



# Power BI

## Dashboard in a Day

by Power BI Team, Microsoft



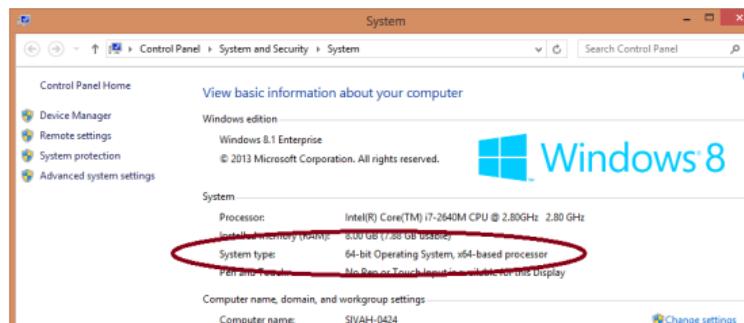
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## Lab Prerequisites

Following prerequisites and setup has to 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:** Download and install Microsoft Power BI Desktop from <http://www.microsoft.com/en-us/download/details.aspx?id=45331>. Optionally, you can also install the Power BI Desktop tool from the Install folder on the flash drive. Please choose appropriate 64-bit or 32-bit version depending on your platform. Microsoft Power BI Desktop is available for 32-bit (x86) and 64-bit (x64) platforms.
- **Download Microsoft Power BI Personal Gateway** from <https://powerbi.microsoft.com/downloads> . We will walk through the **Installation** steps in this lab under “Refreshing data on the Dashboard” section.

- Download and install the Microsoft Power BI Mobile app for Windows.

## 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](http://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 to intermediate course intended to learn how to author reports using Power BI Desktop and create operational dashboards 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 electronic 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. VanArsdel and its competitors have retained a 3<sup>rd</sup> party marketing company to collect and anonymize industry sales so that all participants can benchmark themselves.

## Course Outline

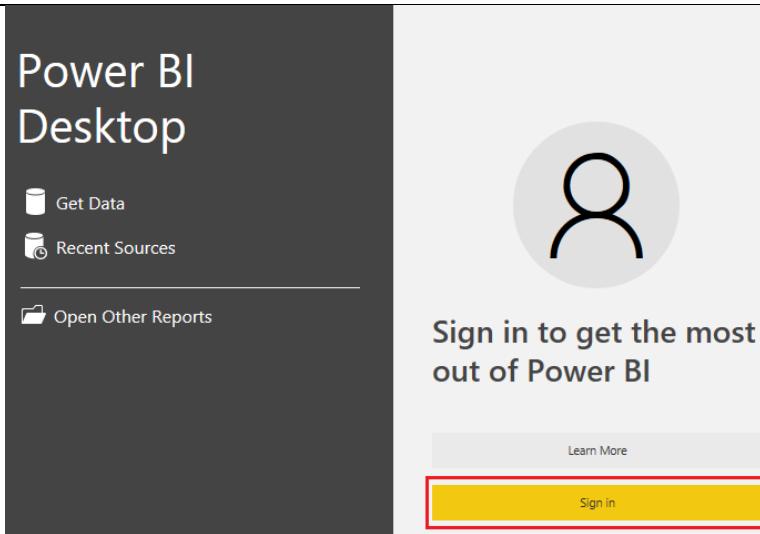
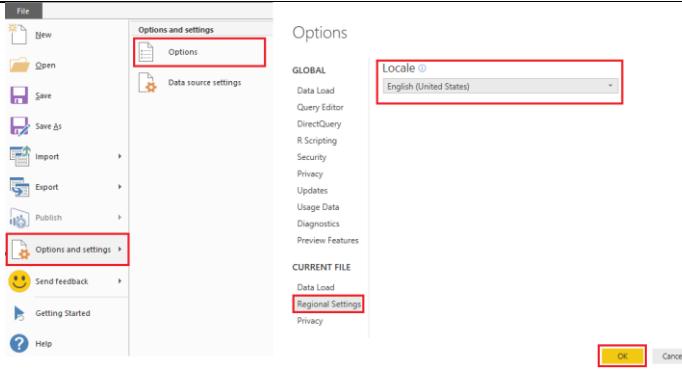
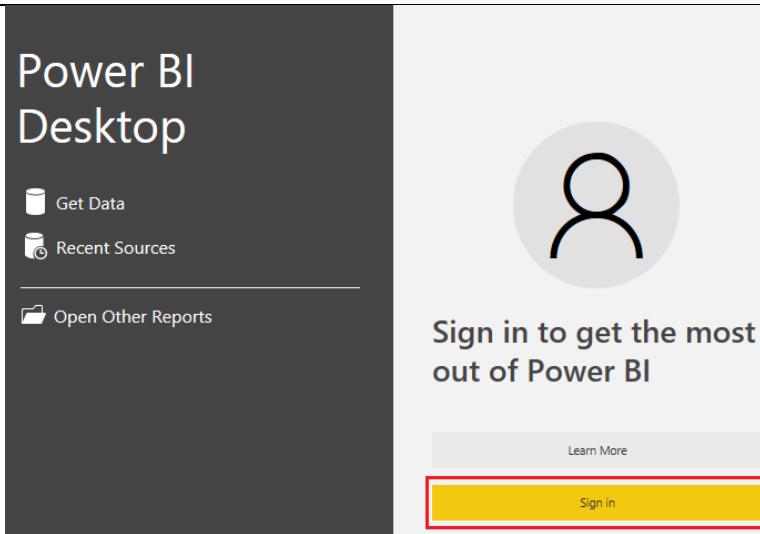
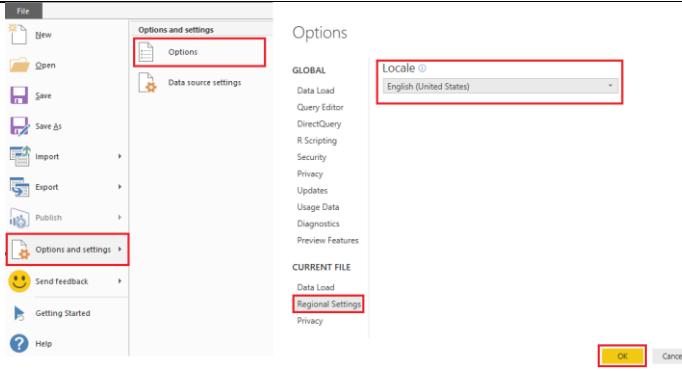
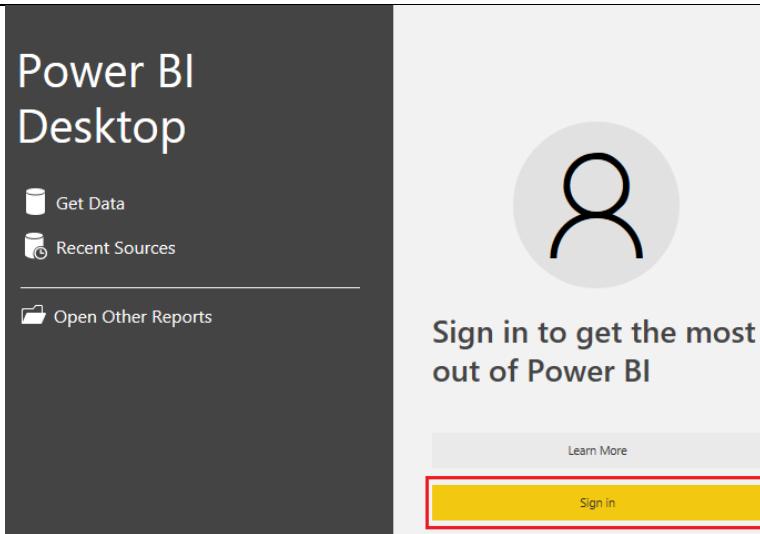
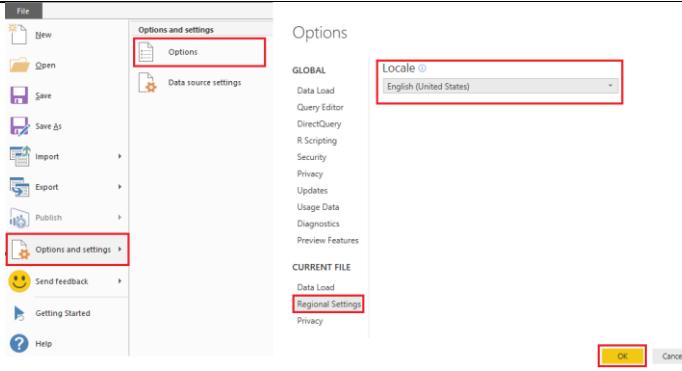
1. Power BI Desktop
2. Power BI Service – Part I
3. Power BI Service – Part II
4. Q&A
5. Create your own Dashboard

# Power BI Desktop

## Importing Data

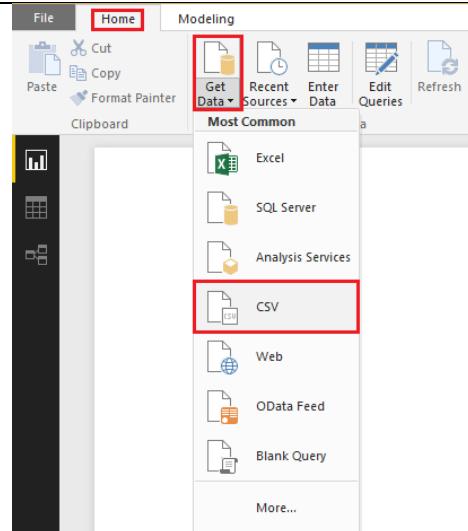
In this section you will be importing sales data of VanArsdel and competing companies within United States. In addition, you also will be merging sales data from other countries.

### Power BI Desktop - Load Data

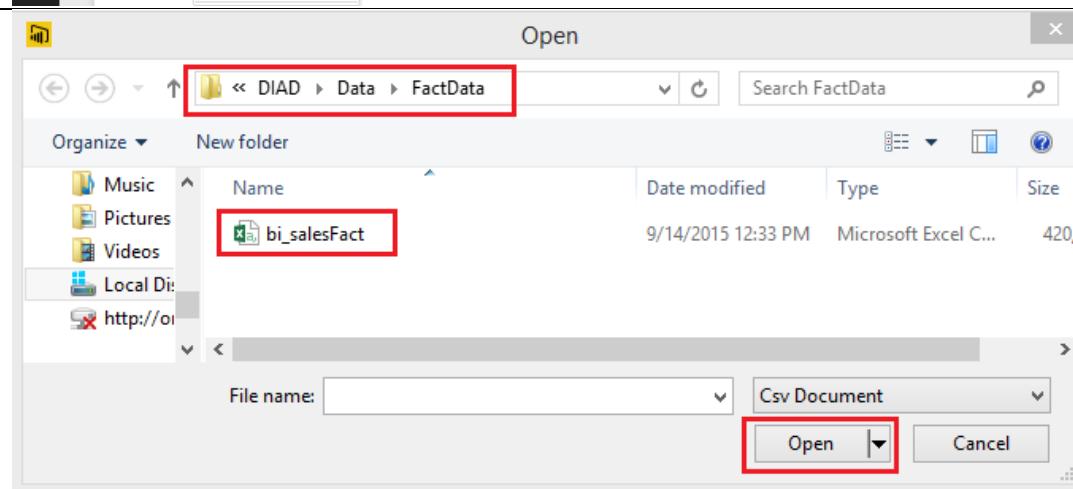
Steps		
<ol style="list-style-type: none"><li>If you don't have the <b>Power BI Desktop</b> open, launch it now.</li><li>Startup screen opens. Click on <b>Sign In</b> and sign in using your Power BI credentials. Signing in to Power BI Desktop helps later on when you are publishing to Power BI Service.</li></ol>		
Let's set up the locale to US English, to make it convenient to go through the rest of this lab. <ol style="list-style-type: none"><li>From the ribbon, select <b>File</b> -&gt; <b>Options and settings</b> -&gt; <b>Options</b>.</li><li>In the left panel of Options dialog, select <b>Regional Settings</b>.</li><li>From the <b>Locale</b> drop down select <b>English (United States)</b>,</li></ol>		

First step is to load data to Power BI Desktop. We will load USA Sales data which is in CSV files.

6. From the ribbon, select **Home** -> **Get Data**.
7. Select **CSV**.



8. Browse to **DIAD\Data\FactData** folder and select **bi\_salesFact.csv**.
9. 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.
- **Cancel** gets you back to the main canvas.

10. Click **Edit** as shown in the diagram. Now you have loaded the Sales data into the file.

You should be in the Query Editor window as shown in the picture to the right. Notice data type of each field is indicated next to the column header.

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

The image consists of three vertically stacked screenshots of the Power BI Query Editor interface.

**Screenshot 1 (Top):** Shows the 'File Origin' dialog for 'bi\_salesFact.csv'. The 'Delimiter' is set to 'Comma'. The 'Detect Data Type' dropdown is set to 'Base on first 200 rows'. A red box highlights this dropdown. Below the dialog is a preview of the data with columns: ProductID, Date, Zip, Units, Revenue. Buttons at the bottom are 'Load', 'Edit' (which is highlighted with a red box), and 'Cancel'.

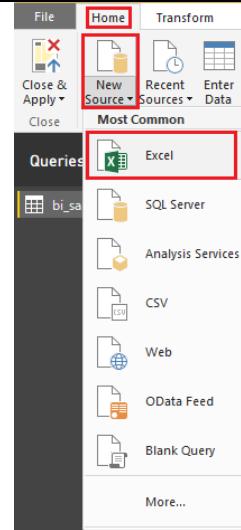
**Screenshot 2 (Middle):** Shows the 'Untitled - Query Editor' window. The 'Home' tab is selected. Under 'Queries [1]', there is one query named 'bi\_salesFact'. The data preview shows columns: productID, date, zip, units, revenue. The 'Data Type' dropdown for the 'zip' column is set to 'Whole Number' (highlighted with a red box). The 'Transform' ribbon tab is visible at the top.

**Screenshot 3 (Bottom):** Shows the same 'Untitled - Query Editor' window, but the 'Data Type' dropdown for the 'zip' column has been changed to 'Text' (highlighted with a red box). A callout box labeled 'IMPORTANT!' contains the text: 'Changing the data type is a big deal to use later'.

11. Notice Zip field is of 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** and change the **Data Type to Text**.

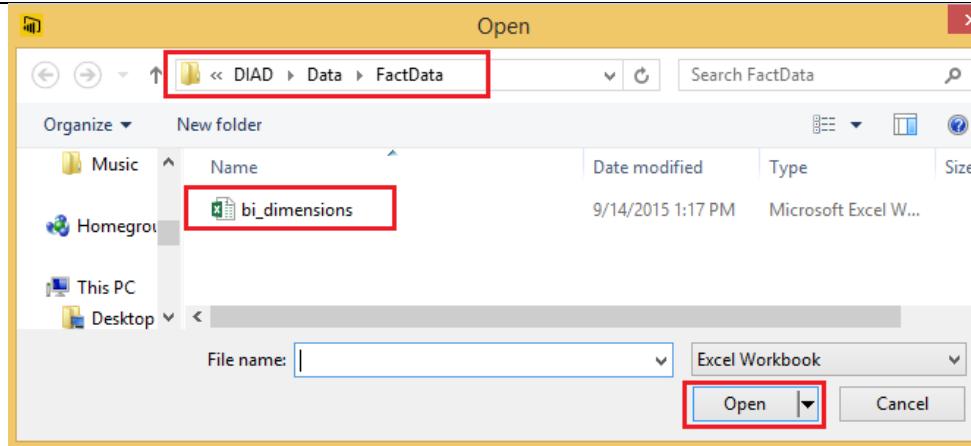
Now let's get the data that is in excel source file.

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



13. Browse to **DIAD\Data\FactData** folder and select **bi\_dimensions.xlsx**.

Navigator dialog opens.



14. In the Navigator window select all the tables. Select each **table** to preview the columns and rows.

**Note:** The first five items are the named Excel Tables and the second set are the Excel Worksheet names. Table names are differentiated from Worksheet names by using different icons.

The preview window retrieves a sample of data and shows the data for you to understand the columns, data type and the data.

15. Click “OK” to edit these tables in the query editor.

Notice 5 new queries are added to the query editor.

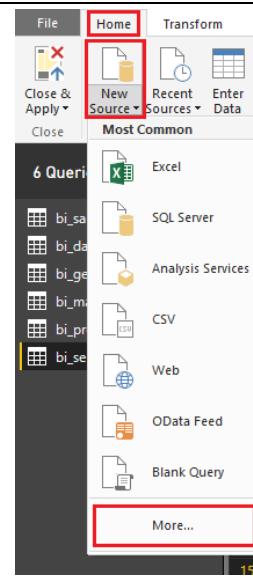
## Power BI Desktop - Adding additional data

Your international subsidiaries have agreed to provide their sales data so that all of 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.

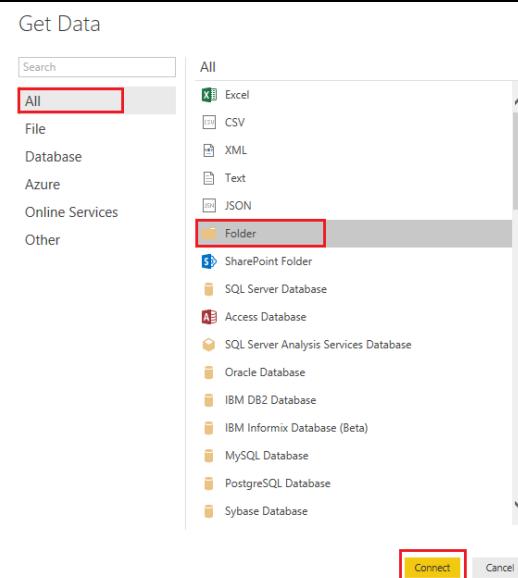
16. Click on the **New Source** drop down in the Home menu tab of the Query Editor.
17. Select "**More...**" as shown in the figure.

Get Data dialog opens



18. In the Get Data dialog select “**Folder**” as shown in the diagram.

19. Click **Connect**.



Folder dialog opens.

20. Click **Browse...** button.

21. In the “**Browse for Folder**” dialog navigate to the location where you unzipped the class files.

22. Open the **DIAD** folder.

23. Open the **Data** folder.

24. Select the **FactData1** folder.

25. Click **OK** (to close the Browse for Folder dialog box).

26. 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

Folder

Choose a folder.

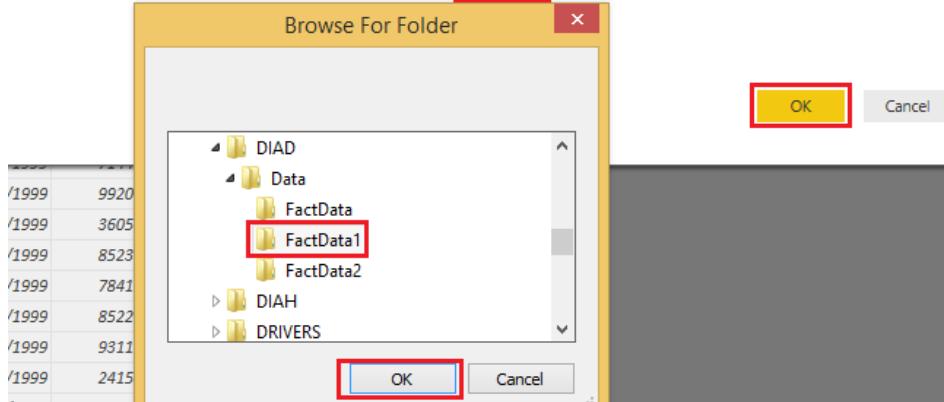
Folder Path

C:\DIAD\Data\FactData1

**Browse...**

**OK**

**Cancel**



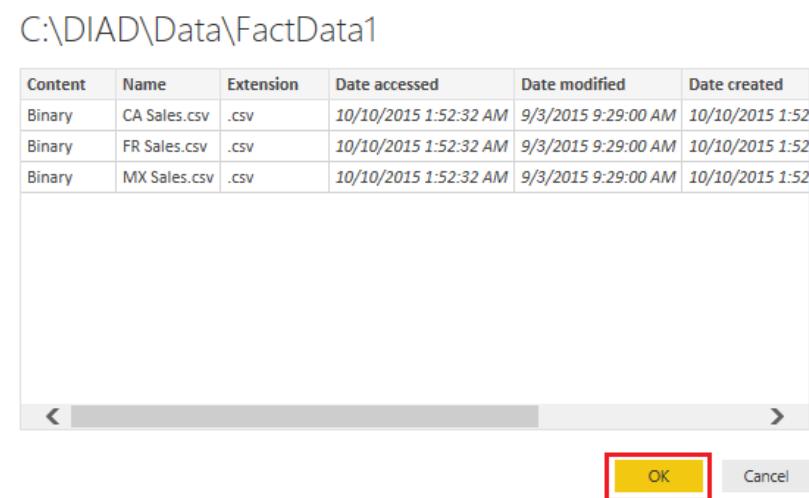
you are not always sure of the names of the files or the number of files.

**Note:** 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.

27. Click **OK** to close the preview and navigate back to the **Query Editor**.

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



You will be in the **Query Editor** window with a new query called “**FactData1**”.

28. If you do not see the **Queries** pane on left, click on the > icon to expand.
29. 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.
30. Click on the Query **FactData1**.

The screenshot shows the Power BI Query Editor interface. The 'Queries [7]' pane on the left lists various data sources. The 'FactData1' query is selected and highlighted with a red box. The main workspace displays a table with three rows, each representing a CSV file from a folder. The columns are labeled 'Content', 'Name', 'Extension', 'Date accessed', 'Date modified', and 'Date created'. The first row's 'Content' cell is also highlighted with a red box. On the far right, the 'Query Settings' pane is open, showing the properties for 'FactData1' and the applied steps, which include 'Source'.

On the query canvas you will see one row for each file in the folder. Each row contains the metadata information for the file.

You will only need the actual sales data from the files and not the metadata for this exercise.

The actual data from the each of the files is contained within the “Content” column shown in the figure.

31. Right click on the column **Content**.
32. Select **Remove Other Columns**.

**Note:** If you are interested in information from other columns such as date modified (the date / time when you receive the CSV files from your international subs), you are welcome to include those. Power BI Desktop provides the

The screenshot shows the Power BI Query Editor with the 'FactData1' query selected. In the main workspace, the 'Content' column of the table is selected and highlighted with a red box. A context menu is open over this column, listing options like 'Copy', 'Remove', and 'Remove Other Columns'. The 'Remove Other Columns' option is specifically highlighted with a red box. Other options in the menu include 'Duplicate Column', 'Remove Duplicates', 'Remove Errors', 'Change Type', and 'Transform'.

functionality and flexibility to shape your contents as needed for your business.

33. Click the icon next to **Content** shown in the figure to expand the data in this column.

**Note:** In this example, you have data that's shown as "Binary" by Power BI Desktop since it has not analyzed the data. You can potentially have nested tables as in JSON format within a table and in those examples Power BI Desktop will show tables which you can then expand in a similar manner.

The screenshot shows the Power BI Desktop interface with the 'Queries [7]' pane open. A red box highlights the 'FactData1' query. To its right, the 'Content' column is expanded, showing three binary entries. A yellow box highlights the 'Content' column header, and a red box highlights the expand icon (a plus sign inside a square) at the top of the expanded list.

34. You will now see the Content column expanded to the Sales information.

If you compare this table and **bi\_salesFact** table you imported earlier, you will see the **FactData1** table contains a new column called **Country**.

The screenshot shows the Power BI Desktop interface with the 'Queries [7]' pane open. A red box highlights the 'FactData1' query. To its right, the table view shows the expanded 'Content' column. A red box highlights the 'Country' column, which is the new column added to the table. The table data includes columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'Country' column consistently shows 'Canada' for all rows.

	ProductID	Date	Zip	Units	Revenue	Country
1	725	1/15/2000	H1B	1	115.4475	Canada
2	2235	1/15/2000	H1B	2	131.145	Canada
3	713	1/15/2000	H1B	1	160.0725	Canada
4	574	6/5/2003	H1B	1	869.1375	Canada
5	94	2/15/2000	H1B	1	866.25	Canada
6	609	2/15/2000	H1B	1	778.8375	Canada
7	2064	3/15/2000	H1B	2	976.395	Canada
8	714	1/15/2000	H1B	1	160.0725	Canada

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

Queries [7]

= Table.TransformColumnTypes(#"Promoted Headers",{{"ProductID", Int64.Type},

	ProductID	Date	Zip	Units	Revenue	Country
1	725	1/15/2000	H1B			
2	2235	1/15/2000	H1B			
3	713	1/15/2000	H1B			
4	574	6/5/2003	H1B			
5	94	2/15/2000	H1B			
6	609	2/15/2000	H1B			
7	2064	3/15/2000	H1B			
8	714	1/15/2000	H1B			
9	826	5/31/2003	H1B			
10	2149	6/6/2003	H1B			
11	992	2/15/2000	H1B			
12	726	1/15/2000	M4X			
13	725	1/15/2000	M4X			
14	910	3/15/2000	M4X			
15	727	1/15/2000	R3T			
16	1426	2/15/2000	R3T			
17	1182	1/15/2000	R3T			
18	076	5/31/2003	R3T			

You will see the countries, Canada, France and Mexico. In addition, you see Country. The reason why you see Country here is due to the fact the CSV files for France and Mexico contain header row where you have the value Country. We do not want to include the header rows.

37. Click on the check box next to **Country** to **deselect** it as shown in the Figure and click **OK**.

Note: You can perform various types of Filters, sorting ascending/descending operations using the drop down to verify your data import and shaping operations.

Queries [7]

= Table.TransformColumnTypes(#"Promoted Headers",{{"ProductID", Int64.Type},

	ProductID	Date	Zip	Units	Revenue	Country
1	725	1/15/2000	H1B			
2	2235	1/15/2000	H1B			
3	713	1/15/2000	H1B			
4	574	6/5/2003	H1B			
5	94	2/15/2000	H1B			
6	609	2/15/2000	H1B			
7	2064	3/15/2000	H1B			
8	714	1/15/2000	H1B			
9	826	5/31/2003	H1B			
10	2149	6/6/2003	H1B			
11	992	2/15/2000	H1B			
12	726	1/15/2000	M4X			
13	725	1/15/2000	M4X			
14	910	3/15/2000	M4X			
15	727	1/15/2000	R3T			
16	1426	2/15/2000	R3T			

## Transforming your Data

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 together. 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.

- 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 each ribbon and note the available transformations

1. Select each query name in the **Queries** section.
2. Rename them in the Query Settings -> Properties section as shown below:

Initial Name	Final Name
bi_salesFact	Sales
bi_date	Date
bi_geo	Geography
bi_manufacturer	Manufacturer
bi_product	Product
bi_sentiment	Sentiment
FactData1	International Sales

The screenshot shows the Power BI Query Editor interface. On the left, the 'Queries [7]' pane lists seven queries: Sales, Date, Geography, Manufacturer, Product, Sentiment, and International Sales. The 'Sales' query is selected and highlighted with a red box. On the right, the 'Query Settings' pane displays the 'PROPERTIES' section, which also has a red box around it. The 'Name' field is set to 'Sales'. Below the properties, the 'APPLIED STEPS' section shows the transformation: 'Source Promoted Headers' and 'Changed Type'. The main workspace shows a table with columns: ProductId, Date, Zip, Units, and Revenue. The first few rows of the table are:

	ProductId	Date	Zip	Units	Revenue
1	833	1/15/2000	76108	1	797.9475
2	837	1/15/2000	33436	1	813.6975
3	837	1/15/2000	76531	1	813.6975
4	838	1/15/2000	29526	1	934.4475
5	838	1/15/2000	33584	1	944.9475
6	838	1/15/2000	33947	1	944.9475
7	838	1/15/2000	74132	1	929.1975
8	838	1/15/2000	75080	1	944.9475

## Power BI Desktop - Changing data types of columns

Power BI Desktop automatically infers data types based on the source data. It is always a good idea to check the data types to make sure they are as you need them. This ensures that the data will appear in the right format when authoring reports.

For time intelligence functions to work properly, it's especially important to make sure the date columns data types are set to Date (or Date/Time).

3. From the left panel, select **Sales** Query.
4. Verify and if needed set Data Type using **Home -> Data Type** drop down as shown below:

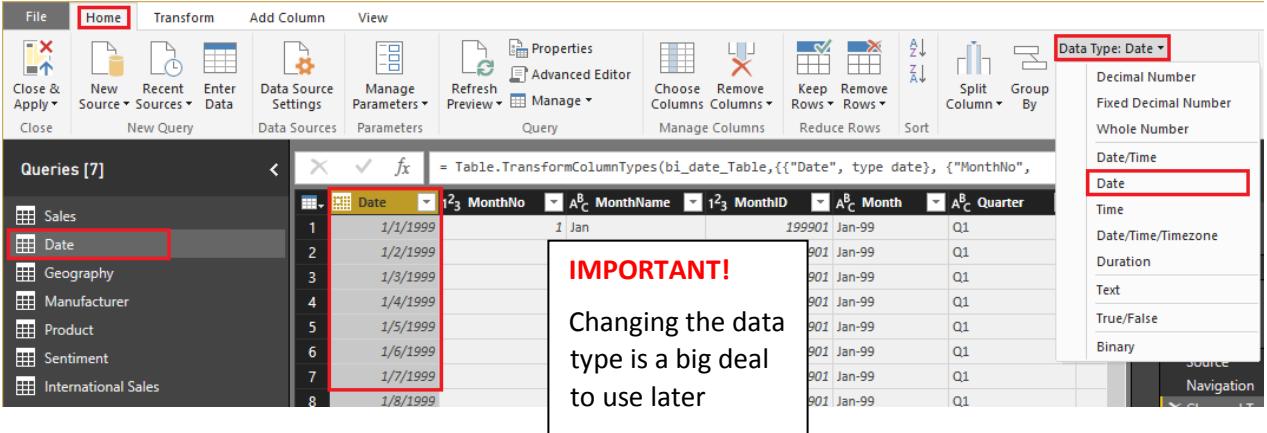
Column	Data Type
Date	Date
Revenue	Fixed Decimal Number

**Note:** We formatted Zip column as text earlier to ensure that zip codes which start with zero don't lose the leading zero.

The screenshot shows the Power BI Desktop interface. The ribbon is at the top with 'File', 'Home' (selected), 'Transform', 'Add Column', and 'View'. The 'Home' tab has icons for Close & Apply, New Source, Recent Sources, Enter Data, Data Source Settings, Manage Parameters, Refresh, Preview, Manage, Properties, and Advanced Editor. Below the ribbon is the 'Queries [7]' pane, where 'Sales' is selected. To the right is a data grid with columns: ProductId, Date, A, Zip, Units, \$, and Revenue. The 'Revenue' column is highlighted with a red box. The 'Advanced Editor' pane shows the M code: = Table.TransformColumnTypes(#"Promoted Headers",{{"ProductId", Int64.Type}, {"Date", Date.Type}, {"A", Text.Type}, {"Zip", Text.Type}, {"Units", Int64.Type}, {"\$, Text.Type}, {"Revenue", FixedDecimalNumber.Type}}). On the far right, a 'Data Type' dropdown menu is open, showing options like Decimal Number, Fixed Decimal Number (selected), Whole Number, Date/Time, Time, Date/Time/Timezone, Duration, Text, True/False, and Binary. The 'Source' and 'Promoted Headers' tabs are visible at the bottom of the Advanced Editor.

5. From the left panel, select Date Query.  
 6. Verify and if needed set Data Type using Home -> Data Type drop down as shown below.

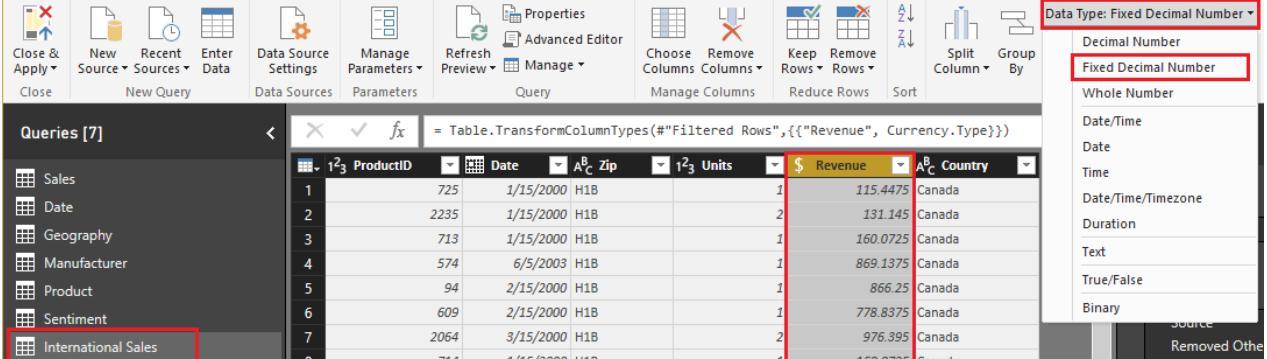
Column	Data Type
Date	Date
Month	Text



The screenshot shows the Power BI Data Editor interface. On the left, the 'Queries [7]' pane lists various tables: Sales, Date, Geography, Manufacturer, Product, Sentiment, and International Sales. The 'Date' table is currently selected, highlighted with a red box. On the right, the main area displays a table with columns: Date, MonthNo, MonthName, MonthID, Month, and Quarter. The 'Date' column contains dates from 1/1/1999 to 1/8/1999. A callout box labeled 'IMPORTANT!' contains the text: 'Changing the data type is a big deal to use later'. A red box highlights the 'Data Type: Date' dropdown menu in the top ribbon, which is open to show options like Decimal Number, Fixed Decimal Number, Whole Number, Date, Time, etc. The 'Date' option is also highlighted with a red box.

7. From the left panel, select International Sales Query.  
 8. Verify and if needed set Data Type using Home -> Data Type drop down as shown below.

Column	Data Type
Zip	Text
Date	Date
Revenue	Fixed Decimal Number



The screenshot shows the Power BI Data Editor interface. On the left, the 'Queries [7]' pane lists the same tables as before, but the 'International Sales' table is now selected, highlighted with a red box. On the right, the main area displays a table with columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'Revenue' column is highlighted with a red box. A red box also highlights the 'Data Type: Fixed Decimal Number' dropdown menu in the top ribbon, which is open to show options like Decimal Number, Fixed Decimal Number, Whole Number, Date, Time, etc. The 'Fixed Decimal Number' option is also highlighted with a red box.

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.

A screenshot of the Power BI Data Editor interface. On the left, the 'Queries [7]' pane lists 'Sales', 'Date', 'Geography', 'Manufacturer', 'Product', 'Sentiment', and 'International Sales'. The main area displays a table with columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'APPLIED STEPS' pane on the right shows a list of transformations, with 'Changed Type' highlighted by a red box.

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

9. Select **Sales** in the Queries window in the left panel as shown in the figure.
10. From the ribbon select **Home -> Append Queries** as shown in the figure.

A screenshot of the Power BI Data Editor interface. The 'Queries [7]' pane shows 'Sales' selected. The ribbon at the top has 'Append Queries' highlighted. The 'APPLIED STEPS' pane on the right shows a list of transformations, with 'Source' highlighted by a red box.

Append dialog opens. There is option to append **Two tables or Three or more tables**. Leave Two tables selected, since we are appending just two tables.

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

A screenshot of the 'Append' dialog box. It has two radio buttons: 'Two tables' (selected) and 'Three or more tables'. Below is a dropdown labeled 'Table to append' containing 'International Sales'. The 'OK' button at the bottom right is highlighted by a red box.

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.

12. From the ribbon select **Add Column -> Add Custom Column** as shown in the figure.

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

14. In the Custom column formula editor enter following formula after the “=” sign.

**if [Country] = null then "USA" else [Country]**

15. Click **OK**.

**Note:** You can double click on the column names **Country** from the **Available columns** in the dialog to populate the formula.

**Note:** that **if then else** and **null** keywords are case sensitive. Power BI Desktop does check syntax as the formula is typed.

	ProductID	Date	Zip	Units	Revenue	Country
1	833	1/15/1999	76108	1	797.9475	null
2	837	1/15/1999	33436	1	813.6975	null
3	837	1/15/1999	76531	1	813.6975	null
4	838	1/15/1999	29526	1	934.4475	null
5	838	1/15/1999	33584	1	944.9475	null
6	838	1/15/1999	33947	1	944.9475	null
7	838	1/15/1999	74132	1	929.1975	null

### Add Custom Column

New column name

CountryName

Custom column formula:

=if [Country] = null then "USA" else [Country] |

Available columns:

ProductID  
Date  
Zip  
Units  
Revenue  
Country

<< Insert

[Learn about Power BI Desktop formulas](#)

✓ No syntax errors have been detected.

OK

Cancel

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

The screenshot shows the Power BI Query Editor interface. The top ribbon has tabs like File, Home, Transform, Add Column, and View. The 'Add Column' tab is selected. The main area shows a table with columns: ProductID, Date, A<sub>C</sub> Zip, Units, \$ Revenue, A<sub>C</sub> Country, and A<sub>B</sub> CountryName. The 'CountryName' column contains values like "USA" or null. The 'Queries [7]' pane on the left lists various tables: Sales, Date, Geography, Manufacturer, Product, Sentiment, and International Sales. The 'Query Settings' pane on the right shows 'Properties' for the query named 'Sales' and 'Applied Steps' which include 'Source', 'Promoted Headers', 'Changed Type', 'Appended Query', and 'Added Custom'. A red box highlights the 'CountryName' column in the table preview.

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.

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

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

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

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

This screenshot shows the same Power BI Query Editor interface as the previous one, but with a key difference: the 'Country' column has been removed from the table. The table now only has columns: ProductID, Date, A<sub>C</sub> Zip, Units, \$ Revenue, and A<sub>B</sub> CountryName. The 'CountryName' column still exists. The 'Queries [7]' pane and 'Query Settings' pane remain the same. A red box highlights the 'Country' column in the table preview, and another red box highlights the 'Remove' option in the context menu that appears when right-clicking on the 'Country' column header.

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.

19. At first, you will only see USA data. Click on **Load more** to validate you have data from all 4 countries included.
20. Click **OK** to close this filter.

A screenshot of the Power BI desktop interface. On the left, the 'Queries [7]' pane shows a list of queries: Sales, Date, Geography, Manufacturer, Product, Sentiment, and International Sales. The 'Sales' query is selected and highlighted with a red box. To the right is a table view with columns: ProductID, Date, Zip, Units, Revenue, and Country. The 'Country' column contains values like 'USA', 'Canada', 'France', 'Mexico', and 'USA'. A context menu is open over the 'Country' column, listing sorting, filtering, and other options. A red box highlights the 'OK' button at the bottom right of the menu.

21. Let's save the file before we proceed. From the ribbon select **File -> Save As**.
22. You will see a dialog box indicating that there are pending changes in your queries that have not been applied. Select **Apply Later**.

**Note:** If you selected **Apply**, your queries would have been processed and all of your data would have been loaded to the data model. With **Apply Later**, your queries are saved but you control when the data is loaded.

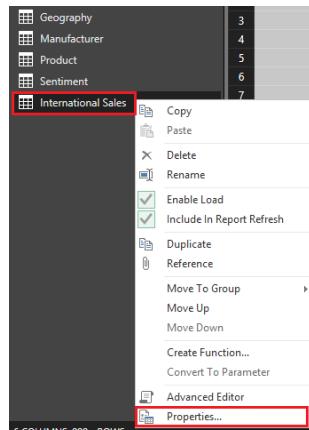
23. Name the file as "**MyFirstPowerBIModel**" and select **Save**. Save the file in **\DIAD\Reports** folder.

A screenshot of the Microsoft Power BI Desktop application. On the left, a 'File' ribbon tab is selected, showing options like Close & Apply, Apply, Close, Save, and Save As. The 'Save As' option is highlighted with a red box. To the right, a modal dialog box appears with the title 'Microsoft Power BI Desktop'. It contains the message: 'There are pending changes in your queries that haven't been applied. Do you want to apply them?'. At the bottom of the dialog are three buttons: 'Apply' (yellow), 'Apply Later' (red box), and 'Cancel'.

We don't need the **International Sales** table to load to the data model now that its rows have been appended to the **Sales** table. Let's prevent the **International Sales** table from loading to the data model.

24. From the Queries panel on the left, select **International Sales** query.

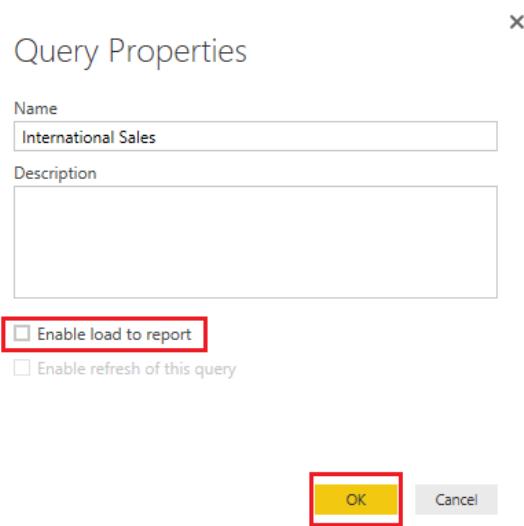
25. Right click and select **Properties**. Query **Properties** window opens.



26. In the **Query Properties** window, click on the checkbox next to “**Enable load to report**” to deselect the load as shown in the figure.

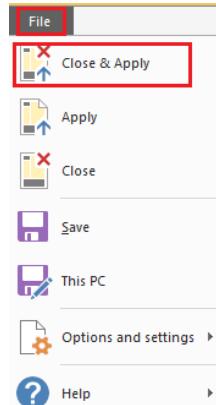
27. Click **OK**.

**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.



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.

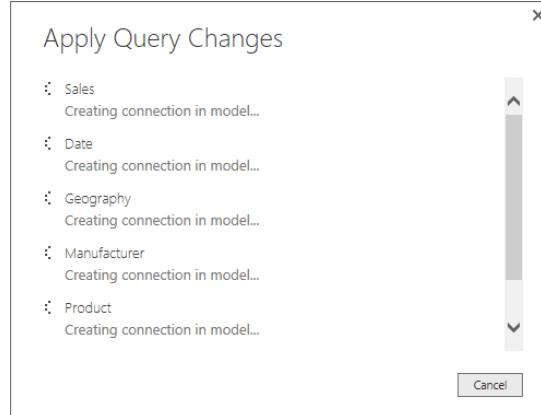
28. Click on **File -> Close & Apply**.



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 of the tables.

29. **Save** the file after the data loading is completed.



