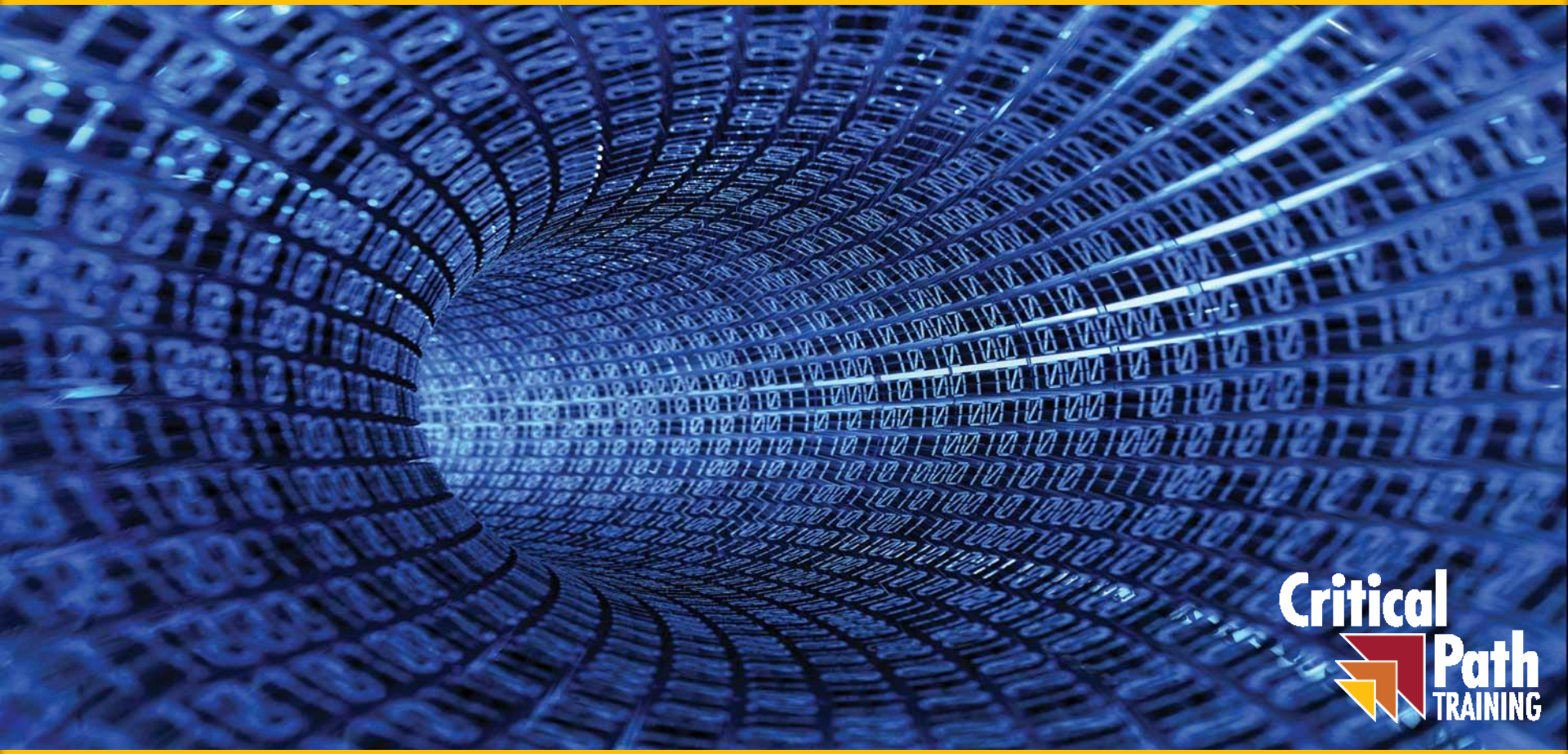
Designing Queries to Extract and Transform Data

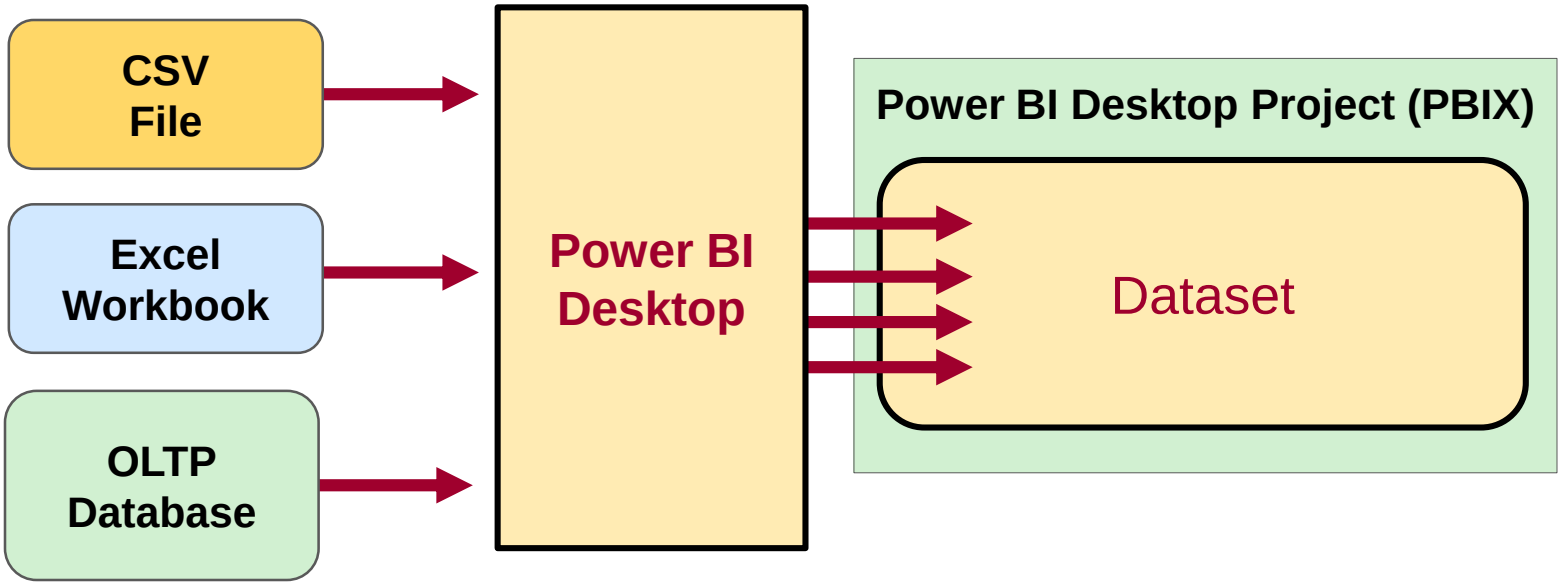


Agenda

- Query Design Fundamentals
- Designing Data Model using a Star Schema
- Working with the Query Editor Window
- Importing Content From SharePoint Online
- Understanding Parameters and Template Files
- Designing with Function Queries

