



MICROSOFT POWER-BI

SERIES 4

DATA MODELLING

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INTRO

Data Modelling in Power-BI is fundamental process that involves creating a structures, interconnected data framework to enable efficient data analysis and reporting.

Key aspects in data modelling within Power-BI are—

1. Designing the data model
2. Establishing relationships

DESIGNING THE DATA MODEL

The core of data modelling in Power-BI involves designing a schema that defines how different data tables relate to each other.

This is usually done using a star schema or snowflake schema.

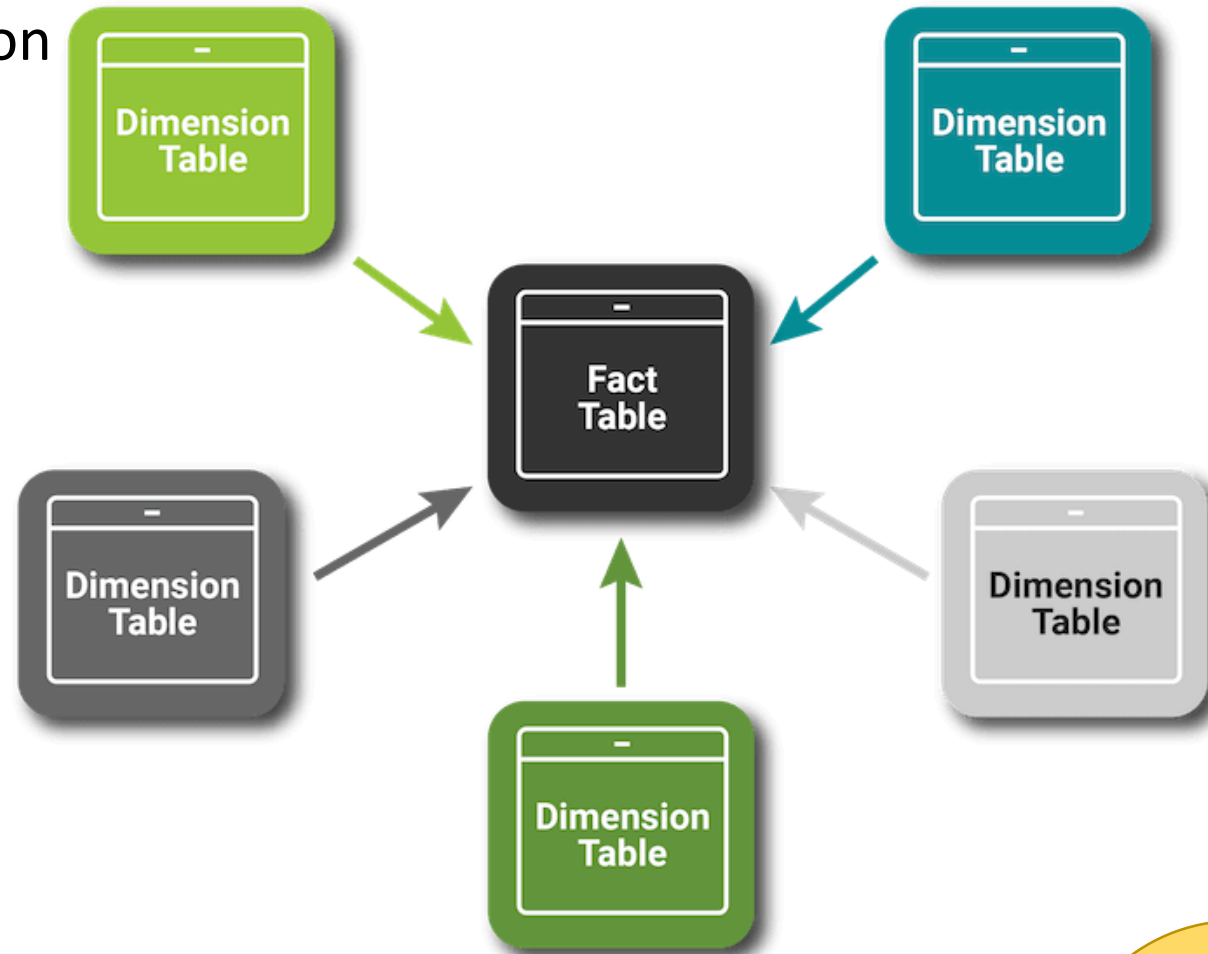
There are two types of tables in any data model—

1. Slicer tables – Dimensions

- They keep descriptive information
- They are used for slicing and dicing
 - Slicers or filters
 - Axis/legends of chart
- Descriptive doesn't means only text data type, also includes other data types
- Small table in no. of rows but big in no. of columns

