TRIP NEST

ONLINE CAB BOOKING SYSTEM

Name: YASHASWINI N.M

Sec: MCA ‘A’

USN No: 24SUPMCAGL104

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CHAPTER 1

INTRODUCTION

With the rapid growth of urbanization and increasing mobility needs, reliable transportation has become one of the most essential services in modern cities. Inefficient cab booking systems, lack of real-time tracking, and poor communication between drivers and passengers often result in long waiting times, unreliable service, and customer dissatisfaction. Traditional taxi services struggle with manual dispatch systems, cash-based transactions, and limited visibility into driver availability and location, leading to operational inefficiencies and poor user experiences.

To address these challenges, TripNest introduces a Comprehensive Online Cab Booking Platform that seamlessly connects passengers, drivers, and administrators under a unified digital ecosystem. TripNest serves as a centralized, full-stack web application that enables real-time cab booking, ride tracking, and secure payment processing. The platform allows passengers to instantly book rides by specifying their pickup and drop locations, preferred vehicle type, and ride preferences through an intuitive and user-friendly interface. On the driver side, registered drivers can view nearby ride requests, accept bookings, and navigate to passenger locations using integrated mapping functionality.

The platform incorporates a sophisticated role-based access system where customers can book rides,drivers can manage their availability and earnings, and administrators can oversee the entire operation. Real-time notifications keep all parties informed about booking confirmations, driver arrivals, and ride completions, ensuring transparent communication throughout the journey. The backend, built using Spring Boot, ensures robust performance and seamless integration between the web interface and database, while Thymeleaf templates provide dynamic content rendering for enhanced user interaction.

TripNest features a comprehensive booking management system where passengers can track their ride history, view fare estimates, and make secure digital payments. Drivers benefit from an earnings dashboard, trip history, and performance metrics that help them optimize their service. The administrative panel provides complete oversight with user management, driver verification, booking analytics, and revenue reports. Data is securely stored and managed using MySQL, ensuring transaction integrity, scalability, and efficient data retrieval for all platform operations.

Moreover, the platform is designed with scalability in mind, allowing for future integration of advanced features such as real-time GPS tracking, AI-powered route optimization, surge pricing algorithms, and mobile application development. The system can be extended to include loyalty programs, corporate accounts, and multi-city operations to serve diverse customer needs. Advanced analytics can help identify peak demand periods, popular routes, and driver performance patterns to optimize fleet management and service quality.

By combining modern web technologies with efficient transportation management, TripNest not only streamlines the cab booking process but also enhances the overall commuting experience for urban residents. It empowers passengers with convenient, reliable transportation options while providing drivers with a steady stream of bookings and fair compensation. The platform encourages digital transformation in the transportation sector while maintaining high standards of safety, transparency, and customer satisfaction.

CHAPTER 2

PROBLEM STATEMENT

Urban transportation systems, particularly in rapidly growing cities, often fail to address the unique safety and convenience needs of women passengers. Despite the increasing demand for reliable cab services, women continue to face significant challenges related to safety, privacy, and accessibility when using online transportation platforms.

In the existing system:

- Lack of Safety Assurance**:** Women passengers often feel vulnerable during rides, especially during late hours or in unfamiliar areas, due to insufficient safety measures and background verification of drivers.
- Limited Gender-Sensitive Features: Most cab booking platforms do not offer gender-specific options such as women-only drivers or female-friendly ride preferences, restricting comfort and choice for women users.
- Inadequate Emergency Support**:** There is often no integrated or quick emergency response mechanism within cab applications to assist women in distress during a ride.
- Poor Communication Channels**:** Women may hesitate to report discomfort, harassment, or safety concerns due to complex or non-transparent complaint redressal systems.

These limitations contribute to a lack of trust in online cab services, discouraging many women from using them regularly and limiting their mobility—especially during odd hours or in isolated locations.

TripNest aims to bridge this gap by introducing a secure, women-friendly cab booking ecosystem. The platform integrates enhanced safety protocols, real-time ride tracking, emergency alert systems, and women-exclusive ride options to ensure a dignified, safe, and comfortable travel experience for women passengers.

CHAPTER 3

OBJECTIVES

The main objectives of TripNest are:

- To design a comprehensive web-based cab booking platform that seamlessly connects passengers, drivers, and administrators through an intuitive and secure interface.
- To implement a robust user authentication and role-based access system that ensures secure login and appropriate permissions for customers, drivers, and administrators.
- To develop a real-time ride booking system that allows passengers to easily book cabs by specifying pickup/drop locations, preferred vehicle type, and ride preferences.
- To create an advanced driver management system that enables driver registration, verification, availability tracking, and earnings management.
- To integrate safety features specifically designed for women passengers including women-only ride options, real-time ride tracking, and emergency alert mechanisms.
- To implement a transparent booking and payment system that provides fare estimates, ride history, and secure digital payment options for seamless transactions.
- To develop an administrative dashboard for comprehensive oversight of users, drivers, bookings, revenue, and platform analytics to support data-driven decision making.
- To ensure platform scalability and reliability through efficient database management, responsive design, and future-ready architecture for potential mobile app integration and advanced feature additions.
- To foster trust and transparency between all stakeholders through real-time notifications, rating systems, and clear communication channels.
- To promote urban mobility solutions that are accessible, efficient, and safe for all users, with special emphasis on women's safety and convenience.

CHAPTER 4

SYSTEM ANALYSIS

4.1 Existing System

In traditional cab booking and transportation services:

- **Manual Booking Processes:** Customers typically rely on phone calls, street hailing, or visiting physical taxi stands to book rides, leading to longer waiting times and inconvenience.
- **Limited Driver-Passenger Coordination:** There is no real-time communication or tracking system between drivers and passengers, resulting in uncertainty about arrival times and ride status.
- **Cash-Based Transactions:** Most traditional services operate on cash payments, which are inconvenient, less secure, and lack digital transaction records.
- **No Centralized Management:** Transportation companies lack integrated systems to monitor driver performance, customer feedback, booking history, or revenue analytics.
- **Inadequate Safety Measures:** Especially for women and vulnerable passengers, there are no dedicated safety features, emergency buttons, or verified driver profiles.