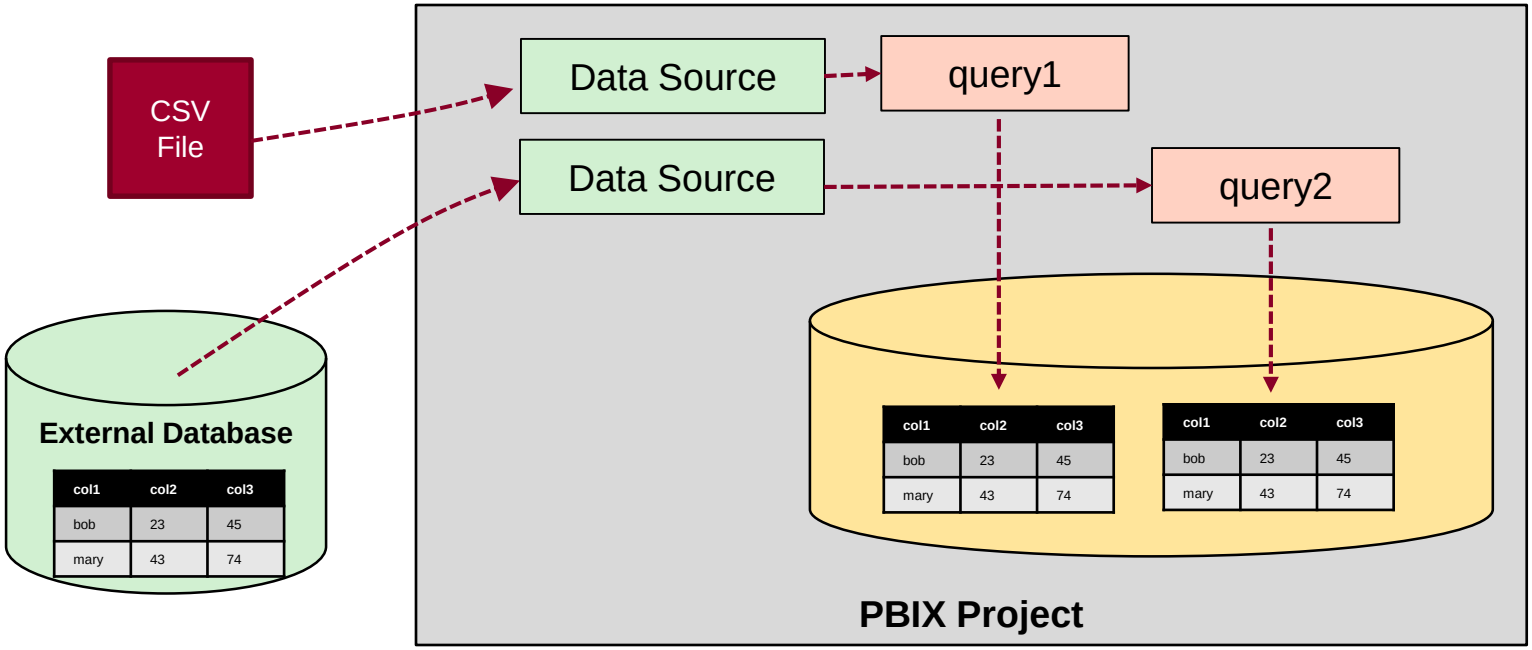
Power BI Desktop is an ETL Tool

- ETL process is essential part of any BI Project
  - **Extract** the data from wherever it lives
  - **Transform** the shape of the data for better analysis
  - **Load** the data into dataset for analysis and reporting



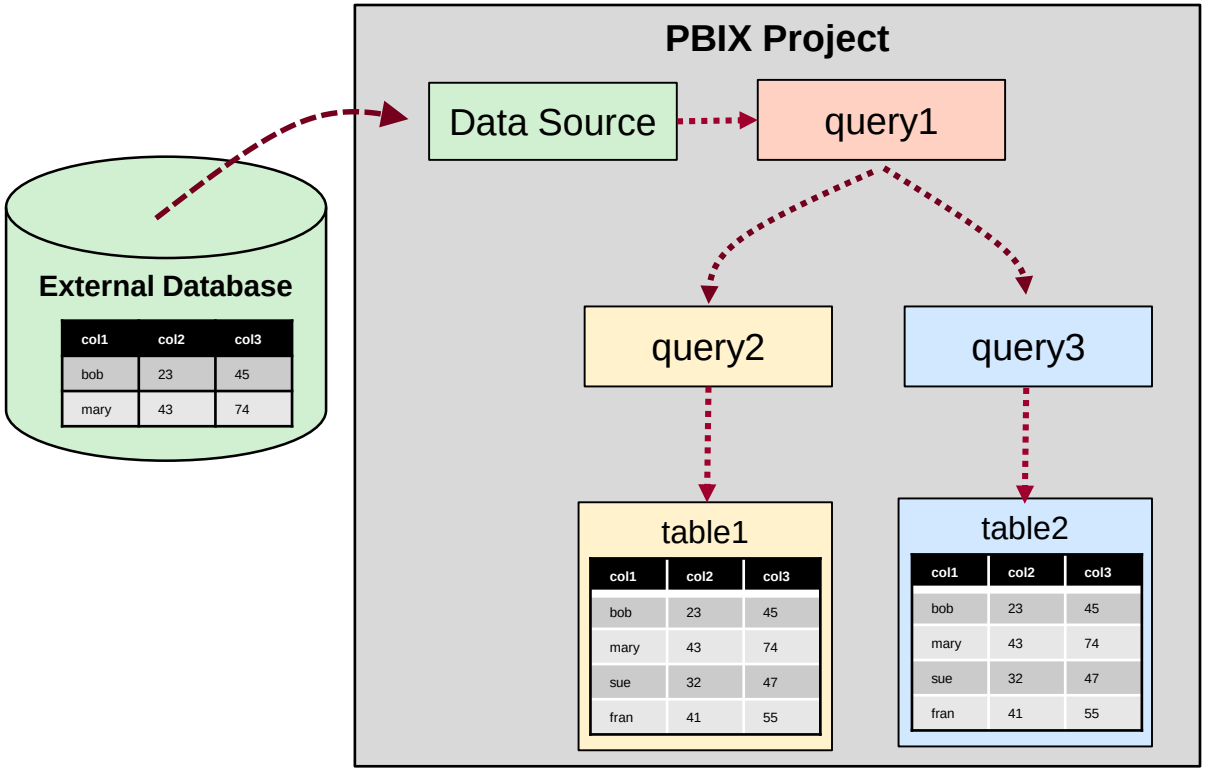
Understanding Query Input and Output

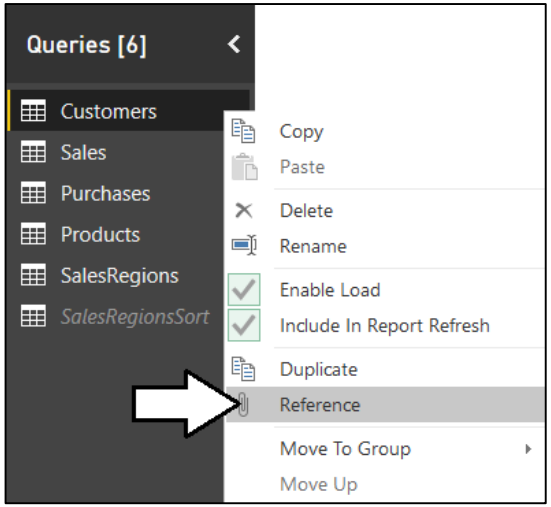
- PBIX project is container for data sources and queries
  - Queries created and saved within scope of Power BI project
  - Queries can pull data from local files
  - Queries can pull data from external content sources
  - Queries main purpose is to load imported data into data model



Query Composition

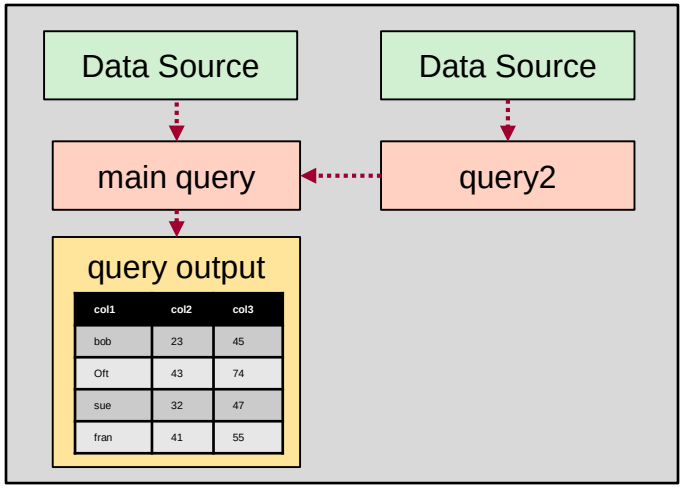
- Query can serve as source for other queries
  - Allows for creation of reusable base queries & query composition
  - Complexity can be hidden in base queries
  - **Reference** command creates new query based on another query

