



Power BI QUICK START

Explore all Phases of Power BI to Create Effective Shareable Reports.

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Introduction:

This is my Fourth Book Training material in the series of learning Power BI. The first one was “**Extracting and Transforming Data in Power BI**”, the Second was “**Data Modeling in Power BI**”, and the Third was “**Data Visualization in Power BI**”.

They were training material about fundamentals of ETL (Extract, Transfer, Load) processes in Power BI, how to create a robust and well-structured data model for your data and use the DAX language making your data ready for analyzing and creating insightful reports, and Creating interactive reports and share them on lin.

You can download all my books with the training materials from my profile repositories on **github**:

<https://github.com/saidfawzy>

You can also visit my channel on YouTube to watch the complete training of my courses in channel lists.

www.youtube.com/saidfawzy

This book is a quick start for those who want to learn Power BI in few hours without going through details of the program for starting their simple reports and analyzing their simple data. For those this book can make them start creating and sharing reports and their insights and they can follow my other books if they need further progress and knowledge in learning the program.

I tried to make the book easy to use with many simple examples. And this material is a companion to my videos of training available in play lists of my YouTube channel.

I Advise you to follow my Videos on YouTube and use this material with the companied Power Point presentation and files of exercise and solution and try everything yourself as you won't learn unless you get your hands dirty.

Feel free to contact me through my Linked in: www.linkedin.com/in/saidfawzy.

You can also join my channels of Power BI:

[Facebook Group](#) [WhatsApp Group](#) [LinkedIn Group](#) [Telegram Group](#)

This Book is free and feel free to share with anyone with the accompanied material. And never hesitate to contact me if you need any help.

Said Fawzy

Manager of Information Center

Arab Contractors

14 Oct. 2024

Chapter 1: Introduction to Power BI

What is Power BI

- Power BI is an industry-leading Microsoft Business Intelligence tool that allows users to **analyze, model, visualize**, and ultimately **share data**.
- Users begin by feeding data into the application.
- From there, they have a multitude of options for exploring relationships and factors that influence trends in their data.
- Then the selection of visuals for custom-designing reports.
- Power BI is also designed to be integrated seamlessly into other Microsoft products such as Teams, PowerPoint, and SharePoint.
- The ultimate purpose of Power BI is to put the power of data-driven decision-making into the hands of businesspeople in companies of any size anywhere.

Power BI History

- The first version of the Power BI data analytics application was unlimited public release in the year 2011 under the name Project Crescent.
- It wasn't widely utilized and after further evolution was later renamed Power BI for Office 365. In 2015.
- Power BI was finally released to the general public as a desktop, web, and mobile app.

What you can expect from this book

- You will learn how to import data from Excel and other locations into Power BI.
- Understand the Power BI environment and its three views.
- Build beginner to moderate-level skills for navigating the Power BI product.
- Explore influential relationships within data sets.
- Design Power BI visuals and reports, and
- Build effective dashboards for sharing, presenting, and collaborating in Power BI, online.

You will receive your instructions in the form of practical example step by step.

You can also follow the course on my Channel on YouTube:

www.youtube.com/saidfawzy

What you will need to proceed in this book

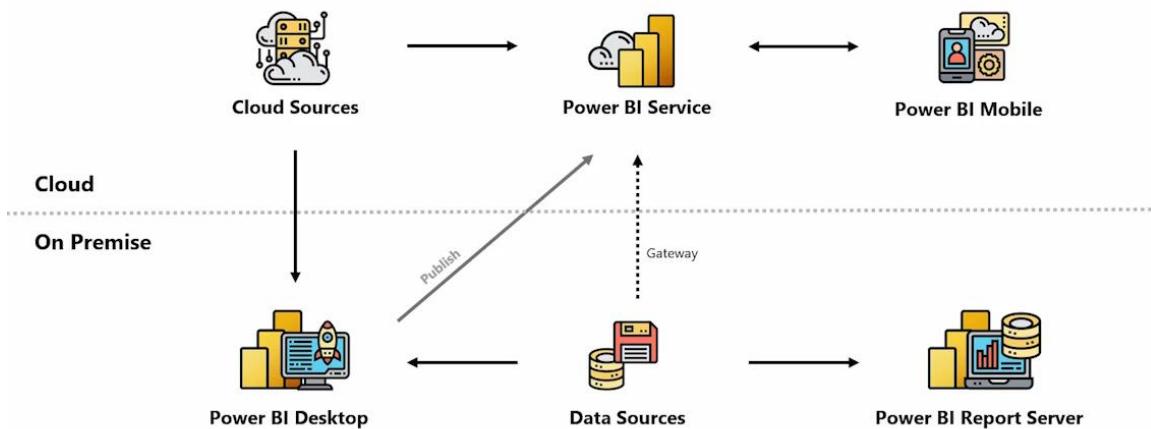
You will need:

- A basic understanding of data analysis processes in Excel,

- At least a free Power BI licensed account, including:
 - The Power BI desktop application.
 - Power BI online in Microsoft 365.

Power Bi Environment

Power BI Architecture



There are separate **two key areas of our services:**

- **On premise:**
 - things installed on a desktop or a server room maybe in your organization.
 - Power BI desktops first connect into data sources and ingest them into the Power BI desktop.
 - We then bring that data in, go through some transformations and get it into a report ready state.
 - And finally building some reports that we can use for consumption.
- **On cloud:**
 - Once that's complete, we want to go through a **publishing** process.
 - We take our work that we've done on the power BI desktop and publish it into the **power BI service** that resides in the cloud.
 - At this point in time the work that you've published will be available through a **mobile device** and almost instantaneously it will be available to you in power BI mobile. And if you have access to the power BI mobile app on your preferred mobile device then you can access your content through there as well.
 - The next one is a **gateway** up is we somehow need a way to get our refresh data daily or whatever your schedule happens to be from our sources on premise up into the cloud.
 - So, the gateway is essentially going to be that transportation highway that allows the Power BI service to connect back down

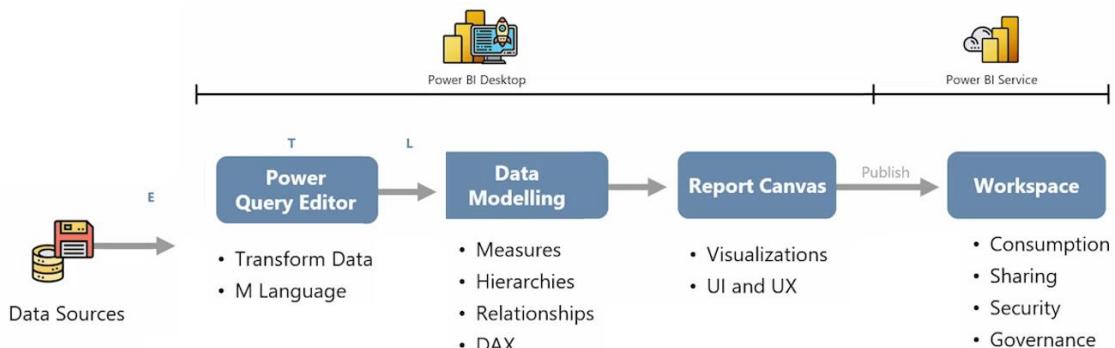
into your on-premises data sources. And bring the new data into the service on your scheduled refresh basis.

- If you have **data in the cloud**, you don't need the data gateway. You can just connect directly to those cloud-based sources.

- **Power BI report server:**

- if you actually want to do Power BI work and build things up but never publish it in the cloud and take advantage of some of the features in Power BI you can utilize the Power BI report server.

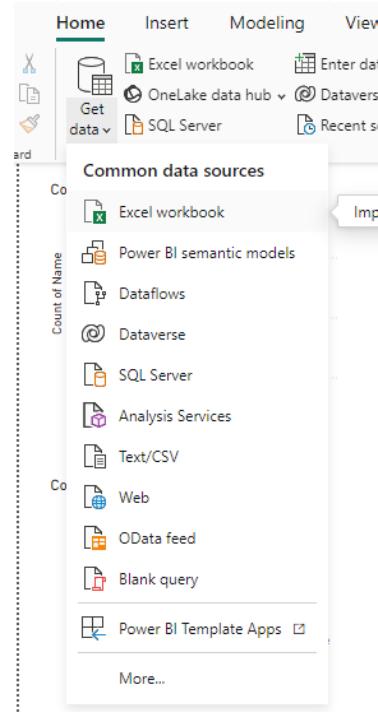
Power BI End to End Service



- In the **Power BI desktop**, we will work with the power query editor. doing some data modeling, end up building some reporting.
- And ultimately when we're done with those processes, we will take our work and publish it into the **Power BI service** and put our work into a **workspace** in that service.
- we first need to go in and find our **data sources** that's answer our business question we will connect then go ahead and **extract** that data from that data source.
- Once we bring it into the power query editor from an extract perspective then go through a **transformation** step and transform data, using the **M language** that is inside the power query editor.
- Once we go through that step of transforming our data and getting it ready for reporting we will then **load** that data over into the data model.
- Once our data is loaded into the data model and we have data that is almost ready for reporting we will go through a process of adding extra value to that data model. We will build relationships between our tables. Will perhaps add hierarchies to our data model which we'll do in this course. We will then go through and build some **DAX** expressions building some measures.
- Once we have our data model ready for reporting then we will go ahead to the **report canvas** and start doing some **visualizations**. And take those visualizations and craft stories. And hopefully stories that are compelling, easy to understand and satisfy our business questions.
- Once we have put stuff on the report canvas, we will then **publish** our work into the **Power BI service**. Because that is where people will go ahead and consume our data. We will work on sharing our data out.

Walkthrough Power BI Journey

- There is the Power BI desktop application and the Power BI service.
- Reports are created in the Power BI desktop application and then published to the Power BI service.
- The Power BI service is where you can engage with **dashboards**, **workspaces**, and **apps**.
- In the Power BI desktop application:
 - You begin by importing data or connecting to a data source.



- Transform Data in Power Query

The screenshot shows the Power BI desktop Power Query editor. The main area displays a table of employee data with columns: Name, Gender, Department, Age, and Date Joined. The 'Transform' tab is selected in the ribbon. The 'Applied Steps' pane on the right shows a step named 'Replaced Value' under the 'Removed Columns' section. The 'Properties' pane shows the query name is 'Employees'.

Name	Gender	Department	Age	Date Joined
Barr Faughny	Female	Procurement	39	06/02/2018
Denilson Crosswhite	Male	Website	26	16/09/2017
Gunar Cockshoot	Male	Website	31	11/05/2017
Willone O'Klett	Female	Website	43	29/10/2017
Gigi Bohling	Male	Sales	33	06/01/2017
Curtice Advari	Male	Finance	30	05/08/2017
Kaine Padly	Male	Website	20	20/03/2017
Ches Bonnell	Male	Website	37	22/11/2016
Andria Kimpton	Male	Website	30	18/09/2016
Brien Boise	Female	Website	31	12/10/2017
Hussein Augar	Female	Finance	30	12/01/2017
Karlen McCaffrey	Female	Finance	34	20/03/2017
Jan Morforth	Male	Finance	28	29/01/2016
Dotty Strutley	Female	Website	31	10/05/2016
Kelci Walkden	Male	Procurement	21	20/01/2018
Marney O'Brien	Female	Finance	21	01/11/2016
Rafaelita Blakslund	Female	Sales	38	30/12/2016
Madeleine Upcott	Male	Procurement	25	14/12/2017
Beverie Moffet	Female	Finance	28	20/06/2016
Oby Sorrel	Female	Finance	34	02/10/2017

- shape the data in the table view.

Customer Profitability 2021 V2 - Power BI...

File Home Help Table tools Column tools

Name Postal Code
Data type Decimal number

Format General \$ % Auto

Σ Summarization Count
Data category PostalCode

Sort by column Sort
Data groups Groups
Manage relationships Relationships
New column Calculations

Structure
Formatting Properties

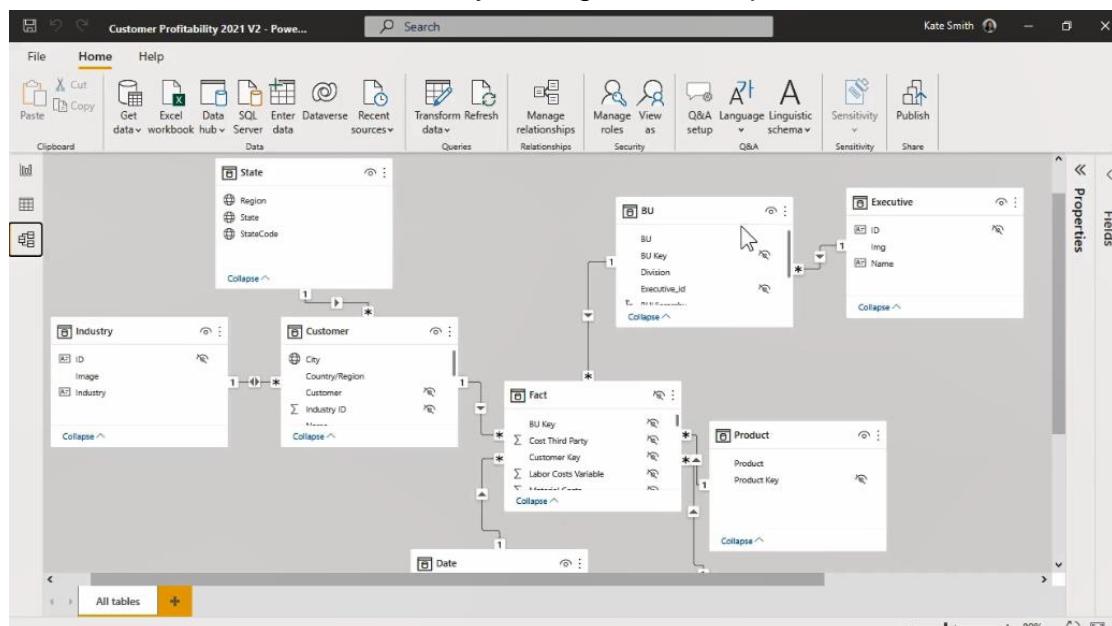
Fields

Customer

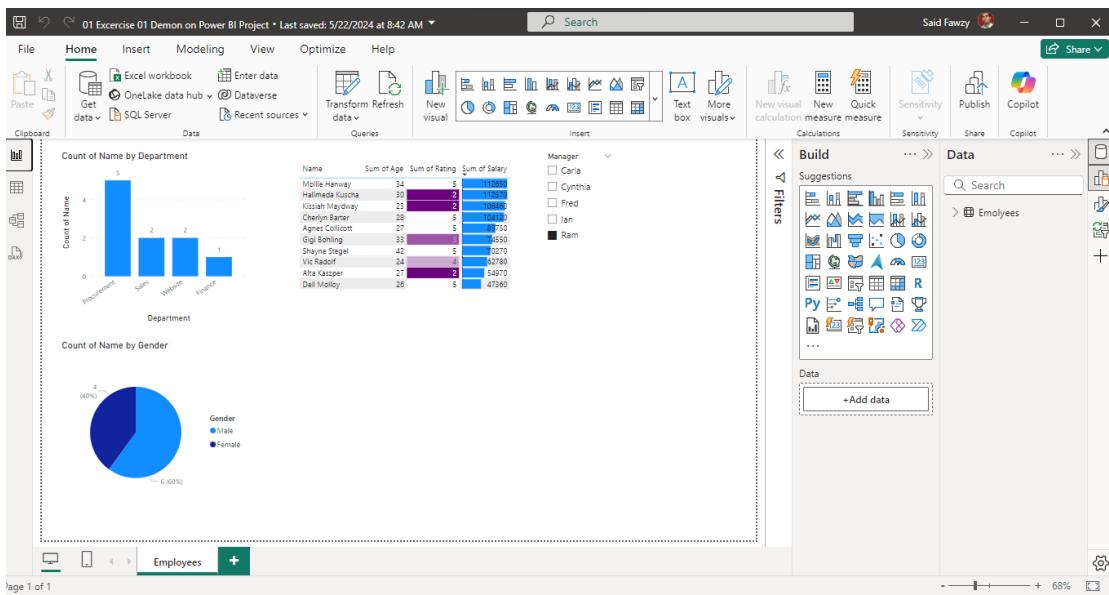
	Country/Region	Name	City	Postal Code	State	Industry ID
1023	US	Spade and Archer	Irving	75038	TX	31
10000	US	Globo-Chem	Chicago	60601	IL	30
10001	US	SNC Directly to America	Westchester	60154	IL	30
10002	US	GHG	Plano	75024	TX	13
10003	US	ABC Helicopter	Fort Worth	76177	TX	34
10004	CA	Mr. Sparkle	Toronto	ON		30
10005	US	GAM Neuro	South Bend	46617	IN	34
10006	US	Sourced Out	Chestbrook	19087	PA	26
10007	US	Processes Inc	Foster City	94404	CA	30
10008	US	Cadams USA	El Paso	79998	TX	7
10009	US	Noca Gas	Irving	75063	TX	23
10010	US	PDP	Falls Church	22042	VA	30
10011	US	EBU Ideals	Battlecreek	49017	MI	11
10012	US	QNII LTD	St Louis	63146	MO	15
10013	US	Keedstar Motors	Ellington City	MD		10
10014	US	Krustyco	Scottsdale	AZ		31
10015	US	Axis Chemical Co.	San Jose	95138	CA	32
10016	US	Rouser and Sideways	Mason	45040	OH	7
10017	US	Intritrode	Melville	11747	NY	7
10018	US	ONESYNE Labs LP	Alexandria	22314	VA	11
10019	US	ProStaffing	Plano	75024	TX	30
10020	US	Creek and Company	Waupaca	54981	WI	20
10021	US	CAKS	Anchorage	99503	AK	32

Table: Customer (327 rows) Column: Postal Code (208 distinct values)

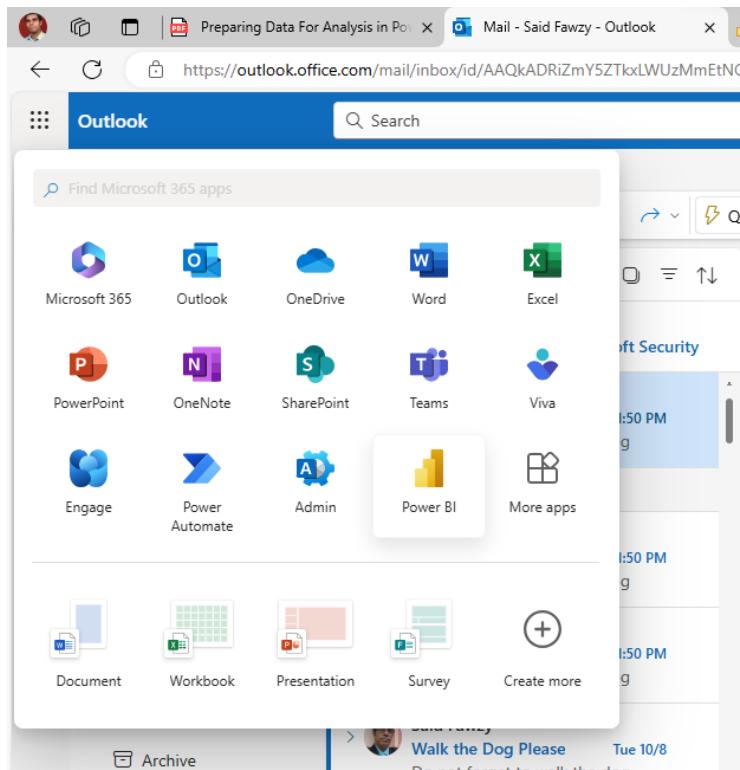
- Then model the data by editing relationships between tables.



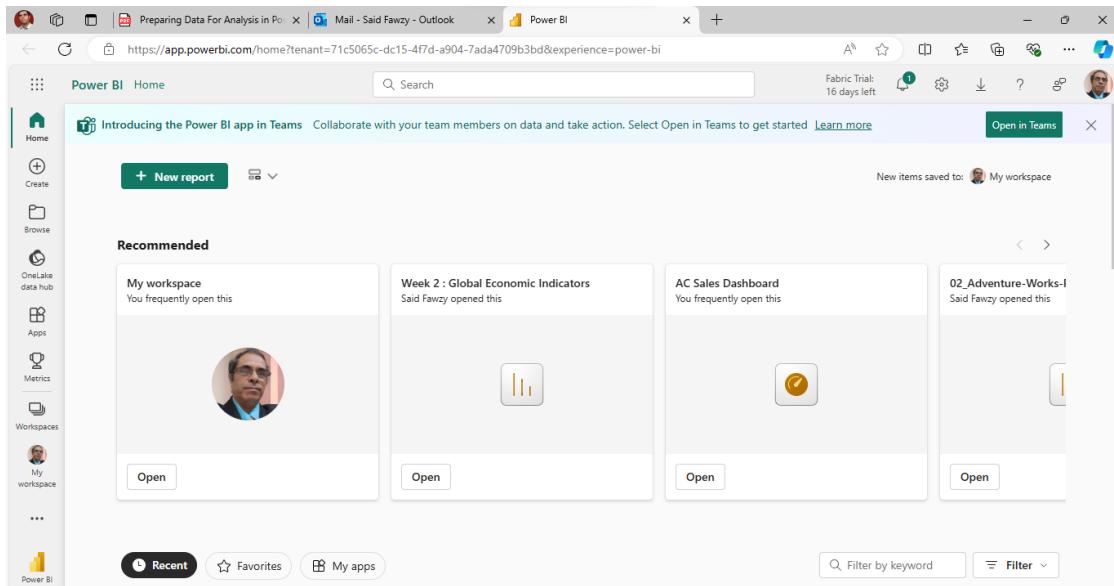
- When the data is ready, start creating a report by adding visualizations to the report canvas.



- There are many visualizations to choose from, and you can even download more from app source.
- Visualizations allow you to gain new insights into your data so that you can tell a specific story.
- Once the report is ready, publish it to the **Power BI service**.
 - The Power BI service can be accessed from the browser on the Microsoft 365 home page or from any web app.



- The Power BI service is where you can find and utilize **workspaces, dashboards, and apps**.



- **Dashboards** allow you to add tiles for multiple reports so that you can see important metrics at a glance.
- **Workspaces** are containers for Power BI items. My workspace is private, whereas workspaces are shared.
- **Apps** are collections of related dashboards, spreadsheets, data sets, and reports bundled together for easy distribution.

Exercise 1: Walkthrough Power BI Journey

You can Create new Report in power BI and follow the Steps of Creating Report. Or you can simply use the file:

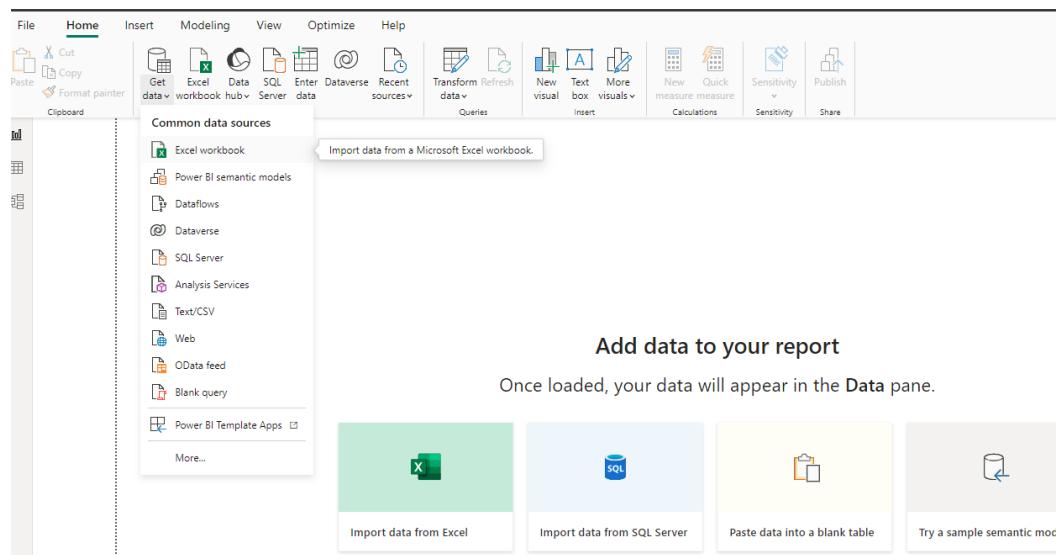
“01 Exercise 01 Demon on Power BI Project.pbix”

Then follow the instructions to explore the solution

Exercise 1 A: Getting Data

1. Use the Excel file: **Employees.xlsx** in Lab folder.
2. Explore the data in the workbook and .
3. Notice you have a worksheet with the Name **HR** and a table with name **table1**.
4. Explore columns you have.
5. Open Power BI.
6. Close the **splash** screen.

7. From Home Ribbon in Data Group Select Get Data.



8. Select Excel Workbook.

9. Browse to your Employees workbook to open.

10. In the Navigation Pane notice that on the left you have the tables that are available in the source and when you click a table you get a preview on the right side.

11. You have a sheet and a table with the same name.

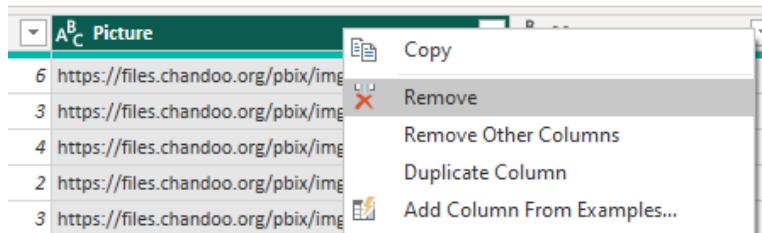
12. Select table1.

Name	Gender	Department	Age	Date Joined	Salary
Barr Faughny	Female	Procurement	39	2/6/2018	
Dennison Crosswaite	Male	Website	26	9/16/2017	
Gunar Cockshoot	Male	Website	31	5/11/2017	
Wilone O'Kielty	Female	Website	43	10/29/2017	
Gigi Bohling	Male	Sales	33	1/8/2017	
Curtice Advani	Male	Finance	30	8/5/2017	
Kaine Padly	Male	Website	20	3/20/2017	
Ches Bonnell	Male	Website	37	11/22/2016	
Andria Kimpton	Male	Website	30	9/18/2016	
Brien Boise	Female	Website	31	10/12/2017	
Husein Augar	Female	Finance	30	1/12/2017	
Karlen McCaffrey	Female	Finance	34	3/20/2017	
Jan Morforth	Male	Finance	28	1/29/2016	
Dotty Strutley	Female	Website	31	5/10/2016	
Kelci Walkden	Male	Procurement	21	1/20/2018	
Marney O'Brien	Female	Finance	21	11/1/2016	
Rafaelita Blaksland	Female	Sales	38	12/30/2016	
Madelene Upcott	Male	Procurement	25	12/14/2017	
Beverie Moffet	Female	Finance	28	6/20/2016	
Oby Sorrel	Female	Finance	34	10/2/2017	
Mallorie Waber	Male	Procurement	30	10/15/2017	
Jehu Rudeforth	Female	Finance	34	8/20/2017	
Van Tuxwell	Female	Website	25	11/13/2017	

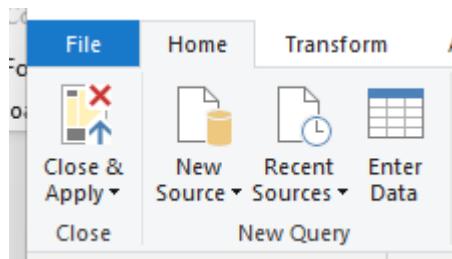
13. You can select Load to load to your data model directly.

14. But select Transform to go to power query

15. The Power Query is opened in a separate window.
16. Explore Power Query.
17. You have your table in the middle of the screen.
18. You have Ribbons to help you to transform data.
19. On the left you have Queries Pane.
20. In right you have Query settings with Properties and the Applied Steps.
21. Change the name of your Query to **Employees**.
22. We do not need the Picture column.
23. Right click then choose to remove.



24. Notice that you have the step added to the **Applied steps**.
25. You can undo what you have done by just deleting the step from the Applied steps.
26. Do and redo your removing column.
27. You can now click close and Apply in the Home tab to close power query and get back to the Power BI.



28. You get back to your Power BI File.



29. Notice you have ribbon on the top.
 30. You have Pans on the right: Data, Visualization , and Filter.
31. And on the left you have the three icons of the 3 view of power BI which are: **Report View, table View and Model view.**

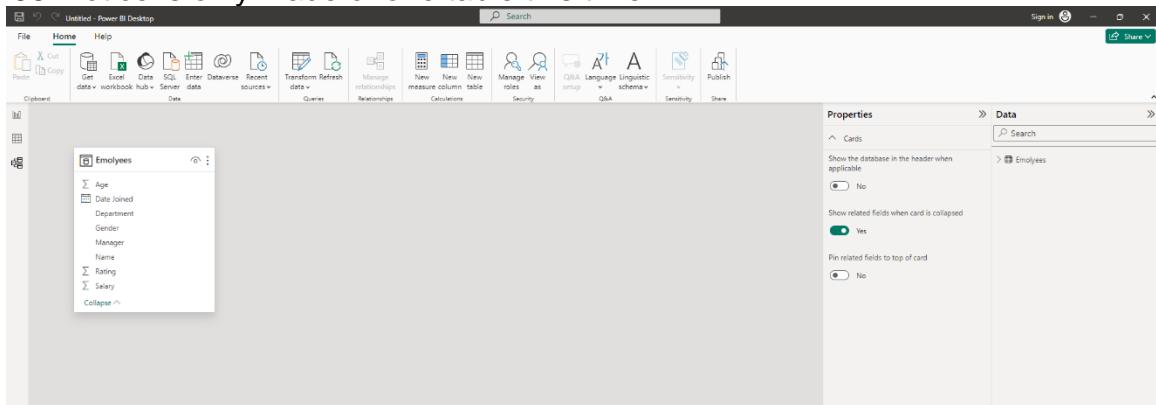
- 32. Report view** is where you do your visualization.

Name	Gender	Department	Age	Date Joined	Salary	Rating	Manager
Barr Faughn	Female	Procurement	39	Tuesday, February 6, 2018	68010	6	Carla
Dennison Crosswaite	Male	Website	26	Saturday, September 16, 2017	90700	3	Ian
Gunar Cockshoot	Male	Website	31	Thursday, May 11, 2017	48950	4	Carla
Wilone O'Kiel	Female	Website	43	Sunday, October 29, 2017	114870	2	Ian
Gigi Bohling	Male	Sales	33	Sunday, January 8, 2017	74550	3	Ram
Curtice Advani	Male	Finance	30	Saturday, August 5, 2017	59810	4	Fred
Kaine Padly	Male	Website	20	Monday, March 20, 2017	107700	2	Carla
Ches Bonnell	Male	Website	37	Tuesday, November 22, 2016	88050	3	Fred
Andria Kimpton	Male	Website	30	Sunday, September 18, 2016	69120	3	Carla
Brien Boise	Female	Website	31	Thursday, October 12, 2017	58100	2	Ian
Husein Augar	Female	Finance	30	Thursday, January 12, 2017	67910	3	Cynthia
Karlen McCaffrey	Female	Finance	34	Monday, March 20, 2017	71230	2	Fred
Jan Morforth	Male	Finance	28	Friday, January 29, 2016	48170	5	Fred
Dottv Strutlev	Female	Website	31	Tuesday, May 10, 2016	41980	2	Fred

- 33.** Click on **table view** to see the actual data you work with.

34. Click on Model view to see Your data model

35. Notice is only made of one table this time.



36. Go back to Report View.

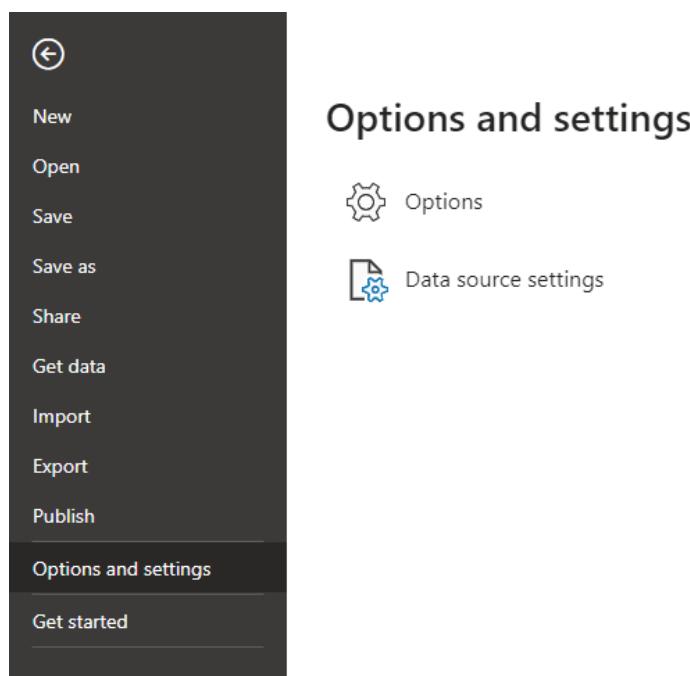
37. Notice that is an old View of Power BI.

Exercise 1B: Change Power BI Settings to on Object Interaction

38. Let us move our view to On Object Interaction View.

39. First Save your File as My First Power BI Report.pbix.

40. Go to File → Option and settings → Options.



41. In Google → Preview Features → select **On-Object Interaction**

42. You got a restart message requirement.

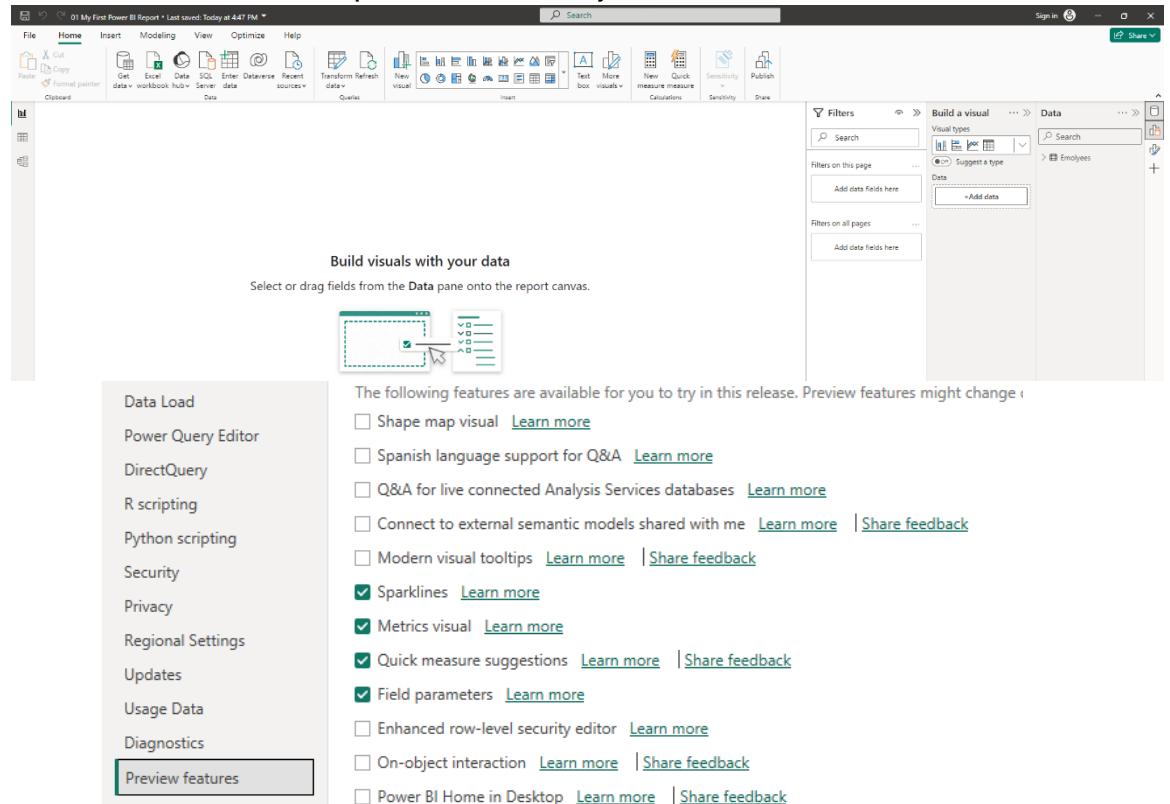
Feature requires a restart

You have enabled one or more Preview features that require restarting Microsoft Power BI Desktop. These changes will take effect after you restart the application.

OK

43. Close and reopen Power BI.

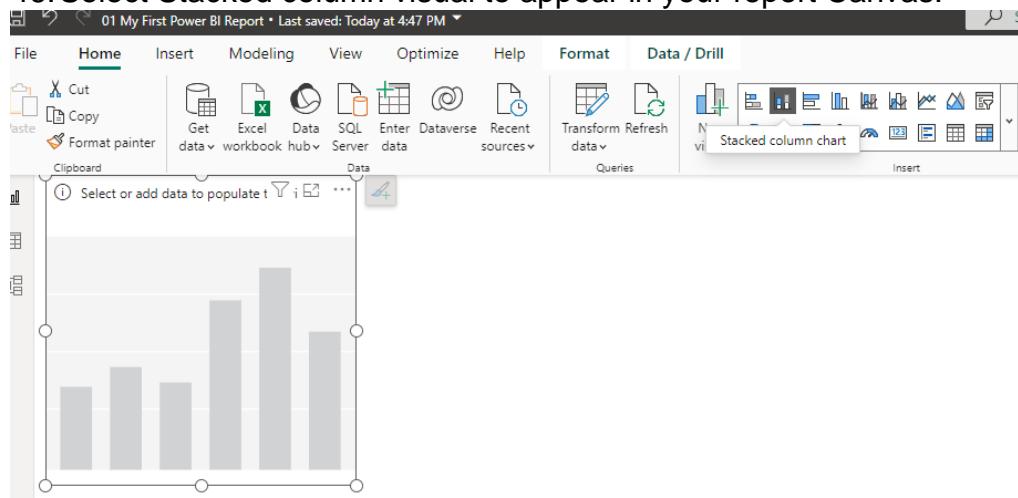
44. You are now in the new preview of on-Object interaction



45. Notice that Visuals are now on the top and you have a new interface.

Exercise 1C: Creating Bar Chart

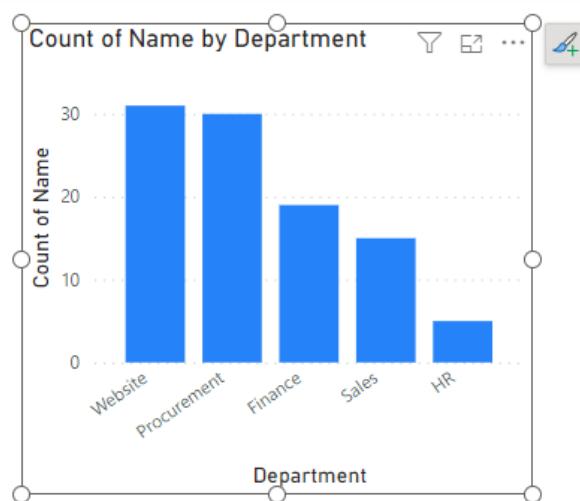
46. Select Stacked column visual to appear in your report Canvas.



47. Your boss wants to know How many employees in each department.

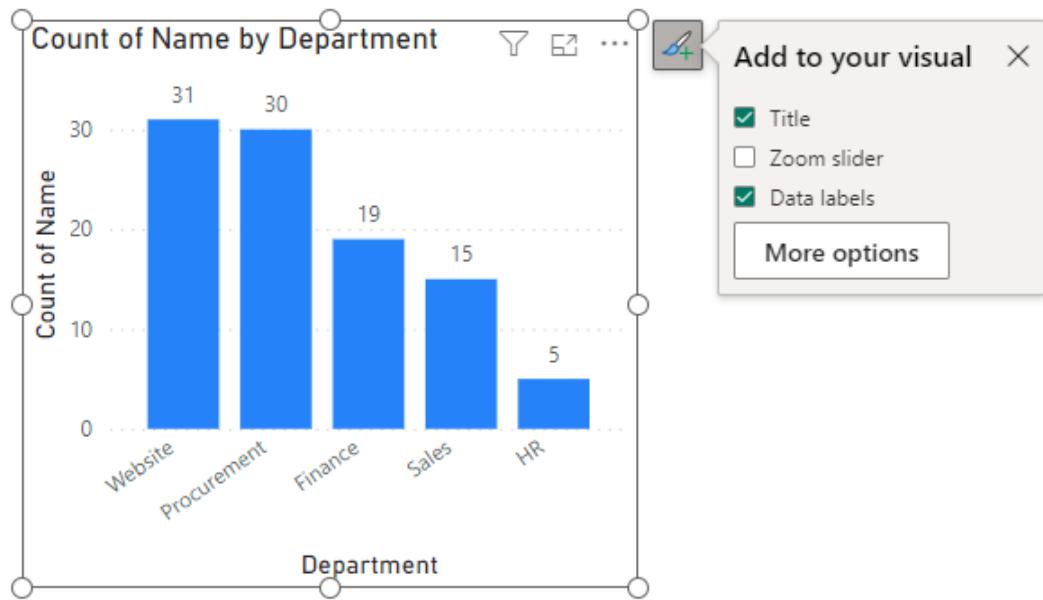
48. Drag Department from data pane to X-axis in Build pane , and drag name to Y-axis (it will then count).

49. You have now the count of employees in each department.



50. Click on the icon on the right of the Visual (add and remove to your visual) and select Data Labels.

51. The Number of employees is now Appear on top of each column.



Exercise 1 D: Create Pie Chart

52. We want to what is the ratio between men and women in the company

53. The suitable visual here is Pie Chart.

54. First Click on a free space in Canvas.

55. Then click on Pie from the visual so it is in your Report.

56. Drag Gender to legend and Names to Values, so Power BI count them.



57. Notice you have 3 Gender in the legend **Male, female and Blank**.

58. That means you have a missing value in this column.

59. Go to **table view** and check the **Gender** column.

60. Notice you have blank value.

61. You can filter the view to see them.

62. Try to change the value of those two rows, you cannot.

63. To transform the data, you must use power query editor.

64. From the **home** tab in data ribbon chose **Transform data** to open power query again.

65. Notice you have two null values in the column.

66. Also, if you go to **view tab** → **Data Preview** → check **column quality**.

67. You get the % of **valid**, **error** and **empty** values.

Name	Gender	Department
Karen McCaffrey	Female	Finance
Jan Morforth	Male	Finance
Dotty Strutley	Female	Website
Kelci Walkden	Male	Procurement
Marney O'Brien	Female	Finance
Rafaelita Blaksland	Female	Sales
Madelene Upcott	Male	Procurement
Beverine Moffet	Female	Finance
Oby Sorrel	Female	Finance
Mallorie Waber	Male	Procurement
Jehu Rudeforth	Female	Finance
Van Tuxwell	Female	Website
Roddy Speechley	Male	Procurement
Camilla Castle	Female	Website
Janene Hairsine	Female	Procurement
Niall Selesnick	Female	Website
Ebonee Roxburgh	Male	Procurement
Zach Polon	Male	Procurement
Orton Livick	Male	Procurement
Gray Seamon	Female	Sales
Benny Karolovsky	null	Finance
Dyna Doucette	Male	Procurement
Erin Androsik	Male	Procurement
Madge McCloughen	null	Website
Esmaria Denecamp	Male	Finance
Hogan Iles	Female	Procurement

Column quality

Category	Percentage
Valid	100%
Error	0%
Empty	2%

68. You must decide now.

69. You can delete those rows.

70. Click Home → Remove Rows → Remove Blank Rows.

The screenshot shows the Power BI desktop interface. The ribbon at the top has 'Tools' and 'Help' tabs. Under the 'Home' tab, there are icons for Refresh, Preview, Advanced Editor, Choose Columns, Remove Columns, Keep Rows, Remove Rows (which is currently selected), Sort, Split Column, Group By, and other options like Remove Top Rows, Remove Bottom Rows, Remove Alternate Rows, Remove Duplicates, Remove Blank Rows, and Remove Errors. Below the ribbon is a table with columns 'Gender' and 'Department'. The table data is as follows:

Gender	Department	Count
Female	Finance	31
Male	Finance	21
Female	Website	21
Male	Procurement	21
Female	Finance	38
Female	Sales	

71. It is not a good decision.

72. Go and delete that step from applied steps pane in the right.

The screenshot shows the 'Applied Steps' pane on the right side of the Power BI desktop. It lists several steps: Source, Navigation, Changed Type, Removed Columns, and Removed Blank Rows. The 'Removed Blank Rows' step is highlighted with a green selection bar.

73. You can do the same thing by filtering the value in the Gender column.

The screenshot shows the Power BI desktop with a filter dialog open for the 'Gender' column. The filter dialog shows 'Sort Ascending', 'Sort Descending', 'Clear Sort', 'Clear Filter', 'Remove Empty', and 'Text Filters'. In the 'Text Filters' section, 'Female' and 'Male' are checked. To the right, the 'Applied Steps' pane shows the same steps as before: Source, Navigation, Changed Type, Removed Columns, and Filtered Rows. The 'Filtered Rows' step is highlighted.

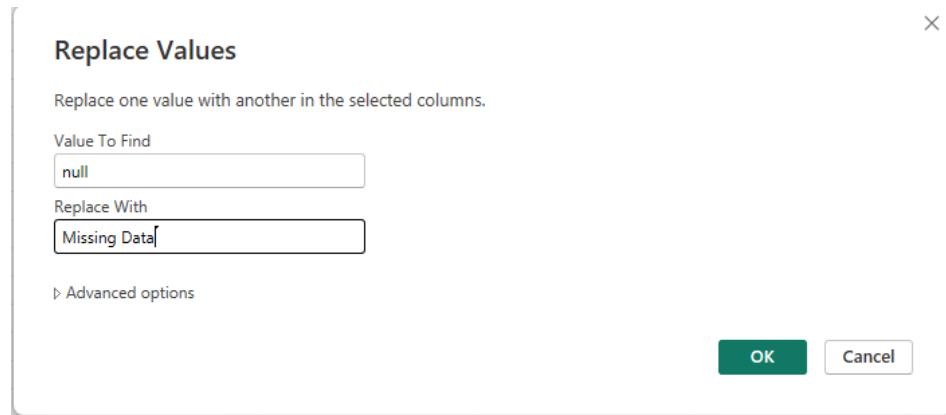
74. Also, it is not a good decision, go and delete this step too.

75. The best thing is to put value in this blank like “missing data”.

76. Right click the Gender column and choose Replace Value.

The screenshot shows a Power BI data grid with columns labeled 'A', 'B', 'C', 'Gender', and 'Age'. A context menu is open over the 'Gender' column, listing various data manipulation options. The 'Replace Values...' option is highlighted with a grey background.

77. In the replace value dialogue box replace null with missing data.



78. It is a chance to see the applied step pan.

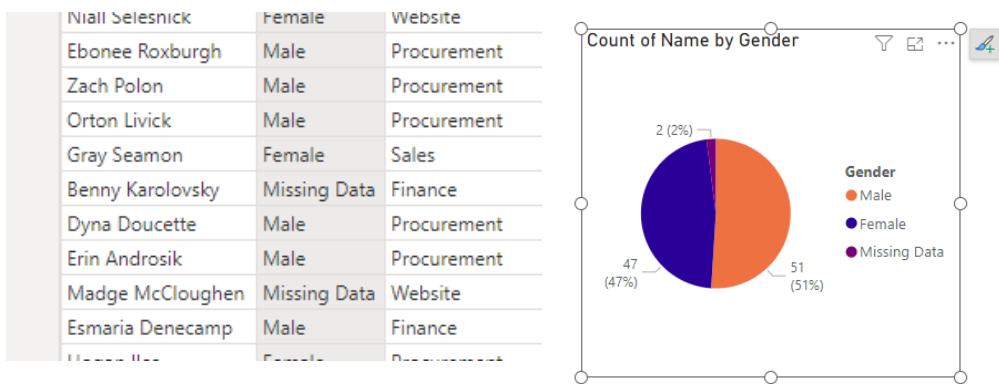
79. Click every step and watch the corresponding **M language** line in the formula bar.

The screenshot shows the 'Applied Steps' pane and the formula bar. The 'Applied Steps' pane lists several steps: 'Source', 'Navigation', 'Changed Type', 'Removed Columns', and 'Replaced Value'. The 'Replaced Value' step is currently selected. The formula bar below shows the M language code: '= Table.ReplaceValue(#"Removed Columns",null,"Missing Data",Replacer.ReplaceValue,{"Gender"})'.

80. You can also go to **Home** tab → **Query Group** → **advanced editor**.

81. You can here see and edit the steps manually in **M language**.

82. From **home** tab click **Close & Apply** to go back to power BI.



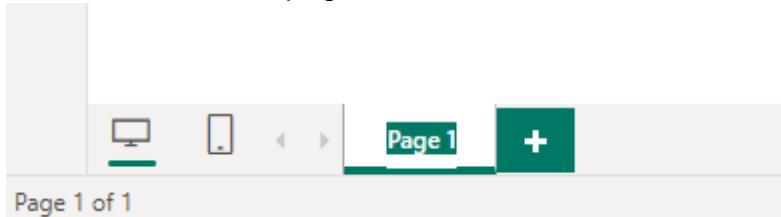
83. Notice now it appears in **table view** and **report view** in the Pie chart.

Exercise 1 E: Visuals interactivity

84. Now you have two visuals in your report.

85. It is Page one of your report.

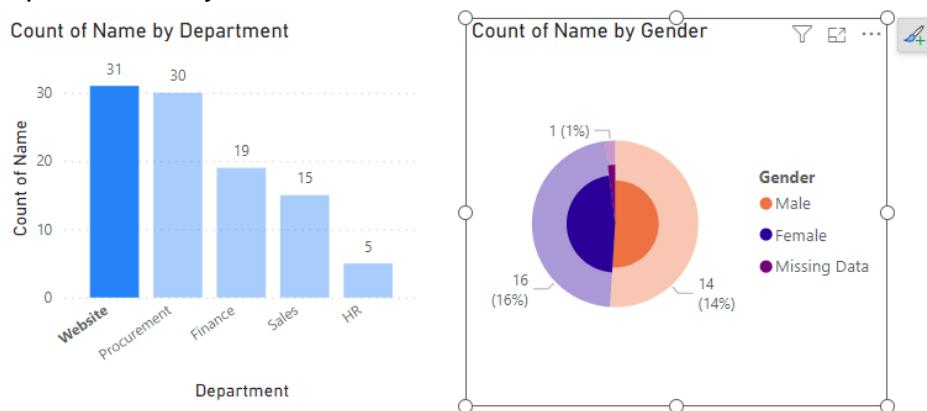
86. Double click on the page 1 in bottom and rename it to **Employees**.



