Find A Mechanic: Admin Portal and SCO Web Application for Efficient Service Management

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***Abstract*— "Find a Mechanic" is a platform designed to simplify the management of automotive service operations. The system consists of four main components: an Admin Portal, an SCO(Service center owner) Web Application, a Customer Mobile Application, and a Mechanic Mobile Application. This report focuses on the development and implementation of the Admin Portal and the SCO Web Application. These components help manage administrative tasks, improve service center operations, and support better communication between service center owners and administrators. This report provides a detailed overview of the design, development, and functionality of these applications.**

I. INTRODUCTION

The "Find a Mechanic" project is a comprehensive digital solution aimed at addressing the challenges in managing automotive repair and maintenance services. The automotive service industry often struggles with fragmented workflows, lack of communication between stakeholders, and inefficiencies in task management. This project integrates these processes into a single, cohesive ecosystem to improve efficiency, transparency, and customer satisfaction.

The "Find a Mechanic" system comprises four primary components: an Admin Portal, an SCO Web Application, a Customer Mobile Application, and a Mechanic Mobile Application. While the Customer and Mechanic Mobile Applications focus on end-user experiences such as booking repair services and tracking tasks, this report concentrates on the Admin Portal and the SCO Web Application, which are essential for administrative oversight and service center management.

The Admin Portal is designed for administrators to manage and oversee the platform's operations, including customer accounts, service center registrations, performance metrics, and system notifications. It serves as the backbone for monitoring and maintaining the quality and efficiency of service operations. Administrators can view and analyze service center performance, approve or reject applications, and communicate directly with service center owners.

The SCO Web Application, on the other hand, is tailored for service center owners (SCOs) to efficiently manage their day-to-day operations. It provides tools for employee task management, handling customer booking requests, and managing appointment schedules through a calendar interface. This application ensures that service centers can operate smoothly by bridging communication gaps and providing real-time updates on bookings and service progress.

Together, these components form the core administrative and operational management system of the "Find a Mechanic" platform, ensuring that service centers and administrators work in tandem to deliver reliable and efficient automotive repair services. This report details the design, development, and implementation of these applications, emphasizing their functionalities, technical architecture, and role in the overall system.

II. SYSTEM OVERVIEW

The Admin Portal and SCO Web Application are integral to the backend management of the "Find a Mechanic" platform, which operates on a modular architecture designed for scalability and real-time interaction.

A. Admin Portal

The Admin Portal empowers administrators to:

i. Manage customer and service center data.
ii. Monitor ratings and feedback.
iii. Approve or reject new service center applications.
iv. Send and manage notifications.
v. Analyze operational performance metrics.*SCO Web Application*

B. SCO Web Application

The SCO Web Application supports service center owners by providing tools for:

i. Employee management.
ii. Task assignment and tracking.
iii. Booking request handling.
iv. Calendar-based appointment scheduling.
v. Inventory and resource management.

C. *Integration Context*

While this report focuses on the Admin Portal and SCO Web Application, these components interact seamlessly with the Customer and Mechanic Mobile Applications to provide a unified service flow.

III. Development Methodology

The development of the "Find a Mechanic" project followed the Agile methodology, ensuring flexibility, adaptability, and continuous improvement throughout the development cycle. Regular feedback from stakeholders and iterative design processes were central to achieving functional and user-centered applications.

A. *Technology Stack*

i. Frontend: React.js, React-Bootstrap, Material-UI, DevExpress, Tailwind CSS, and Chart.js were utilized to build responsive, visually appealing user interfaces and dynamic data visualizations for both the Admin Portal and SCO Web Application.

ii. Backend: Node.js, PHP enabling efficient handling of requests and business logic.

iii. Database: MySQL is employed for robust data storage and management, ensuring scalability and efficient query handling.

iv. Cloud Services**:** AWS S3, EC2, and Lambda were leveraged to deploy, store, and process application components in a scalable cloud environment.

v. API Integration: The platform integrates Nominatim Geocoding API for location filtering, PHPMailer for email notifications, and @react-pdf/renderer for PDF generation and viewing.