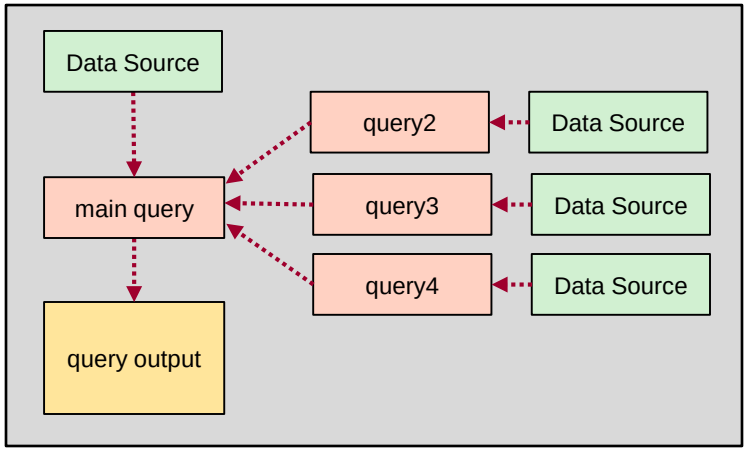




Combining Queries

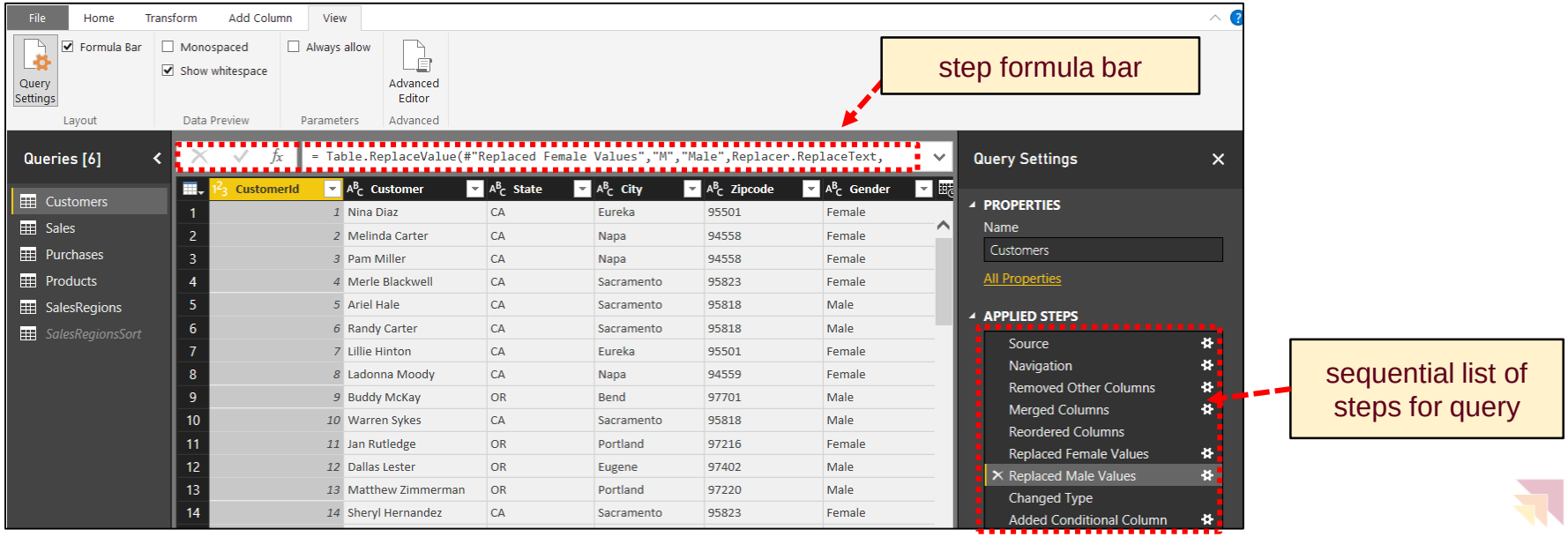
- Query can be merged or appended with another query
  - Merge operation allows you combine columns from two tables
  - Append operation allows you to combine rows from two tables
- Two queries are combined into single output for loading
  - Load settings of main query determines where output is loaded
  - Secondary query acts as source for main query
  - Secondary query be can created with connection-only load setting





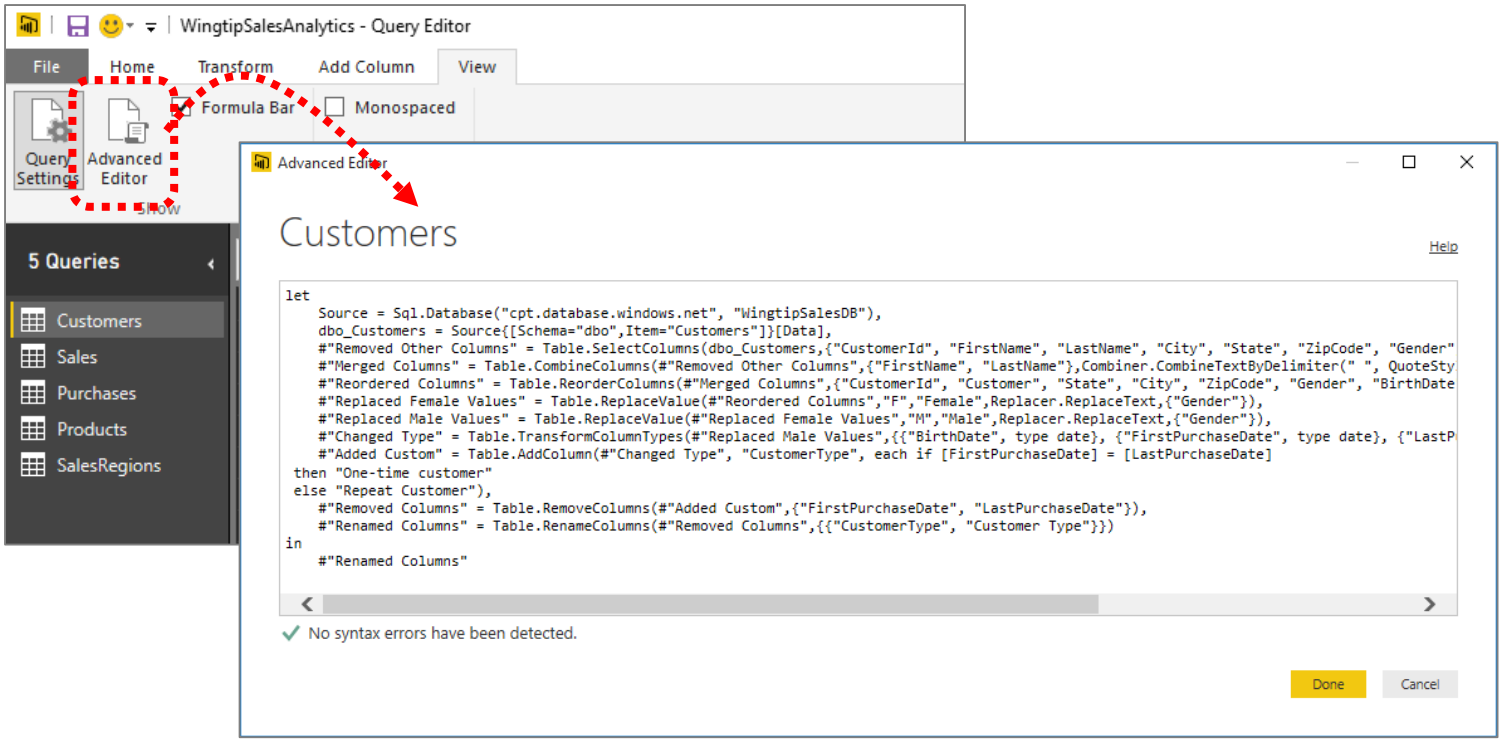
Query Steps

- A query is created as a sequence of steps
  - Each step is a parameterized operation on the data
  - Each step has formula which can be viewed/edited in formula bar
  - Query starts with Source step to extract data from a data source
  - Additional steps added to perform transform operations on data
  - You can replay query operations one by one by clicking on steps



Advanced Editor

- Power BI Desktop based on "M" functional language
  - Query in Power BI Desktop saved as set of M statements in code
  - Query Editor generates code in M behind the scenes
  - Advanced users can view & modify query code in Advanced Editor



