Secure Path Application Development In Makassar City Based on Android

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Abstract — Criminality is a problem that often occurs both in big cities to small cities in Indonesia, of course with minor to severe crimes. According to the BPS (Central Statistics Agency) the city of Makassar is in the 6th position of the highest crime rate in Indonesia where 5299 cases occurred in the streets of Makassar in 2017. Based on the above problems arose the idea to create an easy-to-access direction app when and anywhere like a smartphone that aims to help people, especially in the city of Makassar, to find the shortest and safest route from not street crime, and can increase public awareness of the crime that occurs around it with the Android platform. The Safe Line application in the city of Makassar is expected to help help the city of Makassar people to choose safe roads so as to reduce the risk of road crime that often occurs in the city of Makassar and is able to increase public awareness of the frequent street crime.

The term Index - Road Crime, Android, Application Programming Interface (API), Google Maps, GPS

I. INTRODUCTION

Criminality is a problem that is often presented in the media, both from electronic media to print media. This is happening well in big cities to small cities in Indonesia, of course with minor to severe crimes. One of the things that often happens and makes many lives is street crime [1]. Street crime or Street Crimes is a type of traditional crime that is very disturbing to the people. Especially if street crime is accompanied by violence (crime by using force) such as snatching, muggings, theft, rape, persecution, robbery, murder, etc. [2].

According to the Central Bureau of Statistics (BPS) in its document entitled Criminal Statistics 2017, South Sulawesi is in the 6th position with the highest total crime in Indonesia with a total crime of 14,921 crime cases calculated from the beginning of the month until the end of 2016. Of the total Makassar itself pits (recorded) 68% of the total cases that occurred in South Sulawesi during 2016 with 5299 cases included in street crime [3].

Criminals are a common problem everywhere [4]. According to Danang Sulistiono, Iptu as the Operator of the Big City Resort Police (POLRESTABES) Makassar, the number of casualties on the streets was caused by a lack of information about the road that the community passed, especially if road users were not aware of the description of the road in the area. Crime acts occur in many places with different times of occurrence, which makes it difficult to determine which areas have a level of vulnerability to crime [5].

The research conducted by M.N.Awaludin et al. [6] by making an application that can facilitate people in the city of Bandung to receive socialization from POLRESTABES Bandung and inform the public about which points are prone to crime. But in this study there are still shortcomings, among others, the application only notifies the vulnerable points without recommending which paths are safe from crime and this application is only made on the Windows Phone platform while the Android platform is the most user in Indonesia.

Based on the explanation above, the idea arises to create an application that can help the people of Makassar in finding safe paths from criminal acts and can provide information on points prone to crime so as to increase public awareness. By using the Android platform where this platform is in the first position with the largest number of uses reaching 94% in ASEAN according to Wawai Marketing [7].

II. LITERATURE REVIEW

A. Crime

Criminality is all forms of actions and actions that are economically and psychologically harmful that violate applicable law

In the Indonesian State and social and religious norms. It can be interpreted that, criminal acts are anything that violates the law and violates social norms, so that people oppose it [8]. Criminologically based on sociology, crime is a behavior pattern that is detrimental to society (in other words there are victims) and a behavior pattern that gets social reactions from society. These social reactions can take the form of formal reactions, informal reactions, and non-formal reactions.

Understanding crime as an element in the sense of crime, sociologically has two elements, namely: 1) Crime is an act that is economically harmful and

psychologically harmful. 2) Injuring the sense of morality of a group of people, where these people have the right to give birth to reproach. Seutherland believes that Criminal behavior is a behavior that violates the Law / criminal law [9]. Normal emissions, namely emissions from controlled sources and channeled through the chimney so that they can be measured or monitored in magnitude.

B. Android

Android is a Lunux based operating system designed for screen mobile devices such as smartphones or computer tables. Android was originally developed by Android inc, with support from Google but Google bought it in 2005. Then the system was officially released in 2007, along with the establishment of the company's Open Handset Alliance consortium of hardware, software and telecommunications companies that aims to advance open standards of mobile devices.

