Sri Lanka Institute of Information Technology

Data warehousing and Business Intelligence

Assignment two - 2020

Group 16(DS)

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PART 1

1. Data Source used to create cubes and Reports

DWBI_DataWareHouse is the data source used to create and deploy the OLAP cubes, Excel work sheets and SSRS reports

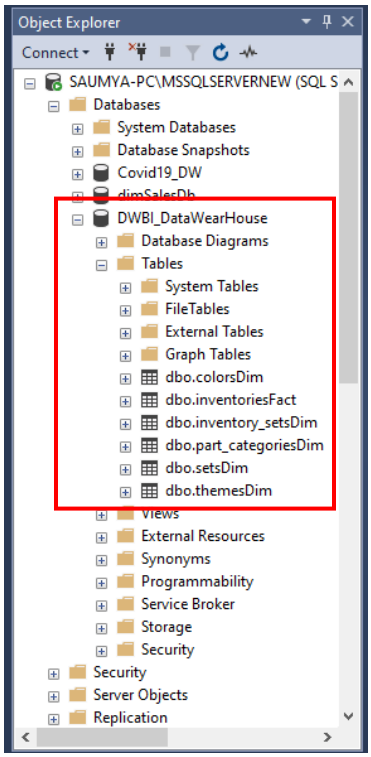


Figure 1.0

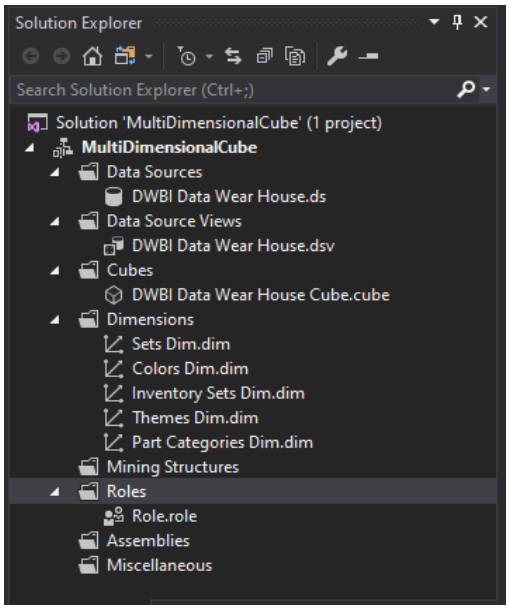


Figure 1.1

As shown in the Figure 1.1 a new project in Analysis Services Multidimensional and Data Mining project in SSAS (SSDT) was created.

Used the data warehouse (DWBI_DataWareHouse) which was implemented and loaded with data in Assignment 1 as the data source (DWBI Data Ware House) for the assignment 2.

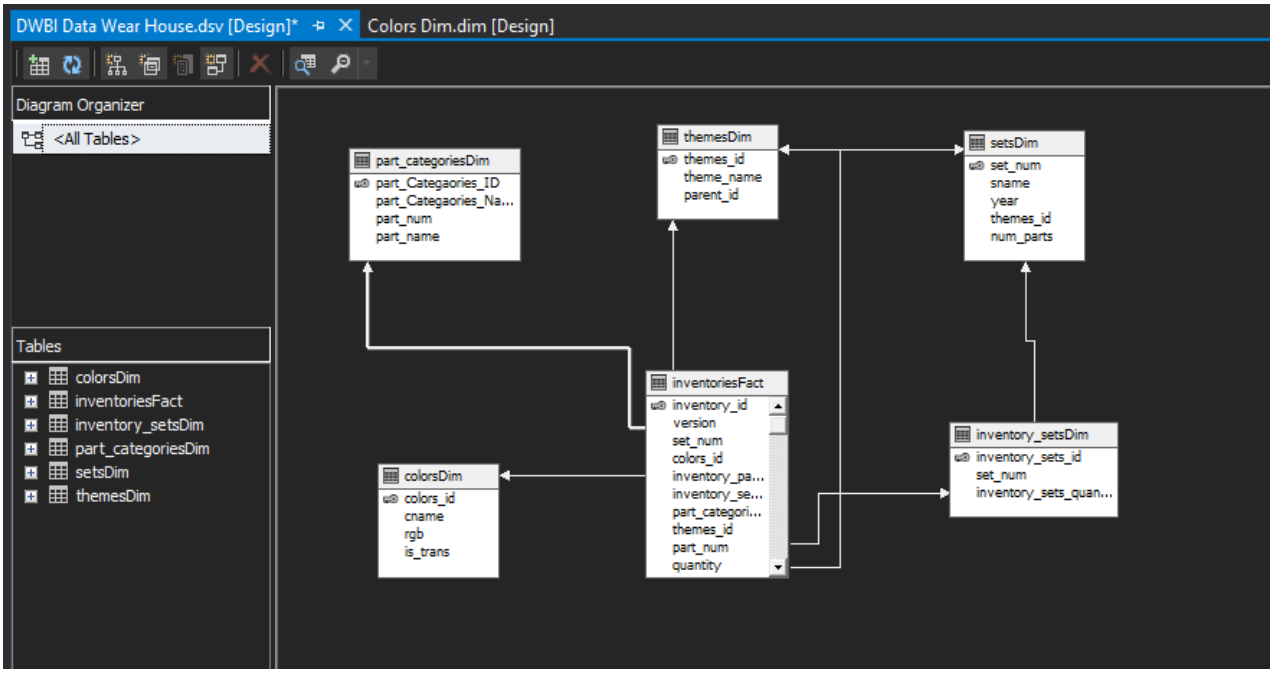


Figure 1.2: Data Source View

2. SSAS Cube implementation

Used DWBI_DataWareHouse as the data source and created an SSAS cube.

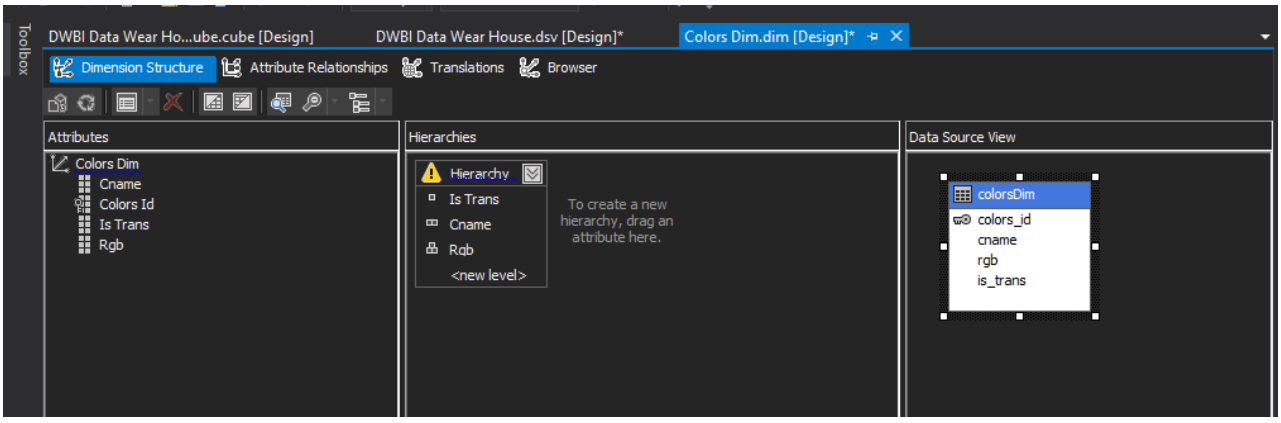


Figure 2.0

Figure 2.0 shows the hierarchy in the cube which was created for the dimension table ColorsDim

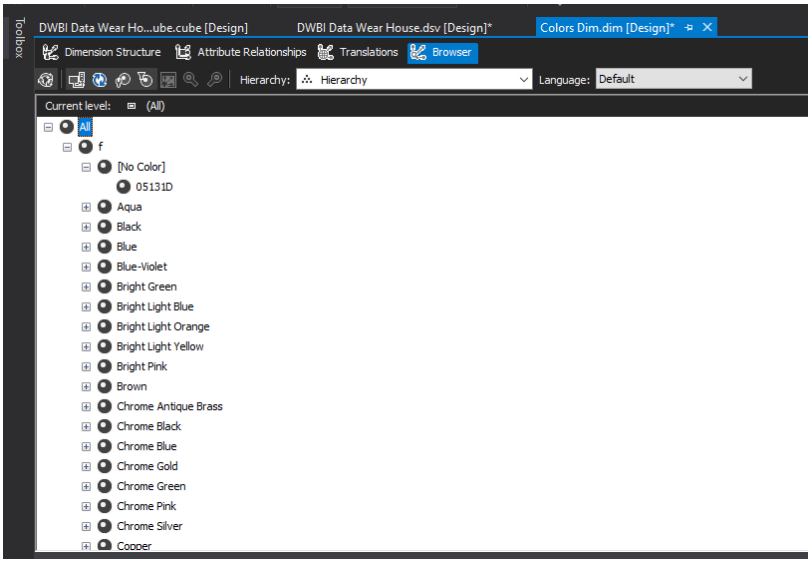


Figure 2.1: Browse the hierarchy

Creating KPI

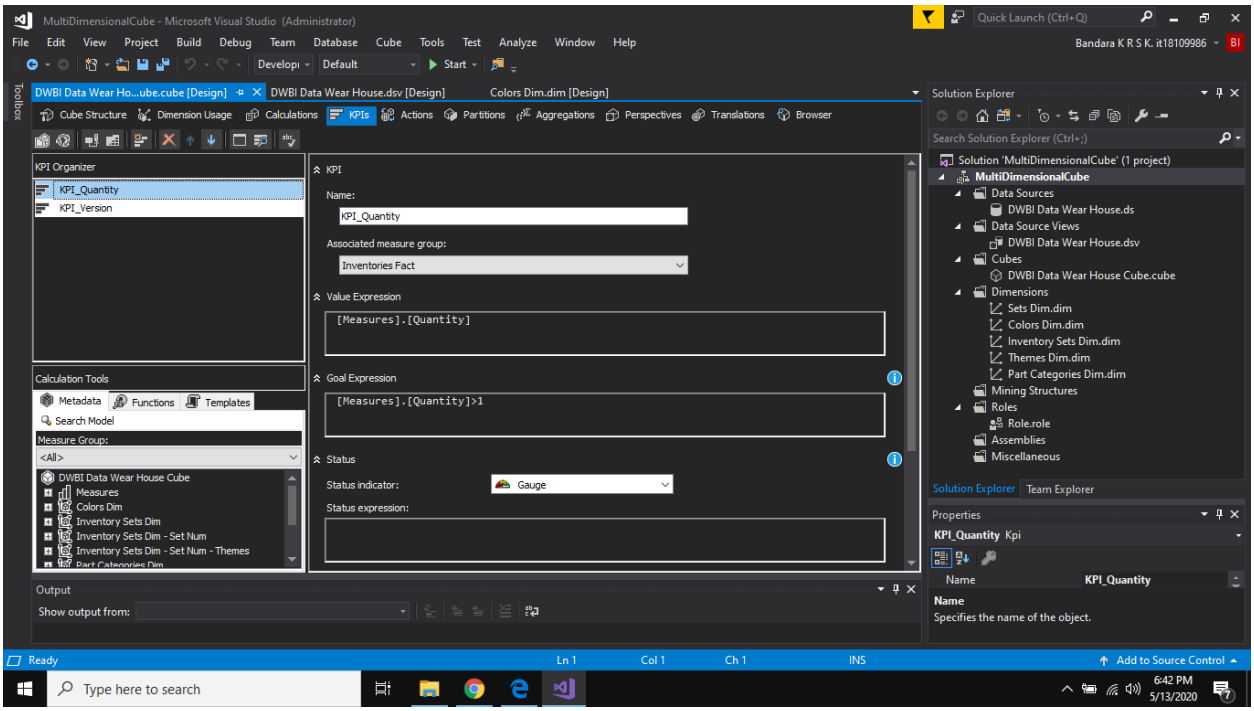


Figure 2.2

Creating Roles

User roles are created to provide permissions on who has access to the date cube

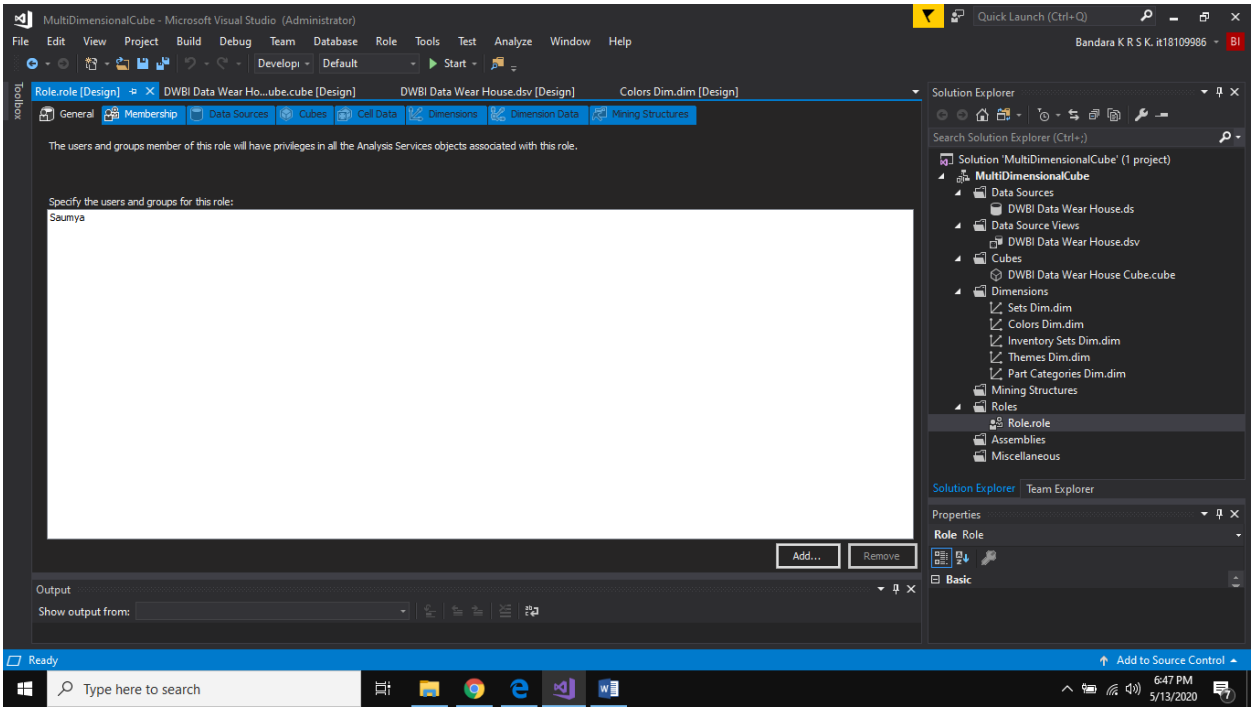


Figure 2.3

Deploying the data cube

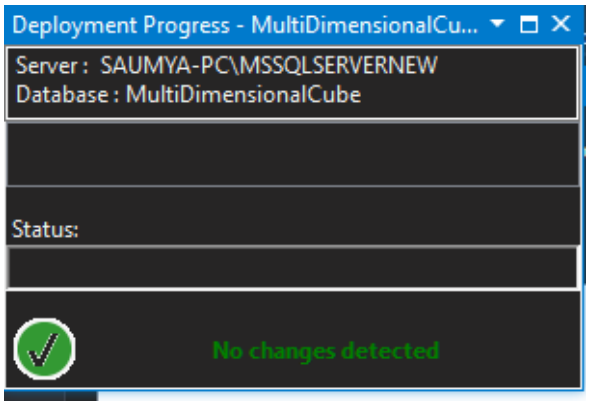


Figure 2.4

After completing all the above steps successfully, data has loaded into the cube inside the SQL server management studio.

