

# Waterfall Method in Designing a Web-Based Waste Payment Information System (Case Study: Calincing Bukit Valley Housing Rt04/Rw008)

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## ARTICLE INFO

Article history:  
Published

Keywords:  
Garbage  
Web Based  
Waste Payment Application  
Waterfall

## ABSTRACT

Valley Bukit Calincing Housing Exchange RT. 04 RW. 08 Bogor City is a housing complex that requires every resident to pay monthly waste fees. Payment of waste fees is payment of waste fees made by the treasurer who visits residents' homes to collect by giving a payment card to each resident and recording it again in the ledger. For reports, we still use Microsoft Excel. Because payment recording still uses Microsoft Excel, files on the laptop or PC can be lost or even accidentally deleted. Meanwhile, if it is recorded in a book, the book could be damaged/lost. The method that will be applied for this research is using Waterfall which has sequential stages starting from analysis, design, coding, testing, and supporting stages, but in this research, it only reaches the testing stage. Meanwhile, for the system development method using the OOAD method, a web-based application was created which is the right choice to simplify the treasurer's work in managing and managing waste fee payments. With this system, it can make it easier for residents to pay waste fees on time and reduce residents who like to pay past due dates because they are always reminded via email notifications sent by the treasurer so that the treasurer does not need to come to residents' homes to collect the waste fees. And with this waste fee payment information system, it makes it easier to manage the treasurer's waste fee payment reports.

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## I. Introduction

This According to Law Number 18 of 2008 concerning Waste Management, the definition of waste is the remainder of daily human activities and/or natural processes in solid form. Waste can be defined as leftover material that is no longer used or has been discarded from a particular process or activity. In Indonesia, every year there is an increase in the amount of waste produced by the community. Residents of Lembah Bukit Calincing Housing RT. 04 RW. 08 Bogor City is a housing complex that requires every resident to pay a monthly waste fee. A cycle that occurs once a week, the cleaning crew comes to remove the existing rubbish so that the environment looks clean and healthy. Therefore, paying waste fees is an obligation that must be carried out by every citizen. Residents really want a clean and healthy environment, cleaning staff are provided every week, but there are still many residents who neglect to pay and deliberately delay payments because of the different busy activities of each resident. Ultimately, payments become irregular and affect the treasurer's performance in paying cleaning staff.



Another problem is that the payment of waste fees is carried out by the treasurer who visits residents' homes one by one and collects them by giving a payment card to each resident and recording it again in the ledger. And for reporting, we still use Microsoft Excel. The problem that occurs if the payment recording is still using Microsoft Excel is that the files on the laptop or PC can be lost or accidentally deleted. Meanwhile, if it is recorded in a book, the book may be damaged or lost. Whether we realize it or not, information systems have helped humans a lot, providing added value to expositions, production, quality, management, and decision making and problem solving, as well as competitive advantages which are of course very useful for business activities. Based on the background above, a web-based application was created which is the right choice to simplify the treasurer's work in managing and managing waste fee payments. The method that will be applied for this research is using Waterfall which has sequential stages starting from analysis, design, coding, testing & support, but in this research, it only extends to testing. Meanwhile, the system development method uses the OOAD (object-oriented analysis design) method which places more emphasis on the object approach. This method is one way to identify problems based on interviews with related parties and data from observations. Several studies are related to the web and the waterfall method, namely the first is the waterfall method for conference registration [1]. Second, application of the waterfall method on the school website [2]. Third, applying the waterfall method to online libraries[3]. Fourthly, the application of the waterfall method in Employee Attendance Information System Design[4]. Fifth, the Information System uses the waterfall method for Vaccination Report Data[5]. Sixth Using the Waterfall Method on the STIMIK Sepuluh November Jayapura information system [6]. Seventh Waterfall method in the Vocational Student Admission information system [7]. Eighth Waterfall Method in web-based mosque activity information system [8]. Ninth Waterfall Method in online-based food ordering information system[9]. Web-based Information System for Malikussaleh University Operational Goods Management [10]

## II. Method

One of the System Development Life Cycle (SDLC) system development models is the waterfall model. The waterfall SDLC model is often also called the linear sequential model or classic life cycle model. The following is a Figure 1 of a waterfall model.

