Employee Management and Attendance Tracker using PostgreSQL

Introduction

The Employee Management System is a database-driven project designed to manage employee records efficiently in an organization. This system handles critical data such as employee details, departments, roles, attendance, and payroll. The project aims to simplify HR processes through an optimized relational database using PostgreSQL.

Abstract

This project builds a backend database system for employee management using PostgreSQL and pgAdmin. The database supports core functionalities like inserting employee records, managing attendance, calculating salaries with deductions, and maintaining departmental data. Triggers and functions are used to automate payroll processing. Dummy data for 200 employees and their July 2025 attendance was generated using SQL queries and functions to simulate real-world use.

Tools Used

- **PostgreSQL**: Relational Database Management System
- **pgAdmin 4**: GUI for managing PostgreSQL databases
- **SQL**: For creating tables, views, triggers, and functions
- **GitHub**: Version control and project hosting

Steps Involved in Building the Project

1. **Database Design**:
    - Created tables: Employees, Departments, Roles, Attendance, Payroll.
    - Established relationships via foreign keys.
2. **Dummy Data Generation**:
    - Used INSERT INTO for inserting employee data with Indian names.
    - Created 200 employees using a generate_series() + randomization script.

- Attendance for July 2025 auto-generated using generate_series() and dynamic check-in/check-out times.

3. **Triggers and Functions**:
    - Wrote a BEFORE INSERT trigger on the Attendance table to set the status automatically (Present/Late).
    - Defined a payroll function to calculate total salary after deduction based on leaves.
4. **Views & Queries**:
    - Created views to display employee info with department and role.
    - Used SELECT queries for attendance tracking and salary reports.
5. **Testing & Validation**:
    - Verified attendance status logic and salary deductions.
    - Ran multiple JOIN queries for integrated reports.

Conclusion

The Employee Management System demonstrates efficient use of PostgreSQL for handling real-world HR operations. By leveraging SQL automation, the project avoids repetitive manual entries, ensures data integrity, and provides insights through views and queries. With the use of dummy data and dynamic queries, the system can be expanded to include more modules like leave management or employee performance tracking.