



Dashboard in a Day

by Power BI Team, Microsoft



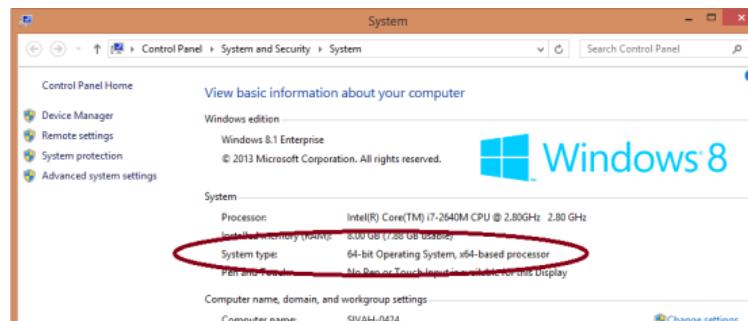
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Lab Prerequisites

Following prerequisites and setup must be complete for successful completion of the exercise:

- You must be connected to the internet.
- **Signup for Power BI:** Go to <http://aka.ms/pbidiadtraining> and sign up for Power BI with a business email address. If you cannot sign up for Power BI, let the instructor know.
- If you have an existing account, please go to <http://app.powerbi.com> and **Sign in** using your **Power BI Account**.
- At minimum, a computer with 2-cores and 4GB RAM running one of the following version of Windows: Windows 10, Windows 7, Windows 8 (64-bit preferred), Windows 8.1, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2.
- Microsoft Power BI Desktop requires Internet Explorer 9 or greater.
- Verify if you have 32-bit or 64-bit operating system to decide if you need to install the 32-bit or 64-bit applications.
 - Search for computer on your PC, right click properties for your computer.
 - You will be able to identify if your operating system is 64 or 32 bit based on “system type” as shown below.



- **Download the Power BI Content:** Create a folder called **DIAD** on the C drive of your local machine. Copy all contents from the folder called **Dashboard in a Day Assets** on the flash drive to the **DIAD** folder you just created (C:\DIAD).
- **Download and install Power BI Desktop** using any one of the options listed below:
 - If you have Windows 10, use Microsoft App Store to download and install Power BI Desktop app.
 - Download and install Microsoft Power BI Desktop from <http://www.microsoft.com/en-us/download/details.aspx?id=45331>.

Document Structure

This document has two main sections:

- **Power BI Desktop:** This section highlights the features available in Power BI Desktop and walks the user through the process of bringing in data from the data source, modeling and creating visualizations.
- **Power BI Service:** This section highlights the features available in Power BI Service including the ability to publish the Power BI Desktop model to the web, creating and sharing dashboard and Power Q & A.

The document flow is in a table format. On the left panel are steps the user needs to follow and in the right panel are screenshots to provide a visual aid for the users. In the screenshots, sections are highlighted with red boxes to highlight the action/area user needs to focus on.

NOTE: This lab is using real anonymized data and is provided by ObviEnce LLC. Visit their site to learn about their services: www.obvience.com. This data is property of ObviEnce LLC and has been shared for the purpose of demonstrating PowerBI functionality with industry sample data. Any uses of this data must include this attribution to ObviEnce LLC.

Overview

Introduction

Today you will be learning various key features of the Power BI service. This is an introductory course intended to learn how to author reports using Power BI Desktop, create operational dashboards and share content via the Power BI Service.

Data Set

The dataset you will use today is a sales and market share analysis. This type of analysis is very common for the office of a Chief Marketing Officer (CMO). Unlike the office of the Chief Financial Officer (CFO), a CMO is focused not only on company's performance internally (how well do our products sell) but also externally (how well do we do against the competing products).

The company, VanArsdel, manufactures expensive retail products that could be used for fun as well as work and it sells them directly to consumers nationwide as well as several other countries.

Workshop Outline

1. Power BI Desktop
2. Power BI Service
3. Bring your own data to build a dashboard
4. Q&A

Power BI Desktop

Power BI Desktop - Accessing Data

In this section, you will import VanArsdel and its competitors USA sales data. Then you import and merging sales data from other countries.

Power BI Desktop - Get Data

Let's start with looking at the data files. The dataset contains sales data of VanArsdel and other competitors. We have 7 years of transaction data by day, product and zip code for each manufacturer. We are going to analyze data from 7 countries.

USA sales data is in a csv file located in /Data/USSales folder.

Sales of all other countries is in /Data/InternationalSales folder. Each countries sales data is in a csv file in this folder.

Product, Geography and Manufacturer information in an excel file in /Data/USSales/bi_dimensions.xlsx.

1. Open [/Data/USSales/bi_dimensions.xlsx](#). Notice the first sheet has **Product** information. The sheet has a header and product data is in a named table. Also notice Category column has a bunch of empty cells.

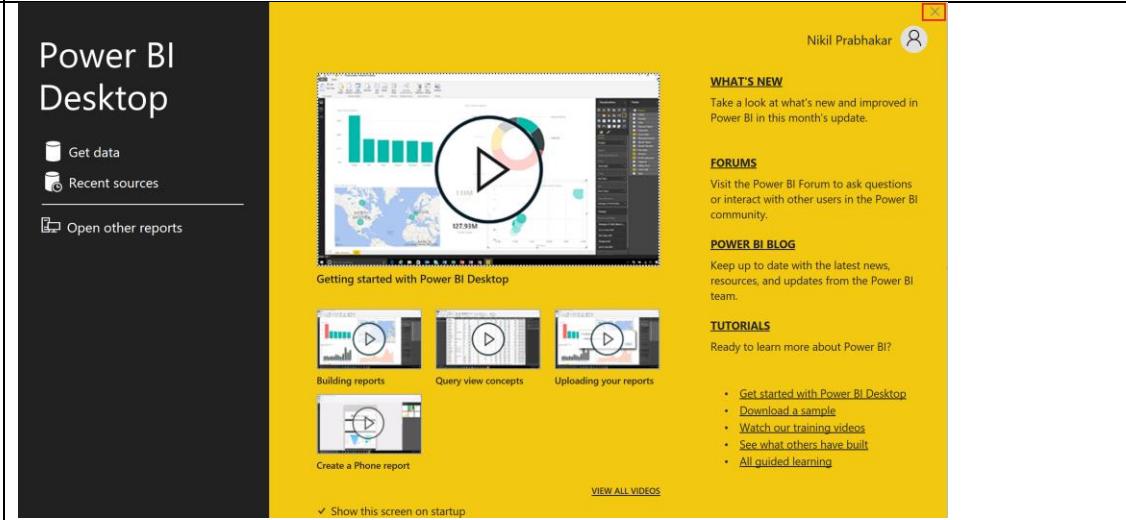
A	B	C	D	E	F
1	Source: Public Database				
2	Last Upda	Monday, February 1, 2016			
3					
4	Zip	City	State	Region	District
5	22654	Star Tannery, VA, USA	VA	East	District #07 USA
6	22655	Stephens City, VA, USA	VA	East	District #07 USA
7	22656	Stephenson, VA, USA	VA	East	District #07 USA
8	22657	Strasburg, VA, USA	VA	East	District #07 USA
9	22660	Toms Brook, VA, USA	VA	East	District #07 USA
10	22663	White Post, VA, USA	VA	East	District #07 USA
11	22664	Woodstock, VA, USA	VA	East	District #07 USA
12	22701	Culpeper, VA, USA	VA	East	District #07 USA
13	22709	Aroda, VA, USA	VA	East	District #07 USA
14	22711	Banco, VA, USA	VA	East	District #07 USA
15	22712	Bealeton, VA, USA	VA	East	District #07 USA

Manufacturer sheet has data laid out across the sheet and with no column headers and it has a couple of blank rows and a note in row 7.

Geo sheet has geography information. The first couple of rows has data details. Actual data starts from row 4.

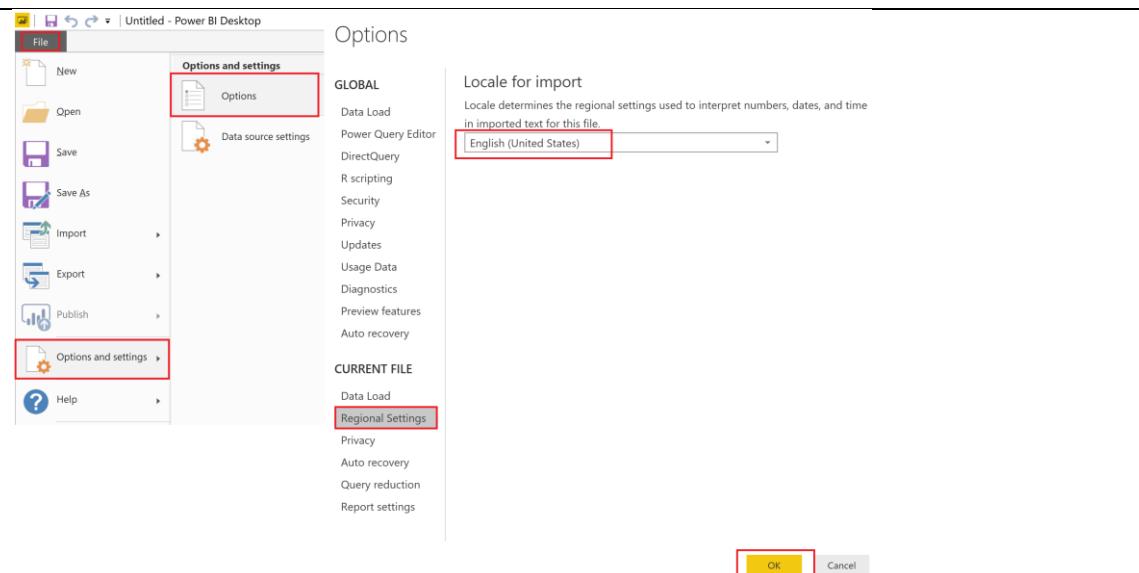
We will start by connecting to data from these different files and perform data cleaning and transformation operations.

2. If you don't have the **Power BI Desktop** open, launch it now.
3. Select **Already have a Power BI Account?** **Sign in** option.
4. **Sign in** using your Power BI credentials.
5. Startup screen opens. Click on **X** on the top right corner of the dialog to close it.



Let's set up the locale to US English, to make it convenient to go through the rest of this lab.

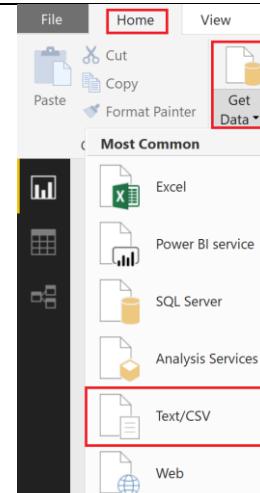
6. From the ribbon, select **File -> Options and settings -> Options**.
7. In the left panel of Options dialog, select **Regional Settings**.
8. From the **Locale** drop down select **English (United States)**.
9. Select **OK** to close the dialog.



First step is to [load data](#) to Power BI Desktop. We will load USA Sales data which is in comma separated value(CSV) files.

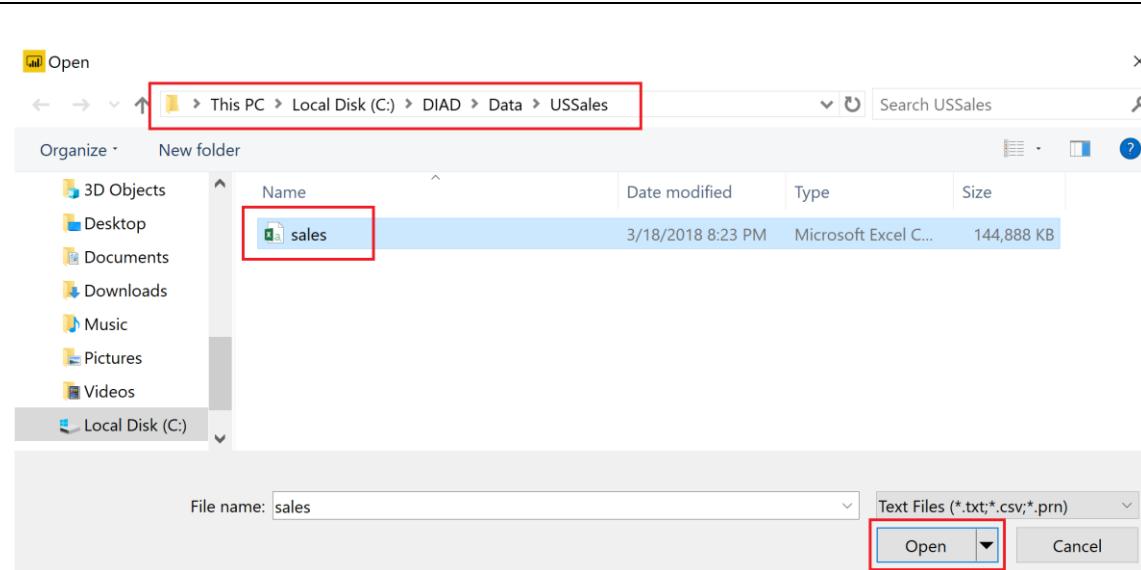
10. From the ribbon, select **Home -> Get Data**.
11. Select **Text/CSV**.

Note: Power BI Desktop has the capability to connect to 70+ data sources. We are using csv and excel data files in this lab for simplicity.



12. Browse to **DIAD\Data\USSales** folder and select **sales.csv**.

13. Click **Open**.



Power BI detects the data type of each column. There are options to detect the data type based on the first 200 rows or based on the entire dataset or not detect it. Since our dataset is large and it will take time and resources to scan the complete data set, let's leave the default option of selecting dataset based on the first 200 rows.

After completing your selection, you have three options – Load, Edit or Cancel.

- **Load**, loads the data from the source into Power BI Desktop for you to start creating reports.
- **Edit** allows you to perform data shaping operations such as merging columns, adding additional columns, changing data types of columns as well as bringing in additional data.

A screenshot of the Power BI Data Source Editor. It shows the 'sales.csv' file loaded. At the top, there are dropdown menus for 'File Origin' (set to '1252: Western European (Windows)') and 'Delimiter' (set to 'Comma'). To the right of these is a 'Data Type Detection' dropdown which is highlighted with a red box and set to 'Based on first 200 rows'. Below this, there is a preview of the data in a table with columns: ProductID, Date, Zip, Units, and Revenue. The data consists of 10 rows of sales information. At the bottom right, there are three buttons: 'Load' (highlighted with a red box), 'Edit' (highlighted with a red box), and 'Cancel'.

- **Cancel** gets you back to the main canvas.

14. Click **Edit** as shown in the screenshot. A new window opens.

You should be in the Query Editor window as shown in the screenshot to the right. Query Editor is used to perform data shaping operations. Notice the sales file you connected to shows as a query in the left panel. You see a preview of the data in the center panel. Power BI predicts data type of each field (based on the first 200 rows) which is indicated next to the column header. In the right panel, steps that Query Editor performs are recorded.

Note: You will be bringing in sales data from other countries as well as performing certain data shaping operations.

15. Notice Power BI has set Zip field to data type Whole Number. To ensure that Zip codes which start with zero don't lose the leading zero, we will format them as text. Highlight the **Zip** column. From the ribbon, select **Home -> Data Type** and update it to **Text**.

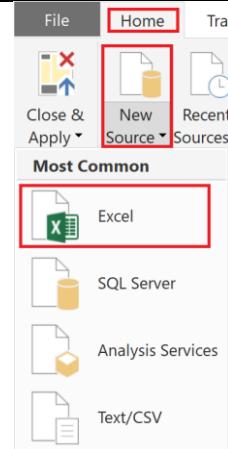
16. **Change Column Type** dialog opens. Select **Replace Current** button which overwrites Power BI's predicted datatype.

The screenshot displays the Power Query Editor interface in two states. In the top state, the 'Zip' column is highlighted in yellow, and its data type is listed as 'Whole Number'. In the bottom state, the 'Zip' column has been changed to 'Text', and its data type is now listed as 'Text'. A red box highlights the 'Data Type' dropdown in the ribbon and the 'Text' option in the 'Change Column Type' dialog. A callout box labeled 'IMPORTANT!' contains the text: 'Changing the data type is a big deal to use later'.

Column	ProductID	Date	Zip	Units	Revenue
1	1076	1/20/2011	72638	1	254.5725
2	1076	1/21/2011	47577	1	254.5725
3	1076	1/28/2011	34653	1	254.5725
4	1076	1/31/2011	84014	1	254.5725
5	1076	2/1/2011	75070	1	254.5725
6	1076	2/1/2011	87031	1	254.5725
7	1076	2/3/2011	72019	1	254.5725
8	1076	2/3/2011	72086	1	254.5725
9	1076	2/3/2011	77089	2	509.145
10	1076	2/9/2011	07649	1	254.5725
11	1076	2/11/2011	79705	1	254.5725

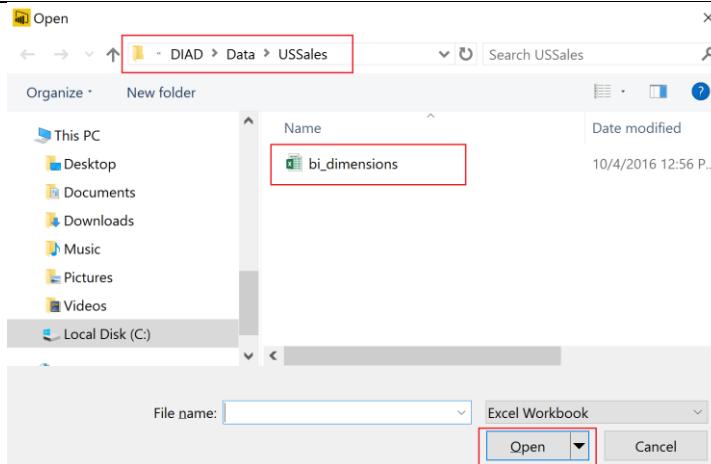
Now let's get the data that is in excel source file.

17. From the ribbon, select **Home** -> **New Source** -> **Excel**.



18. Browse to **DIAD\Data\USSales** folder and select **bi_dimensions.xlsx**.

Navigator dialog opens.



19. Navigator dialog lists 3 sheets that are in the excel workbook. It also lists the Product named table. **Select product** from the left panel and in preview panel notice the first row is the header. This is not part of the data.

20. **Unselect product** from the left panel. **Select Product_Table**. Notice this has only the contents of the named table. This is the data we need.

Note: Table names are differentiated from Worksheet names by using different icons.

21. From the left panel, **select geo**. In the preview panel notice the first couple of rows are headers that are not part of the data. We will remove them shortly.

22. From the left panel, **select manufacturer**. In the preview panel notice the last couple of rows are footers that are not part of the data. We will remove them shortly.

23. Select **OK**. (Make sure Product_Table, geo and manufacturer are selected in the left panel)

Notice all 3 sheets are added as queries in the Query Editor.

Navigator

The Navigator dialog shows the 'bi_dimensions.xlsx [4]' file expanded. Under 'Queries', 'Product_Table' and 'geo' are unselected, while 'product' is selected and highlighted with a red box.

product

Column1	Column2	Column3	Column4	Column5
Product Details		null	null	null
ProductID	Product	Category	ManufacturerID	Price
1	Abbas MA-01 All Season	Mix		1 USD 412.13
2	Abbas MA-02 All Season		null	1 USD 329.78
3	Abbas MA-03 All Season		null	1 USD 963.38
4	Abbas MA-04 All Season		null	1 USD 828.98

Navigator

The Navigator dialog shows the 'bi_dimensions.xlsx [4]' file expanded. Under 'Queries', 'Product_Table' is selected and highlighted with a red box, while 'geo' and 'product' are unselected.

Product_Table

ProductID	Product	Category	ManufacturerID	Price
1	Abbas MA-01 All Season	Mix		1 USD 412.13
2	Abbas MA-02 All Season		null	1 USD 329.78
3	Abbas MA-03 All Season		null	1 USD 963.38
4	Abbas MA-04 All Season		null	1 USD 828.98
5	Abbas MA-05 All Season		null	1 USD 745.5
7	Abbas MA-07 All Season		null	1 USD 451.45

Navigator

The Navigator dialog shows the 'bi_dimensions.xlsx [4]' file expanded. Under 'Queries', 'geo' is selected and highlighted with a red box, while 'Product_Table' and 'manufacturer' are unselected.

geo

Column1	Column2	Column3	Column4	Column5	Column6
Source:	Public Database		null	null	null
Last Updated:		2/1/2016	null	null	null
Zip	City	State	Region	District	Country
22654	Star Tannery, VA, USA	VA	East	District #07	USA
22655	Stephens City, VA, USA	VA	East	District #07	USA

Navigator

The Navigator dialog shows the 'bi_dimensions.xlsx [4]' file expanded. Under 'Queries', 'manufacturer' is selected and highlighted with a red box, while 'Product_Table' and 'geo' are unselected.

manufacturer

Column1	Column2	Column3	Column4	Column5	Column6
ManufacturerID					
Manufacturer	Abbas				
Logo					
List of Suppliers and Manufacturers					

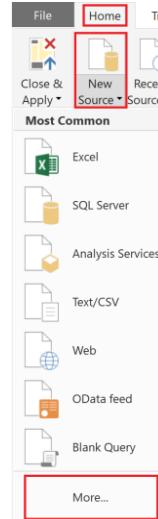
Power BI Desktop - Adding additional data

International subsidiaries have agreed to provide their sales data so that the company's sales can be analyzed together. You've created a folder where they will each put their data.

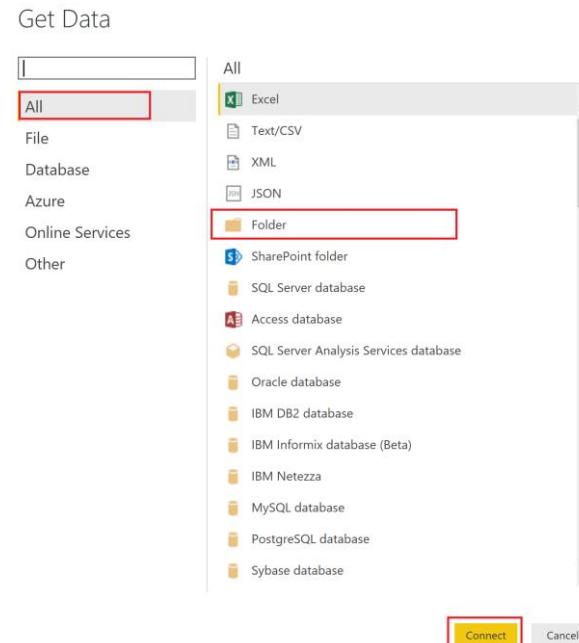
To analyze all the data together you will want to import the new data from each of the subsidiaries and combine it with the US Sales you loaded earlier.

24. Click on the **New Source** drop down in the Home menu tab of the Query Editor.
25. Select **More...** as shown in the figure.

Get Data dialog opens



26. In the Get Data dialog select **Folder** as shown in the diagram.
27. Click **Connect**.

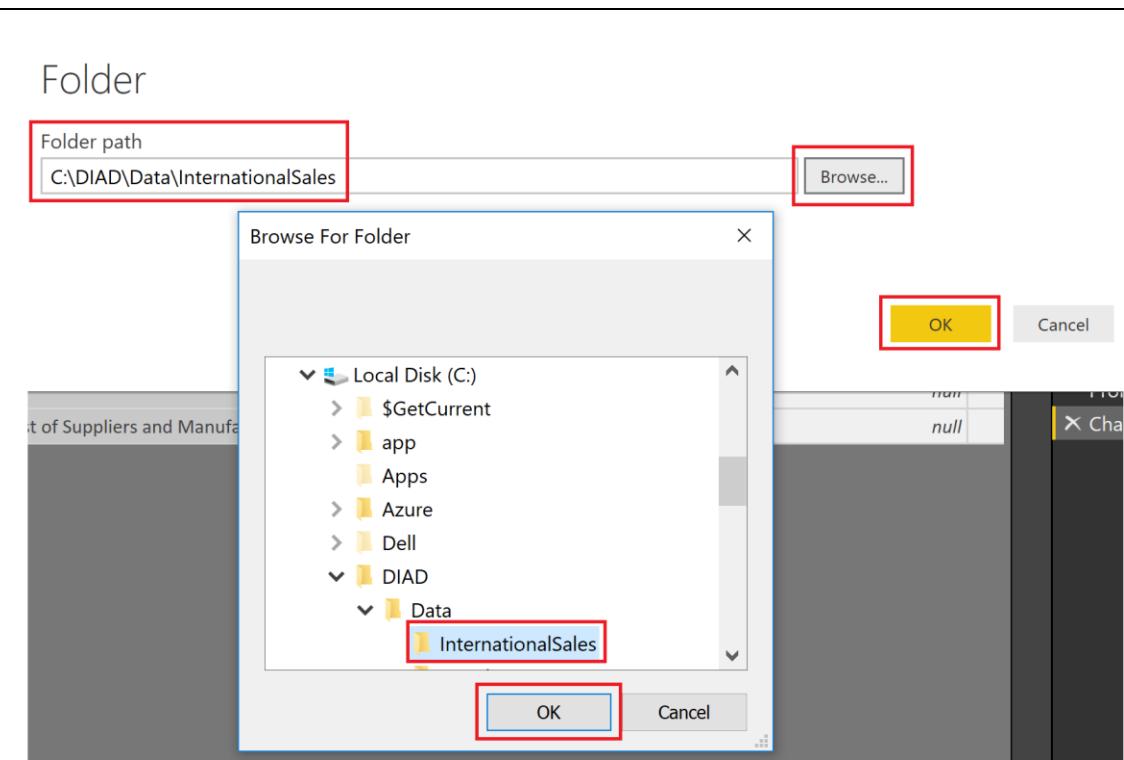


Folder dialog opens.

28. Click **Browse...** button.
29. In the **Browse for Folder** dialog navigate to the location where you unzipped the class files.
30. Open the **DIAD** folder.
31. Open the **Data** folder.
32. Select the **InternationalSales** folder.
33. Click **OK** (to close the **Browse for Folder** dialog box).
34. Click **OK** (to close the **Folder** dialog box).

Note: This approach, uses folders instead of individual files. This will load all files in the folder. This is useful when you have a group that puts files on an ftp site each month and you are not always sure of the names of the files or the number of files.

All the files must be of the same file type with columns in the same order.



Dialog displays the list of files in the folder.

35. Since we want to combine data, click **Combine & Edit**.

Note: Date accessed, Date modified and Date created might be different compared to the dates displayed in the screenshot.

C:\DIAD\Data\InternationalSales								
Content	Name	Extension	Date accessed	Date modified	Date created	Attributes	Folder Path	
Binary	Australia.csv	.csv	3/28/2018 9:40:45 PM	3/14/2018 11:07:23 PM	3/28/2018 9:40:45 PM	Record	C:\DIAD\Data\InternationalSales\	
Binary	Canada.csv	.csv	3/28/2018 9:40:45 PM	2/13/2018 9:40:50 PM	3/28/2018 9:40:45 PM	Record	C:\DIAD\Data\InternationalSales\	
Binary	Germany.csv	.csv	3/28/2018 9:40:45 PM	2/13/2018 9:43:42 PM	3/28/2018 9:40:45 PM	Record	C:\DIAD\Data\InternationalSales\	
Binary	Japan.csv	.csv	3/28/2018 9:40:45 PM	2/13/2018 9:44:37 PM	3/28/2018 9:40:45 PM	Record	C:\DIAD\Data\InternationalSales\	
Binary	Mexico.csv	.csv	3/28/2018 9:40:45 PM	2/13/2018 9:45:22 PM	3/28/2018 9:40:45 PM	Record	C:\DIAD\Data\InternationalSales\	
Binary	Nigeria.csv	.csv	3/28/2018 9:40:46 PM	2/13/2018 9:46:39 PM	3/28/2018 9:40:46 PM	Record	C:\DIAD\Data\InternationalSales\	

Combine & Edit **Edit** **Cancel**

Combine Files dialog opens. By default, Power BI again detects the data type based on the first 200 rows.

Notice there is an option to select various file Delimiters. The file we are working with is Comma delimited, so let's leave Delimiter option as Comma.

There is also an option to select each individual file in the folder (using Example File dropdown) to validate the format of the files.

36. Select OK.

You will be in the **Query Editor** window with a new query called **InternationalSales**.

37. If you do not see the **Queries** pane on left, click on the > icon to expand.

38. If you do not see the Query Settings pane on the right as shown in the figure, click on **View** in the ribbon and click **Query Settings** to see the pane.

39. Click on the Query **InternationalSales**.

Combine Files

Specify the settings for each file. [Learn more](#)

Example File:
First file

File Origin

Delimiter

Data Type Detection

Based on first 200 rows

ProductID	Date	Zip	Units	Revenue	Country
1070	2017-01-18	2128	1	157.447500	Australia
1070	2017-04-02	2565	1	157.447500	Australia
1070	2017-04-25	4581	4	629.790000	Australia
1070	2017-04-26	1189	2	314.895000	Australia
1070	2017-04-26	3981	1	157.447500	Australia

Skip files with errors

OK

Cancel

The screenshot shows the Power BI Query Editor interface. The ribbon is set to 'View'. In the 'Layout' tab, 'Query Settings' is checked. The 'Data Preview' pane displays a table of data with columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'Queries' pane on the left shows a list of queries, with 'InternationalSales' selected. The 'QUERY SETTINGS' pane on the right shows the query name is 'InternationalSales' and the applied step is 'Changed Type'.

Source	ProductID	Date	Zip	Units	Revenue	Country
Australia.csv	1070	1/18/2017	2128	1	157.4475	Australia
Australia.csv	1070	4/2/2017	2565	1	157.4475	Australia
Australia.csv	1070	4/25/2017	4581	4	629.79	Australia
Australia.csv	1070	4/26/2017	1189	2	314.895	Australia
Australia.csv	1070	4/30/2017	3981	1	157.4475	Australia
Australia.csv	1070	5/14/2017	5010	1	157.4475	Australia
Australia.csv	1070	5/27/2017	6646	1	157.4475	Australia
Australia.csv	1070	5/30/2017	7212	1	157.4475	Australia
Australia.csv	1070	6/7/2017	4423	1	157.4475	Australia
Australia.csv	1070	6/20/2017	2155	1	157.4475	Australia
Australia.csv	1070	6/27/2017	1128	1	157.4475	Australia
Australia.csv	1070	6/27/2017	2455	1	157.4475	Australia

Notice that column Zip is of type Whole Number. Based on the first 200 rows Power BI thinks Zip is of type Whole Number. But zip code could be alpha numeric in some countries or leading zeros (similar to USA data). If we do not change the data type, we will see an error when we load the data shortly. So, let's change Zip to data type Text.

40. Highlight the **Zip** column and change the **Data Type** to **Text**.
41. **Change Column Type** dialog opens. Select **Replace Current** button.

IMPORTANT!
Changing the data type is a big deal to use later

A ^b c Source.Name	1 ² 3 ProductID	1 ² 3 Date	1 ² 3 Zip	1 ² 3 Units	1 ² 2 Revenue	A ^b c Country
Australia.csv	1070	1/18/2017	2128	1	157.4475	Australia
Australia.csv	1070	4/2/2017	2565	1	157.4475	Australia
Australia.csv	1070	4/25/2017	4581	4	629.79	Australia
Australia.csv	1070	4/26/2017	1189	2	314.895	Australia
Australia.csv			3981	1	157.4475	Australia
Australia.csv			1189	1	157.4475	Australia
Australia.csv			5010	1	157.4475	Australia
Australia.csv			6646	1	157.4475	Australia
Australia.csv			7212	1	157.4475	Australia
Australia.csv			4423	1	157.4475	Australia
Australia.csv			2155	1	157.4475	Australia
Australia.csv			1128	1	157.4475	Australia
Australia.csv	1070	6/27/2017	2455	1	157.4475	Australia
Australia.csv	1070	6/27/2017	3194	1	157.4475	Australia

In Queries panel, notice Transform File from InternationalSales folder is created. This contains the function used to load each of the files in the folder.

If you compare **InternationalSales** and **sales** table, you will see the **InternationalSales** table contains two new columns, **Source.Name** and **Country**.

A ^b c Source.Name	1 ² 3 ProductID	1 ² 3 Date	A ^b c Zip	1 ² 3 Units	1 ² 2 Revenue	A ^b c Country
Australia.csv	1070	1/18/2017	2128	1	157.4475	Australia
Australia.csv	1070	4/2/2017	2565	1	157.4475	Australia
Australia.csv	1070	4/25/2017	4581	4	629.79	Australia
Australia.csv	1070	4/26/2017	1189	2	314.895	Australia
Australia.csv	1070	4/26/2017	3981	1	157.4475	Australia
Australia.csv	1070	4/30/2017	1189	1	157.4475	Australia
Australia.csv	1070	5/14/2017	5010	1	157.4475	Australia
Australia.csv	1070	5/27/2017	6646	1	157.4475	Australia
Australia.csv	1070	5/30/2017	7212	1	157.4475	Australia
Australia.csv	1070	6/7/2017	4423	1	157.4475	Australia
Australia.csv	1070	6/20/2017	2155	1	157.4475	Australia
Australia.csv	1070	6/27/2017	1128	1	157.4475	Australia
Australia.csv	1070	6/27/2017	2455	1	157.4475	Australia

42. We do not need Source.Name column.
 Select **Source.Name** column. From the ribbon, select **Home** -> **Remove Columns** -> **Remove Columns**.

	ProductID	Date	Zip	Units	Revenue	Country
1	1070	1/18/2017	2128			Australia
2	1070	4/2/2017	2565			Australia
3	1070	4/25/2017	4581			Australia
4	1070	4/26/2017	1189			Australia
5	1070	4/26/2017	3981			Australia
6	1070	4/30/2017	1189			Australia
7	1070	5/14/2017	5010			Australia
8	1070	5/27/2017	6646			Australia
9	1070	5/30/2017	7212			Australia
10	1070	6/7/2017	4423			Australia
11	1070	6/20/2017	2155			Australia
12	1070	6/27/2017	1128			Australia
13	1070	6/27/2017	2455			Australia

43. Click on the drop down next to **Country** column to see the unique values.
 44. You will only see Australia as shown in the figure. Click on **Load more** to validate you have data from various countries included.

Load more

You will see the countries, Australia, Canada, Germany, Japan, Mexico and Nigeria.

45. Click **OK**.

Note: You can perform various types of filters, sorting operations using the drop down to verify the imported data.

The screenshot shows the Power BI Desktop interface. On the left, the 'Queries [9]' pane is open, displaying a list of queries including 'Transform File from Internati...', 'Sample Query [2]', 'Other Queries [5]', and 'InternationalSales'. The 'InternationalSales' query is selected and highlighted with a red box. On the right, a data preview table is shown with columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'Country' column has a dropdown arrow icon, which is expanded to show a filter dialog. This dialog includes a 'Search' input field, a list of checked options: '(Select All)', 'Australia', 'Canada', 'Germany', 'Japan', 'Mexico', and 'Nigeria', and two buttons at the bottom: 'OK' (highlighted with a red box) and 'Cancel'.

	ProductID	Date	Zip	Units	Revenue	Country
1	1070	1/18/2017	2128			
2	1070	4/2/2017	2565			
3	1070	4/23/2017	4581			
4	1070	4/26/2017	1189			
5	1070	4/26/2017	3981			
6	1070	4/30/2017	1189			
7	1070	5/14/2017	5010			
8	1070	5/27/2017	6646			
9	1070	5/30/2017	7212			
10	1070	6/7/2017	4423			
11	1070	6/20/2017	2155			
12	1070	6/27/2017	1128			
13	1070	6/27/2017	2455			
14	1070	6/27/2017	3194			
15	1070	6/27/2017	5139			
16	1070	6/28/2017	2132			
17	1094	3/16/2014	2455			
18	1094	4/17/2014	822			

Power BI Desktop – Data Preparation

In this section, we will explore methods to [transform data in the data model](#). Transforming the data by renaming tables, updating data types, and appending tables together ensures that the data is ready to be used for reporting. In some instances, this means cleaning the data up so that similar sets of data are combined. In other instances, groups of data are renamed so that they are more recognizable by end users and simplifies report writing.

Power BI Desktop - Renaming tables

The Query Editor window should appear as shown in the diagram.

- If formula bar is disabled, you can turn on the formula bar from the View ribbon. This enables you to see the “M” code generated by each click on the ribbons.
- Select the options available on the ribbon – **Home, Transform, Add Column and View** to notice the various features available.

1. Under **Queries** panel, **minimize** Transform Files from InternationalSales folder.
2. Select each query name in the **Other Queries** section.
3. **Rename** them in the Query Settings -> Properties section as shown below:

Initial Name	Final Name
sales	Sales
geo	Geography
manufacturer	Manufacturer
Product_Table	Product
InternationalSales	International Sales

Note: It is best practice to give descriptive query names and column names. These names are used in visuals and in Q&A section, which is covered later in the lab.

The screenshot shows the Power BI Desktop interface with the Query Editor open. The ribbon at the top has 'View' selected. The 'Queries' pane on the left lists 'Transform File from InternationalSales [3]' and 'Other Queries [5]', with 'Sales' selected. The main area displays a table with columns: ProductID, Date, A#, Zip, Units, and Revenue. The 'Query Settings' pane on the right shows the 'Properties' section with 'Name' set to 'Sales' and the 'Applied Steps' section showing 'Source: Promoted Headers' and 'Changed Type'.

Power BI Desktop – Using Fill feature

Some of the data provided is not in the right format. Power BI provides extensive transformation capabilities to clean and prepare the data to meet our needs. Let's start with Product query. Notice that Category column has a lot of null values. Looks like there are values in Category column only when the value changes. We need to fill it down to have values in each row.

4. From the left panel, select **Product** Query.
5. Select **Category** column.
6. From the ribbon select **Transform -> Fill -> Down**.

Notice now all the null values are filled with the appropriate Category values.

The screenshot shows the Power BI Desktop interface with the 'Transform' ribbon tab selected. In the top-right, a 'Product' query table is displayed. The 'Category' column contains several null values. A red box highlights the 'Category' column header and the first few rows where values are present. Below the table, the ribbon shows the 'Fill' dropdown menu open, with the 'Down' option highlighted by a red box. The bottom part of the screenshot shows the result of applying the 'Fill Down' operation, where the null values in the 'Category' column have been replaced by the value 'Mix' from the previous row, as indicated by the red box highlighting the entire column.

ProductID	Product	Category	ManufacturerID	Price
1	Abbas MA-01 All Season	Mix	1	USD 412.13
2	Abbas MA-02 All Season	null	1	USD 329.78
3	Abbas MA-03 All Season	null	1	USD 963.38
4	Abbas MA-04 All Season	null	1	USD 828.98
5	Abbas MA-05 All Season	null	1	USD 745.5
6	Abbas MA-07 All Season	null	1	USD 451.45
7	Abbas MA-06 All Season	null	1	USD 329.78
8	Abbas MA-08 All Season	null	1	USD 485.89

ProductID	Product	Category	ManufacturerID	Price
1	Abbas MA-01 All Season	Mix	1	USD 412.13
2	Abbas MA-02 All Season	Mix	1	USD 329.78
3	Abbas MA-03 All Season	Mix	1	USD 963.38
4	Abbas MA-04 All Season	Mix	1	USD 828.98
5	Abbas MA-05 All Season	Mix	1	USD 745.5
6	Abbas MA-07 All Season	Mix	1	USD 451.45
7	Abbas MA-06 All Season	Mix	1	USD 329.78
8	Abbas MA-08 All Season	Mix	1	USD 485.89

Power BI Desktop – Using Split feature

In Product query, notice that the Product column. Looks like two fields are concatenated into one field with a pipe (|) separator. Let's split them into two columns. This will be useful when we build visuals, so we can analyze based on both fields.

7. From the left panel, select **Product** Query.
 8. Select **Product** column.
 9. From the ribbon select **Home -> Split Column -> By Delimiter**. Split Column by Delimiter dialog opens.
 10. In the dialog, make sure **Custom** is selected in the **Select or enter delimiter** dropdown.
- Note:** Select or enter delimiter dropdown has some of the standard delimiters like comma, colon, etc.
11. Notice in the text area, there is a hyphen (-). Power BI assumes we want to split by hyphen. **Remove hyphen symbol and enter pipe symbol (|)** as shown in the screenshot.
 12. Select **OK**.

Note: If the delimiter occurs multiple times, **Split at** section provides option to split only once (either left most or right most) or the column can be split on each occurrence of the delimiter.

In this scenario delimiter occurs only once, hence Product column is split into 2 columns.

The screenshot shows the Microsoft Power BI interface. On the left, the 'Queries [9]' pane is open, showing a list of queries including 'Transform File from Internati...', 'Other Queries [5]', and a 'Sales' folder containing 'Product', 'Geography', 'Manufacturer', and 'International Sales'. The 'Product' query is currently selected, highlighted with a red box. The main workspace displays a table with columns: ProductID, Product, Category, ManufacturerID, and Price. The 'Product' column contains values like '1 Abbas MA-01|All Season' and '2 Abbas MA-02|All Season', where the pipe character (|) serves as a delimiter. Above the table, the ribbon is visible with the 'Home' tab selected. A red box highlights the 'Split Column' icon in the 'Transform' ribbon group. To the right of the table, the 'Split Column by Delimiter' dialog box is open. It has a dropdown menu 'Select or enter delimiter' set to '-Custom-' with a red box around it. Below it is a text input field containing '|'. Under the heading 'Split at', the radio button 'Each occurrence of the delimiter' is selected, also with a red box around it. At the bottom right of the dialog are 'OK' and 'Cancel' buttons, with 'OK' also having a red box around it.

