Sri Lanka Institute of Information Technology

Faculty of Computing

Data Warehousing and Business Intelligence (IT3021)

Assignment 2

Submitted By:

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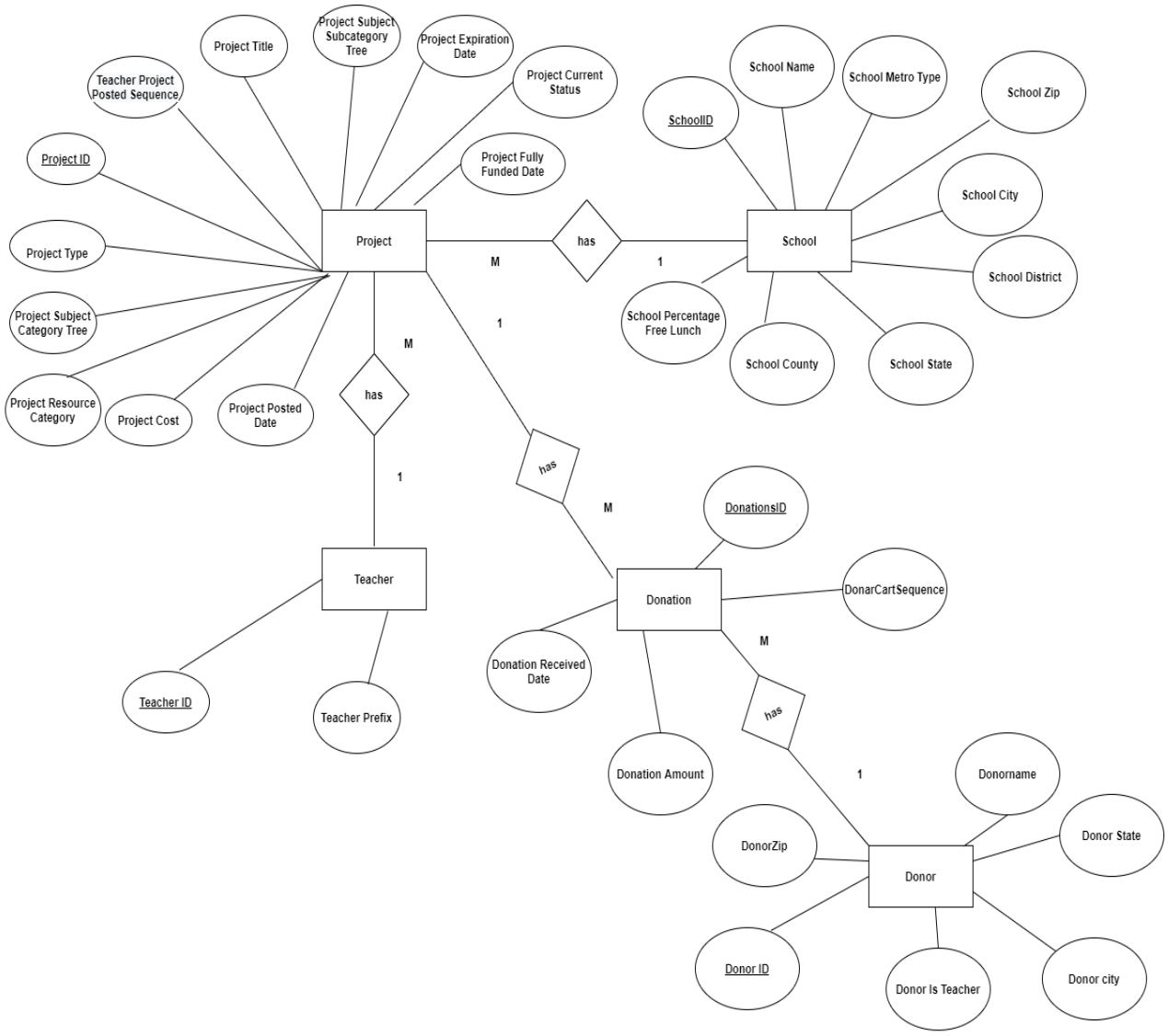
Y3S1.15(DS-Weekday)

Table of Content

1. Data Source

DonorsChoose was Founded in 2000 by a highschool teacher in Bronx, DonorsChoose empowers school teachers to request needed school materials for their students. There are more than thousands teacher requests that people can donate to. Teachers posts Projects to relevant topics and donors Donate. The organization has gained the trust of the society due to the efficiency and clarity.
The ER diagram of the DonorsChoose dataset is attached below

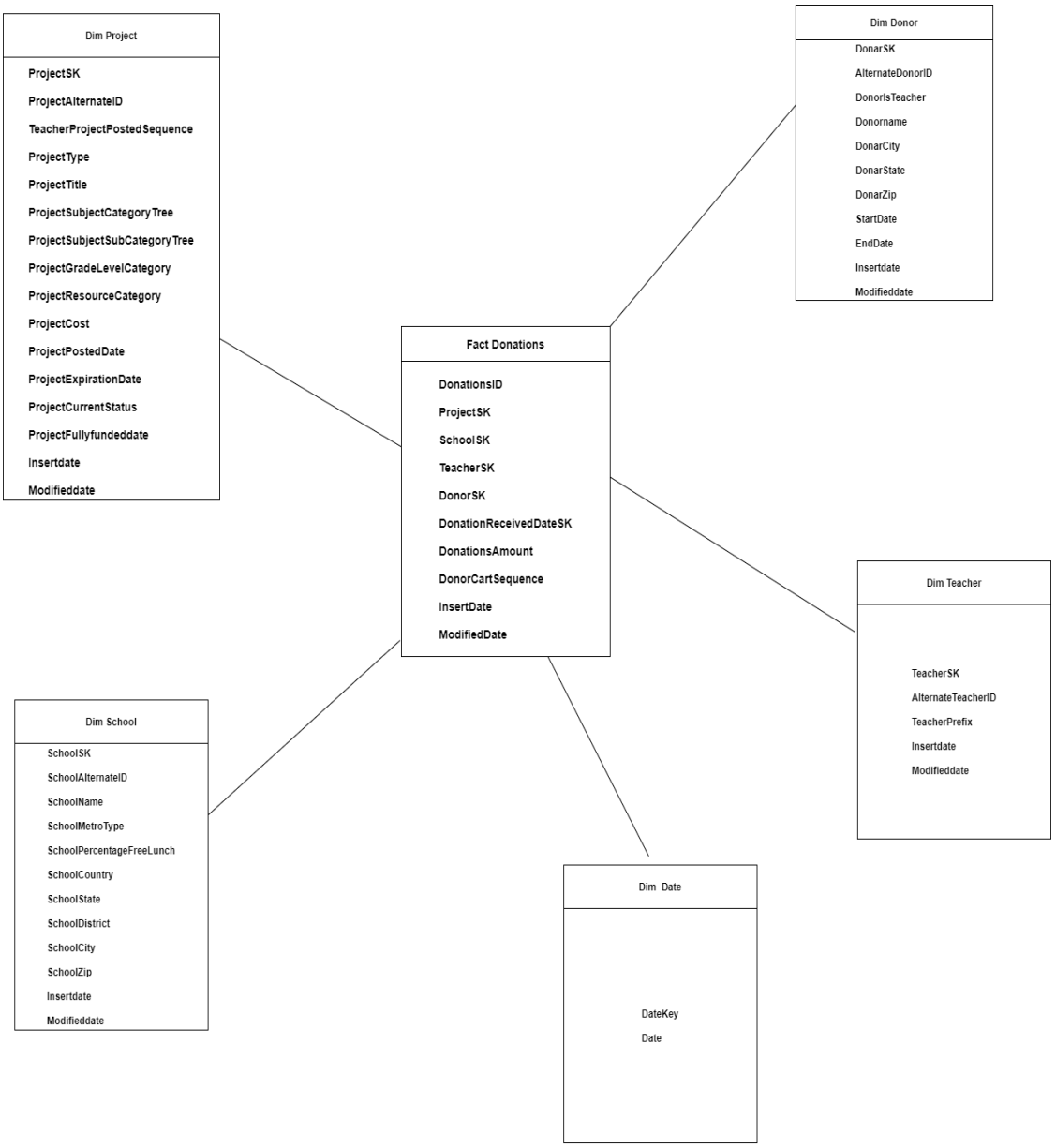
ER Diagram



The dataset used for this assignment is based on the first assignment. The datawarehouse created in the first assignment was used to deploy the analysis service cube and other reports.
There are five dimensions and one fact table in the datawarehouse namely

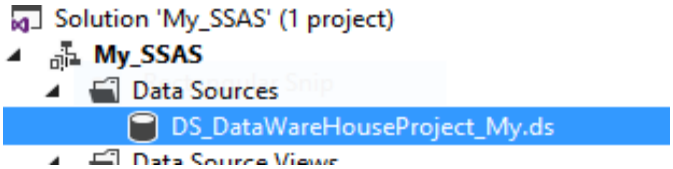
1. FactDonations
2. DimProject
3. DimDonor
4. DimTeacher
5. DimSchool
6. DimDate

The Star Schema of the datawarehouse is attached below.

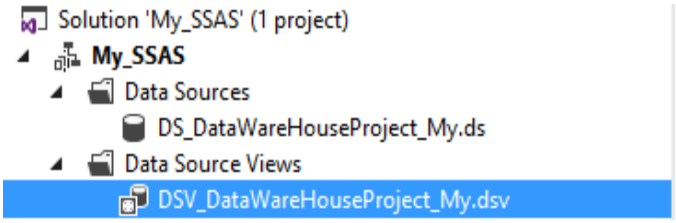


2. SSAS Cube Implementation

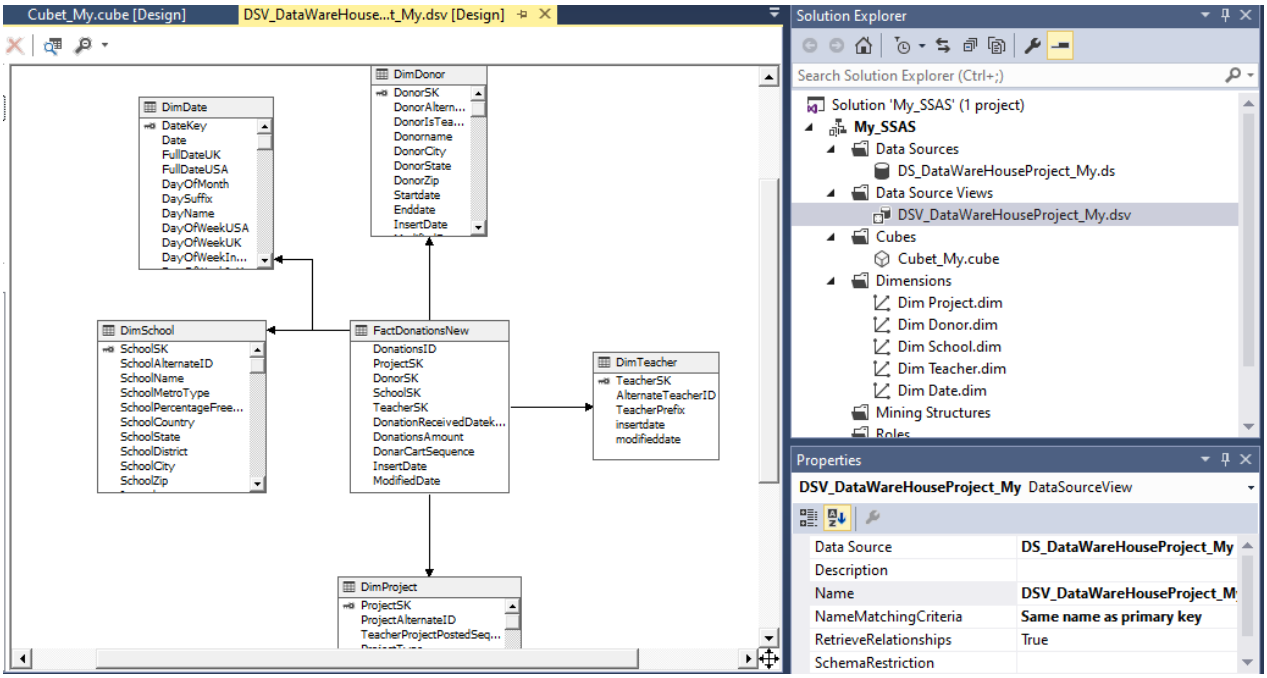
- Cube was implemented using SQL server data tools and deployed in SQL server Management Studio
- Initially the Datawarehouse which was implemented in the Assignment1 was used as the Datasource and a connection was made to it.



