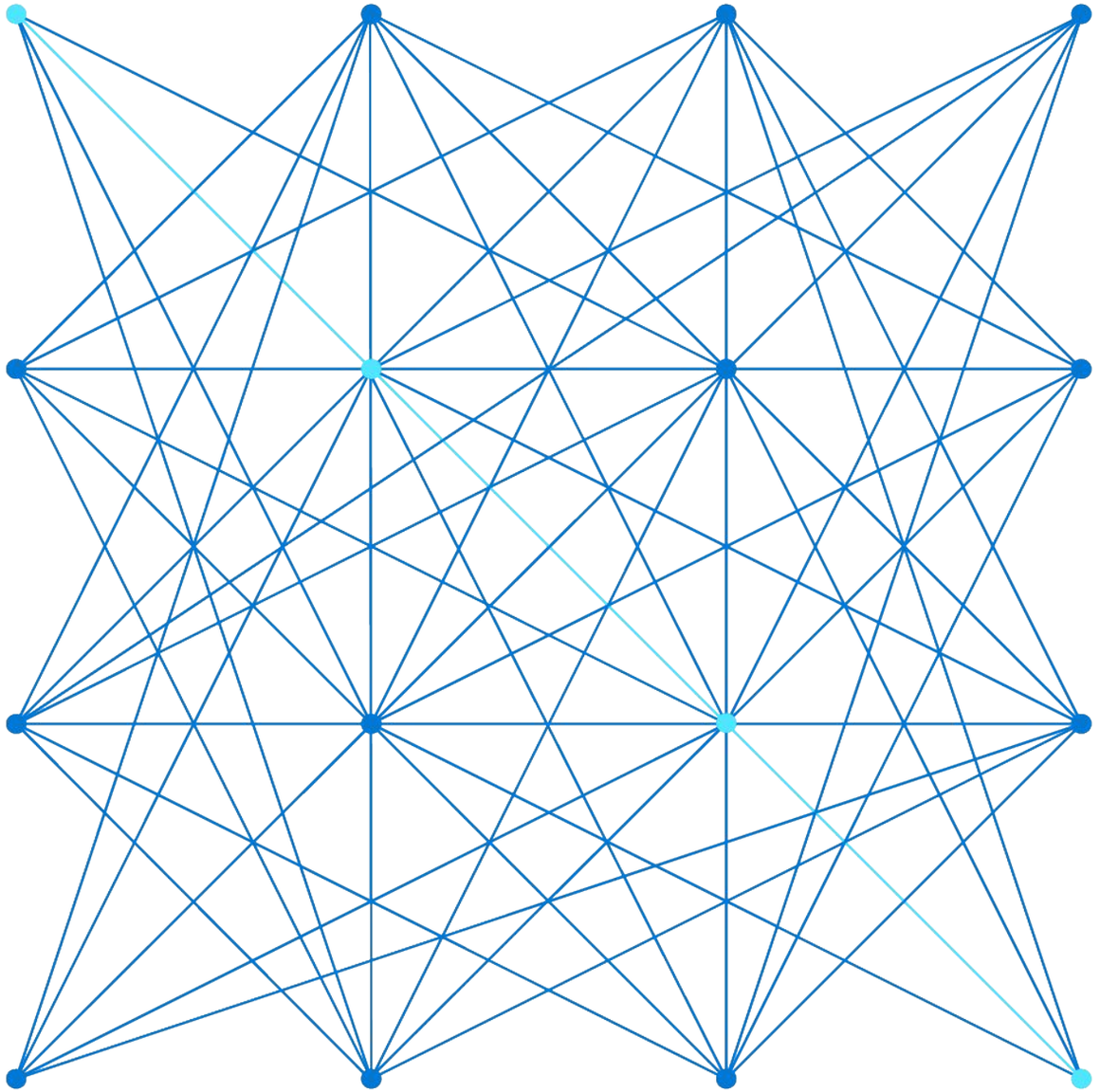
# DA-100 Analyzing Data with Power BI – 4

Prof. Ernesto Lee



# Module 4: Design a Data Model In Power BI

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# Learning Objectives

You will learn the following concepts:

