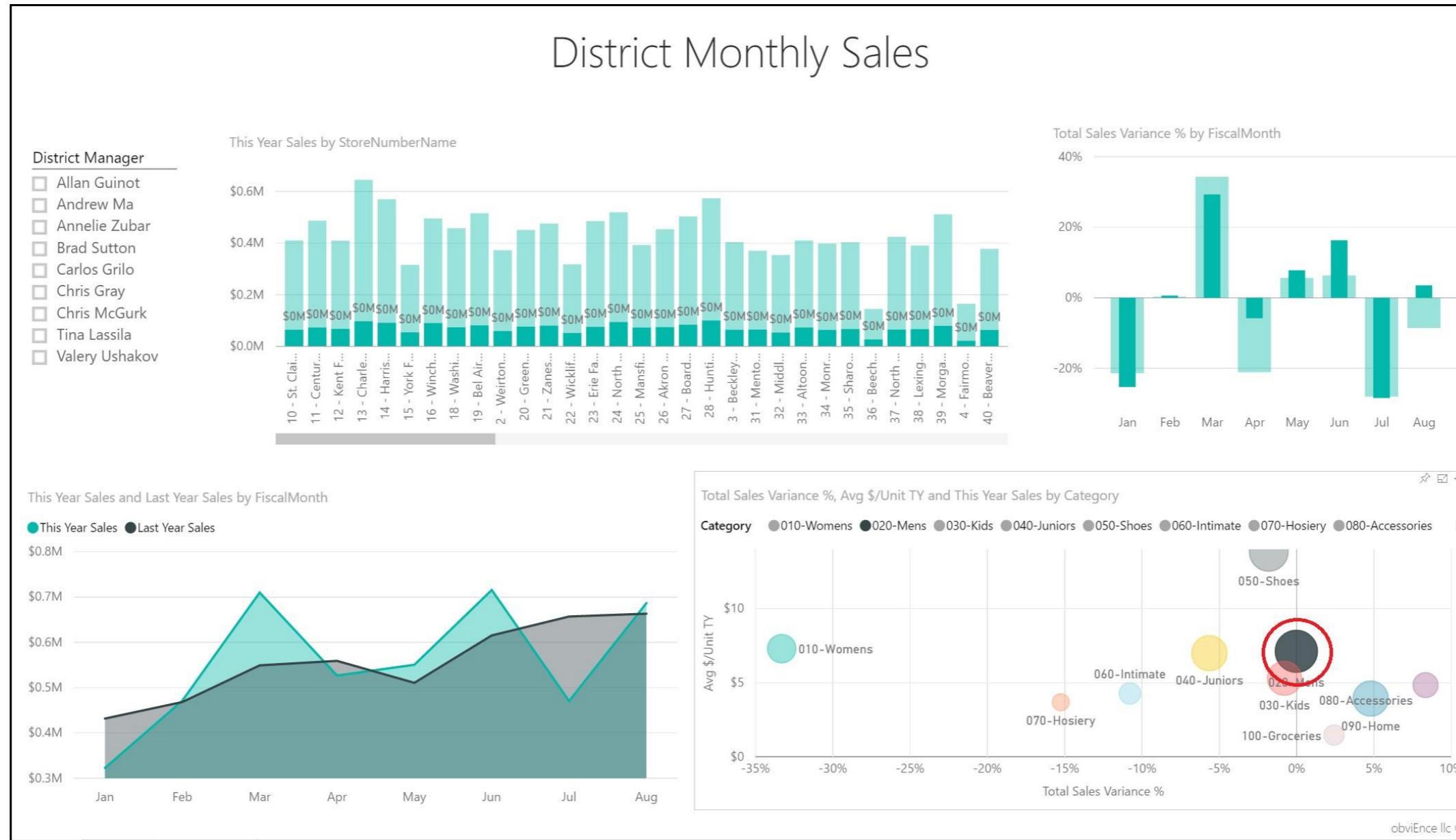


# **Introduction to Power BI**

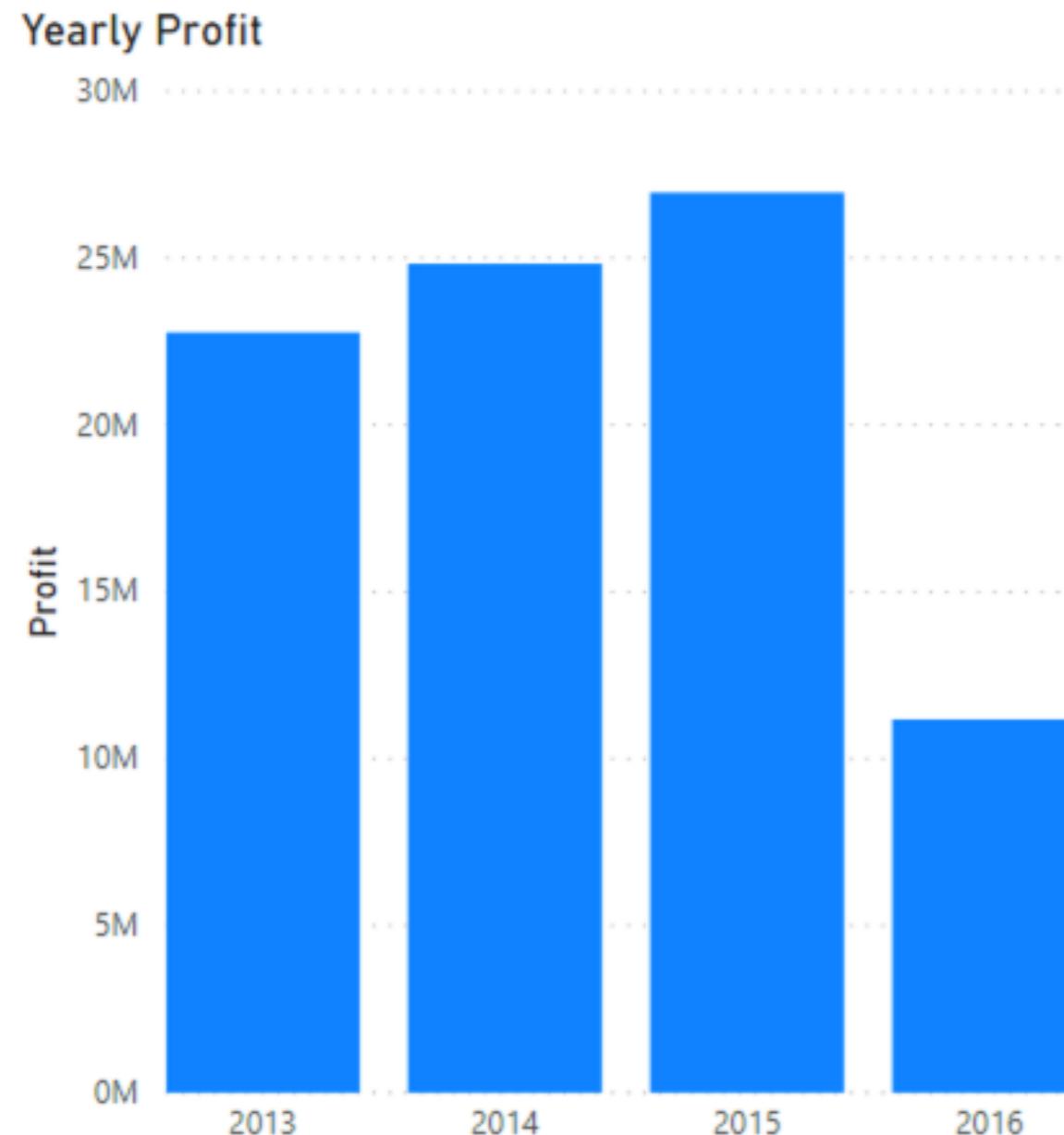
**INTRODUCTION TO POWER BI**

# What is Power BI?



<sup>1</sup> <https://docs.microsoft.com/en-us/power-bi/create-reports/sample-retail-analysis>

