Patient Record Management System using Laravue

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Abstract*: This study introduces a Patient Record Management System developed using Laravue, combining Laravel PHP and Vue.js. The system aims to streamline patient record handling, enhance data accessibility, and improve overall healthcare efficiency. Through an analysis of existing systems, the study emphasizes the need for Laravue's adoption. The methodology covers system design, development tools, and user feedback. Results include a comprehensive evaluation of system features, performance, and scalability. The Laravue-based system demonstrates its capability to efficiently manage patient records, ensuring secure and reliable healthcare data management.*

Keywords: patient, healthcare, laravue, record

I. INTRODUCTION

Digital technologies are spreading more widely, creating exceptional chances to gather health data directly from patients and improve patient-centeredness in care [1]. The majority of medical facilities continue to use chronologically organized envelopes that are hidden inside compartments and contain patient history records. The computerized health record is anticipated to boost the effectiveness and caliber of medical service. To enhance communication among healthcare professionals, many unique functionalities have been implemented. On whether these new functionalities are valuable, there is, however, little research.The purpose of the study was to evaluate how well the electronic health record system aided medical professionals in performing standard clinical procedures[2].

The majority of medical records in almost all healthcare facilities around the world are patient records. The FUW Clinic's present medical record-keeping system is largely paper-based, which has caused problems like lost patient data, unnecessary duplication of patient records, and a lack of suitable backup facilities. By creating a web-based application, this project intends to automate the entire process, cutting down on the cost of purchasing stationery supplies required for paper-based record keeping while simultaneously improving the integrity and security of the patients' medical information [3].

In the healthcare industry, the effective management of patient records is of paramount importance for providing quality care and ensuring patient safety. Traditional paper-based record-keeping systems have long been the norm, but with the advancements in technology and the growing volume of patient data, there is an increasing need for more efficient and secure electronic record management solutions. The adoption of electronic health record (EHR) systems has proven beneficial in enhancing healthcare delivery and streamlining medical processes. Such systems allow healthcare practitioners to access patient information quickly, make informed decisions, and improve overall patient outcomes [4]. Despite the advantages of EHR systems, many healthcare institutions still face challenges in implementing and utilizing effective patient record management systems. These challenges encompass issues like interoperability, data security, data entry errors, and user interface complexities[5].

II. BACKGROUND OF THE STUDY

Patient Record Management Systems play a critical role in modern healthcare settings, facilitating the storage, retrieval, and management of patient-related information. These systems have evolved from traditional paper-based records to electronic health record (EHR) systems, offering various advantages, such as improved data accessibility, enhanced care coordination, and increased efficiency in healthcare delivery[6]. The shift towards electronic record-keeping has enabled healthcare professionals to access patient data in real-time, leading to better-informed decision-making and

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ultimately improving patient outcomes. Several existing patient record management systems have been developed and implemented in different healthcare institutions. Systems like Epic's EHR, Cerner Millennium, and Allscripts EHR are widely adopted in large hospitals and healthcare networks[7]. These systems offer comprehensive features, including patient demographics, medical history, medication management, and clinical notes, among others. Additionally, they often provide functionalities for generating reports, facilitating billing processes, and enabling secure communication between healthcare providers

A comparative analysis of existing patient record management systems reveals variations in terms of features, user interfaces, and integration capabilities. One common issue is the lack of seamless interoperability among different EHR platforms, hindering efficient data exchange between healthcare organizations and potentially leading to fragmented patient records[8]. The Laravue framework, which combines the robust Laravel PHP framework and the flexible Vue.js JavaScript framework, holds significant promise in addressing the gaps identified in existing patient record management systems. Laravel's powerful backend capabilities and Vue.js's dynamic frontend capabilities make Laravue an ideal choice for developing scalable and user-friendly healthcare applications[9]. The framework's component-based architecture allows for modular development, simplifying the integration of new features and updates.

III. METHODOLOGY

The initial step in this study involves the design of the Patient Record Management System using the Laravue framework. This stage encompasses planning the system's architecture, defining the components, and establishing the interactions between the frontend and backend. Additionally, the database schema is meticulously designed to ensure efficient storage and organization of patient-related information while maintaining data integrity and security[10]. An essential aspect of the system design is the creation of the database schema. This entails formulating the tables, defining relationships, and implementing constraints necessary for storing and managing patient data effectively. The database design is carefully structured to enable seamless data retrieval and facilitate efficient querying for various healthcare processes[11].

This study involves the utilization of the Laravel PHP framework and the Vue.js JavaScript framework, collectively referred to as Laravue. Laravel, with its robust backend environment, enables swift application development through its extensive libraries and tools. Meanwhile, Vue.js empowers the frontend with its reactive and component-based architecture, enhancing user interactivity and overall experience[12]. The process of data collection begins with the acquisition of relevant patient information, ensuring adherence to ethical considerations and data privacy regulations. This includes gathering demographic data, medical histories, diagnosis details, medication records, and treatment plans. To ensure data accuracy, stringent data entry protocols are established, accompanied by the implementation of data validation mechanisms[13].