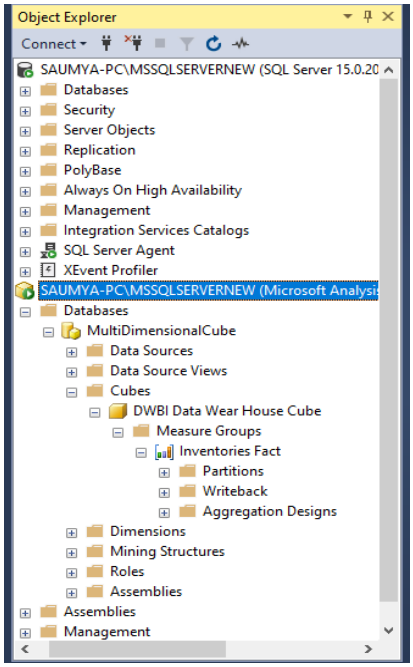


Figure 2.5

3. Demonstration of OLAP operations using the Excel work book

The Power pivot, Power Query, Power view in excel, allow to create a semantic layer inside excel.

MDX query is used to connect the excel work book and to get the data to the semantic layer.

The following is the MDX used to generate excel reports.

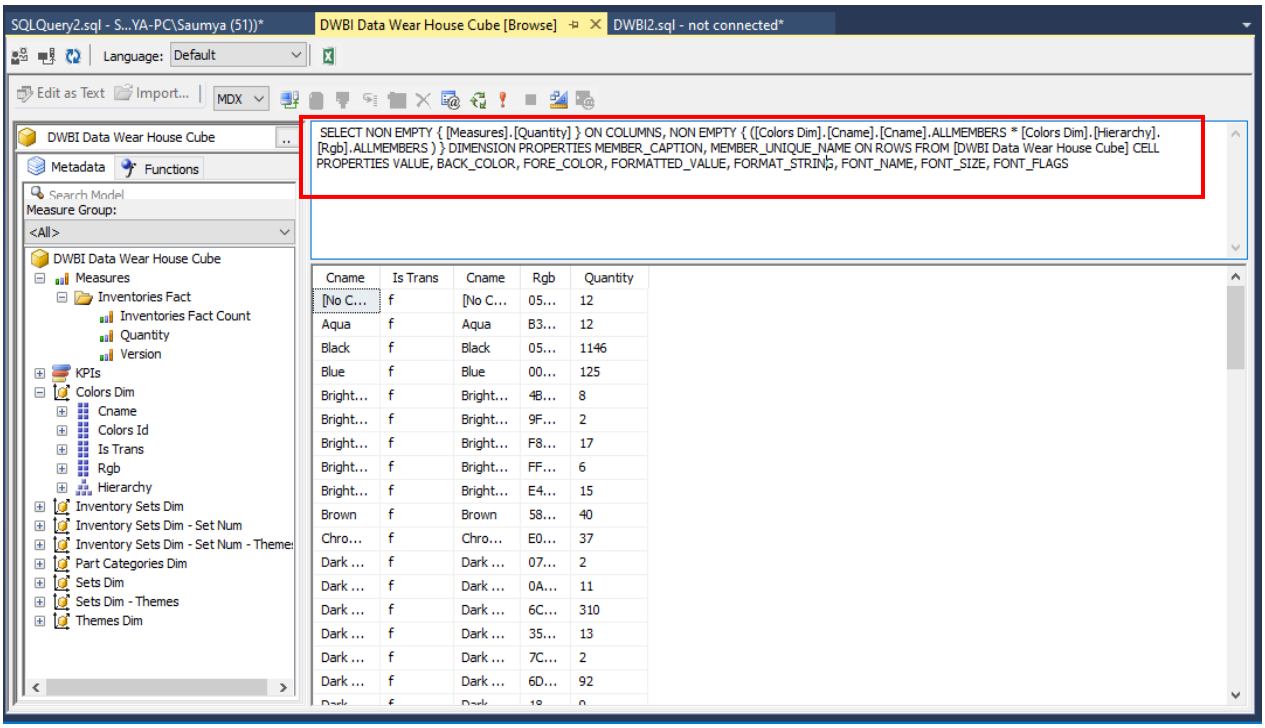
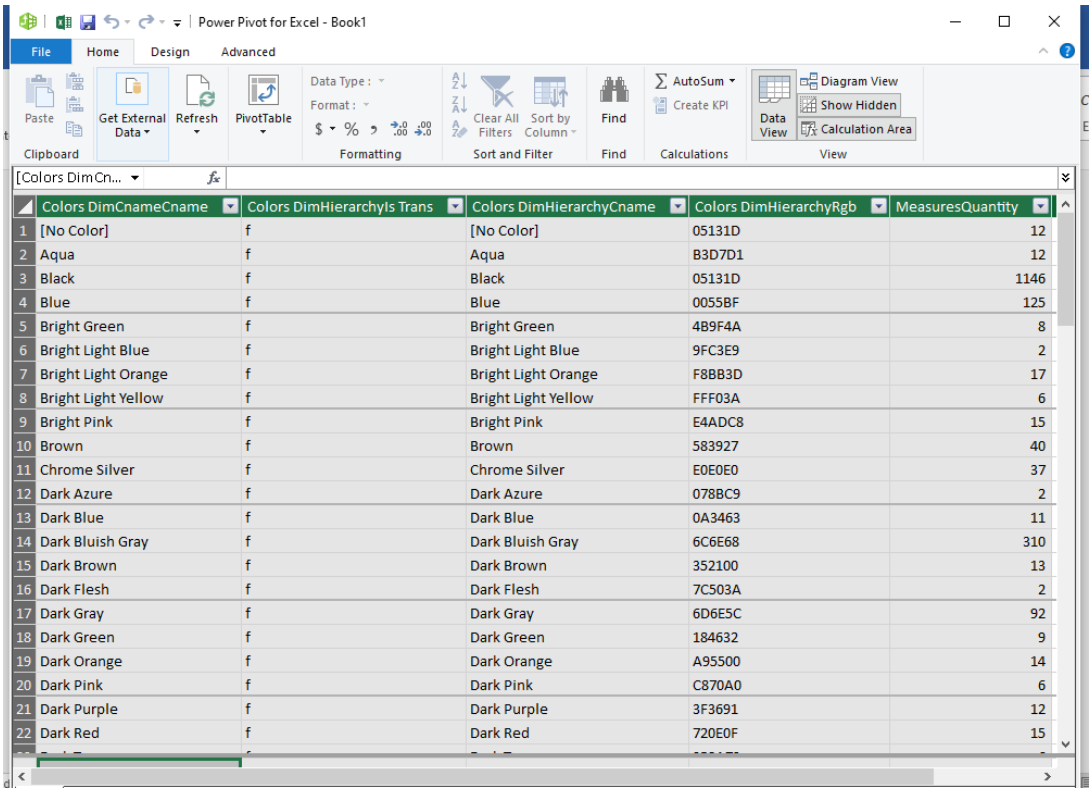


Figure 3.0

Loading data into the excel sheet using power pivot



	Colors DimCnameCname	Colors DimHierarchyIs Trans	Colors DimHierarchyCname	Colors DimHierarchyRgb	MeasuresQuantity
1	[No Color]	f	[No Color]	05131D	12
2	Aqua	f	Aqua	B3D7D1	12
3	Black	f	Black	05131D	1146
4	Blue	f	Blue	0055BF	125
5	Bright Green	f	Bright Green	4B9F4A	8
6	Bright Light Blue	f	Bright Light Blue	9FC3E9	2
7	Bright Light Orange	f	Bright Light Orange	F8BB3D	17
8	Bright Light Yellow	f	Bright Light Yellow	FFF03A	6
9	Bright Pink	f	Bright Pink	E4ADC8	15
10	Brown	f	Brown	583927	40
11	Chrome Silver	f	Chrome Silver	E0E0E0	37
12	Dark Azure	f	Dark Azure	078BC9	2
13	Dark Blue	f	Dark Blue	0A3463	11
14	Dark Bluish Gray	f	Dark Bluish Gray	6C6E68	310
15	Dark Brown	f	Dark Brown	352100	13
16	Dark Flesh	f	Dark Flesh	7C503A	2
17	Dark Gray	f	Dark Gray	6D6E5C	92
18	Dark Green	f	Dark Green	184632	9
19	Dark Orange	f	Dark Orange	A95500	14
20	Dark Pink	f	Dark Pink	C870A0	6
21	Dark Purple	f	Dark Purple	3F3691	12
22	Dark Red	f	Dark Red	720E0F	15

Figure 3.1

OLAP Operations

a) Roll up

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

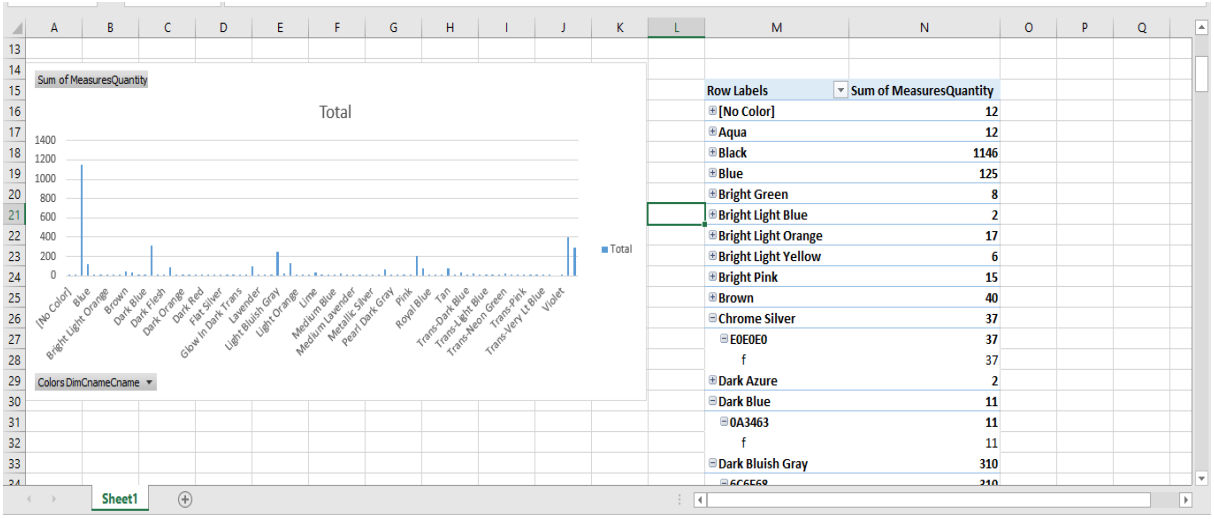


Figure 3.2

b) Drill down

- Stepping down a hierarchy of a dimension allowing navigation through details means the Drill down OLAP operation in cubes.

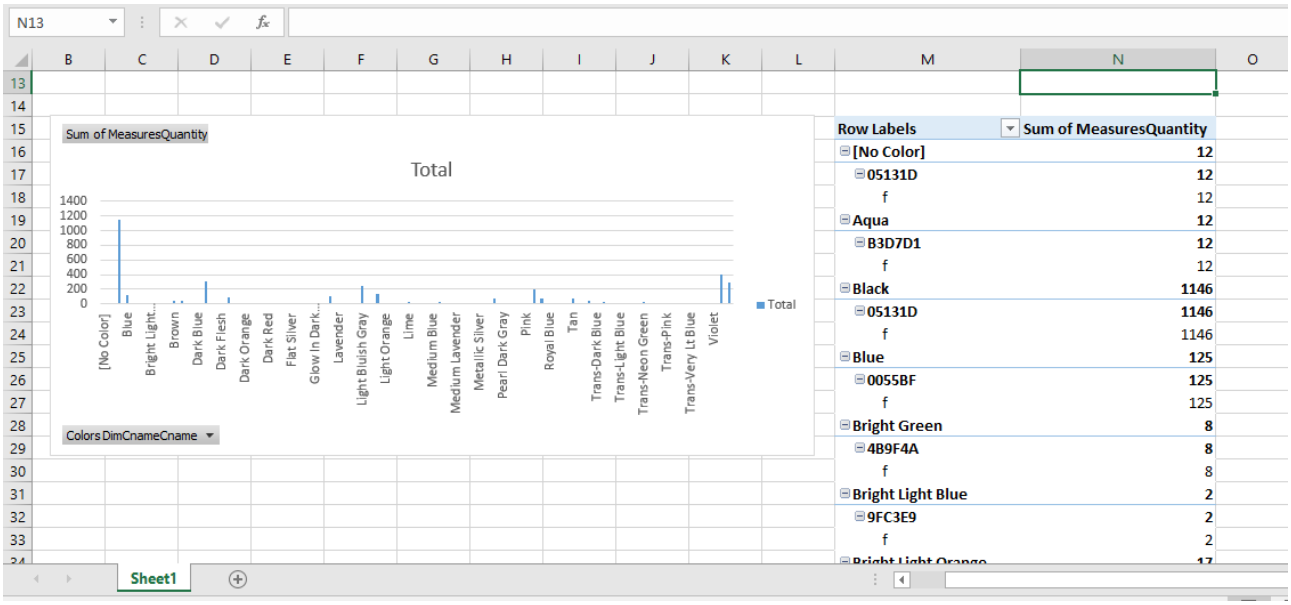


Figure 3.3

In this report we can drill down through Cname to Rgb and from Rgb to is_trans. Likewise from is_trans again we can roll up till Cname.

c) Slice

Slicing is used to retrieve data column wise.

The below graph illustrates the number of copies of the parts included in a LEGO set which has Aqua colour

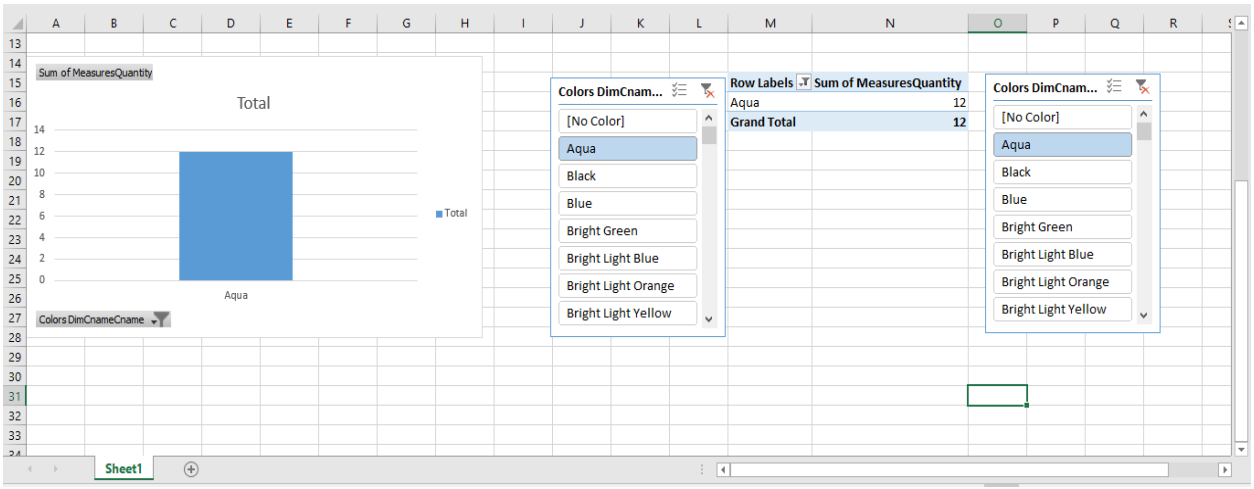


Figure 3.4

d) Dice

A further improvement of slicing is called dicing. In here, it is added two slicers to filter the output better

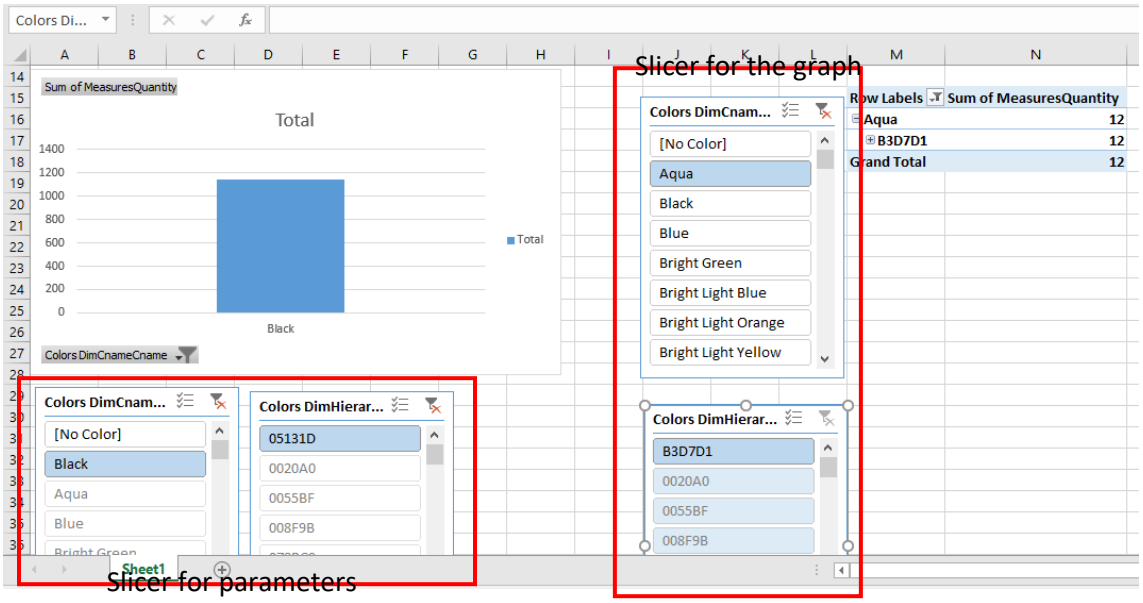


Figure 3.5

According to selected colour name and RPG value, the graph will be modified.

