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Development of an E-News System at Jawa Pos Radar Tulungagung based on Client-Server using the Flutter and Laravel frameworks

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***Abstract*—This study develops a client-server-based e-news system for Jawa Pos Radar Tulungagung using Flutter technology as the user interface and Laravel as the backend. This system adopts a client-server architecture that communicates via REST APIs, offering high flexibility and scalability. The developed mobile application runs smoothly on various Android devices with main features such as responsive and easy-to-use news displays, comments, messages, searches, and profile management. The admin website is also redesigned with a modern look and news, user, and advertising management functions that are tailored to needs. The development method used is Extreme Programming (XP), which has proven effective through short iterations with active user involvement to produce an adaptive and appropriate system. The results of this development show that the e-news system is able to meet user needs well, provide easy access to interactive and responsive digital news, and support the media digitalization process at Jawa Pos Radar Tulungagung.**

Keywords—e-news system, client-server, Flutter, Laravel, Extreme Programming (XP).

I. INTRODUCTION

The rapid development of digital technology and the internet has brought significant changes in the way people access and consume information [1]. The transition from print media to digital media occurred because of the ease of accessing information through electronic devices such as smartphones and tablets [2]. Digital media not only presents news quickly and practically, but also allows users to interact actively through comment features and share content. This phenomenon is very pronounced in Indonesia, where smartphone penetration reached 80% in early 2024, dominated by Android users [3]. This trend is driving the transformation of the print media industry which is starting to lose its existence amidst the rise of digital news platforms [4]. However, digital media also faces challenges in the form of less valid information and the rise of fake news, thus requiring trusted news sources and an appropriate presentation system [5]. Jawa Pos Radar Tulungagung as one the local media must adapt to this change. The development of client-server-based e-news system using Flutter and Laravel frameworks is expected to facilitate real-time news access, maintain information accuracy, and maintain a wide audience reach. Therefore, this study aims to design and test the system architecture to support the digital transformation of print media in the modern era.

II. LITERATURE REVIEW

A. Client-Server Architecture

The client-server model is a network model that separates the client device as the request sender and the server as the service and data provider [6]. According to Forouzan & Fegan [7], this architecture allows for centralized data storage, thereby improving management efficiency and data security. Middleware, as an intermediary component, bridges communication between the client and server, facilitating interoperability despite differences in protocols or operating systems [8]. However, this model has the disadvantage of potential server overload when client demand is very high, which can be overcome with load balancers and the use of server clusters [9].

B. Mobile Applications and the Flutter Framework

Flutter is an open-source framework developed by Google for building cross-platform mobile applications with a single codebase using the Dart programming language [10]. Flutter offers high performance thanks to its proprietary rendering engine and widgets that facilitate the creation of interactive interfaces [11]. Despite its advantages, such as ease of development and UI customization, Flutter still has drawbacks, including large application size and limited availability of third-party libraries.

C. Laravel Framework and PHP Programming Language

Laravel is a popular PHP framework that adopts the Model-View-Controller (MVC) architecture, facilitating the development of dynamic web applications with its elegant syntax and built-in security features [10], [12]. PHP itself is a server-side scripting language widely used in dynamic web development, with strong support for various databases, particularly MySQL [13], [14]. Laravel also features the Eloquent ORM, which simplifies database interaction and increases developer productivity [15], [16].

D. MySQL Database

MySQL is a popular open-source relational database management system that supports several important features, such as ACID transactions, to ensure data security and integrity (Erickson, n.d.). MySQL is highly compatible with PHP-based applications and is widely used in modern web application development [17].

E. Client-Server Integration with Flutter and Laravel

According to Dargie and Poellabauer [18], the client-server communication model allows client devices to send requests for data or services to the server, which responds through specific network protocols. This concept is very relevant in modern applications based on RESTful APIs, where the server acts as a data center accessed by the client. Galloway et al. [19]add that the integration of RESTful APIs in the MVC architecture facilitates the separation between the backend and frontend, allowing the client to send HTTP requests that are processed and replied to by the server in a comprehensible format.

F. E-News System Security

Electronic news (e-News) systems require a multi-layered security approach (defend in depth) to protect against cyber threats, including injection attacks, unauthorized access, and data breaches [20]. This approach involves a combination of technology, policies, and user awareness to ensure the system's resilience and optimal performance in a vulnerable digital environment.

III. METHODOLOGY

A. R&D Research Methods

This research employed a Research and Development (R&D) method aimed at developing a product while simultaneously testing its effectiveness to ensure its functionality for the community [21]. The system development utilized the Agile methodology, which is flexible, iterative, and adaptive, addressing the weaknesses of Waterfall model. Agile operates with short cycles (sprints) encompassing planning, development, testing, and evaluation, enabling developers updates and new features and adapt requirements based on user feedback.

