

Web-Based School Management System for Admin and Staff with Parent Mobile App

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Abstract

Edu-Smart School Management System is designed to simplify and digitalize academic and administrative activities in schools. The system is developed using the MERN stack for the web application and Java in Android Studio for the parent mobile application. It provides a centralized platform for managing student information, attendance, homework, examination results, timetables, and school announcements efficiently. Teachers and administrators can easily update and access data in real time, improving accuracy and productivity. Parents can monitor their child's academic progress, attendance records, and receive important notifications through the mobile app. The system enhances communication between schools and parents, reduces manual paperwork, and minimizes human errors. Additionally, it ensures data security through secure login and role-based access control, allowing different levels of access for administrators, teachers, students, and parents, making the system reliable, user-friendly, and efficient.

Keywords: School Management System, MERN Stack, Android Application, Web Application, MongoDB, React.js, Node.js, Java.

1. Introduction

Schools manage a large amount of information such as student records, attendance, homework, examination results, and school events. In many schools, these activities are still handled using manual registers or basic systems. This process takes more time, increases paperwork, and sometimes leads to errors. It also makes it difficult for parents to regularly monitor their child's academic progress. To overcome these problems, digital school management systems are becoming important. A digital system helps store and manage school data in a centralized database. It allows teachers and administrators to easily update and access information. It also helps reduce manual work and improves the efficiency of school management. The Edu-Smart School Management System is developed to provide a web application for administrators and teachers and a mobile application for parents. The

system allows schools to manage student information, attendance, homework, results, and events. Parents can also view their child's academic updates through the mobile app. The system uses modern technologies such as the MERN stack for the web application and Java with Android Studio for the mobile application [2].

1.1. Need for Digital School Management

Manual record keeping requires more time and effort. It increases paperwork and may lead to errors. A digital system helps store data safely and allows quick access to information [3].

1.2. Role of Web and Mobile Applications in Education

Web applications help teachers and administrators manage school activities. Mobile applications allow parents to check attendance, homework, and results anytime. This improves communication between

schools and parents.

1.3. Edu-Smart School Management System

Edu-Smart provides a web portal for school staff and a mobile app for parents. It helps manage academic information and provide real-time updates. The system improves efficiency, transparency, and communication in school management.

2. Methodology

The Edu-Smart School Management System was developed using a structured development process to design and implement both web and mobile applications. The system provides a centralized platform where administrators, teachers, and parents can easily manage and access academic information such as student records, attendance, homework, results, and school events. The development process includes stages like requirement analysis, system design, development, testing, and deployment. This step-by-step approach helps ensure the system is reliable, secure, and efficient. It also helps reduce manual work and improves communication between schools and parents.

2.1. Requirement Analysis

In this stage, the requirements of the system were collected and analyzed. The needs of administrators, teachers, and parents were identified. The system was planned to manage student data, attendance, homework, results, and events while allowing parents to view academic updates through a mobile application [1].

2.2. System Design

After analyzing the requirements, the system architecture and database structure were designed. The web application was planned using the MERN stack, and the mobile application was planned using Java in Android Studio. The database was designed to store student, staff, and event information securely.

2.3. System Development

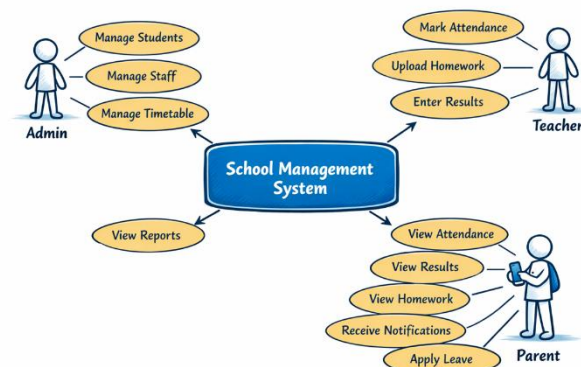
The web application was developed using React.js for the frontend and Node.js with Express.js for the backend. MongoDB was used as the database. The mobile application was developed using Java in Android Studio to allow parents to access their child's attendance, homework, and results.

2.4. Testing and Deployment

After development, the system was tested to ensure that all modules work properly. Errors were fixed and the system performance was checked. Finally, the system was deployed to provide a centralized platform for school management and communication between schools and parents.

