EduSync
(School Management System)
Application Requirements Specification

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Table of Contents

List of Figures

1. Introduction

The EduSync - School Management System (SMS) is a web-based application designed to modernize and streamline educational institution operations. This system aims to replace traditional paper-based methods with a digital solution that enhances efficiency, improves communication, and provides real-time access to crucial information for administrators, teachers, and students.

2. Overall Description

2.1 Brief Description

EduSync - School Management System is a comprehensive digital platform that facilitates the management of various school operations, including student and teacher information, attendance tracking, grade management, and scheduling. It serves as a centralized hub for educational data and processes, accessible to authorized users based on their roles within the institution.

2.2 Detailed Description

Edusync is built to address the unique needs of different user groups within a school environment. It offers a range of functionalities tailored to administrators, teachers, and students, ensuring that each group can efficiently perform their respective tasks and access relevant information.

Key functionalities include:

1. User Management: The system supports three distinct user roles - Administrator, Teacher, and Student - each with specific permissions and access levels.

2. Student and Teacher Information Management: Administrators can add, view, and manage detailed profiles for students and teachers.

3. Attendance Tracking: Teachers can record and manage student attendance, which can be viewed by students and administrators.

4. Grade Management: Teachers can input and update student grades for various assessments, viewable by students and administrators.

5. Timetable Management: Administrators can create and manage class schedules, which can be viewed by teachers and students.
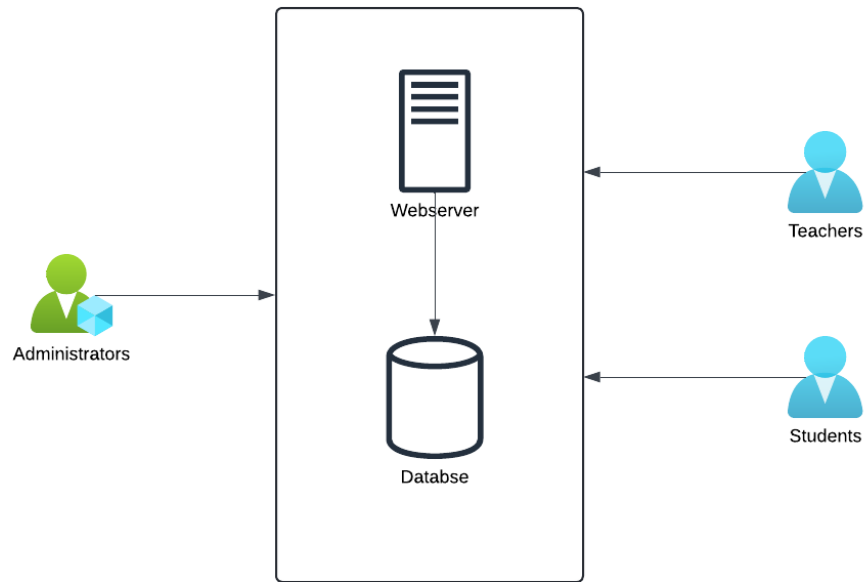
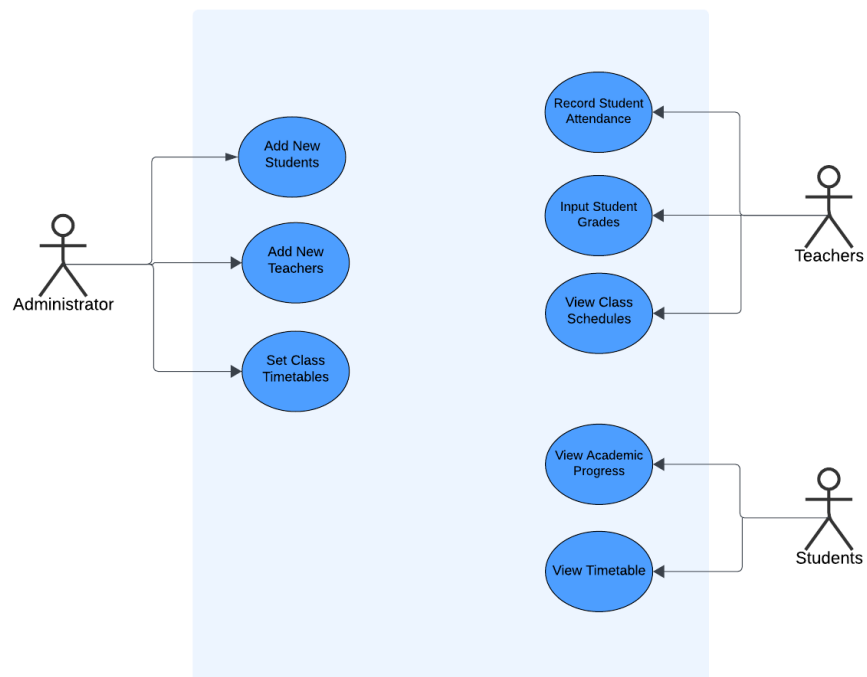Figure 1: System Environment

