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Design and Construction of Website-based Library Information System Using Laravel Framework at SMP Negeri 3 Lubuk Pakam

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ABSTRACT

School libraries have a very vital role in supporting the teaching and learning process, especially in today's digital era, where fast and efficient access to information is increasingly important. However, many schools, including SMP Negeri 3 Lubuk Pakam, still rely on manual library management, which faces various obstacles such as unsystematic data recording and inefficient book borrowing. To overcome this problem, this study designs and builds a website-based library information system using the Laravel framework. This system is designed to improve the operational efficiency of the library by facilitating access to information, facilitating real-time borrowing and returning books, and supporting users in finding the necessary references. By using Laravel, this system is expected to meet the needs of libraries more quickly and safely. It is hoped that with this information system, library management can be carried out more effectively, increase students' interest in reading, and support a better learning process.

Keywords : library, information system, Laravel, management, education

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1. INTRODUCTION

School libraries play a very vital role as a center for information resources that support the teaching and learning process that takes place in the educational environment. In this context, libraries not only provide a wide variety of books and other relevant resources, but also serve as a place that facilitates students and teachers in finding and accessing the information needed to support their learning process (Putri et al., 2022). In today's rapidly evolving digital era, efficient and easy access to information is becoming increasingly important and crucial to ensure that all students can acquire the knowledge they need quickly and appropriately (Sinan, 2023).

However, despite the importance of the library's role, many schools, including SMP Negeri 3 Lubuk Pakam, still rely on manual library management, which is often inadequate to meet the needs of users. This management method often faces various obstacles and challenges, such as unsystematic data recording, inefficient borrowing, and book returns, and can cause confusion for users (Ardiyan et al., 2023).

These obstacles not only hinder the overall operation of the library, but can also reduce students' interest in reading, which is of course very important for their academic development, as well as making it difficult for them to find the necessary references for assignments and research. Therefore, a library information system that can be easily accessed by all users and managed efficiently to overcome existing problems is urgently needed (Mas'ud et al., 2023).

The use of information technology in the form of a website-based library information system can be the right and effective solution to overcome these various problems. With a website-based system, information regarding the availability of books, as well as the borrowing and returning process can be accessed in real-time by students and teachers, thereby significantly improving the efficiency and effectiveness of library operations (Mahardika, 2023).

The Laravel framework was chosen to build this library information system because of its many attractive advantages, such as high level of security, flexibility in development, and extensive and active community support. Laravel also provides very useful features that can speed up the web application development process, so that this system can meet the needs of the library of SMP Negeri 3 Lubuk Pakam more quickly and efficiently (Alpina & Witriyono, 2022).

With this background, this study aims to design and build a website-based library information system using the Laravel framework at SMP Negeri 3 Lubuk Pakam. It is hoped that with this new information system, library management can be carried out more effectively and efficiently, as well as increase information accessibility for all library users, so that it can support a better learning process.

2. LETERATURE REVIEW

A. Basic Concepts of Libraries

Libraries are institutions that provide access to information through collections of books, journals, and other resources. In the context of education, libraries function as learning centers that support the learning process of students and teachers. Some of the functions of the library include:

- Resources of Information: Provide the necessary references for learning.
- Reading Interest Development: Encourage students to read and explore knowledge.
- Learning Facilitation: To be a place for research and information gathering.

B. Library Information System

A library information system is a combination of hardware, software, data, procedures, and users who work together to manage and distribute information. Some of the key components of a library information system include:

- Hardware: The server and computer device used.
- Software: An application used for library data management.
- Data: Information about book collections, users, and lending transactions.
- Procedure: The process that must be followed in the management of the library.
- Users: Students, teachers, and library staff who use the system.

C. Web Technologies in Information Systems

The development of web-based information systems is a popular choice because of its high accessibility. Some of the advantages of a web-based system are:

- Real-Time Access: Users can access information anytime and anywhere.
- Ease of Management: Makes it easy to update and manage data.
- Interactivity: Increase user engagement through an intuitive interface.

