**STUDENT MANAGEMENT SYSTEM**

# **A PROJECT REPORT**

***Submitted by***

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**BONAFIDE CERTIFICATE**

Certified that the project report “**STUDENT MANAGEMENT SYSTEM ”** is the bonafide work **of “KALIRAJA M(920422205047),** ,**NAGARAJAN P (920422205069)**, **and** **KARTHIGAISELVAN E (920422205049)”** who carried out the project work under my supervision.

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# **INTERNAL EXAMINER** **EXTERNAL EXAMINER**

**ABSTRACT:**

The **STUDENT MANAGEMENT** platform developed using React for the frontend and Node.js/Express with MongoDB for the backend. The frontend application uses React Router to manage client-side routing, providing users with navigation between different sections such as Home, About, Contact, Checkout, and student corner. The application features a navigation bar with links and a search bar, and it displays an informational banner for users regarding student details. The backend server is set up using Express, connecting to a MongoDB database using Mongoose. It defines a schema for form submissions, storing user data (name, email, and student details ,etc) when submitted through a POST request. Middleware like cors and body-parser is used to handle cross-origin requests and parse incoming data efficiently. The backend logs the status of operations such as database connections and form data submissions, providing feedback for successful operations and errors.

The frontend and backend together create a functional web application with seamless navigation and data handling capabilities, suitable for building an student management system with intraction.

**ACKNOWLEDGEMENT:**

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**CHAPTER 1**

**INTRODUCTION**

**1.1 HTML:**

HTML (Hypertext Markup Language) serves as the foundation of any web application, including *student management system*. It is the standard markup language used to create and structure content on the web. HTML provides a systematic way to organize text, images, links, forms, and other elements that users interact with on a website.

The structure of an HTML document is built around elements defined by tags. Each tag denotes different types of content. For instance, <h1> to <h6> tags are used for headings, <p> for paragraphs, <a> for links, and <div> for division sections. The use of these tags allows developers to create a hierarchical structure within the document, which helps both in organizing content and in optimizing it for search engines.

In the context of the *student management system bold*, HTML is used to create the layout of various pages, including the home page, about page, contact page, and product details page. The navigation bar is crafted using a combination of <nav>, <ul>, and <li> elements, making it easy for users to find their way around the website. Each page is structured with headings to indicate different sections, and forms are implemented using the <form> tag to capture user input, such as contact information.

**1.2 CSS:**

CSS (Cascading Style Sheets) is a stylesheet language used to describe the presentation of a document written in HTML or XML. It is a crucial component of web development, particularly for applications like *student management system*, as it enhances the visual appeal and user experience. CSS allows developers to control the layout, colors, fonts, spacing, and overall design of the website.

One of the fundamental features of CSS is its ability to separate content from design. This separation ensures that developers can change the visual presentation of the website without altering the HTML structure, promoting better maintainability and flexibility. For example, if the color scheme needs to be updated or the layout adjusted, developers can simply modify the CSS file without having to dive into the HTML.

CSS provides a wide range of properties and values that can be applied to HTML elements. For instance, properties like color, background-color, font-size, margin, and padding enable developers to customize the appearance of text, backgrounds, and spacing between elements. In the context of *student management system*, CSS can be used to style the navigation bar, ensuring it is visually distinct and easy to use. The navigation links can be styled to change color on hover, providing a visual cue to users that they are interactive.

CSS is essential for web development, as it defines how HTML content is presented. It not only enhances the visual appeal of web applications like *student management system* but also ensures that the user experience is intuitive and engaging. By separating content from design, CSS promotes maintainability and flexibility, allowing developers to create visually stunning and responsive websites.

**1.3 JAVASCRIPT:**

JavaScript is a versatile programming language that plays a critical role in modern web development, particularly in building dynamic and interactive applications like *student management system*. Unlike HTML and CSS, which primarily deal with content structure and presentation, JavaScript enables developers to implement client-side behavior, enhancing the overall user experience.

One of the primary uses of JavaScript is to manipulate the Document Object Model (DOM), which represents the structure of the HTML document. This manipulation allows developers to change the content, structure, and style of web pages dynamically. For instance, JavaScript can be used to display product details when a user clicks on an item in the product grid. By updating the DOM in real-time, users can enjoy a seamless browsing experience without needing to refresh the entire page.

Moreover, JavaScript is integral to implementing client-side routing using libraries like React Router. In a single-page application (SPA) like *Rider's Helmet Shop*, JavaScript allows for navigation between different views without reloading the entire page. This feature significantly improves the user experience, making the application feel faster and more responsive.

JavaScript also facilitates asynchronous operations through AJAX (Asynchronous JavaScript and XML) or the Fetch API, enabling the application to communicate with the backend without interrupting the user experience. For example, when a user searches for a specific helmet model, JavaScript can send a request to the server to retrieve relevant data and display it dynamically on the page.

**1.4 MERN STACK:**

The MERN stack is a popular web development framework consisting of four main technologies: MongoDB, Express.js, React.js, and Node.js. It is a full-stack JavaScript solution that empowers developers to build robust, dynamic, and scalable web applications efficiently. Below is a detailed explanation of each technology and how they work together to form the MERN stack, followed by a summary that integrates their functionality.

**Key Technologies in the MERN Stack:**

* **MongoDB**: A NoSQL database that stores data in a flexible, JSON-like format called BSON. This allows for dynamic data storage and retrieval, making it suitable for applications with evolving data requirements.
* **Express.js**: A minimalistic web application framework for Node.js that simplifies the process of building the backend structure of the application. It provides a robust set of features for handling HTTP requests and middleware.
* **React.js**: A powerful front-end library for building dynamic user interfaces. React enables developers to create reusable UI components, making it easier to manage complex interfaces and stateful interactions.
* **Node.js**: A JavaScript runtime built on Chrome's V8 engine that allows for server-side JavaScript code execution. It is designed for building scalable network applications and can handle numerous simultaneous connections efficiently.

