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CAR RENTAL SYSTEM WITH EASY ACCESS USING REACT

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ABSTRACT :

This paper presents a full-stack web application developed to modernize the traditional car rental process through digital transformation. Built using React JS for the frontend and Spring Boot for the backend, the system provides seamless user interaction, real-time vehicle availability, secure JWT-based authentication, and robust admin capabilities. The paper outlines the motivation, system architecture, key modules, and implementation methodology, highlighting improvements in efficiency, scalability, and user experience. Testing and performance metrics indicate the system's readiness forproduction useand futureenhancements such as mobile integration and real-time GPS tracking.

Keywords : Car Rental, Web Application, React JS, Spring Boot, Full-Stack Development, JWT, REST API, Online Booking System

1. Introduction

The car rental industry, historically reliant on physical interactions, has evolved with the advent of web-based systems. This project addresses inefficiencies in traditional rental workflows by implementing a responsive digital platform. It enables users to register, browse vehicles, book rentals, and process payments, all via an intuitive interface. The solution also includes a secure admin portal for managing bookings and inventory.

2. System Design and Methodology

The development followed Agile methodology with iterative sprints.

- **Frontend**: Built with React JS and Tailwind CSS for a responsive UI.
- **Backend**: Developed using Java, Spring Boot, and RESTful APIs.
- **Database**: MySQL with Spring Data JPA for ORM.
- **Authentication**: JWT and Spring Security for secure access.

3. Features and Functionality

User Features:

- Registration/Login
- Car browsing and filtering
- Booking with real-time availability
- Payment processing
- Delivery location input

Admin Features:

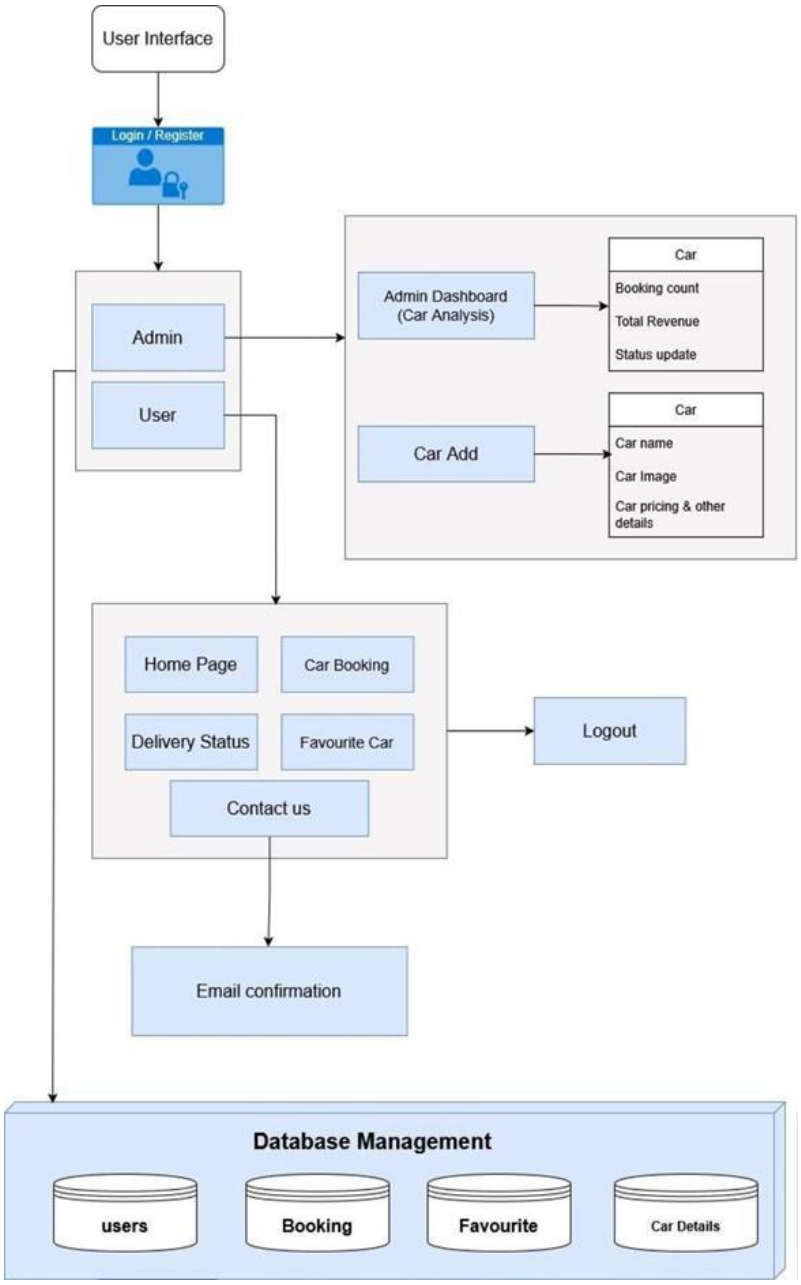
- Vehicle CRUD operations
- Booking management
- Analytics dashboard
- Role-based access control

4. SystemArchitecture

The system uses a three-tier architecture:

- Presentation Layer – React frontend
- Application Layer – Spring Boot backend
- Data Layer – MySQL database

Data flows securely between layers using REST APIs and JWT tokens for access management.



5. Testing and Validation

Multiple testing phases were conducted:

- **Unit Testing**: JUnit and Mockito
- **Integration Testing**: Postman and frontend API tests
- **User Acceptance Testing**: Real user feedback
- **Regression Testing**: Ensured stability after updates

All 47 test cases passed with a 100% success rate.

6. Results and Discussion

The system demonstrated strong performance, scalability, and user satisfaction. Real-time functionality, secure booking, and an intuitive interface significantly enhanced the rental process. Admins benefited from reduced manual operations and better data visibility.

7. Conclusion and Future Work

This project successfully modernized car rental services using full-stack web development. Future enhancements include:

- Real payment gateway integration
- GPS-based tracking
- Native mobile apps
- Multi-language/currency support
- AI-based demand forecasting

REFERENCES :

1. Add standard IEEE/APA-style references to any external sources or frameworks used, e.g., Spring Boot, React JS documentation, etc.