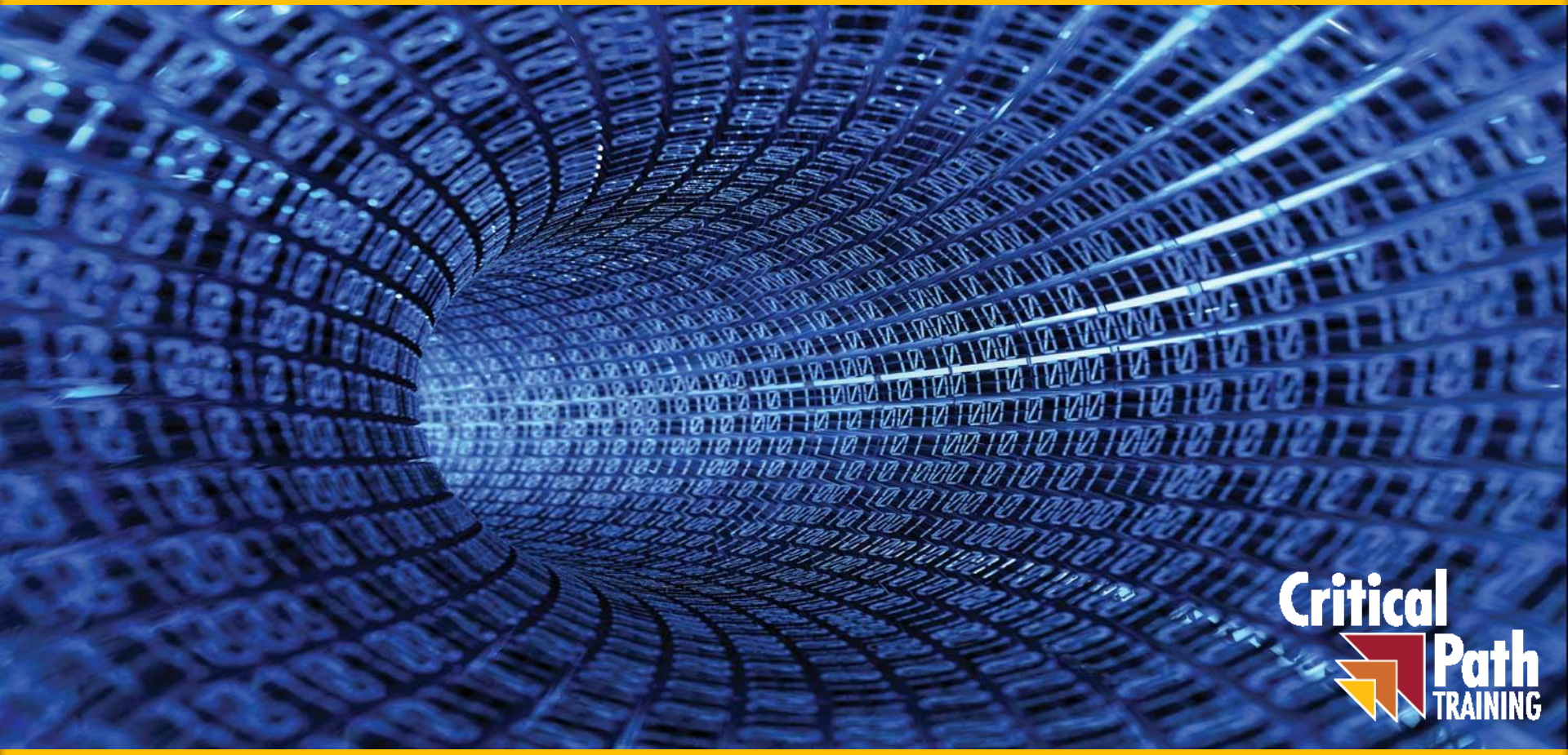
Mastering the Query Features of Power BI Desktop



Agenda

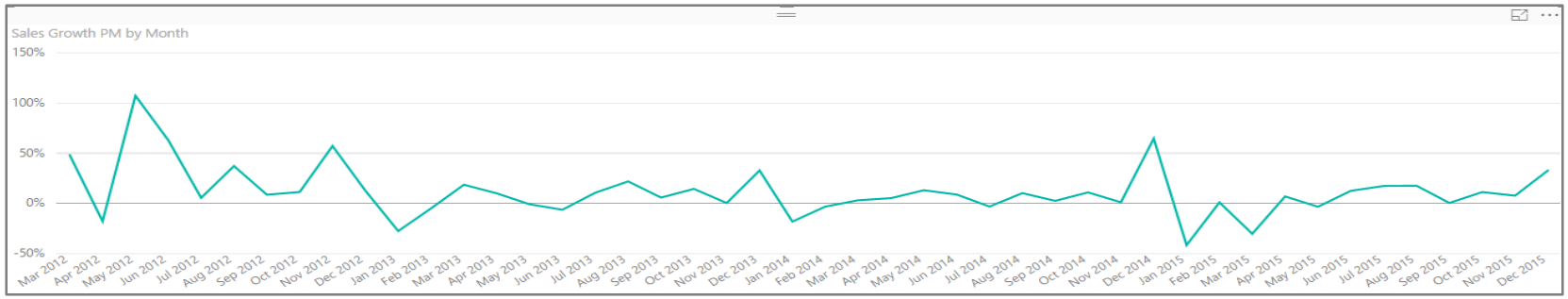
- Deciding What To Measure
- Managing Queries, Datasources and Credentials
- Working with the Query Editor Window
- Designing Queries to Generate a Star Schema

Data Discovery

- Data can live in a variety of sources
  - Files (e.g. CSV file, Excel workbook)
  - OLTP Databases
  - OLAP Databases
  - SharePoint Lists and Document Libraries
  - Azure-based services
  - Online services & SaaS applications

Deciding What To Measure

- You Must Determine Measurable Objectives
  - Financial (revenue, expenses, profit margin, etc.)
  - Business processes efficiency
  - Customer Satisfaction Levels