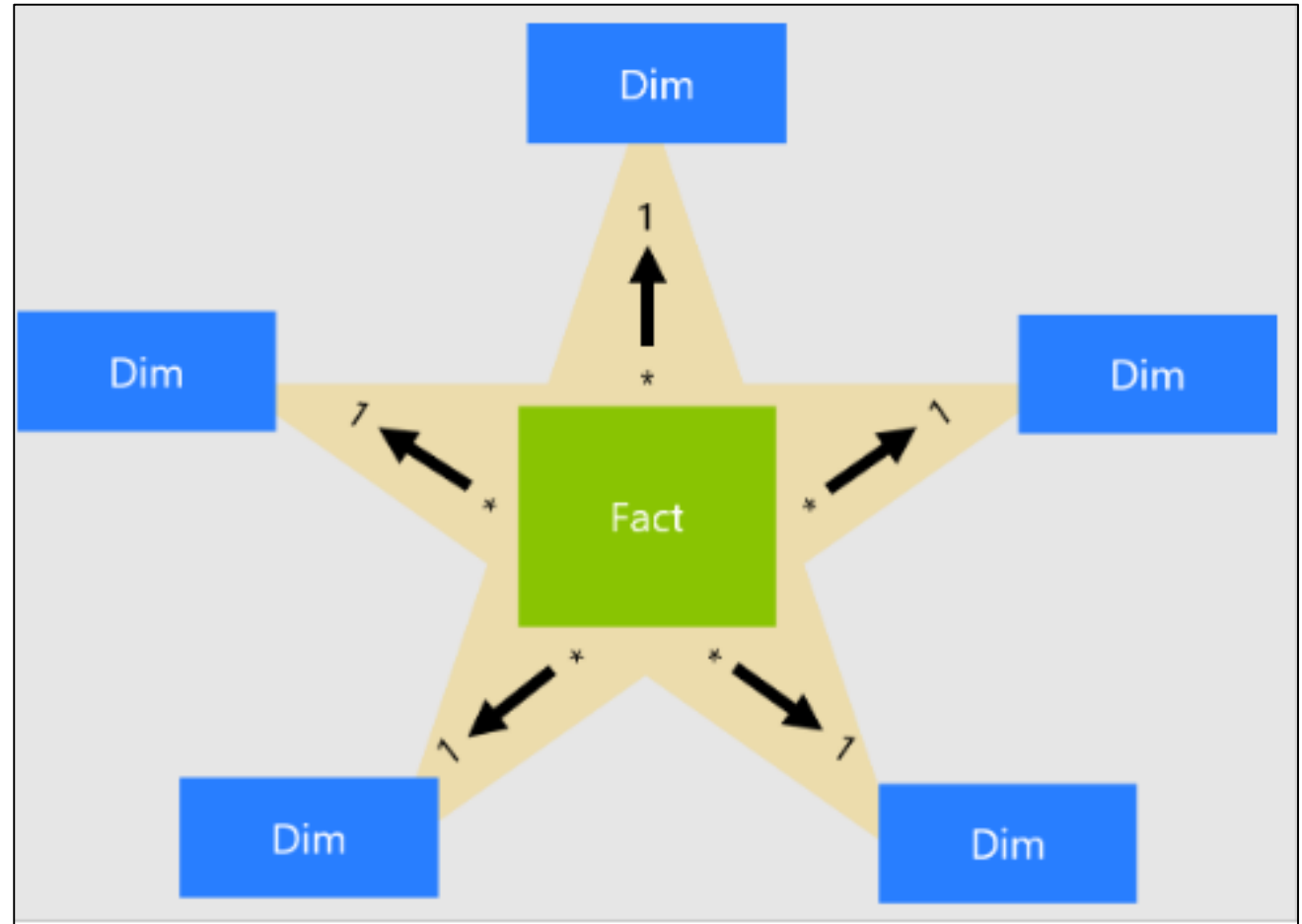
2. Value tables – Facts

- Explains happening of an action
- Keeps values (numeric, aggregable)
- Used in values in charts and visuals
- Small table in no. of columns and huge in no. of rows



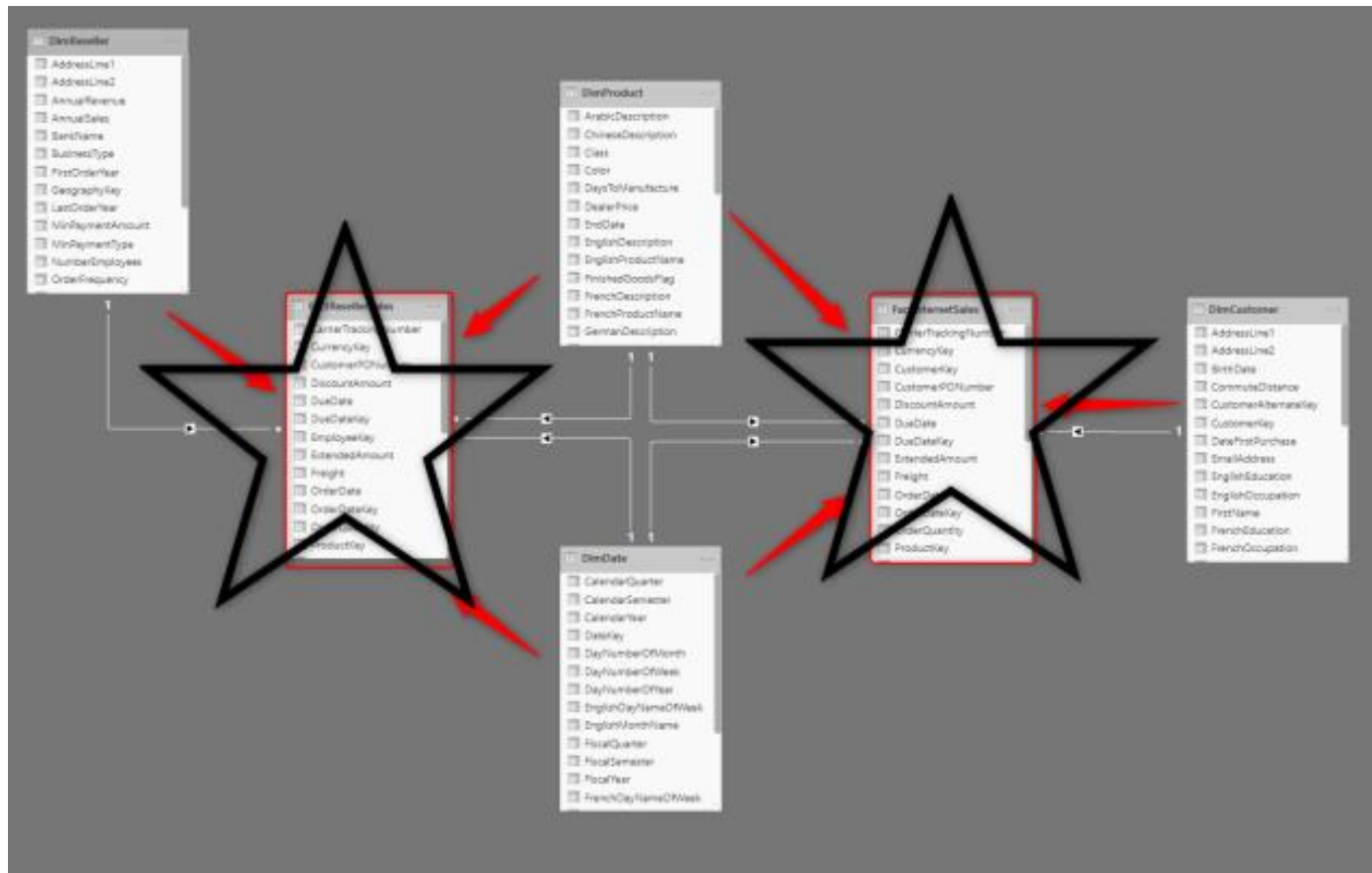
Relationship between Fact and Dimensions tables---

