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Implementation of Flutter and Firebase in Developing a Mobile News Portal Application

Implementasi Flutter dan Firebase dalam Pengembangan Aplikasi Portal Berita Mobile

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A B S T R A C T

The BPKAD PROVSU News Portal information system is a mobile application developed to facilitate the efficient dissemination of information and news to the public, as it can be accessed via smartphone anytime and anywhere. This application was designed using the Flutter framework and Firebase services, with system modeling based on the Unified Modeling Language (UML) and developed using the waterfall method. The research resulted in a functional application that enables fast and accurate information delivery. Testing using the black-box method confirmed that the system operates as expected. These findings indicate that the application can effectively improve public access to government-related news and information.

Keyword: Flutter, Firebase, Waterfall, News Portal, Mobile

A B S T R A K

Sistem informasi Portal Berita BPKAD PROVSU merupakan aplikasi mobile yang dikembangkan untuk mempermudah penyebaran informasi dan berita kepada masyarakat secara efisien, karena dapat diakses melalui smartphone kapan saja dan di mana saja. Aplikasi ini dirancang menggunakan framework Flutter dan layanan Firebase, dengan pemodelan sistem berbasis Unified Modeling Language (UML) serta dikembangkan menggunakan metode waterfall. Penelitian ini menghasilkan aplikasi yang berfungsi dengan baik dalam menyajikan informasi secara cepat dan akurat. Pengujian menggunakan metode black-box menunjukkan bahwa sistem berjalan sesuai dengan yang diharapkan. Hasil penelitian ini menunjukkan bahwa aplikasi yang dikembangkan dapat meningkatkan akses masyarakat terhadap berita dan informasi terkait pemerintahan secara efektif.

Kata Kunci: Flutter, Firebase, Waterfall, Portal Berita, Mobile

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1. INTRODUCTION

We live in an era where technology is essential and inseparable from our daily lives. We have also experienced a significant increase in the development of science and technology, especially in terms of internet network technology. In almost every region in the world, technology is used to search for and share information [1].

The Regional Financial and Asset Management Agency (BPKAD) of North Sumatra Province is a newly formed Regional Work Unit (SKPD), established as a follow-up to Government Regulation No. 18 of 2016 concerning Regional Apparatus. BPKAD is the new name given to the North Sumatra Governor's office, which was

previously known as the Bureau of Finance. The purpose of establishing BPKAD is to manage regional finances and assets more effectively and efficiently. It is responsible for managing and optimizing regional financial resources and ensuring that regional finances are used appropriately in accordance with predetermined objectives [2].

The Regional Financial and Asset Management Agency of North Sumatra Province has a vast amount of information that needs to be disseminated to the public, including technical policies, as well as guidance, coordination, monitoring, and evaluation. The BPKAD of North Sumatra Province already has a web-based news portal; however, it has several accessibility limitations. Users must access the portal through a browser by typing in the URL, which affects its ease of use. Additionally, performance issues arise when executing tasks that require significant processing power or accessing a large amount of locally stored data [3]. Furthermore, web-based news portals require an internet connection to function [4].

Due to these existing problems, a mobile-accessible news portal information system is needed for BPKAD North Sumatra Province. This system will be developed using the Flutter framework, known for its high performance. Thus, it is expected to serve as a solution to overcome the current challenges [5]. The news portal will focus on providing information about the Regional Financial and Asset Management Agency of North Sumatra Province. It will be accessible via smartphones anytime and anywhere, aligning with the vision and mission of the agency [6].

Research conducted by Naufal Aji Dewananto et al. discusses user experience design using the Human-Centered Design method for the Tabloidjubi news portal mobile application [7]. This research aims to improve the user experience of the Tabloidjubi news portal application by identifying and solving existing problems. The initial evaluation stage will be carried out using the heuristic evaluation method with expert evaluators to identify application issues. Once identified, the user experience design will be refined using the Human-Centered Design method based on these findings.

Research conducted by Dita Afrianti Siagian et al. [8] discusses the news portal information system at the Tapian Dolok sub-district office. This system was developed to facilitate easier access to news and information for the public and employees. The authors used DFD and ERD in designing the website, which was later built using MySQL as the database and Macromedia Dreamweaver CS 6.0 for the interface. The primary goal of this website was to provide a reliable platform with accurate and dynamic news data processing at the Tapian Dolok Sub-District Office.

