

Republic of the Philippines

DAVAO ORIENTAL STATE UNIVERSITY

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Faculty of Computing, Data Sciences, Engineering and Technology

Information Technology Program

ITC 130 – Applications Development in Emerging Technologies

PROJECT X: Automated Attendance Tracking System

"High Level Design"

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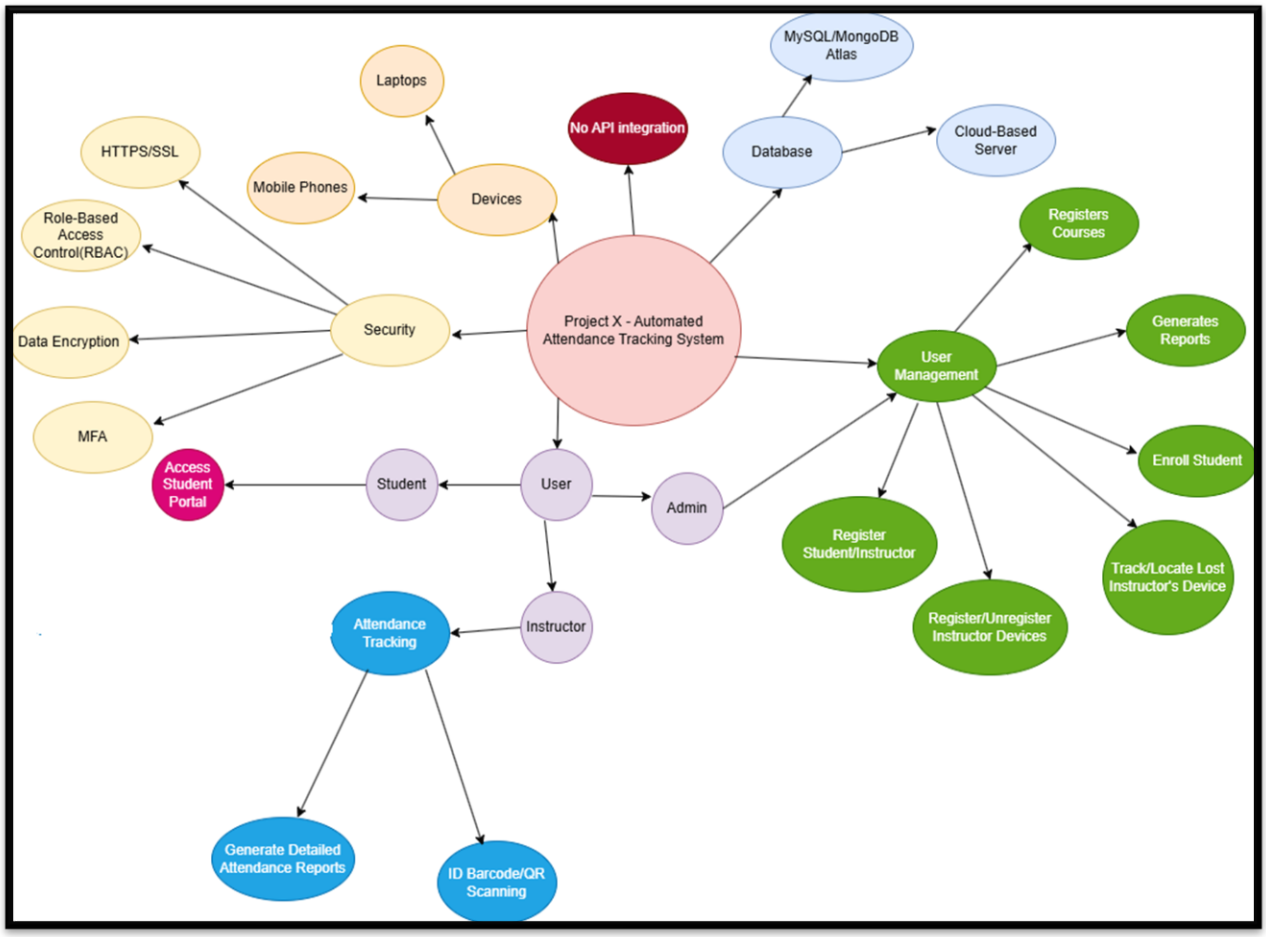
Overview

The conceptual model for the Automated Attendance Tracking System (Project X) represents the high-level entities and their interrelations within the system. It identifies core functional components like security, user roles, and system services that interact to automate and streamline the process of recording, verifying, and managing attendance.

