

# Web Based Application of Bus Inspection System in Pulo Gebang Bus Station

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**Abstract:** Bus inspection is sequence activities to inspect administrative and technical elements for each bus that depart or exit from the bus station, which doing by the certified inspection officer / team, in order to guarantee the safety of traffic and road transport by avoiding everyone from the risk of accidents during traffic caused by humans, vehicles, roads and / or the environment [2]. The bus inspection activity in Pulo Gebang Bus Station which still uses a manual system that makes inspection files to fall apart, prone to loss or damage, difficult to find the history of bus inspection, and weak monitoring of inspection report. Based on this problem, this research is purposed to create a “Web Based Application of Bus Inspection System in Pulo Gebang Bus Station”. This application is created using the method of developing linear sequential software (waterfall). Test conducted on this system is black box testing. By implementation of this application, solve the existing problems in the bus inspection process and simplify the work of employees and leader in Pulo Gebang Bus Station.

**Keywords:** Research, Web, Application, Bus Inspection, Pulo Gebang Bus Station.

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## I. INTRODUCTION

The Pulo Gebang Bus Station Management is the technical unit of the Transportation Department of DKI Jakarta Provincial Government, which has the main task of managing the Pulo Gebang Bus Station. Its main function is to serve public vehicles for interprovince intercity transportation combined with urban transportation [7].

To be able to provide transportation services that ensure traffic safety and road transportation with the avoidance of each person from accident risks during traffic caused by humans, vehicles, roads and / or the environment [2], it is necessary to check the health of bus driver and inspect each bus that will depart or exit from the bus station by the certified inspection officer / team which at least consists of inspection officer and civil servant investigators (PPNS).

At this time the inspection officer is still doing inspections manually by fill the inspection points into the inspection form, after the officer has finished inspecting, the form recapitulation of the bus inspection is rather longer because have to unite the forms from several officers who can different locations and have no a special officer to recapitulate bus inspection results, so the Head of Management difficult to know the results of detailed bus inspections every day.

Other weaknesses are in the filing system of the inspection form because the forms are stored in the file cabinet without put a label with date and not separate where the passed inspection or failed inspection, it causes the files mixed, so if one day the inspection history is needed, officer will be difficult to find the bus inspection history, and the large number of inspection forms causes the files prone to lost / damaged.

Based on these problems, the right solution to solve the problem in the Pulo Gebang Bus Station is to create a "Web Based Application of Bus Inspection System in Pulo Gebang Bus Station".

## II. RESEARCH METHOD

The location of research is in the Pulo Gebang Bus Station, at Jalan Seजार Tol Sisi Timur KM.2 Pulo Gebang, Jakarta, Indonesia.

Supporting tools used in this research are hardware (personal computer) with the specifications of the Intel core-i5 Processor 3.20 GHz, 4 GB DDR-3 SDRAM RAM, 500 GB SATA Hard Drive 7200 rpm, Windows 10 64 bit Operating System and software used are XAMPP Control Panel version 3.2.2, PhpMyAdmin, MySQL database, Google Chrome browser, Sublime Text 3 text editor, Microsoft Office Word 2016 and Microsoft Office Visio 2016.

The data collection techniques used are:

1. Library Study  
Data was collected by studying, researching, and examining various literature from the library that are sourced from books, scientific journals, internet sites, and other reading related to the research conducted.
2. Field Study  
Field study is a technique of collecting data by research and direct field survey of the research object. Field studies in this research at the Pulo Gebang Bus Station, are:
  - a. Interview  
Interview is a technique to get answers from respondents by unilaterally questioning [1]. In this research, interview was conducted to the leader and several employees of the Pulo Gebang Bus Station according to the topic of the problem so it can get information and about the process of bus inspection.
  - b. Observation  
Observation is a technique to get information by conducting careful observations and systematic recording [1]. In this research, observation was conducted by doing survey to the inspection activity and studying the flow of inspection process in the Pulo Gebang Bus Station.

The system development method used is the waterfall method. The stages of the waterfall method are: analisis, design, coding & testing, implementation, and maintenance [8].

