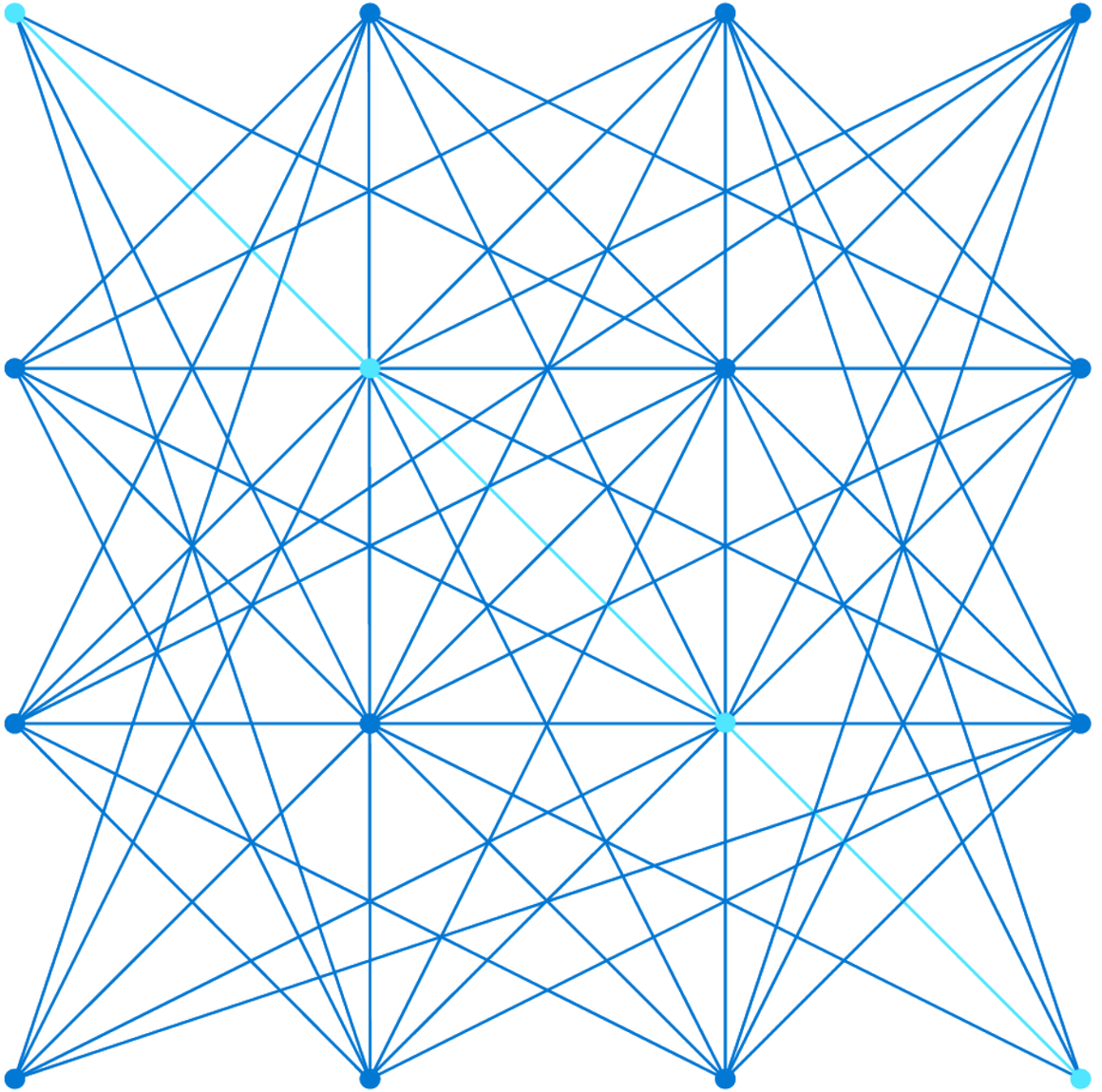
DA-100 Analyzing Data with Power BI



Introduction

Tissana Tanaklang

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- Master of Science Program in Software Engineering King Mongkut's University of Technology Thonburi
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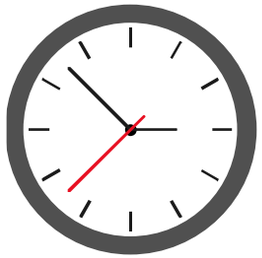
- Microsoft Certified Trainer (MCT)

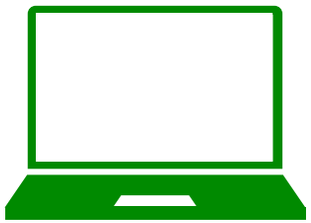
- Microsoft Certified Azure Data Engineer Associate
- Microsoft Certified Solutions Associate - Web Application Development

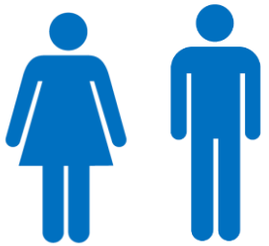
- Microsoft Certified Azure Fundamentals
- Microsoft Certified Azure Data Fundamentals
- Microsoft Certified Azure AI Fundamentals

Facilities

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







Microsoft Power Platform

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.

Microsoft Power Platform

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.

Microsoft Power Platform

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.

Microsoft Power Platform

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

Microsoft Power Platform

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

Microsoft Power Platform

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

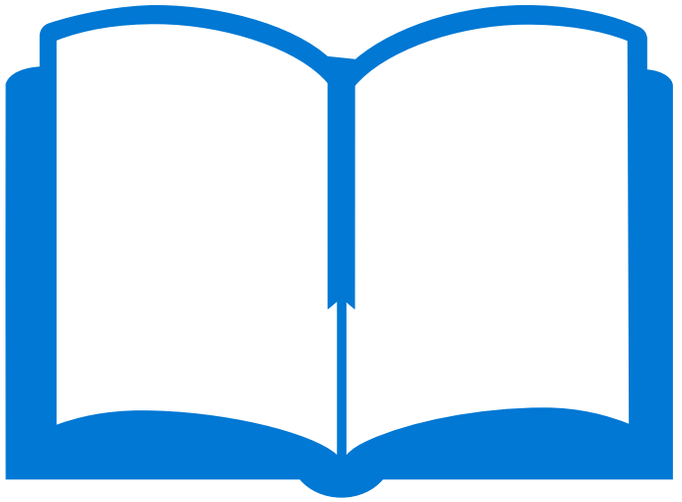
Study Areas	Weights
Prepare the Data	20-25%
Model the Data	25-30%
Visualize the Data	20-25%
Analyze the Data	10-15%
Deploy and Maintain Deliverables	10-15%

Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

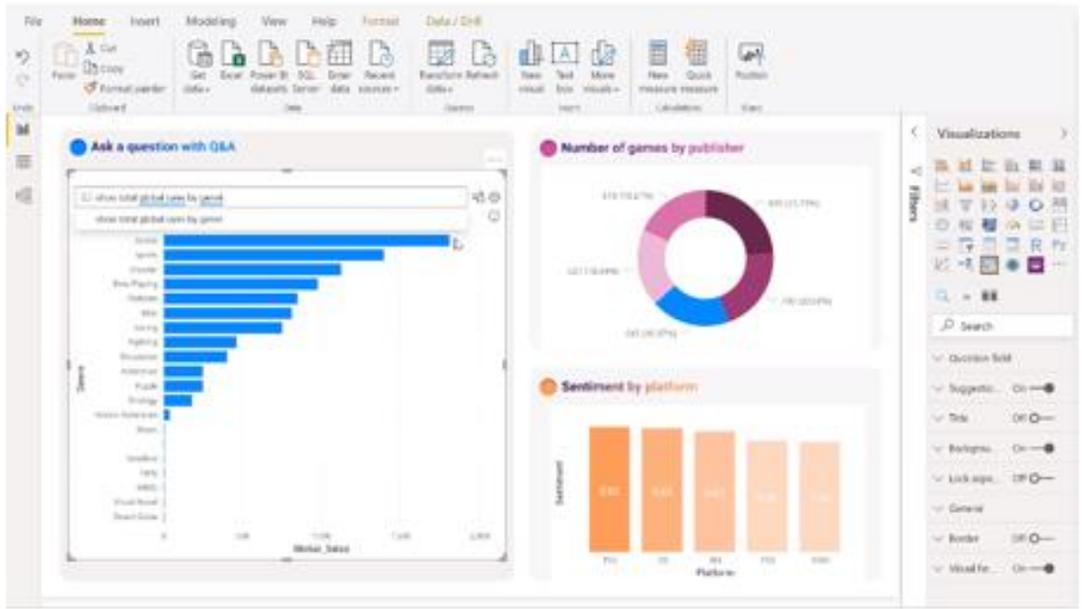
- Data Analysis
- Getting Started with Power BI

Lesson 1:
Data Analytics and Microsoft

Microsoft Power Platform

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

Microsoft Power Platform

Roles in Data

Business Analyst

Data Analyst

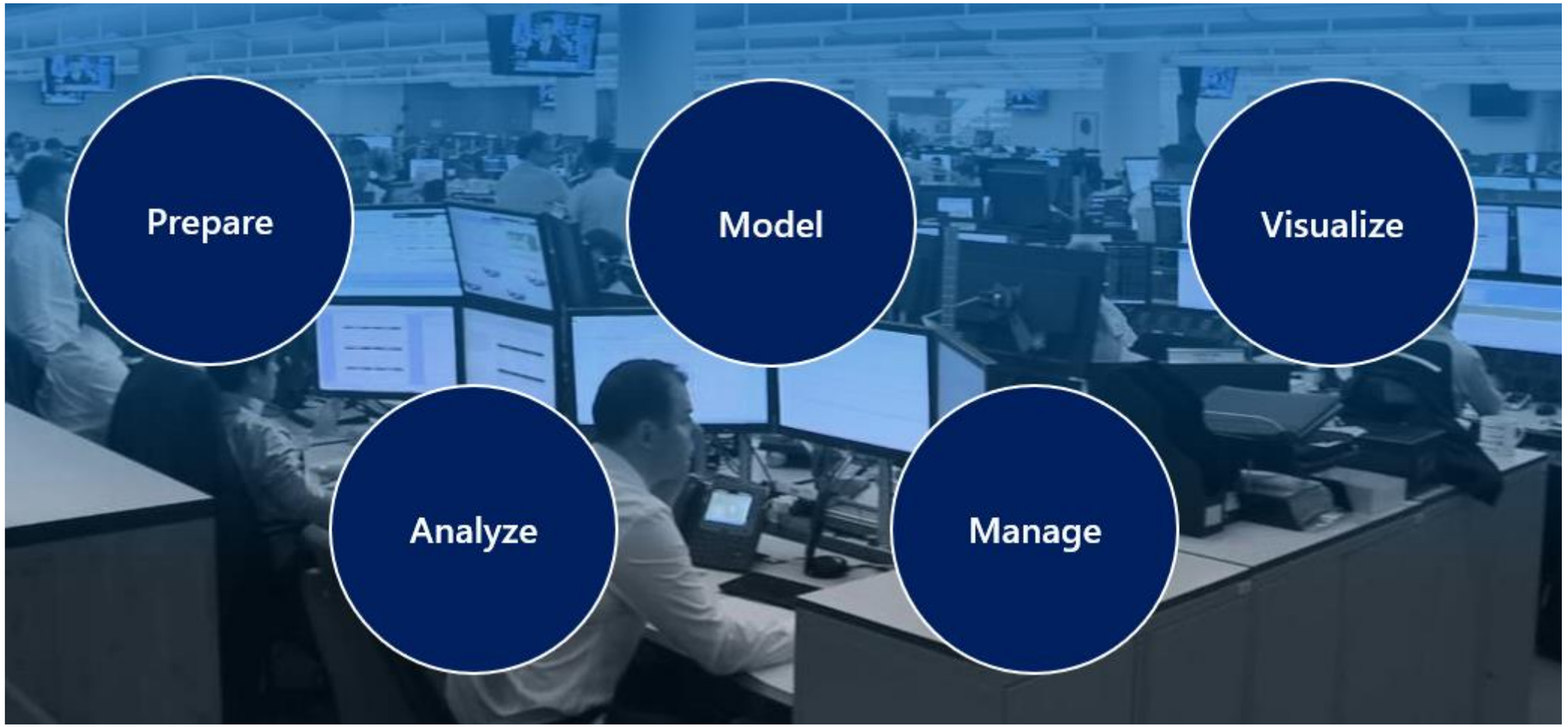
Data Engineer

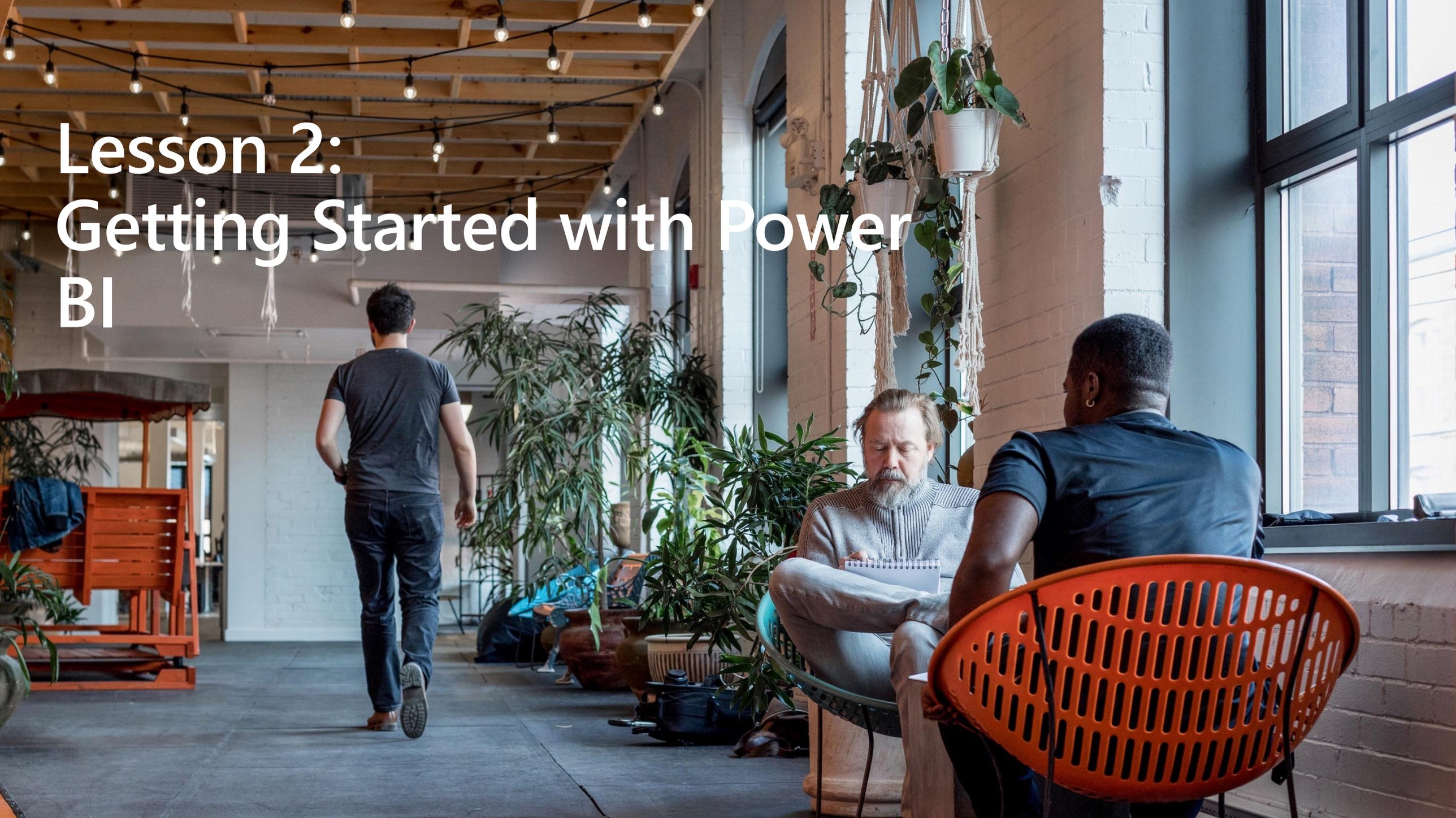
Data Scientist

Database Administrator

Microsoft Power Platform

Tasks of a Data Analyst





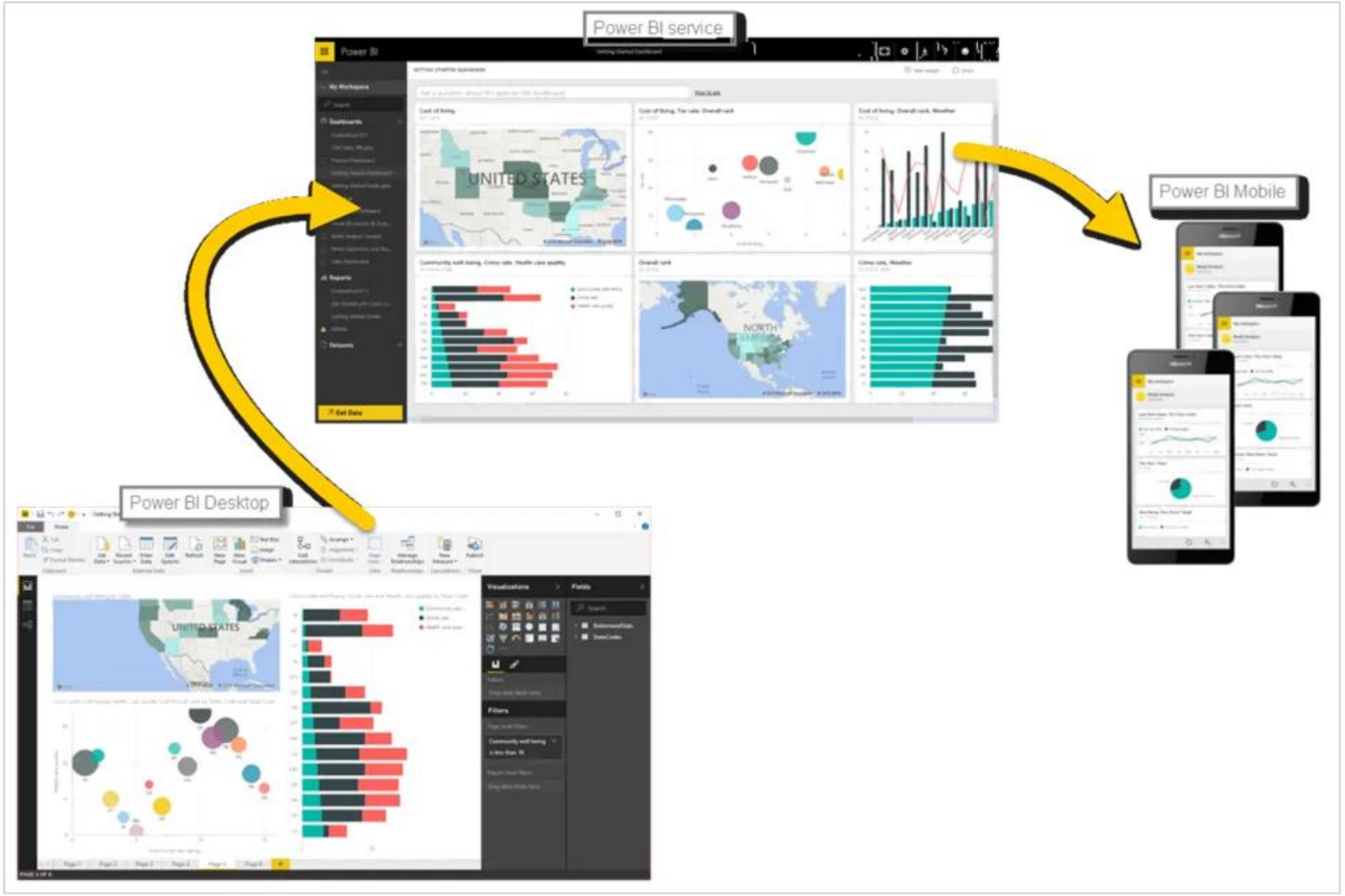
Lesson 2: Getting Started with Power BI

Microsoft Power Platform

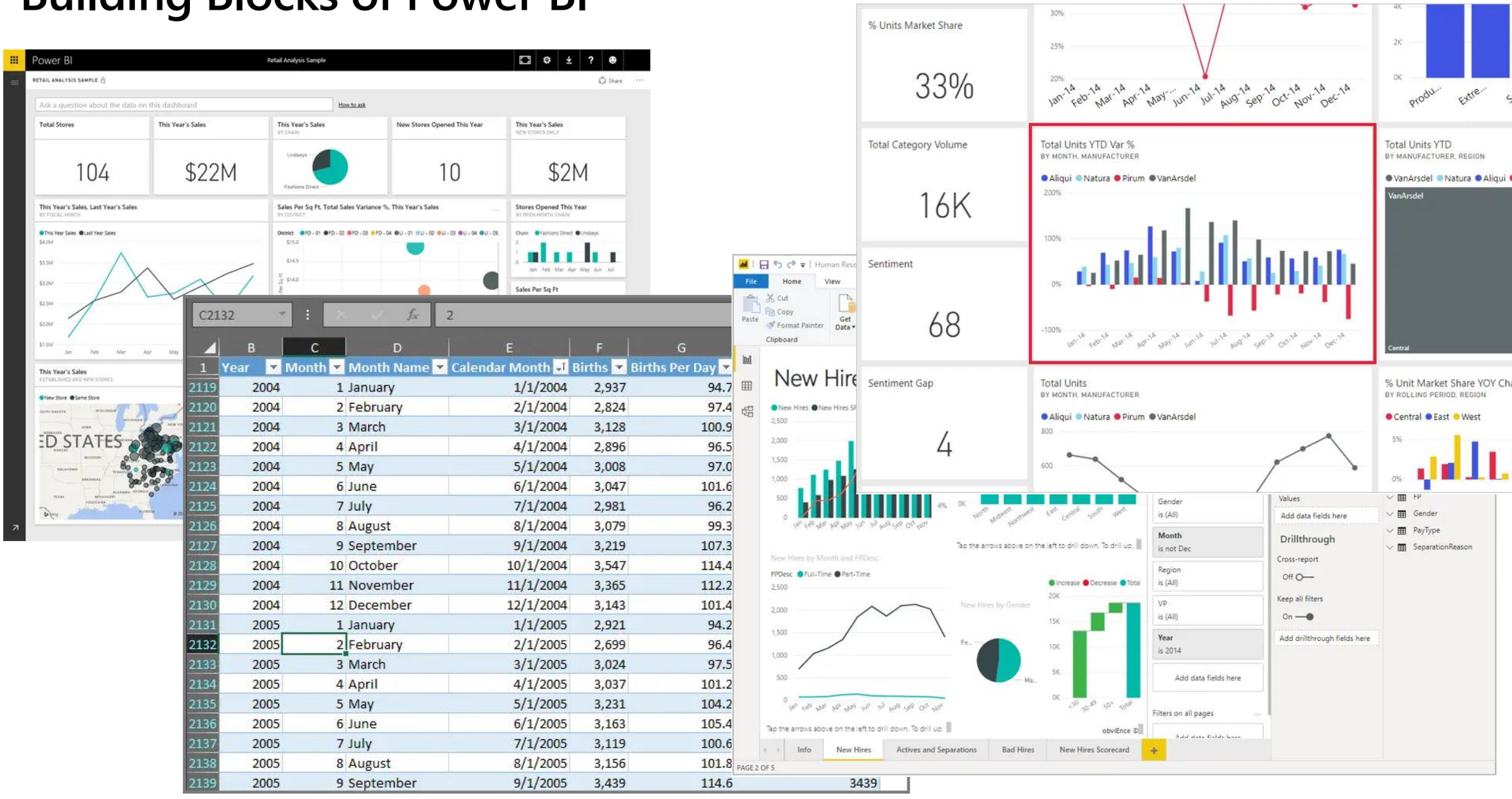
Introduction to Power BI

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

Use Power BI



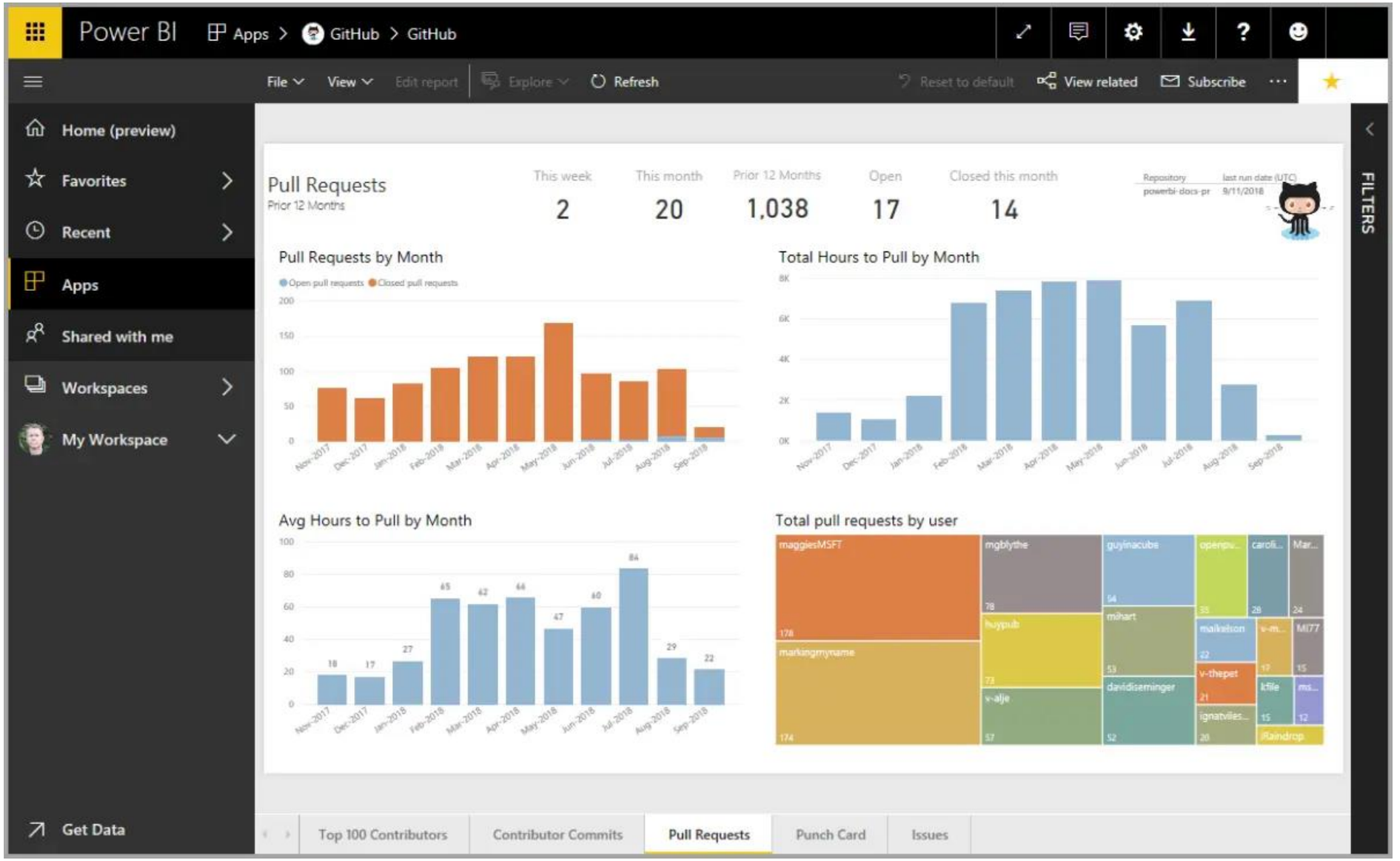
Building Blocks of Power BI



Microsoft Power Platform

Microsoft Power Platform

Touring and Using Power BI



Lab: Getting Started

Microsoft Power Platform

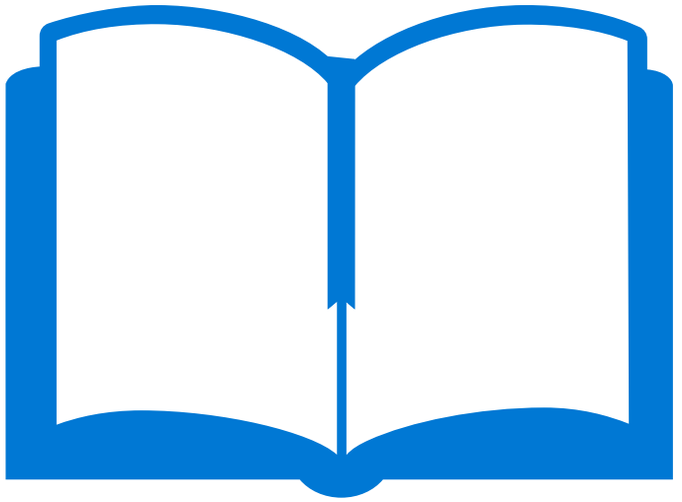
References

- 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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

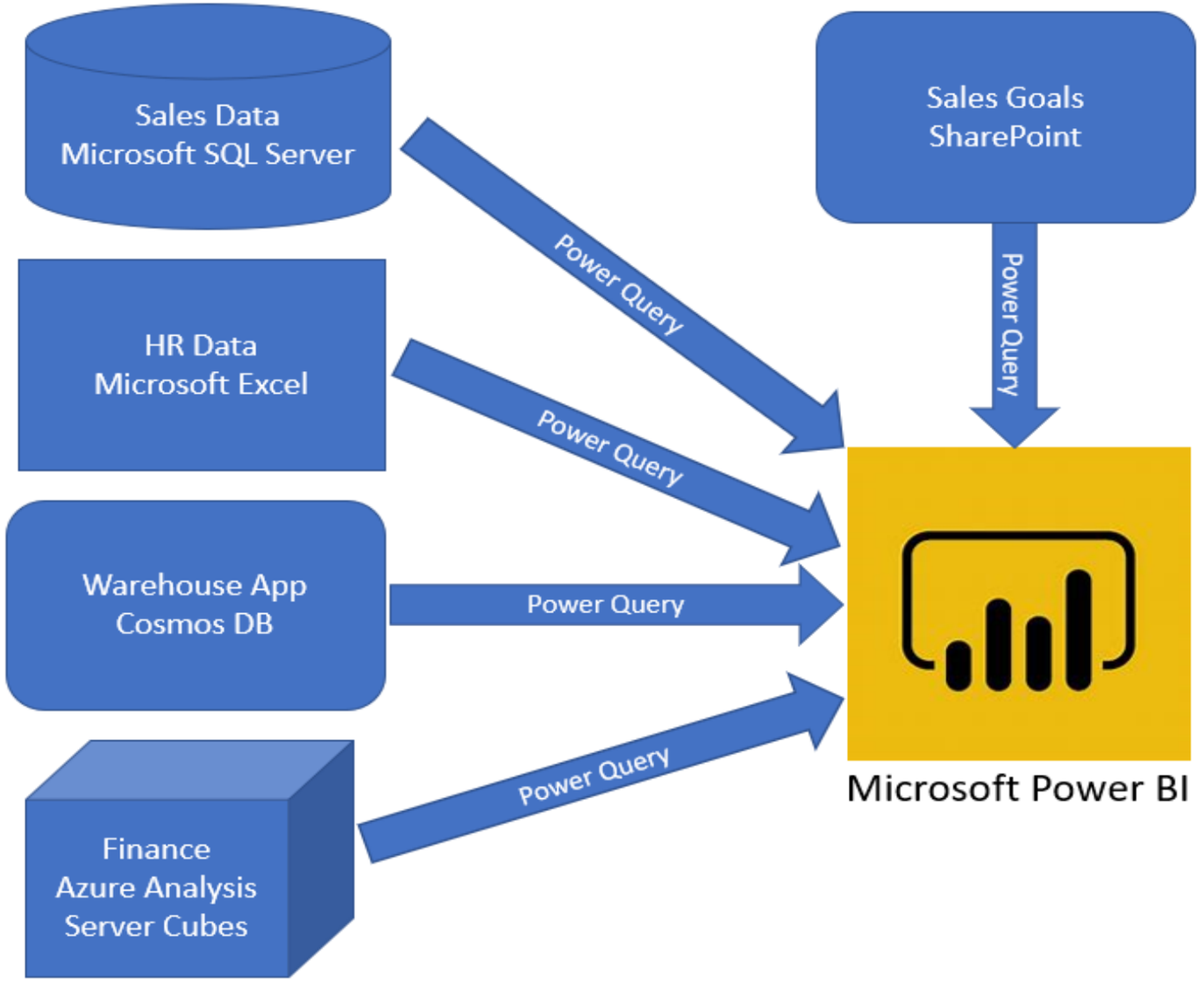
- Getting data from various data sources
- Optimizing Performance
- Resolving data errors

Lesson 1:
Get data from various data sources

Microsoft Power Platform

Introduction to getting data

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



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Get data from flat files

ResellerSales_202006.csv

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

SalesOrderNumber	SalesOrderLineNumber	OrderDate	DueDate	ShipDate	ProductKey	ResellerKey	PromotionKey
SO71691	2	6/1/2020	6/11/2020	6/8/2020	434	104	
SO71691	4	6/1/2020	6/11/2020	6/8/2020	222	104	
SO71774	1	6/1/2020	6/11/2020	6/8/2020	436	609	
SO71774	2	6/1/2020	6/11/2020	6/8/2020	418	609	
SO71775	1	6/1/2020	6/11/2020	6/8/2020	573	595	
SO71775	2	6/1/2020	6/11/2020	6/8/2020	555	595	
SO71775	3	6/1/2020	6/11/2020	6/8/2020	490	595	
SO71776	1	6/2/2020	6/12/2020	6/9/2020	514	106	
SO71777	1	6/2/2020	6/12/2020	6/9/2020	408	128	
SO71777	2	6/2/2020	6/12/2020	6/9/2020	436	128	
SO71778	1	6/2/2020	6/12/2020	6/9/2020	467	557	
SO71778	2	6/2/2020	6/12/2020	6/9/2020	566	557	

Load | Transform Data | Cancel

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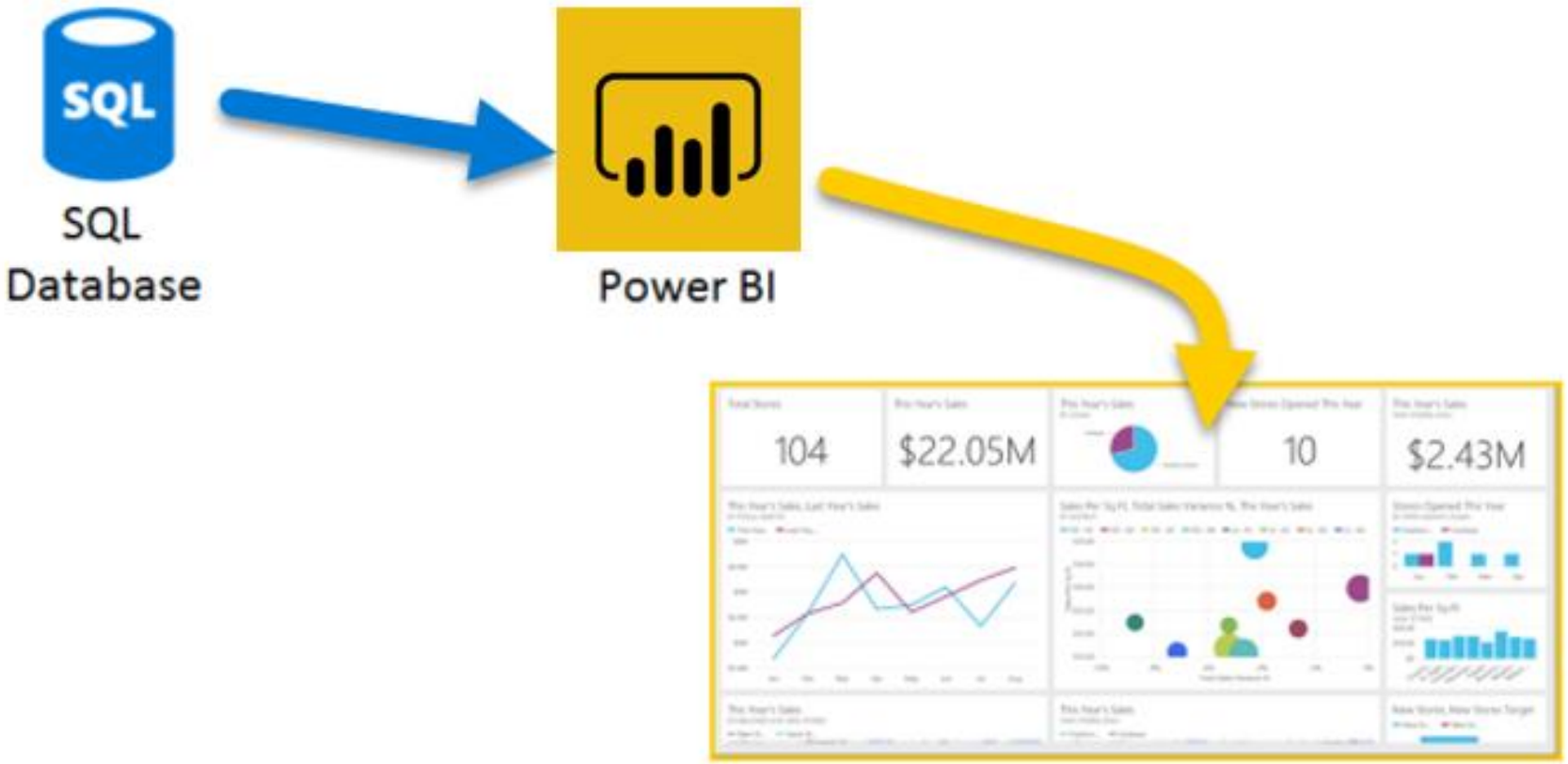
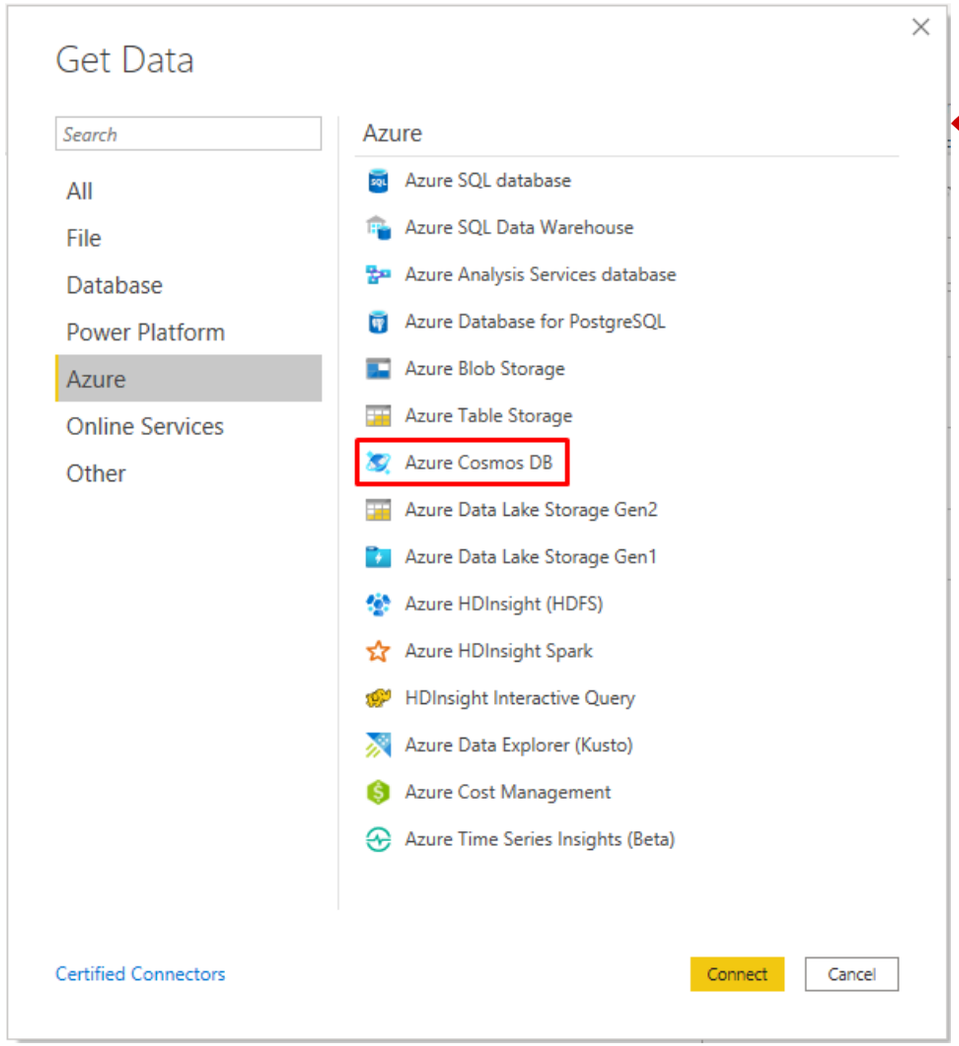
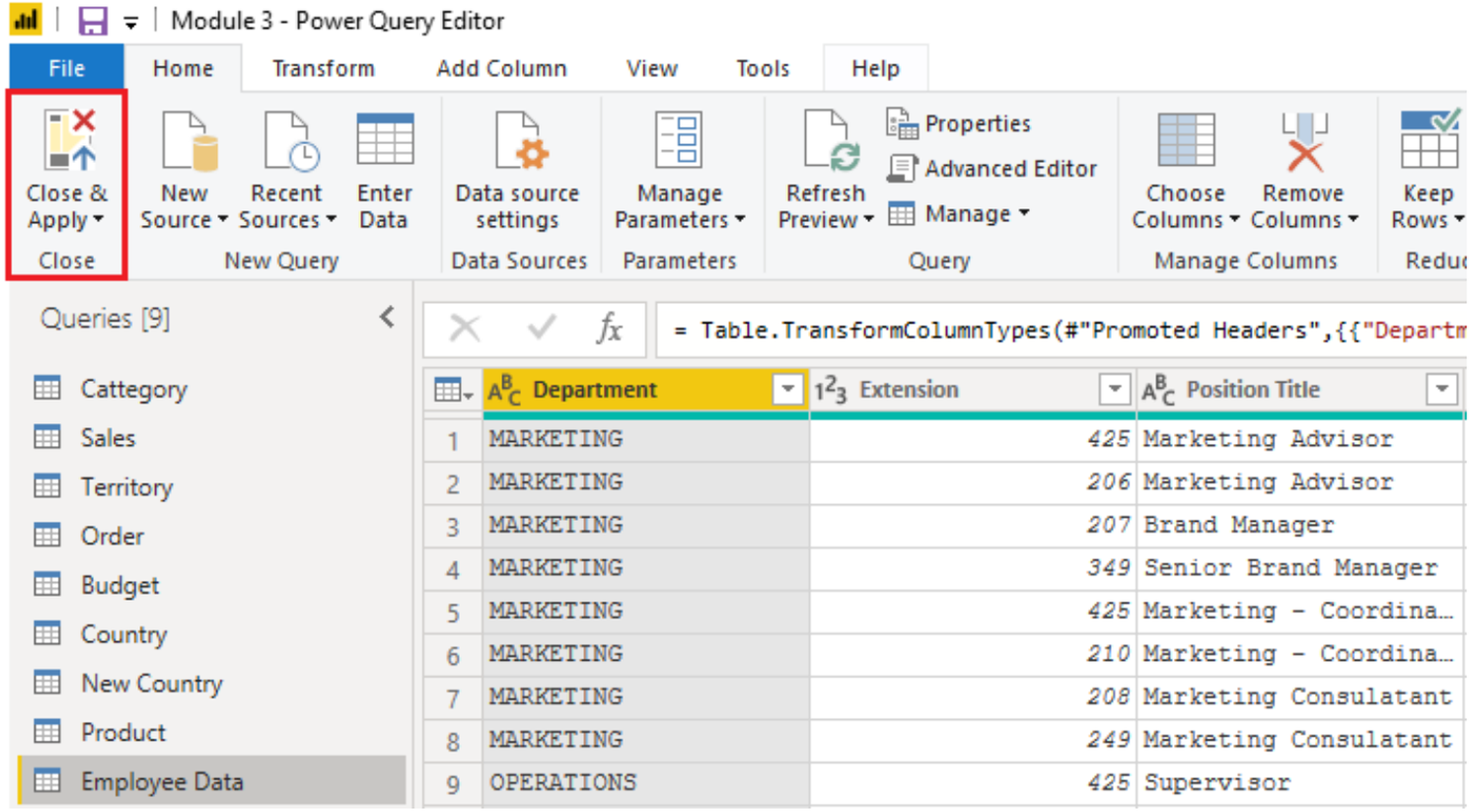
Get data from relational data sources

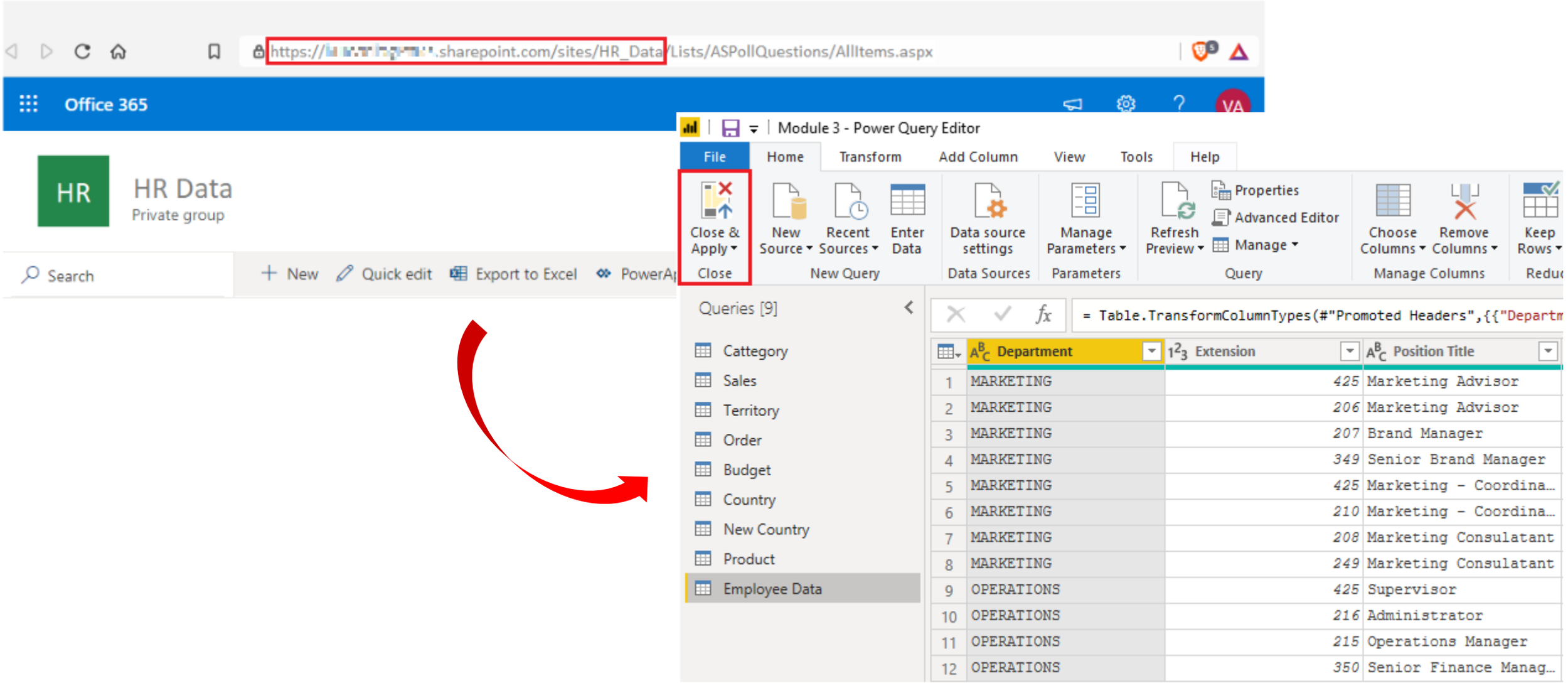


Get data from NoSQL





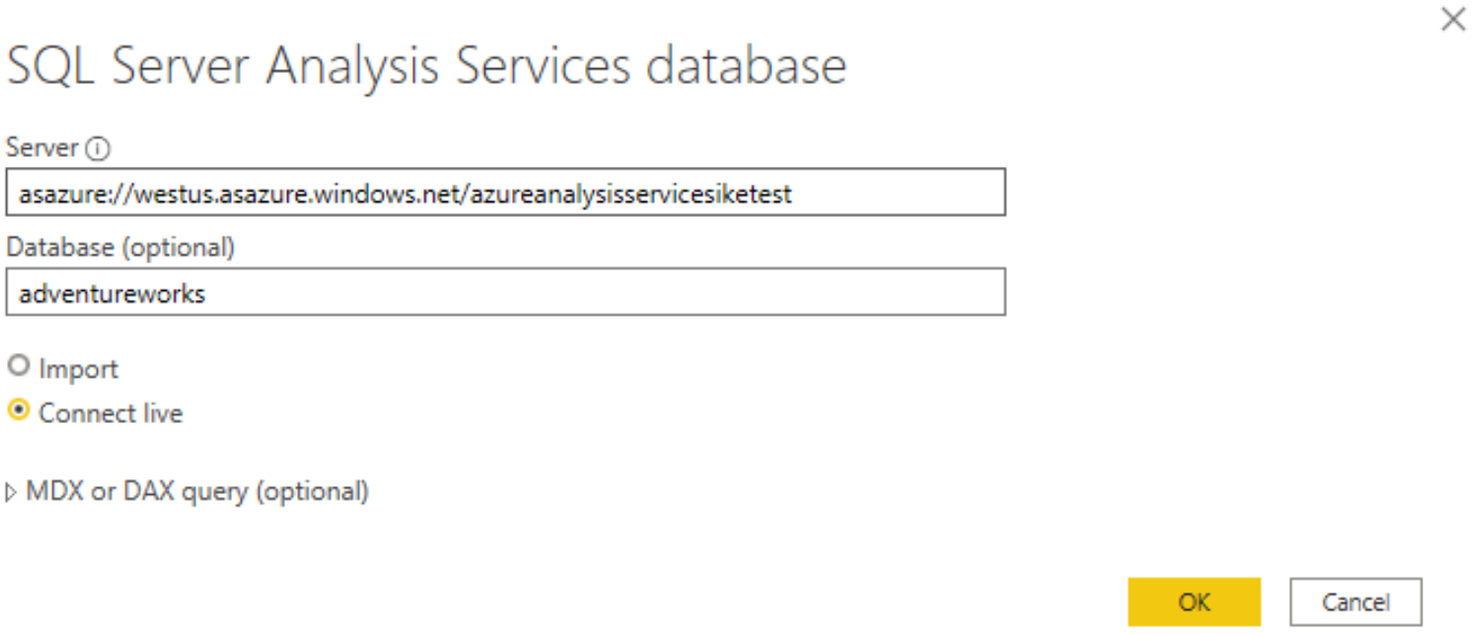
Get data from applications



Microsoft Power Platform

Get data from Analysis Services

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

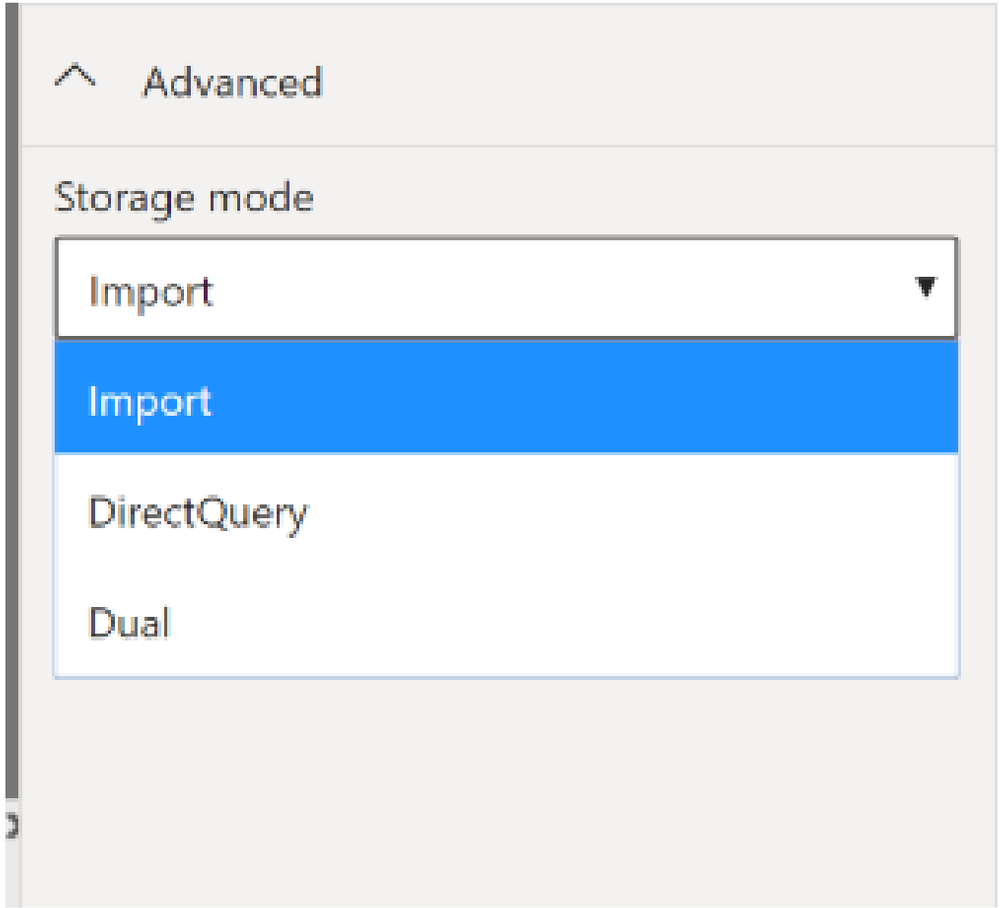


Lesson 2:
Optimize Performance

Microsoft Power Platform

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.