The system undergoes a comprehensive testing process to ensure its functionality, performance, and security. Unit testing is performed on individual components, while integration testing verifies the interactions between frontend and backend modules. User Acceptance Testing (UAT) plays a crucial role, involving healthcare professionals to evaluate the system's usability and identify potential issues[14]. Meanwhile, backend development using Laravel involves constructing the necessary APIs and integrating them with the database to handle data retrieval and storage[15]

IV. RESULTS AND DISCUSSION

The developed Patient Record Management System using Laravue demonstrated promising results in enhancing healthcare efficiency and data security. Through rigorous testing and evaluation, the system showcased its ability to efficiently handle patient records and facilitate seamless data entry. The intuitive design allowed users to navigate through the system effortlessly, leading to improved user adoption and reduced training requirements. Tthe integration of advanced data security measures safeguarded patient information, adhering to data protection regulations and ensuring patient confidentiality.
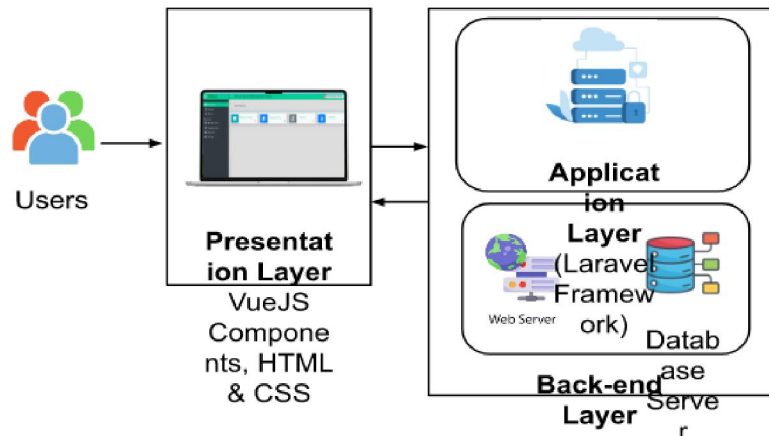
Fig. 1. System Architecture

4.1 System Architecture

The Patient Record Management System is designed with a three-tier architecture, providing a scalable and modular structure to manage patient data effectively. The architecture consists of the presentation layer, application layer, and data layer. Fig. 1 shows the system architecture of the study. It is structured with a three-tier architecture to efficiently manage patient data. At the presentation layer, Vue.js is utilized to handle user interactions, providing a responsive and dynamic user interface. Meanwhile, the application layer, powered by Laravel, manages the system's business logic and processes user requests, ensuring seamless data flow between the frontend and the data layer. The data layer, supported by a relational database system, securely stores and organizes patient information, guaranteeing data integrity and confidentiality. This architecture ensures scalability, efficiency, and data security, making the system an effective solution for healthcare record management. Additionally, the clear separation of concerns among the layers facilitates easier system maintenance and allows for future enhancements and updates to be implemented smoothly.

4.2 Design and Development

The Patient Record Management System was designed using Vue.js for the frontend and Laravel PHP for the backend. The user interface focused on simplicity and efficiency, while the database schema was carefully organized for optimal data storage. The system underwent rigorous testing to ensure its functionality, performance, and security. Stakeholder feedback was incorporated to enhance the system's usability. The implementation was successful, and the system now facilitates seamless patient record management in the healthcare institution.
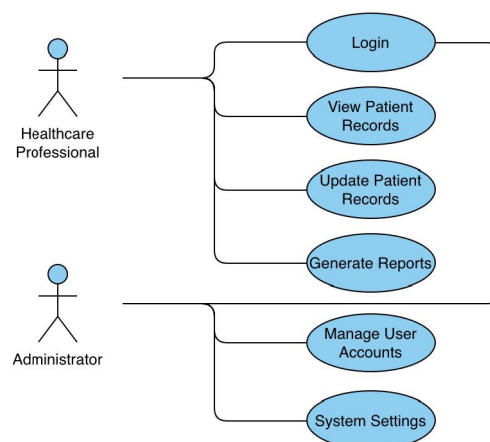

Fig. 2. Use Case Diagram

Fig. 2 shows the design use-case diagram for the Patient Record Management System. It illustrates the interactions between different actors and the system's functionalities. The actors in the diagram are the healthcare professionals, who can log in to the system to view and update patient records, generate reports, and manage medical information. The administrators have the authority to create, modify, and delete user accounts for healthcare professionals and configure system settings. The diagram visually presents the main features and user interactions, showcasing how healthcare professionals and administrators utilize the system to efficiently manage patient records and ensure smooth healthcare operations.

