



## WEB-BASED LIBRARY INFORMATION SYSTEM IN SANGIHE REGENCY

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### ABSTRACT

*With the development of civilization and technological breakthroughs that make it easier for humans to access information, regional libraries in Sangihe Regency have not yet implemented such advancements. All processes are still carried out conventionally. Therefore, with the advancement of technology, a web-based library informationsystem can be implemented intheSangihe district library. The purpose of building this system is to make it easier for librarians to manage library data, such as book data, member data, book borrowing data, book return data, visitor data, and to facilitate library members in using the services available at the Sangihe district library. This study uses the programming languages PHP, CSS, HTML, JavaScript, and utilizes the CodeIgniter frameworkwith an 80% success percentage using Blackbox Testing.*

*Keyword: Information System, Library, Website.*

### INTRODUCTION

Sangihe Islands Regency is a regency in North Sulawesi Province, Indonesia. This district was the parent division of the Talaud Islands District and Siau Islands Tagulandang Biaro District in 2002 and 2007. Sangihe Islands District is located between Sulawesi Island and Mindanao Island, (Philippines) and is on the edge of the Pacific Ocean. In Sangihe Regency there is only 1 library named the Library and Archives Service of Sangihe Nusantara Regency [1] [2].

Libraries in the Sangihe Regency area still apply a manual management system, for example registering library members and writing visitor data so that they are unable to support the ease and effectiveness of transactions between members and librarians [3]. Communities or students who have easy access to the library will be happy and often use the library as a provider of information and knowledge services so that it will be assisted in realizing their educational achievements and aspirations [4], [5]. Therefore, a system is needed that can support these deficiencies in the future.

The library is an institution that collects printed and recorded knowledge, manages it in a special way to meet the intellectual needs of its users through various ways of knowledge interaction [6]. The library is also a place to learn, seek and develop information or educational institutions, and also as an educational facility in education that is managed in such a way. The library contains a collection of books both in print and digital form that can be accessed with a computer network [7], [8].

Research similar to this research, for example, is research entitled Web-Based Library Information Systems at SMK Negeri 2 Bekasi City [9], this study discusses the use of websites in school libraries.

Another example used as a reference for this research is the title Library Information System Using the Waterfall Method [10], [11], [12], this study discusses the use of the waterfall method in designing library information systems. As the final reference used is the Design and Build of a Web-Based School Library Information System to Increase the Effectiveness of Librarian Services, this research discusses the use of web-based libraries in facilitating librarians at SMP Negeri 28 Tangerang. The waterfall method is one of the SDLC models that is often used in the development of information systems or software [13]. The waterfall method uses a systematic and sequential approach. In this research, the Library Information System uses the waterfall method, which is a classical method that is systematic in sequence in building software starting from the stages of analysis, design, coding, testing and also maintenance [14]. The tools used for software modeling use the unified modeling language (UML) such as use case diagrams, activity diagrams, sequence diagrams [15], [16]. This Library Information System can simplify and speed up the process of managing data and information in the library so that it is hoped that there will be no errors in the process of searching and managing information data in the library such as book data, borrower data, return data and reporting can be more real time, effective and efficient. Library information systems must always be maintained regularly according to user needs.

Based on the identification of the problem, the researchers created a Web-based Library information system in the Sangihe Regency area for the need for convenience in managing book lists and convenience for librarians in registering new members in the library. So it is necessary to have a Web-Based Library Information System in the Sangihe district library so that it provides features or convenience in managing the library to be more effective. With the existence of a web-based library information system, it is hoped that more members, especially students, will visit the Sangihe Regency Regional Library.

## **RESEARCH METHODOLOGY AND SYSTEM DESIGN**

### **A. Time and Place of Research**

This research was carried out from May 2022 to July 2022 with case studies at the Sangihe Regional Library, initial information gathering, proposal preparation, designing an information system for borrowing and returning books at the Sangihe Regional Library, then system testing was carried out. The research will be carried out at the Computer Laboratory of the Mathematics Department, Sam Ratulangi University, Manado and data processing at home.

