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Operation and Maintenance Operational Management Application for Building Facilities Based on Android

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ABSTRACT

Application is a program created to do and carry out special tasks from the user. The computer system program in the form of an android-based application can be used in various fields, one of which is in property as the operational management of building engineering in carrying out maintenance and inspection of building facilities. This Android-based application research aims to increase productivity and make it easier to carry out operational tasks, ensuring the operational integrity of building stationary equipment. The method for software development uses the SDLC (System Development Life Cycle) model, which is a method that describes the process of developing information systems. The problem obtained from the research is the management data processing which is still using manual or written so that the data received by the operational technician is inaccurate because the addition of the data is slow and to search for the data is too difficult because the data stored is hardcopy too much. The suggestion in proposing an android-based application system that assigns applications to the user is accessing the menu contained work orders in conducting a checklist to maintain and analyze building facilities. With this android-based application for operational engineering, you can enjoy the convenience of carrying out operational tasks and the data obtained can be stored so that it can be easily found or viewed at any time to be evaluated for damage to building facilities.

1. Introduction

In Operations Management Engineering, one of the supporters responsible for a commercial building facility, maintenance and inspection of building facilities is a very important factor in maintaining building sustainability in the future. The function of Operational Engineering is to protect and analyze the quality of building facilities. Maintenance management is the management of maintenance work through a planning process[1]. Building Maintenance Committee (1972) defines maintenance as follows: "Maintenance is an activity carried out to renew, and improve facilities and infrastructure facilities that meet the building standard".[2]. Company performance factors must be improved by using a mobile application, so that the operational engineering team can improve performance in carrying out activities.

Engineering Department is a department that is responsible for the maintenance of building facilities and infrastructure, while some Engineering Department tasks include engineering operational teams that have important tasks in running company / building operations, for example, such as ensuring the supply of company needs, ensuring all building facilities, maintenance of function of machine / operational equipment and building target (Transformer, LVDP, Genset, Chiller, AMR, etc.)

Application is a program that is used to carry out several tasks for application users that can be used by a company or target to be addressed [3].

Android "Open Mobile Platform" which is an operating system for Linux-based and multi-use mobile devices for application development[4].

Mobile Operations Management Application (Maintenance and Inspection) is an application that can see the results of the maintenance check list form that must be evaluated and revised. Inspect the actual state of the equipment, and see the results of the calculation of the power system on building equipment that has been determined by the Standard Operational Procedure (SOP). The update carried out in this research is to improve the method of carrying out maintenance and inspection of building facilities The application of maintenance

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and inspection of building facilities based on android is specially designed for the operational engineering team. The application assignment service to the user is to access the menu contained work orders in conducting a checklist to maintain and analyze building facilities.

Based on the problems obtained by the Engineering Department, especially the engineering operations team has sufficient complaints in processing operational management data in the maintenance and inspection of building facilities that are done manually (in writing) so that the data received by the operational team is inaccurate because the addition of data is too slow and to find the data is too difficult because of the hardcopy data that is stored too much, on the other hand the admin engineering also had difficulty when evaluating the recording data of building equipment that had been done in writing by the operational team.So the authors will conduct research in developing an Android-based application that makes it easy to carry out operational engineering tasks to analyze building facilities.

2. Research methods

The research methodology in developing this system application is a method with the SDLC (System Development Life - Cycle) model which is a sequence of stages in developing information systems intended to make the research more conceptualized and directed according to the objectives to be achieved, so as to produce a system that has been tested and can solve the problem studied[5]. The method uses the stages of the system in which each stage will be worked in sequence decreasing from the analysis, design, implementation, testing and evaluation of the results of the information system.

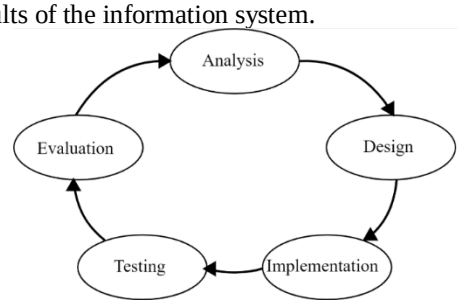

Fig 1. Research Method Diagram

In conducting research, it will be carried out in stages as already shown in Figure 1.[5]

a. Analysis

Finding and analyzing user needs, both in the form of information and devices used and adapted to the needs of users, then provides the best alternative path about the application that will be used by users to facilitate user performance.

b. Design

Based on the analysis obtained, then the design of the operational management management application is presented in carrying out maintenance and inspection of building facilities that will be applied into the system.

c. Implementation

After the design is complete and then implemented into a database and application based on the system design.

d. Testing

Is a testing phase for the application of operational management systems, to analyze and detect the level of system capability.

e. Evaluation

Continuous evaluation so that the system planning that has been made in order to achieve the goals that have been made.

