


Republic of the Philippines

DAVAO ORIENTAL STATE UNIVERSITY

Guang-guang, Dahican, City of Mati, Davao Oriental

Faculty of Computing, Data Sciences, Engineering and Technology

Information Technology Program

ITC 130 – Applications Development in Emerging Technologies

PROJECT X: Automated Attendance Tracking System

“Research”

Presented by:

Kyare Joaquino

Jemar Carlos
Edward Jedah Arabia

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Research Document

Project X – Automated Attendance Tracking System

Questions	Research
What is a conceptual model in a software system, and how is it applied to Project X?	A conceptual model visually outlines the high-level structure of a system by identifying major entities, roles, and their relationships. In Project X, the conceptual model identifies key actors Admin, Instructor and Student core functions such as QR Scanning, Attendance Logging and Report Generation, and system boundaries Database, Device, Portal and Security Layer. It defines how each actor interacts with the system and ensures each module is accounted for in system design. It aids in clarifying system requirements early in development.
How does a traceability matrix help validate system requirements in Project X?	To make sure that every need is met by development and testing, a traceability matrix connects requirements to the use cases or test cases that correspond to them. 46 functional requirements, including device monitoring, report production, and attendance reporting, are mapped across five use cases (UC1 to UC5) in Project X's traceability matrix. Additionally, it shows which system components have undergone accountability and completeness checks via unit testing or user acceptability testing (UAT).
What is a high-level design (HLD) in software engineering, and what does it include in Project X?	A High-Level Design (HLD) defines the core architecture, technologies, and workflows of a software system. For Project X, it specifies a React Native mobile frontend, a Node.js + Express.js backend, and MongoDB Atlas for cloud-based data storage. QR code scanning is handled through the ZXing library, while HTTPS, MFA, and RBAC ensure system security. The HLD also outlines workflows like QR generation, scanning, and attendance logging, providing a modular and scalable blueprint before development begins.

How do QR codes work in attendance systems like Project X?	In Project X, a student's ID, course details, and timestamp are safely encoded into a scannable format using QR codes. Through their site, students create a unique QR code that instructors use a validated mobile device to scan. The technology decodes the QR code when it has been scanned, confirms the student is enrolled in the course, and instantly logs attendance. Using mobile technology, this procedure guarantees precise, instantaneous verification and helps do away with proxy attendance.
What makes Project X secure compared to manual or basic systems?	Project X uses several security levels to safeguard system integrity and data. All client-server communications are encrypted via HTTPS. Role-Based Access Control (RBAC) limits system operations according to user roles, while Multi-Factor Authentication (MFA) provides an additional degree of login security. Additionally, device-level validation restricts attendance scans to authorized instructor devices only. According to OWASP and NIST recommended practices, these security measures cooperate to stop spoofing, illegal access, and data manipulation.
How do I test a React Native Expo project like Project X?	React Native applications built with Expo, such as in Project X, can be tested using several tools. Jest serves as the primary unit testing framework, while the React Native Testing Library (RNTL) enables component-level UI testing. Additionally, @testing-library/jest-native extends Jest with custom matchers tailored for React Native components. To set up the testing environment, developers can install the required packages using the command: npm install --save-dev jest @testing-library/react-native @testing-library/jest-native Once configured, these tools allow developers to validate key behaviors such as UI rendering, QR code generation logic, and communication with backend APIs.

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