DEVELOPMENT OF A SYSTEM OF BUS RAPID TRANSPORT (BRT) ON TRANS METRO BANDUNG (TMB) USING THE MAIN DISPLAY UNIT WITH THE IMPLEMENTATION OF GEOLOCATION

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ABSTRACT

Research done for the development of a system of bus rapid transport (BRT) on Trans Metro Bandung (TMB) aims to develop a system that is already on the Trans Metro Bandung by implementing the geolocation system intends to find out the position of the and estimated arrival Trans Metro Bandung (TMB) that will be used as information to facilitate prospective passengers to find out information and monitoring performed by the Manager of the Trans Metro Bandung (TMB). Research methodology undertaken consist of four (4) stages namely analysis problems, data collection (interviews, literature studies, observation, questionnaire), the construction method of using Multimedia Software Development Life Cycle Luther Sutopo and testing. Applications that can provide information on bus arrival estimation of position and TMB which are used to make it easy for prospective passengers using Trans Metro Bandung, and monitoring the bus carried out by officials to find out if the driver is out of the route has been determined. Main display unit with the implementation of geolocation is used as a medium of information with so prospective passengers can view information through the display unit.

Keywords: BRT, TMB, geolocalition, estimation, monitoring.

1. INTRODUCTION

Bus rapid transit (BRT) is a bus system that is fast, convenient, secure and timely in terms of infrastructure, vehicles and BRT schedule can be used as an alternative means of transportation because it has a better quality of service than other bus the BRT system done in stop mode integrase and passengers up and down rapidly in stops, so that it can save travel time, which ultimately can improve the quality of bus services. TRANS Metro Bandung is a bus rapid transit in the city of Bandung which was inaugurated on December 22, 2008. TRANS Metro Bandung has operated the first corridor the corridor Cibeureum Cibiru-as far as 16 km. There are 16 stops on the Trans Metro Bandung [1].

A comparison between the media information in a few stops by Metro Trans stop TransJakarta Bandung is a media information TransJakarta can already provide information and position estimation of arrival can be seen through the display of information that can be seen directly by prospective passengers while the media information in a few Metro stops away from Bandung, there is yet a Trans media information information that provides the service.

Based on the results of the questionnaire have been made 94.3% of the respondents need information bus and position estimation of arrival Trans Metro Bandung while waiting at the bus stop, because of the time waiting for a bus that is uncertain and it is also the time waiting for a bus too long in the absence of clear information about the arrival of Trans Metro Bandung who will arrive at the bus stop, while the means that are in the current stops have not been much help to provide information on bus to be used by passengers so much more passengers waiting Trans Metro Bandung.

Based on the results of the interview with the head of the UPT Trans Metro Bandung in the service of transportation of Bandung city, Handler against Trans Metro Bandung often breach one of the disiplinan of the driver i.e. Trans Metro Bandung are not increase of passengers when not in the shelter and often the driver of Trans Metro Bandung is not going through the route corridors that have been specified by the Manager and also the lack of regular monitoring carried out by officials so as to make the driver of the Trans Metro Bandung can do violations that are often not noticed by the Manager.

System and previous research done by the provider of the Transjakta with the "Display Information Transjakarta stop" and by m. Junus entitled "position of the Vehicle tracking system

GPS Technology With GPRS & Web-based" [2] States that media very helpful information in the service of the people and processes tailored to the needs, and also do some tracking or monitoring needs to be done to know the position of the vehicle.

Based on the description of the problems that have been described above, then it can be inferred that the media information and monitoring Trans Metro bandung especially in stop and monitoring needed for information Trans Metro Bandung, therefore in make application Development of BRT system (Bus Rapid Transport) on the Trans Metro Bandung uses the main display unit with the implementation of geolocation.

2. THE CONTENT RESEACH

The following is an explanation of the contents of the penelitaian of the development of Bus Rapid Transport System (BRT) on Trans Metro Bandung uses the Main Display Unit with the implementation of Geolocation.