3. Use Cases

Figure 2: User Types and their Use cases

3.1 Administrator Use Cases

3.1.1 Add New Student

Actor: Administrator
Description: The administrator adds a new student to the system.
Normal Flow:
1. Administrator logs into the system.
2. Navigates to the "Students" management section and selects "Add Student."
3. Administrator enters the student's details, including Name, Date of Birth, Class, and other information.
4. Administrator submits the form.
5. System validates the input (e.g., ensuring required fields are filled, validating ID uniqueness).
6. System creates the student record in the database.
7. System displays a confirmation message that the student has been added successfully.

Error Flow:
- If required fields are missing, the system prompts the administrator to complete them
- If the student ID already exists, the system notifies the administrator and prevents duplication

3.1.2 Add New Teacher

Actor: Administrator
Description: Process of adding a new teacher to the system.
Normal Flow:
1. Navigates to the "Teachers" management section and selects "Add Teacher.".
2. System presents a comprehensive form for teacher details.
3. Administrator enters required information.
4. System validates the entered data and makes a teacher profile.
5. Administrator receives confirmation of successful teacher addition.

Error Flow:
- If any required field is left blank, system prompts administrator to complete it.
- If entered employee ID already exists, the system notifies the administrator and prevents duplication.

3.1.3 Set Class Timetable

Actor: Administrator
Description: The administrator creates or updates a class timetable.

Normal Flow:
1. Administrator logs into the system
2. Navigates to the "Timetable Management" section
3. Selects the class for which to set the timetable
4. Assigns subjects, teachers, and time slots for each day of the week
5. System saves the timetable
6. System displays a success message

Error Flow:
- If conflicts are detected, system highlights issues for administrator to resolve.
- Administrator can manually override certain conflicts with justification.

3.1.4 Manage Student

Actor: Administrator
Description: The administrator manages an existing student's information in the system.
Normal Flow:
1. Administrator logs into the system
2. Navigates to the "Manage Students" section
3. Searches for a specific student using name, ID, or class
4. Selects the student record to manage
5. Updates student details as needed
6. System validates the input
7. System saves the updated student record
8. System displays a success message

Error Flow:
- If required fields are left empty after editing, the system prompts the administrator to complete them
- If the system encounters an error while saving the data, it displays an error message and logs the issue

3.1.5 Manage Teacher

Actor: Administrator
Description: The administrator manages an existing teacher's information in the system.
Normal Flow:
1. Administrator logs into the system
2. Navigates to the "Manage Teachers" section
3. Searches for a specific teacher using name, ID, or subject
4. Selects the teacher record to manage
5. Updates teacher details as needed
6. System validates the input
7. System saves the updated teacher record
8. System displays a success message

Error Flow:
- If required fields are left empty after editing, the system prompts the administrator to complete them
- If the system encounters an error while saving the data, it displays an error message and logs the issue

3.1.6 Remove Student

Actor: Administrator
Description: The administrator removes a student from the system.
Normal Flow:
1. Administrator logs into the system
2. Navigates to the "Manage Students" section
3. Searches for a specific student using name, ID, or class
4. Selects the student record to remove
5. Initiates the remove process
6. System prompts for confirmation
7. Administrator confirms the removal
8. System removes the student record and associated data
9. System displays a success message

Error Flow:
- If the system encounters an error during the removal process, it displays an error message and logs the issue

3.1.7 Remove Teacher

Actor: Administrator
Description: The administrator removes a teacher from the system.