CONCEPTUAL MODEL



Main Entity

At the center of the model is the Project X – Automated Attendance Tracking System, which integrates multiple subsystems, including user management, attendance tracking, database services, and security controls. Each component serves a specific role in the system's ecosystem to ensure security, reliability, and performance.

User Roles

- **Admin**
    - Registers students and instructors
    - Manages course registration
    - Tracks and locates lost instructor devices
    - Generates reports
- **Instructor**
    - Uses registered device(s) to scan QR codes
    - Manages attendance logs
    - Views and generates reports
- **Student**
    - Presents QR codes for attendance
    - Accesses their portal to review attendance records

Each user interacts with the system through role-based actions that are filtered through the security layer.

Functional Modules

User Management

- Register Student/Instructor
- Register/Unregister Instructor Devices
- Enroll Student in Courses
- Generate Reports
- Track/Locate Lost Instructor Devices

Attendance Tracking

- Scanning of ID Barcodes or QR codes
- Logs attendance entries with timestamps
- Generates detailed attendance reports

Security

- HTTPS/SSL for encrypted communication
- Role-Based Access Control (RBAC)

- Multi-Factor Authentication (MFA)
- Data Encryption for stored and transmitted data

Devices

- Authorized devices include:
    - Mobile Phones
    - Laptops
- Devices are verified through the backend and tied to instructor accounts

Database and Hosting

- **Database Layer:**
    - MongoDB Atlas or MySQL for storing attendance data, user records, and course information
- **Cloud-Based Hosting:**
    - Ensures availability and scalability