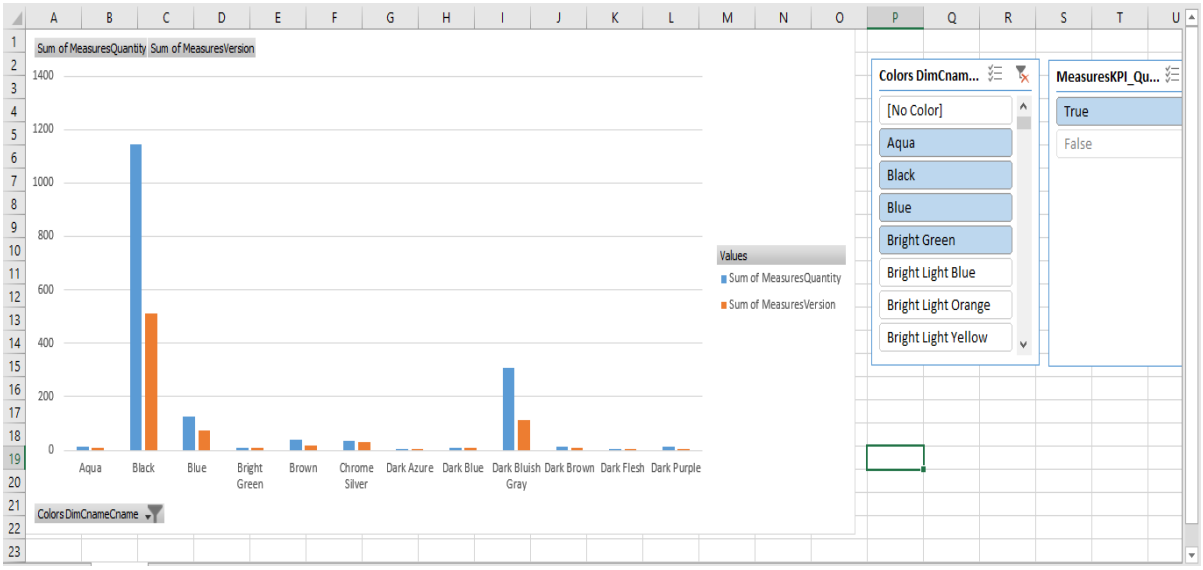


Figure 3.6

This report displays the sum of measure quantity and sum of measure version for 12 selected colours slice by KPI goal

e) Pivot

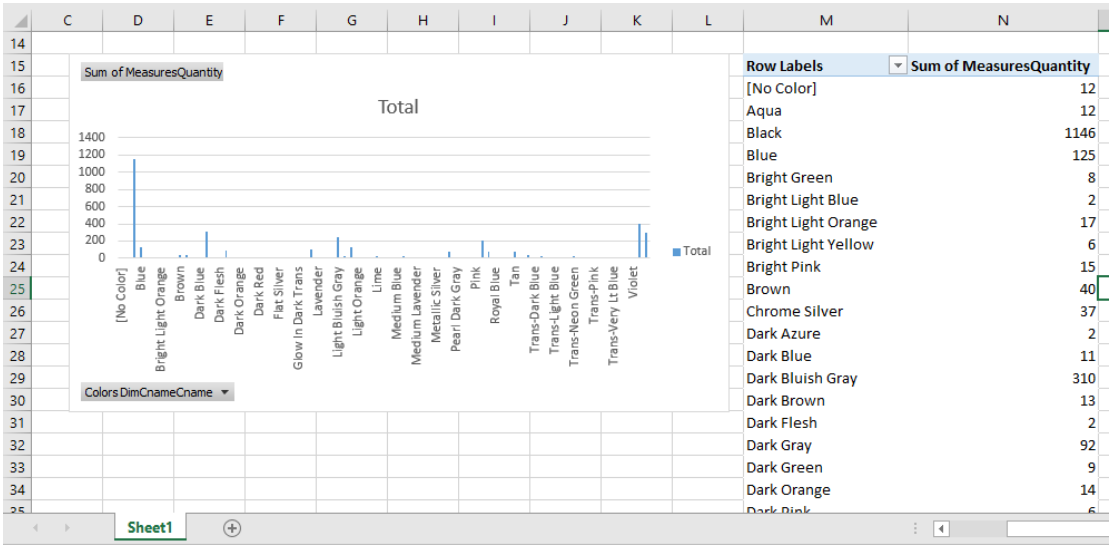


Figure 3.7

4. SSRS Reports using the Report builder

SSRS is a platform creating, publishing, managing reports/dashboards. Then able to deliver them to the right users in different ways like email, via a web browser, mobile device etc.

- SSRS components
  1. Report server
  2. SSRS web portal
  3. Report Server Configuration Manager
  4. Report Server database

Before creating SSRS reports it is required to create report analysis project in SSDT, and then need to define the analysis databases and sql databases. Then need to build up a query using the query builder and then select the format (Tabular/Matrix) of SSRS report which is needed to be generated.

Under SSRS reports, I have generated 5 reports

1. Report with matrix
2. Report with parameters(with one parameter, with two parameters)
3. Report with drill-down
4. Report with drill –through(Summary report)
5. Report with drill –through(Detail report)

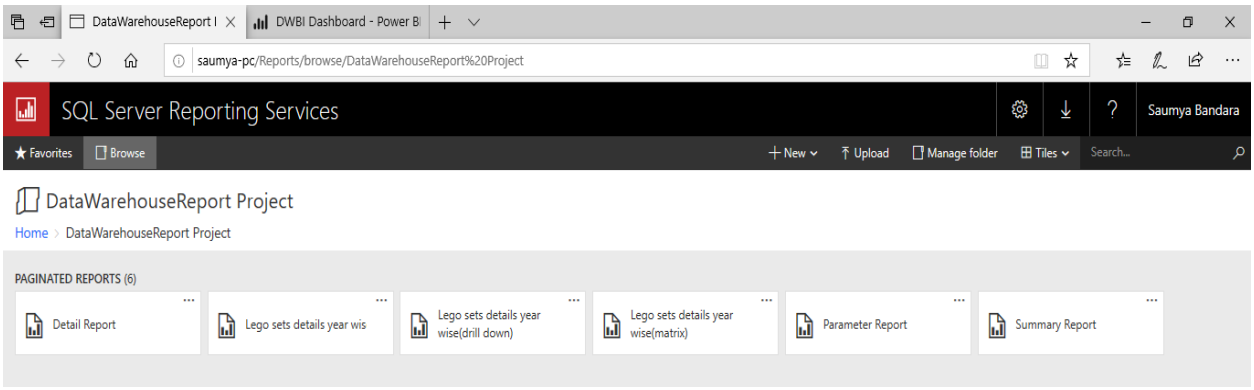


Figure 4.0

Figure 4.0 shows the web portal where the SSRS reports are saved

To obtain the data to the report builder to analyze, the below query is used,

```
select s.sname,s.year,s.num_parts,t.theme_name,p.part_name,f.quantity from dbo.inventoriesFact f
inner join dbo.setsDim s
on f.set_num=s.set_num
inner join dbo.themesDim t
on f.themes_id=t.themes_id
inner join dbo.part_categoriesDim p
on f.part_categories_id=p.part_Categaories_ID
where quantity>0
```

