Electronic Integrated Computer Algorithm Journal
Vol. 2, No. 1, October 2024, pp 15~22

ISSN: 3031-0350, DOI: 10.62123/enigma.v2i1.34

Library Information System at SDN 101826 Tuntungan Web-Based

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DOI : 10.62123/enigma.v2i1.34

Received : July 09, 2024
Revised : September 04, 2024
Accepted : September 12, 2024

Keywords:
Information System, Website, Library, Waterfal

ABSTRACT

The development of technology that is so advanced has a real effect on human life. Libraries can also take advantage of this technological advancement, by building a website-based library information system. The SDN library 101826 still managed manually, this is very inefficient, because in addition to wasting paper, data is inaccurate, archiving is not neatly organized and messy. When employees want to find borrowed books, they have to check and search manually. It is very draining of energy and time, because many books are lost because it is not known who the borrower of the book is. Based on these problems, the author provides a solution by building a library information system at the elementary school based on the web. Data collection methods include observation, interviews, and literature studies. Meanwhile, the system development method uses Waterfall, and in its design utilizes Unified Modeling Language. The programming language used in coding is PHP with MySQL database. This research requires a library information system that can help library officers in carrying out their activities. The system that has been built can speed up, make it easier and more efficient for visitors in the book search process.

1. INTRODUCTION

The development of technology in the 5.0 era is more about humans themselves who utilize all available technologies as wisely as possible, and minimize the gap between humans and technology. The rapid development of technology has had both positive and negative effects on human survival[1][2]. The same is true for several schools that need a library information system. In one of the State Elementary Schools (SDN) in Deli Serdang Regency, North Sumatra, namely the 101826 State Elementary School, has a library that is managed with a manual system. The recording process, borrowing process, return and data collection, and others are still done manually. This is very inefficient, because in addition to wasting paper, data is inaccurate, archiving is not neat and messy. When employees want to find borrowed books, they have to check and search manually. It is very draining of energy and time, because many books are lost because it is not known who the borrower of the book is.

In this study, taking into account the problems that have been described, Penlis provides a solution by building a library information system at the elementary school based on the web. With this system, it is hoped that it can improve and make work faster, making it easier for library employees and library users to manage and borrow books. The development method used by the researcher is Waterfall, which has several advantages such as departmentalization and control, the quality of the resulting system will be good, and the system development documents are very organized. In this research, we will use the PHP programming language with the CodeIgniter framework and MySQL database in the development process. The purpose of this study is to help efficiency and maintain the accuracy of the data obtained, shorten the time in the process of borrowing and returning books, and so on.

2. LITERATURE REVIEW

The Information System is a collection of related components, which can run optimally if work procedures, human resources, and other support also run properly [3]. Technological advances have made the information system web-based. To create a Web-based Information System, coding is required, the programming language that is often used is the Hypertext Preprocessor (PHP) language [4]. In the required database, MySql is a database that is quite often combined with PHP. Meanwhile, PHP itself has many types of frameworks that can help developers complete system development faster. The framework used in this study is CodeIgniter, this famework has the concept of Model-View-Controller (MVC) in it [5][6][7].

The library is a place that contains a collection of many books and other reading materials, this place is a literacy and learning medium that includes public facilities. Existing service and management activities are inseparable from the library information system. The library information system itself is a software built to facilitate library services, administrative activities and other activities in the library [5][8][9]. The development of a system information system can use the waterfall method to help research to be more efficient. After the development of the system is completed, it is necessary to carry out tests that can verify the feasibility

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of the system to be implemented [10]. Black box testing is one of the tests where the tester does not need to understand the content of the code in the development of the system and the focus of this test is the functionality of the system [11].