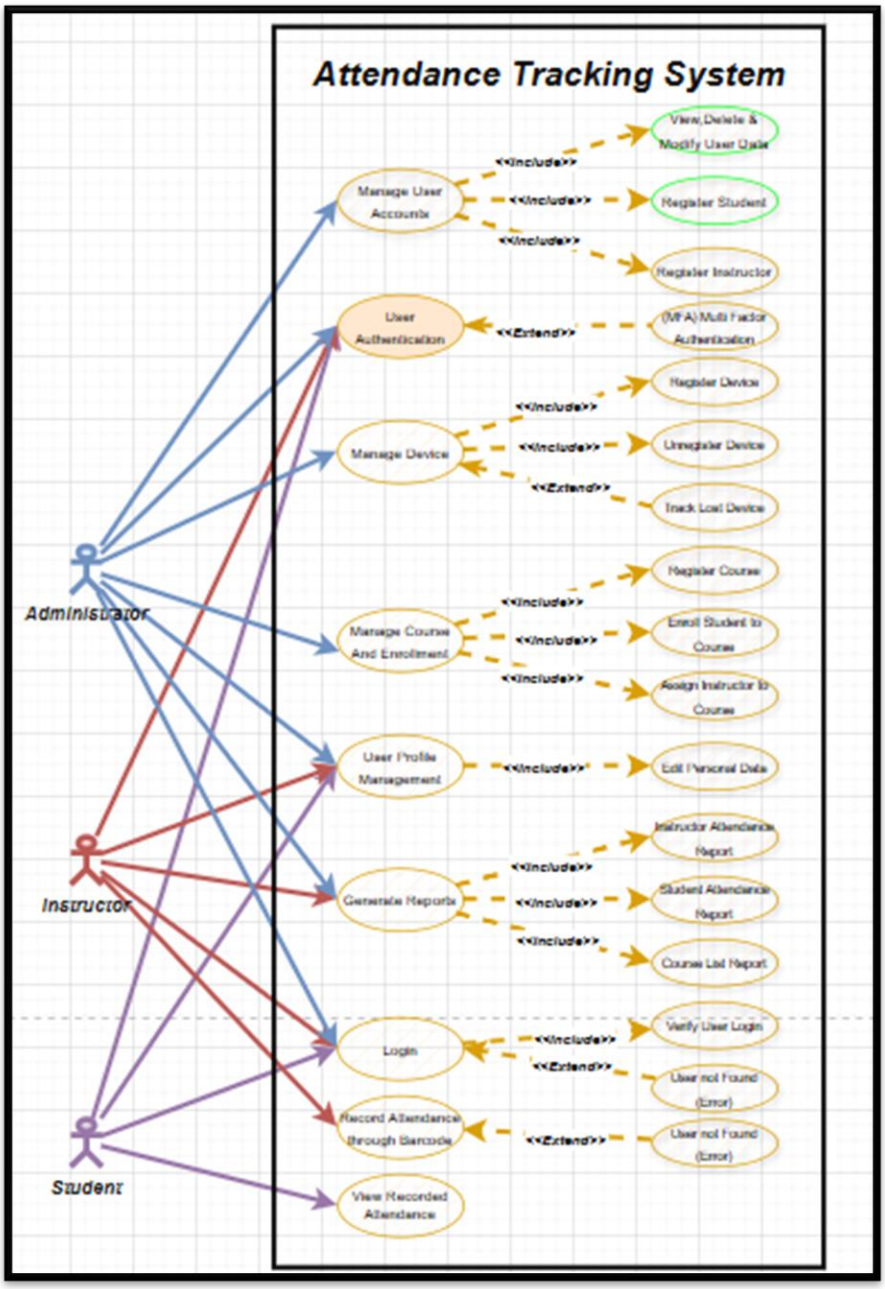
Conclusion

This conceptual model provides a clear, structured vision of how the Automated Attendance Tracking System functions and how its components interconnect. It reflects strong adherence to security best practices, usability for all stakeholders, and scalability via modern cloud and mobile technologies.

Overview

This document describes the key interactions between various users and the system within an educational management platform. The primary user roles Administrators, Instructors, and Students each have distinct responsibilities and functions.

HIGH LEVEL USE CASE DIAGRAM



ACTOR AND THEIR RESPONSIBILITIES:

- Admin: Oversees system-wide operations including user account control, device oversight, course setup, and report generation.
- Instructor: Handles course management, report access, and student attendance evaluation.
- Student: Can view attendance records and manage registration and profile settings.

User Account Management:

Actor: Administrator

Description: Administrators are responsible for creating, modifying, enabling, disabling, deleting, and viewing instructor and student accounts.

Extensions:

- Register Instructor: Add a new instructor profile.
- Register Student: Create a new student account.
- Delete/View User Data: Manage existing user information and access profiles.

User Authentication:

Actor: All users (Administrator, Instructor, Student)

Description: Authentication is required for users to access system functionalities.

Extensions:

- Multi-Factor Authentication (MFA): Enhances login security with an additional verification step.

Device Management:

Actor: Administrator

Description: Enables the admin to register, deregister, and locate lost user-linked devices.

Extensions:

- Register Device: Add a new device to the system.
- Unregister Device: Remove a device from the system.
- Track Lost Device: Locate devices flagged as lost for security purposes.

Course and Enrollment Management:

Actor: Administrator

Description: Admins are responsible for creating courses, assigning instructors, and enrolling students.

Extensions:

- Register Course: Initiate new course offerings.
- Assign Instructor to Course: Allocate instructors to specific courses.
- Enroll Student in Course: Add students to designated courses.

User Profile Management:

Actor: All users (Administrator, Instructor, Student)

Description: Users can view and update their own personal and account information.

Report Generation:

Actor: All users (Administrator, Instructor, Student)

Description: Generate reports relating to users, courses, and system activities.

Extensions:

- Instructor List Report: Display all registered instructors.
- Student List Report: View all student users.
- Course List Report: Access a directory of current course offerings.

Login

Actor: All users

Description: Users sign into the platform using their credentials.

Extensions:

- Verify Login: Validate login details for access.
- Error Message: Notify users of unsuccessful login attempts.

Attendance Recording via Barcode

Actor: Instructor or designated personnel

Description: Attendance is marked by scanning a student's barcode ID.

Extensions:

- Mark Student Dropped: Identify students who have withdrawn from the course during attendance tracking.

View Attendance Records:

Actor: Student

Description: Students can access a record of their attendance history for each course.

Summary:

This comprehensive use case overview illustrates the central interactions between user roles and system functionalities within the educational management platform. It captures essential processes such as user and course management, device oversight, attendance tracking, authentication, and report generation. Each user type Administrator, Instructor,

and Student is equipped with tailored permissions aligned to their roles, ensuring efficient and secure system use.

Furthermore, the platform's modular architecture allows for seamless feature expansion and future integrations with other academic systems. Its scalable design positions it as both a robust solution for current institutional requirements and a forward-compatible foundation capable of adapting to emerging educational and technological needs.

Overview

The traceability matrix for Project X – Automated Attendance Tracking System provides a structured alignment between system requirements and corresponding use cases (UC1 to UC5). Its primary purpose is to ensure that all functional and non-functional requirements are systematically addressed throughout the system development lifecycle.

