

Working with relationships

DATA MODELING IN POWER BI

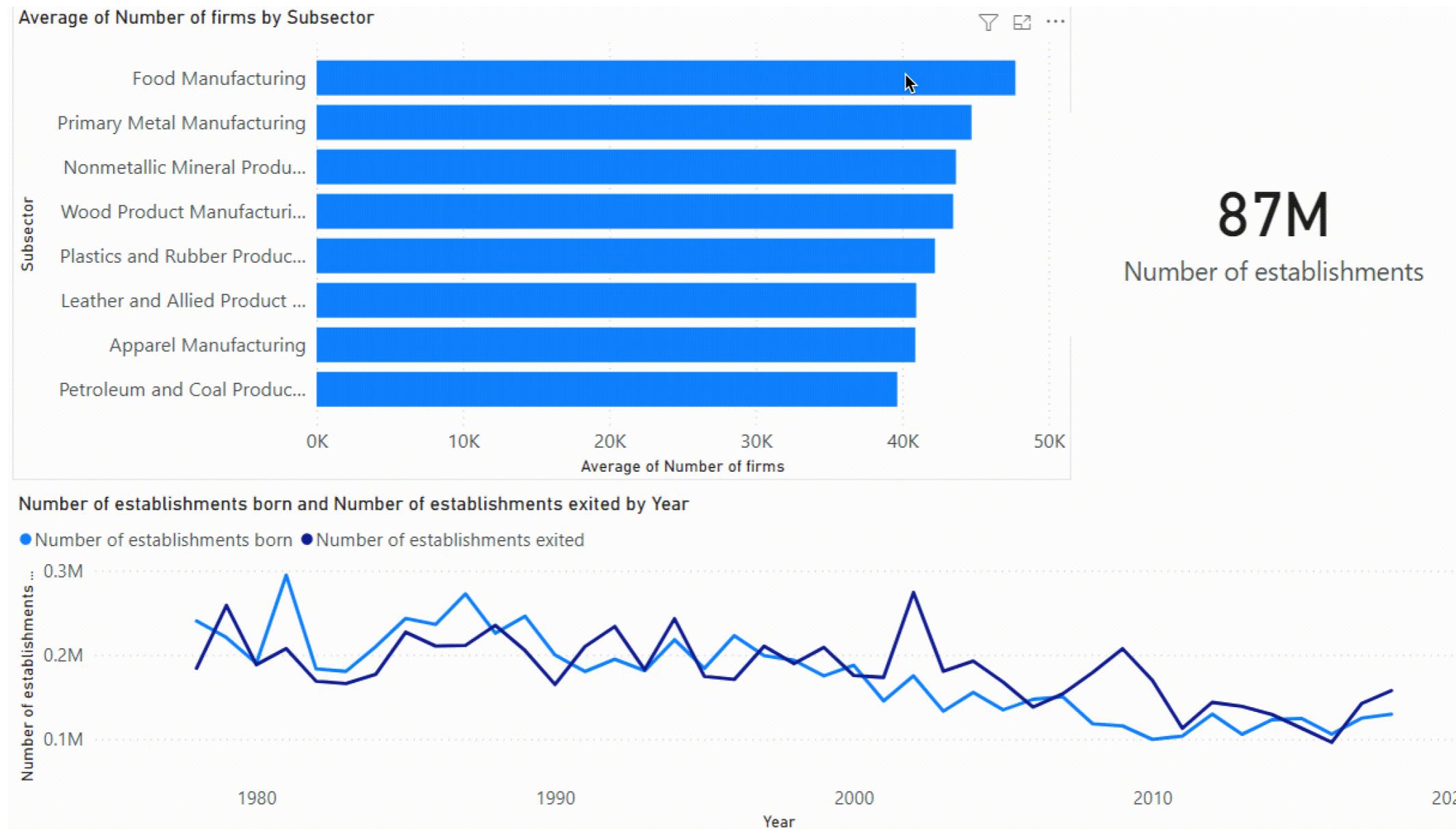


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Cross filtering

Cross-filtering: Selecting a value in one visual narrows down visible data in other visuals



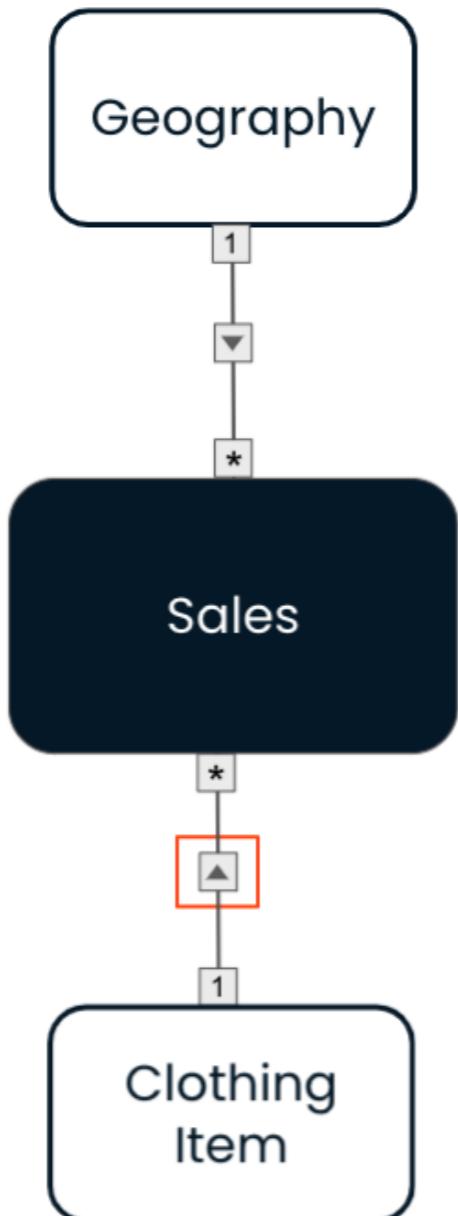
Filter direction

- All relationships have a cross filter direction
- Determines the direction that filters will propagate
- Example:
 - Geography -> Sales
 - Clothing Item -> Sales
- From Dimension to Fact



Filter direction

Data model:



Dimension - Clothing Item

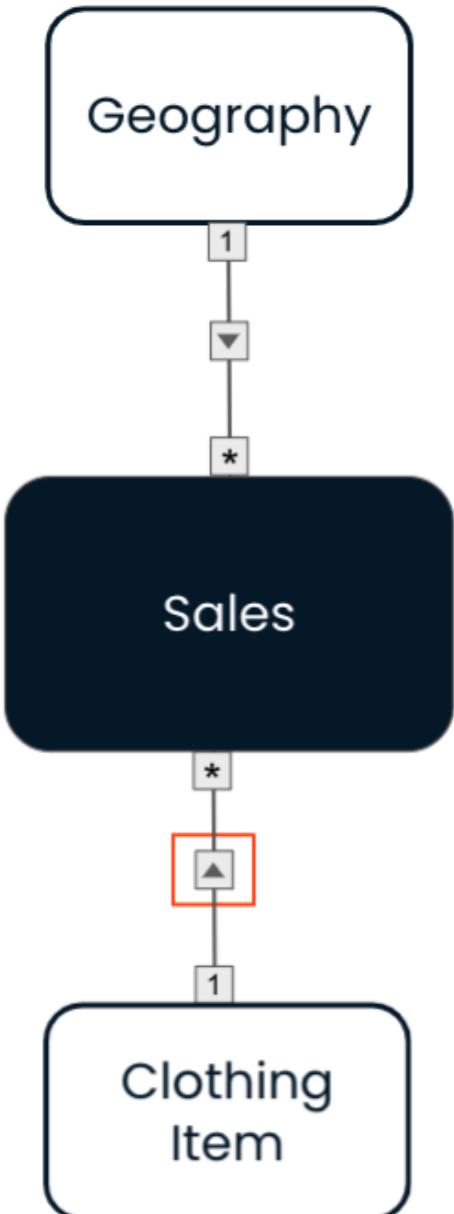
Product Id	Product
C1	T-shirt
C2	Socks
C3	Sweater