2.1 The Cornerstone of theory

The cornerstone of the theory is the explanation of the theories related to the development of bus rapid transport system on the Trans Metro Bandung uses the main display unit with the implementation of Geolocation.

2.1.1 Geolocation

Geolocation is the identification of the geographic location of an object in the real world. Geolocation has a relation with the positioning, the difference is more specific in defining the geolocation of a site (e.g., street address) as compared to the positioning only includes a set of geographic coordinates. A geographical location latitude and longitude values it contains.

2.1.2 Google Geocoding API

Geocoding is the process of changing the address (like "1600 Amphitheatre Parkway, Mountain View, CA") to geogragis coordinates (latitude 37.423021 and longitude-122.083739), which can be used to place a marker or the position of the map. Geocoding API Google provide a direct way to access HTTP request through the geocoder. Besides this service allows us to do the opposite operation 9 changing the coordinates of addresses), this process is known as reverse geocoding [3].

2.1.3 GPS (Global Positioning System)

GPS is the teknologiyang function determines the position on the surface of the Earth by using satellite signals. This technology is supported 24 satellites that transmit microwave signals to Earth. This signal serves to determine the position, speed, direction and time. GPS Tracker is a technology that served to know the position of the vehicle in real time [4].

2.1.4 Base Tranceiver Stasion (BTS)

Base Transceiver Station BTS or simply is a telecommunications infrastructure that facilitates wireless communication between devices and communications network operator, signal receiver communication iranti BTS can telephone, mobile phone, network ad hoc wireless network operator i.e. GSM, CDMA, TDMA or platform BASE STATIONS send and receive radio signals to mobile devices and convert those signals into digital signals for the next sent to another terminal to process circulation of messages or data [5].

2.2 Based Research

The research method used on the peneltian Bus Rapid Transport system development on Trans Metro Bandung uses the Main Display Unit with the implementation of Geolocation is described in Figure 2.1-1

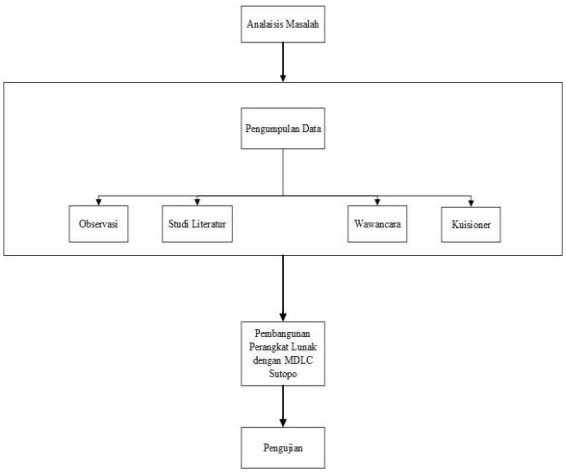


Figure 2.1-1 Based Research

2.3 System Analysis

System analysis can be defined as a decomposition of the system into the main sub-sub system with a view to identifying the needs – the needs that are required in order to built an application regarding Trans Metro Bandung.

2.3.1 Problem analysis

Problem analysis is a process to break something down into sections that are interrelated to each other, so on an issue that occurs on a Bus Rapid Transport System Trans Metro Bandung who still find problems in his system is as follows:

1. Media information residing in shelters located in the city of Bandung has not been able to figure out the position information of the existence of Trans Metro Bandung which is operating so that passengers will use Trans Metro Bandung prefer not to use it in stops.
2. Information provided in the Media still make users TMB residing in shelter do not know the

route by bus will arrive at the bus stop so as to make users who are on the TMB stop prefer to use transport that can bypass the aim user.

3. Organizer will need to know the existence of the bus is operating so that the Manager can evaluate or give punishment to Trans Metro Bandung drivers who commit offences in order to reduce violations often occur.

2.3.2 Analysis of the running system

Analysis of the running system are analyzing the steps work and activities are walking in the steps of those who are aiming to find out more about how does a procedure already underway , so that it can be known deficiency and excess on the procedure already underway.

