# High-Level Design Document

## ****Project Title:**** Project X

## 1. ****Introduction****

### 1.1 Purpose

Project X aims to streamline and digitize the attendance process in educational settings by using mobile devices and QR codes. Instructors can generate QR codes for each session, and students scan them using their devices. The system ensures accurate, secure, and real-time attendance logging.

## 2. ****System Overview****

Project X supports three main roles:

**Instructor**: Creates sessions, generates QR codes, and views attendance logs.

**Student**: Scans QR codes and sends scanned data to mark attendance.

**Admin**: Manages users, courses, and generates reports.

## ****Architecture Overview****

The system consists of:

**Mobile Apps** for Instructors, Students, and Admins

**REST API** that processes authentication and communication

**Backend Logic** that handles QR validation, timing, and attendance logic

**MongoDB** database for storing all data (users, sessions, attendance, etc.)

### 3.1 Architecture Diagram Reference

### Screen Shot 2025-05-27 at 6.49.48 PM

## 4. ****Component Description****

### 4.1 Instructor Module

**Create Session** – Define class session and metadata

**Generate QR** – Produce a time-sensitive QR code for students

**View Attendance Log** – Review students who attended each session

### 4.2 Student Module

**Scan QR Code** – Open the app and scan the code shown by the instructor

**Send Scanned Data** – Automatically submits the scanned QR to the backend for validation and attendance marking

### 4.3 Admin Module

**Manage Users** – Add, update, or remove instructors/students

**Manage Courses** – Handle course assignments and scheduling

**Generate Reports** – Export attendance data per course, date, or student

### 4.4 API Layer

Authenticates users and handles session management

Interfaces with backend logic and MongoDB

Processes attendance requests and QR code checks

### 4.5 Backend

**Check QR Validity** – Ensures QR has not expired

**Session Timing** – Verifies if submission is within allowed time

**Student’s Enrollment** – Confirms if the student is registered for the course

**Record Attendance** – Marks attendance in the database

### 4.6 Database (MongoDB)

Collections include:

users: Instructors, students, admins

sessions: Class sessions with QR code data

attendance: Time-stamped attendance records

courses: Course info and enrollment details

## 5. ****Data Flow Summary****

**Instructor** logs in → creates a session → generates QR

**Student** logs in → scans QR → data is sent to API

**API** passes data to backend → checks validity → attendance is saved

**Admin** accesses reports, manages users/courses

## 6. ****Security Measures****

Credential-based login for all users

QR codes expire after a short period

All sensitive data encrypted (especially passwords)

Only enrolled students can mark attendance