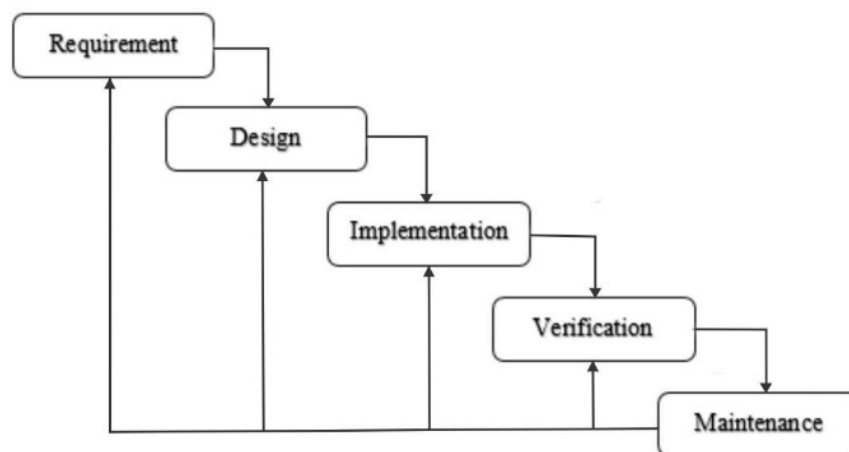


Fig 1. Waterfall Method

The stages of the waterfall model system development method are as follows:

a. Needs analysis

First, it starts with analyzing a system that will be created according to what is needed in making the system, including hardware requirements analysis, software

requirements analysis, process requirements analysis, input and output and data requirements analysis.

#### b. Design

After analyzing the overall needs, we then design the system that will be created. The design carried out in this research was by creating UML (Unified Modeling Language) and software system design. UML modeling includes use case diagrams, class diagrams, sequence diagrams, and activity diagrams.

#### c. Coding

The coding of this research was carried out using the PHP programming language and was carried out in stages by the researcher according to the needs in creating the web-based application to be built.

#### d. Testing

Testing in this research uses alpha testing, namely testing is carried out on the developer side by a group of representatives from end users by recording errors or usage problems. The alpha testing plan that will be carried out is using the BlackBox method. Black box testing focuses on the functional requirements of the software. In alpha testing the author tests each component whether it functions according to its function or not.

### III. Results and Discussion

The results obtained using the proposed system are discussed in this section.

#### 3.1 System Specifications

In the supporting implementation of this web-based application system in the Design of a Waste Payment Information System for the Valley Bukit Calincing Housing Complex RT04/RW08 using PHP MySQL, in this sub-chapter the author will discuss software and hardware specifications.

##### A. Hardware Specifications (Hardware)

Hardware (Hardware) is a device that can be physically seen, touched, and acts to carry out instructions or commands from software (Software). The hardware used to support the creation of programs in this application is as follows:

- 1) Processor is Intel Core i3-6006U 2.0 GHz
- 2) 4GB DDR3L RAM memory
- 3) 500 Gigabyte Hard Disk Memory
- 4) Screen size 14.0 inches HD 1366 x 768 pixels

##### B. Software Specifications (Software)

To implement this application system requires supporting software to run the application. The software needed to design this application is:

- 1) Windows 10
- 2) XAMPP Software
- 3) Sublime Software
- 4) Google Chrome
- 5) Enterprise Architect

### C. Use Case Diagram

Use Case is a diagram model consisting of diagrams for use cases and actors. Use cases represent operations carried out by actors in the form of services or functions available on the system for its users. Designing an information system for paying for waste at the Valley Bukit Calincing housing complex RT04/RW008, including the admin and residents' rights to see the details of how to pay for waste below.

The waste payment information system use case in the Figure 2 involves 2 actors, namely admin and members. Admin can access the website by logging in first. then the admin can manage the website with user data, payment data and report data. Actors as members can also access the web and log in. then members make bill payments, see the payment results. After that, the actor can log out of the application that was logged in first.