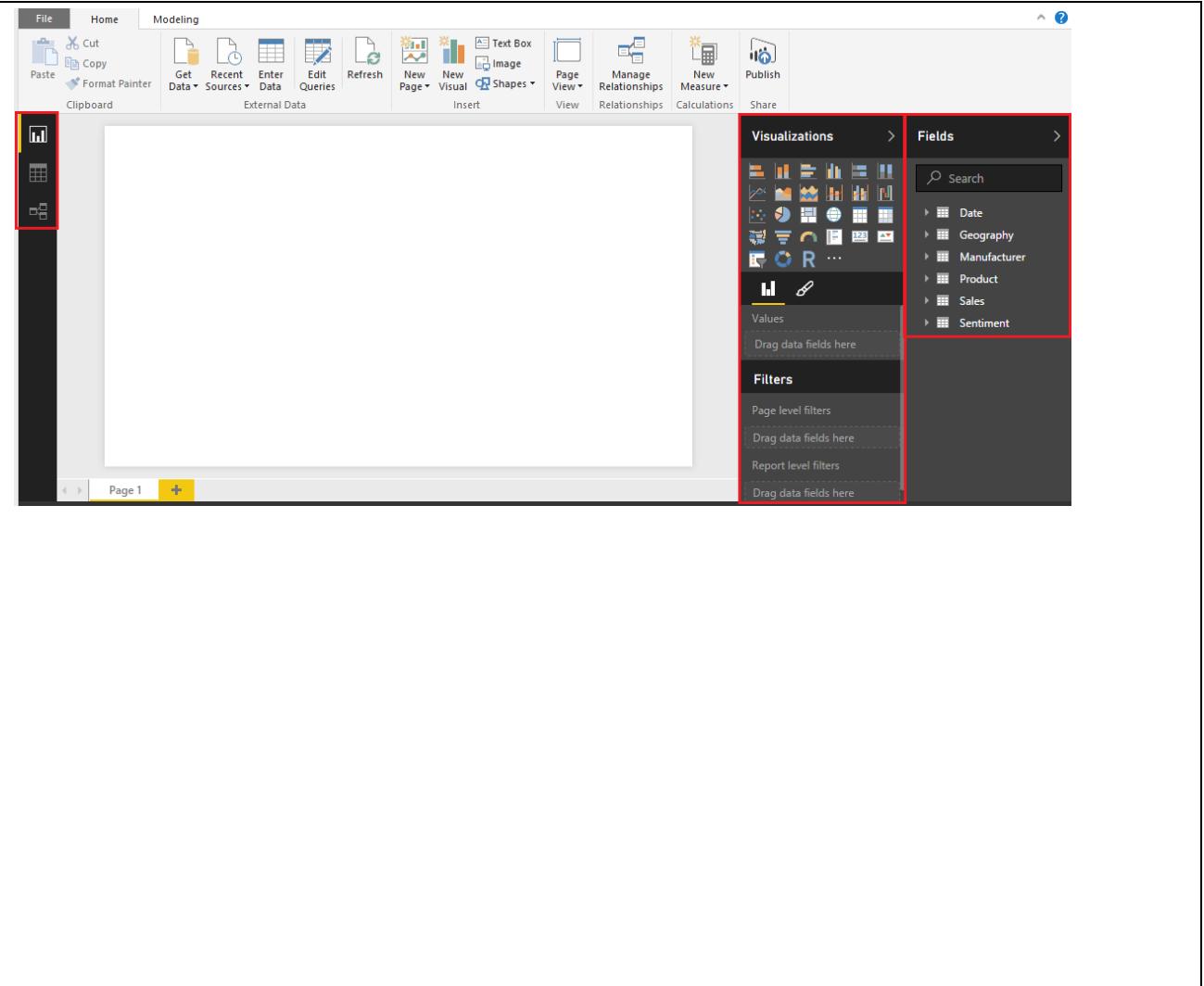
## Interactive Data Exploration

In this section we will learn the key parts of the Power BI desktop, to do ad-hoc exploration of the data.

### Power BI Desktop - Layout

You will land on the main **Power BI Desktop** window. There are distinct sections in the Power BI Window you need to get familiarized.

1. On the top you see the **Home** tab where the most common operations you perform are available.
2. **Modeling** tab in the ribbon enables additional data modeling capabilities like adding custom columns and calculated measures.
3. 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.
4. **Visualizations** panel on the right allows you to select visualizations, add values to the visuals and add columns to the axes or filters.
5. The center **white space** is the canvas where you will be creating visuals.
6. 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.

7. Click on the Data icon. Expand **Sales** table in the **Fields** as shown in the figure
8. Scroll up and down to notice how fast you are able to navigate **through ~ 11 Million rows.**

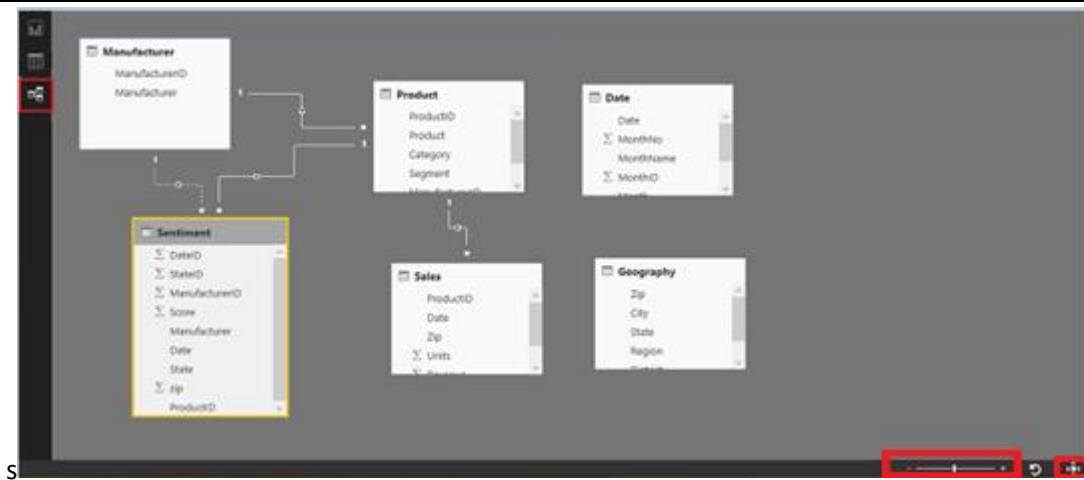
The screenshot shows the Microsoft Power BI Data view interface. The ribbon at the top has tabs: File, Home, Modeling (which is selected), Relationships, Calculations, Sort, and Formatting. On the right side, there are buttons for Manage Roles, View As Roles, and Security. Below the ribbon is a table with columns: ProductID, Date, Zip, Units, Revenue, and Country. The table contains 15 rows of sample data. To the left of the table is a vertical toolbar with icons for relationships, measures, new column, new table, sort by column, and formatting. A red box highlights the 'New Table' icon. To the right of the table is a 'Fields' pane. It lists several categories: Date, Geography, Manufacturer, Product, Sales, and Sentiment. The 'Sales' category is expanded, showing its sub-fields: ProductID, Date, Zip, Units, Revenue, and Country. A red box highlights the 'Sales' category. At the bottom of the table area, a red box highlights the text 'TABLE: Sales (11,046,461 rows)'.

9. 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.
- Relationship is created between Product and Sentiment tables using ProductID column.
- Relationship is created between Sentiment and Manufacturer tables using ManufacturerID. Notice this relationship is denoted with a dotted line. This is because there can only be one active relationship between two tables.

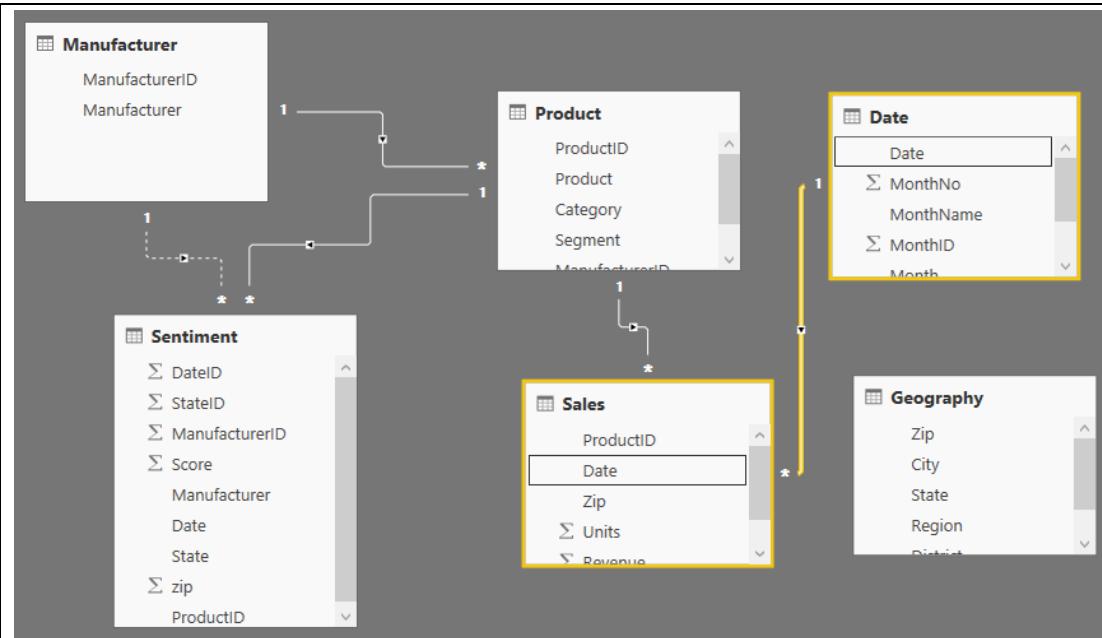
**Note:** Tables may not appear as shown in the figure. You can zoom in and out of the Relationships page by dragging the zoom slider in the bottom right corner of the window. Also, if want to ensure you are seeing all of your tables, use the fit to page icon: . Drag and move the tables to appear as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



Power BI desktop supports 1 to many or 1 to 1 relationships between the tables. This means the column involved in the relationships in one of the tables needs to have unique values.  
 Notice that there is no relationship between Sales and Date tables. We need this relationship to build time intelligence measures.

10. To create a relationship between the **Date** and **Sales** tables, **drag the Date field from the Sales table to the Date field in the Date table**.
11. Highlight the relationship line to validate which columns are related.

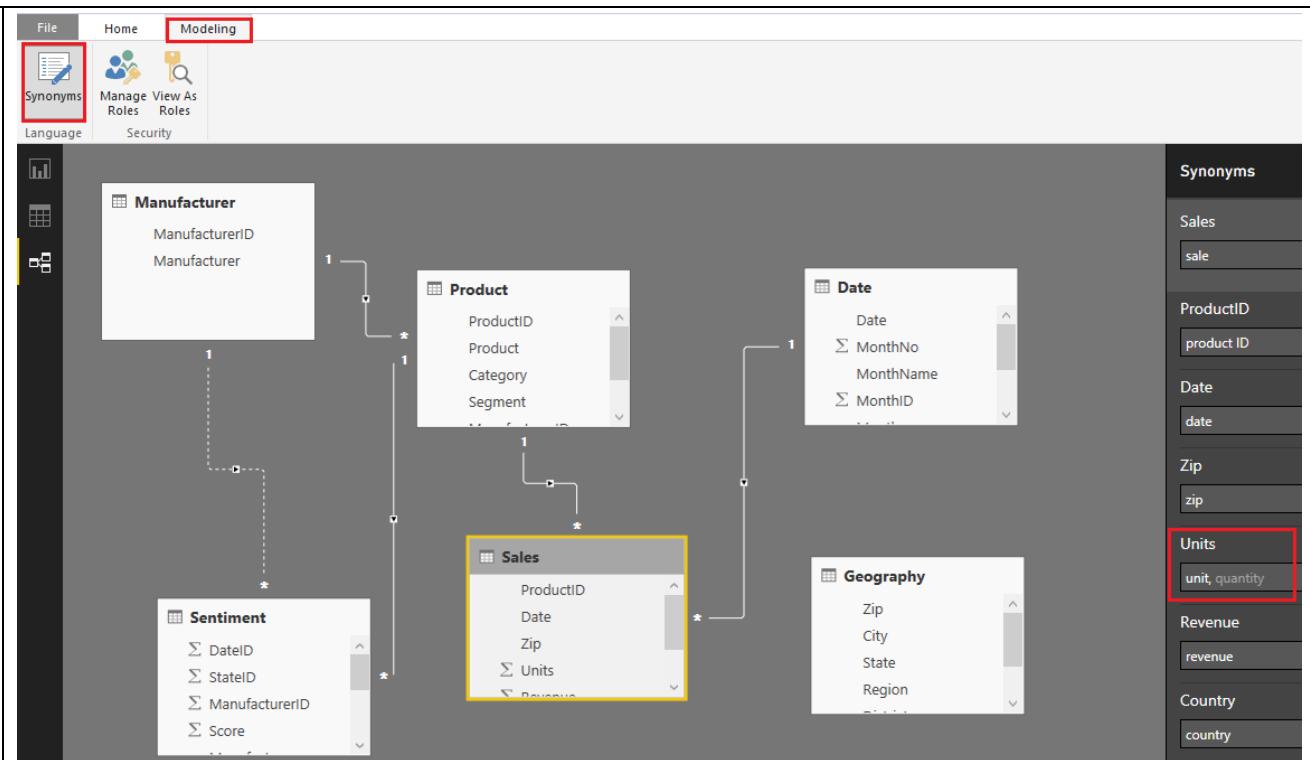
Notice there is no relationship between the Geography and Sales tables. If you want to explore sales data across state or city or country, you will need to setup the relationship between the Geography and Sales tables. You will create the relationship in a later lab.



In our organization, there are some key attributes names that are used interchangeable. E.g. Units and Quantity mean the same and Product and Item are interchangeable used. Power BI provides **synonyms** feature which provides an option to specify alternate names. Here we will do the initial set up and reap the benefits in a later section when we handle Natural Query language (QnA) feature.

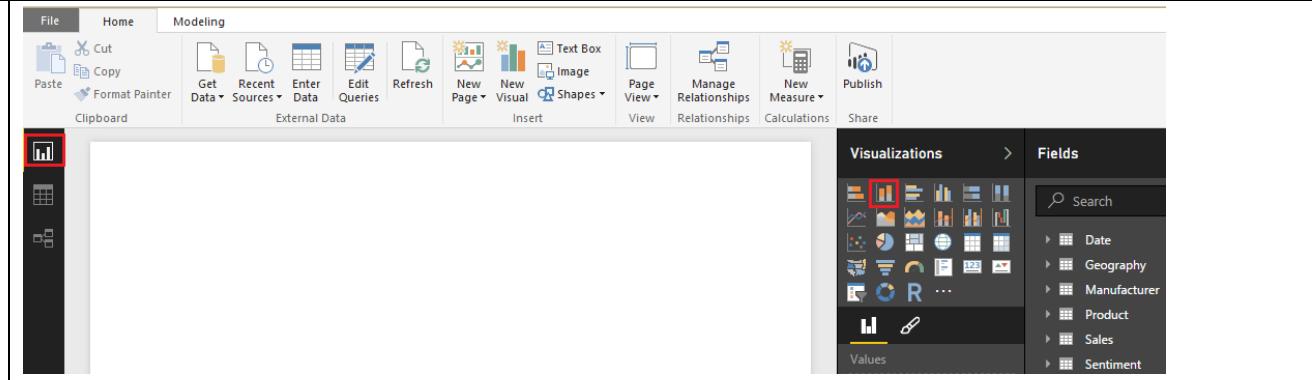
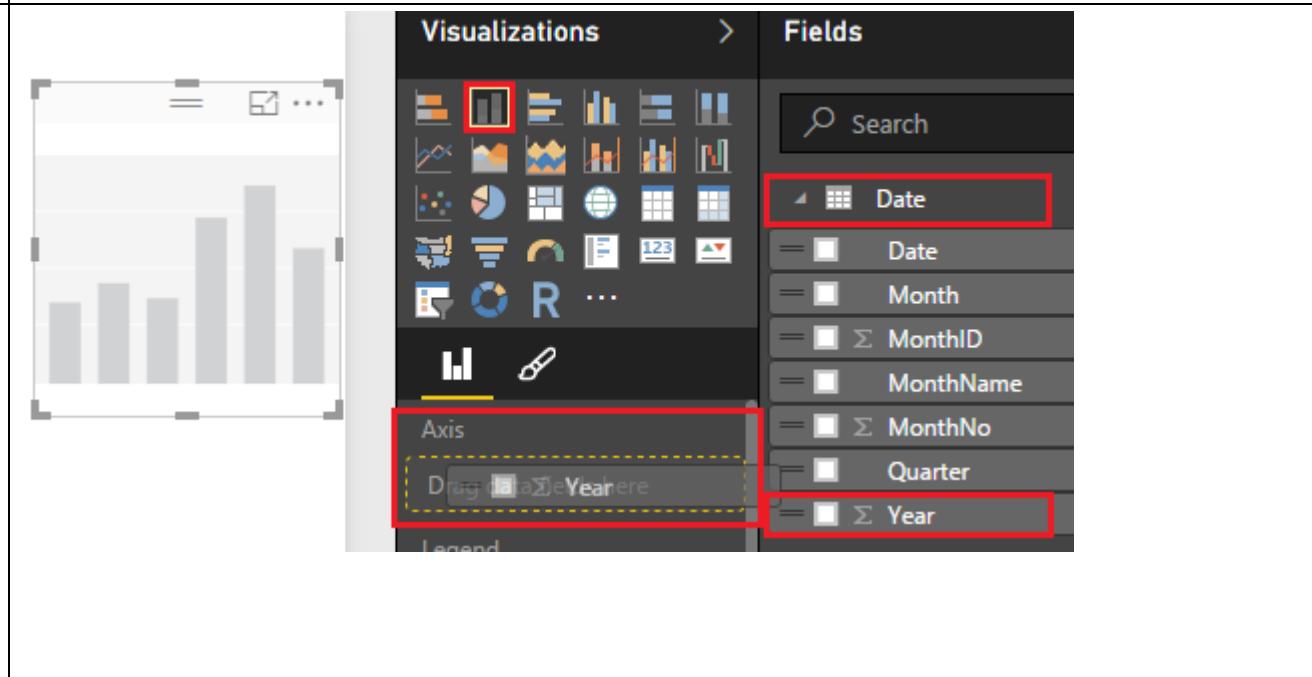
12. Select **Sales** table.
13. From the ribbon select **Modeling** -> **Synonyms**. Notice Synonyms section is displayed in the left panel.
14. Scroll down to **Units** section and enter **quantity**.
15. Highlight **Product** table in relationship panel.
16. In the Synonyms panel, scroll to **Product** and enter **item**.

Now we have entered alternate names for two of the attributes. Later in the lab we will use QnA to show how we benefit from synonyms.

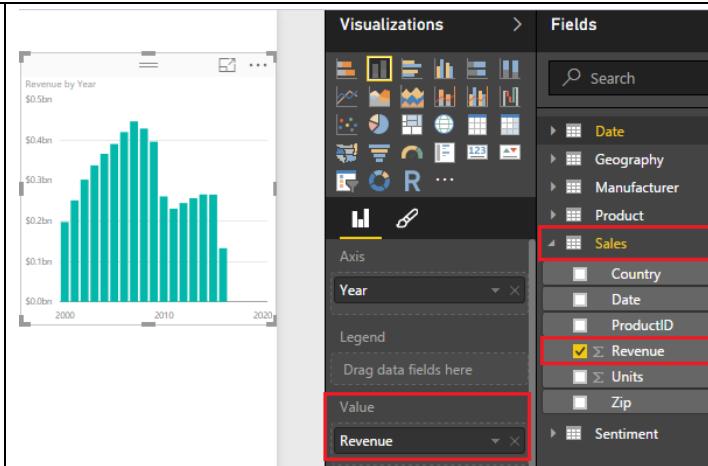


## Power BI Desktop - Enhancing your model and Data exploration

In this section you will do initial data exploration along with model enhancements to create a calculated column, set up relationships and create a measure using DAX (Data Analysis Expression).

<p>You have been asked to analyze the sales over time</p> <p>1. Click on the <b>Report</b> icon on the left panel to get to the Report view.</p> <p>2. Select the <b>Stacked column chart</b> visual in <b>Visualizations</b> as shown in the figure.</p>	
<p>3. From <b>Fields</b> section, expand the <b>Date</b> table.</p> <p>4. Drag and drop <b>Year</b> into <b>Axis</b>.</p>	

5. From **Fields** section, expand the **Sales** table.
6. Drag and drop **Revenue** to **Values** as shown in the figure.
7. You now see the total revenue of all manufacturers by years.
8. **Resize** the visual as needed by dragging the edges.

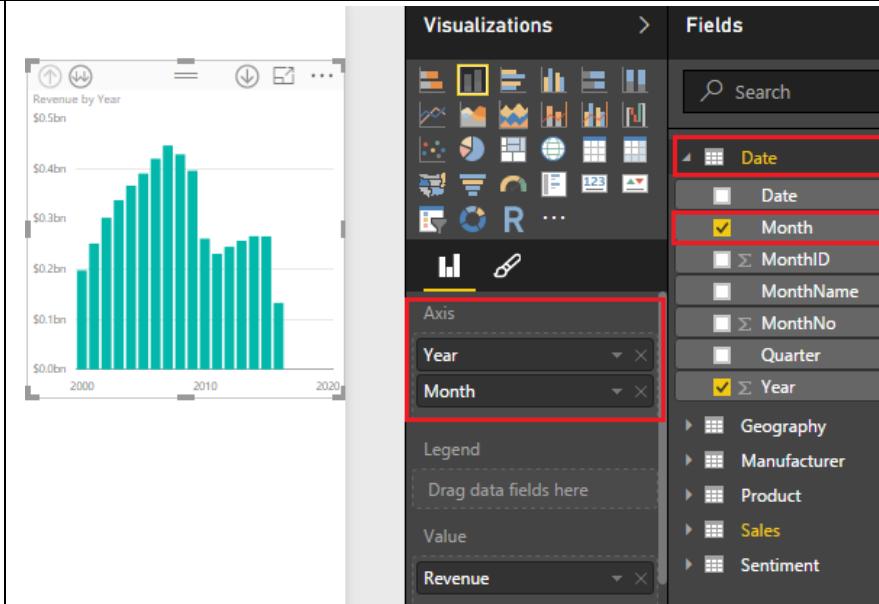


Let us say an executive at your company asks "How were the sales at my company (VanArsdel) by months in addition to years?" You can answer this question very easily by enabling the "drill up/down" functionality in Power BI desktop.

9. To enable this functionality in the visual drag **Month** column from the **Date** Table into the **Axis** below the **Year**. You have now created a Year/Month "Hierarchy" in the Axis column.

You should see additional icons enabled on the top left and right hand side of the visual. These icons allow you to "Drill down/up".

10. You can drill down from Year level to see Revenue at a month level across all data



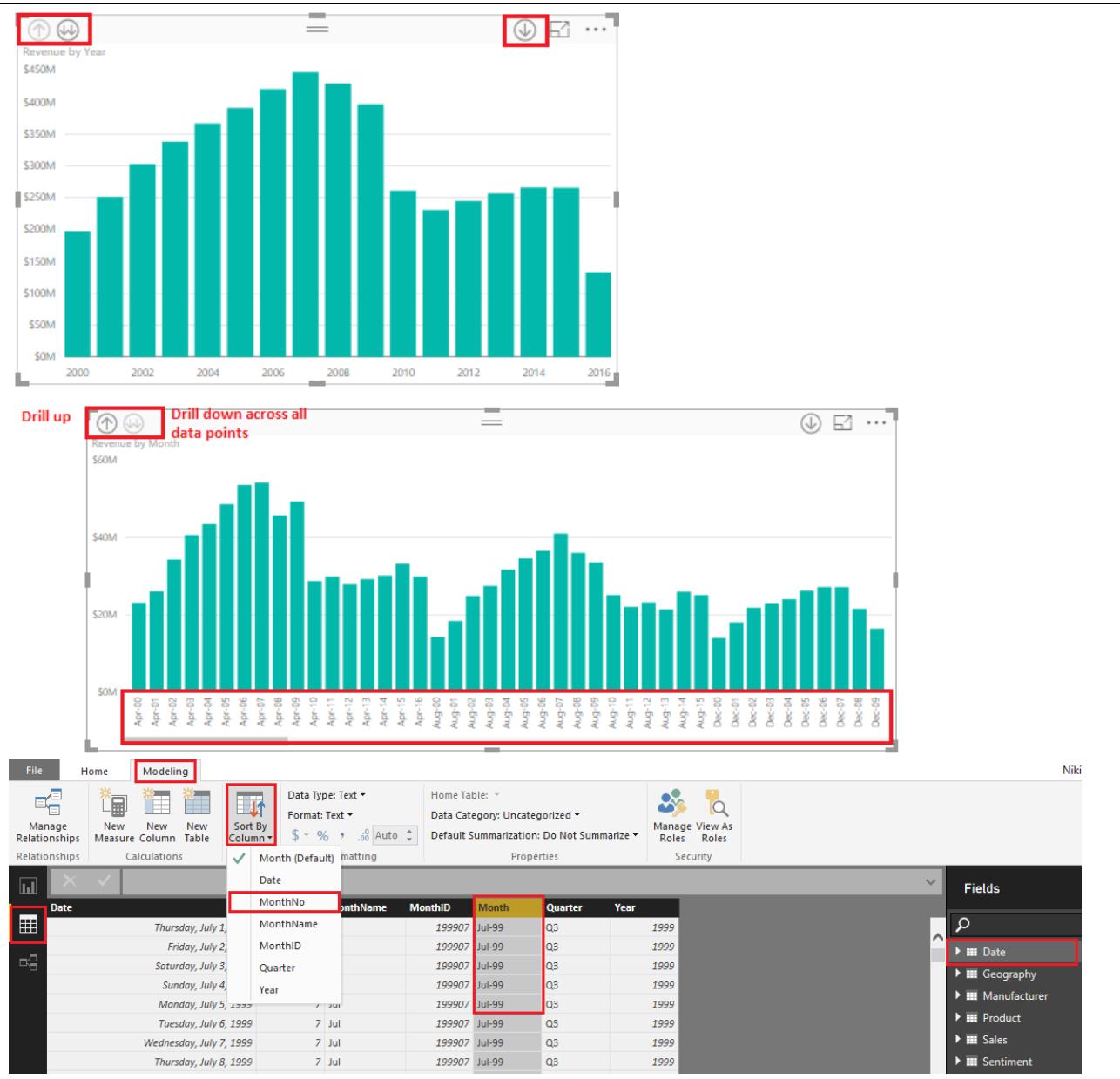
points by clicking on the **double down** arrow at the top left corner of the visual. To go back up to Revenue by Year click on the **up arrow** button on the extreme top left corner of the visual.

When you drill down you will notice that the months are sorted in alphabetical order. Power BI offers you the ability to change the sort order on a column.

11. To change the sort order, go to the **Data** view. Select **Date** table from the **Fields** list on the right. Then highlight the **Month** column within that table. From the ribbon, select **Modeling -> Sort by Column -> MonthID**.

12. Navigate back to the report view and notice the months are now sorted in the right order.

13. Navigate up to the Year level by clicking on the **up arrow** in the top left corner.



14. If you would like to drill down on the month level revenue numbers for a specific year say “2016” then click on the **single down arrow** on top right hand corner of your visual. The arrow should turn black showing that “Single data point” drill is now enabled. Now single click on the rectangle for **year 2016**.

15. You should now see the revenue breakdown by month for 2016. You can again go back up to Year level revenue numbers by clicking on the **up arrow** in the top left corner.

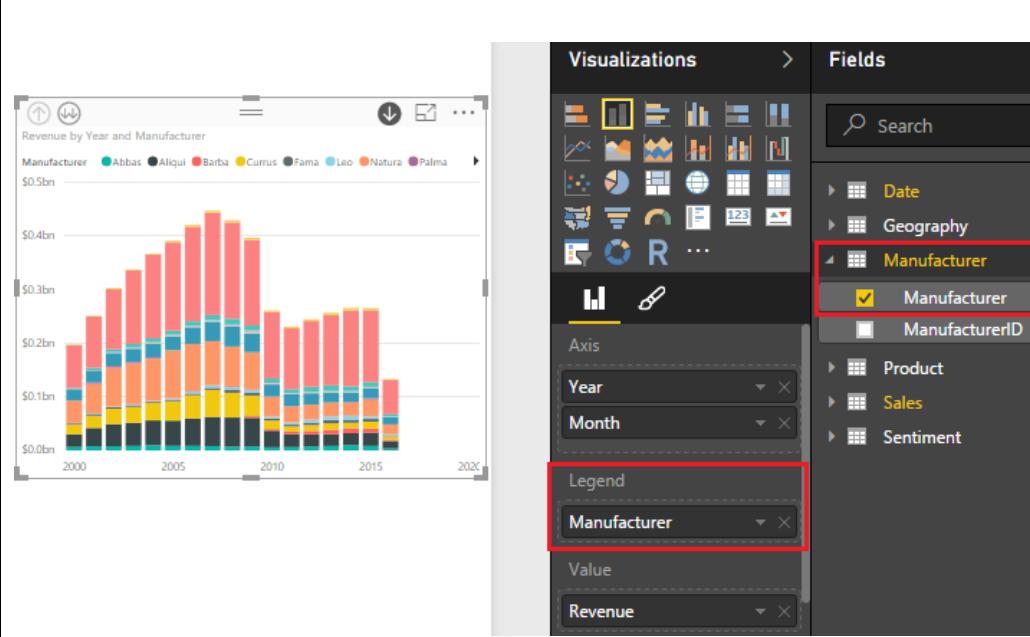
Now let's compare how my company (VanArsdel), is doing as compared to other manufacturers.

16. From the **Fields** section, expand **Manufacturers** table and drag and drop



**Manufacturer** column to the **Legend section** as shown in Figure.

You will see the stacked column chart of sales by various companies and the legend on the top as shown in the figure.



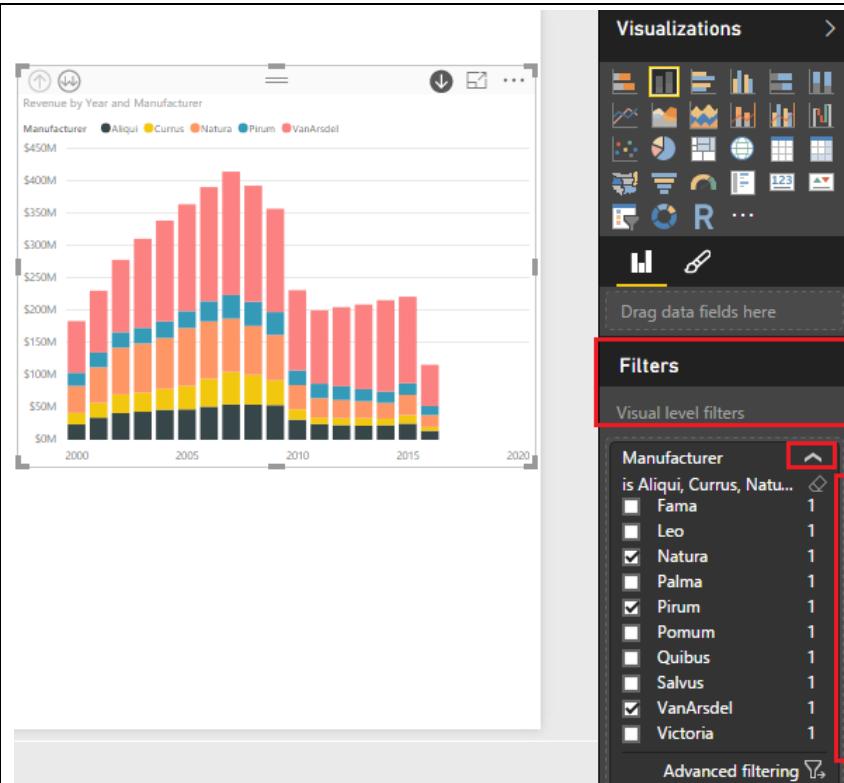
You are primarily interested in the major competitors for VanArsdel and not all companies. You can filter just to the core competitors in the visual.

17. Select the **Stacked column chart** visual. Filters section in Visualizations tab is now scoped to only filter the visual (this chart).

18. Expand **Manufacturer** by clicking on drop down arrow (as show in the figure) .

19. Scroll down to select the companies **Aliqui, Currus, Natura, Pirum and VanArsdel**.

This gives a quick view of how the company is performing against the major competitors. You might need to scroll up and down to select the companies. Please see the scroll bar shown in the figure.

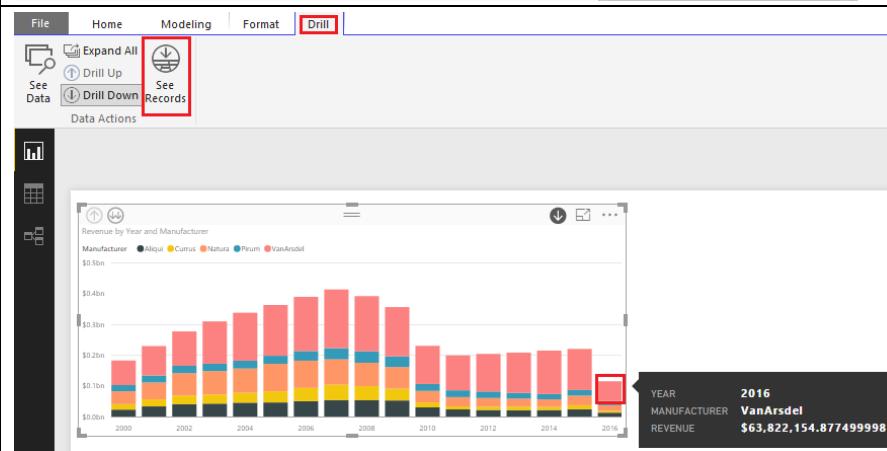


Suppose you want to investigate the records that make up VanArsdel's sales for the year 2016.

20. With the Stacked column chart selected, from the ribbon, select **Drill** -> **See Records**.

Selecting See Records, enables the ability to view the records based on the selection.

21. Click on **VanArsdel** section of the column for the year **2016**.



All the records that make up VanArdel's data for 2016 is displayed.

22. Click on **Back to Report** to get back to the chart view.

23. From the ribbon select **Drill -> See Records** again to disable viewing records.

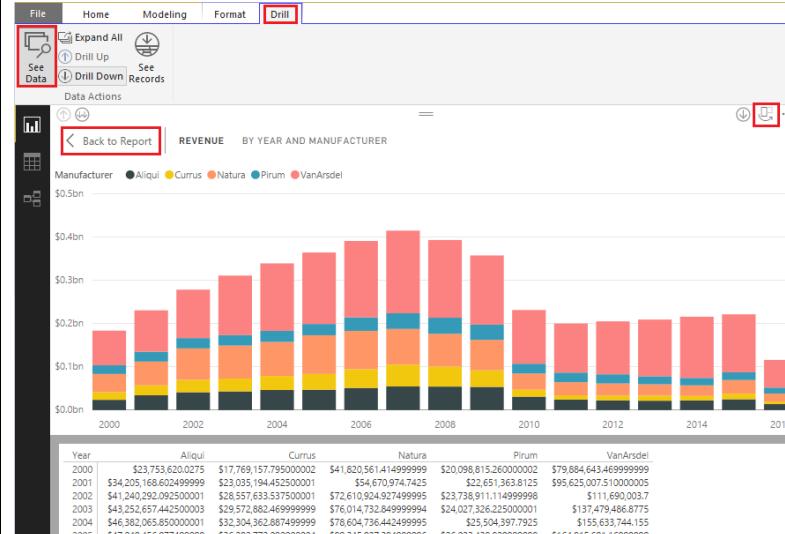
Year	Month	Revenue	Manufacturer	Date	Zip	Country
2016	Mar-16	\$49,084.612500000003	VanArdel	Tuesday, March 22, 2016	33311	USA
2016	May-16	\$12,126.922500000001	VanArdel	Monday, May 30, 2016	60026	USA

24. From the ribbon select **Drill -> See Data**.

Notice now the canvas is divided into two panes, top displays the chart and bottom displays the data that makes the chart.

25. Clicking on **Switch to vertical layout** icon on the top right corner will change the layout to display chart on the left and data on the right.

26. Click on **Back to Report** to get back to the chart view.



For the next visualization, assume you want to be able to analyze the sales of units by various countries along with the sales by years/months.

27. Click on the white canvas in Power BI Desktop.

28. From **Visualizations** section, select **Stacked column** chart. You will see the column chart appear below your existing column chart.

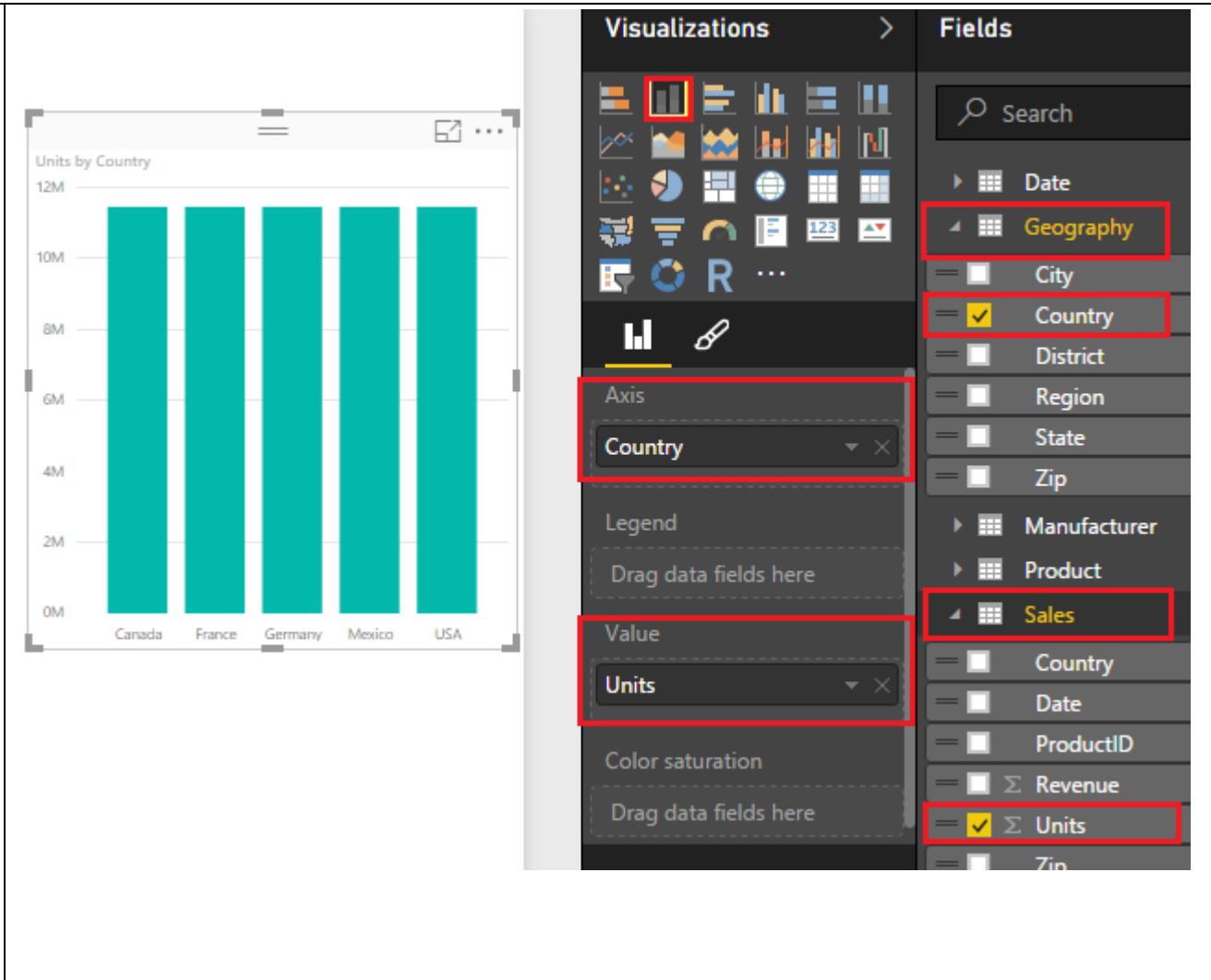
29. From **Fields** section, expand **Geography** table. Drag and drop the **Country** column to **Axis**.

30. From **Fields** section, expand **Sales** table. Drag and drop the **Units** column to the **Value**.

You will see all the countries having about 11.4 Million units. The reason why you see the same value is due to the fact there is no relationship between the Geography table and the Sales table.

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.



In this case the columns Zip and Country will help us establish the relationship since you can uniquely identify each row in the Geography table with Zip and Country.

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.

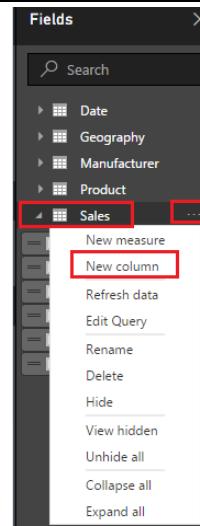
31. In the **Fields** section, click on the ellipsis next to **Sales** table. Select "**New Column**" as shown in the figure.

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

32. 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]**

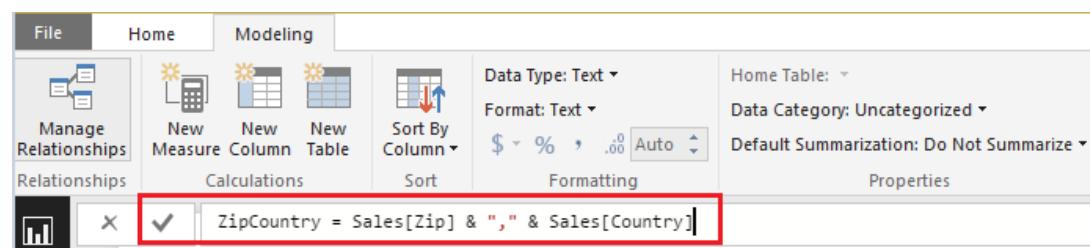
33. Once you are done entering the formula click in the check mark on the left side of the formula editor.



### IMPORTANT!

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

If you still have problems, ask!