- Data Modeling
- Working with Tables
- Dimensions and Hierarchies

# Lesson 1:
# Introduction to Data Modeling

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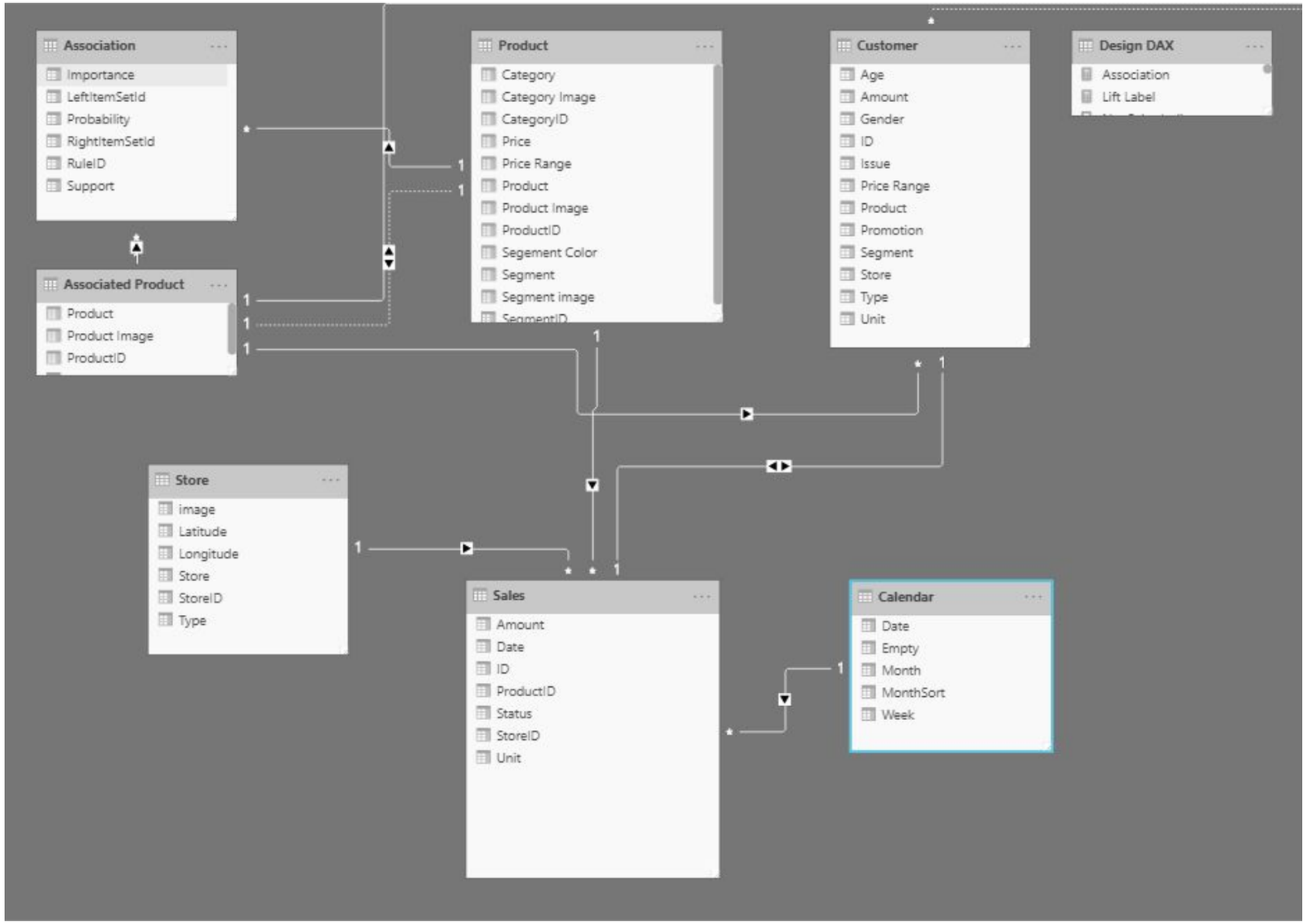
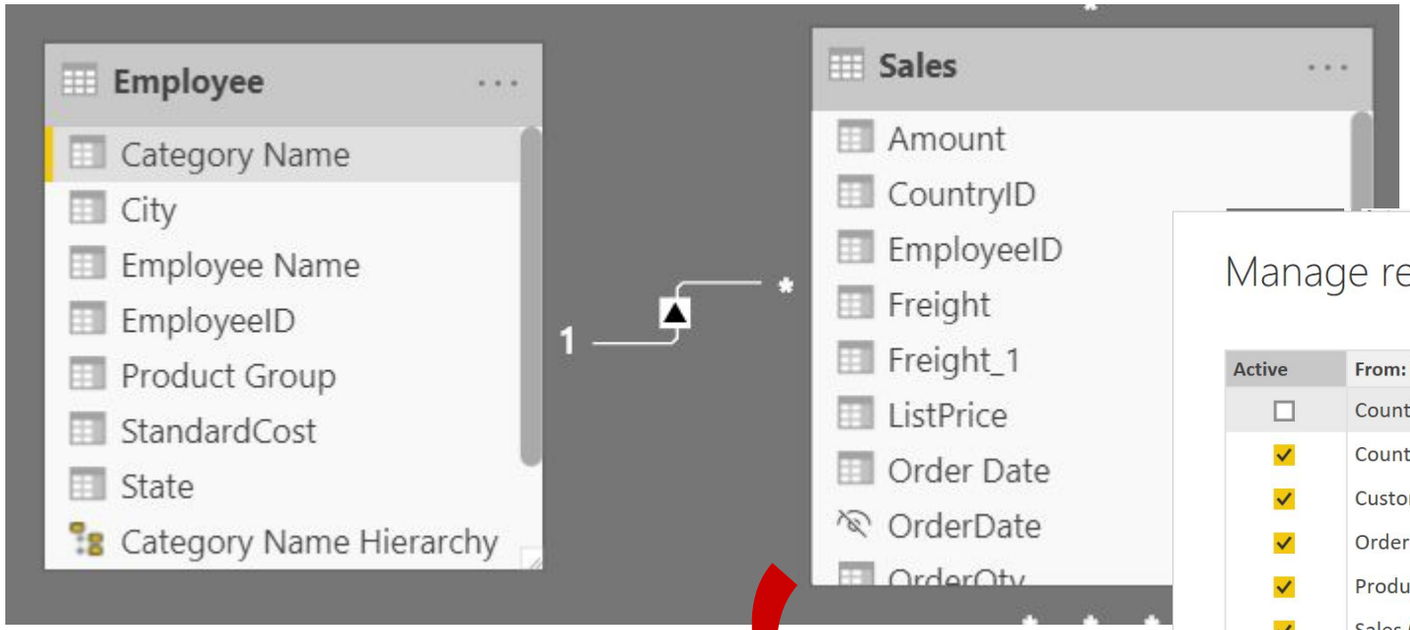
# Introduction to Data Modeling