2.3.3 Analysis of application of its kind

Analysis of the system or application is a type of analysis that will discuss about the system or an application that becomes a reference in the development of an application. In the application of its kind to be discussed about various things that exist in the application of a type of content, including how to use and what are the components that exist in the application so that it can be a reference to the need to be built.

2.3.4 Analisys system that be built

System will be built on the application is a system that can be a system that can present information to the user in the form of media the main display which will be in use at the bus stop for Trans Metro Bandung information and monitoring Trans Metro Bandung conducted by Trans Metro Bandung Manager.

2.3.4.1.Data Analysis

Data analysis meruapakan information and data required in research so that research objectives can be reached, the data on research here is the data stops in the corridors that are used as a means of dismissal Trans Metro Bandung, here existing data in the table 2.2-1 and table 2.2-2.

Tabel 2.2-1 Data Shelter Koridor 1

NAME SHELTER	THE PUT	
	LOCATION	LINE
ELANG	JL.ELANG	KOR 1
HOLIS	JL.SOEKARNO HATTA NO.65	KOR 1
SUMBERSARI	JL.SOEKARNO HATTA NO.101	KOR 1
CARINGIN	JL.SOEKARNO HATTA	KOR 1
LEUWI PANJANG	JL.SOEKARNO HATTA NO.205	KOR 1
INHOFTANK	JL.SOEKARNO HATTA	KOR 1
MOH. TOHA	JL.SOEKARNO HATTA	KOR 1
LPKIA	JL.SOEKARNO HATTA	KOR 1
SAMSAT	JL.SOEKARNO HATTA	KOR 1
METRO	JL.SOEKARNO HATTA	KOR 1
RIUNG BANDUNG	JL.SOEKARNO HATTA	KOR 1
GEDE BAGE	JL.SOEKARNO HATTA	KOR 1
CIBIRU	JL.SOEKARNO HATTA	KOR 1
GEDEBAGE	JL.SOEKARNO HATTA	KOR 1
METRO	JL.SOEKARNO HATTA	KOR 1
CARREFOUR	JL.SOEKARNO HATTA	KOR 1
BUAHBATU	JL.SOEKARNO HATTA	KOR 1
LPKIA	JL.SOEKARNO HATTA	KOR 1
MOH. TOHA	JL.SOEKARNO HATTA	KOR 1
MEKARWANGI	JL.SOEKARNO HATTA	KOR 1
LEUWI PANJANG	JL.SOEKARNO HATTA	KOR1
CARINGIN	JL.SOEKARNO HATTA	KOR 1
SUMBERSARI	JL.SOEKARNO HATTA	KOR 1
HOLIS	JL.SOEKARNO HATTA	KOR 1
JEND SUDIRMAN 2	JL.SUDIRMAN	KOR 1
JEND SUDIRMAN 3	JL.SUDIRMAN	KOR 1
RAJAWALI 1	JL.RAJAWALI BARAT	KOR 1

Tabel 2.2-2 Data Shelter Koridor 1

NAME SHELTER	THE PUT	
	LOCATION	LINE
CICAHEUM	TERMINAL	KOR 2
PHH. MUSTOFA 1	JL. PHH MUSTOFA NO.180	KOR 2
PHH. MUSTOFA 2	JL. PHH MUSTOFA NO.80	KOR 2
SURAPATI 1	JL. SUCI	KOR 2
SURAPATI 2	JL.SUCI	KOR 2

