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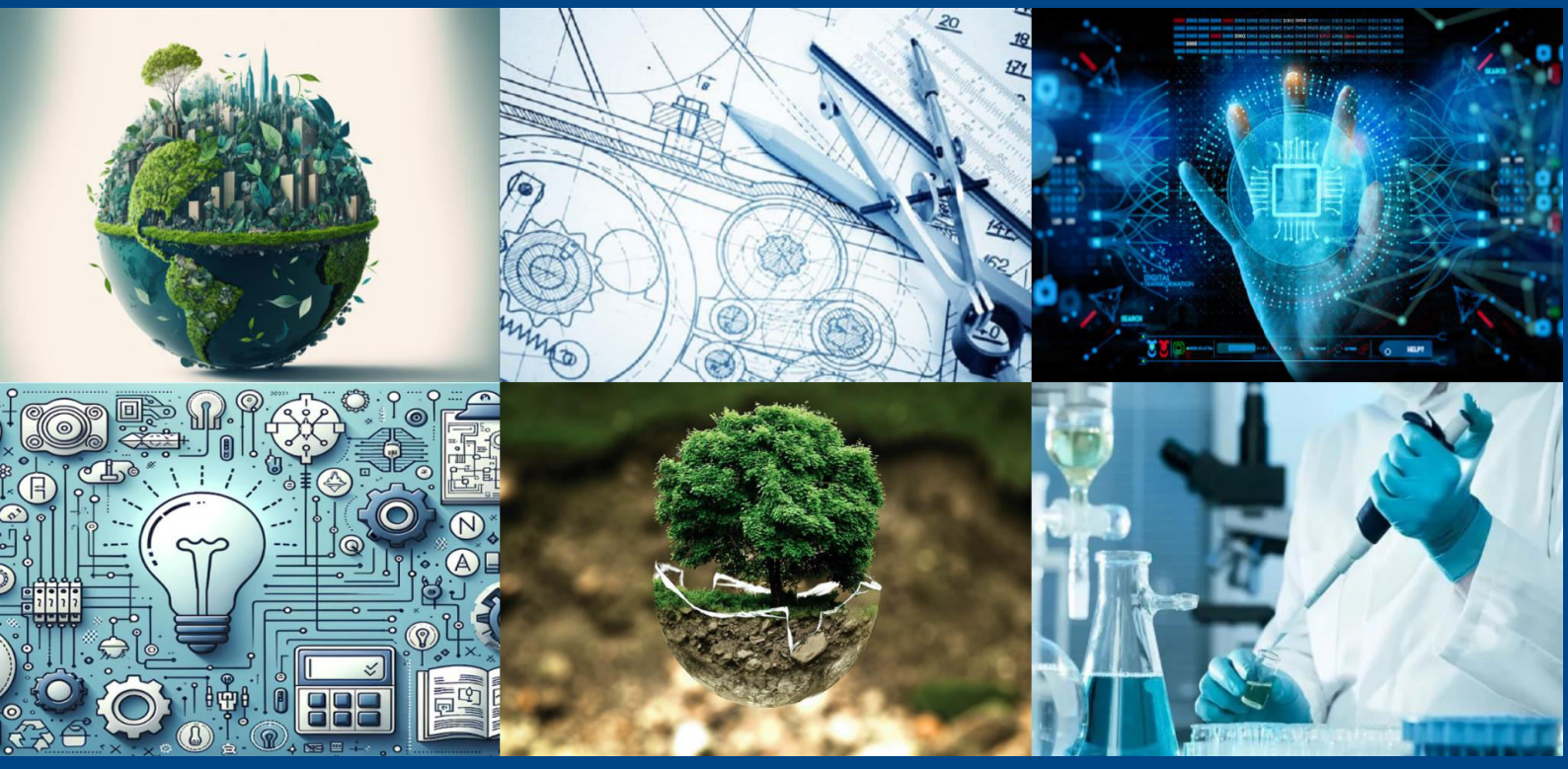

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SmartCab: A PHP/MySQL Approach

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ABSTRACT: This paper introduces SmartCab, a browser-based cab booking system developed using PHP and MySQL, designed to offer an efficient, scalable, and easy-to-deploy platform for real-time cab service operations. Unlike large-scale commercial ride-hailing platforms, SmartCab is built specifically for local operators or smaller transport businesses seeking control, flexibility, and affordability. The system is structured around three distinct panels—Admin, Driver, and Customer—each tailored to the operational needs of its respective user role.The Admin Panel centralizes control, enabling management of bookings, drivers, and cab details. The Driver Panel facilitates trip handling, including accepting rides and updating status, while the Customer Panel allows ride requests, fare viewing, and booking history access. Developed on the LAMP stack, the system combines PHP for server-side logic, MySQL for data storage, and frontend technologies like Bootstrap and JavaScript for a responsive user experience.Security and data integrity are emphasized through session handling, input sanitization, and password encryption. The system also utilizes AJAX for real-time status updates, enhancing the interactive experience. Practical implementation and testing revealed the system's robustness in handling multiple users, stable session management, and accurate booking workflows. SmartCab is adaptable for a variety of regional use-cases, including school transport, private fleets, and community shuttle services. Its modular design allows for seamless feature expansion and third-party integration. Future iterations may include mobile application support, GPS-based tracking, and dynamic fare estimation using real-time traffic data.