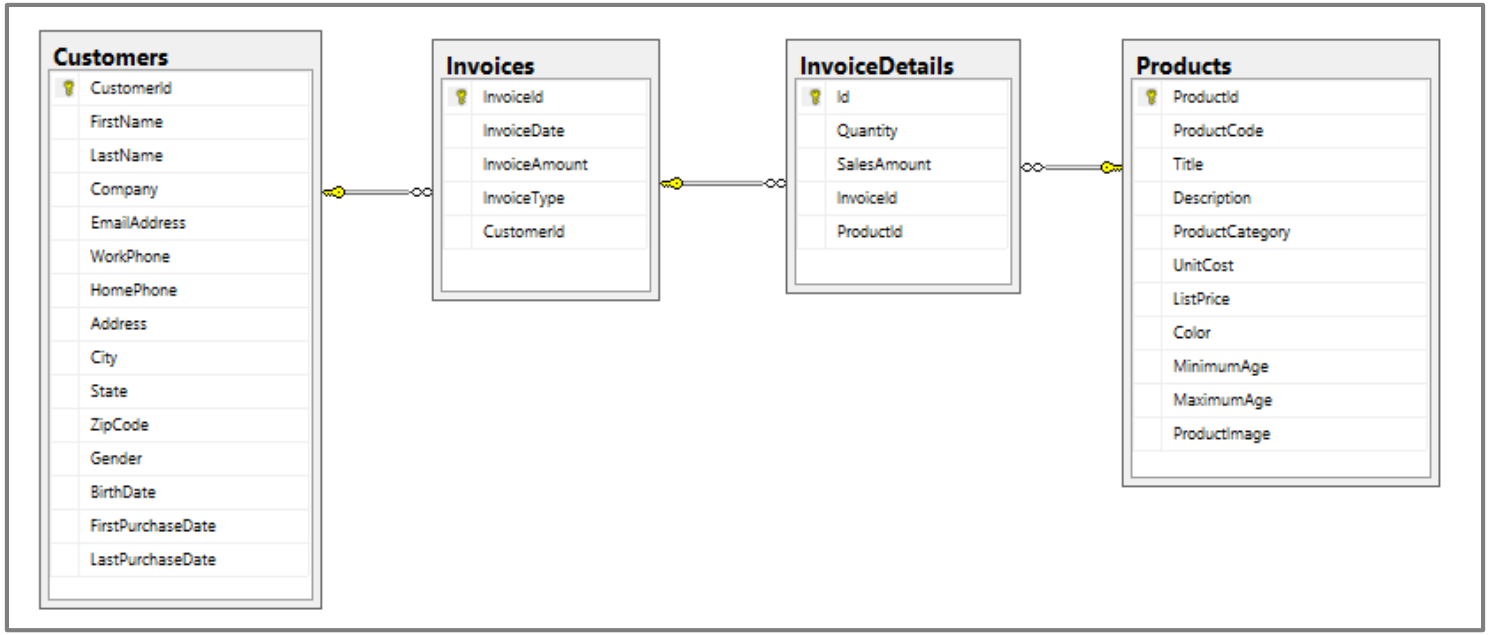


Defining Grain Statements

- Grain statements should be defined in initial design phase
  - Grain statements helps determine requirements for BI queries
  - Grain statements can be created & understood by business users
- Example grain statements for BI project at Wingtip Toys
  - What was the total sales revenue over the last 4 years?
  - What was the sales revenue by year, quarter and month?
  - What was the sales revenue by region, state, city and zip code?
  - What was the sales revenue by category, subcategory and product?
  - What was the growth in sales revenue from month to month in 2013?
  - What was profit margin for each product by year, quarter and month?
  - Have their been any products with significantly decreasing profit margin?

Sample OLTP Database: WingtipSalesDB

- Online Transaction Processing (OLTP) System
  - Used for real-time data access and transaction-based data entry
  - Optimized for faster transactions (e.g. inserts, updates & deletes)
  - Tables normalized to reduce/eliminate redundancies
  - Table schemas can be hard for business users to understand



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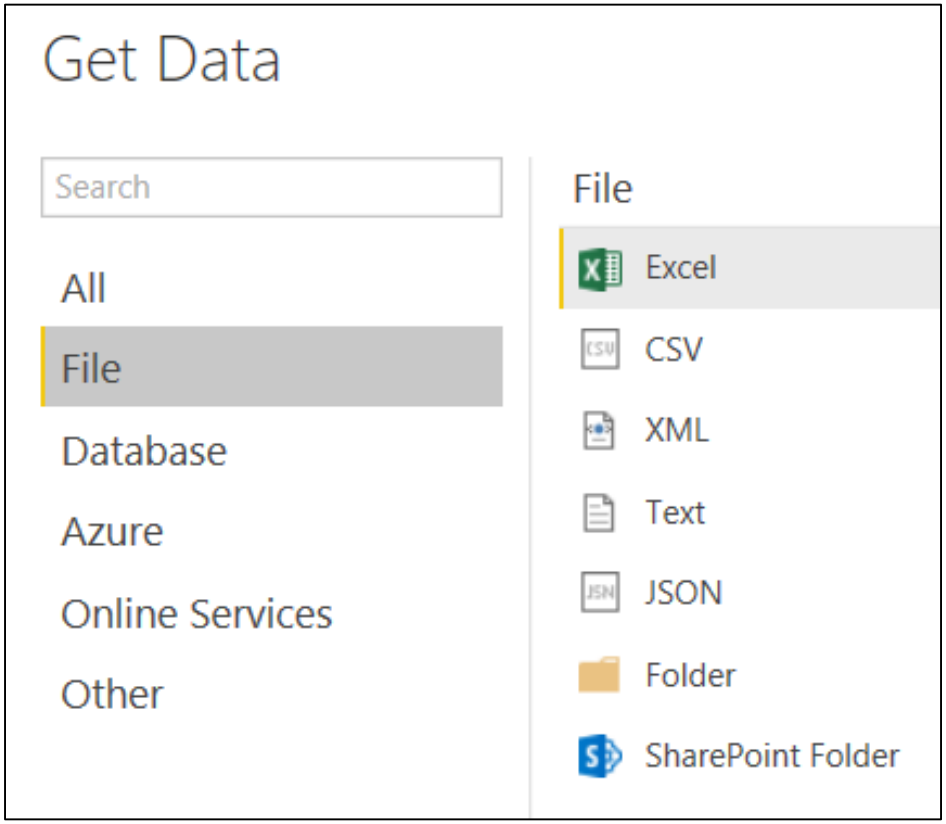
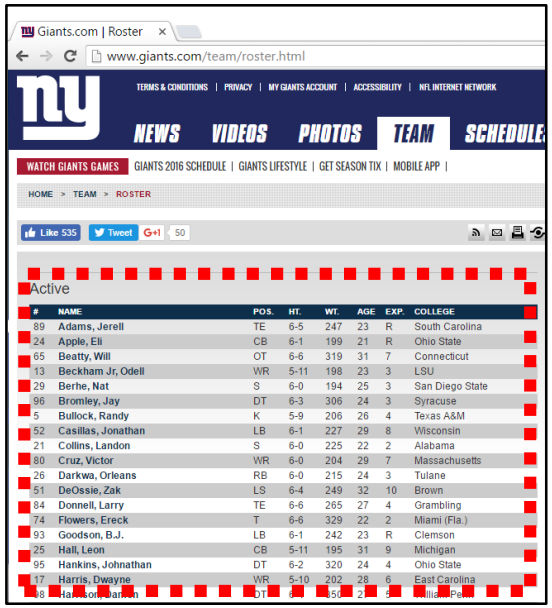
File-based Data Sources

- Power BI Desktop supports common file types



Working with Web Data Sources

- Many public websites publish data using HTML tables
  - Power BI desktop can scrape data from tables in HTML pages



Query Input

	#	Name	Pos.	Ht.	Wt.	Age	Exp.	College
1	89	Adams, Jerell	TE	6-5	247	23	R	South Carolina
2	24	Apple, Eli	CB	6-1	199	21	R	Ohio State
3	65	Beatty, Will	OT	6-6	319	31	7	Connecticut
4	13	Beckham Jr, Odell	WR	5-11	198	23	3	LSU
5	29	Berhe, Nat	S	6-0	194	25	3	San Diego State
6	96	Bromley, Jay	DT	6-3	306	24	3	Syracuse

