

Implementation of The Resident's Dues Applications (SIUMAS) Using Waterfall Method in RT X Cinere Village

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Abstract – Payment of dues is one of the obligations that must be fulfilled by every resident in a neighborhood association area. These dues are used for common purposes such as cleanliness and security. The collection and expenditure of dues are usually handled by the management committee. However, there are still difficulties in managing residents' dues using conventional methods. As a result, dues cards are often lost and the dues collection are not transparent. Therefore, the author developed The Resident's Dues Application (SIUMAS) as a solution used to manage residents' dues. The purpose of developing this application is to simplify the management tasks of the committee in handling the collection and expenditure of dues, as well as to facilitate residents in tracking the utilization of the dues. This application was developed by applying the waterfall method which consists of several stages, starting from analysis to the maintenance process. In addition, this application was built using the PHP programming language and utilizes the MySQL database. The development of this application adopts an object-based application design method. The results of the SIUMAS application testing using Black Box Testing shown that all functionalities of the SIUMAS application are functioning well and meet the expectations.

Keywords – Resident Dues Application, Web Programming, Waterfall Method, Object-Based Design, Black Box Testing

I. INTRODUCTION

The development of information and communication technology has a significant impact on society's social life. People need services that are functional, fast, transparent, and accurate. The role of technology is very important in providing good public services, starting from the RT/RW level. Ease of access and use of information technology in various fields, such as education, health, business, and government administration, provides various benefits. The public can quickly get information at a lower cost than traditional methods, while the government can manage public services more easily and transparently.

In RT areas, environmental safety and cleanliness are very important for the comfort of residents. To achieve this goal, residents formed a security and cleaning team and collected fees. However, the process of recording and publishing dues collections is still done manually and is less effective. To increase efficiency and transparency, an application is needed that can assist in recording and publishing dues collections. At RT X in Cinere Village for example, they feel that having application technology that can be accessed transparently can help citizens monitor contribution funds. This application is used to help manage fees, provide transparency to residents, and ultimately increase the effectiveness of security and cleanliness programs in the RT area.

To support this community program, the author developed an application called Resident's Dues Application (SIUMAS). SIUMAS aims to assist RT administrators in recording and reporting the use of dues

funds transparently to the community in the RT area or areas that use this application. With SIUMAS, the public can easily check and monitor the number of dues funds they have paid and how these funds are used. This will create transparency and accountability in the management of dues funds so that it can create a clean RT environment and good government [1].

Prior to this research, there had been previous research conducted by A.P. Sutrisno et al. (2022) which discusses the design and development of waste dues applications using the Android-based Rapid Application Development method [2]. In this research, the development of an Android-based waste fee application was carried out due to the problems of residents who had difficulty managing waste fees manually. As a result, after the application was developed and tested, the application could run well and meet the needs of residents.

Then next, there is research from N.G. Salsabila et al. (2021) regarding the creation of a series of citizen application modules for managing citizen contribution wallets [3]. This application was created to make it easier for administrators and residents to manage and supervise the collection and use of contribution funds. Then, there is also research from F. Wahyudi (2020) regarding the design of a web-based committee dues application. In this research, the application was designed based on the problems caused by the previous conventional contribution collection method. This application helps the process of paying committee dues [4]. Apart from that, several other studies which also have the same focus and objectives include Rahman and Aryani regarding the application of



citizen fees using Java [5], Alviana and Kurniawan's research on the Citizen Fee Information System [6], Siregar et al. research on the Security Fee System [7] and Sari and Kholil's research on Citizen Applications [8].

The author developed the SUIMAS application by proposing an object-oriented method, which focuses on design and implementation. The application was developed by applying the waterfall method which consists of several stages, starting from analysis to the maintenance process [9]. By using waterfall method, the author can implement the SUIMAS application quickly and purposefully. To support the development process, the author utilizes the Unified Modeling Language (UML) which is very suitable for the method used [10]. Some of the tools that the author also uses include MySQL for the database [11] and the PHP programming language for implementing the coding [12].

Finally, this research produced a resident's dues application that can be used by the RT X Cinere Village in the dues payment process. The reliability of the application has been tested using the black box method where the results show that all functions can run properly [13]. Of course, this application can also be adopted by other parties who have a similar process.

II. RESEARCH METHODS

The research method used to design the Resident's Dues Application (SIUMAS) is object-based design analysis. In this method, research will focus on analysis and application design based on object-oriented programming principles. This involves identifying and modeling the objects involved in the system, as well as the relationships and interactions between these objects. This object-based design analysis method aims to create good and effective designs in meeting the needs of application users and ensuring the sustainability and scalability of the application.