2. METHODOLOGY

This research uses qualitative methods, which emphasize descriptive data collection and employ techniques such as interviews, observations, and literature studies for analysis. This method is used to explore phenomena that are not yet well known and to reveal the meaning and understanding of individuals regarding a particular subject [9].

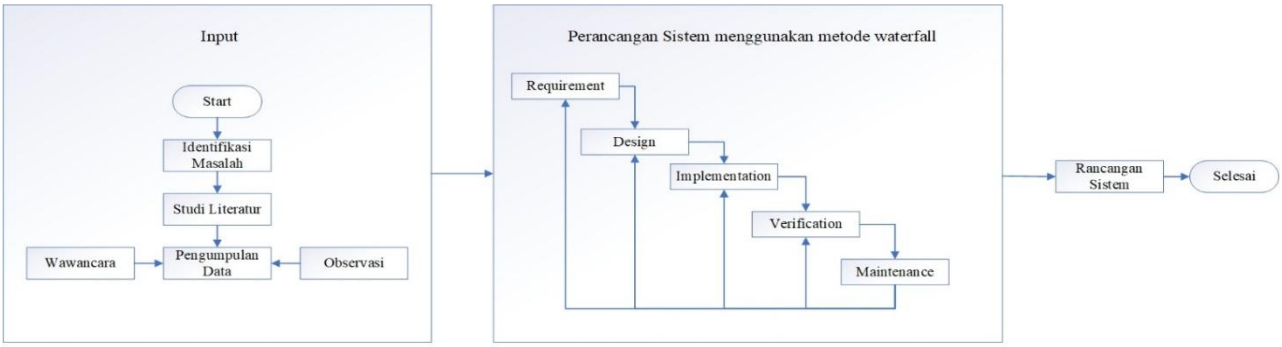

Figure 1. Research Flow Chart

1. Problem Identification

Problem identification in this study focused on the office of the Regional Financial and Asset Management Agency (BPKAD) of North Sumatra Province. This location was chosen as the research object because there were no previous studies discussing the design of a mobile-based news portal information system using the Flutter framework for this office. Problem identification was conducted by searching the internet for other information system design cases that utilize the waterfall methodology, which served as a reference for designing the news portal information system for the BPKAD PROVSU office.

2. Literature Study

In this research, a literature study was conducted to obtain information related to system design through sources such as journals, books, and internet sites relevant to the waterfall method. The purpose of this literature study was to establish a rationale and perspective to support the research being carried out.

3. Data Collection

In this study, data collection techniques were carried out through direct observation and interviews at the North Sumatra Province Regional Financial and Asset Management Agency office. These interviews aimed to identify real problems in the process of disseminating information to the public and to gather accurate information about the system requirements and expectations of the research subject. The interview was conducted with Mr. Juliadi Zurdani Harahap, the secretary of the Regional Financial and Asset Management Agency of North Sumatra Province.

4. System Design

A method is a set of rules or procedures for performing a task. The System Development Life Cycle (SDLC) is a process used by system analysts to develop information systems while considering user needs, validation, training, and system ownership [10]. The waterfall SDLC model, also known as the linear sequential model or classical life cycle, provides a structured software development approach, consisting of the following stages: analysis, design, coding, testing, and support [11].

4.1. Requirements

Before starting software development, a developer must understand user needs. Information about these needs can be gathered through discussions, observations, surveys, and interviews. The collected data is then analyzed to generate a complete specification of user requirements for the software.

4.2. Design

At this stage, the developer creates a system design to determine the required hardware, define system requirements, and establish the overall system architecture.

4.3. Implementation

During this stage, the system is initially developed as small program units, which are later integrated. Each unit is created and tested to ensure proper functionality, a process known as unit testing. The North Sumatra Province BPKAD News Portal application developed in this study utilizes the Flutter framework.

4.4. Verification

At this stage, the system is tested to verify whether it meets the specified requirements. Each program unit is integrated and tested to ensure that the software functions as intended. Testing is conducted using the Black-Box testing method, where each input menu is tested by categorizing it based on its function.

4.5. Maintenance

The final stage of the SDLC model is maintenance. At this stage, the developed software is deployed, and ongoing maintenance is performed, including fixing undetected errors from previous stages. After analyzing system requirements, the design process begins with a general system description, process descriptions, and expected system outcomes.

Unified Modeling Language (UML) is a system design tool based on Object-Oriented (OO) concepts. UML provides various types of diagrams that help describe the system being developed, including both its static aspects (system structure) and dynamic aspects (system functions and interactions between system components) [12][13].

