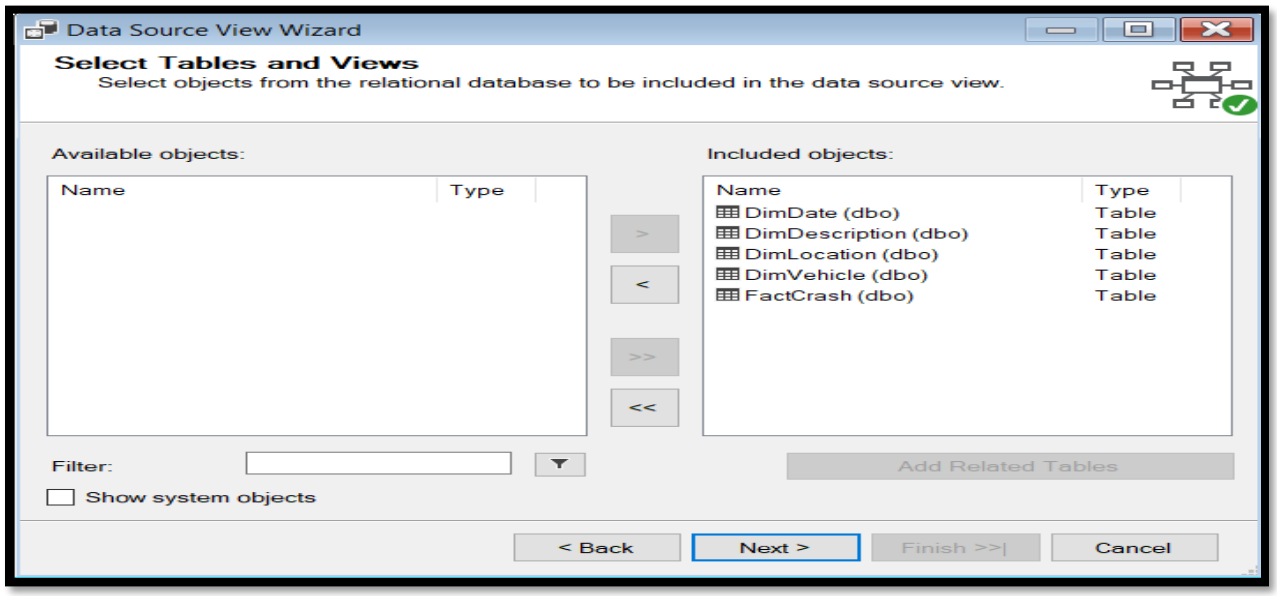
DATA SOURCE VIEW

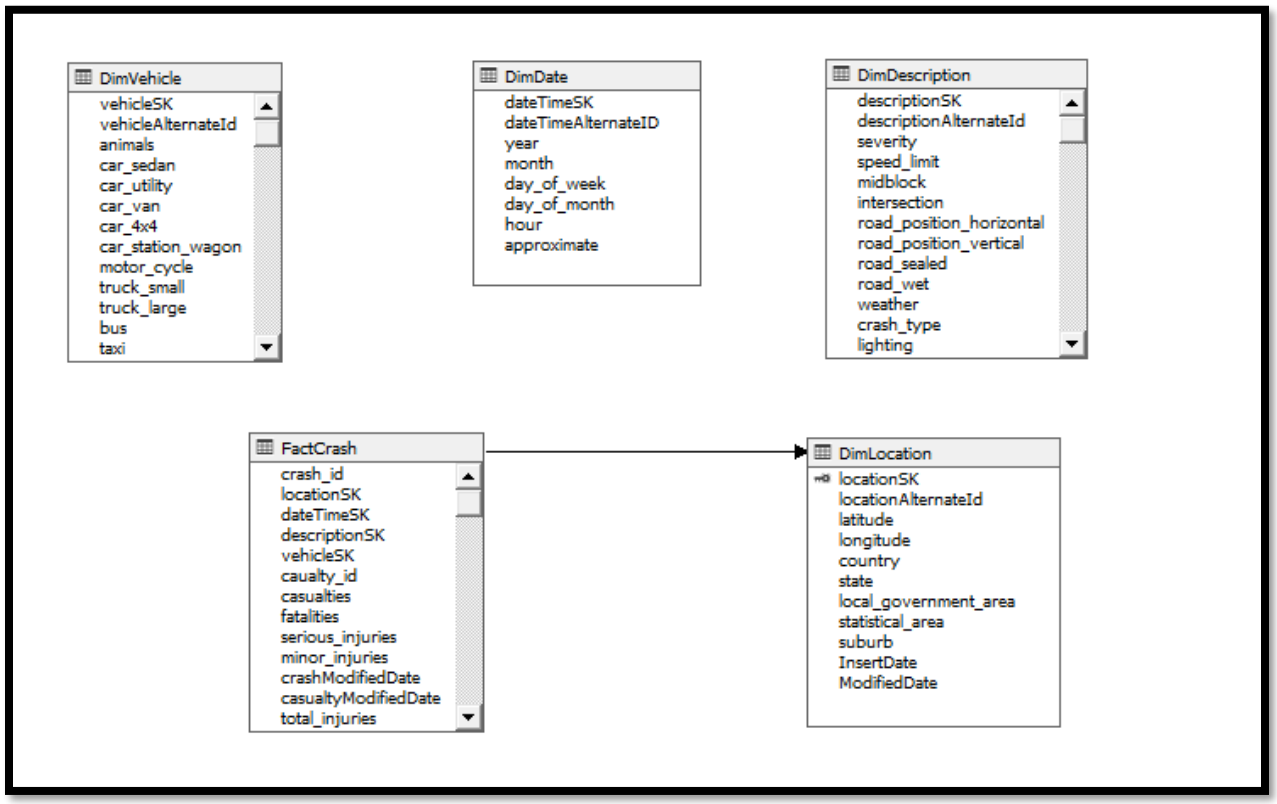
I created a Data Source View named “DSV_Road_Crash_DW” as follows.



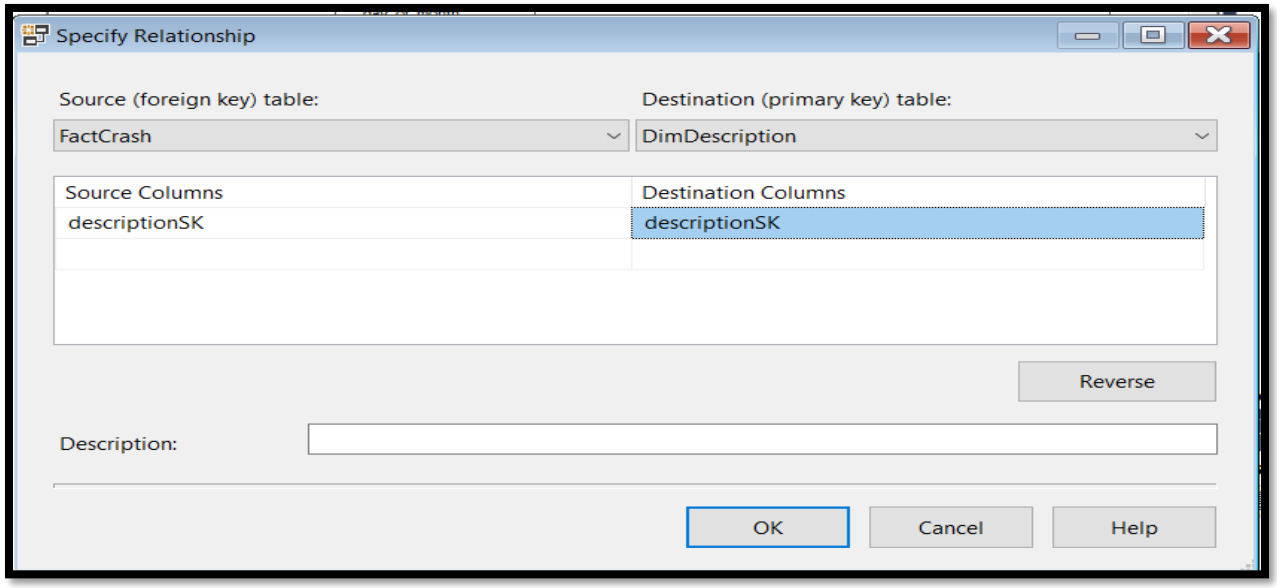


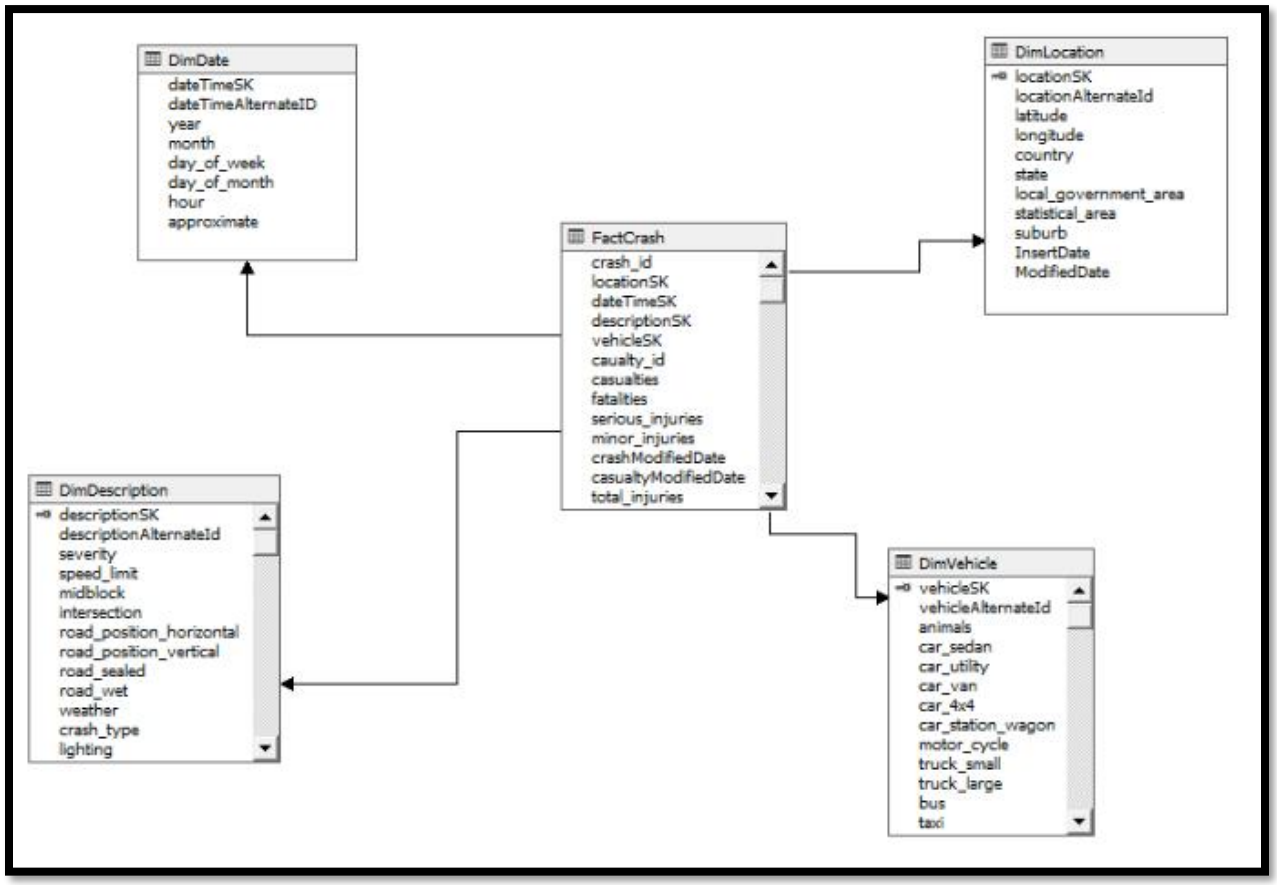
Here I manually moved the tabled to included objects except for DimLocation as primary key field and fact table's foreign key columns were not having the same name in other Dimensions.





Then I established the link between dimension by mapping the relavant keys as follows