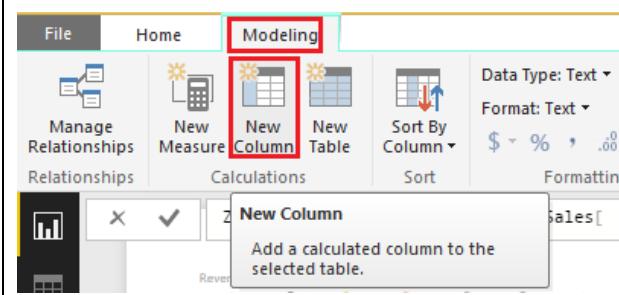
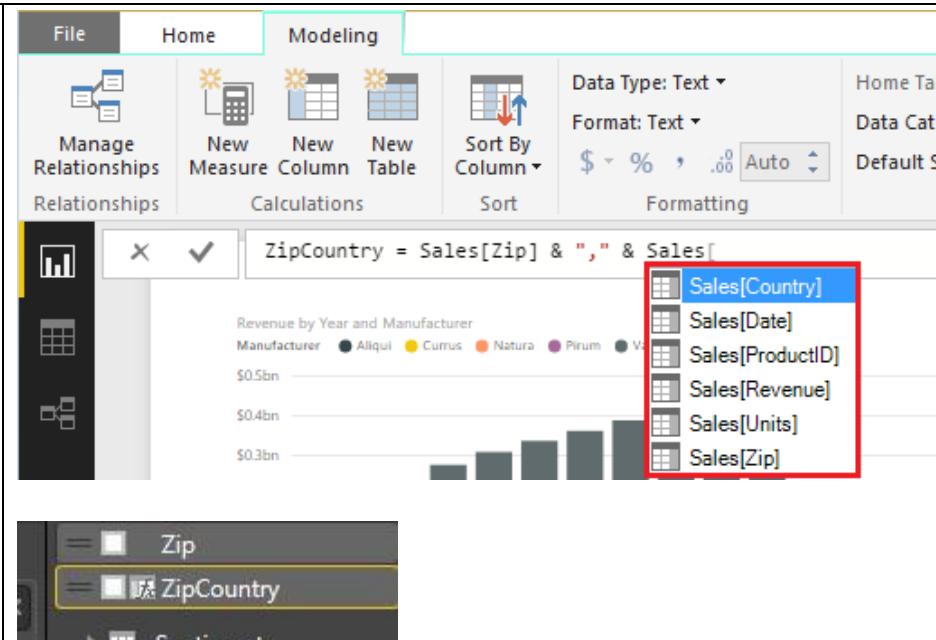


You will notice that as you type the expression the Power BI desktop guides you to choose the right columns using a Technology called Intellisense. As you type half way through you can select the right column by double clicking on it using your mouse or by continuing to hit tab until you see the correct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



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

35. 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.

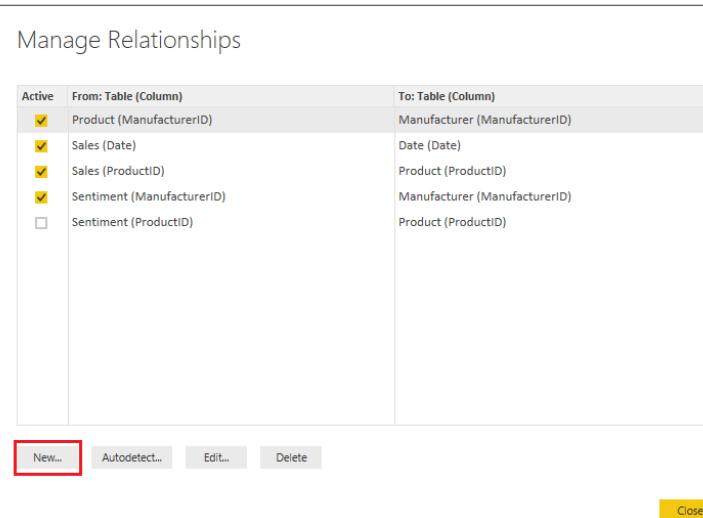
The screenshot shows the Power BI Data Editor interface. The ribbon at the top has the 'Modeling' tab selected. In the center, there's a formula bar with the text 'ZipCountry = Geography[Zip] & "," & Geography[Country]' highlighted by a red box. To the right of the formula bar, there's a 'Properties' pane. On the far right, there's a 'Visualizations' pane and a 'Fields' pane where the 'Geography' table is listed. The status bar at the bottom right says 'Niki Prabhakar'.

36. From the ribbon select **Home -> Manage Relationships**.

The screenshot shows the Power BI ribbon. The 'Home' tab is selected. Under the 'View' section, the 'Manage Relationships' button is highlighted with a red box. Other buttons in the 'View' section include 'Page View', 'New Visual', 'Image', 'Shapes', 'Text Box', 'Refresh', 'Enter Data', 'Recent Sources', 'Get Data', 'Paste', 'Format Painter', 'Clipboard', and 'View'.

37. In the **Manage Relationships** dialog you will see all existing relationship between the tables. You can also create new relationships in this dialog.

38. Click on the **New** button to create a new relationship.

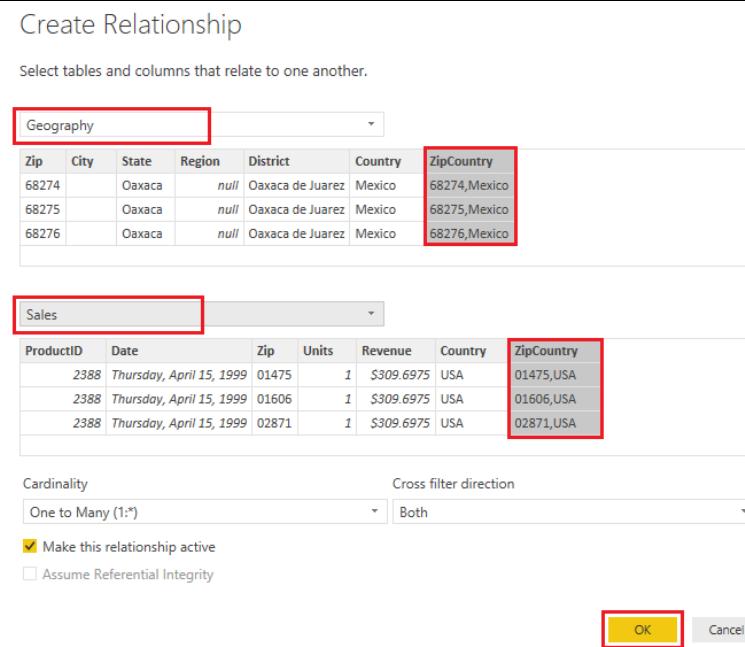


39. In the **Create Relationship** dialog first select **Geography** from the top drop down as shown in the figure.

40. Select the column **ZipCountry**.

41. Select **Sales** table from the second drop down as shown in the figure. Power BI automatically selects the **ZipCountry** column for you because you selected a column with a same name in the **Geography** table.

42. Click **OK** in the **Create Relationship** dialog.



43. You will see the new relationship created as shown in the figure.

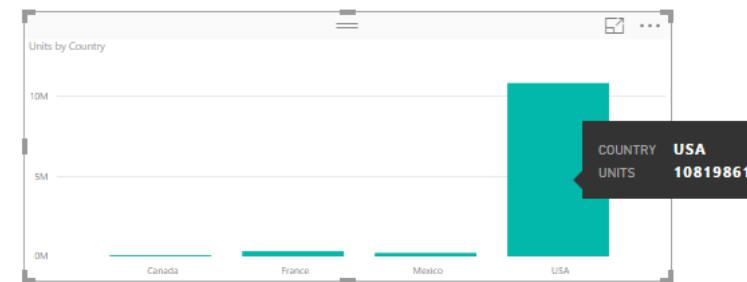
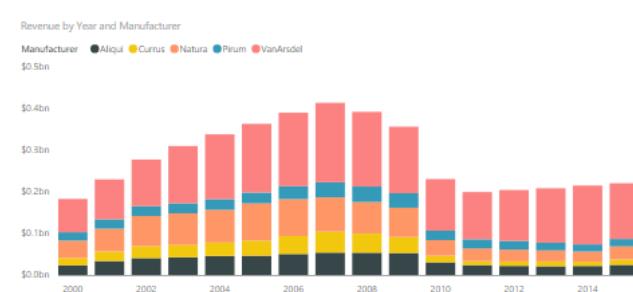
44. Click **Close** in the **Manage Relationships** dialog.

Manage Relationships

Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	Product (ManufacturerID)	Manufacturer (ManufacturerID)
<input checked="" type="checkbox"/>	Sales (Date)	Date (Date)
<input checked="" type="checkbox"/>	Sales (ProductID)	Product (ProductID)
<input checked="" type="checkbox"/>	Sentiment (ManufacturerID)	Manufacturer (ManufacturerID)
<input type="checkbox"/>	Sentiment (ProductID)	Product (ProductID)
<input checked="" type="checkbox"/>	Geography (ZipCountry)	Sales (ZipCountry)

New... Autodetect... Edit... Delete Close

45. When you look at the report canvas you will immediately see that the relationship has taken effect. You can now see the total units sold in each country. You can hover over USA to see the actual value.

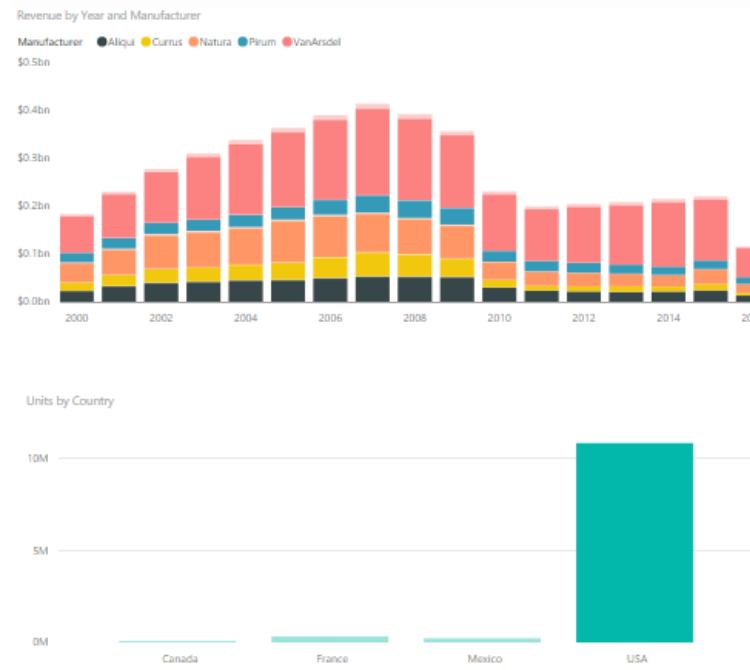


46. Click on bar for **USA** in the bottom graph to analyze what portion of the units sold in USA contributes towards to overall Sales.

You will immediately notice that in the bottom graph the rest of the bars fade away and USA remains highlighted in the bold. Similarly, in the graph on the top a portion of each bar is highlighted in bold and the rest is faded. This visually shows the proportion of over sales that comes from USA (for each manufacturer and in each Year/Month). This is called **Cross filtering** in Power BI.

You can remove the cross filtering effect by clicking anywhere on the bottom graph.

**Note:** You have now created a visual filter on the top graph while the bottom graph on units sold includes all manufacturers.



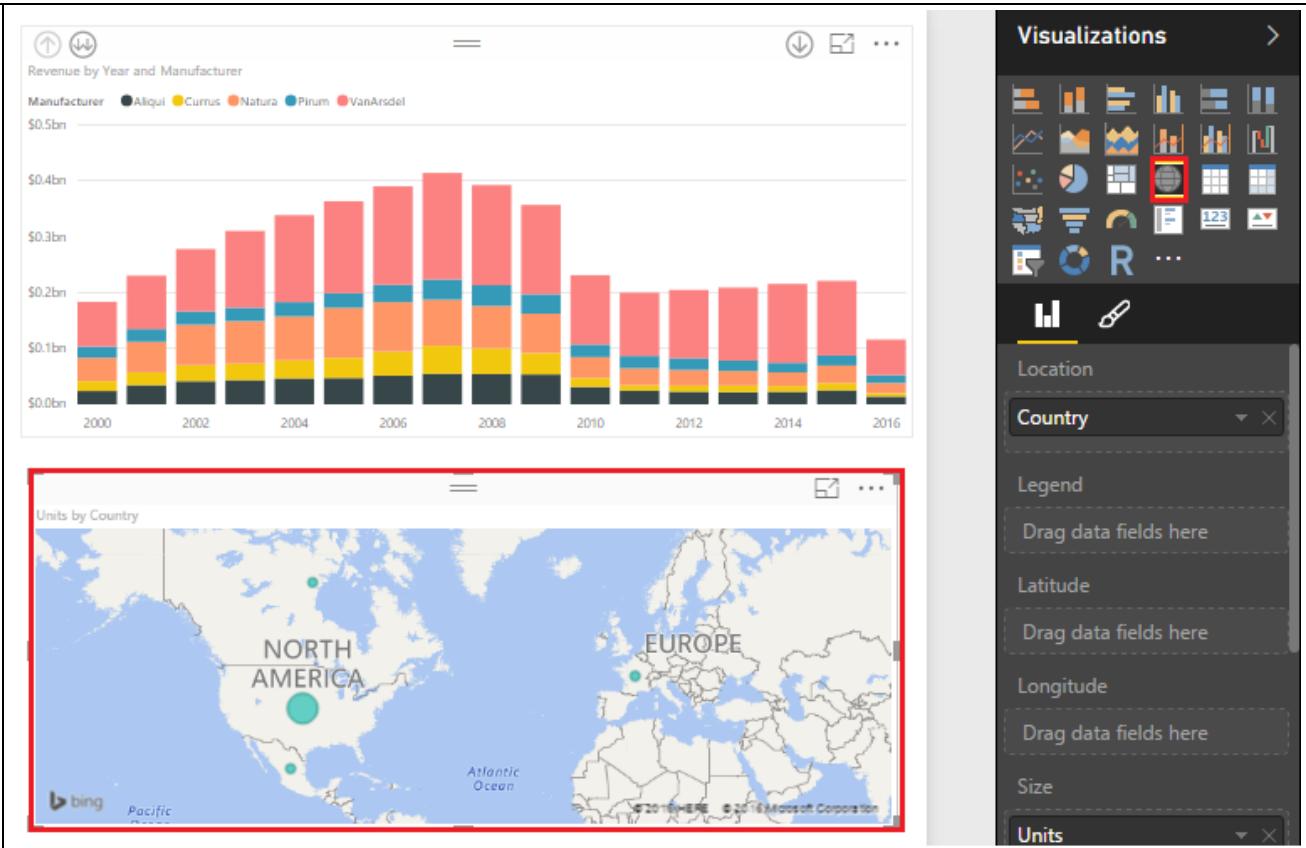
Since the units sold are by country, you can easily map your sales.

47. Select the bottom column chart and click on the **map** visual icon (not the filled map visual) in Visualizations. You will see the bottom visual change to a map visualization and the size of the bubble in each country shows the total number of units sold.

48. Resize the map as needed.

**Note:** Microsoft Bing is used to create the map; hence you have to be connected to the internet for the map visual to work.

**Note:** You didn't have to do any complex operations to change the visual type, Power BI desktop automatically understood the Country column and add it to the location and the units to the values.



Let's assume we want to create a table visual to display the Revenue by year and add a column that displays the % of revenue for each year to help figure out the years where sales were high.

49. From the **Visualizations** section, select **Table**.

50. From the **Fields** section, expand **Date** table and select **Year**.

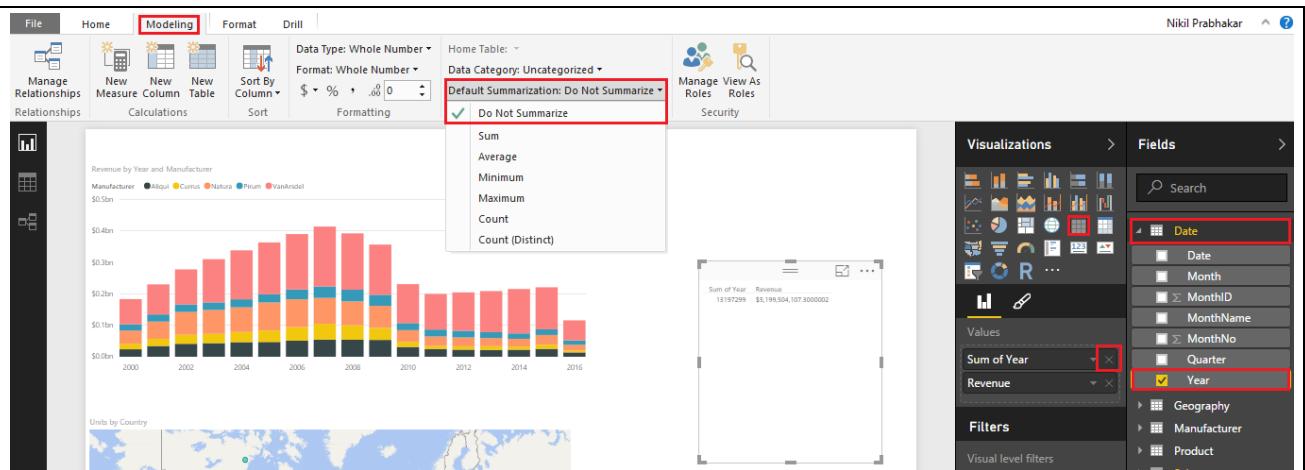
51. From the **Fields** section, expand **Sales** and select **Revenue**.

Notice that Year is summed by default, since the data type is of type Whole Number. We would never sum Year, so let's change it.

52. In the **Fields** section, click on **Year**.

53. From the ribbon, select **Modeling** -> **Default Summarization** -> **Do Not Summarize**.

54. From the **Values** section of the Table visual, delete **Sum of Year** field by clicking on the "x".



55. From the **Date** table, drag **Year** field and drop it above **Revenue** in **Values** section of the table visual.

Notice Year is not summed anymore.

56. From the **Sales** table, drag **Revenue** field and drop it below Revenue in **Values** section of the table visual.

57. Click the **arrow** next to the newly dropped Revenue field.

58. Select **Quick Calc**.

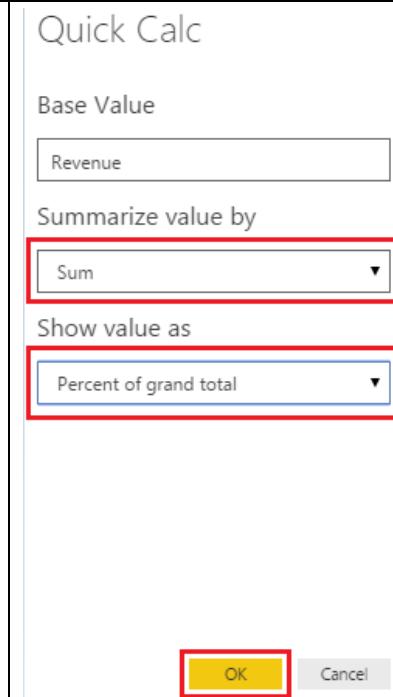
The screenshot shows the Power BI desktop interface. On the left is a table visual with columns 'Year' and 'Revenue'. The 'Year' column shows values like 2016, 2016, 2016, etc., and the 'Revenue' column shows values like \$1,172,647,500,000.0002, \$126,999,999,999,999, etc. On the right is the 'Quick Calc' dialog box. The 'Values' section has 'Year' and 'Revenue' selected. In the 'Filters' section, under 'Sales', the 'Revenue' checkbox is checked. The 'Summarize value by' dropdown in the 'Base Value' section is set to 'Sum'. The 'Show value as' dropdown is set to 'Percent of grand total'. The 'OK' button is highlighted with a red box.

Quick Calc dialog opens.

59. From **Summarize value by** dropdown select **Sum**.

60. From **Show value as** dropdown select **Percent of grand total**.

61. Click **OK**.



Notice now we have % GT Revenue field.  
With Quick Cal feature we are able to add a calculation to the report and meet the requirement of displaying % of revenue by year.

The screenshot shows a Power BI report interface. On the left is a table visualization with three columns: 'Year', 'Revenue', and '%GT Revenue'. The '%GT Revenue' column contains percentage values ranging from 2.56% to 100.00%. On the right is the 'Visualizations' pane, which includes a 'Values' section where '%GT Revenue' is listed. A red box highlights the '%GT Revenue' column in both the table and the Values section of the pane.

It would be nice to have conditional formatting on the table so we can easily identify the years where sales were good versus bad.

62. In the **Values** section of the table report, click on the arrow next to **% GT Revenue**.

63. From the menu select **Conditional Formatting**.

The screenshot shows the 'Values' section of the table report. A red box highlights the '%GT Revenue' column. To the right, the 'Quick Calc' menu is open, listing various calculation options such as Sum, Average, Minimum, Maximum, Count (Distinct), Count, Standard deviation, Variance, and Median. The 'Conditional Formatting' option is also listed and highlighted with a red box.

Conditional formatting dialog opens. By default, there is options to format minimum and maximum.

64. We want to format center value as set, so select the **Diverging** checkbox.

65. Pick **Red** color for the minimum value, **Yellow** for center and **Green** for maximum.

66. Click **OK**.

Notice now we can quickly figure out that sales peaked in 2007.

### Conditional Formatting

Format table cells based on their values.

Base Value

%GT Revenue

Diverging

Minimum

Lowest value

Center

Middle value

Maximum

Highest value

(Lowest value)

(Middle value)

(Highest value)



Year	Revenue	%GT Revenue
2016	\$132,911,064.21250000	2.56%
2015	\$265,644,479.289	5.12%
2014	\$266,054,486.5	4.94%
2013	\$256,810,540.4075	4.71%
2012	\$244,761,573.73500000	4.44%
2011	\$230,123,521.16499999	4.00%
2010	\$206,180,470.40750000	3.62%
2009	\$196,834,759.377	3.24%
2008	\$192,293,398.13	3.00%
2007	\$147,096,083.19	8.60%
2006	\$420,594,221.003	8.09%
2005	\$191,029,357.93000001	7.52%
2004	\$166,786,023.44999999	7.05%
2003	\$138,020,092.02749997	6.50%
2002	\$131,264,410.40750000	5.82%
2001	\$131,264,410.40750000	5.40%
2000	\$117,704,718.14750000	3.80%
Total	\$5,199,504,107.3000002	100.00%

OK Cancel

Now let's format the table to make it easier to read.

67. With the table visual selected, from the **Visualization** section select **Format icon (paintbrush)**.

68. Expand **Table Style** section.

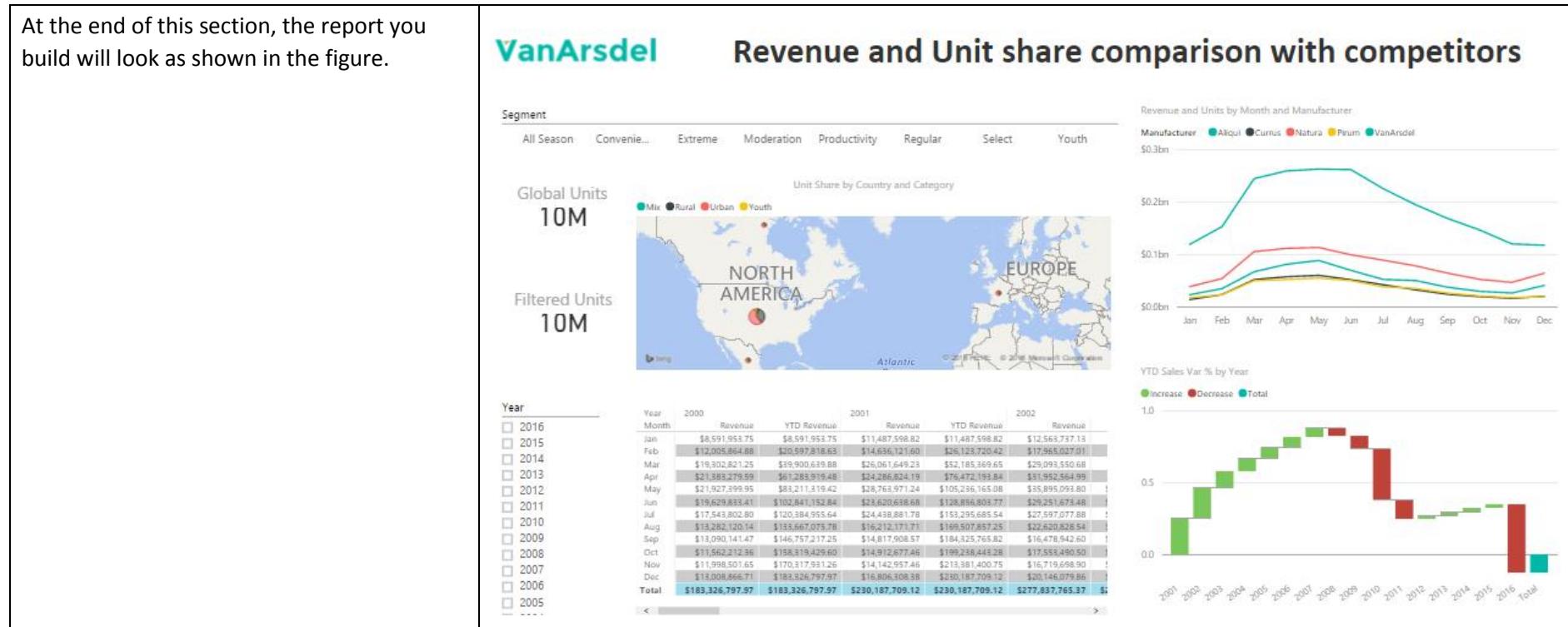
69. From the Style drop down select **Alternating rows**.

Notice there are other options to format the Table Style. Select these options to notice the change is table format.

## Power BI Desktop - Report Authoring

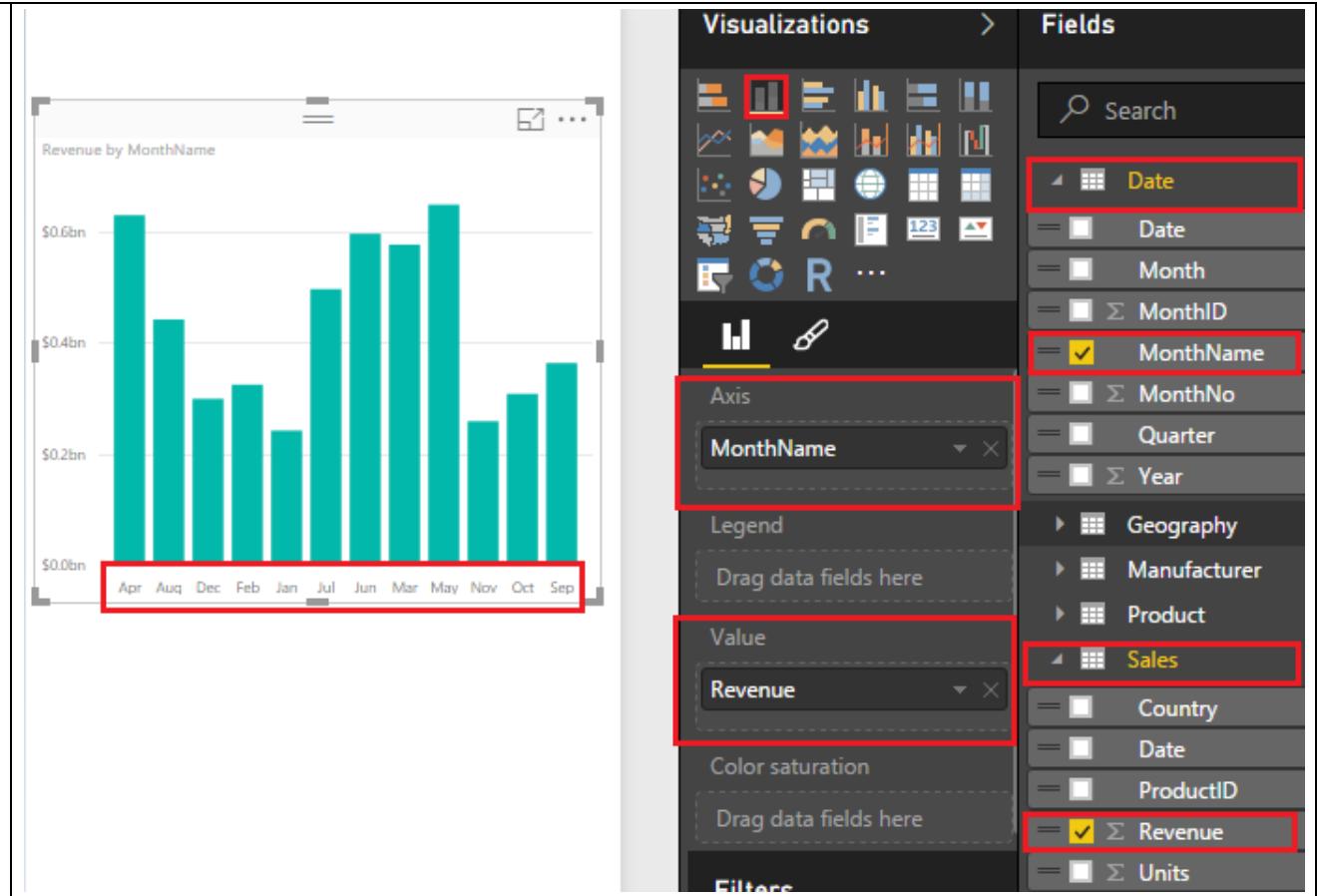
Having done some initial data exploration and visualization you are now finding good insights to share with your team. In this section you will create a professional report that you and your entire team can benefit from on a daily basis. You will be creating a report that can give quick insights into comparing sales of various months this year and easily being able to compare it to previous years in this report.

At the end of this section, the report you build will look as shown in the figure.



Let us start with a clean slate again for this section. To do this, select each visual in the page that we created in the previous section and **delete** it. Now we should be ready to move to the next section.

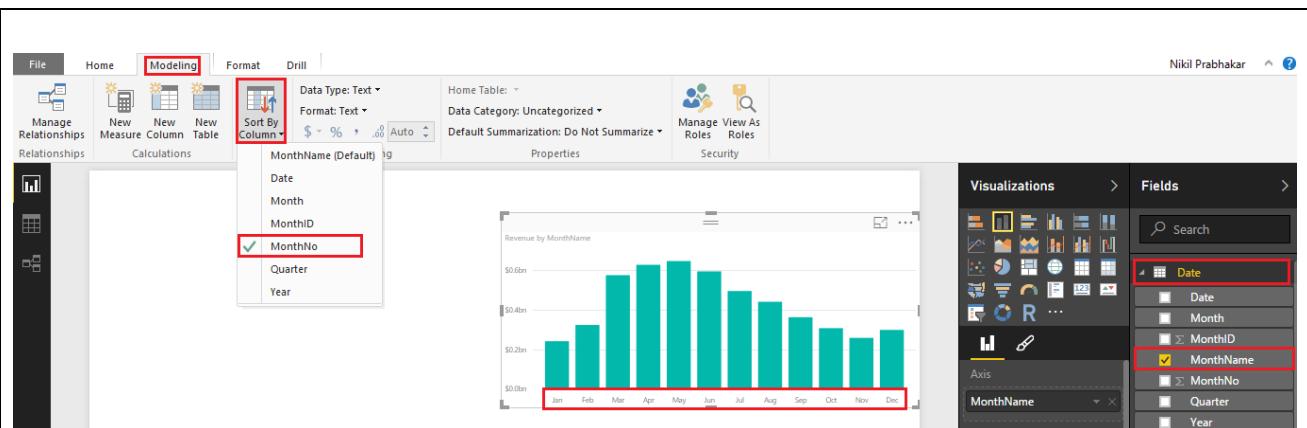
1. From **Visualizations** section select **Stacked column chart**.
2. From the **Fields** section expand **Sales** table and drag and drop **Revenue** to Value as shown in the figure.
3. From the **Fields** section expand **Date** table and drag and drop **MonthName** to **Axis** as shown in the figure. You will see there is a field called **Month** and then **MonthName**. Please select **MonthName**. Notice Month name is not sorted as you would expect.



Let's fix the sort order of MonthName field.

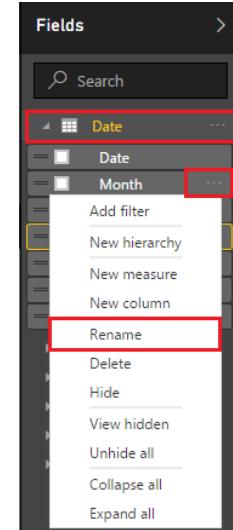
4. From the **Fields** section, expand **Date** table and select the **MonthName** column as shown in the figure.
5. From the ribbon, select **Modeling** -> **Sort By Column** -> **MonthNo**.

By default, the Months are ordered alphabetically. Once you specify the ordering, you will see months ordered logically rather than alphabetically.



Stay in the report view. The **Month** column actually includes month and year. Let's name it appropriately.

6. From the **Fields** section, expand **Date** table and click on the ellipsis next to Month field. Select **Rename** and name it as **MonthYear**.
7. Similarly, rename the **MonthName** field to **Month**.

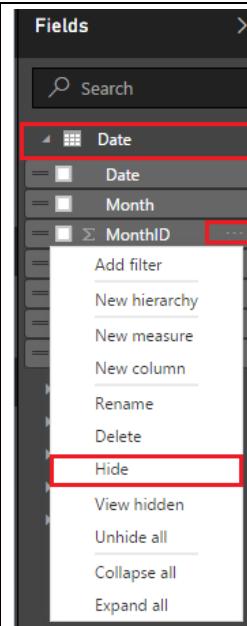


Several of the ID columns in the tables are not useful to the end-users. Let's hide some of the fields to present a clean user experience.

8. From **Fields** section, expand **Date** table and click on the ellipsis next to **MonthID** field and select **Hide**. This hides the column from the report.

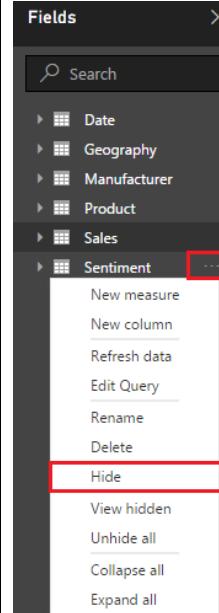
**Note:** You can still see this column in the data view and relationship view.

9. Similarly **Hide** the **MonthNo** and **MonthYear** columns from the **Date** table.



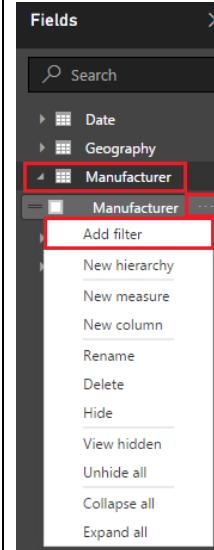
10. In the **Manufacturer** table, **Hide** **ManufacturerID** column.
11. In the **Product** table, **Hide** the columns **ManufacturerID** and **ProductID**.
12. In the **Sales** table, **Hide** the columns **Country**, **Date**, **ProductID**, **Zip** and **ZipCountry**.
13. Select **Geography** table and **Hide** the column **ZipCountry**.
14. Select the ellipsis next to **Sentiment** table and click on **Hide** to hide the entire table.

**Note:** You can hide columns or tables from the report view so that your end users of the report only see the columns with which they need to interact.

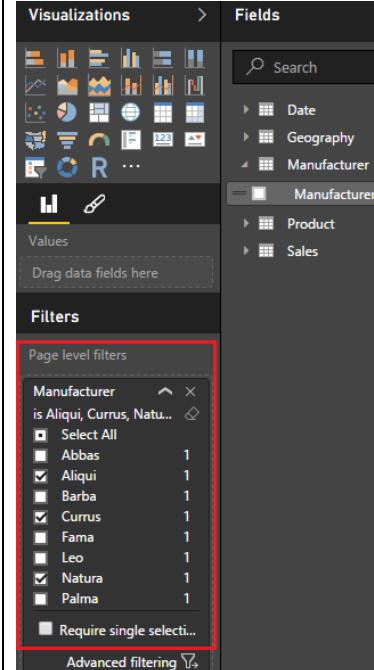


Similar to your analysis of top competitors, when doing comparisons of competitors, your team is also only interested in comparing top competitors.

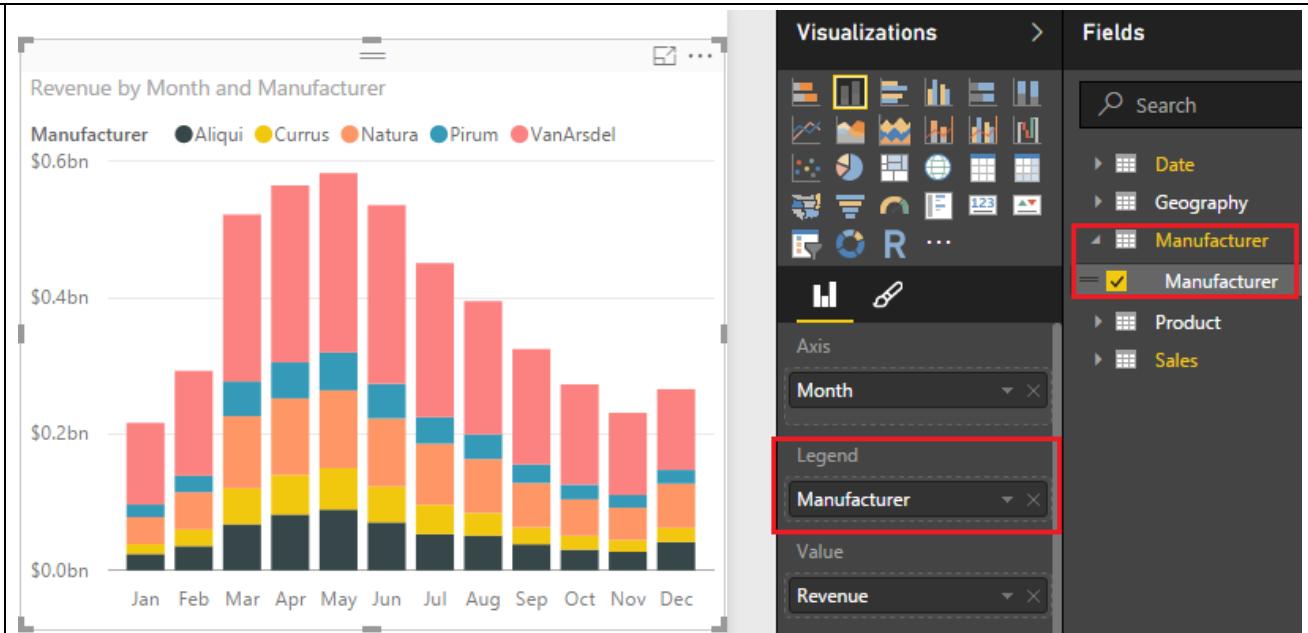
15. In order to apply a global filter for the entire page, **click on the canvas** outside the column chart.
16. In **Fields** section, select the **ellipsis** next to **Manufacturer** column in **Manufacturer** table and click **Add Filter**. This will add the Manufacturer column to Page filter.



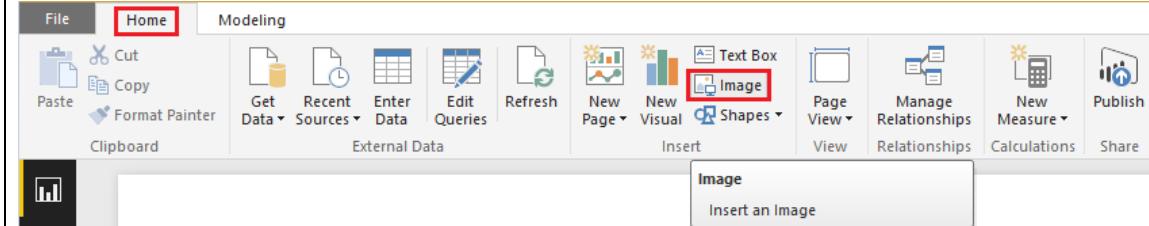
17. In **Visualizations** section, scroll to **Page level filters**.
18. Select the manufacturers **Aliqui**, **Currus**, **Natura**, **Pirum** and **VanArsdel** in the filter.



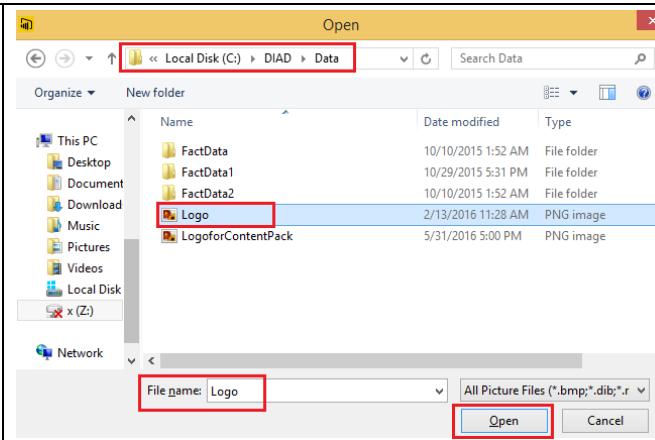
19. Move the column chart visual to the right of the canvas.
20. From the **Fields** section, expand **Manufacturer** table and drag and drop **Manufacturer** to the **Legend** of the visual.



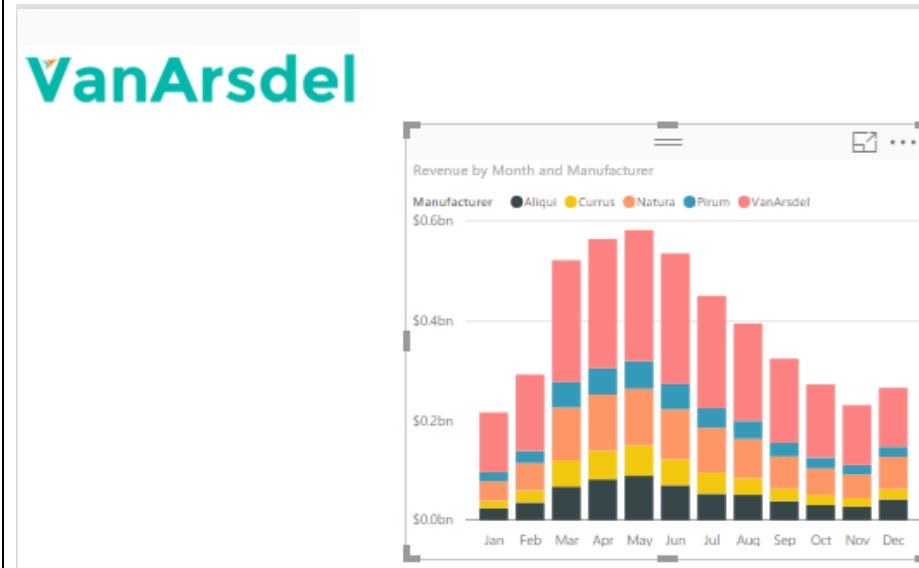
- You need the company logo in most reports.
21. Click on the white space on the canvas.  
22. From the ribbon, select **Home -> Image**.