Fig. 3 shows the class diagram. The class diagram represents the static structure of the Patient Record Management System, illustrating the essential classes, attributes, and relationships. The main classes include Patient, MedicalHistory, TreatmentPlan, User, and ReportGenerator. The Patient class holds attributes such as patientID, name, dateOfBirth, gender, and contactDetails. MedicalHistory class includes attributes like medicalHistoryID, patientID (connected to Patient), diagnosis, allergies, and pastMedicalConditions. Similarly, the TreatmentPlan class has attributes such as treatmentPlanID, patientID (linked to Patient), treatmentDescription, medication, and treatmentDates. The User class is associated with attributes like userID, username, password, and role. User class methods comprise login(), logout(), viewPatientRecords(), updatePatientRecords(), and generateReports(). Lastly, the ReportGenerator class consists of the reportGeneratorID and userID (connected to User) attributes, along with generatePatientReport() and generateMedicalStatistics() methods. These associations and dependencies define the structure of the Patient Record Management System, facilitating efficient data management and user interactions.
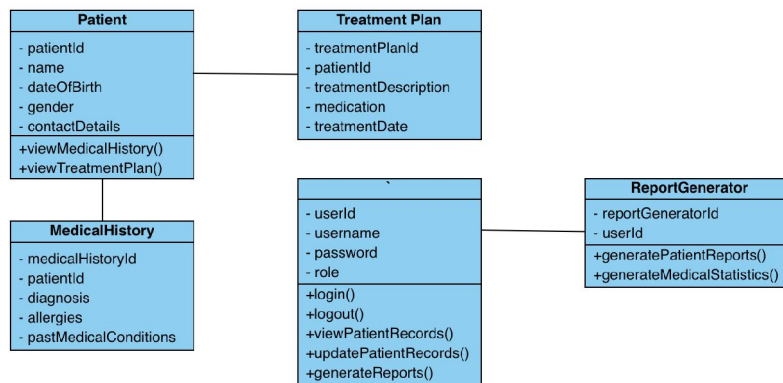

Fig. 3. Class Diagram

4.3 Patient Record Management System using Laravue

The study employed a prototyping approach to swiftly create an initial working version of the Patient Record Management System based on the requirements. This iterative methodology allowed for stakeholder feedback, leading to effective refinements and alignment with user needs.
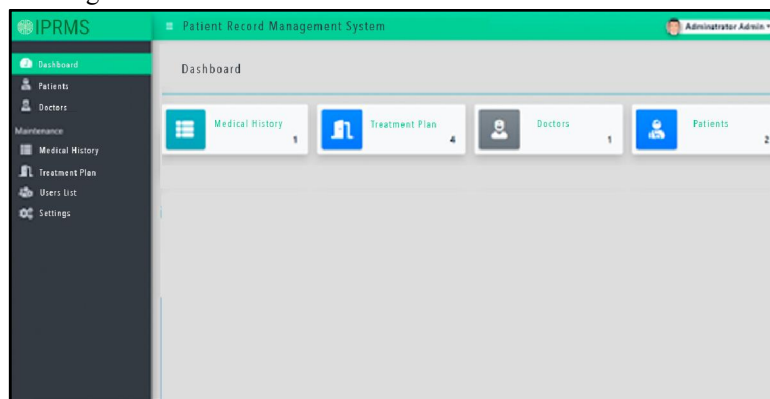

