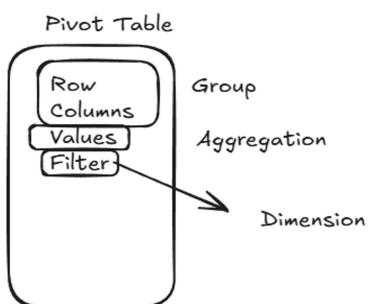
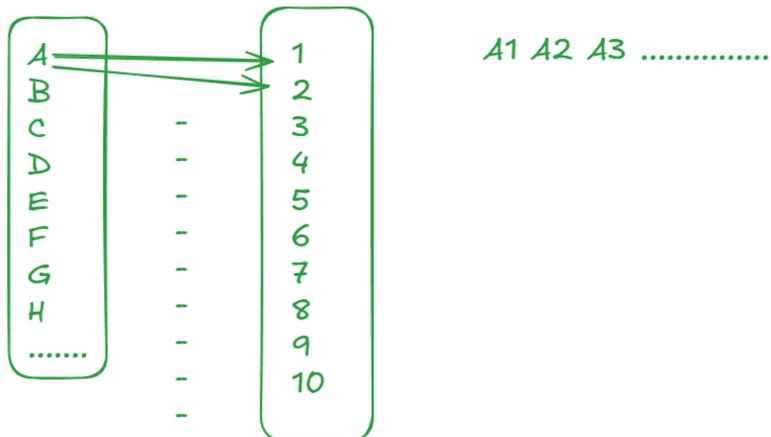
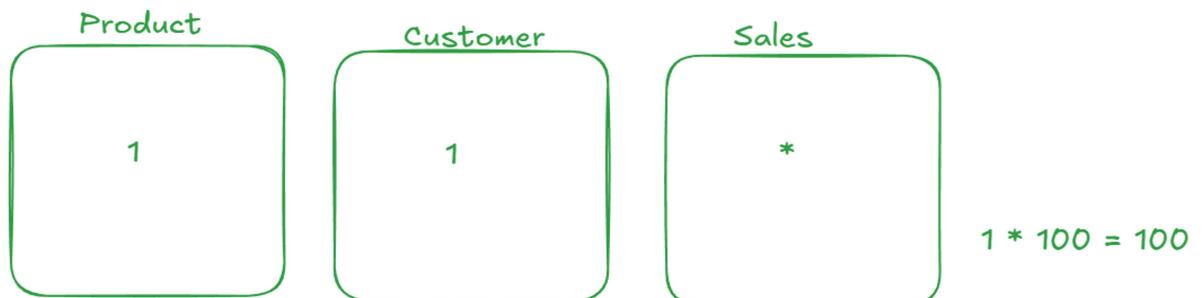


Power BI - Data Modelling - p1

Step 1 : Delete all the existing relationship available on Model View.