3. System Architecture

The system architecture consists of three main layers: User Interface Layer, Application Layer, and Database Layer. The User Interface Layer includes two applications: a mobile application for parents and a web application for administrators and staff. Parents use the mobile app to check their child's attendance, results, and notifications. Administrators and staff use the web portal to manage student information, attendance records, and academic activities. The Application Layer is developed using Node.js and Express.js. This layer processes user requests through REST APIs. It includes authentication using JSON Web Token (JWT), controllers, and business logic to ensure secure and efficient communication between the applications and the database. The Database Layer uses MongoDB to store and manage data such as student records, staff details, attendance, and leave requests. The database ensures centralized and secure data storage for the system. This architecture allows smooth communication between the mobile application, web application, and the server while maintaining data security and system performance.



Figures 1 Use Case Diagram

This diagram shows a School Management System with three users: Admin, Teacher and Parent. Admin

manages students, staff, timetable, and reports, while teachers handle attendance, homework, and results. Parents can view their child’s details, receive notifications, and apply for leave through the system shown in Figure 1.

Table 1 Technologies Used In the System

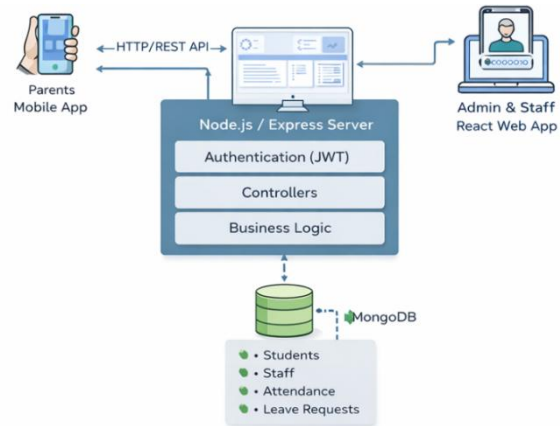
Component	Technology Used	Purpose
Frontend	React.js	User interface for web application
Backend	Node.js, Express.js	Server-side logic and API
Database	MongoDB	Store student and system data
Mobile App	Java, Android Studio	Parent mobile application
Authentication	JWT	Secure user login

shown in Table 1 The technologies used to develop the Edu-Smart School Management System. React.js is used for the frontend, Node.js and Express.js are used for the backend, and MongoDB is used for the database. The mobile application is developed using Java in Android Studio. JWT is used for secure user authentication.

Table 2 System Development Steps

Step	Activity	Description
Requirement Analysis	Requirement Collection	Collect and analyze system requirements from users.
System Design	Architecture Design	Design the system structure and database.
Development	Module Implementation	Develop the web and mobile application modules.
Testing	System Testing	Check system functionality and fix errors.
Deployment	System Launch	Deploy the system for real-time use.

Shown in the Table 2 the main steps followed in the development of the Edu-Smart School Management System. It explains the process from collecting requirements to designing, developing, testing, and finally deploying the system for real-time use.



Figures 2 System Architecture of The Web-Based School Management System

Shown in Figure 2 the architecture of the School Management System. Parents use a mobile app and administrators and staff use a web application. Both applications connect to a Node.js and Express server through HTTP/REST APIs. The server handles authentication, controllers, and business logic. All data such as students, staff, attendance, and leave requests are stored in the MongoDB database. This architecture enables secure and efficient data management [4].

4. Results And Discussion

4.1.Results

The School Management System is a digital platform developed to improve the management of school activities using both a web application and a mobile application. The web application is used by administrators and staff, while the mobile application is designed for parents. This system helps in organizing and managing important school data in a centralized and efficient manner. Administrators can manage student records, staff details, timetables, and overall school operations through the web portal. Teachers can easily update daily activities such as attendance, homework, and examination results. This

reduces manual work and helps teachers complete their tasks quickly and accurately. Parents can access the mobile application to check their child’s attendance, homework, and academic results anytime. They also receive important notifications and updates from the school. This improves communication between the school and parents and keeps them informed about their child’s progress. The system reduces the use of paper, minimizes errors, and saves time for both staff and parents. It ensures that all data is stored securely and can be accessed whenever needed. Testing results show that the system works smoothly and efficiently in managing school data and activities. Overall, the School Management System makes school operations easier, faster, and more reliable. It improves data management, enhances communication, and provides a better experience for administrators, teachers, and parents.

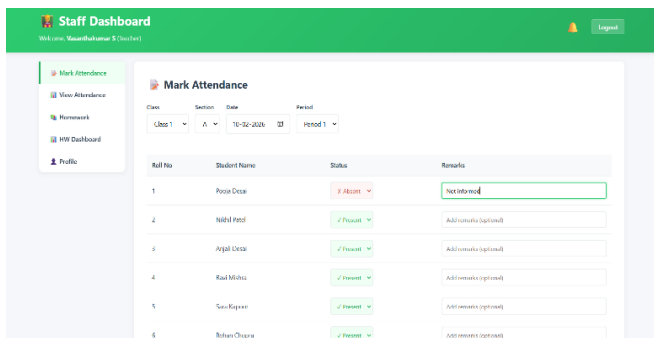


Figure 3. Staff Dashboard – Attendance Management Interface

Shown in Figure 3 Staff Dashboard of the School Management System, where teachers can record and manage student attendance. The interface allows the teacher to select the class, section, date, and period before marking attendance. A list of students with their roll numbers and names is displayed, and the teacher can mark each student as Present or Absent and add optional remarks. The dashboard also includes navigation options such as View Attendance, Homework, HW Dashboard, and Profile, making it easy for staff to manage academic activities efficiently [6].