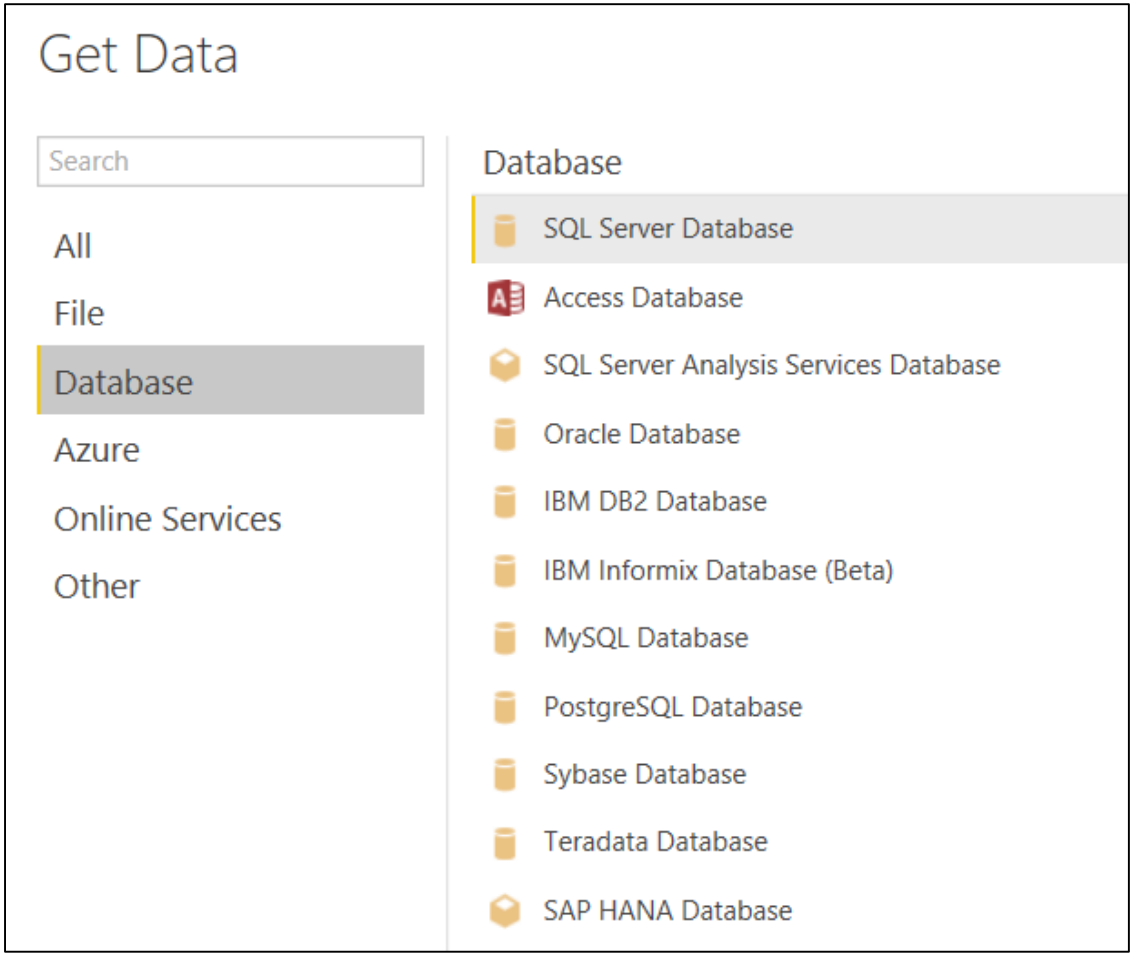
Query Output

	Number	Last Name	First Name	Weight	Height	Age	Experience	Position	Category	Side	College
1	89	Adams	Jerell	247	77	23	0	Tight End	Backs and Receivers	Offense	South Carolina
2	84	Donnell	Larry	265	78	27	4	Tight End	Backs and Receivers	Offense	Grambling
3	45	Tye	Will	262	74	24	1	Tight End	Backs and Receivers	Offense	Stony Brook
4	24	Apple	Eli	199	73	21	0	Cornerback	Defensive Backs	Defense	Ohio State
5	25	Hall	Leon	195	71	31	9	Cornerback	Defensive Backs	Defense	Michigan
6	20	Jenkins	Janoris	198	70	27	5	Cornerback	Defensive Backs	Defense	North Alabama
7	41	Rodgers-Cromartie	Dominique	205	74	30	8	Cornerback	Defensive Backs	Defense	Tennessee State
8	65	Beatty	Will	319	78	31	7	Offensive Tackle	Offensive Line	Offense	Connecticut
9	13	Beckham Jr	Odell	198	71	23	3	Wide Receiver	Backs and Receivers	Offense	LSU
10	80	Cruz	Victor	204	72	29	7	Wide Receiver	Backs and Receivers	Offense	Massachusetts