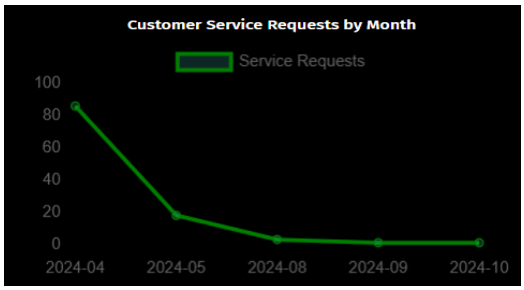
By utilizing this technology stack, the project achieved an optimal balance between performance, scalability, and maintainability, providing service center owners and administrators with reliable and feature-rich tools.

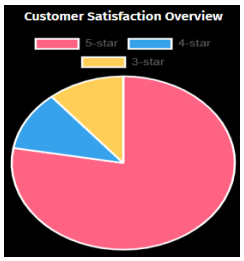
IV. Admin Portal

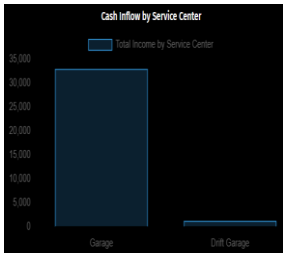
The Admin Portal serves as the central hub for administrators, providing comprehensive tools for managing platform operations, monitoring performance, and ensuring seamless integration across components. Its design focuses on usability and operational efficiency, enabling administrators to oversee platform activities effectively.

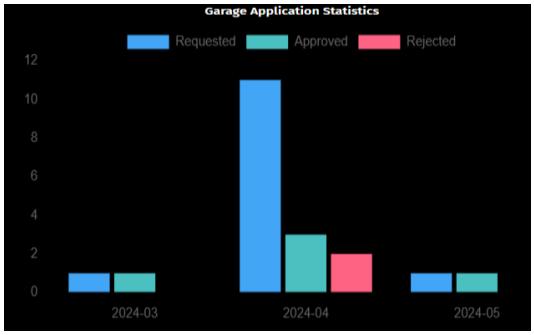
A. *Key Features*

i. Dashboard Analytics: Provides visual insights into operational metrics such as service center performance, customer trends, and vehicle statistics using dynamic graphs and charts.

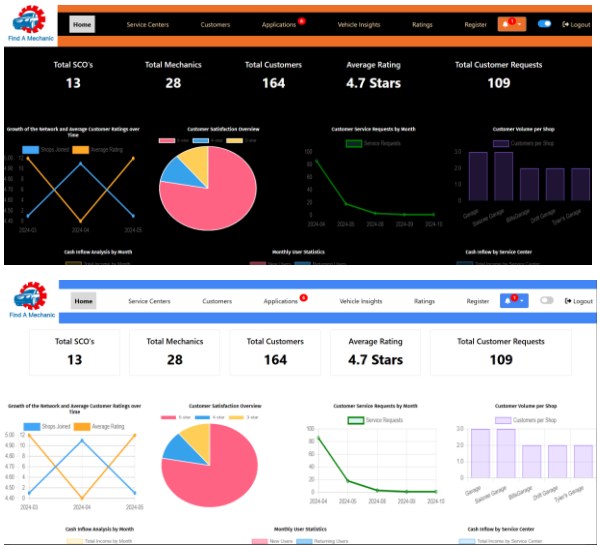




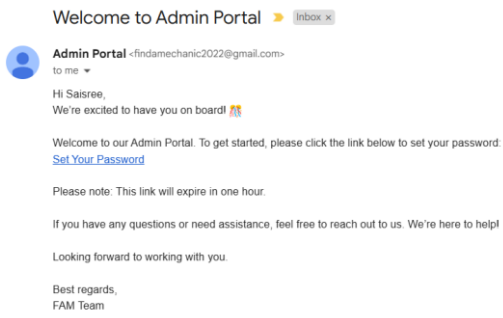


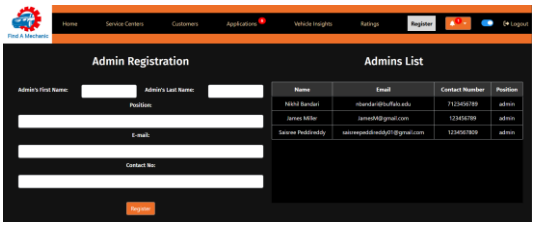


ii. Dynamic Theme Support: Offers night and day modes, enhancing user comfort during extended use.