Power BI Desktop – Using Rename Column feature

Let's rename the columns.

13. Select **Product.1** column. Right click next to the column name.
14. Select **Rename** from the selection dialog.
15. **Rename** the field to **Product**.
16. Similarly rename **Product.2** to **Segment**.

The screenshot shows the Power BI Desktop interface with the 'Queries [9]' pane on the left. A table is open in the main area, showing columns 'ProductID', 'Product', 'Product.2', 'Category', and 'Manufacture'. The 'Product' column is highlighted with a red box. A context menu is open over the 'Product' column, with the 'Rename...' option highlighted with a red box. The menu includes options like Copy, Remove, Duplicate Column, Add Column From Examples..., Replace Values..., Split Column, Group By..., Fill, Unpivot Columns, Unpivot Other Columns, Unpivot Only Selected Columns, and Move.

ProductID	Product	Product.2	Category	Manufacture
1	Abbas MA-01		All Season	
2	Abbas MA-02		All Season	
3	Abbas MA-03		All Season	
4	Abbas MA-04		All Season	
5	Abbas MA-05		All Season	
6	Abbas MA-07		All Season	
7	Abbas MA-06		All Season	
8	Abbas MA-08		All Season	
9	Abbas MA-09		All Season	
10	Abbas MA-10		All Season	
11	Abbas MA-11		All Season	
12	Abbas MA-12		All Season	
13	Abbas MA-13		All Season	
14	Abbas MA-14		All Season	
15	Abbas MA-15		All Season	
16	Abbas MA-16		All Season	
17	Abbas MA-17		All Season	

Power BI Desktop – Using Column From Examples feature

In Product query, notice that the Price column. You will see price and currency concatenated into one field. To do any calculations we just need the numeric value. It will be good to split this field into two columns. We can use the split feature like earlier or we can use Column From Examples. Column From Examples is handy in scenarios where the pattern is more complex than a delimiter.

17. From the left panel, select **Product** Query.
18. From the ribbon, select **Add Column** -> **Column From Examples**.
19. In the **first row of Column1** enter the first Price value which is **412.13** and click enter. Notice as you enter, Power BI knows that you want to split Price column. The formula it uses is displayed as well.
20. **Double click** column header **Text After Delimiter** to rename it.
21. **Rename** the column to **MSRP**.
22. Click **OK** to apply the changes.

Queries (9)

Add Column From Examples

Enter sample values to create a new column (Ctrl+Enter to apply).

Transform: Text.AfterDelimiter([Price], " ")

	ProductID	Product	Product.2	Category	ManufacturerID	Price	MSRP
1	1	Abbas MA-01	All Season	Mix	1	USD 412.13	412.13
2	2	Abbas MA-02	All Season	Mix	1	USD 329.78	329.78
3	3	Abbas MA-03	All Season	Mix	1	USD 963.38	963.38
4	4	Abbas MA-04	All Season	Mix	1	USD 828.98	828.98
5	5	Abbas MA-05	All Season	Mix	1	USD 745.5	745.5

OK Cancel

- Notice MSRP field is of data type text. It must be a decimal. Let's change it.
23. Select **ABC** in **MSRP** column.
 24. From the selection dialog, select **Decimal Number**.

Notice all the steps we performed on the Product query are being recorded under **APPLIED STEPS** in the right panel.

Properties

APPLIED STEPS

- Source
- Navigation
- Changed Type
- Filled Down
- Split Column by Delimiter
- Changed Type1
- Renamed Columns
- Inserted Text After Delimiter

Similarly, let's create a currency column.

25. From the left panel, select **Product** Query.

26. From the ribbon, select **Add Column** -> **Column From Examples**.

27. In the **first row of Column1** enter the first Currency value as **USD** and click enter

Notice as you enter, Power BI knows that you want to split Price column. The formula it uses is displayed as well.

28. Double click column header **Text After Delimiter** to rename it.

29. Rename the column to **Currency**.

30. Click **OK** to apply the changes.

The screenshot shows the 'Add Column From Examples' dialog in Power BI. The 'From Text' tab is active. A sample value '1 USD' is entered in the first row of the preview table under the 'Currency' column. The 'OK' button is highlighted with a red box.

Now that we have split Price into MSRP and Currency columns, we don't need Price column. Let's remove it.

31. From the left panel, select **Product** Query.

32. Right click next to **Price** column.

33. Select **Remove**.

The screenshot shows the 'Product' query editor in Power BI. The 'Price' column is selected and highlighted with a red box. A context menu is open with the 'Remove' option highlighted with a red box.

Power BI Desktop – Using Add/Remove Rows feature

In Geography query, notice that first two rows are informational. It is not part of the data. Similarly, in Manufacturer query the last couple of rows are not part of the data. Let's remove them so we have a clean dataset.

34. In the left panel, select **Geography** query.

35. From the ribbon, select **Home** > **Remove Rows** > **Remove Top Rows**.

36. Remove Top Rows dialog opens. Enter **3** in the text box, since we want to remove the top 2 informational data rows and the blank 3rd row.

37. Select **OK**.

The screenshot shows the Power BI desktop interface. On the left, the 'Queries [9]' pane is open, with 'Geography' selected. The main area displays a table with six columns: Column1, Column2, Column3, Column4, Column5, and Column6. The first three rows are highlighted with a red box. The 'Home' tab is selected in the ribbon. A context menu is open over the table, with the 'Remove Top Rows' option highlighted with a red box. Below the table, a 'Remove Top Rows' dialog box is displayed, asking 'Specify how many rows to remove from the top.' An input field shows the value '3'. The 'OK' button is highlighted with a yellow box.

Notice the first row in Geography query now is the column header. So let's make it a header

38. With **Geography** query selected in the left panel, from the ribbon select **Home** > **Use First Row as Headers**

First Row as Headers

Notice column Zip is of data type number. Let's change it to text as we did earlier. If we don't we will see errors when we load the data.

39. Select **123** next to Zip Column. From the dialog, select **Text**.

40. Select **Replace Current** in the **Change Column Type** dialog.

The screenshot shows the Power BI desktop interface. The 'Queries [9]' pane is open, with 'Geography' selected. The main area shows a table with columns: Zip, City, State, Region, District, and Country. The 'Zip' column is highlighted with a red box. The 'Home' tab is selected in the ribbon. A context menu is open over the table, with the 'Data Type' option selected. A dropdown menu shows 'Whole Number' and 'Text'. The 'Text' option is highlighted with a red box. The 'OK' button is highlighted with a yellow box. The 'Replace Current' button in the bottom right of the dialog is also highlighted with a yellow box.

41. From the left panel, select **Manufacturer** query. Notice the bottom 3 rows are not part of the data. Let's remove it

42. From the ribbon, select **Home** > **Remove Rows** > **Remove Bottom Rows**

43. Remove Bottom Rows dialog opens. Enter **3** in **Number of rows** text box.

44. Select **OK**.

Queries [9]

File Home Transform Add Column View Help

Close & Apply New Source Recent Enter Data Data source settings Data Sources Manage Parameters Refresh Preview Manage Properties Advanced Editor Query Choose Columns Remove Columns Keep Rows Remove Rows

Queries [9]

Remove Bottom Rows

Remove Alternate Rows

Remove Duplicates

Remove Blank Rows

Remove Errors

A^B Column1 ABC Column2

1 ManufacturerID 123

2 Manufacturer Abbas

3 Logo https://raw.g...

4 null

5 null

6 List of Suppliers and Manufacturers

Remove Bottom Rows

Specify how many rows to remove from the bottom.

Number of rows 3

OK Cancel

Power BI Desktop – Using Transpose feature

45. From the left panel, select **Manufacturer** Query. Notice ManufacturerID, Manufacturer and Logo data is laid across in rows. And the header is not useful. We need to transpose the table to meet our needs.

46. From the ribbon select **Transform** -> **Transpose**.

Notice this transposes the data into columns. Now we need the first row to be the header.

File Home Transform Add Column View Help

Transpose Reverse Rows Count Rows

Data Type: Text Replace Values Unpivot Columns

Detect Data Type Fill Move

Rename Pivot Column Convert to List

Table Any Column

Text Column

Statistics Standard

Queries [9]

Transpose

Reverse Rows

Count Rows

Unpivot Columns

Move

Pivot Column

Convert to List

Text Column

X^Σ Statistics Standard

ABC Column1 ABC Column2

1 ManufacturerID 123

2 Manufacturer Abbas

3 Logo https://raw.githubusercontent.com/CharlesSterling/DiadManu/maste...

1

47. From the ribbon select Home -> Use First Row As Headers.

Notice now Manufacturer table is laid out the way we need it with a header and values along columns.

Notice on the right panel under **APPLIED STEPS** you will see the list of transformations and steps that have been applied.

You can navigate through each change made to the data by clicking on the step. Steps can also be deleted by clicking on the X that appears to the left of the step.

The properties of each step can be reviewed by clicking on the gear to the right of the step.

The screenshot shows the Power BI Desktop interface. In the center, the 'Manufacturer' query is displayed in a table view. The first row is highlighted as a header. On the ribbon, the 'Home' tab is selected, and the 'Use First Row as Headers' button is highlighted with a red box. To the right, the 'QUERY SETTINGS' pane is open, showing the 'APPLIED STEPS' section which lists changes like 'Promoted Headers' and 'Changed Type'. The 'Properties' section shows the query is named 'Manufacturer'.

Power BI Desktop – Using Append and Conditional Column feature

To analyze the Sales of all countries, it is convenient to have a single Sales table. Hence you want to append all the rows from **International Sales** to **Sales**.

48. Select Sales in the Queries window in the left panel as shown in the figure.

49. From the ribbon select Home -> Append Queries.

Append dialog opens. There is an option to append **Two tables or Three or more tables**.

Leave Two tables selected since we are appending just two tables.

50. Select International Sales from the drop down and click **OK**.

The screenshot shows the Power BI Desktop interface. In the center, the 'Sales' query is selected in the 'Queries' pane. An 'Append' dialog box is open over the main workspace. The 'Append' dialog has 'Two tables' selected and 'International Sales' chosen from the 'Table to append' dropdown. The 'OK' button in the dialog is highlighted with a yellow box. The ribbon shows the 'Home' tab is selected, and the 'Append Queries' button is highlighted with a red box. The right pane shows the 'QUERY SETTINGS' and 'PROPERTIES' sections.

You will now see a new column in the **Sales** table called **Country**. Since International Sales had the additional column for Country, Power BI Desktop added the column to the Sales table when it loaded the values from International Sales.

You see **null** values in the **Country** column by default for the Sales table rows because the column did not exist for the table with USA data. We will add the value “**USA**” as a data shaping operation.

51. From the ribbon select **Add Column -> Conditional Column**.

52. In the **Add Conditional Column** dialog, enter name of the column as “**CountryName**”.

53. Select **Country** from the **Column Name** dropdown.

54. Select **equals** from the **Operator** dropdown.

55. Enter **null** in the **Values** text.

56. Enter **USA** in the **Output** text.

57. Select the dropdown under **Otherwise** and pick **Select a column** option.

58. Select **Country** from the column dropdown.

59. Click **OK**.

This reads, if Country equals null then the value is USA else value is that of Country.

The screenshot shows the Power BI Desktop interface. The ribbon has 'Add Column' selected. Under the 'Conditional Column' section, 'Sales' is selected in the 'Queries [9]' list. The table view shows columns: ProductID, Date, Zip, Units, Revenue, and Country. All rows in the 'Country' column are currently null.

Add Conditional Column

Add a conditional column that is computed from the other columns or values.

The 'Add Conditional Column' dialog is open. The 'New column name' is set to 'CountryName'. The 'If' condition is set to 'Country' equals 'null' with 'Then' value 'USA'. The 'Otherwise' dropdown is set to 'Select a column' with 'Country' selected. The 'OK' button is highlighted.

60. You will see the **CountryName** column in the Query editor window.

The screenshot shows the Power BI Query Editor interface. On the left, the 'Queries [9]' pane lists 'Sales' as the selected query. The main area displays a table with columns: ProductID, Date, Zip, Units, Revenue, Country, and CountryName. The 'CountryName' column is highlighted with a red box. The 'APPLIED STEPS' pane on the right shows the step 'Added Conditional Column'.

The original **Country** column is only required as a temporary column. It is not required in the final table for analysis and can be removed.

61. Right click on the **Country** column and select **Remove** as shown in the figure.

We can now rename **CountryName** column to **Country**.

62. Right click on the **CountryName** column and rename to **Country**.

63. Using **Home -> Data Type**, change the **data type** of the **Country** column to type **Text**.

When the data is refreshed, it will process through all the “Applied Steps” that you have created.

The screenshot shows the Power BI Query Editor interface. On the left, the 'Queries [9]' pane lists 'Sales' as the selected query. The main area displays a table with columns: ProductID, Date, Zip, Units, Revenue, Country, and CountryName. The 'Country' column is highlighted with a red box, and its context menu is open, showing options like Copy, Remove, Remove Other Columns, Duplicate Column, Add Column From Examples..., Remove Duplicates, Remove Errors, Change Type, and Transform. The 'APPLIED STEPS' pane on the right shows the step 'Added Conditional Column'.

The newly named **Country** column will have names for all countries, including the USA. You can validate this by clicking on the drop down next to **Country** column to see the unique values.

64. At first, you will only see USA data. Click on **Load more** to validate you have data from all 7 countries.

65. Click **OK** to close this filter.

Queries [9]

Sales

ProductID	Date	Zip	Units	Revenue	Country
1076	1/20/2011	72638			
1076	1/21/2011	47577			
1076	1/28/2011	34653			
1076	1/31/2011	84014			
1076	2/1/2011	75070			
1076	2/1/2011	87031			
1076	2/3/2011	72019			
1076	2/3/2011	72086			
1076	2/3/2011	77089			
1076	2/9/2011	07649			
1076	2/11/2011	79705			
1076	2/14/2011	92624			
1076	2/22/2011	08527			
1076	2/22/2011	08816			
1076	2/23/2011	24740			
1076	2/24/2011	63023			
1076	2/25/2011	32503			
1076	2/25/2011	93523			
1076	2/25/2011	93657			

Typically, when exploring data, we load a subset of data. There are multiple ways to do this. From the ribbon, select **Home -> Keep Rows -> Keep Top Rows OR Home -> Keep Rows -> Keep Bottom Rows OR Home -> Keep Rows -> Keep Range of Rows**. You can use any of these options to filter down to a subset of data.

Our dataset has data from 2011 to 2017. For our analysis we want to start with the last 3 years of data (2015-2017). We don't know how many rows. We can filter by year to get the subset.

66. Select the **arrow** next to **Date** in **Sales** Query.

67. Select **Date Filters -> In the Previous...**

68. Filter Rows dialog opens. Enter **3** in the text box next to **is in the previous**.

69. Select **years** from the dropdown.

70. Select **OK**.

Queries [9]

Sales

ProductID	Date	Zip	Units	Revenue
1076	1/20/2011	72638		
1076	1/21/2011	47577		
1076	1/28/2011	34653		
1076	1/31/2011	84014		
1076	2/1/2011	75070		
1076	2/1/2011	87031		

Date Filters

Filter Rows

Keep rows where 'Date'

is in the previous 3 years

In the Previous...

Now that International Sales data is appended to Sales, we don't need the International Sales table to load to the data model. Let's prevent International Sales table from loading to the data model.

71. From the Queries panel on the left, select **International Sales** query.
72. Right click and select **Enable Load**. This will disable loading International Sales.

Note: The appropriate data from the International Sales table will load into the Sales table each time the model is refreshed. By removing the International Sales table, we are preventing duplicate data from loading into the model and increasing its file size. In some instances, storing very large amounts of data affects the data model performance.

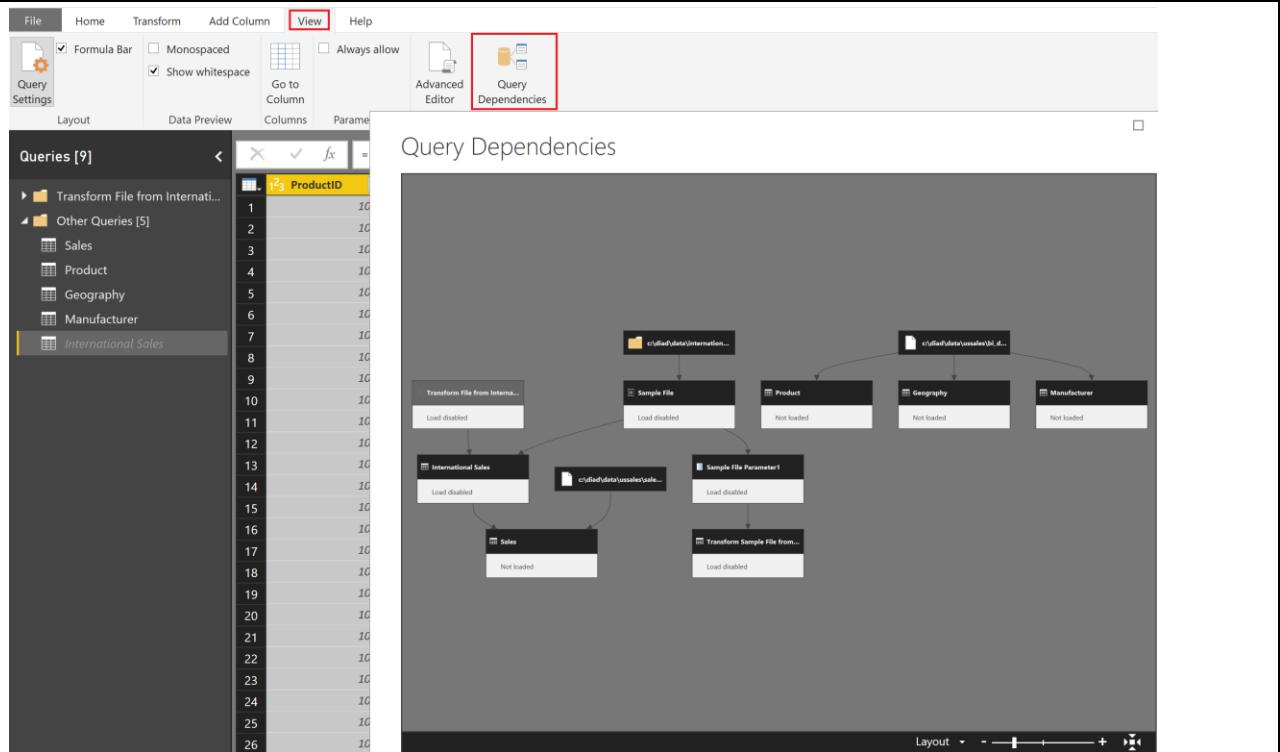
The screenshot shows the 'Queries [9]' pane in Power BI. On the right, there is a preview of a table with columns 'ProductID' and 'ProductName'. The 'ProductID' column has values 1 through 7. Below the preview is a context menu with several options: 'Copy', 'Paste', 'Delete', 'Rename', 'Enable load' (which is checked with a red box around it), 'Include in report refresh' (also checked), and 'Duplicate'.

73. From the ribbon select View -> Query Dependencies.

This opens Query Dependencies dialog. The dialog shows the source of each of the query and dependencies. E.g. We see that Sales query has a csv file source and it has a dependency on International Sales query. This is a useful self-document that can be used to share knowledge with your team members.

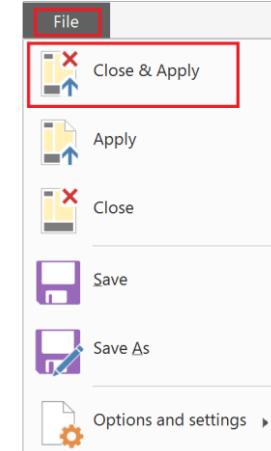
74. Select Close in the dialog.

Query Dependencies view can be zoomed in and out as needed.



You have successfully completed import and data shaping operations and are ready to load the data into the Power BI Desktop data model which allows you to visualize the data.

75. Click on File -> Close & Apply.

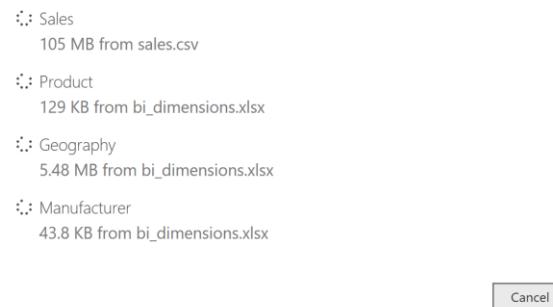


All the data will be loaded in memory within Power BI Desktop. You will see the progress dialog with the number of rows being loaded in each table as shown in the Figure.

Note: It may take several minutes to load all the tables.

76. Select **File -> Save** to save the file after the data loading is completed. Name the file as "**MyFirstPowerBIModel**". Save the file in **\DIAD\Reports** folder.

Apply query changes



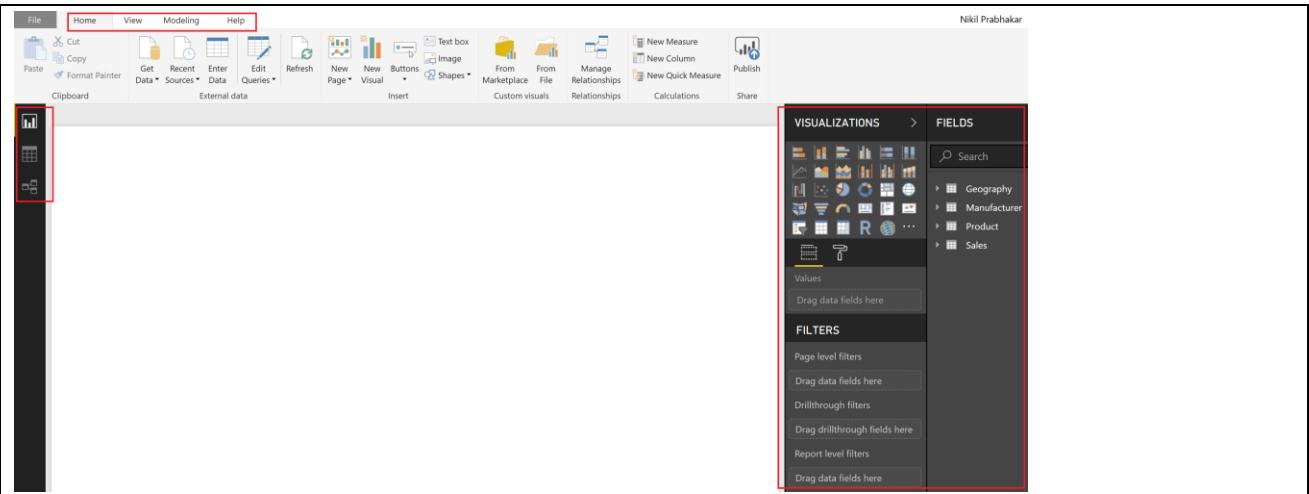
Power BI Desktop – Data Modeling and Exploration

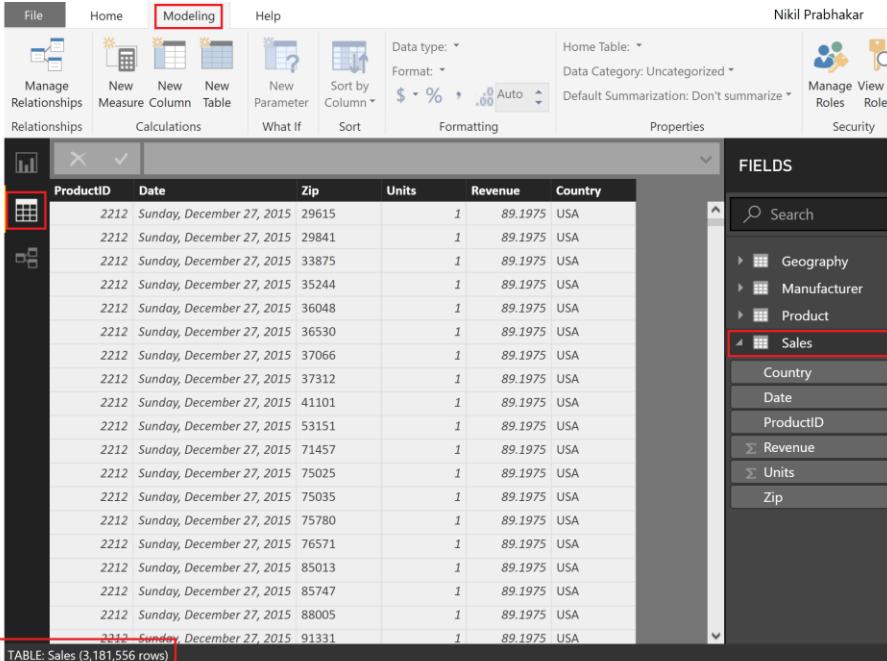
In this section, we will learn the [key parts of the Power BI desktop](#), to model and explore the data and build visuals.

Power BI Desktop - Layout

You will land on the main **Power BI Desktop** window. Let's get familiar with the distinct sections available in the Power BI Window.

1. On the top, you see the **Home** tab where the most common operations you perform are available.
2. **View** tab has options to format the page layout.
3. **Modeling** tab in the ribbon enables additional data modeling capabilities like adding custom columns and calculated measures.



<p>4. Help tab provides self-help options like guided learning, training videos and links to online communities, partner showcase, solution templates.</p>	
<p>5. Help tab provides self-help options like guided learning, training videos and links to online communities, partner showcase, solution templates.</p>	
<p>6. The Fields window on the right panel, is where you will see the list of tables which were generated from the queries. Click the ➤ icon next to a table name to expand to the field list for that table.</p> <p>7. Visualizations panel on the right allows you to select visualizations, add values to the visuals and add columns to the axes or filters.</p> <p>8. The center white space is the canvas where you will be creating visuals.</p> <p>9. On the left side, you have three icons, Report, Data and Relationships. If you hover over the icons, you can see the tool tips. Switching between these allows you to see the data and the relationships between the tables.</p> <p>10. Click on the Data icon. Expand Sales table in the Fields as shown in the figure Scroll up and down to notice how fast you can navigate ~ 3 Million rows.</p>	 <p>The screenshot shows the Power BI desktop application. The ribbon at the top has the 'Modeling' tab selected. The main workspace shows a table with columns: ProductID, Date, Zip, Units, Revenue, and Country. The data consists of approximately 3 million rows. To the right, the 'FIELDS' pane is open, showing a tree view of available tables: Geography, Manufacturer, Product, and Sales. The 'Sales' table is expanded, and its fields (Country, Date, ProductID, Revenue, Units, Zip) are listed. A red box highlights the 'Data' icon in the ribbon and the 'Sales' table in the Fields pane.</p>

11. Click on the **Relationships** icon on the left panel of Power BI Desktop.

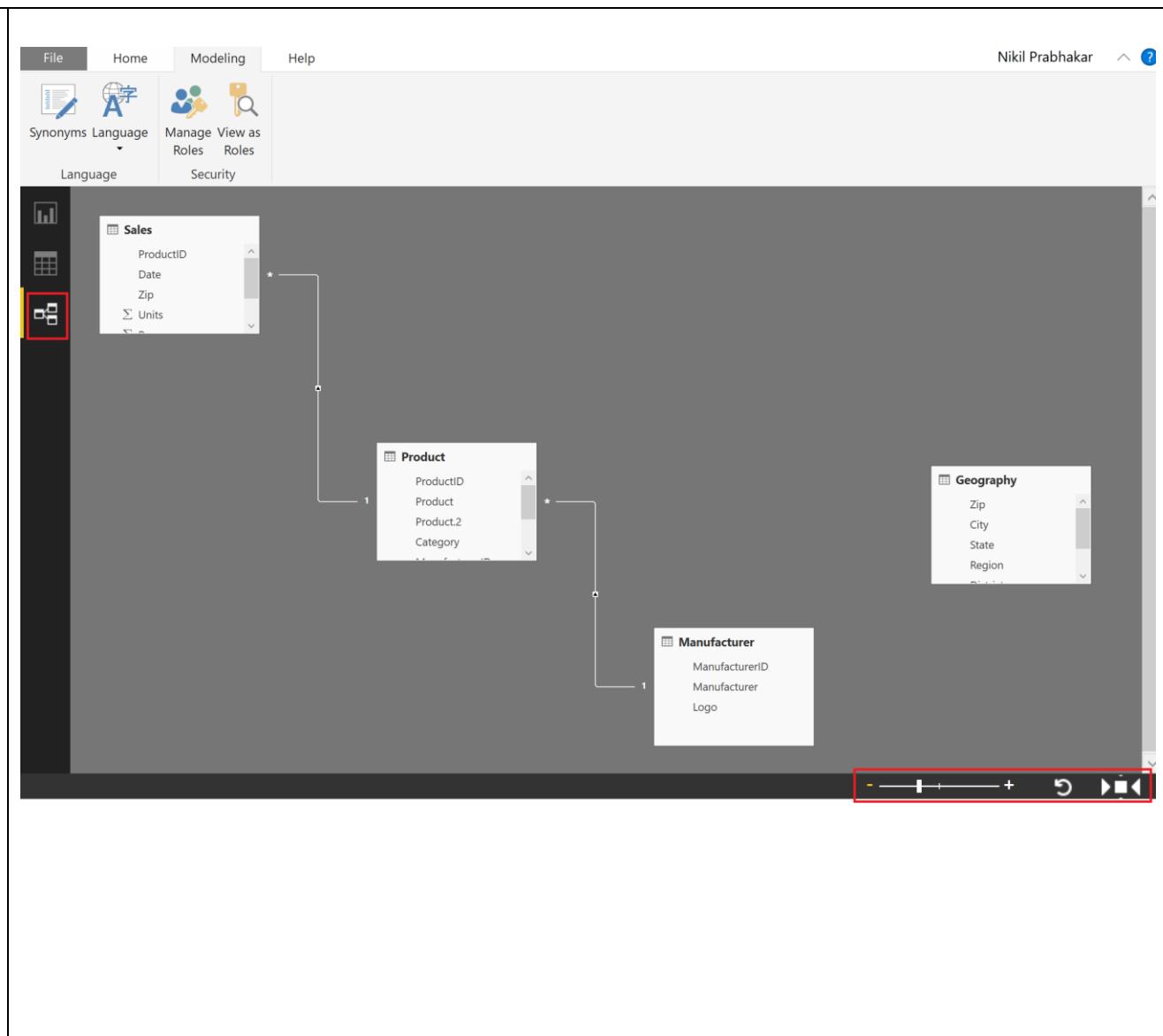
You will see the tables you have imported along with some Relationships. The Power BI Desktop automatically infers relationships between the tables.

- Relationship is created between Sales and Product tables using ProductID column.
- Relationship is created between Product and Manufacturer tables using ManufacturerID column.

Power BI Desktop supports 1 to many or 1 to 1 relationships between the tables. This means one of the tables involved in the relationship should have a unique set of values.

Notice there is no relationship between the Geography and Sales tables. If you want to explore sales data across state or city or country, you will need to setup the relationship between the Geography and Sales tables. You will create the relationship shortly.

Note: Tables may not appear as shown in the figure. You can zoom in and out of the Relationships page by dragging the zoom slider in the bottom right corner of the window. Also, if want to ensure you are seeing all the tables, use the fit to page icon:





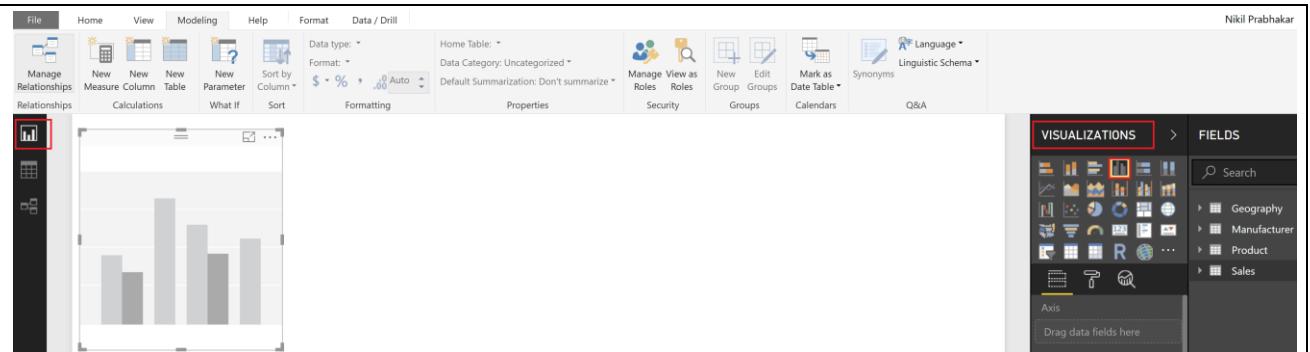
. Drag and move the tables to appear as shown in the figure.

Power BI Desktop - Modeling and Data exploration

In this section, you will do initial data exploration along with model enhancements to create a calculated column and set up relationships.

We loaded data from different countries. So let's start with analyzing sales by country

1. Click on the **Report** icon on the left panel to navigate to the Report view.
2. Select the **Clustered column chart** visual in **Visualizations** as shown in the screenshot.

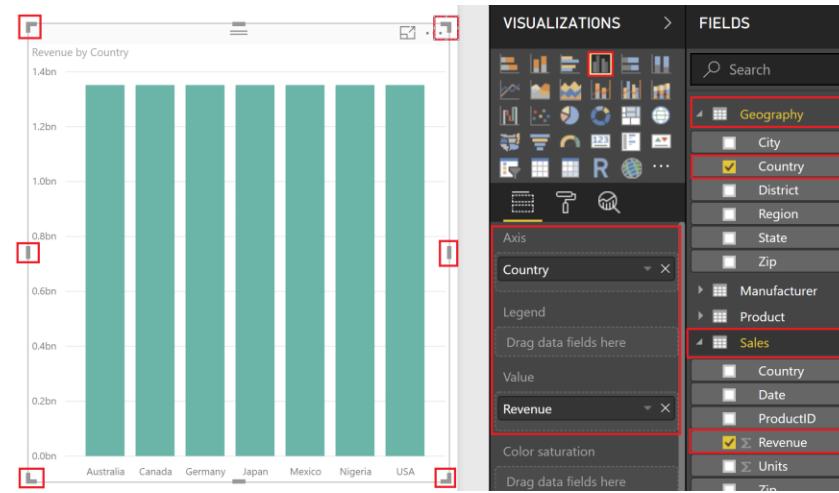


3. From the **FIELDS** section, expand **Geography** table and select **Country** field.
4. From the **FIELDS** section, expand **Sales** table and select **Revenue** field.
5. **Resize** the visual as needed by dragging the edges.

Notice revenue of each country is the same. This is because there is no relationship between Sales and Geography tables. Let's create one.

Note: You now need to set up the correct relationship between these tables.

To create a relationship between the two

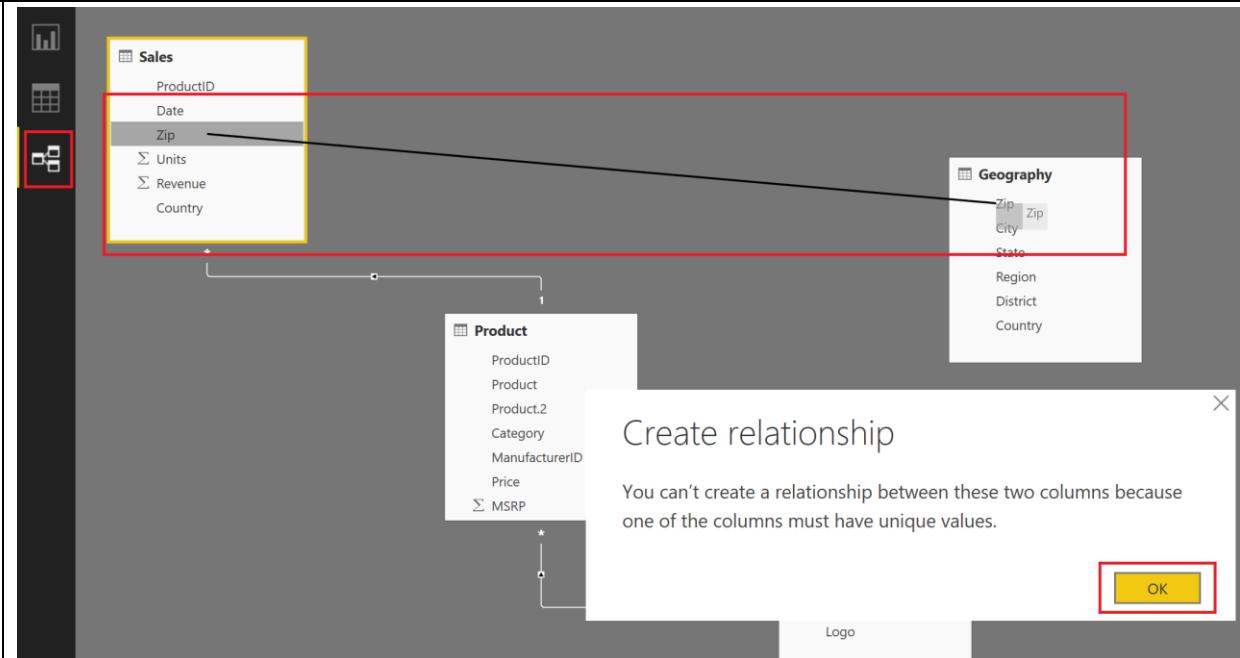


tables we need a “joining” or “relating” column.

6. Click on the **Relationships** icon on the left panel to navigate to the Relationship view.

7. Sales data is by Zip code. Hence, we need to connect Zip column from Sales table with Zip column in Geography table. You can do this by dragging the **Zip** field in **Sales** table and connecting the line with **Zip** field in **Geography** table.

You will see a message stating that you can't create a relationship because one of the columns must have unique values. The reason we don't have unique Zip values in Geography is because multiple countries could have the same Zip code. Let's concatenate Zip and Country columns to create a unique value field.



We need to create a new column in both the Geography table and the Sales table that combines “Zip” and “Country”. Let us start by creating a new column in the Sales table.

8. Click on the **Report** icon on the left panel to navigate to the Report view.
9. In the **Fields** section, click on the ellipsis next to **Sales** table. Select “**New Column**” as shown in the figure.

You will see a formula bar appear as shown in the screenshot to help create this new column.

10. We can combine or concatenate the Zip and Country columns into a new column called ZipCountry separated by a comma. Let us create this column called **ZipCountry** using the following calculation in the editor.

ZipCountry = Sales[Zip] & "," & Sales[Country]

11. Once you are done entering the formula click in the check mark on the left side of the formula bar.

IMPORTANT!

If you get an error creating a new column here, make sure your Zip column is the Text Data Type.

You will notice that as you type the expression the Power BI desktop guides you to choose the right columns using a Technology called Intellisense. As you type half way through you can select the right column by double clicking on it using your mouse or by continuing to hit tab until you see the correct name.

The language you used to create this new column is called DAX (Data Analysis Expression) which is very similar to writing expressions in Excel where you are concatenating the two columns (Zip and Country) in each row by using the “&” symbol.

You will see a new column ZipCountry in Sales table. The icon with a (fx) indicates you have a column that contains an expression, also referred to as calculated column.

You can also create a new column by selecting the table and then clicking on **Modeling > New Column** from the ribbon. Let us use this method to create a “ZipCountry” column in the Geography table.

The screenshot shows the Power BI Desktop interface. The ribbon at the top has the 'Modeling' tab selected, indicated by a red box. In the center, a bar chart titled 'Revenue by Country' is displayed, showing sales for Australia, Canada, Germany, Japan, Mexico, Nigeria, and USA. The Y-axis ranges from 0.0bn to 1.0bn. To the right of the chart, the 'FIELDS' pane is open, showing a list of fields under the 'Sales' table. A red box highlights the 'ZipCountry' field, which is a calculated column. The formula for 'ZipCountry' is visible in the formula bar: `ZipCountry = Sales[Zip] & "," & Sales[Country]`. The 'Axis' section of the Fields pane shows 'Country' assigned to the X-axis. The 'Legend' section shows 'Revenue' checked. The 'Value' section shows 'ZipCountry' checked.

12. From **Fields** section, select **Geography** table and from the ribbon select **Modeling** -> **New Column** as shown in the figure.

13. Formula bar appears. Enter the following DAX expression in the formula bar:

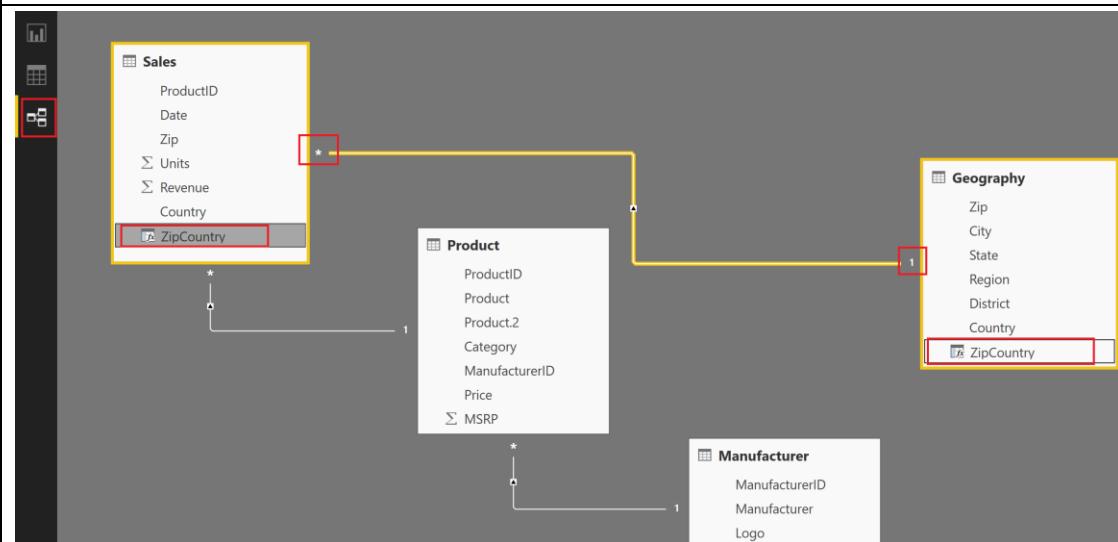
ZipCountry = Geography[Zip] & "," & Geography[Country]

You will see a new column ZipCountry in Geography table. The final step is to setup the relationship between the two tables using the newly created "ZipCountry" columns in each of these tables.

