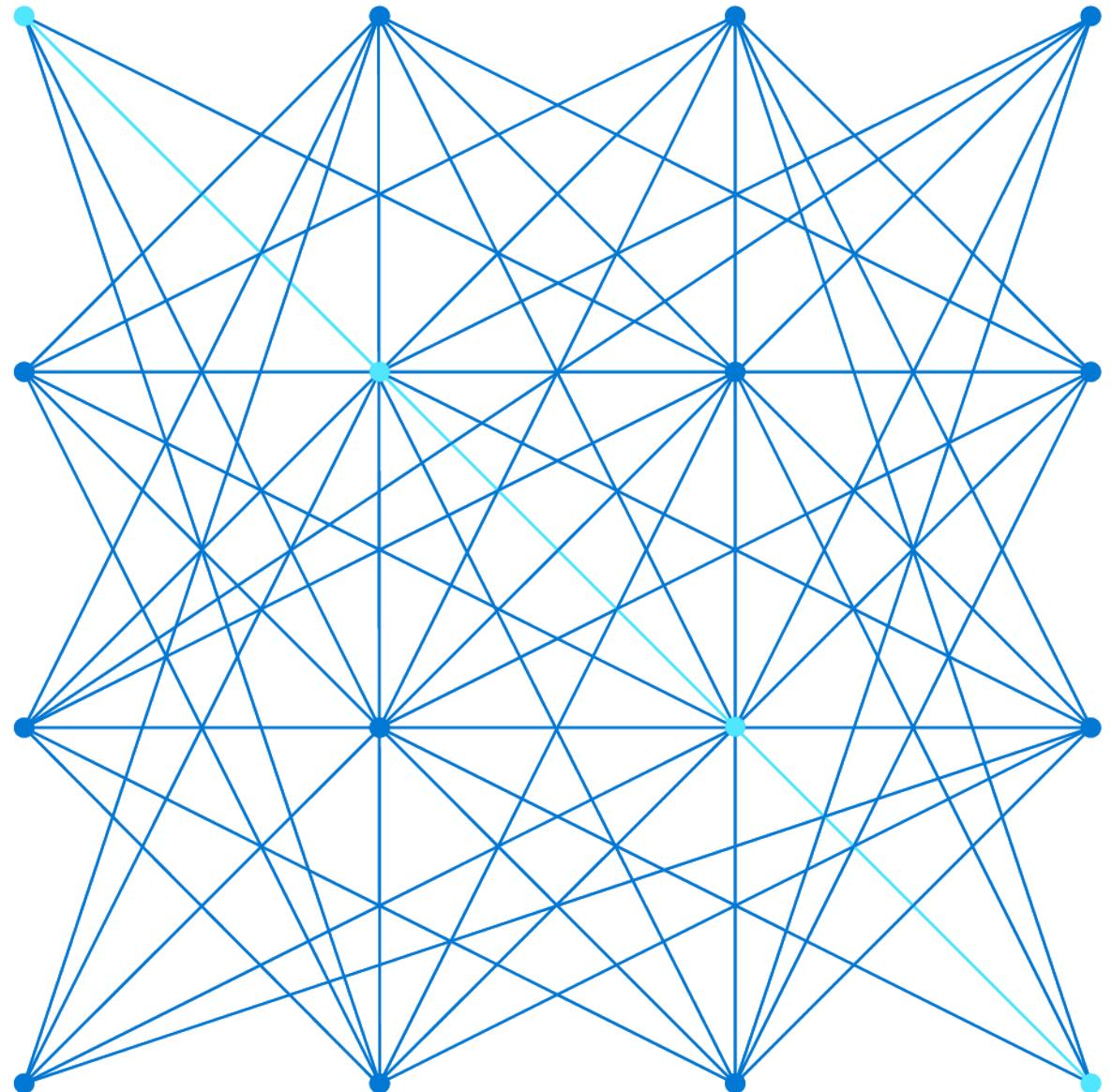


DA-100 Analyzing Data with Power BI



Introduction



Tissana Tanaklang

Software and Solution Development Trainer
Iverson Training Center Co., Ltd.
tissana@iverson.co.th , tissana_t@hotmail.com

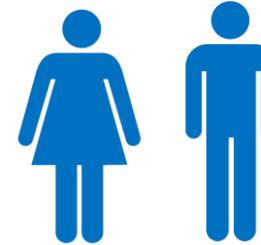
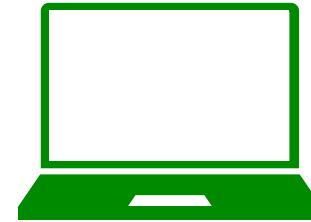
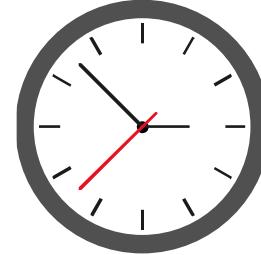


- Master of Science Program in Software Engineering King Mongkut's University of Technology Thonburi
- Bachelor of Science Program in Computer Science Naresuan University
- Microsoft Certified Trainer (MCT)
- Microsoft Certified Azure Data Engineer Associate
- Microsoft Certified Solutions Associate - Web Application Development
- Microsoft Certified Azure Fundamentals
- Microsoft Certified Azure Data Fundamentals
- Microsoft Certified Azure AI Fundamentals



Facilities

- Class hours
- Building hours
- Parking
- Restrooms
- Meals
- Phones
- Messages
- Smoking
- Internet access
- Recycling
- Emergency procedures



Data Analyst Role

- Enable businesses to maximize the value of their data assets using Microsoft Power BI.
- Responsible for designing and building scalable models, cleaning and transforming data, and enabling advanced analytics capabilities that provide meaningful business value through easy-to-comprehend data visualizations.
- Collaborate with key stakeholders across verticals to deliver relevant insights based on business requirements.
- Have a fundamental understanding of data repositories and data processing both on-premises and in the cloud.

About this Course: Prerequisites

- Successful data analysts start this role with experience with data visualization products and services such as Microsoft Power BI.
- Understanding of both on-premises and cloud-based data repositories.
- A fundamental understanding of Azure data services.

About this Course: Objectives

- Identify and retrieve data from data sources and understand the different connection methods.
- Optimize query performance.
- Profile and examine the data and apply data shape transformations.
- Develop a scalable and performance data model.
- Enhance the data model with DAX using measures, calculated columns and tables.
- Use variables and aggregations to optimize model performance.
- Design and create reports and dashboards.
- Select and add appropriate visualizations.
- Create paginated reports.
- Perform Advanced Analytics.
- Create and manage workspaces.
- Manage datasets and dataset refresh.
- Apply row-level security.

About this Course: Course Outline

- M01: Get Started with Microsoft Data Analytics
- M02: Prepare Data in Power BI
- M03: Cleaning, Transforming, and Loading Data
- M04: Designing a Data Model in Power BI
- M05: Create Model Calculations using DAX in Power BI
- M06: Optimize Model Performance

About this Course: Course Outline

- M07: Create Reports
- M08: Create Dashboards
- M09: Create Paginated Reports
- M10: Perform Advanced Analytics
- M11: Create and Manage Workspaces
- M12: Manage Datasets in Power BI
- M13: Row-level Security

Certification Areas (DA-100)

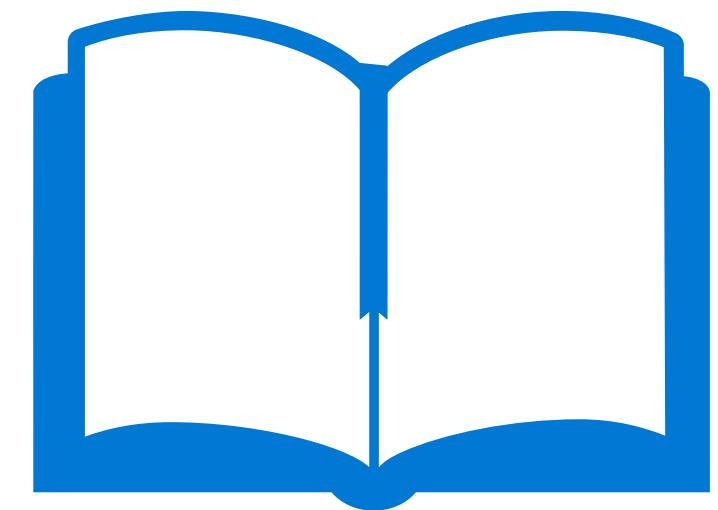
- Percentages indicate the relative weight of each area on the exam
- The higher the percentage, the more questions you are likely to see in that area

Study Areas	Weights
Prepare the Data	20-25%
Model the Data	25-30%
Visualize the Data	20-25%
Analyze the Data	10-15%
Deploy and Maintain Deliverables	10-15%

References

- DA-100 Prepare data for analysis

<https://docs.microsoft.com/en-us/learn/modules/get-data/>



Preparing SQL Server Database & Power BI

Module 1: Getting Started with Microsoft Data Analytics

Learning Objectives

You will learn the following concepts:

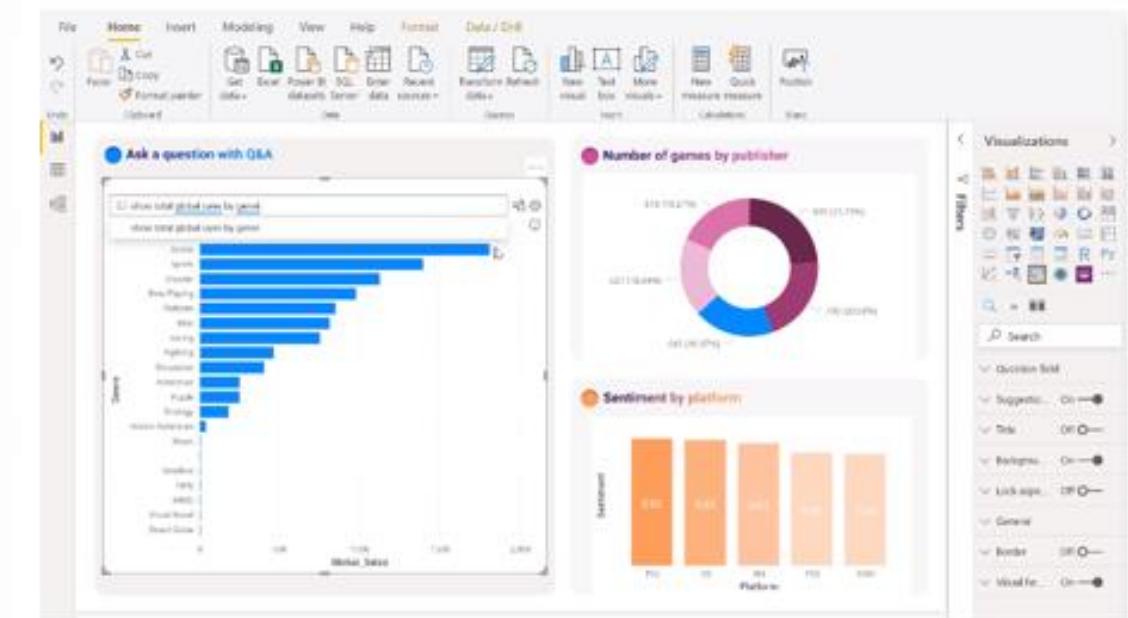
- Data Analysis
- Getting Started with Power BI

Lesson 1: Data Analytics and Microsoft



Introduction

Data and information is the most strategic business asset.



Overview of Data Analysis

Data Analysis is telling a story with data.

Five categories of analytics:

- Descriptive
- Diagnostic
- Predictive
- Prescriptive
- Cognitive



Roles in Data



Business Analyst



Data Analyst



Data Engineer

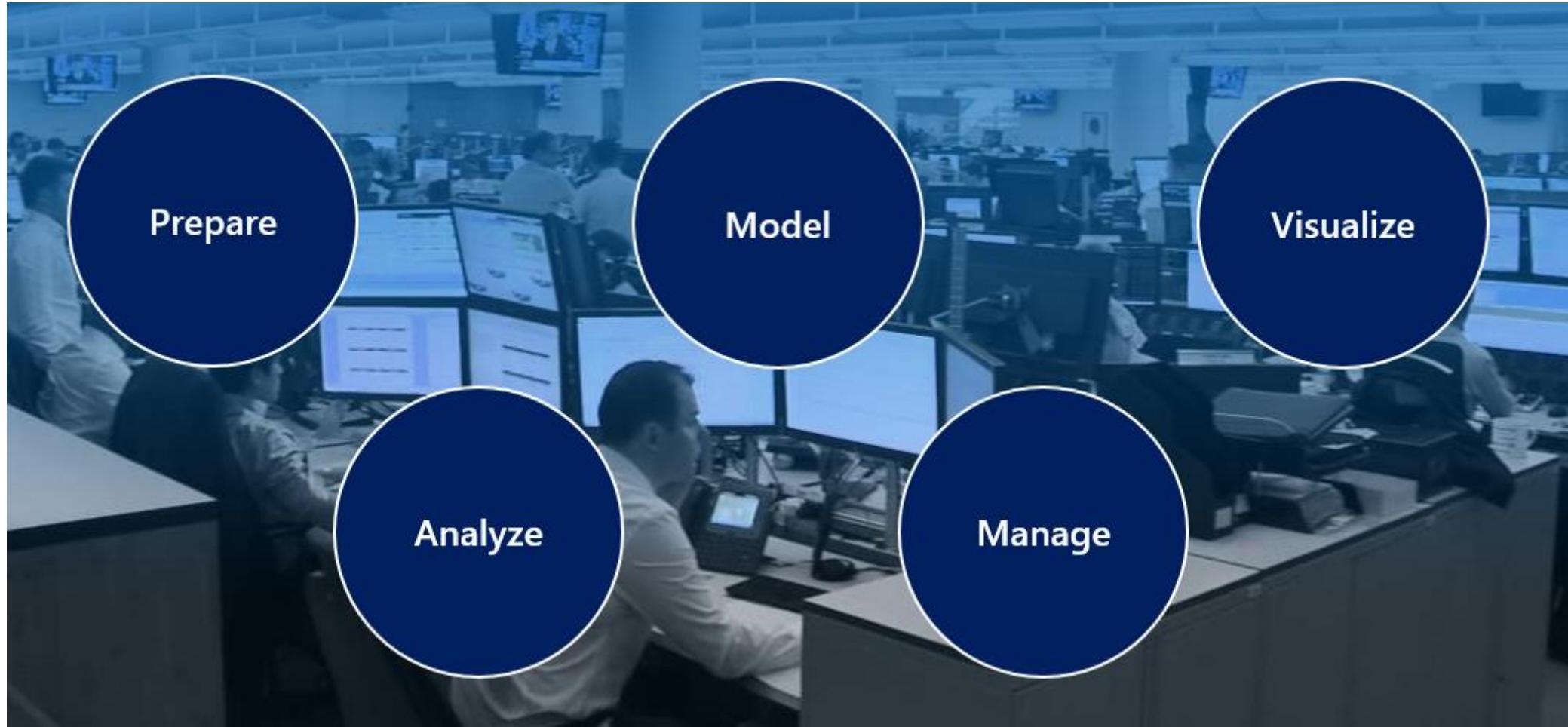


Data Scientist

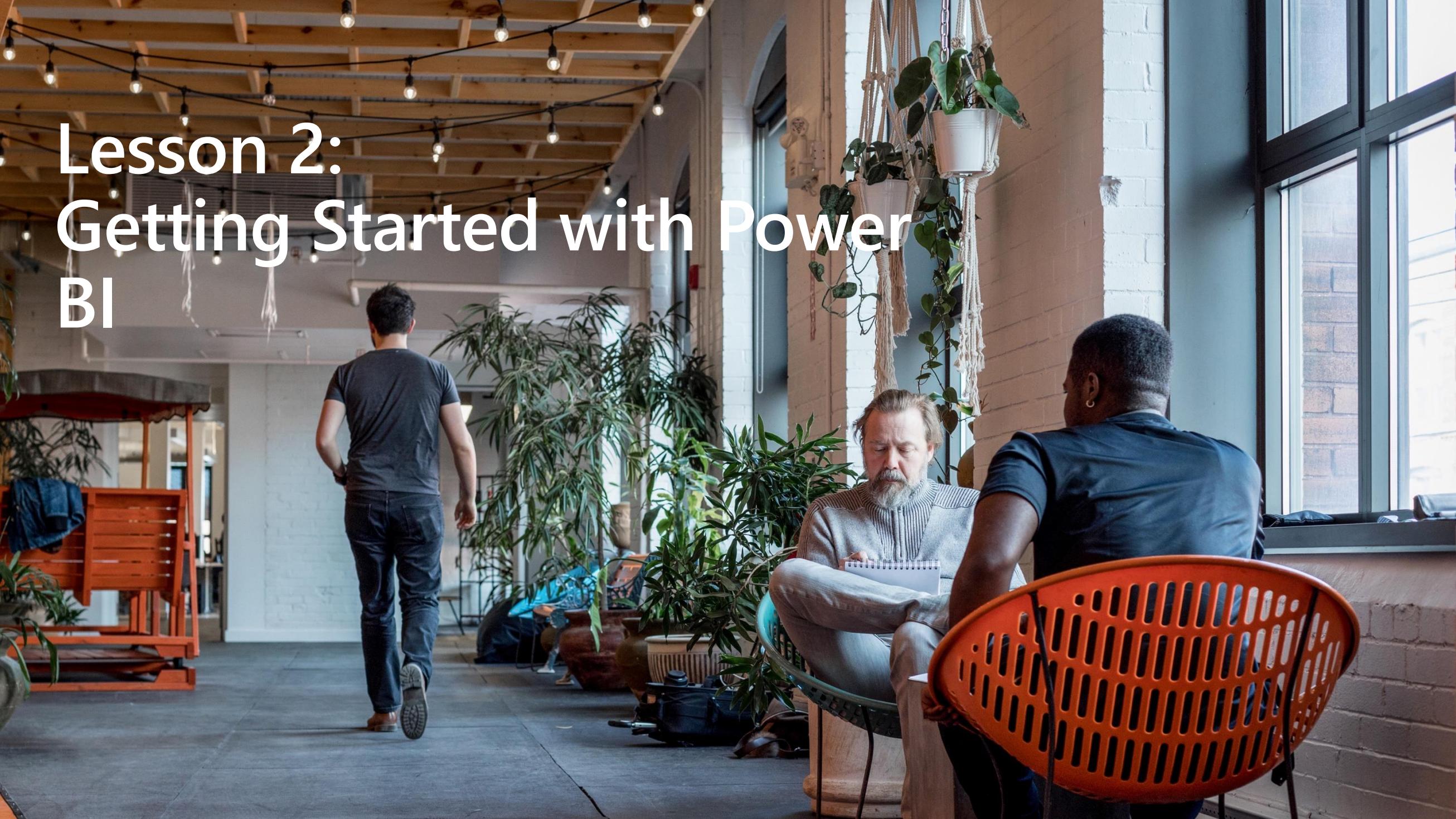


Database
Administrator

Tasks of a Data Analyst



Lesson 2: Getting Started with Power BI

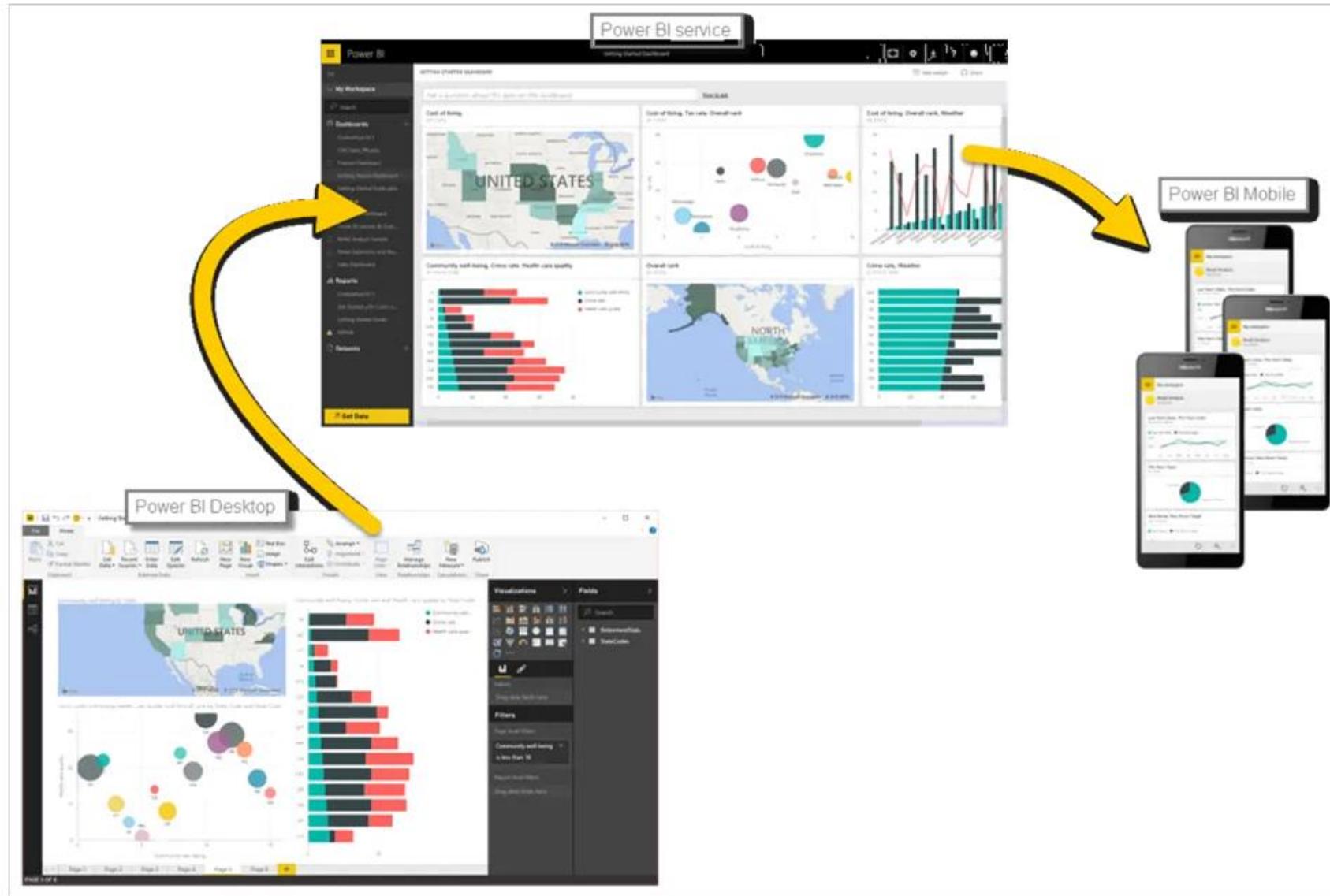


Introduction to Power BI

Power BI: A collection of software, services, apps, and connectors.



Use Power BI



Building Blocks of Power BI

The screenshot shows a Microsoft Power BI dashboard titled "Retail Analysis Sample". The dashboard includes the following components:

- Top Bar:** Includes the Power BI logo, file navigation, and a "Share" button.
- Header:** "Ask a question about the data on this dashboard" and "How to ask".
- Card 1:** "Total Stores" (104), "This Year's Sales" (\$22M), "This Year's Sales BY CHAIN" (Donut chart showing 75% for Fashions Direct and 25% for Undisley), "New Stores Opened This Year" (10), and "This Year's Sales NEW STORES ONLY" (\$2M).
- Card 2:** "This Year's Sales, Last Year's Sales BY FISCAL MONTH" (Line chart comparing sales from Jan to May).
- Card 3:** "Sales Per Sq Ft, Total Sales Variance %, This Year's Sales BY DISTRICT" (Bubble chart).
- Card 4:** "Stores Opened This Year BY OPEN MONTH, CHAIN" (Bar chart).
- Card 5:** "This Year's Sales ESTABLISHED AND NEW STORES BY STATE" (Map of the United States).

A modal window is overlaid on the dashboard, displaying a table of birth data:

1	Year	Month	Month Name	Calendar Month	Births	Births Per Day
2119	2004	1	January	1/1/2004	2,937	94
2120	2004	2	February	2/1/2004	2,824	97
2121	2004	3	March	3/1/2004	3,128	100
2122	2004	4	April	4/1/2004	2,896	96
2123	2004	5	May	5/1/2004	3,008	97
2124	2004	6	June	6/1/2004	3,047	101
2125	2004	7	July	7/1/2004	2,981	96
2126	2004	8	August	8/1/2004	3,079	99
2127	2004	9	September	9/1/2004	3,219	107
2128	2004	10	October	10/1/2004	3,547	114
2129	2004	11	November	11/1/2004	3,365	112
2130	2004	12	December	12/1/2004	3,143	101
2131	2005	1	January	1/1/2005	2,921	94
2132	2005	2	February	2/1/2005	2,699	96
2133	2005	3	March	3/1/2005	3,024	97
2134	2005	4	April	4/1/2005	3,037	101
2135	2005	5	May	5/1/2005	3,231	104
2136	2005	6	June	6/1/2005	3,163	105
2137	2005	7	July	7/1/2005	3,119	100
2138	2005	8	August	8/1/2005	3,156	101
2139	2005	9	September	9/1/2005	3,439	114

This dashboard displays several key performance indicators across different dimensions:

- % Units Market Share**: Shows a value of 33%.
- Total Category Volume**: Shows a value of 16K.
- Sentiment**: Shows a value of 68.
- Sentiment Gap**: Shows a value of 4.
- Total Units YTD Var % BY MONTH, MANUFACTURER**: A bar chart showing monthly variance percentage for four manufacturers: Aliqui, Natura, Pirum, and VanArsdel. The chart highlights a significant dip in June 2014.
- Total Units YTD BY MANUFACTURER, REGION**: A bar chart showing total units for VanArsdel across regions: Central, East, West, and South.
- Total Units BY MONTH, MANUFACTURER**: A line chart showing total units over time for the same four manufacturers.
- % Unit Market Share YOY Change BY ROLLING PERIOD, REGION**: A bar chart showing year-over-year change in market share by region.
- New Hires by Gender**: A bar chart showing new hires by gender (Female, Male) with a total column.
- Drillthrough Options**: A sidebar with filter settings for Month (not Dec), Region (is All), VP (is All), Year (is 2014), and a dropdown for Values.

Touring and Using Power BI

Power BI Apps > GitHub > GitHub

File View Edit report Explore Refresh Reset to default View related Subscribe ...

Favorites

Recent

Apps

Shared with me

Workspaces

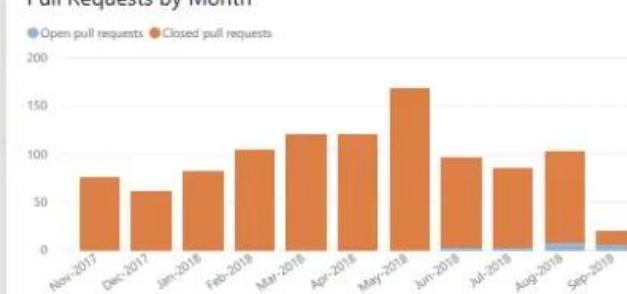
My Workspace

Pull Requests
Prior 12 Months

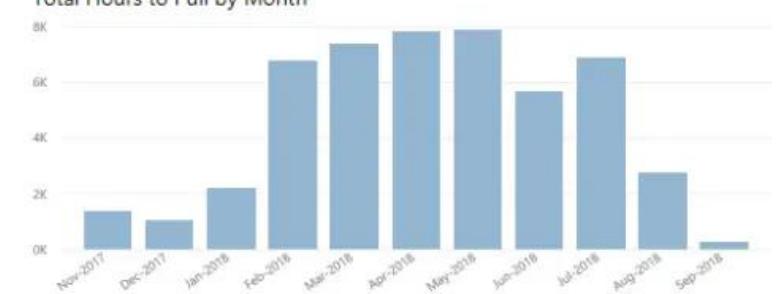
Period	Value
This week	2
This month	20
Prior 12 Months	1,038
Open	17
Closed this month	14

Repository: powerbi-docs-pr, last run date (UTC): 9/11/2018

Pull Requests by Month



Total Hours to Pull by Month



Avg Hours to Pull by Month



Total pull requests by user



Get Data Top 100 Contributors Contributor Commits Pull Requests Punch Card Issues

Lab: Getting Started

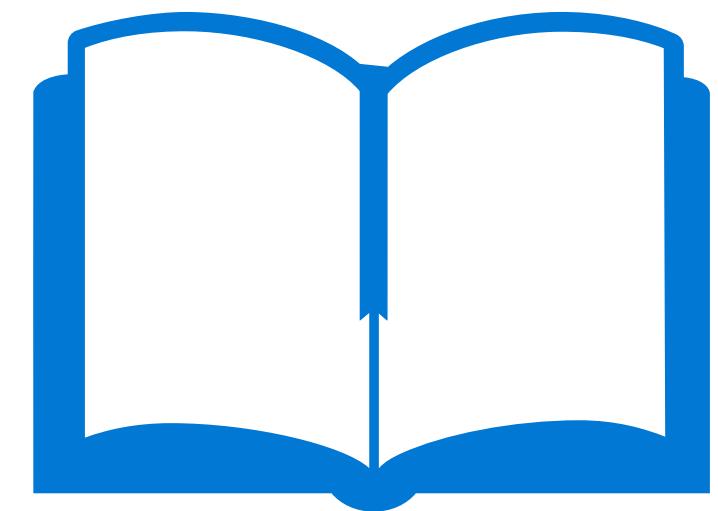
References

- DA-100 Discover data analysis

<https://docs.microsoft.com/en-us/learn/modules/data-analytics-microsoft/>

- DA-100 Get started building with Power BI

<https://docs.microsoft.com/en-us/learn/modules/get-started-with-power-bi/>



Module 2: Get Data in Power BI

Learning Objectives

You will learn the following concepts:

- Getting data from various data sources
- Optimizing Performance
- Resolving data errors

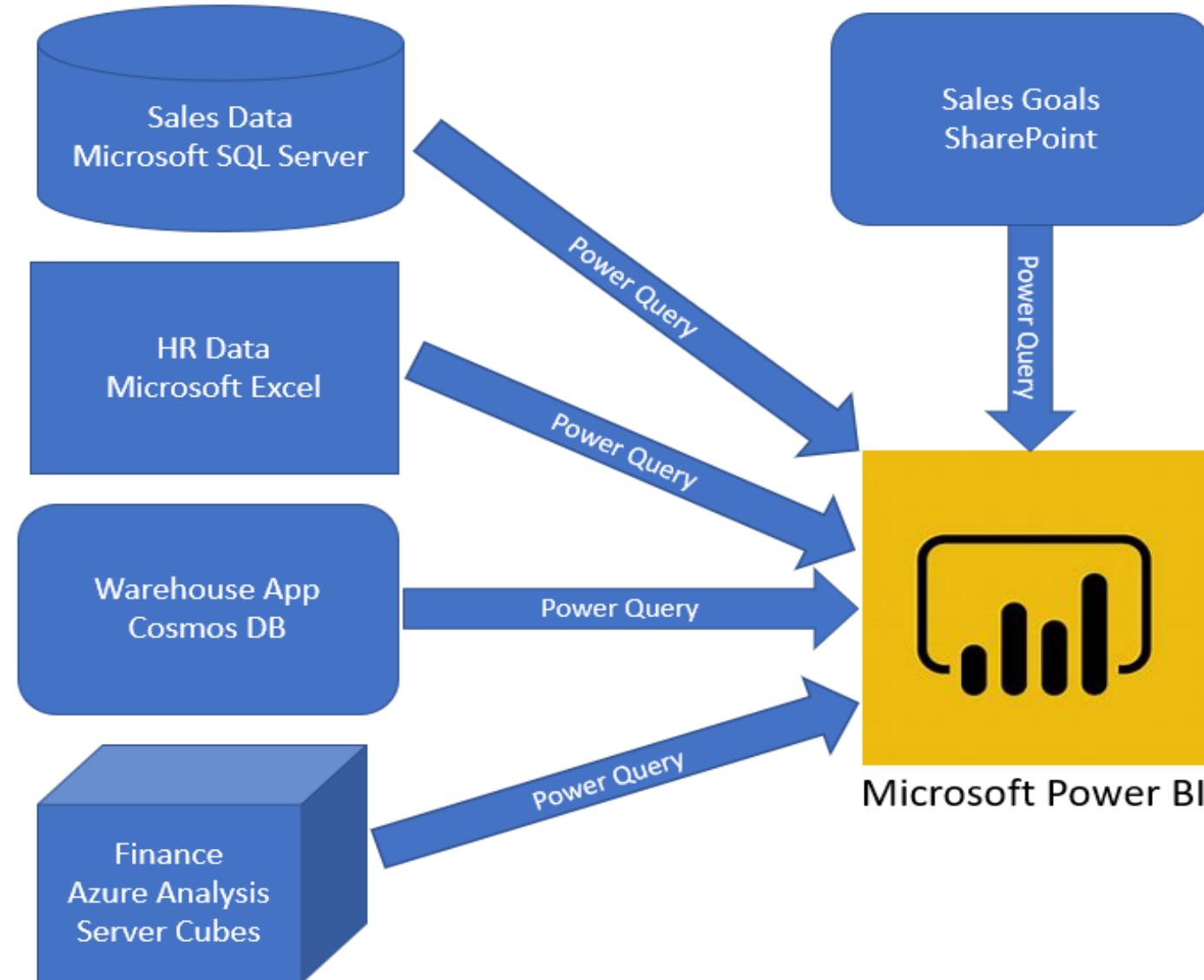
Lesson 1:

Get data from various data sources

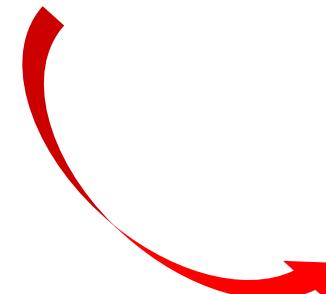


Introduction to getting data

The first step in the data analysis process is identifying and getting data.



Get data from flat files



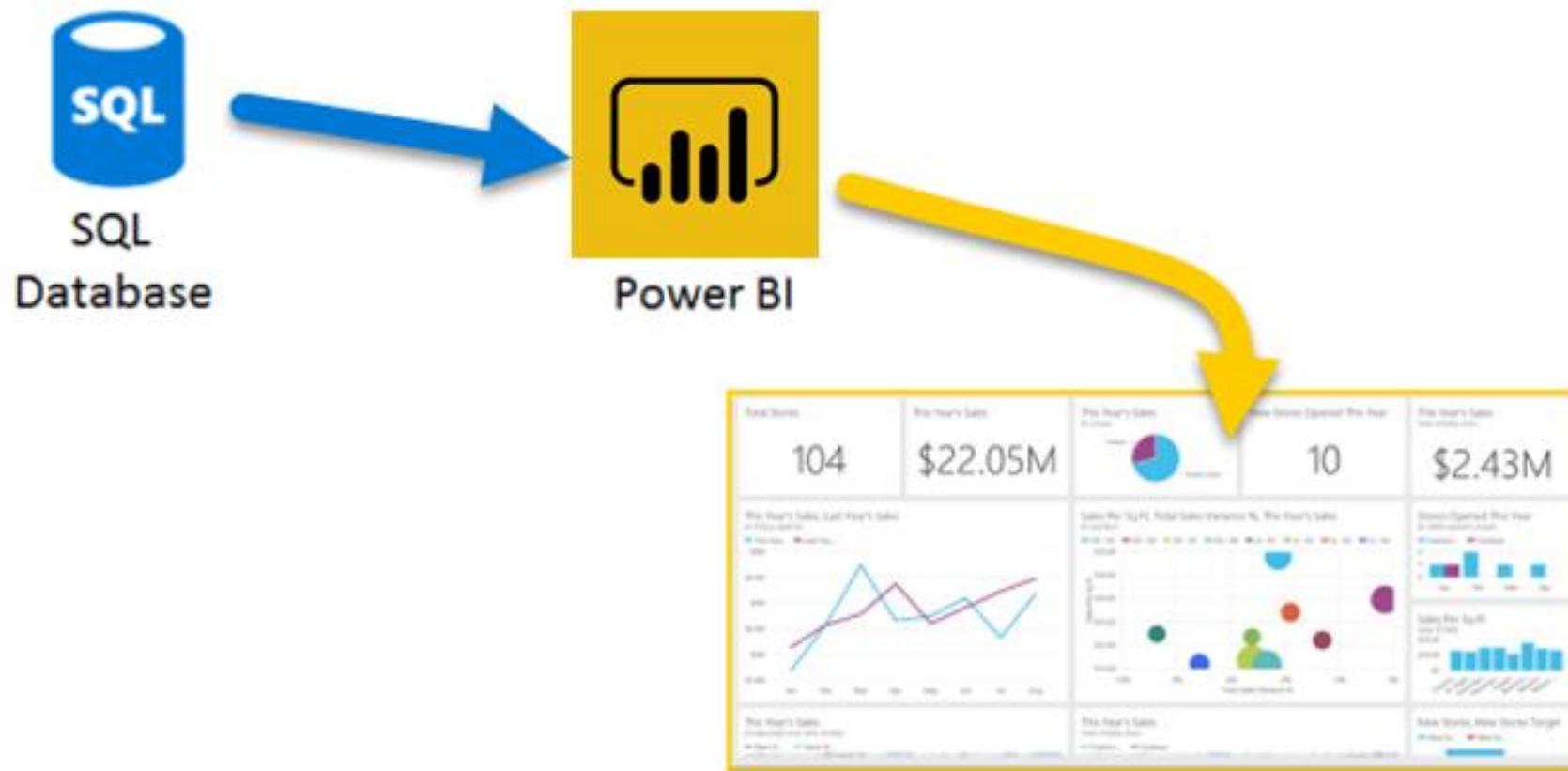
ResellerSales_202006.csv

SalesOrderNumber	SalesOrderLineNumber	OrderDate	DueDate	ShipDate	ProductKey	ResellerKey	PromotionKey
S071691	2	6/1/2020	6/11/2020	6/8/2020	434	104	
S071691	4	6/1/2020	6/11/2020	6/8/2020	222	104	
S071774	1	6/1/2020	6/11/2020	6/8/2020	436	609	
S071774	2	6/1/2020	6/11/2020	6/8/2020	418	609	
S071775	1	6/1/2020	6/11/2020	6/8/2020	573	595	
S071775	2	6/1/2020	6/11/2020	6/8/2020	555	595	
S071775	3	6/1/2020	6/11/2020	6/8/2020	490	595	
S071776	1	6/2/2020	6/12/2020	6/9/2020	514	106	
S071777	1	6/2/2020	6/12/2020	6/9/2020	408	128	
S071777	2	6/2/2020	6/12/2020	6/9/2020	436	128	
S071778	1	6/2/2020	6/12/2020	6/9/2020	467	557	
S071778	2	6/2/2020	6/12/2020	6/9/2020	566	557	

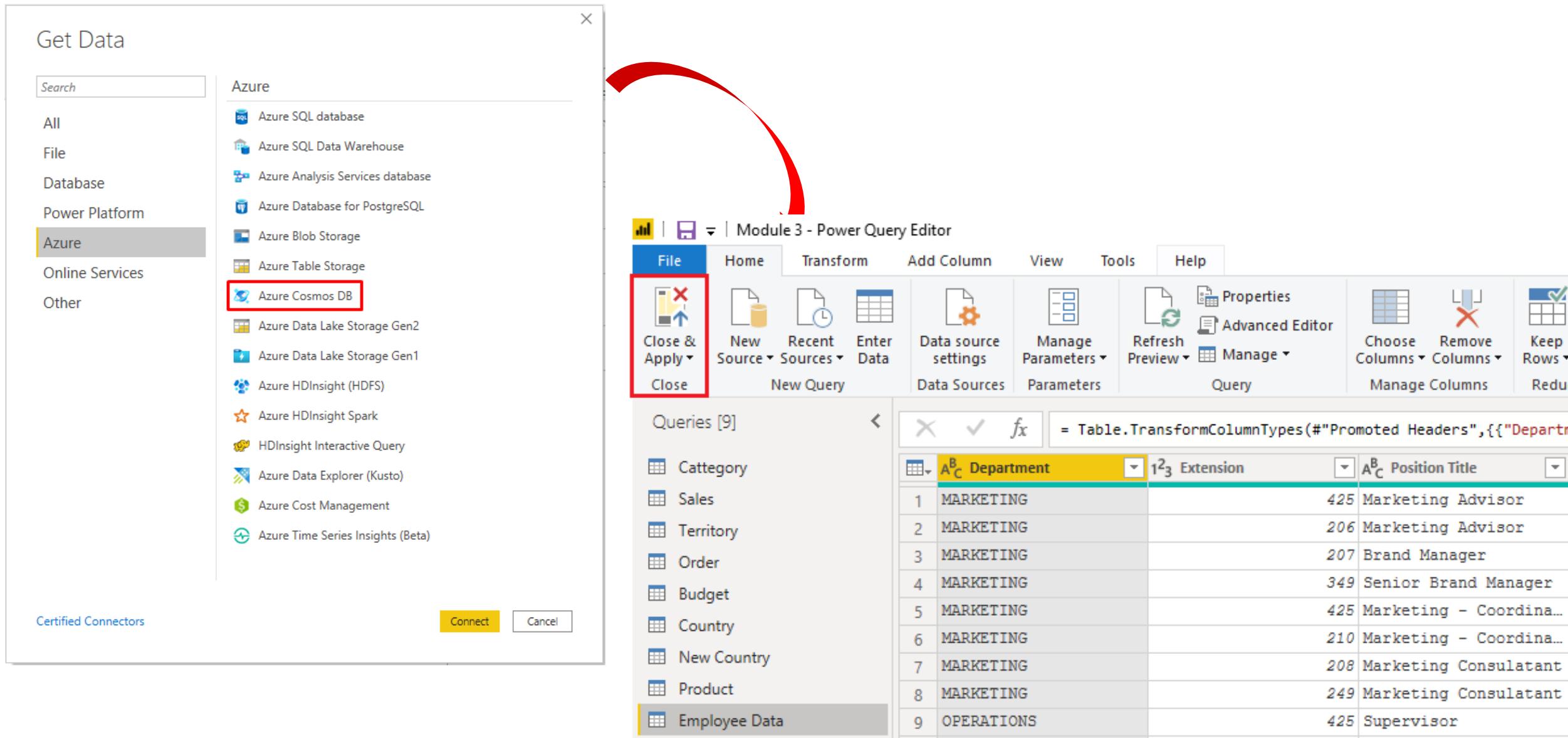
File Origin: 1200: Unicode | Delimiter: Comma | Data Type Detection: Based on first 200 rows

Load Transform Data Cancel

Get data from relational data sources



Get data from NoSQL



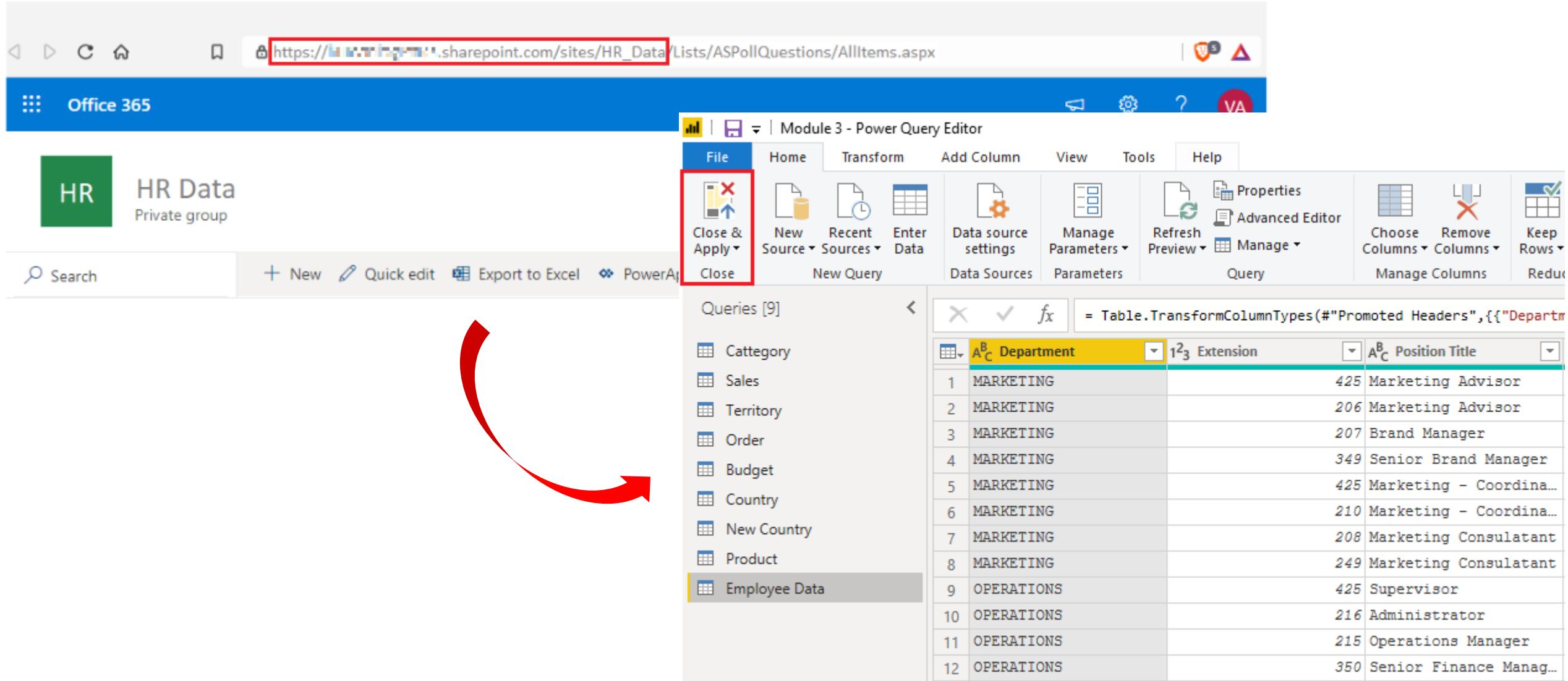
The screenshot illustrates the process of connecting to Azure Cosmos DB and performing data transformations in the Power Query Editor.

Get Data Interface: On the left, the 'Get Data' interface shows the 'Azure' category selected. Under 'Azure', 'Azure Cosmos DB' is highlighted with a red box and a red curved arrow points from it to the 'Close & Apply' button in the Power Query Editor. Other options listed include Azure SQL database, Azure SQL Data Warehouse, Azure Analysis Services database, Azure Database for PostgreSQL, Azure Blob Storage, and Azure Table Storage.

Power Query Editor: The main window is titled 'Module 3 - Power Query Editor'. The 'File' tab is active, showing the 'Close & Apply' button highlighted with a red box. The 'Queries [9]' pane lists various data sources: Category, Sales, Territory, Order, Budget, Country, New Country, Product, and Employee Data. The 'Employee Data' query is currently selected. The main area displays a table with the following data:

	Department	Extension	Position Title
1	MARKETING	425	Marketing Advisor
2	MARKETING	206	Marketing Advisor
3	MARKETING	207	Brand Manager
4	MARKETING	349	Senior Brand Manager
5	MARKETING	425	Marketing - Coordina...
6	MARKETING	210	Marketing - Coordina...
7	MARKETING	208	Marketing Consultat...
8	MARKETING	249	Marketing Consultat...
9	OPERATIONS	425	Supervisor

Get data from applications

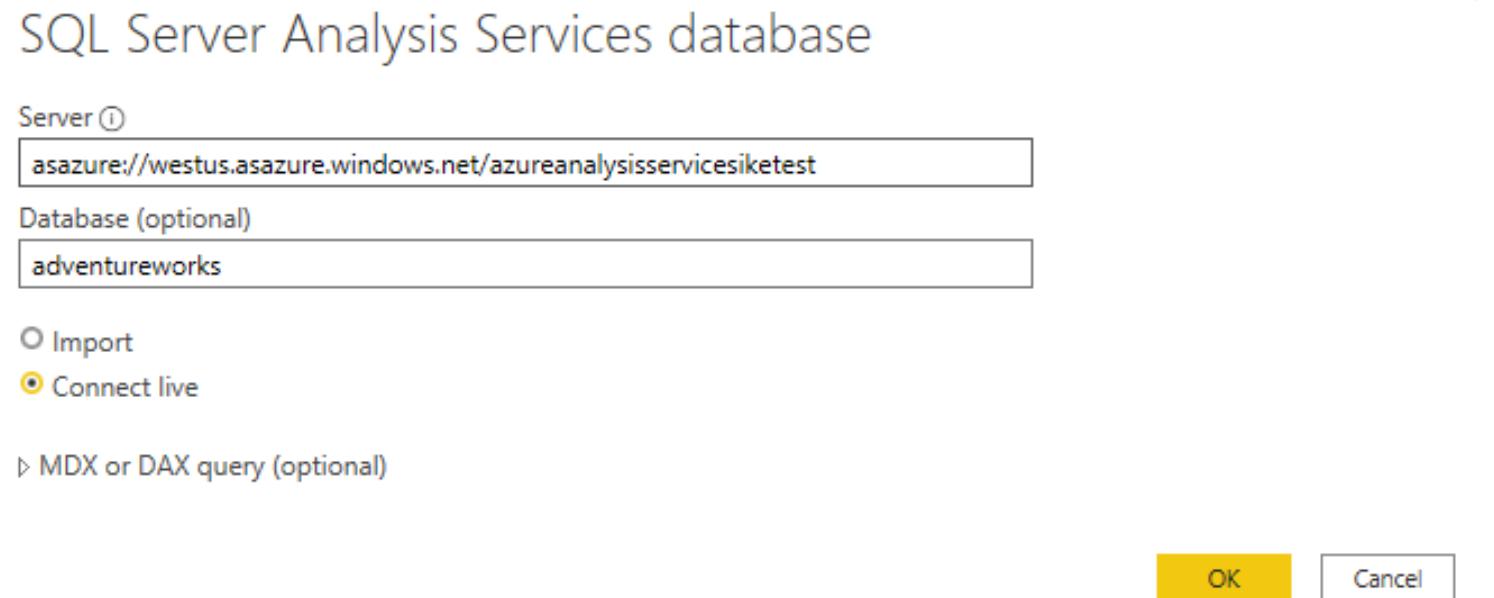


The screenshot shows the Microsoft Power Query Editor interface integrated with a SharePoint list. The browser address bar displays the URL: [https://\[REDACTED\].sharepoint.com/sites/HR_Data/Lists/ASPollQuestions/AllItems.aspx](https://[REDACTED].sharepoint.com/sites/HR_Data/Lists/ASPollQuestions/AllItems.aspx). The SharePoint ribbon shows "Office 365". The Power Query ribbon tabs include File, Home, Transform, Add Column, View, Tools, and Help. The "File" tab is selected, highlighting the "Close & Apply" button, which is also circled in red. The "Queries [9]" pane lists nine queries: Category, Sales, Territory, Order, Budget, Country, New Country, Product, and Employee Data. The "Employee Data" query is currently selected. The main preview area shows a table with columns: Department, Extension, and Position Title. The data consists of 12 rows, mostly from the MARKETING department, with one row from OPERATIONS.

	Department	Extension	Position Title
1	MARKETING	425	Marketing Advisor
2	MARKETING	206	Marketing Advisor
3	MARKETING	207	Brand Manager
4	MARKETING	349	Senior Brand Manager
5	MARKETING	425	Marketing - Coordina...
6	MARKETING	210	Marketing - Coordina...
7	MARKETING	208	Marketing Consultatant
8	MARKETING	249	Marketing Consultatant
9	OPERATIONS	425	Supervisor
10	OPERATIONS	216	Administrator
11	OPERATIONS	215	Operations Manager
12	OPERATIONS	350	Senior Finance Manag...

Get data from Analysis Services

An analytical data engine that lets you digest data from multiple data sources and create calculations on the fly.