Microsoft Power Platform

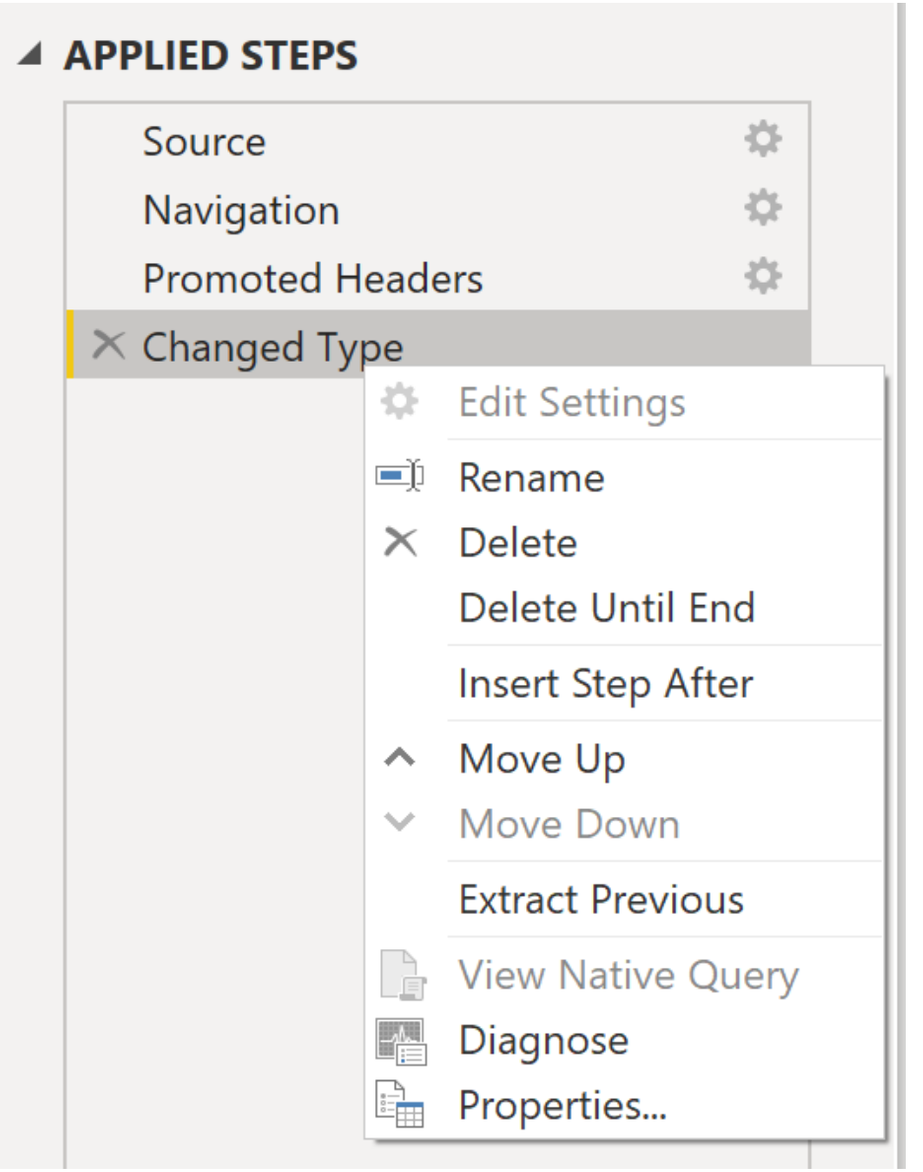
Optimize Query Performance

- 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.

Microsoft Power Platform

Query Folding

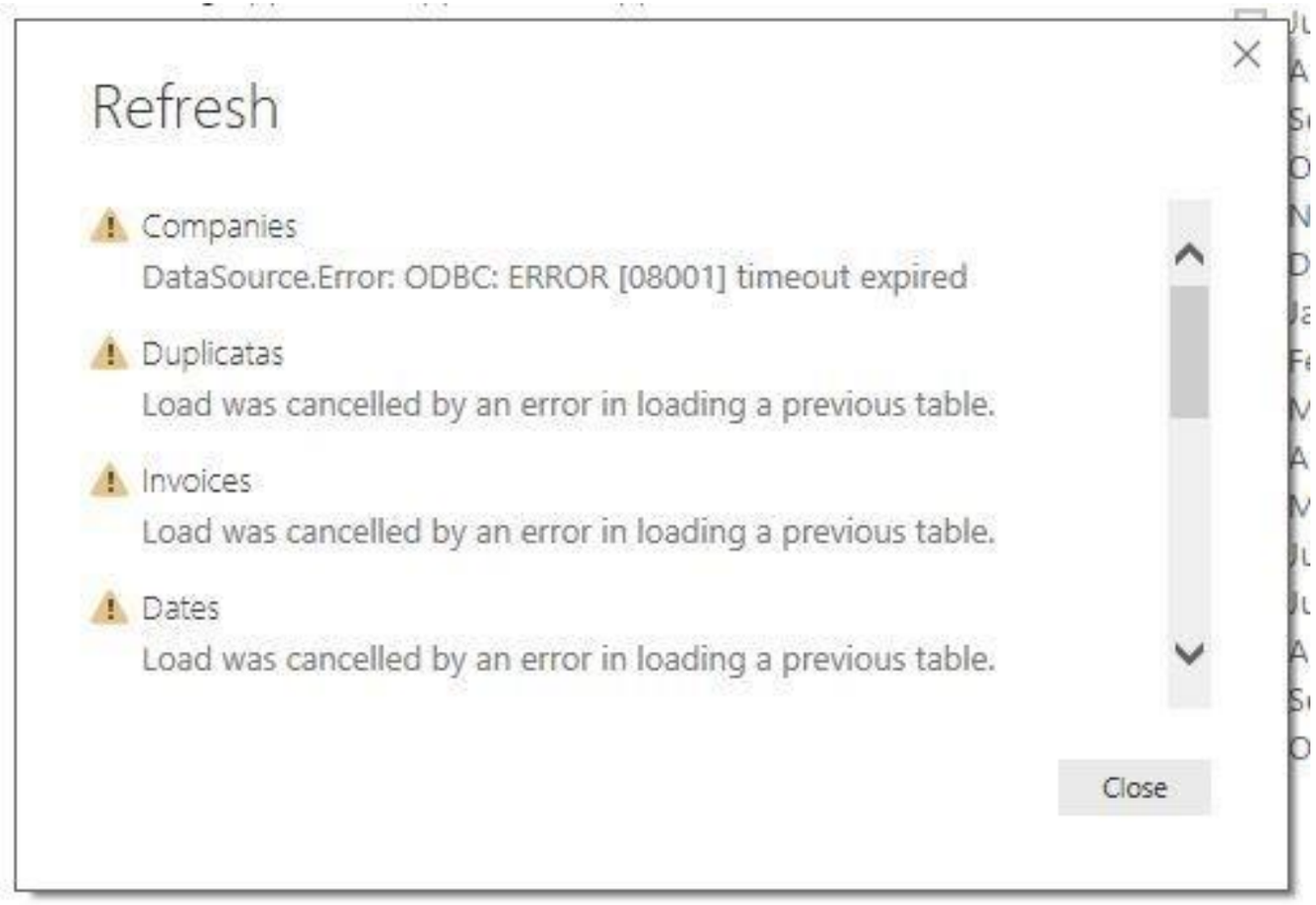
The process that lets Power Query generate a single query statement to retrieve and transform source data.



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 น.

Microsoft Power Platform

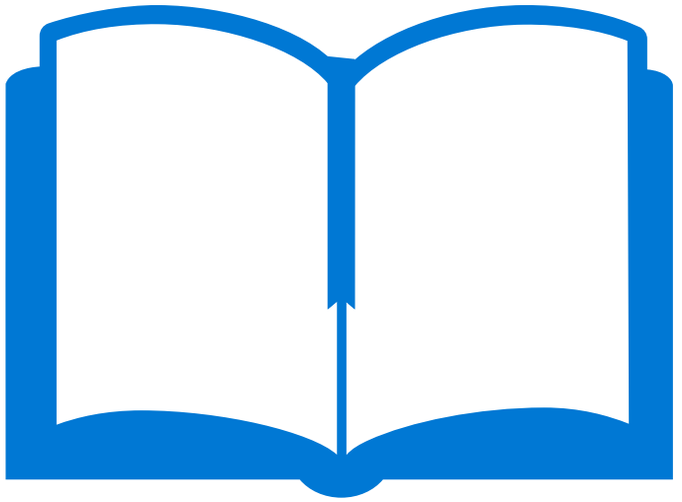
References

- 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

Microsoft Power Platform

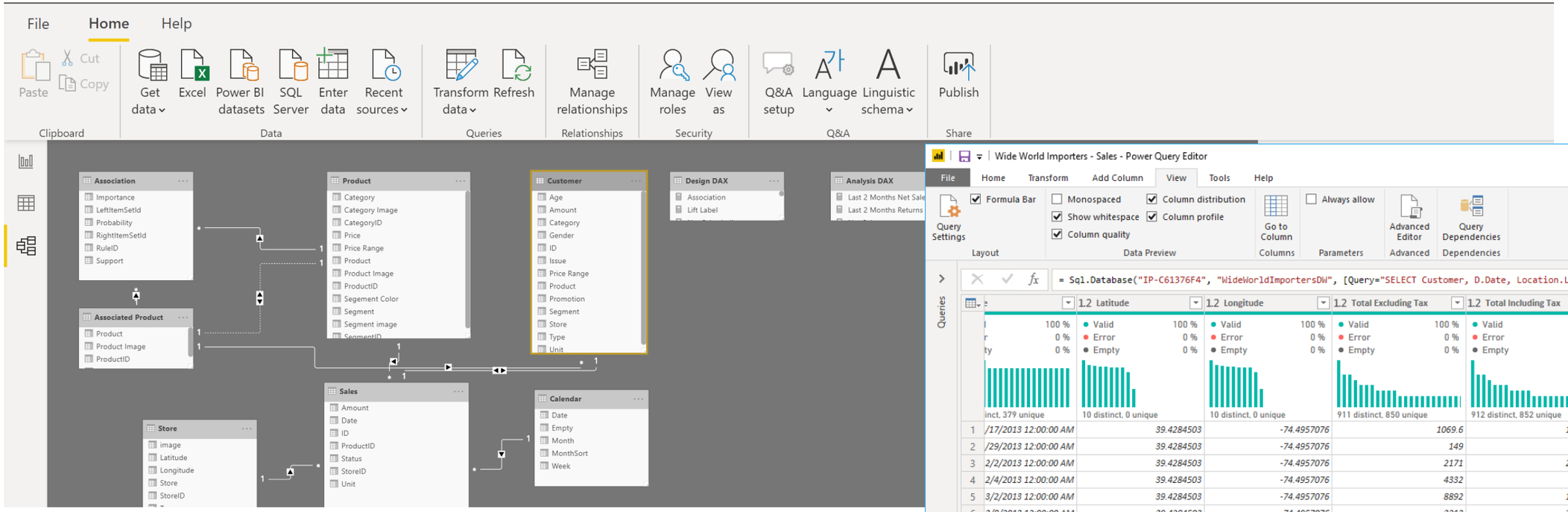
Learning Objectives

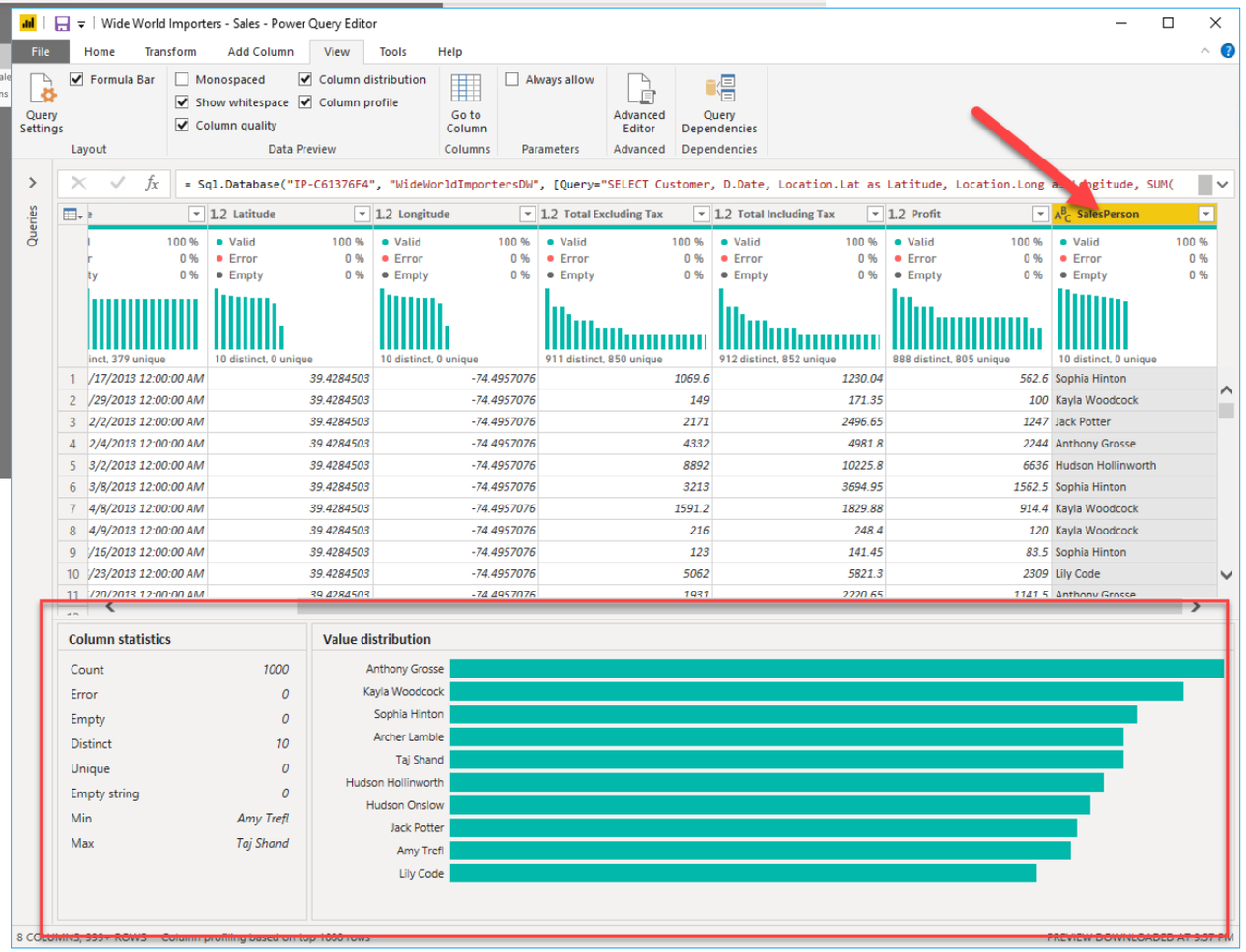
You will learn the following concepts:

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

Lesson 1: Profiling the Data

Profiling Data and Examining Structures





Data profiling is understanding the state and structure of the data you are working with.

Lesson 2:
Shaping the Data

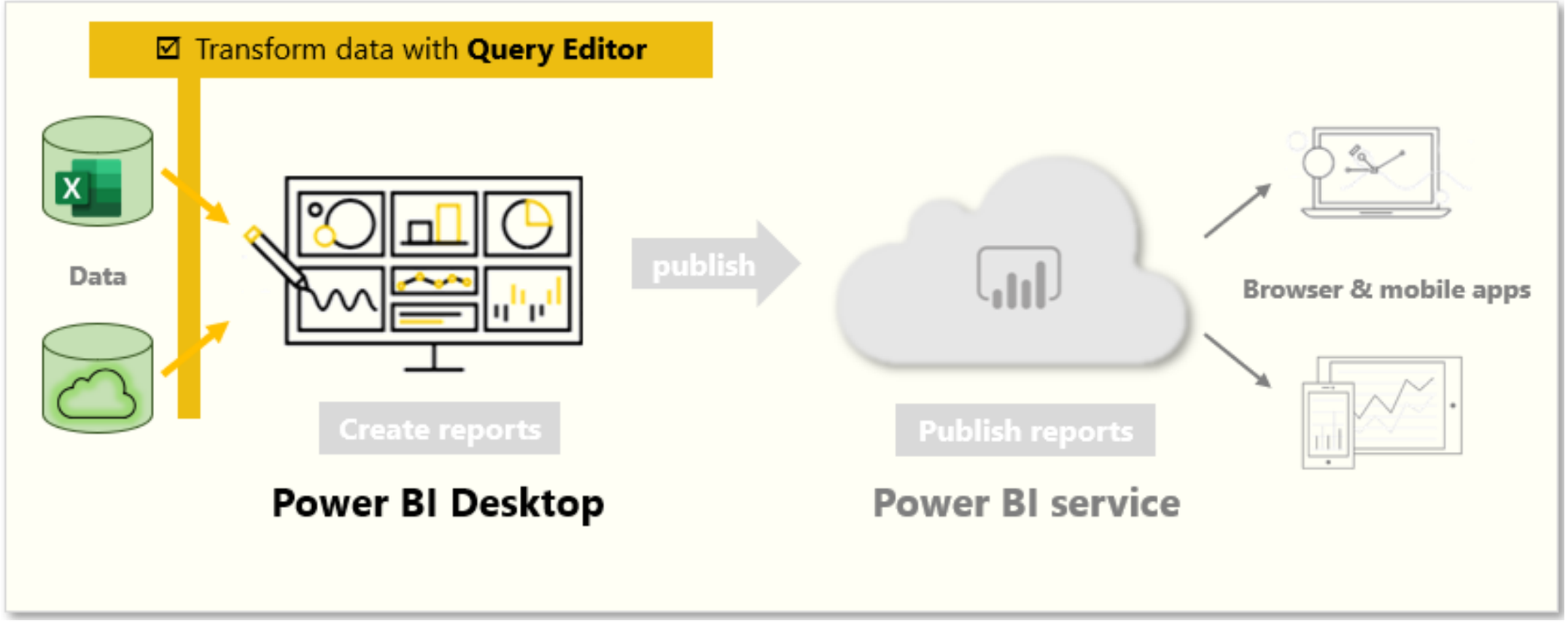
Microsoft Power Platform

Introduction

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

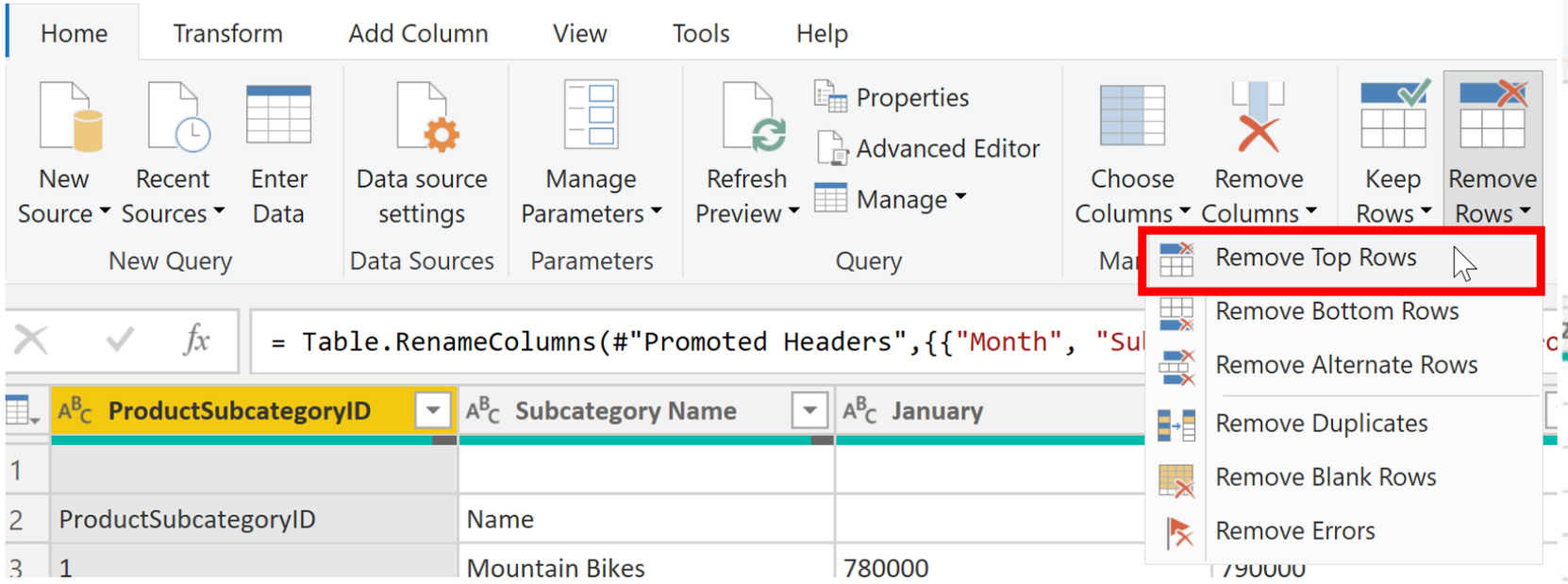
Identify column headers and names

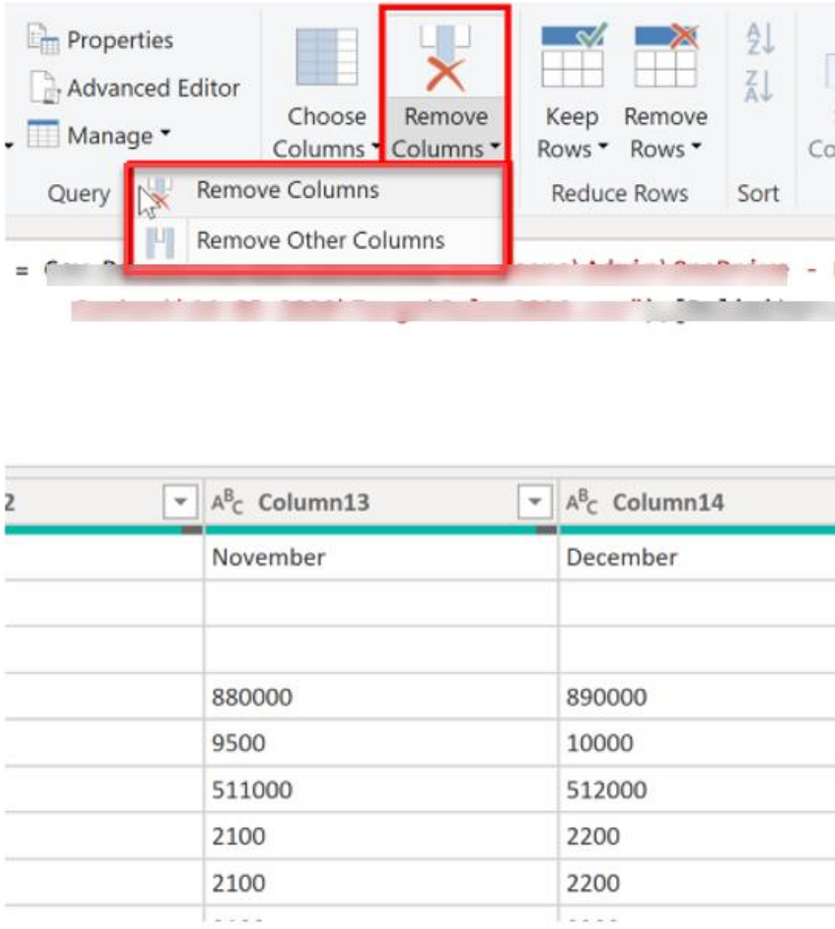
Use Power Query Editor to clean up and shape data.



Shaping Table Structure

Shape the data to meet reporting needs.

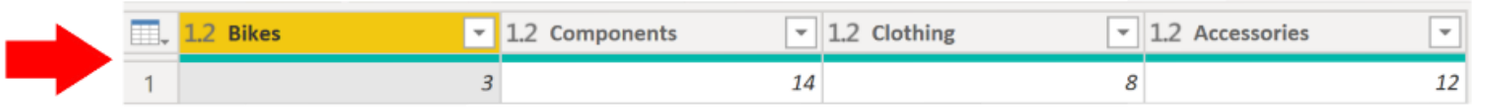




Unpivot and Pivot columns

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

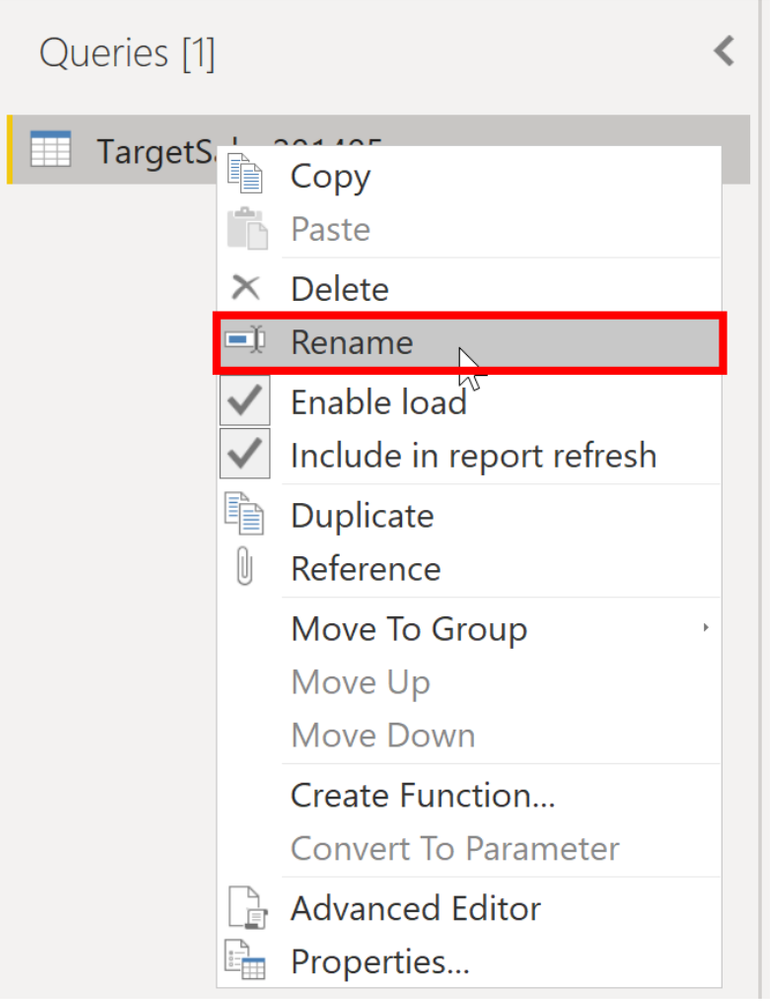
	Category Name	Subcategory Name
1	Bikes	Mountain Bikes
2	Bikes	Road Bikes
3	Bikes	Touring Bikes
4	Clothing	Bib-Shorts
5	Clothing	Caps
6	Clothing	Gloves
7	Clothing	Jerseys
8	Clothing	Shorts
9	Clothing	Socks
10	Clothing	Tights
11	Clothing	Vests
12	Accessories	Bike Racks
13	Accessories	Bike Stands
14	Accessories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



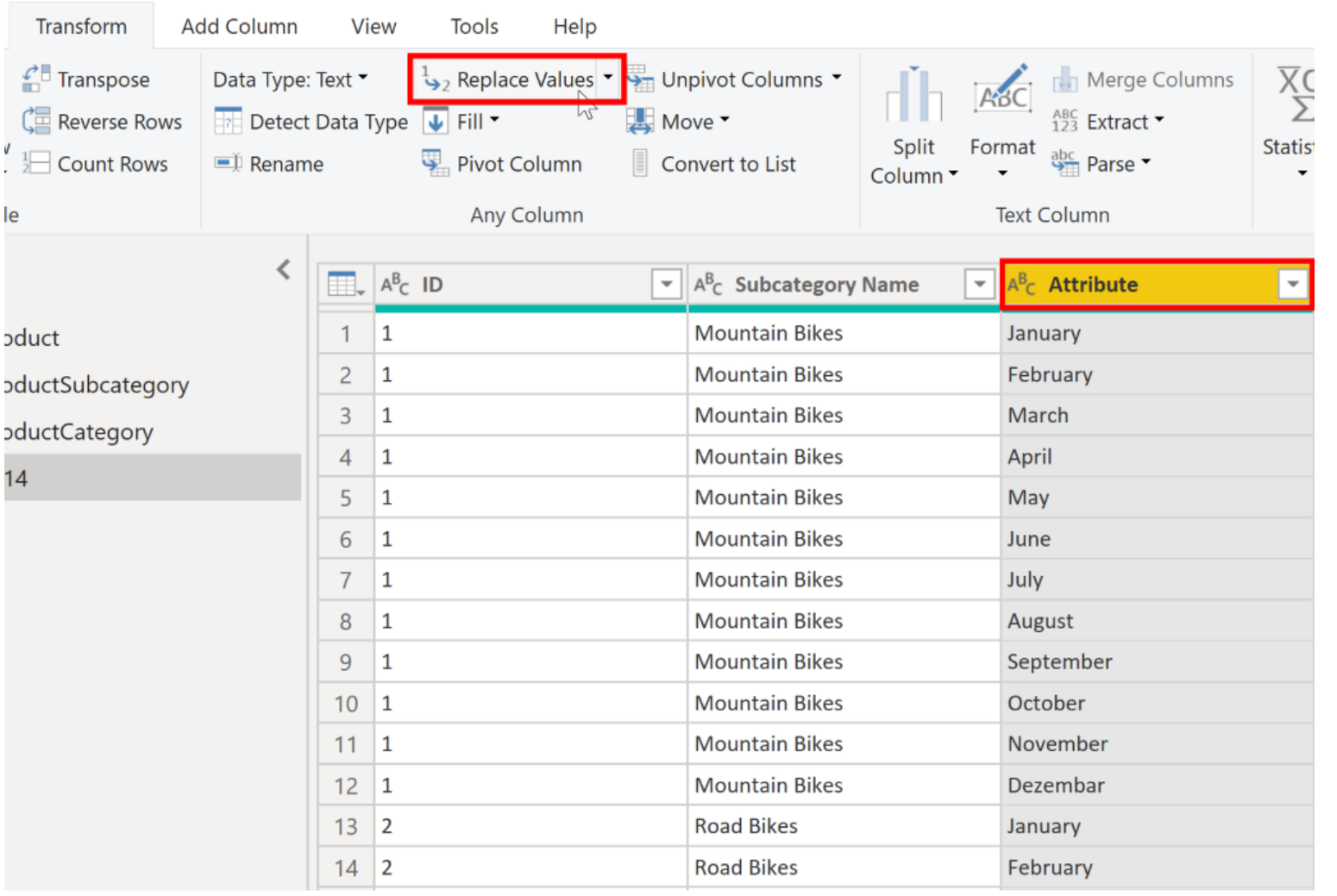
	1.2 Bikes	1.2 Components	1.2 Clothing	1.2 Accessories
1	3	14	8	12

Lesson 3:
Enhance the Data Structure

Apply user-friendly value replacements



Make information user-friendly.

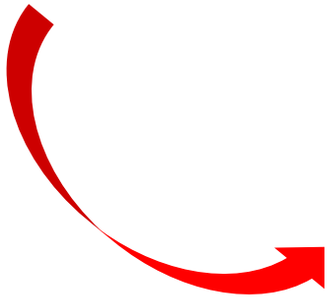


	ID	Subcategory Name	Attribute
1	1	Mountain Bikes	January
2	1	Mountain Bikes	February
3	1	Mountain Bikes	March
4	1	Mountain Bikes	April
5	1	Mountain Bikes	May
6	1	Mountain Bikes	June
7	1	Mountain Bikes	July
8	1	Mountain Bikes	August
9	1	Mountain Bikes	September
10	1	Mountain Bikes	October
11	1	Mountain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

Microsoft Power Platform

Evaluate and Change Column Data Types

	SalesOrderID	OrderDate	Sort_of_Sales	ProductID	OrderQty
1	52242	07/07/2013	Internet	870	1
2	52592	14/07/2013	Internet	870	1
3	52694	16/07/2013	Internet	870	1
4	52799	18/07/2013	Internet	870	1
5	53799	03/08/2013	Internet	870	1
6	54058	08/08/2013	Internet	870	1
7	54059	08/08/2013	Internet	870	1
8	54063	08/08/2013	Internet	870	1
9	54158	10/08/2013	Internet	870	1
10	54261	12/08/2013	Internet	870	1



Couldn't load the data for this visual

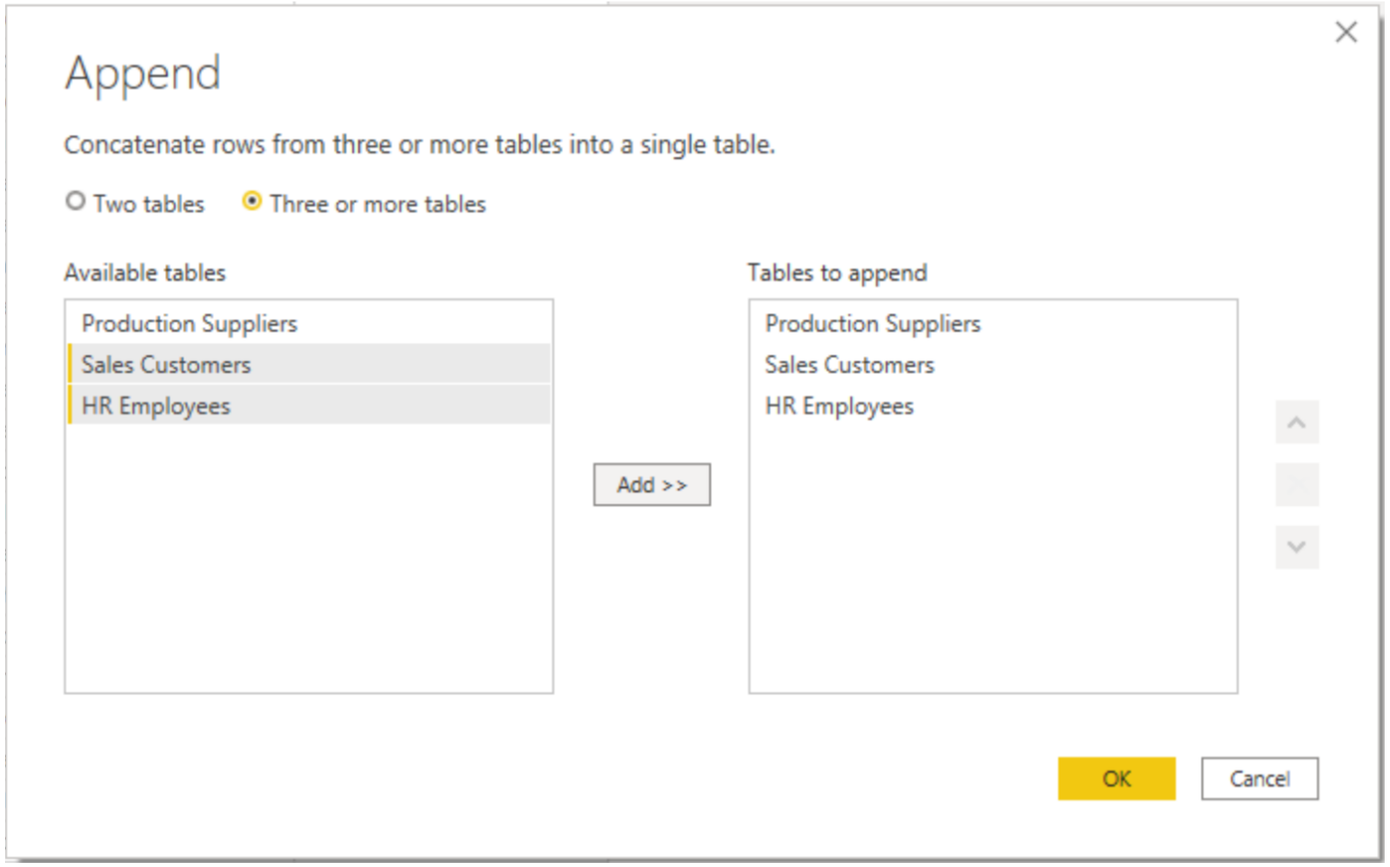
MdxScript(Model) (19, 40) Calculation error in measure 'Sales'[Quantity of Orders YTD]: A column specified in the call to function 'TOTALYTD' is not of type DATE. This is not supported.

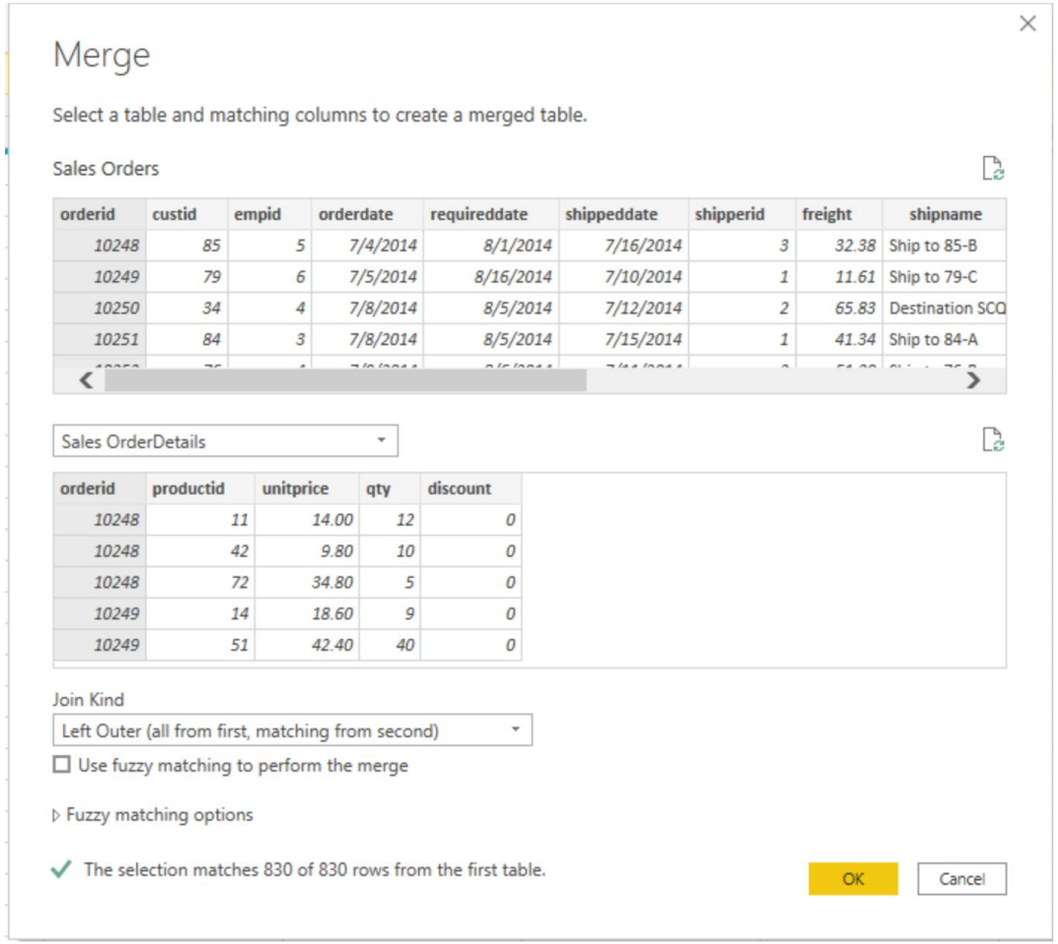
Copy details

Send a Frown Close

Microsoft Power Platform

Combine Multiple Tables into a Single Table





Microsoft Power Platform

Use Advanced Editor to Modify M Code

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

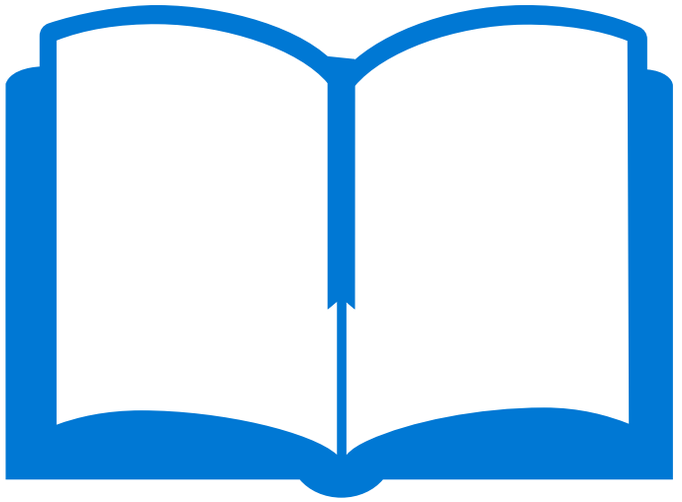
Lab: Transforming and Loading Data

Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

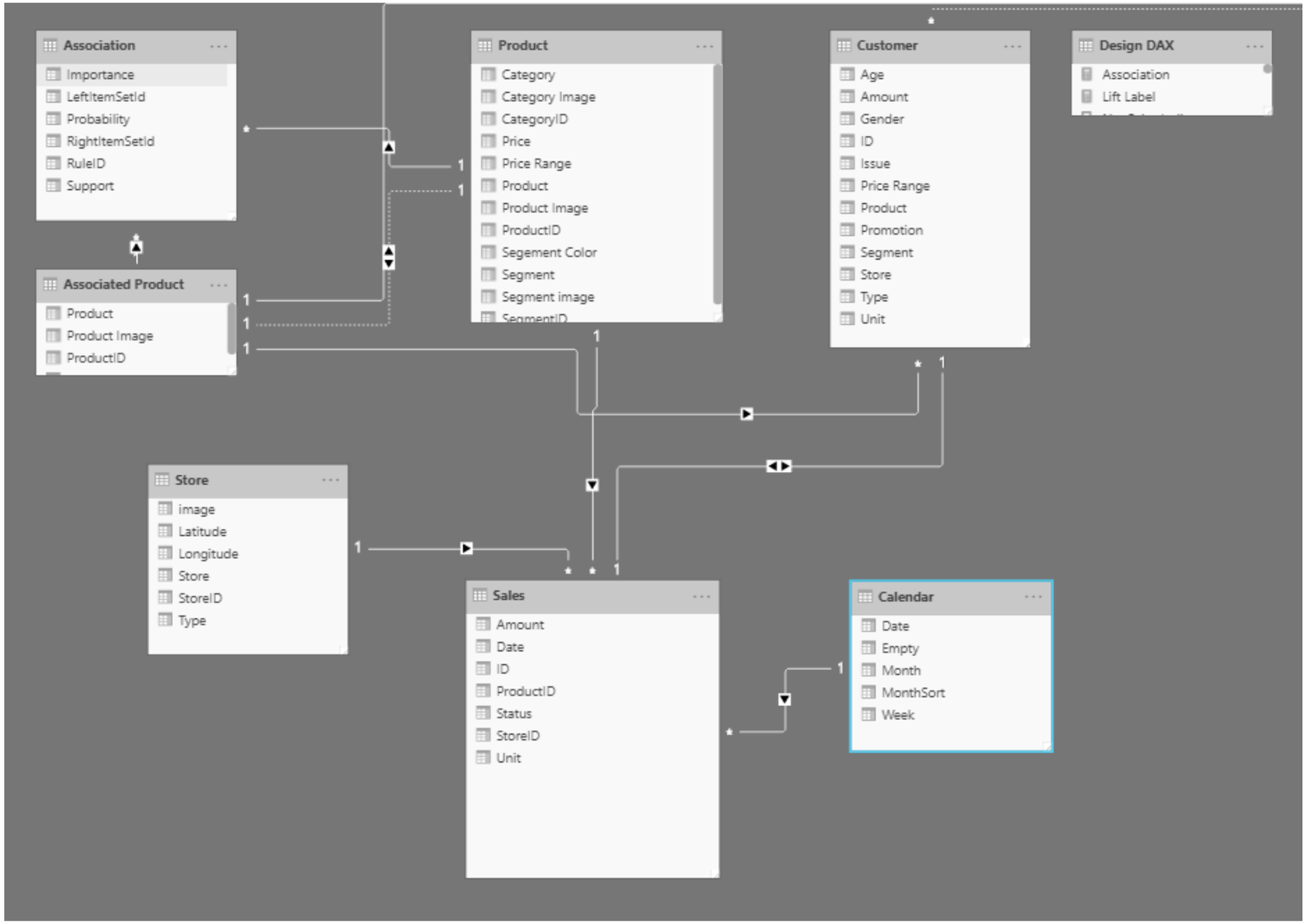
- Data Modeling
- Working with Tables
- Dimensions and Hierarchies

Lesson 1:
Introduction to Data Modeling

Microsoft Power Platform

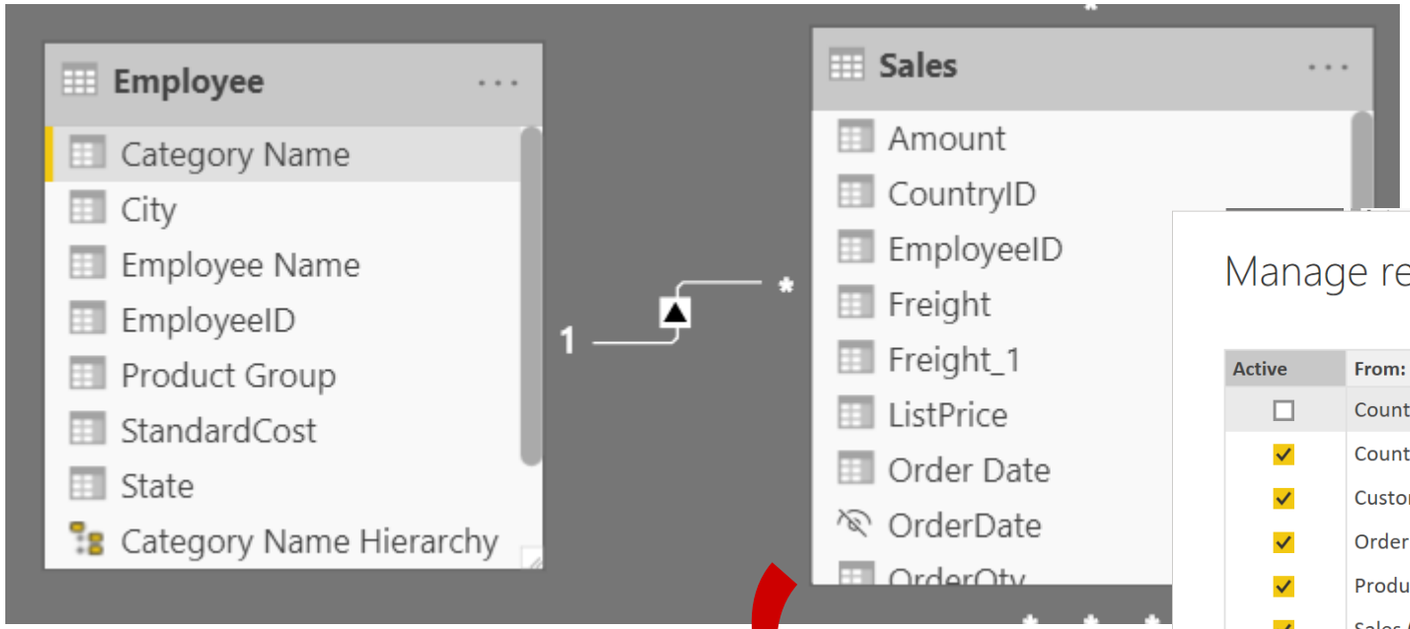
Introduction to Data Modeling

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



Microsoft Power Platform

Joins and Relationships



Manage relationships

Active	From: Table (Column)	To: Table (Column)
☐	Country (Country)	CountryName (Country)
☑	Country (Country)	Territory (Country)
☑	Customers (ID)	SalesVals (ID)
☑	Order (OrderDate)	Sales (OrderDate)
☑	Product ID (ProductID)	Product (ProductID)
☑	Sales (CountryID)	CountryName (CountryID)
☑	Sales (Order Date)	Budget (Date)
☑	Sales (Order Date)	Calendar (Date)
☑	Sales (ProductID)	Product (ProductID)
☑	Territory (Country)	CountryName (Country)

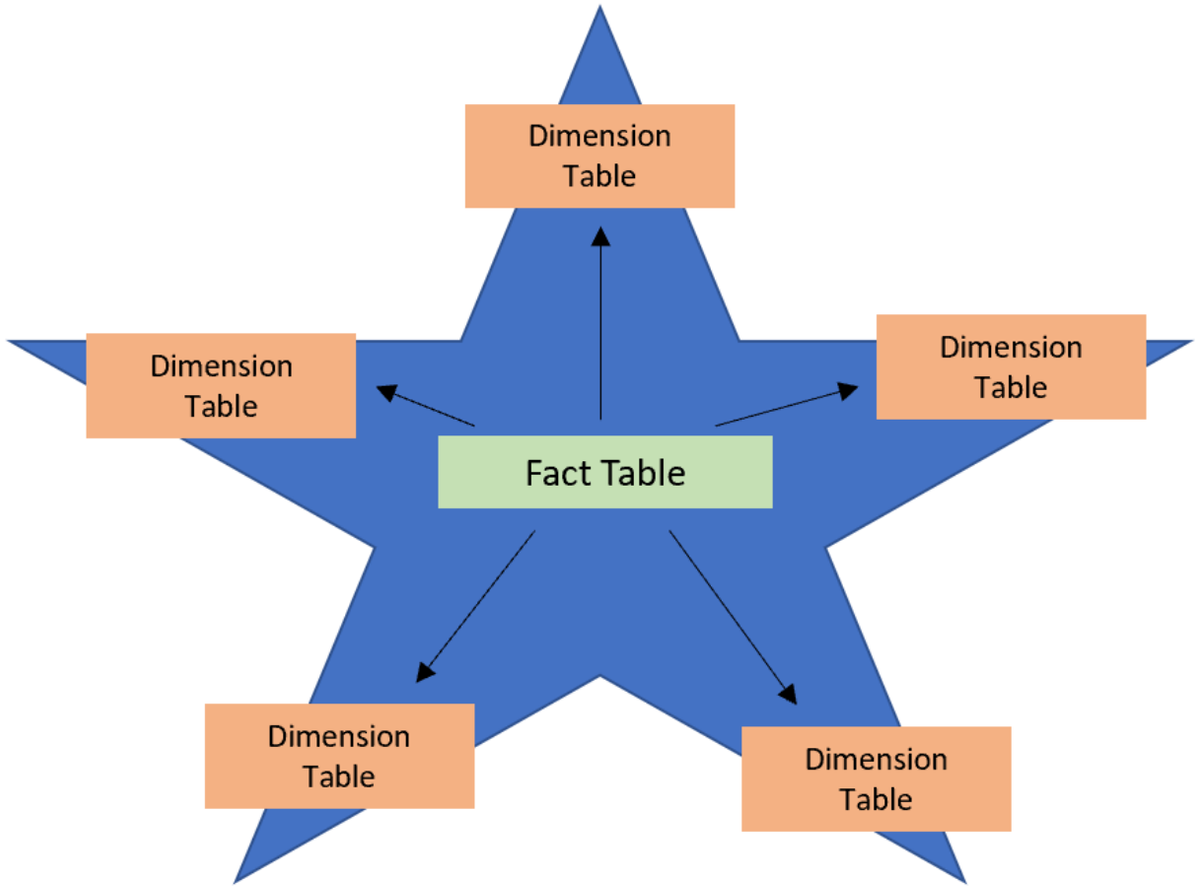
New... Autodetect... Edit... Delete

Close

Microsoft Power Platform

Star Schemas

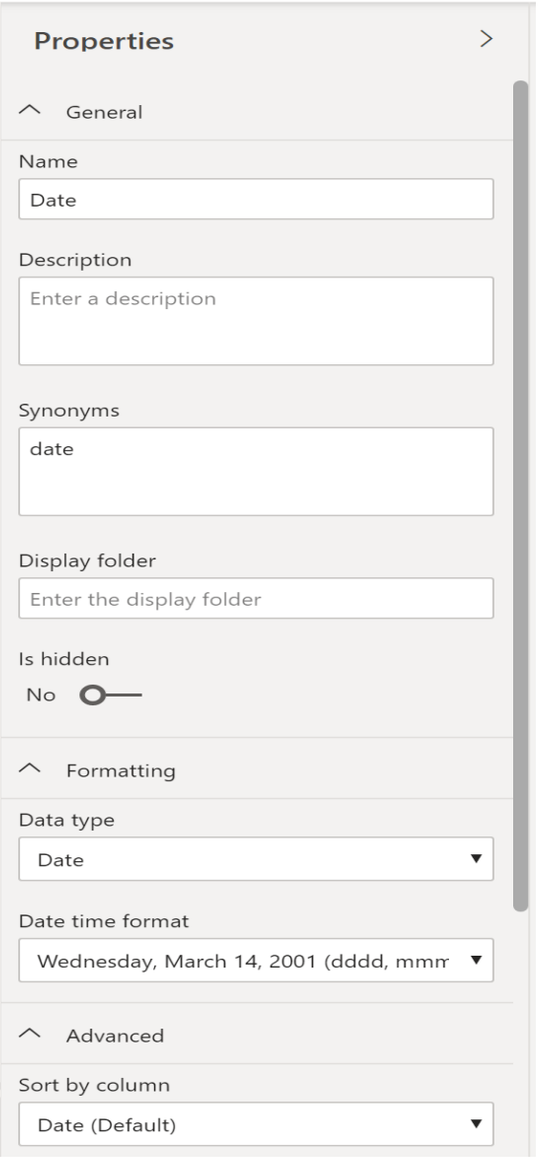
- Tables are classified as dimension or fact tables.
  - Dimension: Describes business entities.
  - Fact: Store observations or events.



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.