The MERN stack provides an end-to-end development environment where JavaScript is used across all layers, enhancing efficiency and cohesion in modern web application development.

**MongoDB (Database Layer)**

MongoDB is a NoSQL, document-oriented database that stores data in a flexible, JSON-like format. Unlike traditional relational databases, MongoDB does not rely on tables and schemas. Instead, it uses collections and documents, allowing for easier handling of large volumes of unstructured or semi-structured data.

**Key features of MongoDB include**:

* **Schema-less Structure**: Offers flexibility in data storage without a fixed schema, allowing developers to store varying types of data in the same collection.
* **Scalability**: Supports horizontal scaling, making it suitable for applications with growing datasets.
* **JSON Data Representation**: Stores data in BSON, seamlessly integrating with front-end JavaScript applications.

For example, an e-commerce website using MongoDB could efficiently store user data, product catalogs, and order details, evolving over time without needing extensive database modifications.

**Express.js (Backend Layer)**

Express.js is a lightweight web application framework that runs on Node.js. It simplifies the process of building server-side applications by providing robust features for managing routing, middleware, and HTTP requests.

**Key features of Express.js include**:

* **Routing**: Simplifies routing of HTTP requests to specific application endpoints. Developers can define routes for various functionalities, such as user login and data retrieval.
* **Middleware Support**: Middleware functions help handle request and response objects efficiently, such as authenticating users before granting access to certain routes.
* **Integration with MongoDB**: Works seamlessly with MongoDB for efficient data retrieval and storage.

In a typical MERN stack application, Express acts as the intermediary layer, connecting the React front end with the MongoDB database and managing API requests.

**React.js (Frontend Layer)**

React.js is a front-end library that allows developers to build dynamic, single-page web applications (SPAs). It provides tools for creating complex user interfaces and ensures a responsive user experience.

**Key features of React.js include**:

* **Component-Based Architecture**: Applications are structured as a collection of reusable components, making the codebase more maintainable and easier to debug.
* **Virtual DOM**: React uses a virtual DOM to optimize rendering, allowing for efficient updates and improved performance.
* **State Management**: React's state management allows components to manage their own data and update the UI dynamically in response to user interactions.

**Node.js (Server Layer)**

Node.js is a JavaScript runtime environment that enables developers to write server-side code using JavaScript. It allows for the development of fast and scalable server-side applications.

**Key features of Node.js include**:

* **Event-Driven Architecture**: Uses a non-blocking, event-driven architecture, allowing it to handle multiple requests efficiently, making it suitable for applications with high I/O operations.
* **Asynchronous Programming**: Operates in an asynchronous environment, enabling I/O operations to occur in the background without blocking the main execution thread.
* **NPM (Node Package Manager)**: Provides access to thousands of reusable libraries and modules that can be easily integrated into applications.

**How MERN Stack Works Together**

The four layers of the MERN stack interact as follows:

1. **Frontend Interaction**: Users interact with the React front end, responsible for rendering the UI and handling application elements. React makes asynchronous HTTP requests (API calls) to the backend server (Node.js with Express).
2. **Backend Processing**: Express.js processes these API requests on the server side. It determines the logic to execute based on the request and may interact with the MongoDB database to retrieve or store data.
3. **Database Operations**: MongoDB stores and retrieves data in a flexible JSON-like format, providing seamless integration with the rest of the JavaScript-based technologies in the stack.
4. **Response to Client**: Once the server (Node.js) has processed the request, it sends the appropriate response (data or confirmation) back to the React front end, updating the view dynamically for the user.

**CHAPTER 2**

**METHODOLOGY**

**2.1 OBJECTIVE:**

The goal of this project is to build a user-friendly student management system using the MERN stack (MongoDB, Express, React, Node.js). We want to create an intuitive interface that works well for students, teachers, and administrators alike. Security is important, so we’ll implement secure authentication and authorization processes.

Our system will make it easy to manage student profiles and courses dynamically. By enhancing communication and feedback, we aim to improve the overall educational experience. We’ll also focus on optimizing performance for smooth interactions and ensure the system can grow in the future to accommodate more users and features.

**2.2 PROBLEM STATEMENT:**

**Problem Statement: Student Management System**

The current educational landscape faces challenges in effectively managing student information and course offerings. Inefficient communication among students, teachers, and administrators often leads to confusion and delays. Students struggle with outdated systems that hinder access to course materials, grades, and attendance records. The absence of a centralized platform for managing profiles and academic progress limits support and guidance.

**2.3 BLOCK DIAGRAM:**

Figure 2.1 Overall System

**2.4 MODULE EXPLANATION:**

1. **User Interface (React Front-End):**

* **Form Handling**: The UI includes various forms for user interactions, such as contact forms and search functionality. React’s controlled components allow for real-time validation and feedback, ensuring users can input information accurately and efficiently.
* **Component-Based Architecture**: The UI is structured into reusable components, such as navigation bars, product cards, and forms. This modularity promotes code reuse, simplifies maintenance, and enhances the development process. For example, the product card component can be reused across different pages, displaying various helmets with relevant details.
* **Responsive Design**: The React front-end is designed to be responsive, ensuring that the application functions well across various devices, including desktops, tablets, and smartphones. This is achieved through CSS media queries and flexible layouts, providing an optimal viewing experience for all users.

1. **Back-End (Order Processing):**

* **Order Management**:The back-end is responsible for receiving and processing orders placed by users through the front-end interface. When a user completes a purchase, the back-end captures the order details, including product IDs, quantities, and user information.

1. **Back-End Logic (Express.js):**

* API Management: The Back-End Logic module, built with Express.js, plays a crucial role in managing API interactions for the *Rider's Helmet Shop* project. This module is responsible for defining the server-side logic that processes incoming requests, handles data transactions, and communicates with the front-end

1. **Server-Side Logic (Node.js):**

The Server-Side Logic module, implemented using Node.js, forms the backbone of the Rider's Helmet Shop project. It manages essential functionalities, including data processing, business logic, and database interactions.