- One to Many
- From dimension to fact
- Single direction
- Star schema



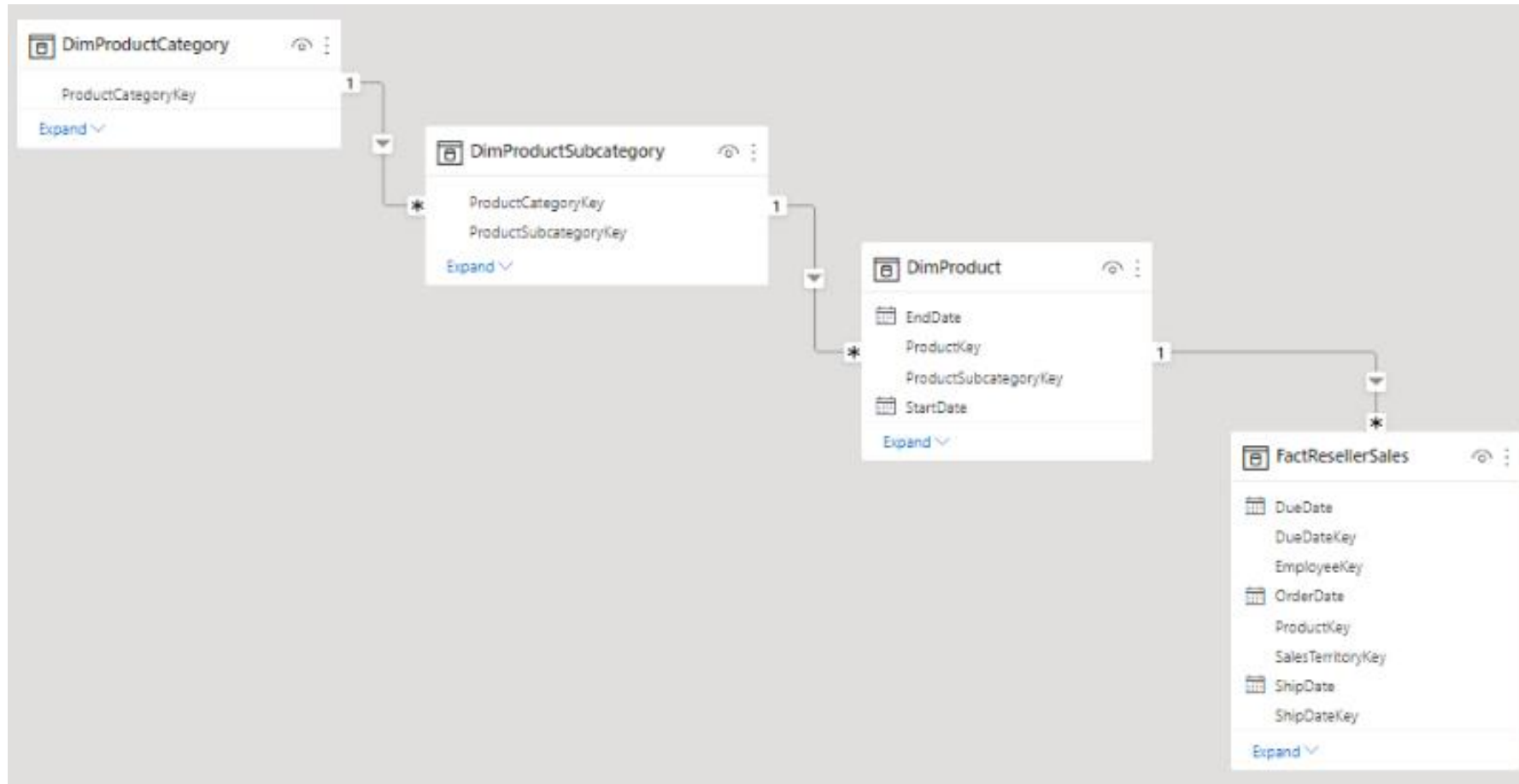
STAR SCHEMA

- Fact table in the middle and other dim tables surrounding it.
- It can also have more than 1 fact tables surrounded by dim tables.
- It cannot have relationship between dim to dim table.



SNOWFLAKE SCHEMA

- It is a variation of star schema
- Dim tables are normalized into multiple related tables.



WHAT IS A GOOD DATA MODEL?

- It has star schema
- It has shared dimensions tables
- It includes fact table
- Single direction relationship
- One to many relationship

ESTABLISHING RELATIONSHIPS

In Power-BI, relationships between tables are created to enable data to be combined across them.

This is done using—

- **Primary and foreign keys**— ensuring unique identifiers in the fact tables match the corresponding keys in dimension tables
- **Cardinality** – defining the type of relationship (one to one, one to many or many to many)
- **Cross-filter direction** – specifying the direction in which filters should flow (single or both direction)

CARDINALITY

Each model relationship is defined by a cardinality type. There are four cardinality type options, representing the data characteristics of the "from" and "to" related columns.

The "one" side means the column contains unique values; the "many" side means the column can contain duplicate values.

There are 4 types of cardinality--

One-to-many (and many-to-one) cardinality-- When configuring a one-to-many or many-to-one relationship, you'll choose the one that matches the order in which you related the columns.

One-to-one cardinality -- A one-to-one relationship means both columns contain unique values

Many-to-many cardinality -- A many-to-many relationship means both columns can contain duplicate values

CROSS FILTER DIRECTION

Each model relationship is defined with a cross filter direction. Your setting determines the direction(s) that filters will propagate. The possible cross filter options are dependent on the cardinality type.

Single cross filter direction means "single direction", and Both means "both directions".

A relationship that filters in both directions is commonly described as bi-directional

Cardinality type	Cross filter options
One-to-many (or Many-to-one)	Single Both
One-to-one	Both
Many-to-many	Single (Table1 to Table2) Single (Table2 to Table1) Both

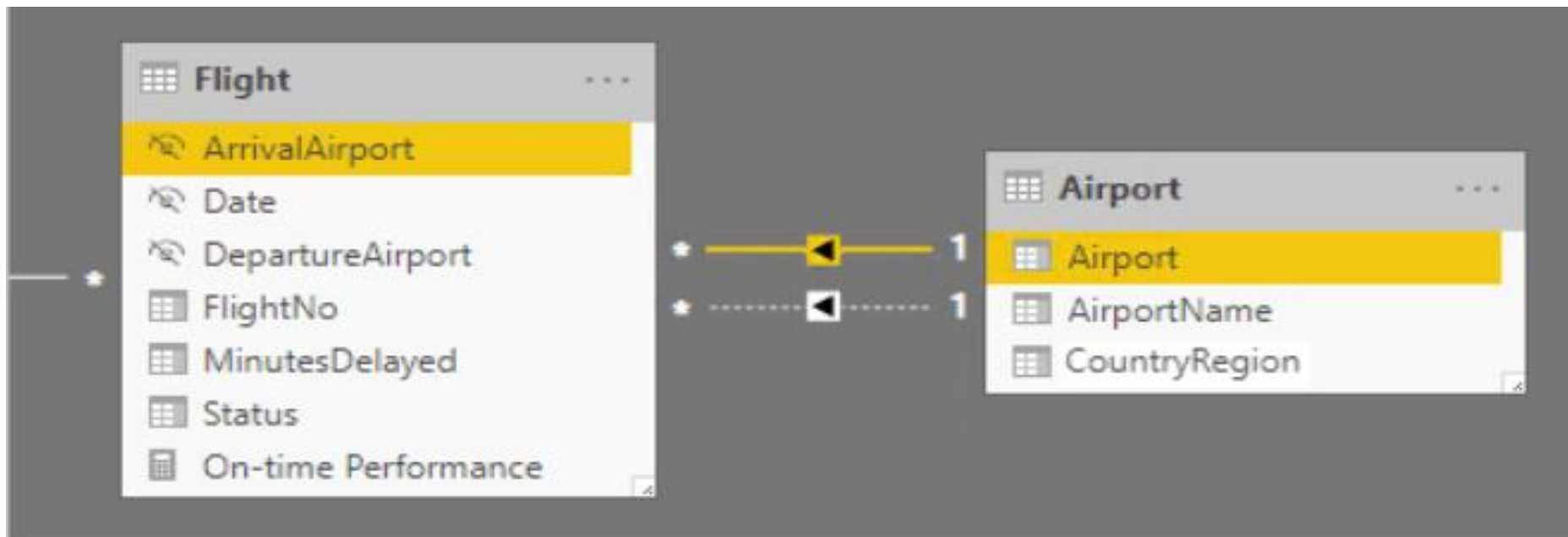
ACTIVE AND INACTIVE RELATIONSHIPS

By default, relationship is always active.

If the tables contains more than one relationship, then first relationship is active rest all remains inactive.

Active relationship is a solid line and inactive relationship is a dotted line.