This matrix categorizes and traces 46 distinct requirements, which are grouped under various functional domains such as:

- Attendance Management (recording via registered devices, storing records, generating reports)
- Device Management (registration, tracking, and authentication)
- User and Course Management (storing profiles, associating users with courses)
- Security & Access Control (preventing unauthorized devices)
- Data Operations (CRUD operations on records)
- System Testing & Integration (e.g., API support, unit and acceptance testing)

Each requirement is cross-checked with related use cases to ensure completeness and traceability. The "Check" column indicates which requirements have been fully addressed, serving as a validation tool to track development progress and coverage. This systematic mapping ensures that all functionalities are implemented, tested, and aligned with stakeholder expectations**.**

TRACEABILITY MATRIX

Requirement ID	Requirement Description	UC1	UC2	UC3	UC4	UC5	Check
1.1	Automated attendance tracking for university lecturers	☑	☐	☐	☐	☐	☑
1.2	Support multiple registered devices (smartphones, tablets, computers)	☑	☐	☐	☐	☐	☑
1.3	Restrict attendance recording to registered devices	☑	☑	☐	☐	☐	☑
1.4	Store attendance records in a cloud-hosted MySQL database	☐	☑	☑	☐	☐	☑
1.5	Provide REST API endpoints for data access and modification	☐	☐	☑	☐	☐	☑
2.1.1	Lecturers can register devices, record attendance, manage students, and generate reports	☑	☑	☐	☐	☐	☑
2.1.2	Administrators can manage lecturers, students, courses, and attendance records	☐	☑	☑	☐	☐	☑
2.1.3	Students are identified in the system and associated with attendance records	☐	☑	☐	☐	☐	☑
2.2	Only registered devices can record attendance	☐	☑	☐	☐	☐	☑
2.3	Persist user-related data (lecturers, students, courses)	☐	☑	☑	☐	☐	☑
3.1	Lecturers can record attendance using a registered device	☑	☐	☐	☐	☐	☑
3.2	Attendance records are stored in a database	☐	☑	☑	☐	☐	☑
3.3	Prevent unauthorized devices from recording attendance	☐	☑	☐	☐	☐	☑
3.4	Generate attendance reports	☐	☐	☑	☐	☑	☑
4.1	Lecturers can register one or more devices	☑	☐	☐	☐	☐	☑
4.2	Functionality to locate a registered device	☐	☑	☐	☑	☐	☑
5.1	Store student profiles (name, university ID)	☐	☑	☐	☐	☐	☑
5.2	Capture and store passport-style photos for students	☐	☑	☐	☐	☐	☑
6.1	Store and manage courses	☐	☑	☐	☐	☐	☑
6.2	Associate students with courses	☐	☑	☐	☐	☑	☑
6.3	Associate lecturers with courses	☐	☑	☐	☐	☑	☑
7.1.1	Generate attendance records reports	☐	☐	☑	☐	☐	☑
7.1.2	Generate student lists	☐	☐	☑	☐	☐	☑
7.1.3	Generate lecturer lists	☐	☐	☑	☐	☐	☑
7.1.4	Generate course lists	☐	☐	☑	☐	☐	☑
7.1.5	Generate student enrollments in courses	☐	☐	☑	☐	☐	☑
7.2.1	Support adding new records	☐	☐	☑	☐	☐	☑
7.2.2	Support modifying records	☐	☐	☑	☐	☐	☑
7.2.3	Support deleting records	☐	☐	☑	☐	☐	☑
7.2.4	Support viewing records	☐	☐	☑	☐	☐	☑
8.1	Use a cloud-hosted MySQL database	☐	☑	☑	☐	☐	☑
8.2	Provide database access via a REST API	☐	☐	☑	☐	☐	☑
9.1.1	Conduct User Acceptance Testing (UAT)	☐	☐	☐	☐	☑	☑
9.1.2	Conduct System Testing	☐	☐	☐	☑	☐	☑
9.1.3	Conduct Unit Testing (where applicable)	☐	☐	☐	☑	☐	☑

For Better View: https://docs.google.com/spreadsheets/d/1zGzMMXct7iXR2Hl-LuByJCMRJI764TVWEX56U-hjwGU/edit?usp=sharing

Conclusion

The traceability matrix for Project X – Automated Attendance Tracking System maps system requirements to their corresponding use cases (UC1 to UC5), ensuring comprehensive coverage and validation of functional and non-functional specifications. It demonstrates how each requirement ranging from user management, attendance recording, data storage, to device

authorization and reporting is addressed by at least one-use case. This matrix facilitates systematic verification, highlights testing priorities including UAT and unit testing, and ensures all critical system features such as REST API support, secure device registration, and course management are traceably linked to actionable development and validation steps.