# Development of Cloud Messaging-Based Mobile Learning Application to Improve Interaction in the Learning Process at STIKI (ebelajar case study)

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***Abstract***

In the digital era, the use of technology in the learning process is crucial to improve the effectiveness and efficiency of education. This study aims to develop a cloud messaging-based mobile learning application to improve interaction between students and lecturers at STIKI. This application is developed using the Dart programming language with the Flutter framework and utilizes cloud messaging technology to enable fast and effective communication in the form of announcements, discussions, and task notifications.

The research method used is the research and development (R&D) method with the Agile software development model. The development stages include needs analysis, design, implementation, and application testing and evaluation. The results of the study show that this mobile learning application can increase the frequency and quality of interaction in the learning process. This increase is measured through user satisfaction surveys and analysis of application usage data.

With this application, it is expected to provide a positive contribution in increasing student involvement in the teaching and learning process, as well as making it easier for lecturers to deliver materials and information related to lectures. This study also presents recommendations for further development so that the application can continue to be adjusted to user needs and technological developments.

## 1. Introduction

In an increasingly digital era, the education model is significantly influenced by the important role of information and communication technology. The rise of mobile technology and the increasing access to the internet have opened up great opportunities for transformation in the world of education. Mobile learning is becoming increasingly popular, giving students the ability to access materials and learn anytime and anywhere using mobile devices.

### 1.1 Literature Review

interaction is a crucial component of effective learning. The relationship between educators and learners, as well as interactions between learners, can enrich the learning experience, boost student motivation, and support deeper understanding. One technology that enables real-time interaction is Cloud Messaging, which allows text, image, and voice messages to be sent between users quickly and efficiently. Mobile learning application users can interact with each other, discuss, and share knowledge more easily, thereby increasing collaborative learning.

However, although e-learning technology at STIKI Malang has been implemented since 2009 through the E-Learning platform, there are still several significant problems that hinder the effectiveness of learning. Many students report that they have difficulty understanding the content provided by the instructor. In addition, in certain situations, instructors are not always able to provide direct assistance when students have difficulty with assignments or understanding the material presented. This often causes delays in the learning process and reduces the quality of interaction between lecturers and students.

The current E-Learning platform also has limitations in terms of interaction and flexibility. For example, communication between lecturers and students is often hampered by the limitations of the platform's features, which do not support real-time notifications or effective discussion forums. This causes students to feel less connected to the learning process, especially when they need immediate feedback or assistance. From the description of the problems above, it is clear that an application is needed that can help students open E-Learning and work on assignments more flexibly and improve real-time interaction between lecturers and students. Therefore, this study focuses on the development of a mobile learning application based on Cloud Messaging, which is expected to be an effective solution to improve interaction in the learning process at STIKI Malang. This application is expected to not only facilitate better access to the e-learning platform, but also improve the quality of interaction between students and lecturers and among peers.

Taking the background and problems identified previously, the main objective of this study is to conceptualize, build, and improve a Mobile Learning Application for Cloud Messaging Based Messages to Enhance Interaction in the Learning Process at STIKI Malang, which can support interactions between students and lecturers in academic activities.

## 2. Research Methods

In creating a Cloud Messaging-Based Mobile Learning Application Development Application to Improve Interaction in the Learning Process at STIKI, the author is racing against collecting information using interviews, research, and library research until the source of the information collection method, the author uses descriptive analysis in his conclusion, the author formulates the results of the information analysis according to the problems that are naturalized by the object of the research.

The materials and tools used to carry out this research are:

- Software

The devices used in this study are Visual Studio Code, Git HUb, Goland.

- Quantitative Method

The Quantitative Method in this study is useful for collecting data and information. Interviews were conducted at the STIKI Malang Campus with various students from several batches. The main tool for collecting data from research participants is the Xiaomi MI 8 cellphone. The cellphone used by the researcher is used to record and read several questions to the interviewees [2].

- Previous Research

Previous studies have been involved in the analysis of comparable or related research conducted previously with the aim of distinguishing it from previous research or complementing previous research so that research updates can be found. Therefore, researchers include the results of previous research in this literature search. [2].

## 3. Result and Discussion

Problem Identification

The learning system at STIKI Malang is still not flexible enough, because it can only be accessed via the website, which does not display optimally on mobile devices. Students often experience obstacles in using the E-Learning platform, such as limited interaction with lecturers and the absence of real-time notifications. To improve the quality of learning, it is necessary to develop reminder features and the ability to upload files larger than 5MB, which are currently not available at STIKI Malang.

Problem Solving

The application "Development of Cloud Messaging-Based Mobile Learning Applications to Improve Interaction in the Learning Process at STIKI" was designed, which has advantages such as a responsive interface optimized for various screen sizes, thorough testing to ensure an optimal user experience, and training for students to increase adoption and flexibility of learning.