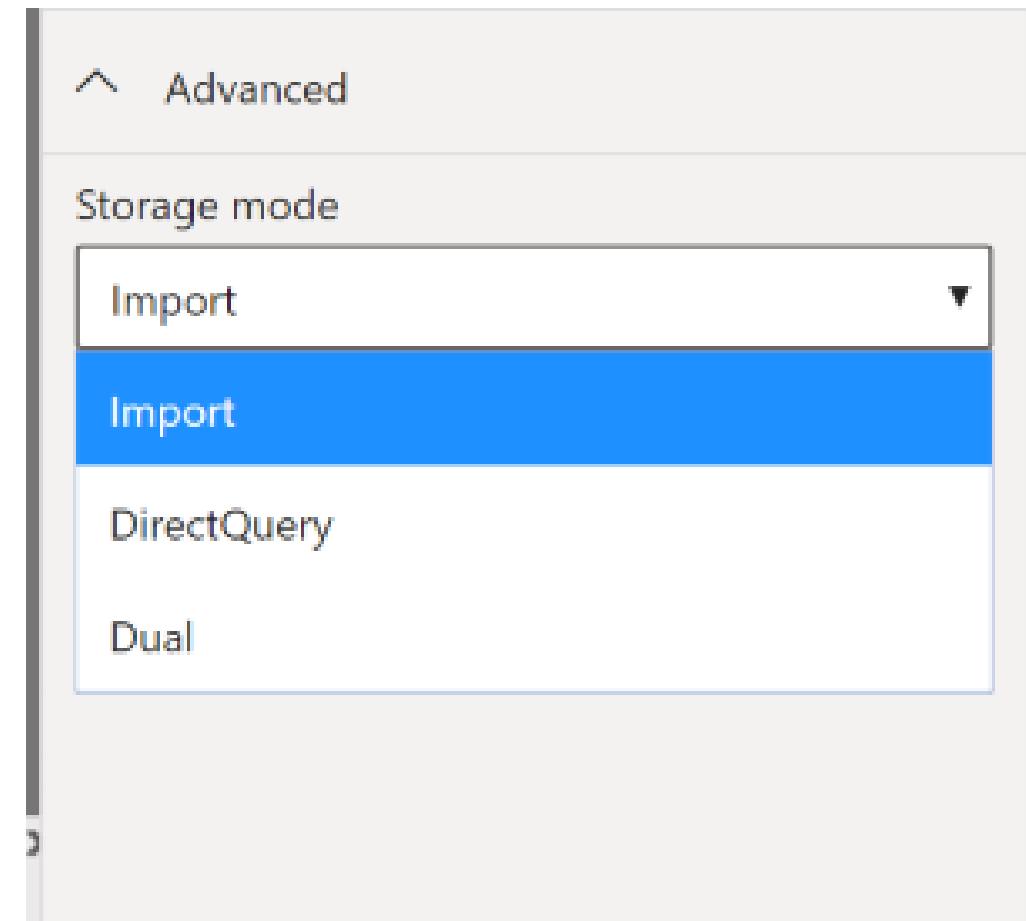


Lesson 2: Optimize Performance



Select a Storage Mode

- Specifies the storage mode of a table and lets Power BI determine how to cache data for reports.
- Set the storage mode for each table individually.



Optimize Query Performance

- Performance in Power Query depends heavily on the performance at the data source.
- Follow performance tuning guidelines of the source product.
- Some performance tuning can be done in Power BI.

Query Folding

The process that lets Power Query generate a single query statement to retrieve and transform source data.

▲ APPLIED STEPS

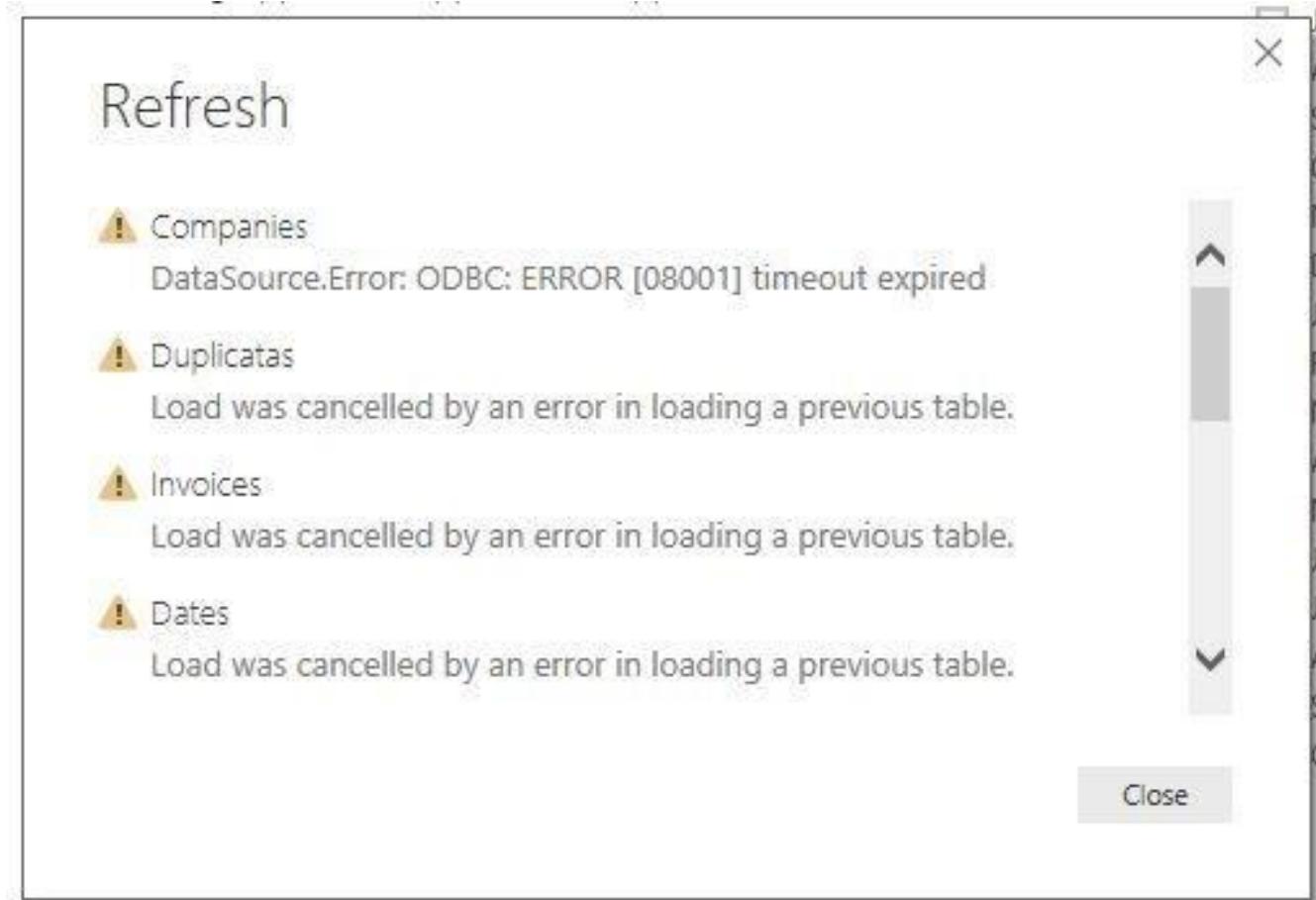
- Source 
- Navigation 
- Promoted Headers 
- Changed Type 
 -  Edit Settings
 -  Rename
 -  Delete
 - Delete Until End
 - Insert Step After
 -  Move Up
 -  Move Down
 - Extract Previous
 -  View Native Query
 -  Diagnose
 -  Properties...

Lesson 3: Resolve Data Errors



Identify and Resolve Data Import Errors

- You may encounter the following errors:
 - Query Timeout.
 - Couldn't find data formatted as a table.
 - Could not find file.
 - Data type errors.



Lab: Preparing Data

Start : 14.50 ນ.

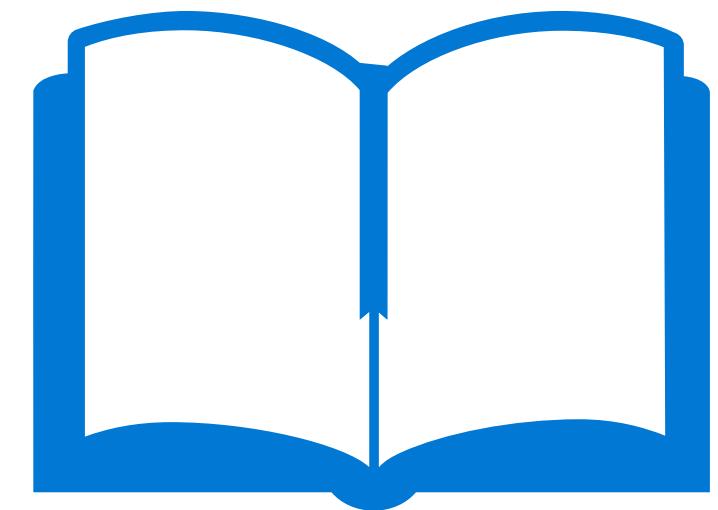
References

- DA-100 Prepare data for analysis

<https://docs.microsoft.com/en-us/learn/modules/get-data/>

- DA-100 Clean, Transform, and load data in Power BI

<https://docs.microsoft.com/en-us/learn/modules/clean-data-power-bi/>



Module 3: Clean, Transform, and Load Data In Power BI

Learning Objectives

You will learn the following concepts:

- Profiling the Data
- Shaping the Data
- Enhancing the structure of the data

Lesson 1:

Profiling the Data



Profiling Data and Examining Structures

The screenshot shows the Microsoft Power BI Data Profiler interface. On the left, the Data Model view displays various tables and their relationships. In the center, the Power Query Editor shows a query for Sales data, with a red arrow pointing to the 'SalesPerson' column. Below the editor, a table of sales data is shown with columns for Date, Latitude, Longitude, Total Excluding Tax, Total Including Tax, Profit, and SalesPerson. A red box highlights the 'Column statistics' and 'Value distribution' sections at the bottom right.

Data Model View:

```

    graph TD
        Association[Association] --- Product[Product]
        Product --- Customer[Customer]
        Customer --- Sales[Sales]
        Sales --- Store[Store]
        Store --- AssociatedProduct[Associated Product]
        AssociatedProduct --- Product
    
```

Power Query Editor:

Query: = Sql.Database("IP-C61376F4", "WideWorldImportersDW", [Query="SELECT Customer.D.Date, Location.Lat as Latitude, Location.Long as Longitude, SUM(Amount) as TotalExcludingTax, SUM(Amount) + DTax as TotalIncludingTax, SUM(Amount) - DCommission as Profit FROM Sales S JOIN Customer ON S.CustomerID = Customer.ID JOIN Location ON S.StoreID = Location.StoreID WHERE S.Date >= '2013-01-01' AND S.Date <= '2013-12-31' GROUP BY Customer.D.Date, Location.Lat, Location.Long"])

Date	Latitude	Longitude	Total Excluding Tax	Total Including Tax	Profit	SalesPerson
1/17/2013 12:00:00 AM	39.4284503	-74.4957076	1069.6	1230.04	156.2	Sophia Hinton
2/29/2013 12:00:00 AM	39.4284503	-74.4957076	149	171.35	100	Kayla Woodcock
3/2/2013 12:00:00 AM	39.4284503	-74.4957076	2171	2496.65	1247	Jack Potter
4/2/2013 12:00:00 AM	39.4284503	-74.4957076	4332	4981.8	2244	Anthony Grosse
5/3/2013 12:00:00 AM	39.4284503	-74.4957076	8892	10225.8	6636	Hudson Hollinworth
6/3/2013 12:00:00 AM	39.4284503	-74.4957076	3213	3694.95	1562.5	Sophia Hinton
7/4/2013 12:00:00 AM	39.4284503	-74.4957076	1591.2	1829.88	914.4	Kayla Woodcock
8/4/2013 12:00:00 AM	39.4284503	-74.4957076	216	248.4	120	Kayla Woodcock
9/16/2013 12:00:00 AM	39.4284503	-74.4957076	123	141.45	83.5	Sophia Hinton
10/23/2013 12:00:00 AM	39.4284503	-74.4957076	5062	5821.3	2309	Lily Code
11/20/2013 12:00:00 AM	39.4284503	-74.4957076	1631	2220.65	1141.5	Anthony Grosse

Column statistics:

- Count: 1000
- Error: 0
- Empty: 0
- Distinct: 10
- Unique: 0
- Empty string: 0
- Min: Amy Trefl
- Max: Taj Shand

Value distribution:

SalesPerson	Count
Anthony Grosse	1141.5
Kayla Woodcock	2309
Sophia Hinton	83.5
Archer Lamble	120
Taj Shand	914.4
Hudson Hollinworth	6636
Hudson Onslow	1562.5
Jack Potter	1247
Amy Trefl	100
Lily Code	100

Lesson 2: Shaping the Data

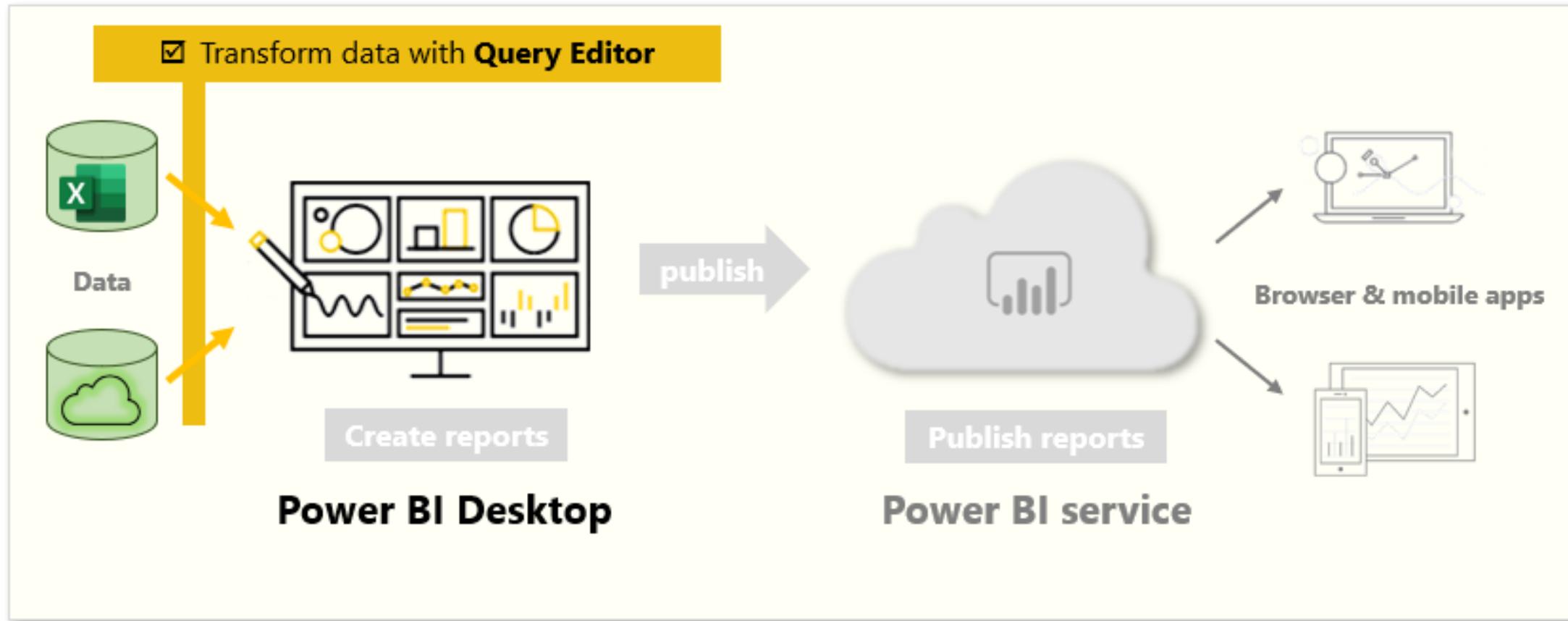


Introduction

- Benefits of clean data:
 - More accurate results
 - Better organized tables
 - Simpler data navigation
 - Human-readable values

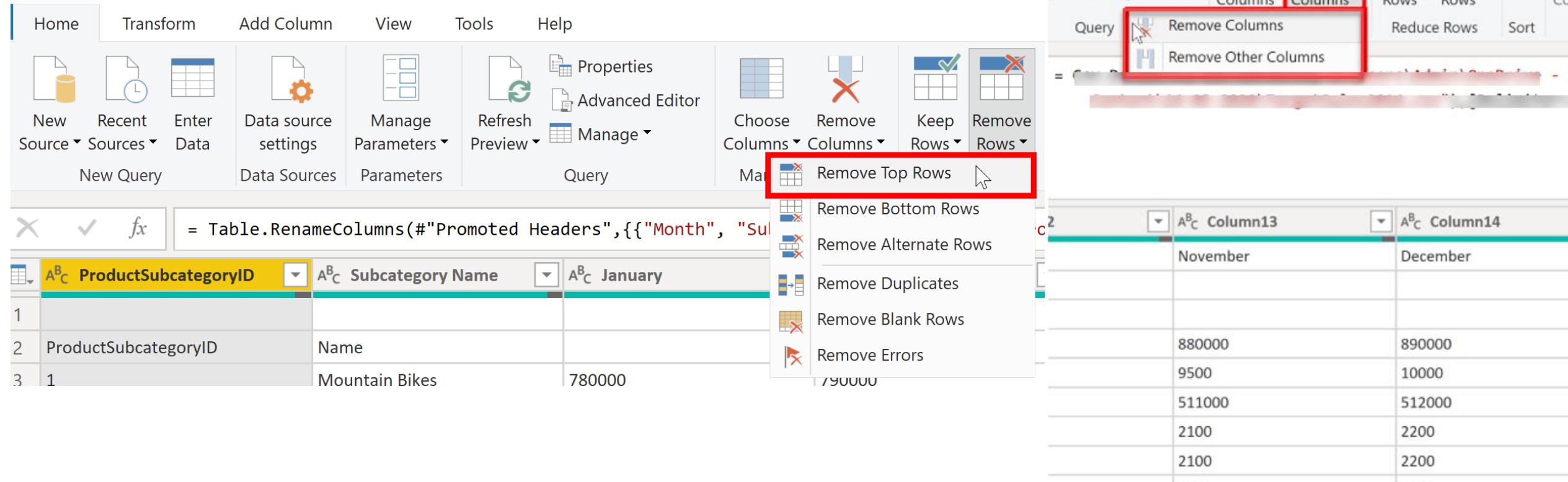
Identify column headers and names

Use Power Query Editor to clean up and shape data.



Shaping Table Structure

Shape the data to meet reporting needs.



The screenshot illustrates the Microsoft Power BI Data Editor interface, specifically focusing on the 'Transform' tab. The ribbon at the top provides various data management functions. In the 'Query' section of the ribbon, the 'Remove Columns' button is highlighted with a red box. Below the ribbon, a context menu is open over a table row, with the 'Remove Top Rows' option also highlighted with a red box. The data grid displays a table with three columns: ProductSubcategoryID, Subcategory Name, and January. The January column contains numerical values: 780000, 790000, and 2100. The entire screenshot is framed by a thick red border.

	A ^B ProductSubcategoryID	A ^B Subcategory Name	A ^B January
1			
2	ProductSubcategoryID	Name	
3	1	Mountain Bikes	780000
			790000
			2100
			2100
			2200
			2200

Unpivot and Pivot columns

Transfer data from rows to columns, and columns to rows.

	Category Name	Subcategory Name
1	Bikes	Mountain Bikes
2	Bikes	Road Bikes
3	Bikes	Touring Bikes
4	Clothing	Bib-Shorts
5	Clothing	Caps
6	Clothing	Gloves
7	Clothing	Jerseys
8	Clothing	Shorts
9	Clothing	Socks
10	Clothing	Tights
11	Clothing	Vests
12	Accessories	Bike Racks
13	Accessories	Bike Stands
14	Accessories	Bottles and Cages



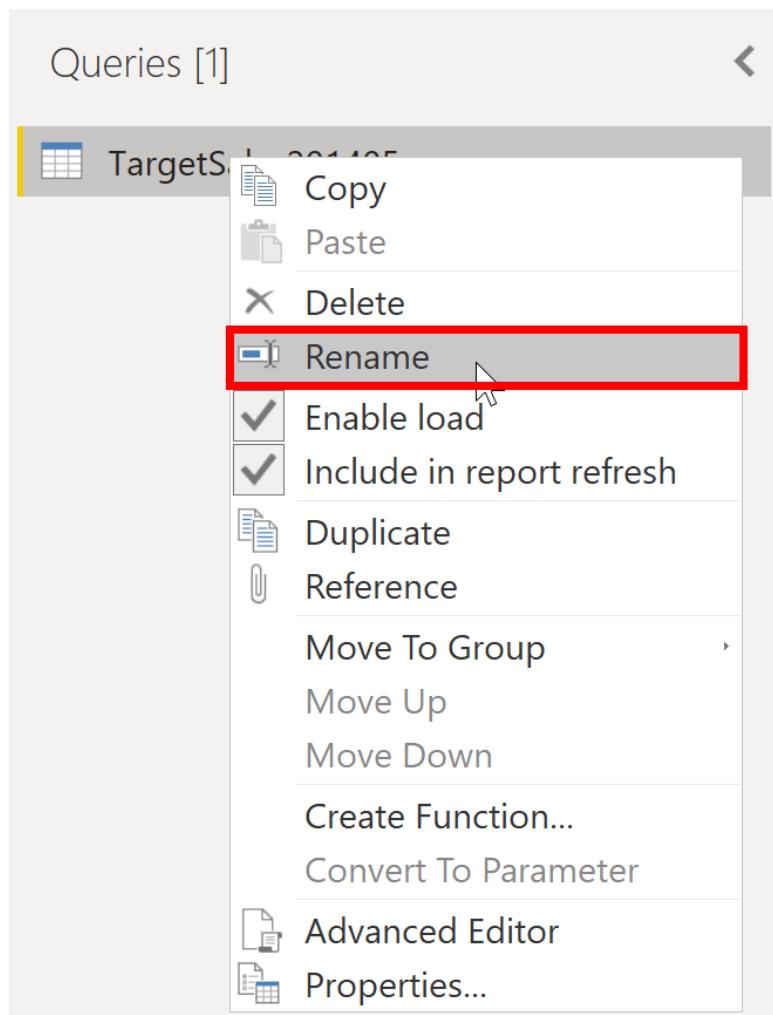
A red arrow points from the source table on the left to the target table on the right, indicating the transformation process.

	1.2 Bikes	1.2 Components	1.2 Clothing	1.2 Accessories
1	3	14	8	12

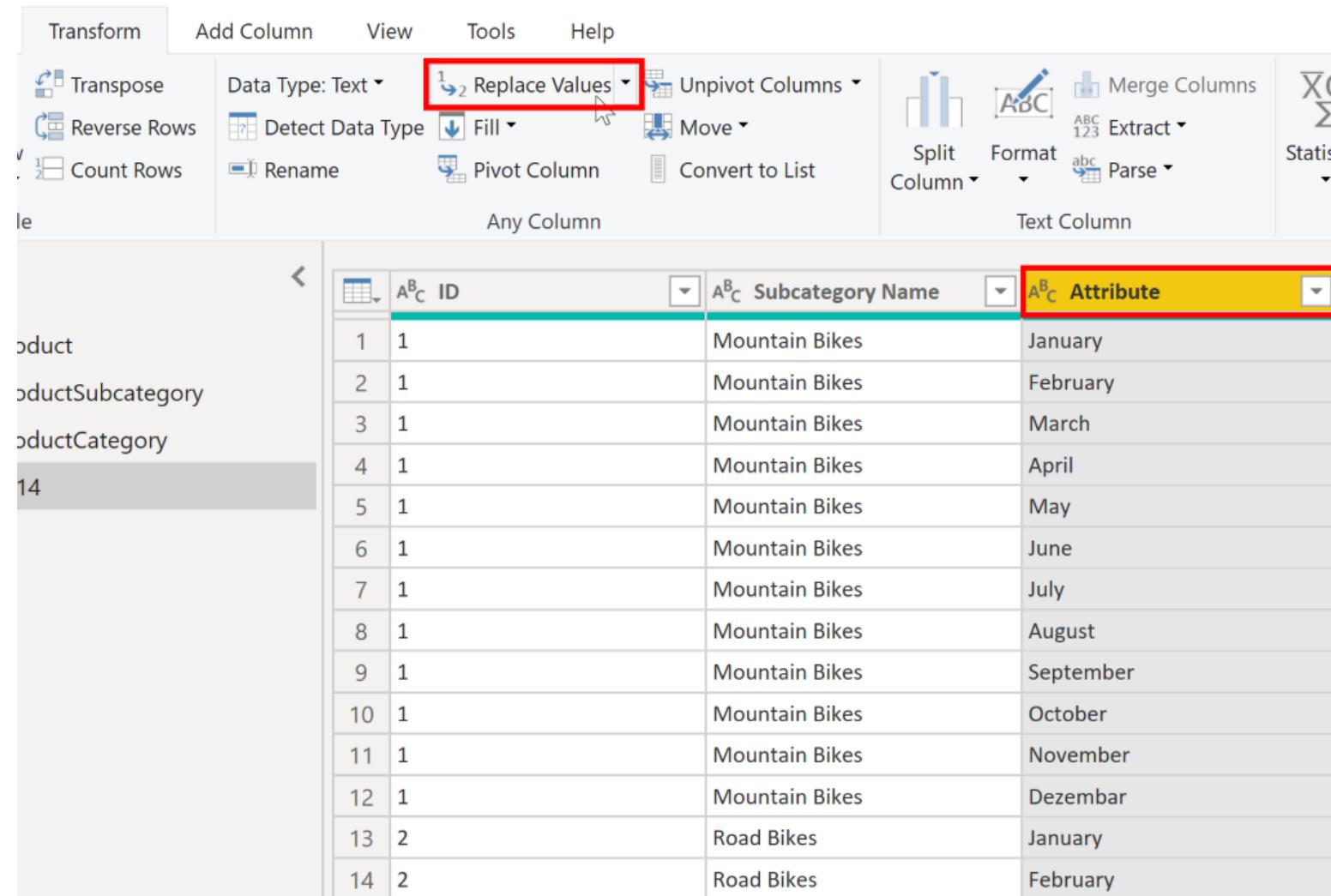
Lesson 3: Enhance the Data Structure



Apply user-friendly value replacements



Make information user-friendly.

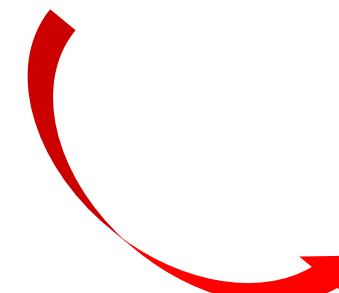


The screenshot shows the Power BI Query Editor interface. The ribbon has 'Transform' selected. The 'Replace Values' button in the 'Text Column' section is highlighted with a red box. A table is displayed with three columns: 'ID', 'Subcategory Name', and 'Attribute'. The 'Attribute' column is highlighted with a yellow box. The data in the table is as follows:

ID	Subcategory Name	Attribute
1	Mountain Bikes	January
2	Mountain Bikes	February
3	Mountain Bikes	March
4	Mountain Bikes	April
5	Mountain Bikes	May
6	Mountain Bikes	June
7	Mountain Bikes	July
8	Mountain Bikes	August
9	Mountain Bikes	September
10	Mountain Bikes	October
11	Mountain Bikes	November
12	Mountain Bikes	Dezembar
13	Road Bikes	January
14	Road Bikes	February

Evaluate and Change Column Data Types

SalesOrderID	OrderDate	Sort_of_Sales	ProductID	OrderQty
52242	07/07/2013	Internet	870	1
52592	14/07/2013	Internet	870	1
52694	16/07/2013	Internet	870	1
52799	18/07/2013	Internet	870	1
53799	03/08/2013	Internet	870	1
54058	08/08/2013	Internet	870	1
54059	08/08/2013	Internet	870	1
54063	08/08/2013	Internet	870	1
54158	10/08/2013	Internet	870	1
54281	12/08/2013	Internet	870	1



Couldn't load the data for this visual

MdxScript(Model) (19, 40) Calculation error in measure
'Sales'[Quantity of Orders YTD]: A column specified in the call to
function 'TOTALYTD' is not of type DATE. This is not supported.

[Copy details](#)

[Send a Frown](#)

[Close](#)

Combine Multiple Tables into a Single Table

Append

Concatenate rows from three or more tables into a single table.

Two tables Three or more tables

Available tables

Production Suppliers
Sales Customers
HR Employees

Tables to append

Production Suppliers
Sales Customers
HR Employees

Add >> OK Cancel

Merge

Select a table and matching columns to create a merged table.

Sales Orders

orderid	custid	empid	orderdate	requireddate	shippeddate	shipperid	freight	shipname
10248	85	5	7/4/2014	8/1/2014	7/16/2014	3	32.38	Ship to 85-B
10249	79	6	7/5/2014	8/16/2014	7/10/2014	1	11.61	Ship to 79-C
10250	34	4	7/8/2014	8/5/2014	7/12/2014	2	65.83	Destination SCO
10251	84	3	7/8/2014	8/5/2014	7/15/2014	1	41.34	Ship to 84-A

Sales OrderDetails

orderid	productid	unitprice	qty	discount
10248	11	14.00	12	0
10248	42	9.80	10	0
10248	72	34.80	5	0
10249	14	18.60	9	0
10249	51	42.40	40	0

Join Kind
 Use fuzzy matching to perform the merge

The selection matches 830 of 830 rows from the first table. OK Cancel

Use Advanced Editor to Modify M Code

See the code that Power Query Editor is creating with each step.

Sales Orders Display Options ▾ ?

```
let
    Source = Sql.Database("localhost", "tsqlv4"),
    Sales_Orders = Source{[Schema="Sales",Item="Orders"]}[Data],
    #"Split Column by Delimiter" = Table.SplitColumn(Sales_Orders, "shipaddress", Splitter.SplitTextByDelimiter(",", QuoteStyle.Csv), {"shipaddress.1", "shipaddress.2"}),
    #"Changed Type" = Table.TransformColumnTypes(#"Split Column by Delimiter",{{"shipaddress.1", type text}, {"shipaddress.2", type text}}),
in
    #"Changed Type"
```

No syntax errors have been detected.

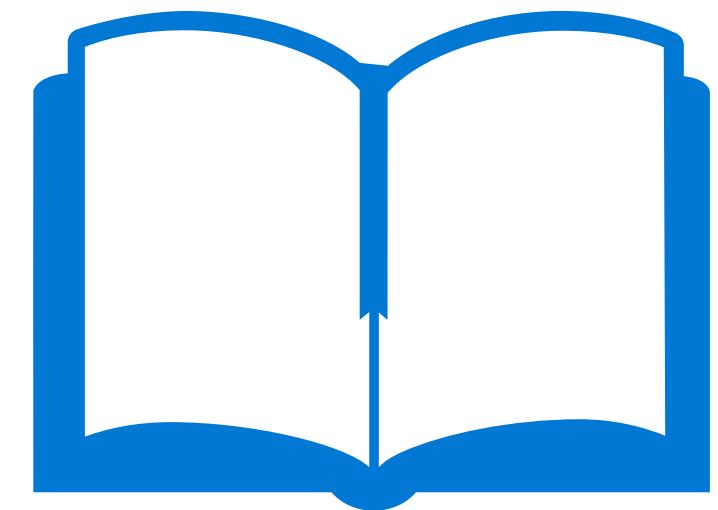
Done Cancel

Lab: Transforming and Loading Data

References

- DA-100 Clean, transform, and load data in Power BI

<https://docs.microsoft.com/en-us/learn/modules/clean-data-power-bi/>



Module 4: Design a Data Model In Power BI

Start : 13.15

Learning Objectives

You will learn the following concepts:

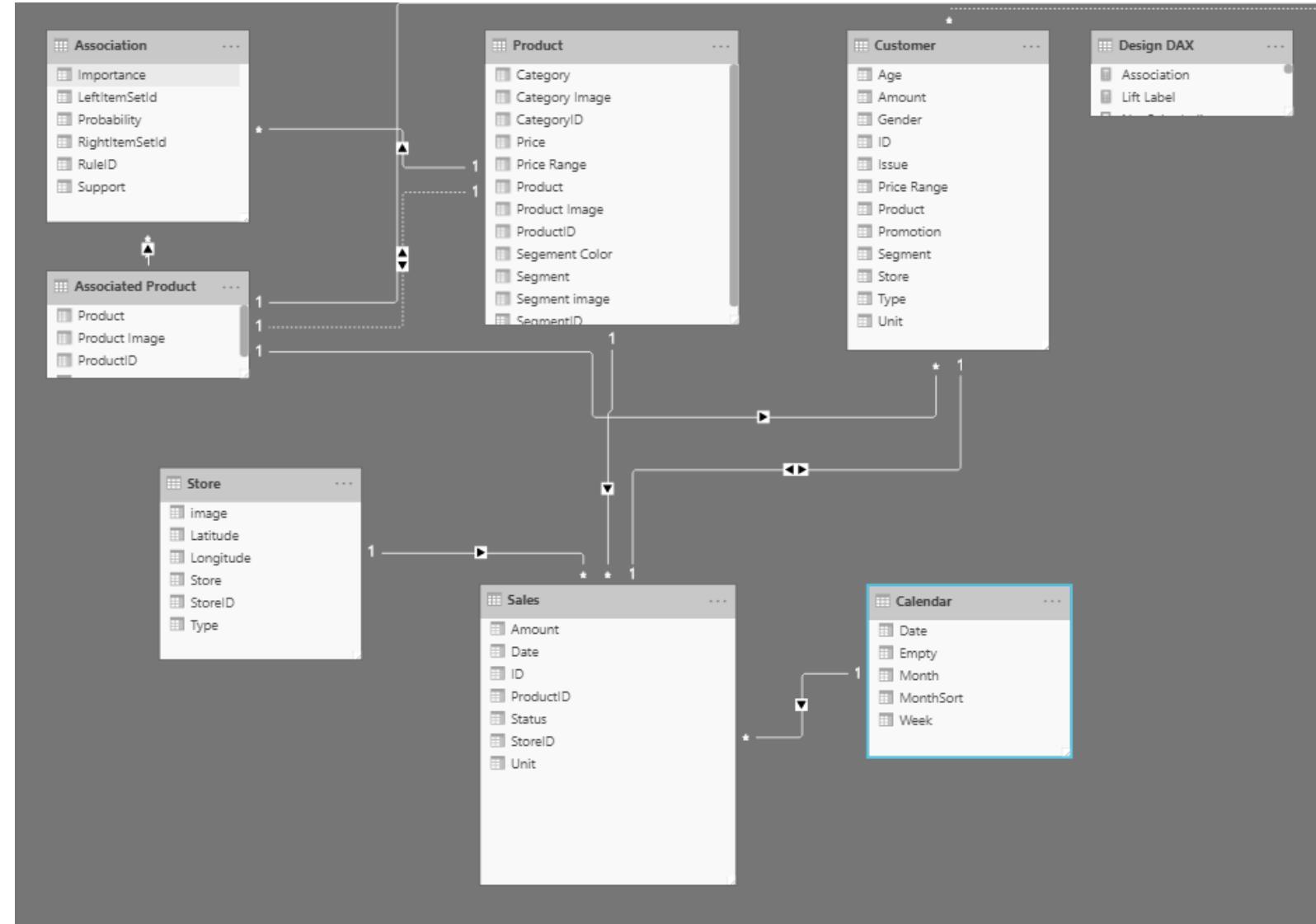
- Data Modeling
- Working with Tables
- Dimensions and Hierarchies

Lesson 1: Introduction to Data Modeling

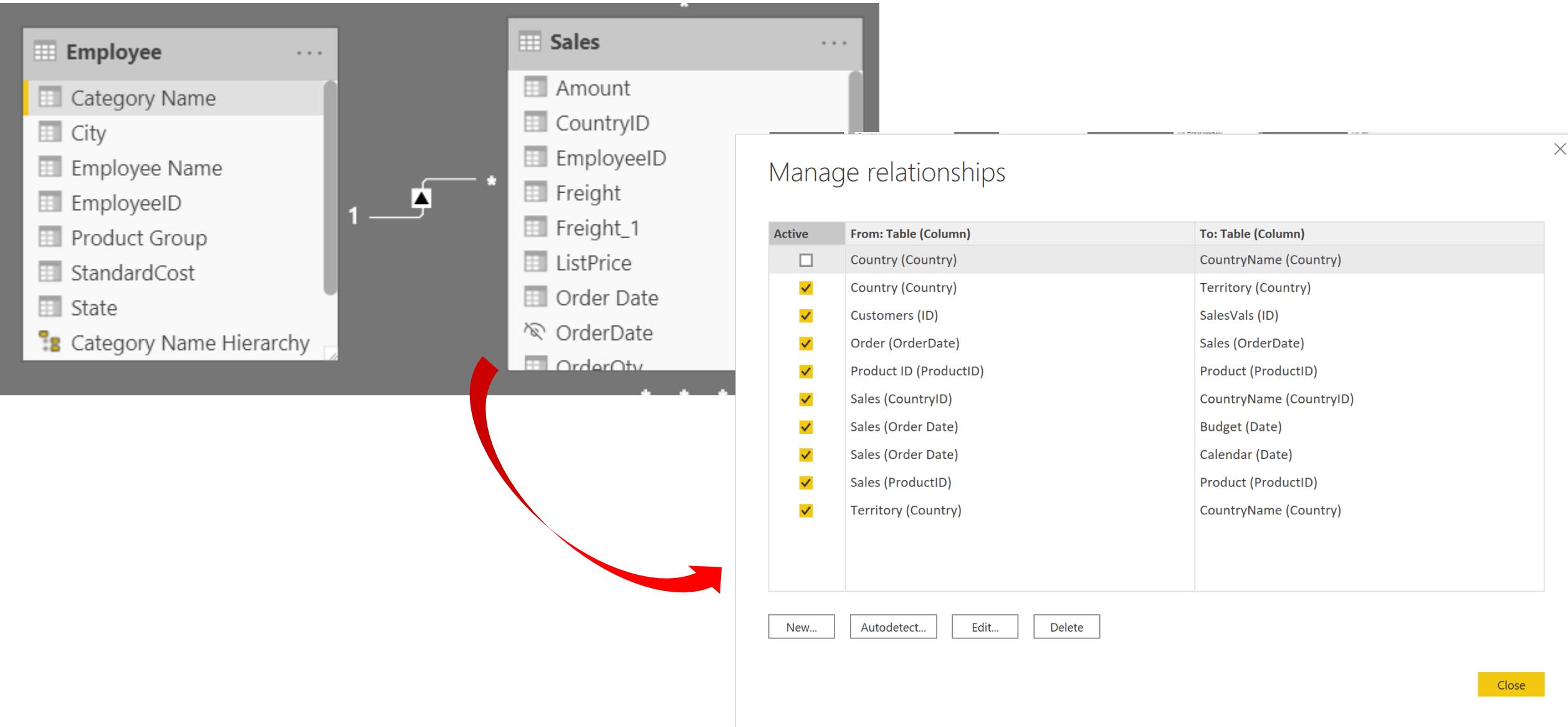


Introduction to Data Modeling

- Benefits of a good data model:
 - Accurate reports.
 - Faster data exploration.
 - Simpler aggregations.
 - Easier to maintain.



Joins and Relationships



The screenshot illustrates the management of joins and relationships in a data model. On the left, two tables are shown: **Employee** and **Sales**. A relationship is established between them, indicated by a line with a 1 on the **Employee** side and an * on the **Sales** side. A red curved arrow points from the **Employee** table towards the **Manage relationships** dialog box.

Employee table columns:

- Category Name
- City
- Employee Name
- EmployeeID
- Product Group
- StandardCost
- State
- Category Name Hierarchy

Sales table columns:

- Amount
- CountryID
- EmployeeID
- Freight
- Freight_1
- ListPrice
- Order Date
- OrderDate
- OrderQty

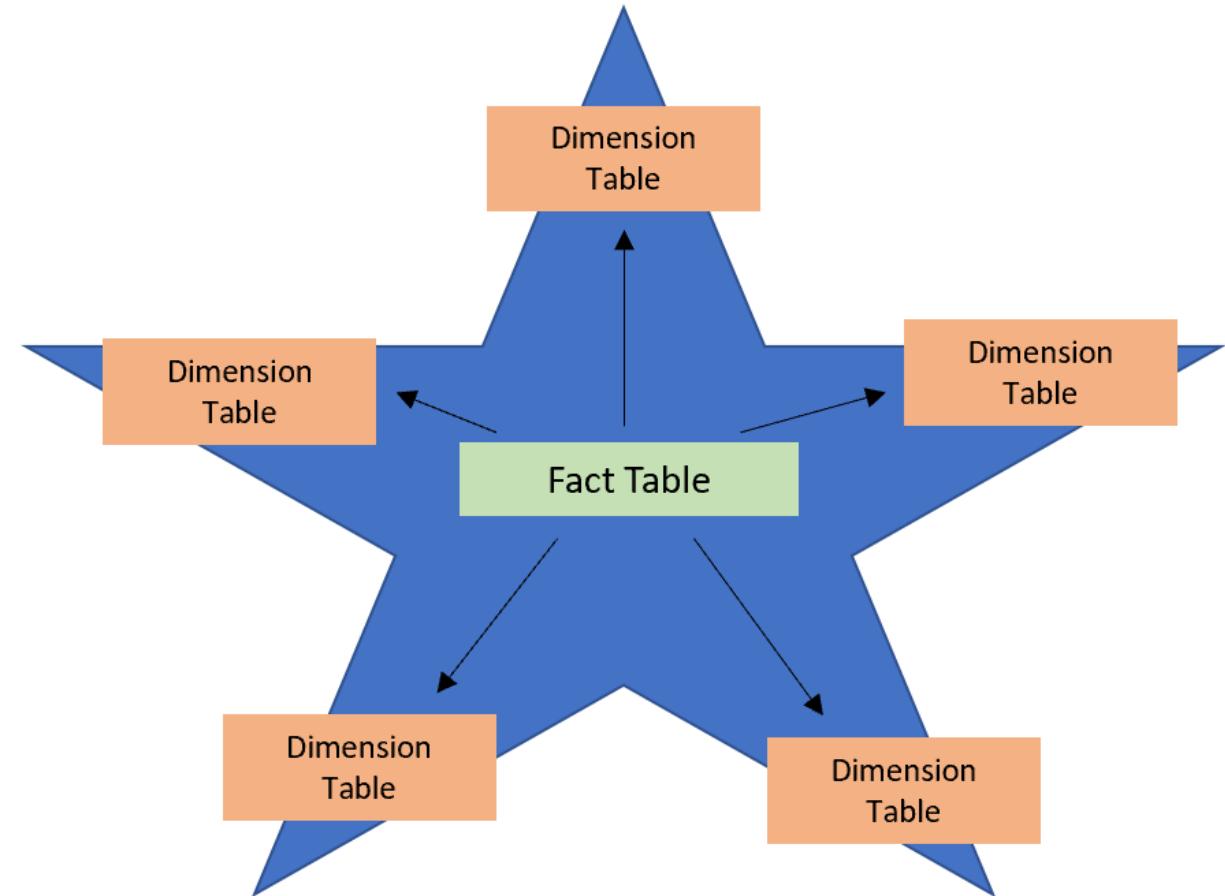
Manage relationships dialog box:

Active	From: Table (Column)	To: Table (Column)
<input type="checkbox"/>	Country (Country)	CountryName (Country)
<input checked="" type="checkbox"/>	Country (Country)	Territory (Country)
<input checked="" type="checkbox"/>	Customers (ID)	SalesVals (ID)
<input checked="" type="checkbox"/>	Order (OrderDate)	Sales (OrderDate)
<input checked="" type="checkbox"/>	Product ID (ProductID)	Product (ProductID)
<input checked="" type="checkbox"/>	Sales (CountryID)	CountryName (CountryID)
<input checked="" type="checkbox"/>	Sales (Order Date)	Budget (Date)
<input checked="" type="checkbox"/>	Sales (Order Date)	Calendar (Date)
<input checked="" type="checkbox"/>	Sales (ProductID)	Product (ProductID)
<input checked="" type="checkbox"/>	Territory (Country)	CountryName (Country)

Buttons at the bottom of the dialog box: New..., Autodetect..., Edit..., Delete, Close.

Star Schemas

- Tables are classified as dimension or fact tables.
 - Dimension: Describes business entities.
 - Fact: Store observations or events.

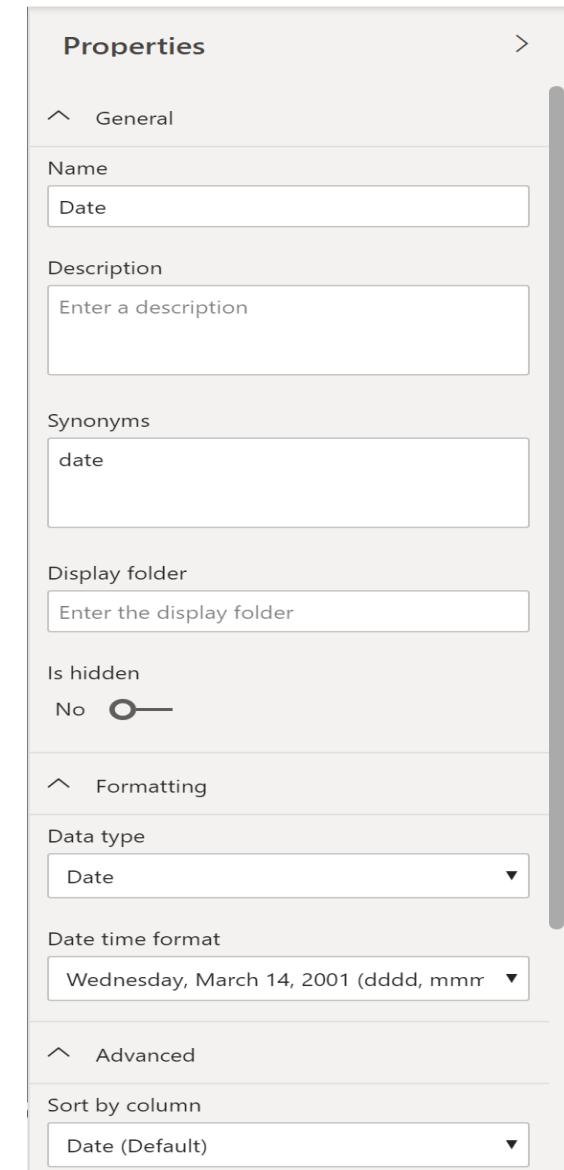


Lesson 2: Working with Tables



Configure Table and Column Properties

- Before working on reports, ensure your model and table structure are simplified.
- A simple table structure will be easy to navigate.



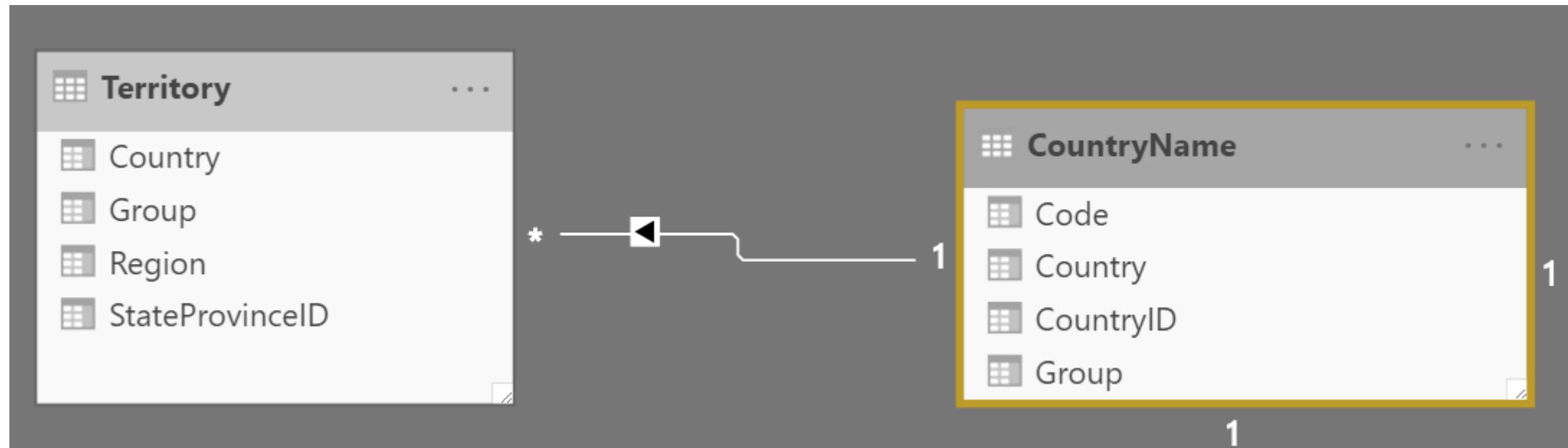
Create a Dates Table

Standardize on date formats and ranges that meet company requirements.

Date	Year	MonthNum	WeekNum	DayoftheWeek
Tuesday, May 31, 2011	2011	5	23	Tuesday
Wednesday, June 1, 2011	2011	6	23	Sunday
Thursday, June 2, 2011	2011	6	23	Monday
Friday, June 3, 2011	2011	6	23	Tuesday

Relationships and Cardinality

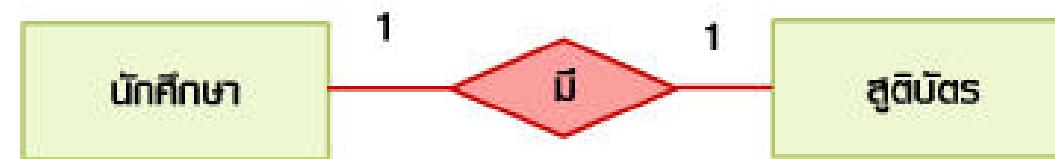
- Relationship: Formed by correlating rows belonging to different tables.
- Cardinality: Uniqueness of data values in a column.



