Power BI

Relationships in Power BI

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DATA MINING

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Relationships in Power BI

1. One-to-One [1 : 1]

2. One-to-Many [1 : *]

3. Many-to-Many [* : *]

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1. One-to-One[1 : 1]

Consider Denormalization

Each record in Table A corresponds to exactly one record in Table B, and vice versa.

Uncommon but powerful in certain scenarios

If we had a table where each Sale record had a Unique Corresponding Record in a details table (e.g., Sale Details], this would be a 1:1 relationship.
This type is less common in complex data models.

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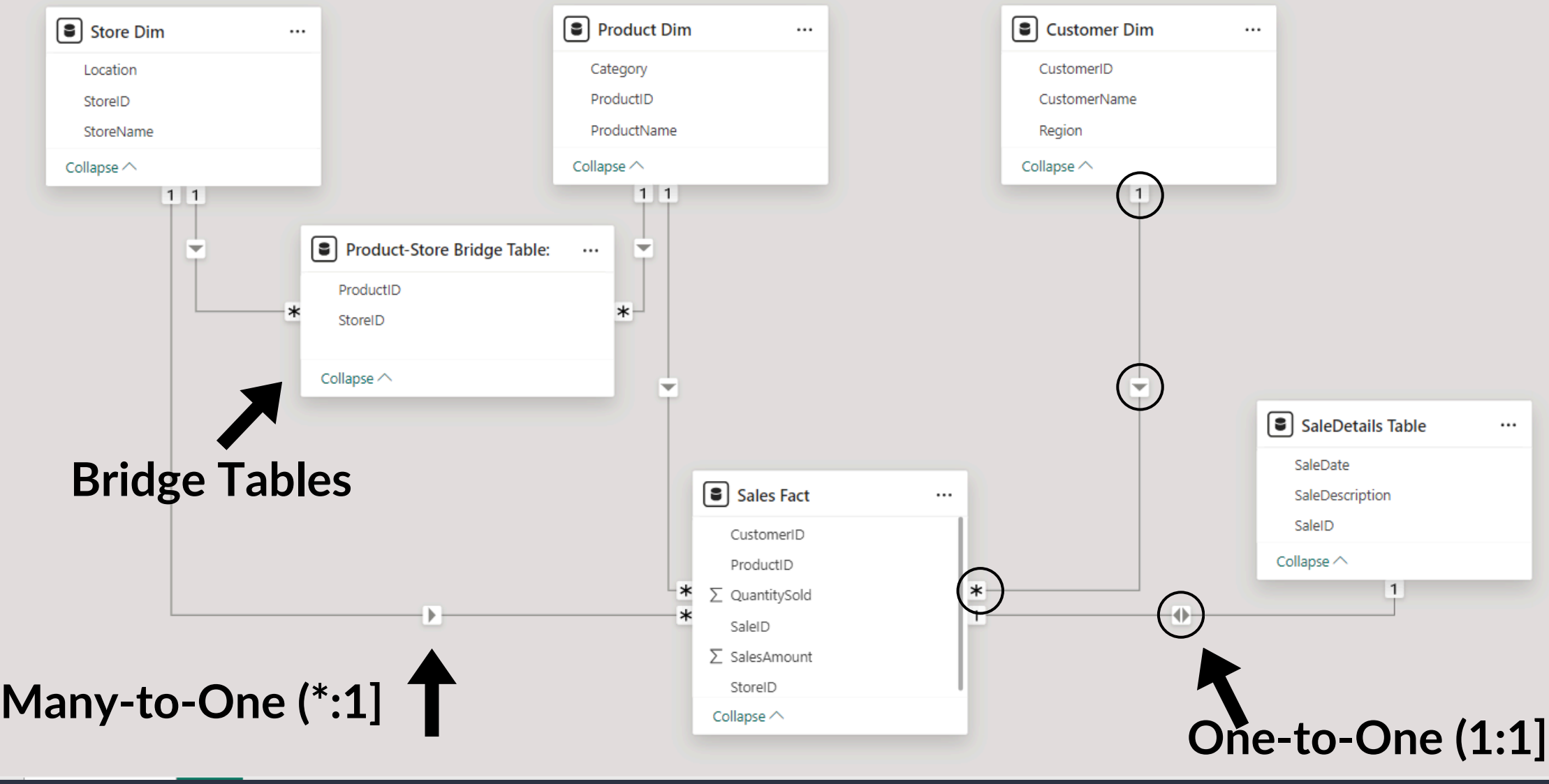
Before Denormalization



By Merging the Sales Detail with Sales Fact, we create a simplified model with all relevant data in one place.