NAME SHELTER	THE PUT	
	LOCATION	LINE
CIKAPAYANG 1	JL.CIKAPAYANG	KOR 2
METROLOGI	JL.PASTEUR NO.25	KOR 2
NY. OONG	JL.PASTEUR	KOR 2
SURYA SUMANTRI 1	JL.SURYASUMA TRI	KOR 2
SARIMANIS	JL.SARIWANGI	KOR 2
SURYA SUMANTRI 2	JL.SURYASUMA TRI	KOR 2
PASTEUR 1	JL.PASTEUR NO.190	KOR 2
RS HASAN SADIKIN	JL.PASTEUR NO.38	KOR 2
PASTEUR 2	JL.PASTEUR	KOR 2
CIKAPAYANG 2	JL.CIKAPAYANG	KOR 2
SURAPATI 3	JL.SURAPATI	KOR 2
SURAPATI 4	JL.SURAPATI	KOR 2
SURAPATI 5	JL. SUCI	KOR 2
SURAPATI 6	JL. SUCI	KOR 2
PHH. MUSTOFA 3	JL. PHH MUSTOFA	KOR 2
SURAPATI CORE	JL. PHH MUSTOFA	KOR 2

2.4 The Architecture of the system

The architecture of the system aims to identify which will be built on the application will be built a Web-based Application. This helps managers Trans Metro Bandung to monitor Trans Metro Bandung which are running and also help passengers to see the route information and estimation of the Trans Metro Bandung who will arrive at the bus stop. The development of Bus Rapid Transport System Trans Metro Bandung uses the Main Display Unit with the implementation of Geolocation is described in Figure 2.4-1

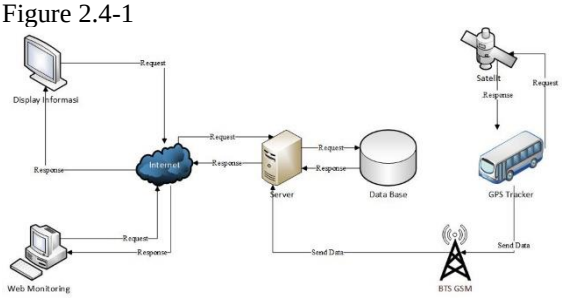


Figure 2.4-1 Architecture of the system

2.5 Non functional needs analysis

Non functional needs analysis is the analysis required to determine the specification of the application needs to be made. This specification also includes elements or components of any required components untuuk system will be built up to such a system is implemented. Non functional requirements analysis describes the system requirements that focuses on property owned by the behavior of the system, including the needs of users, hardware, and software for the analysis of deficiencies and the needs to be met in the design of the system to be applied.

2.5.1 Needs Analysis of Hardware

Needs analysis hardware (hardware) aims in order for the system to be built run well and in accordance with the system being built. Hardware is one of an important tool in the development of applications that will be made, in the absence of hardware then the application that will be created will not be able to walk. Hardware is the physical device from a computer that can be seen and felt its presence. now some hardware requirements specification required can be seen in table 2.2-3 to table 2.2-5 Hardware Requirements

Table 2.2-3 Needs Hardware Monitoring

No	Hardware	Spesification
1	Processor	Core 2 duo
2	Memory	RAM 1 GB
3	Monitor	Resolution 1920 x 1080
4	Grapic Card	VGA 512 GB
5	Harddisk	80 GB
6	Supporting Device	(keyboard), (mouse),and Internet

Table 2.2-4 Needs Hardware GPS

No	Hardware	Spesification
1.	GPS (Global Positioning System)	GT 06 atau smartphone yang dapat mengirimkan sinyal lokasi.
2.	GSM	Jaringan 3G / GPRS / 4G

Table 2.2-5 Needs Hardware Main Display

No	Hardware	Spesification
1.	Mini PC with Processor	Core 2 duo
2.	Memory	RAM 1 GB
3.	Monitor	Resolution 1920 x 1080
4.	Grapic Card	VGA 512 GB
5.	Harddisk	80 GB
6.	Modem (internet conection)	Speed 10Mbps

2.5.2 Needs Analysis of Software

Needs analysis software is an analysis software will be used in the construction of this

system. Before looking at the software that will be used, it is very necessary to know the software used at this time so it can be in proposing the use of software that can support the system

.2.5.3 Needs Analysis of user (Brainware)