The Agile development workflow in this study followed the Extreme Programming (XP) model, which is considered suitable for small to medium-sized development teams and projects that experience rapidly changing requirements [22]. XP emphasizes continuous feedback, simplicity, communication, and courage throughout the development process. It consists of four core activities: planning, designing, coding, and testing, as shown in Fig. 1.

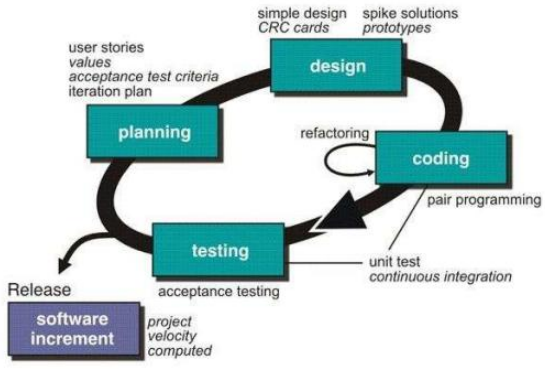

Fig. 1. Extreme Programming (XP) model used in the Agile development workflow

1) Planning: User stories are created to identify and prioritize system features. These user stories are the reviewed with the client to determine time and cost estimates for system development.

2) Design: System logic is continously refined throughout the development cycle based on evolving user storiess and client input. Rather than performing design once at the beginning, XP promotes ongoing system design adaptation.

3) Coding: This stage involves coding and unit testing, which are divided into three sub-stages:

a) Unit Testing: Functions are individually tested to verify correctness.

b) Code Generation: Based on the user stories, code is implemented using Dart with the Flutter framework for the mobile platform and PHP with the Laravel framewok for the web platform.

c) Code Refactoring: Code is reviewed and refined. If issues are found, corrections are made before proceeding.

4) Testing: Comprehensive testing is carried out with end-users and clients to evaluate whether the system meets the specified requirements. Feedback collected in this phase is used to identify bugs and enhance features prior to final deployment.

B. Use Case Diagram

Use Case Diagram is one of the components of Unified Modeling Language (UML) used to describe the interaction between the system and its actors (either users or external systems). This diagram illustrates the main functionalities accessible to each actor and how they interact with the features provided by system. The designed Use Case Diagram for this system is shown in Fig.2.

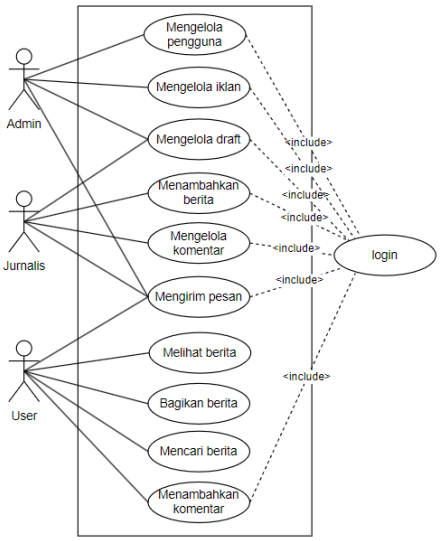

Fig. 2. Use case diagram of the system showing interaction between actors and functionalities

C. Activity Diagram

The Activity Diagram is a type of Unified Modeling Language (UML) used to visualize the workflow of activities within a system, program, or software. This diagram illustrates the sequence of steps or processes that occur, involving both

user and system perspectives, thereby assisting in understanding the overall logic and flow of activities. Moreover, the activity diagram plays a vital role in analyzing and deepening the understanding of scenarios described in the use case diagram, particularly in elaborating the internal processes of each use case.

Fig. 3 illustrates the login activity flow. The process begins when user accesses the login page and enters their email and password credentials. The system then verifies the input. If the credentials are valid and the user's role is identified as admin, the system redirects them to the admin dashboard interface according to their access rights.

Fig. 3. Activity diagram of admin login process

Fig. 4 illustrates the user management activity. After logging in as an admin, the user accesses the user management page via the admin dashboard. The admin can add, edit, or delete user data. Once the information is correctly entered or updated, the admin submits the changes by clicking the save button, and the system stores the data accordingly.