### **B. System Design Method**

The research method used is waterfall. The Waterfall model is a classic model that is sequentially systematic in building software. The name of this model is actually Linear Sequential Model. This is often referred to as the "classic life cycle" [17], [18].

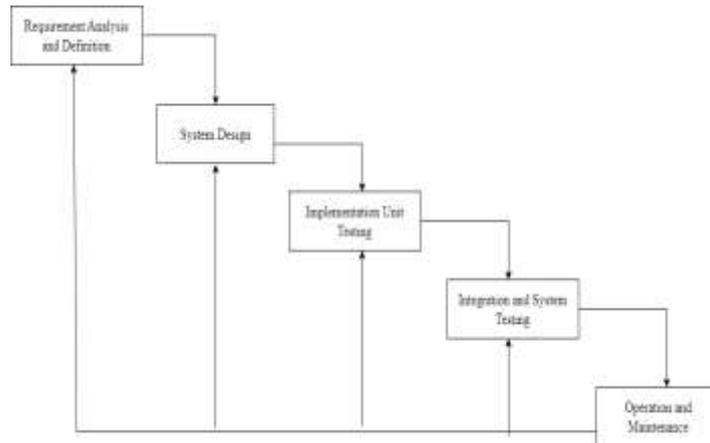


Figure 1. Waterfall method[5].

This method has advantages in the development of an information system because the process is sequential, starting from needs analysis to operating the system, each process has its own specifications so that the designed system can be in accordance with the objectives and each process does not overlap. There are five stages in the waterfall method which are described below from figure 1.

- **Requirements Analysis and Definition**

At this stage, it is carried out by gathering complete requirements and then analyzing them to facilitate system development and defining the needs that must be met by the program to be carried out.

- **System Design**

The results of the analysis obtained will be made into a system using coding. This stage aims to provide an overview of what will be done. In this stage the developer will produce a system as a whole and determine the software flow to the detailed algorithm. The designs made are in the form of UML, ERD, and Interface

- **Implementation Unit Testing**

In this stage the system that has been created will be realized into a website-based software program and testing will be carried out whether the system is running properly and smoothly.

- **Integration and System Testing**

At this stage all programs will be combined and tested as a complete website-based software program and ensure whether the system created has achieved the agreed goals and test whether there are still errors in the system that has been made.

- **Operations and Maintenance**

In this last stage the system that has been created will be put into real operation and see the performance of the system that is already running, as well as correct errors in the previous stage to improve system services.

The Librarian Business Process at the Sangihe Regency Regional Library begins with inventorying and grouping books based on catalogs so that readers can easily find them. Then the librarian records the

name, date of visit, and the purpose of visiting the visitor in the guest book. After the librarian helps register members, the librarian helps members find books they want to borrow. After getting the book you want to borrow, the librarian records back the date the book was borrowed, the title of the book, the name of the borrower, and the duration of the borrowing. After the member returns the borrowed book, the librarian records the return date of the book on the borrower's book list. Then return the book to its original place.

The member's business process begins with the member coming to the Sangihe Regency Regional Library, then the member registers as a member of the library to the librarian. After registering, the member informs the librarian of the title of the book to be borrowed and the duration of the borrowing. Then, members can ask the librarian to direct members to where the books they want to borrow are. Then after the member wants to return the book, the member informs the librarian of the book he wants to return.