Not Always Needed: In some cases, a one-to-one relationship is unnecessary and can be a sign of suboptimal data modeling. It might indicate that two tables should actually be merged into one.

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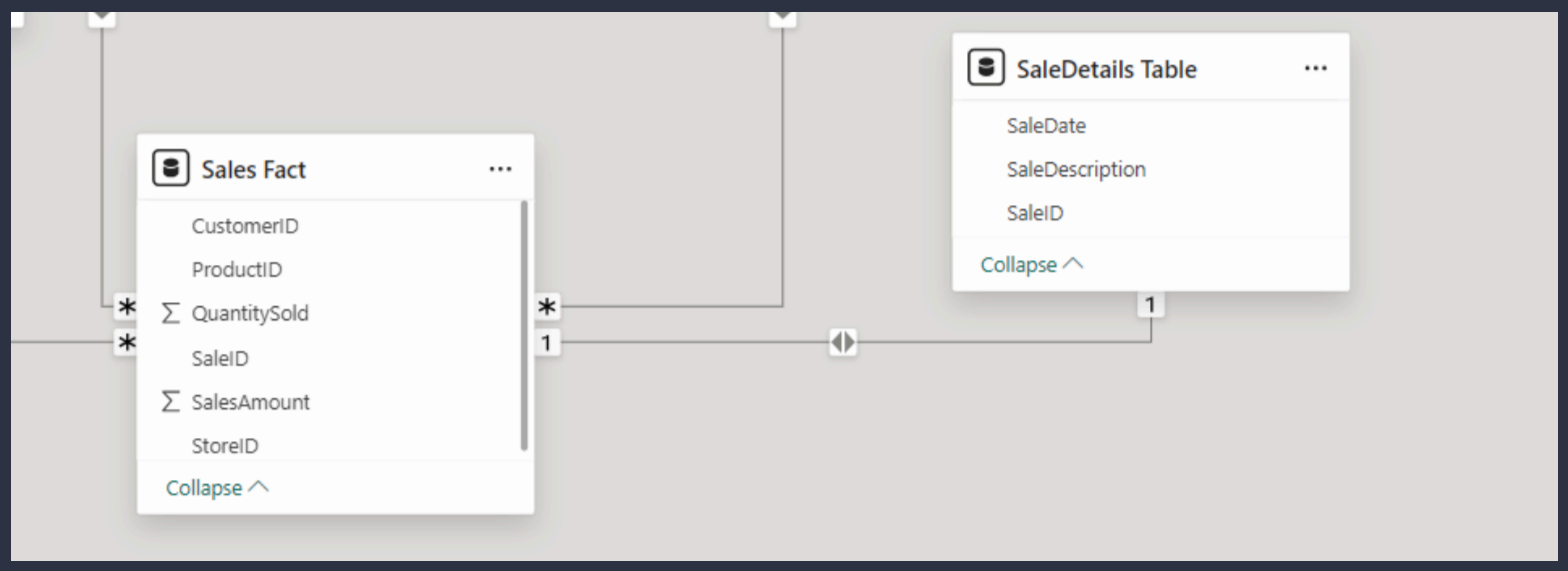