In the previous research conducted by Saputra [12] designing the National University library information system using PHP as the programming language. The researcher uses the Waterfall method in the development of the system. The system that has been built can minimize the shortcomings contained in the UNAS library. In the research conducted by Mulyana [13] focusing on the provision of book lending and return services at Pasudan 7 Junior High School (SMP) Bandung. The use of manual methods in libraries causes some inconvenience and even causes problems in library activities. In designing the system using the Waterfall method, and the implementation that has been carried out shows that the use of web-based information systems is more effective and efficient than manual methods. Akbar in his research [14] which was carried out at Warungnangka Elementary School, building a library information system using the Waterfall method. The system was built using the CodeIgniter Framework, and tested with Black box testing.

3. RESEARCH METHODS

3.1 Data Collection and study Literature

This study uses three data collection techniques, namely:

1. Literature Study: By collecting data and information about theories, methods, and concepts that are in accordance with the problem to be researched, such as searching for information and references.
2. Observation: From the observations made by the author, there are several systems needed in the elementary school, one of which is the library system. In the library there are computer and printer facilities. However, these computer facilities are rarely used or underutilized. So that it has not affected the management of the library's data. Which is still a lack of efficiency in book data collection, borrower data and returns. The recording or data collection carried out is still manual. So that it is not efficient, because in addition to wasting paper, data is inaccurate, archiving becomes unorganized and messy. When employees want to find borrowed books, they have to check and search manually.
3. Interview: The interview was conducted at SDN 101826 State Elementary School in November 2023. In an interview conducted with one of the library administrations, Mrs. Nurhalima, explained several case studies at the elementary school. One of them is the library. The resource person explained that the system used by the school is a manual recording/data collection system.

3.2 System Development Methods

In this study, the author uses a waterfall system development method, often also called a sequential linear model or classic life cycle. The waterfall model provides a sequential or sequential approach to the software lifeflow, at each step it cannot be executed simultaneously. Each step is related to the results of the previous steps and their respective tasks [15][16][17].

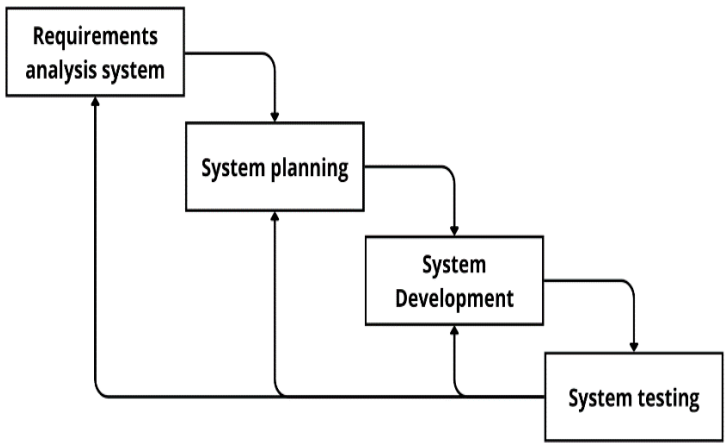

Figure 1. Waterfall Method

The following is an explanation of the stages of system development using the waterfall method in the figure above:

1. System Requirements Analysis
   At this stage, what is done is an analysis to find out what needs are needed in designing the Library Information System, and collecting information related to the system to be built [18].
2. System Planning
   At this stage, the system will begin to be designed using the Unified Modelling Language, where the tools used are usecase diagrams, activity diagrams, sequence diagrams [19].
3. System Implementation
   At this stage, also commonly referred to as the code phase, the action carried out is coding to create a web-based information system based on the design that has been designed in the previous stage [20].

4. System Testing
   At this stage, a test is carried out on the functional system whether it has run as expected or not using Black box testing [21].

