Product Requirements Document

Time-Booking Application for Efficient Lab Access

Title: Time-Booking Application for Efficient Lab Access

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1. Introduction

The Time-Booking Application is a web-based platform designed to manage user access to Coding Labs in Madhya Pradesh. The application will allow users to book, reschedule, and cancel lab time slots efficiently, ensuring fair and equitable access to resources. The system will also include features like waitlisting, notifications, and user authentication to ensure secure and organized lab usage.

2. Goals

- To provide a user-friendly and efficient system for booking lab time slots.
- To ensure fair and equitable access to lab resources.
- To reduce administrative overhead associated with manual lab scheduling.
- To improve lab utilization and minimize downtime.

3. Target Audience

- **Users:** Students, researchers, and other individuals requiring access to Coding Labs in Madhya Pradesh.
- **Admins:** Lab managers, Lab operators, IT personnel, and other authorized individuals responsible for managing lab schedules and resources of an organization.

4. Scope

The scope includes:

- User registration and authentication.
- Lab time slot booking, rescheduling, and cancellation.
- Waitlist management and notifications.
- Reporting and monitoring for administrators.
- Web accessibility.

5. Out of Scope

- Integration with external systems beyond basic authentication (e.g.learning management systems).
- Advanced analytics and predictive modeling for lab usage.

6. Functional Requirements

6.1 User Roles

- **User:** Primary user who can book, reschedule, and cancel lab time slots.
- **Admin:** Responsible for updating lab schedule and computer availability.
- **System:** Automated role for sending notifications, managing waitlists, and ensuring fair access.

6.2 Core Features

6.2.1 User Authentication and Authorization

- **FR-1:** The system shall allow users to register on application & allow log in using their ID and password.
- **FR-2:** The system shall authenticate users based on their ID and ensure only authorized users can access the booking system.
- **FR-3:** The system shall allow admins to log in using a separate admin ID and password.

6.2.2 Lab Time Slot Booking

- **FR-4:** The system shall display available time slots for Coding Labs in real-time.
- **FR-5:** The system shall allow users to book a time slot based on availability.
- **FR-6:** The system shall allow users to view their booked slots in a "My Bookings" section.
- **FR-7:** The system shall prevent overbooking by limiting the number of users per time slot.

6.2.3 Rescheduling and Cancellation

- **FR-8:** The system shall allow Users to reschedule their booked time slots, subject to availability.
- **FR-9:** The system shall allow Users to cancel their booked time slots.
- **FR-10:** The system shall automatically free up cancelled slots for other Users to book.

6.2.4 Waitlist Management

- **FR-11:** The system shall allow Users to join a waitlist if no slots are available.
- **FR-12:** The system shall notify waitlisted Users via email or SMS when a slot becomes available.
- **FR-13:** The system shall prioritize waitlisted Users based on their position in the queue.

6.2.5 Notifications and Reminders

- **FR-14:** The system shall send confirmation notifications to Users upon successful booking.
- **FR-15:** The system shall send reminders to Users 24 hours before their booked time slot.
- **FR-16:** The system shall notify Users of any changes to their booked slots (e.g., rescheduling or cancellation).

6.2.6 Fair Access and Scheduling

- **FR-17:** The system shall ensure fair access by limiting the number of bookings per user per week.
- **FR-18:** The system shall prevent monopolization of resources by enforcing a maximum usage limit per user.

6.2.7 User-Friendly Interface

- **FR-19:** The system shall provide a simple and intuitive interface for web platform.

- **FR-20:** The system shall display available time slots in a calendar view for easy selection.
- **FR-21:** The system shall provide a search feature to filter available slots by date and time.

6.2.8 Reporting and Monitoring (Admin Features)

- **FR-22:** The system shall allow admins to view all booked slots and lab usage statistics.
- **FR-23:** The system shall generate reports on lab usage, including peak hours and most active users.
- **FR-24:** The system shall allow admins to manually override bookings in case of emergencies or conflicts.

7. Non-Functional Requirements

7.1 Performance

- **NFR-1:** The system shall handle up to 10,000 concurrent users without performance degradation.
- **NFR-2:** The system shall respond to user requests within 2 seconds under normal load.

7.2 Security

- **NFR-3:** The system shall encrypt all user data, including login credentials and booking details.
- **NFR-4:** The system shall implement role-based access control to ensure only authorized users can perform specific actions.

7.3 Scalability

- **NFR-5:** The system shall be scalable to accommodate additional labs and users as the project expands.

7.4 Availability

- **NFR-6:** The system shall have a 99.9% uptime, ensuring it is always available for bookings.