Agenda

- ✓ Query Design Fundamentals
- ➢ Designing Data Model using a Star Schema
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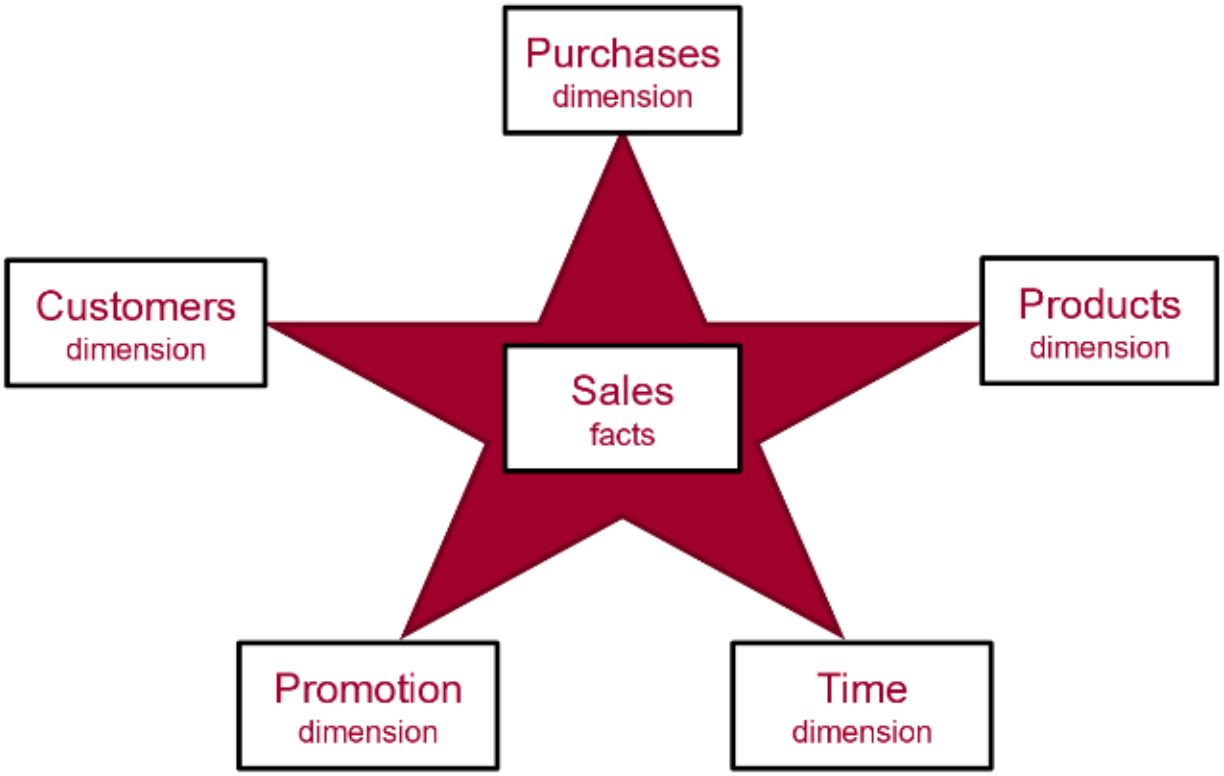
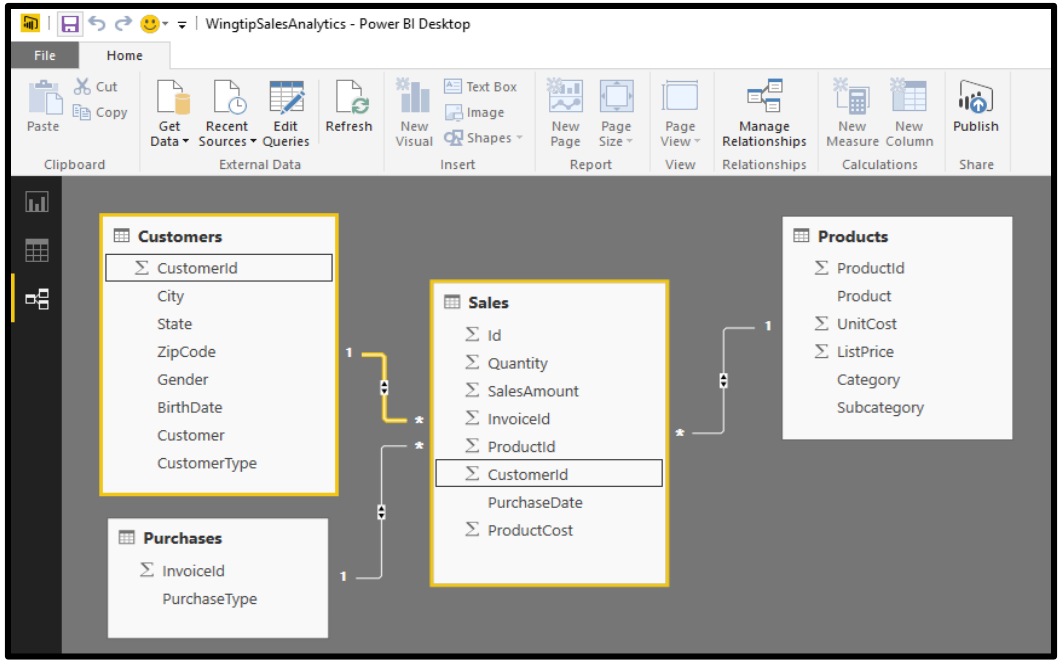
Data Modeling using a Star Schema

- OLAP Modeling often based on Star Schema
  - Tables defined as fact tables or dimension tables
  - Fact tables related to dimension table using 1-to-many relationships



Designing Queries to Build a Star Schema

- Converts OLTP Data Model to OLAP Data Model
  - Sales table is modeled as a OLAP Fact Table
  - Other tables are modeled as OLAP Dimension tables
  - Requires pulling CustomerId column into Sales table
  - All dimension tables should be directly related to fact table




DEMO
Exploring the Wingtip Sales Analysis Demo Project

Agenda

- ✓ Query Design Fundamentals
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- ➢ Working with the Query Editor Window
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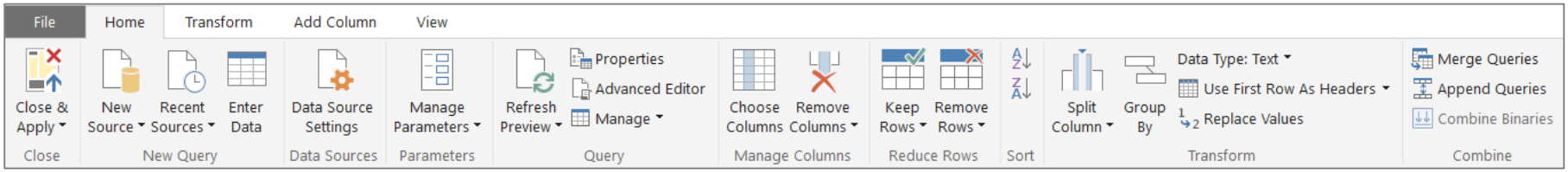
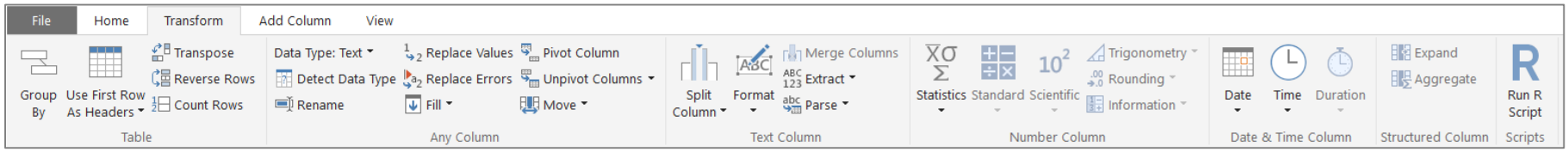
Query Editor Ribbon Tabs