4. RESULTS AND DISCUSSIONS

4.1 Needs Analysis

Needs Analysis is the stage where the process of collecting data and information will be used as supporting and supporting suggestions in the creation of a library information system in this study. The purpose of analyzing a system is to find out why the system is needed, formulate the needs of the system to reduce excess resources, and plan the scheduling of the system's formation, so that the functions contained in the system work optimally. The Software and Hardware used to run the system are as shown in the following table 1:

Table 1. Needs Analysis

No.	Software	Hardware
1.	Operation System Windows 8	RAM 4 GB
2.	Visual Studio Code	Processor Intel Core i3
3.	Google Chrome	Hard Disk Capacity 320 GB
4.	PHP MyAdmin	VGA Intel Graphics 4000
5.	Xampp	Monitor
6.	-	Keyboard and Mouse
7.	-	Printer

4.2 System Planning

1. Use case diagram:
   Use Case Diagrams are perfect for describing who the actors are involved and what functions can be performed in an application. The actors and functions designed in this application are as follows:

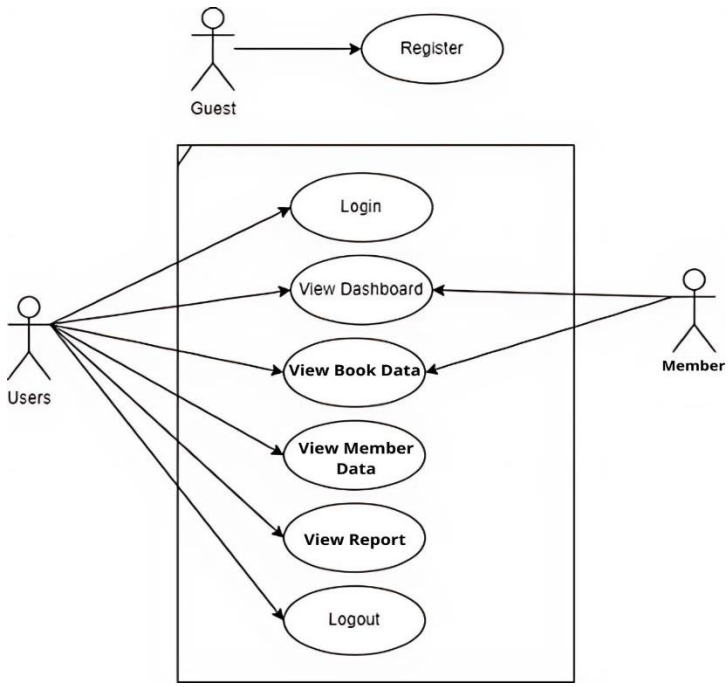

Figure 2. Use case diagram

2. Activity diagram
   In analyzing what will happen in an application, the author uses an activity diagram. Activity diagrams can show the steps taken to perform an action in the application. The design diagram of this application is as follows:
   a. Activity diagram login:

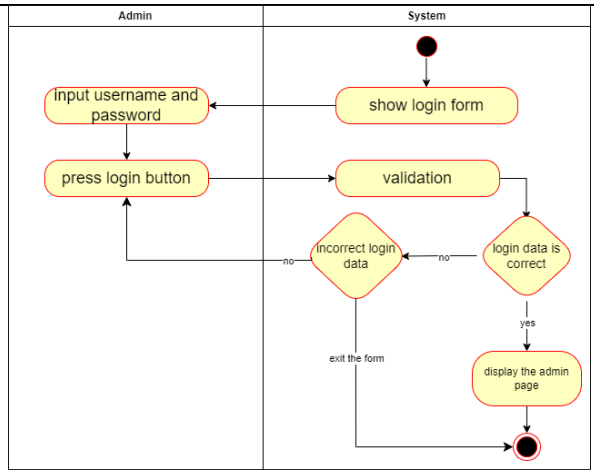

Figure 3. Activity diagram login

b. Activity diagram of visitors:

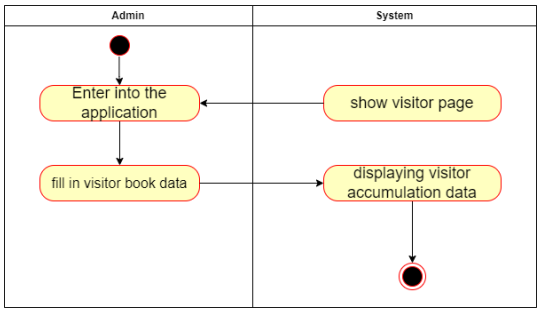

Figure 4. Visitor activity diagram

c. Activity diagram book data:

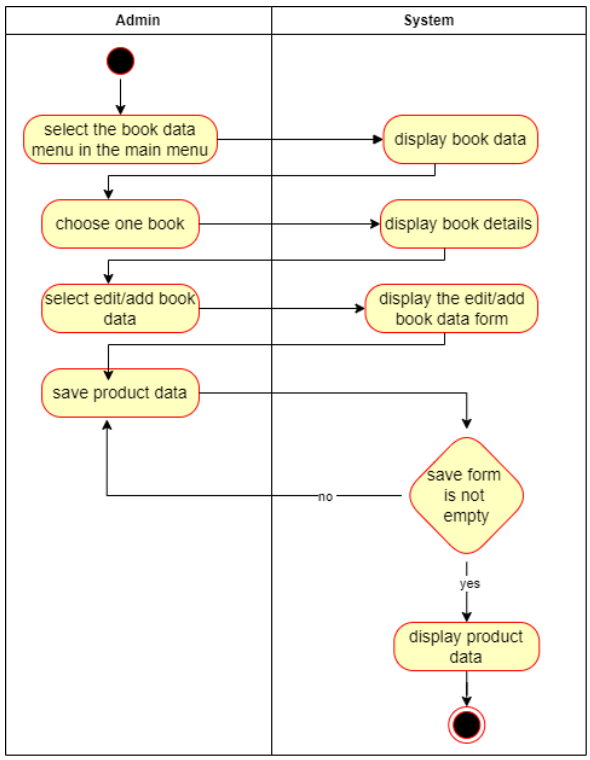

Figure 5. Activity diagram book data

3. Sequence diagram
To explain the logical chronology (order) of the changes that should be done to produce something in accordance with the use case diagram of the author, the author uses a squence diagram. The sequence diagram of this application is:

a. Sequence diagram login:

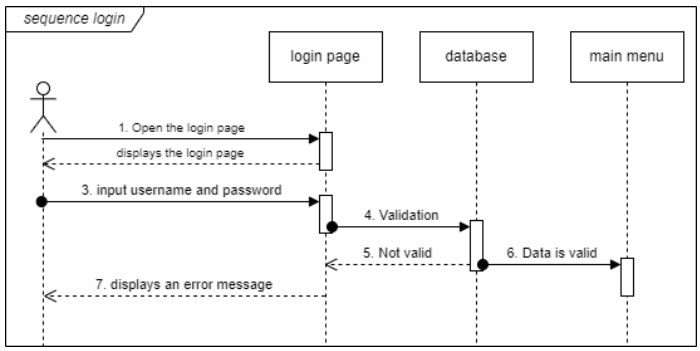

Figure 6. Sequence diagram login

b. Sequence diagrams of visitor:

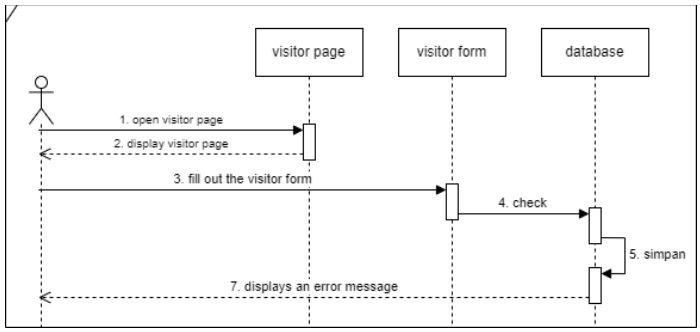

Figure 7. Visitor sequence diagram

c. Sequence diagram data chart book:

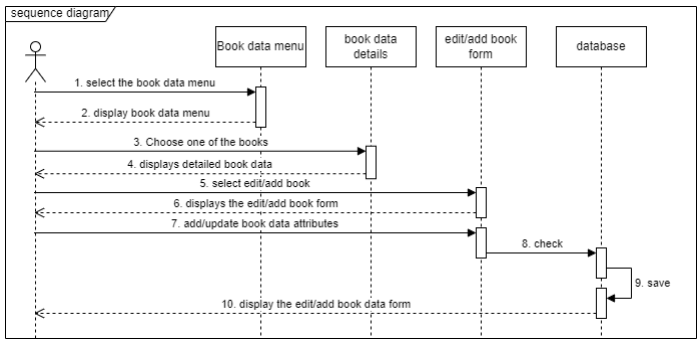

Figure 8. Book data diagram sequence

4.3 System Implementation

System Implementation is a process of managing the results of a predetermined design into program code, resulting in a system that can be used. The library information system of SDN 101826 Tuntungan uses the PHP programming language using MySQL as the database. The things that were done after the development of the system were tested using a black box. The following is an explanation of the implementation that will be discussed.

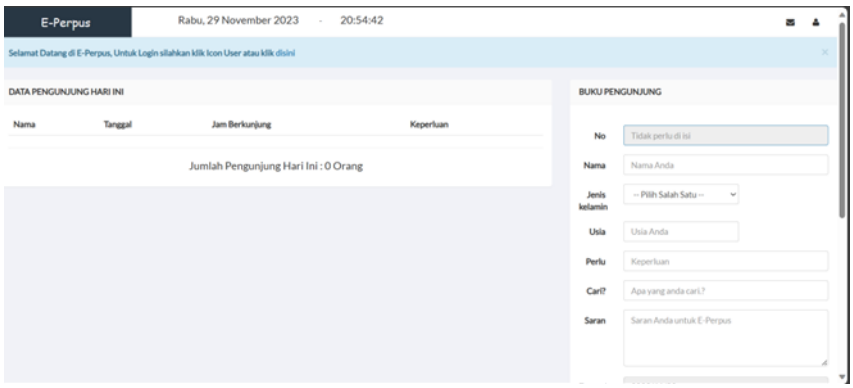

Figure 9. Visitor Data Page

Figure 9 is the visitor data page. On this page, users do not need to log in to access this page. This page will display visitor data for that day, visitor book form, and visitor accumulation data. In the user visitor book form who fills out the form, anyone whose data visits the library of SDN 101826 Tuntungan. This page is only for recording visitors and not a page for borrowing books.

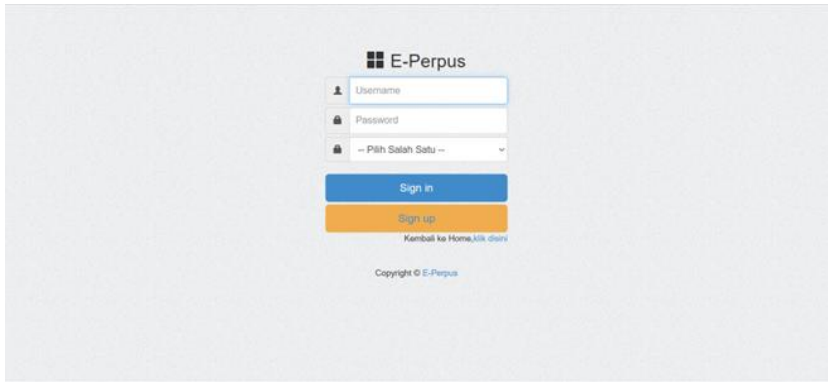

Figure 10. Login Page

Figure 10 is an image of login page. On this page, system users, both members and admins, must *log in* to enter the system. On this page view, system users can enter the email and password that have been registered in the system, and choose one of the user statuses whether admin or member of this library information system.