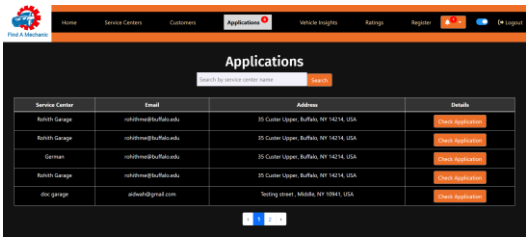


iii. Secure Admin Registration: Facilitates the addition of new administrators with automated email notifications and role-based access control.





iv. Service Center Management: Manages service center approvals, performance tracking, and profile updates.



v. Customer Service Insights: Presents detailed customer activity data, including ratings and service feedback.

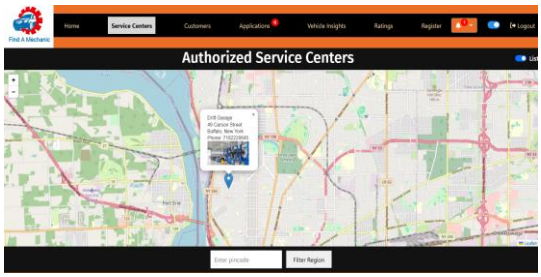
vi. Ratings Management: Allows administrators to monitor, sort, and manage ratings for service centers.

vii. Vehicle Statistics: Displays data on common vehicle issues, reliability, and usage trends.

viii. External Data Integration: Integrates with external APIs for enriched functionality, such as appointment scheduling.

ix. Automated Email Notifications: Notifies service center owners of critical updates, such as application status and ratings alerts.

x. Map Integration for Location Insights: Includes a map-based feature to view service centers' geographical distribution, enabling administrators to identify underserved areas and strategize expansion efforts.

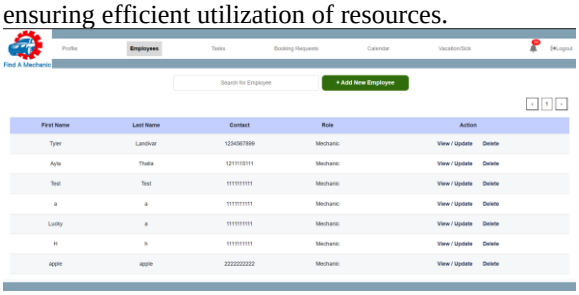


V. SERRVICE CENTER PORTAL

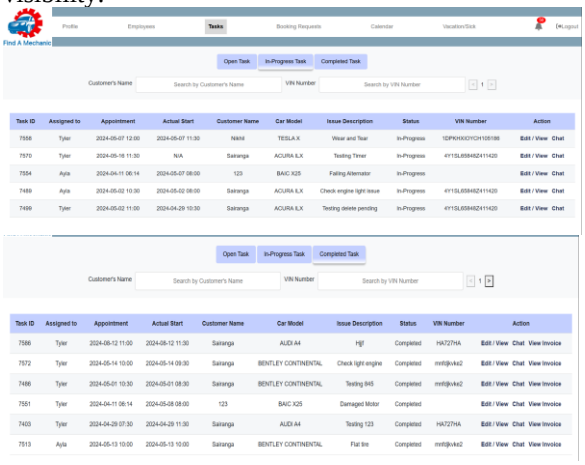
The SCO Web Application is tailored for service center owners (SCOs), addressing their operational needs with intuitive features that simplify task management, customer interaction, and resource planning.

A. Key Features

i. Employee Management: Provides tools to track employee details, performance, and task assignments, ensuring efficient utilization of resources.