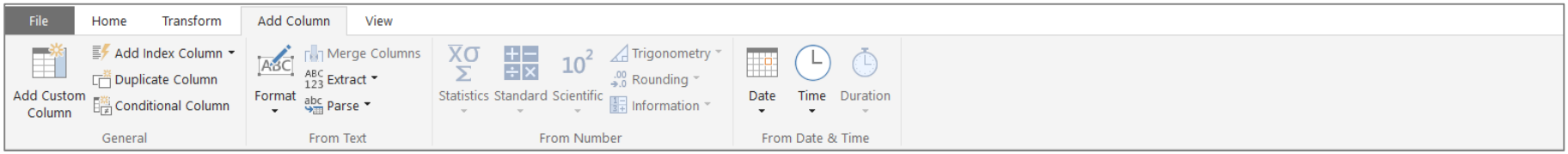
Home tab



Transform tab



Add Column tab



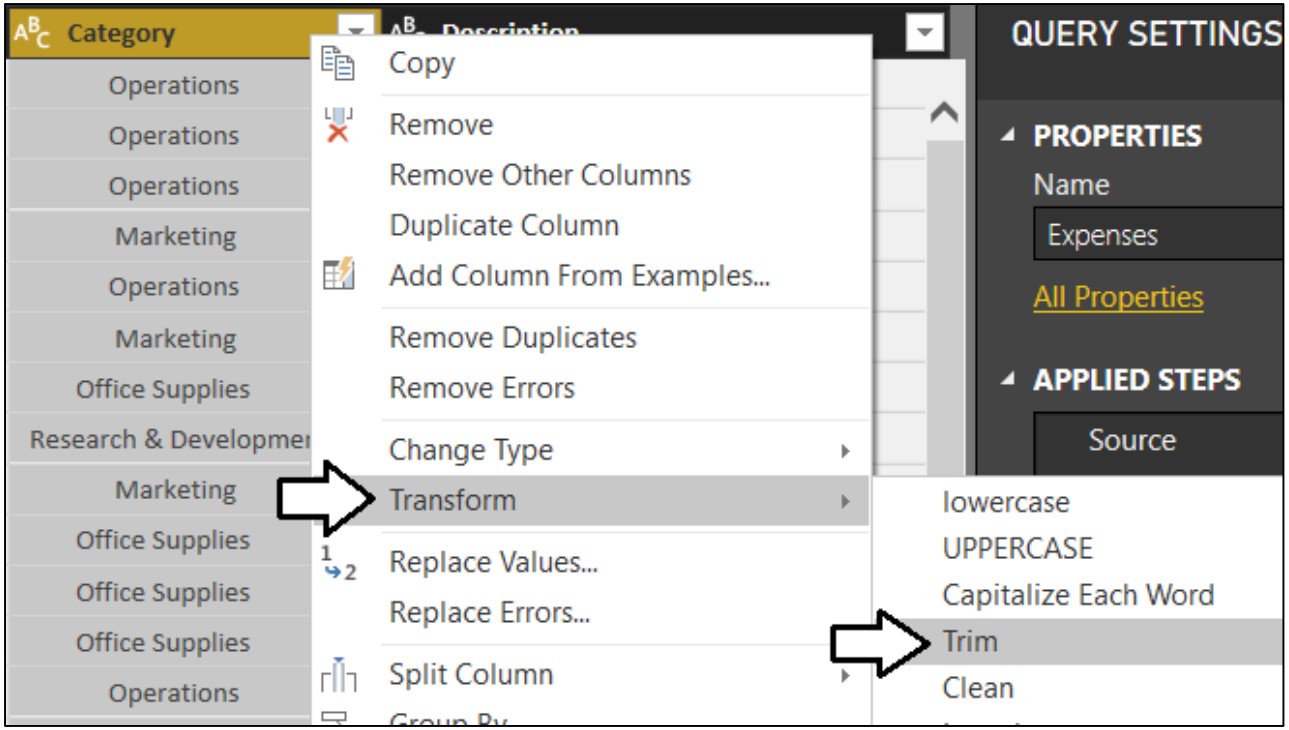
View tab

Examples of Basic Power BI Desktop Steps

- Rename column
- Convert column type
- Format column values
- Reorder columns
- Replace column values
- Expanding related column
- Merging columns
- Splitting columns

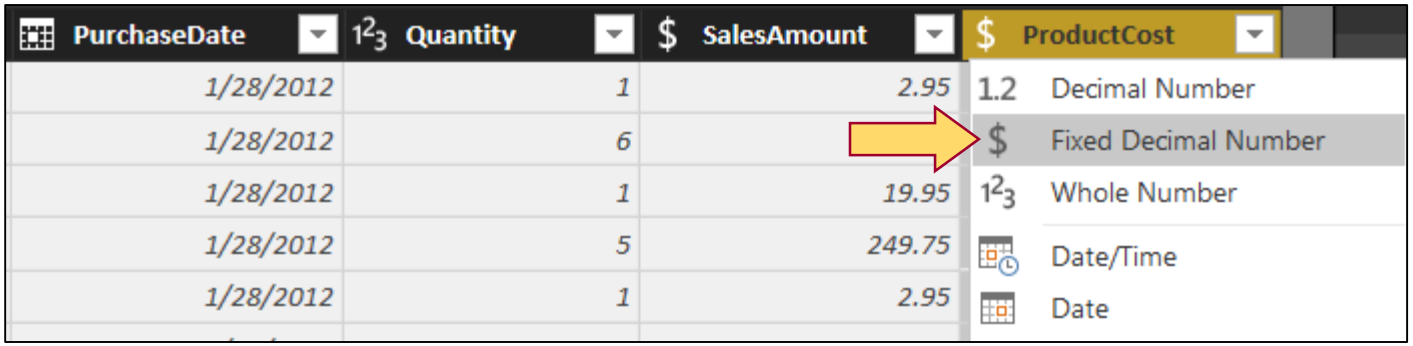
Cleaning Data

- Special steps available to clean up string-based data
  - **Transform > Trim** removes whitespace
  - **Transform > Clean** removed non-printable characters



Converting Column Types

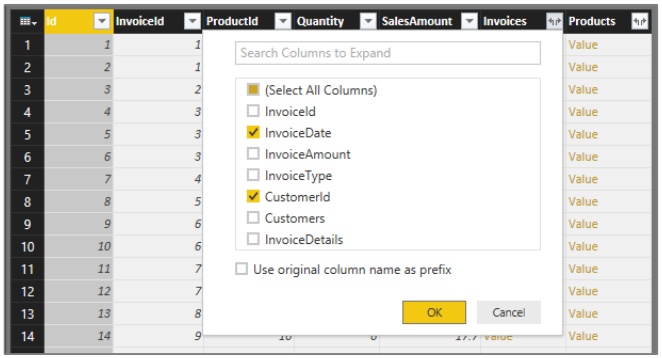
- Transform data to make it more reliable
  - Convert date-time column to date column
- Transform data to make it more efficient
  - Convert decimal to fixed decimal number for currency



Expanding Related Columns

- Used to pull data from related tables
  - Saves you from performing SQL joins or VLOOKUP

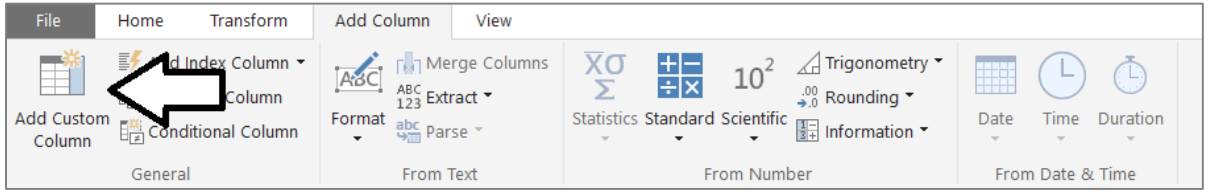
SalesAmount	Invoices	
119.8	Value	Value
29.95	Value	Value
59.9	Value	Value
399.6	Value	Value
29.9	Value	Value
59.8	Value	Value

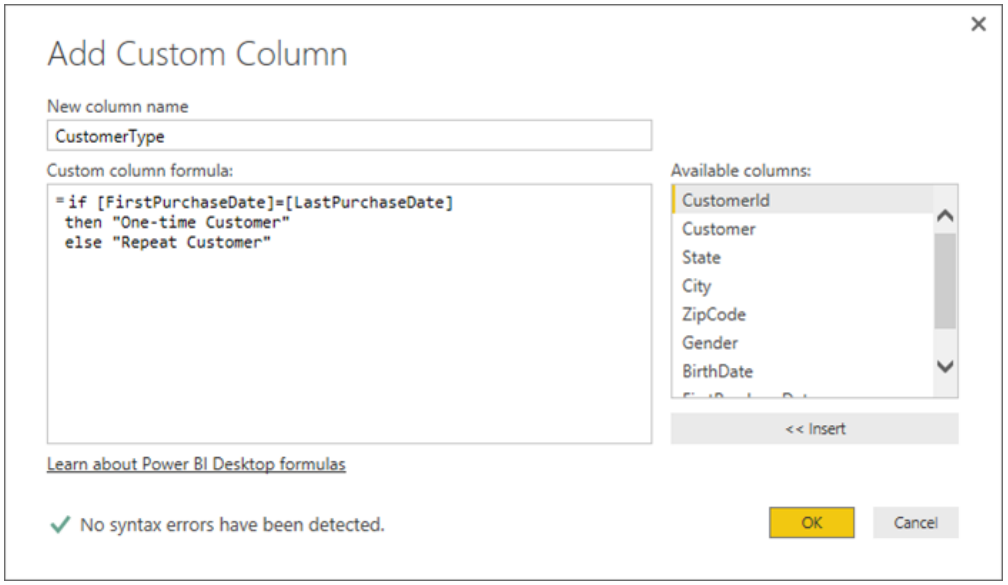


	Id	InvoiceId	ProductId	Quantity	SalesAmount	InvoiceDate	CustomerId	Products
1	1	1	22	4	119.8	1/28/2012 12:00:00 AM	1	Value
2	2	1	22	1	29.95	1/28/2012 12:00:00 AM	1	Value
3	3	2	22	2	59.9	1/28/2012 12:00:00 AM	2	Value
4	4	3	17	8	399.6	1/28/2012 12:00:00 AM	3	Value
5	5	3	18	2	29.9	1/28/2012 12:00:00 AM	3	Value
6	6	3	18	4	59.8	1/28/2012 12:00:00 AM	3	Value
7	7	4	16	1	2.95	1/28/2012 12:00:00 AM	4	Value

