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# 

# Business Description

## Business background

The business operates in the **retail industry**, specifically selling consumer products across various city branches. The organization handles both **online and offline orders**, with a broad product portfolio classified into categories and sold through multiple store locations. The company employs sales staff, offers occasional discounts, and operates in a competitive environment where timely and accurate reporting of sales data is crucial to drive strategic decisions.

## Problems because of poor data management

The company has faced several challenges due to fragmented and inconsistent data management practices. The lack of a unified reporting system has resulted in discrepancies between online and offline sales data, complicating the process of performance evaluation and financial forecasting. Manual changing of records not only delays strategic decision-making but also increases the risk of human error. Also, the business has struggled to gain insights into key performance metrics such as cost efficiency, revenue generation, and discount impact. Without integrated customer and product-level analytics, it is difficult to tailor offerings, track performance, and stay ahead of the competition.

## Benefits from implementing a Data Warehouse

Implementing a data warehouse will significantly enhance the company's ability to collect, store, and analyze data from both operational systems. With structured access to consistent and cleansed sales and cost data, decision-makers will be able to track profitability, identify high-performing products and branches, and monitor employee performance across locations. The warehouse will support time-based, product-based, and geography-based reporting and allow for the exploration of patterns in customer purchases. Hierarchical structures within the data, such as those linking product categories to individual items and time-based groupings like year, month, and day, will provide valuable multidimensional views. Ultimately, the business will benefit from improved forecasting, targeted marketing strategies, and optimized inventory management.

## DATASETS DESCRIPTION

### ****Dataset 1: Online Orders****

Includes all orders placed through the company's e-commerce platform. The dataset contains:

* **Product Information:**

Item Code, Item Name, Category Code, Category Name, Wholesale Price, Loss Rate

* **Sales Facts:**

Date, Time, Quantity Sold, Unit Selling Price, Discount, Total Sales, Cost, Gross Income

* **Organizational Data:**

Employee ID, Branch, City

* **Customer Information:**

Simulated using Customer IDs

* **Other:**

Transaction ID, Source System = "Online", Date hierarchy (Year, Month, Day)

### ****Dataset 2: Offline Orders****

Includes all orders placed in company’s physical branches

* **Product Information:**

Item Code, Category Code, Wholesale Price, Loss Rate

* **Sales Facts:**

Date, Time, Quantity Sold, Unit Selling Price, Discount, Total Sales, Cost, Gross Income

* **Organizational Data:**

Employee ID, Branch, City

* **Customer Information:**

Customer ID

* **Other:**

Transaction ID, Source System = "Offline", Date hierarchy (Year, Month, Day)

In this dataset we have several entities, such as

1. **Product**

Which represents items available for sale. Includes product codes, names, categories, pricing, and expected loss rates. Used to analyze what is being sold.

1. **Customer**

Which represents the buyer.

1. **Date**

Which represents the transaction date and supports hierarchical analysis by day, month, and year. Enables time-based trend reporting.

1. **Employee**

Which represents staff responsible for handling sales (online processing or in-store). Helps assess staff performance and assignment.

1. **Branch**

Which represents physical store locations and helps us to analyze geographic trends and branch-level performance.

1. **Channel**

That distinguishes the source of the sale — either **Online** or **Offline** — helping compare e-commerce vs. physical store performance.

1. **Sales Facts**

That is the central numeric data of each transaction: quantity sold, unit price, discounts, total revenue, cost, and gross income. Tied to all dimensions for complete analysis.

The two datasets differ in several important ways. The online dataset contains complete information for all attributes, while the offline version is limited and that shows the lack of advanced data systems. Additionally, transaction IDs are uniquely prefixed to distinguish between the two sources, and the structure of certain dimensions varies to reflect differing system designs. Despite these differences, both datasets share common dimensions, such as date, customer, and geography, which will allow them to be merged in the data warehouse.

## GRAIN / DIM / FACT

The business process selected is 'Sales Transactions'. This process captures all data generated from both online and offline product sales.  
  
The grain of the fact table is defined at the transaction line-item level, meaning one row represents one product sold in a specific transaction. This ensures the atomic level of detail necessary for flexible and accurate aggregation.  
  
The following dimension tables are identified to provide descriptive context: Product, Customer, Employee, Date, Branch (Geography), and Channel (Online/Offline).  
  