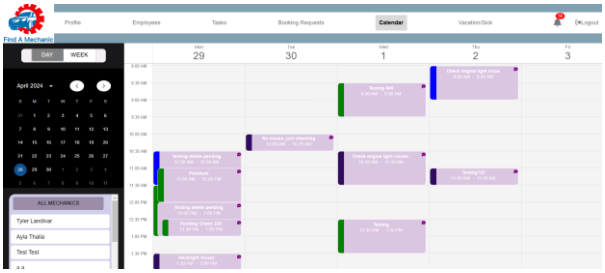


ii. Task Management: Enables service center owners to manage tasks across statuses such as open, in-progress, and completed, ensuring clear workflow visibility.

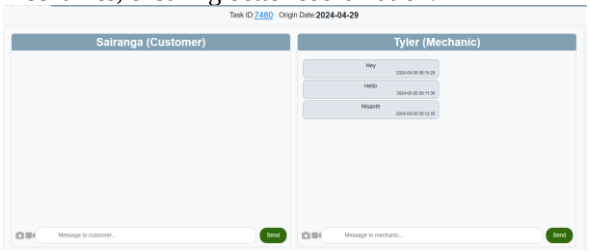


iii. Booking Requests: Allows SCOs to view, accept, or reject customer booking requests, facilitating seamless service management.

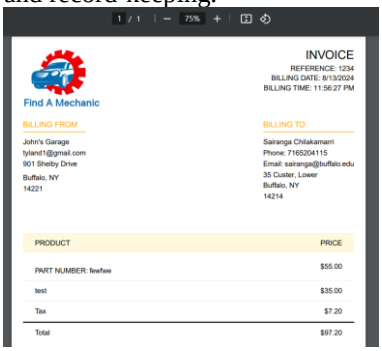
iv. Appointment Scheduling: Features a calendar interface to schedule tasks and appointments, considering the availability of mechanics and customer preferences.



v. Chat Feature: Enables real-time communication between service center owners, customers, and mechanics, ensuring better coordination.



vi. Invoice Generation: Automatically generates detailed invoices for completed tasks, enhancing transparency and record-keeping.



VI. Integration and Workflow

The Admin Portal and SCO Web Application are seamlessly interconnected through secure APIs, ensuring real-time data synchronization and enabling collaborative workflows across the ecosystem. This integration ensures smooth communication between the various components of the "Find a Mechanic" platform, creating a unified system for managing operations.

A. *Workflow*

i. Customer Interaction:
- Customers book repair and maintenance appointments using the Customer Mobile Application.
- Booking requests, including service details, are automatically routed to the appropriate service centers via the SCO Web Application.

ii. Service Center Operations:
- Service Center Owners (SCOs) manage booking requests, assign tasks to mechanics, and schedule appointments using the integrated calendar feature in the SCO Web Application.
- SCOs can communicate directly with both customers and mechanics via the inbuilt chat feature, ensuring clarity and efficiency.

iii. Mechanic Involvement:
- Mechanics use the Mechanic Mobile Application to receive task details, log their progress, and communicate with the service center owners as needed.
- Task completion details and efforts are logged in the system, providing a transparent record for future reference.

iv. Administrative Oversight:
- Feedback from customers and operational data from service centers flow back to the Admin Portal.
- Administrators analyze this data to monitor performance, identify trends, and make informed decisions to optimize the platform.

This integrated workflow ensures that all stakeholders—customers, service centers, mechanics, and administrators—operate cohesively within a unified system, enhancing efficiency and user satisfaction.

VII. Conclusion and Future Work

The "Find a Mechanic" platform have significantly streamlined automotive service operations, providing essential management tools for administrators and service center owners. These components establish a strong foundation for future enhancements and growth.

A. *Future Work*

i. Payment Integration: Implement secure payment features for seamless financial transactions.

ii. SCO Mobile Application: Develop a mobile application for service center owners to manage operations on the go.

iii. Customer and Mechanic Enhancements: Enhance customer and mechanic-facing applications with advanced features like automated scheduling and AI-driven recommendations.

iv. AI and Advanced Analytics: Incorporate predictive maintenance and analytics for improved operational insights and decision-making.

v. Service Expansion: Broaden the platform to include additional services such as plumbing, electrical repairs, home improvement, and other service industries.

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