Inactive relationship doesn't play any role, it just remains there. So to make it working there are 2 methods– Define it using USERELATIONSHIP() in DAX or Role playing dimension(RPD)



METHOD 1-- Define using USERELATIONSHIP() in DAX

You can use the USERELATIONSHIP DAX function to activate a specific relationship for relevant model calculations.

Syntax--

USERELATIONSHIP(<columnName1>,<columnName2>)

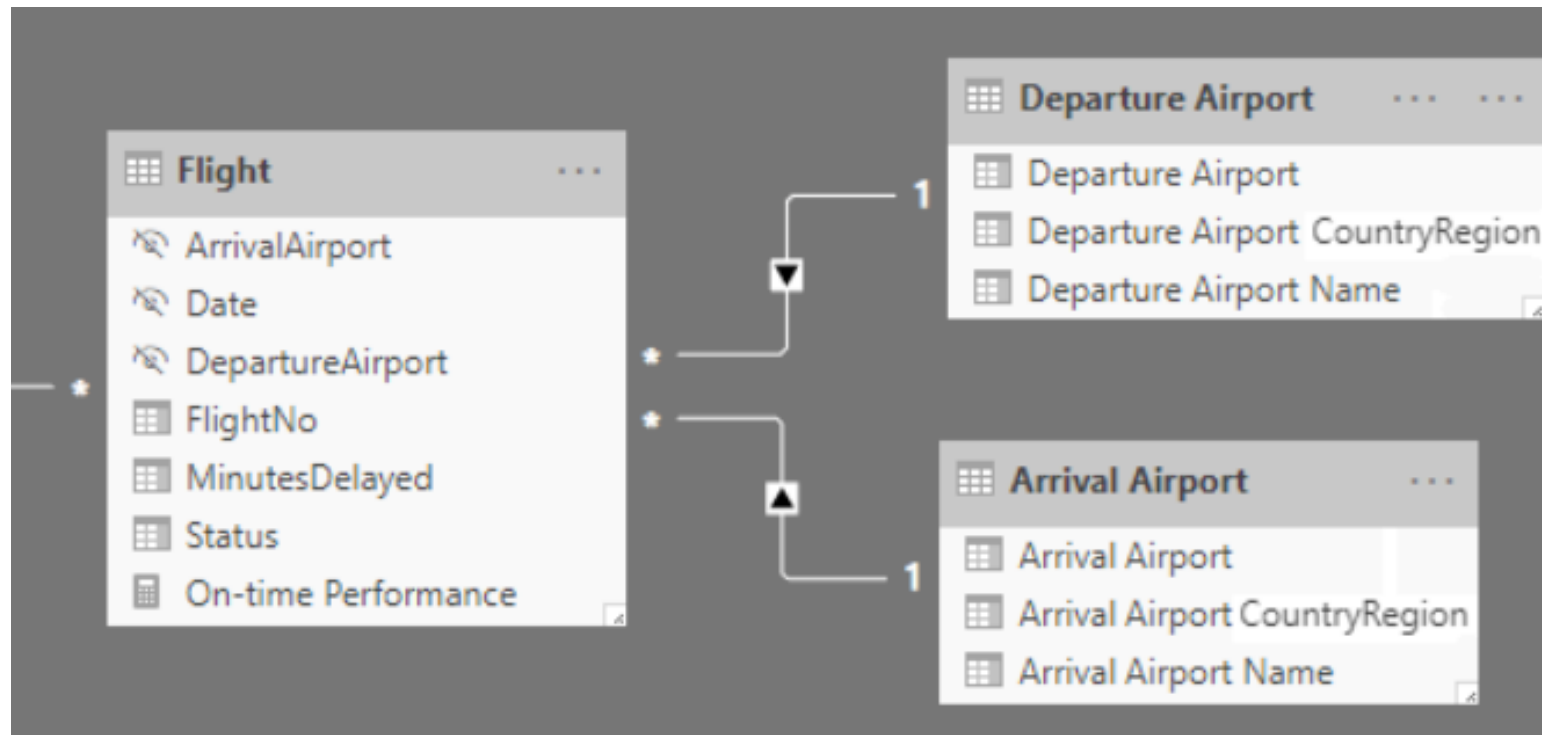
In USERELATIONSHIP, the status of a relationship is not important; that is, whether the relationship is active or not does not affect the usage of the function.

Even if the relationship is inactive, it will be used and overrides any other active relationships that might be present in the model but not mentioned in the function arguments.

METHOD 2– Role Playing Dimensions

Duplicate table is created, and then create a active relationship between them.

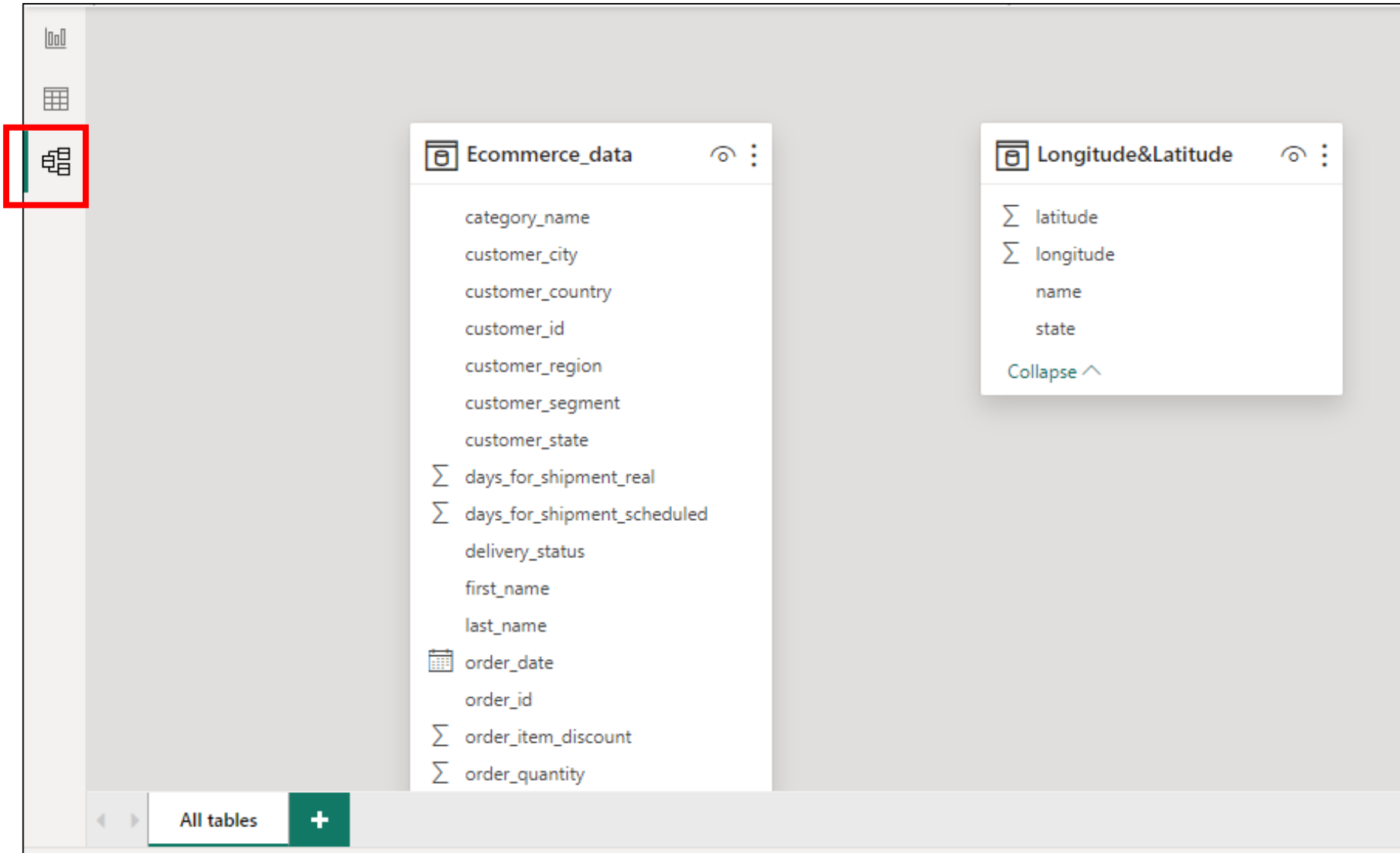
Here, Airport table is duplicated and named them accordingly.