# Data Visualization in Power BI

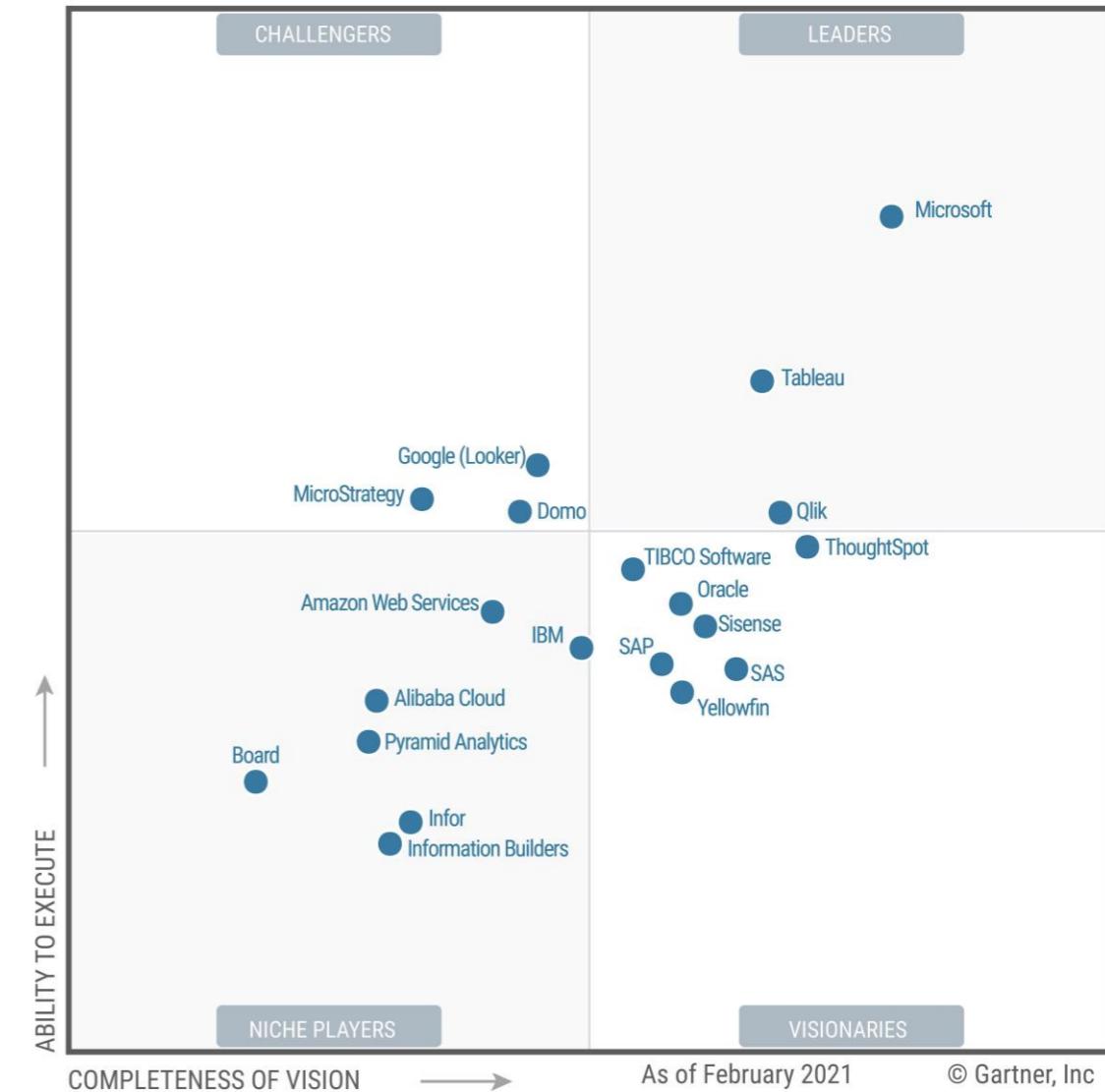


Total Excluding Tax	Tax Amount	Profit	Total Including Tax
129	19.35	67.5	148.35
258	38.7	135	296.7
301	45.15	157.5	346.15
172	25.8	90	197.8
86	12.9	45	98.9
387	58.05	202.5	445.05
387	58.05	202.5	445.05
387	58.05	202.5	445.05
344	51.6	180	395.6
344	51.6	180	395.6
344	51.6	180	395.6
344	51.6	180	395.6
344	51.6	180	395.6
258	38.7	135	296.7
258	38.7	135	296.7
258	38.7	135	296.7

# Why Power BI

- Leading BI tool according to Gartner
- Over 97% of Fortune 500 companies use Power BI
- Over 6 million customers

Figure 1: Magic Quadrant for Analytics and Business Intelligence Platforms



Source: Gartner (February 2021)

# **Power BI Components**

## **Power BI Desktop**

- Desktop version
- Data analysis and report creation tool
- Includes the Power Query Editor
- 100% free

## **Power BI service**

- Cloud-based version
- Light report editing
- Share and distribute reports

# Power BI Pro

## Exclusive features:

- Publish and share across the Power BI cloud platform
- Mobile app
- Collaborate with other Power BI users

# Power BI Interface

The image consists of three side-by-side screenshots of the Power BI interface.