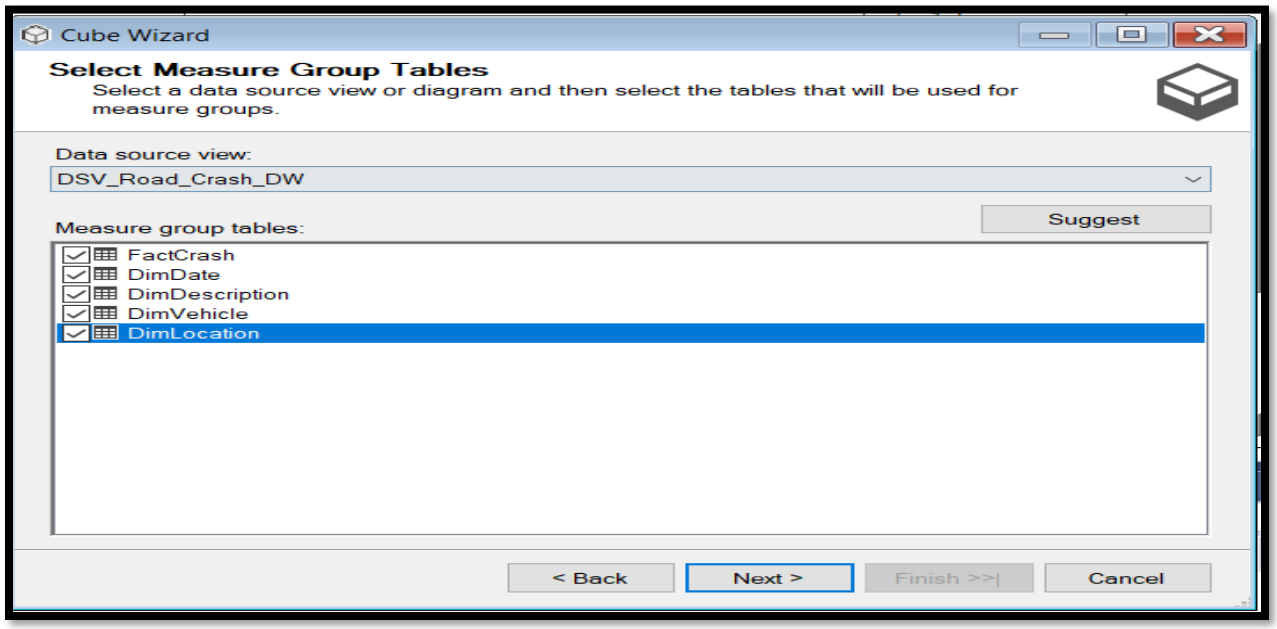


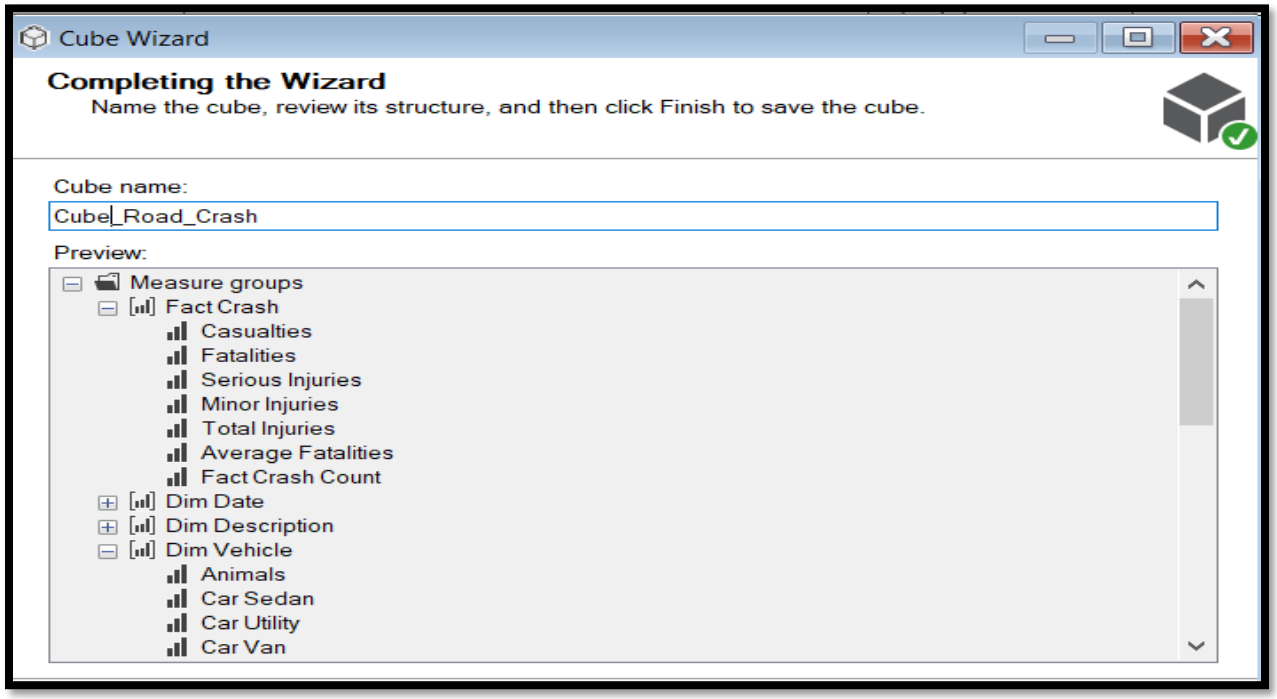


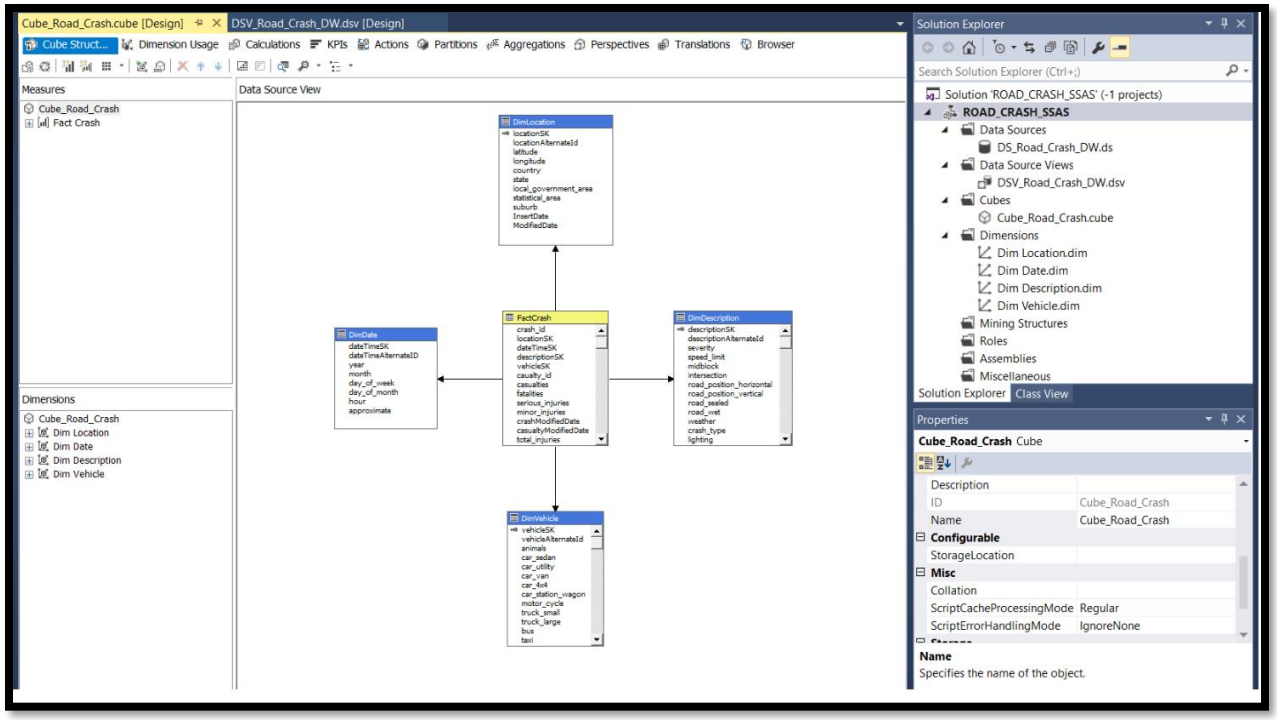
CUBE CREATION

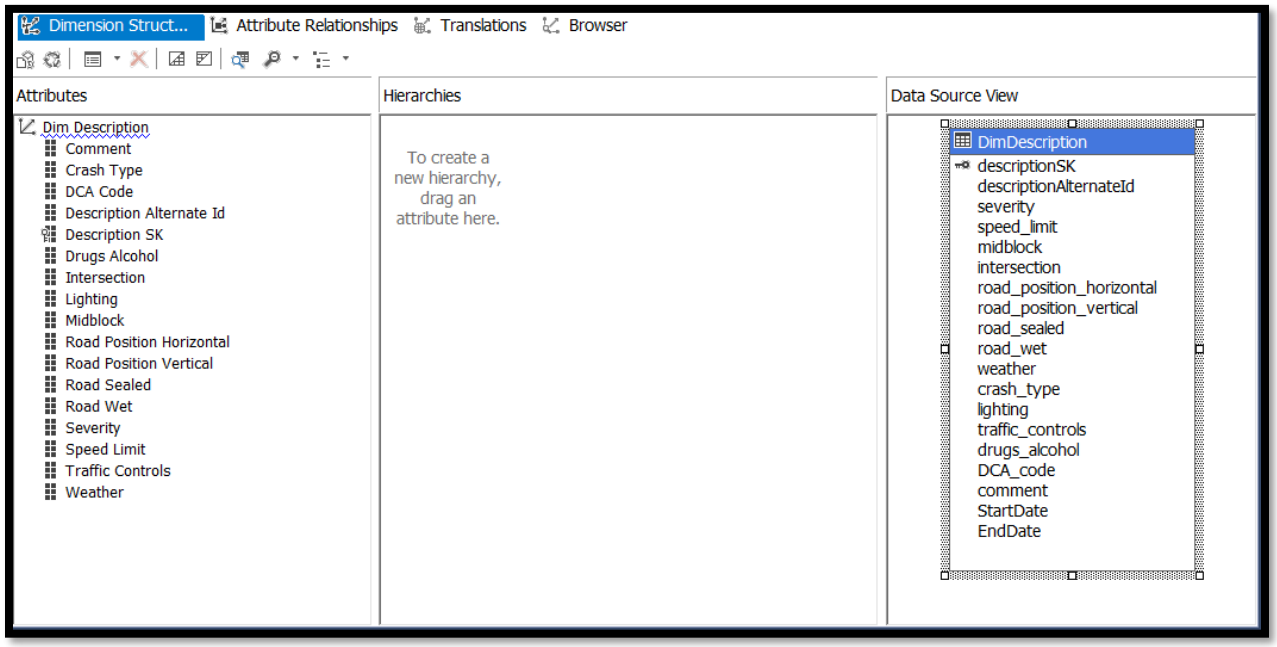
The data source view created the relevant tables . I used the existing data source to create the Cube.

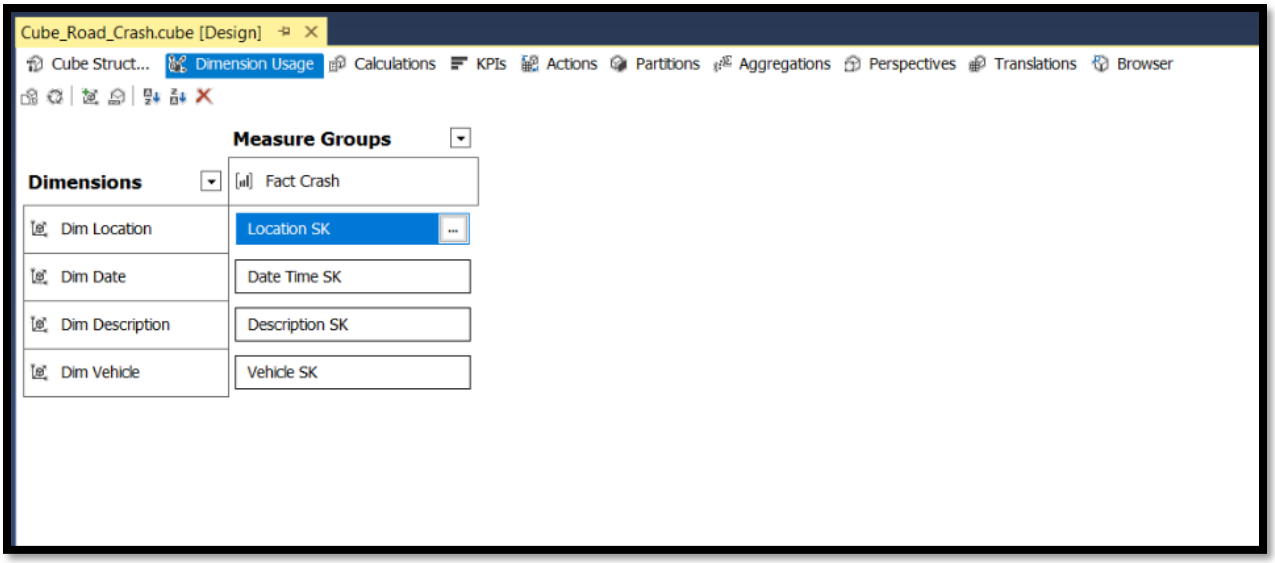
From the “Cube wizard”,I selected all the measures from the “FactSales” fact table which is needed to include in the cube and select all the other dimensions and created a cube named “Cube_Road_Crash”.





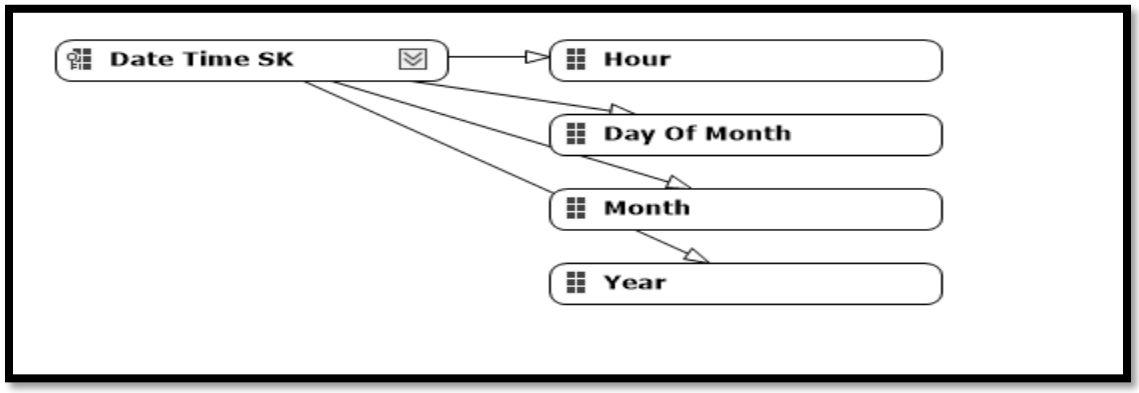

Cube_Road_Crash.cube [Design]
DSV_Road_Crash_DW.dsv [Design]
Cube Struct...
Dimension Usage
Calculations
KPIs
Actions
Partitions
Aggregations
Perspectives
Translations
Browser
Measures
Cube_Road_Crash
Fact Crash
Dimensions
Cube_Road_Crash
Dim Location
Dim Date
Dim Description
Dim Vehicle
Data Source View
DimLocation
FactCrash
DimDate
DimDescription
DimVehicle
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'ROAD_CRASH_SSAS' (-1 projects)
ROAD_CRASH_SSAS
Data Sources
DS_Road_Crash_DW.ds
Data Source Views
DSV_Road_Crash_DW.dsv
Cubes
Cube_Road_Crash.cube
Dimensions
Dim Location.dim
Dim Date.dim
Dim Description.dim
Dim Vehicle.dim
Mining Structures
Roles
Assemblies
Miscellaneous
Solution Explorer
Class View
Properties
Cube_Road_Crash Cube
Description
ID
Cube_Road_Crash
Name
Cube_Road_Crash
Configurable
StorageLocation
Misc
Collation
ScriptCacheProcessingMode
Regular
ScriptErrorHandlingMode
IgnoreNone
Name
Specifies the name of the object.


Dimension Struct...
Attribute Relationships
Translations
Browser
Attributes
Dim Description
Comment
Crash Type
DCA Code
Description Alternate Id
Description SK
Drugs Alcohol
Intersection
Lighting
Midblock
Road Position Horizontal
Road Position Vertical
Road Sealed
Road Wet
Severity
Speed Limit
Traffic Controls
Weather
Hierarchies
To create a new hierarchy, drag an attribute here.
Data Source View
DimDescription
descriptionSK
descriptionAlternateId
severity
speed_limit
midblock
intersection
road_position_horizontal
road_position_vertical
road_sealed
road_wet
weather
crash_type
lighting
traffic_controls
drugs_alcohol
DCA_code
comment
StartDate
EndDate

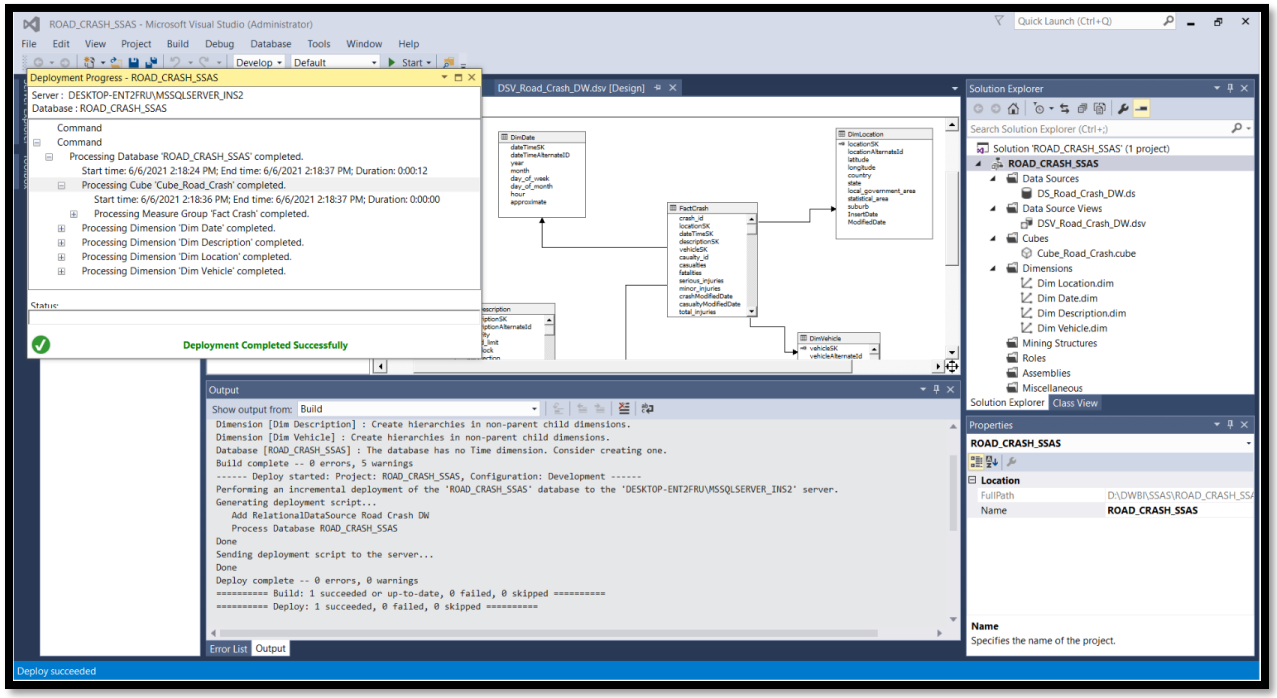


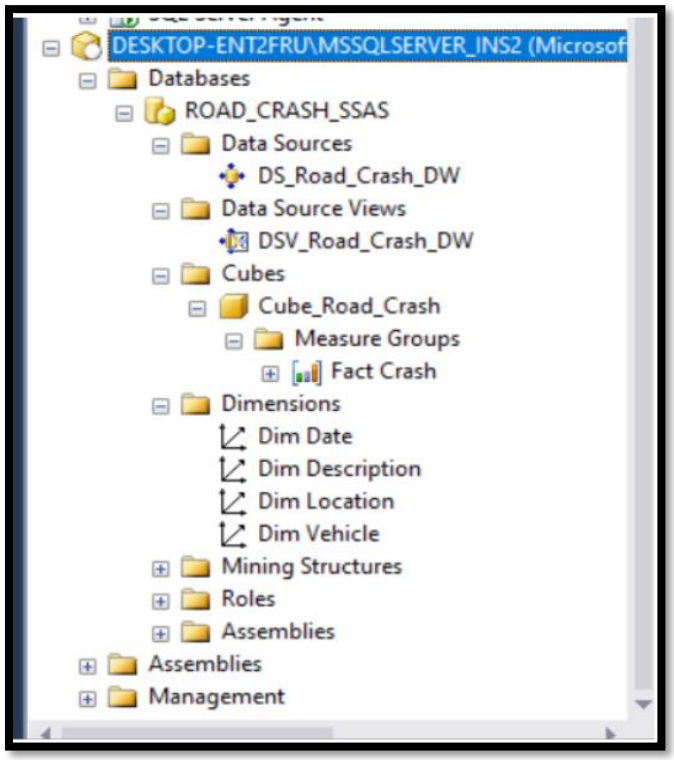
HIERARCHY

I Implemented a hierarchy to the DimDate as follows.



