

1.2. Student Handout

Student Handout: Introduction to Data Modeling and Basic Visualization in Power BI

Overview

This handout provides a concise summary of the key concepts covered in the session on **Data Modeling and Basic Visualization in Power BI**. It includes definitions, examples, and steps to help you understand and apply these concepts effectively.

What is Data Modeling?

Data modeling is the process of organizing and structuring data for easy analysis and visualization. In Power BI, it involves connecting tables, defining relationships, and ensuring data is structured for analysis.

Examples:

1. **Sales and Customers:** Connect a Sales table with a Customers table using a common CustomerID to analyze sales per customer.
 2. **Orders and Products:** Link an Orders table with a Products table using ProductID to track product sales.
 3. **Employees and Departments:** Relate an Employees table with a Departments table using DepartmentID to analyze employee distribution across departments.
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Importance of Data Modeling in Business Intelligence (BI)

Data modeling is crucial in BI for:

1. **Organizing Data:** Ensures data is structured and easy to analyze.

2. **Improving Performance:** Enhances the efficiency of reports and dashboards.
 3. **Enabling Accurate Analysis:** Defines relationships for accurate insights.
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Understanding Relationships in Data Modeling

Relationships define how tables are connected in Power BI. Common types include:

1. **One-to-Many Relationship:** One record in a table relates to many records in another.
Example: One customer can place many orders.
 2. **Many-to-Many Relationship:** Many records in one table relate to many in another.
Example: Many students can enroll in many courses.
 3. **One-to-One Relationship:** One record in a table relates to one record in another.
Example: Each employee has one unique ID.
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Creating and Managing Relationships Between Tables

In Power BI, relationships can be created:

1. **Automatically:** Power BI detects relationships based on common columns.
 2. **Manually:** Define custom relationships by specifying linked columns.
 3. **Editing Existing Relationships:** Modify relationships to correct or optimize data connections.
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Cardinality and Cross-Filtering Options

When creating relationships, define:

1. **Cardinality:** Type of relationship (e.g., one-to-many, many-to-many).
 2. **Cross-Filtering:** Direction of filter flow between tables (single or both).
 3. **Active/Inactive Relationships:** Choose which relationships are active for analysis.
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Optimizing Data Models: Star Schema vs Snowflake Schema

Star Schema

- **Structure:** Central fact table surrounded by dimension tables.
- **Example:** Sales data as the fact table, with Customers, Products, and Date as dimension tables.

Snowflake Schema

- **Structure:** Dimension tables are further normalized into related tables.
 - **Example:** A Products table split into ProductDetails and ProductCategory tables.
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Basic Visualizations in Power BI

Visualizations are graphical representations of data. Basic types include:

1. **Bar Charts:** Compare categories. Example: Sales by region.
 2. **Line Charts:** Show trends over time. Example: Monthly sales trends.
 3. **Pie Charts:** Show proportions. Example: Sales percentage by product category.
 4. **Tables:** Display data in tabular format. Example: List of orders with details.
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Formatting and Customizing Visualizations

Enhance visualizations by:

1. **Changing Colors:** Match branding or highlight data points.
 2. **Adding Labels:** Display exact values on charts.
 3. **Adjusting Axis:** Improve readability of data.
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Adding Filters and Slicers for Dynamic Reports

Create interactive reports with:

1. **Filters:** Limit displayed data. Example: Show sales data for the past month.
2. **Slicers:** Allow user interaction. Example: Filter data by product category.
3. **Drill-Through:** Enable detailed exploration of data points.

Hands-On: Building a Basic Report with a Data Model and Visualizations

Steps:

1. **Import Data:** Load data from sources like Excel or SQL Server.
2. **Create Relationships:** Link tables using common columns.
3. **Build Visualizations:** Create charts and tables based on data.
4. **Add Filters and Slicers:** Make the report interactive and dynamic.

Conclusion

This session covered the basics of data modeling and visualization in Power BI. You learned how to structure data, create relationships, and build visualizations. These skills are foundational for creating insightful and interactive reports in Power BI.

Thank you for your attention! Now, let's apply these concepts in the hands-on exercise.