## RESULTS AND DISCUSSION

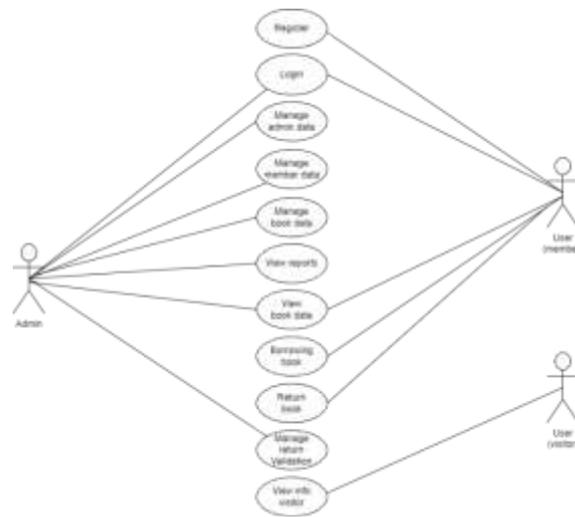
### 1. Requirements Analysis and Definition

**Table 1.** Requirements Analysis

No.	Description
1	Showing the usability of a web-based library: namely to make it easier for librarians to store member data, book data. and also minimize the loss of data files
2	Showing the member data: which can be seen by the admin. and the data can be changed or deleted by the admin
3	Showing information about the admin data
4	Showing a report: displays the book report data and member data. can be viewed or downloaded in pdf format
5	Showing information about book data: the book data can be managed by the admin and the admin can only see book data
6	Showing the return validation: admin uses to validate books that will be returned by users
7	Create content that contains information or announcements: The content created is book data, admin data and member data
8	Showing the content that contains information or announcements: The content that will be displayed is book data, admin data, and member data

### 2. System Design

#### A. Use Case Diagram

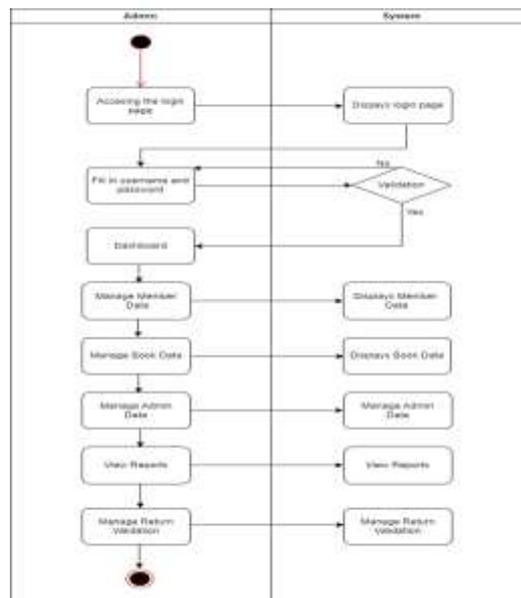


**Figure 2.** Use Case Diagram

The description of the use case in figure 6 is as follows :

1. User (member) can register, login, views book data, borrowing book, return books. User (visitor) just can view info visitor
2. Admin can log in to be able to manage data.
3. Admin can manage book data, admin data, member data, return validation
4. Admin can view book data, member data, admin data, view report

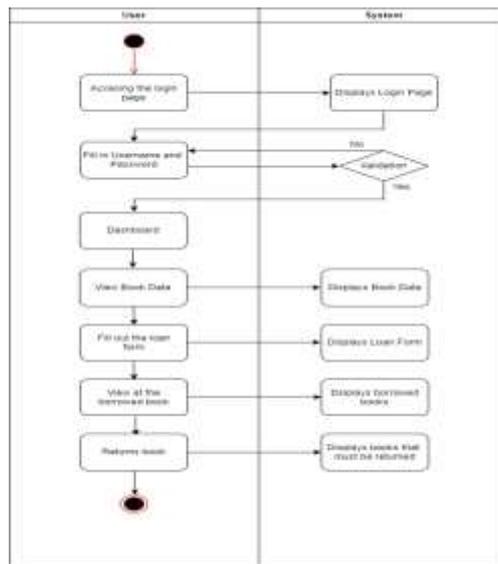
**B. Diagram Activity**



**Figure 3.** Admin Diagram Activity

Can be seen in the Figure 3, first the admin will go to the log in page, then the system will display the login page then the admin can enter the username and password. The system will validate the entered username and password. if true, the admin is immediately directed to the dashboard.

