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Data Modeling in Power BI

TRANSFORM YOUR DATA INTO DECISIONS!


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What is Data Modeling?

Data modeling is the process of organizing and structuring data from different sources into related tables using relationships, keys, and defined logic.

In Power BI, it involves designing a model where data tables are connected using relationships, and calculated metrics are created using **DAX (Data Analysis Expressions)**.

A well-designed data model is the foundation of an effective Power BI report—it allows you to slice, filter, and aggregate your data accurately and efficiently.


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Why is It Important?

- **Improves Performance:** A properly structured model ensures faster calculations and report loading.
- **Reduces Complexity:** Clean relationships and schema design make it easier to build visuals and write DAX formulas.
- **Supports Scalability:** A solid model can handle growing datasets and multiple business questions.
- **Ensures Accuracy:** Reliable relationships prevent data duplication or misrepresentation.


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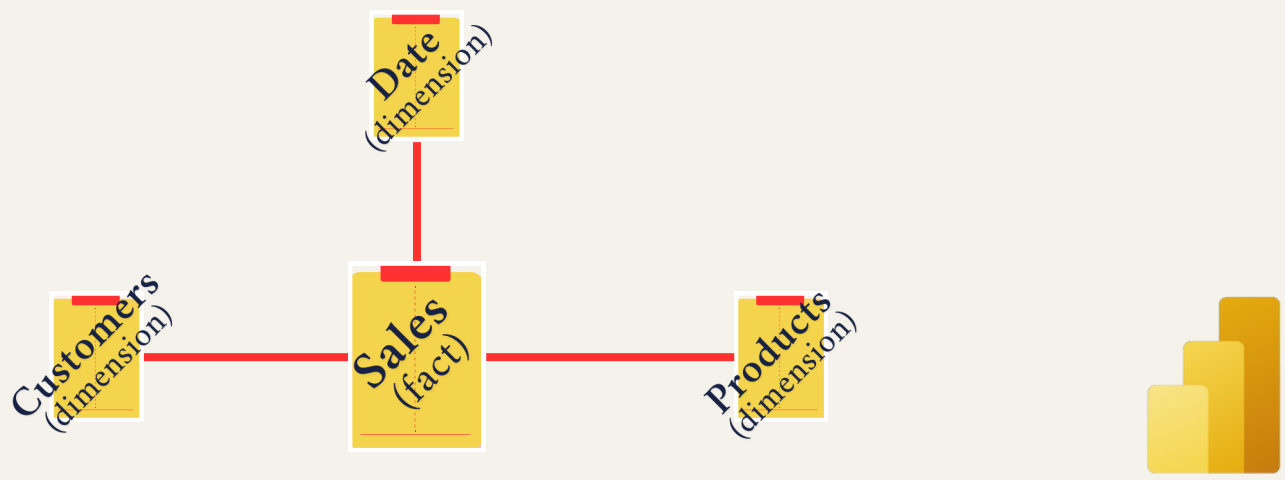
Core Components of Data Modeling

1. Tables: Fact and Dimension

- **Fact Tables:** Contain measurable data (sales, revenue, quantity). These are usually large and transactional.
- **Dimension Tables:** Contain descriptive attributes (date, product, region) that describe the facts.

📌 **Example** – In a sales model:

- *Sales* is the fact table.
- *Customers*, *Products*, and *Date* are dimension tables.



2. Keys: Primary Key & Foreign Key

- **Primary Key:** A unique identifier for each row within a table. It ensures data integrity within a single table.
- **Foreign Key:** It establishes a link between two tables by referencing the primary key of another table, maintaining relationships and consistency.

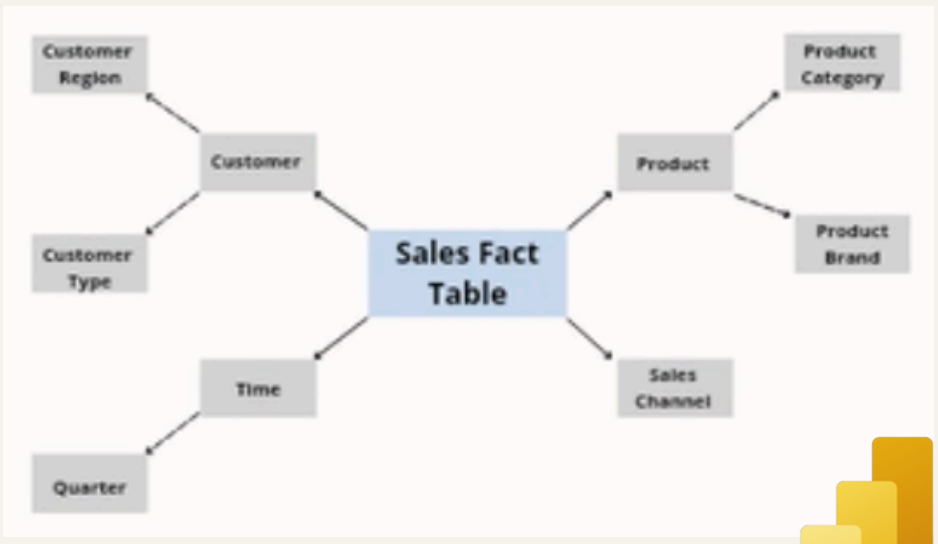
3. Schema:

A structured framework for organizing and representing information. It can refer to the structure of a database.