DEMO
Scraping Data from a Web Page

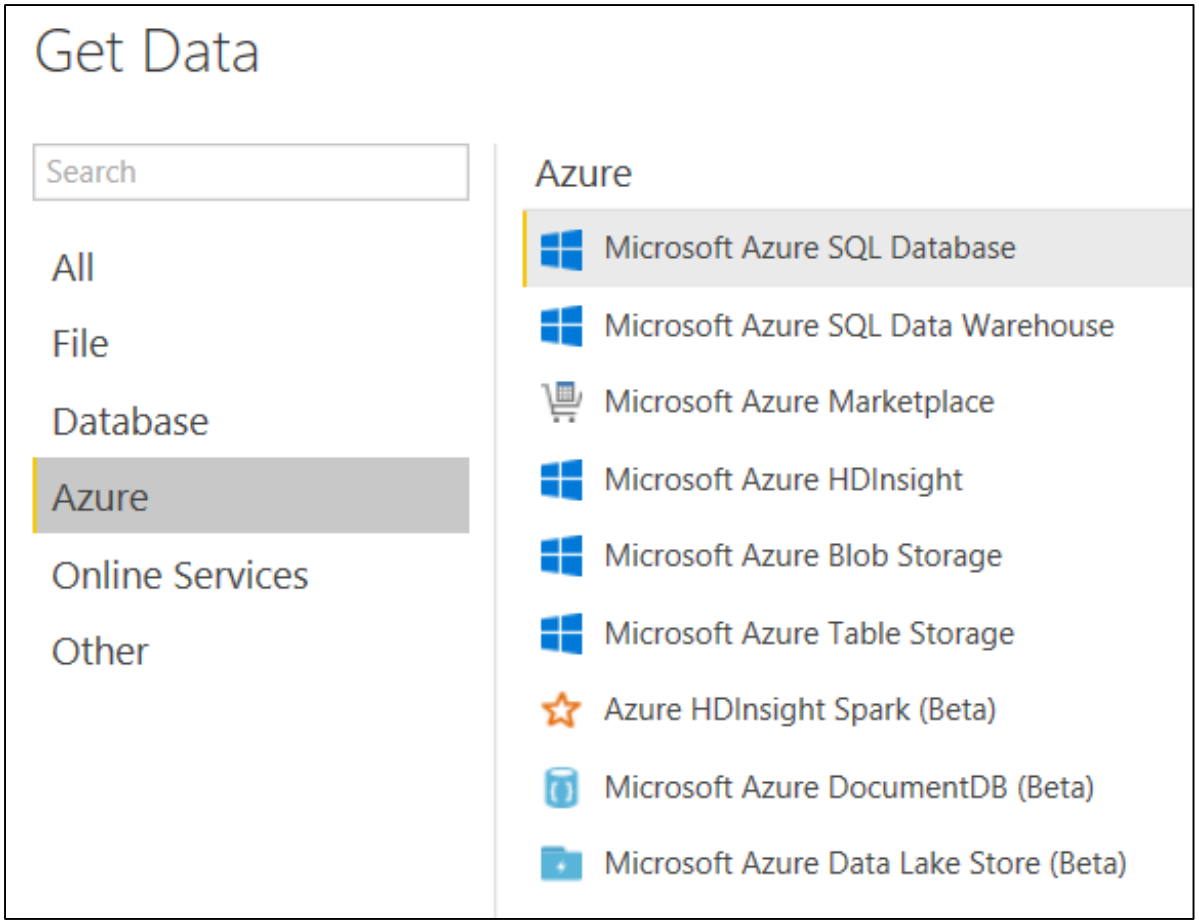
Supported Databases

- Power BI Desktop supports many database systems



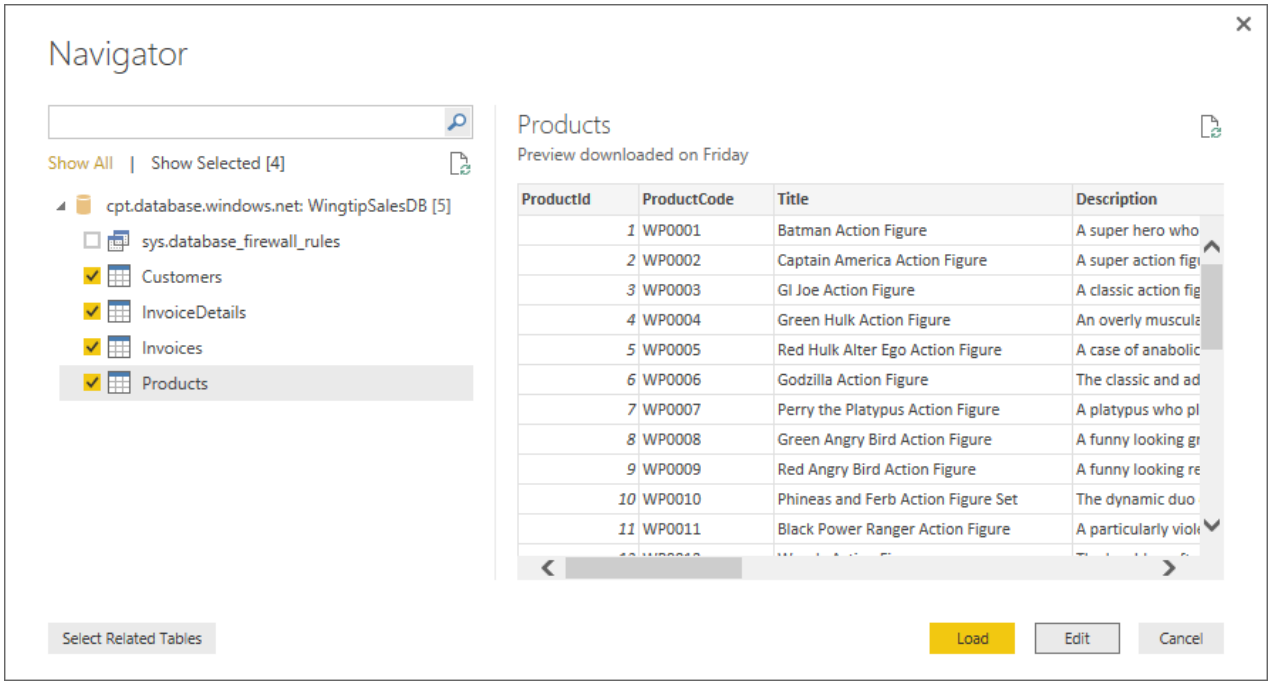
Azure Data Sources

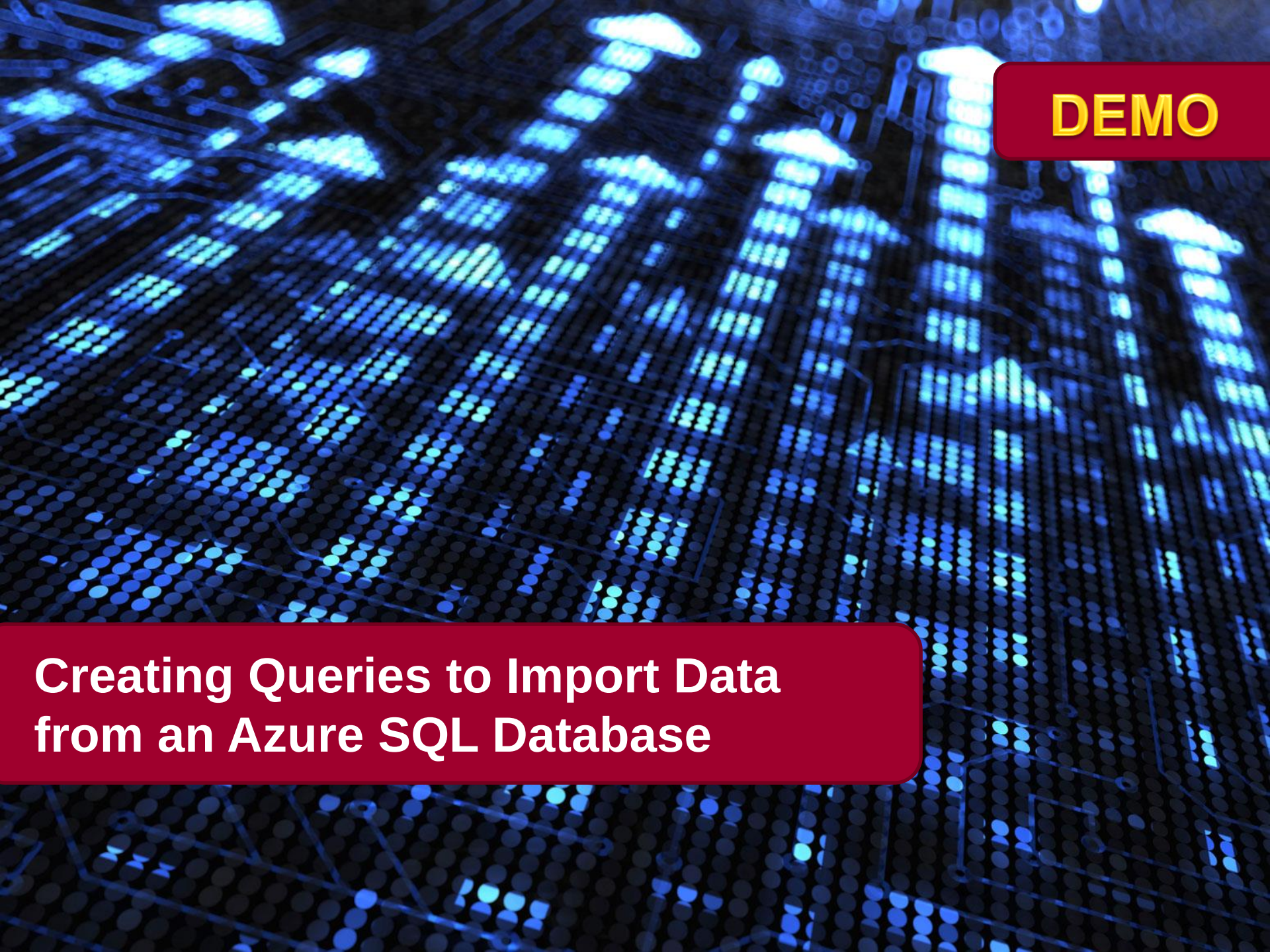
- Power BI Desktop supports many Azure data sources



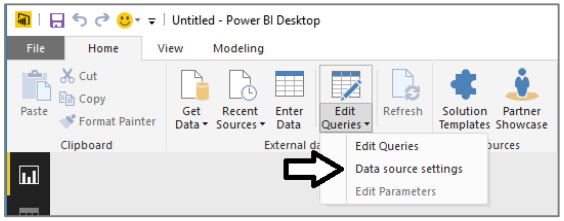
Selecting Tables from a SQL Database

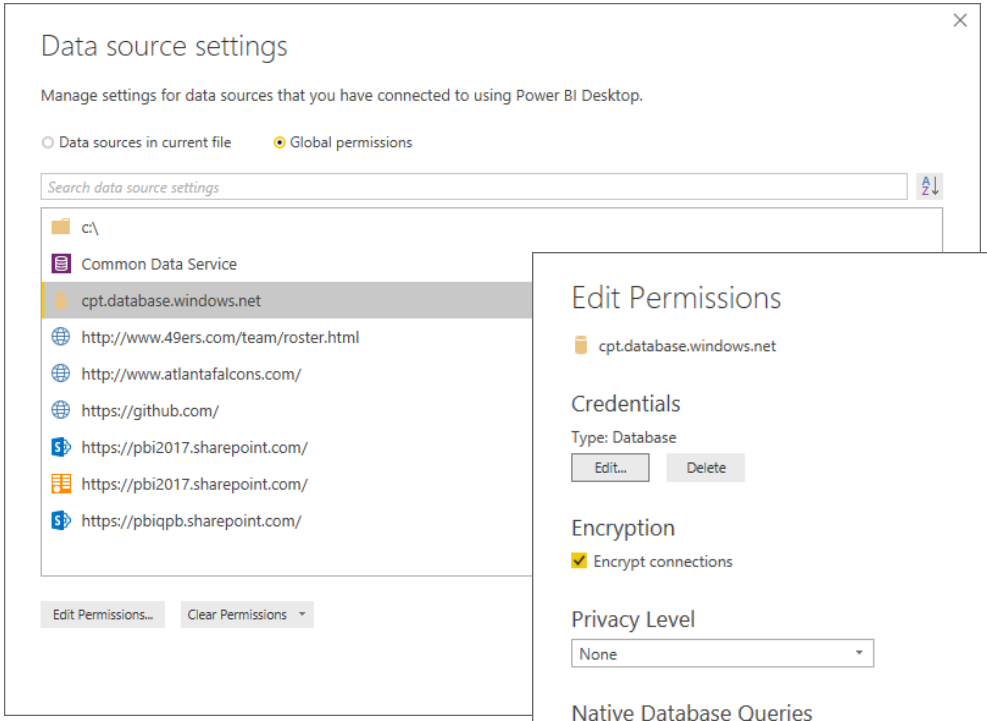
- Power BI Desktop provides Navigator dialog
  - Allows you to select tables
  - Navigator understands existing table relationships
  - Clicking **Load** will run query and import data
  - Clicking **Edit** will open queries in Query Editor window