87. You can also click on + button and add a new page.

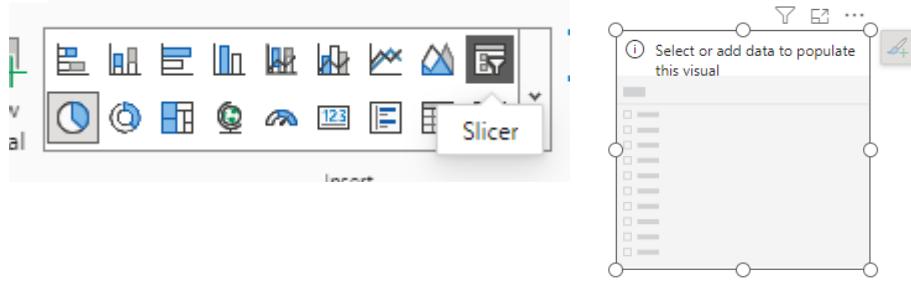
88. Click on Column Website department in the column chart.

89. You will see that pie chart reflects that and show only value of that department only.



90. Go and click on every department to see their values in pie chart.

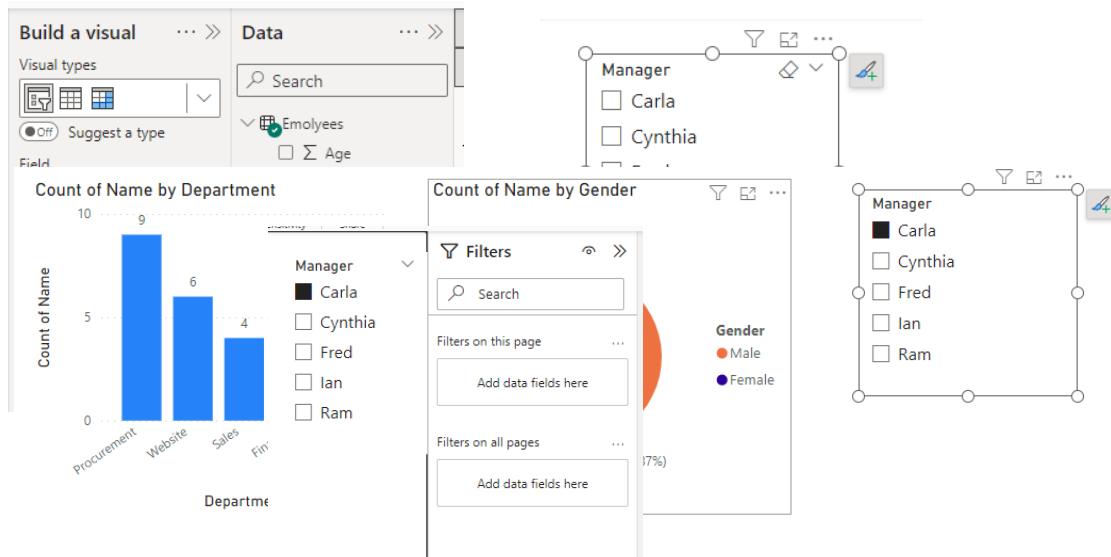
91. Now we want to filter by manager



92. You can add visual slicer and add manager to it.
93. Make sure you always click on empty part of canvas before you add any new visual.
94. Now you can filter the two visuals with your new slicer.
95. Notice you can do that by using filter pane to save space, but slicers are so intuitive for the users of your report.

Exercise 1F: Creating table and format results

1. Your boss liked your report, but it asked you to see the employees of each manager.



2. Add a table to your report
3. In Data pane click on Name, age, rating and salary.

Name	Sum of Age	Sum of Salary
Agnes Collicott	27	83750
Alta Kaszper	27	54970
Cherlyn Barter	28	104120
Dell Molloy	26	47360
Gigi Bohling	33	74550
Halimeda Kuscha	30	112570
Kissiah Maydway	23	106460
Mollie Hanway	34	112650
Shayne Stegel	42	70270
Vic Radolf	24	62780
Total	294	829480

4. You must now have your table like this.
5. Go to icon in right of table (format) → More Options → Visual tab → Totals → Values and make it off.
6. Notice you have search bar in format pane you can search for what you want.
7. Your boss is happy now he can see every manager employee.
8. He asked you to see which employees have low ratings.
9. He wanted to having conditional formatting for rating column.
10. Go to Format pan → Visual → Cell elements → Apply setting to → choose rating → Make back ground color on and thin click the fx icon.
11. In conditional formatting dialogue box change color for min and max.

Background color - Background color

Format style: Gradient

Apply to: Values only

What field should we base this on?: Sum of Rating

Summarization: Sum

How should we format empty values?: As zero

Minimum: Lowest value (light blue square)

Maximum: Highest value (dark purple square)

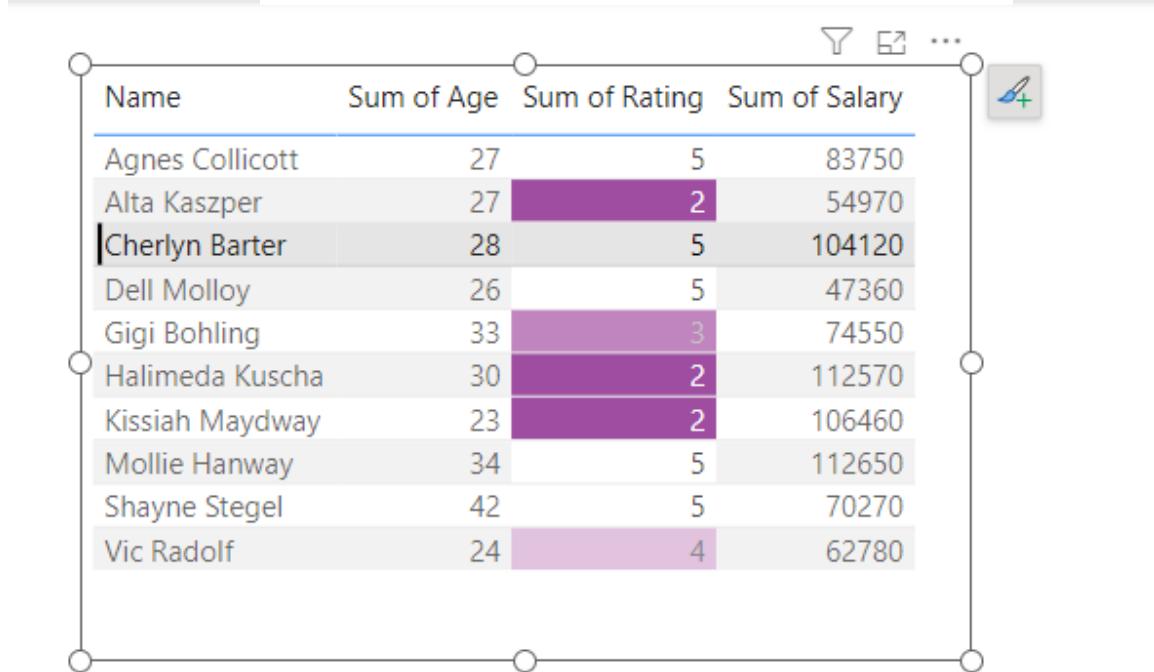
Add a middle color:

Learn more about conditional formatting [Learn more](#)

OK Cancel

12. You can also format font color
13. Your boss wanted to highlight the high salary.
14. Choose salary this time and use the data bars options and make it on.
15. You must have your table now like this

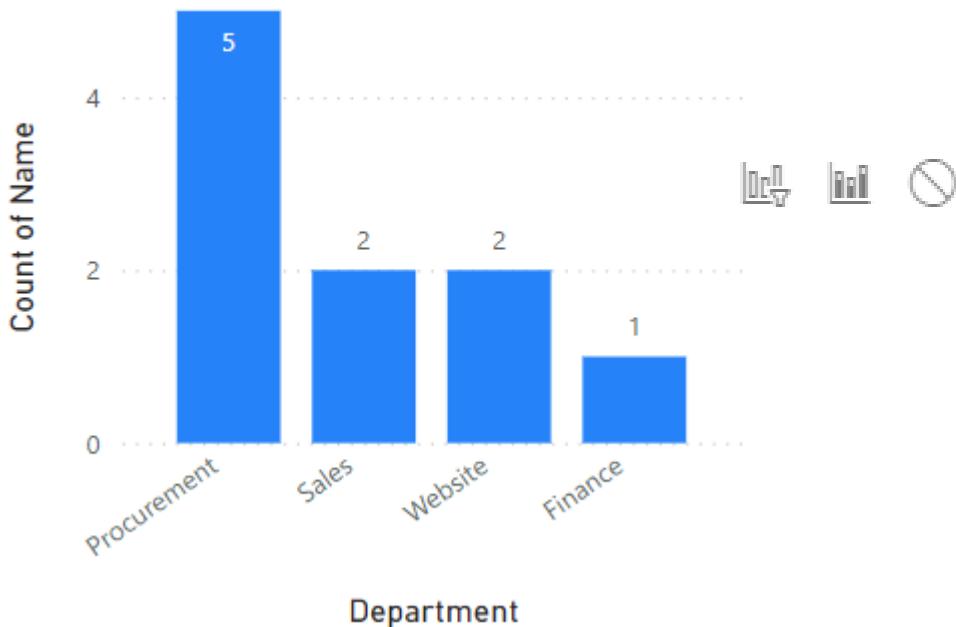
Name	Sum of Age	Sum of Rating	Sum of Salary
Agnes Collicott	27	5	83750
Alta Kaszper	27	2	54970
Cherlyn Barter	28	5	104120
Dell Molloy	26	5	47360
Gigi Bohling	33	3	74550
Halimeda Kuscha	30	2	112570
Kissiah Maydway	23	2	106460
Mollie Hanway	34	5	112650
Shayne Stegel	42	5	70270
Vic Radolf	24	4	62780



16. Notice that table also when you click on an employee it filters the other two charts which has no meaning.
17. Stop that as follow as you select the table chart:

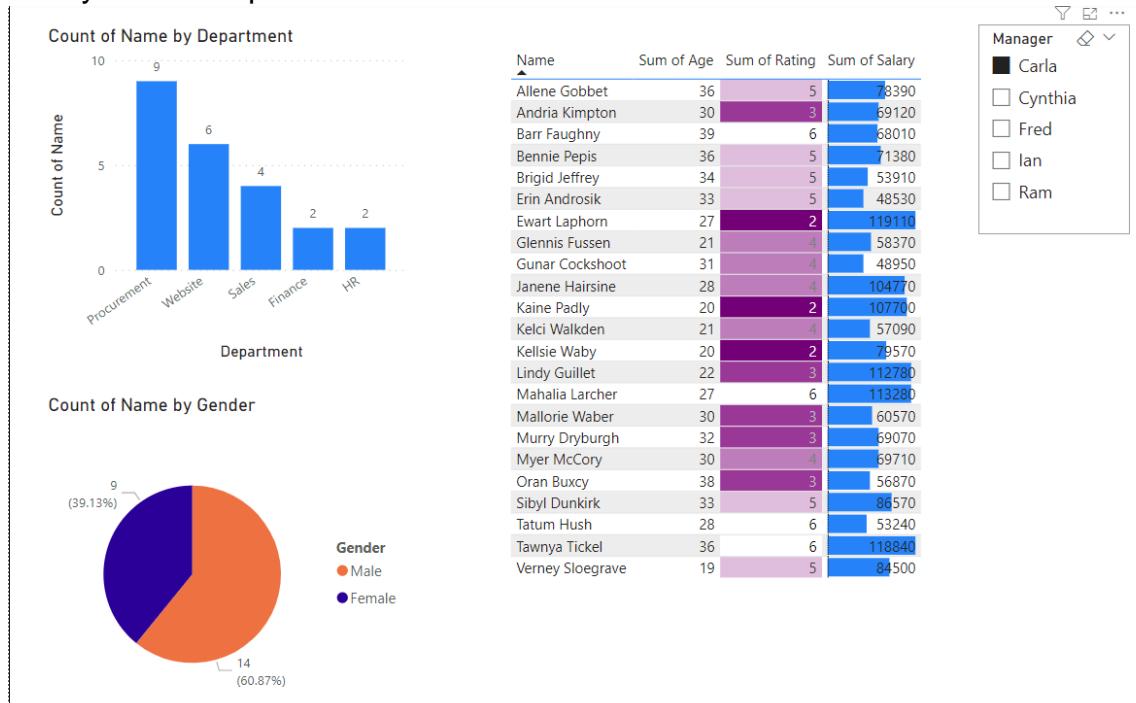
- Go to Format tab → Indicators group → edit indicators.

Count of Name by Department



- This shows new icons on top right of other visuals.
- They are Filter, Highlight, **non**.
- Choose non for all other visuals.
- Click edit indicators again to remove these icons.

18. Now your final report like this:

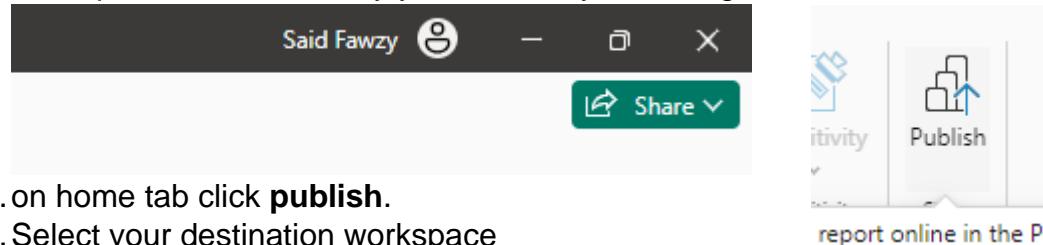


19. You can click any column Header to sort.

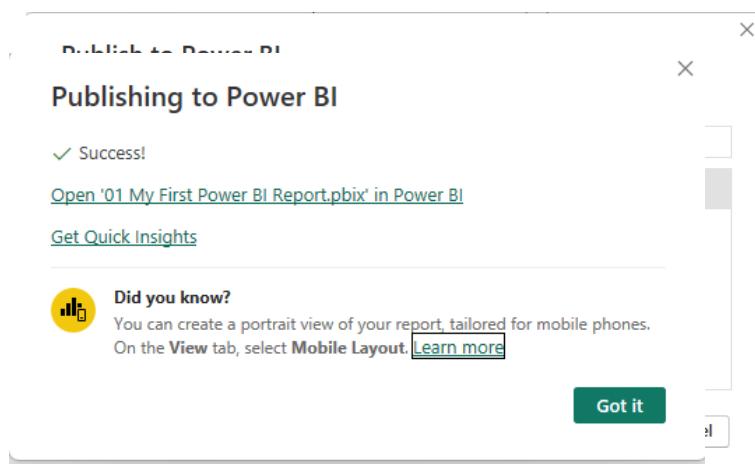
20. Save your work.

Exercise 1G: Publish and share your report.

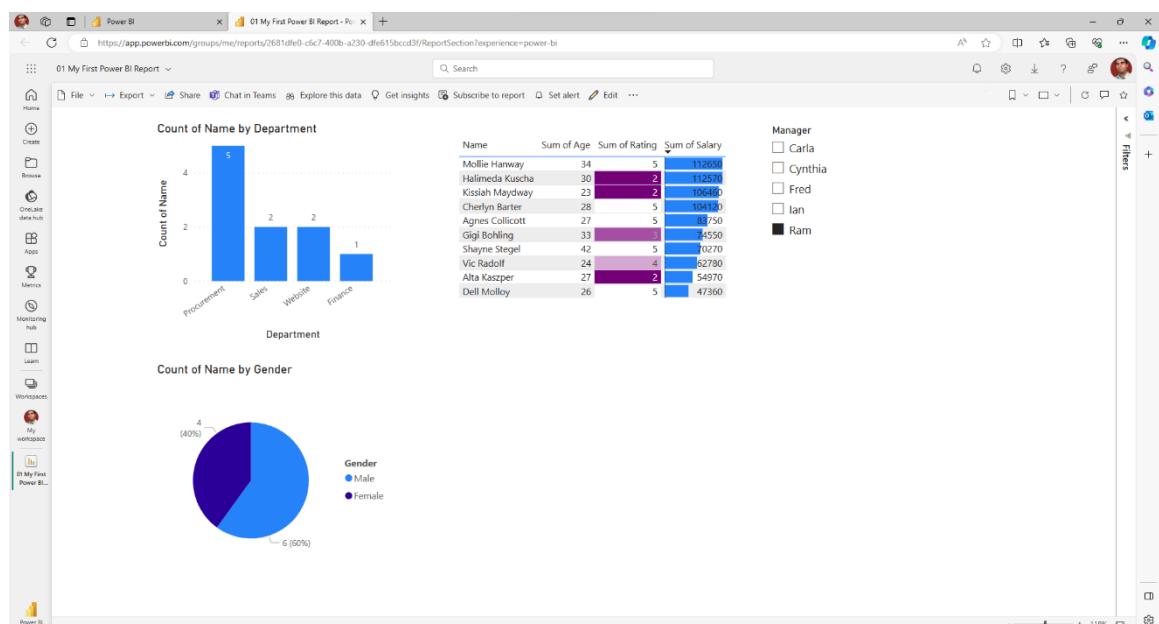
21. Click sign in in top right of the screen.
22. Enter your business mail or developer mail and press continue.
23. Enter pass word and verify your mail so you are signed in



24. on home tab click **publish**.
25. Select your destination workspace



26. Then click the link to go to your report



27. Now your report is published in your workspace, and you can share it if you have pro account

Power BI Licenses

The kind of Power BI license you have will determine capabilities and features you will have access to.

The free license:

- Users with a Power BI free license can access content in the Power BI service from my workspace.
- They can also view shared content. If their organization has a **Power BI premium subscription** and the content was shared with them from a premium capacity.
- They cannot share content.

The Power BI Pro License

- Users with the Power BI Pro license can publish content to other workspaces and share dashboards.
- Additionally, Power Pro users can subscribe to dashboards and reports and share content with users who have the same license as them.
- They cannot distribute content in a premium workspace to users with a premium per user license.
- Instead, they can only distribute content in a premium workspace to users with a free license.
- The Pro License also restricts users from viewing content in a Power BI Premium per User (PPU) Workspace and from utilizing paginated reports or AI capabilities.

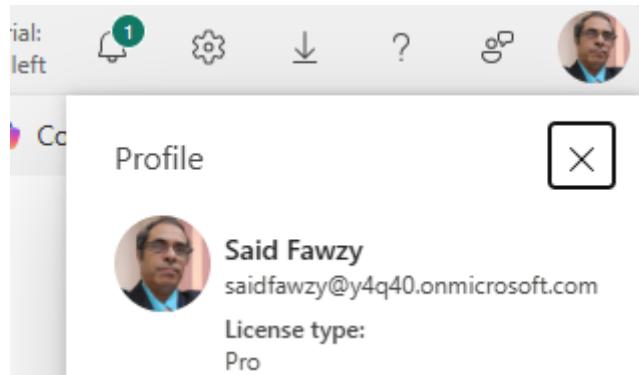
The Power BI premium per user license

- Users with the Power BI premium per user license, also called the PPU license, have the greatest amount of capabilities.
- With the PPU license, users can publish content to other workspaces, shared dashboards, and subscribe to dashboards and reports.
- With a PPU license, users can share content with other users who have the same license as them and distribute content to users who have free and pro licenses in premium workspaces.
- What's more, users can view content in any workspace that is shared with them, regardless of license type, and utilize paginated reports and AI capabilities.

Check Your Power BI License

Checking to see what kind of Power BI License you have is easy.

- In the Power BI service, click your profile icon. The license type area will display your license.



Download Power PI Desktop

1. You can download directly from Power BI Site:
 - o <https://powerbi.microsoft.com/en-us/downloads/>
 - o Advantage: You can apply to many computers.
2. You Can Install form **Microsoft Store**.
 - o Advantage: Automatic update

Chapter 2: Extracting and Transforming Data

The ETL (Extract, Transform, Load) process

- Have you ever tried to solve a jigsaw puzzle when the pieces are scattered everywhere, and you don't even know if those pieces belong to the same puzzle?
- That's what it can feel like as a data analyst tasked with extracting insights from data that spread across multiple sources, formats, and structures.
- Not to worry, there's a way to solve this problem. The **Extract, Transform, Load**, or **ETL** process.

ETL Components

- **ETL** stands for extract, transform and load, the names given to the three main steps in the ETL process.
- This process involves taking raw data from various sources, preparing it for analysis, and loading it into a repository or data storage and management system.

Extract

- **Extract** is the first step in the ETL process, which involves retrieving and extracting raw data from different sources, such as databases, files, or other data storage systems. For example:
 - o Customer Relationship Management, or **CRM**.
 - o Enterprise resource planning system, or **ERP**
 - o Spreadsheets.

- The extraction process involves pulling the data from these different sources.
- Then, you consolidate it into an easily accessible central location, often a temporary intermediate storage location known as the **staging area** and prepare it for further processing in the next step.

Transforming

- Once the data is extracted, the second step is to transform it.
- Transforming the data involves cleaning, structuring, and enriching the data to make it more suitable for analysis.
- This may involve:
 - removing duplicates,
 - handling missing values,
 - creating new calculated fields,
 - converting data types, and
 - standardizing measurement units. let's say that the sales and marketing data is in US dollars. But the manufacturing and purchasing data is in different currencies, depending on where in the world the sales or purchase take place. As part of transforming the data, you may need to convert all the currency values into a standard unit of measurement, in this case US dollars, to ensure consistency.

Load

- The third and last step involves loading the transformed data into the final storage system, typically a data warehouse. Where it can be readily accessed and analyzed, for example, using tools like Power BI.

Depending on the organization's needs, the loading process can be a one-time event or scheduled to run regularly.

Connecting to flat data source

- Every day, businesses generate large amounts of data. But where do they store it all?
- Many organizations store and export data as files, such as flat files.

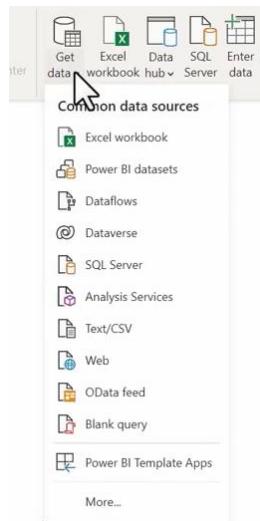
What is a flat file?

- A flat file is a file type that contains a single data table, with a uniform structure for every row of data, and does not have hierarchies.
- Some examples of flat files include:
 - comma separated value or CSV files,
 - delimited text or TXT files and
 - fixed width files. Additionally, output files from various applications such as Microsoft Excel Workbooks, can also be classified as flat files.

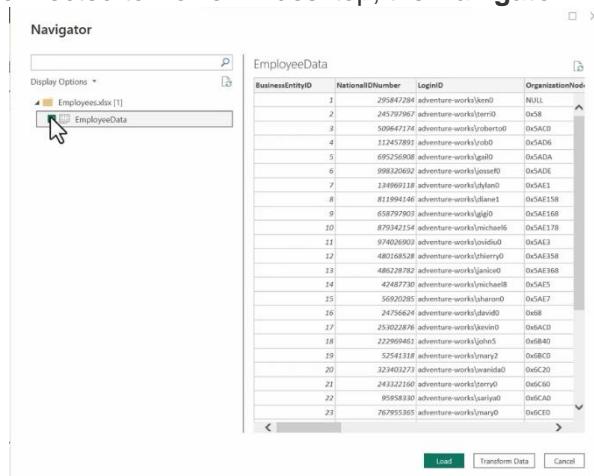
How to set up a flat data source

- The first step is to determine which file location you need to use to export the data.
- The file location is important, because when it is **changed**, Power Bi will not be able to refresh the data. This can cause errors, such as file not found, or Data source not found.
- Once you have located your file, you can proceed in Power Bi to display available data sources in the **Home** group of the Power Bi desktop ribbon.

- Select the **Get Data** button option, or down arrow to open the Common Data Sources list.



- If the data source you want isn't listed under Common Data Sources, select more to open the **Get Data dialog box**.
- If you need an Excel data source for example, select the Excel workbook you want, and select Open.
- When your file is connected to Power Bi desktop, the **Navigator window** opens.



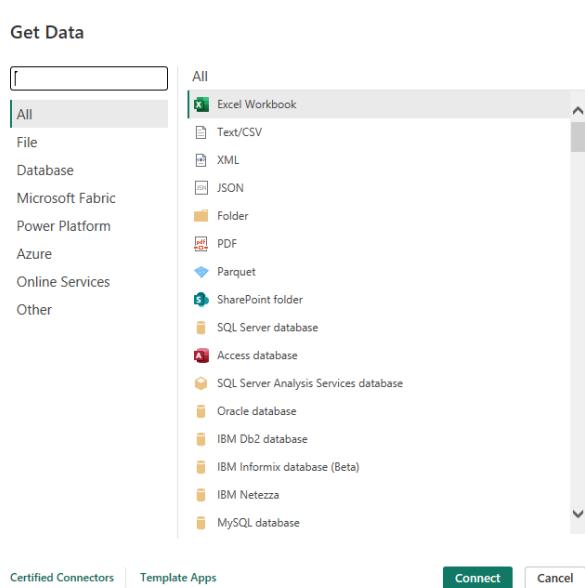
- This window displays the tables available in your data source. The excel file in this example.
- You can select a table to preview its contents, and to ensure that the correct data is loaded into the model.
- After selecting the checkbox of the table that you want to bring into Power Bi, it activates the Load button.
- Now you can select the Load button to import your data into the Power Bi dataset.

Exercise 2: Connecting to Flat Data Source

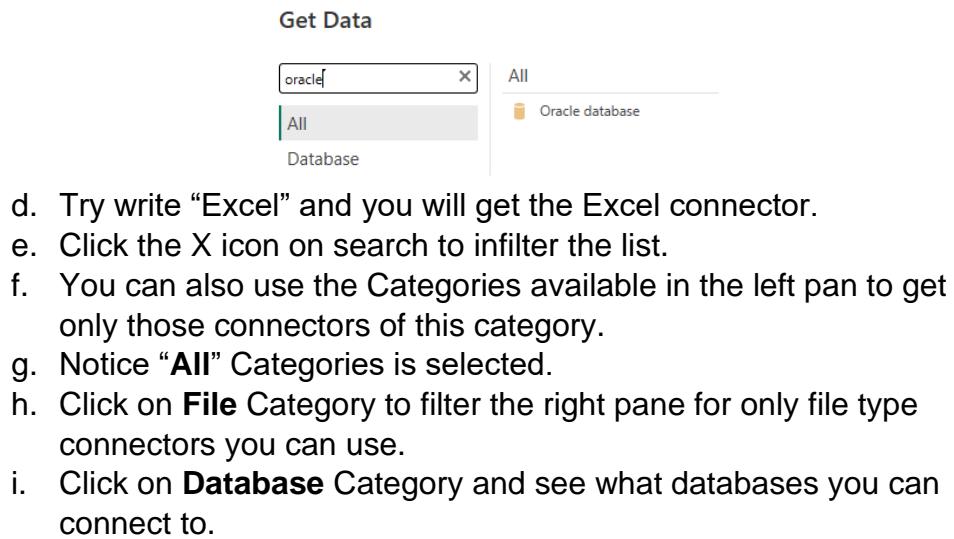
- Create new Report and rename it: **02 Transform Data.pbix** and save it to folder **Exercise 2**
- Use the Get Data Button on Home tab.

3. You can either:

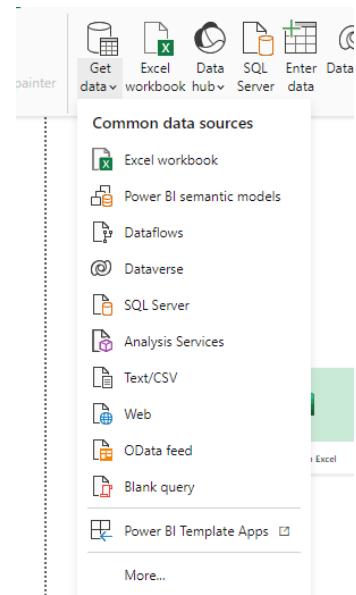
- Click in upper part ➔ Get the full options of connecting to data sources.



- You can search for the data source you want to connect to in the search box.
- Write “oracle” in the search box, the list is filtered only to Oracle Database connector.

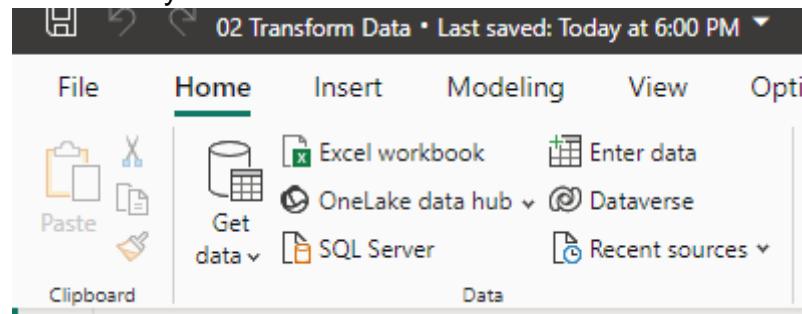


4. Or you can Click on the Arrow down the **Get Data** Button to get a list



of the most common data sources.

5. If you click on the more option at the bottom of the list, you get the complete connectors list again.
6. We want to connect to an excel file.
7. Notice it has a separate icon you can use directly from the Home tab because it is a very common data source.



8. You will find in the middle of the report canvas an option to connect to Excel file to

Add data to your report

Once loaded, your data will appear in the Data pane.

Import data from Excel

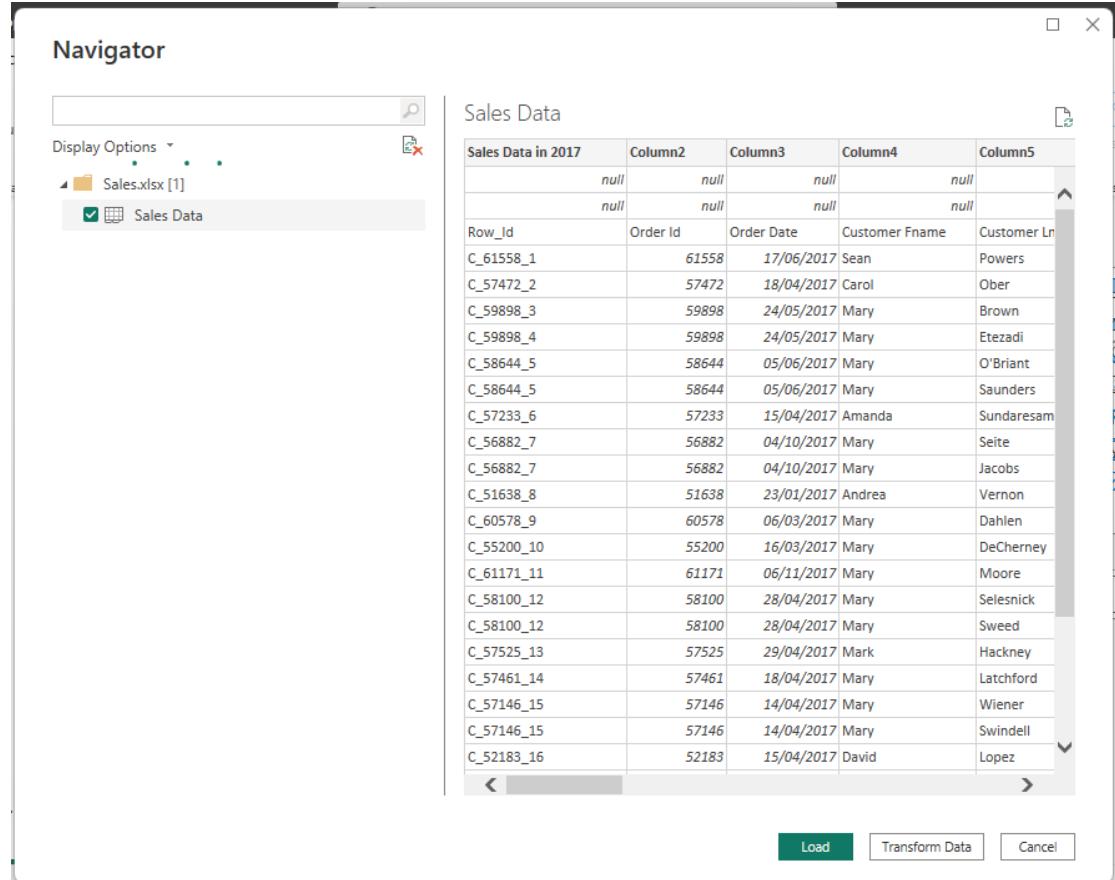
Import data from SQL Server

Paste data into a blank table

Use sample data

[Get data from another source →](#)

9. Explore the data file **Sales.xlsx** file in your Files Folder and open in Excel.
10. Use Excel data source connector and connect to **Sales.xlsx** file in your Files Folder.



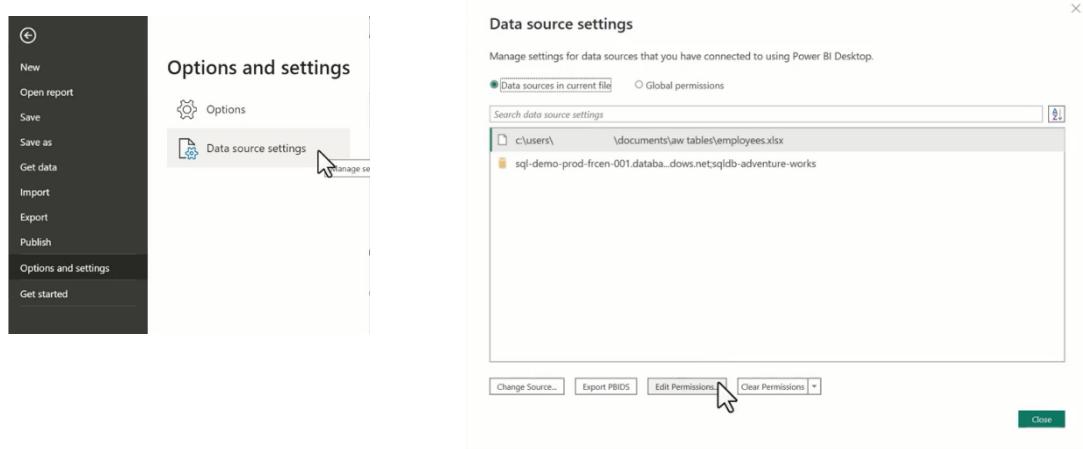
11. In the **Navigation Pane** that appears, on the left you have all data tables you have in the source, when you click one you can preview on the right.
12. Select check box next to **Sales Data** worksheet.
13. You have two options now:
 - a. to click **Load** to load to data model or
 - b. click **Transform data** to open Power Query
14. Click **Load**.
15. You will notice that the table has been loaded to your model.
16. Go to Table view to view your table.
17. Save your report.

The screenshot shows the Power BI Desktop interface. At the top, there's a ribbon with 'Share', 'New visual calculation', 'New measure', 'Quick measure', 'Sensitivity', 'Publish', and 'Copilot'. Below the ribbon are two main panes: 'Build' on the left and 'Data' on the right. The 'Build' pane has a 'Filters' section with a dropdown menu and a grid of visualization icons. The 'Data' pane has a search bar and a list of data sources, with 'Sales Data' highlighted. Below these panes is a table preview titled 'Sales Data in 2017' with 53,203 rows. The table includes columns for ID, Column1, Column2, Column3, Column4, Column5, Column6, Column7, Column8, Column9, Column10, Column11, and Column12. The data shows various entries such as C_52427_18045, Mary, Smith, Men's Footwear, Consumer, LATAM, Men's Footwear, Caguas, Puerto Rico, 7081.

change the location of your source file

- In case you need to change the location of your source file for a data source during development. Or if your file storage location changes, you'll need to update your **connection strings** in Power Bi, to keep your reports up to date.
- To do this in Power Bi desktop:
 - select File in the menu bar,
 - then select Options and Settings from the File menu.
 - And now, select Data Source Settings from the options and settings menu.
 - You can also change or clear the permissions, by selecting Edit or Clear permissions, respectively.

- Permissions cover the privacy level and credentials used for connecting to a data source.



- You can also Reach this window from Home Ribbon tab.
Home → Queries group → Click on the arrow of **Transform Data** and choose **Data Source Settings**.

- Remember that any structural changes to the file, can break the reporting model. So, it's important to reconnect to the same file with the same file structure.
- By following these steps, you'll be able to ensure, that your report uses the most accurate and UpToDate information available.

Introduction to Power Query and its interface

- Power Query is part of Power BI Desktop, allowing for seamless data preparation within the Power BI environment.
- Power Query is a data transformation and data preparation tool allowing you to connect, clean, and transform data from a wide range of sources.
- It ensures that your data is ready for analysis, enabling you to create insightful visualizations and reports.

Exploring Power Query

- Features that Power Query can help with:
 - **Data connectivity**, Power Query connects to various data sources both on-premises and the Cloud directly within Power BI Desktop. You can access data from traditional databases as well as file-based sources.

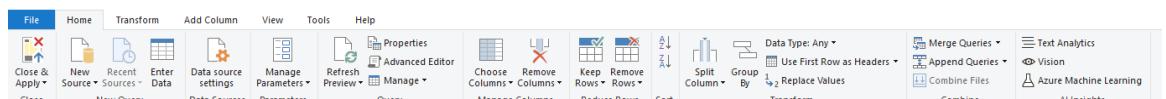
- **Data extraction and transformation:** Power Query interface allows you to extract and transform data with ease. During the extraction process, you can filter, sort, and apply custom transformations, ensuring that you import only the required data.
- **Power Query Editor:** in Power BI within Power BI Desktop, which provides a graphical user interface or GUI for designing and managing queries.
- Tabs such as **Home**, **Transform**, **Add Column**, and **View** have data manipulation tools.
- **Applied steps:** Power Query records each transformation as an applied step allowing you to review, modify, or delete any step. This ensures that your data transformations are transparent and easily modifiable.
- **Performance and scalability:** Power Query handles large datasets efficiently using various techniques that optimize performance and reduce memory usage.

Starting Power Query

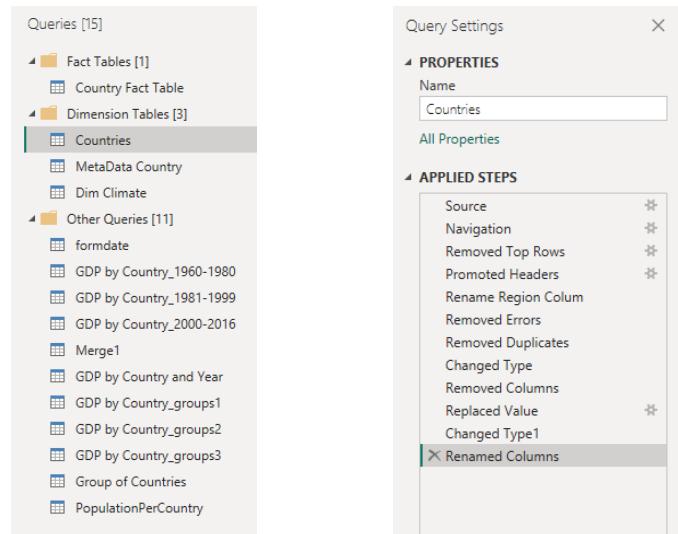
- To get started, you'll need to import your data into Power BI using Power Query. To begin the import, you must add a data source in the Power BI Desktop.
- In the **Home** tab, Select, "**Get Data**" to choose a data source.
- The power query editor opens in a separate Power BI window where you can apply various data transformations, such as removing columns, changing data types, and filtering data.
- Next, you need to **load** the data, select your data source and configure the connection settings if necessary.
- Select "**Transformed Data**" to open the Power Query Editor.

Navigating in Power Query.

- The Power Query Editor has several key areas:
 - **Ribbon:** The ribbon is the set of toolbars at the top of the window and helps you quickly find the commands that you need to complete your tasks.
 - The ribbon tabs, such as **home**, **transform**, **add column**, and **view**, contain commands and tools for data transformation and manipulation.



- **The query's pane:** is located on the left side of the editor. The queries pane displays a list of all the queries in your project.
- Select a query to view or edit its applied steps and data preview. This pane is where you can manage and navigate between different queries in your project.
- By selecting a query, you can view the data and the applied steps associated with it, helping you keep track of your work and maintain organization in your project.



-
- **Applied steps section:** on the right pane below the ribbon.
- It displays the sequence of transformations applied to the selected query.
- Select a step to view the data state at that point or delete, re-order or modify steps as needed.
- The applied steps section provides a visual representation of the transformations applied to your data, making it easier to understand the changes made.
- By reviewing the applied steps, you can identify errors, redundancies, or inefficiencies in your data transformations.
- **Data preview:** in the center of the power query window.
- The data preview pane displays a preview of your data as it appears after the applied transformations.
- You can interact with the data by sorting, filtering, or changing the datatype of columns.
- This pane enables you to review your data at different stages of the transformation process, helping you to get your transformations accurate and effective before loading the data into the data model. Question

	Avg 123 Country	Avg 123 Country Code	Avg 123 Region	Avg 123 Population	Avg 123 Area (sq. mi.)	1.2 Pop. Density (per sq. mi.)	Avg 123 Coastline (coast/area ratio)	Avg 123 Net r	
1	Afghanistan	AFG	ASIA (EX. NEAR EAST)	31056997	647500	48.1 0	44005		
2	Albania	ALB	EASTERN EUROPE	3581655	28748	124.6 46023	-4.93		
3	Algeria	DZA	NORTHERN AFRICA	32930091	2381740	13.8 0.04	-0.39		
4	American Samoa	ASM	OCEANIA	57794	199	290.4 58.29	-20.71		
5	Andorra	AND	WESTERN EUROPE	71201	468	152.1 0	43988		
6	Angola	AGO	SUB-SAHARAN AFRICA	12127071	1245700	9.7 0.13	0		
7	Anguilla	AIA	LATIN AMER. & CARIB	13477	102	132.1 59.8	28034		
8	Antigua & Barbuda	ATG	LATIN AMER. & CARIB	69108	443	156 34.54	-6.15		
9	Argentina	ARG	LATIN AMER. & CARIB	39921833	2766890	14.4 0.18	0.61		
10	Armenia	ARM	C.W. OF IND. STATES	2976372	29800	99.9 0	-6.47		

-

Exercise 3: Exploring Power Query

1. Open file: **01 Exercise 01 Demon on Power BI Project.pbix** you have created in Exercise 1.
2. Remember that we have three views.
3. Go ahead and explore them.
4. Go to Report view.
5. Open Power Query: Home → Queries group → Transform data.
6. On the top you see your Ribbon tabs.

7. On the left is the Queries pane that shows your tables.
8. You can change the name of any query by double clicking or in the property pane in the right.
9. You can rename the columns either right click and choose Rename or double clicking the header.

The screenshot shows the Power BI interface. On the left, the 'Query Settings' pane displays the 'Name' field set to 'Employees'. On the right, a context menu is open over a column named 'A_C Name' in a table view. The menu includes options like Remove, Remove Other Columns, Duplicate Column, Add Column From Examples..., Remove Duplicates, Remove Errors, Change Type, Transform, Replace Values..., Replace Errors..., Split Column, Group By..., Fill, Unpivot Columns, Unpivot Other Columns, Unpivot Only Selected Columns, Rename..., Move, Drill Down, and Add as New Query.

10. In the right you have the applied steps pane.

The screenshot shows the 'APPLIED STEPS' pane. It lists several steps: Source, Navigation, Changed Type, Removed Columns, and Replaced Value. The 'Removed Columns' step is currently selected.

11. You can move to a step to see how your data was look at this point.
12. Click on Changed Type step so you can see your data before removing picture column.
13. You can see that column still there.
14. Click on Remove columns step the column is not here.
15. Click on Removed columns step and delete this step.
16. The column now appears at the final step.
17. Again, go and delete this column and the step now will be the last step.
18. Notice that some steps have a Gear icon beside.
19. That means you can modify this step.

The screenshot shows the 'Replace Values' dialog box and the 'APPLIED STEPS' pane. The 'Replace Values' dialog has fields for 'Value To Find' (set to 'null') and 'Replace With' (set to 'Missing Data'). The 'APPLIED STEPS' pane shows the 'Replaced Value' step, which has a gear icon next to it, indicating it's a modifiable step. The 'Removed Columns' step is also listed.

20. Click on Gear icon next to step Replaced Value.
21. Change **Missing Data** into **No Value** and Click OK.
22. You can also rename the step into a meaningful name.

23. Right Click **Replaced Value** step and choose **Rename**.

24. Rename the step into **Replace null values in Gender**.

Exploring Ribbon Tabs

25. In **Home** tab You have many Groups of sections that mostly used



when transforming and cleaning data like **transform section**

26. You can Get new data **Home → New Query Group → New Source**.

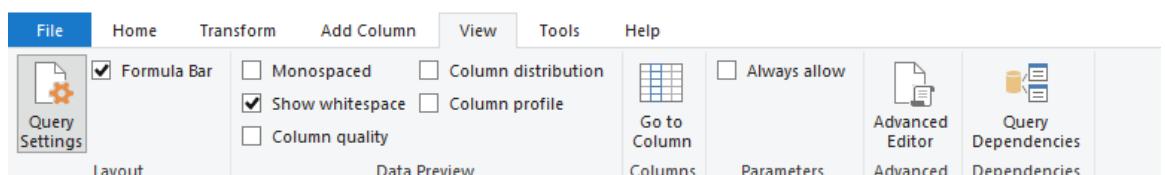
27. In the transform tab you have many options to transform your data.

28. The Add column tab allows you to add calculated new columns to help

A screenshot of the Microsoft Power Query ribbon showing the Transform tab. The ribbon includes tabs for File, Home, Transform, Add Column, View, Tools, and Help. Under the Transform tab, there are several groups of icons: Column From Examples, Custom Column, Invoke Custom Function, General, Conditional Column, Index Column, Duplicate Column, Format, ABC 123 Extract, abc Parse, From Text, Merge Columns, Statistics, Standard, Scientific, Trigonometry, Rounding, Information, Date, Time, Duration, Text Analytics, Vision, Azure Machine Learning, and AI Insights. Below the ribbon, a preview pane shows a table with columns 'Gender' and 'Email'. The 'Gender' column has values 'Female', 'Male', 'Male', 'Female', 'Male', 'Male', 'Male', 'Female', 'Female', 'Female', 'Male'. The 'Email' column has values 'abc@xyz.com', 'def@xyz.com', 'ghi@xyz.com', 'jkl@xyz.com', 'mno@xyz.com', 'pqr@xyz.com', 'stu@xyz.com', 'vwx@xyz.com', 'yza@xyz.com', 'bcd@xyz.com', 'efg@xyz.com'. At the bottom, there are more transformation tools: Transpose, Reverse Rows, Detect Data Type, Fill, Move, Unpivot Columns, Pivot Column, Convert to List, Split Column, Format, ABC 123 Extract, abc Parse, Merge Columns, Statistics, Standard, Scientific, Trigonometry, Rounding, Information, Number Column, Date & Time Column, Run R, Run Python script, and Scripts.

you in your analysis that are not originally in the source data.

29. The **View** tab can show and hide some section in your data view like



for example profiling your data in **Data Preview** Group

30. We will cover those tabs through our training course.

31. Now click on **Close & Apply** to go back to your Power BI Report.

32. Notice that changes you have made is applied.

33. Notice in the Pie chart has the **No Value** instead of **Missing Data**.

34. Save and close your file.

The Applied Steps list

- Thanks to the Applied Steps List in Power Query, you can easily undo and reorder steps without losing progress.
- In the Power Query Editor, you'll find the Applied Steps List on the right pane below the ribbon. It has all the steps you've performed on your data presented in the order of application.
- The Applied Steps List is a visual representation of the transformations applied to your data.

- By reviewing the Applied Steps, you can identify errors, redundancies or inefficiencies in your data transformations.
- To view the data state at a specific point in the process, select the corresponding step in the Applied Steps List.
- The Applied Steps List makes it easy to correct a mistake or change your mind or undo a transformation.

Undo a step

- To undo a step, simply select the X icon next to the step to remove.
- Power Query will automatically revert the data to the state it was in before that step was applied.
- Please note that removing a step will also remove all subsequent steps in the list, as they are dependent on the previous transformations.

Reordering Steps

- To reorder steps, select and drag the step you'd like to move to a new position in the list.
- Power Query will update the data accordingly applying the transformations in the new sequence.
- You should note that reordering steps might affect the results of subsequent transformations.
- Review your data and the Applied Steps List to check everything.

Modifying a Step

- Suppose you need to modify a step, just select the Gear icon next to the step.
- This opens a settings window to edit the transformation parameters.
- When changed, select OK to apply the update.
- As with reordering steps, modifying a step might affect subsequent transformations. Always review your data and the Applied Steps List to ensure everything is as expected.

Adding a New Step

- To add a new step, use the Power Query Editor ribbon to choose a transformation such as filtering or sorting.
- When you perform a new data transformation, it's added to the Applied Steps List.

Adding Filters

- With the Power Query editor, you can also add filters.
- Filtering is the process of narrowing down your data set by displaying only the rows that meet specific criteria.
- It helps focus on a particular subset of data, remove unwanted data that may affect your analysis, or simplify your data set for better readability.

Steps to add a filter:

- In the Power Query Editor, select the column header for the column you want to filter.
- This highlights the entire column.
- With a column selected, select the small down arrow next to the column header. This opens a drop-down menu with filtering options such as text filters, number filters or date filters, depending on the data type in the column.
- Choose the type of filter and select OK.

- Notice the new filtering step has been added to the Applied Steps List.

Sorting Data

- You can also sort your data set.
- Sorting is the process of arranging your data in a specific order, either ascending or descending.
- Sorting organizes data based on specific attributes such as alphabetical order, numerical values, or chronological order, helping to identify the highest or lowest values in a data set.

Steps to filter Column

- Select the column header for the column you want to sort.
- In the home tab of the ribbon, find the **Sort group**. Choose sort ascending **A to Z** or sort descending **Z to A**. To sort the selected column in ascending or descending order. The data is sorted based on your chosen sorting order.
- Check the Applied Steps List to ensure the new sorting step is added.

Renaming an Applied Steps

- Finally, for better organization and readability, you can rename any step in the Applied Steps List.
- Just right click the step you'd like to rename and select **Rename**.
- Enter a new descriptive name for the step and press Enter.
- Renaming steps helps keep track of transformations, making it easier to navigate and understand the data transformation process.

Cleaning Data

The most common cleaning steps are:

1. Removing Columns.
2. Renaming Columns.
3. Removing Duplicate Rows.
4. Merging Columns.
5. Splitting Columns.
6. Replacing Null Values.
7. Changing Data Types.
8. Sorting Data.
9. Filtering Data.