14. Click on the **Relationships** icon on the left panel to navigate to the Relationship view.

15. Drag **ZipCountry** field from **Sales** table and connect it to **ZipCountry** field in **Geography** table.

Now we have successfully created a relationship. The number 1 next to Geography indicates it is on the one side of the relationship and * next to Sales indicates it is on the many side of the relationship.

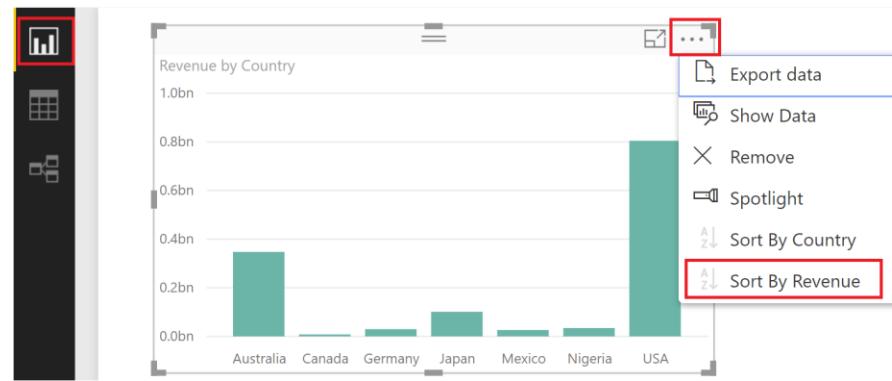


16. Click on the **Report** icon on the left panel to navigate to the Report view. Notice the clustered column chart we created earlier. It shows different sales for each country. USA has the most sales followed by Australia and Japan.

By default, it is sorted by Country name.

17. Click on the **ellipsis** on the top right corner of the visual.

18. Select **Sort By Revenue**. Notice the change.

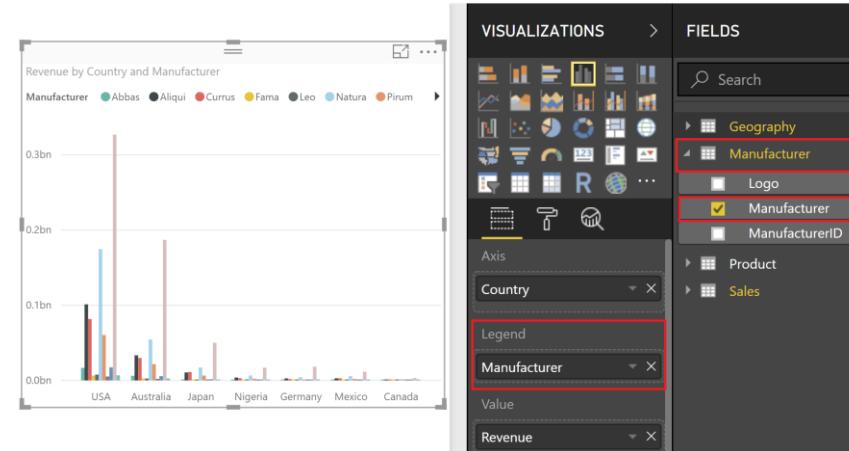


Now let's analysis Sales by Country by Manufacturer and see if we get more insights.

19. With the Clustered column chart selected, from the **Fields** section expand **Manufacturer** table.

20. Drag and drop **Manufacturer** field to **Legend** section.

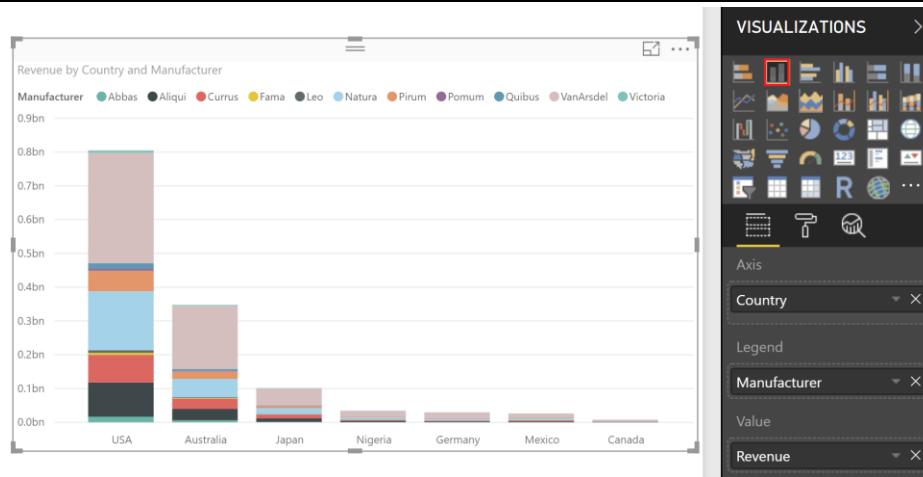
There are many manufacturers and clustered column chart does not represent the information well. Let's change the visual.



21. With the Clustered column chart selected, from the **VISUALIZATIONS** section select **Stacked column chart** visual.

22. **Resize** the visual as needed.

Now we are able to figure out the top manufacturers by country. It will be nice to narrow down to the top 5 competitors to better analyze the data.



23. With Clustered column chart selected, scroll down to the **Visual level filters** section under **VISUALIZATIONS** panel.

24. Expand **Manufacturer** under Visual level filters.

25. From the **Filter Type** drop down select **Top N**.

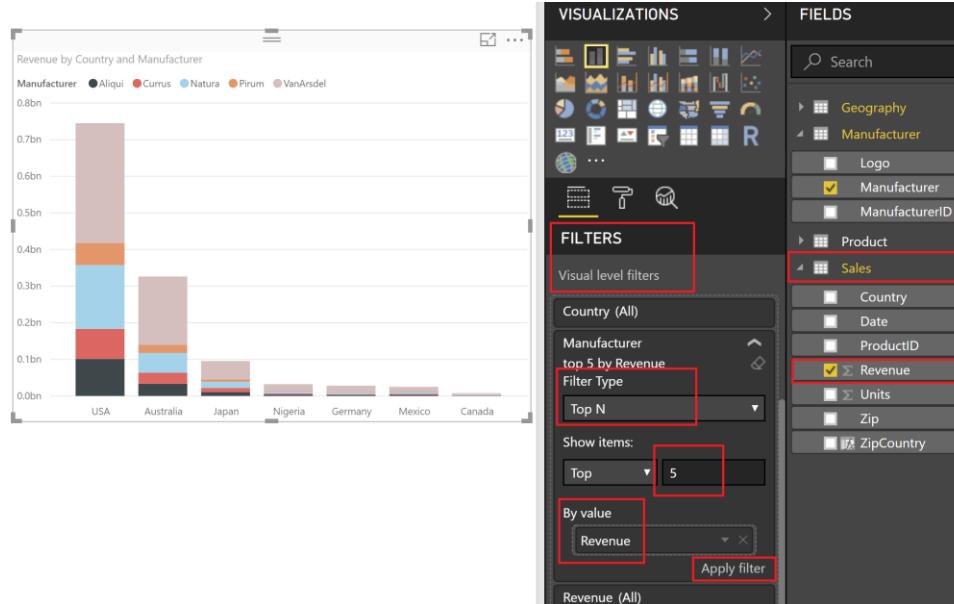
26. Enter **5** in the text box next to Top.

27. From the **FIELDS** section expand **Sales** table.

28. Drag and drop **Revenue** field to **By value** section.

29. Select **Apply filter**.

Notice now the visual is filtered to display the Top 5 manufacturers by Revenue. We see that VanArsdel has higher percentage of sales in Australia compared to other countries.



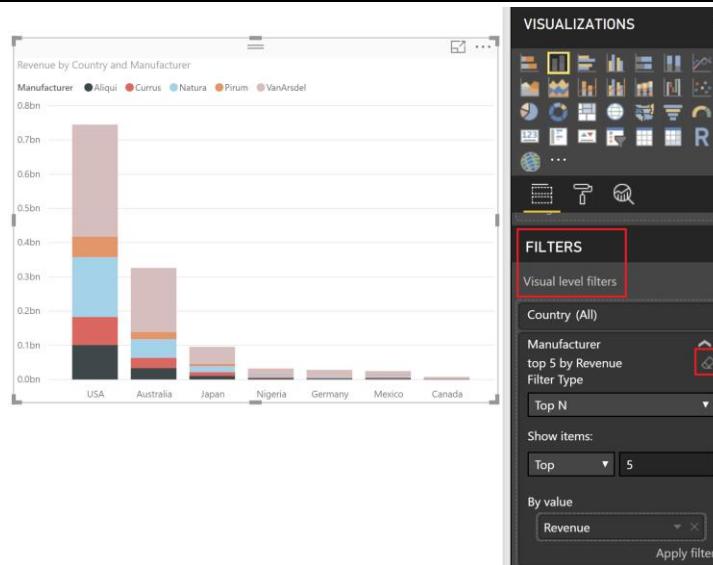
We are interested in the top 5 competitors by revenue. Let's group them so we don't have to add a filter in every visual.

Before we do that let's remove the Top 5 visual level filter.

30. With Clustered column chart selected, scroll down to the **Visual level filters** section in **VISUALIZATIONS** panel.

31. Expand **Manufacturer** under Visual level filters.

32. Hover over and select the **Clear filter** icon (erase) next to Manufacturer field.



33. From the **FIELDS** section expand **Manufacturer** table.

34. Select **Manufacturer** field.

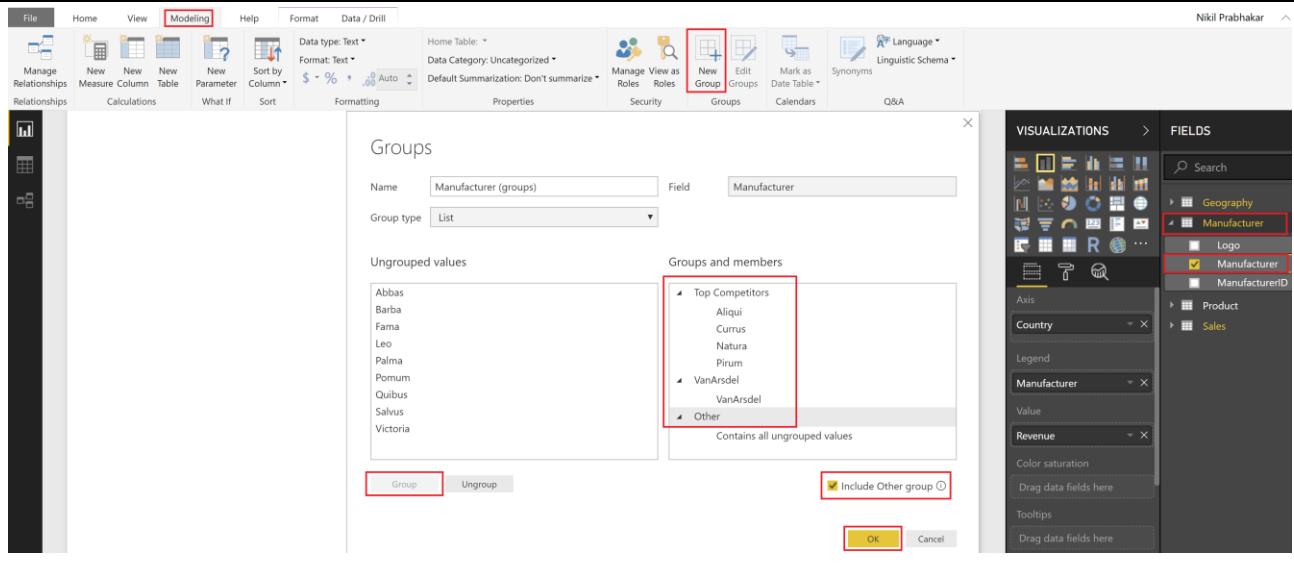
35. From the ribbon select **Modeling** -> **New Group**. Groups dialog opens.

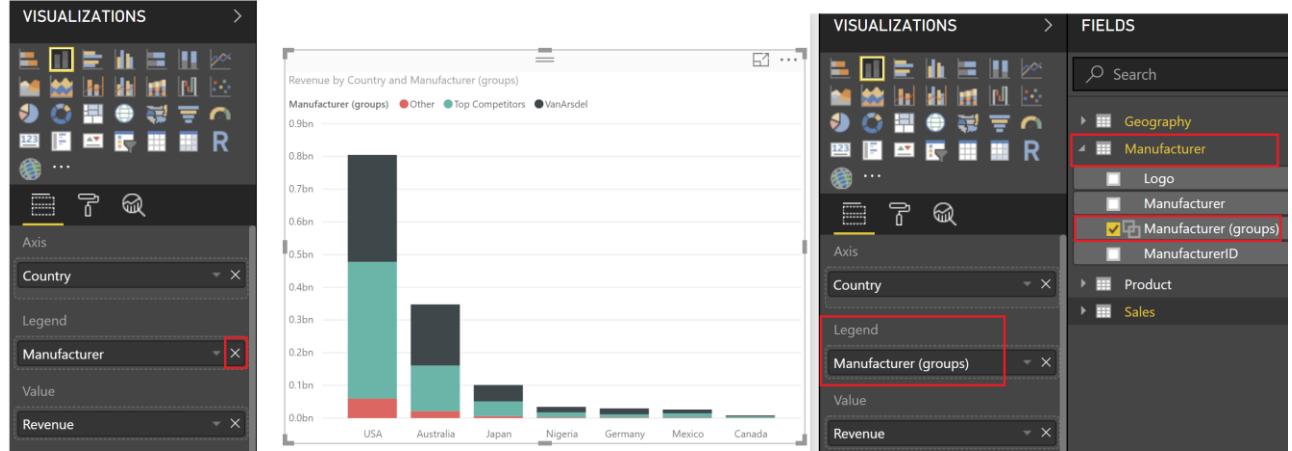
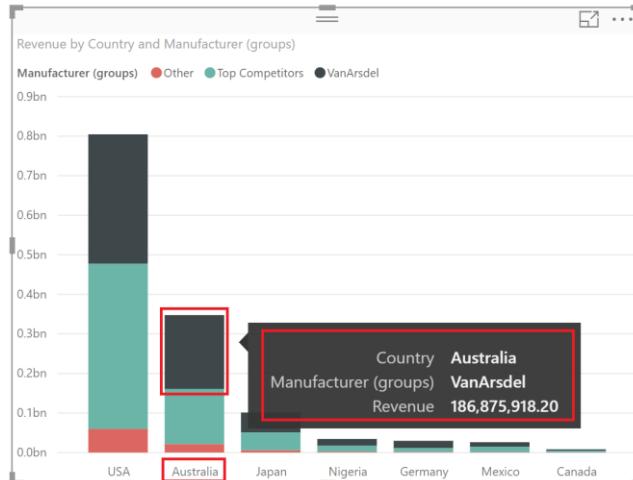
36. In the Ungrouped values section, using Ctrl key, select **Aliqui, Currus, Natura and Pirum**.

37. Select **Group** button. Notice a new group is added in the Groups and members section.

38. Double click the newly created group and **rename it to Top Competitors**.

39. Select **VanArsdel** from the Ungrouped values section and select **Group** button to create **VanArsdel Group**.



<p>40. Select the check box Include Other group. This will create an Other group which will include all the other manufacturers.</p> <p>41. Select OK to close Groups dialog.</p>	
<p>42. With the Stacked column chart selected, click on the X next to Manufacturer in the Legend section. This will remove Manufacturer.</p> <p>43. From the FIELDS section, drag the newly created Manufacturer (groups) to the Legend section.</p> <p>Now we can clearly see that VanArsdel has nearly 50% share in Australia.</p>	 <p>The screenshot shows the Power BI interface. On the left, the 'Visualizations' pane lists various chart types. In the center, a stacked bar chart titled 'Revenue by Country and Manufacturer (groups)' displays revenue for USA, Australia, Japan, Nigeria, Germany, Mexico, and Canada. The USA bar is red, Australia is teal, Japan is dark grey, and the others are very small. The legend at the bottom shows 'Other' (red), 'Top Competitors' (teal), and 'VanArsdel' (dark grey). On the right, the 'Fields' pane shows a tree view of fields under 'Geography'. Under 'Manufacturer', there are 'Logo', 'Manufacturer', and 'Manufacturer (groups)'. 'Manufacturer (groups)' is checked. A red box highlights the 'X' button next to 'Manufacturer' in the legend and the 'Manufacturer (groups)' entry in the fields pane.</p>
<p>44. Hover over VanArsdel section of the Australia column. You will see a tooltip with the Revenue.</p> <p>45. Hover over Top Competitors section of Australia column to get the Revenue value.</p> <p>Let's find a better way to view the data without creating a new visual.</p>	 <p>The screenshot shows the same stacked bar chart. The 'Australia' bar is highlighted with a red box. A tooltip appears over the dark grey 'VanArsdel' segment of the Australia bar, displaying the text: 'Country: Australia', 'Manufacturer (groups): VanArsdel', and 'Revenue: 186,875,918.20'. Another red box highlights the 'Top Competitors' segment of the Australia bar.</p>

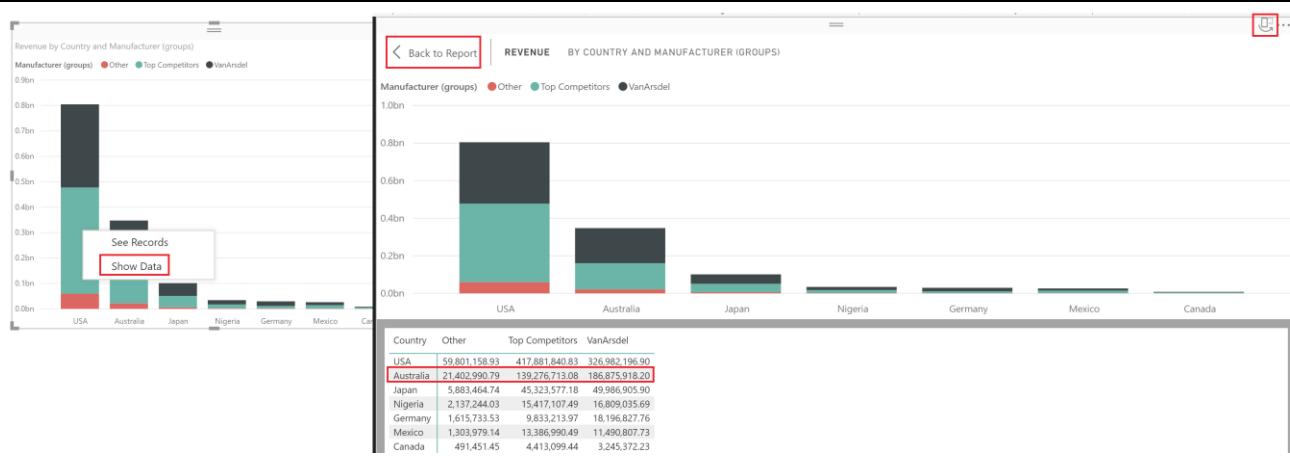
46. Hover over one of the columns and right click.

47. Select **Show Data**.

You will be Focus mode with the chart displayed on top and the data displayed below. It is easy to see that VanArsdel has a big percent of the Australian market.

48. You can use the icon on the top right corner to switch to **vertical layout**. In this layout you will view the chart on the left and data on the right panel.

49. Select **Back to Report** to go back to Report canvas.



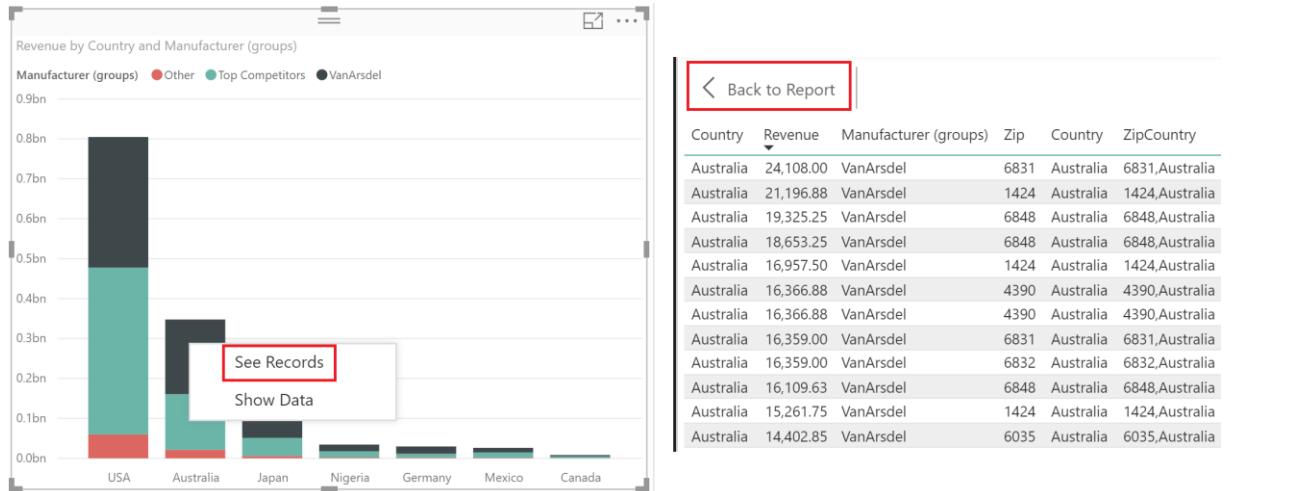
50. There is also an option to see the records. Hover over one of the columns and **right click**.

51. This time select **See Records**.

You will see the detailed records.

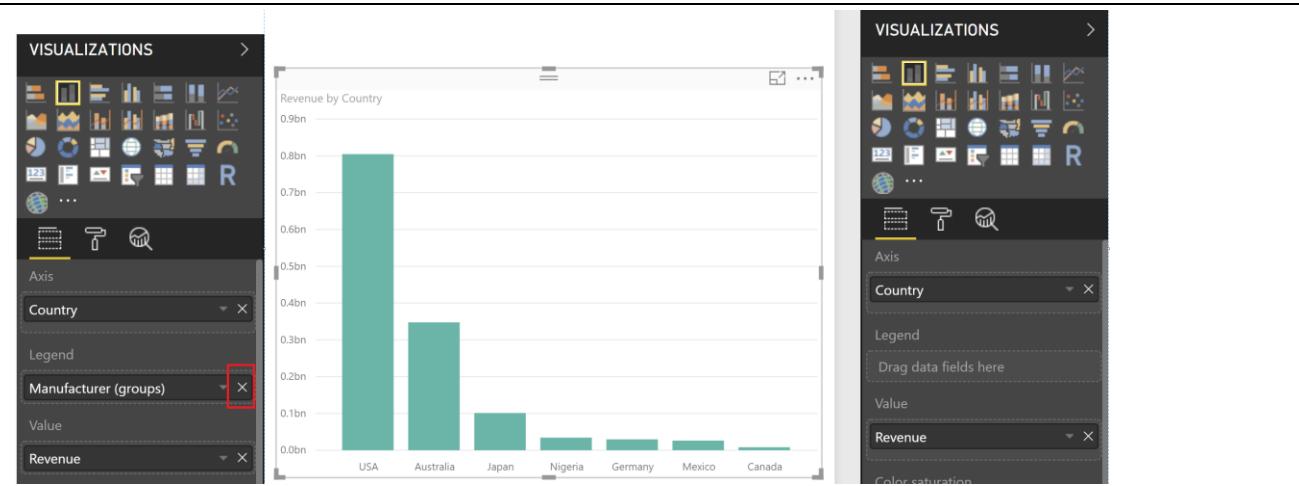
52. Select **Back to Report** to go back to Report canvas.

Note: See Records and Show Data options are also available in the ribbon under **Data/Drill** menu option.



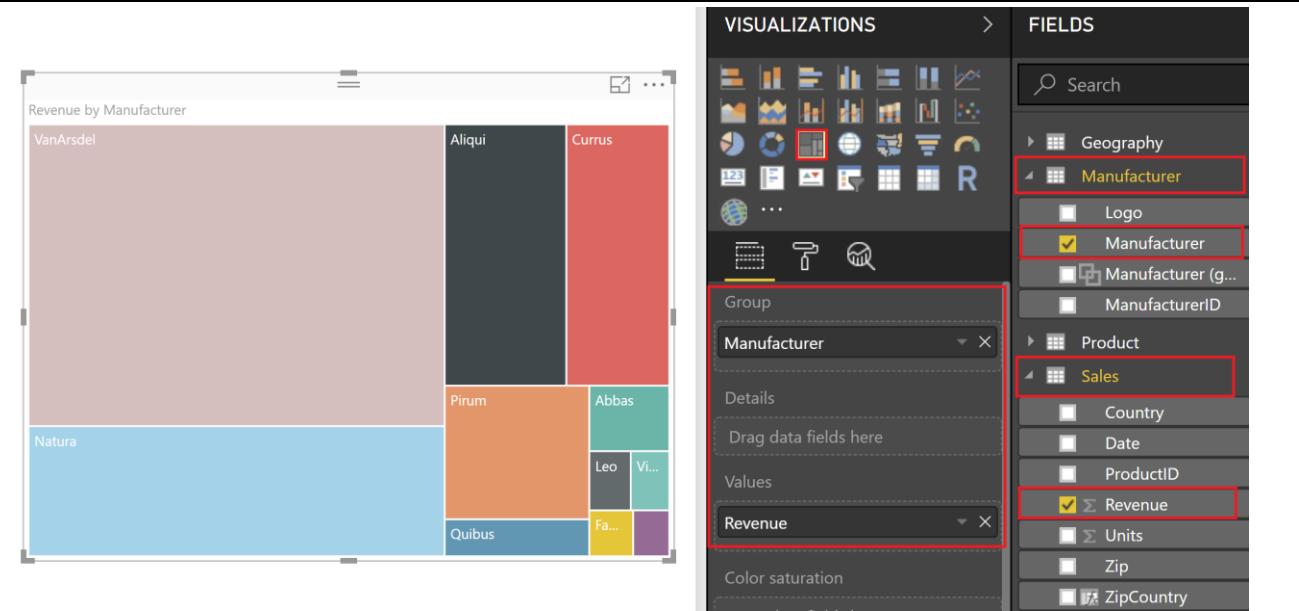
Let's remove Manufacturer from the Legend and create a visual which represents Revenue by Manufacturer and check if it will help with any new insights.

53. With the Stacked column chart selected, click on the X next to **Manufacturer (groups)** in the **Legend** section. This will remove Manufacturer.

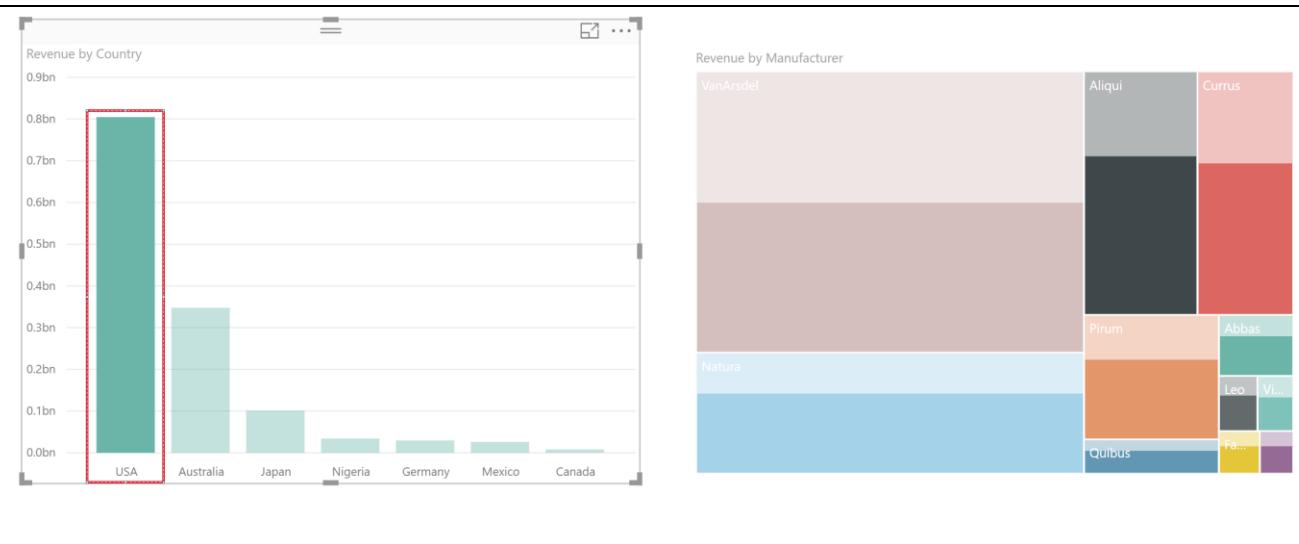


54. Click on the white space in the canvas. From the **VISUALIZATIONS** section, select **Treemap** visual.
55. From the **FIELDS** section, expand **Manufacturer** table and select **Manufacturer** field.
56. From the **FIELDS** section, expand **Sales** table and select **Revenue** field.
57. **Resize** the visual as needed.

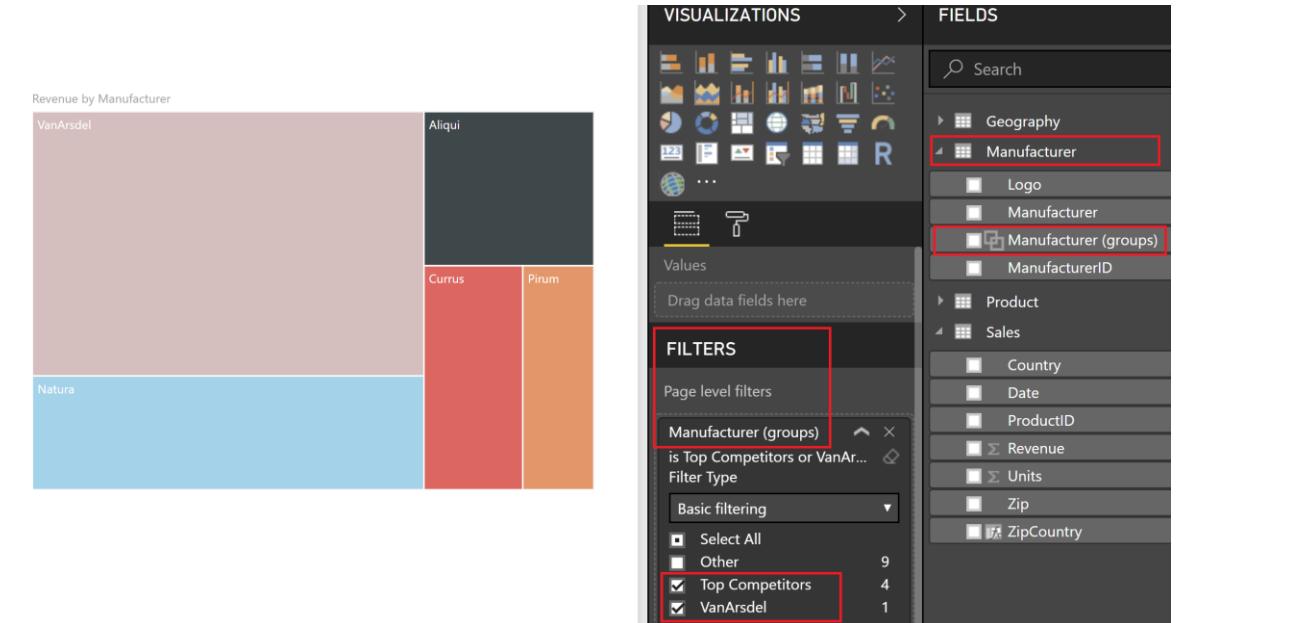
We have Revenue by Manufacturer. Let's figure out the interaction between the Stacked column chart and the Treemap visuals.



58. Click on **USA** column in the Stacked column chart and notice the Highlighted section of Treemap updates.
 59. Click on **Australia** column in the Stacked Column chart and notice the Highlighted section of Treemap updates.
 60. Similarly, select **VanArsdel** in the Treemap and notice Stacked column chart is filtered. This confirms that VanArsdel has a big percent of the Australian market.
 61. To **remove the filter** select VanArsdel again.
 The interaction between visuals is called **cross filtering**.



- Previously we added Top 5 Visual level filter. Let's add a filter to the Page level, so we are working with the Top Competitors and VanArsdel and filter out the other manufacturers.
- Page level filters apply to all the visuals on the page whereas Visual level filter applies to a visual.
62. From the **FIELDS** section expand **Manufacturer** table.
 63. Drag **Manufacturer (groups)** field to **Page level filters** section under **VISUALIZATIONS** panel.
 64. Select **Top Competitors** and **VanArsdel**.



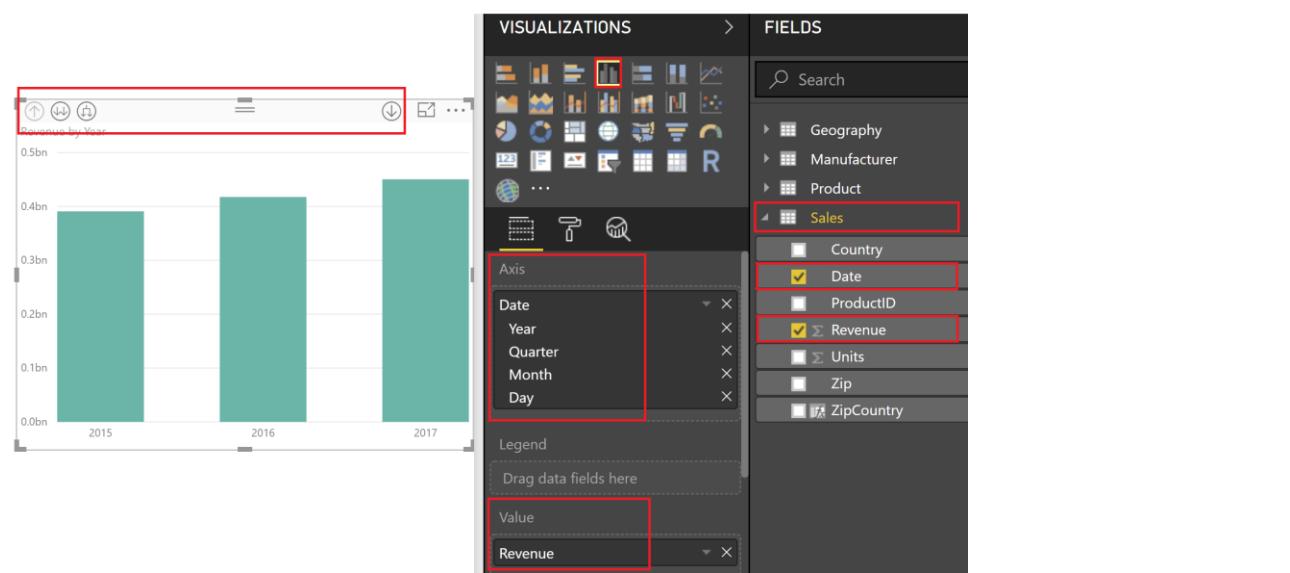
Let's add a visual that will provide sales information over time.

65. Click on the white space in the canvas. From the **FIELDS** section, expand **Sales** table.

66. Select **Date** field.

67. Select **Revenue** field.

Notice a Clustered column chart is created. Also notice in the **Axis** section, a date hierarchy is created. There are arrows on the top bar of the chart. This is used to navigate through the hierarchy.

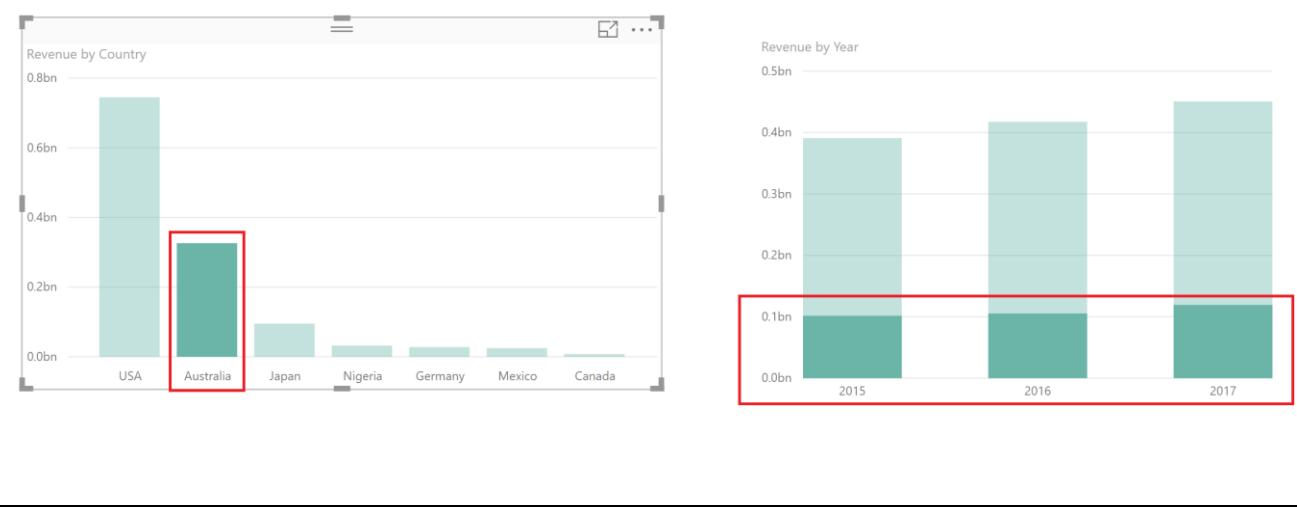


68. Click on **USA** column in the **Revenue by Country** visual. Notice sales is on the upward trend over time.

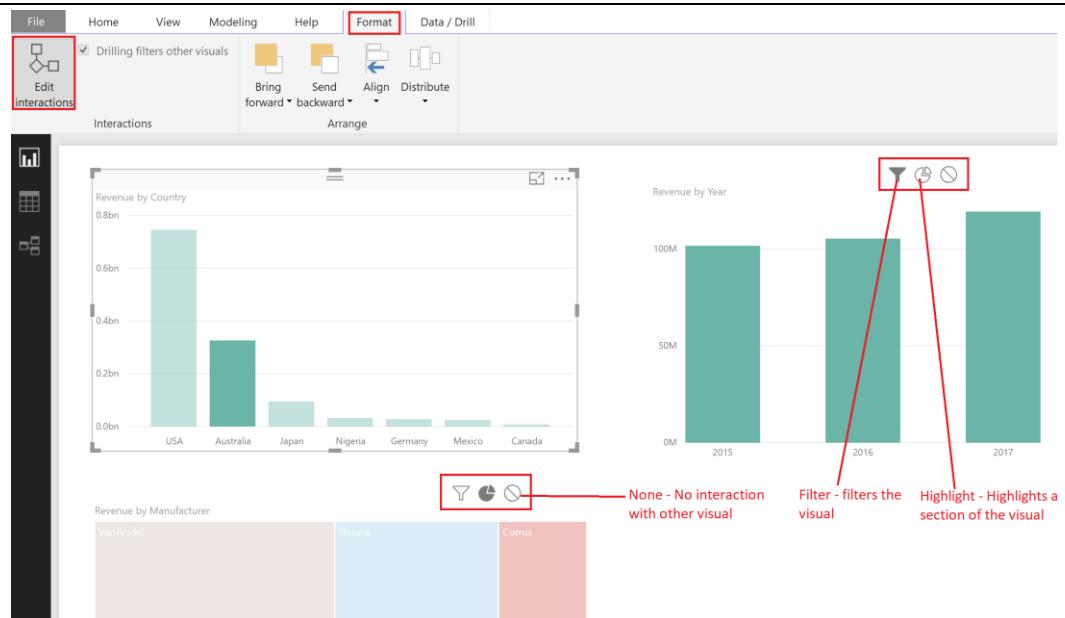
69. Click on **Australia** column in the **Revenue by Country** visual. Again, the trend is upwards.

70. We see a similar scenario with **Japan** as well.

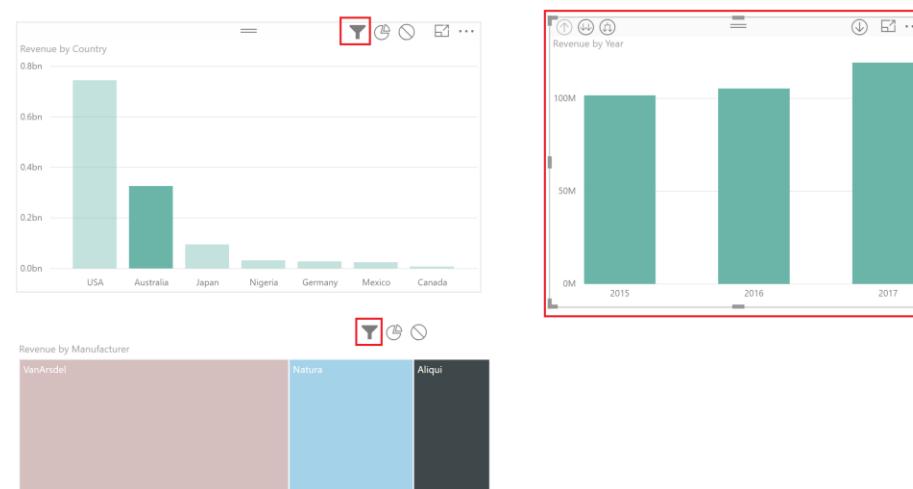
With the current interaction the visuals are slicing the data. It will be nice to filter data across visuals. This might give us a better perspective. Let's try that.