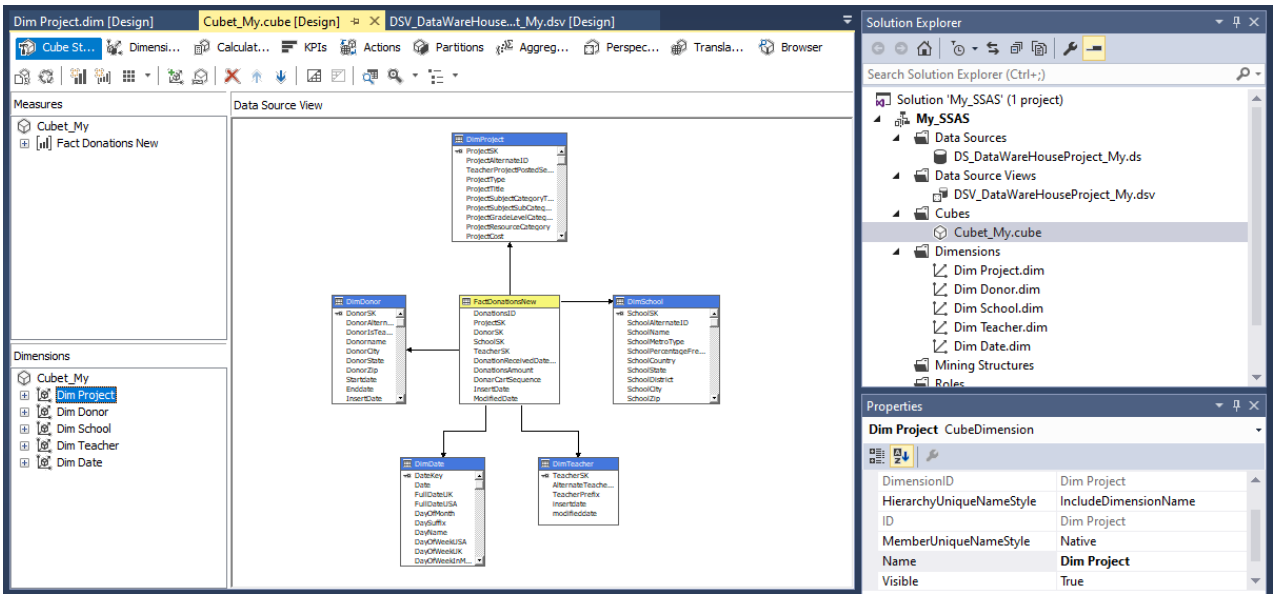
- Then a datasource view was created



- Then the links with the fact tables and dimension tables were created. The links were as follows

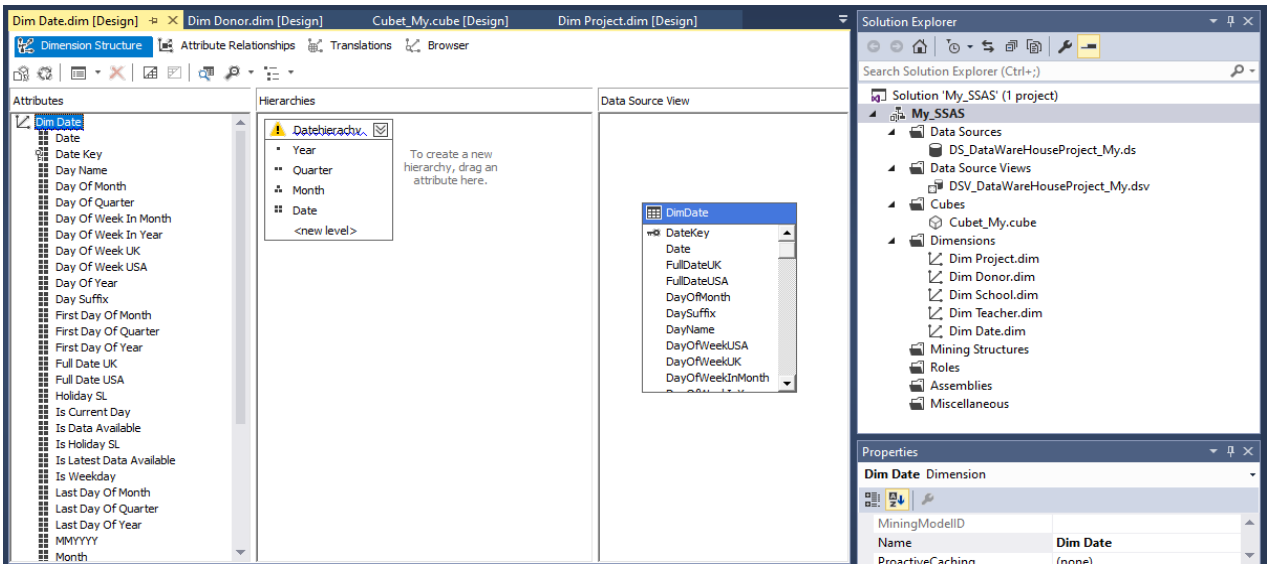


- Then in the cube wizard, FactDonationsNew was selected as the measurable group table and the cube was created.

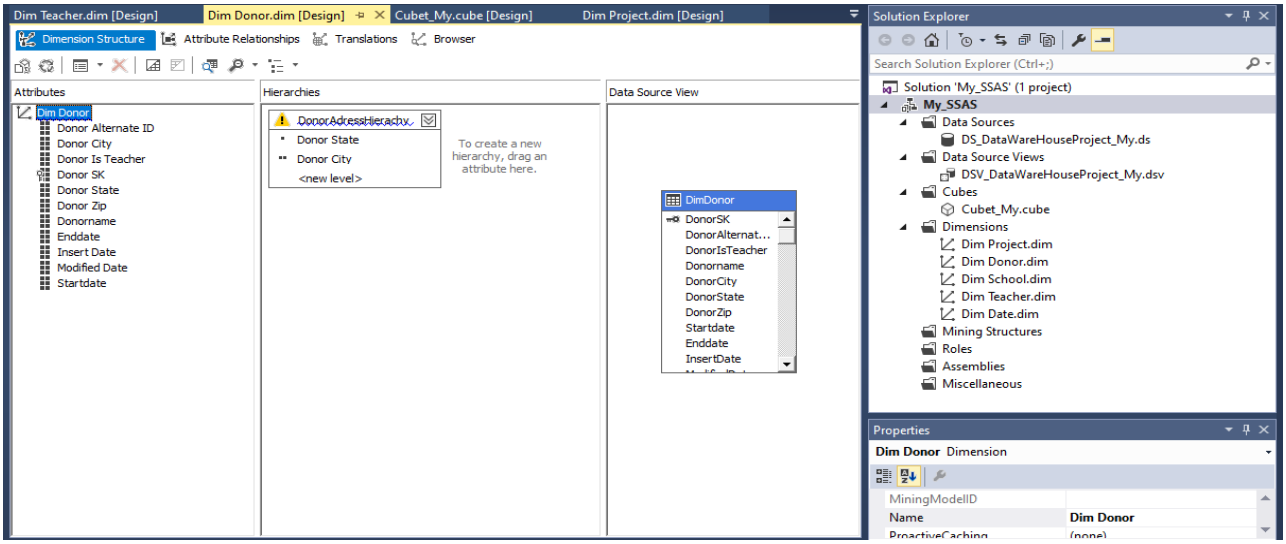


- Next the primary keys for all the dimensions along with the relationships were created.
- Next the Hierarchies were defined