Exercise 4: Clean Data

1. Create new file in Folder Exercise 4
2. Name file: **Clean Data.pbix**.
3. Get Data to the file from the **Sales.xlsx** File.
4. Explore the Excel file of your Data first then connect to the file from Power BI using Get Data Button as before.
5. This time click Transform Data Option in the Navigation pane to open Power Query.
6. Now Start Clean your data

Remove Empty Rows

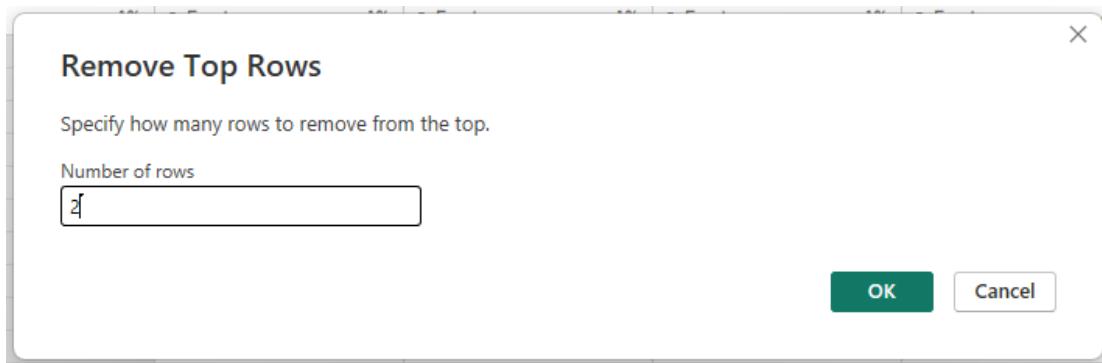
- Notice you have Empty rows come with you from the Excel Sheet.

The screenshot shows the Power Query Editor interface. The ribbon is visible with the 'Transform' tab selected. A context menu is open over a specific row in the table, with the 'Remove Top Rows' option highlighted. The 'Applied Steps' pane on the right shows a single step named 'Sales Data'.

- From Home → Reduce Rows group → Remove Rows.

- Select Remove Top Rows.

- In the select top rows dialogue box type 2



Upgrade first row to be column headers

- Now the column header needs to be the first row you have.

- Home → Transform group → Use first row as header

The screenshot shows the Power Query Editor ribbon. The 'Transform' tab is selected. The 'Advanced Editor' button is visible in the ribbon bar.

Exploring Applied Steps List

- You have made a lot of changes to your data.
- Every step you do is recorded in the list.
- You can review states of your data at any step by clicking that step.
- You can insert steps if you want (but the might break your data).
- You can delete any steps.

The screenshot shows the Power BI Query Editor interface. On the left, there's a preview of a table with columns 'Customer Lname' and 'A'. The 'Customer Lname' column has three rows: '100%', '0%', and '0%'. The 'A' column has three rows: 'Valid', 'Error', and 'Empty'. The 'APPLIED STEPS' pane on the right lists several steps: Source, Navigation, Promoted Headers, Changed Type, Removed Top Rows, Promoted Headers1, and Changed Type1. The 'Changed Type1' step is currently selected.

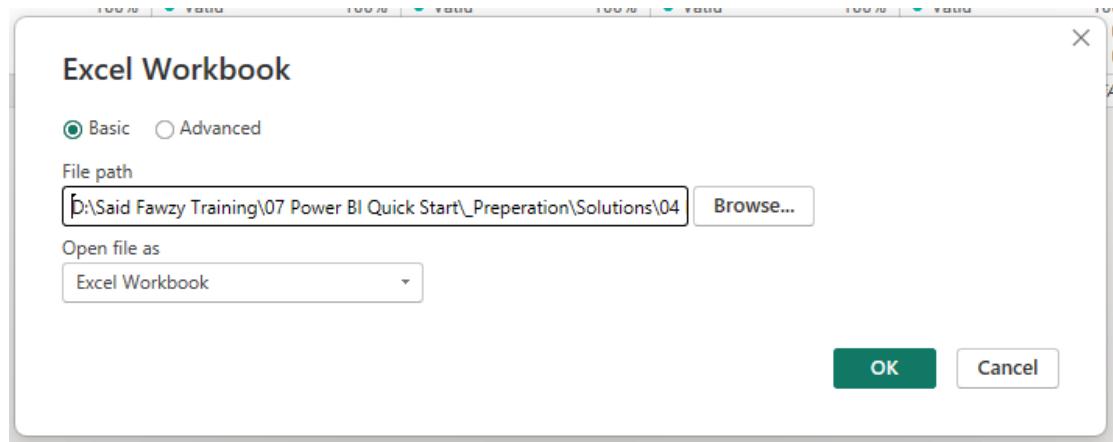
18. When you click any step the formula bar shows the M language code for this step.

The screenshot shows the Power BI Query Editor with the formula bar visible. The formula bar displays the M language code: `= Table.TransformColumnTypes(#"Promoted Headers1",{{"Row_Id", type text}, {"Order_Id", Int64.Type}, {"Order ..."}},`

19. You can modify the code on the M language.
20. Notice that some steps have Gear icon on its right
21. If you click this icon, you can update this step
22. Click on Source Step

The screenshot shows the Power BI Query Editor with the 'Source' step selected in the 'APPLIED STEPS' pane. The formula bar shows the full M language code for the query. The 'Source' step is highlighted in the list of applied steps.

23. You can change the path of your file in M language in the Formula bar.
24. Click the **Gear Icon** beside Source.
25. You get a dialogue box you can modify the source of your file



Remove unwanted columns

26. You can select a column you do not want and right click the its header and chose Remove.
27. Try this in one column and delete the step from the Applied list to undo what you have done

s("#Promoted Headers1",{{"Row_Id", type text}, {"Order Id"...

	A _B Market Region	A _B Additional Order items
0%	Valid	
0%	Error	
0%	Empty	
LATAM		

Right-click context menu for the 'Market Region' column header:

- Copy
- Remove
- Remove Other Columns
- Duplicate Column
- Add Column From Examples...
- Remove Duplicates
- Remove Errors
- Change Type
- Transform

28. You can multi select columns and delete them using the CTRL button.

Try	Manage Columns	Reduce Rows	Sort	Transform	Combine	Query Settings
mColumnTypes("#Promoted Headers1",{{"Row_Id", type text}, {"Order Id", Int64.Type}, {"Order...	mer Segment	A _B Market Region	A _B Additional Order items	A _B Cu	C	PROPERTIES
100%	Valid	100%	Valid	100%	Valid	Copy
0%	Error	0%	Error	0%	Error	Remove Columns
0%	Empty	0%	Empty	0%	Empty	Remove Other Columns
LATAM		Camping & Hiking	Camping & Hiking	Cagu...	Cagu...	Add Column From Examples...
LATAM		Camping & Hiking	Camping & Hiking	Cagu...	Cagu...	Remove Duplicates
LATAM		Camping & Hiking	Camping & Hiking	Mayag...	Mayag...	Remove Errors
LATAM		Camping & Hiking	Camping & Hiking	Mayag...	Mayag...	Replace Values...
LATAM		Hunting & Shooting	Hunting & Shooting	Cagu...	Cagu...	Fill
LATAM		Hunting & Shooting	Hunting & Shooting	Cagu...	Cagu...	Change Type
LATAM		Camping & Hiking	Camping & Hiking	Cagu...	Cagu...	Transform
LATAM		Camping & Hiking	Camping & Hiking	Cagu...	Cagu...	Merge Columns
LATAM		Camping & Hiking	Camping & Hiking	Cagu...	Cagu...	

29. If you have many columns and you want to keep only few columns

30. Select the columns in the table below to keep and choose Remove other columns.

Order	Column	Data Type
1	Order Id	Whole Number
2	Order Date	Date
3	Customer Fname	Text
4	Customer Lname	Text
5	Category Name	Text
6	Customer Segment	Text
7	Customer City	Text
8	Customer Country	Text
9	Customer Id	Whole Number
10	Customer State	Date
11	Order Quantity	Whole Number
12	Sales	Fixed Decimal Number
13	Profit Per Order	Fixes Decimal Number

Order	Column	Data Type
1	Order Id	Whole Number
2	Order Date	Date
3	Customer Fname	Text
4	Customer Lname	Text
5	Category Name	Text
6	Customer Segment	Text
7	Customer City	Text
8	Customer Country	Text
9	Customer Id	Whole Number
10	Customer State	Date
11	Order Quantity	Whole Number
12	Sales	Fixed Decimal Number
13	Profit Per Order	Fixes Decimal Number

Order Columns

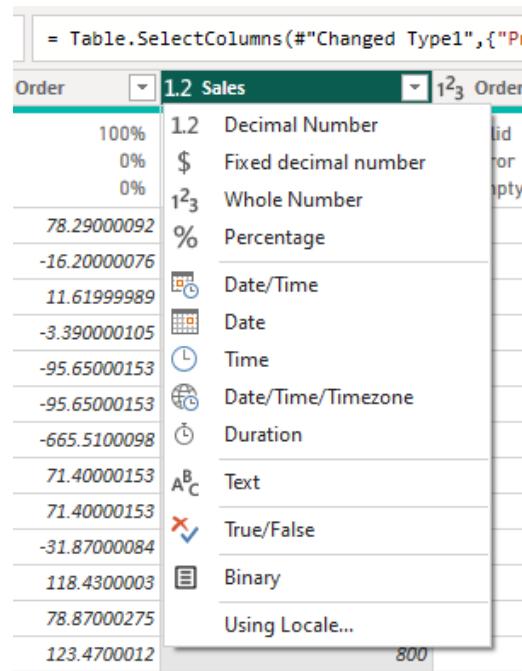
31. Drag and drop Columns to move them and order them as in the table.

Change Data Types

32. You have to check your columns to have the right data type.

33. Go now and check and change the data types as in the table below:

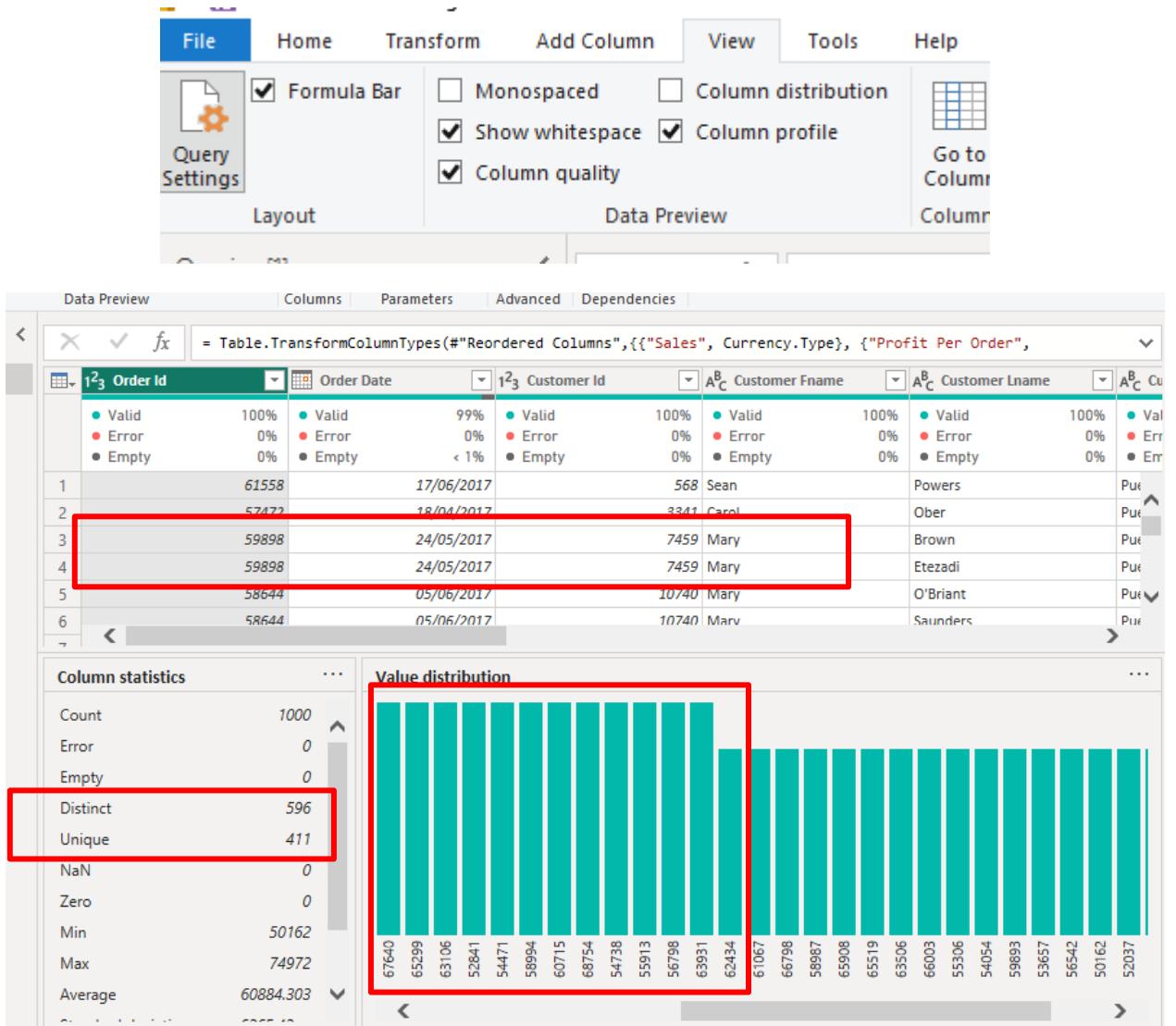
34. You can click on the top left of the column header and change the Data Type



35. Notice the icon used for each data type.
 36. You can also select the column and change the type from ribbon.
 37. Transform → Any Column group → Data type

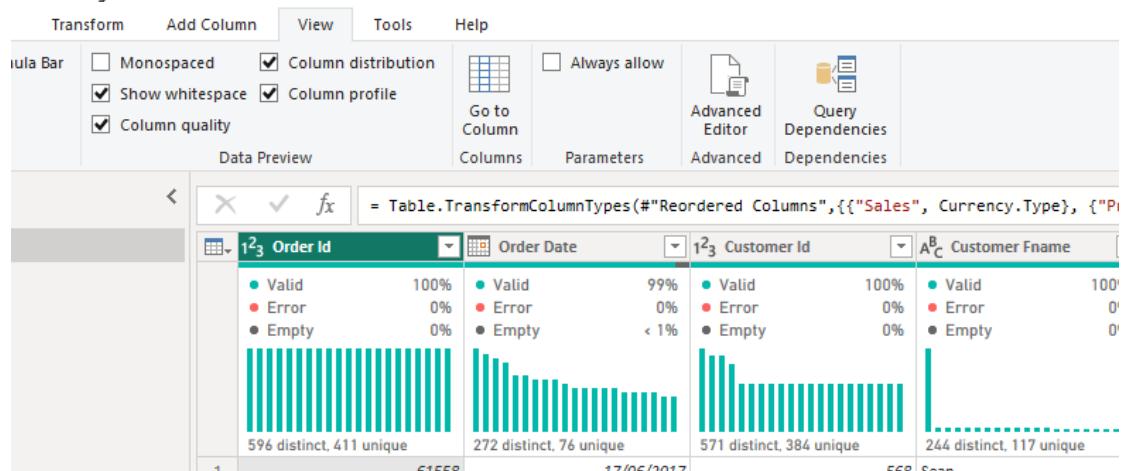
Removing Duplicate

38. You have your **Order ID** is the Primary column of the table.
 39. It should not be repeated.
 40. Let us check
 41. Select Order ID column
 42. Select View → Data Preview group → Column Profile
 43. Notice you have rows that are repeated and not unique

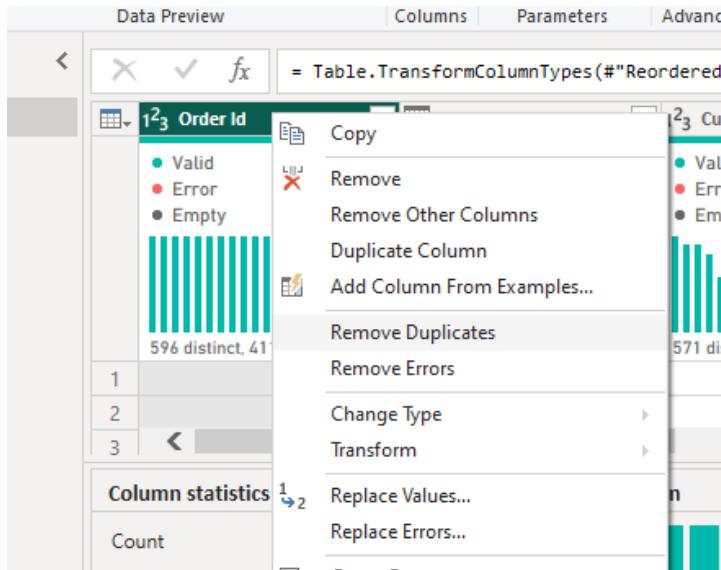


44. Check also Column Distribution to see more

Data Cleaning



45. Right click the Order ID Column and chose Remove Duplicates



46. Notice that you have now all distinct and Unique

	= Table.Distinct(#"Changed Type2", {"Order Id"})								
	1 ² ₃ Order Id	Order Date	1 ² ₃ Customer Id	A ^B _C Customer Fname	A ^B _C Customer Lname	A ^B _C C			
	1000 distinct, 1000 unique	330 distinct, 70 unique	949 distinct, 900 unique	331 distinct, 174 unique	471 distinct, 210 unique	2 dist			
1	61558	17/06/2017	568	Sean	Powers	Put			
2	57472	18/04/2017	3341	Carol	Ober	Put			
3									

	Column statistics	Value distribution
Count	1000	59898, 57233, 56882, 51638, 55200, 61171, 57525, 57461, 57146, 52183, 63030, 62571, 63922, 64813, 67892, 56339, 58613, 60807, 53413, 56973, 59155, 53403, 51288, 52640, 57106, 56172
Error	0	
Empty	0	
Distinct	1000	
Unique	1000	
Nan	0	
Zero	0	
Min	50162	
Max	74994	
Average	62266.035	

47. Notice also the **Column Quality** that gives you indication if there is error in the columns or empty cells.

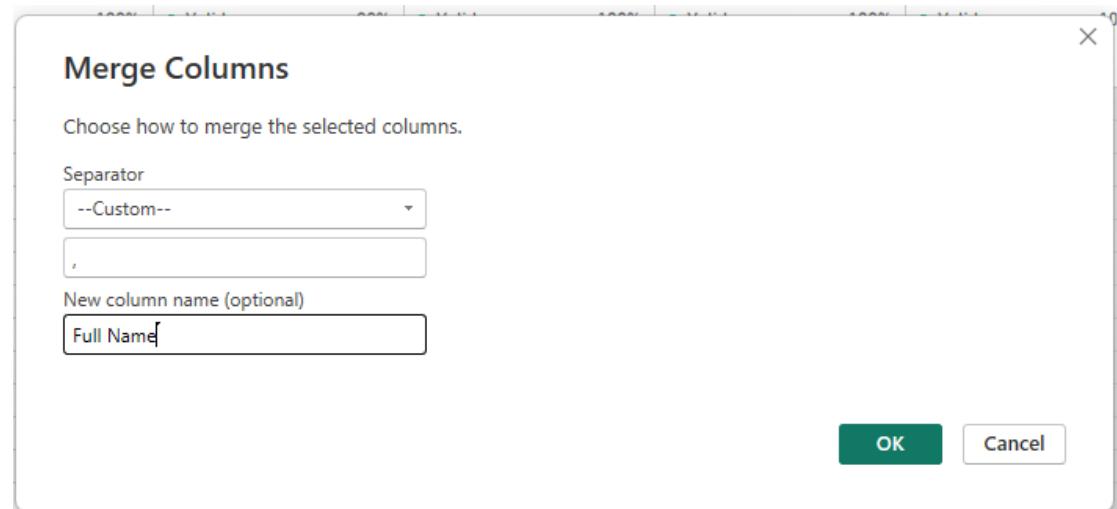
Merging Two Columns

48. We Want to have Full Name of Customer with “ , ” Separating the two.

49. Select Customer FName and Customer LName.

50. Select Transform → Text Column group → Merge Column

51. In Merge column Window select the separator Custom and make it “ , ” and name the new column **Full Name**.



52. Now you have the Full Name column

	A ^B _C Full Name	A ^B _C C
568	Sean, Powers	Puert
341	Carol, Ober	Puert
459	Mary, Brown	Puert
740	Mary, O'Briant	Puert
193	Amanda, Sundaresam	Puert
292	Mary, Seite	Puert
645	Andrea, Vernon	Puert
997	Mary, Dahlen	Puert
339	Mary, DeCherney	Puert
1899	Mary, Moore	Puert

53. You can also select the two columns and right click to chose Merge Columns.

A screenshot of the Power BI Data Editor interface. A context menu is open over a column header labeled 'Customer Fname'. The menu contains several options: Copy, Remove Columns, Remove Other Columns, Add Column From Examples..., Remove Duplicates, Remove Errors, Replace Values..., Fill, Change Type, Transform, Merge Columns, Group By..., Unpivot Columns, Unpivot Other Columns, Unpivot Only Selected Columns, and Move.

Rename your Applied Steps

54. It is a good practice to Rename your steps to a descriptive name
55. Right click and select rename option in the applied Step pane and rename it “Merge to get Full Name”

The screenshot shows the 'APPLIED STEPS' pane in the Power BI interface. It lists various steps taken during the data preparation process. One step, 'Merge to get Full Name', is highlighted, indicating it is the current target for renaming.

Split Columns

56. Let us do the opposite and split the full name to two columns.
57. Select the Full Name column , right click and chose split column.
58. You will have many options.
- 59.

The screenshot shows the Power BI Data Editor interface. A context menu is open over a column named 'Full Name'. The 'Split Column' option is selected, revealing a submenu with several options: 'By Delimiter...', 'By Number of Characters...', 'By Positions...', 'By Lowercase to Uppercase', 'By Uppercase to Lowercase', 'By Digit to Non-Digit', and 'By Non-Digit to Digit'. Other options like 'Copy', 'Remove', and 'Change Type' are also visible in the main menu.

60. Let us use By Delimiter and split the column back.

The screenshot shows the 'Split Column by Delimiter' dialog box. The 'Select or enter delimiter' dropdown is set to '--Custom--' and contains a single character: '}'. The 'Split at' section has 'Left-most delimiter' selected. Under 'Quote Character', a dropdown shows a single quote character (''). The 'Advanced options' section includes a checkbox for 'Split using special characters' which is unchecked. At the bottom right are 'OK' and 'Cancel' buttons.

61. Rename the new columns to FName and LName.

	A ^B _C Full Name.1	A ^B _C Full Name.2	A ^B _C
568	Sean	Powers	Pu
3341	Carol	Ober	Pu
7459	Mary	Brown	Pu
10740	Mary	O'Briant	Pu
5193	Amanda	Sundaresam	Pu
2092	Mary	Seite	Pu
9645	Andrea	Vernon	Pu
997	Mary	Dahlen	Pu
3339	Mary	DeCherney	Pu
4899	Mary	Moore	Pu
12322	Mary	Selesnick	Pu
714	Mark	Hackney	Pu

62. Right Click LName column and select Transform ➔ Trim to remove the spaces at the beginning

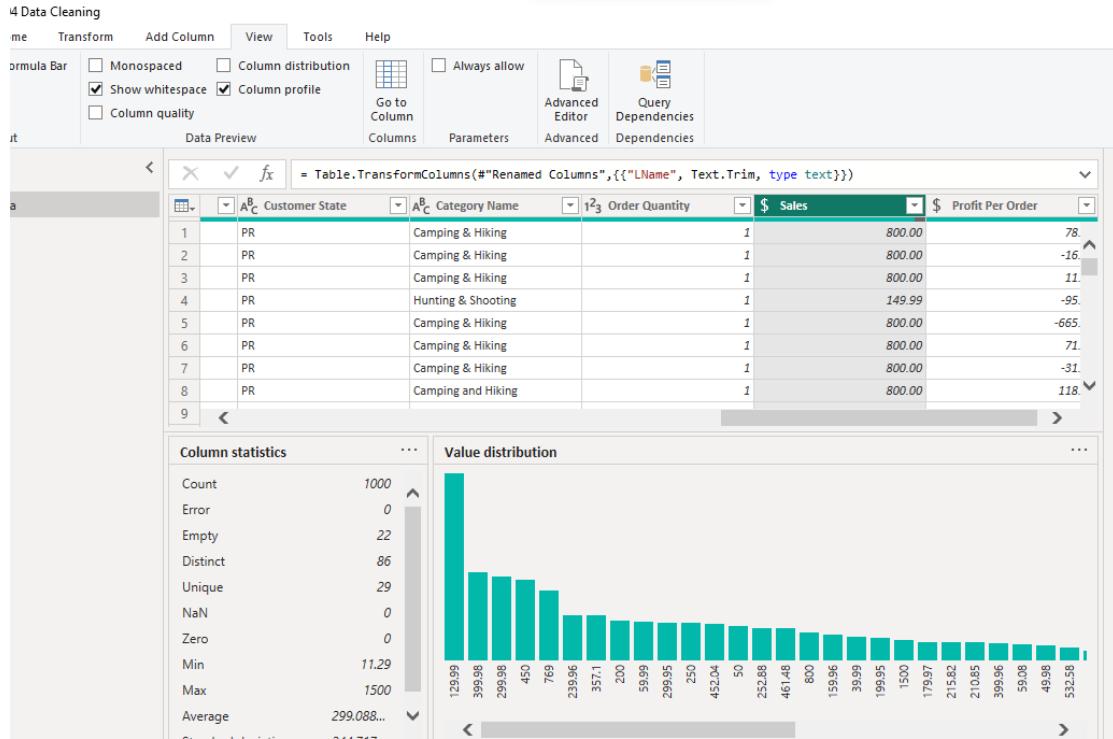
The screenshot shows the Power BI Data Editor interface. A context menu is open over the 'LName' column, specifically over the cell for 'Mark'. The menu path 'Transform' is highlighted. Other options visible in the menu include 'Copy', 'Remove', 'Remove Other Columns', 'Duplicate Column', 'Add Column From Examples...', 'Remove Duplicates', 'Remove Errors', 'Change Type', 'Replace Values...', 'Replace Errors...', 'Split Column', 'Group By...', 'Fill', 'Unpivot Columns', 'Unpivot Other Columns', 'Unpivot Only Selected Columns', 'Rename...', 'Move', 'Drill Down', and 'Add as New Query'.

	A ^B _C FName	A ^B _C LName
568	Sean	Powers
3341	Carol	Ober
7459	Mary	Brown
10740	Mary	O'Briant
5193	Amanda	Sundaresam
2092	Mary	Seite
9645	Andrea	Vernon
997	Mary	Dahlen
3339	Mary	DeCherney
4899	Mary	
12322	Mary	
714	Mark	
9204	Mary	
5421	Mary	
9923	David	
11329	Hanna	
3570	Mary	
9353	Michael	MacIntyre
12151	Vincent	Boeckenhau
10018	Gregory	Goranitis
3182	Frances	McGrath
1025	Megan	Adams
RR31	Maru	Daniels

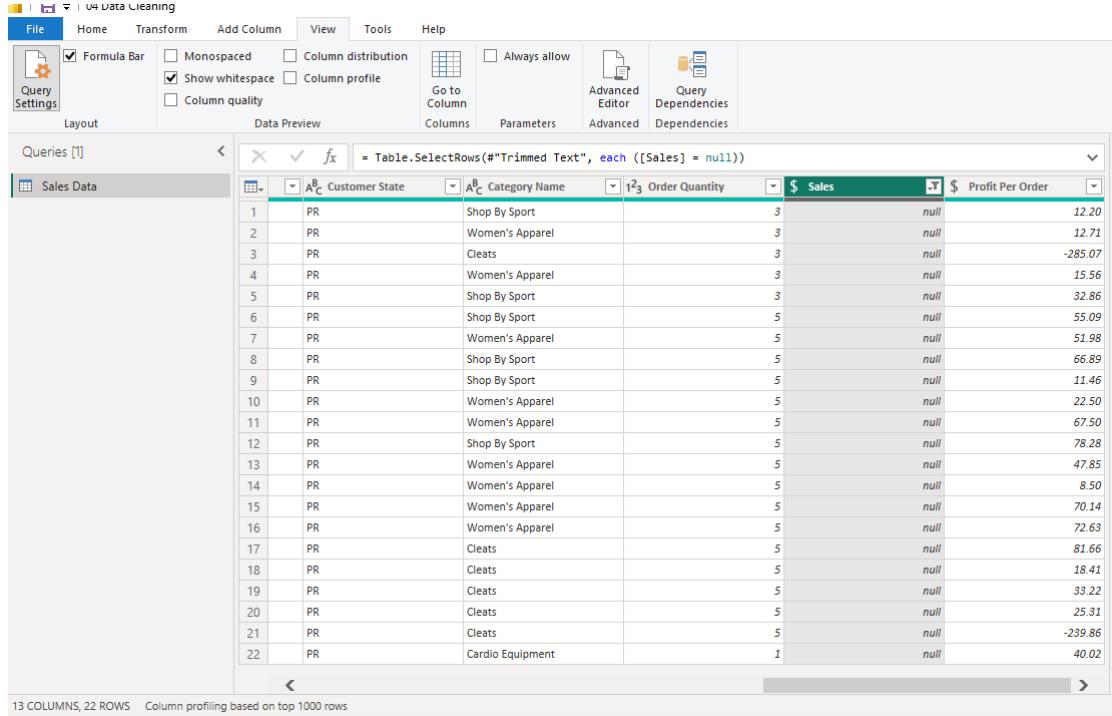
Dealing With Null Values

63. Select Sales Column and check its profile.

64. Notice it has 22 Rows empty.



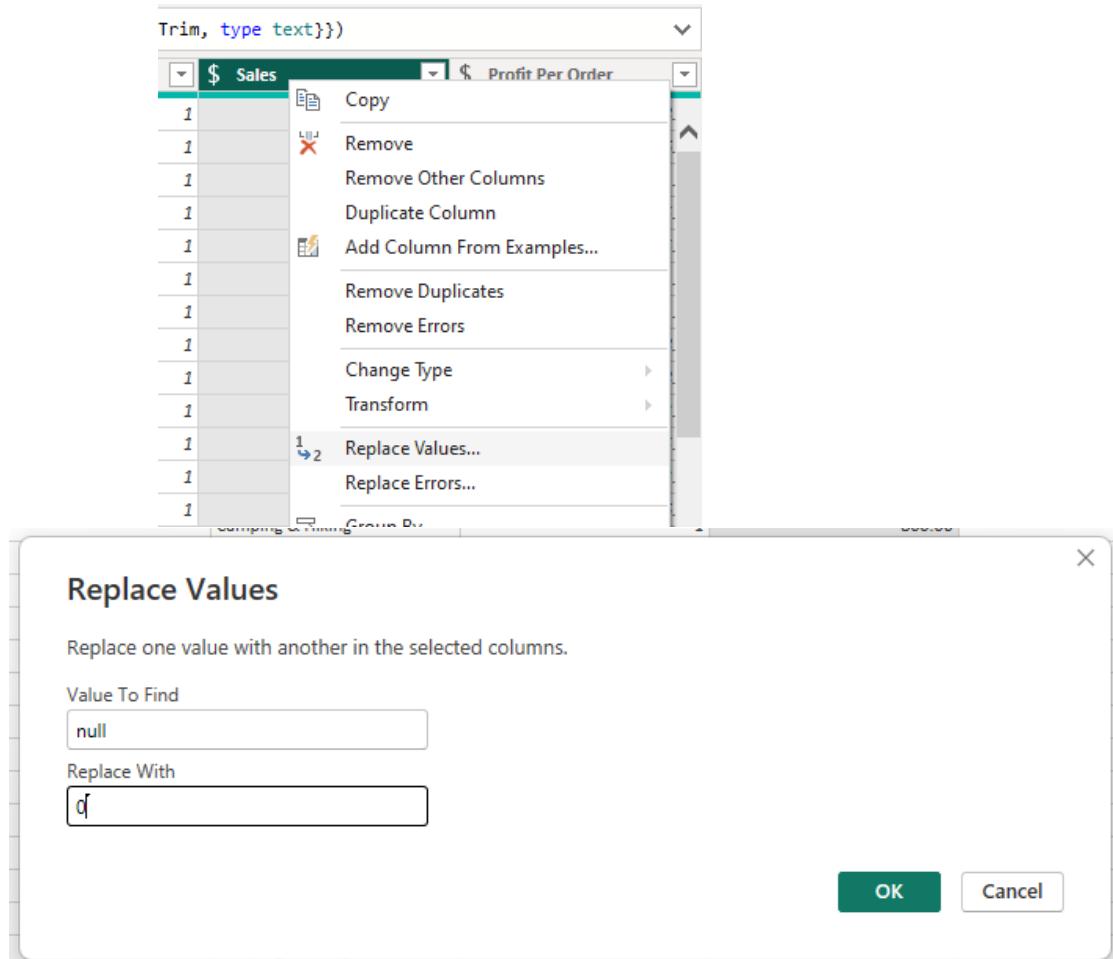
65. Click the arrow on the header of the column and select the Null Values to see them.



66. Notice you have indicator on the bottom bar they are 22 rows.
 67. You must Have decision here.
 68. When you asked your manager, he said change null to 0.

Replace Value

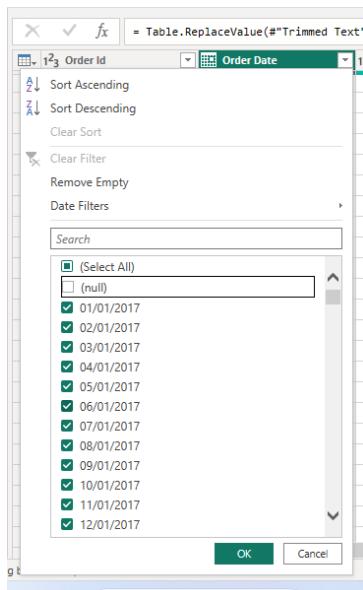
69. Delete the last step from the applied steps pane.
 70. Right click the Sales column and select Replace Value.
 71. Replace null with Zeo.



72. Now you have your null values having 0 and you can calculate them.

Filter Data

- 73. Check the values of Order Date column.
- 74. You also have Null values here.
- 75. Your manager said you should remove those columns.
- 76. So Filter the column and remove null values.
- 77.



Format Data

78. You have some options to Format your data.

79. Select FName column , Right Click and select Transform ➔

The screenshot shows the Power BI Data Editor interface. A context menu is open over the 'FName' column header. The 'Transform' option is highlighted. A dropdown menu lists several transformation steps: UPPERCASE, LOWERCASE, Capitalize Each Word, Trim, Clean, Length, JSON, and XML. To the right of the menu, the 'APPLIED STEPS' pane shows a history of changes: Source, Navigation, Promoted Headers, and Changed Type. The 'Changed Type' step is currently selected.

UPPERCASE

Check M Language

80. All your steps has been written in M Langue for you.

81. You can check and take a copy and save.

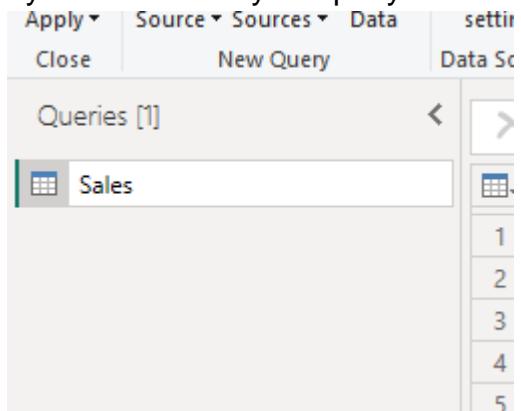
82. Home ➔ Query ➔ Advanced Editor

The screenshot shows the Power BI Advanced Editor ribbon. The 'Home' tab is selected. Other tabs include File, Transform, Add Column, View, Tools, and Help. Below the ribbon are various icons for closing, applying changes, and managing data sources and parameters.

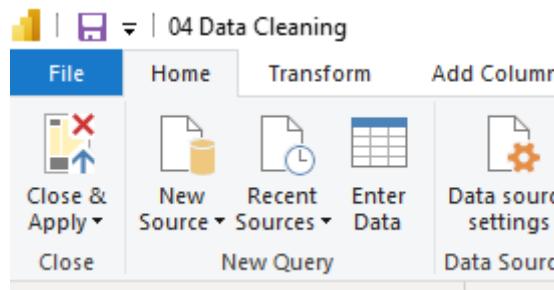
83. If you look closely you will notice that it is not complicate language.

84. Each step starts from the previous step.

85. In the Query Pane rename your query to sales.

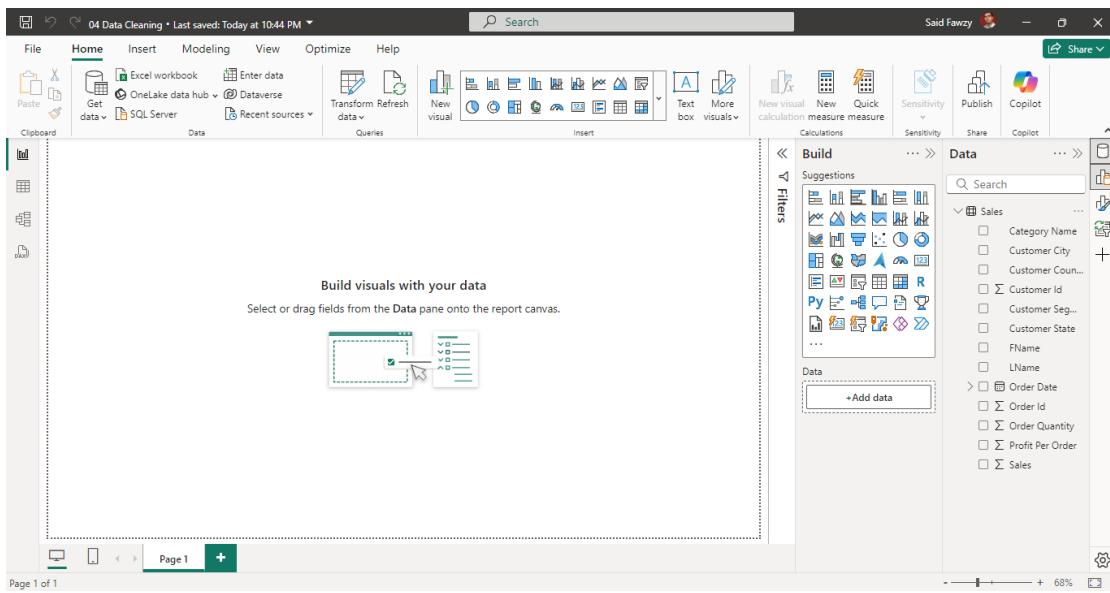


86. From Home select close and Apply to go back to power Query.



87. Make sure you have your sales table now in your Data pane.

88. Save and close your File.



Chapter 4: Data Modeling

What is a Data Model?

- At its core, data modeling is **creating a structured representation of data**. Representation can then be used to support different business aims.
- In other words, a data model shows **how different data elements interact**, and it also outlines the **rules** that **influence** these interactions.

How to build Data Model with Power BI

- **First, you need to connect to data sources:**
 - by executing a query in Power Query Editor.
 - The result is then loaded into the Power BI data model as a table.
 - Using Power Query in Power BI, you can finish importing and cleaning their data sources. This creates a data model that contains cleaned for example customer, date, employee, and marketing data as separate tables.
 - **Each table in the model** represents a specific **business entity**, and each table also has its own related attributes.
- **The next step is to define the relationships between the tables** in Power BI's model view:
 - The company can link for example its customers and sales tables using the Customer ID column, which is common to both tables.

- Finally, the company needs to create measures and calculated columns using DAX:
 - DAX is a syntax used in Power BI to analyze data.
 - You can use DAX to create **aggregations** and **custom calculations** to generate insights on important aspects of their data, like sales totals.
- A strong understanding of data models will help you:
 - maximize your data's full potential.
 - Building sophisticated data models
 - creates a robust foundation for data analysis and generating insights.

Model view in Power BI

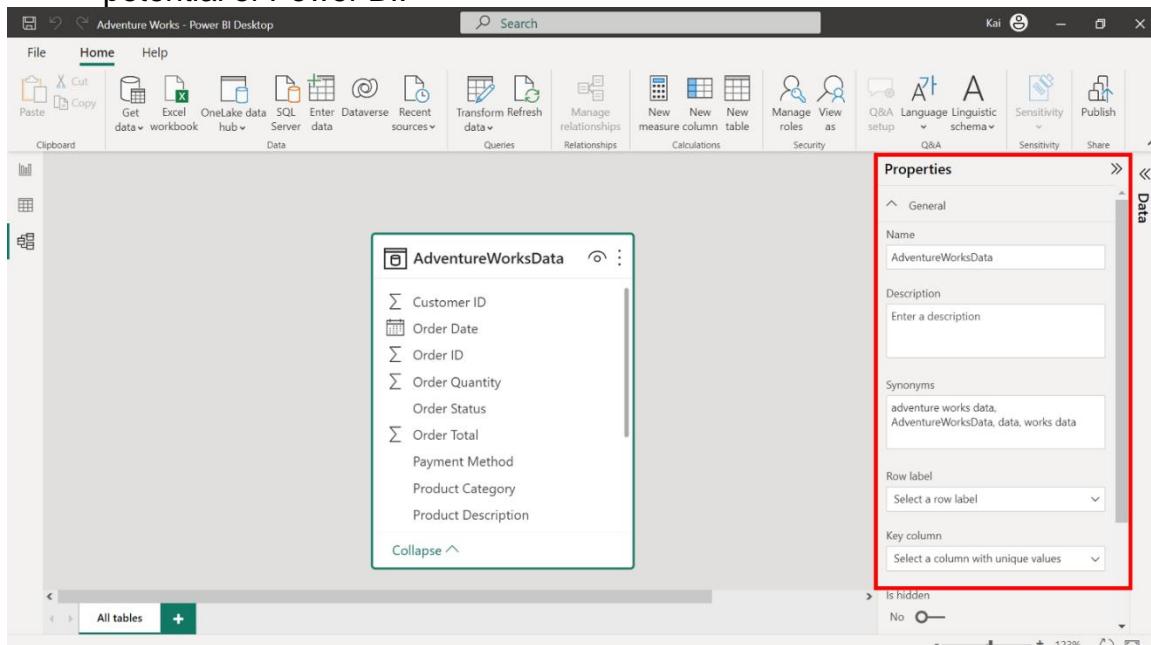
- The **Model view** visually represents all data tables, relationships, and columns. You can use these visuals to shape and structure your data. The **Model view** is especially crucial when a data model contains complex relationships between its tables.

Model view elements

- The **Model view** can be accessed by selecting the **model** icon on the left sidebar of Power BI desktop. The **Model view** contains the following UI elements:
 - **Diagram view (canvas)**
 - **Data pane**
 - **Properties pane**
 - **Home ribbon**

Table properties

- In Power BI, tables are the foundational data modeling, analysis, and visualization elements. Understanding and managing the different properties associated with tables is essential for maximizing the potential of Power BI.



Column properties

- In Power BI table view, column properties refer to the specific settings and characteristics associated with individual columns within a table.
- These properties influence how data in columns is displayed, treated, and used for analysis and visualization. Correctly configuring these properties enhances data accuracy, visualization quality, and overall user experience.
- Some common column properties are as follows:

Table: AdventureWorksData (96 rows) Column: Product Name (48 distinct values)

Fact and Dimension Tables

- As you discovered You can use schemas for data organization. And two central components of all schemas are **fact** and **dimension** tables.
- As you learned earlier, a schema is a **logical and visual representation of how your fact and dimension tables relate**.
- They're the backbone of schemas in Power BI.

Fact Tables

- Fact tables are called fact tables because they consist of the **measurements**, **metrics**, or **facts** of a business process. In other words, they hold **quantifiable measurable** data.
- For example, In a star schema **Sales Orders** table it includes **transaction details** like **Order ID**, **Product ID**, **Customer ID**, **Quantity**, and **Total Price**. These are **core facts** about transactions, like the **customer** who made the purchase, the **price** of the product they purchased, and so on.
- And this fact table is related to dimension tables.

Dimension Tables

- Dimension tables are typically **textual fields** and provide **descriptive attributes** related to fact data.
- They offer the context surrounding a business process event.
- In the Star schema, the dimension tables are linked to the fact table and include **date**, **customer**, **sales**, and **product** data.

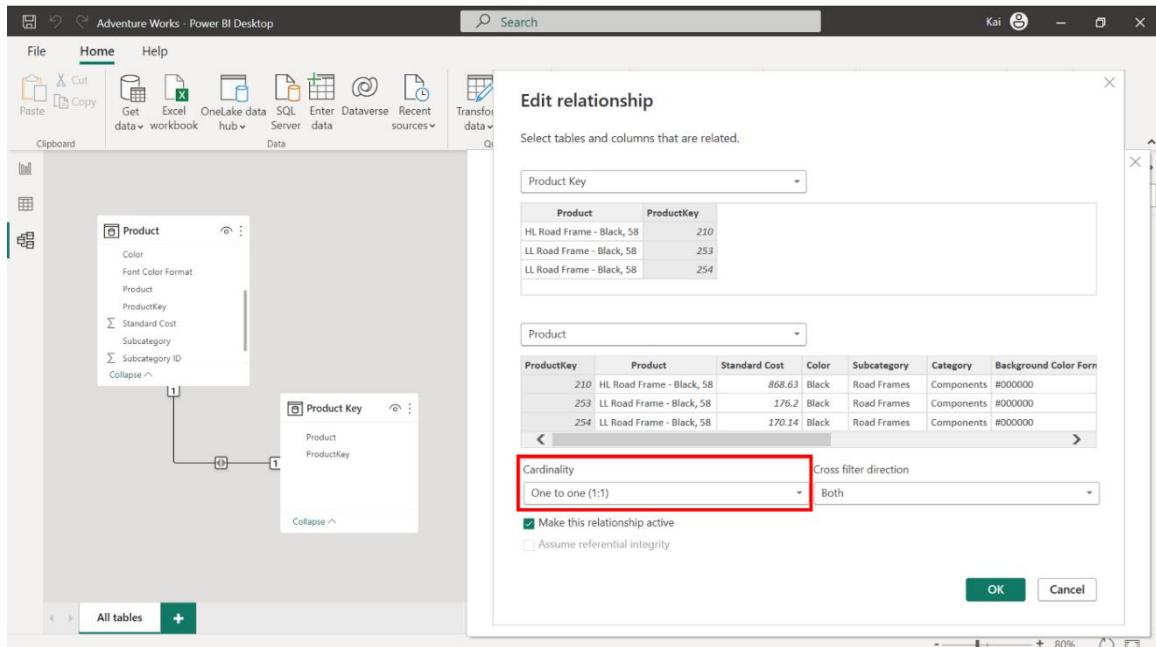
These are **descriptive details** that can be used to identify individual customers

Model relationships

One-to-one Relationship

For example, Adventure Works has two dimension tables: **Product** and **Product Category**. Each table has a **SKU (Stock keeping unit)** column. All fields in these columns contain unique values.

A one-to-one relationship exists between these two tables based on the **SKU** column, because it is common to both. This means that when **SKU** filters the **Product Category** table, the **Products** table is filtered for products associated with the SKU.

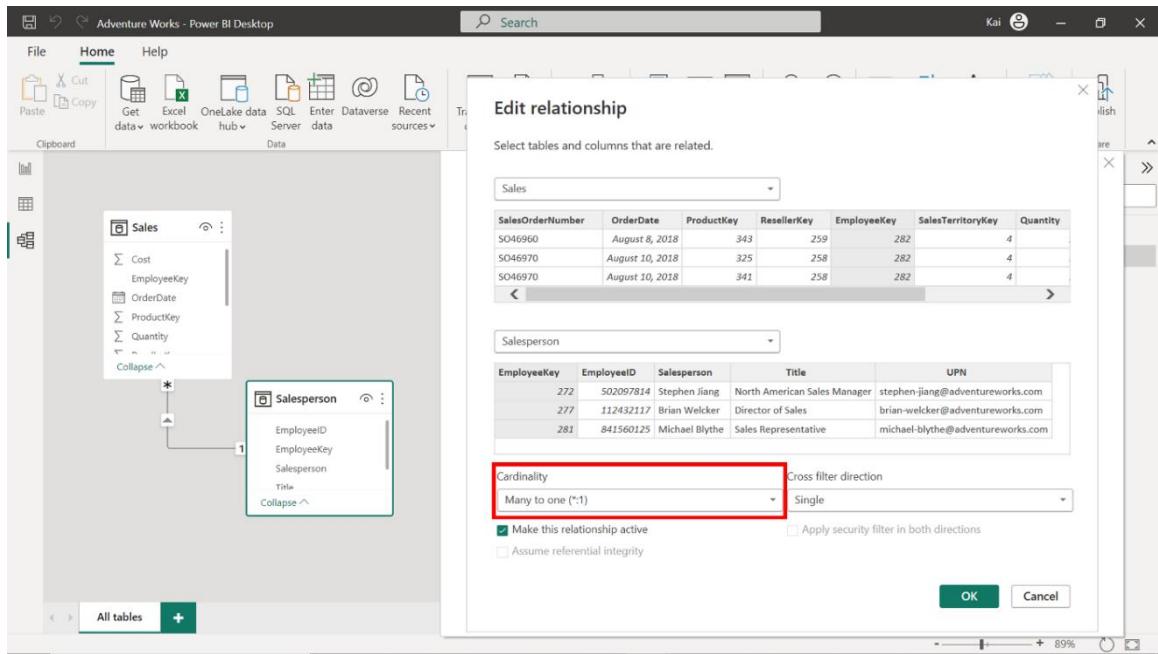


One-to-many relationship

- A one-to-many relationship exists where each value in the column of one table (**Table A**) can be associated with multiple values in the column of another table (**Table B**).
- This is the most common cardinality type and the default relationship in Power BI.
- In most data models, a one-to-many relationship describes the directionality between the Fact and the dimension table.

For example, in Adventure Works, the **Sales** table (the Fact table) is associated with the **Salesperson** table (the dimension table). Both tables have an **EmployeeKey** column, which establishes the relationship between the tables. In the **Salesperson** table, the **EmployeeKey** column contains a unique value in each row, as each salesperson only exists once. Each salesperson can have multiple sales, so their **EmployeeKey** may be repeated in multiple rows of the **Sales** table.

This is illustrated in the diagram below, where each salesperson can be associated with multiple sales.

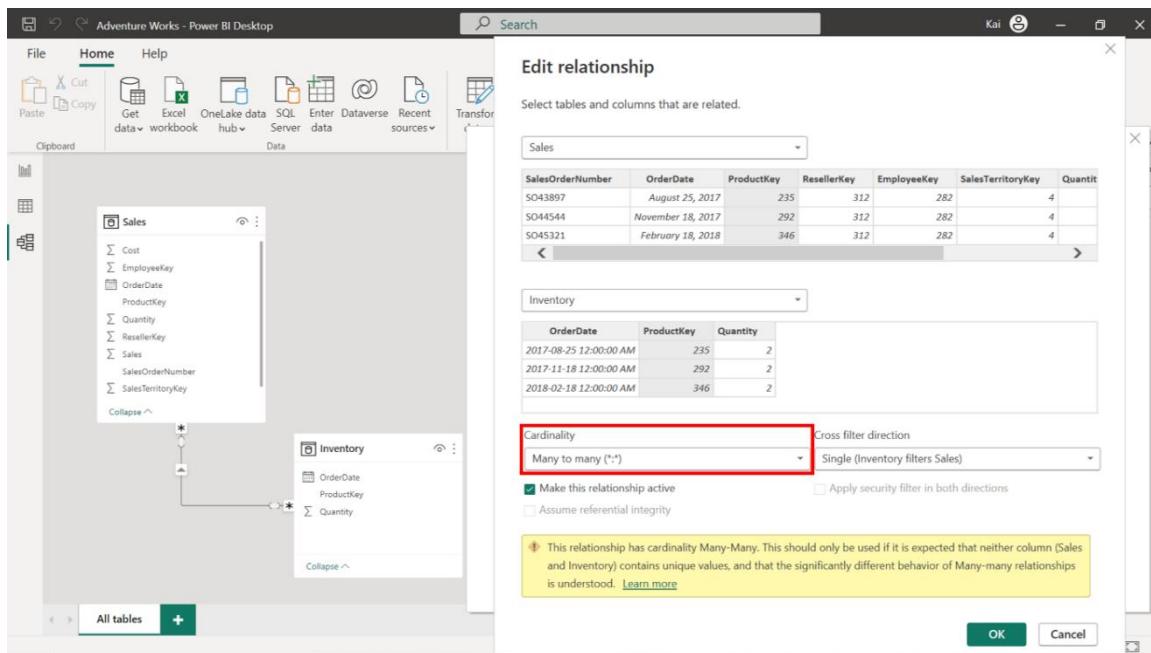


Many-to-many relationship

- A many-to-many relationship exists when multiple values in the column of one table can be associated with multiple values in the column of a related table. This relationship **does not require unique values** for either table.
- The disadvantage of a many-to-many relationship is that it introduces **ambiguity** in data analysis. So, it's only recommended to use it in certain specific scenarios.
- Typically, this relationship relates to two Fact tables or two dimension tables.

