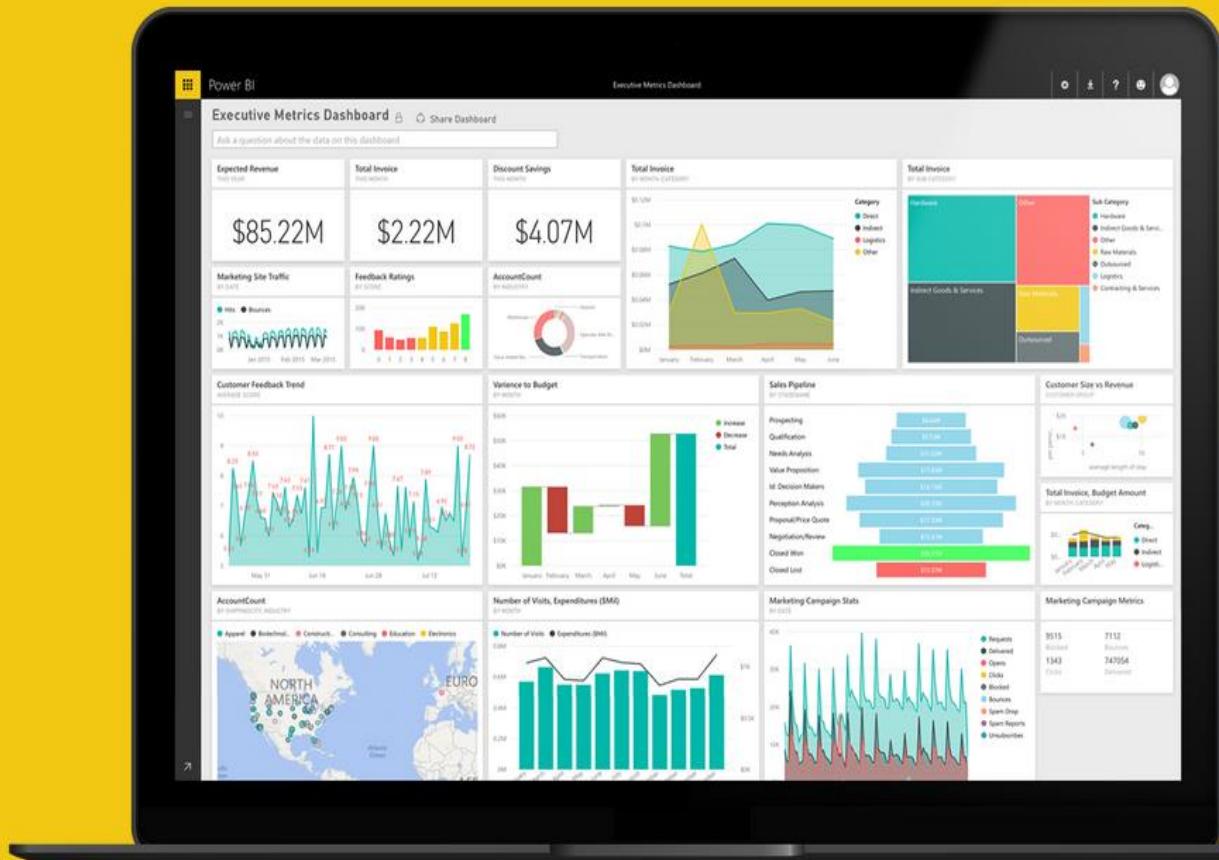




# Dashboard in a Day – Data Modeling and Exploration

by Power BI Team, Microsoft



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# Lab Prerequisites

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

- You must be connected to the internet.
- **Signup for Power BI:** Go to <http://aka.ms/pbidiadtraining> and sign up for Power BI with a business email address. If you cannot sign up for Power BI, let the instructor know. If you have an existing Power BI account please use the same url as above.
- At minimum, a computer with 2-cores and 4GB RAM running one of the following version of Windows: Windows 8 / Windows Server 2008 R2, or later.
- Microsoft Power BI Desktop requires Internet Explorer 10 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** to the **DIAD** folder you just created (C:\DIAD).
- **Download and install Power BI Desktop** using any one of the options listed below:
  - If you have Windows 10, use Microsoft App Store to download and install Power BI Desktop app.
  - Download and install Microsoft Power BI Desktop from <http://www.microsoft.com/en-us/download/details.aspx?id=45331>.
  - If you already have Power BI Desktop installed ensure you have the **latest version** of Power BI downloaded.
- **Download and install Power BI Mobile App on your mobile device**
  - If you are using an Apple product download and install the Microsoft Power BI Mobile app from the Apple store or this link <https://apps.apple.com/us/app/microsoft-power-bi/id929738808>
  - If you are using an Android product download and install the Microsoft Power BI Mobile app from the Google Play store or this link <https://play.google.com/store/apps/details?id=com.microsoft.powerbim>

# Document Structure

This document is lab 02 of 05 labs in total. The document structure and introduction section can be found in lab 01.

If you are joining the DIAD at this point or were unable to complete Lab 01, please start this lab with the provided: "Lab 1 solution.pbix" file you can find in the Reports folder.

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 Power BI functionality with industry sample data. Any uses of this data must include this attribution to ObviEnce

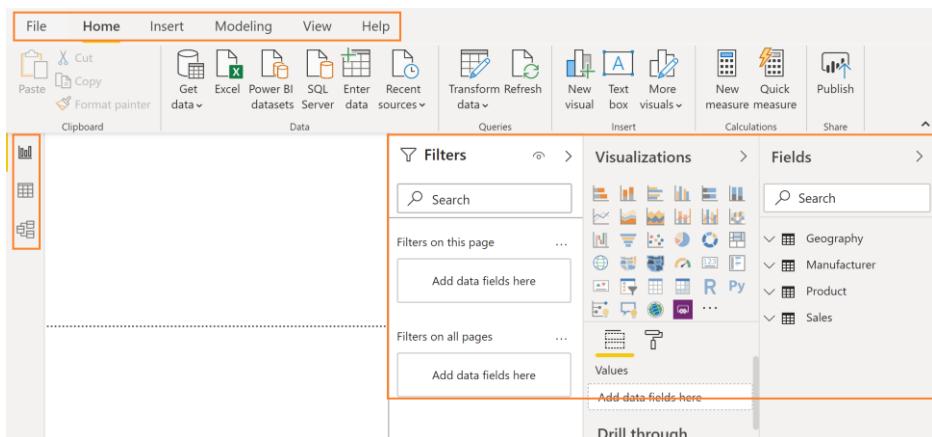
# Power BI Desktop – Data Modeling and Exploration

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

## Power BI Desktop - Layout

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

1. On the top, you see the **Home** tab where the most common operations you perform are available.
2. **Modeling** tab in the ribbon enables additional data modeling capabilities like adding custom columns and calculated measures.
3. **View** tab has options to format the page layout.
4. **Help** tab provides self-help options like guided learning, training videos and links to online communities, partner showcase and consulting services.
5. On the left side, you have three icons, **Report**, **Data** and **Model**. 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.
6. The center **white space** is the canvas where you will be creating visuals.
7. **Visualizations** panel on the right allows you to select visualizations, add values to the visuals and add columns to the axes or filters.



8. 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.

9. Click on the Data icon. Expand **Sales** table in the **Fields** as shown in the figure

Scroll up and down to notice how fast you can navigate **through ~ 3 Million rows**.

Table tools							
Name	Sales	Mark as date table	Manage relationships	New measure	Quick measure	New column	New table
Structure							
Date	Zip	Units	Revenue	Source.Name	Country		
2213 Wednesday, December 27, 2017 02764	1	89.1975	USA				
2213 Wednesday, December 27, 2017 21502	1	89.1975	USA				
2213 Wednesday, December 27, 2017 29918	1	89.1975	USA				
2213 Wednesday, December 27, 2017 34145	2	89.1975	USA				
2213 Wednesday, December 27, 2017 36600	1	89.1975	USA				
2213 Wednesday, December 27, 2017 36736	1	89.1975	USA				
2213 Wednesday, December 27, 2017 37312	1	89.1975	USA				
2213 Wednesday, December 27, 2017 37683	1	89.1975	USA				
2213 Wednesday, December 27, 2017 39350	2	89.1975	USA				
2213 Wednesday, December 27, 2017 46052	1	89.1975	USA				
2213 Wednesday, December 27, 2017 50461	1	89.1975	USA				
2213 Wednesday, December 27, 2017 59801	1	89.1975	USA				
2213 Wednesday, December 27, 2017 70040	1	89.1975	USA				
2213 Wednesday, December 27, 2017 70734	2	89.1975	USA				
2213 Wednesday, December 27, 2017 75407	1	89.1975	USA				
2213 Wednesday, December 27, 2017 75901	1	89.1975	USA				
2213 Wednesday, December 27, 2017 81331	1	89.1975	USA				
TABLE: Sales (2,906,112 rows)							

10. Click on the **Model** 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.

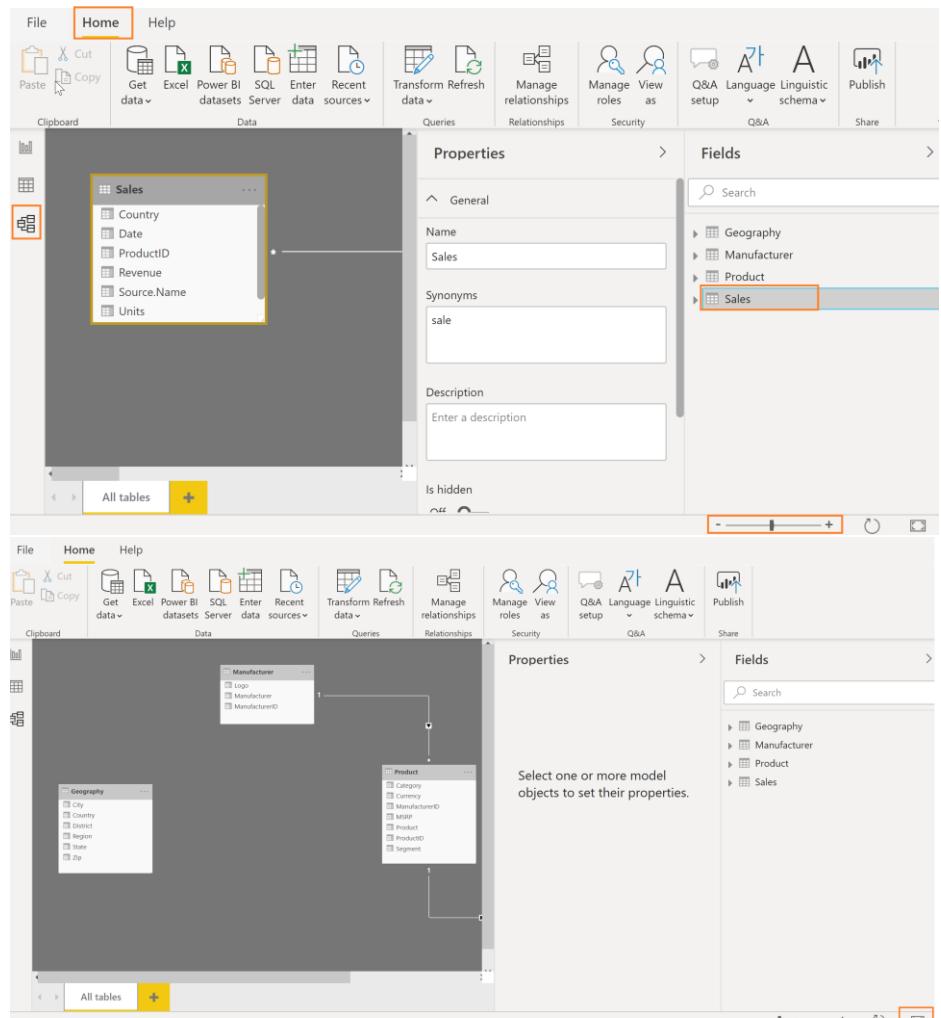
- A relationship is created between Sales and Product tables using ProductID column.
- A relationship is created between Product and Manufacturer tables using ManufacturerID column.