- Left Screenshot (Power BI Desktop):** Shows the desktop application window. Key elements include:
  - A sidebar with "Get data" and "Recent sources" buttons highlighted with a red border.
  - A list of recent files:
    - 2.2.6ScreencastStart.pbix (C: » Users » Public » Documents)
    - 2.2.1.pbix (C: » Users » Public » Documents)
    - 2.1.6Screencaststart.pbix (C: » Users » Public » Documents)
    - 2.1.3.pbix (C: » Users » Public » Documents)
  - An "Open other reports" button at the bottom of the sidebar.
- Middle Screenshot (Sign in):** Shows the Power BI sign-in page. Key elements include:
  - A large circular user icon.
  - The text "Sign in to collaborate and share content".
  - A paragraph about Power BI Pro's collaboration features.
  - Two buttons at the bottom: "Try free" (white background) and "Sign in" (yellow background).
- Right Screenshot (Home):** Shows the Power BI home page. Key elements include:
  - A red "Close" button with a red arrow pointing to it.
  - A "WHAT'S NEW" section with a brief update.
  - A "POWER BI BLOG" section encouraging users to stay updated.
  - A "FORUMS" section linking to the Power BI Forum.
  - A "TUTORIALS" section for learning more about Power BI.

# Power BI Interface - Three views

The screenshot illustrates the Power BI Desktop interface with three main views:

- Report View (Left):** Displays a dashboard with three visualizations:
  - A large blue bar chart titled "Amount by AccountType" showing "Income" and "Expense". A red box labeled "1" highlights the chart area.
  - A bar chart titled "Amount by MonthName and ScenarioName" comparing "Actual", "Budget", and "Forecast" values across months from November to January. A red box labeled "2" highlights the chart area.
  - A table titled "ScenarioName" showing sales figures for various product categories like Audio, Cameras and camcorders, Cell phones, etc., for Actual, Budget, Forecast, and Total scenarios. A red box labeled "3" highlights the table area.
- Data View (Middle):** Located at the top of the dashboard, showing the data source structure with sections for Data, Queries, Insert, and Calculations.
- Fields View (Right):** Shows the available fields categorized into Visualizations, Fields, and Values, along with filter settings and drill-through options.

# Power BI Interface - Report View

**Report View**

The screenshot shows the Power BI Desktop application window titled "2.1.6Screencaststart - Power BI Desktop". The ribbon is visible at the top with the "Home" tab selected. The main workspace contains three visualizations:

- Amount by AccountType**: A treemap chart showing data categorized by account type.
- Amount by MonthName and ScenarioName**: A grouped bar chart comparing Actual, Budget, and Forecast values across months from November to January.
- ScenarioName**: A table showing financial data for various categories like Audio, Cameras and camcorders, Cell phones, etc., across four scenarios: Actual, Budget, Forecast, and Total.

The ribbon also includes sections for Data, Queries, Insert, and Calculations. On the right side, there are panels for Filters, Visualizations, Fields, Drill through, Cross-report, and a clipboard section. A red arrow points to the "Report View" icon in the ribbon, and a red box highlights the "Clipboard" section in the ribbon.

ScenarioName	Actual	Budget	Forecast	Total	Cameras and camcorders	Cell phones	Computers	Games and Toys	Home Appliances	Music, Movies and Audio Books	TV and Video	
Actual	273,081,757.15	3,587,092,338.37	1,287,810,461.47	803,305,814.64	3,572,004,626.25	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Budget	256,826,621.81	3,347,605,529.68	1,208,041,332.59	803,305,814.64	3,572,004,626.25	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Forecast	273,397,435.67	3,572,004,626.25	1,285,330,168.28	803,305,814.64	3,572,004,626.25	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Total	273,397,435.67	3,572,004,626.25	1,285,330,168.28	803,305,814.64	3,572,004,626.25	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25