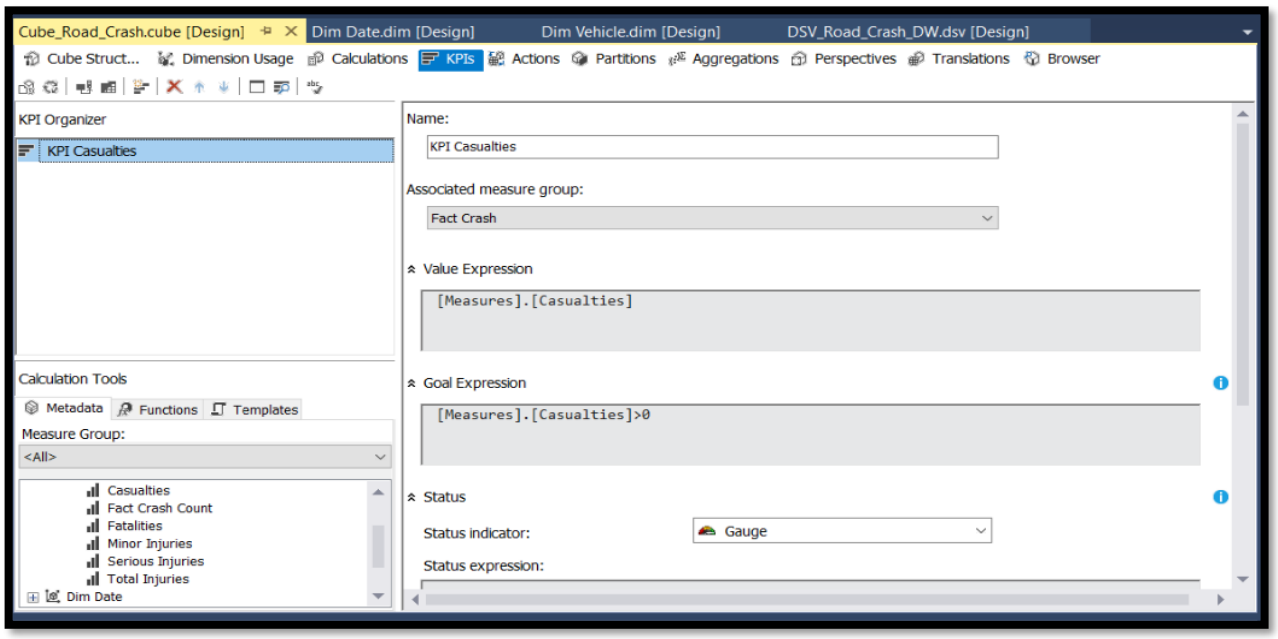
Successfully deployed the Cube



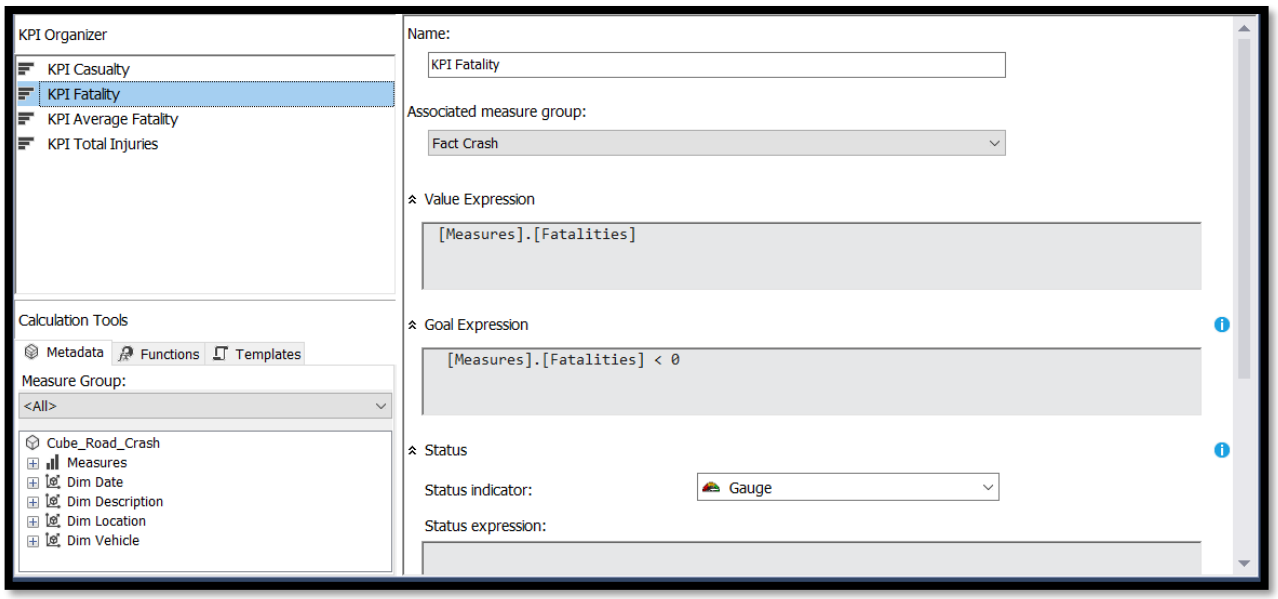


CREATING KPI

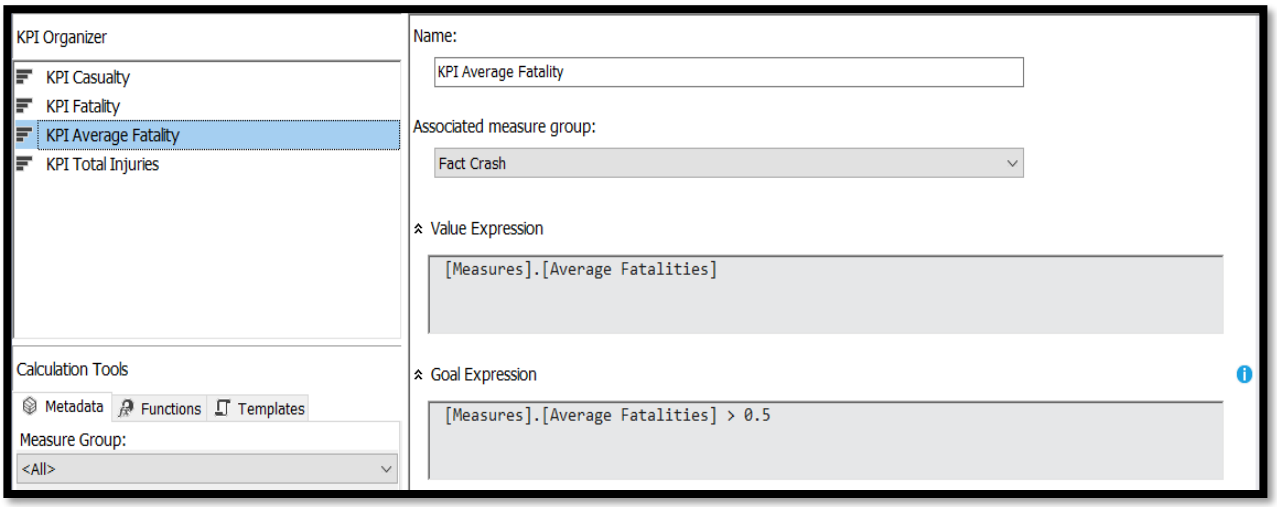
(i) I created a KPI to measure the count of casualties. If casualty count is greater than 0, then it is success else fail.



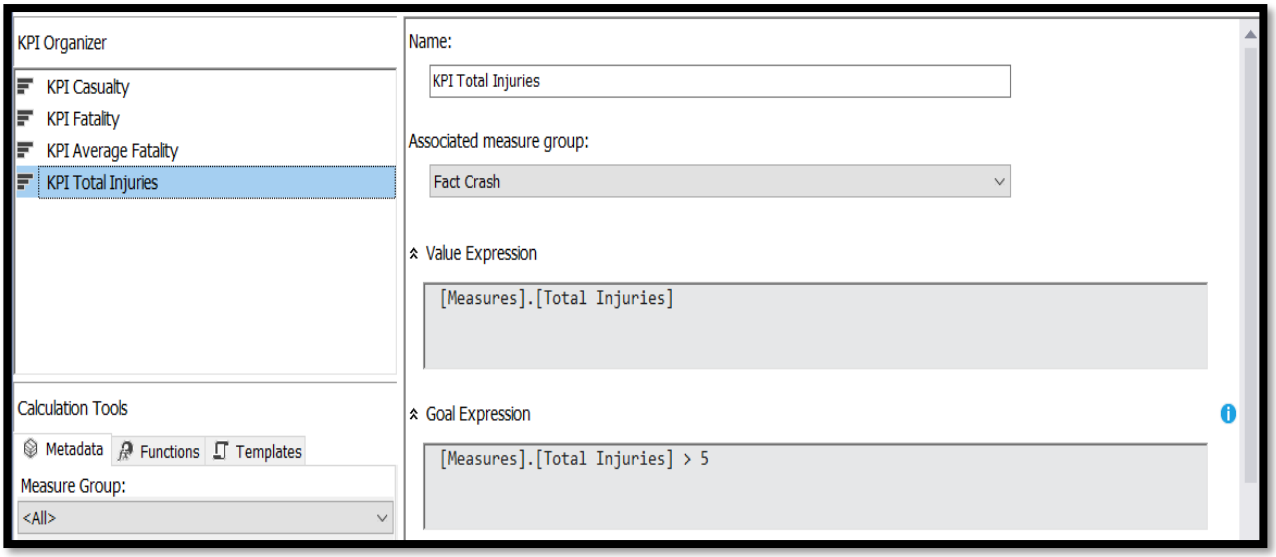
(ii) I created a KPI to measure the count of fatalities. If casualty count is less than 0, then it is success else fail.



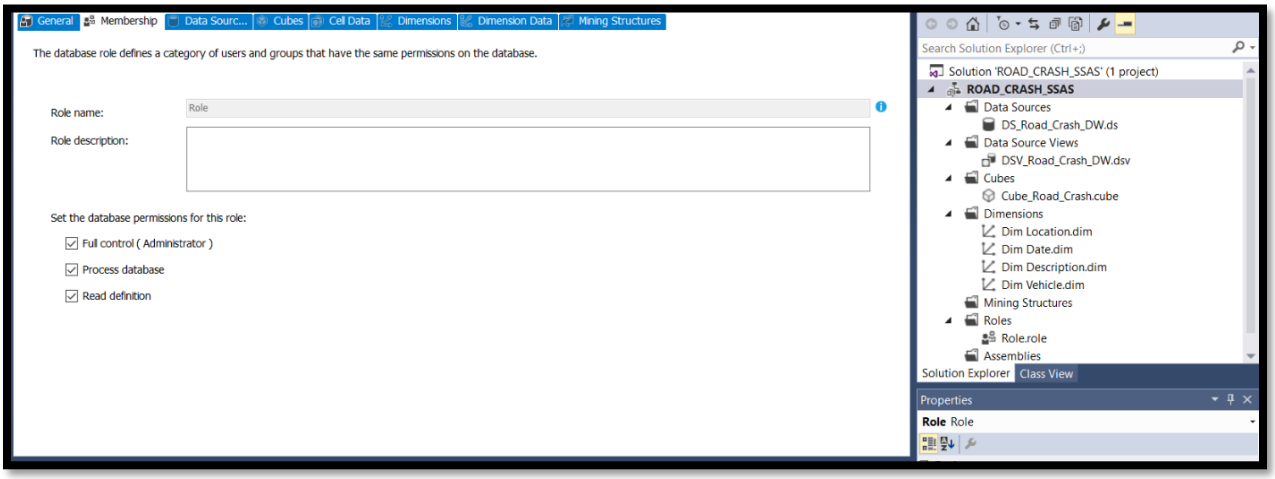
(iii) I created a KPI to measure the average fatalities. If casualty count is greater than 0.5, then it is success else fail.



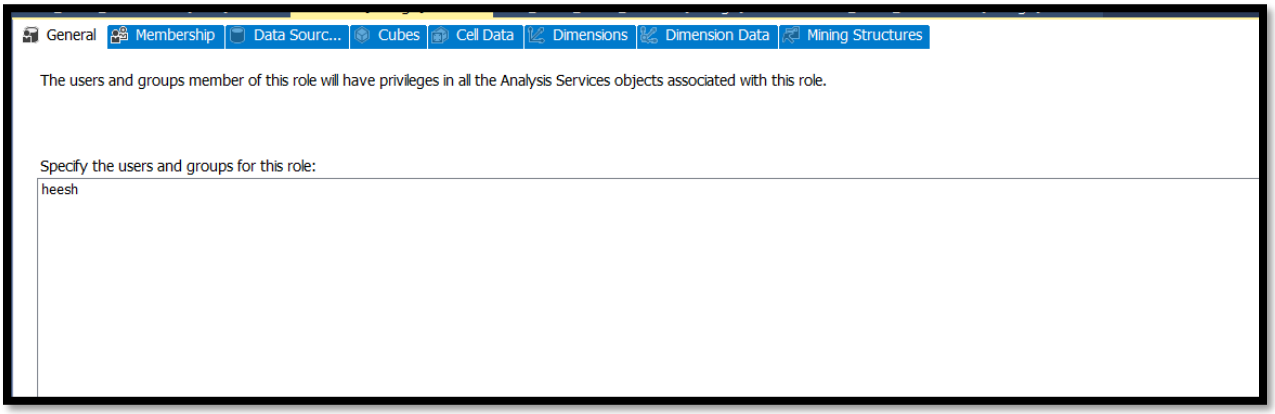
(iv) I created a KPI to measure the total injuries. If casualty count is greater than5, then it is success else fail.



I created a role with full control

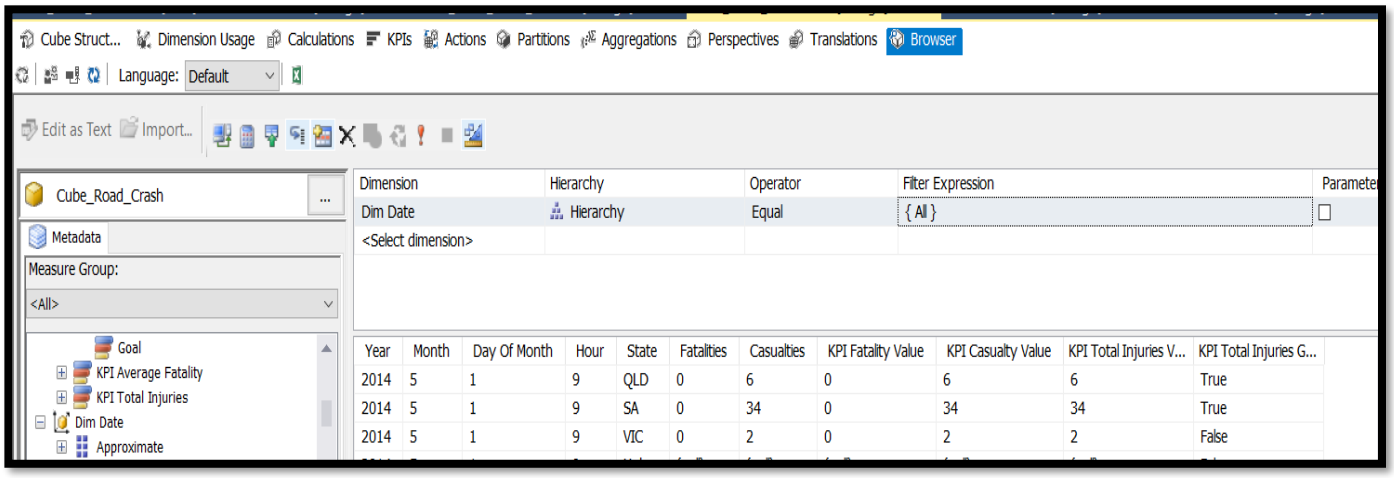


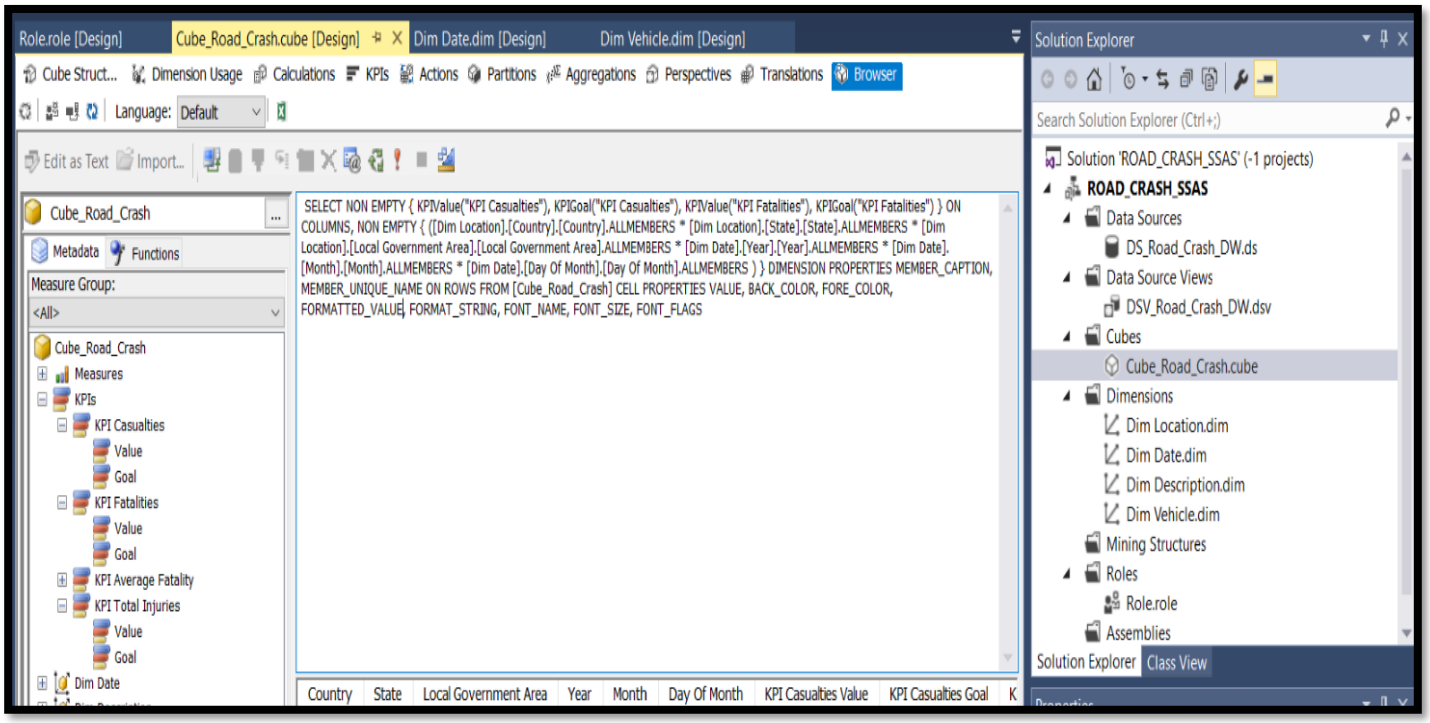
Specified "heesh" as the user and added



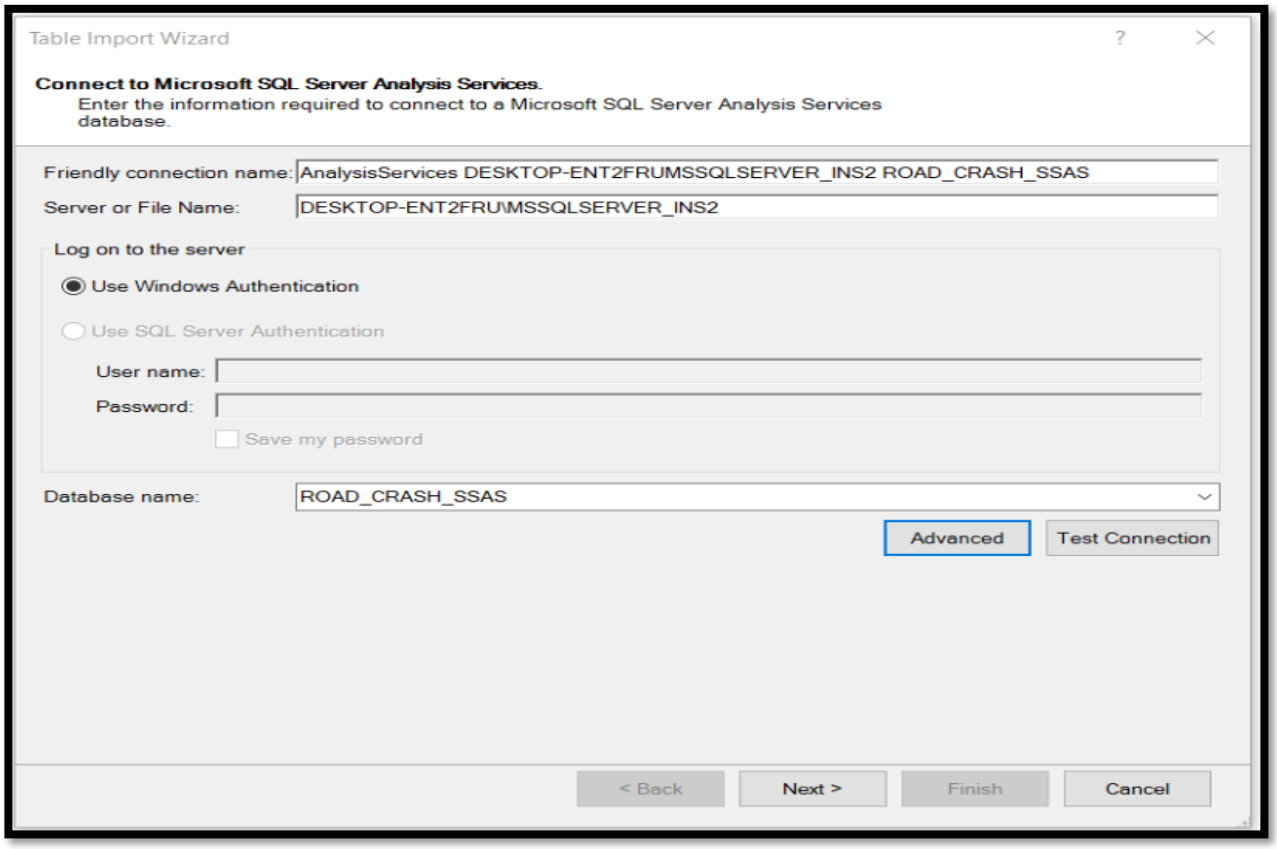
Step 3: Demonstration of OLAP operation

From cube browser I selected the following field to create the MDX query. a) Date hierarchy from DimDate b) Fatality and Casualty from the Measures c) State from DimLocation d) KPI Fatalities and KPI Casualties Goal . Then added filtering.