4.2 Limitations of the Existing System

- **Poor User Experience:** Lack of real-time updates and digital convenience leads to customer dissatisfaction.
- **Inefficient Resource Utilization:** Drivers often waste time and fuel searching for passengers without a structured dispatch system.
- **Safety Concerns:** Absence of ride tracking, SOS features, and driver background checks increases risks for passengers.
- **Limited Accessibility:** Services are often unavailable in remote or less crowded areas.
- **No Data-Driven Insights:** Inability to analyze ride patterns, peak demand hours, or customer preferences for service improvement.

4.3 Proposed System

The TripNest platform offers:

- **A Customer Portal** for easy ride booking, real-time tracking, fare estimation, and secure digital payments.
- **A Driver Portal** for managing ride requests, earnings, availability status, and navigation support.
- **An Admin Portal** for overseeing users, drivers, bookings, payments, and platform analytics.
- **Enhanced Safety Features** including women-only ride options, SOS alerts, and real-time location sharing.
- **Automated Notifications** sent to users and drivers for booking confirmations, driver arrival, and ride completion.
- **A Centralized Database** built using MySQL to ensure secure, scalable, and efficient management of all platform data.
- **Future-Ready Architecture** supporting integration with GPS, mobile apps, AI-based routing, and advanced analytics.

CHAPTER 5

SYSTEM DESIGN

TripNest follows the MVC (Model-View-Controller) design pattern:

Model: JPA entities like User, Driver, Booking, Vehicle, and Payment represent data stored in the MySQL database. These entities define the core business objects and their relationships within the cab booking system.

View: Thymeleaf templates render dynamic HTML pages for different user interfaces:

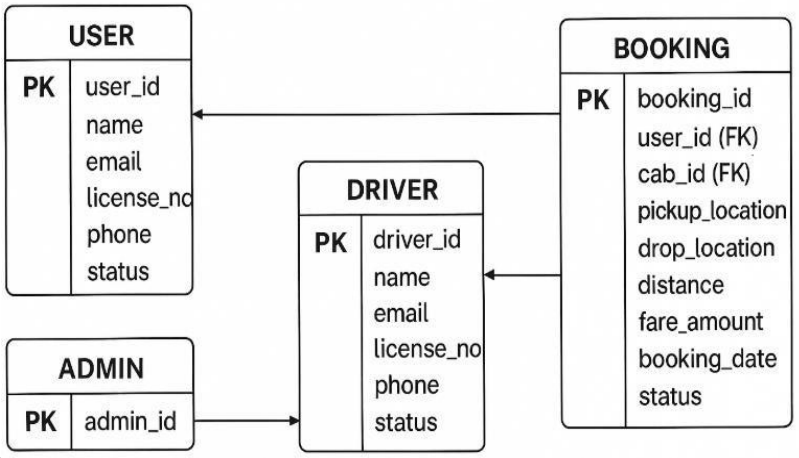
- **Customer Interface** (customer-dashboard.html, book-ride.html, booking-history.htl)
- **Driver Interface** (driver-dashboard.html, driver-registration.html)
- **Admin Interface** (admin-dashboard.html, admin-users.html, admin-bookings.html)

Controller: Spring Boot controllers handle HTTP requests and business logic:

- **AuthController** - manages user authentication, registration, and session handling
- **BookingController** - processes ride requests, booking management, and status updates
- **DriverController** - handles driver operations, availability, and earnings
- **AdminController** - manages administrative functions and platform analytics

Database: MySQL database stores all application data including user profiles, driver information, vehicle details, booking records, payment transactions, and system configurations. The database ensures data integrity and efficient retrieval for real-time operations.
Service Layer: Business services like UserService, BookingService, DriverService, and PaymentService encapsulate the core business logic and coordinate between controllers and repositories.

Repository Layer: Spring Data JPA repositories provide data access abstraction for all entities, enabling CRUD operations and custom queries.
This MVC architecture ensures clear separation of concerns, maintainability, and scalability while providing a robust foundation for the online cab booking platform.



CHAPTER 6

DATABASE DESIGN

```
-- Create Database
CREATE DATABASE tripnest_db;
USE tripnest_db;
```

1. Users:stores the users data credentials

```
-- Table: users
CREATE TABLE users (
    user_id INT AUTO_INCREMENT PRIMARY KEY,
    username VARCHAR(100) NOT NULL,
    email VARCHAR(150) UNIQUE NOT NULL,
    password VARCHAR(255) NOT NULL,
    role ENUM('Admin', 'Traveler') DEFAULT 'Traveler',
    phone VARCHAR(15),
    created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);
```

2. Destinations: stores the destinations od the user

```
-- Table: destinations
CREATE TABLE destinations (
    destination_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(150) NOT NULL,
    location VARCHAR(150),
    description TEXT,
    image_url VARCHAR(255),
    created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);
```

3. Bookings: stores the users bookings

```
-- Table: bookings
CREATE TABLE bookings (
    booking_id INT AUTO_INCREMENT PRIMARY KEY,
    user_id INT,
    package_id INT,
    booking_date DATE DEFAULT (CURRENT_DATE),
    status ENUM('Pending', 'Confirmed', 'Cancelled') DEFAULT 'Pending',
    num_travelers INT DEFAULT 1,
    total_amount DECIMAL(10,2),
    FOREIGN KEY (user_id) REFERENCES users(user_id)
        ON DELETE CASCADE ON UPDATE CASCADE,
    FOREIGN KEY (package_id) REFERENCES packages(package_id)
        ON DELETE CASCADE ON UPDATE CASCADE
);
```