DEMO
Creating Queries to Import Data
from an Azure SQL Database

Managing Datasources and Credentials





Agenda

- ✓ Deciding What To Measure
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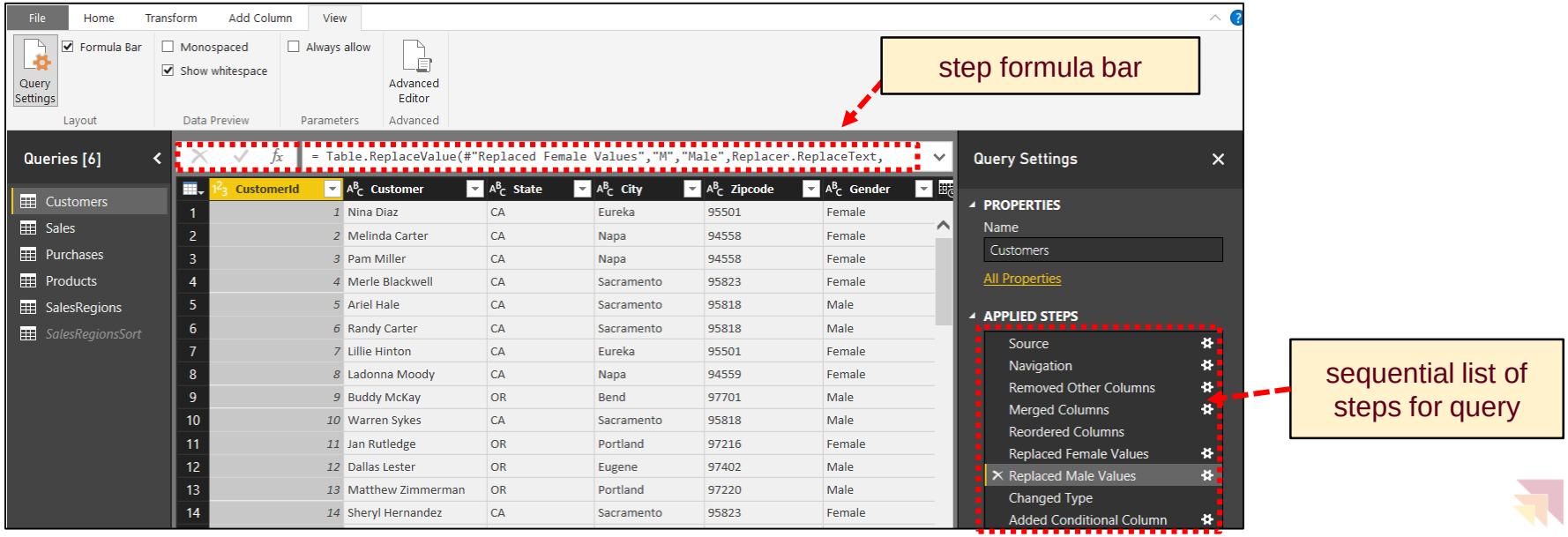
- ➢ Working with the Query Editor Window
- • Designing Queries to Generate a Star Schema

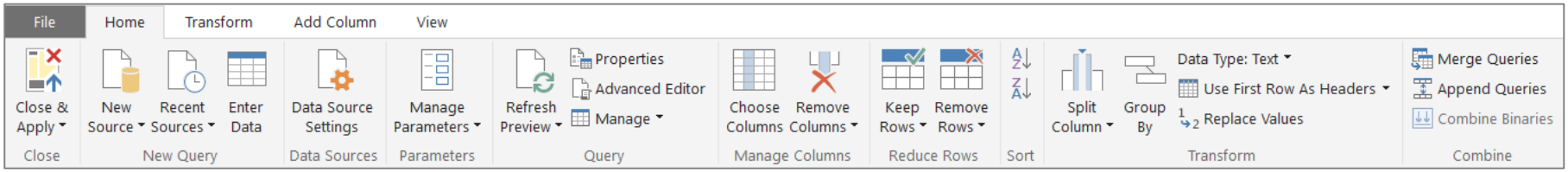
Query Steps

- 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

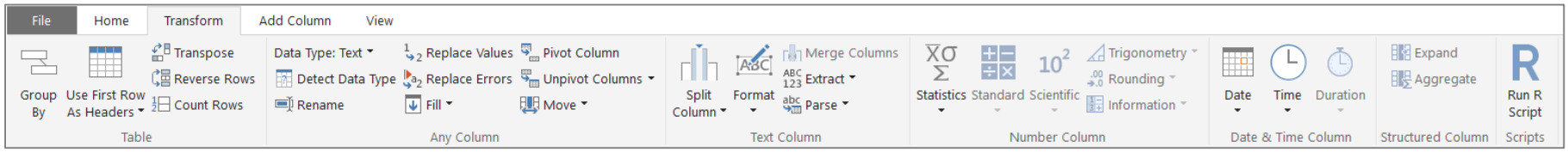


Query Editor Ribbon Tabs

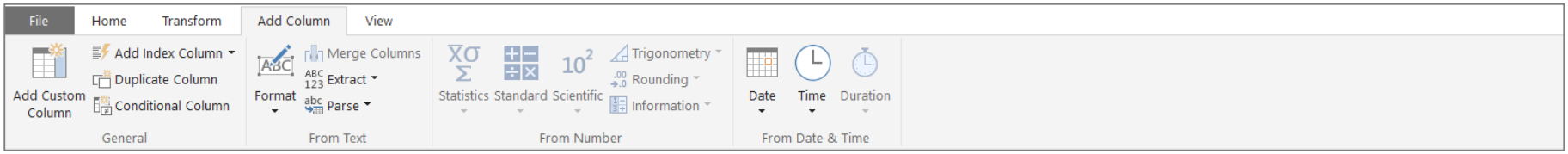
Home tab



Transform tab



Add Column tab



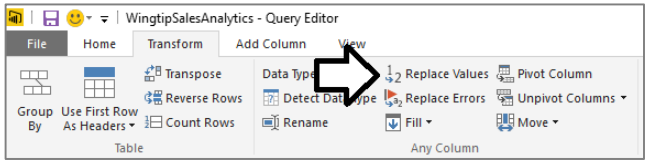
View tab

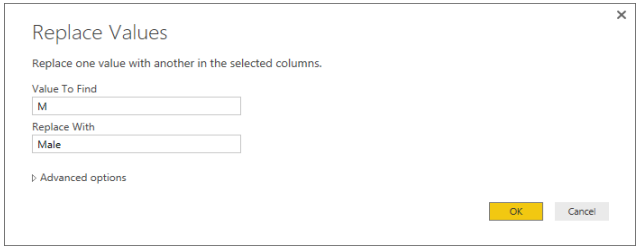
Examples of Basic Power BI Desktop Steps

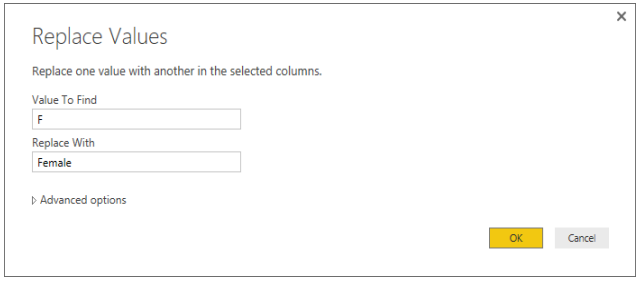
- Rename column
- Convert column type
- Format column values
- Reorder columns
- Replace column values
- Expanding related column
- Merging columns
- Splitting columns