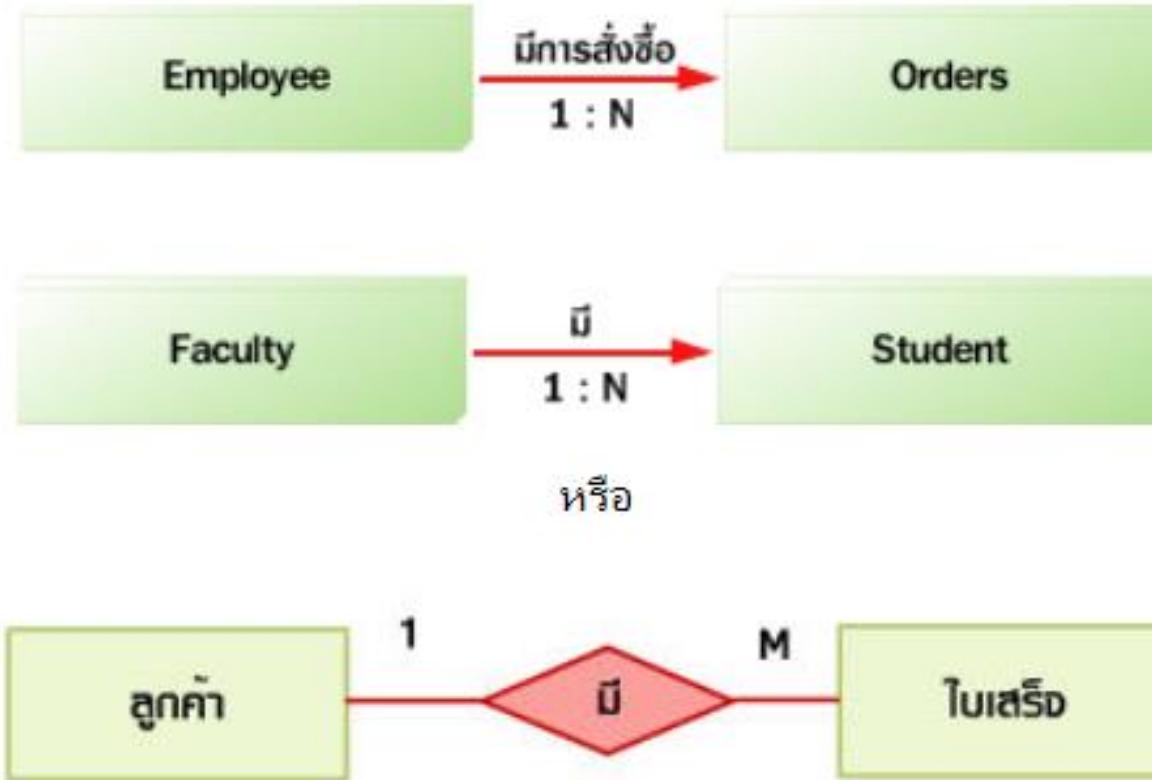
1:1 Relationship



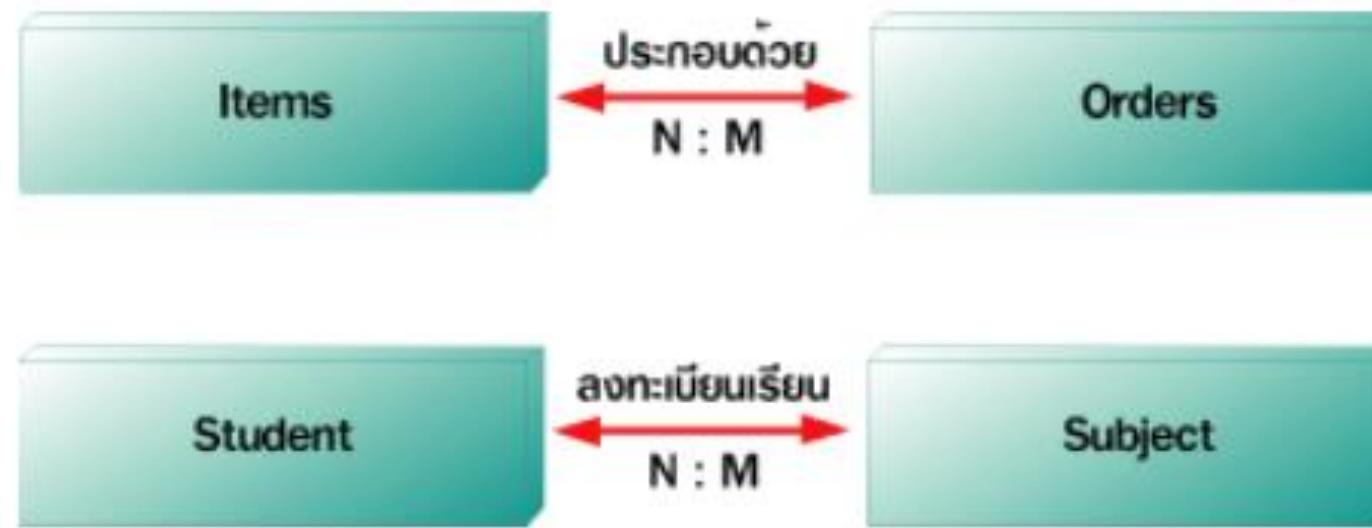
หรือ



1 : * Relationship



M : N Relationship



<https://cst.tsu.ac.th/>

Create Many-to-many Relationships

CustID	CustName
1022	Roy M
1023	Bob K
1024	Ellen L
1025	Mitch W
1026	Regan Q
1027	Lulu S
1028	Aliya R

CustomerTable

CustomerID	AccountID	AccountName
1022	12	BHP
1023	12	BHP
1024	13	RogerInc
1024	14	MyShip
1026	15	Holdings Unl.
1025	16	Key Biz Insiders
1028	17	Ty Inc
1022	17	Ty Inc

AccountTable

Create relationship

Select tables and columns that are related.

AccountTable

CustomerID	AccountID	AccountName
1022	12	BHP
1023	12	BHP
1024	13	RogerInc

CustomerTable

CustID	CustName
1022	Roy M
1023	Bob K
1024	Ellen L

Cardinality: **Many to Many (*:*)** Cross filter direction: **Both**

Make this relationship active Apply security filter in both directions

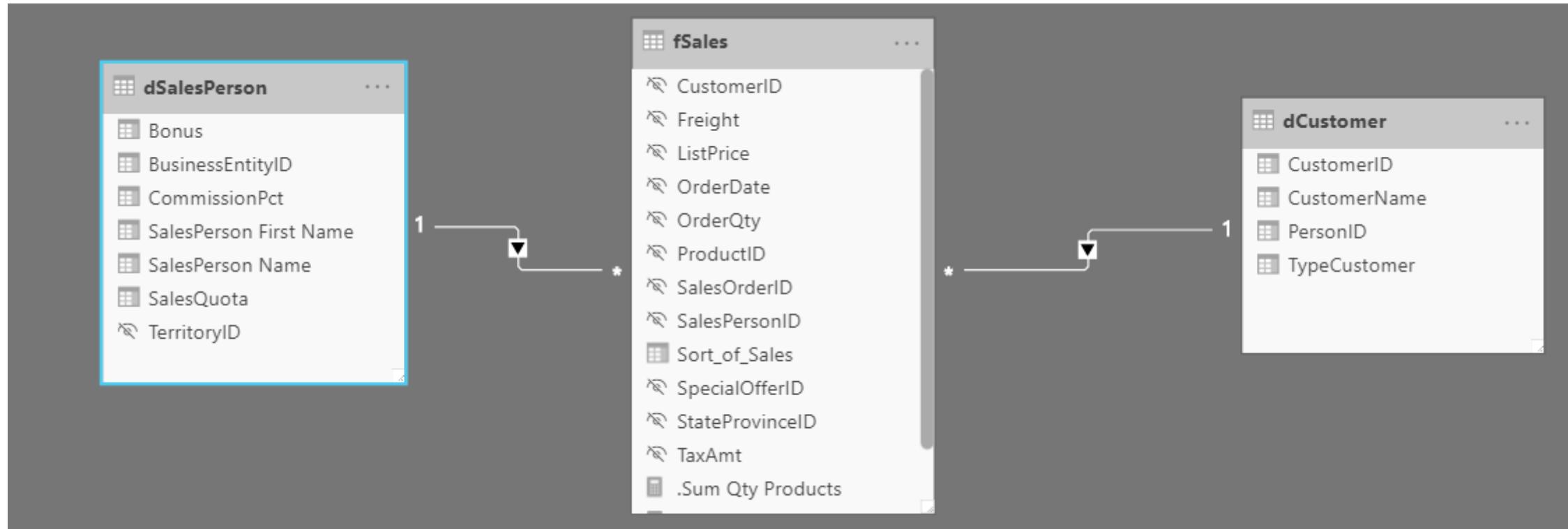
Assume referential integrity

! This relationship has cardinality Many-Many. This should only be used if it is expected that neither column (CustomerID and CustID) contains unique values, and that the significantly different behavior of Many-many relationships is understood. [Learn more](#)

OK **Cancel**

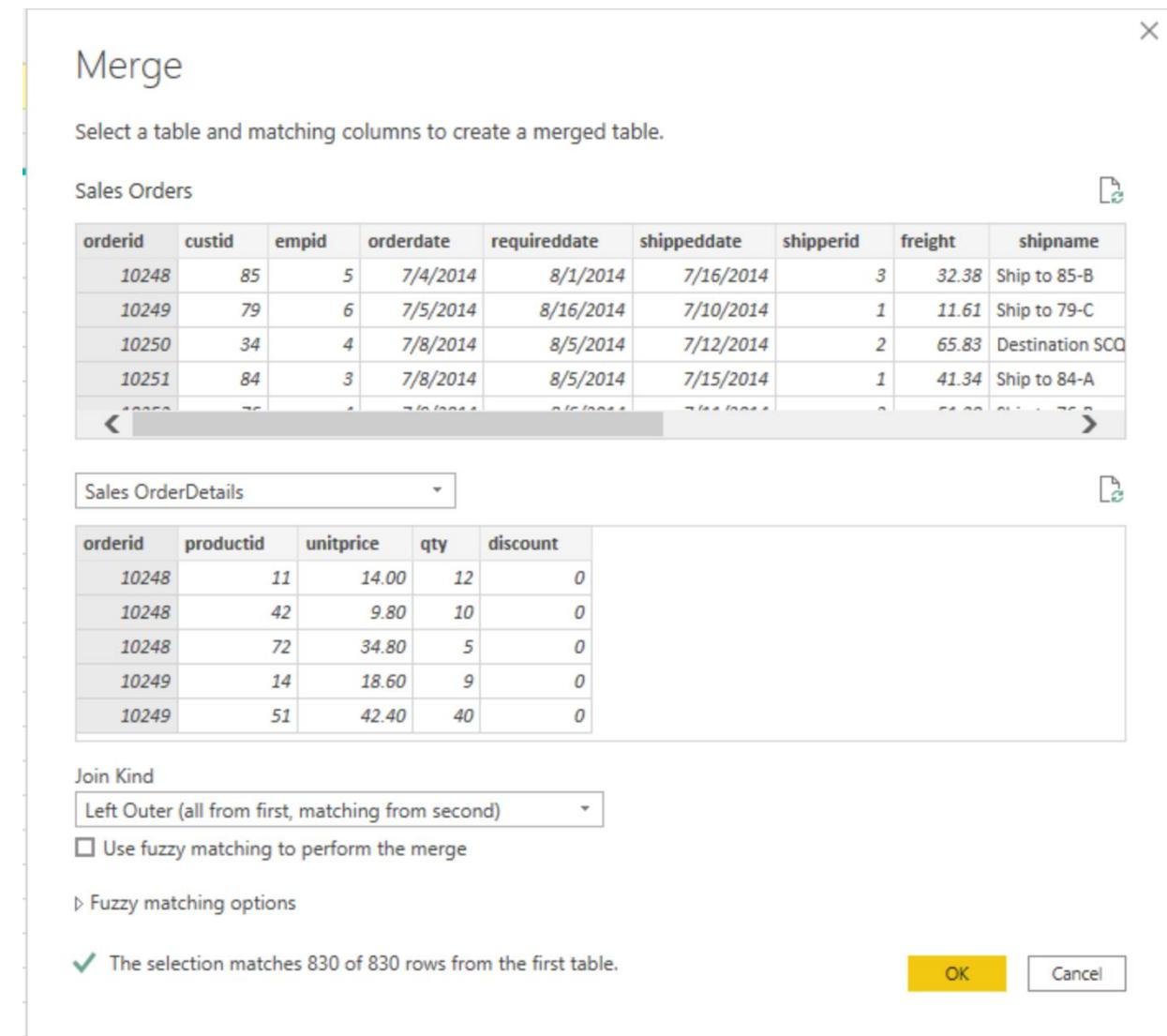
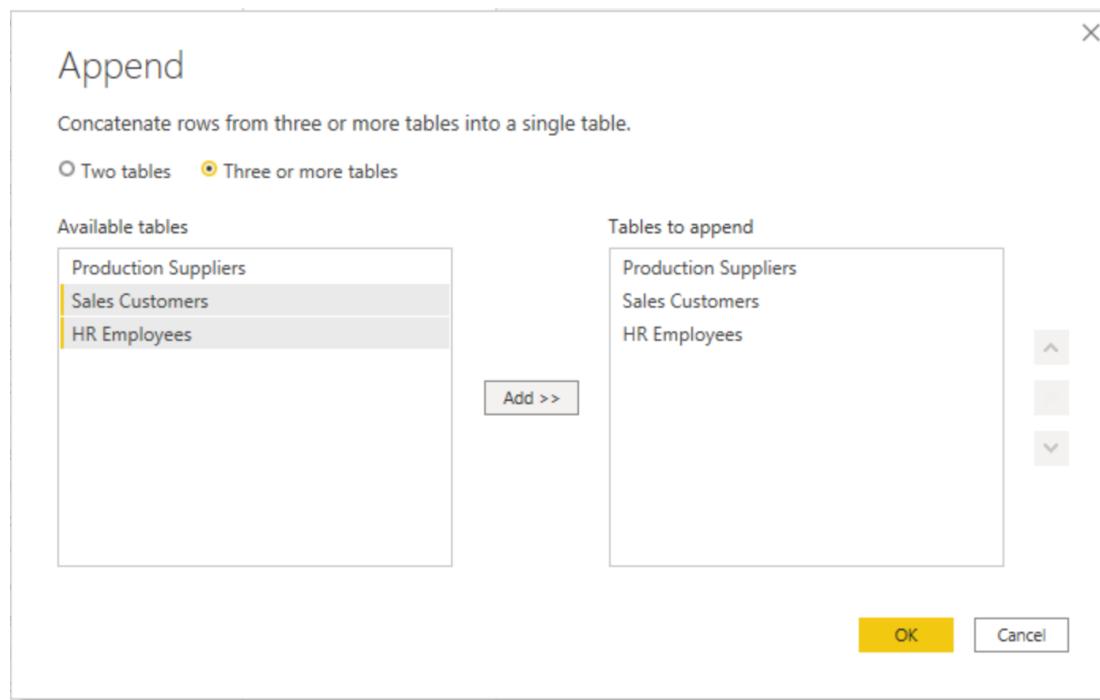
Modeling Challenges

Circular relationships and relational dependencies.



Combine Queries

- Two methods for combining queries:
 - Append
 - Merge



Lab: Data Modeling in Power BI Desktop

Lesson 3: Dimensions and Hierarchies



Introduction to Dimensions and Hierarchies

- Dimension: Store details about business entities.
- Hierarchy: Organize data such that one element is ranged over other data.

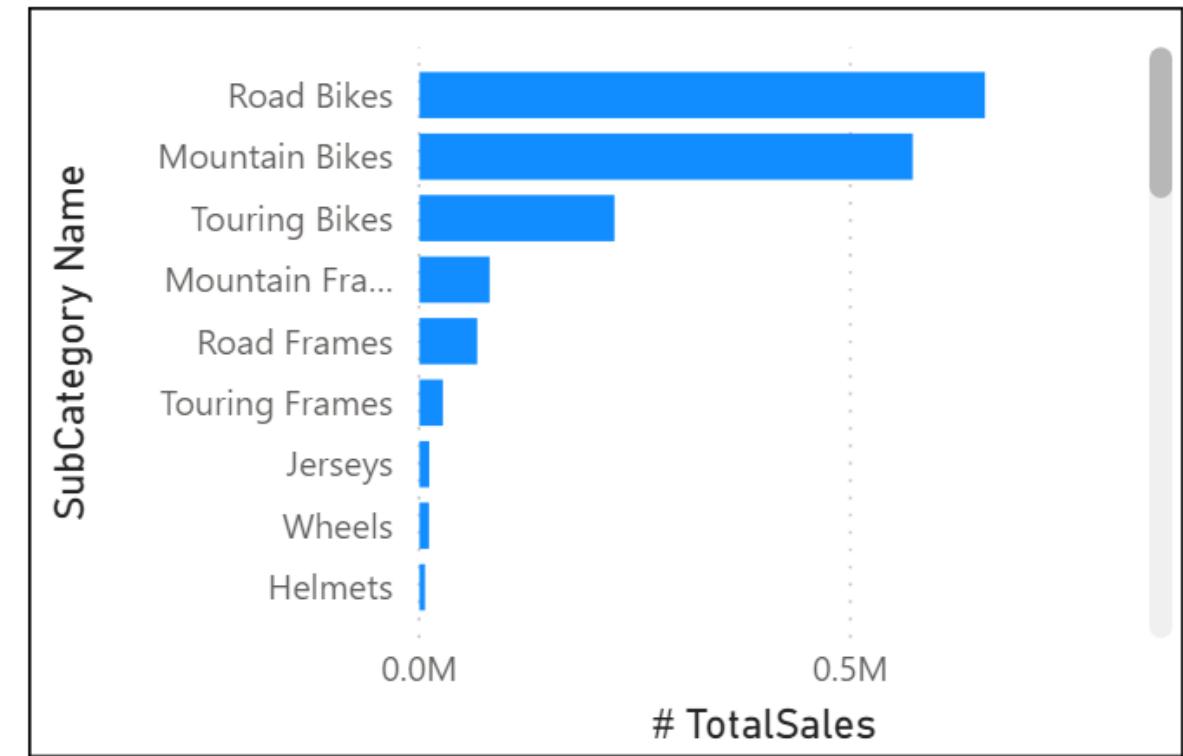
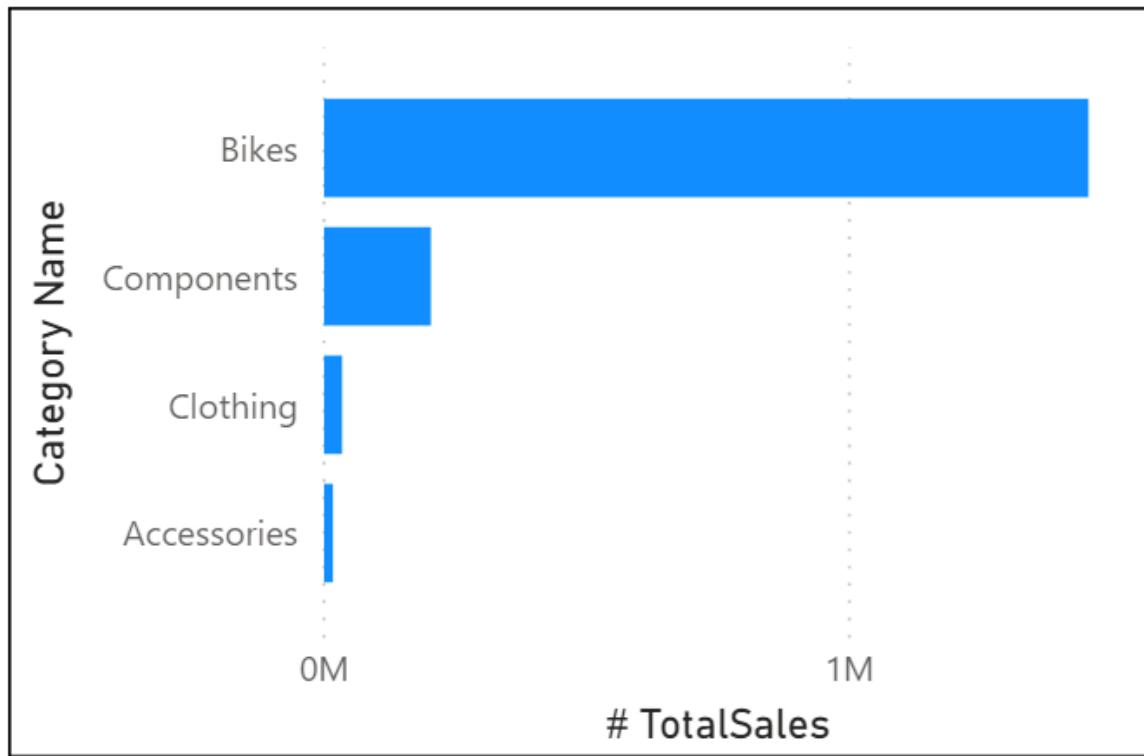
	Employee ID	Employee	Manager ID	Manager
1	1010	Roy F	null	
2	1011	Pam H	1010	Roy F
3	1012	Guy L	1010	Roy F
4	1013	Roger M	1011	Pam H
5	1014	Kaylie S	1011	Pam H
6	1015	Mike O	1012	Guy L
7	1016	Rudy Q	1012	Guy L

Role-playing Dimensions

A dimension that can filter related facts differently.



Creating new Hierarchies



Flatten out a Parent-child Hierarchy

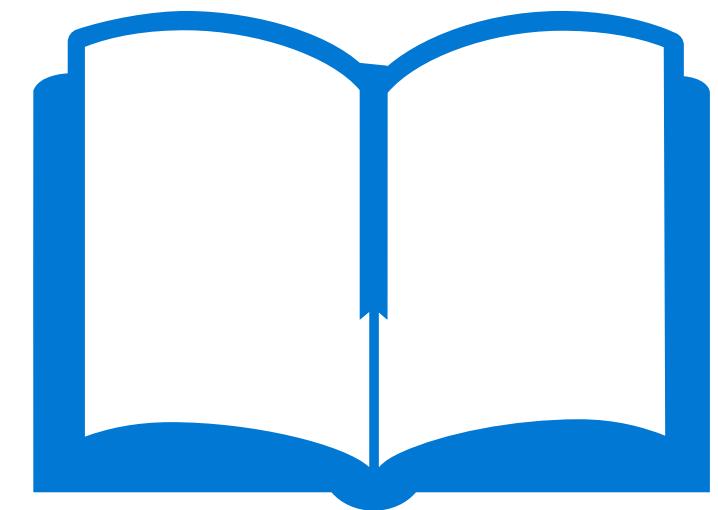
Employee ID	Manager ID	Employee	Manager	Path	Level 1	Level 2	Level 3	Level 4
Employee ID	Name	Manager	Manager ID	Path				
1010	Roy F			1010				
1011	1010 Pam H	Roy F		1010 1011				
1012	1010 Guy L	Roy F		1010 1012				
1013	1011 Roger M	Pam H		1010 1011 1013				
1014	1011 Kaylie S	Pam H		1010 1011 1014				
1015	1012 Mike O	Guv L		1010 1012 1015				
1000	Quincy Howard			1000	1000			
1001	Mallory Yang	Quincy Howard	1000	1000 1001	1000	1001		
1002	Donovan Maynard	Quincy Howard	1000	1000 1002	1000	1002		
1003	Giselle Mcclain	Mallory Yang	1001	1000 1001 1003	1000	1001	1003	
1004	Melvin Marsh	Mallory Yang	1001	1000 1001 1004	1000	1001	1004	
1005	Ria Snow	Giselle Mcclain	1003	1000 1001 1003 1005	1000	1001	1003	1005
1006	Callie Savage	Giselle Mcclain	1003	1000 1001 1003 1006	1000	1001	1003	1006

Lab: Advanced Data Modeling in Power BI Desktop

References

- DA-100 Design a data model in Power BI

<https://docs.microsoft.com/en-us/learn/modules/design-model-power-bi/>



Module 5: Create Model Calculations using DAX in Power BI

Learning Objectives

You will learn the following concepts:

- DAX
 - Measures
 - Calculated columns
 - Context
 - Time-Intelligence

Lesson 1: Introduction to DAX

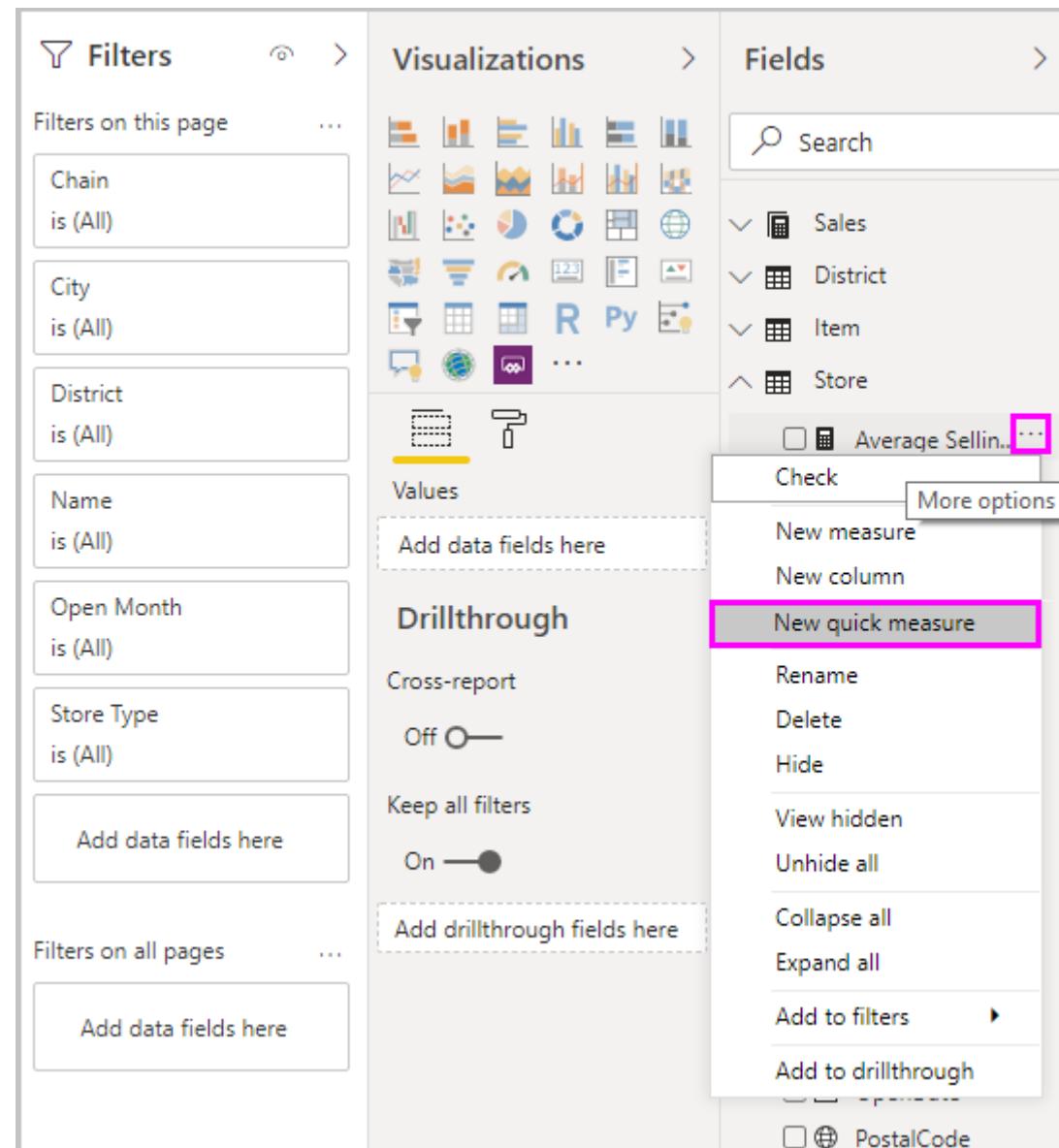


Introduction to DAX

- Data Analysis Expressions (DAX).
- Developed by Microsoft.
- A library of functions and operators.
- Build formulas and expressions.
- Create calculated tables, columns, and measures.

Measures

- Measures are a summarization of data.
- A way of defining aggregate calculations on data.
- Often called “Calculated Measures”.



Calculated Columns

The screenshot illustrates the creation of a calculated column in a Microsoft Power Platform data view. On the left, the 'Structure' tab shows a table with six columns: Order ID, Product ID, Quantity, Unit Price, and Total Price. The 'Total Price' column is currently empty and highlighted in blue, indicating it is being edited. The formula bar at the top displays the formula: `1 Column =`. The formula itself is shown below the table: `Total Price = 'Sales OrderDetails'[Quantity] * 'Sales OrderDetails'[Unit Price]`. A red curved arrow points from the formula back to the 'Total Price' column in the table. On the right, the 'Properties' tab shows the table structure with columns: Order ID, Product ID, Quantity, Unit Price, and Total Price.

Order ID	Product ID	Quantity	Unit Price	Total Price
10248	11	12	\$14	\$168
10248	42	10	\$9.8	\$98
10248	72	5	\$34.8	\$174
10249	14	9	\$18.6	\$167.4
10249	51	40	\$42.4	\$1,696
10250	41	10	\$7.7	\$77
10250	51	35	\$42.4	\$1,484
10250	65	15	\$16.8	\$252
10251	22	6	\$16.8	\$100.8
10251	57	15	\$15.6	\$234
10251	65	20	\$16.8	\$336
10252	20	40	\$64.8	\$2,592
10252	33	25	\$2	\$50
10252	60	40	\$27.2	\$1,088

Columns vs. Measures

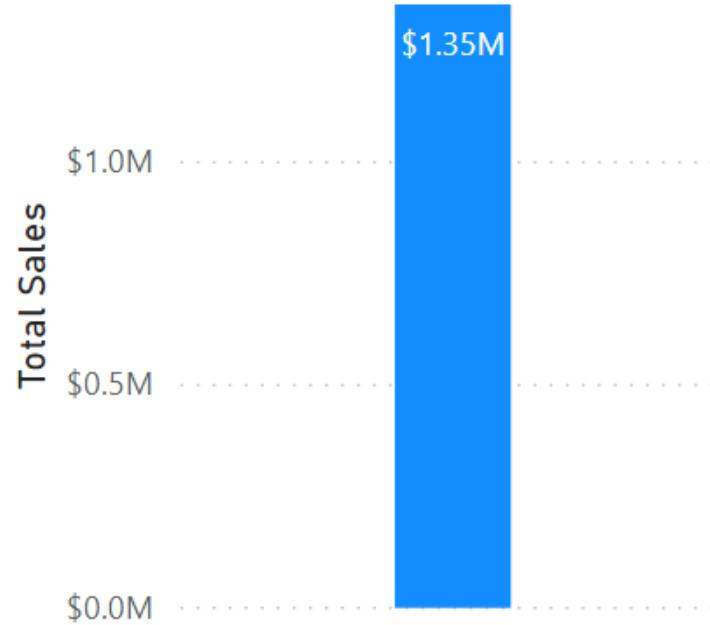
- Calculated column creates a value for each row in a table.
- Calculated column values are stored in the Power BI .pbix file.
- Measures are calculated on demand.
- Measures are calculated based on filters.

Lesson 2: DAX Content

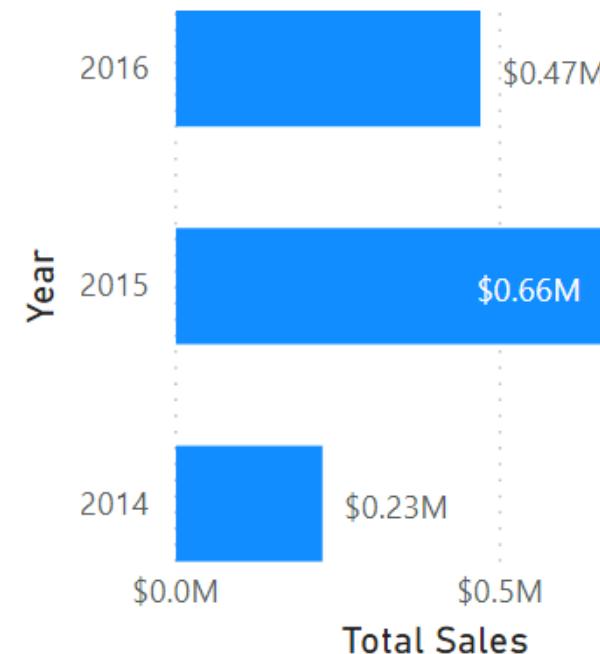


Understanding Context

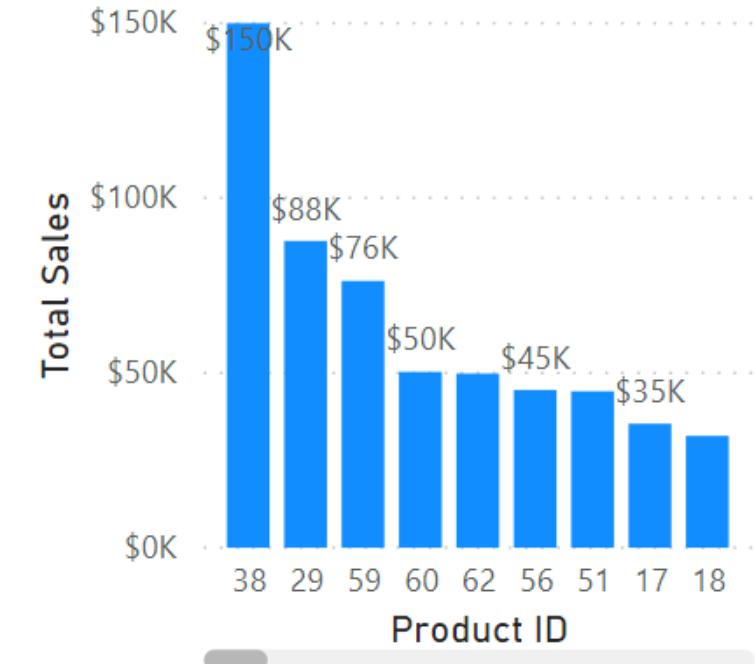
Total Sales



Total Sales by Year



Total Sales by Product ID



วิธีการชำระเงิน เงินสด						
Sum of ยอดขาย Column Labels						
Row Labels	dvd หนัง	ของเล่น	หนังสือ	อาหาร	Grand Total	
sales ก	11368	7360	2930	9590	31248	
sales ข	6386	6070	6560	3340	22356	
sales ค	998	1 1100	490	10350	3 12938	
sales ง	9275	6770	3970	4580	24595	
Grand Total	28027	2 21300	13950	27860	4 91137	

<https://www.thepexcel.com/>

```
-- HASONEVALUE checks that a column has only one value
-- visible in the current filter context
```

DEFINE

```
MEASURE Sales[Audio only] =
    CALCULATE (
        HASONEVALUE ( 'Product'[Category] ),
        'Product'[Category] = "Audio"
    )
MEASURE Sales[Audio and computers] =
    CALCULATE (
        HASONEVALUE ( 'Product'[Category] ),
        'Product'[Category] IN { "Audio", "Computers" }
    )
EVALUATE
{
    ( "Audio only", [Audio only] ),
    ( "Audio and computers", [Audio and computers] ),
}
```

HASONEVALUE (<ColumnName>)

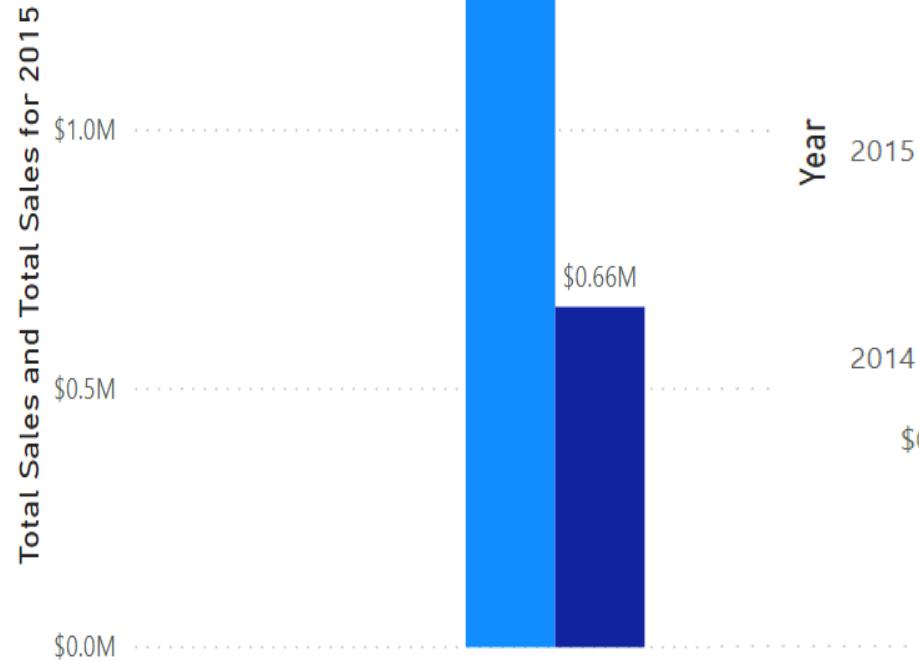
PARAMETER	ATTRIBUTES	DESCRIPTION
ColumnName		The column to check the filter info.

Value1	Value2
Audio only	true
Audio and computers	false

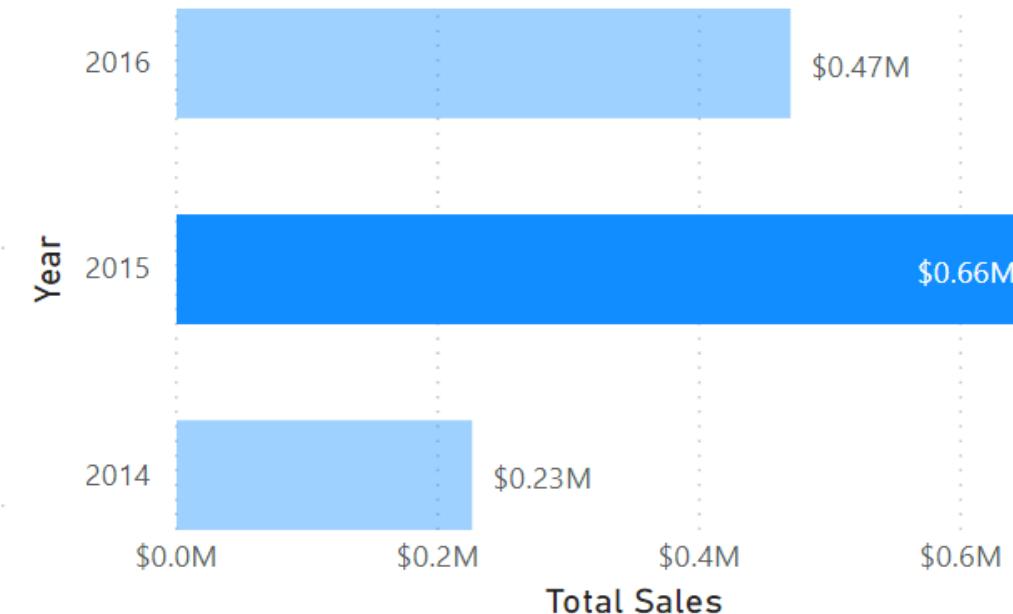
The CALCULATE() Function

Total Sales and Total Sales for 2015

● Total Sales ● Total Sales for 2015



Total Sales by Year



```
CALCULATE ( <Expression> , [<Filter1>] , [<Filter2>] , ... )
```

```
CalculateEconomyRevenue = CALCULATE( [TotalRevenue], dProduct[ClassName] = "Economy")
```

ClassName TotalRevenue

Deluxe	→ 201,737,756.36
Economy	→ 122,007,218.29
Regular	→ 523,086,366.99
Total	846,831,341.64

ClassName CalculateEconomyRevenue

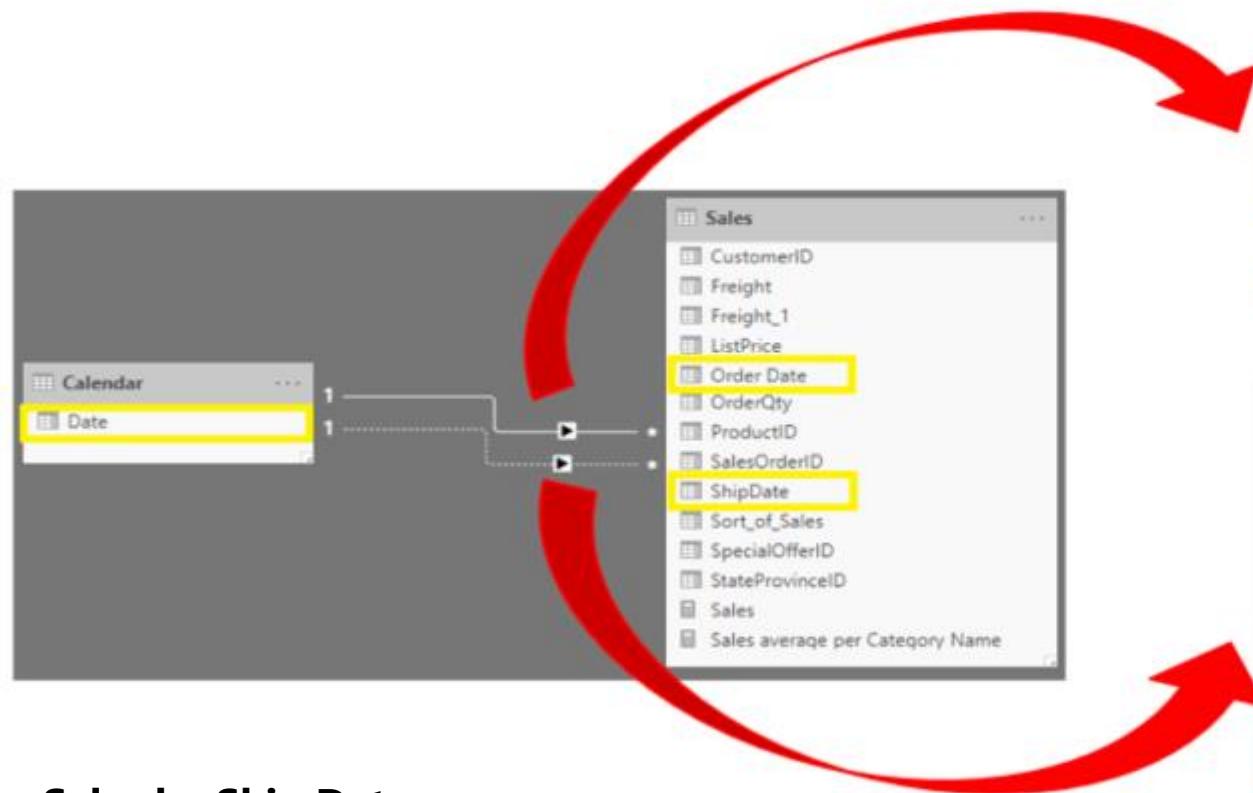
Deluxe	→ 122,007,218.29
Economy	→ 122,007,218.29
Economy	→ 122,007,218.29
Total	122,007,218.29

Lab: Introduction to DAX in Power BI Desktop

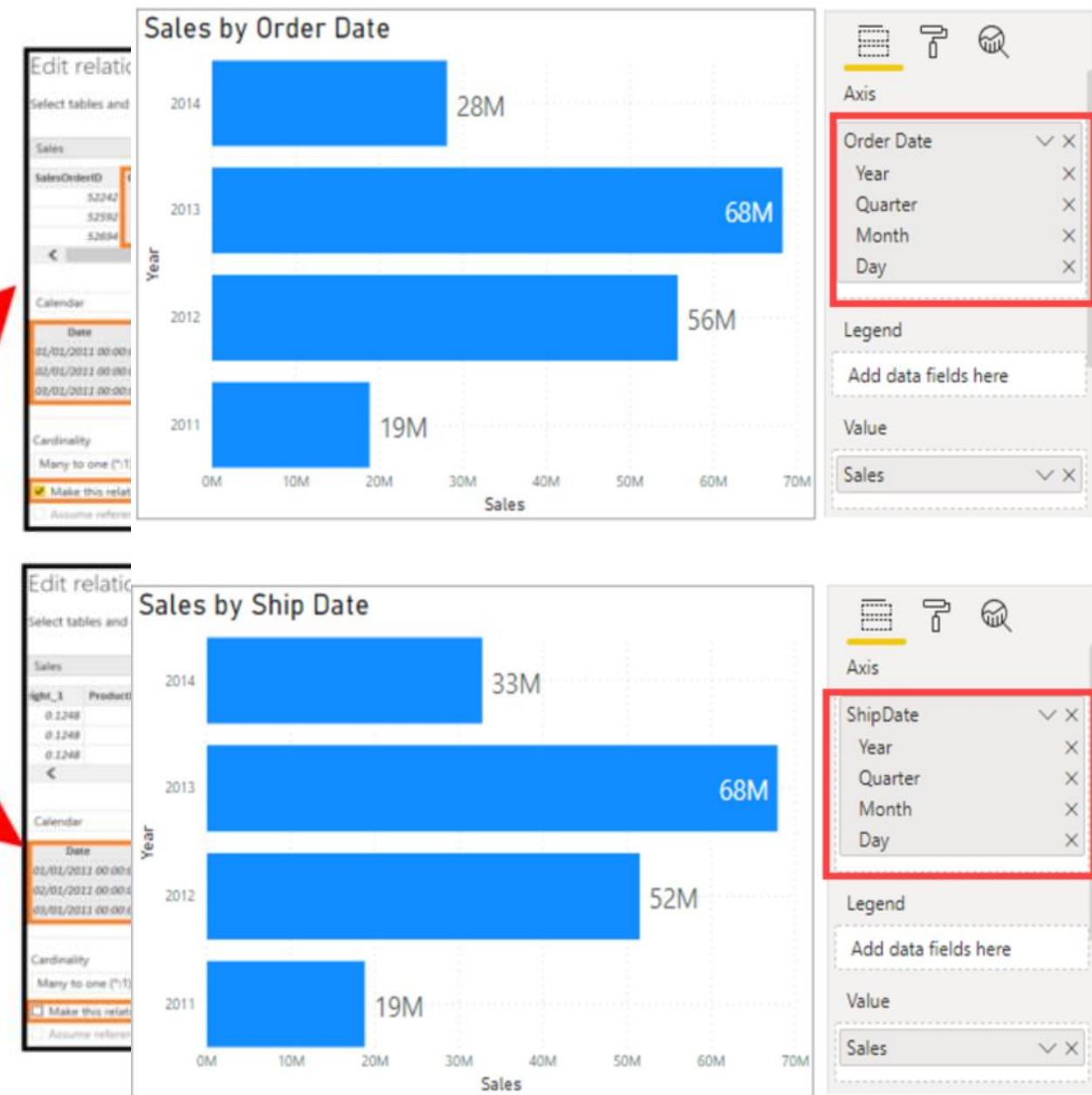
Lesson 3: Advanced DAX



Using Relationships Effectively



Sales by Ship Date =
CALCULATE(Sales[TotalPrice],
USERELATIONSHIP('Calendar'[Date], Sales[ShipDate]))



Semi-additive Measures

- Use SUM() to aggregate over one set of dimensions while using different aggregations over other dimensions.
- Commonly used over Time dimensions.
- Ex: calculating inventory each month.

Last Inventory Count =
CALCULATE
(
 SUM ('Warehouse'[Inventory Count]),
 LASTDATE ('Date'[Date])
)

Time-Intelligence

Month	2014	2015	2016
January		\$66,692.8	\$100,854.72
February		\$107,900	\$205,416.67
March		\$147,879.9	\$315,242.12
April		\$203,579.29	\$449,872.68
May		\$260,402.99	\$469,771.34
June		\$299,490.99	\$469,771.34
July	\$30,192.1	\$354,955.92	\$469,771.34
August	\$56,801.5	\$404,937.61	\$469,771.34
September	\$84,437.5	\$464,670.63	\$469,771.34
October	\$125,641.1	\$534,999.13	\$469,771.34
November	\$175,345.1	\$580,912.49	\$469,771.34
December	\$226,298.5	\$658,388.75	\$469,771.34
Total	\$226,298.5	\$658,388.75	\$469,771.34

Year	Month	Total Sales	Total Sales Previous Month
2015	March	\$39,979.9	\$41,207.2
2015	April	\$55,699.39	\$39,979.9
2015	May	\$56,823.7	\$55,699.39
2015	June	\$39,088	\$56,823.7
2015	July	\$55,464.93	\$39,088
2015	August	\$49,981.69	\$55,464.93
2015	September	\$59,733.02	\$49,981.69
2015	October	\$70,328.5	\$59,733.02
2015	November	\$45,913.36	\$70,328.5
2015	December	\$77,476.26	\$45,913.36

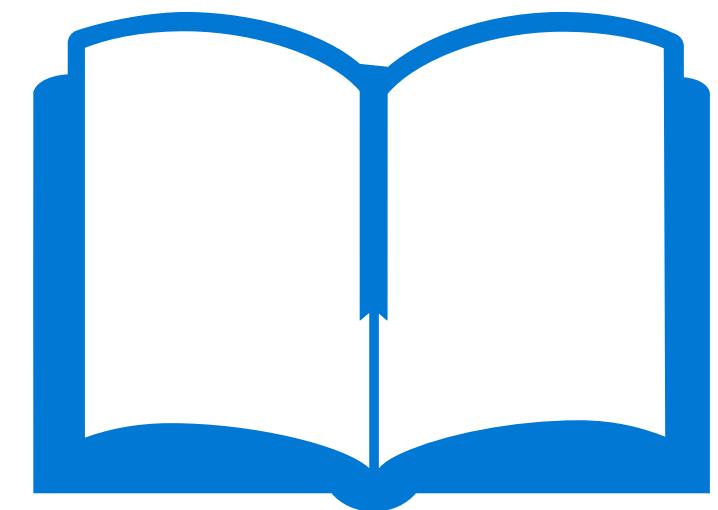
Total Sales Previous Month = CALCULATE
 (
 SUM('SalesOrderDetails'[Total price]
 , PREVIOUSMONTH(Dates[Date]))
)

Lab: Advanced DAX in Power BI Desktop

References

- DA-100 Introduction to creating measures using DAX in Power BI

<https://docs.microsoft.com/en-us/learn/modules/create-measures-dax-power-bi/>



Module 6: Optimize Model Performance

Learning Objectives

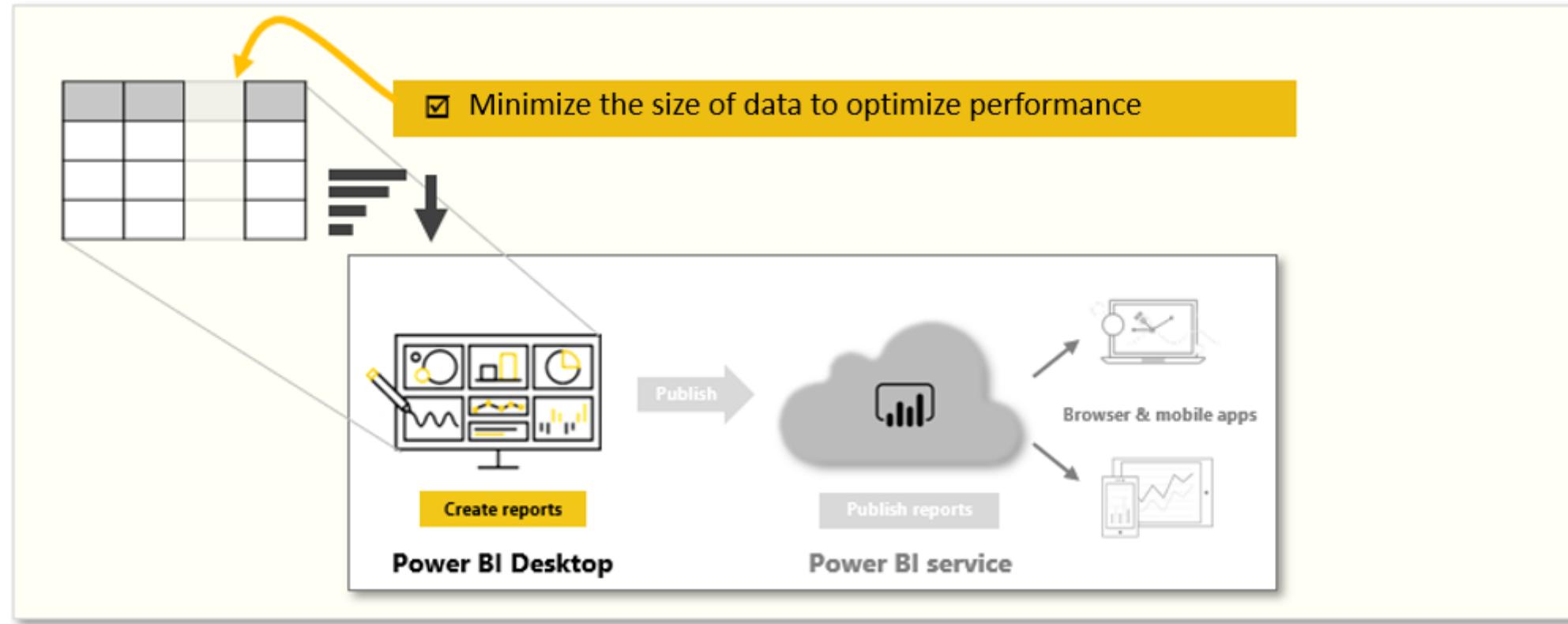
You will learn the following concepts:

- Data model performance optimization
- DirectQuery model optimization
- Aggregations

Lesson 1: Optimize the Data Model for Performance



Introduction to Performance Optimization



When your data model is optimized, it performs better.