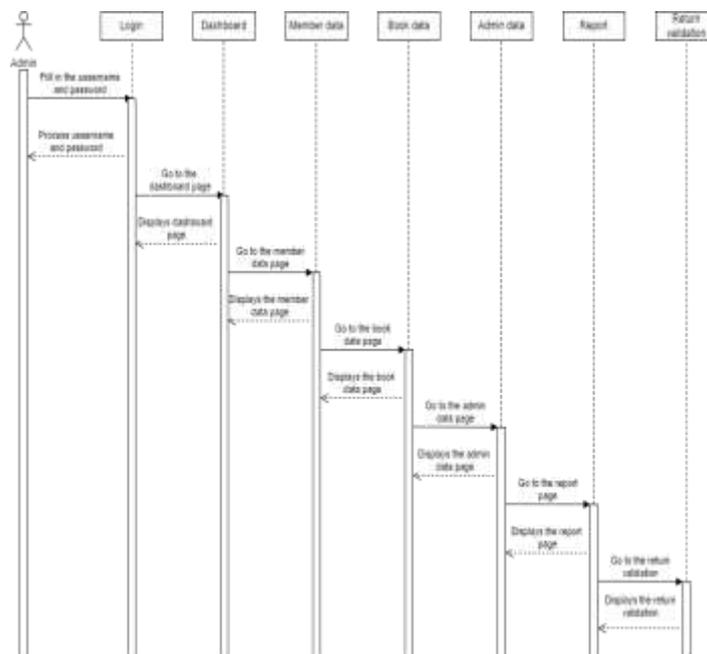
Admins can manage book data, manage admin data, manage member data, manage admin data and view reports and manage return validation.



**Figure 4.** User Diagram Activity

As shown in the figure 4, the first time the user will enter the login page, then the system will display the login page then the user can enter a username and password. then the system will validate the username and password entered by the user. if true then the user is immediately directed to the dashboard. Users can view book data that has been uploaded by the admin. Users can fill out loan forms. users can also see what books have been borrowed and what books must be returned based on the specified date.

**C. Sequence Diagram**



**Figure 5.** Admin Sequence Diagram

Admin can log in by entering the username and password then the system processes the username and password to enter the Dashboard page. Then the admin can access or manage member data, book data, admin data, view reports and manage return validation.

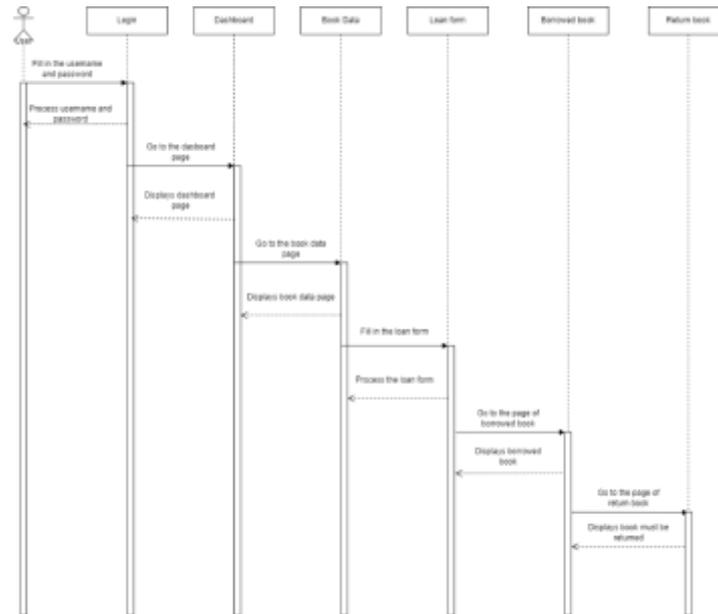


Figure 6. User Sequence Diagram

In Figure 6, the first time the user will enter the login page, then the system will display the login page then the user can enter a username and password. then the system will validate the username and password entered by the user. if true then the user is immediately directed to the dashboard. Users can view book data that has been uploaded by the admin. Users can fill out loan forms. users can also see what books have been borrowed and what books must be returned based on the specified date.