Let's take the example of Adventure Works' **Sales** and **Inventory** Fact tables. Both tables have a **ProductKey** column connected through a many-to-many relationship. This indicates that multiple sales can exist for a specific product key, and the product key can exist in multiple inventories in the warehouse.

In the data model, this means that for a given value of **ProductKey**, there can be multiple rows in the **Sales** table and multiple rows in the **Inventory** table. This must be a many-to-many relationship because no **ProductKey** field has unique values.



Cross-filter direction

- If your company needs to calculate which members of its sales team have sold the most product types and should be awarded a bonus. However, the data required to generate this insight is spread across multiple tables with **fixed cross-filter directions**.

You can help your company analyze this data by **changing the cross-filter directions** of its tables.

Exercise 5: Configuring Relationship between tables

- Use file **AdventureWorksDataset3.xlsx**.

Step 1: Explore the Excel File

- Explore the file in Exercise 3 Folder.
- the Excel workbook **AdventureWorksData.xlsx**. The workbook contains four tables of data: **Sales**, **Products**, **Region**, and **Salesperson**.

Step 3: Load the data from the Excel workbook

- Load the data from the Excel sheet into Power BI. Ensure you load all tables in the workbook.
- Open a preview of the table in the **Preview** pane.

Tip: You can import data using the **Get Data** drop-down menu.

Step 4: Configure a Star Schema

- In Table View explore the tables and identify the Key Column.

2. A unique identifier is usually an ID column or key column within the data table. Once you select a **column**, Power BI displays **the total number of rows** at the bottom left corner of the interface with **unique values**. For the **ID** column, the number of rows and **unique** values should be **the same**.
3. In the Adventure Works dataset, the **Sales** table is the fact table that records transactional details.

Adventure Works - Power BI Desktop

File Home Help Table tools Column tools

Name: SalesOrderNumber Format: Text Summarization: Don't summarize Data category: Uncategorized Sort by column: Data groups: Manage relationships: New column

Structure Formatting Properties Sort Groups Relationships Calculations

SalesOrderNumber OrderDate ProductKey ResellerKey EmployeeKey SalesTerritoryKey Quantity Unit Price Sales Cost

SO46960	August 8, 2018	343	259	282	4	1	469.79	469.79	486.71
SO46970	August 10, 2018	325	258	282	4	1	469.79	469.79	486.71
SO46970	August 10, 2018	341	258	282	4	1	469.79	469.79	486.71
SO46970	August 10, 2018	331	258	282	4	1	469.79	469.79	486.71
SO46988	August 14, 2018	335	78	282	4	1	469.79	469.79	486.71
SO46992	August 16, 2018	323	97	282	4	1	469.79	469.79	486.71
SO46992	August 16, 2018	333	97	282	4	1	469.79	469.79	486.71
SO46992	August 16, 2018	325	97	282	4	1	469.79	469.79	486.71
SO47032	August 24, 2018	323	313	282	4	1	469.79	469.79	486.71
SO47035	August 24, 2018	333	528	282	4	1	469.79	469.79	486.71
SO47056	August 28, 2018	335	403	282	4	1	469.79	469.79	486.71
SO47056	August 28, 2018	331	403	282	4	1	469.79	469.79	486.71
SO47056	August 28, 2018	343	403	282	4	1	469.79	469.79	486.71
SO47056	August 28, 2018	333	403	282	4	1	469.79	469.79	486.71
SO47350	September 1, 2018	323	277	282	4	1	469.79	469.79	486.71
SO47355	September 2, 2018	339	24	282	4	1	469.79	469.79	486.71
SO47372	September 7, 2018	325	649	282	4	1	469.79	469.79	486.71
SO47372	September 7, 2018	343	649	282	4	1	469.79	469.79	486.71
SO47425	September 19, 2018	343	674	282	4	1	469.79	469.79	486.71
SO47661	October 2, 2018	327	510	282	4	1	469.79	469.79	486.71
SO47994	November 8, 2018	339	258	282	4	1	469.79	469.79	486.71
SO47994	November 8, 2018	325	258	282	4	1	469.79	469.79	486.71

Data

Search

- Product
- Region
- Sales
 - Cost
 - EmployeeKey
 - OrderDate
 - ProductKey
 - Profit
 - Profit Margin
 - Quantity
 - ResellerKey
 - SalesOrderNumber
 - SalesTerritoryKey
 - Total Sales
 - Unit Price
- Sales (2)
 - Cost
 - EmployeeKey
- OrderDate

4. The **Products**, **Region**, and **Salesperson** tables are the dimension tables. To determine the unique identifier, check the total number of rows at the bottom left corner of the interface with unique values.

Adventure Works - Power BI Desktop

File Home Help

Paste Cut Copy Get data workbook OneLake data hub Data Server Data Enter Dataverse Recent sources Transform Refresh data Relationships Manage roles as Security Q&A Language setup Sensitivity Publish

Clipboard

Region Country Group Region SalesTerritoryKey

Product Background Color Format Category Color Font Color Format Product

Salesperson EmployeeID EmployeeKey Salesperson Title UPN

All tables +

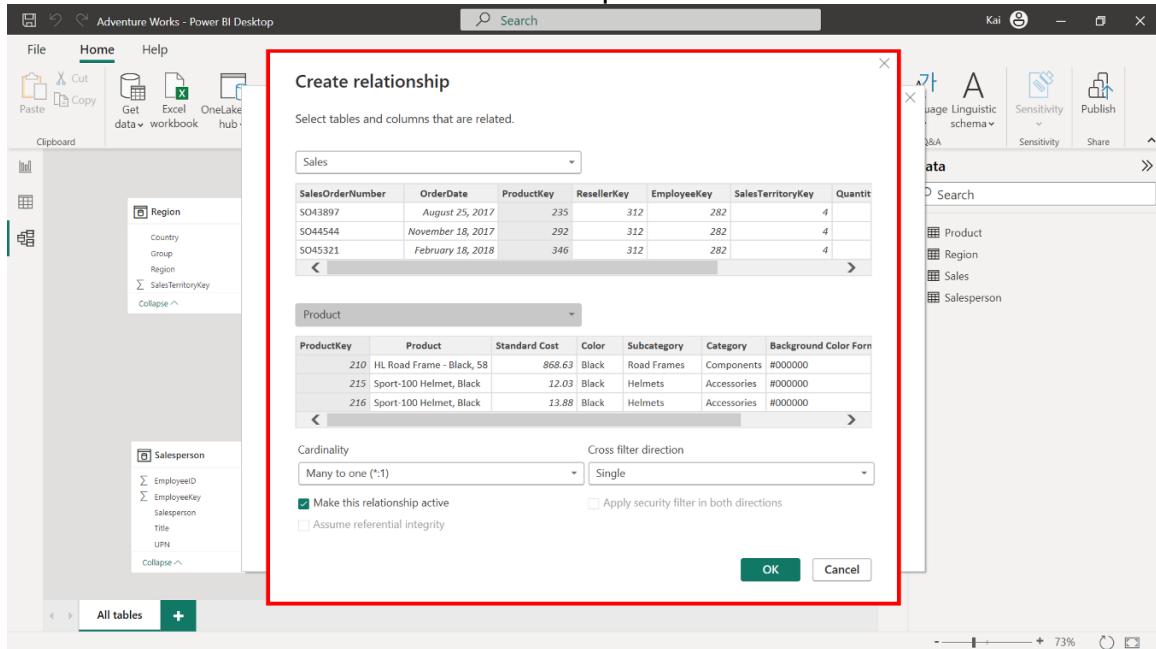
Data

Search

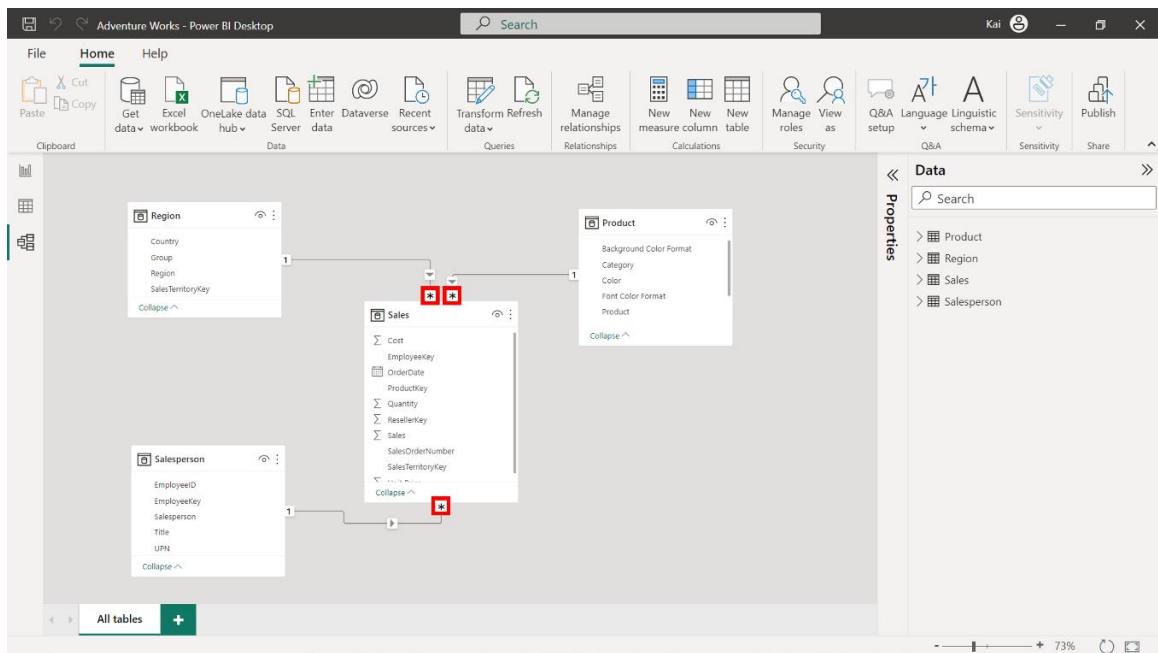
- Product
- Region
- Sales
 - Salesperson
- Salesperson

5. To create the schema and the model relationships between the fact table and the dimension tables, select **Model view** on the left sidebar of Power BI desktop.

6. You must establish relationships between the fact and dimension tables in the **Model view**. Select and drag the foreign key fields from the fact table to their corresponding primary key fields in the dimension tables.
7. Connect **Sales.ProductKey** to **Products.ProductKey**, then **Sales.SalesTerritoryKey** to **Region.SalesTerritoryKey**, and finally, **Sales.EmployeeKey** to **Salesperson.EmployeeKey**.
8. Alternatively, you can build relationships using the **Create Relationship** dialog box. Access the dialog box by selecting **Manage Relationship** in the **Model view** of Power BI desktop.



9. Once the relationships are established, double-check to ensure each type is a many-to-one relationship. Select the **connector line** between the tables to open the **Edit Relationship** dialog box. Here you can verify that the cardinality is set to **Many-to-One** and that the cross-filter direction is set to **Single**.



Save the Power BI project.

Chapter 4: Introduction to DAX

What is DAX?

- DAX is a programming language used in:
 - Microsoft SQL Server Analysis Services,
 - Power Pivot in Excel, and
 - Power BI.
- It is a library of:
 - functions,
 - operators, and
 - constants used in formulas or expressions to create additional information about the data are not present in the original data model.
- With DAX expressions, you can create **custom calculations** on data models to extract maximum information from your data to solve real-world problems.

Creating calculated columns

- You might often encounter tables that don't have the data you need.
- You can generate this data by combining existing columns to create a new calculated column.
- If your company is analyzing the data in its **Sales** table and realizes there's no data for the profit margins on its product categories in the original data source. **Calculated columns** are the perfect solution to this problem.
- You can add data on its profit margins using DAX expressions to create new calculated columns within the original data source.

What is a Calculated Column?

- A calculated column is a new column added to an existing data table in Power Bi.
- Data analysts can use calculated columns to derive new data from existing columns and add it to the data model.
- Once added, these columns can be used in any part of a report or visual just like any other column.

Exercise 6: Creating Calculated Columns

Scenario

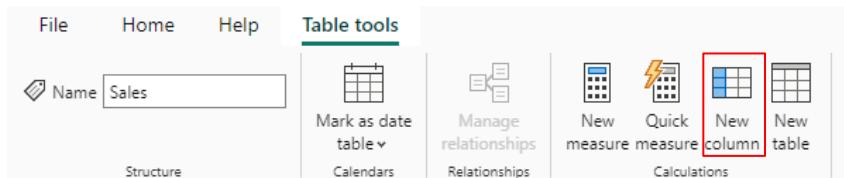
- Your company wants to calculate its profit margin from its Sales data on its Sales table by creating calculated columns.
- However, the table is missing this data
- You need to add it using DAX and Calculated Columns

Steps

1. Use file **Sales6.xlsx**
2. Create a new Power BI file and save it to Folder Exercise 6
3. Import the Sales table.
4. The workbook contains one table called **Sales**. The table tracks Company recent sales data.
5. Load the table Sales into your model.
6. Your company wants to calculate its profit margin from its Sales data in its Sales table by creating calculated columns.

Total Sales Column

7. Access power BI's **table view** to view the **Sales** table, your company needs to calculate its profit margin. But to do this, it must first calculate its **Total Sales** for the quantity of each item sold.
8. However, the table is missing this data. You can add this data to the table by creating a new Total Sales column. You just need to **multiply** the **quantity** and **unit price** columns.
9. Select the Sales table from the data pane on the right-hand side of Power Bi desktop.



10. In the **Table Tools** tab, select the **new column** from the **Calculations** group.

11. This opens the **DAX formula bar**.

12. Write **DAX code** in the Formula bar that multiplies the quantity column

```
1 Total Sales = Sales[Quantity] * Sales[Unit Price]
```

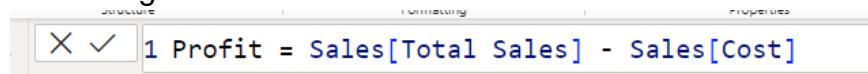
by the unit price column and adds the result as a new **Total Sales** column.

13. Press **Enter** to execute the code.

14. A new Total Sales calculated column appears under the Sales table in the Data view on the right-hand side of the Power BI interface.
15. You can use this new column in any report or visualization like any other table column.

Profit Column

16. Now that you've identified the Total Sales data, you can create a **Profit** column to determine how much profit has been made on each item.
17. Write another DAX formula that subtracts the **cost** from the **Total sales** and generates the data as a new **Profit** column.

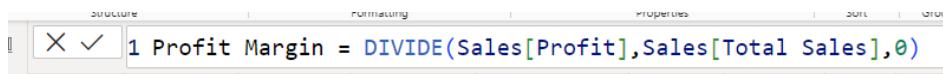


`1 Profit = Sales[Total Sales] - Sales[Cost]`

18. Press **Enter** to execute the formula. The new Profit Calculated column is added to the sales table.

Profit Margin

19. Now that you've identified the profits, you can create the **profit margin** column.
20. Select new column again. Then write another DAX formula in the formula bar that **divides** the **Profit** and **Total Sales** columns and



`1 Profit Margin = DIVIDE(Sales[Profit],Sales[Total Sales],0)`

generates the result in a **Profit Margin** Calculated column.

21. Press **Enter** to execute the formula. The profit margin column is added to the data.

Format Columns

22. Finally, you need to format the calculated columns, select the **profit** column and format it as **currency**.
23. Then format the **profit margin** column as a **percentage**.

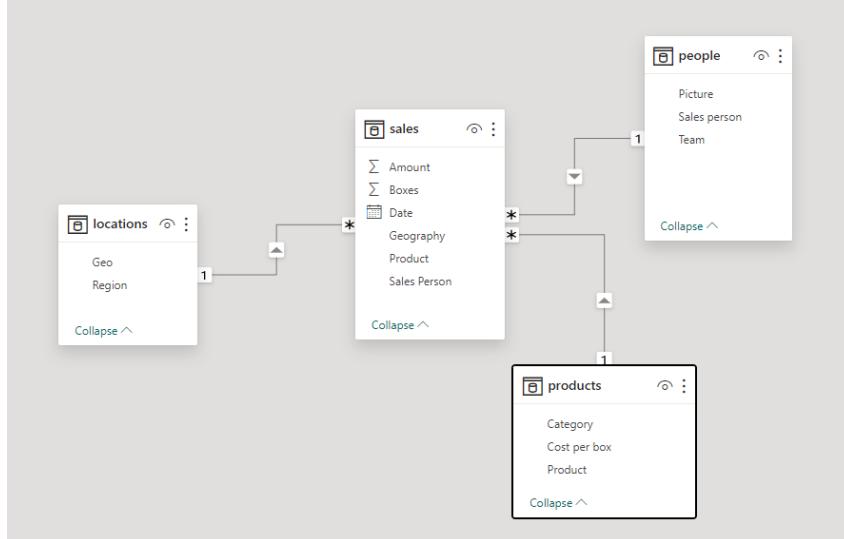
Measures

- Measures in Power BI are used to perform calculations on data model fields.
- Measures play a pivotal role in data analysis and interpretation.
- Measures are used in Power BI to perform aggregations, calculations or evaluations on data that provide meaningful insights.
- Measures are typically used in data visualization elements. Examples of these elements include charts, tables, and cards.
- By using measures, you can compute aggregated values such as **sums**, **averages**, **minima**, **maxima**, **counts** or more complex statistical calculations.

Exercise 7: Creating Measures

1. Open **Create Measures START.pbix**.

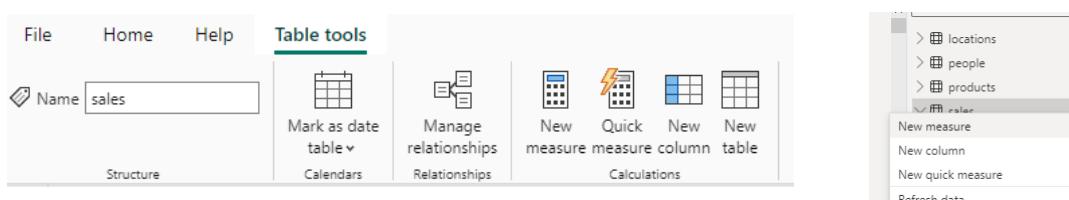
2. Explore your Data Model.



3. This is a chocolate company; Sales are recorded in **Sales** table.
4. The Salespersons recorded in **People** table.
5. The location of the Sales is stored in **Location** table.
6. What chocolate you have sold in the Product table.

Create Total Sales Measure

7. We want to answer the question: What is the total money we have generated?
8. Go to **Table view** and see the data in the tables.
9. In the Sales table we have an **Amount** Column, that is what we want to get its total.
10. Select **Sales** table.
11. **Table tools** ribbon appears on top.
12. Create new measure either:
 - a. Right Click **Sales** table and select **New Measure**, or
 - b. Select **New Measuer** from the Ribbon.



13. Write the DAX Code to create the measure:

Total Amount = `SUM(sales[Amount])`

14.

The screenshot shows the Power BI formula bar with the following text:

```
Structure Adds all the numbers in a column. Properties
X ✓ 1 Total Amount = SUM(sales[Amount])
Sales Person Geography people[Sales person]
Baker's Baker's
Gunar Cockshoot New Zealand Almond
Gunar Cockshoot New Zealand Raspberry
Gunar Cockshoot New Zealand White
Gunar Cockshoot New Zealand Drinkin
Gunar Cockshoot New Zealand Orange Crouc
Tuesday, February 23, 2021
```

The formula bar indicates that a new measure named 'Total Amount' is being created, defined as `SUM(sales[Amount])`.

15. Just write **SUM** and choose **sales[Amount]** then press Enter.

16. The Measure appears in the table.

The screenshot shows the Power BI Fields pane with the 'sales' table selected. Under the table, there are several columns and a measure. The measure, 'Total Amount', is highlighted with a red box.

17. Think of a measure as something Acts on **Top of your data**.

18. That is why we could not consider it as a column in the table.

19. You can only see its value when you use in reports.

20. Go to **Report View** and Create a Card with the measure you have created.

The screenshot shows the Report View. On the left, a card visual displays the value '46M' under the heading 'Total Amount'. To the right are three panes: 'Filters', 'Build a visual', and 'Data'. In the 'Data' pane, the 'Total Amount' measure is selected, indicated by a checked checkbox.

21. To make it total clearer create a table with **Geo** and the **Total Amount** measure.

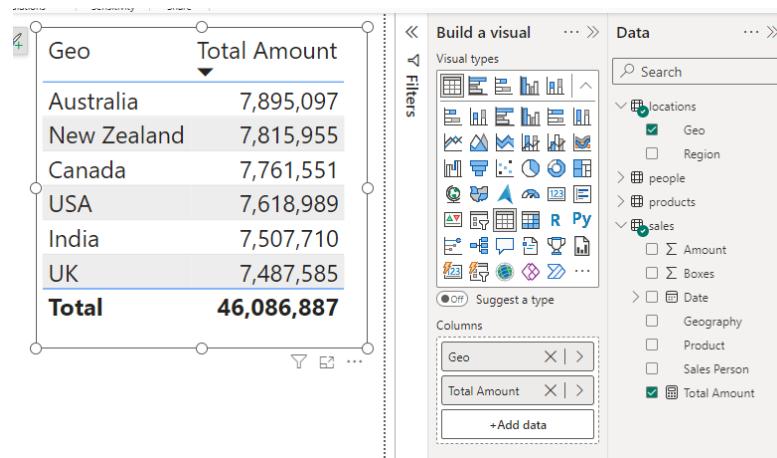
Format Measure

22. Go to **Table view** and select your measure.

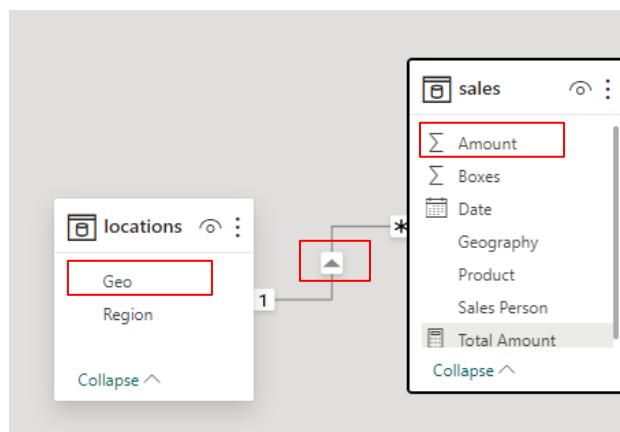
23. **Measure Tools** appear on the ribbon.

The screenshot shows the ribbon with the 'Measure tools' tab selected. Below the ribbon, the 'Formatting' group is highlighted with a red box. This group contains options for 'Name', 'Home table', 'Format', 'Data category', and 'Properties'.

24. In **Format** group format your measure as **Currency** with **no decimals**.



25. That is the power of Power BI it follows the filter direction to calculate each region amount as you specified in the measure.
26. For example it takes **Australia** form the **Geo** and filter the **Amount** according to and then calculate your measure to get the total.



27. It takes into account the filter direction in the model.
28. Remember that Power BI first **Filter Data** then Apply **calculation**.

Create Total Boxes Measure

29. In the same table Sales create another measure **Total Boxes**.

$$\text{Total Boxes} = \text{SUM}(\text{sales}[Boxes])$$

30. Add the new measure to your table you have created in report view and format it as a whole number with separator.

The screenshot shows the Power BI Data view. On the left is a table visual with columns: Geo, Total Amount, and Total Boxes. The data includes rows for Australia, New Zealand, Canada, USA, India, UK, and a total row. On the right is the data model pane, which shows the relationships between tables like locations, people, products, and sales. It also lists measures such as Total Amount and Total Boxes.

Create Total Shipment Count

31. We want to know the total shipments we have made.
32. That is the count of all our sales rows.
33. Create **Shipment Count** measure and add it to your report table.

Shipment Count = COUNTROWS(sales)

34. Format it as **Whole Number** with separator.
35. You can use any filed name to count rows.

Adding Category Filter to your Report

36. Add a **Filter** to your Report and Add **Category** column to it.
37. As you can see all values were calculated again using the new filter.
38. Select Bars Category and see how the other two Visuals are filtered.
39. Remember Power Bi first **filter** the data then **calculate**.

The screenshot shows a table visual with columns: Geo, Total Amount, Total Boxes, and Total Shipments. The data includes rows for Australia, Canada, India, New Zealand, UK, and USA, with a total row. To the right is a filter visual titled "Category" with three options: Bars, Bites, and Other. The "Bars" option is selected.

Reuse Measure in Calculation

40. You can reuse the two measures you have defined before and create new measure:

Amount per Shipment = [Total Amount] / [Shipment Count]

41. You can start to write "[" so you see all measures you have created.
42. Add the new measure to your report table.
43. Create another measure **Amount per Box**:

Amount per Box = DIVIDE([Total Amount], [Total Boxes], 0)

44. Notice that we have used **DIVIDE** function which saves me the error when dividing by **Zero**. It allows you to all **alternative value**.
45. Notice we do not write the table name before the measure name.

46. You can write the table name before measure.
47. But it is better not to do it.
48. Add your new measure to your table report.

Geo	Total Amount	Total Boxes	Total Shipments	Amount per Shipment	Amount per Box
Australia	\$7,895,097	522,672	1,578	5,003.23	15.11
USA	\$7,618,989	512,612	1,556	4,896.52	14.86
New Zealand	\$7,815,955	504,862	1,601	4,881.92	15.48
Canada	\$7,761,551	523,869	1,590	4,881.48	14.82
India	\$7,507,710	509,198	1,556	4,825.01	14.74
UK	\$7,487,585	503,103	1,568	4,775.25	14.88
Total	\$46,086,887	3,076,316	9,449	4,877.44	14.98

Reusing your Measures in many places

49. Create a new Page in your report and create a new table with **Salesperson, Amount per Box , and Amount per Shipment.**
50. Click on the columns to sort to analyze which salesperson has the top Amount per box and amount per shipment.

Sales person	Amount per Box	Amount per Shipment
Jehu Rudeforth	14.76	6,558.86
Mallorie Waber	15.01	5,657.39
Roddy Speechley	15.19	5,550.66
Camilla Castle	15.04	5,528.40
Van Tuxwell	14.68	5,169.23
Madelene Upcott	15.48	5,027.48
Jan Morforth	14.84	4,996.56
Marney O'Breen	14.25	4,959.98
Dotty Strutley	15.10	4,945.42
Beverie Moffet	15.30	4,940.56
Total	14.98	4,877.44

Exercise 8: IF Function

1. User file If **IF Function Start.pbix**.
2. If you want to check salespeople who have met their targets or not.
3. Create a new Page for your report page3.
4. Create a Measure **Amount per Shipment Target Achieved?:**

5. Amount Per Shipment Target Achieved? = `IF([Amount per Shipment] > 4800 , "Yes", "No")`

6. Create a new table with **sales person** and **Amount per shipment target Achieved**

Sales person	Amount Per Shipment Target Achieved?
Wilone O'Kielt	Yes
Van Tuxwell	Yes
Roddy Speechley	Yes
Rafaelita Blaksland	No
Oby Sorrel	No
Marney O'Brien	Yes
Mallorie Waber	Yes
Madelene Upcott	Yes

Using Emoji Trick

7. Select your measure again and start to edit.
8. You can use Emoji instead of Yes and No words.
9. Delete “Yes” and “No” in the quotations and start writing.
10. Press **(Windows key + dot Key)**
11. This will show the emoji list.
12. Select **happy face** and **sad face** instead of yes and no.

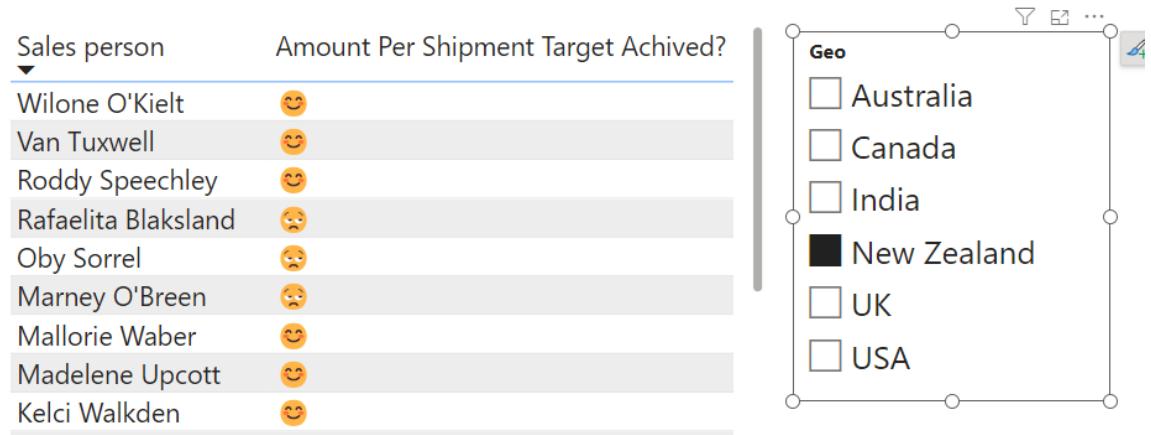
The screenshot illustrates the process of replacing 'Yes' and 'No' values with emojis. In the formula bar, the measure definition is shown as:

```
= IF([Amount per Shipment] > 4800, "Yes", "No")
```

The 'Calculations' pane shows the full formula with the original text. A floating emoji picker window is open, titled 'Emoji - Keep tapping to find an emoji'. It contains a grid of various smiley faces. Below the picker, the table structure is visible, showing the sales people and their achievement status replaced by emojis.

Sales person	Amount Per Shipment Target Achieved?
Wilone O'Kielt	😊
Van Tuxwell	😊
Roddy Speechley	😊
Rafaelita Blaksland	😢
Oby Sorrel	😢
Marney O'Brien	😊
Mallorie Waber	😊
Madelene Upcott	😊

13. Add a filter with Geo to your report and see how people in each country do.



Exercise 09 Creating Aggregation Function

1. Use file **Aggregation Functions.pbix**
2. Create Some measures for Amount Column like (Average, Min , Max , Count , CountA , Median , COUNTBLANK)
3. Create a New Page.
4. Use cards for each measure to show in the page.



Exercise 10: Organize your Measures in one table

1. Use file **Organizing Measures in a table .pbix**
2. Go to **Table View**
3. Select **Enter Data**
4. Create a one column empty table with name **Measures Table**
5. You can move all your measures to the new table either:
 - a. Go to your **table view**

- b. Select each measure and move to the **Measures** table using

The screenshot shows the Power BI ribbon with the 'Measure tools' tab selected. In the 'Home table' dropdown, 'locations' is chosen. The 'Measures' section shows two measures: 'Americas Shipment' and 'Shipment'. The formula for 'Shipment' is shown as `CALCULATE([Total Shipments], locations[Region] = "Americas")`. The 'Data' pane on the right lists various measures and tables, with 'locations' expanded to show its columns.

Location option in **measure tools** ribbon

- c. Click on the Eye Icon next to **Column 1** to hide.
- d. Or just click and delete it.

6. Or:

- a. Go to **Model View**.
- b. Select all the measures you want.
- c. In the Properties Pane Change the **Home Table** to the Measure Table.
- d. Notice that Measure Table now is on the top of tables.

The screenshot shows the Power BI Model View. On the left is the 'Properties' pane for a measure named 'Total Amount'. The 'Home table' dropdown is set to '_Measures'. The 'Data' pane on the right shows the list of measures, with 'Total Amount' highlighted in red. This indicates that the measure has been moved to the 'Measures' table.

Data Modeling Project

Exercise 11 Create Complete Data Model

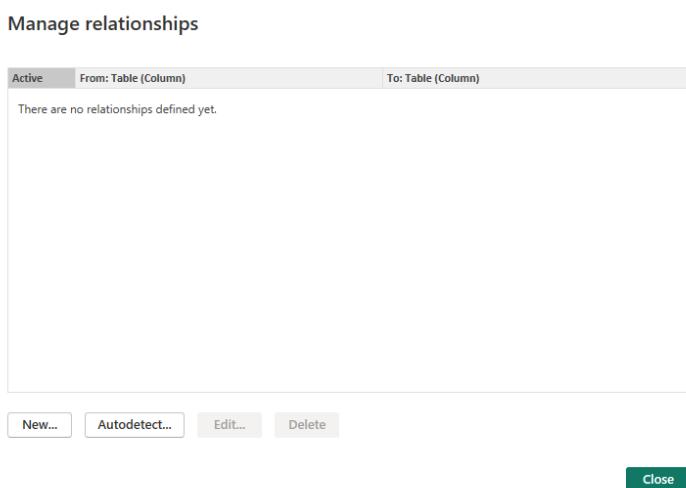
Step 1: Create Tables Relationships

1. The first step in data modeling is defining the initial relationships between the tables. In this task. You will define relationships using different user interface techniques.
2. Select the **model view** icon on the left bar.
3. zoom out to show our tables to make things a little bit more visible using the icon on bottom right corner.
4. Grab the sales table and drag it down. So you can see all the

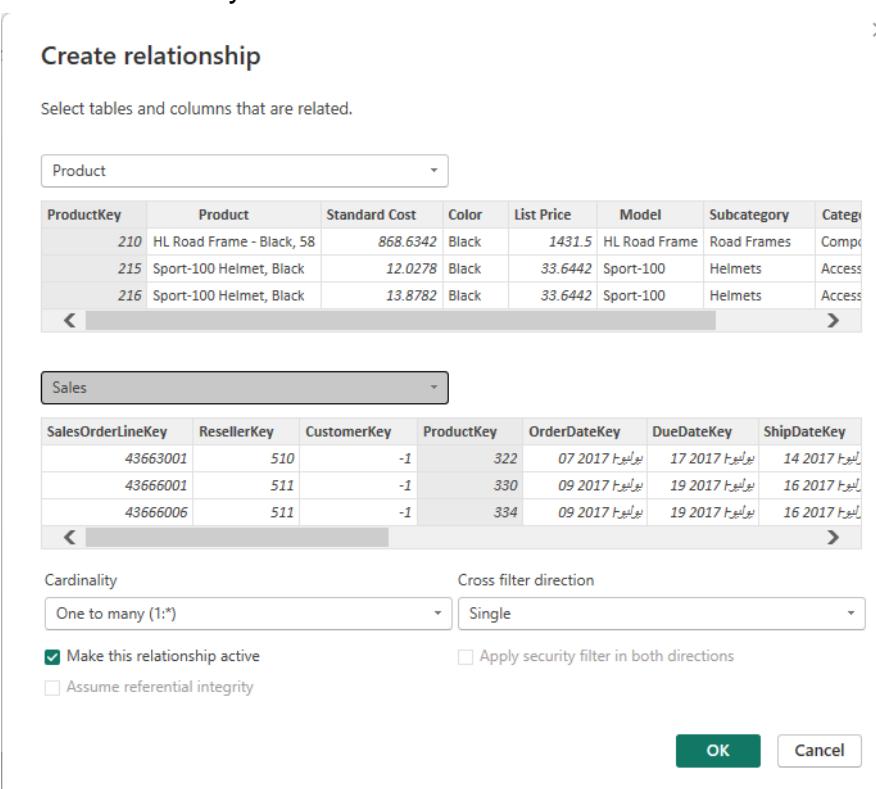
The screenshot shows the Power BI Data Model view. On the ribbon, the 'Home' tab is selected. Below the ribbon, there are five tables displayed in a grid: Customer, Reseller, Product, Region, and Sales Order. Each table has a small icon and a collapse/expand button. To the right of each table, its columns are listed. A vertical scroll bar is visible on the right side of the table area. The 'Sales' table is currently highlighted with a blue border, indicating it is selected or being moved.

tables that are involved inside the data model.

5. We have **customer reseller, product region, sales order** and **sales**.
6. There are currently no defined relationships between the tables. This is our task. You are going to manually create the relationships instead of using the auto detect feature.
7. First select the **manage relationship** button on the ribbon.
8. This screen currently shows all of our relationships between the tables. And of course, we don't have any yet because we're going to manually.



9. Do not select the **auto detect button**, select the **new button**.
10. And for the table, we're going to select **product**. And for the second table, we are going to select **sales**
11. next, confirm their **cardinality** and **cross filter direction**.
12. The cardinality has **one to many** selected. This is correct. The product is used in many sales.



13. The **single filter direction** means that the filter propagates from the one side to the many side. In this case, it means filters applied to the **product** table will **propagate** to the **sales** table but not in the opposite direction.

14. Select the **OK** button, you'll now see in the list our newly created **relationship**.

Manage relationships

Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	Product (ProductKey)	Sales (ProductKey)

15. If you need to **edit**, you can always select the edit button.

16. Now select **close**.

17. You will now see a **line** from the **product** table to the **sales** table. The product shows a one with the line including an arrow, which is the cross-filter direction to the sales table that shows



the star, which is the many side of the cardinality.

18. Next, you will create the same type of relationship using the **drag and drop capability** by dragging a field with the same name from one table to another.

19. The relationship will automatically be defined.

20. At the **reseller** table, drag and drop the **reseller key** from the reseller table onto the **sales reseller key** field.

21. Now the line appears to show the relationship was created.

22. You can check with the **managed relationships button** on the ribbon to see that we now have two relationships.

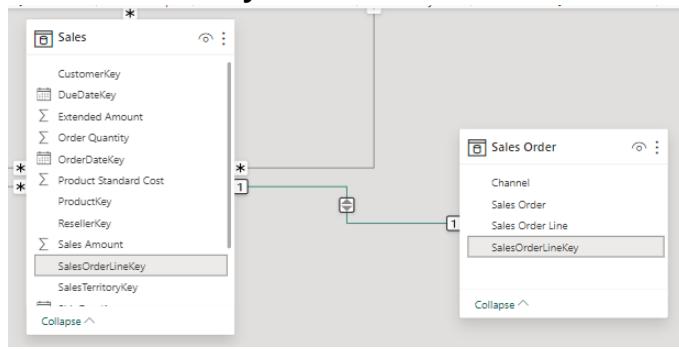


Manage relationships

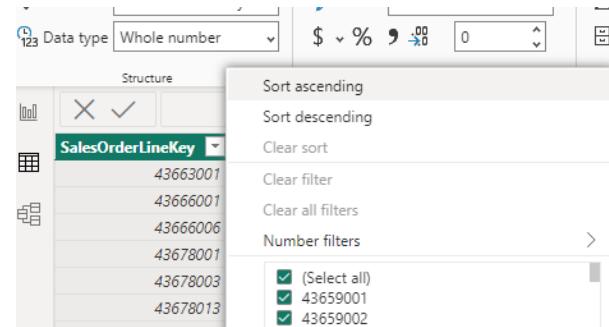
Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	Sales (ProductKey)	Product (ProductKey)
<input checked="" type="checkbox"/>	Sales (ResellerKey)	Reseller (ResellerKey)

23. Next, create a relationship from **region** to **sales** by using the **sales territory key** and inside sales, we have the **sales territory key** too.

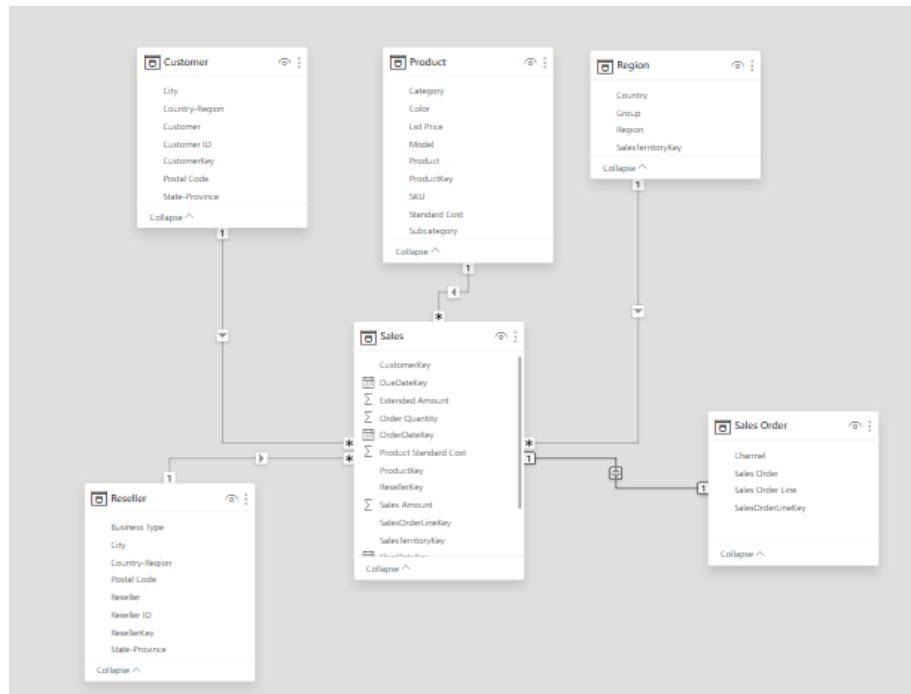
24. Define a relationship from the **customer**, **customer key** to the sales **customer key**.
25. Define the relationship between **sales order**, and **sales**, using field **sales order line key**.



26. The line between the two tables show a **1 to 1 relationship**.
27. when creating the relationship. Power bi I detected a 1 to 1 relationship. This would also set the **cross filter** to **both**.
28. You need to explore the **data** to confirm this is correct.
29. Select the table view button on the left menu. Then select the **sales** table. We can now view the data with inside the **sales** table.
30. Now sort the **sales order line key** ascending by selecting the arrow next to the column name.



31. Do we see any **duplicate numbers**?
32. I don't, this table seems to have **unique numbers** that explains the one side of the relationship.
33. Now on the **table view**, select the **sales order** table, let's go ahead and, and sort the **sales order line key** column.
34. Once again, let's take a look for any duplicate numbers. The table seems to have **unique numbers**.
35. So once again, this explains why in the relationship we had a one on that side.
36. So, everything looks good. Let's select our model view on the left menu and you have now defined the base relationships between all the tables. You are ready for the next task.



Step 2: Configure Tables

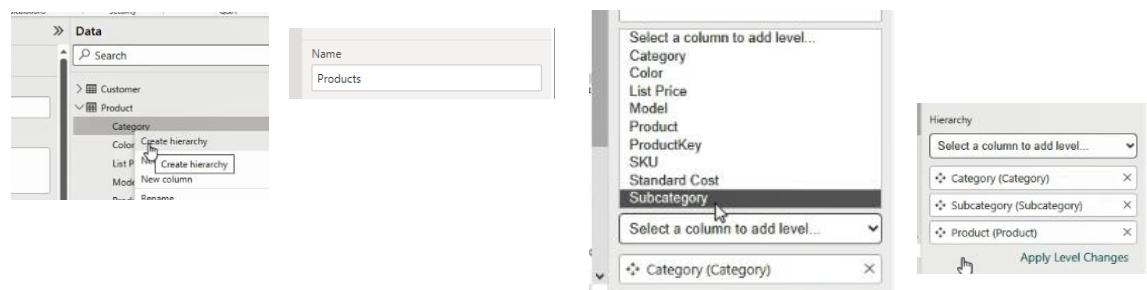
- Once you have defined the basic table relationships, your next task is to configure table specific properties.
- This includes **field formatting** and **field groupings**.
- Select the model view and expand the **properties** and **data** panes.

Configure Product table

- Select the **product** table.

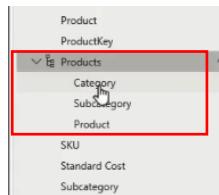
Creating Hierarchy

- You'll be creating a **hierarchy** on **category subcategory** and **product**:
- Right Click on the **category** column and select **create hierarchy**.
- In the **properties pane**.
 - For the **name**, enter **products**,
 - Scroll to the bottom, you'll see an area to build a **field list**.
 - select a column to add: select **subcategory**. And then select **product**.
 - The next most important thing to do, select, **apply level changes**.



- You can now look at the hierarchy inside the data pane.

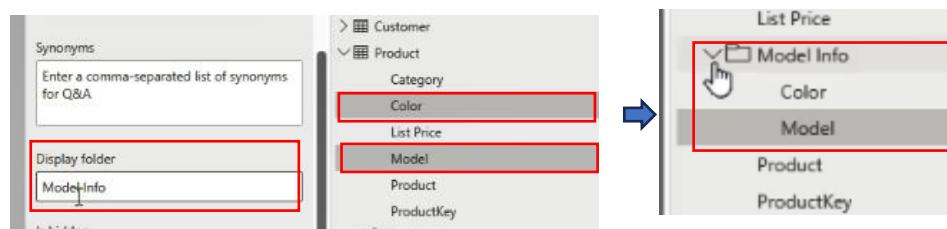
9. You have products categories, subcategory and then the product.



Organize Columns into Display Folder

10. Next, we will organize columns into a display folder.

11. select the **model** field and **products** and while holding the **control key**, select the **color** field.



12. In the **properties** pane and the **display folder** field enter “**model info**”.

13. If you leave that field, it will save and under the folder, we now have the model info, we have the color and the model.

Configure Region Table

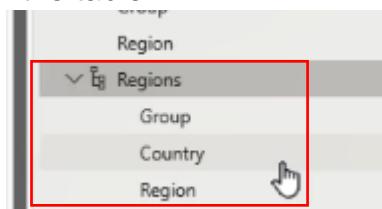
Create Hierarchy Regions

14. Next, you need to configure the region table,

15. Select the **region** table.

16. Create a **hierarchy** on group country and **region**.

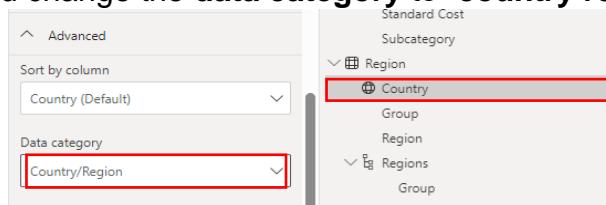
17. Don't forget to select **apply level changes** and you should see our regions listed in the table.



Data Category

18. Next, select the **country** field that is not part of our hierarchy.

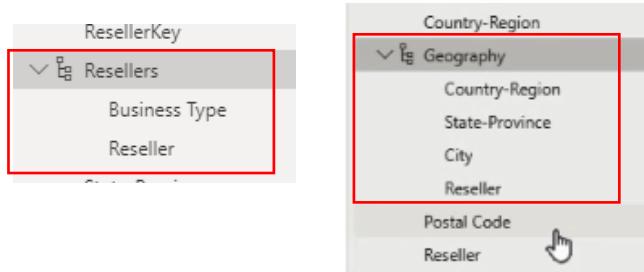
19. And then with inside the **properties**, scroll down to the **advanced** options and change the **data category** to “**country region**”.



Configure Reseller Table

Hierarchies:

20. Next, we will configure the **reseller** table,
21. Select the reseller table.
22. Create a **hierarchy** on **business type** and **reseller** columns.
23. For the name type **resellers**.
24. apply level changes. And once again, you should see the hierarchy in

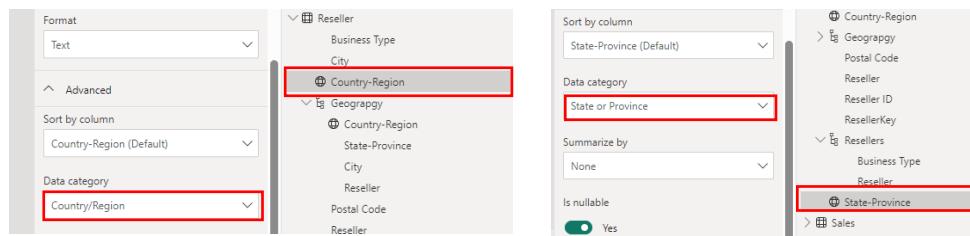


the table.

25. Create a second hierarchy in the reseller table. This time on **country region**, **state**, **province**, **city** and **reseller** columns.
26. For name type “**geography**”.
27. **Apply level changes** and you should see **geography** and the reseller table.

Data Category

28. Next we'll set the **data category** for **country region**, **state province** and **city**
29. select the **country region** field that's **not part of the geography hierarchy**.
30. And then in our properties select **advanced** and for **data category**, select **country region**.



31. Next select **state province**, which is not part of our geography hierarchy. And for the data category, select **state or province**
32. and then our final field will be **city** once again, not part of our hierarchy for data category. Configure as **city**.

Configure Sales Table

33. Select the sales table.
34. select the **product standard cost** column on the **properties** tab slide the 1000 separator to **yes**.
35. Now select the **unit price** column and inside properties set the **decimal places** to 2.
36. In the **advanced** section set, the **summarize by** to **average**.

The screenshot shows the Power BI Data View interface. On the left, there's a sidebar with 'Thousands separator' (set to 'Yes') and 'Decimal places' (set to '2'). The main area lists columns: 'Σ Extended Amount', 'Σ Order Quantity', 'OrderDateKey', 'Σ Product Standard Cost' (which is highlighted), 'ProductKey', 'ResellerKey', and 'Σ Sales Amount'. To the right, the 'Properties' pane is open for the 'Σ Product Standard Cost' column. It shows 'Decimal places' set to '2', 'Advanced' settings with 'Sort by column' as 'Unit Price (Default)', 'Data category' as 'Uncategorized', 'Summarize by' set to 'Average' (which is also highlighted with a red box), and 'Is nullable' set to 'No'. A large list of columns is visible on the far right, including CustomerKey, DueDateKey, Extended Amount, Order Quantity, OrderDateKey, Product Standard Cost, ProductKey, ResellerKey, Sales Amount, SalesOrderLineKey, SalesTerritoryKey, ShipDateKey, Total Product Cost, Unit Price, and Unit Price Discount Rate.

Bulck Update Columns

37. as you could see if you had to individually update every column for the same setting. This could take a while.
38. Fortunately, you can **bulk update columns**.
39. For example, you can hide all the **keys** because they provide no other value than linking the tables together.
40. To make this a little bit easier, expand all of the tables just so we can see.
41. select the **customer key**. Then while holding down the **control key**, select the **product key**, the **sales territory key**, continue holding down the control key and the **reseller key**, then the **sales order line key** with inside **sales** table and then also the **sales territory key** with inside sales table, the **product key**, the **reseller key** and the **customer keys**.
42. Finally, down in **sales order** table, we should have our **sales order line key**.
43. In **properties** pane we will select **is hidden to Yes**.

