

Software Requirements Specification for Student Attendance System



Prepared by **GROUP ALPHA.**

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RFID: Radio Frequency Identification	
QR Code: Quick Response Code	
LMS: Learning Management System	
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1. Introduction

1.1 Purpose

This document specifies the software requirements for the Student Attendance System, a critical tool designed to enhance the quality of education by effectively managing and monitoring student attendance. This system, implemented using Apex and JavaScript, aims to address absenteeism through automated recording, real-time monitoring, and comprehensive data analytics.

1.2 Document Conventions

- **Fonts and Highlighting:** Specific fonts and highlighting are used to differentiate between priorities, such as bold for high-priority requirements and italics for medium.
- **Priorities:** Higher-level requirements are assumed to inherit priorities from detailed requirements unless explicitly stated.

1.3 Intended Audience and Reading Suggestions

- **Developers:** Focus on Sections 2, 3, and 4 for detailed requirements and implementation constraints.
- **Project Managers:** Review Sections 1 and 5 for an overview and nonfunctional requirements.
- **Users and Testers:** Sections 3 and 4 will be most relevant.
- **Documentation Writers:** Refer to Sections 1 and 2 for overall system context and description.

1.4 Product Scope

The Student Attendance System aims to enhance the quality of education by ensuring accurate and efficient attendance tracking, providing real-time data and analytics, and integrating with existing Learning Management Systems (LMS). This system supports objectives related to access, equity, and educational outcomes.

1.5 References

- Uganda Education Policy Documents. Available: <https://www.education.go.ug/policies-and-regulations-2/>
- Data Protection Regulations. Available: <https://ict.go.ug/wp-content/uploads/2020/08/Data-Protection-and-Privacy-Regulation.pdf>

2. Overall Description

2.1 Product Perspective

The Student Attendance System is a new, self-contained product designed to replace traditional attendance tracking methods. It integrates with existing LMS and provides interfaces for administrators, faculty, and students.

2.2 Product Functions

- Automated Attendance Recording
- Integrated Biometric Systems
- Real-Time Monitoring and Alerts

- Dashboard Views
- Data Analytics and Reporting
- Engagement and Motivation Features
- Automated Reminders and Follow-Ups
- LMS Integration
- Attendance-Based Resource Access
- User-Friendly Interfaces
- Policy Enforcement
- Secure Data Storage
- Compliance Monitoring

2.3 User Classes and Characteristics

- **Administrators:** Manage attendance policies and monitor overall attendance.
- **Faculty:** Track class attendance and receive alerts for absentees.
- **Students:** Record attendance and receive notifications.
- **IT Staff:** Maintain system and ensure data security.

2.4 Operating Environment

- **Hardware:** RFID/QR code scanners, biometric systems.
- **Operating System:** System independent.
- **Software:** Apex and JavaScript for application development, integrated with LMS.

2.5 Design and Implementation Constraints

- **Policies:** Compliance with data protection regulations.
- **Hardware:** Dependence on RFID/QR code and biometric systems.
- **Technologies:** Use of specific technologies (Apex and JavaScript).

2.6 User Documentation

- **User Manuals:** Detailed guides for administrators, faculty, and students.
- **Online Help:** Context-sensitive help within the application.
- **Tutorials:** Step-by-step guides for using the system.

2.7 Assumptions and Dependencies

- **Assumptions:** Availability of necessary hardware (RFID/QR scanners, biometric systems).
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- **Dependencies:** Integration with existing LMS and compliance with data protection regulations.

3. External Interface Requirements

3.1 User Interfaces

- **Login Screen:** Secure login for all user classes. Admins will be required to enter their details for authorization.
- **Dashboard:** Real-time attendance monitoring for administrators and faculty. Teachers can grade students by accessing the “grade student” button.
- **Notifications:** Alerts for students and faculty upon capturing attendance.
- **Reports:** Detailed attendance reports for students.

3.2 Hardware Interfaces

- **RFID/QR Scanners:** For automated attendance recording.
- **Biometric Systems:** For accurate tracking, the software will communicate with the hardware devices using standard communication protocols for web-based applications like HTTPS.
- **Device compatibility:** The application is designed to be accessed on a wide range of devices like desktops, laptops, and smartphones.

3.3 Software Interfaces

- **Database:** The application uses Oracle Database Management System.
- **Notification Systems:** Integration for real-time alerts.
- **Operating system:** The software is designed to be platform-independent.
- **Development tools:** JavaScript, Oracle Apex.

3.4 Communications Interfaces

- **Email:** Notifications to students and faculty.
- **Web Services:** The system should support high data transfer rates to provide a seamless and responsive user experience.
- **Security and encryption:** Data transfer should be encrypted using SSL (Secure Sockets Layer) to ensure secure communication.

4. System Features

System features refer to the functional and non-functional attributes of a system, which define its behavior, performance, and characteristics. They describe what a system can do, how it works, and what benefits it provides to its users.