23. Navigate to **/DIAD/Data** folder and select Logo.gif. Click **Open**. Logo will appear on the report.



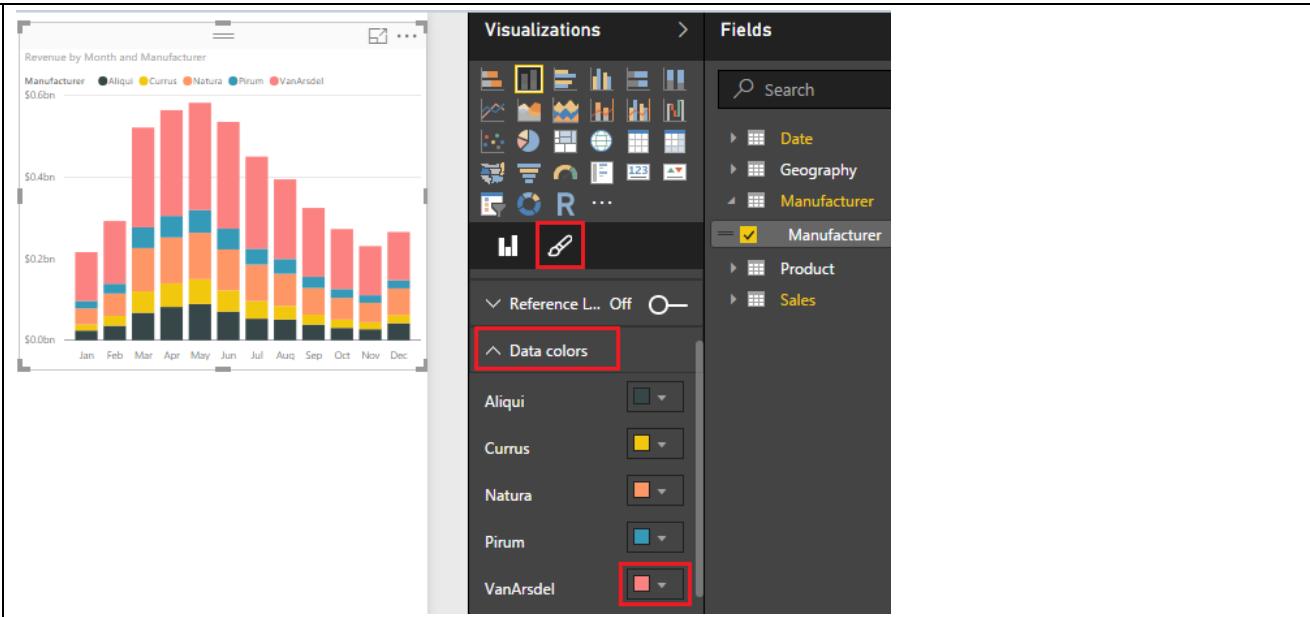
24. Resize and Move the logo to the top left of the report.



You can see VanArsdel logo is GREEN. You want to be able to match the logo color with the color of the sales for VanArsdel in the bar chart in your report.

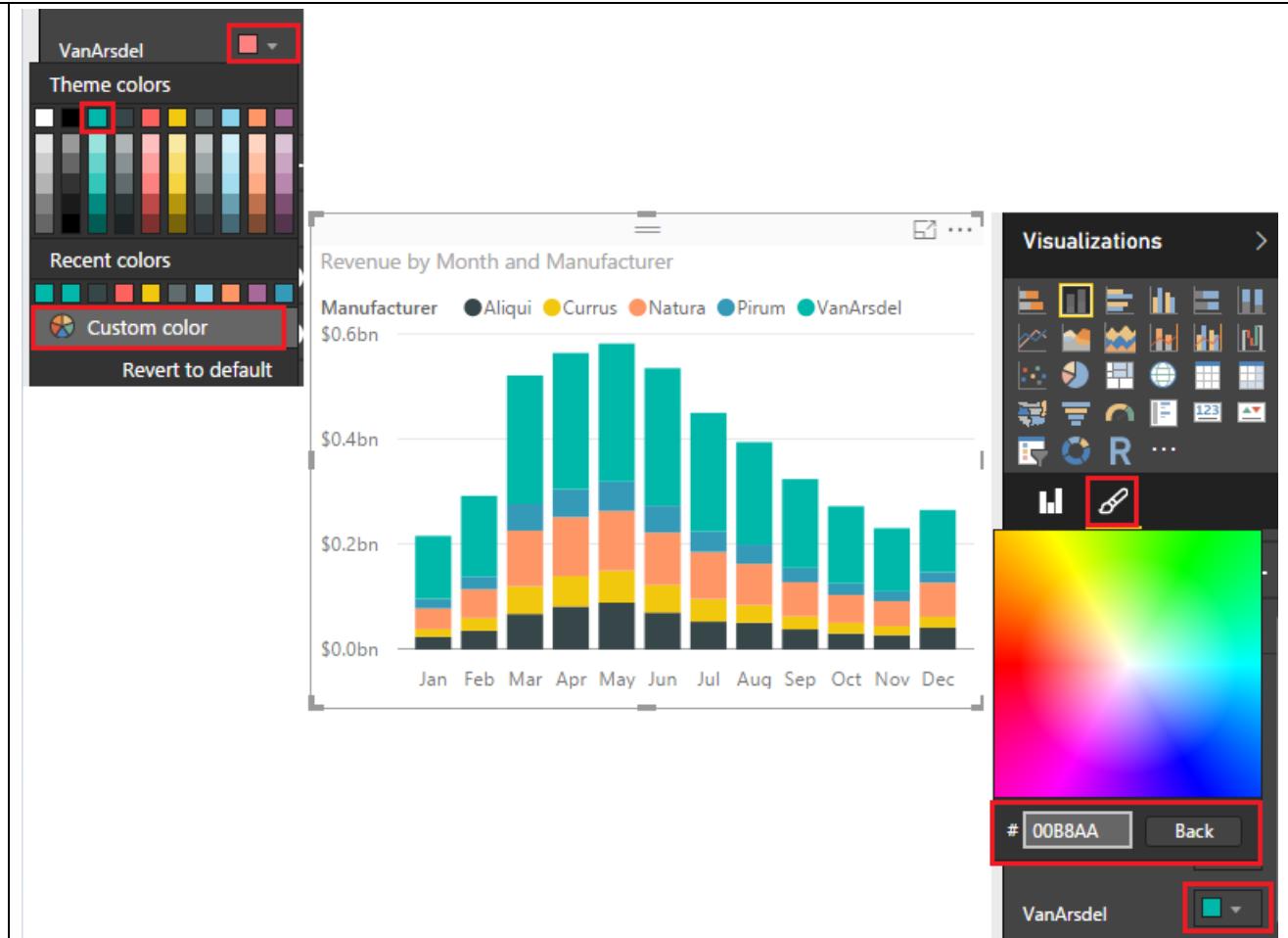
25. Click on the previously created **Stacked column chart**. From the **Visualization** section select the format icon (**paintbrush**) as shown in the figure.

26. Select the drop down icon next to **Data Colors** and then the **color next to VanArsdel**.



27. Select the **GREEN** Theme color to match VanArsdel logo color or Select the **Custom color** as shown in the first figure and select the color or type in the code **00B8AA**.

28. Click on the **white canvas** next to the visual to continue to the next step. You can also select back button.



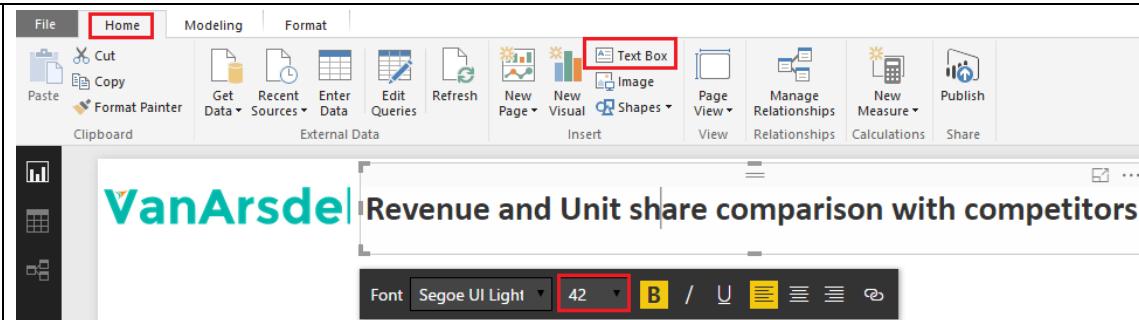
Next let us add a title to this report. To do so click anywhere on the white canvas.

29. From the ribbon, select **Home** -> **Text box**. Text box area is available in the canvas.

30. Enter the title "**Revenue and Unit share comparison with competitors**".

31. Highlight and select the **entire text**.

32. Change the font to **size 42** and move the text box to the top of the page as shown in the figure.



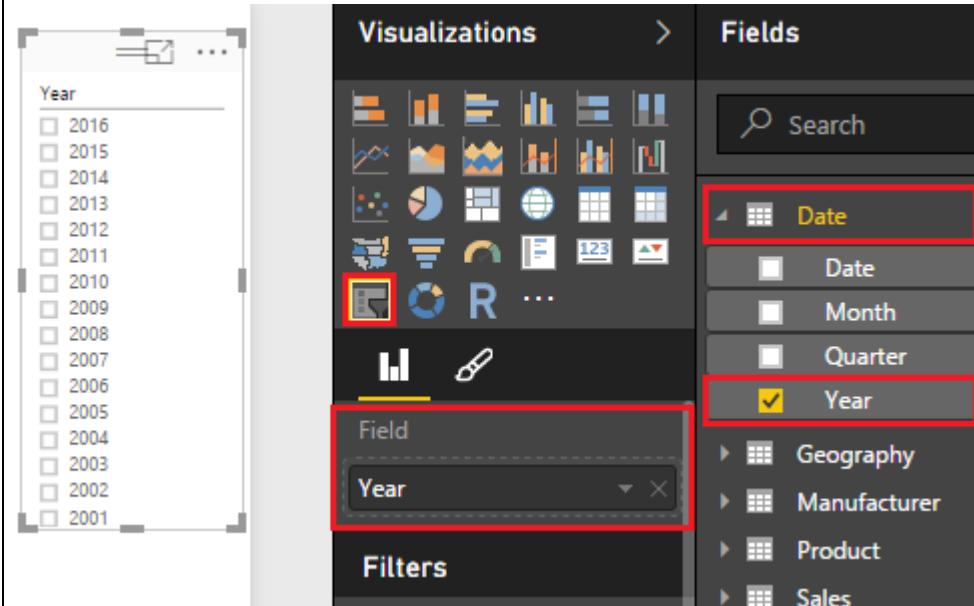
33. Click on the **canvas**.

34. From the **Fields** section, expand **Date** table and select **Year** column.

35. Click on the **slicer icon** in **Visualizations** pane.

36. **Resize and move** the slicer below the logo.

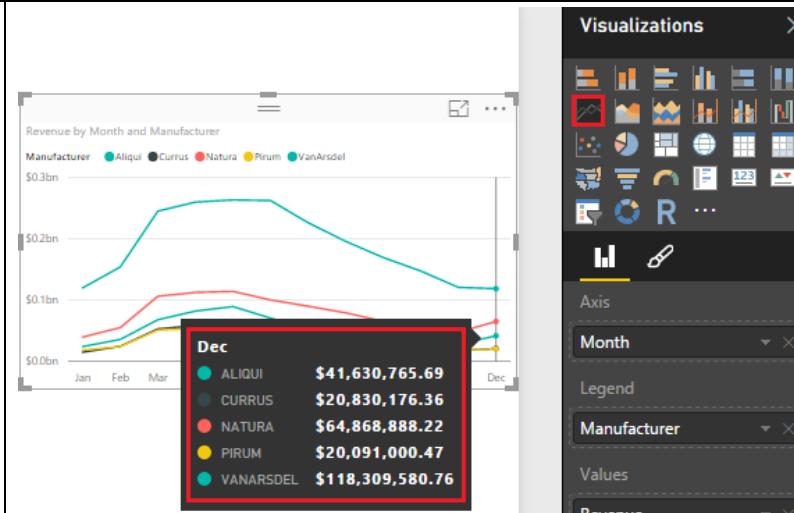
A slicer provides the ability for end users to visually see the key filters applied to the entire page and also the flexibility to select/deselect values easily.



In order to compare the revenue by competitors over time easily line charts are more helpful.

37. Select the **column chart** visual and change it to **Line chart** visual in the **Visualizations**. Your report should like the one on the right.

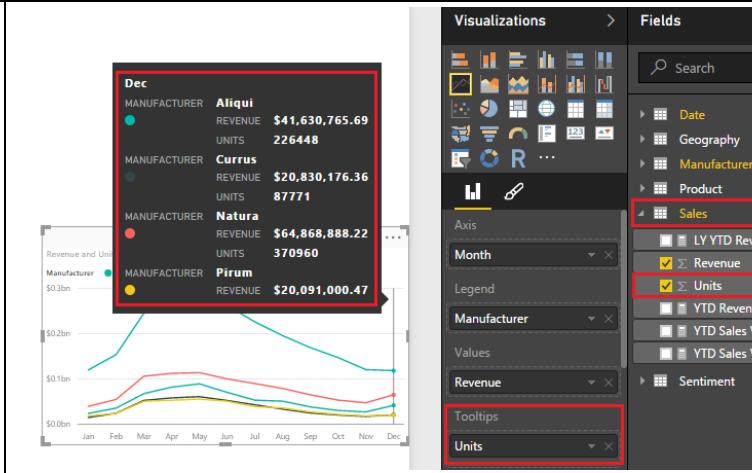
Hover over the visual and notice a tooltip appears displaying the Revenue numbers for each of the manufacturers.



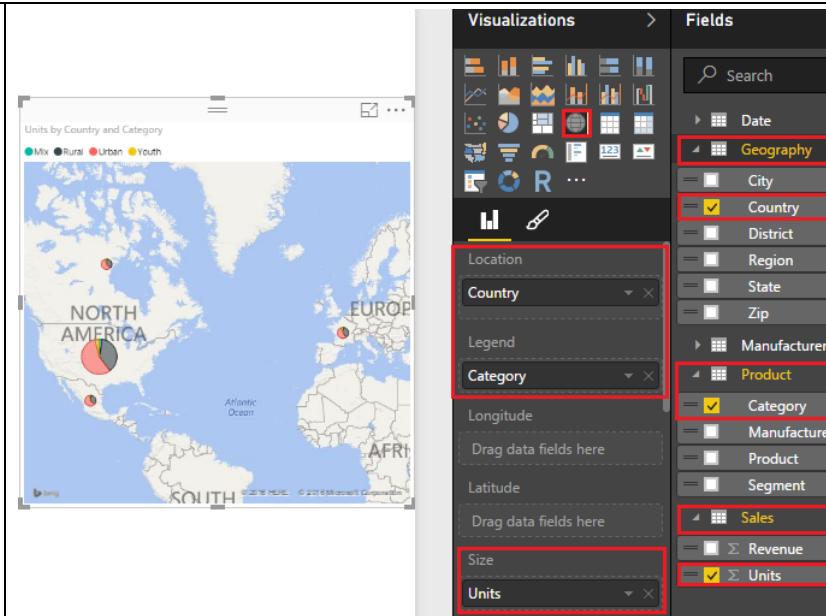
It will be useful to display Units sold along with Revenue information on the tooltip.

38. From the **Fields** section, expand **Sales** and drag **Units** to **Tooltips**.

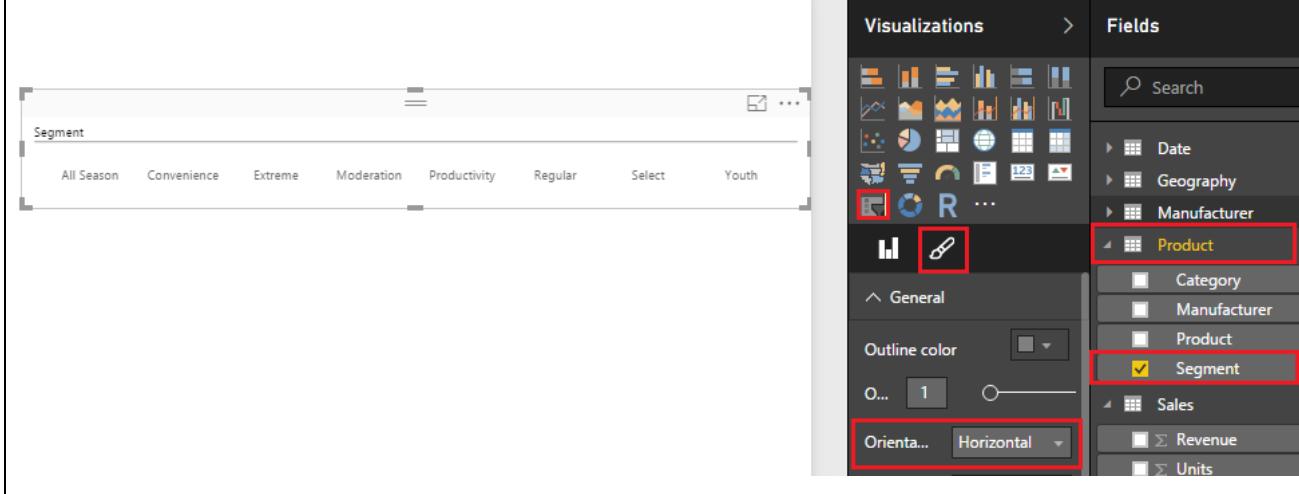
Hover over the visual now and notice the tooltip has both Revenue and Units information.



39. Click in the report canvas. Select the **map** visual from Visualizations.
40. From Fields section, expand **Geography** table and drag and drop **Country** column from **Location** of the map visual as shown in figure.
41. From Fields section, expand **Sales** table and drag and drop **Units** column to **Size** section of the visual.
42. From Fields section, expand **Product** table and drag and drop **Category** column **Legend** section.
43. **Resize** the map as needed.

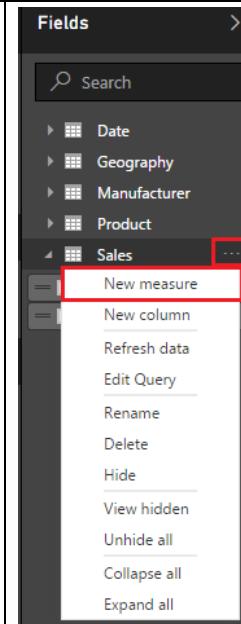


44. Click in the report canvas. Select the **slicer** visual from the Visualizations section.
45. From Fields section, expand Product table and select **Segment** column.
46. Notice this creates a vertical slicer by default. From the **Visualizations** section, select **Format** area (paint brush icon)
47. Expand **General** section.
48. Select **Horizontal** from the **Orientation** drop down. Notice this changes the orientation of the slicer.
49. **Resize** the slicer as needed.



You want the ability to compare current Year to Date sales with the previous year and see if you are doing better or worse. In order to achieve such calculations in Power BI desktop you need to create a Measure using a DAX functions that understand Time calculations such as “Year to Date”, “Month over Month”, “Year over Year” etc.

50. To create a new Measure, from **Fields** section click on the **ellipsis** next to **Sales** table. Select **New Measure**. Notice a formula bar appears.



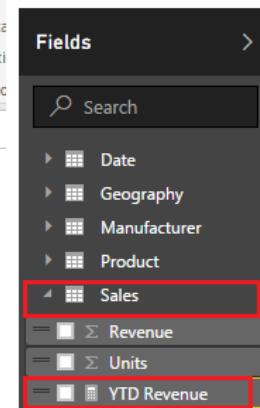
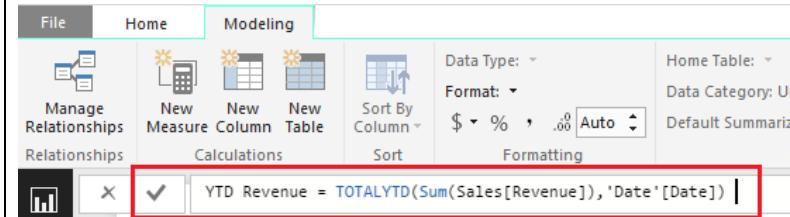
51. In the formula bar enter the following DAX Expression as shown in the figure.

```
YTD Revenue =  
TOTALYTD(Sum(Sales[Revenue]),'Date'[Date])
```

52. Click on the **check mark** next to the formula bar.

You will see the YTD Revenue under Sales table with a special icon which indicates it is a measure (calculator).

This DAX calculation aggregates the value of revenue on a year to date basis.



Similarly, let's create Last Year to Date Revenue measure.

53. Create a **New Measure** in the **Sales** table and enter the following DAX expression.

```
LY YTD Revenue = CALCULATE([YTD Revenue],SAMEPERIODLASTYEAR('Date'[Date]))
```

This DAX expression evaluates the YTD revenue for the previous year in context of the current date so that it's easier to compare the revenue.

To compare the percentage difference in Revenue between the years, you need two additional DAX expressions.

54. Please create the two additional **Measures** in the **Sales** table.

```
YTD Sales Var = [YTD Revenue]-[LY YTD Revenue]
```

```
YTD Sales Var % = DIVIDE([YTD Sales Var],[LY YTD Revenue])
```

These above DAX expressions calculate the YTD revenue difference between a specific year and its previous year and then the percentage Variance.

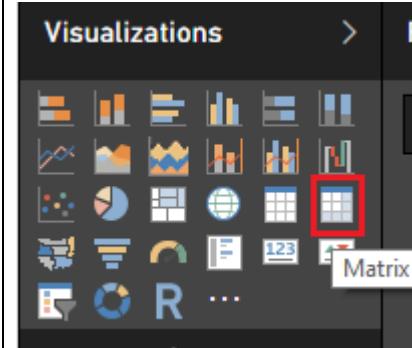
The screenshot shows the Power BI Fields pane. At the top, there is a DAX formula: `LY YTD Revenue = CALCULATE([YTD Revenue],SAMEPERIODLASTYEAR('Date'[Date]))`. Below the formula, the Fields pane lists several columns under the Sales table:

- Date
- Geography
- Manufacturer
- Product
- Sales
  - LY YTD Revenue
  - Revenue
  - Units
  - YTD Revenue
  - YTD Sales Var
  - YTD Sales Var %

The "Sales" table and the "LY YTD Revenue" column are highlighted with red boxes. The "Fields" pane has a header with a back arrow and a right arrow, and a search bar at the top.

Now let's include the **Revenue** and **YTD Revenue** by each month in tabular view for your users.

55. Click in the report canvas. Select the **Matrix** visual in **Visualizations** section.



56. From **Fields** section, expand **Date** table and drag and drop **Month** field to **Rows**.

57. Drag and drop **Year** column from **Date** table to **Columns**.

58. From **Fields** section, expand **Sales** table and drag and drop **Revenue** and **YTD Revenue** to **Values**.

59. Resize the matrix table as needed.

You should see the matrix with the values as shown in the figure. Notice Revenue and YTD Revenue measures needs to be formatted.

Year	2000		2001		
	Month	Revenue	YTD Revenue	Revenue	YTD Re
Jan		\$8,591,953.75	\$8,591,953.75	\$11,487,598.82	\$11,487.5
Feb		\$12,005,864,877,499,999	\$20,597,818,627,500,001	\$14,636,121,597.5	\$26,123,720
Mar		\$19,302,821,252,500,001	\$39,900,639,800,000,003	\$26,061,649,232,500,002	\$52,185,369,649,9
Apr		\$21,383,279,594,999,999	\$61,283,919,475,000,001	\$24,286,824,187.5	\$76,472,191,887.5
May		\$21,927,399,949,999,999	\$83,211,319,424,999,997	\$28,763,971,242.5	\$105,236,7
Jun		\$19,629,833,412,500,001	\$102,841,152,837,500,001	\$23,620,638,684,999,999	\$128,856,80
Jul		\$17,543,802,800,000,001	\$120,384,955,637.5	\$24,438,881,777.5	\$153,295,685,542.5
Aug		\$13,282,120,145	\$133,667,075,782.5	\$16,212,171,705	\$169,507,851
Sep		\$13,090,141,467,499,999	\$146,757,217.25	\$14,817,108,57	\$184,325,767.5
Oct		\$11,562,212,335	\$158,319,429,604,999,999	\$14,912,677,462.5	\$199,238,441.5
Nov		\$11,998,501,652.5	\$170,317,931,257,499,999	\$14,142,957,462.5	\$213,381,40.5
Dec		\$13,008,866,710,000,001	\$183,326,797,967.5	\$16,806,308,675	\$240,187,7.5
Total		\$183,326,797,967.5	\$183,326,797,967.5	\$230,187,709.12	\$230,187.7

Visualizations >		Fields	
<b>Visualizations</b> >		<b>Fields</b>	
		Search	
		<b>Date</b>	
		<input type="checkbox"/> Date	<input checked="" type="checkbox"/> Month
		<input type="checkbox"/> MonthID	<input type="checkbox"/> Quarter
		<input type="checkbox"/> Year	
		<b>Rows</b>	
		<b>Month</b>	
		<b>Columns</b>	
		<b>Year</b>	
		<b>Values</b>	
		<b>Revenue</b>	
		<b>YTD Revenue</b>	
		<b>Filters</b>	
		<b>Sales</b>	
		<input type="checkbox"/> LY YTD Revenue	<input checked="" type="checkbox"/> Revenue
		<input type="checkbox"/> Units	<input checked="" type="checkbox"/> YTD Revenue
		<input type="checkbox"/> YTD Sales Var	<input type="checkbox"/> YTD Sales Var %

Year	2000	2001	2002			
Month	Revenue	YTD Revenue	Revenue	YTD Revenue	Revenue	YTD Re
Jan	\$8,591,953.75	\$8,591,953.75	\$11,487,598.82	\$11,487,598.82	\$12,563,737.125	\$12,563,73
Feb	\$12,005,864,877,499,999	\$20,597,818,627,500,001	\$14,636,121,5975	\$26,123,720,4175	\$17,965,027,010,000,002	\$30,528,764,13501
Mar	\$19,302,821,252,500,001	\$39,900,639,880,000,003	\$26,061,649,232,500,002	\$52,185,369,649,999,999	\$29,093,550,677,499,998	\$59,622,314
Apr	\$21,383,279,594,999,999	\$61,283,919,475,000,001	\$24,286,824,1875	\$76,472,193,837,500,006	\$31,952,564,989,999,998	\$91,574,879,8024!
May	\$21,927,399,949,999,999	\$83,211,319,424,999,997	\$28,763,971,2425	\$105,236,165,08	\$35,895,093,799,999,997	\$127,469,973,602!
Jun	\$19,629,833,412,500,001	\$102,841,152,875,0001	\$23,620,638,684,999,999	\$128,856,803,765	\$29,251,673,482,500,002	\$156,721,647,085!
Jul	\$17,543,802,800,000,001	\$120,384,955,6375	\$24,438,881,7775	\$153,295,685,542,499,999	\$27,597,077,8825	\$184,318,724
Aug	\$13,282,120,145	\$133,667,075,7825	\$16,212,171,705	\$169,507,857,2475	\$22,620,828,5425	\$206,939,553,509!
Sep	\$13,090,141,467,499,999	\$146,757,217,25	\$14,817,908,57	\$184,325,765,8175	\$16,478,942,595,000,001	\$223,418,496,104!
Oct	\$11,562,212,355	\$158,319,429,604,999,999	\$14,912,677,465	\$199,238,443,2825	\$17,553,490,5	\$240,971,986,604!
Nov	\$11,998,501,6525	\$170,317,931,257,499,999	\$14,142,957,4625	\$213,381,400,745	\$16,719,698,904,999,999	\$257,691,685,509!
Dec	\$13,008,866,710,000,001	\$183,326,797,9675	\$16,806,308,375	\$230,187,709,12	\$20,146,079,862,500,001	\$277,837,765
Total	<b>\$183,326,797,9675</b>	<b>\$183,326,797,9675</b>	<b>\$230,187,709,12</b>	<b>\$230,187,709,12</b>	<b>\$277,837,765,3725</b>	<b>\$277,837,765</b>

60. From **Fields** section, expand **Sales** table and select **Revenue** field.

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

62. Similarly, format **YTD Revenue** measure.

Matrix visual is very bland, let's format it so it is easy to read.

63. With the Matrix visual highlighted, from **Visualizations** section, select **Format** (paint brush icon).

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

65. Click on the drop down next to **Alternate background color** and pick a lighter shade of gray.

66. Collapse **Values** section and expand **Totals** sections.

67. Click on the drop down next to **Background color** to set it to a shade of cyan.

68. Collapse **Totals** section and expand **Grid** section.

69. Using the slider enable **Vert grid**.

Table visual should look similar to the screenshot.

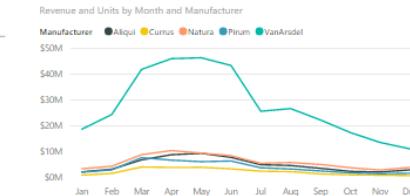
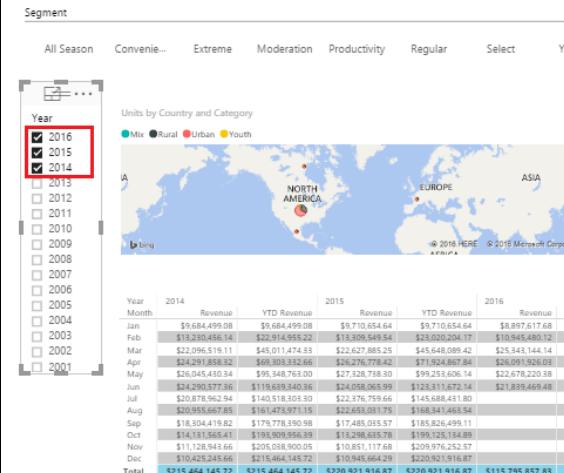
Year	2000			2001			2002		
	Month	Revenue	YTD Revenue	Revenue	YTD Revenue	Revenue	YTD Revenue		
Jan	\$8,591,953.75	\$8,591,953.75	\$11,487,598.82	\$11,487,598.82	\$12,563,737.13	\$12,563,737.13			
Feb	\$12,005,864.88	\$20,597,818.63	\$14,636,121.60	\$26,123,720.42	\$17,965,027.01	\$30,528,764.14			
Mar	\$19,302,821.25	\$39,900,639.88	\$26,061,649.23	\$52,185,369.65	\$29,093,550.68	\$59,622,314.81			
Apr	\$21,383,279.59	\$61,283,919.48	\$24,286,824.19	\$76,472,193.84	\$31,952,564.99	\$91,574,879.80			
May	\$21,927,399.95	\$83,211,319.42	\$28,763,971.24	\$105,236,165.08	\$35,895,093.80	\$127,469,973.60			
Jun	\$19,629,833.41	\$102,841,152.84	\$23,620,638.68	\$128,856,803.77	\$29,251,673.48	\$156,721,647.09			
Jul	\$17,543,802.80	\$120,384,955.64	\$24,438,881.78	\$153,295,685.54	\$27,597,077.88	\$184,318,724.97			
Aug	\$13,282,120.14	\$133,667,075.78	\$16,212,171.71	\$169,507,857.25	\$22,620,828.54	\$206,939,553.5			
Sep	\$13,090,141.47	\$146,757,217.25	\$14,817,908.57	\$184,325,765.82	\$16,478,942.60	\$223,418,496.1			
Oct	\$11,562,212.36	\$158,319,429.60	\$14,912,677.46	\$199,238,443.28	\$17,553,490.50	\$240,971,986.6			
Nov	\$11,998,501.65	\$170,317,931.26	\$14,142,957.46	\$213,381,400.75	\$16,719,698.90	\$257,691,685.5			
Dec	\$13,008,866.71	\$183,326,797.97	\$16,806,308.38	\$230,187,709.12	\$20,146,079.86	\$277,837,765.37			
Total	<b>\$183,326,797.97</b>	<b>\$183,326,797.97</b>	<b>\$230,187,709.12</b>	<b>\$230,187,709.12</b>	<b>\$277,837,765.37</b>	<b>\$277,837,765.37</b>			

Year	2000			2001			2002		
	Month	Revenue	YTD Revenue	Revenue	YTD Revenue	Revenue	YTD Revenue		
Jan	\$8,591,953.75	\$8,591,953.75	\$11,487,598.82	\$11,487,598.82	\$12,563,737.13	\$12,563,737.13			
Feb	\$12,005,864.88	\$20,597,818.63	\$14,636,121.60	\$26,123,720.42	\$17,965,027.01	\$30,528,764.14			
Mar	\$19,302,821.25	\$39,900,639.88	\$26,061,649.23	\$52,185,369.65	\$29,093,550.68	\$59,622,314.81			
Apr	\$21,383,279.59	\$61,283,919.48	\$24,286,824.19	\$76,472,193.84	\$31,952,564.99	\$91,574,879.80			
May	\$21,927,399.95	\$83,211,319.42	\$28,763,971.24	\$105,236,165.08	\$35,895,093.80	\$127,469,973.60			
Jun	\$19,629,833.41	\$102,841,152.84	\$23,620,638.68	\$128,856,803.77	\$29,251,673.48	\$156,721,647.09			
Jul	\$17,543,802.80	\$120,384,955.64	\$24,438,881.78	\$153,295,685.54	\$27,597,077.88	\$184,318,724.97			
Aug	\$13,282,120.14	\$133,667,075.78	\$16,212,171.71	\$169,507,857.25	\$22,620,828.54	\$206,939,553.5			
Sep	\$13,090,141.47	\$146,757,217.25	\$14,817,908.57	\$184,325,765.82	\$16,478,942.60	\$223,418,496.1			
Oct	\$11,562,212.36	\$158,319,429.60	\$14,912,677.46	\$199,238,443.28	\$17,553,490.50	\$240,971,986.6			
Nov	\$11,998,501.65	\$170,317,931.26	\$14,142,957.46	\$213,381,400.75	\$16,719,698.90	\$257,691,685.5			
Dec	\$13,008,866.71	\$183,326,797.97	\$16,806,308.38	\$230,187,709.12	\$20,146,079.86	\$277,837,765.37			
Total	<b>\$183,326,797.97</b>	<b>\$183,326,797.97</b>	<b>\$230,187,709.12</b>	<b>\$230,187,709.12</b>	<b>\$277,837,765.37</b>	<b>\$277,837,765.37</b>			

Your team will most likely be interested only in performance in recent years.

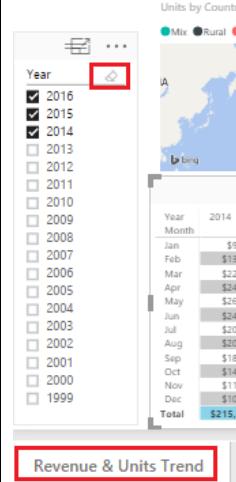
70. By default, a slicer is single select. To enable multi select, highlight **Year slicer**.
71. From **Visualizations** section, select **Format** (paint brush icon).
72. Expand **Selection Controls**.
73. Turn **Single Selection Off** by moving the slider bar.
74. In the **Year slicer** select the years **2014, 2015 and 2016**. Notice all the visuals update to reflect the selection.

## VanArsdel Revenue and Unit share comparison with competitors



The screenshot shows the "Visualizations" pane on the right side of the Power BI interface. It includes sections for General, Selection Controls, Header, Items, and Title. Under "Selection Controls", the "Single S..." option is highlighted with a red box and set to "Off". Other options like "Select All" and "Revert to default" are also visible.

75. Clear the **Year** slicer by clicking on the clear selections icon on the top right of the slicer.
76. Double click on the **Page1** at the bottom of the screen and change the name "**Revenue & Units Trend**".



77. Select the map where the title is **Units by Country and Category**. Let's change this to Unit Share by Country and Category.
78. Click on the **brush** in the Visualizations pane for formatting.
79. Expand **Title** section. Change Title text to **Unit Share by Country and Category**
80. Click on the **center alignment** shown in the figure.

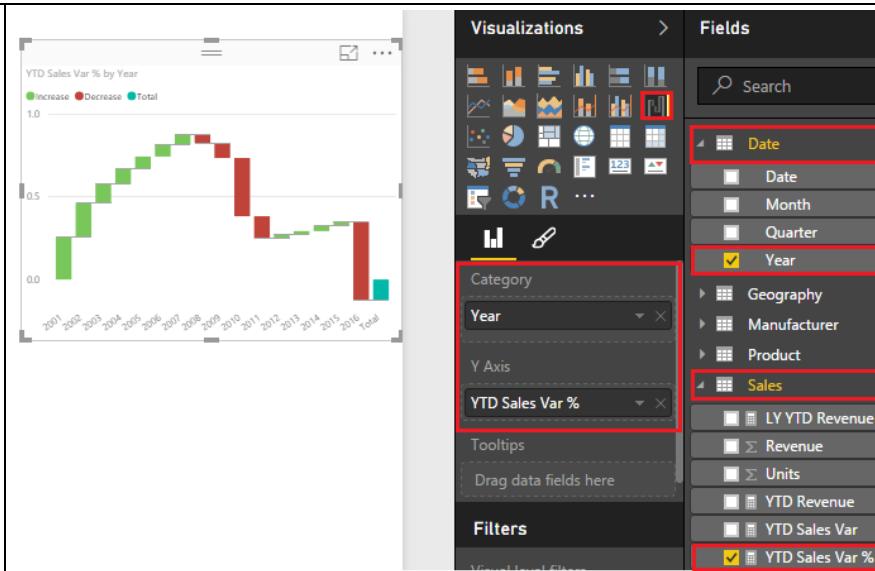
Explore selecting the various slicers, specific manufacturer from the legend in the line chart and see how the various values change interactively.

81. Resize the matrix so that it's half the width so that the matrix is just below the map visual.
82. **Clear all the slicer selections** from both slicers by selecting the "**Clear selections**" icon in the slicer.
83. Click in the **whitespace** to the right of the matrix and select the **waterfall** visual from the Visualizations pane.

The screenshot shows the Power BI desktop application. On the left, there is a world map titled "Unit Share by Country and Category". The map includes a legend with four categories: Mix (teal), Rural (black), Urban (red), and Youth (yellow). The map displays data for North America, Europe, and Asia. On the right, the "Visualizations" pane is open, showing a grid of icons for different visual types. A red box highlights the "Waterfall" icon in the bottom row. To the right of the map, the "Format" pane is open, showing settings for the map visual. A red box highlights the "Title Text" field, which is currently set to "Unit Share by ...". Other settings visible in the Format pane include "Font color", "Background color", "Alignment" (set to center), and "Text Size" (set to 8 pt).

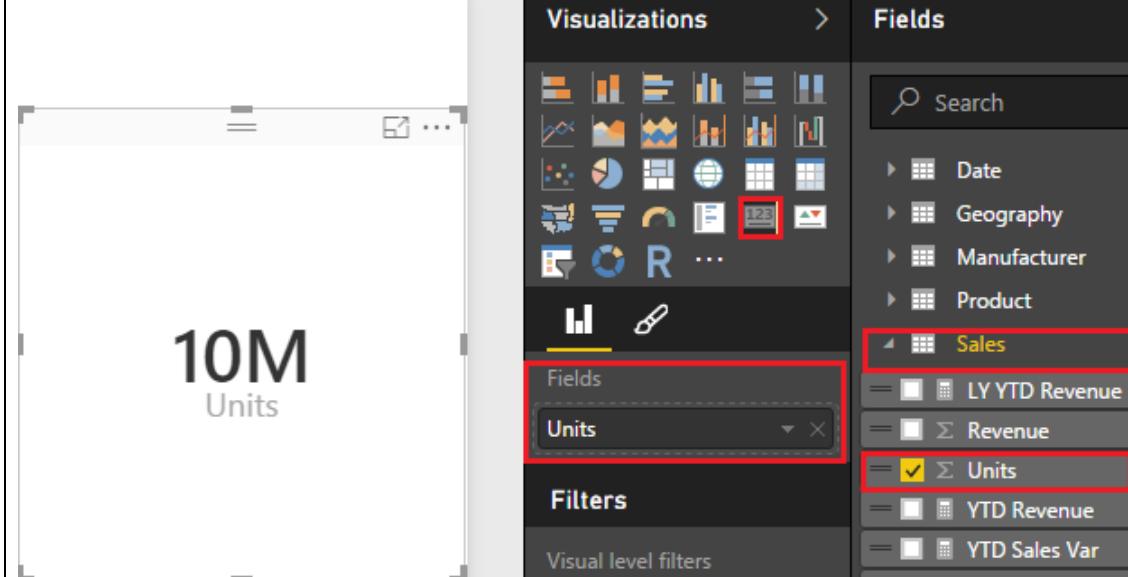
84. Resize and move the waterfall visual below the line chart visual.
85. From **Fields** section, drag and drop **Year** column from **Date** table to **Category** as shown in the figure.
86. From Fields section, drag and drop the **YTD Sales Var %** to **Y axis**

You will see the percentage variance YoY increase or decrease.



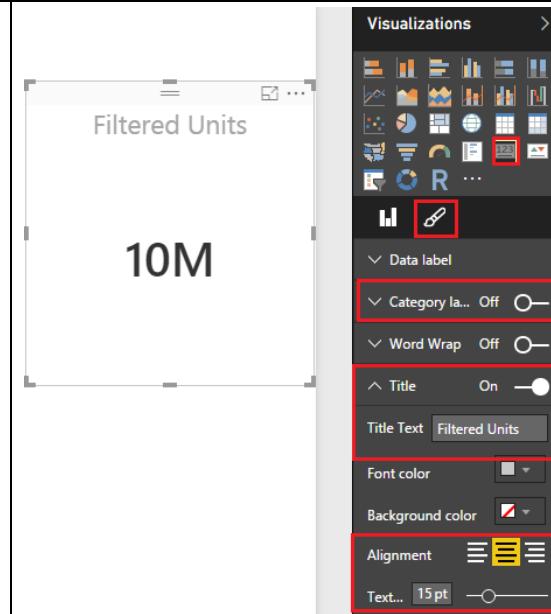
**Cards** visual is used to display a single piece of data. Let's add two cards to the report to show the number of units sold. One card will show the number of units sold depending on the slicers that are selected. The second card will be set to always display the global number of units irrespective of the slicer selection.

87. Click on the **whitespace** in the canvas.
88. Click on the **Card** visual in **Visualizations** section.
89. From the **Fields** section, expand **Sales** table and select **Units** column.



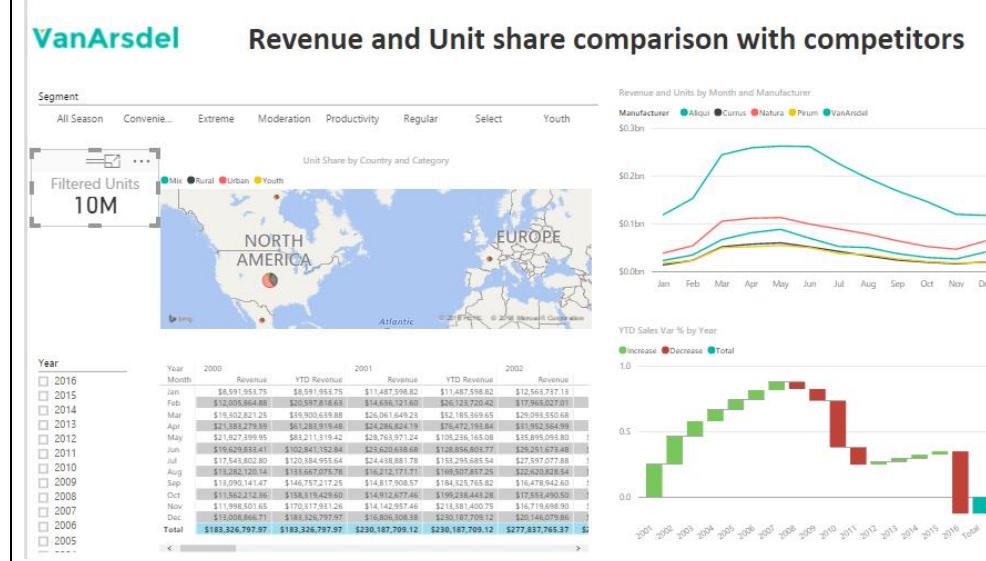
Let's remove the label underneath the number and add a title to the card.