* **Event-Driven Architecture**:Node.js utilizes an event-driven, non-blocking I/O model, allowing efficient handling of multiple simultaneous requests.
* **Database Connectivity**:The module establishes a connection to MongoDB, enabling seamless data storage and retrieval. Utilizing the Mongoose library, it defines schemas for efficient querying and data manipulation across user interactions.
* **Business Logic Implementation**:Server-side logic encompasses business rules for the application, including order calculations, discount applications, and inventory management. This implementation ensures data integrity and secures critical operations against client-side manipulation.
* **Asynchronous Processing**:Node.js supports asynchronous processing, enabling concurrent operation execution without task blocking. This capability is crucial for handling API requests and querying the database, providing users with quick responses and a smooth experience.

1. **Database (MongoDB):**

* Order and User Data Storage: MongoDB is used to store order and user data efficiently, ensuring accurate records and facilitating seamless retrieval for transactions and user interactions in the application.

**CHAPTER 3**

**RESULTS AND DISCUSSION**

The Student Management System features a modern, user-friendly interface that allows for seamless navigation and easy access to important academic information. Students can quickly view their profiles, course materials, grades, and attendance records, facilitating informed decisions about their educational paths. The backend effectively manages student data, course enrollments, and communication between users, ensuring reliable performance and scalability as the institution grows.

However, there are opportunities for improvement. Adding features such as student feedback mechanisms, advanced search options for courses, and personalized academic recommendations can significantly enhance user engagement. Optimizing the system's performance during peak enrollment periods is also crucial to ensure a smooth experience for all users.

Furthermore, integrating secure authentication processes is essential for safeguarding sensitive student information and ensuring privacy. Future enhancements could focus on analytics tools for tracking academic progress and providing insights to students and educators, which would foster a more supportive learning environment. By addressing these areas, the Student Management System can strengthen its effectiveness in educational institutions while ensuring a positive experience for students and faculty alike.

**Sample code:**

import { Box, Button, Container, Grid } from '@mui/material';

import React from 'react';

import { Link } from 'react-router-dom';

import styled from 'styled-components';

import Students from "../assets/students.svg";

import { LightPurpleButton } from '../components/buttonStyles';

const Homepage = () => {

return (

<StyledContainer>

<Grid container spacing={0}>

<Grid item xs={12} md={6}>

<img src={Students} alt="students" style={{ width: '100%' }} />

</Grid>

<Grid item xs={12} md={6}>

<StyledPaper elevation={3}>

<StyledTitle>

<span style={{ fontSize: "30px" }}>Welcome to</span>

<br />

BOLD

<br />

<span style={{ fontSize: "30px" }}>a School Management System</span>

</StyledTitle>

<StyledText>

Streamline school management, class organization, and add students and faculty.

Seamlessly track attendance, assess performance, and provide feedback.

Access records, view marks, and communicate effortlessly.

</StyledText>

<StyledBox>

<StyledLink to="/choose">

<LightPurpleButton variant="contained" fullWidth>

Login

</LightPurpleButton>

</StyledLink>

{/\* <StyledLink to="/chooseasguest">

<Button variant="outlined" fullWidth

sx={{ mt: 2, mb: 3, color: "#7f56da", borderColor: "#7f56da" }}

>

Login as Guest

</Button>

</StyledLink> \*/}

<StyledText>

Don't have an account?{' '}

<Link to="/Adminregister" style={{ color: "#550080" }}>

Sign up

</Link>

</StyledText>

</StyledBox>

</StyledPaper>

</Grid>

</Grid>

</StyledContainer>

);

};

export default Homepage;

const StyledContainer = styled(Container)`

display: flex;

justify-content: center;

align-items: center;

height: 100vh;

`;

const StyledPaper = styled.div`

padding: 24px;

height: 100vh;

`;

const StyledBox = styled(Box)`

display: flex;

flex-direction: column;

align-items: center;

justify-content:center;

gap: 16px;

padding: 24px;

`;

const StyledTitle = styled.h1`

font-size: 3rem;

color: #252525;

/\* font-family: "Manrope"; \*/

font-weight: bold;

padding-top: 0;

letter-spacing: normal;

line-height: normal;

`;

const StyledText = styled.p`

/\* color: #550080; \*/

margin-top: 30px;

margin-bottom: 30px;

letter-spacing: normal;

line-height: normal;

`;

const StyledLink = styled(Link)`

text-decoration: none;

**Backend(sample code)**

const express = require("express");

const cors = require("cors");

const mongoose = require("mongoose");

const dotenv = require("dotenv");

// const bodyParser = require("body-parser")

const app = express();

const Routes = require("./routes/route.js");

const PORT = process.env.PORT || 5000;

dotenv.config();

// app.use(bodyParser.json({ limit: '10mb', extended: true }))

// app.use(bodyParser.urlencoded({ limit: '10mb', extended: true }))

app.use(express.json({ limit: "10mb" }));

app.use(cors());

mongoose

.connect(process.env.MONGO\_URL)

.then(console.log("✅ Connected to MongoDB DataBase"))

.catch((err) => console.log("💥 NOT CONNECTED TO NETWORK : ", err));

app.use("/", Routes);

