Prototype Design of Campus Social Media Application using LBSN

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Abstract

Students pursuing higher education are required to actively learn, participate in academic and social activities, and develop critical and innovative thinking. Interactions between students, both with peers and lecturers, play a crucial role in shaping the learning experience on campus. The importance of these interactions prompted the researcher to design an application specifically for the campus environment. The app features chat, adding friends, and finding mates to expand students' social interactions. The find mate feature allows students to find friends randomly, while the maps feature makes it easier for them to find the location of their lecturers and friends in real time. By integrating the concept of a Location-Based Social Network (LBSN), this application is expected to reduce the level of academic stress and improve the quality of interaction among students and lecturers. Students can easily find friends and lecturers, and share locations in real-time. The method is based on the Prototyping Model and the testing is based on the Black-box method. The results are implemented through the Use Case diagrams and graphical user interfaces. The application prototype has been completely designed, however, recommendations for future researchers need to consider the application OS version for multiple platforms to broaden the user base.

Keywords— Social Media, Location-Based Social Network (LBSN), Mobile Application, Prototype

1. INTRODUCTION

Universitas Klabat is a private university located in Airmadidi, North Minahasa Regency, North Sulawesi, Indonesia. The university was established in 1965 under the name Perguruan Tinggi Klabat. Universitas Klabat's mission is to become a Christian university recognized both nationally and internationally by contributing to the development of the nation and state through education, research, and community service. Some of the study programs offered at Universitas Klabat include economics, computer science, nursing, theology, and others [1].

Students are individuals pursuing higher education at a college or university to enhance their knowledge, skills, and abilities in a specific field [2]. As part of society, students play a role as agents of change and future leaders in various sectors, including business, technology, health, and education [3]. During their studies, students are expected to actively learn, participate in academic and social activities, and develop critical and innovative thinking to address the increasingly complex and dynamic challenges of the world [4][5].

Lectures are one of the crucial activities in higher education. In lectures, there is interaction between students and their peers as well as interaction between students and lecturers. Peer interaction can influence the learning experience in class. Students who have good interpersonal skills and can interact well with peers can help build good cooperative relationships with other students.

According to research conducted by [6] with 189 students from the Urban and Regional Planning program at Diponegoro University, the level of peer social support affects the level of academic stress. Factors influencing academic stress in students include both internal and external

factors [6]. Internal factors are influenced by physical and mental health, such as low self-confidence, feelings of loneliness, or health issues. External factors are influenced by family, friends, and lecturers [6]. Interaction between students and lecturers can affect learning motivation and students' understanding of lecture materials. Friendly, open, and easily accessible lecturers can help improve students' confidence and participation [7]. Additionally, facilities can affect students' learning experiences during lectures [8].

Based on the explanations above regarding interactions between students and between students and lecturers, the researcher proposed a study to create a specialized campus application with features like chatting, adding friends, and finding mates. The find mate feature is intended for students to randomly find friends, thereby broadening their social interactions. To enhance interactions between students and lecturers, the application will include similar features but with an added map function for sharing locations in real time, making it easier for students to find lecturers and their peers. These features are expected to improve interactions among students and between students and lecturers, thereby reducing academic stress and enhancing academic performance. The suitable type of social media application based on the features and conclusions is the Location-Based Social Network (LBSN) [9].

Social Media plays a significant role in modern communication by providing various platforms tailored to different forms of interaction, content sharing, and networking [10][11][12][13][14][15]. Each type of platform offers unique features that cater to specific needs and preferences, contributing to the diverse landscape of digital communication.

Location-Based Social Networks (LBSNs) are a type of social media service that allows users to continuously share information about their location with others around the world using GPS technology [9]. These applications enable users to interact with their friends in a digital environment and share their location information in the form of photos, messages, and status updates using geotagging metadata [16]. One of the most appealing features of LBSNs is the ability to share locations in real time. With Real-Time Location Sharing (RTLS) [17], users can share information about their location every second, which is very useful in emergencies or when meeting friends at a specific place [18][19].

