Consulting & Analytics Club
IIT Guwahati

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Solving Inventory Inefficiencies Using SQL

Introduction

Urban Retail Co. is a rapidly expanding mid-sized retail chain with a presence in both physical stores and online platforms. We operate across several cities and offer more than 5,000 diverse stock keeping units (SKUs), ranging from daily groceries and home essentials to electronics and personal care items. Our logistics network depends on regional warehouses that feed inventory to individual retail outlets.
With growing complexity in operations, we are struggling to maintain optimal inventory levels. While data from our sales transactions, product catalogs, and warehouse logs is available, it is underutilized, leading to significant inefficiencies in inventory management.

The Challenge

Our current issues stem from reactive, manual decision-making and a lack of integrated data analytics:

- Frequent **stockouts** of fast-moving products, resulting in missed sales and poor customer experience.
- **Overstocking** of slow-moving items, locking up working capital and increasing warehousing costs.
- Lack of **real-time insights** into SKU performance, reorder thresholds, and supplier reliability.
- **Poor visibility** across product categories, store locations, and regions.

We strongly believe that leveraging SQL-based analytics can convert our raw data into actionable insights that will enhance our inventory management practices and decision-making process.

Your Mission

- As a team of aspiring data analysts, your goal is to design and implement a **SQL-driven inventory monitoring** and **optimization solution**. This project will simulate the core responsibilities of a data analyst in a retail setting.

You are expected to:

- Create **efficient and scalable** SQL queries to extract, transform, and analyze inventory and sales data.
- **Diagnose inefficiencies**, suggest corrective actions, and predict future needs based on data.
- Deliver both **technical outputs** (SQL scripts, schema designs) and **analytical insights** that the business can act on.

Key Tasks and Deliverables

SQL Queries

You will write and test a suite of advanced SQL queries that enable the following:

- **Stock Level Calculations** across stores and warehouses
- **Low Inventory Detection** based on reorder points
- **Reorder Point Estimation** using historical trends
- **Inventory Turnover Analysis**
- **Summary Reports** with KPIs like stockout rates, inventory age, and average stock levels

Database Optimization

- Normalize a given raw inventory dataset into a relational schema
- Apply best practices for query performance: indexing, joining, use of window functions, etc.

Analytical Outputs

Use your queries to produce reports and dashboards (or summaries) that

- Identify **fast-selling vs slow-moving products**
- Recommend **stock adjustments** to reduce holding costs
- Highlight **supplier performance inconsistencies**
- Forecast demand trends based on seasonal/cyclical data

What We Expect From You

- **Technical Clean**, optimized, and well-documented SQL code.
- **Analytical Thinking**: Ability to turn raw data into insights that solve real business problems.
- **Communication**: Clear presentation of findings, rationale, and business impact.
- **Creativity**: Go beyond the provided queries — suggest additional insights or visualizations we haven't considered.

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Expected Business Impact

By the end of this project, your solution should help Urban Retail Co.:

- Achieve smarter inventory decisions based on actual data
- Reduce stockouts and overstocks
- Improve supply chain efficiency
- Enhance customer satisfaction and boost profitability

Final Submission Should Include

- SQL scripts and documentation.
- Entity Relationship Diagram (ERD) or schema design.
- Inventory KPI dashboard/report (mocked-up or real).
- A brief executive summary (1-2 pages) outlining your key insights and recommendations.

Dataset

Access the dataset using the following link:
Link

Project Mentors

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Resources :

Link