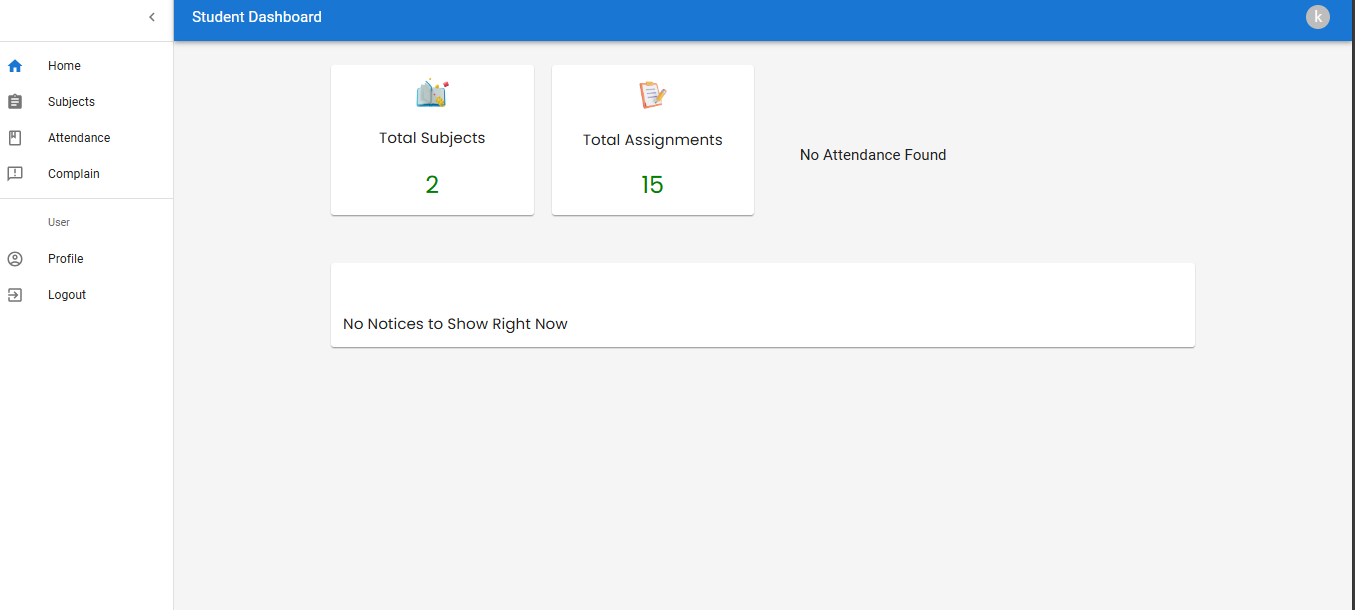
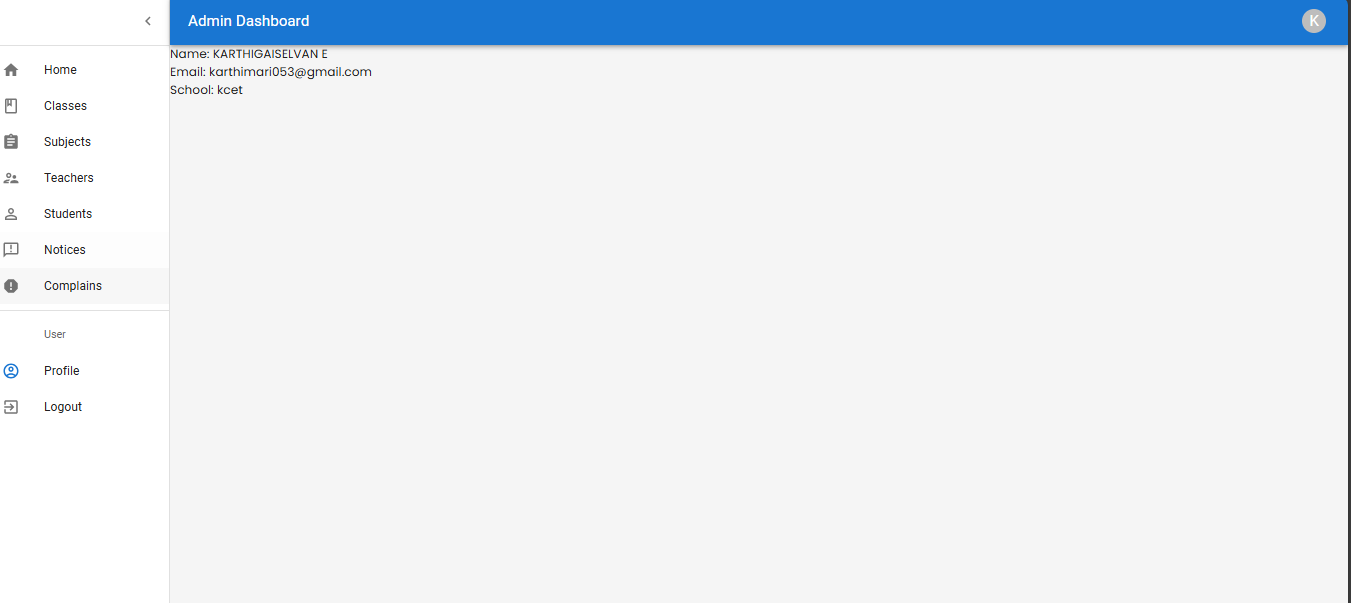
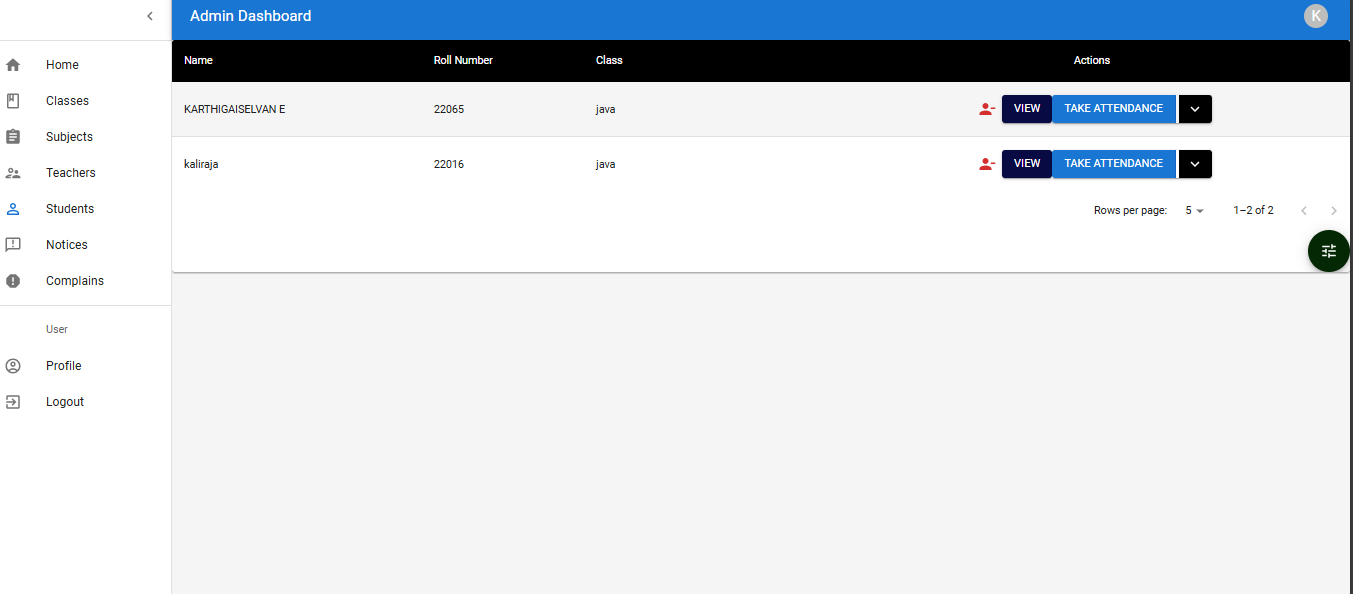
