SQL PROJECT

Project Focus: Relational Data Modeling, SQL Queries, and Transaction Management

1. Introduction

These projects focused on designing and managing relational databases using SQL. The goal was to simulate real-world business scenarios (sales management for a retail system and employee management for an organization). I applied **relational data modeling, complex queries, aggregate functions, joins, updates, and transaction handling** to demonstrate practical SQL proficiency.

2. Project Objectives

- Design **normalized relational databases** to manage structured data efficiently.
- Perform **data manipulation** using `INSERT`, `UPDATE`, and `DELETE`.
- Retrieve and analyze data using **joins, aggregate functions, and grouping**.
- Maintain **data integrity** with transactions and commit operations.
- Apply practical SQL techniques to real-world datasets for reporting and analysis.

3. Database Design and Modeling

3.1 Unicorn Sales Database

- Created a **sales management system** with a table for sales (`UNICORN_SALES`) and a table for customer details (`CUSTOMER_INFO`).
- Implemented **one-to-many and many-to-many relationships** by linking customers to sales records.
- Applied **grouping and aggregate functions** to summarize sales per region, per customer, and per product.
- Performed **table alterations** to rename tables and modify structure dynamically.
- Conducted **transaction operations** to update records safely while maintaining data consistency.

3.2 Employee Records Database

- Created **employee management system** with tables for employee information, attendance, and salary.
- Normalized the database to store employee details, attendance tracking, and salary records separately.
- Applied **filters, pattern matching, and conditional queries** to extract employee performance, absences, and salary information.

- Used **aggregate functions and grouping** to calculate total salaries per month and summarize employee attendance.
- Performed **updates and ordering operations** to manage employee salaries and department data efficiently.

4. SQL Techniques Demonstrated

1. **Joins:**
    - Combined sales and customer data to generate detailed reports.
    - Linked employee attendance with salary data for performance analysis.
    - Used **INNER, LEFT, RIGHT joins** and unions to extract comprehensive insights.

2. **Aggregate Functions and Grouping:**
    - Summed quantities and salaries.
    - Counted records per region, product, or employee performance category.
    - Calculated averages to analyze trends, such as average quantity per product or average salary.

3. **Data Manipulation:**
    - Added new sales, customers, employees, and salary records.
    - Updated existing records to reflect changes in quantity, salary, and attendance.

4. **Transactions and Commit:**
    - Used **transaction blocks** to ensure safe updates and prevent data inconsistency.
    - Demonstrated commit operations after successful updates to finalize changes.

5. **Filtering and Conditional Queries:**
    - Applied `WHERE`, `BETWEEN`, `IN`, `NOT IN`, and `LIKE` conditions for advanced data retrieval.
    - Filtered high-value sales, specific employee performance categories, and departmental records.

6. **Database Management:**
    - Created multiple databases and tables.
    - Renamed tables and columns to reflect changing requirements.
    - Ensured structured and normalized storage of data for efficiency and scalability.

5. Conclusion

Through these projects, I developed hands-on expertise in **designing relational databases, writing advanced SQL queries, performing data analysis, and ensuring transactional integrity**. The exercises demonstrated my ability to:

- Handle **real-world business and organizational data**.
- Apply **SQL best practices** for structured querying and reporting.
- Use **joins, aggregations, and transactions** effectively for data management and decision-making.

These projects strengthened my practical understanding of SQL and relational database concepts, preparing me for more complex data management and analytics tasks.