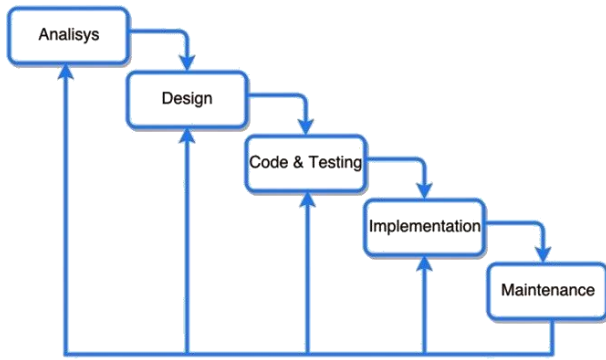


Fig 1. The waterfall stages

The stages of the waterfall method are explained as follows:

- a. Analysis  
Analysis is the first step to determine the design of application systems needed by the user to manage the website.
- b. Design  
The documentation produced from this system design stage includes: Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams.
- c. Coding & Testing.  
Coding is writing the translation of system design that has been made into the form of commands understood by computers using programming languages. The programming language used is PHP with Codeigniter framework. Testing is to make sure all input output processes from the possibility of an error and a bug. So it can be immediately known and made improvements to the writing of the program code. Testing method used is Blackbox testing.
- d. Implementation  
The implementation of the application is the last stage where the developer implements an application that has been completed and tested before.
- e. Maintenance  
This step occurs after installation, and involves making modifications to the system or an individual component to alter attributes or improve performance. These modifications arise either due to change requests initiated by the customer, or defects uncovered during live use of the system. Client is provided with regular maintenance and support for the developed software.

### III. LITERATURE REVIEW

The literature review method is a series of activities relating to the method of collecting data, reading and recording, and managing research materials [12]. Some related research are explained in the table below:

Table 1. Related research

<b>Researcher</b>	Samsinar, Lis Suryadi
<b>Journal Title</b>	Desain Sistem Informasi Pengujian Kendaraan Bermotor Pada UPT. PKB Kendaraan Khusus Cilincing
<b>Journal Published</b>	Seminar Nasional Sistem Informasi Indonesia (SESINDO), 22 September 2014 [10]
<b>Conclusion</b>	<b>Conclusion:</b> With the implementation of a computerized system can minimize

	administrative process errors or the occurrence of human error and simplify the work. <b>Advantages:</b> The administration process is computerized <b>Weaknesses:</b> Still desktop based, not web-based so that it cannot be accessed anywhere, and this system is still general for periodic inspection vehicles not specifically for bus inspection.
<b>Researcher</b>	Mohammad Rosul, Yudie Irawan
<b>Journal Title</b>	Sistem Informasi Pengujian Kendaraan Bermotor Dinas Perhubungan Komunikasi Dan Informatika Kabupaten Kudus
<b>Journal Published</b>	Prosiding SNATIF Ke -1 Tahun 2014 [9]
<b>Conclusion</b>	<b>Conclusion:</b> The study produced a Motorized Vehicle Testing Information System application program that has a main menu module consisting of files (log out and exit), master data (applicant data, vehicle data, levy data, vehicle type data and user data), testing, payment and report. <b>Advantages:</b> The administration process is computerized <b>Weaknesses:</b> still desktop base using VB.net, not web-based so that they cannot be accessed anywhere, and this system is still general for periodic inspection vehicles not specifically for bus inspection.
<b>Researcher</b>	Nurhayati, Budi Serasi Ginting
<b>Journal Title</b>	Perancangan Sistem Informasi Pengujian Kendaraan Bermotor Pada Dinas Perhubungan Kabupaten Langkat
<b>Journal Published</b>	KAPUTAMA, Vol.7 No.2, Januari 2014 [6]
<b>Conclusion</b>	<b>Conclusion:</b> With a system designed this can help people or owners of vehicles for registration administration processes, vehicle data stored in the database, can present vehicle data that has been tested if data search is needed. and others can be handled faster. <b>Advantages:</b> This application is web-based <b>Weaknesses:</b> The interface of the application is less user friendly and still uses PHP native, and the system is still general for periodic inspection vehicles not specifically for bus inspection.