D. State Machine Diagram

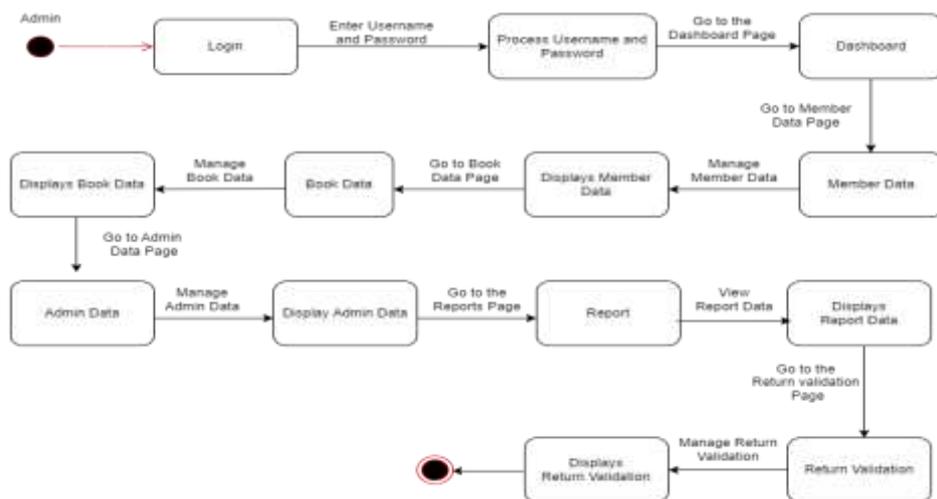


Figure 7. Admin State Machine Diagram

Admin can log in by entering the username and password then the system processes the username and password to enter the Dashboard page. Then the admin can access or manage member data, book data, admin data, view reports and back up data and validate book returns by users.



**Figure 8.** User State Machine Diagram

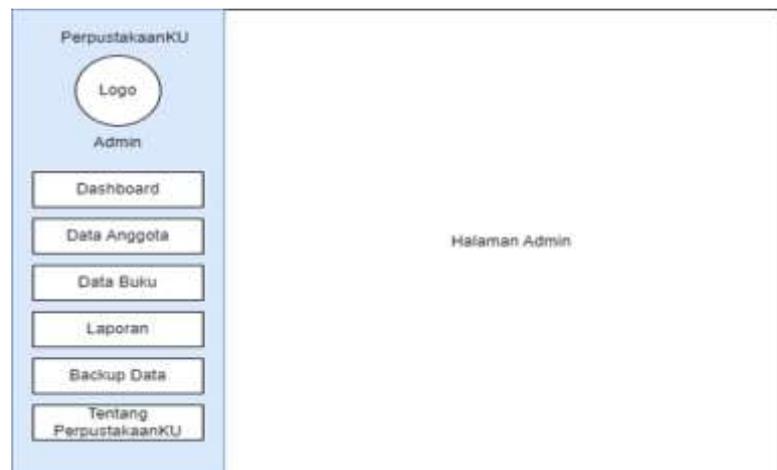
User can go to login page and enter username and password. After logging in, the user can enter the dashboard page. Then open the book data page and select a book to borrow or read. Users can borrow books by filling out the loan form. Then the user is redirected to a book return page where the user can see what books should be returned.