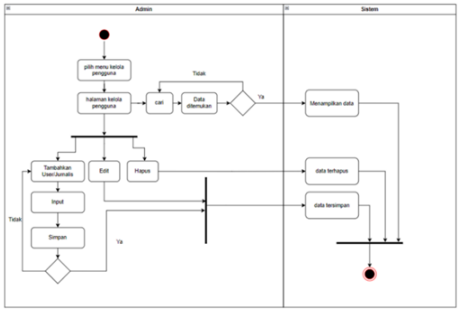

Fig. 4. Activity diagram of user management by admin

Fig. 5 illustrates the comment activity by a guest user. The process begins when a guest views a news article and attempts to add a comment. The system automatically checks the user ID and, if identified as a guest, prompts a login or registration form. Once the guest successfully logs in as a registered user, the comment is automatically submitted to the comment section.

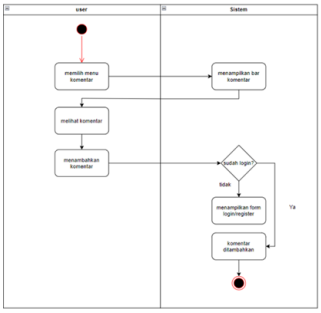

Fig. 5. Activity diagram of user adding a comment

D. Database Schema

The database is a fundamental component of the system being developed. The database structure defines a set of tables consisting of attributes or fields necessary to support the overall system development process. The tables used in this study are designed to manage various system entities such as users, news, comments, roles, and other related components. These tables are logically interconnected to ensure data consistency, efficiency, and scalability throughout the system. The database schema designed for this system is presented in Fig. 6.

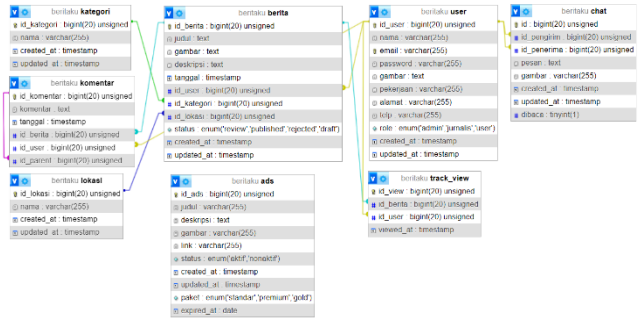

Fig. 6. Database schema of the E-News system

E. Research Location and Duration

The study was conducted at Jawa Pos Radar Tulungagung, Jl. Jayeng Kusuma No. 44, Tulungagung, East Java, from September 2024 to January 2025.

IV. Result And Discussion

The E-News system developed for Jawa Pos Radar Tulungagung adopts a client-server model using Flutter (mobile) and Laravel (web) frameworks. The web-based admin and journalist interfaces allow content and user management, while the mobile enables users to view news, post comments, search, share, and engage in direct messaging. The system aims to support digital transformation, reduce printing costs, and meet the growing use of smartphones in Indonesia.

A. System Testing

The testing was conducted to ensure that the developed system operates according to specified requirement. The Black Box testing method was employed, focusing on input-output functionality without analyzing internal code. A total test cases were executed to validate various system functions on both web and mobile platforms.

TABLE I. TABLE OF BLACK BOX TESTING

No	Feature	Test Scenario	Input	Expected Output	Result
1	Login Auth (Website)	Login with correct credentials	Valid email/password	Redirected to dashboard	Passed
2	Dashboard (Website)	Access dashboard after login	Click dashboard menu	Dashboard page displays summary data	Passed
3	Manage Ads (Website)	Add new advertisement	Valid ad form	Ad is saved and listed	Passed
4	Manage Users (Website)	Delete a user	Click delete button	User is removed from list	Passed
5	Comments (Mobile)	Post comment without logging in	Write comment & send	Redirected to login page	Passed

B. *Interface Results*

1) *Website*

a) Home Page: Fig. 7 illustrates the implemented user interface of the home page. The page allows visitors to explore news by categories such as politics, technology, sports, entertainment, and more. Each category displays two types of news: the latest news on the left for quick access to current updates, and archived news on the right for reference to previously published content. Additional features include a search bar at the top for keyword-based news queries and a login button at the top-right corner that redirects users to the login page. The home page is designed to be intuitive and responsive, supporting both exploratory browsing and direct access to information.

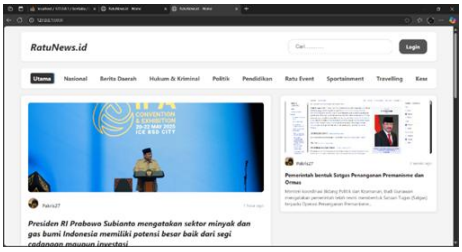

Fig. 7. Home page website

b) Dashboard: Fig. 8 illustrates the implemented admin dashboard interface. This page serves as the central control panel for administrators to monitor and manage system-wide data. It displays dynamically updated statistical summaries, including total published news, registered users (admin, journalists, and general users), active advertisements, news categories, available locations, news under review, and monthly news views. The total view count is adjustable based on the selected month, allowing the admin to track performance trends accurately and flexibly over time.