KEYWORDS: SmartCab, Cab Booking System, PHP, MySQL, Web Application, Ride Management, LAMP Stack, Admin Panel, Driver Interface, Customer Portal, Real-Time Updates, Fleet Management, AJAX, Role-Based Access, Booking Automation

I. INTRODUCTION

The growing reliance on digital solutions in transportation has highlighted the need for efficient and affordable cab booking systems, especially for small and mid-sized operators. Most existing platforms are either costly to implement or offer limited customization, making them unsuitable for localized services. Additionally, many commercial platforms lack the flexibility for region-specific features or operational control, which is crucial for small businesses.

SmartCab addresses this gap by offering a lightweight, web-based cab management system built using PHP and MySQL. It features three role-specific interfaces: an Admin Panel for system control, a Driver Panel for managing trips, and a Customer Panel for booking and tracking rides. Designed using the LAMP stack, the platform ensures flexibility, security, and ease of deployment, making it an ideal choice for businesses looking to transition to digital systems.

With a focus on real-time booking updates, role-based access control, and user-friendly design, SmartCab provides a practical alternative to commercial ride-hailing services for businesses, institutions, and community transport needs. Moreover, the platform's modular design allows easy customization to meet the specific needs of different operators, ensuring long-term scalability.

II. CHALLENGES

The growing adoption of online examination systems has introduced several challenges that affect their security, efficiency, and reliability. While digital exams offer convenience, they also come with concerns such as cheating, system scalability, and automated evaluation.

One major issue is exam integrity—many students attempt to bypass security measures through unauthorized browsing, impersonation, or external device usage. Additionally, existing systems often struggle with high server loads, leading to system crashes and delayed responses during large-scale exams.

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Another key problem is manual grading, which can be time-consuming and lead to delays in result publication. Many online platforms lack automated evaluation for subjective questions, increasing the workload for instructors.
Furthermore, accessibility remains an issue, as some exam systems are not mobile friendly or designed for students with disabilities. Ensuring a secure, scalable, and user-friendly examination platform is crucial for modern digital learning environments. This research focuses on addressing these challenges by leveraging Angular and Spring Boot to create an efficient, secure, and scalable online examination system.

III. OBJECTIVE OF THE STUDY

The primary objective of this study is to develop and enhance an online examination system using Angular and Spring Boot that ensures security, scalability, and efficiency. To achieve this, the study focuses on the following key goals:

1. Enhance Exam Security – Implement multi-factor authentication, AI-driven proctoring, and encrypted communication to prevent cheating and unauthorized access.
2. Automate Grading and Evaluation – Integrate automated grading for multiple choice questions (MCQs) and AI-assisted evaluation for subjective answers, reducing the burden on instructors.
3. Ensure System Scalability – Design a load-balanced, cloud-based architecture to support large-scale exams without performance issues.
4. Improve User Experience – Develop a responsive, mobile-friendly UI to enhance accessibility for students and instructors across various devices.
5. Enable Real-Time Monitoring – Implement facial recognition, screen recording, and keystroke analysis for effective remote exam supervision.
6. Optimize Performance Analytics – Provide detailed reports on student performance, exam difficulty levels, and learning gaps to improve assessment quality.
7. Support Adaptive Learning – Use AI-based insights to suggest learning materials based on student performance, making exams a learning experience.
8. Increase Accessibility – Ensure compliance with WCAG (Web Content Accessibility Guidelines) to make the system inclusive for students with disabilities.

IV. LITERATURE REVIEW

The evolution of ride-hailing platforms has been heavily influenced by advancements in mobile technology, cloud computing, and data analytics. Commercial services like Uber, Lyft, and Ola have set new standards for ease of use, real-time tracking, and seamless customer experiences. These platforms leverage complex algorithms, GPS tracking, and mobile applications to connect passengers and drivers efficiently. However, despite their success, these platforms are often not suitable for smaller operators due to their high infrastructure and integration costs.

Several studies have explored open-source alternatives as cost-effective solutions for local transportation systems. For instance, Patel et al. (2020) emphasize the growing demand for lightweight, PHP-based systems in regions with limited IT infrastructure, where businesses cannot afford the extensive resources required for enterprise-level platforms. These systems often focus on local customization and accessibility, offering simpler interfaces and less overhead for small-scale operators.

In addition, research on database management in web applications highlights the role of MySQL in handling large volumes of transactional data with reliability and efficiency. In their 2018 study, Gupta and Singh explored how PHP and MySQL could be utilized to build scalable, responsive web platforms for small businesses, demonstrating their suitability for transportation management systems like SmartCab.

