DEVELOPMENT OF LEBAK STREET CRIME APPLICATION TO DETECT ROBBER VULNERABLE AREAS BASED ON ANDROID

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ABSTRACT

Crime is an act that violates the law and social norms. One of the main crimes is street crime. The last three years data shows 70 criminal cases including street crimes were recorded in the Lebak district police department. From the survey that has been done, the community has difficulty in finding locations that are prone to crime and safer alternative travel routes. Besides, the community is also quite difficult to contact the police when the crime occurs. The Lebak Street Crime application based on Android mobile was built using the Maps API and GPS (Global Positioning System) technology, the use of technology on this smartphone is used to get the user's real-time position and then using Geofencing technology the user will get a notification if the road in his path is a road that is detected prone to crime. The application can also provide alternative travel route information that can be passed. Firebase Cloud Messaging (FCM) as a cloud messaging technology is applied as a cross-platform messaging solution that is used to facilitate users when reporting. The results of black-box testing and questionnaires that have been carried out, it can be concluded that the application built can be accepted by the user, functioning properly, helping to find out vulnerable routes, alternative travel routes and can report criminal acts that occur in Lebak Regency especially in the Rangkasbitung area.

Keywords: Criminality, Street Crime, Maps API, GPS, Geofencing, Firebase Cloud Messaging

1. INTRODUCTION

Lebak Resort Police are on Jalan Siliwangi KM. 1, Rangkasbitung, Lebak Regency, Banten is an institution that has the duty and obligation to provide services to the community in the form of receiving and handling complaints reports from the public, as well as providing services for complaints in accordance with the provisions of laws and regulations. Receiving complaints reports from the community was handled by the Integrated Police Service Center (SPKT) which was then further handled by the Criminal Investigation Unit.

Based on data obtained from the Satreskrim and the results of interviews with the Head of Satreskrim Lebak district, explained that several types of criminality often occur, including motor vehicle theft, theft by weighting and theft by violence or which usually called robber. Crimes that occur in the majority occur on the streets (Street Crime) and have increased the number of events over the last three years. Criminal events often occur at vulnerable hours and vulnerable areas when entering quiet hours. As a form of prevention efforts carried out, the police put personnel in the bag chain and conduct patrols at vulnerable hours.

Based on data from the past three years, 70 cases have been registered with the Lebak District Police. From the data recorded, there has been an increase in the number of criminal cases each year. The data shows that Rangkasbitung is an area that often occurs with 30 cases compared to other regions. So, this can disturb public order and cause anxiety and insecurity among the people of the Lebak Regency, especially in the Rangkasbitung area.

In February 2019 a questionnaire was distributed to determine the level of reporting difficulties when contacting the police. From a total of 100 respondents who are 99% of the Rangkasbitung community, were given 3 choices to fill in the questionnaire with the choice of Yes, Quite Difficult and Not. According to the data of respondents who have filled out the questionnaire, it was found that 39% answered yes and 37% answered that it was quite difficult when contacting the police. So from the results of the questionnaire, it can be seen that there needs to be an easier way to communicate with the police when the community needs emergency assistance. Besides, it is known that 51% of respondents have difficulty in knowing the location of the area which often occurs in crime.

Difficulties faced by the people of Kabupaten Lebak, especially the Rangkasbitung Subdistrict are in obtaining information about unsafe travel routes and alternative routes to avoid these unsafe routes. Therefore, there needs to be an application that is easier to connect the public with the police than by telephone, Short Message Service (SMS), and chat applications. While the police can provide

information about routes that are considered unsafe and alternative routes for the road user community.

Several studies that are still related to crime-prone locations have also been conducted before. One of them was a study conducted by Hendra Yufit Riskiawan, et al [1]. The research carried out the construction of a criminal zone zoning application system in Jember Regency, the new system displays information and the distribution of crime-prone locations.

Other related research has been conducted by Muhammad Nur Awaludin and Adam Mukharil Bachtiar [2]. In this research, the application that was built aims to make it easier for users to know the crime-prone points in the city of Bandung. The data used is based on the latest data from the Bandung Police and the application that is built based on a mobile that is applied to the Windows phone operating system. So researchers try to research by implementing on the Android operating system, adding reports in realtime and providing safer alternative routes to the public.

The research conducted by Izmi Latifa by making applications that can facilitate the public in providing reports without the need to come to the nearest police station. Besides that, it makes it easier for the police to deal with crime because they know criminal reports [3].