Power BI supports 1 to many, 1 to 1 and many to many types of relationships between the tables.

In this lab we will be using 1 to many type of relationship. This is the most common type of relationship between tables. This means one of the tables involved in the relationship should have a unique set of values.

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

**Note:** Tables may not appear as shown in the figure. You can zoom in and out of the Relationships page by dragging the

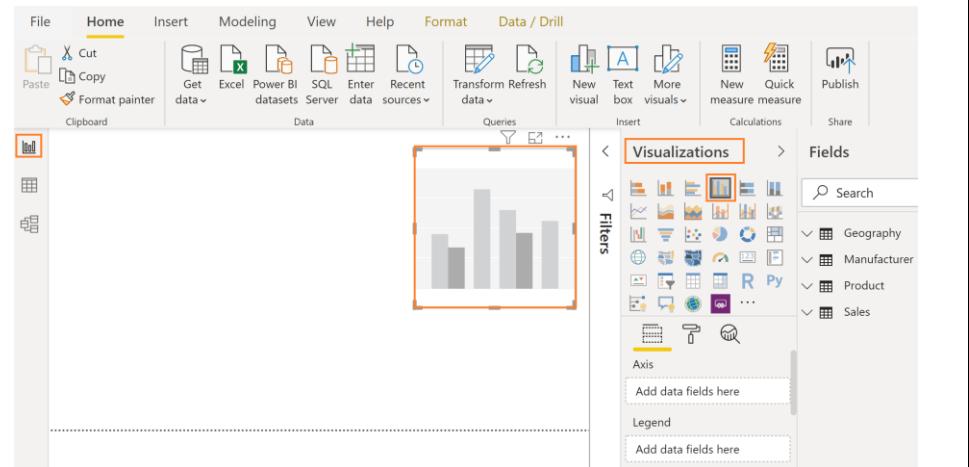


zoom slider in the bottom right corner of the window. Also, if want to ensure you are seeing all the tables, use the fit to screen icon:  . Drag and move the tables to appear as shown in the figure.

## Power BI Desktop – Data Exploration

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

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



13. From the **FIELDS** section, expand **Geography** table and click the checkbox next to the **Country** field.

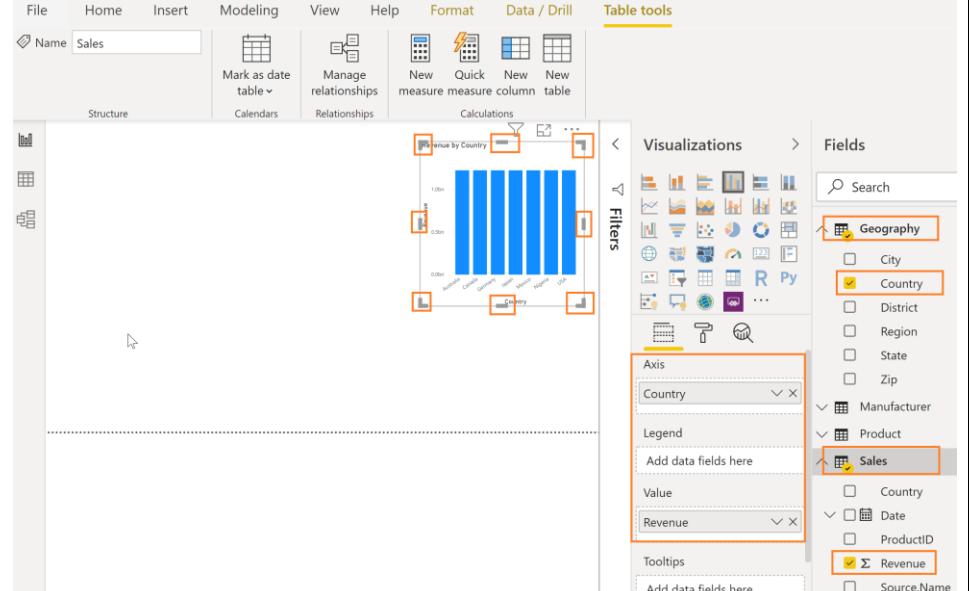
14. From the **FIELDS** section, expand **Sales** table and click the checkbox next to the **Revenue** field.

15. **Resize** the visual as needed by dragging the edges.

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

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

To create a relationship between the two tables we need a “joining” or “relating” column.



16. Click on the **Model** icon on the left panel to navigate to the Relationship view.

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

You will notice Create relationship dialog opens with a warning message at the bottom stating the relationship has a many-many cardinality. The reason for the warning is that we don't have unique Zip values in Geography. This is because multiple countries could have the same Zip code. Let's concatenate Zip and Country columns to create a unique value field.

18. Select **Cancel** in Create relationship dialog.

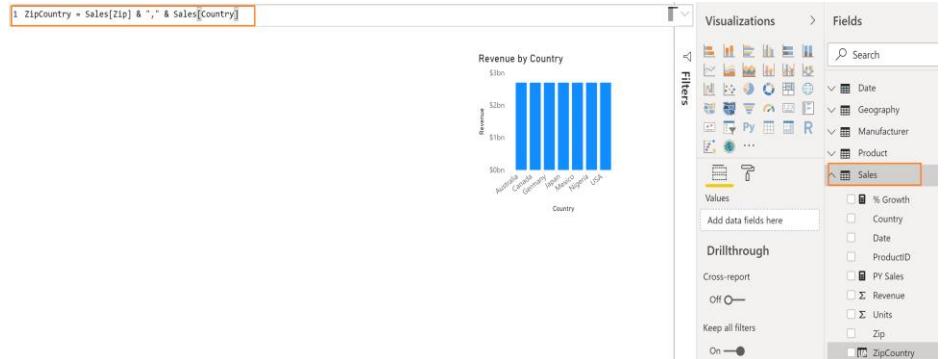
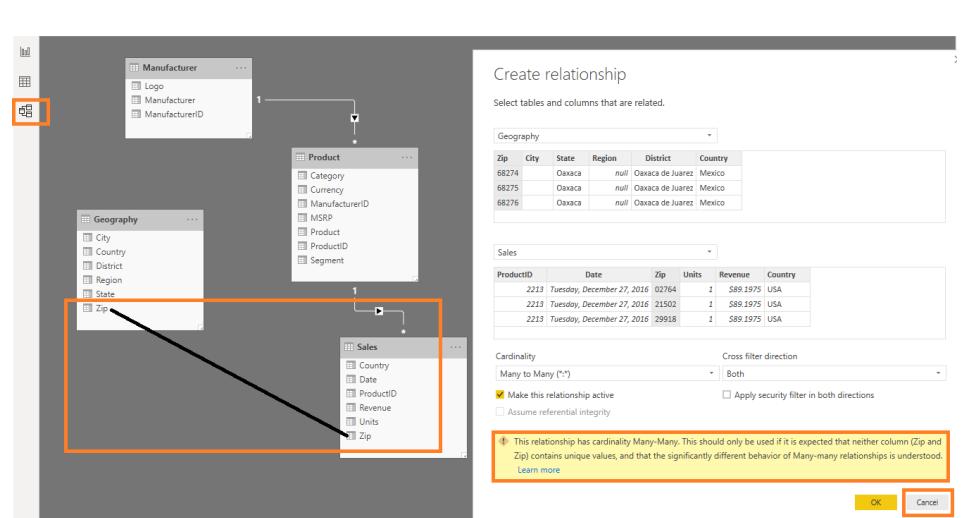
We need to create a new column in both the Geography table and the Sales table that combines "Zip" and "Country". Let us start by creating a new column in the Sales table.

19. Click on the **Report** icon on the left panel to navigate to the Report view.

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

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

21. 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.



### IMPORTANT!

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

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

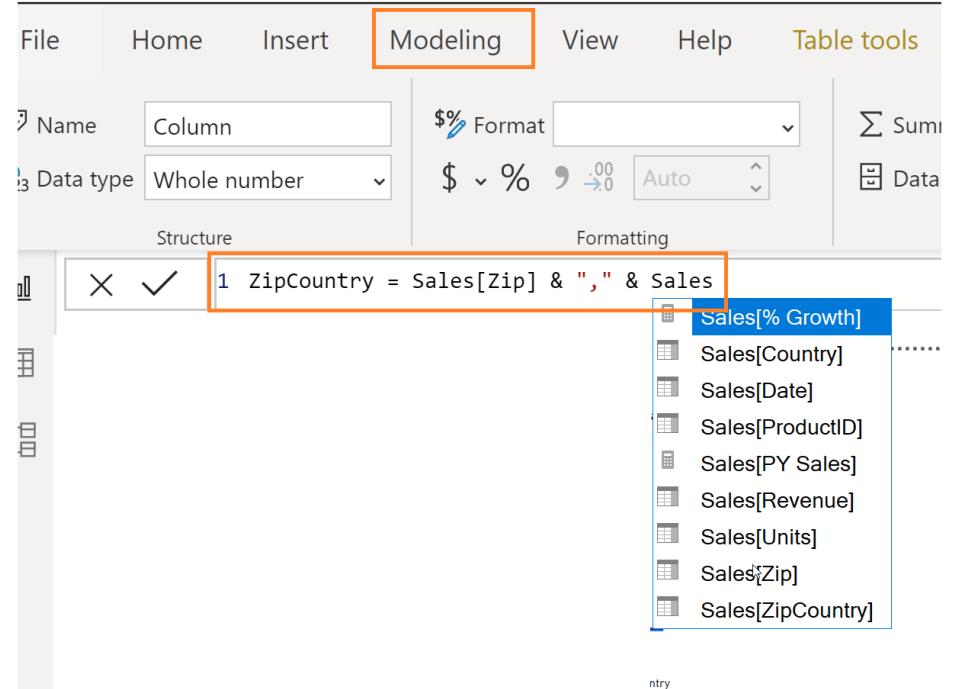
22. Once you are done entering the formula press Enter or click in the check mark on the left side of the formula bar.

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 Data Analysis Expression (DAX) 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 **Table Tools -> New Column** or **Modeling -> New Column** from the ribbon. Let us use this method to create a "ZipCountry" column in the Geography table.