Delete table

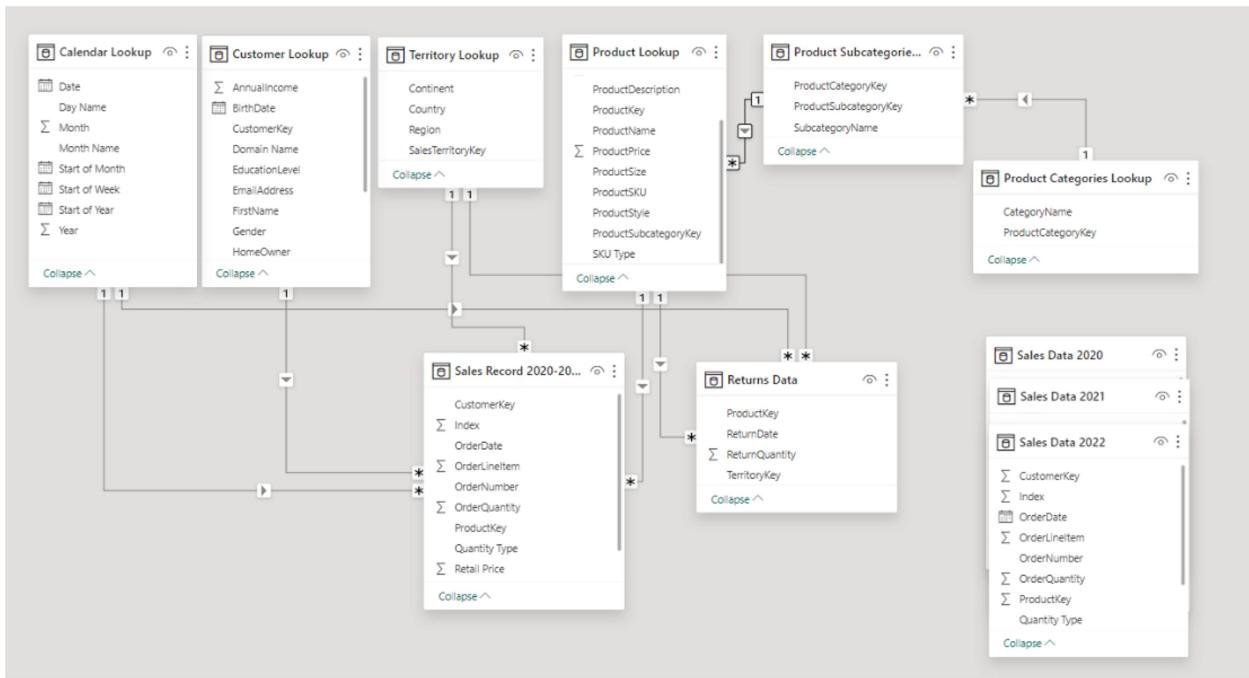
X

The query "Sales Data 2020" cannot be deleted because it's being referenced by another query "Sales Record 2020-2022".

The query will remain, but its data won't be directly loaded to the model.

Yes

Cancel



CREATING A DATA MODEL

In this section we'll cover foundational data modeling topics like normalization, fact and dimension tables, primary and foreign keys, relationship cardinality and filter flow

TOPICS WE'LL COVER:

1. Data Modeling 101
2. Facts & Dimensions
3. Cardinality
4. Common Schemas
5. Normalization
6. Primary & Foreign Keys
7. Filter Flow
8. Hierarchies

GOALS FOR THIS SECTION:

- Understand the basic principles of data modeling, including normalization, fact & dimension tables and common schemas.
- Create table relationships using primary and foreign keys, and discuss different types of relationship cardinality
- Configure report filters and trace filter context as it flows between related tables in the model
- Explore data modeling options like hierarchies, data categories and hidden fields

WHAT IS A DATA MODEL?

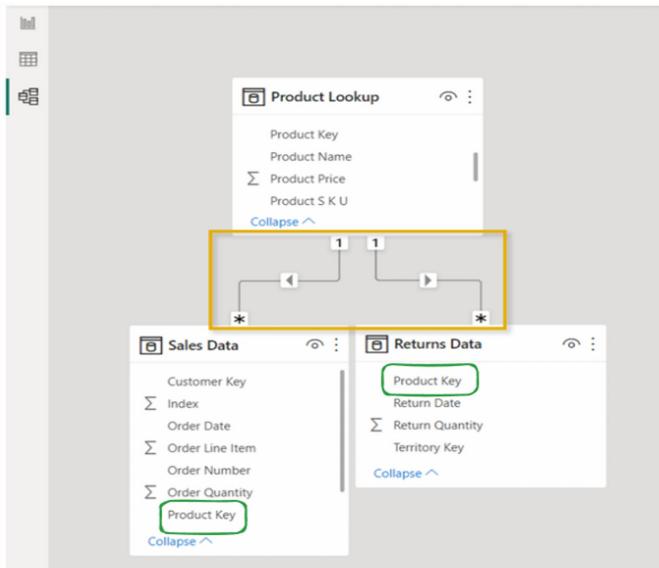
The screenshot shows a data modeling interface with three separate tables:

- Product Lookup:** Contains columns: Model Name, Product Color, Product Cost, Product Description, Product Key, and Product Name. A "Collapse ^" button is present.
- Sales Data:** Contains columns: Customer Key, Index, Order Date, Order Line Item, Order Number, Order Quantity, Product Key, Stock Date, and Territory Key. A "Collapse ^" button is present.
- Returns Data:** Contains columns: Product Key, Return Date, Return Quantity, and Territory Key. A "Collapse ^" button is present.

This IS NOT a data model 😞

- This is a collection of independent tables, which share no connections or relationships
- If you tried to visualize Orders and Returns by Product, this is what you'd get

ProductName	OrderQuantity	ReturnQuantity
All-Purpose Bike Stand	84,174	1,828
AWC Logo Cap	84,174	1,828
Bike Wash - Dissolver	84,174	1,828
Cable Lock	84,174	1,828
Chain	84,174	1,828
Classic Vest, L	84,174	1,828
Classic Vest, M	84,174	1,828
Classic Vest, S	84,174	1,828
Fender Set - Mountain	84,174	1,828
Total	84,174	1,828



This IS a data model! 😊

- The tables are connected via relationships, based on a common field (Product Key)
- Now Sales and Returns data can be filtered using fields from the Product Lookup table!

ProductName	OrderQuantity	ReturnQuantity
All-Purpose Bike Stand	234	8
AWC Logo Cap	4,151	46
Bike Wash - Dissolver	1,706	25
Classic Vest, L	182	4
Classic Vest, M	182	7
Classic Vest, S	157	8
Fender Set - Mountain	3,960	54
Half-Finger Gloves, L	840	18
Half-Finger Gloves, M	918	16
Total	84,174	1,828

DATABASE NORMALIZATION

Normalization is the process of organizing the tables and columns in a relational database to reduce redundancy and preserve data integrity. It's commonly used to:

- Eliminate redundant data to decrease table sizes and improve processing speed & efficiency.
- Minimize errors and anomalies from data modifications (inserting, updating or deleting records).
- Simplify queries and structure the database for meaningful analysis.

In a normalized database, each table should serve a distinct and specific purpose (i.e. product information, transaction records, customer attributes, store details, etc.)

date	product_id	quantity	product_brand	product_name	product_sku	product_weight
1/1/1997	869	5	Nationeel	Nationeel Grape Fruit Roll	52382137179	17
1/7/1997	869	2	Nationeel	Nationeel Grape Fruit Roll	52382137179	17
1/3/1997	1	4	Washington	Washington Berry Juice	90748583674	8.39
1/1/1997	1472	3	Fort West	Fort West Fudge Cookies	37276054024	8.28
1/6/1997	1472	2	Fort West	Fort West Fudge Cookies	37276054024	8.28
1/5/1997	2	4	Washington	Washington Mango Drink	96516502499	7.42
1/1/1997	76	4	Red Spade	Red Spade Sliced Chicken	62054644227	18.1
1/1/1997	76	2	Red Spade	Red Spade Sliced Chicken	62054644227	18.1
1/5/1997	3	2	Washington	Washington Strawberry Drink	58427771925	13.1
1/7/1997	3	2	Washington	Washington Strawberry Drink	58427771925	13.1
1/1/1997	320	3	Excellent	Excellent Cranberry Juice	36570182442	16.4

- Models that aren't normalized contain redundant, duplicate data. In this case, all of the product-specific fields could be stored in a separate table containing a unique record for each product id
- This may not seem critical now, but minor inefficiencies can become major problems at scale!