Android was chosen because it is an operating system with an open-source license so that it can be freely developed by everyone to support daily activities and work. Besides, according to Waiwai Marketing, a digital marketing consultant based in Taiwan released data that the highest percentage of Android users in July 2015 in Southeast Asia with a market share of 94% was Indonesia [4].

Based on the problems described above, the Lebak community, especially the Rangkasbitung Subdistrict requires applications related to areas that are prone to crime and alternative routes to avoid criminal prone areas in the Rangkasbitung District of Lebak Regency. So that it can make it easier for the public to obtain information about the prone routes and alternative safer routes and can facilitate the public in reporting crime that occurs in real-time to the police.

2. LITERATURE REVIEW

1.1. Criminality

Crime is an act and act that violates the law and can harm the victim and the community such as the loss of peace and order. One form of crime that is often circulated in the media lately is street crime, one of which is the robber.

The laws governing theft by violence (robber) are regulated in (Article 365 of the Criminal Code), extortion (Article 368 of the Criminal Code), rape or rape (Article 285 of the Criminal Code), torture (Article 351 of the Criminal Code), damaging property (Article 406 of the Criminal Code) which of

course can disturb public order and cause unrest in the community.

2.2 Android

Android is a mobile operating system based on the Linux operating system. Android offers a comprehensive approach to application development. That is, an android application that is built can run on various devices that use the Android operating system be it a smartphone, smartwatch, tablet, and other devices [5].

The Android SDK is the API (Application Programming Interface) tool needed to start developing Android data platform applications using the java programming language. Currently available Android SDK (Software Development Kit) as a tool and API to start java programming [6].

The reason for using the Android operating system, because Android is an operating system that can run on mobile devices and the most widely used operating system based on market data obtained from netmarketshare.com, that Android controls the market share of mobile operating systems as of March 2019.

2.3 Global Positioning System (GPS)

Global Positioning System (GPS) is a satellite navigation and positioning system that is owned and managed by the United States [7].

In determining the location of an Android device, there are several methods used in obtaining such data. The method used is as follows.

a. GPS Provider, which determines the location of Android users, Android devices are directly connected to the satellite to obtain the coordinates of the user.

b. Network Provider, which determines the location of Android users, when Android devices cannot be connected to satellites, the device will search for the position of the Base Transceiver Station (BTS) of the android device network provider automatically.

2.4 Google Maps API

Google Maps is one of the many applications that is integrated as a default application on the Android platform. Google Maps is used to display, mark, and navigate maps. In addition to the stand-alone application Google Maps, the functions and appearance of Google Maps can be included in the application itself. Examples of real use of Google Maps API in applications, namely the Go-Jek Application, GrabBike, Uber, and others [5].

Google Maps API is a service from Google to users to take advantage of Google Maps in developing applications. Google Maps API provides several features for manipulating maps, and adding content through various types of services owned, and allows users to build enterprise applications on their websites.

2.5 Google Maps Direction API

Google Maps Directions API is a service provided by Google to make it easier for developers to calculate directions between one location and another by using an HTTP request to call the Google Directions API.

So, in this study, the Google Maps Direction API is used to find directions. Because by using the Google Maps Directions API it can return the most efficient route when calculating directions and can optimize travel time when choosing the destination route.

2.6 Geofencing

Geofencing is a technology used to monitor moving objects (vehicles, people, containers, etc.), using GPS. The geographical coordinates of the objects are automatically tracked and periodically sent to the surveillance center, through a network of mobile devices [8].

The main function of geofencing is to conduct remote monitoring (monitoring) of a mobile device from a virtual map when the mobile device exits or enters a geofence-restricted area (virtual fence).

2.7 Firebase Cloud Messaging

Firebase Cloud Messaging (FCM) or formerly known as Google Cloud Messaging (GCM) is a platform that allows sending messages or notifications to be done reliably and without cost [9].

By using FCM, client applications can receive notifications when new data is ready to be synchronized. FCM also allows to send notification messages to each user or users in certain segments.

3. RESEARCH METHODS

The method of data analysis in software development is done by the waterfall software paradigm, which is a model that performs software development with a sequential system [10]. Following the results of the waterfall method can be seen in Figure 1.
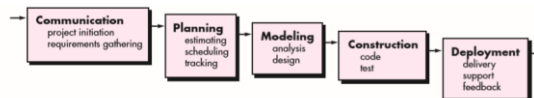

Image Source: Software Quality Engineering: A Practitioner's Approach [10]
Figure 1. Waterfall Pressman

4. ANALYSIS AND DESIGN

4.1. Problem Analysis

Based on observations made at the research site, several common problems occur and are experienced by the Lebak district community. The first problem is that vehicle users on the road in the Lebak district, especially in the Rangkasbitung area, are largely unaware of the prone areas which often occur in criminal cases and alternative travel routes to avoid these vulnerable points. This is due to the lack of information from the police so that vehicle users do not know which path is safer to pass.