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

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

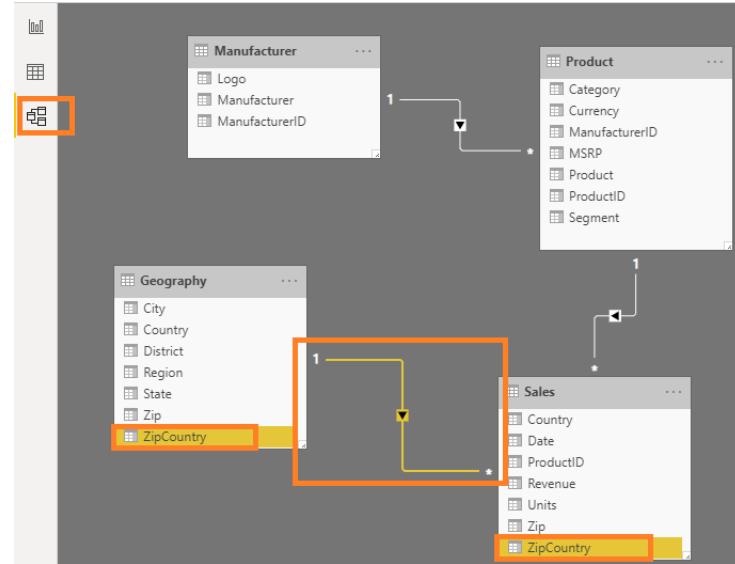
**ZipCountry = Geography[Zip] & "," & Geography[Country]**

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.

25. Click on the **Model** icon on the left panel to navigate to the Relationship view.

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

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



27. Click on the **Report** icon on the left panel to navigate to the Report view. Notice the clustered column chart we created earlier. It shows different sales for each country. USA has the most sales followed by Australia and Japan. By default, it is sorted by Revenue.

28. Click on the **ellipsis** on the top right corner of the visual. (the ellipsis may also show up on the bottom of the chart instead of the top)

Notice there is option to Sort by Country as well.

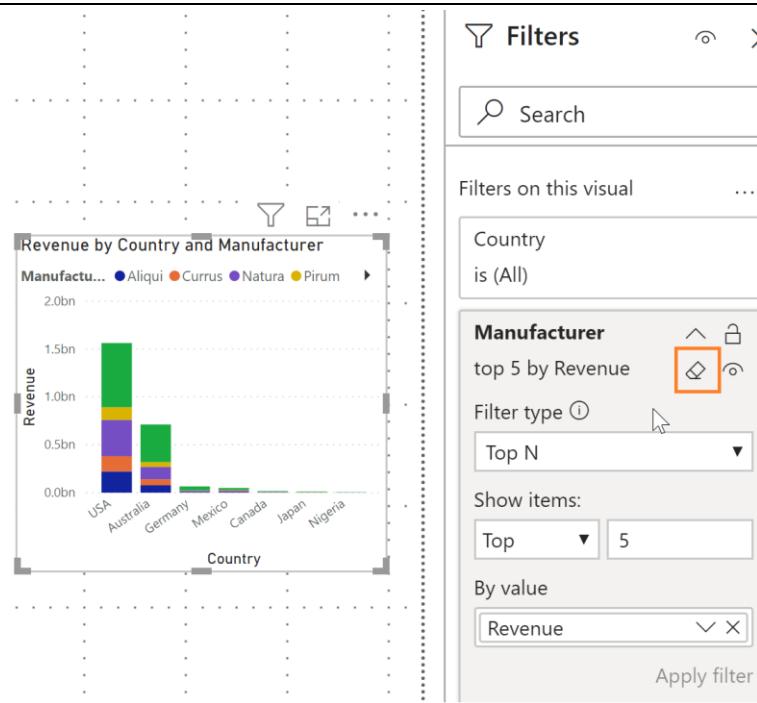
<p>29. From the <b>FIELDS</b> section, expand <b>Manufacturer</b> table and drag <b>Manufacturer</b> column to the <b>Legend</b> section under <b>Visualizations</b>.</p>	<p><b>Filters</b></p> <ul style="list-style-type: none"> <li>Country is (All)</li> <li>Manufacturer is (All)</li> <li>Revenue is (All)</li> </ul> <p><b>Visualizations</b></p> <ul style="list-style-type: none"> <li>Axis: Country</li> <li>Legend: Manufacturer</li> <li>Value: Revenue</li> </ul> <p><b>Fields</b></p> <ul style="list-style-type: none"> <li>Geography</li> <li>Manufacturer (selected)</li> <li>Product</li> <li>Sales</li> </ul>
<p>30. While you have your chart selected, select the Clustered column chart from the <b>VISUALIZATIONS</b> section select <b>Stacked column chart</b> visual.</p> <p>31. Resize the visual as needed.</p> <p>Now we can figure out the top manufacturers by country. It will be nice to narrow down to the top 5 competitors to better analyze the data.</p> <p>Try different visuals to see which chart explains the data the best.</p>	<p><b>Visualizations</b></p> <ul style="list-style-type: none"> <li>Stacked column chart (selected)</li> <li>Axis: Country</li> <li>Legend: Manufacturer</li> <li>Value: Revenue</li> </ul>
<p>32. With <b>Stacked column chart</b> selected</p> <p>33. In the Filters pane, expand <b>Manufacturer</b>.</p> <p>34. From the <b>Filter Type</b> drop down select <b>Top N</b>.</p> <p>35. Enter 5 in the text box next to Top.</p> <p>36. From <b>Sales</b> table, drag and drop <b>Revenue</b> field to <b>By value</b> section.</p> <p>37. Select <b>Apply filter</b>.</p> <p>Notice now the visual is filtered to display the Top 5 manufacturers by Revenue. We see that VanArsdel has higher percentage of sales in Australia compared to other countries.</p>	<p><b>Filters</b></p> <ul style="list-style-type: none"> <li>Country is (All)</li> <li>Manufacturer is (All)</li> <li>Filter type: Top N</li> <li>Show items: Top 5</li> <li>By value: Revenue</li> </ul> <p><b>Visualizations</b></p> <ul style="list-style-type: none"> <li>Stacked column chart</li> <li>Axis: Country</li> <li>Legend: Manufacturer</li> <li>Value: Revenue</li> </ul> <p><b>Fields</b></p> <ul style="list-style-type: none"> <li>Geography</li> <li>Manufacturer</li> <li>Product</li> <li>Sales (selected)</li> <li>Revenue (selected)</li> <li>Source.Name</li> <li>Units</li> <li>Zip</li> <li>ZipCountry</li> </ul>

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

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

**38. With Clustered column chart selected**

**39. Hover over and select the Clear filter icon (erase) next to Manufacturer field in the Filters Pane.**



**40. From the FIELDS section, right click on the Manufacturer field name (note: do not check the checkbox) from Manufacturer table.**

**41. Click New Group**

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

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

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

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

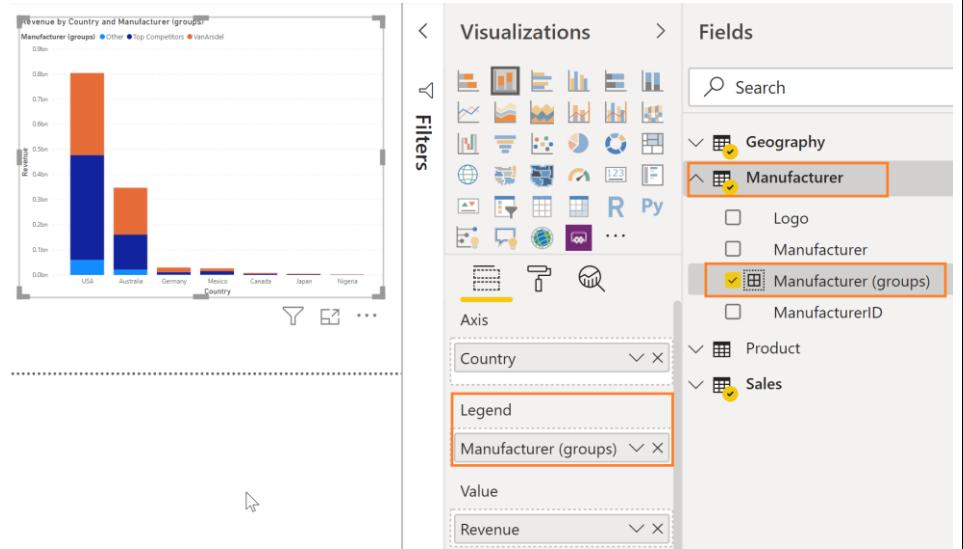
**46. Select the check box Include Other group.** This will create another Other group which will include all the other manufacturers.

**47. Select OK to close Groups dialog.**

**Groups**

48. With the **Stacked column chart** selected, click on the X next to **Manufacturer** in the **Legend** section. This will remove Manufacturer.
49. From the **FIELDS** section, drag the newly created **Manufacturer (groups)** to the Legend section.

Now we can clearly see that VanArsdel has nearly 50% share in Australia.



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

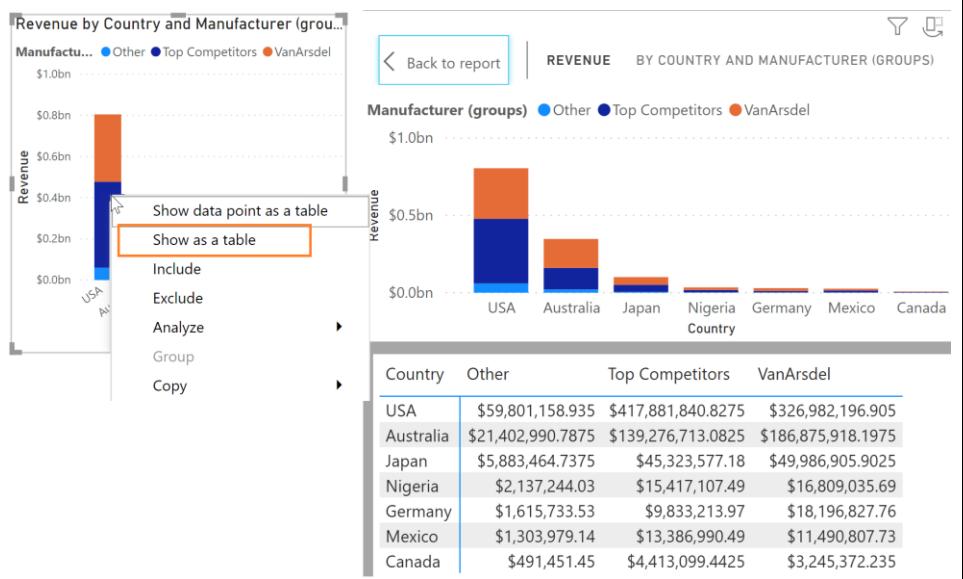
#### 51. Select **Show as a table**.

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

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

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

You can use similar steps to **Show data point as a table** to see records for a particular data point



Let's create Revenue by Manufacturer visual.