For system design, Microsoft Visio was used to create application diagrams. Microsoft Visio is a design application used to create diagrams and charts. It offers various templates and symbols for creating flowcharts, network diagrams, organizational charts, and more [14]. Visio also provides features such as auto-alignment and auto-connect, which simplify the diagram creation process.

1. Use Case Diagram

A use case diagram is a type of UML diagram used to illustrate the interaction between a system and its users (actors). The objectives of a use case diagram include:

a. Describing the interactions between the system and its actors.
b. Assisting in identifying the boundaries of the system.
c. Identifying the users or entities interacting with the system and defining the actions the system must perform.

The use case diagram for the North Sumatra Province BPKAD News Portal application in the following figure:

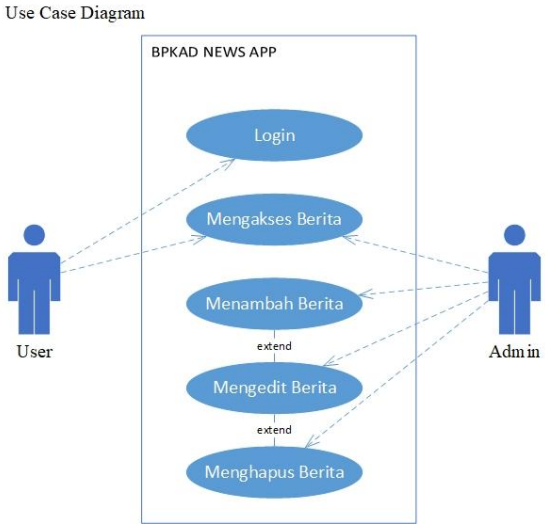

Figure 2. Use Case Diagram

Use case diagram is one type of UML diagram that is used to describe the process or flow of activities of the system to be created. Figure 2 shows that there are two actors involved in the North Sumatra Province BPKAD News Portal Application, namely the user and the admin. This use case diagram is used to identify who interacts with the system and to find out what the system should do, based on the prioritization of predetermined system requirements.

2. Activity Diagram

Activity diagrams can help in understanding the processes that occur in more detail, so that they can help in analyzing and developing strategies to improve the efficiency and effectiveness of the process.

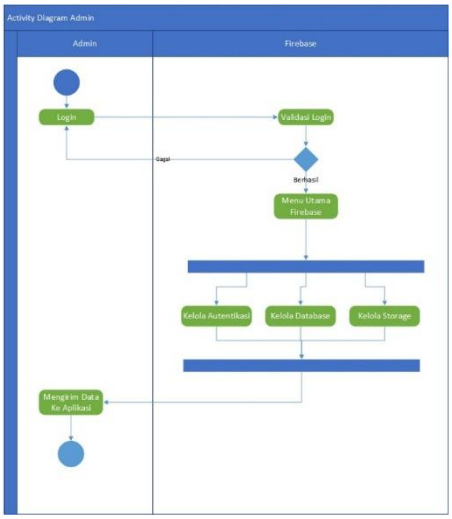

Figure 3. Activity Diagram Admin

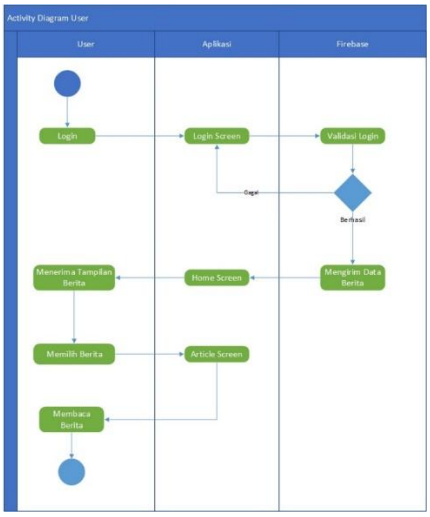

Figure 4. Activity Diagram User

3. RESULTS AND DISCUSSION

1. System Implementation

System implementation is the stage where system components are developed and integrated into a functional whole. This process includes several stages to ensure that the system can work properly and as needed.

This implementation produces a display page or interface that shows that the BPKAD news portal application of North Sumatra Province has worked well.