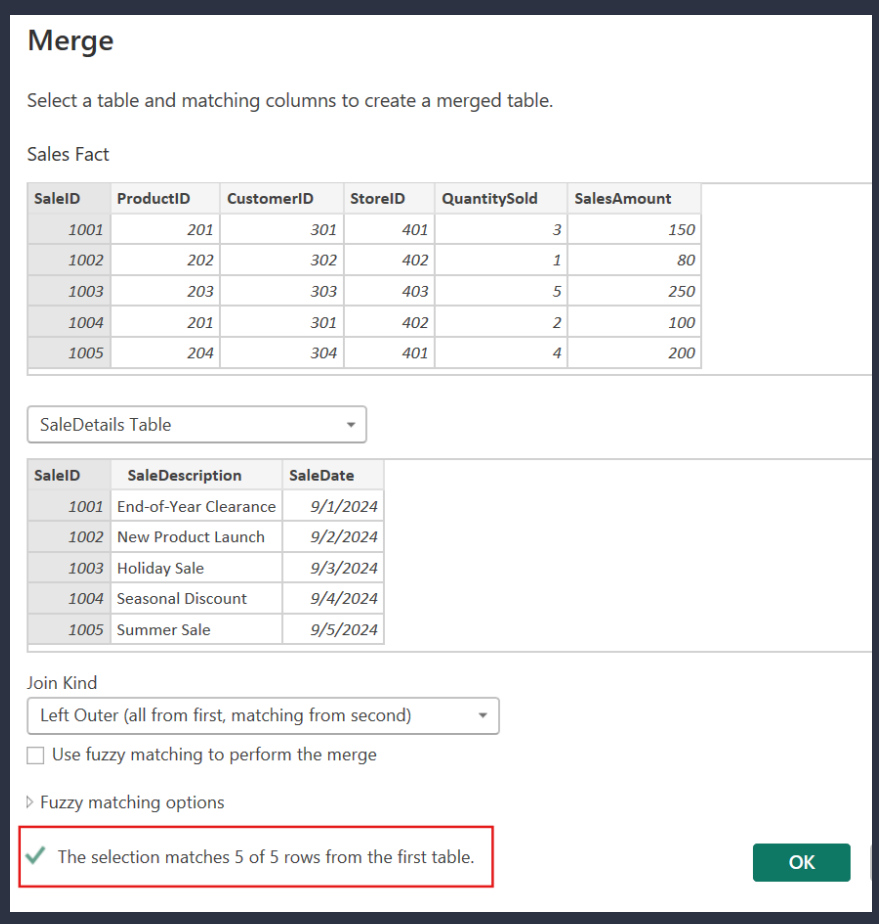
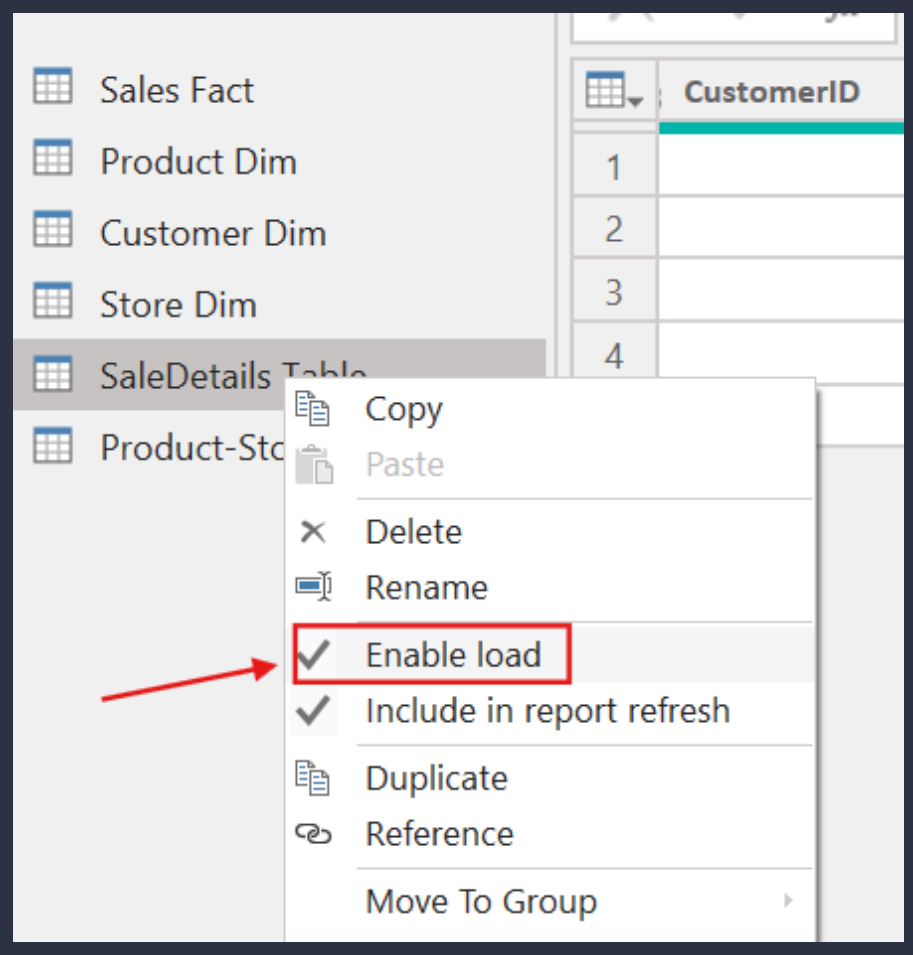
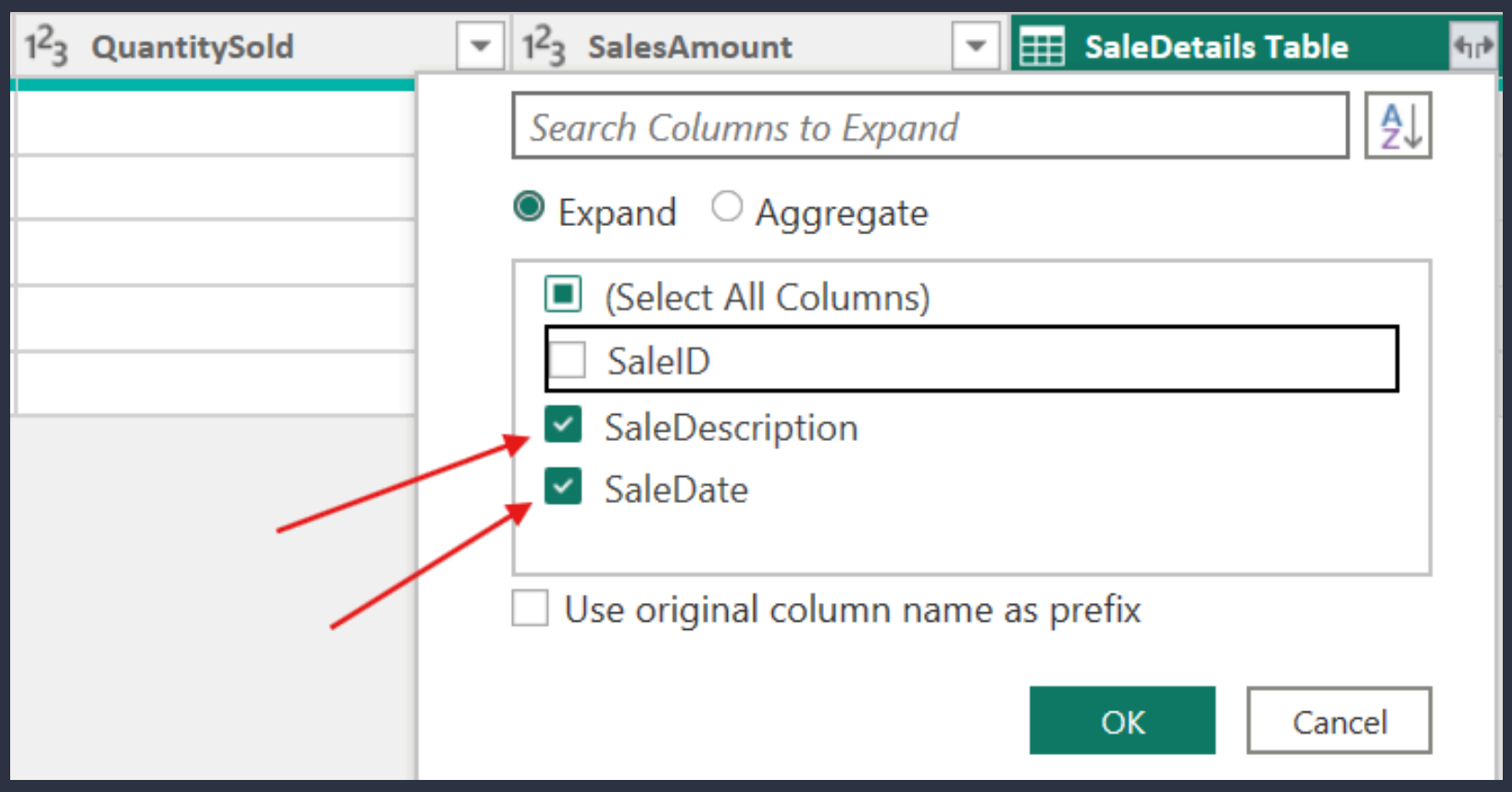