90. Click on the **brush** in the Visualizations pane for formatting.
91. Set **Category label** to **Off**.
92. **Expand** Title section.
93. Set **Title** to **On**.
94. Enter the **Title Text** "**Filtered Units**".
95. Set Alignment to **Center**.
96. Set **Text Font** to size **15 pt**.



97. **Resize** and move the card under company logo. You will need to resize and move Year slicer down the report.

This card will always show data that reflects the slicer selection.



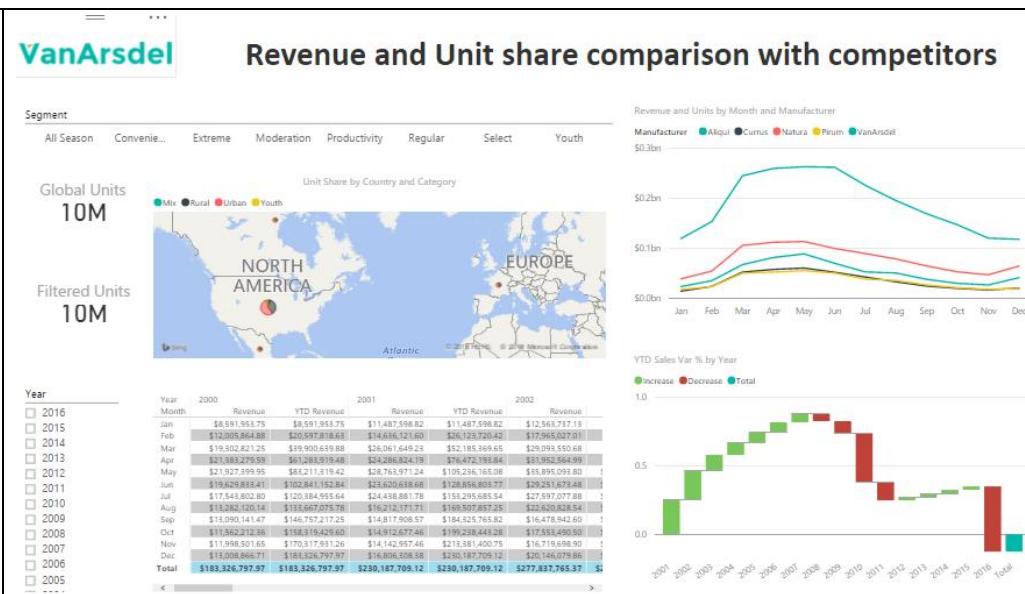
Let's create the card that will always show the global number of units sold.

98. Select **Filtered Units** card visual and use **Ctrl+C** to copy.

99. Click on the **whitespace** in the canvas. Use **Ctrl+V** to paste the visual.

100. Change the **title** of the pasted visual to "**Global Units**".

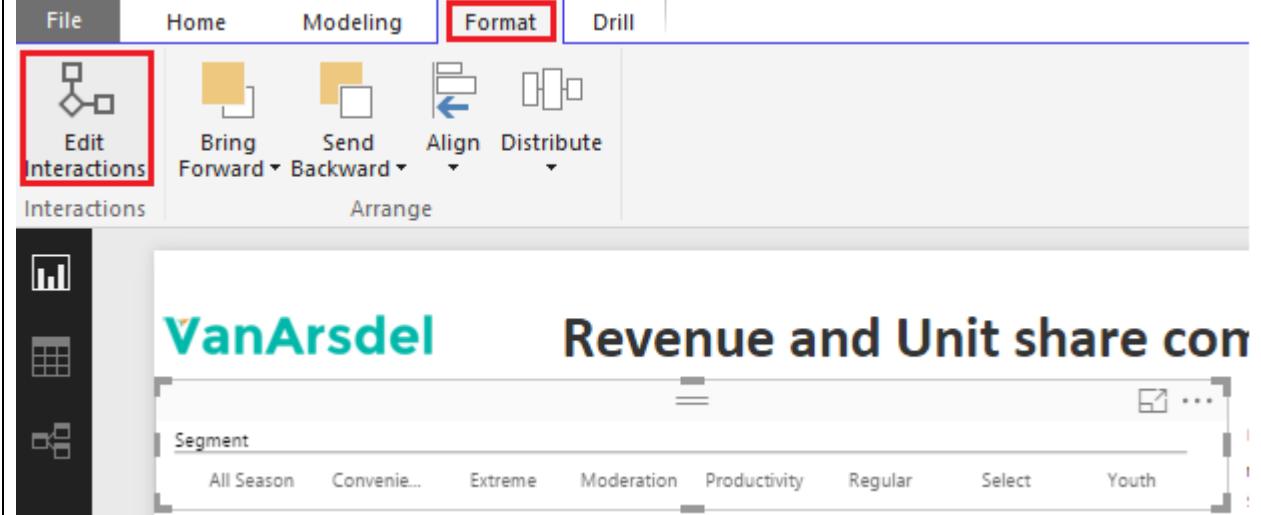
101. Resize and move the card underneath company logo. You'll need to move Filtered Units card and Year slicer down the report.



The Global Units card should always show the total number of units sold for each year, regardless of Segment slicer selection. Power BI Desktop enables users to control how specific slicers interact with charts on a report via Edit Interactions.

102. Select Segment slicer.

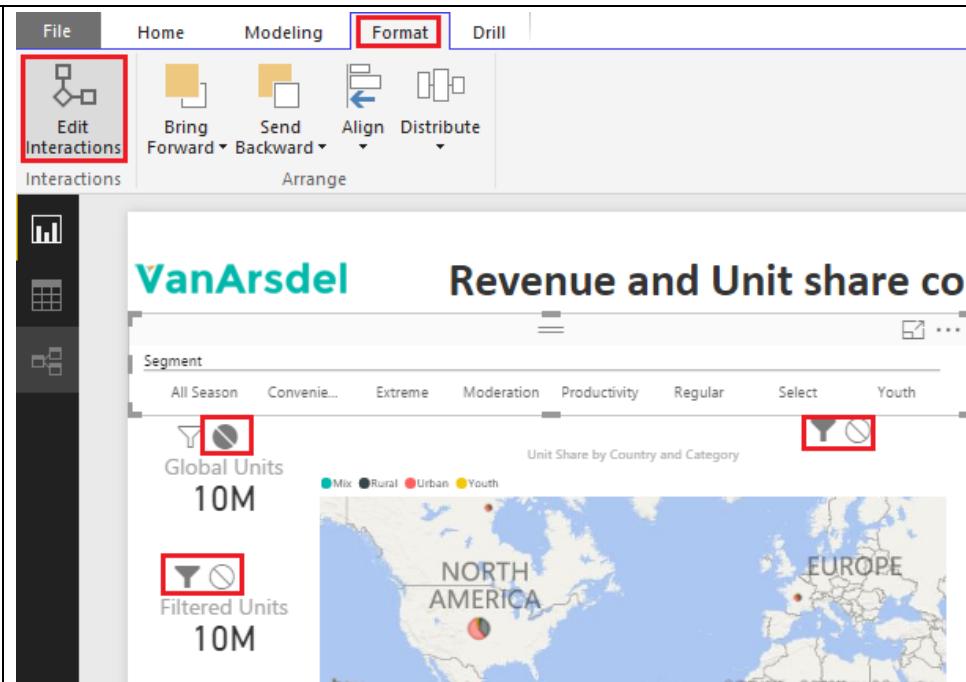
103. From the ribbon select **Format -> Edit Interactions**.



Notice two icons appear on the top right corners of all the other visuals in the report. One is the **filter icon**, which is selected by default. This means that the visual will be filtered based on the slicer selection. Second is a **none icon**. Selecting this icon will make the visual not interact with the slicer.

104. Select None for the **Global Units card**.
105. Click on **Edit Interactions** again to turn off Edit Interactions view.

You can apply similar interaction for the Year slicer or any of the other visuals.

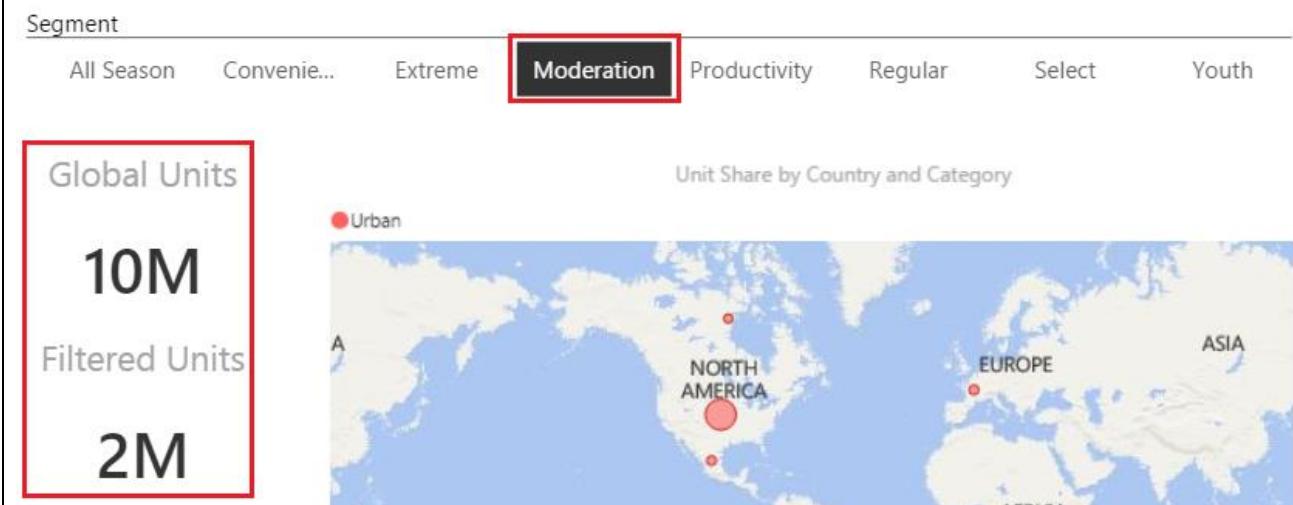


106. From the **Segment** slicer, select **Moderation**.

Notice that the value of Global Units did not change. Global Units will always show the total units sold for all Segments.

Notice the value of Filtered Units changed. Filtered Units will show the number of units sold for the selected Segment.

107. From the **Segment** slicer, de-select **Moderation**.



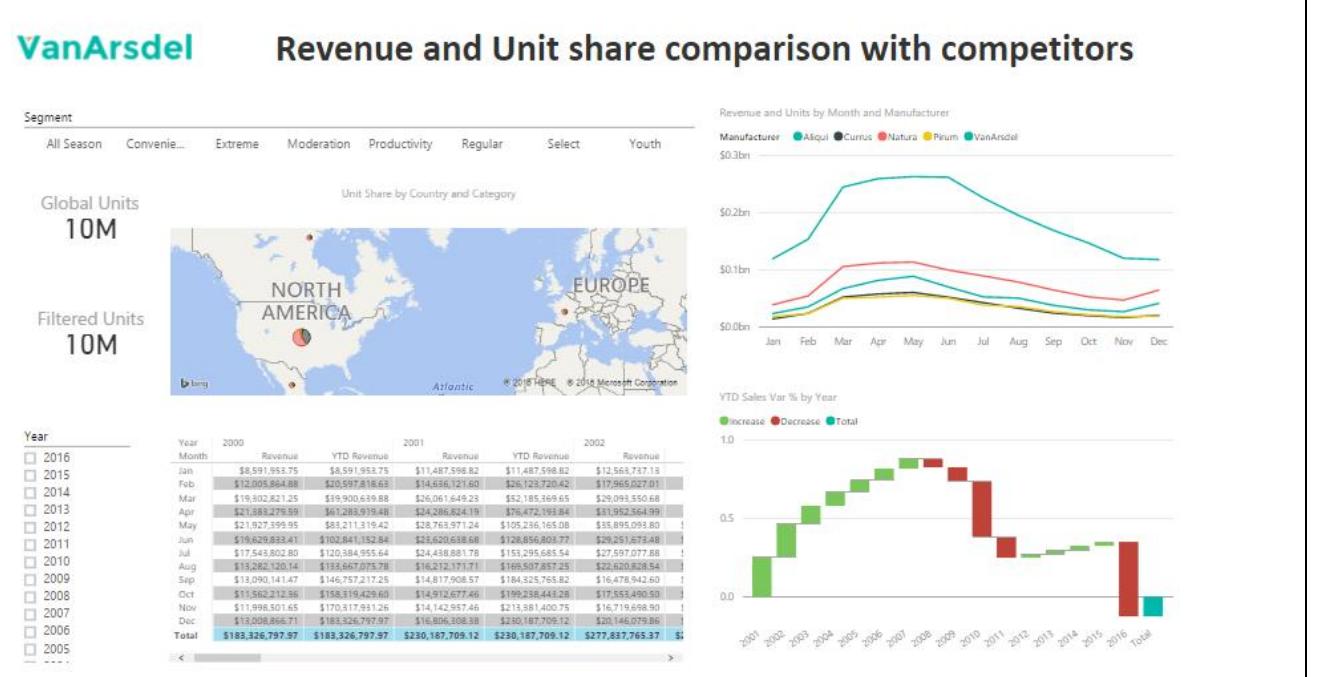
Now that we have built all the visuals that we like to display on the report, let's format the report.

### 108. Resize the Map, Line, Matrix and Waterfall charts so that they are approximately the same size.

109. Increase the height of the Line chart so that it fills more of the space on the page.

110. Resize Segment slicer so that it fits above the Map chart.

111. Resize Logo, Year slicer, Global Units and Filtered Units cards so that they are approximately the same width.



Let's make sure that the charts are aligned with each other.

112. Press **Ctrl** key on the keyboard and select **Map and Matrix** charts.

113. From the ribbon, select **Format** -> **Align** -> **Align Left**.

Similarly align the remainder of the charts so that they are evenly and neatly spaced in the report.

The screenshot shows the Microsoft Power BI ribbon with the 'Format' tab selected. In the 'Arrange' group, the 'Align' button is highlighted with a red box. A dropdown menu is open, showing options: Align Left (highlighted with a red box), Align Center, Align Right, Align Top, Align Middle, and Align Bottom. Below the ribbon, there is a chart titled 'Global Units 10M' and a map titled 'Unit Share by Country and Category'. At the bottom, there is a table with data for years 2000, 2001, and 2002.

Year	2000	2001	2002
Month	Revenue	YTD Revenue	Revenue
Jan	\$8,591,953.75	\$8,591,953.75	\$11,487,598.82
Feb	\$12,005,864.88	\$20,597,818.68	\$16,123,720.42
Mar	\$19,302,821.25	\$39,900,639.88	\$26,061,649.23
Apr	\$21,383,279.59	\$61,283,919.48	\$24,286,824.19
May	\$21,927,399.95	\$83,211,319.42	\$28,763,971.24
			\$105,236,165.08
			\$35,895,093.80

Now we have the model and report ready, we want to add security around it, so that individuals from a USA view only USA data and individuals from Mexico view only Mexico data and so forth.

114. From the ribbon select **Modeling** ->

**Manage Roles**.

115. Manage roles dialog opens. Click on **Create** button.

116. Name the role as **US Role**.

117. Click on the **ellipsis** next to **Geography**.

118. Select **Add Filter** -> **[Country]**.

The screenshot shows the 'Manage roles' dialog in Power BI. In the 'Roles' section, 'US Role' is selected. In the 'Tables' section, 'Geography' is selected. A 'Table Filter DAX Expression' dialog is open, containing the expression '[Country] = "USA"'. The 'Add filter...' button in this dialog is highlighted with a red box.

Notice a DAX Expression appears in the text area.

119. Edit the DAX Expression to **[Country] = "USA"**.

120. Click on the **check mark** on the top right corner. This will validate the DAX expression.

The screenshot shows the 'Manage roles' dialog in Power BI. In the 'Roles' section, 'US Role' is selected. In the 'Tables' section, 'Geography' is selected. A 'Table Filter DAX Expression' dialog is open, containing the expression '[Country] = "USA"'. The checkmark icon in the top right corner of this dialog is highlighted with a red box.

Similarly add roles for Mexico, Canada and France using the following DAX Expressions.

Mexico Role	<b>[Country] = "Mexico"</b>
Canada Role	<b>[Country] = "Canada"</b>
France Role	<b>[Country] = "France"</b>

121. Once you add all the roles, click on **Save** button.

Manage roles

Roles

- Canada Role
- France Role
- Mexico Role
- US Role

Tables

- Date
- Geography
- Manufacturer
- Product
- Sales
- Sentiment

Table Filter DAX Expression

```
[Country] = "Canada"
```

Filter the data that this role can see by entering a DAX filter expression that returns a True/False value. For example: [Entity ID] = "Value"

Save Cancel

Power BI Desktop provides the capability to validate the roles you created. This helps us view the reports as a different role and make sure it's formatted right for that role.

122. From the ribbon, select **Modeling** -> **View As Roles**.

123. View as roles dialog appears. Select **Mexico Role**.

124. Click **OK**.

File Home Modeling

Relationships Calculations Sort Sort By Column Sort By Column

Data Type: Data Category: Uncategorized Default Summarization: Do Not Summarize Properties Security

Manage Roles View As Roles

View as roles

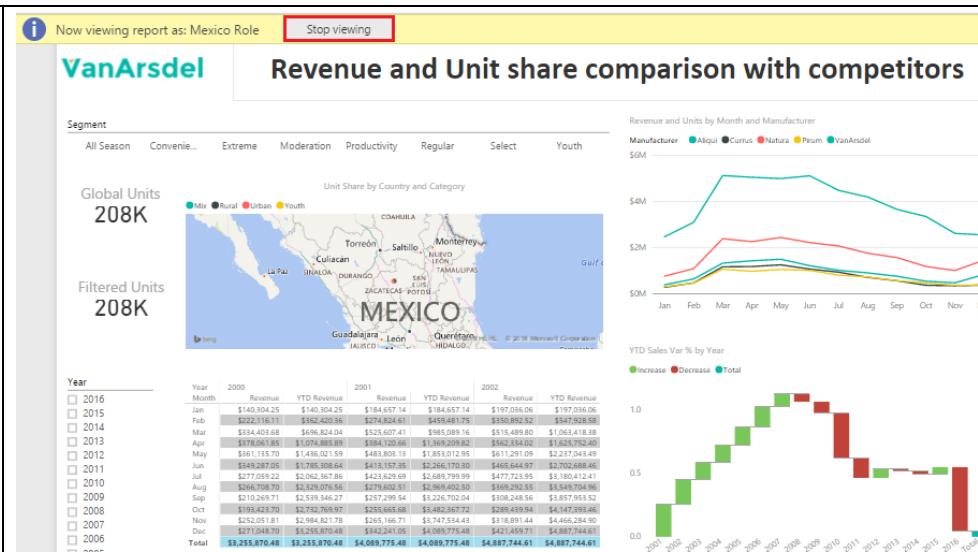
None  
 Other user  
 Canada Role  
 France Role  
 Mexico Role  
 US Role

OK Cancel

Notice now you are viewing as a person with Mexico Role would view.

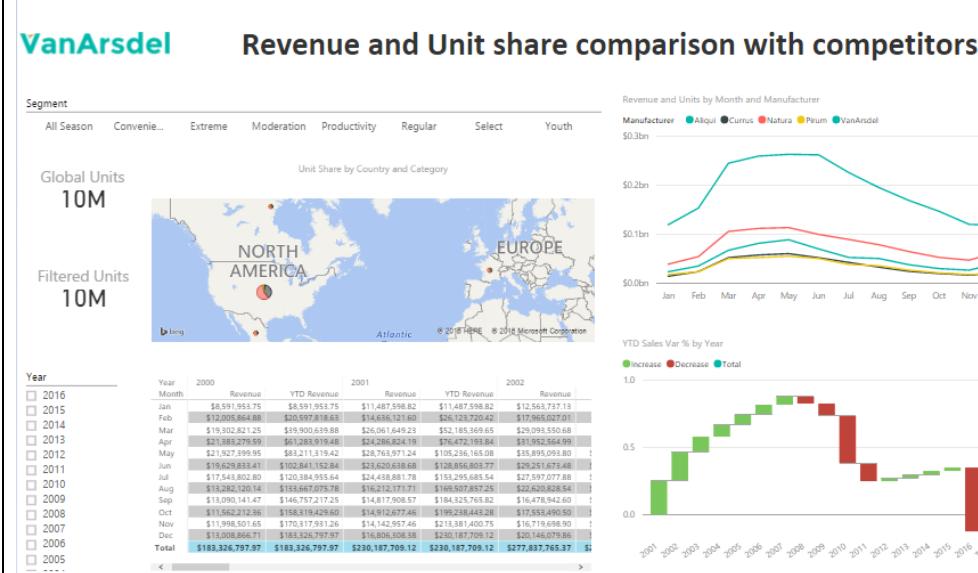
**125. Click on Stop viewing to exit Mexico Role view.**

We will add users to these roles once we publish the model to Power BI Service.



**126. Collapse the Visualizations and Filters pane by clicking on the arrows**

**127. Your report should look as shown in the figure. Save the file.**



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 – Part I

You will now leverage the report authored using Power BI Desktop and create a dashboard for VanArsdel data analysis team and finally share it to the CMO. We have been given a Power BI Desktop file with additional reports / views of Sales information. Please use this for the next two sections of the lab.

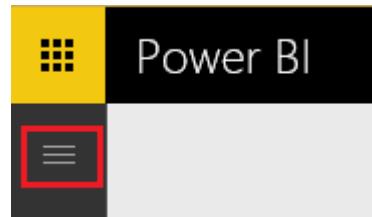
### Power BI Service - Creating Dashboard and uploading your Report

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.
4. Click on **Power BI** in the upper left corner.

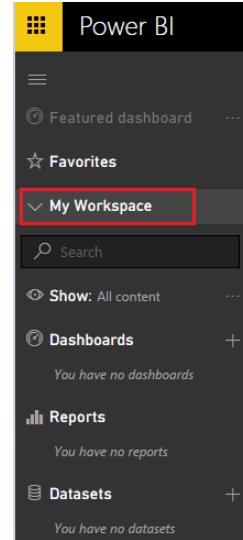
The screenshot shows the 'Welcome to Power BI' page. At the top, there is a navigation bar with icons for settings, download, help, and sign-in. Below the navigation bar, the title 'Welcome to Power BI' is displayed in large bold letters. A sub-header reads 'You're on your way to exploring your data and monitoring what matters. Let's start by getting some data.' A link 'Need more guidance? Try this tutorial' is provided. The page is divided into several sections: 'Content Pack Library' (with 'My organization' and 'Services' options), 'Import or Connect to Data' (with 'Files' and 'Databases' options), and a central area with a large 'Get started' button.

5. This will display  icon below Power BI in the top left. Click on the icon. This will take you to “**My Workspace**”

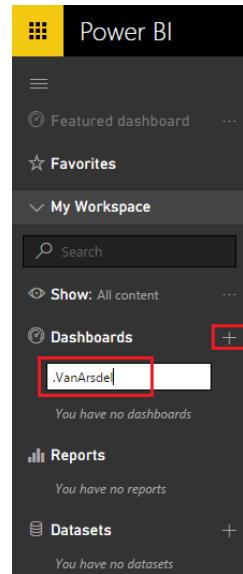
**Note:** If you have previously signed into Power BI, then your screen will look different. You will be directly navigated to your Workspace skipping the Welcome page.



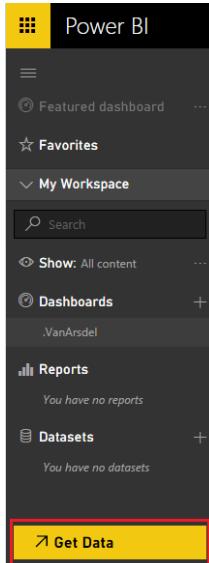
**My Workspace** is selected by default and below that you will see Dashboards, Reports and Datasets as shown in the figure.



6. Create a dashboard by clicking the + icon next to Dashboards.  
7. Enter “[.VanArsdel](#)” in the text box as shown in the figure.



8. Click on the **Get Data** at the bottom left to import your Power BI Desktop file.



9. In the Get Data page, Click **Get** icon below the Files section as shown in the Figure.

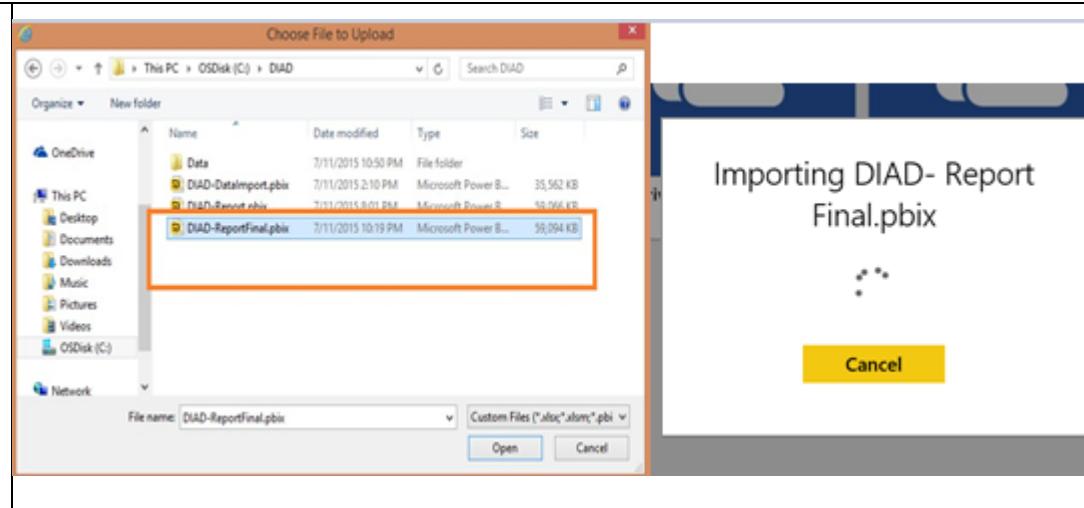
The screenshot shows the 'Get Data' page. At the top right, there is a link to 'Try this tutorial' or 'watch a video'. Below this, there are two main sections: 'Content Pack Library' and 'Import or Connect to Data'. The 'Import or Connect to Data' section contains four cards: 'My organization', 'Services', 'Files', and 'Databases'. The 'Files' card has a yellow 'Get' button with a red box around it, indicating it should be clicked. The other three cards also have 'Get' buttons.

10. Select **Local File** as shown in the Figure.

The screenshot shows the 'Get Data > Files' page. On the left is a sidebar with options: 'My Workspace', 'Content Pack Library', 'Import or Connect to Data', and 'Databases & More'. Under 'Import or Connect to Data', there are three items: 'My organization', 'Services', and 'Samples'. The 'Files' item is highlighted with a red box. To the right of the sidebar, there are three cards: 'Local File' (highlighted with a red box), 'OneDrive - Business', and 'OneDrive - Personal'. Each card has a cloud icon above its name.

11. Browse to **\DIAD\Reports** folder.
12. Select the Power BI Desktop file **DIAD – Report Final.pbix** and click **Open**.

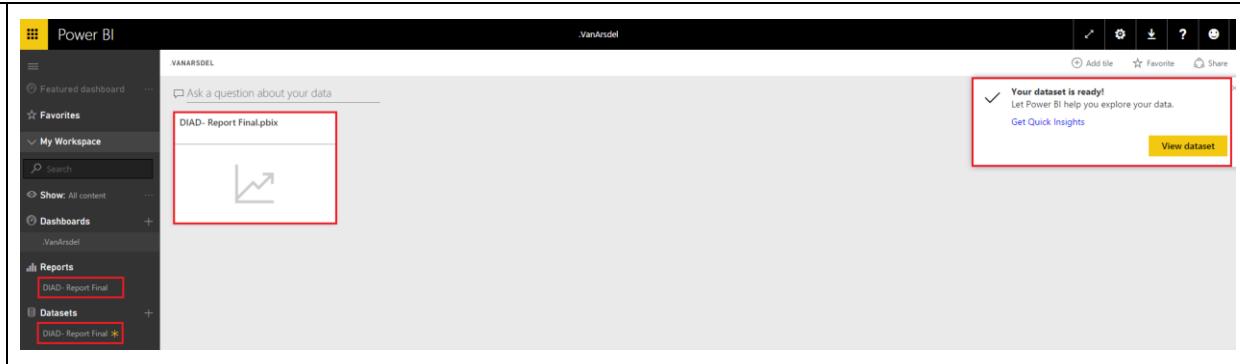
You will see the upload status as shown in the figure. Upload might take a few minutes based on bandwidth and network connectivity.



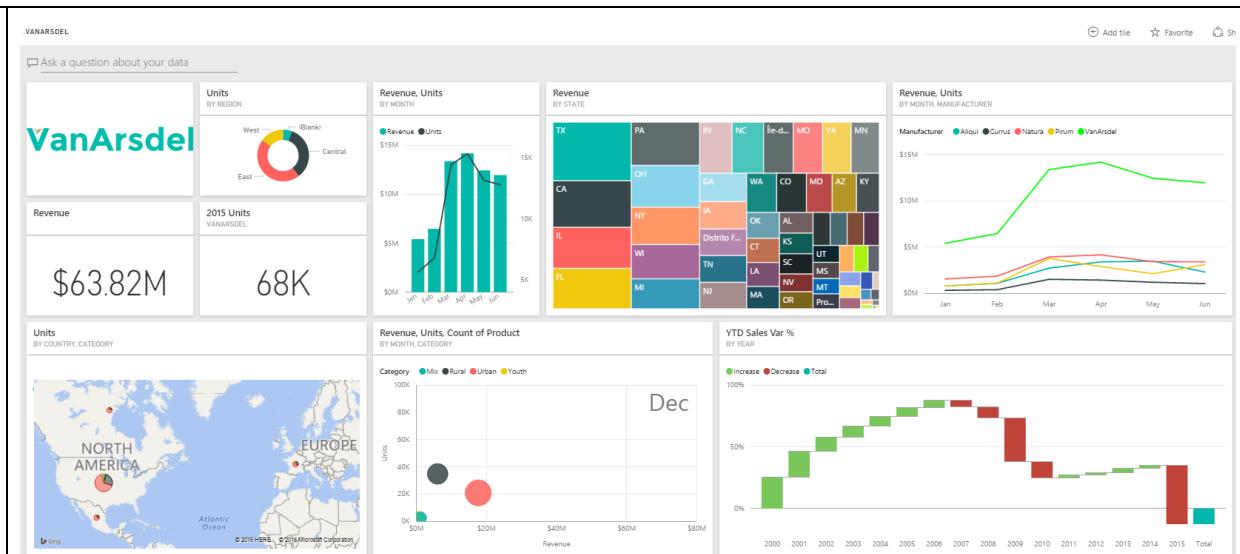
## Power BI Service - Operational Dashboard and Sharing

You will see a message on the top right indicating the data set is ready for use. You will see a tile with the name of the file on the dashboard.

The service extracted the data model and reports that were part of the Power BI Desktop file and added separate entries under Reports and Datasets as shown in the Figure.



In this section we will create a dashboard that will help compare VanArsdel's performance over the years and also compare VanArsdel's performance with the competitors. At the end of the section, we will create a dashboard that looks like this

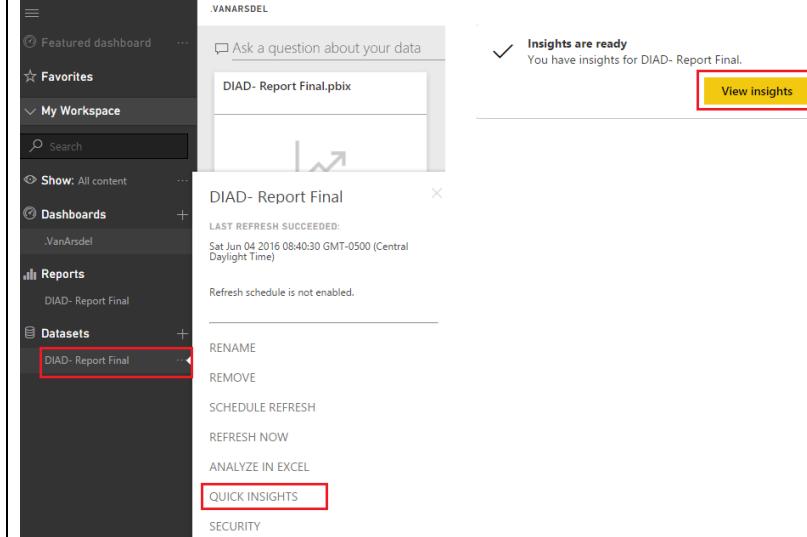


Once the dataset is loaded, Power BI provides an option to get quick insights into the data.

1. In the left panel, under **Datasets**, hover over **DIAD- Report Final** and click on the **ellipsis**.
2. 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.

3. Select **View insights**.



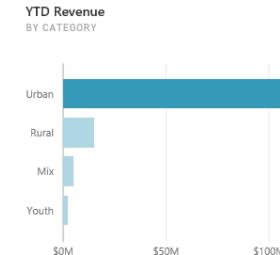
A quick insights report is displayed based on the dataset. This provides insights into data you may have missed and also helps to get a quick start with creating dashboards.

Hovering over each report provides an option to Pin it to a dashboard.

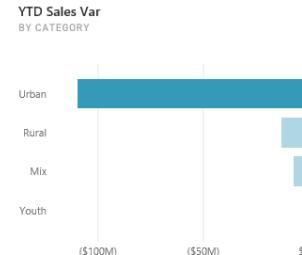
We will talk about pinning to dashboard in the next few steps.

## Quick Insights for DIAD- Report Final

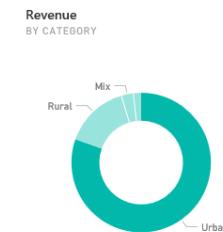
A subset of your data was analyzed and the following insights were found. [Learn more](#)



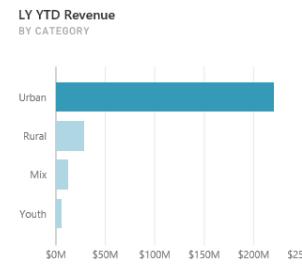
CATEGORY OUTLIERS  
'Urban' has noticeably more 'YTD Revenue'.



CATEGORY OUTLIERS  
'Urban' has noticeably less 'YTD Sales Var'.



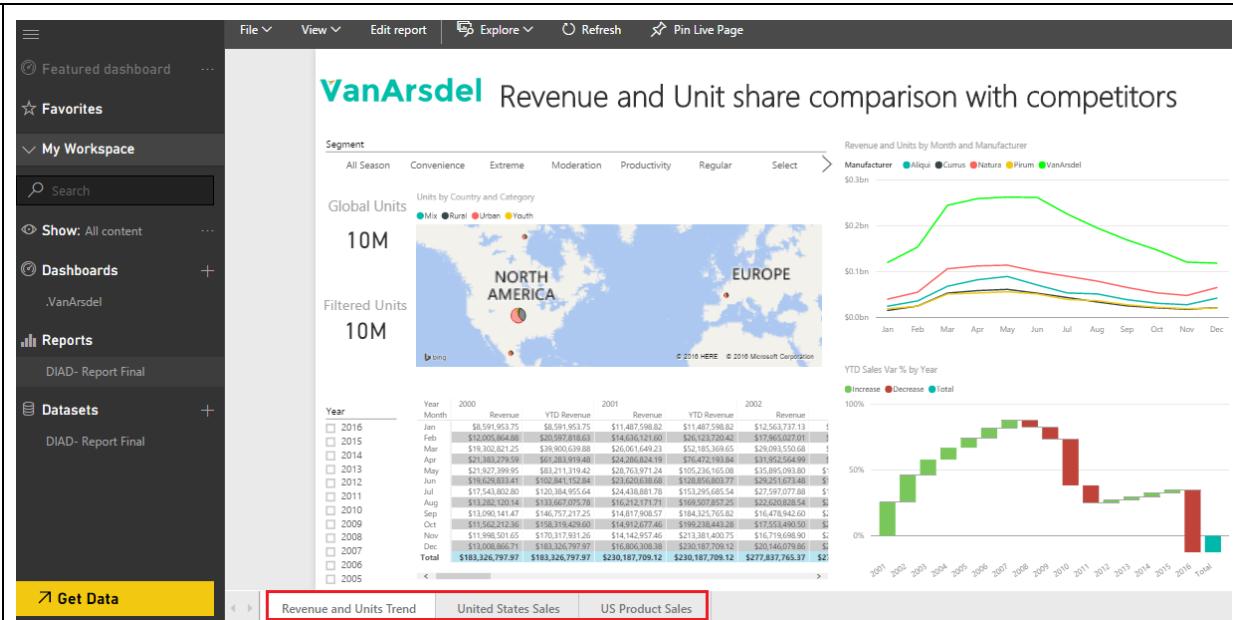
MAJORITY  
'Urban' accounts for the majority of 'Revenue'.



CATEGORY OUTLIERS  
'Urban' has noticeably more 'LY YTD Revenue'.

To create an operational dashboard, you need to open the report and select visuals that provide metrics to the organization.

4. From the left panel, select **Dashboards -> .VanArsdel** to navigate back to the dashboard
5. Click on the **tile** of the report (DIAD – Report Final.pbix) that now appears on your dashboard.
6. You will see the **entire report open** and you will see the three report pages.

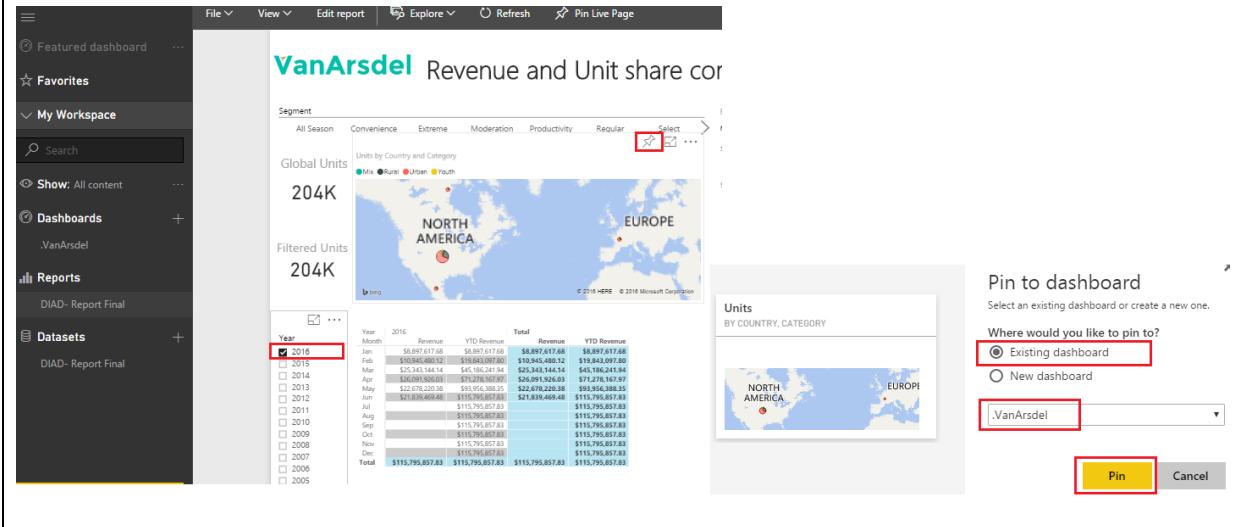


Let's add tiles to the dashboard.

7. Select the year **2016** in the Year slicer.
8. Select the **map** visual or Hover over the map visual and you will see a pin icon as shown in the Figure. The pin icon will appear for each visual you would like to pin to the dashboard.
9. Click on the **Pin** icon of the map.

This brings up a dialog box which asks you to select which Dashboard you would like to pin the Visual.

By default Power BI selects the last selected Dashboard, **.VanArsdel**. There is an option to

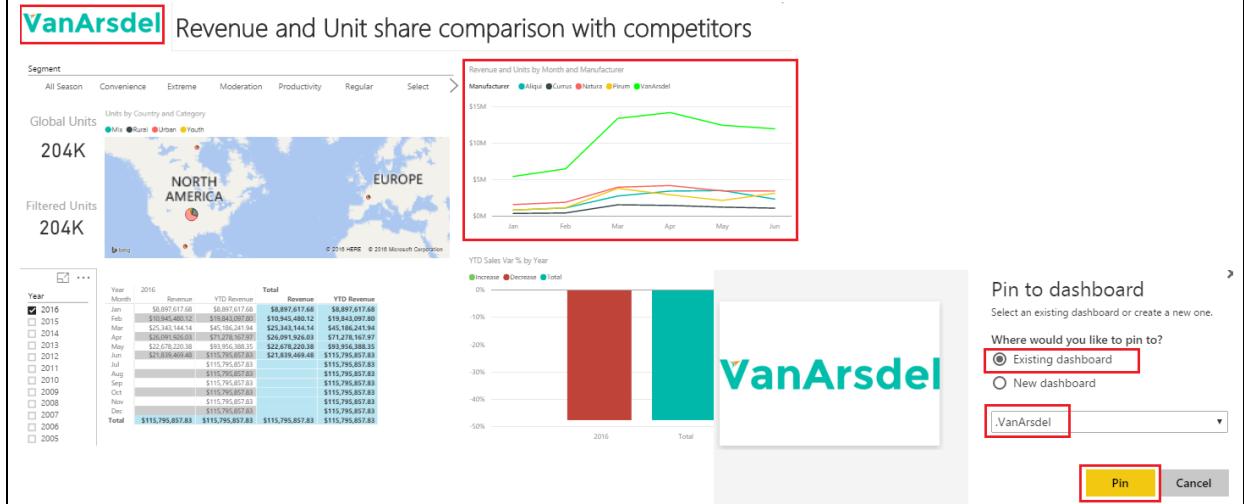


create a new dashboard and select another dashboard.

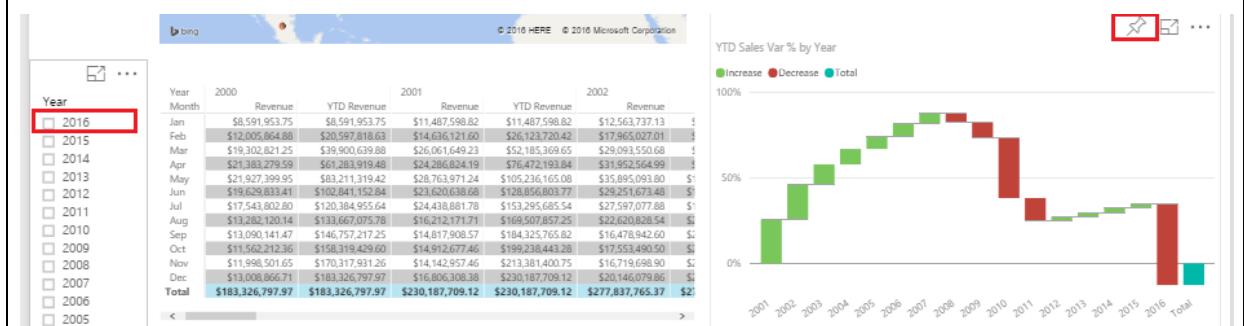
**10. Select .VanArsdel dashboard.** Once pinning is successful a confirmation dialogue displays.