3. Results and Discussion

3.1. System Analysis Results

The results of the development of an Android-based application for maintenance and inspection of building menu facilities obtained contain some features of the checklist components that have been made, with this feature operational engineering of the building can facilitate the inspection of building facilities, such as

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generators, transformers, electrical panels and others so. The information system assignment service to the user is to access the menu contained work orders in conducting a checklist to maintain and analyze building facilities.

Besides being given some operational management application features that can be operated on an android device. This application is also operated into a computer or laptop to be connected as a web server (admin)[10]. Below is a table of the minimum requirements needed to run the application on the hardware.

Table 1
Min Specifications Mobile Application Hardware and Software

No	Device Name	Minimum Specifications
1	Android Operating System	Android 4.4 Kitkat
2	RAM	1 GB
3	Processor	Dual Core 2 GHz
4	Screen Dimensions	5.0 Inches
5	Network	3G: HSDPA 850/900/1900/2100 4G: LTE 850/900/1900/2100

Table 2.
Min Specifications Back End Application and Hardware and Software

No	Device Name	Minimum Specifications
1	Operating system	Windows 7 32 Bit
2	RAM	1 GB
3	Processor	1 Gigahertz speed (GHz)
4	Hard drive	80 GB

For modeling the system used in the development of information systems using the Unified Modeling Language (UML) as a medium for developing application systems for maintenance and inspection of building facilities. UML modeling used includes Flow Diagrams, Use Case Diagrams, Activity Diagrams, Class Diagrams, and Squence Diagrams. The following diagram is the application of operational management maintenance maintenance and inspection of building facilities, namely:

A. Flowchart

Flowchart is a description or symbol of a detailed process sequence in a system [6][7]. Flow diagram of the system created can be seen in Figure 2.

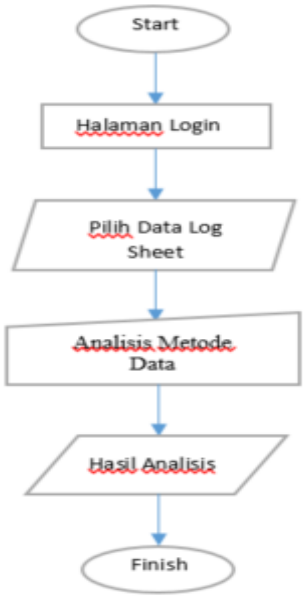

Fig 2. System Flowchart Diagram

B. Use Case Diagrams

Use Case This diagram is made to illustrate the system used by the Use Case and the actor, namely from the user and admin[8]. The following is a Use Case diagram for checking sheets or log sheets for building support equipment using the Operational Engineering Management Application. The Use Case diagram of the system created can be seen in Figure 3.

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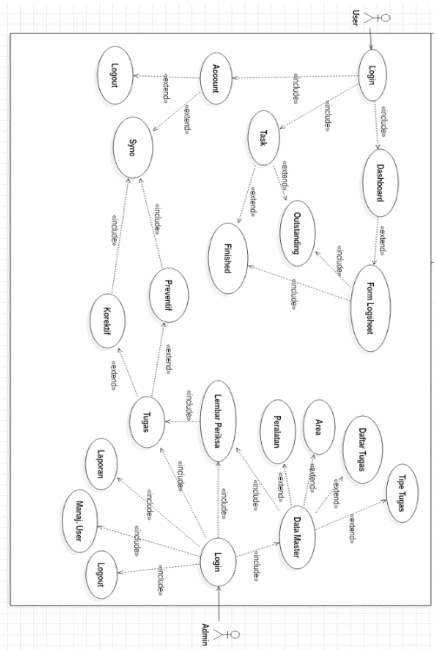

Fig 3. Use Case Application Diagram

In Figure 3 you can see the user enter the Login, then go to the Dashboard menu, where the user can see several Log Sheets whose contents have different components, after that the user can check the list of building supporting equipment, and finally the user can see analysis results (finished) through the task menu on the specified log sheet. And for the admin that is the content in making log sheet forms, as well as managing or receiving reports from users.

C. Activity Diagram

Activity Diagram is a functional application development that describes the process of the system program functions.[9] Activity Diagram of the design of a mobile operational engineering (Preventive Maintenance) application can be shown in Figure 4.