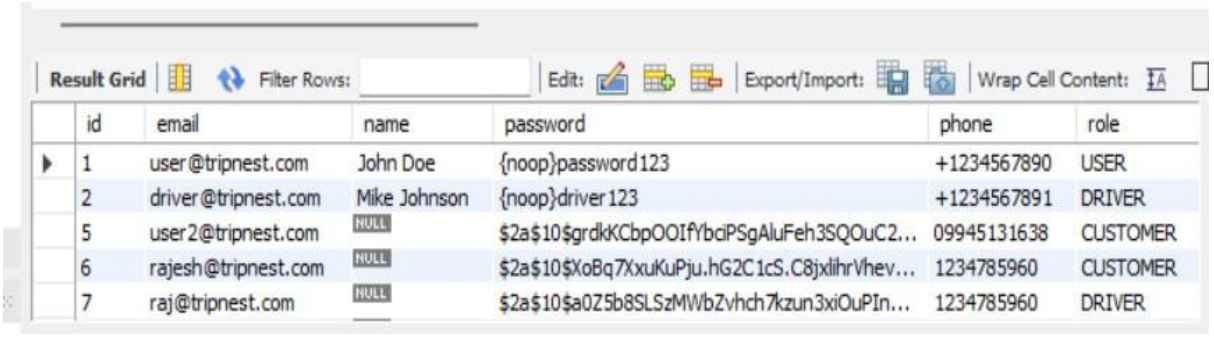
4. payments:stores the user payments paid

```
 -- Table: payments
CREATE TABLE payments (
    payment_id INT AUTO_INCREMENT PRIMARY KEY,
     booking_id INT,
    payment_date DATETIME DEFAULT CURRENT_TIMESTAMP,
    amount DECIMAL(10,2) NOT NULL,
    payment_method ENUM('Credit Card', 'Debit Card', 'UPI', 'NetBanking', 'Cash') NOT NULL,
    payment_status ENUM('Success', 'Pending', 'Failed') DEFAULT 'Pending',
```

```
FOREIGN KEY (booking_id) REFERENCES bookings(booking_id) ON
DELETE CASCADE ON UPDATE CASCADE
    );
```

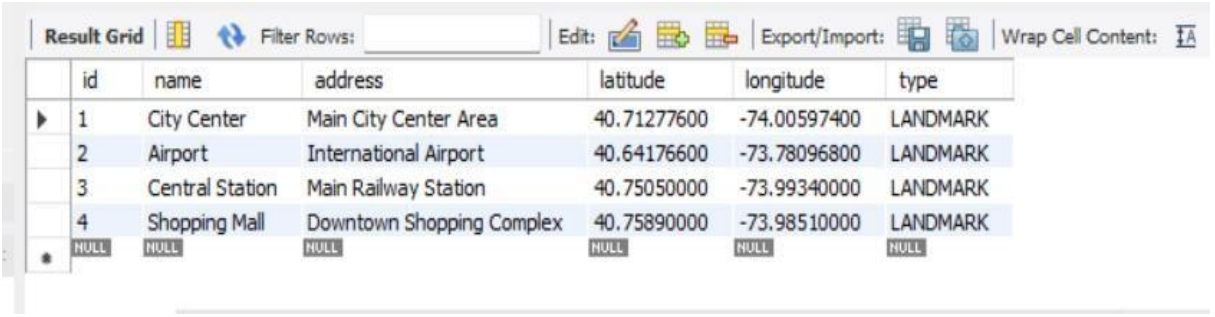
5. Reviews:stores the user gave the reviews

```
-- Table: reviews
CREATE TABLE reviews (
    review_id INT AUTO_INCREMENT PRIMARY KEY,
    user_id INT,
    package_id INT,
    rating INT CHECK (rating BETWEEN 1 AND 5),
    comment TEXT,
    review_date TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    FOREIGN KEY (user_id) REFERENCES users(user_id)
        ON DELETE CASCADE ON UPDATE CASCADE,
    FOREIGN KEY (package_id) REFERENCES packages(package_id)
        ON DELETE CASCADE ON UPDATE CASCADE
);
```



Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

id	email	name	password	phone	role
1	user@tripnest.com	John Doe	{noop}password123	+1234567890	USER
2	driver@tripnest.com	Mike Johnson	{noop}driver123	+1234567891	DRIVER
5	user2@tripnest.com	NULL	$2a$10$grdkKCbpOOIfYbciPSgAluFeh3SQOuC2...	09945131638	CUSTOMER
6	rajesh@tripnest.com	NULL	$2a$10$XoBq7XxuKuPju.hG2C1cS.C8jxlihrVhev...	1234785960	CUSTOMER
7	raj@tripnest.com	NULL	$2a$10$a0Z5b8SLSzMWbZvhch7kzun3xiOuPIn...	1234785960	DRIVER



Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

id	name	address	latitude	longitude	type
1	City Center	Main City Center Area	40.71277600	-74.00597400	LANDMARK
2	Airport	International Airport	40.64176600	-73.78096800	LANDMARK
3	Central Station	Main Railway Station	40.75050000	-73.99340000	LANDMARK
4	Shopping Mall	Downtown Shopping Complex	40.75890000	-73.98510000	LANDMARK
NULL	NULL	NULL	NULL	NULL	NULL