Fact - Sales

ID	Units	Amount	Product Id
001	3	60	C2
002	2	10	C1
003	1	70	C3
004	1	50	C3
005	5	50	C3

Filter direction

Data model:



Dimension - Clothing Item

Product Id	Product
C1	T-shirt
C2	Socks
C3	Sweater



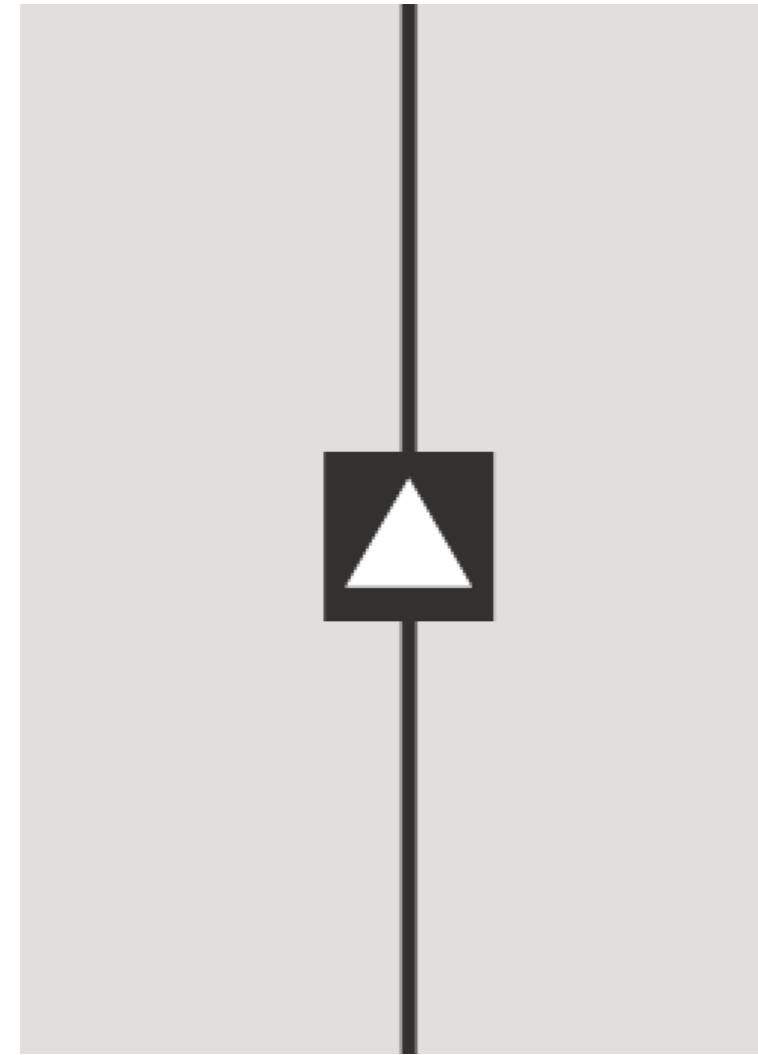
Fact - Sales

Id	Units	Amount	Product Id
001	3	60	C2
002	2	10	C1
003	1	70	C3
004	1	50	C3
005	5	50	C3

