PROJECT PROPOSAL: Digital Student Attendance Tracking System

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PROBLEM STATEMENT:

Keeping track of student attendance manually with paper or spreadsheets is slow, prone to mistakes, and hard to manage. Teachers spend a lot of time recording attendance, students may question their records, and administrators cannot easily see overall attendance trends. A digital system is needed to make attendance tracking fast, accurate, and easy to report.

TARGET USERS:

- **Teachers/Instructors:** Create courses, schedule sessions, mark attendance, and view student attendance records.
- **Students:** View their own attendance records and track progress.

DATABASE TYPE:

- **PostgreSQL**, a relational database.

Why PostgreSQL?

- The system involves **many-to-many relationships** (students can attend multiple courses; courses can have multiple students).
- Relational databases **handle structured data** with clear entities (students, teachers, courses, sessions).
- SQL queries enable **complex reporting** (example: "find all students with <75% attendance in a given course").
- PostgreSQL supports **constraints, foreign keys, and enums** (enumeration), ensuring data integrity.
- Integrates easily with web frameworks **(Application Builders)** like Flask or Django for rapid development.

APPLICATION GOALS AND FEATURES:

- **Core CRUD Operations (Live UI):**
  Add, edit, view, and delete students, courses, sessions, and attendance records.
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- **Attendance Recording:**
  Mark attendance for each student per session.
  Status options: Present, Absent.

- **Reports & Analytics:**
  Calculate attendance percentage for each student in a course.
  Use **aggregate operators** such as:
    SUM – total classes attended by a student
    COUNT – total sessions or absences
    AVG – average attendance percentage
    MAX / MIN – highest or lowest attendance in a course
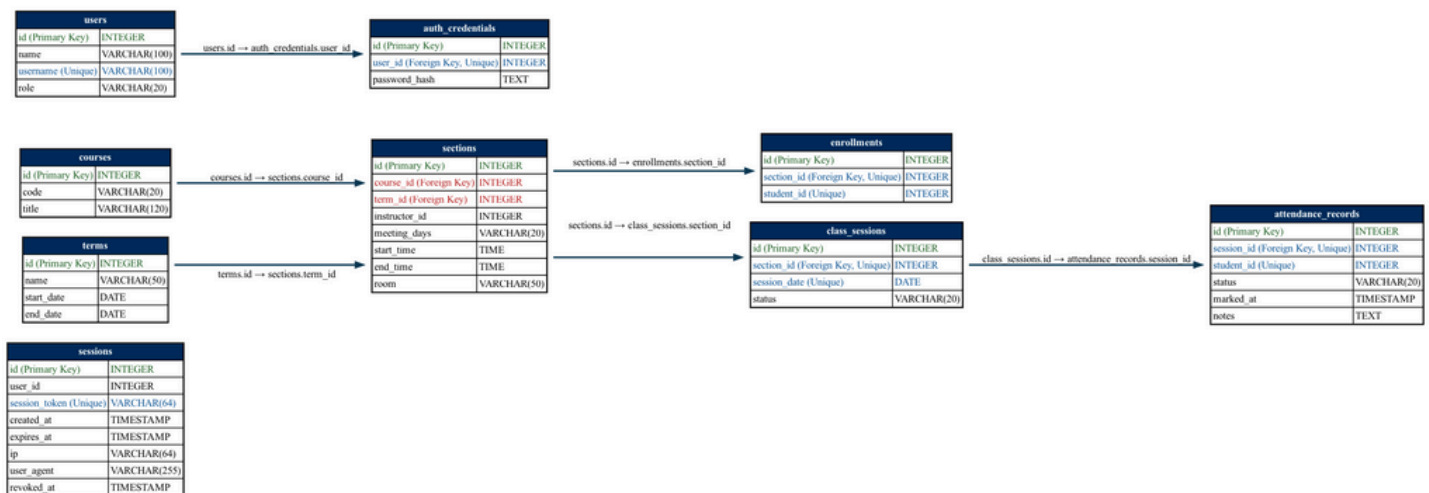 Generate reports for teachers or administrators.

- **User Interface:**
  Web-based system with simple forms for CRUD operations.

- **Bulk Import/Export (Bonus Feature):**
  Import student lists or historical attendance from CSV/Excel.
  Export attendance reports for offline use.

SAMPLE SCHEMA DIAGRAM:

FUTURE ENHANCEMENT:

- Implement **face recognition** to automatically mark attendance.
- Develop a **mobile app** for students and teachers.
- Add/ trigger **push notifications** for low attendance alerts.
- Dashboard creation that includes visualizations for trends.
- Integrate with learning management systems **(LMS)** like Canvas or Moodle.
- Implement role-based access control **(RBAC)** for different users.

CONCLUSION:

The Digital Student Attendance Tracking System will make attendance tracking faster, easier, and more accurate. It will save teachers time, help students check their records, and give administrators useful insights. With a web-based interface and a PostgreSQL database, the system will allow easy management of students, courses, sessions, and attendance, as well as reporting and analytics.

ABSTRACT:

Managing student attendance manually using paper or spreadsheets is time-consuming and prone to errors. Teachers spend a lot of time recording attendance, students may question incorrect records, and administrators cannot easily see overall attendance trends. This project proposes a Digital Student Attendance Tracking System to automate attendance management and provide real-time access to accurate records.

The system will use a **PostgreSQL** relational database to handle **structured data** and maintain clear relationships between students, courses, sessions, and attendance records. A **web-based interface** will allow teachers to create, view, update, and delete records easily. Teachers can mark attendance for each session with status options such as Present, Absent, or Late (**enumeration**), and view attendance summaries, including total sessions attended, absences, and percentage of attendance per student.

The system will include reporting and analytics features, using **aggregate functions** like **SUM, COUNT, AVG, MAX,** and **MIN** to calculate attendance percentages, identify trends, and generate reports for teachers and administrators. Key functions will include searching and filtering records by course, student, or date, sorting by attendance percentage, and visual dashboards for quick insights. There is also the idea of implementing **bulk import** and **export of attendance data** via CSV or Excel files, which could simplify management of large datasets in the future.

Overall, the system aims to save time, improve **accuracy**, and provide actionable insights into attendance trends, making attendance tracking more efficient and reliable for educational institutions like universities.