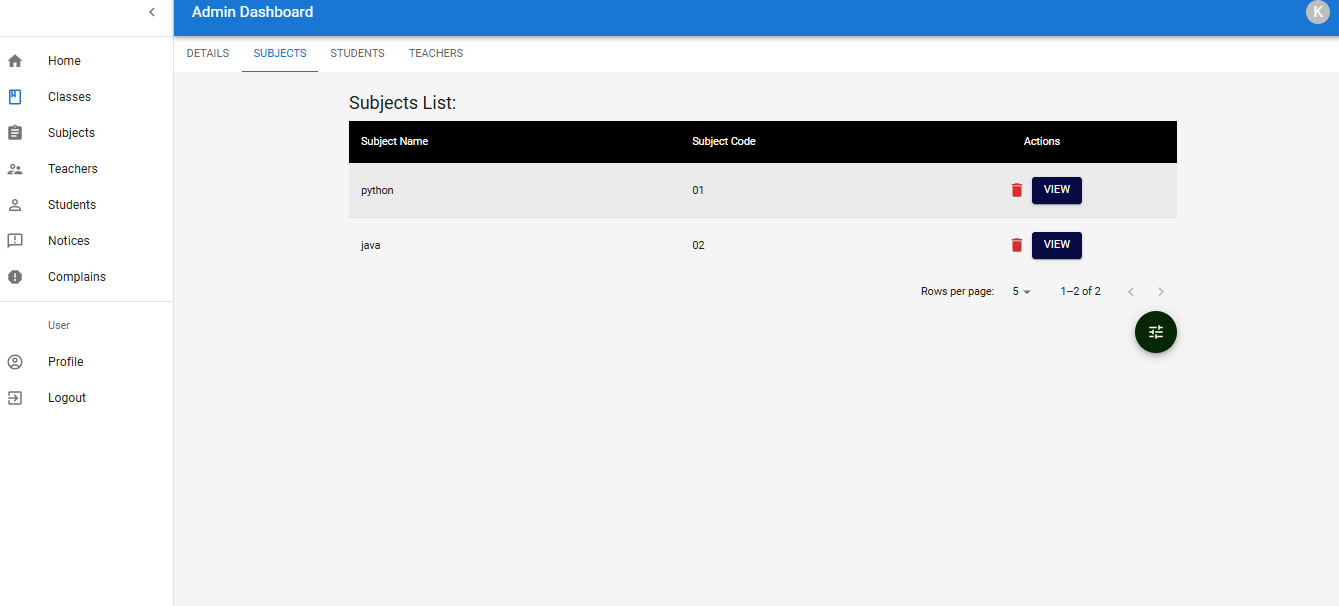
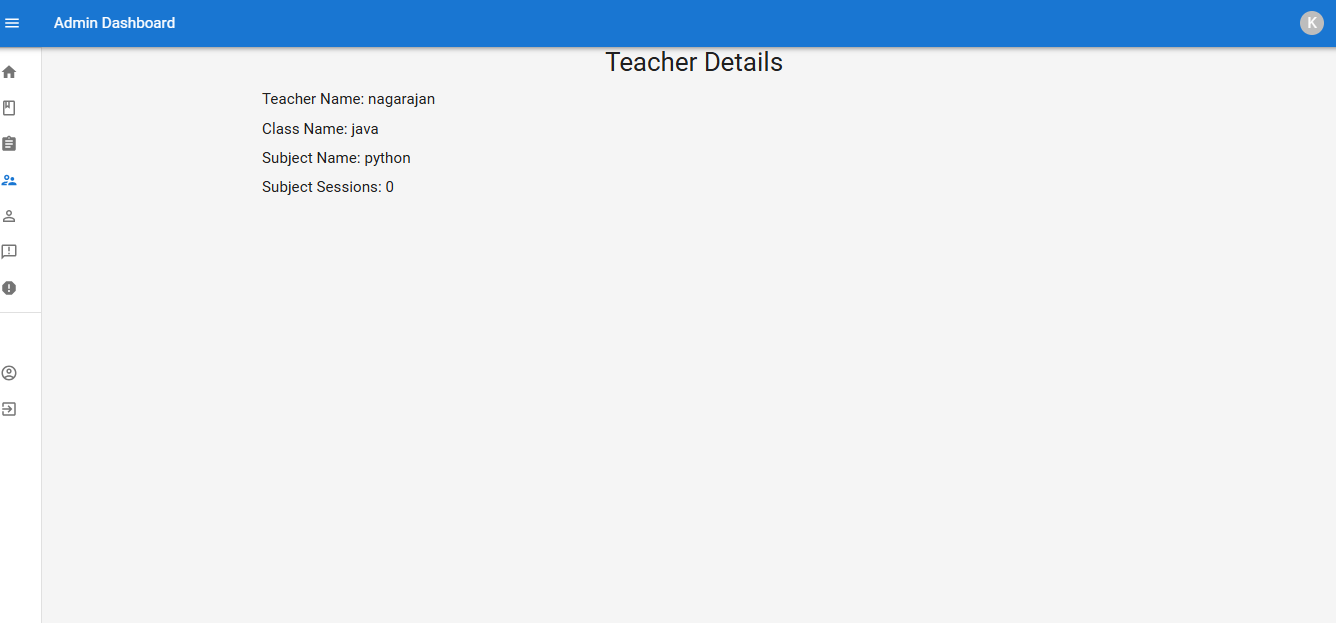
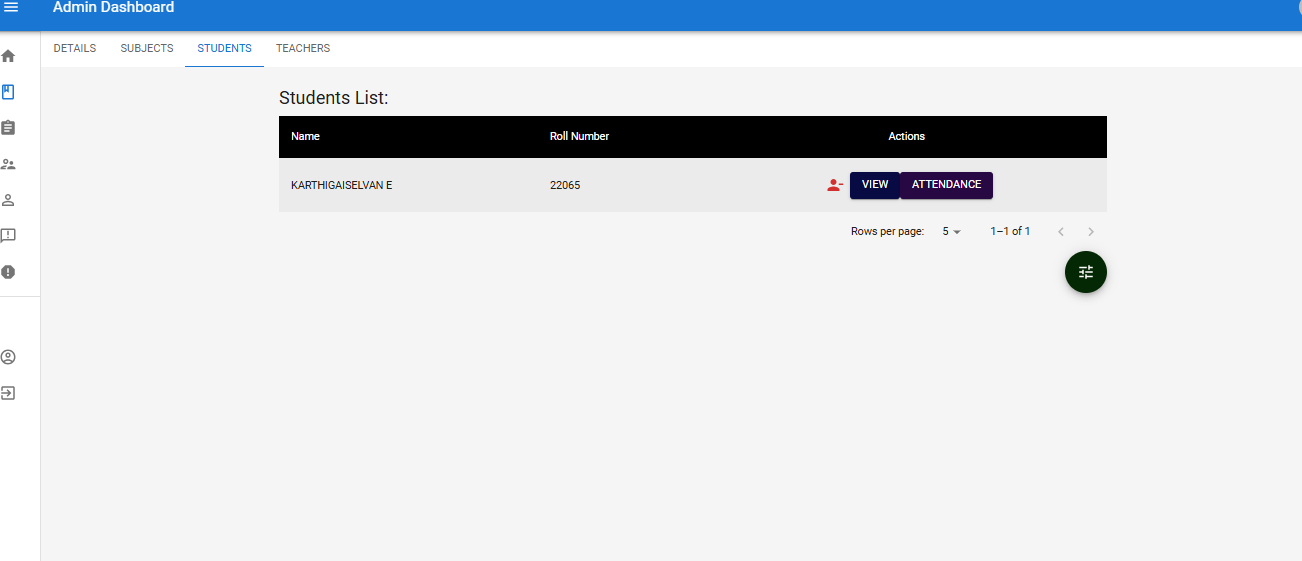