System Design

System design aims to obtain an overview of the application to be developed in order to achieve system effectiveness and efficiency. In this study, an activity diagram was used to determine the system design [3], as follows:

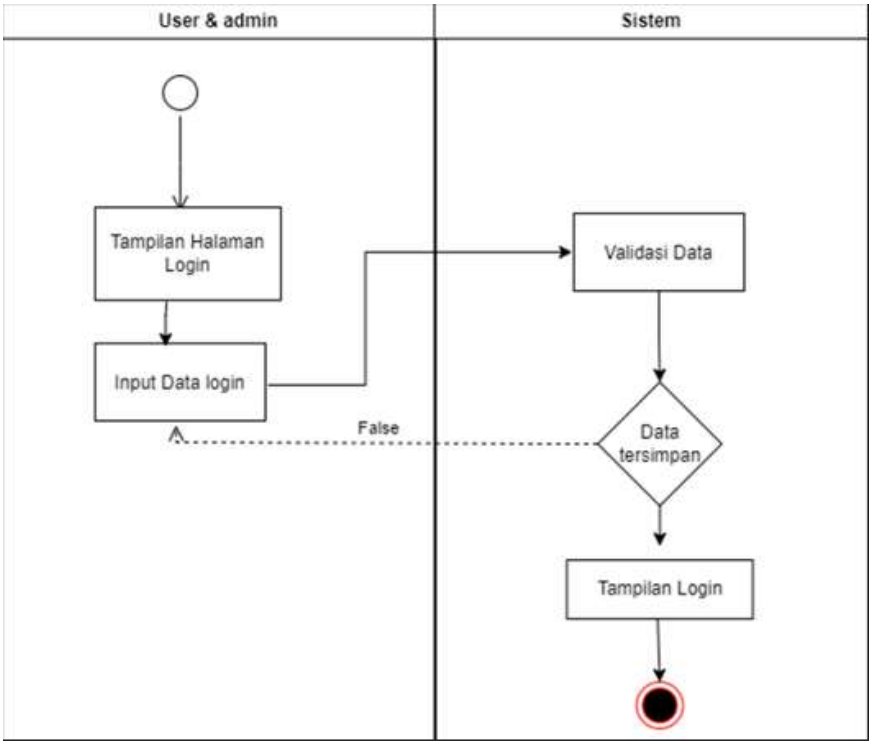


*Fig. 1 activity diagram Login User*

In (Figure 1) it is explained that the User can log in to the application where the data entered in the login form in the form of username and password will be checked whether it is correct or not so that they can continue to the Home Page.