2. RESEARCH METHODS

2.1. Conceptual Research

In this research, the method we use refers to the prototyping theory as a software development life cycle [20][21][22]. The prototyping model process, illustrated in Figure 1, consists of five stages, which are described as follows:

1. Communication Stage: The researcher identifies the problem and gathers all possible user needs and system requirements. To identify the problem, the researcher performs observation of the environment, and to gather user and system needs, the researcher performs communication with the stakeholders.

2. Quick Plan Stage: The researcher creates a rapid plan based on the requirements identified in the first stage. At this stage, data of users, functional and non-functional requirements, scheduling, and budgeting are all considered.

3. Modeling Quick Design Stage: The researcher design the application model based on the planning from the second stage by utilizing integrated modeling tools (UML) to analyze and design the application. However, the researcher only chose the Use Case diagrams that are provided in this manuscript.

4. Construction of Prototype Stage: After modeling and designing the application, the researcher creates a prototype of the application using Figma and Java Script and then performs testing to ensure the application prototype is free from errors and bugs.

5. Deployment, Delivery, and Feedback Stage: At this stage, the researcher delivers the application to users to validate whether it meets their needs or requirements. If further refinements are needed, users are allowed to inform the development team to make modifications.

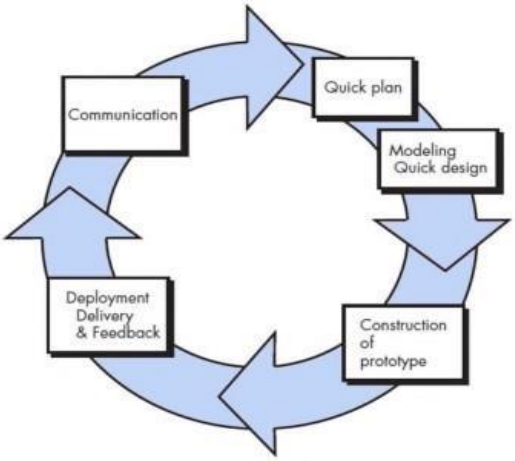

Figure 1. Prototyping Process Model [14]

2.2. Conceptual Aplication

In this section, the researcher describes the application concept illustrated in Figure 2 regarding the environment of the designed application.

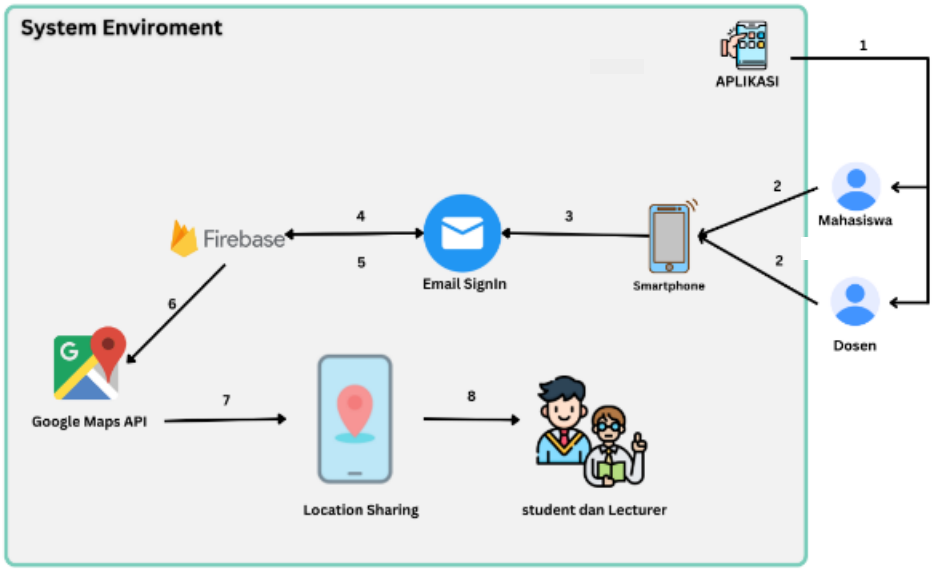

Figure 2. Application environment

Broadly speaking, the environment of this application consists of several entities, including hardware, external software, and users. The hardware used includes smartphones, which are used by two types of users: students and lecturers. The external software includes Google email for login verification, Firebase for data storage [23][24], and Google Maps for location services.