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



# 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

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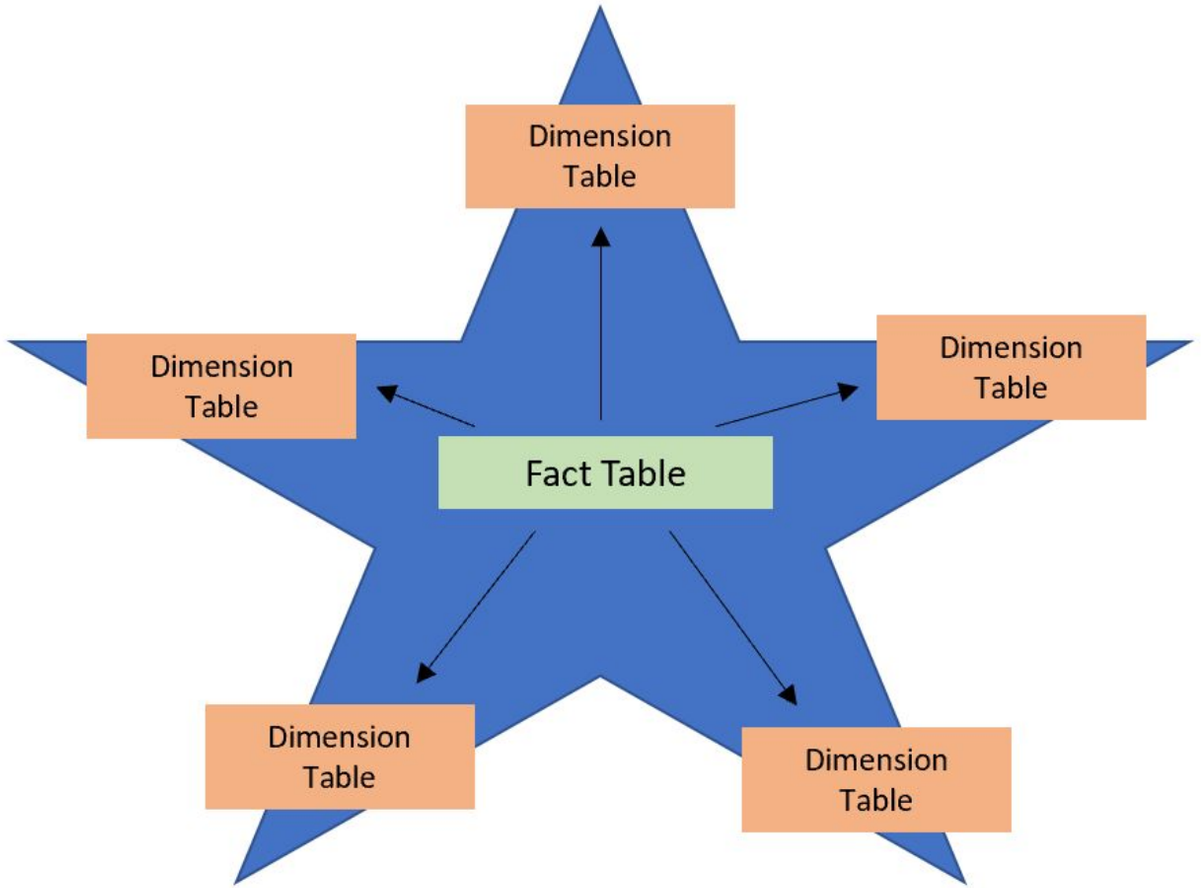
# Star Schemas

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



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# Review Questions

- Q01 – The two types of tables in a star schema are what?
- A01 – Dimension and Fact tables.

- Q02 –What is the difference between a fact table and a dimension table?
- A02 – Fact tables store observations or events while dimension tables contain information about specific entities within the data.

# Lesson 2:
# Working with Tables

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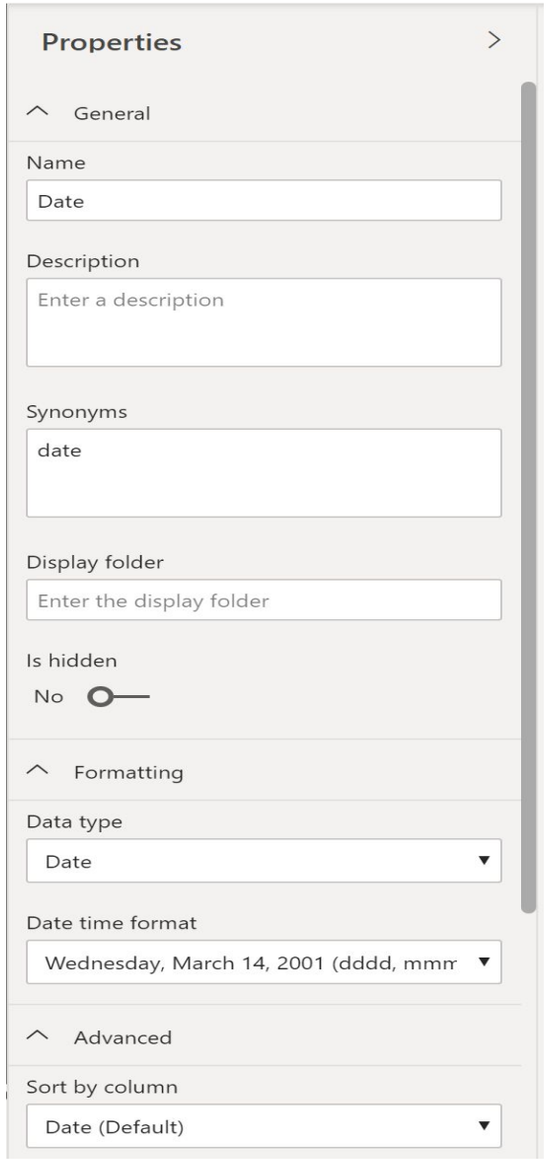
# Configure Table and Column Properties