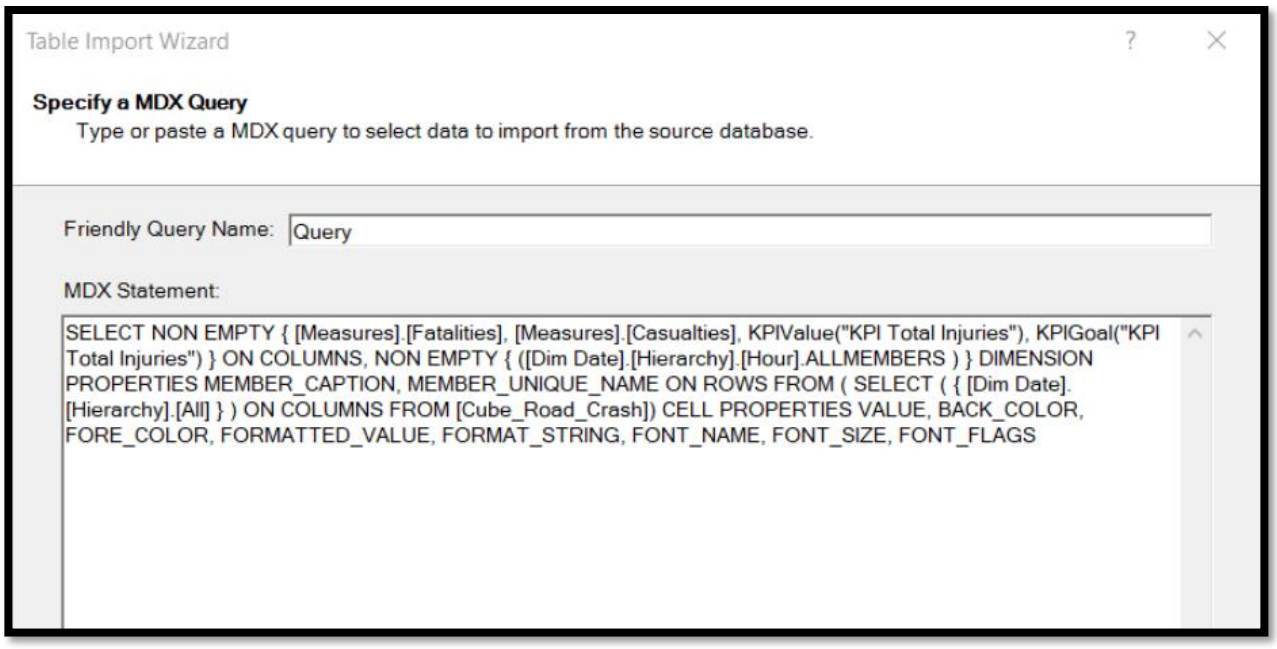




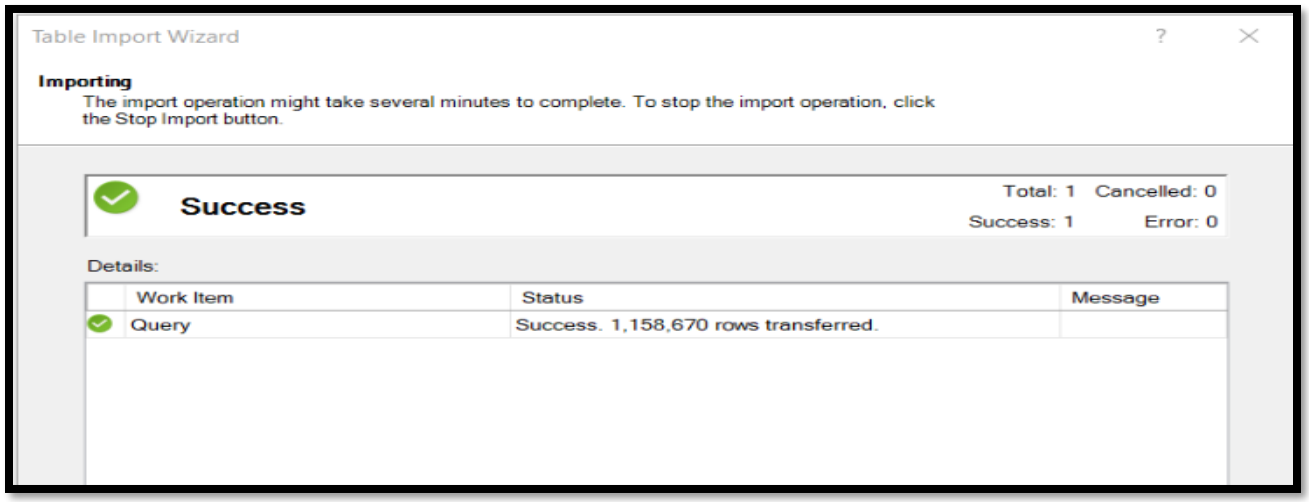
By providing the server name and multidimensional project I created connection to the Excel with cube I created.



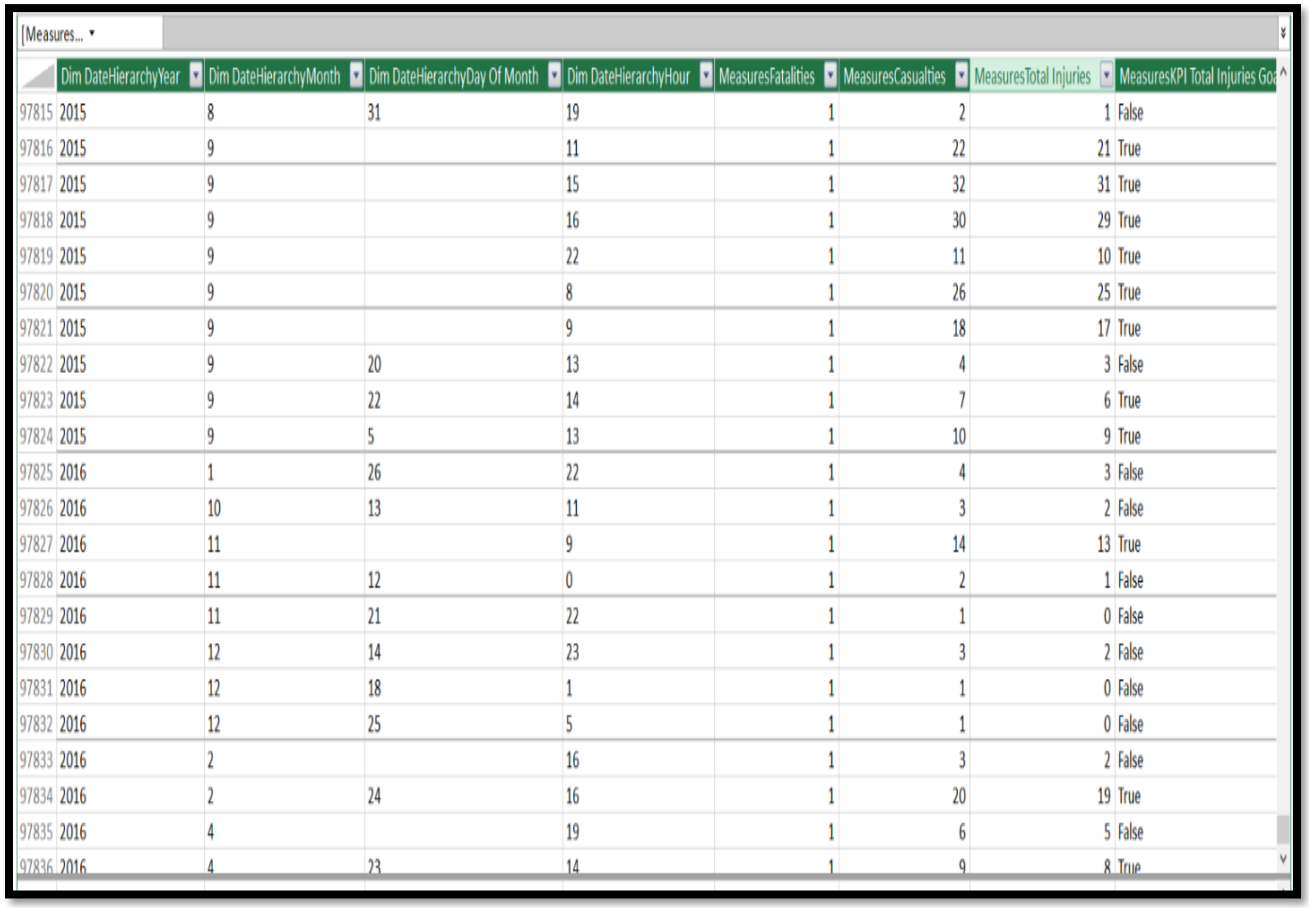
I pasted the MDX Query which was generated in SSRS.



Data got successfully loaded.



Power Pivot Table is generated as below



[Measures...]

	Dim DateHierarchyYear	Dim DateHierarchyMonth	Dim DateHierarchyDay Of Month	Dim DateHierarchyHour	MeasuresFatalities	MeasuresCasualties	MeasuresTotal Injuries	MeasuresKPI Total Injuries Goa
97815	2015	8	31	19	1	2	1	False
97816	2015	9		11	1	22	21	True
97817	2015	9		15	1	32	31	True
97818	2015	9		16	1	30	29	True
97819	2015	9		22	1	11	10	True
97820	2015	9		8	1	26	25	True
97821	2015	9		9	1	18	17	True
97822	2015	9	20	13	1	4	3	False
97823	2015	9	22	14	1	7	6	True
97824	2015	9	5	13	1	10	9	True
97825	2016	1	26	22	1	4	3	False
97826	2016	10	13	11	1	3	2	False
97827	2016	11		9	1	14	13	True
97828	2016	11	12	0	1	2	1	False
97829	2016	11	21	22	1	1	0	False
97830	2016	12	14	23	1	3	2	False
97831	2016	12	18	1	1	1	0	False
97832	2016	12	25	5	1	1	0	False
97833	2016	2		16	1	3	2	False
97834	2016	2	24	16	1	20	19	True
97835	2016	4		19	1	6	5	False
97836	2016	4	23	14	1	9	8	True

DRILL DOWN

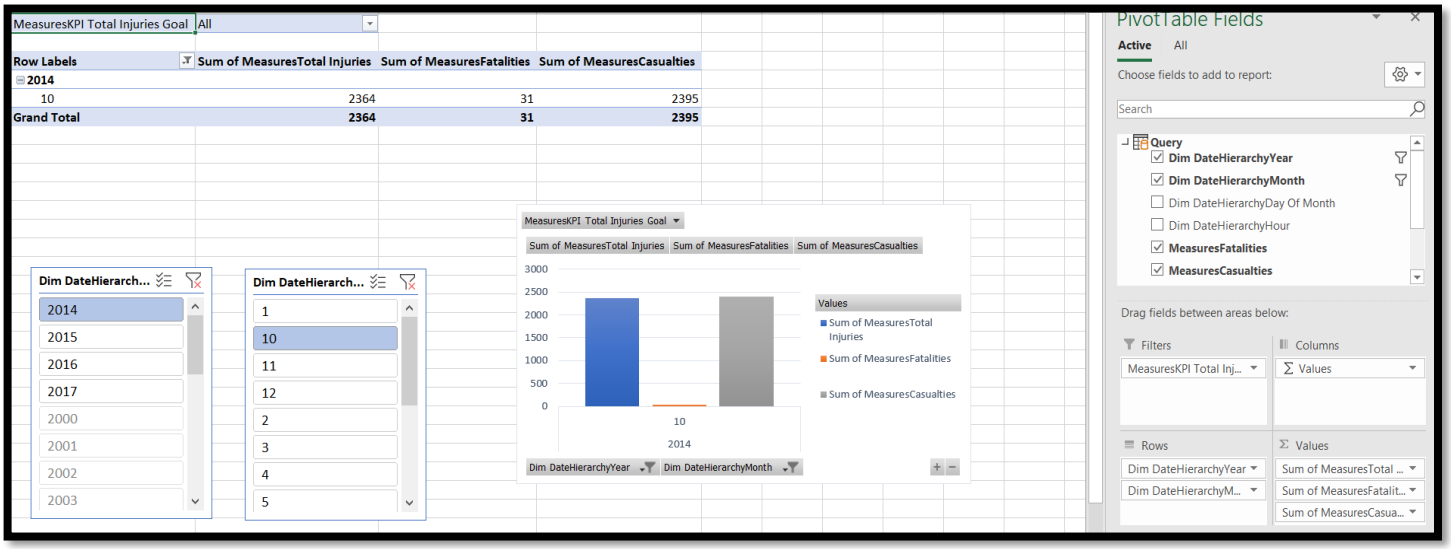
Here Date hierarchy has moved down from year to month.

The Chart and the table are about the sum of casualties and fatalities each month of the year

SLICE

Here the DimDate dimension is sliced to 10th month of the year with a filter.

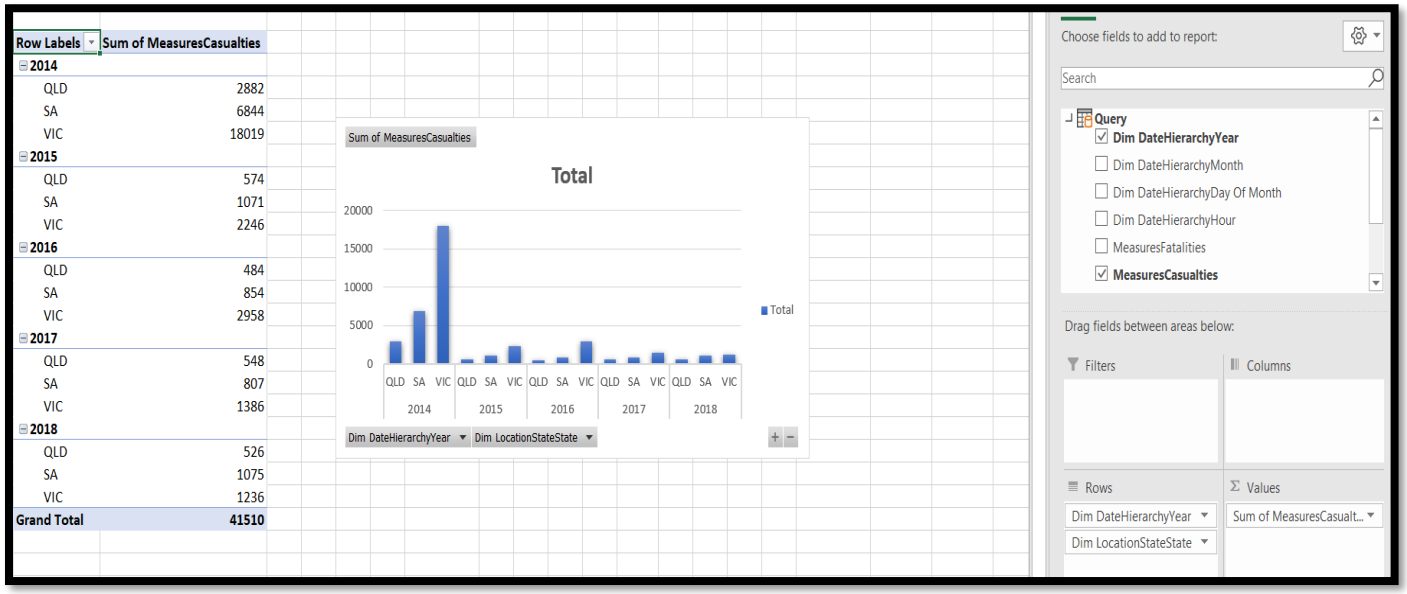
The Chart and the table are about the sum of casualties and fatalities on 10 the month of the year.



PIVOT

1. Here I have rotate the axes in table.

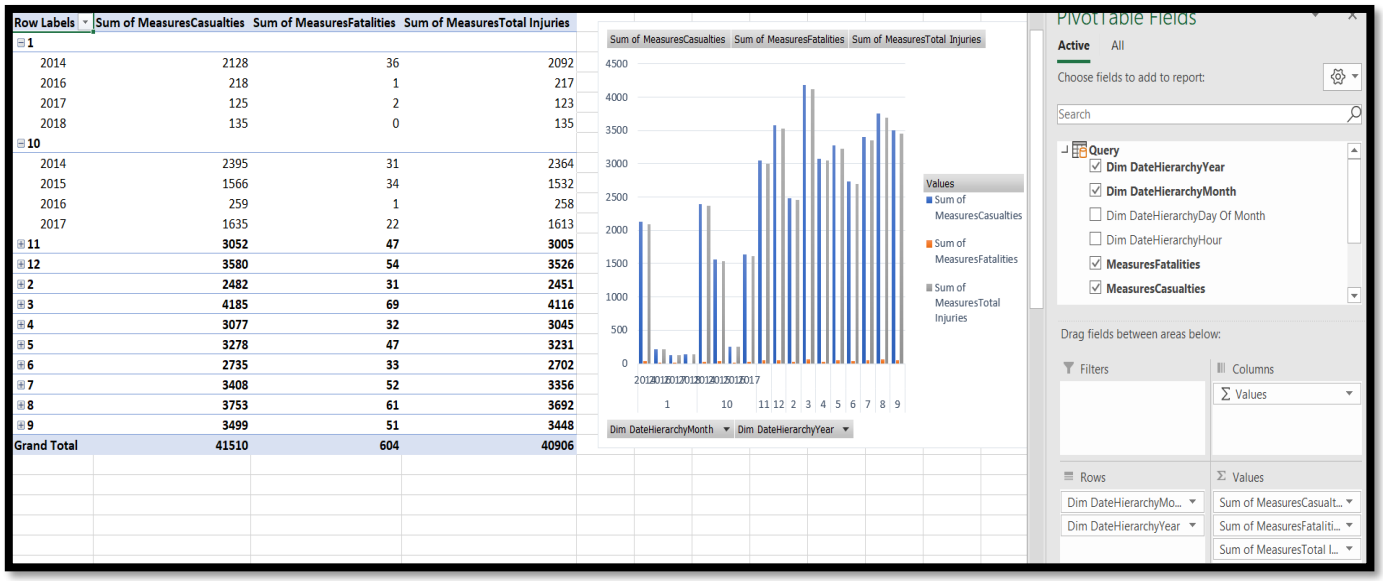
2. The Chart and the table show the sum of casualties in each state in each year



ROLL UP

1. Here Date hierarchy has moved up from month to year.

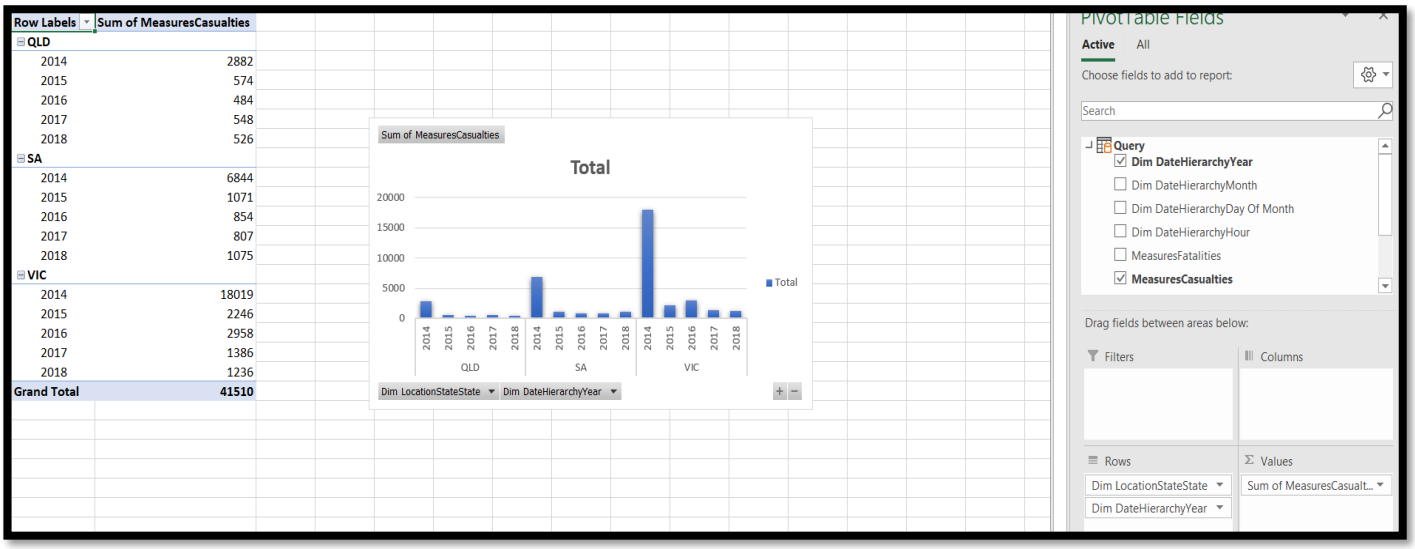
2. The Chart and the table are about sum of casualties and fatalities in each month of the year.