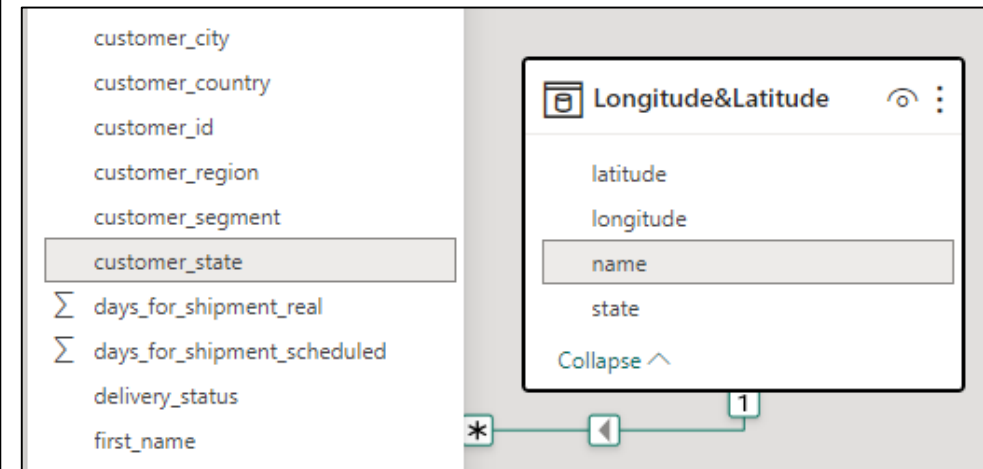
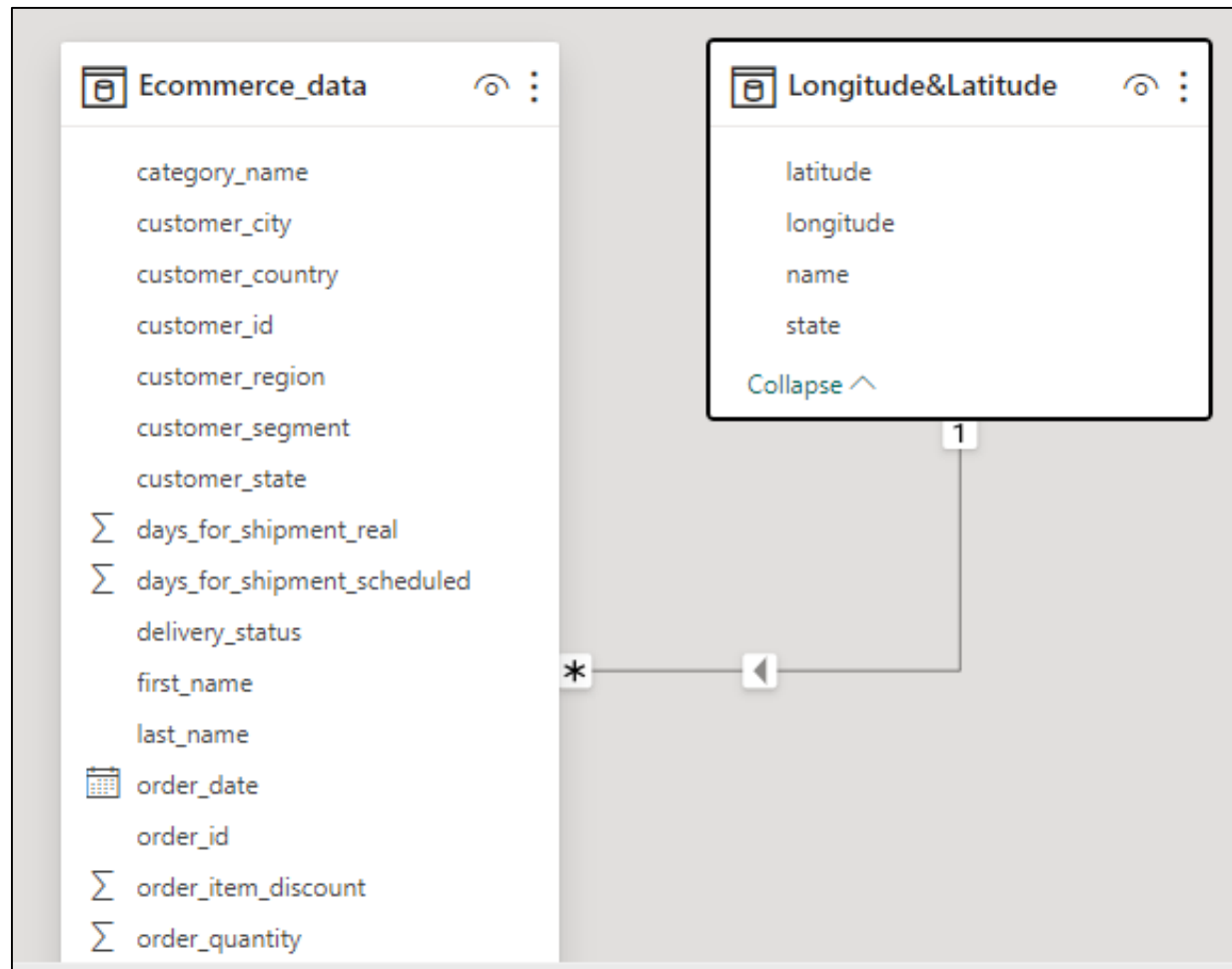
Practical Implementation on Ecommerce sales dataset

Open Model View and check if Power-BI has automatically detected relationship, if not you have to create them.



Method 1---

Check which columns are common in both table. Drag column from one table on the other table's respective column, it creates automatic relationship.