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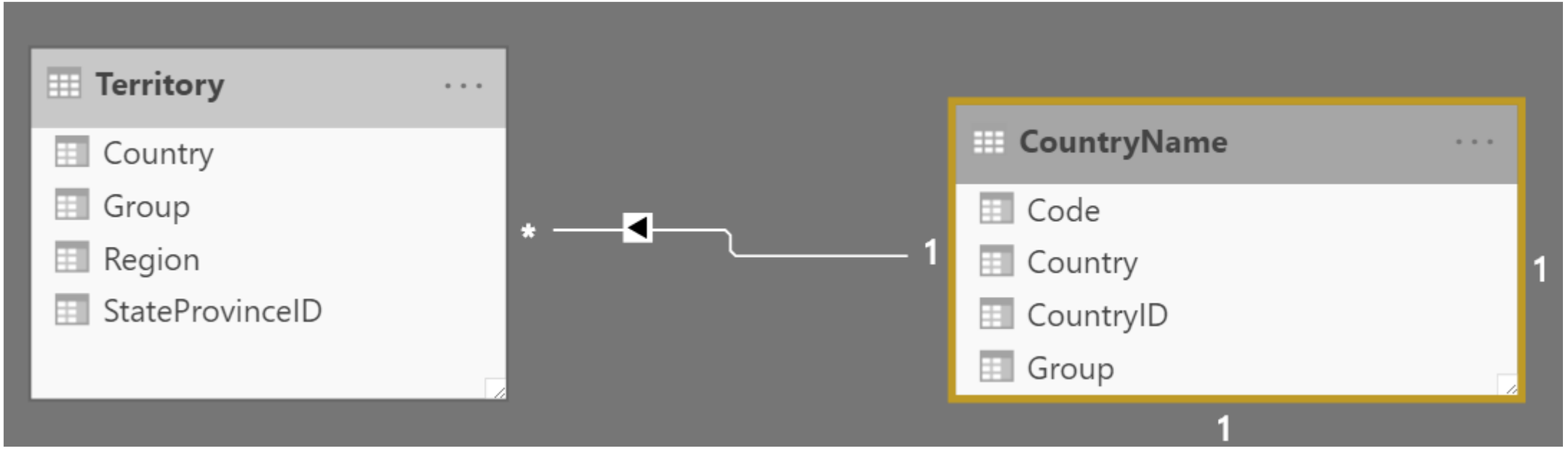
Create a Dates Table

Standardize on date formats and ranges that meet company requirements.

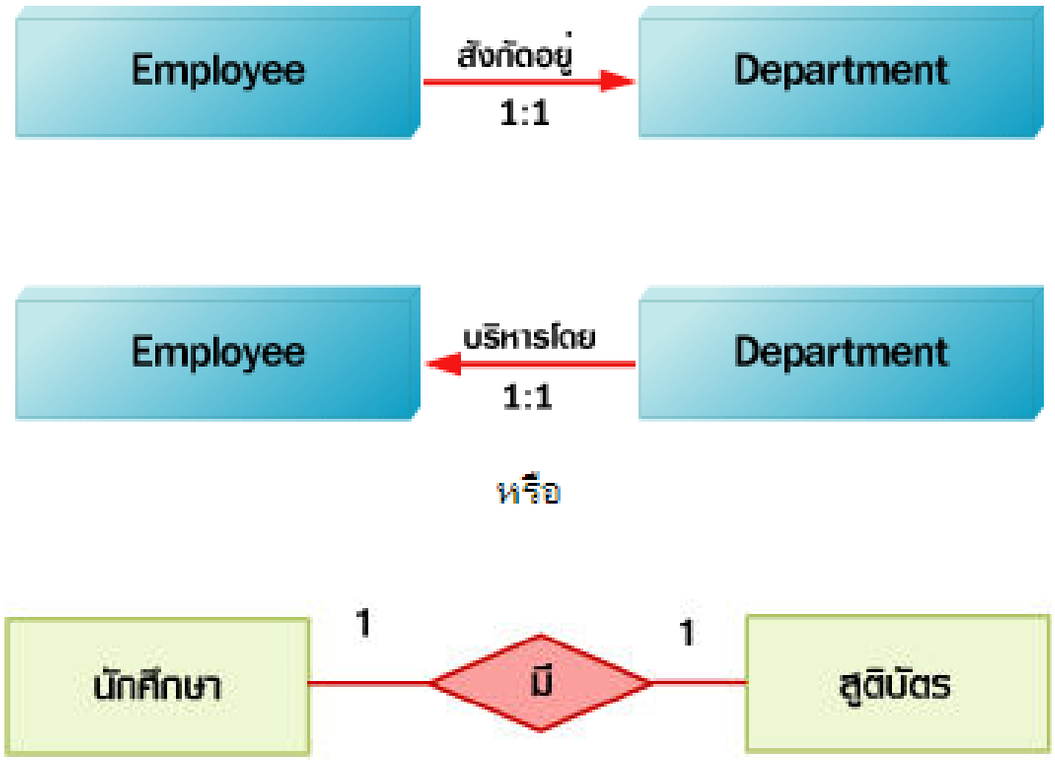
Date	Year	MonthNum	WeekNum	DayoftheWeek
Tuesday, May 31, 2011	*2011*	*5*	*23*	Tuesday
Wednesday, June 1, 2011	*2011*	*6*	*23*	Sunday
Thursday, June 2, 2011	*2011*	*6*	*23*	Monday
Friday, June 3, 2011	*2011*	*6*	*23*	Tuesday

Relationships and Cardinality

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



1 : 1 Relationship



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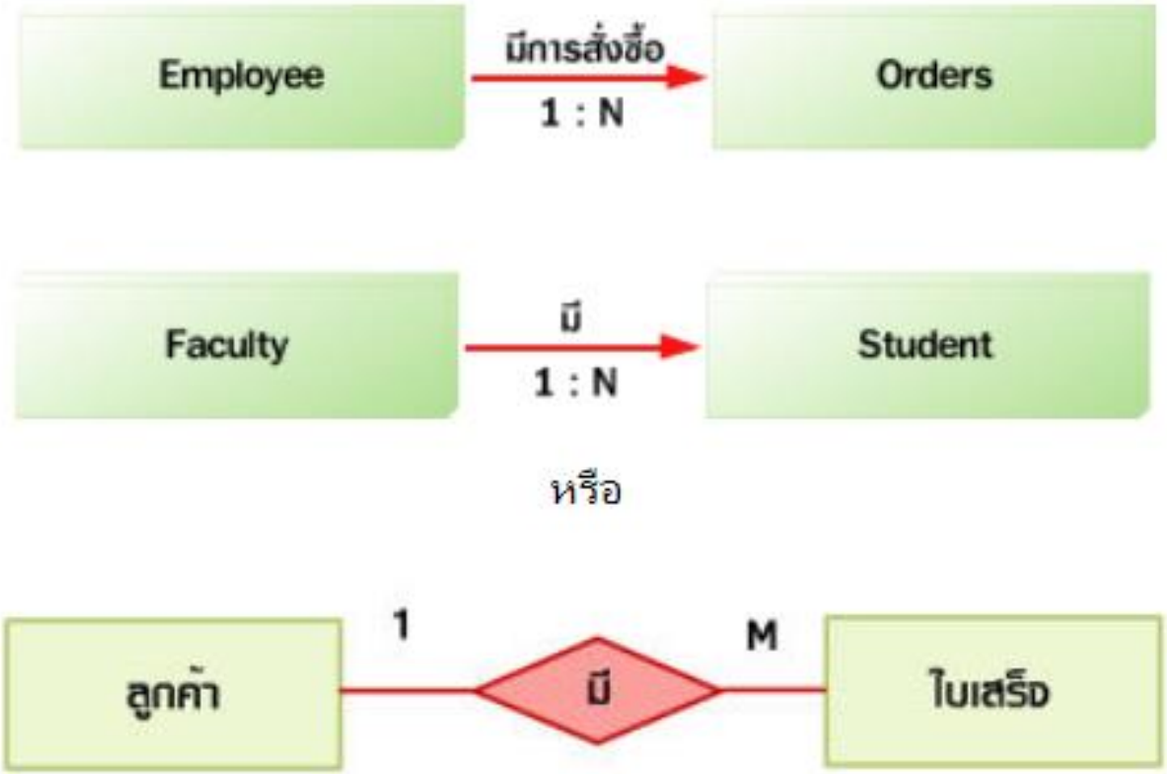
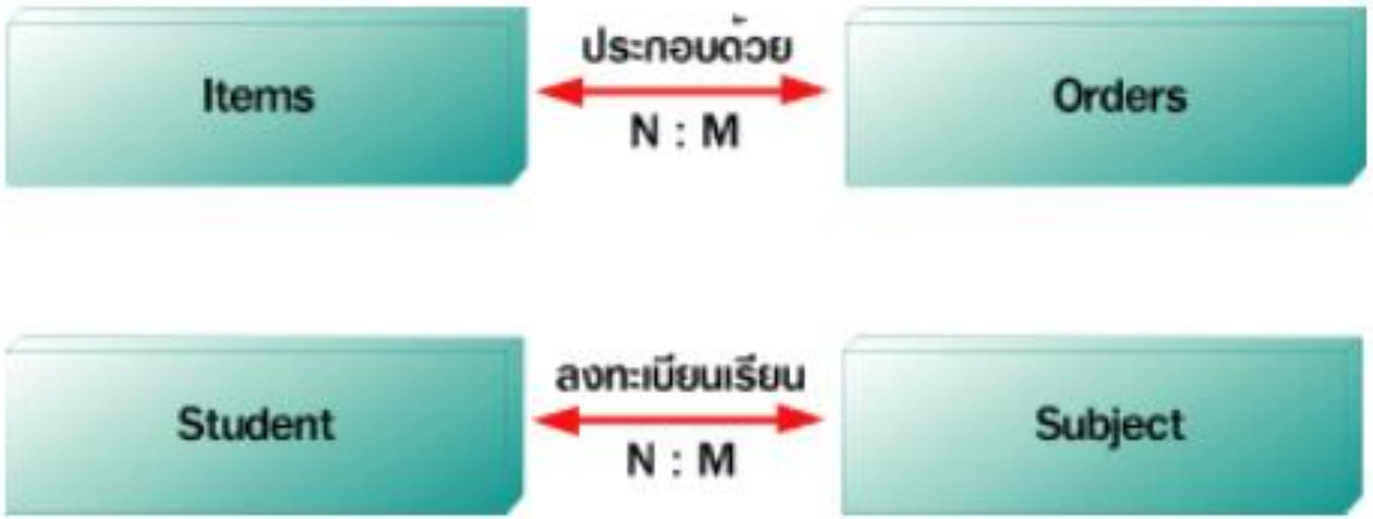
1 : * Relationship



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

Microsoft Power Platform

M : N Relationship



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

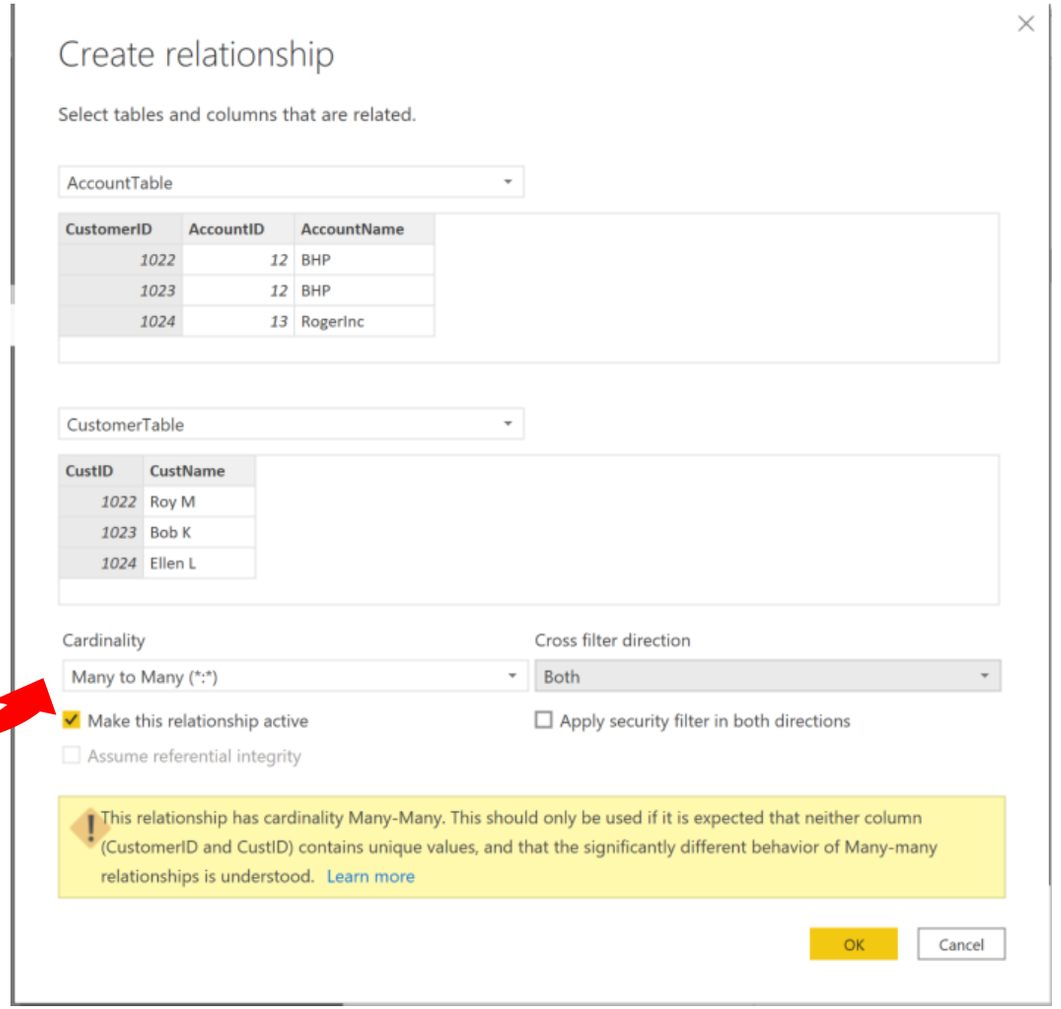
Create Many-to-many Relationships

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

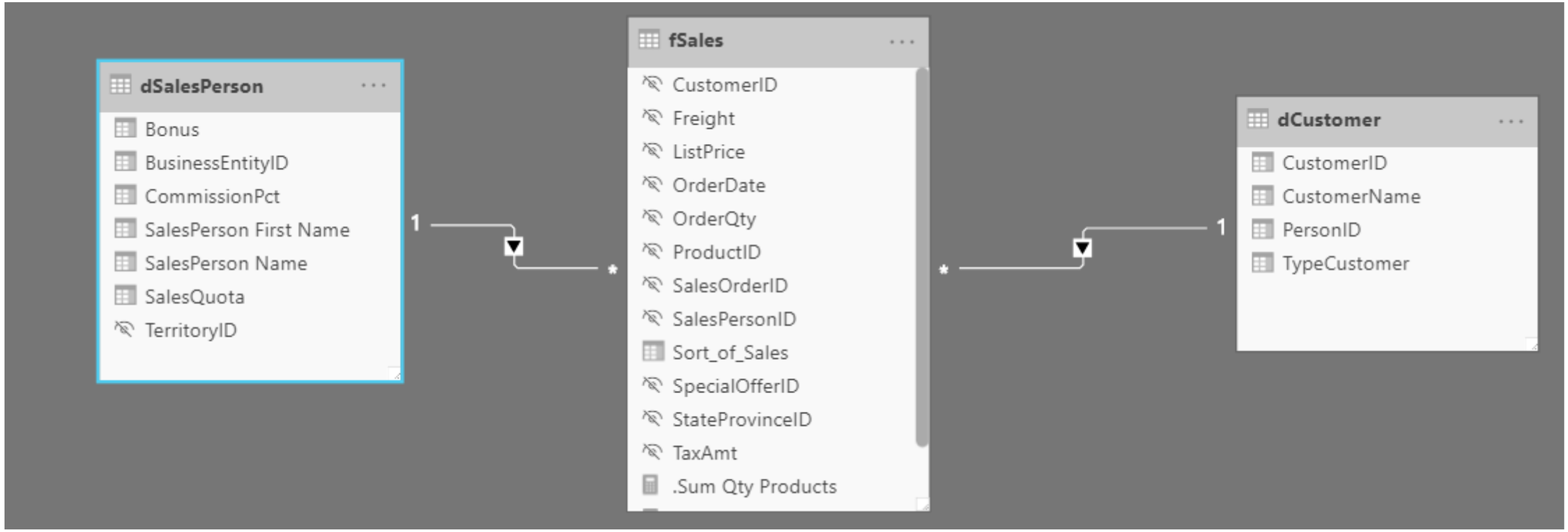
AccountTable



Microsoft Power Platform

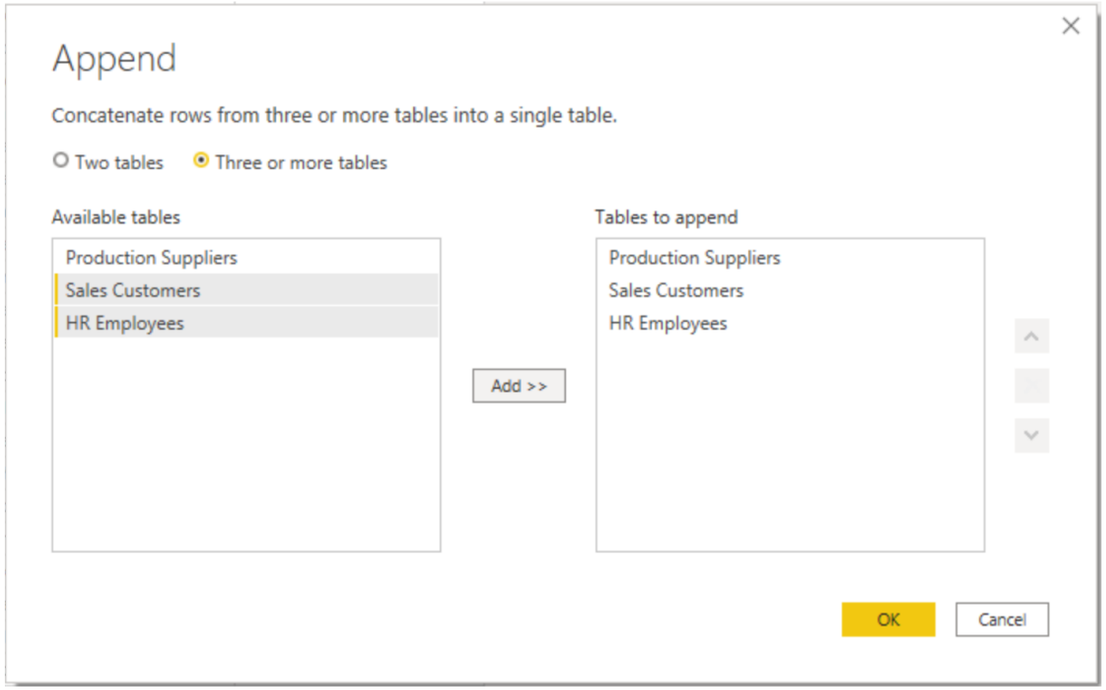
Modeling Challenges

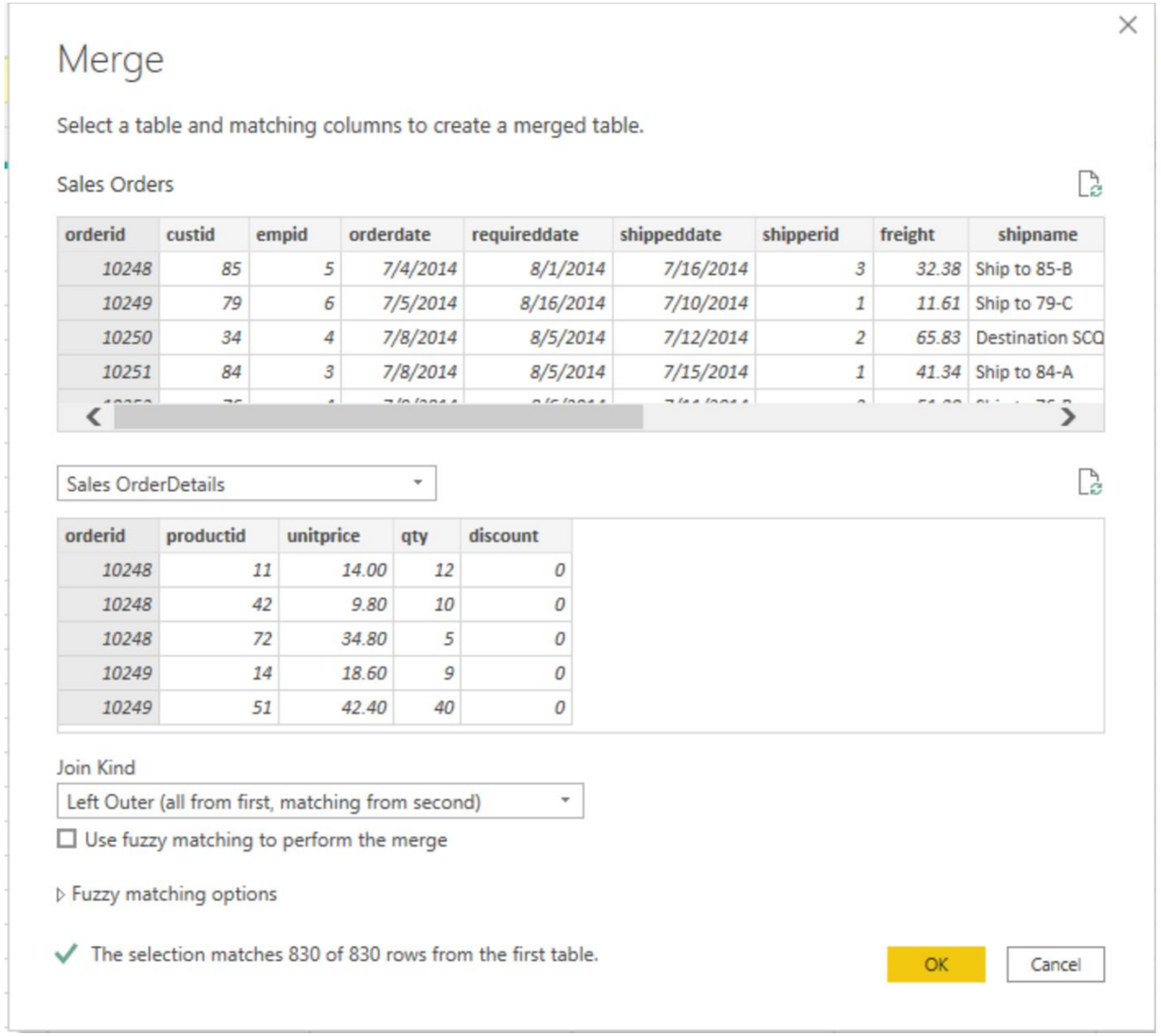
Circular relationships and relational dependencies.



Combine Queries

- Two methods for combining queries:
  - Append
  - Merge





Lab: Data Modeling in Power BI Desktop

Lesson 3: Dimensions and Hierarchies

Microsoft Power Platform

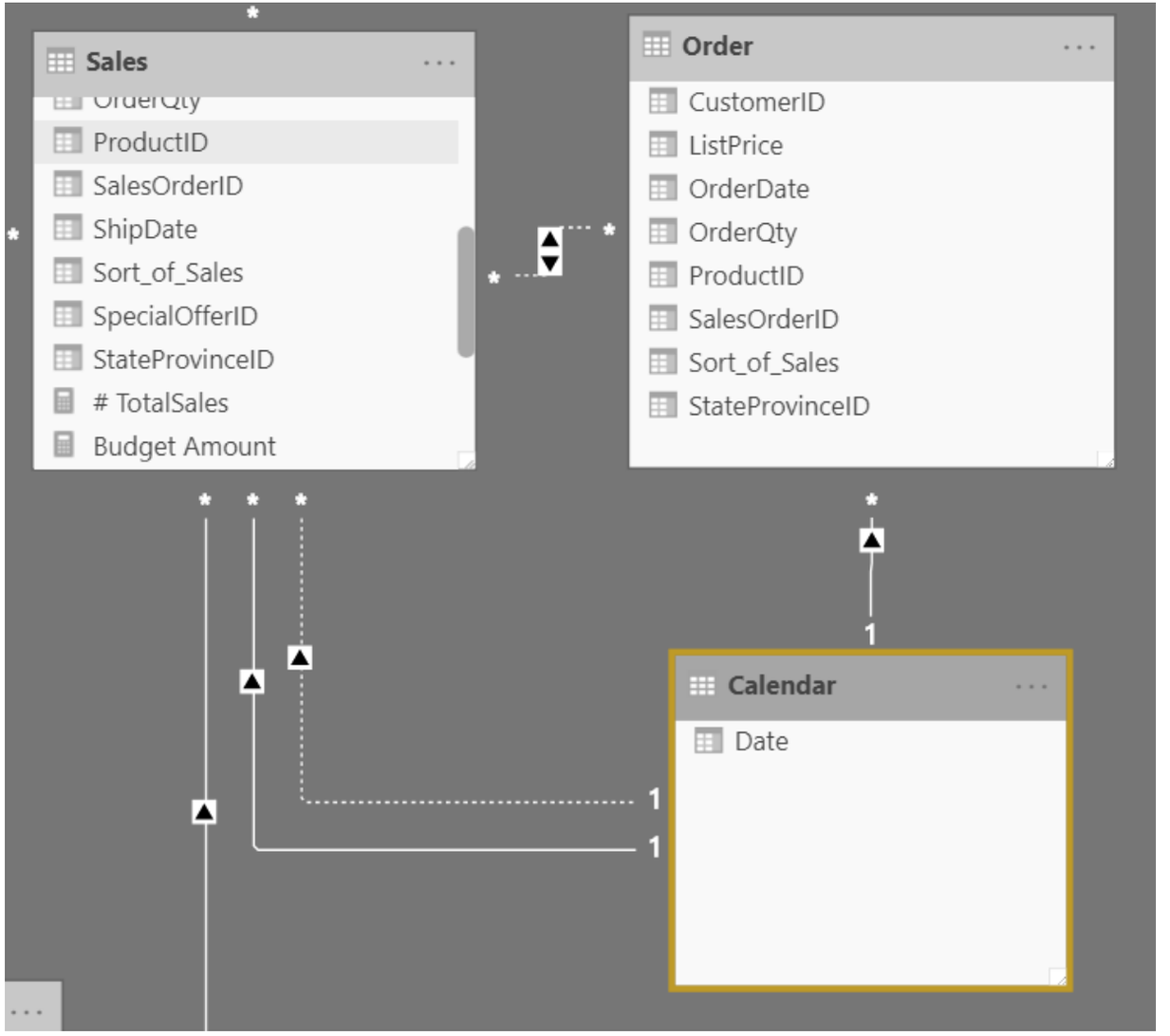
Introduction to Dimensions and Hierarchies

- 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

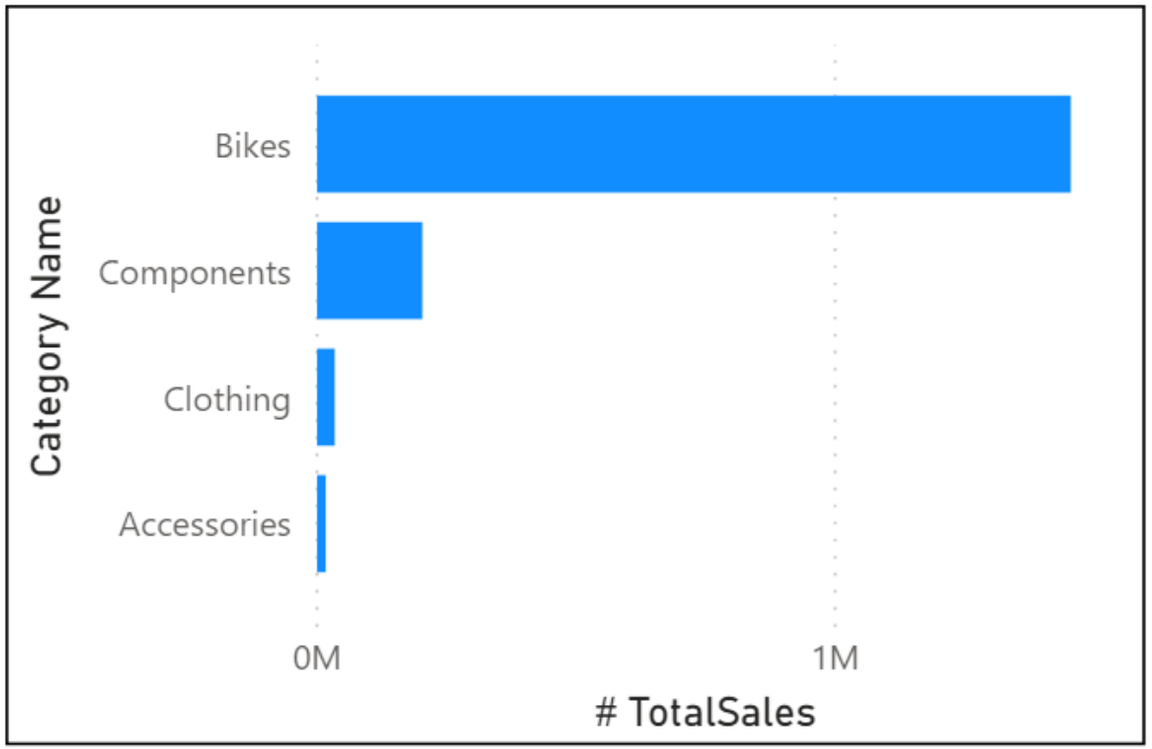
Role-playing Dimensions

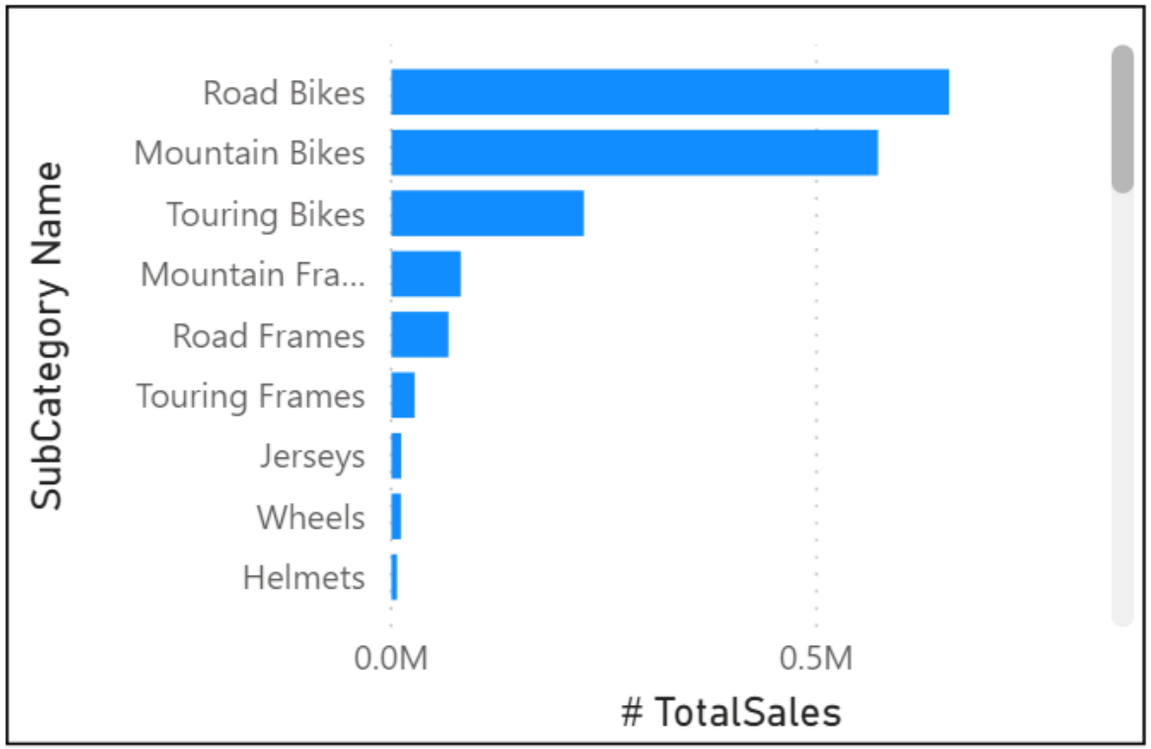
A dimension that can filter related facts differently.



Microsoft Power Platform

Creating new Hierarchies





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Flatten out a Parent-child Hierarchy

Employee ID	Manager ID	Employee	Manager	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	Guy L	1010|1012|1015

Employee ID	Name	Manager	Manager ID	Path	Level 1	Level 2	Level 3	Level 4
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

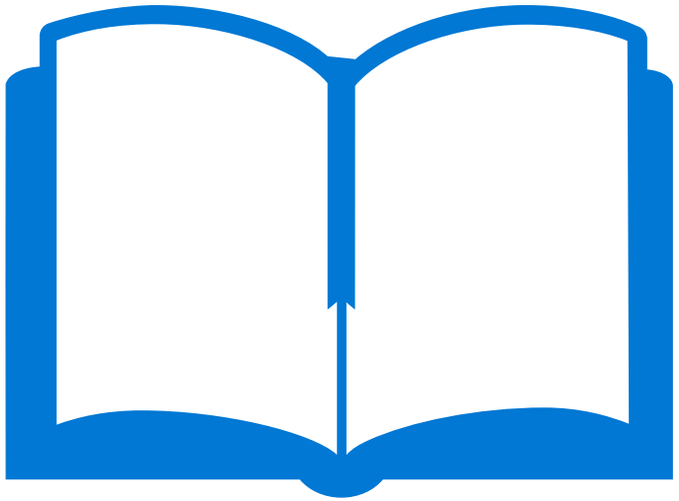
Lab: Advanced Data Modeling in Power BI Desktop

Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

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

Lesson 1:
Introduction to DAX

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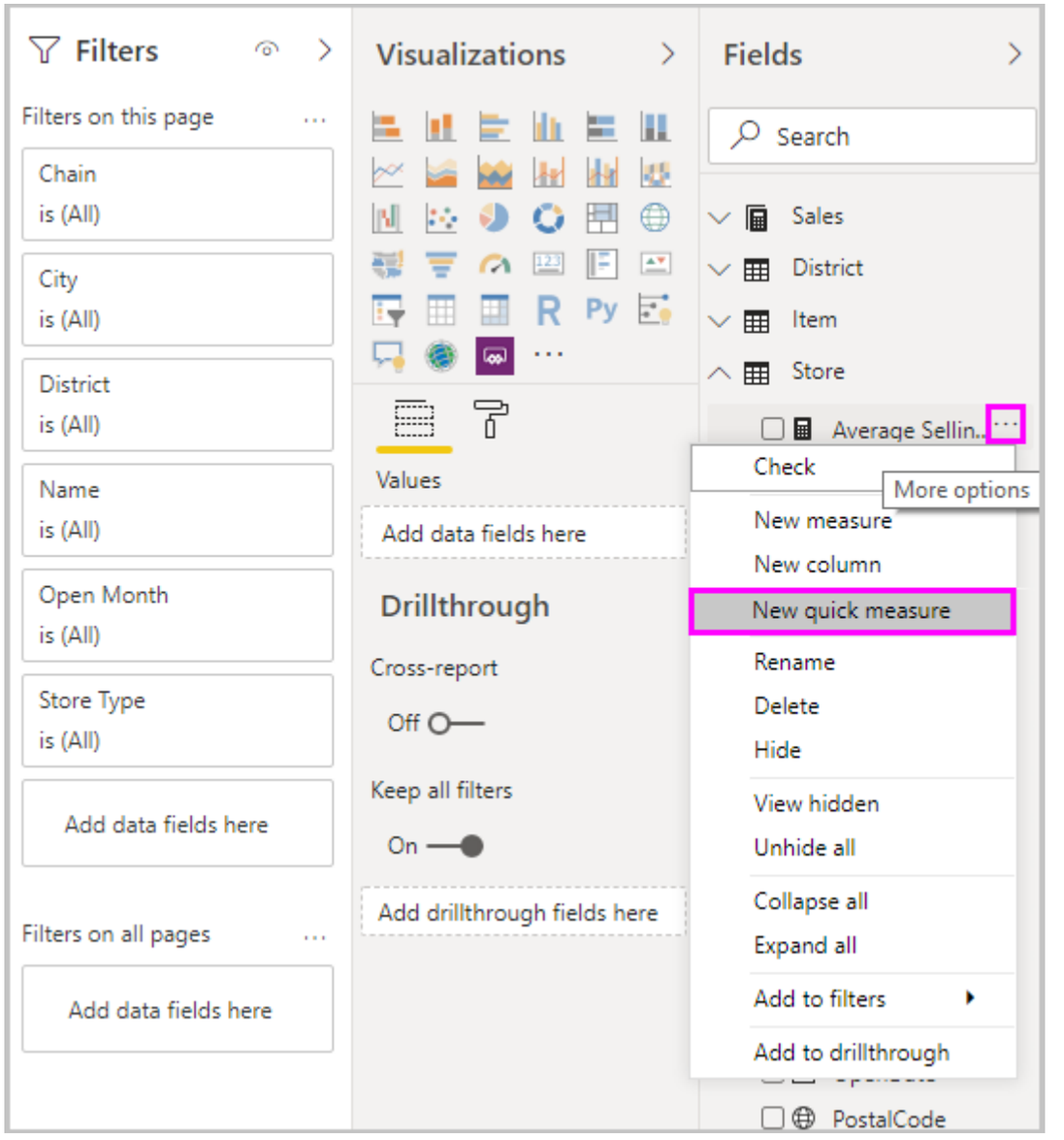
Introduction to DAX

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

Microsoft Power Platform

Measures

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



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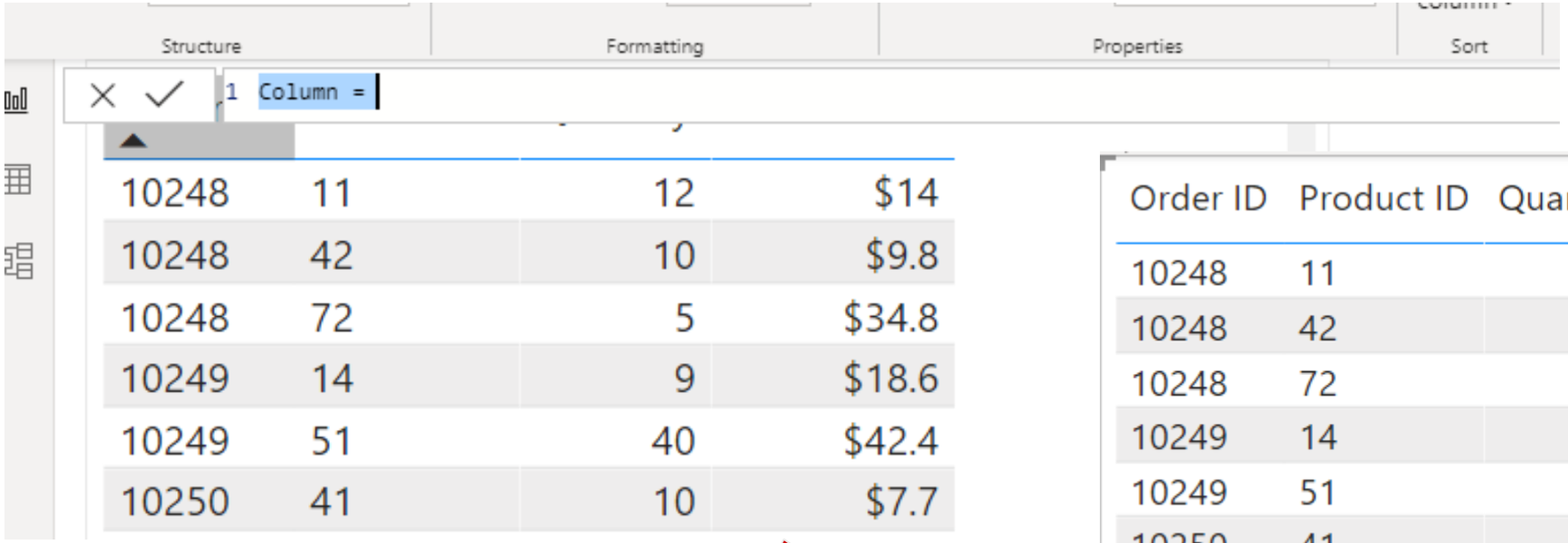
Calculated Columns



10248	11	12	$14
10248	42	10	$9.8
10248	72	5	$34.8
10249	14	9	$18.6
10249	51	40	$42.4
10250	41	10	$7.7

Total Price = 'Sales OrderDetails'[Quantity] * 'Sales OrderDetails'[Unit 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

Microsoft Power Platform

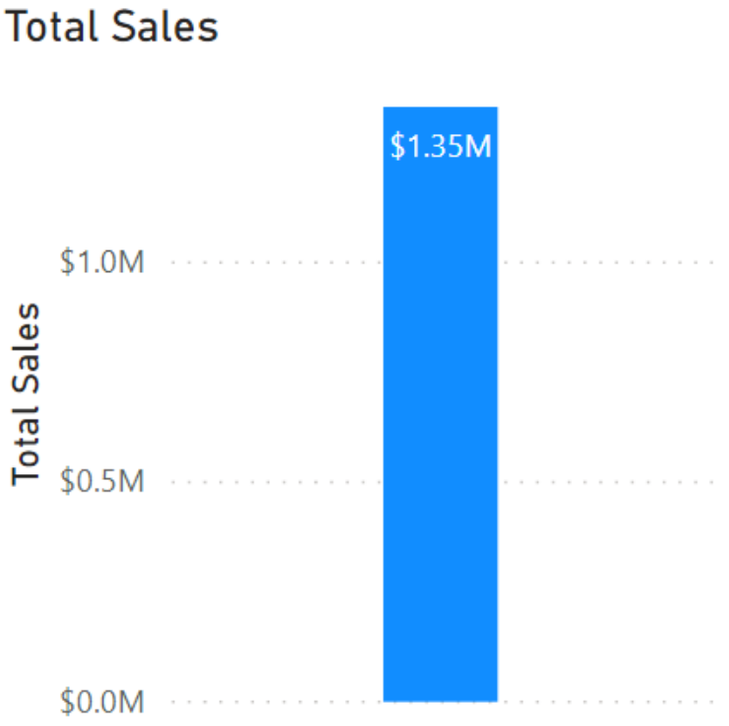
Columns vs. Measures

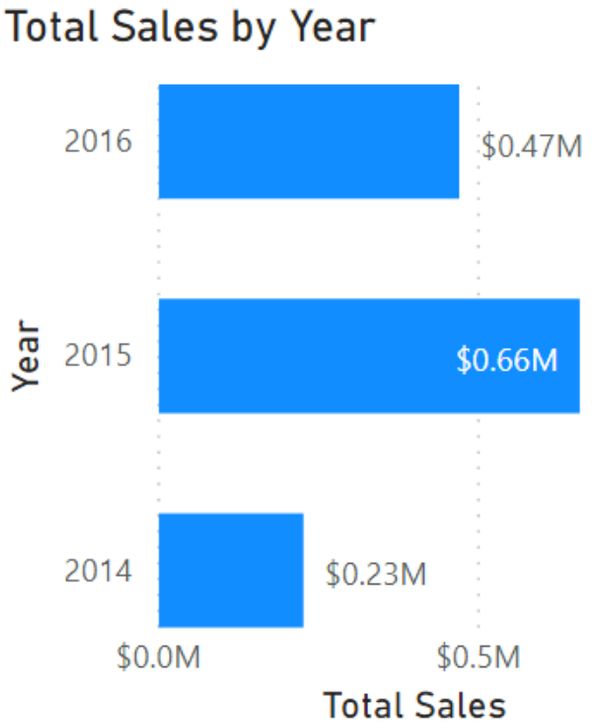
- Calculated column creates a value for each row in a table.
- Calculated column values are stored in the Power BI .pbix file.
- Measures are calculated on demand.
- Measures are calculated based on filters.

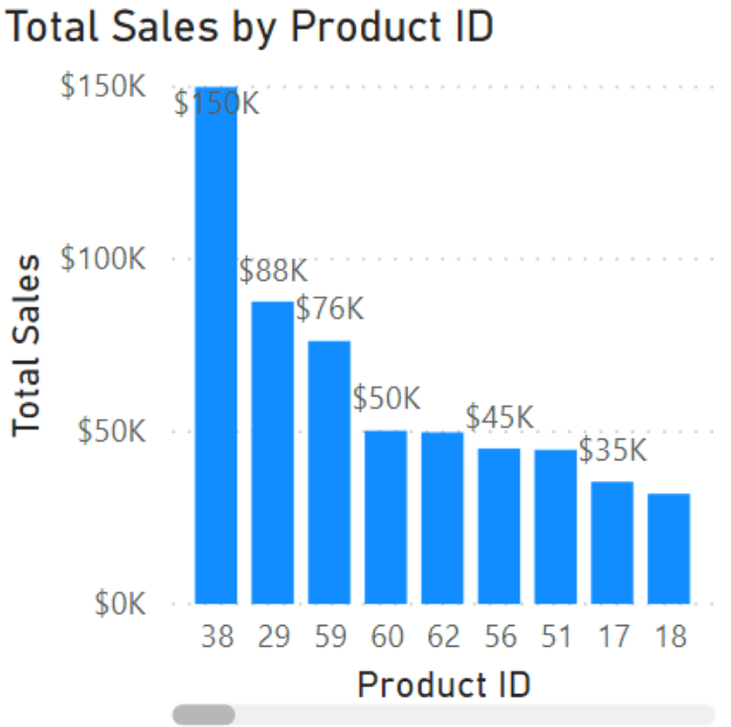
Lesson 2:
DAX Content

Microsoft Power Platform

Understanding Context







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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	1100	490	10350	12938
sales ง	9275	6770	3970	4580	24595
Grand Total	**28027**	**21300**	**13950**	**27860**	**91137**

1 2 3 4

https://www.thepexcel.com/

Microsoft Power Platform

```
--  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] ),
 }
```

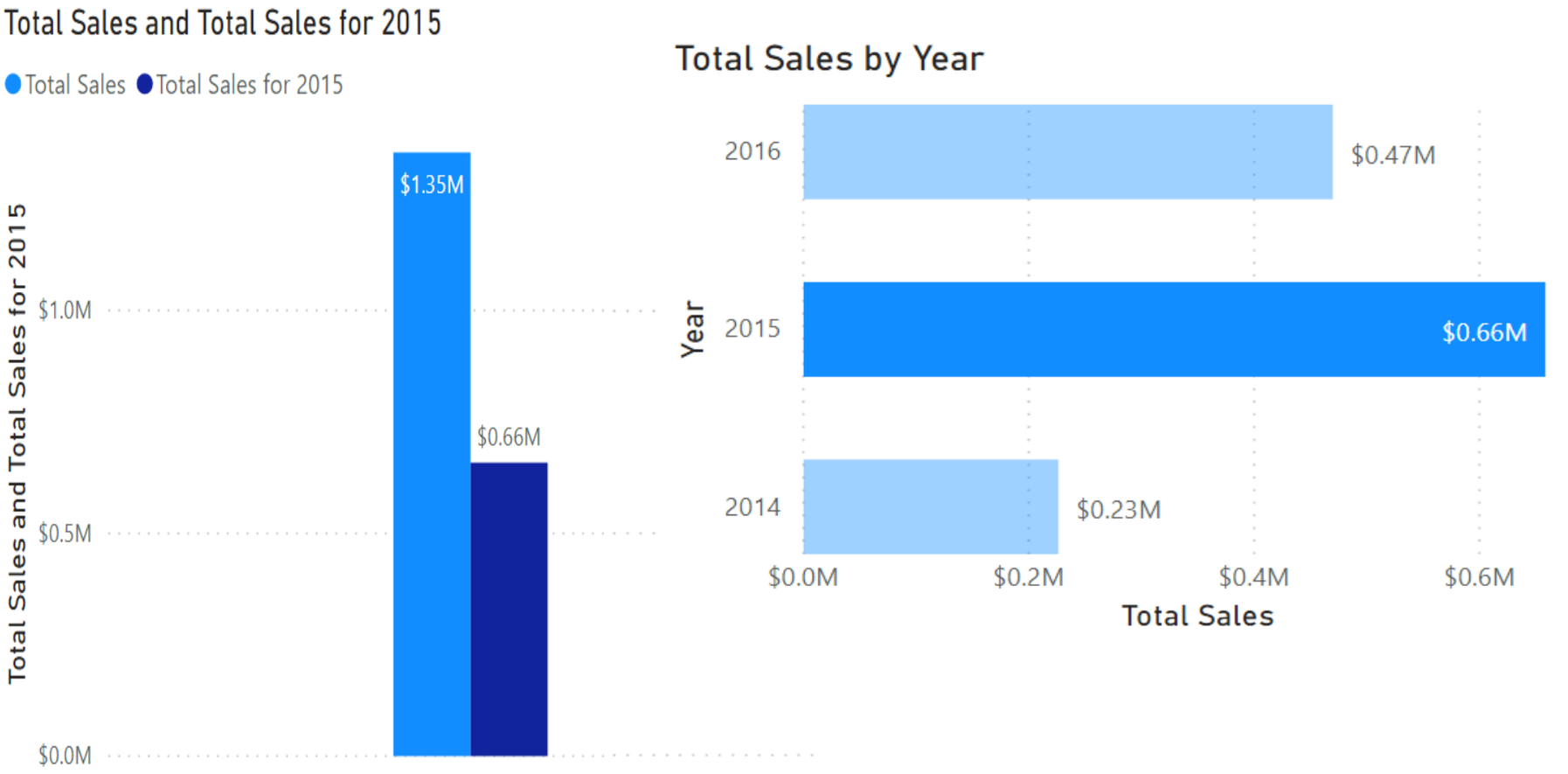
```
HASONEVALUE ( <ColumnName> )
```

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

Value1	Value2
Audio only	true
Audio and computers	false

Microsoft Power Platform

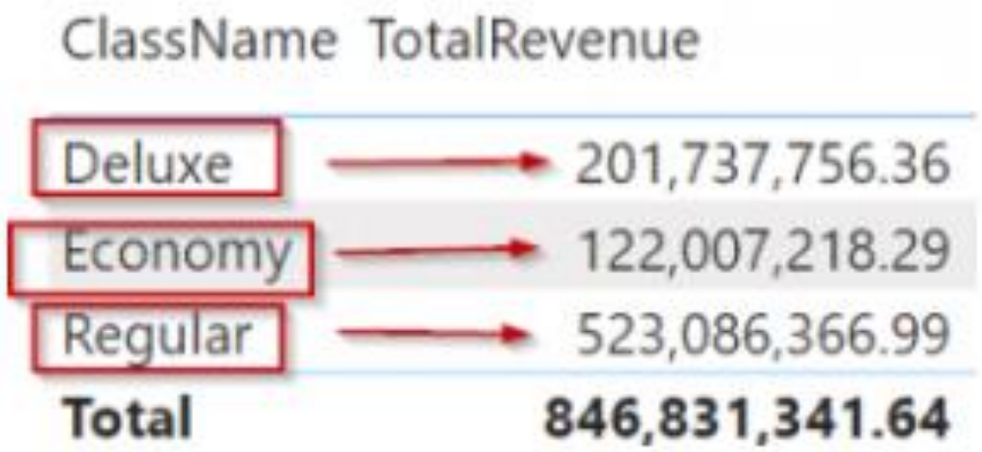
The CALCULATE() Function

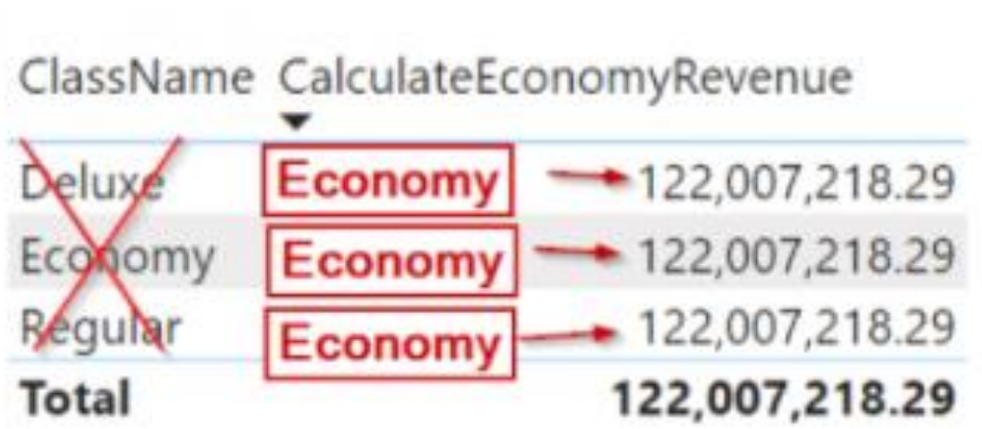



```
CALCULATE ( <Expression> , [<Filter1>] , [<Filter2>] , ... )
```