Report 1: Report with a matrix

Design view

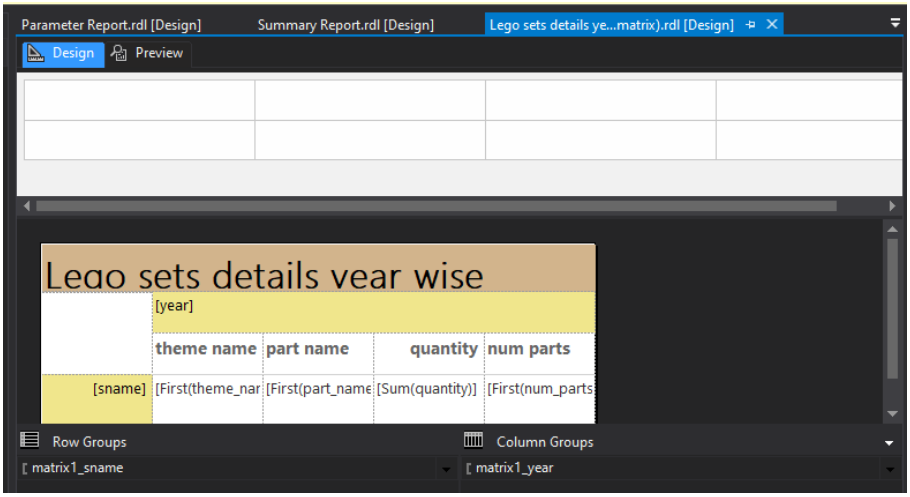


Figure 4.1

Preview

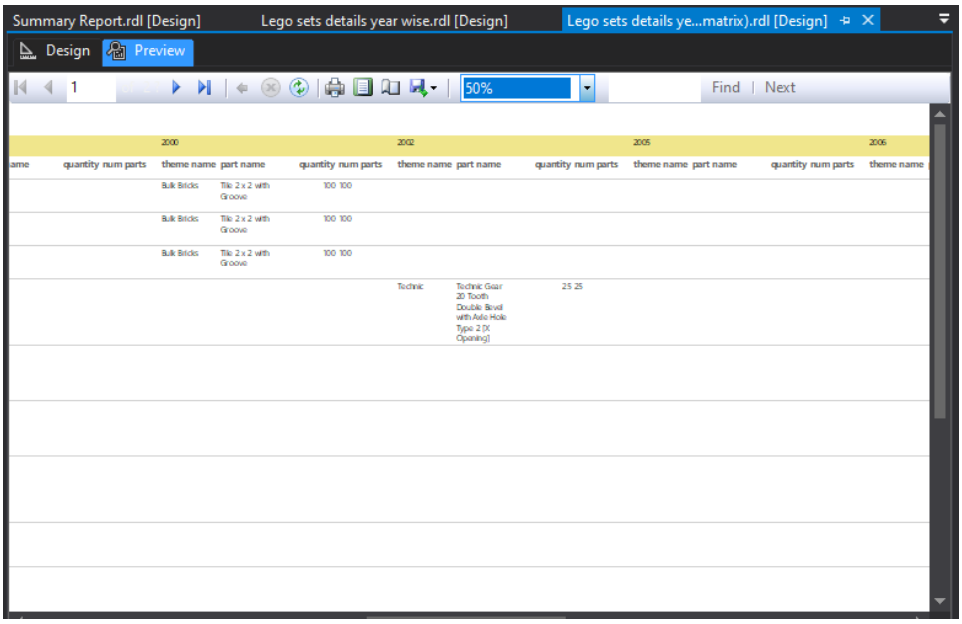


Figure 4.2

Web view

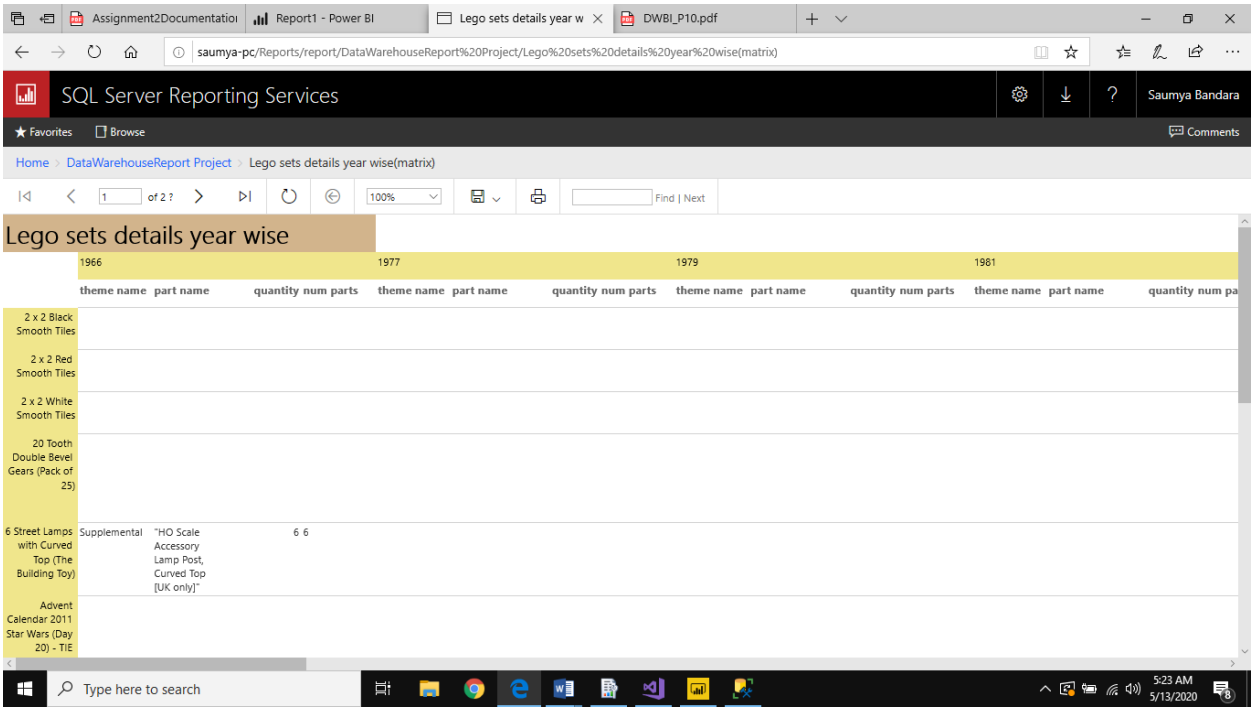


Figure 4.3

Report 2: Report with parameters

Design view1

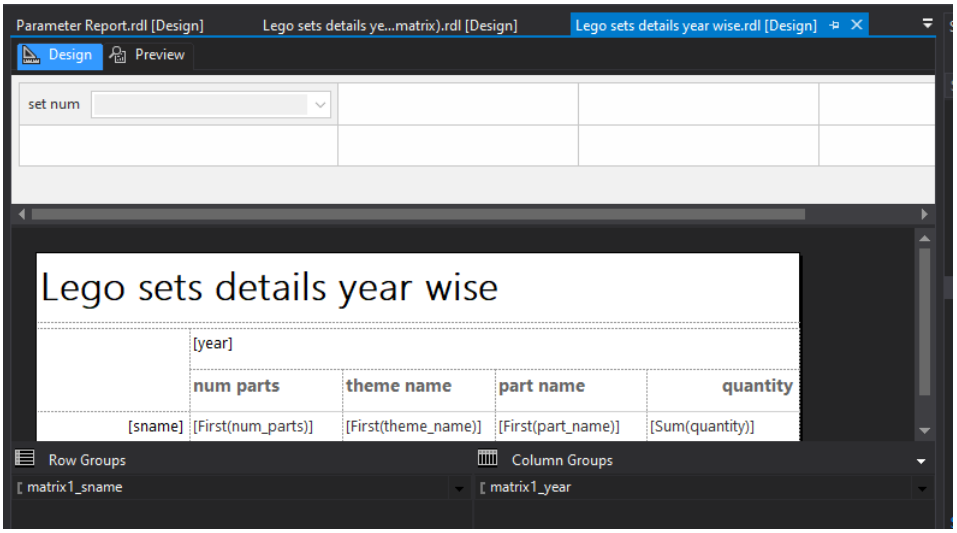


Figure 4.4

Preview1

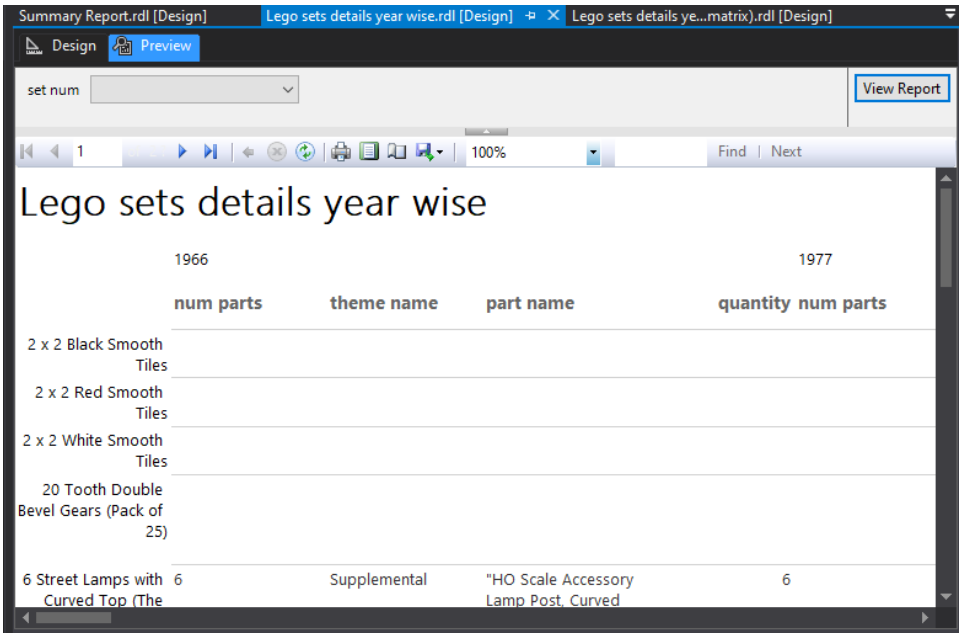


Figure 4.5

Web view1

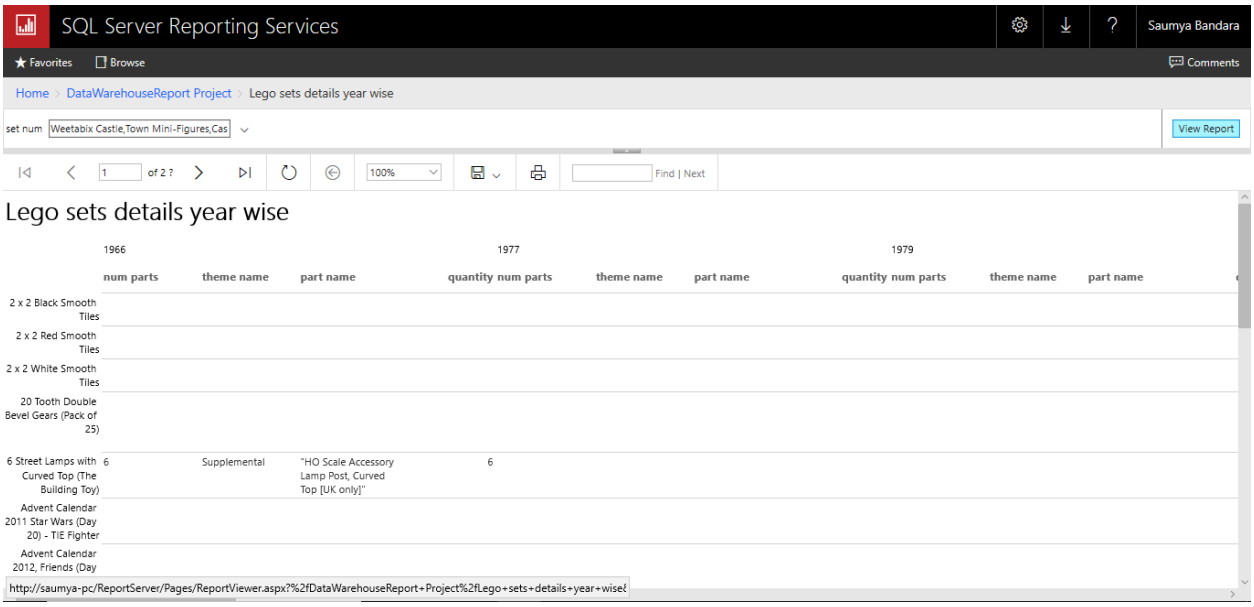


Figure 4.6

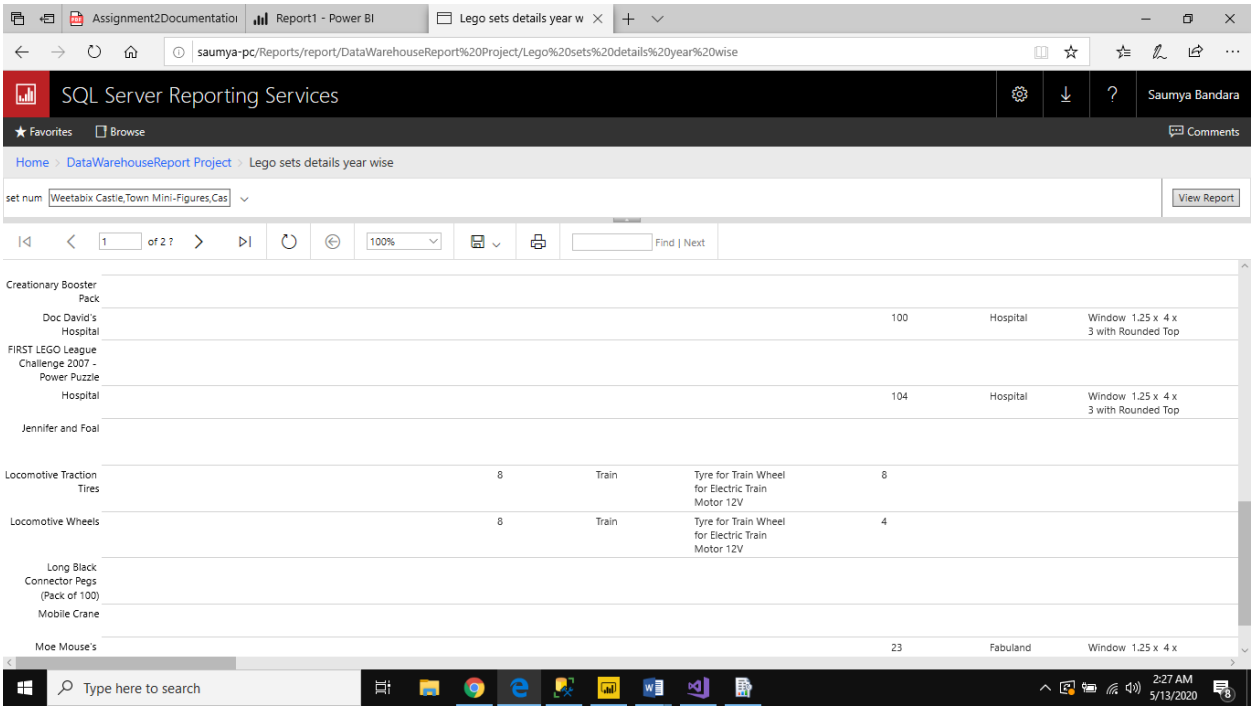


Figure 4.7

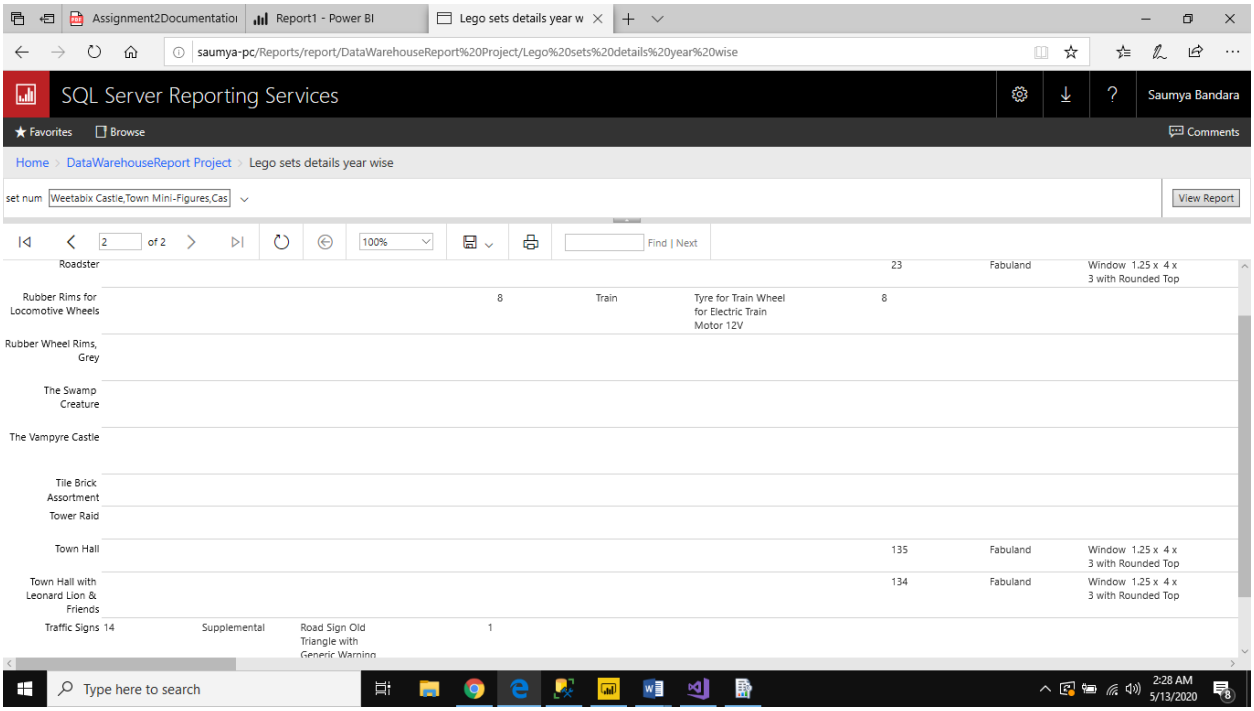


Figure 4.8

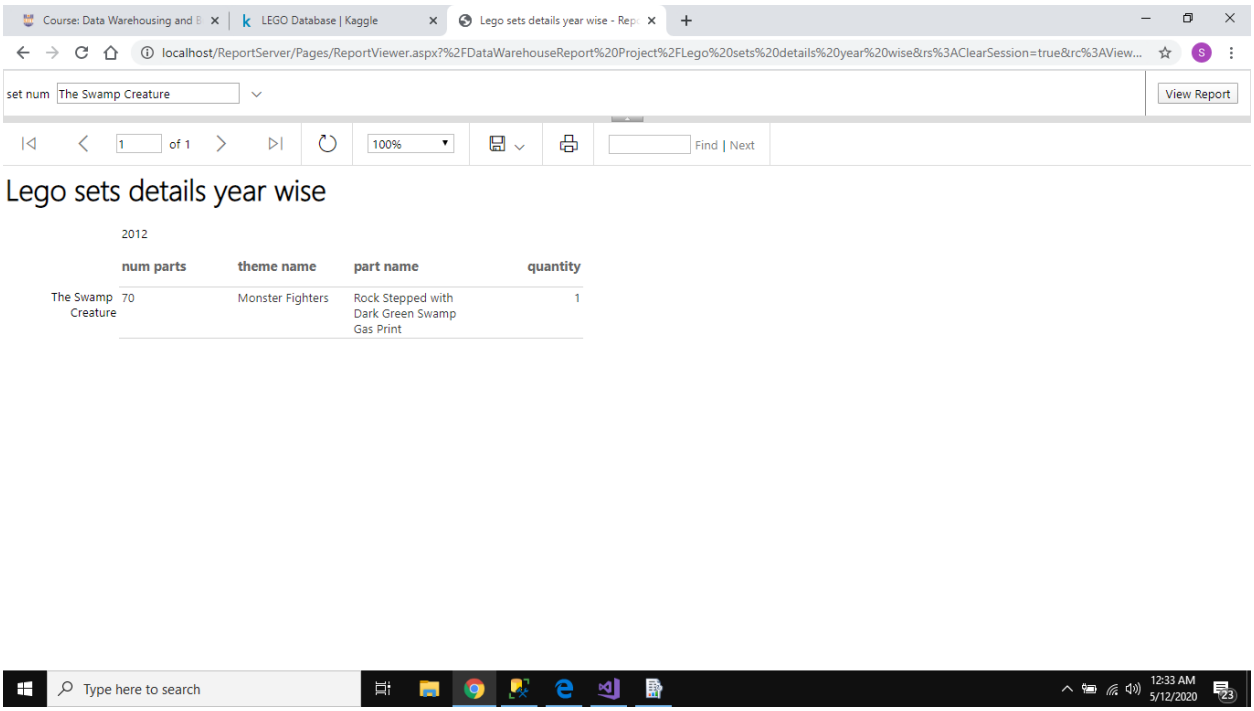


Figure 4.9: Sorted output according to the parameter value

Design view2

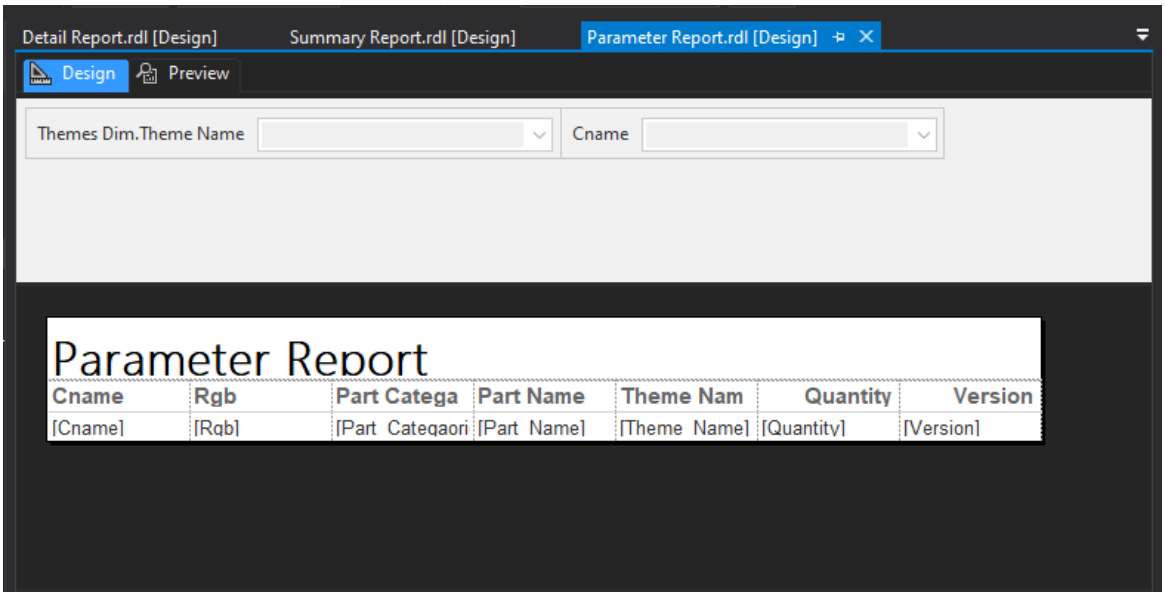
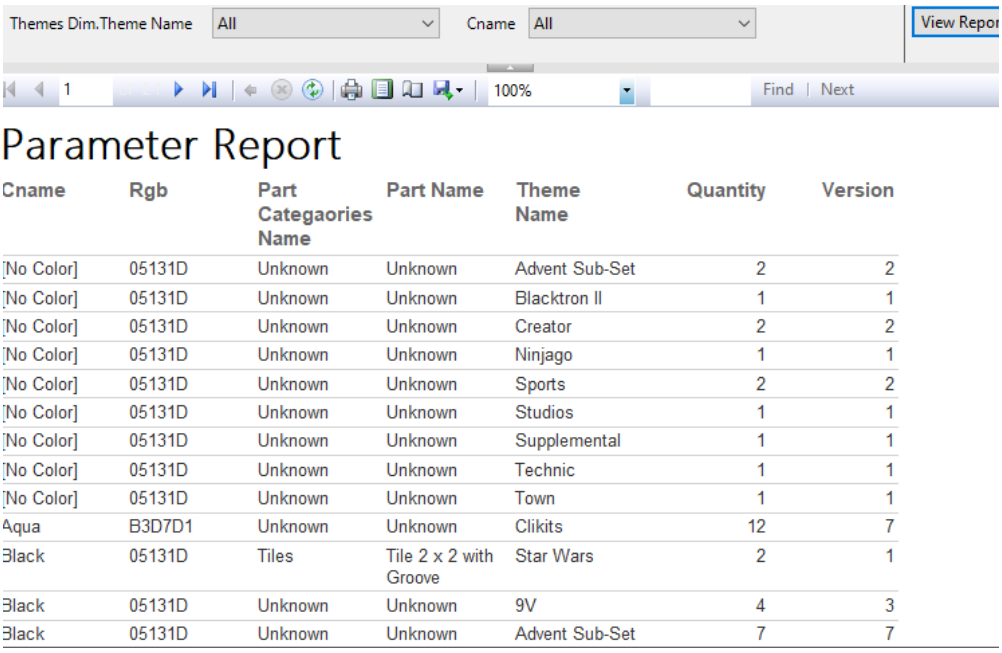