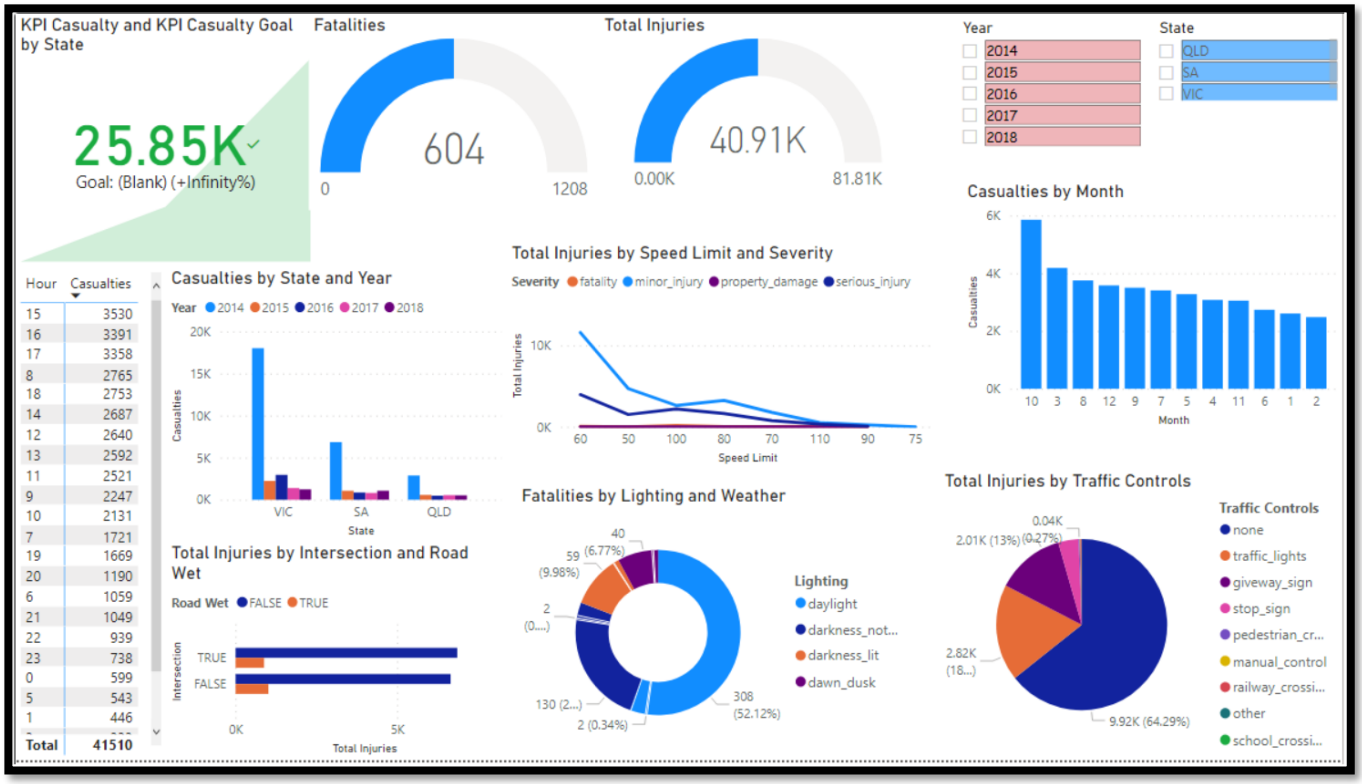
DICE

1. Here it has taken two dimensions DimLocation & DimDate dimension to create this sub cube along with one measure.

2. The Chart and the table show the sum of casualties in each state in each year



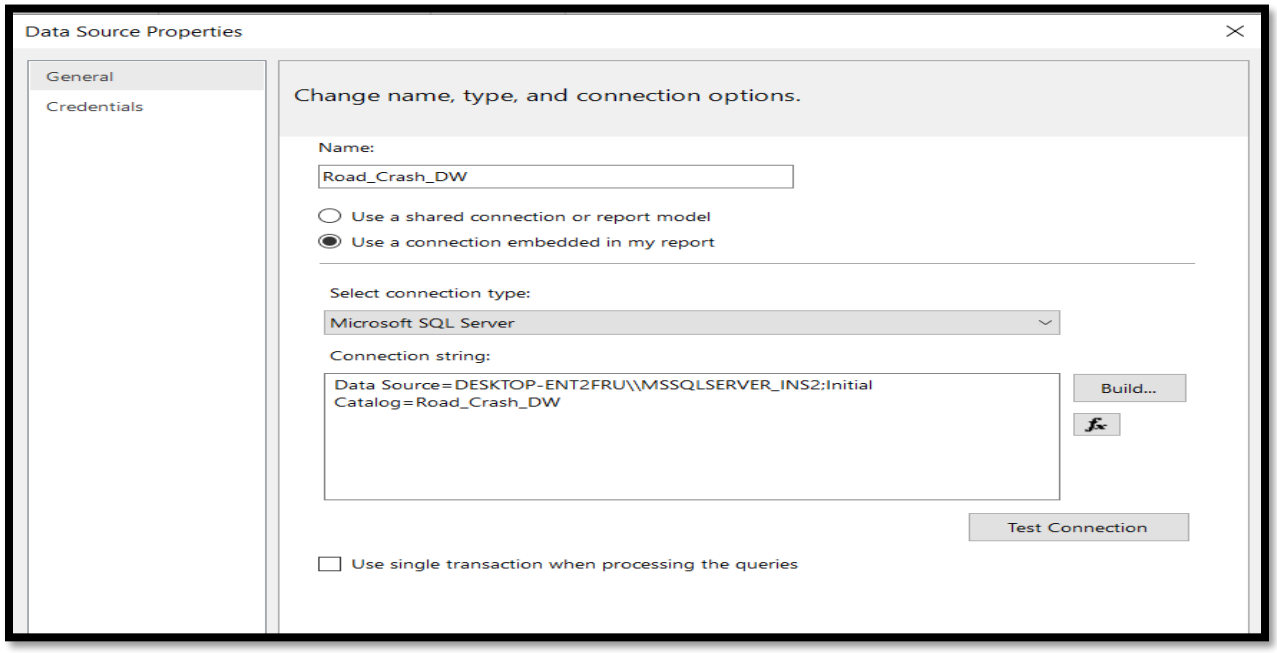
I created a POWER BI dashboard as follows reflecting the OLAP operations