CHAPTER 7

MODULE DESCRIPTION

1.1 User Module (Passenger Portal)

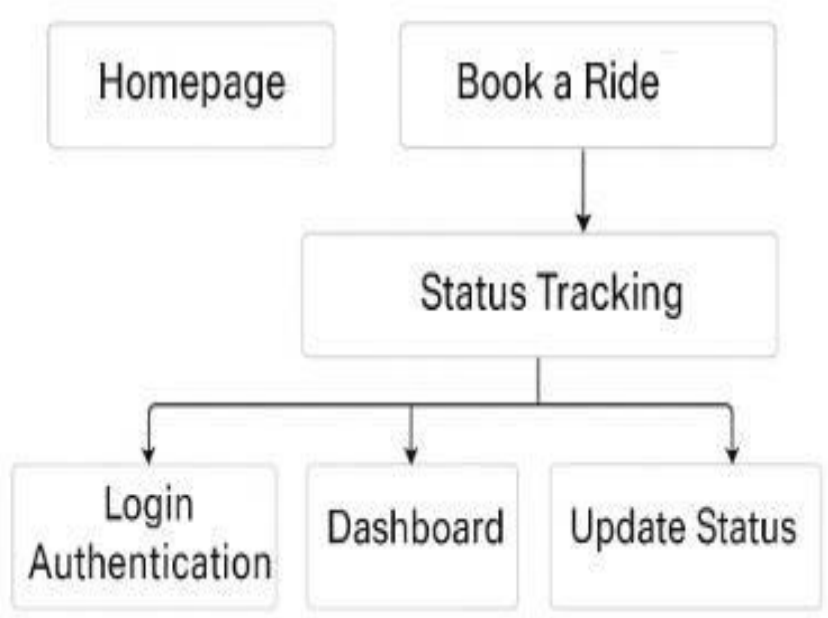
- **Homepage:** Displays TripNest overview and navigation options.
- **Book Cab:** Allows users to select pickup & drop locations, cab type, and schedule rides.
- **Ride Status Tracking:** Shows cab details, driver info, and live trip updates.
- **Payment Gateway:** Secure online payments via UPI, card, or wallet.
- **Ride History:** Displays previous rides and invoices.

1.2 Driver Module (Driver Portal)

- **Login Authentication:** Secure driver access with profile verification.
- **View Bookings:** Displays assigned rides and trip details.
- **Update Ride Status:** Driver can mark rides as accepted, ongoing, or completed.
- **Earnings Dashboard:** Shows total earnings, trip count, and feedback.

1.3 Admin Module (Administrator Portal)

- **Admin Login:** Secure admin access.
- **Manage Users & Drivers:** Add, edit, or remove passengers and drivers.
- **Monitor Bookings:** View all active and completed rides.
- **Reports & Analytics:** Display total rides, revenue, and performance charts.



CHAPTER 8

IMPLEMENTATION DETAILS

Backend

- Framework: Spring Boot
- Database: MySQL
- ORM Tool: Spring Data JPA
- Architecture: MVC (Model–View–Controller) pattern
- Security: Spring Security with encrypted passwords and form validation
- API Integration: Google Maps API for route and fare calculation

Frontend

- Languages: HTML, CSS, JavaScript
- Templating Engine: Thymeleaf (for dynamic UI rendering)
- Design Theme: Travel-inspired (blue and white tones for clarity and trust)
- Responsive Design: Optimized for mobile, tablet, and desktop views
- UI Components: Booking forms, cab listings, and real-time status indicators

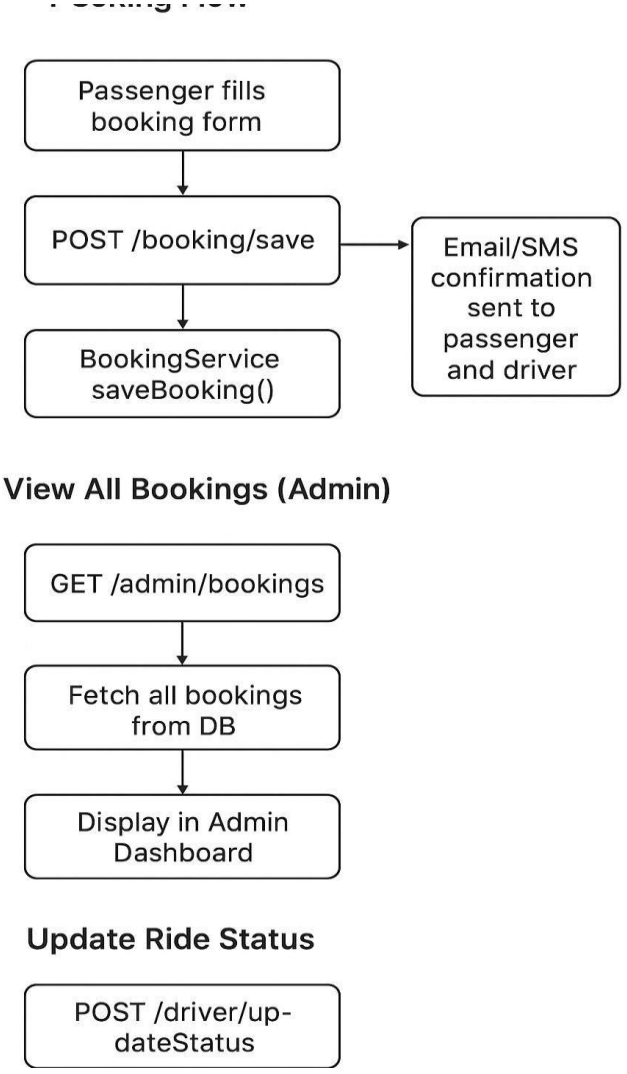
CHAPTER 9

SYSTEM WORKFLOW

1. Booking Flow
Flow: Passenger fills booking form → POST /booking/save → BookingService.saveBooking() → Data stored in DB → Email/SMS confirmation sent to passenger and driver

2. View All Bookings (Admin)
Flow: GET /admin/bookings → Fetch all bookings from DB → Display in Admin Dashboard

3. Update Ride Status
Flow: POST /driver/updateStatus → Update DB (status: Accepted, Ongoing, Completed) → Reflect in Passenger's Portal



CHAPTER 10

TESTING AND RESULTS

Testing Methods

The TripNest application underwent systematic testing to ensure reliability, performance, and user satisfaction.