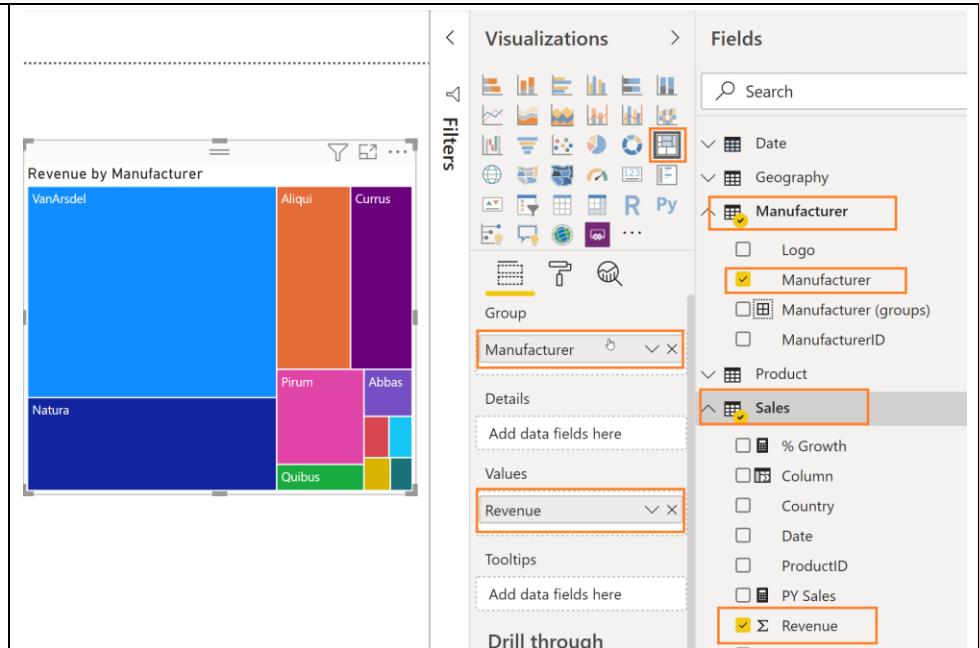
54. Click on the white space in the canvas. From the **FIELDS** section, click the **checkbox** next to **Revenue** field in **Sales** table.

55. From the **FIELDS** section, click the **checkbox** next to **Manufacturer** field in **Manufacturer** table.

56. From the **VISUALIZATIONS** section, select **Treemap** visual.

We have Revenue by Manufacturer.

Let's figure out the interaction between the Stacked column chart and the Treemap visuals.

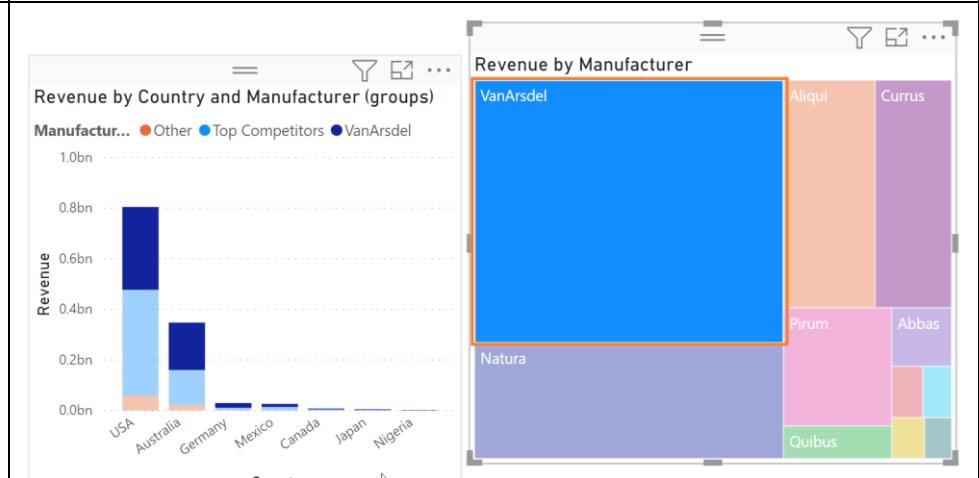


57. Select **VanArsdel** in the **Treemap** and notice Stacked column chart is filtered. This confirms that VanArsdel has a big percent of the Australian market.

58. To remove the filter select

VanArsdel again.

The interaction between visuals is called **cross filtering**.



Previously we added Top 5 Visual level filter. Let's add a filter to the Page level, so we are working with the Top Competitors and VanArsdel and filter out the other manufacturers.

Page level filters apply to all the visuals on the page whereas Visual level filter applies to a visual. Ensure the Filters pane is expanded/open

59. From **FIELDS** section, drag **Manufacturer (groups)** from **Manufacturer** table to the **Filters on this page** box in the **Filters Pane**
60. Select **Top Competitors** and **VanArsdel**.

The screenshot shows a 'Revenue by Manufacturer' chart with categories like VanArsdel, Aliqui, Curus, Natura, and Pirum. To the right, the 'Filters' pane is open, showing a 'Manufacturer (g)' group with 'Top Competitors 4' and 'VanArsdel' selected. The 'Fields' pane shows the 'Sales' table with 'Revenue' selected.

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

61. Click on the white space in the canvas.
62. Click the checkbox next to the **Date** field in **Sales** table. Notice a Date Hierarchy is created.
63. Click the checkbox next to the **Revenue** in **Sales** table field. Notice a Clustered column chart is created. Also notice in the **Axis** section, a date hierarchy is created. There are arrows on the top bar of the chart. This is used to navigate through the hierarchy.

The screenshot shows a 'Revenue by Year' chart with bars for 2017, 2018, and 2019. To the right, the 'Filters' pane shows the 'Sales' table with 'Date' and 'Revenue' selected. The 'Fields' pane shows the 'Sales' table with 'Revenue' selected.

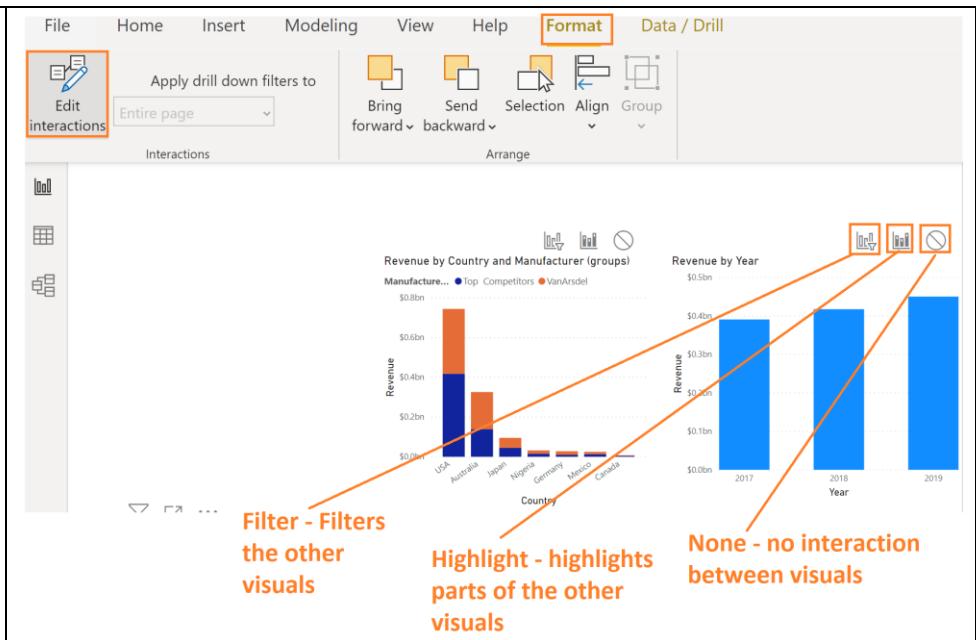
64. Click on **Australia** column in the **Revenue by Country** visual.

65. With the Revenue by Country visual selected, from the ribbon select **Format -> Edit Interactions**.

Notice on the top right of the other two visuals we see new icons with the highlight icon selected.

66. Select **filter icon** for **both** **visuals**.

Notice now in both Revenue by Year and Revenue by Manufacturer data is filtered for Australia.



67. Now select **Revenue by Year** visual.

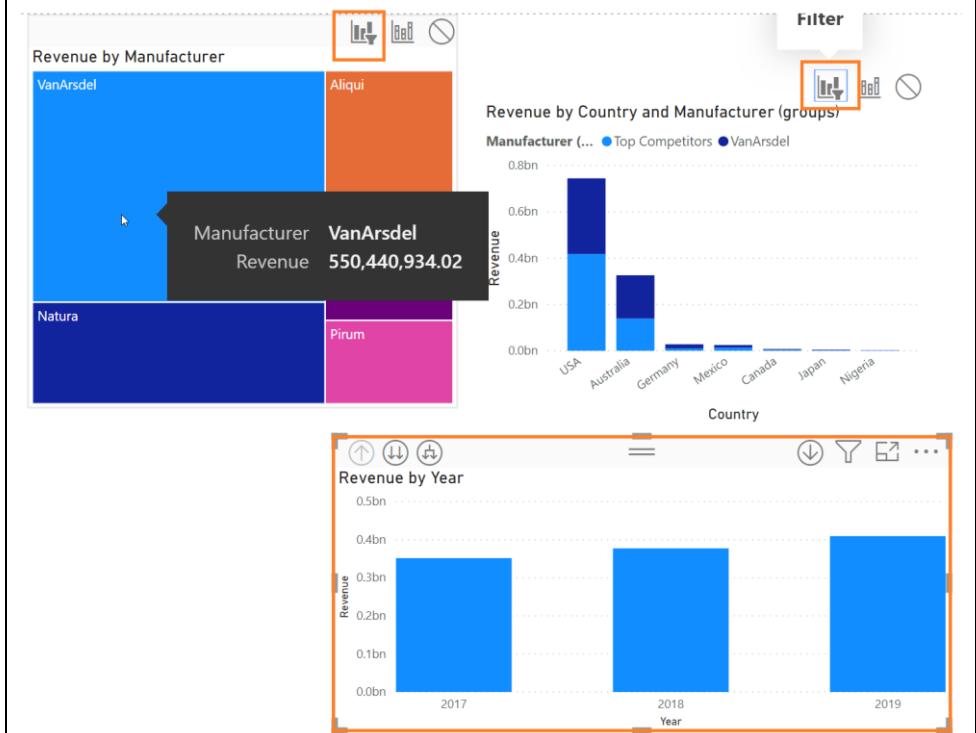
68. Select **filter icon** on the other **two** **visuals**.

69. Similarly, select **Revenue by Manufacturer** visual and select **filter icon** on the other **two** **visuals**.

Once you are done, all the visuals should be in filter mode.

70. With the **Revenue by Manufacturer** visual selected, from the ribbon select **Format -> Edit Interactions** to remove the icons.