Figure 4.10

Web view2



Cname	Rgb	Part Categaories Name	Part Name	Theme Name	Quantity	Version
[No Color]	05131D	Unknown	Unknown	Advent Sub-Set	2	2
[No Color]	05131D	Unknown	Unknown	Blacktron II	1	1
[No Color]	05131D	Unknown	Unknown	Creator	2	2
[No Color]	05131D	Unknown	Unknown	Ninjago	1	1
[No Color]	05131D	Unknown	Unknown	Sports	2	2
[No Color]	05131D	Unknown	Unknown	Studios	1	1
[No Color]	05131D	Unknown	Unknown	Supplemental	1	1
[No Color]	05131D	Unknown	Unknown	Technic	1	1
[No Color]	05131D	Unknown	Unknown	Town	1	1
Aqua	B3D7D1	Unknown	Unknown	Clikits	12	7
Black	05131D	Tiles	Tile 2 x 2 with Groove	Star Wars	2	1
Black	05131D	Unknown	Unknown	9V	4	3
Black	05131D	Unknown	Unknown	Advent Sub-Set	7	7

Figure 4.11

By giving the parameter values (Theme name, Colour name), can customize the output as the below screenshot

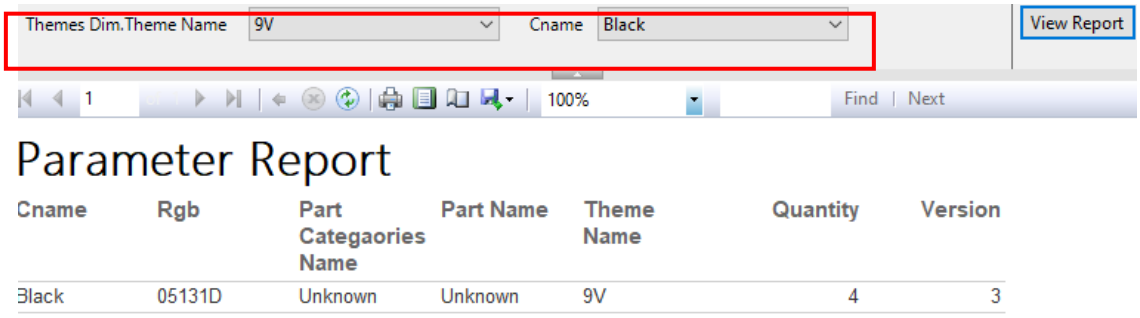


Figure 4.12

Report 3: SSRS drill-down report

Design view

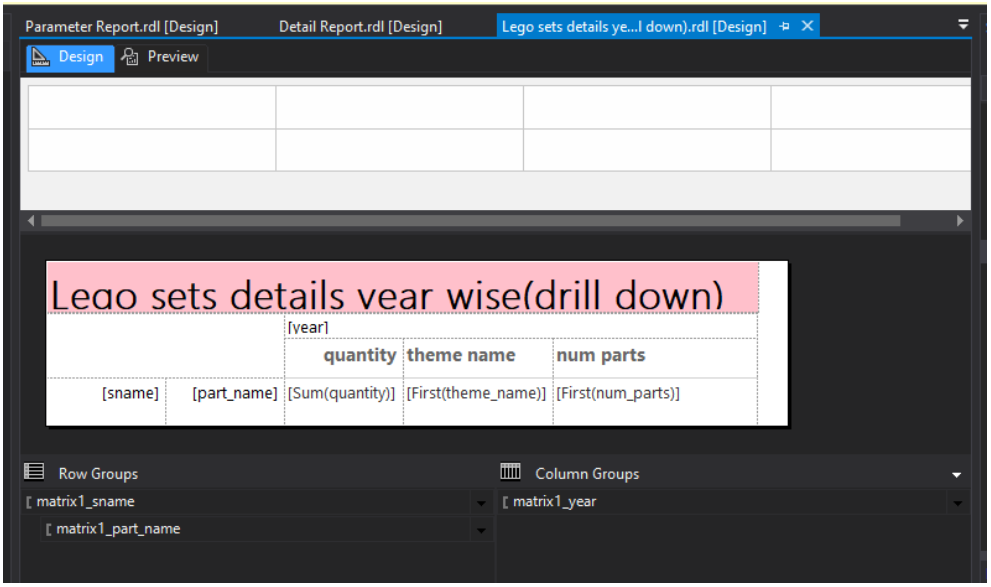


Figure 4.13

Preview

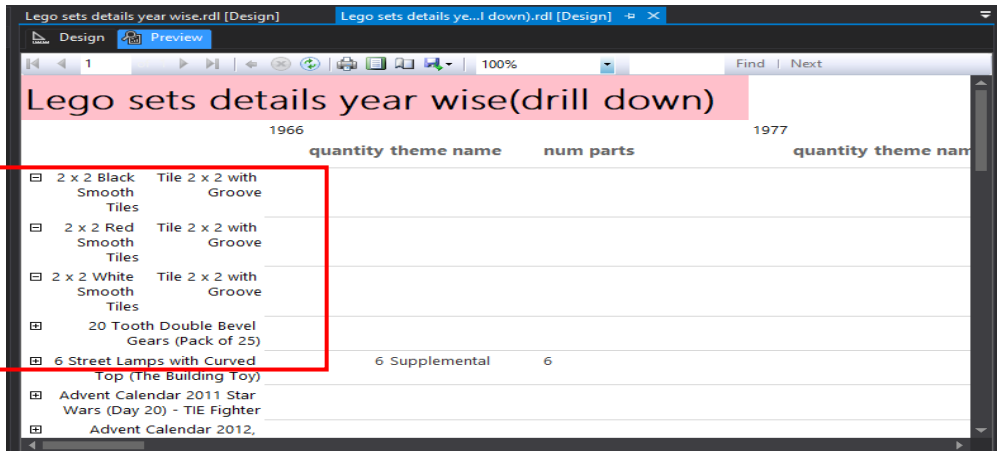


Figure 4.14

Web view

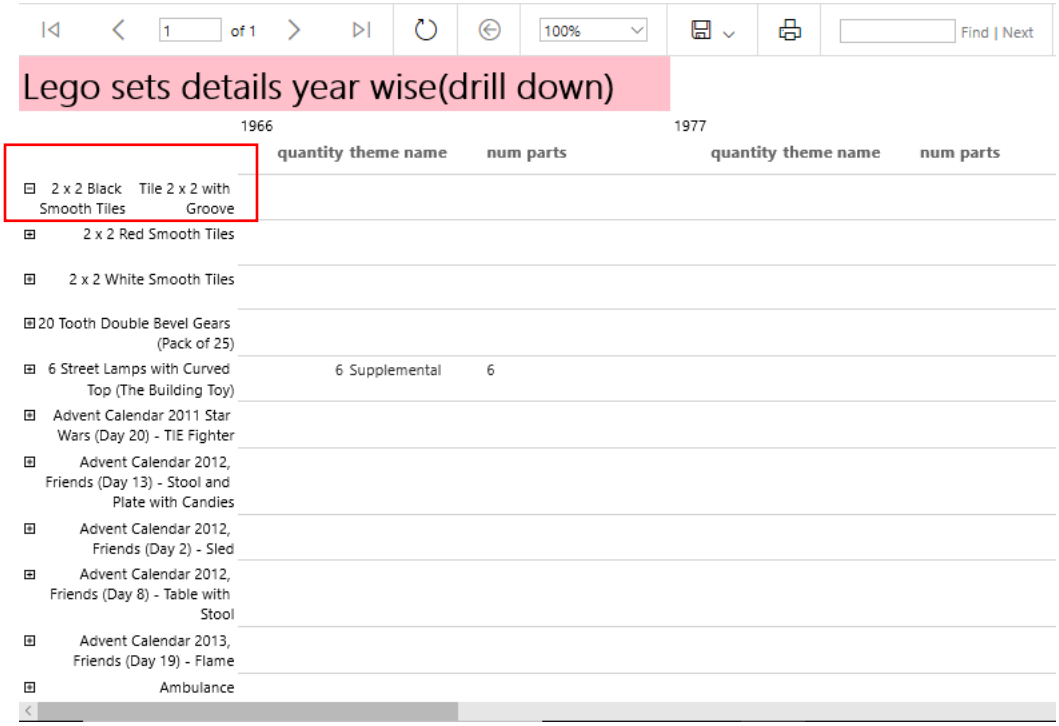


Figure 4.15

Report 4: SSRS drill-through report

Following is the sql query for the summary report

```
select t.theme_name , f.quantity
from dbo.inventoriesFact f , dbo.themesDim t
where t.themes_id = f.themes_id
```

Design view: Summary Report

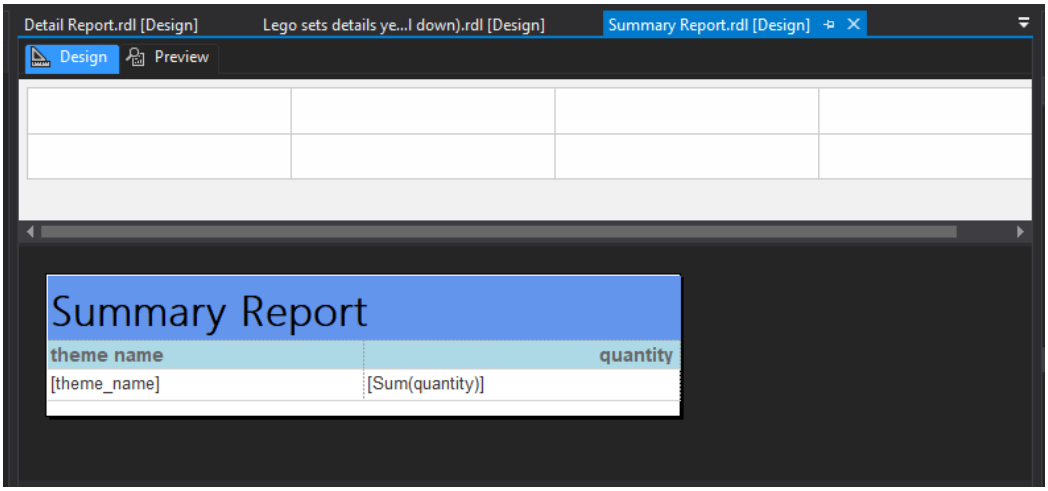
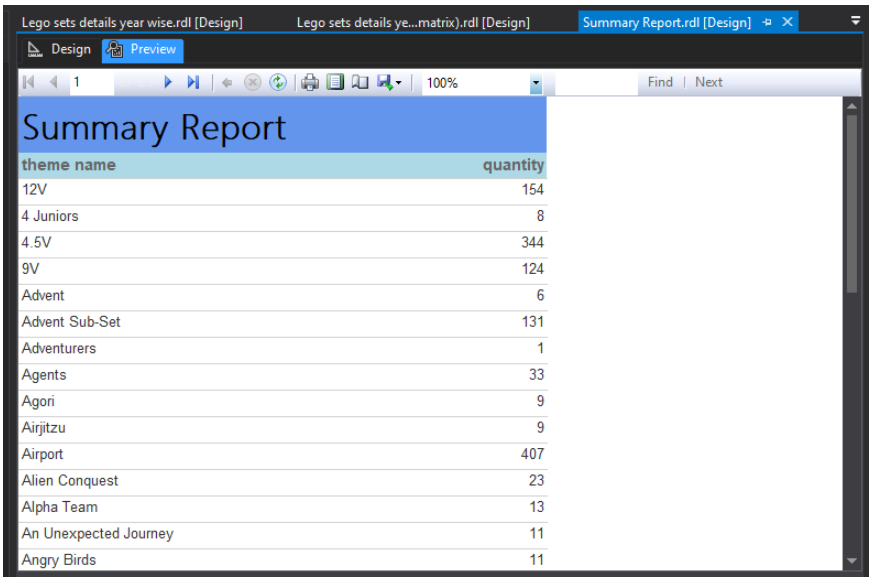


Figure 4.16

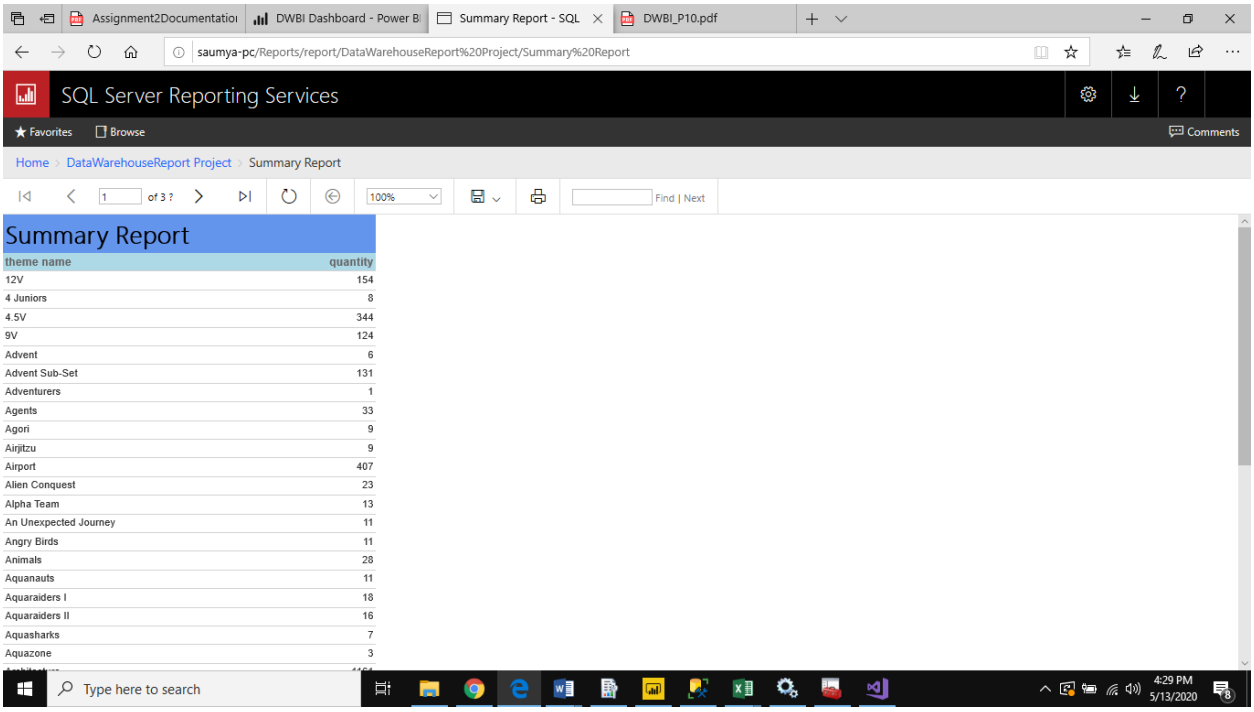
Preview: Summary Report



theme name	quantity
12V	154
4 Juniors	8
4.5V	344
9V	124
Advent	6
Advent Sub-Set	131
Adventurers	1
Agents	33
Agori	9
Airjitzu	9
Airport	407
Alien Conquest	23
Alpha Team	13
An Unexpected Journey	11
Angry Birds	11