71. Click on **Australia** column in the **Revenue by Country** visual.
72. With the Revenue by Country visual selected, from the ribbon select **Format -> Edit Interactions**.
- Notice on the top right of the other two visuals we see new icons with the slice/highlight icon selected.
73. Select **filter icon** for **both** **visuals**.
- Notice now in both Revenue by Year and Revenue by Manufacturer data is filtered for Australia.



74. Now select **Revenue by Year** visual.
75. Select **filter icon** on the other **two** **visuals**.
76. Similarly, select **Revenue by Manufacturer** visual and select **filter icon** on the other **two** **visuals**.
- Once you are done, all the visuals should be in filter mode.
77. With the **Revenue by Manufacturer** visual selected, from the ribbon select **Format -> Edit Interactions** to remove the icons.



78. Click on **VanArsdel** in the **Revenue by Manufacturer** visual. Notice sales is on an upward trend over time.

79. Click on **Natura** column in the **Revenue by Manufacturer** visual. Notice sales in 2017 for Natura was on a downward trend.

Similarly, you can analyze other manufacturer's performance.



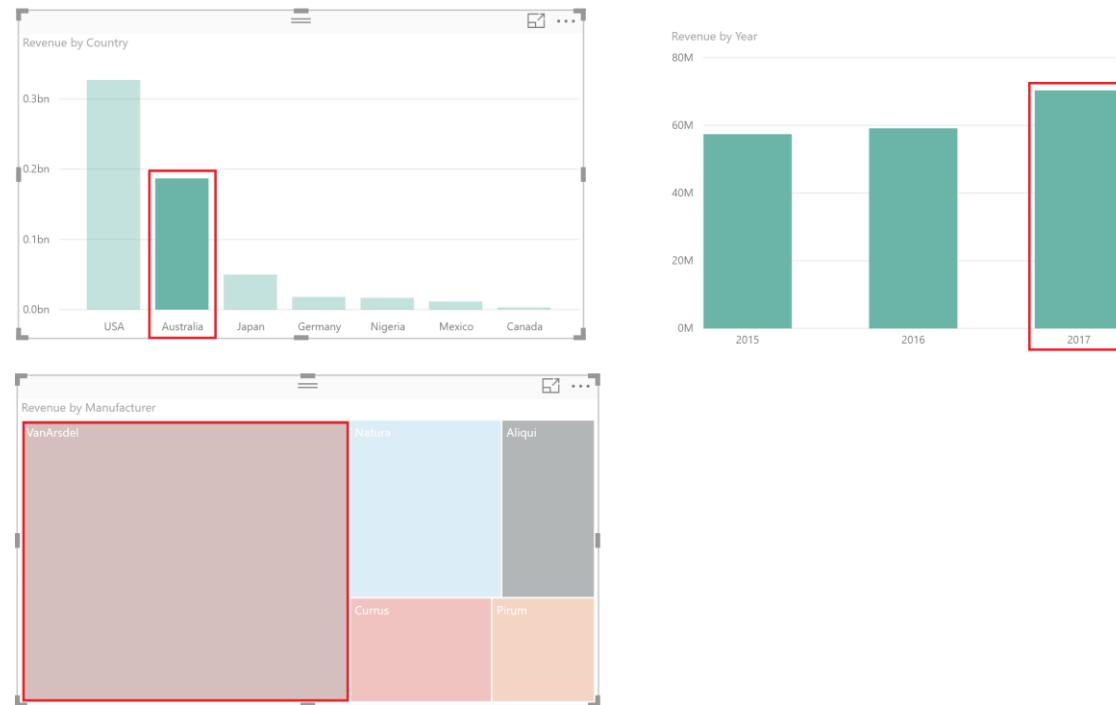
We had already noticed that VanArsdel has a big share of the market in Australia. Let's check how VanArsdel has done over time in Australia.

80. Click on **VanArsdel** in the **Revenue by Manufacturer** visual.

81. **Ctrl+Click** **Australia** column in **Revenue by Country** visual. Now we have filtered the charts by both VanArsdel and Australia. We see a spike in 2017 sales for VanArsdel in Australia.

82. Let's see what's happening in USA. **Click** **USA** column in **Revenue by Country** visual.

83. **Ctrl+Click** on **VanArsdel** in the **Revenue by Manufacturer** visual. Now we have filtered the charts by both VanArsdel and USA. We see a steady growth. Similarly, we can analyze data for different countries and manufactures and time frame.



We are intrigued by the spike in 2017 for VanArsdel in Australia. Let's investigate further.

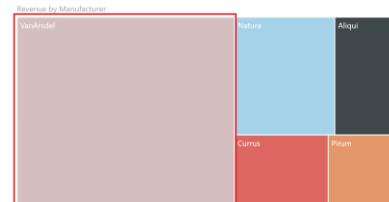
84. Click on **VanArsdel** in the **Revenue by Manufacturer** visual.

85. **Ctrl+Click Australia column in Revenue by Country** visual

86. Select the **arrow on the top right corner** of the **Revenue by Year** visual. This enables drill down capability.

87. Select **2017 column in Revenue by Year** visual.

Notice you have drilled down to quarter level of 2017. There is a big spike in the 4th quarter. Interesting let's dig further...

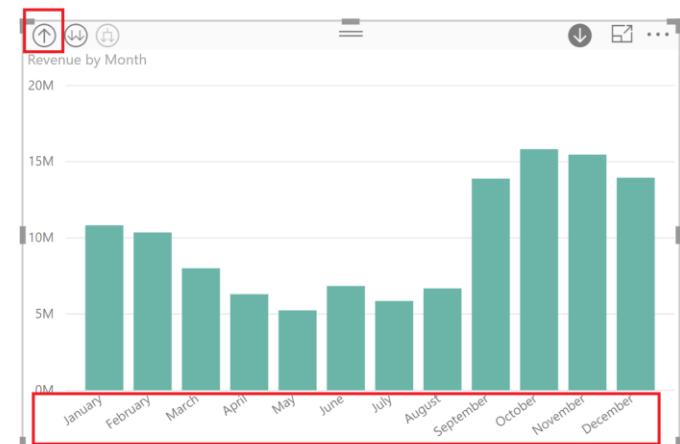


88. Click on the **second icon on the top left of Revenue by Year** visual. This drills down to the **next level of the hierarchy** which is month.

Looks like sales picked up in September and October and is holding steady since then. Ok this is interesting. Now is this a yearly trend. Let's check.

89. Click on the **first icon on the top left of Revenue by Year** visual to drill up to **Quarter level**.

90. Click on the **drill up icon** again to go up to **Year level**.



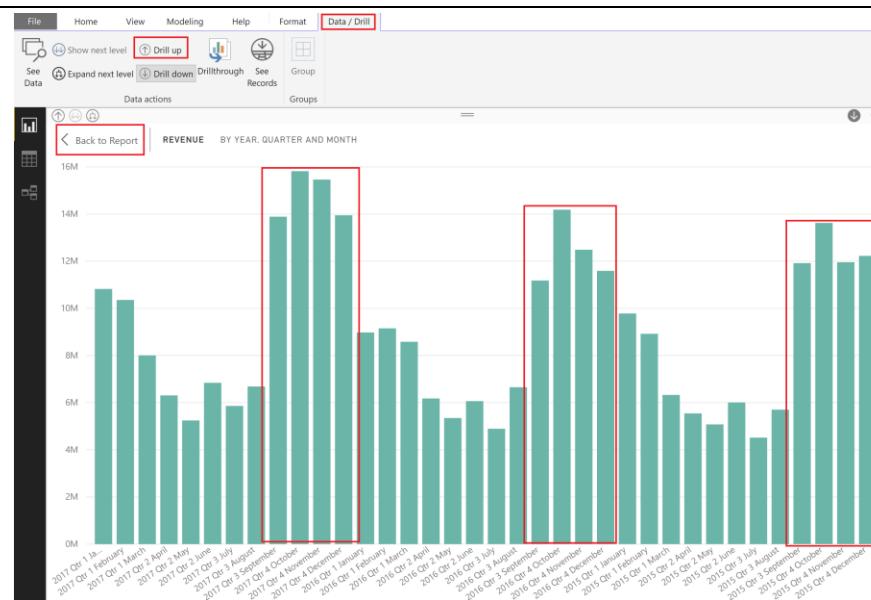
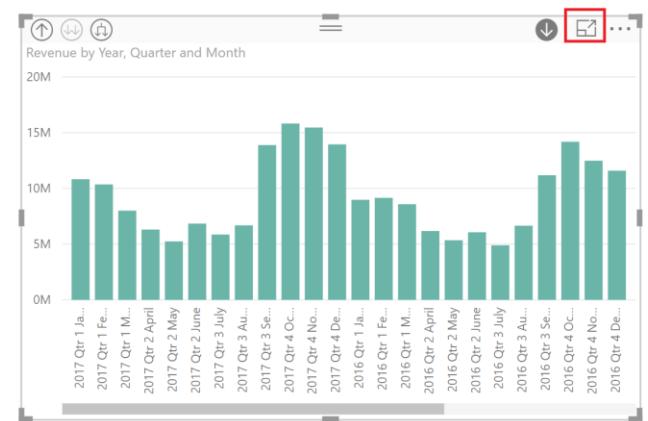
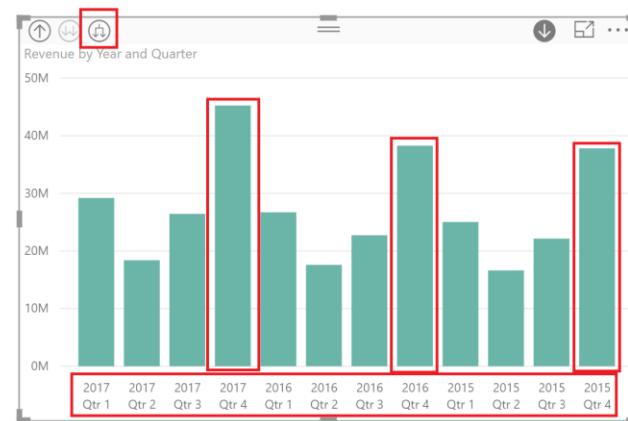
91. Click on the **third icon** on the **top left of Revenue by Year** visual. This expands down to the **next level of the hierarchy** which is quarter for all the years.

Notice 4th quarter sales have always been high but in 2017 there is a bigger spike in the 4th quarter.

92. Let's expand down to the month level. Click on the **third icon** on the **top left of Revenue by Year** visual. This expands down to the **next level of the hierarchy** which is month for all the years.

There is a lot of information on the visual and we must scroll left and right to compare.

93. Click on **focus mode icon** on the top right of **Revenue by Year** visual.



Power BI Desktop – Data Exploration Continued

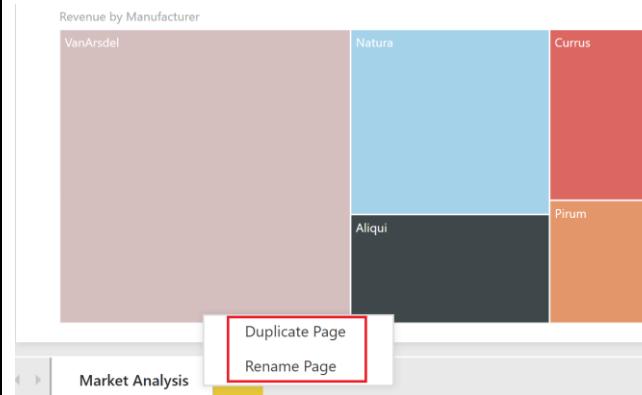
In this section, you will continue to explore the data. You will investigate to see if a product segment has an impact on sales.

At the end of the section, you will find that one of the reason for the spike in sales in Australia for the year 2017 is 158% growth of product Maximus UE-04.



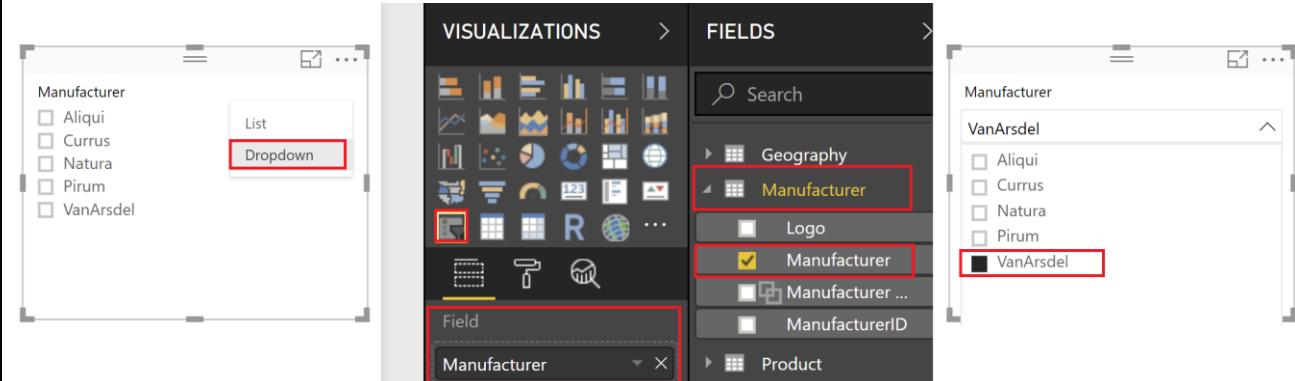
Let's continue to investigate our findings of VanAarsdel's sales spike in 2017 in Australia. We will start by adding a new page.

1. Right click on **Page 1** (bottom left).
 2. Select **Rename Page**. Rename the page to **Market Analysis**.
 3. Right click on Market Analysis page. This time pick **Duplicate Page**. We are duplicating the page since we can reuse some of the visuals.
- A new page is created, and you will be navigated to this new page.



Let's add a slicer so we can filter manufacturers.

4. Click on the white space in the canvas. From the **FIELDS** section, expand **Manufacturer table** and select **Manufacturer** field.
5. From the **VISUALIZATIONS** section select **Slicer** visual.
6. You will see a list of Manufacturers. Select **VanAarsdel** and notice all the visuals are filtered based on your selection.
7. Hover over the top right corner of the visual and click on the **down arrow**. Notice you have the option to change the slicer from a list to a drop down.
8. Select **Dropdown**.
9. Select **VanAarsdel** from the dropdown.



10. In the **VISUALIZATIONS** panel, scroll down to **FILTERS** section.
 Notice the Page level filters for Manufacturers. Since we have two pages and we want Manufacturer filter to apply to both pages it makes sense to move it to Report level filters.
11. In the **FIELDS** section, expand **Manufacturer** table.
12. Drag **Manufacturer (groups)** field to **Report level filters**.
13. Select **Top Competitors** and **VanArsdel**.
14. Click on “X” next to **Manufacturers** in **Page level filters**.

The screenshot shows the Power BI Fields pane. Under the **Manufacturer** table, the **Manufacturer (groups)** field is highlighted with a red box in the **Report level filters** section. Below it, the **Manufacturers** field is listed with a red 'X' icon, indicating it has been moved to Page level filters.

- We use the Manufacturer slicer to analyze one manufacturer at a time. Notice when we do this Revenue by Manufacturer Treemap visual is not the best representation of the data. Let's change it.
15. Select **Revenue by Manufacturer** **Treemap** visual.
16. From the **VISUALIZATIONS** section, select **Card** visual.
- The card visual will give us the Revenue as we filter and cross filter the visuals.

The screenshot illustrates the change in visual representation. On the left, a Treemap visual for 'VanArsdel' is shown. On the right, a Card visual displays the revenue '613.59M' for 'VanArsdel'. The Visualizations pane on the far right shows the 'Card' icon selected.

Notice all key dimensions/characteristics is in its own table with the related attributes **except date**. E.g. Product attributes are in Product table and we created a relationship between Product and Sales. It is good practice to have dimensions in different tables. In future if we need to add date attributes like Week number, Day of Week, Holiday, etc, we need to have a Date table. Let's create Date table.

17. Navigate to Data view by clicking on the **Data** icon on the left panel.

18. From the ribbon select **Modeling** -> **New Table**.

Notice a new table is created in the FIELDS section on the right and formula bar opens.

19. Enter **Date =CALENDAR
(DATE(2011,1,1), DATE(2017,12,31))** in the formula bar and click on the **check mark**. A Date table with a Date column is created.

We are using 2 DAX functions: **CALENDAR** function which takes the start and end data. **DATE** function which takes year, month and date fields.

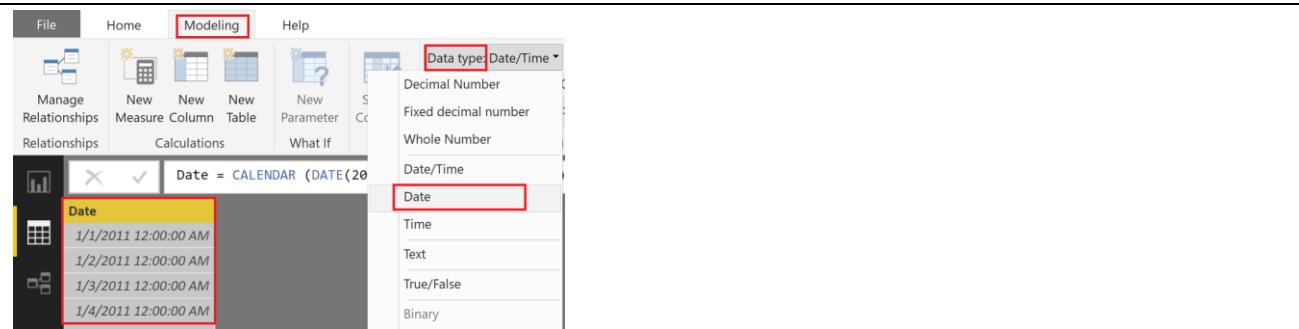
We are creating Date from 2011 to 2017 since our dataset has data for those years.

We can add more fields to this table like Year, Month, Week etc. by using DAX functions.

Date
1/1/2011 12:00:00 AM
1/2/2011 12:00:00 AM
1/3/2011 12:00:00 AM
1/4/2011 12:00:00 AM
1/5/2011 12:00:00 AM
1/6/2011 12:00:00 AM
1/7/2011 12:00:00 AM
1/8/2011 12:00:00 AM
1/9/2011 12:00:00 AM

Notice Date field is of type Date/Time.
Let's change it to data type Date.

20. Select the **Date** field in the **Date** table.
21. From the ribbon, select **Modeling** -> **Data type** -> **Date**.



Next, we need to create a relationship between the newly created Date table and Sales table. Previously we used the visual drag and drop feature to create a relationship. This time around let's use a different option.

22. From the ribbon, select **Modeling** -> **Manage Relationships**.

23. Manage Relationships dialog opens. Select **New** button.

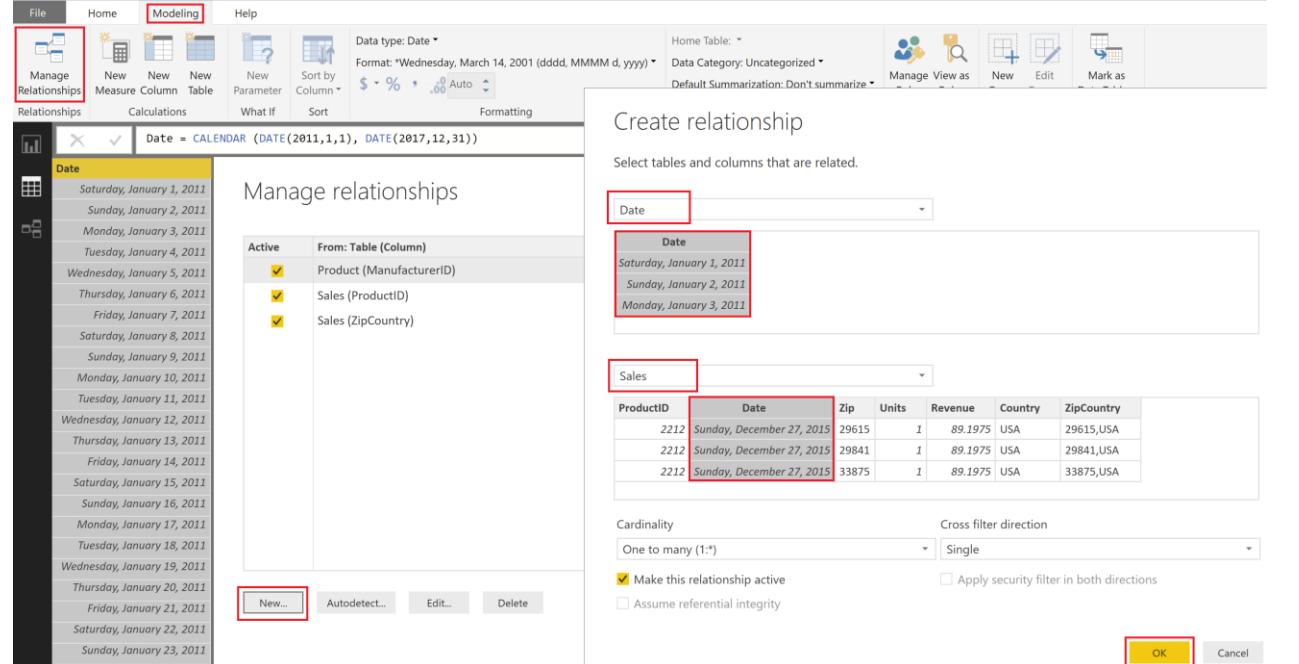
24. Create relationship dialog opens. Select **Date** from the top dropdown.

25. Select **Sales** from the second dropdown.

26. Highlight **Date** fields from both the tables.

27. Select **OK** to close Create relationship dialog.

28. Select **Close** to close Manage relationships dialog.



29. Navigate to Report view by clicking on the **Report** icon on the left panel.

Notice Revenue by Date chart looks different. Let's fix it.

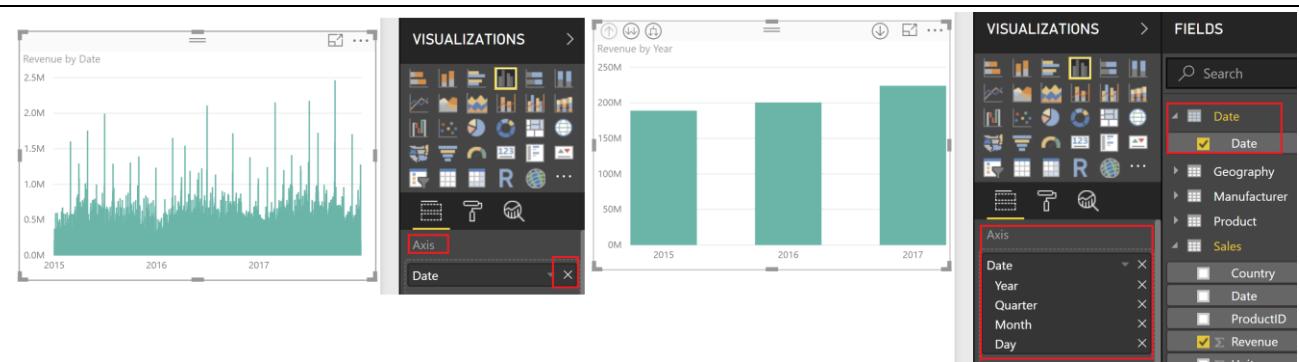
30. Select **Revenue by Date** visual.

31. From the **Axis** click on “X” to remove the **Date** field.

32. From the **FIELDS** section expand **Date** table.

33. Drag **Date** field to **Axis** section.

Notice with the new Date field behavior is like earlier.



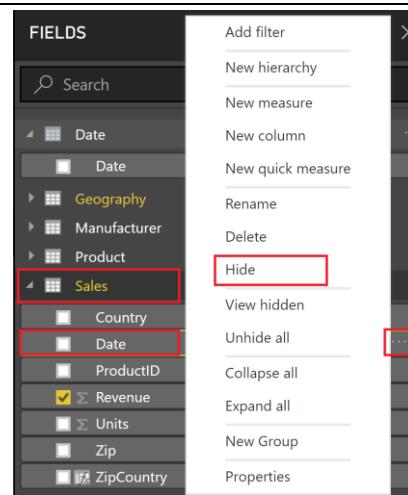
There are two Date fields, it might get confusing to figure out which to use. Let's hide the Date field in Sales table.

34. From the **FIELDS** section, expand **Sales** table.

35. Click on the **ellipsis** next to **Date** field.

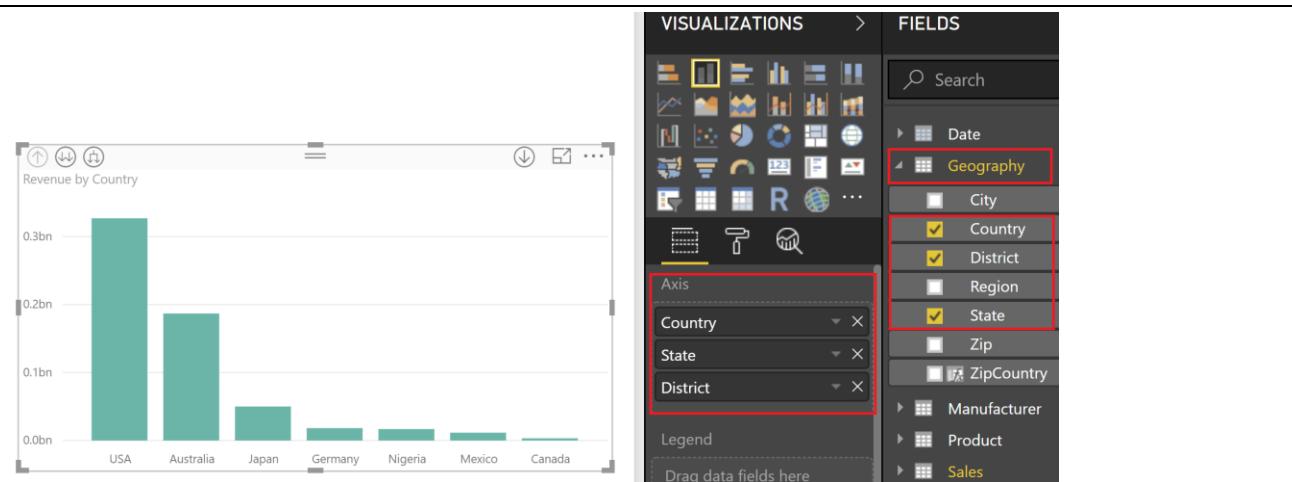
36. Select **Hide**. This hides Date field in the reports view. We have the option to view hidden fields and unhide fields as needed.

Note: It is best practice to hide fields that are not used in reports like ZipCountry, ProductID, ManufacturerID.

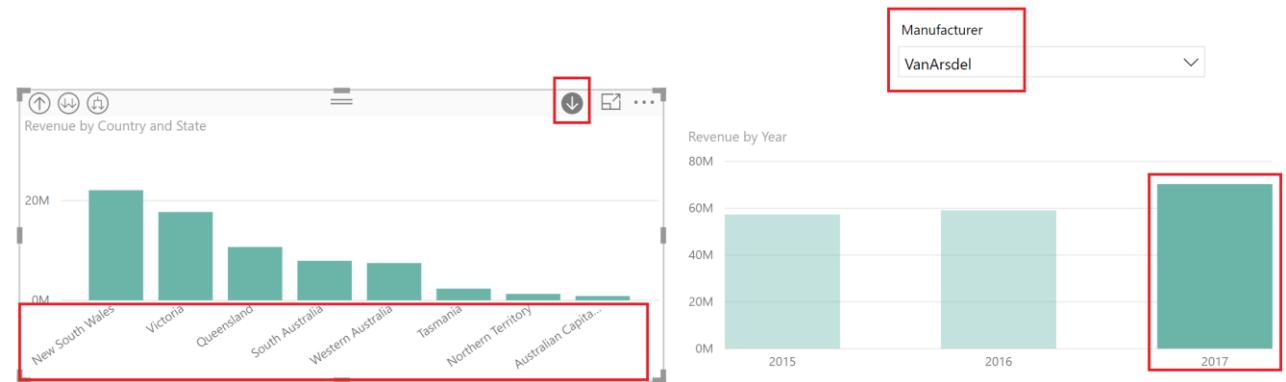


Let's get back to our data story, Australia, VanArsdel and 2017 – remember 😊. Let's check if the spike occurred in a specific region in Australia.

37. Select **Revenue by Country** visual.
 38. In the **FIELDS** section, expand **Geography** table.
 39. Drag **State** field below **Country** in the **Axis** section.
 40. Drag **District** field below **State** in the **Axis** section.
- We just created a hierarchy.



41. Make sure **VanArsdel** is selected in the **Manufacturer slicer**.
42. **Enable Drill mode** by selecting down arrow on the top right corner of Revenue by Country visual.
43. Select **Australia** to drill down to **State** level.
44. From **Revenue by Year** visual select **2017** and notice Revenue by Country and State visual.
45. From Revenue by Year visual select **2016** and notice Revenue by Country and State visual.
46. Similarly, select **2015**. We don't see a spike in a specific state.
47. Select **2015** again to remove year filter.
48. Drill up to country level.

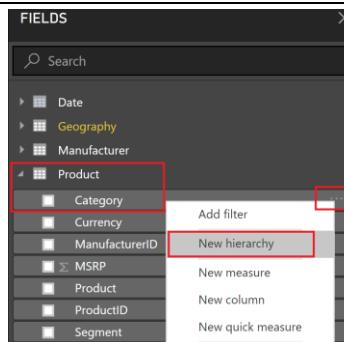


Let's us analyze by Product to figure out what's happening there. Before we start with that let's create a Product Hierarchy. This way we don't have to drag multiple fields to the visual.

49. From the **FIELDS** section, expand **Product** table.

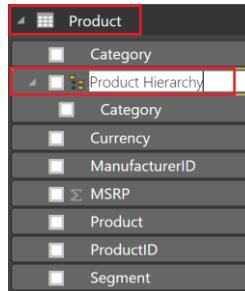
50. Click on the **ellipsis** next to **Category**.

51. Select **New Hierarchy**.



Notice a new field called Category Hierarchy is created in the Product table.

52. Double click on **Category Hierarchy** and rename it to **Product Hierarchy**.



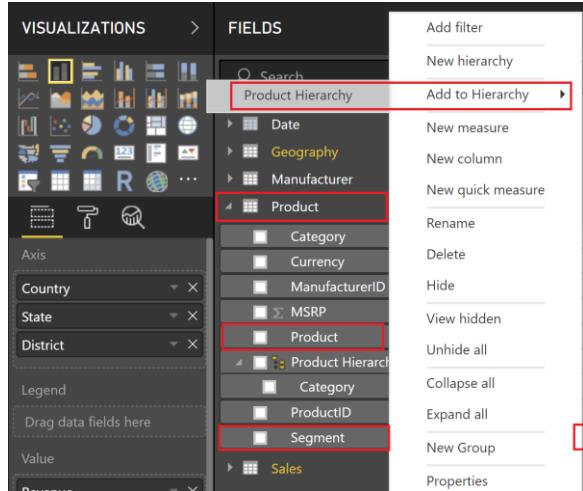
53. Click on the **ellipsis** next to **Segment**.

54. Select **Add to Hierarchy -> Product Hierarchy**.

55. Click on the **ellipsis** next to **Product**.

56. Select **Add to Hierarchy -> Product Hierarchy**.

We have created a Product Hierarchy which is Category -> Segment -> Product.



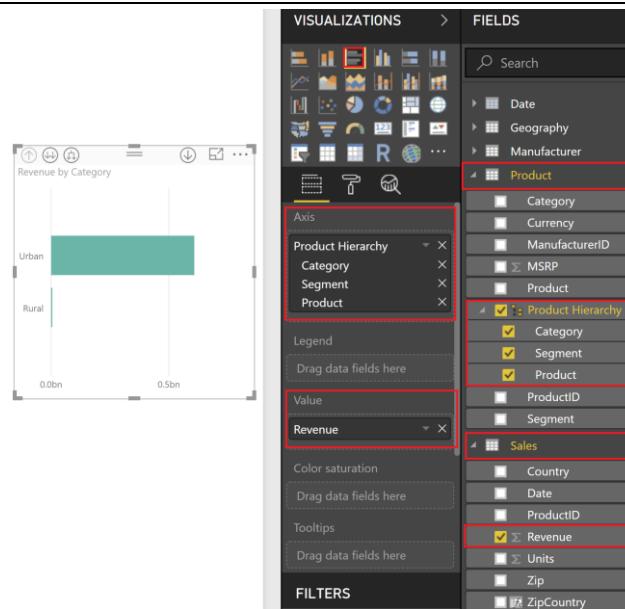
57. Click on the white space in the canvas. From the **VISUALIZATIONS** section select **Clustered bar chart**.

58. From the **FIELDS** section, expand **Product** table.

59. Select **Product Hierarchy**. Notice complete hierarchy is selected.

60. From the **FIELDS** section, expand **Sales** table.

61. Select **Revenue** field.

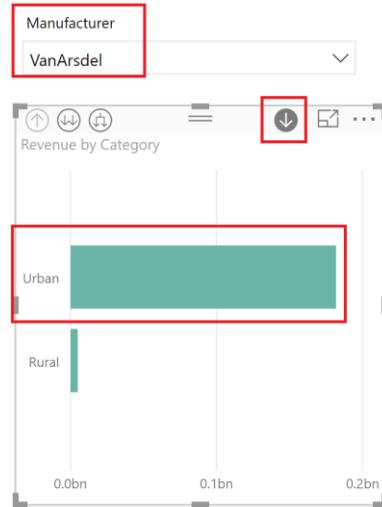


Note: Make sure you have VanArsdel selected in the slicer.

We see that VanArsdel has a presence in the Urban category and a small presence in the Rural category.

62. **Drill down Urban category** (yes you are an expert drilling up and down hierarchy). If not, select the **down arrow** on the top right corner of the visual.

63. Select the **Urban** row to drill down to Urban segments.



64. In **Revenue by Country** visual make sure **drill down mode is disabled**.
65. Select **USA**. Notice that Convenience and Moderation are the segments with most sales.
66. In **Revenue by Country** visual select **Japan**. Notice that again Convenience and Moderation are the segments with most sales.
67. In **Revenue by Country** visual select **Australia**. Notice that sales in Extreme segment is comparable to Convenience and Moderation. Let's dive into Extreme segment and investigate further.

68. In **Revenue by Country** visual select **USA**.
69. **Ctrl+Select 2017** from Revenue by Year visual. Notice Convenience and Moderation are the key segments in USA.

70. In **Revenue by Country** visual select **Australia**.
71. **Ctrl+Select 2017** from Revenue by Year visual. Notice sales in Extreme category is higher than Convenience and Moderation segments.
- We need to investigate further...



72. Select the **down arrow** on the top right corner of **Revenue by Country** visual to enable drill model.

73. Select **Australia** to **drill down** to **State** level.

74. Select **2017** in Revenue by Year visual.

75. **Remove drill mode** from Revenue by Category visual.

76. **Ctrl+Select Extreme** Segment in Revenue by Category and Segment visual.

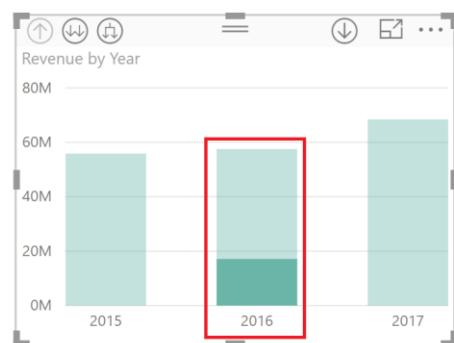
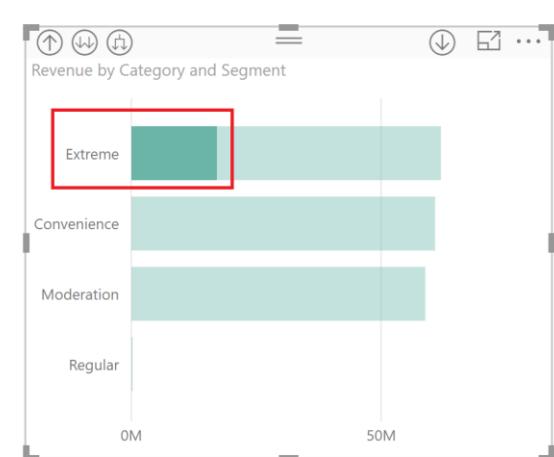
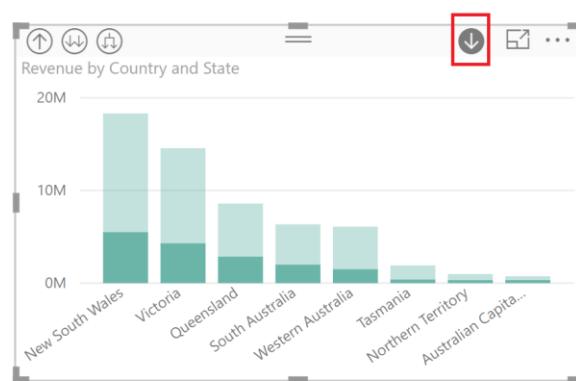
77. Select **2016** in Revenue by Year visual.

78. **Ctrl+Select Extreme** Segment in Revenue by Category and Segment visual.

There is no significant spike by State.

79. Select **Extreme** again to remove cross filtering between visuals.

80. **Drill up to Category** level in Revenue by Category visual.



Let's add a matrix visual so we can view data in rows and columns. We can apply conditional formatting to the matrix visual to highlight outliers.

81. Click on the white space in the canvas. From the **VISUALIZATIONS** section, select **Matrix** visual.

82. From **FIELDS** section expand **Product** table.

83. Drag and drop **Product Hierarchy** field to **Rows** section.

84. From **FIELDS** section expand **Sales** table.

85. Drag and drop **Revenue** to **Values** section.

The screenshot shows the Power BI desktop interface. On the left is the canvas with a matrix visual containing the following data:

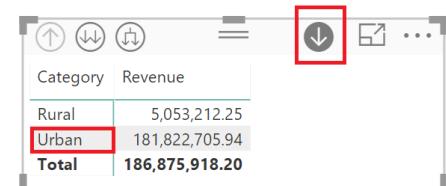
Category	Revenue
Rural	5,053,212.25
Urban	181,822,705.94
Total	186,875,918.20

The **VISUALIZATIONS** pane on the right has a matrix icon selected. The **FIELDS** pane on the right shows the following settings:

- Product** table:
 - Rows: Product Hierarchy, Category, Segment, Product (all checked)
 - Values: Revenue (checked)
- Sales** table:
 - Visual level filters: Category (All), Country is Australia
 - Values: Revenue (checked)

86. Enable drill mode in the **matrix** by selecting the down arrow on the top right corner of the visual.

87. Select **Urban** row to drill down.



Well the text is too small, let's format the matrix and make it more readable.

88. In the **VISUALIZATIONS** panel, select the **paint roller** icon to format the visual.

89. **Scroll down** and expand **Values** section.

90. **Scroll down** and increase the **Text size** to **10**.

Notice there are a lot of formatting options. Feel free to explore them.

91. **Scroll up** and expand **Column headers** section.

92. **Scroll to** Text size and increase it to **10**.

93. **Scroll up** and expand **Row headers** section.

94. **Scroll to** Text size and increase it to **10**.

The screenshot shows the Power BI Visualizations pane. A matrix visual is selected. The 'Values' section is expanded, showing a dropdown menu for 'Text size' which is currently set to 10. Below the text size, there are sections for 'Row headers' and 'Values', both of which are highlighted with red boxes.

Let's add percent of total field. This will give us a better perspective.

95. From **FIELDS** section expand Sales table.

96. Drag **Revenue** field below the existing Revenue field in **Values** section.

97. Select the **arrow** next to the newly added **Revenue** field.

The screenshot shows the Power BI Fields pane. The 'Sales' table is expanded. The 'Revenue' field is selected and has an arrow icon next to it, indicating it is being moved. The 'Values' section is highlighted with a red box.

98. From the dialog select **Show value as - > Percent of grand total**.

We see that in Australia, Extreme segment has highest market share. Let's check across time if this is true.

The screenshot shows a Power BI interface. On the left is a table visual with columns 'Category' and 'Revenue'. The data includes Urban, Convenience, Extreme, Moderation, and Regular categories with their respective revenue values. The 'Revenue' column has a header '%GT Revenue' with a red box around it. On the right is a 'FIELDS' context menu with various aggregation options like Sum, Average, Minimum, Maximum, etc., and a 'Show value as' option which is checked. A red box highlights the 'Percent of grand total' option under 'Show value as'.