Normal Flow:
1. Administrator logs into the system
2. Navigates to the "Manage Teachers" section
3. Searches for a specific teacher using name, ID, or subject
4. Selects the teacher record to remove
5. Initiates the remove process
6. System prompts for confirmation
7. Administrator confirms the removal
8. System removes the teacher record and associated data
9. System displays a success message

Error Flow:
- If the system encounters an error during the removal process, it displays an error message and logs the issue

3.2 Teacher Use Cases

3.2.1 Record Student Attendance

Actor: Teacher

Description: A teacher records attendance for a class.

Normal Flow:

1. Teacher logs into the system
2. Navigates to the "Manage Attendance" section
3. Selects the class and date
4. Marks each student as present or absent
5. Submits the attendance record
6. System saves the attendance data

Error Flow:

- If the teacher attempts to submit incomplete attendance data, the system prompts for completion

3.2.2 Input Student Grades

Actor: Teacher

Description: A teacher inputs grades for a specific assessment.

Normal Flow:

1. Teacher logs into the system
2. Navigates to the "Manage Grade" section
3. Selects the class, subject, and assessment type (e.g., quiz, midterm, final)
4. Enters grades for each student
5. Submits the grades
6. System saves the grade data

Error Flow:

- If entered grades are outside the valid range, the system alerts the teacher and prevents submission

3.2.3 View Class Timetable

Actor: Teacher

Description: Process of viewing the teacher's class timetable.

Normal Flow:

1. Teacher logs into the system
2. Teacher selects "View Timetable" option from their dashboard.
3. System displays the class schedules.

Error Flow

- If the timetable hasn't been finalized, system displays a message indicating the same.

3.3 Student Use Cases

3.3.1 View Academic Progress

Actor: Student
Description: Student checks their current academic standing.
Normal Flow:
1. Student selects "View Academic Progress" option.
2. System retrieves student's current enrolled classes.
3. Student can search a specific class for detailed view.
4. System presents graphical representation of student's performance over time.

Error Flow:
- If grades for a class are not yet available, system displays "Pending" status.

3.3.2 View Personal Timetable

Actor: Student
Description: A student views their personal class timetable.
Normal Flow:
1. Student logs into the system
2. Navigates to the "View Timetable" section
3. System displays the timetable.

Error Flow:
- If the timetable hasn't been set or there's an error retrieving it, the system displays an appropriate message

4. Requirements Specification

4.1 External Interface Requirements

The EduSync system does not have direct external system interfaces. However, it will need to interface with the following:
1. **Database System**: EduSync will interface with a relational database management system (e.g., MySQL, PostgreSQL) to store and retrieve all system data.
2. **Email System**: For sending notifications to users, the system will interface with an SMTP server.

4.2 Functional Requirements

4.2.1 Add New Student

Use Case Name: Add New Student

XRef: Section 3.1.1, Add New Student

Trigger: Administrator selects "Add New Student" option

Precondition: Administrator is logged into the system

Basic Path:
1. System presents a form for entering student details
2. Administrator enters required information (name, ID, class, contact information, etc.)
3. System validates the input
4. System saves the new student record and creates a student profile
5. System displays a success message

Alternative Paths:
> None

Exception Paths:
1. If any required field is left blank, the system prompts the administrator to complete it
2. If the entered student ID already exists, the system notifies the administrator and prevents duplication
3. If the system encounters an error while saving the data, it displays an error message and logs the issue
4. Administrator may abandon the process at any time

Postcondition: A new student record is created in the system.

4.2.2 Add New Teacher

Use Case Name: Add New Teacher
XRef: Section 3.1.2, Add New Teacher

Trigger: Administrator selects "Add New Teacher" option

Precondition: Administrator is logged into the system

Basic Path:
1. System presents a form for entering teacher details

2. Administrator enters required information (name, ID, subjects, qualifications, contact information, etc.)
3. System validates the input
4. System saves the new teacher record and creates a teacher profile
5. System displays a success message

Alternative Paths:
> None

Exception Paths:
1. If any required field is left blank, the system prompts the administrator to complete it
2. If the entered teacher ID already exists, the system notifies the administrator and prevents duplication
3. If the system fails to create the teacher profile, it rolls back any partial changes and displays an error message
4. Administrator may abandon the process at any time

Postcondition: A new teacher record is created in the system.