Use Variables to Improve Performance and Troubleshooting

Without variable:

Sales YoY Growth =

DIVIDE (

 ([Sales] - CALCULATE ([Sales], PARALLELPERIOD ('Date'[Date], -12, MONTH))),

 CALCULATE ([Sales], PARALLELPERIOD ('Date'[Date], -12, MONTH))

)

With variable:

Sales YoY Growth =

VAR SalesPriorYear =

 CALCULATE ([Sales], PARALLELPERIOD ('Date'[Date], -12, MONTH))

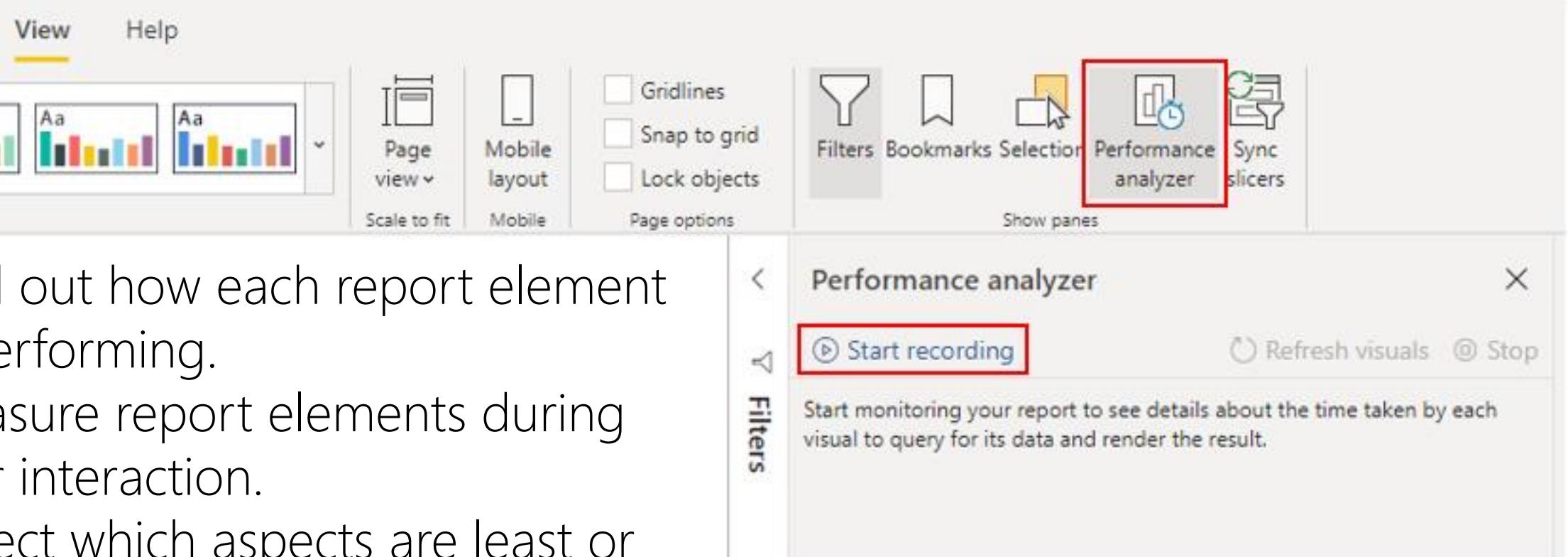
VAR SalesVariance =

 DIVIDE (([Sales] - SalesPriorYear), SalesPriorYear)

RETURN

 SalesVariance

Performance Analyzer

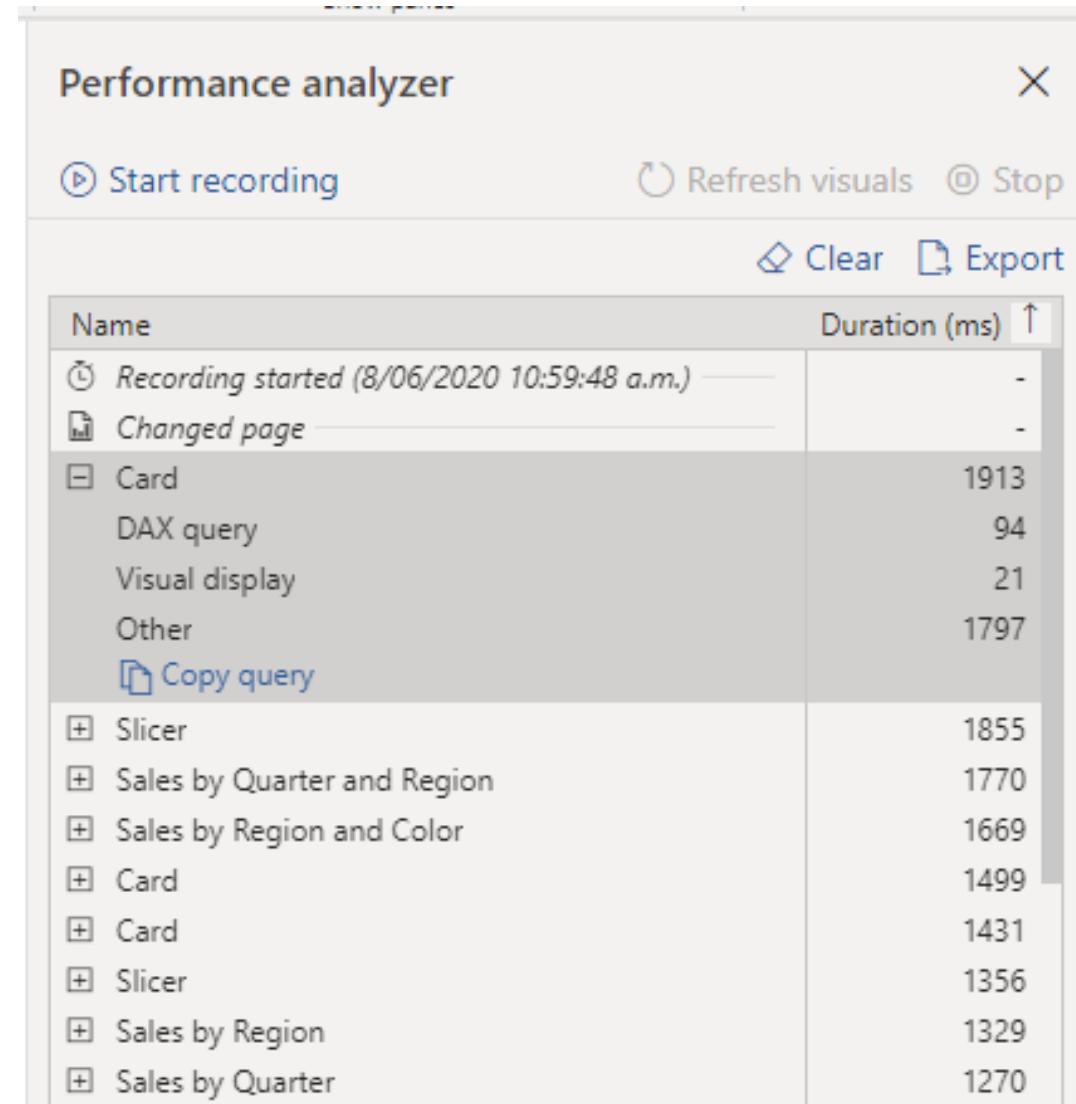


The screenshot shows the Microsoft Power BI desktop application. The top ribbon has 'View' selected. In the 'Show panes' section of the ribbon, the 'Performance analyzer' icon is highlighted with a red box. A floating window titled 'Performance analyzer' is open, containing a 'Start recording' button which is also highlighted with a red box. The window also includes 'Refresh visuals' and 'Stop' buttons, and a descriptive text about monitoring report performance.

- Find out how each report element is performing.
- Measure report elements during user interaction.
- Detect which aspects are least or most resource intensive.

Review Performance Results

- Log information shows duration to complete each task.
- Duration value indicates the difference between the start and end timestamp for each operation.



The screenshot shows the Microsoft Power Platform Performance analyzer interface. At the top, there are buttons for 'Start recording' (blue), 'Refresh visuals' (orange), 'Stop' (grey), 'Clear' (blue), and 'Export' (blue). Below this is a table titled 'Performance analyzer' with two columns: 'Name' and 'Duration (ms)'. The table lists various operations and their execution times:

Name	Duration (ms)
⌚ Recording started (8/06/2020 10:59:48 a.m.)	-
💾 Changed page	-
☰ Card	1913
DAX query	94
Visual display	21
Other	1797
📄 Copy query	
☰ Slicer	1855
☰ Sales by Quarter and Region	1770
☰ Sales by Region and Color	1669
☰ Card	1499
☰ Card	1431
☰ Slicer	1356
☰ Sales by Region	1329
☰ Sales by Quarter	1270

Analyze Query Plans

Sales by Year	270
DAX query	2754
Visual display	57
Other	160
 Copy query	

Count Customers =
CALCULATE (DISTINCTCOUNT (Order[ProductID]),
FILTER (Order, Order[OrderQty] >= 5))

Count Customers =
CALCULATE (DISTINCTCOUNT (Order[ProductID]),
KEEPFILTERS (Order[OrderQty] >= 5))

Sales by Year	270
DAX query	54
Visual display	57
Other	160
 Copy query	

Reduce Cardinality

Screenshot of the Microsoft Power Platform Data Editor interface showing the 'Columns' tab.

The 'Column distribution' checkbox is selected (checked) and highlighted with a red box and a red arrow pointing down to the data preview.

The data preview shows the following distribution for columns M01 through M04:

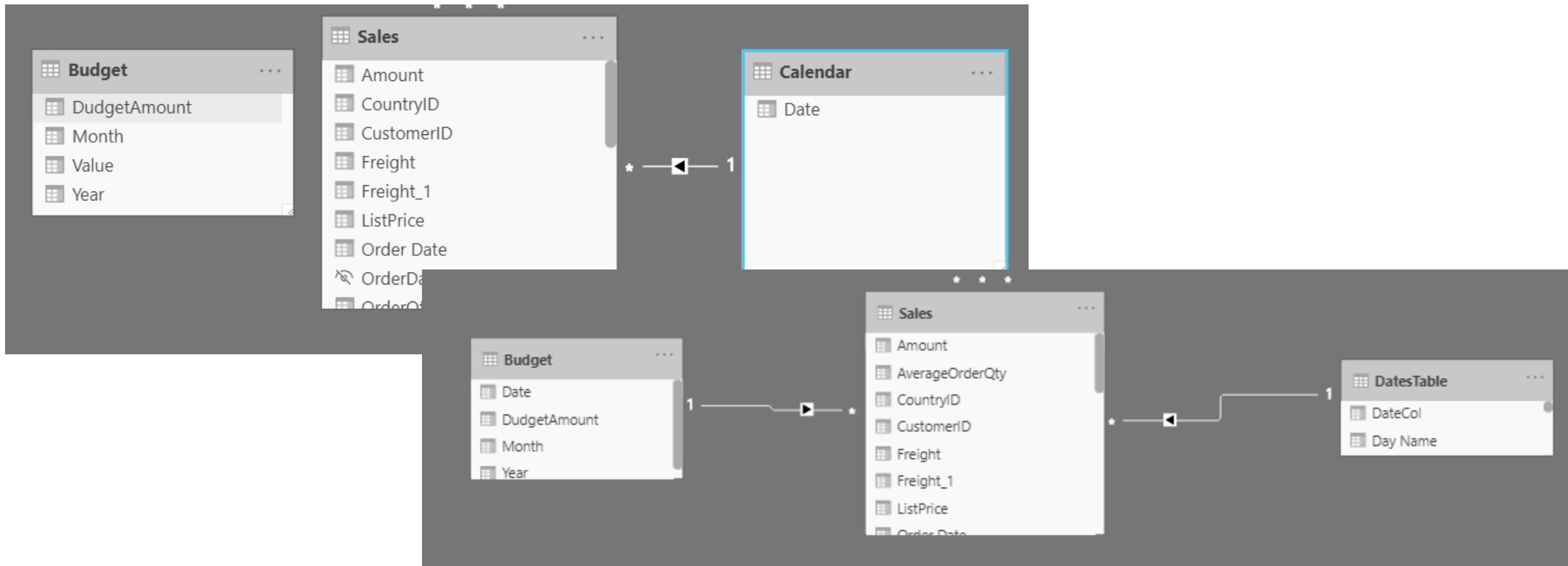
Column	Distribution	Distinct Values	Unique Values
M01	5 distinct, 0 unique	5	0
M02	18 distinct, 0 unique	18	0
M03	17 distinct, 3 unique	17	3
M04	21 distinct, 8 unique	21	8
M05	22 distinct, 9 unique	22	9
M06	21 distinct, 10 unique	21	10

The rows below show data for columns Year, EmployeeID, and M01 through M06. The first five rows are highlighted.

	Year	EmployeeID	M01	M02	M03	M04	M05	M06
1	2017	61161660	-	-	-	-	-	-
2	2017	90836195	-	-	-	-	-	-
3	2017	112432117	-	-	-	-	-	-
4	2017	139397894	-	-	-	-	-	-
5	2017	191644724	-	-	-	-	-	-

Implement Table Granularity

Granularity: The lowest level that data can be in a set of data.

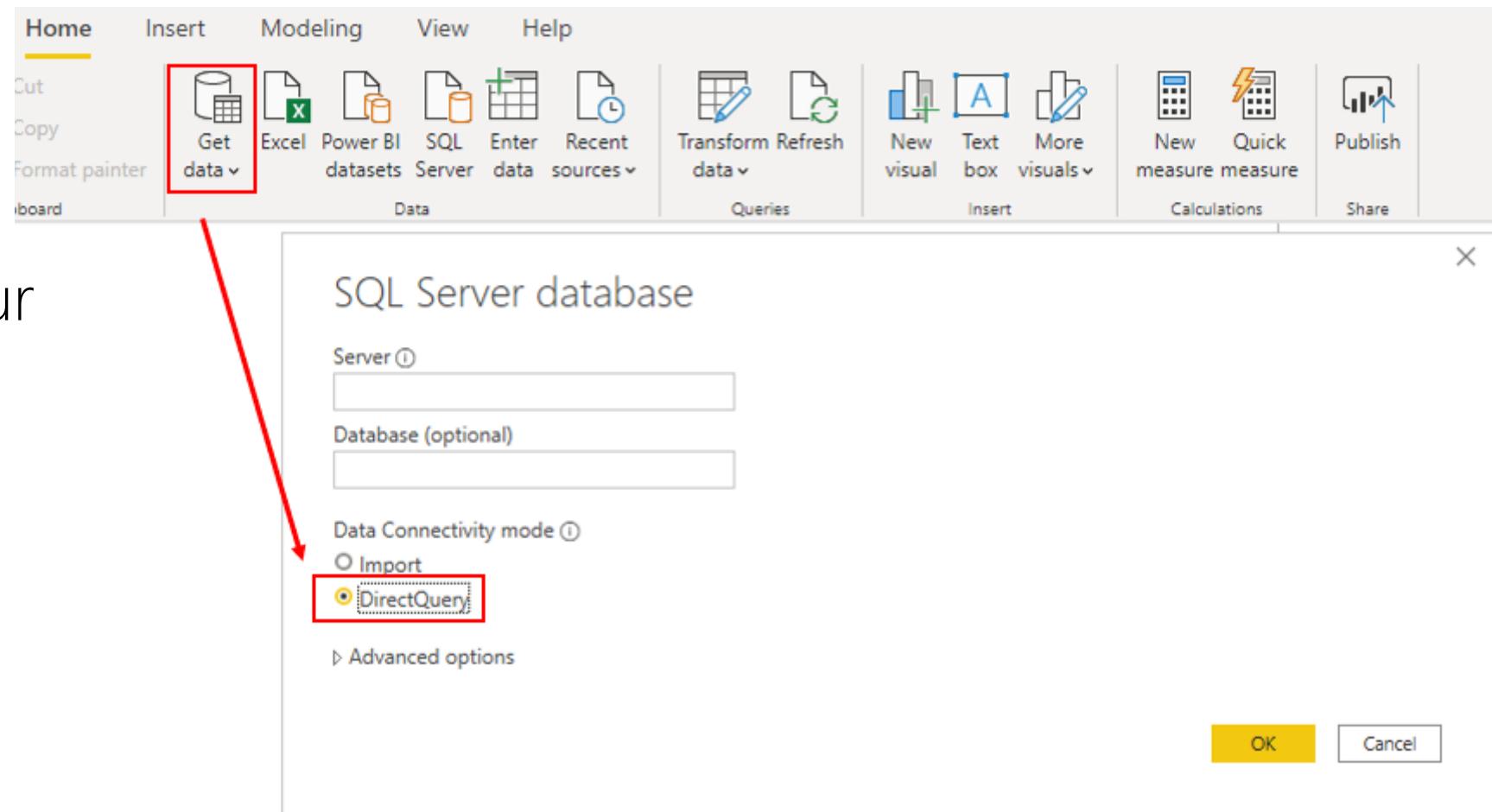


Lesson 2: Optimize DirectQuery Models



Introduction to DirectQuery

Connect directly to your data source repository.

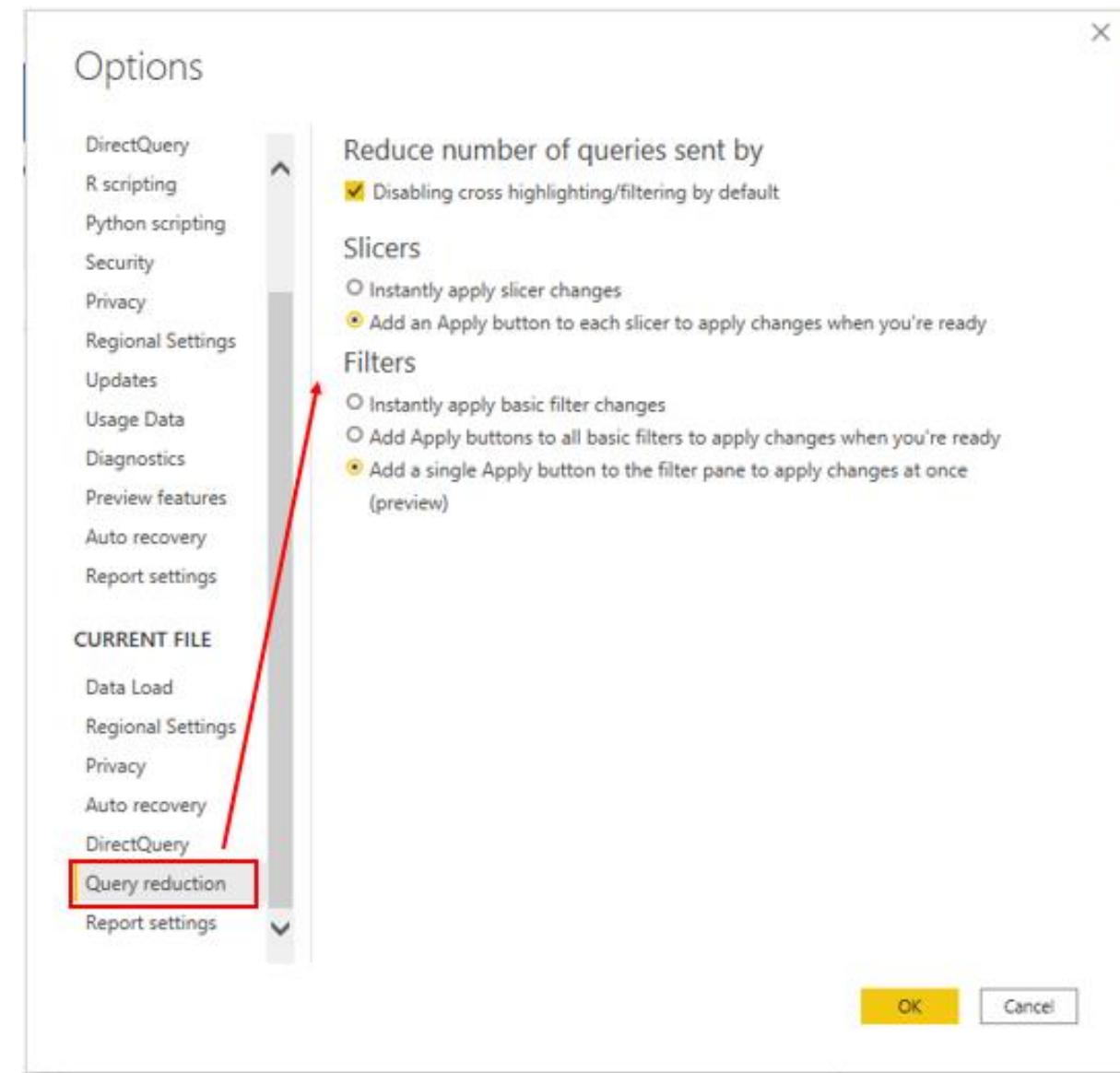


Implications of using DirectQuery

- Benefits:
 - Where data changes frequently.
 - Near-real time reporting is needed.
 - Supports large data volumes.
 - Supports multi-dimensional data.
- Limitations:
 - Performance: Depends on the underlying data source.
 - Security: Understand how data moves between source and destination.
 - Modeling: Some modeling capabilities are limited or aren't supported.
 - Transformation: Some data transformation techniques are limited.

Optimize Performance

- Steps to optimize:
 - Performance Analyzer
 - Data Source
 - Query Reduction

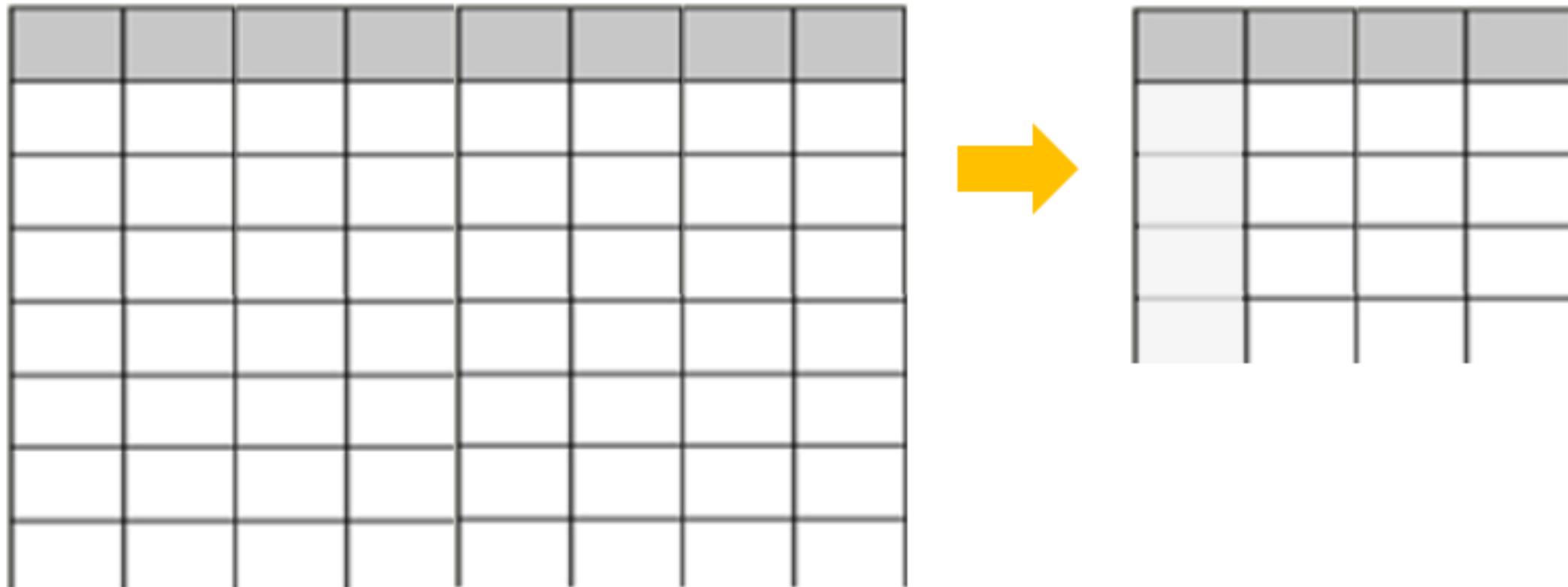


Lesson 3: Create and Manage Aggregations



Introduction to Aggregations

Reduce table size and improve query performance.



Creating Aggregations

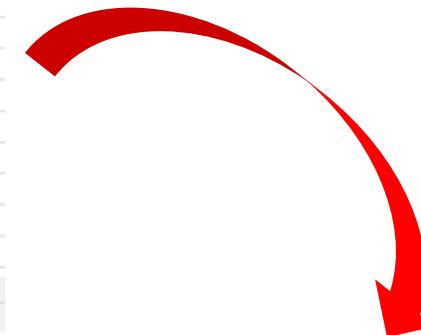
Queries [1] <

ResellerSales_2006

	SalesOrderNumber	SalesOrderLineNumber	OrderDate	DueDate	Ship
1	S071691	2	1/06/2020	11/06/2020	
2	S071691	4	1/06/2020	11/06/2020	
3	S071774	1	1/06/2020	11/06/2020	
4	S071774	2	1/06/2020	11/06/2020	
5	S071775	1	1/06/2020	11/06/2020	
6	S071775	2	1/06/2020	11/06/2020	
7	S071775	3	1/06/2020	11/06/2020	
8	S071776	1	2/06/2020	12/06/2020	
9	S071777	1	2/06/2020	12/06/2020	
10	S071777	2	2/06/2020	12/06/2020	
11	S071778	1	2/06/2020	12/06/2020	
12	S071778	2	2/06/2020	12/06/2020	
13	S071778	3	2/06/2020	12/06/2020	
14	S071778	4	2/06/2020	12/06/2020	
15	S071779	1	2/06/2020	12/06/2020	
16	S071779	2	2/06/2020	12/06/2020	
17	S071779	3	2/06/2020	12/06/2020	
18	S071779	4	2/06/2020	12/06/2020	
19	S071779	5	2/06/2020	12/06/2020	
20	S071779	6	2/06/2020	12/06/2020	
21	S071779	7	2/06/2020	12/06/2020	
22	S071779	8	2/06/2020	12/06/2020	
23	S071779	9	2/06/2020	12/06/2020	
24	S071779	10	2/06/2020	12/06/2020	
25					

14 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

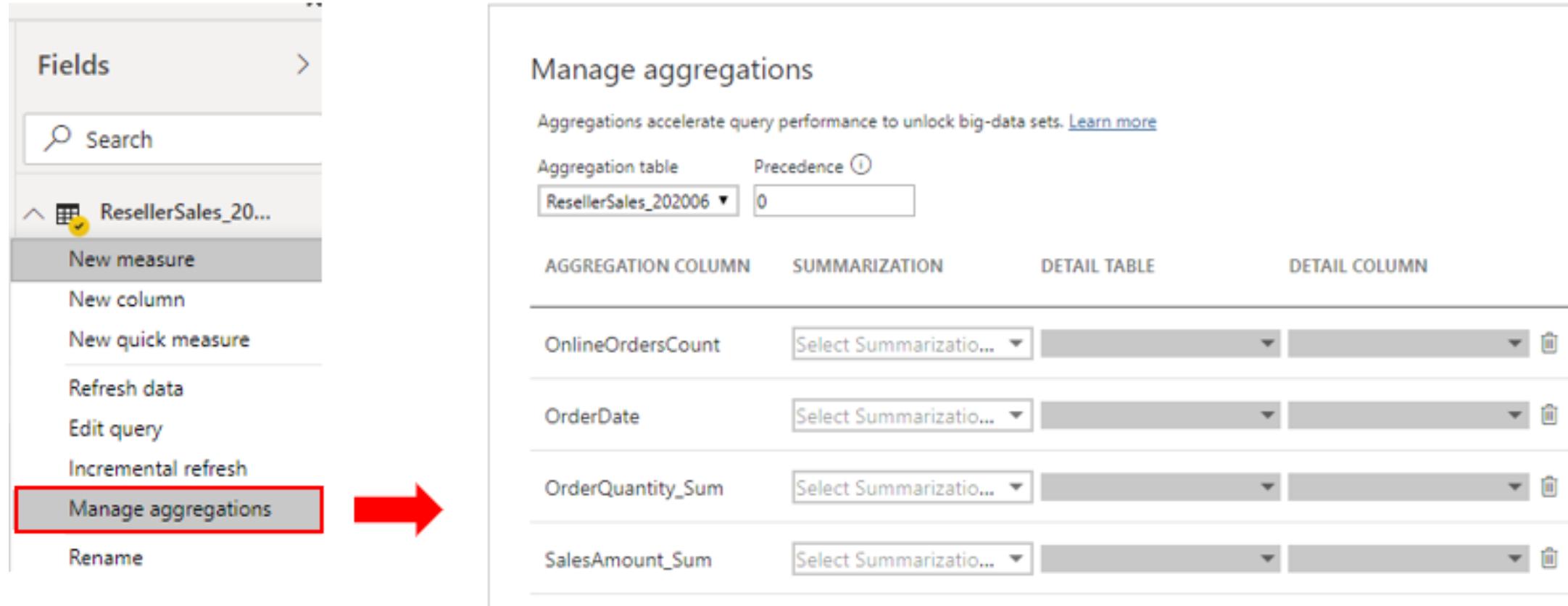
- Determine aggregation level.
- Decide appropriate creation method.



	22	22/06/2020	55	73935.41	129
	23	23/06/2020	116	191212.91	371
	24	24/06/2020	20	11193.33	26
	25	25/06/2020	62	65857.75	183

4 COLUMNS, 30 ROWS Column profiling based on top 1000 rows

Managing Aggregations



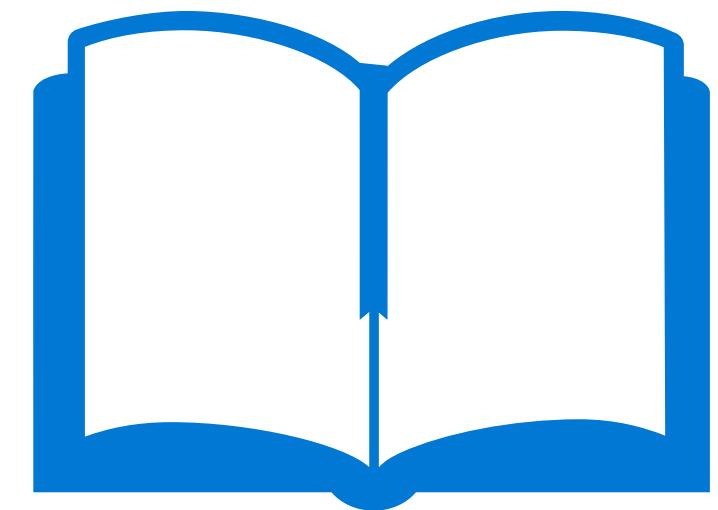
The screenshot shows the Power BI service interface. On the left, there's a sidebar with a 'Fields' section containing a search bar and a list of items. One item, 'ResellerSales_20...', has a yellow circular icon with a checkmark next to it. Below this are several options: 'New measure', 'New column', 'New quick measure', 'Refresh data', 'Edit query', 'Incremental refresh', 'Manage aggregations' (which is highlighted with a red box and has a red arrow pointing to the main content area), and 'Rename'. The main content area is titled 'Manage aggregations' and contains a sub-header: 'Aggregations accelerate query performance to unlock big-data sets. [Learn more](#)'. It shows an 'Aggregation table' dropdown set to 'ResellerSales_202006' and a 'Precedence' input field set to '0'. Below this is a table with four columns: AGGREGATION COLUMN, SUMMARIZATION, DETAIL TABLE, and DETAIL COLUMN. There are four rows in the table:

AGGREGATION COLUMN	SUMMARIZATION	DETAIL TABLE	DETAIL COLUMN
OnlineOrdersCount	Select Summarizatio...		
OrderDate	Select Summarizatio...		
OrderQuantity_Sum	Select Summarizatio...		
SalesAmount_Sum	Select Summarizatio...		

References

- DA-100 Optimize a model for performance in Power BI

<https://docs.microsoft.com/en-us/learn/modules/create-measures-dax-power-bi/>



Module 7: Create Reports

Learning Objectives

You will learn the following concepts:

- Design a Report
- Enhance a Report

Lesson 1:

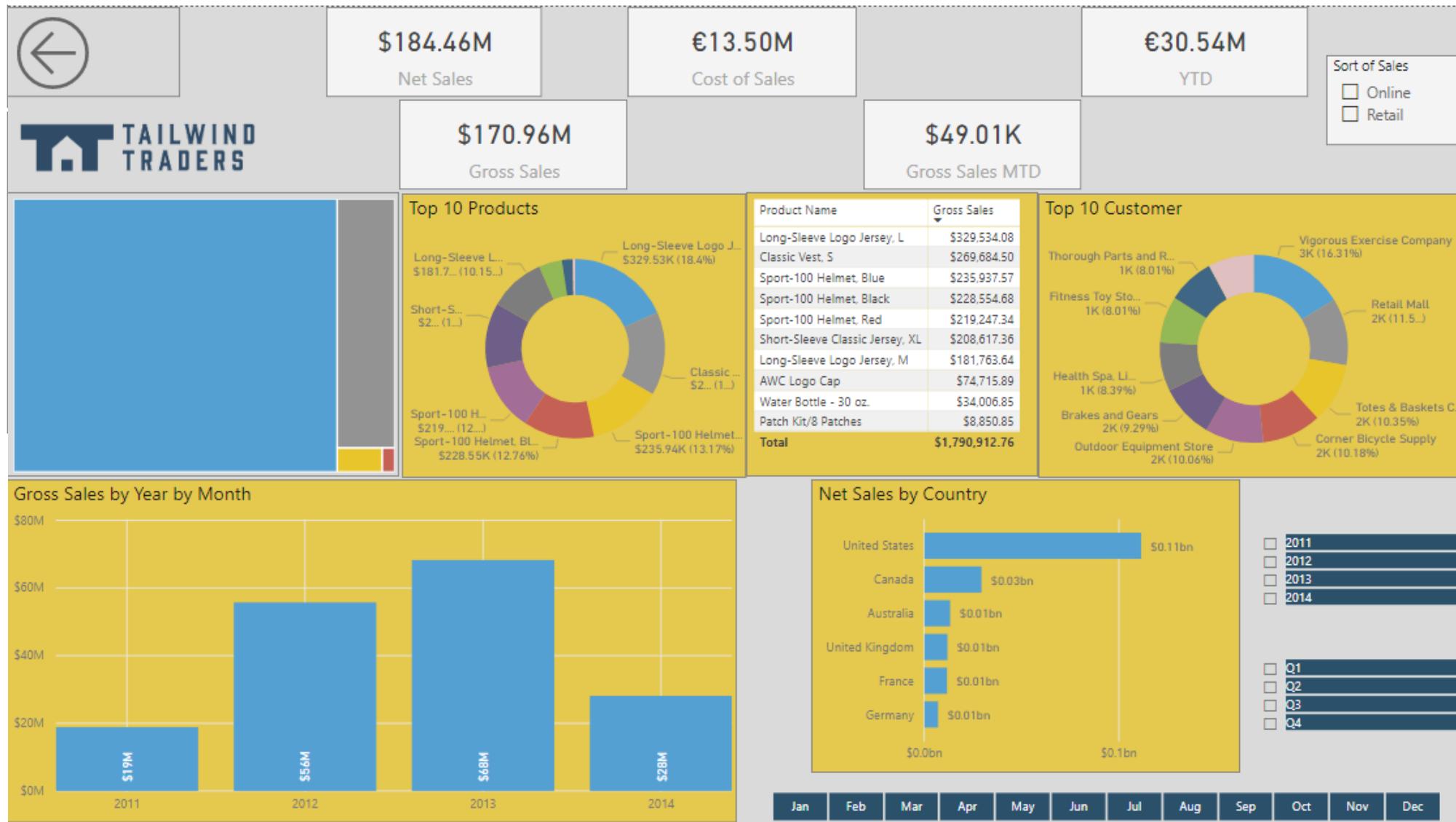
Design a Report



Introduction

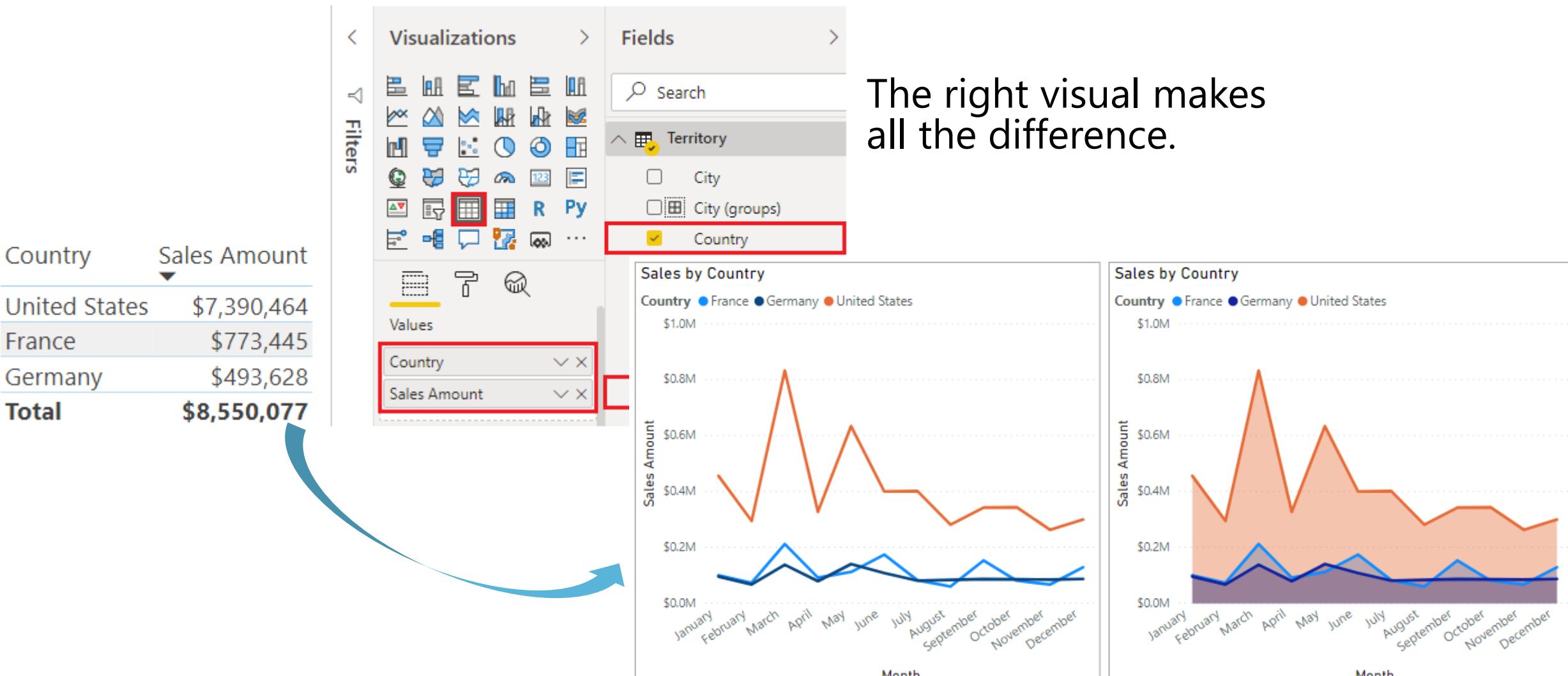
- Visuals allow you to share data insights more effectively.
- Effective visualizations help your users connect and interact with the information.

Design a Report Layout



Choosing Effective Visualizations

The right visual makes all the difference.



The screenshot shows the Power BI visualization settings interface. On the left, a table displays sales data by country:

Country	Sales Amount
United States	\$7,390,464
France	\$773,445
Germany	\$493,628
Total	\$8,550,077

In the center, the "Visualizations" pane shows various chart icons. The "Fields" pane lists "Territory" (City, City (groups)), and "Country" (selected). The "Values" pane shows "Country" and "Sales Amount" selected. A large blue arrow points from the table to the charts below.

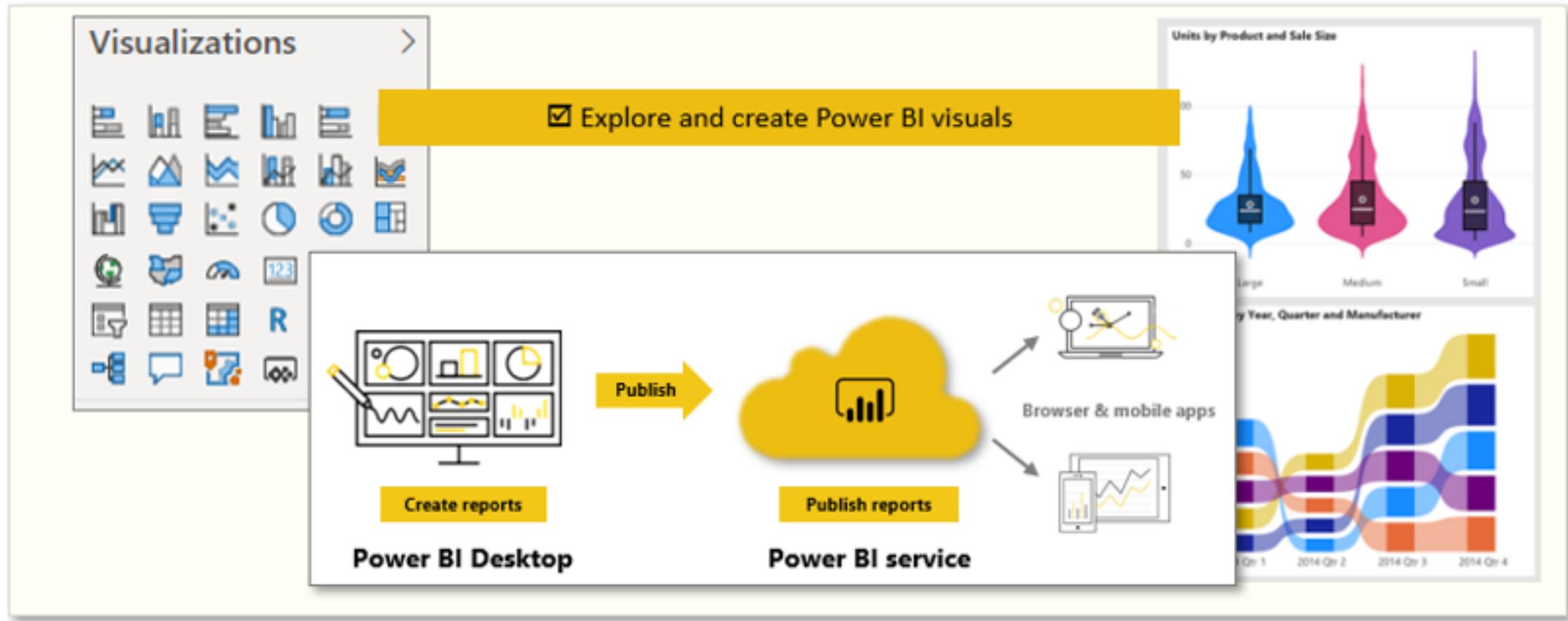
Line Chart

Area Chart

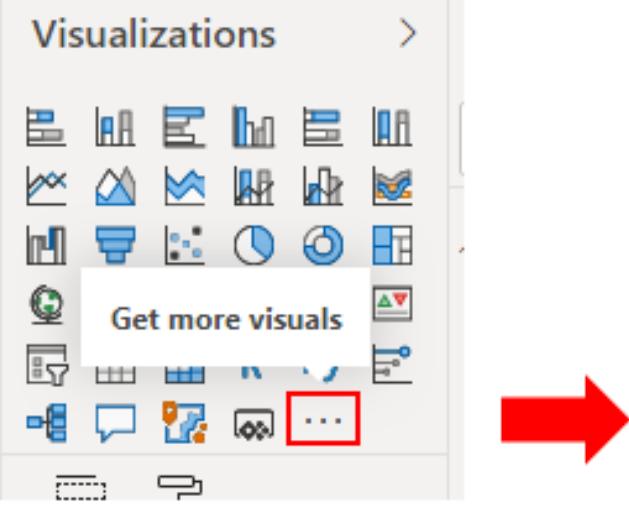
The charts show monthly sales for France (blue), Germany (dark blue), and the United States (orange). The Line Chart shows individual data points, while the Area Chart shows stacked areas.

Month	United States	France	Germany	Total
January	\$450,000	\$100,000	\$50,000	\$600,000
February	\$350,000	\$80,000	\$40,000	\$570,000
March	\$800,000	\$120,000	\$60,000	\$1,000,000
April	\$300,000	\$100,000	\$50,000	\$550,000
May	\$400,000	\$110,000	\$60,000	\$670,000
June	\$350,000	\$130,000	\$50,000	\$530,000
July	\$400,000	\$90,000	\$50,000	\$540,000
August	\$300,000	\$80,000	\$50,000	\$430,000
September	\$350,000	\$100,000	\$50,000	\$500,000
October	\$380,000	\$110,000	\$50,000	\$540,000
November	\$320,000	\$90,000	\$50,000	\$460,000
December	\$340,000	\$100,000	\$50,000	\$500,000

Adding Visualizations to Reports



Import a Custom Visual



The screenshot shows the 'Visualizations' ribbon in Power BI. A red arrow points from the 'Get more visuals' button in the ribbon to the 'Power BI Visuals' dialog window.

Power BI Visuals

AppSource | My organization

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

Search 

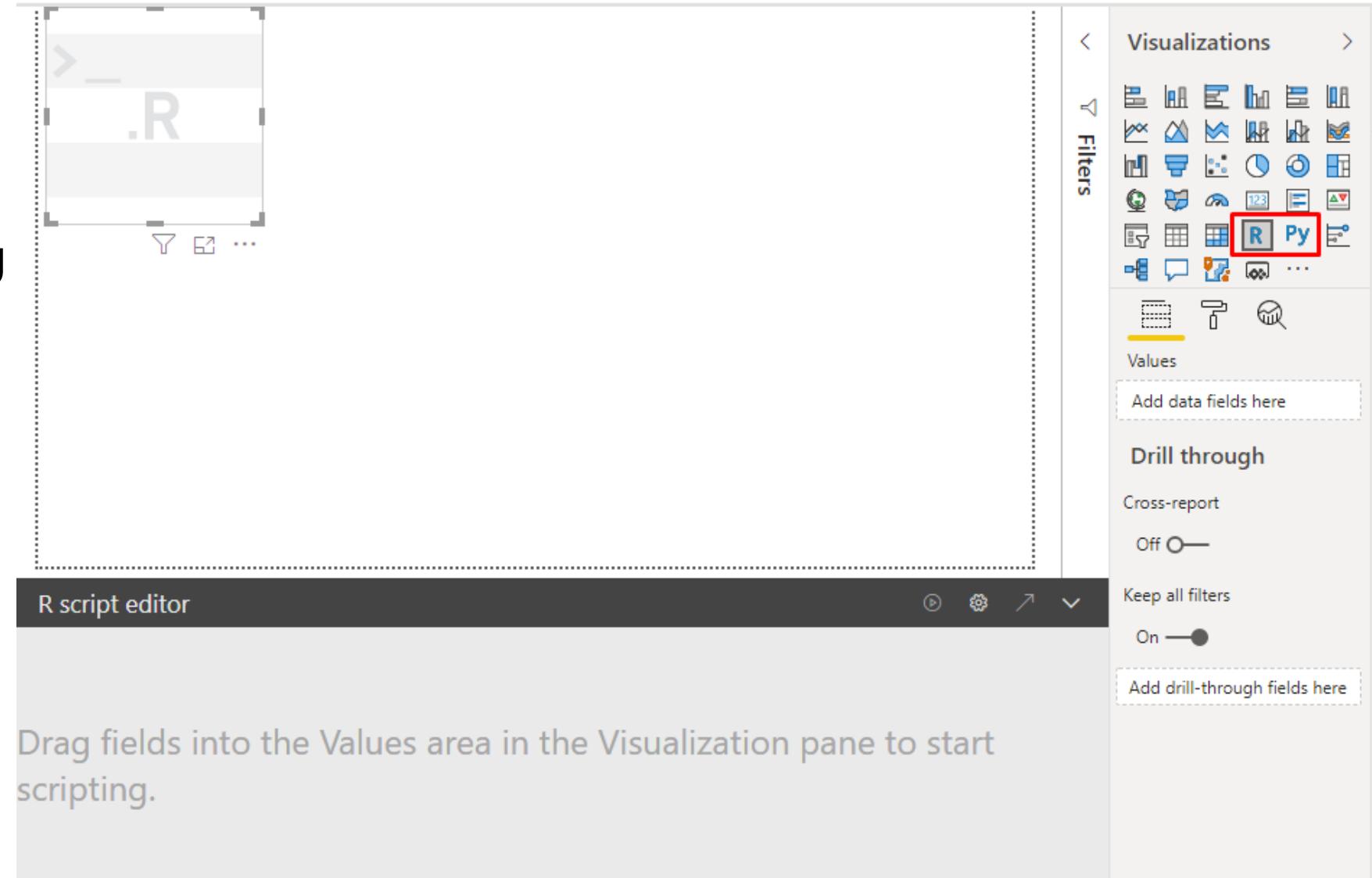
Suggested for you ▾

Category	Visual	Action
All	Bullet Chart 	Add
Advanced Analytics		
Data Visualizations		
Editor's Picks	Word Cloud 	Add
Filters	Create a fun visual from frequent text in your data	
Gauges		
Infographics		
KPIs		
Maps		
Power BI Certified	Infographic Designer 	Add
Time		

Use visuals tailored
for your needs.

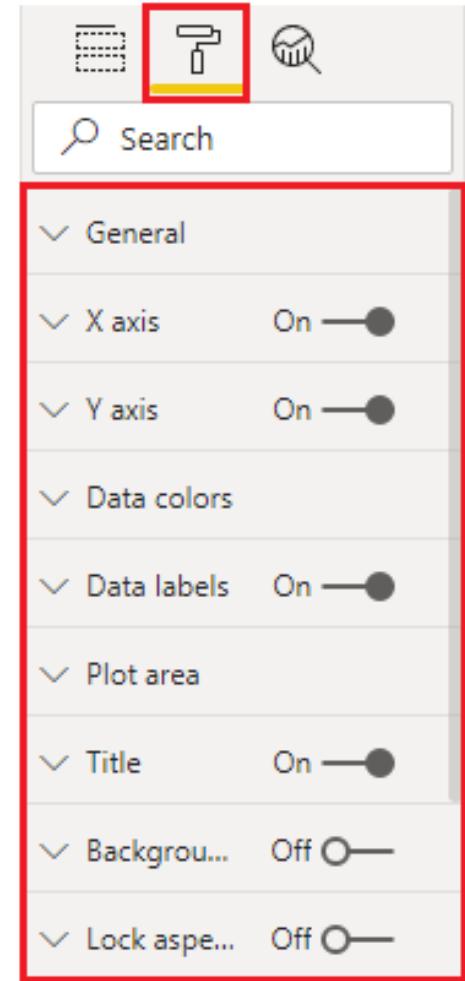
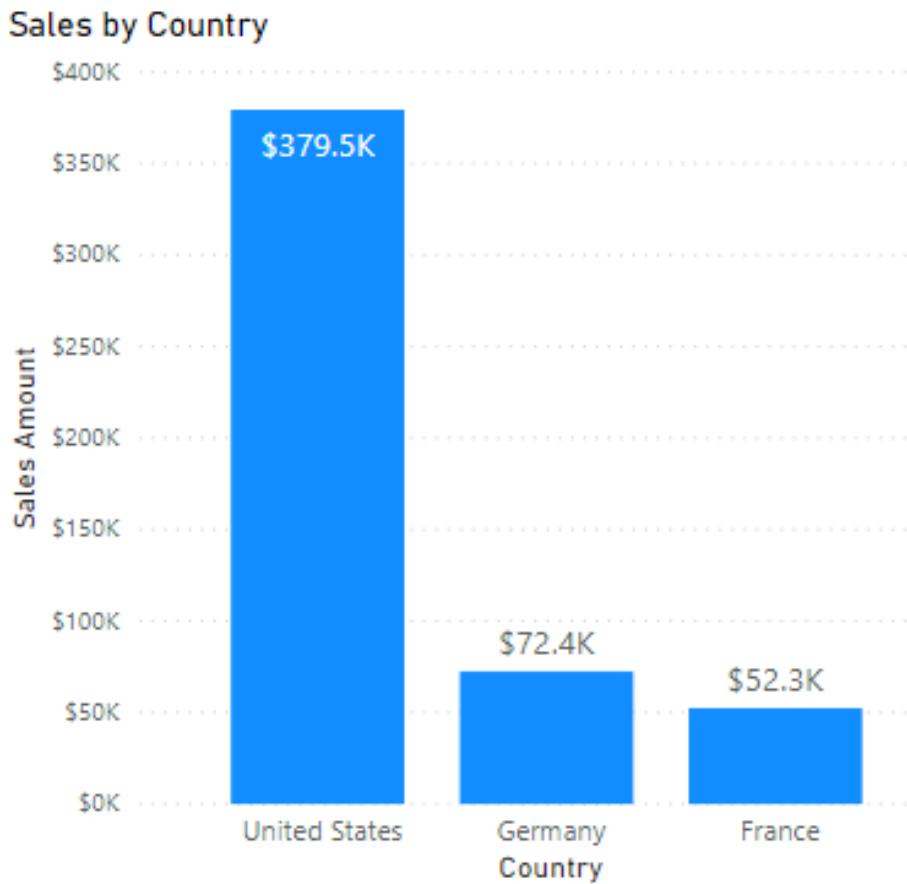
Add an R or Python Visual

- Create advanced analytics and visualizations using R scripts.
- Use Python to visualize your data.