Analysis of user needs (brainware) dilakukkan to find out who is running the application. Before looking at the users is required, it is very necessary to know of users who use the current proposed system users so they can be. As for the user's specifications are available at the Department of transportation can be seen in Table 2.5-1

Table 2.5-1 Analysis of user (Brainware)

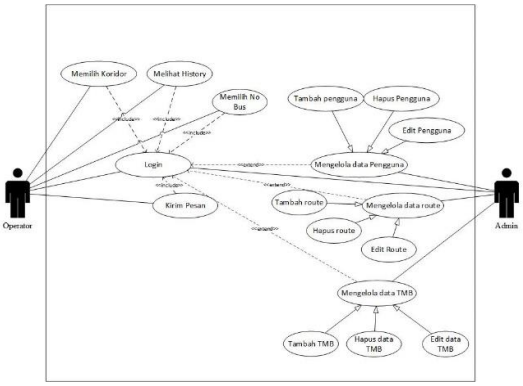
Stakeholder	Access Rights	Competencies That Are Owned
Admin	Manage Data TMB	1. Able to operate the computer. 2. Can run a computer application. 3. Can process data. 4. It can take a decision.
Unit Operations (Operator)	Monitoring Trans Metro Bandung	1. Able to operate the computer. 2. Can run a computer application. 3. Can process data. 4. It can take a decision.
Passengers (User)	Can view the Display Information	-

2.6 A functional needs analysis

Describe the process of functional needs analysis activities will be implemented in a system and explain the necessary system requirements so that the system can run well and in accordance with theirneeds.

2.6.1 Use Case Diagram

Use case diagram is modeling for behavior (behavior) system to be created. Use Case describes an interaction between one or more of the actor with the system to be created. As for interactions between one or more systems to be built can be seen in Figure 2.6.1-1.



.Figure 2.6-1 Use Case Diagram

2.7 Testing

Software testing is a stage for menmukan errors or omissions on the application which is built so that it can be known whether applications that have been created can meet the criteria in accordance with purpose or not. As for the testing methods used to test the application is by testing blacbox testing and User Acceptance Test.

2.7.1 Blackbox Testing

Blackbox testing is the testing done against BRT systems development application functionality on the Trans Metro Bandung uses the Main Display Unit with the implementation of Geolocation. The purpose of this test is to find the error functionality in applications that have been built. As for the stages of functional testing is done namely include black box, testing scenarios and cases from the test results.

Based on the results of the testing that has been done on the blackbox application development of BRT system in Trans Metro Bandung built can be drawn the conclusion that in the appropriate output functionality generate the results expected and has gonewell.

2.7.2 User Acceptance Test (UAT)

User Acceptance Testing (UAT) is a verification process that the solutions created in the system already according to the user. On this test done testing by providing several questionnaires to passengers who never used Trans Metro Bandung in the shelter to find out peniliain of applications that have been built.

2.7.2.1 Scenario Testing

In this test scenario the researchers gave questionnaires to prospective passengers or passengers who use the Trans Metro Bandung with the purpose of knowing the judgment on the application of BRT system development on Trans Metro Bandung using main display unit with the implementation of geolocation with the purpose of the question is as follows..

1. Provide information the position Trans Metro Bandung Trans Metro Bandung to users

2. Provide the information estimated arrival Trans Metro Bandung
3. Assist passengers to find out which information Trans Metro Bandung will be used

2.7.2.2 The Test Conclusions

Based Beta testing that has been done before with the method using interviews and questionnaires, it can be drawn the conclusion that the development of the system on the Trans Metro Bandung uses the Main Display Unit with the implementation of geolocation, can received or in accordance with the objectives.

2.8 Implementation System

System implementation is a realization of the results of the analysis and the design of systems that have been done before.

