Assignment No. 7

6CS371 : Advanced Database System Lab

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Problem Statement

X-Mart is having different malls in city, where daily sales take place for various products. Higher management is facing an issue while decision making due to non availability of integrated data they can't do study on their data as per their requirement. So objective is to design a system which can help them quickly in decision making and provide Return on Investment (ROI).

Requirements

Sales Analysis:

- View daily, weekly, monthly, and quarterly profit of each store.
- Compare sales and profit across different time periods.
- Analyze sales trends by time bands throughout the day.

Product Demand Analysis:

- Identify products with high demand at specific locations.

Trend Analysis:

- Study sales trends by time periods (e.g., week, month, year).

Sales Patterns:

- Determine which days experience higher sales.
- Analyze sales trends on weekdays versus weekends.

Comparison and Growth Analysis:

- Compare weekly, monthly, and yearly sales to assess growth and key performance indicators (KPIs).

Data Warehouse Design

Dimensional Model:

- Dimension Tables:

- Product Dimension:
    - Product ID (Primary Key)
    - Product Name
    - Category
    - Brand
    - Other relevant product attributes
- Customer Dimension:
    - Customer ID (Primary Key)
    - Customer Name
    - Address
    - Contact Information
    - Other relevant customer attributes
- Store Dimension:
    - Store ID (Primary Key)
    - Store Name
    - Location
    - Manager
    - Other relevant store attributes
- Date Dimension:
    - Date ID (Primary Key)
    - Date (YYYY-MM-DD format)
    - Day of Week
    - Month
    - Quarter
    - Year
    - Public Holidays
    - Other relevant date attributes
- Time Dimension:
    - Time ID (Primary Key)
    - Hour
    - Minute
    - Time Band (e.g., Morning, Afternoon, Evening)
    - Other relevant time attributes
- Fact Table:
    - Sales Fact Table:
        - Sales ID (Primary Key)
        - Sales Date Key (Foreign Key to Date Dimension)
        - Sales Time Key (Foreign Key to Time Dimension)
        - Invoice Number

        - Sales Person ID (Foreign Key)
        - Store ID (Foreign Key)
        - Customer ID (Foreign Key)
        - Product ID (Foreign Key)
        - Actual Cost
        - Total Sales
        - Quantity Sold
        - Fact table record count

Schema:

- Utilize the Star Schema:
    - Central fact table surrounded by dimension tables.
    - Fact table serves as the center point for analysis.
    - Provides a simple and intuitive structure for querying and reporting.

Implementation

```sql
USE ads_sample;
-- Product Dimension Table
CREATE TABLE product (
    product_id INT PRIMARY KEY,
    product_name VARCHAR(255),
    category VARCHAR(255),
    brand VARCHAR(255)
);

-- Customer Dimension Table
CREATE TABLE customer (
    customer_id INT PRIMARY KEY,
    customer_name VARCHAR(255),
    address VARCHAR(255),
    contact_info VARCHAR(255)
);

-- Store Dimension Table
CREATE TABLE store (
    store_id INT PRIMARY KEY,
    store_name VARCHAR(255),
    location VARCHAR(255),
    manager VARCHAR(255)
);
```

```sql

    -- Date Dimension Table
CREATE TABLE date_dimension (
    date_id INT PRIMARY KEY,
    sales_date DATE,
    day_of_week VARCHAR(10),
    month VARCHAR(10),
    quarter VARCHAR(10),
    year INT,
    public_holidays VARCHAR(255)
);

    -- Time Dimension Table
CREATE TABLE time_dimension (
    time_id INT PRIMARY KEY,
    hour INT,
    minute INT,
    time_band VARCHAR(20)
);
    -- Sales Person Dimension Table
CREATE TABLE sales_person (
    sales_person_id INT PRIMARY KEY,
    sales_person_name VARCHAR(255),
    department VARCHAR(255)
);

```

```
);

-- Sales Fact Table
CREATE TABLE sales_fact (
    sales_id INT PRIMARY KEY,
    sales_date_key INT,
    sales_time_key INT,
    invoice_number VARCHAR(50),
    sales_person_id INT,
    store_id INT,
    customer_id INT,
    product_id INT,
    actual_cost DECIMAL(10, 2),
    total_sales DECIMAL(10, 2),
    quantity_sold INT,
    fact_record_count INT,
    FOREIGN KEY (sales_date_key) REFERENCES date_dimension (date_id),
    FOREIGN KEY (sales_time_key) REFERENCES time_dimension (time_id),
    FOREIGN KEY (sales_person_id) REFERENCES sales_person (sales_person_id),
    FOREIGN KEY (store_id) REFERENCES store (store_id),
    FOREIGN KEY (customer_id) REFERENCES customer (customer_id),
    FOREIGN KEY (product_id) REFERENCES product (product_id)
);
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

#	time_band	total_sales
1	Morning	2700.00
2	Afternoon	1750.00
3	Evening	1800.00

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

#	month	total_sales	total_cos	total_profi
1	March	6250.00	4400.00	1850.00

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

#	product_name	location	total_quantity_so
1	Laptop	Downtown	5
2	Smartphone	Mall	4
3	Laptop	Plaza	3
4	T-shirt	Suburb	3
5	T-shirt	Downtown	2

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

#	day_of_week	total_sales
1	Monday	2700.00
2	Wednesday	1800.00
3	Tuesday	1750.00