D. Framework Laravel

Laravel is one of the popular and widely used PHP frameworks in web application development. Some of the reasons for choosing Laravel in this project include:

- Security: Built-in security features that help protect apps from attacks.
- Easy Routing: Makes it easy to set up URLs and manage app routing.
- Eloquent ORM: Simplify interaction with databases using models.
- Community Support: An active community provides a wealth of resources and support.

3. Research Methods

A. Software Development Methods

The method used in the development of this software is the Waterfall Method. The Waterfall method is one of the approaches that is usually applied in the software development process. This model has a unique characteristic, in that the development of the system is carried out systematically, structured and sequentially, starting from one stage to the next in a clear sequence, similar to the flow of a waterfall flowing from top to bottom. As such, each stage in this model must be fully completed before moving on to the next stage, which creates an organized process and makes it easy to manage software development projects.

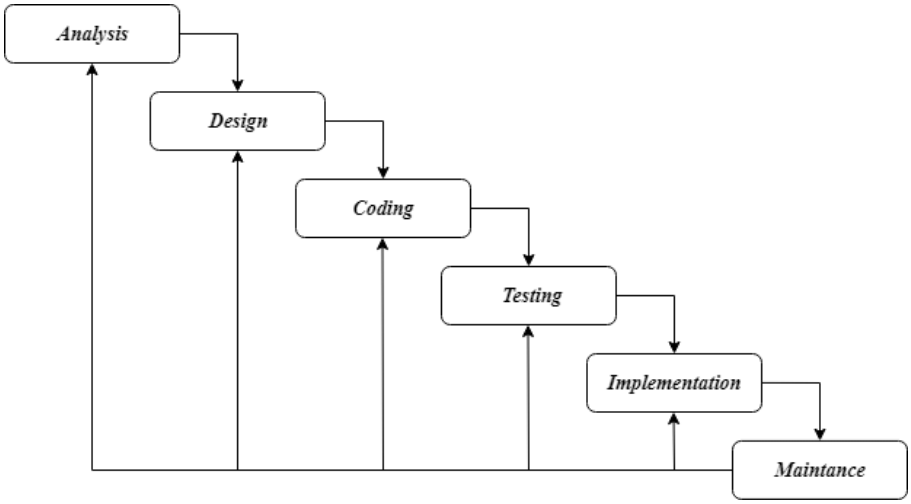

Figure 1. Stages of the Waterfall Method

The explanation of the stages above includes, as follows:

1. Analysis

At this stage, developers identify needs and problems that must be solved through software. The analysis is carried out by gathering information from users and stakeholders through interviews, surveys, or observations. The result of this stage is a clear specification document of the requirements, which will be the basis for the next steps.

2. Design

Once the system needs have been analyzed, the next step is to design the system. The design includes a depiction of the system architecture, user interface, and database structure. At this stage, developers create flowcharts and models that help illustrate the interactions between the various components of the system. A good design ensures that the system will be easy to use and meet the needs of users.

3. Coding

Once the design is complete, the next stage is coding, where the design is implemented into the program code. The developers write the code using the appropriate programming language. At this stage, it is important to ensure that the code is well written and follows applicable programming standards to facilitate future maintenance.

4. Testing

Once the coding is complete, the system must be tested to ensure that all features are working properly and according to the specifications that have been set. Testing is carried out in several stages, including unit testing (for each component), integration testing (to ensure components work well together), and testing the system as a whole. This testing is important to identify and fix bugs before the system is deployed.

5. Implementation

Once the system has been tested and deemed ready, the next stage is deployment. At this stage, the system is installed in the user's environment, and the user is given training to understand how to use the new system. Deployment also includes migrating data from legacy systems (if any) and ensuring that all users can access the system properly.

6. Maintenance

Once the system is in place, maintenance is an important step to ensure that the system remains running properly. This stage includes fixing bugs that may arise, updating the system to adapt to new needs, and adding new features based on user feedback. Good maintenance will help extend the life of the system and increase user satisfaction.

B. Research Methods

Research methods can be interpreted as a systematic and structured scientific way to obtain valid and reliable data, with the aim of discovering, developing, and proving a certain knowledge. With this approach, researchers hope to understand, solve, and overcome various problems that exist in the context studied. In this study, the authors chose to use qualitative research methods, which allow for more in-depth and comprehensive information extraction.