4.2. System Architecture Analysis

Analysis of system architecture aims to identify the architecture that will be built based on two web and mobile systems. Here is a picture that illustrates the overall system architecture which can be seen in Figure 2.
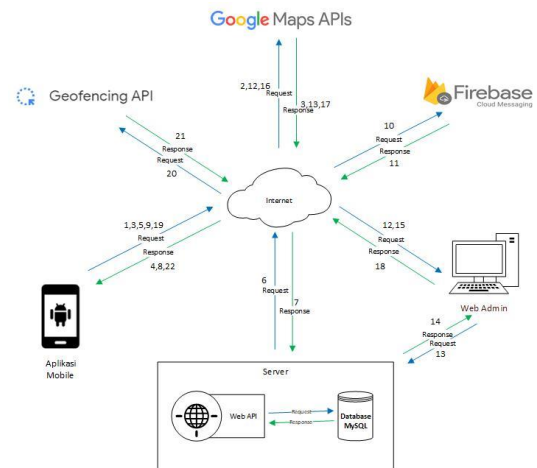

Figure 2. System Architecture Analysis

4.3. Analysis Of The Technology Used

The technology used in the design of this application is as follows.

1. GPS

How it works or the use of GPS in applications that are built is essentially the same as the use of GPS in general in other existing applications such as Google Maps. Here is how the GPS works on the application built can be seen in Figure 3.
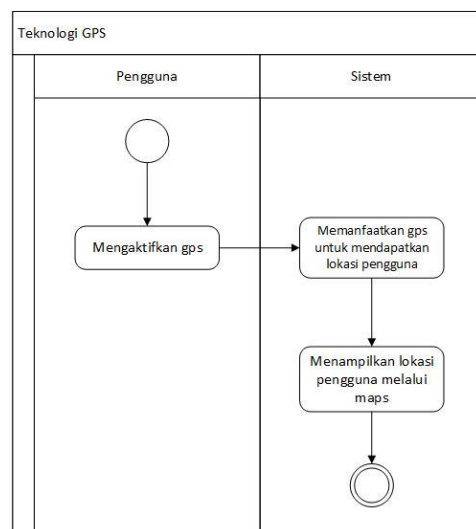

Figure 3. GPS Technology Workflows

2. Google Maps API

Using the Google Maps API, users can directly see safe route recommendations on the map and see the location of vulnerable points in the form of markers on the map. Here is how the work of the

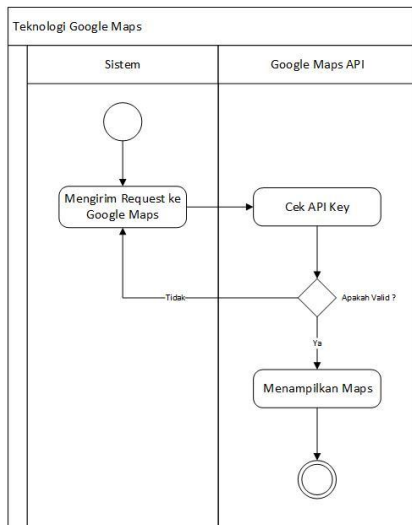Google Maps API on the application built can be seen in Figure 4.

Figure 4. Google Maps API Workflows

3. Firebase Cloud Messaging

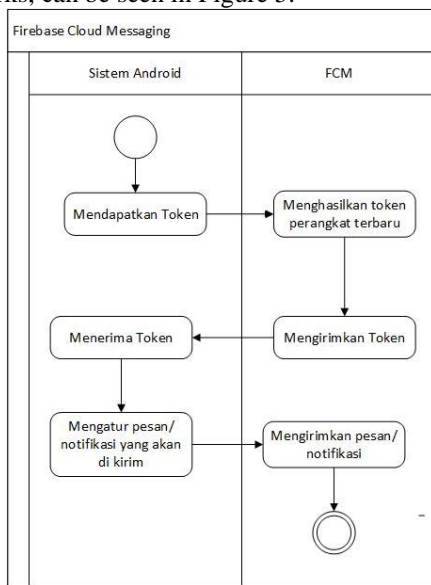Here is how the Firebase Cloud Messaging works, can be seen in Figure 5.

