**Davao Oriental State University**

**Faculty of Computing, Engineering, and Technology**

**Bachelor of Science in Information Technology**



**AUTOMATED ATTENDANCE TRACKING SYSTEM**

**Team Name: Jack of all Trades**

**Allen Jean Lagangga**

**Jessa Diano**

**Kent Christian Luardo**

**MAY 2025**

### **1. INTRODUCTION**

#### **1.1 Purpose**

#### The Automated Attendance Tracking System is designed to efficiently and accurately manage student attendance. It uses Qr code scanning and cloud-based storage to simplify attendance recording, reduce manual errors, and ease administrative tasks. The system supports multiple user roles—administrators, instructors, and students—each with specific permissions. Administrators can manage users and reports; instructors can monitor class attendance; and students can view their attendance records. Security features include role-based access control, data encryption, and multi-factor authentication. Its scalable, cloud-deployed architecture ensures data integrity, accessibility, and a reliable solution for modern attendance management.

#### **1.2 Scope**

#### The system is designed to automate and streamline the process of recording student attendance in an educational institution. It replaces manual attendance tracking methods with a QR code based solution, ensuring greater accuracy, efficiency, and security. The system supports multiple roles, including administrator, instructor, and student, and offers functionalities such as user and device management, real-time attendance recording, course scheduling, and secure access to reports and attendance history.

#### **1.3 Definitions, Acronyms, and Abbreviations**

* **QR Code**: Quick Response Code, used to identify student records.
* **MFA**: Multi-Factor Authentication, a security measure requiring multiple forms of verification.
* **RBAC**: Role-Based Access Control, a method for restricting system access based on user roles.
* **UI**: User Interface, the means by which the user and a computer system interact.
* **SSL**: Secure Sockets Layer, protocol for encrypting internet communication
* **HTTPS**: Hypertext Transfer Protocol Secure, a secure version of HTTP

### **2. SYSTEM OVERVIEW**

The Automated Attendance Tracking System is a cloud-based solution that enables instructors to record student attendance using QR code scanning via mobile or desktop devices. The system includes secure authentication, cloud data storage, and access control mechanisms to ensure the reliability and confidentiality of attendance records. Administrators manage users, courses, and reports, while students access their attendance logs via a secure portal.

**Main functionalities include:**

* Attendance tracking via QR code scanning
* Instructor-course-student management
* Real-time report generation
* Role-based dashboards and access control
* Security through MFA and RBAC

### **3. Architecture Design**

#### **3.1 Architectural Approach**

The system adopts a **client-server architecture** with a cloud-based backend. It follows a modular, layered approach consisting of presentation, application, and data layers.

#### **3.2 System Components**

* **Frontend Web Portal**: Interfaces for students, instructors, and admins
* **Authentication Service**: Manages user login, MFA, and role assignment
* **Attendance Module**: Handles scanning, logging, and validation of attendance
* **Course Management Module**: Supports course creation and user enrollment
* **Reporting Module**: Generates attendance reports based on filters
* **Cloud Database**: Stores user, attendance, and course data securely

#### **3.3 Component Interaction**

* The users log in via the web portal with MFA.
* Student’s attendance will be tracked via QR code scanning.
* Data is sent to the Application Server and stored in the Cloud Database.
* Reports and dashboards are dynamically generated based on stored data.

#### **3.4 Technology Stack**

* **Frontend**: CSS, JavaScript (React.js)
* **Backend**: Node.js / Python (Flask)
* **Database**: MongoDB
* **Authentication**: Auth0

### **4. Data Design**

#### **4.1 Data Flow**

The data flow in the Automated Attendance Tracking System follows a structured, role-driven process that begins with the interaction between the instructor and students during a class session. The following steps outline the general flow of data:

1. **Instructor Login and Device Authorization**The instructor logs in using a registered device, which is authenticated through MFA and verified using role-based access control (RBAC).
2. **Attendance Scanning**Student’s attendance will be tracked via QR code scanning.
3. **Attendance Processing**The scanned data is sent to the application server. The system verifies the student's identity and enrollment in the course.
4. **Data Storage**The validated attendance record is saved in the cloud-based database.
5. **Access and Reporting**
   * Students can view their own attendance records via the student portal.
   * Instructors and administrators can generate reports based on courses, students, or faculty sections.
6. **Administrative Management**Administrators handle user and course registration, course scheduling, and report generation.

### **5. Interface Design**

#### **5.1 User Interface**

Key screens/interface include:

* Admin Dashboard
* Instructor Attendance Dashboard
* Student PortaL

#### **5.2 External Interfaces**

The system does not currently integrate with external university systems. Future iterations may include API-based integration with student information systems or learning management systems.

### **6. Security Considerations**

* **Authentication**: MFA required for instructors and admins.
* **Authorization**: RBAC ensures role-specific access.
* **Data Encryption**: SSL used for transmission, with data-at-rest encryption in the cloud.
* **Secure Protocols**: All communication occurs over HTTPS.

### **7. Performance Considerations**

* **Scalability**: System hosted on a cloud platform with auto-scaling capabilities.
* **Load Handling**: Efficient data queries, caching mechanisms, and asynchronous processing.
* **Uptime**: Target uptime of 99.9% ensured through redundancy and failover.

### **8. Error Handling and Logging**

* Errors are handled through custom error messages and logging modules.
* Logs are maintained for authentication events, attendance anomalies, and system warnings.
* Monitoring tools will be implemented to track real-time performance and errors.

### **9. Assumptions and Dependencies**

**Assumptions:**

* Users have internet access and smart devices.
* QR codes are used in tracking student attendance.

**Dependencies:**

* Cloud hosting services
* QR code scanning
* Browser and device compatibility

### **10. Risks and Mitigations**

**Identified Risks:**

* Device theft or misuse
* Internet outages
* Unauthorized access to sensitive data

**Mitigations:**

* Remote device deregistration
* Offline data caching
* Implementation of RBAC, MFA, and encryption

### **11. CONCLUSION**

The Automated Attendance Tracking System is designed to enhance attendance monitoring through secure, reliable, and efficient technologies. By integrating barcode scanning, cloud storage, and user-friendly interfaces, the system meets the institutional needs of scalability, accuracy, and data protection. The next steps include detailed design, implementation, and testing phases.