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## **Project X – HIGH LEVEL DESIGN**

### **Overview**

Project X is a mobile-based attendance system that utilizes QR code scanning to enable secure, efficient, and real-time attendance tracking. It supports three user roles: Administrator, Instructor, and Student. The system provides QR generation, student check-in, schedule management, and attendance reporting through a modern mobile app.

### **Target Users**

**Administrator:** Manages users and course assignments.

**Instructor:** Generates class QR codes and monitors attendance logs.

**Student:** Logs their presence by scanning QR codes generated per session.

### **Key Modules:**

**Authentication:** Login system with role-based access.

**User Management:** Admins can manage user accounts and roles.

**Course Management:** Admins can manage course details and enrolled students.

**QR Code Generation:** Instructors can generate session-specific QR codes.

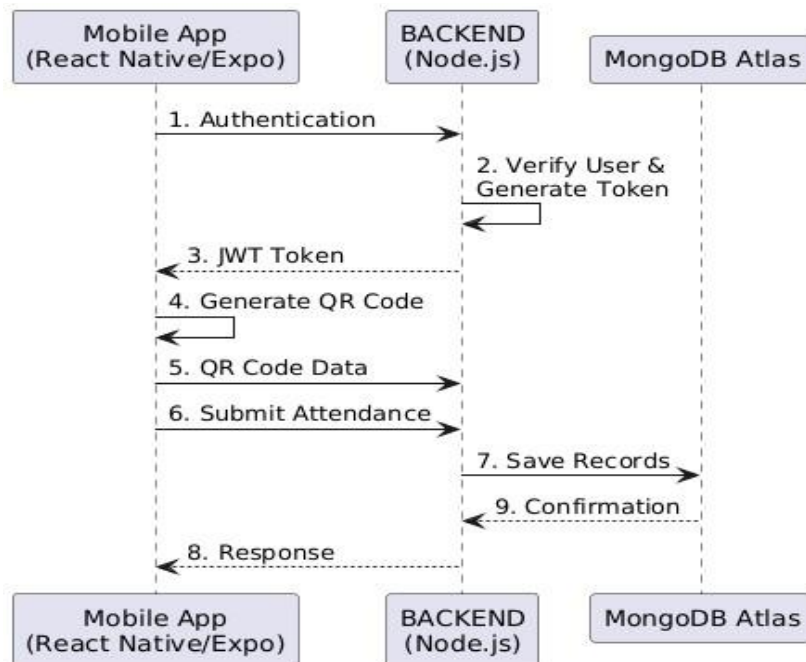
**Attendance Scanning:** Students scan QR codes to log attendance.

**Logging & Reporting:** All actions are logged for auditing, and attendance reports can be generated.

## Technology Stack

Layer	Technology
Frontend	React Native, Expo
Backend	Node.js, Express
Database	MongoDB Atlas

