

KJ CORP

Database Design and Implementation for Retail Operations

A relational SQL system for supplier, inventory, and sales management.

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Executive Summary

This report presents the design and implementation of a professional SQL-based database system for KJ CORP, a retail and distribution company specializing in solar systems, electronic locks, and hardware. The purpose of this project was to centralize operations, reduce data redundancy, and improve efficiency in managing suppliers, products, customers, sales, and payments. The result is a normalized relational schema that ensures data integrity, scalability, and real-time insights for business decision-making.

Business Context

KJ CORP operates in the renewable energy and hardware sector, offering a wide range of products from solar panels to electronic locks and bathroom equipment. Prior to this implementation, the company relied heavily on spreadsheets and manual records, leading to inconsistencies and errors. The new database consolidates critical business processes, enabling accurate, real-time access to information across departments.

Objectives

The main objectives of this project were to:

- Design and implement a normalized SQL database for retail operations.
- Ensure referential integrity through primary and foreign key constraints.
- Enable business intelligence and reporting through optimized data retrieval queries.
- Provide scalability for future data analysis and predictive modeling.

Database Design and Structure

The database includes ten core tables: Company, Suppliers, Categories, Products, Inventory, Customers, Sales, Sales_Details, Payments, and Employees. These tables are connected through primary and foreign key relationships to maintain referential integrity. The schema design follows best practices in normalization and indexing to ensure optimal performance.

Each table serves a clear business purpose: Suppliers and Products manage procurement; Customers and Sales handle transactions; Inventory tracks stock levels; and Payments manage financial records. The design allows full traceability of each transaction and supports analytical queries for decision-making.

Implementation Highlights

The SQL implementation covers Data Definition Language (DDL) for schema creation, Data Manipulation Language (DML) for managing inserts and updates, and Data Query Language (DQL) for business analysis queries. Key constraints such as UNIQUE, NOT NULL, and CHECK ensure data consistency. Additionally, performance indexes and views were implemented to accelerate reporting and analytics workflows.

Sample Analytical Queries

Examples of SQL queries used for reporting and analytics include:

- Retrieve top-selling products by total quantity sold.
- Calculate total revenue by customer for business performance insights.
- Generate monthly demand trends by product category.

These queries support integration with BI tools such as Power BI or Tableau for visualization.

Key Insights and Business Impact

The database design directly supports data-driven operations, enabling KJ CORP to make informed decisions across its supply chain and sales activities. Centralized data improved accuracy, reduced duplication, and provided analytical visibility into sales performance and inventory optimization. The modular schema allows integration with ERP or BI systems for future expansion.

Lessons Learned

Throughout the development, several lessons were learned:

- Normalization is critical to prevent redundancy and maintain consistency.
- Indexing and query optimization significantly improve retrieval times.
- Designing for scalability facilitates future integration with advanced analytics pipelines.

Conclusion

The SQL-based database designed for KJ CORP successfully provides a unified data environment that enhances operational efficiency and decision-making. The system supports supplier management, sales tracking, inventory control, and payment processing with data integrity and scalability. This project demonstrates practical application of data analytics and database engineering skills in a business context relevant to the retail and renewable energy industries in Canada.