Assignment IIIT Allahabad
PROJECT
Court Booking App

Enrollment Number   Name

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1. Introduction

The Court Booking App is designed to provide a seamless experience for users looking to reserve sports courts across various cities. The app allows users to browse and book courts for sports like tennis, badminton, and basketball, among others. It supports a user-friendly booking process, secure authentication, and payment integration. Additionally, it offers an admin dashboard where admins can manage courts, view bookings, and handle user requests. The primary objective of the project is to streamline the booking process while offering flexibility and convenience for users and admins alike.

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2. Design Decisions

The project is built using the **MERN (MongoDB, Express, React, Node.js)** stack. The choice of this stack was based on its robustness for developing full-stack applications, with MongoDB providing a flexible NoSQL database structure, Express.js for backend routing, React.js for frontend user interactions (if applicable), and Node.js for handling server-side operations.

Key Design Decisions:

- **Role-Based Authentication**: JWT-based authentication was implemented, with two user roles: regular users and admins. Admins have additional privileges like creating courts, viewing all bookings, and managing centers.
- **RESTful API**: A modular approach was used for designing RESTful APIs to handle various functionalities such as booking, center management, and user authentication.
- **Middleware**: Custom middleware was created to handle authentication, role verification, and input validation to ensure a secure and efficient process.

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3. Implementation Details

Technologies Used:

- **Backend**: Node.js, Express.js
- **Database**: MongoDB for storing user, booking, and court information.
- **Authentication**: JSON Web Tokens (JWT) for secure user authentication.
- **Frontend**: React.js(VITE) for the user interface.
- **Middleware**: Custom middleware for role-based access control and input validation.

API Endpoints:

- **Authentication**: Registration, login, and profile retrieval endpoints were created.
- **Booking**: Endpoints to create bookings, view user-specific bookings, and allow admins to manage all bookings.
- **Centre and Sports**: Endpoints for adding centers and managing sports for each center.
- **Courts**: Admins can add new courts, and users can check court availability based on selected criteria.

4. Challenges and Solutions

Challenges:

1. **Role-Based Access Control**:
   ○ Implementing different levels of access for users and admins required a thoughtful approach to middleware design.
   ○ **Solution**: Developed a custom middleware to handle role verification using JWT and ensured that admin-only routes were protected.
2. **Managing Booking Conflicts**:
   ○ Preventing double bookings for the same court at overlapping times was a challenge.
   ○ **Solution**: Implemented robust backend logic to check for court availability by comparing the requested booking time against existing bookings.

5. Future Improvements

1. Notification System:

● Add email or SMS notifications to confirm bookings and remind users of upcoming bookings.

2. User Reviews and Ratings:

● Allow users to rate courts and provide feedback, which can help other users make informed decisions.

3. Enhanced Booking Suggestions:

- Implement a recommendation system to suggest courts based on user preferences, location, and past bookings.

4. Mobile Application:

- Expand the functionality by developing a dedicated mobile app to provide users with better on-the-go accessibility.

5. Data Analytics for Admins:

- Provide an analytics dashboard for admins to gain insights into court utilization, peak booking times, and user trends.