Note: If your screen doesn't look similar please edit interactions

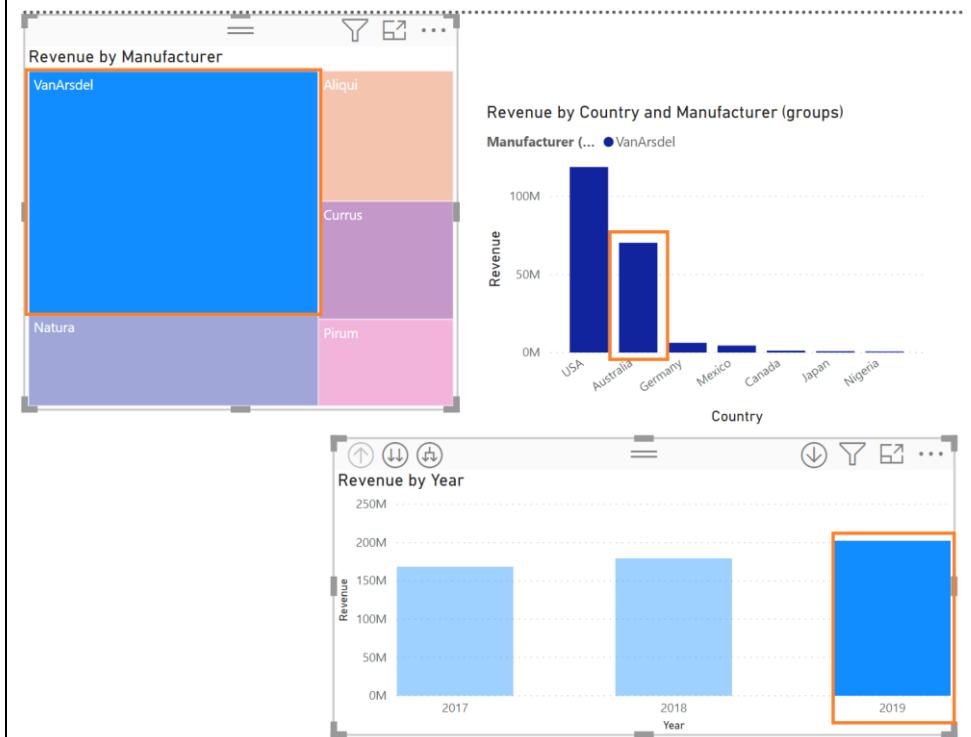


We had already noticed that VanArsdel has a big share of the market in Australia. Let's check how VanArsdel has done over time in Australia.

71. Click on the **Revenue by Country** chart, remove **Manufacturer (groups)** from the legend

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

73. **Ctrl+Click Australia column in Revenue by Country** visual. Now we have filtered the charts by both VanArsdel and Australia. We see a spike in 2019 sales for VanArsdel in Australia.



We are intrigued by the spike in 2019 for VanArsdel in Australia. Let's investigate further.

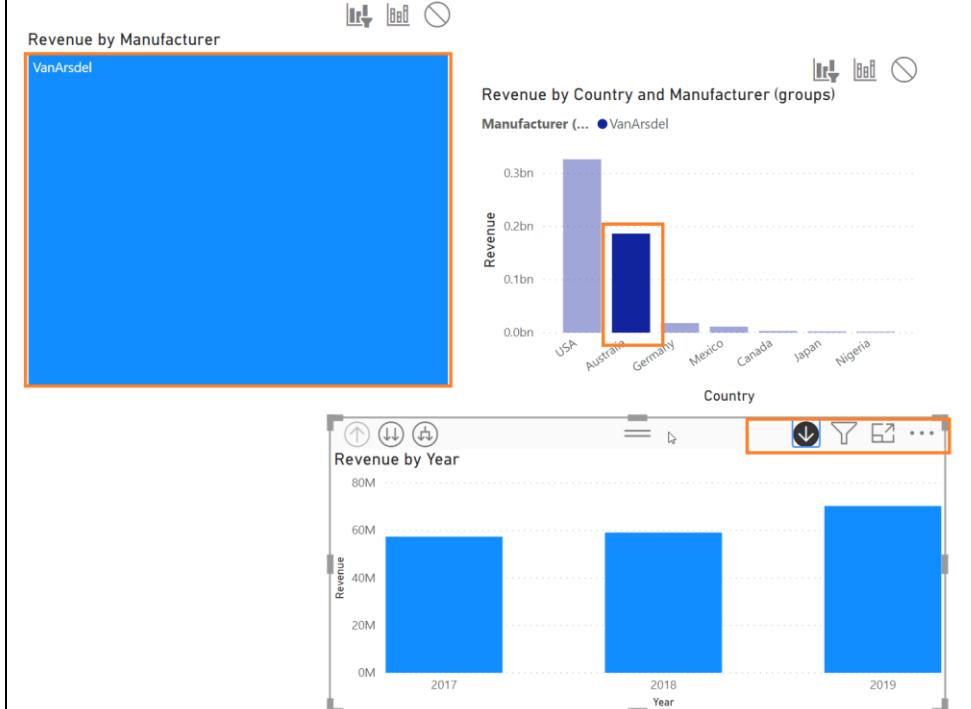
74. Click on **VanArsdel** in the **Revenue by Manufacturer** visual.

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

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

77. Select **2019** column in **Revenue by Year** visual.

Notice you have drilled down to quarter level of 2019. There is a big spike in the 4<sup>th</sup> quarter. Interesting let's dig further...



78. Click on the **double arrow icon** on the **top right** of Revenue by Year visual. This drills down to the **next level of the hierarchy** which is month.

Looks like sales picked up in September and October will it be an annual trend?

79. Click on the **up arrow icon** on the **top right** of Revenue by Year visual to drill up to **Quarter** level.

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



81. Click on the **split arrow icon** on the **top right** of Revenue by Year visual. This expands down to the **next level of the hierarchy** which is quarter for all the years.

Notice 4<sup>th</sup> quarter sales have always been high but in 2019 there is a bigger spike in the 4<sup>th</sup> quarter.

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

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



## Power BI Desktop – Data Exploration Continued

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

83. Click on the white space in the canvas. From the **FIELDS** section, click the checkbox next to **Manufacturer** field in **Manufacturer** table.

84. From the **VISUALIZATIONS** section select **Slicer** visual.

85. You will see a list of Manufacturers. Select **VanArsdel** and notice all the visuals are filtered based on your selection.

86. Hover over the top right corner of the visual and click on the **down arrow**.

Notice you have the option to change the slicer from a list to a drop down.

87. Select **Dropdown**.

88. Select **VanArsdel** from the dropdown.

89. Confirm **Top Competitors** and **VanArsdel** are selected in the **Manufacturer (groups)** filter in the Filters pane

Note that there is a box for **Filters on all pages** in the Filters pane. If you have duplicate pages this is how you sync a filter for the whole document

The screenshot shows the Power BI desktop interface. On the left, the 'Fields' pane lists fields from various tables: Geography, Manufacturer, Product, and Sales. The 'Manufacturer' field is selected, indicated by a yellow checkmark. In the center, the 'Visualizations' pane shows a 'Slicer' visual. A context menu is open at the top right of the slicer, with 'Dropdown' highlighted. Below the slicer, a 'Field' dropdown menu is open, also showing 'Manufacturer'.

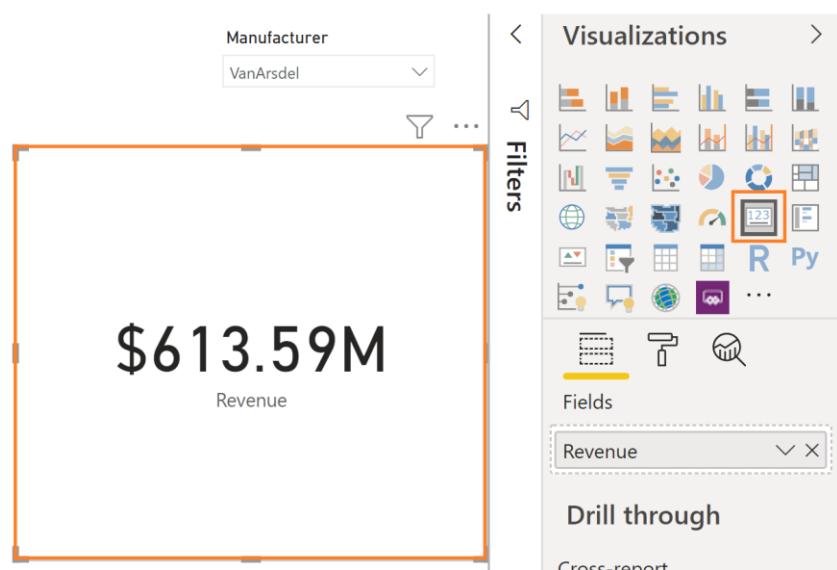
The screenshot shows the 'Filters' pane in Power BI. It displays a list of filters applied across all pages. One filter, 'Manufacturer (groups)', is expanded, showing it includes 'TopCompetitors' and 'VanArsdel'. Other filters listed include 'Select all', 'Other', and 'Require single selection'.

We use the Manufacturer slicer to analyze one manufacturer at a time. Notice when we do this, Revenue by Manufacturer Treemap visual is not the best representation of the data. Let's change it.

#### 90. Select Revenue by Manufacturer Treemap visual.

91. From the **VISUALIZATIONS** section, select **Card** visual.

The card visual will give us the Revenue as we filter and cross filter the visuals.



Notice all key dimensions/characteristics is in its own table with the related attributes **except date**. E.g. Product attributes are in Product table and we created a relationship between Product and Sales.

It is good practice to have dimensions in different tables. In the future if we need to add date attributes like Week number, Day of Week, Holiday, etc., we need to have a Date table. Let's create Date table.

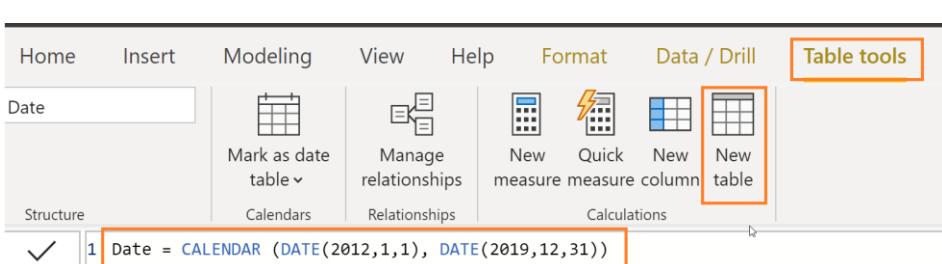
92. Navigate to Data view by clicking on the **Data** icon on the left panel.

93. From the ribbon select **Table Tools -> New Table**.

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

94. Enter **Date =CALENDAR  
(DATE(2012,1,1), DATE(2019,12,31))** in the formula bar and click on the **check mark**. A Date table with a Date column is created.