Microsoft Power Platform

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

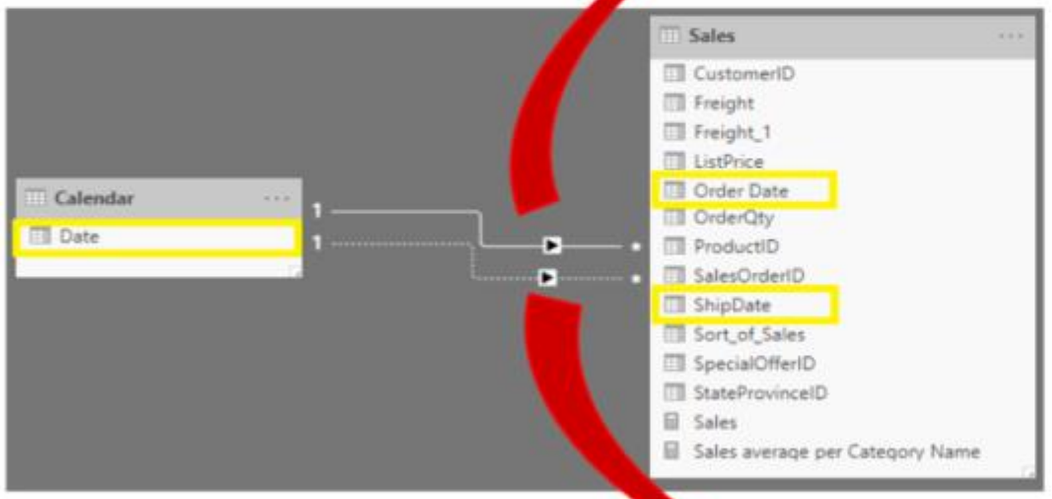


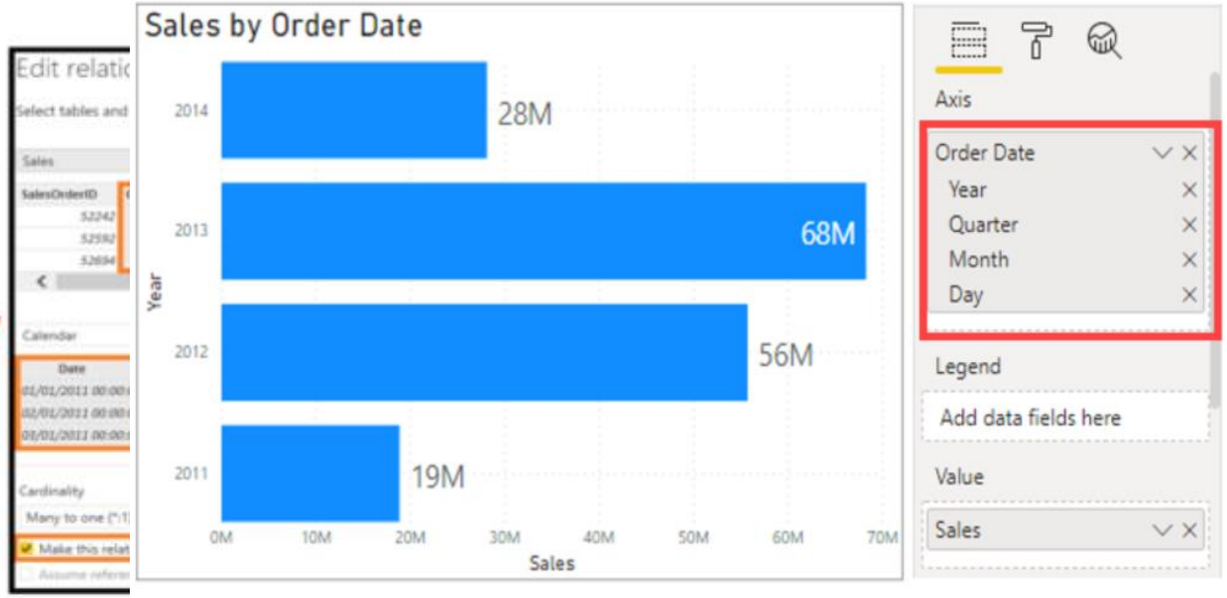


Lab: Introduction to DAX in Power BI Desktop

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])
)
```

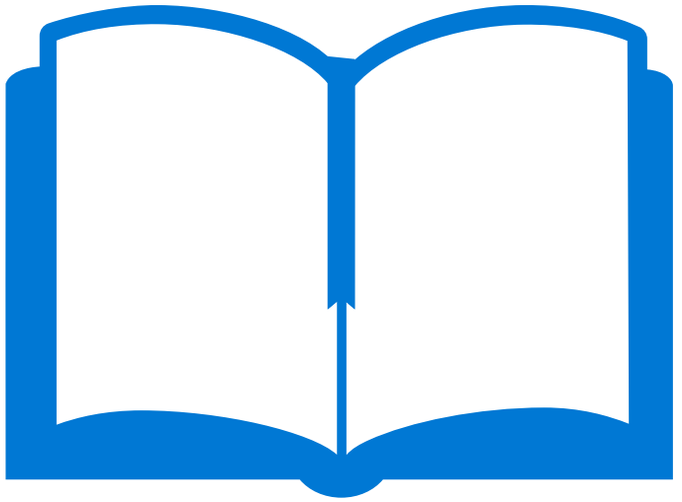
Lab: Advanced DAX in Power BI Desktop

Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

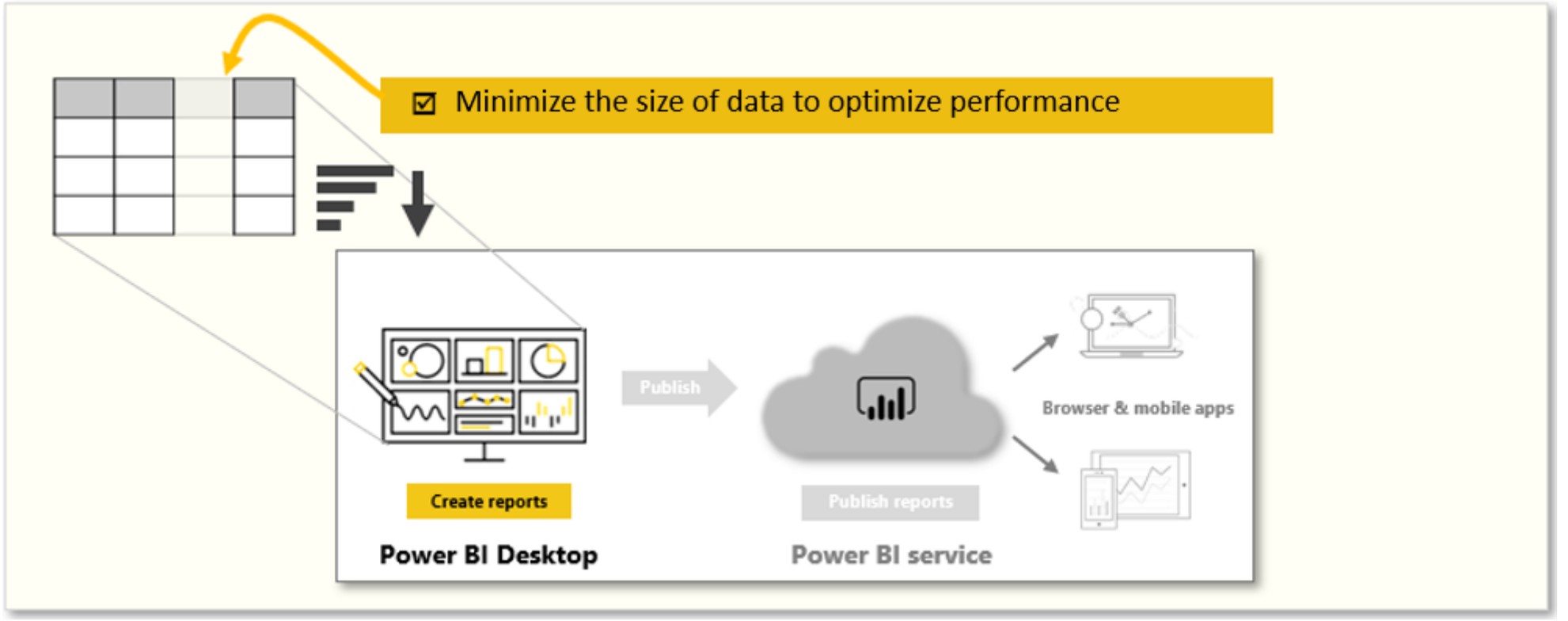
You will learn the following concepts:

- Data model performance optimization
- DirectQuery model optimization
- Aggregations

Lesson 1: Optimize the Data Model for Performance

Microsoft Power Platform

Introduction to Performance Optimization



When your data model is optimized, it performs better.

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Use Variables to Improve Performance and Troubleshooting

Without variable:

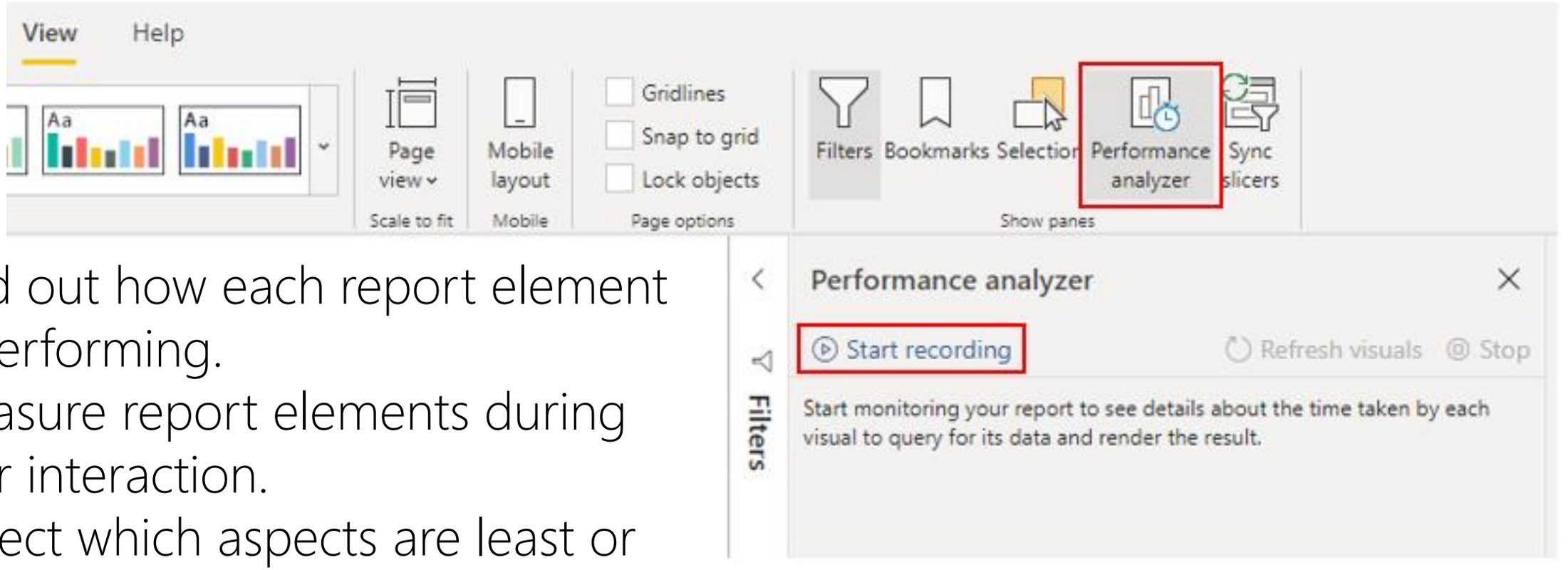
```
Sales YoY Growth =
DIVIDE (
        ( [Sales] - CALCULATE ( [Sales], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) ) ),
        CALCULATE ( [Sales], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) )
 )
```

With variable:

```
Sales YoY Growth =
VAR SalesPriorYear =
        CALCULATE ( [Sales], PARALLELPERIOD ( 'Date'[Date], -12, MONTH ) )
VAR SalesVariance =
        DIVIDE ( ( [Sales] - SalesPriorYear ), SalesPriorYear )
RETURN
        SalesVariance
```

Microsoft Power Platform

Performance Analyzer

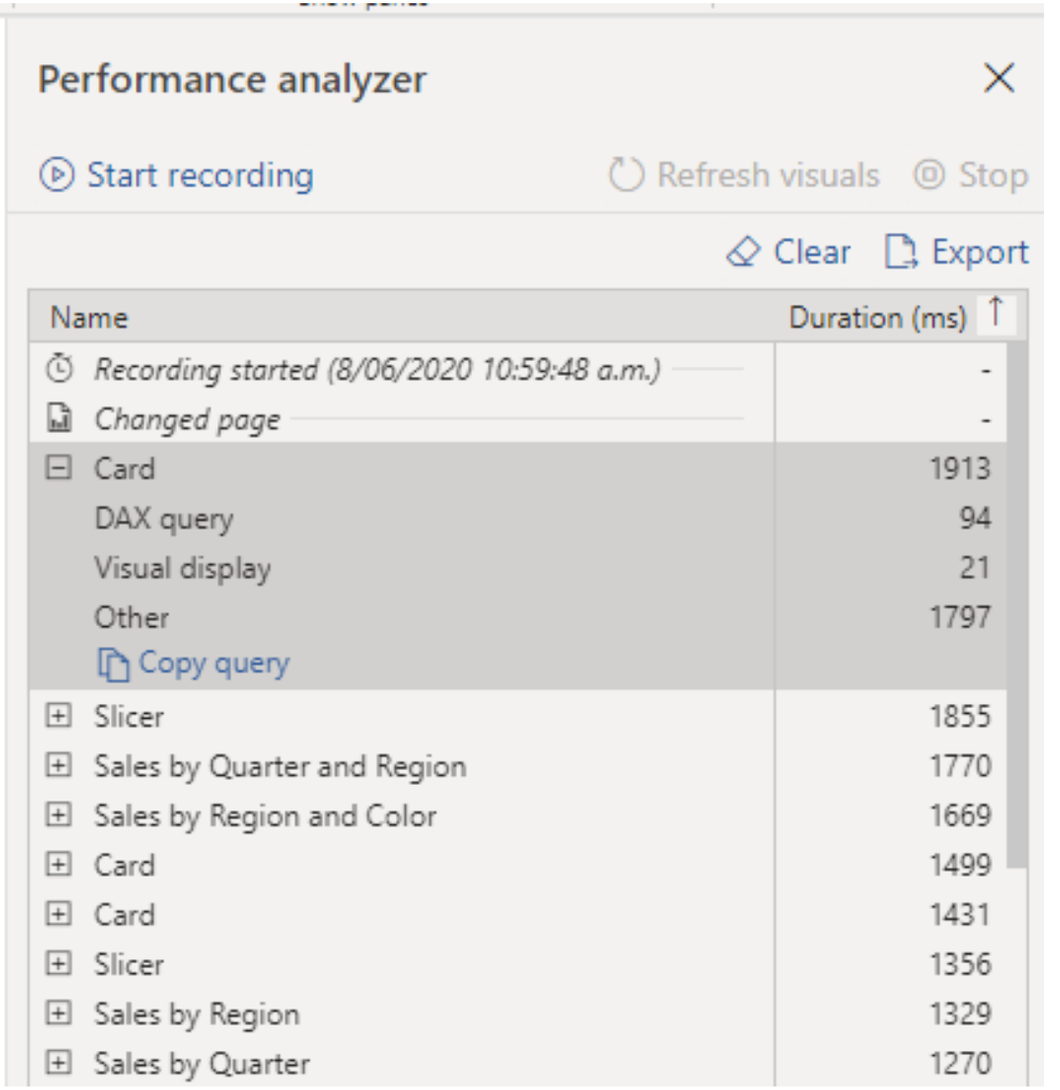


- Find out how each report element is performing.
- Measure report elements during user interaction.
- Detect which aspects are least or most resource intensive.

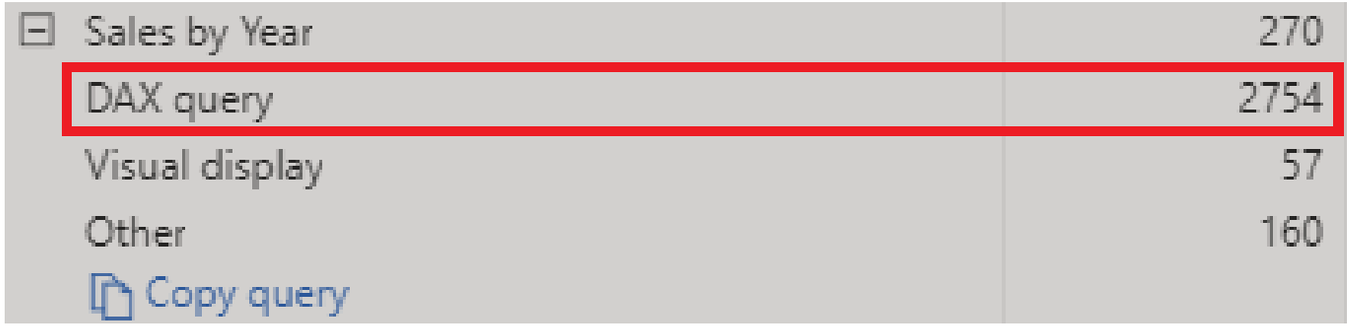
Microsoft Power Platform

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.

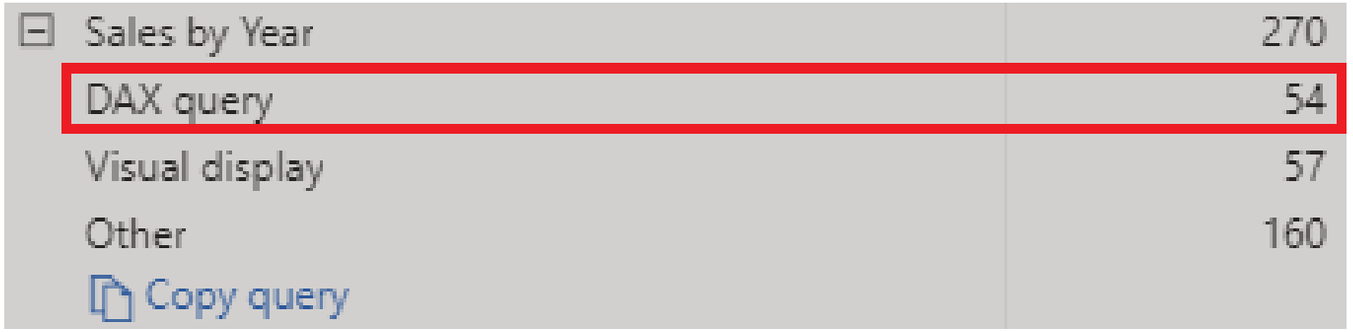


Analyze Query Plans

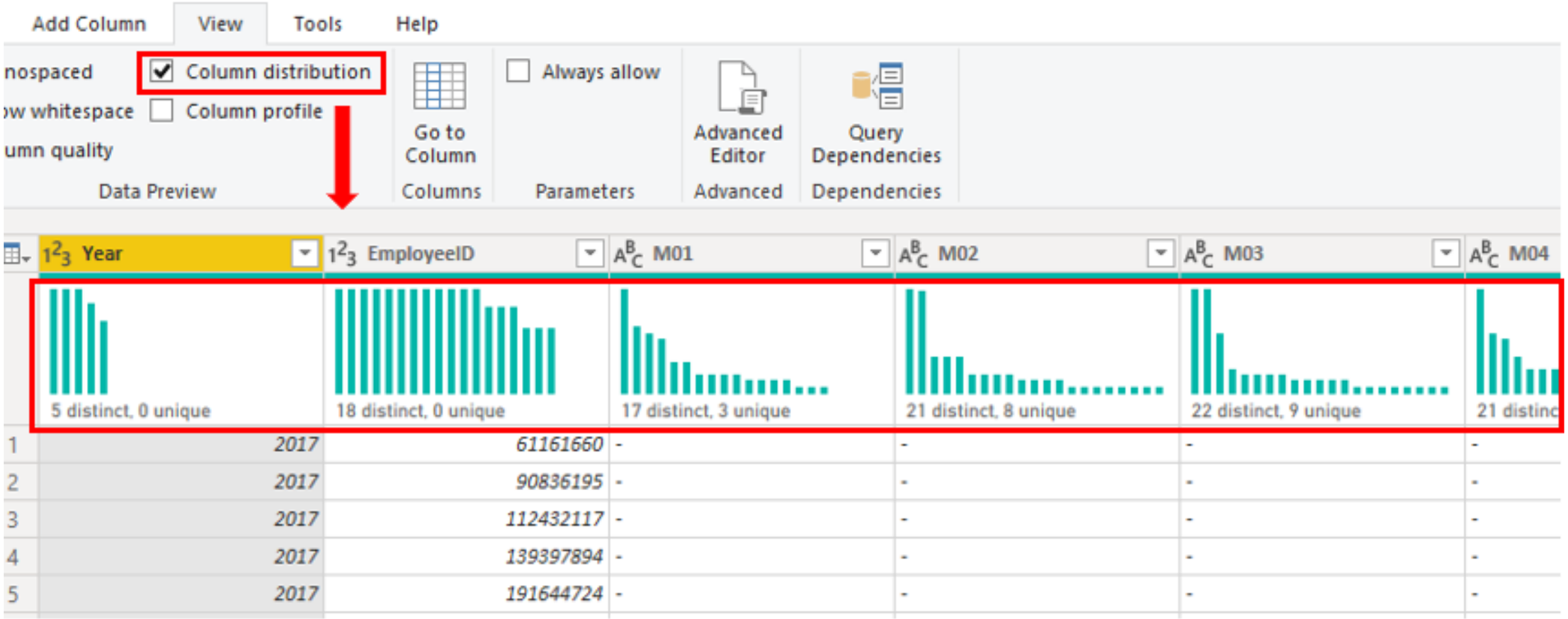