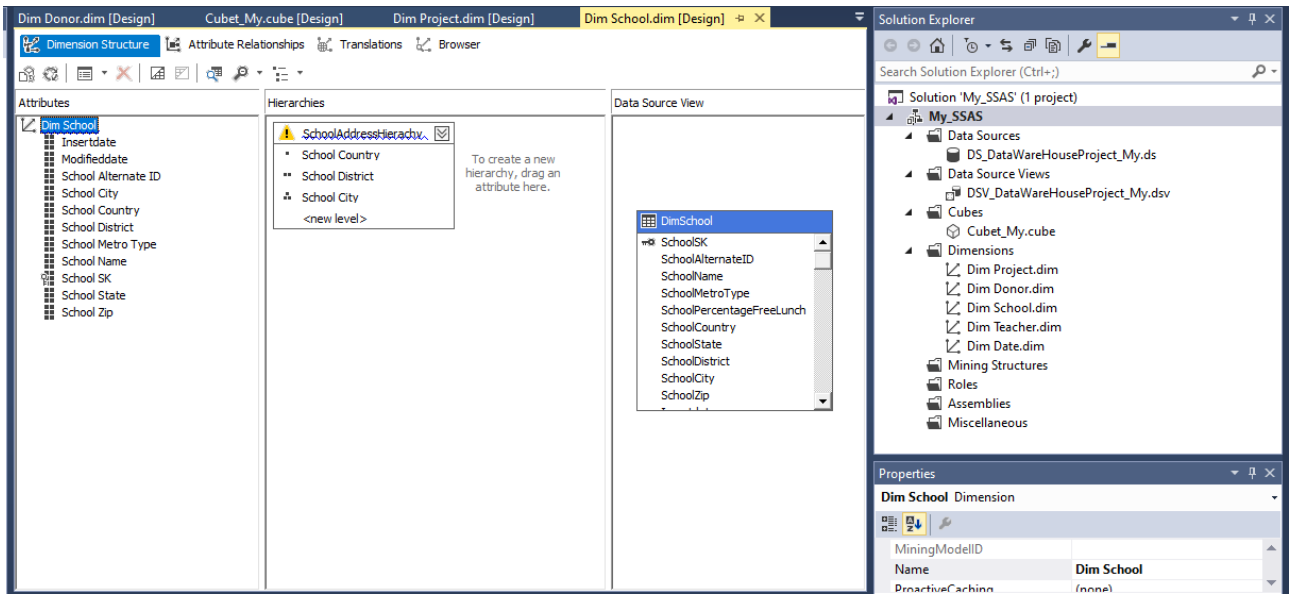
1)Date Hierarchy



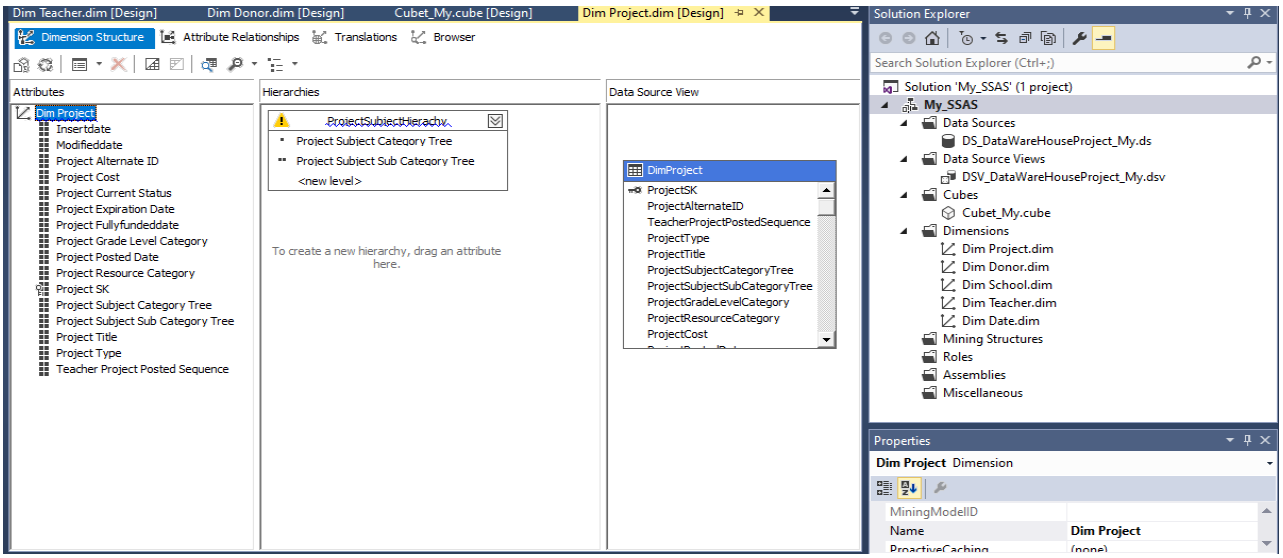
2)DonorAddress Hierarchy



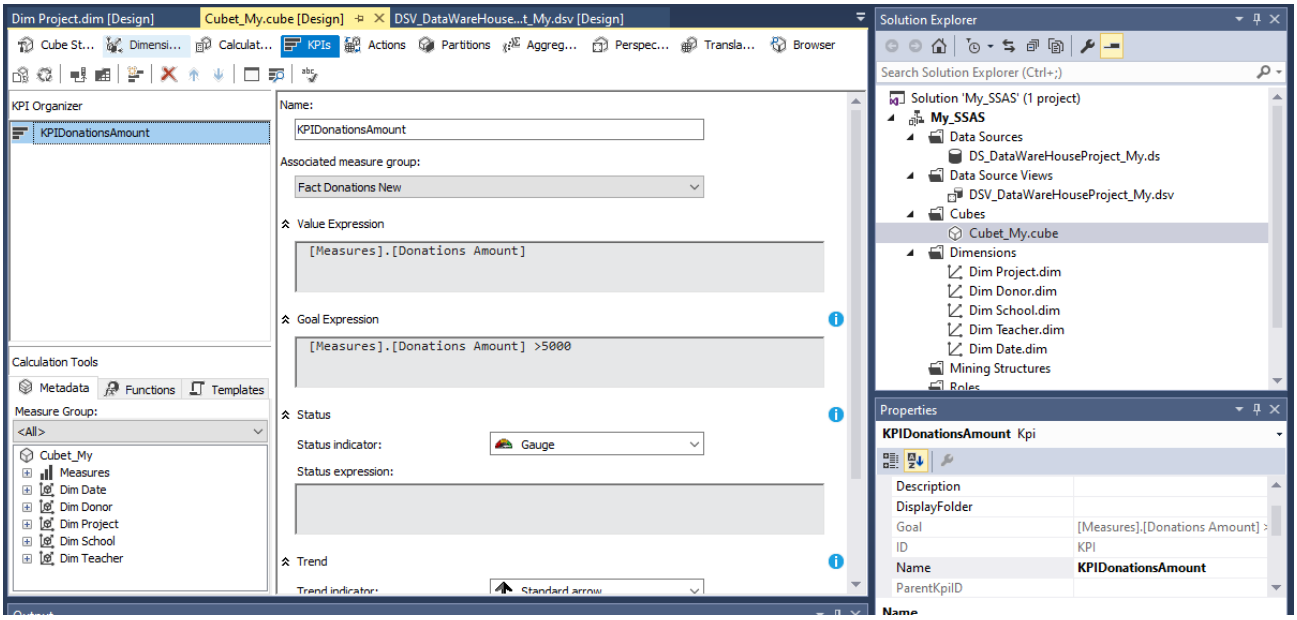
3)SchoolAddress Hierarchy



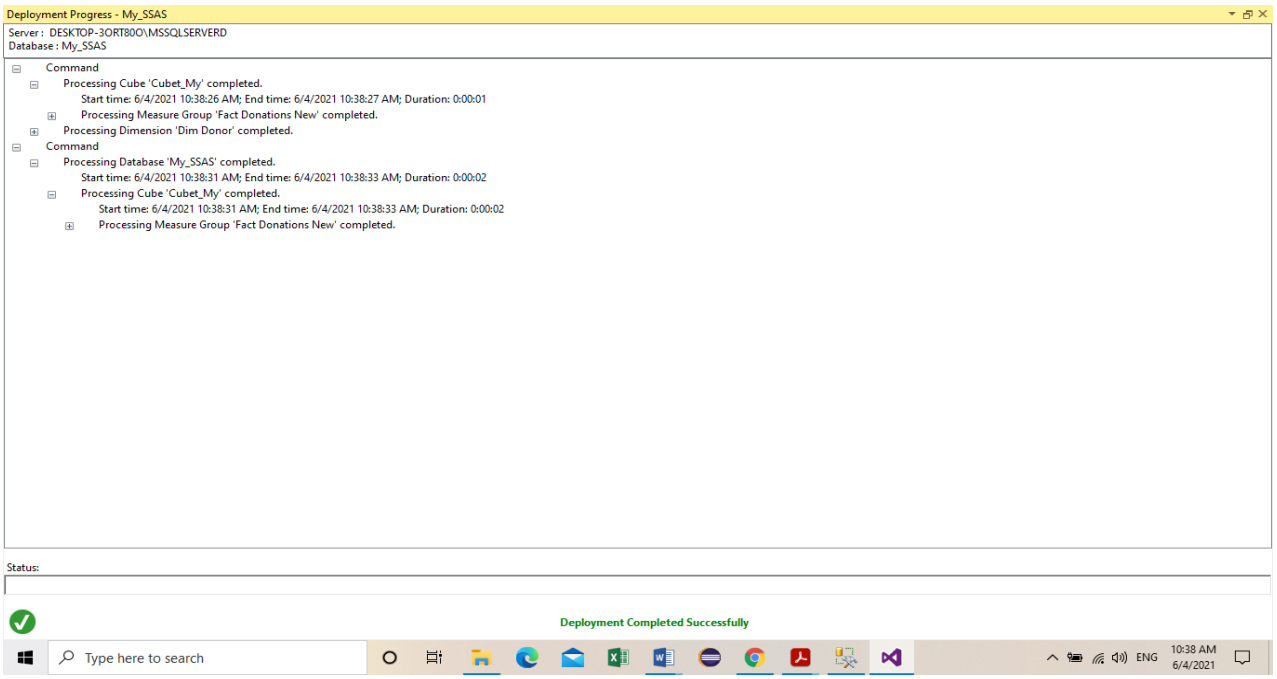
4)Project Hierarchy



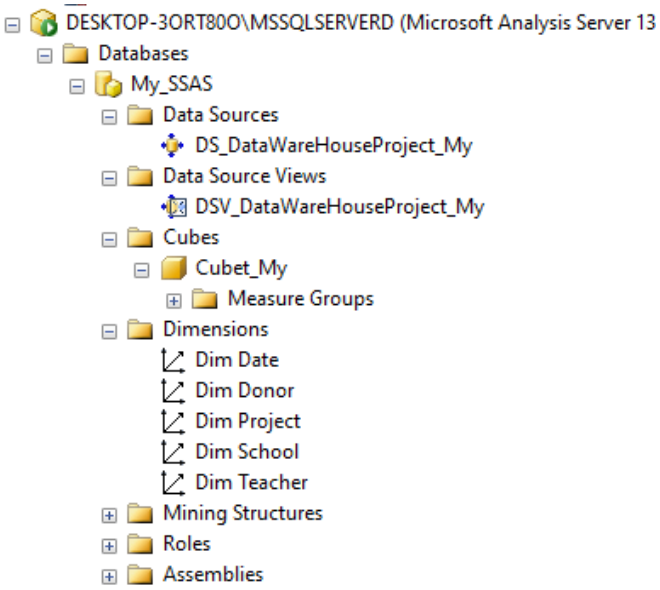
- Then a KPI was created for the donations amount



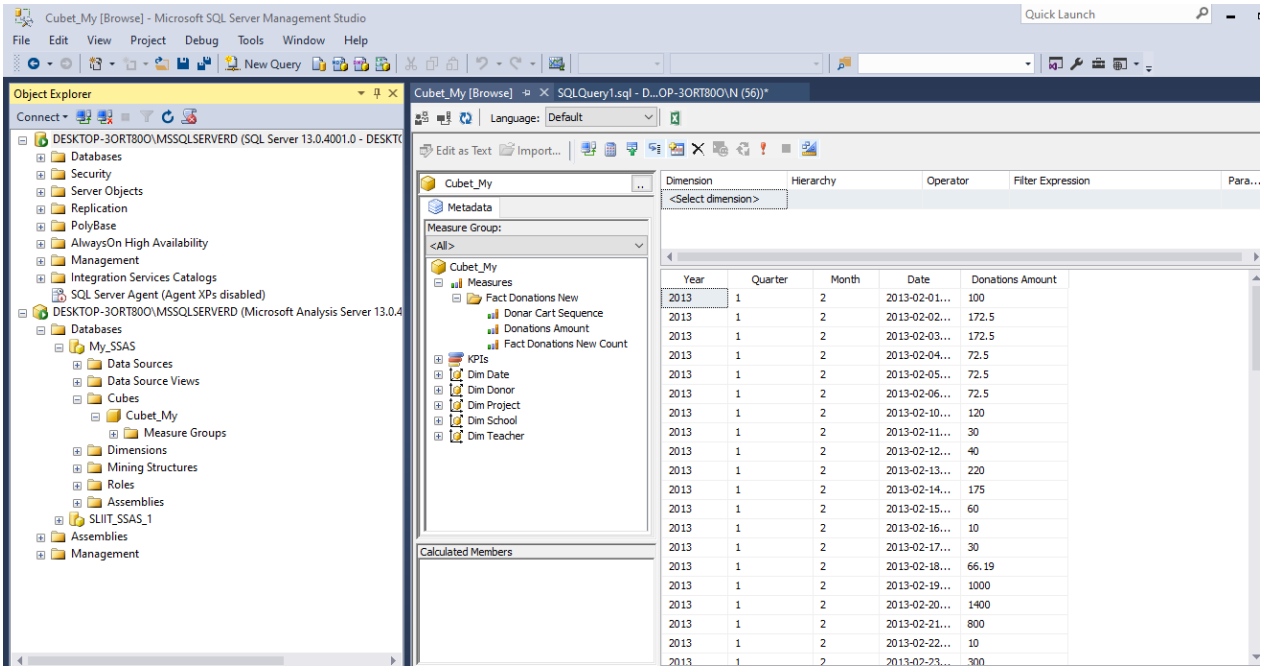
- Then finally the cube was deployed



- Deployment in SSMS



- Browsing the cube



3. OLAP Operations

The Excel workbooks were connected with the analysis services through the Data tab.

1) Roll-up

The Roll up operation is presented using the Subject Category hierarchy of the project dimension with the sum of the donations amount.

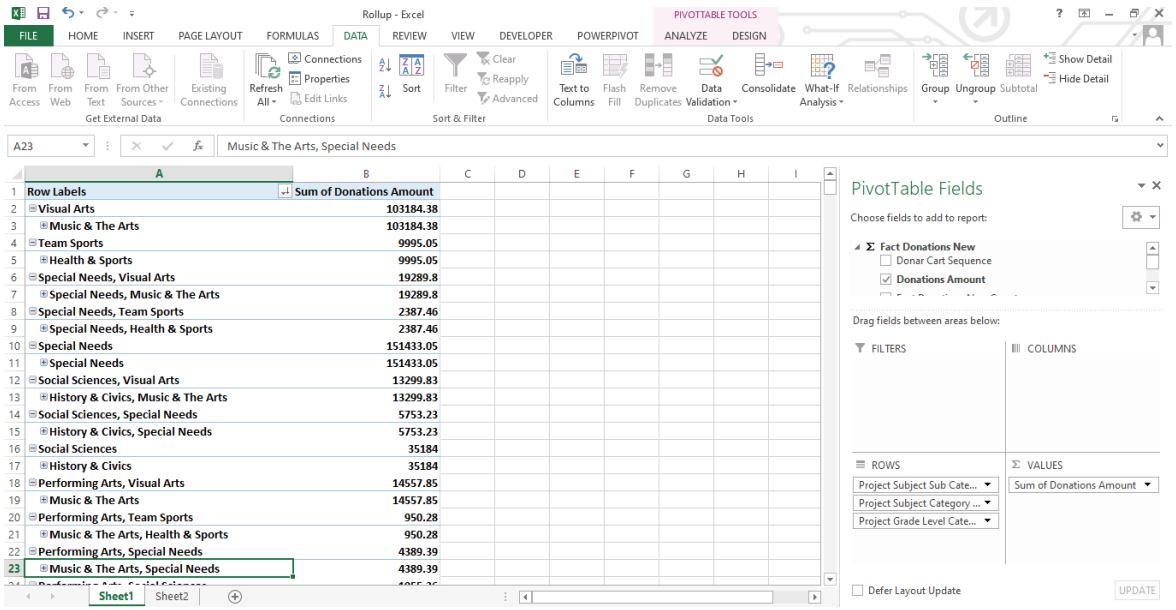
Project Subject SubCategory tree

↓

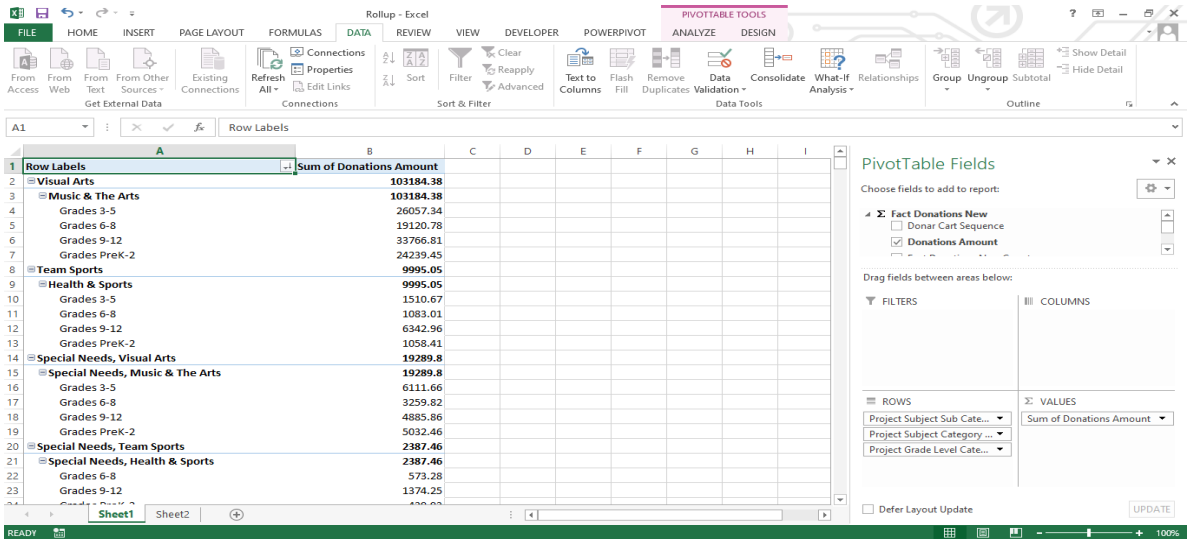
Project Subject Category tree

↓

Project Grade Level Category



Row Labels	Sum of Donations Amount
Visual Arts	103184.38
Music & The Arts	103184.38
Team Sports	9995.05
Health & Sports	9995.05
Special Needs, Visual Arts	19289.8
Special Needs, Music & The Arts	19289.8
Special Needs, Team Sports	2387.46
Special Needs, Health & Sports	2387.46
Special Needs	151433.05
Special Needs	151433.05
Social Sciences, Visual Arts	13299.83
History & Civics, Music & The Arts	13299.83
Social Sciences, Special Needs	5753.23
History & Civics, Special Needs	5753.23
Social Sciences	35184
History & Civics	35184
Performing Arts, Visual Arts	14557.85
Music & The Arts	14557.85
Performing Arts, Team Sports	950.28
Music & The Arts, Health & Sports	950.28
Performing Arts, Special Needs	4389.39
Music & The Arts, Special Needs	4389.39



