

Software Development Project Proposal

Railway Management System

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2 Project Overview

2.1 Objective

The objective of this project is to design and develop a Railway Management System, a web-based application that allows users to search for trains, book tickets, and manage their bookings, while enabling administrators to manage train schedules, user data, and ticketing operations efficiently.

2.2 Problem Statement

Manual railway ticket booking and train schedule management can be time-consuming, error-prone, and inconvenient for both passengers and railway staff. Existing systems may lack modern features like real-time seat availability or user-friendly interfaces. This project aims to solve these issues by providing a centralized and automated platform for passengers and administrators, ensuring efficiency, reliability, and ease of use.

2.3 Scope

The project will cover the following:

- A secure login/registration system for users and admins
- Train search based on date, time, and destination
- Ticket booking and cancellation, including download/print options
- Seat availability checking and optional seat selection
- A comprehensive admin panel to manage trains, schedules, users, and bookings
- Optional payment simulation
- Additional UX features like mobile responsiveness and dark mode

2.4 Technologies

- **Frontend:** HTML,CSS,Bootstrap
- **Backend:** Laravel
- **Database:** MySQL
- **Version Control:** Git & GitHub (shared repository)
- **Tools:** VS Code, Postman (for API testing)

3 Related Projects

1. Bangladesh Railway (eticket.railway.gov.bd)

- **Features:** Train search, ticket booking, user registration/login, ticket cancellation, mobile-friendly interface.
- **Limitations:** Basic UI, minimal user personalization, and slow during peak hours.

2. Indian Railways IRCTC (www.irctc.co.in)

- **Features:** Real-time seat availability, secure payment gateway, multiple travel classes, SMS/email confirmation, refund policy.
- **Limitations:** Complex UI for new users, occasional downtime, and not mobile-first in design.

3. RedBus Train Booking (www.redbus.in/train)

- **Features:** Clean and intuitive UI, train search by source/destination, integration with IRCTC for ticket booking, customer support, and mobile app availability.
- **Limitations:** Relies on IRCTC infrastructure for bookings, meaning limited control over backend reliability and occasional syncing issues with IRCTC data.

Key Takeaways

From analyzing these existing systems, our project aims to:

- Combine essential functionalities like search, booking, cancellation, and user management.
- Improve upon UI/UX by offering mobile responsiveness and dark mode.
- Provide both user-side and admin-side control panels.
- Keep the system scalable and modular for future improvements like live tracking or email notifications.

4 Tentative Features

The Railway Management System is designed to streamline railway operations, ticket booking, and user management. The system will offer the following categorized features:

1. User Authentication

Secure and accessible access control for users.

- **User registration:** Allows new users to create an account.
- **Secure login/logout:** Authenticated access to system functionalities.
- **Password reset / Forgot password:** Enables users to recover accounts easily.
- **Session management:** Ensures secure and timed logouts or session handling.

2. User Dashboard

Personalized area for managing user data and bookings.

- **Profile management:** Update personal details like name, contact, and password and their personal informations.
- **View booking history:** Track previous and upcoming bookings.

3. Train Search and Schedule

Helps users find and plan travel easily.

- **Search trains by destination/date/class:** Filter and find suitable trains.
- **View train schedules:** Display timings, routes, and stoppages.
- **View train details:** Information about train type, available classes, and duration.

4. Ticket and Booking Management

Manages the entire ticket lifecycle from booking to cancellation.

- **Book tickets:** Select route, train, and seats to reserve tickets.
- **Auto seat assignment:** Automatically allocate seats if selection is skipped.
- **Cancel tickets:** Cancel confirmed tickets as per policy.
- **Check seat availability:** Live seat availability before booking.
- **Seat selection (optional):** Users may manually pick seats.
- **Download/print tickets:** Generate a printable ticket after booking.
- **Display ticket confirmation:** Booking summary shown after payment.

5. Admin Panel

Central control system for managing all data.

- **Add/edit/delete trains:** CRUD operations on train entries.
- **Manage schedules:** Create or update train timings and routes.
- **Manage users:** View or modify user accounts. (with limited control — no direct access to sensitive information like passwords or payment methods).
- **Manage bookings:** Oversee all ticket bookings and cancellations.
- **Manage the Overall System:** Oversee all core functionalities, system settings.

6. Payment Gateway (Optional)

Handles ticket purchase transactions.

- **Simulated or real payment system:** Integrate mock or actual payment API.
- **Track payment status:** Confirm and show success/failure of payments.
- **Payment history log:** Maintain user-wise transaction records.

7. Additional Features

Enhance user experience and usability.

- **Dark mode:** Optional theme for better nighttime viewing.
- **Mobile-responsive design:** Works smoothly on various screen sizes.

8. Future Enhancements (Post-MVP)

Scalable improvements for future versions.

- **Email/SMS notifications:** Send alerts on booking confirmations and updates.
- **QR code verification:** Tickets can be scanned during travel for quick validation.
- **Real-time train tracking:** Integration with GPS-based live train status.

5 System Design

5.1 Requirement Gathering

Requirements for the Railway Ticket Booking System will be collected through:

- **User Surveys:** To understand common needs like train searching, booking, and cancellation among general passengers.
- **Stakeholder Interviews:** Discuss with railway staff and potential users to identify operational bottlenecks and expectations.
- **Domain Analysis:** Analyze how traditional railway systems work and what digital systems (like IRCTC) currently offer.

