ONLINE RETAIL SALES DATABASE DESIGN

Introduction

In today's digital economy, online retail platforms rely heavily on efficient and well-structured databases to manage large volumes of transactional data. A properly designed database ensures data accuracy, consistency, and scalability while supporting essential business operations such as order processing, inventory tracking, and sales reporting.
This project focuses on designing a relational database for an online retail sales system using MySQL. The database is structured using normalization techniques to minimize redundancy and maintain data integrity. The design supports core e-commerce functionalities, including customer management, product cataloging, order processing, payment handling, and shipping management.

Abstract

The Online Retail Sales Database Design project demonstrates the practical application of database design principles and normalization techniques. The objective of the project is to design a normalized database schema up to Third Normal Form (3NF) to eliminate data redundancy and avoid update, insertion, and deletion anomalies.
The project involves identifying key entities, defining relationships, creating tables with constraints, populating sample data, and generating meaningful sales reports using SQL JOIN queries and views. The resulting database design is efficient, scalable, and suitable for real-world e-commerce applications.

Tools Used

- MySQL – Used for database creation, table design, and data management
- SQL – Used for writing DDL, DML, JOIN queries, and views
- dbdiagram.io – Used to design and visualize the ER diagram
- Microsoft Word – Used for documentation and report preparation

Steps Involved in Building the Project

1. **Requirement Analysis**
   The functional requirements of an online retail system were analyzed to understand data storage and processing needs.
2. **Entity Identification**
   Key entities such as Customers, Products, Categories, Orders, Order_Items, Payments, Shipping, and Inventory were identified.
3. **Normalization**
   The database schema was normalized step-by-step to First Normal Form (1NF), Second Normal Form (2NF), and finally Third Normal Form (3NF) to remove redundancy and transitive dependencies.
4. **Table Creation**
   Tables were created in MySQL using DDL statements with appropriate primary keys, foreign keys, UNIQUE, NOT NULL, and CHECK constraints.
5. **Data Population**
   Sample data was inserted into all tables to validate relationships and test queries.

6. **Query and View Development**
   SQL JOIN queries and views were written to generate sales reports such as order-wise sales, customer-wise sales, product-wise sales, and category-wise sales.
7. **ER Diagram Creation**
   An ER diagram was created using dbdiagram.io to visually represent entities and their relationships.

Conclusion

The Online Retail Sales Database Design project successfully delivers a well-structured and fully normalized relational database suitable for an e-commerce platform. By applying Third Normal Form (3NF), the database minimizes redundancy, ensures data integrity, and improves query efficiency.

The project demonstrates a strong understanding of database design concepts, SQL implementation, and real-world application of relational databases. This database model can be easily extended to support additional features such as discounts, returns, and advanced analytics, making it scalable for future business requirements.