Row Labels	Sum of Donations Amount
Visual Arts	103184.38
Music & The Arts	103184.38
Grades 3-5	26057.34
Grades 6-8	19120.78
Grades 9-12	33766.81
Grades PreK-2	24239.45
Team Sports	9995.05
Health & Sports	9995.05
Grades 3-5	1510.67
Grades 6-8	1083.01
Grades 9-12	6342.96
Grades PreK-2	1058.41
Special Needs, Visual Arts	19289.8
Special Needs, Music & The Arts	19289.8
Grades 3-5	6111.66
Grades 6-8	3259.82
Grades 9-12	4885.86
Grades PreK-2	5032.46
Special Needs, Team Sports	2387.46
Special Needs, Health & Sports	2387.46
Grades 6-8	573.28
Grades 9-12	1374.25

2) Drill-down

The Dill down operation is presented using the School Address hierarchy of the school dimension with the sum of the donations amount and Goal of the KPI of the donations amount.

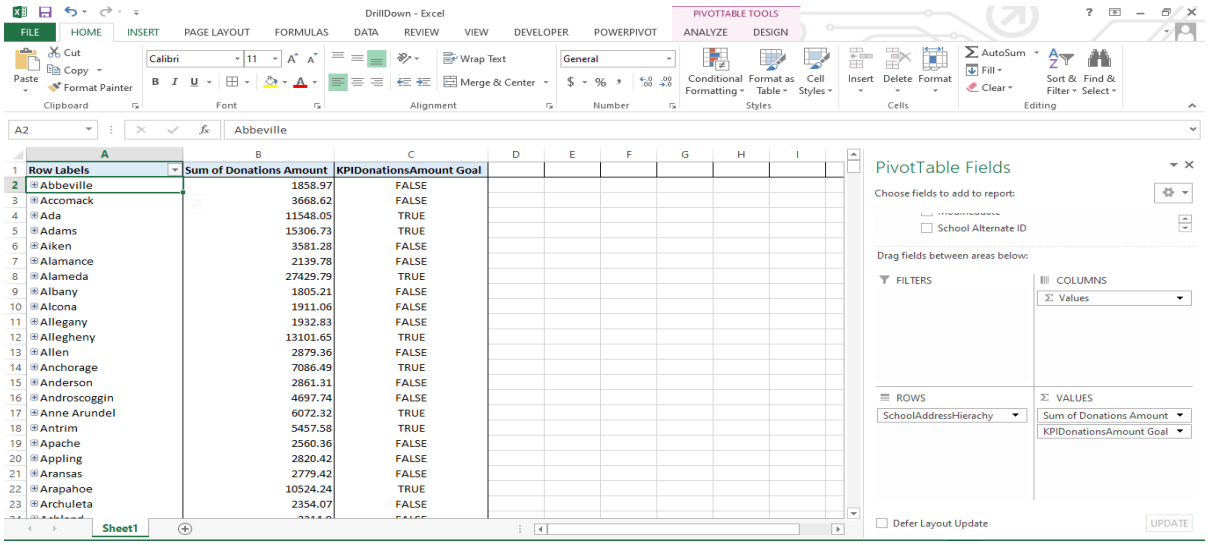
School Country

↓

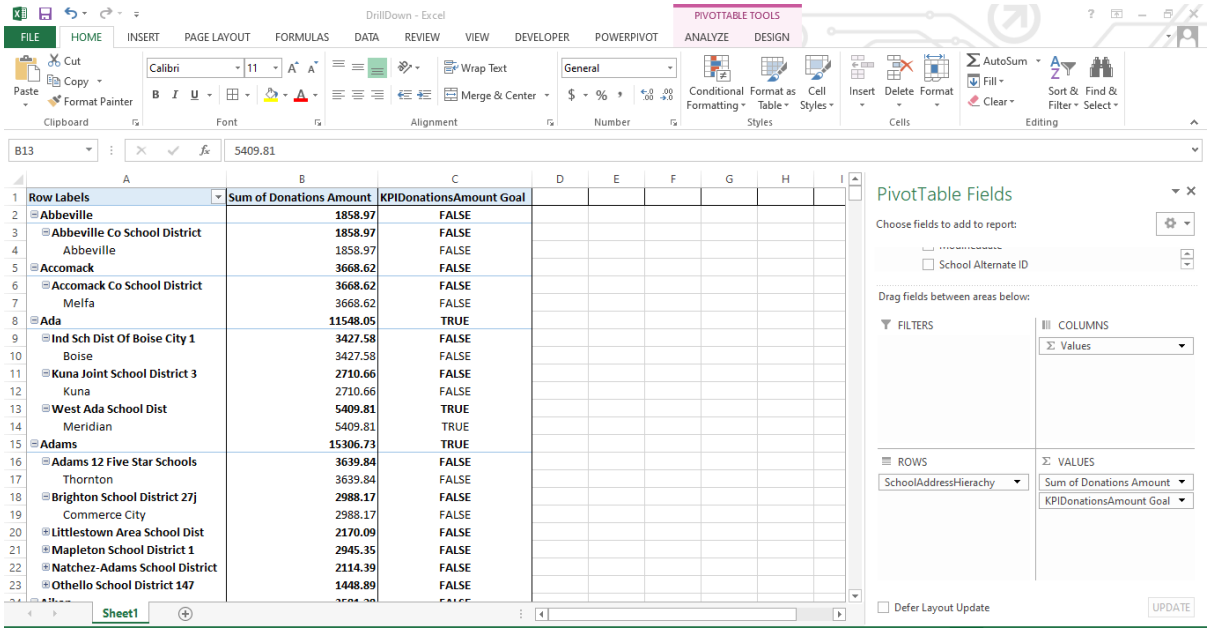
School District

↓

School City



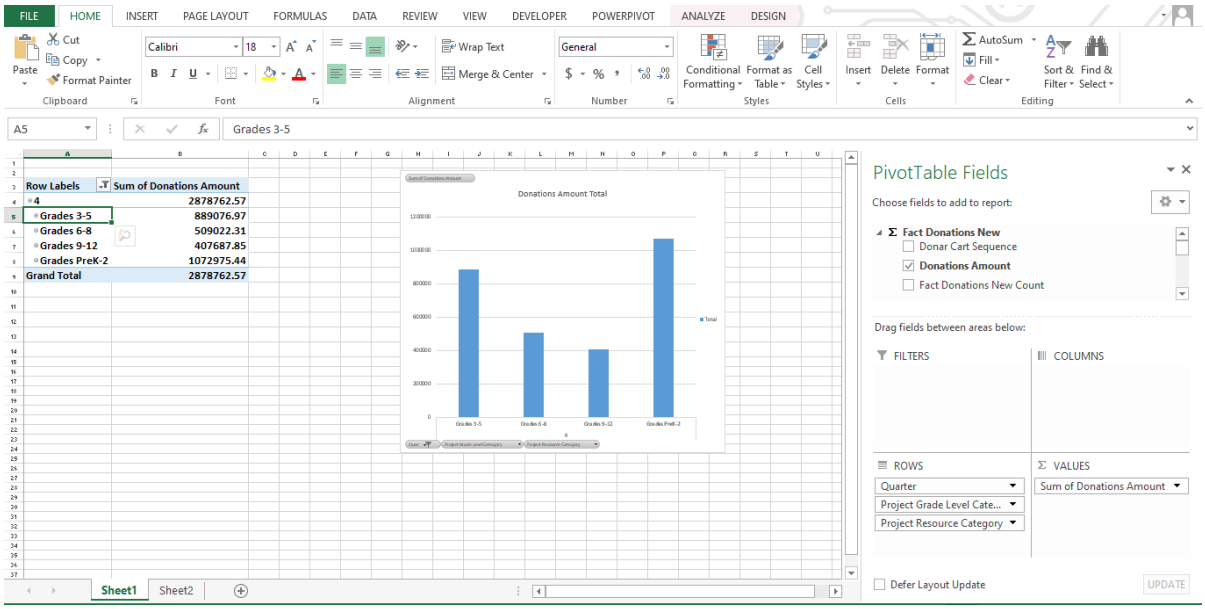
Row Labels	Sum of Donations Amount	KPIDonationsAmount Goal
Abbeville	1858.97	FALSE
Accomack	3668.62	FALSE
Ada	11548.05	TRUE
Adams	15306.73	TRUE
Aiken	3581.28	FALSE
Alamance	2139.78	FALSE
Alameda	27429.79	TRUE
Albany	1805.21	FALSE
Alcona	1911.06	FALSE
Allegany	1932.83	FALSE
Allegheny	13101.65	TRUE
Allen	2879.36	FALSE
Anchorage	7086.49	TRUE
Anderson	2861.31	FALSE
Androscoggin	4697.74	FALSE
Anne Arundel	6072.32	TRUE
Antrim	5457.58	TRUE
Apache	2560.36	FALSE
Appling	2820.42	FALSE
Aransas	2779.42	FALSE
Arapahoe	10524.24	TRUE
Archuleta	2354.07	FALSE

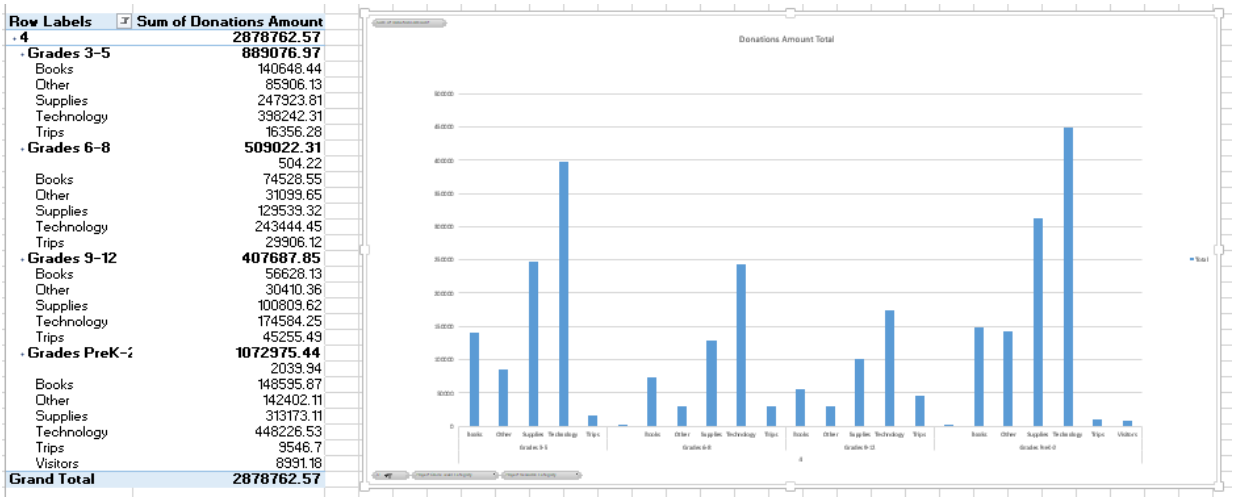


Row Labels	Sum of Donations Amount	KPIDonationsAmount Goal
Abbeville	**1858.97**	**FALSE**
Abbeville Co School District	**1858.97**	**FALSE**
Abbeville	1858.97	FALSE
Accomack	**3668.62**	**FALSE**
Accomack Co School District	**3668.62**	**FALSE**
Melfa	3668.62	FALSE
Ada	**11548.05**	**TRUE**
Ind Sch Dist Of Boise City 1	**3427.58**	**FALSE**
Boise	3427.58	FALSE
Kuna Joint School District 3	**2710.66**	**FALSE**
Kuna	2710.66	FALSE
West Ada School Dist	**5409.81**	**TRUE**
Meridian	5409.81	TRUE
Adams	**15306.73**	**TRUE**
Adams 12 Five Star Schools	**3639.84**	**FALSE**
Thornton	3639.84	FALSE
Brighton School District 27j	**2988.17**	**FALSE**
Commerce City	2988.17	FALSE
Littlestown Area School Dist	**2170.09**	**FALSE**
Mapleton School District 1	**2945.35**	**FALSE**
Natchez-Adams School District	**2114.39**	**FALSE**
Othello School District 147	**1448.89**	**FALSE**