```
Count Customers =
CALCULATE ( DISTINCTCOUNT ( Order[ProductID] ),
FILTER ( Order, Order[OrderQty] >= 5 ) )
```

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

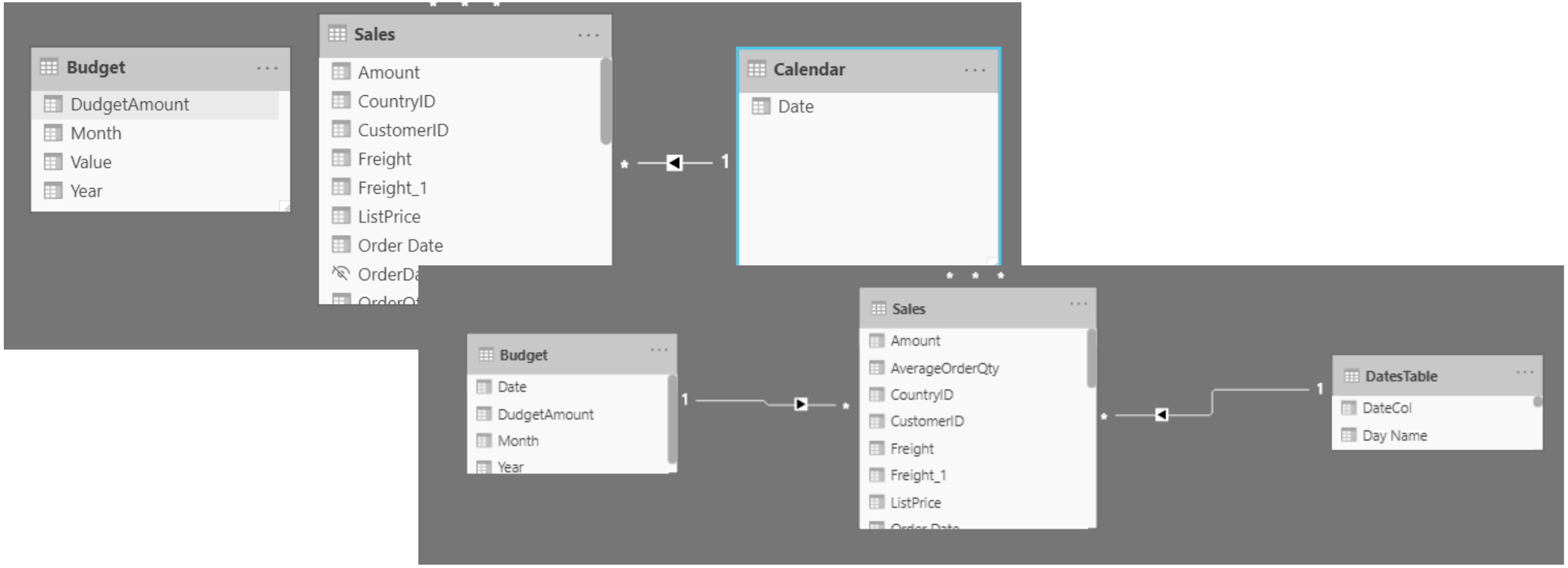


Reduce Cardinality



Implement Table Granularity

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



Lesson 2: Optimize DirectQuery Models

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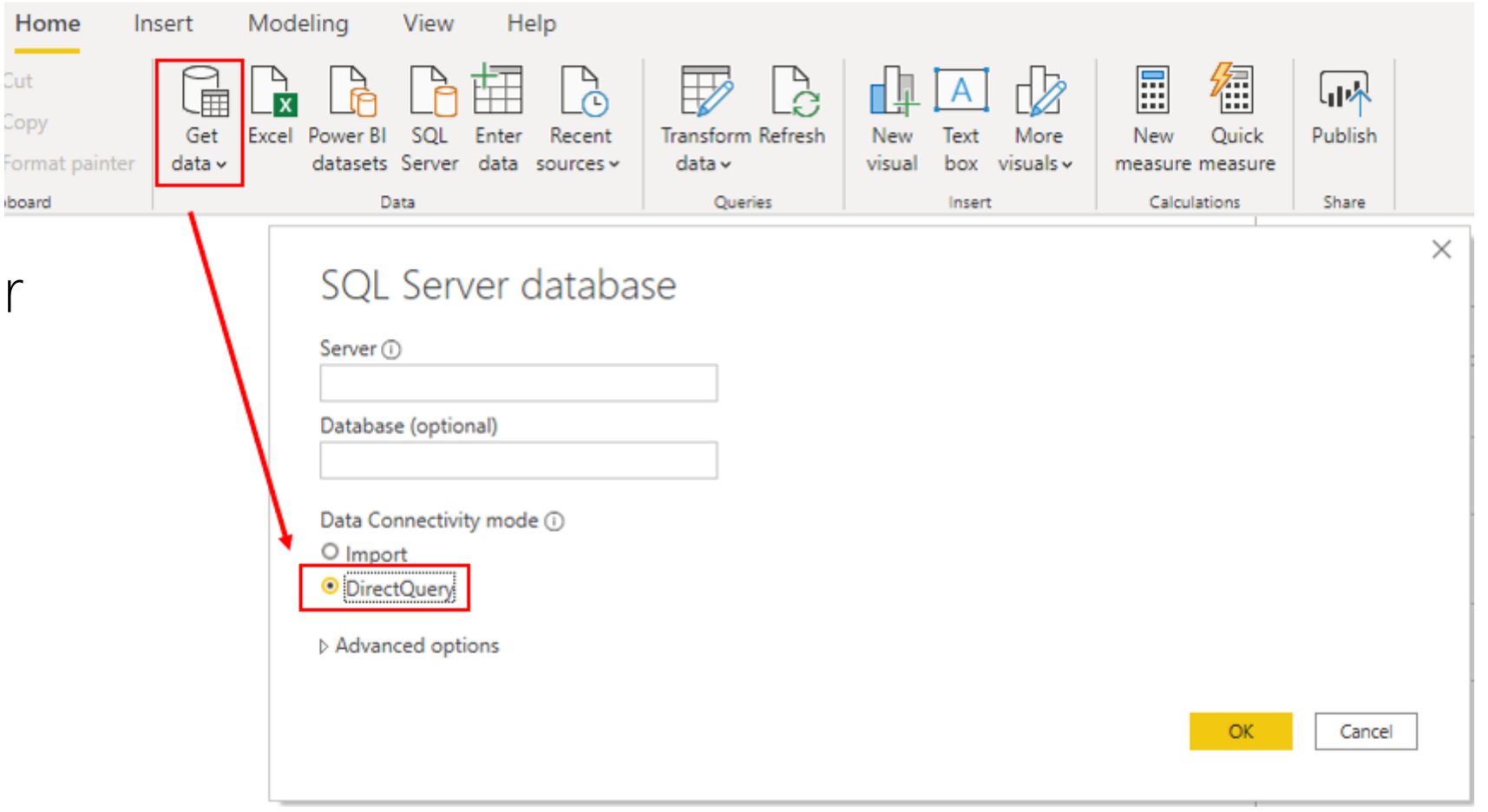
Introduction to DirectQuery

Connect directly to your data source repository.



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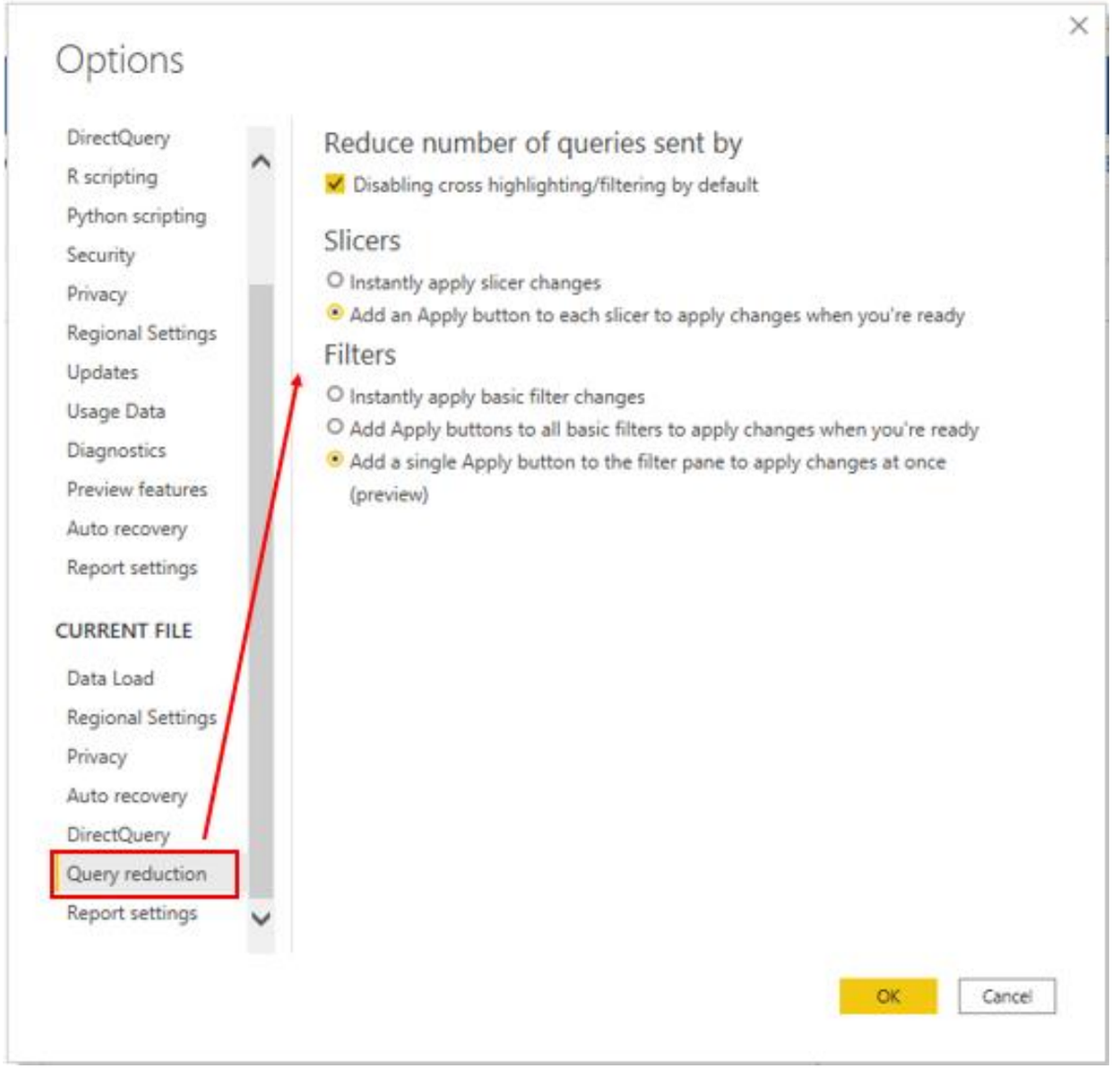
Implications of using DirectQuery

- 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

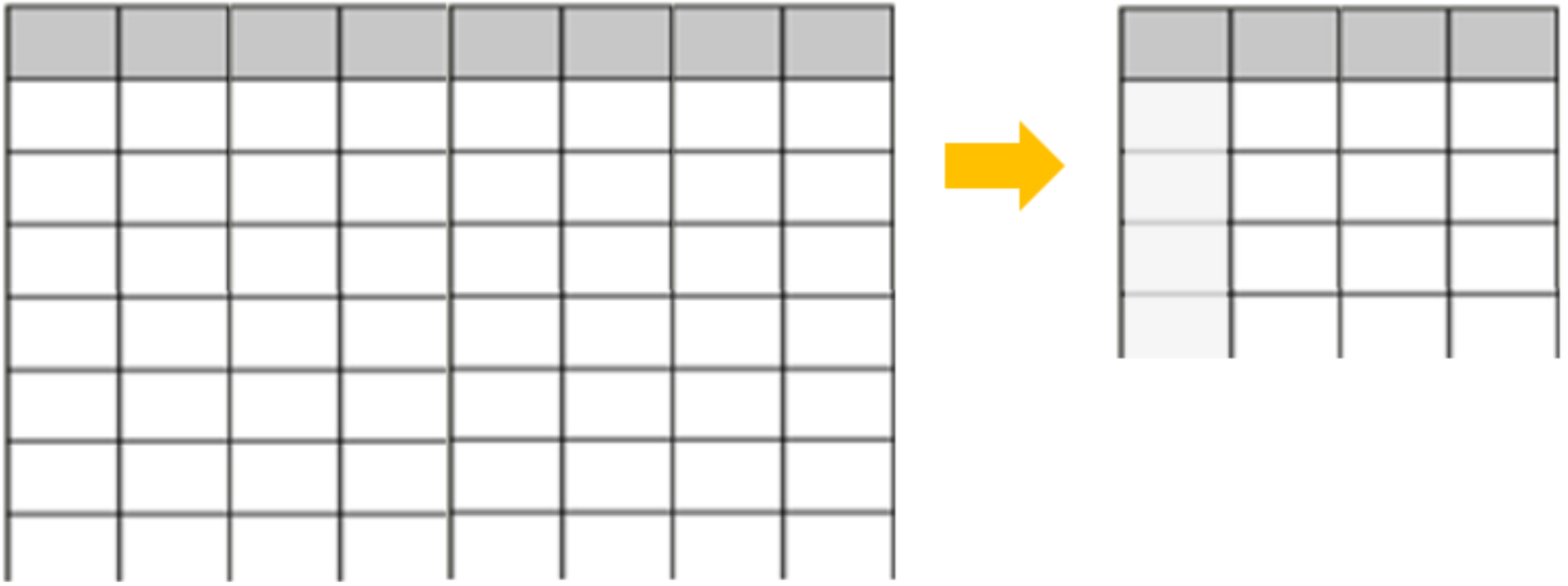


Lesson 3: Create and Manage Aggregations

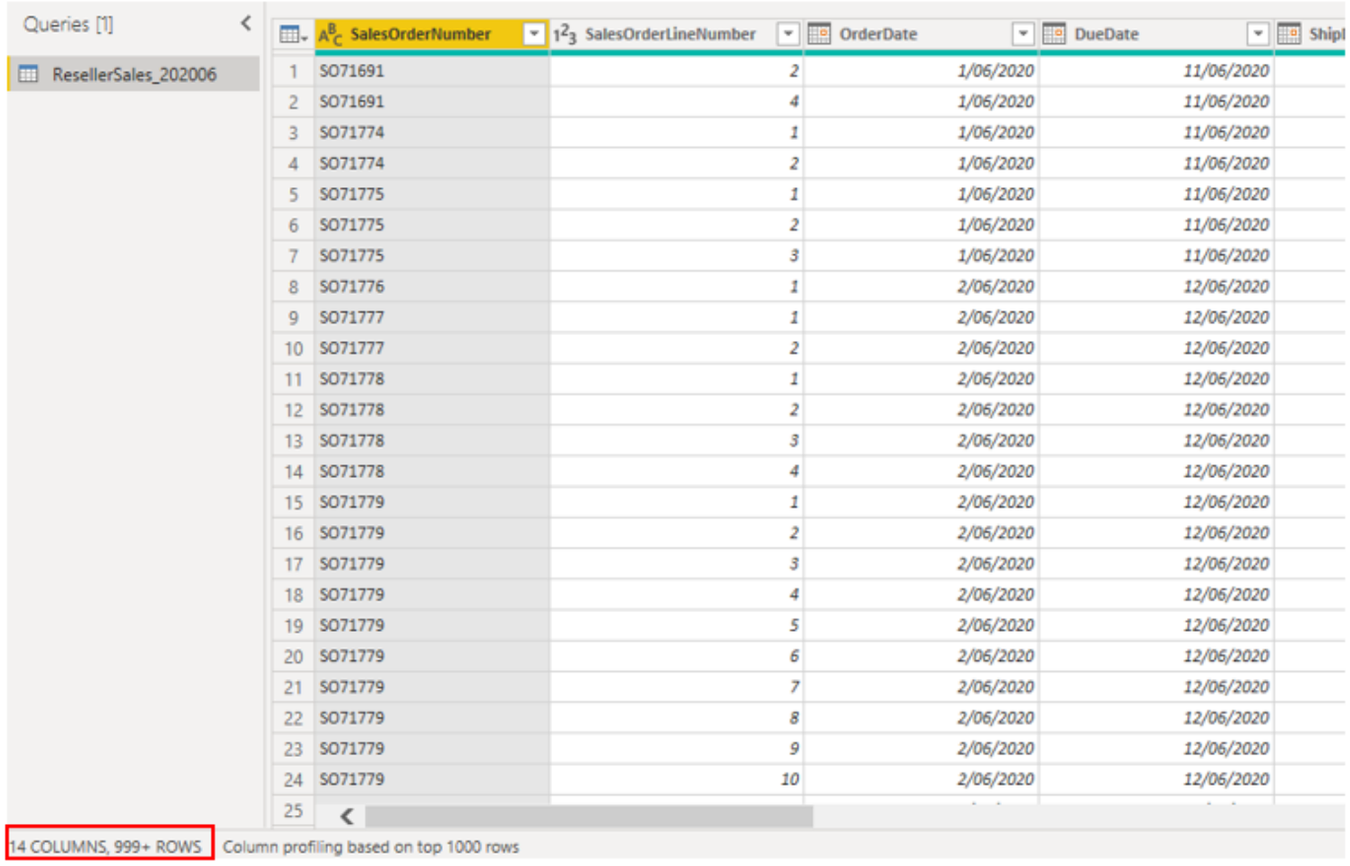
Microsoft Power Platform

Introduction to Aggregations

Reduce table size and improve query performance.



Creating Aggregations



	SalesOrderNumber	SalesOrderLineNumber	OrderDate	DueDate
1	SO71691	2	1/06/2020	11/06/2020
2	SO71691	4	1/06/2020	11/06/2020
3	SO71774	1	1/06/2020	11/06/2020
4	SO71774	2	1/06/2020	11/06/2020
5	SO71775	1	1/06/2020	11/06/2020
6	SO71775	2	1/06/2020	11/06/2020
7	SO71775	3	1/06/2020	11/06/2020
8	SO71776	1	2/06/2020	12/06/2020
9	SO71777	1	2/06/2020	12/06/2020
10	SO71777	2	2/06/2020	12/06/2020
11	SO71778	1	2/06/2020	12/06/2020
12	SO71778	2	2/06/2020	12/06/2020
13	SO71778	3	2/06/2020	12/06/2020
14	SO71778	4	2/06/2020	12/06/2020
15	SO71779	1	2/06/2020	12/06/2020
16	SO71779	2	2/06/2020	12/06/2020
17	SO71779	3	2/06/2020	12/06/2020
18	SO71779	4	2/06/2020	12/06/2020
19	SO71779	5	2/06/2020	12/06/2020
20	SO71779	6	2/06/2020	12/06/2020
21	SO71779	7	2/06/2020	12/06/2020
22	SO71779	8	2/06/2020	12/06/2020
23	SO71779	9	2/06/2020	12/06/2020
24	SO71779	10	2/06/2020	12/06/2020
25				

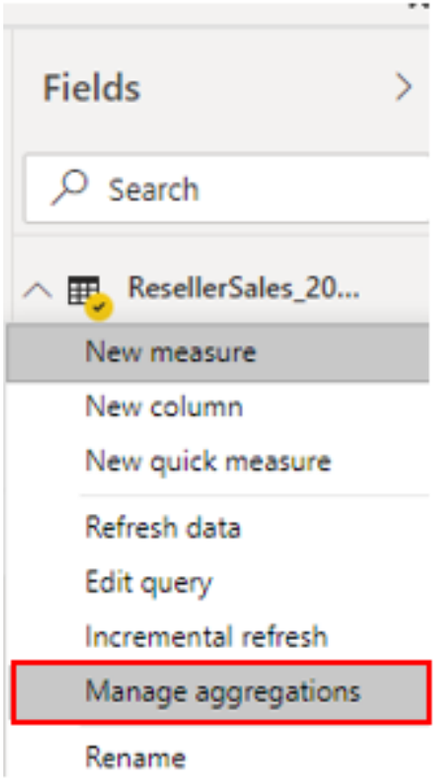
- Determine aggregation level.
- Decide appropriate creation method.

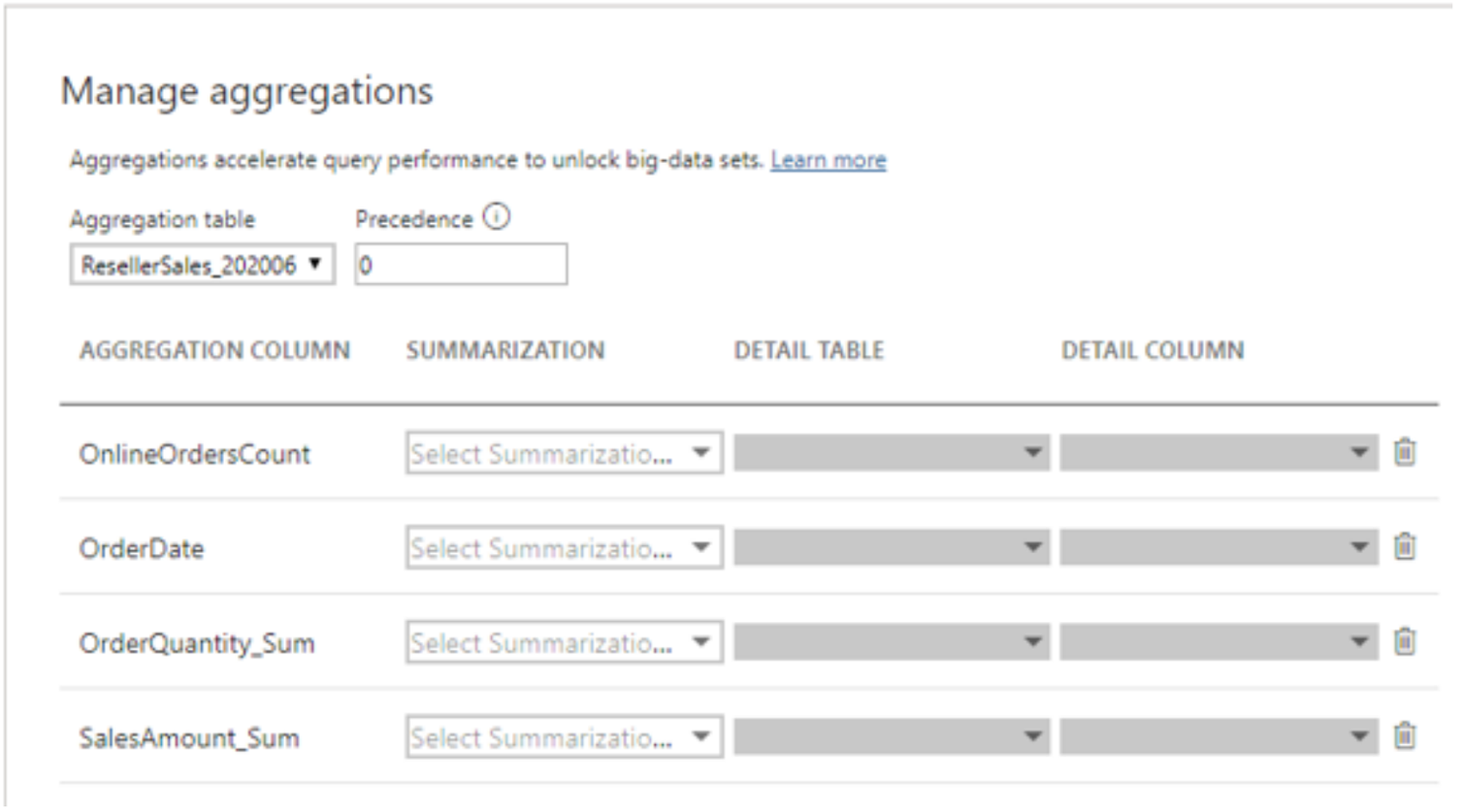
22	22/06/2020	55	73935.41	129
23	23/06/2020	116	191212.91	371
24	24/06/2020	20	11193.33	26
25	25/06/2020	62	65857.75	183

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

Microsoft Power Platform

Managing Aggregations



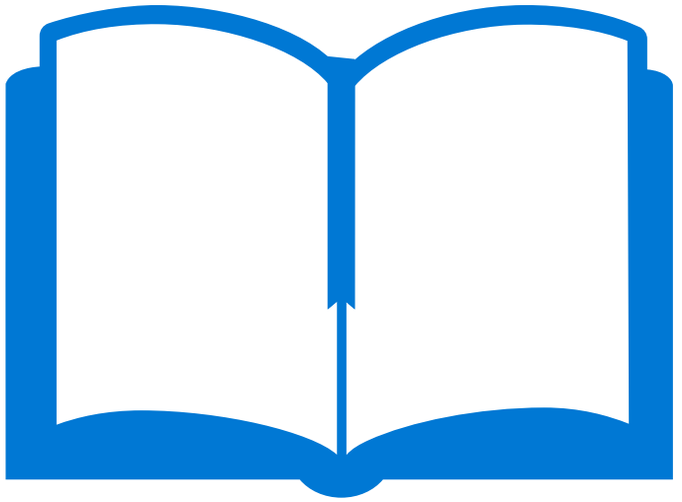


Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

- Design a Report
- Enhance a Report

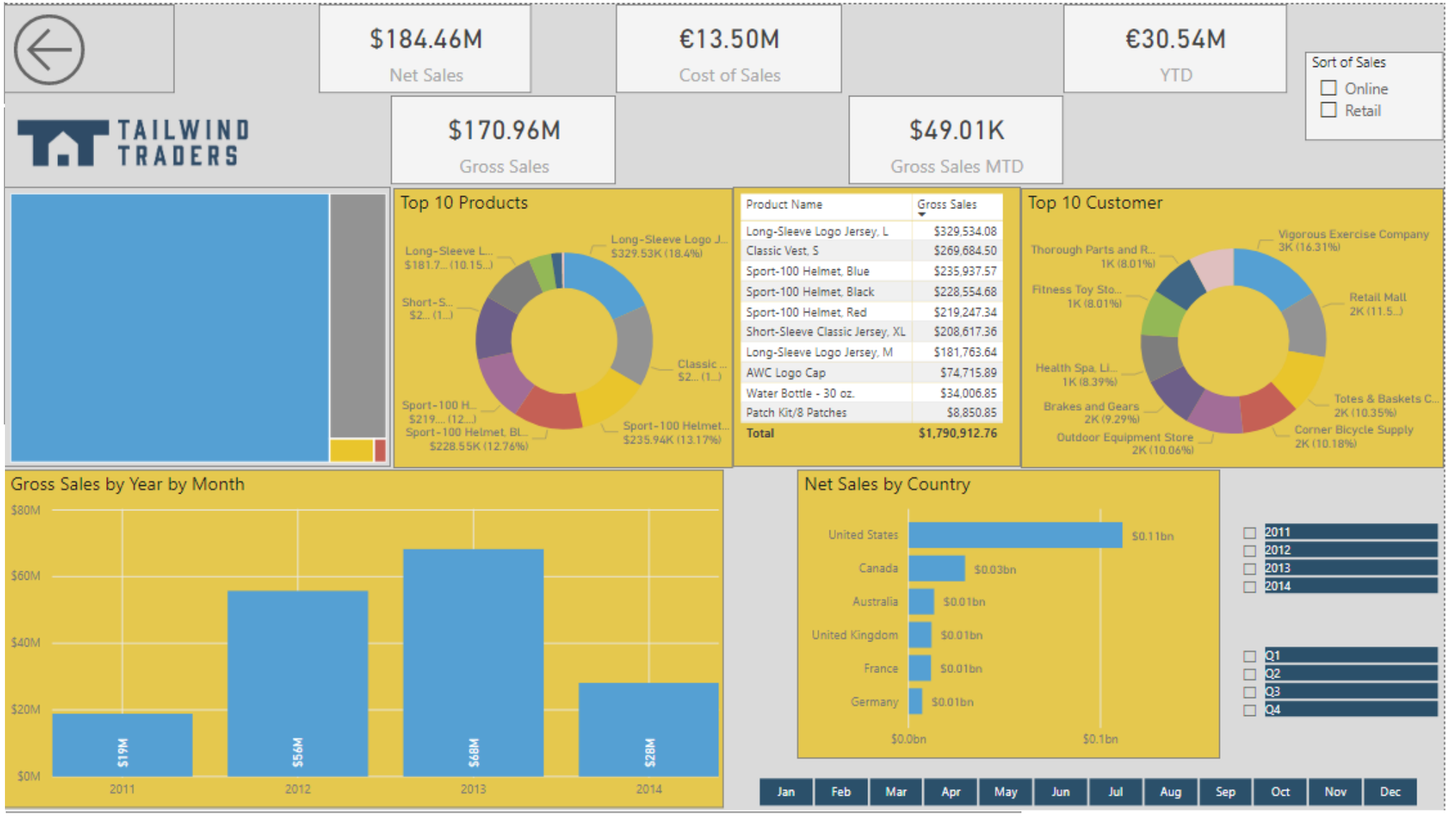
Lesson 1:
Design a Report

Microsoft Power Platform

Introduction

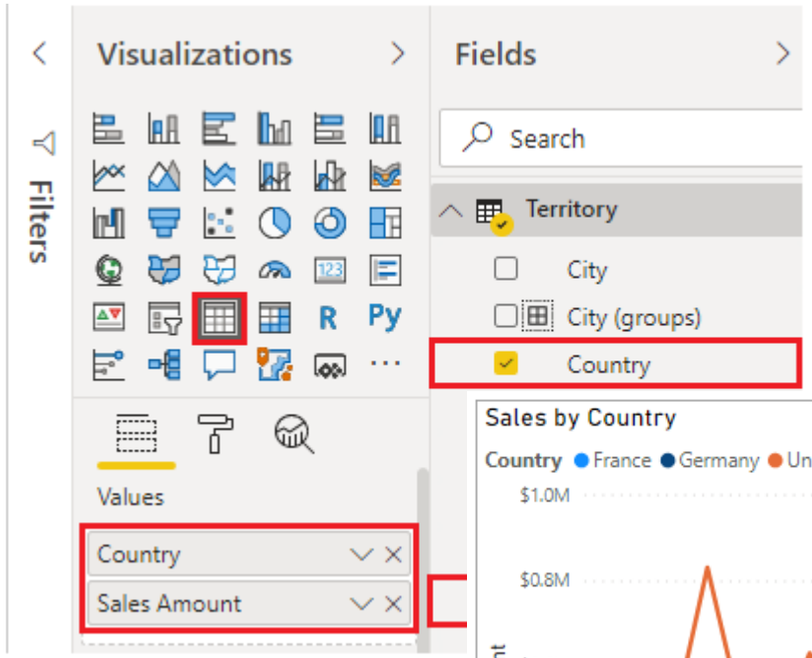
- Visuals allow you to share data insights more affectively.
- Effective visualizations help your users connect and interact with the information.

Design a Report Layout

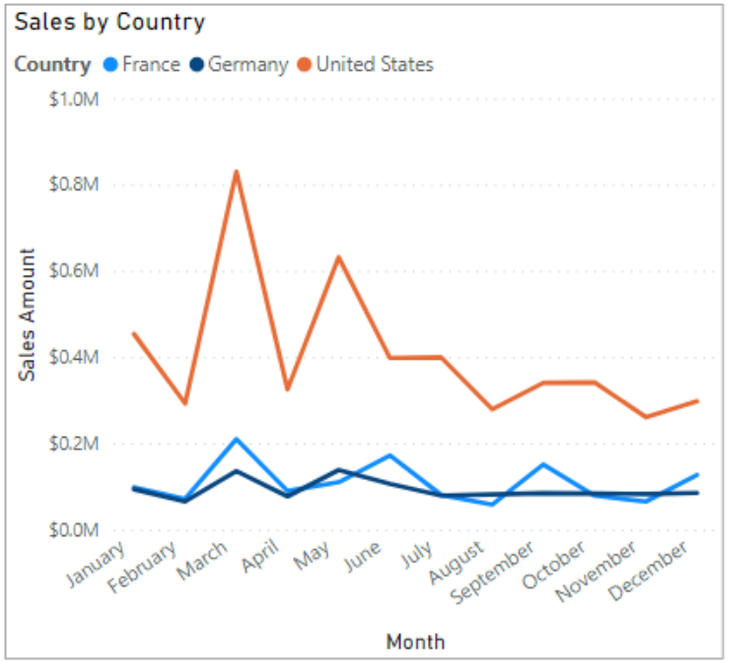


Choosing Effective Visualizations

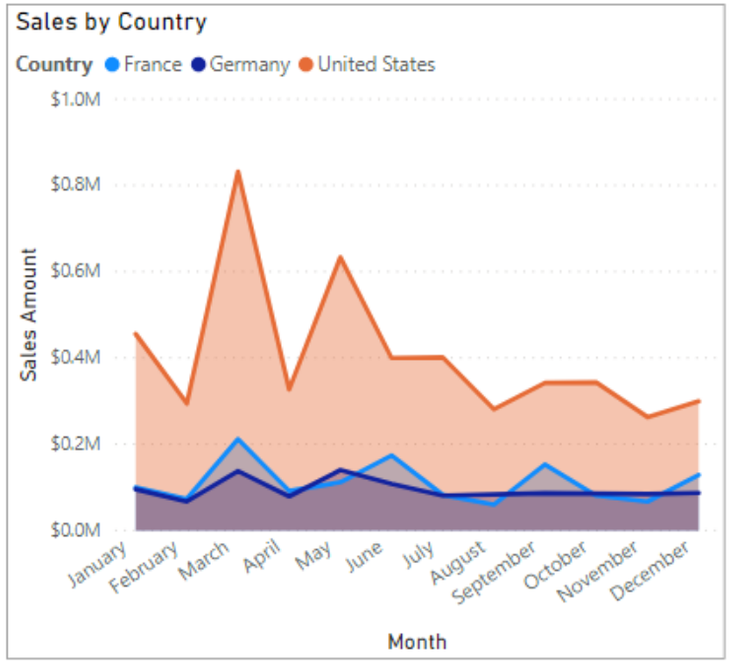
Country	Sales Amount
United States	$7,390,464
France	$773,445
Germany	$493,628
Total	**$8,550,077**



The right visual makes all the difference.



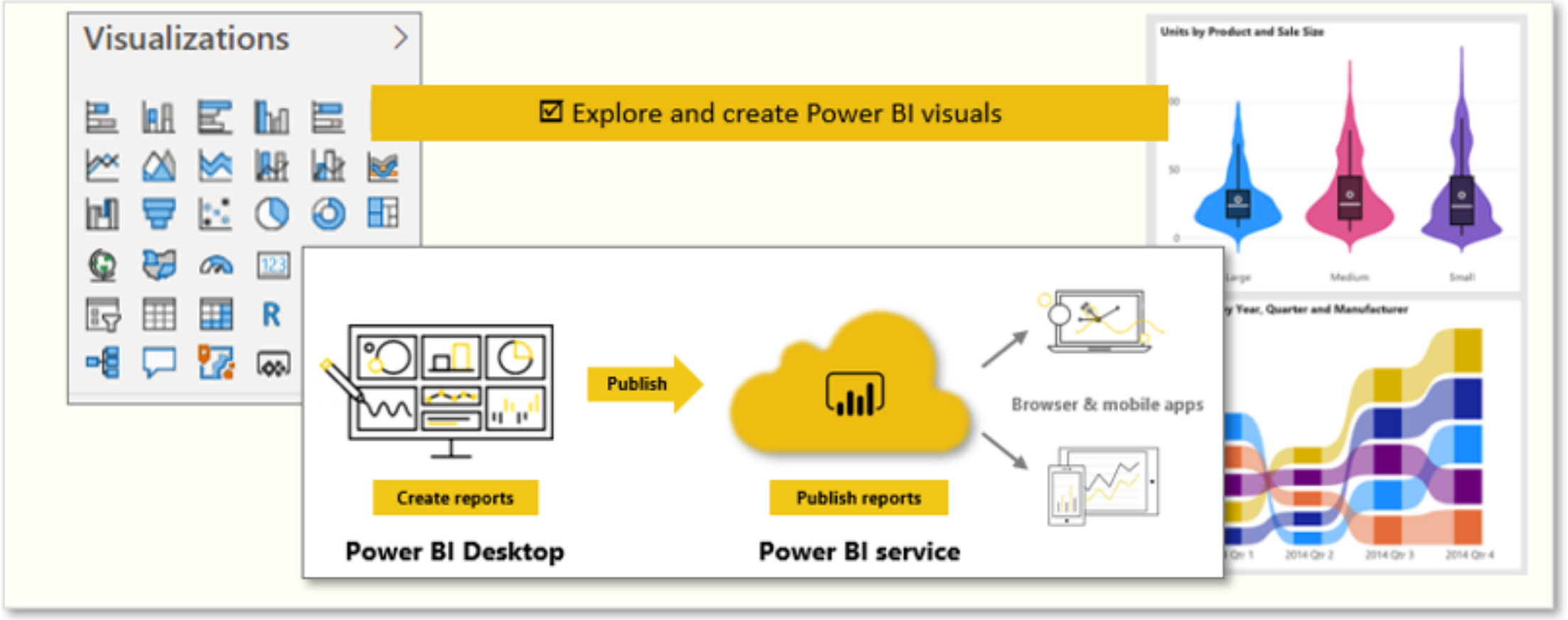
Line Chart



Area Chart

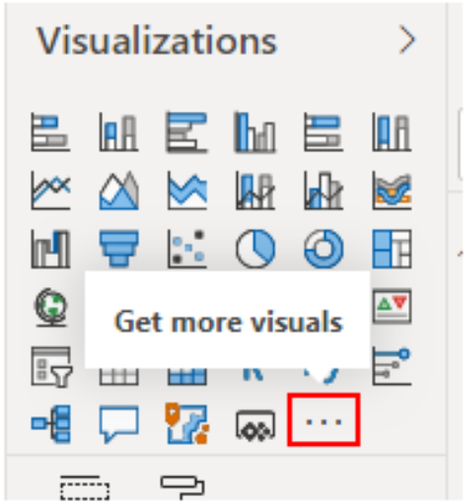
Microsoft Power Platform

Adding Visualizations to Reports

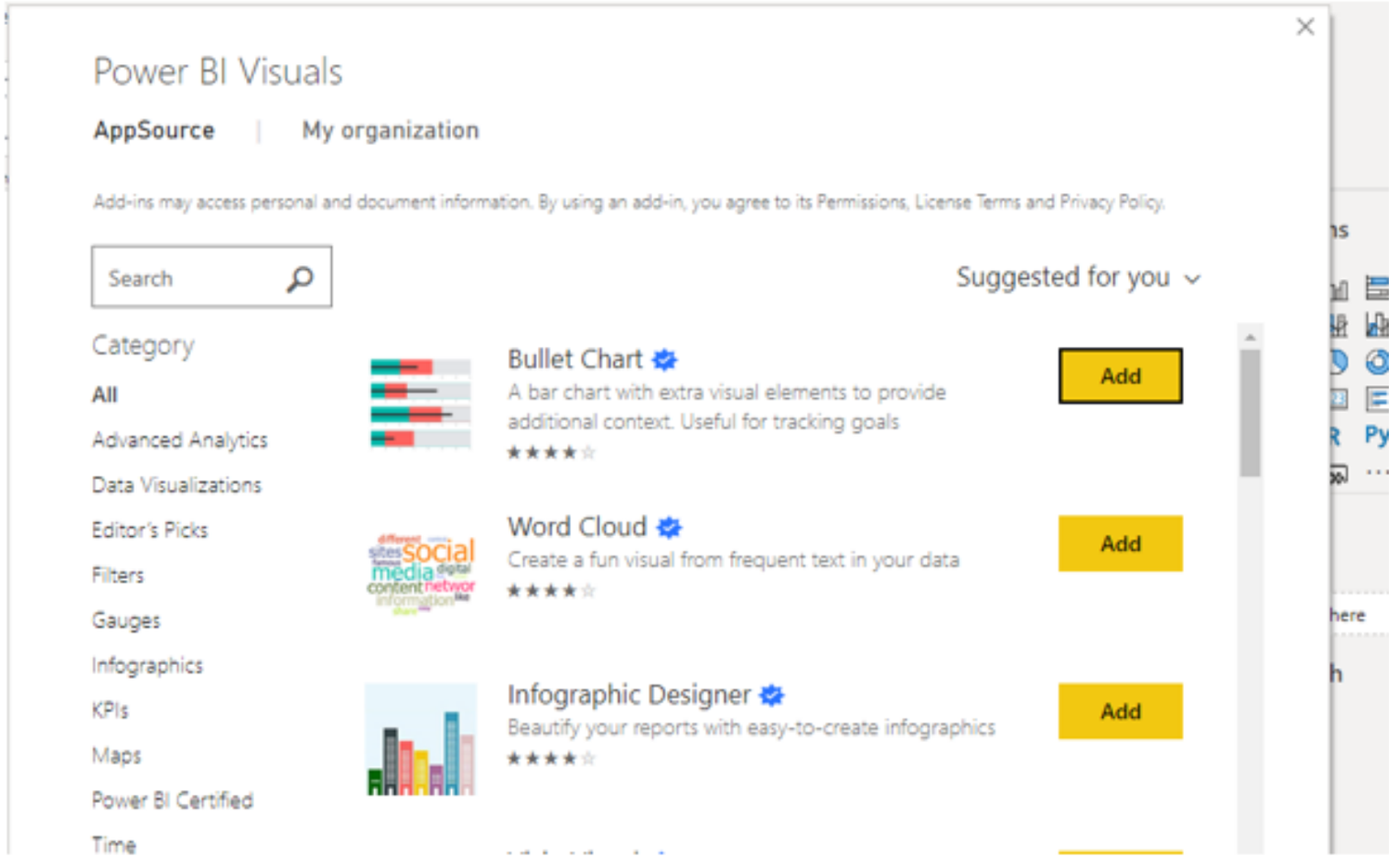


Microsoft Power Platform

Import a Custom Visual



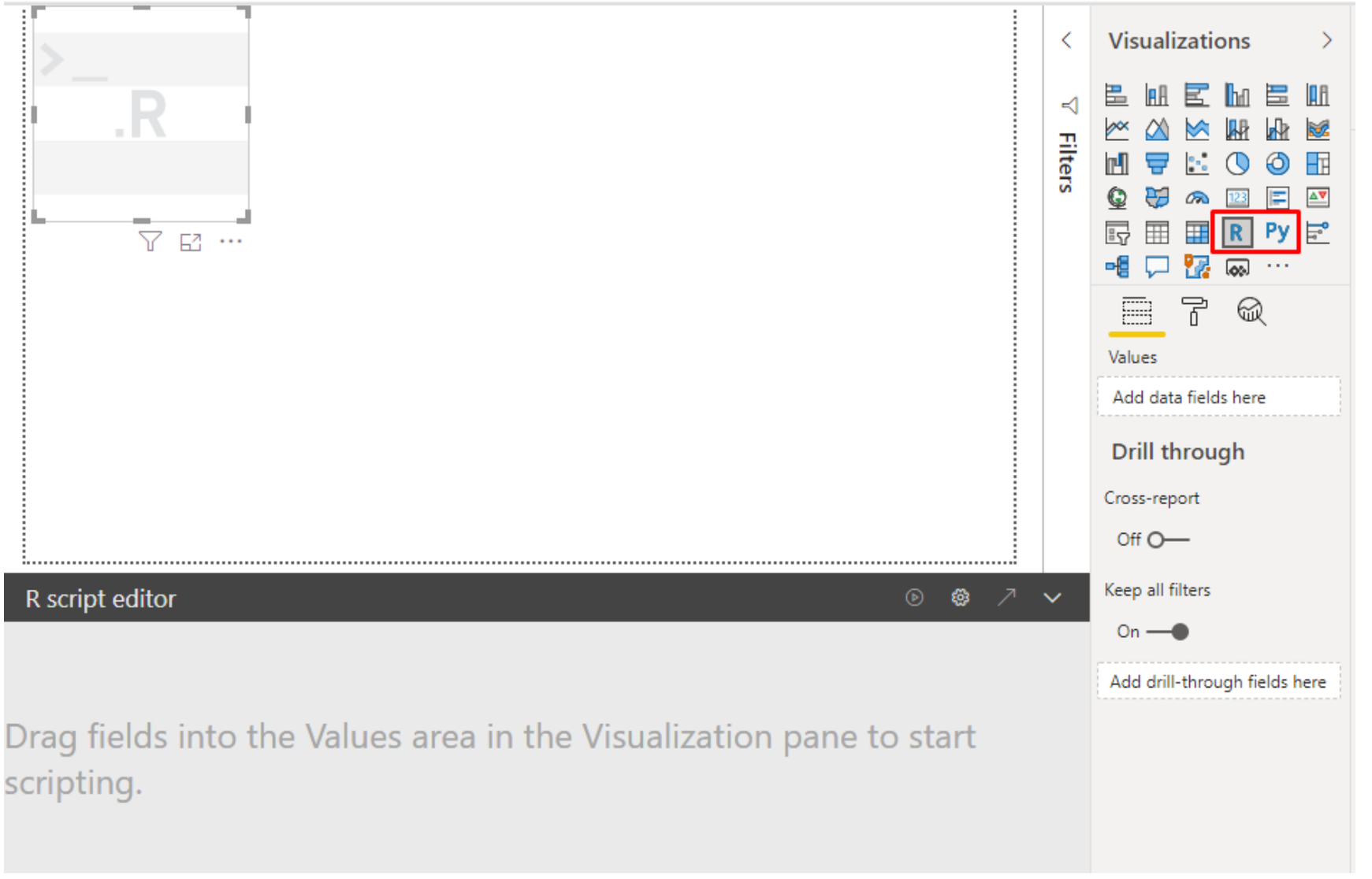
Use visuals tailored for your needs.



Microsoft Power Platform

Add an R or Python Visual

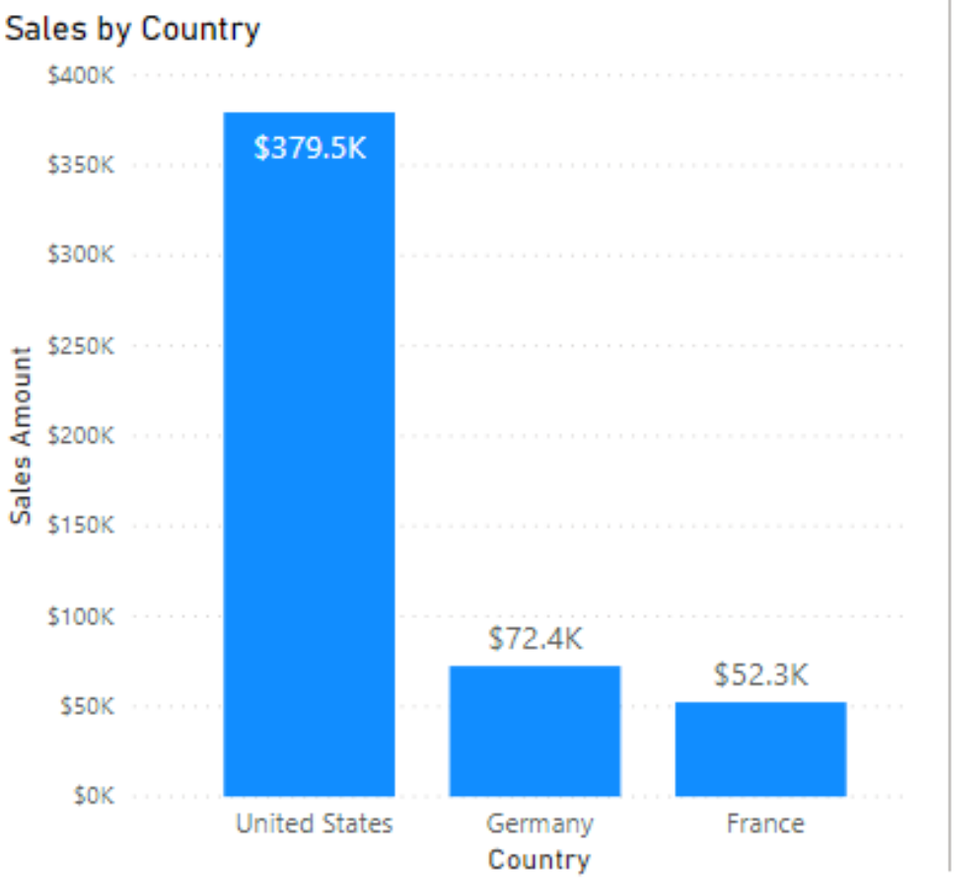
- Create advanced analytics and visualizations using R scripts.
- Use Python to visualize your data.

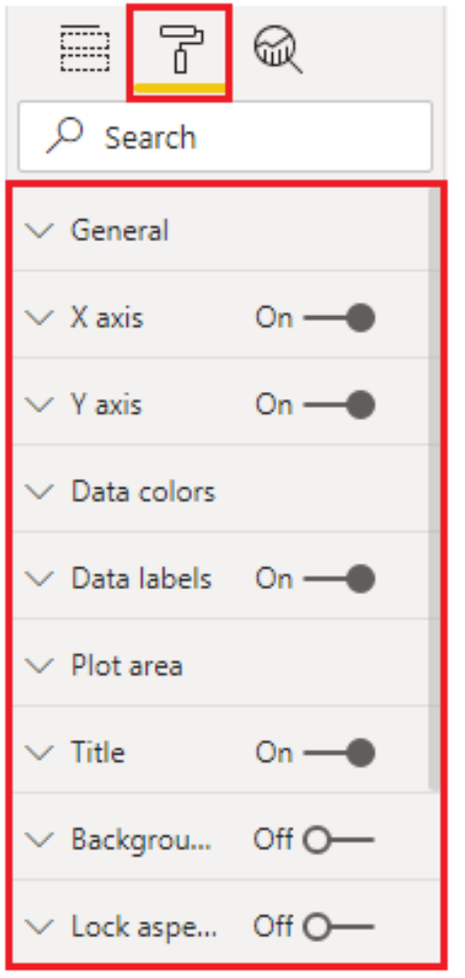


Microsoft Power Platform

Format and Configure Visualizations

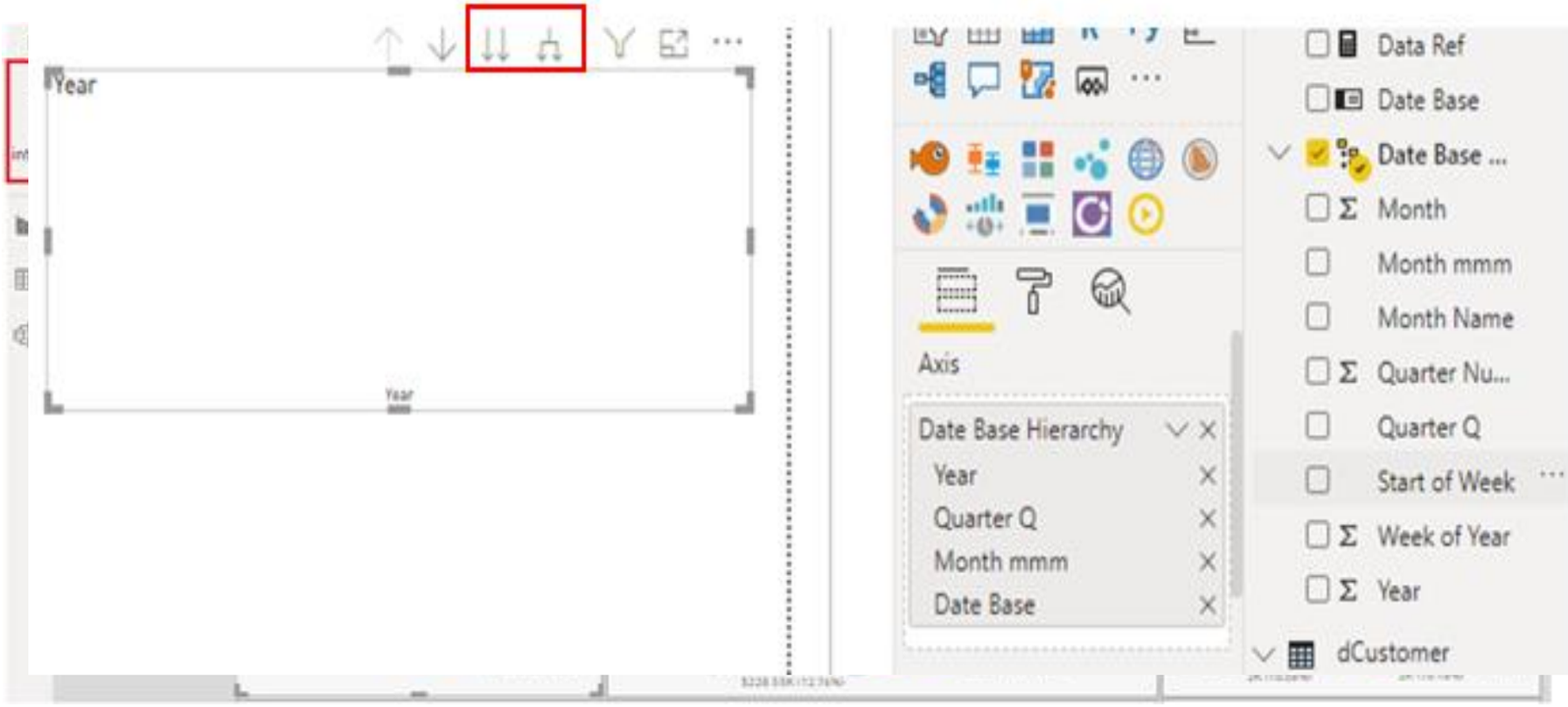
- Control the look and feel of each visual.