### IV. RESULT AND DISCUSSION

#### 4.1 Running System Analysis

Analysis of the running system is by making an activity diagram of the bus inspection process, as illustrated below:

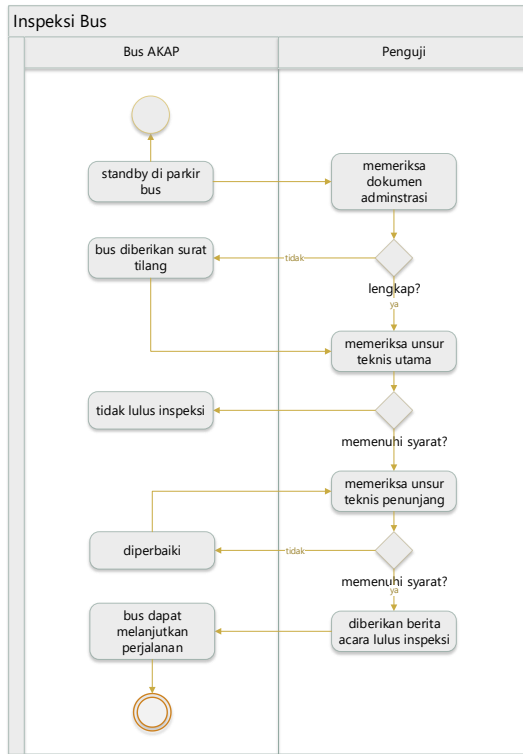


Fig 2. Activity diagram of the bus inspection process

The activity diagram of the bus inspection process is explained as follows:

1. The bus parking in parking area.
2. The officer checks the administrative document of the bus.
3. If the administration of the bus is incomplete, the Civil Servant Investigator (PPNS) give the violation letter, but the bus can still allow to take bus inspection.
4. The officer inspects the main technical element of the bus, consist of lighting systems, braking systems, vehicle bodies, tires, speed gauges, safety belt equipment, wipers and emergency response equipment.
5. If the inspection of main technical element is passed, the officer continues to inspects the supporting elements of the bus, consist of additional lighting systems, vehicle body parts, seating capacity, and other equipment.
6. If there is one or some parts of the supporting elements of the bus are not completed, the bus inspection is still passed with recommendation to complete the supporting element and the bus is permitted to enter the departure area of Pulo Gebang Bus Station.
7. The officer records the result of bus inspections into the bus inspection book.

#### 4.2 Identification of problems

Table 2. Identification of problems with PIECES Method

No	PIECES	Running System	Proposed System
1	Performance	The inspection officer is still doing inspections manually so its rather longer.	Bus inspection is doing by input data into the application so it will be stored in the database.

2	Information	Bus inspection results were recorded manually so the bus inspection data cannot be presented well	Bus inspection data can be seen directly in the application, and the bus inspection report can be created automatically
3	Economics	The use of paper and stationary on every bus inspection causing need more inspection cost	Bus inspections conducted by input data into the application so that reduce the cost
4	Control	Leaders cannot perform control or monitoring of bus inspections because the inspection officer did not make a report	Leaders can directly control or monitor the bus inspection process in the application
5	Efficiency	Bus inspections results were recorded manually to the report.	The application simplify the process of inputting and reporting of inspection results.
6	Service	Bus inspection process is complicated because the officer should always borrow an administrative documents of each busses even though the bus had been recorded.	The officer no need to borrow the administrative documents because the data was stored in the application database, so the process is easier

#### 4.3 Proposed System Design

After analyzing the running system and identifying problems so the next step is proposing the system design as needed in making web-based application. In this proposed system, the modeling language used is the Unified Modeling Language (UML).