3) Slice

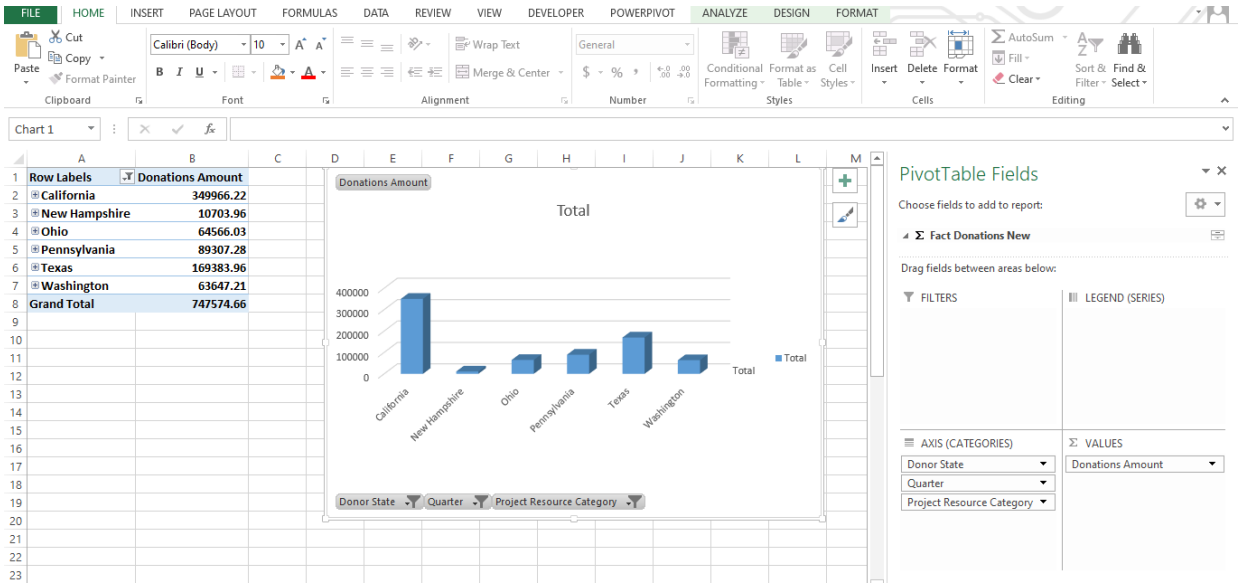
The Slice operation is presented using the Quarter 4 of the Date Dimension and Project Grade level category and Project Resource level category of the Project dimension with the sum of the donations amount

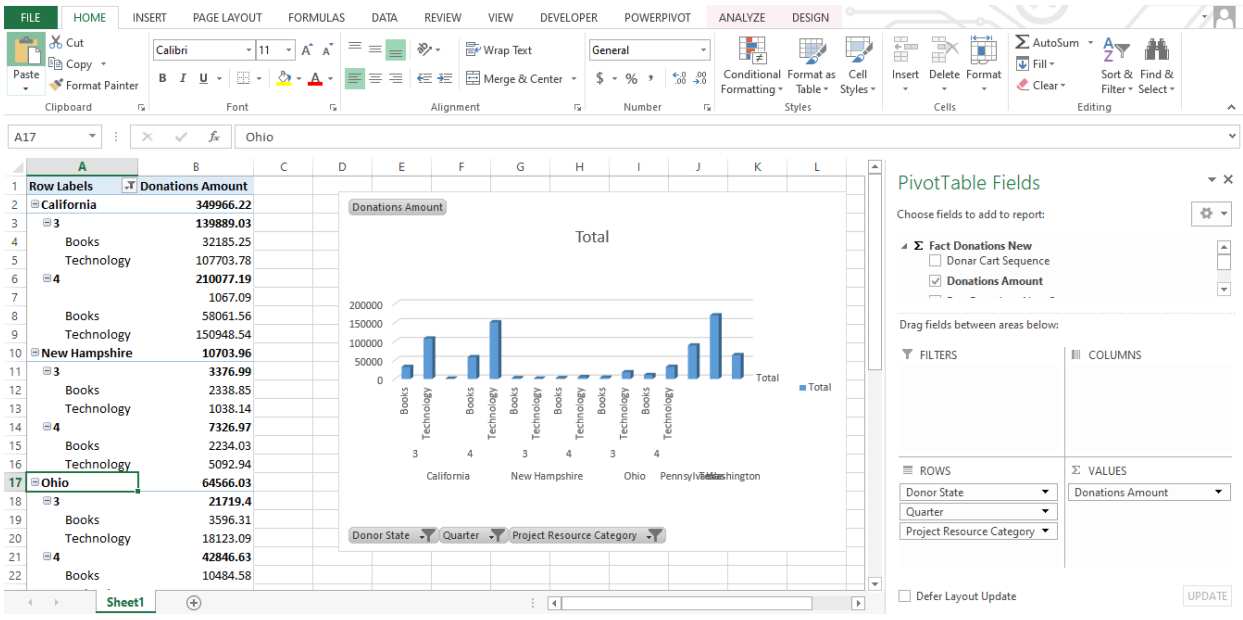




4) Dice

The Dice operation is presented using the Quarter 3 and 4 of the Date Dimension , seven donor states were selected namely California, New Hampshire, Ohio ,Pennsylvania ,Texas ,Washington From Donor Dimension and Books and Technology were selected from Project Resource category of Project Dimension.





5) Pivot

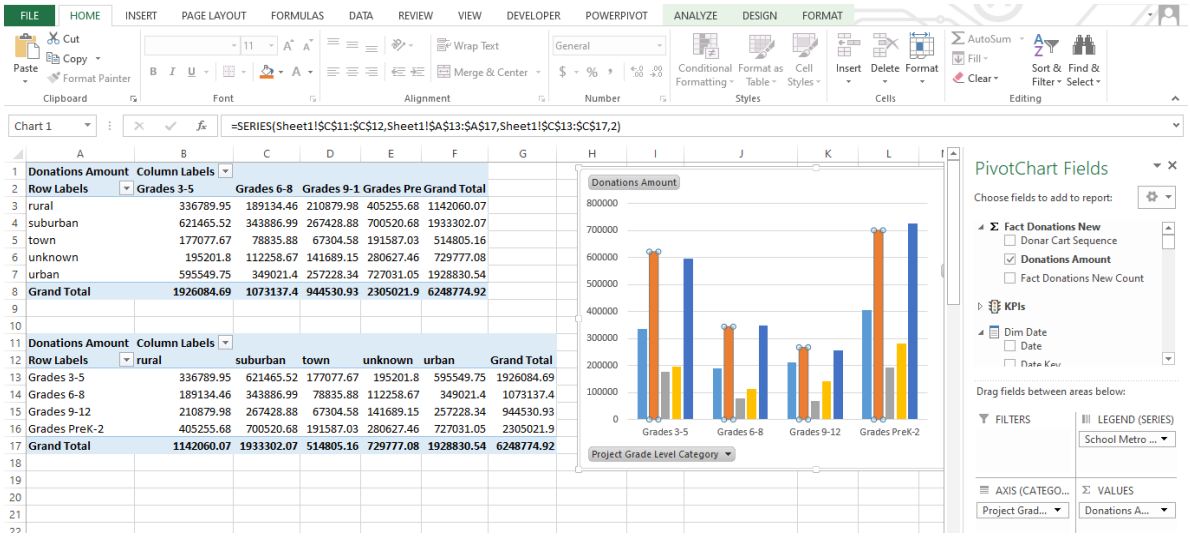
Pivot operation rotates the data axes to provide an alternative presentation by swapping the rows and columns.
The Project Grade Level category of Project Dimension was used as the column and School Metro Type of School Dimension was used as the row along with the sum of the donations amount in the first pivot table.

Donations Amount	Column Labels				
Row Labels	Grades 3-5	Grades 6-8	Grades 9-1	Grades Pre	Grand Total
rural	336789.95	189134.46	210879.98	405255.68	1142060.07
suburban	621465.52	343886.99	267428.88	700520.68	1933302.07
town	177077.67	78835.88	67304.58	191587.03	514805.16
unknown	195201.8	112258.67	141689.15	280627.46	729777.08
urban	595549.75	349021.4	257228.34	727031.05	1928830.54
Grand Total	**1926084.69**	**1073137.4**	**944530.93**	**2305021.9**	**6248774.92**

The Project Grade Level category of Project Dimension was used as the row and School Metro Type of School Dimension was used as the column along with the sum of the donations amount in the second pivot table.

Donations Amount	Column Labels					
Row Labels	rural	suburban	town	unknown	urban	Grand Total
Grades 3-5	336789.95	621465.52	177077.67	195201.8	595549.75	1926084.69
Grades 6-8	189134.46	343886.99	78835.88	112258.67	349021.4	1073137.4
Grades 9-12	210879.98	267428.88	67304.58	141689.15	257228.34	944530.93
Grades PreK-2	405255.68	700520.68	191587.03	280627.46	727031.05	2305021.9
Grand Total	**1142060.07**	**1933302.07**	**514805.16**	**729777.08**	**1928830.54**	**6248774.92**

A Bar chart is also used to visualize the data



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unknown	195201.8	112258.67	141689.15	280627.46	729777.08
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Grand Total	**1926084.69**	**1073137.4**	**944530.93**	**2305021.9**	**6248774.92**

Donations Amount	Column Labels					
Row Labels	rural	suburban	town	unknown	urban	Grand Total
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Grades 6-8	189134.46	343886.99	78835.88	112258.67	349021.4	1073137.4
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Grand Total	**1142060.07**	**1933302.07**	**514805.16**	**729777.08**	**1928830.54**	**6248774.92**

4. SSRS Reports

Report Builder was used to create the paginated reports using the datawarehouse. They were Published in the SSRS web portal and users can view reports and interact through it. There were 4 types of reports generated from Report Builder and published in SSRS web portal.

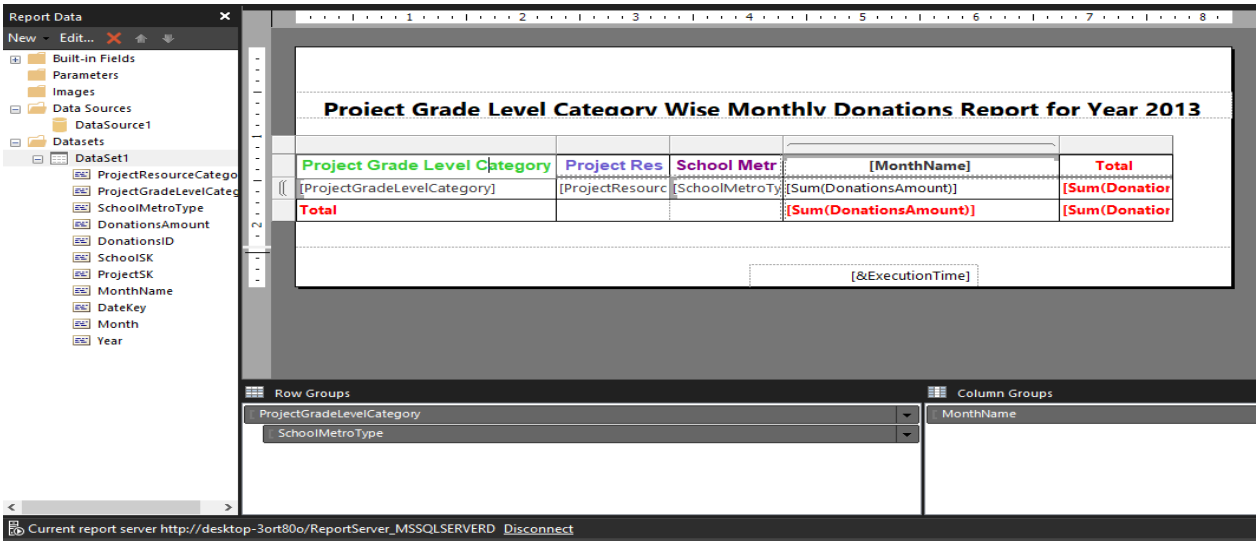
Report 1 : Report with a Matrix

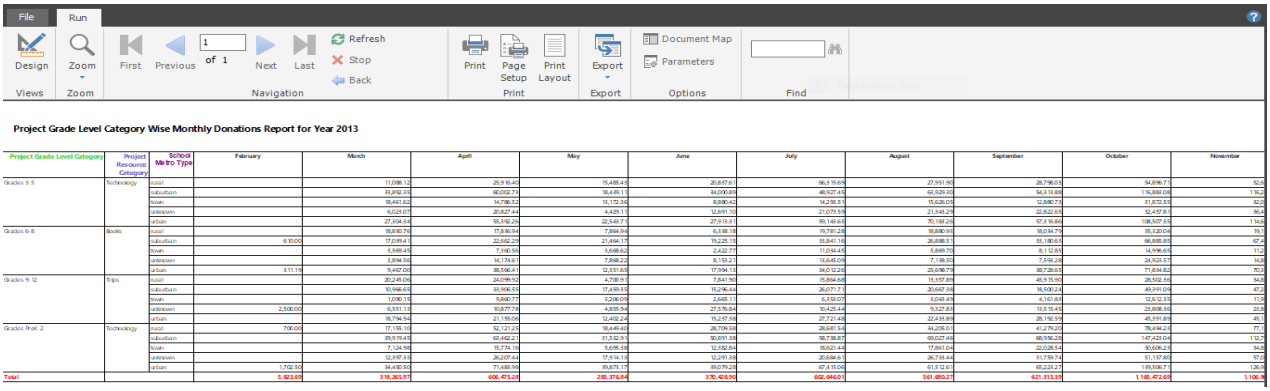
Report For monthly donations Amount for year 2013 on Project Grade Level Category

Initially a connection for the datasource was created.
Then a dataset was created. The below mentioned query was used to execute the dataset.