Figure 11. Admin Dashboard Page

On the admin page, there are several menus displayed such as the dashboard menu, book data menu, member data menu, and Report menu. In figure 11 is the dashboard page on the admin. This page displays graphs of book borrowings, notifications such as new members, new books, new visitors, and so on. In addition, there is information about the total of members, total books, total admins, total visitors.

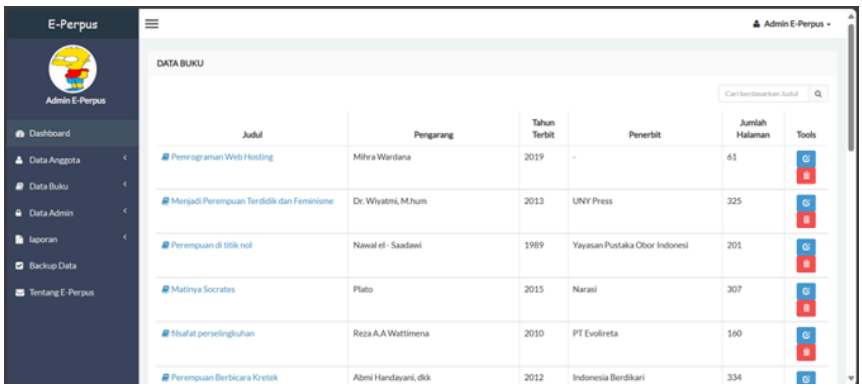

Figure 12. Book Data Menu Page

In figure 12 is the book data menu page. On this page, there is a book data table containing the title, author, year of publication, publisher, and number of pages. In addition, to see more detailed information about a book, the admin can press one of the books. In this menu, admins can also delete, edit and add books.

DATA BUKU

Website E-Perpus

Judul	Pengarang	Tahun	Penerbit	ISBN	Jml Hal.
Pemrograman Web Hosting	Mihra Wardana	2019	-	-	61
Menjadi Perempuan Terdidik dan Feminisme	Dr. Wiyatmi, M.hum	2013	UNY Press	978-602-7981-02-7	325
Perempuan di titik nol	Nawal el - Saadawi	1989	Yayasan Pustaka Obor	978-979-461-867-7	201
Matinya Socrates	Plato	2015	Indonesi	(10)979-16844-8 / (13) 97	307
filsafat perselingkuhan	Reza A.A Wattimena	2010	Narasi	978-602-8861-76-2	160
Perempuan Berbicara Kretek	Abmi Handayani, dkk	2012	PT Evolireta	978-602-99292-1-8	334
Perempuan Yang Dihapus Namanya	Avianti Armand	2017	Indonesia Berdikari	978-602-0337-135	90
Filsafat Islam Masa Awal	Drs.H. Ibrahim, M.Pd	2016	PT Gramedia Pustaka Utama	978-602-1175-14-9	159
Teologi dan Falsafah Hijab	Murtadha Muthahhari	2011	PKBM Rumah Buku Carabaca	978-602-1602-08-9	192
Agama Jawa	Abangan, Santri, Priyayi	2014	Makassar	978-602-9402-12-4	640
Pulang	Leila S. Chudori	2012	Rausyanfikr Institute	978-979-91-0515-8	476
Teknologi Informasi	Abdul Qadil & Terra Ch.	2013	Komunitas Bambu	-	26
Petani dan Penguasa	Triwahyuni	1999	PT Gramedia Jakarta	979-9289-04-1	330
Perempuan Yang Mengantarkan surga	Noer Fauzi	2014	CV. Andi Offset	978-602-1337-32-5	278
Desain dan Pemrograman Multimedia Pembelajaran	Haris Priyatna & Lisdy Rahayu	2017	INSIST, KPA, bekerja sama	978-602-7534-26-1	195
Interaktif	Wandah Wibawanto, S.Sn.,	2007	dengan Pustaka Pelajar	-	216
Kebenaran yang hilang	M.Ds	-	PT Mizan Pustaka	978-623-6569-62-7	0

Figure 13. Report Menu Page

Figure 13 is the report menu page, where in this menu the admin will choose what report to see. After that, the admin can also print the selected report in pdf form.