In this waterfall methodology, research is focused on understanding information about user needs for software. The information collection method is determined through discussion, observation, surveys and interviews. This information is then processed and analyzed to obtain complete data or information regarding user perceptions. and software to be developed [14].

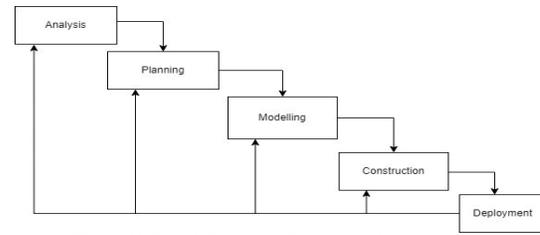


Fig 1. SUIMAS Research Waterfall Methodology

1. Analysis

This step involves analyzing software requirements and collecting data through meetings with customers as well as collecting additional information from journals, articles, and the internet.

2. Planning

The planning process is a continuation of needs analysis (communication). This stage produces user requirements documents or data related to user desires in creating software, including implementation plans.

3. Modeling

The modeling process translates requirements into a predictable software design before code generation. The focus is on data structure design, software architecture, interface representation, and procedural details (algorithms). This stage produces documents called software requirements.

4. Construction

The construction phase involves coding. Coding or coding translates a design into a language that can be recognized by a computer. The programmer translates the transactions requested by the user. This stage is the real stage in software creation, where computer use is maximized. After coding is complete, the system that has been created will be tested to find errors which can then be corrected.

5. Deployment

This stage can be considered the final stage in creating software or systems. After analyzing, designing and coding, the finished system will be used by users. Software that has been created must undergo regular maintenance after implementation.

Object-oriented design is defining all types of objects that are important for communicating with humans and equipment in the system and showing how objects interact with each other to complete certain work and improve the function of each type of object so that it can be implemented with a special language or environment [15].

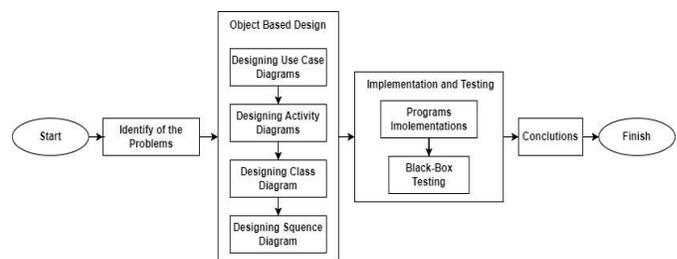


Fig 2. SIUMAS research methodology

Based on figure 2 steps of the research is:



1. Identification of problems

At this stage, the author collects information to analyze the dues collection methods that are being implemented in RT X. Then, the author identified any problems that occurred using the dues collection method that was being implemented at that time and then looked for solutions.

2. Object Based Design

At this design stage, the application design is described SIUMAS object based. This design includes designing use case diagrams, activity diagrams, class diagrams, and sequence diagrams.

3. Program Implementation and Testing

At this stage, the application code is written so that the application can be built and the results tested using the black box testing method [16]. The technology used to build SIUMAS includes the programming language and database used.

The programming language used to build SIUMAS is PHP. PHP (Hypertext Preprocessor) is a server-side scripting language, a programming language used to build static websites, dynamic websites, or web applications [17]. The database used for the application SIUMAS is MySQL. MySQL is a server that serves databases. To create and process a database, you are required to learn special programming called SQL queries [18].

In an application testing session SIUMAS, Black box testing was chosen to test the course of the application process. Black Box Testing is a type of testing that involves software without paying attention to how its internals work. In this testing, testers see the software as a "black box" entity that does not need to understand the internal details, but still carries out the testing process on the external part [19].

4. Conclusion

At this stage, the conclusions of the research conducted by the author are written.

III. RESULTS AND DISCUSSION

Citizen dues activities at RT X Cinere Village still using the manual method with printed dues cards which will be checked every month by officers. Residents who are visited by officers will pay their fees, then their printed dues cards will be marked as proof of payment. Printed fee cards have disadvantages such as being easily lost, so officers must carry replacement printed fee cards. In addition, contribution data could potentially be lost. Then, the amount of fees collected is also not transparent to residents because the total is on their respective printed contribution cards.

Based on the problem analysis above, the problems faced by RT X Cinere Village is the lack of transparency in the number of dues. Apart from that, it is also inefficient to use printed dues cards. So, the author created a Resident's Dues Application (SIUMAS) which can be used to help record and publish resident's dues.