Adding a Custom Column

- Custom column provide custom logic
  - Logic must be written in M programming language

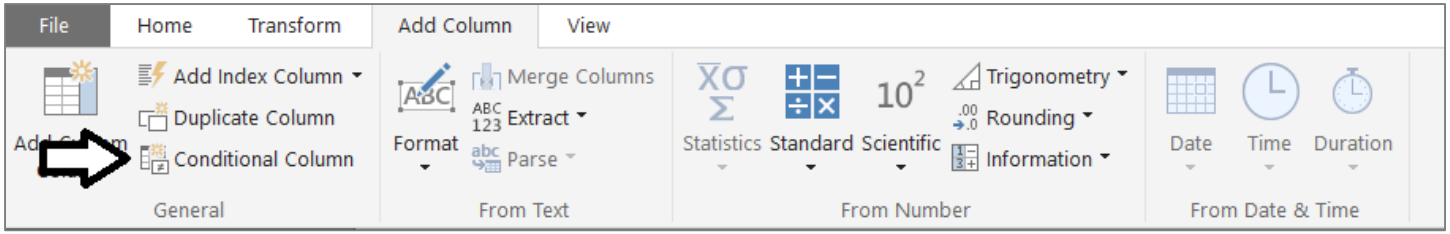


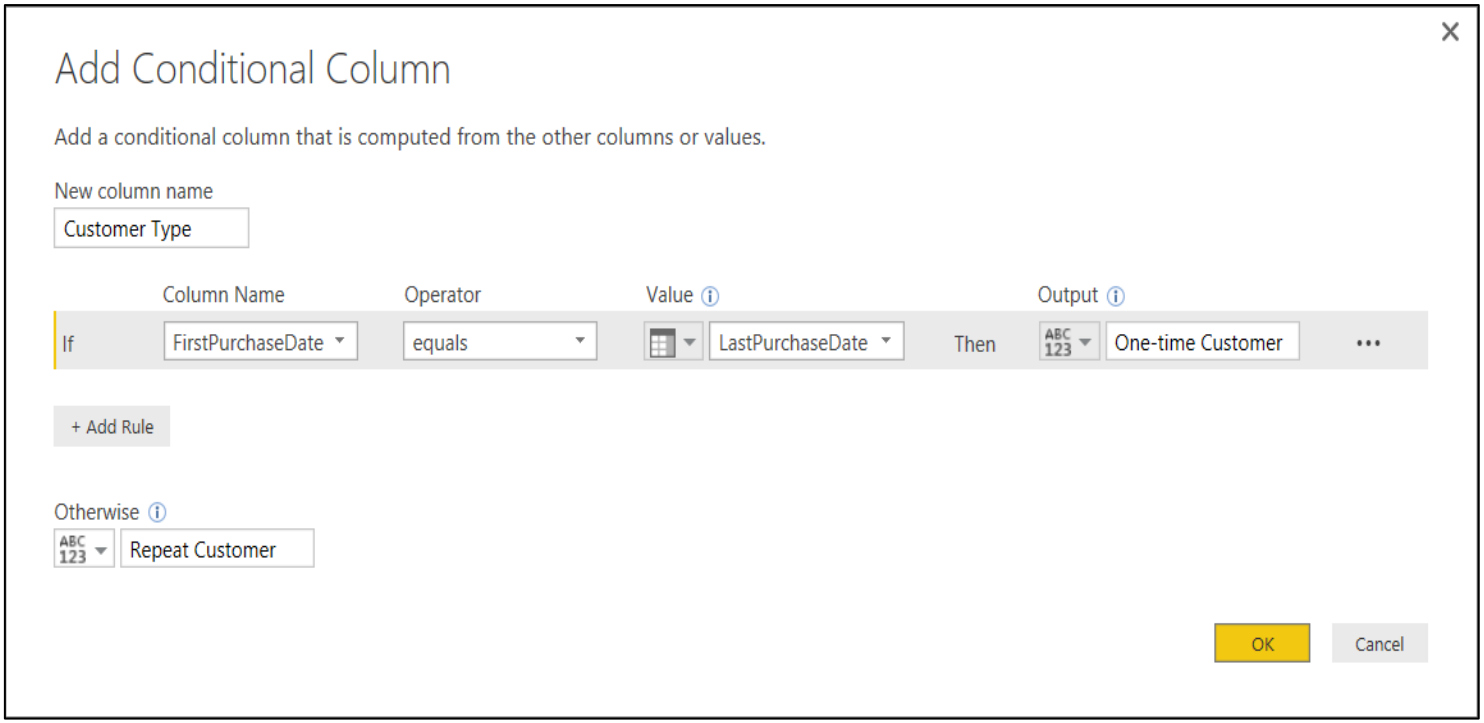


FirstPurchaseDate	LastPurchaseDate	CustomerType
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/29/2012	11/22/2015	Repeat Customer
1/29/2012	10/2/2015	Repeat Customer
1/29/2012	1/29/2012	One-time Customer
1/29/2012	5/6/2015	Repeat Customer
1/29/2012	1/29/2012	One-time Customer

Adding a Conditional Column

- Abstracts away need to write M code





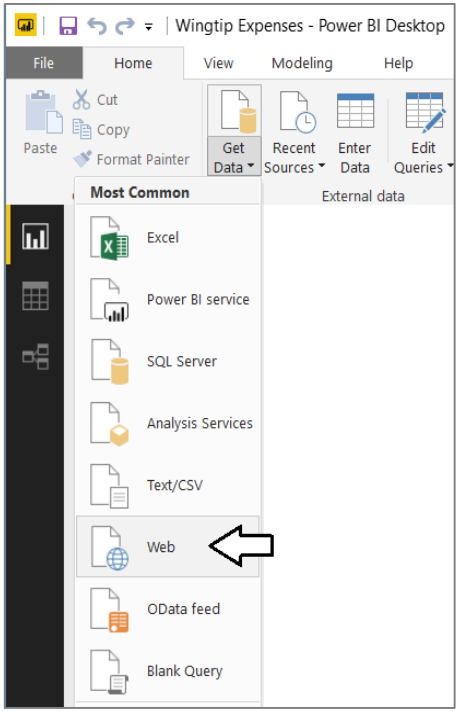

DEMO
Using Queries to Transform Data During the Load Process

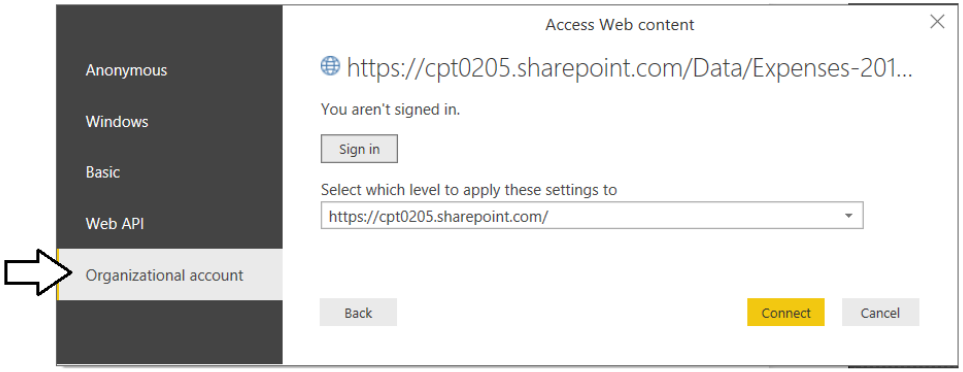
Agenda

- ✓ Query Design Fundamentals
- ✓ Designing Data Model using a Star Schema
- ✓ Working with the Query Editor Window
- ➢ Importing Content From SharePoint Online
- Understanding Parameters and Template Files
- Designing with Function Queries