FACT & DIMENSION TABLES

Data models generally contain two types of tables: fact ("data") tables, and dimension ("lookup") tables:

- Fact tables contain numerical values or metrics used for summarization (sales, orders, transactions, pageviews, etc.)
- Dimension tables contain descriptive attributes used for filtering or grouping (products, customers, dates, stores, etc.)

date	product_id	quantity
1/1/1997	869	5
1/1/1997	1472	3
1/1/1997	76	4
1/1/1997	320	3
1/1/1997	4	4
1/1/1997	952	4
1/1/1997	1222	4
1/1/1997	517	4
1/1/1997	1359	4
1/1/1997	357	4
1/1/1997	1426	5
1/1/1997	190	4
1/1/1997	367	4
1/1/1997	250	5
1/1/1997	600	4
1/1/1997	702	5

This Fact table contains quantity values, along with date and product_id fields

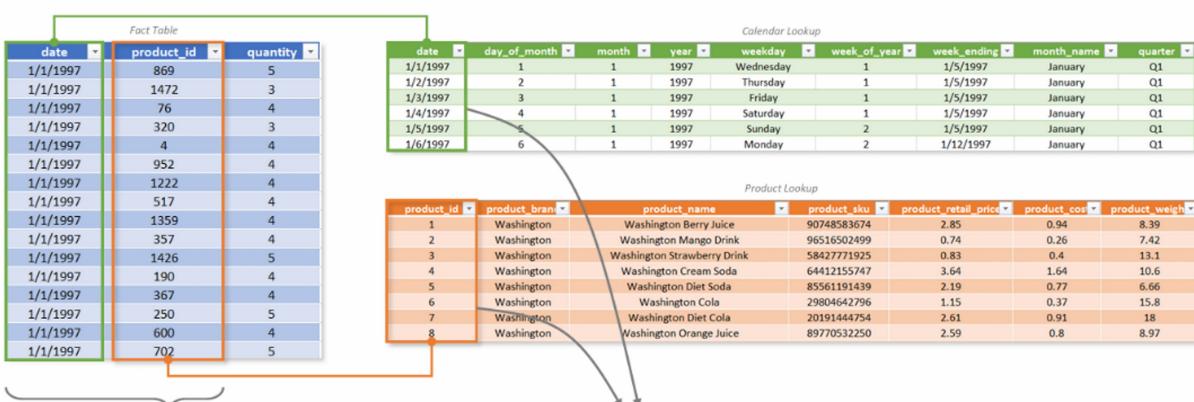
date	day_of_month	month	year	weekday	week_of_year	week_ending	month_name	quarter
1/1/1997	1	1	1997	Wednesday	1	1/5/1997	January	Q1
1/2/1997	2	1	1997	Thursday	1	1/5/1997	January	Q1
1/3/1997	3	1	1997	Friday	1	1/5/1997	January	Q1
1/4/1997	4	1	1997	Saturday	1	1/5/1997	January	Q1
1/5/1997	5	1	1997	Sunday	2	1/5/1997	January	Q1
1/6/1997	6	1	1997	Monday	2	1/12/1997	January	Q1

This Calendar Lookup table contains attributes about each date (month, year, quarter, etc.)

product_id	product_brand	product_name	product_sku	product_retail_price	product_cos	product_weight
1	Washington	Washington Berry Juice	90748583674	2.85	0.94	8.39
2	Washington	Washington Mango Drink	96516502499	0.74	0.26	7.42
3	Washington	Washington Strawberry Drink	58427771925	0.83	0.4	13.1
4	Washington	Washington Cream Soda	64412155747	3.64	1.64	10.6
5	Washington	Washington Diet Soda	85561191439	2.19	0.77	6.66
6	Washington	Washington Cola	29804642796	1.15	0.37	15.8
7	Washington	Washington Diet Cola	20191444754	2.61	0.91	18
8	Washington	Washington Orange Juice	89770532250	2.59	0.8	8.97

This Product Lookup table contains attributes about each product_id (brand, SKU, price, etc.)