As explained in the research methodology chapter, to assist the author in designing and developing the SIUMAS application, the author utilized the UML tool. Some of the diagrams that the author put forward are:

A. Use Case Diagram Design

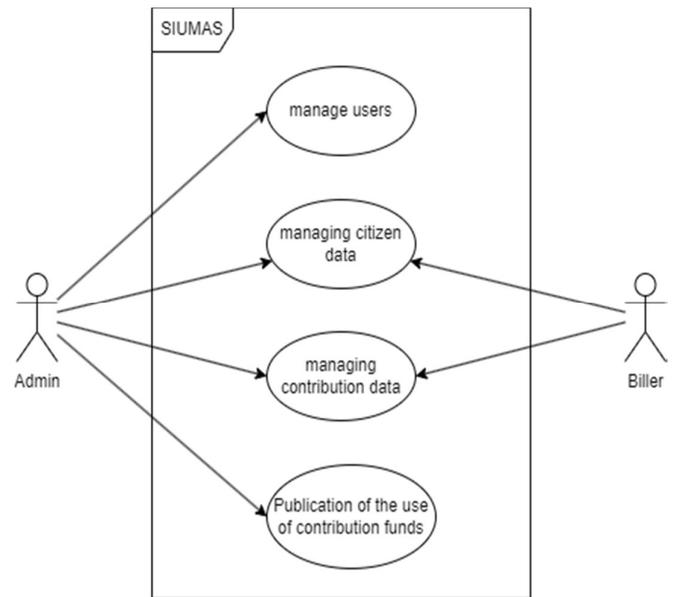


Fig 3. Use case diagram of SIUMAS

In Figure 3, it can be seen that the SIUMAS use case diagram has two main actors. The first actor is the biller whose job is to manage citizen data and manage contribution data. Then, the second actor is the admin whose job is to manage all the data in the application.

B. Activity Diagram Design

In the SIUMAS activity diagram design, there are two main activity flows, namely activity admin and biller as shown in Figure 4.

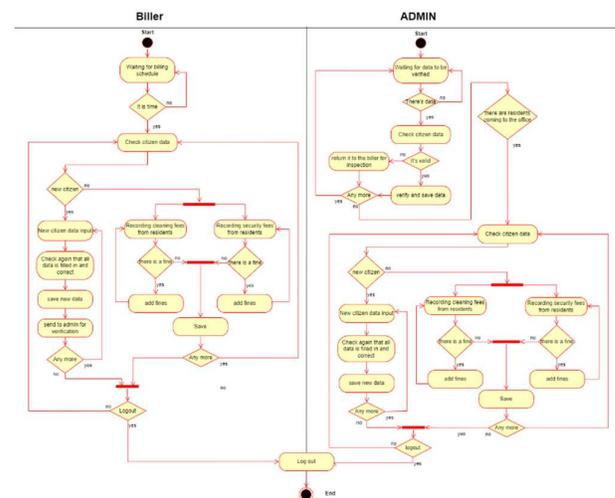


Fig 4. Activity diagram of SIUMAS

C. Class Diagrams Design

In the SIUMAS class diagram design, as can be seen in Figure 4, there are 5 main class entities, namely Billing



Users, Admin Users, Biller, Dues, Family, and Expenditures.

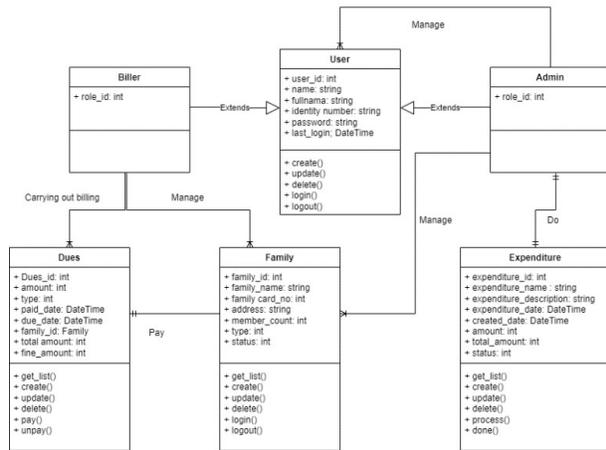


Fig 5. Class diagram of SIUMAS

D. Sequence Diagram Design

The author also designed a sequence diagram for the SIUMAS application to find out in more detail the processes running in the application. The results are as in Figure 6.