The system features of the student management system include;

Functional features;

- Student profile management: create, edit, and view student profiles
- Course management: create, edit, and delete courses
- Grade management: record and track student grades

Nonfunctional features;

- Performance: the system responds to user inputs within two seconds
- Security: the system ensures data privacy and security, compiling with relevant regulations
- Usability: the system provides an intuitive interface for students and administrators

User interface features;

- login/logout: secure login and logout functionality for students and administrators
- Navigation: easy navigation between different sections of the system

Integration features;

- Payment gateway: integration with a secure payment gateway for fee payments
- Student information system: integration with existing student information systems

Security features

- Access controls: restrict access to authorized personnel
- Data encryption: encrypt sensitive data

Reporting and analytics features;

- Students' performance reports: generate reports on students grades and progress
- Course analytics: analyze course effectiveness and student engagement

Customization and configuration features;

User preferences: allows users to customize their dashboard and settings

4.1 Automated Attendance Recording

4.1.1 Description and Priority

High priority. Automate attendance recording using RFID/QR code scanning to ensure accuracy and reduce manual effort.

4.1.2 Stimulus/Response Sequences

- **Stimulus:** Student scans RFID/QR code.
- **Response:** System records attendance and updates the database.

4.1.3 Functional Requirements

- System must record attendance within 2 seconds of scanning.
- System must update attendance data in real time.

4.2 Integrated Biometric Systems

4.2.1 Description and Priority

High priority. Ensure accurate attendance tracking using biometric systems.

4.2.2 Stimulus/Response Sequences

- **Stimulus:** Student uses a biometric scanner.
- **Response:** System verifies identity and records attendance.

4.2.3 Functional Requirements

- System must verify biometric data within 5 seconds.
- System must store biometric data securely.

4.3 Real-Time Monitoring and Alerts

4.3.1 Description and Priority

High priority. Provide real-time monitoring and alerts for absenteeism.

4.3.2 Stimulus/Response Sequences

- **Stimulus:** System detects an absentee.
- **Response:** The system sends an instant notification to relevant parties.

4.3.3 Functional Requirements

- System must send notifications within 1 minute of detecting an absentee.
- System must allow customization of notification settings.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- System must handle up to 1000 simultaneous users.
- System response time should not exceed 2 seconds for any operation.

5.2 Safety Requirements

- System must ensure data integrity and prevent data loss.
- The system must provide a backup mechanism.

5.3 Security Requirements

- System must use encryption for all data transmissions.
- System must implement role-based access control.

5.4 Software Quality Attributes

- **Adaptability:** The system should be easily adaptable to different school environments.
- **Reliability:** The system should have 99.9% uptime.
- **Usability:** The system should have an intuitive user interface.

5.5 Business Rules

- Only administrators can modify attendance policies.
- College can view and update attendance records for their classes.

6. Other Requirements

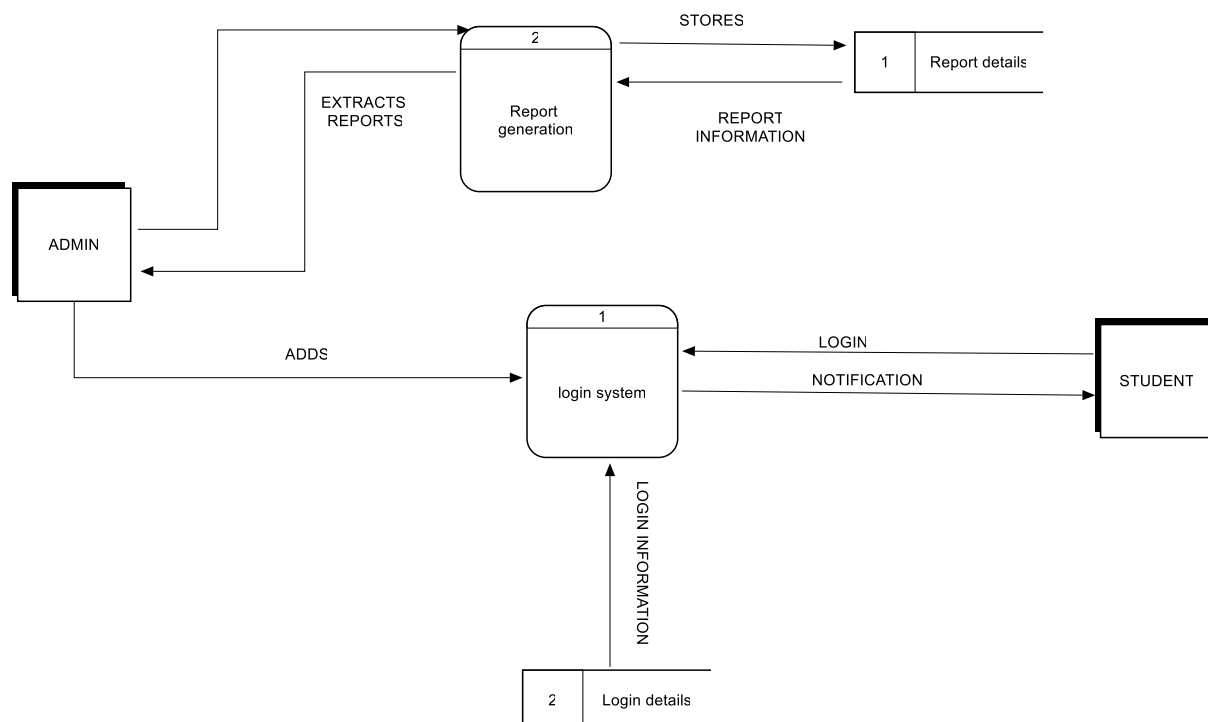
- **Mobile compatibility:** The system should be compatible with different mobile phones.
- **Historical records:** The System should store records of student attendance for future reference.
- **Alerts:** The system should provide alerts to parents about the absence of their child or student.
- **Internationalization:** The system should support multiple languages.
- **Legal Requirements:** The system must comply with local data protection laws.