Filter direction options

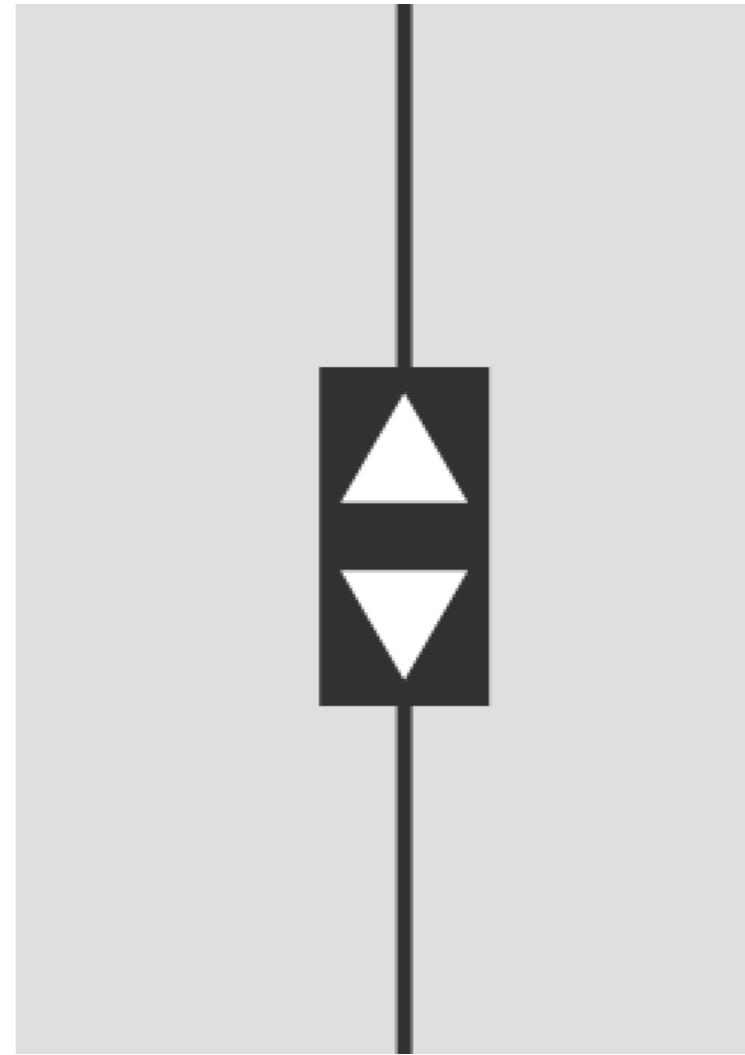
Single direction

Filter in one direction



Bi-directional

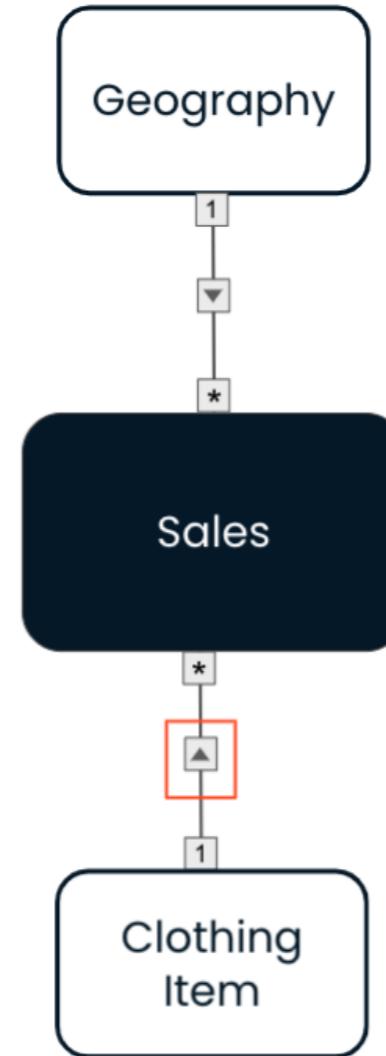
Filter in both directions



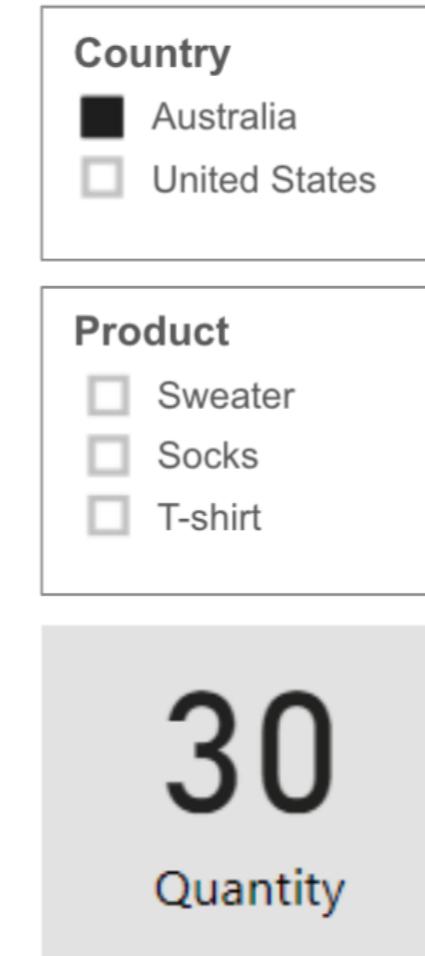
Bi-directional filtering: use case

Show only relevant slicer entries

Data model:



Report view:



Bi-directional filtering: use case

Only sweaters were sold in Australia

Fact - Sales

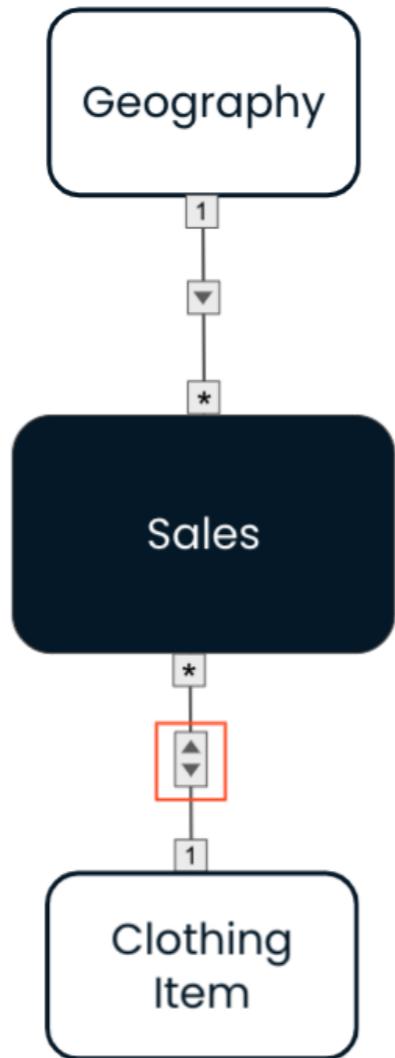
Id	Units	Amount	Product Id	Country Id
001	3	60	C2	US
002	2	10	C1	US
003	1	70	C3	AU
004	1	50	C3	AU
005	5	50	C3	AU

*Product Id: C3 = Sweater, Country Id: AU = Australia

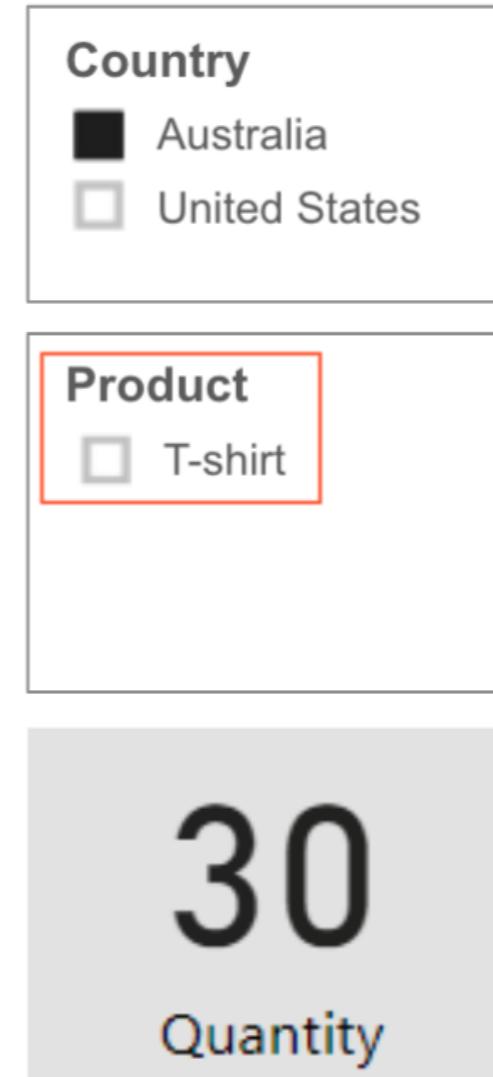
Bi-directional filtering: use case

Show only relevant slicer entries

Data model:

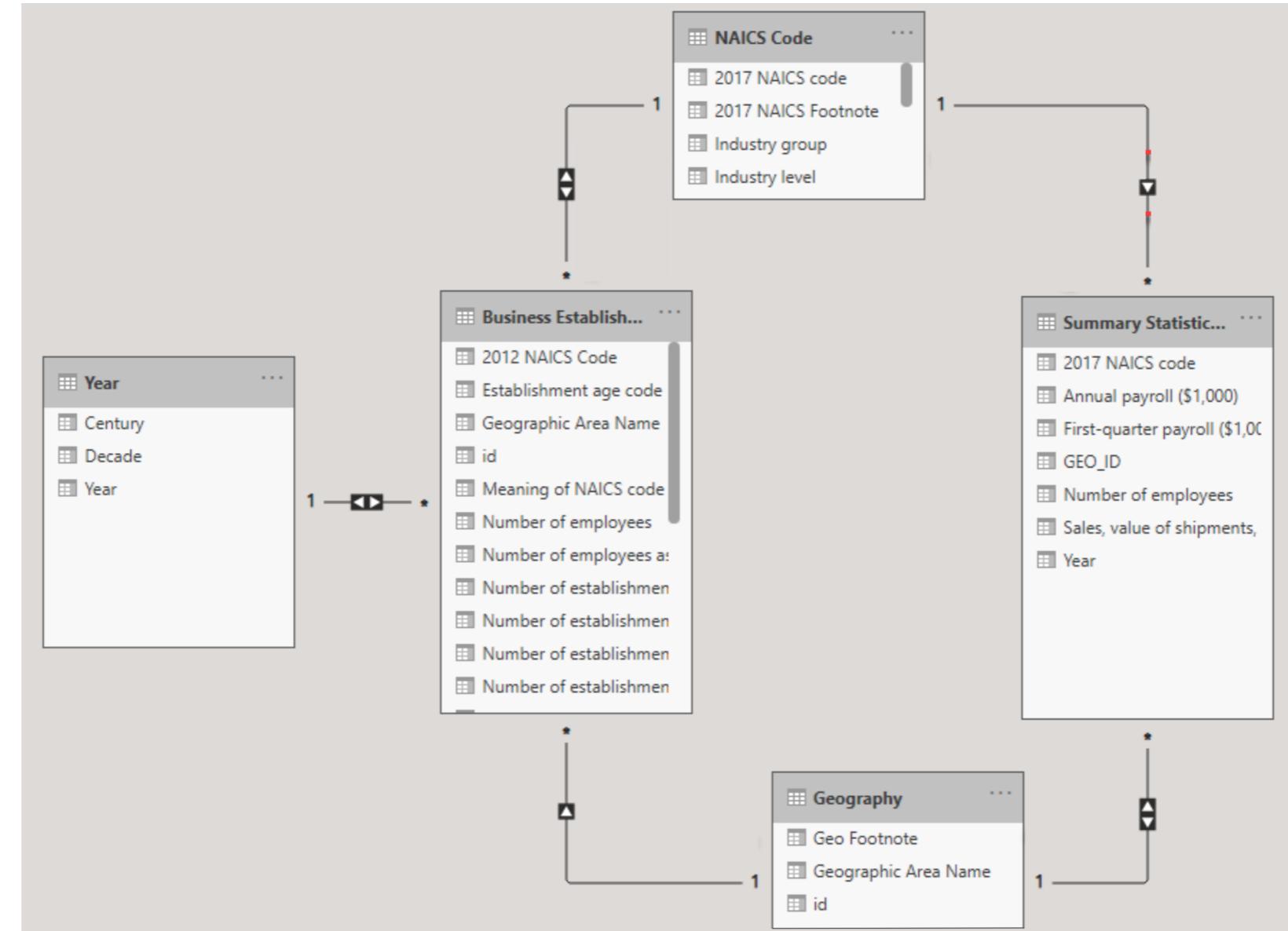


Report view:



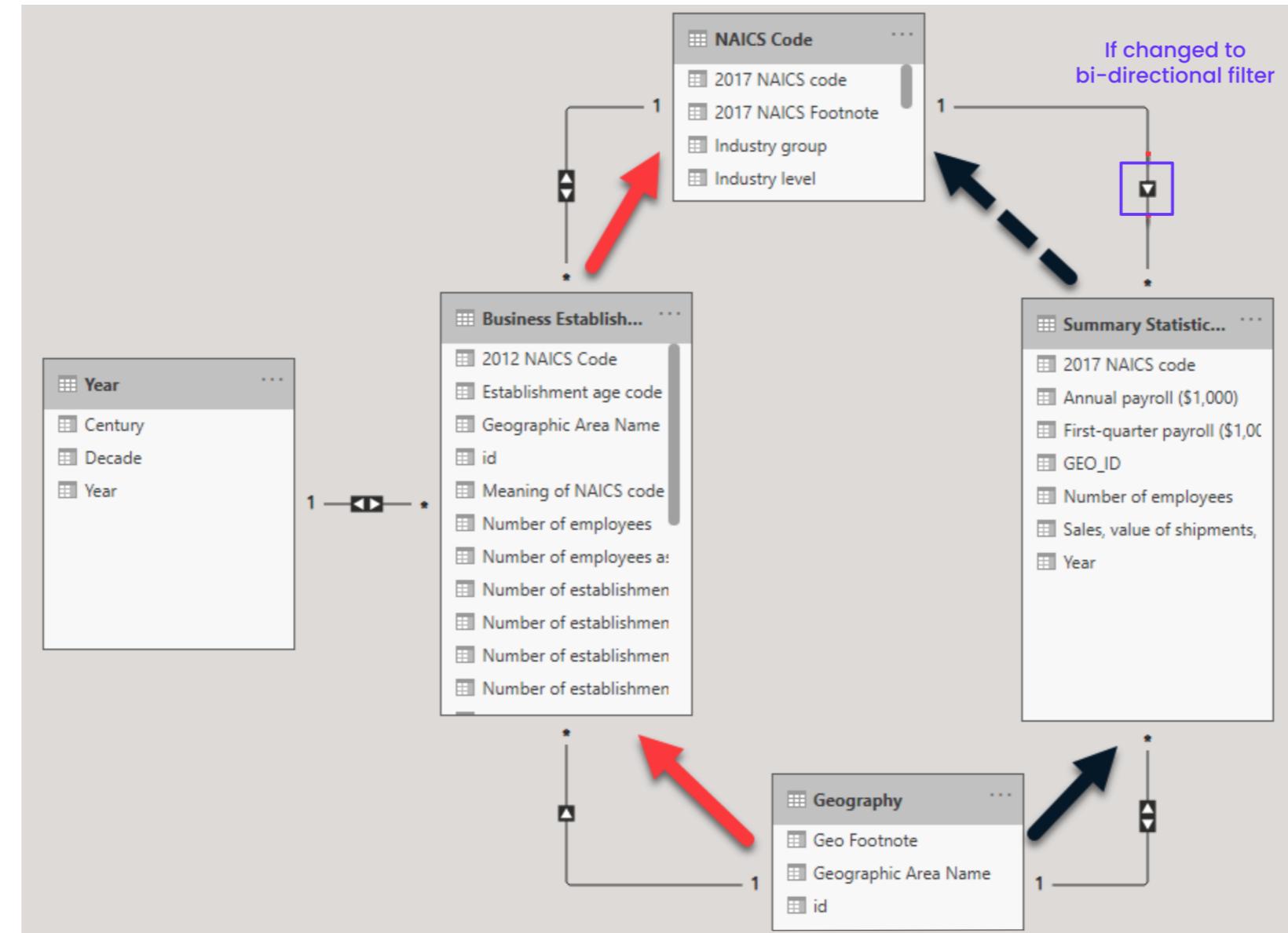
Bi-directional filtering and paths

Bi-directional filters cannot allow for two separate paths between two tables



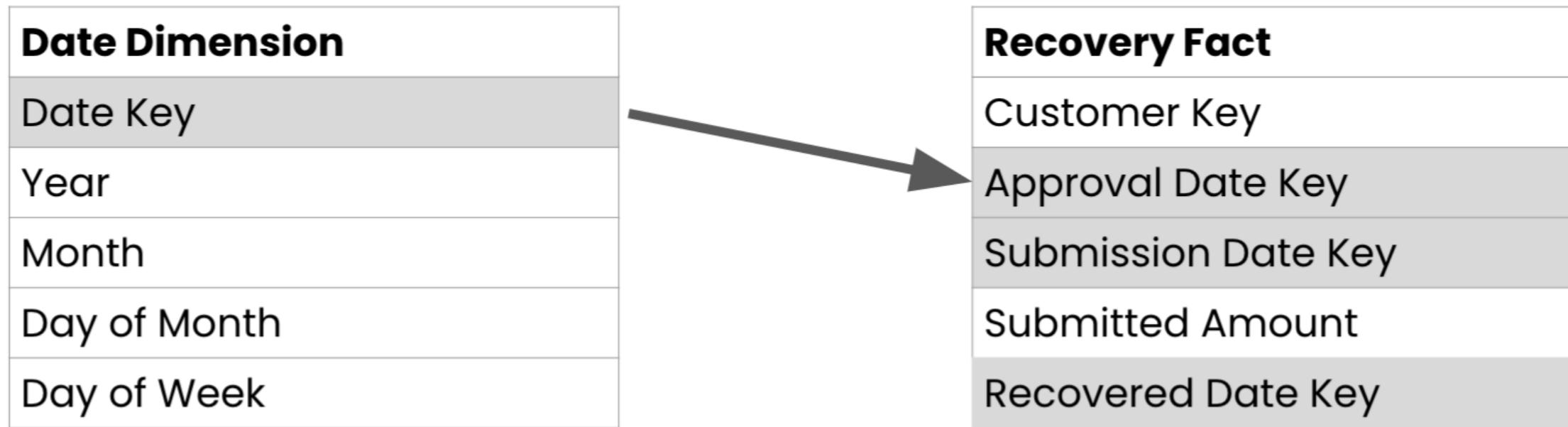
Bi-directional filtering and paths

Bi-directional filters cannot allow for two separate paths between two tables



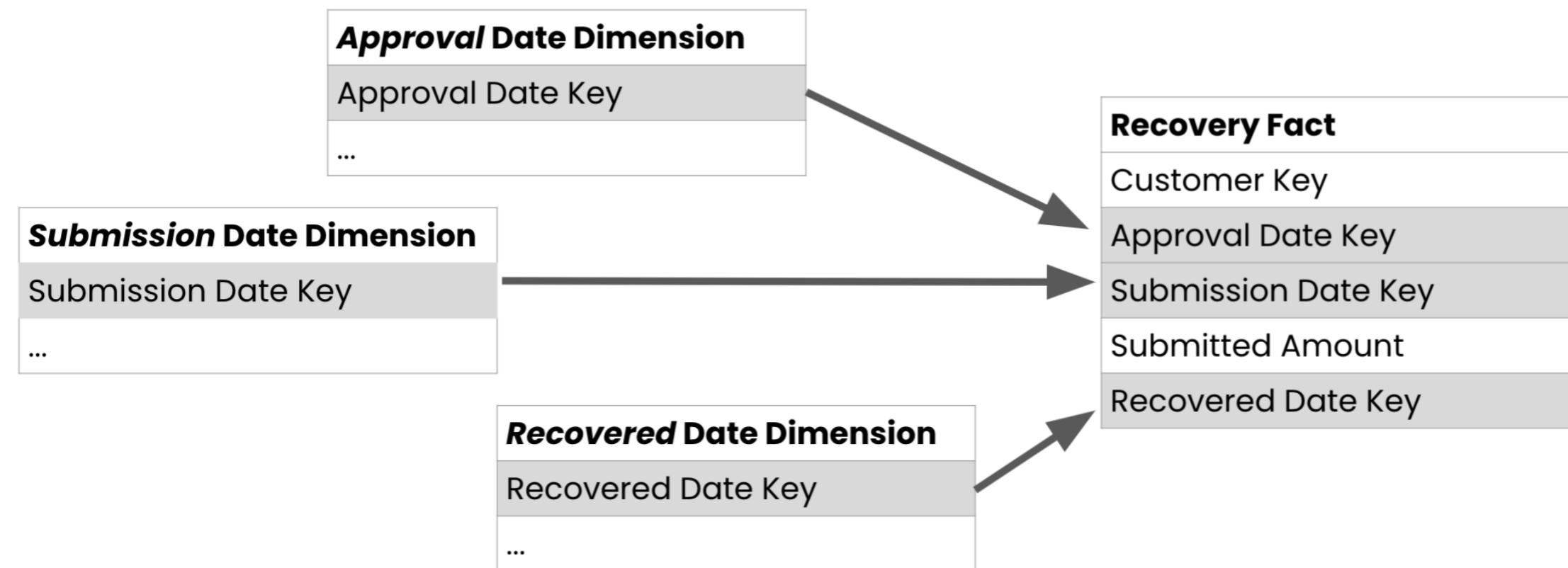
Role-playing dimensions

- Sometimes we need to create multiple relationships between tables



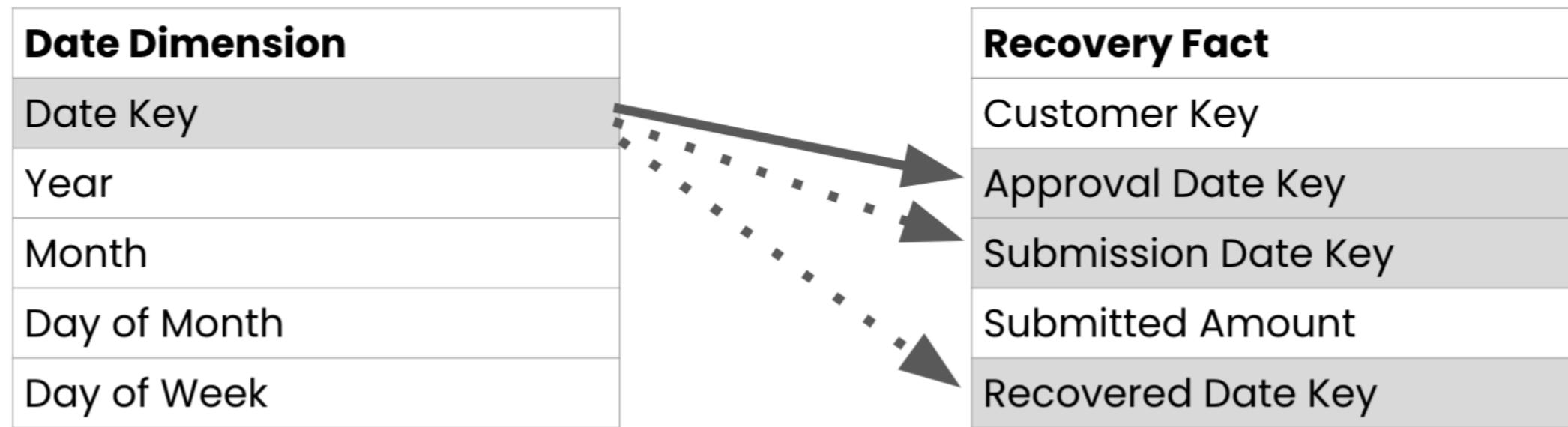
Role-playing dimensions

- Kimball model
- **Role-playing dimension:**
 - Dimension that can filter related facts differently
- Typically implemented as views of the Date dimension



Role-playing dimensions in Power BI

- Create multiple relationships on a dimension, but only one is active



- Use `USERELATIONSHIP()` in DAX to specify which relationship to use:

```
Measure Name = CALCULATE(<Measurement function>,
    USERELATIONSHIP(<Dimension Key Column>, <Fact Key Column>))
```

Let's practice!

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Cross-filtering and role-playing dimensions

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Let's practice!