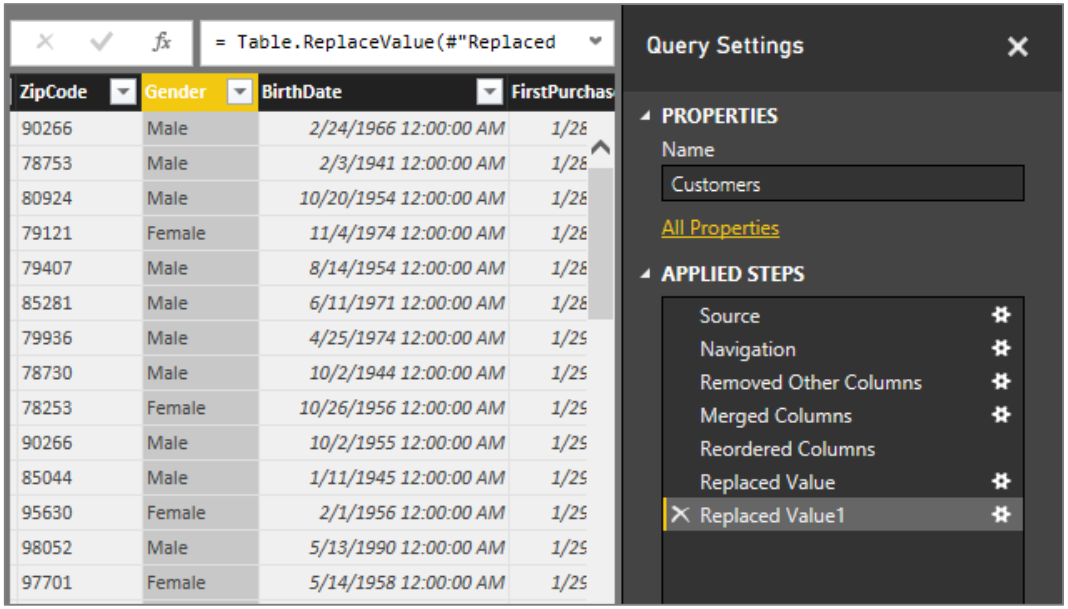
Replacing Values

- Used to substitute values during import



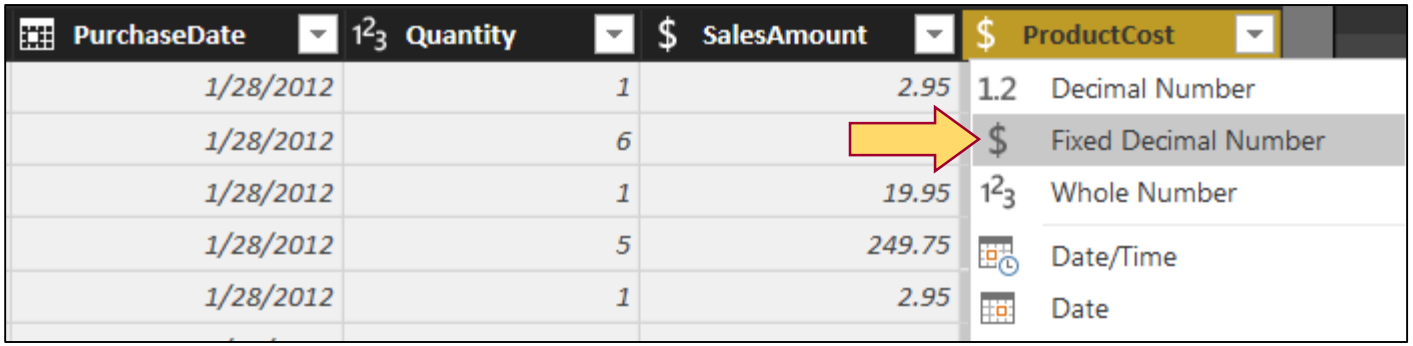






Converting Column Types

- 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

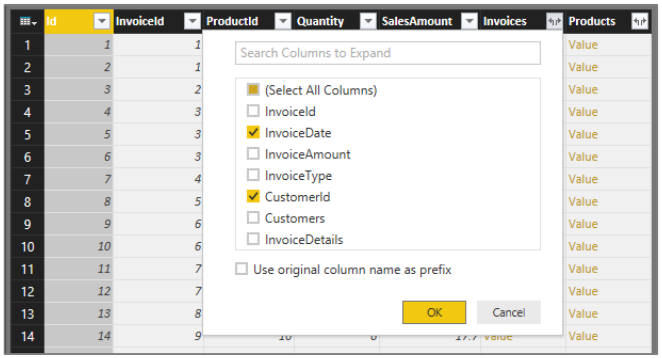


- Beware: Conversion can have destructive effect on data

Expanding Related Columns

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

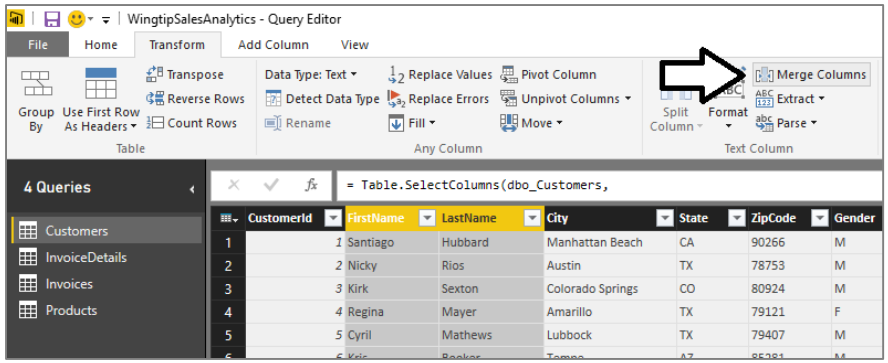
SalesAmount	Invoices	
119.8	Value	Value
29.95	Value	Value
59.9	Value	Value
399.6	Value	Value
29.9	Value	Value
59.8	Value	Value

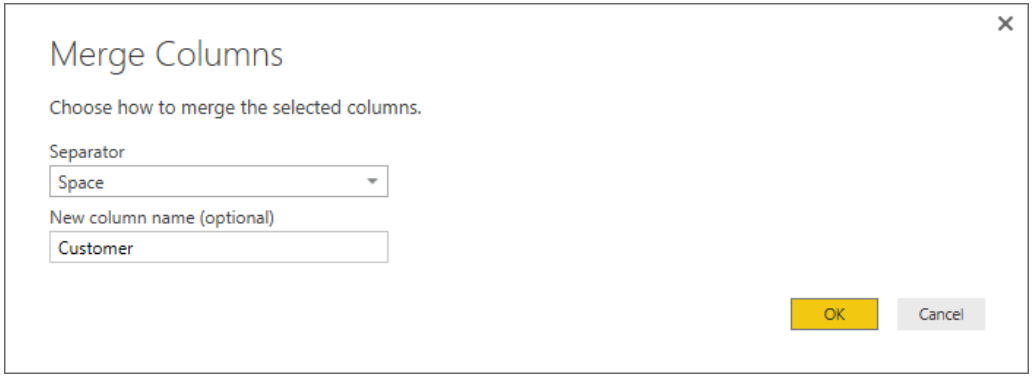


	Id	InvoiceId	ProductId	Quantity	SalesAmount	InvoiceDate	CustomerId	Products
1	1	1	22	4	119.8	1/28/2012 12:00:00 AM	1	Value
2	2	1	22	1	29.95	1/28/2012 12:00:00 AM	1	Value
3	3	2	22	2	59.9	1/28/2012 12:00:00 AM	2	Value
4	4	3	17	8	399.6	1/28/2012 12:00:00 AM	3	Value
5	5	3	18	2	29.9	1/28/2012 12:00:00 AM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