Figure 4.17

Web view: Summary Report



theme name	quantity
12V	154
4 Juniors	8
4.5V	344
9V	124
Advent	6
Advent Sub-Set	131
Adventurers	1
Agents	33
Agori	9
Airjitzu	9
Airport	407
Alien Conquest	23
Alpha Team	13
An Unexpected Journey	11
Angry Birds	11
Animals	28
Aquanauts	11
Aquaraiders I	18
Aquaraiders II	16
Aquasharks	7
Aquazone	3

Figure 4.18

Following is the sql query for the detail report

```
select t.theme_name , f.quantity ,f.version , f.part_num , f.colors_id
from dbo.inventoriesFact f , dbo.themesDim t
where f.themes_id = t.themes_id AND
t.theme_name=@theme_name
```

Design view: Detail Report

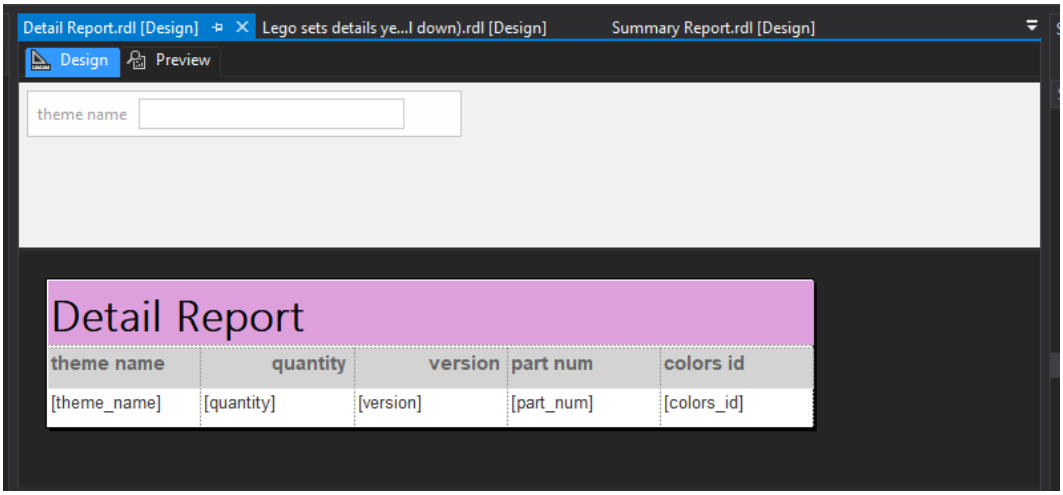


Figure 4.19

Preview: Detail Report

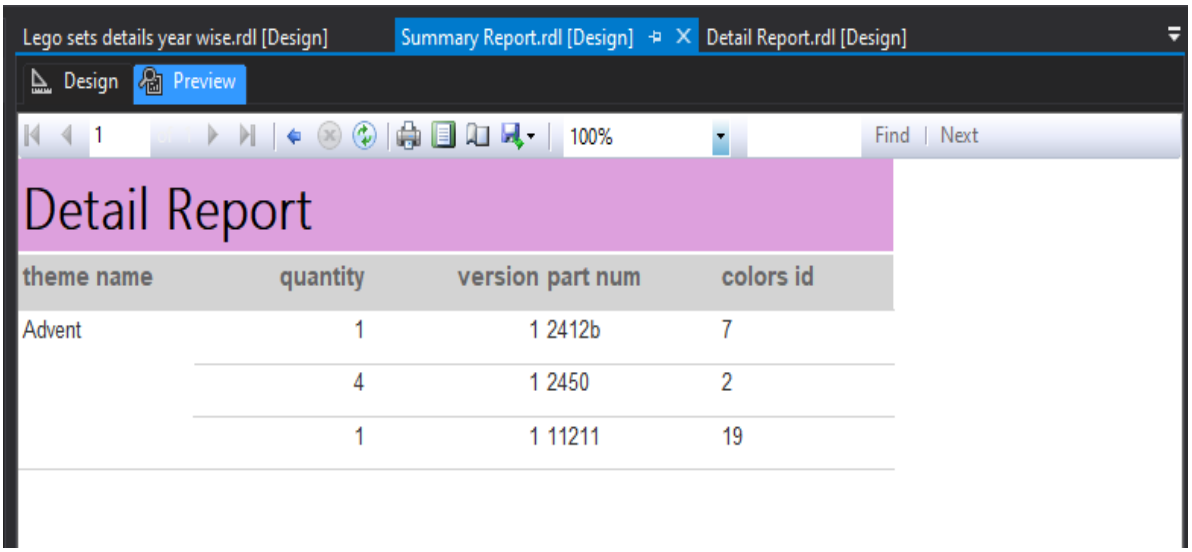


Figure 4.20

Web view: Detail Report

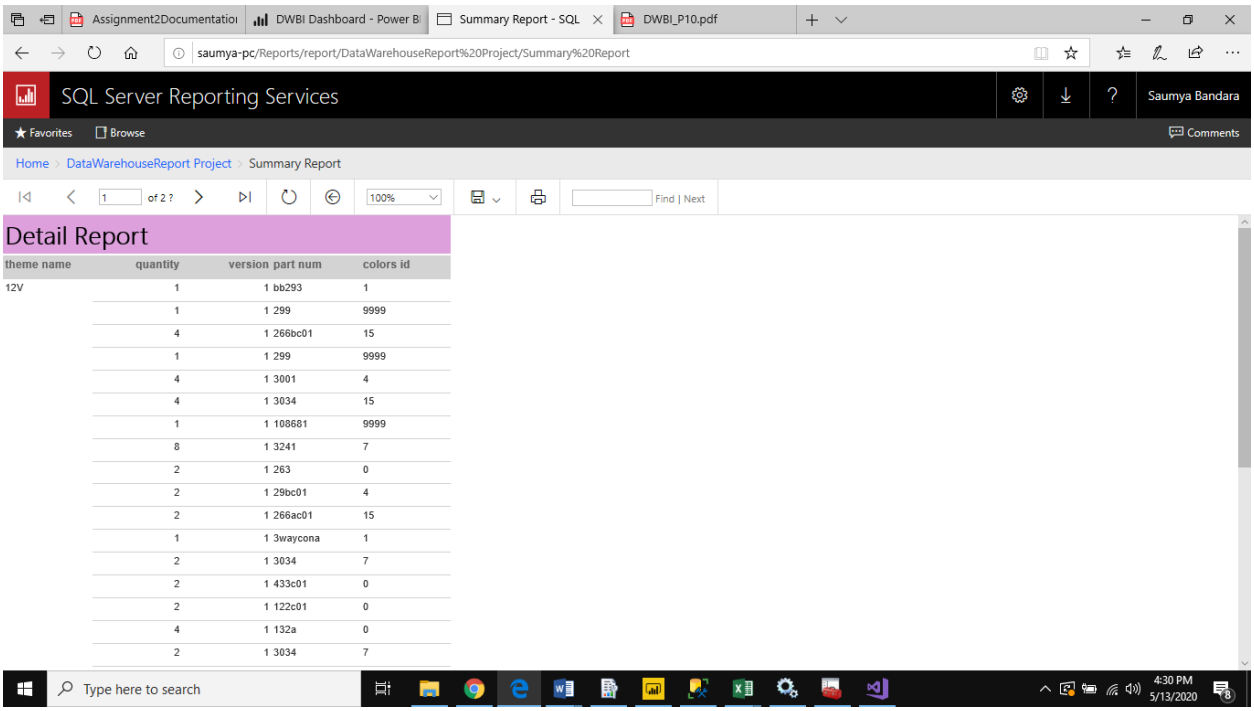


Figure 4.21

By clicking on a theme name of Summary Report can navigate to the Detail Report of the selected value

PART 2 – Power BI

5. Audience

LEGO is a popular brand of toy building bricks. They are often sold in sets with in order to build a specific object. Each set contains a number of parts in different shapes, sizes and colors. This dashboard is to help people who owned some LEGO sets already figure out what other sets they could build with the pieces they had.

6. The story

The audience can observe the deviation of the number of copies of each part included in the LEGO set along with the LEGO theme name, theme id, LEGO set name and the LEGO part name.

Load data to Power BI

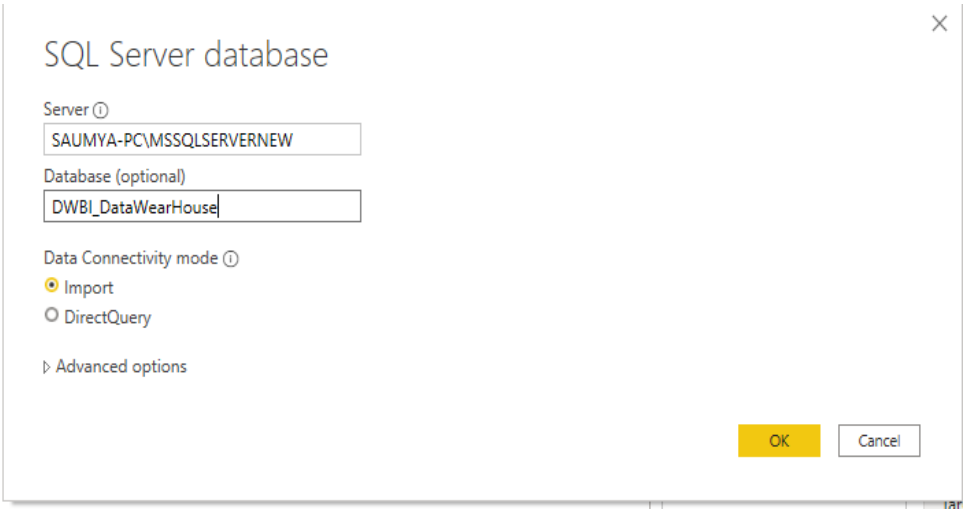


Figure 6.0

7. KPI

KPI gives a condition: This graph shows the theme names of the LEGO sets which have a quantity greater than 50 and less than 500

The following graph displays Lego theme name along with the number of copies of parts included in the set which have the respective theme

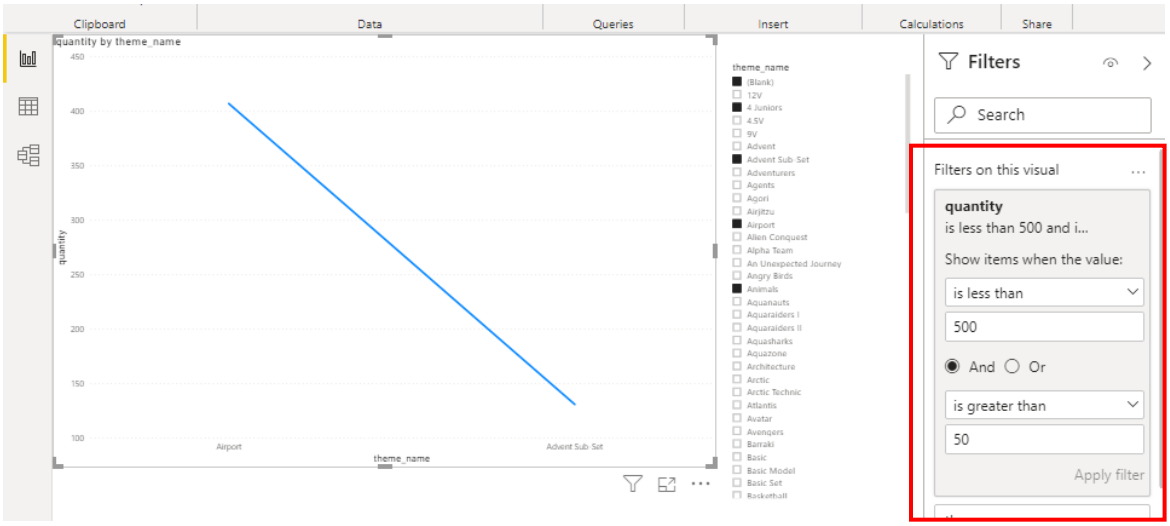


Figure 7.0

8.The reasons for selecting a paticular display type

- Line graph

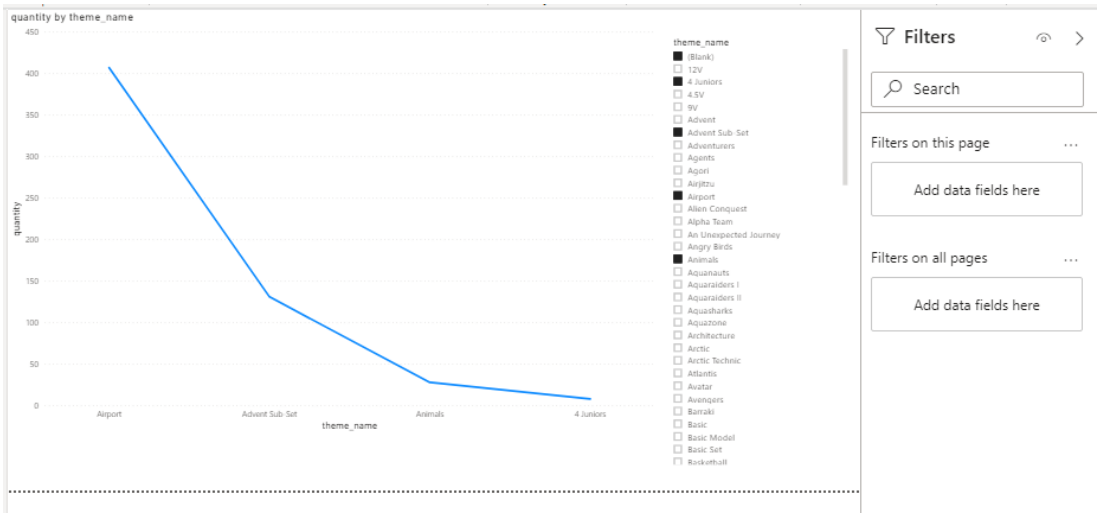


Figure 8.0

The above line graph illustrates the available quantity of selected themes

The number of copies of each part included in the LESO set is represented by quantity axis while the names of the LEGO themes are represented by theme_name axix

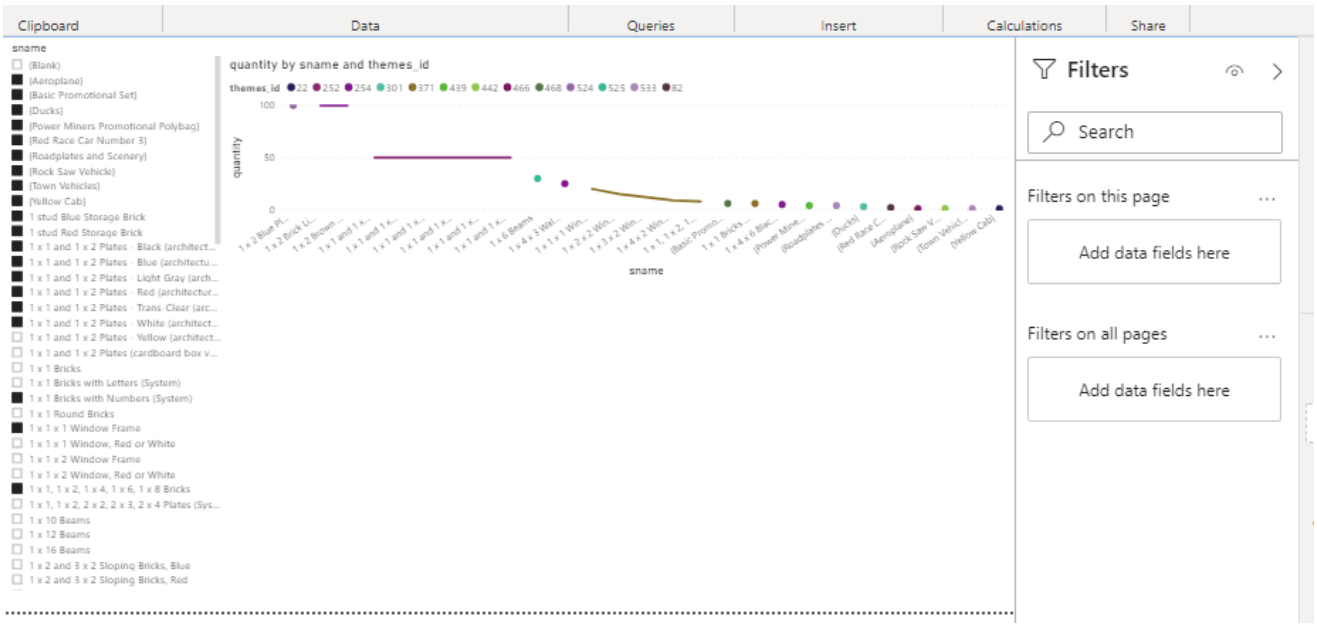


Figure 8.1

The above line graph illustrates the available quantity of selected LEGO set and the related theme ids together.The graph will be modified according to the selected values