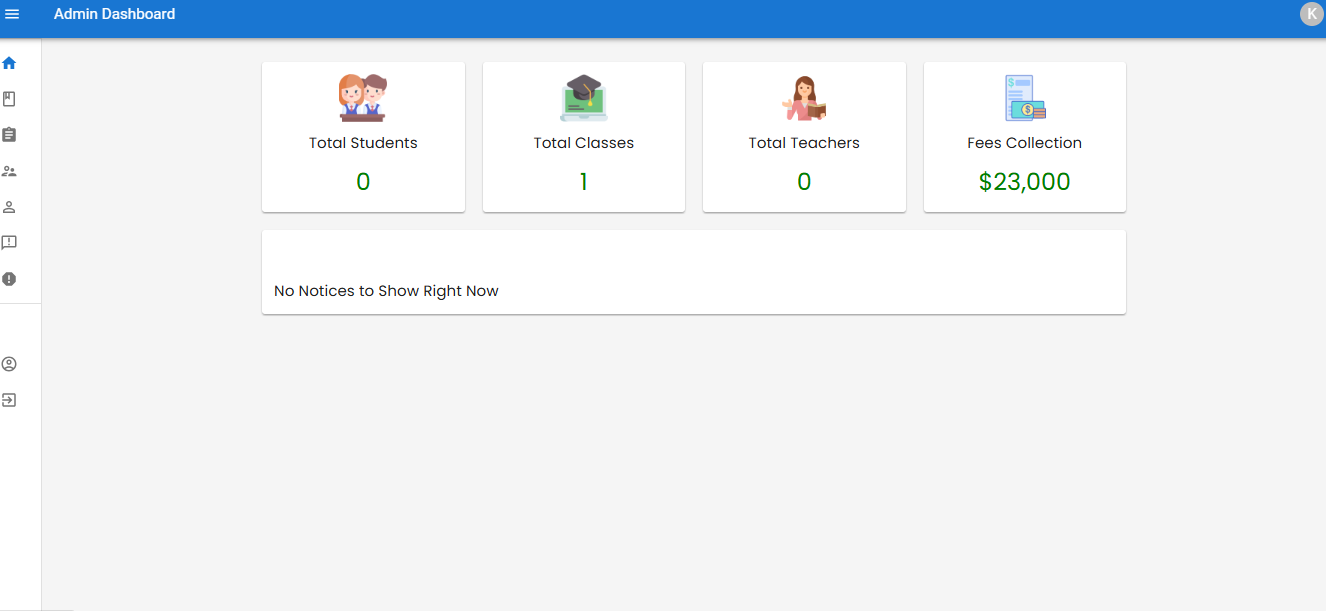
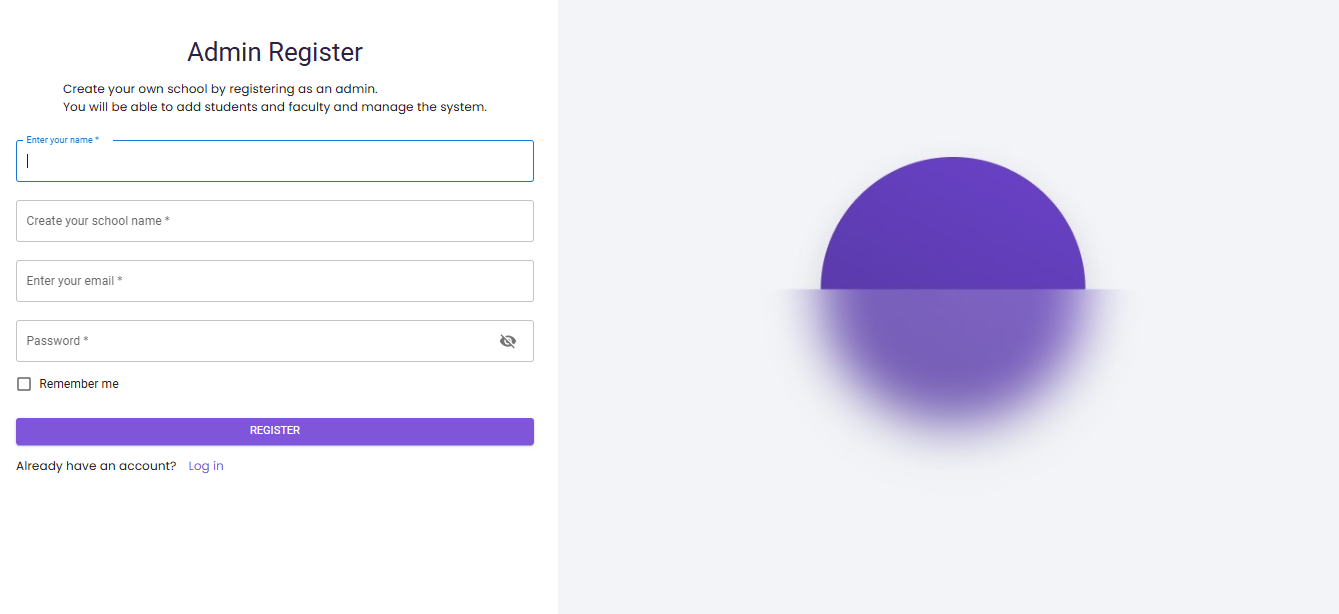
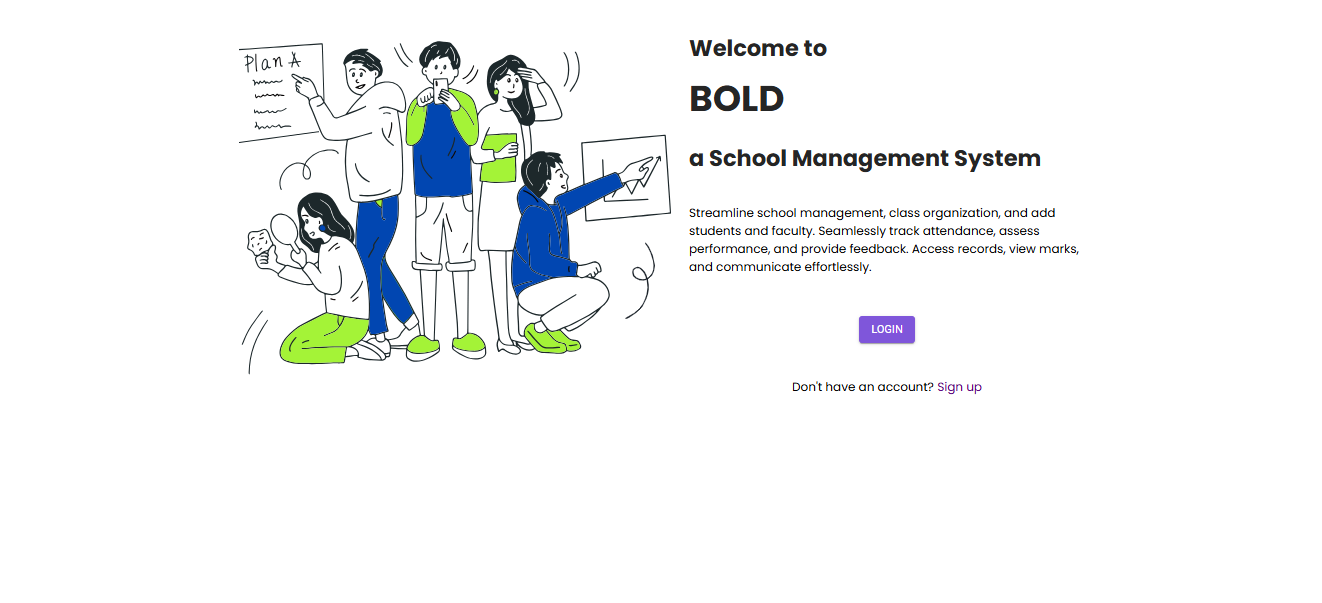
app.listen(PORT, () => {