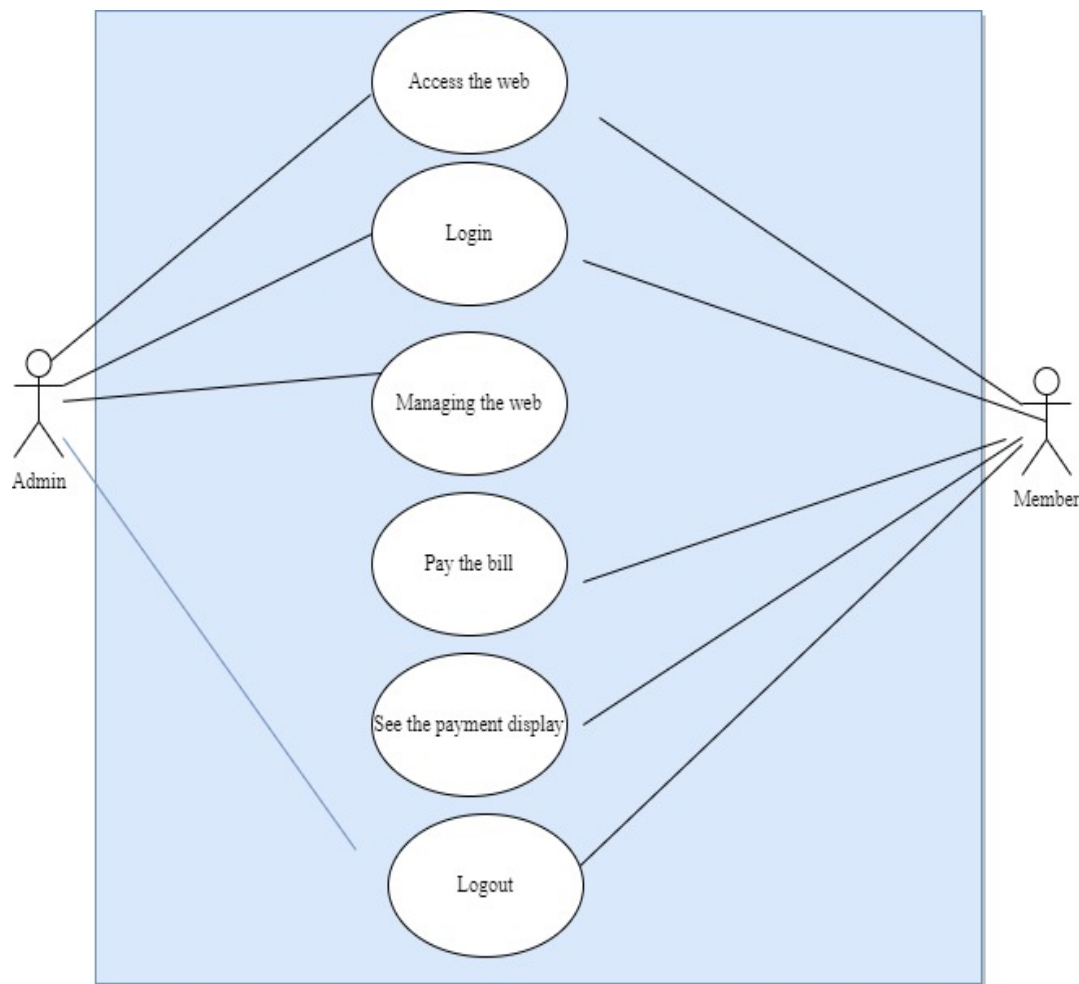


Fig 2. Use Case Diagram

Use Case Description:

#### a. Admin covers

- 1) Admin logs in by entering username and
- 2) passwords
- 3) Admin manages user data
- 4) Admin manages payment data
- 5) Admin manages report data
- 6) Admin logs out

## b. Member

- 1) Members who log in log in by entering their username and password
- 2) Members pay trash bills
- 3) Members view and print payment bills
- 4) Members log out

### 1. Payment Log Page Screen Design

Members who want to make payments must make additional payments. The payment page in Figure 3 consists of number, name, bill number, cost, date of proof of bill, status and action. Each member must first fill out a payment log on the member's billing list.