Android is an open source operating system which means that if Google allows and frees anyone to be able to develop the operating system. Even you can also install an Android system that is in accordance with your desire. The Android system has a warehouse application and a game that is Google Playstore, which here can download and use applications or games contained in Google Playstore as much as you like by using a mobile device with an Android system. [1]

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D. Aplication

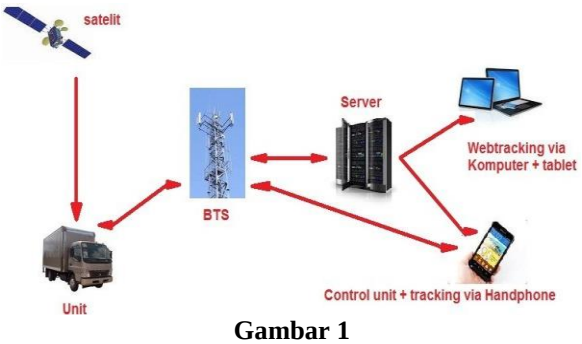
Applications can be interpreted as a program in the form of software that runs on a particular system that is useful to help various activities carried out by humans. In addition to this understanding there are many understandings from experts regarding the word application as follows:

a. According to Henry [10], "Application is a software unit that is made to serve the needs of several activities such as commerce, community service, advertising or all processes carried out by humans".
b. According to Janer [11], "Application is a software unit that is made to serve the needs of several activities such as commercial systems, community services, advertising or all processes carried out by humans".
c. According to Suprianto [12], "Applications are programs that have command processing activities needed to carry out user requests with a specific purpose."
d. Menurut According to Hengky W.Pranama [13], "The application is a software unit that is deliberately made to meet the needs of various activities or work, such as commercial activities, advertising, community services, games, and various other activities carried out by humans."

E. Global Positioning System (GPS)

GPS is a tool or system that can be used to inform users where it is located (globally) on a satellite-based earth surface. Data is sent from satellites in the form of radio signals with digital data. Wherever the user is located, the GPS can help show directions. This GPS service is available free of charge. Initially gps was only used for military purposes, but in the 1980s it could be used for civilian purposes. GPS can be used anywhere in 24 hours, the position of the GPS unit will be determined based on the points of latitude and longtitude coordinates [8].

GPS consists of 3 segments: space segment, control / control segment, and user segment. Where the space segment consists of 24 satellites operating in 6 orbits at an altitude of 20,200 km and inclination of 55 degrees with a period of 12 hours (the satellite will return to the same point in 12 hours). Gps workings can be seen from Figure 2 below:



Gambar 1

F. Location Based Service (LBS)

Web service is a software system designed to support interoperability and interaction between systems on a network. Web service is used as a facility provided by a web site to provide services (in the form

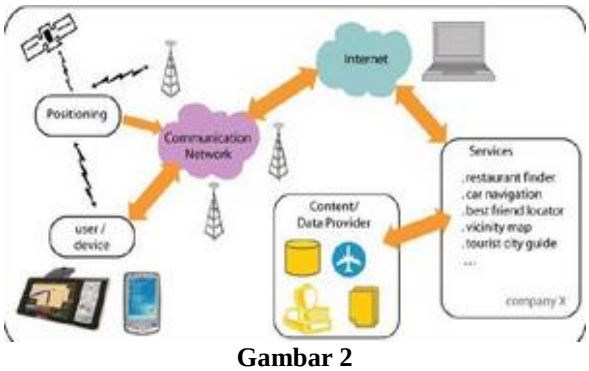
of information) to other systems, so that other systems can interact with the system through services provided by a system that provides web services. Web services store information data in XML format, so that this data can be accessed by other systems, although different platforms, operating systems, and compiler languages.