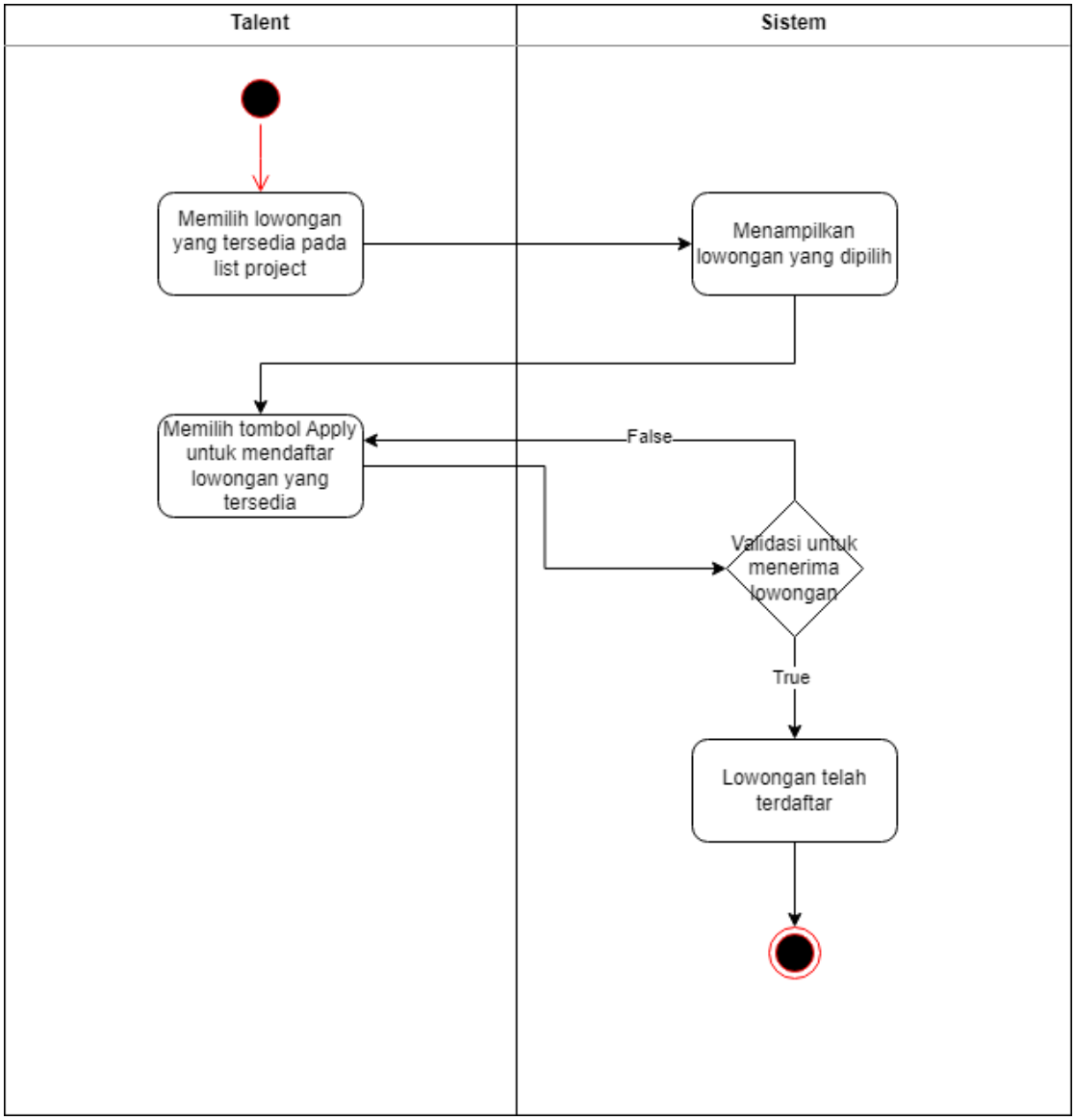


*Fig.2 Activity Diagram Apply Job Talent*

In the Activity Diagram in (Figure 3) explains the process used by talents or users to select jobs on the talent dashboard, after the talent selects a job, the details of the job are displayed. When the talent or user presses the apply button to register, the system performs validation. If validation is successful (true), the user will be registered for the vacancy. If validation fails (false), the system will return to the available vacancy selection page.

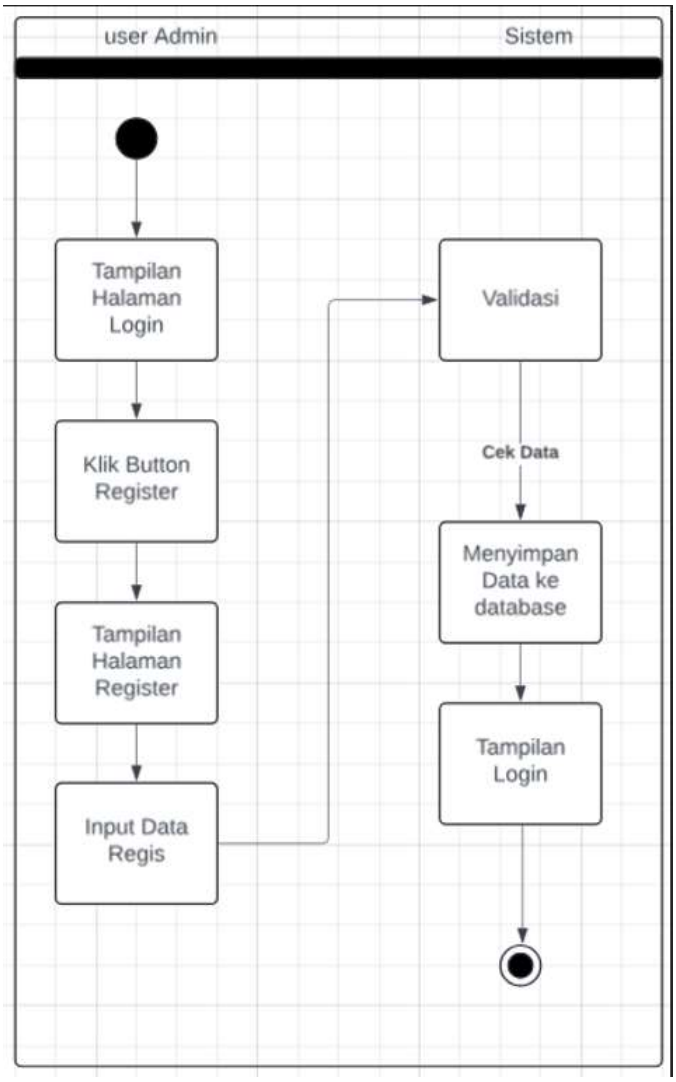


*Fig. 3 Activity Diagram Regis User*

Figure 4) The Activity Diagram above explains how the registration process for new users. Users register by filling in the data specified by the system.