In terms of where the research is carried out, this research is carried out in a certain field or research location, which is a place that is carefully selected as a location to investigate the objective symptoms that occur. The selection of this location is very important, because it can provide relevant context to conduct analysis and compile an accurate and informative thesis report. This qualitative research aims to describe the findings or existing phenomena, as well as present the data as it is in accordance with the facts and realities found in the field.

Furthermore, the authors collect data through various methods, analyze the information obtained, and make direct observations. The data collection techniques used in this study include in-depth interviews, field observations, and relevant literature studies. By using these various methods, the author hopes to get a complete and accurate picture of the phenomenon being studied. The data collection methods used in this study are as follows:

Interview

Interviews are a method of data collection with one-sided question and answer methods that are carried out systematically and based on research objectives.

Observation

It is a data collection, where the researcher makes direct observations to the research object to see the activities carried out closely.

Literature study

It is an activity to collect information that is relevant to the topic or object of research. This information can be obtained from scientific books, literature and the internet

4. Results and Discussion

A. Software Development Methods

System design is a very important advanced stage after the system analysis stage, which aims to clearly define the functional needs that must be met by the new system. At this stage, the developer is responsible for preparing the implementation design of the new system to be built, including describing the new system in detail, so that all parties involved can understand how the system will function.

In addition, the design stage also includes the arrangement and planning of separate elements into a single whole, so that each component can interact well and support the overall system objectives. It also involves configuring the devices required in the design of the new system, including the hardware and software that will be used to support the operation of the system.

To facilitate the process of designing this information system, the tool used is a structured approach method. This method includes the use of Data Flow Diagrams (DFDs), which serve to map the flow of data in a system and help illustrate how information moves from one process to another. In addition, table relationships are also used for database design, which is very important to ensure that data is managed efficiently and can be easily accessed according to user needs. By using this tool, it is hoped that system design can be carried out more systematically and structured, resulting in an effective and efficient system.

DFD Level 0

Data Flow Diagram (DFD) is a very useful tool for the preparation and design of information systems in a structured manner, the advantage of which is that it makes it easier for users who lack mastery of the computer field to understand the system being worked on or developed. Where the depiction of DFD uses symbols that explain or represent the actual state of the system, DFD Level 0 (Context Diagram), DFD level 0, or can also be called a context diagram, is a description of how the system interacts with

external entities[9]. What is meant by external entities here are Admins and Members. The external entity here interacts with the system which then provides a reciprocating interaction to the external entity.

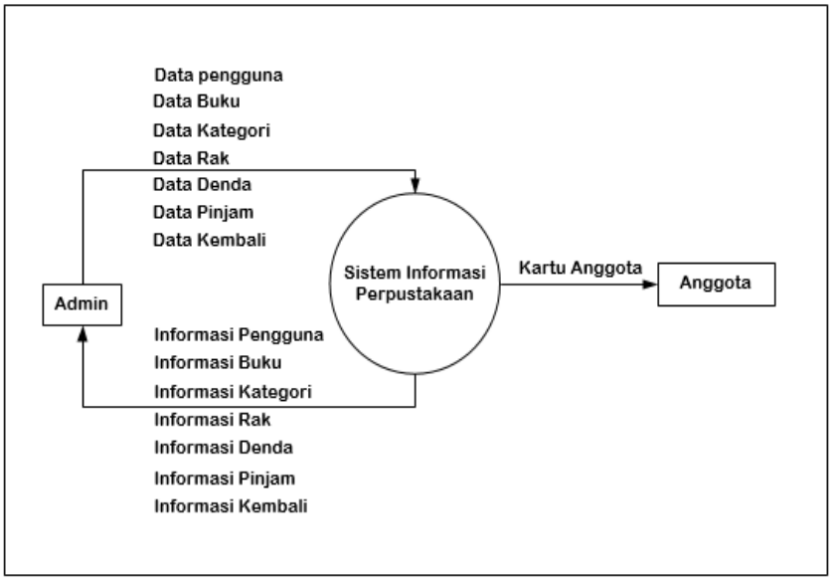

Figure 2. DFD Level 0

DFD Level 1

DFD level 1 indicates the main processes that occur in the system under construction. DFD level 1 is an elaboration of DFD level 0. Here is a level 1 DFD image that displays entities, processes, data stores and data flows that will show the flow of data within the system.