The screenshot shows the Power BI interface with two main panes: 'Properties' on the left and 'Data' on the right.

- Properties pane:**
 - Synonyms:** A text input field with placeholder text "Enter a comma-separated list of synonyms for Q&A".
 - Display folder:** A text input field with placeholder text "Enter the display folder".
 - Is hidden:** A toggle switch labeled "Yes" is highlighted with a red box.
 - Formatting:** Sections for "Data type" (Whole number) and "Format" (Whole number).
 - Percentage format:** A section for percentage format.
- Data pane:**
 - Business Type:** Reseller, State-Province.
 - Sales table:** A list of columns:
 - CustomerKey (highlighted with a red box)
 - DueDateKey
 - Extended Amount
 - Order Quantity
 - OrderDateKey
 - Product Standard Cost
 - ProductKey (highlighted with a red box)
 - ResellerKey (highlighted with a red box)
 - Sales Amount
 - SalesOrderLineKey (highlighted with a red box)
 - SalesTerritoryKey (highlighted with a red box)
 - ShipDateKey
 - Total Product Cost
 - Unit Price

44. Now this has updated all of those columns to be hidden.

45. You are ready for the next task but remember to also save your file.

Step 3: Create Quick Measures

1. To quickly create calculated fields without the need for writing DAX calculations, you can create quick measures.
2. in this task, you will create quick measures to enhance the data.
3. Select the **table view**,
4. select the **sales** table and expand it.
5. Right Click **sales** table, you'll see an option for **new quick measure**.
6. New quick measure is also available to you with inside the **tables tools**, ribbon menu.

Quick Subtraction Measure

7. Select **subtraction** for the **base value**

8.

The screenshot shows the 'Quick measure' dialog box in two states, connected by a blue arrow.

Initial State: The 'Calculations' tab is selected. The 'Subtraction' option is highlighted with a red box in the 'Mathematical operations' section.

Final State: The 'Subtraction' option is selected in the 'Calculations' dropdown. The 'Base value' field contains "Sum of Sales Amount" and the 'Value to subtract' field contains "Sum of Total Product Cost", both highlighted with red boxes.

9. drag and dropped the **sales amount** field from the sales table

10. for the **value to subtract** drag and drop the **total product cost** field from the sales table.
11. Then select **add**.
12. As you can see the measure has been added to our sales table.
13. Looks like it has a very long name. Let's rename this measure to **profit**.
14. So right mouse on the column, select **rename** and type in **profit**.
15. Notice the DAX code in the function bar for the new measure

Profit =
`SUM('Sales'[Sales Amount]) - SUM('Sales'[Total Product Cost])`

Quick Division Measure

16. Our calculation is going to be division.
17. So select **division** for the **mathematic operations**
18. for the **numerator** drag and dropped the **profit** field from the **sales** table and for the **denominator** drag and dropped the **sales of Amount** field.
19. Then select **add**.
20. as you can see our new measure has been created with a very long descriptive name. rename it to **profit margin**.
21. Notice the DAX code of the new quick measure

Profit Margin =
`DIVIDE([Profit], SUM('Sales'[Sales Amount]))`

Format measures

22. Now that we have the **profit margin** column, we need to format the field.
23. So, in the ribbon, we have the formatting section set the format to **percentage** and confirm that the decimals are 2.

Test The Measure

24. test our quick measures. Select the report icon on the left menu. This is the report view area.
25. double click on **table** that now drops a table into our canvas
26. from the sales table. Select the check box for **profit**, **profit margin** and **sales amount**.

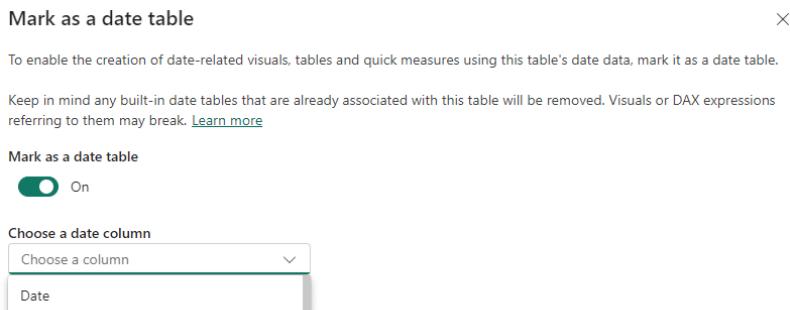
Sum of Sales Amount	Profit	Profit Margin
109,809,274.20	12,551,366.25	11.43%

27. This shows an overall total for the sales table.
28. I think we need to see a little bit more detail.
29. select the **product** table and then select the check box for **category**.

Category	Sum of Sales Amount	Profit	Profit Margin
Accessories	1,272,057.89	634,467.16	49.88%
Bikes	94,620,526.21	10,515,096.61	11.11%
Clothing	2,117,613.45	368,836.00	17.42%
Components	11,799,076.66	1,032,966.48	8.75%
Total	109,809,274.20	12,551,366.25	11.43%

30. Now we have the profit, profit margin sales amount for each category.

You are ready for the next task. Don't forget to press the save button first.



Create Some Measure

1. Select Sales table and create some measures.
2. **Avg Price:**

Avg Price = AVERAGE(Sales[Unit Price])

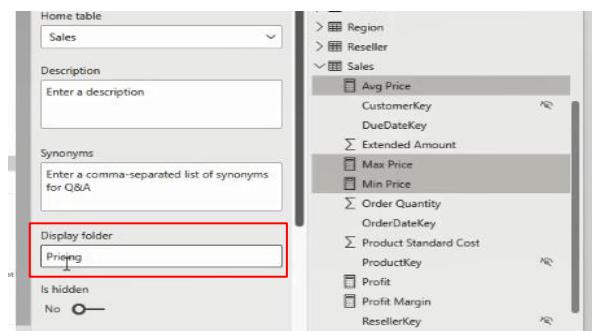
3. **Min Price:**

Min Price = MIN(Sales[Unit Price])

4. **Max Price:**

Max Price = MAX(Sales[Unit Price])

5. Go to Model view.
6. Arrange those measures to a Display Folder : **Pricing**



Display Measure in Matrix

7. Go to your **Report View**.

8. Select your Matrix.

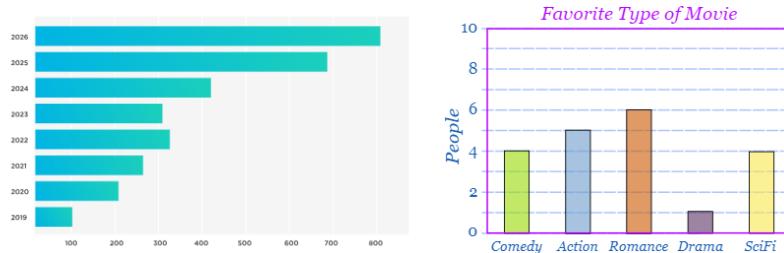
Year	Avg Price	Max Price	Min Price
<input checked="" type="checkbox"/> FY2018	1,288.13	3,578.27	4.75
2017 Jul	1,785.38	3,578.27	5.19
2017 Aug	1,371.54	3,578.27	5.01
2017 Sep	1,122.39	3,578.27	4.75
2017 Oct	1,381.91	3,578.27	5.19
2017 Nov	1,118.65	3,578.27	5.01
2017 Dec	1,268.60	3,578.27	5.19
2018 Jan	1,735.97	3,578.27	5.19
2018 Feb	1,190.45	3,578.27	5.01
2018 Mar	1,596.34	3,578.27	5.19
2018 Apr	1,672.56	3,578.27	5.19
2018 May	1,198.20	3,578.27	5.01
2018 Jun	1,002.16	3,578.27	4.75
<input checked="" type="checkbox"/> FY2019	573.74	2,443.35	2.29
2018 Jul	689.43	2,443.35	5.01
2018 Aug	474.43	2,443.35	4.75
Total	465.18	3,578.27	1.33

- 9. Chek the measures Avg Price, Min Price , and Max Price to add to matrix.**
- 10. Save your File.**

Chapter 5: Report Design

Bar and Column Charts

- Bar and column charts are popular types of visualizations to display data in a clear and organized way.
- They are beneficial for showcasing categorical data or data that can be organized into distinct groups.
- Bar charts display data horizontally, whereas column charts display data vertically.
- The simplicity and intuitive nature of bar and column charts make them effective tools for presenting data and identifying patterns or trends over time.
- With six different types of bar and column charts in Power BI, you can convert raw data into visually appealing and meaningful insights.
- A column chart is a data visualization where each category is represented by a rectangle, with the height of the rectangle being proportional to the values being plotted.
- A Bar chart is the same as column chart, but data is presented horizontally. It is good for long category names.



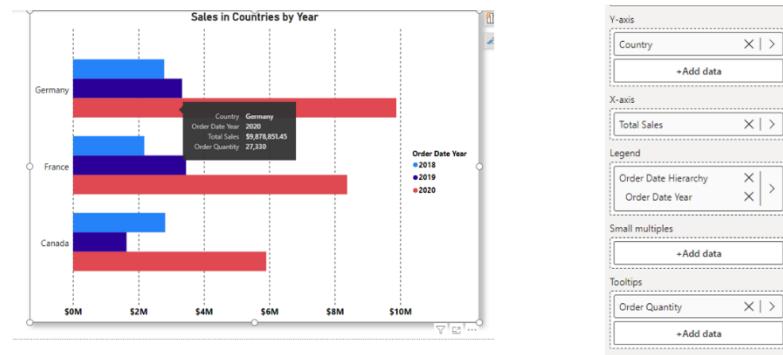
- There are 6 types of Column and bar charts



4 essential field wells in Column and Bar Charts:

- The legend, X-axis and Y-axis, and tooltips.

- The field wells represent different sections of your chart that you can customize according to your requirements.



legend

- It displays under the title or on the side of a chart.
- The legend field controls the color coding or grouping of the bars or columns in your chart.
- It helps to differentiate between different categories or subgroups within the data. The legend makes it easier to understand which color in the chart represents which item.
- You can hide the legend by turning it off in the Format tab on the visualizations pane,
- you can hover your mouse over the bar or column to display the data if the legend is not shown.

The x and y axis

- Each axis represents the data points you want to compare or analyze.
- For bar charts, the x axis shows the values like order, quantity, and total sales, and the y axis shows the categories like month or product regions.
- For column charts, this is reversed. The x axis shows the category, and the y axis shows the values like order, quantity, or total sales.

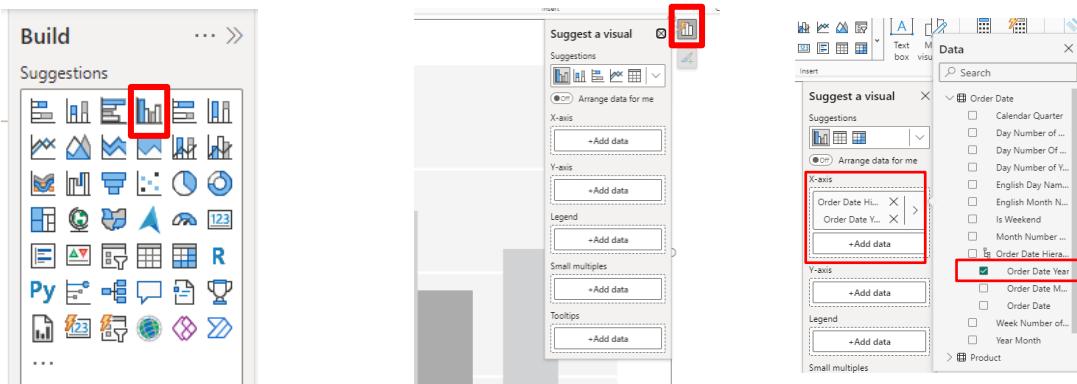
ToolTips

- A tooltip displays data or extra information when you hover over the data points of a chart.

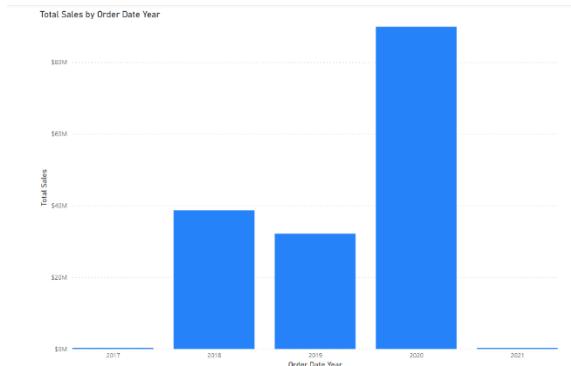
Exercise 12: Creating Column Chart

- Use file: **Exercise Creating Columns Start.pbix**.
- Rename Page 1 to: **Column Chart**.
- In the Build pane select clustered Column Chart.
- An empty bar chart appears on the canvas.
- Resize the visual to fill the canvas.
- Select the Visual and click the icon that appears on right (**Add data and build your visual**).

7. Click on the (+Add data) on the **X-axis Well** (input box) and add **Order date Year** field from the **Order date** table.



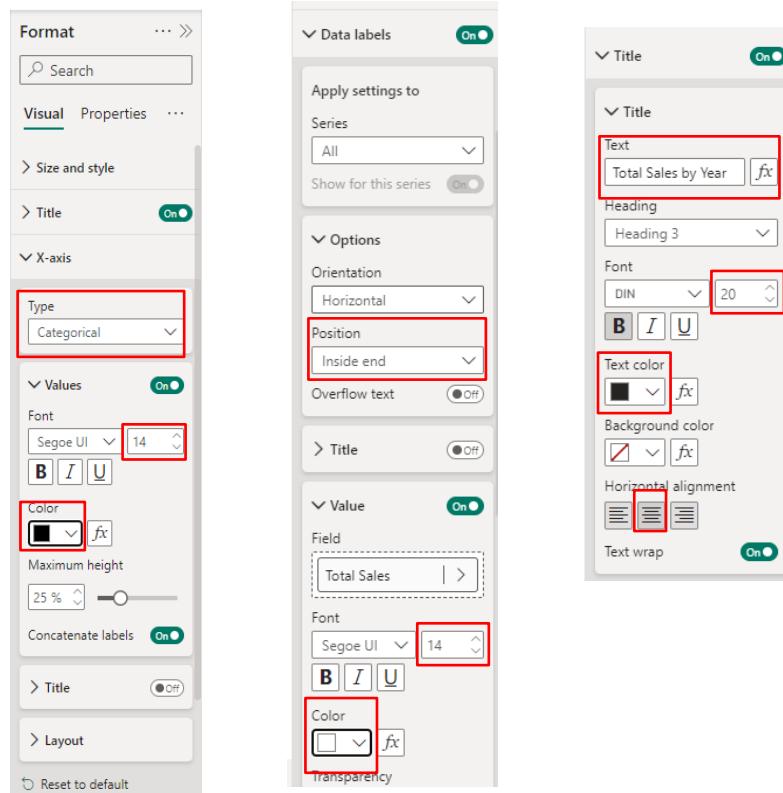
8. The same way add **Total Sales** measure from the **Sales** table to **Y-axis**.
 9. You must now have a column chart with every year's total sales.
 10. Hover the columns of the created chart and see the tooltip that appears.
 11. Your manager wants to know the Quantity ordered for each year.
 12. Add **Order Quantity** Field to the **Tooltip** well.
 13. Hover now over each column to see the tooltip.



Formatting the column chart

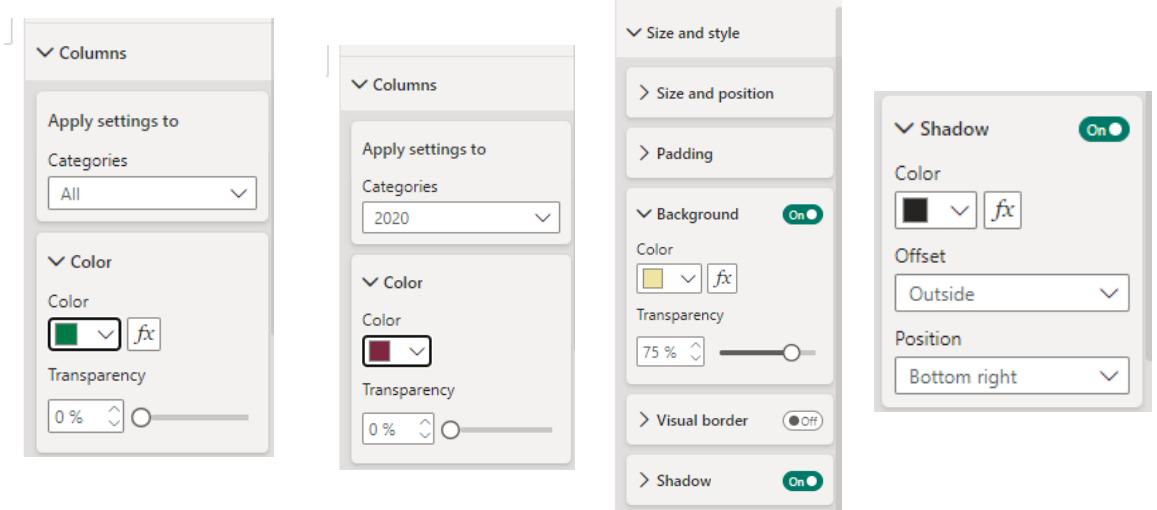
14. Make sure the column chart is selected and focused.
 15. Now ribbon and Format pane reflect the current selected visual.
 16. In Format pane Visual tab select **X-axis** Card.
 17. Change type to **Categorical** and make the **Title off**.
 18. Increase the **Values** font to **14** and color to **black**.
 19. Click to close **X-axis** card (it is a good hobbit to close each card you have finished working with).
 20. Expand **Y-axes** card turn the title off and increase font to 14.
 21. Close **Y-axis** card.
 22. Turn the **Data labels** on and expand to change **Position** to inside end font values to 14 and bold and color to white.
 23. Change the chart title to **Sales Order by Year**.

24. Make the font 20, bold and text color to black and align it to center.



25. Change all column colors to #277941.

26. We want to emphasize year 2020 change its color to #782642.

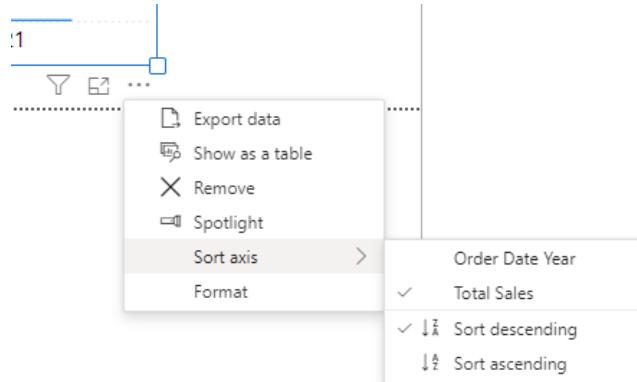


27. In Card Size and Style Change the background with color #F0E199 and transparency 75%.

28. Give the Chart Shadow black outside bottom right.

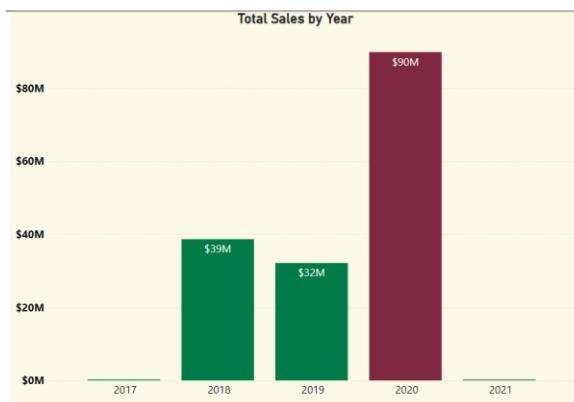
Control Sorting

29. Click on the three ... ellipsis on the right of the visual to open more options.



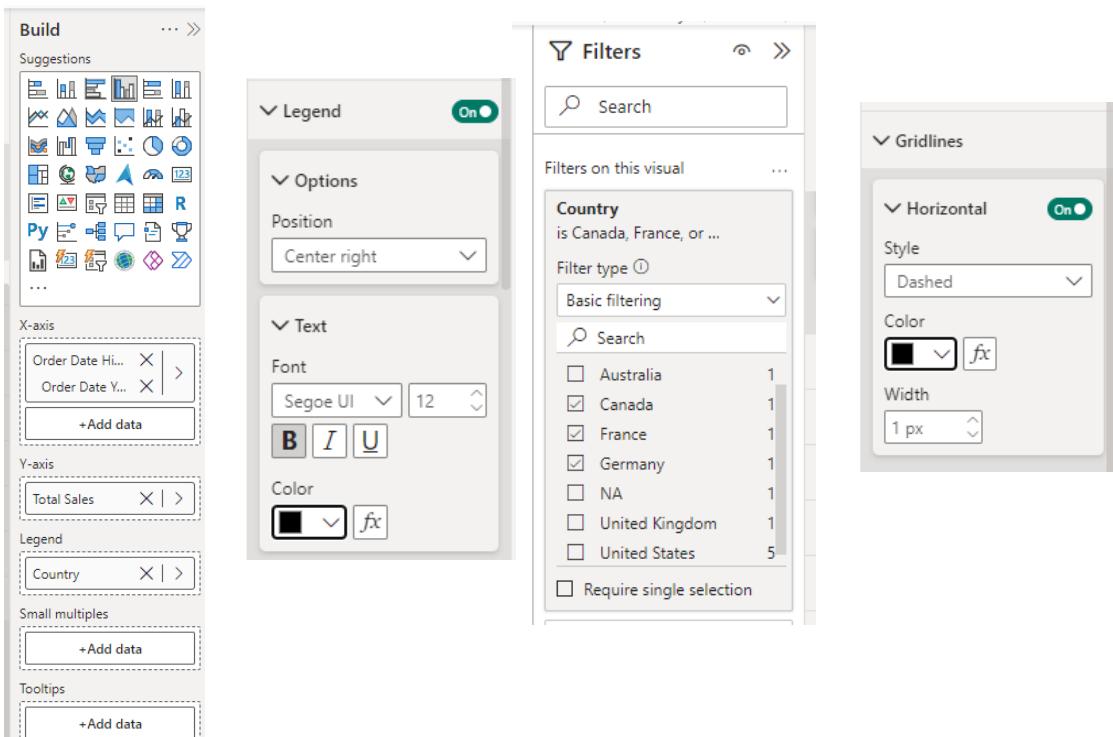
30. Here you can select Which field you would like to sort on and if it was ascending or descending.

31. Select **Order Date Year** and **ascending**.

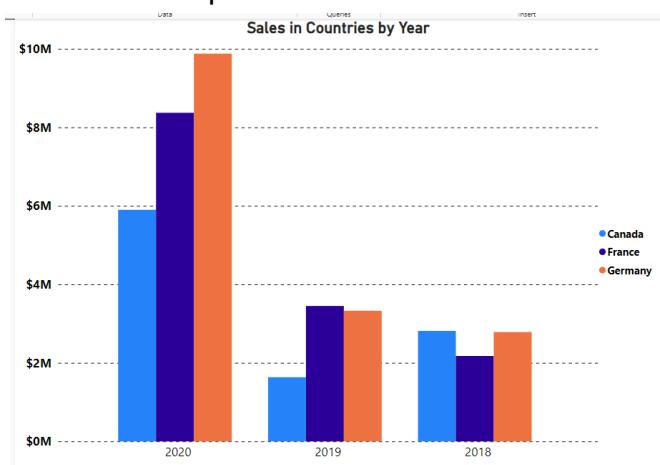


Create Clustered Column Chart

32. Duplicate the page and rename it Clustered Column chart
33. Change the color for all bars to #118DFF.

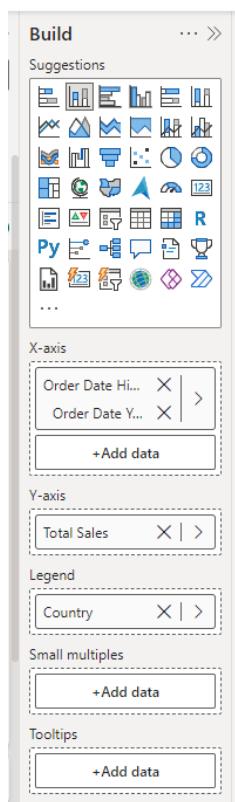


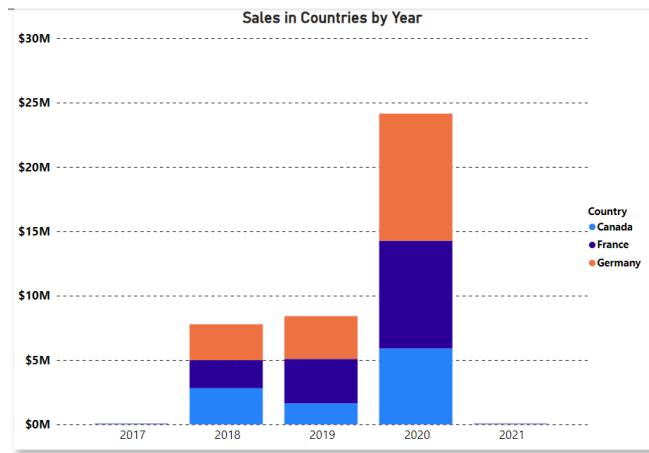
34. In the Build pane drag **country** to the legend well.
35. In the filter pane chose only **Canada, France** and **Germany**.
36. Remove **data labels**.
37. make **legend** center right and font 12 black.
38. Remove the **legend title**.
39. Make the **Grid line** Style Dashed and color black.
40. Change the title of the chart to **Sales in Countries by year**.
41. Check how the tooltip shows in each column now.



Create Stacked Column Chart

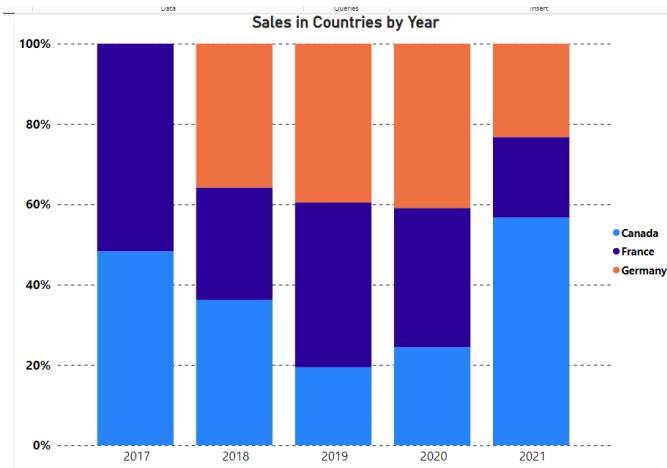
42. Duplicate the page and rename it **Stacked Column Chart**.
43. Select the Chart and click on Stacked column chart in the Build pane.
44. You have now stacked column chart.
45. Notice it has the same wells of clustered column chart.
46. Check the tooltip for each part of the stacked column.





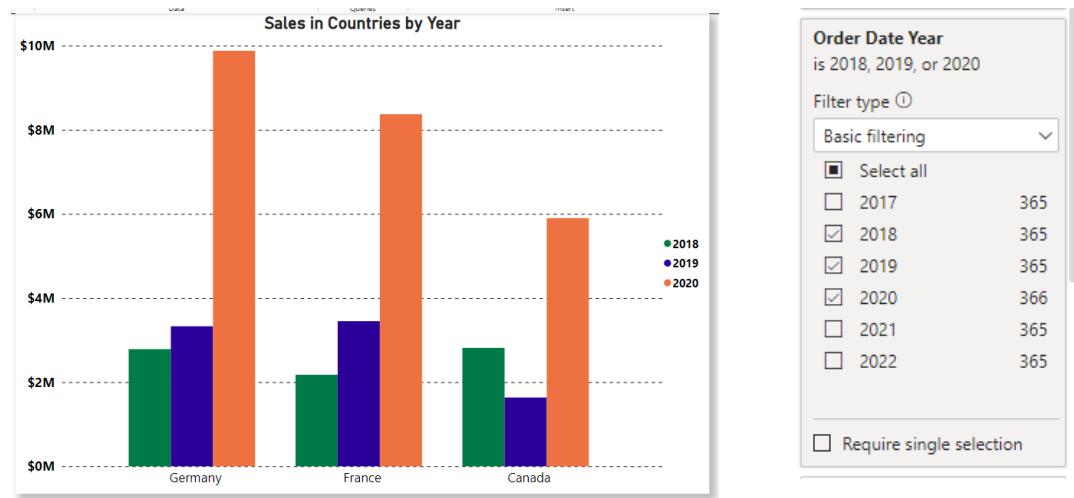
Create 100% Stacked column Chart

47. Again, duplicated your page and rename it **% Stacked Column Chart**.
48. Select the Chart and choose **%100 Stacked Column Chart**.
49. Check the tooltip for each part of the stacked column.



Change Legend

50. Your manager wants to compare each country through years 2018-2019-2020.
51. Go to Clustered column chart and put **year** in **legend well** and **country** in **x-axis** well.
52. In filter pane select only **2018-2019-2020**.
53. Now you can compare each country through the years.

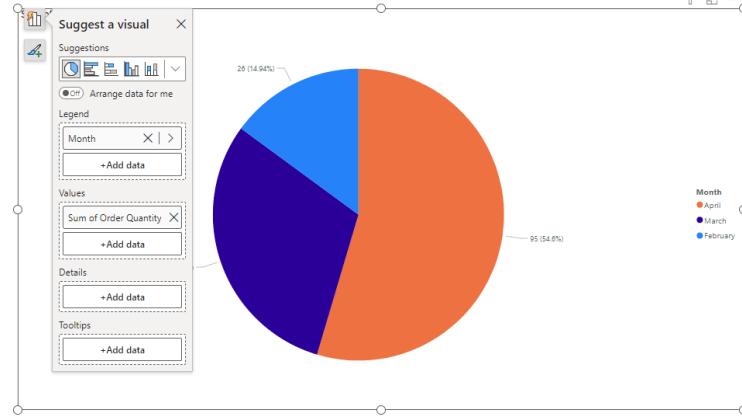


Exercise 13: Creating Pie and Donut Chart

1. Use file **Exercise 13 Pie Chart .pbix**

Pie Chart

2. Start by placing a pie chart on the report area from the visualizations pane and resizing it by dragging its edges.
3. Select the **pie** chart and while keeping it selected, open the **data** pane and select two fields, **month** and **order quantity**.
4. Ensure that **month** goes to the **legend** field and the **order quantity** goes to the **values** field.



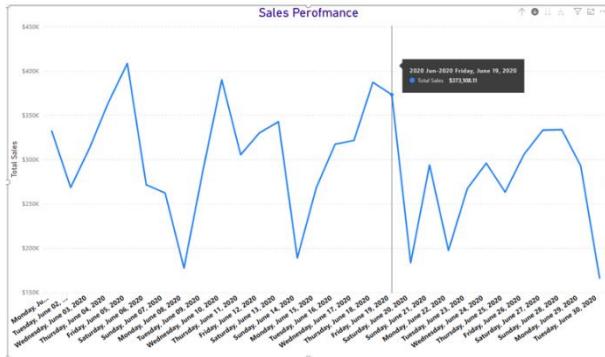
Donut Chart

5. You can also visualize this data using a donut chart, which also shows the relationship of parts to a whole.
6. To convert the pie chart to a donut chart, select the pie chart. While it is still selected, select the **donut** chart icon on the visualizations pane.
7. Unlike a pie chart, the center of the donut chart is blank. This allows space for additional information that can provide context for the surrounding segments.

Line Chart

- A line chart uses a line to connect individual data points.

- It is the perfect tool for illustrating a sequence of values or displaying trends over time.
- For example, a line chart can help company understand how sales are progressing month to month or year to year.
- A line chart with multiple lines can show sales across different regions over time and help the stakeholders understand the trend or sales performance.



Exercise 14: Creating Line Chart

1. Use file **Exercise 14 Start.pbix**.
2. In the **Build** pane click on the line chart visual.
3. Resize the visual to fill the page.
4. Drag **Order date Year** field to x-axis well.
5. Drag **Total Sales** measure to y-axis well.

6. In **x-axis** card change the title of the axis to **Years** make font 14 and bold black.

The image shows two side-by-side panels from a data visualization interface. The left panel is titled 'X-axis' and contains settings for 'Type' (set to 'Continuous'), 'Range' (with 'Minimum' and 'Maximum' fields both set to 'Auto'), and 'Title' (set to 'Years' with a font of 'DIN' at size 14). The right panel is titled 'Markers' and contains settings for 'Shape' (set to a triangle), 'Size' (set to 8 px), and 'Colors' (set to purple). Both panels have an 'On' button at the top right.

7. Turn **Markers** on and make the shape type **triangle** with **purple** color.
 8. Add **Order Quantity** field to **tooltip** well.
 9. Hover over each point to see the tooltip.
 10. Change the title of the chart to **Sales Performance** make font 20 bold dark blue in the center.
 11. Add **continent** field to the **legend** well.
 12. You now have performance of three continent area.
 13. Hover over each point to see details of sales and quantity ordered in each region.
 14. Name your page **Sales Performance**.

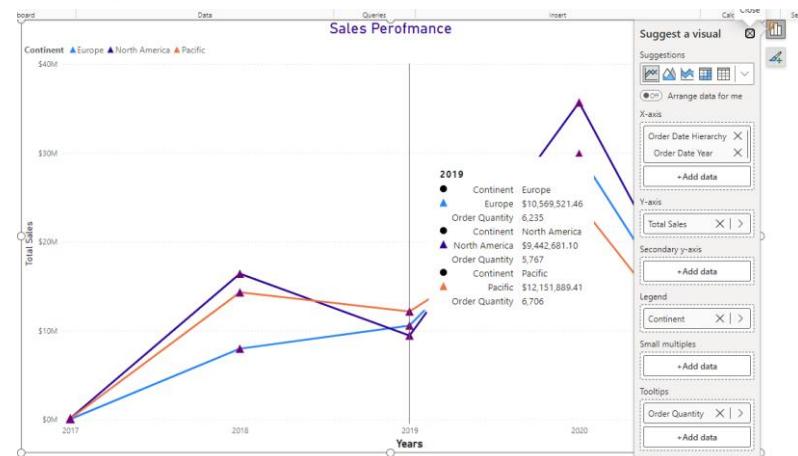


Table Visualization

- There are moments when your audience wants simplicity, a straightforward, no frills presentation.
- Microsoft Power BI table visualization is useful when you want to employ the classic clear-cut style of tables to ensure your audience can grasp the essence of the data quickly.
- It elegantly presents refined data, allowing viewers to immediately consume critical information and insights. The table displays summarized insights which is much more user friendly to work with.
- You can even customize the table visualization to improve its aesthetic appeal or aid engagement and comprehension.

Exercise 15: Creating Table Visualization

1. Use file **Exercise 15 Tables Start .pbix**.

Create a table

2. Click on table visual to add to your report and resize.
3. Notice that this visual has only one well field **Columns**. That is where you drag all your fields to.
4. Click on the following fields to add to your table (**Sub-category, Sales, Profit, Quantity**).

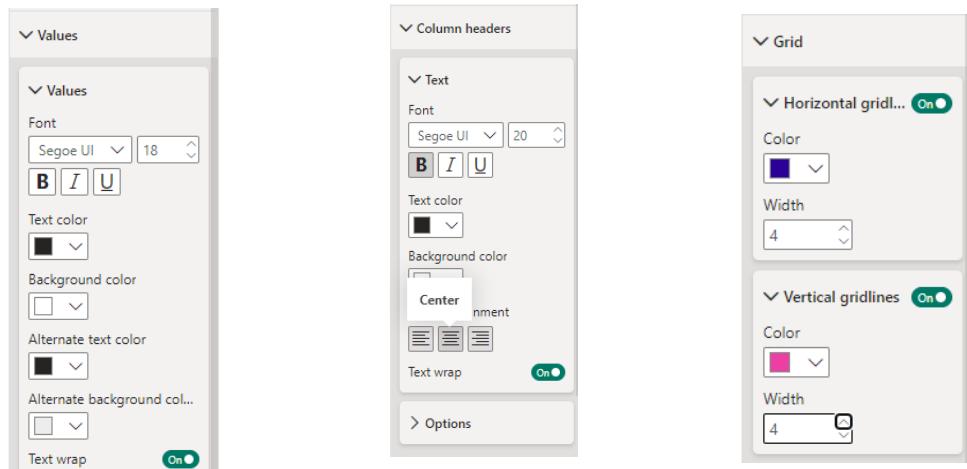


Sub-Category	Sales	Profit	Quantity
Copiers	149530.00	55,618	234
Machines	189242.00	3,385	440
Supplies	46679.00	-1,189	647
Bookcases	114879.00	-3,473	868
Envelopes	16477.00	6,964	906
Fasteners	3024.00	950	914
Tables	206967.00	-17,725	1241
Labels	12505.00	5,546	1400
Appliances	107537.00	18,138	1729
Chairs	328452.00	26,590	2356
Accessories	167400.00	41,937	2976
Art	27136.00	6,528	3000
Storage	223860.00	21,279	3158
Phones	330047.00	44,516	3289
Total	2297339.00	286,397	37873

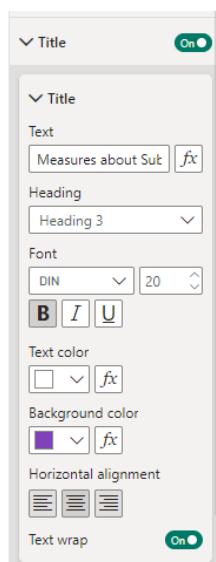
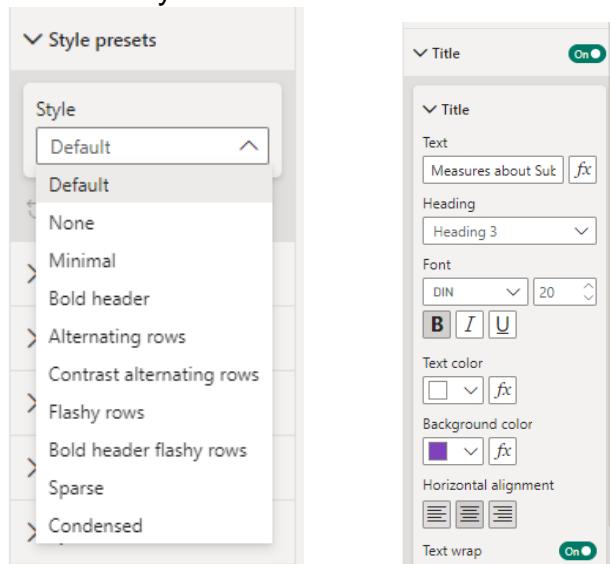
5. You can sort any column in ascending or descending order by just clicking on the column header once or twice to change sort order.
6. Click on Quantity to sort in ascending order, then click again to sort in descending order.
7. Try to sort Sales and profit columns the same way.
8. Try to sort Sub-Category in alphabetical order.
9. You can click (X) on any field in the columns Well to remove.
10. Remove Profit and drag it again to table.
11. You can double click any field and rename it if you want to.
12. You can reorder the fields by arrange their orders in Columns well.

Format a table

13. Create a new page.
14. Copy and paste the table from Page1 to Page2.
15. Increase the size of the values.
16. Increase the size of the headers and make it bold and center.



17. Enable **Vertical** and **horizontal grid**, change the **color** of each and increase **width**.
18. Try the **Style presets** card and chose the styles available one by one to see how they works.

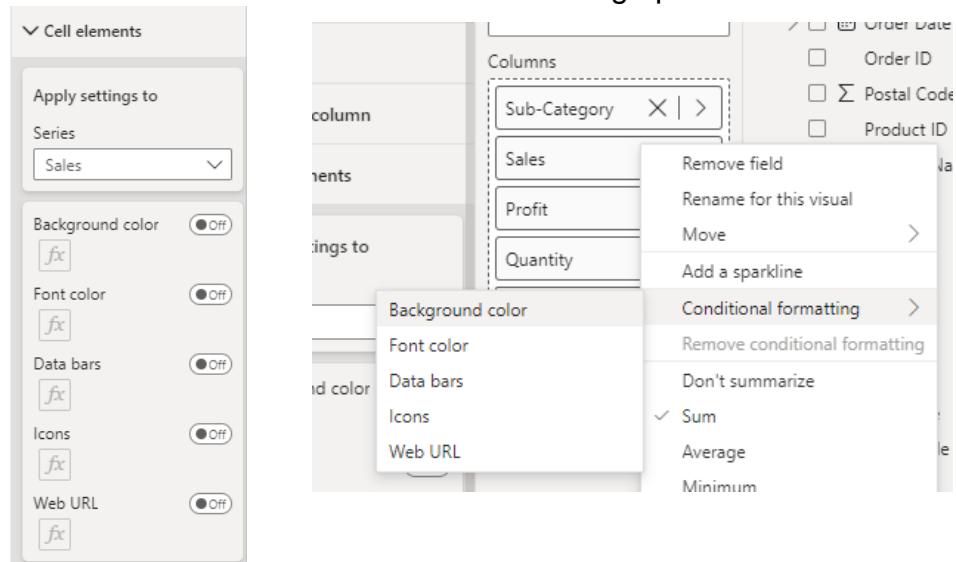


19. Enable the **Title** Card of the table make the text = **Measures about Sub-Categories**.
20. Make its **font** 20 **Bold** and **Center**.
21. Make **text** color is **white** and background **purple**.

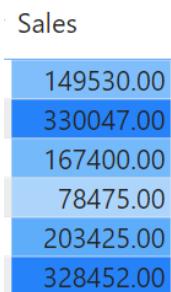
Measures about Subcategories			
Sub-Category	Sales	Profit	Quantity
Copiers	149530.00	55,618	234
Machines	189242.00	3,385	440
Supplies	46679.00	-1,189	647
Bookcases	114879.00	-3,473	868
Envelopes	16477.00	6,964	906
Fasteners	3024.00	950	914
Tables	206967.00	-17,725	1241
Labels	12505.00	5,546	1400
Appliances	107537.00	18,138	1729
Chairs	328452.00	26,590	2356
Accessories	167400.00	41,937	2976
Art	27136.00	6,528	3000
Storage	223860.00	21,279	3158
Phones	330047.00	44,516	3289
Furnishings	91704.00	13,059	3563
Paper	78475.00	34,054	5178
Total	2297339.00	286,397	37873

Conditional Formatting

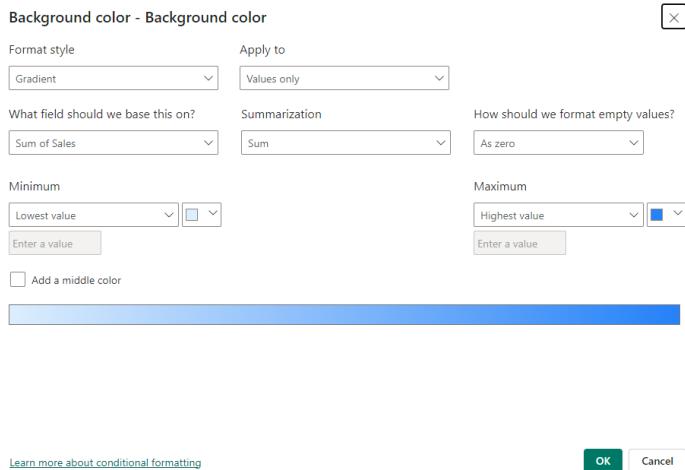
22. Create a new page and copy the table from page 1.
23. Select the **Cell elements** Card and Chose **sales** to apply conditional formatting to.
24. You can also reach conditional formatting in the Build pane by right click the field and chose conditional formatting option.



25. You have many options to apply.
26. For the **sales** column I want to apply a background color.
27. Turn on the background color.
28. Blue color is in the background and when the value is **higher** it is **darker**.
29. You can click the **fx** icon next to the background and select other color and control the gradient.



30. Sort the column sales in descending order to see the dark cells are on top.

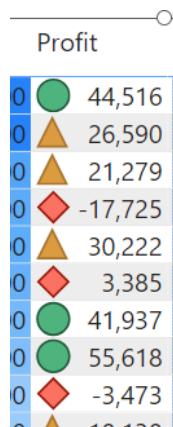


31. For the **Profit** column apply **Font color** conditional format and see.
 32. Change the color to dark red.

33. For **Quantity** column apply **Data Bars** conditional formatting
 34. **Sort Quantity descending** to see the format.

Sub-Category	Sales	Profit	Quantity
Phones	330047.00	44,516	3289
Chairs	328452.00	26,590	2356
Storage	223860.00	21,279	3158
Tables	206967.00	-17,725	1241
Binders	203425.00	30,222	5974
Machines	189242.00	3,385	440
Accessories	167400.00	41,937	2976
Copiers	149530.00	55,618	234
Bookcases	114879.00	-3,473	868

35. Go to **Profit** column again and disable **Font color** conditional formatting and apply **Icons** conditional formatting.
 36. Different icons appear beside the number in each cell.
 37. **Sort profit** column descending and see how it works.
 38. A **Green** circle is when the profit is high , **yellow** triangle if it was medium and **red** rhombus if it was low.
 39. Click on fx icon to change the icons like the figure below.
 40. Review the values in **Percentage** and you can change and you can also use **values** instead of percentage.



Icons - Icons

Format style Apply to

What field should we base this on? Summarization

Icon layout Icon alignment Style

Rules + New rule

If value <input type="button" value="≥"/> 0	<input type="button" value="Percent ▾"/> and <input type="button" value="≤"/> 33	<input type="button" value="Percent ▾"/> then <input type="button" value="▼"/>	<input type="button" value="▲"/>
If value <input type="button" value="≥"/> 33	<input type="button" value="Percent ▾"/> and <input type="button" value="≤"/> 67	<input type="button" value="Percent ▾"/> then <input type="button" value="▼"/>	<input type="button" value="▲"/>
If value <input type="button" value="≥"/> 67	<input type="button" value="Percent ▾"/> and <input type="button" value="≤"/> 100	<input type="button" value="Percent ▾"/> then <input type="button" value="▲"/>	<input type="button" value="▼"/>

[Learn more about conditional formatting](#)

41. Your final table should look like this one

Sub-Category	Sales	Profit	Quantity
Phones	330047.00	44,516	3289
Chairs	328452.00	26,590	2356
Storage	223860.00	21,279	3158
Tables	206967.00	-17,725	1241
Binders	203425.00	30,222	5974
Machines	189242.00	3,385	440
Accessories	167400.00	41,937	2976
Copiers	149530.00	55,618	234
Bookcases	114879.00	-3,473	868
Appliances	107537.00	18,138	1729
Furnishings	91704.00	13,059	3563
Paper	78475.00	34,054	5178
Supplies	46679.00	-1,189	647
Art	27136.00	6,528	3000
Total	2297339.00	286,397	37873

Formatting Numbers

42. Create a new page and copy the table from page 1.

43. In Data pane select **sales** field in the **sales** table.

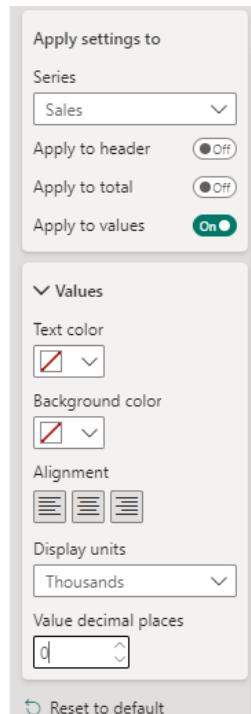
44. A Column tools tab appears on the ribbon.

45. Change the **Data type** to **decimal Number** and format with 2 decimal places.

46. If you want to show the Numbers in sales in Thousands or Millions, Go to **Specific column** card → Apply Settings to → Choose sales.

47. In Display Units chose **Thousands**.

48. Make the **Value Decimal places = 0**.



49. Do the same with the **Profit** field.

Exercise 16: Working with themes

1. Use **Exercise 16 Themes Start.pbix**.

Applying Theme

2. You can choose Report Themes by going to the **View** ribbon. In the **theme** section, select the dropdown arrow and then select the theme you want to apply to your report.
3. These themes are similar to themes seen in other Microsoft products such as Microsoft PowerPoint.



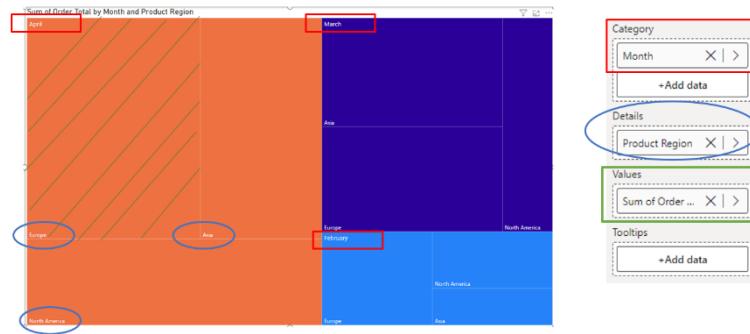
4. Here you can also find **accessible themes**, which you can utilize to create accessible reports.
5. Select a theme **Accessible City Park** to apply it to your report instantly.
6. If you would like to **customize** the appearance of your Power BI reports in the future, changing the theme allows you to update all your visuals at once.

Treemaps

- Like a pie or donut chart, treemaps are another helpful tool in Power BI for illustrating your proportional data.
- However, instead of circles, treemaps use rectangles to display your data, making the best use of **space** in your reports and add variety by displaying data in new and exciting ways.
- A treemap is a unique visual used to display **hierarchical** data or data that's organized in a treelike structure as nested rectangles.
- The entire chart represents the total dataset or tree and each **rectangle** or branch represents a **portion** of the whole tree.
- Each **rectangle size** corresponds to the **value** or size of the data it represents.
- While pie and donut charts are familiar and widely used to represent data proportionally, pie and donut charts can become **cluttered** and

difficult to read when dealing with **many categories** of variables, or when the **differences** between data points are **small**.

- However, the design of a treemap chart allows for easier visualization and interpretation of larger datasets. Its rectangular, nested structure means it can handle more data points without becoming overly complex.

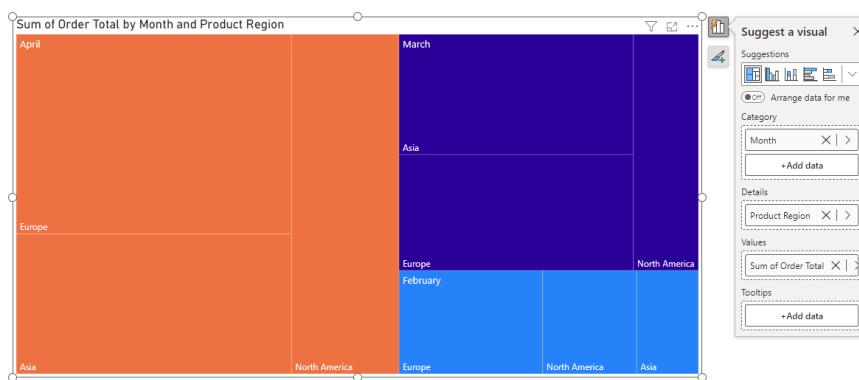


Exercise 17: Create Treemap

1. Use file **Exercise 17 Treemaps Start.pbix**.

Create a Treemap

2. Place a treemap chart from the visualizations pane on the report area. You can resize it as required by dragging the edges.
3. To create a treemap chart, you need **three fields**:
 - a. Category well,
 - b. Details well,
 - c. Values well.
4. Drag:
 - a. Month to the category well,
 - b. Product region, to the details well, and
 - c. Order total to the values well.