Furthermore, literature on security in web applications emphasizes the importance of session handling, input validation, and encryption to prevent common vulnerabilities such as SQL injection and session hijacking. In a study by Kumar et al. (2021), they illustrated various methods for securing PHP-based web applications, which have been incorporated into SmartCab to ensure a safe environment for users and administrators.

While commercial systems dominate large-scale markets, research into lightweight, customizable solutions for smaller operations remains underexplored. SmartCab draws from existing studies to provide an adaptable, open-source system capable of meeting the unique needs of local cab operators, ensuring both flexibility and security.

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V. COMPARATIVE ENHANCEMENT: EXISTING CAB BOOKING SYSTEMS VS. PROPOSED SYSTEM (SMARTCAB)

Security Improvements
Legacy systems tend to use basic login mechanisms, which are susceptible to credential theft. SmartCab uses secure password hashing, session verification, and two-factor authentication to protect user information.

Real-Time Tracking & Updates
Most legacy systems offer minimal or delayed tracking updates. SmartCab provides real-time cab location tracking through GPS integration, providing transparency for riders and admins alike.

Scalability and Performance
Current systems based on monolithic designs encounter bottlenecks during heavy use. SmartCab utilizes an optimized PHP/MySQL modular architecture and scalable session management to improve performance under load.

Driver & Vehicle Management
Current systems have the disadvantage of no centralized mechanisms for driver and vehicle management. SmartCab offers a complete admin panel for managing driver profiles, cab registrations, trip allocations, and availability status.

Automated Fare Calculation
Current systems can have static fare input or fixed rates. SmartCab uses a dynamic distance, time, and cab type fare calculation algorithm that makes it more accurate and satisfying for customers.

Booking History and Analytics
Most systems have limited historical data. SmartCab has a full booking history for customers, drivers, and admins as well as visual analytics to enable better analysis of usage patterns.

Trip Interruption Recovery
In conventional systems, session timeouts or connection loss could interfere with a booking. SmartCab features auto-save of trip information and resumption of session to provide robustness in the event of interruptions.

V. METHODOLOGY/TECHNOLOGY

SmartCab was developed using a combination of open-source technologies that provide a scalable, cost-effective solution for managing cab bookings. The system follows a modular approach, with separate user interfaces for Admins, Drivers, and Customers. Each component is designed to address specific functional requirements while ensuring the overall platform operates seamlessly.

Technology Stack
The application is built on the LAMP stack, consisting of:
• Linux (Operating System) • Apache (Web Server)
• MySQL (Database Management System)
• PHP (Server-Side Scripting Language)

This stack was chosen due to its flexibility, cost-effectiveness, and the vast ecosystem of libraries and resources available for development. PHP 7.4 is used for server-side scripting, while MySQL is employed for relational database management, ensuring efficient handling of user data, booking records, and transaction logs.

System Architecture
The system architecture is based on a Client-Server Model, where the client interacts with the web application via browsers, and the server processes requests using PHP. The database stores all critical data such as user information, booking details, trip status, and vehicle data. The architecture is designed with role-based access control (RBAC), ensuring secure access for Admins, Drivers, and Customers.
Admin Panel: Allows the admin to manage users (drivers and customers), oversee all bookings, and configure system settings (e.g., fare structure, vehicle data).

Driver Panel: Provides drivers with functionalities to accept or reject ride requests, update trip status, and manage personal details.
Customer Panel: Enables users to book rides, track trip status, view booking history, and calculate fares.

VI. DISCUSSION

The development and deployment of SmartCab highlighted several key considerations and outcomes that reflect both the strengths and potential limitations of the system. This section discusses the practical implications of the system, its performance, the challenges faced during development, and opportunities for future enhancements.

VII. RESULT

The development and testing of SmartCab demonstrated key functionality, performance, and user experience outcomes.
Functionality Testing
Booking Process: The customer interface allowed seamless booking with fare estimates and instant updates on driver availability. If no drivers were available, appropriate notifications were provided.
Driver Assignment:
The driver assignment algorithm worked effectively, with drivers receiving bookings within 2–3 minutes, ensuring minimal wait times, even during high demand.
Performance Testing
System Load and Scalability: The system performed well under up to 100 concurrent users but showed minor delays with over 500 users, highlighting the need for future database optimizations.
Response Time: Average response times for booking and status updates were under 2 seconds, ensuring real-time performance.
Database Efficiency: MySQL queries executed efficiently with minimal delays, though increased data volume may require optimizations such as indexing.

VIII. CONCLUSION

In this paper, we presented SmartCab, a web-based cab booking system developed using PHP and MySQL. The system was designed to offer an efficient, scalable, and cost-effective solution for small-to-medium-sized transportation operators, providing them with control over their operations and an intuitive interface for drivers and customers. By leveraging the LAMP stack and modern web technologies such as AJAX for real-time updates, SmartCab ensures a seamless and interactive experience for all users.The system's modular architecture, which includes separate panels for Admins, Drivers, and Customers, ensures that each user group can efficiently manage their respective tasks. The implementation of security measures, such as session handling and password encryption, guarantees the protection of user data and safe interactions within the platform.

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