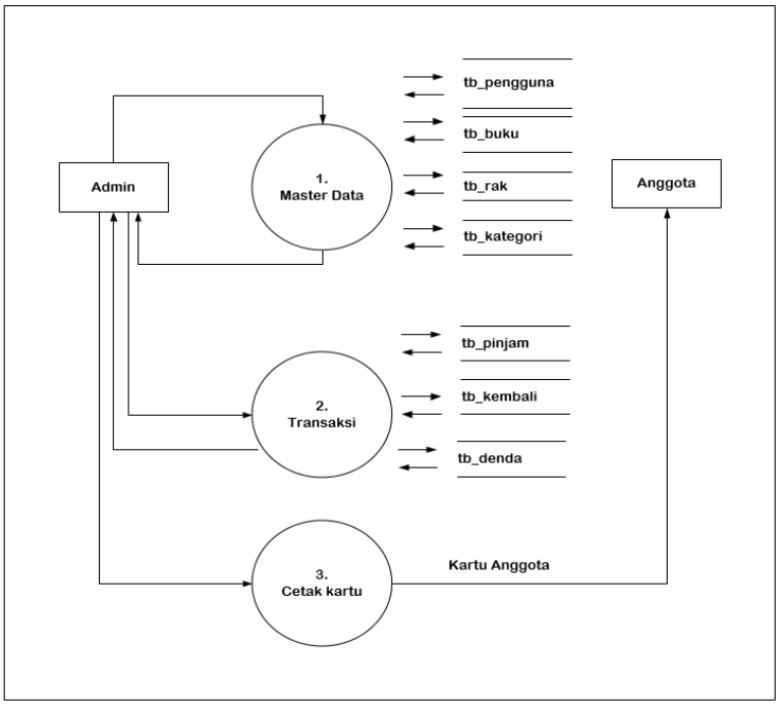

Figure 3. DFD level 1

B. System implementation

The following is the implementation of the system that has been produced:

Login Page Implementation

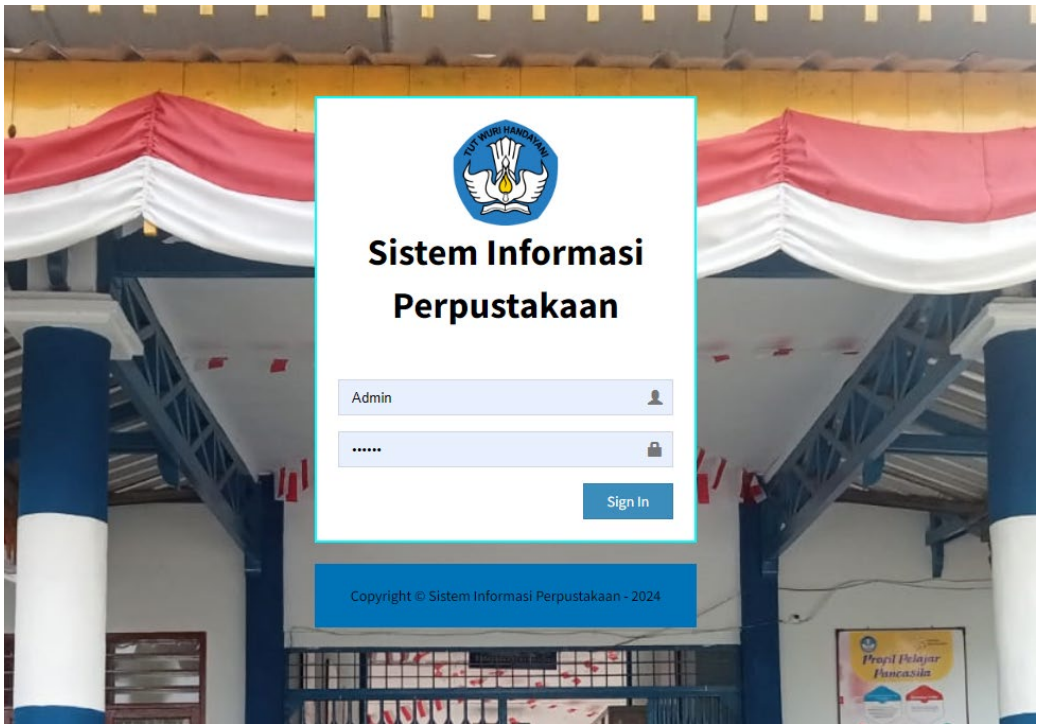

Figure 4. Login Page

As shown in the image above, the Login page appears the first time the application is run where the Admin or Head of the Library must enter a username and password before entering the main page to be able to access the system that has been created.