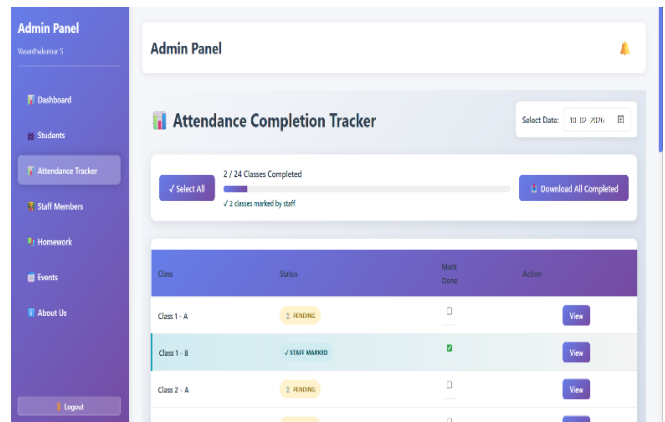


Figure 4 Admin Panel – Attendance Completion Tracker

Shown in Figure 4 the Admin Panel of the School Management System. It allows the administrator to track whether attendance has been completed for different classes. The admin can select a date, view the attendance status (pending or completed), and check details for each class. This helps the admin monitor attendance updates by staff [5].

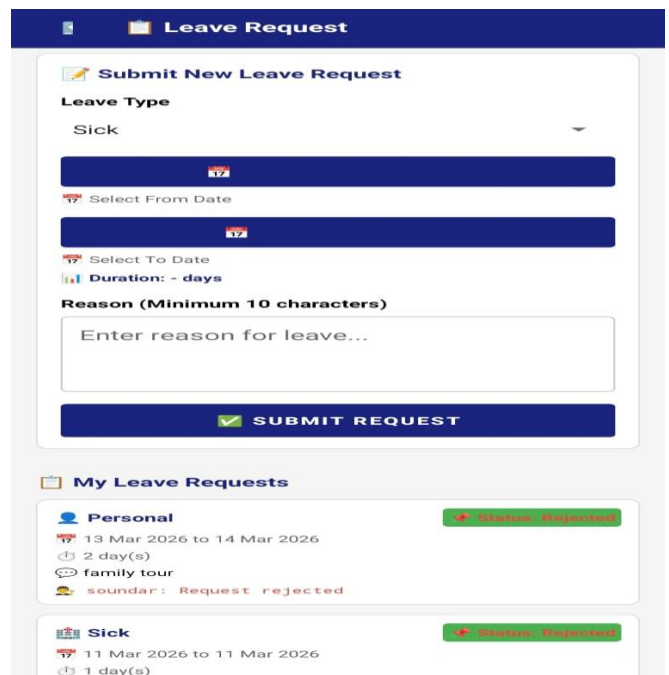


Figure 5 Parent Mobile App – Leave Request Module

Shown in the Figure 5 The Leave Request page in the mobile app. Parents can select the leave type, choose the dates, and enter a reason to submit a leave request. The page also shows previous leave requests and their status.

4.2. Discussion

The developed School Management System improves the efficiency of managing school activities by providing both web and mobile applications. Administrators and staff can easily manage student records, attendance, and academic information through the web portal. Teachers can mark attendance and update student data quickly, which reduces manual work. The mobile application allows parents to monitor their child's attendance, homework, and leave requests in real time. This improves communication between the school and parents. The system also ensures better data organization and secure storage using the database. Overall, the system helps schools reduce paperwork, save time, and manage information more effectively.

Conclusion

The proposed School Management System provides an effective solution for managing academic and administrative activities in educational institutions. The system integrates a web application for administrators and staff with a mobile application for parents. Through this system, schools can easily manage student records, attendance, homework, and leave requests. The implementation of the system reduces manual paperwork and improves the accuracy of data management. It also helps teachers update information quickly and allows parents to receive real-time updates about their child's academic activities. The results show that the system improves communication between schools and parents while saving time and effort. In the future, the system can be enhanced by adding advanced features such as analytics for student performance, automated notifications, and integration with additional educational tools.

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