The testing covered backend services, database operations, and the user interface.
Integration testing was conducted for all major modules, including booking flow, driver allocation, and payment simulation.

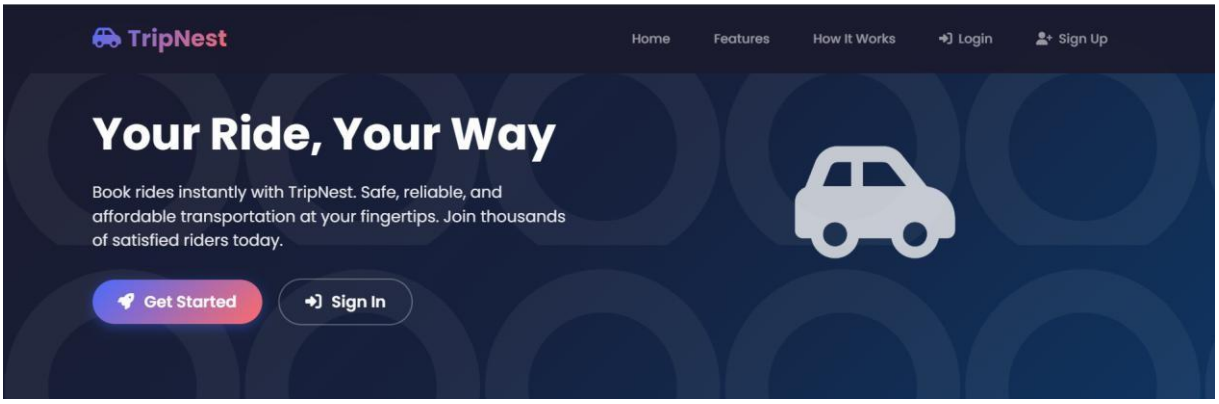
End-to-end testing validated the process from user login to cab confirmation, ensuring a seamless experience.

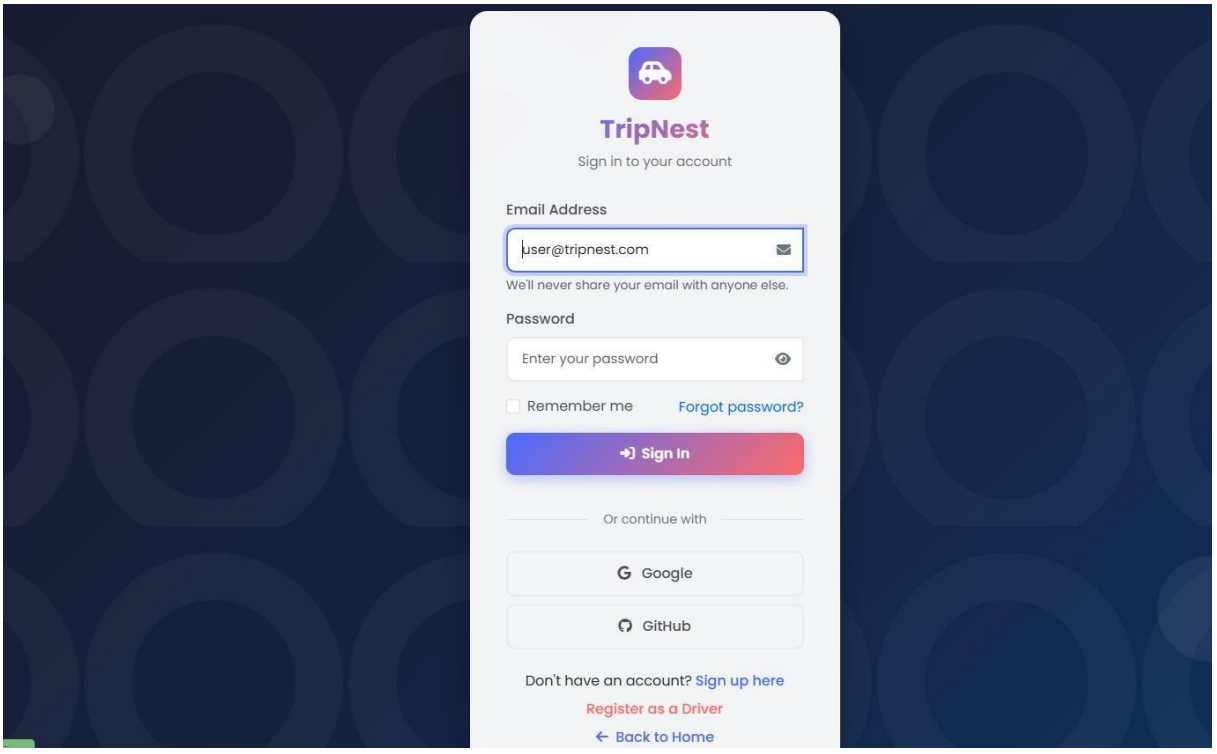
Responsiveness of the Thymeleaf templates and accurate data retrieval through Spring Boot and JPA were verified.
Notifications and booking confirmations were also tested to ensure real-time updates.

