Step 1: Scenario

You are building a **mini Data Warehouse** for an **E-Commerce company**.
Business wants to analyze:

- How much revenue is generated by category, product, and time.
- How customer information changes over time (name, email).

We will use **Star Schema**:

- **Fact table**: `fact_orders`
- **Dimension tables**: `dim_customers`, `dim_products`, `dim_date`

Step 2: Tasks

Part A: Design Schema

1. Create the following tables in PostgreSQL:

`dim_customers`

- customer_sk (PK, surrogate key, auto-increment)
- customer_id (business key)
- name
- email
- effective_date (date when record became active)
- end_date (date when record expired; NULL = active)
- is_active (Y/N)

`dim_products`

- product_sk (PK, surrogate key)
- product_id (business key)
- name
- category

`dim_date`

- date_sk (PK)
- full_date (date)
- year, month, day_of_week

`fact_orders`

- order_id (PK)
- order_date_sk (FK → dim_date.date_sk)
- customer_sk (FK → dim_customers.customer_sk)
- product_sk (FK → dim_products.product_sk)
- quantity
- price
- total_amount (quantity × price)

☞ **Learning here**: surrogate keys, star schema, date dimension.

Part B: Populate Data

1. Insert at least:
   - 5 customers
   - 5 products
   - 10 orders
2. Implement **SCD Type-2** in `dim_customers`:
   - Example: customer changes email → old record end_date updated, new record inserted with same customer_id but new surrogate key.

Part C: Queries

Write SQL queries for:

1. Show **total revenue per product category**.
2. Show **monthly revenue trend** (use `dim_date`).
3. Find customers whose information changed over time (SCD-2 history).
4. Using a **CTE**, find the top 2 customers by total spend in each month.
5. Using a **window function**, show each customer's order **rank by date**.

Step 3: Deliverables

1. A `.sql` file containing:
   - CREATE TABLE statements (schema).
   - INSERT statements (sample data).
   - Queries (with comments).
2. A short write-up (half page):
   - Difference between OLTP and OLAP modeling.
   - Why surrogate keys are important in dimensions.

- What you learned about Slowly Changing Dimensions.