Sales Fact
CustomerID
ProductID
QuantitySold
SaleID
SalesAmount
StoreID
Collapse
SaleDetails Table
SaleDate
SaleDescription
SaleID
Collapse
*
*
*
1
1


Merge
Select a table and matching columns to create a merged table.
Sales Fact
SaleID | ProductID | CustomerID | StoreID | QuantitySold | SalesAmount
1001 | 201 | 301 | 401 | 3 | 150
1002 | 202 | 302 | 402 | 1 | 80
1003 | 203 | 303 | 403 | 5 | 250
1004 | 201 | 301 | 402 | 2 | 100
1005 | 204 | 304 | 401 | 4 | 200
SaleDetails Table
SaleID | SaleDescription | SaleDate
1001 | End-of-Year Clearance | 9/1/2024
1002 | New Product Launch | 9/2/2024
1003 | Holiday Sale | 9/3/2024
1004 | Seasonal Discount | 9/4/2024
1005 | Summer Sale | 9/5/2024
Join Kind
Left Outer (all from first, matching from second)
Use fuzzy matching to perform the merge
Fuzzy matching options
The selection matches 5 of 5 rows from the first table.
OK


Sales Fact
Product Dim
Customer Dim
Store Dim
SaleDetails Table
Product-Sto
CustomerID
1
2
3
4
Copy
Paste
Delete
Rename
Enable load
Include in report refresh
Duplicate
Reference
Move To Group


QuantitySold
SalesAmount
SaleDetails Table
Search Columns to Expand
Expand
Aggregate
(Select All Columns)
SaleID
SaleDescription
SaleDate
Use original column name as prefix
OK
Cancel

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Benefits of Denormalization

1. Denormalization can simplify your data model by merging tables in a One-to-One relationship, improving performance but potentially introducing some redundancy and complexity.
2. Simplified Model: Fewer tables to manage.
3. Improved Performance: Faster queries by reducing joins.
4. Easier Data Retrieval: All relevant data in one table.

When to Use

1. When you need a simpler model for performance reasons.
2. When data volume is manageable and redundancy is acceptable.
3. Identify opportunities to denormalize and streamline your tables for improved efficiency.