4.4 System Testing

At this stage, the researcher uses Black Box Testing on the system that has been developed, to check the compatibility between the input and output. This is done to ensure that the system functions run as expected. The following are the results of the Web-based Black Box Test of the Library Information System at SDN 101826 Tuntungan:

Table 2. Black Box Testing

No.	Tested functions	How to test	Expected results	Test results
1.	Visitor data display	Run the app by opening the web address in the browser	Displaying a *login page*	Succeed
2.	Login page	Enter your registered email and password	The system will check the data that has been entered by the *user* and the user's authentication into the database	Succeed
3.	Dashboard page	Admins or members log in to the system	Displaying the dashboard page	succeed
4.	The book data page on the admin	Admin selects the book data menu menu	View book data table, add book data, edit book data, delete book data, view book details	Succeed
5,	Book data page on members	Members select the book data menu	View a book data table, view book details	Succeed
6.	Member data page	Admin selects the member data menu	View member data table, add member data, edit member data, delete member data, view member details	Succeed

7.	Member report page	Admin selects the member report submenu on the report menu	Displays a pdf of the member's report. Where the report contains the number and details of members	Succeed
8.	Book report page	Admin selects the book report submenu on the report menu	Displays a pdf of the book report. Where the report contains the number and details of the book	Succeed
9.	*Logout*	Admin select *logout*	Displaying a login page	Succeed

5. CONCLUSSION

Based on the results and black box tests that have been carried out, it can be concluded that, with this library information system, it can help library officers in carrying out their activities. The system that has been built can speed up, make it easier and more efficient for visitors in the book search process. In the next development, it is hoped that there will be a system that manages fines for book returns, be it fines for theft of books, fines for book damage or with the loss of books.

REFERENCES

[1] R. H. Siregar and A. M. Harahap, "Sistem Informasi Perpustakaan Berbasis Web pada Perpustakaan Fakultas Saintek UINSU," vol. 5, no. 1.

[2] Y. Yang, "Library Information Personalized Information Service Management System Based on Improved Genetic Algorithm," in *2023 International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE)*, Ballar, India: IEEE, Apr. 2023, pp. 1–6. doi: 10.1109/ICDCECE57866.2023.10151347.

[3] V. Y. P. Ardhana, M. Sapi'i, H. Hasbullah, and E. A. M. Sampetoding, "Web-Based Library Information System Using Rapid Application Development (RAD) Method at Qamarul Huda University," *IJICS Int. J. Inform. Comput. Sci.*, vol. 6, no. 1, p. 43, Mar. 2022, doi: 10.30865/ijics.v6i1.4031.

[4] D. Gunawan, I. A. Ar Raniri, R. N. Setyawan, and Y. D. Prasetya, "WEB-BASED LIBRARY INFORMATION SYSTEM IN MADRASAH IBTIDAIYAH NEGERI SURAKARTA," *J. Tek. Inform. Jutif*, vol. 2, no. 1, pp. 33–41, Jan. 2021, doi: 10.20884/1.jutif.2021.2.1.44.

[5] W. Winarti and A. Qhoriza, "Design of a web based library information system at Bahrul Ulum Islamic middle school," *J. Info Sains Inform. Dan Sains*, vol. 14, no. 01.

[6] D. Ramadaniah, J. Fitra, F. Satria, and E. Y. G. Zidane, "DESIGN OF LIBRARY INFORMATION SYSTEM BASED ON FRAMEWORK CODE IGNITER CASE STUDY OF INSTIDLA," *Asia Inf. Syst. J.*, vol. 1, no. 1, p. 15, May 2022, doi: 10.24042/aisj.v1i1.13622.