- 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 |

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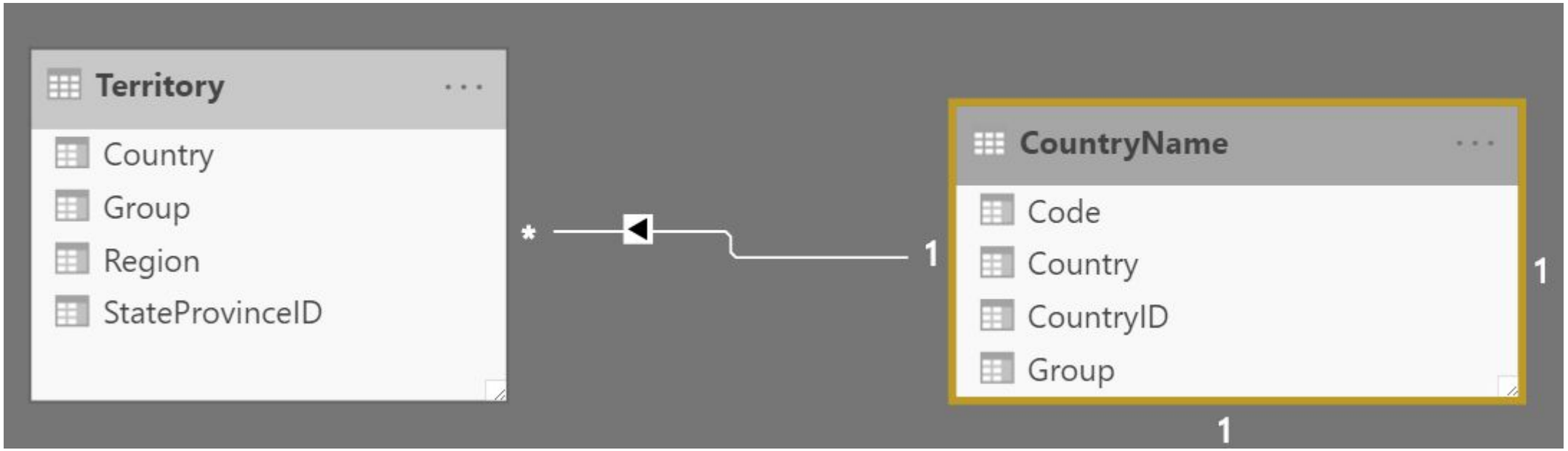
# Relationships and Cardinality