PRIMARY & FOREIGN KEYS



These are foreign keys (FK)

They contain multiple instances of each value, and relate to primary keys in dimension tables

These are primary keys (PK)

They uniquely identify each row of the table, and relate to foreign keys in fact tables

RELATIONSHIPS VS. MERGED TABLES



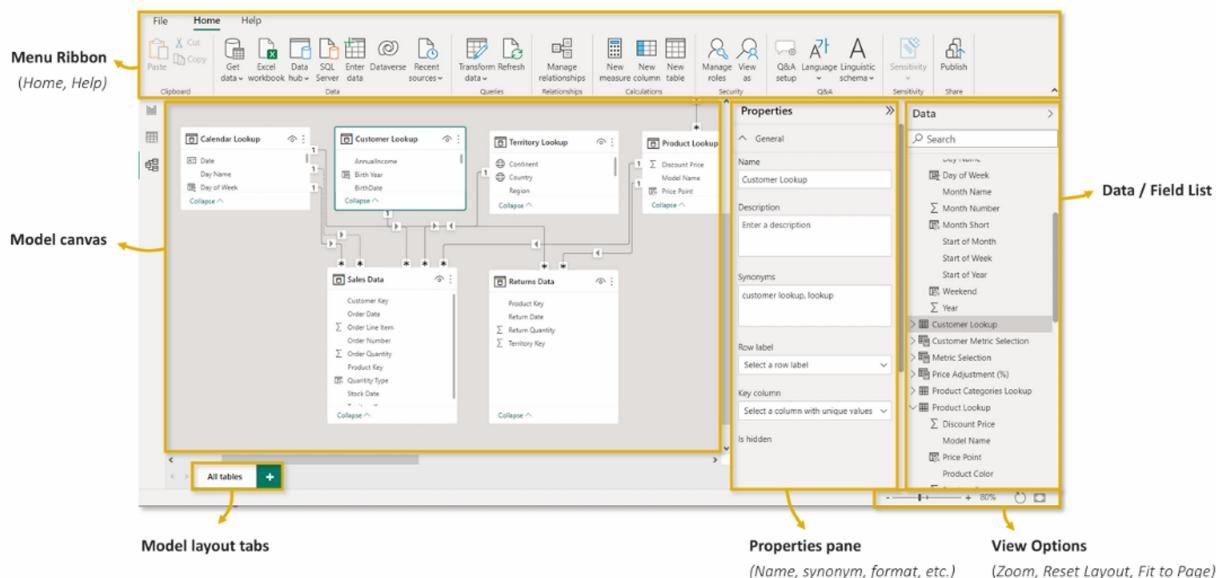
Can't I just merge queries or use lookup functions to pull everything into one single table?

Original Fact Table fields										Attributes from Calendar Lookup table				Attributes from Product Lookup table			
date	product_id	quantity	day_of_month	month	year	weekday	month_name	quarter	product_brand	product_name	product_sku	product_weight					
1/1/1997	869	5	1	1	1997	Wednesday	January	Q1	Nationel	Nationel Grape Fruit Roll	52382137179	17					
1/7/1997	869	2	7	1	1997	Tuesday	January	Q1	Nationel	Nationel Grape Juice	52382137179	17					
1/3/1997	1	4	3	1	1997	Friday	January	Q1	Washington	Washington Berry Juice	90748583674	8.39					
1/1/1997	1472	3	1	1	1997	Wednesday	January	Q1	Fort West	Fort West Fudge Cookies	37276054024	8.28					
1/6/1997	1472	2	6	1	1997	Monday	January	Q1	Fort West	Fort West Fudge Cookies	37276054024	8.28					
1/5/1997	2	4	5	1	1997	Sunday	January	Q1	Washington	Washington Mango Drink	96516502499	7.42					
1/1/1997	76	4	1	1	1997	Wednesday	January	Q1	Red Spade	Red Spade Sliced Chicken	62054644227	18.1					
1/7/1997	76	2	1	1	1997	Wednesday	January	Q1	Red Spade	Red Spade Sliced Chicken	62054644227	18.1					
1/5/1997	3	2	5	1	1997	Sunday	January	Q1	Washington	Washington Strawberry Drink	58427771925	13.1					
1/7/1997	3	2	7	1	1997	Tuesday	January	Q1	Washington	Washington Strawberry Drink	58427771925	13.1					
1/1/1997	320	3	1	1	1997	Wednesday	January	Q1	Excellent	Excellent Cranberry Juice	36570182442	16.4					

You can, but it's extremely inefficient!

