Part B: Data Models for Starbucks

4. Starbucks Data Warehouse Schema

The Starbucks Data Warehouse Schema in the attached image represents a star schema designed to centralize and integrate data from different operational systems into a unified structure. This schema is optimized for analytical queries, reporting, and business intelligence. The star schema revolves around a central Fact Table connected to multiple Dimension Tables, allowing efficient querying and data aggregation.

Components of the Data Warehouse Schema

1. FactSales Transaction Table:

- **Role:** This is the central fact table containing transactional data, such as sales, linked to dimensional tables for deeper insights.
- **Key Attributes:**
    - **OrderID:** Unique identifier for each transaction.
    - **CustomerKey (FK):** Links to the DimCustomer Table.
    - **DateKey (FK):** Links to the DimDate Table.
    - **ProductKey (FK):** Links to the DimProduct Table.
    - **EmployeeKey (FK):** Links to the DimEmployee Table.
    - **SupplierKey (FK):** Links to the DimSupplier Table.
    - **Quantity, UnitPrice, and TotalPrice:** Store metrics for analytics, such as sales volume and revenue.
- **Purpose:** This table allows tracking of sales data, such as which products were sold, by whom, to whom, and when, along with associated metrics.

2. DimEmployee Table:

- **Role:** Stores employee-related information for analysis, such as performance or contribution to sales.
- **Key Attributes:**
    - **EmployeeKey (FK):** Unique identifier linking the employee to the fact table.
    - **EmployeeID (PK):** Unique ID for employees in the source operational system.
    - **FirstName, LastName, Position, HireDate, Salary:** Detailed attributes of employees.
- **Purpose:** Provides insight into employee performance, sales impact, and workforce analysis.

3. DimCustomer Table:

- **Role:** Maintains detailed customer information for understanding purchasing behavior and customer segmentation.
- **Key Attributes:**
  - **CustomerKey (FK):** Unique identifier linking the customer to the fact table.
  - **CustomerID (PK):** Identifier for customers in the source system.
  - **FirstName, LastName, Email, PhoneNumber, Address:** Detailed attributes for customer profiling.
- **Purpose:** Enables segmentation, targeted marketing, and analysis of customer loyalty.

4. DimProduct Table:

- **Role:** Contains detailed information about the products sold.
- **Key Attributes:**
  - **ProductKey (FK):** Unique identifier linking the product to the fact table.
  - **ProductID (PK):** Product identifier from the operational system.
  - **ProductName, ProductDescription:** Details about each product.
- **Purpose:** Supports product-level analytics, such as identifying top-selling products and performance of product categories.

5. DimSupplier Table:

- **Role:** Stores supplier information to track procurement and supply chain performance.
- **Key Attributes:**
  - **SupplierKey (FK):** Unique identifier linking the supplier to the fact table.
  - **SupplierID (PK):** Identifier for suppliers in the source system.
  - **SupplierName, ContactNumber, Email:** Details about suppliers.
- **Purpose:** Enables analysis of supplier performance, sourcing efficiency, and cost optimization.

6. DimDate Table:

- **Role:** A time dimension table that provides a detailed calendar for temporal analysis.
- **Key Attributes:**
  - **DateKey (FK):** Links to the fact table for time-based queries.
  - **FullDate, Year, Quarter, Month, Day, DayOfWeek:** Attributes for date-based aggregations.
- **Purpose:** Facilitates time-series analysis, such as sales trends over time and seasonality.

Why This Schema is Crucial for Starbucks

1. **Centralized Data Analysis:** The star schema consolidates data from disparate systems (Employee, Customer, and Supplier Management Systems), creating a single source of truth for analytics.
2. **Improved Decision-Making:** Enables Starbucks to make data-driven decisions by analyzing customer behavior, employee performance, and product trends in one unified structure.
3. **Scalable and Flexible:** The schema is optimized for querying large datasets, allowing Starbucks to scale as data volumes grow without compromising performance.
4. **Efficiency in Querying:** The fact-dimension relationships allow quick aggregation of key metrics, such as total sales, average revenue per customer, or product-specific performance.