Merging Columns

- Merge two columns into a single column

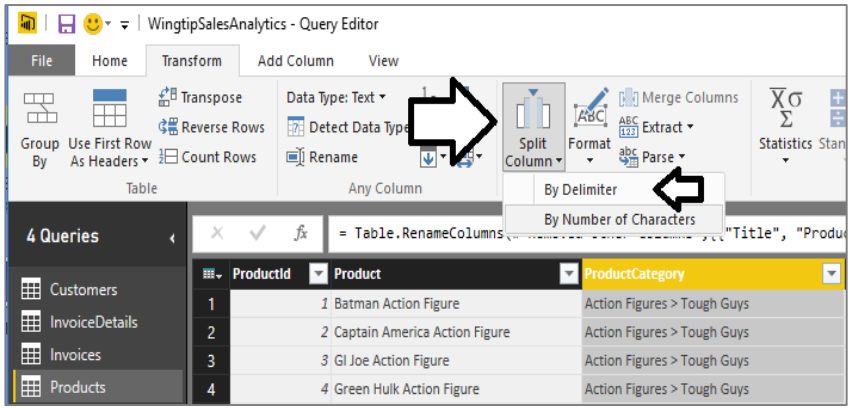


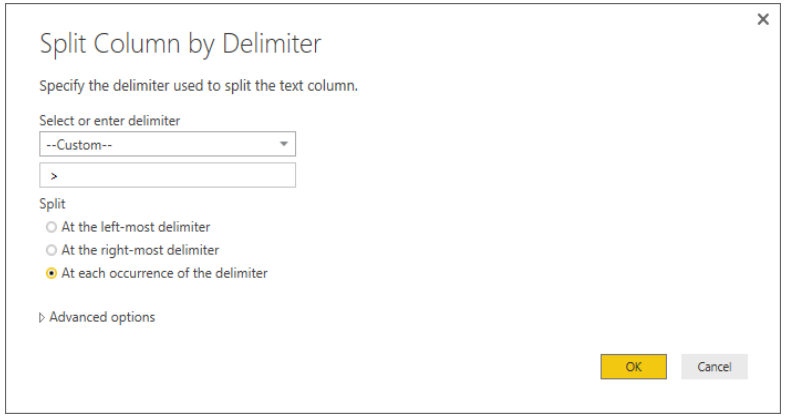


	CustomerId	Customer
1	1	Santiago Hubbard
2	2	Nicky Rios
3	3	Kirk Sexton
4	4	Regina Mayer
5	5	Cyril Mathews
6	6	Kris Booker
7	7	Tracy Christensen
8	8	Reed Glover

Splitting Columns

- Split a single column up into two columns

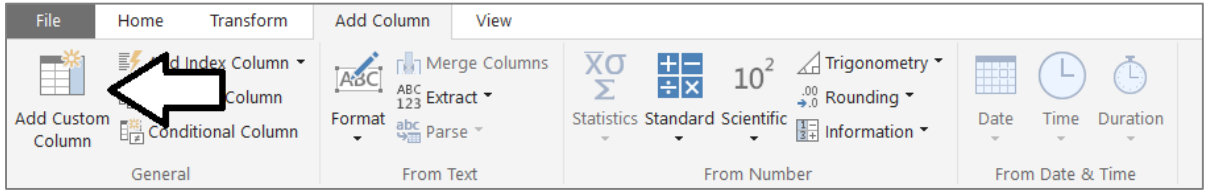


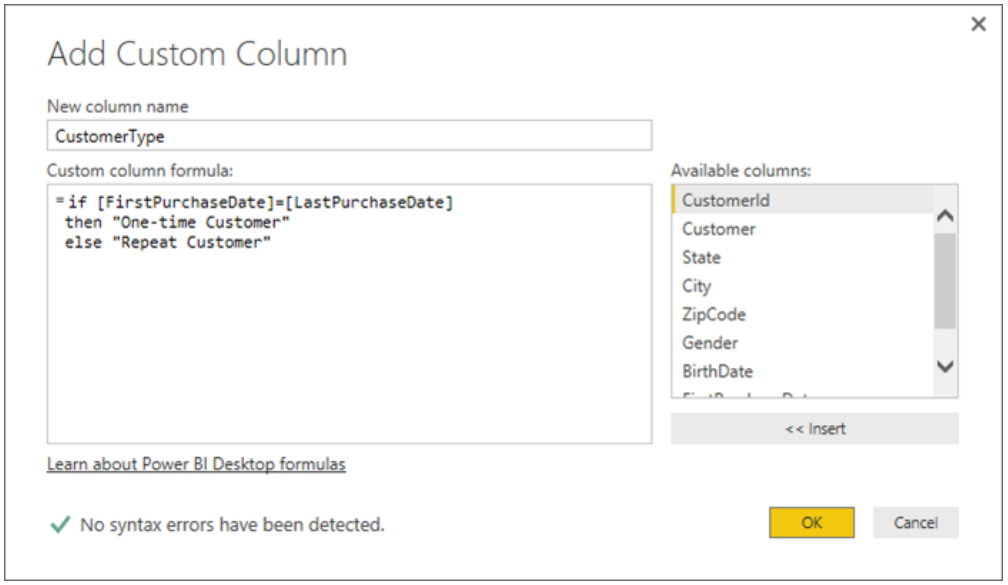


	ProductId	Product	Category	Subcategory
1	1	Batman Action Figure	Action Figures	Tough Guys
2	2	Captain America Action Figure	Action Figures	Tough Guys
3	3	GI Joe Action Figure	Action Figures	Tough Guys
4	4	Green Hulk Action Figure	Action Figures	Tough Guys
5	5	Red Hulk Alter Ego Action Figure	Action Figures	Tough Guys
6	6	Godzilla Action Figure	Action Figures	Tough Guys
7	7	Perry the Platypus Action Figure	Action Figures	Cute and Huggable
8	8	Green Angry Bird Action Figure	Action Figures	Cute and Huggable

