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METHOD AND TOOLS FOR THE DEVELOPMENT OF THE AUTOMATED INFORMATION SYSTEM FOR CONTROLLING THE PERFORMANCE OF SERVICE STATION WORK

This paper presents the development of an automated information system for controlling the performance of service station work. The system is designed to improve management efficiency, operational transparency, and service quality through automation of core business processes. Key features include order tracking, technician scheduling, client and vehicle management, analytics, and customer notifications. Developed using Nuxt3, Node.js, TypeScript, PostgreSQL, TailwindCSS, and Drizzle ORM, the system incorporates role-based access control and security measures to prevent unauthorized access. The system also supports client self-service for booking, enabling a modern and user-friendly experience. The architecture was designed for adaptability and scalability, offering a solid foundation for future innovations in automotive service automation.

Keywords: ***information system, car service station, web application, process automation.***

Background

The system is implemented according to the principles of multi-tier client-server architecture, consisting of three main levels (Laudon K., & Laudon J., 2018). The client level includes a web interface for car service station employees and a mobile application for customers. The server level provides business logic, data processing, and interaction between client applications. The data level is responsible for storing and managing information. Interaction between levels is carried out through clearly defined API interfaces, ensuring low coupling of components and high system scalability as shown in Fig. 1.

The system is expected to handle and manage structured data that includes comprehensive details about clients, mechanics, vehicles, service posts, orders and other related entities (Brandt, 2013). These data components are inherently interconnected through clearly defined relationships, for example, each service request is associated with a

specific client and vehicle, while diagnostic results are tied to particular service records. As illustrated in Fig. 2, this interconnected nature of the data necessitates a data model capable of efficiently managing such relationships. Therefore, a relational database model is the most suitable choice, as it allows for structured storage, ensures data integrity through the use of keys and constraints, and supports complex queries to retrieve and manipulate related data effectively (Douglas, 2021).

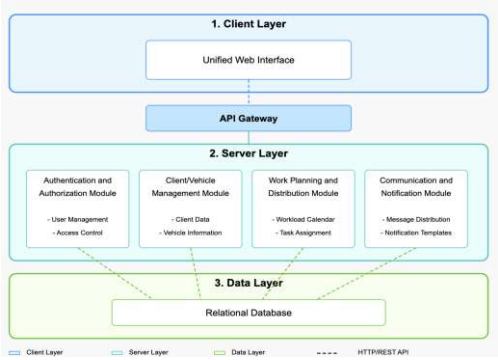

Fig. 1. *General architecture scheme of the implemented system*

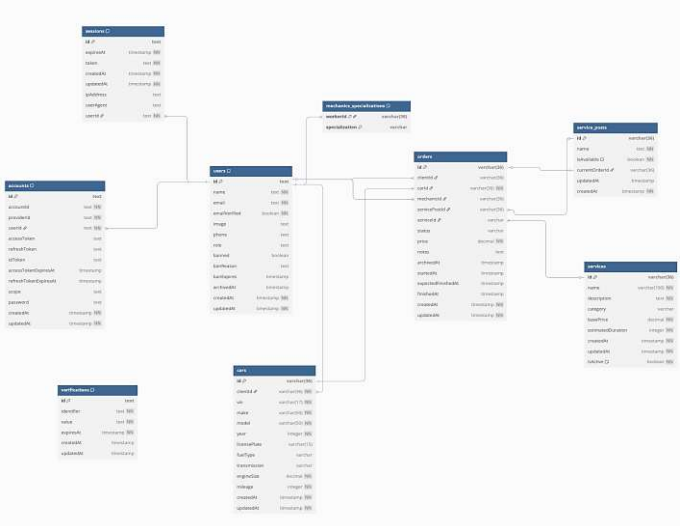

Fig. 2. *Database relationship diagram*

Client part consists of an admin panel for car service staff and a client portal for customers.

The admin panel is developed as a web-based application using modern frameworks, offering an adaptive and user-friendly interface. It features a responsive design for seamless use across different devices, an interface optimized for fast access to frequently used functions and a clean, minimalist layout. This approach ensures usability even in fast-paced work environments or when employees' hands may be dirty. General architecture scheme of the implemented system is shown in Fig. 3.