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



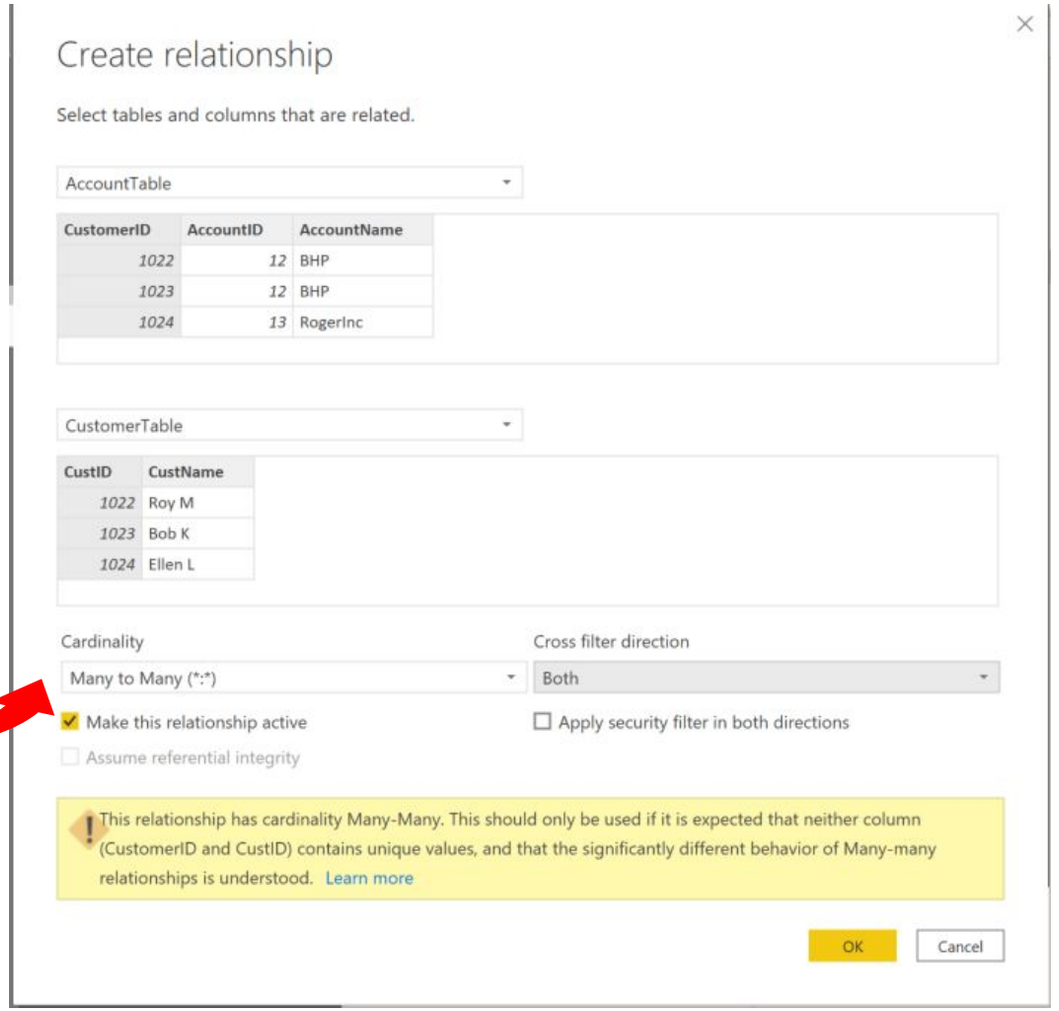
# Create Many-to-many Relationships

| 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



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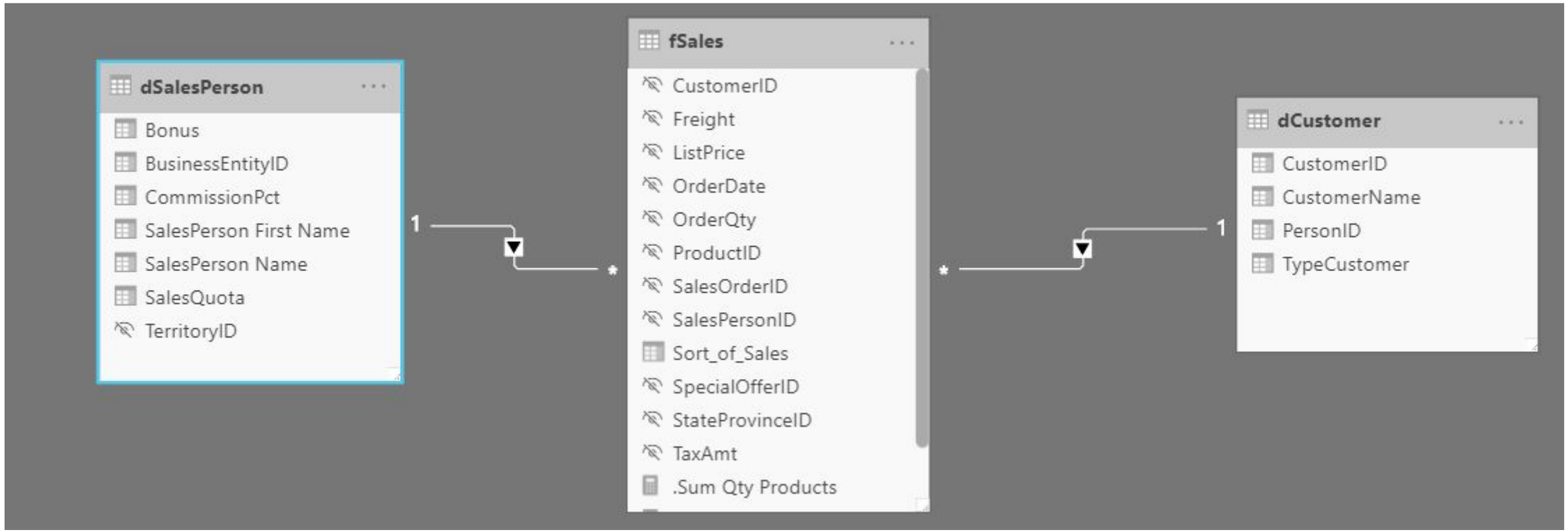
# Modeling Challenges

Circular relationships and relational dependencies.