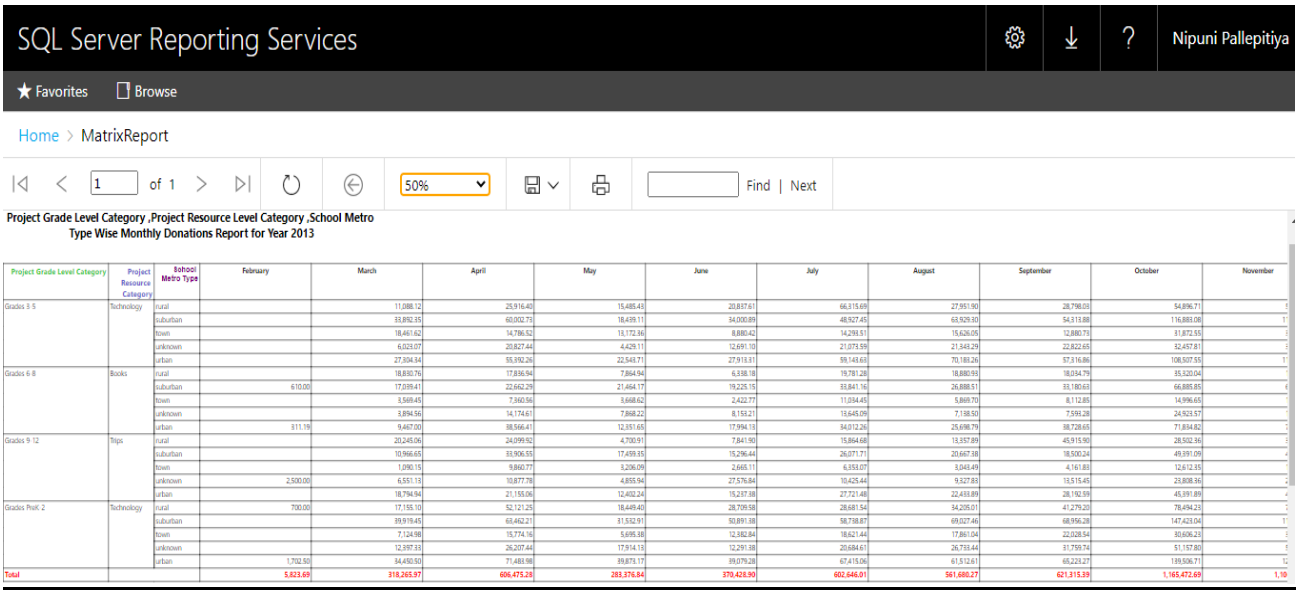
```
SELECT
  DimProject.ProjectResourceCategory
  ,DimProject.ProjectGradeLevelCategory
  ,DimSchool.SchoolMetroType
  ,FactDonationsNew.DonationsAmount
  ,FactDonationsNew.DonationsID
  ,DimSchool.SchoolSK
  ,DimProject.ProjectSK
  ,DimDate.DateKey
   ,DimDate.Month
   ,DimDate.Year
  ,DimDate.MonthName
FROM
  DimDate
  INNER JOIN FactDonationsNew
    ON DimDate.DateKey = FactDonationsNew.DonationReceivedDatekey
  INNER JOIN DimProject
    ON DimProject.ProjectSK = FactDonationsNew.ProjectSK
  INNER JOIN DimSchool
    ON DimSchool.SchoolSK = FactDonationsNew.SchoolSK
Order by DateKey
```

Then Row Groups were selected Based on ProjectGradeLevelCategory and SchoolMetroType and Column Groups were based on the month names and the sum of the donations amount were calculated within all those categories.





Report Published in the SSRS Web-Portal



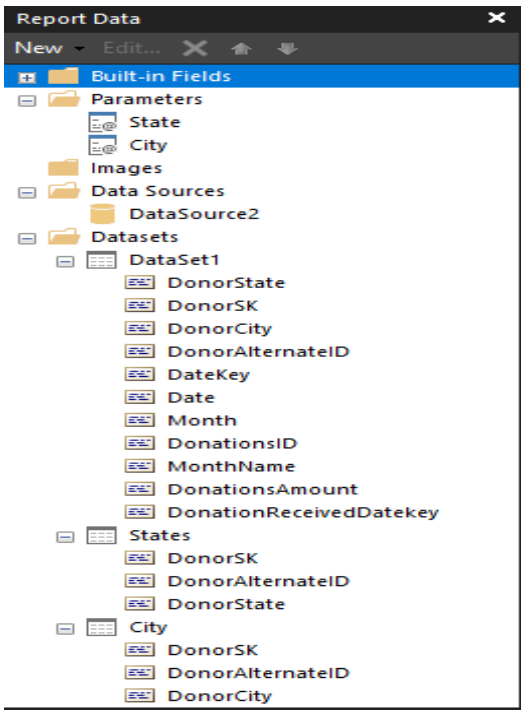
Report 2 : Report with Multiple Parameters

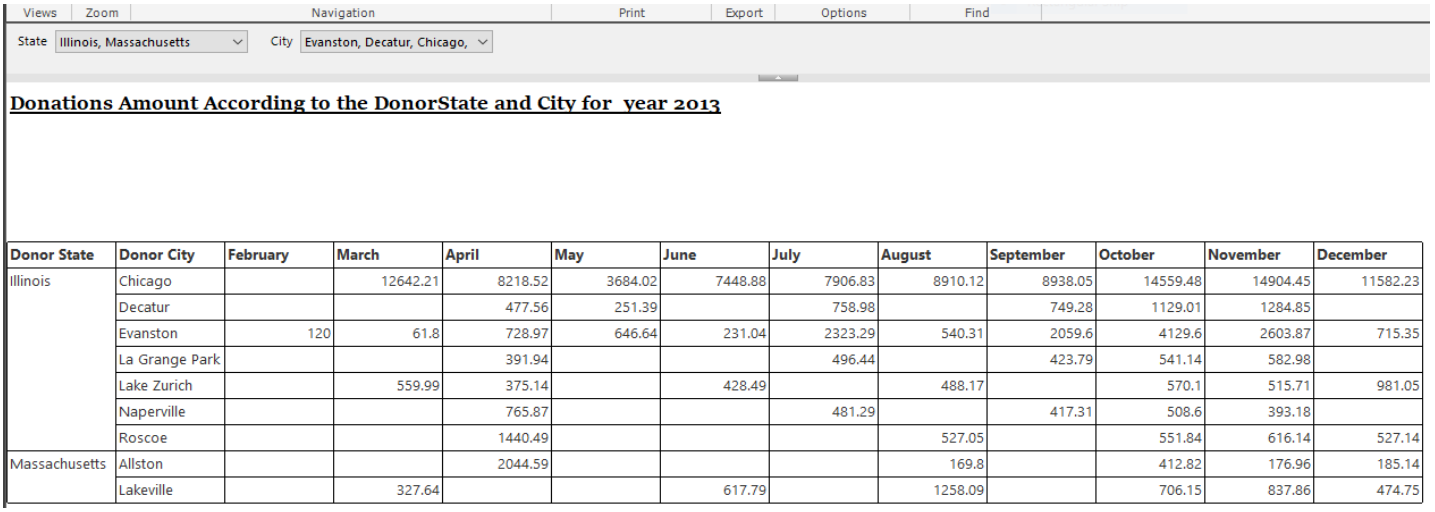
Report For monthly donations Amount for year 2013 based Donor State and Donor City

Initially a connection for the datasource was created.
Then a dataset was created. The below mentioned query was used to execute the dataset.

```
SELECT
  DimDonor.DonorState
  ,DimDonor.DonorSK
  ,DimDonor.DonorCity
  ,DimDonor.DonorAlternateID
  ,DimDate.DateKey
  ,DimDate.[Date]
  ,DimDate.[Month]
  ,DimDate.[MonthName]
  ,FactDonationsNew.DonationsID
  ,FactDonationsNew.DonationsAmount
  ,FactDonationsNew.DonationReceivedDatekey
FROM
  DimDonor
  INNER JOIN FactDonationsNew
    ON DimDonor.DonorSK = FactDonationsNew.DonorSK
  INNER JOIN DimDate
    ON DimDate.DateKey = FactDonationsNew.DonationReceivedDatekey
where DimDonor.DonorState in (@State) and DimDonor.DonorCity in (@City)
```

2 parameters were created namely state and city.According to the state or states selected by the user the cities are loaded. For both State and City parameters multiple values were allowed.