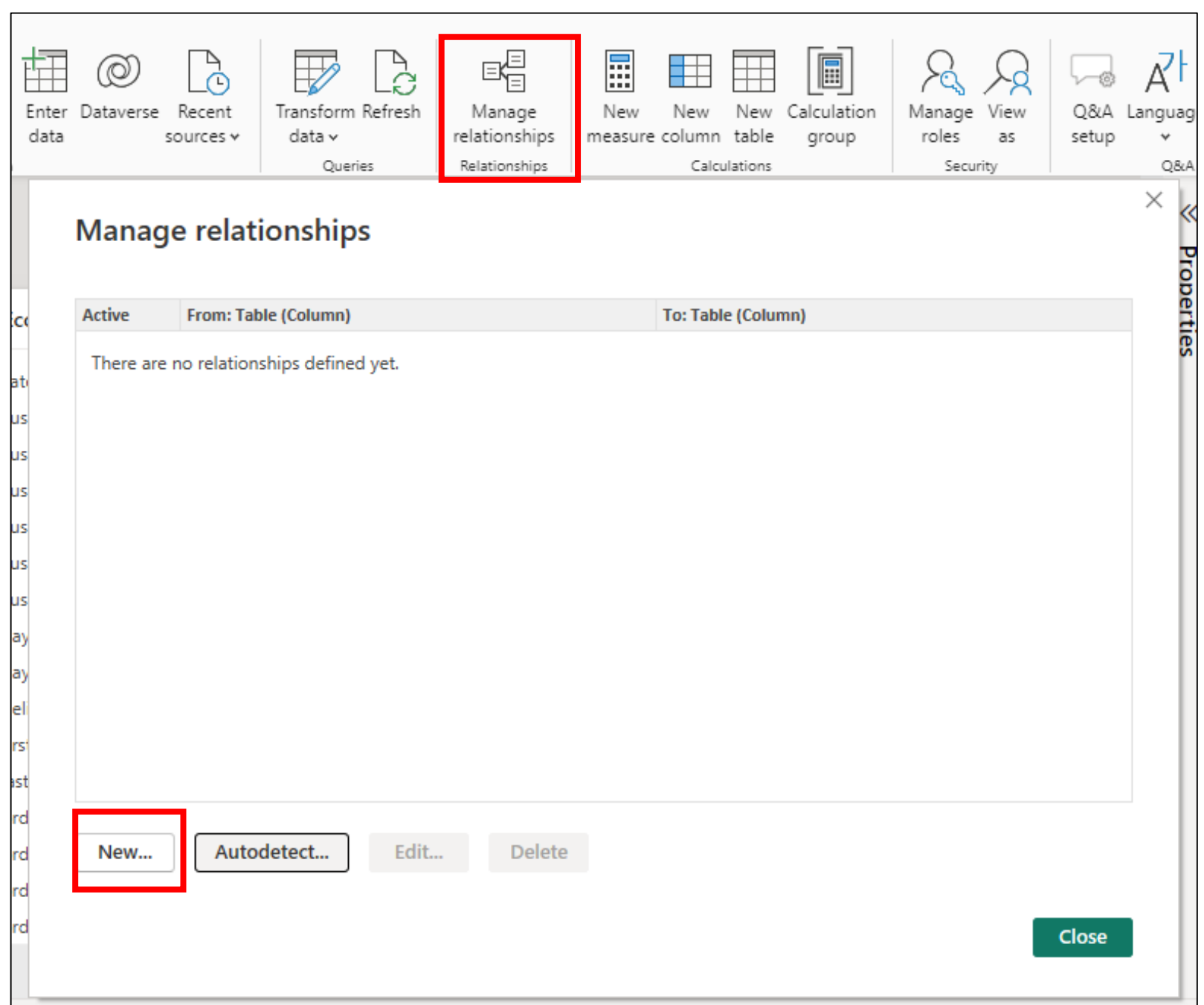


Hover on relationship line to see which columns are connected.

Method 2---

Step1--

Click on “ Manage Relationship” then “New”



Step 2--

Select table

Select column

Select column

Create relationship

Select tables and columns that are related.

Ecommerce_data

customer_segment	customer_city	customer_state	customer_country	customer_region	delivery_status
Consumer	Los Angeles	California	United States	West	Advance shipping
Consumer	Los Angeles	California	United States	West	Shipping on time
Consumer	Los Angeles	California	United States	West	Late delivery

Longitude&Latitude

state	latitude	longitude	name
AK	63.588753	-154.493062	Alaska
AL	32.318231	-86.902298	Alabama
AR	35.20105	-91.831833	Arkansas

Cardinality

Many to one (*:1)

Cross filter direction

Single

☒ Make this relationship active

☐ Assume referential integrity

☐ Apply security filter in both directions

OK

Cancel

Cardinality types



AR	55.20105	-91.831855	Arkansas
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Cardinality

Many to one (*:1)

Many to one (*:1)

One to one (1:1)

One to many (1:*)

Many to many (*:*)