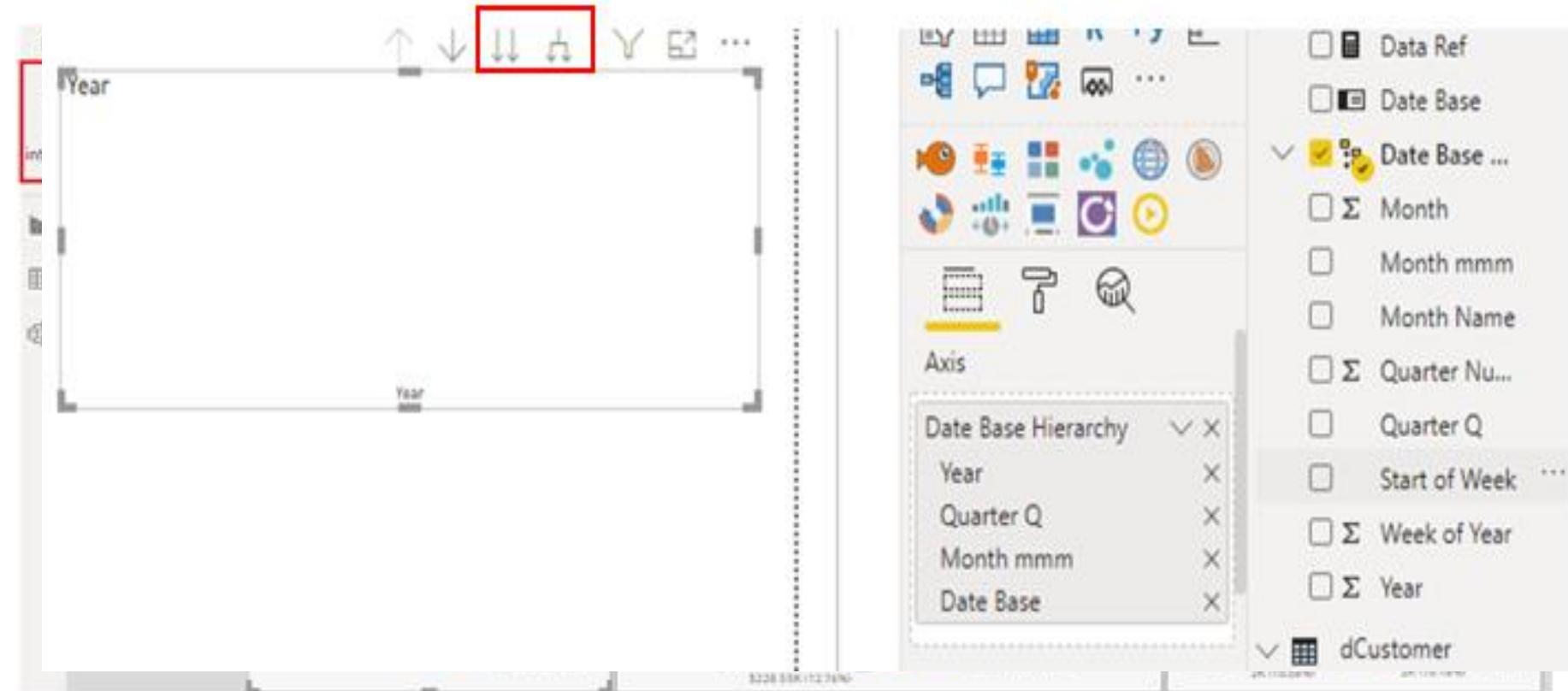
Format and Configure Visualizations

- Control the look and feel of each visual.
- Format options differ depending on the type of visual selected.

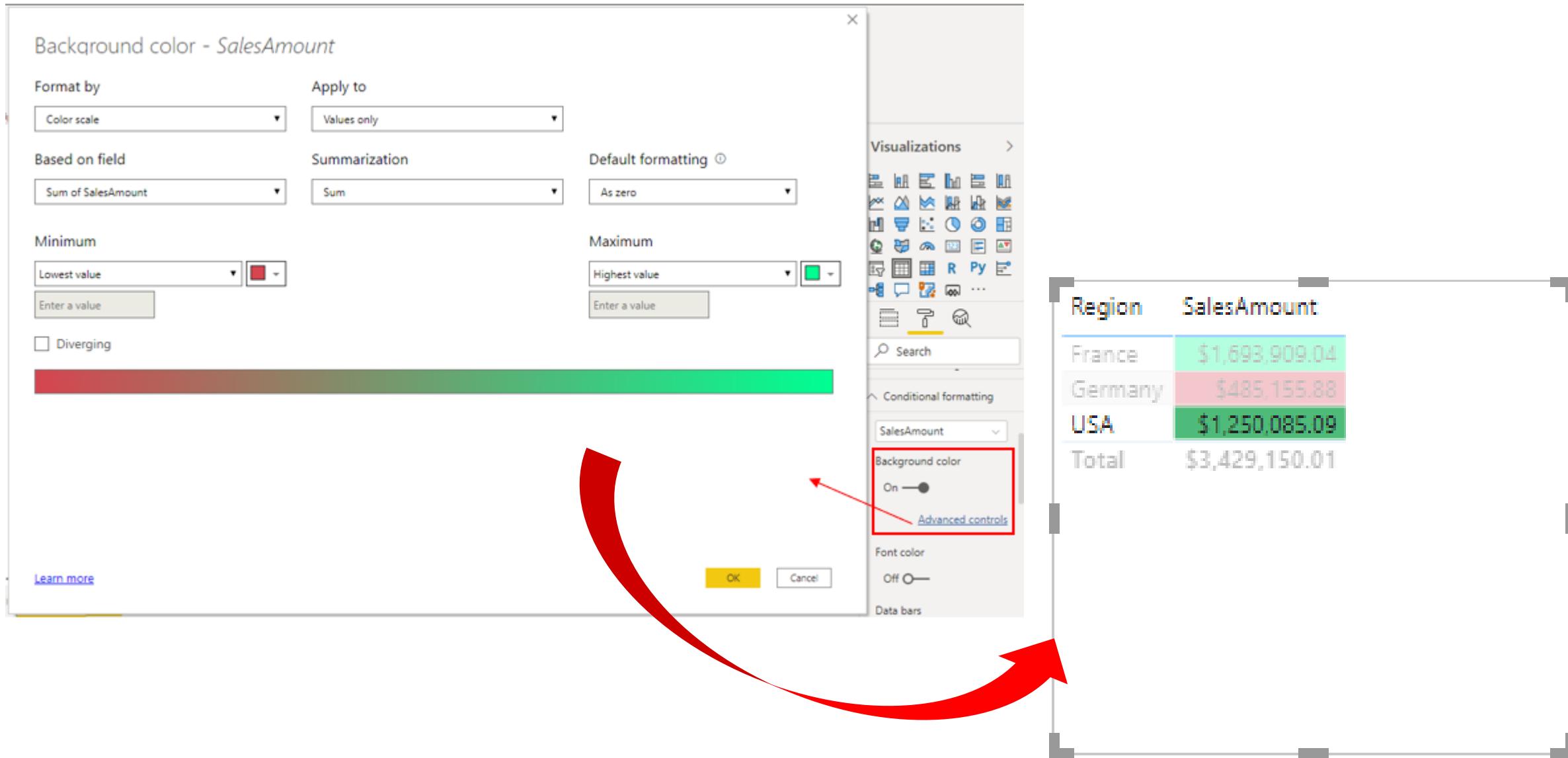


Basic Interactions

- Use interactions to change how visuals impact each other.
- Use hierarchies to drill down for additional relevant content.



Configure Conditional Formatting



The screenshot illustrates the configuration of conditional formatting for the **SalesAmount** field. The dialog box shows the following settings:

- Format by:** Color scale
- Apply to:** Values only
- Based on field:** Sum of SalesAmount
- Summarization:** Sum
- Default formatting:** As zero
- Minimum:** Lowest value (dropdown set to "Lowest value")
- Maximum:** Highest value (dropdown set to "Highest value")
- Diverging:** Unchecked

A color gradient bar at the bottom indicates the mapping from SalesAmount values to colors, transitioning from red (lowest) to green (highest).

On the right, a visualization displays the configured conditional formatting. The table shows:

Region	SalesAmount
France	\$1,693,909.04
Germany	\$485,155.88
USA	\$1,250,085.09
Total	\$3,429,150.01

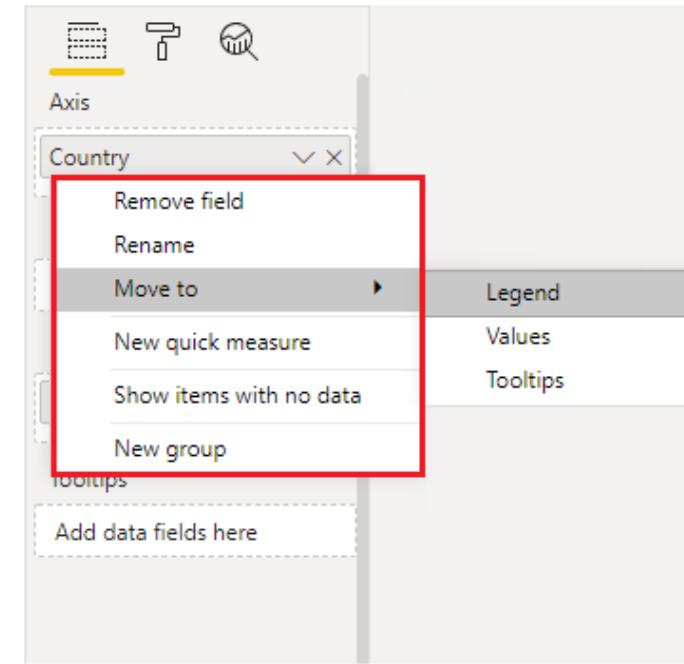
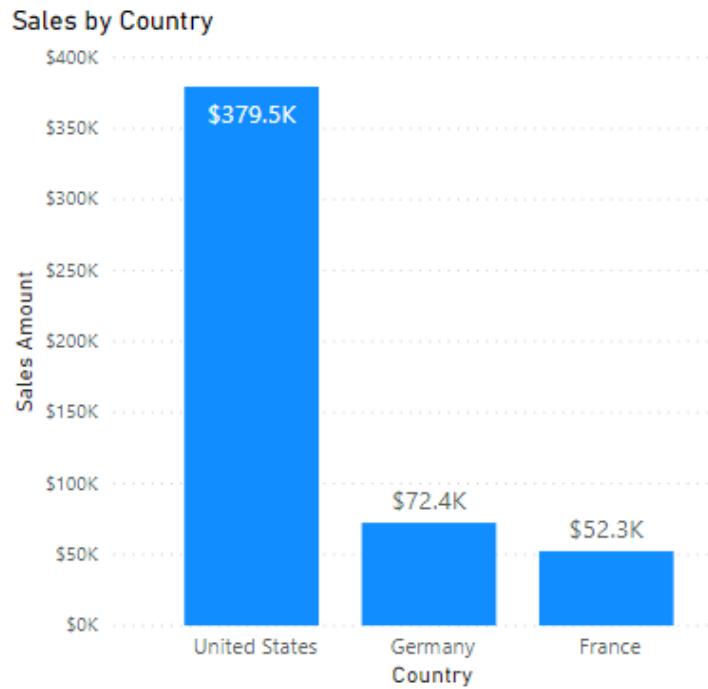
A red arrow points from the "Background color" section of the dialog box to the corresponding colored cells in the visualization table.

Design Report Navigation

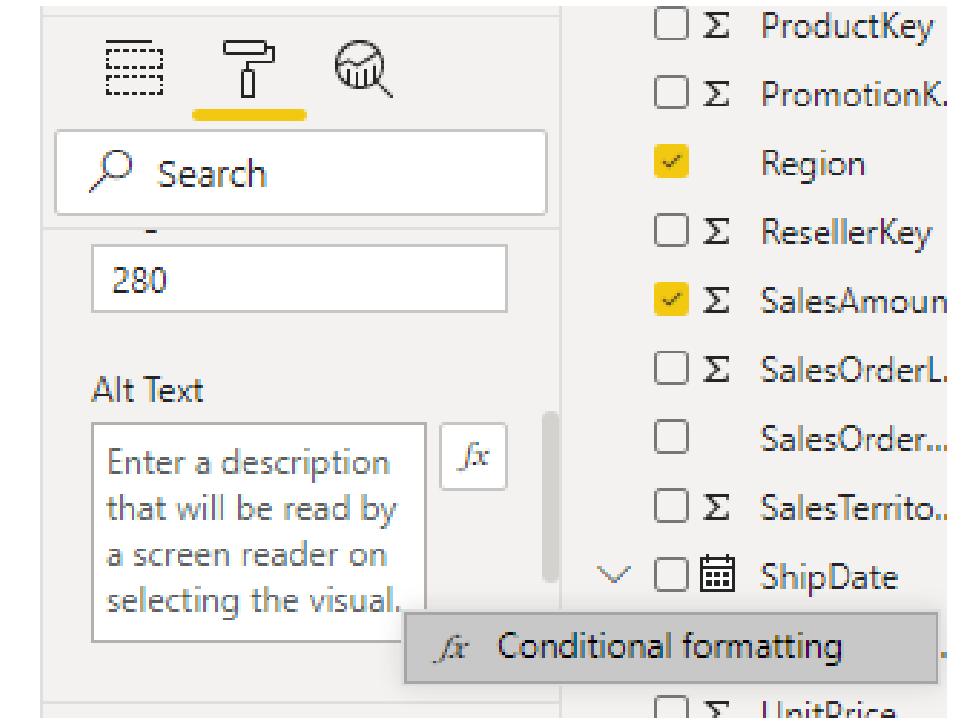
- Move users between pages.
- Use buttons, bookmarks, or conditional formatting.



Design for Accessibility



Design a report that adheres to accessibility standards and makes use of accessibility features.



Alt Text

Enter a description that will be read by a screen reader on selecting the visual.

- Σ ProductKey
- Σ PromotionK.
- Region
- Σ ResellerKey
- Σ SalesAmoun
- Σ SalesOrderL...
- SalesOrder...
- Σ SalesTerrito..
- ShipDate

fx Conditional formatting

fx UnitDri...

Lab: Designing a Report in Power BI

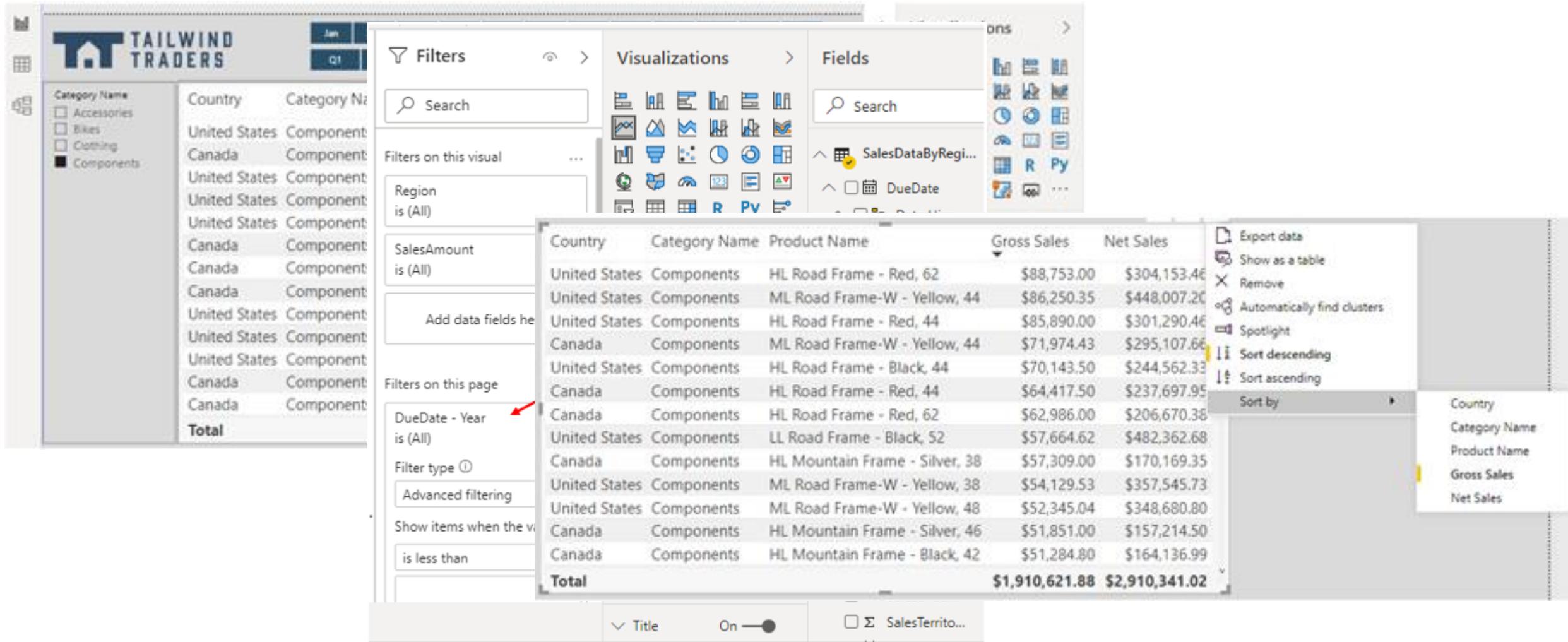
Lesson 2: Enhance the Report



Introduction to Report Enhancement

- Organizations rely on report information when making decisions.
- Reports drive organizational behavior and action.

Apply Slicing, Filtering, and Sorting



The screenshot shows a Microsoft Power BI dashboard for Tailwind Traders. The left sidebar contains navigation icons and a 'Tailwind Traders' logo. The main area displays a table visual titled 'SalesDataByRegion'. The table has columns: Country, Category Name, Product Name, Gross Sales, and Net Sales. The data shows various products from different countries and categories with their respective sales figures.

Filters:

- Region is (All)
- SalesAmount is (All)
- DueDate - Year is (All)

Visualizations:

- SalesDataByRegion
- DueDate

Fields:

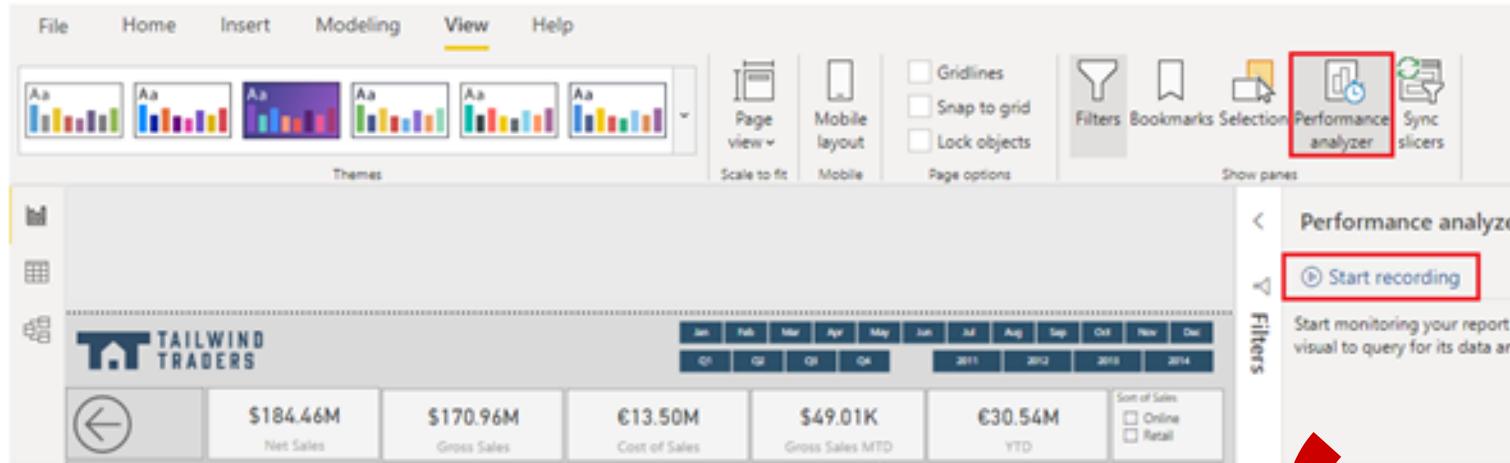
- Export data
- Show as a table
- Remove
- Automatically find clusters
- Spotlight
- Sort descending
- Sort ascending
- Sort by

Sort by:

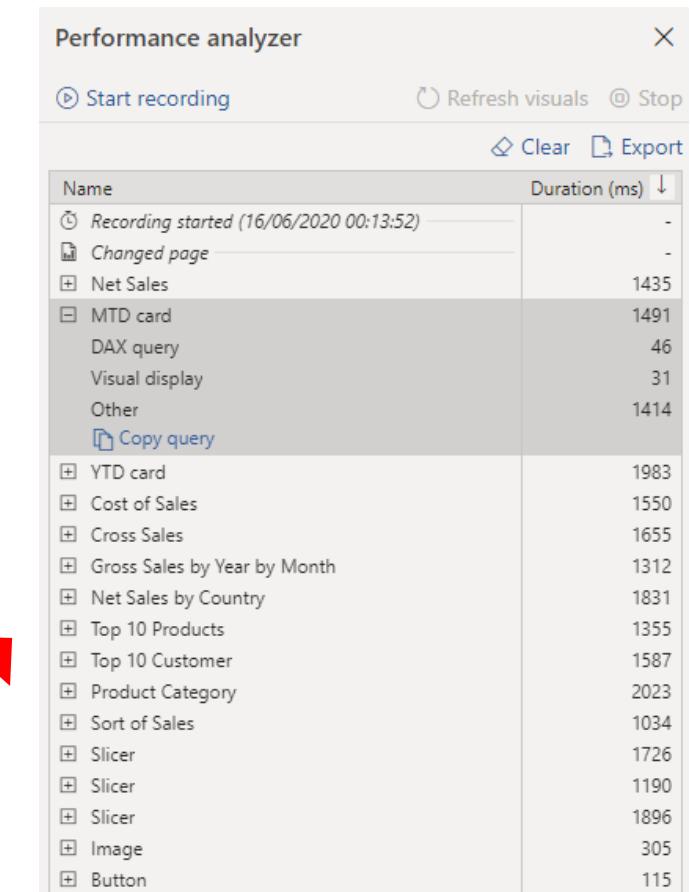
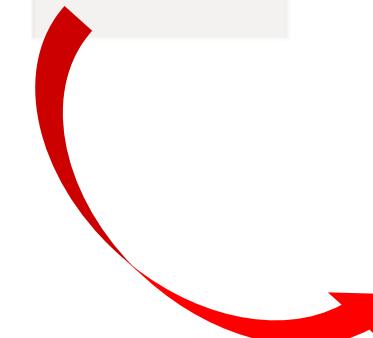
- Country
- Category Name
- Product Name
- Gross Sales
- Net Sales

Country	Category Name	Product Name	Gross Sales	Net Sales
United States	Components	HL Road Frame - Red, 62	\$88,753.00	\$304,153.46
United States	Components	ML Road Frame-W - Yellow, 44	\$86,250.35	\$448,007.20
United States	Components	HL Road Frame - Red, 44	\$85,890.00	\$301,290.46
Canada	Components	ML Road Frame-W - Yellow, 44	\$71,974.43	\$295,107.66
United States	Components	HL Road Frame - Black, 44	\$70,143.50	\$244,562.33
Canada	Components	HL Road Frame - Red, 44	\$64,417.50	\$237,697.95
Canada	Components	HL Road Frame - Red, 62	\$62,986.00	\$206,670.38
United States	Components	LL Road Frame - Black, 52	\$57,664.62	\$482,362.68
Canada	Components	HL Mountain Frame - Silver, 38	\$57,309.00	\$170,169.35
United States	Components	ML Road Frame-W - Yellow, 38	\$54,129.53	\$357,545.73
United States	Components	ML Road Frame-W - Yellow, 48	\$52,345.04	\$348,680.80
Canada	Components	HL Mountain Frame - Silver, 46	\$51,851.00	\$157,214.50
Canada	Components	HL Mountain Frame - Black, 42	\$51,284.80	\$164,136.99
Total			\$1,910,621.88	\$2,910,341.02

Performance Tuning Reports



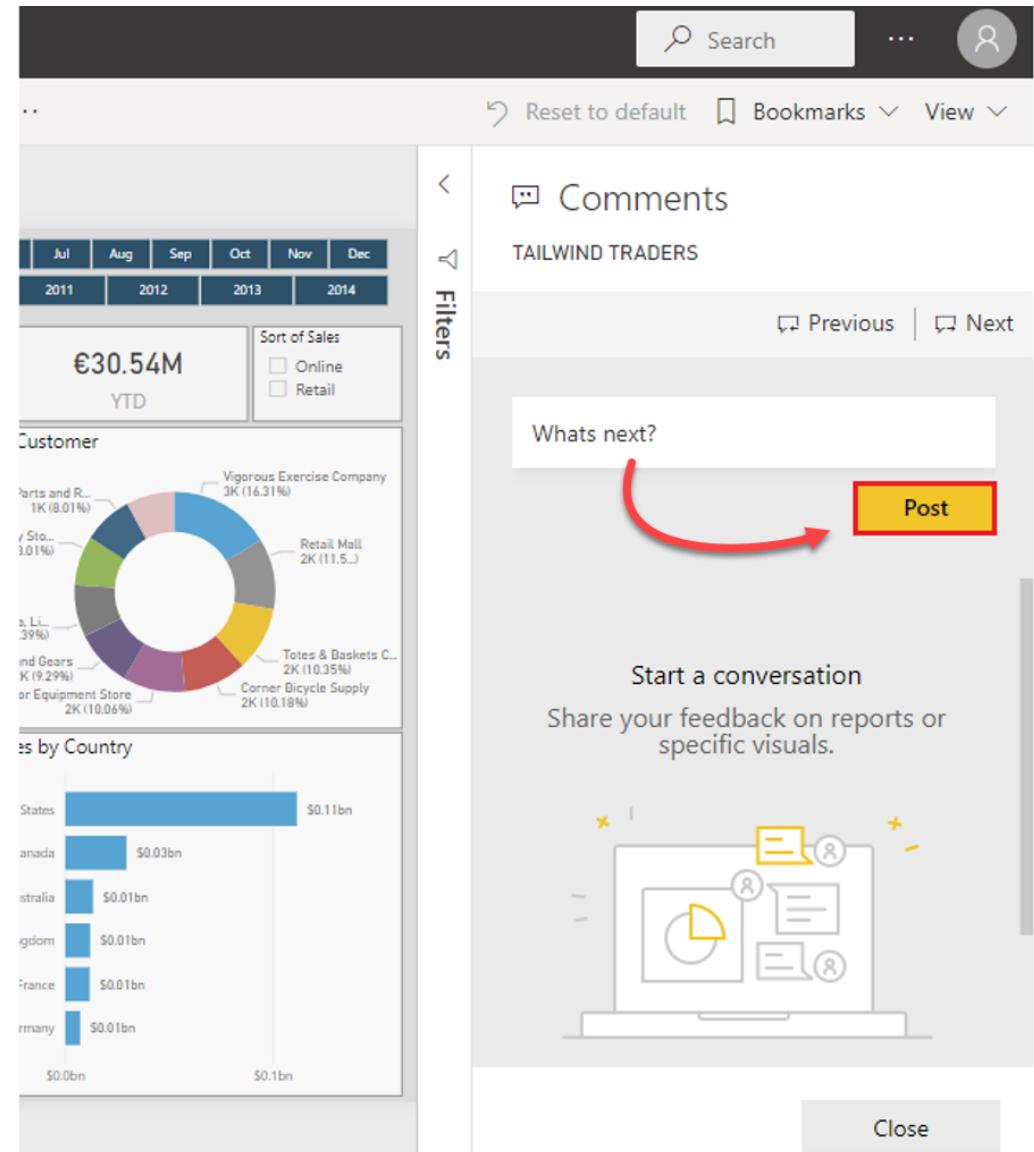
The performance of a report depends on how quickly data can load into the report page.



Name	Duration (ms)
Recording started (16/06/2020 00:13:52)	-
Changed page	-
Net Sales	1435
MTD card	1491
DAX query	46
Visual display	31
Other	1414
YTD card	1983
Cost of Sales	1550
Cross Sales	1655
Gross Sales by Year by Month	1312
Net Sales by Country	1831
Top 10 Products	1355
Top 10 Customer	1587
Product Category	2023
Sort of Sales	1034
Slicer	1726
Slicer	1190
Slicer	1896
Image	305
Button	115

Commenting on Reports

- Used for personal comments or for collaborating with a colleague.
- Available for paginated reports, dashboards, and visuals.
- Anyone with permissions can see comments.



Advanced Interactions and Drill-Throughs

The screenshot illustrates the use of drill-throughs in a Microsoft Power BI dashboard.

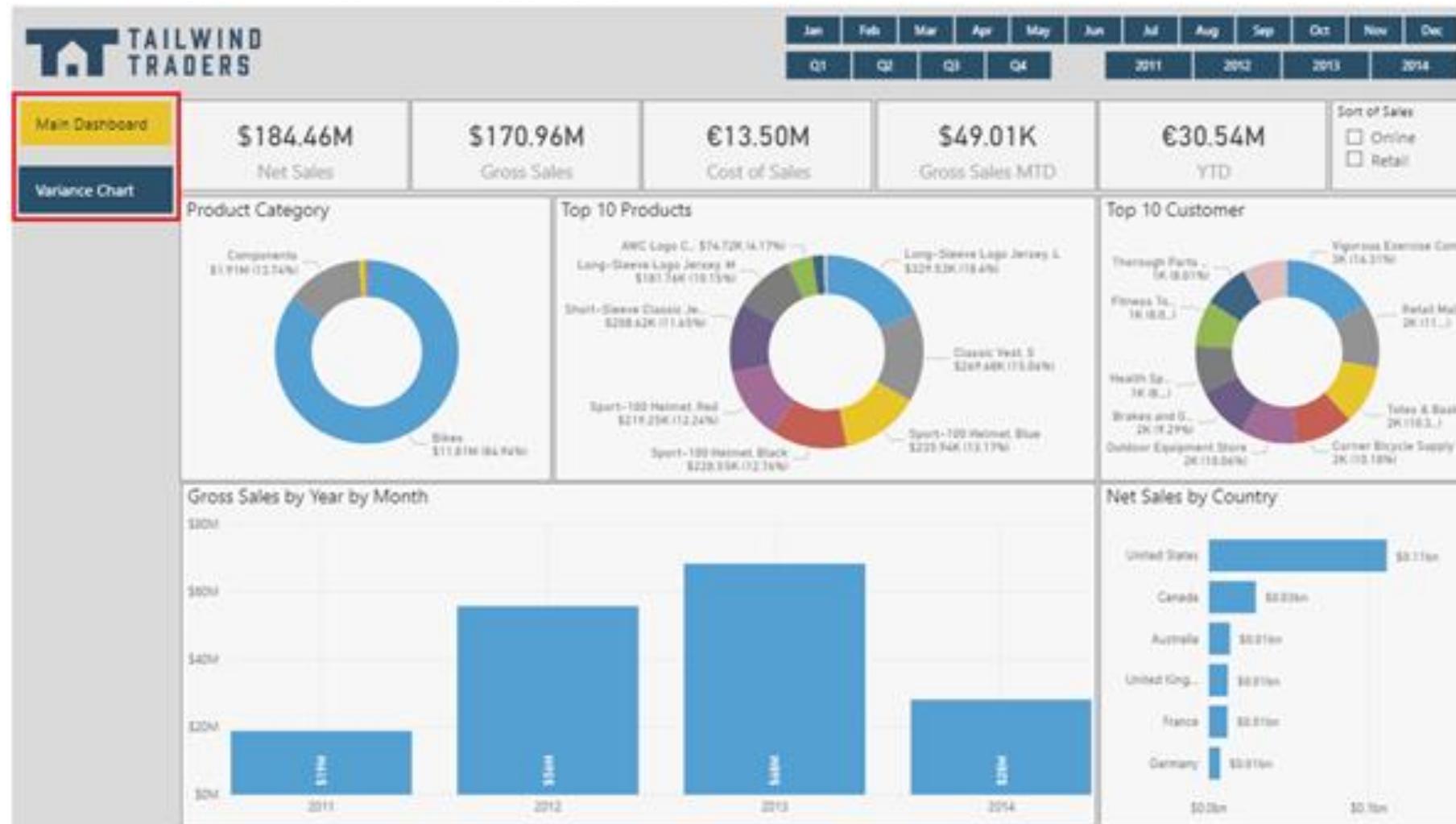
Top Right: Tailwind Traders dashboard showing Net Sales (\$184.46M), Gross Sales (\$170.96M), Cost of Sales (\$13.50M), and other metrics. A context menu is open over a map of North America, with the "Drill through" option highlighted.

Bottom Left: Advanced Analytics view of the same dashboard. A context menu is open over a donut chart, with the "Drill through" option highlighted.

Bottom Right: A detailed table of Order Detail for Tailwind Traders Orders, showing sales data by Country, Category Name, Product Name, Gross Sales, and Net Sales.

Country	Category Name	Product Name	Gross Sales	Net Sales
United States	Components	ML-Road Frame-W - Yellow, 44	\$86,250.35	\$448,007.20
Canada	Components	ML-Road Frame-W - Yellow, 44	\$71,974.43	\$295,107.66
United States	Components	LL-Road Frame - Black, 52	\$57,664.62	\$482,362.68
United States	Components	ML-Road Frame-W - Yellow, 38	\$54,129.53	\$357,545.73
United States	Components	LL-Road Frame - Black, 58	\$32,710.34	\$328,946.58
Canada	Components	LL-Road Frame - Black, 58	\$32,035.90	\$267,869.53
Canada	Components	LL-Road Frame - Red, 44	\$28,326.40	\$200,708.54
Total			\$729,936.88	\$1,489,832.44

Adding Buttons, Bookmarks, and Selections



Key Performance Indicators

- An excellent source in helping track toward a specific goal over time.
- Best when used in a series (e.g., daily, monthly, etc.).

TotalSales and Goal by Month



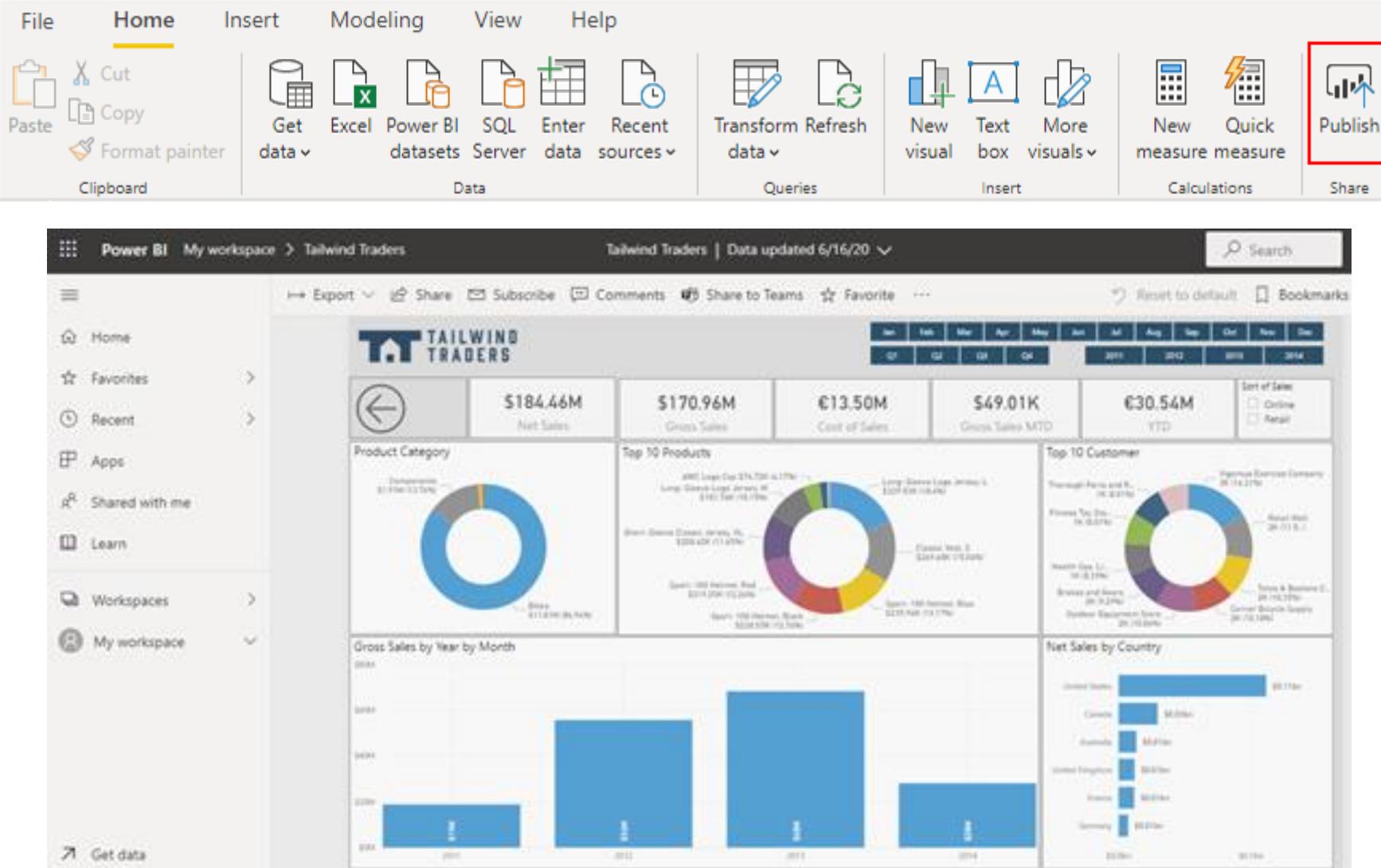
TotalSales and Goal by Fiscal Year



TotalUnits and Last Year Sales ...



Publish and Export Reports



The screenshot illustrates the process of publishing a report from the Microsoft Power BI desktop application to the Power BI service.

Power BI Desktop Ribbon:

- File**: Standard file operations like Open, Save, and Exit.
- Home**: Selected tab, showing options for Paste, Cut, Copy, Format painter, Get data (from various sources like Excel, Power BI datasets, SQL Server), Enter data, Recent sources, Transform data, Refresh data, New visual, Text box, More visuals, New measure, Quick measure, and Publish.
- Insert**: Inserting various visual elements.
- Modeling**: Data modeling tools.
- View**: View settings.
- Help**: Help and support.

Power BI Service Interface:

- Header:** Power BI | My workspace > Tailwind Traders | Tailwind Traders | Data updated 6/16/20 | Search.
- Left Sidebar:** Navigation menu with Home, Favorites, Recent, Apps, Shared with me, Learn, Workspaces, and My workspace.
- Top Bar:** Export, Share, Subscribe, Comments, Share to Teams, Favorite, Reset to default, Bookmarks.
- Report Preview:** Tailwind Traders dashboard showing key metrics and visualizations:
 - Top-level metrics: \$184.46M Net Sales, \$170.96M Gross Sales, €13.50M Cost of Sales, \$49.01K Gross Sales MTD, €30.54M YTD.
 - Product Category donut chart.
 - Top 10 Products donut chart.
 - Top 10 Customer donut chart.
 - Gross Sales by Year by Month bar chart.
 - Net Sales by Country bar chart.

Lab: Enhancing Power BI Reports with Interactions and Formatting

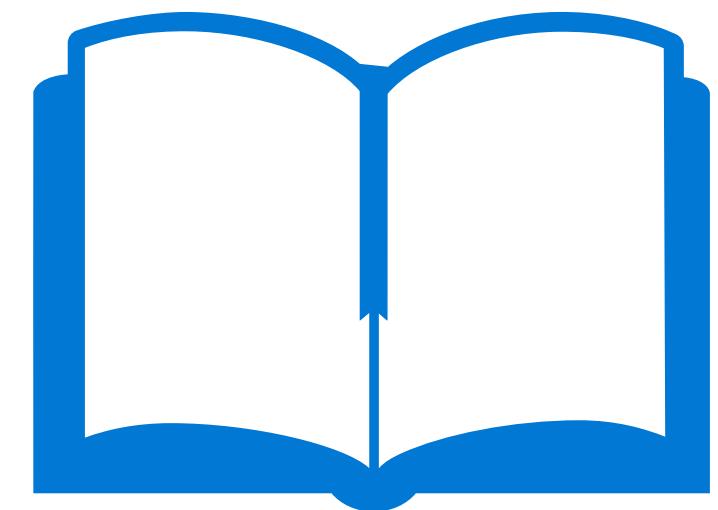
References

- DA-100 Work with Power BI visuals

<https://docs.microsoft.com/en-us/learn/modules/visuals-power-bi/>

- DA-100 Create a data-drive story with Power BI

<https://docs.microsoft.com/en-us/learn/modules/data-driven-story-power-bi/>



Module 8: Create Dashboards

Learning Objectives

You will learn the following concepts:

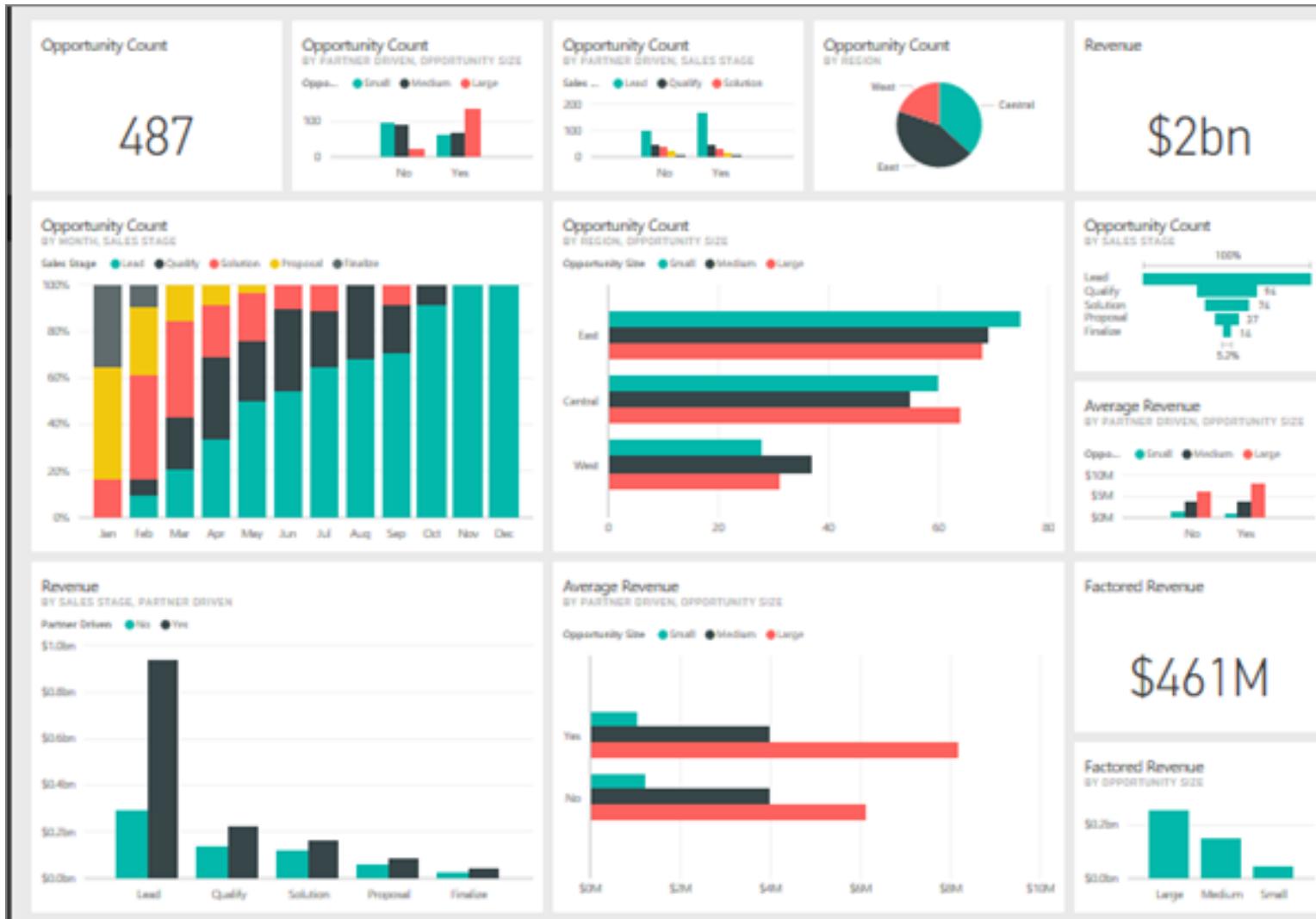
- Dashboards
- Real-time Dashboards
- Enhancing Dashboards

Lesson 1:

Create a Dashboard



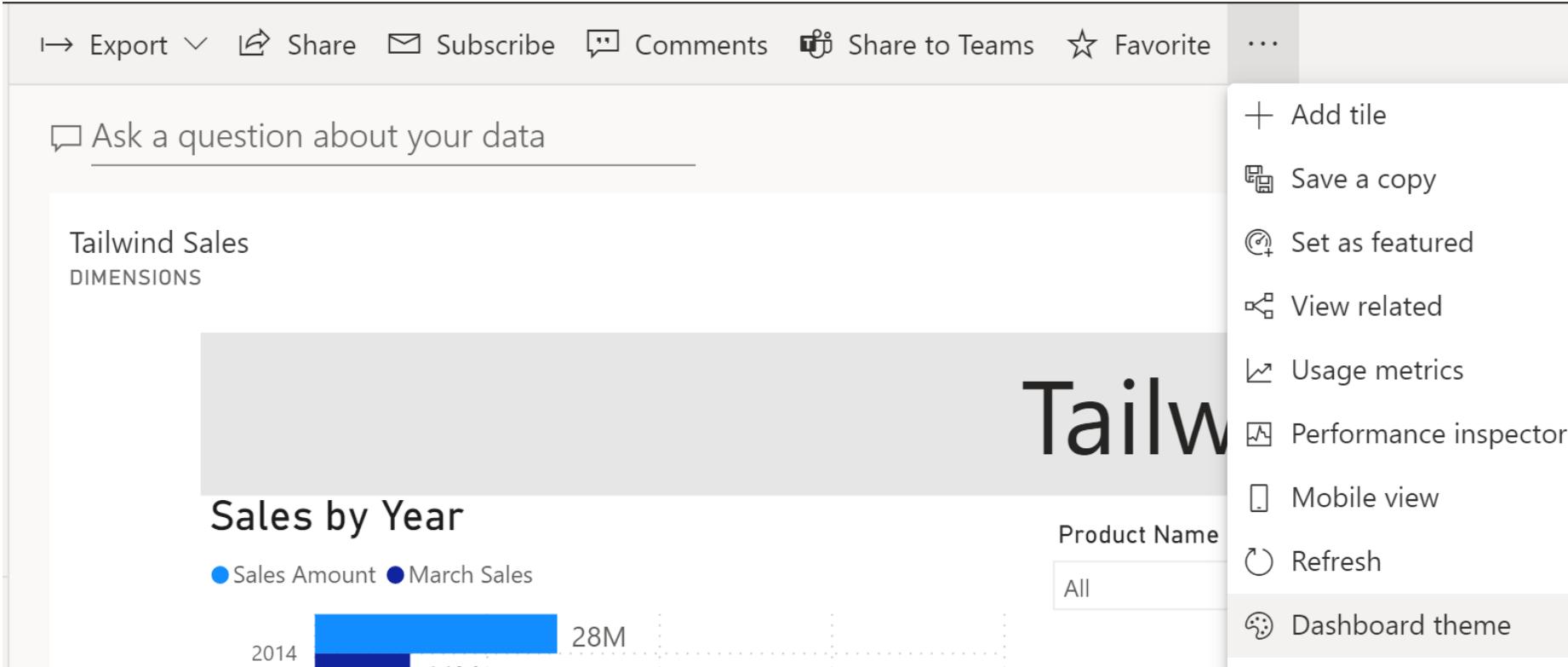
Introduction to Dashboards



A dashboard:

- Is a single-page canvas that tells a story through visualizations.
- Can draw from multiple reports.
- Contains no Filter, Visualization, or Fields pane.
- Does not display the underlying dataset.

Add a Dashboard Theme



Export Share Subscribe Comments Share to Teams Favorite ...

Ask a question about your data

Tailwind Sales

DIMENSIONS

Sales by Year

Product Name

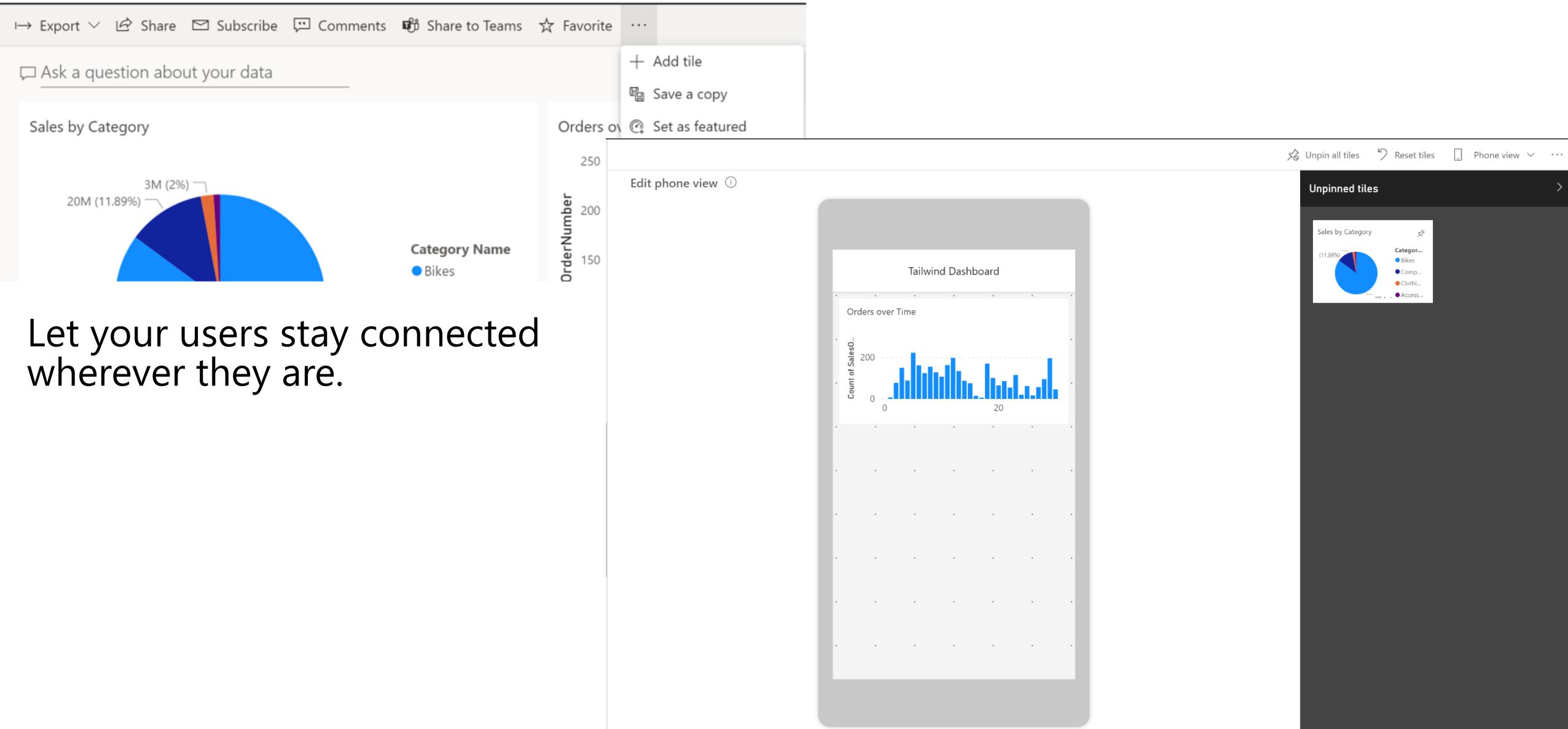
All

2014 28M

- + Add tile
- Save a copy
- Set as featured
- View related
- Usage metrics
- Performance inspector
- Mobile view
- Refresh
- Dashboard theme

Create a cohesive picture across dashboards using themes.