Exercise 18: Creating Card Visual Charts

1. Use file **Exercise 1 Cards Start.pbix**.

Card Visual with Numbers

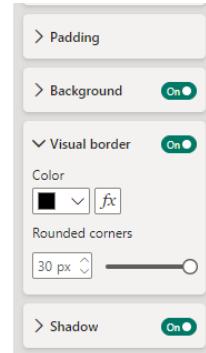
2. Create 3 new Card Visuals.

- Add **Sales, Profit, Quantity** fields to them.



Region	Sum of Sales
Central	501,239.89
East	678,781.24
South	391,721.91
West	725,457.82
Total	2,297,200.86

- The 3 cards now show all **total** values.
- Cards are so great on the top of a dashboard to show an overall view of totals.
- Create a table with **Region** and **Sales** fields.
- Click on any region in the table, the Cards show totals of this region.
- In **Format** pane add **border** with **rounded corner = 30** and **shadow** to the 1st Card then Copy Format to the other 2 cards.

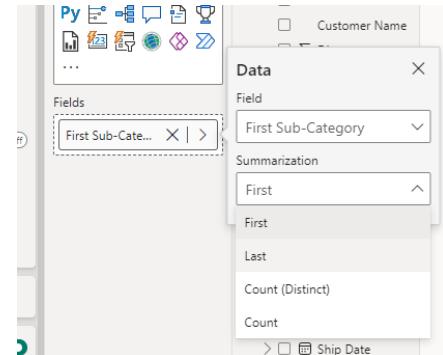


Create Visual with Text

- Create new Card.
- Add **sub-category** field to it.



- Notice that the Card shows **First Sub-Category alphabetically** (Accessories).
- In the **Build** pane click the arrow next to the Fields well to choose which Value you want to show (**First, Last, Count, Count Distinct**).
- Try all options yourself.



Showing Highest Selling Sub-Category

- Create a new page.
- Create a table with **sub-category, Sales, Profit and Quantity** fields.

Sub-Category	Sum of Sales	Sum of Profit	Sum of Quantity
Copiers	149,528.03	55,617.82	234
Phones	330,007.05	44,515.73	3289
Accessories	167,380.32	41,936.64	2976
Paper	78,479.21	34,053.57	5178
Binders	203,412.73	30,221.76	5974
Chairs	328,449.10	26,590.17	2356
Storage	223,843.61	21,278.83	3158
Appliances	107,532.16	18,138.01	1729
Furnishings	91,705.16	13,059.14	3563
Envelopes	16,476.40	6,964.18	906
Art	27,118.79	6,527.79	3000
Labels	12,486.31	5,546.25	1400
Machines	189,238.63	3,384.76	440
Fasteners	3,024.28	949.52	914
Supplies	46,673.54	-1,189.10	647
Bookcases	114,880.00	-3,472.56	868
Tables	206,965.53	-17,725.48	1241
Total	2,297,200.86	286,397.02	37873

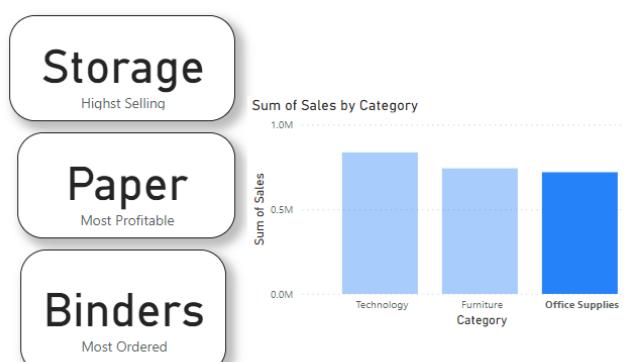
16. Now I want a card that shows which is the highest sub-category in sales.
17. Add a Card to the page with **sub-category** field on its fields well.
18. Drag the **sub-category** field to **Filter** pane to filter the Card.
19. Choose **Top N** in Filter Type, shows item **Top 1** and by value drag **sales** to this well.
20. Do not forget to click **Apply filter**.
21. Now the Card shows **Phones**, the highest sub-category in sales.
22. Check from the table by clicking the **head of sales** to sort descending and know that phones is the top one in sales.
23. Repeat steps 17 to 22 to add two other cards for **Top profit** and **top Quantity**.
24. You should have **Phones**, **Copiers**, and **Binders** in the three cards now.
25. In the Build pane, double click each Fields well and change the names of the cards to : **Highest Sales**, **Most profitable** and **Most ordered**.

Sub-Category	Sum of Sales	Sum of Profit	Sum of Quantity
Copiers	149,526.03	55,617.82	234
Phones	330,007.05	44,515.73	3289
Accessories	167,380.32	41,936.64	2976
Paper	78,479.21	34,053.57	5178
Binders	203,412.73	30,221.76	5974
Chairs	328,449.10	26,590.17	2356
Storage	223,843.61	21,278.83	3158
Appliances	107,532.16	18,138.01	1729
Furnishings	91,705.16	13,059.14	3563
Envelopes	16,476.40	6,964.18	906
Art	27,118.79	6,527.79	3000
Labels	12,486.31	5,546.25	1400
Machines	189,238.63	3,384.76	440
Fasteners	3,024.28	949.52	914
Supplies	46,673.54	-1,189.10	647
Bookcases	114,880.00	-3,472.56	668
Tables	206,965.53	-17,725.48	1241
Total	2,297,200.86	286,397.02	37873

The screenshot shows the Power BI interface. On the left, there is a table of sales data with columns: Sub-Category, Sum of Sales, Sum of Profit, and Sum of Quantity. The data includes categories like Copiers, Phones, Accessories, Paper, Binders, etc. To the right of the table is a filter pane titled "Filters on this visual". It shows a dropdown for "First Sub-Category" set to "(All)". Below it, under "Sub-Category", is a section for "top 1 by Sum of Sales" with "Filter type" set to "Top N" and "Top N" selected. A "Show items" button is also present. On the far right, there are three cards: "Phones" (Highest Selling), "Copiers" (Most Profitable), and "Binders" (Most Ordered). Each card has a small sub-label below it: "Highest Selling", "Most Profitable", and "Most Ordered" respectively. At the bottom right of the filter pane is an "Apply filter" button.

26. Add rounded boarder and shadows to cards.
27. Add a column chart with **category** in x-axis and **sales** in y-axis.

Click on each category on the column chart to see which **sub-category** high selling



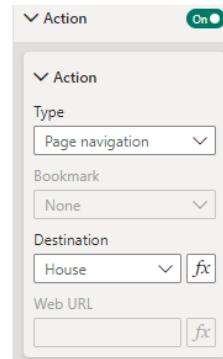
Exercise 19: Page Navigators

1. Use file **Exercise 19 Page Navigation Start.pbix**.
2. You have a Start Page and 6 other pages you want to Navigate to.



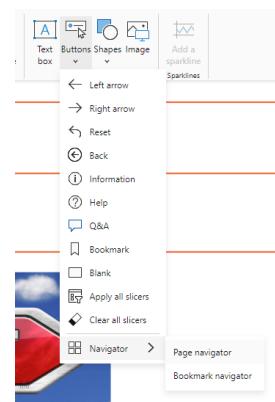
Add Buttons Manually

3. You can manually add buttons and format as you like.
4. In Start Page and Add **button** on the page Navigator section.
5. Change its text to House.
6. Enable the **action** and choose type to **Page Navigation** and select **House** page as your destination.
7. Try your button using **CTRL + CLICK**.
8. You will go to the **house** page.



Create Page Navigator

9. Go to Page **Start** and **delete** the button you have created.
10. Insert page navigator from Insert tab in the Ribbon.
11. Insert → Elements → Buttons → Navigator → Page Navigator.
12. A group of buttons appears on the top.
13. Position them in the page Navigation section.
14. Try each button to see you go to each page.
15. Now copy the page navigator to all other pages (use **CTRL + C** and **CTRL+ V**).
16. Check your work and navigate.



Exercise 20: Filtering Context

Scenario

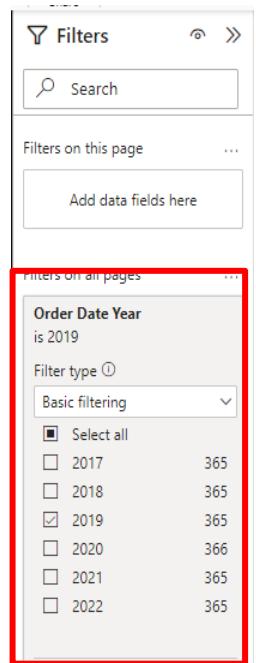
- We want to review some of the filtering context like:
 - Filters on All Pages.
 - Filters on this Page.
 - Filters on a Visual.

Steps:

1. Use file **Exercise 20 Filter context Start.pbix**.

Step 1: Review the Data Model

2. Go to **Model View**.
3. Review the two tables' **Sales** and **Products** and their relationship.



Step 2: Review the Calculated field

4. Go to **table view**.
5. Select **Sales** Table.
6. Select the calculated column **Total Sales**.
7. Let us explore deeper the DAX expression of the column.
8. Imagine a **Pointer** goes row by row and calculate each value in the column in the **Row Context**.
9. This happens more than 60,000 times for all rows one by one.

Create 3 tables in Report View

10. Go to **Report View**.
11. Create table with 3 columns: **Product**, **Year**, **Total Sales**

(Expand Order Date Hierarchy to find the Year field)

12. Select the Table you have created and Copy (Ctrl+C)
13. Paste the table again in the **same Page**.
14. Create **another page** and paste the table again.
15. We now have 3 copies of the same visual.

Step 4: Filters on All Pages

16. Go back to Page 1
17. From table **Order Date hierarchy** Drag **Year** field to the **Filters on All Pages** in the **Filters** pane.
18. In **Filter Type** select **Basic Filtering** and Choose **2019**.
19. Notice that the two visuals on the page have accepted 2019 and the table were filtered to one row showing totals of **2019**.
20. Also, if you go to the other page, it will see that filter was applied.
21. That is because we have applied the filter to **All Pages**.
22. Click the (X) sign in the filter to clear the filter from All Pages.

Step 5: Filters on This Page

23. Repeat steps 16,17,18 but this time in **Filters on this Page**.
24. This time it will be applied to Page 1 only and Page 2 is not affected.
25. Click the (X) sign in the filter to clear the filter.

Step 6: Filters on a Visual

26. Go to Page 1 and select the 2nd Visual.
27. You will find now that the Filter Pan has a new Option **Filters on this Visual**.
28. Repeat steps 13,14, 15 but this time in **Filters on this Visual**.

29. Only that visual is filtered.
30. Click the (X) sign in the filter to clear the filter.

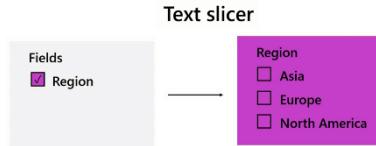
Notice also that Power BI filter the table in each row **in context of each year (2017,2018,2019,2020)** each row is calculated filtering only record form each.

Slicers

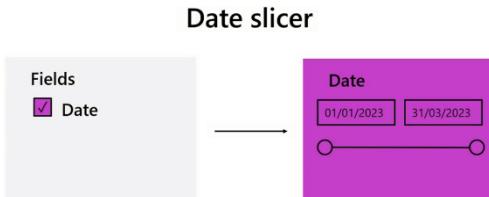
- A slicer is a great way to apply common **filters** to a report page quickly.
- When added to a report, you can use the slicer to display a list of commonly used or most important filters.

Slicer Format

- The slicer can be displayed in **multiple formats** depending on the **field** on which the slicer is filtering.
- For example, if you apply the slicer to a field with **text data type**, the slicer can display as a list of unique entries in that field.



- Similarly, if you apply the slicer to a field with a **date type**, the slicer can be displayed as a **date range selector**.



- However, no matter which format the slicer is displayed in, the underlying behavior is the same.
- The slicer provides a list of filters that users can apply to the visualizations in the report. When a filter is selected, the visualizations will immediately update to reflect the filtered data.

It is important to note that you do not need to connect every visualization in a report to the slicer.

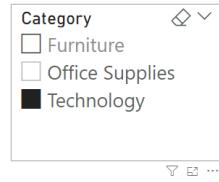
Exercise 21: Creating Slicers

1. Use File: **Exercise 21 Start.pbix**.
2. It is only one Visual can be used with any type of field.
3. Options in display and format differ according to the type of field you use in the slicer.

Text Field

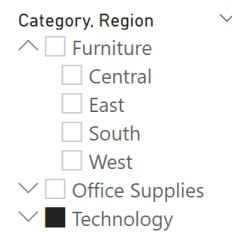
4. Create a new table with fields **Sub-category** and **Sales**.

- Create a new slicer with field **Category**.
- Whatever **Category** you select from the slicer the table is filtered to show sales of this category.
- If you want to select **multiple** categories, Use the **CNTRL** button while selecting.
- To clear the selection, click the **Eraser Icon** on top right of the filter.

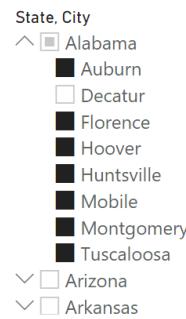


Add levels in Slicer

- You can **drag** multiple **fields** to the slicer to create hierarchy.
- Drag Region** to the slicer.
- Now you have **arrow down** beside each category you can expand to show the next level.
- Drag Segment** to the slicer, to have 3 levels.
- Add another slicer with **States** and **City**.

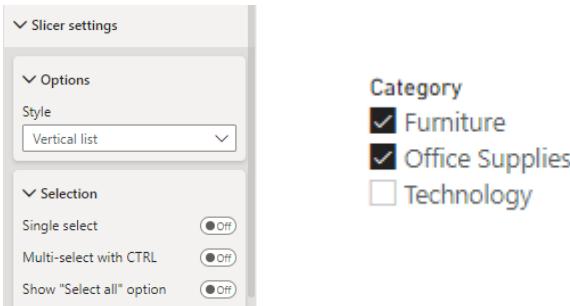


Sub-Category Sales	
Accessories	1,584.91
Art	276.43
Binders	430.94
Chairs	3,915.54
Envelopes	105.84
Fasteners	3.62
Furnishings	40.48
Labels	491.55
Machines	3,040.00
Paper	826.70
Phones	2,525.35
Total	16,135.82



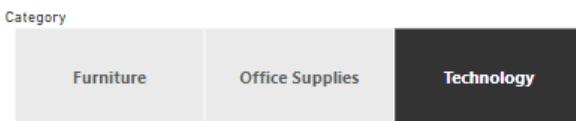
Format Text Slicer

- Create a new page.
- Copy your **table** from page 1 to page 2.
- Create a new slicer with **Category** field.
- We want to enable **multiple selection** without making our user use the **CTRL** key.
- In the **Format** pane, in Card **Slicer settings** in **Selection** section turn off **Multi-select with CTRL** option.
- Now you can select multiple selection without having to press **CTRL** key.
- We want to make the slicer in horizontal tiles.



- Format pane → Slicer settings → Options → Style → Tile.

22. You now have your slicer as horizontal buttons, and you can reshape it to make it vertical if you want.



23. When the button is **darker** means it is **selected**.

24. In the **Values** Card change font to be white Bold and background color to blue.

25. This gives you button colors when not selected.

26. When selected it is white font with black background always.



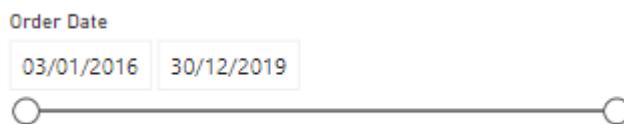
Date Slicer

27. Create a new page.

28. Create a table with **Order Date** and **Sales**.

29. Add slicer with the Order Date field.

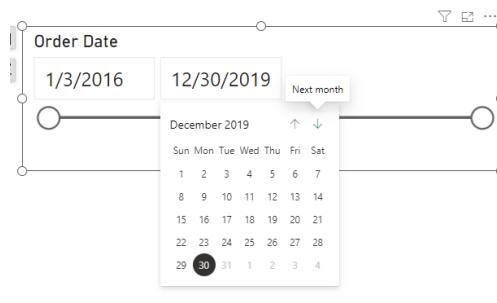
30. You will have a slicer with a **scroll** you can set the period of date you want to filter on or select start and end date.



31. Scroll form left and right to adjust start and end date.

32. The table is filtered for this period.

33. You can click on **Start** or **End** Date and a calendar will appear to select your start and end date.

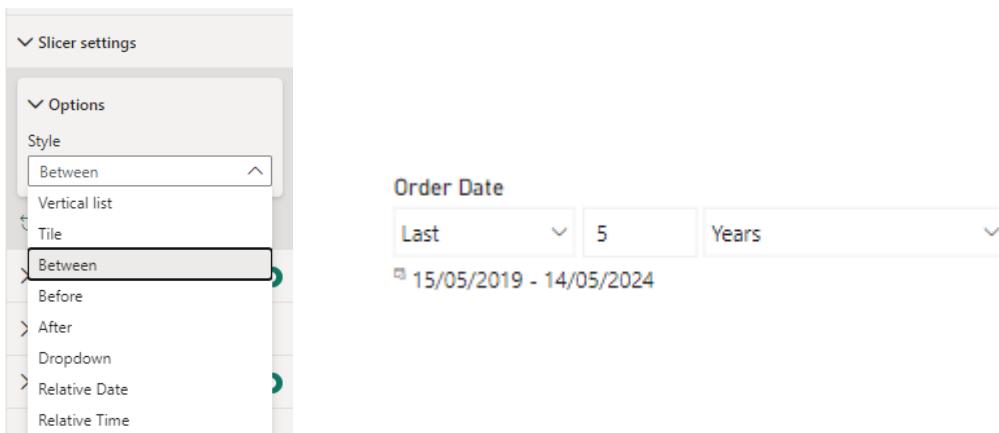


34. You can also **type** your **start** and **end** date on the boxes.

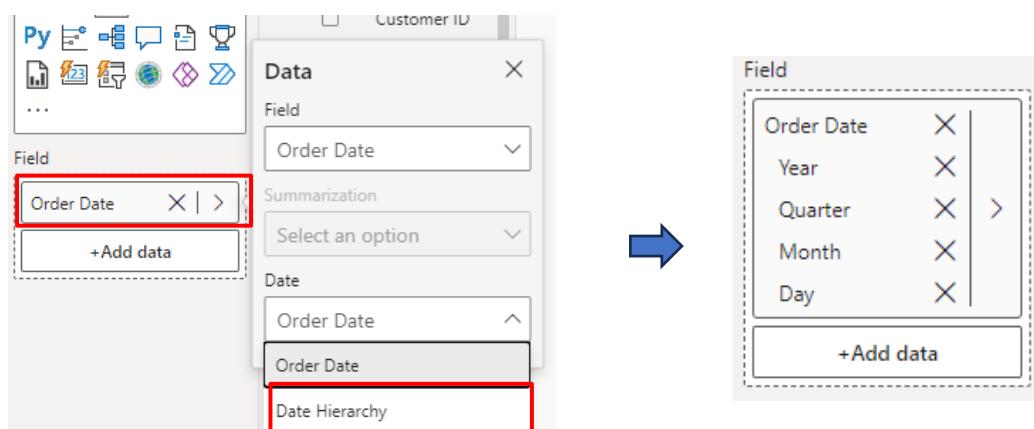
35. Click on the Clear Filter button to unfiltered the date.

36. In the **Format** pane in **Visual** tab in Card **Slicer Settings** and in **Section Options** try all **Styles** available for the slicer.

- The default for the Date slicer is **Between** Style.
- The **Dropdown** option is good for saving space in your report.
- In The **Relative date** you can for example filter on **last 5 years**.



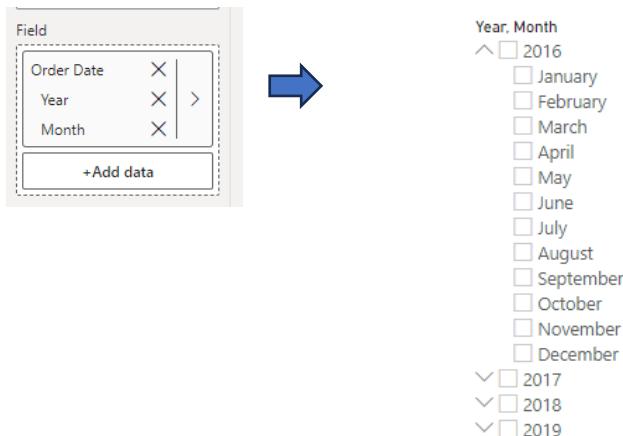
37. If you don't want to filter using date periods and want to filter using **Year**, or **Month** or **Quarter** you can change to date hierarchy.
38. On **Build** pane in the **Field** well click on the **arrow** right to Order Date Field and select the **Date** dropdown list and chose **Date Hierarchy**.



39. Your **Field** well now shows the **Order Date hierarchy**, and you have **down arrows** in your slicer starting from **year** down to **quarter** then **month** then **date**.



40. You can click the **X** icon next to any field in the hierarchy you do not want to remove from your slicer.
41. Suppose we want to filter only on years and months.
42. Delete all fields in the hierarchy and keep only **years** and **months**.
- 43.



Format Date Slicer

44. In Format pane change your slicer style to **Dropdown** to save space.



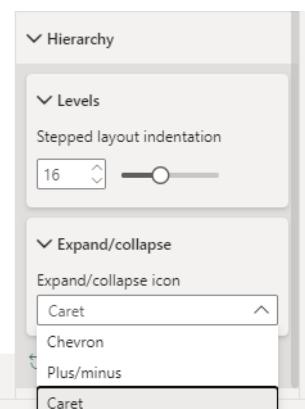
45. Change the Style back to **Vertical list**.

46. In Slicer Setting card → Selection turn Show “**Select all**” option on.

47. Now you have a “**select all**” option on top of your slicer.

48. You can click if you want to select all and then start to **deselect** what you don't want to select.

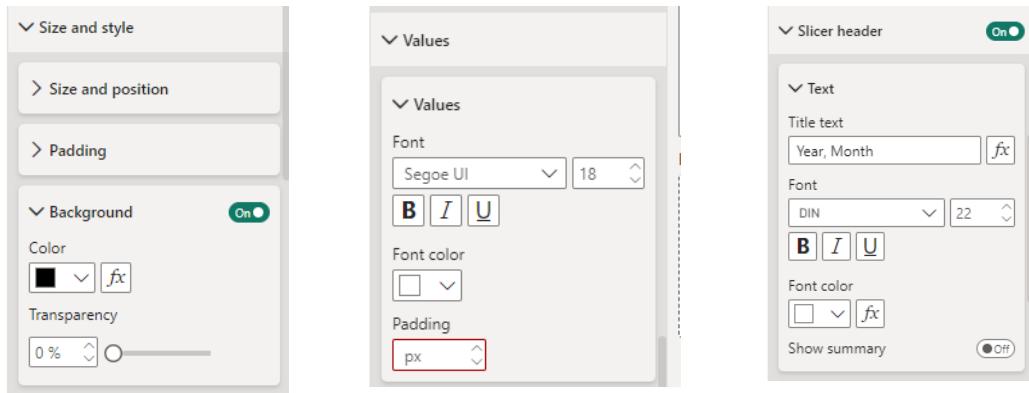
49. In the Hierarchy Card you can change the Levels of indentation in your layout and the icon used to expand or collapse the hierarchy.



50. In **Size and Style** → Background change the color to black.

51. In **Values** Card → Values make font color **white**.

52. In Slicer Header Card → Text make color **white**.



Cross-filter and cross-highlight

- Microsoft Power BI's cross filter and cross highlight functionalities make it possible for you to **emphasize** related data across multiple charts or **remove** unrelated data.

Cross-filter

- Cross filtering refers to the practice of selecting an item or data point on one visual, which in turn **filters out unrelated data** in another visual.
- It creates a relationship between two separate visuals, such that a selection in one visual affects the data shown in another.
- For example, with cross filtering, selecting the Mountain Bikes column in a report will filter the table visual to display only sales data related to this product category. The other product categories are no longer shown.



Cross-highlight

- With cross highlighting, when you select a data point in one visual, it **highlights** the related data in other visuals instead of filtering out unrelated data.
- This is the **default behavior** for most visuals in Power BI.
- Unlike cross filtering, it still **displays unrelated data**. However, it's **dimmed or faded**.



Exercise 22: Cross-Filter and Cross-Highlight

1. Use file **Exercise 22 Cross Filter Cross Highlight Start.pbix**.
2. In this report, there are four different visuals displaying various sales data.



Cross-Highlight

3. Let's start by examining how **default cross highlighting** works in Power BI, using the stacked bar chart in the top left corner.
4. If you select any **region**, for example, **Europe**, it **highlights** the bar related to Europe and **dims** the other bars (*Click Europe in the legend of the chart to select it in the 3 months*).
5. Notice how all other charts instantly reflect your selection and highlight data that is related to your selection in the stacked bar chart.



6. The bright areas represent data related to Europe and the dim areas represent data from other regions.
7. You can press the **Shift key** on the keyboard and select **multiple regions** or even **multiple units** in the stacked bar chart.
8. Every time your selection changes, the other charts respond automatically by highlighting the related data.

Cross Filtering

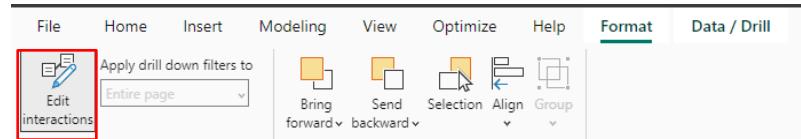
9. Take note that the **Table Visual** behaves differently. Rather than fading the irrelevant data, it **hides** them based on your selection. This is called **cross filtering**.



10. To clear your selection, you can select the selected item again to return to normal view.
11. If you select data points on any of the charts on this page, the other charts will cross highlight based on your selection instantly.
12. For example, if you select **Mountain Bike** on the stacked column chart, in the top right corner, the other charts respond.
13. Just remember that **cross highlighting means irrelevant data will remain visible but dimmed**, and **cross filtering means irrelevant data will be hidden**.
14. Now, if you select **Mountain Bike** on the stacked column chart, notice how the stacked bar chart on the left reacts. It is not showing the dimmed areas anymore and is displaying data related to the mountain bikes only.

Change Behavior Individually

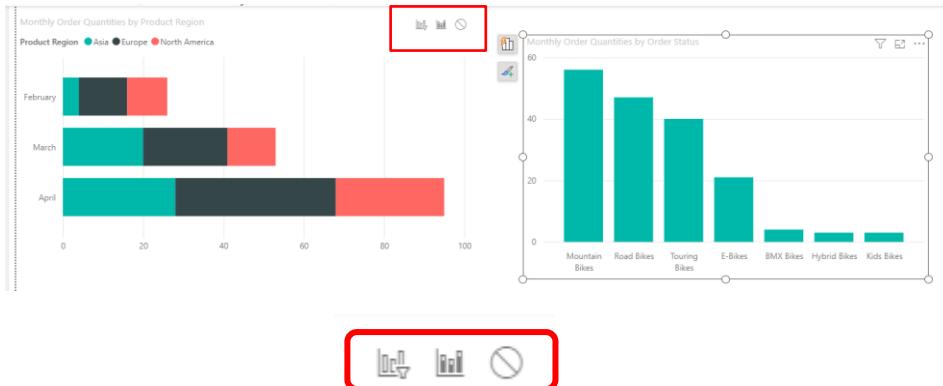
15. You can Change the behavior individually by selecting the visual you want to change its effect on other visuals then select **Edit interaction** from the **Format** tab in the ribbon.



16. On the top right corner of the other visuals three icons will appear to make you control how this visual will affect the other one by one



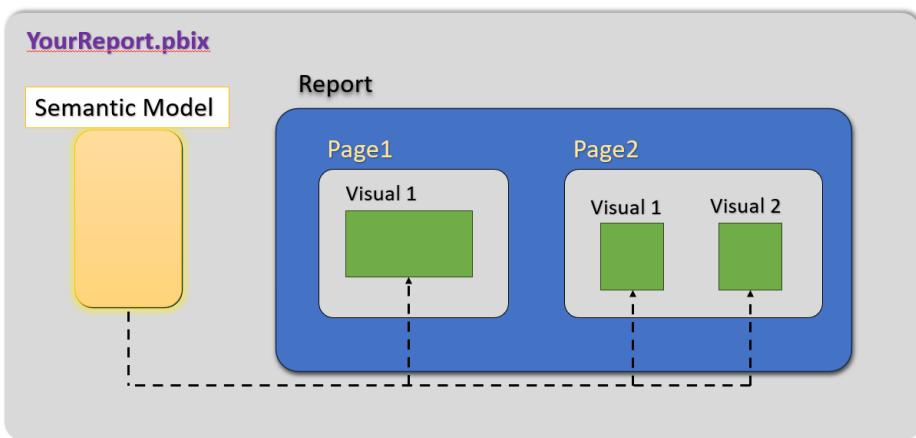
You can choose either Filter, Highlight or Non



Chapter 6: Publish and Share Your Report

The Structure of .pbix file

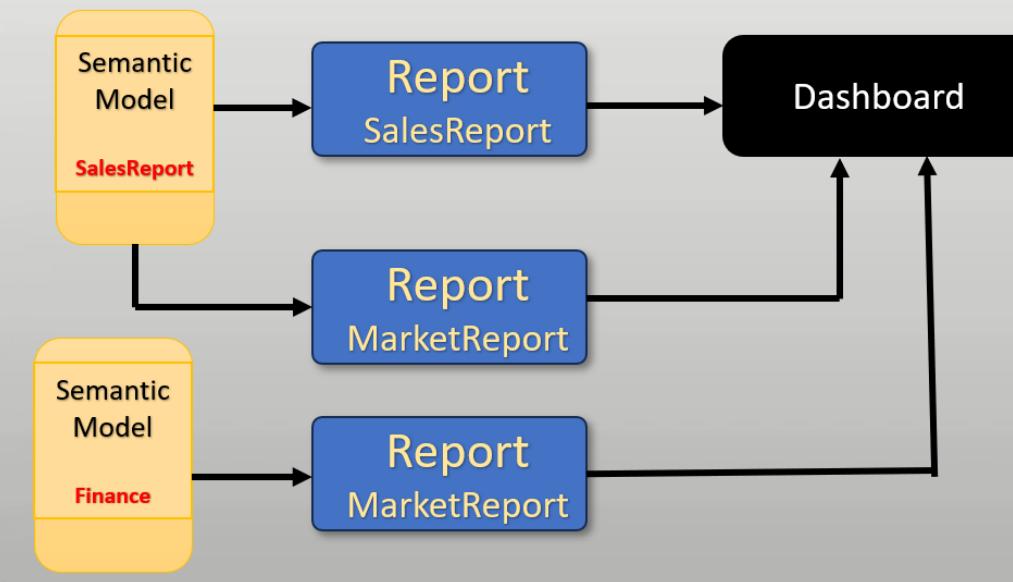
- The file you create in power BI desktop is saved with the extension of .pbix file.
- It contains **Semantic Model** (known as dataset before) and **pages** with **visuals**.
- Visuals in pages gets its data from the **Semantic Model**.
- A report can be connected to only one **Semantic Model**.



Publish your report to Power BI Service

- When publish your report to the power BI service the .pbix file is separated into a **Report** and a **Semantic Model**.
- You can use the Semantic Model to create many other Reports.
- Remember that a **Report** can get its data from only one Semantic Model.
- You can create a **Dashboard** from visuals from many reports.

My Workspace in Power BI Service



Create a Power BI Account

- To publish your .pbix file you must have at least a free Power BI account to publish your file to **My Workspace** you have.
- **My Workspace** is a personal workspace you cannot share with others.
- If you have a **Pro power BI account**, you can create many others workspace and share your work with others.
If you do not have an account, please watch my video on my channel on YouTube, to Create a developer account on Microsoft Developer program to proceed with exercises in this chapter.

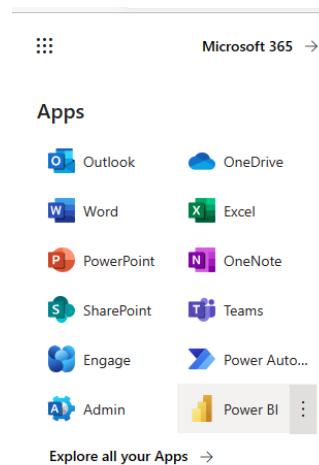


Exercise 23: Publish a Report

1. Use file **Exercise 23 Start.pbix**.

Sign in to Power BI Service

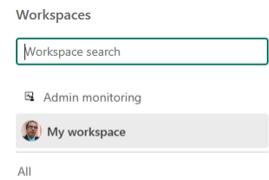
2. Create a power BI Developer account as I mentioned in the previous section.
3. Go to either:
 - a. <https://app.powerbi.com/>
 - b. <https://Office.com>
4. Login with your account.
5. If you login to your account office account, click the **waffle** icon on the top left then select Power BI.



Create a new Workspace

(**Note:** You can skip this part and use your My Workspace if you have a Free Power BI account).

6. On the left bar click the **Workspaces** button.
7. All your workspaces will show if you have any.
8. Click a **New workspace** button to create a new one.
 - a. Name: **AC Training**.
 - b. Description: **This workspace contains all reports and Semantic Models for training in AC Institute.**
9. Now you have an empty workspace.



Create a workspace

Name *

This name is available

Description

This workspace contains all reports and Semantic Models for training in AC Institute

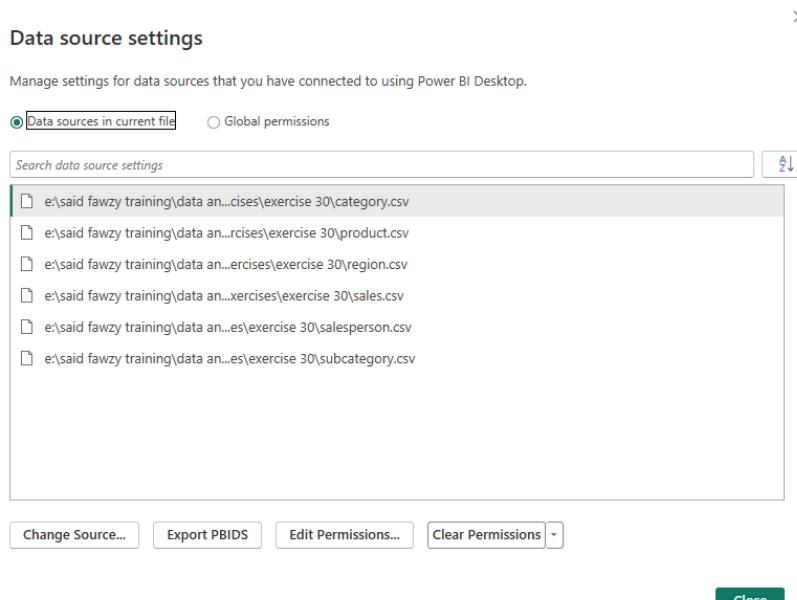
+ New workspace

The form has a header "Create a workspace" with a close button "X". It has two main sections: "Name *" with a text input field containing "AC Training" and a checkbox below it that says "This name is available" with a green checkmark. The second section is "Description" with a text input field containing "This workspace contains all reports and Semantic Models for training in AC Institute". At the bottom right is a green button with a plus sign and the text "+ New workspace".

Publish Report to your Workspace

10. Open your exercise file.
11. Go to Power Query and explore the files you have imported to your report.

12. Go back to Power BI and from Home tab in ribbon → Queries Click the arrow down the Transform Data and choose Data Source Settings



13. Notice your data source is 6 .CSV files.

14. Go to Model View and review your data model.

15. You have a report of one page **Sales Report**.

Save Your File

16. The first step is to save your report, you cannot publish unsaved report.

17. Save your report as **Sales Report.pbix**.

Login to your account

18. Click on the top right corner of Power BI and make sure you are logged into your power BI account.

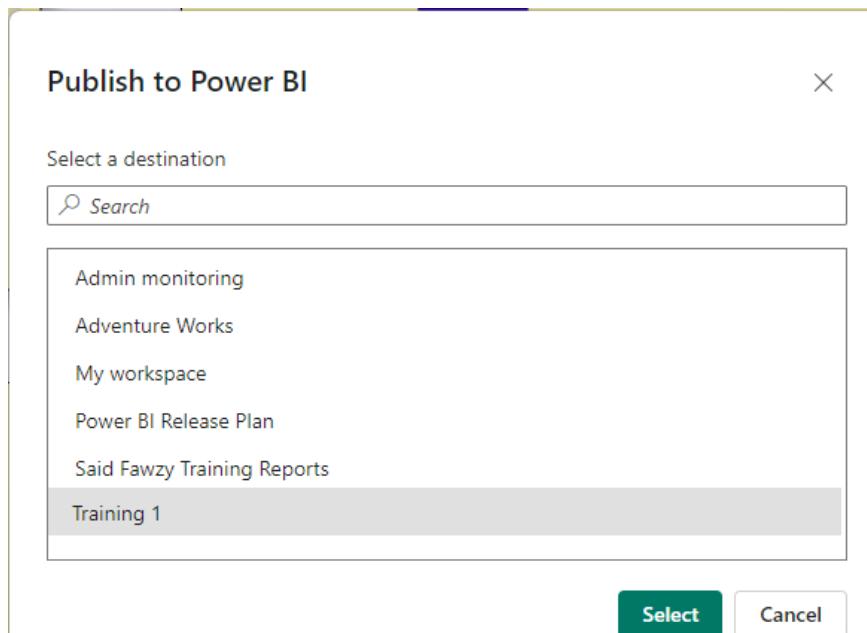
19. If not click on to login.

Publish your Report

20. In Home tab in the ribbon on Share Group click Publich.

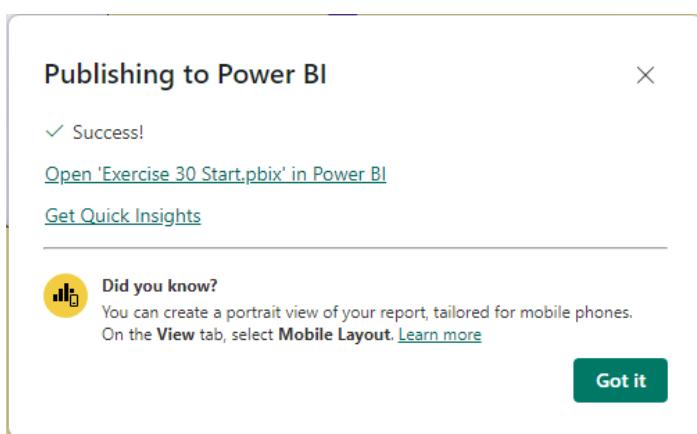
21. You will receive a list of all Workspaces you have in your account.

22. Select **AC Training** workspace and click Select button.



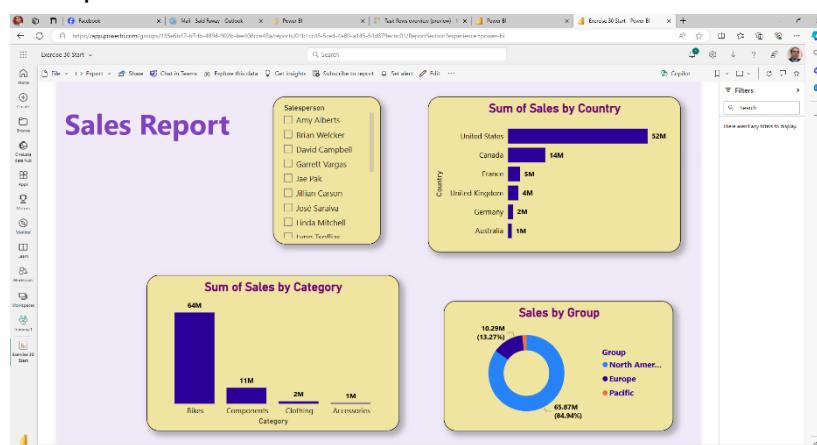
23. A **Publishing to Power BI** dialogue box appears.

24. After a while you will get a success notification.



25. Click on the link he gives to you to open your report

26. Your report is now available online.



27. Click on the Workspace **AC Training**.

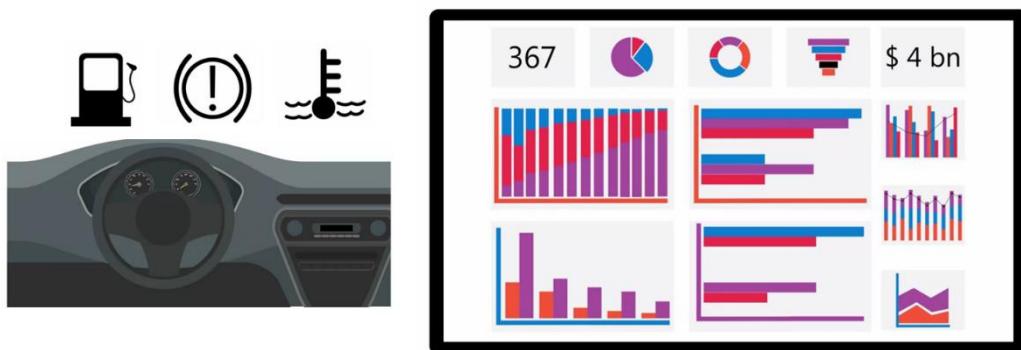
28. You can see you have two objects now, your **report** and your **Semantic Model** and they have the same name Sales Report, the same name of your .pbix file.

29. When you have many objects in your workspace you can filter them using the **Filter Dropdown** list or writing key words in the **search box**.

30. Notice the icon beside the **Report** and **Semantic model**.

Dashboard

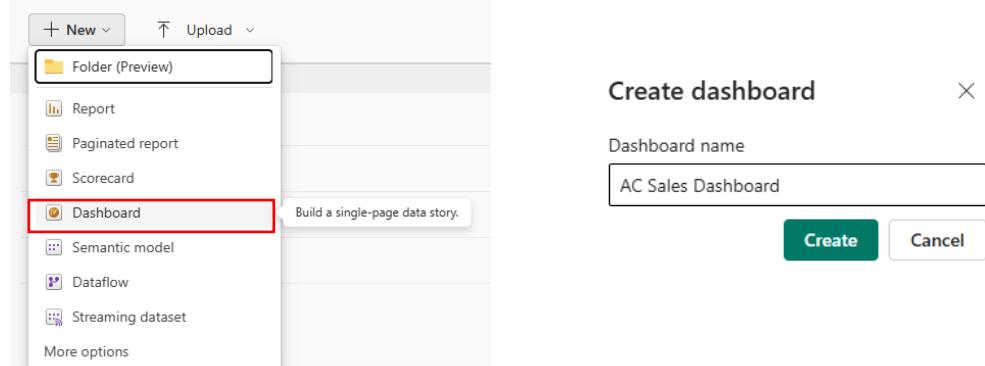
- Consider the dashboard of a car. It presents critical data like speed, fuel level, and engine temperature in a consolidated visually understandable way. This information allows you to make necessary decisions while driving.
- Similarly, in the business context, a dashboard **visualizes the critical information** required to accomplish specific objectives, skillfully arranged and consolidated on one screen.
- Dashboards can present data from **different sources** in various forms, making it easier for stakeholders to understand.



Exercise 24: Create a Dashboard

1. Open your Microsoft Power BI service and navigate to your **workspace** in the left navigation pane.
2. From your available workspaces, select the **AC Training** workspace.
3. Change to **List** view.
4. On the top left corner, select **New**, and then select **Dashboard**.

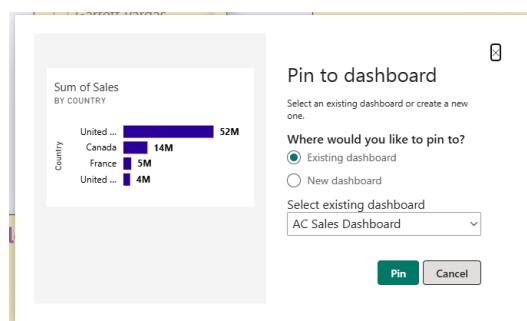
5. A pop up appears asking you to name your dashboard.



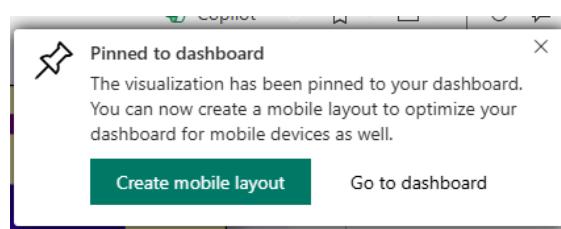
6. Let's name it **AC Sales Dashboard**. then select **Create**.
 7. Once you have created your dashboard, you can start adding visuals.
 8. Return to your workspace and open the **sales report** you and your team created.
 9. Each visualization in your report has a **Pin icon** in the top right corner. Select the Pin icon for the **Sum of sales country**, bar chart.



10. This opens a dialog box where you can choose where to pin this visual. Select your newly created **AC Sales Dashboard** from the dropdown menu.



11. Then pin the **Sum of Sales by Category** Column Chart.
 12. Click the Go to dashboard in the pop-up message that shows up.



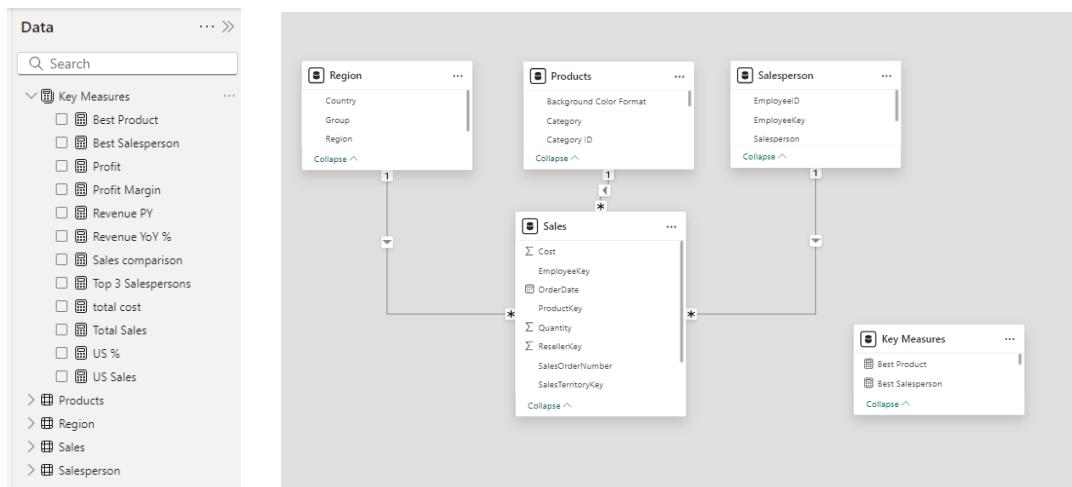
13. You have now your dashboard with two **Tiles**.

Chapter 7: Final Projects

Final Project 1

Create Report

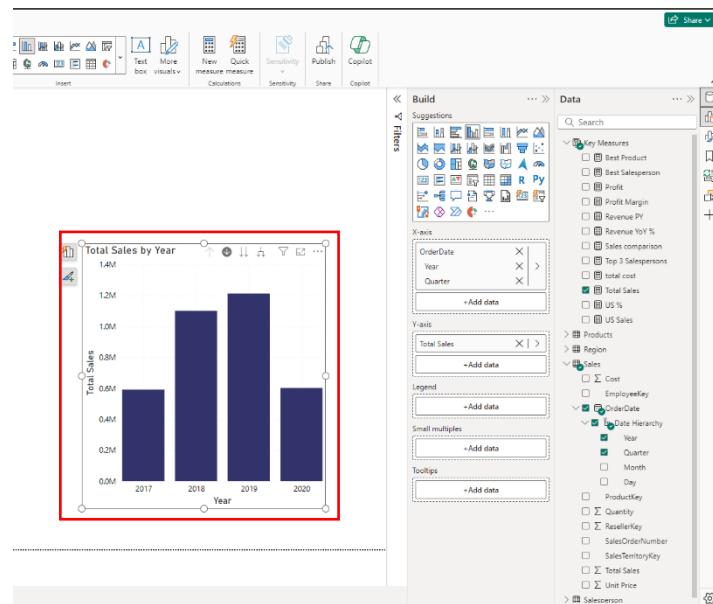
1. Use file: **Project Start.pbix**.
2. You are required to create the following visualization:
 - a. A column/bar chart to display sales on a time scale.
 - b. A donut chart or funnel chart can show sales by category.
 - c. A map visual, a pie chart, or bar chart can be used to display sales by country.
 - d. A bar chart can be used to show the sales performance of salespeople.
 - e. A treemap can be used to visualize units sold for each category.
 - f. As the objective of the story is to show the quarterly sales performance you can add slicers for the year and quarters to interactively explore the data.
 - g. You can also add top selling products, top performing regions, and salesperson to your report to support your story. Card visuals highlight key metrics for the executive board such as profit, revenue, profit margin and so on.
3. Review the data fields available.
4. Review the measures available and their calculations.



5. Rename the 1st page “Sales”.

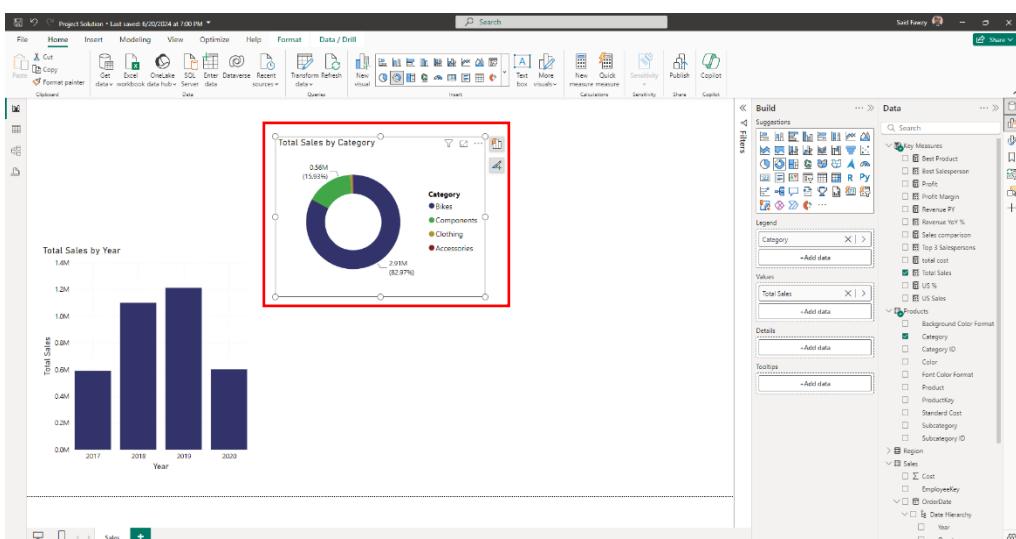
Sales on a time scale

6. A **column or bar** chart is the best option to visualize time related data. You can create a date hierarchy based on your analytical needs.
7. In this case, you need to bring **year** and **quarter** fields from the **sales table** date field to the column chart **x-axis**
8. and **total sales** measure on **y-axis**.
9. Enable **drill mode**, then click on any year to drill down to its quarters.