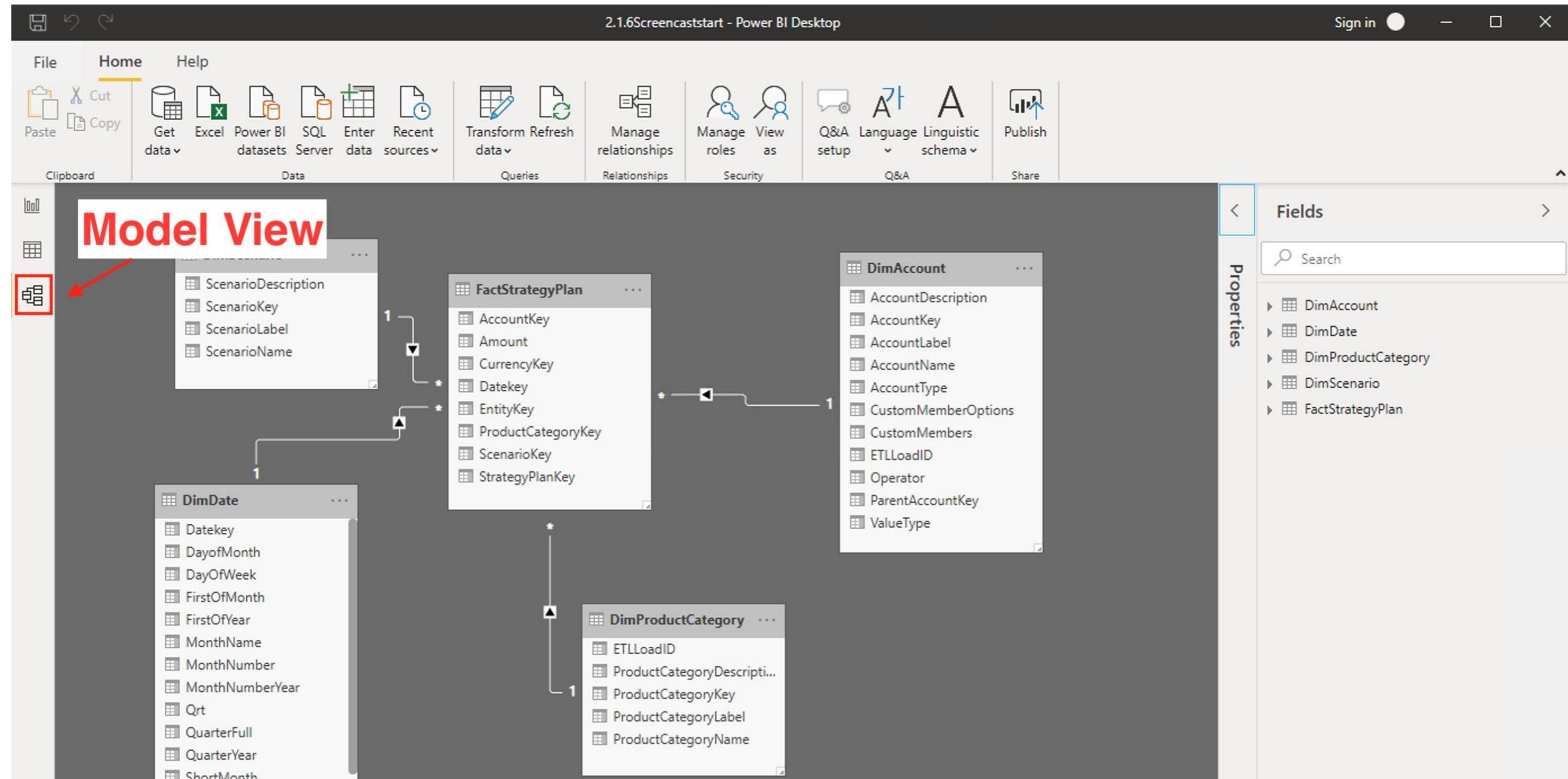
# Power BI Interface - Data View

The screenshot shows the Power BI Desktop interface with the title bar "2.1.6Screencaststart - Power BI Desktop". The ribbon is visible with the "Table tools" tab selected. A red box highlights the "Mark as date table" button in the "Calendars" group. The main area displays the "DimAccount" table in a grid view. A red arrow points from the text "Data View" to the left edge of the table grid. The table has columns: AccountKey, ParentAccountKey, AccountLabel, AccountName, AccountDescription, AccountType, Operator, CustomMembers, ValueType, and CustomM...". The "Fields" pane on the right lists columns from the DimAccount table, with "DimDate", "DimProductCateg...", "DimScenario", and "FactStrategyPlan" expanded. The "Search" field in the Fields pane contains "DimAccount".