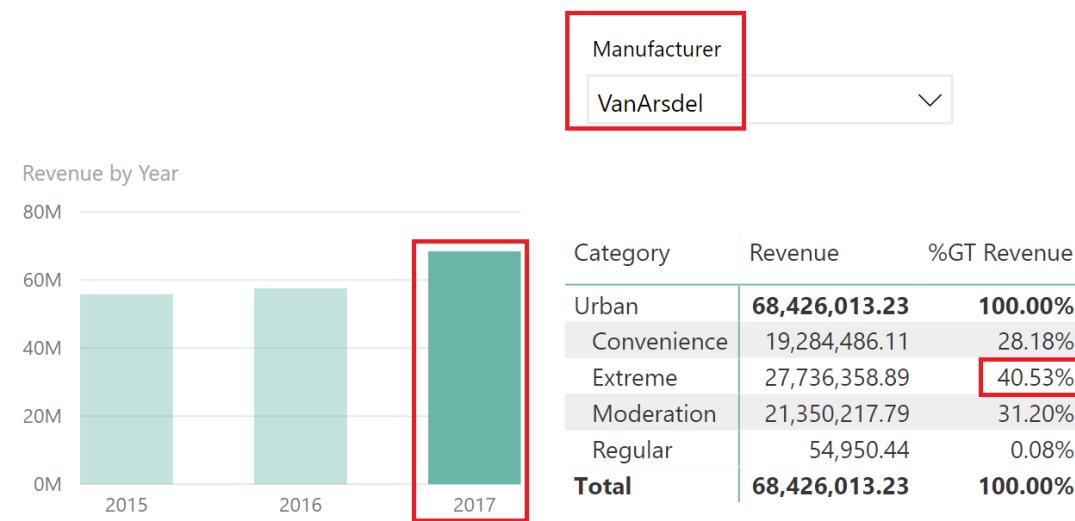
99. In the **Revenue by Year** visual select **2015** column. Notice Extreme segment has around **30%** of the grand total.

100. In the **Revenue by Year** visual select **2016** column. Notice Extreme segment has around **30%** of the grand total.

101. In the **Revenue by Year** visual select **2017** column. Notice Extreme segment has around **40%** of the grand total.

102. In the **Revenue by Year** visual select **2017** column to remove the filter.

Let's drill down Extreme Segment and figure out if a Product stands out.



103. In the **matrix** visual select **Extreme** row to **drill down** to Product level.

104. **Resize** the visual as needed.

105. **Hover** over matrix visual and select the **ellipsis** on the top right corner.

106. Select **Sort By % GT Revenue**.

We see the top Products. Let's analyze top Products over time.

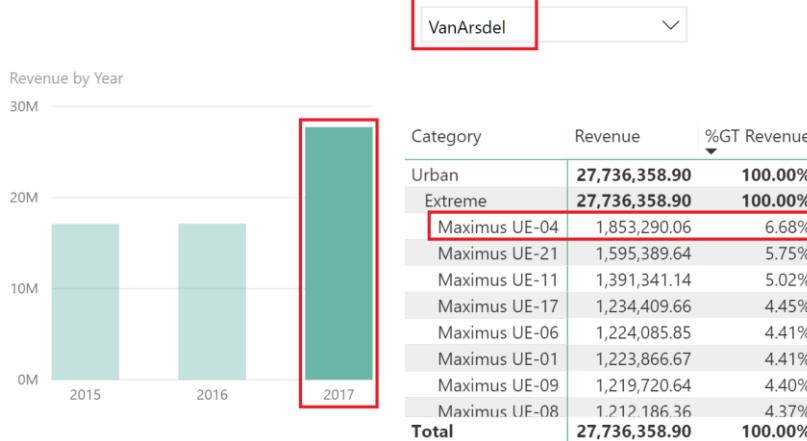
Category	Revenue	%GT Revenue
Urban	61,963,429.45	100.00%
Extreme	61,963,429.45	100.00%
Maximus UE-04	3,479,914.04	5.62%
Maximus UE-21	3,167,088.65	5.11%
Maximus UE-11	2,892,042.62	4.67%
Maximus UE-17	2,792,441.30	4.51%
Maximus UE-16	2,685,803.03	4.33%
Maximus UE-13	2,674,811.42	4.32%
Maximus UE-06	2,674,048.91	4.32%
Maximus UE-03	2,667,416.85	4.30%
Maximus UE-01	2,637,476.47	4.26%
Maximus UE-09	2,631,889.73	4.25%
Total	61,963,429.45	100.00%

107. In the **Revenue by Year** visual select **2015** column. Notice Maximus UE-04 and 11 are the top products.

108. In the **Revenue by Year** visual select **2016** column. Notice Maximus UE-16 and 17 are the top products.

109. In the **Revenue by Year** visual select **2017** column. Notice Maximus UE-04 and 21 are the top products. And Product 04 has nearly 7% of the grand total. Product 04 has a big spike.

110. In the **Revenue by Year** visual select **2017** column to remove the filter.



Earlier we created a calculated column (ZipCountry). Let's create % Growth measure so we can compare sales over time. We are going to do this in two steps.

But first, what's the difference between measure and calculated column.

Calculated column is evaluated row by row. We extend a table by adding calculated columns.

Measure is used when we want to aggregate values from many rows in a table.

111. In the **FIELDS** section, select **Sales** table.

112. From the ribbon, select **Modeling** -> **New Measure**. Formula bar opens.

113. Enter PY Sales =
**CALCULATE(SUM(Sales[Revenue]),
SAMEPERIODLASTYEAR('Date'[Date]))**

114. Select the **check mark** next to the formula bar. You will see PY Sales measure in Sales table.

The screenshot shows the Power BI desktop interface. The ribbon is at the top with 'Modeling' selected. The formula bar contains the DAX code: `PY Sales = CALCULATE(SUM(Sales[Revenue]), SAMEPERIODLASTYEAR('Date'[Date]))`. The 'FIELDS' section on the right shows the 'Sales' table selected, and the 'PY Sales' measure is also selected. The main workspace displays three visualizations: a bar chart of Revenue by Country and State, a bar chart of Revenue by Year, and a table of Manufacturer data.

Let's create another measure.

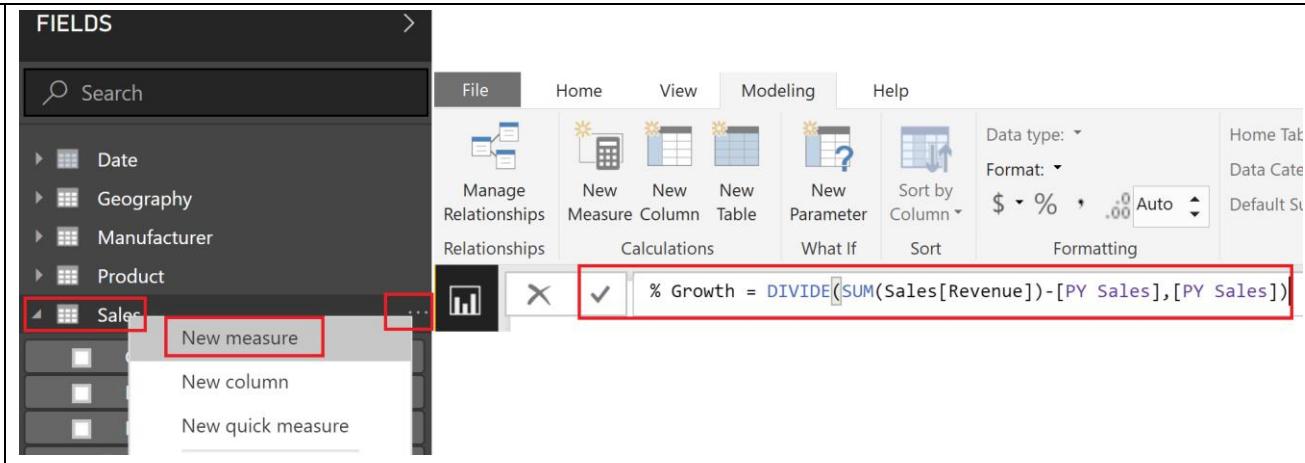
115. In the **FIELDS** section, hover over **Sales** table.

116. Click on the **ellipsis** on the right corner.

117. Select **New Measure** from the dialog. Formula bar opens.

118. Enter **% Growth = DIVIDE(SUM(Sales[Revenue])-[PY Sales],[PY Sales])**

119. Select the **check mark** next to the formula bar. You will see % Growth measure in Sales table.



120. Select the **matrix** visual.

121. In the **FIELDS** section, expand **Sales** table.

122. Select newly created **PY Sales** and **% Growth** measures.

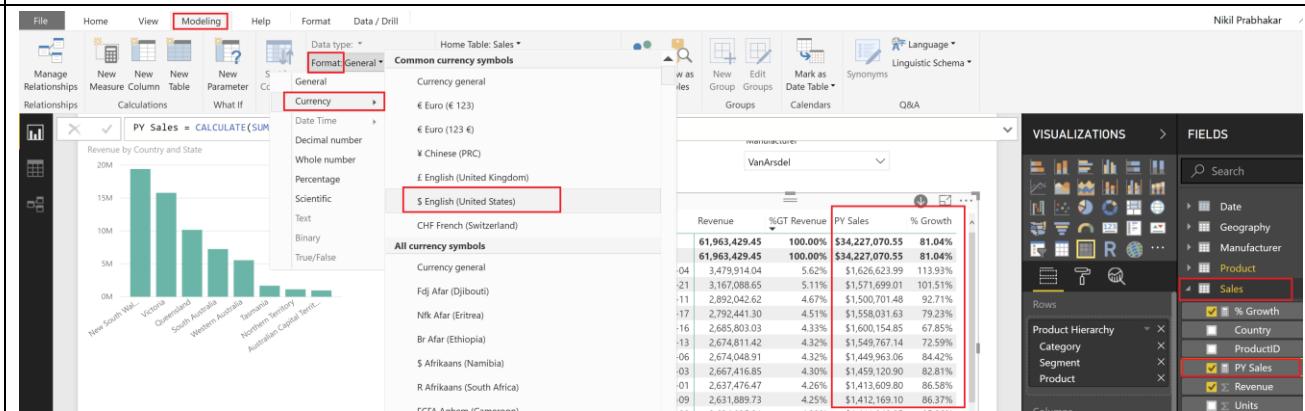
Notice these fields need to be formatted.

123. From the **FIELDS** section, select **% Growth** field.

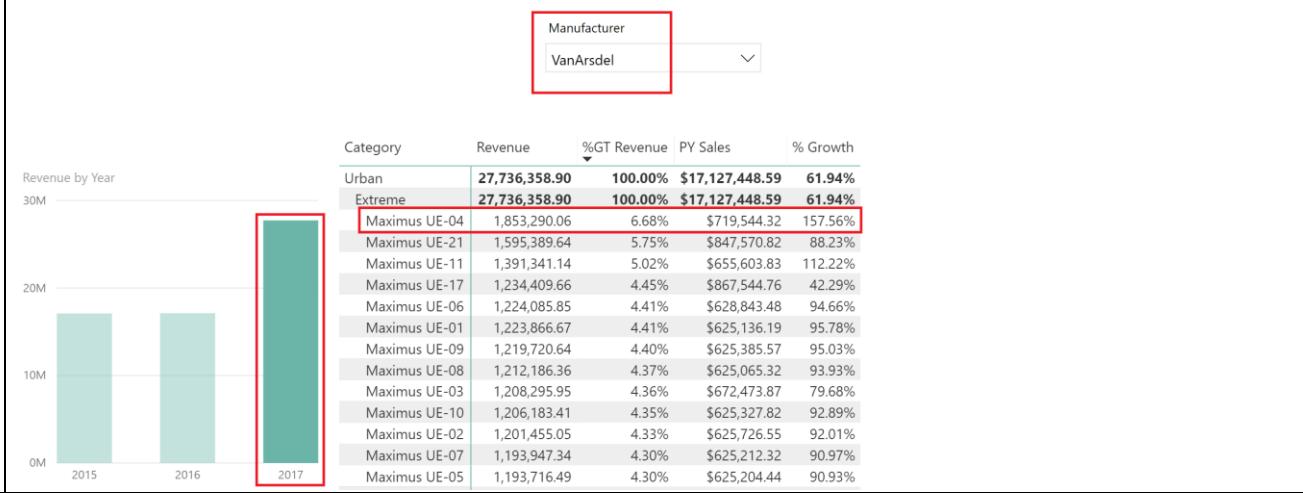
124. From the ribbon select **Modeling -> Format -> Percentage**

125. Similarly, from the **FIELDS** section, select **PY Sales** field.

126. From the ribbon select **Modeling -> Format -> Currency -> \$ English (United States)**



127. In the **Revenue by Year** visual select **2017** column. Notice Maximus UE-04 has nearly 158% growth compared to last year.

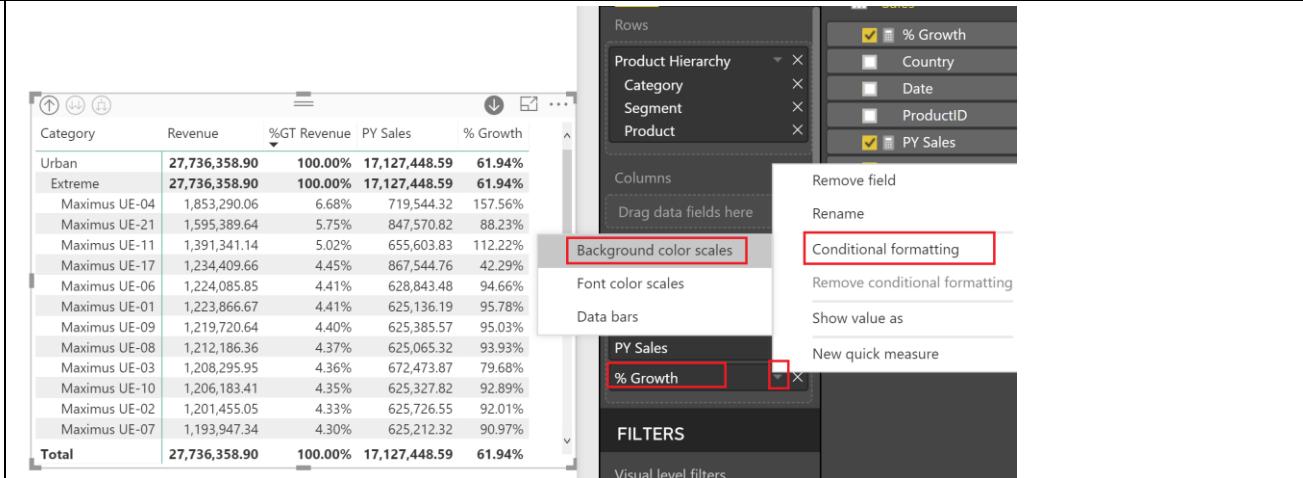


128. Select **matrix** visual.

129. From the **Values** section, select the arrow next to **% Growth**.

130. Select **Conditional Formatting -> Background color scales**.

Note: Conditional formatting can be applied using font color or data bars as well.



Background color scales dialog opens. This dialog provides options to format background color either using rules or diverging colors.

131. Diverging checkbox.

132. Select OK.

Background color scales

Format cells with color based on their value.

Base value

% Growth

Color by rules

Format blank values

As zero

Minimum

Lowest value



(Lowest value)

Diverging

Center

Middle value



(Middle value)

Maximum

Highest value



(Highest value)

OK

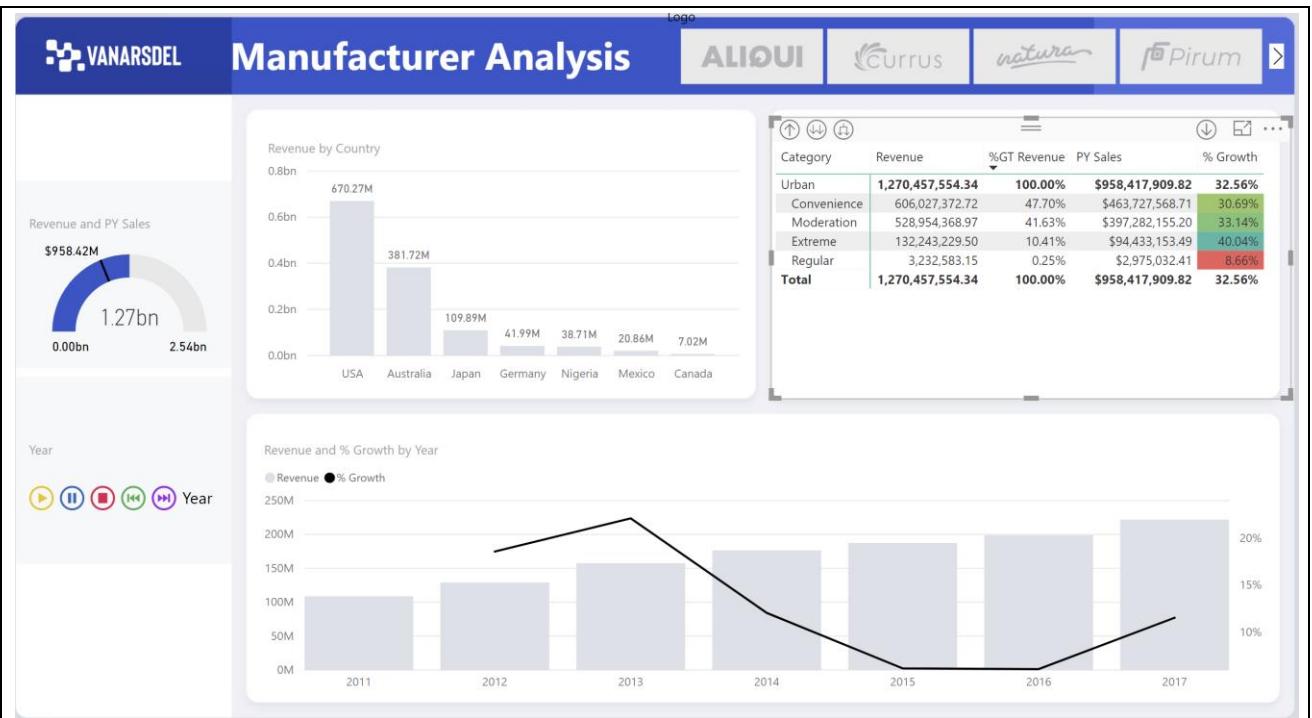
Cancel

Category	Revenue	% GT Revenue	PY Sales	% Growth
Urban	27,736,358.90	100.00%	17,127,448.59	61.94%
Extreme	27,736,358.90	100.00%	17,127,448.59	61.94%
Maximus UE-04	1,853,290.06	6.68%	719,544.32	157.56%
Maximus UE-21	1,595,389.64	5.75%	847,570.82	88.23%
Maximus UE-11	1,391,341.14	5.02%	655,603.83	112.22%
Maximus UE-17	1,234,409.66	4.45%	867,544.76	42.29%
Maximus UE-06	1,224,085.85	4.41%	628,843.48	94.66%
Maximus UE-01	1,223,866.67	4.41%	625,136.19	95.78%
Maximus UE-09	1,219,720.64	4.40%	625,385.57	95.03%
Maximus UE-08	1,212,186.36	4.37%	625,065.32	93.93%
Maximus UE-03	1,208,295.95	4.36%	672,473.87	79.68%
Maximus UE-10	1,206,183.41	4.35%	625,327.82	92.89%
Maximus UE-02	1,201,455.05	4.33%	625,726.55	92.01%
Maximus UE-07	1,193,947.34	4.30%	625,212.32	90.97%
Total	27,736,358.90	100.00%	17,127,448.59	61.94%

Power BI Desktop – Data Visualization

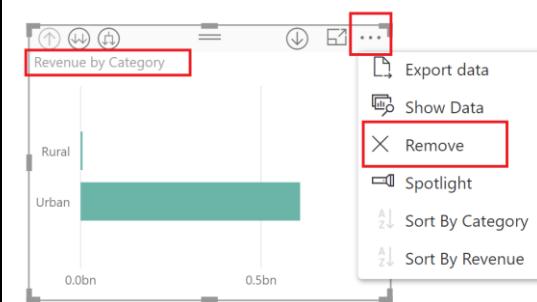
Having done the data exploration and visualization you have found good insights to share with your team. In this section, you will create a professional report that you and your entire team can benefit.

At the end of this section, you will build a report like the one shown in the screenshot.



Let's remove Revenue by Category clustered bar chart.

1. Hover over **Revenue by Category** visual.
2. From the top right corner select the **ellipsis**
3. Select **Remove** to delete the visual.



Initially we added a filter to load 3 years of data. Let's load the complete data.

4. From the ribbon, select Home -> Edit

Queries. Power Query Editor window opens.

5. From the left panel, select **Sales** query.

6. From the right panel, under **APPLIED STEPS**

click on the X next to **Filtered Rows1** to remove the 3-year filter.

7. Select **Home -> Close & Apply** to load the data.

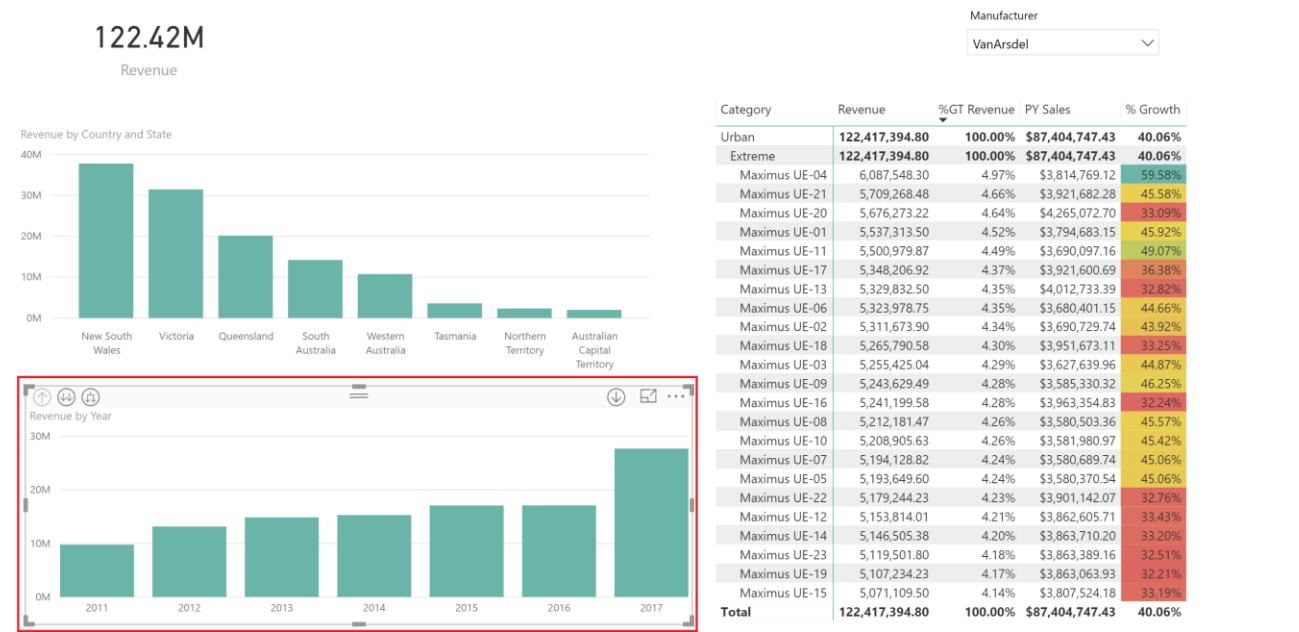
Sales data is reloaded, this time all the data is loaded. It might take a couple of minutes we are loading ~7 million rows.

The screenshot shows the Power Query Editor interface. The ribbon is at the top with 'Home' selected. The 'Queries [9]' list on the left includes 'Sales' (selected), 'Product', 'Geography', 'Manufacturer', and 'International Sales'. The main area shows a table with columns: ProductID, Date, Apc_Zip, Units, Revenue, and Country. The 'APPLIED STEPS' pane on the right has a red box around 'Filtered Rows1' in the 'Removed' section.

Make sure report is filtered by VanArsdel using Manufacturer slicer. Remove all other filters.

At this point your report page should look something like the screenshot.

Once data is loaded, notice **Revenue by Year** visual. You will see columns for years 2011 through 2017.



Let's add a Date slicer so we can control how many years of data we want to analyze.

8. Click on the white space in the canvas. From the **VISUALIZATIONS** section, select **Slicer visual**.

9. From **FIELDS** section, expand **Data** table.

10. Select **Date** field.

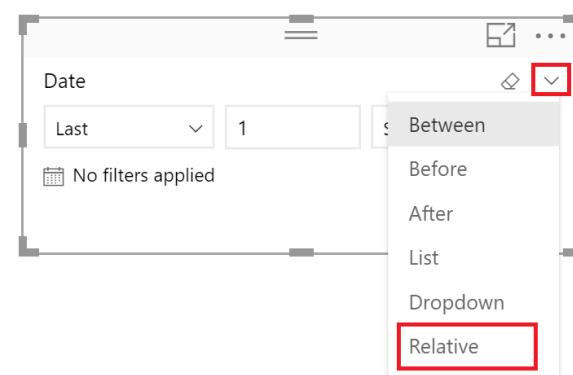
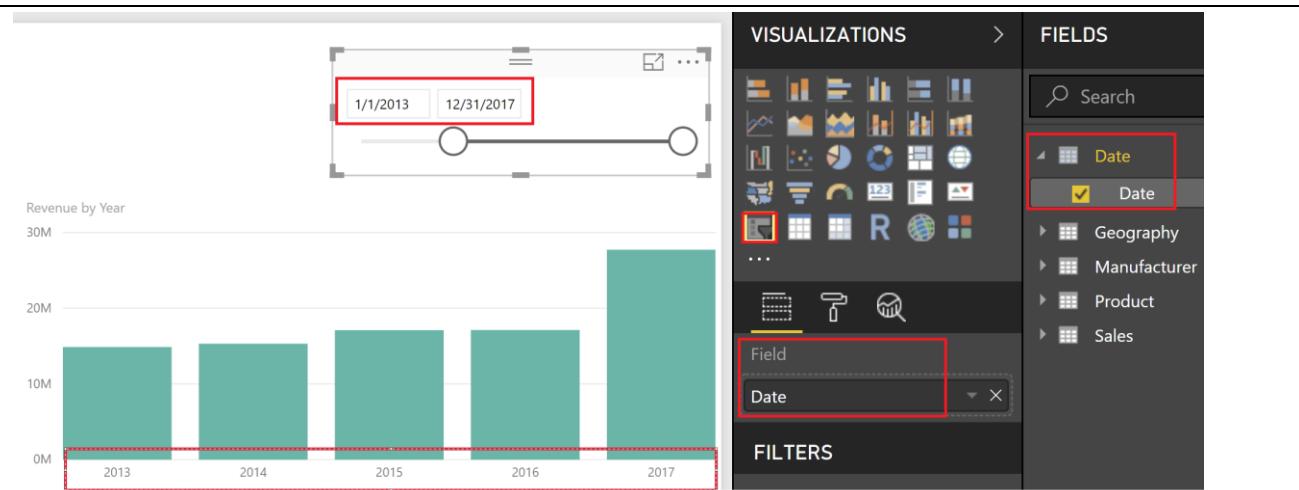
Notice we have a range slicer with a slider.

11. Move the slicer to filter the data to **1/1/2013 to 12/31/2017** or type in the values.

12. Hover over the date slicer.

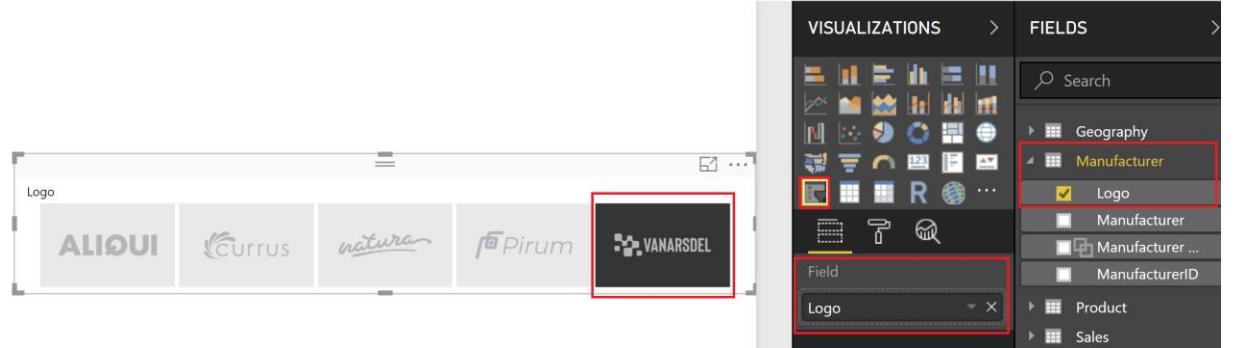
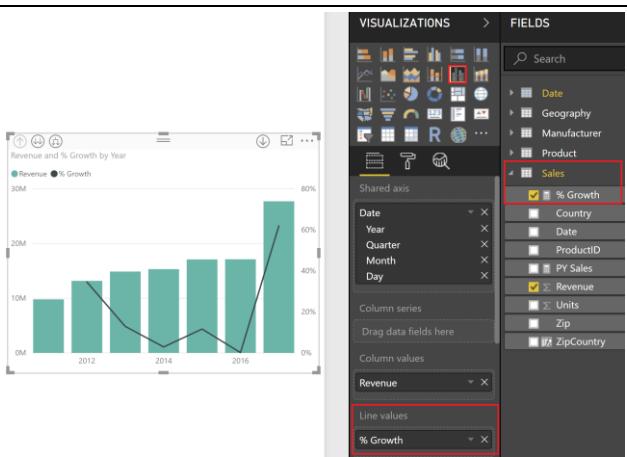
13. Select the **arrow** from the **top right corner**. Notice following options are available – Before, After, List, Dropdown and Relative. Feel free to try out the various options.

14. Select **Relative**. Notice this has options to filter data by the Last x years, months, days or Next x years, months, days, etc. Feel free to try out various options.

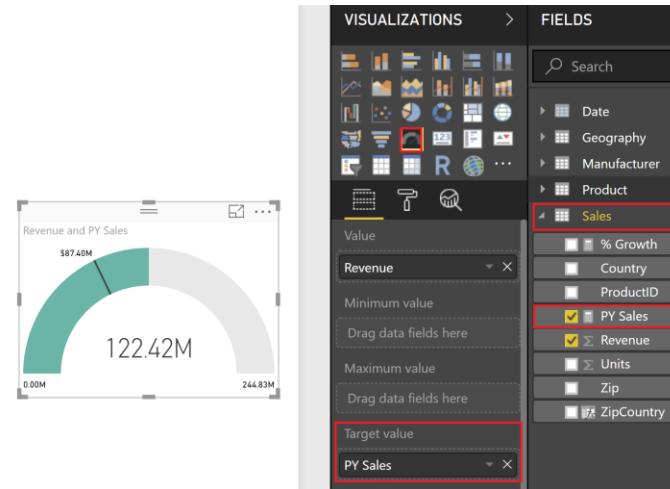


15. Hover over **Manufacturer** slicer visual.
 16. On the top right corner select the arrow.
 17. Select **List**.
 18. in **VISUALIZATIONS** panel select the paint roller icon. This opens the formatting options available for a visual.
 19. **Expand General** section, select **Horizontal** from the **Orientation** dropdown.
 20. Select **VanArsdel**.
 21. Notice the Slicer visual is updated. You can **resize** the visual, so all the manufacturers are listed horizontally.
- Note:** There are other options to change the Outline color, weight, etc.
22. **Collapse General** section.
 23. **Note:** Expand Selection Controls section. Notice there is an option to enable Select All option in the visual. There is also an option to make the slicer multi select. Feel free to explore other formatting options.

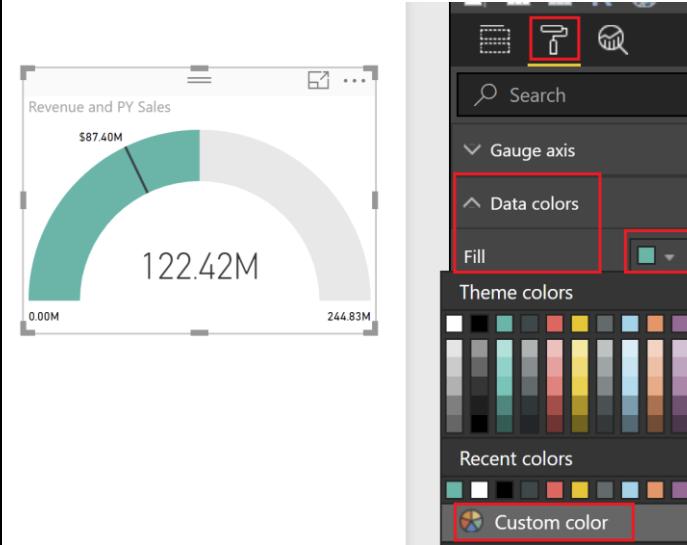
- It will be nice to add logos of the manufacturer to the slicer. Let's do it.
24. From **FIELDS** section, expand **Manufacturer** table.
 25. Select **Logo** field.
 26. From the ribbon, select **Modeling -> Data Category -> Image URL**. Setting data category to Image URL helps Power BI to

understand the it is a URL and it can access the data.	
<p>27. From the canvas, select Manufacturer slicer.</p> <p>28. From FIELDS section, expand Manufacturer table.</p> <p>29. Drag and drop Logo to Field section.</p> <p>30. Select Logo field.</p> <p>31. Resize slicer visual as needed.</p> <p>32. Select VanArsdel logo to filter all the other visuals.</p>	
<p>33. Select Revenue by Year visual.</p> <p>34. From VISUALIZATIONS panel, select Line and clustered column chart to change the visual type.</p> <p>35. From FIELDS section, expand Sales table.</p> <p>36. Drag and drop % Growth field to Line values.</p> <p>This provides a representation of the revenue and growth over time.</p>	

37. Select **Revenue Card** visual. Let's change this to a Gauge visual.
 38. From **VISUALIZATIONS** panel, select the **Gauge** visual.
 39. From **FIELDS** section, expand **Sales** table.
 40. Drag and drop **PY Sales** field to **Target value**.
 41. **Resize** the visual as needed. Now we can compare Revenue with the target.



- It will be nice to change the colors on the visuals.
42. Select **Gauge** visual.
 43. From **VISUALIZATIONS** panel, select **paint roller** icon.
 44. Expand **Data Colors** section.
 45. Select the **arrow** next **Fill** color.



Marketing department has provided a standard color theme to be used across reports. We can use Report Theme feature in Power BI upload the theme. Report Theme requires a JSON file where the data colors, background, foreground and tableAccent colors are defined. The JSON file can be used across all the reports. Custom Report Theme is a Preview feature. Let's enable it.

46. From the ribbon select **File -> Options and settings -> Options**.

47. From the Options dialog, select **Preview features**.

48. Select **Custom report themes**.

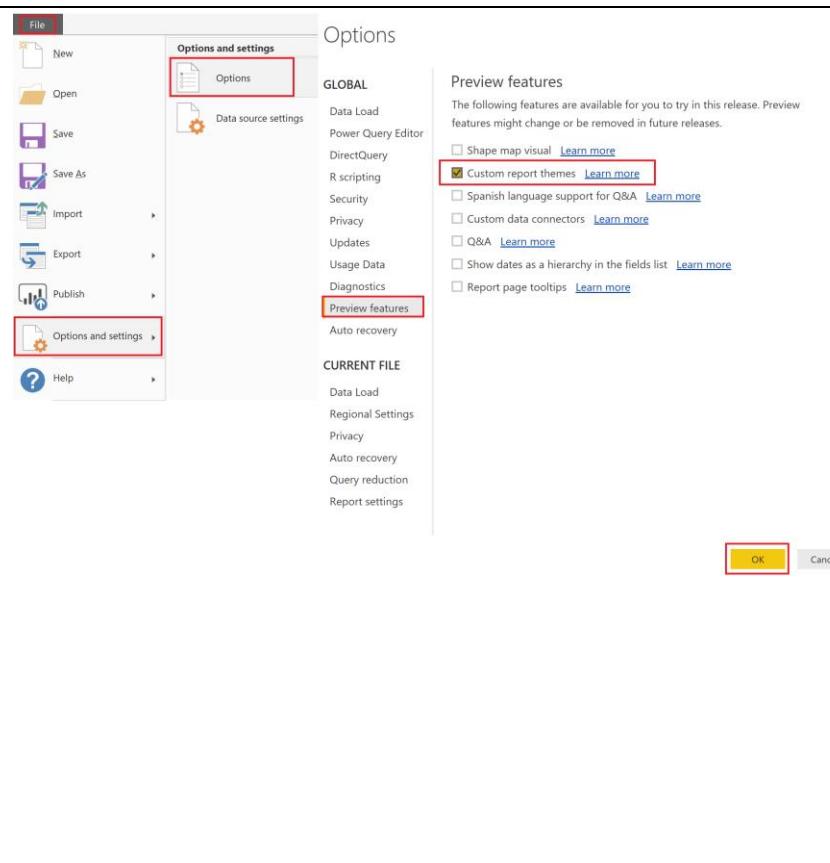
49. Select **OK**.

To enable the feature, we need to restart Power BI Desktop.

50. Feature requires a restart dialog opens. Select **OK**.

51. From the ribbon, select **File -> Save**.

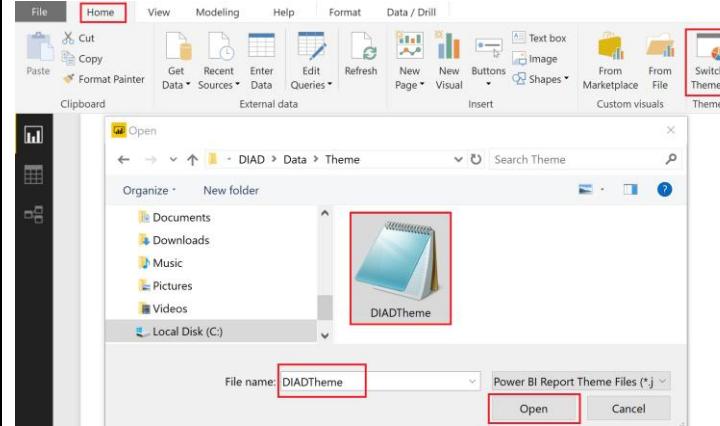
52. From the ribbon, select **File -> Exit**.



53. Open Power BI Desktop.
 54. From startup dialog, select **MyFirstPowerBIModel.pbix** under Recent sources.

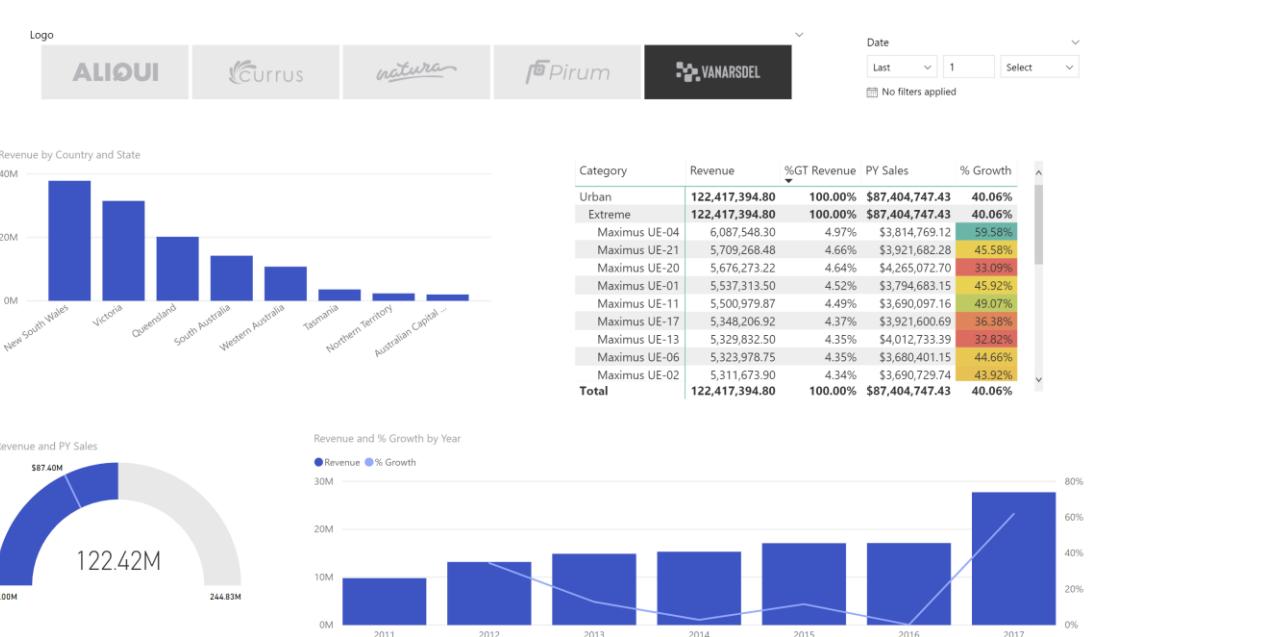


- Notice in the ribbon we have a new menu option called Switch Theme.
 55. From the ribbon, select **Home -> Switch Theme -> Import Theme**.
 56. File browser dialog opens. Navigate to **/Data/Theme** folder.
 57. Select **DIADTheme** file and select **Open**.
 58. Once theme is imported, a success dialog opens. Select **Close**.

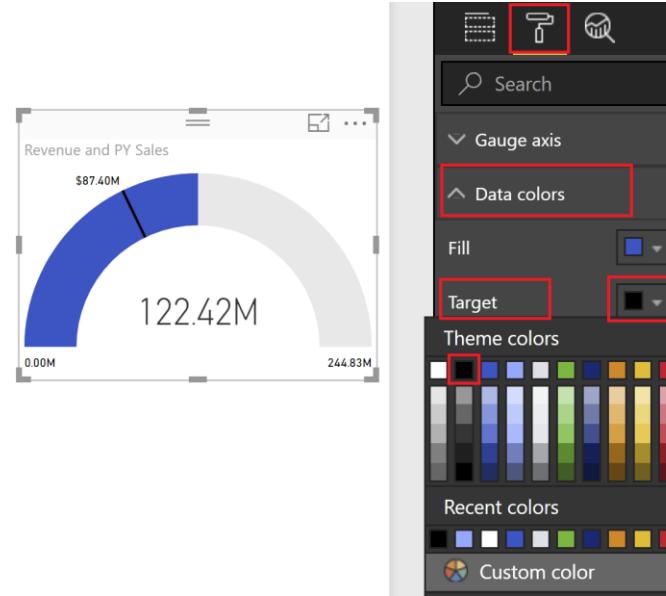


Notice colors on all the visuals updated.
Your report should look something like the screenshot at this point.