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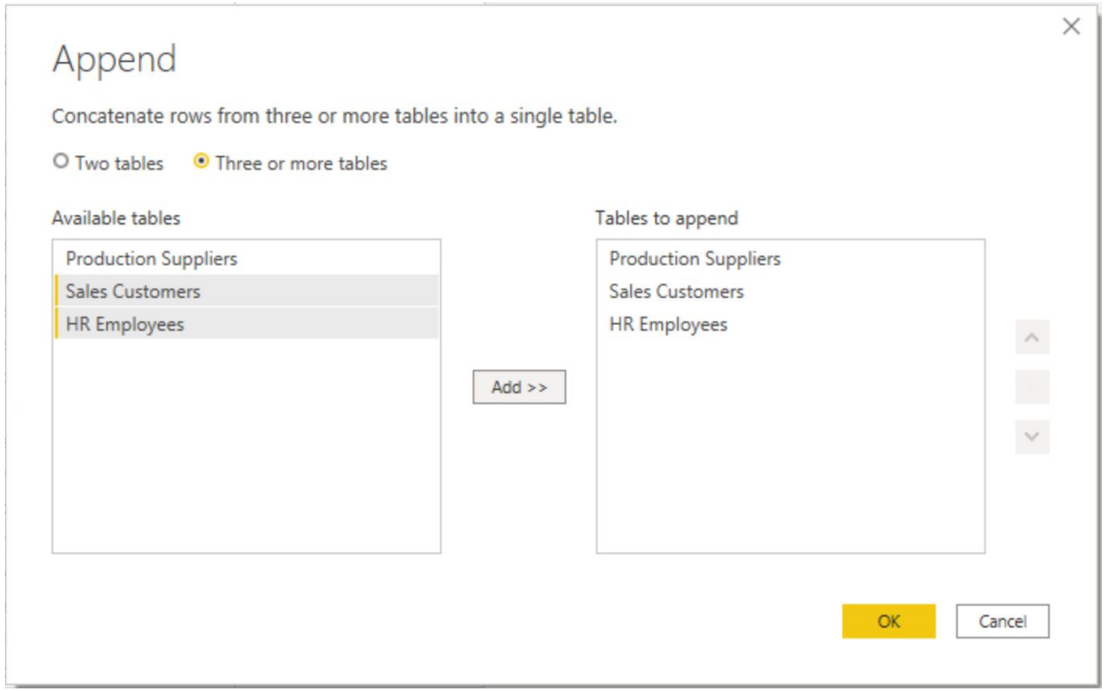
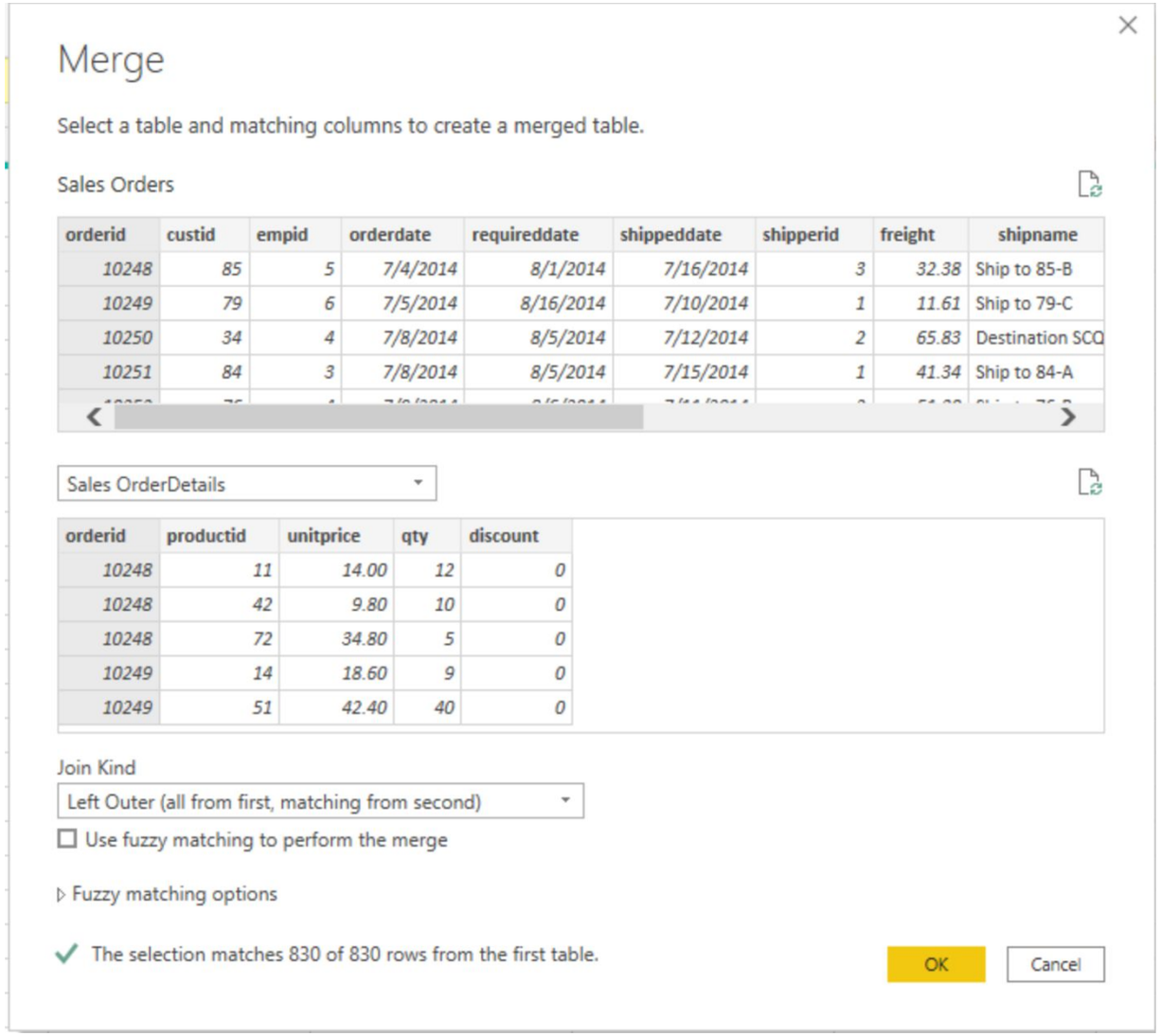
# Combine Queries

- Two methods for combining queries:
  - Append
  - Merge



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# Review Questions

- Q01 – What is Cardinality?
- A01 – The direction that the data flows in a relationship between two tables.