**11. Hover over the logo of **.VanArsdel** and click on the Pin icon and repeat step **Select 10.****

**12. Hover over the **Linechart** visual and click on the Pin icon and repeat step **10.****



**13. Clear the 2016 selection in the slicer, select the waterfall visual and click pin and repeat Step 10.**

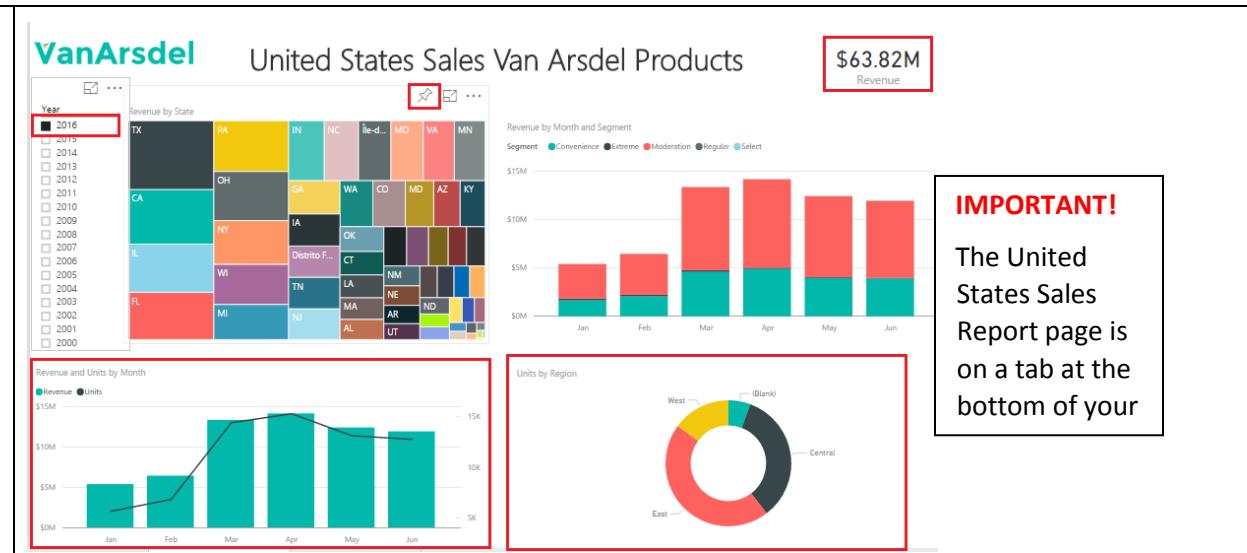


14. Navigate to **United States Sales report** page as shown in the figure.

15. Select the year **2016** in the slicer.

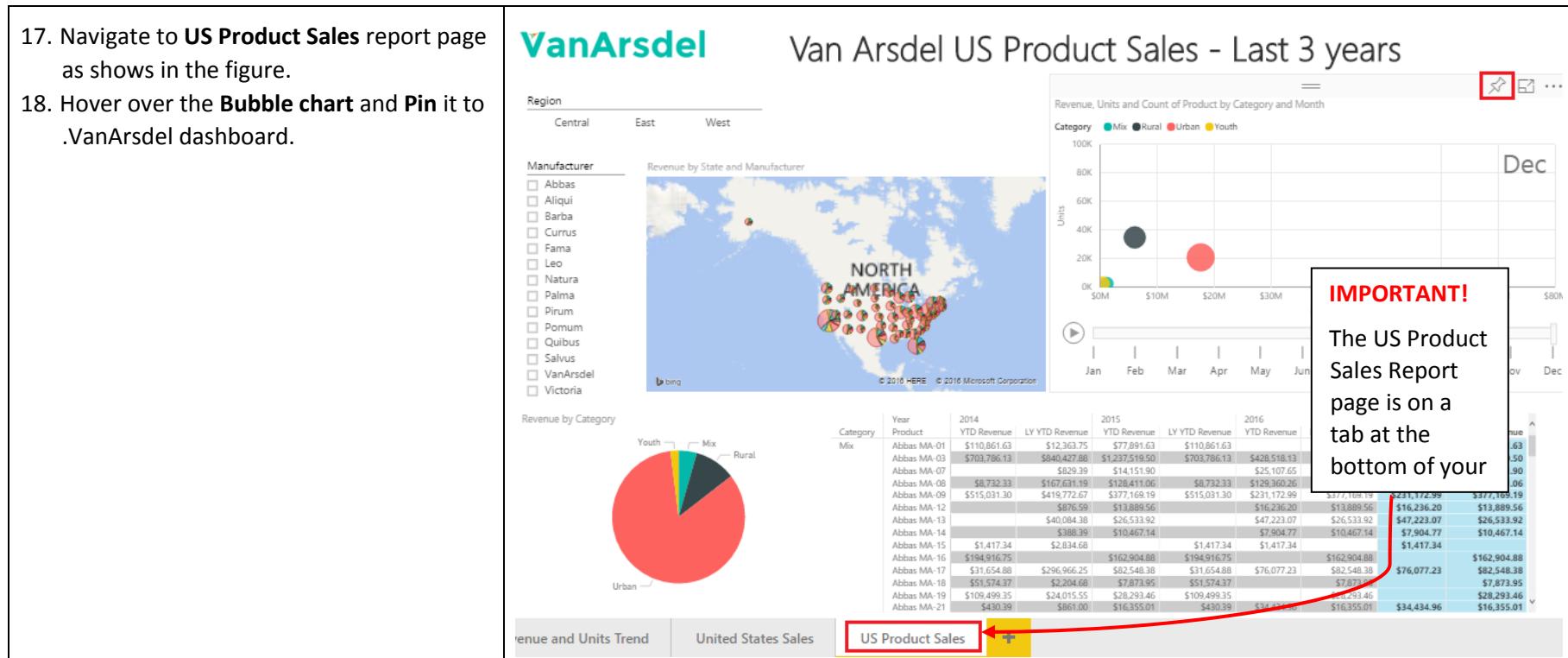
16. Pin the following visuals:

- **Tree map**
- **Card** showing the United States revenue
- **Combo Chart** of revenue and units
- **Donut Chart**

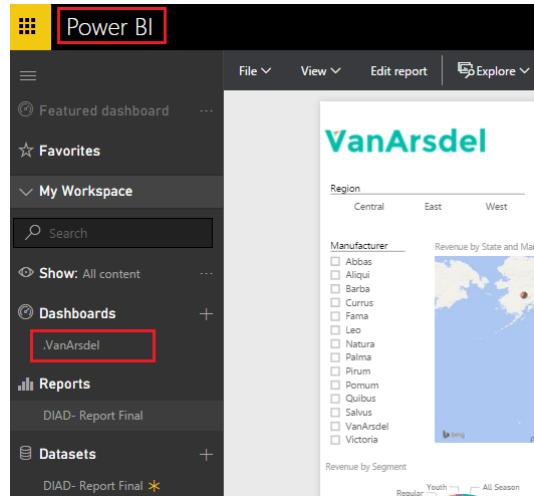


17. Navigate to **US Product Sales** report page as shows in the figure.

18. Hover over the **Bubble chart** and **Pin it** to .VanArsdel dashboard.



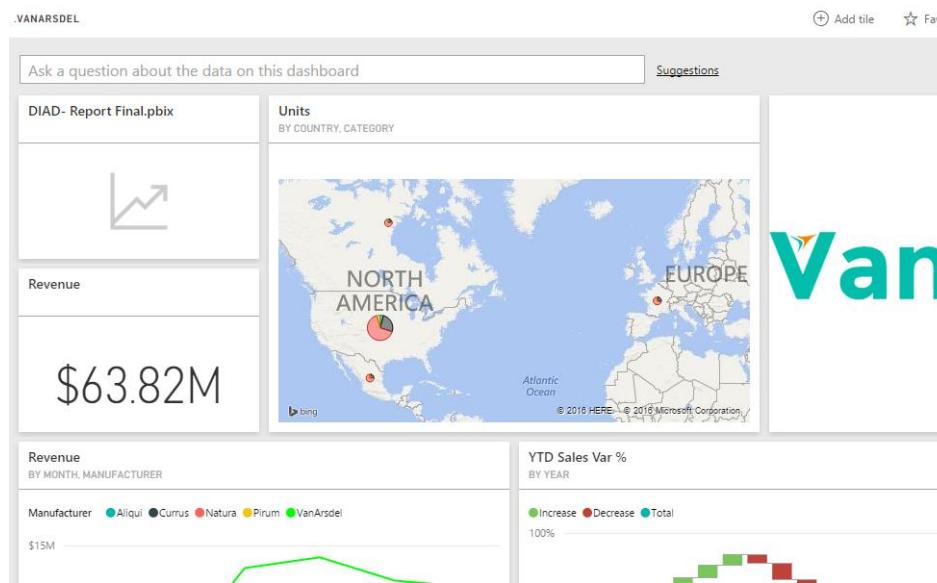
19. Click on **Power BI** on the top left hand corner of your browser window or on **.VanArsdel dashboard** to get back to the dashboard.



You will see the visuals on the dashboard similar to 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 of the data model changed.

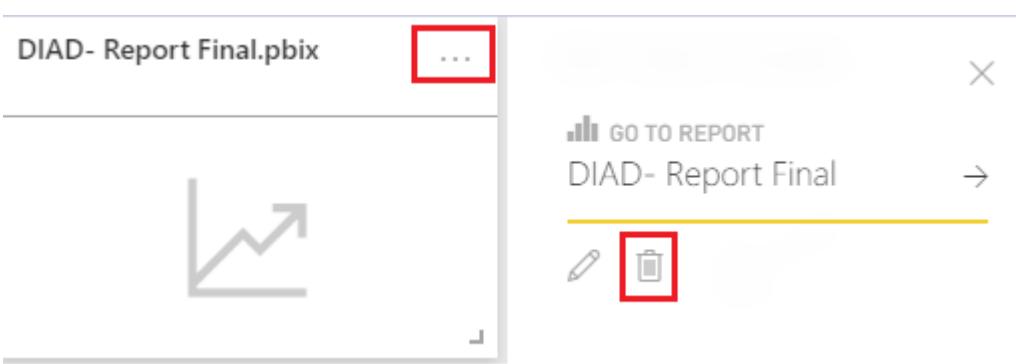
We will organize the dashboard for the team now.



We do not need the default report tile that was created.

20. Highlight **DIAD-Report Final.pbix** tile and click on the **ellipsis** on the top right corner.

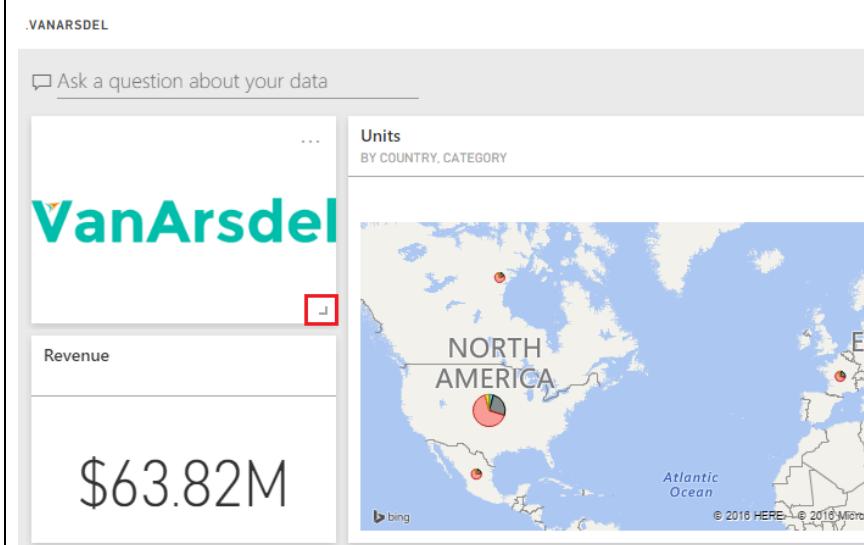
21. Click on the **delete** icon.



22. Select and move the **logo image visual** to the top left corner.

23. Select the **bottom right corner** of the visual and move it diagonally to change the image to a **small**.

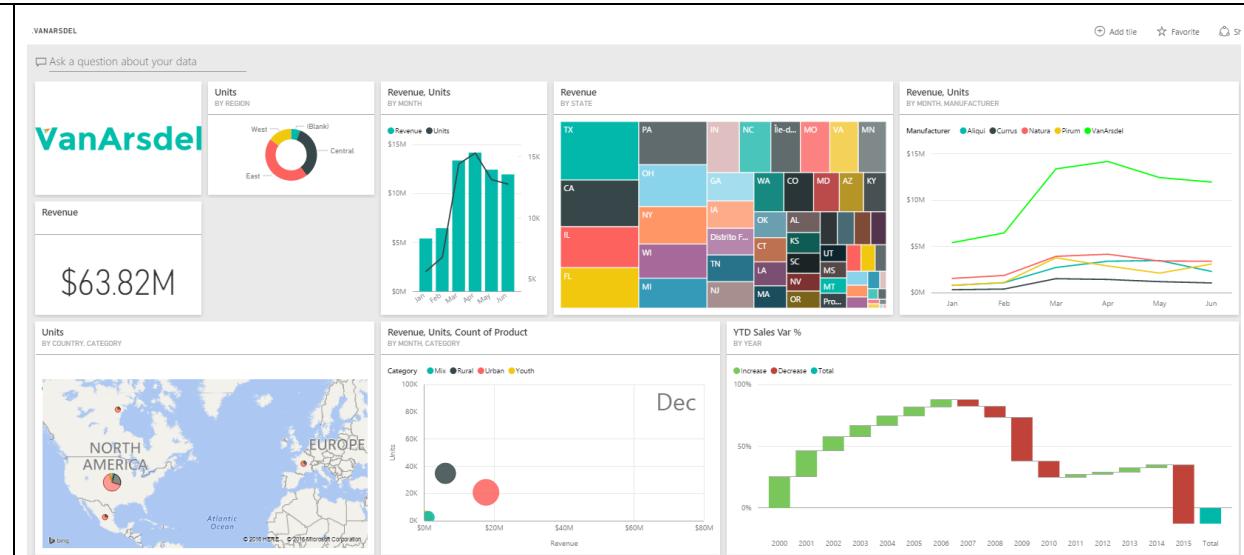
Tiles can be of **various sizes (1x1 to 5x5)**. Drag the tile using the bottom right corner to resize.



24. Change the tile size and organize the dashboard as shown in the Figure.

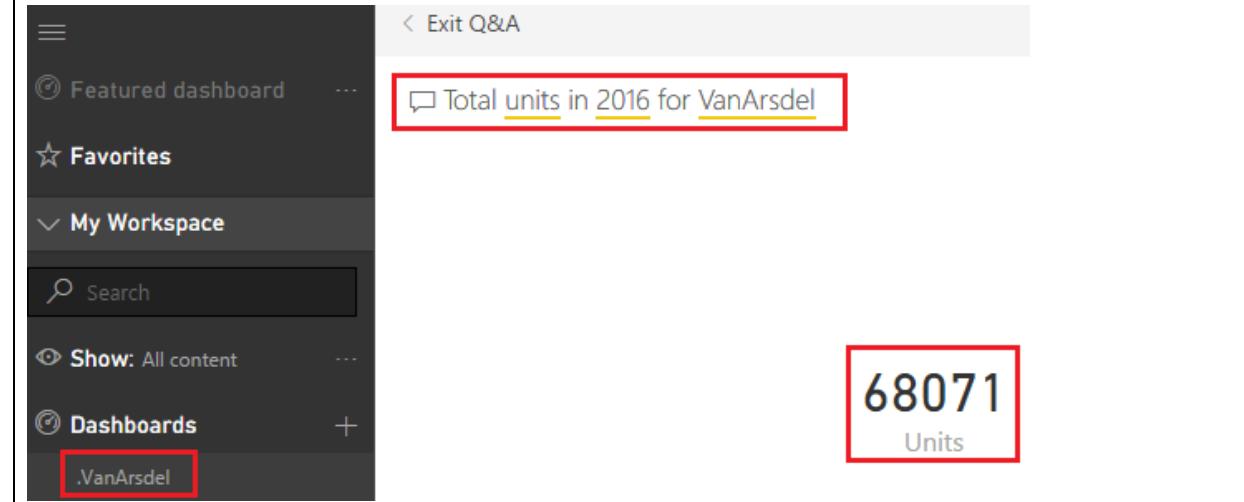
The top row contains data about VanArsdel for the year 2016 while the bottom row contains the industry trend and competitors' revenue.

**Note:** The tiles can be of various sizes.



25. Power BI supports asking questions against your data. Type “**Total units in 2016 for VanArsdel**” in the box below the dashboard name as shown in the figure.

You will see the total units sold shown as a card. Power BI also shows how it translated your request.



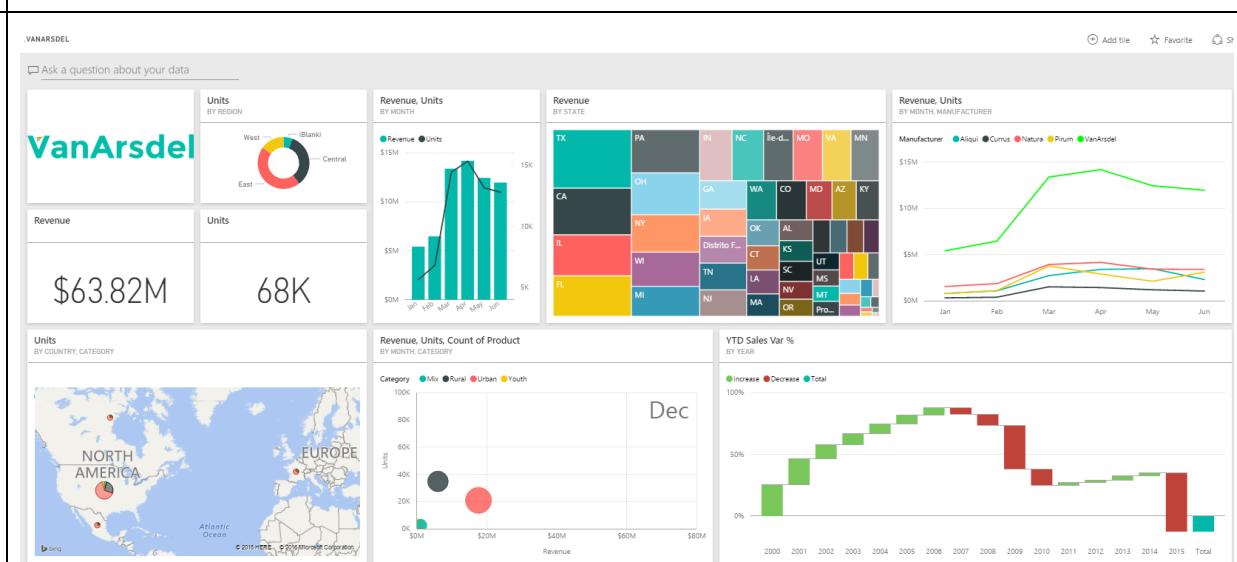
Remember we had created a **synonym** for **units called quantity**. We can utilize the synonym feature to perform natural language query.

26. Type “**Total quantity in 2016 for VanArsdel**” in the query box as shown in the figure. Notice it is able to interpret quantity as units and provide the same result.
27. Click on the **pin icon** on the right corner next to the box to pin the value to your dashboard. Notice in the Pin dialog total units is rounded to 68K. Pin the visual to .VanArsdel dashboard.
28. Click on the < **Exit Q&A** or Power BI or the dashboard name to get to the dashboard

The screenshot shows the Power BI Q&A interface. In the top-left, there's a text input field with the query "Total quantity in 2016 for VanArsdel". To the right of the input is a red-bordered "Pin visual" icon. Below the input, a large blue rectangular tile displays the value "68071" with the word "Units" above it. To the right of this tile is another smaller blue rectangular tile displaying "68K". On the far right, a vertical sidebar lists "Fields", "Visualizations", and "Filters". A "Pin to dashboard" dialog box is open, asking "Where would you like to pin to?", with the radio button selected for "Existing dashboard". The dropdown menu shows ".VanArsdel". At the bottom right of the dialog are "Pin" and "Cancel" buttons, with the "Pin" button also highlighted with a red border.

The units sold in 2016 will be pinned to the dashboard.

29. **Reorganize** the tiles on the dashboard so that your dashboard looks like the figure.



You can hover over a tile to edit it.

30. Hover over the newly created **Unit** tile and click on the ellipsis on the top right corner.

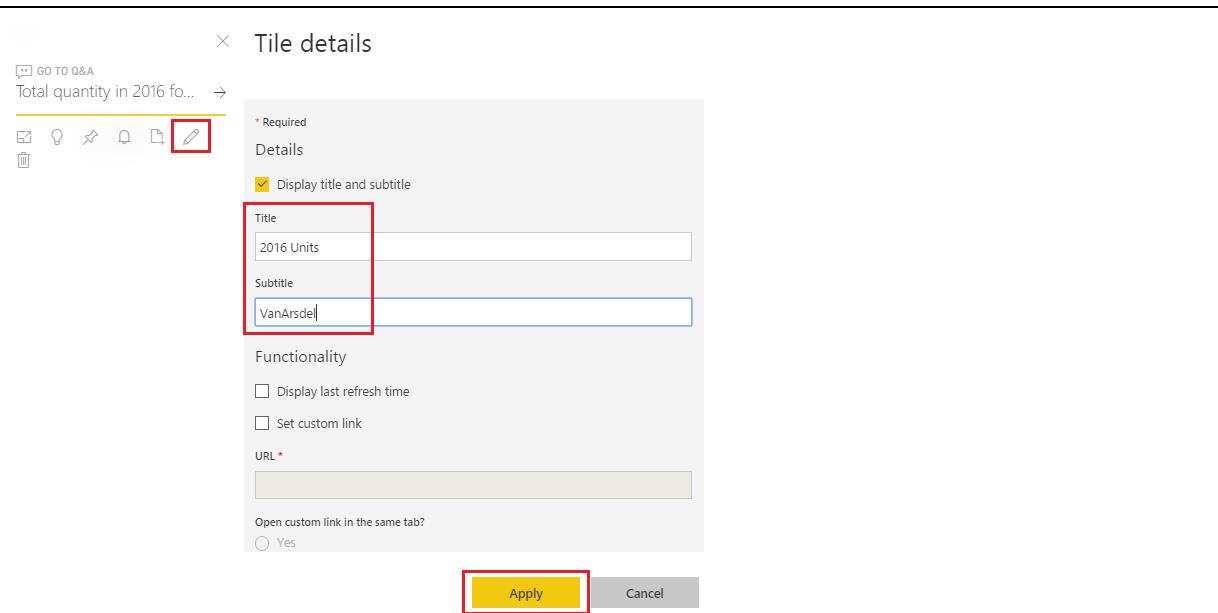
31. Select the **pen** icon. Notice Tile Details dialog opens on the right.

32. Change the title to **2016 Units**.

33. Add a Subtitle as **VanArsdel**.

34. Click **Apply**. Notice the changes are applied to the tile.

If you click on a tile, it takes you directly to the underlying report. If you accidentally click, you can get back to the dashboard by clicking on the dashboard name on the navigation pane or by clicking on **Power BI** on the top left.

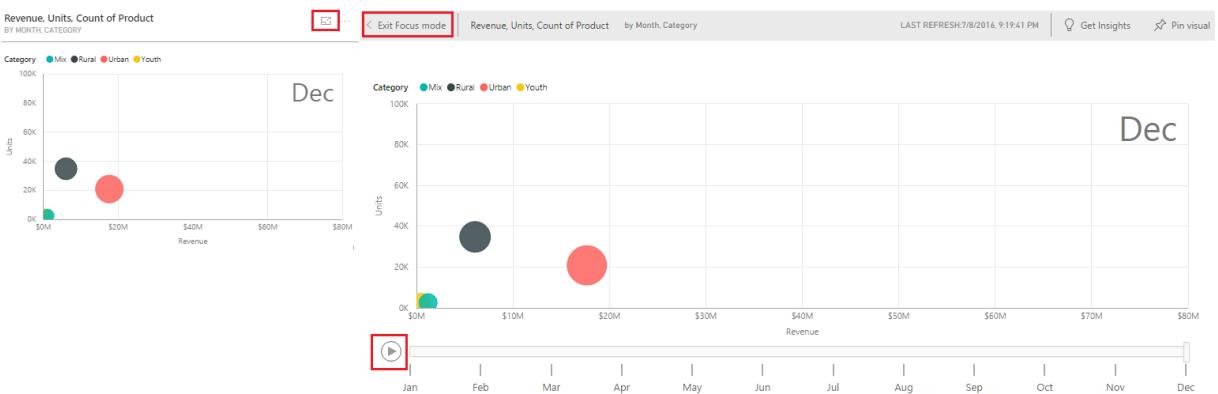


35. Hover over the **bubble chart** tile and click on the in **focus mode** icon.

36. This pops out the bubble chart. Click on the **play axis** on the bottom left of the screen. This plays the sales performance across states by month.

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

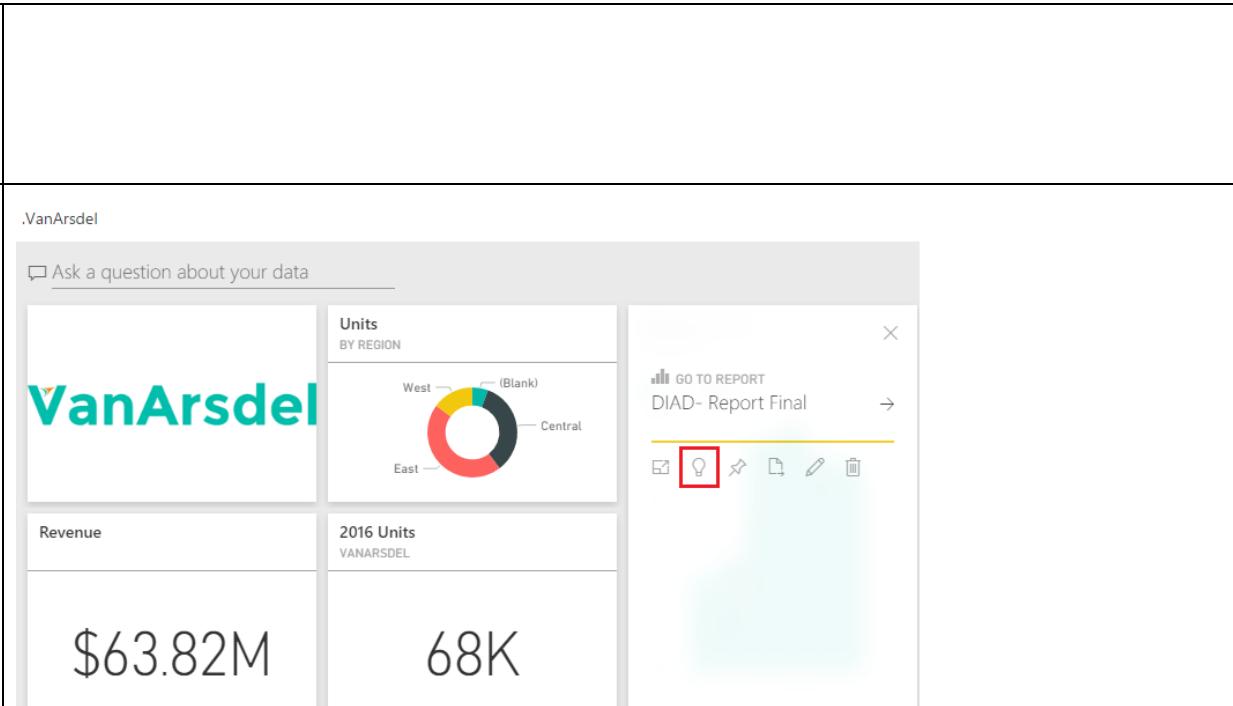
Note: Tiles pinned to dashboard are not interactive. Clicking on a tile navigates you to the report.



If you want an interactive dashboard, you can pin the entire report using “**Pin Live Page**” feature.

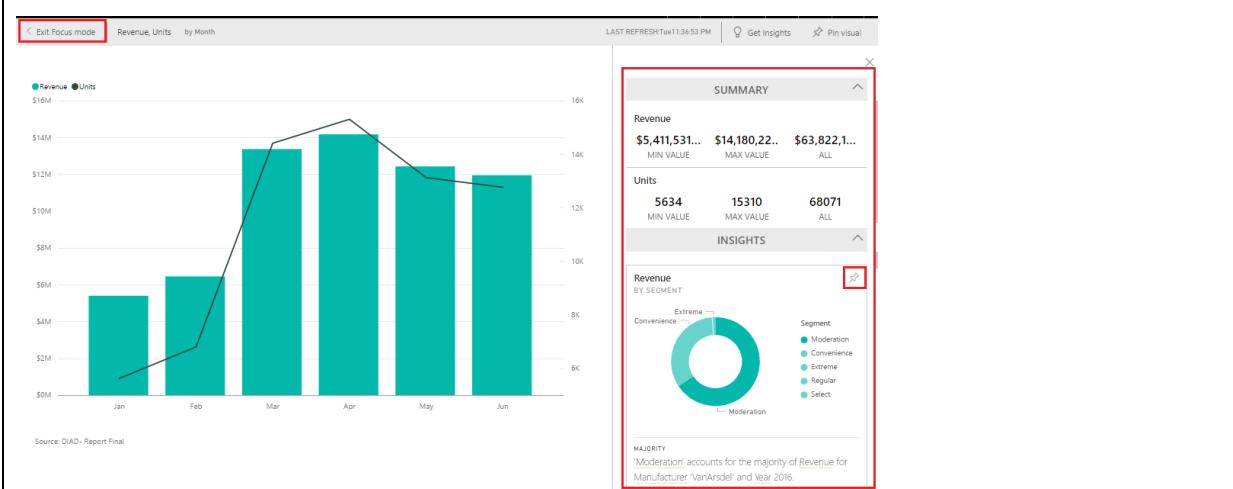
Earlier in the section we created Insights for the complete dataset. Power BI also provides the capability to get quick insights for a particular tile on the dashboard.

38. In .VanArsdel dashboard, click on the **ellipsis** on the top right corner of the **Revenue, Units BY MONTH** tile (line and stacked column chart).
39. Click on **light bulb icon**.



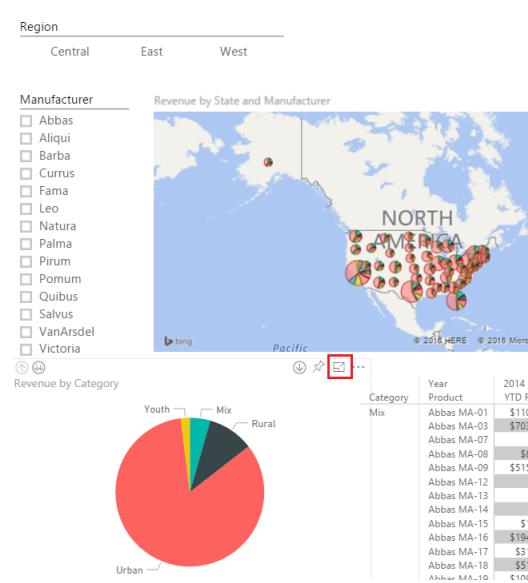
You will be navigated to focus mode and on the right side panel you will find quick insights into the data that makes up the tile.

40. **Scroll** on the summary panel to review the various insights Power BI is able to generate. Notice that there is an option to pin the pie chart.
41. Click on **Exit Focus mode** on the top left to navigate back to the dashboard.



42. Click on the **bubble chart** to be navigated to VanArsdel **US Product Sales report page**.

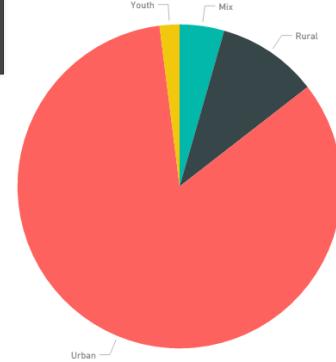
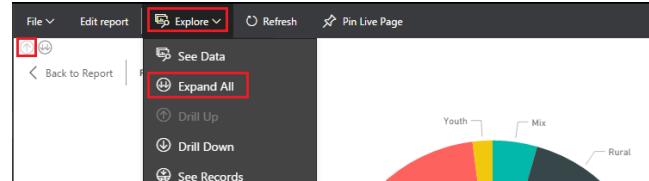
43. Hover over the **Pie chart** and click on the **In Focus mode** icon on the top right corner.



44. From the report menu, select **Explore -> Expand All**.

Notice pie chart is drilled down to display Revenue by Product Segment.

45. Use the **arrow on the top left corner** to navigate back to Revenue by Product Category.



46. This time, click on the **down arrow** on the top right corner.

47. Click on **Mix** category.

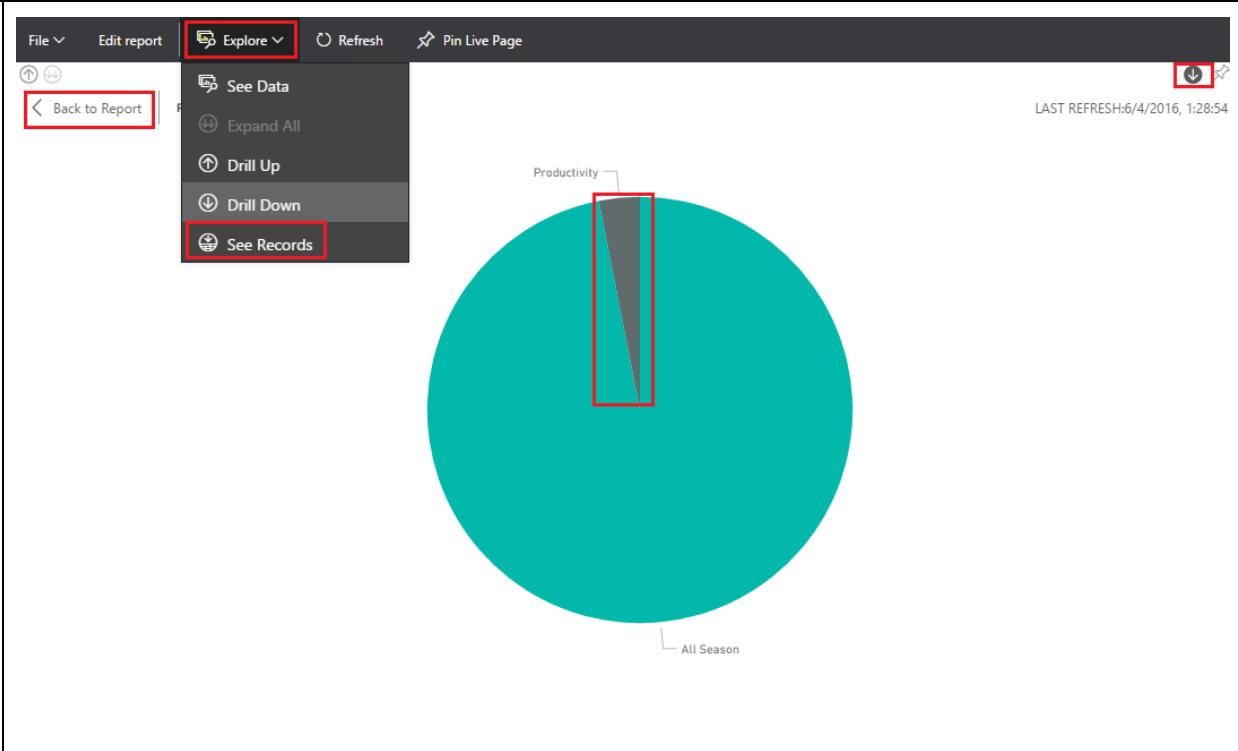
Now we the report displaying data for Mix category by segment.

48. From the report menu, select **Explore -> See Records**.

49. Select **Productivity** section.

Notice all the records that make up the Mix category and Productivity section is displayed. Similarly work with the various drill and see data/records options.

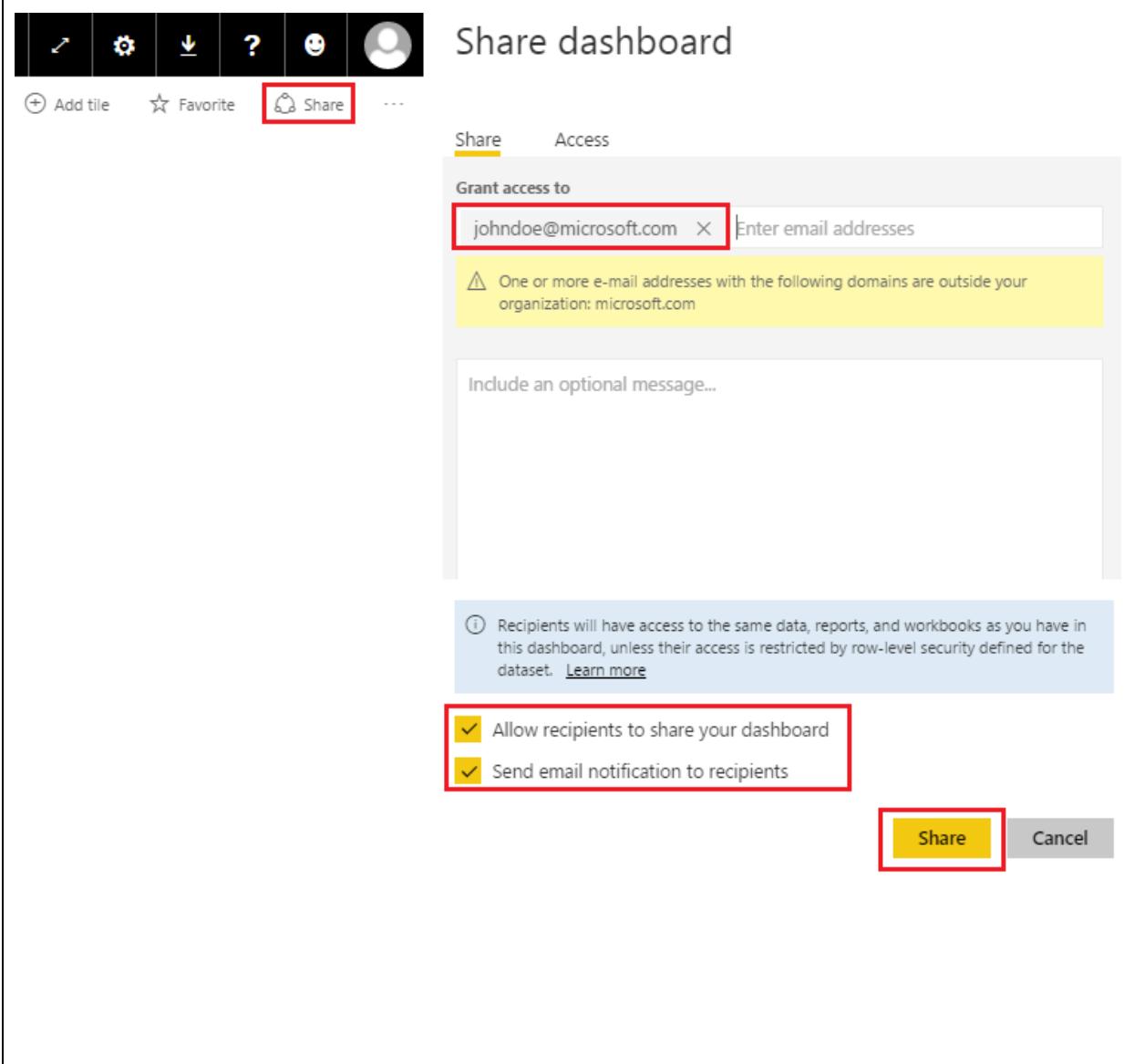
50. Click on **Back to Report** on the top right corner to navigate back to the report page.



Now that you have a dashboard built, let's share it with your colleagues.

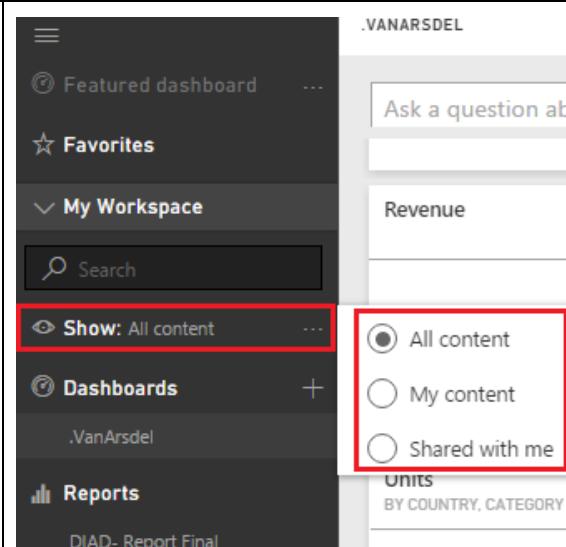
51. Select **Dashboards** -> **.VanArsdel** to navigate back to the dashboard.
52. You can share your dashboard with your team using their email address. Click on the **Share** in the top right of the screen.
53. Enter **email address** of the members of your team separate by ;. Power BI is connected to Azure Active directory.
54. Enter appropriate **message** in the text box below the email addresses.
55. 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.

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.  
If the dashboard is backed by tiles from on premise SSAS then the recipients' credential is flown through to SSAS and the Power BI service retrieves the data that can be accessed by the recipient.



