**Fact and Dimension table**

**Fact Table**

* A fact table is a central table in a data warehouse schema that stores quantitative data and measurable events, such as sales transactions or performance metrics.
* It typically contains numeric values or metrics, such as revenue, quantities, or durations, which can be aggregated and analysed to generate insights.
* Fact tables are characterized by their numeric measures and foreign keys that link to dimension tables, providing context for the stored metrics.

**Dimension Table**

* A **dimension table** provides descriptive context for the data stored in a fact table.
* Unlike fact tables, which contain quantitative measures, dimension tables store detailed attributes and metadata that help organize and describe the facts.
* For example, a dimension table might include information about products (product name, category, manufacturer) or time (date, month, year).

**Use Case: Fact and Dimension Tables in a Retail Analytics**

This use case of a retail analytics system designed to analyse sales performance using a star schema in a data warehouse. Enable businesses to derive actionable insights from transactional sales data by integrating product, customer, store, and time-related dimensions.

**A diagram of a data flow

Description automatically generated**

**Star Schema Design**

The schema follows the star schema design, with a central fact table surrounded by dimension tables. Simplifies analytical queries and supports high-performance analysis of retail data.

**Fact Table:** Stores transactional data and measures for analysis.  
**Key Columns**:

* Sale\_id (Primary Key)
* Product\_id (Foreign Key)
* Customer\_id (Foreign Key)
* Store\_id(Foreign Key)
* Date\_id (Foreign Key)
* Quantity\_sold
* Revenue:

**Dimension Tables**

1. **dim\_product**: Provides details about products.

* Product\_id (Primary Key)
* Product\_name
* Category
* Brand
* Price

1. **dim\_customer**: Contains customer attributes.

* Customer\_id (Primary Key)
* Customer\_name
* Gender
* Age
* Region

1. **dim\_store**: Describes stores where transactions occurred.

* Store\_id (Primary Key)
* Store\_name
* Location
* Manager\_name

1. **dim\_date**: Captures time-based attributes for transactions.

* Date\_id (Primary Key)
* Date
* Year
* Month
* Quarter
* Weekday

**Relationships**:

**Primary and Foreign Keys**: Fact and dimension tables are linked via foreign key relationships, enabling joins for analysis.

**Product Dimension (One-to-Many)**

* A product in the Fact\_Sales table is associated with a single record in the Dim\_Product table, providing descriptive details about the product sold.

**Customer Dimension (One-to-Many)**

* A sale in Fact\_Sales is linked to a specific customer in the Dim\_Customer table. This allows for customer-based analysis, such as revenue by customer demographics.

**Store Dimension (One-to-Many)**

* A sale in the Fact\_Sales table is linked to a specific store in the Dim\_Store table, enabling analysis of store-level performance.

**Date Dimension (One-to-Many)**

* Each sale in Fact\_Sales is linked to a specific date in the Dim\_Date table, allowing for time-based analysis such as daily or monthly trends.

**Granularity Levels**

**Fact Table (fact\_sales) - Transaction level**

* One record per sale transaction.
* Data at most detailed level (individual sale, product, customer, store, time)

**Dimension Tables**

One record per unique dimension entity

1. **dim\_product**: One record per product.
2. **dim\_customer**: One record per customer.
3. **dim\_store**: One record per store.
4. **dim\_date**: One record per day.