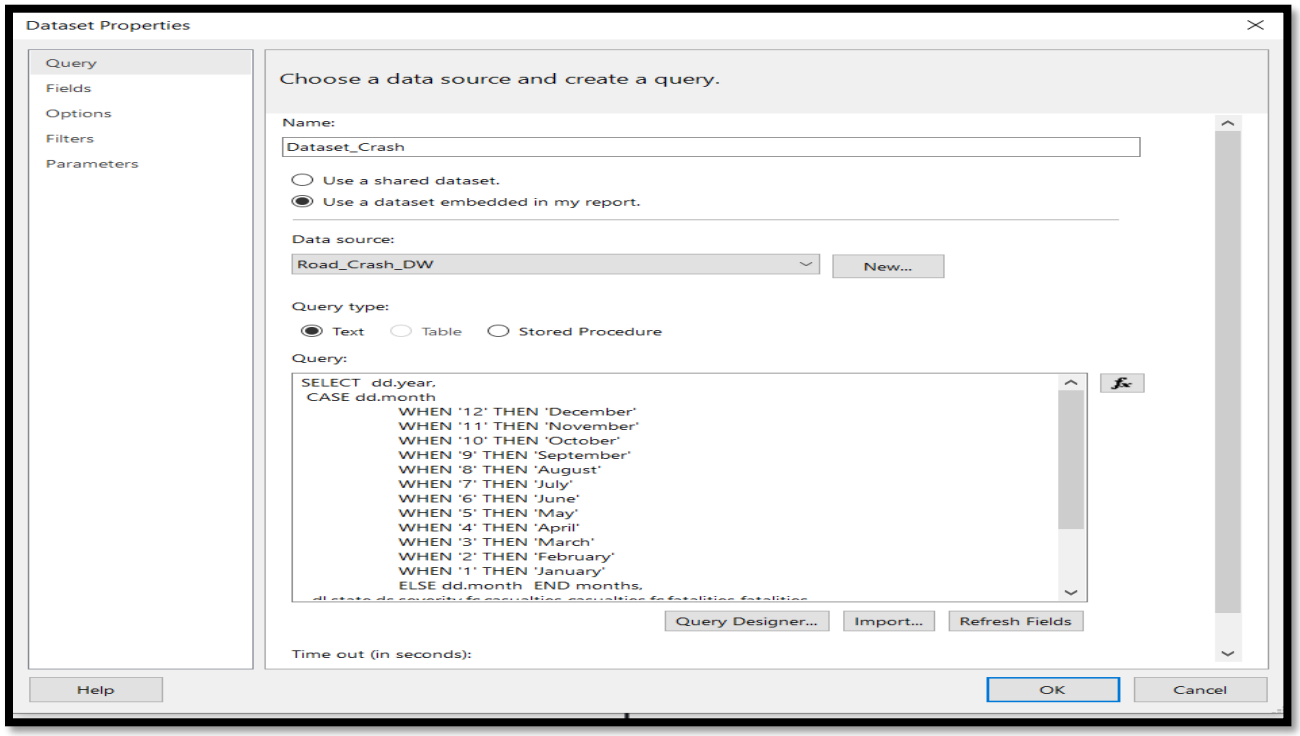


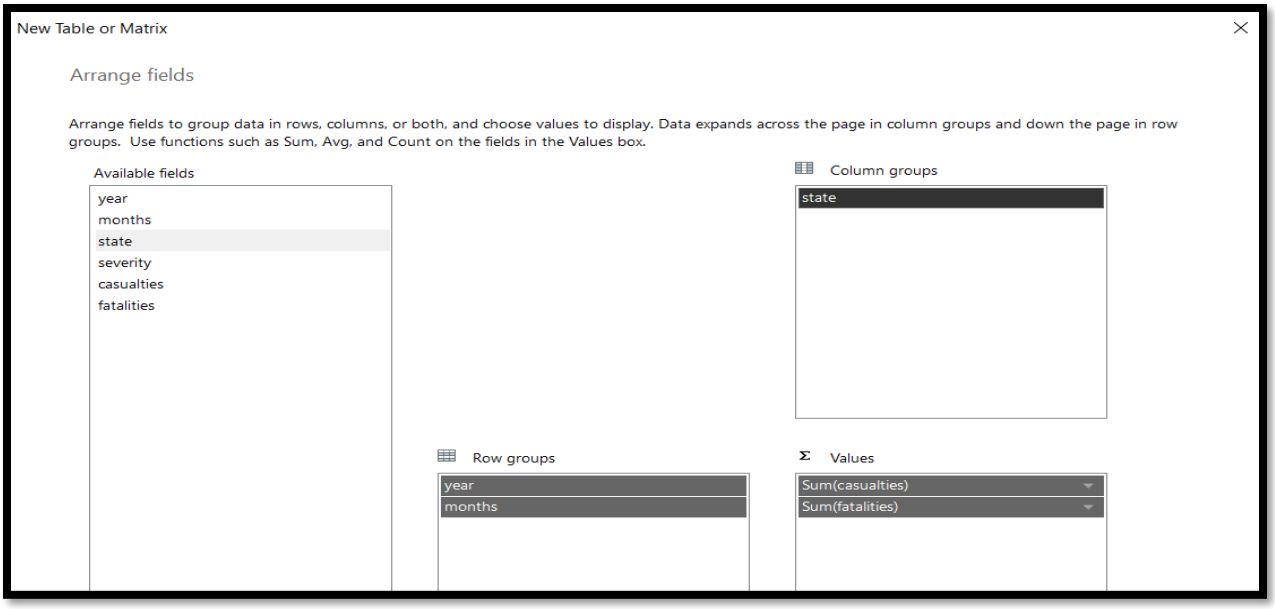
Step 4: SSRS Reports

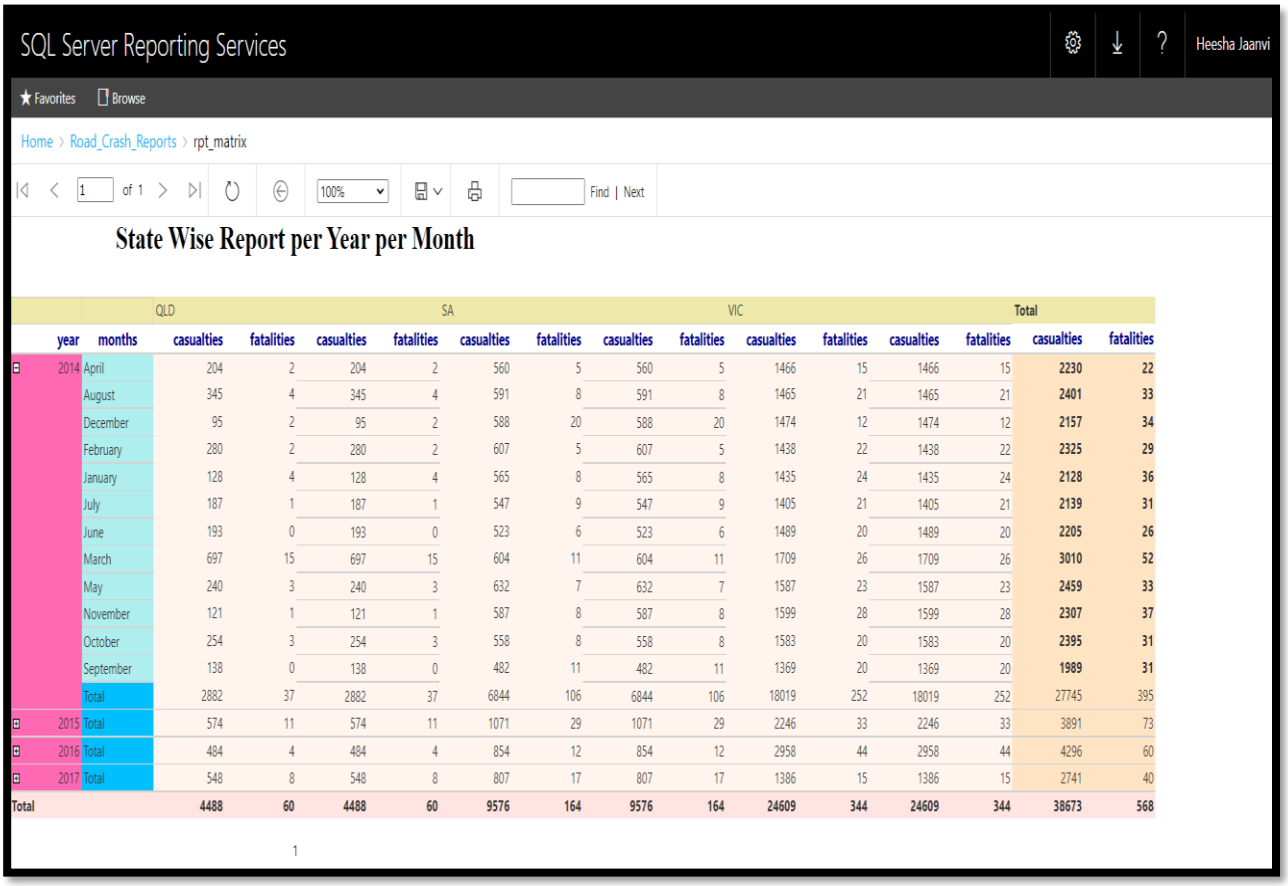
1)Report 1: Report with a matrix

I created a data source in Reports Builder as follows and created a dataset









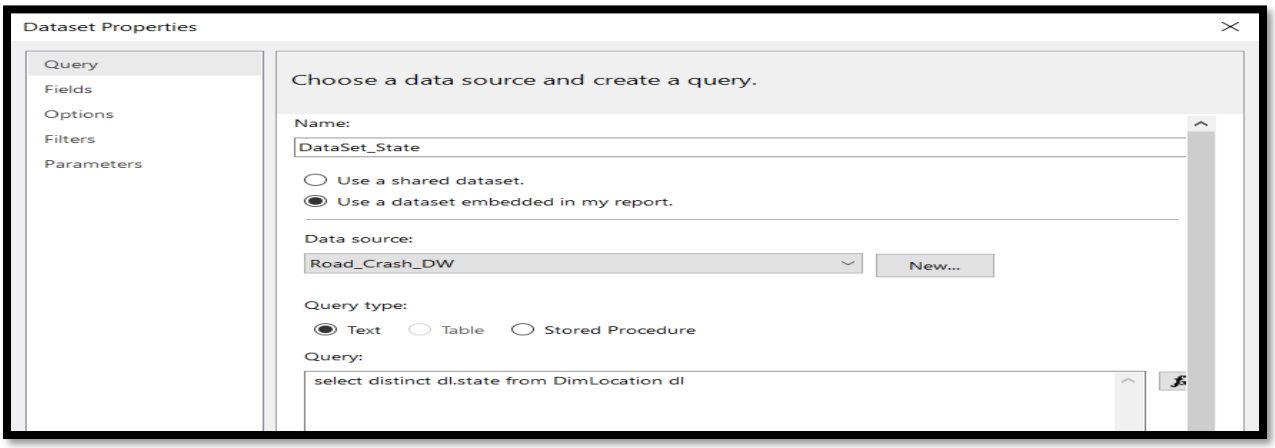
State Wise Report per Year per Month

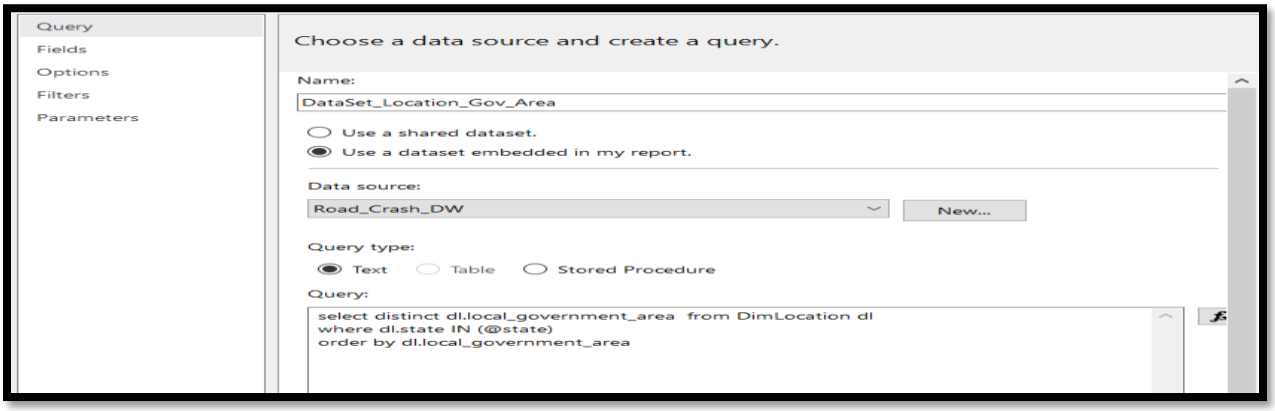
		QLD		SA		VIC		Total							
year	months	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities
2014	April	204	2	204	2	560	5	560	5	1466	15	1466	15	**2230**	**22**
	August	345	4	345	4	591	8	591	8	1465	21	1465	21	**2401**	**33**
	December	95	2	95	2	588	20	588	20	1474	12	1474	12	**2157**	**34**
	February	280	2	280	2	607	5	607	5	1438	22	1438	22	**2325**	**29**
	January	128	4	128	4	565	8	565	8	1435	24	1435	24	**2128**	**36**
	July	187	1	187	1	547	9	547	9	1405	21	1405	21	**2139**	**31**
	June	193	0	193	0	523	6	523	6	1489	20	1489	20	**2205**	**26**
	March	697	15	697	15	604	11	604	11	1709	26	1709	26	**3010**	**52**
	May	240	3	240	3	632	7	632	7	1587	23	1587	23	**2459**	**33**
	November	121	1	121	1	587	8	587	8	1599	28	1599	28	**2307**	**37**
	October	254	3	254	3	558	8	558	8	1583	20	1583	20	**2395**	**31**
	September	138	0	138	0	482	11	482	11	1369	20	1369	20	**1989**	**31**
	Total	2882	37	2882	37	6844	106	6844	106	18019	252	18019	252	27745	395
2015	Total	574	11	574	11	1071	29	1071	29	2246	33	2246	33	3891	73
2016	Total	484	4	484	4	854	12	854	12	2958	44	2958	44	4296	60
2017	Total	548	8	548	8	807	17	807	17	1386	15	1386	15	2741	40
Total		**4488**	**60**	**4488**	**60**	**9576**	**164**	**9576**	**164**	**24609**	**344**	**24609**	**344**	**38673**	**568**

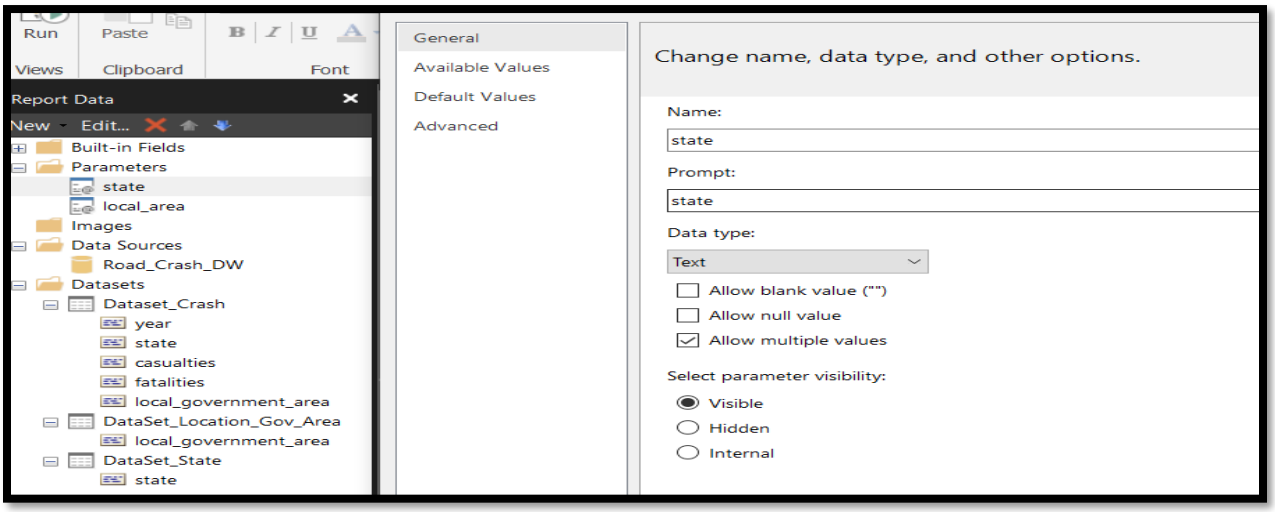
1

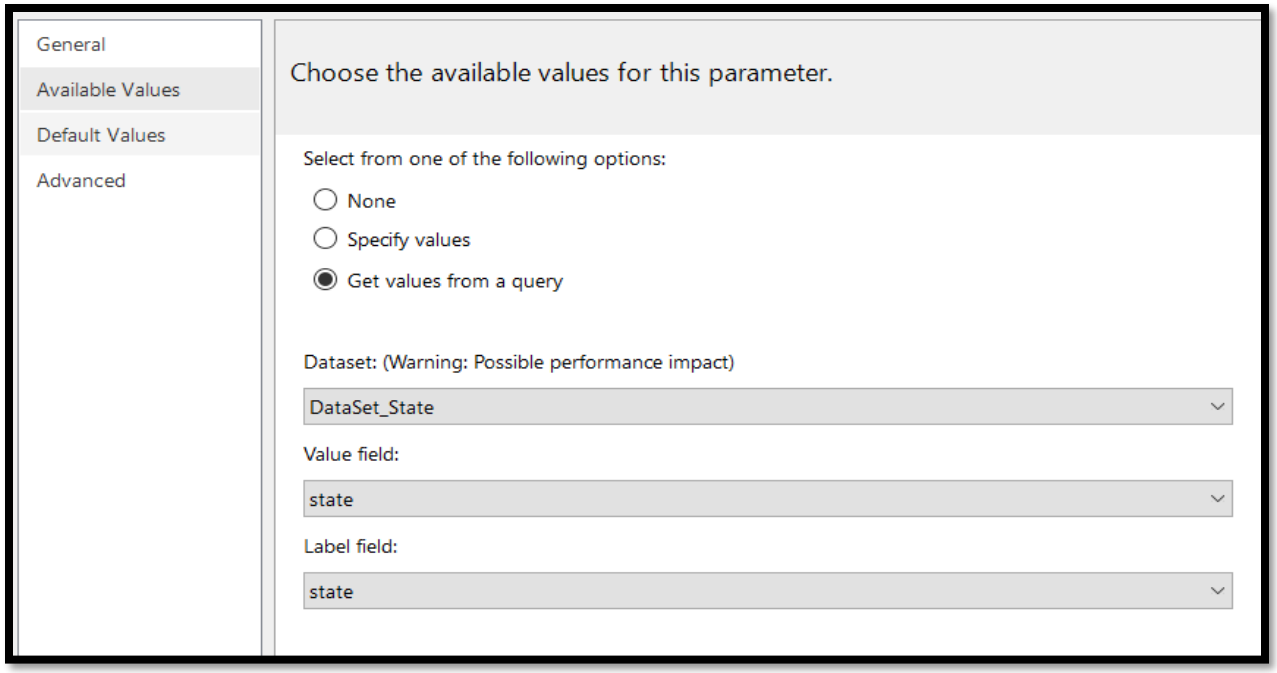
Report 2: Report with more than one parameter

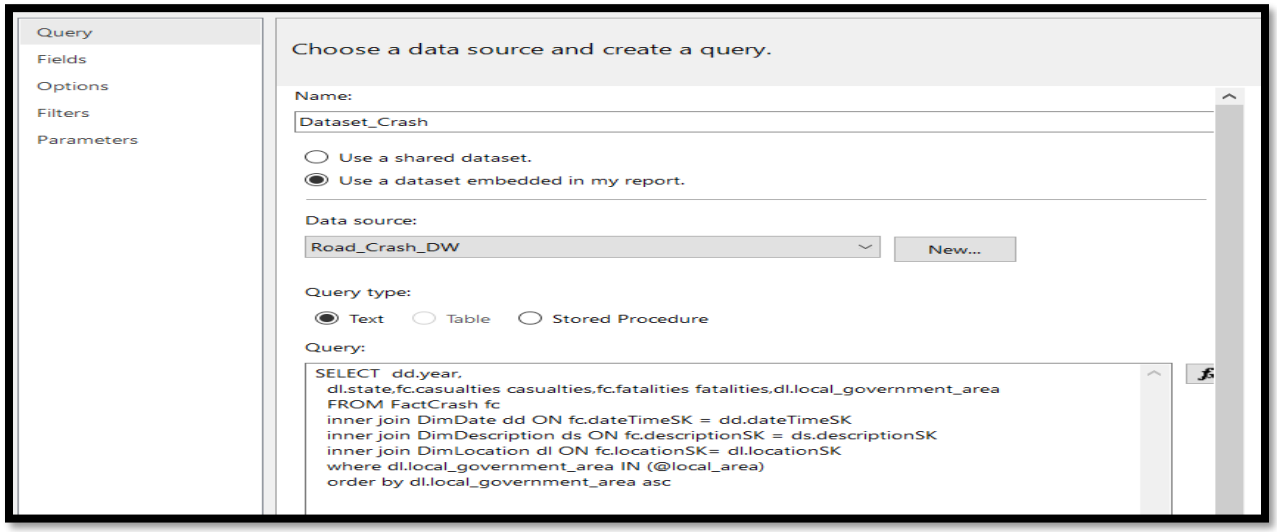
I created a dataset “DataSet_State” in order to retrieve the available states in DimLocation. I created a dataset “DataSet_Location_Gov_Area” in order to retrieve the availablelocal government areas so I can filter them by state in DimLocation. **According to the state selected from state parameter, the values for the local government area changes** , and multiple states can be created

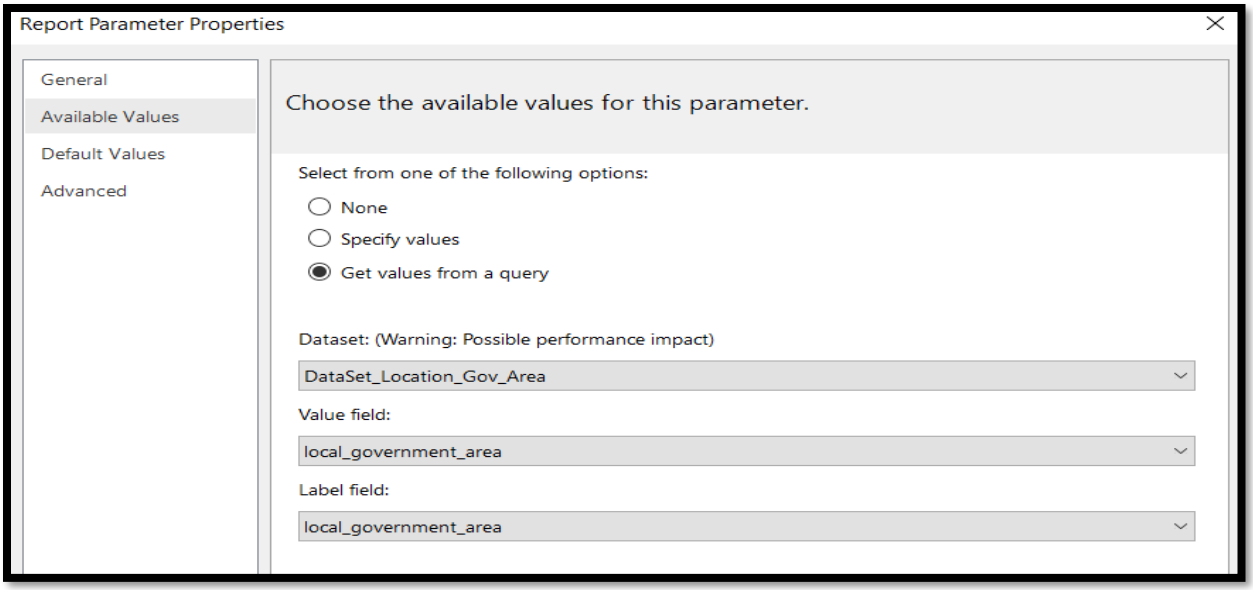


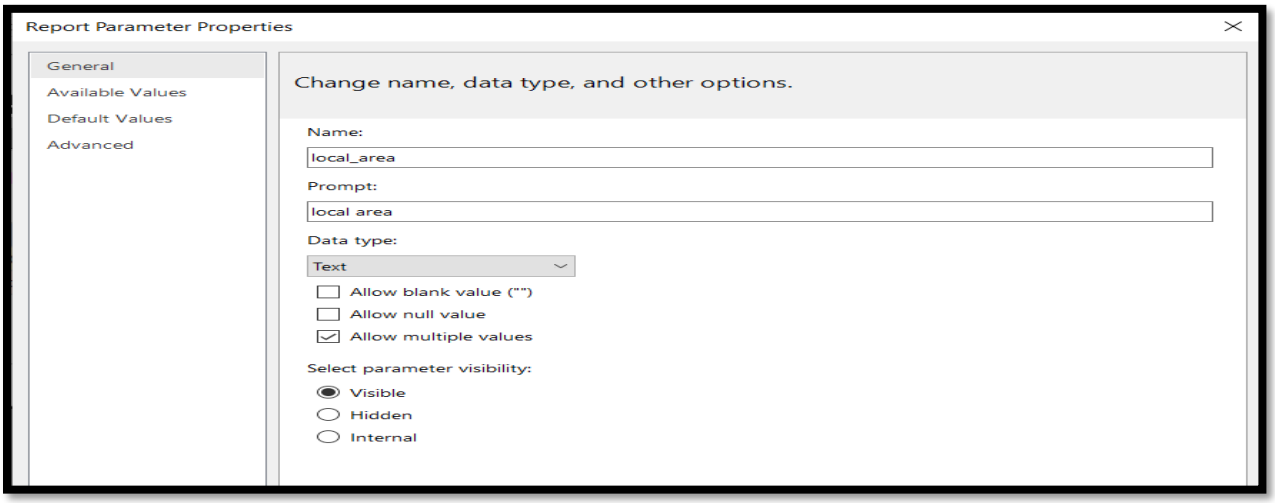


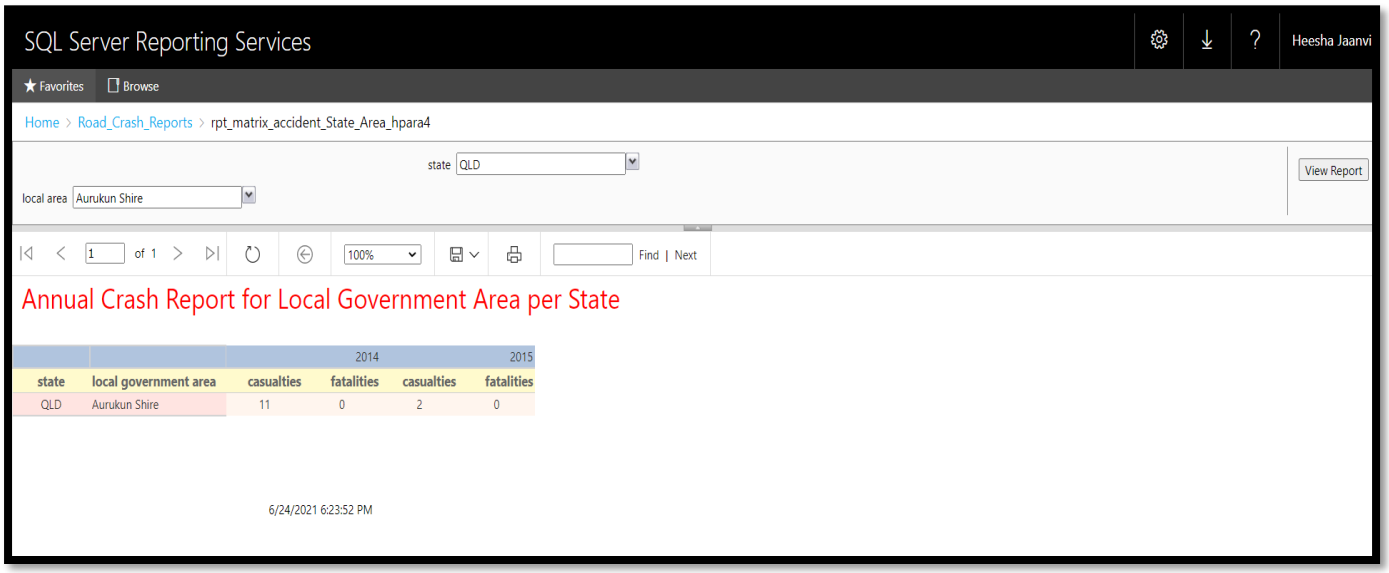



General
Available Values
Default Values
Advanced
Choose the available values for this parameter.
Select from one of the following options:
None
Specify values
Get values from a query
Dataset: (Warning: Possible performance impact)
DataSet_State
Value field:
state
Label field:
state