To use the application, users first need to download and install the app. They must log in to access the services, requiring an email address from a student or lecturer for the username and password. The application will access and input data into Firebase for each user. The app will request permission to use the device's GPS to display location points on the Google Maps API [19-25][26][27][28].

3. RESEARCH AND DISCUSSION

3.1. Application Analysis

Figure 3 outlines the analysis of the application design in the form of a use case diagram along with its description to detail the functionality of the developed application. A use case diagram is used to describe the interaction between the actor and the functionality of the system or application [29][30][31].

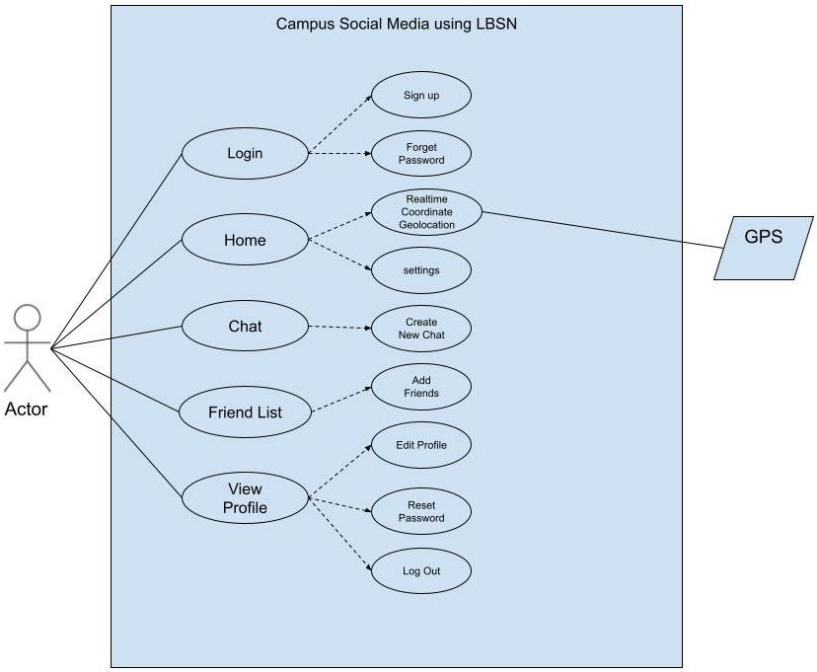

Figure 3. Usecase

Use Case: Log In. This use case describes the functionality of how actors or users can access the location-based social application. Users need to log in to the application by entering their email and password and then pressing the login button. Users must provide their username and password to access the main page or homepage of the application.

Use Case: Sign Up. This use case explains the process when a user wants to create a new account through the sign-up menu on the login page. To create a new account, the user must correctly fill out the registration form. If the entered data is accurate and valid, the new account will be successfully created.

Use Case: Forgot Password. This use case describes what happens if a user forgets their password during the login process. If a user does not remember their password, they can press the "Forgot Password" button in the login menu and fill out the form provided. If the form is filled out and valid, a website address will be sent via email to reset the password and create a new one for re-login into the application.

Use Case: Display Home. This use case explains how a user can access the home menu, which displays the user's location and the locations of other users. The user first logs in, and the application then directs them to the main menu, which immediately shows the real-time locations of the user and others.

Use Case: Realtime Coordinate Geolocation. This use case outlines the Location-Base Social Network concept process where users can display their locations to show among users. Before locations are shown, the user must enable the GPS feature so that locations among users can be available or appear on the map.

Use Case: Settings. This use case describes how users can adjust GPS settings within the application. Users can enable or disable the GPS feature as needed.

Use Case: Chat. This use case describes the process of how users interact with other users through the chat feature by selecting the profile of the user they want to chat with.