**E. Software Design**

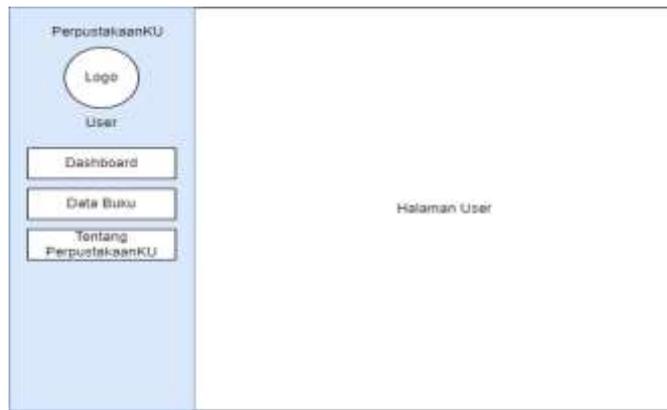
The design of the display system to display the Library information system in sangihe is as follows:



**Figure 9.** Log in Page Design



**Figure 10.** Admin Page Design



**Figure 11.** User Page Design

### 3. Implementation Unit Testing

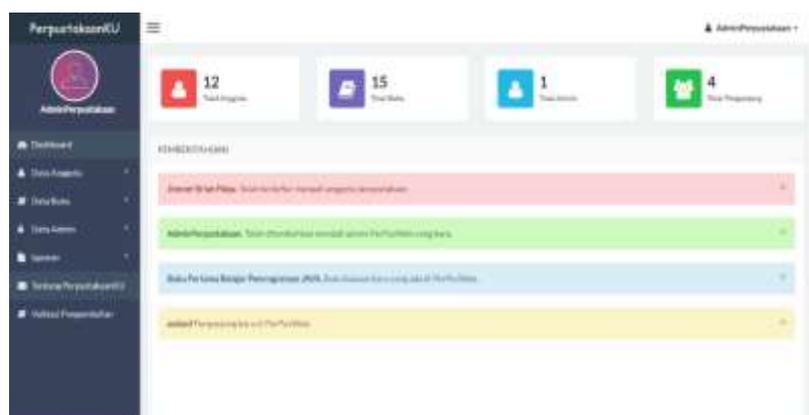
#### A. Home Page



**Figure 12.** Home Page

The Home Page display that appears when the User and Admin enter the system. There are several features available, such as a clock that has been set in real time. A visitor form is also available that can be used by users (Visitors) who are limited to making certain visits.

#### B. Admin Dashboard Page



**Figure 13.** Admin Dashboard Page

As can be seen in the Figure 13, on the admin dashboard page there is a notification window starting from Total Members, Total Books, Total Admin, and Total Visitors.

**C. Member Data Page**

Detail	Nama	Username	Password	Jenis Anggota	Uang	Tanggal Terbit	Alamat	Toko
idmember@gmail.com	idmember@gmail.com	idmember	idmember	1	10	10/10/2022	Surabaya	10
idmember@gmail.com	idmember	idmember	idmember	1	10	10/10/2022	Surabaya	10
idmember@gmail.com	idmember	idmember	idmember	1	10	10/10/2022	Surabaya	10
idmember@gmail.com	idmember	idmember	idmember	1	10	10/10/2022	Surabaya	10
idmember@gmail.com	idmember	idmember	idmember	1	10	10/10/2022	Surabaya	10
idmember@gmail.com	idmember	idmember	idmember	1	10	10/10/2022	Surabaya	10

**Figure 14.** Member Data Page

On the member data page, there are tools that can be used by the admin to change or delete member data. There are also search tools that admins can use to find members based on usernames

**D. User Dashboard Page**

The dashboard features four main statistics cards: 12 Total Members, 15 Total Books, 1 Total Admin, and 4 Total Visitors. Below these are four notification banners with expandable details.

**Figure 15.** User Dashboard Page

As can be seen in the Figure 15, on the User dashboard page there is a notification window starting from Total Members, Total Books, Total Admin, and Total Visitors.

