

University Course Management System (PostgreSQL Project)

1. Project Overview

The University Course Management System is a fully normalized SQL-based project designed to manage academic operations such as student records, faculty assignments, course registration, attendance, exam scores, and fees. Built in PostgreSQL, it uses a wide range of SQL features from basic CRUD to advanced procedures, triggers, window functions, and views.

2. Database Design (Schema)

Tables and Relationships:

- departments: Department information
- students: Student personal and academic details
- faculty: Faculty details linked to departments
- courses: Courses offered by departments
- enrollments: Many-to-many relationship between students and courses
- attendance: Daily course-wise attendance
- marks: Exam scores for each student
- fees: Payment records
- fee_log: Logged entries when fees are paid

3. DDL: Table Creation

DDL scripts for creating tables with constraints and relationships.

(Use provided SQL code in project for exact table creation statements.)

4. Sample Data (DML)

Insert sample departments, students, faculty, courses, enrollments, attendance, marks, and fees.

(Refer to the provided INSERT INTO SQL script.)

5. Key Queries

- List students with department names
- Courses with faculty
- Enrolled students
- Fee summary per student

6. Views

Create views for student performance and attendance summary to simplify reporting and reuse.

7. Stored Procedure

Create a function `get_grade(score)` that returns grade string like A+, A, B based on marks.

8. Trigger

Trigger 'after_fee_payment' auto-inserts into `fee_log` table when a new fee record is added.

9. Transactions

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Demonstrates fee payment and logging in a single transaction block using BEGIN and COMMIT.

10. Window Function

Rank students by score per course using RANK() OVER (PARTITION BY course_id ORDER BY score DESC).

11. Subquery

Select students with the highest marks per course using (course_id, MAX(score)) subquery.

12. Resume Summary

University Course Management System (PostgreSQL Project): Built a normalized relational database for managing students, faculty, courses, attendance, grades, and fees. Implemented advanced SQL features like joins, views, stored procedures, triggers, window functions, and transactions to simulate real-world university data operations.