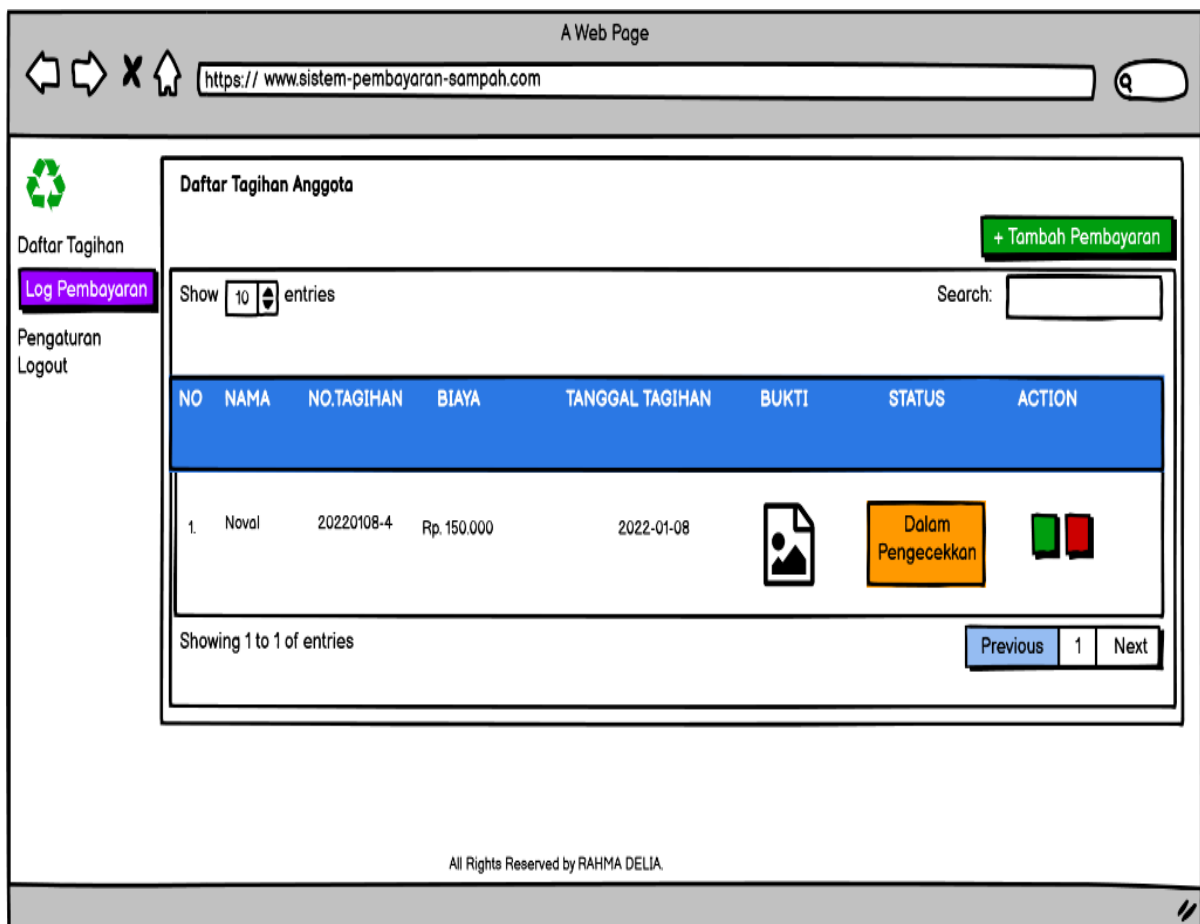


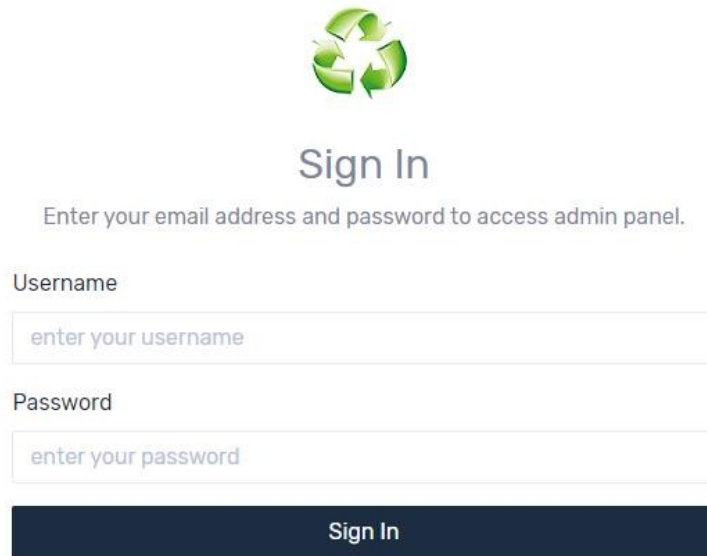
Fig 3. Payment Log Page Screen Design

In the payment log page is used by the admin to view the bill amount and change the payment status if it has been paid by uploading proof of payment.