#### 4.4 Use Case Diagram

Use case diagram describes the interaction between users and systems or applications [3]. There are two actors in the proposed use case diagram, are Leader as Admin and Officer as User:

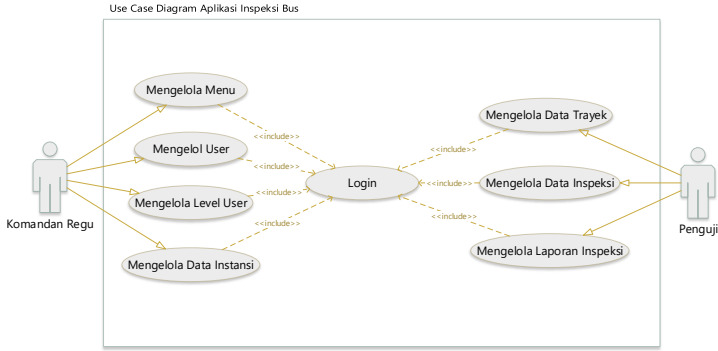


Fig 3. Use case diagram of the application

In figure of use case diagram above, there are two actors, Leader as Admin and Officer as Inspector. Identification of actor is explained in the table below:

Table 3. Identification of actor

No	Actor name	Description
1	Leader	The leader is an actor who has the authority to manage menus, manage users, manage user levels and manage agency data. Leader has the right to full access to the application
2	Officer	The officer are actors given access rights by the leader primarily to manage bus route data, and manage bus inspection data and manage bus inspection reports

Table 4. The description of use case diagram

No	Name Use Case	Description	Actor
1	Login	The application display the first login page, leader and officer input email and password in the fields, if account correct the system will display the dashboard of application	Leader / Officer, System
2	Manage Menus	The application will display the menus data, Leader can create, update and delete menus data.	Leader, System
3	Manage Users	The application will display the users data, Leader can create, update and delete users data.	Leader, System
4	Manage User Level	The application will display the user levels data, Leader can create, update and delete user levels data, and grant permission to the officer in accordance with user level	Leader, System
5	Manage Agency Data	The application will display the agency data to be header of reports, Leader update the agency data.	Leader, System
6	Manage Bus Route Data	The application will display the bus route data, Officer can create, update and delete bus route data.	Officer, System
7	Manage Inspection Data	The application will display the bus inspections data, Officer can create, update and delete	Officer, System

		bus bus inspection data.	
8	Print inspection reports	The application will display the report of inspections data according to inspection periode.	Officer, System

The use case scenario aims to explain the actor actions with the activities of the proposed system. Some of use case scenario of the application are explained in the table below:

Table 5. Use case scenario of manage inspection

Use case name	Manage inspection data
Description	Officer can create, update and delete bus inspection data
Actor	Officer
Initial condition	Once logged in, the actor opens manage inspection page
Main scenario	
Actor Action	System Reaction
1. Select manage inspection menu	1. Display manage inspection page
2. Input the inspection data by filling out the inspection data form	2. Display input form of inspection data
3. Update the inspection data	3. Save inspection data into the database (tbl_rampcek)
4. Delete the inspection data	4. Display the inspection data on manage inspection page
Alternative scenario	-
Final condition	The inspection data successfully saved and appear in the manage inspection data page

Table 6. Use case scenario of print inspection report

Use case name	Print inspection report
Description	Print inspection report into PDF file
Actor	Officer
Initial condition	Once logged in, the actor opens inspection report page
Main scenario	
Actor Action	System Reaction
1. Select inspection reports menu	1. Display inspection report page
2. Choose the period of inpection report	2. Display inspection report data based on the selected period
3. Print inspection report into a pdf file	3. Generate Pdf file of inspection reports
Alternative scenario	-
Final condition	Display inspection report based on the selected period and generate Pdf file

#### 4.5 Activity Diagram

Activity diagram is an activity flow diagram in the system that is being designed, which will be used by the application system created [3]. Some of activity diagram of the application are shown below:

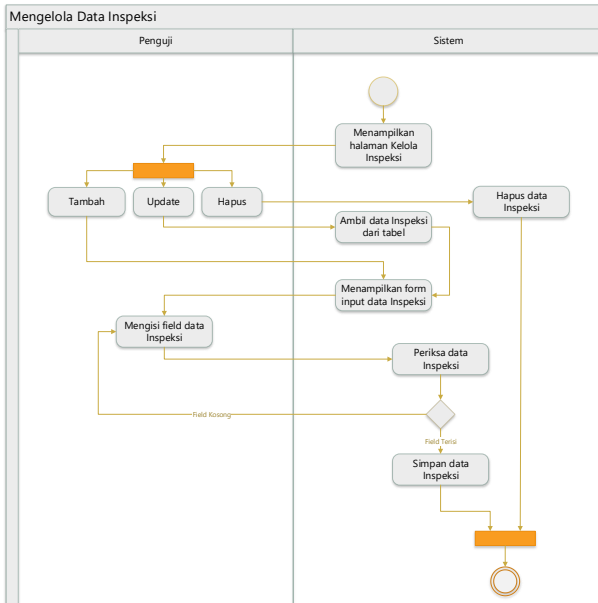


Fig 4. Activity diagram of manage inspection data

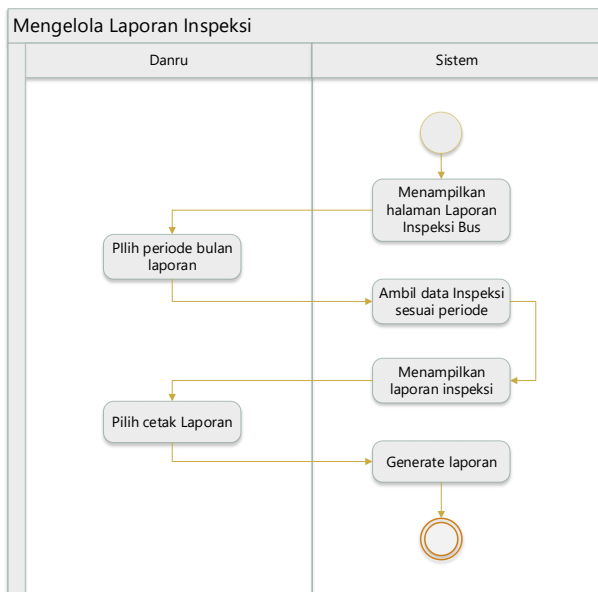


Fig 5. Activity diagram of print inspection report

#### 4.6 Sequence Diagram

Sequence Diagram is a diagram that is associated with use cases where sequence diagrams show what stages should occur in a use case [3]. Some of sequence diagram of the application are shown below:

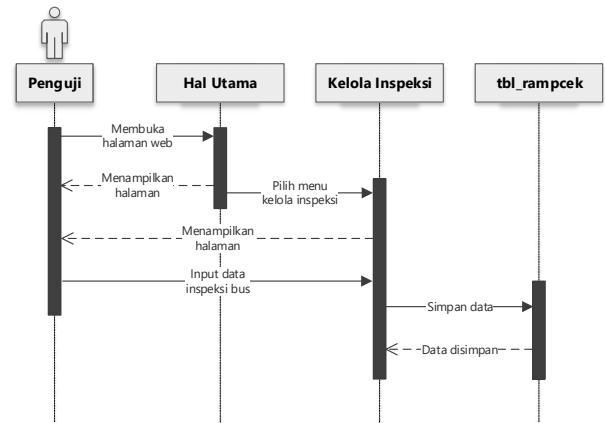


Fig 6. Sequence diagram of manage inspection data

The sequence diagram of manage inspection data is explained as follows:

After logging in and the system display dashboard page, Officer select the “manage inspection” menu, then the system will display a bus inspection data, if the user clicks add then the form will display an inspection form that will be inputted by the user, after the user inputs the data, it will be stored by the system into the database, then the system will return to the inspection data page.