**E. Book Data Page**

Detail	Judul	Program	Tahun Terbit	Isi	Jumlah Halaman
idmember@gmail.com	idmember@gmail.com	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember
idmember@gmail.com	idmember	idmember	idmember	idmember	idmember

**Figure 16.** Book Data Page

As shown, the user can see the books that are already on the system. And there are also search tools that can be used to find books based on the book title and publisher name.

#### 4. Integration and System Testing

##### A. BlackBox Testing

##### a. Login Test

**Table 2.** Result Of Black Box Testing Log In

No	Testing Scenario	Test Case	Expected Result	Result Testing	Point
1	Username and password are not filled in then click the login botton	Username : Empty Password : Empty	The system will reject and display “Pleasse fill out this field”	According to expecations	1
2	Username isfilled in and password is not filled in	Username : Admin Password : Empty	The system will reject and display “ Please fill out this field “	According to expecations	1
3	Username is not filled in and password is filled in	Username: Empty Password: admin	The system will reject and display “ Please fill out this field “	According to expecations	1
4	Username is entered incorrectly and password is entered correctly	Username: Armwang Password: admin	The system will reject and display "The username or password are incorrect"	not as expected	0
5	Username is entered correctly and password is entered incorrectly	Username: Admin Password: Ebon	The system will reject and display "The username or password are incorrect"	not as expected	0
6	Username and password filled in	Username: Admin Password: Admin	The system will proceed to the admin dashboard interface	According to expecations	1
7	Username entered incorrectly and password entered correctly	Username : Anggota Password : Admin	The system will display an incorrect username notification	not as expected	0
8	Username entered correctly and password entered incorrectly	Username : Admin Password : Anggota	The system will display an incorrect password notification	not as expected	0

**b. Input, Delete, Edit Data Test**

No	Testing Scenario	Test Case	Expected Result	Result Testing	Point
1	Add Data Admin	Click the save button without filling in the data	The system will reject and display the message “name is required”	According to expectations	1
2	Add Data Admin	Click the save button by filling in the data	The system will continue the data to the database and display the message "Data added successfully"	According to expectations	1
3	Add Data User	Click the save button without filling in the data	The system will reject and display the message “name is required”	According to expectations	1
4	Add Data User	Click the save button by filling in the data	The system will continue the data to the database and display the message "Data added successfully"	According to expectations	1
5	Add Data Book	Click the save button without filling in the data	The system will reject and display the message “name is required”	According to expectations	1
6	Add Data Book	Click the save button by filling in the data	The system will continue the data to the database and display the message "Data added successfully"	According to expectations	1
7	Edit Data Admin	Click the update button by filling in the data	The system will continue the data to the database and display the message "Data changed successfully"	According to expectations	1
8	Edit Data User	Click the update button by filling in the data	The system will continue the data to the database and display the message "Data changed successfully"	According to expectations	1
9	Edit Data Book	Click the update button by filling in the data	The system will continue the data to the database and display the message "Data changed successfully"	According to expectations	1

10	Delete Data Admin	Click the delete button	The system will continue the data to the database and display the message “Data deleted successfully!”	According to expectations	1
11	Delete Data User	Click the delete button	The system will continue the data to the database and display the message “Data deleted successfully!”	According to expectations	1
12	Delete Data Book	Click the delete button	The system will continue the data to the database and display the message “Data deleted successfully!”	According to expectations	1

The Result of BlackBox Testing are 16 correct out of 20 test or 80% Information

Number	Information
< 60 %	Not successful
61 – 70 %	Enough Success
71 – 80 %	Succeed
81 – 100 %	Very Successful

## CONCLUSION AND SUGGESTION

From the research objectives, it can be concluded that the web-based library system at the Sangihe Regency regional library has been successfully created, with blackbox testing success percentage of 80. This research is still not in the usage stage because it requires hosting for web pages. For future system development, it is hoped that future researchers may be able to add more complete features, so that they can be useful and facilitate web-based library services.

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