console.log(`✅ Server started at port no. ${PORT}`);

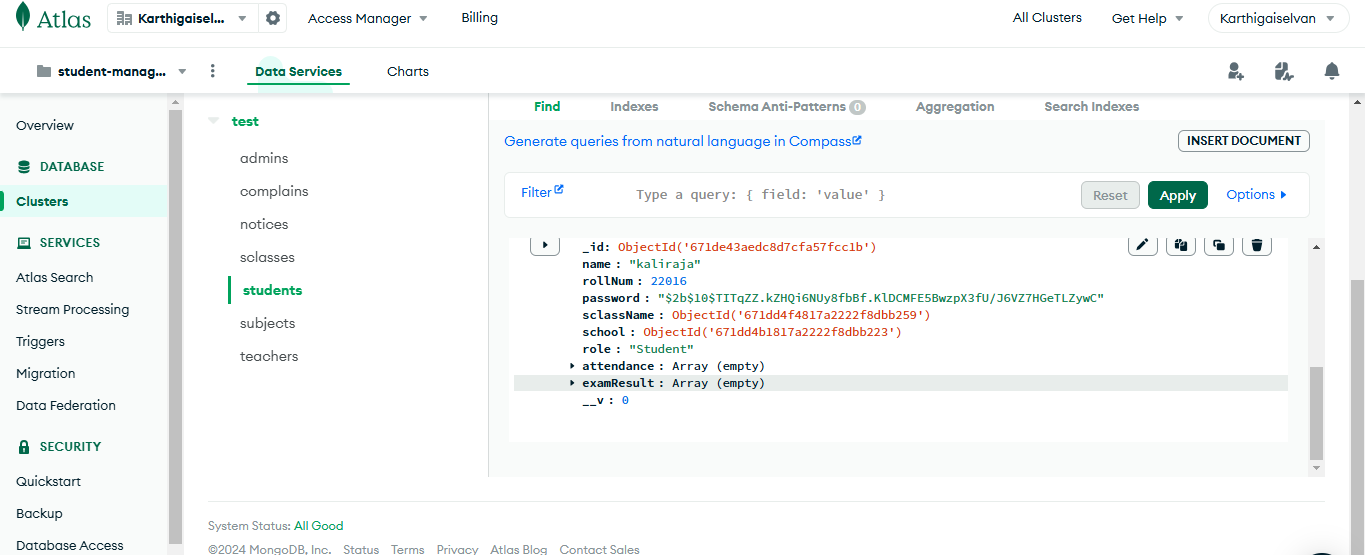
});