Data View

AccountKey	ParentAccountKey	AccountLabel	AccountName	AccountDescription	AccountType	Operator	CustomMembers	ValueType	CustomM...
1	NULL		100000 Profit and Loss after tax	Profit and Loss after tax	NULL	NULL	NULL	NULL	NULL
4	2		110100 Sale Revenue	Sale Revenue	Income	+	NULL	Income	+
5	3		112100 Cost of Goods Sold	Cost of Goods Sold	Expense	-	NULL	Expense	-
6	3		112200 Selling, General & Administrative Expenses	Selling, General & Administrative Expenses	Expense	+	NULL	Expense	+
7	6		112300 Administration Expense	Administration Expense	Expense	+	NULL	Expense	+
8	6		112400 IT Cost	IT Cost	Expense	+	NULL	Expense	+
9	6		112500 Human Capital	Human Capital	Expense	+	NULL	Expense	+
10	6		112600 Light, Heat, Communication Cost	Light, Heat, Communication Cost	Expense	+	NULL	Expense	+
11	6		112700 Property Costs	Property Costs	Expense	+	NULL	Expense	+
12	6		112800 Other Expenses	Other Expenses	Expense	+	NULL	Expense	+
13	6		112900 Marketing Cost	Marketing & Advertisement Cost	Expense	+	NULL	Expense	+
14	13		112910 Holiday Ad Cost	Holiday Ad Cost	Expense	+	NULL	Expense	+
15	13		112920 Spring Ad Cost	Spring Ad Cost	Expense	+	NULL	Expense	+
16	13		112930 Back-to-School Ad Cost	Back-to-School Ad Cost	Expense	+	NULL	Expense	+
17	13		112940 Business Ad Cost	Business Ad Cost	Expense	+	NULL	Expense	+
18	13		112950 Tax Time / Summer Ad Cost	Tax Time / Summer Ad Cost	Expense	+	NULL	Expense	+
19	1		131000 Taxation	Taxation	Taxation	-	NULL	Taxation	-
20	14		112911 Radio & TV	Holiday Ad Cost by Radio & TV	Expense	+	NULL	Expense	+
21	14		112912 Print	Holiday Ad Cost by Print	Expense	+	NULL	Expense	+
22	14		112913 Internet	Holiday Ad Cost by Internet	Expense	+	NULL	Expense	+
23	14		112914 Other	Holiday Ad Cost by Other	Expense	-	NULL	Expense	-

# Power BI Interface - Model View



# Power BI Interface - Canvas area

2.1.6Screencaststart - Power BI Desktop

Sign in

File Home Insert Modeling View Help

Cut Copy Paste Format painter Get data Excel Power BI datasets SQL Server Enter data sources Recent Transform Refresh data New visual Text box More visuals New measure Quick measure Publish Share

Clipboard Data Queries Insert Calculations

Amount by AccountType

53.64bn Amount

Income Expense

■ Select all  
■ 2020  
■ 2019  
■ 2018  
■ 2017  
■ 2016  
■ 2015

Amount by MonthName and ScenarioName

ScenarioName Actual Budget Forecast

2bn  
1bn  
0bn

MonthName November December May July August June October April September March February January

ScenarioN Audio Cameras and camcorders Cell phones Computers Games and Toys Home Appliances Music, Movies and TV and Video Audio Books

ScenarioN	Actual	Budget	Forecast	Total	Cameras and camcorders	Cell phones	Computers	Games and Toys	Home Appliances	Music, Movies and TV and Video	Audio Books
Actual	273,081,757.15	3,587,092,338.37	1,287,810,461.47	803,305,814.64	3,572,004,626.25	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Budget	256,826,621.81	3,347,605,529.68	1,208,041,332.59	10,506,702,494.30	3,572,004,626.25	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Forecast	273,397,435.67	3,572,004,626.25	1,285,330,168.28	10,506,702,494.30	3,572,004,626.25	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25
Total	803,305,814.64	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03

Filters

Search

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Fields

Search

DimAccount

DimDate

DimProductCateg...

DimScenario

FactStrategyPlan

Values

Add data fields here

Drill through

Cross-report

Off

Keep all filters

On

Add drill-through fields here

Canvas

# Power BI Interface - Filters pane

The screenshot shows the Power BI Desktop application window titled "2.1.6Screencaststart - Power BI Desktop". The ribbon menu is visible at the top, with the "Home" tab selected. The main workspace displays several visualizations: a large blue bar chart for "Amount by AccountType" (Income and Expense), a smaller bar chart for "Amount by MonthName and ScenarioName" comparing Actual, Budget, and Forecast values across months from November to January, and a detailed table for "ScenarioN" (Actual, Budget, Forecast, Total) across categories like Audio, Cameras and camcorders, Cell phones, Computers, Games and Toys, Home Appliances, Music, Movies and Audio Books, and TV and Video.