Cross filter direction

Single

☐ Apply second filter

Relationship direction



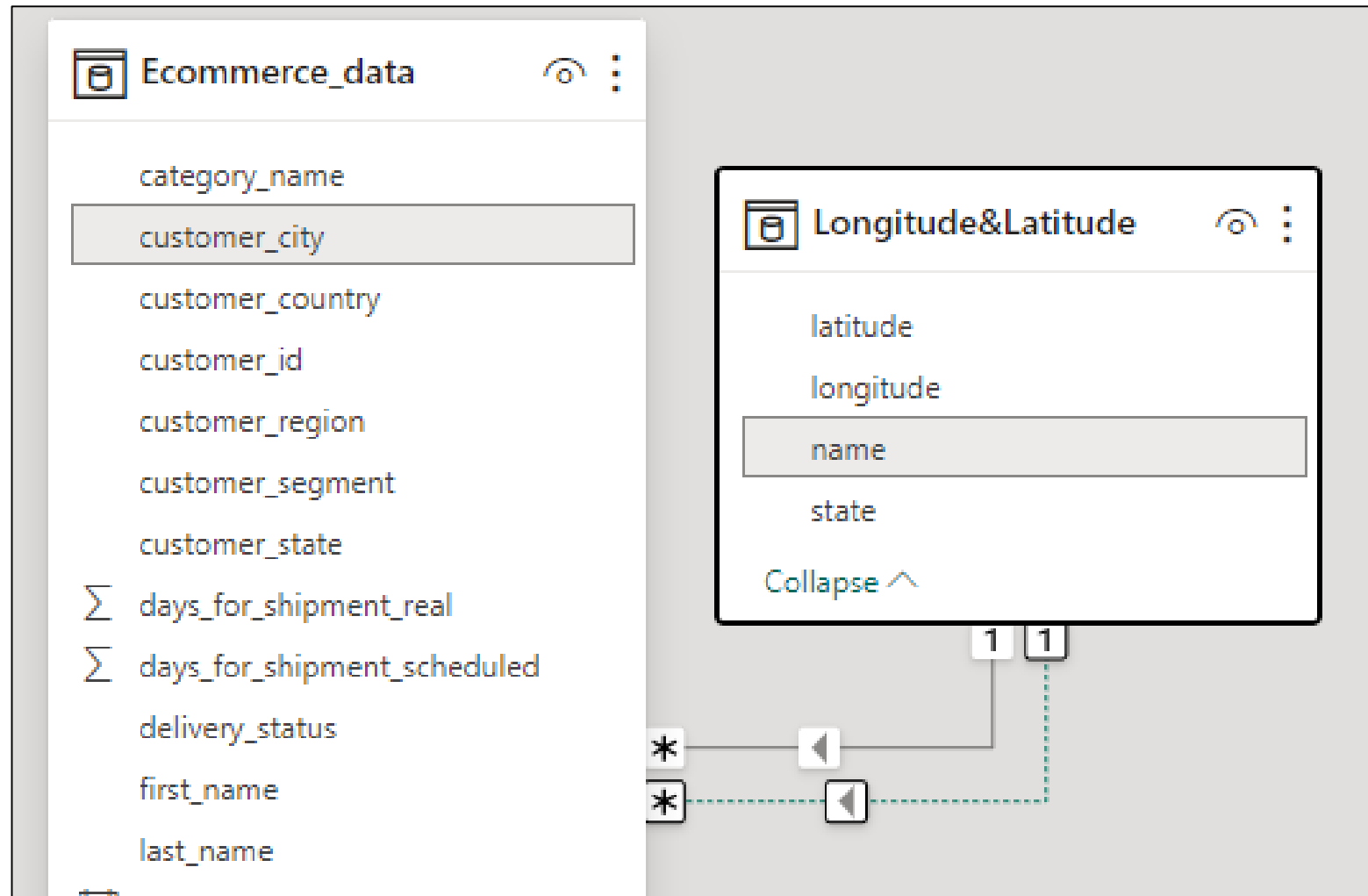
Cross filter direction

Single

Single

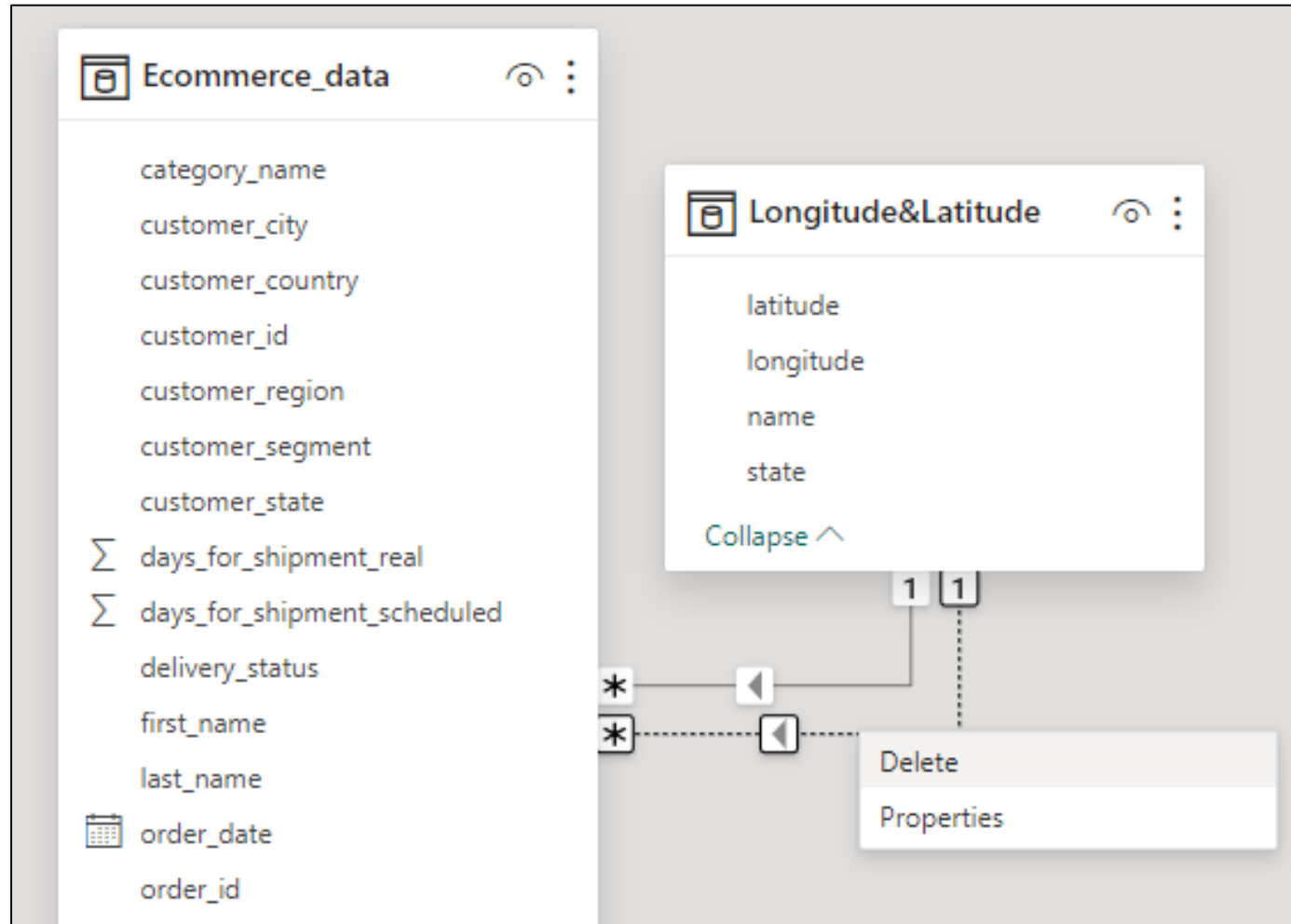
Both

(JUST FOR DEMO)– Inactive relationship
It is identified by dotted line.



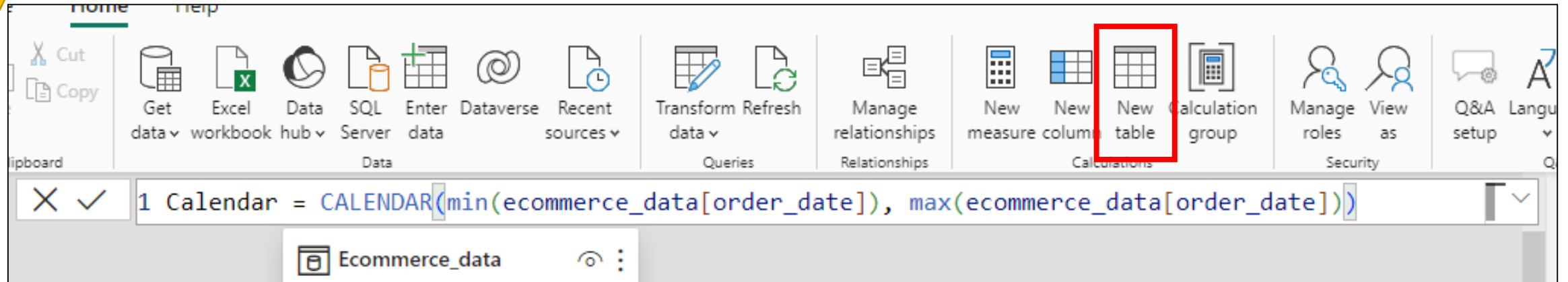
If any relationship is wrong, you can delete it or edit it.
Right click on the line—

- To delete click delete
- To edit click properties



You need to create a Calendar table.

A separate date table enhances time intelligence capabilities, ensures consistency across fact tables, and enables more flexible and efficient date-based filtering and calculations.