Dashboard Page Implementation

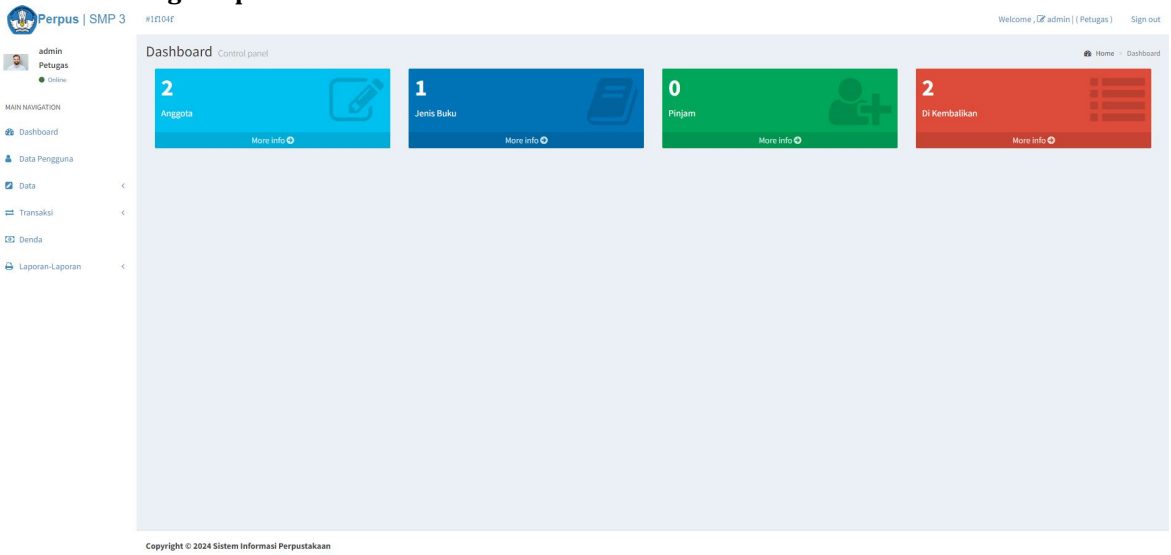

Figure 5. Dashboard Page

As shown in the image above, the dashboard page contains the menus Manage Book Data, Data Circulation, Manage Transactions, Fines, System Users and Logout, in these menus there are sub menus (Member Data, Book Data, Borrowed Data, Return Data, Fines).