4.2.3 Set Class Timetable
Use Case Name: Set Class Timetable

XRef: Section 3.1.3, Set Class Timetable

Trigger: Administrator selects "Set Class Timetable" option Precondition: Administrator is logged into the system, classes and teachers are already in the system

Basic Path:
1. System presents a grid-like interface for the timetable
2. Administrator selects a class
3. For each time slot, administrator assigns a subject and a teacher
4. System checks for conflicts (e.g., teacher already assigned elsewhere at the same time)
5. Administrator submits the completed timetable
6. System saves the timetable

Alternative Paths:
1. Administrator sets recurring patterns (e.g., same schedule every Monday) to speed up the process
2. System allows for the creation of multiple timetables (e.g., odd week/even week schedules)

Exception Paths:
1. Administrator may abandon the process at any time

Postcondition: A new timetable is set for the selected class.

4.2.4 Record Student Attendance

Use Case Name: Record Student Attendance

XRef: Section 3.2.1, Record Student Attendance

Trigger: Teacher selects "Record Attendance" option Precondition: Teacher is logged into the system and has selected a class

Basic Path:
1. System displays the list of students in the selected class
2. Teacher marks each student as present or absent
3. Teacher submits the attendance record
4. System saves the attendance data

Alternative Paths:
    None

Exception Paths:
1. If the teacher attempts to submit incomplete attendance data, the system prompts for completion
2. If the system fails to save the attendance data, it retains the information and prompts the teacher to try again
3. Teacher may abandon the process at any time

Postcondition: Attendance record for the class is updated.

4.2.5 Input Student Grades

Use Case Name: Input Student Grades
XRef: Section 3.2.2, Input Student Grades

Trigger: Teacher selects "Input Grades" option Precondition: Teacher is logged into the system and has selected a class and assessment

Basic Path:
1. System displays a list of students in the selected class
2. Teacher enters grades for each student
3. System validates that grades are within the acceptable range
4. Teacher submits the completed grade sheet

5. System saves the grade data

Alternative Paths:
    None

Exception Paths:
1. If entered grades are outside the valid range, the system alerts the teacher and prevents submission
2. If the system fails to save the grades, it retains the entered data and prompts the teacher to try again
3. Teacher may abandon the process at any time

Postcondition: Grades for the selected assessment are recorded in the system.

4.2.6 View Class Timetable (Teacher)
Use Case Name: View Class Timetable (Teacher)

XRef: Section 3.2.3, View Class Timetable

Trigger: Teacher selects "View Timetable" option Precondition: Teacher is logged into the system

Basic Path:
1. System retrieves the teacher's schedule
2. System displays a weekly view of the teacher's classes
3. Teacher can select a specific day for a detailed view

Alternative Paths:
1. Teacher can switch between weekly and monthly views
2. Teacher can filter the timetable to show only specific subjects or classes
3. System provides an option to view the timetables of other teachers for coordination purposes

Exception Paths:
1. If the timetable hasn't been finalized, the system displays a message indicating this
2. If the system fails to load the timetable, it displays an error message and offers to retry
3. Teacher may exit the view at any time

Postcondition: Teacher views their class schedule.

4.2.7 View Class Timetable (Student)
Use Case Name: View Class Timetable (Student)

XRef: Section 3.3.2, View Personal Timetable

Trigger: Student selects "View Timetable" option Precondition: Student is logged into the system

Basic Path:
1. System retrieves the student's class schedule
2. System displays a weekly view of the student's classes
3. Student can select a specific day for a detailed view

Alternative Paths:
1. Student can switch between weekly and monthly views

Exception Paths:
1. If the student's timetable hasn't been assigned yet, the system displays an appropriate message
2. If the system fails to load the timetable, it displays an error message and offers to retry
3. Student may exit the view at any time

Postcondition: Student views their class schedule.

4.2.8 View Academic Progress
Use Case Name: View Academic Progress
XRef: Section 3.3.1, View Academic Progress

Trigger: Student selects "View Academic Progress" option Precondition: Student is logged into the system

Basic Path:
1. System retrieves student's current enrolled classes
2. For each class, system displays current grade and attendance record
3. Student can select a specific class for detailed view
4. System presents graphical representation of student's performance over time

Alternative Paths:
1. Student can view progress reports for previous semesters/years

Exception Paths:
1. If grades for a class are not yet available, system displays "Pending" status
2. If the system fails to load the progress data, it displays an error message and offers to retry

3. Student may exit the view at any time

Postcondition: Student views their current academic standing.