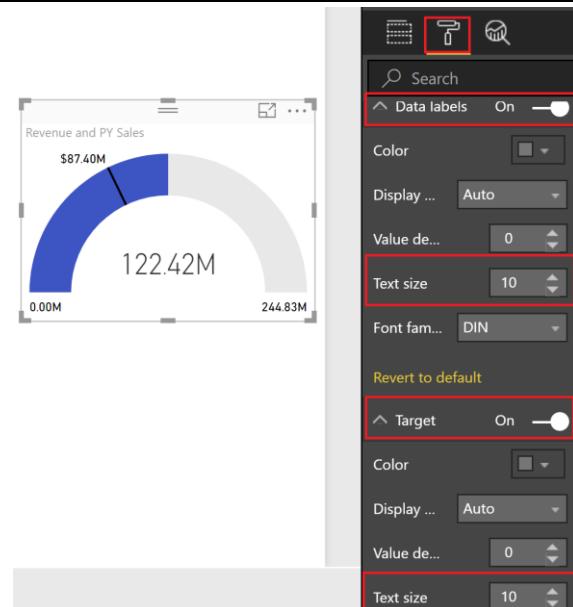
Now most of the visuals are blue in color.
Let's add some contrast.



59. Select the **Gauge** visual.
60. From **VISUALIZATIONS** panel, select **paint roller** icon.
61. Expand **Data colors** section.
62. Select the drop down next to **Target**. Notice the color palette is different now.
63. Select **black** color. Notice the change in the visual.

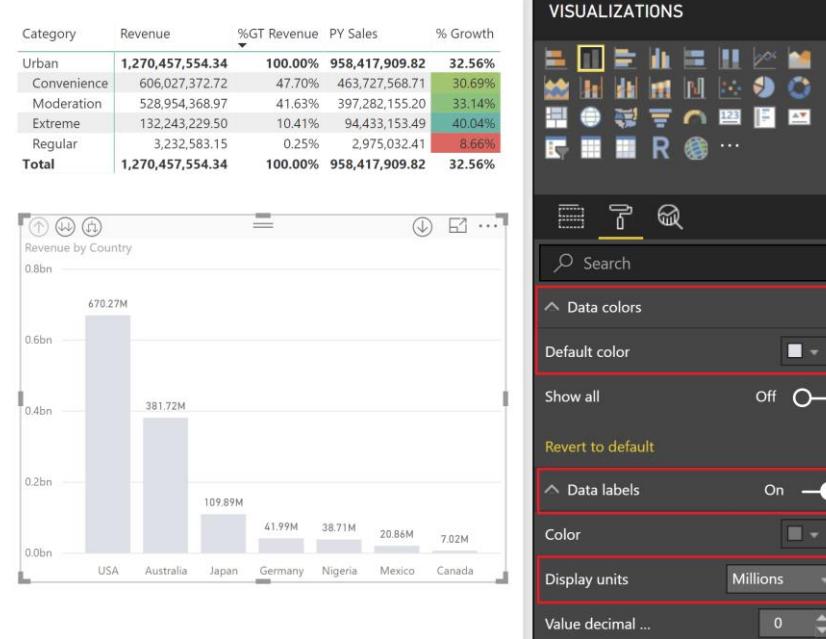


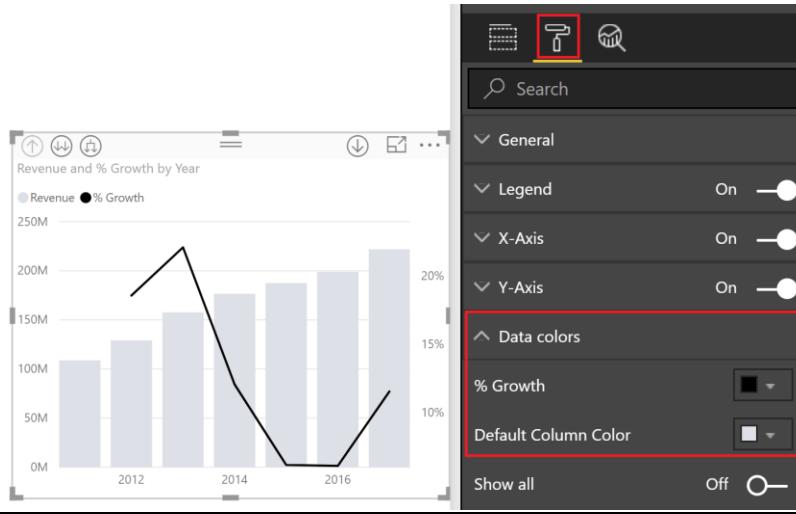
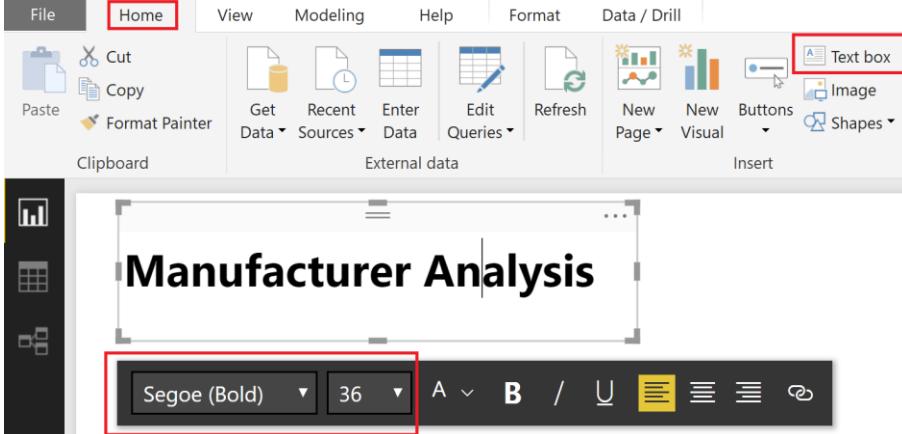
64. Collapse **Data colors** section.
65. Expand **Data Labels** section.
66. Increase **Text size** to **10**.
67. Expand **Target** section.
68. Increase **Text size** to **10**.



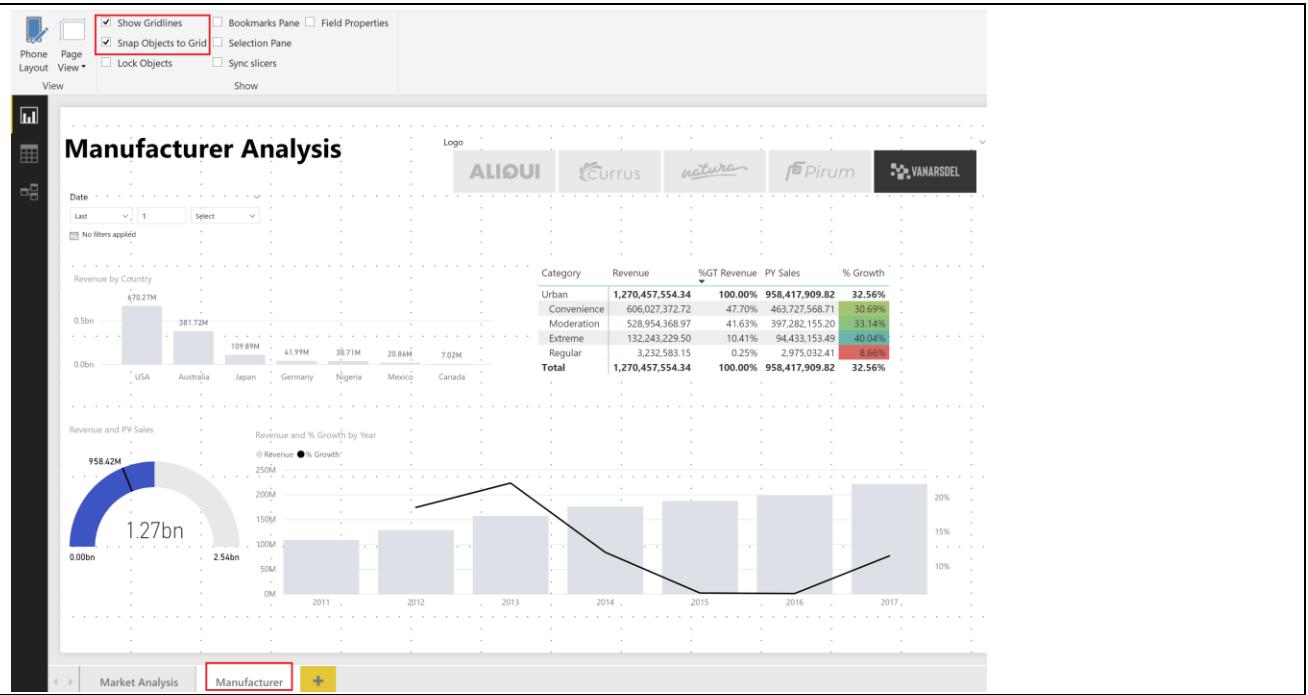
69. Select **matrix visual**.
70. Drill up to **Segment** level.
71. Select **Revenue by Country** visual.
72. Drill up to **Country** level.
73. From **VISUALIZATIONS** panel, select **paint roller icon**.
74. Expand **Data colors** section.
75. Select a light shade of **gray** as the **Default color**.
76. Enable and expand **Data labels**.
77. Change Display units to **Millions**.

Notice there a lot of formatting options.
E.g. visual title can be changed and formatted, you can add a border and



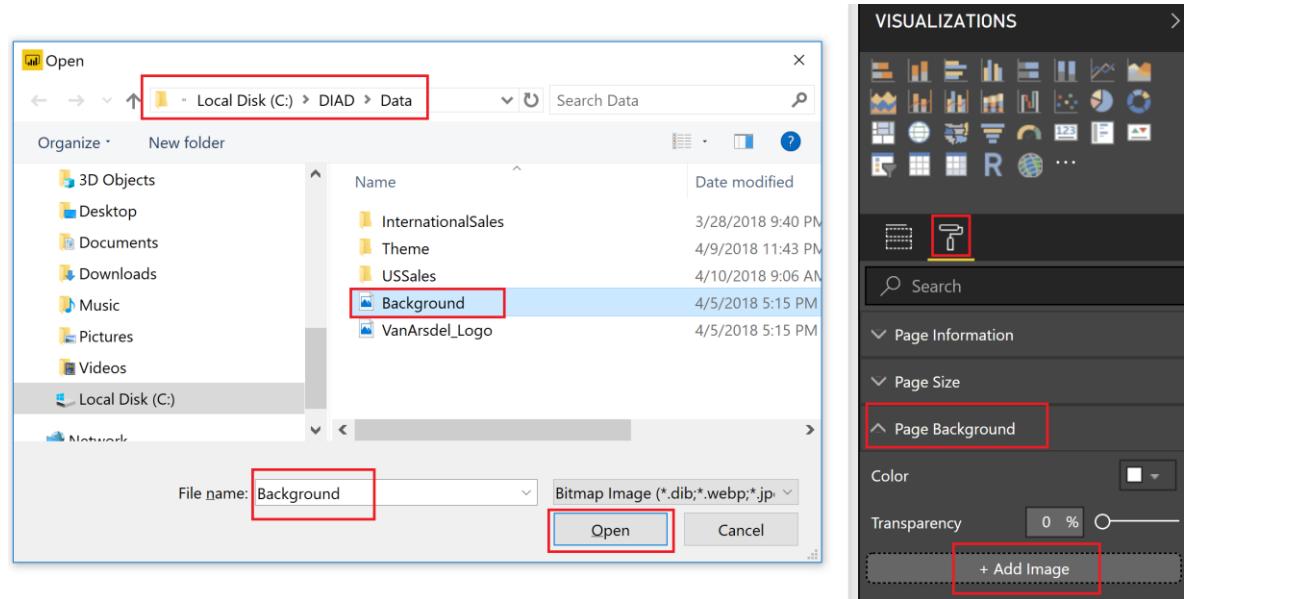
<p>background to the visual, etc. Feel free to explore the options.</p> <p>78. Select Revenue and % Growth by Year visual.</p> <p>79. From VISUALIZATIONS panel, select paint roller icon.</p> <p>80. Expand Data colors section.</p> <p>81. Select black color for % Growth.</p> <p>82. Select a light shade of gray as the Default Column color.</p>	
<p>Let's add a report title.</p> <p>83. From the ribbon, select Home -> Text box. Notice a text box visual is added.</p> <p>84. Resize the visual as needed.</p> <p>85. Enter Manufacturer Analysis in the Text box.</p> <p>86. Highlight Manufacturer Analysis to format the text.</p> <p>87. Select Segoe (Bold) as the font.</p> <p>88. Select 36 as the font size.</p> <p>89. Resize the text box as needed.</p>	

90. From the **ribbon**, select **View**.
 91. Select the checkbox next to **Show Gridlines** and **Snap Objects to Grid**. This will help with aligning the visuals.
 92. **Move and align** the visuals like the screenshot.
 Uncheck **Show Gridlines** and **Snap Objects to Grid** options to disable these features.
 93. **Rename** the page to Manufacturer.

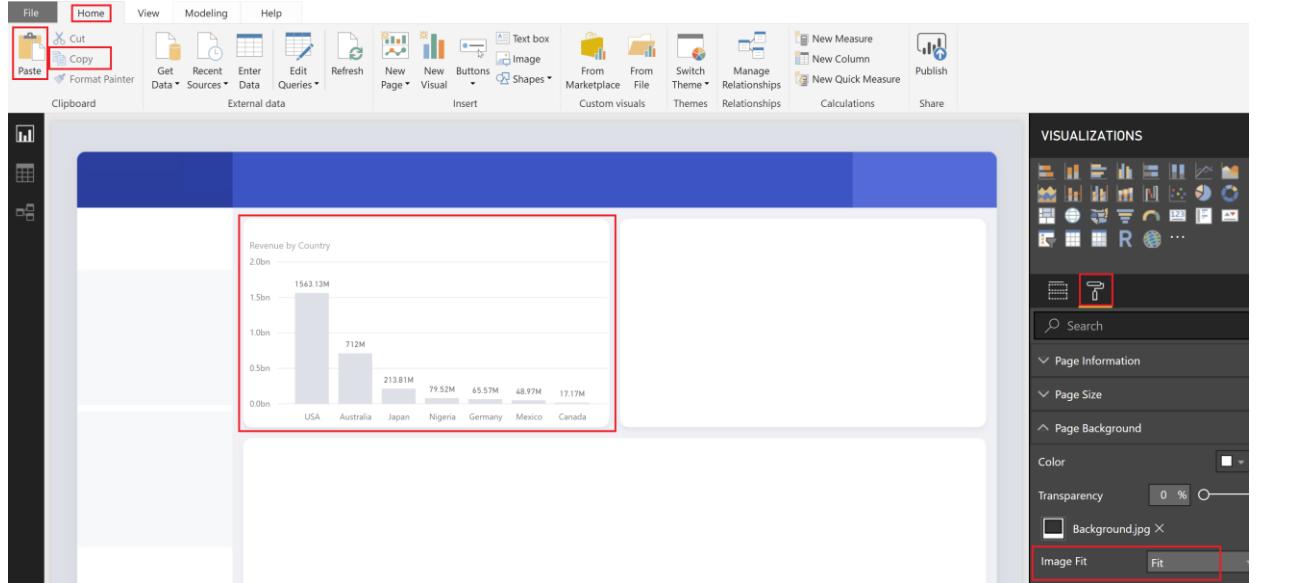


We can also use a background images to format the reports. Let's try it.

94. Select + icon in the bottom of the page to create a new page. You will be navigated to a Page 1.
95. Click on the white space in the canvas.
96. From **VISUALIZATIONS** panel, select **paint roller** icon.
97. Expand **Page Background** section.
98. Select **Add Image** button.
99. File browser dialog opens. Browse to **/DIAD/Data** folder.
100. Select **Background** file.
101. Select **Open**.



102. From **Image Fit** drop down, select **Fit**. Notice we have a template which has place for header and slots for images.
103. Navigate to **Manufacturer page**.
104. Select **Revenue by Country** visual.
105. From the ribbon select **Home -> Copy**.
106. Navigate to **Page 1**.
107. From the ribbon select **Home -> Paste**.
108. **Resize** the visual and place it as shown in the screenshot.



109. Navigate to **Manufacturer page**.

110. Select **Manufacturer slicer**.

111. From the ribbon select **Home -> Copy**.

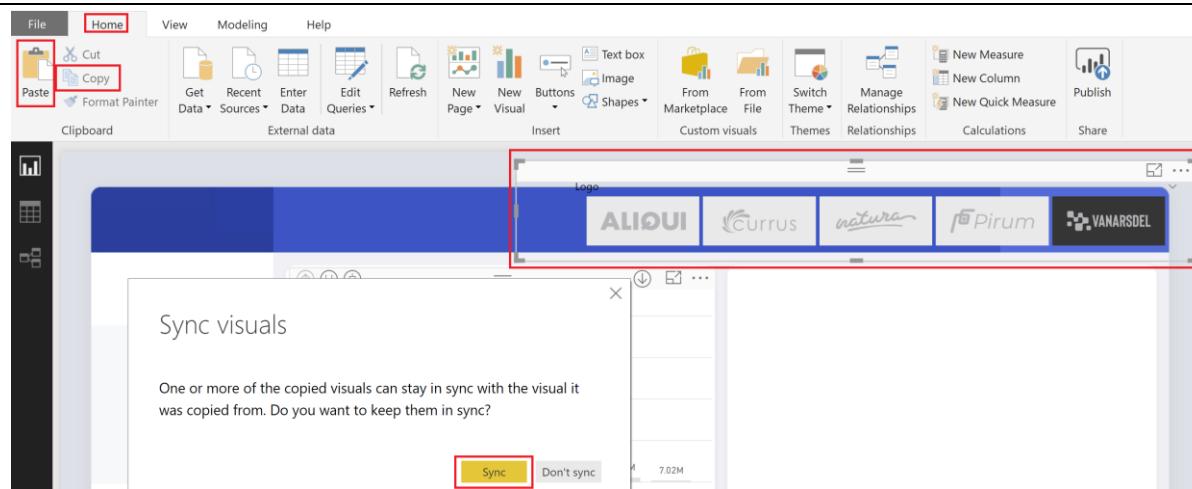
112. Navigate to **Page 1**.

113. From the ribbon select **Home -> Paste**.

114. Sync visuals dialog opens. Select **Sync**.

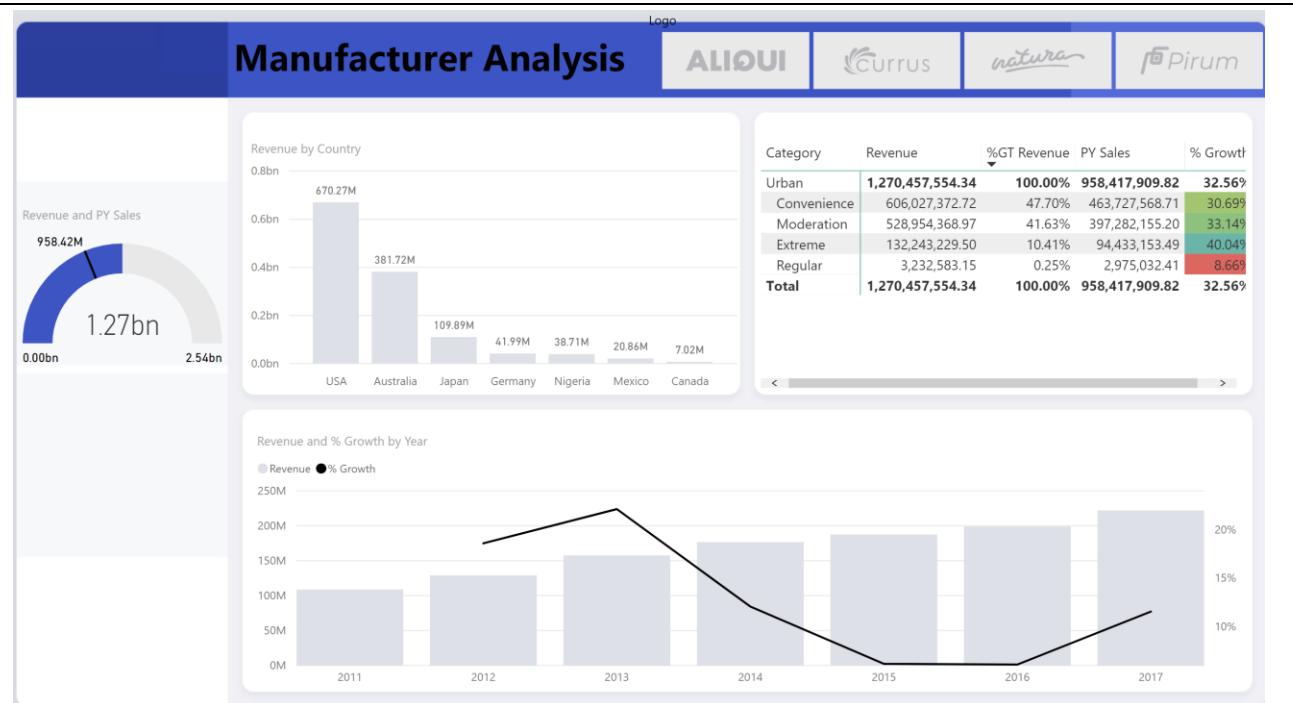
This will keep Manufacturer slicer in both the pages in sync. Changing slicer in one of the pages will update visuals in both the pages.

115. **Resize** the slicer and place it as shown in the screenshot.



116. Similarly, copy the report title, gauge, matrix and the line and clustered column visual.

117. Resize and arrange the visuals as shows in the screenshot.



Let's add a logo.

118. From the ribbon, select **Home** -> **Image**.

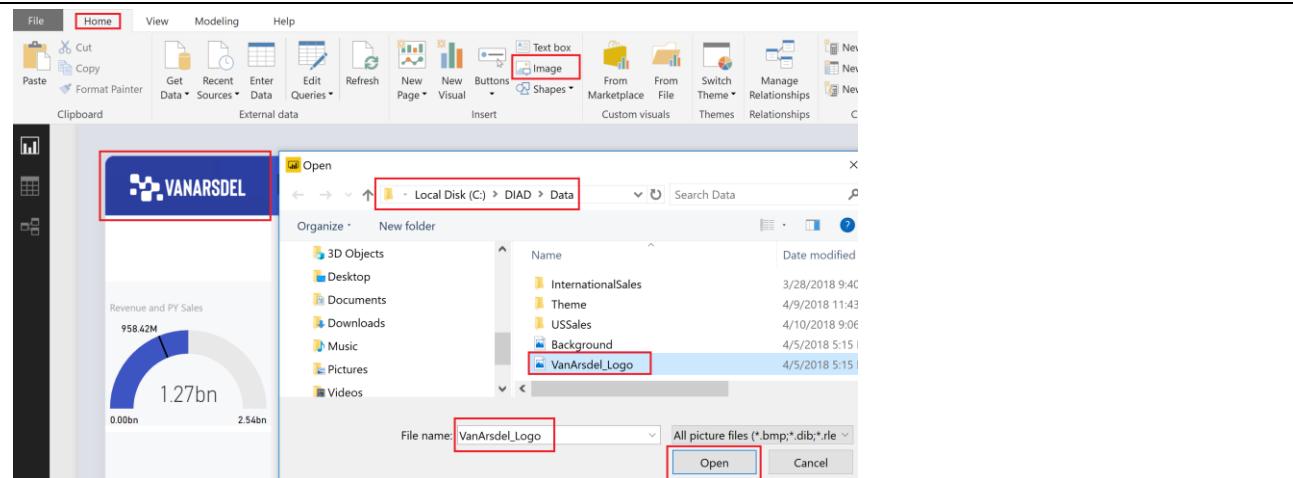
119. File browser dialog opens. Browse to **/DIAD/Data** folder.

120. Select **VanArsdel_Logo** file.

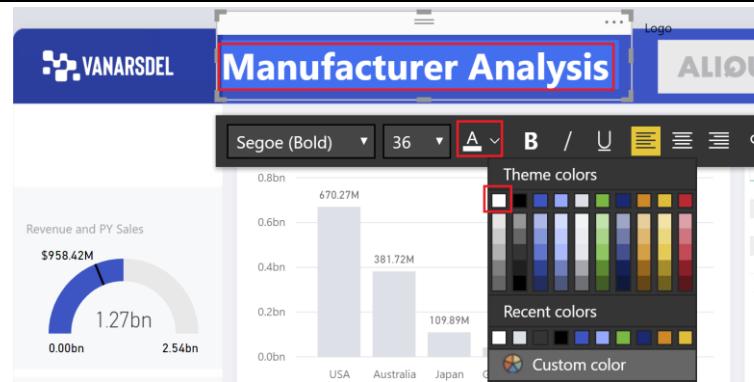
121. Select **Open**.

122. **Resize** the visual as needed.

123. **Drag** the visual to the top left corner of the page.



- Let's change the font color of report title.
124. Highlight **Manufacturer Analysis**.
 125. Select the arrow next to A for font color.
 126. Select **white** color.



Out of the box, Power BI has a good selection of visuals. However, there is always a use-case where you need a custom visual. To meet this need, visualization engine is open sourced. Power BI community contributes visuals which are available in the marketplace. You can add and use these visuals in your reports.

There is also an option to create your own visual and import it into Power BI Desktop. Let's add a custom visual.

127. In **VISUALIZATIONS** section, select the ellipsis in the last row of visuals.

128. Select **Import from marketplace**.

129. Type **play axis** in the **search box** and select search.

130. Select **Add** next to **Play Axis (Dynamic Slicer)**.

131. Import custom visual dialog opens. Select **OK**.

Power BI Visuals

[MARKETPLACE](#) | [MY ORGANIZATION](#)

Add-ins may access personal and document information. By using an add-in, you agree to its Permissions, License Terms and Privacy Policy.

play axis

Category

All

Editor's Picks

Filters

KPIs

Maps

Advanced Analytics



Play Axis (Dynamic Slicer)

Working like a dynamic slicer, it animates your other power bi visuals without any user interaction.

Add



Impact Bubble Chart

Advanced bubble chart, used to compare two entities against each other.

Add

VISUALIZATIONS > **FIELDS**

Search

- > Date
- > Geography
- > Manufacturer

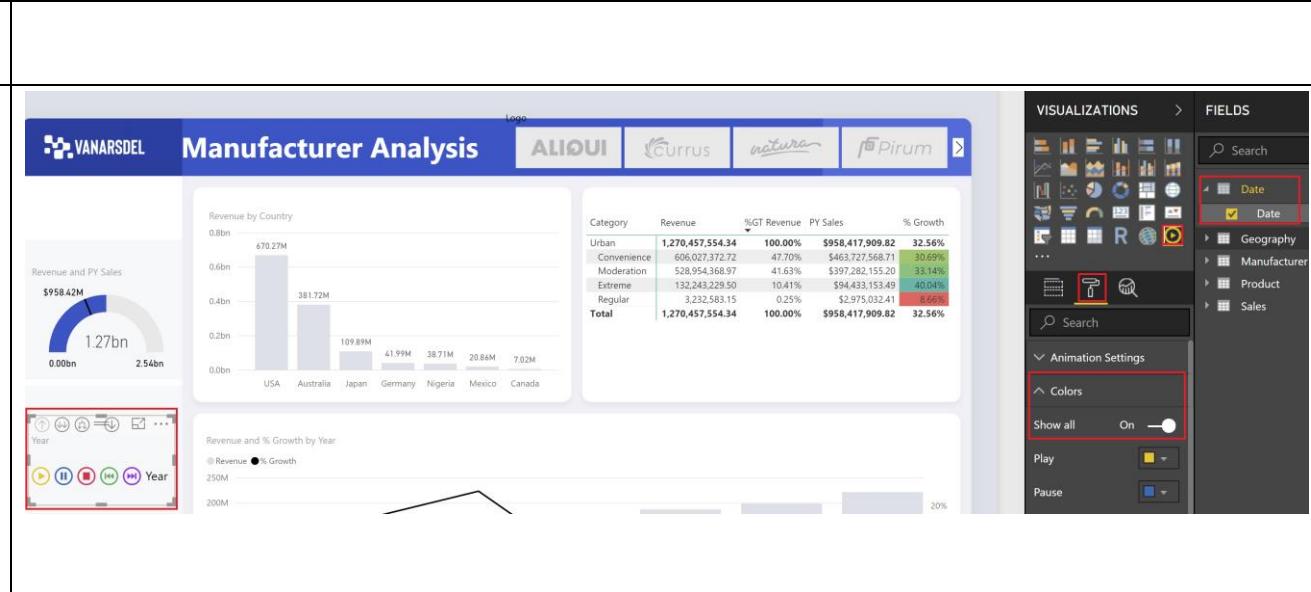
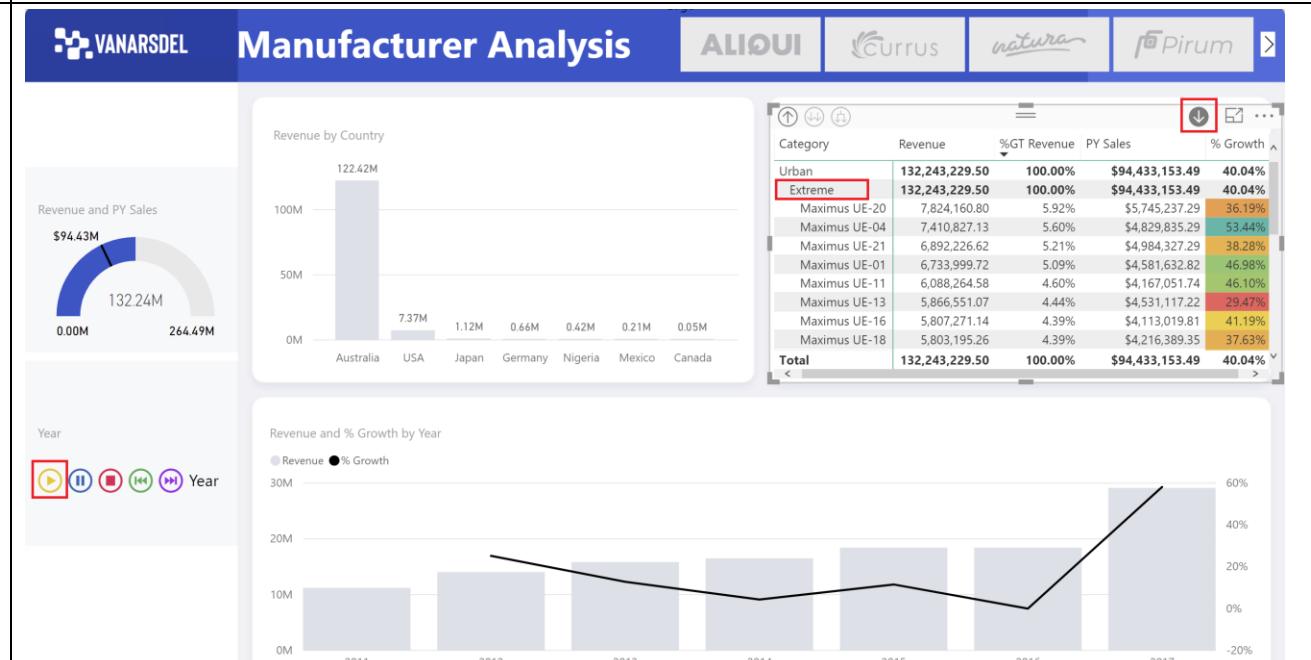
Import from file

Import from marketplace

Values

Drag data fields here

Delete a custom visual

<p>Notice a new visual is added to the list of available visuals.</p>	
<p>132. Click on the white space in the canvas.</p> <p>133. From VISUALIZATIONS section, select the newly imported Play Axis visual.</p> <p>134. From FIELDS section, expand Date table.</p> <p>135. Select Date field.</p> <p>136. From VISUALIZATIONS panel, select paint roller icon.</p> <p>137. Expand Colors section.</p> <p>138. Enable Show all option.</p> <p>139. Resize and position the visual as shown in the screenshot.</p> <p>140. Enable drill mode in matrix visual.</p> <p>141. Select Extreme category to drill down to Extreme products.</p> <p>142. Select Play in the Play axis visual. Notice all the visuals update as play axis moves through years. You can view Product performance over time as well as performance of countries over time. Play axis provides an option to analyze data over time (or any other dimension) across all visuals in the page.</p> <p>143. Once you are done playing through the years, in the matrix visual drill back up to Product Category level.</p> <p>144. Disable drill mode in matrix visual. There a lot of custom visuals available and new ones are added periodically.</p>	

Now we have a report ready, let's use Bookmarks to tell the story we discovered. Bookmarks capture the currently configured view of a report page, including filtering and the state of visuals which makes it easy to present the story.

145. From the **ribbon**, select View.

146. Select the **checkbox** next to **Bookmarks Pane** to enable Bookmarks.

BOOKMARKS pane opens.

147. Click on **Add** in **BOOKMARKS** pane. This will add the current state of the visual to the bookmark.

148. Click on the **ellipsis** next to the newly created **Bookmark 1**.

149. Select **Rename** to rename it to **Initial State**

150. In **Revenue by Country** visual, select **USA** column.

151. Hover over **Revenue by Country** visual and select the **ellipsis** on the top right corner.

152. Select **Spotlight**.

153. In the **BOOKMARKS** pane, select **Add**. This will add a new bookmark with the current state of the report.

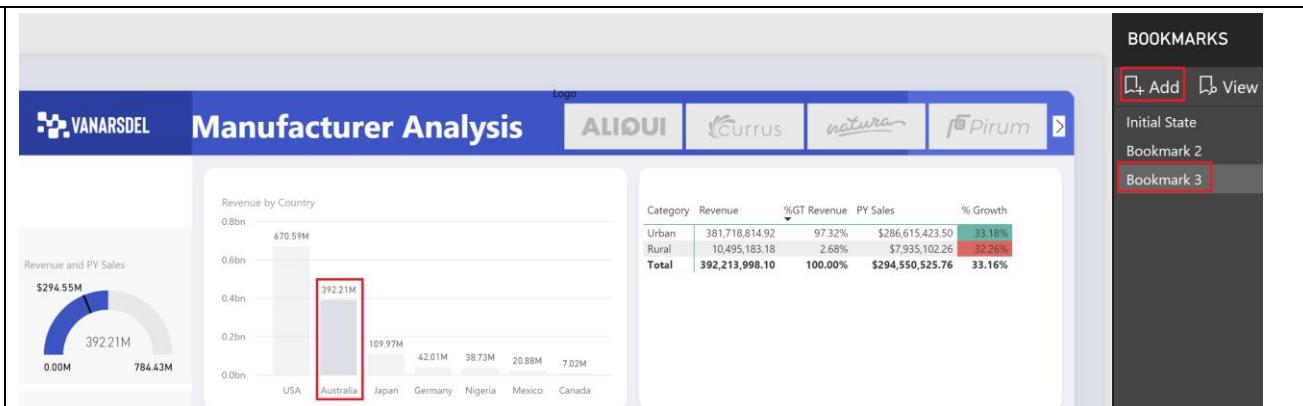
The screenshot shows the Microsoft Power BI desktop interface. The ribbon at the top has 'View' highlighted. In the 'View' tab, the 'Bookmarks Pane' checkbox is checked. To the right, the 'BOOKMARKS' pane is open, showing 'Bookmark 1'. The main area displays a 'Manufacturer Analysis' report with a 'Revenue by Country' bar chart and a summary table.

The screenshot shows the 'Revenue by Country' visual with its context menu open. The 'Spotlight' option is highlighted with a red box. The 'BOOKMARKS' pane on the right shows two bookmarks: 'Initial State' and 'Bookmark 2'.

154. Click on the canvas.

155. Select **Australia** in Revenue by Country visual.

156. In the **BOOKMARKS** pane, select **Add**. This will add a new bookmark with the current state of the report.



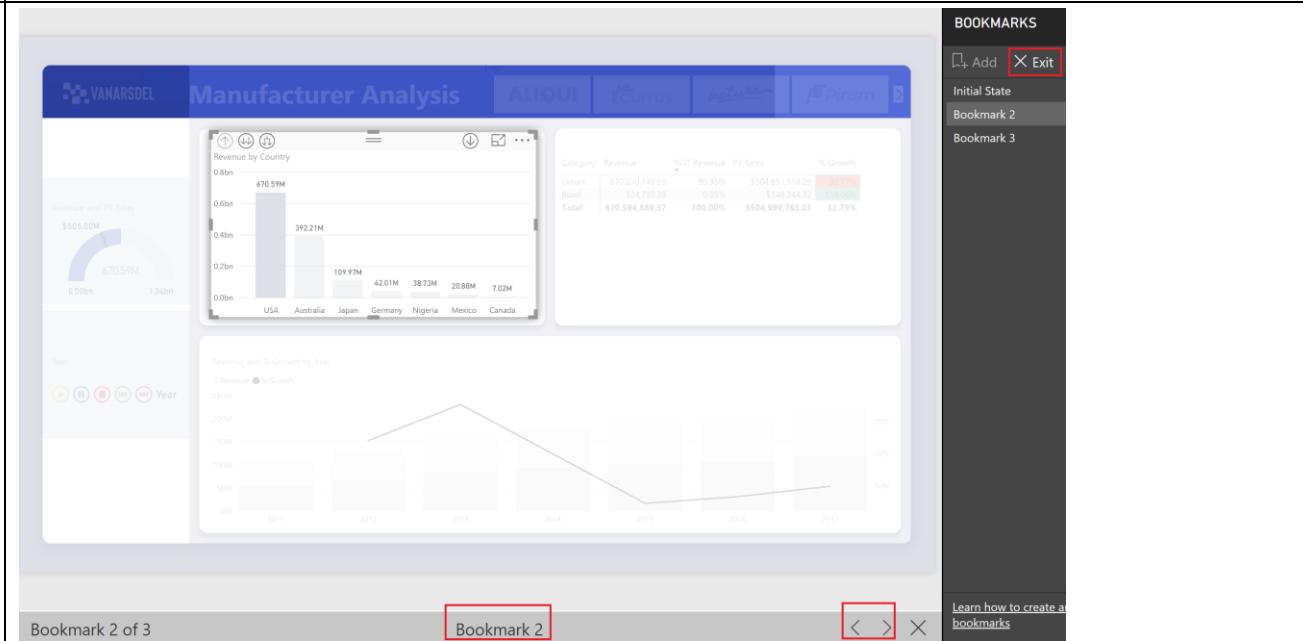
157. From the **BOOKMARKS** pane, select **View**. You are in Bookmarks slide show mode.

You will be in the first bookmark which we called Initial State. Notice on the bottom of the report pane there is an option to navigate between bookmarks.

158. You can use the **arrows** to navigate between bookmarks and tell your story.

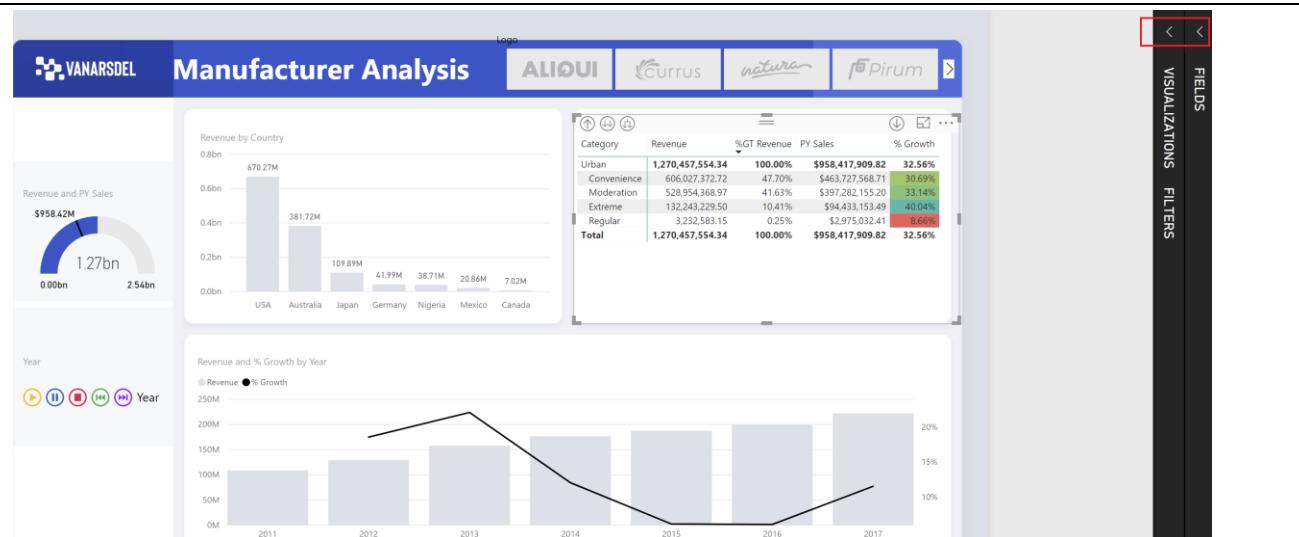
159. From **BOOKMARKS** pane, select **Exit** to exit Bookmarks slide show mode.

If time permits, feel free to explore other options available with Bookmarks like Selected Visuals and more as you continue to build the story.