Adding a Custom Column

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

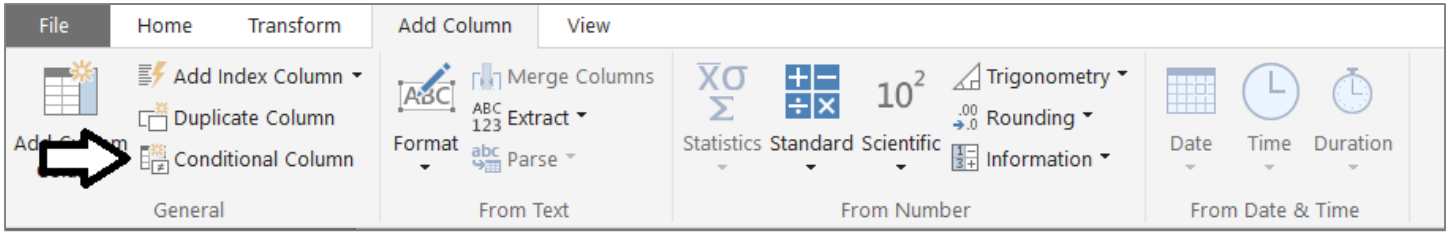


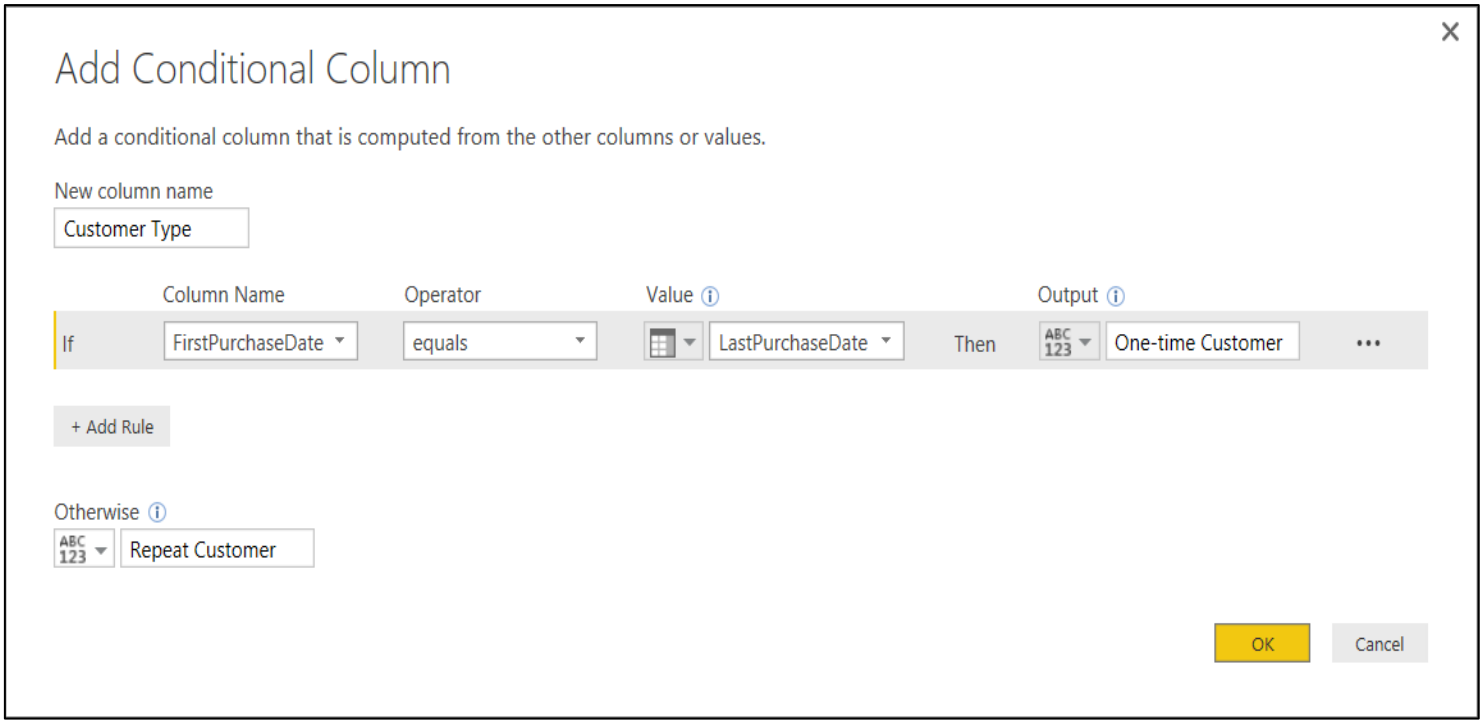


FirstPurchaseDate	LastPurchaseDate	CustomerType
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/28/2012	1/28/2012	One-time Customer
1/29/2012	11/22/2015	Repeat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





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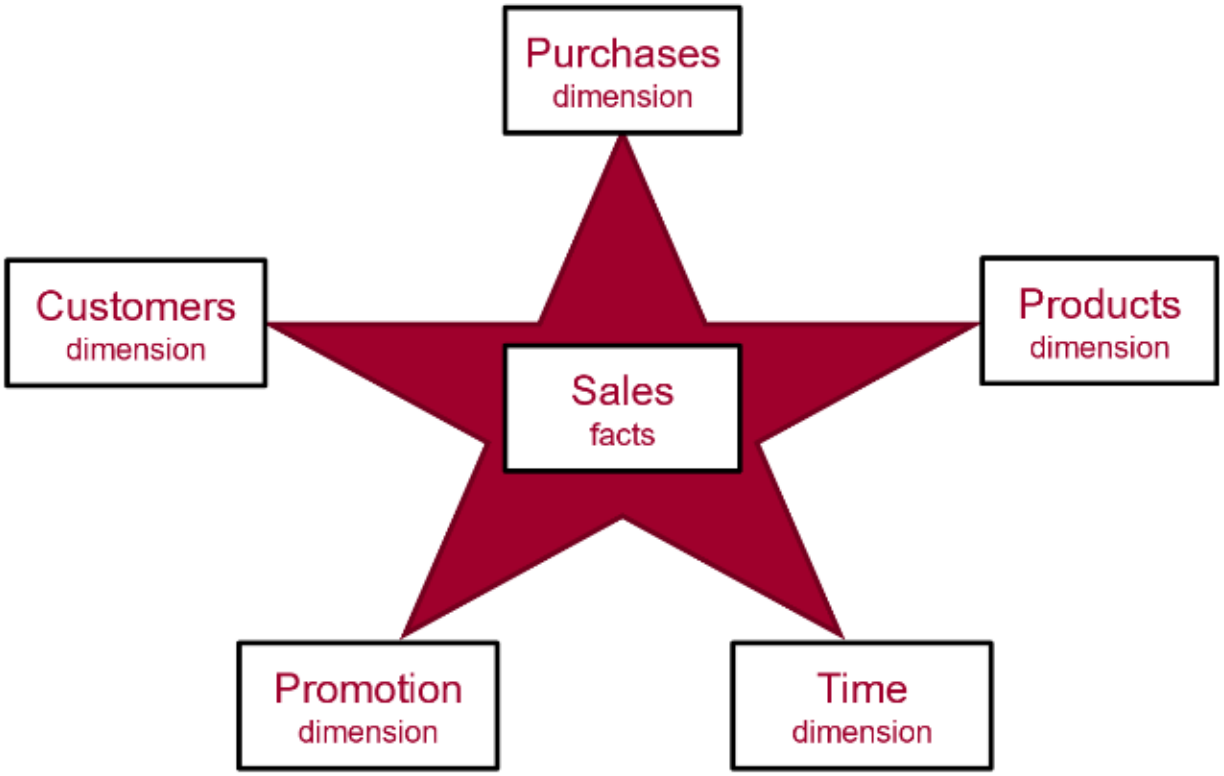
- ✓ Working with the Query Editor Window
- ➢ Designing Queries to Generate a Star Schema

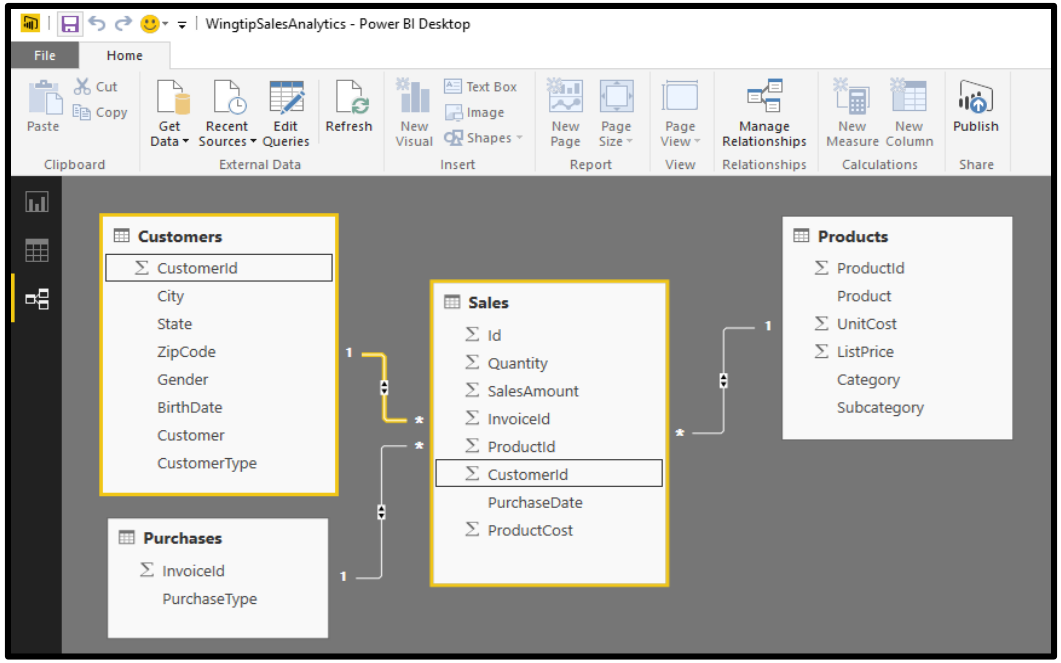
Data Modeling using a Star Schema

- 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
Using Power BI Desktop to Import Data into a Star Schema

Summary

- ✓ Deciding What To Measure
- ✓ Working with the Query Editor Window
- ✓ Managing Queries, Datasources and Credentials
- ✓ Designing Queries to Generate a Star Schema