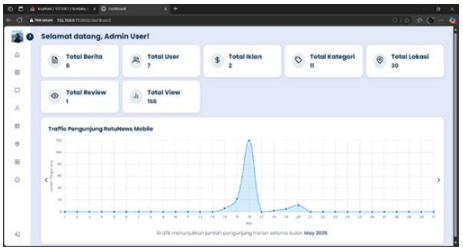

Fig. 8. Dashboard admin

c) Chat: Fig. 9 illustrates the messaging interface of the system. This page enables private communication between users through a structured chat layout. The left panel displays the list of available message threads, while the right panel shows the active chat room between two users. The chat content dynamically updates based on user interaction; selecting a different conversation (e.g., with user 3) will load the corresponding message history. The interface is designed for easy navigation and clear, organized conversation flow.

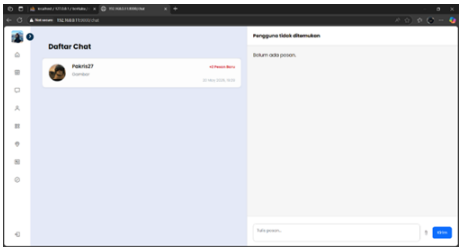

Fig. 9. Chat page website

2) *Mobile*

a) Home Page: Fig. 10 illustrates the mobile home page interface. The layout consists of two sections: a horizontal column displaying all the latest news and a vertical column presenting the latest news grouped by category. This design enables users to quickly browse recent updates while also exploring news based on their interestss.

Fig. 10. Home page mobile

b) News Details: Fig. 11 illustrates the news detail page interface. This page displays complete information about a selected news article. It also includes a share feature and a comment section, enabling users to respond to content, enhance interaction, and broaden the reach of the information.

Fig. 11. News detail mobile

c) Colom Commenter: Fig. 12 illustrates the comment section interface. This section allows users to post comments and includes a reply feature that enables interaction between users through threaded discussions.

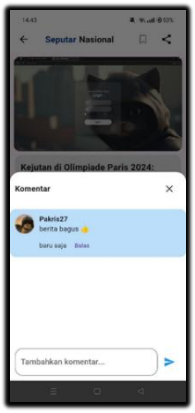

Fig. 12. Colom commenter

d) Chat: Fig. 13 shows the messaging interface. This interface serves as a direct communication space between users, displaying real-time conversations using bubble chat design. Messages are visually separated by sender and receiver, each with timestamps. At the bottom, users can compose new messages, attach media, and send them instantly, offering an interactive and user-friendly chat experience.

Fig. 13. Chat page mobile

e) Profile: Fig. 14 displays the user profile interface. This page presents structured personal information including profile photo, name, address, email, and other details. Users can conveniently monitor and update their data via the edit button, which redirects to the profile editing page.

Fig. 14. Profile page mobile

C. *Evaluation and Discussion*

An evaluation session conducted with stakeholders from Jawa Pos Radar Tulungagung. The system was presented and tested by internal users, followed by feedback collection. Results indicated:

1) Strengths: Intuitive interface, relevant features (search, notifications, comments, sharing, profile management), and smooth navigation.

2) Suggestions: Improve mobile responsiveness and visual design consistency.

This feedback provides valuable input for future refinement to better align the system with organizational needs and enhance user experience.

V. Conclusion and Recommendations

A. *Conclusion*

This research successfully developed a client-server-based E-News system for Jawa Pos Radar Tulungagung using Flutter for the mobile interface and Laravel for the backend. The system supports efficient communication through REST API and provides flexibility and scalability. The mobile application performs reliably across Android devices with responsive UI and functional features such as news browsing, commenting, messaging, and user profile. The admin website has also been redesigned with modern UI, retaining functional alignment with the previous system. Core features such as news management for journalists, user and advertisement management for administrators, and user interactions, were implemented based on user expectations. The Extreme Programming (XP) method proved effective through short, iterative cycles that enhanced adaptability and prioritized critical features based on direct user feedback.

B. *Recommendation*

To ensure sustainability, it is recommended to:

1) Actively utilize the developed system support digital news distribution and serve as an interaction hub between editors, readers, and advertisers.

2) Disseminate the system via social media, print announcements, and internal staff training.

3) Enhance the system based on user feedback, such as integrating editorial scheduling and improving accessibility (e.g, dark mode, font size, language options).

4) Improve system security through encryption, two-factor authentication (2FA), and secure API practices.

5) Conduct regular evaluations and maintance, including performance and compatibility testing.

6) Provide internal training for administrators and journalists to ensure effective system use and reduce operational errors.

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