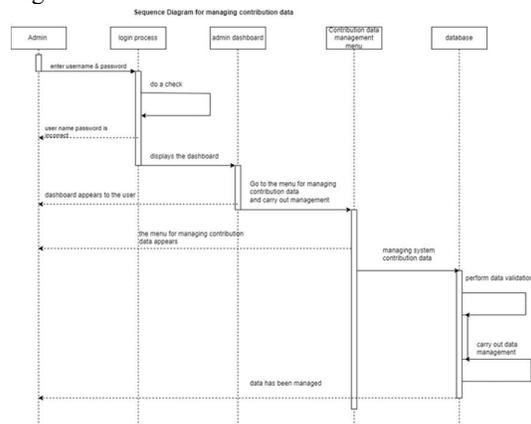


Fig 6. Sequence diagram of SIUMAS

E. Program Implementation

At the program implementation stage, the SIUMAS application began to be implemented in the form of programming code. Based on the object-based application design method, application creation follows Use Case Diagram, Activity Diagram, Class Diagram and Sequence Diagram.

1. Home Page SIUMAS

This page is the display of the main SIUMAS page when opened by residents. There are several menus such as View Reports, About Us, Terms & Conditions, and FAQ. There is also a Login button here to enter the data management menu.



Fig 7. Home page of SIUMAS

2. Reports Page SIUMAS

This page is a display of the SIUMAS report page which contains comprehensive income and expenditure data from SIUMAS as shown in Figure 7.

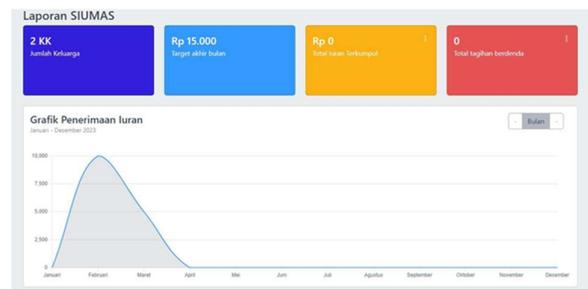


Fig 8. Report page of SIUMAS

3. Dues Management Page

This page displays the SIUMAS dues management page when opened by the biller or admin. On this page, dues and expense data is managed by the admin and biller as shown in Figure 8.

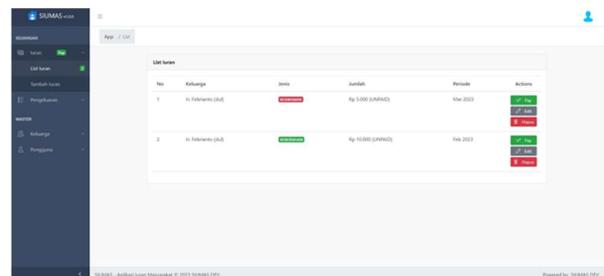


Fig 9. Dues management page of SIUMAS

F. Application Testing

To test the reliability of the SIUMAS application, the author uses the black box testing method. In this test, all test cases have passed all stages of testing successfully. In this test, there are several stages and processes in the SIUMAS application that are tested as in Table 1



Table 1. Black Box Testing results

Test ID	Black Box Testing Result			
	Description	Expected	Test Result	Remarks
T1	Admin Login	Admin will successfully logged into the application	Succeed login to the application	Success
T1	Admin Manages data	Admin will successfully manage data	Successfully manage expense data	Success
T2	expenses The biller logs in	The expense biller has successfully logged into the application	Successfully logged in to the application	Success
T2	The biller carries out the collection	The biller enters billing data	Successfully entered billing data	Success
T3	Open the web and see home page	The web is open and can see the home page	Home Page web open	Success

Description: T1 is Admin, T2 is Biller, T3 is Community.

IV. CONCLUSION

Based on research conducted by the author, the SUIMAS application can help RT administrators and residents to manage dues easily and transparently. Users can use the application to manage dues income and expenditure data optimally. By implementing this application thoroughly, cleanliness and security can be well maintained and will improve the quality of the environment and make people feel comfortable and safe.

During the application development process, the object-based design method was used for the author to complete this SIUMAS application. The application produced in this research has been tested using the black box method and it is known that the entire application function runs well. This shows that the SUIMAS application is ready to be used by the public to manage their contribution data.

As a recommendation from the author for further research, RT administrators who will use the SIUMAS application can be given socialization on the use of the application. Apart from that, after the socialization is carried out, a survey can also be given to find out the level of public acceptance of the SIUMAS application.

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