Appendix A: Glossary

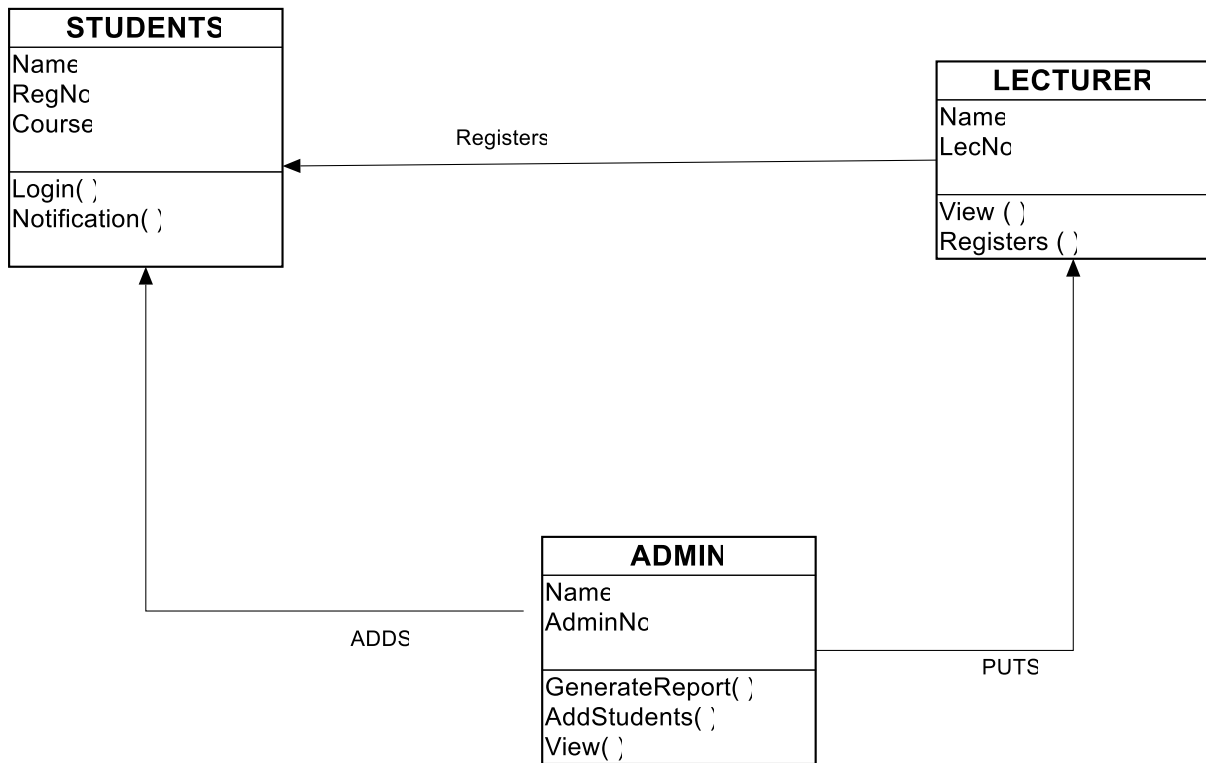
- **RFID:** Radio Frequency Identification
- **QR Code:** Quick Response Code
- **LMS:** Learning Management System

Appendix B: Analysis Models

- **Data Flow Diagram:**



- **Class Diagram:**



Appendix C: To Be Determined List

- **TBD-1:** Finalize the data flow diagram.

GROUP ALPHA MEMBERS

NAME	REG. NUMBER	STUDENT NUMBER
ODOCH NELSON OCHAN	23/U/16508/EVE	2300716508
MUWANGUZI ALVIN KIGGUNDU	23/U/12372/PS	2300712372
ISSA SULAIMAN MAYOMBWE	23/U/25639/EVE	2300725639
NASSAKA BONITA POLLINE	23/U/15483/PS	2300715483
MIREMBE GRACE	23/U/11316/PS	2300711316
BWIRE MELVIN MASINDE	23/U/07831/PS	2300707831
RODNEY KAVUMA	18/U/21052/EVE	1800721052
MASEREKA BRIGHT	23/U/0738	2300700738
TUMUKUNDE SIMON PETER	23/U/18071/PS	2300718071
KASEMIIRE BRIDGET.	23/U/27044	2300727044
KUTENTSA HAPPY	23/U/0654	2300700654