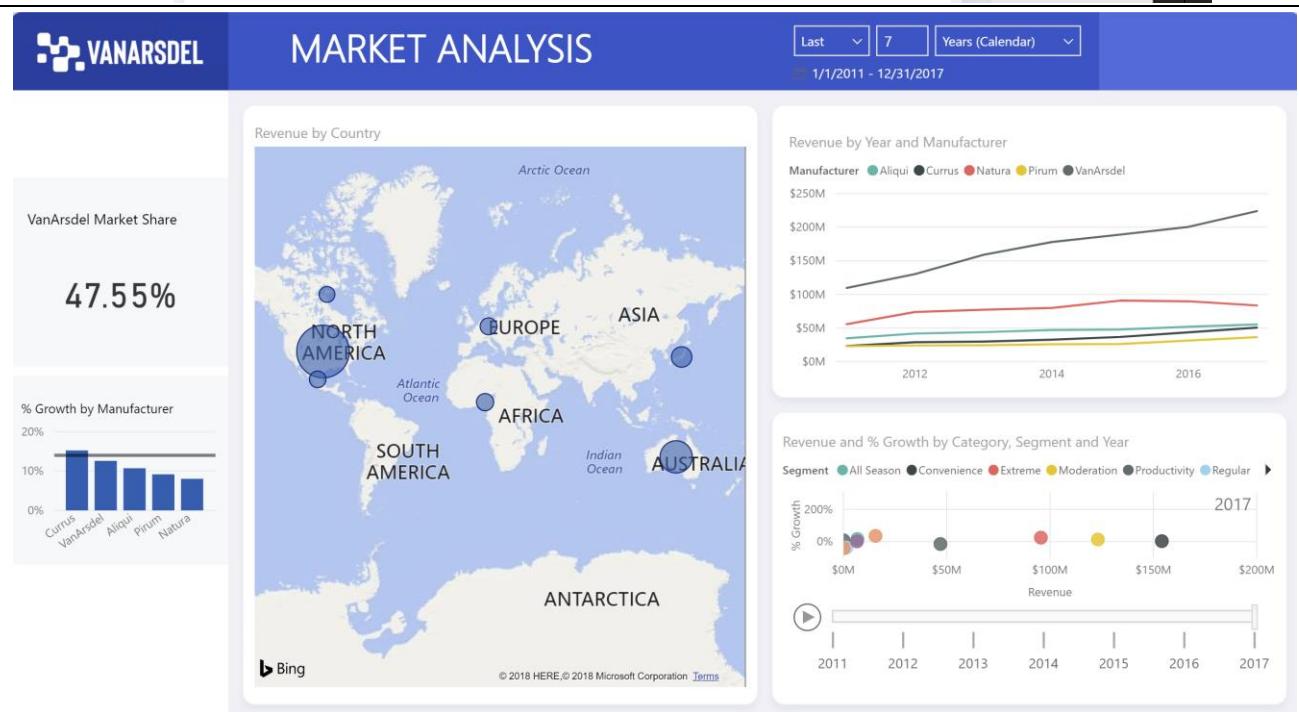
160. From the ribbon, select **View**.
 161. Uncheck **Bookmarks Pane**.
 162. Collapse the **Visualizations** and **Filters** pane by clicking on the arrows. **Report** should look as shown in the figure. **Save** the file.
 163. Select **File -> Save**.

You have built your first report!!!



164. Navigate to **/DIAD/Reports** folder.
 165. Open **DIAD Final Report.pbix** file.

This file uses the same dataset that you used for the lab. We have added a few more visuals and formatted the reports. Feel free to explore the report.



You have successfully completed the hands-on lab in creating a report to share to your team. The next section covers creating a dashboard from this report so that you can easily share it to your team. You have learned a quick overview of various functionality in Power BI Desktop to get accelerated. There are a lot more features for you to build upon this on your own data.

Power BI Service

You will now leverage the report authored using Power BI Desktop and create a dashboard for VanArsdel data analysis team and share it with the CMO. A Power BI Desktop file with additional reports / visuals is provided. Please use this for the next section of the lab.

Power BI Service - Publishing Report

1. If you have not signed up for a Power BI account, go to <http://aka.ms/pbidiadtraining> and sign up for Power BI with a business email address.
2. If you have not already opened app.powerbi.com page, please open the browser and navigate to <http://app.powerbi.com>.
3. Sign in to Power BI using your user account. Once logged in, you will see Welcome to Power BI page.

The screenshot shows the Power BI Service homepage. On the left, there is a sidebar with navigation links: Favorites, Recent, Apps, Shared with me, Workspaces, and My Workspace (which is currently selected). The main content area has a title 'Welcome to Power BI' and a sub-section 'You're on your way to exploring your data and monitoring what matters. Let's start by getting some data.' It also includes links to 'Try this tutorial' or 'watch a video'. Below this, there are sections for 'Microsoft AppSource' and 'Import or Connect to Data'. The 'Microsoft AppSource' section contains four cards: 'My organization' (Get), 'Services' (Get), 'Files' (Get), and 'Databases' (Get). The 'Import or Connect to Data' section also contains four cards with similar labels and 'Get' buttons.

4. If the left navigation is collapsed, select  icon below Power BI on the top left of the screen to expand the left navigation. Following options are listed in the left navigation:

Favorites: Lists all your favorite dashboards (we will create a favorite in a later section).

Recent: Lists the most recent dashboards you have viewed.

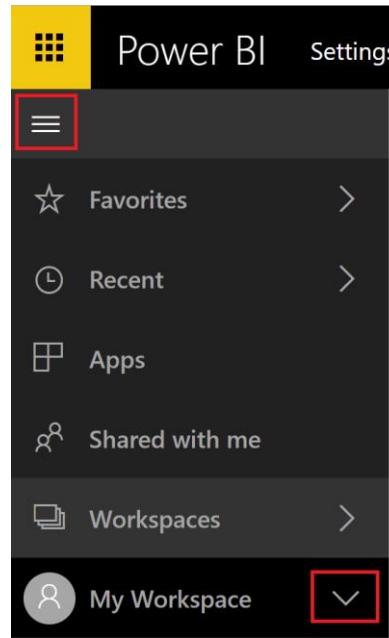
Apps: List all the apps you have installed.

Shared with me: Lists the dashboards that are shared with you (we will share dashboards in a later section).

Workspaces: Lists all the workspaces you are assigned. By default, you are assigned My Workspace.

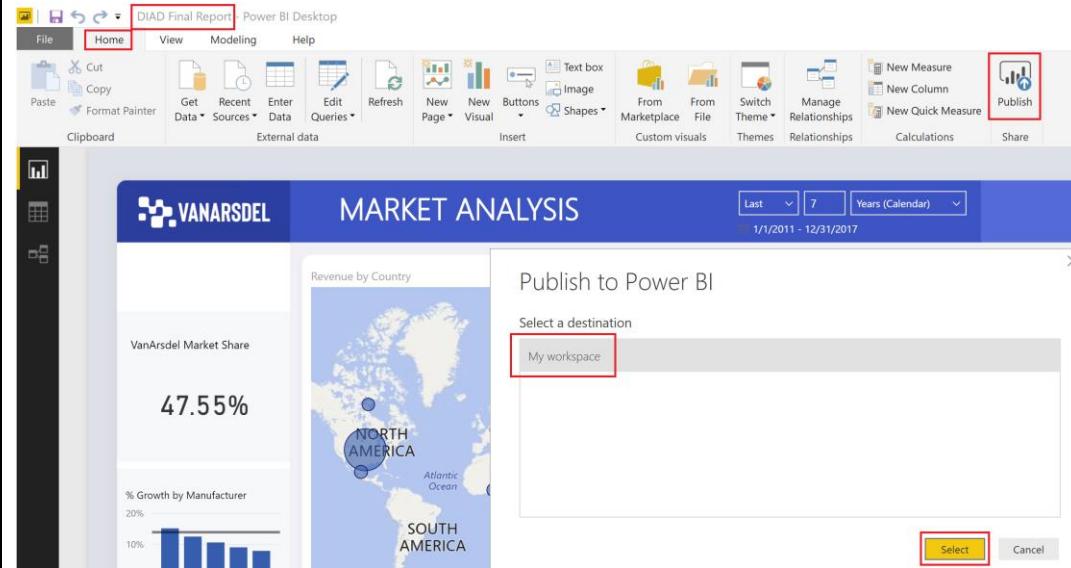
5. Select the down arrow next to **My Workspace**. Notice DASHBOARDS, REPORTS, WORKBOOKS and DATASETS section are empty. Let's import a Power BI Desktop file and create dashboards.

Note: If you have previously signed into Power BI, then your screen will look different. You will be directly navigated to your Workspace skipping the Welcome page.



Let's publish the report to Power BI Service and then we will come back to the browser.

6. Navigate to **/DIAD/Reports** folder.
7. Open **DIAD Final Report.pbix** file.
8. From the ribbon select **Home -> Publish**.
9. If you have not already logged into Power BI, a **Sign in** dialog opens. Please sign in.
10. Once you are signed in, Publish to Power BI dialog opens. Select **My workspace** from the dialog.
11. Click **Select**.



Publishing to Power BI dialog opens. Once completed, a success message is displayed.

12. Select **Got it** to close the dialog.

Now we have published the report to Power BI service. Let's navigate back to the browser and start exploring.

Publishing to Power BI

Success!

[Open 'DIAD Final Report.pbix' in Power BI](#)

[Get Quick Insights](#)



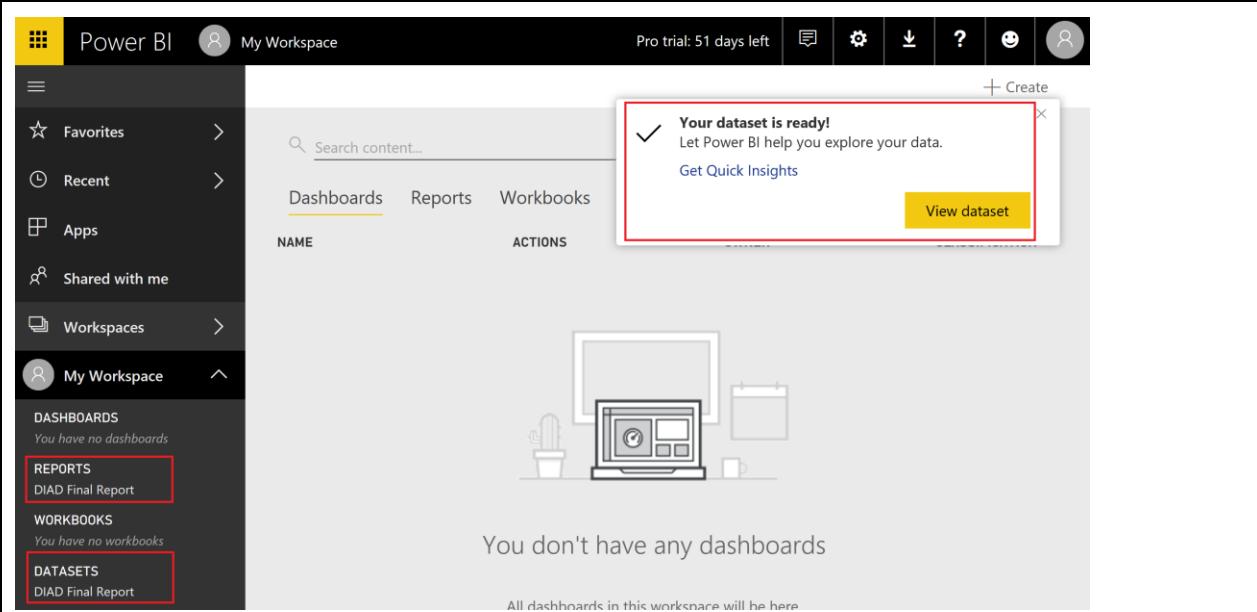
Did you know?

You can create a portrait view of your report tailored for mobile phones, on the **View** tab select **Phone Layout**. [Learn more](#)

[Got it](#)

13. Once you are in the browser, notice a message appears stating the dataset is ready. Select **X** on the top right corner of the dialog to close it.

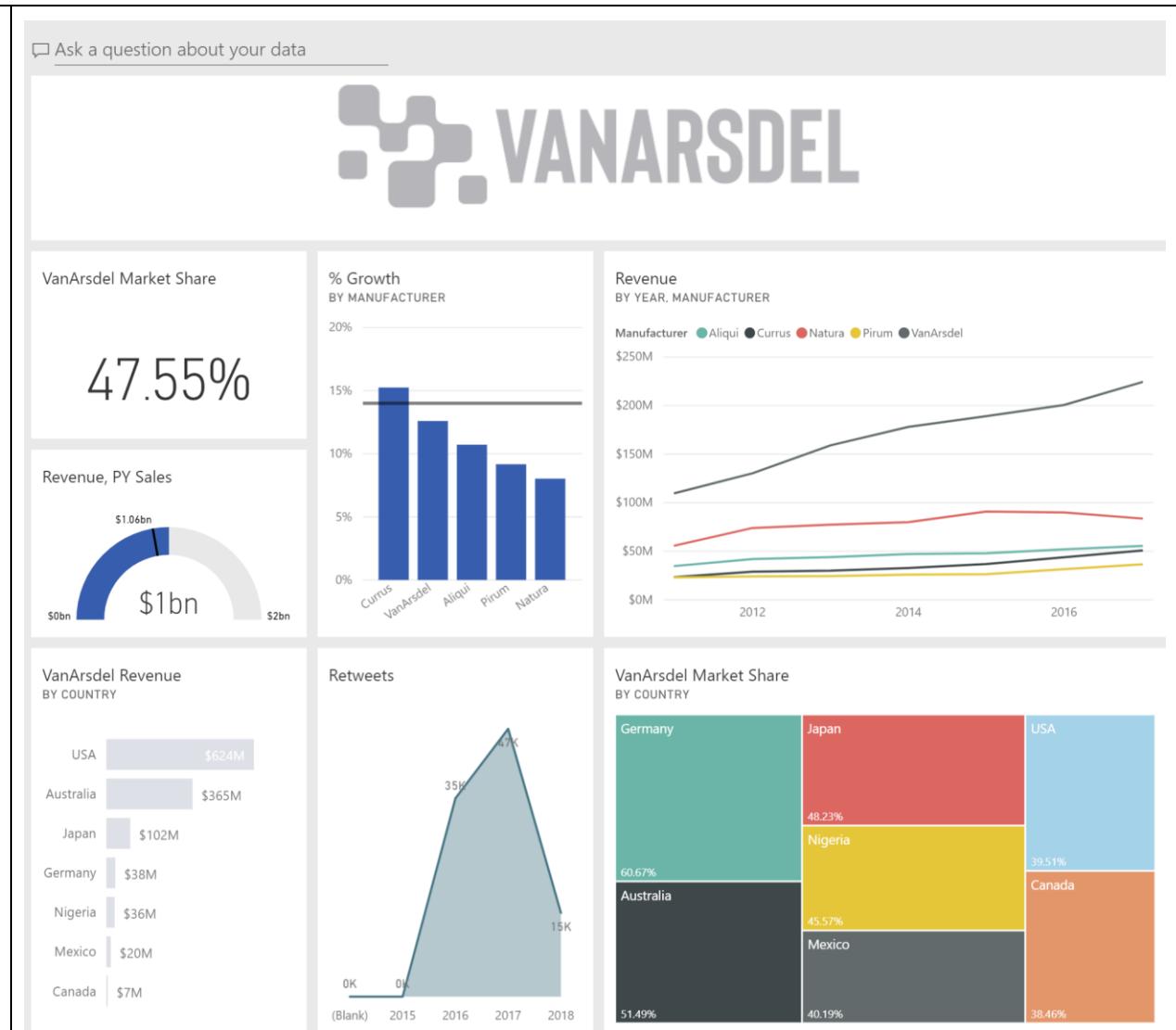
Notice under **My Workspace**, you will see
REPORTS -> DIAD Final Report and
DATASETS -> DIAD Final Report.



Power BI Service – Building Dashboard

In this section, we will create a dashboard that will help compare VanArsdel's market share and performance over the time.

At the end of the section, we will create a dashboard that looks like the screenshot.

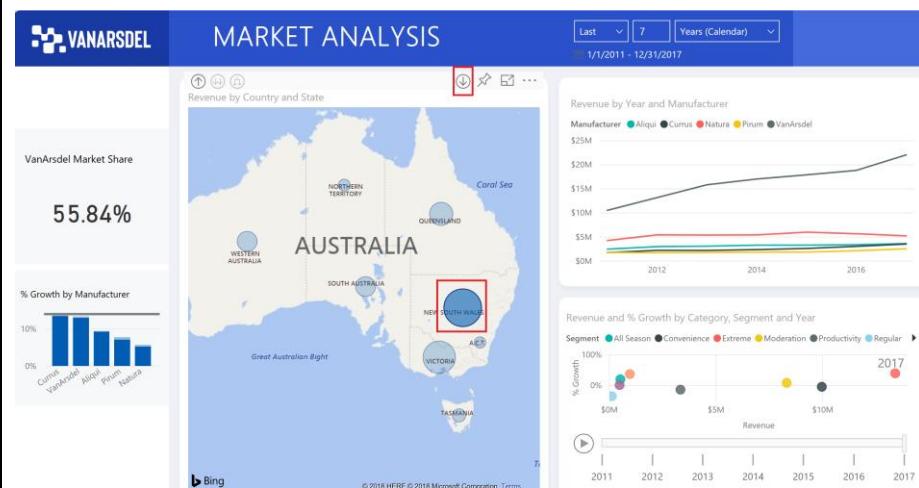


Let's start with exploring the report.

14. From the left menu, select **REPORTS** -> **DIAD Final Report**. You will be navigated to the report you just uploaded.
15. In the **map visual**, enable drill down by **hovering** over the visual.
16. Select the **down arrow** on the top right corner of the visual.
17. Select **Australia** to drill down to **State level**.

The screenshot shows the Power BI service interface. On the left, the navigation pane is open, showing 'Favorites', 'Recent', 'Apps', 'Shared with me', 'Workspaces', and 'My Workspace'. Under 'My Workspace', the 'REPORTS' section is expanded, showing 'DIAD Final Report' which is highlighted with a red box. Below it are 'WORKBOOKS' and 'DATASETS', both of which have 'DIAD Final Report' listed. The main content area displays a 'MARKET ANALYSIS' dashboard. It features a map of the world with bubbles representing revenue by country. A specific bubble for Australia is highlighted with a red box. To the right of the map is a bar chart titled 'VanArsdel Market Share' showing 47.55%. Below the map is another bar chart titled '% Growth by Manufacturer' showing growth for Curus, VanArsdel, Aliqui, Pirum, and Natura.

18. In the map visual, disable drill mode by selecting the **down arrow** on the top right corner of the visual.
19. Select the **bubbles on different states** and notice that as you select the states, other visuals get cross filtered. The behavior is like that of Power BI Desktop.
20. Select the **top arrow** on the top left corner to **drill up to Country level**.

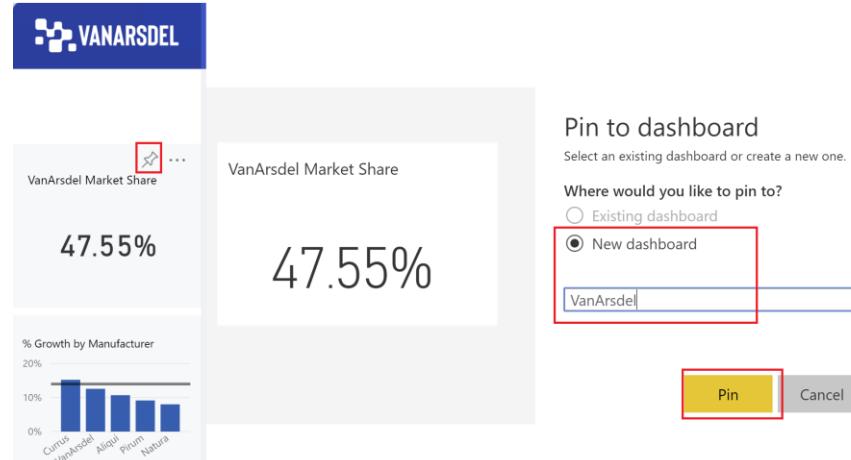


- Hover over the **bubble chart** on the bottom right of the screen.
- Select **Focus mode icon** so the visual fits in the canvas.
- Select **Extreme from the legend**. This will highlight the performance of Extreme segment over time. Notice the spike in 2017.
- Select the **Play axis** on the bottom left of the screen. This will show the revenue and % growth of each Product Segment over time.
- Select **Extreme from the legend** again to remove the filter.
- Select **Back to Report** on the top left to navigate back to report view.



- Let's pin visuals to the dashboard.
- Hover over **VanArsdel Market Share** card visual.
 - Select the **pin icon** on the top right of the visual. Pin to dashboard dialog opens.
 - We do not have a dashboard yet. Let's create one. With **New dashboard** selected, enter **VanArsdel** in the text box.
 - Select **Pin**.

Notice alert messages are displayed stating the dashboard is ready to view.



Notice in the left panel, VanArsdel Dashboard is created under DASHBOARDS.

31. From the left panel, select DASHBOARDS -> VanArsdel.

Notice the VanArsdel Market Share tile is pinned to the dashboard.

32. Click on **VanArsdel Market Share**, notice you are navigated to the report.

Tiles in dashboard are not interactive.

The screenshot shows the Power BI service's navigation pane on the left. The 'DASHBOARDS' section is expanded, and 'VanArsdel' is highlighted with a red box. Other options in the 'DASHBOARDS' section include 'Reports' and 'Workbooks'. To the right, the main workspace area displays a large, pinned tile titled 'VanArsdel Market Share' with the value '47.55%'.

33. Hover over **% Growth by Manufacturer** visual.

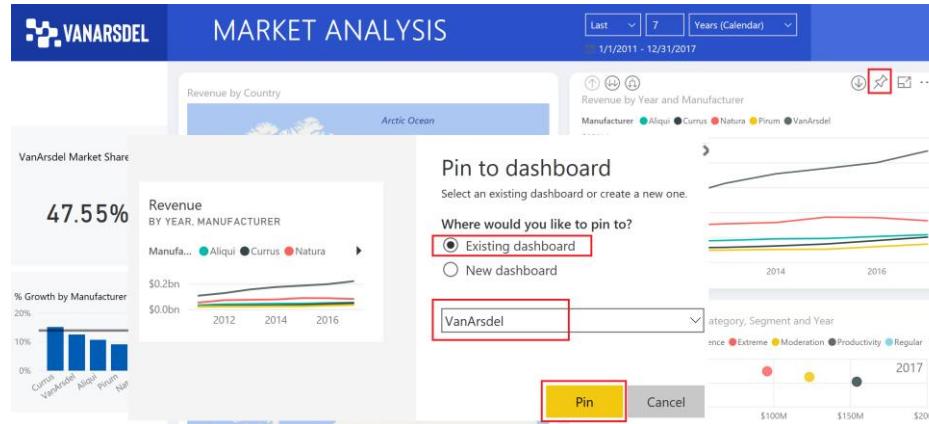
34. Select the **pin icon** on the top right of the visual. Pin to dashboard dialog opens.

35. Make sure **VanArsdel** is selected in the dropdown.

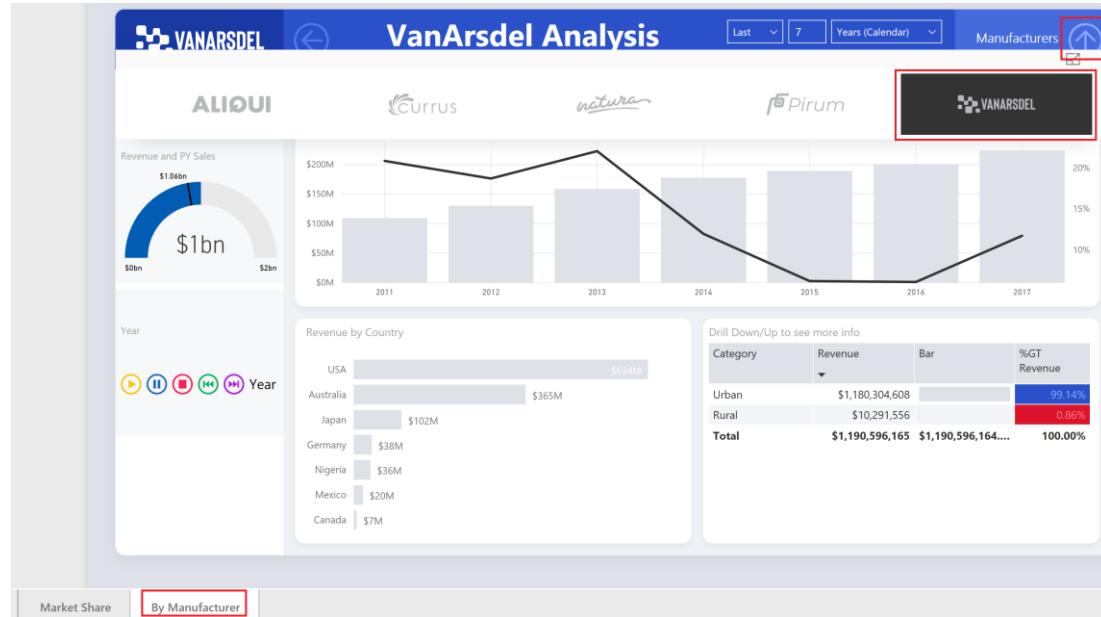
36. Select **Pin**.

The screenshot shows the 'MARKET ANALYSIS' report with a bar chart titled '% Growth BY MANUFACTURER'. A pin icon is highlighted with a red box. A 'Pin to dashboard' dialog box is open on the right. It contains a dropdown menu where 'VanArsdel' is selected, also highlighted with a red box. Below the dropdown, there are two radio button options: 'Existing dashboard' (which is selected) and 'New dashboard'. At the bottom of the dialog are 'Pin' and 'Cancel' buttons, with 'Pin' also highlighted with a red box.

37. Close out alert dialogs.
 38. Hover over **Revenue by Year and Manufacturer** visual.
 39. Select the **pin icon** on the top right of the visual. Pin to dashboard dialog opens.
 40. Make sure **VanArsdel** is selected in the dropdown.
 41. Select **Pin**.

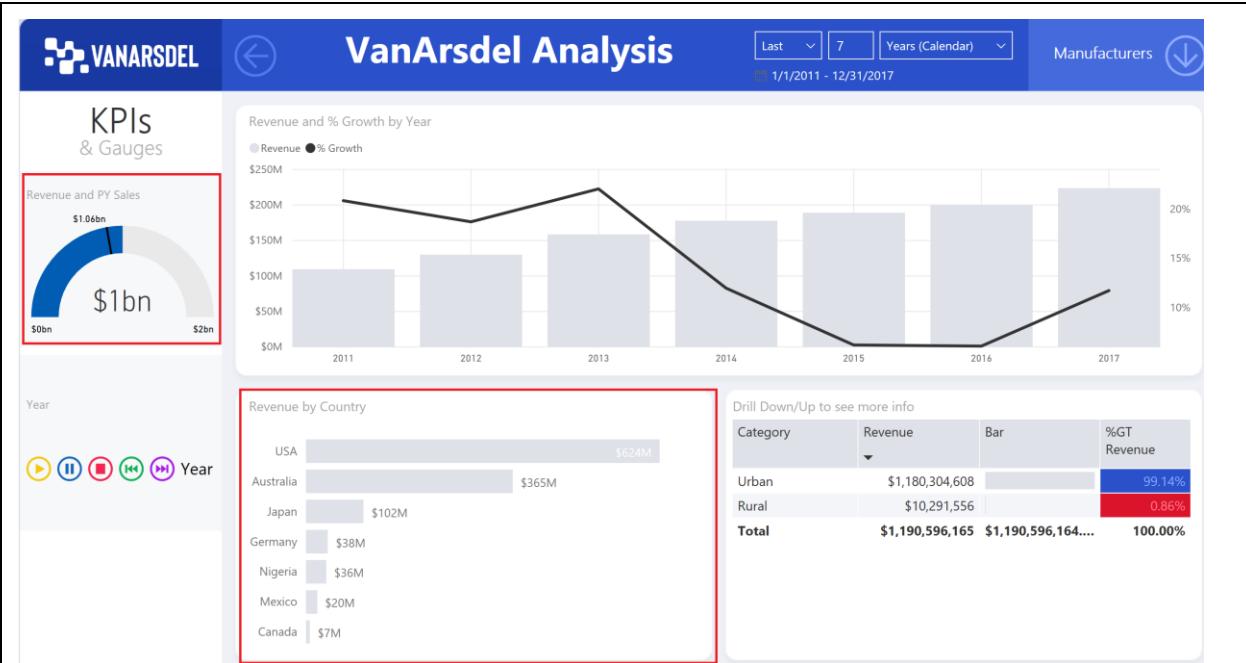


42. Close out alert dialogs.
 43. Navigate to **By Manufacturer** page.
 44. From the top right corner, select the **down arrow**. Notice manufacturer slicer displays.
 45. Select **VanArsdel** from the slicer. This will filter the visuals.
 46. From the top right corner, select the **up arrow**. Notice manufacturer slicer collapses.



- 47. Pin the gauge visual to the dashboard.**
48. Pin Revenue by Country visual to the dashboard.
49. Close out alert dialogs.

Note: VanArsdel filter is applied to the tile that is pinned to the dashboard.



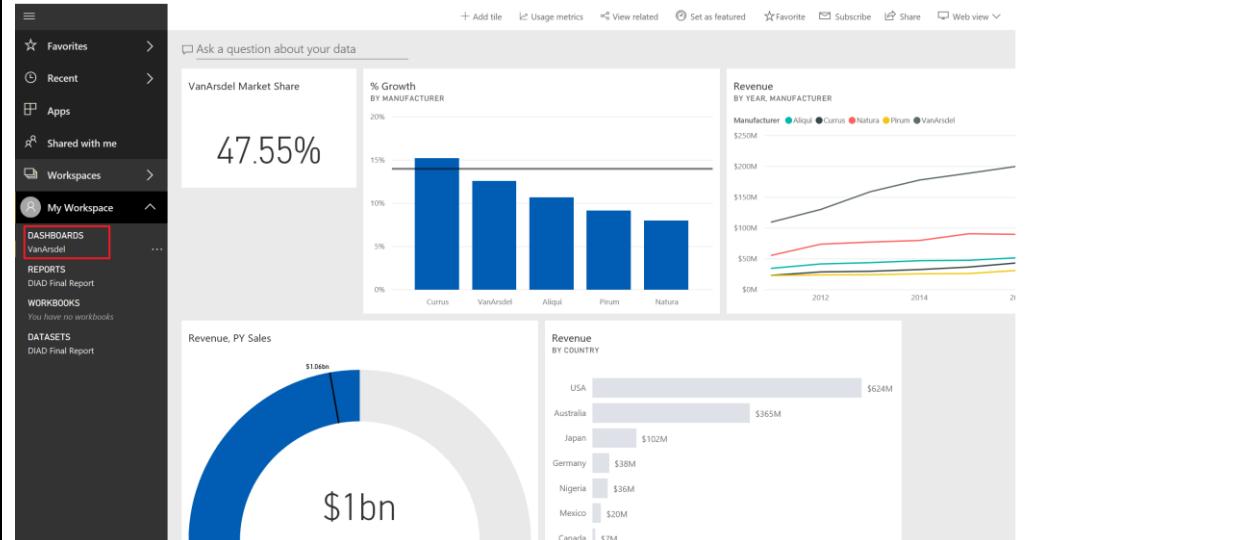
- 50. From the left panel, select DASHBOARDS -> VanArsdel.**

Notice all the visuals are pinned as tiles to the dashboard.

You will see the visuals on the dashboard like the screenshot.

Each visual on the dashboard is called as a tile. The tiles represent the data chosen and will be kept up to date as the data in the data model updates. Tiles are not interactive.

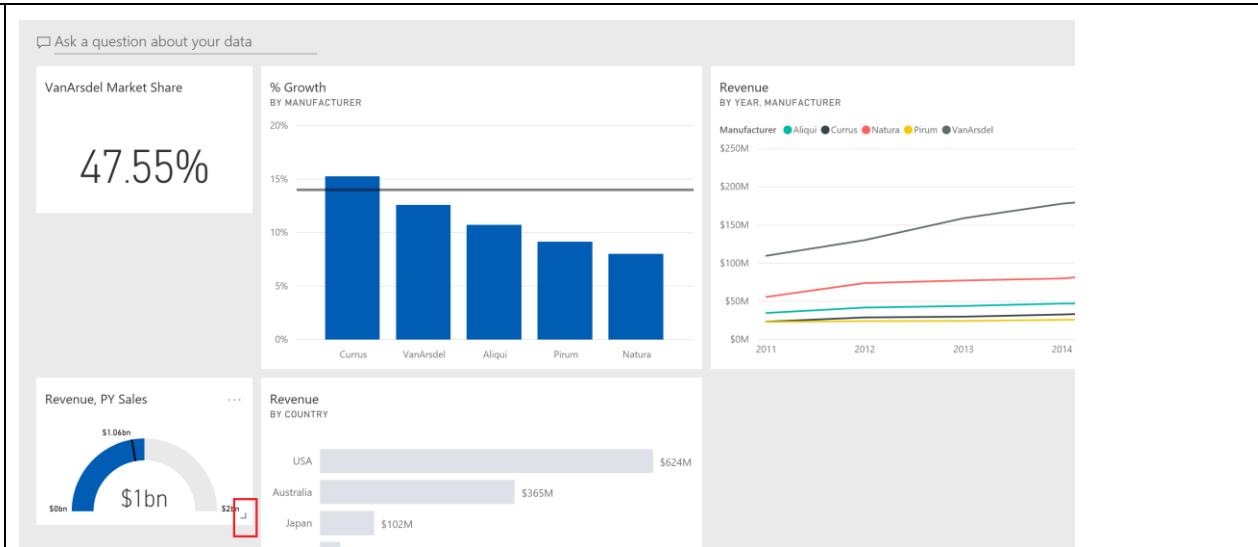
Let's organize the dashboard now.



51. Select and move the **gauge tile** as shown in the screenshot.

52. Select the **bottom right corner** of the tile and move it diagonally to change the image size.

Tiles can be of **various sizes (1x1 to 5x5)**. Drag the tile using the bottom right corner to resize. As you are dragging, note the gray shadow which indicates the size of the tile when you stop dragging.



53. From the top menu, select **Add tile**.
Add tile dialog opens.

54. Select **Image** as the source.

55. Select **Next**.

56. In **URL** text box, enter

<https://raw.githubusercontent.com/CharlesSterling/DiadManu/master/Vanarsdel.png>

57. Select **Apply**.

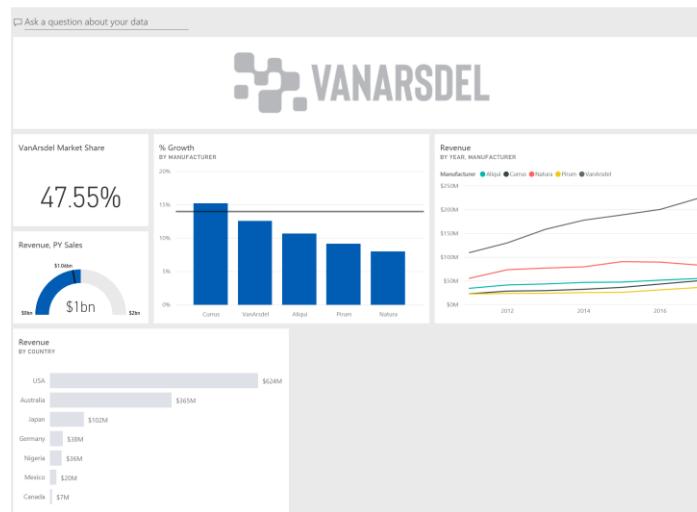
Notice a new tile with VanArsdel logo is added to the dashboard.

The screenshot shows the "Add image tile" dialog box with the following fields:

- Details**:
 - Display title and subtitle
- Title**: (empty input field)
- Subtitle**: (empty input field)
- Content**:
 - URL ***:
- Functionality**:
 - Set custom link
- Link type**:
 - External link
- Technical Details**: (empty section)

At the bottom are buttons: Back, Apply (highlighted with a red border), and Cancel.

58. Resize and rearrange the tiles as shown in the screenshot.



Revenue by Country tile shows Revenue by Country for VanArdel, so let's rename it.

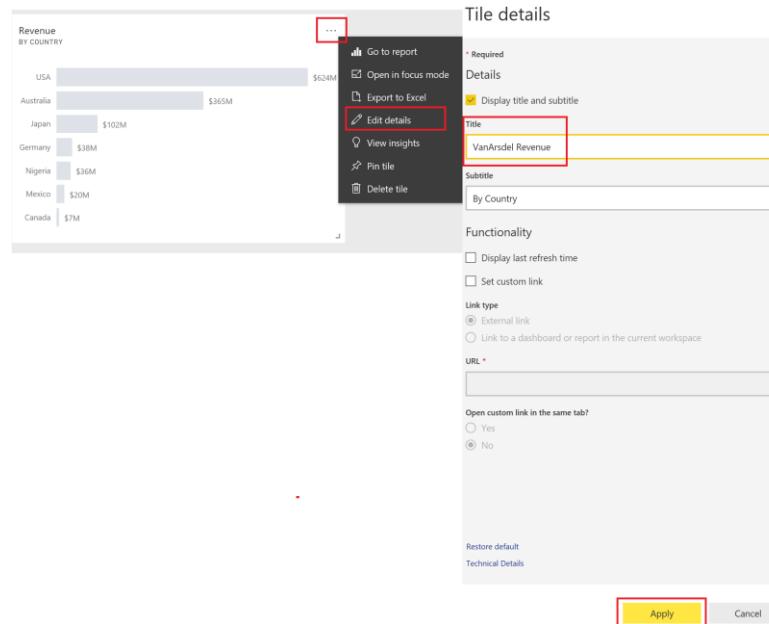
59. Hover over Revenue by Country tile.

60. Select the **ellipsis** on the top right corner of the tile.

61. Select **Edit Details**. Tile Details dialog opens.

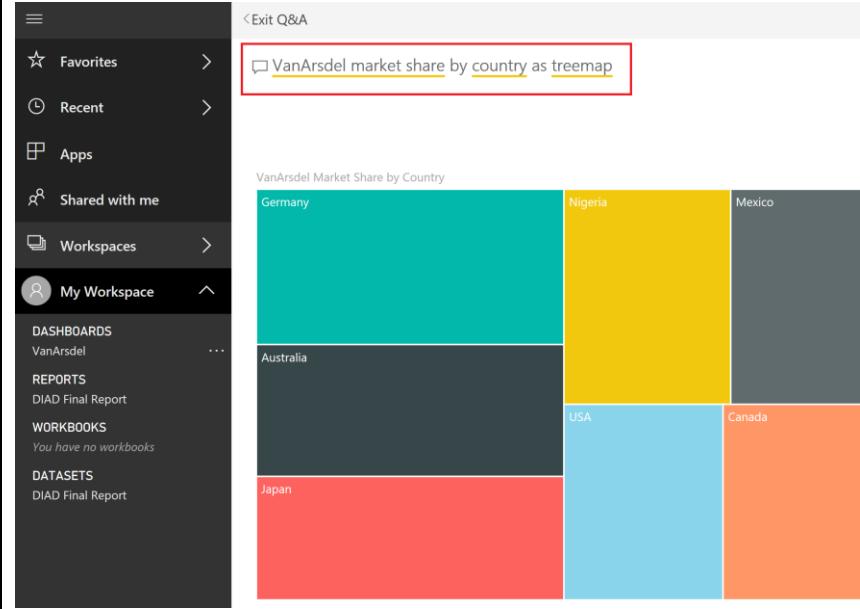
62. Change **Title** to [VanArdel Revenue](#).

63. Select **Apply**.



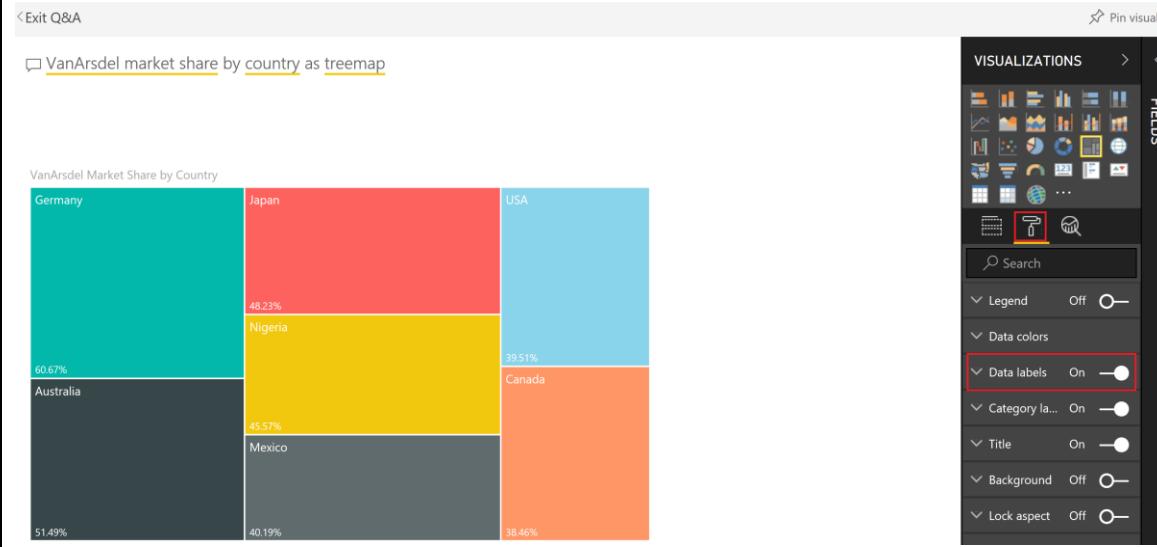
- It will be nice to have a visual that represents Market Share by country. Notice on the top of the visual, there is an option to **Ask a question about your data**.
64. In the text box start typing, **VanArsdel market share**. Notice a card visual is created.
65. Continue typing **VanArsdel market share by country**. Notice a bar chart is created.
66. Continue typing **VanArsdel market share by country as treemap**. Notice a treemap visual is created.