Query
Fields
Options
Filters
Parameters
Choose a data source and create a query.
Name:
Dataset_Crash
Use a shared dataset.
Use a dataset embedded in my report.
Data source:
Road_Crash_DW
New...
Query type:
Text
Table
Stored Procedure
Query:
SELECT dd.year,
dl.state,fc.casualties casualties,fc.fatalities fatalities,dl.local_government_area
FROM FactCrash fc
inner join DimDate dd ON fc.dateTimeSK = dd.dateTimeSK
inner join DimDescription ds ON fc.descriptionSK = ds.descriptionSK
inner join DimLocation dl ON fc.locationSK= dl.locationSK
where dl.local_government_area IN (@local_area)
order by dl.local_government_area asc


Report Parameter Properties
General
Available Values
Default Values
Advanced
Choose the available values for this parameter.
Select from one of the following options:
None
Specify values
Get values from a query
Dataset: (Warning: Possible performance impact)
DataSet_Location_Gov_Area
Value field:
local_government_area
Label field:
local_government_area


Report Parameter Properties
General
Available Values
Default Values
Advanced
Change name, data type, and other options.
Name:
local_area
Prompt:
local area
Data type:
Text
Allow blank value ("")
Allow null value
Allow multiple values
Select parameter visibility:
Visible
Hidden
Internal


SQL Server Reporting Services
Heesha Jaanvi
Favorites
Browse
Home
Road_Crash_Reports
rpt_matrix_accident_State_Area_hpara4
state QLD
local area Aurukun Shire
View Report
1 of 1
100%
Find | Next
Annual Crash Report for Local Government Area per State
2014
2015
state
local government area
casualties
fatalities
casualties
fatalities
QLD
Aurukun Shire
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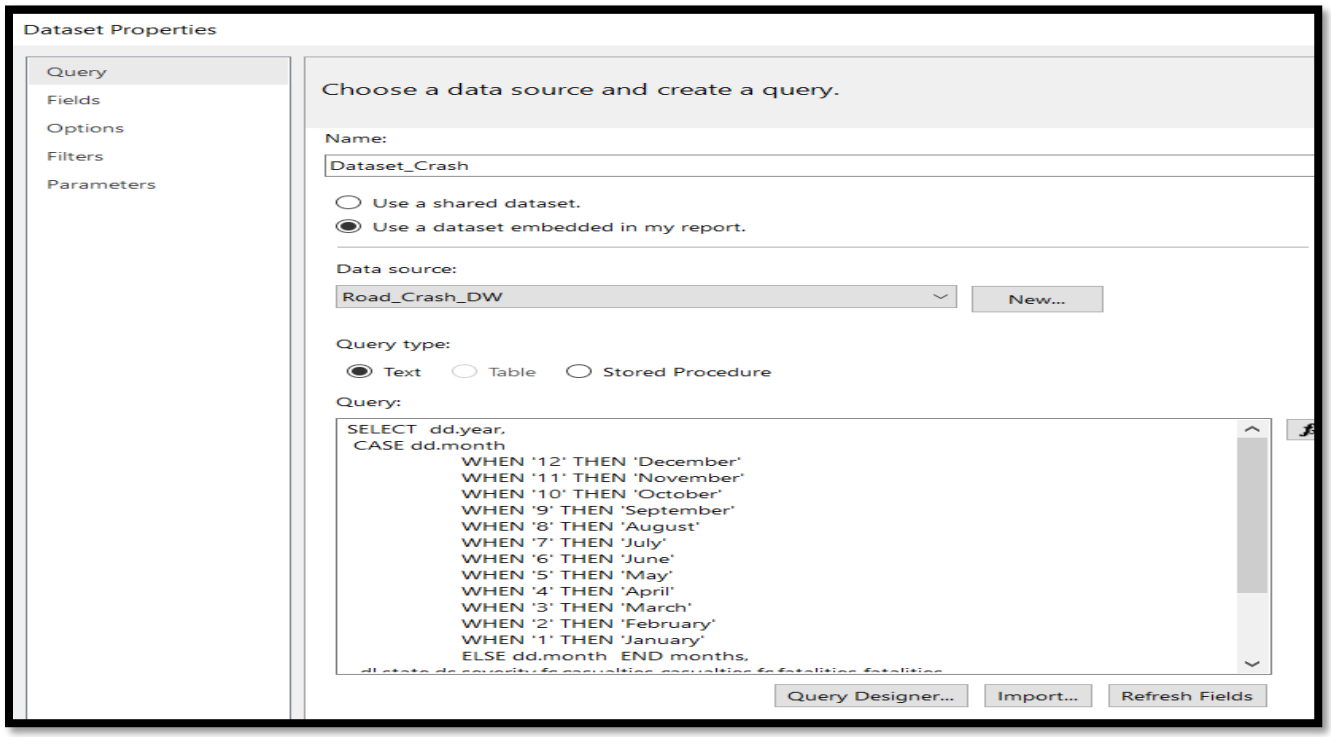
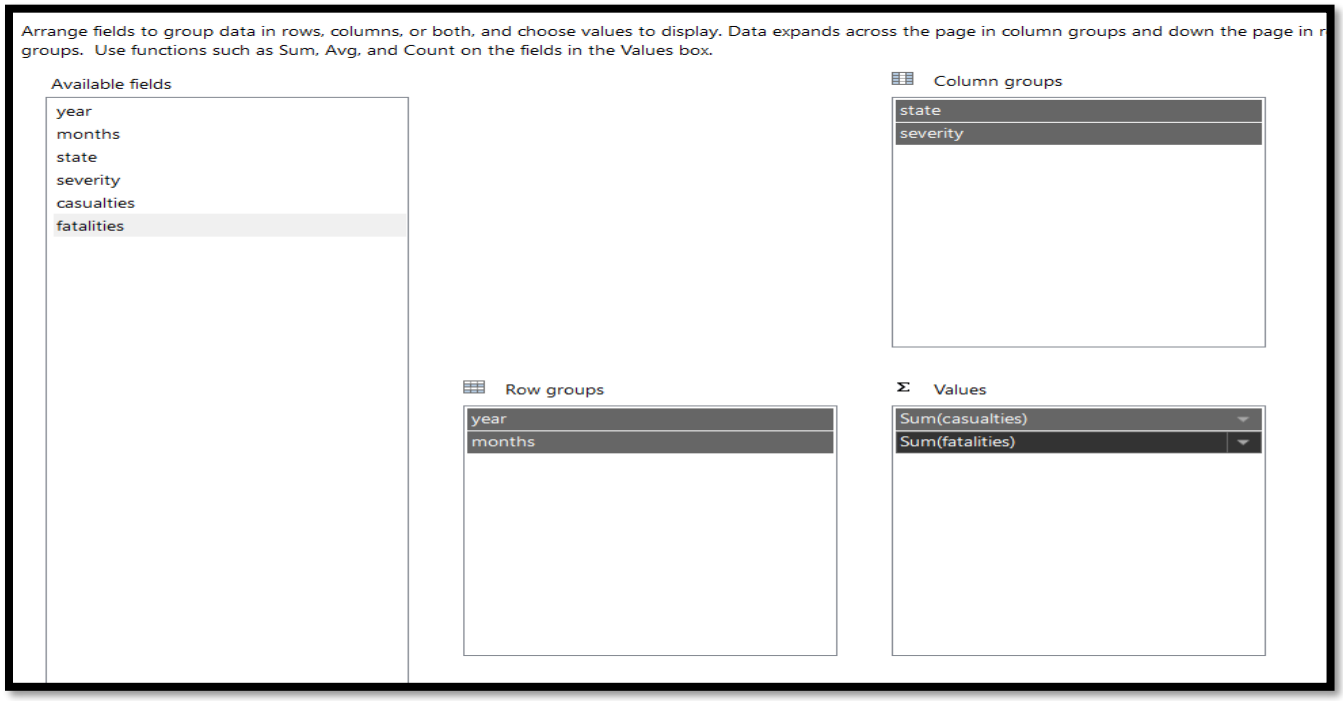
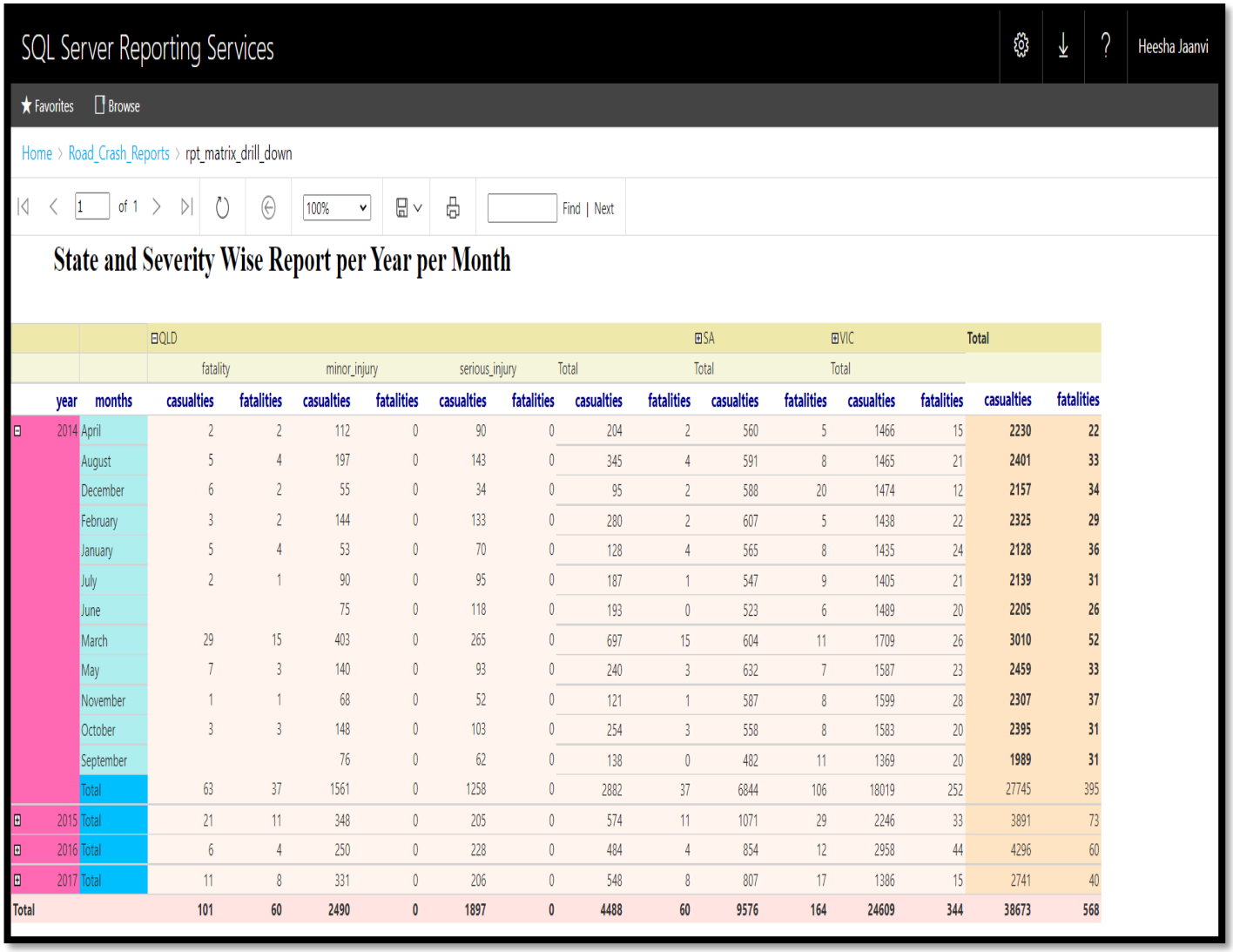
Report 3: Create an SSRS drill-down report



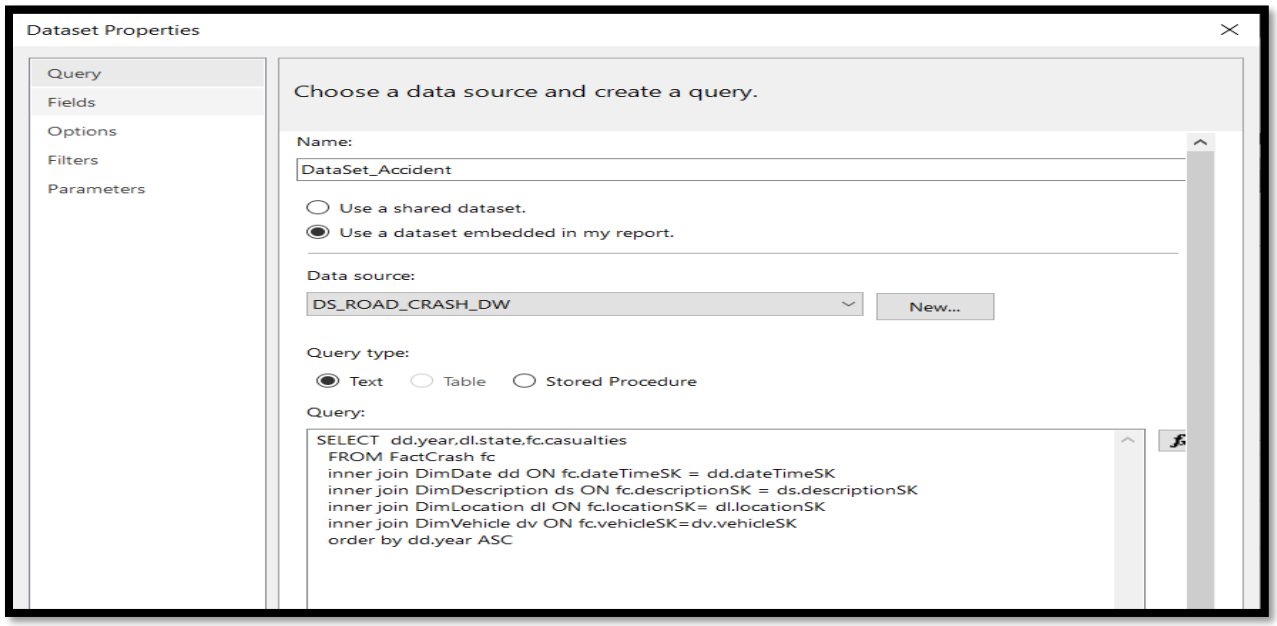


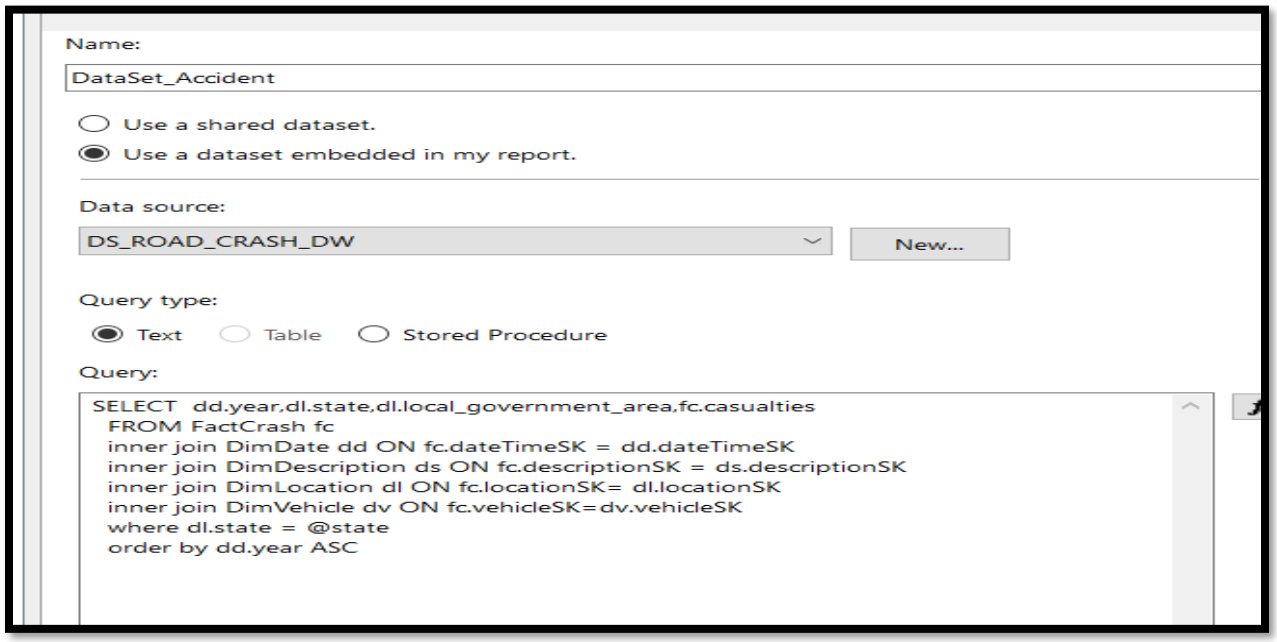


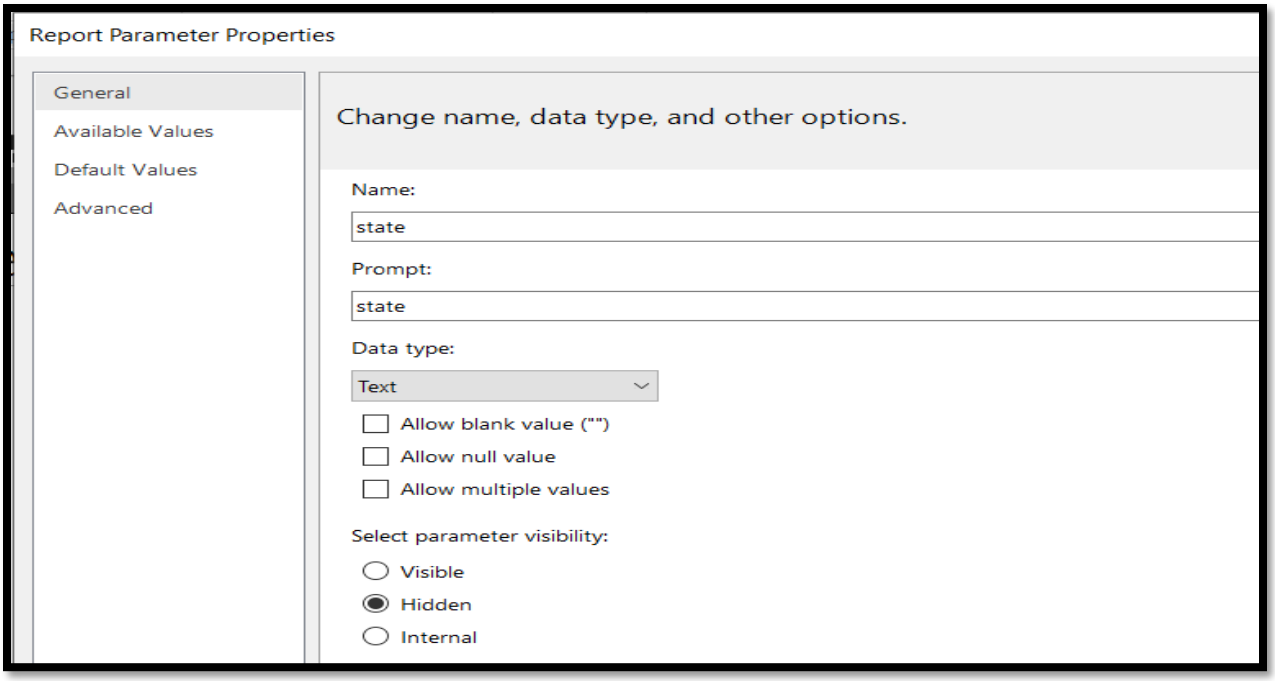
State and Severity Wise Report per Year per Month