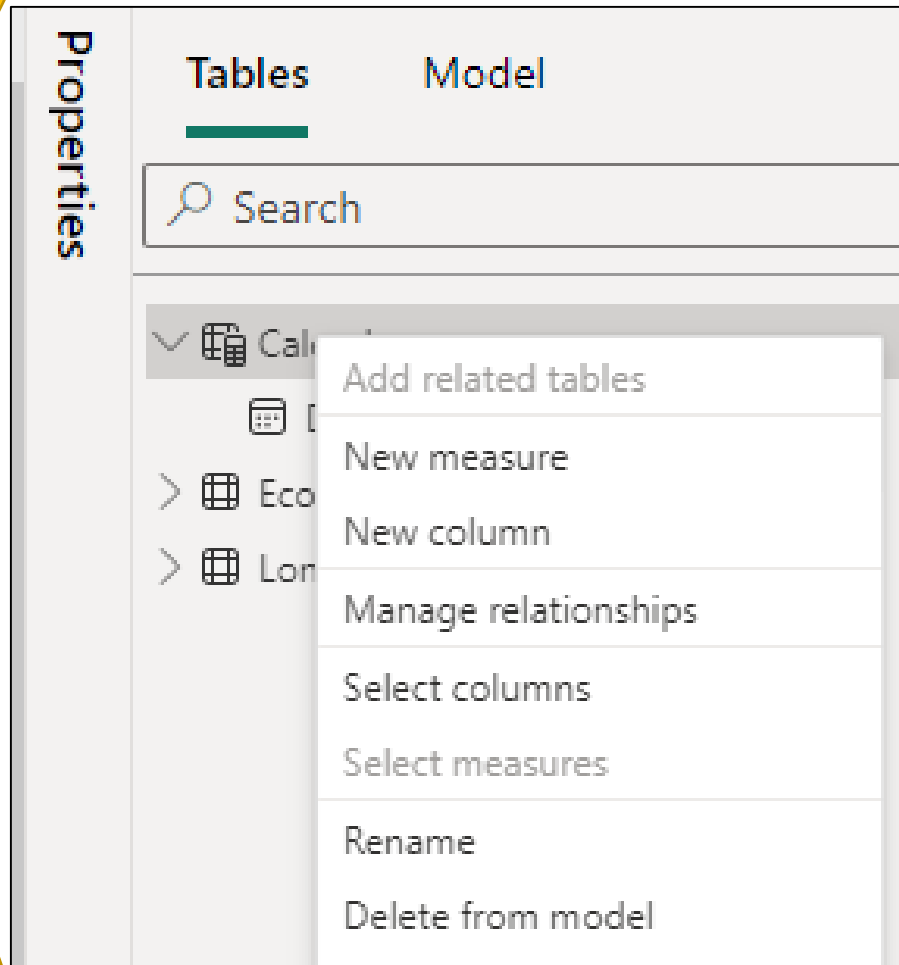


Click on “new table”

Write DAX query for new table

Press Enter

You need to extract Year, Month, Month_Number from Date column.



Right-Click on table name select “new column”
write following queries for each column



```
1 Year = year('Calendar'[Date])
```

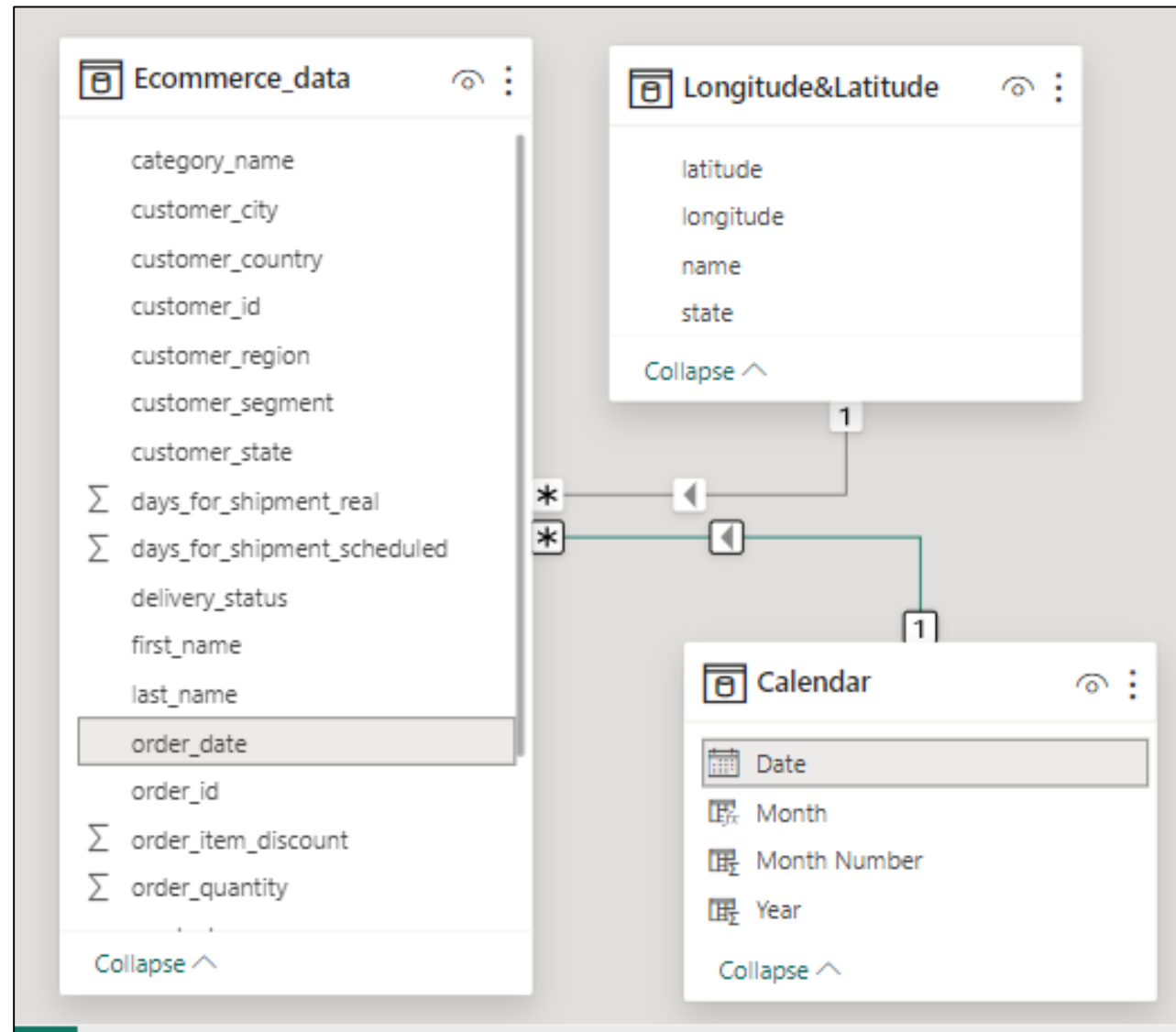


```
1 Month = format('Calendar'[Date], "mmmm")
```



```
1 Month Number = MONTH('Calendar'[Date])
```


Create relationship between date columns





THANK YOU

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