- **Star Schema:** A central fact table connected directly to multiple dimension tables.
- **Snowflake Schema:** Dimension tables are further normalized into sub-dimensions.

Star Schema

Snowflake Schema



4. Relationships Cardinality

Relationships define how tables are connected:

- **One-to-One (1:1):** One record in Table A matches one in Table B
- **One-to-Many (1: or *:1):** One record in Table A matches many in Table B (most common)
- **Many-to-Many (:):** Multiple records in both tables match each other (use carefully!)

🔗 Relationships also have **cross-filter direction**:

- **Single (one-way):** Filters flow from dimension to fact
- **Both (bi-directional):** Filters flow both ways—use only when necessary

5. DAX (Data Analysis Expressions)

DAX is a powerful formula language used to:

- Create calculated columns & measures
- Perform aggregations, time intelligence, filtering, etc.
- Enhance your data model with logic-driven insights

Example

```
Total Sales = SUM(Sales[Amount])
        Sales LY = CALCULATE([Total Sales],
        SAMEPERIODLASTYEAR('Date'[Date]))
```

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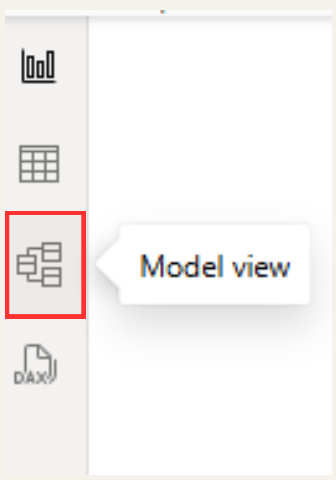
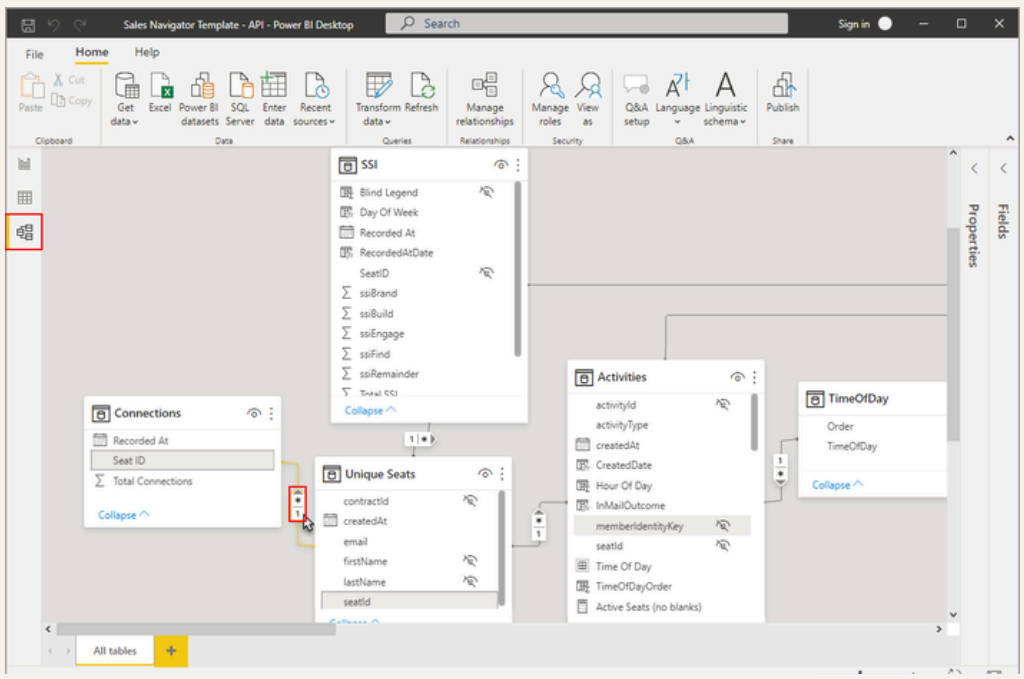
How to Create Relationships

1. **Automatically:** When importing related tables, Power BI may auto-detect relationships.
2. **Manually:**
   - Go to ***Model View***
   - Drag a field from one table to the related field in another
   - Or use ***Manage Relationships*** > ***New***
   - Define the tables, columns, cardinality, and filter direction



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Common Mistakes

1. Circular Relationships
2. Many-to-Many joins (without understanding)
3. Not setting proper cardinality
4. The relationship cannot be created because the columns do not have unique values.
5. Data type mismatch between columns

Best Practices

1. Use Star Schema whenever possible
2. Hide unnecessary columns
3. Set relationships explicitly (don't always rely on Auto)
4. Validate with simple visuals before publishing
5. Document your model logic for teams

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THANK YOU!!!

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SAVE FOR LATER

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