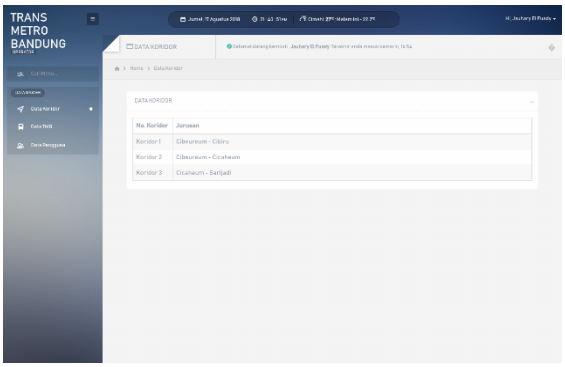


Figure 2.8-1 Interface Main Page

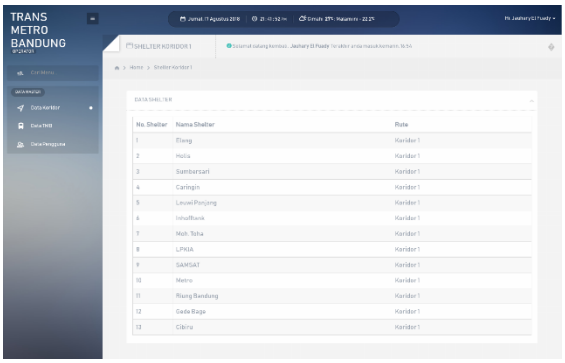


Figure 2.8-2 Interface Page Koridor

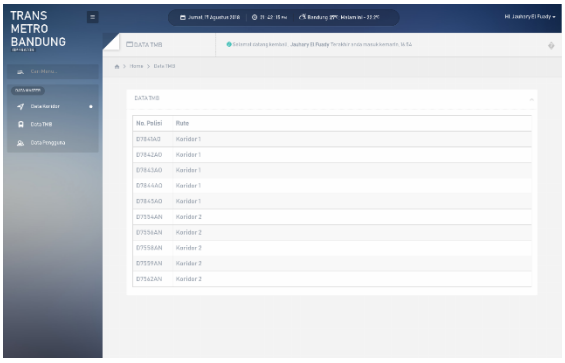


Figure 2.8-2 Interface Chose TMB

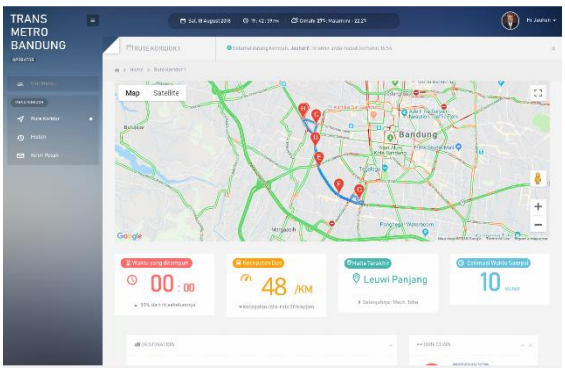


Figure 2.8-2 Interface Page Maps Operator

3 THE CLOSURE

The closure was the conclusion that was done from the stage of the analysis that has been done and give some advice so that applications can be better.

3.1 Conclusion

Based on the test results obtained from research conducted in the preparation of this final task and refers to the purpose of the research that has been created, it can be concluded that:

1. Once done testing with the dissemination of the questionnaire, then gained a manager that test the information system can know the position Trans Metro Bandung
2.Information systems using a display with estimated arrival can help prospective passengers Trans Metro Bandung which lies in knowing the TMB information stops will be used.
3. application development system bus rapid Transport on Trans Metro Bandung with the main display unit with the implementation of geolocation with Web base built mostly has been representing information in meeting the needs of managers to monitor Trans.

3.2 Suggestion

Based on all the results that have been achieved in the preparation of this final project, has recommended that should some future application development can better:

1. Add information in the form of a message to the driver of a Trans Metro Bandung in violation.

2. Add the number of passengers that are sent to the display so that the information known to the State of charge of passenger Trans Metro Bandung.

3. Add the information to the driver on the monitoring that is done the Manager.

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