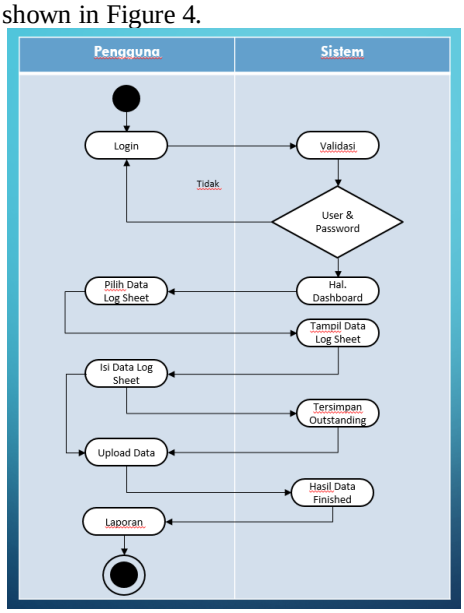

Fig 4. Activity Diagram Application Design

D. Class Diagram

The following is a Class diagram of the structure of an operational engineering application system which is a description or description of the class, attributes and system operations and object relationships.

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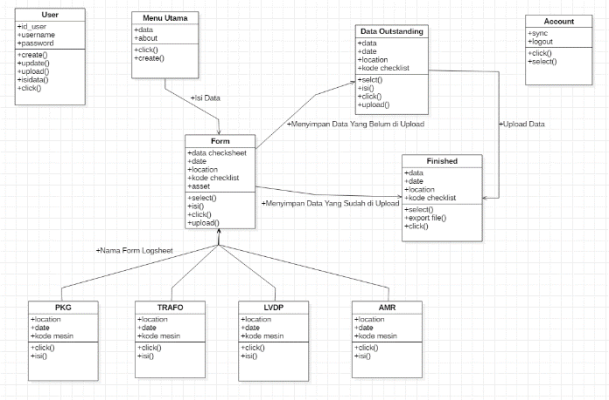

Fig 5. Class Application Diagram in Operaational Engineering Applications

E. Squence Diagram

Squence diagram that illustrates a number of objects in response to an application (system). In the operational engineering application sequence diagram there are several objects namely user data, main menu, checksheet data, outstanding data and finished data that has been made in Figure 6.

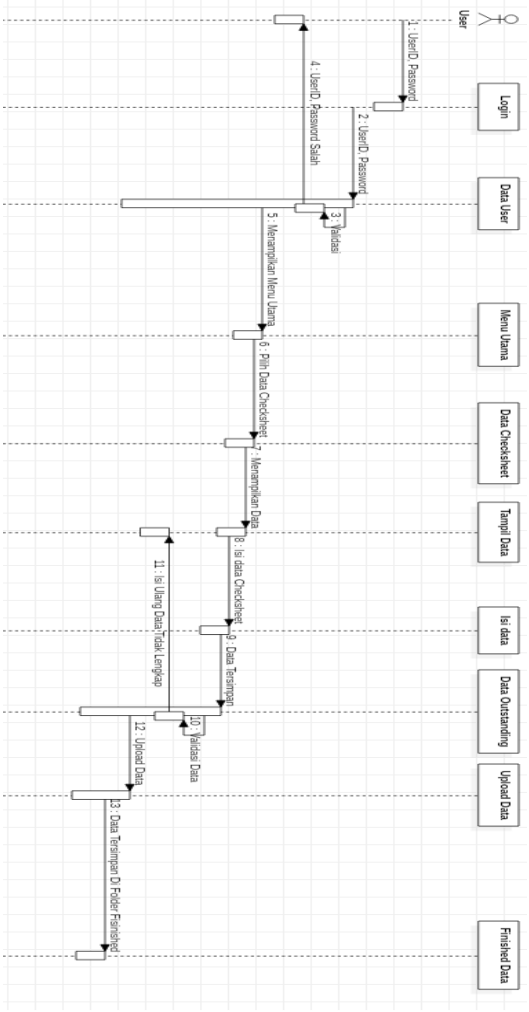

Fig 6. Squence Application Diagram

3.2. Discussion on System Implementation

1. Front End Interface

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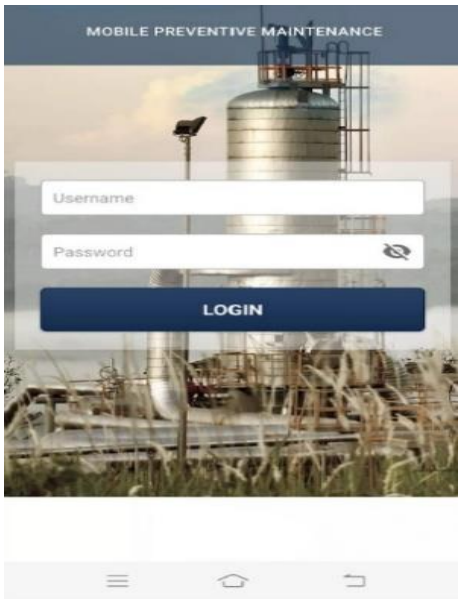

Fig 7. Login page

In Figure 7 you can see the Login screen as the first part of the system interface. Then the user will enter the main page display menu (dashboard) after logging in by entering the username & password.