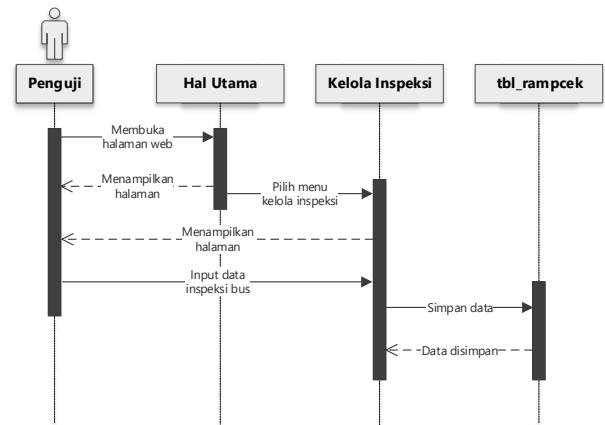


Fig 7. Sequence diagram of print inspection report

The sequence diagram of print inspection report is explained as follows:

After logging in and the system display dashboard page, Officer select the "inspection report" menu, then the system will display the report page. Officer determine the reporting month period, then the system will retrieve data from the database and will generate a report.

#### 4.7 Class Diagram

Designing database specifications is a step to map the conceptual model to the database model that will be used [3]. The design of the bus inspection application database is described in the UML Class Diagram model. The class diagram of the application is shown below:

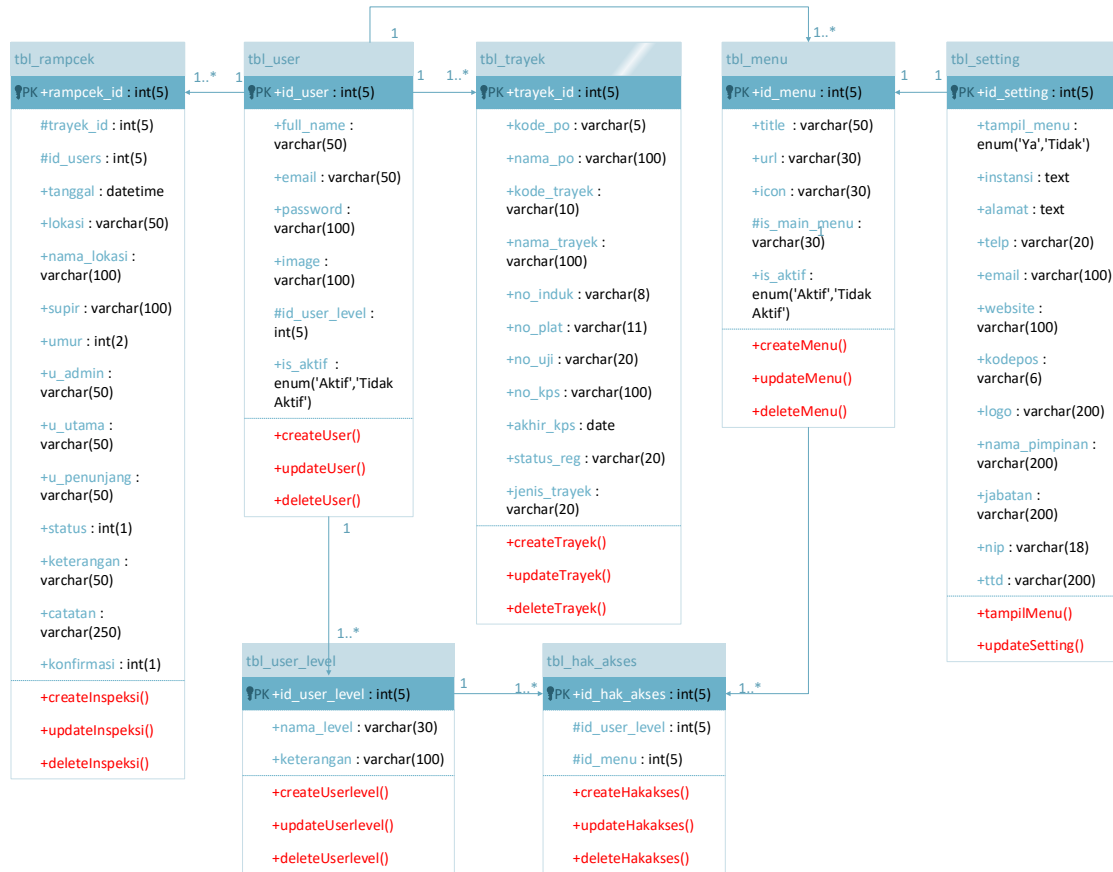


Fig 8. Class diagram of the application

The explanation of Table tbl\_rampcek according to class diagram above:

Table 7. Table tbl\_rampcek (bus inspection)

Table Name		tbl_rampcek		
No	Field Name	Type of Data	Lenght	Description
1	rampcek_id	integer	5	Primary Key, Auto Increment
2	trayek_id	integer	5	Foreign Key with tbl_trayek
3	id_users	integer	5	Foreign Key with tbl_user
4	tanggal	datetime		Date of input inspection data
4	lokasi	varchar	50	Inspection Location
5	nama_lokasi	varchar	100	Inspection Location Name
6	supir	varchar	100	Bus driver name
7	umur	int	2	Bus driver age
8	u_admin	varchar	50	Administrative elements inspection results
9	u_utama	date	50	Technical elements inspection results
10	u_penunjang	varchar	50	Supporting elements inspection results

11	status	int	1	Inspection Result (Passed or Failed)
12	keterangan	varchar	50	Description of Inspection
13	catatan	varchar	250	Additional Notes
14	konfirmasi	int	1	Confirmation

#### 4.8 User Interface Design

User Interface design is to create a page display that will be used by the user to interact with the system using the interface on the computer screen. User interface design of this application is web-based using the PHP programming language with the Code Igniter framework. Some of user interface designs of the application are shown below:

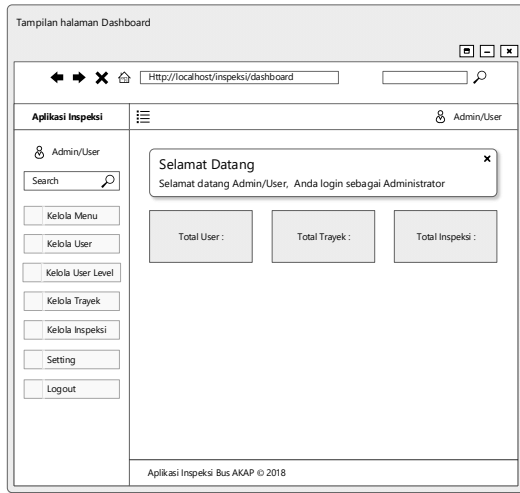


Fig 9. User Interface of dashboard

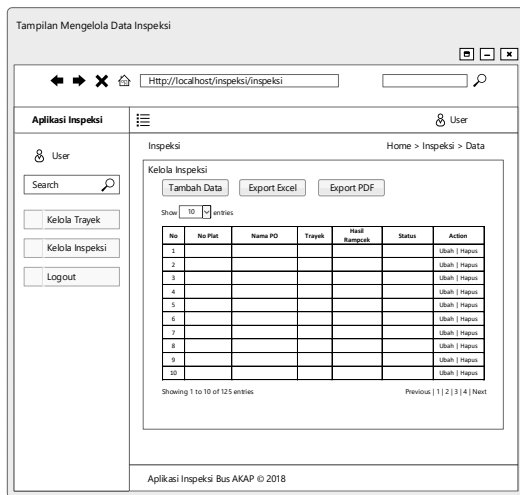


Fig 10. User Interface of manage inspection data

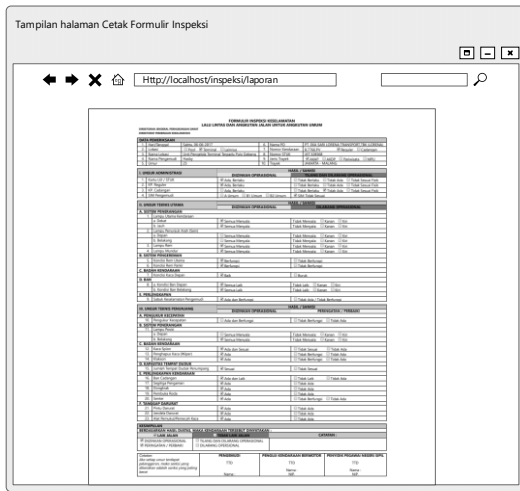


Fig 11. User Interface of bus inspection report