Set Mobile View



The screenshot displays a Power BI dashboard with various components and a mobile phone view overlay.

Top Navigation: Includes Export, Share, Subscribe, Comments, Share to Teams, Favorite, and a three-dot menu. The three-dot menu is open, showing options: Add tile, Save a copy, and Set as featured.

Left Panel: A pie chart titled "Sales by Category" showing the distribution of sales. The largest category is "Bikes" at 20M (11.89%). Other categories include "Category Name" (Bikes), "Comp...", "Cloth...", and "Access...".

Right Panel: A bar chart titled "Orders over Time" showing the count of sales over time.

Bottom Right: A "Unpinned tiles" section showing a preview of the "Sales by Category" chart.

Mobile Phone View Overlay: A large gray box representing a mobile device screen. Inside, the "Tailwind Dashboard" is displayed, showing the "Orders over Time" chart.

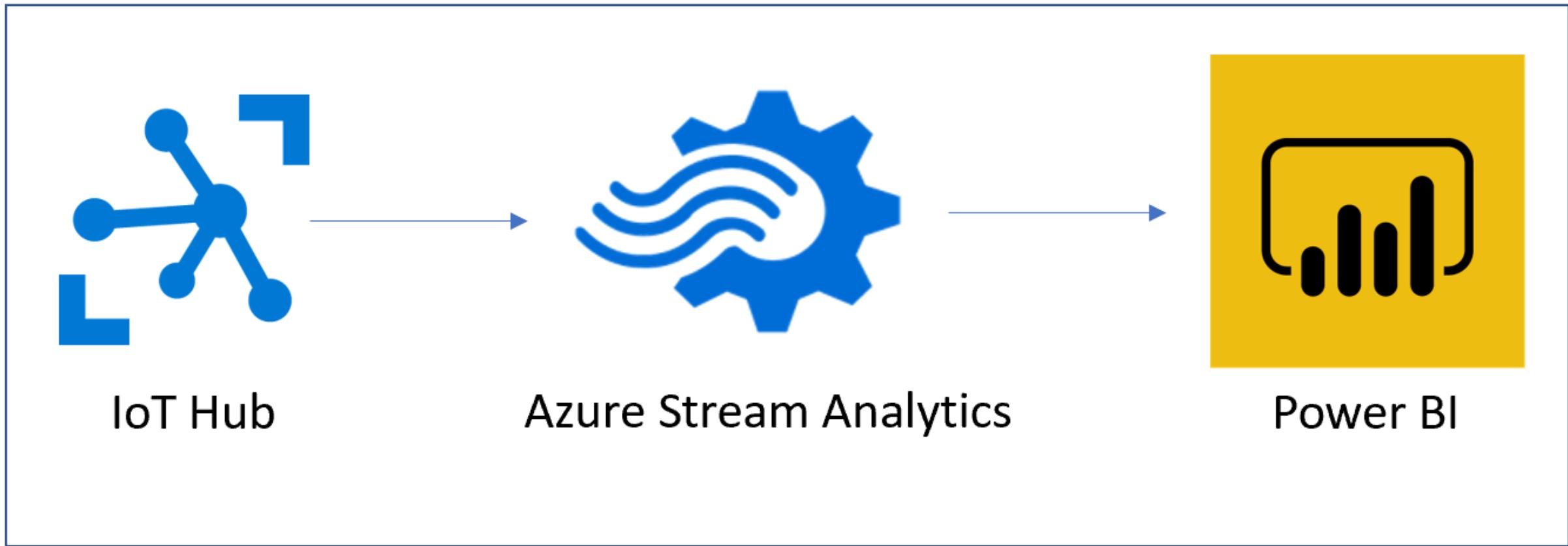
Text Overlay: The text "Let your users stay connected wherever they are." is overlaid on the left side of the dashboard.

Lesson 2: Real-time Dashboards

A wide-angle photograph of a modern office or co-working space. On the left, a man in a dark t-shirt and jeans walks away from the camera down a hallway. In the center-right, two men are seated in a large, orange, perforated metal chair. One man, with a beard and wearing a grey sweater, sits facing the other man, who is seen from the back. They appear to be engaged in a conversation. The room is filled with various plants in different containers, hanging from the ceiling and placed on the floor. The ceiling features exposed wooden beams and string lights. Large windows on the right side provide natural light and a view of a brick wall outside.

Create a Real-time Dashboards

Stream data and update dashboards as soon as the data is logged.



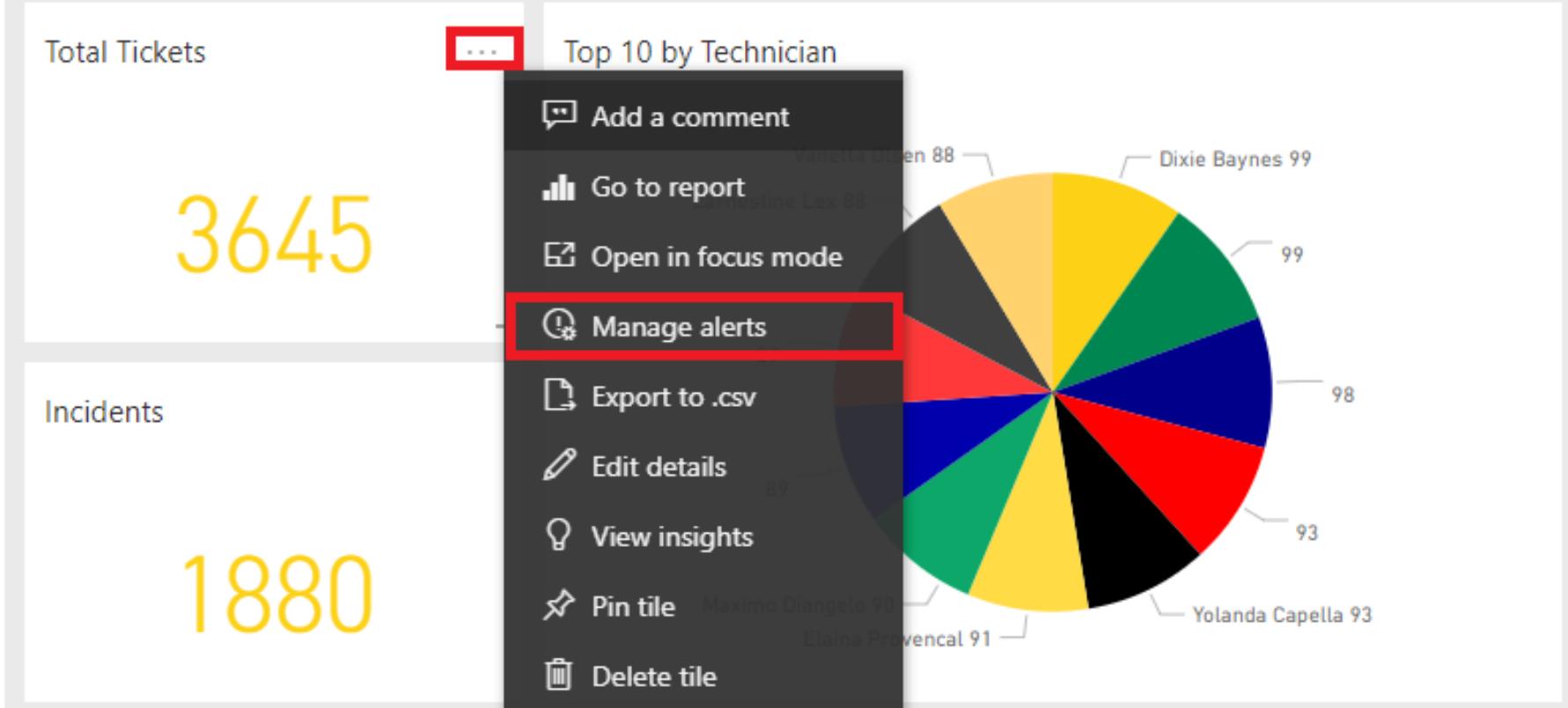
Configure Data Alerts

Ask a question about your data

Total Tickets **3645**

Incidents **1880**

Top 10 by Technician

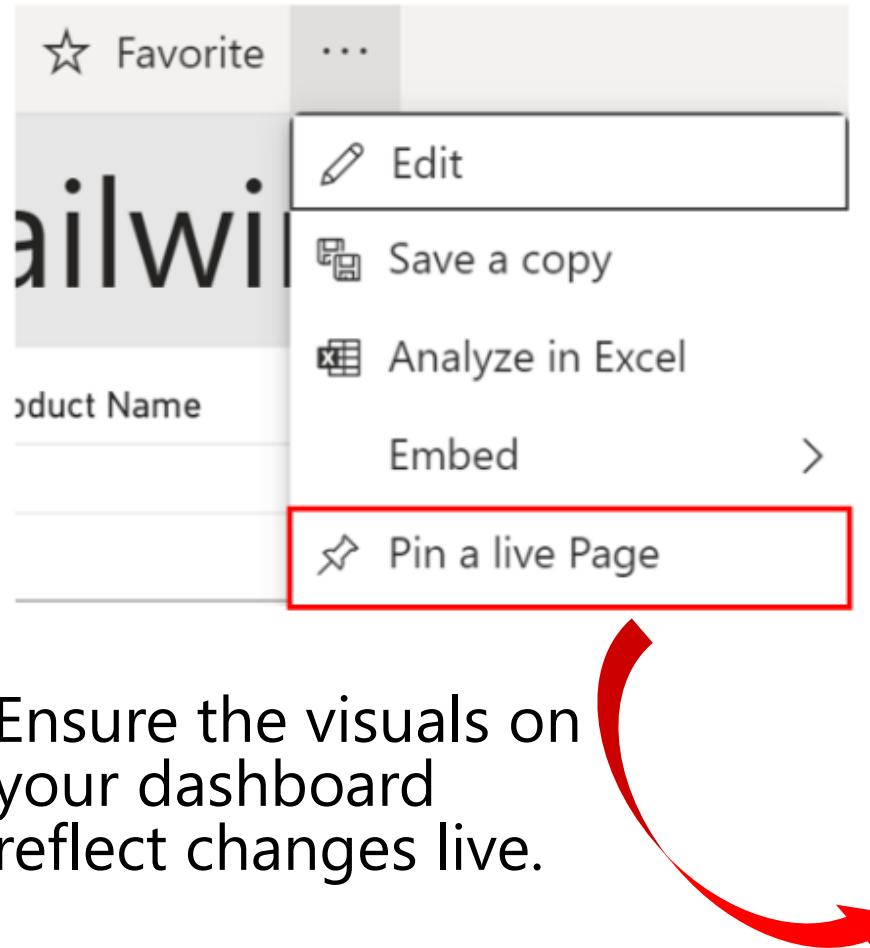


A pie chart titled "Top 10 by Technician" showing the distribution of tickets. The segments are labeled with technician names and their ticket counts: Dixie Baynes 99, 99, 98, 93, Yolanda Capella 93, Maximo Diangelo 90, Elaina Provençal 91, 89, Ernestine Lex 88, and Karen Denen 88. A context menu is open over the chart, with the "Manage alerts" option highlighted.

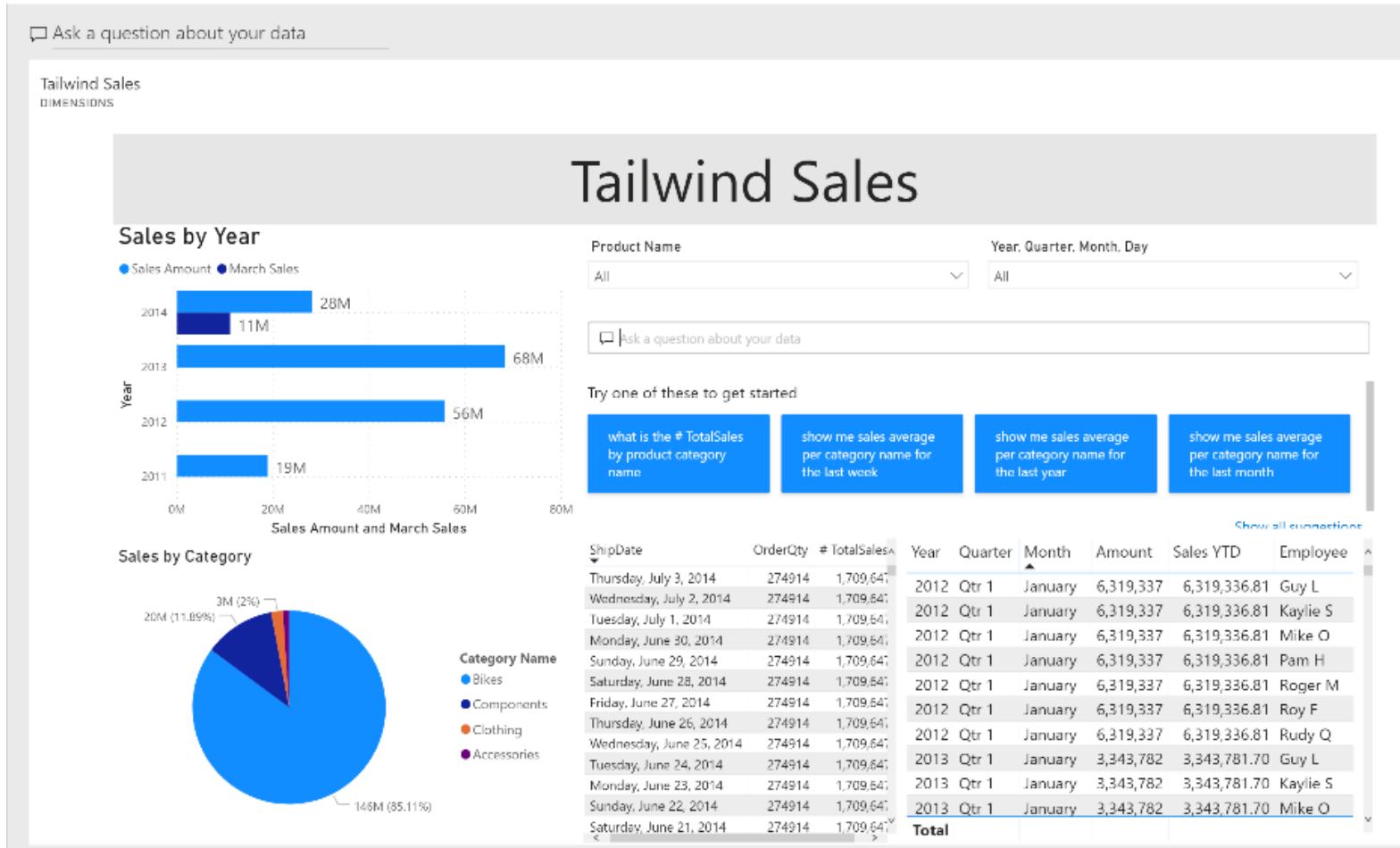
- ...
Add a comment
Go to report
Open in focus mode
Manage alerts
Export to .csv
Edit details
View insights
Pin tile
Delete tile

Notify users that a specific data point has reached a defined threshold.

Pin a Live Report Page to a Dashboard



Ensure the visuals on your dashboard reflect changes live.

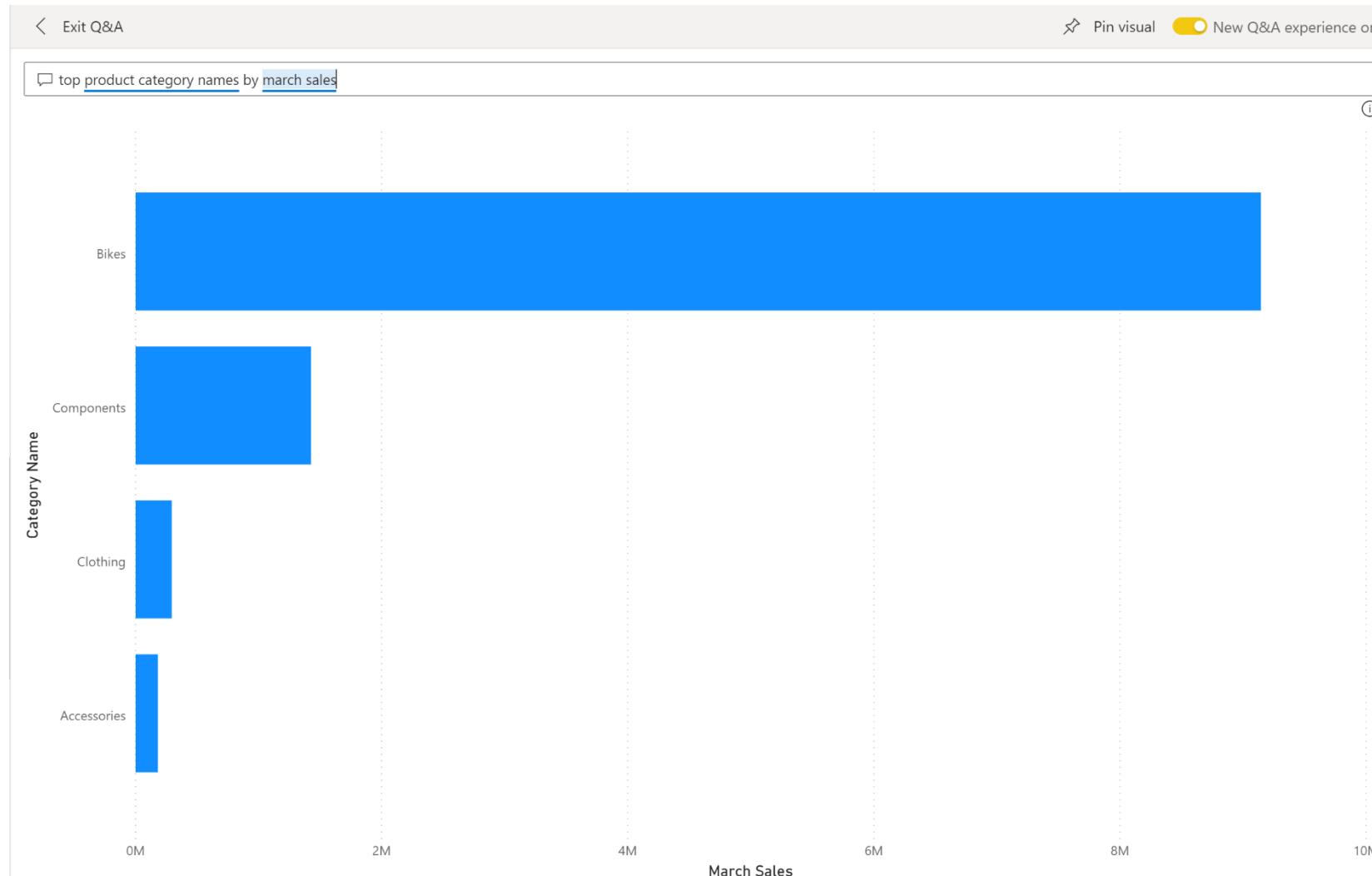


The screenshot shows a live report page titled 'Tailwind Sales'. At the top, there's a search bar with 'Ask a question about your data' and a 'Tailwind Sales' section labeled 'DIMENSIONS'. Below this is a 'Sales by Year' chart showing sales for 2011, 2012, 2013, and 2014. To the right of the chart is a 'Product Name' filter and a 'Year, Quarter, Month, Day' filter, both set to 'All'. A red box highlights the 'Pinned' status at the top right of the dashboard area. Below the chart is a 'Sales by Category' pie chart with segments for Bikes, Components, Clothing, and Accessories. To the right of the pie chart is a table of sales data with columns for ShipDate, OrderQty, # TotalSales, Year, Quarter, Month, Amount, Sales YTD, and Employee. The table includes rows for various dates and employees like Guy L, Kaylie S, Mike O, Pam H, Roger M, Roy F, Rudy Q, and others. A red box highlights the 'Pinned' status at the top right of the dashboard area.

Lesson 3: Enhance a dashboard



Explore Data by Asking Questions



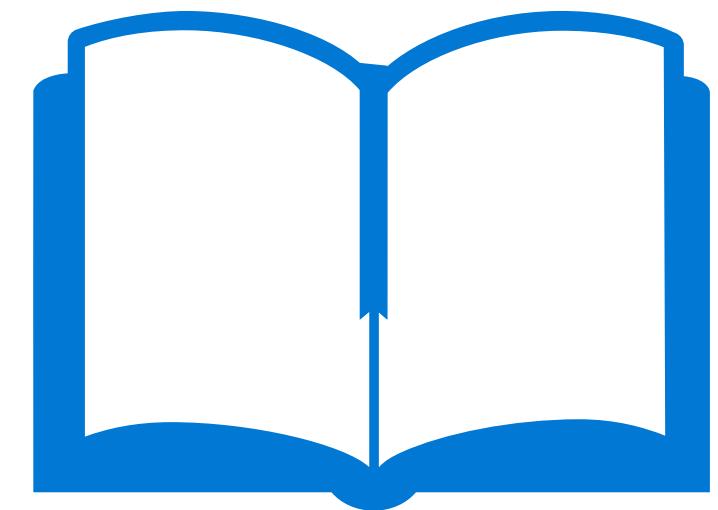
Sometimes the fastest way to get an answer from your data is to ask a question using natural language.

Lab: Creating a Power BI Dashboard

References

- DA-100 Create dashboards in Power BI

<https://docs.microsoft.com/en-us/learn/modules/create-dashboards-power-bi/>



Module 9: Create Paginated Reports in Power BI

Learning Objectives

You will learn the following concepts:

- Paginated Reports
 - What are they?
 - When they should be used
 - Charts and Tables
 - Publishing a paginated report

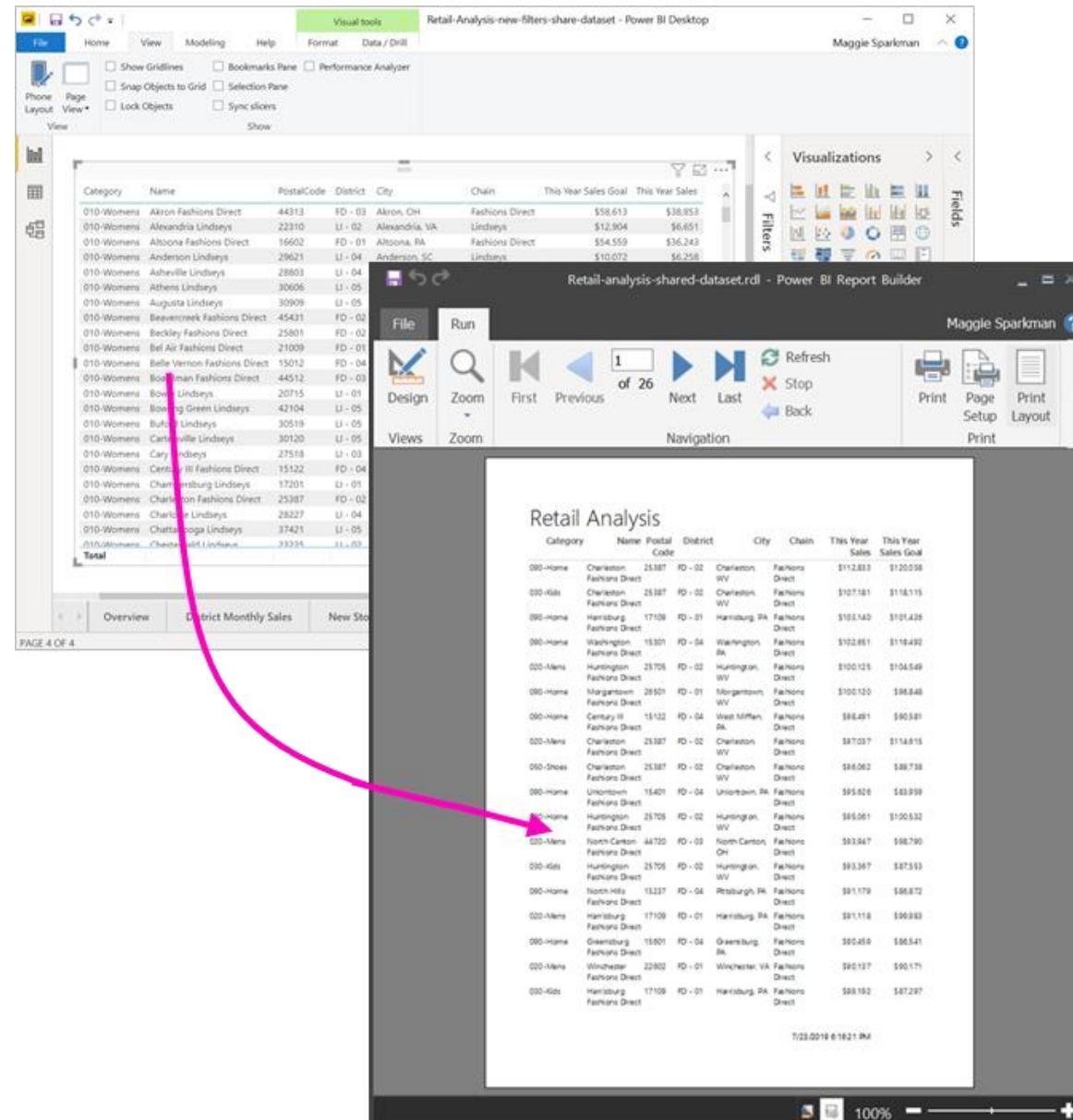
Lesson 1:

Paginated Report Overview



Introduction to Paginated Reports

- Descendant of SQL Server Reporting Services.
- Created in Power BI Report Builder.
- Part of Power BI Premium.



The screenshot shows the Power BI Desktop application window titled "Retail-Analysis-new-filters-share-dataset - Power BI Desktop". The main area displays a paginated report titled "Retail Analysis" with four pages. The report includes a table of district monthly sales data and navigation controls for "First", "Previous", "Next", and "Last". A pink arrow points from the bottom of the report table towards the "Run" tab in the ribbon menu. The ribbon also includes tabs for "File", "Design", "Run", "Zoom", "Views", and "Navigation". The "Visualizations" pane on the right side of the ribbon contains various chart and report icons.

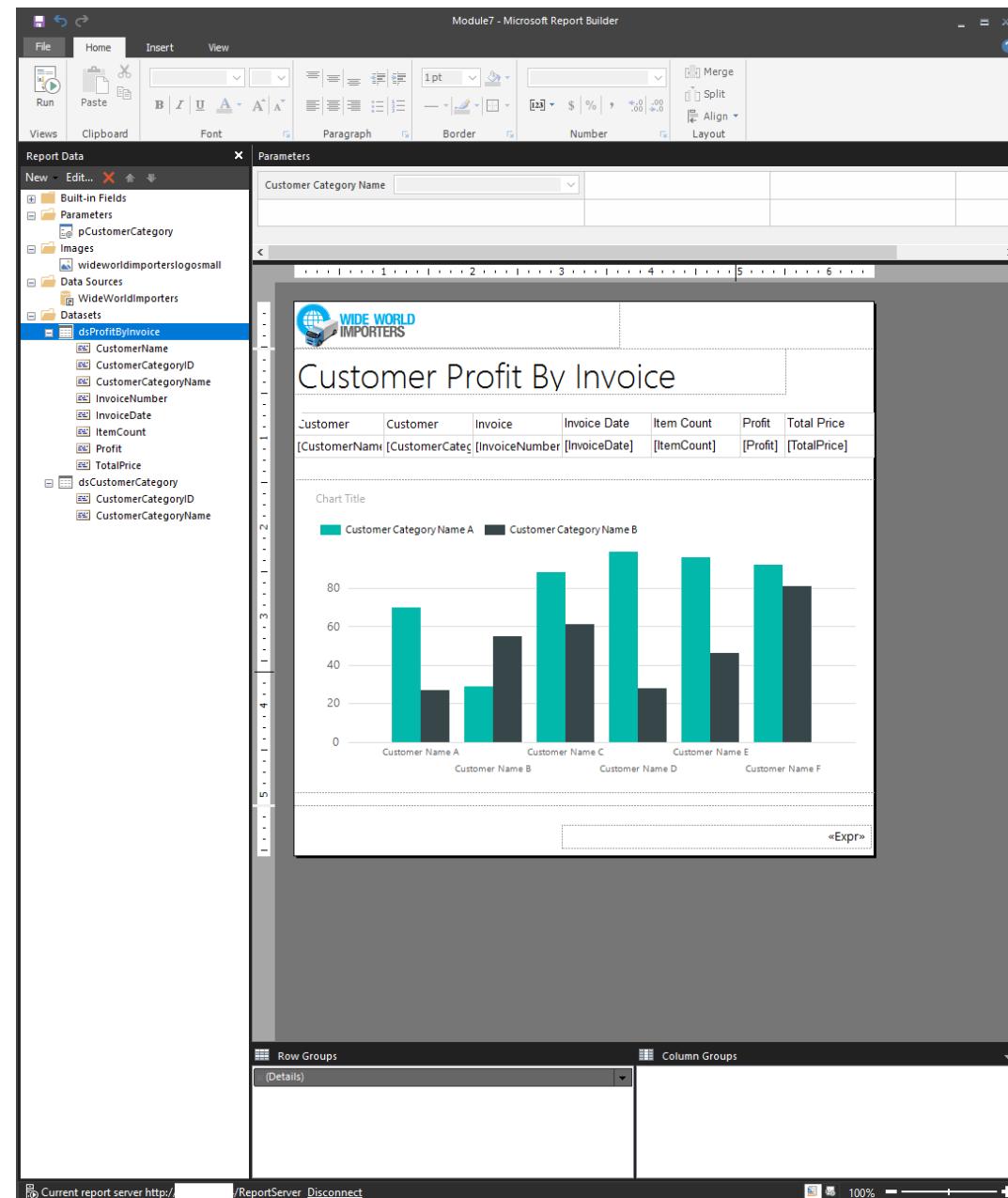
Category	Name	PostalCode	District	City	Chain	This Year Sales Goal	This Year Sales
010-Women	Akron Fashions Direct	44313	FD - 03	Akron, OH	Fashions Direct	\$58,613	\$38,853
010-Women	Alexandria Lindseys	22310	U - 02	Alexandria, VA	Lindseys	\$12,904	\$6,651
010-Women	Altosona Fashions Direct	16602	FD - 01	Altosona, PA	Fashions Direct	\$54,559	\$36,243
010-Women	Anderson Lindseys	29621	U - 04	Anderson, SC	Lindseys	\$10,072	\$6,258
010-Women	Asheville Lindseys	28803	U - 04	Asheville, NC	Lindseys	\$10,072	\$6,258
010-Women	Athens Lindseys	30906	U - 05	Athens, GA	Lindseys	\$10,072	\$6,258
010-Women	Augusta Lindseys	30909	U - 05	Augusta, GA	Lindseys	\$10,072	\$6,258
010-Women	Beechmire Fashions Direct	45431	FD - 03	Beechmire, OH	Fashions Direct	\$58,613	\$38,853
010-Women	Beckley Fashions Direct	25801	FD - 02	Beckley, WV	Fashions Direct	\$58,613	\$38,853
010-Women	Bel Air Fashions Direct	21000	FD - 01	Bel Air, MD	Fashions Direct	\$58,613	\$38,853
010-Women	Belle Vernon Fashions Direct	15012	FD - 04	Belle Vernon, PA	Fashions Direct	\$58,613	\$38,853
010-Women	Bloomington Fashions Direct	44512	U - 01	Bloomington, IL	Fashions Direct	\$58,613	\$38,853
010-Women	Bowling Green Lindseys	42104	U - 05	Bowling Green, KY	Lindseys	\$10,072	\$6,258
010-Women	Buffalo Lindseys	30519	U - 05	Buffalo, NY	Lindseys	\$10,072	\$6,258
010-Women	Carlisleville Lindseys	30120	U - 05	Carlisleville, KY	Lindseys	\$10,072	\$6,258
010-Women	Cary Lindseys	27518	U - 03	Cary, NC	Lindseys	\$10,072	\$6,258
010-Women	Centerville Fashions Direct	15122	FD - 04	Centerville, OH	Fashions Direct	\$58,613	\$38,853
010-Women	Charlottesville Lindseys	17201	U - 01	Charlottesville, VA	Lindseys	\$10,072	\$6,258
010-Women	Charleston Fashions Direct	25387	FD - 02	Charleston, WV	Fashions Direct	\$58,613	\$38,853
010-Women	Charlotte Lindseys	28227	U - 04	Charlotte, NC	Lindseys	\$10,072	\$6,258
010-Women	Chattanooga Lindseys	37421	U - 05	Chattanooga, TN	Lindseys	\$10,072	\$6,258
010-Women	Chesterfield Lindseys	33324	U - 03	Chesterfield, VA	Lindseys	\$10,072	\$6,258
Total:							
PAGE 4 OF 4							

Category	Name	PostalCode	District	City	Chain	This Year Sales	This Year Sales Goal
080-Home	Charleston Fashions Direct	25387	FD - 02	Charleston, WV	Fashions Direct	\$112,833	\$120,038
080-Kids	Charleston Fashions Direct	25387	FD - 02	Charleston, WV	Fashions Direct	\$107,181	\$118,115
080-Home	Harrisburg Fashions Direct	17109	FD - 01	Harrisburg, PA	Fashions Direct	\$103,140	\$101,628
080-Home	Washington Fashions Direct	15351	FD - 04	Washington, DC	Fashions Direct	\$102,851	\$118,490
080-Mens	Huntington Fashions Direct	25705	FD - 02	Huntington, WV	Fashions Direct	\$100,125	\$104,549
080-Home	Morgantown Fashions Direct	26501	FD - 01	Morgantown, WV	Fashions Direct	\$100,120	\$98,848
080-Home	Century II Fashions Direct	15122	FD - 04	West Mifflin, PA	Fashions Direct	\$88,491	\$90,381
080-Mens	Charleston Fashions Direct	25387	FD - 02	Charleston, WV	Fashions Direct	\$87,037	\$114,615
080-Shoes	Charleston Fashions Direct	25387	FD - 02	Charleston, WV	Fashions Direct	\$86,062	\$88,738
080-Home	Univtown Fashions Direct	15401	FD - 04	Univtown, PA	Fashions Direct	\$85,826	\$83,939
080-Home	Huntington Fashions Direct	25705	FD - 02	Huntington, WV	Fashions Direct	\$85,061	\$100,532
080-Mens	North Canton Fashions Direct	44720	FD - 03	North Canton, OH	Fashions Direct	\$83,947	\$98,790
080-Kids	Huntington Fashions Direct	25705	FD - 02	Huntington, WV	Fashions Direct	\$83,367	\$87,533
080-Home	North Hills Fashions Direct	15127	FD - 04	Pittsburgh, PA	Fashions Direct	\$81,179	\$86,872
080-Mens	Harrisburg Fashions Direct	17109	FD - 01	Harrisburg, PA	Fashions Direct	\$81,118	\$90,933
080-Home	Greensburg Fashions Direct	15601	FD - 04	Greensburg, PA	Fashions Direct	\$80,450	\$86,541
080-Mens	Winchester Fashions Direct	22802	FD - 01	Winchester, VA	Fashions Direct	\$80,137	\$80,171
080-Kids	Harrisburg Fashions Direct	17109	FD - 01	Harrisburg, PA	Fashions Direct	\$80,192	\$87,297

7/23/2019 6:16:21 PM

When are they the right fit?

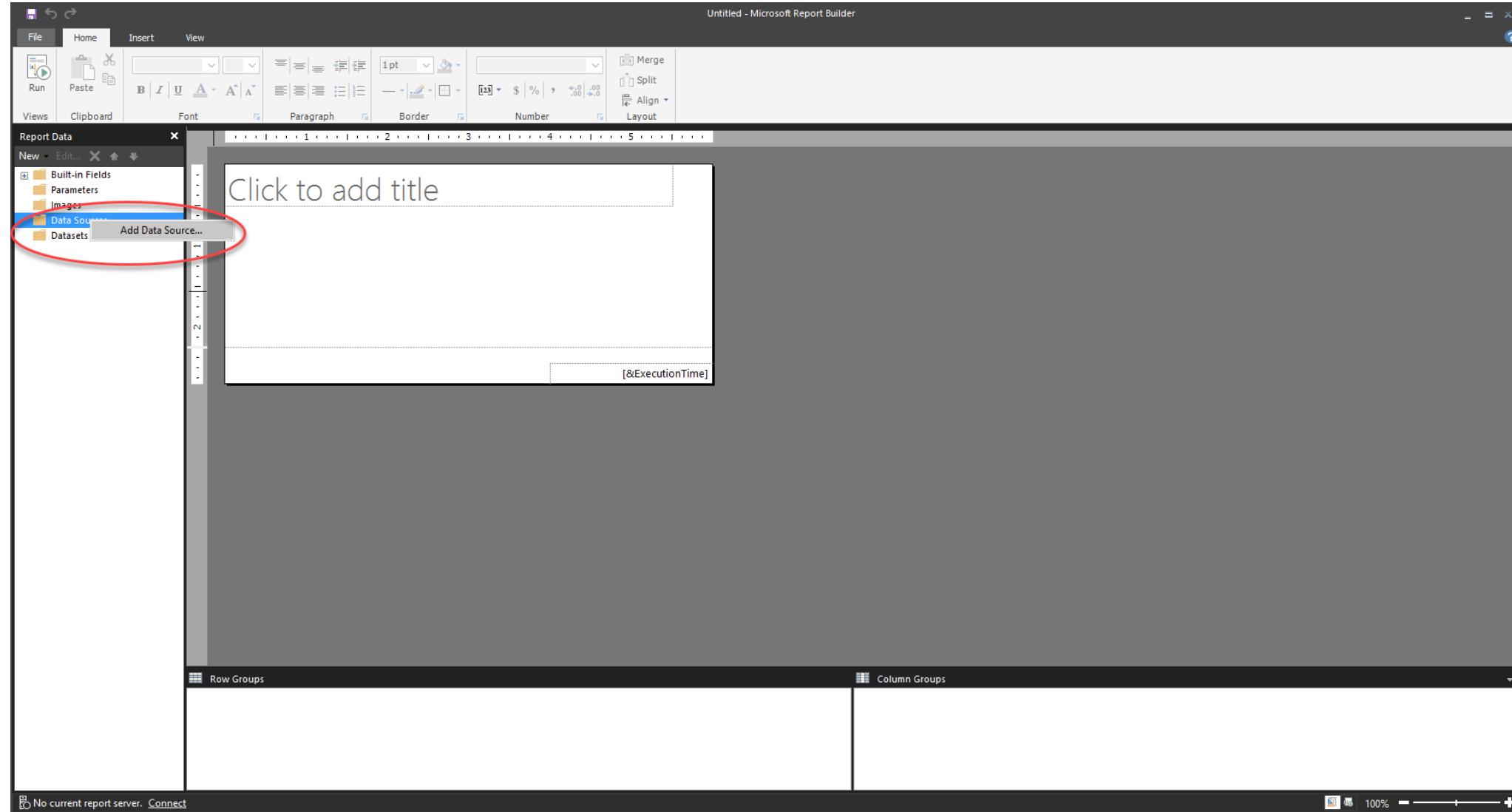
- Operational reports with tables of detail.
- Headers and footers are needed.
- Customized sort orders.
- Clickable headers.
- Rendering tabular data.



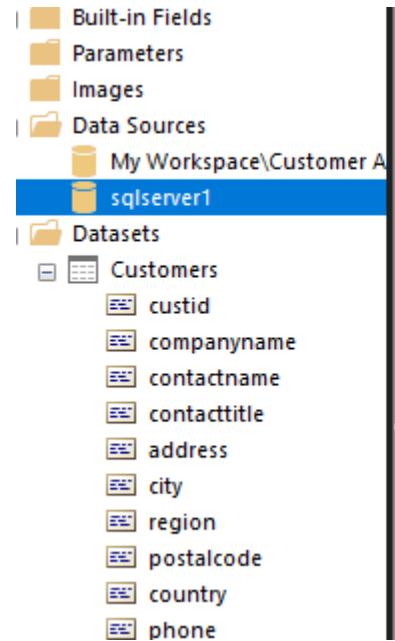
Lesson 2: Creating Paginated Reports



Getting Data

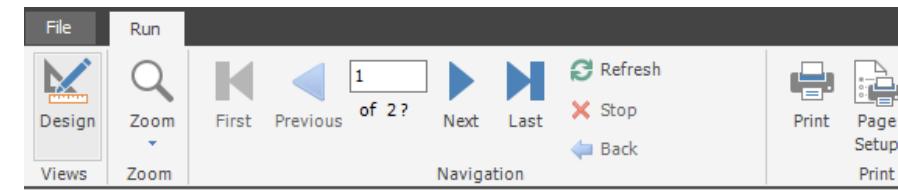


Create a Paginated Report



Click to add title

companyname	contactname	contacttitle
[companyname]	[contactname]	[contacttitle]



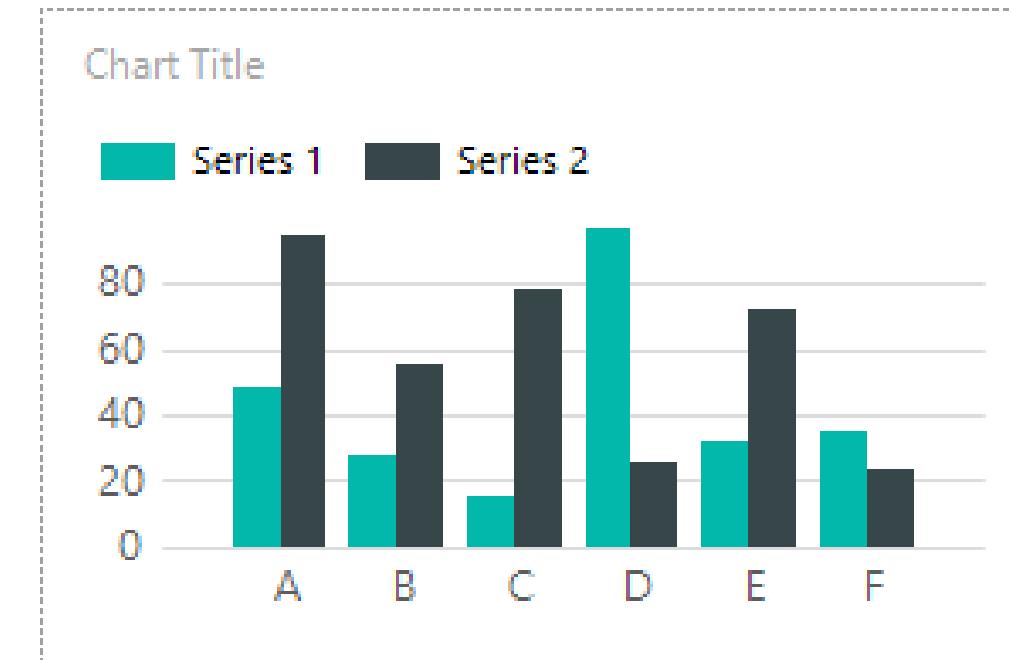
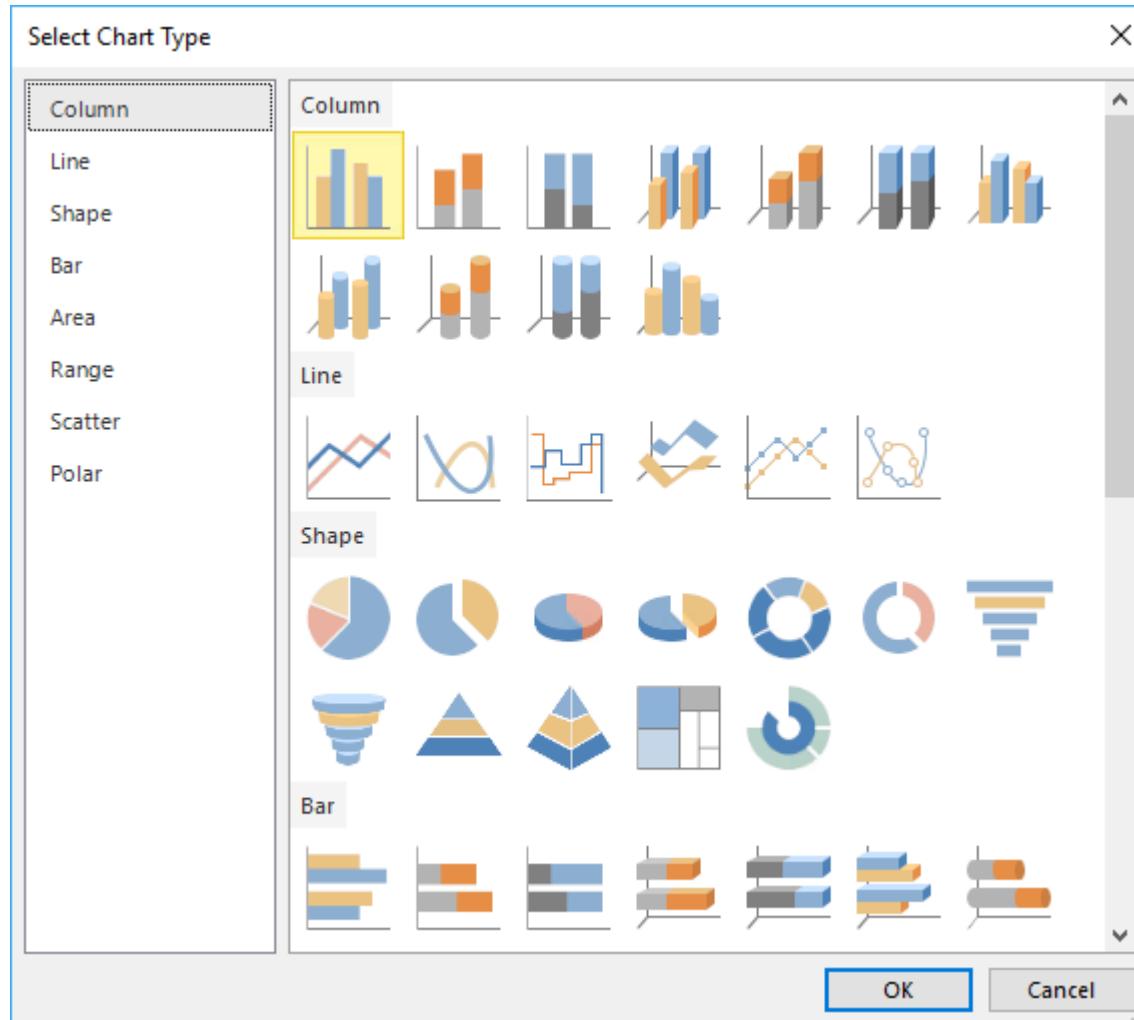
Customer List

Company	Contact	Title	Phone
Customer NRZBB	Allen, Michael	Sales Representative	030-3456789
Customer MLTDN	Hassall, Mark	Owner	(5) 789-0123
Customer KBUDE	Strome, David	Owner	(5) 123-4567
Customer HFBZG	Cunningham, Conor	Sales Representative	(171) 456-7890
Customer HGVLZ	Higginbotham, Tom	Order Administrator	0921-67 89 01
Customer XHXJV	Poland, Carole	Sales Representative	0621-67890
Customer QXVLA	Bansal, Dushyant	Marketing Manager	67.89.01.23
Customer QUHWH	Ilyina, Julia	Owner	(91) 345 67 89
Customer RTXGC	Raghav, Amritansh	Owner	23.45.67.89

Similar to Power BI, add visuals to the design surface.

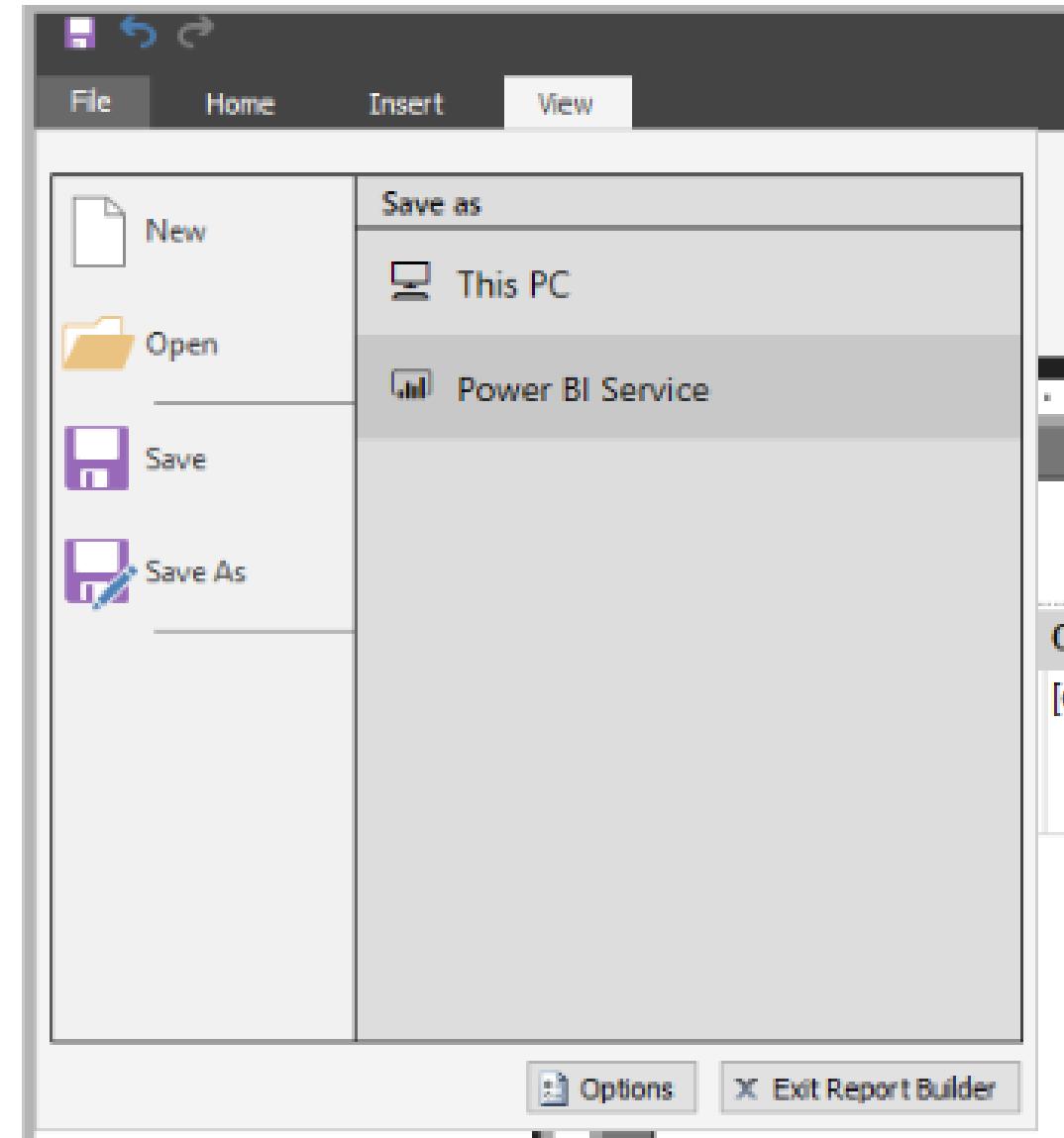


Work with Charts and Tables



Publish the Report

Publish your report to the Power BI service.

