**Data Warehousing for Customer Order Processing System**

**Report**

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ADS assignment 6

# **Introduction**

## Objective and Scope

This project aims to design and build a data warehouse for managing customer orders in a company with multiple stores spread across different cities and states. The data warehouse will bring together information from various sources to support better business decision-making using Online Analytical Processing (OLAP).

### Scope of the Project:

* Designing a **star schema** to structure the data warehouse.
* Implementing **OLAP operations** such as roll-up, drill-down, slice, and dice.
* Generating **analytical reports** to provide business insights.

# Business Requirements

## Why a Data Warehouse is Needed

The company operates multiple stores in various locations and needs a data warehouse to:

* Monitor stock levels across all stores.
* Evaluate how efficiently customer orders are fulfilled.
* Optimize inventory distribution based on demand trends.
* Understand customer purchasing behavior.
* Support strategic decision-making using historical data analysis.

# Functional Specifications

## Data Sources (Input)

The data warehouse will collect information from the company's operational databases, including:

* **Customer details** (ID, name, city, order history)
* **Store details** (ID, city, state, contact number)
* **Inventory details** (item ID, description, size, weight, unit price, quantity available)
* **Order details** (order number, date, items ordered, store ID)

## Reports and Analysis (Output)

The system will generate:

* Reports on stock availability in different stores and cities.
* Analysis of customer orders and fulfillment performance.
* Insights into product sales trends and demand patterns.
* Multi-dimensional OLAP reports for deeper business analysis.

# Data Warehouse Design

## Star Schema Structure

The data warehouse follows a **star schema** design with the following structure:

### **Fact Table:**

* **Orders** (Order ID, Customer ID, Store ID, Item ID, Quantity, Ordered Price, Order Date)

### **Dimension Tables:**

* **Customers** (Customer ID, Name, City, First Order Date)
* **Stores** (Store ID, City ID, Phone Number)
* **Items** (Item ID, Description, Size, Weight, Unit Price)
* **Cities** (City ID, City Name, State, Headquarter Address)

# Data Cube Implementation

## Implementation Steps

1. **Extract Data**: Gather information from operational databases.
2. **Transform Data**: Clean, normalize, and aggregate the data.
3. **Load Data**: Store the processed data in the data warehouse.
4. **Create Data Cubes**: Build multi-dimensional cubes for OLAP analysis.
5. **Run OLAP Queries**: Perform roll-up, drill-down, slice, and dice operations for insights.

# Observations

## OLAP Reports Generated

Using OLAP queries, the following reports are created:

* **Stock Report**: Shows which stores have specific items, including details like city, state, and unit price.
* **Order Fulfillment Report**: Lists the orders that can be processed by a given store.
* **Customer Analysis**: Provides insights into customer purchasing behavior at different stores.
* **Stock Availability Report**: Highlights which headquarters manage stores with high stock levels.
* **Detailed Order Report**: Breaks down customer orders by item, store, and city.

## Data Validation & Accuracy Checks

* Cross-checking OLAP reports with the relational database to ensure accuracy.
* Verifying data integrity after transformation.
* Ensuring consistency between the data warehouse and source databases.

# Conclusion

The implementation of the data warehouse successfully consolidates information from multiple sources, improving customer order processing and inventory management. The integration of OLAP enables powerful reporting and analysis, supporting better business decisions. Future enhancements could include **predictive analytics** and **real-time data processing** to further improve business intelligence.