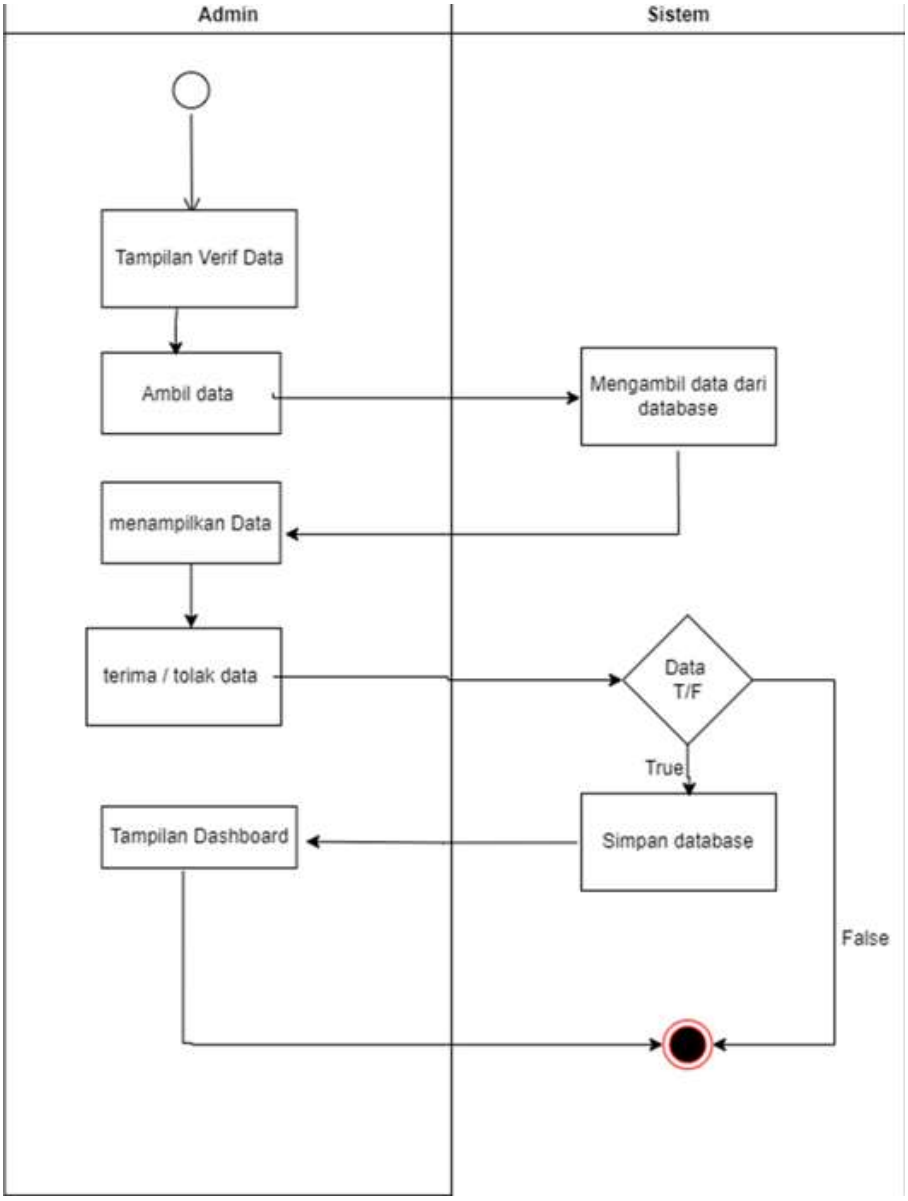


*Fig. 4 Activity Diagram Accepcgt atau reject data*

In (Figure 5) This Activity Diagram explains how the data validation process for new users. Users upload daily assignments or tests by uploading files or folders that have been determined by the system.

## 4. Conclusions

The purpose of this study is to design, develop, and build a Cloud Messaging-based Mobile Learning Application to improve interaction in the learning process at STIKI Malang, with the hope that this application can facilitate students and lecturers in the teaching and learning process. The methodology used includes data collection through literature studies and interviews, as well as data analysis using the cause-and-effect method. In developing the application, various hardware and software were used, including laptops with Windows 11 operating systems, smartphones with a minimum API level of Oreo, and software such as Visual Studio Code, SCRCPY, Android Studio, Firebase, Figma, and Balsamiq. The results of this study are the creation of a Learning Management System application that is more flexible, accurate, and easily accessible anywhere, with the advantages of platform compatibility, high accessibility, simple appearance, and a user-friendly and modern

interface. However, this study also faces challenges such as the need to expand knowledge in developing features on the Flutter platform and handling expired widgets that require intensive reading of documentation. This application makes a significant contribution to facilitating STIKI Malang students and lecturers in the teaching and learning process, and is expected to be an effective solution to improve interaction and learning efficiency. As a recommendation, it is suggested to fix bugs, update the interface that may be outdated, and continue to develop new features to improve the quality of this application in the future.

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