Figure 5. Firebase Cloud Messaging Workflows

4.4. Use Case Diagram

Use case diagrams are interactions between actors and activities contained in the system. From the analysis of existing application users, the use case diagram for the Lebak Street Crime application can be seen in Figure 6.
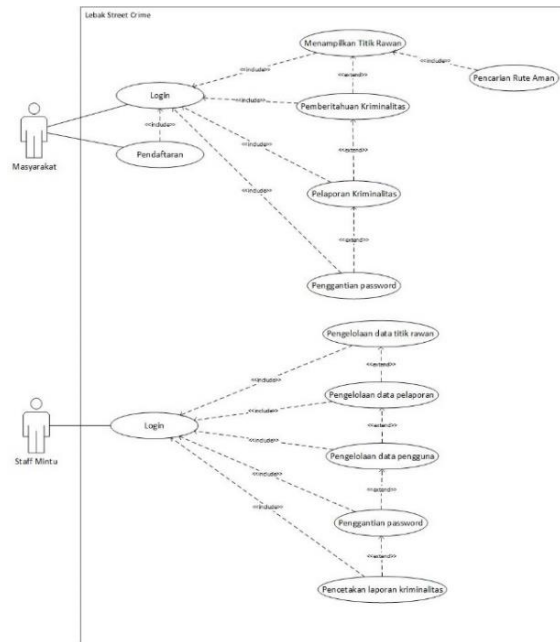
Figure 6. Use Case Diagram

4.5. Activity Diagram

The activity diagram illustrates the process sequence of activities in a process or use case to show the sequence of business process activities. As for some activity diagrams in each use case as follows.

1. Safe Route Search Activity Diagram
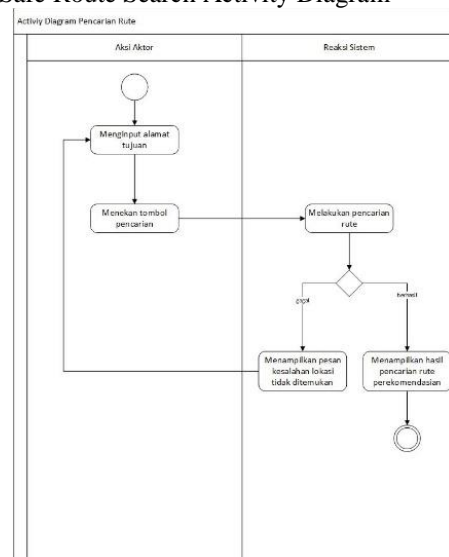
Figure 7. Safe Route Search Activity Diagram
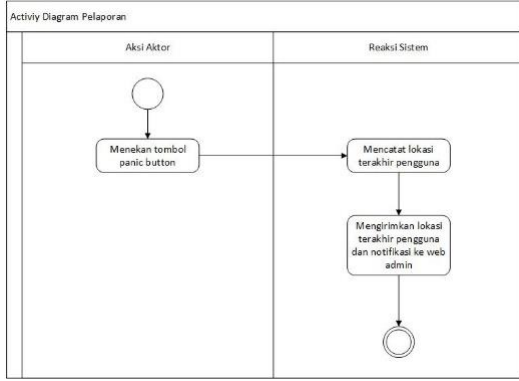
2. Reporting Activity Diagram

Figure 8. Reporting Activity Diagram

4.6. Class Diagram

Class diagrams are used to describe the classes involved in the analysis of a system to be built. The class diagram that is created is shown in Figure 9.
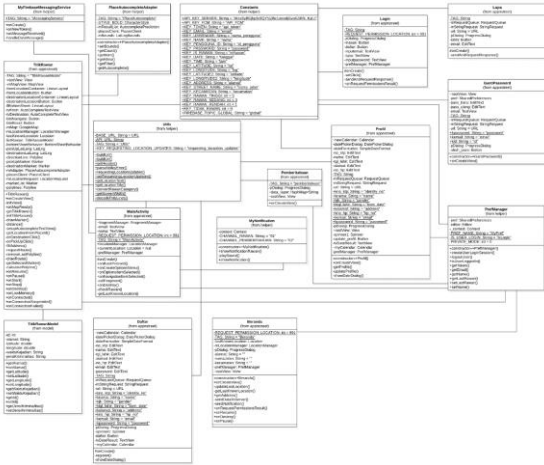

Figure 9. Class Diagram

4.7. Sequence Diagram

Here are some sequence diagrams in the design of the Lebak Street Crime application.
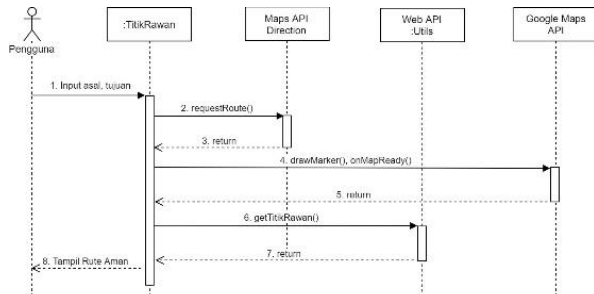
1. Safe Route Search Sequence Diagram