testing of application systems that are intended to analyze the results of the test, whether the results are as planned. Some of implementation of database and user interface are shown below:

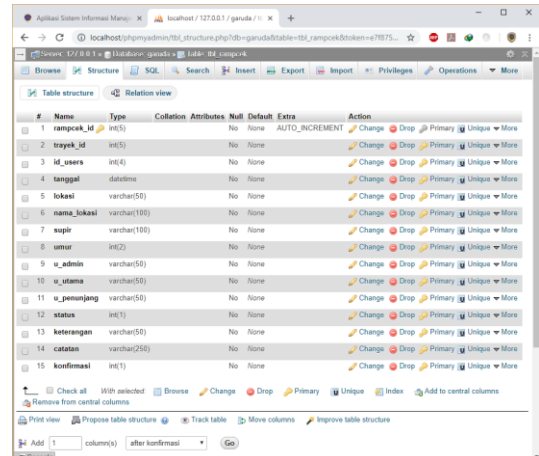


Fig 12. Implementation of inspection database (tbl\_rampcek)

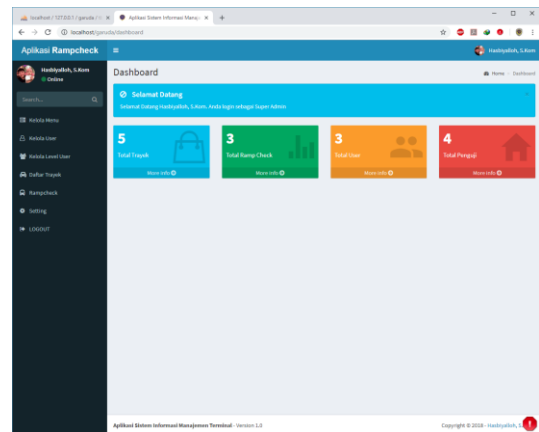


Fig 13. Implementation of Dashboard page

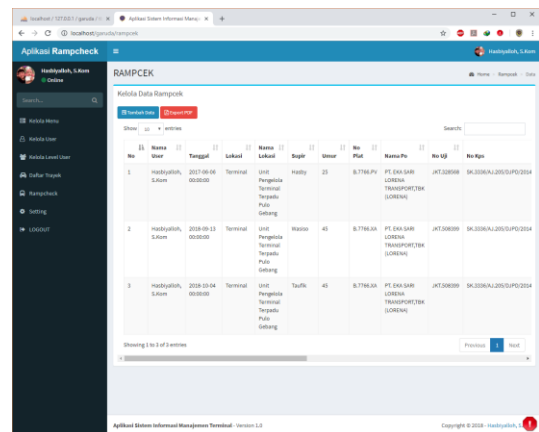


Fig 14. Implementation of Inspection data page

#### 4.9 Implementation

The implementation is the stage where the system begins to be made using information that has been collected [3] at the implementation of information that has been previously collected is applied using a programming language and also besides that the implementation stage also discusses the

Fig 15. Implementation of Inspection report page

## V. CONCLUSION

Conclusion of this research are:

1. Running system of bus inspection in the Pulo Gebang Bus Station still uses manual system that makes inspection files to fall apart, prone to loss or damage, difficult to find the history of bus inspection, and weak monitoring of inspection report.
2. By implementing the application, solve the existing problems in the bus inspection process by make it easier to input inspection data, print inspection reports, finding inspection history and simplify the work of employees and leaders in Pulo Gebang Bus Station.

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