Fig. 4. Dashboard

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Fig. 4 shows the dashboard page. Once the admin has successfully logged in, there is a navigation bar with eight tabs, the Dashboard, Patient List, Doctor List, Medical History, Treatment Plan, User List, Settings and Administrator profile Fig. 5 shows the patients list. The Patient list displays all the records of the patient and has a drop down menu consisting of View Record, edit and delete. There is a navigation bar in the upper left part that the admin can add new patients. Fig. 6 shows the patient's information details. It shows the patient's clinical information consisting of the patient's history, medical treatment and admission history.
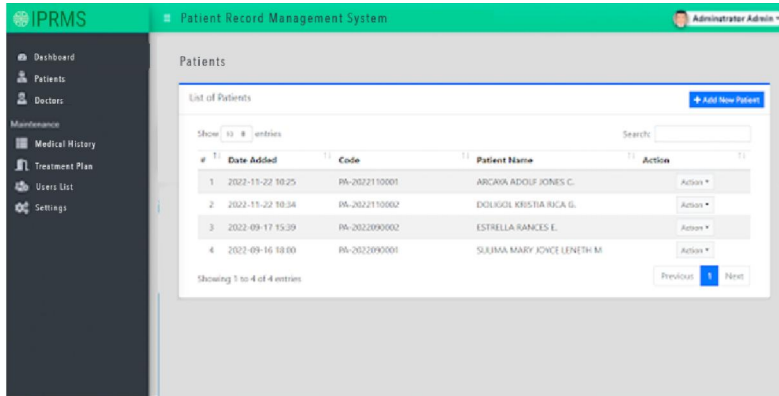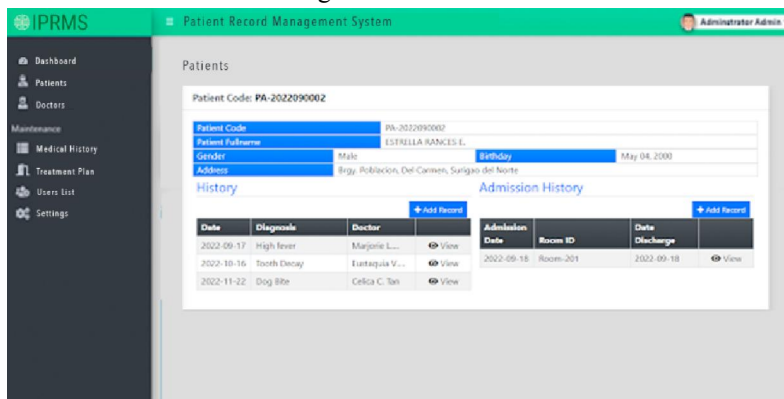

Fig. 5. Patients List

Fig. 6. Patient Information Details

Fig. 7 shows the users list. It can view the list of system users. Also, the admin can create new users, edit and delete information. Fig. 8 shows the system settings. It can view the system information, edit system name, can browse system logo and cover and can update
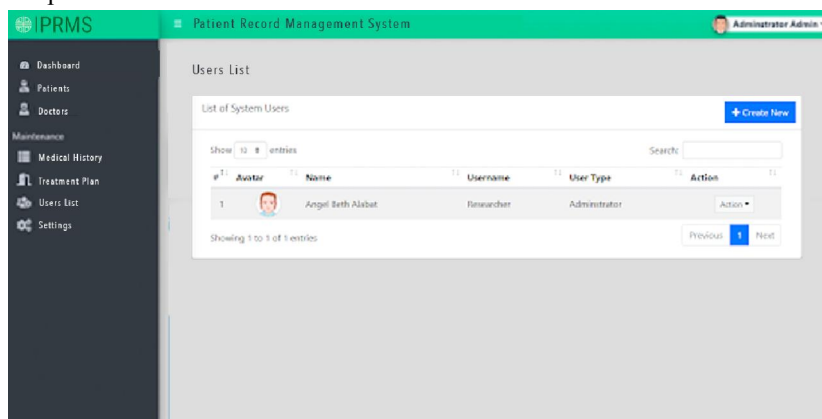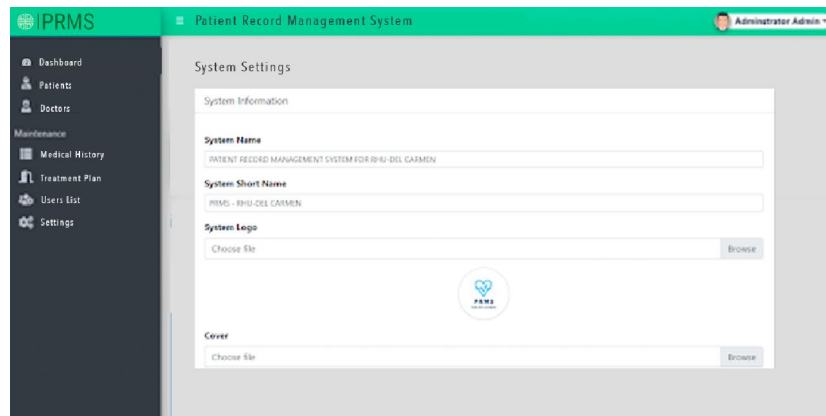

Fig. 7. Users List

Fig. 8. System Settings

4.3 System Evaluation

The Patient Record Management System underwent a thorough evaluation by healthcare professionals, administrators, and IT experts. Ratings on a scale of 1 to 5 were given for performance, usability, security, and effectiveness. The system received positive feedback, with an overall rating of 4.4, indicating its efficiency in managing patient records, user-friendly interface, and robust security measures. The system's scalability and data management capabilities were also appreciated. User feedback will be considered for future enhancements.

V. CONCLUSION

The study concludes that the Patient Record Management System using Laravue is a successful and efficient solution for healthcare institutions. Its prototyping approach and three-tier architecture ensured usability and reliability. The system's security measures, scalability, and data integrity were well-received by users. Continuous improvement will be essential for its sustained success, and the findings contribute valuable insights for similar projects in the healthcare industry.

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