Importing Files using the Web Datasource

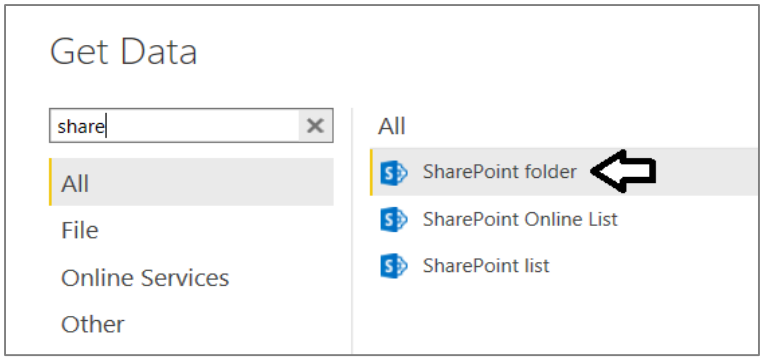
- Files in SharePoint document library exposed via HTTPS
  - Use **Web** datasource to import files in SharePoint Online
  - Use the absolute path to file in document library
  - Authenticate using **Organizational account**



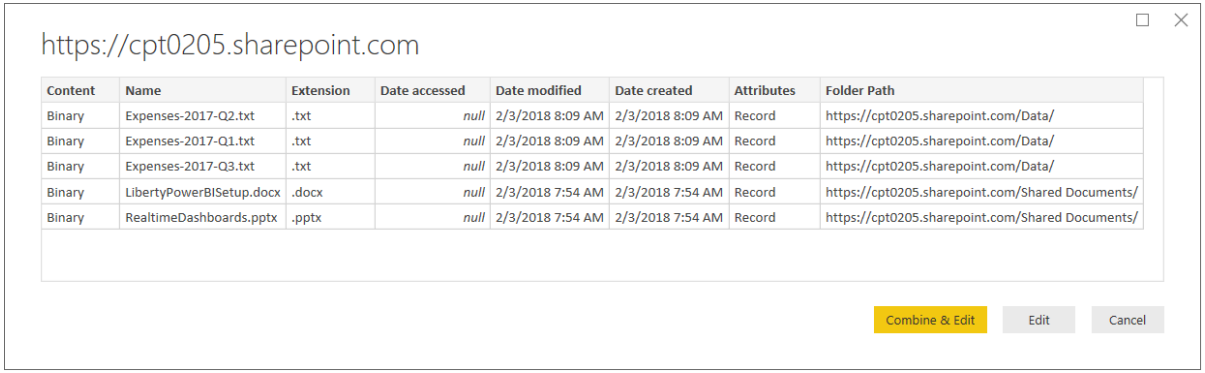


Importing using the SharePoint Folder

- Select the **SharePoint folder** datasource



- Query returns a row for each file in the site



Content	Name	Extension	Date accessed	Date modified	Date created	Attributes	Folder Path
Binary	Expenses-2017-Q2.txt	.txt	*null*	2/3/2018 8:09 AM	2/3/2018 8:09 AM	Record	https://cpt0205.sharepoint.com/Data/
Binary	Expenses-2017-Q1.txt	.txt	*null*	2/3/2018 8:09 AM	2/3/2018 8:09 AM	Record	https://cpt0205.sharepoint.com/Data/
Binary	Expenses-2017-Q3.txt	.txt	*null*	2/3/2018 8:09 AM	2/3/2018 8:09 AM	Record	https://cpt0205.sharepoint.com/Data/
Binary	LibertyPowerBISetup.docx	.docx	*null*	2/3/2018 7:54 AM	2/3/2018 7:54 AM	Record	https://cpt0205.sharepoint.com/Shared Documents/
Binary	RealtimeDashboards.pptx	.pptx	*null*	2/3/2018 7:54 AM	2/3/2018 7:54 AM	Record	https://cpt0205.sharepoint.com/Shared Documents/


DEMO
Importing Content from Files in SharePoint Online

Agenda

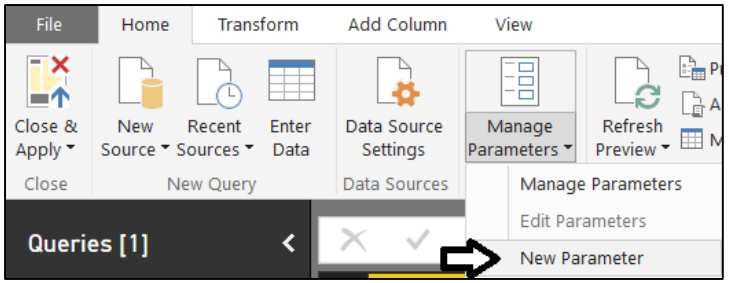
- ✓ Query Design Fundamentals
- ✓ Designing Data Model using a Star Schema
- ✓ Working with the Query Editor Window
- ✓ Importing Content From SharePoint Online
- ➢ Understanding Parameters and Template Files
- • Designing with Function Queries

Query Parameters

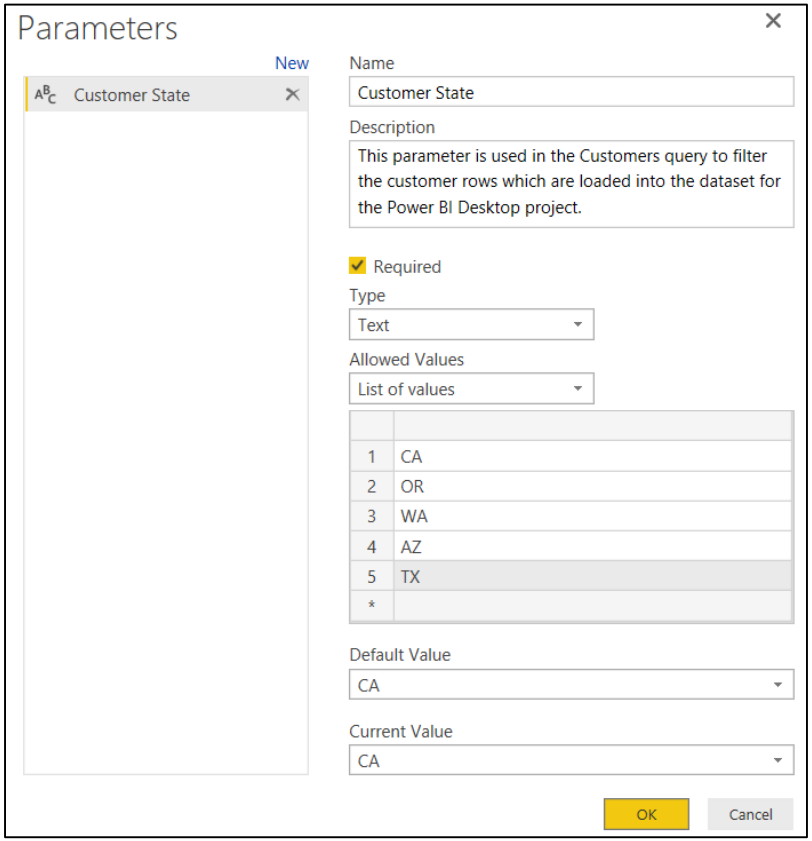
- What is a Query Parameter?
  - Configurable setting with project scope
  - Strongly-typed value to which you can apply restrictions
  - Can be referenced from a query
  - Can be referenced from DAX code in data model
- Where are Parameters commonly used
  - To parameterize data source connection details
  - To filter rows when importing data