Use Case: New Chat. This use case explains the process of creating a new conversation with other users through the chat menu. Users can press the search button to find other users to start a conversation, and the application will direct the user to the chat interface with the selected user.

Use Case: Friend List. This use case outlines how users can view their list of friends by accessing the friend list menu, where the application will immediately display the user's list of friends.

Use Case: Add Friend. This use case describes how users can add a new friend to the application. Users can go to the friend list menu, search for a new friend by pressing the search button, and then find the username of the user they want to add. By pressing the add friend button, the user will be added to the friend list.

Use Case: View Profile. This use case describes how users can view their profile by accessing the view profile menu.

Use Case: Edit Profile. This use case explains how users can edit their profile through the view profile menu. In the view profile menu, users can press the edit profile icon and modify details such as bio, interests, and more, although not all personal information can be edited.

Use Case: Reset Password. This use case describes how users can reset or change their previously created password by accessing the view profile menu. In this menu, users can press the reset password button, and enter a new password, and if the new password is valid, they can use it to log in to the application.

Use Case: Logout. This use case outlines the process of how a user can log out of the application. To exit the application, users can go to the view profile menu and press the logout button. If they are sure they want to log out, they can press "yes."

3.2. Application Result

In this section, the researcher explains the implementation results of the user interface of the application, which consists of 12 screens, each with its function.

Figure 4 shows the initial user interface of this application. On this screen, users are prompted to enter their email as the username and password if they already have an account. For those who do not have an account, meaning they do not have a username and password, there is an option to sign up by pressing the "Sign Up" button. Additionally, the application provides a help feature for users who forget their password, which can be accessed via the "Forgot Password" link.

Figure 4. Login Screen

Figures 5, 6, and 7 collectively depict the sign-up interface of this application. In this view, users are required to enter a range of personal information as part of the registration process. This information includes name, email, password, date of birth, residence, faculty, and gender. This process is the initial step in building the user's profile within the application.

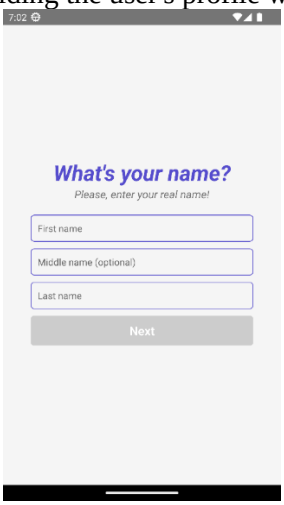

Figure 5. Input name interface

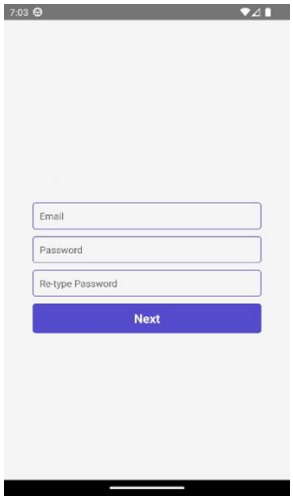

Figure 6. Input data account interface

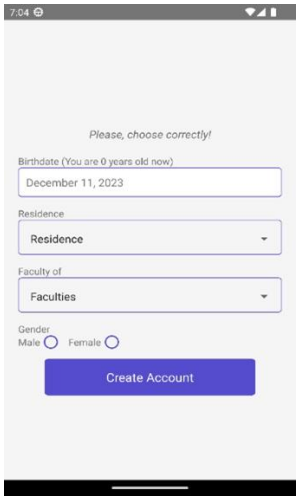

Figure 7. Sign-up interface.

Figure 8 shows the interface for resetting the password in this application. On this screen, users only need to enter their email address and then press the "Reset Password" button. After this, instructions to reset the password will be sent to the user's email. Additionally, there is also a "Back to Login" button that allows users to return to the login page if needed.