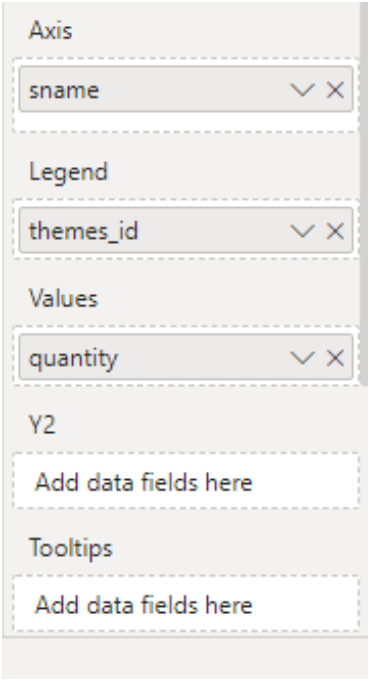


Figure 8.2

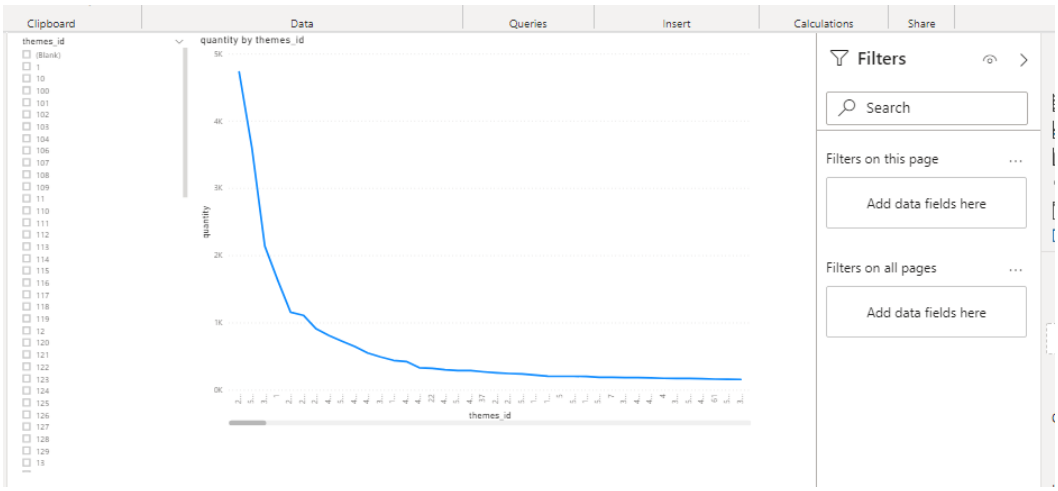


Figure 8.3

The above line graph illustrates the available quantity of selected themes. Each LEGO set has a unique theme name. The number of copies of each part included in the set which has the selected theme name is represented by the quantity

- Waterfall graph

Figure 8.4

The above waterfall graph describes the available quantity of selected LEGO parts and the total quantity of all the selected parts

Publish the project to Power BI

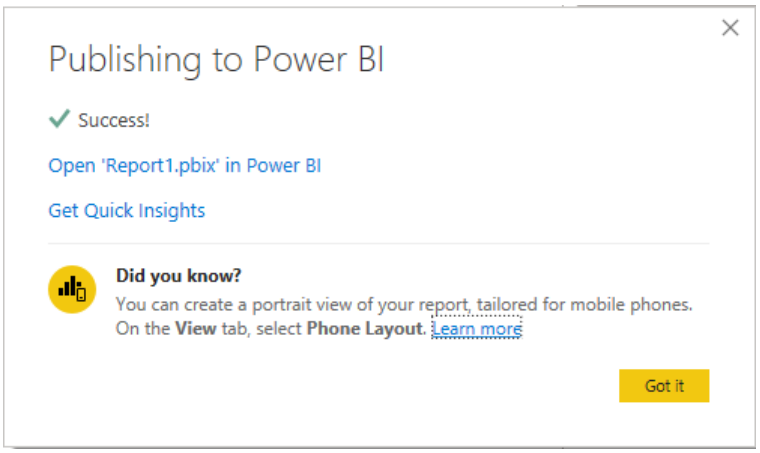


Figure 8.5

9.Dashboard

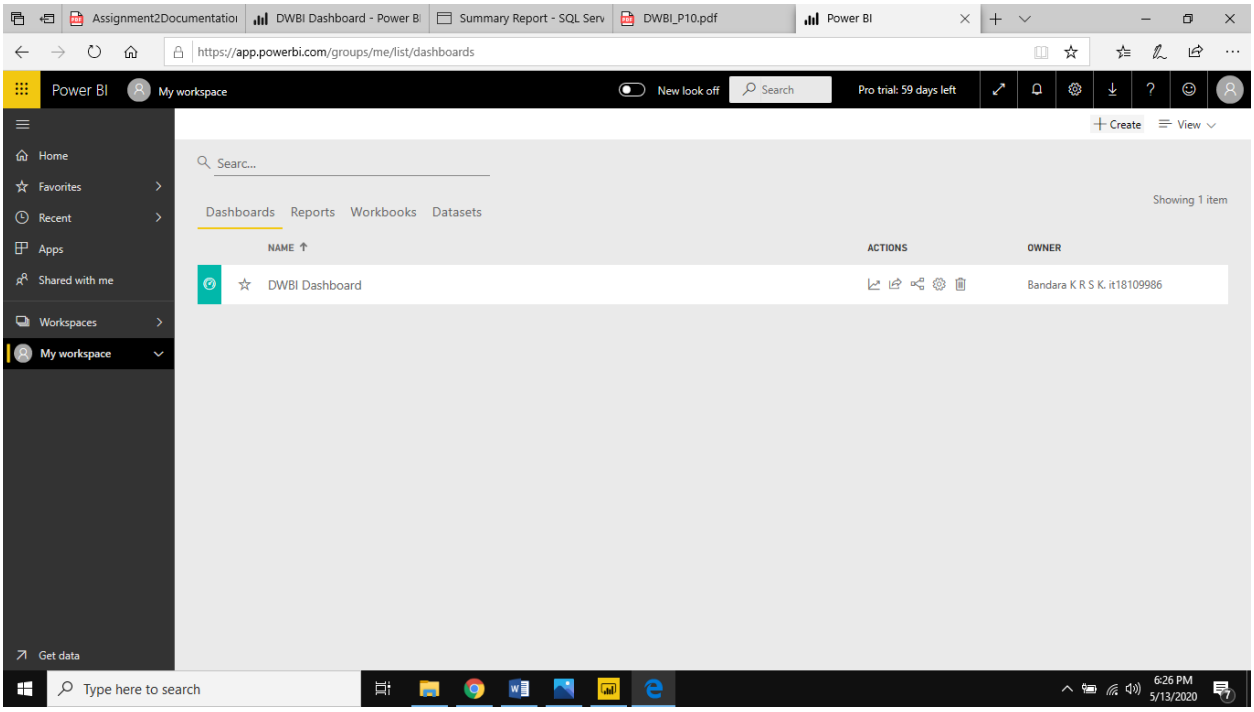


Figure 9.0

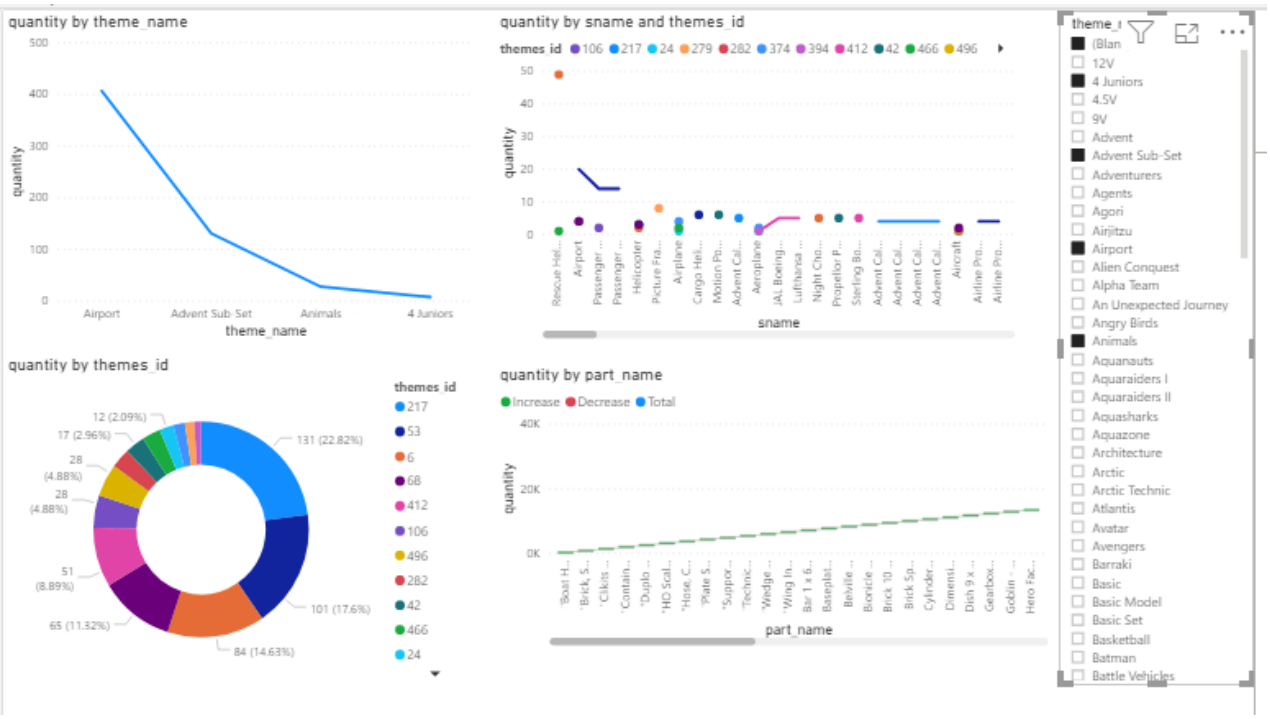


Figure 9.1

The above dashboard shows the deviation of LEGO themes with the quantity. Theme names can be selected from the slicer and graphs will be changed according to the selected values.

10. Possible alerts that can be generated

With **Power BI** service, once the dashboard is published to users, individuals can create an **alert** to notify them if the value of the card changes beyond a threshold.

To create an **alert**, hover over a tile in the dashboard and then click the ellipsis in the top right of the tile

Adding alerts to dashboard

In here, it is required to set an alert rule.

By adding an alert, the necessary users are notified when there is a modification to the dashboard in a selected notification frequency.