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Identifying performance problems

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Resolving performance problems



Performance problems



Where things can go wrong:

- Data import
- Querying the database with DirectQuery
- Displaying visuals
- Calculated versus computed columns
- Inefficient relationships
 - Many-to-many relationships
 - Bi-directional cross-filtering

Optimizing data import

- Remove unnecessary rows and columns
- Choose correct data types
 - Numeric data takes less space
 - Casting and aggregating data is slower
- Group and summarize data
 - Store less data on disk
 - Get to aggregate results faster

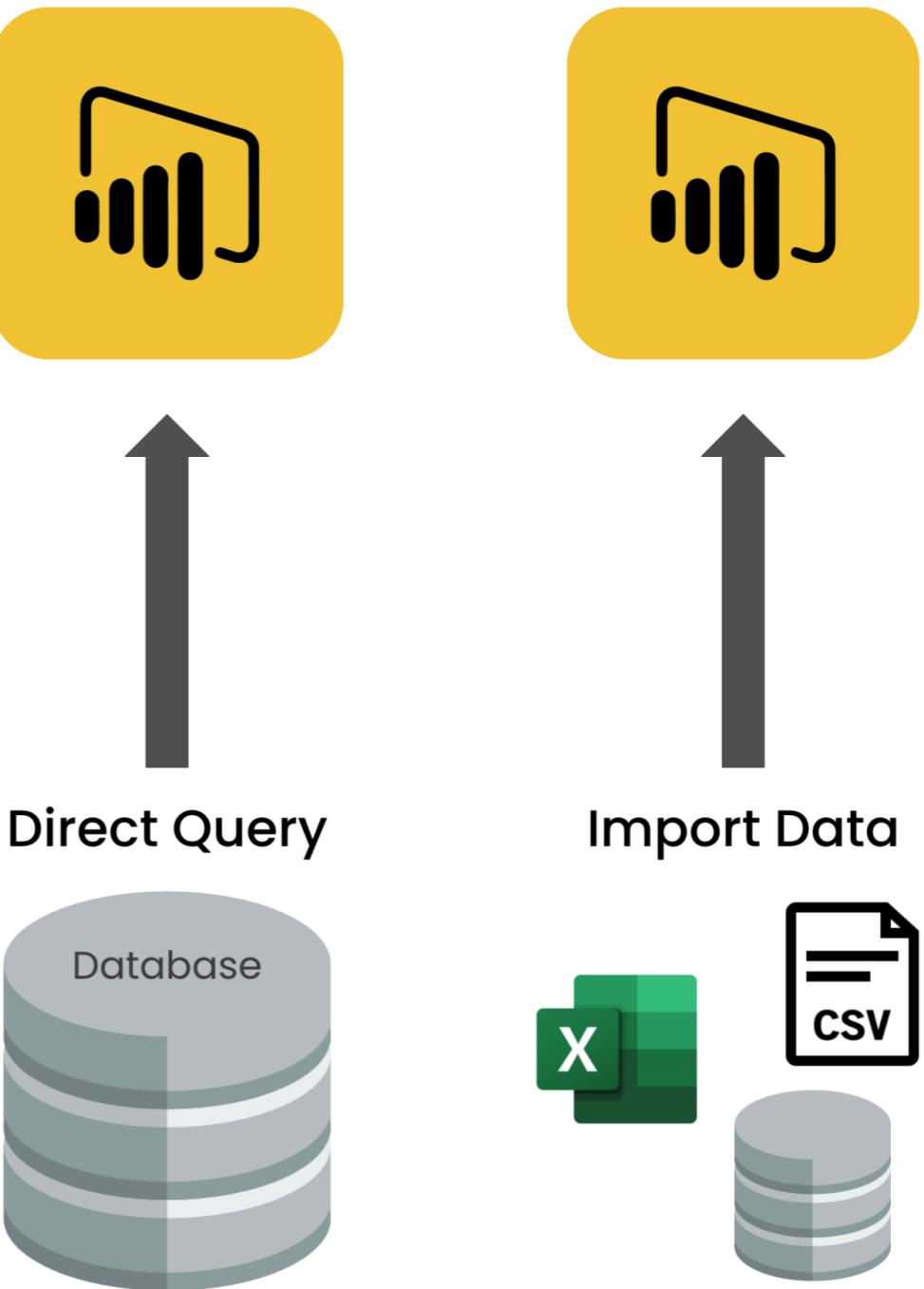


Import Data



Optimizing Direct Query

- Two ways to connect to data:
 - **Import model:** stores data in Power BI
 - **Direct Query:** directly queries the database
- Limit parallel queries
- Relational database advice
 - Write efficient SQL queries
 - Use appropriate indexes
 - Get the right columns and rows



Calculated versus computed columns

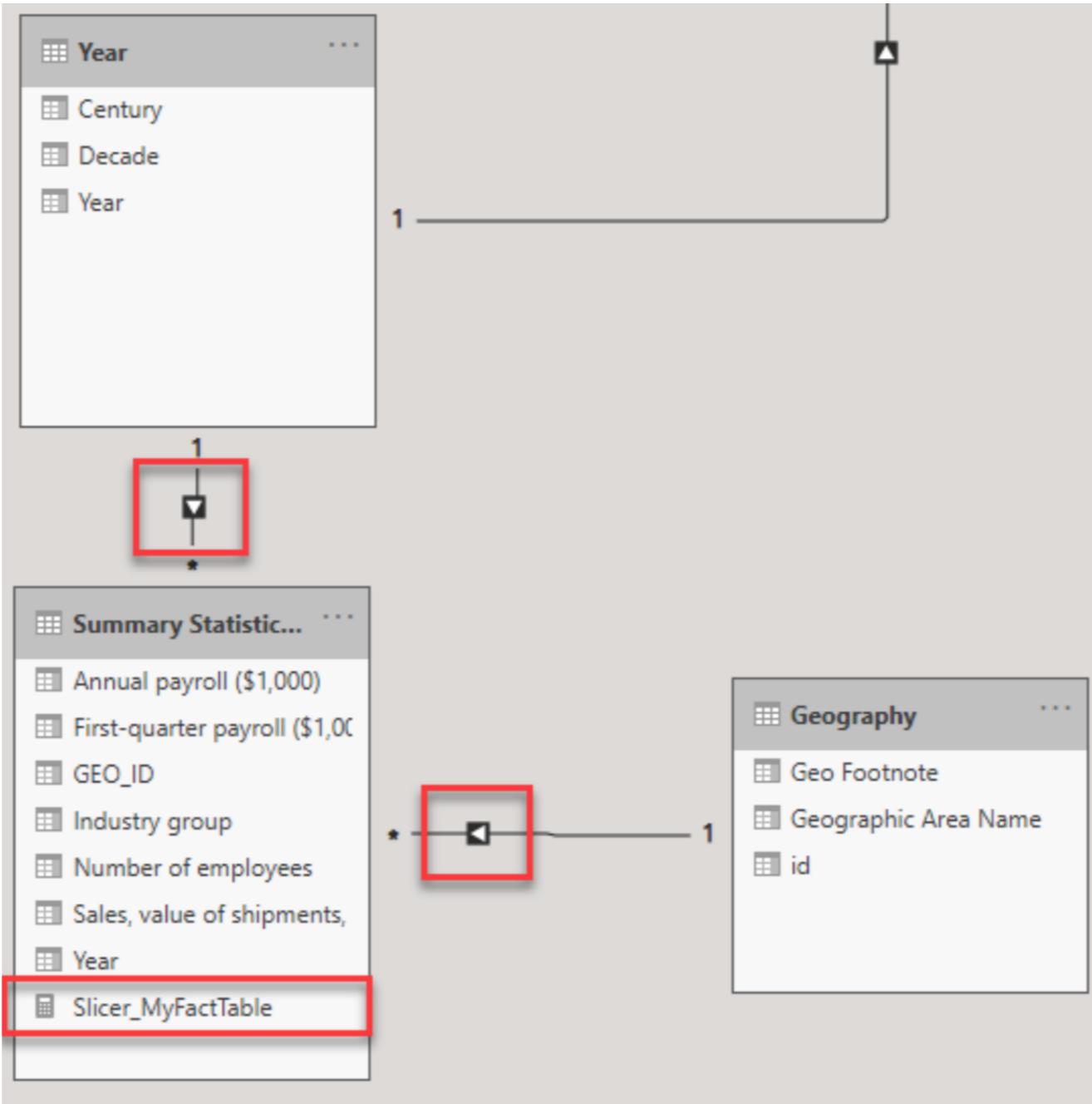
Build custom columns with:

Calculated columns	Computed columns
DAX	Power Query (M)
Fast for <i>simple</i> calculations	Fast for <i>simple</i> calculations
Slow for <i>complex</i> calculations	Fast for <i>complex</i> calculations
Generated per visual at runtime	Generated once at import time

Removing bi-directional filtering using filter measures

- Use case for bi-directional filtering
 - Find relevant slicer entries between dimensions
- We can create filter measures to avoid bi-directional relationships for the third use case!