The service aims to enhance collaboration between programmers and companies, which allows a function within the Web Service to be borrowed by other applications without the need to know the details of the programming contained in it. [15] Some reasons why web services are used are as follows:

1. Web services can be used to transform one or more logic or class businesses and separate objects in one single scope, so that the security level can be handled properly.
2. Web service has ease in the deployment process, because it does not require special registration into an operating system. Enough web service is uploaded to the web server and is ready to be accessed by parties who have been given authorization.
3. Web service running on port 80 which is a standard HTTP protocol, thus web service does not require a special configuration on the side of the firewall.

G. Location Based Service (LBS)

Location based services are location-based services or general terms that are often used to describe the technology used to find the location of a device that a user uses. This service uses global positioning service (GPS) technology and cell-based location from Google. In addition, the LBS consists of several components including mobile devices, communication networks, position components, and service and content providers. Mobile devices are a very important component. These mobile devices include smartphones, PDAs, and others that can function as navigation tools or like GPS-based navigation devices.

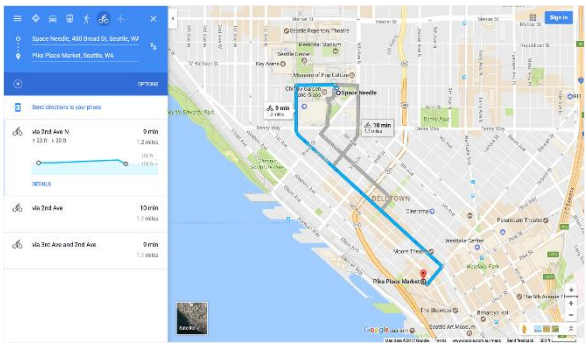


Gambar 2

H. Google Maps API (Application Programming Interface)

Google Maps is a free service provided by Google and is very popular. Google maps is a world map that we can use to see an area. In other words, google maps is a map that can be viewed using a browser. Similar to a Geographic Information System that integrates computer and data technology, as well as data storage and processing media [14]. Google provides a variety of APIs that are very useful for web developers and desktop applications to utilize various features provided by Google such as: AdSense, Search Engine, Translation and Youtube. [1]

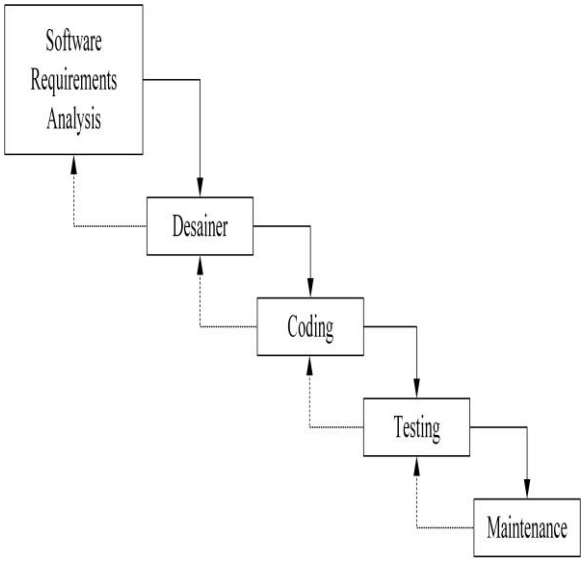
The Google Maps API is a service (service) provided by Google to users to utilize Google Maps in developing applications. The Google Maps API provides several features to manipulate maps, and add content through various types of services that are owned, as well as allowing users to build enterprise applications on their website. Users can take advantage of the services offered by Google Maps after registering and obtaining the Google Maps API Key. Google provides this service for free to users around the world. Following are examples of google maps:



Gambar 3

III. RESEARCH METHODS

The method used in developing the safe path application in the city of Makassar based on Android is the use of the waterfall method. Waterfall method is used because this method can approach systematically and sequentially in the construction of this application system. The process contained in the waterfall method is the creation of a system that is carried out in a row. This method makes the resulting system will be of better quality, due to the gradual implementation so that it does not focus on only one process. The following description of the waterfall method is as follows:



Gambar 4

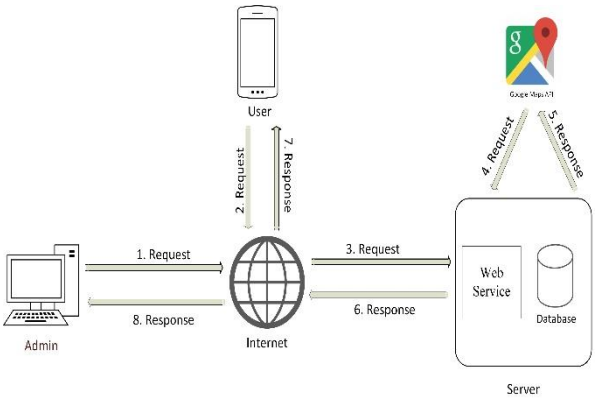
1. **Software Requirement Analisis**
   This stage of needs analysis is carried out by analyzing users, as well as analysis of hardware and software that is needed in the development of application paths where the city of Makassar is based on Android.
2. **Desainer**
   The next stage is the system designer. This stage is the stage that is carried out before the coding stage. The purpose of this stage is to be able to give an idea of what is done in the construction of this application and how it looks.
3. **Coding**
   Then in the coding stage is the writing of the system code. Writing this application code is a stage of changing the commands that are configured into the programming language that can be recognized by the system.
4. **Testing**
   Testing or testing is a test to ensure that the application that has been made in accordance with the appearance that has been described previously and all functions can be used according to their needs without any errors.
5. **Maintenance**
   PaIn the last stage is system maintenance, maintenance includes correction of system errors that are not found with the previous stages.

IV. RESULTS AND DISCUSSION

This stage consists of a general description of a system, system analysis and design. The final step is to do the testing so that conclusions can be drawn. This stage consists of a general description of the system, analysis and system design that will be described in the form of a system architecture. Technology implementation consisting of GPS technology analysis, Google Maps API, Google Maps Diretcion, and Google Direction Direction Maps. The final step is to do testing so that conclusions and suggestions can be obtained that will be needed by application developers in order to develop applications that are better than previous applications.

A. System Analysis and Design

Architectural analysis is a discussion of technology and a description of the technology flow that will be carried out on the system to be built. This analysis can be used to see the infrastructure that supports the system to be built. The following is an overview of the architecture of the application that will be built can be seen in Figure 5 below.



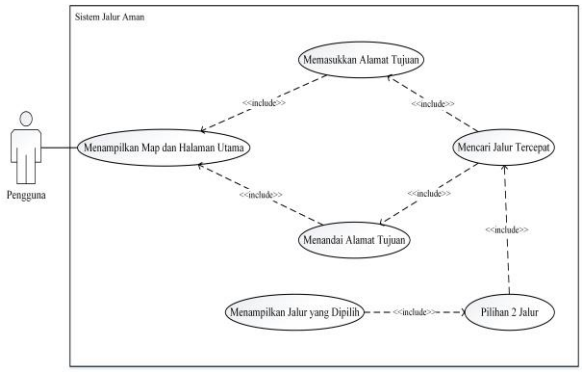
Gambar 5

The following description of Figure 5 above is as follow:

1. Admin sends the required data to the web server through an internet intermediary.
2. After arriving at the web service the data will be entered into the database through an intermediary web service.
3. Then when the user records a data it needs an internet intermediary to get to the web server.
4. After arriving at the web server the system will ask the Google Maps API to go to the user so that it can display the regional mapping.
5. Then the system asks for data through a web service intermediary to retrieve data in the database then convert it so that the data can be read and displayed to the user.