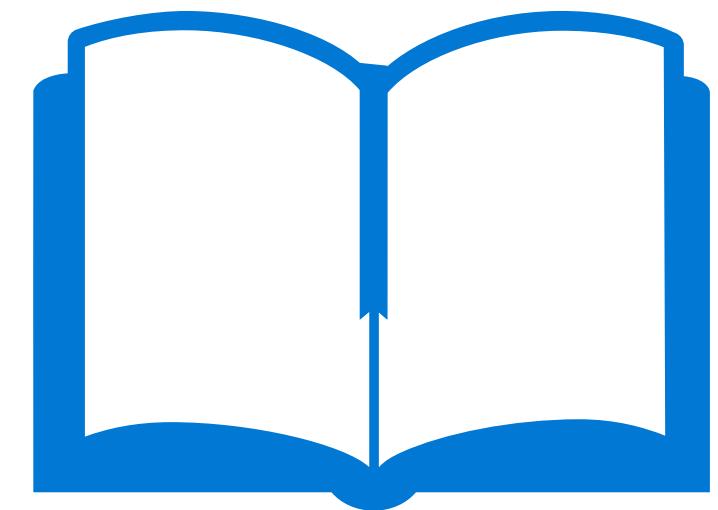


Lab: Creating a Paginated Report [Optional]

References

- DA-100 Create Paginated Reports

<https://docs.microsoft.com/en-us/learn/modules/create-paginated-reports-power-bi/>



Module 10: Perform Advanced Analytics

Learning Objectives

You will learn the following concepts:

- Advanced Analytics
- Data Insights through AI Visuals

Lesson 1: Advanced Analytics

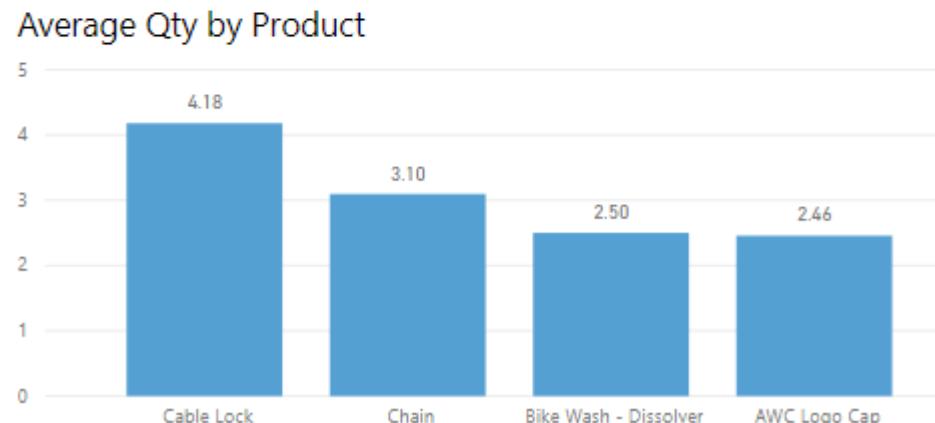


Introduction to Advanced Analytics

- Advanced analytics enables organizations to make better business decisions and create actional and meaningful insights.
- The emerging power of advanced analytics.
- Bring value to an organization through Power BI's advanced analytics capabilities.

Explore Statistical Summary

- Information that provides quick and simple description of your data.
- See clusters, patterns, and behavioral data.



Visualizations

Filters

Remove field
Rename
Move to

Sum
Average
Minimum
Maximum
Count (Distinct)
Count
Standard deviation
Variance
Median

Show value as

New quick measure

Axis

Product Name

Legend

Add data fields here

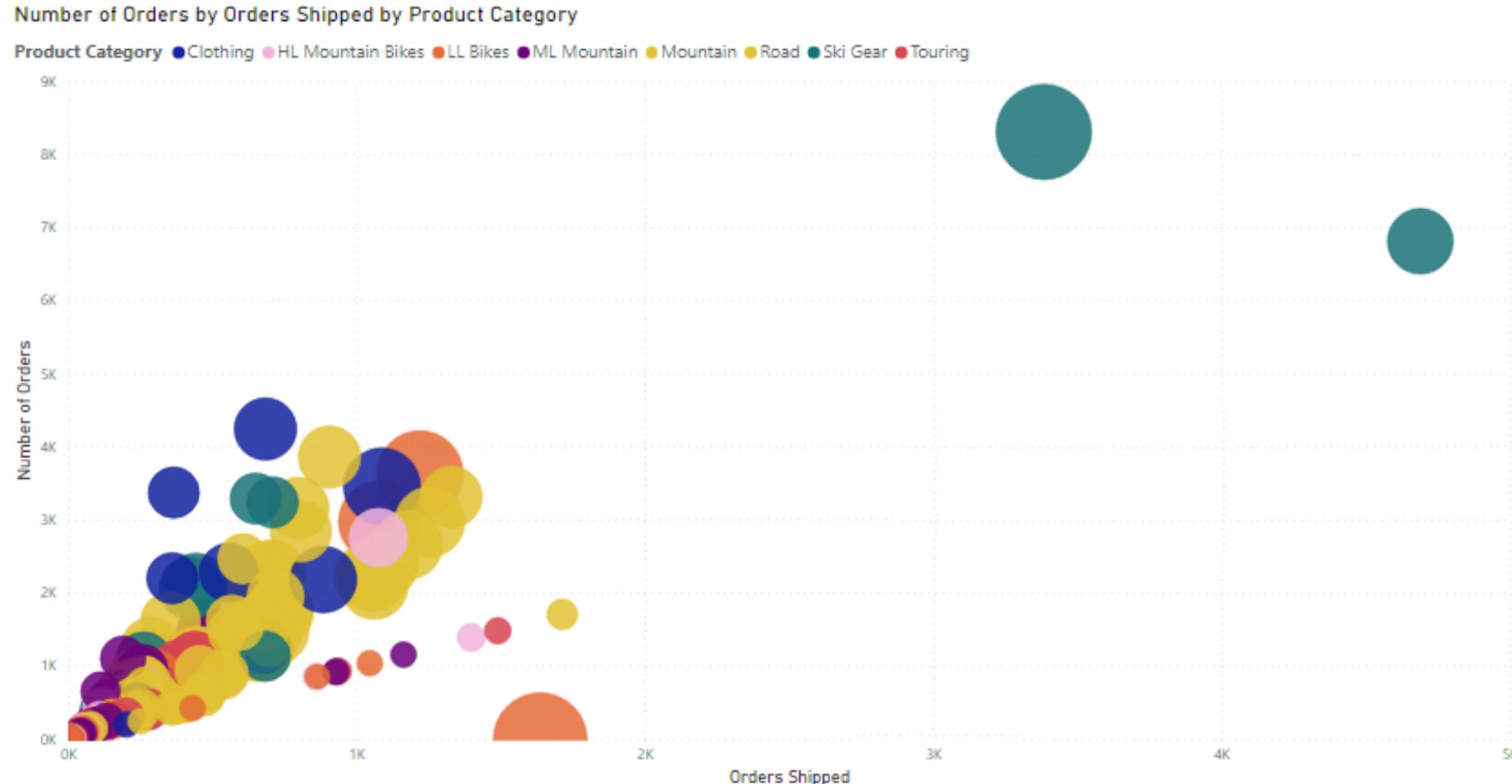
Values

Average Qty

Tooltips

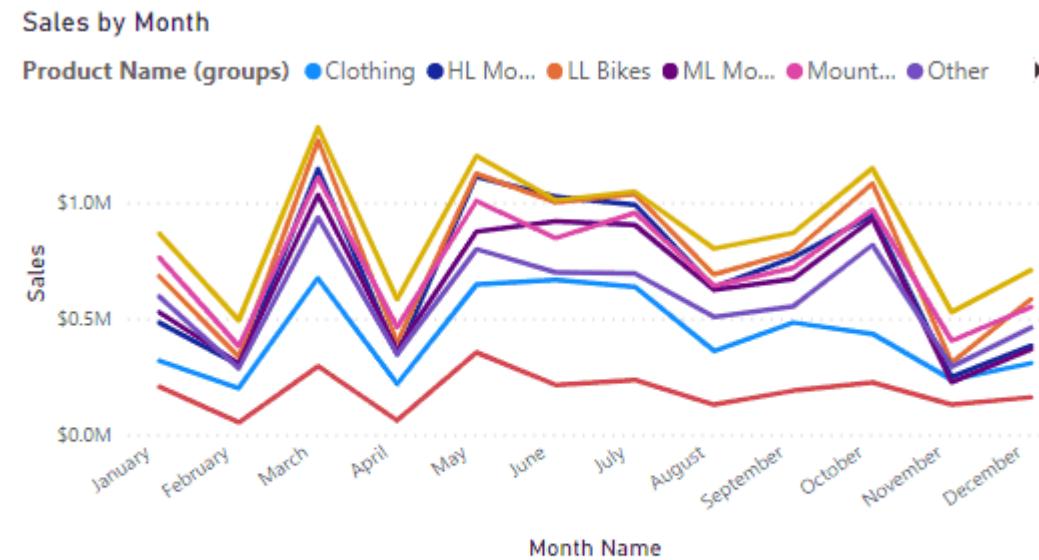
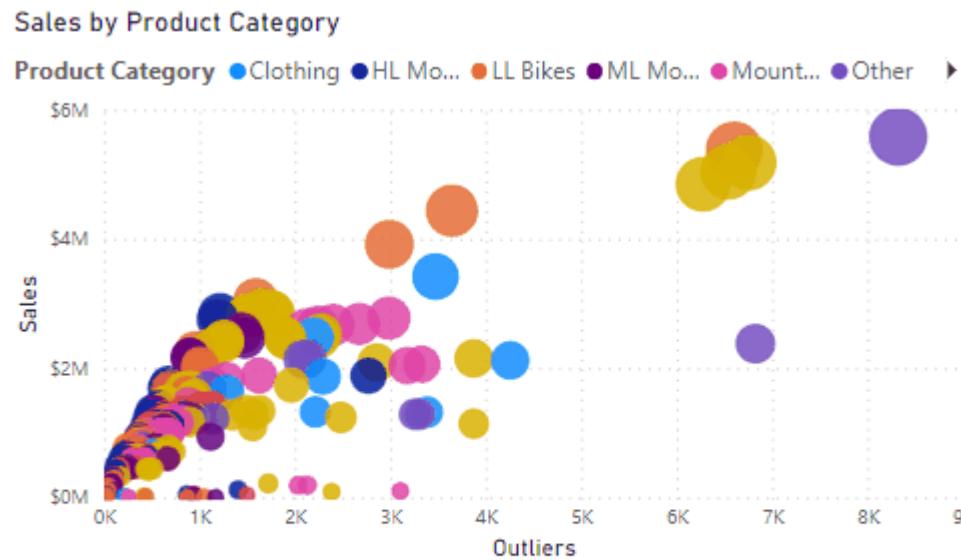
The screenshot shows the Power BI visualizations pane on the right side of the interface. It includes sections for 'Visualizations' (with icons for various chart types), 'Filters', and a context menu with options like 'Remove field', 'Rename', and 'Move to'. Below these are several statistical aggregation functions: Sum, Average (which is selected and highlighted with a red box), Minimum, Maximum, Count (Distinct), Count, Standard deviation, Variance, and Median. The 'Values' section contains a dropdown set to 'Average Qty', which is also highlighted with a red box. The 'Axis' section lists 'Product Name' and 'Legend' (with a placeholder 'Add data fields here'). The 'Tools' section includes 'Show value as' and 'New quick measure'.

Identify Outliers

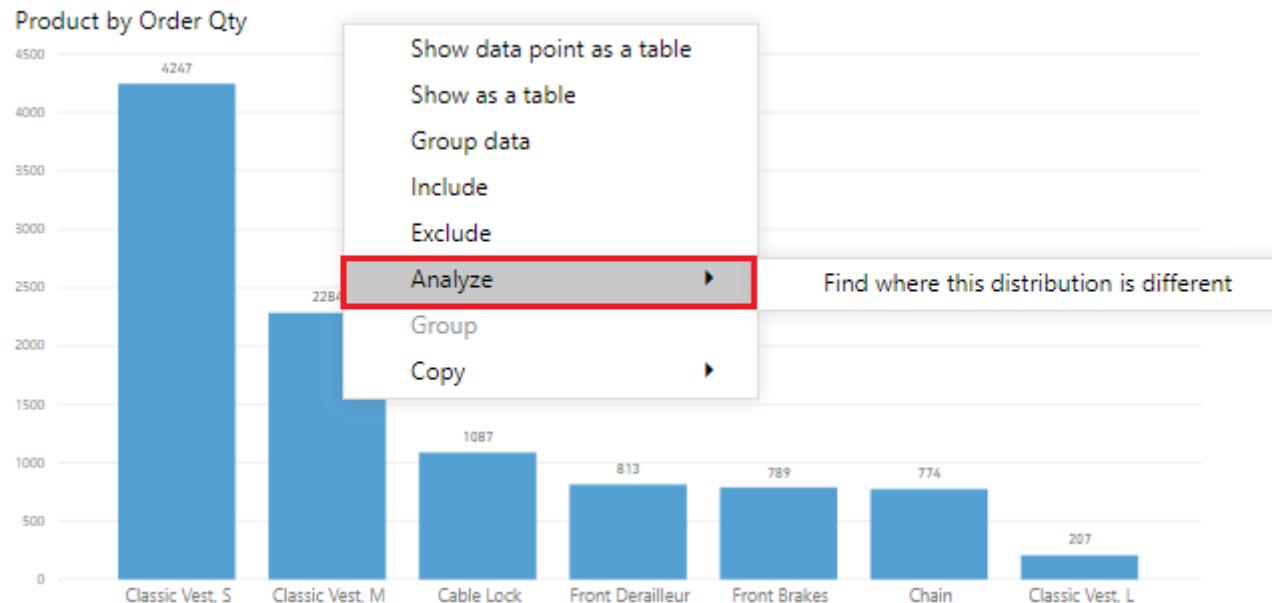


Conduct Time-series Analysis

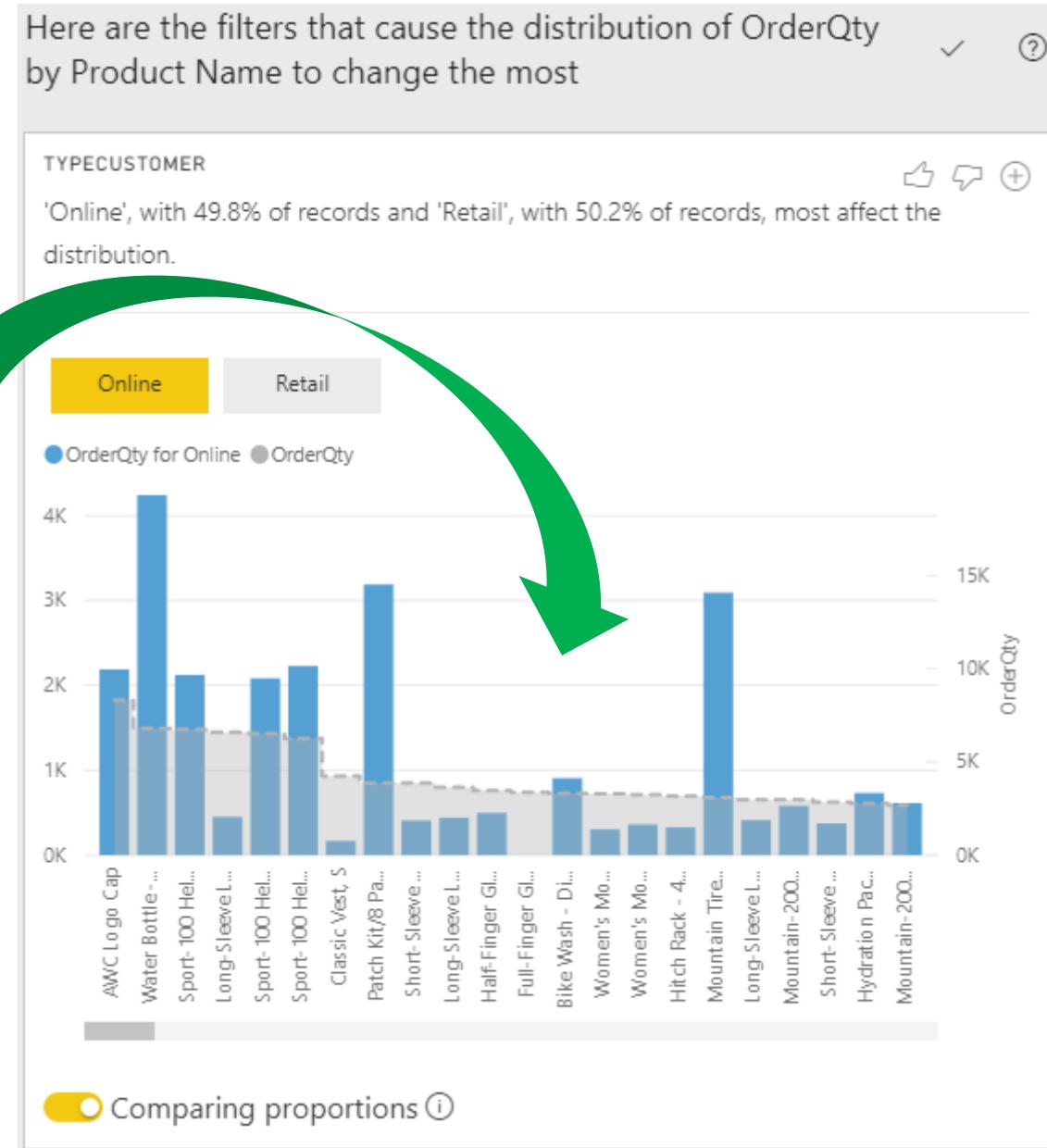
- Analyze a series of data over time.
- Identify meaningful trends and make predictions.



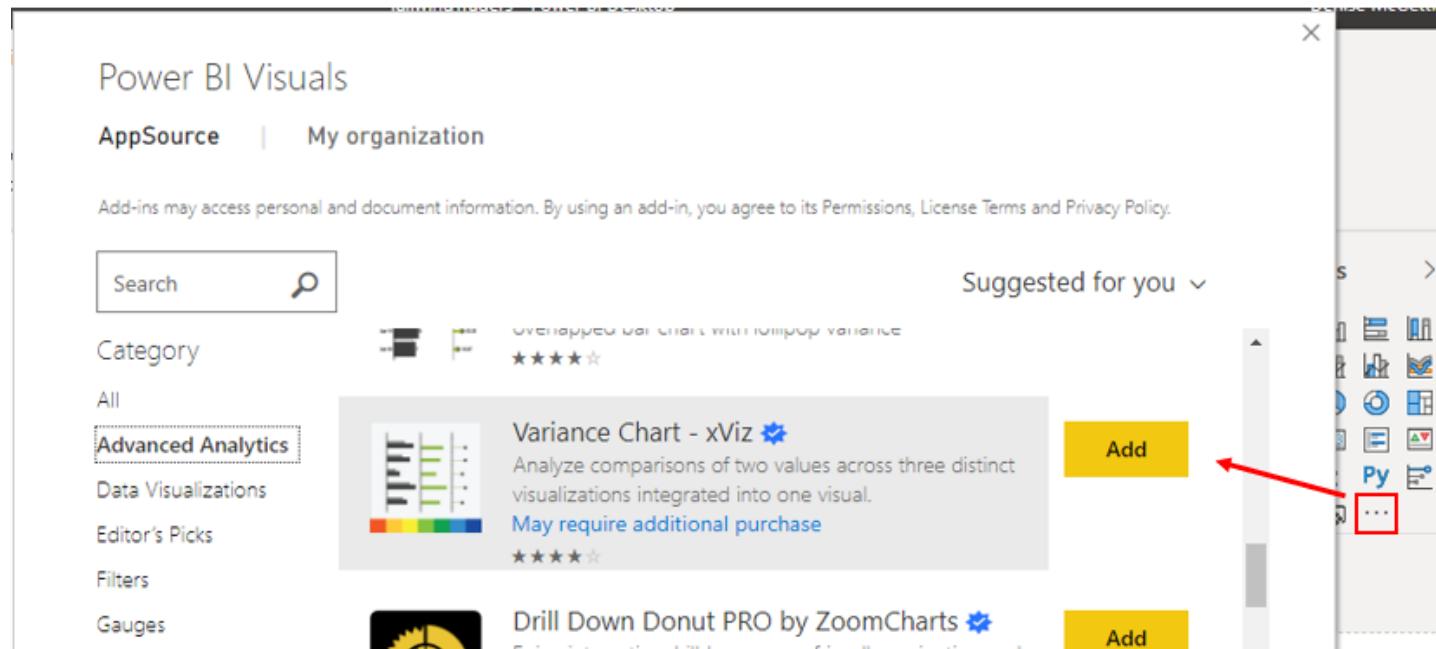
Using the Analyze Feature



Get fast, automated, and insightful analysis on your data.



Advanced Analytics Custom Visuals



Power BI Visuals

AppSource | My organization

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

Search 

Category

All

Advanced Analytics (selected)

Data Visualizations

Editor's Picks

Filters

Gauges

Suggested for you

Variance Chart - xViz 

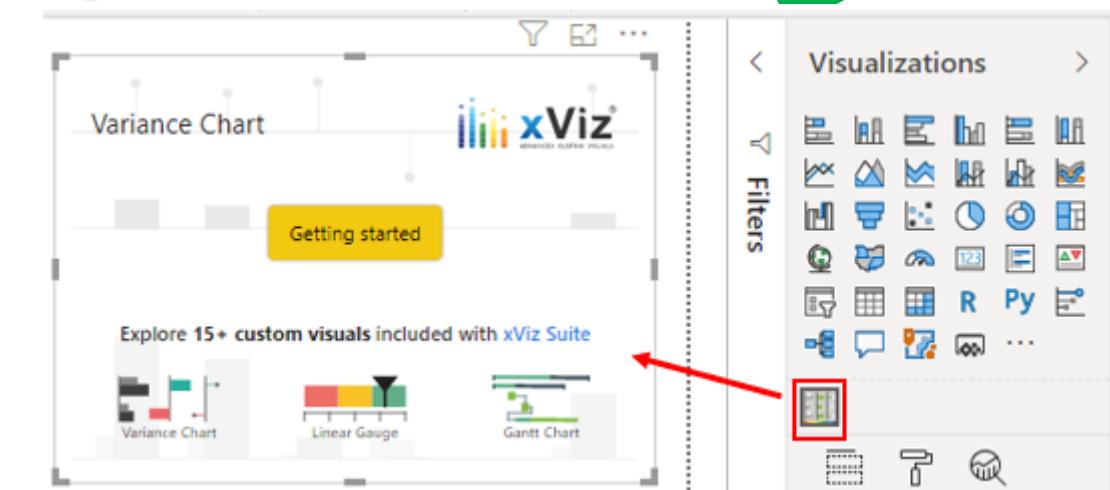
Analyze comparisons of two values across three distinct visualizations integrated into one visual.
May require additional purchase

Drill Down Donut PRO by ZoomCharts 

Add 

The screenshot shows the Power BI Visuals section of the AppSource website. A red arrow points from the 'Add' button next to the 'Variance Chart - xViz' listing to a red box around the 'Py' icon in the 'Suggested for you' sidebar. A large green curved arrow points from the sidebar back towards the main content area.

Add a layer of data insights to your reports for further analysis.



Variance Chart 

Getting started

Explore 15+ custom visuals included with xViz Suite

Variance Chart 

Linear Gauge 

Gantt Chart 

Visualizations

Filters

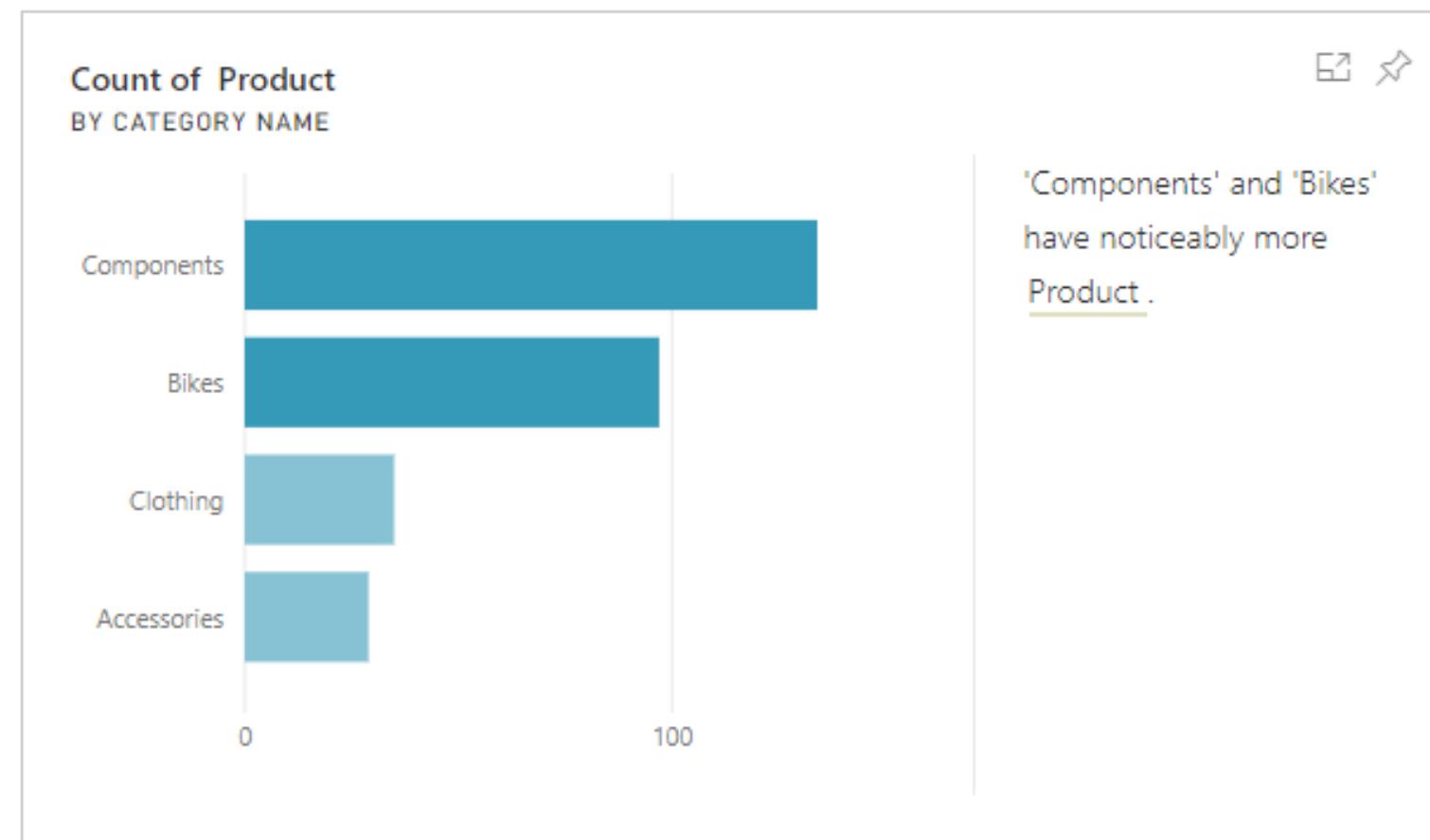
A red box highlights the 'Variance Chart' icon in the 'Visualizations' section of the Power BI ribbon. Another red box highlights the 'Gantt Chart' icon in the same section. A red arrow points from the 'Gantt Chart' icon to the 'xViz Variance Chart' visualization in the report preview.

Quick Insights

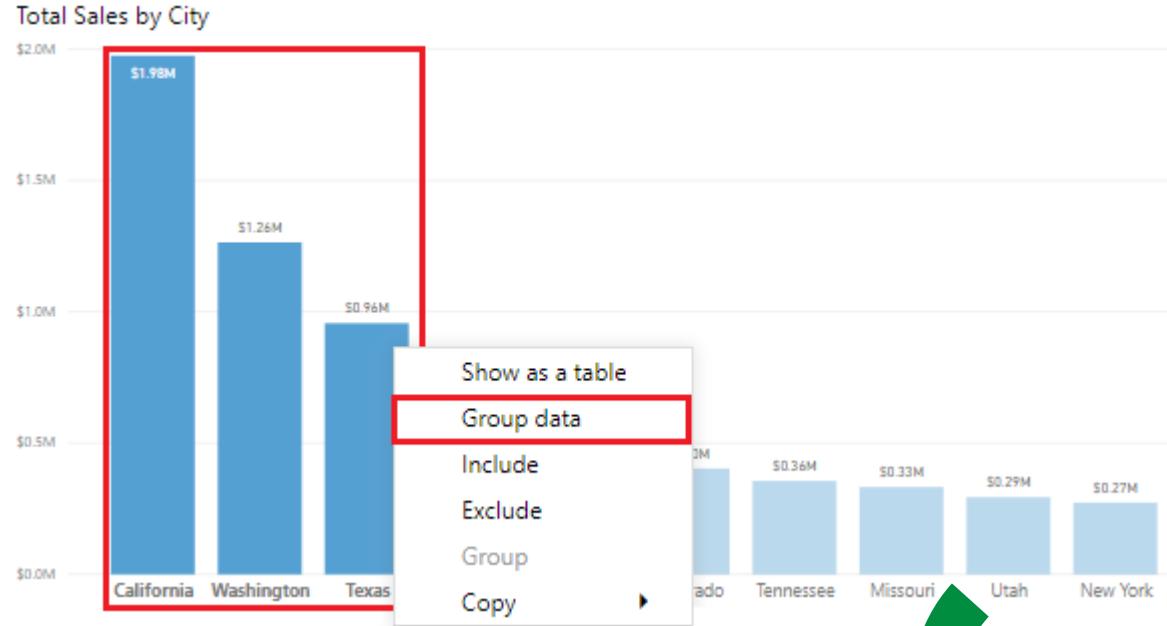
- Uses Machine Learning algorithms to produce quick insights.
- Uncover insights missed during report construction.
- Generate stimulating visual interactions.

Quick Insights

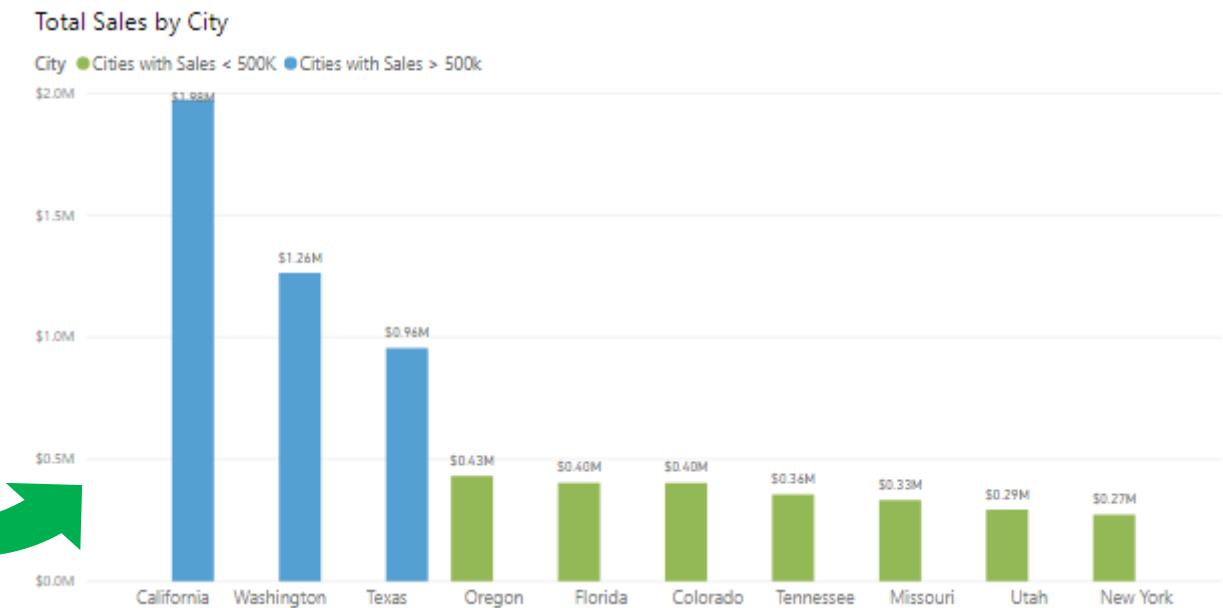
A subset of your data was analyzed and the following insights were found. [Learn more](#)



Grouping and Binning

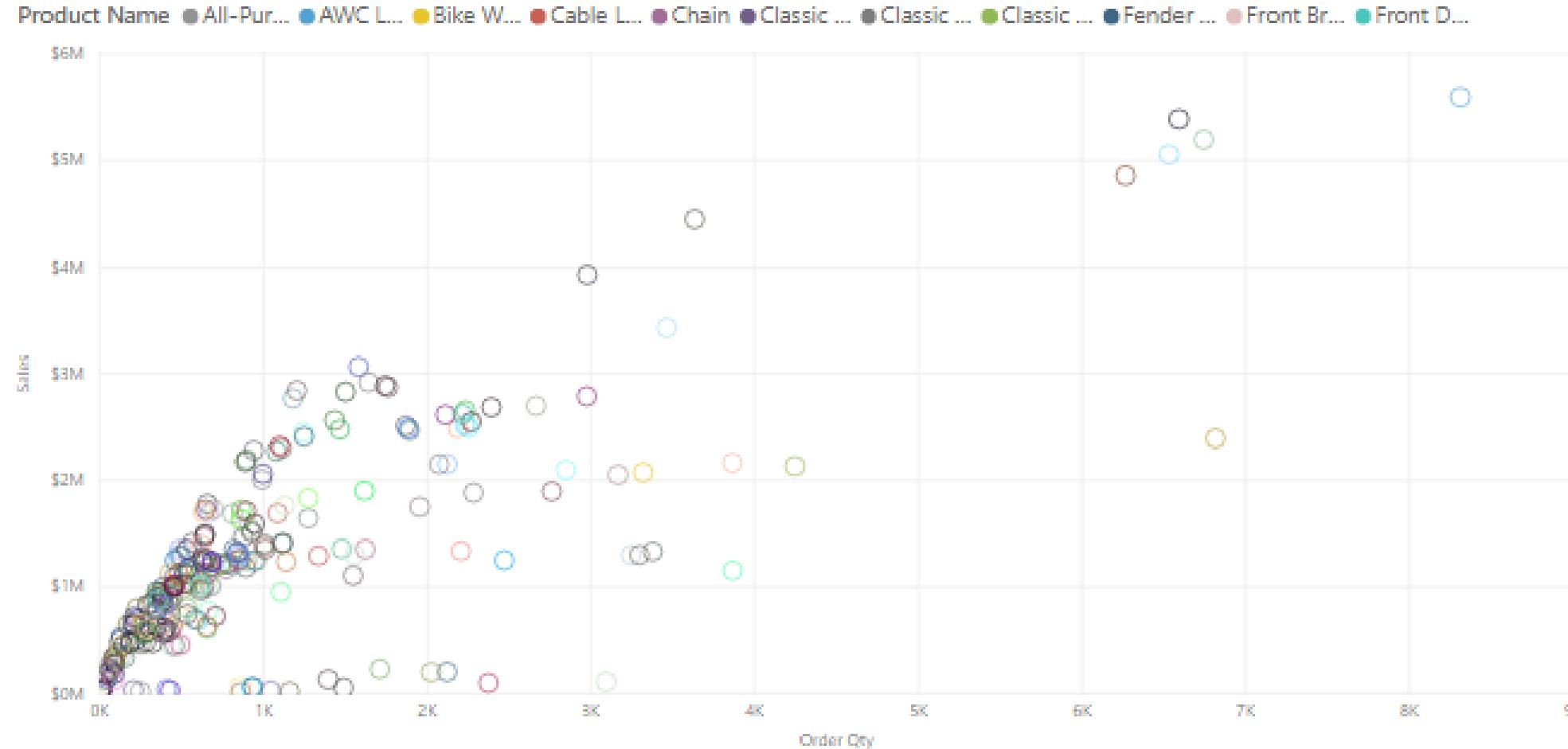


- Grouping: Group categories of data.
- Binning: Group continuous fields.



Clustering Techniques

Product Clusters



Lesson 2: Data Insights through AI Visuals

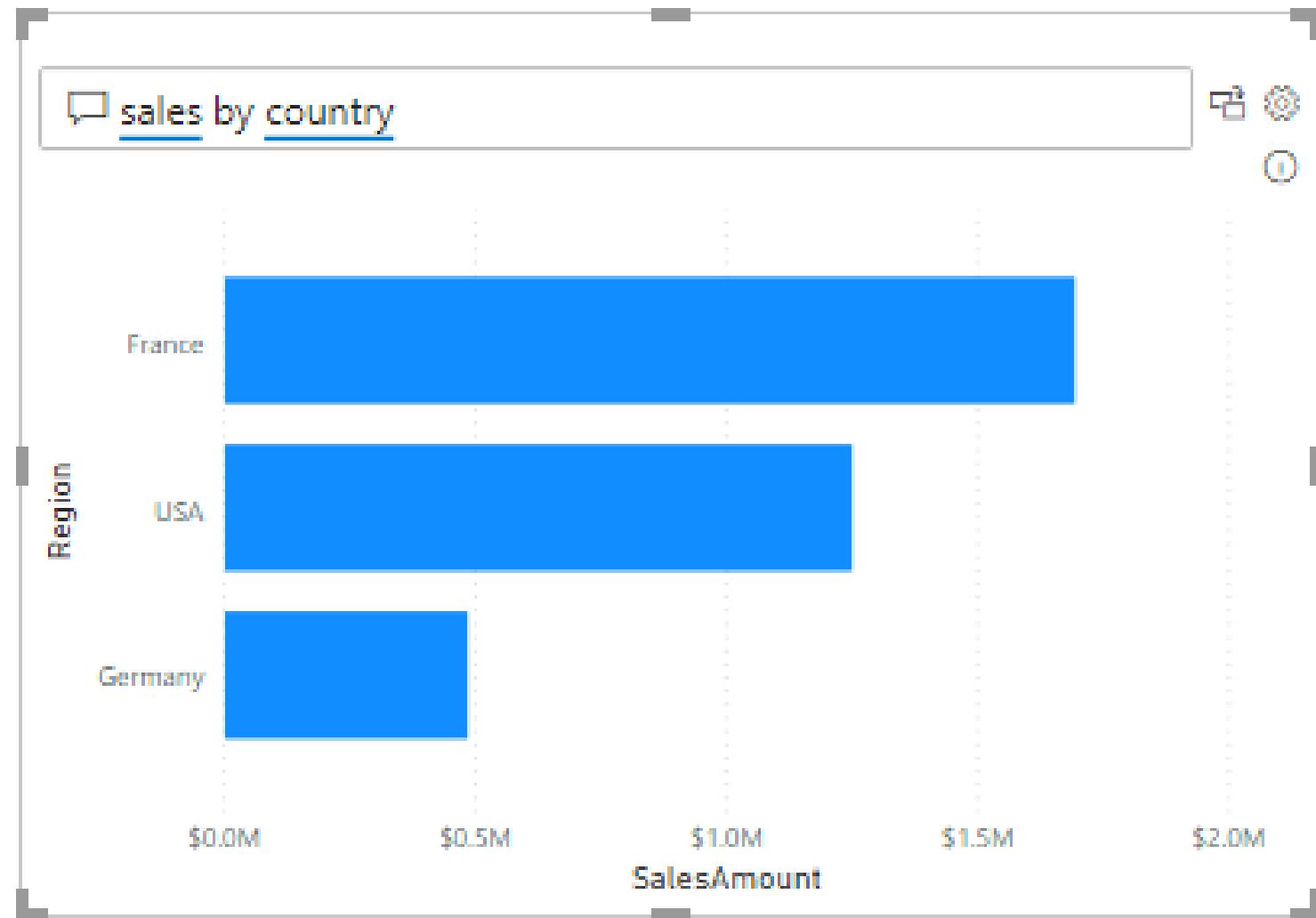


Introduction to AI Visuals

- Power BI provides a wide range of methods to analyze data.
- Fastest way to get an answer is to ask a question.
- Analyze raw data and transform it into valuable information.

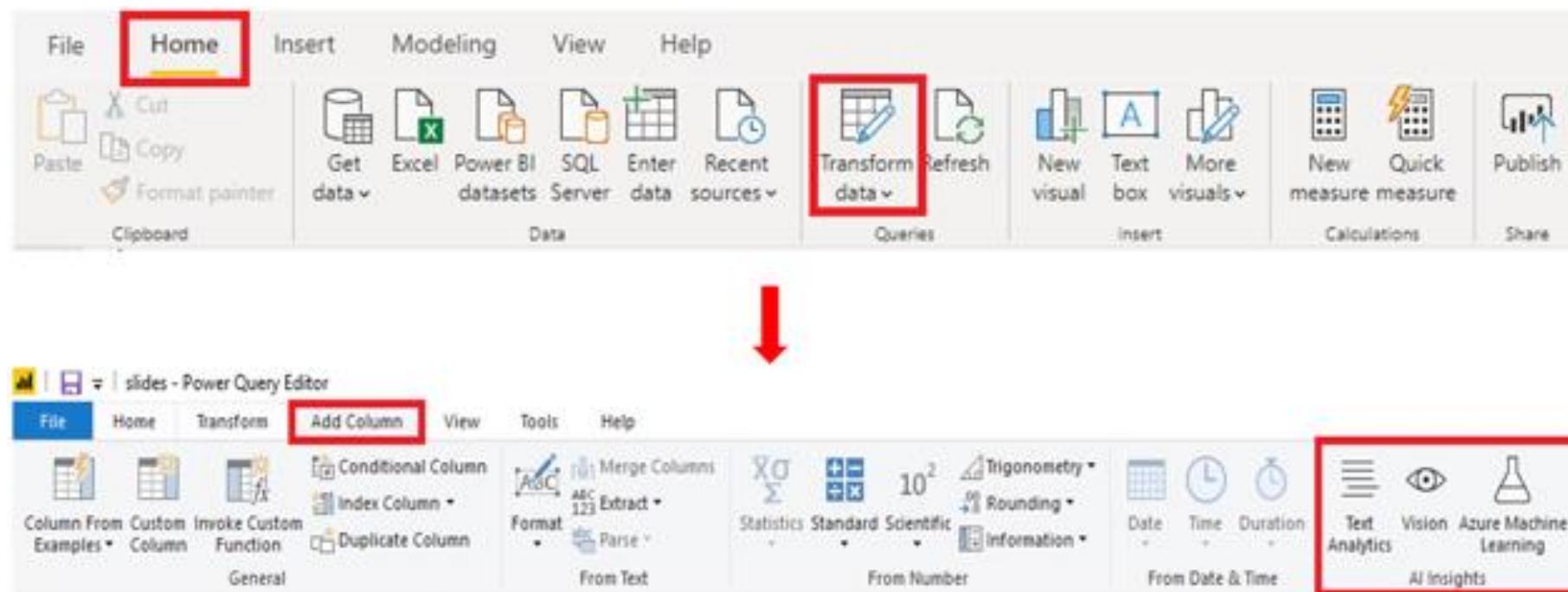
The Q&A Feature

- Explore data in your own words.
- Ask natural language questions.
- A “self-help” feature for insights the user is interested in.

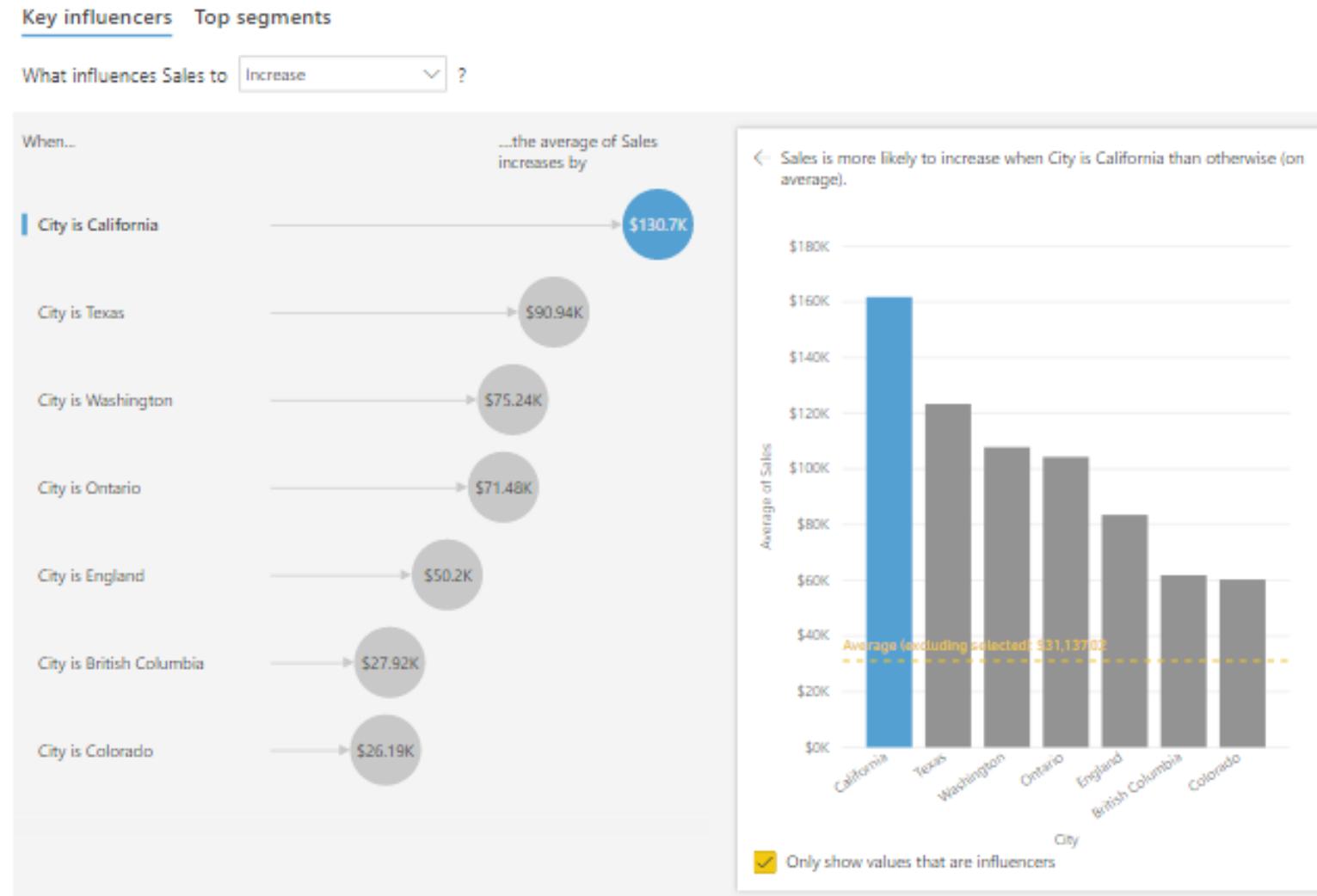


AI Insights

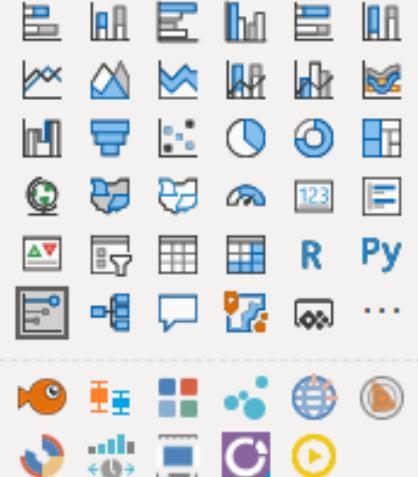
Connect to a collection of pre-trained Machine Learning models.



Key Influencer Visual



Visualizations >



Analyze

Sales

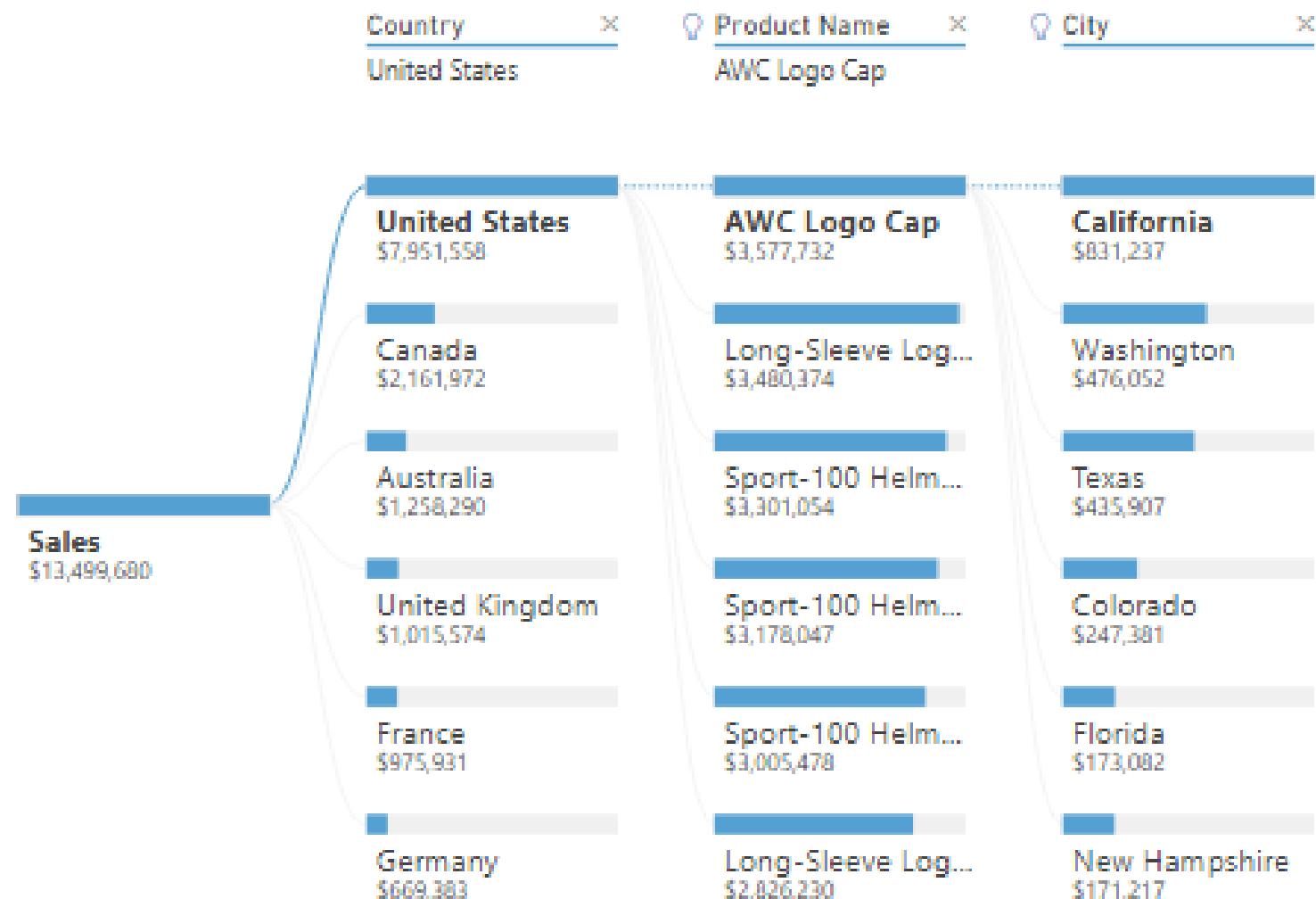
Explain by

City

Product Name

Decomposition Tree Visual

- Aggregate data and drill down into your dimension.
- Improvise exploration and root cause analysis.