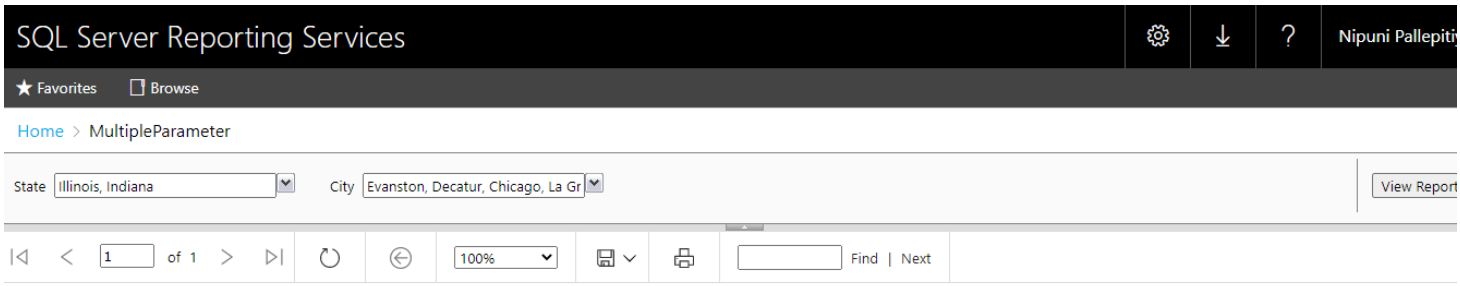




Donations Amount According to the DonorState and City for year 2013

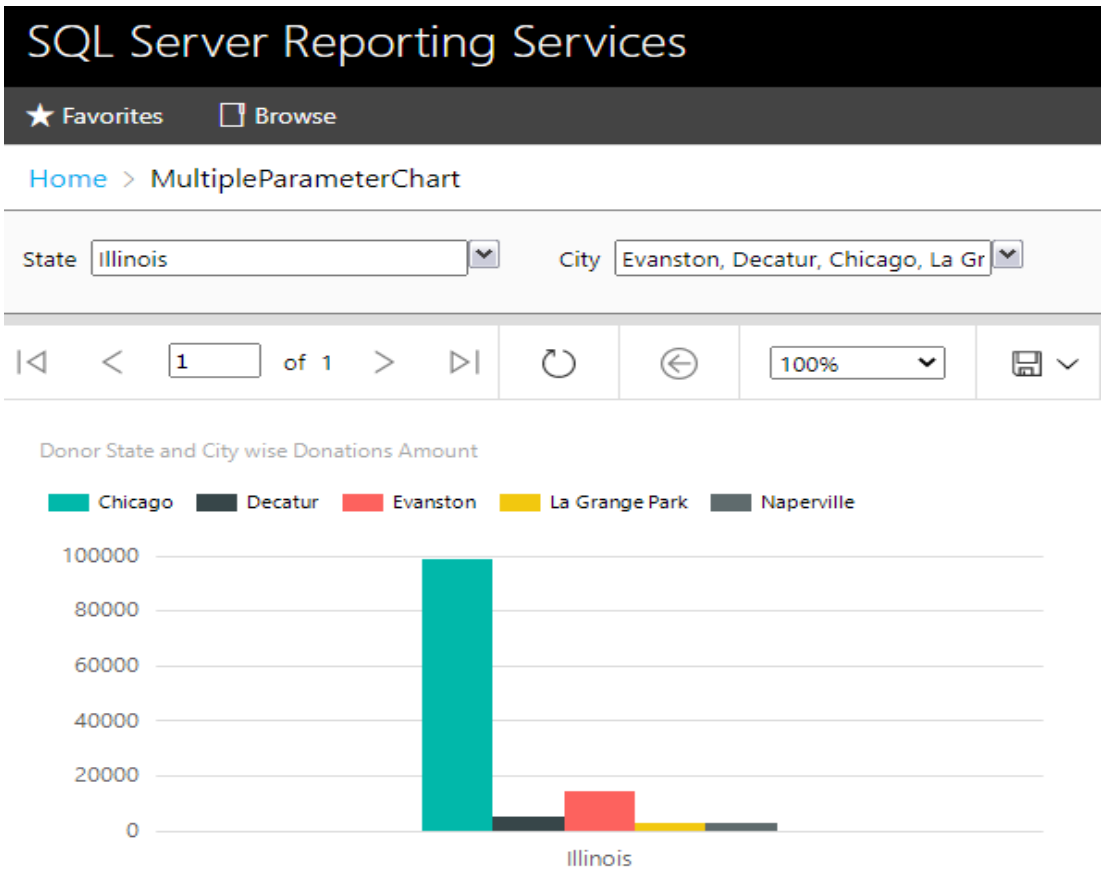
Donor State	Donor City	February	March	April	May	June	July	August	September	October	November	December
Illinois	Chicago		12642.21	8218.52	3684.02	7448.88	7906.83	8910.12	8938.05	14559.48	14904.45	11582.23
	Decatur			477.56	251.39		758.98		749.28	1129.01	1284.85	
	Evanston	120	61.8	728.97	646.64	231.04	2323.29	540.31	2059.6	4129.6	2603.87	715.35
	La Grange Park			391.94			496.44		423.79	541.14	582.98	
	Lake Zurich		559.99	375.14		428.49		488.17		570.1	515.71	981.05
	Naperville			765.87			481.29		417.31	508.6	393.18	
	Roscoe			1440.49				527.05		551.84	616.14	527.14
Massachusetts	Allston			2044.59				169.8		412.82	176.96	185.14
	Lakeville		327.64			617.79		1258.09		706.15	837.86	474.75

Report Published in the SSRS Web-Portal



Donor State	Donor City	February	March	April	May	June	July	August	September	October	November	December
Illinois	Chicago		12642.21	8218.52	3684.02	7448.88	7906.83	8910.12	8938.05	14559.48	14904.45	11582.23
	Decatur			477.56	251.39		758.98		749.28	1129.01	1284.85	
	Edwardsville			801.69				404.93		458.98	269.48	533.95
	Evanston	120	61.8	728.97	646.64	231.04	2323.29	540.31	2059.6	4129.6	2603.87	715.35
	La Grange Park			391.94			496.44		423.79	541.14	582.98	
	Lake Zurich		559.99	375.14		428.49		488.17		570.1	515.71	981.05
	Roscoe			1440.49				527.05		551.84	616.14	527.14
	Woodridge			367.36				384.21		960.62	301.22	542.86
	Worth			1024.87			480.38		822.86	691.15	659.76	
Indiana	Greensburg			259.29				236.07		483.53	466.12	323.48
	Huntington			462.25				619.15		243.53	208.08	741.73

Report Published in SSRS Web- Portal using a bar chart



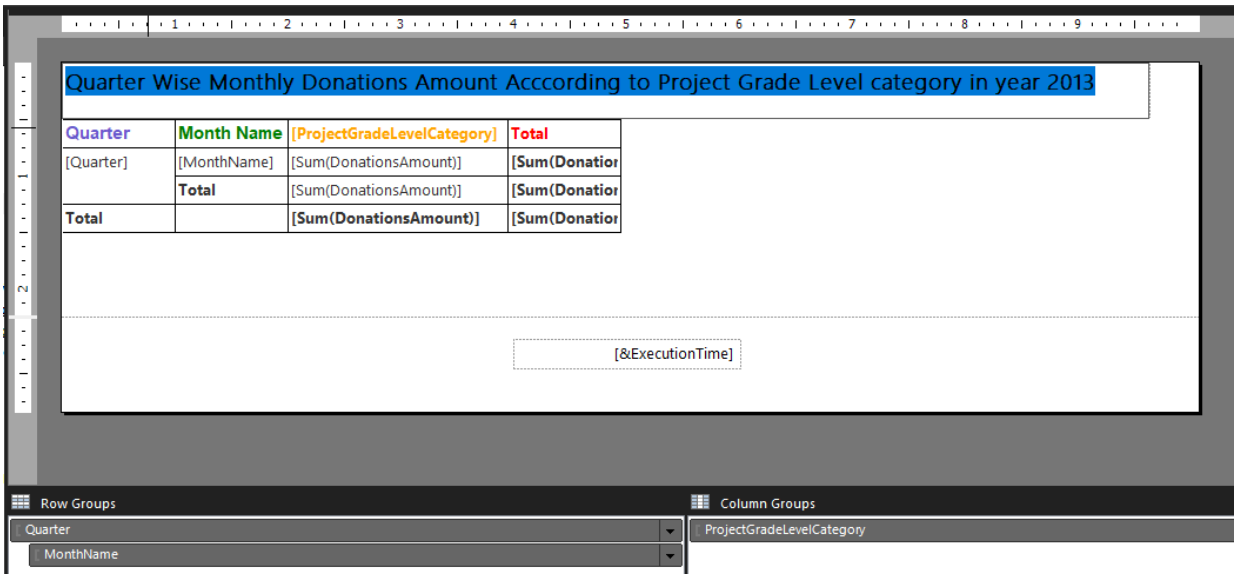
Report 3 : Drilldown Report

Report For Quarter Wise Monthly Donations Amount Acccording to Project Grade Level category

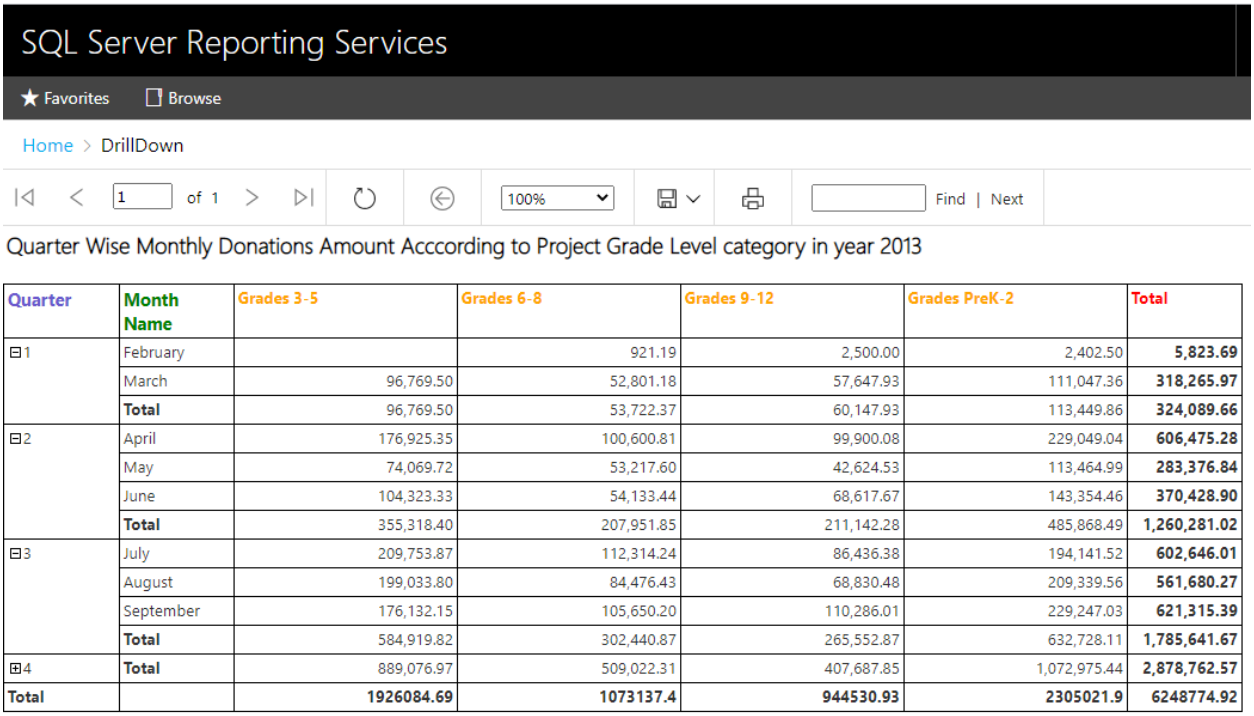
Initially a connection for the datasource was created
Then a dataset was created. The below mentioned query was used to execute the dataset

```
    DimDate.Quarter
    ,DimDate.Datekey
    ,DimDate.MonthName
    ,DimProject.ProjectSubjectCategoryTree
    ,DimProject.ProjectSubjectSubCategoryTree
    ,DimProject.ProjectGradeLevelCategory
    ,DimProject.ProjectResourceCategory
    ,DimProject.ProjectType
    ,DimSchool.SchoolCountry
    ,DimSchool.SchoolState
    ,DimSchool.SchoolDistrict
    ,DimSchool.SchoolCity
    ,FactDonationsNew.DonationReceivedDatekey
    ,FactDonationsNew.DonationsID
    ,FactDonationsNew.DonationsAmount
FROM
    DimDate
    INNER JOIN FactDonationsNew
      ON DimDate.DateKey = FactDonationsNew.DonationReceivedDatekey
    INNER JOIN DimProject
      ON DimProject.ProjectSK = FactDonationsNew.ProjectSK
    INNER JOIN DimSchool
      ON DimSchool.SchoolSK = FactDonationsNew.SchoolSK
```

A drill down created according to the quarter wise monthly donations amount received for the project grade Level categories in year 2013.Futher more Row Groups were Quarter,Month Name and Column groups were Project Grade Level category



Report published in SSRS web portal



Quarter Wise Monthly Donations Amount Acccording to Project Grade Level category in year 2013

Quarter	Month Name	Grades 3-5	Grades 6-8	Grades 9-12	Grades PreK-2	Total
⊟1	February		921.19	2,500.00	2,402.50	**5,823.69**
	March	96,769.50	52,801.18	57,647.93	111,047.36	**318,265.97**
	Total	96,769.50	53,722.37	60,147.93	113,449.86	**324,089.66**
⊟2	April	176,925.35	100,600.81	99,900.08	229,049.04	**606,475.28**
	May	74,069.72	53,217.60	42,624.53	113,464.99	**283,376.84**
	June	104,323.33	54,133.44	68,617.67	143,354.46	**370,428.90**
	Total	355,318.40	207,951.85	211,142.28	485,868.49	**1,260,281.02**
⊟3	July	209,753.87	112,314.24	86,436.38	194,141.52	**602,646.01**
	August	199,033.80	84,476.43	68,830.48	209,339.56	**561,680.27**
	September	176,132.15	105,650.20	110,286.01	229,247.03	**621,315.39**
	Total	584,919.82	302,440.87	265,552.87	632,728.11	**1,785,641.67**
⊞4	**Total**	889,076.97	509,022.31	407,687.85	1,072,975.44	**2,878,762.57**
Total		**1926084.69**	**1073137.4**	**944530.93**	**2305021.9**	**6248774.92**

Report 4 : DrillThrough Report

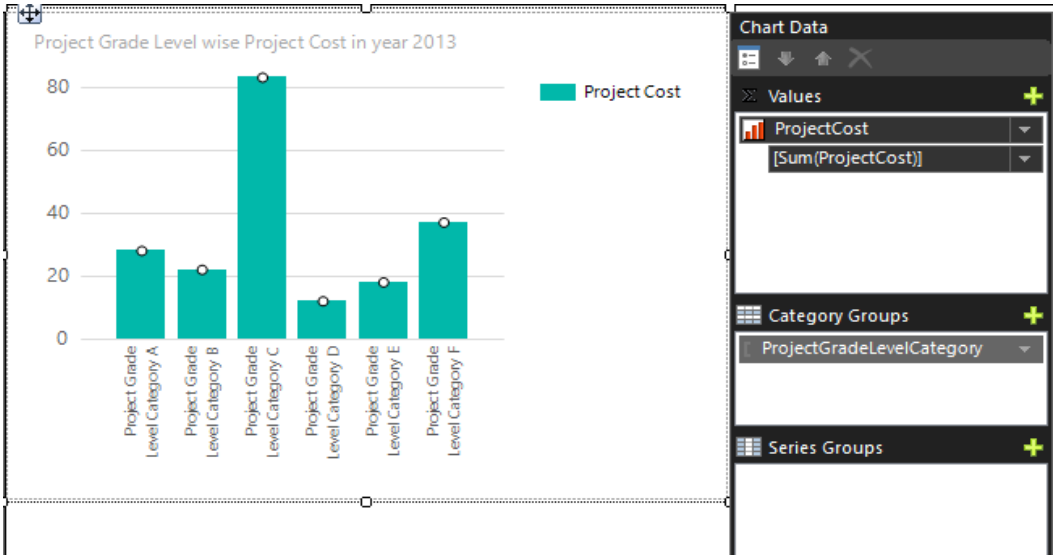
Report for Project Grade level wise Project cost and Donations Amount