Member Data Page Implementation

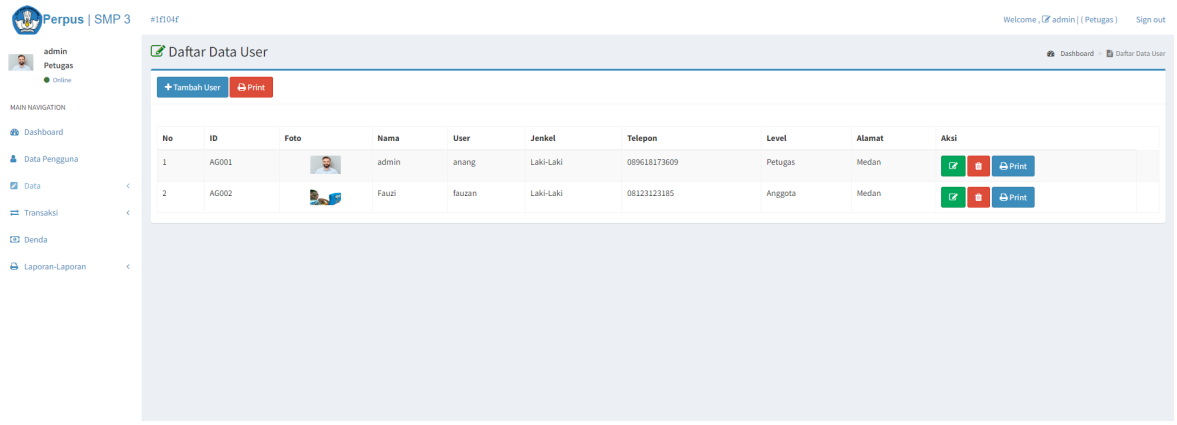

Figure 6. Member Data Page

As shown in the image above, the Member Data page, can be used if you want to add new Member data, select the Add Data menu then fill in the data on the member data filling form then click the submit menu to save the new member data to the database.

Implementation of Book Data Pages

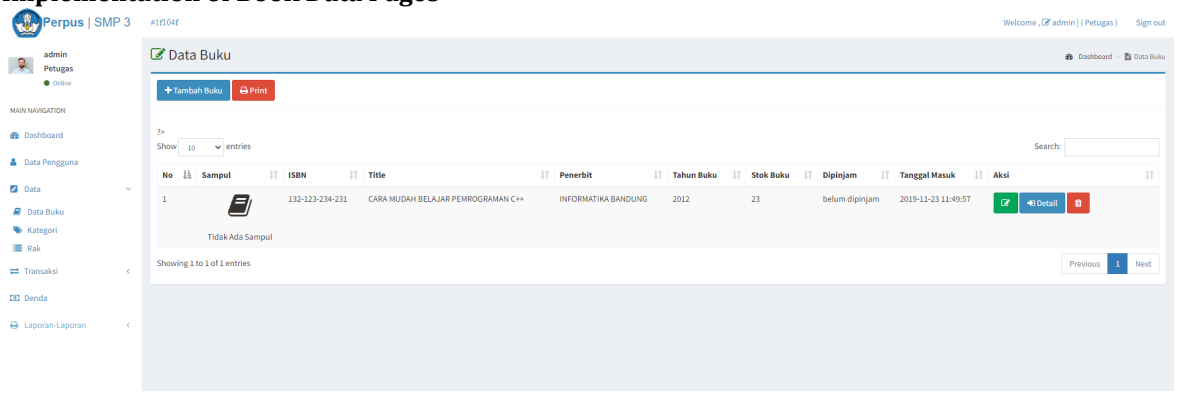

Figure 7. Book Data Page

As shown in the image above, the Book data page is used if you want to add book data, select the add book menu then fill in the data on the book data filling form then click the submit menu to add new population data to the database

Borrow Book Page Implementations

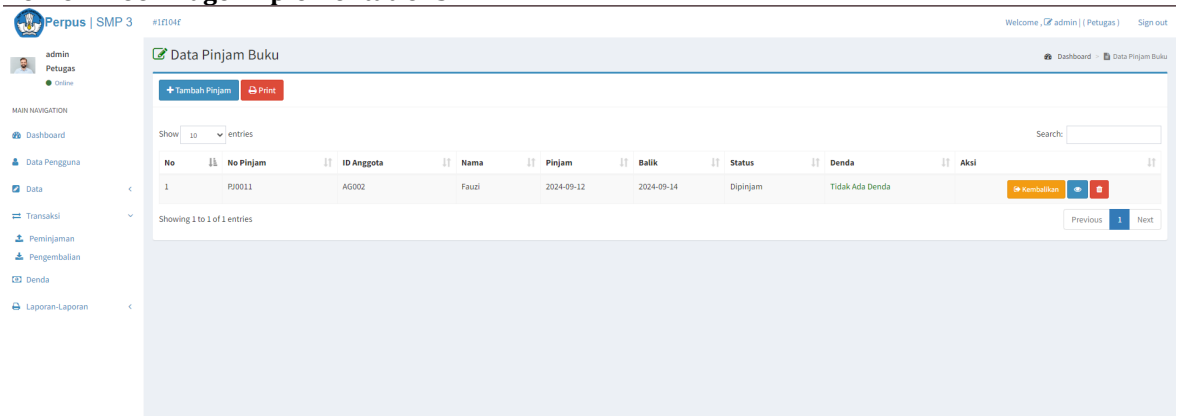

Figure 8. Book Borrowing Page

As shown in the image above, the book borrowing data page is the same as entering book data by filling out the form according to the fields listed in the image above.