Note: Remember we renamed table. One of the reason we did it is to make it user friendly for Q&A.



67. From the right panel, select the arrow next **VISUALIZATIONS** to expand the section.
 68. Select the **paint roller icon**.
 69. Enable **Data labels**.

Note: The visual can be modified and formatted like we did in Power BI Desktop. You can expand **FIELDS** section to add fields like Power BI Desktop.



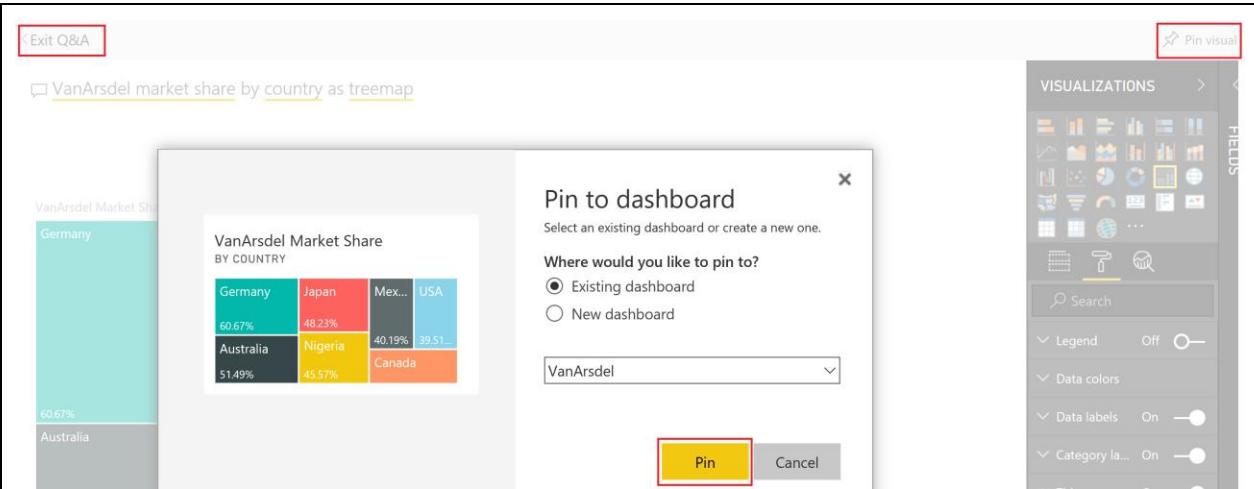
70. From the top right of the screen, select **Pin Visual**.

71. Pin to dashboard dialog opens. Select **Pin** to pin the visual to VanArsdel dashboard.

72. Close the alert dialogs.

73. Select **Exit Q&A** to navigate back to the dashboard.

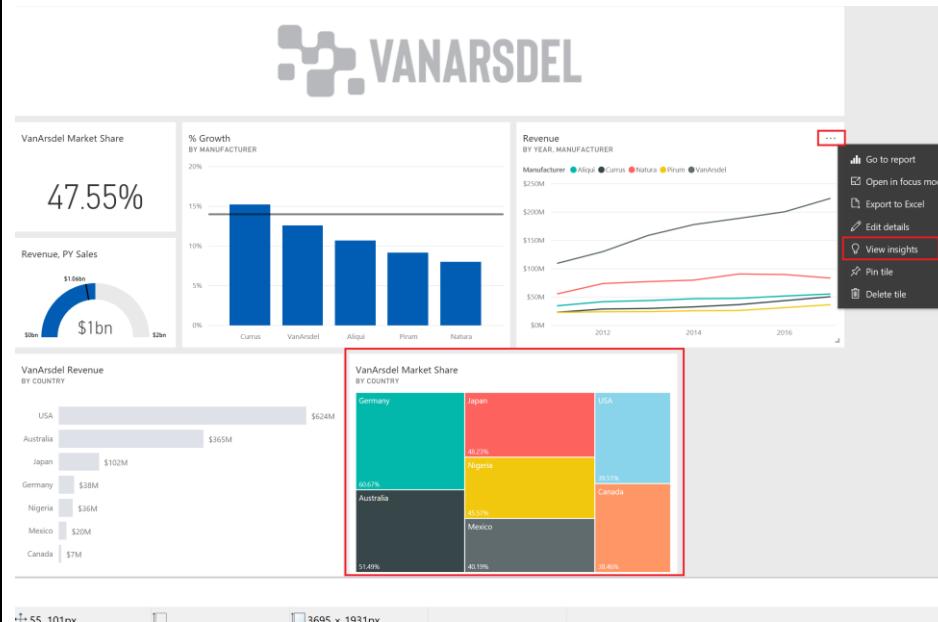
Notice the visual is added as tile to the dashboard. Clicking on the tree map visual will navigate you back to the Q&A section.



74. Hover over the **line chart** on the dashboard.

75. Select the **ellipsis** on the top right corner.

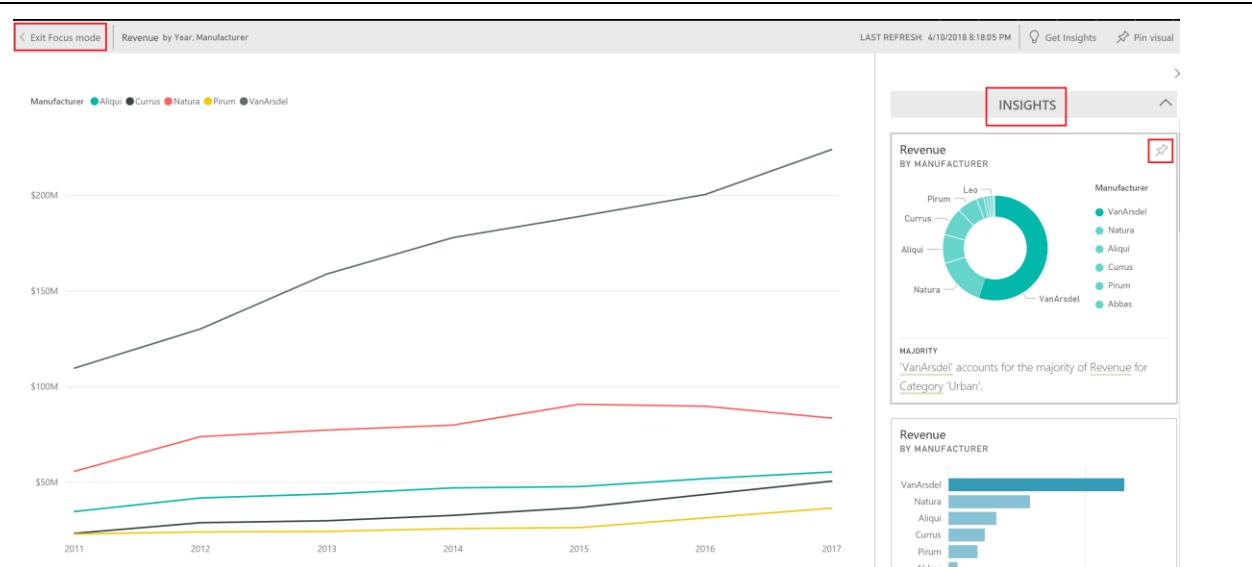
76. Select **View Insights**.



You will be navigated to **Focus mode** for the line chart.

77. **Scroll** on the Insights panel to review the various insights Power BI can generate. Notice that there is an option to pin insight visuals to the dashboard.

78. Click on **Exit Focus mode** on the top left to navigate back to the dashboard.



79. Hover over **VanArsdel Market Share** tile.

80. Click on the **ellipsis** on the top right corner of the tile.

81. Select **Manage alerts**. Manage alerts dialog opens.

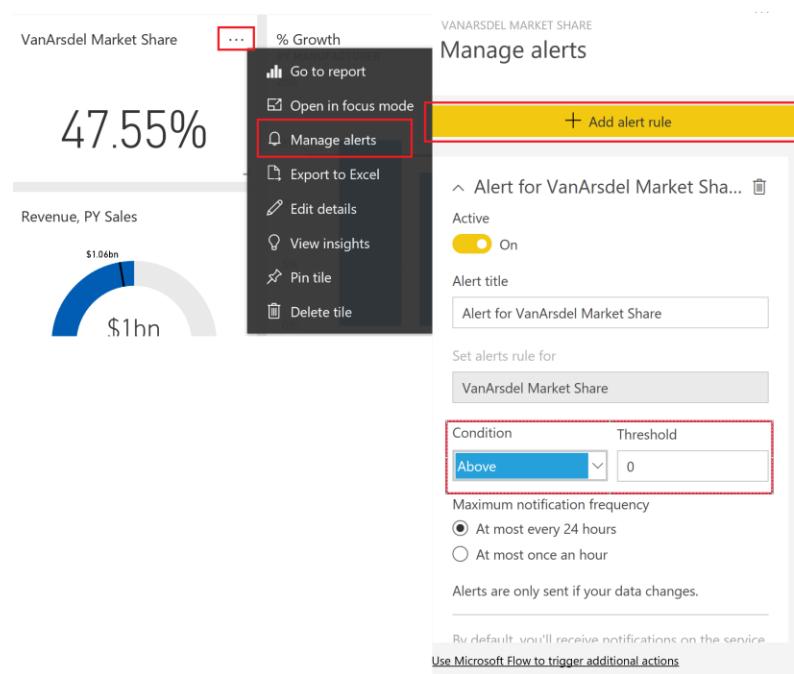
82. Select **Add alert rule dialog**.

Notice you can add Above and Below threshold and notification frequency can be set.

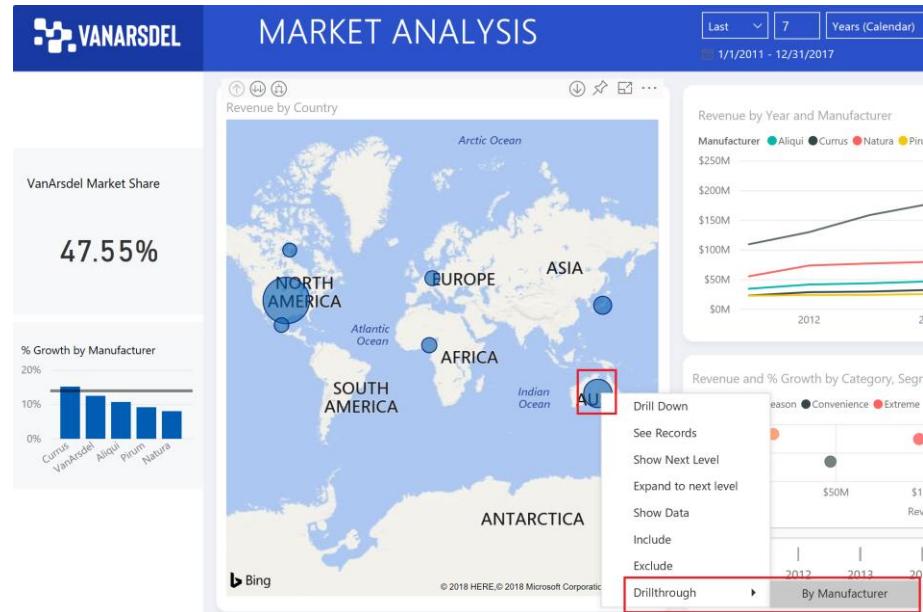
This is an introduction to managing alerts. Complete functionality is not covered in this lab.

83. Select **Cancel** to close the dialog.

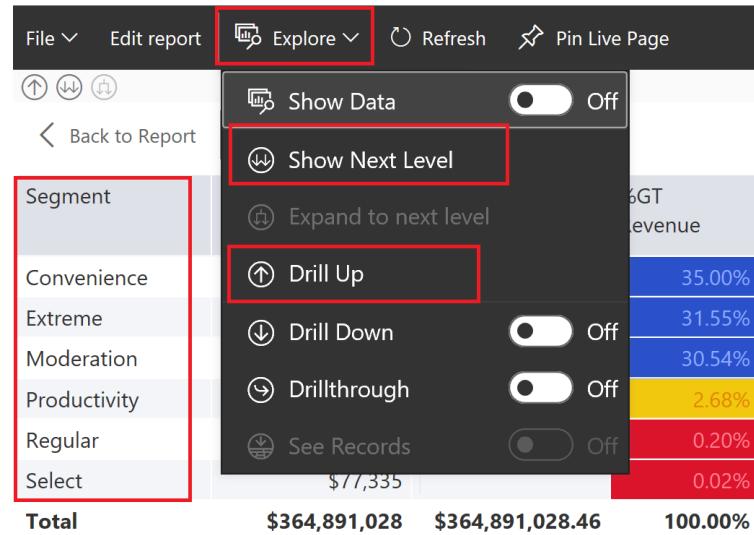
84. Select **Don't Save**.



85. Click on **VanArsdel Market Share** to navigate to the report.
86. In map visual, right click on Australia bubble and select **Drillthrough -> By Manufacturer**.
 You will be navigated to By Manufacturer page of the report with Australia filter applied to the report page.



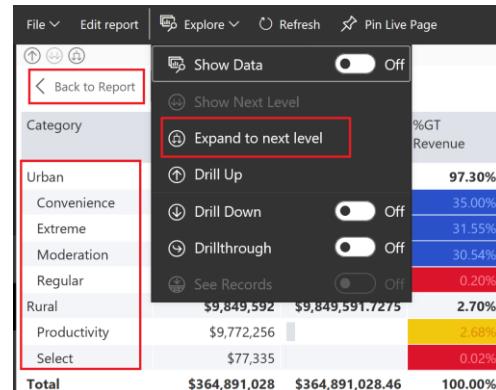
87. Hover over **matrix visual**.
88. Select **focus mode icon** on the top right corner of the visual.
89. From the top menu, select **Explore -> Show Next Level**. Notice now data is at Product Segment level.
90. From the top menu, select **Explore -> Drill up**.



91. This time from the top menu, select **Explore -> Expand to next level**. Notice now data is at Segment level but laid out as a hierarchy.

92. Select **Back to Report** to navigate back to the report view.

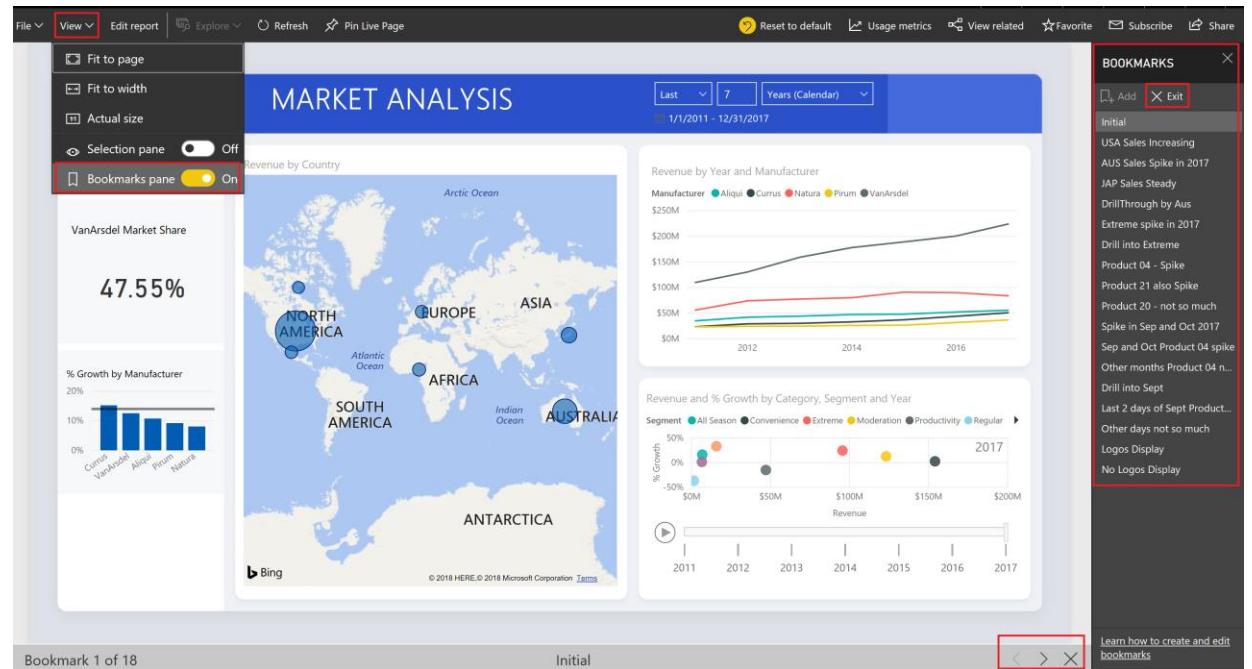
Notice all the functionality that is available in Power BI Desktop is available in the service. E.g. Show Data, See Records, etc.



93. From the top menu, select **View** and **enable Bookmark pane**. Bookmark pane opens on the right.

94. Select **View** in the Bookmark pane. Notice you can view and navigate through the bookmarks using the arrow in the bottom of the screen. The behavior is like in Power BI Desktop.

95. Select **Exit** in Bookmark pane to close it.



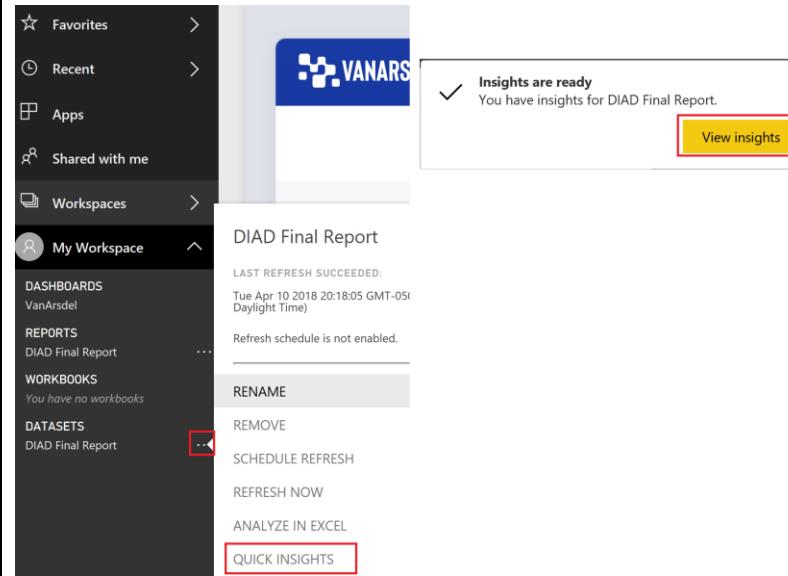
Power BI provides an option to get quick insights into the complete dataset.

96. In the left panel, hover over **DATASETS** → **DIAD Final Report**.

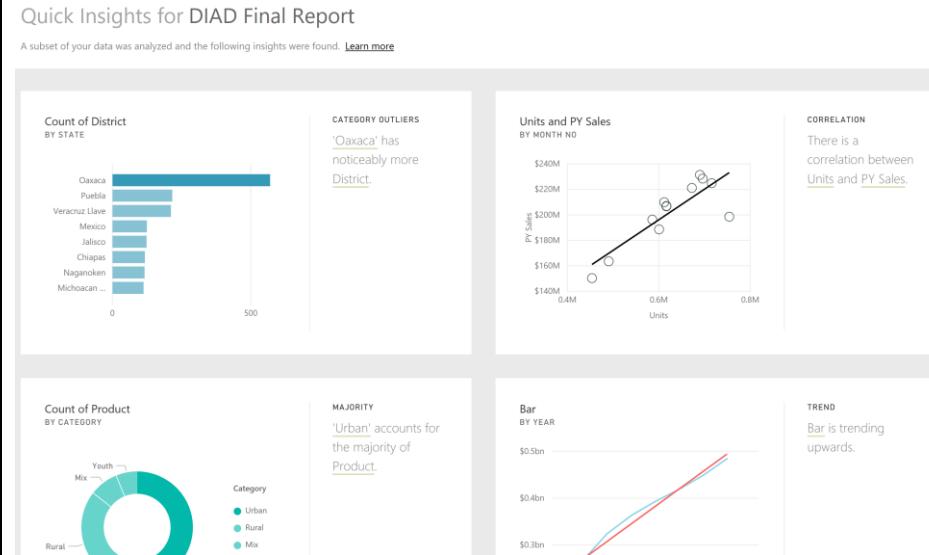
97. Select **Quick Insights**.

It might take a few minutes for the insights to be created. Once insights are ready a message appears in the top right corner.

98. Select **View insights**.



A quick insights report is displayed based on the dataset. This provides insights into data you may have missed and helps to get a quick start with creating dashboards.
Hovering over each report provides an option to Pin it to a dashboard.



Marketing team has captured data from social networks and built a Power BI report. Let us publish this report to Power BI service and analyze the data.

99. From the bottom of the left panel, select **Get Data**.

100. **Get Data** screen is displayed. Under Import or Connect to Data, select **Files**.

The screenshot shows the 'Get Data' screen in Microsoft AppSource. On the left, there's a sidebar with navigation links like Favorites, Recent, Apps, Shared with me, Workspaces, and My Workspace. The 'My Workspace' section shows DASHBOARDS (VanArdel), REPORTS (DIAD Final Report), WORKBOOKS (You have no workbooks), and DATASETS (DIAD Final Report). At the bottom of this sidebar is a 'Get Data' button, which is also highlighted with a red box. The main area is titled 'Get Data' and includes sections for 'Microsoft AppSource' (My organization, Services, Samples, Solution Templates, Partner Showcase) and 'Import or Connect to Data' (Files, Databases). The 'Files' section is specifically highlighted with a red box, and its 'Get' button is also highlighted.

101. From Get Data -> Files screen select **Local File**.

102. File browser dialog opens. Navigate to **/DIAD/Reports** folder.

103. Select **Social.pbix** file and click **Open**.

The screenshot shows a Windows 'Open' file dialog. The left pane shows a tree view with 'This PC' selected, followed by 'Local Disk (C)'. Inside 'Local Disk (C)', 'DIAD' is expanded, and 'Reports' is selected. The right pane displays a list of files in the 'Reports' folder. One file, 'Social.pbix', is highlighted with a red box. At the bottom of the dialog, the 'File name:' field contains 'Social' and the 'Open' button is also highlighted with a red box.

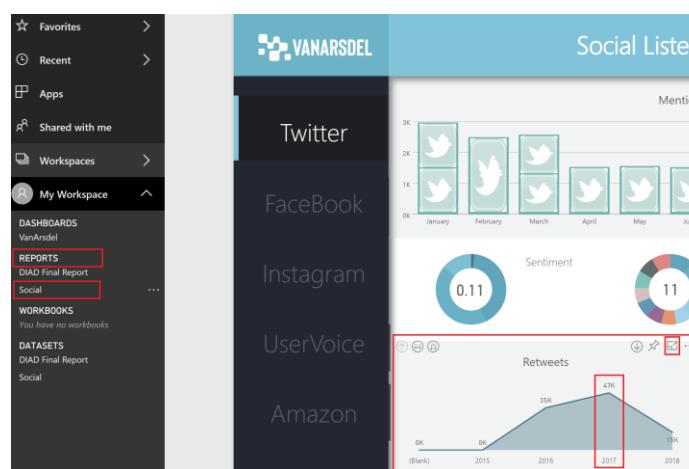
104. Once the report is published, an alert message appears. **Close the alert dialog.**

In the left panel, notice under REPORTS, we see Social.

105. Select **REPORTS -> Social** to be navigate to the Twitter page of the Social report.

Marketing team has captured the retweets of #VanArsdel. Notice there is a spike in 2017. Does this have any correlation to the spike in sales in Australia? Let's investigate.

106. Hover over **Retweets visual** and click on **Focus mode icon**.



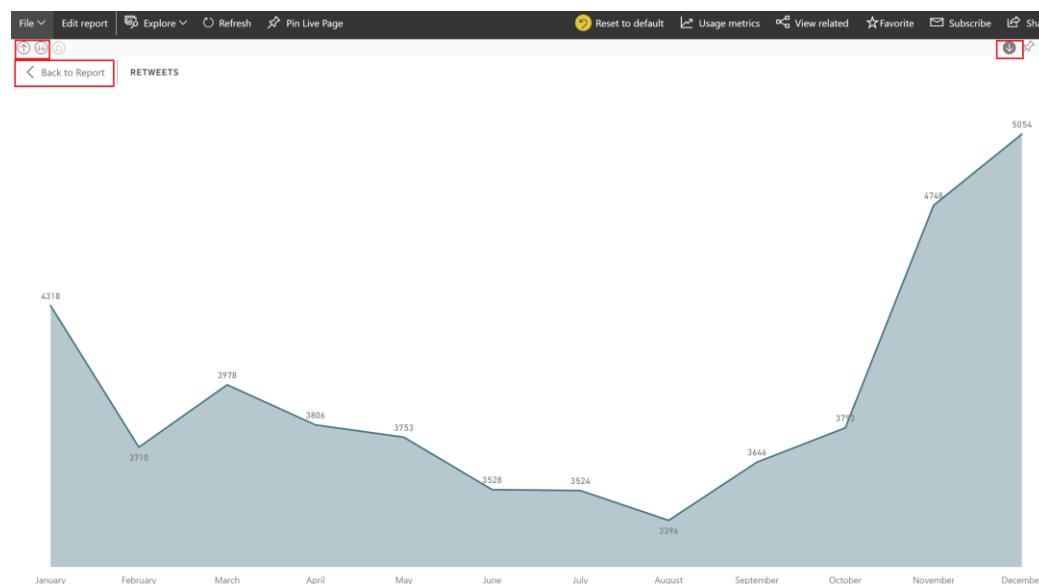
107. **Enable drill mode.**

108. Drill down to **month level** for the year 2017.

Notice there is a big spike in retweets in the last few months of 2017. Maybe this has a correlation to the spike in sales.

109. Drill back up to **Year level**.

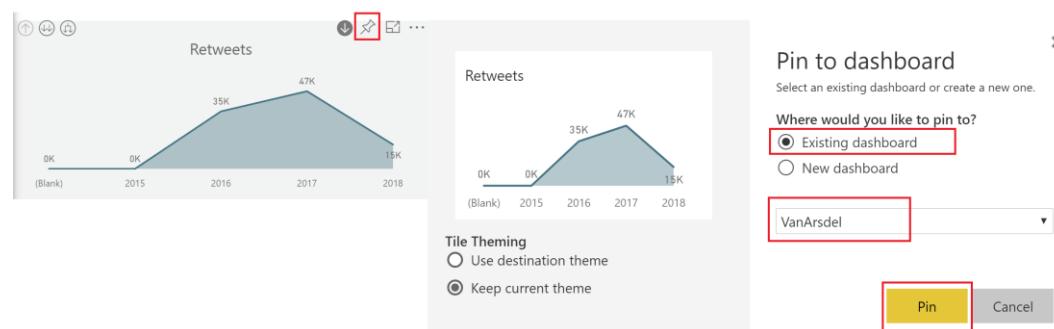
110. Select **Back to Report** to navigate back to report view.



111. Hover over Retweets visual.

112. Select the **pin icon** on the top right of the visual. Pin to dashboard dialog opens.

113. Pin the visual to **VanArsdel dashboard**.



114. Close the alert dialogs.

115. From the left panel, select **DASHBOARDS -> VanArsdel** to navigate to the dashboard.

Notice two new tiles are added to the dashboard. The retweets tile we just pinned and a default tile that is added when a new dataset is added.

116. Hover over **Social.pbix** tile.

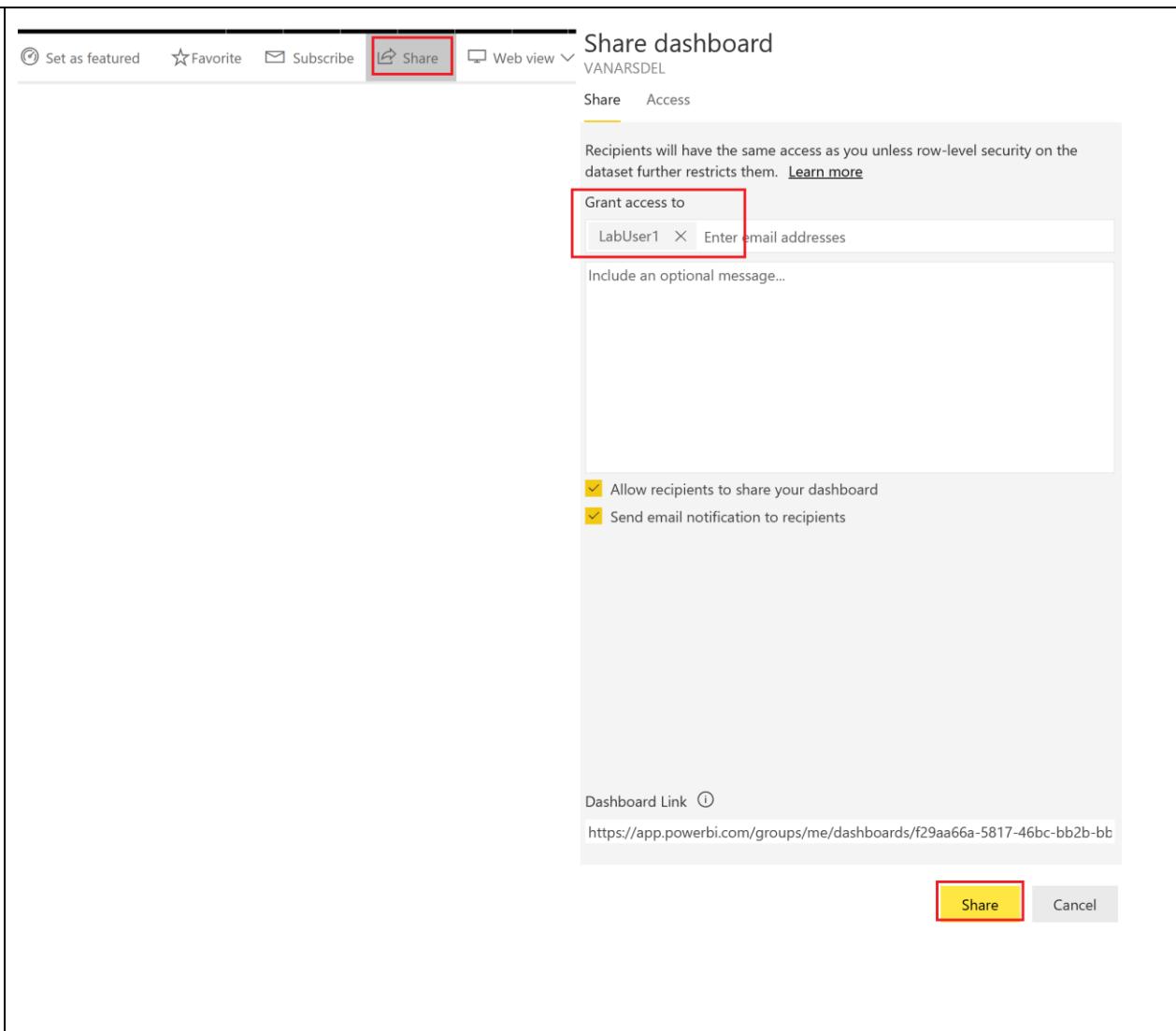
117. Click on the **ellipsis** on the top right corner.

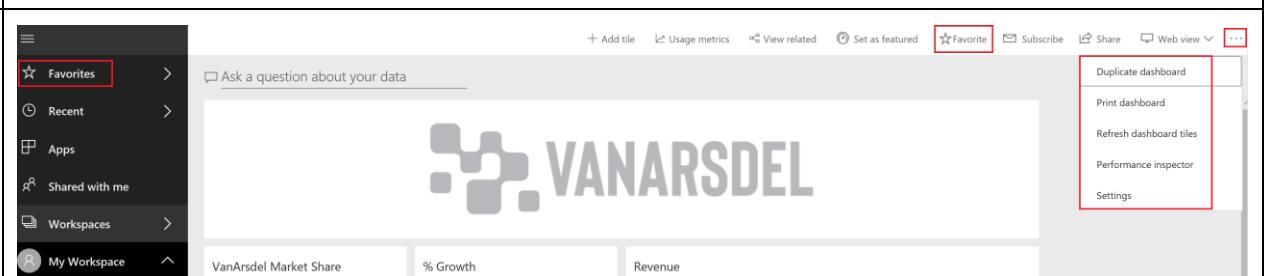
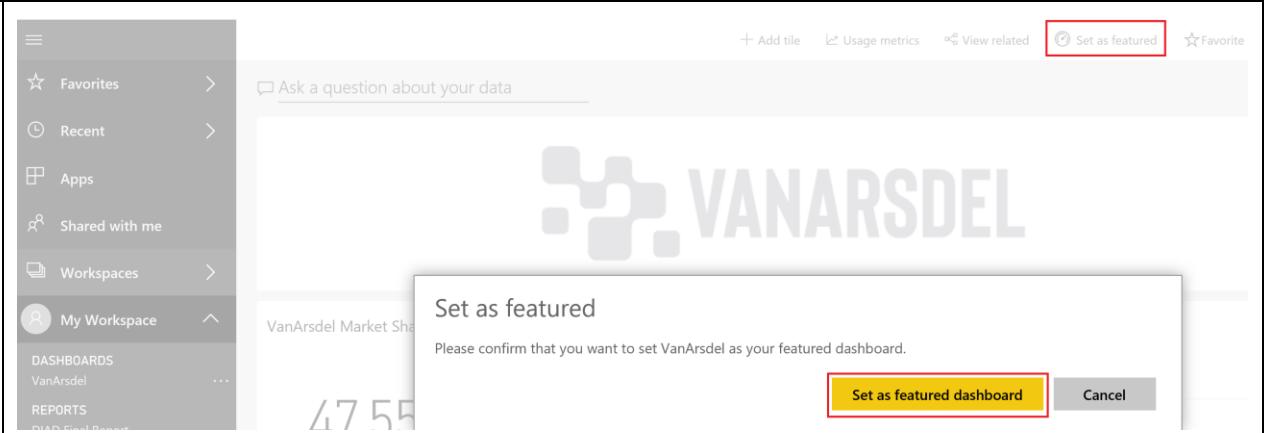
118. Select **Delete tile** to remove the tile.

Notice you can have tiles from multiple reports and Q&A section on a single dashboard.

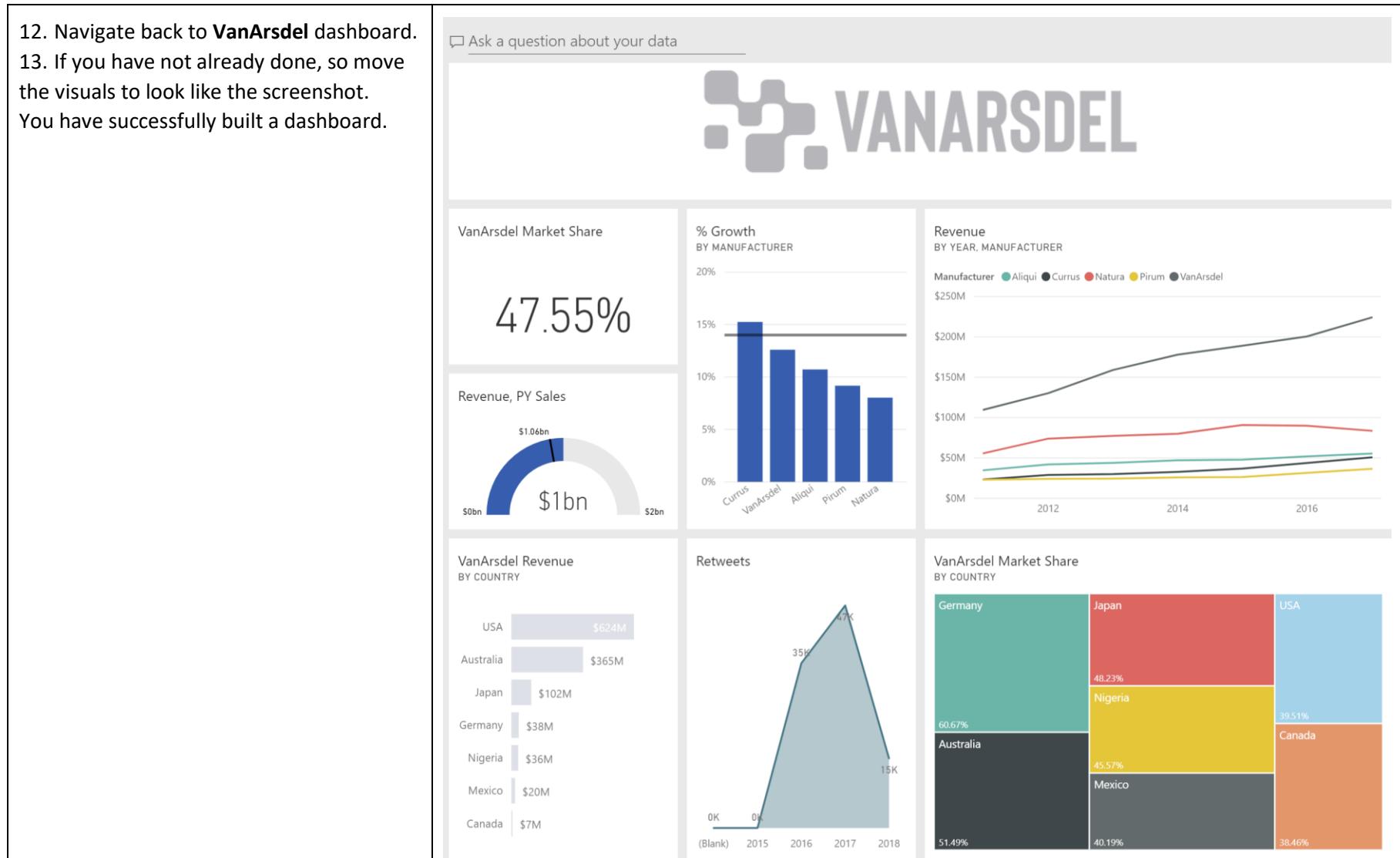


Power BI Service – Sharing Dashboard

<p>Now that you have a dashboard built, let's share it with your colleagues.</p> <p>1. Select DASHBOARDS -> VanArsdel to navigate back to the dashboard.</p> <p>2. You can share your dashboard with your team using their email address. Click on Share in the top right of the screen.</p> <p>3. Enter email address of the members of your team separate by “;”. Power BI is connected to Azure Active directory.</p> <p>4. Enter appropriate message in the text box below the email addresses.</p> <p>5. You can allow recipients to share these dashboards with other team members. If you do not want the users to re-share, please deselect the checkbox and then Share the dashboard.</p> <p>Power BI service will send out email notification if the option is selected. Once the recipient accepts the invite, the user will get a read only copy of the dashboard and will see any changes to the dashboard you make periodically.</p> <p>If the dashboard is backed by tiles from on premise SSAS then the recipients' credential is passed through to SSAS and</p>	 <p>The screenshot shows the 'Share dashboard' dialog box for a dashboard named 'VANARSDEL'. At the top, there are buttons for 'Set as featured', 'Favorite', 'Subscribe', 'Share' (which is highlighted with a red box), and 'Web view'. The main area is titled 'Share dashboard' and shows the recipient 'LabUser1' entered in the 'Grant access to' field. Below this is a message input field with the placeholder 'Include an optional message...'. At the bottom, there are two checked checkboxes: 'Allow recipients to share your dashboard' and 'Send email notification to recipients'. A 'Dashboard Link' is provided at the bottom left, and 'Share' and 'Cancel' buttons are at the bottom right.</p>
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<p>the Power BI service retrieves the data that can be accessed by the recipient.</p>	
<p>6. Navigate back to VanArsdel dashboard. 7. Notice on the top right of the menu bar, there is options to add this dashboard to the favorites. Click on Favorite option. 8. Now click on Favorite in the left panel. Notice the dashboard is added to the list. This is an easy way to access all your favorite or most used dashboards quickly. 9. Click on the ellipsis on the top right corner of the page, next to Share option. Notice there is options to duplicate, print and refresh dashboard</p>	
<p>On the top right corner of the screen, next to Favorite, there is Set as featured option. Set as Featured dashboard sets the dashboard as the default dashboard that user will land every time they login.</p> <p>10. Select Set as Featured. 11. A confirmation dialog is displayed. Select Set as Featured Dashboard. This sets VanArsdel as the featured/default dashboard.</p>	

12. Navigate back to **VanArsdel** dashboard.
13. If you have not already done so move the visuals to look like the screenshot. You have successfully built a dashboard.



References

Dashboard in a Day provides an introduction to some of the key functionalities available in Power BI. Here are a few references that will help you with your next steps with Power BI.

Getting started: <http://powerbi.com>

Power BI Desktop: <https://powerbi.microsoft.com/desktop>

Power BI Mobile: <https://powerbi.microsoft.com/en-us/mobile>

Community site <https://community.powerbi.com/>

Power BI Getting started support page: <https://support.powerbi.com/knowledgebase/articles/430814-get-started-with-power-bi>

Support site <https://support.powerbi.com/>

Feature requests <https://support.powerbi.com/forums/265200-power-bi>

Power BI course <https://www.edx.org/course/analyzing-visualizing-data-power-bi-microsoft-dat207x-0>

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