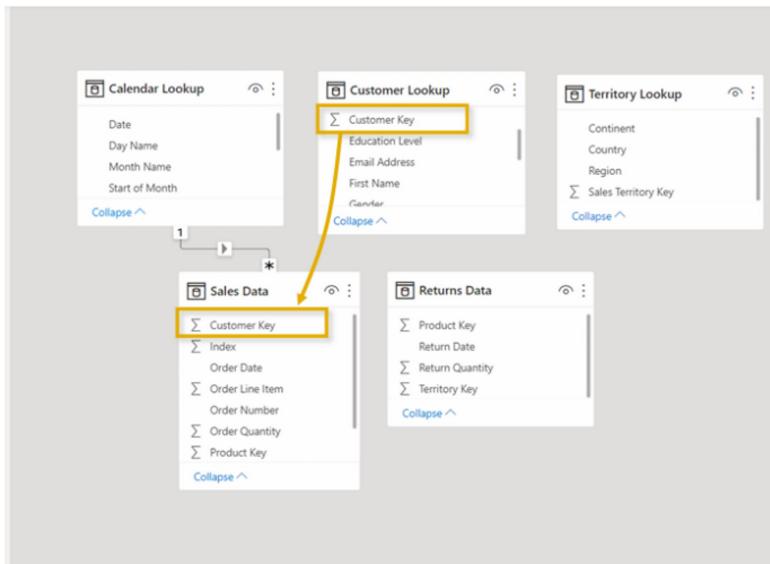
- Merging tables creates redundancy and often requires significantly more memory and processing power to analyze, compared to a relational model with multiple small tables.

