

Inventory and Warehouse Management System – Project Report

Introduction

Efficient inventory and warehouse management is fundamental to any organization that deals with products, suppliers, and logistics. This project focuses on designing and implementing a fully functional SQL-based Inventory and Warehouse Management System that allows tracking of stock quantities, warehouse operations, supplier relations, and product movements. The primary objective is to ensure accurate stock visibility, minimize shortages, automate reordering alerts, and enhance the overall supply-chain decision-making process.

Abstract

This project demonstrates how SQL-driven systems can replace manual inventory tracking by automating the monitoring, valuation, and movement of stock across warehouses. Multiple inter-related tables—Products, Warehouses, Suppliers, Stock, Product_Suppliers, Stock_Movements, and Notifications—were designed using normalization principles to ensure data consistency and integrity.

Tools Used

Database: PostgreSQL - Interface: pgAdmin / SQL CLI - Data Simulation: Randomized datasets using SQL `generate_series()` - Core SQL Concepts Applied: Joins, Window Functions, Triggers, Stored Procedures, CTEs, Aggregation Functions - Data Visualization (Optional): Power BI or Excel for further trend analysis

Steps Involved in Building the Project

1. Database Design and Schema Creation Designed seven core tables: Products, Warehouses, Suppliers, Product_Suppliers, Stock, Stock_Movements, and Notifications.
2. Data Insertion and Population Populated the database with synthetic datasets using `generate_series()` and random data generation.
3. Implementing SQL Functions and Triggers Automated low-stock alerts, stock updates, and movement recording using triggers and stored procedures.
4. Analytical Queries and Business Insights Developed SQL queries for inventory overview, supplier analysis, stock movement trends, and profitability insights.
5. Data Integrity and Automation Enforced referential integrity through constraints, automated operations through triggers, and ensured traceability for all stock transactions.

Conclusion

The Inventory and Warehouse Management System offers a structured approach to manage product stocks, warehouse space, and stock movement. Automated triggers prevent data errors, while analytical SQL queries provide managers with real-time insights into sales performance, supplier analysis, stock movements, profitability analysis and storage utilization. This project lays a strong foundation for operational efficiency and decision intelligence.