Project Charter: Digital Attendance & Session Management System

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Section 1: Executive Summary

This document outlines the vision, scope, and functional requirements for the development of a modern, web-based **Digital Attendance & Session Management System**. The project is designed to replace the current inefficient and insecure manual, paper-based attendance tracking process for Industrial Practical Training (IPT) sessions.

The proposed solution is a comprehensive platform featuring distinct roles for administrators/instructors and students. The system's core innovation is a secure attendance-marking mechanism that combines time-sensitive, single-use codes with browser-based geolocation verification to virtually eliminate proxy signing.

The platform will provide a robust administrative backend for managing users, courses, venues, and session schedules. It will also feature a reporting engine to provide clear insights into attendance data. For students, the system offers a simple, intuitive interface to mark their presence and view their attendance history.

This project will deliver a scalable, fully-functional, and production-ready application that solves a tangible real-world problem, providing a significant and practical learning experience for the entire development team.

Section 2: Problem Statement & Project Opportunity

2.1 The Challenge of Manual Attendance

The current paper-based system presents several critical challenges:

- **Time-Consuming & Inefficient:** The process of passing a sheet of paper through a classroom is slow, often extending well beyond the session's end time and causing delays for students.

- **Insecure & Prone to Abuse:** The system is highly susceptible to "proxy signing," where absent students have friends sign on their behalf, compromising the integrity of attendance records.
- **Lack of Real-Time Data:** There is no immediate way for instructors or administrators to know who is present. Tallying records for reporting is a tedious, manual, and error-prone task.
- **Poor User Experience:** The process is frustrating for students and provides no value beyond a signature. Records are not easily accessible for students to review their own history.

2.2 The Project Opportunity

By replacing the manual system with a modern digital platform, we can:

- **Ensure Data Integrity:** Implement a secure verification system that confirms a student's physical presence, making attendance records reliable and trustworthy.
- **Create an Efficient Process:** Reduce attendance marking time from 30+ minutes to under 90 seconds for the entire class.
- **Provide Data-Driven Insights:** Enable administrators to instantly view attendance rates, generate reports for specific students or sessions, and analyze trends.
- **Modernize the Experience:** Deliver a professional and seamless digital experience for both students and staff, aligning with modern technological standards.

Section 3: Proposed Solution

We propose the development of a centralized, web-based platform built on a modern Java and JavaScript technology stack. The system is designed to be robust, scalable, and user-friendly for all parties.

3.1 The End-User Experience (A Seamless Journey)

1. **Login:** A student securely logs into the platform using their credentials.
2. **Dashboard View:** The student sees their dashboard, which displays their scheduled session for the day.
3. **Attendance Window Opens:** The instructor starts the attendance process, which generates and displays a unique, 6-digit code on the main classroom screen.
4. **Secure Verification:** The student enters the code into the portal on their device (phone or laptop). The application simultaneously captures their GPS location.
5. **Instant Confirmation:** The system validates the code, its time validity, and the student's location against the venue's predefined perimeter. Upon success, the student is marked "Present" and receives instant confirmation.
6. **History Access:** The student can, at any time, view their complete attendance history for all past sessions.

3.2 Core System Components

- **Frontend Application:** The public-facing interface for both students and admins, built with **Next.js**. It will feature a clean, responsive design that works flawlessly on mobile and desktop devices.
- **Backend API:** The "engine" of the system, built with **Spring Boot**. It will handle all business logic, user authentication, data processing, and communication with the database via a secure REST API.
- **Attendance Verification Engine:** A core backend module responsible for generating time-sensitive codes, validating them, and cross-referencing user-submitted GPS data with pre-configured venue coordinates.
- **Relational Database:** A **MySQL** database that serves as the single source of truth, storing all information related to users, courses, sessions, venues, and attendance records.

Section 4: Functional Requirements (System Features)

4.1 Administration / Instructor Features

- **Authentication:** Secure login/logout for authorized admin/instructor personnel.
- **Dashboard:** A central hub showing key metrics like today's scheduled sessions and recent attendance rates.
- **User Management:** Ability to Create, Read, Update, and Delete student profiles.
- **Course & Venue Management:** Ability to define and manage different courses (e.g., "Java Technologies") and physical venues (e.g., "Lab 1"), including setting their GPS coordinates and radius.
- **Session Management:** Ability to schedule future sessions, assigning a course, instructor, venue, date, and time.
- **Live Attendance Control:** An interface for instructors to select a current session, "Start Attendance" to generate and display the code, and view a real-time list of students as they successfully check in. Includes a manual override to mark a student present in exceptional cases.
- **Reporting Engine:** Ability to generate and view attendance reports for a specific student across all sessions, or for a specific session listing all attendees and absentees.

4.2 Student Features

- **Authentication:** Secure login/logout for students.
- **Dashboard:** A simple view of upcoming scheduled sessions.
- **Attendance Marking Interface:** A clean and simple page to input the session code for verification.
- **Attendance History:** A personal, read-only view of their entire attendance record (Present, Absent) for the duration of the training.

Section 5: Scope of Work

5.1 IN-SCOPE: What We Will Deliver

- **Software Design & Development:**
  - Development of the customer-facing Frontend Application (Next.js).
  - Development of the secure Backend API (Spring Boot).

- **Implementation of all Functional Requirements** as detailed in Section 4.
- **System Deployment:** Deployment of the completed web application to a free-tier hosting environment (e.g., Vercel for frontend, Render for backend, PlanetScale for database).
- **Core Documentation:**
  - **API Contract:** A detailed document specifying all API endpoints.
  - **Project Playbook:** A comprehensive, step-by-step implementation guide for the development team.

5.2 OUT-OF-SCOPE: What Is Not Included

- **Native Mobile Applications:** This is a web-based application. Native iOS or Android apps are not in scope.
- **Integration with Official College Systems:** The system will operate as a standalone platform.
- **Advanced Analytics & Predictions:** The reporting engine will provide historical data; it will not include predictive analytics.
- **Automated Email/SMS Notifications:** Features like password resets via email or session reminders are not part of the initial scope.

Section 6: Project Milestones (Phased Delivery Model)

The project will be executed in a series of logical milestones to ensure structured progress and clear deliverables.

- **Milestone 1: Foundation & Authentication:** Project setup, database schema design, and implementation of the User model, registration, and login functionality for all roles.
- **Milestone 2: Core Admin Functionality:** Development of the admin-facing modules for managing Students, Courses, Venues, and Sessions (full CRUD functionality).

- **Milestone 3: The Attendance Flow:** Implementation of the core feature: the instructor's live control panel and the student's attendance marking process, including code and geolocation validation.
- **Milestone 4: Reporting & Dashboards:** Development of the reporting engine and the admin/student dashboards to visualize data.
- **Milestone 5: End-to-End Testing & Deployment:** Rigorous quality assurance, bug fixing, and final deployment of the application to the live servers.

Section 7: Next Steps & Moving Forward

1. **Review the Charter:** The entire project team is to review this document to ensure a shared understanding of the project's goals and scope.
2. **Learning curve:** Learning the technologies that will be used. Focus on understanding how they work, not craming every syntax and every detail. We dedicate this week for this particular task while other tasks are progressing.
3. **Review the documentations:** Review and understand the detailed documents , **API Contract** and the **Project Playbook**, ask if there's anything you don't understand.
4. **Project Setup:** I'll begin the initial setup tasks as outlined in the Project Playbook.