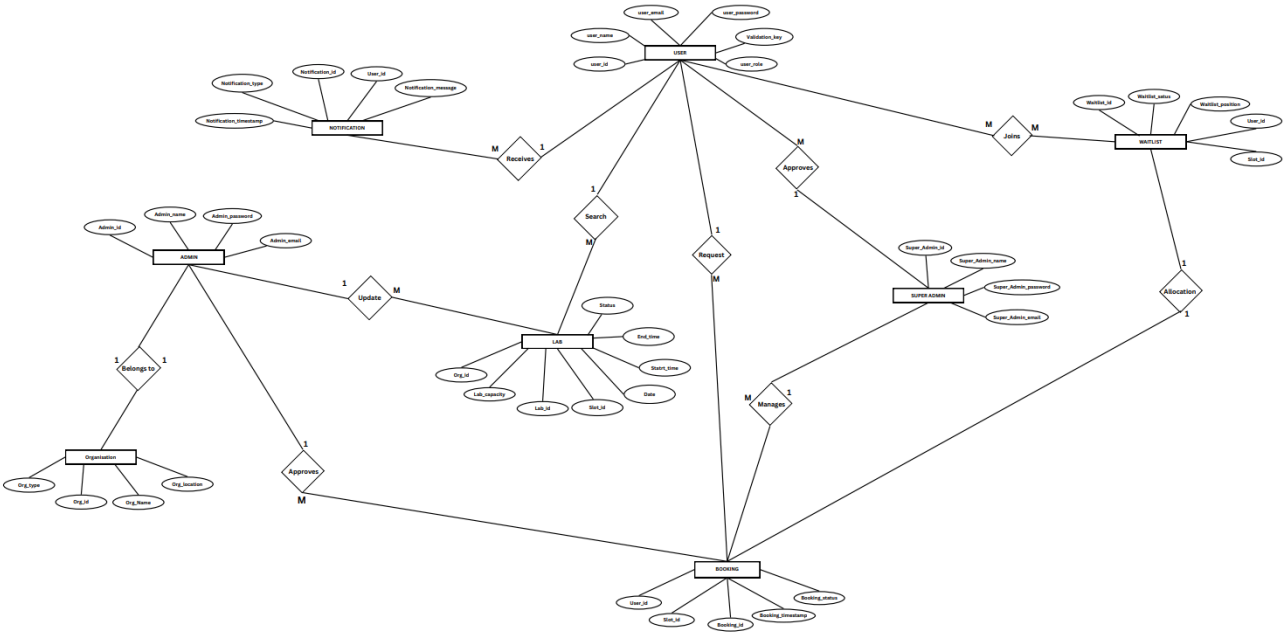
7.5 Accessibility

- **NFR-7:** The system shall be accessible on both web platform, with a responsive design for different screen sizes.
- **NFR-8:** The system shall support multiple languages to cater to Users from diverse linguistic backgrounds.

8. Essential Requirements

- **ER-1:** Dedicated high end server grade machine with public network access
- **ER-2:** Cloud Infrastructure

9. Entity Relationship Diagram (ERD)



10. Use Cases

10.1 User Use Cases

- **UC-1:** Register for an account.
- **UC-2:** Log in to the application.
- **UC-3:** View available lab time slots.
- **UC-4:** Book a lab time slot.
- **UC-5:** View booked lab time slots.
- **UC-6:** Reschedule a booked lab time slot.
- **UC-7:** Cancel a booked lab time slot.
- **UC-8:** Join a waitlist for a lab time slot.
- **UC-9:** Receive notifications and reminders.

10.2 **Admin Use Case**

- **UC-10:** Log in to the application.
- **UC-11:** Update available lab time slots.
- **UC-12:** Approve Bookings

10.2 Super Admin Use Cases

- **UC-13:** Log in to the admin panel.
- **UC-14:** View lab usage statistics.
- **UC-15:** Generate lab usage reports.
- **UC-16:** Manually override bookings.
- **UC-17:** System Oversight

11. Technology Stack (Proposed)

- **Frontend:** React (Web)
- **Backend:** Node.js
- **Database:** PostgreSQL
- **Cloud Platform:** To be determined

12. Assumptions and Dependencies

- Reliable internet connectivity for users and admins.
- Availability of lab resources according to the schedule.
- Timely maintenance of the application and infrastructure.

13. Open Issues and Risks

- Potential for user resistance to a new booking system.
- Security vulnerabilities if not properly addressed.
- Scalability challenges with rapid user growth.

14. Future Enhancements

- Integration with payment gateways for paid lab access.
- Advanced analytics and reporting features.
- Integration with learning management systems.
- Implementation of a feedback system for users.
- Developing Mobile Application.

15. Glossary

- **Lab:** Computer Lab in Madhya Pradesh.
- **Time Slot:** A specific period of time allocated for lab usage.
- **User:** An individual who uses the lab resources.
- **Admin:** An individual responsible for managing lab resources of an organization.
- **Super Admin:** An individual responsible for overall management of the system.