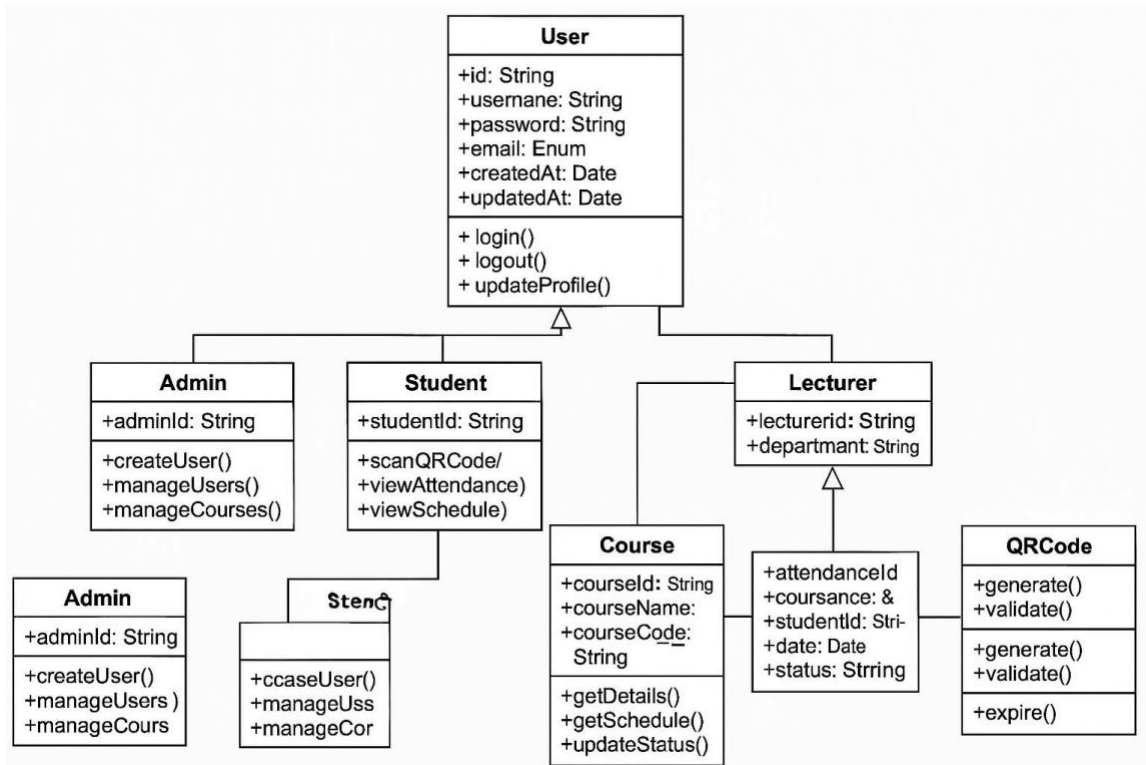
## System Architecture Diagram



## Use Case Diagram



## Class Diagram



## Database Collections

### Users Collection:

```
{
  _id: ObjectId, username:
String, password: String
(hashed), email: String, role:
String, created_at: Date
}
```

### **Courses Collection:**

```
{  
  _id: ObjectId,  name:  
String,  code: String,  
  lecturer_id: ObjectId,  
  schedule: String,  
  created_at: Date  
}
```

### **Attendance Collection:**

```
{  
  _id: ObjectId,  course_id:  
ObjectId,  student_id:  
ObjectId,  date: Date,  
  status: String,  qr_code_id:  
ObjectId  
}
```

### **QRCodes Collection:**

```
{  
  _id: ObjectId,  course_id:  
ObjectId,  generated_at:  
Date,  expires_at: Date,  
  is_active: Boolean  
}
```

## 7. Security Considerations

- **Authentication:** JWT-based authentication
  - Password Security: Bcrypt hashing
  - **API Security:** Rate limiting, input validation
  - **QR Code Security:** Time-based expiration
  - **Data Protection:** Input sanitization, XSS prevention
- Key Relationships and Features:**

User (Base Class)

Abstract base class for all users

Common attributes: id, username, password, email

Basic authentication methods

Admin (Inherits User)

Manages users and courses

Full system access

Administrative functions

Lecturer (Inherits User)

Views assigned courses

Generates QR codes

Views attendance reports

Student (Inherits User)

Scans QR codes

Views personal attendance

Views course schedule

Course

Contains course details

Linked to Lecturer

Has many Students

Has many Attendance records

Attendance

Records student attendance

Links Student, Course, and QR Code

Tracks attendance status

QRCode

Generated for attendance marking

Time-based expiration Linked to

Course and Attendance

### **Relationships:**

User —|▶ Admin

    |▶ Lecturer

    └▶ Student

**Lecturer — 1:N —> Course**

**Course — 1:N —> QRCode**

**Course — 1:N —> Attendance**

**Student — 1:N —> Attendance**

**QRCode — 1:1 —> Attendance**

## **Conclusion:**

### **Project X – The PresQR System**

PresQR is a smart, secure attendance tracking system designed to streamline the entire process for Admins, Lecturers, and Students. With seamless QR code-based check-ins via a mobile app, attendance is logged in real-time—eliminating the hassle of manual tracking and outdated roll calls.

Built with a clean architecture leveraging React Native, Node.js, and MongoDB Atlas, PresQR ensures each user role gets the tools they need:

- Admins manage users, schedules, and system-wide settings
- Lecturers generate time-sensitive QR codes and monitor attendance
- Students simply scan and go

Security is at the core of PresQR. Using JWT authentication, hashed passwords, and expiring QR codes, the system protects data integrity and ensures access is always controlled and reliable.

More than just efficient, PresQR is designed for everyday usability. Whether in classrooms or training environments, it replaces routine friction with seamless convenience—smart attendance that just works.