- Format options differ depending on the type of visual selected.



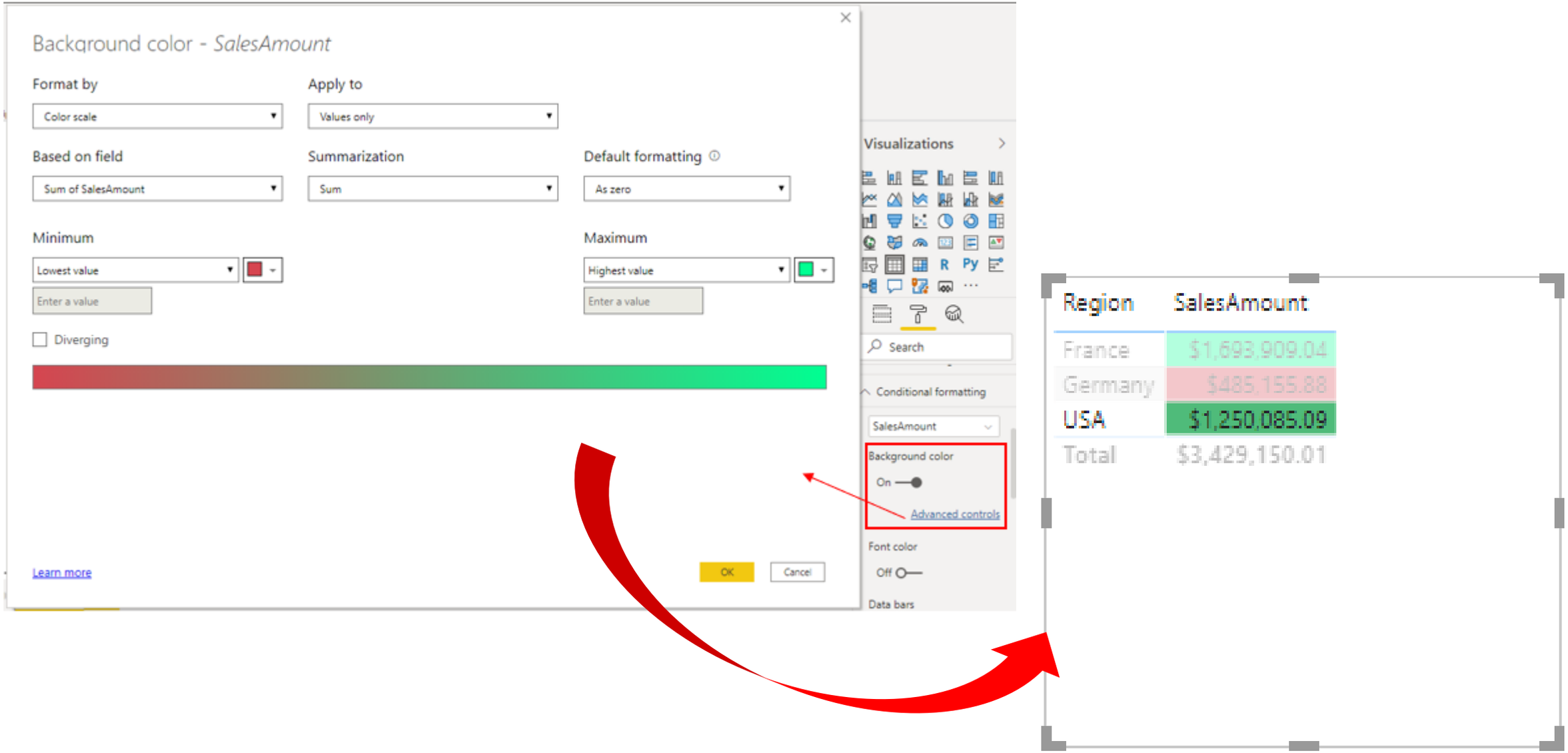


Basic Interactions

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

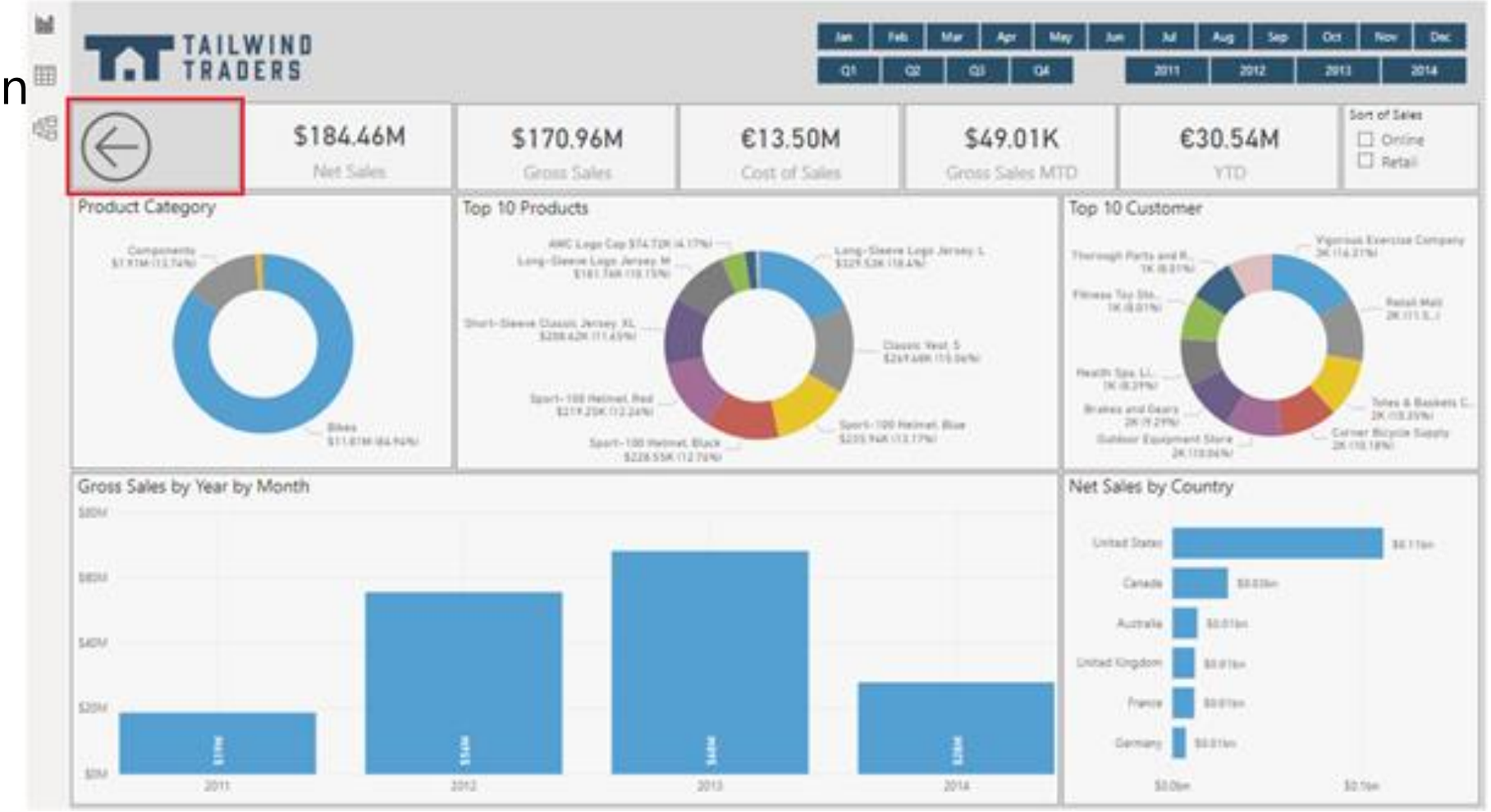


Configure Conditional Formatting



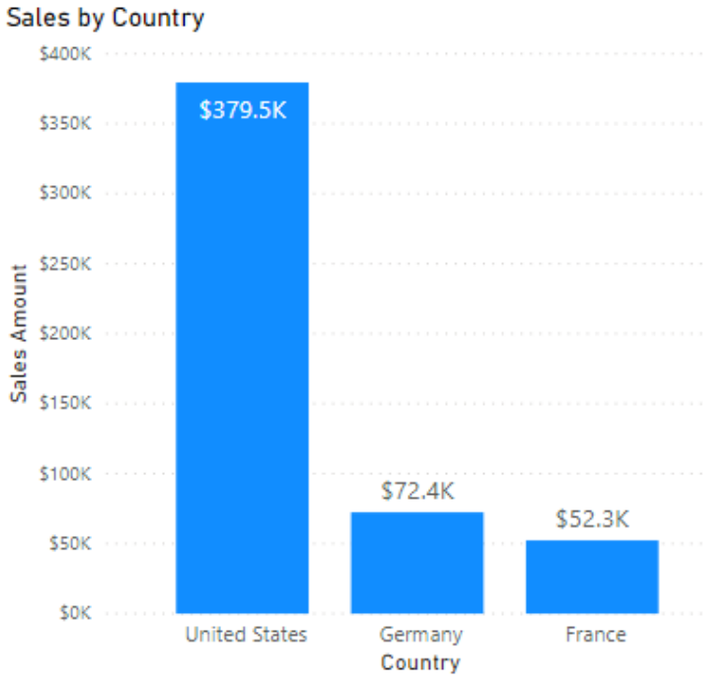
Design Report Navigation

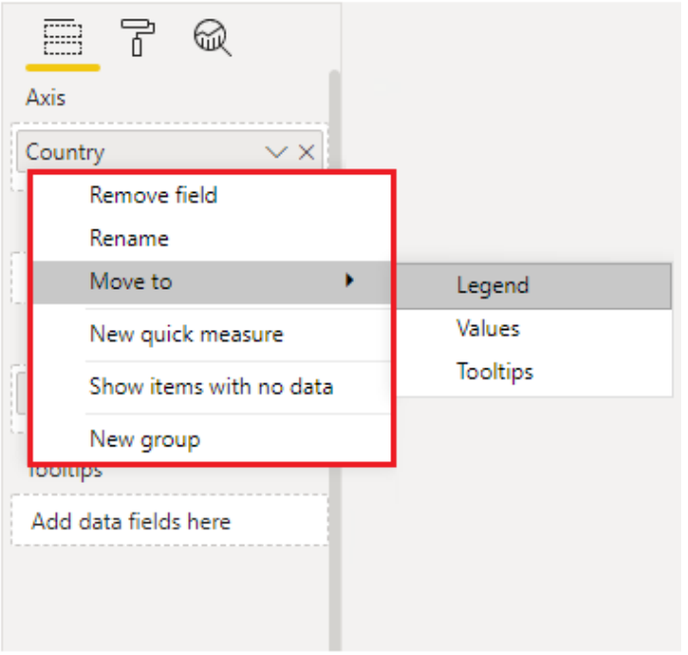
- Move users between pages.
- Use buttons, bookmarks, or conditional formatting.

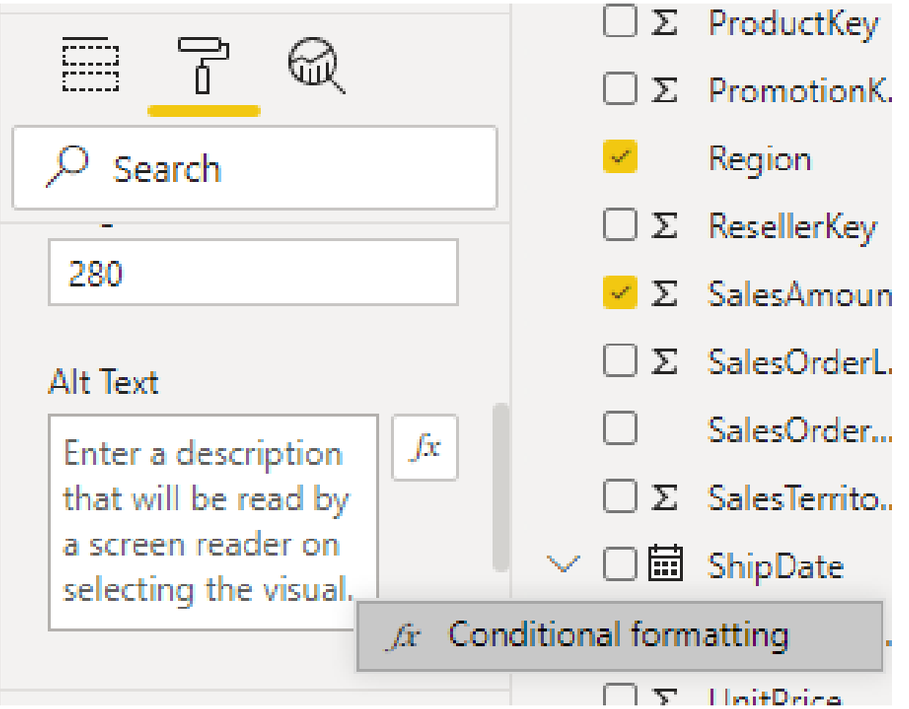


Microsoft Power Platform

Design for Accessibility







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

Lab: Designing a Report in Power BI

Lesson 2:
Enhance the Report

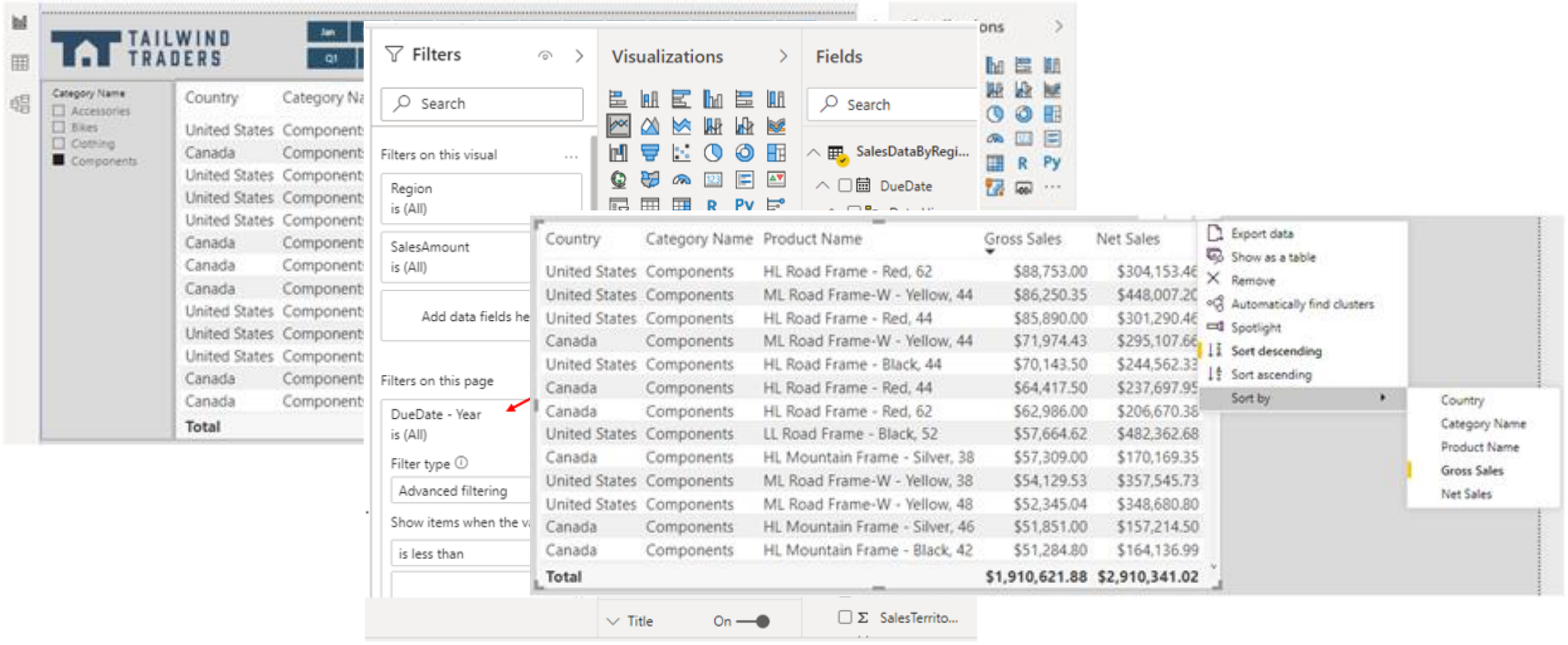
Microsoft Power Platform

Introduction to Report Enhancement

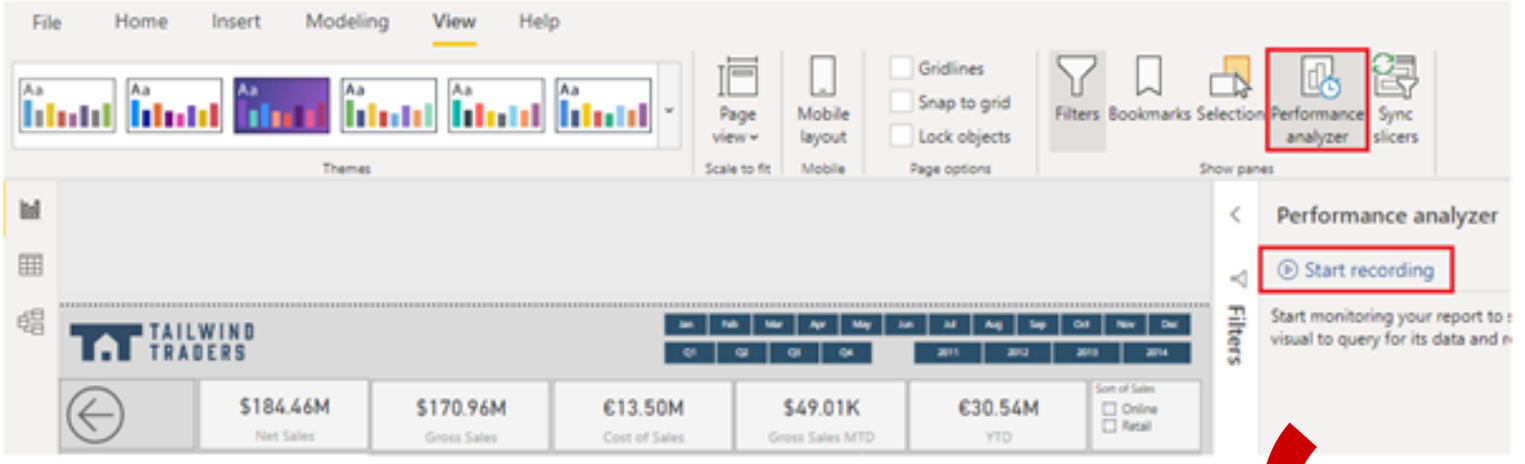
- Organizations rely on report information when making decisions.
- Reports drive organizational behavior and action.

Microsoft Power Platform

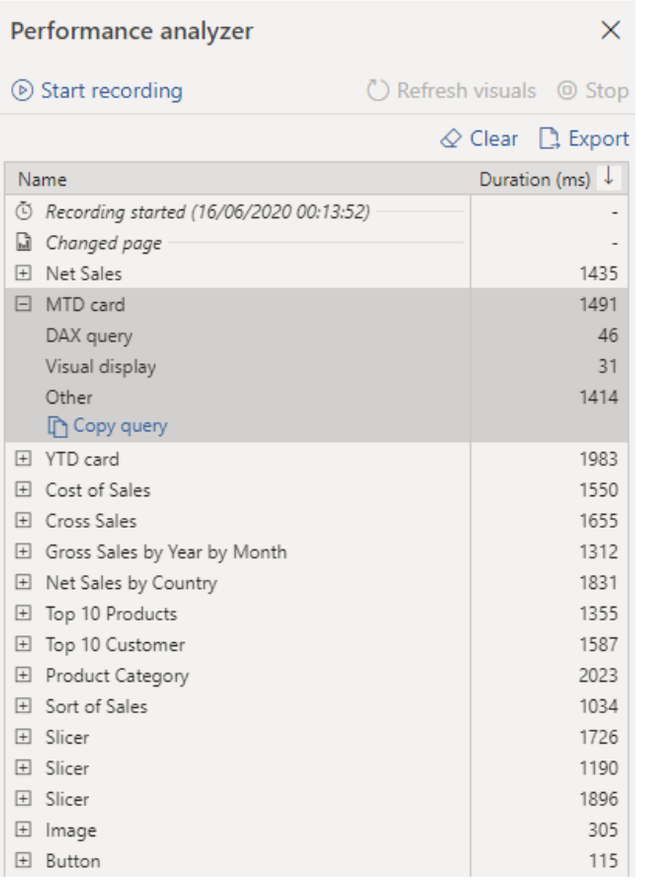
Apply Slicing, Filtering, and Sorting



Performance Tuning Reports

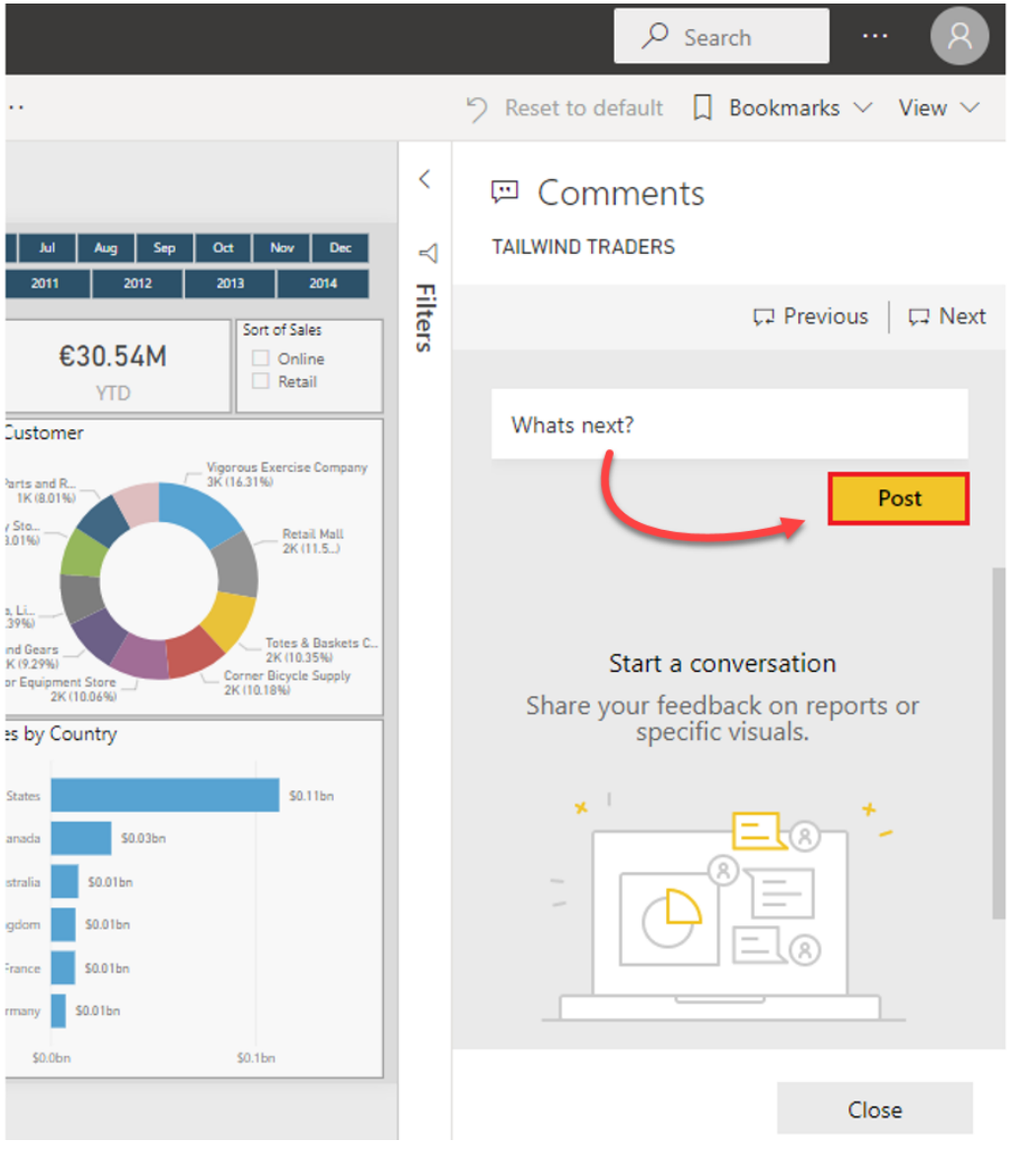


The performance of a report depends on how quickly data can load into the report page.



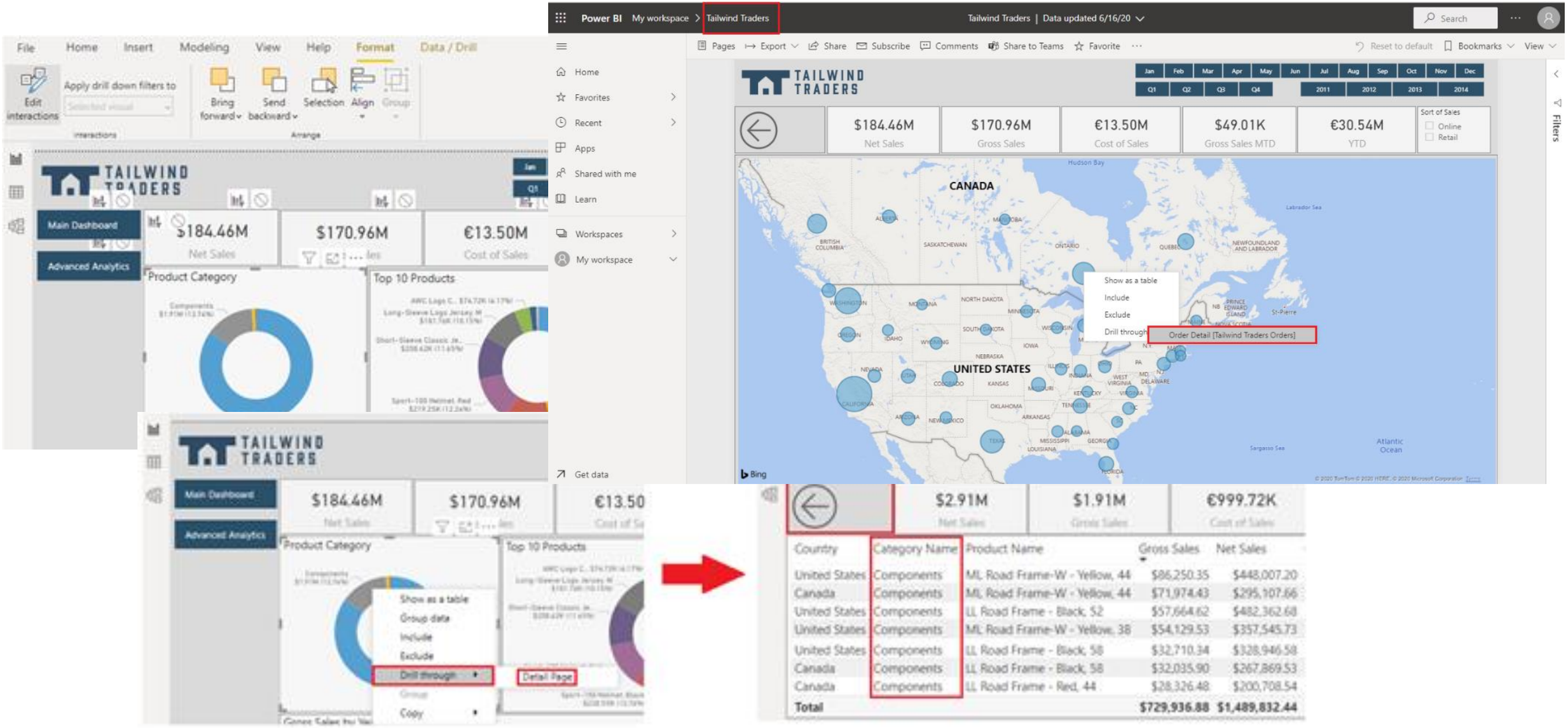
Commenting on Reports

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



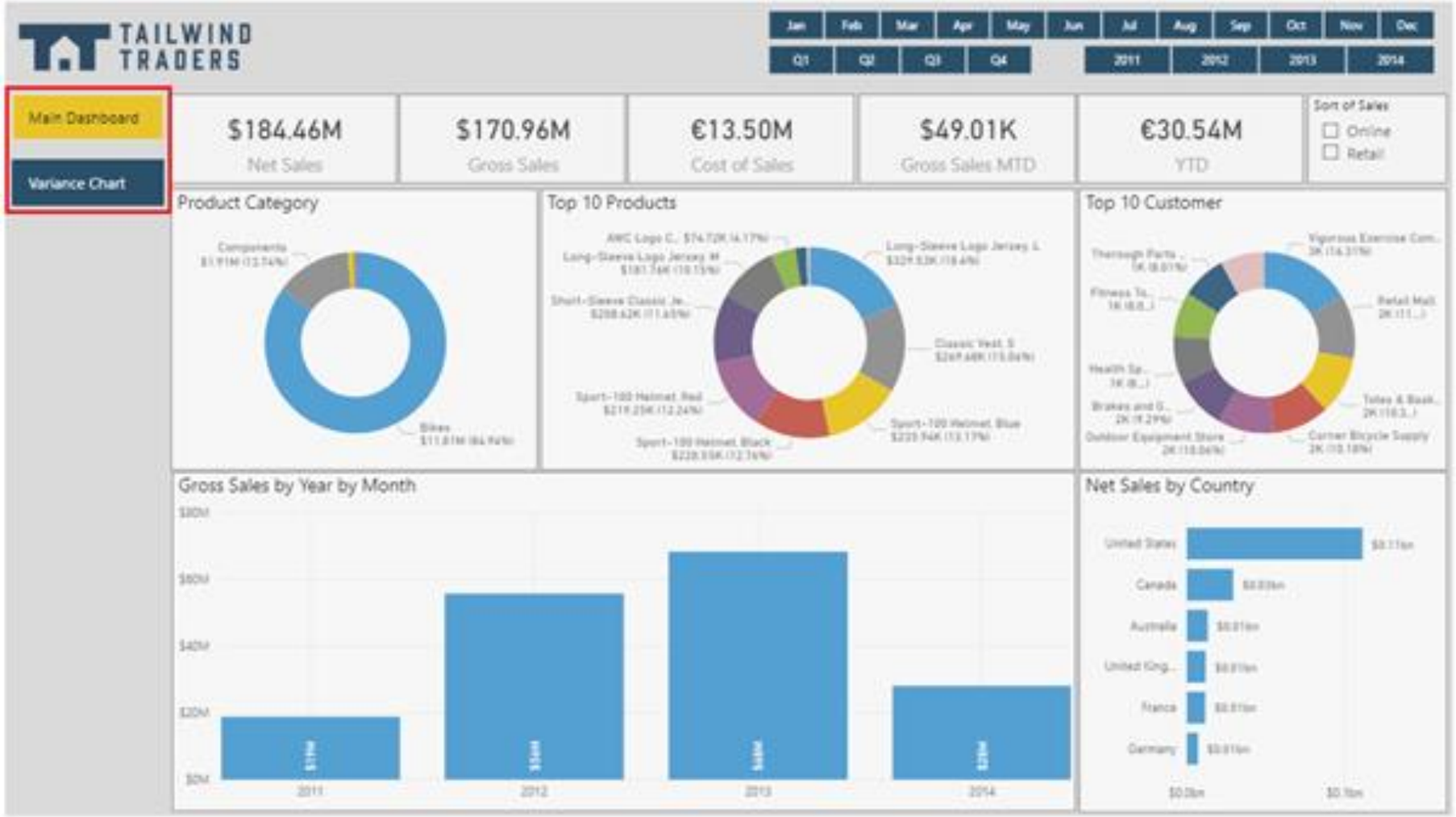
Microsoft Power Platform

Advanced Interactions and Drill-Throughs



Microsoft Power Platform

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.).

Publish and Export Reports

Lab: Enhancing Power BI Reports with Interactions and Formatting

Microsoft Power Platform

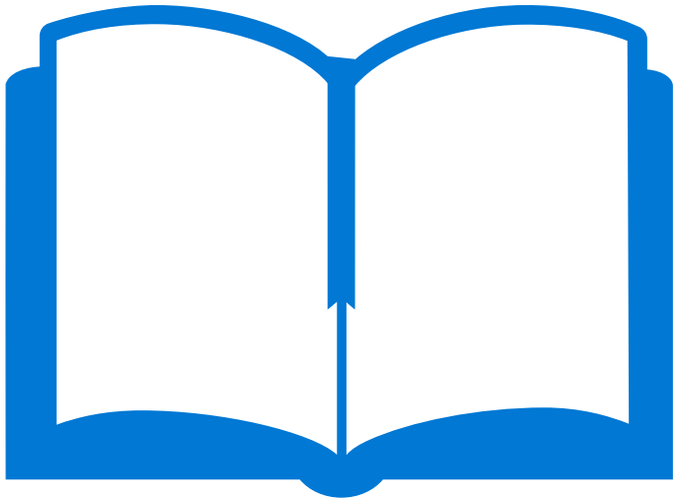
References

- 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

Microsoft Power Platform

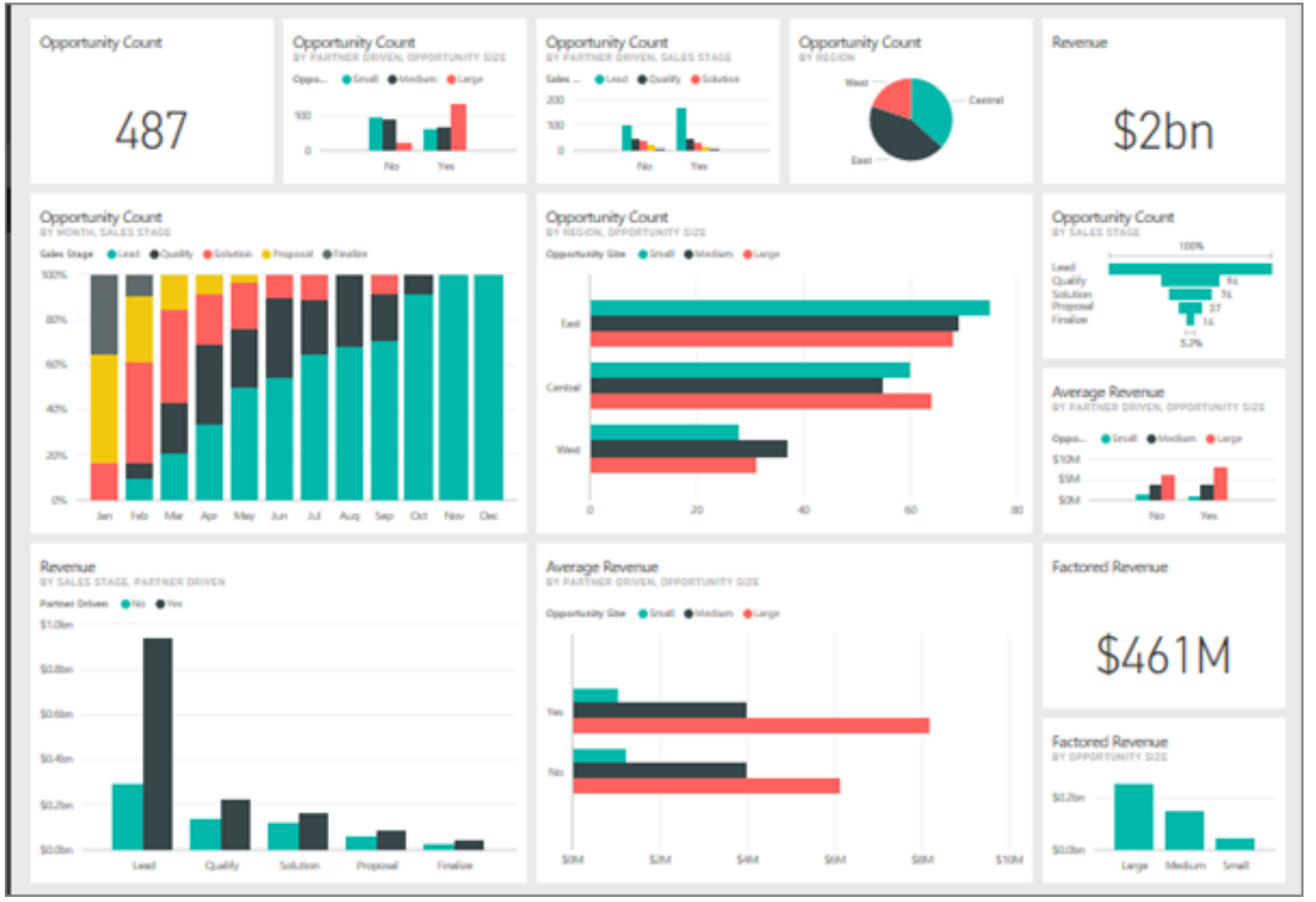
Learning Objectives

You will learn the following concepts:

- Dashboards
- Real-time Dashboards
- Enhancing Dashboards


Lesson 1:
Create a Dashboard

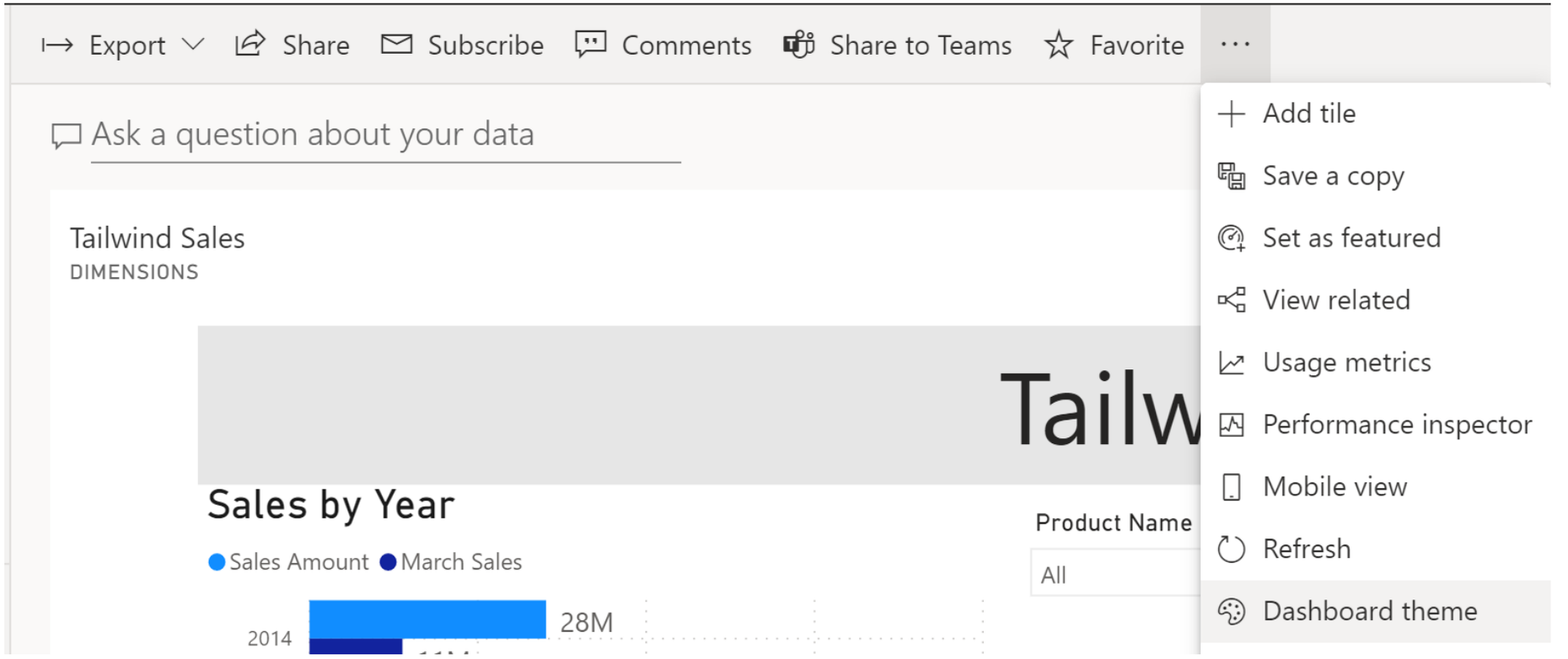
Introduction to Dashboards



A dashboard:

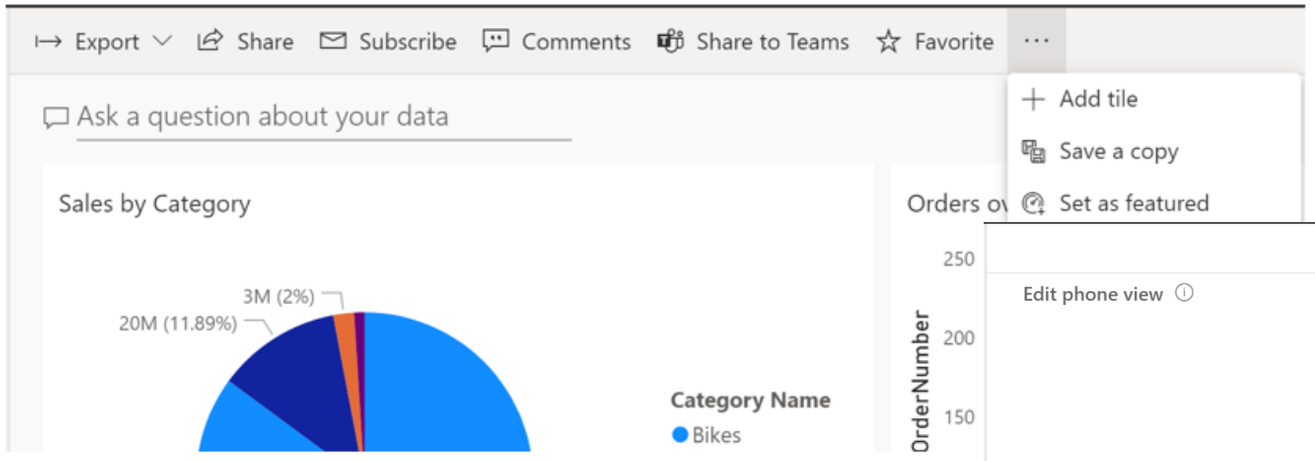
- Is a single-page canvas that tells a story through visualizations.
- Can draw from multiple reports.
- Contains no Filter, Visualization, or Fields pane.
- Does not display the underlying dataset.

Add a Dashboard Theme

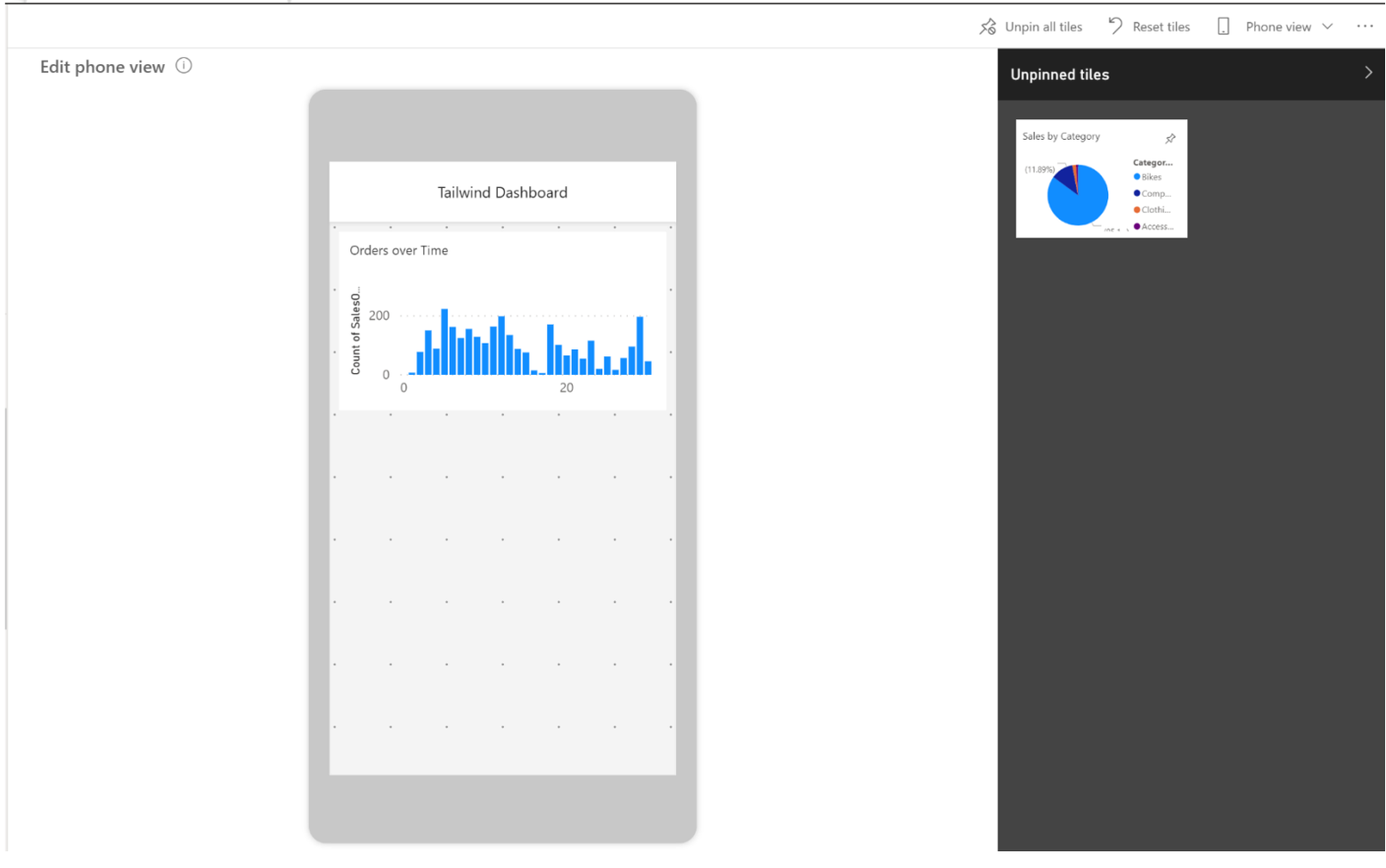


Create a cohesive picture across dashboards using themes.

Set Mobile View



Let your users stay connected wherever they are.

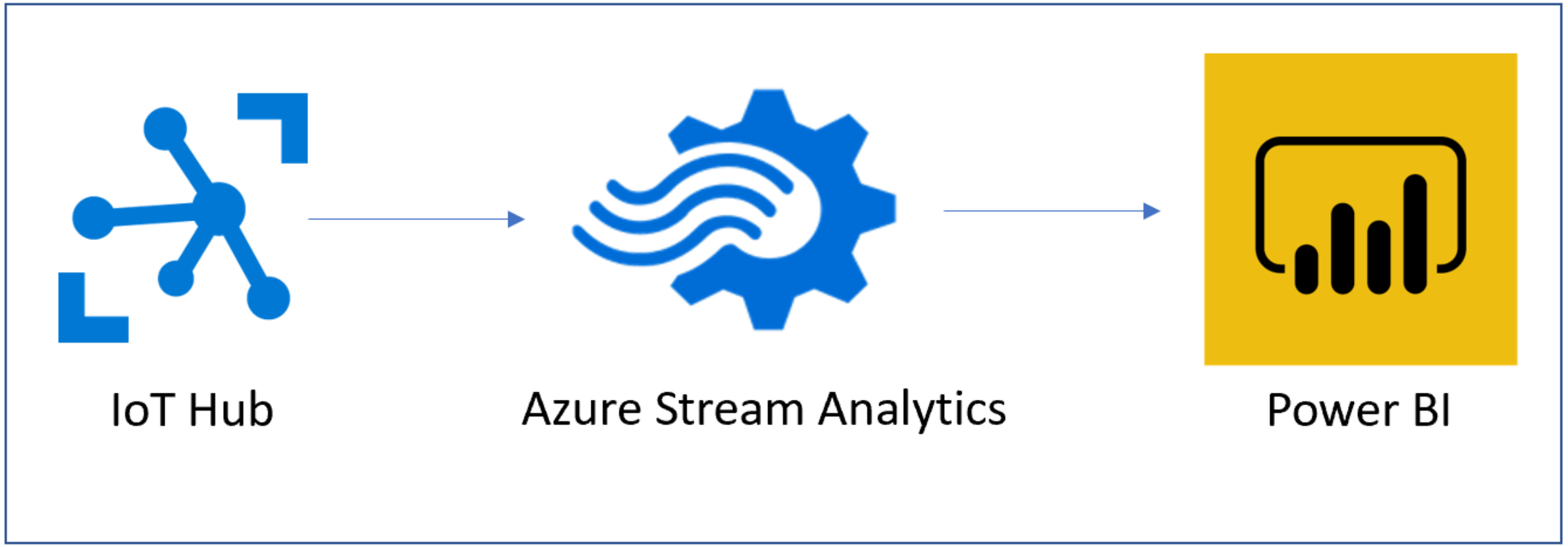


Lesson 2:
Real-time Dashboards

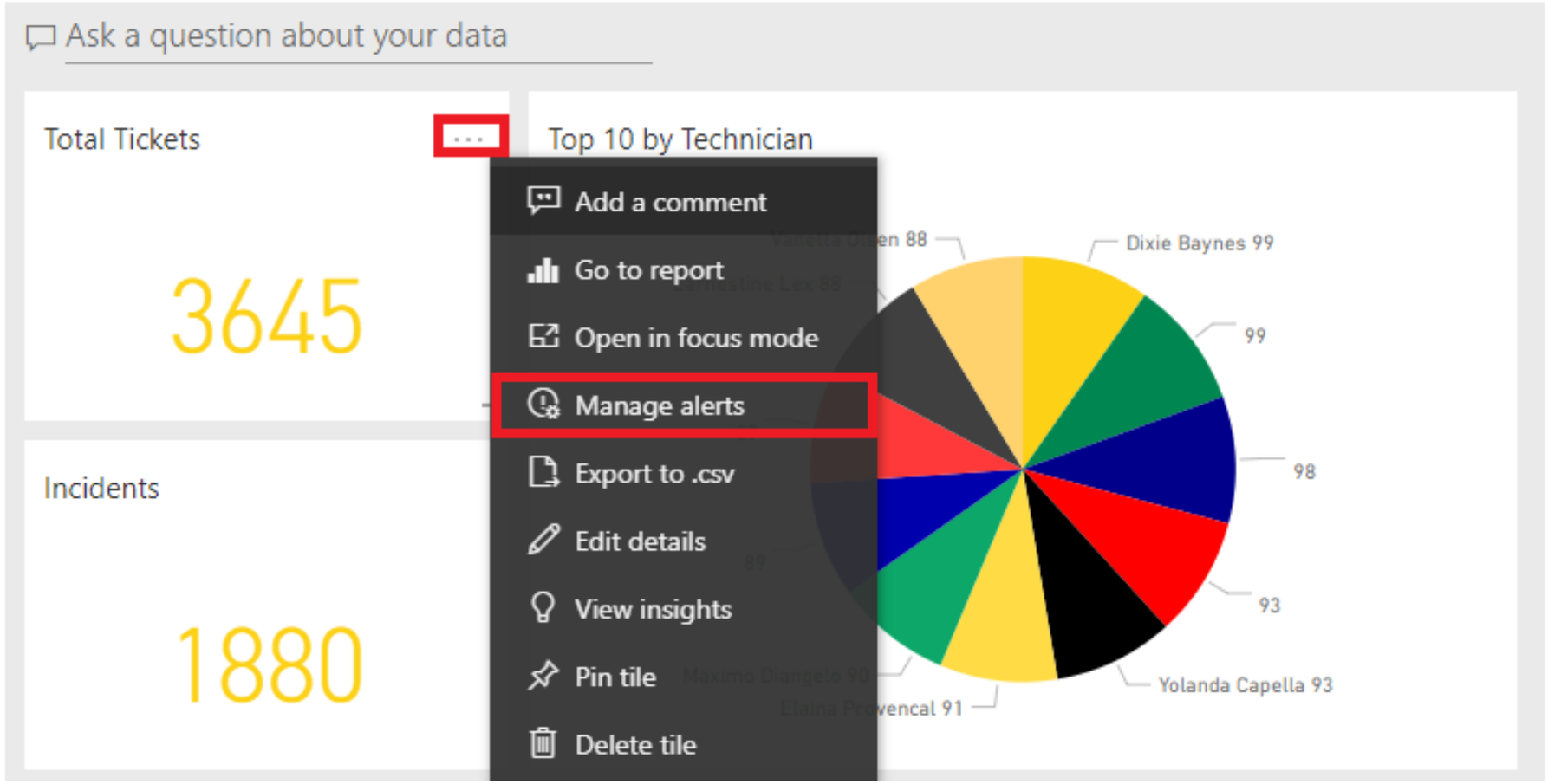
Microsoft Power Platform

Create a Real-time Dashboards

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

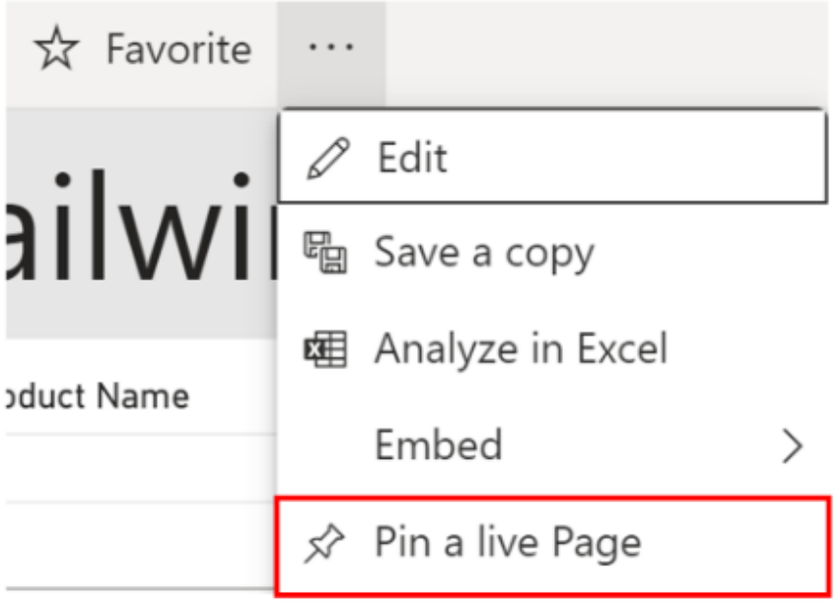


Configure Data Alerts

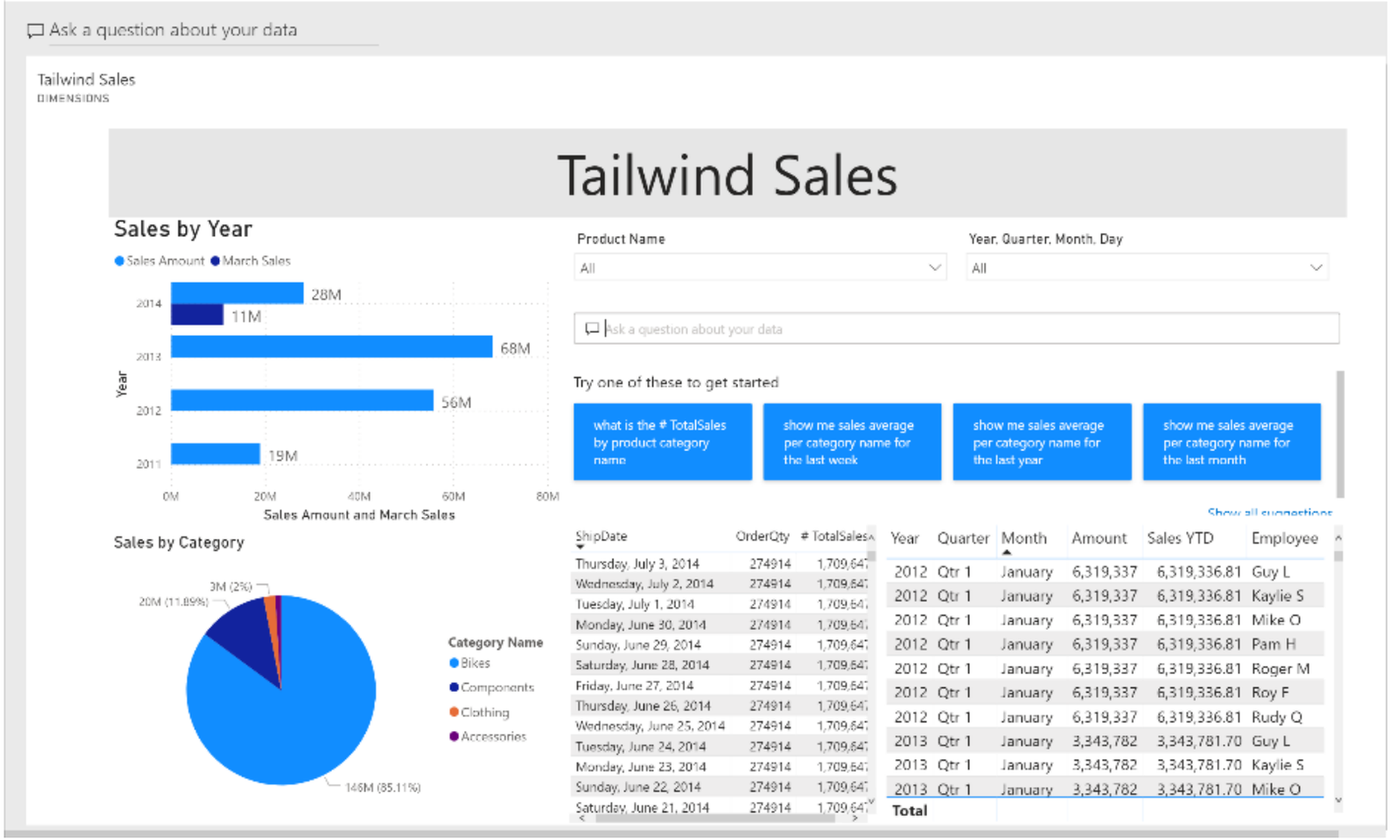


Notify users that a specific data point has reached a defined threshold.

Pin a Live Report Page to a Dashboard



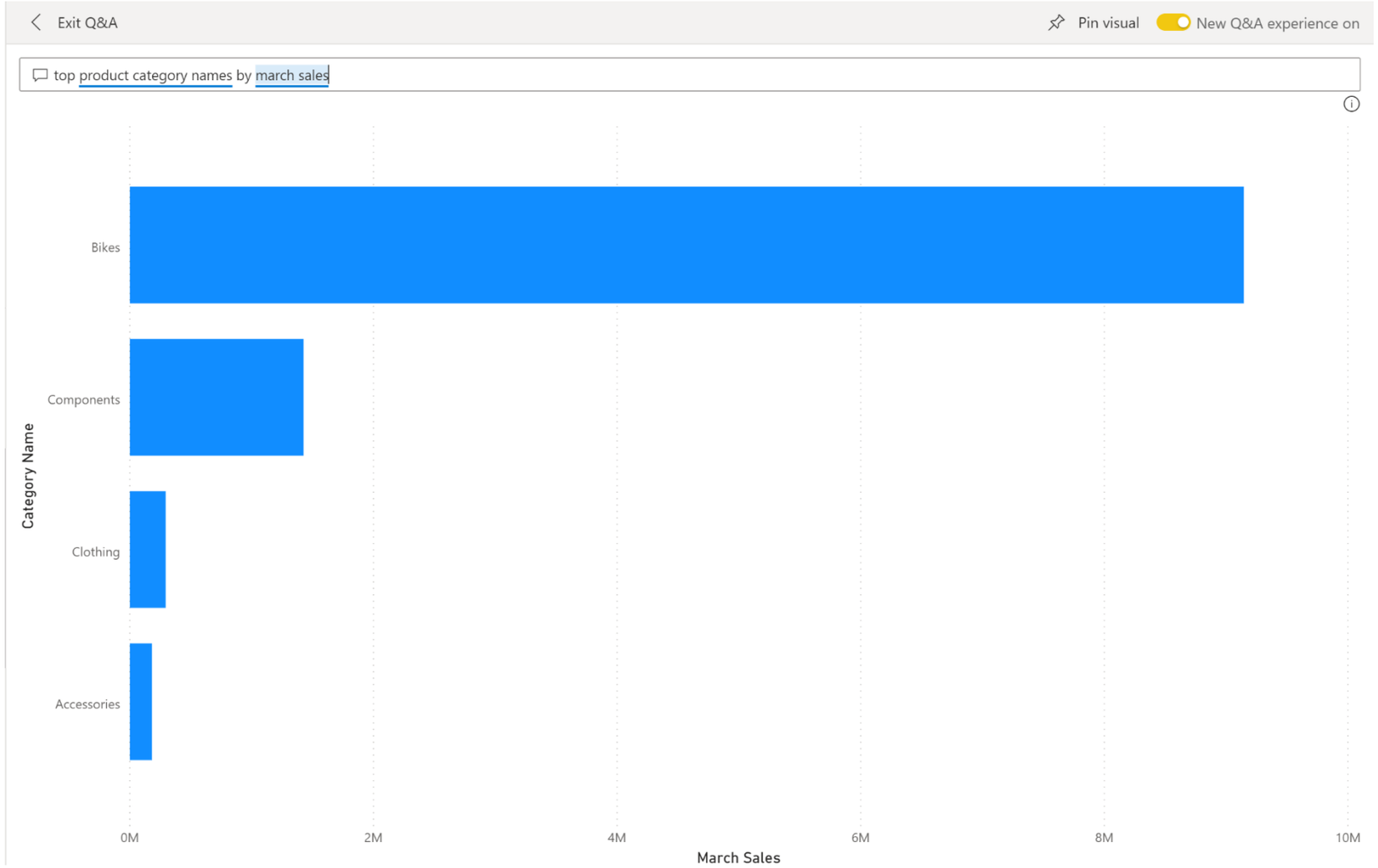
Ensure the visuals on your dashboard reflect changes live.



Lesson 3:
Enhance a dashboard

Microsoft Power Platform

Explore Data by Asking Questions



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

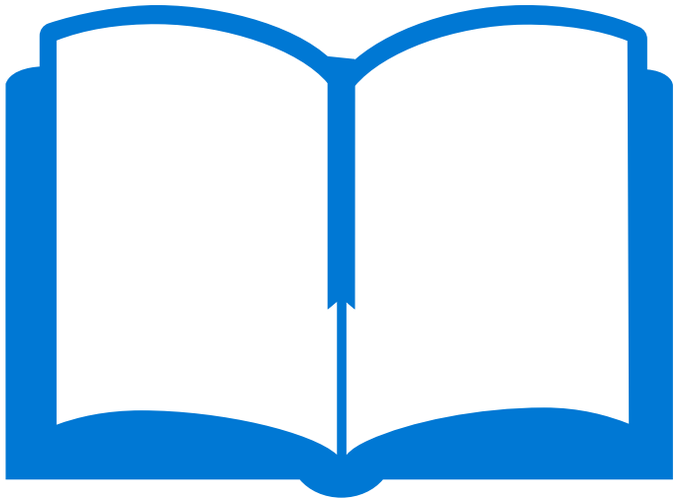
Lab: Creating a Power BI Dashboard

Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

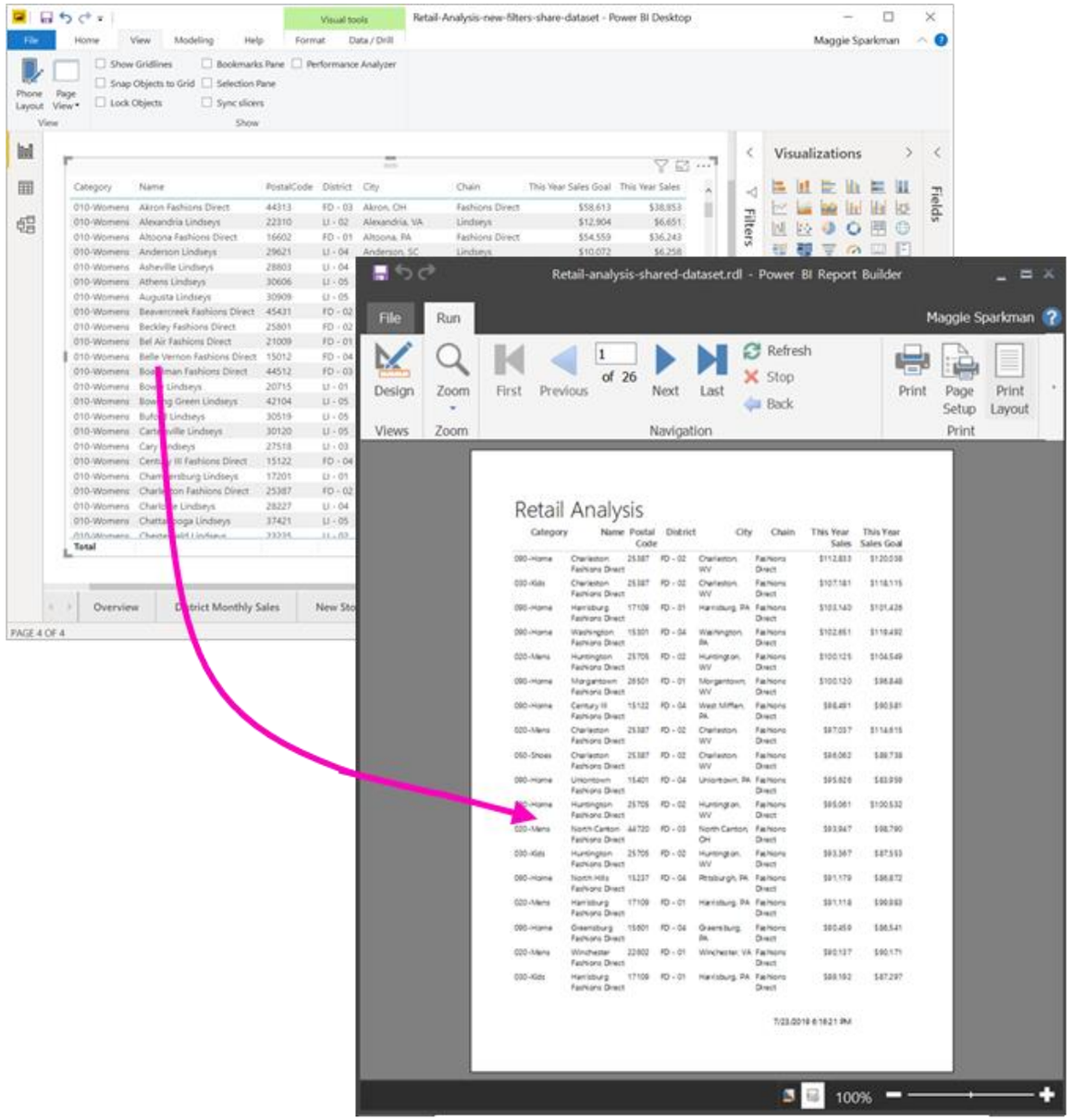
You will learn the following concepts:

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

Lesson 1:
Paginated Report Overview

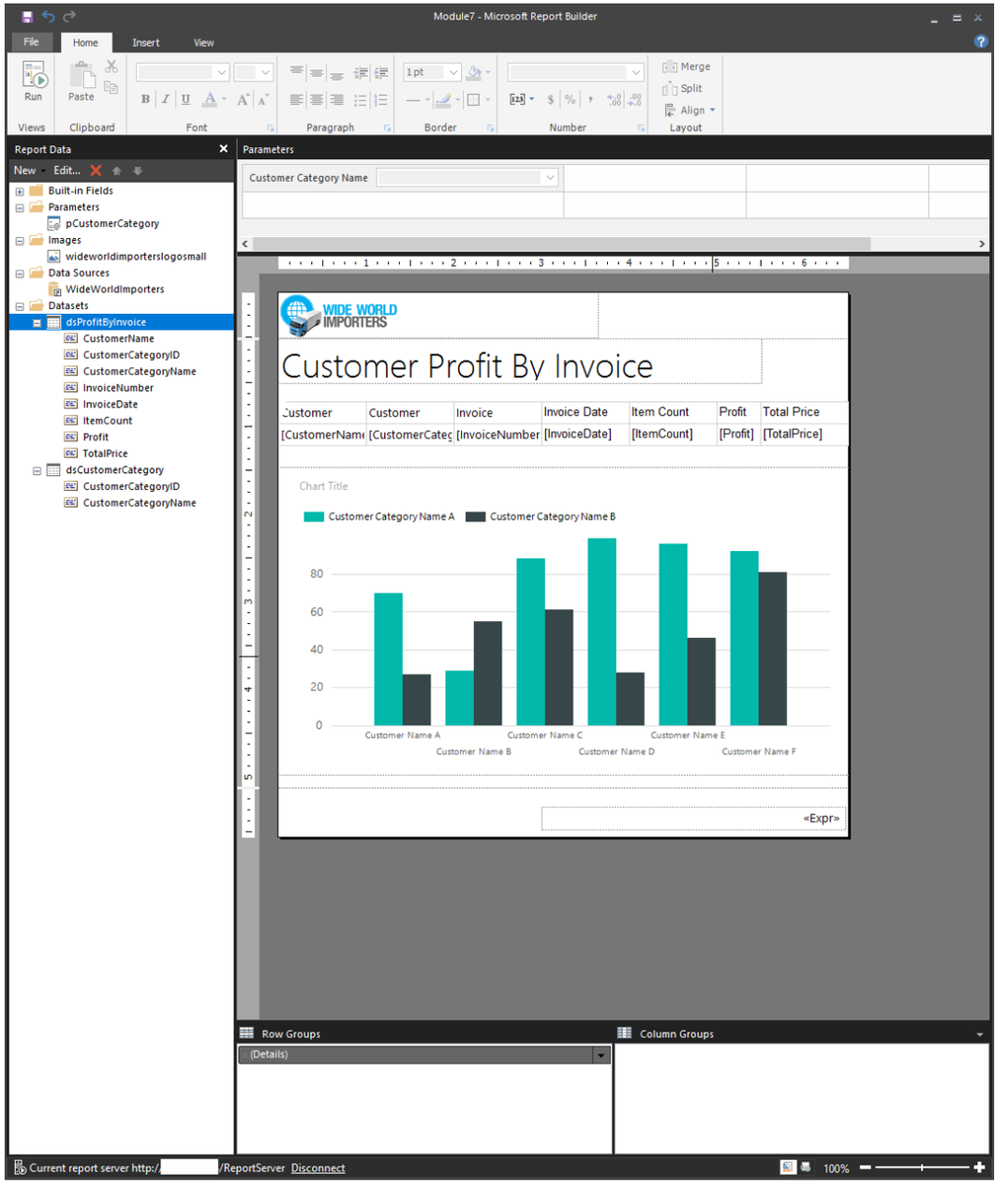
Introduction to Paginated Reports

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



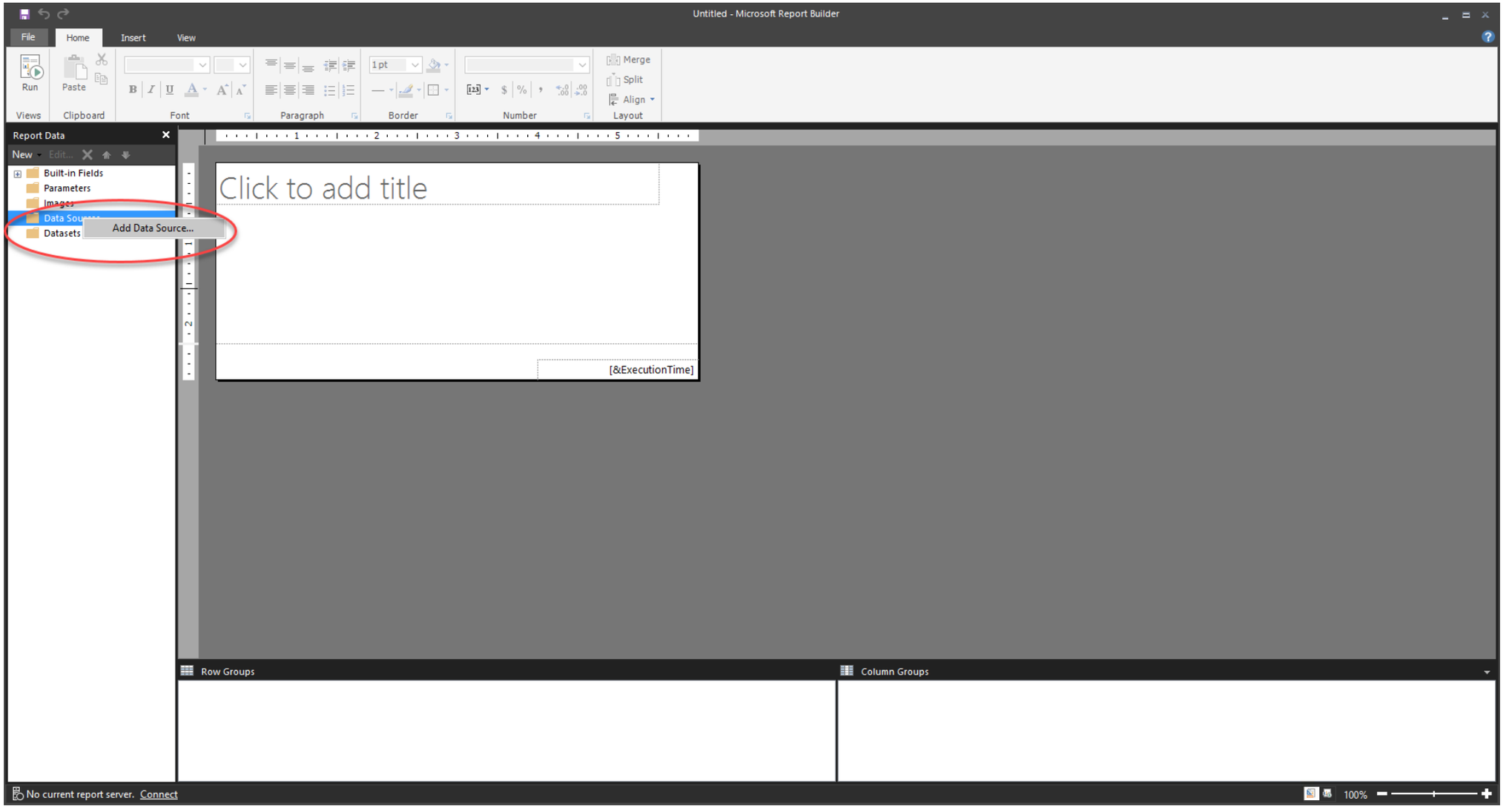
When are they the right fit?

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