Back Data Page Implementation

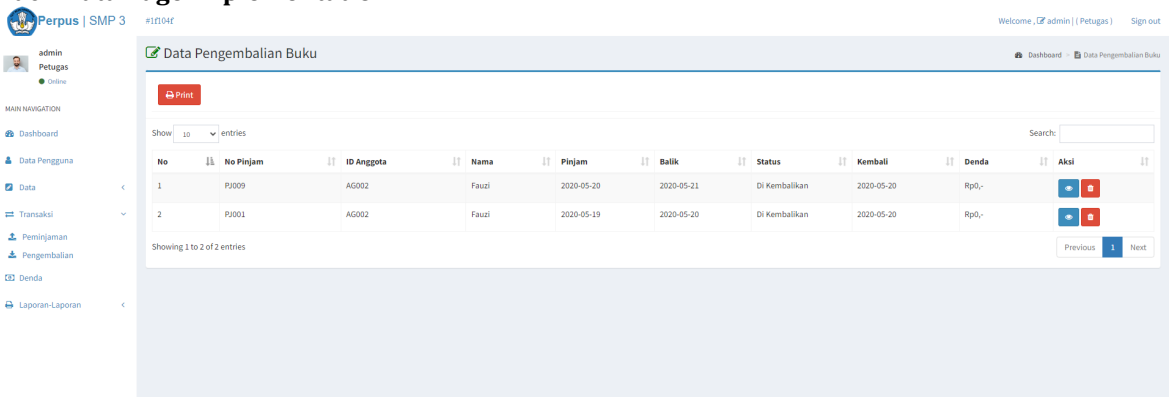

Figure 9. Kembal Data Page

As in the image above, the book return data page by filling out the form according to the fields listed in the image above. After filling in the data, then click the back sign so that it is stored in the database.

Category Data Page Implementation

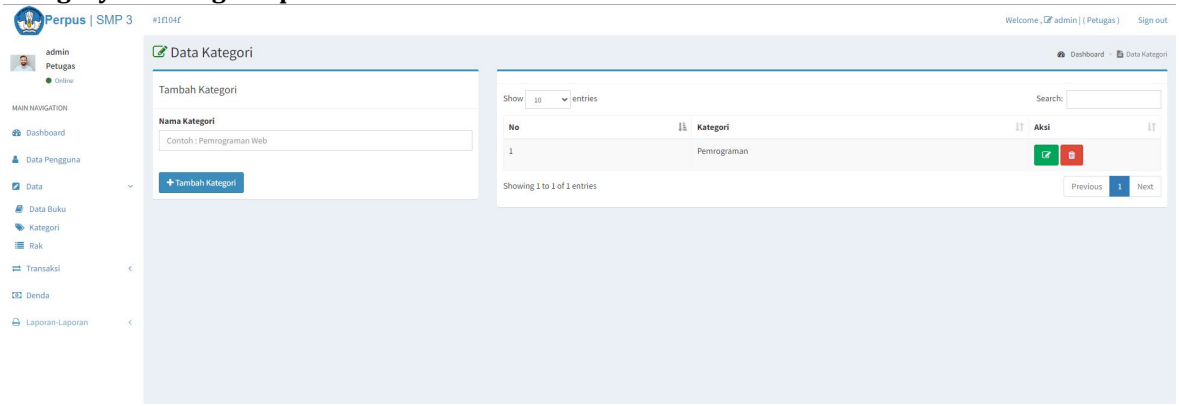

Figure 10. Category Data Page

As shown in the image above, the category data page is used to fill in the category data by clicking the plus menu to save the new category data to the database.