B. Use Case Digram

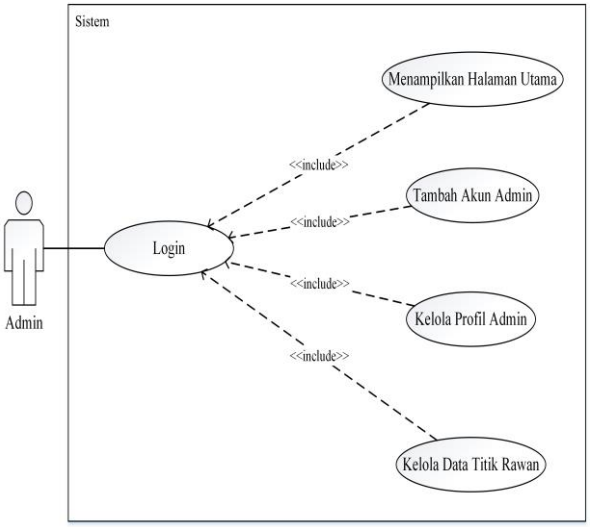
Use case Diagram is one diagram to model aspects of system behavior. From analysis Existing application users, here is a use case diagram which can be seen in Figure 10 as follows:



Gambar 6

From the picture above it can be explained that when the system displays the main map and page to the user the next process such as entering the address and marking the address can be used after the user opens the application, after that can find the fastest path that will display the 2 paths found.

Then there is a use case backend in this application useful for processing data on the admin, here is a description of the use case backend which can be seen in Figure 11 below:



Gambar 7

Where in the picture above explains how the user must log in before being able to access the main page features, add an admin account, manage admin profiles, and manage vulnerable point data.

C. System Implementation

System implementation is an explanation of the implementation of the system that supports the current system. The system to be built will be used for servers and accesses, namely users and admin. Explanation includes in 2 parts namely hardware and software.

1. Hardware Implementation

In the backend application which is a web, the application is run on a computer device with a minimum specification of computer hardware requirements with specifications can be seen in Table 1.

Then there is also a frontend on this application which is an Android platform that is usually run on a smart phone device or smartphone with the minimum specifications of the hardware requirements of this smart phone can be seen in Table 1 below:

Tabel 1

Jenis	Spesifikasi
Resolusi Layar	240 x 320 pixels
Memori	1 GB
CPU	Kecepatan Minimal 300 MHz
WLAN	Wi-fi 802.11 b/g/n
Jaringan	3G
GPS	A-GPS

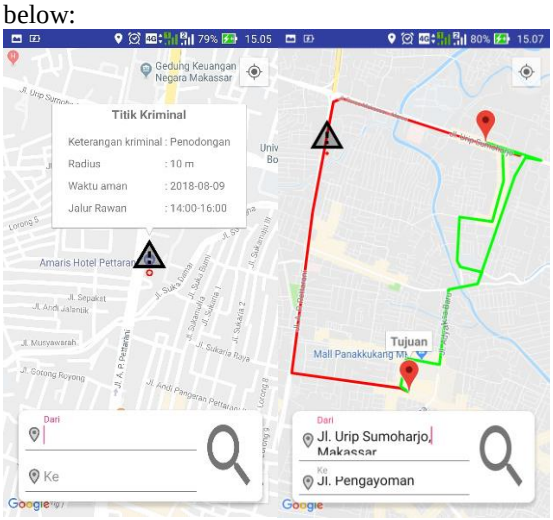
2. Software implementation

Software analysis consists of minimum device specifications required and elmen goolge maps api. Software specifications for building this application can be seen below:

1. Windows 7 Operating System
2. JDK v1.7 and Windows Android SDK
3. ADT v.10.0.0
4. Android 5.0 Lolipop Platform
5. PHP to connect to databases with PHP scripts
6. Editing Text to write PHP scripts with Notepad ++
7. MySQL database
8. Browser Mozla Firefox

D. Interface Implementation

The interface is the appearance of the application of the Secure Path application in the City of Makassar Based on Android. One of the interface implementations is to display information on vulnerable points and path recommendations if there is a criminal point that can be seen from the picture below:



Gambar 8

In Figure 8 above there are 2 different images where the image on the left is an image showing the interface between the folders containing information from the criminal points that appear, then the right

picture is the interface when the system gives a path recommendation where the color path red is a vulnerable path while a green line is a safe recommended route.