Figure 10. Safe Route Search Sequence Diagram
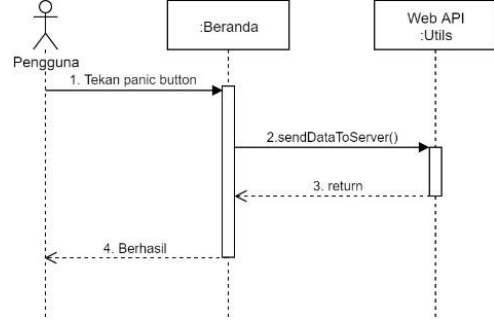
2. Reporting Sequence Diagram

Figure 11. Reporting Sequence Diagram

4.8. System Planning

After the system analysis phase is finished, then do the system design. The following is the system design..

4.9. Relation Scheme

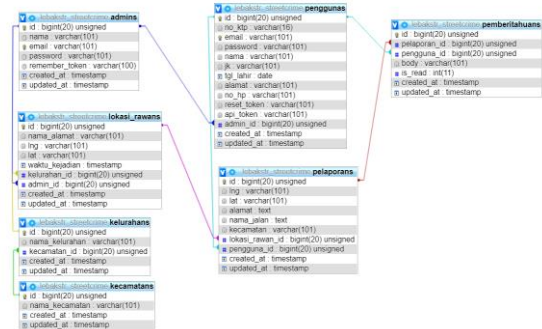In the picture below, is a picture of a series of databases on the design of Lebak Street Crime.

Figure 12. Relation Scheme

4.10. Interface Design

The interface design describes the display plan of each display that will be used in the Lebak Street Crime application. The interface design on Lebak Street Crime consists of the following design.
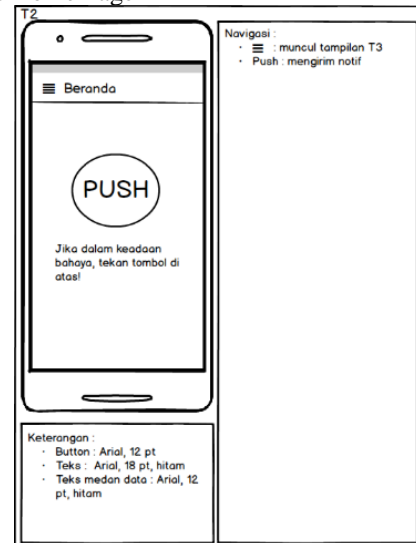
1. Home Page

Figure 13. Home Page Interface Design
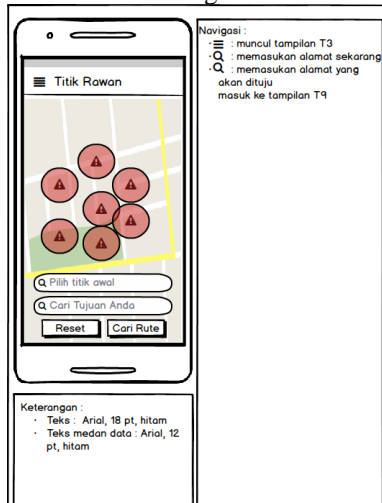
2. Vulnerable Point Page

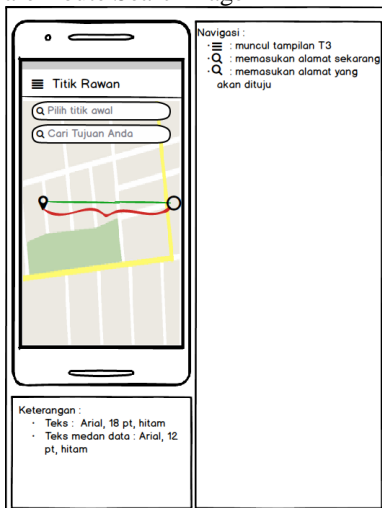**Figure 14.** Vulnerable Point Interface Design

3. Safe Route Search Page

Figure 15. Safe Route Search Interface Design

5. CLOSING

5.1. Conclusion

Based on the results of the design that was made, the design of the Lebak Street Crime application to detect robber vulnerable areas based on Android is in accordance with what is expected to be further implemented and tested.

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