4.2.9 Manage Student
Use Case Name: Manage Student
XRef: Section 3.1.4, Manage Student

Trigger: Administrator selects "Manage Students" option

Precondition: Administrator is logged into the system

Basic Path:
1. System presents a search interface for finding students
2. Administrator enters search criteria (name, ID, or class)
3. System displays matching student records
4. Administrator selects a student record to manage
5. System displays the student's information in an editable form
6. Administrator makes necessary changes
7. System validates the input
8. Administrator submits the changes
9. System saves the updated student record

Alternative Paths:
   None

Exception Paths:
1. If any required field is left blank, the system prompts the administrator to complete it
2. If the system fails to save the changes, it retains the entered data and prompts the administrator to try again
3. Administrator may abandon the process at any time

Postcondition: The selected student's information is updated in the system

4.2.10 Manage Teacher
Use Case Name: Manage Teacher
XRef: Section 3.1.5, Manage Teacher

Trigger: Administrator selects "Manage Teachers" option

Precondition: Administrator is logged into the system

Basic Path:
1. System presents a search interface for finding teachers
2. Administrator enters search criteria (name, ID, or subject)
3. System displays matching teacher records
4. Administrator selects a teacher record to manage
5. System displays the teacher's information in an editable form
6. Administrator makes necessary changes
7. System validates the input
8. Administrator submits the changes
9. System saves the updated teacher record

Alternative Paths:
1. System allows management of teacher's class assignments directly from this interface
2. System provides an option to update multiple teachers' information based on department-wide changes

Exception Paths:
1. If any required field is left blank, the system prompts the administrator to complete it
2. If the system fails to save the changes, it retains the entered data and prompts the administrator to try again
3. Administrator may abandon the process at any time

Postcondition: The selected teacher's information is updated in the system.

4.2.11 Remove Student

Use Case Name: Remove Student
XRef: Section 3.1.6, Remove Student

Trigger: Administrator selects "Remove Student" option
Precondition: Administrator is logged into the system

Basic Path:
1. System presents a search interface for finding students
2. Administrator enters search criteria (name, ID, or class)
3. System displays matching student records
4. Administrator selects a student record to remove
5. System displays a confirmation dialog with the student's details
6. Administrator confirms the removal
7. System removes the student record and associated data
8. System displays a success message

Alternative Paths:
1. System provides an option for bulk removal of multiple students (e.g., after graduation)

Exception Paths:
1. If the system encounters an error during the removal process, it halts the operation and logs the issue
2. Administrator may abandon the process at any time

Postcondition: The selected student is removed from the system.

4.2.12 Remove Teacher
Use Case Name: Remove Teacher
XRef: Section 3.1.7, Remove Teacher

Trigger: Administrator selects "Remove Teacher" option

Precondition: Administrator is logged into the system

Basic Path:
1. System presents a search interface for finding teachers
2. Administrator enters search criteria (name, ID, or subject)
3. System displays matching teacher records
4. Administrator selects a teacher record to remove
5. System displays a confirmation dialog with the teacher's details
6. Administrator confirms the removal
7. System removes the teacher record and associated data
8. System displays a success message

Alternative Paths:
   None

Exception Paths:
1. If the system encounters an error during the removal process, it halts the operation and logs the issue
2. Administrator may abandon the process at any time

Postcondition: The selected teacher is removed from the system.

4.3 Non-Functional Requirements
1. **Performance**:

- The system should support up to 1000 concurrent users without significant degradation in performance
- Page load times should not exceed 3 seconds under normal network conditions
2. **Usability**:
    - The user interface should be intuitive and require minimal training for users to become proficient
    - The system should be accessible on various devices, including desktops, tablets, and smartphones
3. **Reliability**:
    - The system should have an uptime of at least 99.9%
    - Data backups should be performed daily
4. **Scalability**:
    - The system should be able to handle a 50% increase in user base without requiring major architectural changes
5. **Maintainability**:
    - The system should be built using modular architecture to facilitate easy updates and maintenance
    - Comprehensive documentation should be maintained for all system components
6. **Compatibility**:
    - The web application should be compatible with the latest versions of major web browsers (Chrome, Firefox, Safari, Edge)

5. References

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