



Data Modeling Basics

Section 1: Learn

What is Data Modeling?

Data modeling is the process of **structuring data** to define relationships between different datasets, ensuring accurate analysis and reporting. In Power BI, **data models** help connect tables logically to create meaningful insights.

Why is Data Modeling Important?

- **Removes Data Redundancy:** Avoids unnecessary duplication of data.
- **Improves Query Performance:** Optimizes the speed of data retrieval.
- **Enhances Data Accuracy:** Ensures consistency across reports.
- **Facilitates Advanced Calculations:** Enables the use of DAX (Data Analysis Expressions).
- **Creates Relationships Between Tables:** Allows data integration from multiple sources.



Key Components of Data Modeling

Component	Description
Tables	Collections of data arranged in rows and columns.
Relationships	Connections between tables based on common fields.
Primary Key	A unique identifier for each row in a table.
Foreign Key	A column in one table that references the primary key in another table.
Star Schema	A simple model where a central fact table connects to multiple dimension tables.
Snowflake Schema	A more normalized version of the star schema, breaking dimension tables into sub-dimensions.

How Does Data Modeling Work in Power BI?

1. **Import Data** → Load tables from different sources (Excel, SQL, etc.).
2. **Create Relationships** → Link tables using primary and foreign keys.
3. **Define Hierarchies** → Arrange data into meaningful levels (e.g., Year > Month > Day).



4. *Use DAX for Calculations* → Perform aggregations and custom metrics.
5. *Validate Model* → Ensure relationships and calculations work as expected.

A Brief History

Data modeling has been used in databases for decades. The **relational database model**, introduced in the 1970s by **Edgar F. Codd**, laid the foundation for modern data modeling techniques. Power BI adopts these principles to create efficient and scalable data models.

Section 2: Practice

Creating a Simple Data Model in Power BI

Step 1: Import Data

1. *Open Power BI Desktop.*
2. *Click Get Data and select Excel or SQL Server.*
3. *Load multiple tables containing related data.*

Step 2: Creating Relationships Between Tables

1. *Go to the Model View (third icon on the left panel).*
2. *Drag and drop fields to establish relationships.*



3. Ensure the relationship is *One-to-Many* or *Many-to-One*.

Step 3: Using a Star Schema Approach

- Create a **Fact Table** (e.g., Sales Data containing Order ID, Amount, Date).
- Create **Dimension Tables** (e.g., Customers, Products, Dates).
- Link the fact table to the dimension tables using keys.

Example: Building a Sales Data Model

1. Import "Sales Data", "Customer Data", and "Product Data".
 2. Connect "Sales Data" to "Customer Data" using Customer ID.
 3. Connect "Sales Data" to "Product Data" using Product ID.
 4. Create a measure to calculate total sales:
$$\text{Total Sales} = \text{SUM}(\text{Sales}[\text{Amount}])$$
 5. Validate the relationships and use them in reports.
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Section 3: Know More

Frequently Asked Questions

1. What is the difference between Star Schema and Snowflake Schema?

- *Star Schema: Simple, fast, and easy to understand.*
- *Snowflake Schema: More normalized, reducing data redundancy but slightly complex.*

2. Can I create relationships automatically in Power BI?

Yes! Power BI automatically detects relationships, but they can be manually edited for accuracy.

3. What happens if I delete a relationship between tables?

Deleting a relationship may cause report errors if the model relies on that connection.

4. What is a Many-to-Many relationship?

A Many-to-Many relationship occurs when multiple records in one table match multiple records in another table, often requiring a bridge table.



5. How do I check if my model is correct?

Go to Model View, verify relationships, and test calculations in a report.

6. Do I need DAX for data modeling?

Basic models don't require DAX, but DAX helps with advanced calculations and aggregations.

These notes will help you understand and apply data modeling concepts in Power BI, enabling better data structuring and efficient reporting. Mastering data modeling ensures your reports are accurate, fast, and scalable!