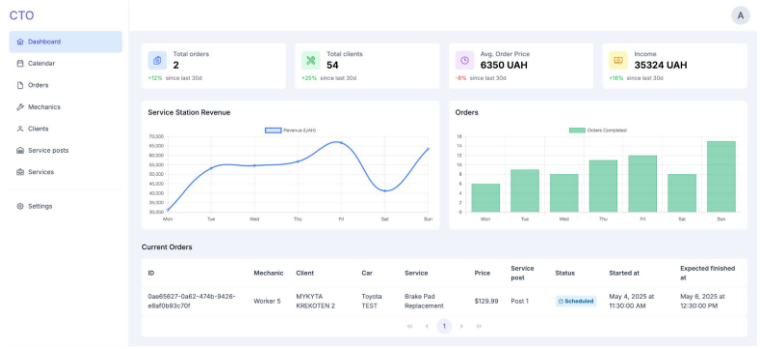

Fig. 3. *General architecture scheme of the implemented system*

The client portal allows customers of the car service station to access a personal account with various self-service features. These include online appointment booking, viewing service history, monitoring the progress of current work, accessing digital copies of documents and invoices, and providing feedback on the quality of service (Fig. 4).

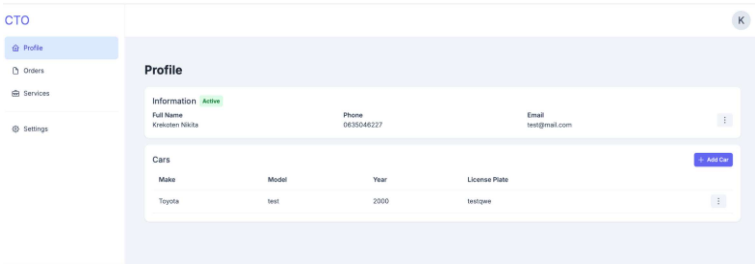

Fig. 4. *General architecture scheme of the implemented system*

Discussion and conclusions

The developed automated information system offers a comprehensive solution for the digital transformation of service station work. By automating key business processes such as order management, technician scheduling, client and vehicle data handling, and service analytics, the system not only streamlines internal workflows but also enhances overall service delivery. This leads to increased productivity, more informed decision-making, and improved customer satisfaction.

The implementation of a multi-tier client-server architecture ensures that the system is both modular and scalable, with clearly separated concerns for user interface, business logic, and data management (Richards, & Ford, 2020). This architectural approach allows for easier maintenance, integration of new features, and future scalability as the business grows or adapts to changing technological environments. Role-based access control and built-in security features strengthen the system's reliability and resilience against unauthorized use.

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МЕТОДИ ТА ЗАСОБИ РОЗРОБЛЕННЯ АВТОМАТИЗОВАНОЇ ІНФОРМАЦІЙНОЇ СИСТЕМИ КОНТРОЛЮ ВИКОНАННЯ РОБІТ СТАНЦІЇ ТЕХНІЧНОГО ОБСЛУГОВУВАННЯ

Представлено розроблення автоматизованої інформаційної системи для контролю ефективності роботи сервісних станцій. Систему призначено для підвищення ефективності управління, прозорості операцій та якості обслуговування за допомогою автоматизації основних бізнес-процесів. Основні функції охоплюють відстеження замовлень, планування роботи техніків, керування клієнтами та транспортними засобами, аналітику та повідомлення клієнтів. Розроблена з використанням Nuxt3, Node.js, TypeScript, PostgreSQL, TailwindCSS і Drizzle ORM система охоплює контроль доступу на основі ролей і заходи безпеки для запобігання несанкціонованому доступу. Система також підтримує самообслуговування клієнтів для бронювання, забезпечуючи сучасний і зручний досвід. Архітектуру розроблено з урахуванням адаптивності та масштабованості, пропонуючи потужну основу для інновацій в автоматизації автомобільних послуг.

Ключові слова: ***інформаційна система, автосервісна станція, вебзастосунок, автоматизація процесів.***