Figure 9 displays the main page interface of this application. In this view, users can see their geographic location as well as the locations of their friends. This feature helps users to know the real-time geographic positions of their friends. Additionally, at the bottom of the interface, there are several functional buttons including Chat, Friends, and Profile. These buttons facilitate users in easily accessing communication features and personalizing their profiles.

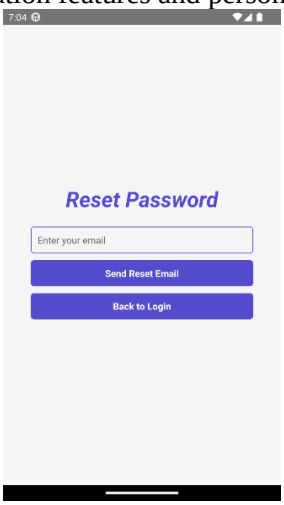

Figure 8. Reset password interface

Figure 9. Home Interface

Figure 10 illustrates the Chat feature interface in this application. This interface specifically displays all the private conversations that users have initiated. It allows users to easily access and continue previous conversations. Additionally, there is an "Add New Chat" button located at the bottom right. The function of this button is to facilitate users in starting a new private conversation. The placement and design of this button are intended to provide intuitive and efficient access to communication.

Figure 11 shows the Create New Chat interface in this application. In this interface, users are presented with a list of friends from which they can choose to start a new conversation. This list helps users in finding and selecting the desired contact for communication. Notably, if a conversation with a particular friend has been started previously, the system will automatically

display the existing chat. This feature is designed to provide direct access to prior conversations, making it easier for users to continue ongoing communications.

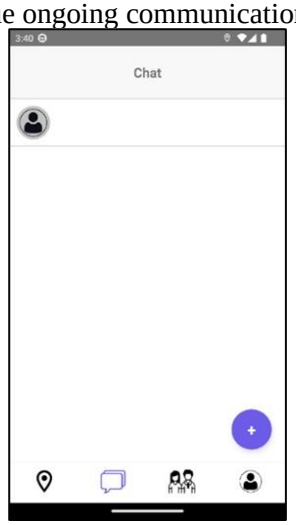

Figure 10. Chat interface

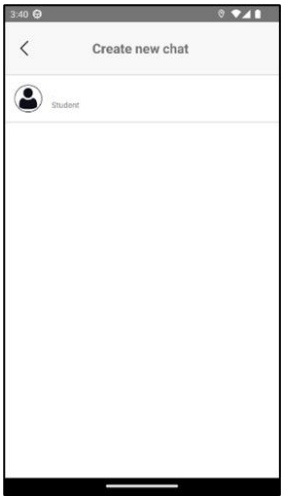

Figure 11. Create chat interface

Figure 12 shows the Private Chat interface in this application. On this page, users can engage in private conversations with other users. This interface is designed to provide a comfortable and personal space for users to communicate. The primary focus of this page is to facilitate the efficient and secure exchange of messages between two users, emphasizing privacy and personalization in communication.

Figure 13 depicts the Friend List interface in this application. This interface functions to display the list of friends who are connected with the user. From this interface, users can easily tap on an existing friend's name to view their profile. This feature allows for quicker and more efficient interactions when exploring information about friends. Additionally, there is an "Add Friend" button located at the far right. This button is provided to facilitate users in adding new friends to their contact list, enhancing the ease of expanding their social network through the application.

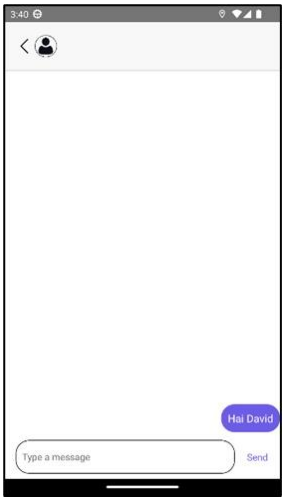

Figure 12. Private chat interface

Figure 13. Friend list interface

Figure 14 shows the Add Friend interface in this application. This interface is specifically used to manage friend requests. All received Add Friend requests are displayed here. If users want to add a new friend, they can search using the username of the other user they wish to add. This feature is designed to facilitate users in expanding their social network by connecting them with other users through a simple and intuitive process.