The fact table captures measurable metrics such as Quantity Sold, Unit Price, Total Amount, Discount, Cost, and Gross Income. These values are all additive and useful for analysis across various dimensions.

### Fact Table

FCT\_Sales\_DD

This is the central fact table that stores detailed information about each sales transaction. Each row represents a product sold in a specific transaction, along with measurable data such as quantity sold, sales amount, cost, discount, and gross income. It references all dimension tables through foreign keys.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| EVENT\_DT | Date of the transaction | DATE |
| DATE\_KEY | FK to DIM\_TIME\_DAY | BIGINT |
| PRODUCT\_SURR\_ID | FK to DIM\_PRODUCTS\_SCD | BIGINT |
| CUSTOMER\_SURR\_ID | FK to DIM\_CUSTOMERS | BIGINT |
| EMPLOYEE\_SURR\_ID | FK to DIM\_EMPLOYEES | BIGINT |
| BRANCH\_SURR\_ID | FK to DIM\_BRANCHES | BIGINT |
| CHANNEL\_SURR\_ID | FK to DIM\_CHANNELS | BIGINT |
| QUANTITY\_NO | Quantity sold | INT |
| UNIT\_PRICE\_ACT | Unit selling price | FLOAT |
| DISCOUNT\_ACT | Discount applied | FLOAT |
| AMOUNT\_TOT\_ACT | Total revenue | FLOAT |
| COST\_ACT | Cost of goods sold | FLOAT |
| GROSS\_INCOME\_ACT | Gross profit | FLOAT |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |

Examples:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EVENT\_DT | DATE\_KEY | PRODUCT\_SURR\_ID | CUSTOMER\_SURR\_ID | EMPLOYEE\_SURR\_ID | BRANCH\_SURR\_ID | CHANNEL\_SURR\_ID | QUANTITY\_NO | UNIT\_PRICE\_ACT | DISCOUNT\_ACT | AMOUNT\_TOT\_ACT | COST\_ACT | GROSS\_INCOME\_ACT | INSERT\_DT | UPDATE\_DT |
| 2024-05-12 | 20240512 | 101 | 501 | 3002 | 5 | 1 | 3 | 49.99 | 10.0 | 139.97 | 100.0 | 39.97 | 2024-05-12 | 2024-05-12 |

### Dim Tables

DIM\_Products\_SCD

This table contains descriptive information about products such as item code, item name, category, wholesale price, and expected loss rate. It allows analysis of sales performance by product or product category.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| PRODUCT\_SURR\_ID | Surrogate key | BIGINT |
| PRODUCT\_SRC\_ID | Item code | VARCHAR(20) |
| PRODUCT\_NAME | Product name | VARCHAR(100) |
| CATEGORY\_CODE | Category code | VARCHAR(20) |
| CATEGORY\_NAME | Category name | VARCHAR(100) |
| LOSS\_RATE\_ACT | Expected loss rate | FLOAT |
| START\_DT | Start of valid period (SCD) | DATE |
| END\_DT | End of valid period (SCD) | DATE |
| IS\_ACTIVE | Active flag (Y/N) | CHAR(1) |
| INSERT\_DT | Insert timestamp | DATE |
| SOURCE\_SYSTEM | Source system name | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Examples:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRODUCT\_SURR\_ID | PRODUCT\_SRC\_ID | PRODUCT\_NAME | CATEGORY\_CODE | CATEGORY\_NAME | LOSS\_RATE\_ACT | START\_DT | END\_DT | IS\_ACTIVE | INSERT\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 101 | A456 | Men's Running Shoes | C001 | Footwear | 0.05 | 2020-01-01 | 2029-12-31 | Y | 2020-01-01 | Online | Products |

DIM\_Customers

This table holds information about customers including ID, name, gender, age, and segment type. Enables customer-based reporting such as segmentation, frequency of purchase, and targeting.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| CUSTOMER\_SURR\_ID | Surrogate key | BIGINT |
| CUSTOMER\_SRC\_ID | Customer ID from source | INT |
| CUSTOMER\_NAME | Customer full name | VARCHAR(100) |
| GENDER | Gender | VARCHAR(15) |
| AGE\_NO | Age | INT |
| SEGMENT\_NAME | Segment (e.g., Premium) | VARCHAR(50) |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |
| SOURCE\_SYSTEM | Source system | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Example:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CUSTOMER\_SURR\_ID | CUSTOMER\_SRC\_ID | CUSTOMER\_NAME | GENDER | AGE\_NO | SEGMENT\_NAME | INSERT\_DT | UPDATE\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 501 | 501 | Ana Kordzaia | Female | 29 | Premium | 2023-01-10 | 2023-01-10 | Online | Customers |