A red box highlights the "Filters" pane on the right side of the interface. The "Filters" pane contains the following sections:

- Search:** A search bar with a magnifying glass icon.
- Filters on this page:** A section titled "Select all" containing a list of years from 2015 to 2020, each preceded by a checkbox.
- Add data fields here:** A button for adding filters specific to the current page.
- Filters on all pages:** A section titled "Add data fields here" for applying filters across the entire report.
- Values:** A section titled "Add data fields here" for managing values.
- Drill through:** A section with settings for "Cross-report":
  - "Off" (radio button)
  - "Keep all filters" (radio button)
  - "On" (radio button, currently selected)
- Add drill-through fields here:** A button for adding fields related to drill-through functionality.

A large red text overlay "Filters Pane" is centered over the highlighted pane.

# Power BI Interface - Visualizations pane

2.1.6Screencaststart - Power BI Desktop

Sign in

File Home Insert Modeling View Help

Paste Cut Copy Format painter Get data Excel Power BI datasets SQL Server Enter data sources Transform Refresh data New visual Text box More visuals New measure Quick measure Publish Share

Clipboard Data Queries Insert Calculations

**Visualizations Pane**

Amount by AccountType

Income Expense

Amount by MonthName and ScenarioName

ScenarioName Actual Budget Forecast

2bn

1bn

0bn

MonthName November December May July August June October April September March February January

ScenarioN Audio Cameras and camcorders Cell phones Computers Games and Toys Home Appliances Music, Movies and Audio Books TV and Video

ScenarioN	Actual	Budget	Forecast	Total
Cameras and camcorders	273,081,757.15	3,587,092,338.37	1,287,810,461.47	10,506,702,494.30
Cell phones	256,826,621.81	3,347,605,529.68	1,208,041,332.59	3,781,181,962.35
Computers	4,593,694,374.88	4,307,849,337.57	207,049,792.29	13,487,431,779.03
Games and Toys	218,933,396.02	5,299,115,246.06	215,317,906.62	645,713,709.26
Home Appliances	5,665,988,969.42	229,865,165.02	229,865,165.02	16,629,515,967.52
Music, Movies and Audio Books	230,738,587.69	2,296,131,319.12	675,921,659.33	7,112,453,151.25

Filters

Search

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Values

Drill through

Cross-report

Off

Keep all filters

On

Fields

Search

DimAccount

DimDate

DimProductCateg...

DimScenario

FactStrategyPlan

Add data fields here

Add drill-through fields here

# Power BI Interface - Fields pane

The screenshot shows the Power BI Desktop application window titled "2.1.6Screencaststart - Power BI Desktop". The interface includes a ribbon menu with tabs like File, Home, Insert, Modeling, View, and Help. Below the ribbon are various icons for data management, visualization creation, and publishing. On the left side, there are three visualizations: a large blue bar chart labeled "Amount by AccountType" with a value of "53.64bn", a smaller bar chart labeled "Amount by MonthName and ScenarioName", and a table labeled "ScenarioN". The main area contains a table with columns for ScenarioName, Audio, Cameras and camcorders, Cell phones, Computers, Games and Toys, Home Appliances, Music, Movies and Audio Books, and TV and Video. The table rows include Actual, Budget, Forecast, and Total values. To the right of the visualizations is the "Filters" pane, which includes sections for "Filters on this page" and "Filters on all pages", each with an "Add data fields here" button. Further right is the "Visualizations" pane, which lists various visualization types with their corresponding icons. The most prominent feature on the right is the "Fields" pane, which is highlighted with a red border. It contains a search bar, a tree view of data sources including DimAccount, DimDate, DimProductCategory, DimScenario, and FactStrategyPlan, and sections for "Values" (with an "Add data fields here" button), "Drill through", "Cross-report" (set to "Off"), "Keep all filters" (set to "On"), and "Add drill-through fields here". A large red text overlay "Fields Pane" is positioned over the right side of the Fields pane.