THE MODEL VIEW

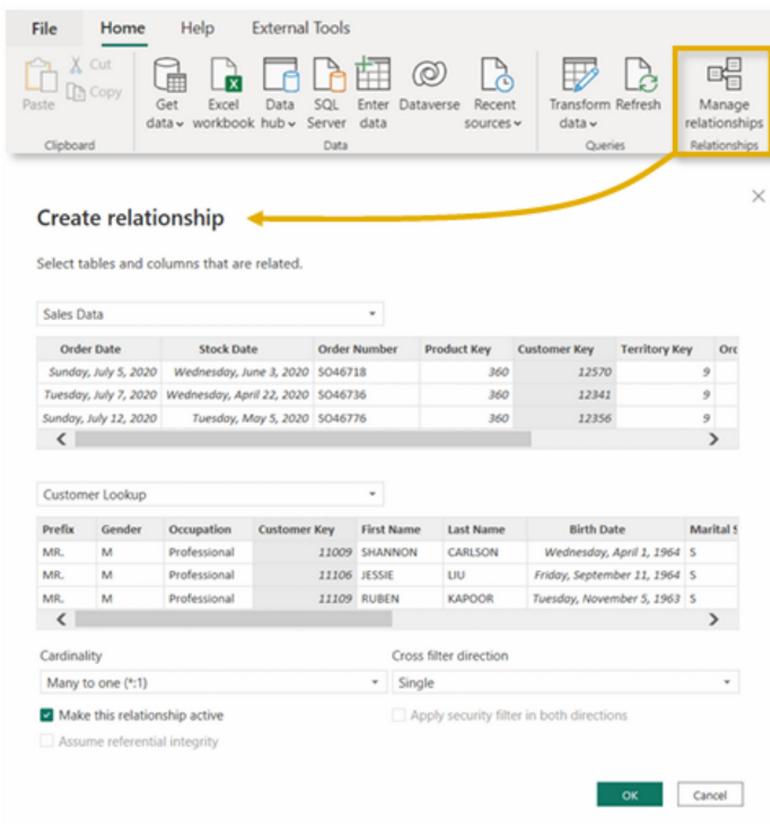


CREATING TABLE RELATIONSHIPS

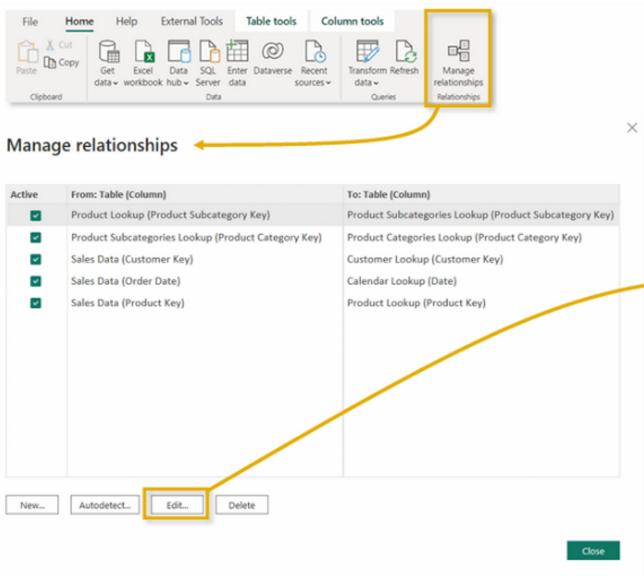
OPTION 1: Click and drag to connect primary and foreign keys within the Model view



OPTION 2: Add or detect relationships using the Manage Relationships dialog box



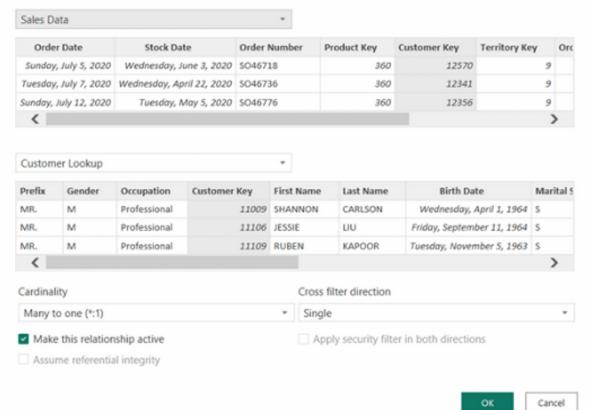
MANAGING & EDITING RELATIONSHIPS



Launch the Manage Relationships dialog box or double-click a relationship to modify it

Edit relationship

Select tables and columns that are related.



Editing tools allow you to activate or deactivate relationships and manage cardinality and filter direction—more on that soon!

CategoryName	SubcategoryName	ProductName
Accessories	Bike Racks	Hitch Rack - 4-Bike
Accessories	Bike Stands	All-Purpose Bike Stand
Accessories	Bottles and Cages	Mountain Bottle Cage
Accessories	Bottles and Cages	Road Bottle Cage
Accessories	Bottles and Cages	Water Bottle - 30 oz.
Accessories	Cleaners	Bike Wash - Dissolver
Accessories	Fenders	Fender Set - Mountain
Accessories	Helmets	Sport-100 Helmet, Black
Accessories	Helmets	Sport-100 Helmet, Blue
Accessories	Helmets	Sport-100 Helmet, Red
Accessories	Hydration Packs	Hydration Pack - 70 oz.
Accessories	Lights	Headlights - Dual-Beam
Accessories	Lights	Headlights - Weatherproof
Accessories	Lights	Taillights - Battery-Powered
Accessories	Locks	Cable Lock
Accessories	Panniers	Touring-Panniers, Large