DIM\_Employees

This table represents sales employees or staff members. Includes employee IDs, names, roles, and hire dates. Useful for analyzing employee performance and sales by staff.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| EMPLOYEE\_SURR\_ID | Surrogate key | BIGINT |
| EMPLOYEE\_SRC\_ID | Employee ID from source | INT |
| EMPLOYEE\_NAME | Employee full name | VARCHAR(100) |
| ROLE\_NAME | Employee role/title | VARCHAR(50) |
| HIRE\_DT | Hiring date | DATE |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |
| SOURCE\_SYSTEM | Source system name | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Example:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EMPLOYEE\_SURR\_ID | EMPLOYEE\_SRC\_ID | EMPLOYEE\_NAME | ROLE\_NAME | HIRE\_DT | INSERT\_DT | UPDATE\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 3002 | 3002 | David Jashi | Sales Associate | 2021-07-10 | 2021-07-10 | 2021-07-10 | Online | Employees |

DIM\_time\_Date

This table stores calendar-related attributes for each transaction date including year, month, day, and weekday. Enables time-based reporting like monthly sales, year-over-year growth, and seasonal trends.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| DATE\_KEY | Surrogate key (sequence-generated) | BIGINT |
| DATE\_SRC\_ID | Natural source date | DATE |
| YEAR\_NO | Calendar year | INT |
| MONTH\_NO | Month number | INT |
| DAY\_NO | Day of the month | INT |
| WEEKDAY\_NAME | Day of the week | VARCHAR(20) |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |
| SOURCE\_SYSTEM | Source system | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Example:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATE\_KEY | DATE\_SRC\_ID | YEAR\_NO | MONTH\_NO | DAY\_NO | WEEKDAY\_NAME | INSERT\_DT | UPDATE\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 20240512 | 2024-05-12 | 2024 | 5 | 12 | Sunday | 2024-05-12 | 2024-05-12 | Online | Orders |

DIM\_Branches

This table provides details about physical store locations. Includes branch ID, name, city, and region. Used to evaluate store-level performance and geographic trends.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| BRANCH\_SURR\_ID | Surrogate key | BIGINT |
| BRANCH\_SRC\_ID | Original Branch ID | INT |
| BRANCH\_NAME | Store name | VARCHAR(100) |
| CITY\_NAME | City | VARCHAR(50) |
| REGION\_NAME | Region or State | VARCHAR(50) |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |
| SOURCE\_SYSTEM | Source system | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Example:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BRANCH\_SURR\_ID | BRANCH\_SRC\_ID | BRANCH\_NAME | CITY\_NAME | REGION\_NAME | INSERT\_DT | UPDATE\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 5 | 5 | Liberty Mall | Chicago | Illinois | 2022-03-01 | 2022-03-01 | Offline | Branches |

DIM\_Channels

This table distinguishes between sales made online and offline. This dimension enables comparison of performance between different sales platforms.

|  |  |  |
| --- | --- | --- |
| Column Name | Description | Data Type |
| CHANNEL\_SURR\_ID | Surrogate key | BIGINT |
| CHANNEL\_SRC\_ID | Source Channel ID | INT |
| CHANNEL\_NAME | Channel name (Online / Offline) | VARCHAR(25) |
| INSERT\_DT | Insert timestamp | DATE |
| UPDATE\_DT | Last update timestamp | DATE |
| SOURCE\_SYSTEM | Source system | VARCHAR(100) |
| SOURCE\_ENTITY | Source table name | VARCHAR(100) |

Example:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CHANNEL\_SURR\_ID | CHANNEL\_SRC\_ID | CHANNEL\_NAME | INSERT\_DT | UPDATE\_DT | SOURCE\_SYSTEM | SOURCE\_ENTITY |
| 1 | 1 | Online | 2021-01-01 | 2021-01-01 | System | Channel Table |

# Business Layer 3NF

# Business Layer Dimensional Model

# Logical Scheme

# Data Flow

# Fact Table Partitioning Strategy