Amount by AccountType

Income Expense

Amount by MonthName and ScenarioName

ScenarioName ● Actual ● Budget ● Forecast

ScenarioName	Audio	Cameras and camcorders	Cell phones	Computers	Games and Toys	Home Appliances	Music, Movies and Audio Books	TV and Video
Actual	273,081,757.15	3,587,092,338.37	1,287,810,461.47	4,593,694,374.88	218,933,396.02	5,665,988,969.42	230,738,587.69	2,485,487,457.19
Budget	256,826,621.81	3,347,605,529.68	1,208,041,332.59	4,307,849,337.57	207,049,792.29	5,299,115,246.06	215,317,906.62	2,330,834,374.94
Forecast	273,397,435.67	3,572,004,626.25	1,285,330,168.28	4,585,888,066.58	219,730,520.95	5,664,411,752.04	229,865,165.02	2,296,131,319.12
Total	803,305,814.64	10,506,702,494.30	3,781,181,962.35	13,487,431,779.03	645,713,709.26	16,629,515,967.52	675,921,659.33	7,112,453,151.25

Filters

Visualizations

Fields

Fields Pane

# Wide World Importers (WWI) dataset



# Wide World Importers (WWI) dataset structure

- Star schema
- **Fact Table:**
  - FactSales.csv
- **Dimension Tables:**
  - DimCustomer.csv
  - DimEmployee.xlsx
  - DimStockItem.csv
  - DimDate.csv
  - DimCity.csv

# **Let's practice!**

## **INTRODUCTION TO POWER BI**

# Demo!

# **Exercise:**

# **Install Power BI**

# Exercise: What was the total number of chiller items sold in 2016?

Under **File** menu in Power BI, click on "Browse Reports" and open the report called `1_0_making_maps.pbix`, from the `Exercises` folder on the desktop. It might take a while to load.

A new report has opened so you can now safely close the `EmptyReport` file. Closing previous files is good practice to ensure Power BI runs smoothly.

You can enlarge the Power BI Interface by clicking on the full-screen button in the bottom right corner or by zooming out.

You can also make the canvas area bigger by expanding and collapsing the *Filters*, *Visualizations*, and *Fields* panes by selecting the arrows at the tops of the panes.

Time to start loading your own data!

In this exercise, `FactSale.csv` has been loaded and there is already a bar chart with the quantity of items ever sold by Wide World Importers (WWI). This would be more meaningful if we segmented the graph into years. Let's load another data file that contains that information.

- Open `1_1_your_first_viz.pbix` from the `Exercises` folder on the desktop.
- Make sure to close any reports from earlier, as having too many reports open will decrease the speed of the machine.

Using the `Get Data` button, select `Text/CSV` from the list and load `DimDate.csv` from `Datasets/WWI`. Make sure to use the file in the `WWI` folder.

In the `Model` view, create a relationship between `FactSale`'s `Invoice Date Key` and `DimDate`'s `Date`.

- In the `Report` view, select the existing bar chart and then select `Calendar Year` from `DimDate` in the `Fields` pane.
- Make sure to use `Calendar Year` instead of `Calendar Year Label`. You can expand the `Fields` pane by dragging its left-hand border.

In the `Visualizations` pane, drag `Calendar Year` to `X-axis` rather than `Y-axis`.

**Based on your resulting visualization, which statement is true?**

- Quantity of Items sold per year has decreased every year.
- Quantity of Items sold per year has remained about the same through all years.
- Quantity of Items sold per year has only increased from 2013 to 2015.
- Quantity of Items sold per year has been increasing every year.

# Add a Card

Let's add some more details to your report. We already found the quantity of items sold per year. Now, you want to know more about the profit made over the years. A card is a great choice because it's simple and adds some elegant interactivity.

If you lost progress, close any open reports and load `1_2_add_a_card.pbix` from the *Exercises* folder on the desktop.

In the *Report* view, deselect any visuals you have selected by clicking a blank area of the canvas.

Select the `Profit` field from `FactSale`. A bar chart will get created automatically. Note that you can use the *Search* function in the *Fields* pane to easily locate columns.

Choose the *Card* visualization to change the bar chart

into text:



You should now have two visualizations in your report. Arrange and resize them to your liking so there is no overlap between the two visuals!

Select the year 2014 bar. How does the profit card change?

- The card changes from 9.92M to 2.91M.
- The card doesn't change and displays 9.92M.
- The card changes from 9.92M to 3.16M.