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



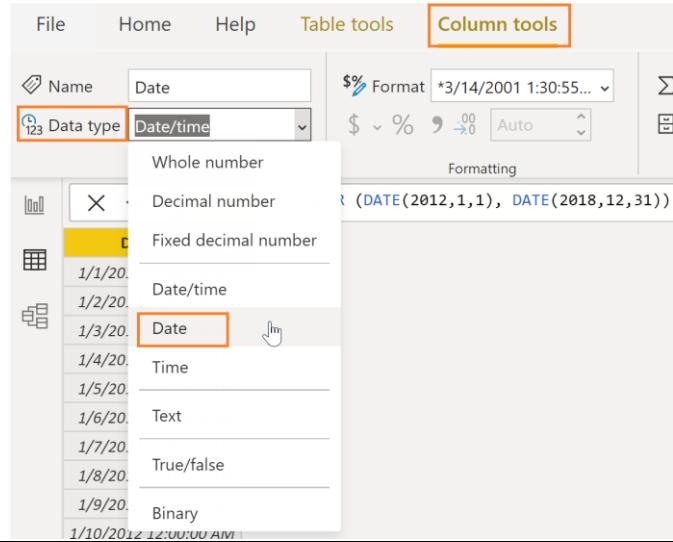
We are creating Date from 2012 to 2019 since our dataset has data for those years.

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

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

95. Select the **Date** field in the **Date** table.

96. From the ribbon, select **Column Tools** -> **Data type -> Date**.



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

97. From the ribbon, select **Column Tools** -> **Manage Relationships**.

98. Manage Relationships dialog opens.

Select **New** button.

99. Create relationship dialog opens.

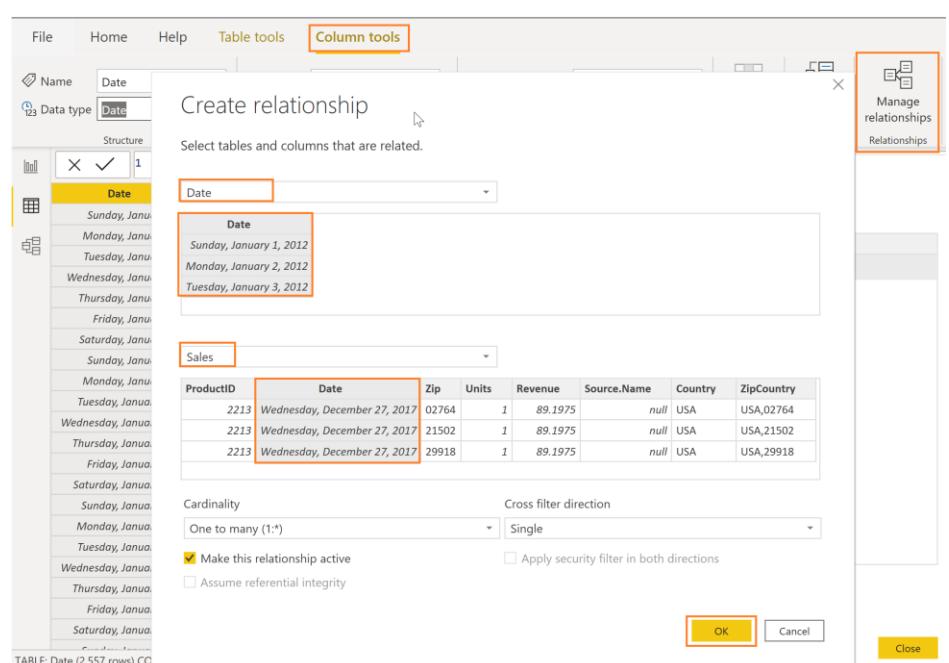
Select **Date** from the top dropdown.

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

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

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

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



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

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

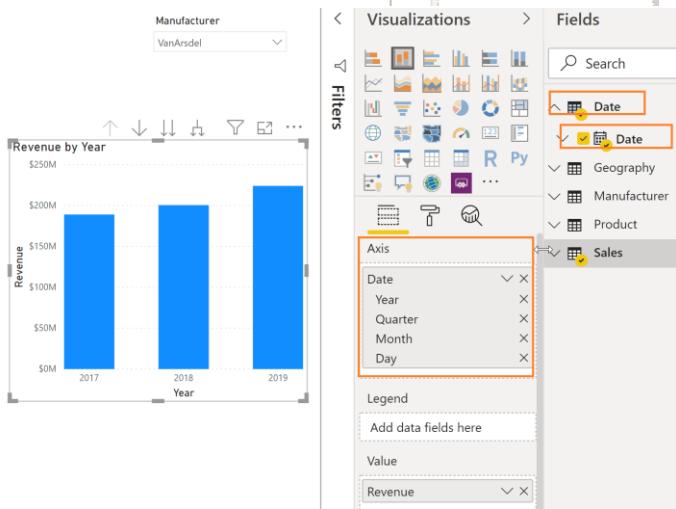
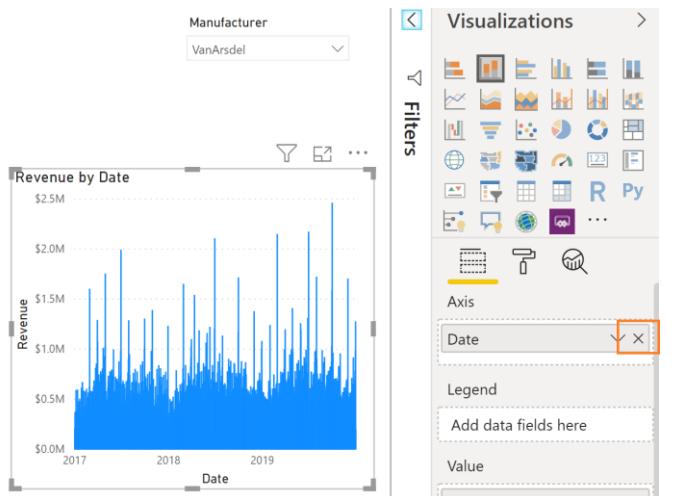
105. Select **Revenue by Date** visual.

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

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

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

Notice with the new Date field behavior is like earlier.

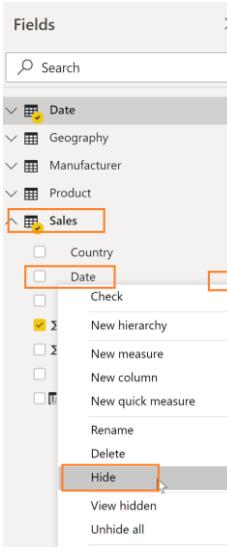


There are two Date fields, it might get confusing to figure out which to use. Let's hide the Date field in Sales table.

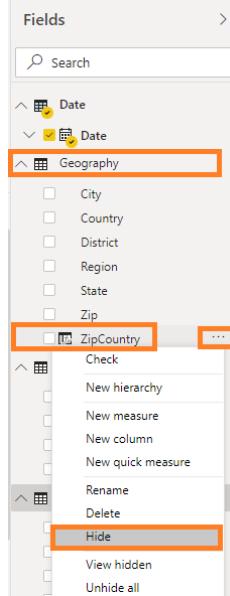
109. From the **FIELDS** section, Click on the ellipsis next to **Date** field in **Sales** table.

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

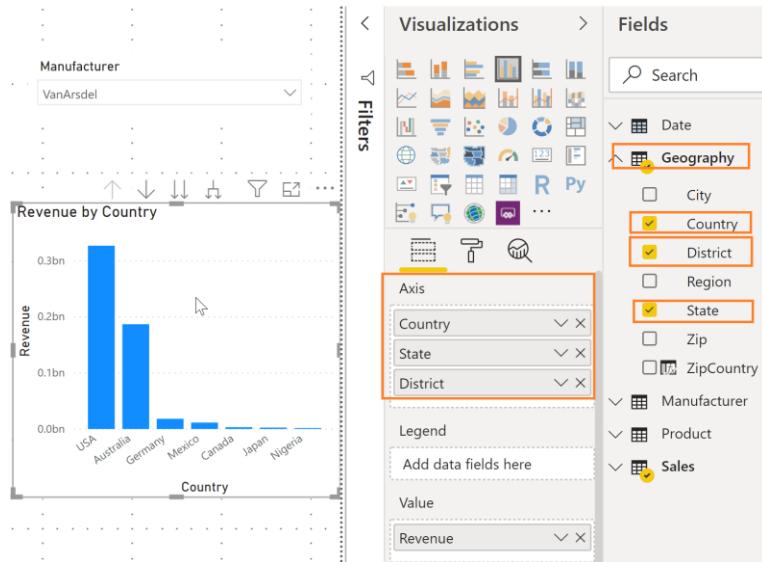
111. Similarly hide **Country**, **ProductID**, **Zip** and **ZipCountry** in **Sales** as well



112. Similarly hide **ZipCountry** from the **Geography** table.
113. Hide **ManufacturerID** from **Manufacturer** table.
114. Hide **ProductID** and **ManufacturerID** from **Product** table.
- 115.
- Note:** It is best practice to hide fields that are not used in reports.



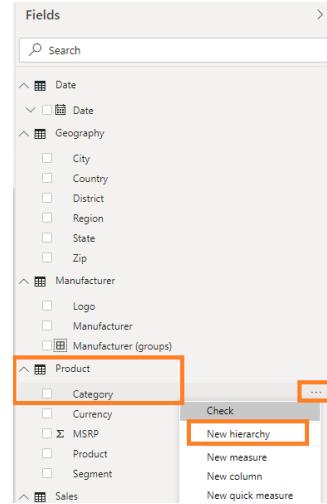
- Let's get back to our data story, Australia, VanArsdel and 2019 – remember 🧐. Let's check if the spike occurred in a specific region in Australia.
116. Select **Revenue by Country** visual.
117. From the **FIELDS** section, drag **State** field from **Geography** table, below **Country** in the **Axis** section.
118. Drag **District** field below **State** in the **Axis** section.
- We just created a hierarchy.



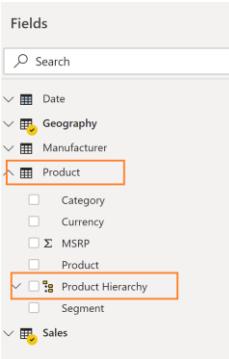
119. Make sure **VanArsdel** is selected in the Manufacturer slicer.
120. **Enable Drill mode** by selecting down arrow on the top right corner of **Revenue by Country** visual.
121. Select **Australia** to drill down to **State level**.
122. From **Revenue by Year** visual select **2019** and notice Revenue by Country and State visual.
123. **Drill up to country level**.



- Let's analyze by Product to figure out what's happening there. Before we start with that let's create a Product Hierarchy. This way we don't have to drag multiple fields to the visual.
124. From the **FIELDS** section, click on the ellipsis next to **Category** in **Product** table.
125. Select **New Hierarchy**.



- Notice a new field called Category Hierarchy is created in the Product table.
126. **Double click on Category Hierarchy** and **rename it to Product Hierarchy**.



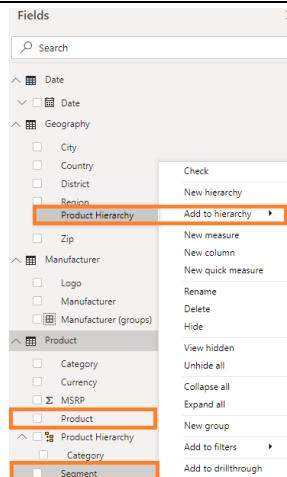
127. Click on the ellipsis next to **Segment**.

