**PROJECT SYNOPSIS REPORT**

**ON**

**EduNova: School Management System**

**SUBMITTED**

**TO**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**FOR**

**Full Stack Engineering (22CS037)**



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### **Problem Statement**

Managing school operations manually is not only time-consuming but also prone to frequent errors and inefficiencies. Schools often face difficulties in maintaining accurate attendance records, tracking fee payments, handling student and parent complaints, issuing timely notices, and keeping updated databases for both students and teachers. As the number of students and staff increases, the complexity of managing these tasks manually also grows, leading to delays, miscommunication, and lack of transparency. Paper-based methods and fragmented systems make it challenging to maintain data consistency, ensure accountability, and provide a smooth experience for administrators, teachers, parents, and students alike. This results in unnecessary administrative burden, reduced productivity, and compromised focus on the core goal of education.

To overcome these challenges, there is a strong need for a centralized, secure, and scalable digital platform that can streamline academic as well as administrative workflows. Such a solution can automate repetitive tasks, minimize human errors, and provide real-time updates for all stakeholders. It enables efficient tracking of attendance, seamless fee management, easy complaint handling, and quick dissemination of notices, while also maintaining comprehensive records in a structured manner. By integrating communication tools and data management in one system, schools can improve efficiency, transparency, and collaboration. Ultimately, a robust digital platform empowers institutions to reduce operational hurdles, enhance trust among parents and students, and focus more on delivering quality education and holistic student development.

**Title of Project**

**EDUNOVA -** School Management Platform using MERN Stack

**Objective & Key Learnings:**

* Designing and developing a secure, web-based school management system using the MERN stack (MongoDB, Express.js, React.js, Node.js).
* Implementing role-based access control to manage administrators, teachers, and students effectively.
* Managing core school operations such as classes, attendance, fees, complaints, and notices through CRUD functionalities.
* Ensuring scalability, efficiency, and accuracy in handling academic and administrative workflows.
* Enhancing overall user experience by providing a centralized and easy-to-use digital platform.

**Options Available to Execute the Project:**

### **Build with MERN Stack (MongoDB, Express.js, React, Node.js) –** preferred for scalability, performance, and modern UI.

### **Build with MEAN Stack (MongoDB, Express.js, Angular, Node.js) –** strong for enterprise-grade apps but requires more complexity.

### **Use PHP with MySQL –** easier setup and widely used but less scalable for modern requirements.

### **Adopt Serverless or BaaS (Backend-as-a-Service) Architecture –** ensures rapid development, reduced server management, and built-in backend features.

### **Integrate Advanced Tools (Next.js, Tailwind CSS, WebSockets, CI/CD) –** accelerates development, enables real-time communication, and supports efficient automated deployments.

### **Tech Stack:**

### **React.js –** Chosen for building dynamic and responsive user interfaces with reusable components.

### **Material UI –** Provides a modern, professional design system with ready-to-use UI components, reducing development time.

### **Redux –** Manages application state efficiently, ensuring data consistency across different components.

### **Node.js –** Enables fast, scalable, and event-driven server-side execution using JavaScript.

### **Express.js –** Simplifies backend development with a lightweight framework for routing, middleware, and APIs.

### **MongoDB –** A NoSQL database that offers flexibility, scalability, and easy handling of large, unstructured data.

### **Advantages and Disadvantages:**

### **Advantages:**

#### Centralized Platform – Combines all school operations in one place.

#### Secure & Role-Based Access – Ensures data privacy and controlled usage.

#### Improved Accuracy – Minimizes manual errors and reduces effort.

#### Highly Scalable – Can adapt to schools of any size and growth.

#### Better Communication – Streamlines notices and complaint handling.

#### Disadvantages:

* **Internet Dependency –** Requires stable connectivity for access.
* **Training Requirement –** Teachers/admins may need initial guidance.
* **Time-Consuming Migration –** Converting old/manual records takes effort.

**Implementation Strategy:**

1. **Backend Development**

* Set up a Node.js + Express.js server to handle requests and manage school operations.
* Design RESTful API endpoints for attendance, fees, complaints, notices, and user management.
* Use MongoDB to store student, teacher, class, and administrative data securely.

1. **Role-Based Access & Automation**

* Implement role-based authentication (Admin, Teacher, Student) for secure access.
* Automate repetitive tasks such as attendance tracking, fee reminders, and notice distribution.
* Ensure smooth CRUD operations for all academic and administrative modules.

1. **Security Measures**

* Implement JWT (JSON Web Tokens) for secure user authentication and session management.
* Use HTTPS for secure data transmission.
* Regularly update dependencies and conduct data validation & input sanitization to prevent vulnerabilities.

1. **Scalability & Performance**

* Design the backend with scalability in mind to support schools of different sizes.
* Use load balancing and caching mechanisms (e.g., Redis in future scope) for faster responses.
* Structure APIs and database schema to handle high volumes of student and teacher records efficiently.

1. **Frontend Integration**

* Develop a responsive React.js + Material UI frontend for an intuitive user experience.
* Integrate features like attendance dashboards, fee status tracking, and complaint/notice boards.
* Ensure smooth communication with backend services using Axios/Fetch API.

1. **Testing and Deployment**

* Perform unit testing, integration testing, and user acceptance testing (UAT) to ensure reliability.
* Use Docker for containerization and optionally CI/CD pipelines for continuous integration and deployment.
* Deploy on a cloud platform (AWS/Heroku/Render) for high availability and scalability.

### **Conclusion:**

The School Management System project provides a comprehensive and efficient solution for digitizing and streamlining school operations. By integrating modern technologies such as React.js, Material UI, Node.js, Express.js, and MongoDB, the system ensures scalability, reliability, and ease of use. Core academic and administrative processes like attendance tracking, fee management, complaints, notices, and role-based access are centralized on a single platform, reducing manual effort and minimizing errors. With robust security measures such as JWT-based authentication and HTTPS communication, the platform ensures safe and secure handling of sensitive data. Overall, this project enhances transparency, improves communication, and empowers schools to operate more efficiently, allowing administrators, teachers, students, and parents to focus on the core objective of education and holistic development.

**References:**

* **Official React Documentation: https://react.dev**
* **MongoDB Documentation:** [**https://www.mongodb.com/docs/**](https://www.mongodb.com/docs/)
* **Express.js Documentation: https://expressjs.com/**
* **Node.js Documentation: https://nodejs.org**
* **Bootstrap Documentation: https://getbootstrap.com**