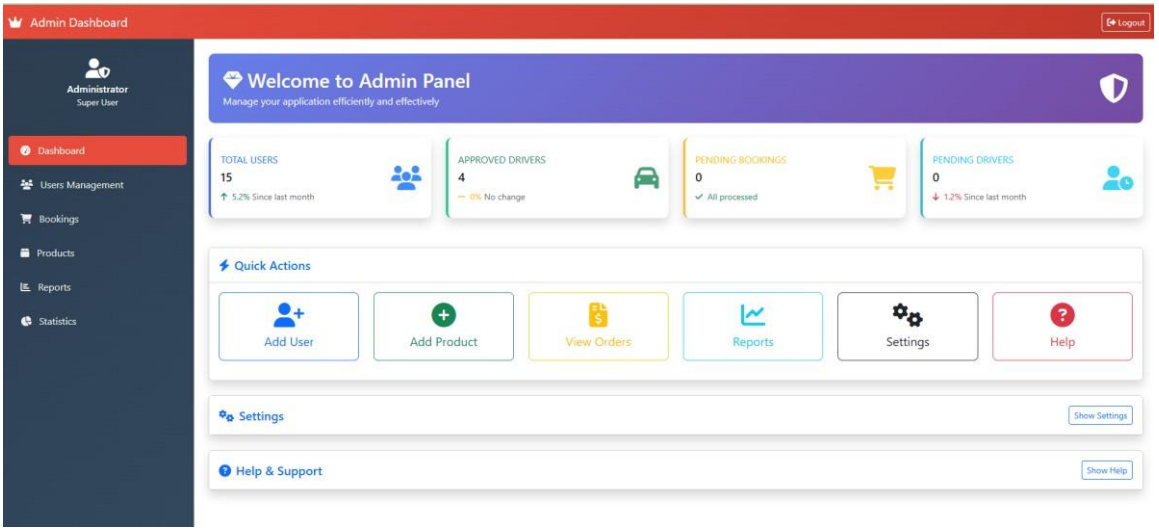
Test Case Summary

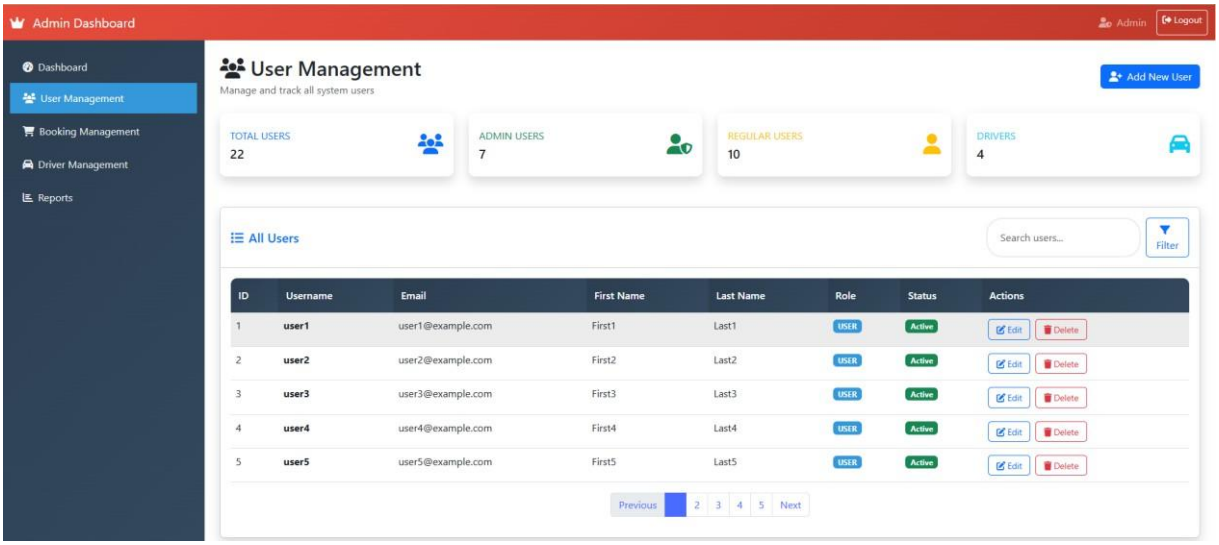
Module	Test Performed	Expected Output	Result
User Registration & Login	New user signs up and logs in	User account created and login successful	Success
Cab Search	User enters pickup and drop location	Available cabs displayed with fare and time estimate	Success
Cab Booking	User selects cab and confirms booking	Booking details stored in database and confirmation shown	Success
Driver Allocation	Assign driver automatically or manually	Driver details mapped to booking record	Success
Email/SMS Notification	Trigger confirmation alerts to user and driver	Both parties receive instant booking notification	Success
Booking History	User views past rides	Accurate ride details fetched from DB	Success
Admin Login	Admin logs into dashboard	Secure login and access to analytics panel	Success
Trip Management	Admin monitors ongoing trips and updates status	Real-time status reflected in system	Success
Payment Module (Simulation)	User makes payment (COD / online)	Payment status updated successfully	Success
Database Connectivity	Test CRUD operations using JPA	Data inserted, updated, and fetched correctly	Success
UI Functionality	Navigation between user, driver, and admin modules	Responsive, fast-loading, and user-friendly UI	Success

