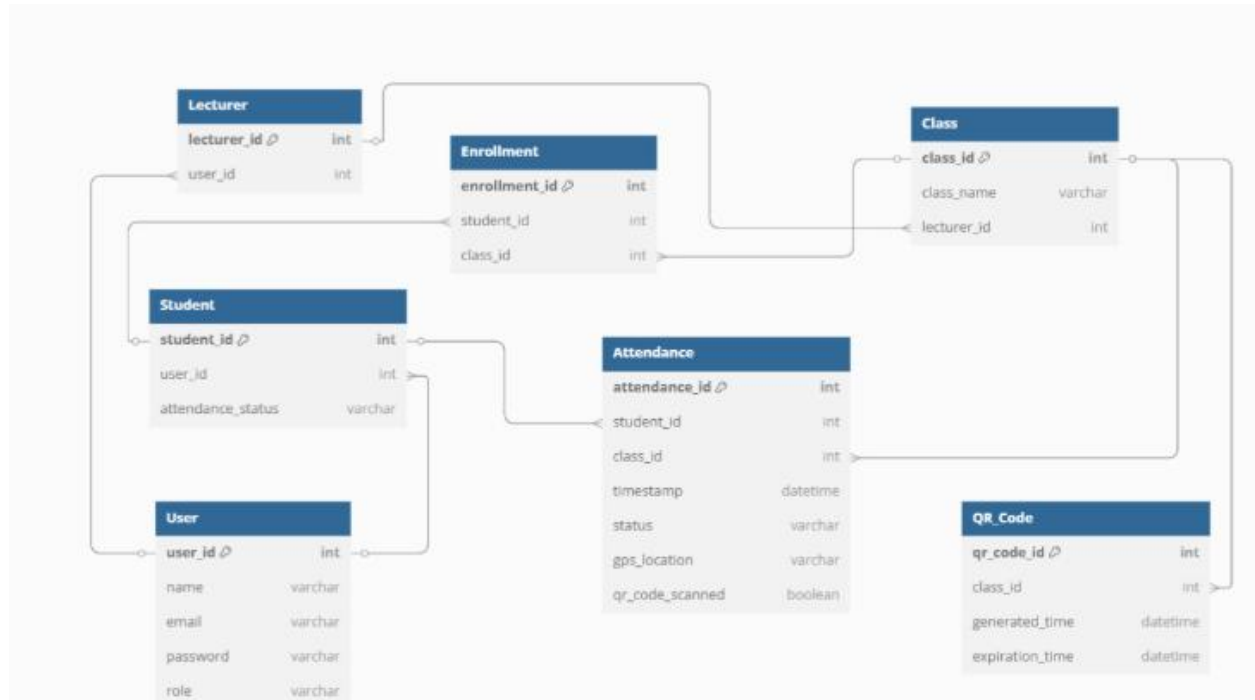# Conceptual Model

Key Entities and Their Roles

1. User

- Primary Key: user_id

- Attributes: name, email, password, role

- Role:
  Acts as the base entity for both students and lecturers. It holds general user information and helps identify whether the user is a student or lecturer via the role attribute.

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2. Student

- Primary Key: student_id

- Foreign Key: user_id → User

- Attributes: attendance_status

- Role:
  Represents students in the system. It is associated with a User and tracks the student's overall attendance status.

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3. Lecturer

- Primary Key: lecturer_id
- Foreign Key: user_id → User
- Role:
  Represents lecturers in the system. It is also linked to a User and is responsible for managing classes.

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4. Class

- Primary Key: class_id
- Foreign Key: lecturer_id → Lecturer
- Attributes: class_name
- Role:
  Defines a class session managed by a lecturer. Students are enrolled in these classes.

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5. Enrollment

- Primary Key: enrollment_id
- Foreign Keys: student_id → Student, class_id → Class
- Role:
  Links students to the classes they are enrolled in. This is a many-to-many relationship bridge between Student and Class.

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6. Attendance

- Primary Key: attendance_id
- Foreign Keys: student_id → Student, class_id → Class
- Attributes: timestamp, status, gps_location, qr_code_scanned

- Role:
  Records student attendance for specific classes, including time, status (e.g., present, absent), location, and whether a QR code was scanned.

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7. QR_Code

- Primary Key: qr_code_id

- Foreign Key: class_id → Class

- Attributes: generated_time, expiration_time

- Role:
  Stores QR codes associated with classes, used for attendance verification. Each code has a validity window.