2. Splash Screen Splash

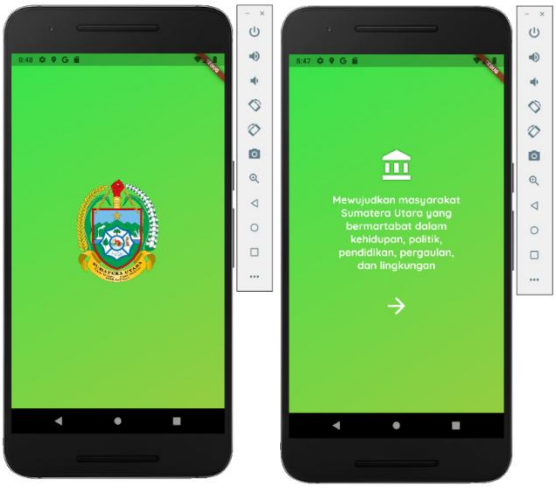

Figure 5. Splash Screen

Splash screen is the initial page that appears when the BPKAD News Portal application of North Sumatra Province is first run. Its main function is as the first display that will be seen by users when opening the application. In addition, the splash screen is used as a way to provide information about the application. The User Interface is designed using the flutter framework, flutter is a new cross-platform mobile application SDK offered by Google that helps developers to create Android and iPhone (iOS) applications using the same base code. Applications created with Flutter are written in the Dart language. Flutter uses a modern reactive framework that allows developers to build UIs with a native look and feel. Google revealed that Flutter is based on inspiration from React. Basically, Flutter uses a 2D rendering engine to create all UI elements [15][16].

3. Menu Display and Main Screen

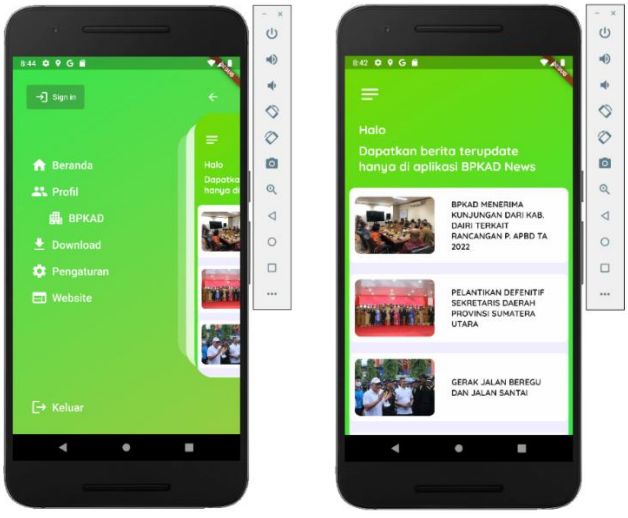

Figure 6. Main Screen

Main Screen is a page that will be seen by the user after the Splash Screen which contains the latest news headlines about BPKAD North Sumatra Province, on the other hand there is a Menu Screen that displays a list of choices or options for users such as: Sign-in to login to the user's google account, Download to download report files about BPKAD North Sumatra Province, Settings and others.

4. Display of Login Screen and Article Screen

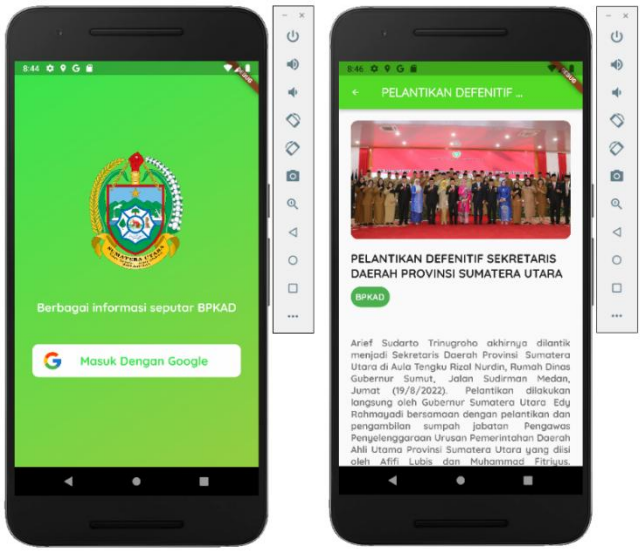

Figure 7. Login Screen and Article Screen

To log into the application using Google, a feature from Firebase is required, namely Firebase Authentication. Firebase Authentication provides backend services, an easy-to-use SDK, and an instant UI library to verify clients through the application. Users can be allowed to log into the Firebase application either by using FirebaseUI as a complete authentication solution or by using the SDK to integrate one or more manual login techniques [17].