Removing bi-directional filtering using filter measures



Removing bi-directional filtering using filter measures

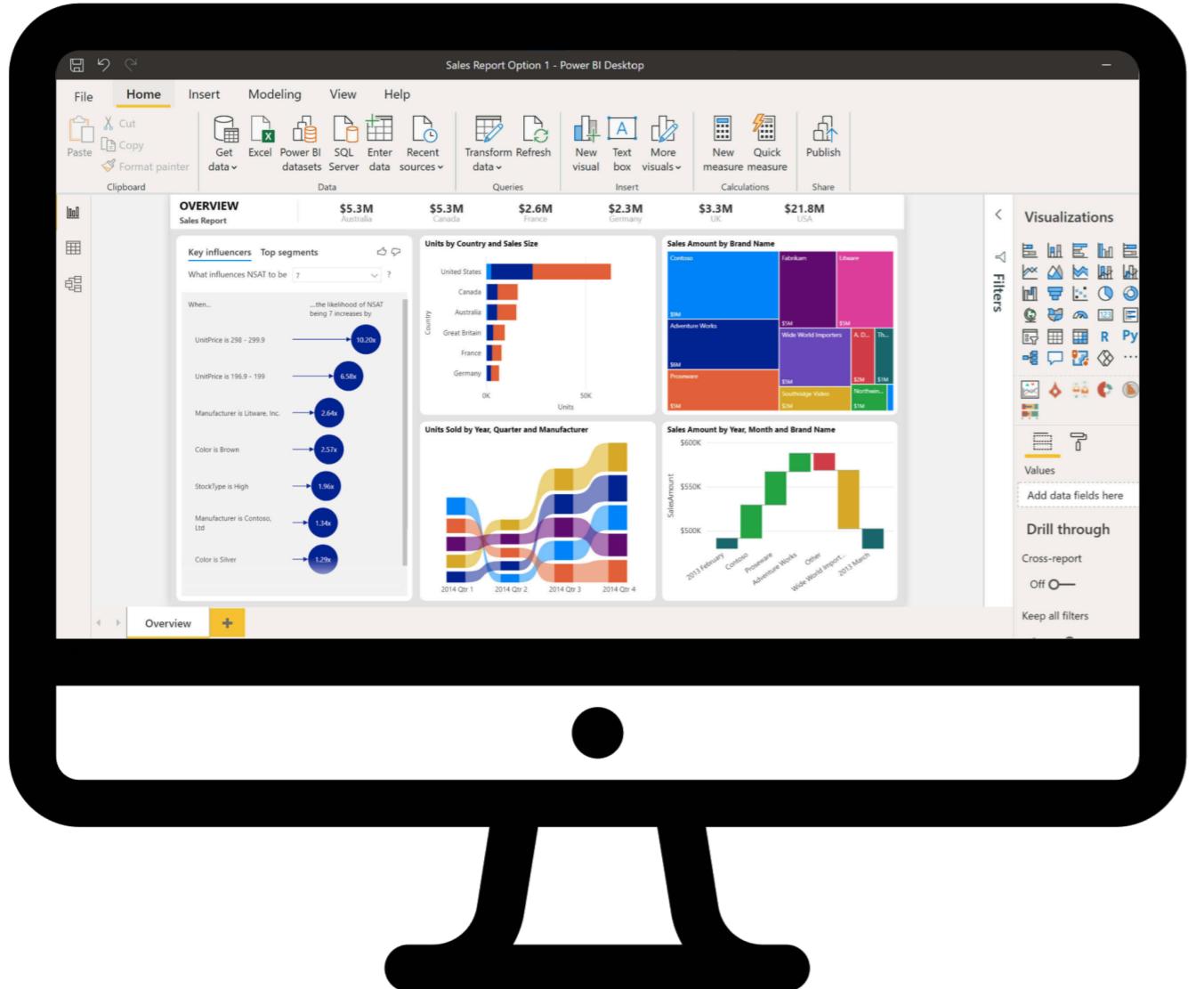
1) Create a filter measure in DAX:

```
Slicer_MyFactTable = INT(NOT ISEMPTY('My Fact Table'))
```

- Returns 1 if at least one value in the fact table
- Returns 0 if no values in the fact table

2) Add a visual filter to the slicer and set where `Slicer_MyFactTable = 1`

Displaying visuals



- Use restrictive filters to minimize data
- Show as little data as possible on visuals
- Limit the number of visuals on report pages
- Use only fast custom visuals

Let's practice!

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Performance tips in Power BI

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Let's practice!

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Congratulations!

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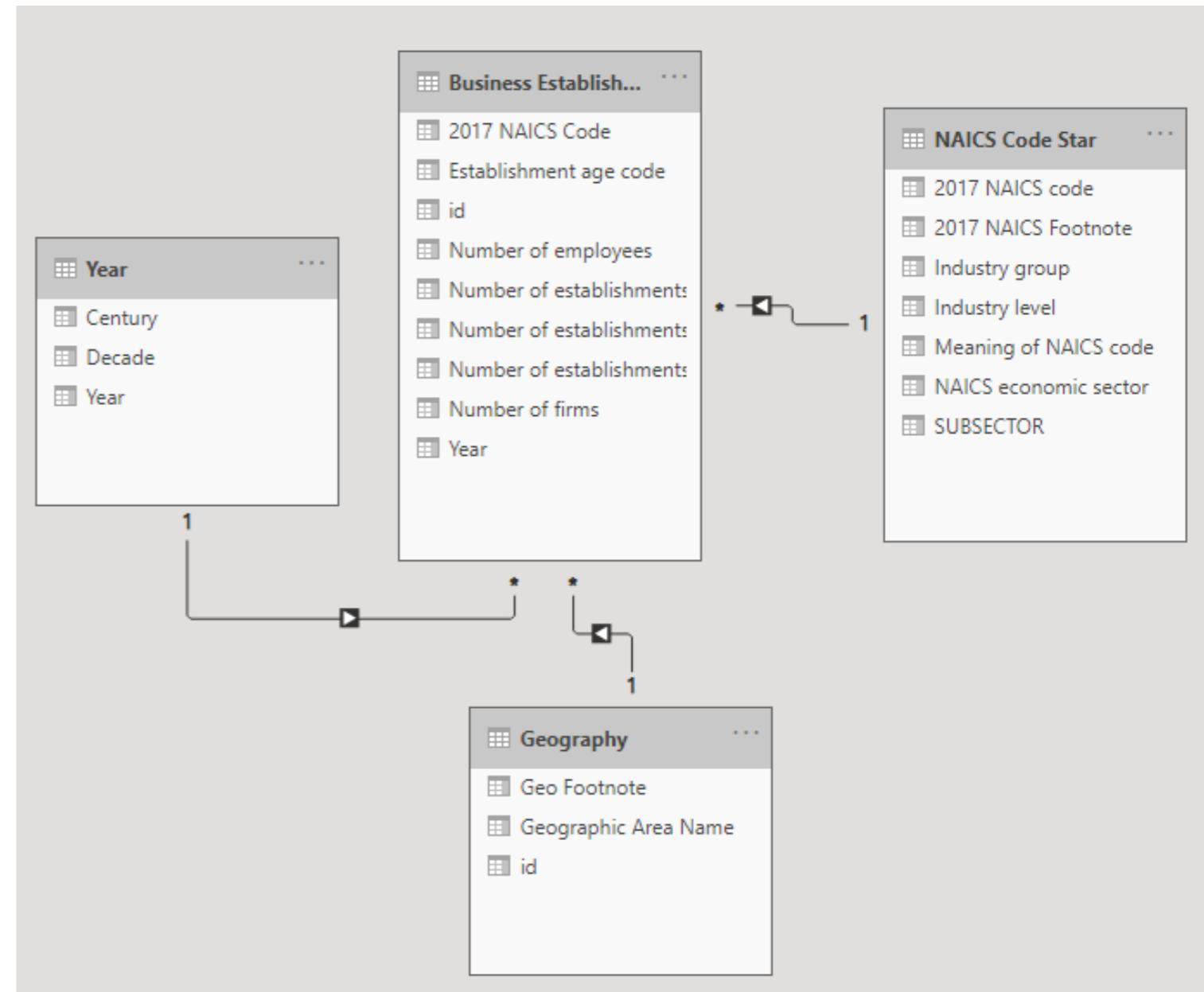