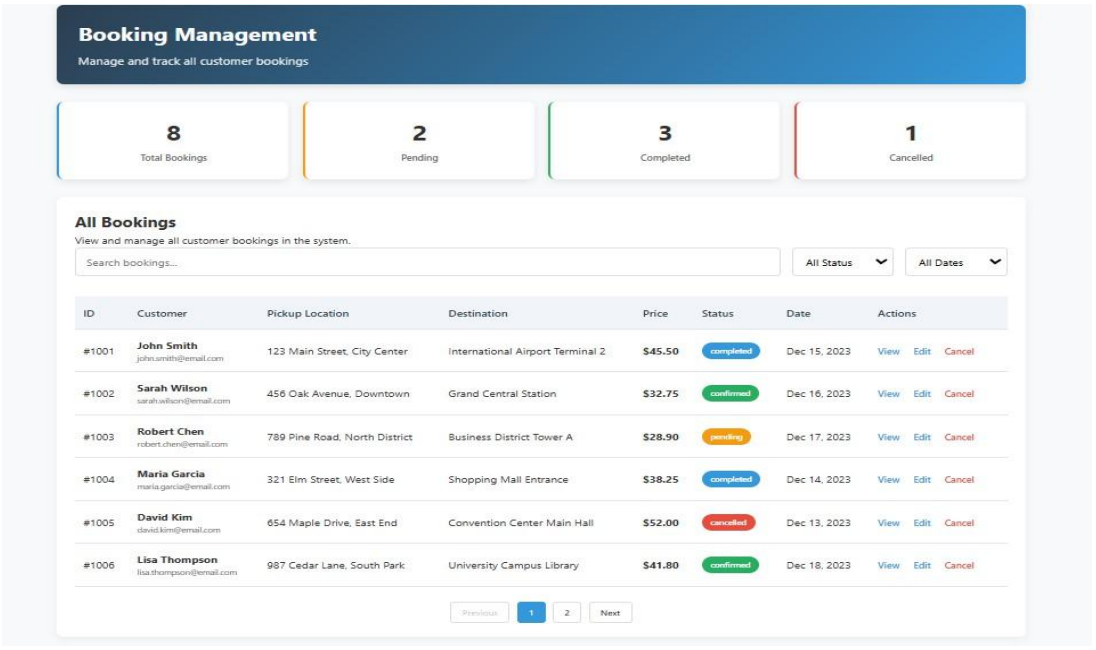
Output

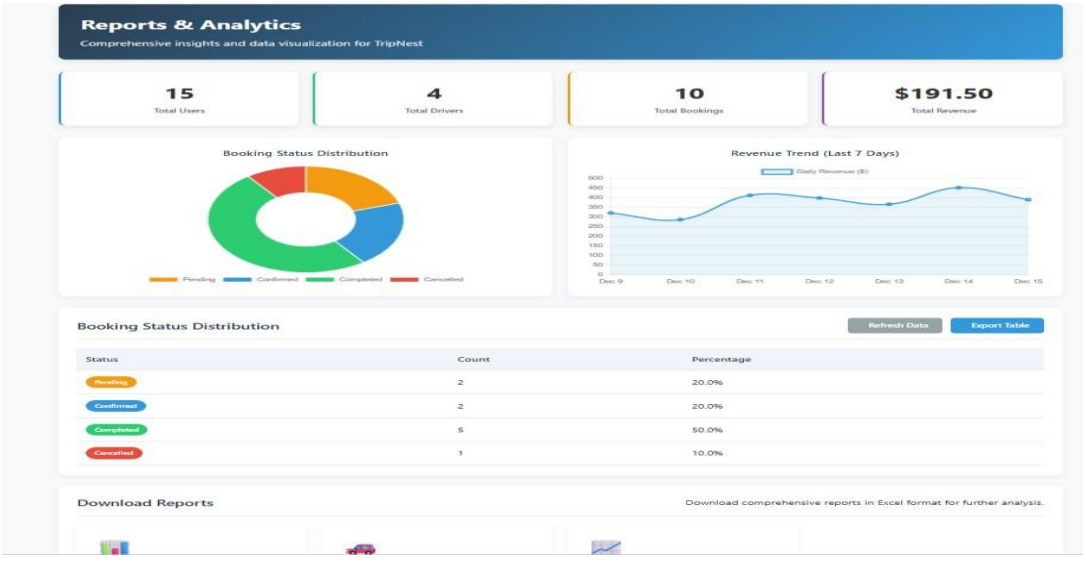

TripNest
Home
Features
How It Works
Login
Sign Up
Your Ride, Your Way
Book rides instantly with TripNest. Safe, reliable, and affordable transportation at your fingertips. Join thousands of satisfied riders today.
Get Started
Sign In

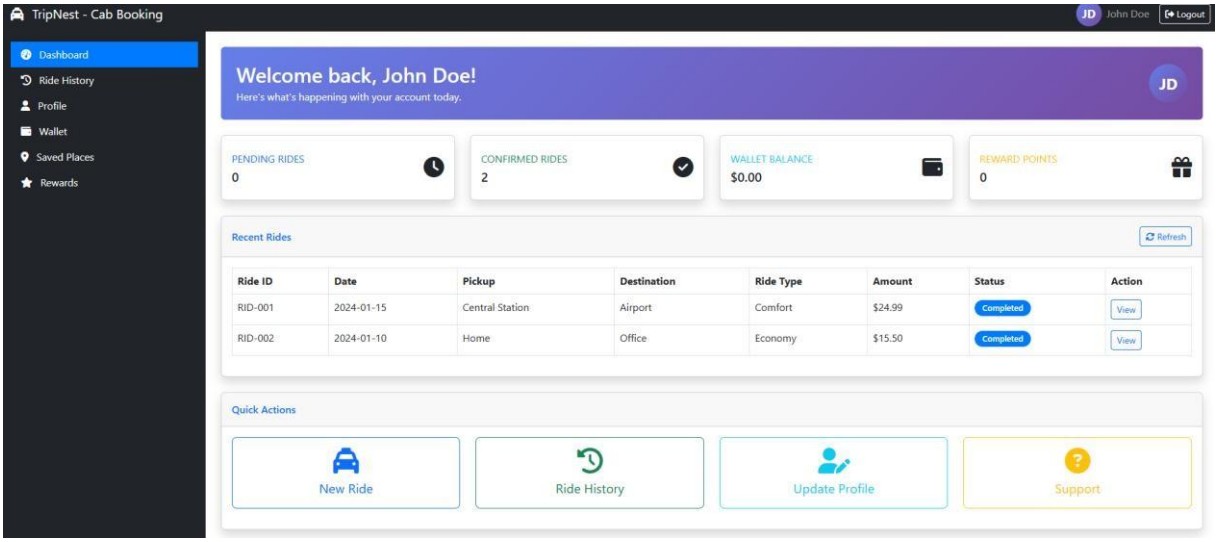

TripNest
Sign in to your account
Email Address
user@tripnest.com
We'll never share your email with anyone else.
Password
Enter your password
Remember me
Forgot password?
Sign In
Or continue with
Google
GitHub
Don't have an account? Sign up here
Register as a Driver
Back to Home