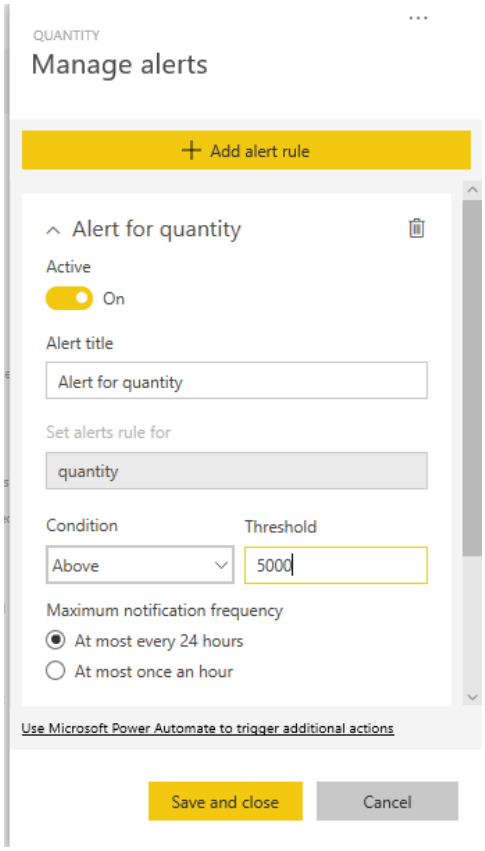


Figure 10.0

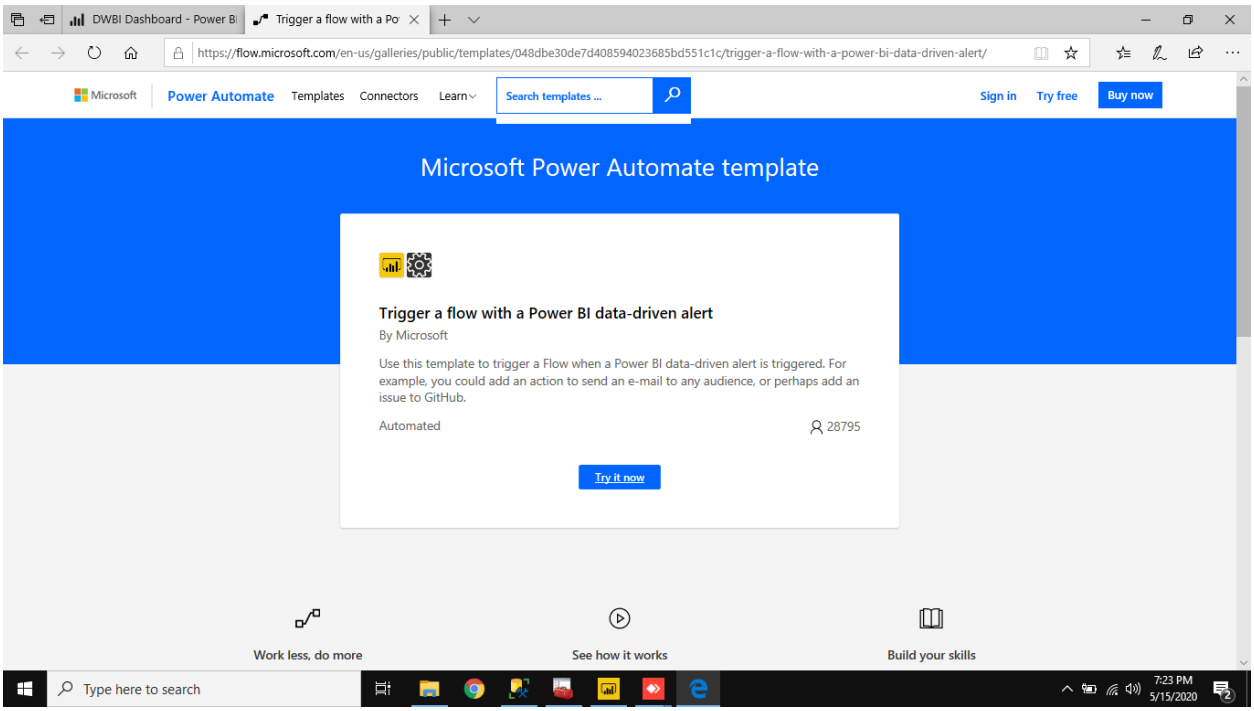


Figure 10.1

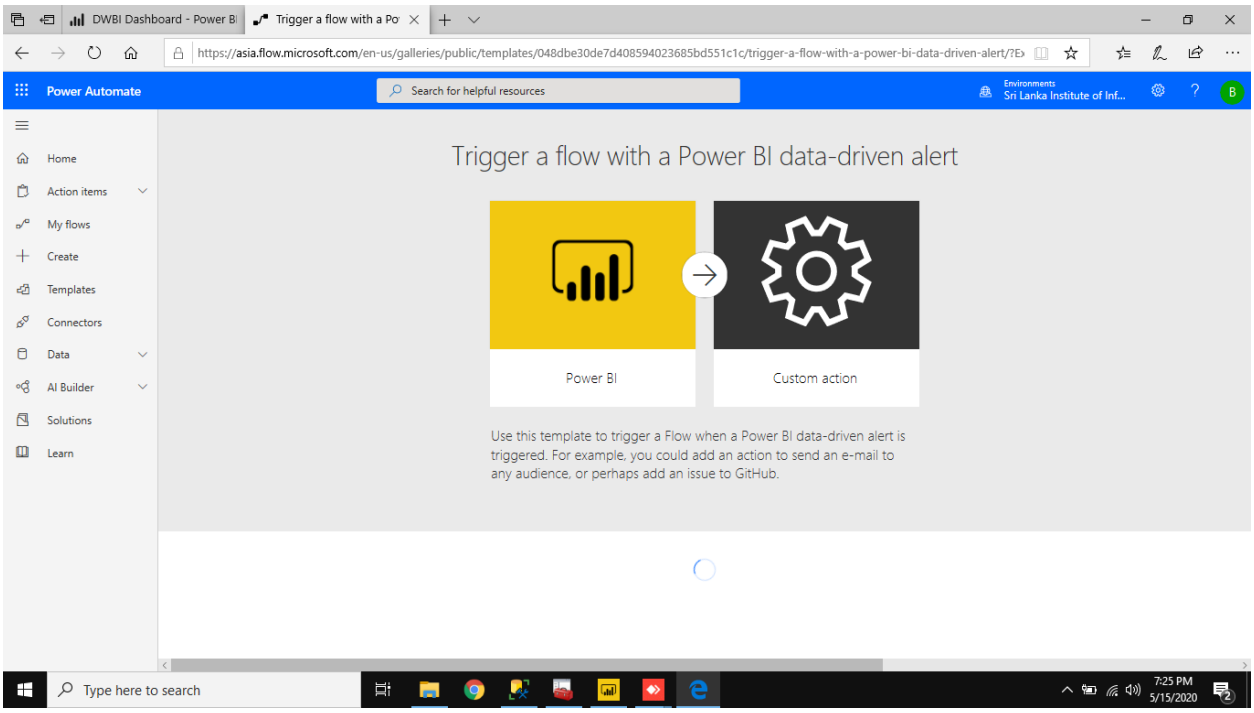


Figure 10.2

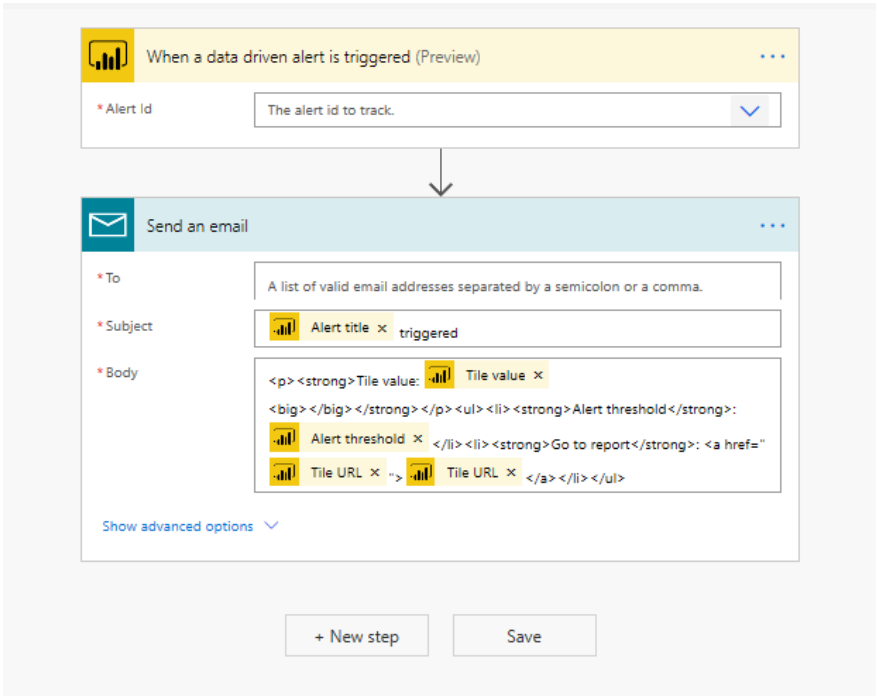


Figure 10.3

After refreshing the dataset it will show the alert

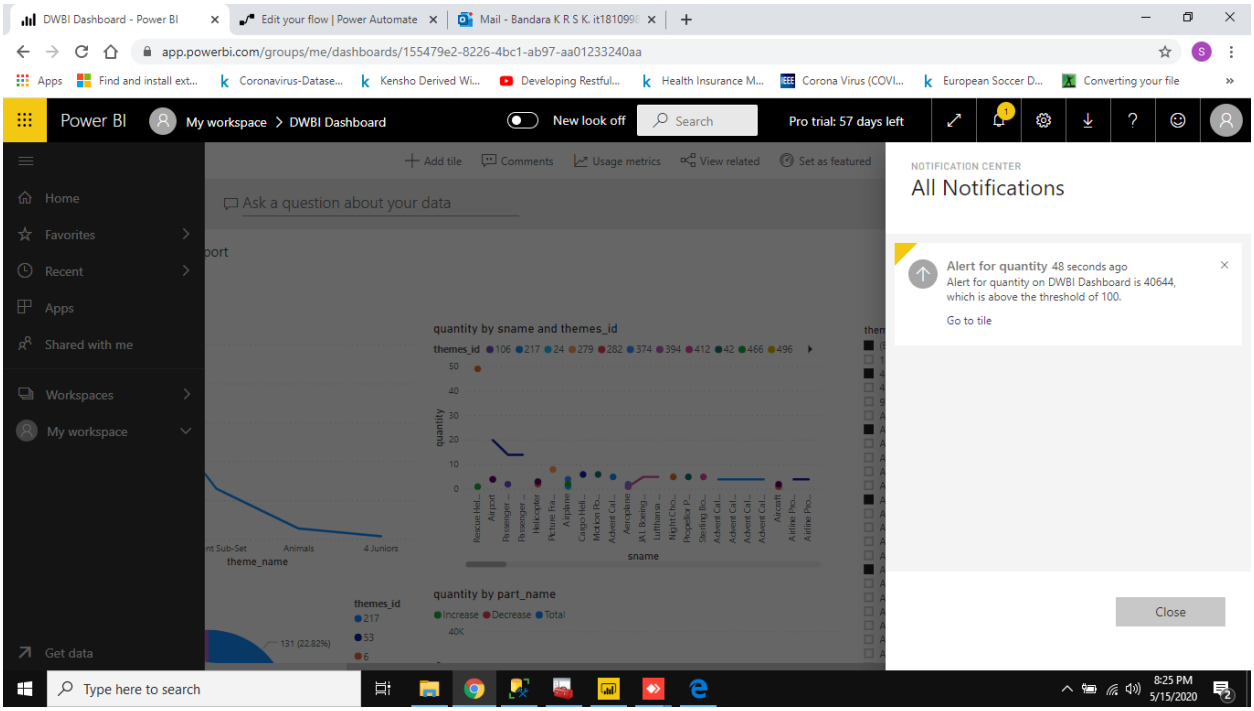


Figure 10.4

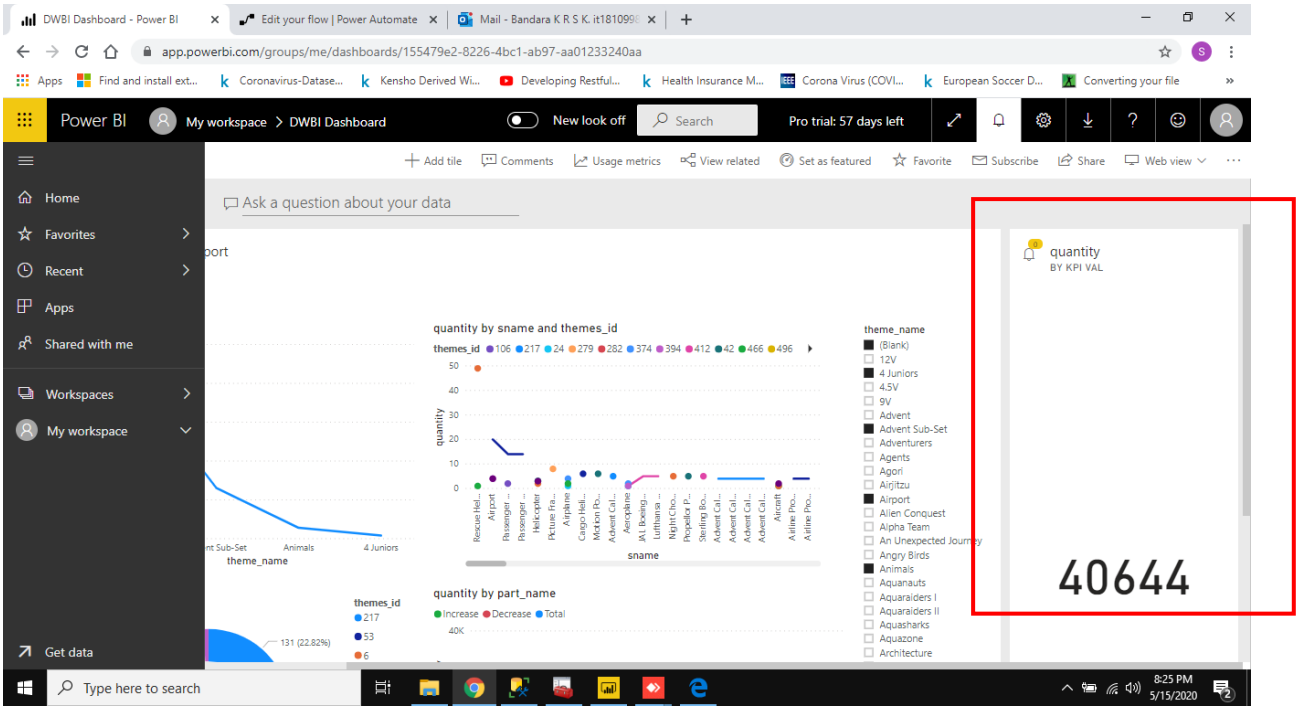


Figure 10.5

The email has sent to user's email address as shown in the below screenshot

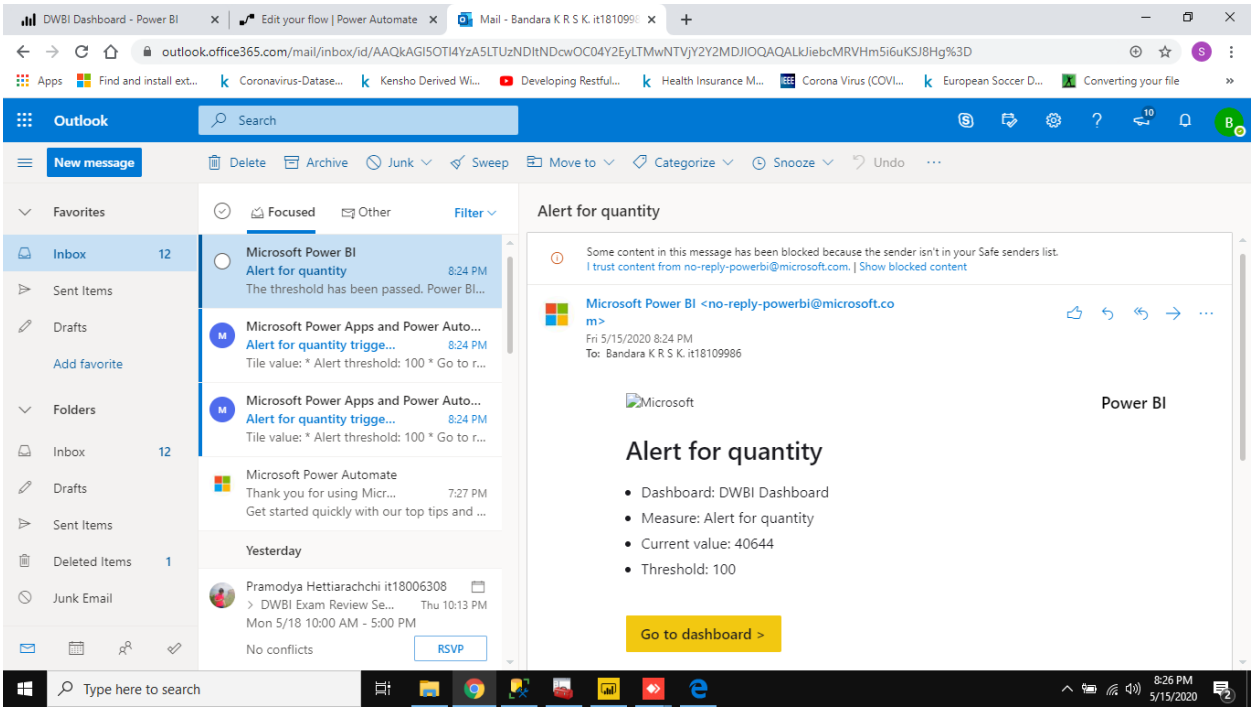


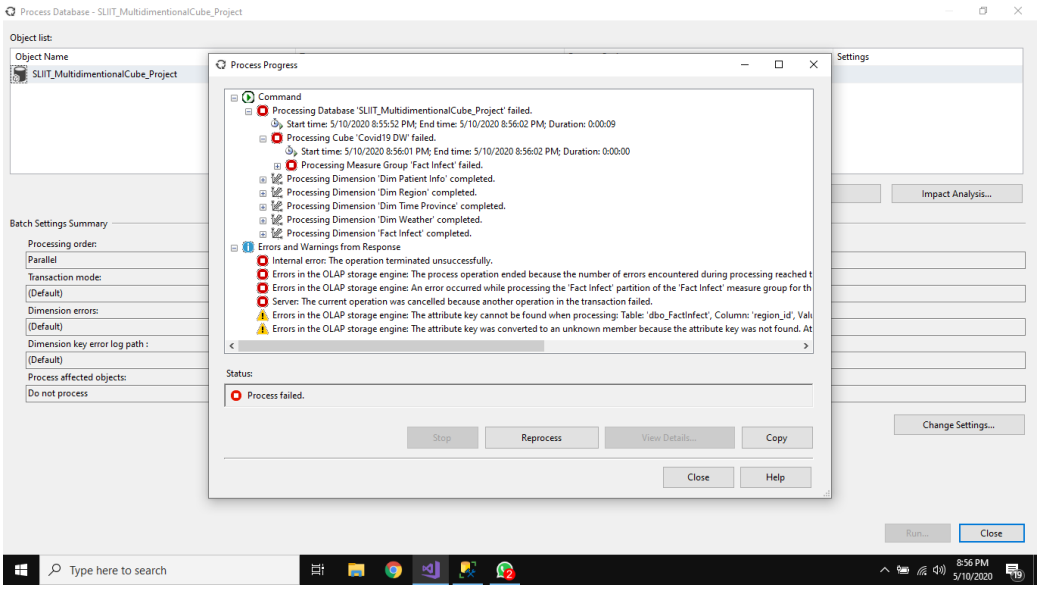
Figure 10.6

Dashboard link:

https://app.powerbi.com/groups/me/dashboards/155479e2-8226-4bc1-ab97-aa01233240aa?ctid=44e3cf94-19c9-4e32-96c3-14f5bf01391a

NOTE:

I used COVID 19 dataset (Data Science for COVID-19 in South Korea) for the Assignment 1, but when I continuing the Assignment 2, I got many errors with the dataset. And it doesn't have data around 1 year. So it was hard to continuing with that dataset.



Link of COVID 19 dataset used in Assignment 1:
https://www.kaggle.com/kimjihoo/coronavirusdataset#trend.csv

So I chose a new dataset for the Assignment 2.

Link of LEGO database used in Assignment 2:
https://www.kaggle.com/rtatman/lego-database?select=themes.csv