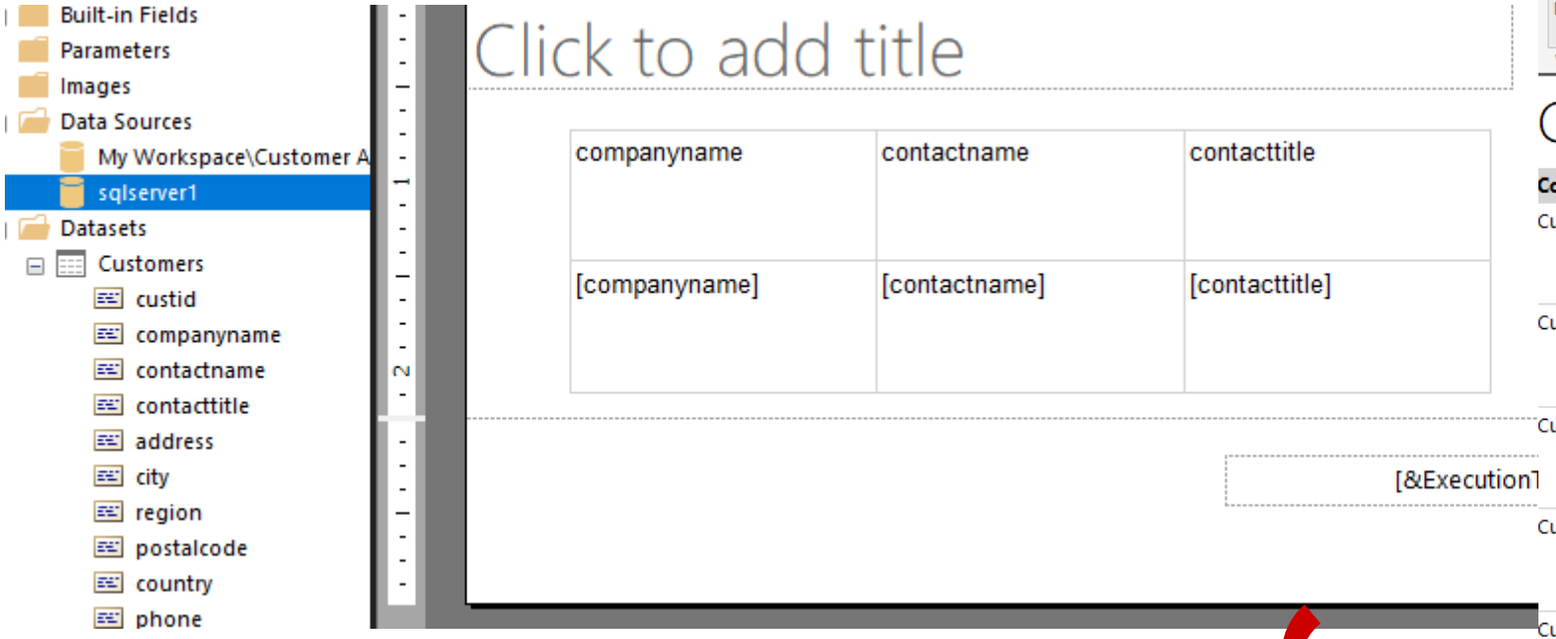


Lesson 2:
Creating Paginated Reports

Getting Data



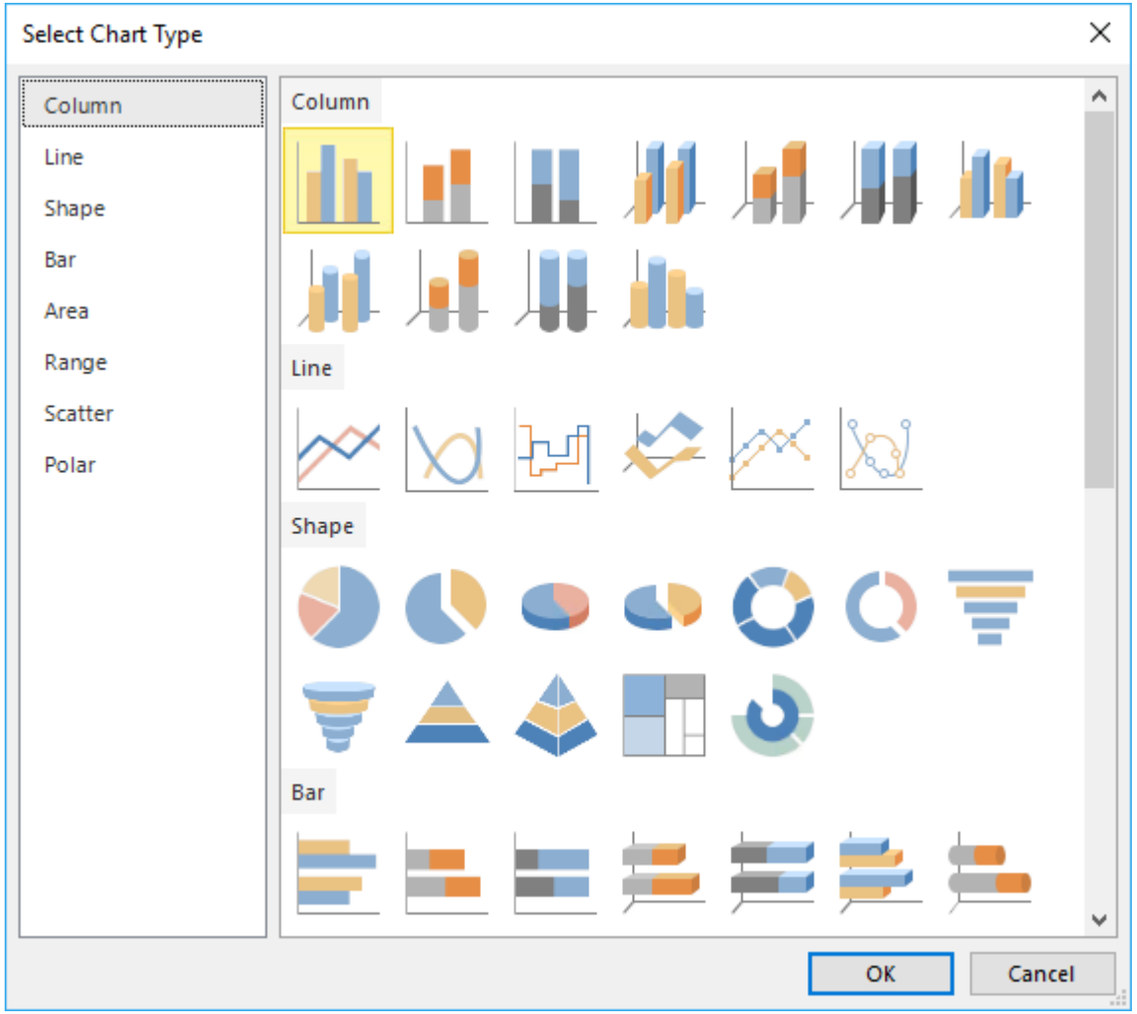
Create a Paginated Report

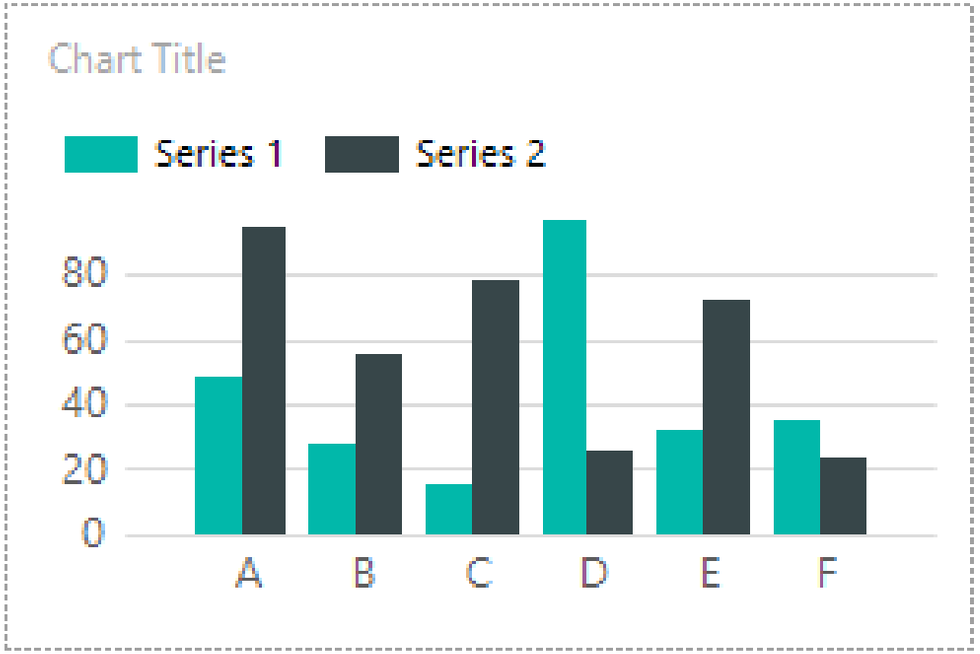


Similar to Power BI, add visuals to the design surface.

Microsoft Power Platform

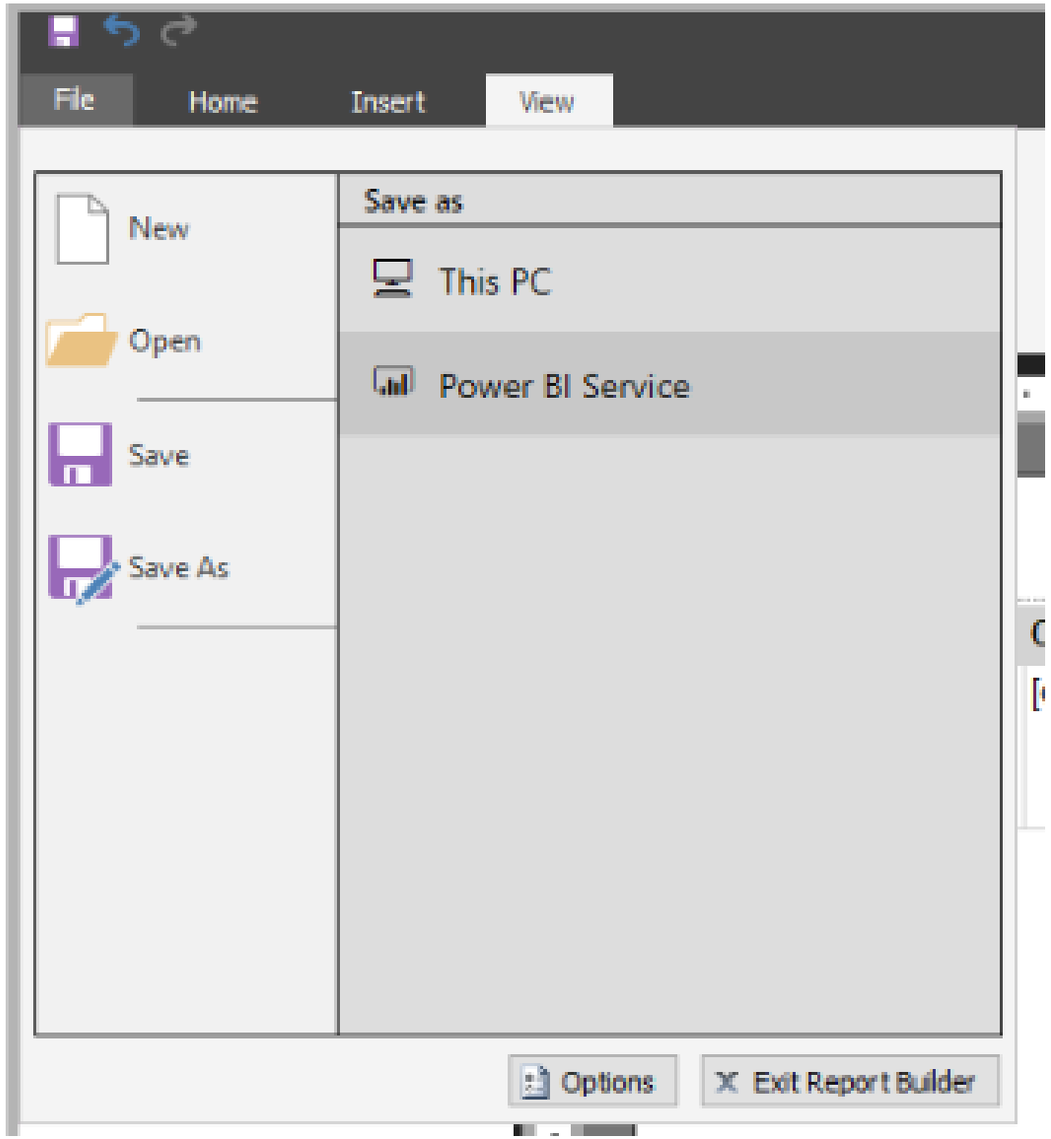
Work with Charts and Tables





Publish the Report

Publish your report to the Power BI service.

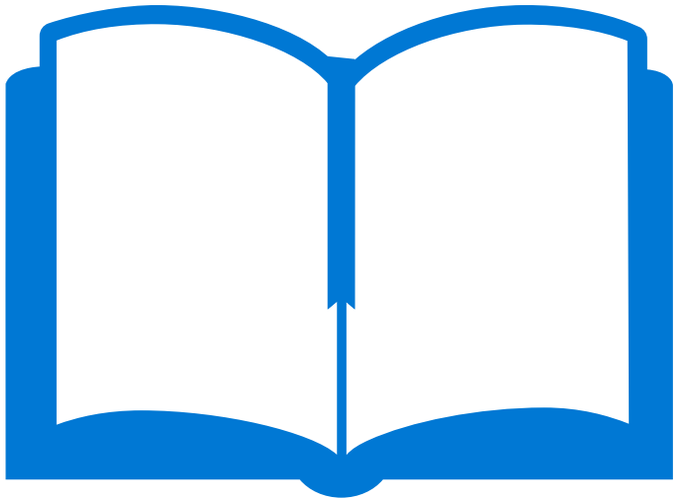


Lab: Creating a Paginated Report [Optional]

Microsoft Power Platform

References

- DA-100 Create Paginated Reports
https://docs.microsoft.com/en-us/learn/modules/create-paginated-reports-power-bi/



Module 10: Perform Advanced Analytics

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

- Advanced Analytics
- Data Insights through AI Visuals

Lesson 1:
Advanced Analytics

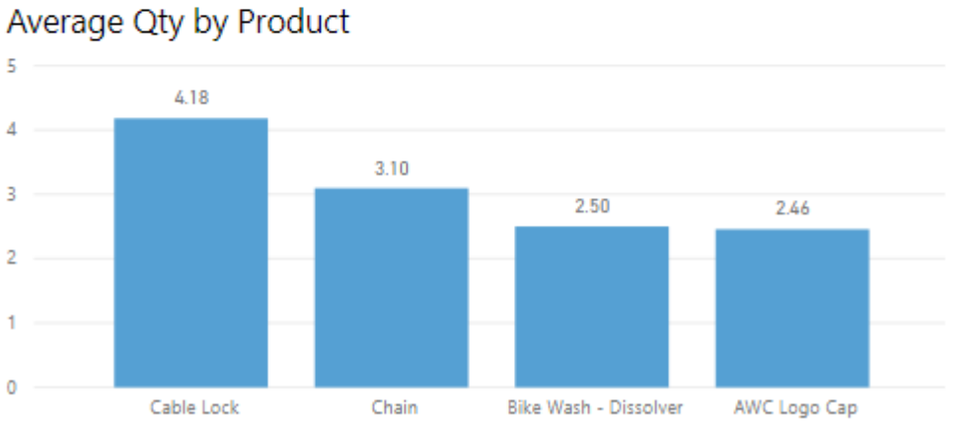
Microsoft Power Platform

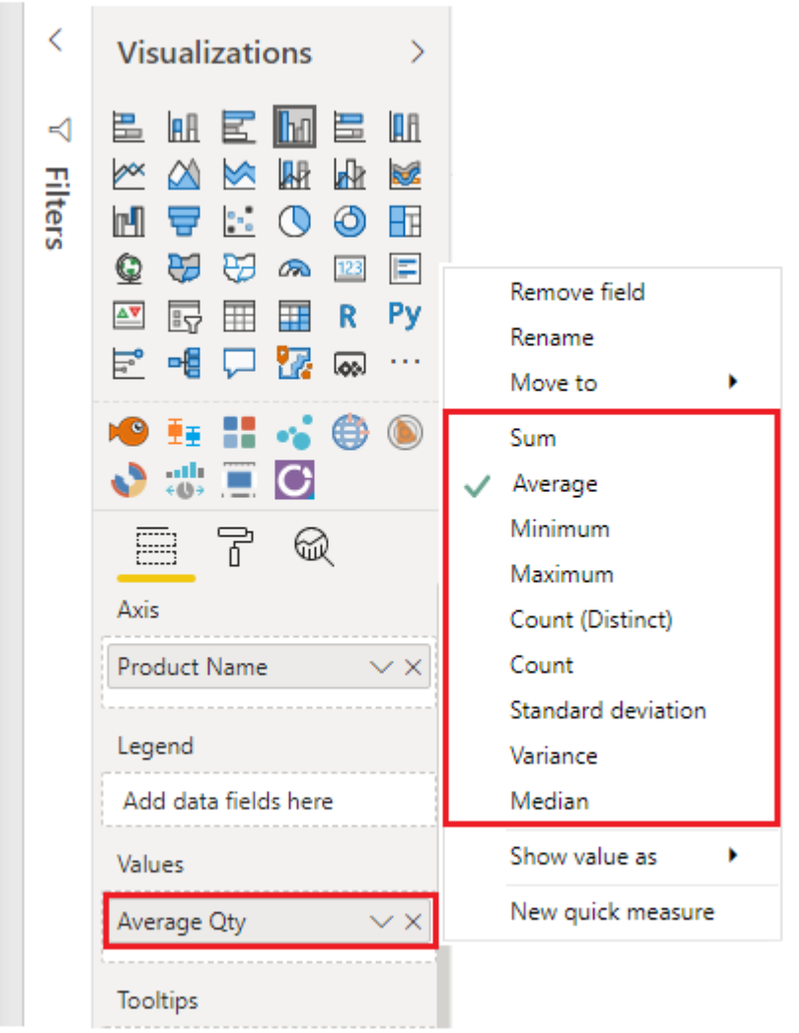
Introduction to Advanced Analytics

- 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

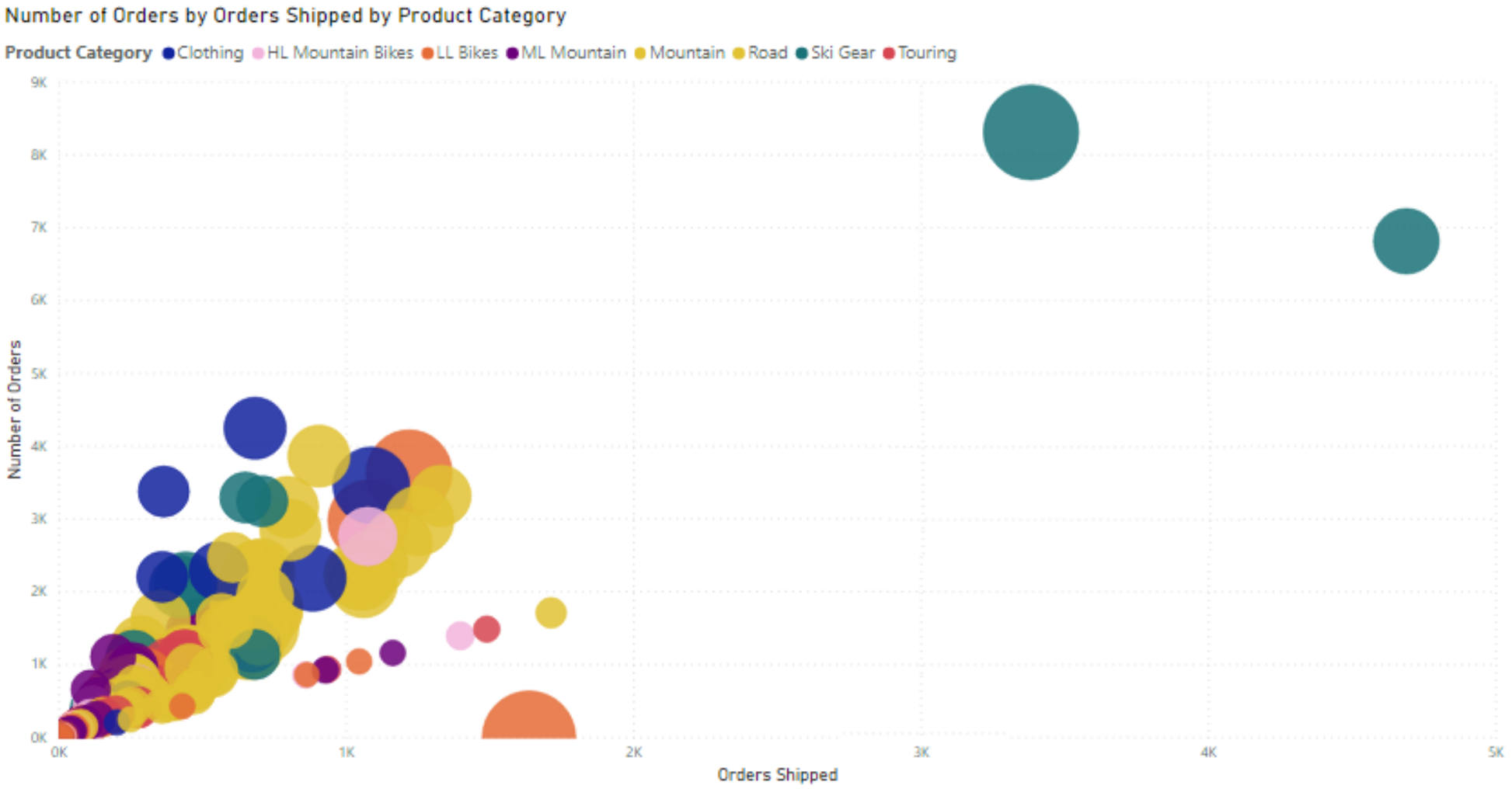
- Information that provides quick and simple description of your data.
- See clusters, patterns, and behavioral data.





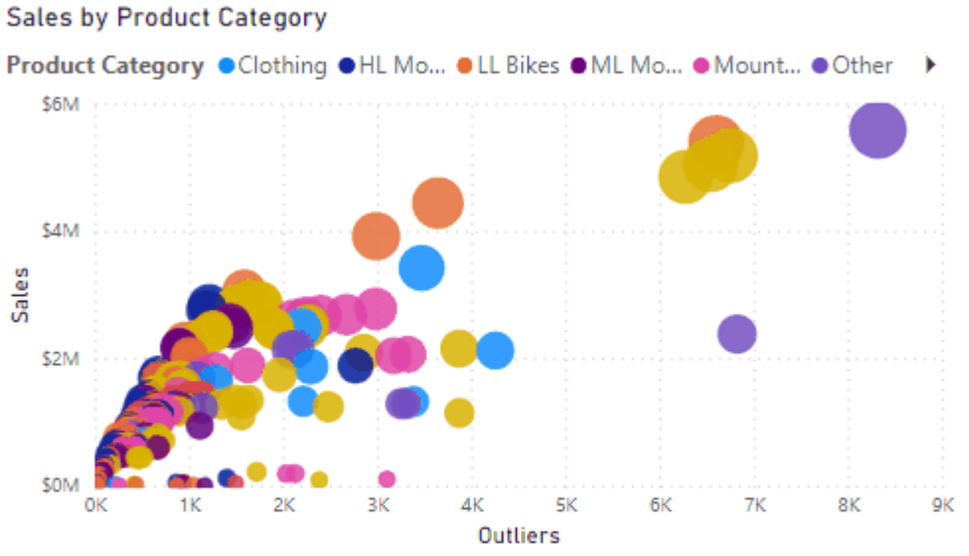
Microsoft Power Platform

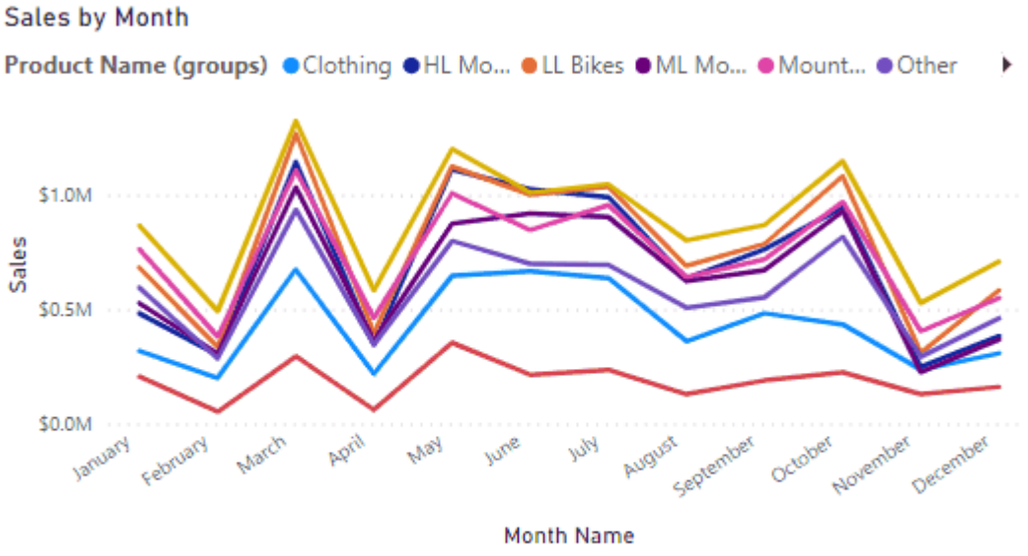
Identify Outliers



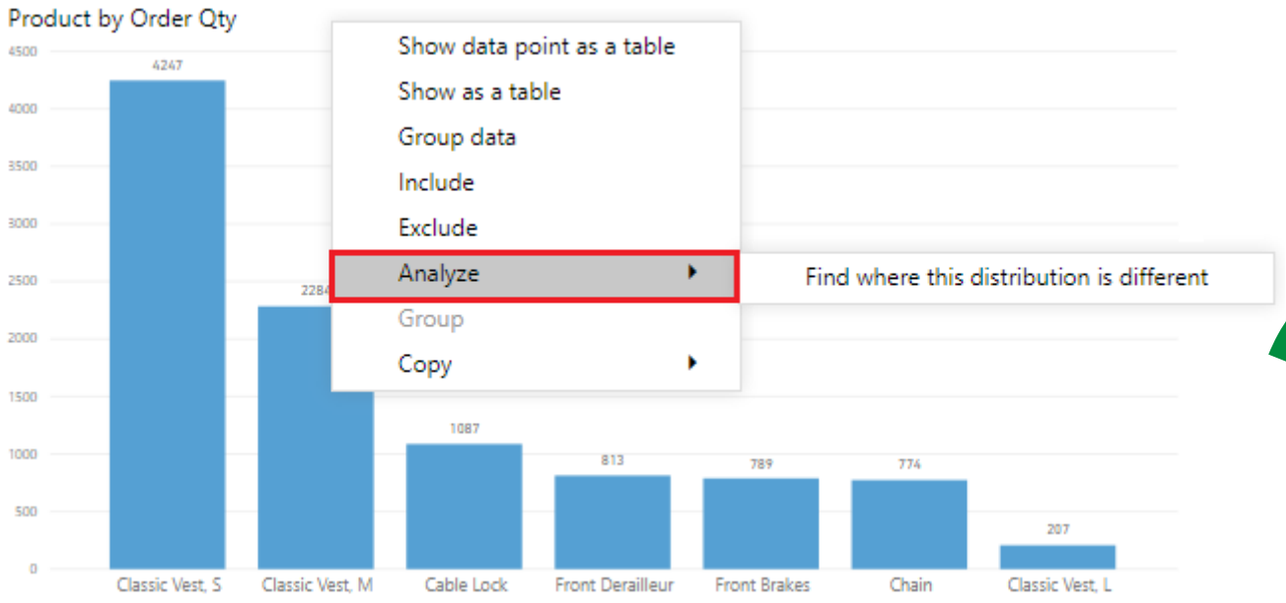
Conduct Time-series Analysis

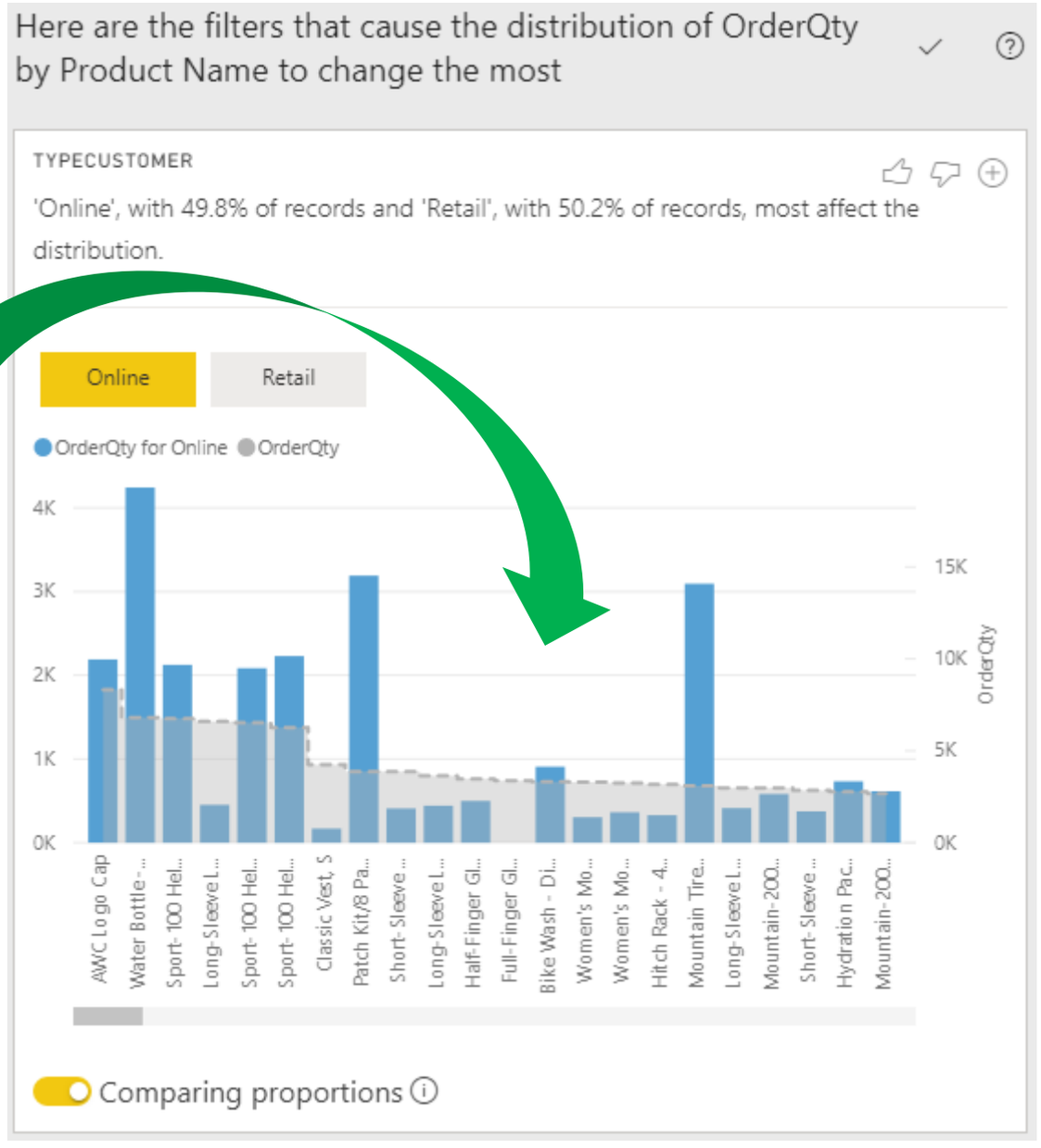
- Analyze a series of data over time.
- Identify meaningful trends and make predictions.





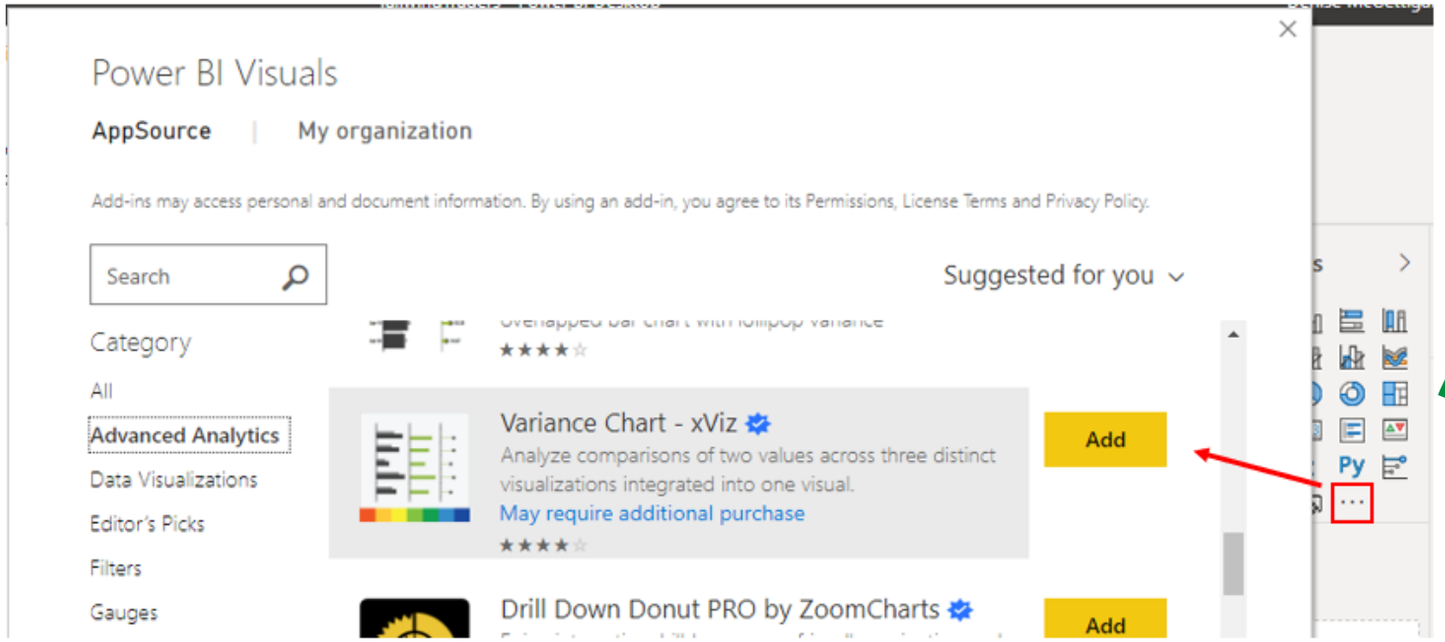
Using the Analyze Feature

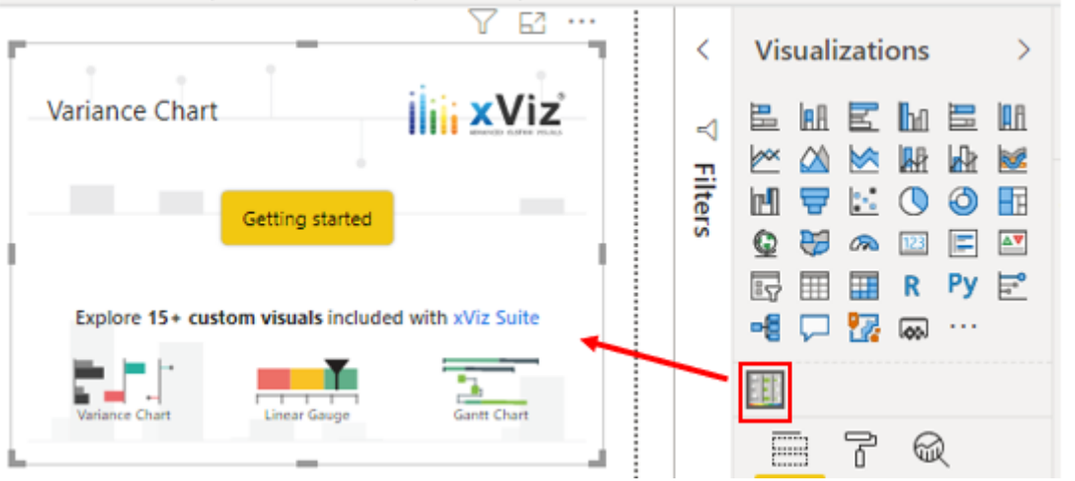




Get fast, automated, and insightful analysis on your data.

Advanced Analytics Custom Visuals





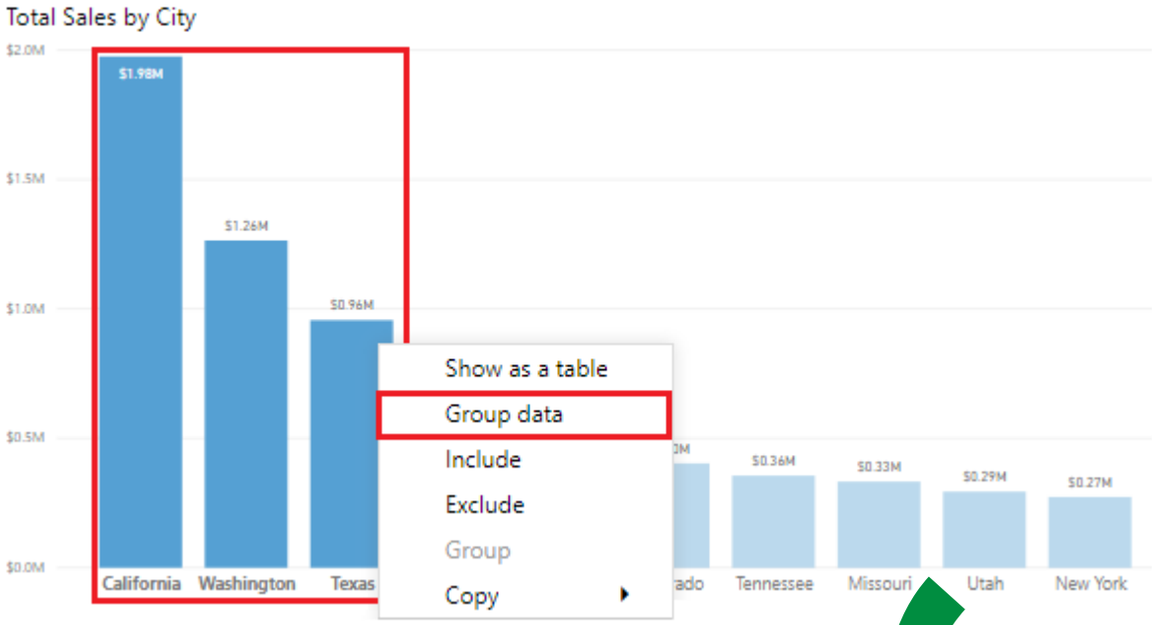
Add a layer of data insights to your reports for further analysis.

Microsoft Power Platform

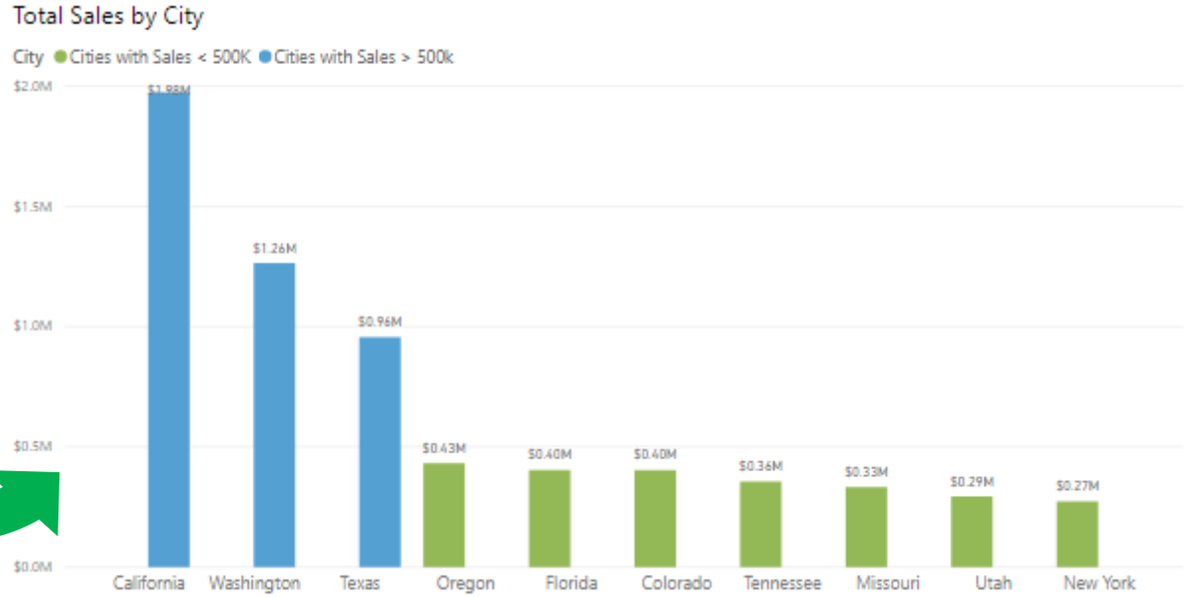
Quick Insights

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

Grouping and Binning



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



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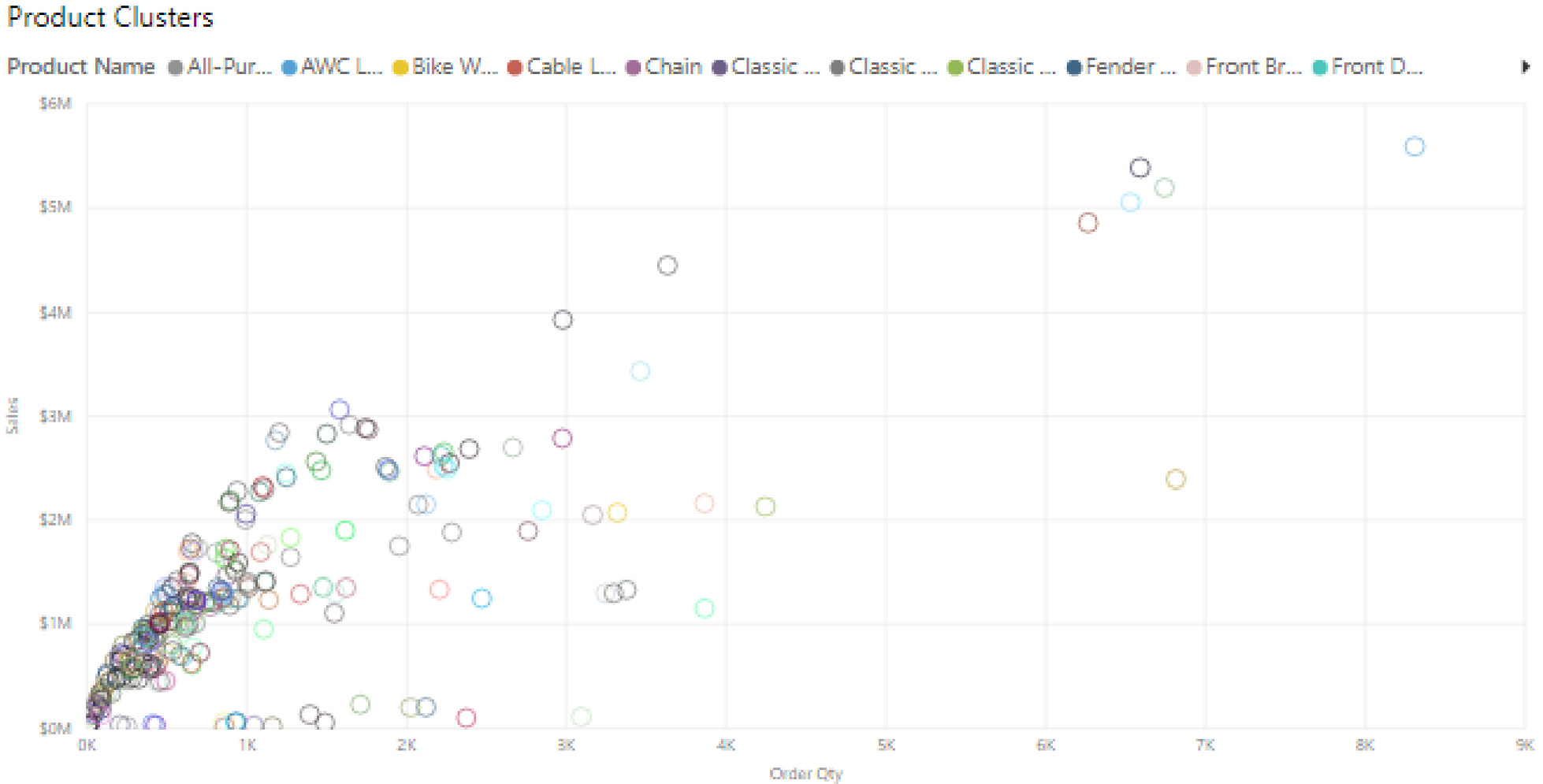
Clustering Techniques



Lesson 2: Data Insights through AI Visuals

Microsoft Power Platform

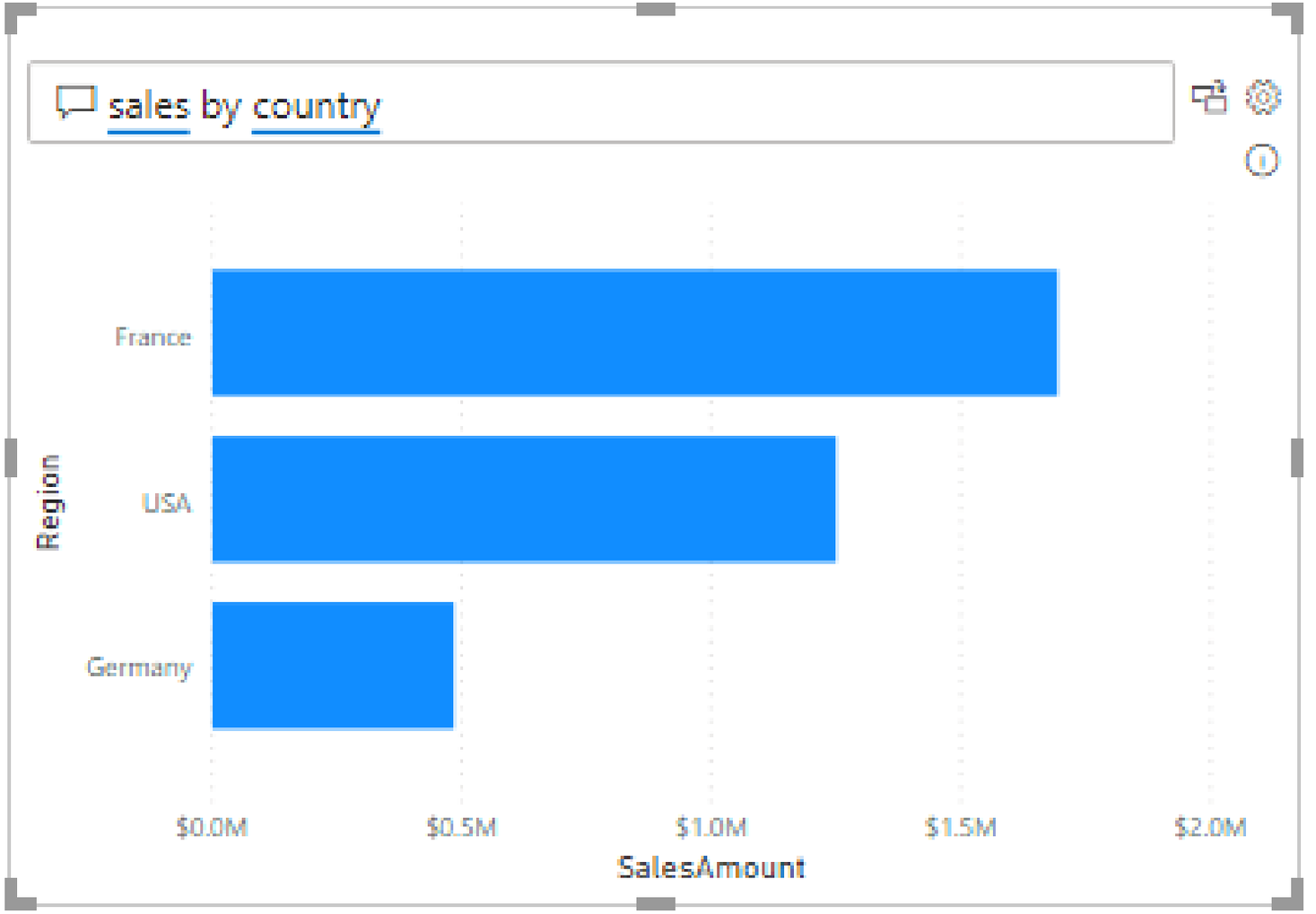
Introduction to AI Visuals

- 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.

Microsoft Power Platform

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.



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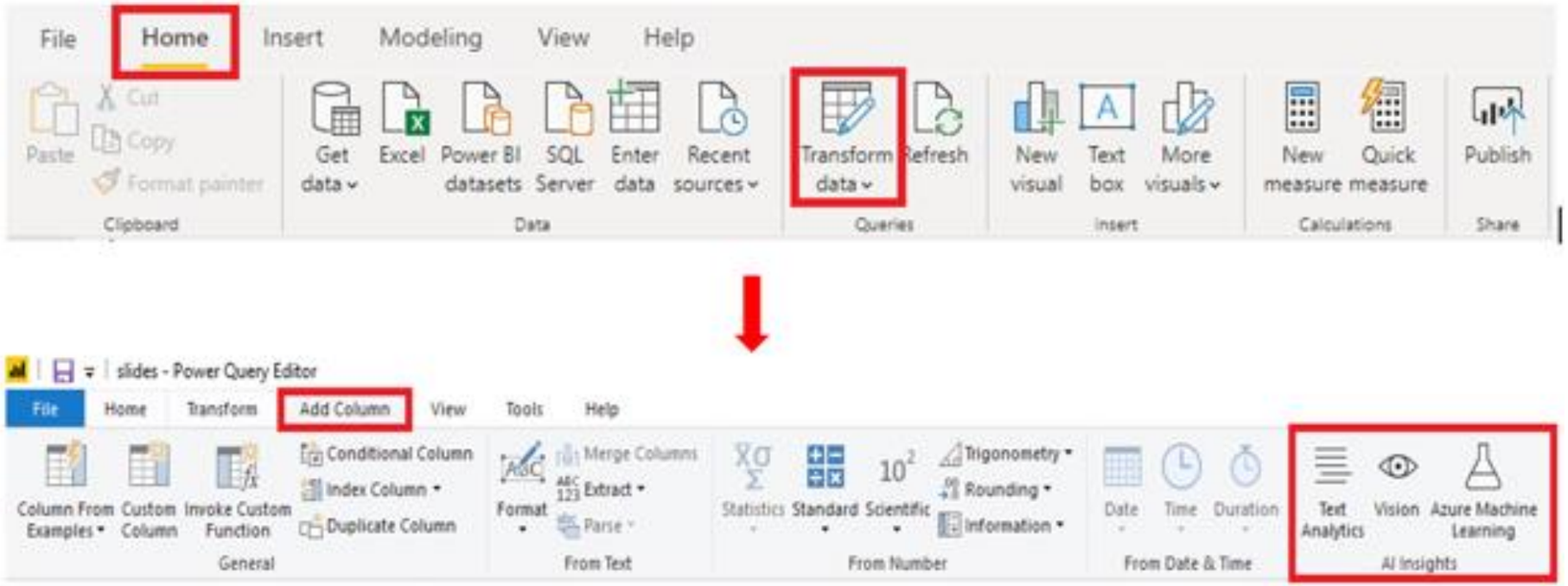
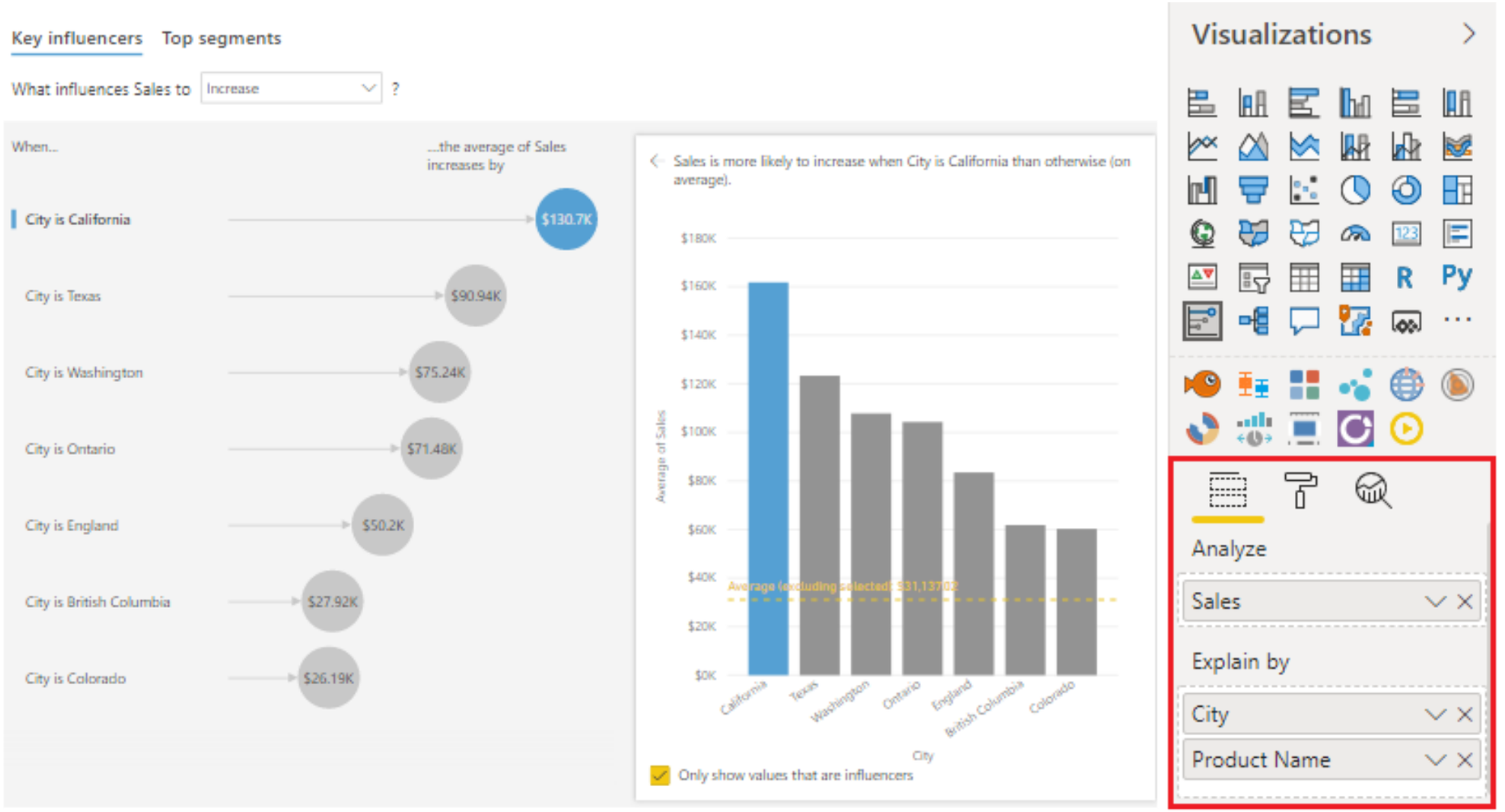
AI Insights

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



Key Influencer Visual



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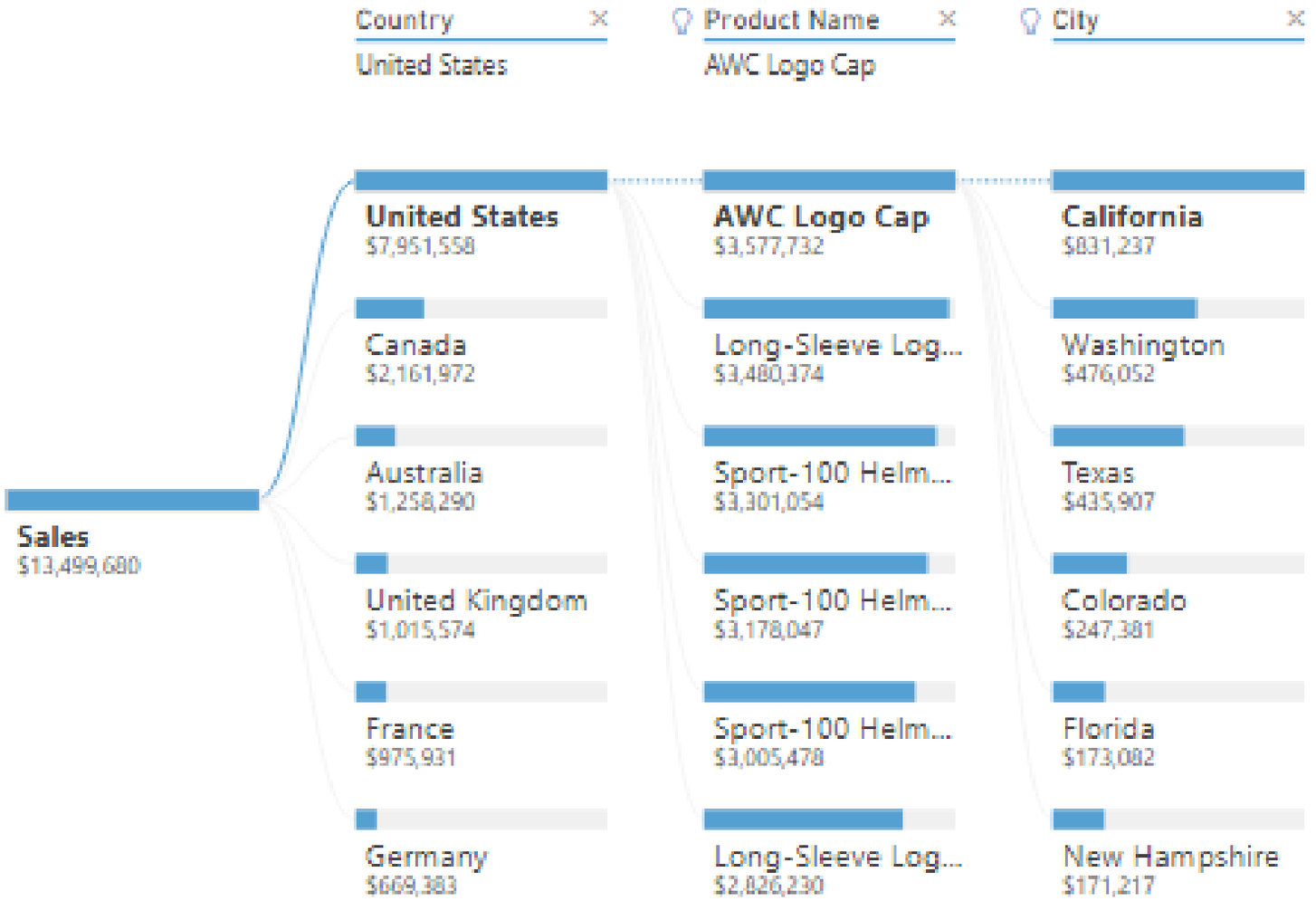
Decomposition Tree Visual

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



Lab: Data Analysis in Power BI

Microsoft Power Platform

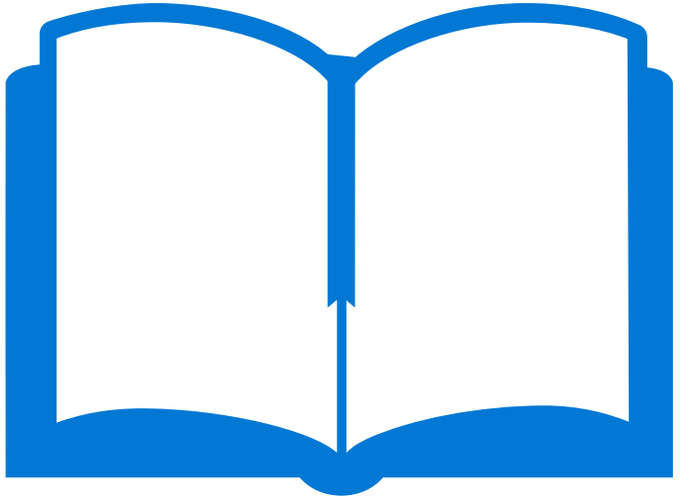
References

- DA-100 Perform analytics in Power BI

https://docs.microsoft.com/en-us/learn/paths/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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

- Workspaces
- Sharing and Managing Power BI Assets

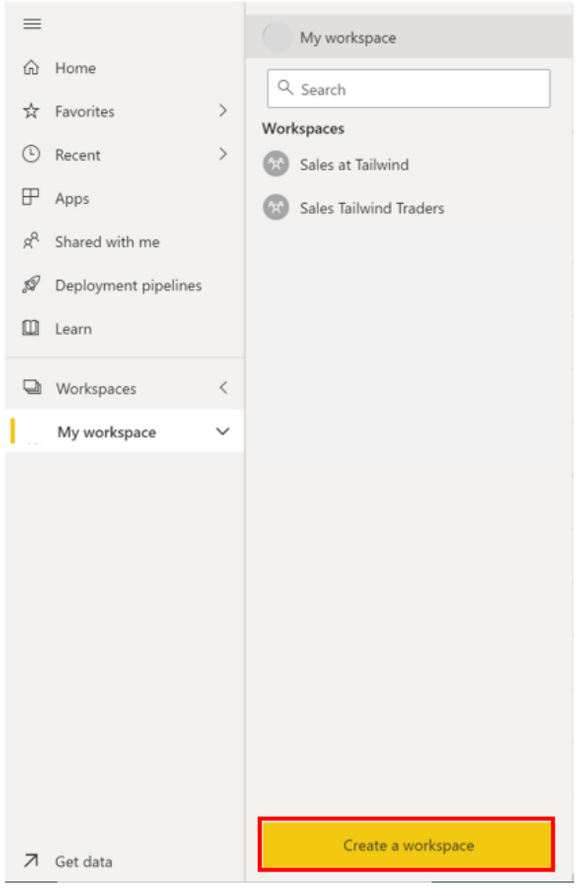
Lesson 1: Creating Workspaces

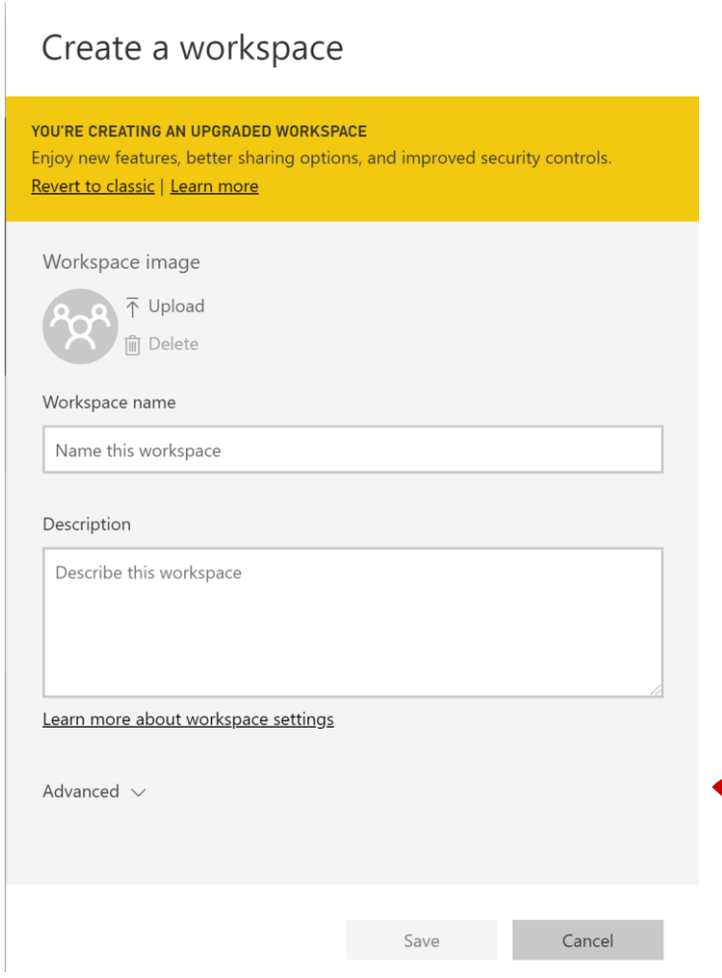
Introduction to Workspaces

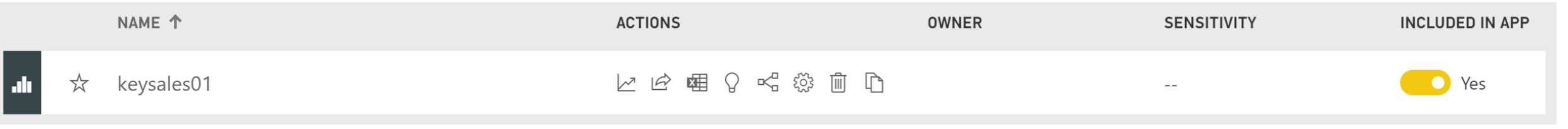
- A centralized repository to:
  - Collaborate with colleagues and teams.
  - Create collections of reports and dashboards.
- Workspaces provide the following benefits:
  - Share and present reports in a single environment.
  - Enable the highest level of security.