Fig 8. Homepage (Dashboard)

In figure 8 you can see the main view (Dashboard), which should have several checksheet forms.

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Fig 9. LVDP Checksheet Form page

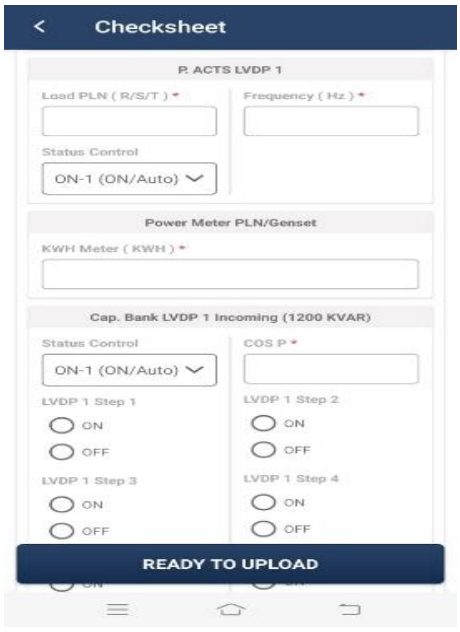

Fig 10. Continued LVDP Form Checksheet page

Figures 9 & 10 are the worksheets or features menu of the LVDP checksheet form for maintenance or prevention to prevent unwanted things happening. When all worksheets have been filled in, the data is ready to be uploaded

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Fig 11. Task page on Outstanding

In Figure 11 the task page on the outstanding menu is useful for storing data if the data is still under monitoring or revision. So basically when filling out worksheets on the checksheet form without having to be uploaded automatically the data is stored in the outstanding menu.

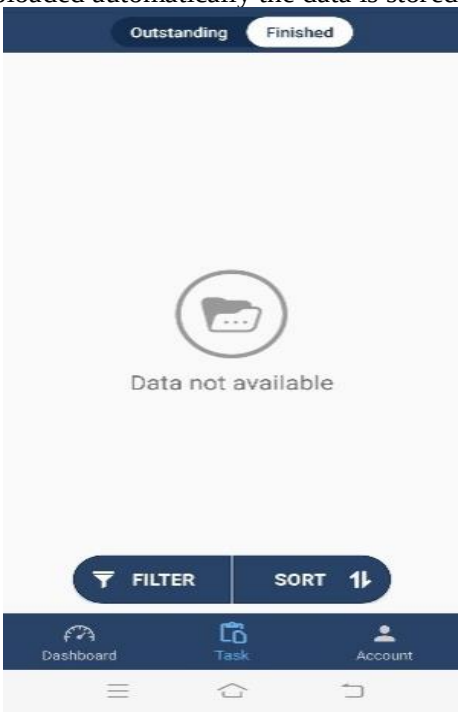

Fig 12. Task page on the Finished menu

In figure 12, the task page on the finished menu is useful for storing uploaded data.

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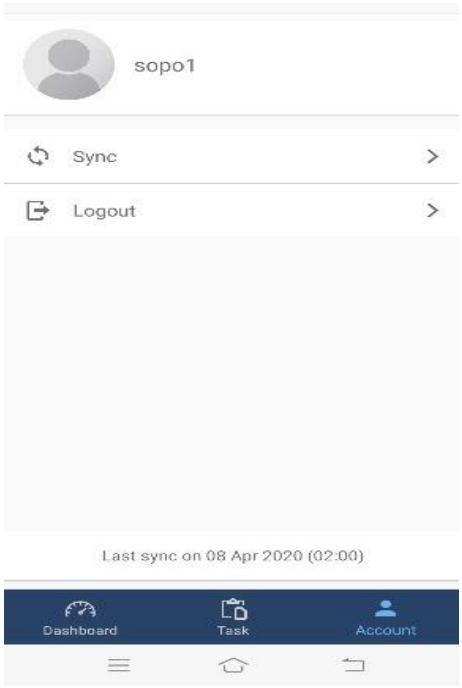