5. Firebase Console

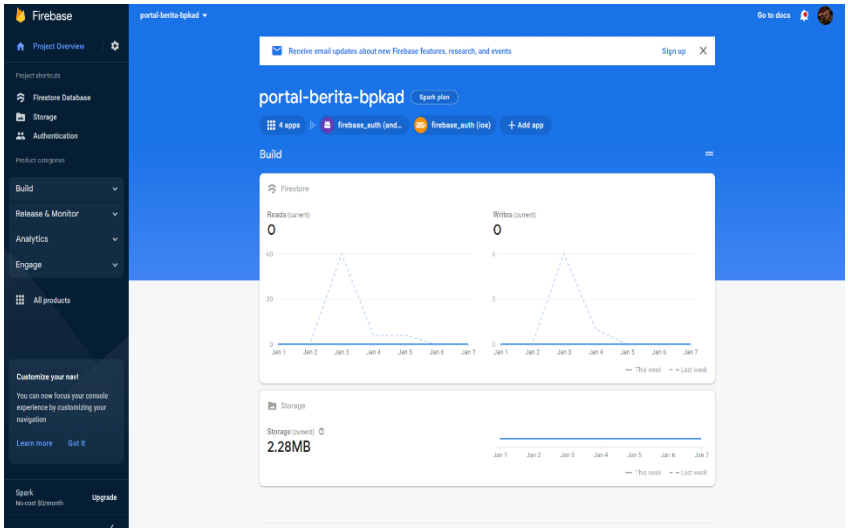

Figure 8. Firebase Console

Console is a web platform that provides access to all Firebase services. Through Firebase Console, users can manage Firebase projects and access features available in Firebase, such as Realtime Database, Authentication, Cloud Storage, and others. database by firebase is cloud-hosted NoSQL based. This database provides synchronization across connected devices and is available when there is no network connection through a local cache. It is an event-driven database that works very differently from traditional SQL databases. There is no server-side code and database access level; all coding is done by the client. Whenever a data change occurs in the database,

an event will be triggered in the client code, and you can then handle and update the user interface state in response [18].

Firebase will be used as the database to assist in the development of the application. Firebase uses NoSQL technology, which means that data is stored in JSON (JavaScript Object Notation) format and does not use table format as commonly used in relational databases[19]. Although this technology is new, the flutter framework is already an option for many companies because it can reduce development costs and the number of errors in applications. Flutter is attractive because it is as easy to use as web application development, but also has a working speed equivalent to native applications [20].

6. System Testing

Software testing by evaluating functional specifications without testing the design and program code to determine whether the functions, inputs, and outputs of the software match the desired requirements. The BlackboxTesting method is one way that is easy to use because it only requires the upper and lower limits of the expected data. The amount of test data can be calculated by observing the number of entry data fields to be tested, the entry rules that must be met, and the upper and lower limit cases that are met. With this method, it can be seen whether the functionality can still accept unexpected input data, which may cause the stored data to be invalid [21].

Table 1. Black Box Testing Process Login User, Main Menu & Select Article

No	Test	Test Case	Expected Conditions	Result Conditions	Result
1	Access the login page	Press the sign in button	Successully logged in	Worked	Valid
2	Sign in using Google account	Press the enter button	Successully logged in to the main page	Worked	Valid
3	Accesing news	Press the news tittle	Successully logged in to the news page	Worked	Valid
4	Accessing web-based news pages	Press the website menu	Successfully logged in to the news web page	Worked	Valid
5	Sign out with Google account	Press the exit menu	News web page successfully signed out	Worked	Valid

Based on the results of the tests carried out on the system, it was found that the news portal information system of the Financial and Regional Asset Management Agency of North Sumatra Province has proven to meet expectations and has good performance. Therefore, the system can be said to be Successful and Eligible to be used as a solution to facilitate the delivery of information to the public.

4. CONCLUSION

Based on the discussion and evaluation conducted, it can be concluded that this study aims to develop a news portal application for the North Sumatra Province BPKAD using the waterfall method, with the Flutter and Firebase frameworks. The modeling used in the application incorporates Unified Modeling Language (UML), specifically use case diagrams and activity diagrams. Both diagrams are utilized to describe the architecture and processes of the North Sumatra Province BPKAD application. Use case diagrams illustrate the interaction between the system and users, while activity diagrams depict the process flow from one action to another within the system.

The results of this study indicate that the interface and page display of the North Sumatra Province BPKAD news portal information system function properly. The system was tested using the Black-Box testing method to evaluate the news page functionality. As a result, the developed system successfully meets the community's need for precise and accurate information.

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