Shelf Data Page Implementation

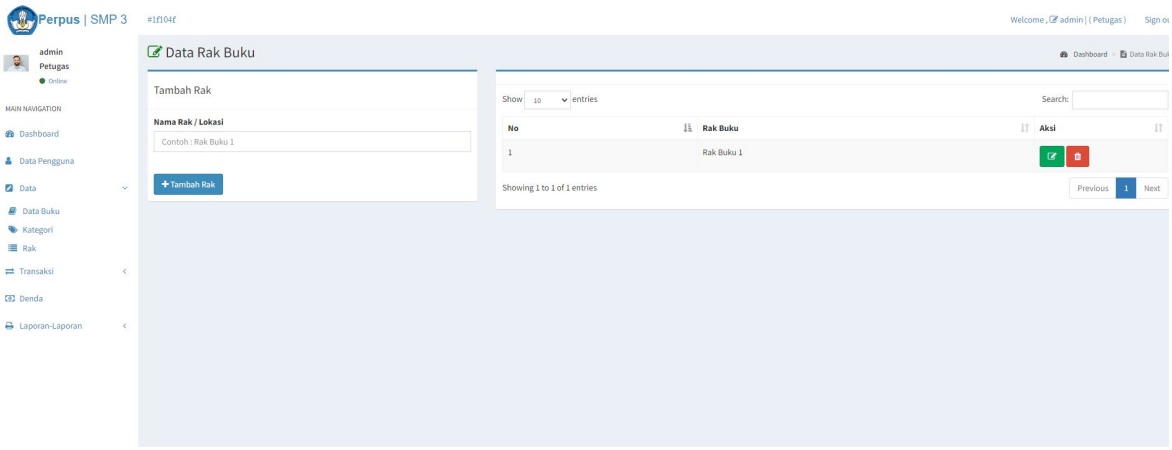

Figure 11. Shelf Data Pages

This page is used to manage shelf data as a place to store books.

Implementation of Fine Data Page

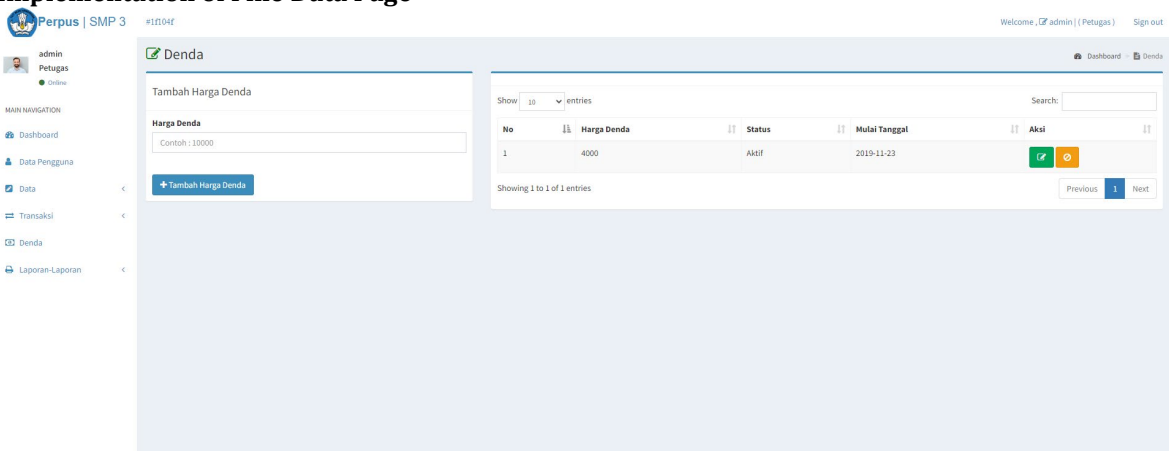

Figure 12. Fines Page

The Fine Data page is used if the student is slow to return the borrowed book.

Implementation of Card Print Pages

Figure 13. Card Print Page

This page is used to print a member card, if the member does not have a card

C. System Testing

The testing method used in this study is a direct testing method, namely by using Black Box testing.The testing technique used is the Equivalence Partitioning (EP) technique, by the author entering and sharing data based on its function so as to obtain valid test cases.

5. Results and Discussion

Based on the results of the design of the library information system carried out by the author at SMP Negeri 3 Lubuk Pakam, the author can conclude that this library information system makes it easier for library staff to carry out the process of registering members, borrowing and returning books, and calculating fines. With this system, all data has been stored safely in the database so as to prevent damage and data loss.

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