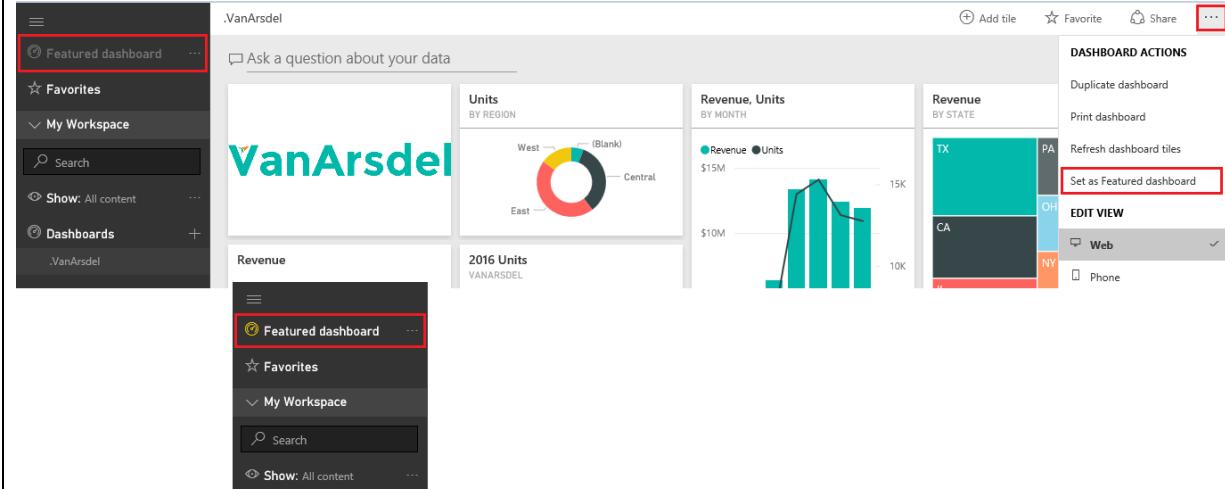
Suppose over a period of time you have started working with a lot of dashboards, Power BI provides an option to filter these dashboards and set the featured dashboard that you would like to land on every time you login to Power BI.

56. In the left panel, click on the ellipsis next to **Show: All Content**. Notice there are options to change the settings to show only content created by you or shared with you. This is useful when you are working with a large set of dashboards.



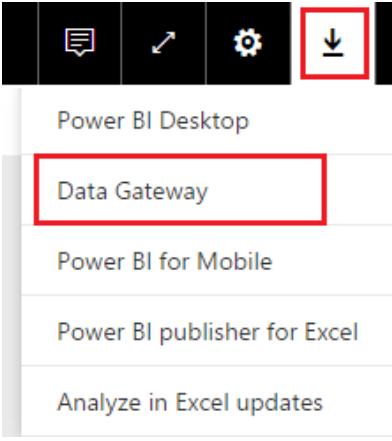
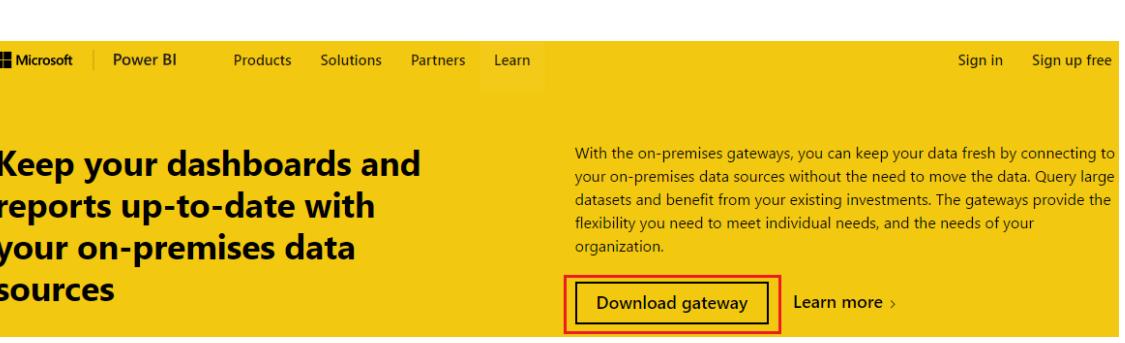
57. Navigate back to .VanArsdel dashboard.  
 58. Click on the **ellipsis** on the top right corner of the page, next to **Share** option. This provides options to **duplicate**, **print**, **refresh dashboard** and **Set as Featured** dashboard. Set as Featured dashboard sets the dashboard as the default dashboard that user will land every time they login.

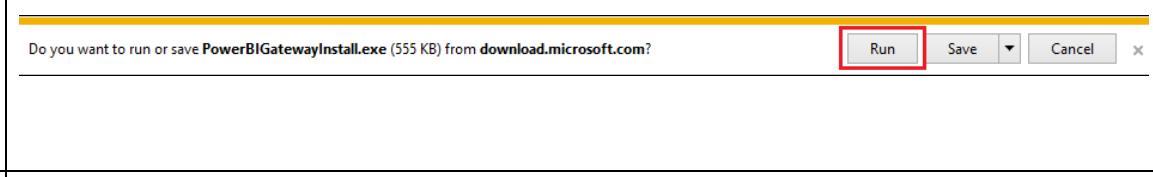
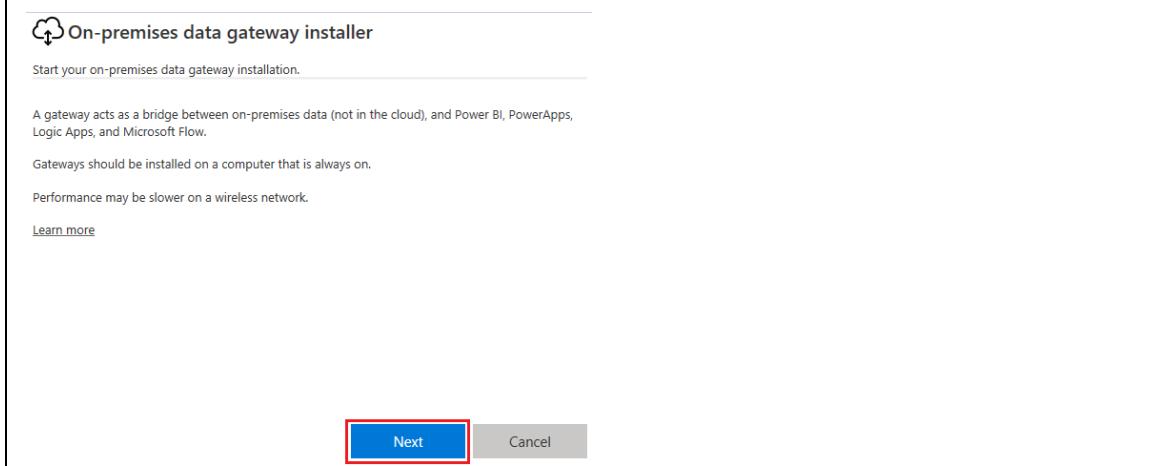
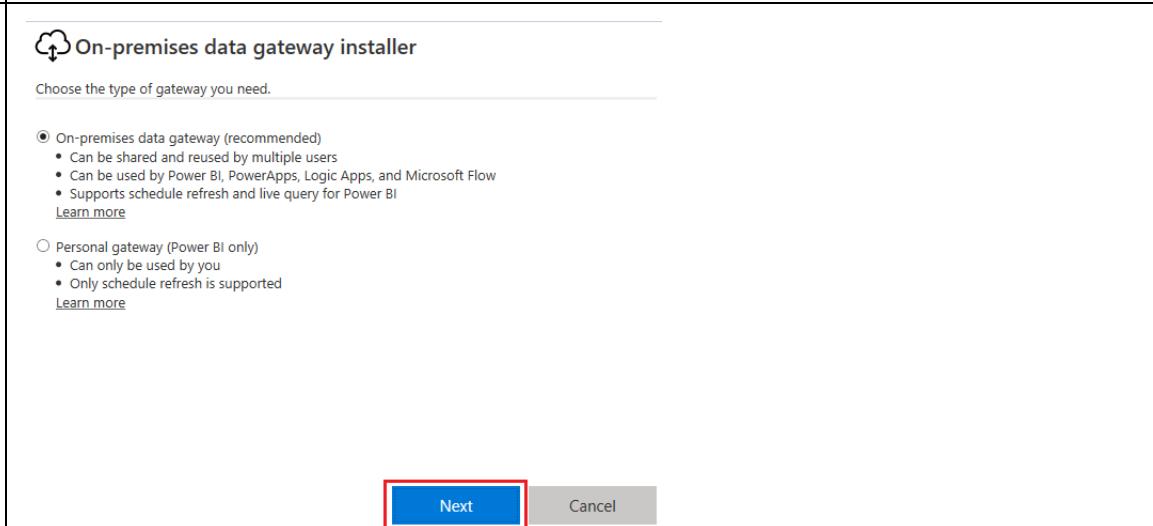
59. Select **Set as Featured**.  
 60. A warning message is displayed. Select **Set as Featured Dashboard**. This sets .VanArsdel as the featured/default dashboard. Notice Featured Dashboard is enabled in the left panel.

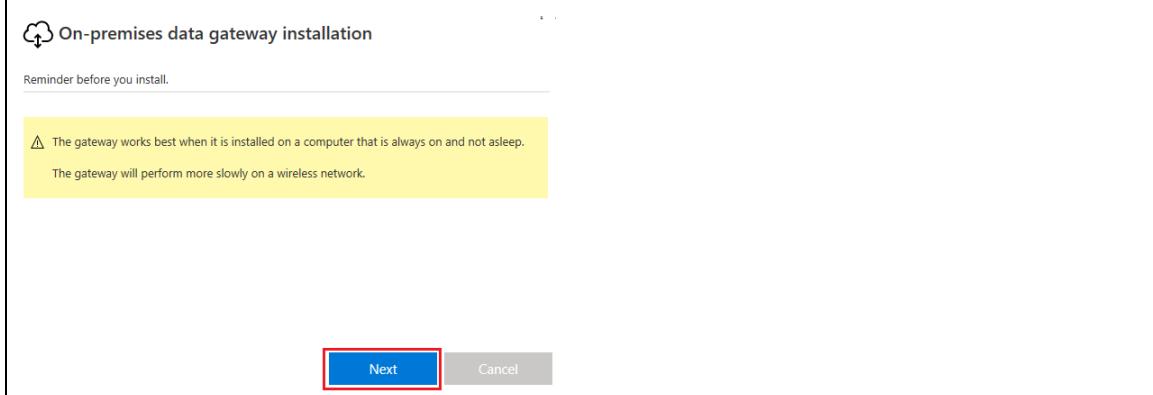
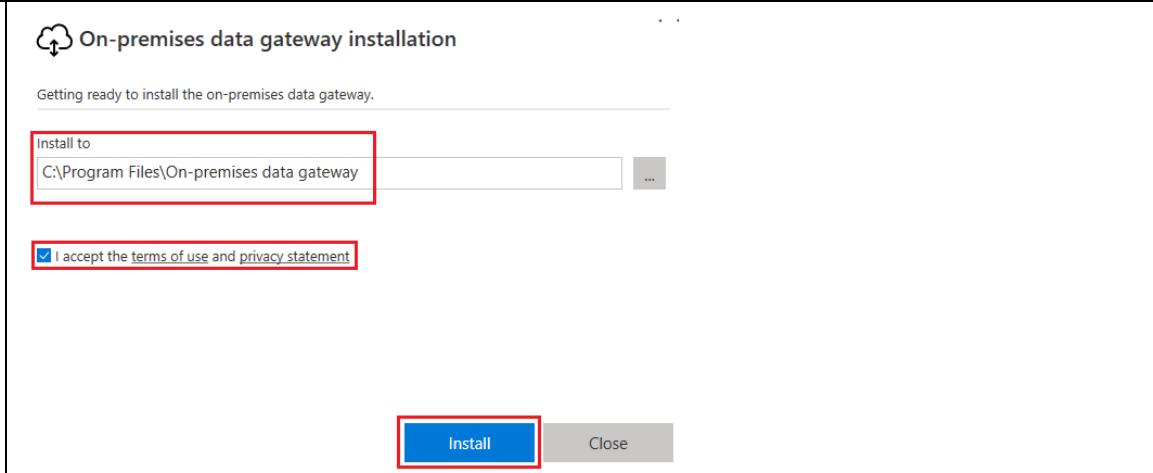


## Power BI Service - Refreshing data on the Dashboard

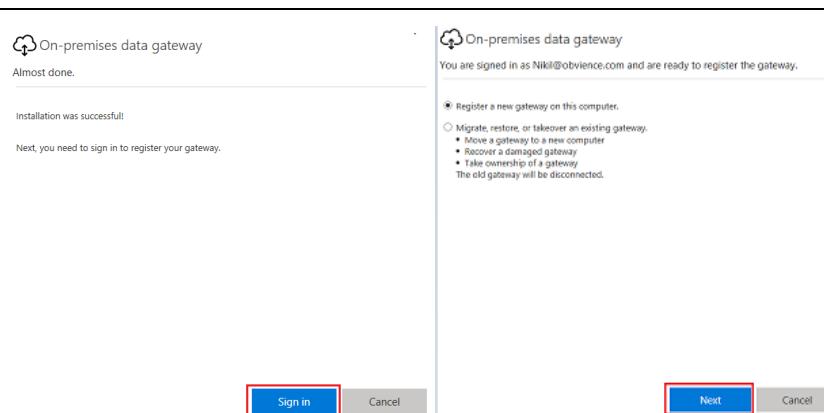
Once the dashboard has been shared with the members of the team, one of the key benefits of Power BI is the ability to setup automated data refresh. This enables the dashboard to be live and operational for the organization. If your data is being retrieved from a cloud data source such as SQL Azure, then you can click on the Dataset ... and schedule the refresh as per your organization needs. In this section you will learn to setup On-Premises Gateway that allows the author of the report and dashboard to refresh the content in the data model from an on premise data source.

<ol style="list-style-type: none"><li>1. Go to <a href="http://app.powerbi.com">http://app.powerbi.com</a> and click on the down arrow on the top right corner.</li><li>2. Select <b>Data Gateway</b>.</li></ol>	
This opens a new browser window which provides details regarding the On-Premises gateway.  3. Select <b>Download gateway</b> .	

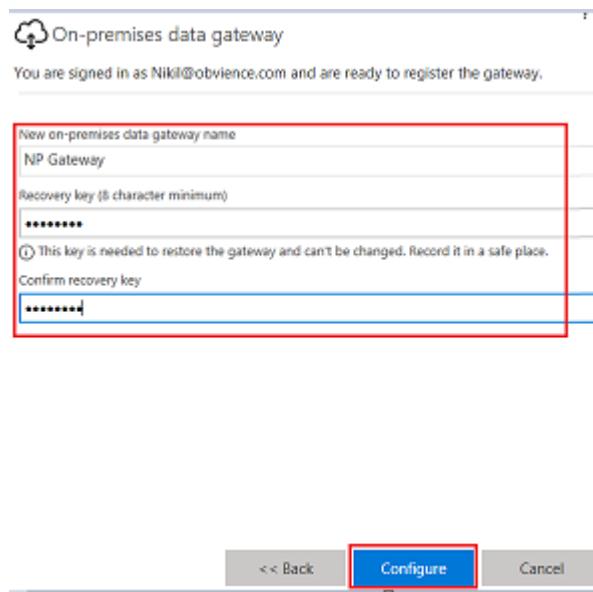
<p>4. Click on <b>Run</b> once the download is complete.</p> <p>5. Click on <b>Yes</b> on the alert message box.</p>	
<p>6. Installation wizard will start. Click on <b>Next</b> as shown in the figure.</p>	
<p>You are provided with 2 options:</p> <p><b>On-premises gateway</b> that can be shared with multiple users and used by other apps like Power Apps, Logic Apps, etc.</p> <p><b>Personal gateway</b> is used by Power BI only and can only be used by you.</p> <p>7. Let's leave the default On-premises gateway selected. Click <b>Next</b> in this dialog.</p>	

<p>A reminder message is displayed.</p> <p>8. Click <b>Next</b> in this dialog.</p>	 <p>The screenshot shows the 'On-premises data gateway installation' dialog. At the top, it says 'Reminder before you install.' Below that is a yellow warning box with the text: '⚠ The gateway works best when it is installed on a computer that is always on and not asleep. The gateway will perform more slowly on a wireless network.' At the bottom right are two buttons: a blue 'Next' button and a grey 'Cancel' button.</p>
<p>9. Select the <b>default install path</b> for the gateway install.</p> <p>10. Select the <b>check box</b> once you have read through the Terms of use and privacy statement.</p> <p>11. Select <b>Install</b>.</p>	 <p>The screenshot shows the 'On-premises data gateway installation' dialog. It says 'Getting ready to install the on-premises data gateway.' There is a red box around the 'Install to' field, which contains 'C:\Program Files\On-premises data gateway'. Below it is a red box around a checked checkbox labeled 'I accept the <a href="#">terms of use and privacy statement</a>'. At the bottom right are two buttons: a blue 'Install' button and a grey 'Close' button.</p>

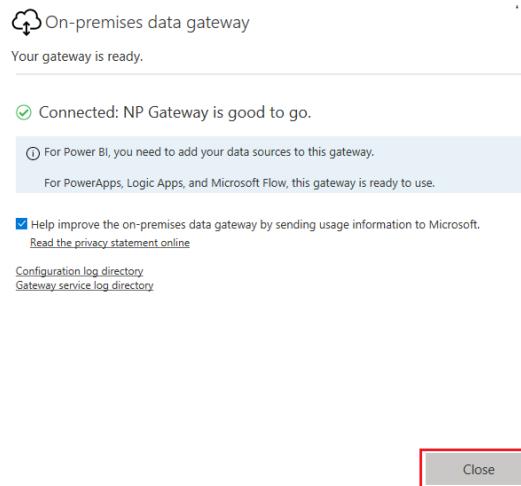
12. After the installation is complete click on **Sign In** as shown in the figure.
13. Sign in to account window opens. Enter the credentials you use to access powerbi.com and sign in.
14. Once you are signed in, select **Register** a new gateway on this computer option (if you have an existing gateway and want to restore it, select the 2<sup>nd</sup> option).
15. Select **Next**



16. Provide a **name** for the gateway.
17. Follow the instructions to create a **Recovery key** and confirm it. In case you want to restore the gateway, you will need this key. Record it in a safe place.
18. Select **Configure**.



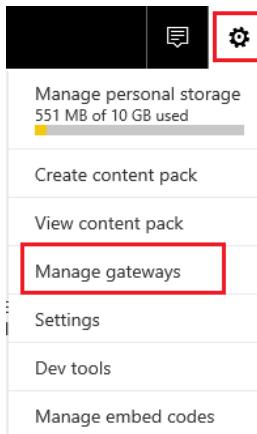
19. Your gateway is now installed and configured. Click on **Close** to close the dialog.



Next step is to configure the gateway on Power BI Service by adding data sources that can be accessed by the gateway and the users who have

20. Login to <http://app.powerbi.com> or the service URL provided by the instructor.

21. From the menu on the top right, click on the **gear** and select **Manage gateways**.



You will be navigated to Gateways screen. Notice the gateway you created is available. On the right panel of the screen you can add more information regarding the gateway using **Gateway Settings** screen. On the right panel of the screen there is also an option to add **Administrators** for the gateway. Let's add data sources that are used in our model so we can set up a refresh schedule.

22. Click on the **ellipsis** next to the gateway name and select **ADD DATA SOURCE**.

We need to configure 3 data sources that are used in the model.

23. In the Data Source Settings page enter the name of the data as **Dimensions**.
24. From the Data Source Type drop down select **File**.
25. Enter following for the Full Path  
**C:\DIAD\Data\FactData\bi\_dimensions.xlsx** (if your file is in a different location change the path accordingly).
26. Enter the **Windows username and password** (this is typically the username and password you use to login to your machine).
27. Select **Add**.

Once the data source is added, notice you can add **Users** who can access this data source.

Let's add the US Sales csv data source file.

28. Click on the **ellipsis** next to the gateway name and select **ADD DATA SOURCE**.
29. In the Data Source Settings page enter the name of the data as **US Sales**.
30. From the Data Source Type drop down select **File**.
31. Enter following for the Full Path  
**C:\DIAD\Data\FactData\bi\_salesFact.csv**  
(if your file is in a different location change the path accordingly).
32. Enter the **Windows username and password** (this is typically the username and password you use to login to your machine).
33. Select **Add**.

**Data Source Settings**

Data Source Name  
US Sales

Data Source Type  
File

Full path  
C:\DIAD\Data\FactData\bi\_salesFact.csv

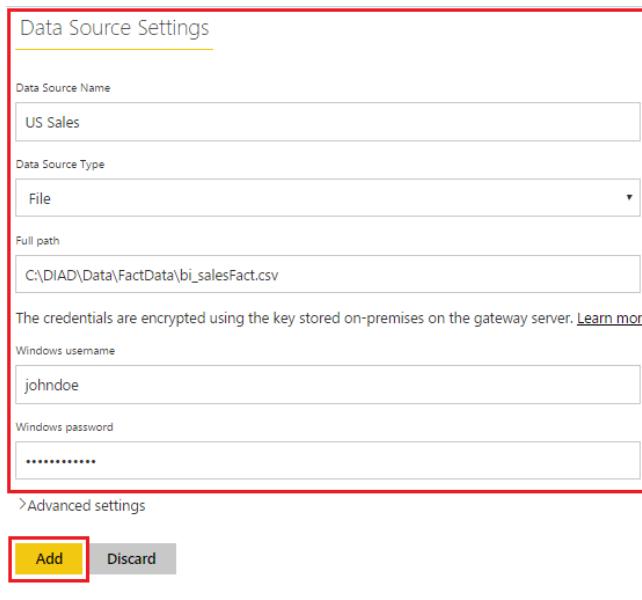
The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Windows username  
johndoe

Windows password  
\*\*\*\*\*

>Advanced settings

**Add** **Discard**



Let's add the International Sales folder data source.

34. Click on the **ellipsis** next to the gateway name and select **ADD DATA SOURCE**.
35. In the Data Source Settings page enter the name of the data as **International Sales**.
36. From the Data Source Type drop down select **Folder**.
37. Enter following for the Full Path **C:\DIAD\Data\FactData1** (if your file is in a different location change the path accordingly).
38. Enter the **Windows username and password** (this is typically the username and password you use to login to your machine).
39. Select **Add**.

Data Source Settings

Data Source Name: International Sales

Data Source Type: Folder

Full path: C:\DIAD\Data\FactData1

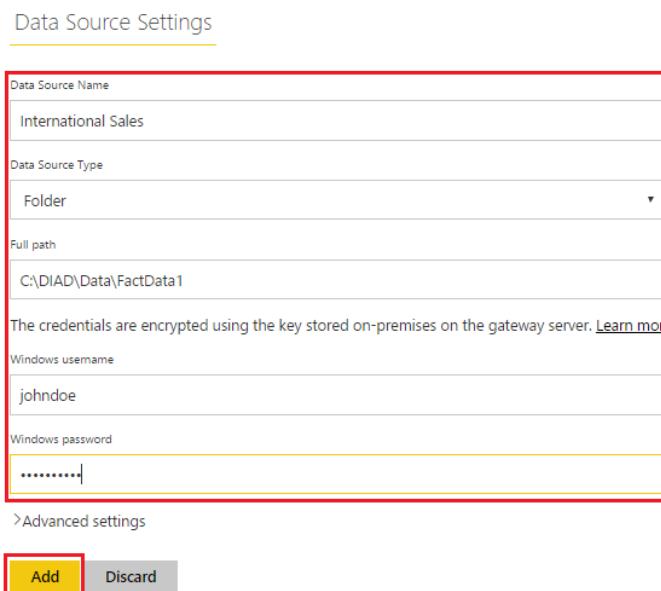
The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Windows username: johndoe

Windows password: .....  
.....

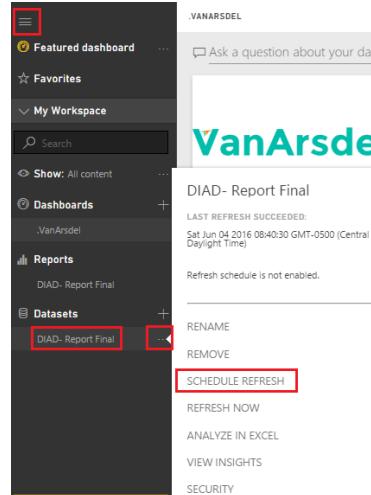
[Advanced settings](#)

**Add** **Discard**



Now let's look at how refresh is going to work.

40. If the left panel is collapsed, expand it by clicking on the three bars below PowerBI.
41. Navigate to Datasets section on the left panel and locate the dataset called **DIAD-ReportFinal**. Click on the **ellipsis** and click on **Schedule Refresh** as shown in the Figure.



42. Scheduling a refresh from on-premise data sources is a **pro feature**. However, Microsoft is offering pro features for free for a limited time.
43. Click on Try Pro for free.
44. Start free **60-day trial** dialog appears.
45. Agree to the **terms and conditions** and click on Try Power BI Pro.
46. Once trial is extended, click on **Close** to close the dialog.
47. You will be directed back to .VanArsdel Dashboard.

Notice a few pop ups are displayed to indicate the Pro features.

Key features include:

- Storage space is increased to 10GB (click on the gear on the top right of the page).
- Ability to refresh on premise data sources.
- Ability to create content packs.
- Ability to collaborate using Group feature.
- Live connectivity to various sources.

Settings

General Dashboards Datasets Workbooks

DIAD- Report Final

This dataset contains on-premises data sources. To schedule data refresh, try Power BI Pro for 60 days, or contact your Office 365 tenant administrator to purchase Power BI Pro.

Try Pro for free

On-premises data sources

Build reports and dashboards that connect to your existing on-premises databases. You will always see the latest information with live connections to your most important data sources.

Learn more Got it

Get Data

Manage personal storage  
58 MB of 10 GB used

Create content pack

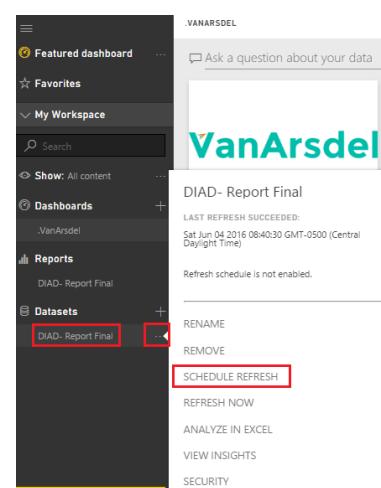
View content pack

Manage gateways

48. Navigate back to **Datasets** section and locate the data set called **DIAD-Report Final**, click on the ellipses.

49. Click on **Schedule Refresh** as shown in the Figure.

Notice that this time you are redirected directly to the Datasets page.

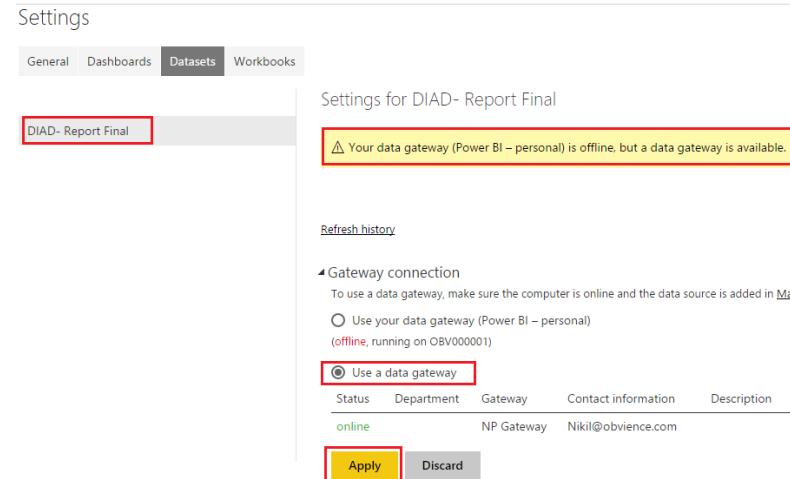


In the Settings page, you will see the Datasets section is selected.

50. The Power BI service has detected that you have setup a Gateway setup. **Expand Gateway connection**.

51. Select **Use a data gateway** and click **Apply**.

A dialog appears confirming the gateway for DIAD- Report Final has been updated.



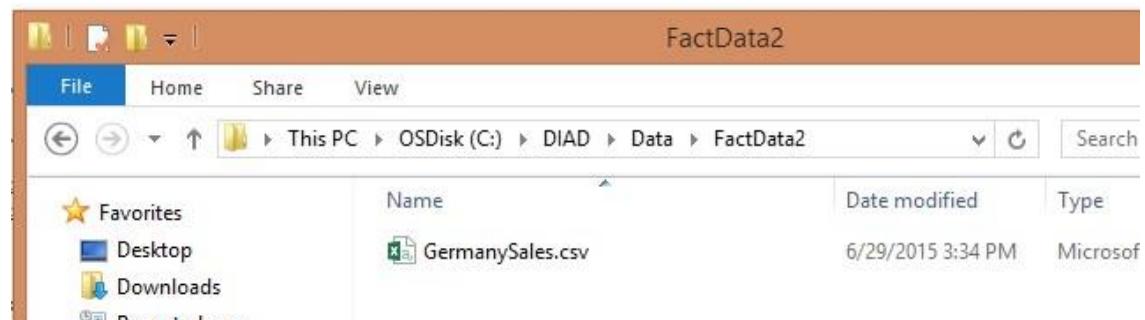
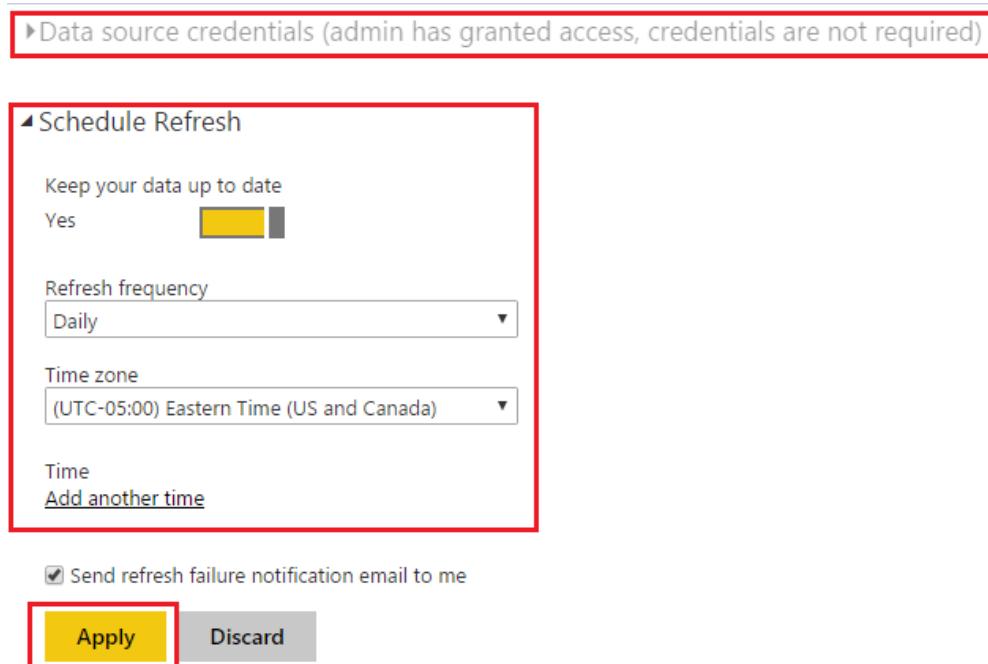
Now let's schedule data refresh. Notice that you do not have to re-enter the credentials for each data source again. Since it is set up at the gateway level.

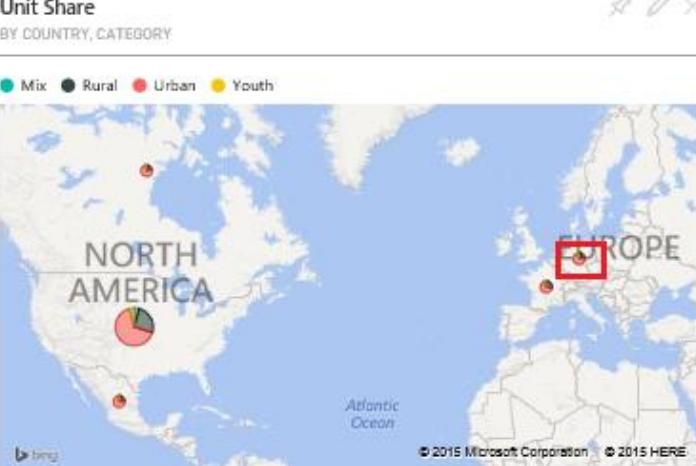
52. Expand Schedule Refresh section.
  53. Enable data refresh by moving the slider below “**Keep your data up-to-date**”.
  54. There are two options for **Refresh Frequency**, daily and weekly. Pick **Daily**.
  55. Change the time zone to your time zone under “**Time Zone**” drop down.
  56. Click on “**Add another time**” to select refresh time.
  57. Data refresh can be scheduled on the hour or 30min. Change the time to the **next available 30 min time slot** but give 5 min to complete the next few steps.
  58. Click **Apply**.

You have now setup automated refresh. Power BI Service also has an option to send out failure notifications.

The company has acquired another company selling the product in Germany and just received the sales details from Germany. The CSV file is located under the folder **\DIAD\Data\FactData2.**

59. Copy and paste this file from  
    \DIAD\Data\FactData2 to  
    \DIAD\Data\FactData1 folder where you  
have all the remaining CSV files.



<p>Note: If your file is in a different location change the path accordingly.</p>	
<p>60. Once data refresh is complete, navigate back to .VanArsdel dashboard.  Notice the map in the dashboard, there is a dot over Germany indicating a data point.</p>	<p>Unit Share BY COUNTRY, CATEGORY</p>  <p>Mix ● Rural ● Urban ● Youth</p> <p>NORTH AMERICA</p> <p>EUROPE</p> <p>Atlantic Ocean</p> <p>© 2015 Microsoft Corporation © 2015 HERE</p>

Now you have configured on premise data refresh. Wait for the refresh operation to complete and the data to change on the dashboard. Continue to next section to learn more functionality.

## Power BI Service -- Part II

The dashboards and report you have shared with your team have become really useful for entire team to get insights. You have heard the following requests from your team. You are unable to support them individually and you cannot meet their needs even if you work 24 hour/day.

1. Several users have requested you to create a dashboard for them that they can customize.
2. Some users have complained to you that the dashboards you have shared are dynamically changing sometimes and they are not clear what's happening. This is due to the fact you are updating the dashboards based on some user requests.
3. You want the ability to manage the list of users to whom you want to share the dashboards and you have existing security groups in your organization.
4. Certain Excel power users in your team created reports in Excel with Excel data model where they have pivot tables and power view sheets. They really like Power BI and want to be able to see all their reports in Power BI. In addition, they really like the functionality of automatic refresh in Power BI.
5. Additional people on your team have started creating reports that are useful for your team and organization. You want to be able to leverage them as a group and maintain content efficiently.

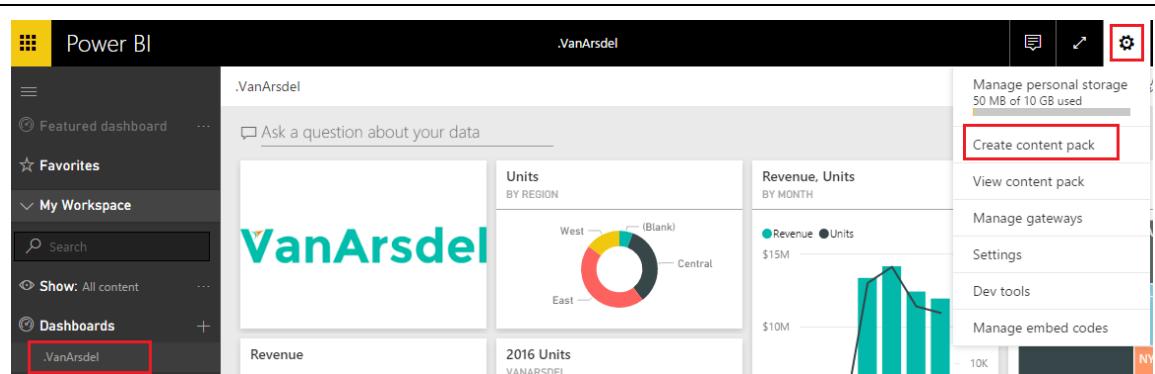
You only have 24 hours in a day and you are unable to meet the demands from all your users for the requests above. You want to make them be successful. In order to tackle this business problem in this section you will learn how to leverage the features in Power BI.

### Distributing content to larger audiences for them to customize

Power BI offers a feature content pack which helps you to package dashboards, reports and datasets and share it to a broad set of audiences – entire company or a group of people.

#### Power BI Service - Sharing content to your organization

1. Go to **.VanArsdel** dashboard.
2. Click on the settings icon on the top right and select “**Create content pack**” as shown in the figure.



3. Enter a valid **email address** with whom you want to share the content pack.
4. In the create content pack page enter the “**VanArsdel Sales Report**” under Title as shown in the figure.
5. Enter “**This report contains VanArsdel revenue and unit shares over the years along with competitor information**”.
6. Select the Upload text below Image and choose **LogoforContentPack** file from **\DIAD\Data** folder
7. You can select the set of Dashboards, reports and datasets to be shared. In this example, we will just be using the .VanArsdel dashboard, report and dataset as shown in the Figure.
8. Finally, you will be choosing if you want to share this to a group of users or to entire organization which is your entire company. **Follow the instructions from the instructor on what group to share your content pack.**
9. Click on **Publish**.

Create content pack

Choose who will have access to this content pack:

Specific groups  My entire organization

X

Title

Description

  
Upload an image or company logo  
Image size: 45 KB or less, 4:3 aspect ratio, JPG or PNG format  
[Use default](#)

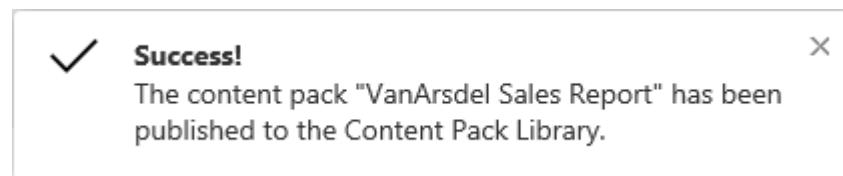
Select items to publish

Dashboards	Reports	Datasets
<input checked="" type="checkbox"/> .VanArsdel	<input type="checkbox"/> DIAD- Report Final	<input type="checkbox"/> DIAD- Report Final

The content pack will be available in your organization's content gallery. [Learn more](#)

**Publish** **Cancel**

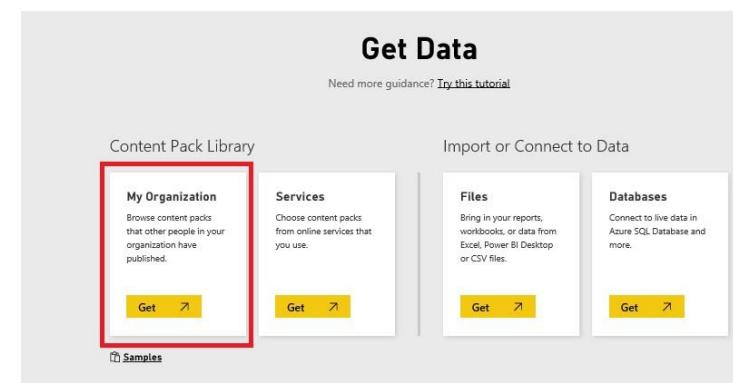
9. You should see a notification that content pack creation was successful as shown in the figure.



Identify a user from your company to whom you shared the content pack. This user can be you as well.

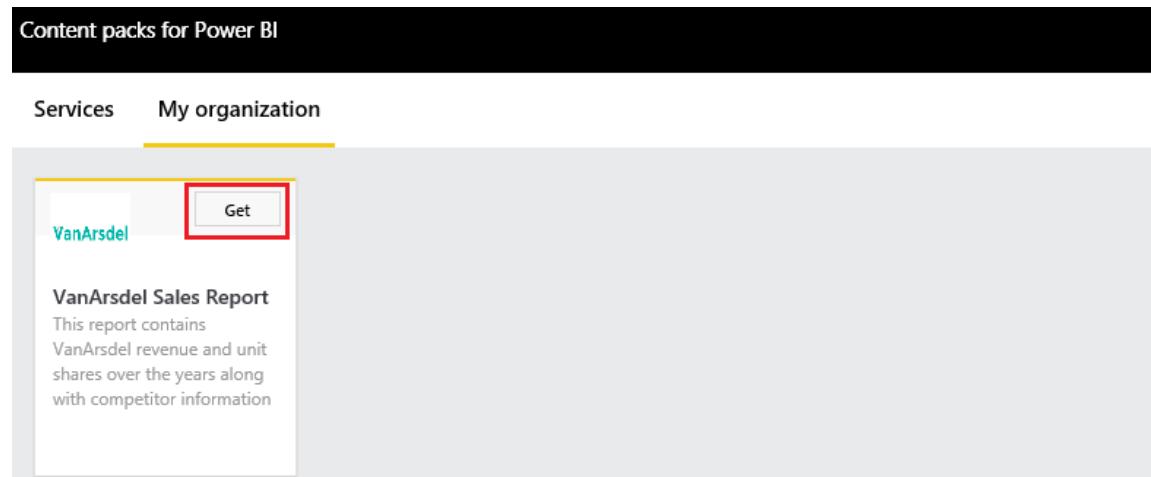
10. Click on **Get Data** on the Power BI Service.

11. In the Get Data page click on **Get** under **My Organization** as shown in the figure.



12. In **My Organization** page you will see the VanArsdel content package as shown in the figure.

13. Request the end user to click on **Get**.



A new dashboard is created for the end user as shown in the figure. By default, the dashboard is a read only dashboard for the end user and any updates made to the content packs will be seen by the end user. You will learn how to make updates to the content pack shortly.

15. If the user wants to personalize (rearrange the tiles, add additional tiles from his/her reports) then the user needs to make a **copy** of the dashboard. Request your co-worker to click on the **ellipsis** next to .VanArsdel dashboard and select **MAKE A COPY**.

This creates a copy of the dashboard with edit capability.

The screenshot shows a Power BI dashboard titled ".VanArsdel". On the left, there is a sidebar with navigation options: Featured dashboard, Favorites, My Workspace, Search, Show: All content, Dashboards, Reports, and Datasets. The "Dashboards" section contains a list item ".VanArsdel". A context menu is open over this item, with the "MAKE A COPY" option highlighted by a red box. The main dashboard area displays three tiles: "Units BY REGION" (a donut chart showing West, Central, and East regions with a total of 16 Units), "Revenue, Units BY MONTH" (a chart showing monthly revenue and units from January to June), and a large numerical value "\$63.8ZM" with "68K" below it.

## Power BI Service - Updating a content pack

After publishing your content pack, you receive requests from key members of your team to organize and add additional content (tiles to the dashboard, new reports using the same data as well as additional data). In this section you will learn how to update a content pack. In this example you will add a custom visual, add a new QnA tile and re-organize the tiles to update the content pack.

By default, a set of standard visuals is available in Power BI desktop and service. But there is always a need for visuals that are outside the standard set. Power BI has created an open source community where users can contribute and consume custom visuals.

In your browser, navigate to <https://app.powerbi.com/visuals/> and browse the gallery to find custom visuals. This is an ever growing community with new visuals added frequently.

For the purposes of this lab, download Bubble chart.

1. Scroll to find and click on **Bubble chart**. Dialog explaining the visual details opens.
2. Select **Download Visual**.
3. Read through the Terms of Use and select **I agree**.
4. Save the visual in **DIAD\Data** folder. File is named SuperBubbles.