  - An environment for housing reports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

Create a Workspace

Make reports easily viewable and sharable.

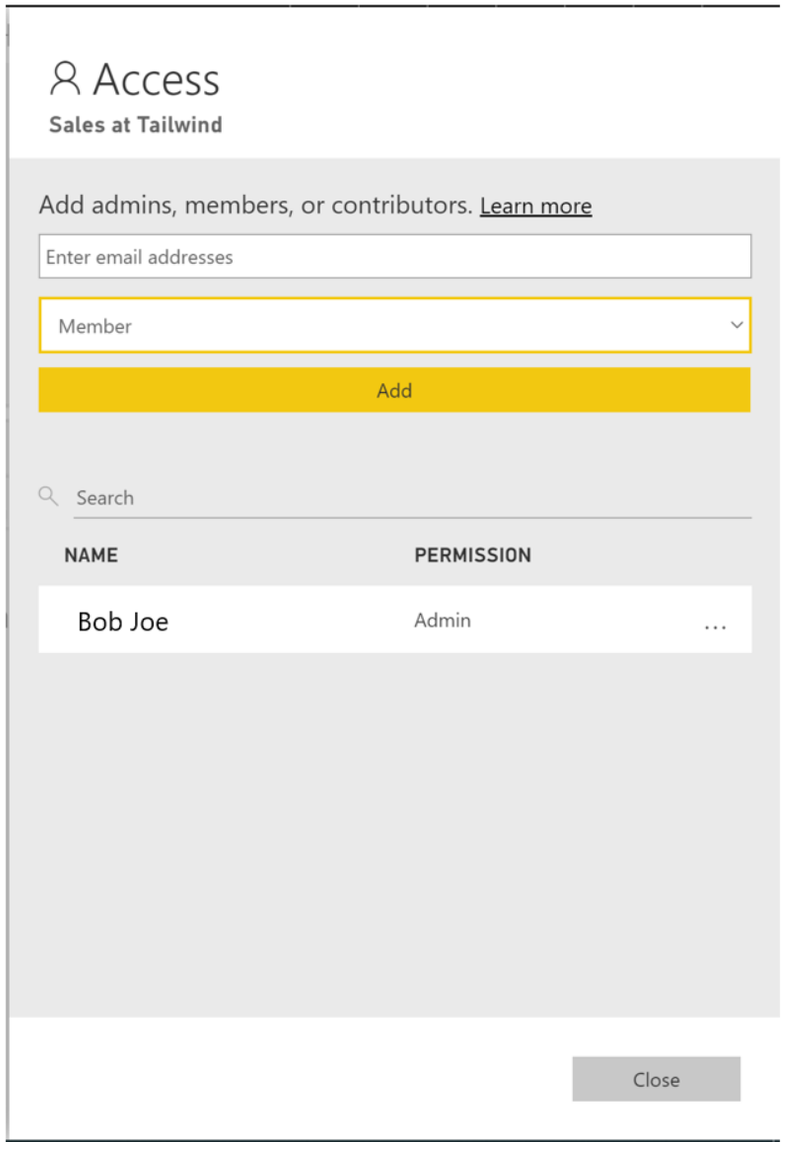






Assign Workspace Roles

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



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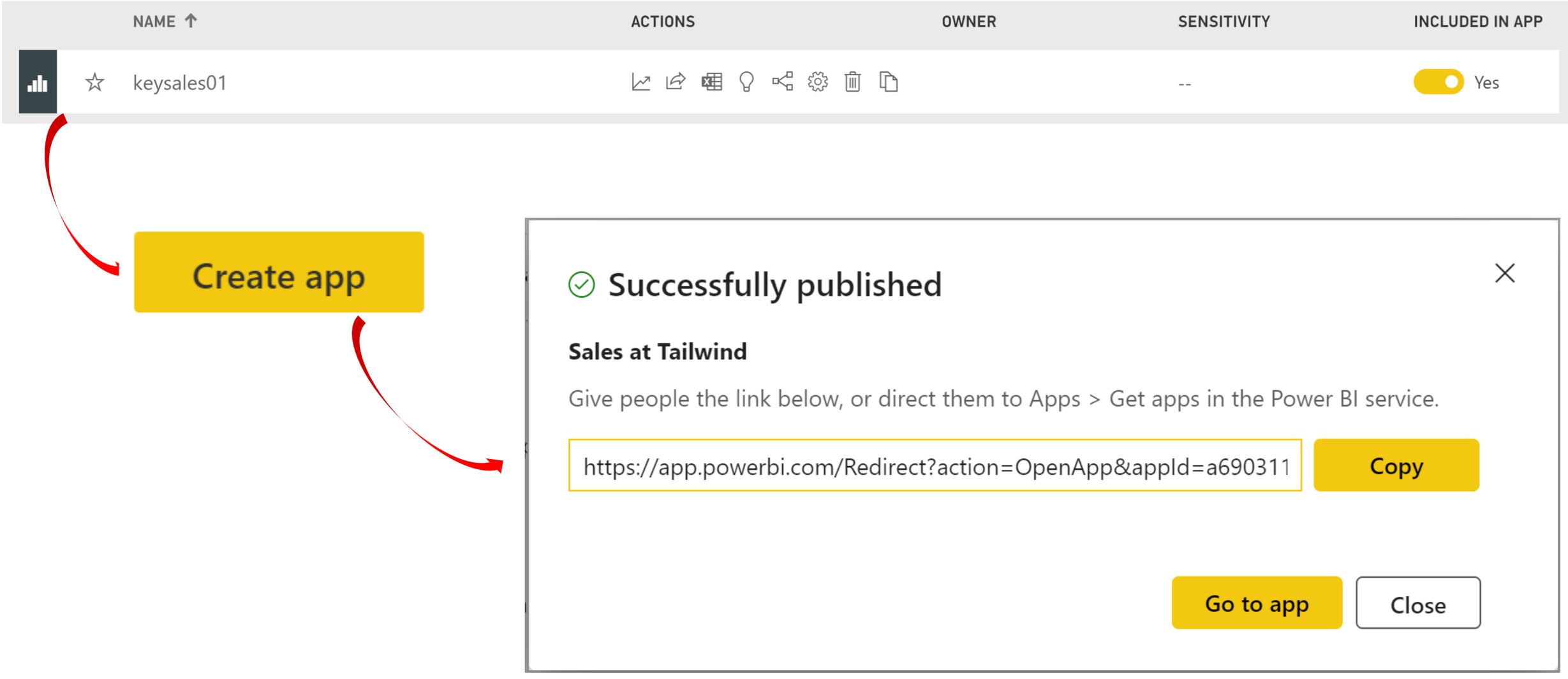
Create Apps



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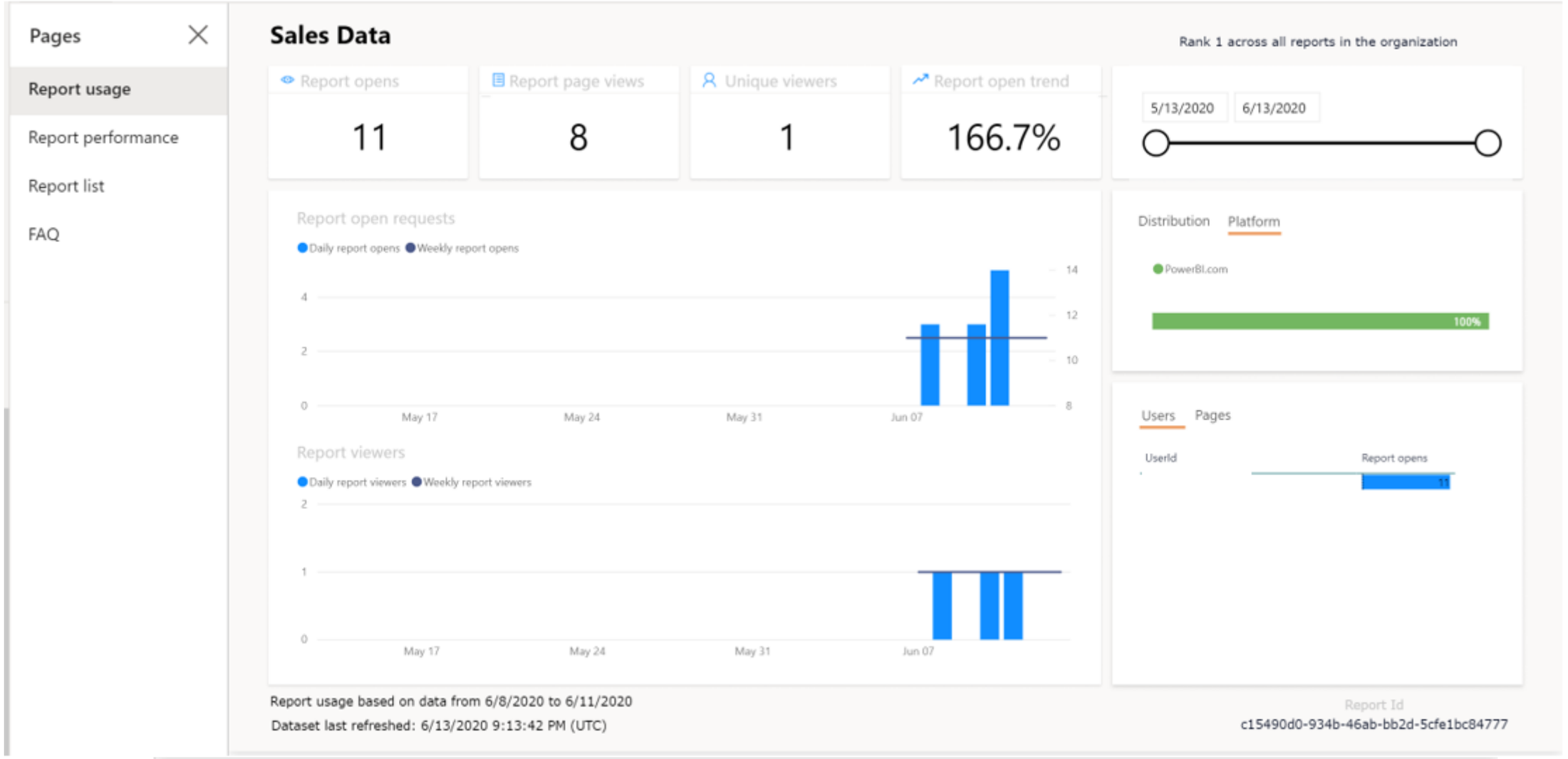
Configure and Update a Workspace App

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

Lesson 2: Sharing and Managing Assets

Microsoft Power Platform

Monitor Usage and Performance



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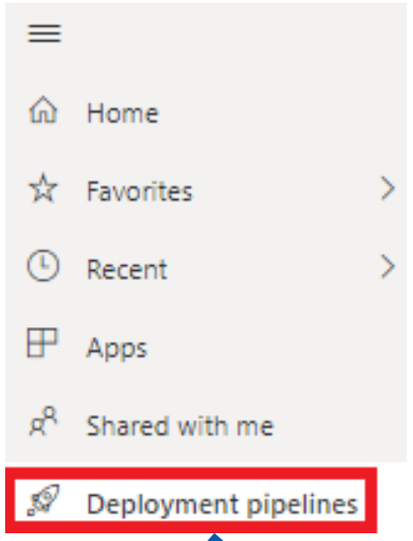
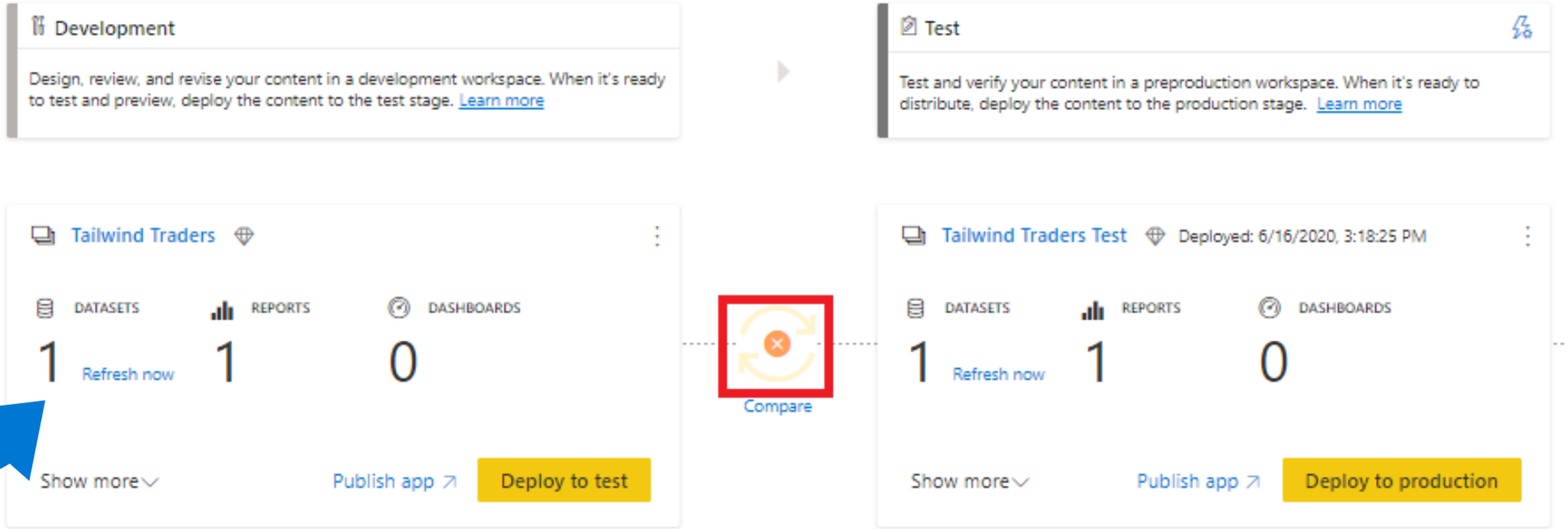
Development Lifecycle Strategy



Manage content in dashboards, reports, and datasets in different environments.



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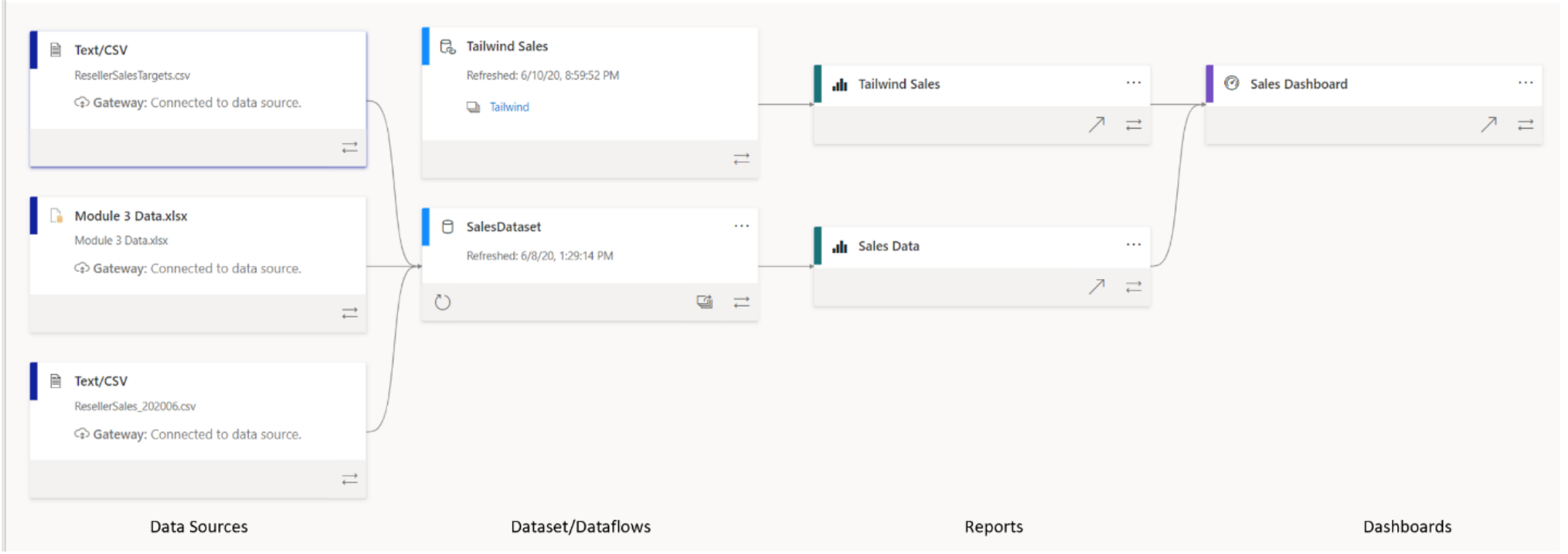
Viewing Data Lineage



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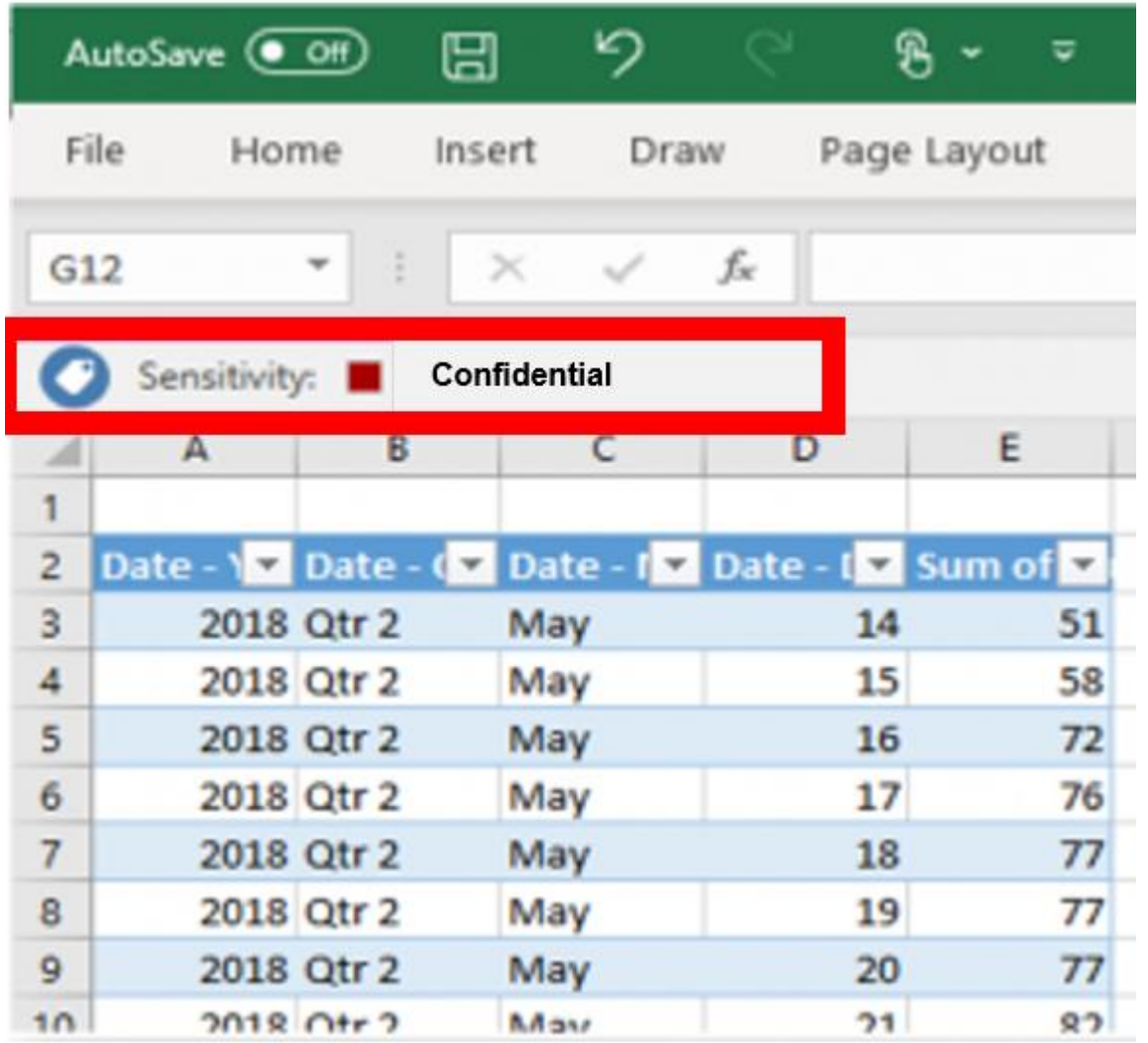
Data Protection

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



Microsoft Power Platform

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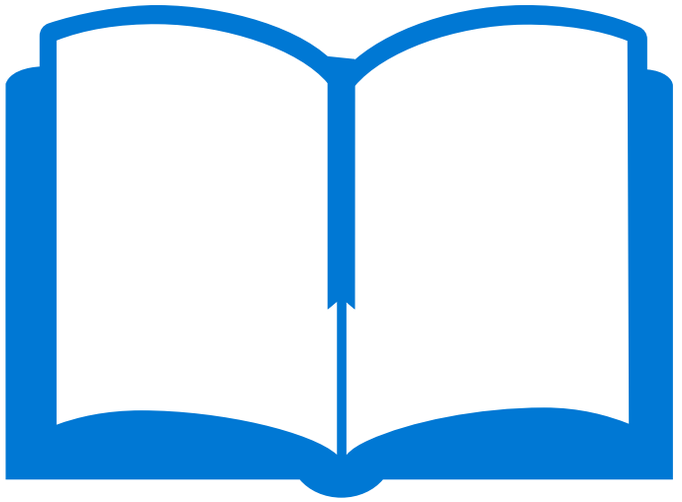
- DA-100 Create and manage Workspaces in Power BI

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



Module 12: Manage Datasets in Power BI

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

- Parameters
- Datasets

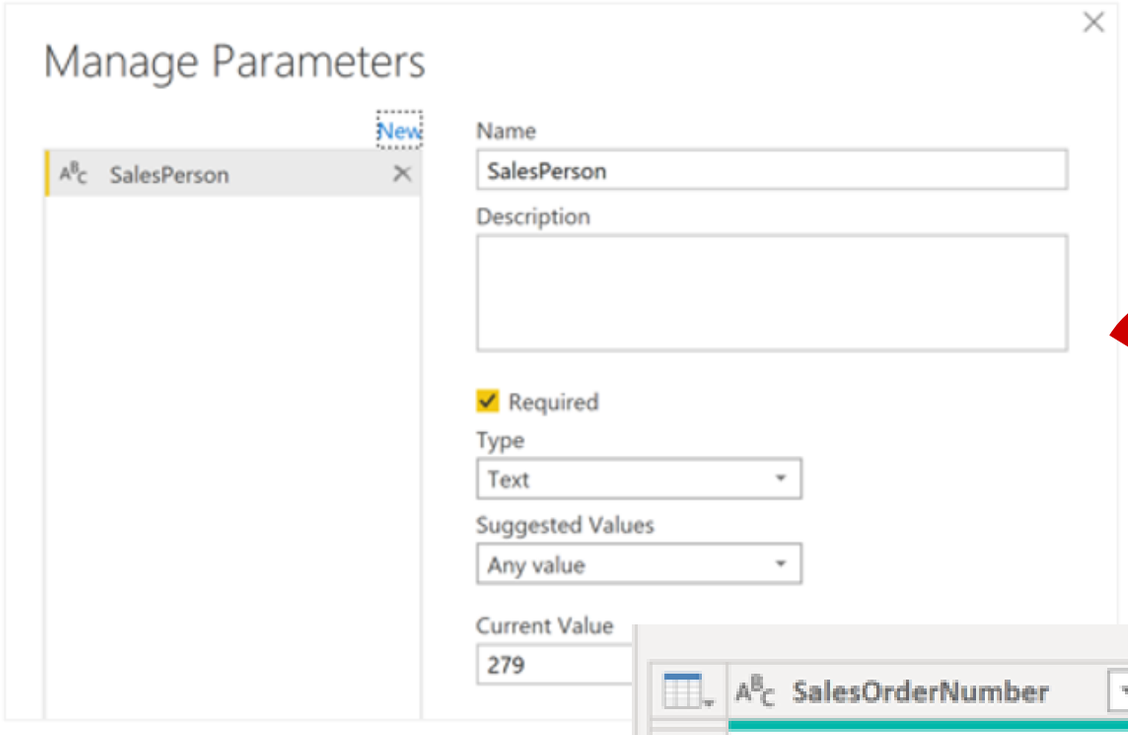
Lesson 1: Parameters

Microsoft Power Platform

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



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

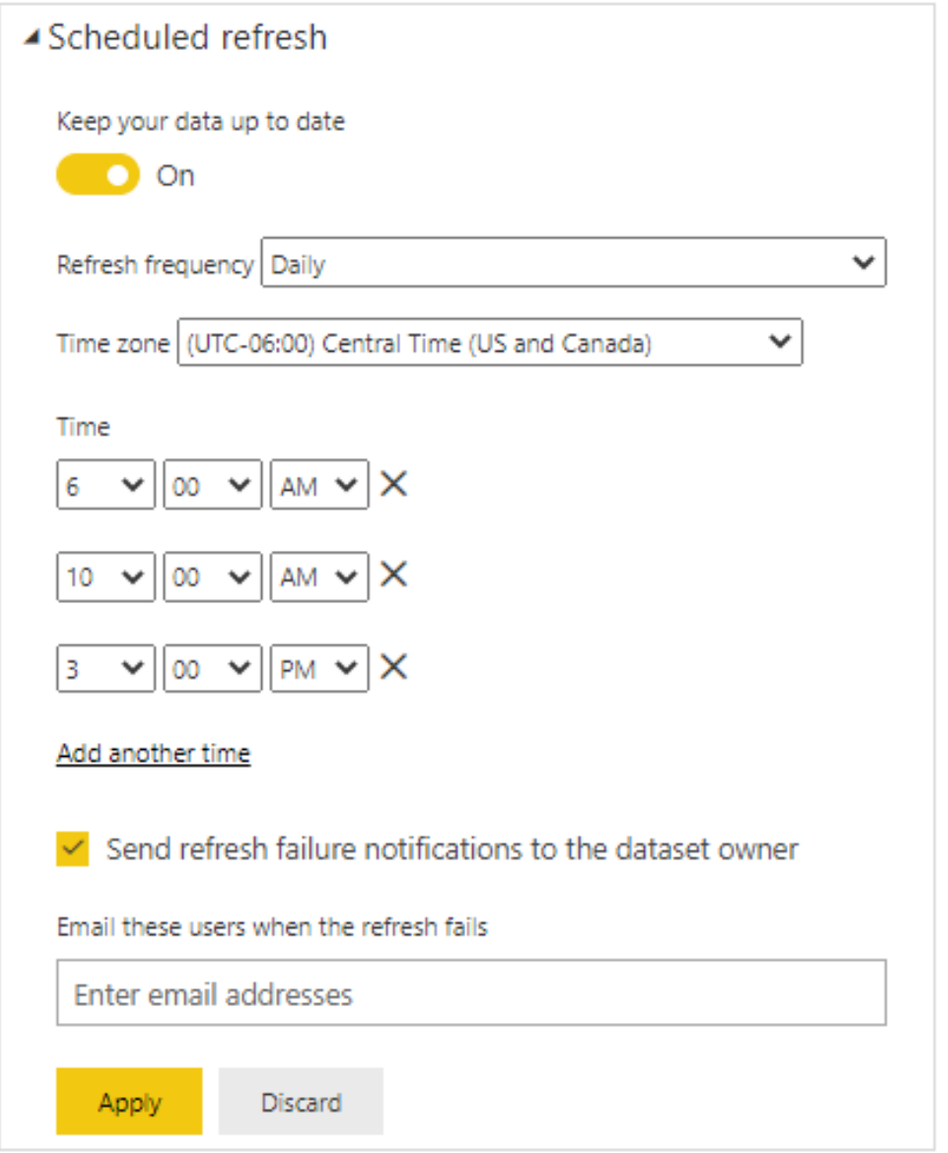
	SalesOrderNumber	SalesOrderID	SalesPersonID	OrderDate
1	SO43659	43659	279	31/05/2011 00:00:00
2	SO43660	43660	279	31/05/2011 00:00:00
3	SO43681	43681	279	31/05/2011 00:00:00
4	SO43684	43684	279	31/05/2011 00:00:00
5	SO43685	43685	279	31/05/2011 00:00:00
6	SO43694	43694	279	31/05/2011 00:00:00
7	SO43695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

Lesson 2: Datasets

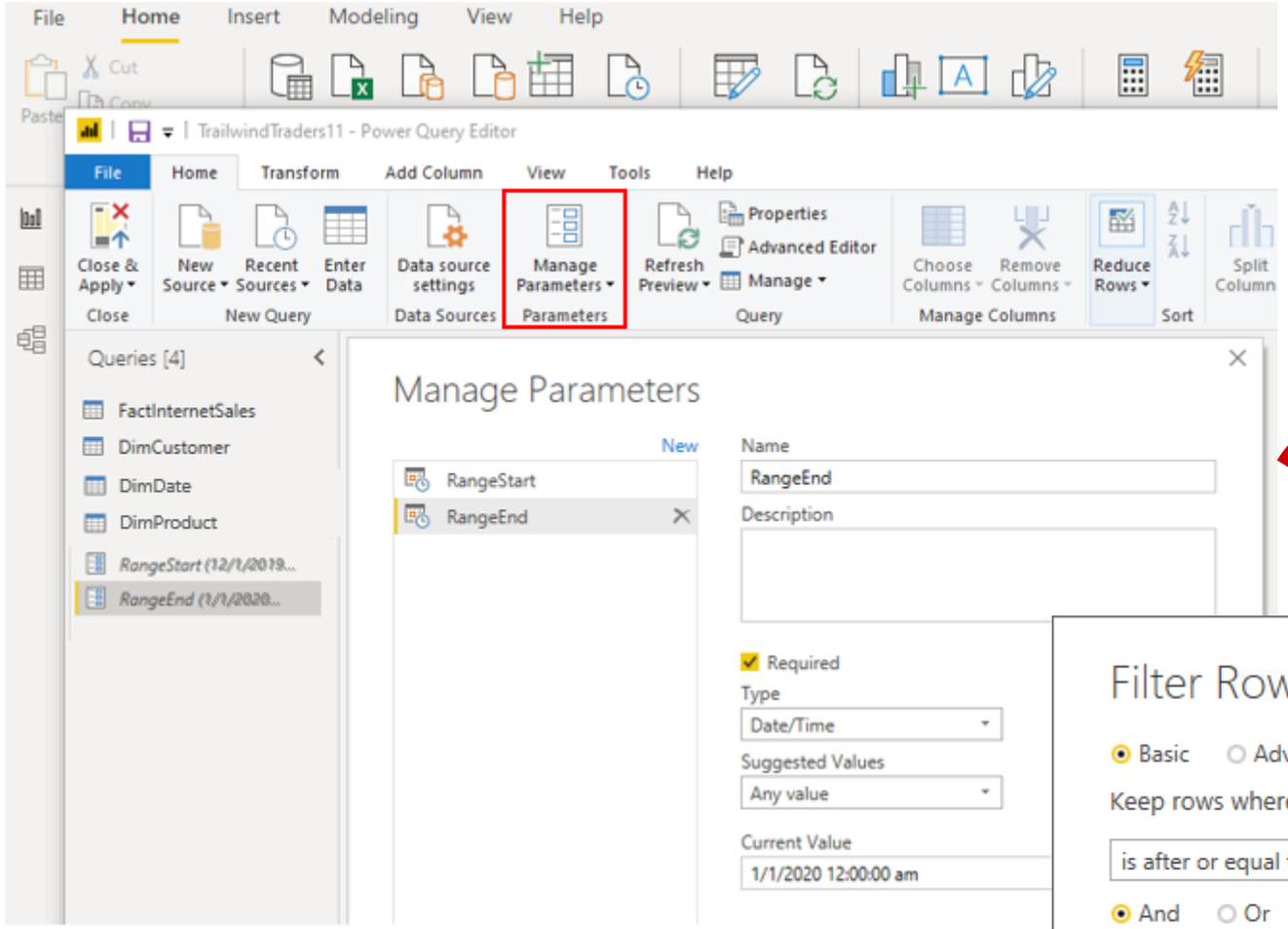
Microsoft Power Platform

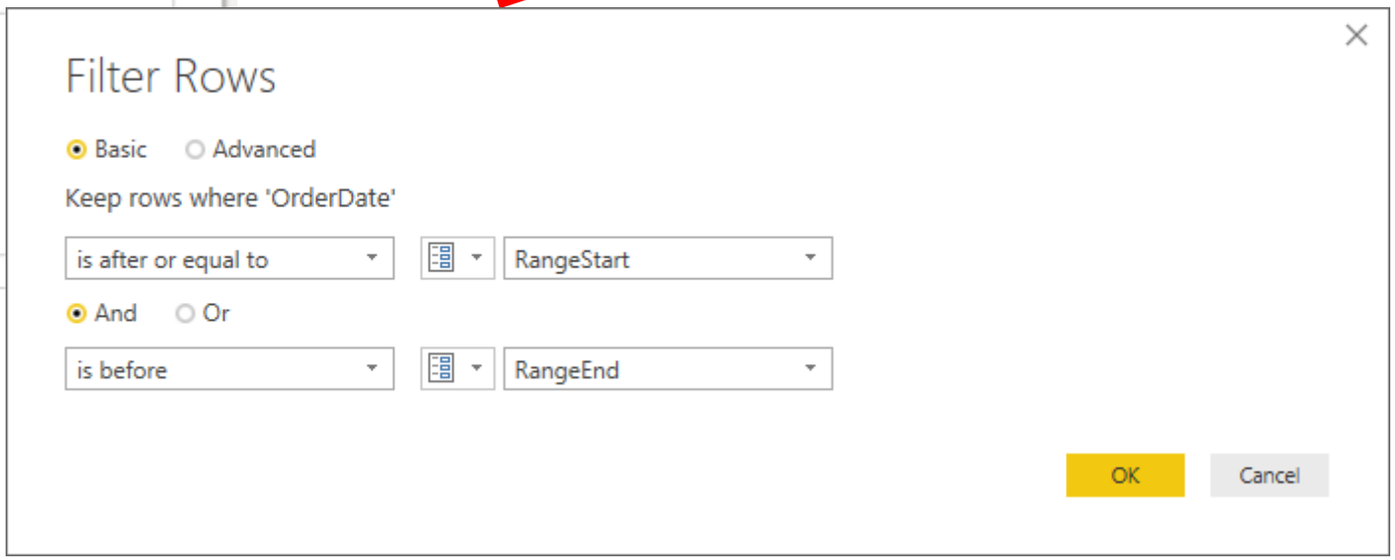
Dataset Scheduled Refresh

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



Incremental Data Refresh Settings



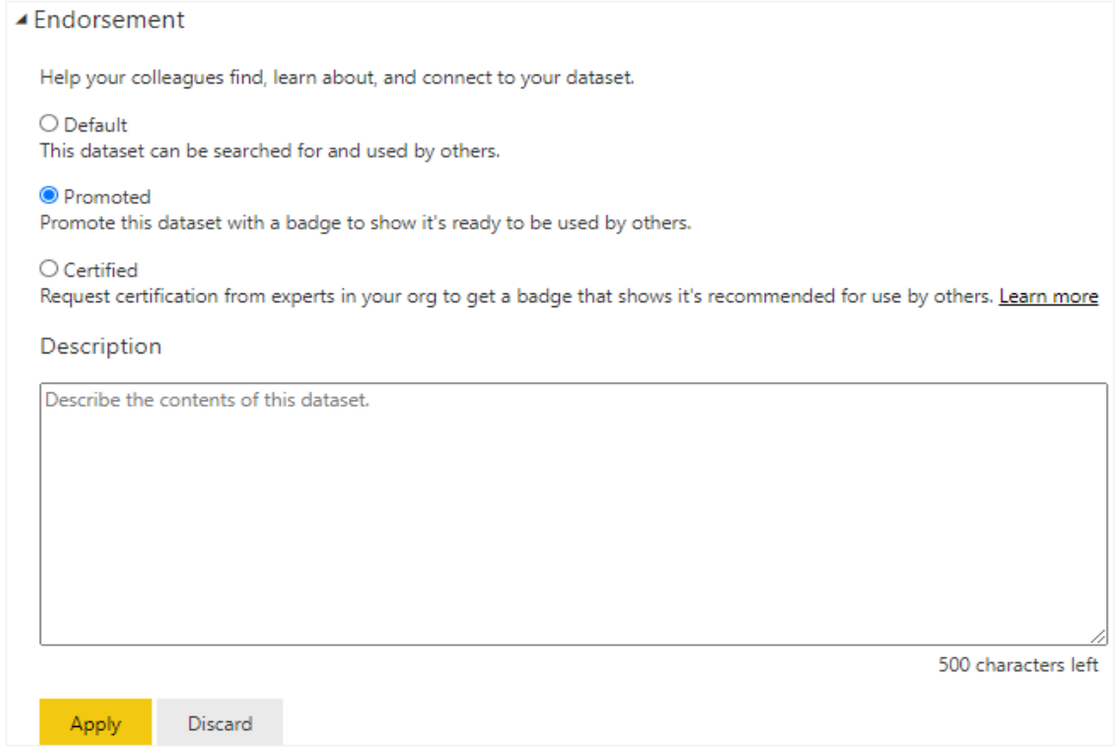


- Refreshes are faster.
- Refreshes are more reliable.
- Resource consumption is reduced.

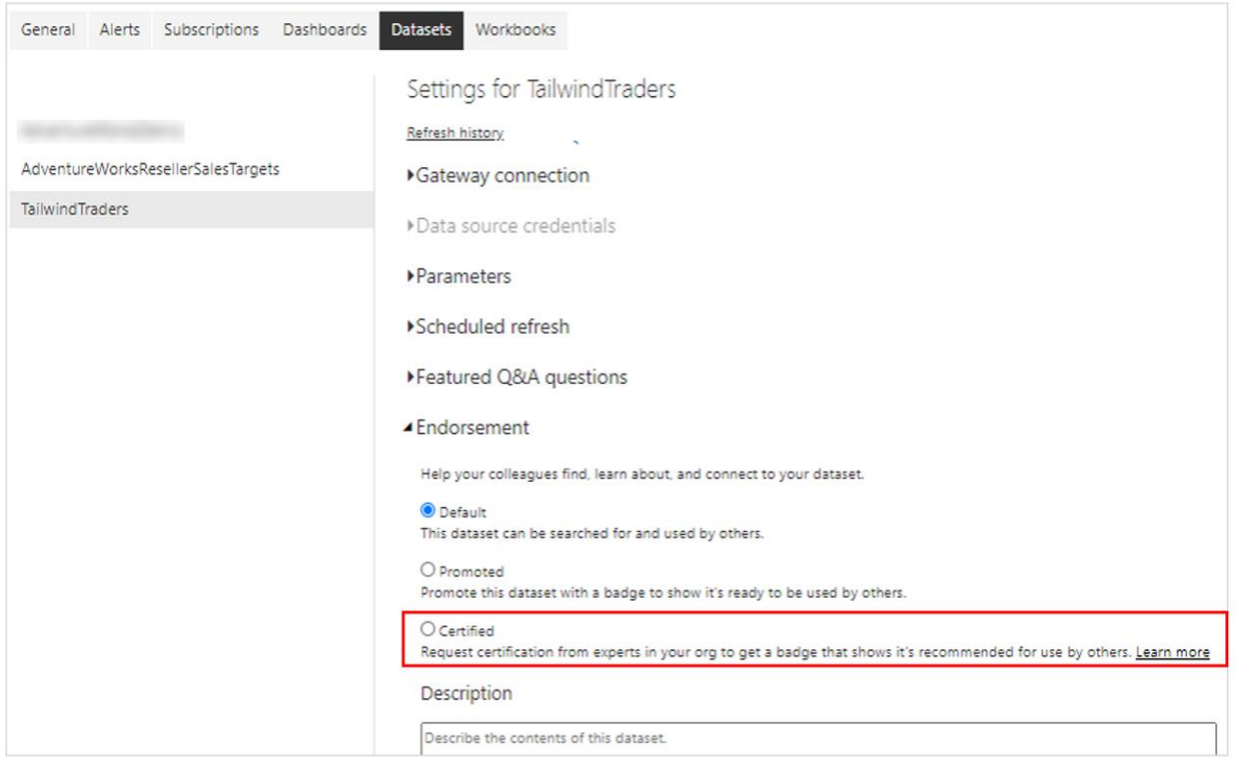
Manage and Promote Datasets

Two options for endorsing a dataset:

Promotion

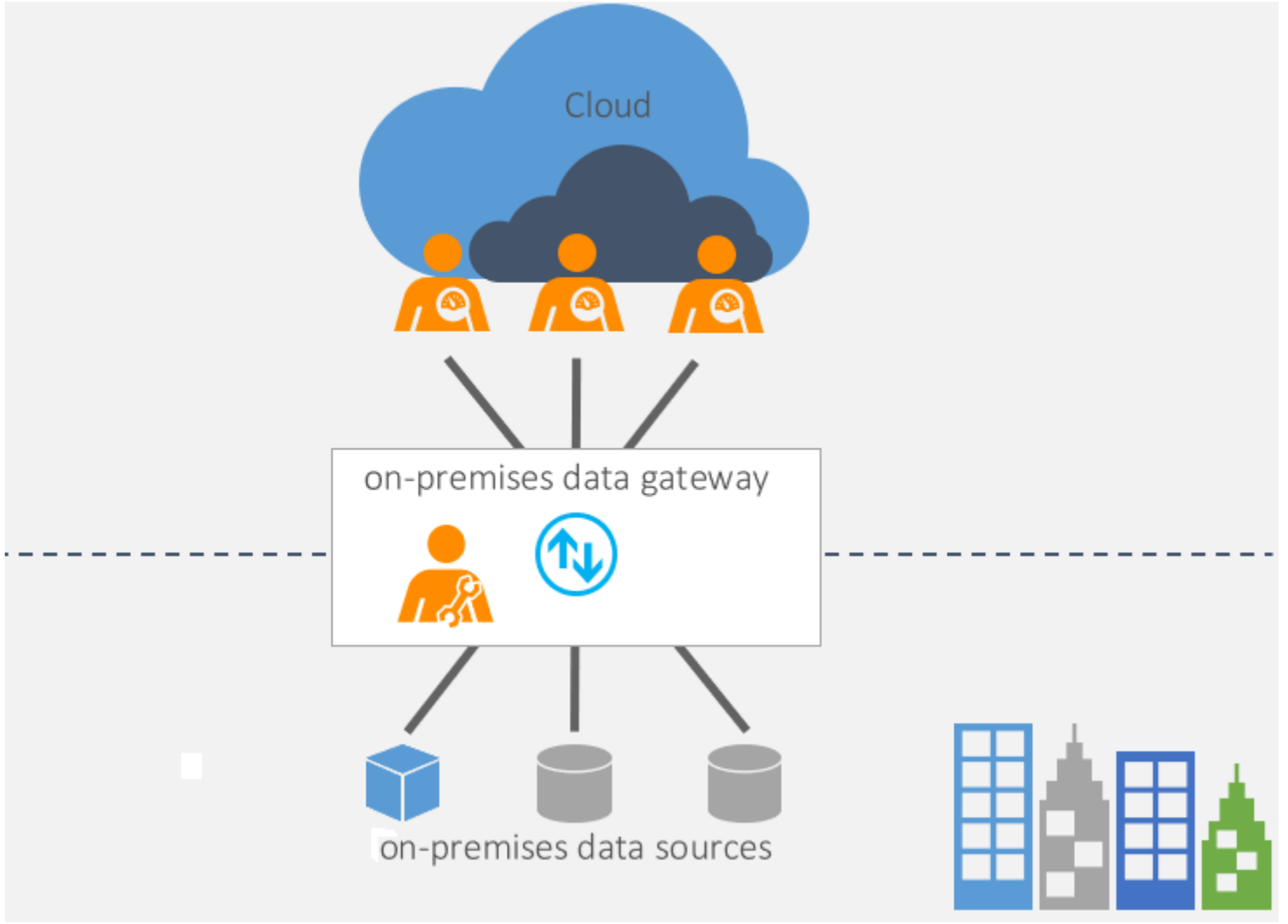


Certification



Troubleshooting Service Connectivity

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

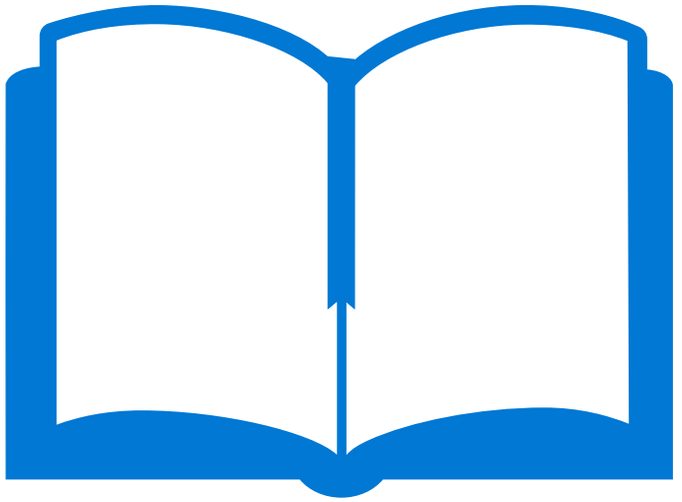


Microsoft Power Platform

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

Microsoft Power Platform

Learning Objectives

You will learn the following concepts:

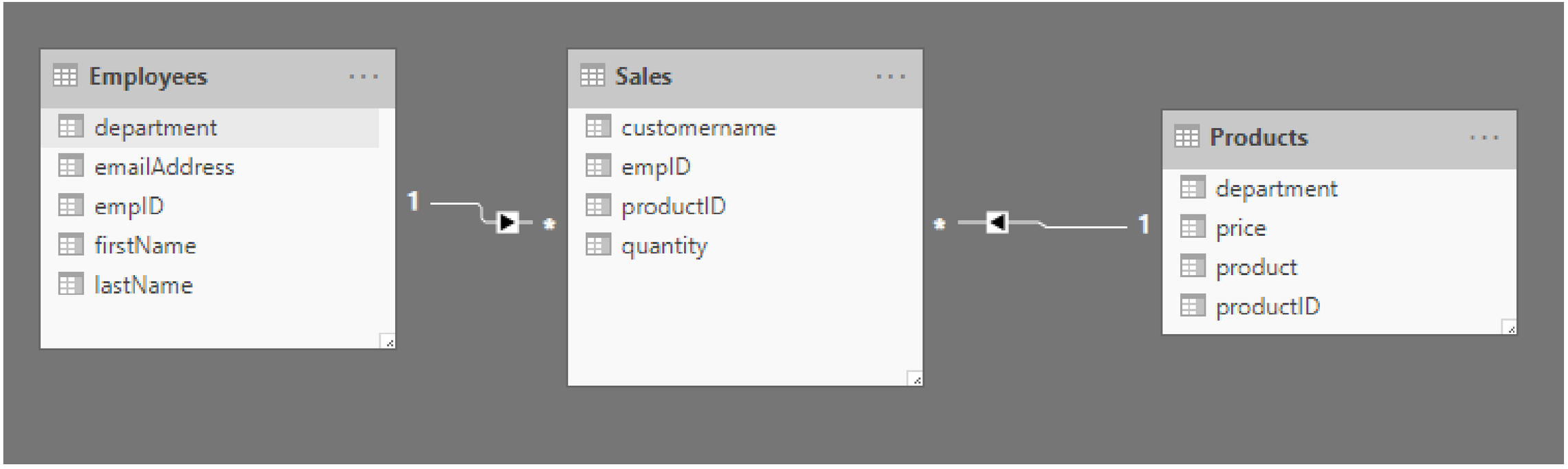
- Security
  - Row-level security
  - Static method
  - Dynamic method

Lesson 1:
Security in Power BI

Microsoft Power Platform

Security overview in Power BI

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



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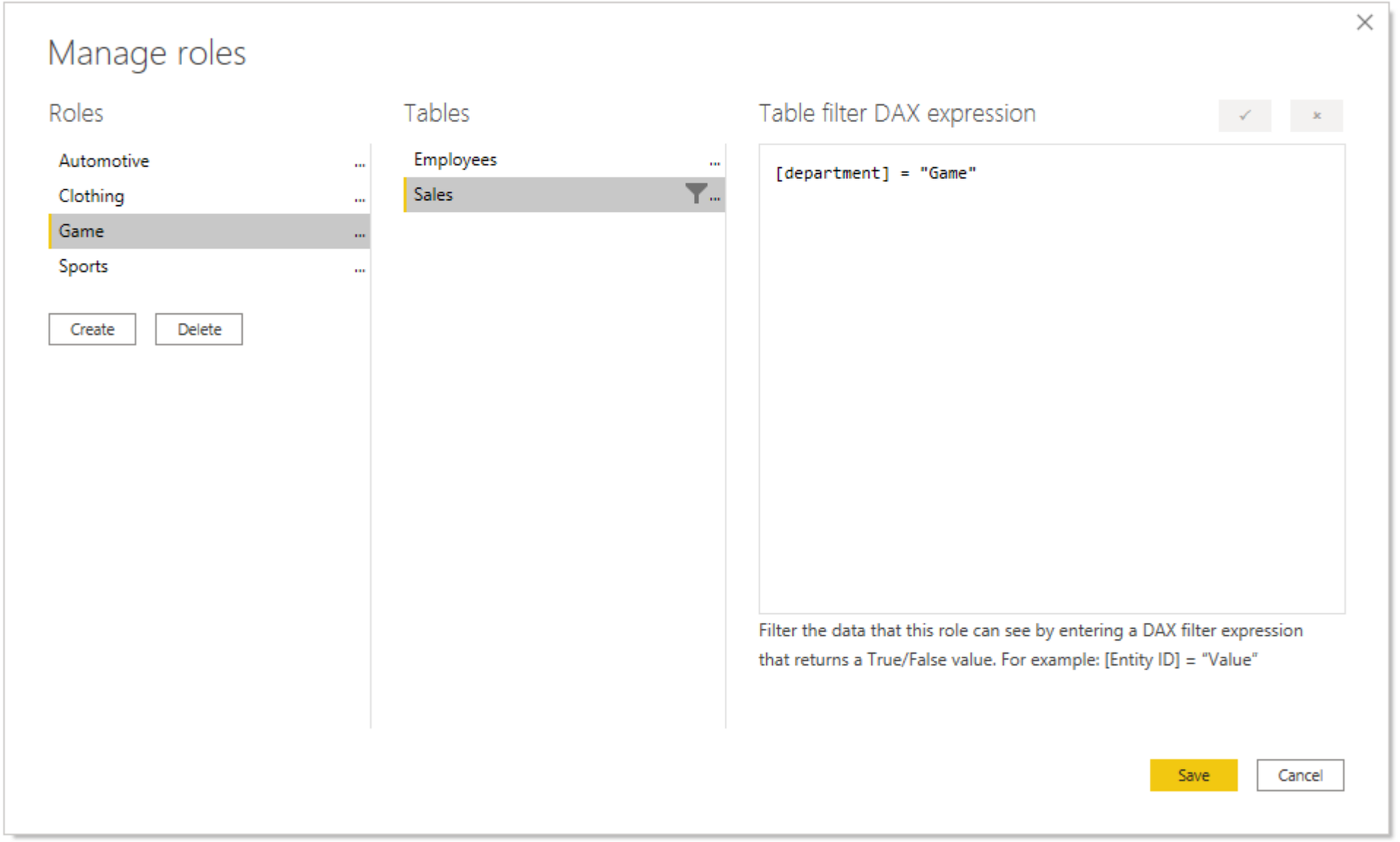
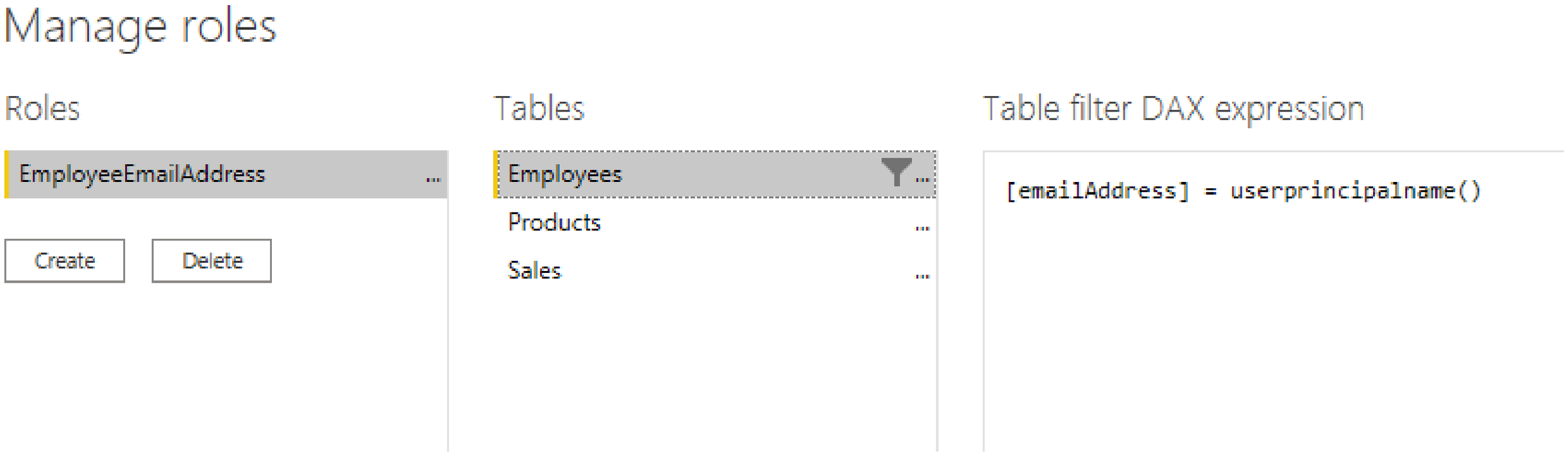
Static Method

Uses a fixed value in the DAX filter.



Dynamic Method

Uses a dynamic value in the DAX filter.

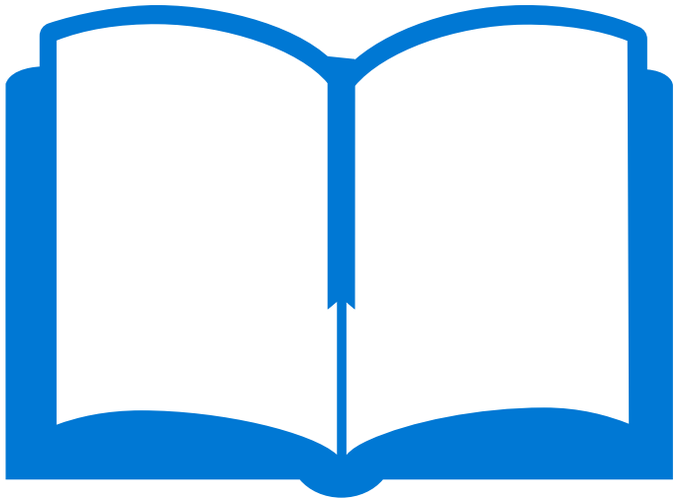


Microsoft Power Platform

References

- DA-100 Implement row-level security

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



… The End …