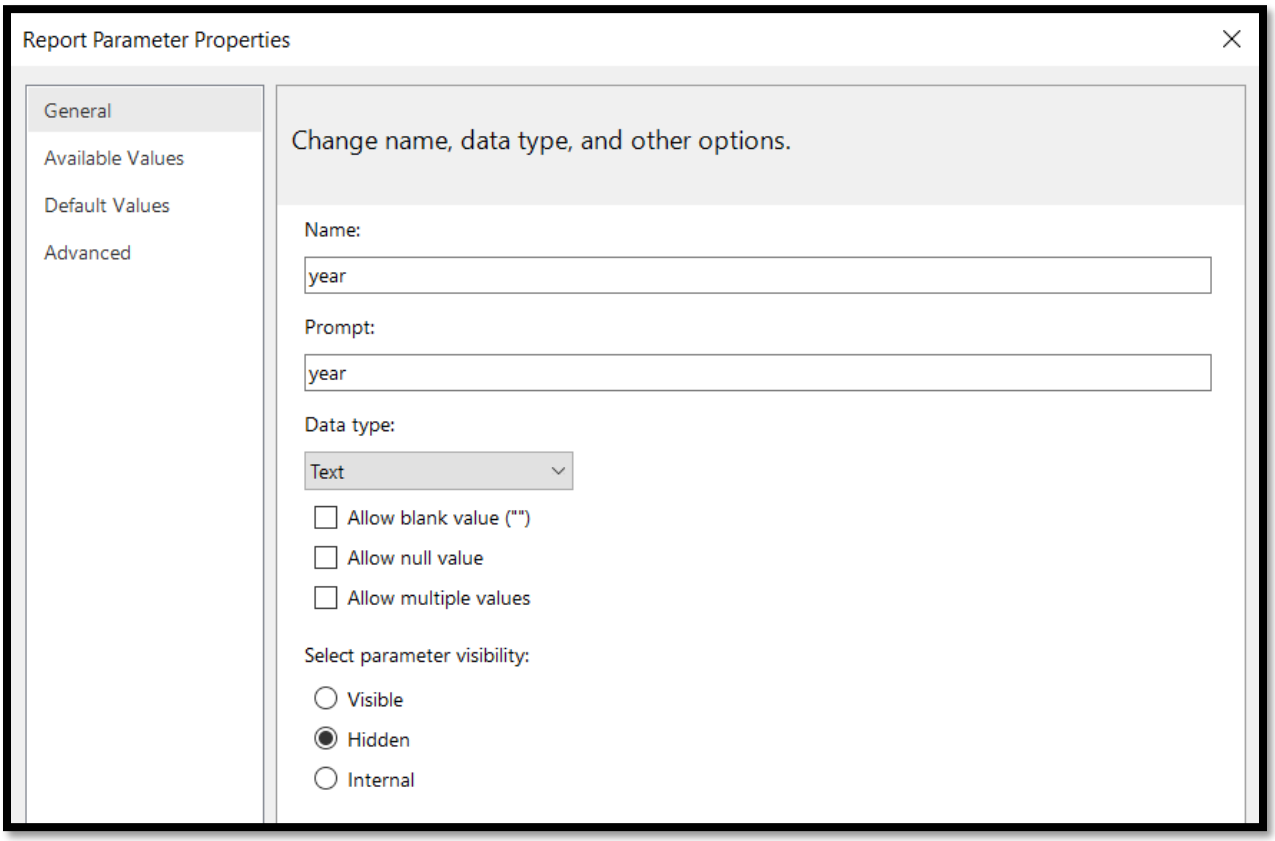
		⊟QLD								⊞SA		⊞VIC		Total	
		fatality		minor_injury		serious_injury		Total		Total		Total			
year	months	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities	casualties	fatalities
⊟ 2014	April	2	2	112	0	90	0	204	2	560	5	1466	15	**2230**	**22**
	August	5	4	197	0	143	0	345	4	591	8	1465	21	**2401**	**33**
	December	6	2	55	0	34	0	95	2	588	20	1474	12	**2157**	**34**
	February	3	2	144	0	133	0	280	2	607	5	1438	22	**2325**	**29**
	January	5	4	53	0	70	0	128	4	565	8	1435	24	**2128**	**36**
	July	2	1	90	0	95	0	187	1	547	9	1405	21	**2139**	**31**
	June			75	0	118	0	193	0	523	6	1489	20	**2205**	**26**
	March	29	15	403	0	265	0	697	15	604	11	1709	26	**3010**	**52**
	May	7	3	140	0	93	0	240	3	632	7	1587	23	**2459**	**33**
	November	1	1	68	0	52	0	121	1	587	8	1599	28	**2307**	**37**
	October	3	3	148	0	103	0	254	3	558	8	1583	20	**2395**	**31**
	September			76	0	62	0	138	0	482	11	1369	20	**1989**	**31**
	Total	63	37	1561	0	1258	0	2882	37	6844	106	18019	252	27745	395
⊞ 2015	Total	21	11	348	0	205	0	574	11	1071	29	2246	33	3891	73
⊞ 2016	Total	6	4	250	0	228	0	484	4	854	12	2958	44	4296	60
⊞ 2017	Total	11	8	331	0	206	0	548	8	807	17	1386	15	2741	40
Total		**101**	**60**	**2490**	**0**	**1897**	**0**	**4488**	**60**	**9576**	**164**	**24609**	**344**	**38673**	**568**

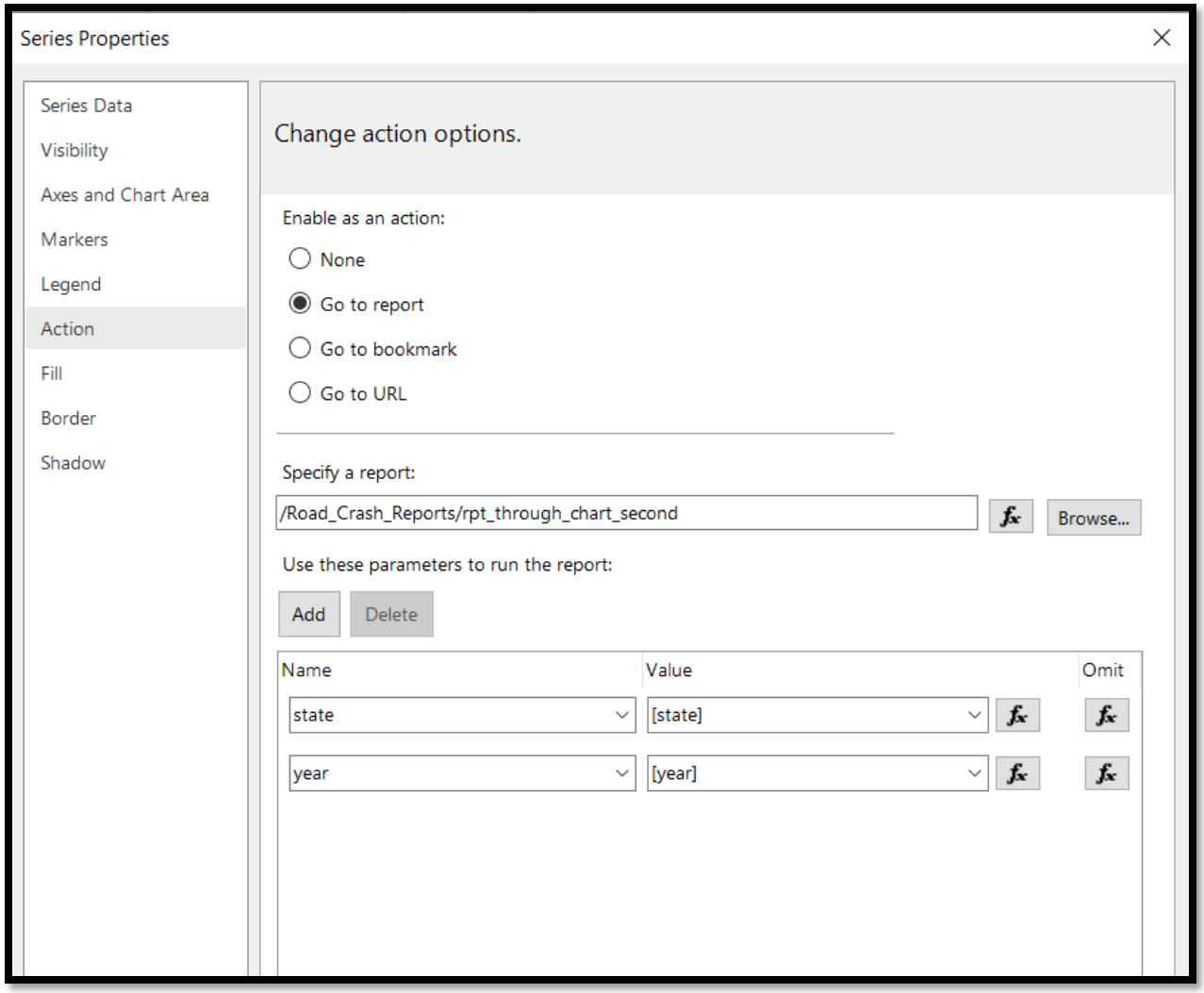
Report 4: Create an SSRS drill-through report.






Report Parameter Properties
General
Available Values
Default Values
Advanced
Change name, data type, and other options.
Name:
state
Prompt:
state
Data type:
Text
Allow blank value ("")
Allow null value
Allow multiple values
Select parameter visibility:
Visible
Hidden
Internal

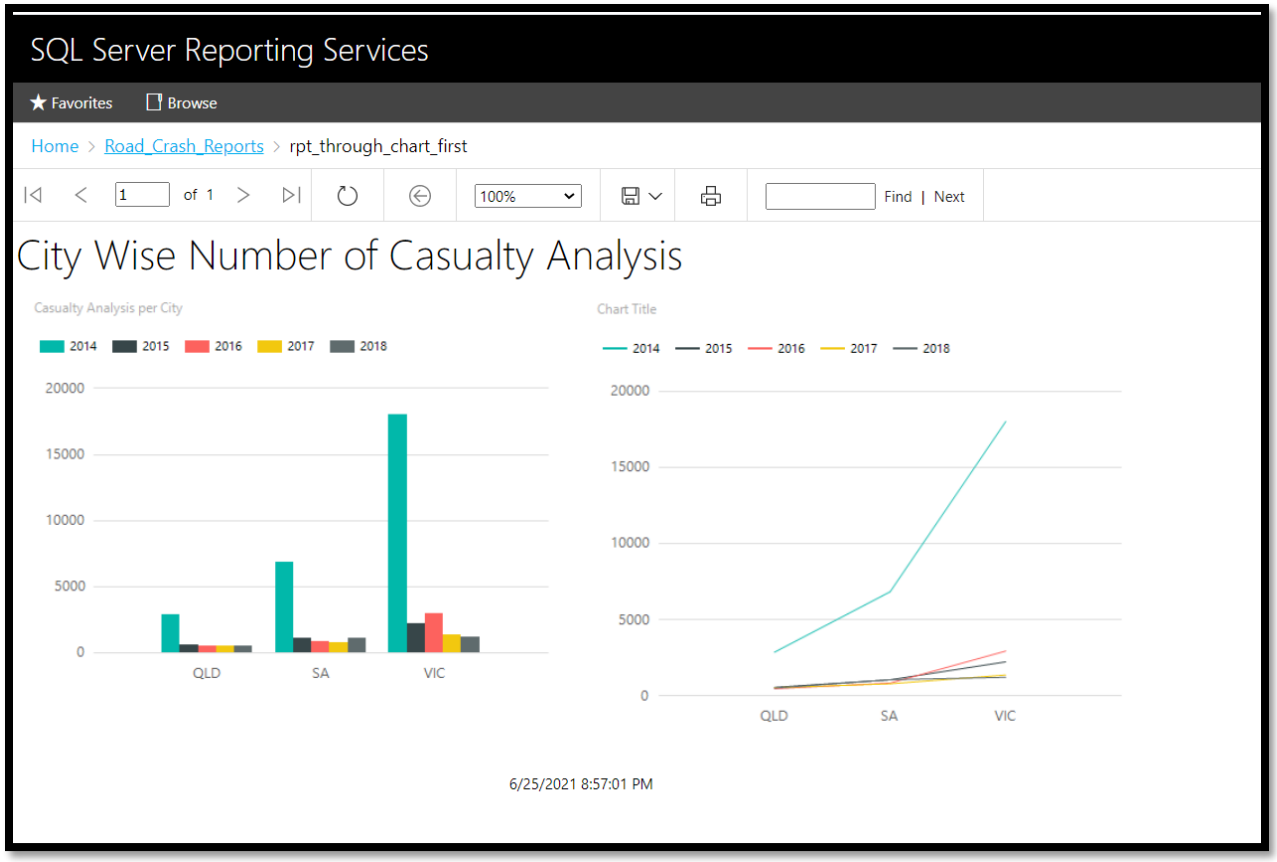

Report Parameter Properties
General
Available Values
Default Values
Advanced
Change name, data type, and other options.
Name:
year
Prompt:
year
Data type:
Text
Allow blank value ("")
Allow null value
Allow multiple values
Select parameter visibility:
Visible
Hidden
Internal

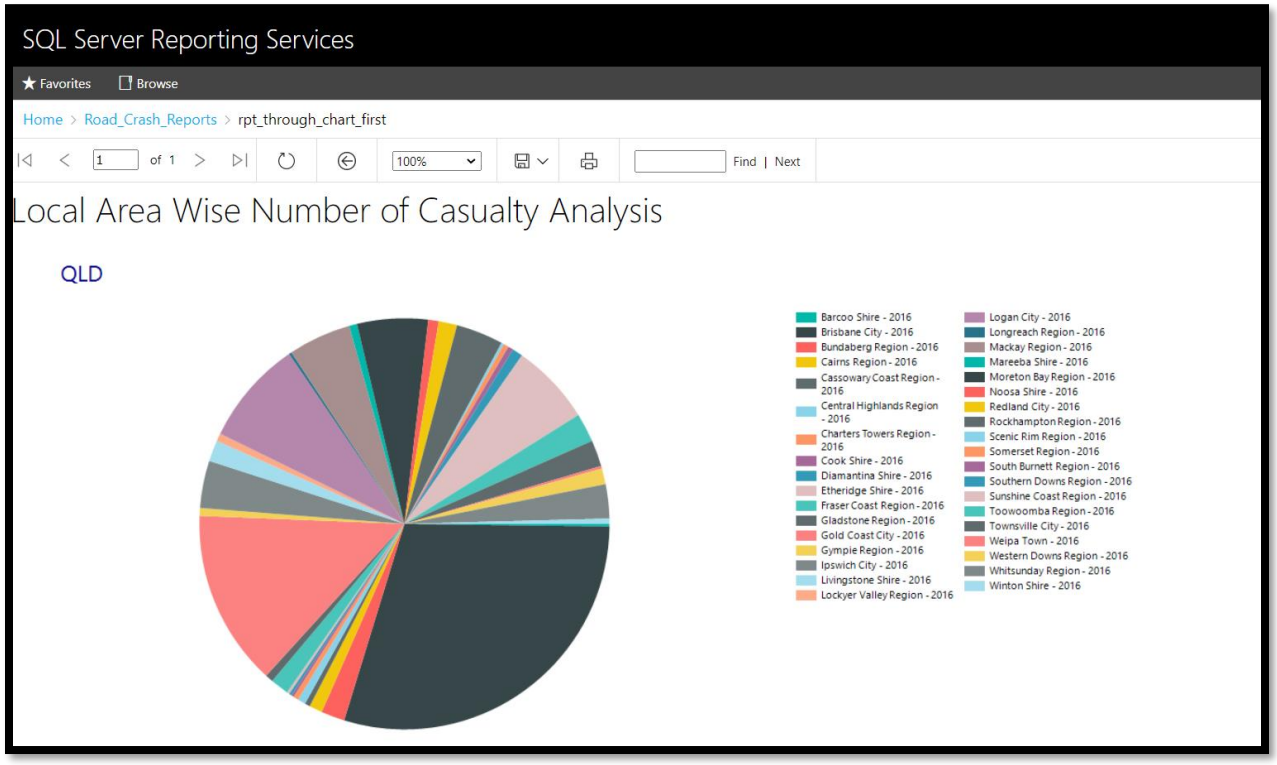


I have created a line chart which displays trend of casualties per year per state.

Moreover I have created a column chart which shows the sum of casualties per year per state.

Once the bar is clicked, the pie char report will display in detail the local government areas to the particular state and year.


SQL Server Reporting Services
Favorites
Browse
Home
Road_Crash_Reports
rpt_through_chart_first
1
of 1
100%
Find | Next
City Wise Number of Casualty Analysis
Casualty Analysis per City
2014
2015
2016
2017
2018
20000
15000
10000
5000
0
QLD
SA
VIC
Chart Title
2014
2015
2016
2017
2018
20000
15000
10000
5000
0
QLD
SA
VIC
6/25/2021 8:57:01 PM


SQL Server Reporting Services
Favorites
Browse
Home
Road_Crash_Reports
rpt_through_chart_first
1
of 1
100%
Find | Next
Local Area Wise Number of Casualty Analysis
QLD
Barcoo Shire - 2016
Brisbane City - 2016
Bundaberg Region - 2016
Cairns Region - 2016
Cassowary Coast Region - 2016
Central Highlands Region - 2016
Charters Towers Region - 2016
Cook Shire - 2016
Diamantina Shire - 2016
Etheridge Shire - 2016
Fraser Coast Region - 2016
Gladstone Region - 2016
Gold Coast City - 2016
Gympie Region - 2016
Ipswich City - 2016
Livingstone Shire - 2016
Lockyer Valley Region - 2016
Logan City - 2016
Longreach Region - 2016
Mackay Region - 2016
Mareeba Shire - 2016
Moreton Bay Region - 2016
Noosa Shire - 2016
Redland City - 2016
Rockhampton Region - 2016
Scenic Rim Region - 2016
Somerset Region - 2016
South Burnett Region - 2016
Southern Downs Region - 2016
Sunshine Coast Region - 2016
Toowoomba Region - 2016
Townsville City - 2016
Weipa Town - 2016
Western Downs Region - 2016
Whitsunday Region - 2016
Winton Shire - 2016