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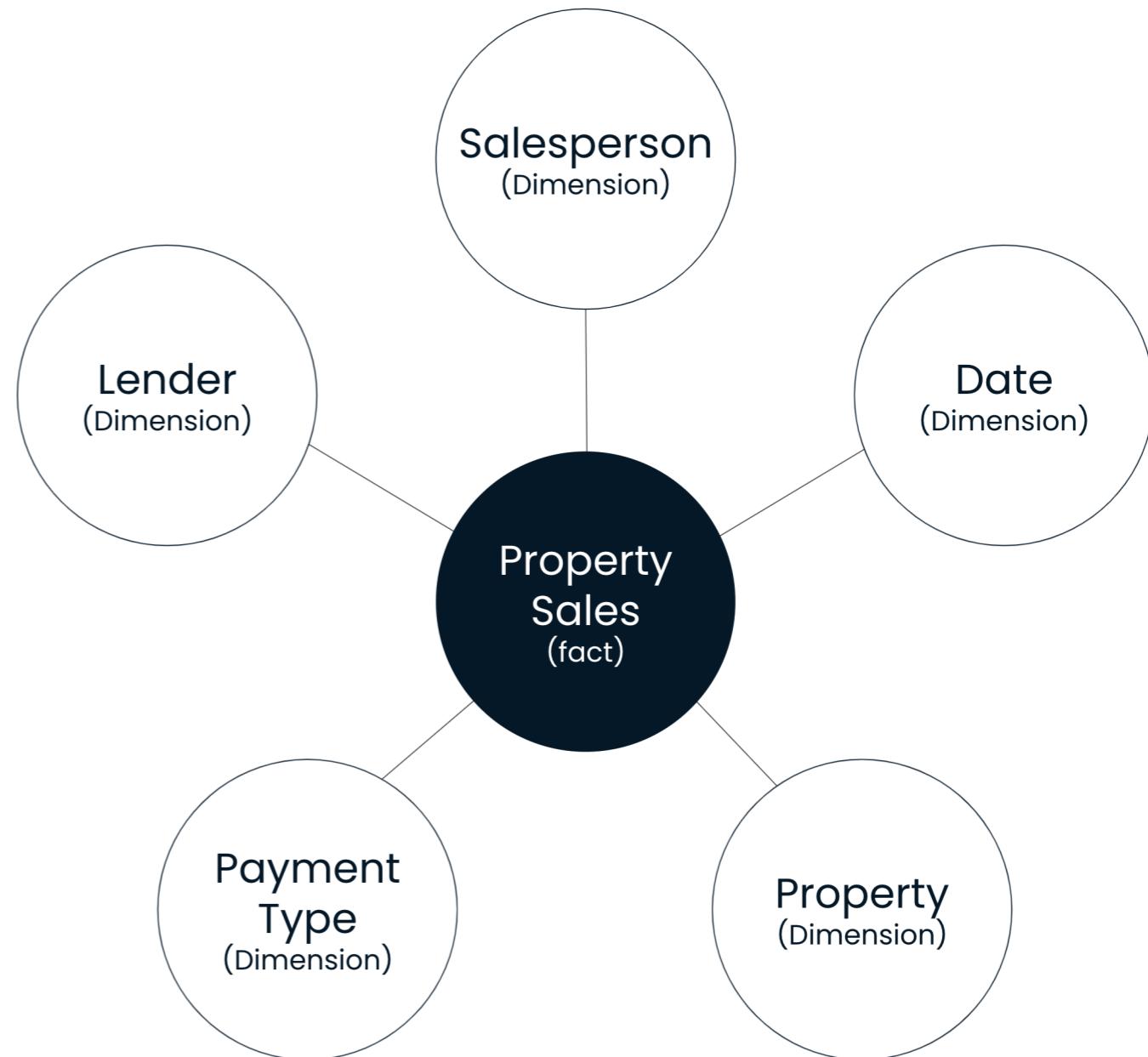
Chapter 1: Defining tables

- Basic data modeling concepts
- Load and transform data
 - Power BI
 - Power Query
- Merge and append tables



Chapter 2: Dimensional modeling

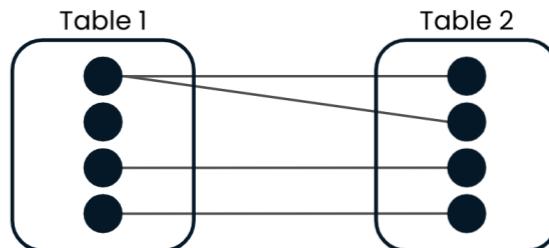
- Dimensional modeling (Kimball model)
 - Facts
 - Dimensions
 - Star schemas
 - Snowflake schemas



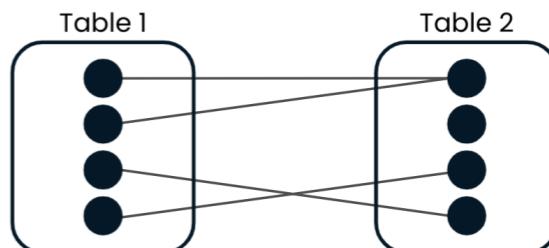
Chapter 3: Extending the Kimball model

- Date dimensions
- Relationships
- Hierarchies
- Granularity

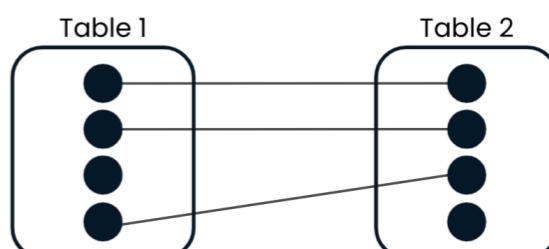
One-to-many



Many-to-one



One-to-one



Many-to-many



Chapter 4: Advanced data modeling

- Bi-directional cross filtering
- Role-playing dimensions
- Performance optimization



Thank you!

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