Fig 13. Account page

2. Interface Back End

Fig 14. Login page

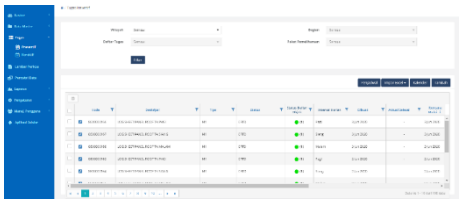

Fig 15. Preventive Task Page

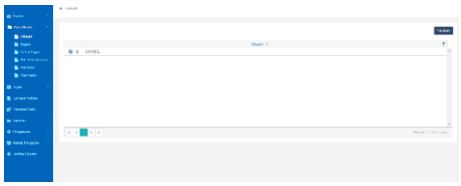

Fig 16 Master Data Page (Area)

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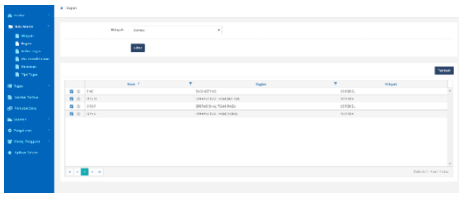

Fig 17. Master Data (Section)

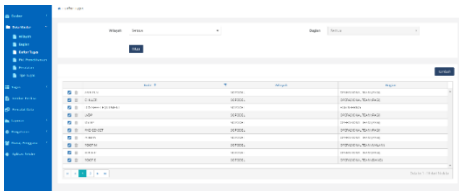

Fig 18 Master Data 2 (Task List)

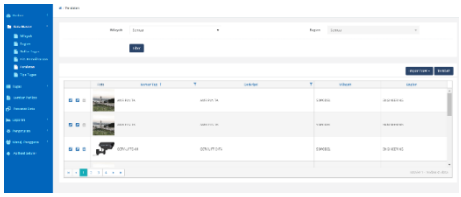

Fig 19 Master Data Pages (Equipment)

On the master data page is a sequence of data sources in making the checksheet form.

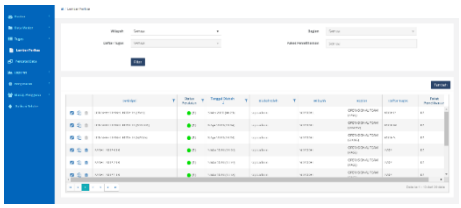

Fig 20. Check Sheet Page

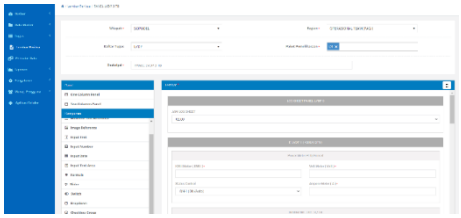

Fig 21. Display in making a Checksheet

Testing this system uses a method called the Black box. Tests based on functionality are carried out only to ensure the results of program execution in errors entered in the system. The following table is the system test results

Table 3
Black - box Testing

No	Activity	Which are expected	Results	Ket.
1	Fill in the checksheet form provided	Upload will display the output form checksheet that has been filled	Data saved (Finished)	Valid
2	Some were not filled when filling out the checkshet form	Will display the output and cannot be uploaded	A notification will appear and the data is stored outstanding	Valid

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Table 3 shows that if the user has completely filled in the checksheet form provided, the system runs as expected and the data can be uploaded and then stored in the finished area of the data area. However, if there are some users who do not fill out the checksheet form, the system will notice that the form must be filled in completely and cannot upload data, then the data will be stored as outstanding.

Evaluation of the results of testing on functionality can be interpreted that the application of the operational engineering management system is running as expected in terms of both validation and error handling processes for the user.

4. Conclusion

Based on the results of the discussion that has been voiced previously. Operational management applications Maintenance and inspection of building facilities is made with several component features on the form checksheet for infrastructure or building support equipment such as PKG (Genset Control Panel), Transformers, LVDP (Low Voltage Distirbution Panel), AMR (Auto Meter Reading) PLN. With the application feature components, it is expected to facilitate the performance of the engineering operational team, especially in the office of the building engineering department (Building Management), easily in maintaining and maintaining a building supporting equipment or infrastructure.

This operational engineering application can also simplify the work of the admin section when checking for building support equipment, and does not incur significant costs. Checksheet data in this operational engineering application is quite well stored (a checksheet form storage folder is created for each piece of equipment) and at any time can be easily searched if anyone needs it.

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