The screenshot shows the Power BI Visuals Gallery interface. At the top, the URL https://app.powerbi.com/visuals/ is visible in the browser's address bar. Below the header, there are six visual cards arranged in a grid:

- Sparkline**: A line chart showing fluctuating data over time.
- Force-Directed Graph**: A network graph with nodes and red edges.
- Advanced Time Slicer**: A chart with multiple horizontal layers of data.
- Stream Graph**: A wavy chart showing data flow across different categories.
- Sunburst**: A sunburst chart with concentric rings.
- Bubble**: A bubble chart with colored circles of varying sizes.

The **Bubble** visual is highlighted with a red border. Below it, a detailed view of the **Bubble** visual is shown:

**Bubble**  
Published by [Dharminder Kumar Dhanda](#)

Bubble chart encodes the data in area of circles. Size of the bubble represents measure and multiple bubble represent dimension attribute.

[License](#) [Privacy Statement](#)

[Download Visual](#) [Download Sample](#)

Your organization has requested a visual representation of Units Sales across Manufacturers. Let's add a **custom visual**.

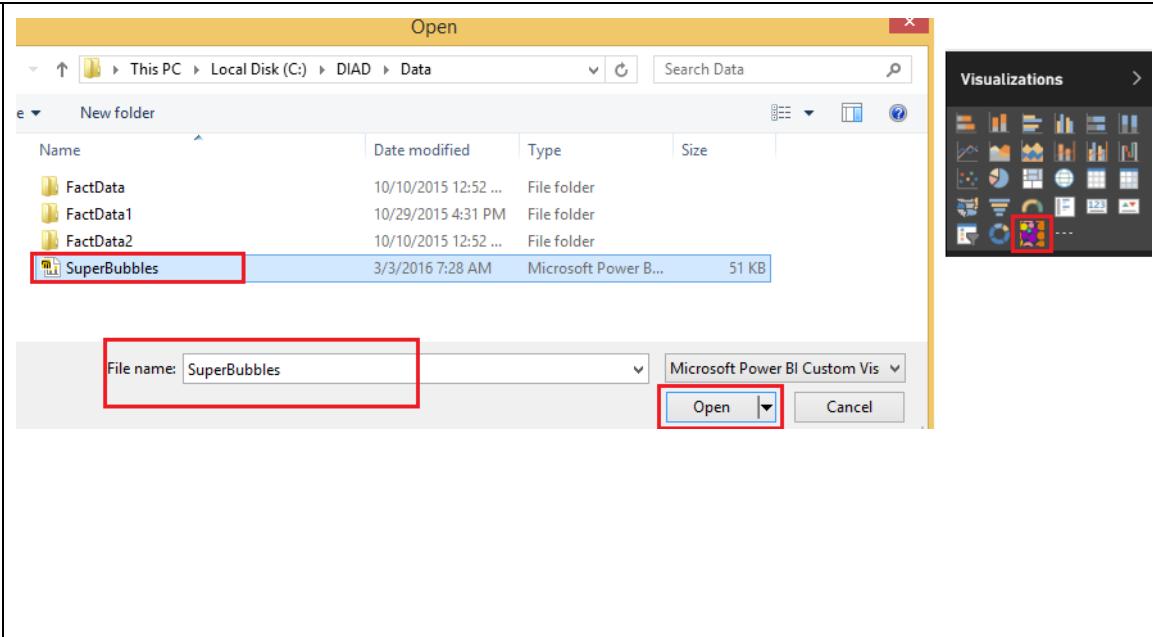
5. Navigate back to your Power BI account.
6. From the left menu select **Reports -> DIAD – Report Final**.
7. Click on **Edit Report** on the top menu bar.

8. In the **Visualizations** section click on the **ellipsis** in the last row of the visualizations and select **Import a custom visual**.
9. A warning dialog opens. Click **Import**.

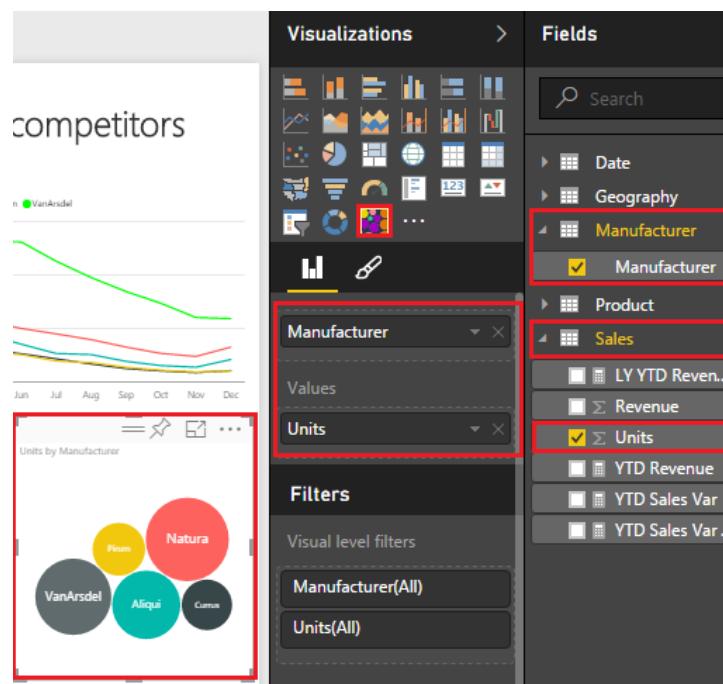
10. Browse window opens. Navigate to **DIAD\Data** and select **SuperBubbles** visual.

11. Click **Open**.

A success message appears and notice a new visualization option is added.



12. Resize the **Matrix** visual by reducing the width.
13. Resize the **Waterfall** visual by reducing the width and moving it to the left.
14. From the **Visualizations** section select the newly added **SuperBubbles** visual and move it to the space available in the bottom right corner
15. From the Fields section expand **Manufacturer** table and drag **Manufacturer** column to top section.
16. From the Fields section expand **Sales** table and drag **Units** column to **Values** section.
17. From the top menu, select **File -> Save** to save the changes.

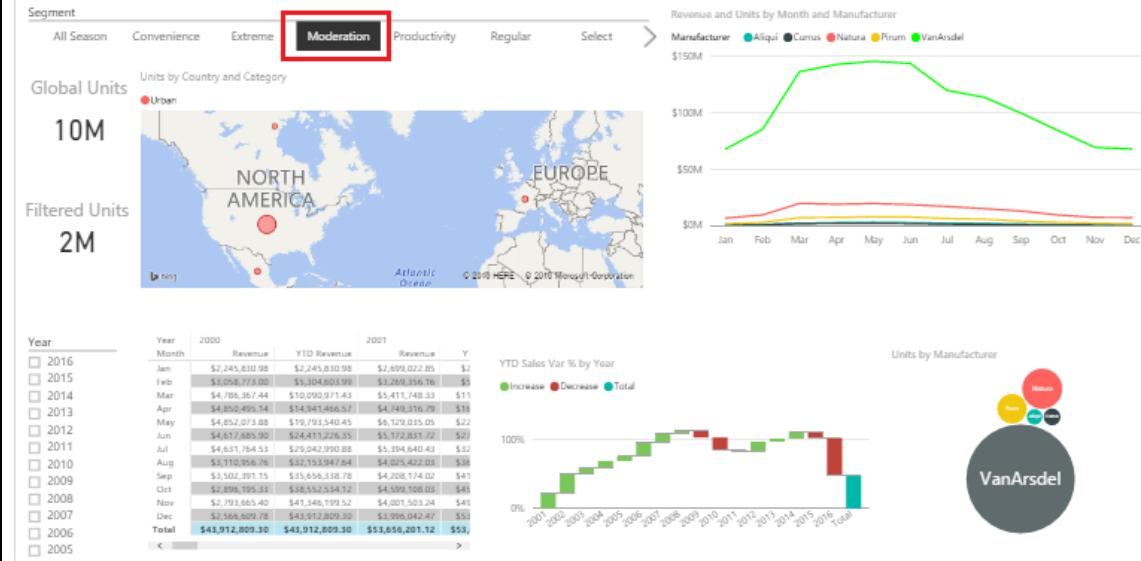


SuperBubbles chart represents the Units sold by Manufacturer

18. From the **Segment** slicer, select **Moderation** and notice that VanArdel is a huge in this segment both in terms of Revenue and Units sold.
19. Notice that the Data colors used for the various Manufacturers in the Line Chart and SuperBubbles chart do not match.

As an exercise at a later time, using Visualizations formatting options make sure the colors for the Manufacturers match across visuals.

## VanArsdel Revenue and Unit share comparison with competitors



20. From the Segment slicer, select **Moderation** again to clear the selection.
21. From the **Year** slicer, select **2016**.
22. Pin the SuperBubbles visual to **.VanArsdel** dashboard.

You will see a warning on the top right stating that the dashboard that was published as content pack has changed. You do need to republish for your end users to see the changes.

The screenshot shows a Power BI dashboard titled "Global Units" with a value of "204K". It includes a map of North America, a "Units BY MANUFACTURER" card, and a line chart for "Units by Manufacturer" from March to June. A SuperBubbles visualization on the right shows bubbles for "VanArsdel", "Aliqui", "Natura", and "Gama". A modal dialog box titled "Pin to dashboard" is open, asking "Where would you like to pin to?", with "Existing dashboard" selected and ".VanArsdel" chosen in the dropdown. A yellow box highlights the "Pin" button. Below the dashboard, a warning message says: "You've made changes to a published content pack. You'll need to update it for others to see the changes." with a "View content packs" button.

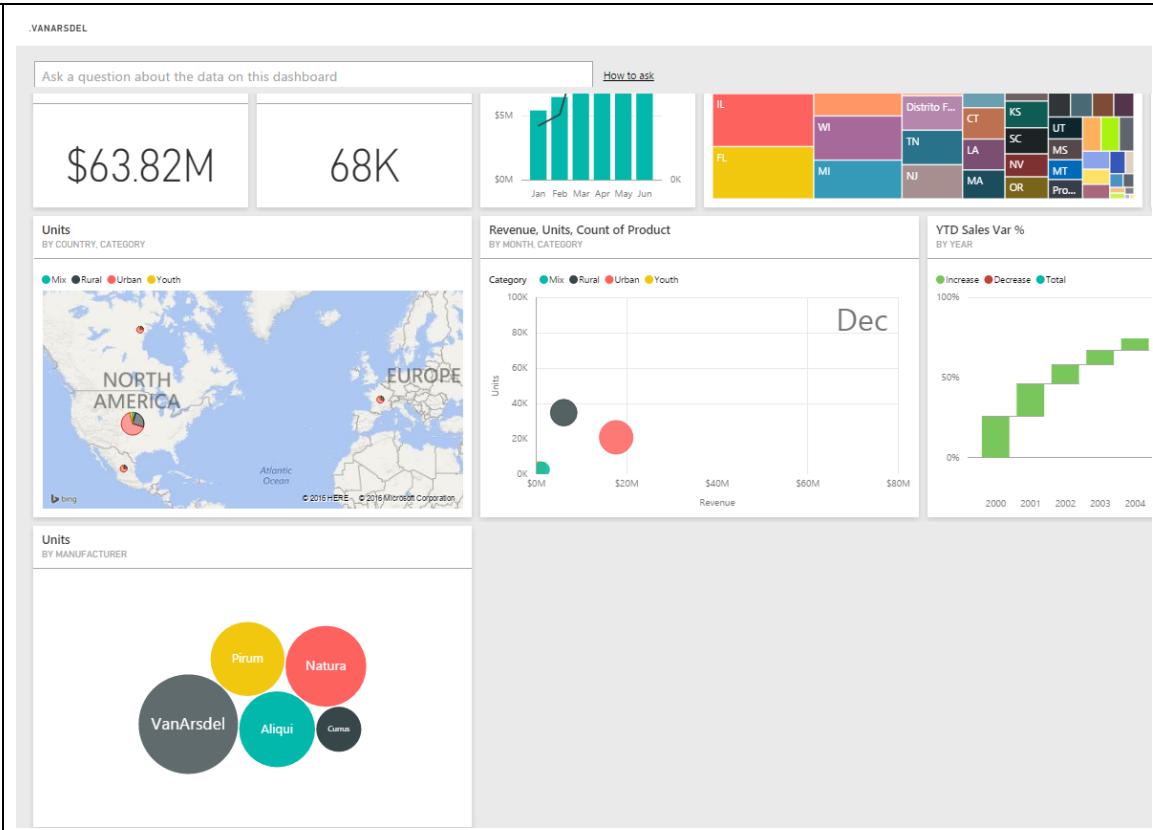
Year	2015	Revenue	YTD Revenue	Revenue	YTD
2004		\$8,897,617.68	\$8,897,617.68	\$8,897,617.68	\$8,897,617.68
2005		\$10,043,480.12	\$10,043,480.12	\$10,043,480.12	\$10,043,480.12
2006		\$25,343,144.14	\$45,196,241.94	\$25,343,144.14	\$45,196,241.94
2007		\$26,091,926.03	\$71,278,167.97	\$26,091,926.03	\$71,278,167.97
2008		\$22,678,220.38	\$93,956,388.35	\$22,678,220.38	\$93,956,388.35
2009		\$21,839,469.48	\$115,795,857.83	\$21,839,469.48	\$115,795,857.83
2010					
2011					
2012					
2013					
2014					
Total		\$115,795,857.83	\$115,795,857.83	\$115,795,857.83	\$115,795,857.83

**Pin to dashboard**  
Select an existing dashboard or create a new one.  
Where would you like to pin to?  
 Existing dashboard  
 New dashboard  
./VanArsdel  
Pin Cancel

⚠ You've made changes to a published content pack. You'll need to update it for others to see the changes. X

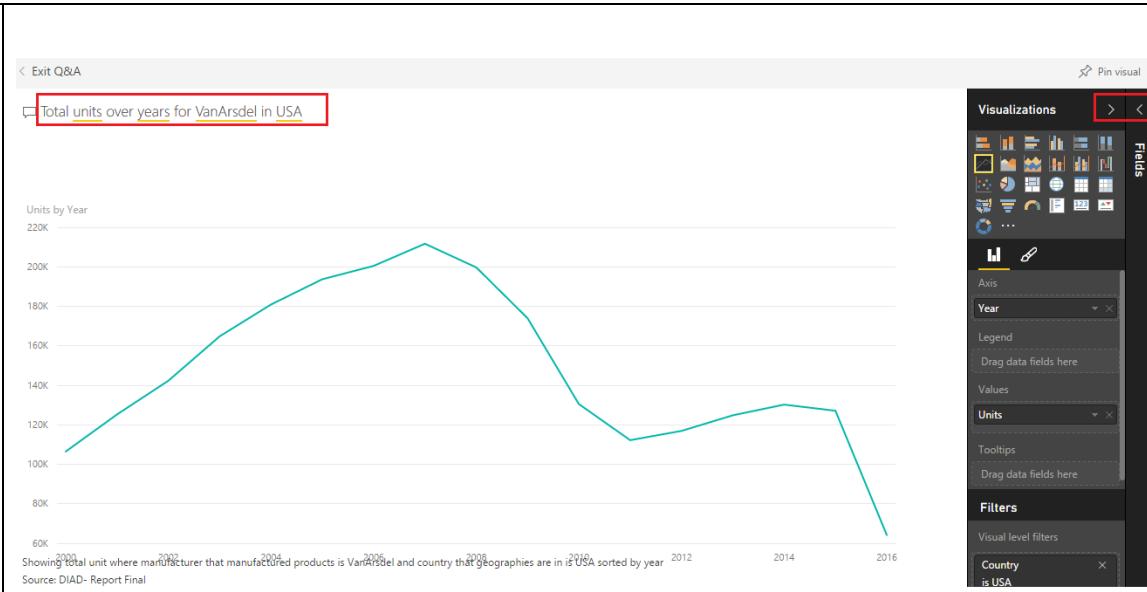
[View content packs](#)

Notice the SuperBubbles visual is part of the dashboard now.



Your organization has requested you to add the **total units sold since 2010 for United States** as top level metric.

23. Enter the text “**Total units over years for VanArsdel in USA**” in the **QnA** text box. You will see the line chart formed by QnA.
24. Click on the **>** icons next to **Visualizations** and **Fields** so that you can see the list of filters that have been applied in the filter pane.



25. Using **Visualizations** panel, change the visual to **Stacked column chart**.

26. From **Fields** section, expand **Product** table and drag and drop **Segment** column to the **Legend** section of the column chart.

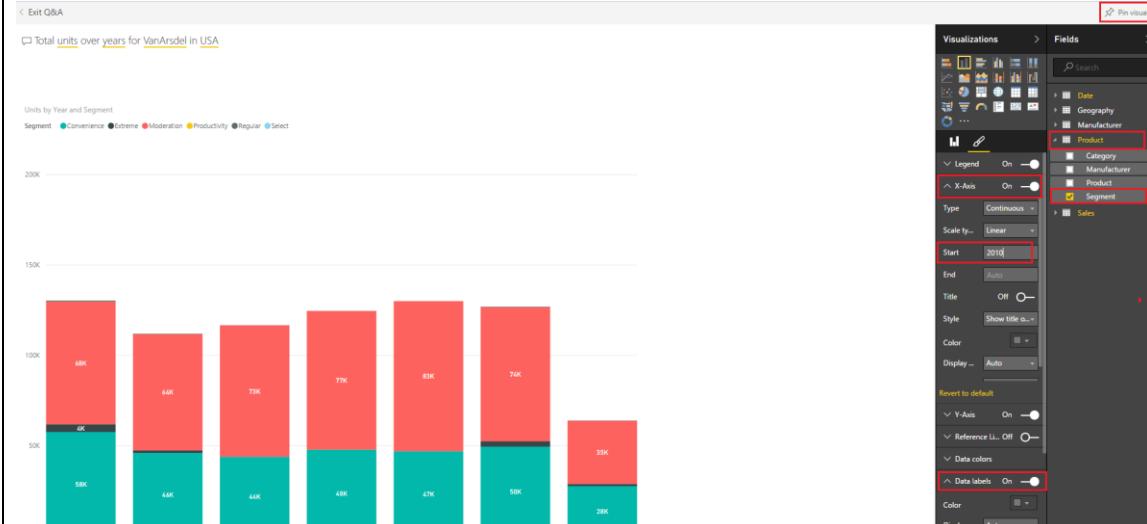
27. Click on the **formatting brush**.

28. Enable **Data Labels**.

29. Expand **X-axis** and enter the start year as **2010**.

30. **Pin** the tile to your dashboard.

Again you will notice warning about changes to the content pack is displayed.

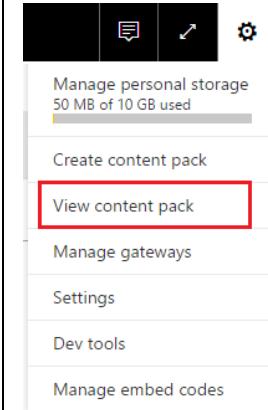


31. Navigate to **.VanArsdel** dashboard  
 32. **Organize** your dashboard as shown in the Figure.

You will see a warning on the top right stating that the dashboard that was published as content pack has changed. You do need to republish for your end users to see the changes



33. Now that you have made all the changes, you do need to update the content pack. Click on the **Settings** and click on **View Content Pack**.



In the View Content Packs page, you get to see all the content packs you have published, to whom you have published as well as date it was published.

Notice there is a warning icon next to VanArsdel Sales Report content pack.

Hover over the warning icon and warning details is displayed.

34. You can edit or delete content pack to make changes. Click **Edit**.

Published To	Date published	Actions
VanArsdel Sales Report  Nikil@obvience.com	Feb 13, 2016	 

35. Make any changes to description you want to inform your users and click **Update** to republish your content pack. A dialog is displayed confirming the update.

If your end-users did not personalize the content pack, they see the changes to the dashboard. No user action required.

If end-users have personalized the content pack, they will see a warning that a new version of the content pack has been published. They can choose to get the updated content pack.

Delivering the dashboards as content pack helps you in formatting the right content on the dashboard before your end-users can see the changes.

The users will not see new data at random times. You can establish a rhythm in your organization that changes will get published on a regular cadence that the users can expect. In addition, you can also manage this efficiently for large user group via security group.

Using the content pack, you will achieve the first three business requirements in the beginning of this section.

## Update content pack

Choose who will have access to this content pack:

Specific groups     My entire organization

Nikil@obvience.com X Enter email addresses

### Title

VanArsdel Sales Report

### Description

This report contains VanArsdel revenue and unit shares over the year along with competitor information



Upload an image or company logo

Image size: 45 KB or less, 4:3 aspect ratio, JPG or PNG format

[Use default](#)

### Select items to publish

#### Dashboards

.VanArsdel

#### Reports

DIAD- Report Final

#### Datasets

DIAD- Report Final

The content pack will be available in your organization's content gallery. [Learn more](#)

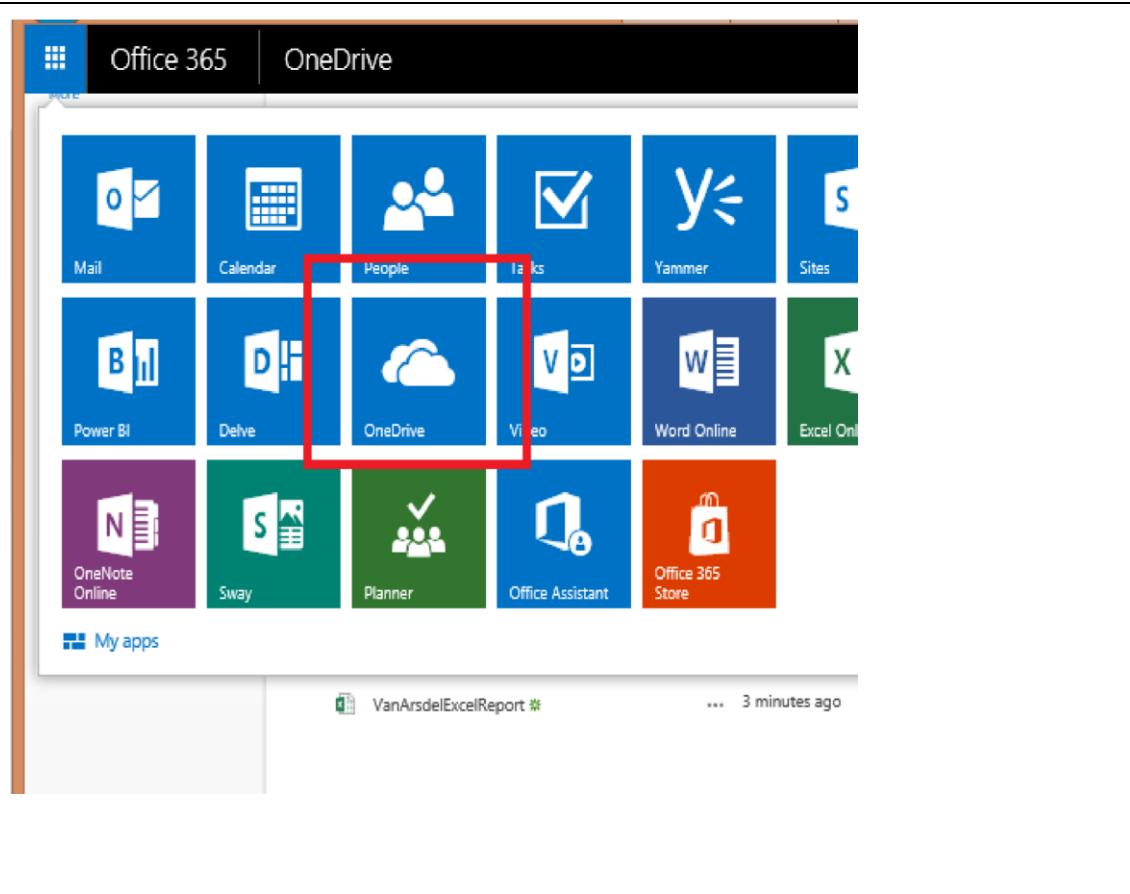
**Update**

Cancel

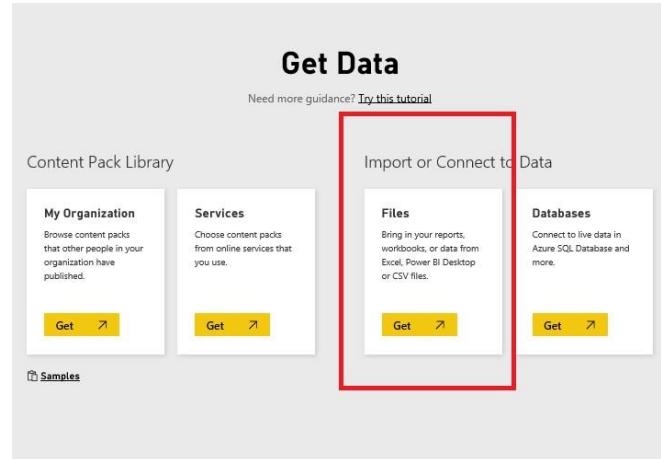
## View and manage your Excel reports in Power BI

The next business problem is to share information to your end-users on how they can bring in their Excel content and setup data refresh. In this section you will learn how to bring your Excel content and setup refresh so that you can guide your end-users who want to view all their content from Power BI.

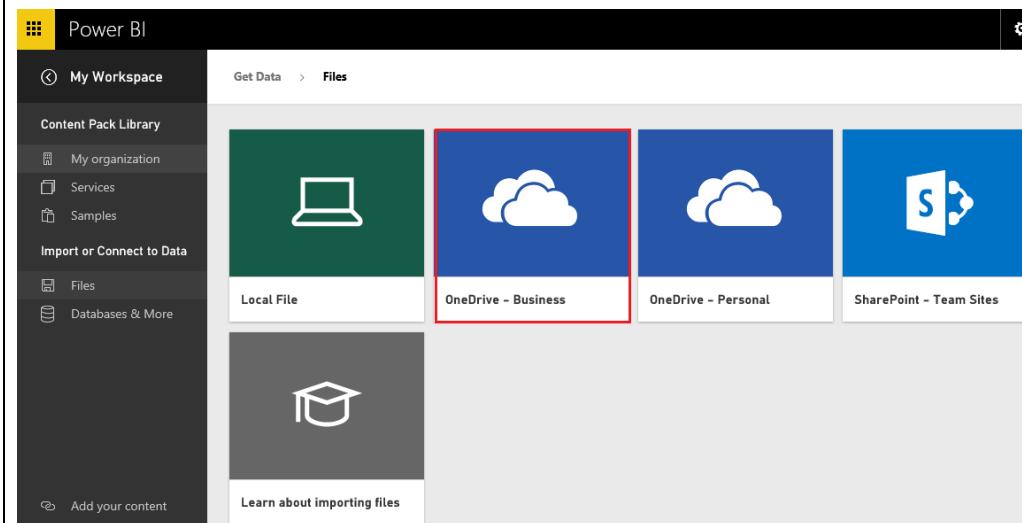
1. Login to your Office 365 account.
2. Click on the top left corner and select OneDrive.
3. Go to the documents and upload the file **VanArsdelExcelReport** provided to you.



4. Login to <http://app.powerbi.com> (or URL provided by the instructor) using your organizational credential and click on **Get Data**.
5. Click on **Get** under **Files** as shown in the figure.



6. In the **Get Data Files** page click on **OneDrive – Business** as shown in the figure.



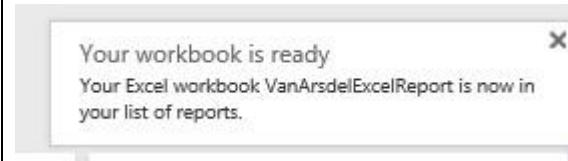
7. Select the **VanArsdelExcelReport** you uploaded to your Onedrive for Business and click **Connect** as shown in the figure.

The screenshot shows the 'Get Data' interface in Microsoft Power BI. The path is 'Get Data > Files > OneDrive - Business'. The main area displays 'OneDrive for Business' files under 'Microsoft > DIAD'. A file named 'VanArsdelExcelReport.xlsx' is listed, with its details: Name, Modified date (4 minutes ago), and Size (1.28MB). A red box highlights the 'Connect' button in the top right corner of the interface.

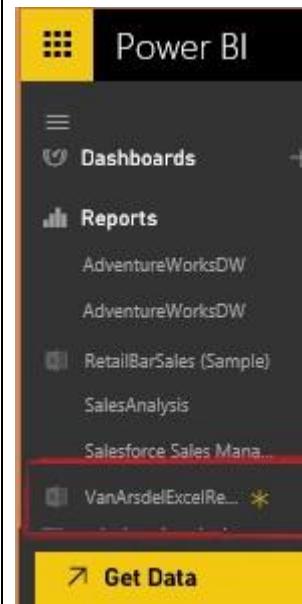
8. In the OneDrive for Business page you have two options:
- Import Excel data into Power BI.
  - Connect, Manage and View Excel reports in Power BI.
9. Select option (b) (**Connect**) as highlighted in the figure.

The screenshot shows a dialog box titled 'OneDrive for Business' with the sub-instruction 'Choose how to connect to your Excel workbook'. It presents two options: 'Import Excel data into Power BI' (represented by a chart icon) and 'Connect, Manage and View Excel in Power BI' (represented by a grid icon). A red box highlights the 'Connect' button in the 'Connect, Manage and View Excel in Power BI' section.

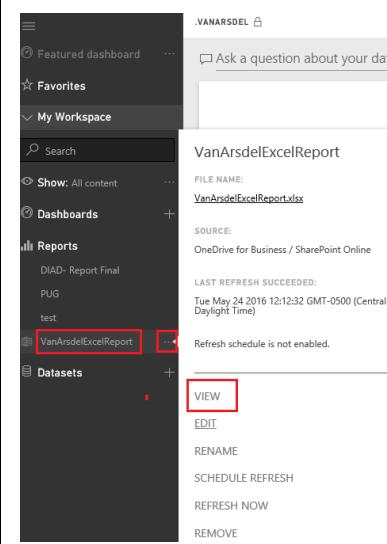
10. Once the Excel workbook has been successfully connected to Power BI you will see the information shown in the figure on top right corner of your browser.



11. You will now see the Excel report under the Reports. You will notice an Excel icon next to the report to indicate it's a high fidelity Excel report, meaning the excel content with pivot tables and charts can be viewed in Power BI.



12. If you click the ellipsis (...) to the right of the report, you will have the option to View the report.



13. Clicking **View** opens the excel report within Power BI. Notice the Pivot Table reports is displayed.

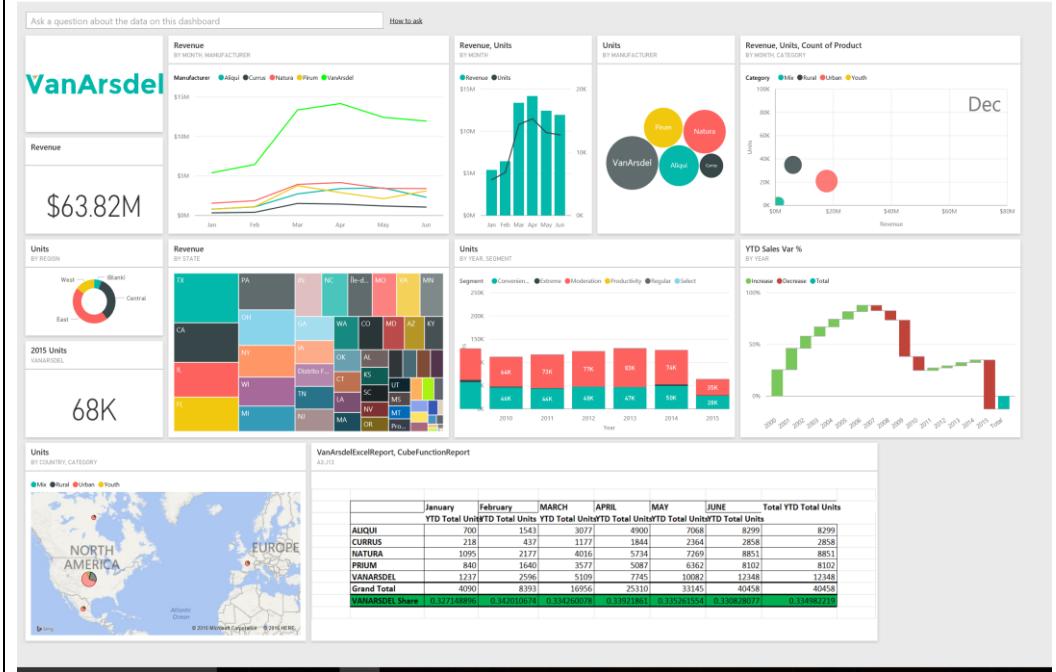
14. **Highlight** the Excel cells with data and click on the Pin on the top right corner.

15. **Pin** the Excel report to .VanArnsdel dashboard.

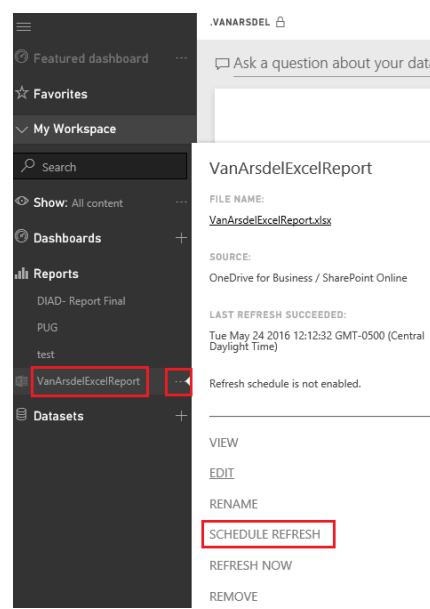
Navigate to the other sheets of the excel work book and filter the pivot table to analyze data.

		January	February	MARCH	APRIL	MAY	JUNE	Total YTD Total Units
		YTD Total Units	YTD Total					
6	ALQUI		700	1543	3077	4900	7068	8299
7	CURRUS		218	437	1177	1844	2364	2858
8	NATURA		1095	2177	4016	5734	7269	8851
9	PRIUM		840	1640	3577	5087	6362	8102
10	VANARNSDEL		1237	2596	5109	7745	10082	12348
11	Grand Total		4090	8393	16956	25310	33145	40458
12	VANARNSDEL Share	0.327148896	0.342011	0.33426	0.339219	0.335262	0.330828	0.334982219

16. Navigate back to .VanArsdel dashboard and notice the Excel report is part of the dashboard.
17. Resize and reposition the tiles as shown.



18. To schedule a refresh for your Excel workbook click on the ellipses ... next to your Excel report and click **Schedule Refresh**.



19. You will be in the **Settings** page. Depending on your source data (cloud or on premise) you can setup data refresh. If the source data is on premise you need a personal gateway. We will not be setting up data refresh again in this section. You can setup the data refresh very similar to what you did in earlier section for your Excel workbooks.

## Settings

General Dashboards Datasets Workbooks

excelreportsinpowerbi

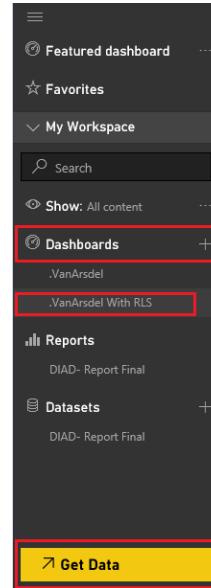
VanArsdelExcelReport

You have learned how to view and manage your Excel reports within Power BI. You can now communicate to your power users of Excel to leverage this functionality for your workbooks. This helps address the fourth business problem we reviewed earlier.

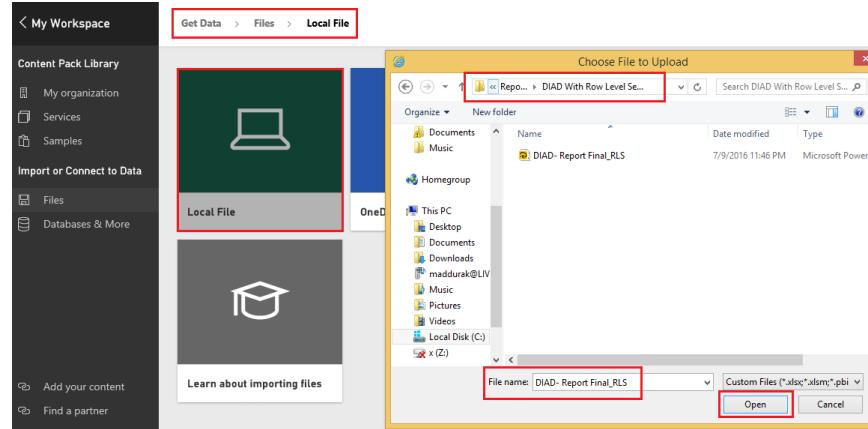
## Row-Level Security

Row-level security with Power BI can be used to restrict data access for given users. Remember we have created various roles in the Power BI Desktop model. Using Power BI Service, we will add users to these roles. For dashboards with row-level security enabled, QnA and Quick Insights is not enabled. Since we are using both QnA and Quick Insights feature in the .VanArsdel dashboard we created, let's create a new dashboard and publish a different Power BI Desktop file which has row-level security created.

1. If you are not already there, navigate to .VanArsdel dashboard by clicking on **Dashboards -> .VanArsdel**.
2. Click on the + sign next to **Dashboards** to create a new dashboard.
3. Name the dashboard as **.VanArsdel With RLS**
4. From the left panel, select **Get Data**.

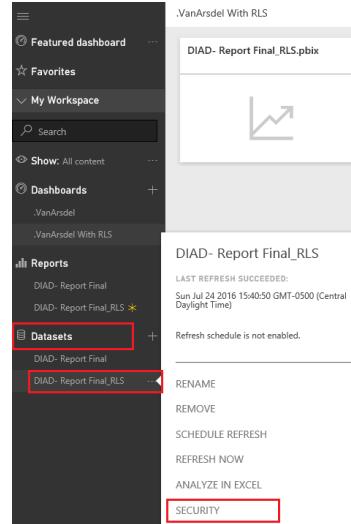


5. Select **Files** in **Get Data** page.
6. Select **Local File** in the next page.
7. Browse to **\DIAD\Reports\DIAD With Row Level Security** and select **DIAD- Report Final\_RLS.pbix** file.
8. Select **Open**.



Once the data is imported, a notification appears on the top right corner.

9. In the left panel, **hover over DIAD- Report Final\_RLS** under **Datasets** section. Click on the **ellipsis**.
10. Click on **SECURITY**. Row-Level Security page is displayed. You can create and configure roles.



11. Click on each role, and enter members email address.
12. Click on **Add** to add users.

## Row-Level Security

Canada Role (0)

France Role (0)

US Role (0)

Mexico Role (0)

Members (0)

People or groups who belong to this role

Enter email addresses

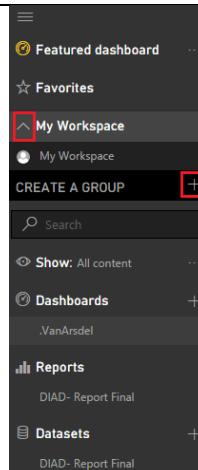
Add

## Collaboration via Office 365 Groups

In order to address the last business problem of leveraging your co-workers preparing reports and collaboratively creating content for your organization you can leverage the group functionality in Power BI. In this section you will learn how to create groups and create content. You will learn this section more efficiently if you can pair up with a co-worker from your organization.

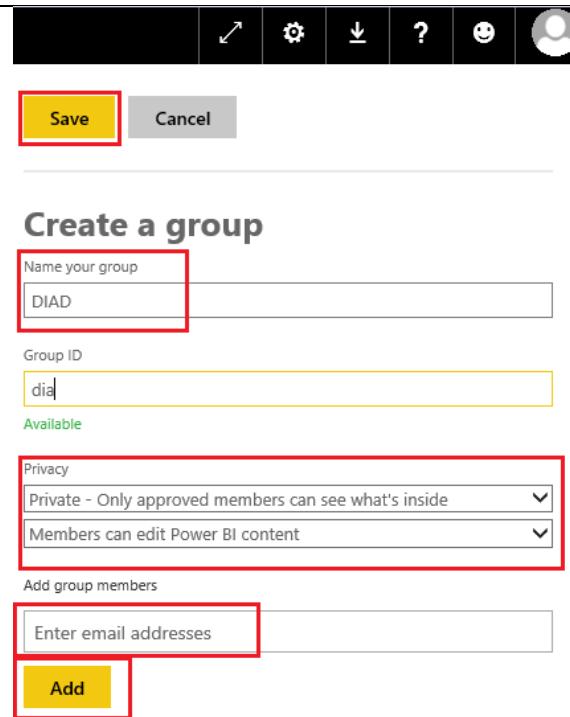
### Power BI Service - Creating a Group

1. Log into your <http://app.powerbi.com> or the URL provided by your instructor using your organizational credential.
2. Expand the left panel.
3. Select the drop down next to **My Workspace**.
4. Click the + sign next to **CREATE A GROUP**. If you are part of other groups those groups will be show here as you can see from the figure.



5. Notice Create a Group panel opens on the right side of the screen.
6. Enter a name for your group.
7. Select if you want the group to be private or public. We recommend using **private**.
8. Select if you want the members of the group to have the ability to edit content.
9. Enter the email addresses of users of your organizational who need to be part of this group as shown in the figure.
10. Click **Add** to add the members.
11. Save button is enabled at the top of the screen. Click on **Save**.

You will now have a group created.



Notice that you are now navigated to the new group workspace you just created. In this example we created a group called DIAD.

In DIAD workspace, you have separate set of Dashboards, Reports and Datasets that are part of the group. You and your co-workers can bring content into the group, create dashboards together and package the set of dashboards, reports and datasets and share them as content pack.

The screenshot shows the Power BI Group workspace for the 'DIAD' group. The left sidebar lists 'Featured dashboard', 'DIAD' (which is expanded), 'Search', 'Show: All Content', 'Dashboards' (with a note: 'You have no dashboards'), 'Reports' (with a note: 'You have no reports'), and 'Datasets' (with a note: 'You have no datasets'). The main content area has a title 'Welcome to the DIAD group' and a message: 'You're on your way to exploring your data and monitoring what matters with all your group members. Let's start by getting some data.' Below this are sections for 'Content Pack Library' (with 'My organization', 'Services', 'Files', and 'Databases' options) and 'Import or Connect to Data'. Each section has a 'Get' button.

When you create a group, there is a separate OneDrive account created for the group. You can have all your assets of Excel and Power BI Desktop files stored in the groups OneDrive.

You can get to the groups OneDrive account by clicking on the ellipsis next to the group name and selecting Files or logging into Office 365 and selecting the appropriate group.

Please wait for automated email about creation of groups to see all the functionality about groups.

The screenshot shows the Office 365 Groups interface. On the left, under 'Groups', the 'DIAD' group is selected and highlighted with a red box. Other groups listed are 'PowerBI', 'Samples', and 'TestGroup'. On the right, the 'Power BI' tab is selected, showing the 'VanArsdel' group details. The 'Files' option is highlighted with a red box. Other options include 'Members', 'Calendar', 'Conversations', 'Edit Group', and 'Leave Group'.

## 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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