Admin Dashboard
Logout
Administrator
Super User
Dashboard
Users Management
Bookings
Products
Reports
Statistics
Welcome to Admin Panel
Manage your application efficiently and effectively
TOTAL USERS
15
APPROVED DRIVERS
4
PENDING BOOKINGS
0
PENDING DRIVERS
0
Quick Actions
Add User
Add Product
View Orders
Reports
Settings
Help
Settings
Show Settings
Help & Support
Show Help


Admin Dashboard
Admin
Logout
Dashboard
User Management
Booking Management
Driver Management
Reports
User Management
Manage and track all system users
Add New User
TOTAL USERS
22
ADMIN USERS
7
REGULAR USERS
10
DRIVERS
4
All Users
Search users...
Filter
ID
Username
Email
First Name
Last Name
Role
Status
Actions
1 user1 user1@example.com First1 Last1 USER Active Edit Delete
2 user2 user2@example.com First2 Last2 USER Active Edit Delete
3 user3 user3@example.com First3 Last3 USER Active Edit Delete
4 user4 user4@example.com First4 Last4 USER Active Edit Delete
5 user5 user5@example.com First5 Last5 USER Active Edit Delete
Previous
1
2
3
4
5
Next


Booking Management
Manage and track all customer bookings
8
Total Bookings
2
Pending
3
Completed
1
Cancelled
All Bookings
View and manage all customer bookings in the system.
Search bookings...
All Status
All Dates
ID
Customer
Pickup Location
Destination
Price
Status
Date
Actions
#1001 John Smith john.smith@email.com 123 Main Street, City Center International Airport Terminal 2 $45.50 completed Dec 15, 2023 View Edit Cancel
#1002 Sarah Wilson sarah.wilson@email.com 456 Oak Avenue, Downtown Grand Central Station $32.75 confirmed Dec 16, 2023 View Edit Cancel
#1003 Robert Chen robert.chen@email.com 789 Pine Road, North District Business District Tower A $28.90 pending Dec 17, 2023 View Edit Cancel
#1004 Maria Garcia maria.garcia@email.com 321 Elm Street, West Side Shopping Mall Entrance $38.25 completed Dec 14, 2023 View Edit Cancel
#1005 David Kim david.kim@email.com 654 Maple Drive, East End Convention Center Main Hall $52.00 cancelled Dec 13, 2023 View Edit Cancel
#1006 Lisa Thompson lisa.thompson@email.com 987 Cedar Lane, South Park University Campus Library $41.80 confirmed Dec 18, 2023 View Edit Cancel
Previous
1
2
Next


Reports & Analytics
Comprehensive insights and data visualization for TripNest
15
Total Users
4
Total Drivers
10
Total Bookings
$191.50
Total Revenue
Booking Status Distribution
Revenue Trend (Last 7 Days)
Booking Status Distribution
Refresh Data
Export Table
Status
Count
Percentage
Pending 2 20.0%
Confirmed 2 20.0%
Completed 5 50.0%
Cancelled 1 10.0%
Download Reports
Download comprehensive reports in Excel format for further analysis.


TripNest - Cab Booking
JD John Doe
Logout
Dashboard
Ride History
Profile
Wallet
Saved Places
Rewards
Welcome back, John Doe!
Here's what's happening with your account today.
JD
PENDING RIDES
0
CONFIRMED RIDES
2
WALLET BALANCE
$0.00
REWARD POINTS
0
Recent Rides
Refresh
Ride ID
Date
Pickup
Destination
Ride Type
Amount
Status
Action
RID-001
2024-01-15
Central Station
Airport
Comfort
$24.99
Completed
View
RID-002
2024-01-10
Home
Office
Economy
$15.50
Completed
View
Quick Actions
New Ride
Ride History
Update Profile
Support

CHAPTER 11

FUTURE ENHANCEMENTS AND CONCLUSION

Future Enhancements

1. **AI-based Ride Recommendation System:**
   Implement artificial intelligence to suggest the best cab options based on user preferences, past trips, and real-time demand.

2. **GPS-based Live Tracking:**
   Enable real-time GPS tracking for both users and drivers to monitor cab locations, estimated time of arrival (ETA), and route optimization.

3. **In-app Payment Gateway:**
   Integrate secure online payment systems such as UPI, credit/debit cards, and wallets for seamless and cashless transactions.

4. **Driver Rating and Feedback System:**
   Allow passengers to rate drivers and provide feedback, improving service quality and accountability.

5. **Dynamic Fare Calculation:**
   Introduce surge pricing during peak hours based on real-time traffic and ride demand.

6. **Mobile Application:**
   Develop Android and iOS applications for convenient cab booking on the go, enhancing user accessibility and engagement.

7. **AI-powered Chatbot Assistance:**
   Include an interactive chatbot to handle user queries, ride booking, and support requests automatically.

Conclusion

TripNest successfully delivers a smart and efficient platform for online cab booking.
It simplifies the process of finding and booking rides while ensuring transparency between passengers, drivers, and administrators.
The system, developed using Spring Boot, Thymeleaf, and MySQL, offers a robust, secure, and scalable backend architecture.
Through its user-friendly interface, automated driver assignment, and instant booking confirmation, TripNest ensures a smooth and reliable travel experience.
With future enhancements like AI integration, GPS tracking, and mobile app development, TripNest has the potential to evolve into a fully automated and intelligent cab management ecosystem.
Overall, the project demonstrates how modern web technologies can streamline urban mobility and make transportation services more efficient, accessible, and sustainable.