### 2. Interface Implementation (User Interface)

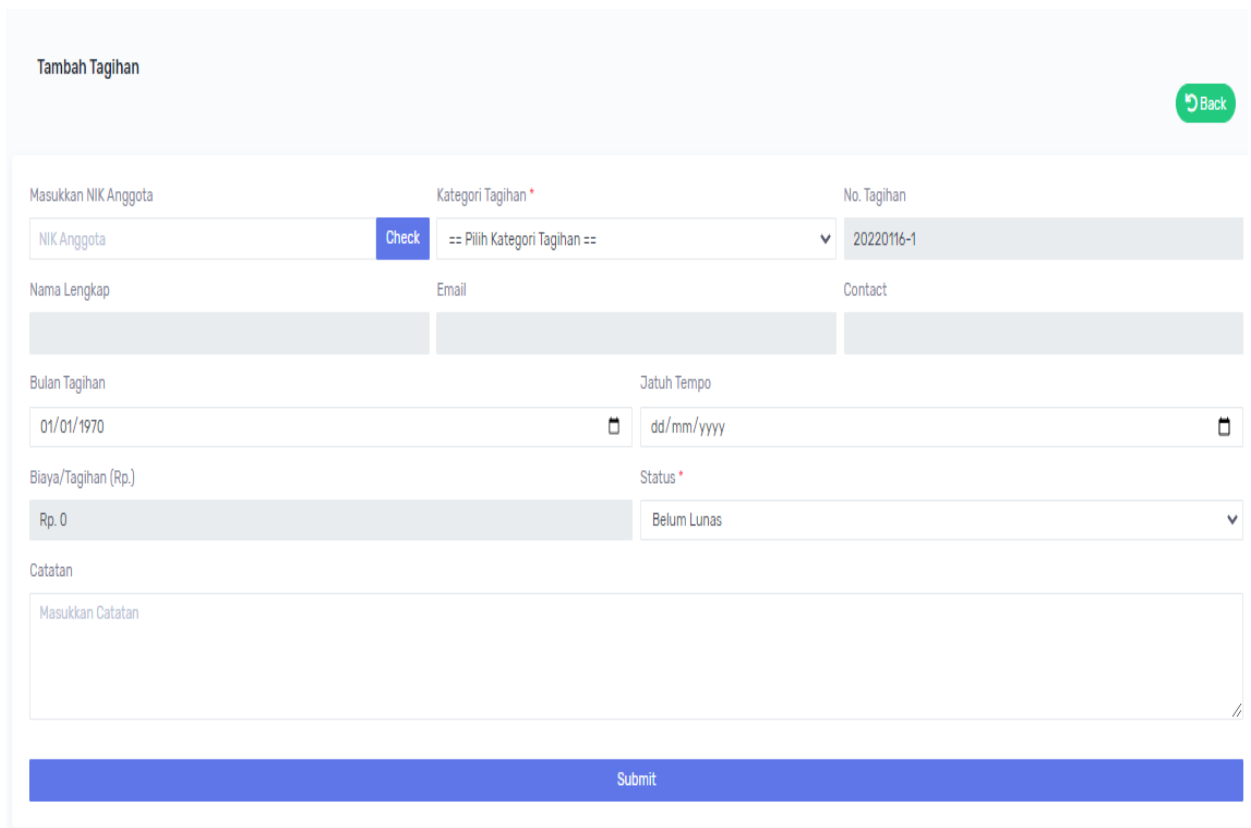
Interface implementation is carried out on each page to make it easier for users to use the waste payment information system. The following is a display of the interface on the waste payment information system at the Lembah Bukit Calincing Housing Complex rt04/rw08.

The login page interface is used by admins and members to enter the payment information system so they can carry out their respective roles in the system.



The image shows a login interface. At the top center is a green circular logo with three arrows forming a triangle. Below the logo is the text "Sign In" in a large, bold, dark font. Underneath is a subtitle: "Enter your email address and password to access admin panel." The form consists of two input fields: "Username" and "Password", both with placeholder text "enter your username" and "enter your password" respectively. Below the password field is a dark blue button with the text "Sign In" in white.

Fig 4. Login interface



The image shows a billing interface titled "Tambah Tagihan" (Add Bill). It features a "Back" button in the top right corner. The form is divided into several sections: "Masukkan NIK Anggota" (Member NIK) with a "Check" button and a dropdown menu for "Kategori Tagihan\*" (Bill Category); "No. Tagihan" (Bill No.) with a text input field containing "20220116-1"; "Nama Lengkap" (Full Name), "Email", and "Contact" fields; "Bulan Tagihan" (Bill Month) with a date picker set to "01/01/1970" and "Jatuh Tempo" (Due Date) with a date picker set to "dd/mm/yyyy"; "Biaya/Tagihan (Rp.)" (Bill Amount) with a text input field containing "Rp. 0" and "Status\*" (Status) with a dropdown menu set to "Belum Lunas" (Not Paid); and "Catatan" (Remarks) with a large text area containing the placeholder "Masukkan Catatan". A blue "Submit" button is located at the bottom of the form.

Fig 5. Billing Interface

The create new bill page interface in Figure 5 is a page for creating new bills for admins and registered members.

#### IV. Conclusion

Based on the results of research and discussions at the Lembah Bukit Calincing Housing Complex RT04/RW008, it can be concluded that:

1. With this system, it can make it easier for residents to pay waste fees on time and reduce residents who like to pay past due dates because they are always reminded via email notifications sent by the treasurer so that the treasurer does not need to come to residents' homes to collect the waste fees.
2. With this waste fee payment information system, it makes it easier to manage waste fee payment reports to the treasurer.

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