[7] Y. Zhou, "Research on Modelling of Innovation Information System in Smart Libraries Using Computer Big Data," *J. Phys. Conf. Ser.*, vol. 1982, no. 1, p. 012027, Jul. 2021, doi: 10.1088/1742-6596/1982/1/012027.

[8] R. G. Komara, M. R. Pahlevi, and R. F. R. Hernawan, "Web-Based Library Information System Design," *Int. J. Res. Appl. Technol.*.

[9] T. Sidauruk, S. P. Tarigan, V. Padang, S. Agape, S. Sihotang, and M. G. Hafidz, "WEB-BASED SCHOOL LIBRARY INFORMATION SYSTEM," no. 2, 2023.

[10] R. I. Handayani and D. A. Astuti, "Application of the Rapid Application Development Model to a Web-Based Library Information System," *Inform. Softw. Eng.*, vol. 1, no. 2, pp. 68–75, Dec. 2023, doi: 10.58777/ise.v1i2.163.

[11] M. H. Munandar and S. Z. Harahap, "Design of Online Library Information System at Sei Kamah Village Hall I," vol. 4, no. 36, 2020.

[12] H. Saputro, I. Wahyudin, and A. Iskandar, "Development of a Web-Based Online Library Information System at the National University Using the Waterfall Method," vol. 4, no. 1, 2020.

[13] A. Mulyana, D. Rohpandi, E. B. Sambani, M. Fahmi, and N. Sudarsono, "Web-Based Library Information System Design (Study at Pasundan 7 Junior High School, Bandung)".

[14] M. F. Akbar and A. Fauzi, "Application of Waterfall Method In Design Of Web-Based Library Information System Program Case Study at Elementary School Warungnangka Kabupaten Subang," *J. Teknol. DAN OPEN SOURCE*, pp. 72–85, Jun. 2023, doi: 10.36378/jtos.v6i1.3065.

[15] J. S. Pasaribu and P. A. Sunarya, "Design Of Web-Based School Library Information System Using YII Framework In SMA Karya Pembangunan Ciwidey," *CCIT J.*, vol. 13, no. 2, pp. 196–208, Aug. 2020, doi: 10.33050/ccit.v13i2.1001.

[16] R. D. Asworowati and Y. Defita, "Web-Based Library Information System Design at SMA S Assyfa Pasaman Barat, West Sumatra," *Int. J. Bus. Inf. Technol.*, vol. 3, no. 2, pp. 1–10, Dec. 2022, doi: 10.47927/ijobit.v3i2.453.

[17] S. Prabandari and Tedy Maulana Ishaq, "Library Information System Design in SMP Negeri 1 Muaragebong Bekasi," *ENCRYPTION J. Inf. Technol.*, vol. 1, no. 1, pp. 1–12, Aug. 2023, doi: 10.58738/encryption.v1i1.358.

[18] R. H. Hendriani and E. Indrawan, "Web-Based School Library Information System with Wordpress Vocational High School," *J. Ilm. Pendidik. Profesi Guru*, vol. 4, no. 3, pp. 475–482, Dec. 2021, doi: 10.23887/jippg.v4i3.31945.

[19] B. Kumar and K. Singh, "Testing UML Designs using Class, Sequence and Activity Diagrams," vol. 2, no. 03.

[20] R. H. Hefifiya, I. N. Jambak, R. Abdillah, and C. A. Harahap, "Perancangan Sistem Informasi Siskamling Berbasis Web Di Kelurahan Pasar Merah Timur Kota Medan," *JUKTISI*, vol. 2, no. 3, 2024.

[21] W. Zhou, "Design and Implementation of Management Information System for University Library," *Int. J. Comput. Sci. Inf. Technol.*, vol. 2, no. 1, pp. 258–277, Mar. 2024, doi: 10.62051/ijcsit.v2n1.28.