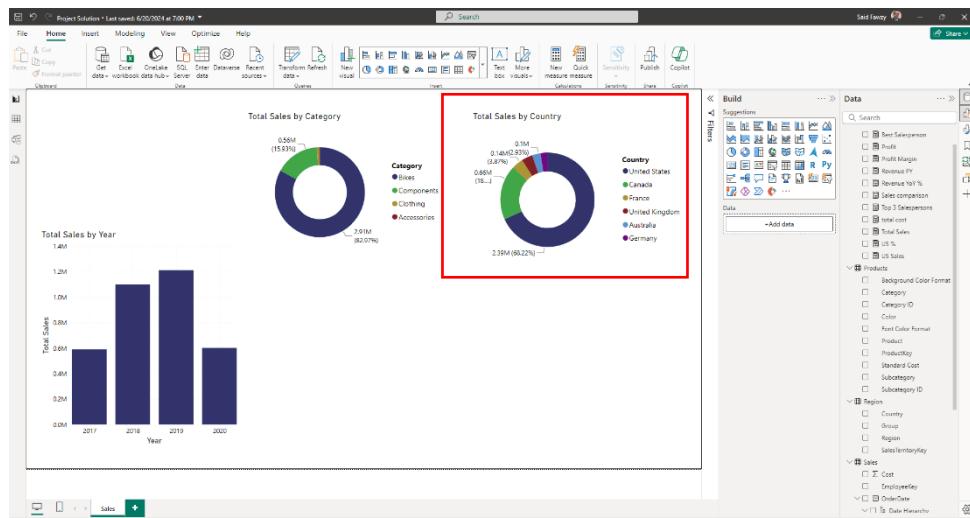
Sales by category

10. The Company has only four product categories.
11. You can use a donut chart to display the sales by category.



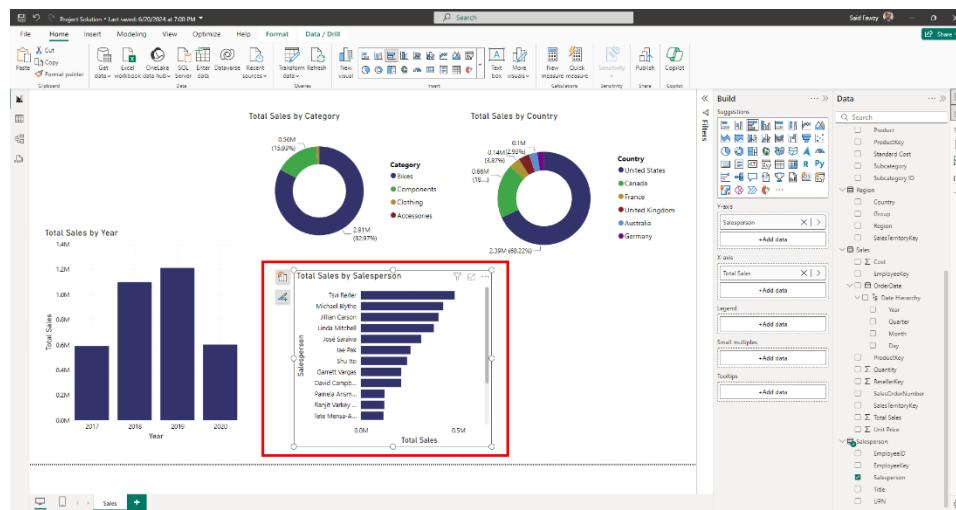
Sales by country

12. Although you can use any map visual to display sales values by each country, to create a consistent design look, it is good to use the **donut chart** as there are only 6 countries worth of data available.



Sales performance of salespeople

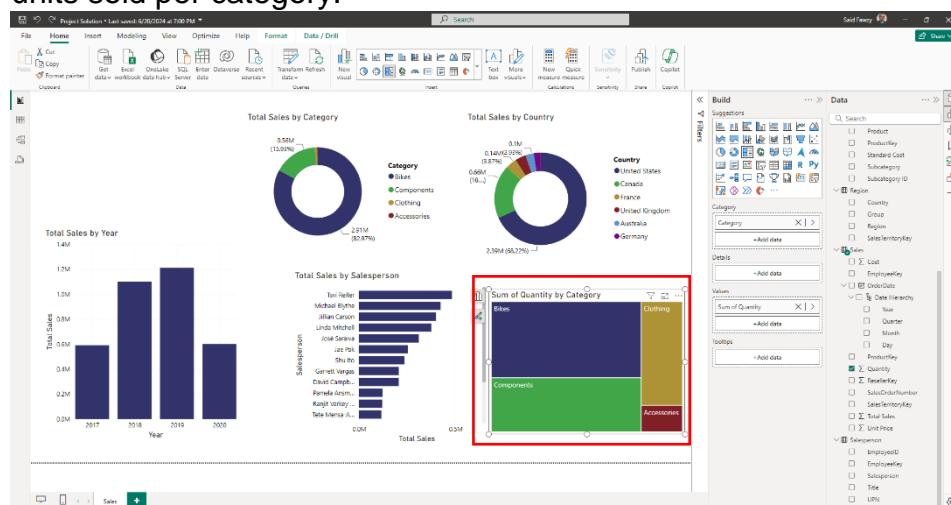
13. You can use a bar chart to show the sales performance by salespersons.



Units sold for each category

14. You can use a treemap to visualize units sold for each category.

15. The size of each rectangle proportionally represents the number of units sold per category.



Quarterly sales performance

16. To show quarterly sales performance, you can add **slicers** for the **years** and **yearly quarters** so users can interactively explore the data.
17. You need to create
 - a **slicer** for each **year** and
 - a **slicer** for each **quarter**.
18. You can use the **tile style** of **slicer** because there are only **4 years** of data available in the report.

The screenshot shows a Power BI desktop interface with a report containing four visualizations: a donut chart for 'Total Sales by Category', another donut chart for 'Total Sales by Country', a bar chart for 'Total Sales by Year', and a treemap chart for 'Sum of Quantity by Category'. A slicer at the top allows filtering by year (2017-2020) and quarter (Q1-Q4). The 'Format' tab is selected in the ribbon. The 'Build' pane on the right displays the data hierarchy for 'QuotaDate' and 'Quarter'.

Apply and Customize Them to your report

1. You first need to activate and customize the **Accessible City Park** theme from the View tab of Power BI desktop.

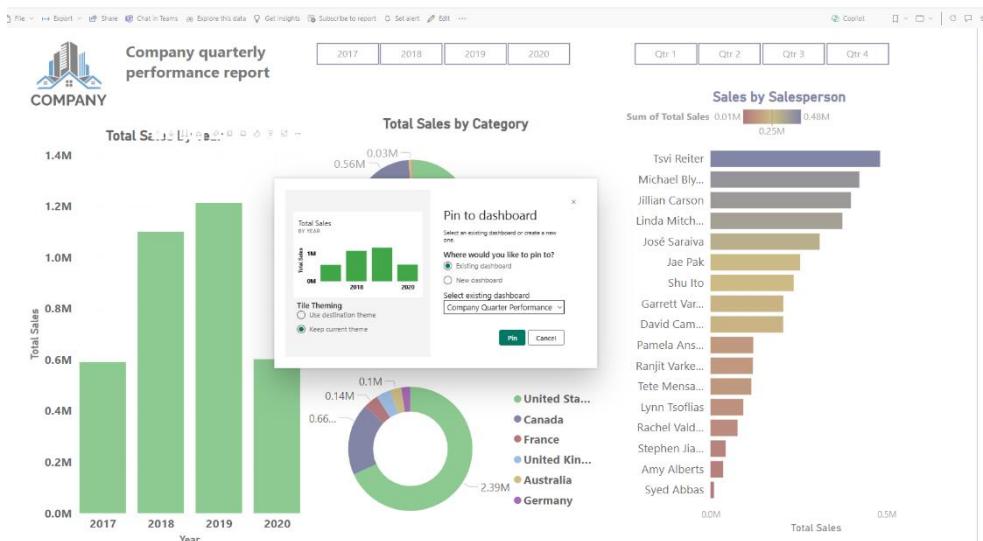
The screenshot shows the 'View' tab selected in the Power BI desktop ribbon. The 'Accessible themes' section is open, showing several theme options. The 'Accessible City park' theme is highlighted with a yellow box. A large number '4' is overlaid on the bottom right of the screenshot.

Publish your report

1. Log into your account and publish your report to your workspace.



Create a Dashboard and add visuals to it.



Final Project 2

Project Requirements

Introduction

- A company Needs to analyze its sales.
- Data Came in .csv files
- The data introduced was a historical data of sales in 1997 and 1998.
- The report is supposed to be created in Jan 2000.
- It is suppose to clean, Create data model and create interactive report for top management to support them in decision making for next year

Analysis should Answer the following Questions:

- Which Region sells well , and which ones need more concentration in our next Marketing Cobain.
- Which people are interested in our products and which ones are not and what to do to grasp their attentions.
- Which seasons we sell will and which product do we sell more.
- What is the recommendations for the future for getting more selling

Findings

Sales Overview

- Total Sales were 1.76 M
- Total Profit was 1.05 M
- Top Sales Brand was Hermanos.
- Mr. Smith was the Top Customer.
- Top Country in Sales were “USA”.
- Top Selling Product were “Hermanos Green Paper”.
- Sales are High in Months Nov. and Dec.
- Sales are low in Feb. ,Apr., and Oct.

Sales in Regions

- Sales were high in Supermarkets and Deluxe Supermarket.
- Sales in 1998 were higher than 1997 , nearly double.
- Sales are high in Nov. and Dec.
- USA were the best country in sales.
- Drill down : in USA best region were North West.
- Drill Down : in North west best city were Salem.

Demographic Analysis

- High school and partial high school people are the people with high sales.
- College and those of graduate degrees have low spellings.
- People with no Children or 5 children are low in sales.
- People with income from 10-50\$ are the ones with high sales.
- High income people have less interest in our products
- Old age people are the ones interested to buy our products.
- Young people do not buy our project much.

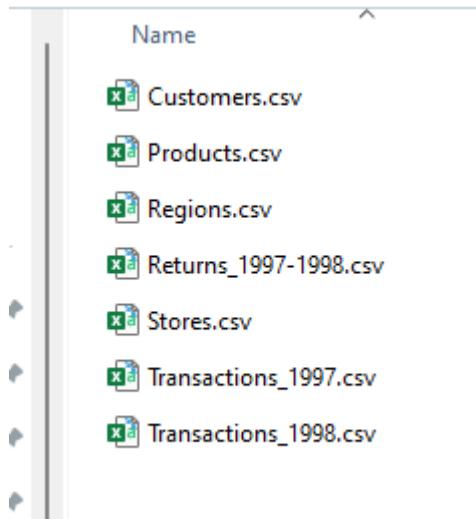
Recommendations

- We need more investigation in:
 - Why people not interested to buy our products in Feb. , April , and Oct.
 - Why Small Grocery stores have always low spellings.
 - In USA: why stores Northwest always double selling those in Southwest.
- We need to concentrate in our upcoming Marketing Combines on:
 - Collage Graduate people and Young age people , as they always not interested in buying our products.
- We need to take the chance of:
 - Old people who are interested in our products.
 - Northwest stores in USA as they are selling well

Project Creation Steps

Getting Data

- Get the data from the Project Data folder in .csv files.
- Load the data from the files



- Then open the Power Query

Clean Data in Power Query

Customer Table

Add Age Column:

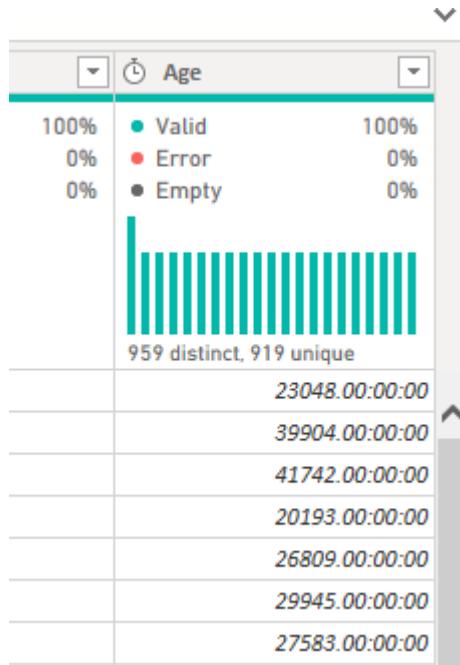
- Select birthdate column.
- Add Age Column.

A screenshot of the Microsoft Power Query ribbon interface. The ribbon tabs include 'Add Column', 'View', 'Tools', and 'Help'. Below the ribbon is a toolbar with various icons for data manipulation. A data preview table is shown below the toolbar, containing columns for 'first_name', 'last_name', and 'customer_address'. Each column has a percentage breakdown of data types: 'Valid' (green), 'Error' (red), and 'Empty' (black). The preview shows 537 distinct first names, 849 distinct last names, and 1000 distinct customer addresses. To the right of the preview, a 'Date' dropdown menu is open, showing options like 'Date Only', 'Parse', 'Year', 'Month', 'Quarter', 'Week', 'Day', 'Subtract Days', 'Combine Date and Time', 'Earliest', 'Latest', and 'Issaquan'. A tooltip for 'customer_address' indicates there are 13 distinct values.

- Suppose your report was in 1/1/200
- Update the M formula of the age column to subtract

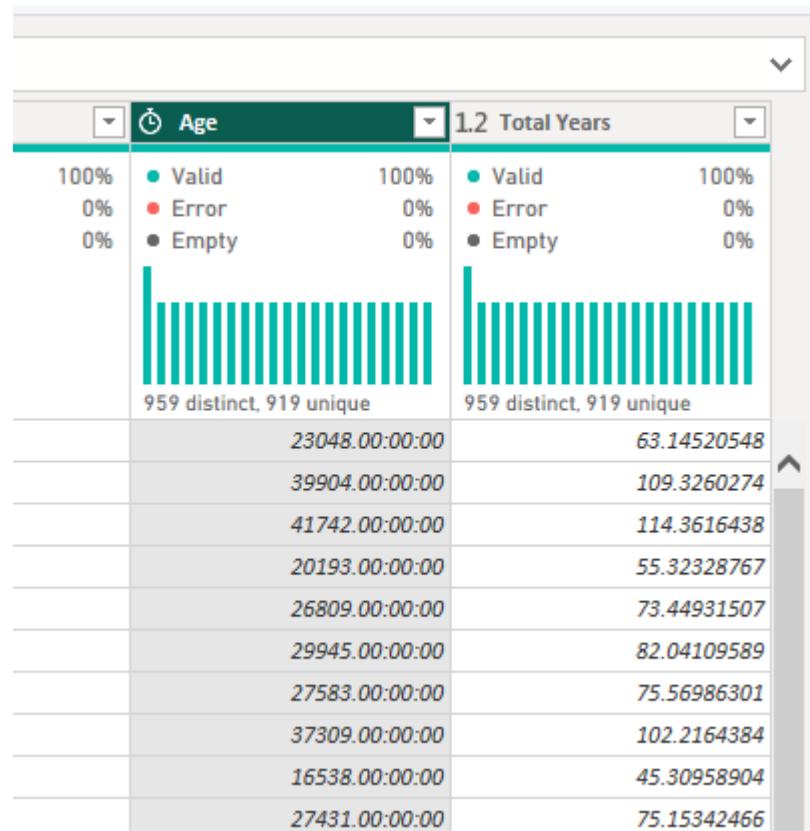
```
= Table.AddColumn(#"Changed Type", "Age", each Date.From(#date(2000,1,1)) - [birthdate], type duration)
```

- You get an age column.



- Select Age Column and Add Total Years column from the Duration Menu

- you will get Total Years column



- o Round the years

The screenshot shows the Power Query Editor interface. The formula bar at the top contains the following formula:

```
= Table.AddColumn(#"Inserted Total Years", "Round Down", Number.Rounding([Total Years], 0))
```

The preview pane below shows a table with two columns: "Total Years" and "Round Down". The "Total Years" column contains various numerical values, and the "Round Down" column contains percentages (100%, 0%, 0%) corresponding to the values in the first column. A tooltip indicates there are 919 unique values in the "Total Years" column.

- Remove the Age and Total years columns
- Rename Round Down Column Age.

Create Age Group column

- Add Conditional column

The screenshot shows the Power Query ribbon menu. The "Conditional Column" option is highlighted under the "Add Column" tab.

Add Conditional Column

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

New column name
AgeGroup

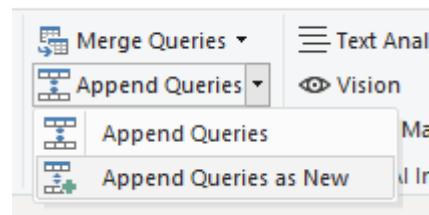
Column Name	Operator	Value ⓘ	Output ⓘ
If Age	is less than	ABC 123 20	Then ABC 123 Teenage
Else If Age	is less than	ABC 123 35	Then ABC 123 Young
Else If Age	is less than	ABC 123 60	Then ABC 123 Adult
...			

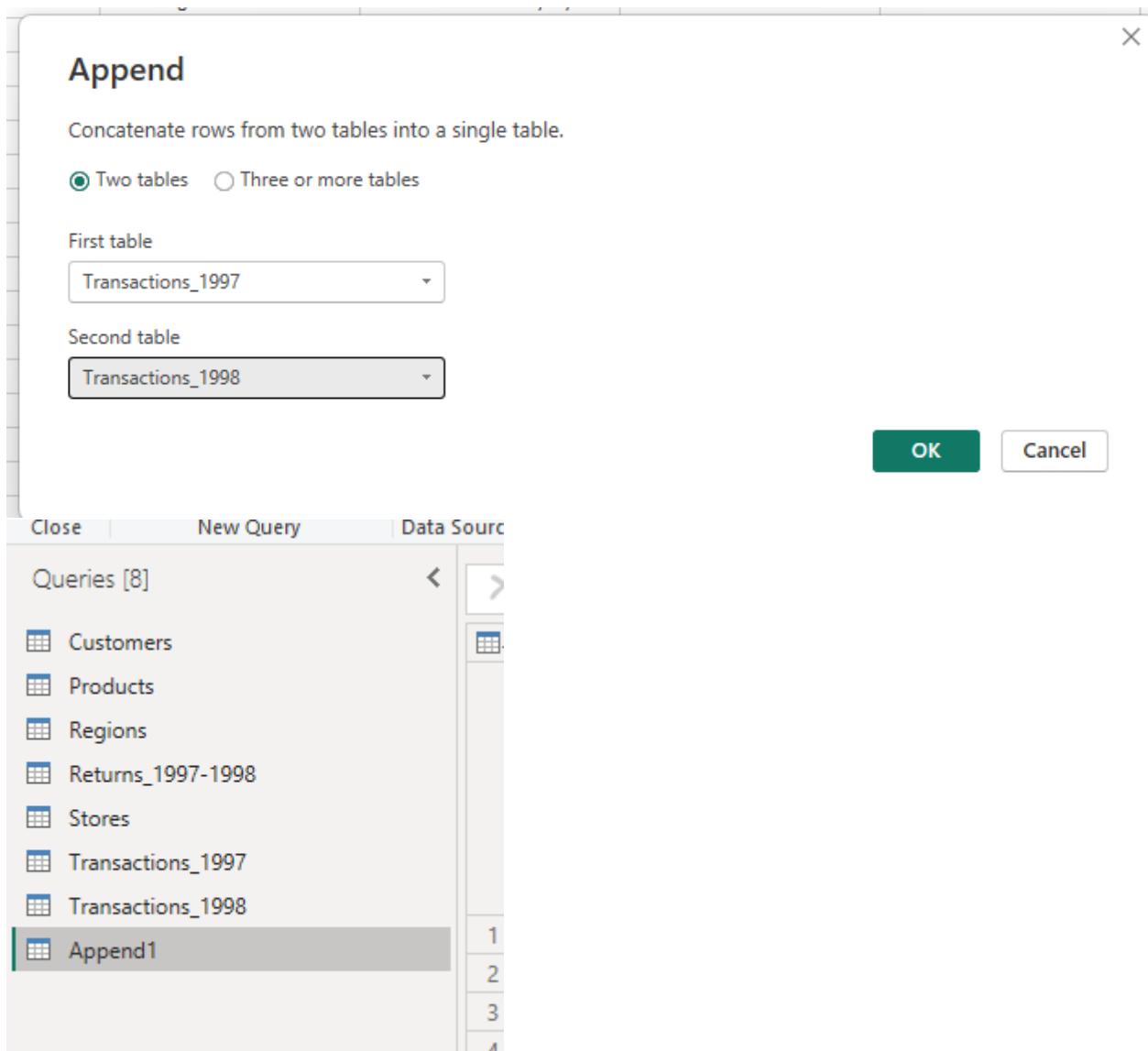
Add Clause

Else ⓘ ABC 123 Old

OK Cancel

Append Transactions of 1997 and 1998

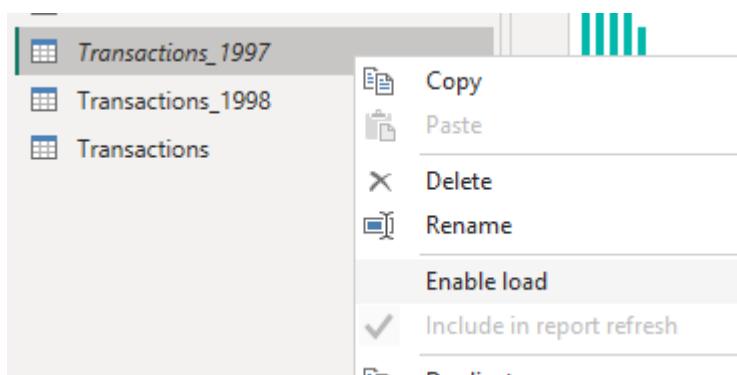




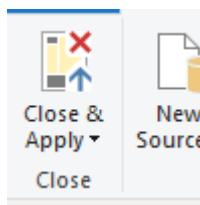
Rename Append query to Transactions

Rename Returns_1997_1998 to Returns

Make Transaction 1997 and Transactions 1998 not loaded to model



Close and Apply

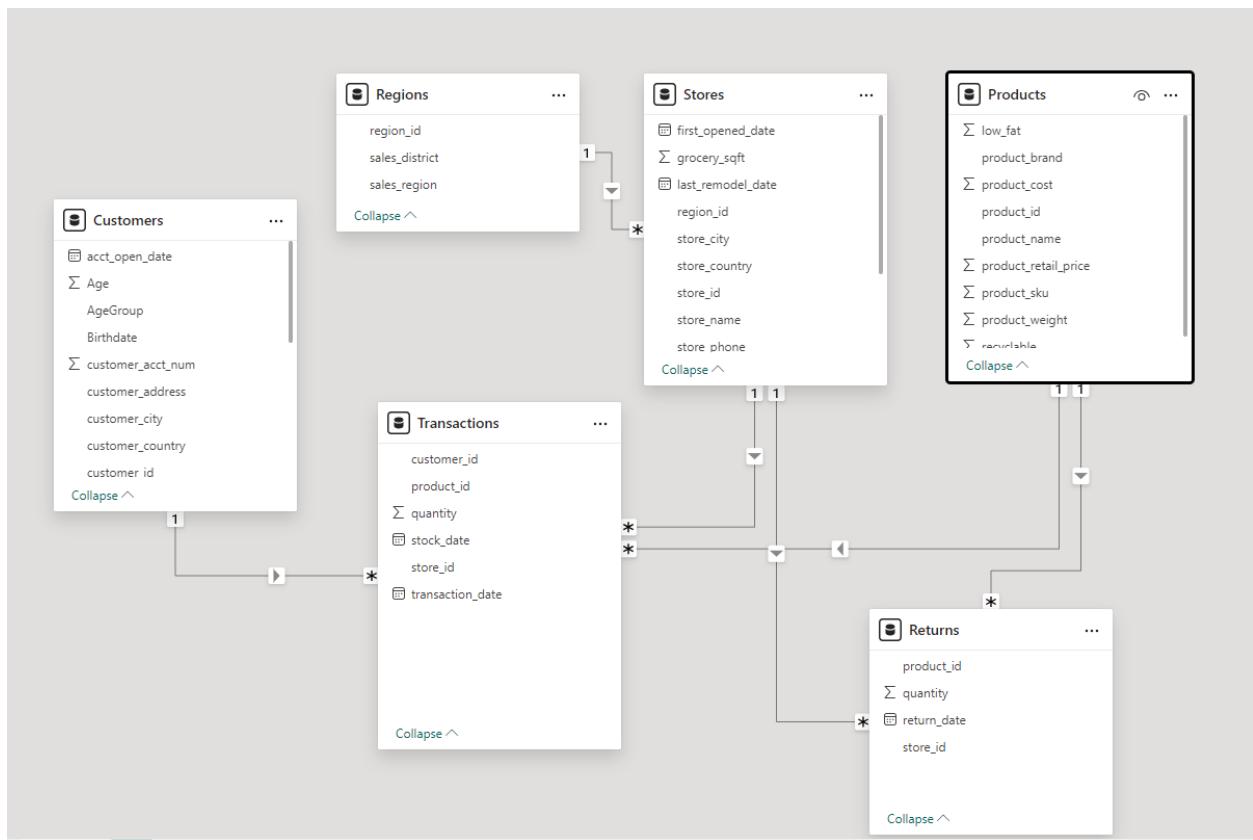


A screenshot of the Power BI Data view. The left pane shows a tree structure with nodes for Customers, Products, Regions, Returns, Stores, and Transactions. The 'Transactions' node is currently selected, indicated by a green selection bar at the bottom of its row.

Create Data Model

You have two fact tables Returns and Transactions

You have Stores and Products belongs to the two fact tables.



Create Date Table

The screenshot shows the Power BI Data Model view with the following details:

- Structure** tab selected.
- DateTable** is the active table.
- DAX** pane on the left shows the formula: `1 DateTable = CALENDARAUTO()`.
- Date** column data preview:

Date
1/1/1910 12:00:00 AM
1/2/1910 12:00:00 AM
1/3/1910 12:00:00 AM
1/4/1910 12:00:00 AM
1/5/1910 12:00:00 AM
1/6/1910 12:00:00 AM
1/7/1910 12:00:00 AM
1/8/1910 12:00:00 AM
1/9/1910 12:00:00 AM
1/10/1910 12:00:00 AM
1/11/1910 12:00:00 AM
1/12/1910 12:00:00 AM
1/13/1910 12:00:00 AM
1/14/1910 12:00:00 AM

Format and other columns

Structure Formatting

1 Year = YEAR(DateTable[Date])

Date Year

Date	Year
01/01/1910	1910
02/01/1910	1910
03/01/1910	1910
04/01/1910	1910
05/01/1910	1910
06/01/1910	1910
07/01/1910	1910
08/01/1910	1910
09/01/1910	1910
10/01/1910	1910
11/01/1910	1910

Structure Formatting

1 MonthNumber = MONTH(DateTable[Date])

Date Year MonthNumber

Date	Year	MonthNumber
01/01/1910	1910	1
02/01/1910	1910	1
03/01/1910	1910	1
04/01/1910	1910	1
05/01/1910	1910	1
06/01/1910	1910	1
07/01/1910	1910	1
08/01/1910	1910	1
09/01/1910	1910	1

Structure Formatting Properties

`1 MonthName = FORMAT(DateTable[Date], "MMMM")`

Date	Year	MonthNumber	MonthName
01/01/1910	1910	1	January
02/01/1910	1910	1	January
03/01/1910	1910	1	January
04/01/1910	1910	1	January
05/01/1910	1910	1	January
06/01/1910	1910	1	January
07/01/1910	1910	1	January
08/01/1910	1910	1	January
09/01/1910	1910	1	January
10/01/1910	1910	1	January
11/01/1910	1910	1	January
12/01/1910	1910	1	January
13/01/1910	1910	1	January
14/01/1910	1910	1	January

Structure Formatting Properties column▼ Sort

`1 Quarter = DateTable[Year] & " Qtr" & QUARTER(DateTable[Date])`

Date	Year	MonthNumber	MonthName	Quarter
01/01/1910	1910	1	January	1910 Qtr1
02/01/1910	1910	1	January	1910 Qtr1
03/01/1910	1910	1	January	1910 Qtr1
04/01/1910	1910	1	January	1910 Qtr1
05/01/1910	1910	1	January	1910 Qtr1
06/01/1910	1910	1	January	1910 Qtr1
07/01/1910	1910	1	January	1910 Qtr1
08/01/1910	1910	1	January	1910 Qtr1
09/01/1910	1910	1	January	1910 Qtr1
10/01/1910	1910	1	January	1910 Qtr1
11/01/1910	1910	1	January	1910 Qtr1
12/01/1910	1910	1	January	1910 Qtr1

Select MonthNumber Column and make it sorted by MonthNumber

MonthName

Text

Format Text

\$ %

Auto

Summarization Don't summarize

Data category Uncategorized

Sort by column

Data groups

MonthName

Date

MonthNumber

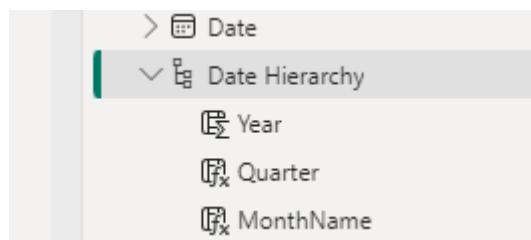
Quarter

Year

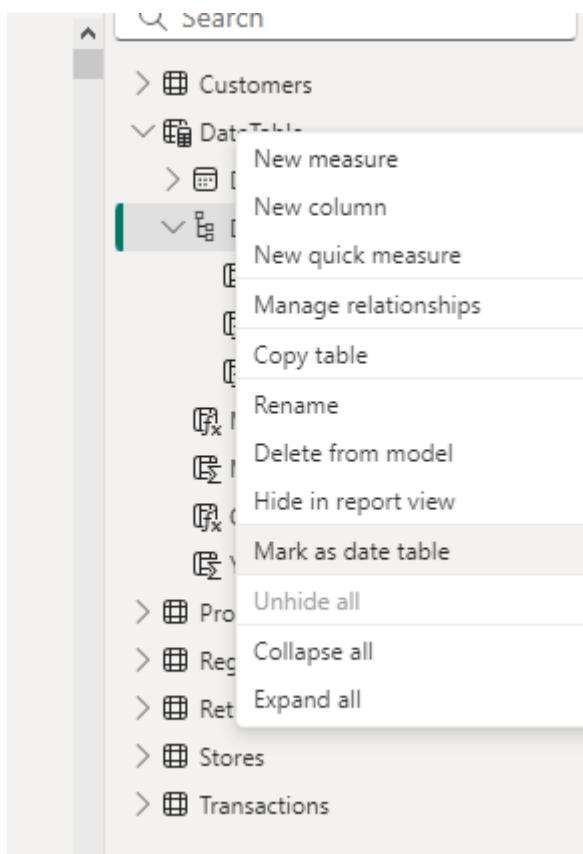
1 MonthName = FORMAT(DateTable[Date], "MMMM")

	Year	MonthNumber	MonthName	Quarter
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1
'1910	1910	1	January	1910 Qtr1

Create Date Hierarchy



Make the DataTable Date table for the Model



Mark as a date table

X

To enable the creation of date-related visuals, tables and quick measures using this table's date data, mark it as a date table.

Keep in mind any built-in date tables that are already associated with this table will be removed. Visuals or DAX expressions referring to them may break. [Learn more](#)

Mark as a date table



Choose a date column

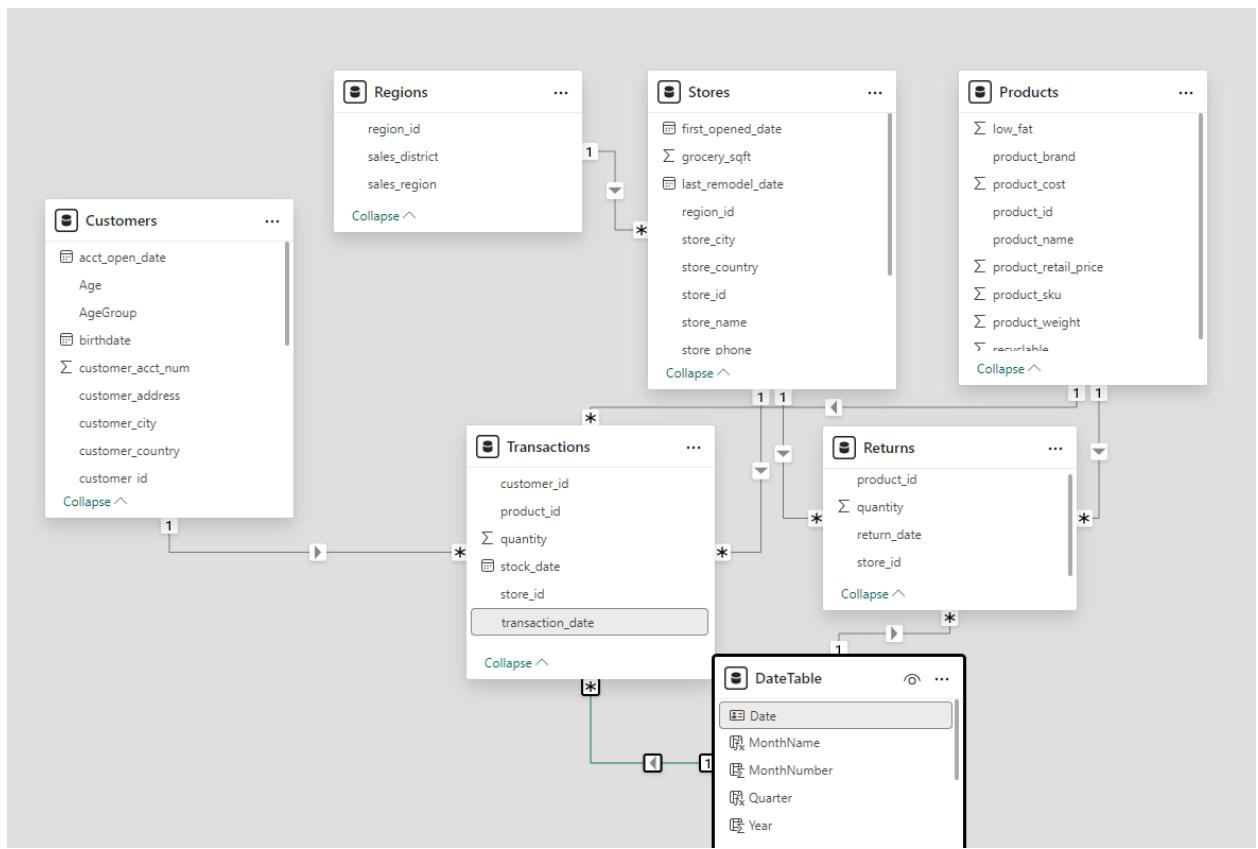
Date

✓ Validated successfully

Save

Cancel

Create Relationship with transaction table and Returns table



Create Columns to Calculate Sales in Transaction Table

Structure		Formatting		Properties		Sort		Groups		Relationships	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	Product_Cost = RELATED(Products[product_cost])								
transaction_date	stock_date	product_id	customer_id	store_id	quantity	Product_Cost					
Sunday, July 27, 1997	Friday, July 25, 1997	721	1954	13	3	0.7					
Sunday, July 27, 1997	Friday, July 25, 1997	1374	4342	13	3	1.42					
Sunday, July 27, 1997	Friday, July 25, 1997	832	545	13	3	1.1					
Sunday, July 27, 1997	Friday, July 25, 1997	690	6686	13	3	0.52					
Sunday, July 27, 1997	Friday, July 25, 1997	952	6686	13	3	0.99					
Sunday, July 27, 1997	Friday, July 25, 1997	497	5855	13	3	0.64					
Sunday, July 27, 1997	Friday, July 25, 1997	1339	5610	13	3	0.5					
Sunday, July 27, 1997	Friday, July 25, 1997	1156	5610	13	3	0.8					

Structure Formatting Properties Sort Groups Re

1 Line_Cost = Transactions[Prodcut_Cost] * Transactions[quantity]								
transaction_date	stock_date	product_id	customer_id	store_id	quantity	Prodcut_Cost	Line_Cost	
Sunday, July 27, 1997	Friday, July 25, 1997	721	1954	13	3	0.7	2.1	
Sunday, July 27, 1997	Friday, July 25, 1997	1374	4342	13	3	1.42	4.26	
Sunday, July 27, 1997	Friday, July 25, 1997	832	545	13	3	1.1	3.3	
Sunday, July 27, 1997	Friday, July 25, 1997	690	6686	13	3	0.52	1.56	
Sunday, July 27, 1997	Friday, July 25, 1997	952	6686	13	3	0.99	2.97	
Sunday, July 27, 1997	Friday, July 25, 1997	497	5855	13	3	0.64	1.92	
Sunday, July 27, 1997	Friday, July 25, 1997	1339	5610	13	3	0.5	1.5	
Sunday, July 27, 1997	Friday, July 25, 1997	1156	5610	13	3	0.8	2.4	
Sunday, July 27, 1997	Friday, July 25, 1997	427	7496	13	3	0.79	2.37	
Sunday, July 27, 1997	Friday, July 25, 1997	1156	950	13	3	0.8	2.4	
Sunday, July 27, 1997	Friday, July 25, 1997	464	9495	13	3	1.74	5.22	
Sunday, July 27, 1997	Friday, July 25, 1997	1374	790	13	3	1.42	4.26	
Sunday, July 27, 1997	Friday, July 25, 1997	1550	9286	13	3	0.83	2.49	
Sunday, July 27, 1997	Friday, July 25, 1997	765	1468	13	3	0.77	2.31	
Sunday, July 27, 1997	Friday, July 25, 1997	765	1954	13	3	0.77	2.31	
Sunday, July 27, 1997	Friday, July 25, 1997	106	1954	13	3	1.39	4.17	

Structure Formatting Properties Sort Groups Relationships Calculations

1 Product_Price = RELATED(Products[product_retail_price])								
transaction_date	stock_date	product_id	customer_id	store_id	quantity	Prodcut_Cost	Line_Cost	Product_Price
Sunday, July 27, 1997	Friday, July 25, 1997	721	1954	13	3	0.7	2.1	2.26
Sunday, July 27, 1997	Friday, July 25, 1997	1374	4342	13	3	1.42	4.26	2.89
Sunday, July 27, 1997	Friday, July 25, 1997	832	545	13	3	1.1	3.3	3.24
Sunday, July 27, 1997	Friday, July 25, 1997	690	6686	13	3	0.52	1.56	1.44
Sunday, July 27, 1997	Friday, July 25, 1997	952	6686	13	3	0.99	2.97	2.91
Sunday, July 27, 1997	Friday, July 25, 1997	497	5855	13	3	0.64	1.92	1.87
Sunday, July 27, 1997	Friday, July 25, 1997	1339	5610	13	3	0.5	1.5	1.31
Sunday, July 27, 1997	Friday, July 25, 1997	1156	5610	13	3	0.8	2.4	1.82
Sunday, July 27, 1997	Friday, July 25, 1997	427	7496	13	3	0.79	2.37	2.14
Sunday, July 27, 1997	Friday, July 25, 1997	1156	950	13	3	0.8	2.4	1.82

Structure Formatting Properties Sort Groups Relationships Calculations

1 Line_Price = Transactions[Product_Price] * Transactions[quantity]								
transaction_date	stock_date	product_id	customer_id	store_id	quantity	Prodcut_Cost	Line_Cost	Product_Price
Sunday, July 27, 1997	Friday, July 25, 1997	721	1954	13	3	0.7	2.1	2.26
Sunday, July 27, 1997	Friday, July 25, 1997	1374	4342	13	3	1.42	4.26	2.89
Sunday, July 27, 1997	Friday, July 25, 1997	832	545	13	3	1.1	3.3	3.24
Sunday, July 27, 1997	Friday, July 25, 1997	690	6686	13	3	0.52	1.56	1.44
Sunday, July 27, 1997	Friday, July 25, 1997	952	6686	13	3	0.99	2.97	2.91
Sunday, July 27, 1997	Friday, July 25, 1997	497	5855	13	3	0.64	1.92	1.87
Sunday, July 27, 1997	Friday, July 25, 1997	1339	5610	13	3	0.5	1.5	1.31

Structure Formatting Properties Sort Groups Relationships Calculations

1 Line_Profit = Transactions[Line_Price] - Transactions[Line_Cost]								
transaction_date	stock_date	product_id	customer_id	store_id	quantity	Prodcut_Cost	Line_Cost	Product_Price
Sunday, July 27, 1997	Friday, July 25, 1997	721	1954	13	3	0.7	2.1	2.26
Sunday, July 27, 1997	Friday, July 25, 1997	1374	4342	13	3	1.42	4.26	2.89
Sunday, July 27, 1997	Friday, July 25, 1997	832	545	13	3	1.1	3.3	3.24
Sunday, July 27, 1997	Friday, July 25, 1997	690	6686	13	3	0.52	1.56	1.44
Sunday, July 27, 1997	Friday, July 25, 1997	952	6686	13	3	0.99	2.97	2.91
Sunday, July 27, 1997	Friday, July 25, 1997	497	5855	13	3	0.64	1.92	1.87
Sunday, July 27, 1997	Friday, July 25, 1997	1339	5610	13	3	0.5	1.5	1.31
Sunday, July 27, 1997	Friday, July 25, 1997	1156	5610	13	3	0.8	2.4	1.82
Sunday, July 27, 1997	Friday, July 25, 1997	427	7496	13	3	0.79	2.37	2.14
Sunday, July 27, 1997	Friday, July 25, 1997	1156	950	13	3	0.8	2.4	1.82
Sunday, July 27, 1997	Friday, July 25, 1997	464	9495	13	3	1.74	5.22	5.56
Sunday, July 27, 1997	Friday, July 25, 1997	1374	790	13	3	1.42	4.26	4.41

Create Table “Measure Table”

Create Measures for Sales

Structure	Formatting	Properties	
<input type="checkbox"/> X ✓ 1 Total Sales = SUM(Transactions[Line_Price])			
<input type="checkbox"/>			
Structure	Formatting	Properties	
<input type="checkbox"/> X ✓ 1 Total Profit = SUM(Transactions[Line_Profit])			
<input type="checkbox"/>			
Structure	Formatting	P	
<input checked="" type="checkbox"/> 1 Total Cost = SUM(Transactions[Line_Cost])			
<input type="checkbox"/>			
Structure	Formatting	Properties	Calculations
<input type="checkbox"/> 1 Sales Last Years = CALCULATE([Total Sales], SAMEPERIODLASTYEAR(DateTable[Date]))			
<input type="checkbox"/>			
Structure	Formatting	Properties	Calculations
<input type="checkbox"/> 1 Sales Year to date = CALCULATE([Total Sales], DATESYTD(DateTable[Date]))			
<input type="checkbox"/>			
Structure	Formatting	Properties	Calculations
<input type="checkbox"/> 1 Sales Month to date = CALCULATE([Total Sales], DATESMTD(DateTable[Date]))			
<input type="checkbox"/>			

Create Report Pages

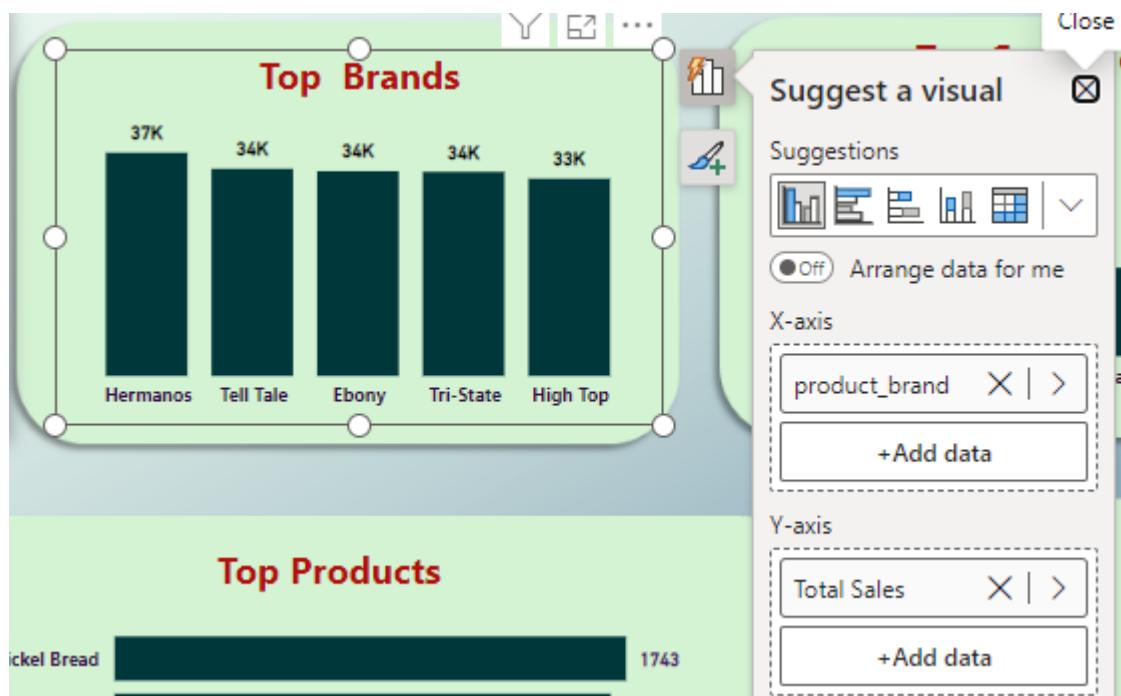
Create 4pages : Sales overview, sales in Regions Demographic analysis and conclusion

Sales Overview Page

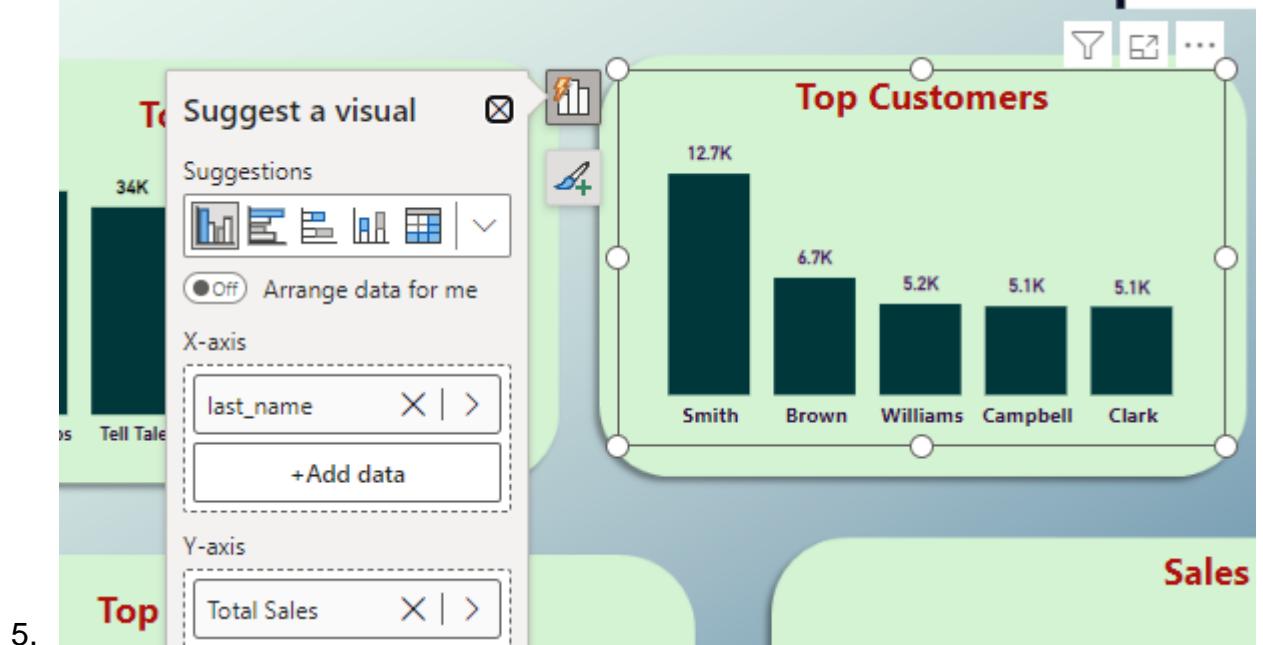
1. Create Two Cards with total sales and total profits

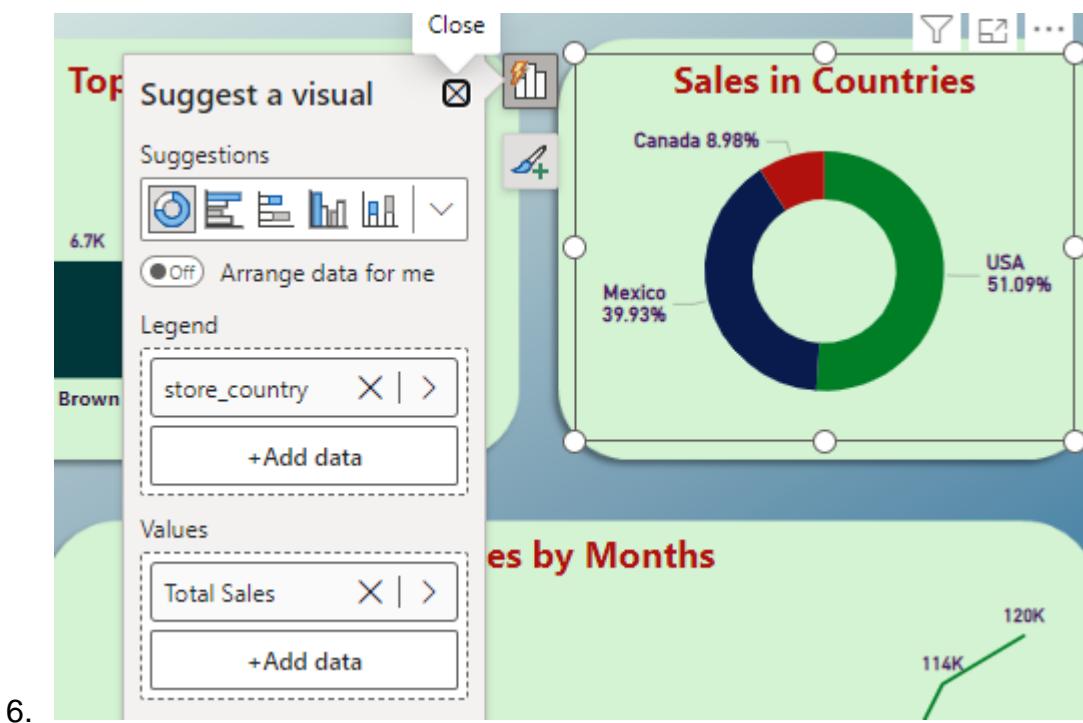


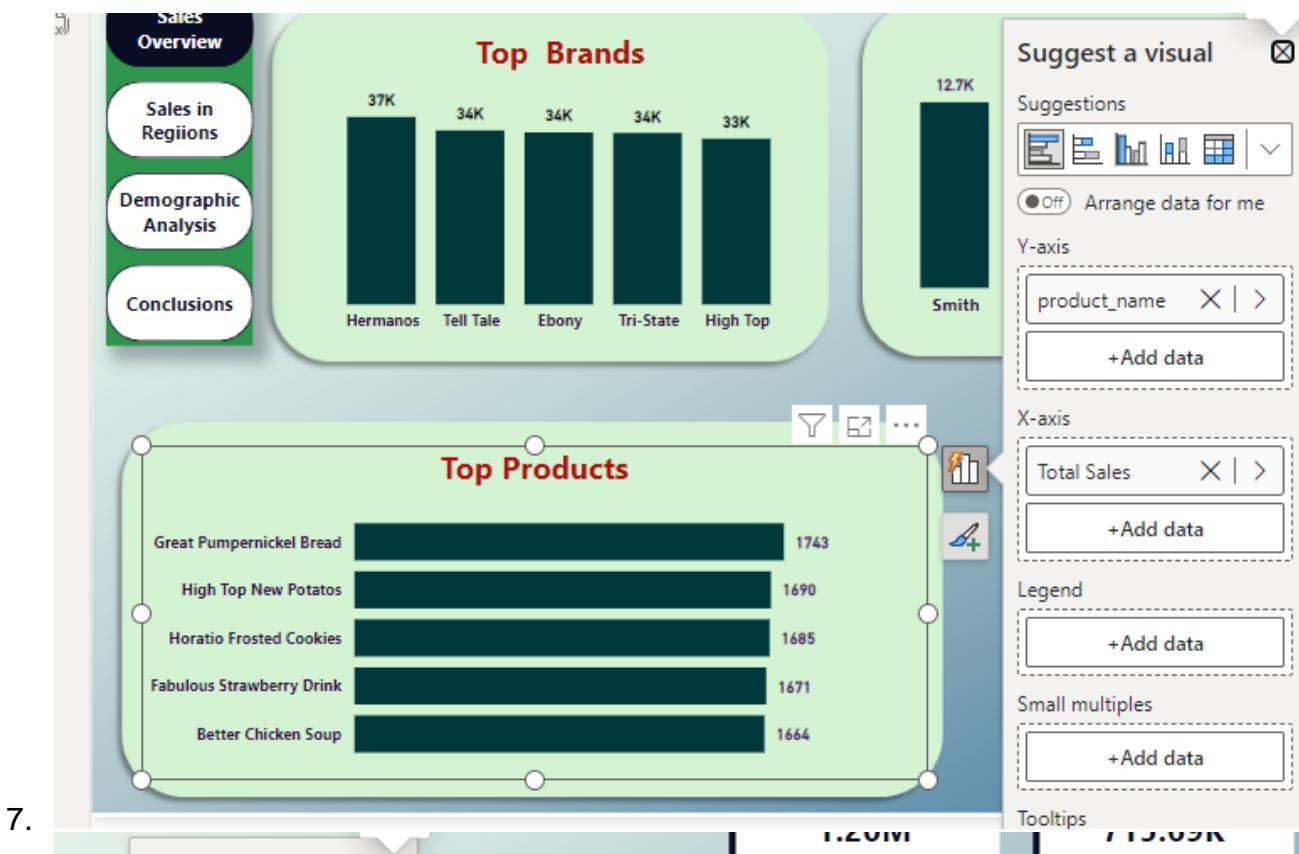
2. Create Top Brand column chart and filter it for Top 5



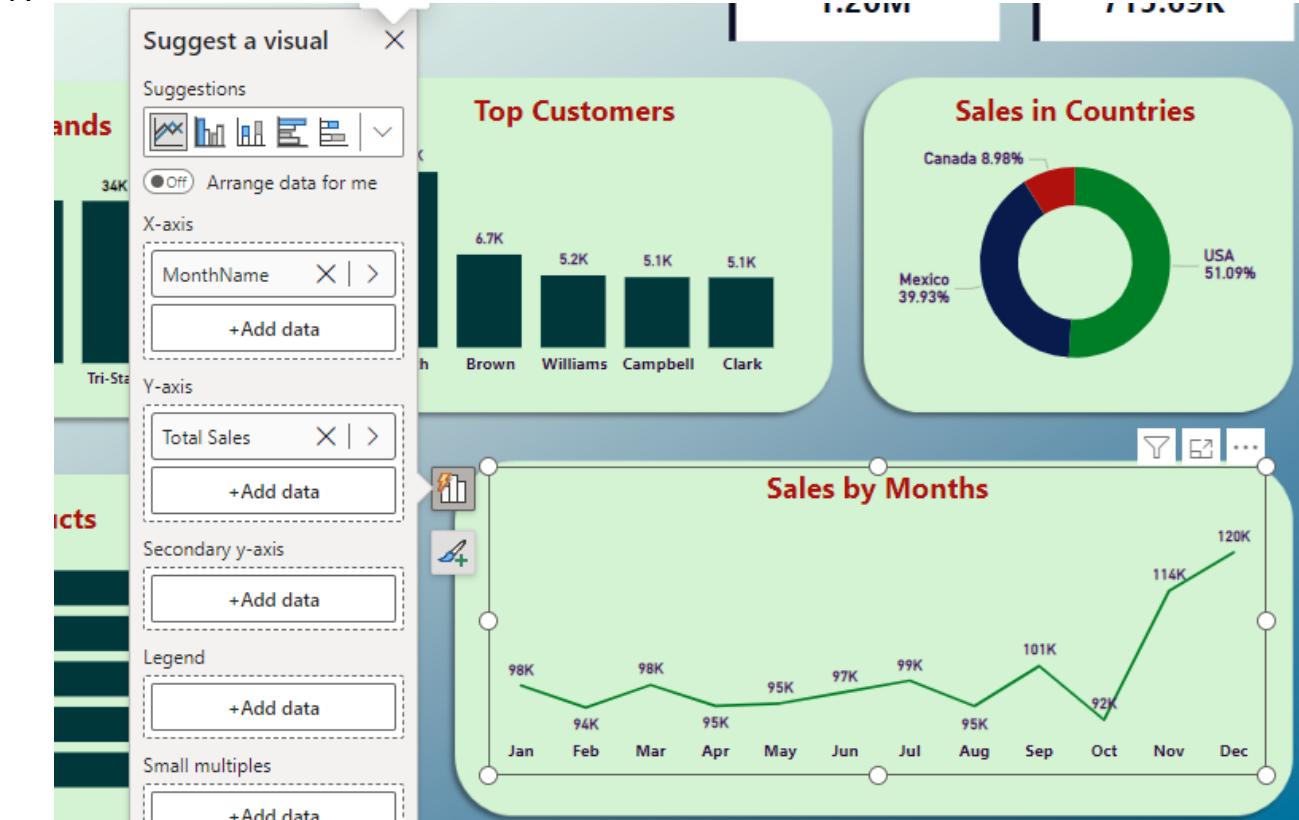
- 3.
4. Create Top Customers





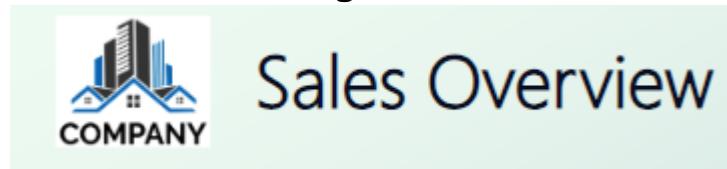


7.