- Q02 – What is it called when multiple records in one table are associated with multiple records in another table?
- A02 – many-to-many relationship.

# Lab: Data Modeling in Power BI Desktop

# Lesson 3:
# Dimensions and Hierarchies

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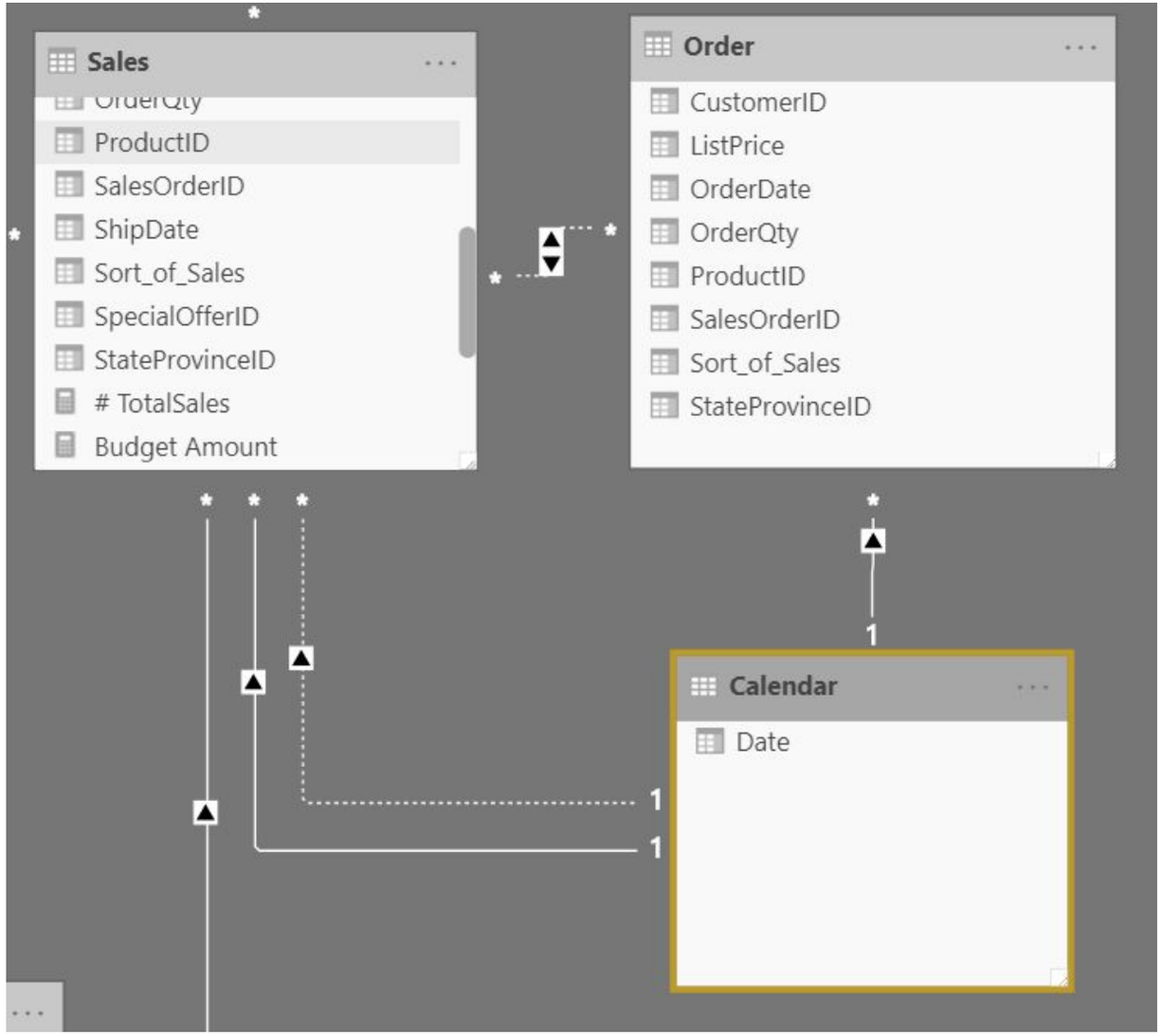
# Introduction to Dimensions and Hierarchies

- 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.