G. Database Testing

Database creation is done using the MySQL DBMS application. Following is the implementation of data in the SQL language as follows:

```
1. CREATE TABLE `user` (
2. `id`    bigint(20)    NOT    NULL
   AUTO_INCREMENT,
3. `enabled` bit(1) DEFAULT NULL,
4. `nama`    varchar(255)    DEFAULT
   NULL,
5. `password` varchar(255)  DEFAULT
   NULL,
6. `roles`    varchar(255)    DEFAULT
   NULL,
7. `username` varchar(255)  DEFAULT
   NULL,
8. PRIMARY KEY (`id`)
9. ) ENGINE=InnoDB AUTO_INCREMENT=2
   DEFAULT CHARSET=latin1;
```

Gambar 9

The result of the command to create a user table in the database above is successful by displaying some of the attributes that are in it such as names, passwords, and roles. Where in the application this section is part of creating a new user account that is used in various phobia, including the account add section and change the account profile.

```
1. CREATE TABLE `kategori` (
2. `id`   bigint(20)   NOT   NULL
   AUTO_INCREMENT,
3. `nama`   varchar(255)   DEFAULT
   NULL,
4. PRIMARY KEY (`id`)
5. )                ENGINE=InnoDB
   AUTO_INCREMENT=7       DEFAULT
   CHARSET=latin1;
```

Gambar 10

Figure 10 shows the results of successfully creating a category in the database. In the above command is a crime category by having several attributes including the category id and category name that will be associated with the vulnerable point data. Prone point data requires a category table because the vulnerable point data has the imposition of a crime category.

Then in Figure 11 is a command in the database to create a table of criminal points where the criminal point table functions to later display the data of the vulnerable points that will be entered into the system. Attributes contained in this table are as follows: address attribute is an attribute to store the address of the crime scene, jam_rawan which serves to store data on crime times, attribute information useful for making statements on each crime report, longtitude provides coordinates for crime locations, also with latitude, radius is how big the radius of the vulnerable point, then the date attribute serves to save the date of the occurrence of a crime, then there is a safe time where this attribute functions according to its name to make data safe times that can be used by the system , and the last is the id_category containing the category data described earlier. To clarify the explanation above, below is the coding of the database:

```
1.     CREATE TABLE
`titik_kriminal` (
2.       `id` bigint(20) NOT NULL
AUTO_INCREMENT,
3.       `alamat` varchar(255)
DEFAULT NULL,
4.       `jam_rawan` varchar(255)
DEFAULT NULL,
5.       `keterangan` varchar(255)
DEFAULT NULL,
6.       `latitude` double DEFAULT
NULL,
7.       `longitude` double
DEFAULT NULL,
8.       `radius` int(11) DEFAULT
NULL,
9.       `tanggal` date DEFAULT
NULL,
10.      `waktu_aman` date DEFAULT
NULL,
11.      `kategori_id` bigint(20)
DEFAULT NULL,
12.      PRIMARY KEY (`id`),
13.      KEY
`FKfty2i3tbopdapig27ww5qbcsq`
(`kategori_id`),
14.      CONSTRAINT
`FKfty2i3tbopdapig27ww5qbcsq`
FOREIGN KEY (`kategori_id`)
REFERENCES `kategori` (`id`)
 ) ENGINE=InnoDB AUTO_INCREMENT=13
 DEFAULT CHARSET=latin1;
```

Gambar 11

V. CONCLUSIONS AND RECOMMENDATIONS

The conclusions and suggestions obtained from the results of this study are:

A. Conclusion

Based on the results of the beta testing that has been carried out in Table 4 it can be concluded that the majority of correspondents agree with the main function of the system that is built in increasing public awareness of street crime and recommending safe routes from surrounding crime.

B. Suggestions

In the construction of the Secure Path Application in Makassar City Based on Amdroid, it still has many shortcomings. The suggestions for developing this application for the future are as follows:

1. Can further optimize the path recommendations.
2. Can connect to the direct police database.
3. Applications can reach all of Indonesia

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