Project Report
Title: Sport Booking System

Introduction

Sport Booking is a MERN stack web application developed to allow users to easily book sports grounds at multiple centres. The objective is to provide a seamless booking experience for users, while giving centre administrators the ability to manage ground availability and details through a secure admin panel.

Design Decisions

The application is structured using the MERN stack (MongoDB, Express, React, Node.js) to allow for a modern, full-stack JavaScript solution. Tailwind CSS was chosen for styling due to its simplicity and efficiency. Authentication is handled using JSON Web Tokens (JWT) to ensure secure access to the admin panel, while Redux is used to manage state across the application for a smooth user experience.

Implementation Details

The **Sport Booking System** project uses the following technologies:

- **MongoDB**: A NoSQL database for storing data related to grounds, bookings, and users. MongoDB's schema-less nature allows flexibility in data storage and retrieval.
- **Express.js**: A backend framework for building RESTful APIs that interact with MongoDB, handling routing and server-side logic efficiently.
- **React.js**: A frontend JavaScript library for building responsive user interfaces. It simplifies creating reusable components and managing the user interface's dynamic nature.
- **Node.js**: A runtime environment that enables JavaScript to run server-side, allowing for the same language across both frontend and backend.
- **Tailwind CSS**: A utility-first CSS framework chosen for its ease of use and efficiency in styling, enabling rapid design without writing custom CSS from scratch.
- **JWT (JSON Web Tokens)**: For handling user authentication and ensuring secure access to the application, particularly the admin panel.

The MERN stack was chosen to ensure a seamless, full-stack JavaScript solution that is scalable, flexible, and suitable for modern web applications.

The rationale behind these choices was to create a fully integrated, scalable solution that leverages JavaScript across both the client and server.

Challenges and Solutions

One of the main challenges faced was implementing secure authentication while ensuring a smooth user experience. This was addressed by using JWTs, which allow for stateless authentication, reducing server load. Another challenge was managing real-time bookings across multiple users. This was solved by ensuring that booking data is updated in real time using MongoDB's atomic operations to avoid double booking of the same slot.

Future Improvements

With more time, the following improvements could be made:

- **Real-time Notifications**: Implementing real-time notifications for booking confirmations and changes.

- **Payment Integration**: Adding functionality for online payments through payment gateways.

- **Enhanced Reporting**: Providing detailed reports on ground usage and booking trends for administrators.