Relationships in the Schema

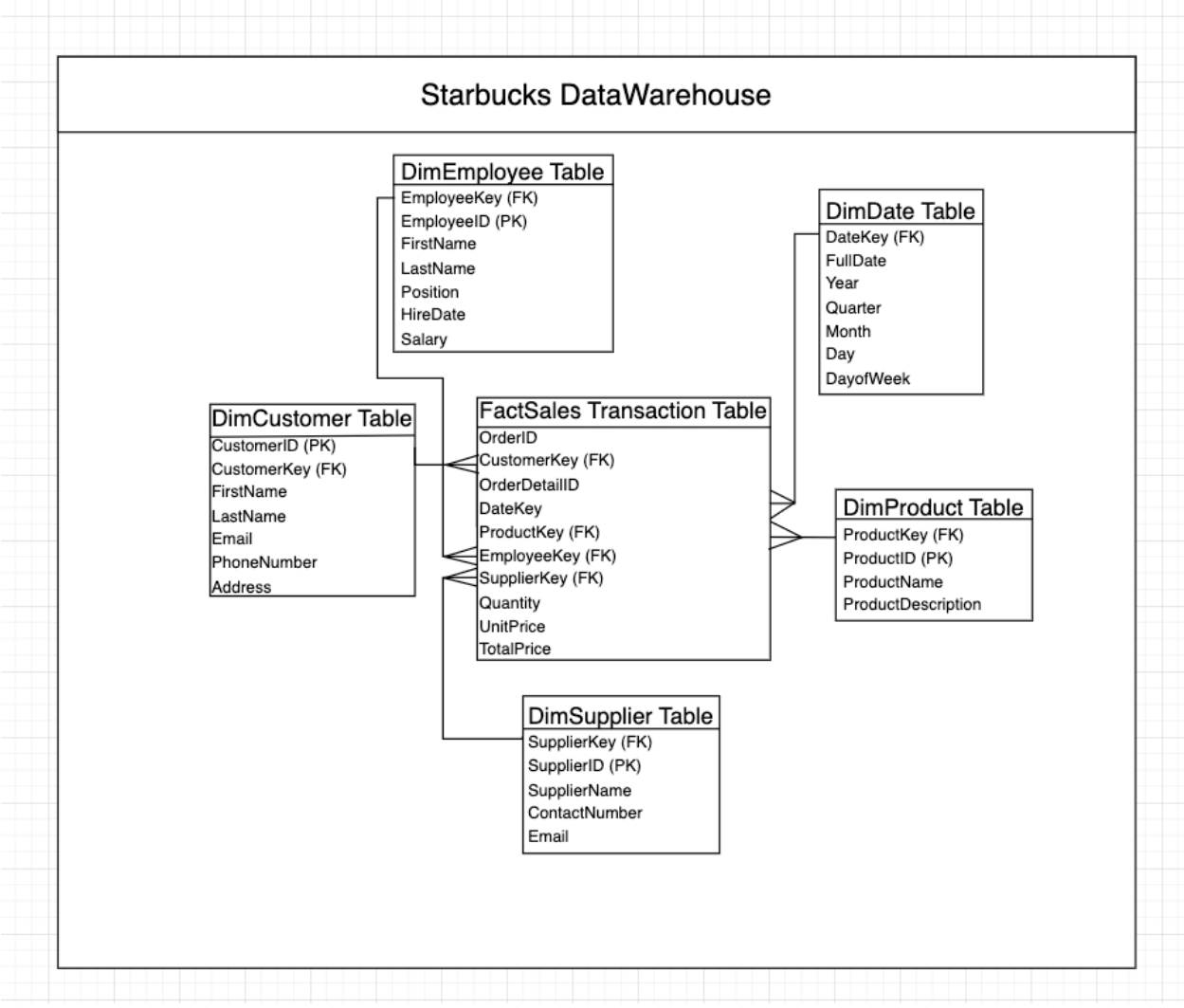
1. **Fact Table to Dimension Tables:**
    - The FactSales Transaction Table serves as the central hub and is connected to all dimension tables via foreign keys (CustomerKey, EmployeeKey, ProductKey, SupplierKey, and DateKey).
    - Each foreign key points to a unique record in the corresponding dimension table, allowing detailed drill-down analysis.
2. **One-to-Many Relationships:**
    - Each dimension table has a one-to-many relationship with the fact table. For example:
        - One employee (DimEmployee Table) can be linked to multiple transactions in the FactSales Transaction Table.
        - One product (DimProduct Table) can appear in multiple sales transactions.