Lab: Data Analysis in Power BI

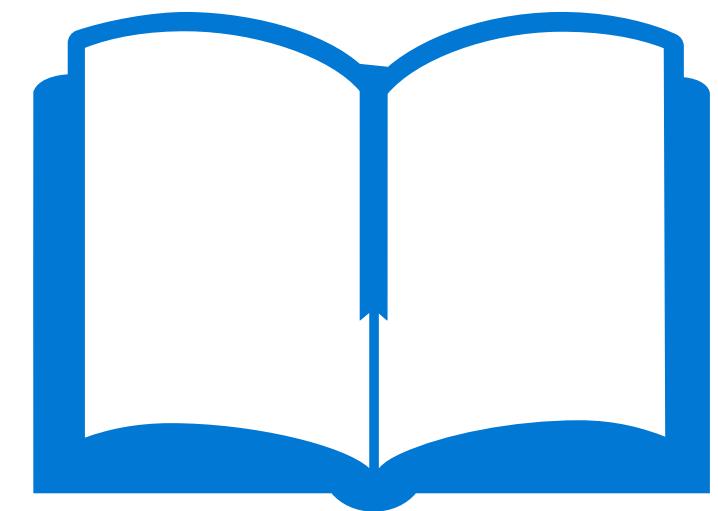
References

- DA-100 Perform analytics in Power BI

<https://docs.microsoft.com/en-us/learn/patterns/perform-analytics-power-bi/>

- Work with AI visuals

<https://docs.microsoft.com/en-us/learn/modules/ai-visuals-power-bi/>



Module 11: Create and Manage Workspaces

Learning Objectives

You will learn the following concepts:

- Workspaces
- Sharing and Managing Power BI Assets

Lesson 1: Creating Workspaces

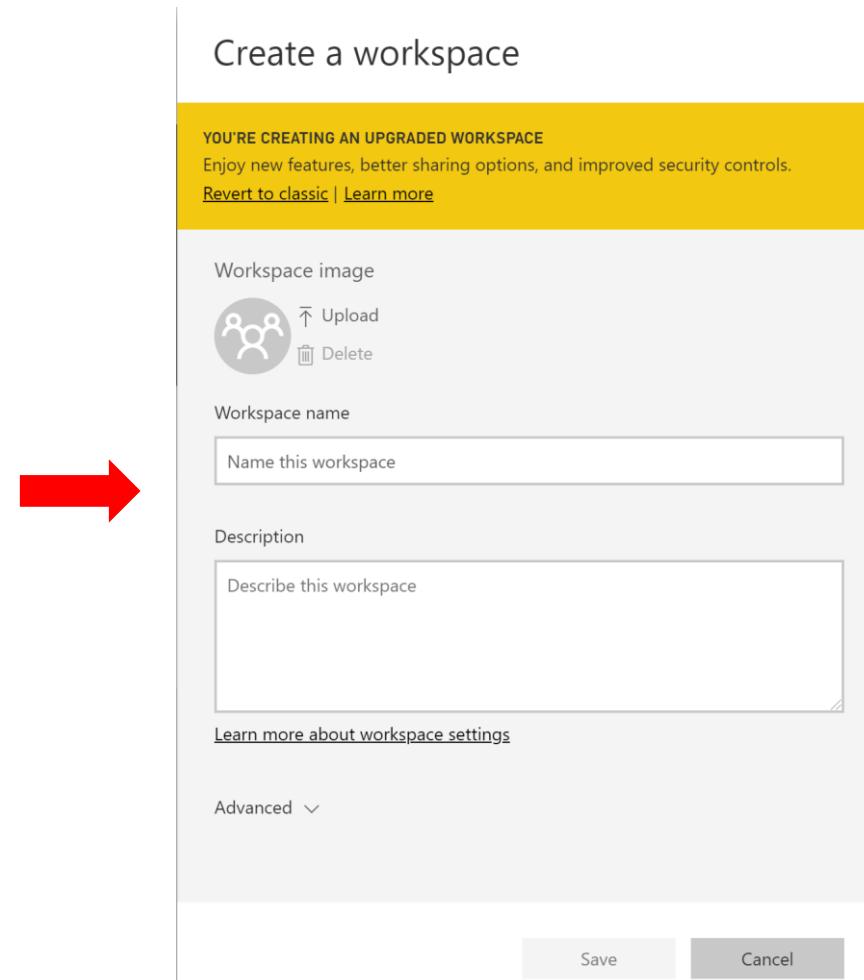
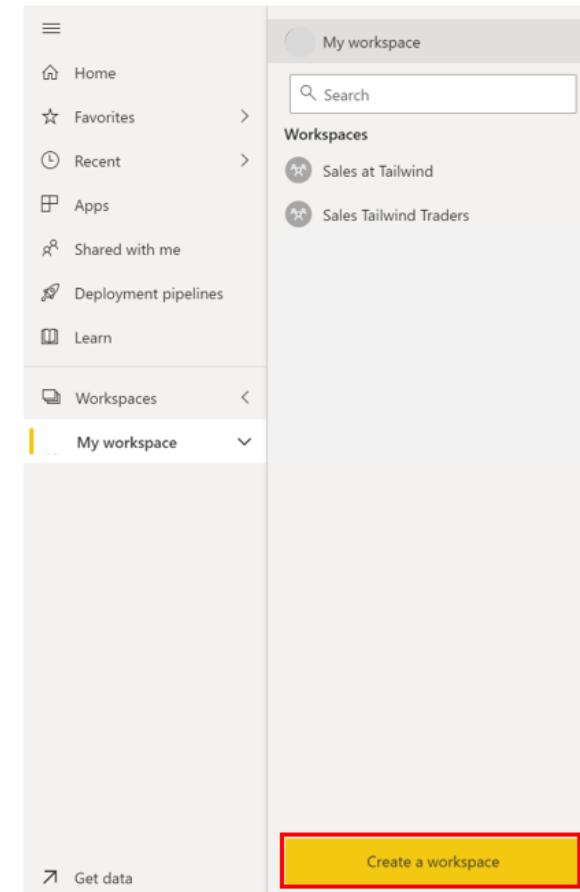


Introduction to Workspaces

- A centralized repository to:
 - Collaborate with colleagues and teams.
 - Create collections of reports and dashboards.
- Workspaces provide the following benefits:
 - Share and present reports in a single environment.
 - Enable the highest level of security.
 - An environment for housing reports and dashboards for use by others.

Create a Workspace

Make reports easily viewable and sharable.

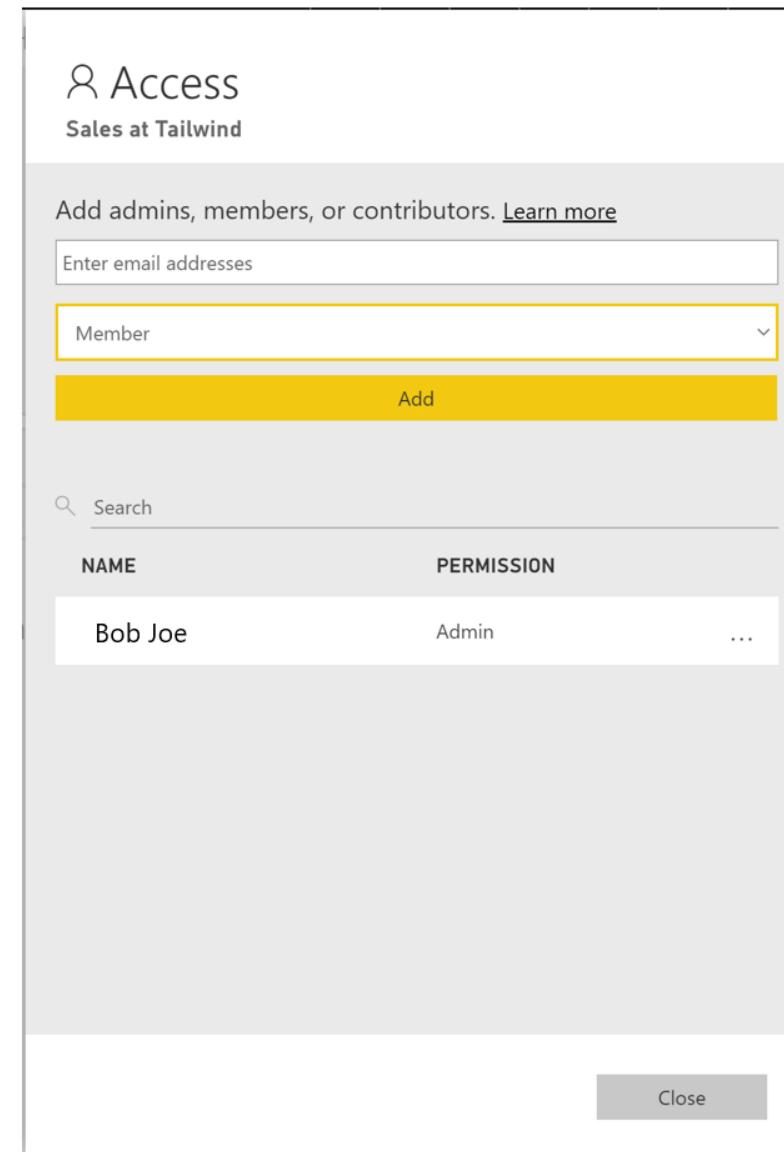


The screenshot shows the 'Create a workspace' dialog box. It has a yellow header bar with the text 'YOU'RE CREATING AN UPGRADED WORKSPACE' and links to 'Revert to classic' and 'Learn more'. Below this is a section for 'Workspace image' with upload and delete options. The next sections are 'Workspace name' (with a 'Name this workspace' input field) and 'Description' (with a 'Describe this workspace' input field). At the bottom are 'Save' and 'Cancel' buttons.

Name ↑	Actions	Owner	Sensitivity	Included in App
 keysales01	       	--	--	 Yes

Assign Workspace Roles

- Roles determine what a user can do in a workspace, so teams can collaborate.
- Key roles include:
 - Admin.
 - Member.
 - Contributor.
 - Viewer.



The screenshot shows the 'Access' panel for the 'Sales at Tailwind' workspace. At the top, there's a header with the workspace name and a link to 'Learn more'. Below it is a search bar labeled 'Enter email addresses'. A dropdown menu is open, showing 'Member' as the selected option. A large yellow button labeled 'Add' is prominently displayed. Below these controls is a search bar with a magnifying glass icon and the placeholder 'Search'. The main area displays a table with two columns: 'NAME' and 'PERMISSION'. A single row is shown, listing 'Bob Joe' with 'Admin' permission. There's also a '...' button next to the permission column. At the bottom right of the panel is a 'Close' button.

NAME	PERMISSION	...
Bob Joe	Admin	...

Create Apps

NAME ↑	ACTIONS	OWNER	SENSITIVITY	INCLUDED IN APP
 keysales01	      	--		 Yes

Create app

 Successfully published

Sales at Tailwind

Give people the link below, or direct them to Apps > Get apps in the Power BI service.

<https://app.powerbi.com/Redirect?action=OpenApp&appId=a690311>

 Copy

 Go to app

 Close

Configure and Update a Workspace App

- How do you update a published App?
 - Navigate back to the workspace.
 - Make any necessary updates.
 - Click **Update App** (previously called Publish App).

Update app

Lesson 2: Sharing and Managing Assets



Monitor Usage and Performance

Pages X

Report usage

Report performance

Report list

FAQ

Sales Data

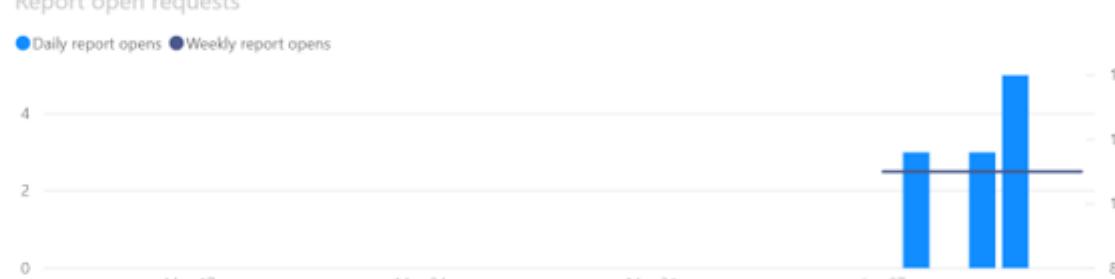
Rank 1 across all reports in the organization

Report opens	Report page views	Unique viewers	Report open trend
11	8	1	166.7%

5/13/2020 6/13/2020

Report open requests

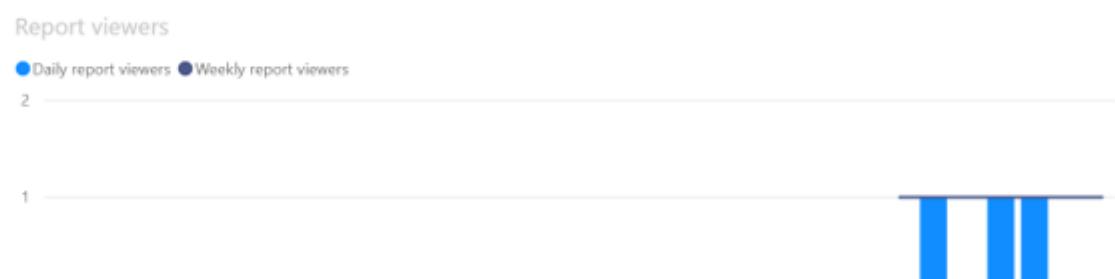
Daily report opens Weekly report opens



May 17 May 24 May 31 Jun 07

Report viewers

Daily report viewers Weekly report viewers



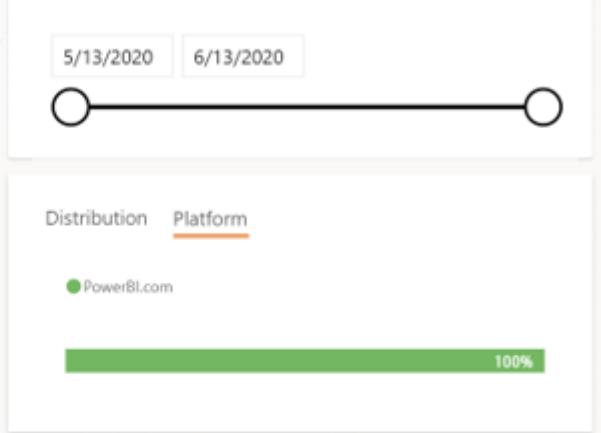
May 17 May 24 May 31 Jun 07

Report usage based on data from 6/8/2020 to 6/11/2020

Dataset last refreshed: 6/13/2020 9:13:42 PM (UTC)

Distribution Platform

PowerBI.com



100%

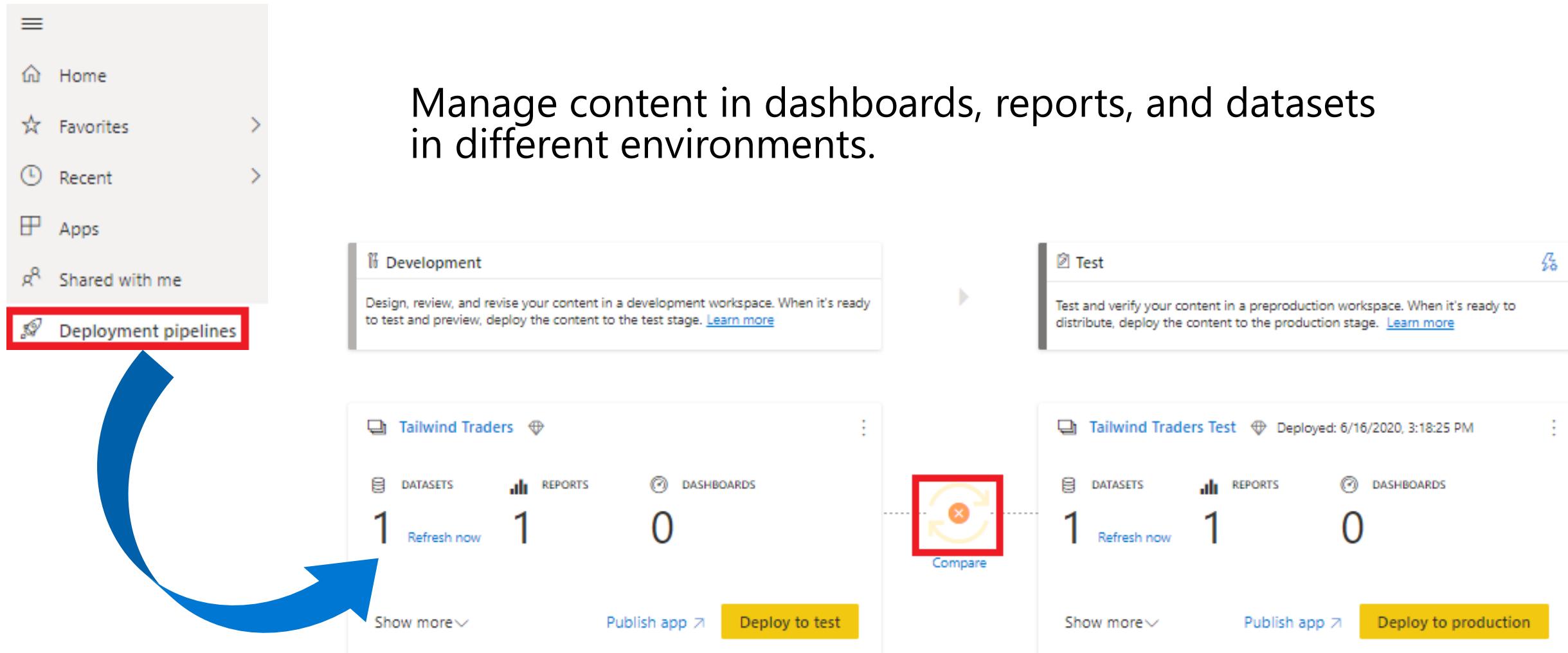
Users Pages

Userid

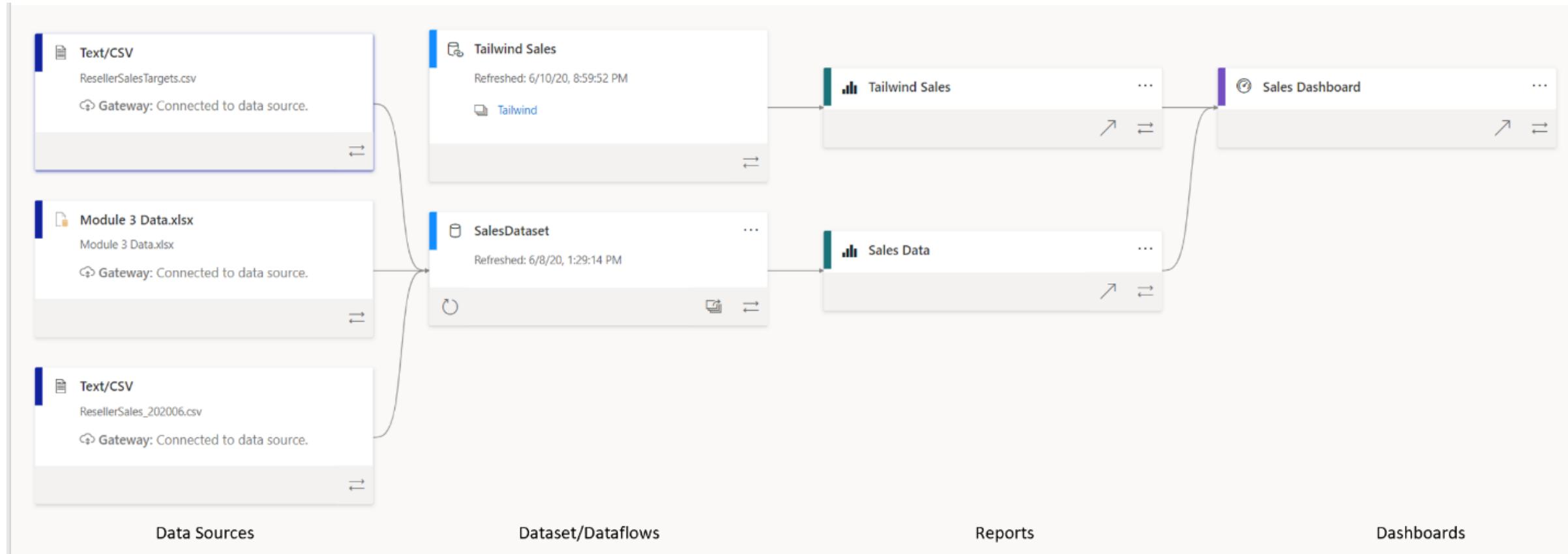
Report opens

Report Id c15490d0-934b-46ab-bb2d-5cfe1bc84777

Development Lifecycle Strategy

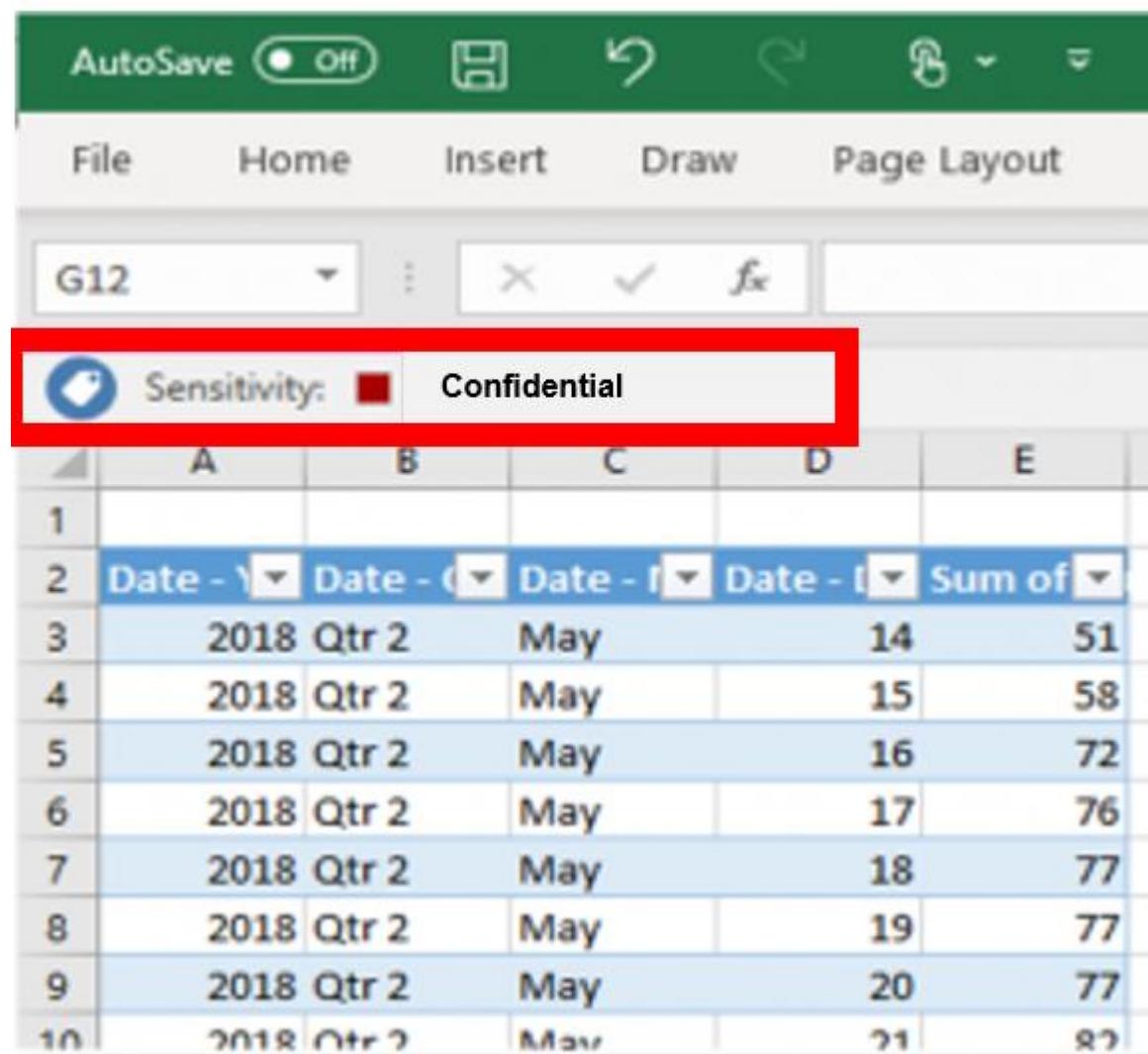


Viewing Data Lineage



Data Protection

- Secure sensitive data:
 - Sensitivity labels.
 - Encryption and watermarks.
 - Cloud Ap security.



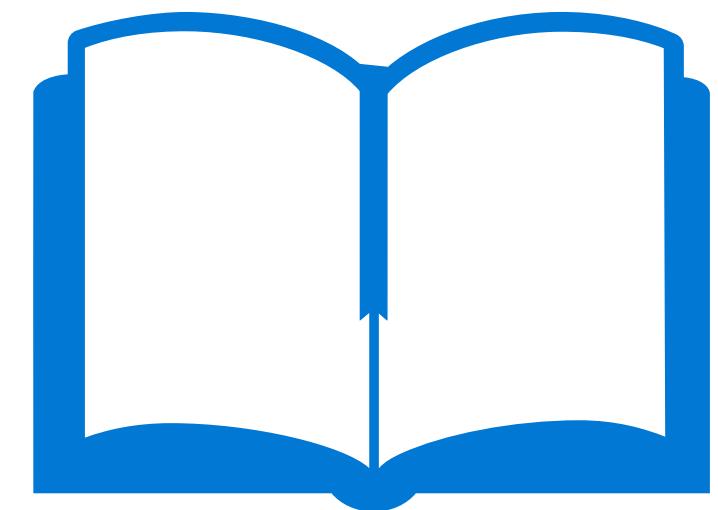
The screenshot shows a Microsoft Excel spreadsheet. The top menu bar includes AutoSave (Off), File, Home, Insert, Draw, and Page Layout. The formula bar shows 'G12'. The table has columns A through E and rows 1 through 10. The first row contains headers: 'Date - 1' (dropdown), 'Date - C' (dropdown), 'Date - F' (dropdown), 'Date - I' (dropdown), 'Sum of' (dropdown), and an empty column. Rows 2 through 10 show data: '2018 Qtr 2' in column B, 'May' in column C, and numerical values (14, 51, 15, 58, 16, 72, 17, 76, 18, 77) in column D. Row 10 ends with a 'May' entry in column E. A red box highlights the 'Sensitivity' header in row 2, which is preceded by a blue circular icon containing a white bird-like symbol.

	A	B	C	D	E
1					
2	Date - 1	Date - C	Date - F	Date - I	Sum of
3	2018 Qtr 2	May		14	51
4	2018 Qtr 2	May		15	58
5	2018 Qtr 2	May		16	72
6	2018 Qtr 2	May		17	76
7	2018 Qtr 2	May		18	77
8	2018 Qtr 2	May		19	77
9	2018 Qtr 2	May		20	77
10	2018 Qtr 2	May		21	82

References

- DA-100 Create and manage Workspaces in Power BI

<https://docs.microsoft.com/en-us/learn/modules/create-manage-workspaces-power-bi/>



Module 12: Manage Datasets in Power BI

Learning Objectives

You will learn the following concepts:

- Parameters
- Datasets

Lesson 1: Parameters



Introduction to Datasets and Parameters

- Datasets are published to workspaces.
- Sharing datasets are a productivity boost for report authors.
- The management of datasets involves the implementation of parameters within those datasets.

Dynamic Reports with parameters

Manage Parameters

New

A^B SalesPerson X

Name: SalesPerson

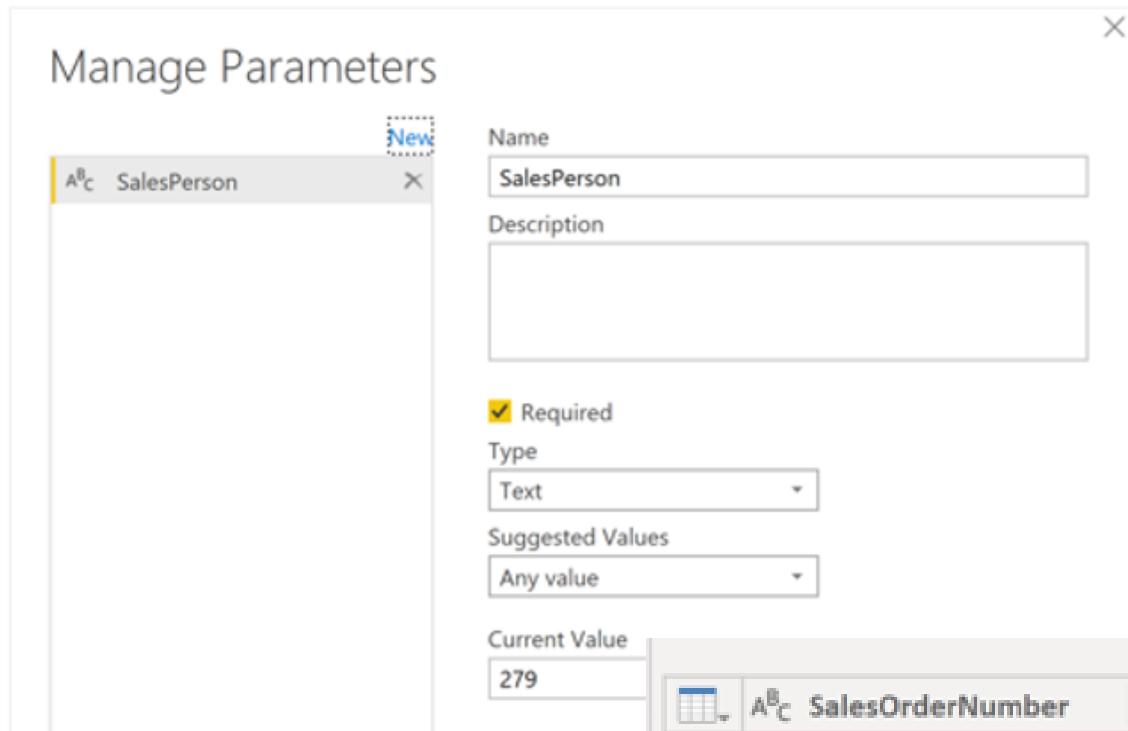
Description:

Required

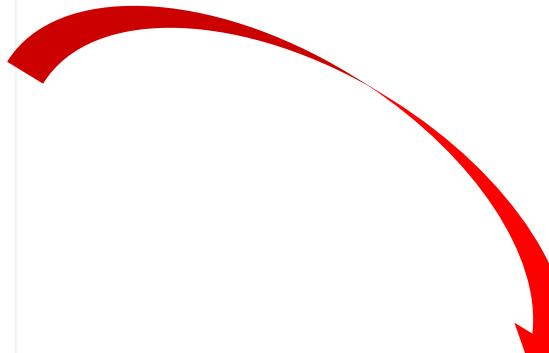
Type: Text

Suggested Values: Any value

Current Value: 279



Give end-users more power over the data that is displayed on the report.



	A ^B SalesOrderNumber	1 ² 3 SalesOrderID	1 ² 3 SalesPersonID	OrderDate
1	SO43659	43659	279	31/05/2011 00:00:00
2	SO43660	43660	279	31/05/2011 00:00:00
3	SO43681	43681	279	31/05/2011 00:00:00
4	SO43684	43684	279	31/05/2011 00:00:00
5	SO43685	43685	279	31/05/2011 00:00:00
6	SO43694	43694	279	31/05/2011 00:00:00
7	SO43695	43695	279	31/05/2011 00:00:00
8	SO43696	43696	279	31/05/2011 00:00:00

Lesson 2: Datasets



Dataset Scheduled Refresh

Re-importing data from the original data source to ensure end users have the most up-to-date data.

▪ Scheduled refresh

Keep your data up to date

On

Refresh frequency

Time zone

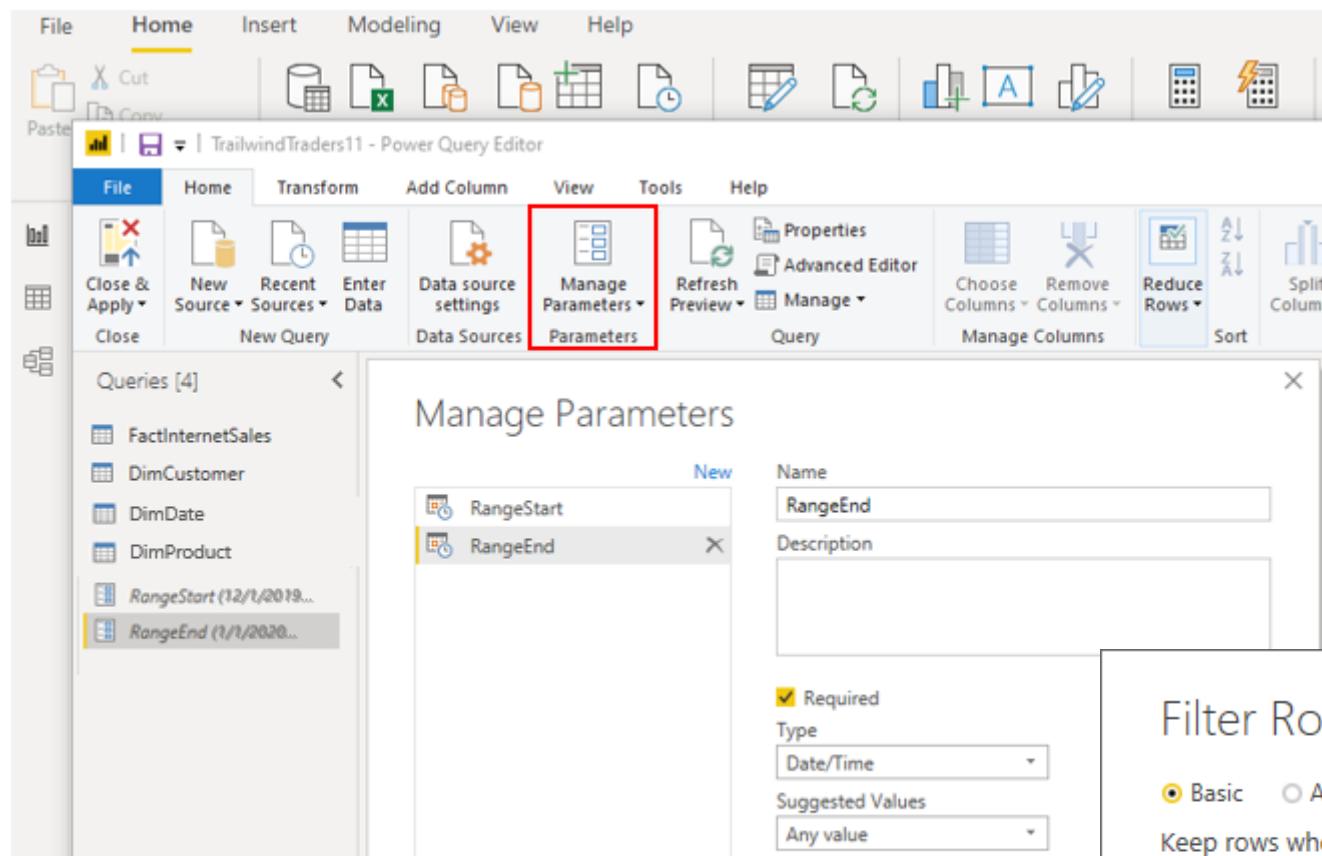
Time

[Add another time](#)

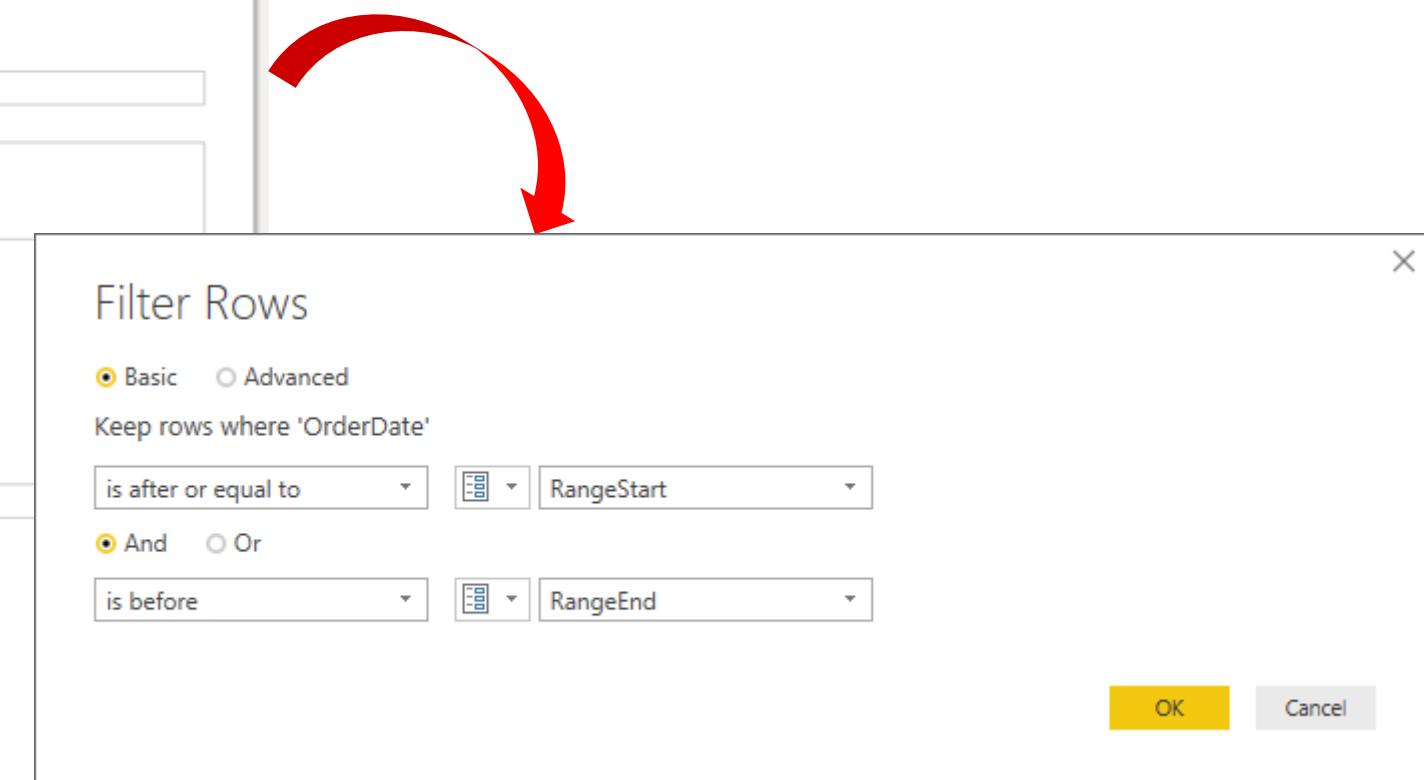
Send refresh failure notifications to the dataset owner

Email these users when the refresh fails

Incremental Data Refresh Settings



- Refreshes are faster.
- Refreshes are more reliable.
- Resource consumption is reduced.



Manage and Promote Datasets

Two options for endorsing a dataset:

Promotion

◀ Endorsement

Help your colleagues find, learn about, and connect to your dataset.

Default
This dataset can be searched for and used by others.

Promoted
Promote this dataset with a badge to show it's ready to be used by others.

Certified
Request certification from experts in your org to get a badge that shows it's recommended for use by others. [Learn more](#)

Description

Describe the contents of this dataset.

500 characters left

Apply **Discard**

Certification

General Alerts Subscriptions Dashboards **Datasets** Workbooks

Settings for TailwindTraders

[Refresh history](#)

▶ Gateway connection

▶ Data source credentials

▶ Parameters

▶ Scheduled refresh

▶ Featured Q&A questions

◀ Endorsement

Help your colleagues find, learn about, and connect to your dataset.

Default
This dataset can be searched for and used by others.

Promoted
Promote this dataset with a badge to show it's ready to be used by others.

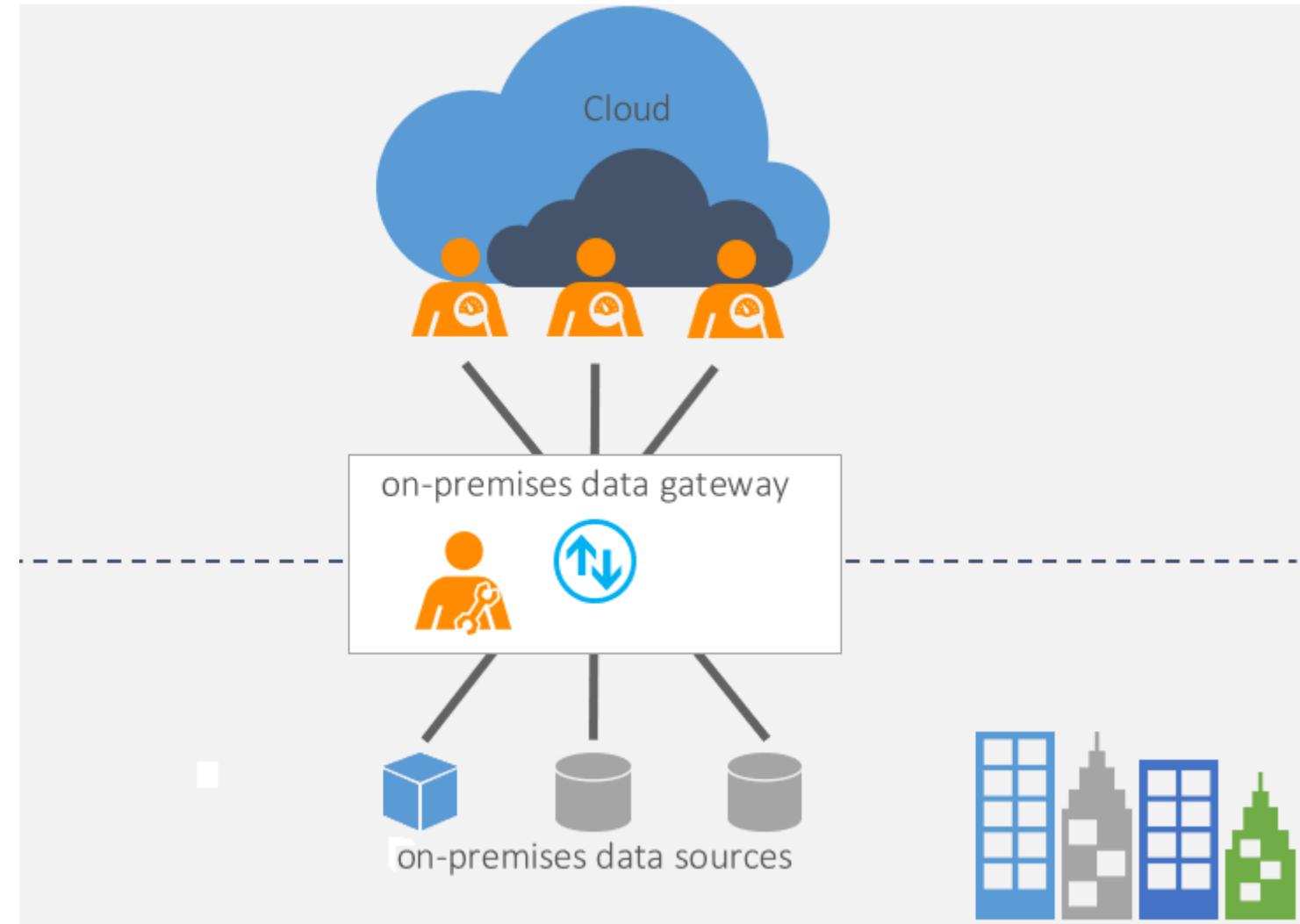
Certified
Request certification from experts in your org to get a badge that shows it's recommended for use by others. [Learn more](#)

Description

Describe the contents of this dataset.

Troubleshooting Service Connectivity

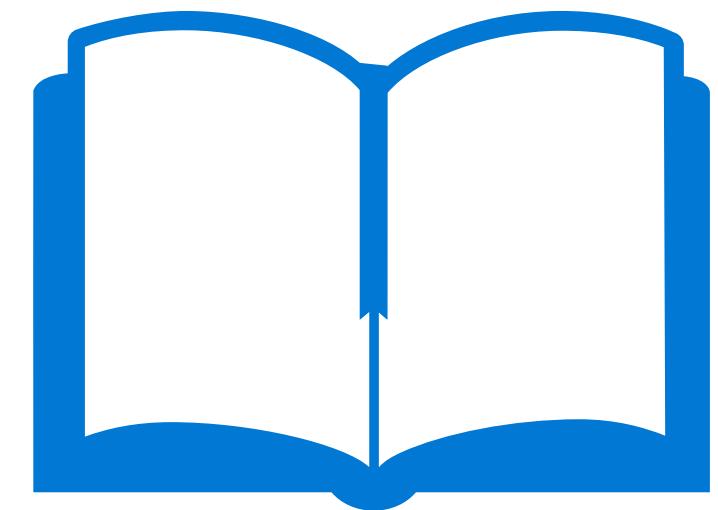
- Two types of on-premises Gateways:
 - Organization mode.
 - Personal mode.
- Both modes require the installation of the data gateway on-premises.



References

- DA-100 Manage datasets in Power BI

<https://docs.microsoft.com/en-us/learn/modules/manage-datasets-power-bi/>



Module 13: Row-level Security

Learning Objectives

You will learn the following concepts:

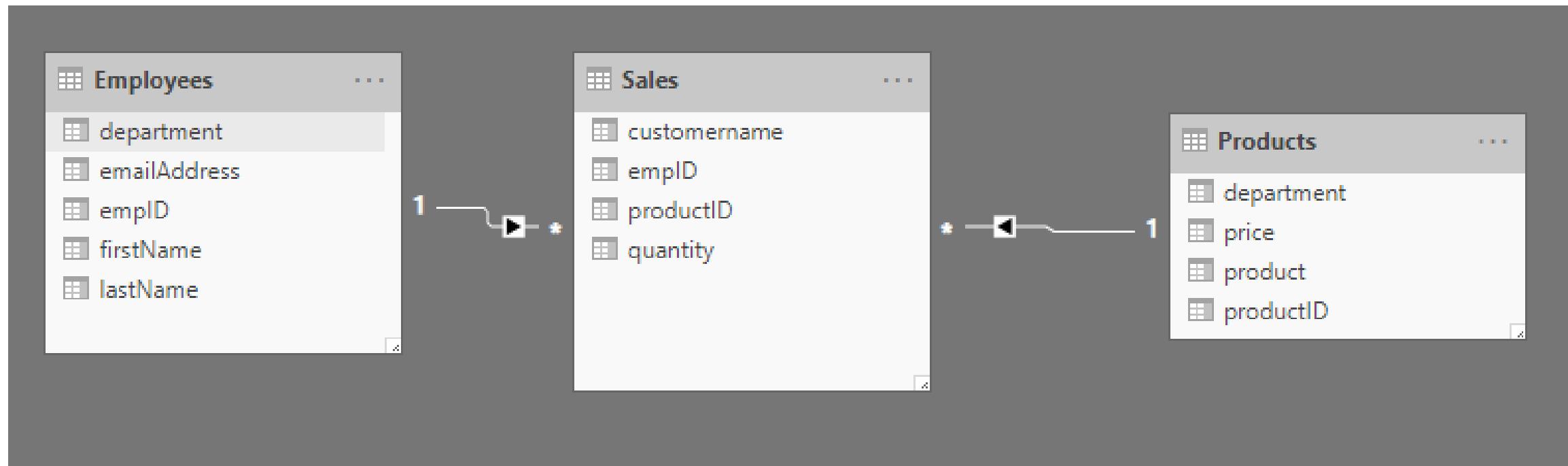
- Security
 - Row-level security
 - Static method
 - Dynamic method

Lesson 1: Security in Power BI



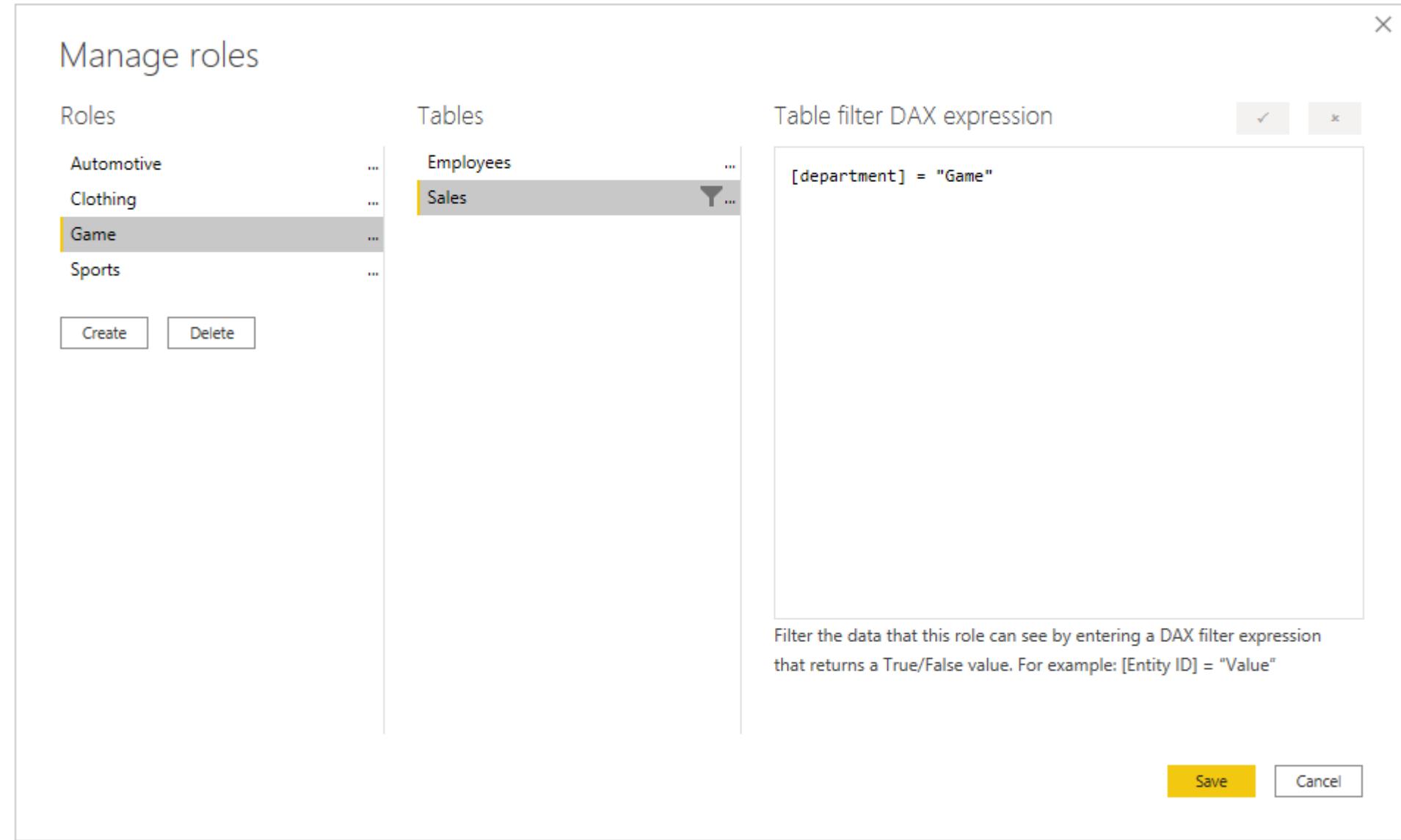
Security overview in Power BI

Secure reports and workspace by sharing them to Active Directory users and groups.



Static Method

Uses a fixed value in the DAX filter.



The screenshot shows the 'Manage roles' dialog in Microsoft Power BI. On the left, under 'Roles', the 'Game' role is selected and highlighted with a yellow border. In the center, under 'Tables', the 'Sales' table is selected and highlighted with a yellow border. On the right, the 'Table filter DAX expression' field contains the expression `[department] = "Game"`. A descriptive note below the expression states: 'Filter the data that this role can see by entering a DAX filter expression that returns a True/False value. For example: [Entity ID] = "Value"'.

Manage roles

Roles

- Automotive
- Clothing
- Game**
- Sports

Tables

- Employees
- Sales**

Table filter DAX expression

```
[department] = "Game"
```

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

Save Cancel

Dynamic Method

Uses a dynamic value in the DAX filter.

Manage roles

Roles

EmployeeEmailAddress	...
Create	Delete

Tables

Employees	...
Products	...
Sales	...

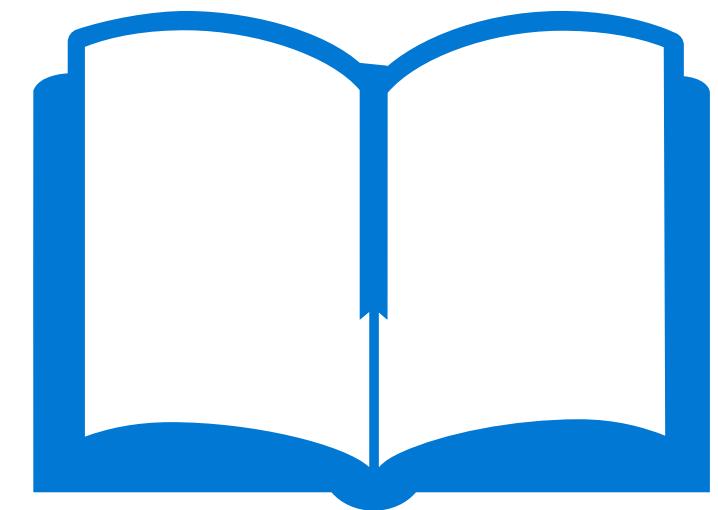
Table filter DAX expression

```
[emailAddress] = userprincipalname()
```

References

- DA-100 Implement row-level security

<https://docs.microsoft.com/en-us/learn/modules/row-level-security-power-bi/>



... The End ...