Initially a connection for the datasource was created
Then a dataset was created. The below mentioned query was used to execute the dataset

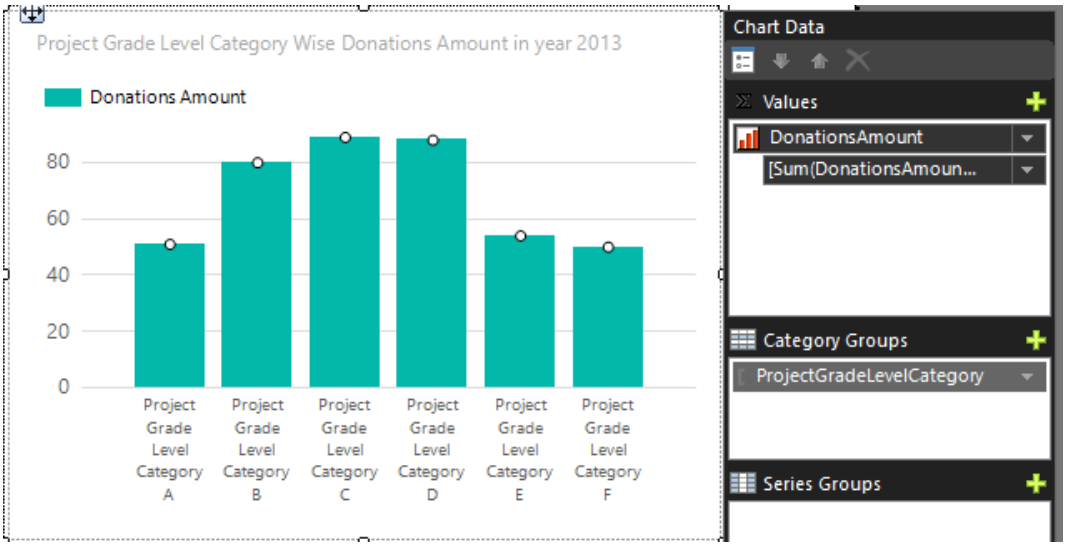
```
SELECT
  DimProject.ProjectSK AS [DimProject ProjectSK]
  ,DimProject.ProjectResourceCategory
  ,DimProject.ProjectGradeLevelCategory
  ,DimProject.ProjectCost
  ,DimDate.DateKey
  ,DimDate.[Date]
  ,DimDate.[Month]
  ,DimDate.[MonthName]
  ,FactDonationsNew.DonationsID
  ,FactDonationsNew.ProjectSK AS [FactDonationsNew ProjectSK]
  ,FactDonationsNew.DonationsAmount
  ,FactDonationsNew.DonationReceivedDatekey
FROM
  DimProject
  INNER JOIN FactDonationsNew
    ON DimProject.ProjectSK = FactDonationsNew.ProjectSK
  INNER JOIN DimDate
    ON DimDate.DateKey = FactDonationsNew.DonationReceivedDatekey
```

Here when the user clicks on the project grade level category of a chart it redirects to another chart where it shows the project Resource category wise sum of project costs and donations amount.

Project Grade level wise project cost in drill through report1

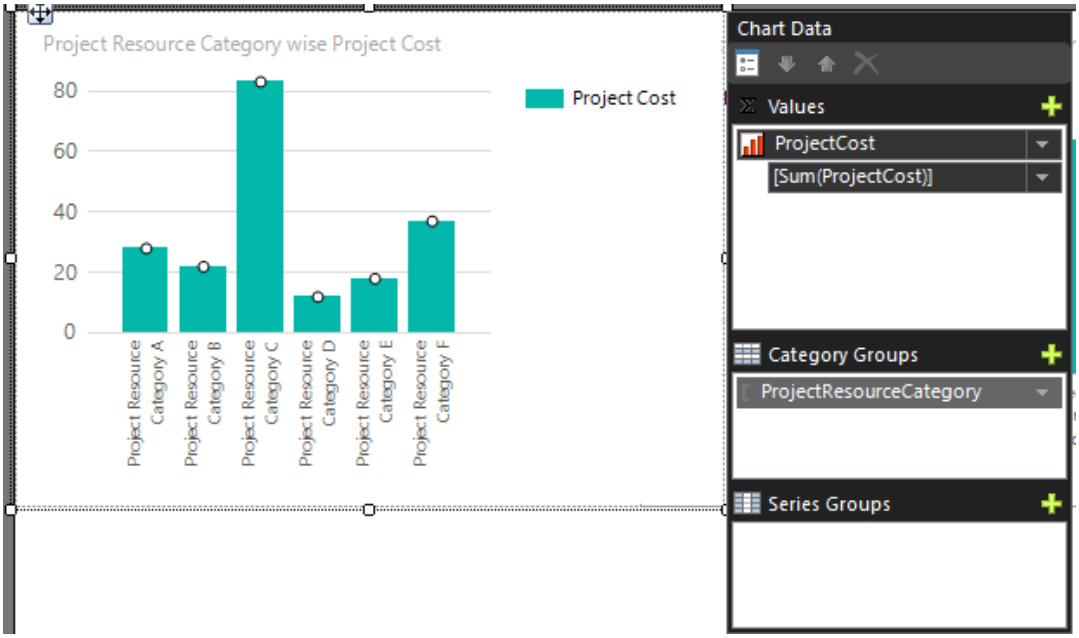


Project Grade Level wise donations amount in drill through report1

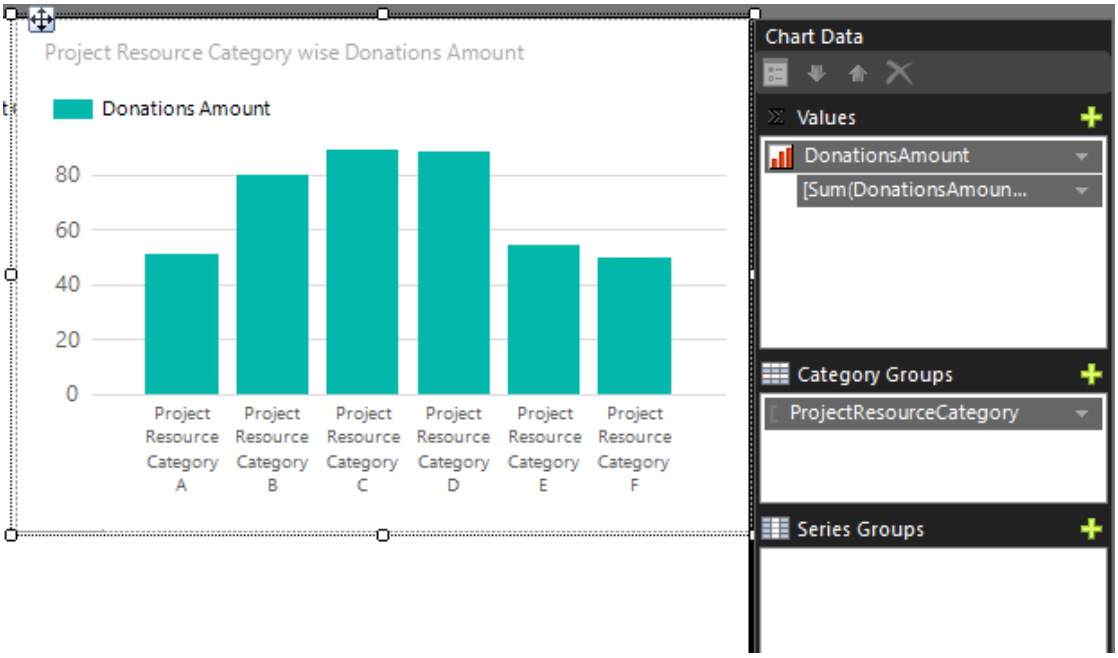


When user clicks the bars the report is redirected to another chart which shows the project resource level category according to the selected project grade level category

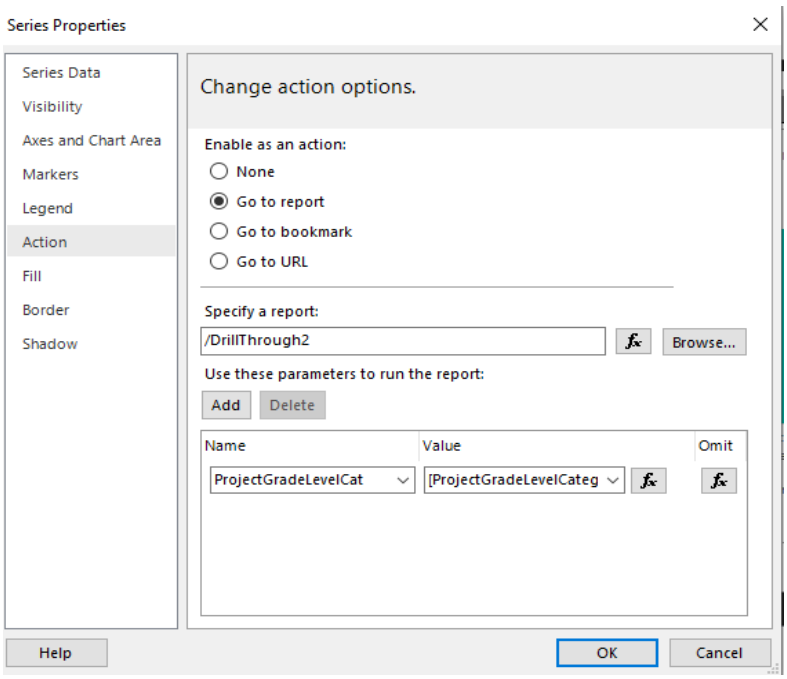
Project Resource Level wise sum of project costs in drill through report2



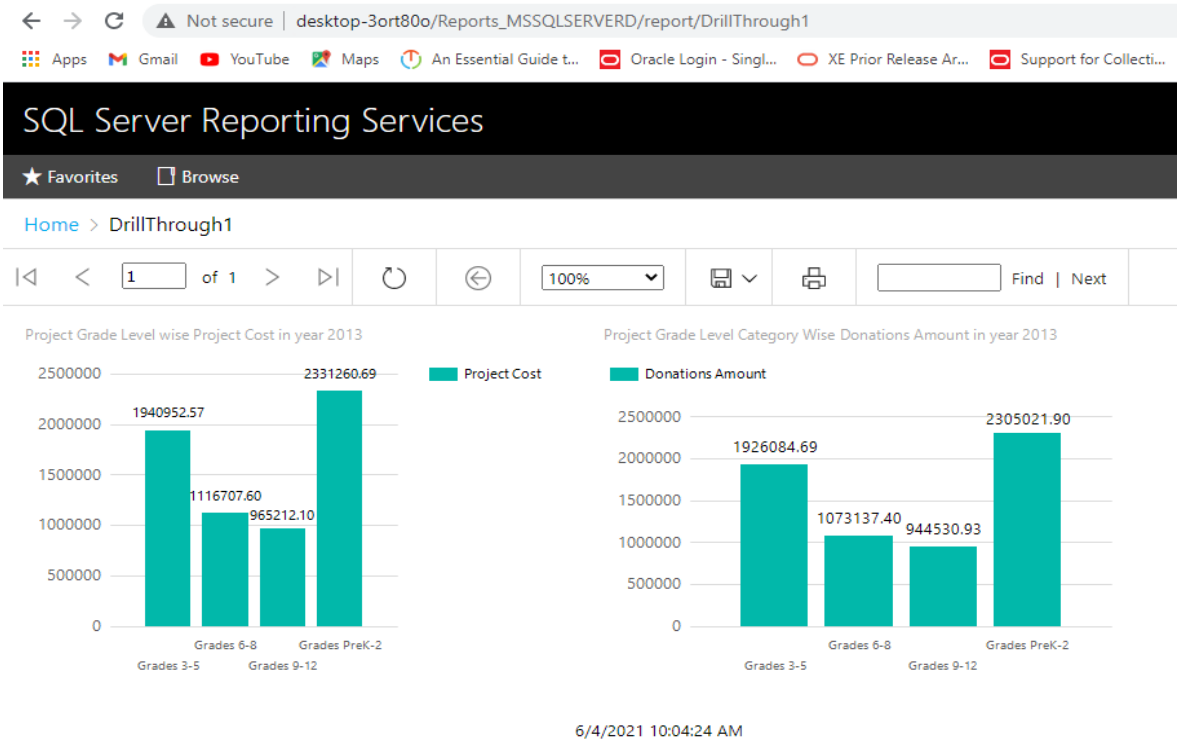
Project Resource Level wise sum of donations amount in drill through report2



Using the drill through1 report when the user clicks on a bar as an action its passed to the drillthough report 2. The parameter value passed is the project Grade level category.In the drillthrough report2 the resource level category is based on the project grade level category that is passed.



Report Published in the SSRS web portal



When user clicks its redirected to the Project Resource Level category wise report