Benefits of a Star Schema Over Independent OLTP Systems

1. **Integrated Data Analysis:** Combines customer, employee, product, and supplier data into a single schema, eliminating silos and enabling holistic analytics.
2. **Better Query Performance:** Star schemas are optimized for read-heavy operations, making them ideal for business intelligence queries and reporting.
3. **Simplified Maintenance:** Centralized schema simplifies database maintenance compared to managing separate OLTP systems for employees, customers, and suppliers.
4. **Enhanced Scalability:** As Starbucks' data grows, the star schema can easily adapt, allowing the addition of more dimensions or facts without disrupting the existing structure.

Benefits of the Data Warehouse for Starbucks

1. **Customer Insights:** Enables Starbucks to analyze customer purchase patterns and create targeted marketing campaigns, enhancing customer loyalty and driving revenue growth.
2. **Operational Efficiency:** Provides insights into supplier performance and employee contributions, helping optimize the supply chain and improve workforce management.
3. **Product Performance Analysis:** Identifies best-selling products, underperforming items, and opportunities for introducing new products.
4. **Time-Based Analytics:** Allows Starbucks to track trends over time, such as seasonal demand variations or annual growth rates.



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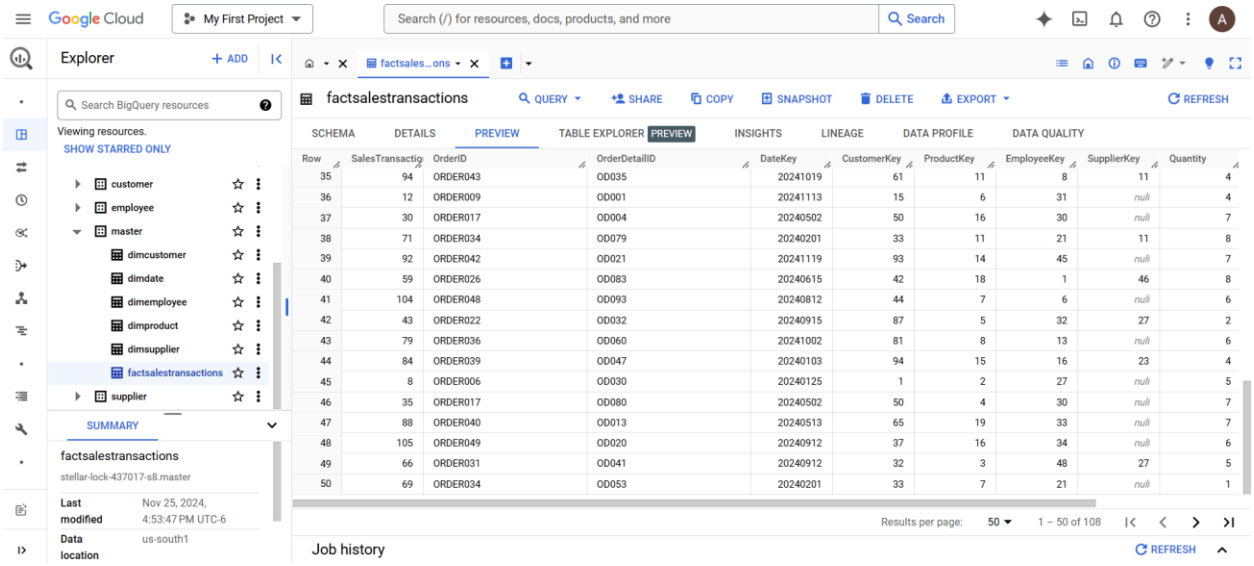
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