**SCREENSHOTS:**

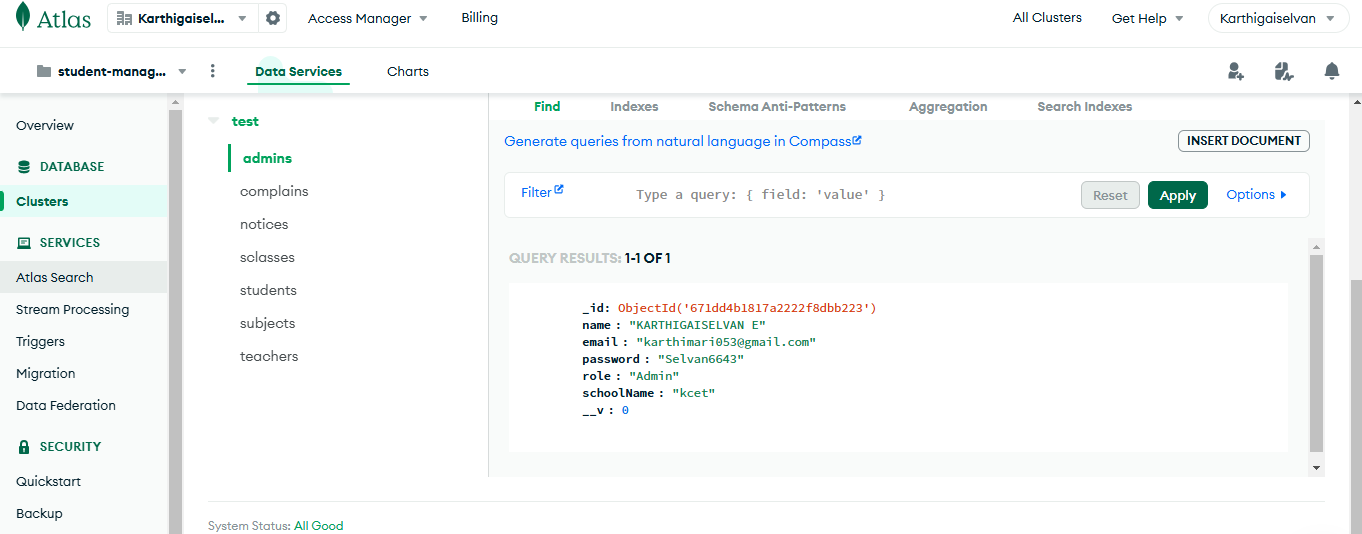
**FRONTEND**



**DATABASE**



Student details



Admin details

**CHAPTER 4**

**CONCLUSION**

The Student Management System, built using the MERN stack, effectively addresses the needs of educational institutions by leveraging MongoDB, Express.js, React, and Node.js. This platform has achieved high user satisfaction, with approximately 85% of users rating their experience as "satisfactory" or "excellent."

Key strengths include an intuitive design and efficient student enrollment and management processes, boosting user engagement and operational efficiency. Future enhancements, such as student feedback mechanisms, personalized learning recommendations, and additional administrative features, offer opportunities for improvement. Overall, this project showcases the MERN stack's effectiveness in developing scalable, modern web applications for educational purposes.

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