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

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

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

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



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

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

133. Click the checkbox next to **Product Hierarchy**. Notice complete hierarchy is selected.

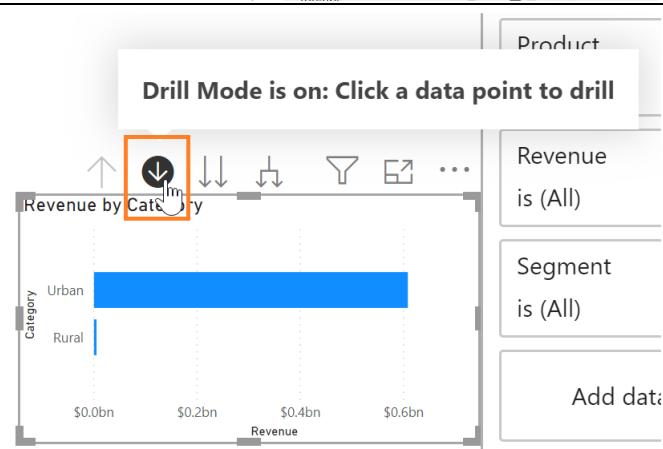
134. From the **FIELDS** section, expand **Sales** table.

135. Click the checkbox next to **Revenue** field.

The screenshot shows the Power BI canvas with a clustered bar chart titled 'Revenue by Category'. The chart has 'Category' on the Y-axis (Urban, Rural) and 'Revenue' on the X-axis (\$0.0bn, \$0.1bn, \$0.2bn). The 'Product' table is expanded in the Fields pane, showing 'Product Hierarchy' selected. The 'Sales' table is also expanded, with 'Revenue' selected. The 'Axis' section of the visualizations pane shows 'Product Hierarchy' selected.

136. Enable drill down mode in the **Revenue by Category** chart by clicking on the down arrow

137. Click on **Urban**



138. In Revenue by Country visual select Australia.

139. Ctrl+Click 2019 from Revenue by Year visual. Notice sales in Extreme category is higher than Convenience and Moderation segments.

We need to investigate further...



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

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

142. Select **2018** in Revenue by Year visual.

143. Remove drill mode from Revenue by Category visual.

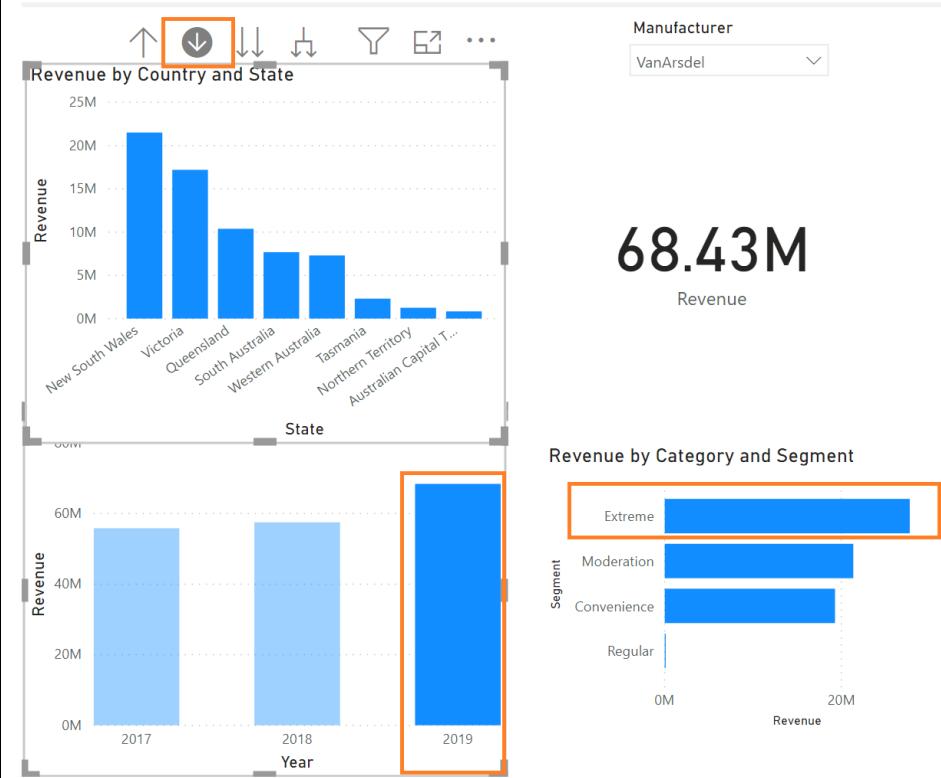
144. Ctrl+Click **Extreme** Segment in Revenue by Category and Segment visual.

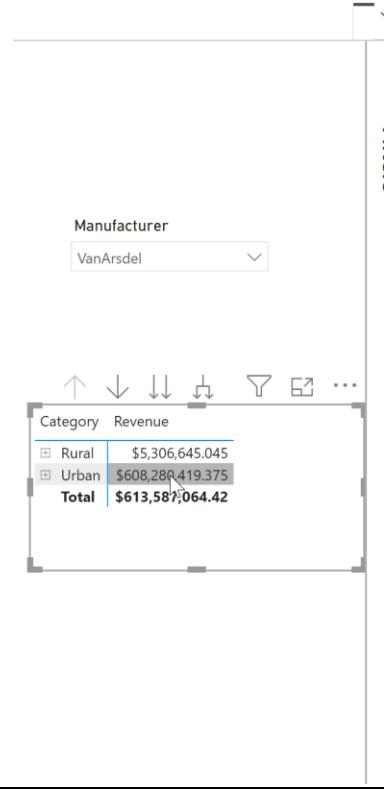
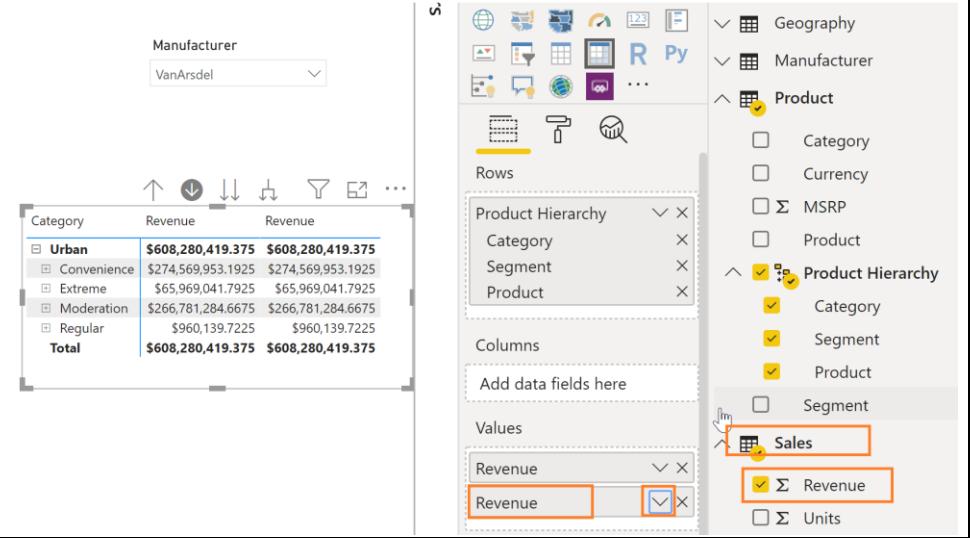
145. Select **2019** in Revenue by Year visual.

146. Ctrl+Click **Extreme** Segment in Revenue by Category and Segment visual.

There is no significant spike by State.

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



<p><b>148. Drill up to Category level in Revenue by Category visual.</b></p> <p>Let's add a Matrix visual so we can view data in rows and columns. We can apply conditional formatting to the matrix visual to highlight outliers.</p> <p><b>149. Click on the white space in the canvas. From the <b>VISUALIZATIONS</b> section, select <b>Matrix</b> visual.</b></p> <p><b>150. From <b>FIELDS</b> section, drag and drop <b>Product Hierarchy</b> field from <b>Product</b> table to <b>Rows</b> section.</b></p> <p><b>151. From <b>Sales</b> table in <b>FIELDS</b> drag and drop <b>Revenue</b> to <b>Values</b> section.</b></p> <p><b>Note:</b> Notice Revenue field needs to be formatted so it shows the same number of decimal points. We will do this shortly.</p>	 <p>The screenshot shows the Power BI desktop interface. On the left, there is a matrix visual with the following data:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Revenue</th> </tr> </thead> <tbody> <tr> <td>Rural</td> <td>\$5,306,645.045</td> </tr> <tr> <td>Urban</td> <td>\$608,280,419.375</td> </tr> <tr> <td>Total</td> <td>\$613,587,064.42</td> </tr> </tbody> </table> <p>To the right of the visual is the 'Visualizations' pane, which shows various chart types. Below it is the 'Fields' pane, which lists fields from the 'Date', 'Geography', 'Manufacturer', and 'Product' tables. The 'Product' table is expanded, showing 'Category', 'Currency', 'Σ MSRP', 'Product', and 'Product Hierarchy' fields. The 'Product Hierarchy' field is checked under 'Values'. At the bottom of the 'Fields' pane is a 'Drill through' section.</p>	Category	Revenue	Rural	\$5,306,645.045	Urban	\$608,280,419.375	Total	\$613,587,064.42
Category	Revenue								
Rural	\$5,306,645.045								
Urban	\$608,280,419.375								
Total	\$613,587,064.42								
<p><b>152. Select <b>Urban</b> row to drill down.</b></p>	 <p>The screenshot shows the matrix visual with the 'Urban' row highlighted in red. The data in the matrix is as follows:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Revenue</th> </tr> </thead> <tbody> <tr> <td>Urban</td> <td>\$608,280,419.375</td> </tr> <tr> <td>Rural</td> <td>\$5,306,645.045</td> </tr> <tr> <td>Total</td> <td>\$613,587,064.42</td> </tr> </tbody> </table>	Category	Revenue	Urban	\$608,280,419.375	Rural	\$5,306,645.045	Total	\$613,587,064.42
Category	Revenue								
Urban	\$608,280,419.375								
Rural	\$5,306,645.045								
Total	\$613,587,064.42								
<p>Let's add percent of total field. This will give us a better perspective.</p> <p><b>153. Navigate away from Format section to the <b>Fields</b> well.</b></p> <p><b>154. From <b>FIELDS</b> section drag <b>Revenue</b> field from <b>Sales</b> table below the existing <b>Revenue</b> field in <b>Values</b> section.</b></p> <p><b>155. Select the <b>arrow</b> next to the newly added <b>Revenue</b> field.</b></p>	 <p>The screenshot shows the matrix visual with the 'Urban' row selected. The 'Fields' pane on the right shows the following configuration:</p> <ul style="list-style-type: none"> <li><b>Rows:</b> Product Hierarchy (Category, Segment, Product)</li> <li><b>Columns:</b> Add data fields here</li> <li><b>Values:</b> Revenue (selected), Revenue (unchecked)</li> <li><b>Drill through:</b> Sales (Revenue, Units)</li> </ul> <p>A red box highlights the 'Sales' section in the 'Drill through' pane, and another red box highlights the second 'Revenue' field in the 'Values' section of the 'Fields' pane.</p>								

156. From the menu select **Show value as**  
-> **Percent of grand total**.

157. Make sure you have **Australia** and **2019** selected on the other charts

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

158. In the **Revenue by Year** visual select **2017** column. Notice Extreme segment has around **30%** of the grand total.