Functional Requirements:

- User registration and login
- Train search and seat availability
- Ticket booking and cancellation
- Booking history and invoice
- Admin panel for managing trains, schedules, and users

Non-Functional Requirements:

- Scalability for large numbers of users
- Secure authentication and session management
- Responsive design for various devices
- Maintainability for future feature additions

5.2 Feasibility Analysis

- **Technical Feasibility:** The system will use Laravel (PHP), MySQL, and standard front-end technologies (HTML, CSS, Bootstrap). These are all well-documented and within the team's skill set.
- **Economic Feasibility:** Development costs are low due to the use of open-source tools. Deployment can be done on free-tier platforms during development (e.g., Laravel Forge or shared hosting).
- **Operational Feasibility:** The system is designed to simplify booking and management processes, making it efficient for both users and admins.
- **Schedule Feasibility:** A 11-week timeline is considered sufficient for an MVP and feature-complete system, with deliverables clearly defined.

5.3 System Architecture

The system will follow a **three-tier architecture**:

- **Presentation Layer (Frontend):** HTML, CSS, Bootstrap – Handles UI and user interaction
- **Application Layer (Backend):** Laravel (PHP Framework) – Contains all business logic, handles routing, authentication, booking logic, etc.
- **Data Layer (Database):** MySQL – Stores user data, train info, booking records, etc.

5.4 Data Flow

Here's a simplified overview of the data flow:

1. **User Registration/Login** → Credentials are sent to backend for validation.
2. **Train Search** → User inputs route/date → Backend fetches train list from DB.
3. **Seat Booking** → User selects train/seat → Backend checks availability → Confirms and stores booking.
4. **Cancellation** → User initiates cancellation → Backend updates seat status and booking record.
5. **Admin Actions** → Admin manages trains, adds schedules, updates info → Data stored/updated in DB.

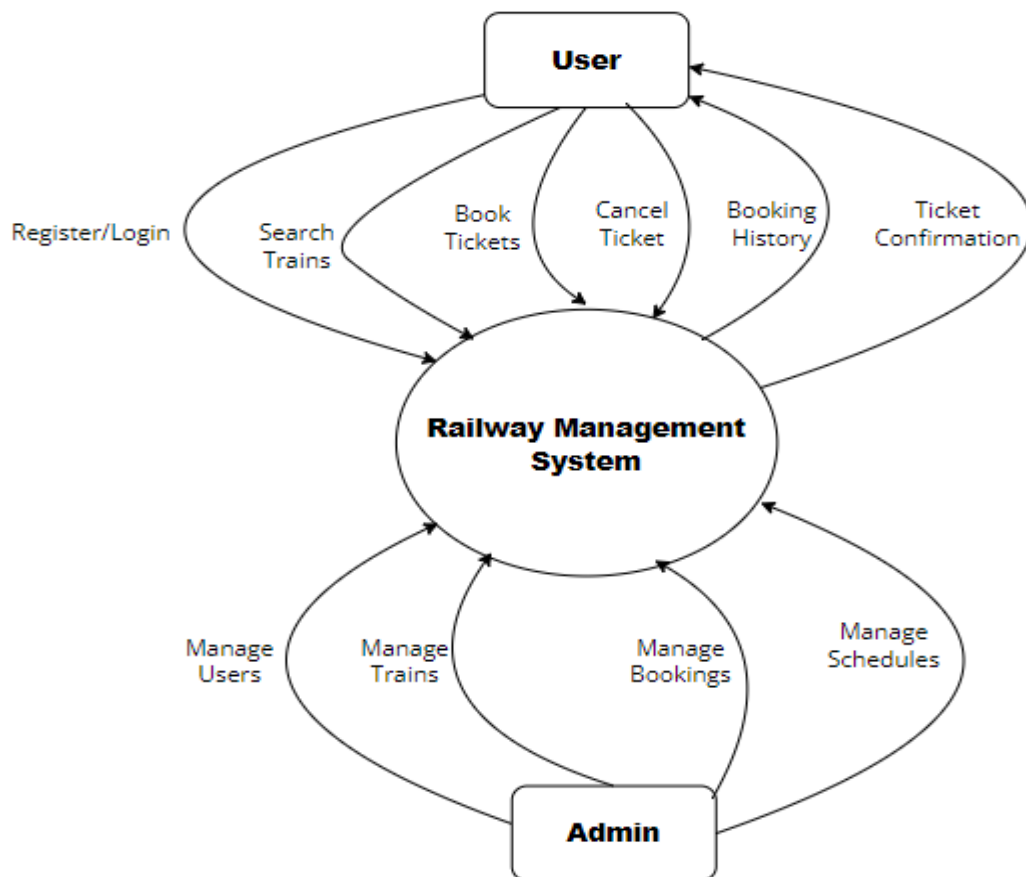


Figure : Context Level Diagram of Railway Management System

6 Project Timeline (Gantt Chart)

The project will span 11 weeks, with the proposal due in Week 4. Below is a Gantt chart outlining key tasks and milestones.

Task	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11
Requirement Analysis	X	X									
Research & Related Projects	X	X									
Proposal Drafting		X	X								
Proposal Submission				X							
System Design					X	X					
Frontend Development						X	X	X			
Backend Development						X	X	X			
Database Setup							X	X			
Integration & Testing								X	X	X	
User Testing & Feedback									X	X	
Final Adjustments										X	X
Project Submission											X

.Note: X represents task duration in a given week.

7 Deliverables

The following milestones have been defined to ensure systematic progress throughout the development lifecycle:

- **Week 4: Project Proposal Document**

- Submission of the detailed proposal outlining the project scope, objectives, system design, features, and work plan.

- **Week 8: Minimum Viable Product (MVP)**

Core modules implemented:

- User registration and login
- Train search and availability checking
- Ticket booking and cancellation
- Admin panel with limited control

- **Week 12: Final Application**

- All planned features fully integrated
- Admin dashboard with full control over trains and schedules
- Final UI polish, validation, and user feedback handling
- Full documentation:
 - Technical report
 - User manual / user guide
 - Deployment guide (if applicable)
- Final project presentation