Figure 15 displays the Profile interface in this application. In this interface, the user's profile is shown in full, including bio and photo. Users are given the ability to edit their profile, such as changing personal information or updating their profile photo. This allows users to have full control over how they are perceived in the application's social network. Additionally, there is a "Logout" button available for users who wish to exit the application. This function ensures that users can easily and securely log out of the application as needed.

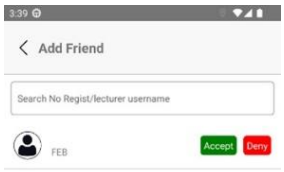

Figure 14. Add friend interface

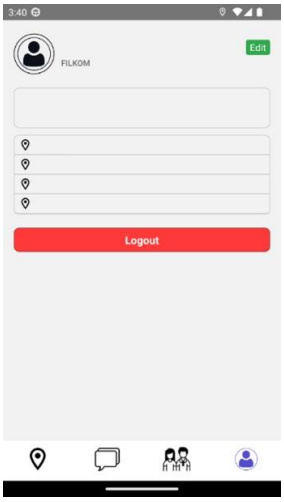

Figure 15. Profile interface

3.3. Application Testing

The testing conducted by the researcher, as shown in Table 1, includes 7 test scenarios: signing up, logging in, resetting the password, starting a conversation with a friend, adding a new friend, accepting a friend request, and rejecting a friend request. Out of these 7 tests, all 7 tests passed, and none failed, resulting in a 100% success rate.

Table 1. Final Testing of Application

No.	Test Scenario	Data	Expected Output	Actual Result	Description	PIC
1	Sign up for new users	First_name= Alvino Middle_name= - Last_name= Tular Email= alvino@gmail.com Password= 123456 Re-type password= 123456 DOB= December 11, 2023 Residence Type= Residence Faculty type= Faculties Gender= male **Action**: click the button Next, Create Account	Successful sign-up	Successful sign-up	Pass	Green

2	Log in	Email= alvino@gmail.com password= 123456 **Action:** Click the button login	Successful login Display the main page	Successful login Display the main page	Pass	Green
3	Reset password (forgot password)	Email= alvino@gmail.com **Action**: click the button Send Reset Email	Successful password reset via email link	Successful password reset via email link	Pass	Green
		Email= alvino@gmail.com **action**: click the button Back to Login	Return to the login screen	Return to the login screen	Pass	Green
4	Engage in conversation through the Chat feature	**action:** 1. Click the button chat 2. Click the button add (+) 3. Choose a friend name= David 3. Send message = Hai David	Message successfully sent to a friend	Message successfully sent to a friend	Pass	Green
5	Add new friends	**action:** 1. click the button Add friend 2. Search username 3. click add	Friend request successfully sent	Friend request successfully sent	Pass	Marchel
6	Accept friend requests from other users	**action:** 1. click button Accept	Friend request successfully accepted	Friend request successfully accepted	Pass	Marchel
7	Reject friend requests from other users	**action:** 1. click button Deny	Friend request successfully rejected	Friend request successfully rejected	Pass	Marchel

4. CONCLUSION

The application includes several main features that users can utilize, such as logging in to access the application, a home menu where users can view a map showing the locations of other users, a chat menu for interaction between users, a friend list menu displaying the user's list of friends, and an add friend feature within this menu for finding new friends. Additionally, there is a view profile menu for viewing the personal information of users. All of these functions have been tested. There are seven test cases, and all those test cases have been successfully passed.

The mobile application, a location-based social media for students and lecturers of Universitas Klabat, developed by the researcher, does have some limitations. Recommendations for future researchers include considering the development of an app version for operating systems other than Android, such as iOS, to broaden the user base. Furthermore, consider developing additional features to enhance user experience, such as integration with academic calendars, reminder features, or discussion forums to improve collaboration among students. Lastly, it is suggested to conduct further impact studies on how the application affects social interaction levels among students and its impact on their well-being.

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