Creating Query Parameters

- Parameters can be created using **Manager Parameters** menu

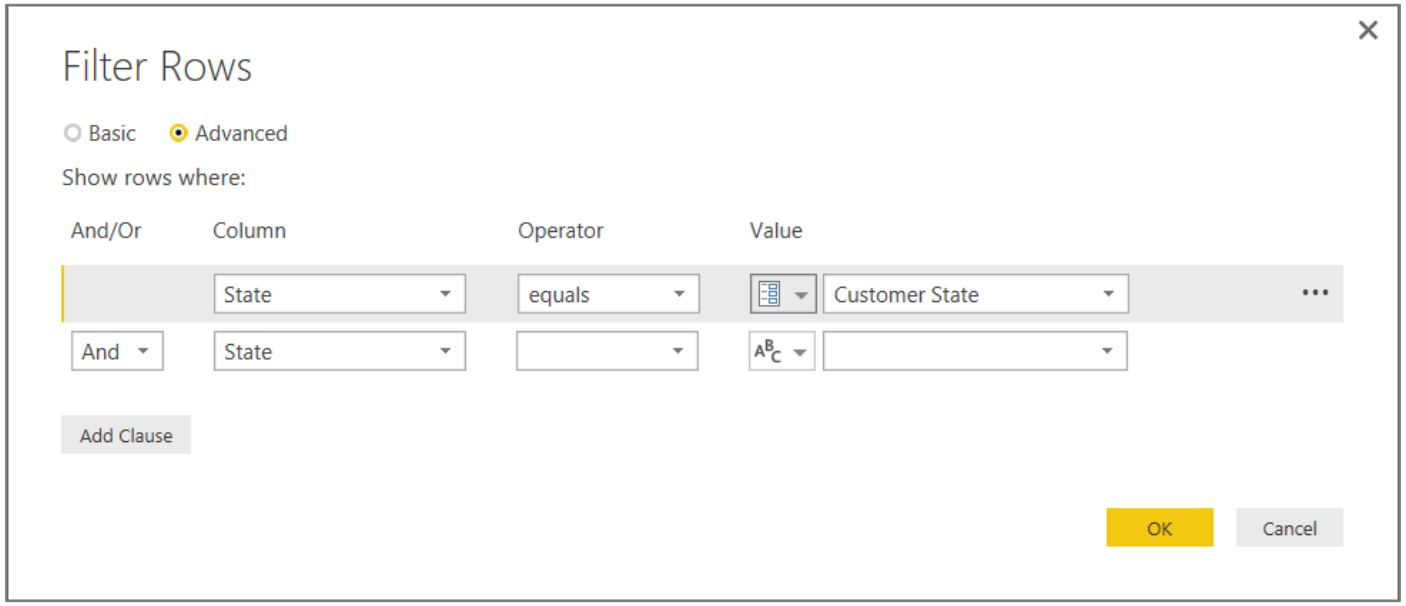


- Parameter properties
  - Name
  - Description
  - Required
  - Allowed Values
  - Default Value
  - Current Value



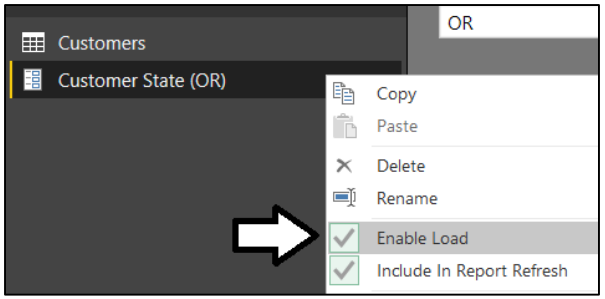
Referencing Parameters in a Query

- Parameters can be referenced inside query
  - Next query execution uses current parameter value

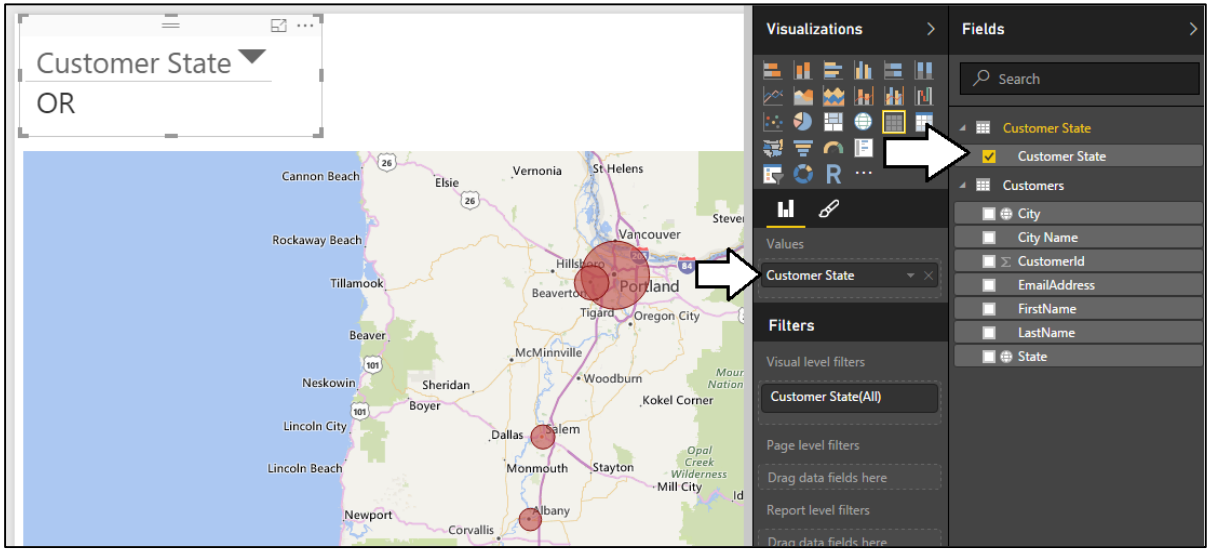


Making Parameters Available to Data Model

- Configure parameter's Enable Load setting

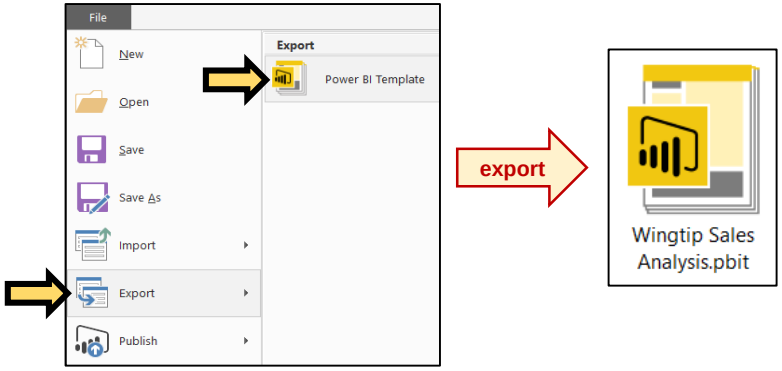


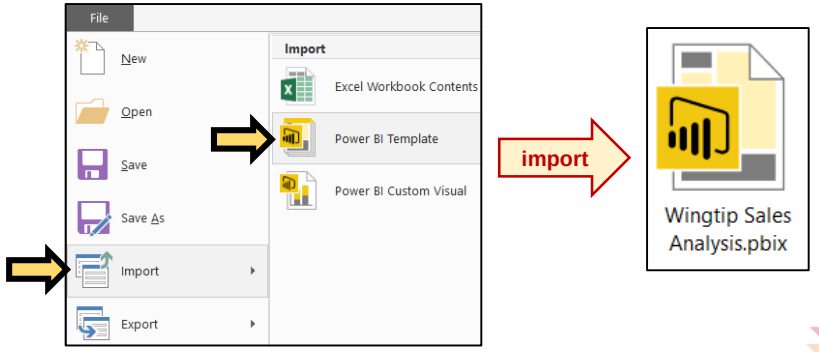
- Parameter becomes visible within fields list in report view



Power BI Project Template Files

- PBIX project can be exported to project template file
  - Template file created with PBIT file extension
  - Generated template files contains everything except for the data
  - PBIT template file can be imported to create new PBIX projects
  - Template files are powerful when used together with parameters
- How are template files used?
  - Export PBIX project to create a PBIT template file
  - Import the PBIT template file to create a new PBIX project





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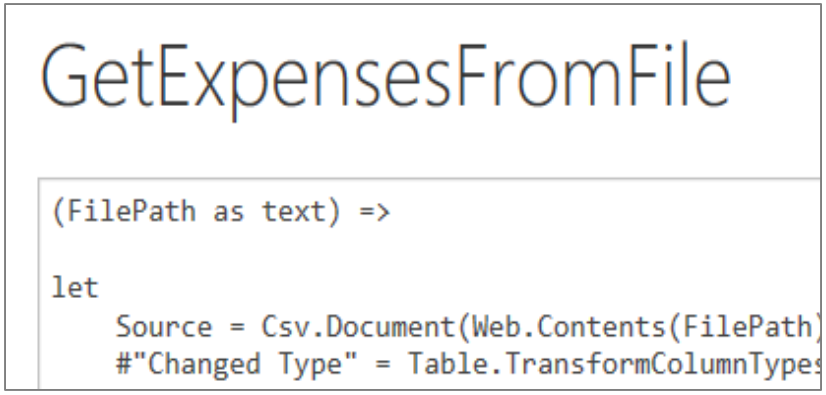
- ➢ Designing with Function Queries

Understanding Function Queries

- Query can be converted into reusable function
  - Requires editing query M code in Advanced Editor
  - Function query can be defined to accept parameters



  - Function query can't be edited with visual designer


DEMO
Creating a Function Query

Summary

- ✓ Query Design Fundamentals
- ✓ Designing Data Model using a Star Schema
- ✓ Working with the Query Editor Window
- ✓ Importing Content From SharePoint Online
- ✓ Understanding Parameters and Template Files
- ✓ Designing with Function Queries