Drawbacks

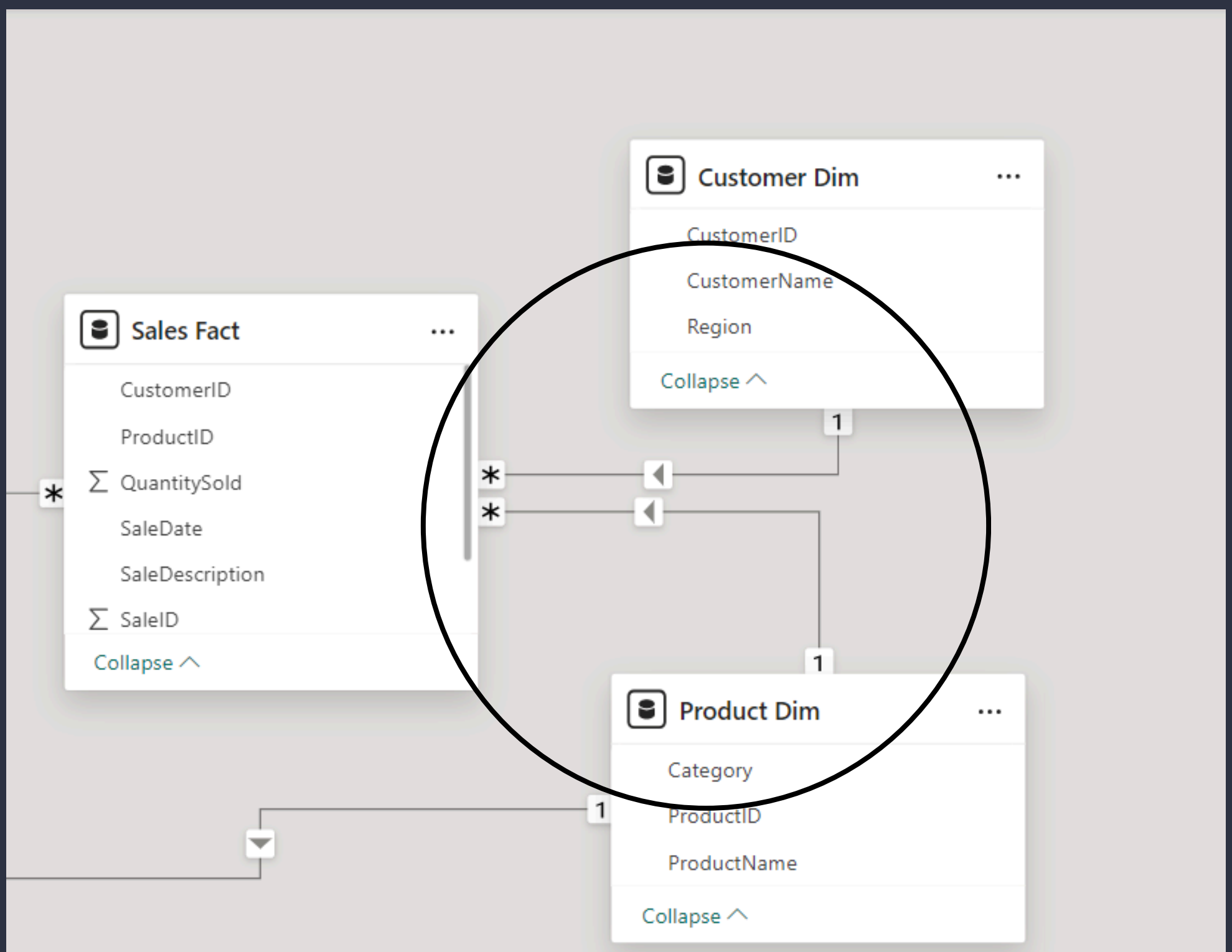
1. Data Redundancy: Potential for increased storage and inconsistencies.
2. Data Integrity: Harder to maintain consistency.
3. Scalability Issues: Large tables can become unwieldy.

2. One-to-Many [1 : *]

The [Products-Customer-Store] Dim tables [One side] relate to the [Sales Fact] table [Many side].

 Each Sale record is linked to one [Product-Customer-Store], but each [Products-Customer-Store]can appear in many Sales records.

One-to-Many [1 : *]



The “One” Side Should Have Unique Values [Primary Key], While The “Many” Side Can Have Duplicates.

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One-to-Many [1 : *]

This Is The Most Common Type Of Relationship

It is used for scenarios where a Single Record [Products-Customer-Store] can be associated with Multiple Records [e.g., Sales]

Best Practice:

Ensure that the one side of the relationship has unique values [primary key], and the many sides can have duplicate values [foreign key].

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3. Many-to-Many [* : *]

Happens when multiple records in one table can relate to multiple records in another.

1. **Students and Courses**

A student can enroll in multiple courses, and a course can have multiple students.

2. **Salespeople and Regions**

A supplier can supply multiple products, and a product can have multiple suppliers.

3. **Doctors and Patients**

A doctor can treat multiple patients, and a patient can have multiple doctors.

4. **Books and Authors**

A book can have multiple authors, and an author can write multiple books.

Many-to-Many [* : *]

The Products Table To The Stores Table, With The Product-Store Bridge Table. Each Product Can Be Available In Multiple Stores, And Each Store Can Stock Multiple Products

Why is it a Problem in Power BI?