159. In the **Revenue by Year** visual select **2018** column. Notice Extreme segment has around **30%** of the grand total.

160. In the **Revenue by Year** visual select **2019** column. Notice Extreme segment has around **40%** of the grand total.

161. In the **Revenue by Year** visual select **2019** column to remove the filter.

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

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

163. **Resize** the visual as needed.

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

165. Select **Sort By %GT Revenue** and **Sort Descending**.

We see the top Products.

The screenshot shows a table titled "Manufacturer" with a dropdown set to "VanArdel". A context menu is open over the table, specifically over the "%GT Revenue" column header. The menu is titled "Show value as" and includes options like "Count", "Standard deviation", "Variance", "Median", "No calculation", "Percent of column total", "Percent of row total", and "Percent of grand total". The "Percent of grand total" option is highlighted with an orange border.

Category	Revenue	%GT Revenue
Urban	68,426,013.23	100.00%
Convenience	19,284,486.11	28.18%
Extreme	27,736,358.90	40.53%
Moderation	21,350,217.79	31.20%
Regular	54,950.44	0.08%
Total	68,426,013.23	100.00%

The screenshot shows a bar chart titled "Revenue by Year" with three bars for the years 2017, 2018, and 2019. The y-axis ranges from 0M to 80M. The 2019 bar is highlighted with an orange border. To the right is a matrix visual with columns "Category", "Revenue", and "%GT Revenue". The matrix data is identical to the table above:

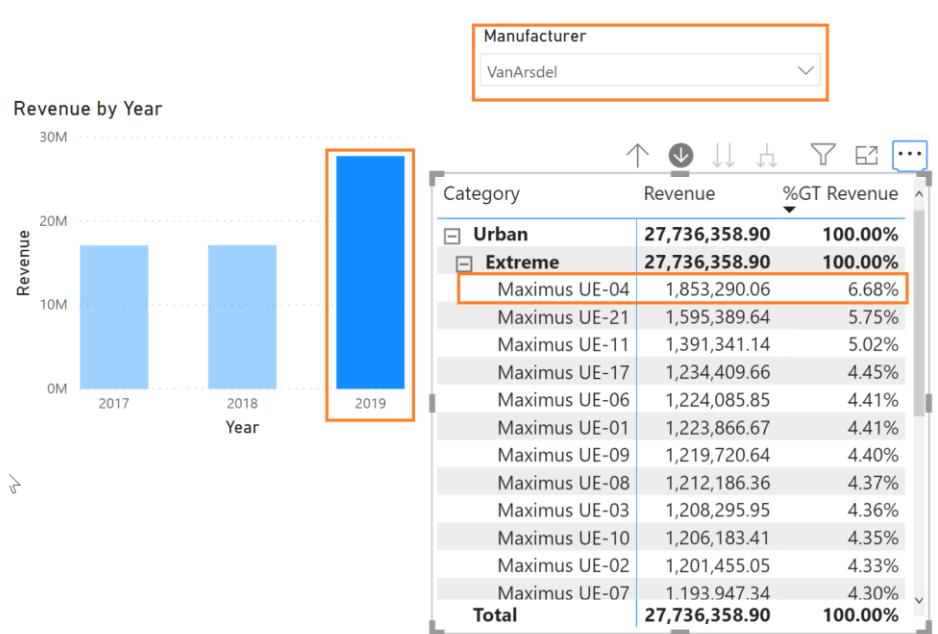
Category	Revenue	%GT Revenue
Urban	68,426,013.23	100.00%
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Extreme	27,736,358.90	40.53%
Moderation	21,350,217.79	31.20%
Regular	54,950.44	0.08%
Total	68,426,013.23	100.00%

The screenshot shows the same bar chart and matrix visual. The matrix visual now has a "Sort by" context menu open, with "Sort descending" highlighted with an orange border. The matrix data is sorted by "%GT Revenue" in descending order:

Category	Revenue	%GT Revenue
Urban	27,736,358.90	100.00%
Extreme	27,736,358.90	100.00%
Maximus UE-04	1,853,290.06	6.68%
Maximus UE-21	1,595,389.64	5.75%
Maximus UE-11	1,391,341.14	5.02%
Maximus UE-17	1,234,409.66	4.45%
Maximus UE-06	1,224,085.85	4.41%
Maximus UE-01	1,223,866.67	4.41%
Maximus UE-09	1,219,720.64	4.40%
Maximus UE-08	1,212,186.36	4.37%
Maximus UE-03	1,208,295.95	4.36%
Maximus UE-10	1,206,183.41	4.35%
Maximus UE-02	1,201,455.05	4.33%
Maximus UE-07	1,193,947.34	4.30%
Total	27,736,358.90	100.00%

166. In the **Revenue by Year** visual select **2019** column. Notice Maximus UE-04 and 21 are the top products. And Product 04 has nearly 7% of the grand total. Product 04 has a big spike.

167. In the **Revenue by Year** visual select **2019** column to remove the filter.



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

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

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

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

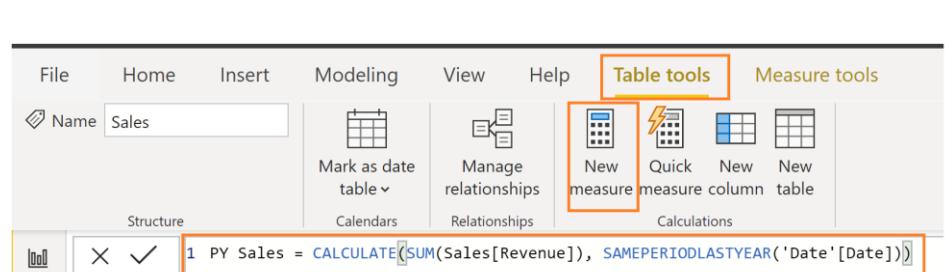
168. In the **FIELDS** section, select **Sales** table.

169. From the ribbon, select **Table Tools - > New Measure**. Formula bar opens.

170. Enter **PY Sales =**

**CALCULATE(SUM(Sales[Revenue]), SAMEPERIODLASTYEAR('Date'[Date]))**

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



Let's create another measure.

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

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

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

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

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

177. Select the **matrix** visual.

178. In the **FIELDS** section, click the checkbox next to the newly created **PY Sales** and **% Growth** measures in **Sales** table.

Notice fields need to be formatted.

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

180. From the ribbon select **Measure Tools -> Format -> Percentage**

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

182. From the ribbon select **Measure Tools -> Format -> Currency**

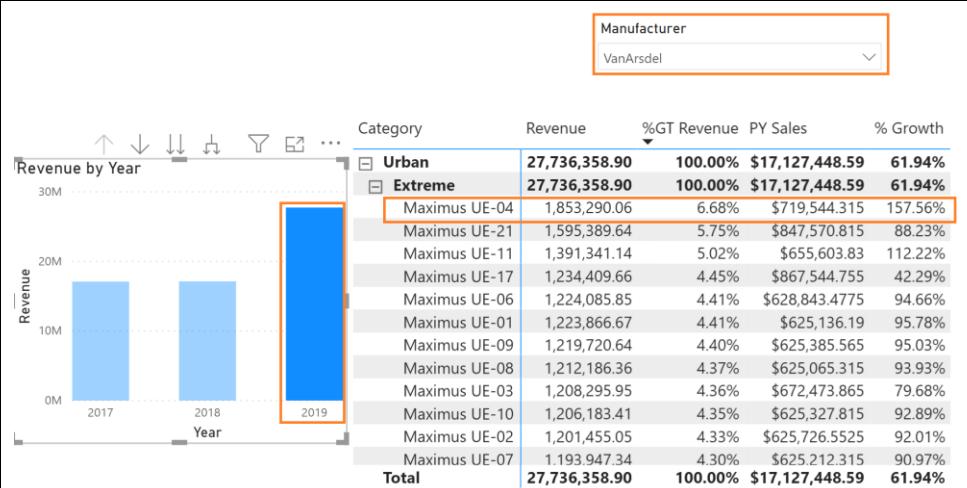
183. Similarly, from the **FIELDS** section, select **Revenue** field.

184. From the ribbon select **Measure Tools -> Format -> Currency**

185. In the **Revenue by Year** visual select **2019** column. Notice Maximus UE-04 has nearly 158% growth compared to last year.

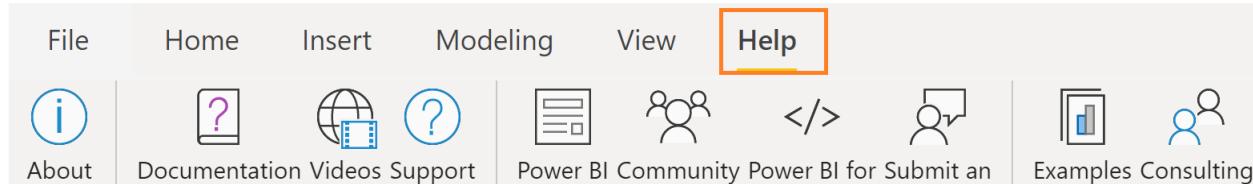


Measure tools					
Name	Untitled Paint	\$%	General	Currency	Properties
1 % Growth = DIVIDE(SUM(Sales[Revenue])-[PY Sales],[PY Sales])		Percentage			
Structure		Whole number	7,448.59	61.94%	
Urban	27,736,358.90	Percentage	7,448.59	61.94%	
Extreme	27,736,358.90	Scientific	3,544.315	157.56%	
Maximus UE-04	1,853,290.06	Standard	7,570.815	88.23%	
Maximus UE-21	1,595,389.64	Percent	3,560.83	112.22%	
Maximus UE-11	1,391,341.14	Text	867,544.755	42.29%	
Maximus UE-17	1,234,409.66	Custom	628,843.4775	94.66%	
Maximus UE-06	1,224,085.85	Double	625,136.19	95.78%	
Maximus UE-01	1,223,866.67	Single	625,385.565	95.03%	
Maximus UE-09	1,219,720.64	Large	625,065.315	93.93%	
Maximus UE-08	1,212,186.36	Small	625,065.315	93.93%	
Maximus UE-03	1,208,295.95	Medium	672,473.865	79.68%	
Maximus UE-10	1,206,183.41	Large2	625,327.815	92.89%	
Maximus UE-02	1,201,455.05	Small2	625,726.5525	92.01%	
Maximus UE-07	1,193,947.34	Medium2	625,212.315	90.97%	
Total	27,736,358.90	Total	100.00%	\$17,127,448.59	61.94%



# References

Dashboard in a Day introduces you to some of the key functionalities available in Power BI. In the ribbon of Power BI Desktop, the Help section has links to some great resources to help you as needed.



Here are a few more 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/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://ideas.powerbi.com/forums/265200-power-bi-ideas>

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

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