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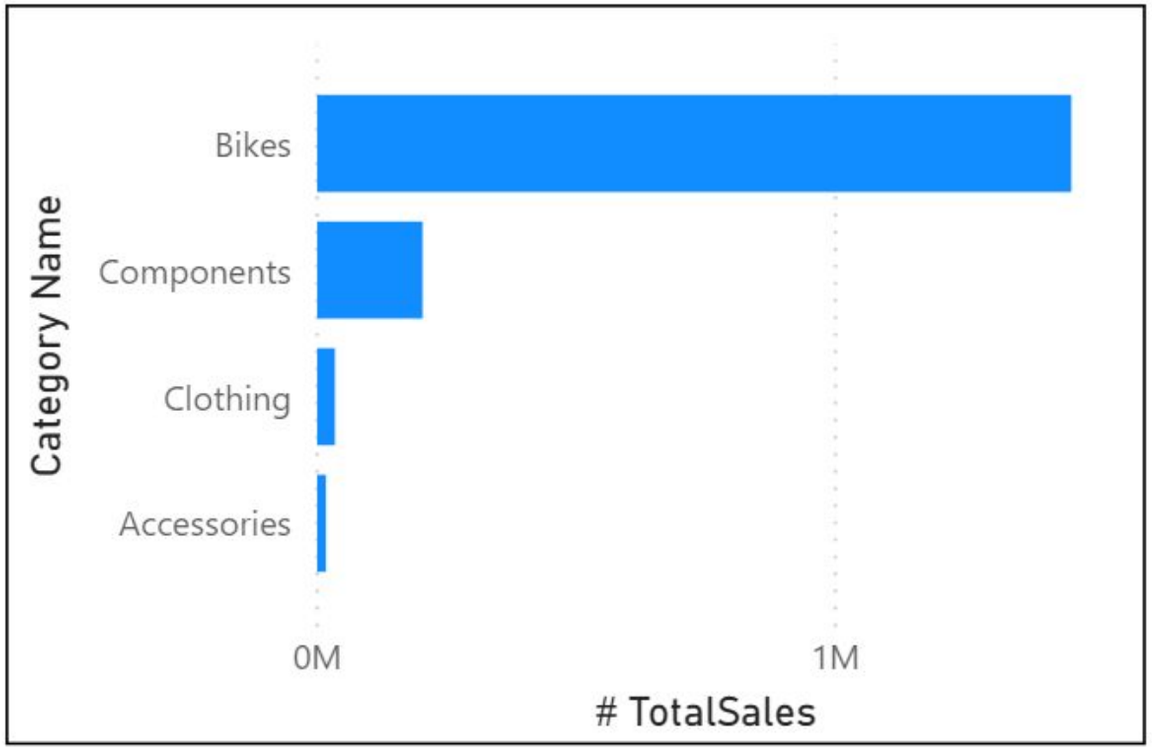
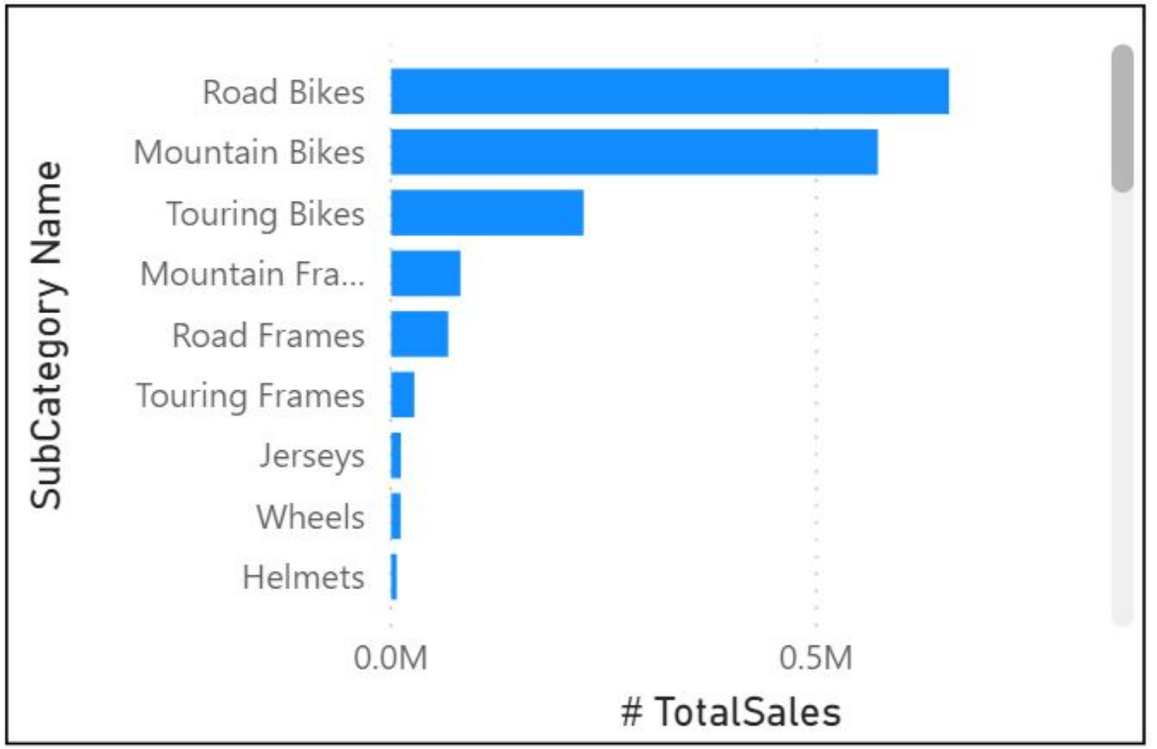
# Creating new Hierarchies



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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 |

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# Review Questions

- Q01 – A dimension that can filter related facts differently is called what?
- A01 – A role-playing dimension.

- Q02 – What type of table stores details about business entities?
- A02 – Dimension table.

# Lab: Advanced Data Modeling in Power BI Desktop

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# Module Overview

We covered the following concepts:

- Data Modeling
- Working with Tables
- Dimensions and Hierarchies

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# References

- DA-100 Design a data model in Power BI

https://docs.microsoft.com/en-us/learn/modules/design-model-power-bi/