8.

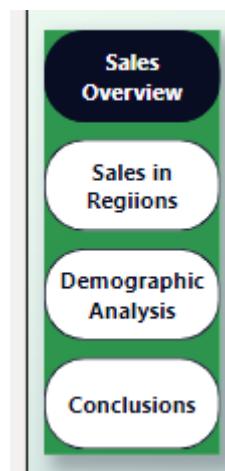
Create Title and logo



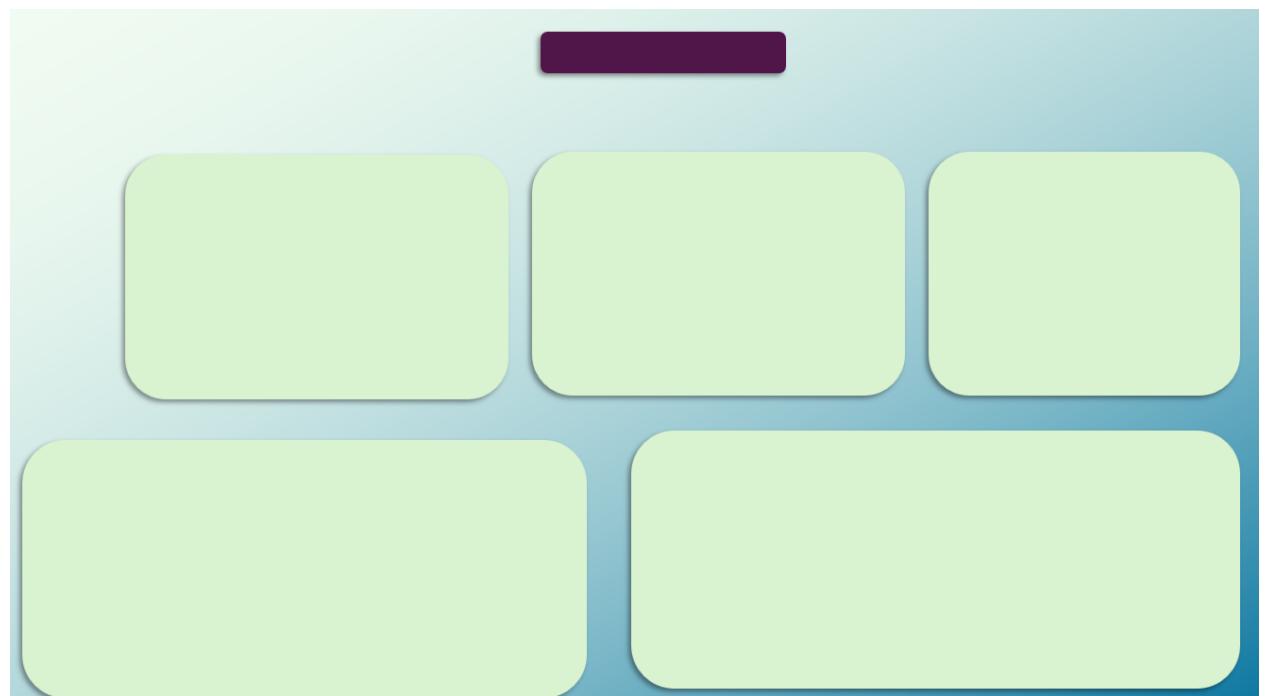
Create Year slicer



Create Navigation buttons and copy to the other pages



Use file BG1.png in the accompanied files as your background of the page

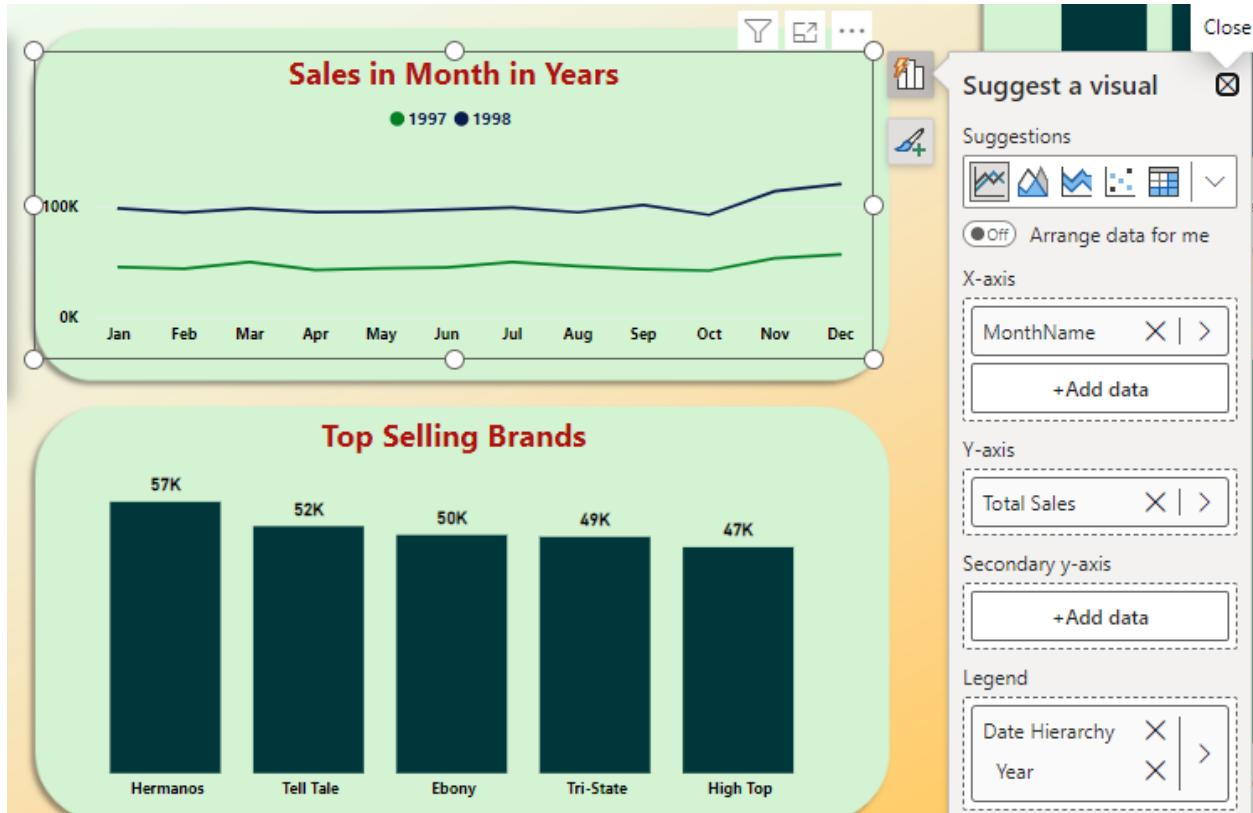


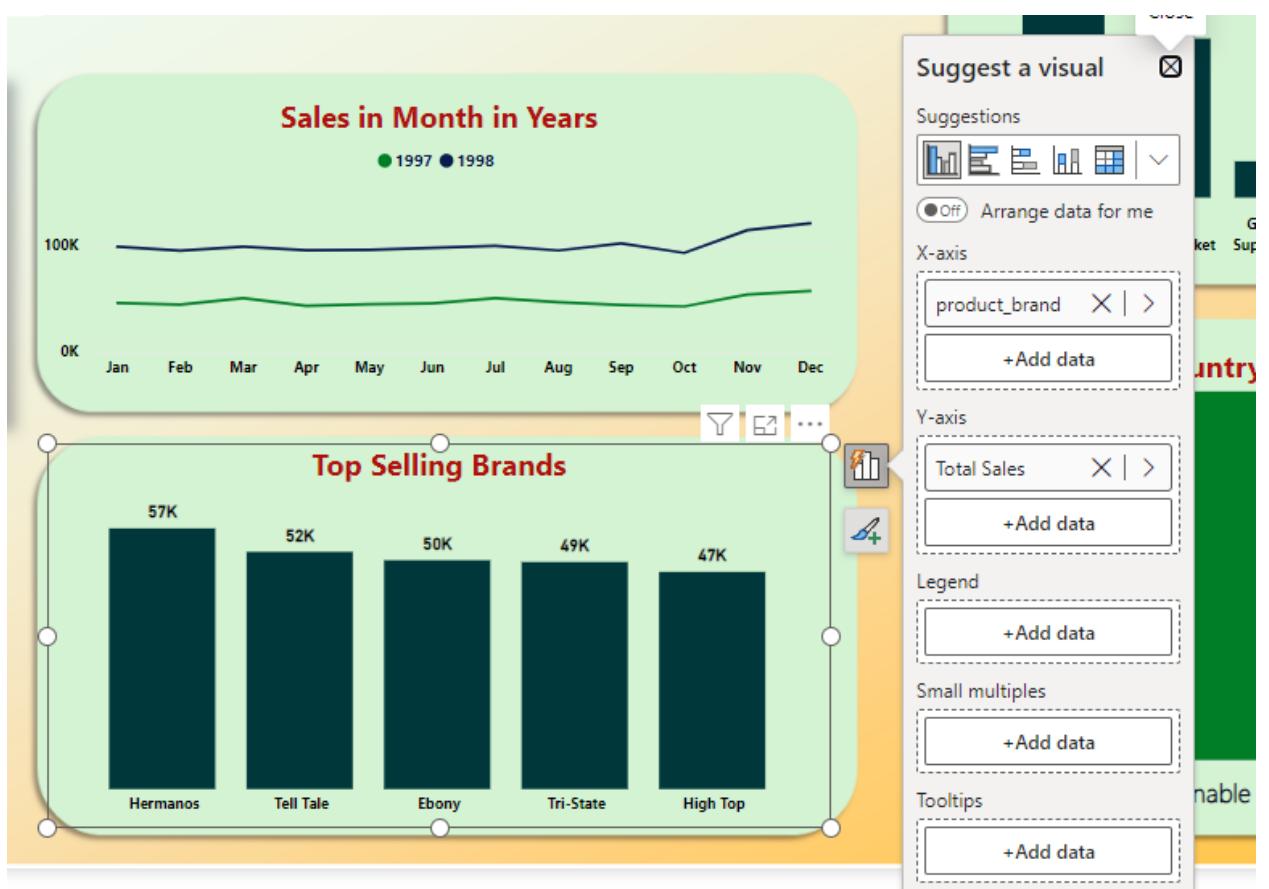
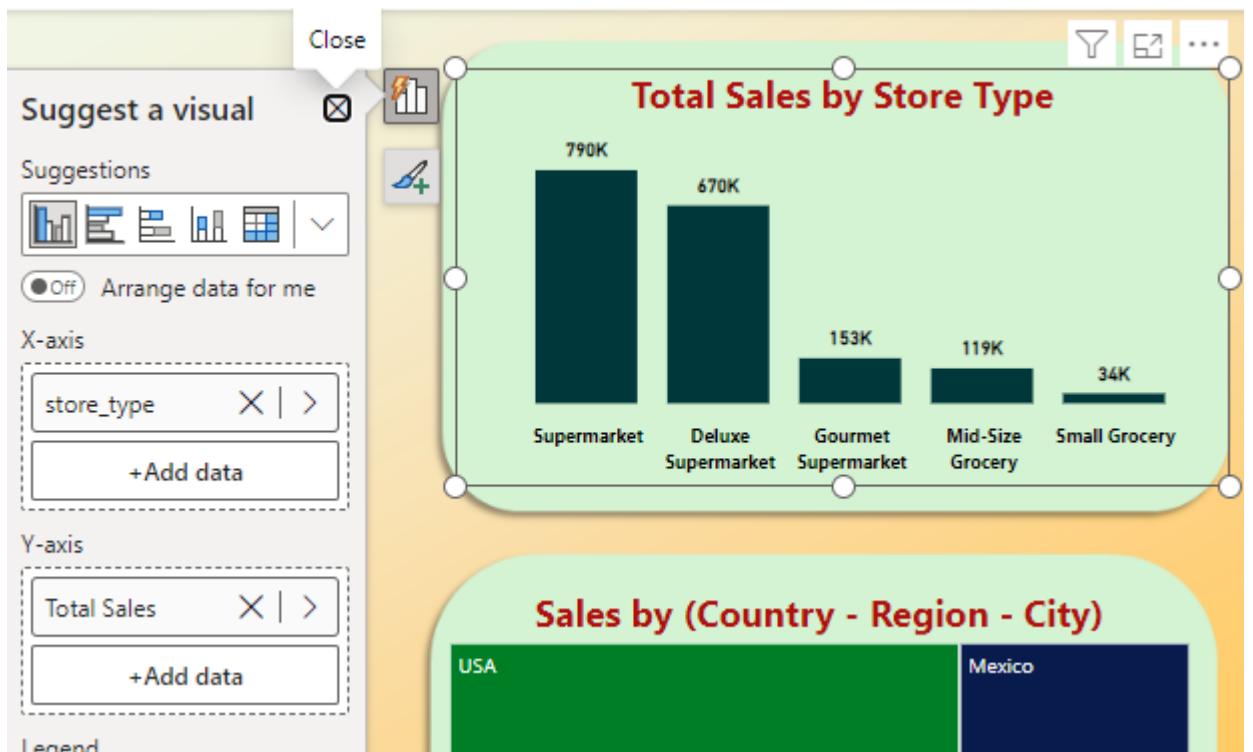
Your page should look like this

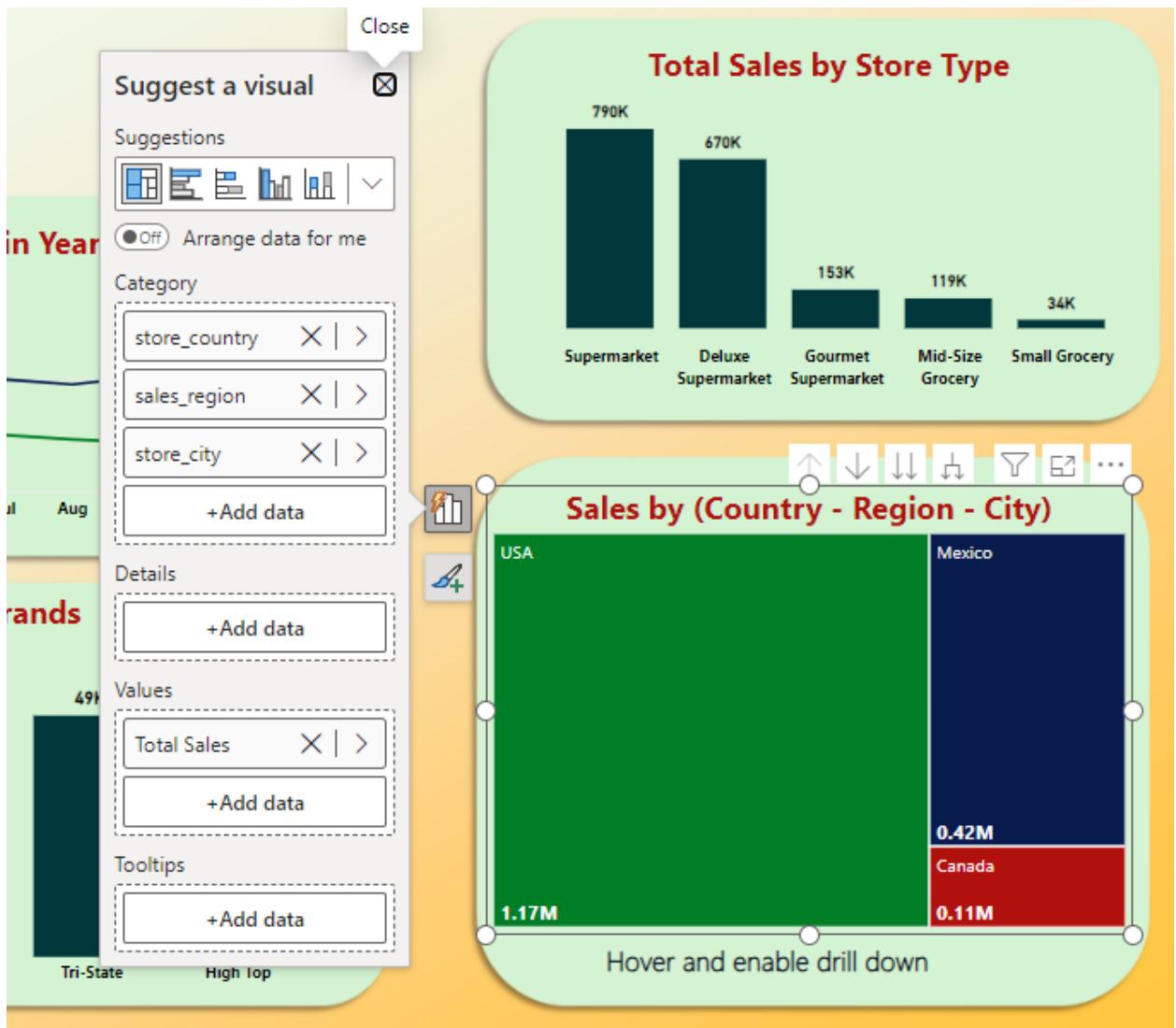


Sales in Regions Page

Create the following charts

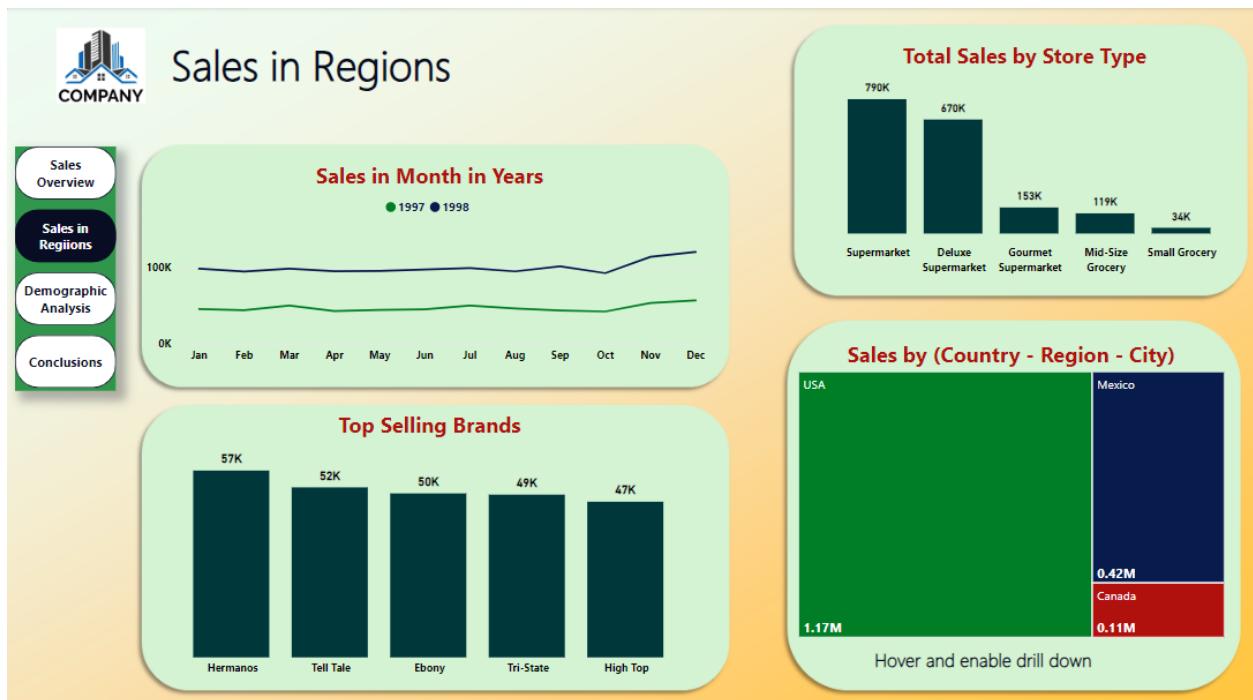






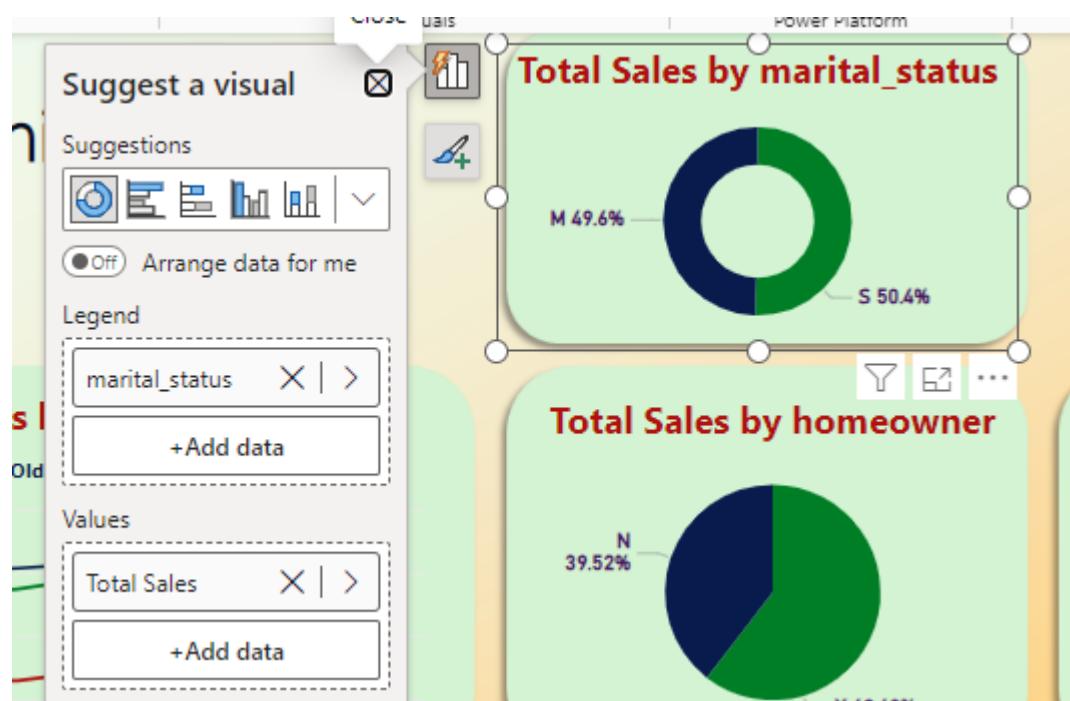
Use background BG2.png

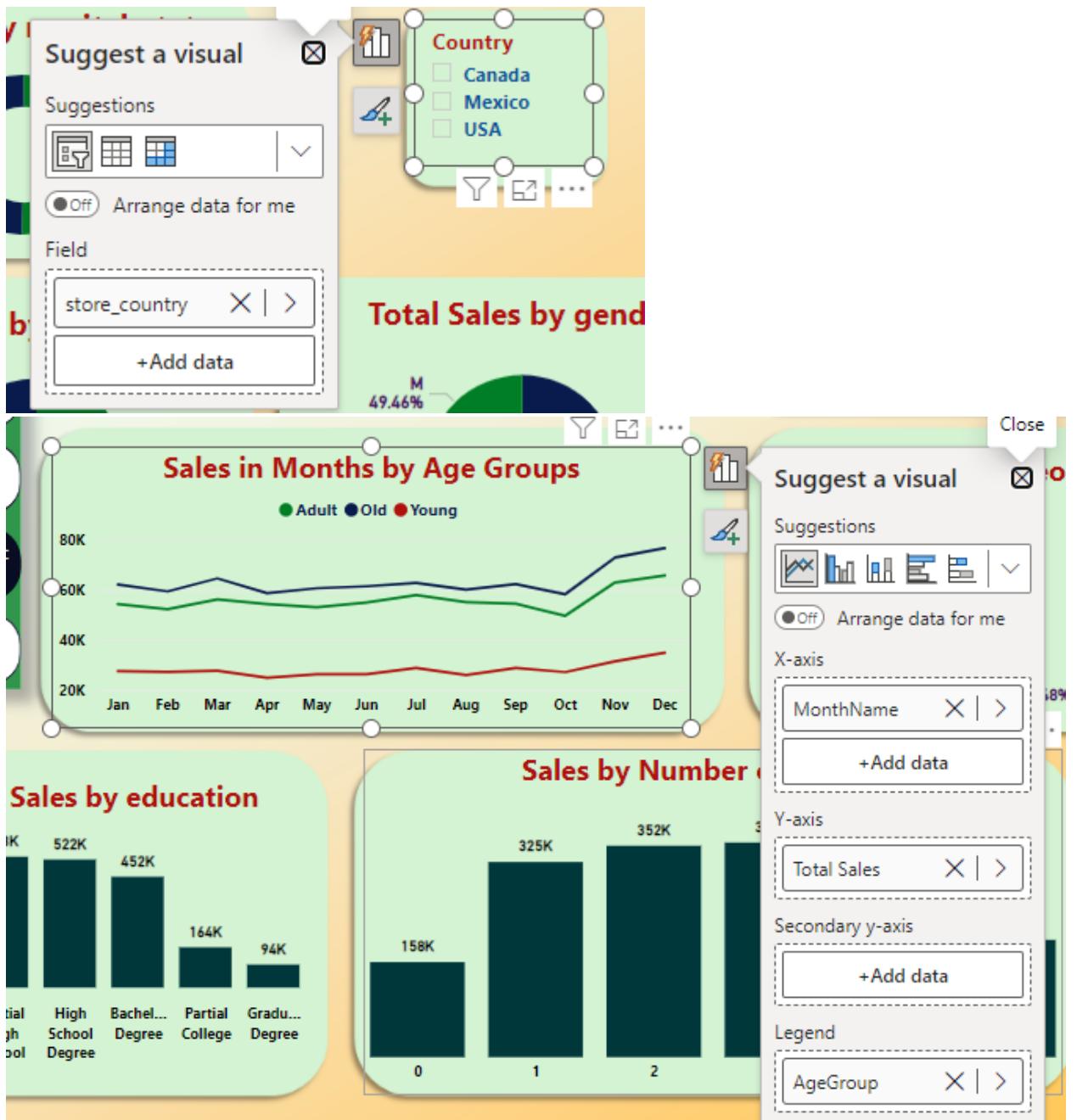
Your page should look like this

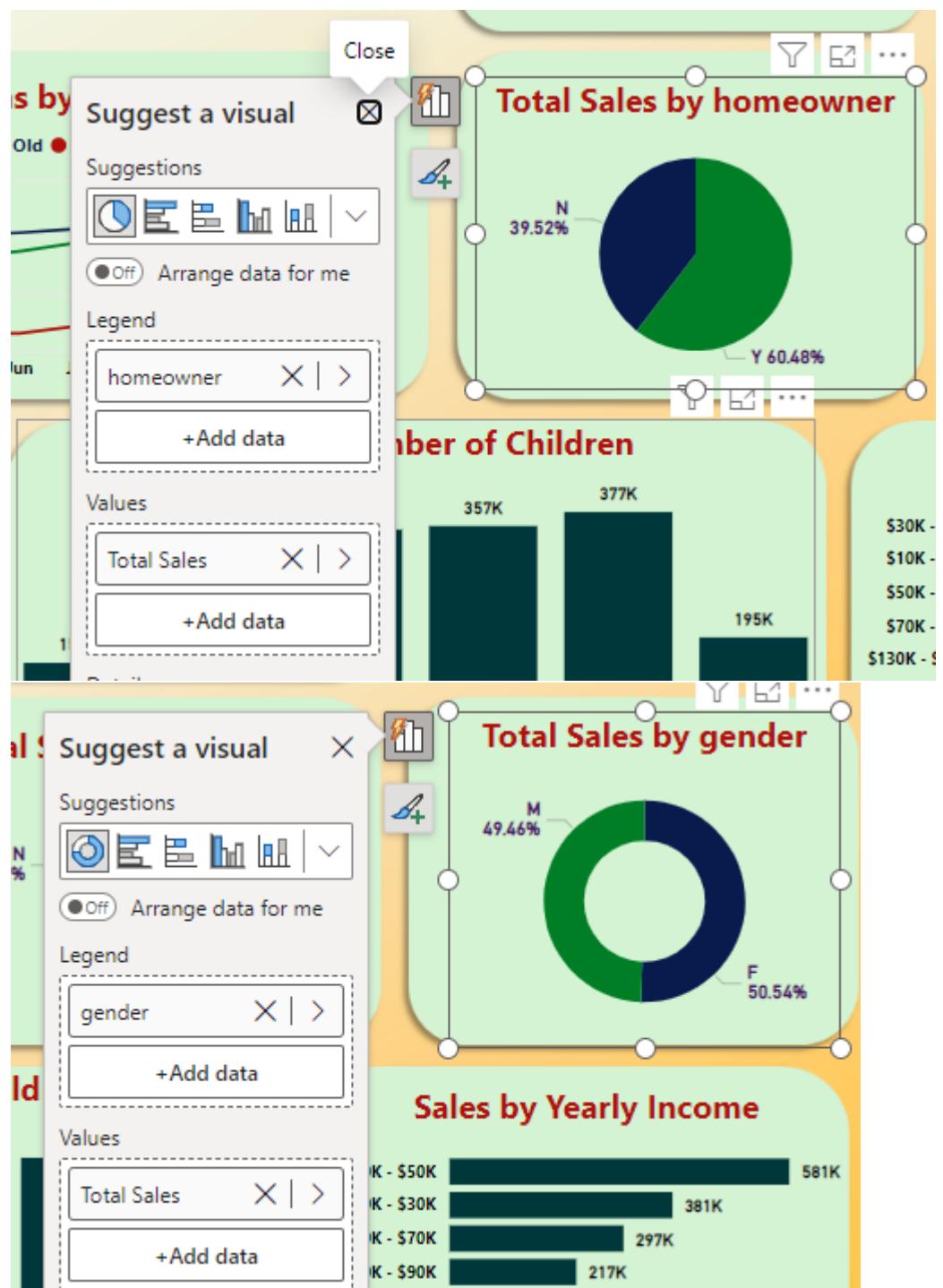


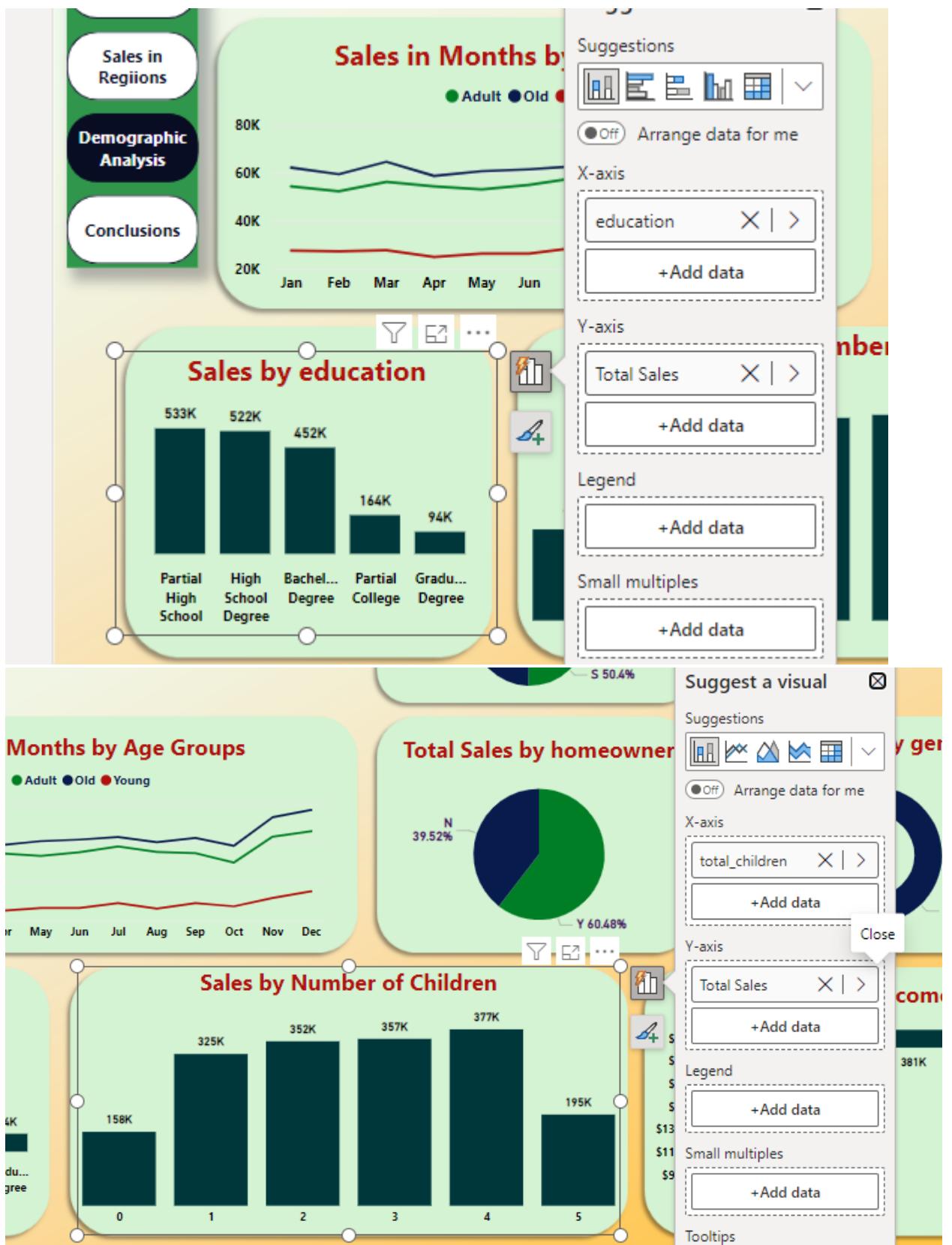
Page Demographic analysis

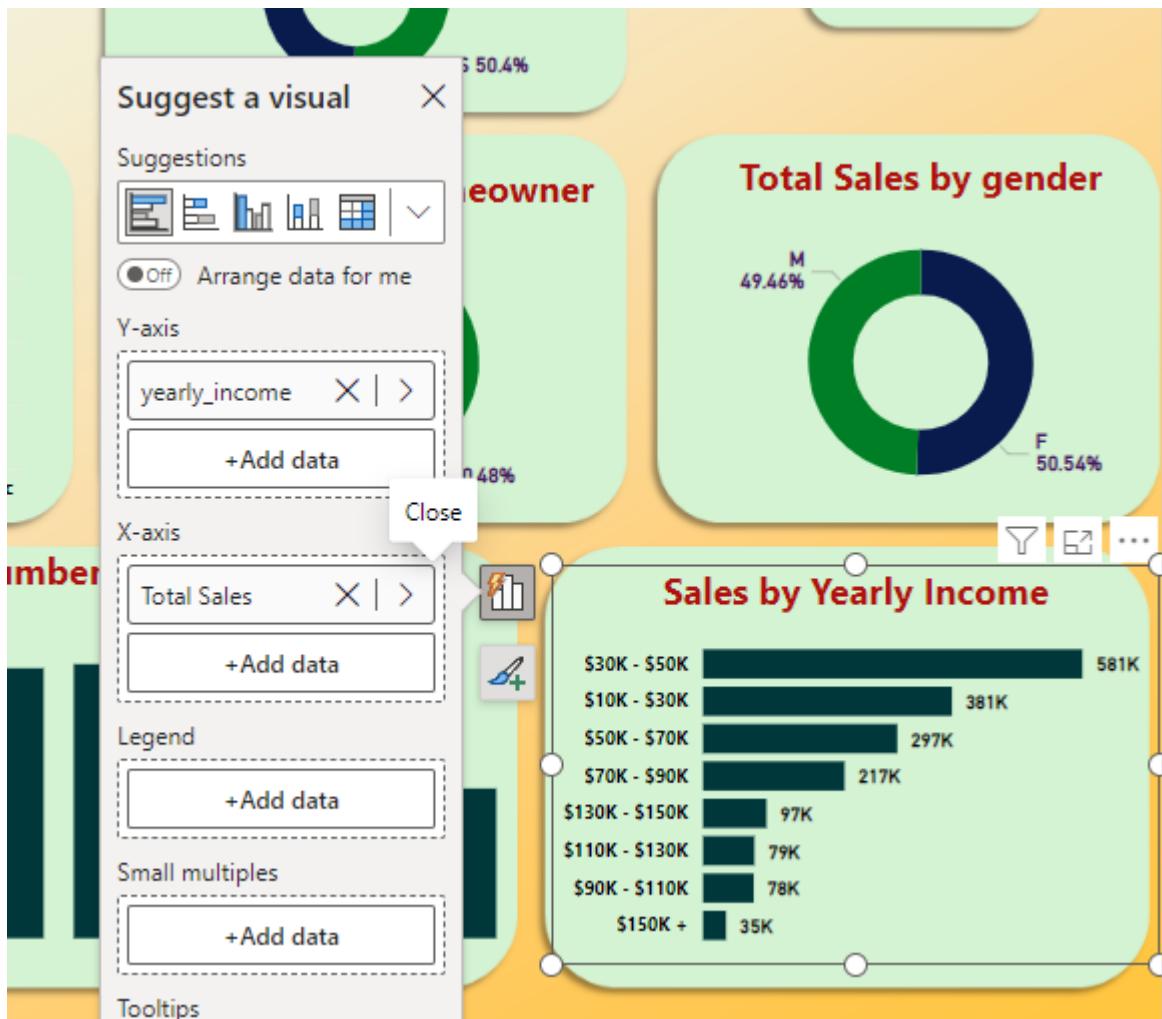
Create the following charts





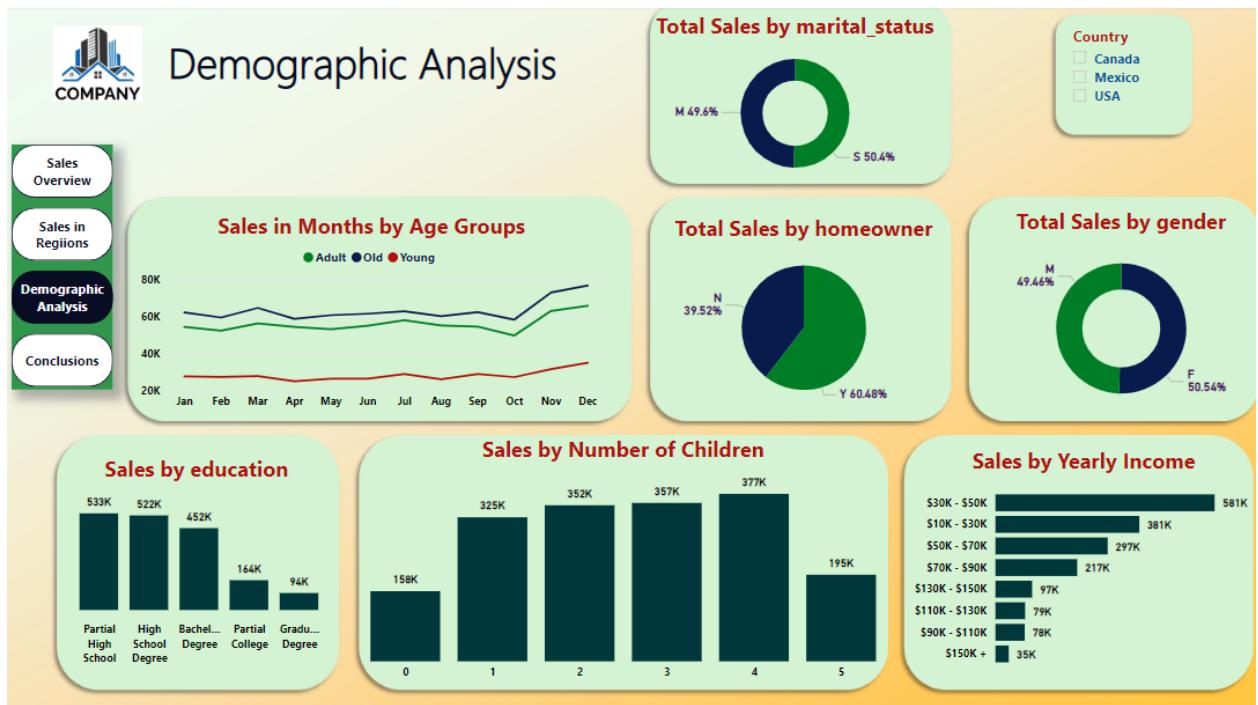






Use BG3.ping as background

Your page should look like this



Page Conclusion

Insert 4images for Pages you have in the files

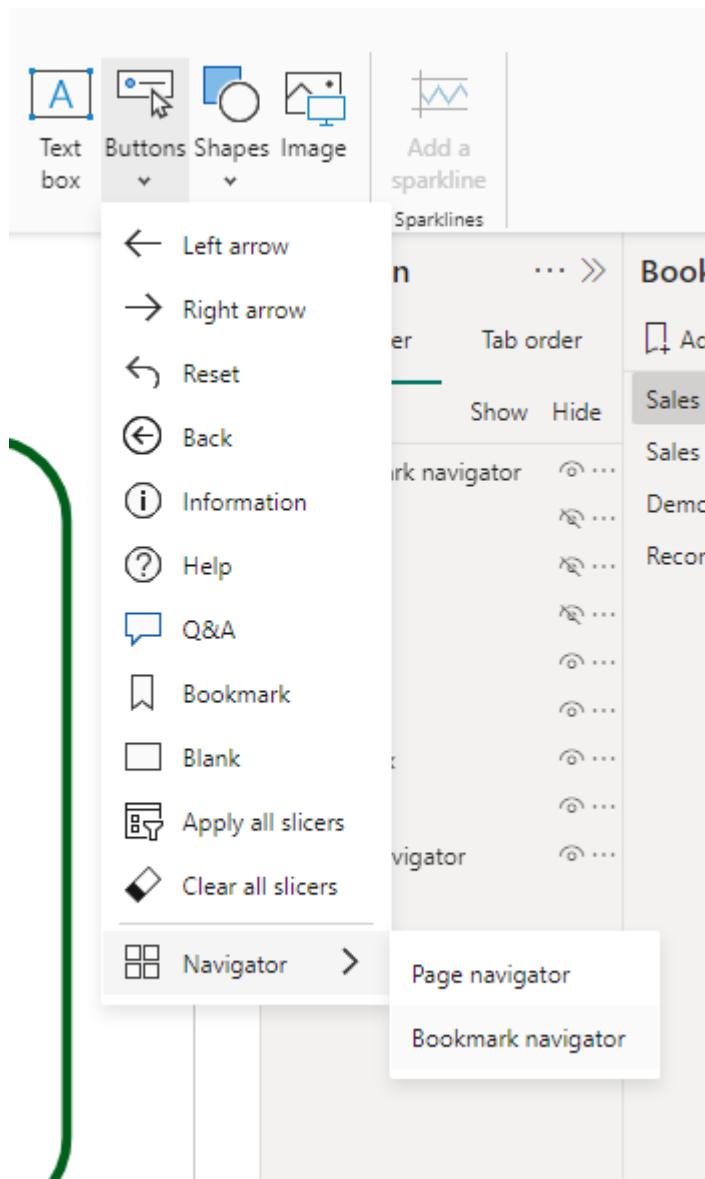
Page1 , Page2 ,Page3 and Page4

Rename the pages in the selection pane

Create bookmarks to show and hide pages

Selection		Bookmarks	
Layer order	Tab order	Add	View
Show	Hide	Sales Overview	
Bookmark navigator		Sales in Regions	
Page4		Demographic Analysis	
Page3		Recommendations	
Page2			
Page1			
Image			
Text box			
Frame			
Page navigator			

Insert bookmark navigator for the book marks you have



Your final page should look like this



Conclusion



Sales Overview

Sales in Regions

Demographic...

Recommendations

- High school and partial high school people are the people with high sales.
- College and those of graduate degrees have low spellings.
- People with no Children or 5 children are low in sales.
- People with income from 10-50\$ are the ones with high sales.
- High income people have less interest in our products
- Old age people are the ones interested to buy our products.
- Young people do not buy our project much.