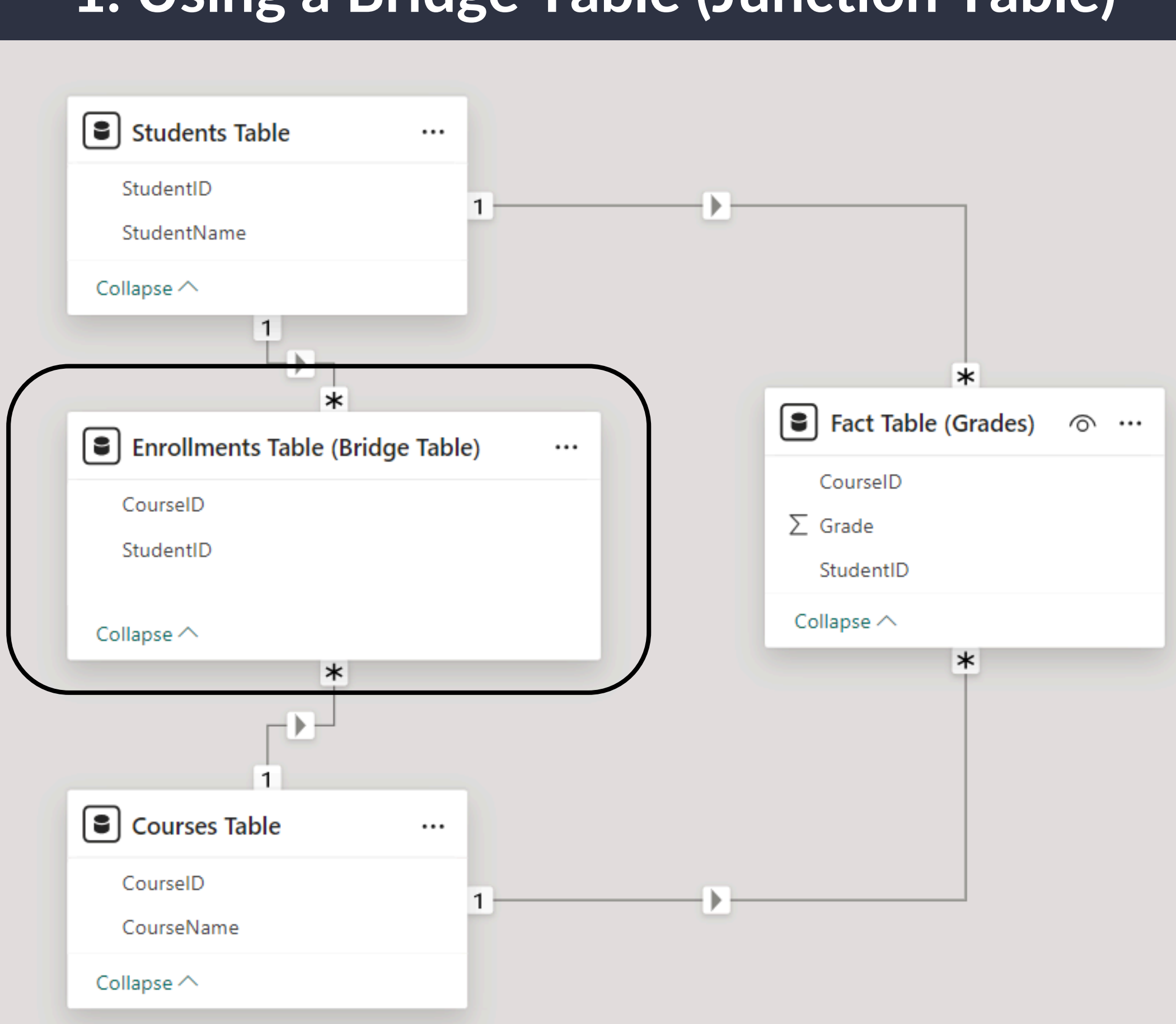
In Power BI, Many-to-Many Relationships can lead to issues like Ambiguous joins and incorrect Aggregations.

However, there are several strategies to overcome these challenges.

How to manage Many-to-Many relationships

Students and Courses
Scenario: A student can enroll in multiple courses, and a course can have multiple students (many-to-many).

1. Using a Bridge Table (Junction Table)



How to manage Many-to-Many relationships

Scenario: A salesperson can operate in multiple regions, and a region can have multiple salespeople.

Instead of maintaining a many-to-many relationship between Salespeople and Regions, Aggregate the data to summarize the number of sales per region.

2. Aggregating Data to Remove Duplicates

Aggregated Table:

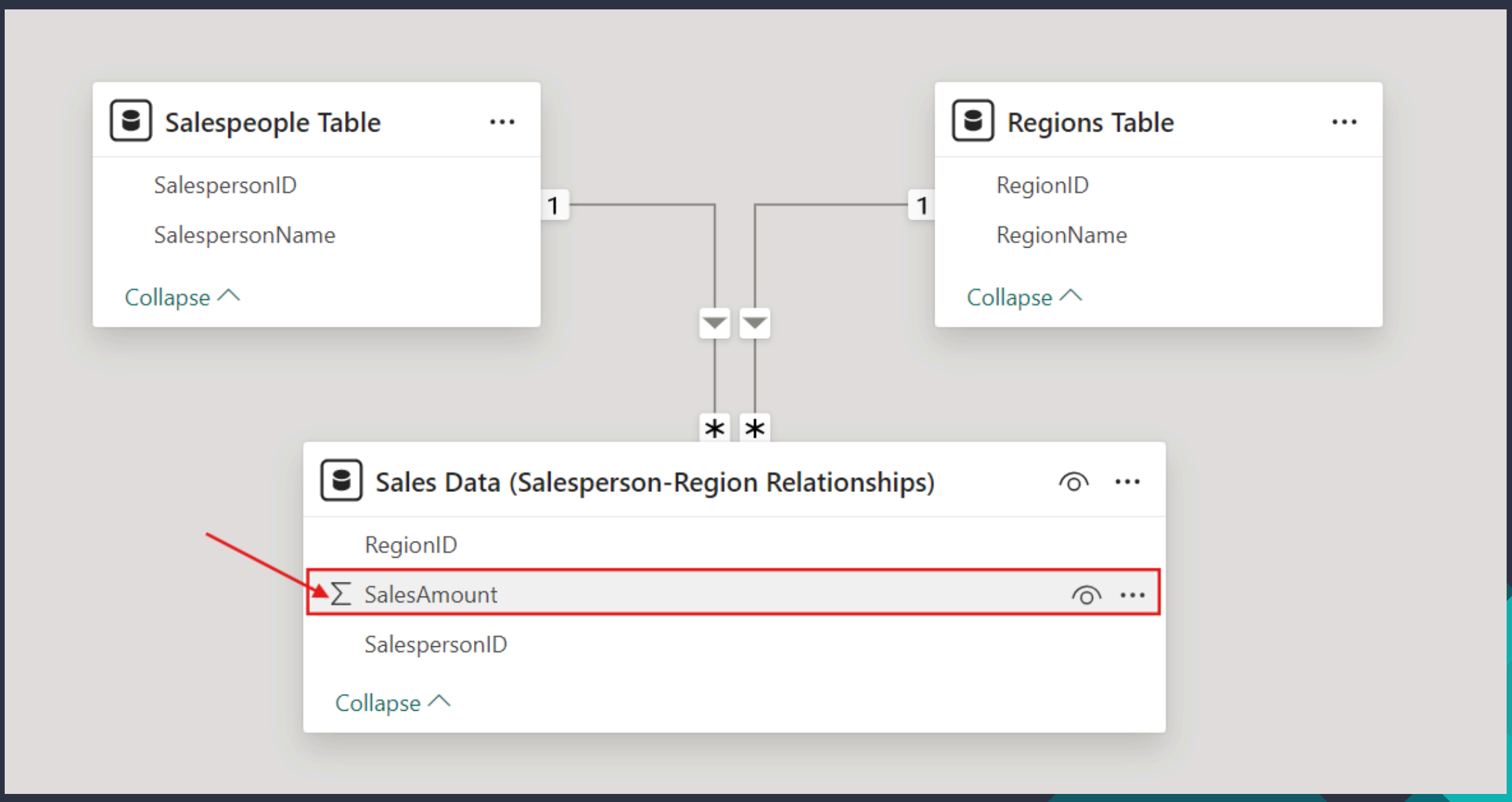
Summarize sales by RegionID (total sales, average sales, etc.).

SalespersonID	RegionID	SalesAmount
1	101	500
2	101	700
3	102	600
1	103	400
4	102	550
2	103	300
3	101	650

How to manage Many-to-Many relationships

Aggregating Data to Remove Duplicates

Now, the relationship between Salespeople and the aggregated table will be one-to-many (one salesperson to many aggregated regions).



Key Takeaways

- Use Star Schema Whenever Possible
- Keep Relationships One-to-Many
- Avoid Many-to-Many Relationships
- Use Single Directional Filters
- Eliminate Unnecessary Relationships
- Create Relationships Based on Surrogate Keys
- Leverage Power BI’s Relationship Diagram View
- Optimize Cardinality
- Maintain Clean and Well-Documented Models

Thank You!

Happy Learning