Research Article

Library Book Recommendation System Using Content-Based Filtering

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Abstract:
In today's digital era, libraries are developed to adapt to student needs. Students can easily search for books on digital library services. However, the large number of books sometimes makes it difficult for students to find the books they want. Overcoming this problem can be done by using a recommendation system. A recommendation system is a system used to provide suggestions to users. This research aims to develop a library book recommendation system at Darul Mustofa Bangkalan Vocational School using content-based filtering. The content-based filtering method offers recommendations based on user preferences according to the item description. The algorithms used are Term Frequency Inverse Document Frequency (TF-IDF) and Cosine similarity. The method used in this research is research and development with a waterfall model. The researcher's testing stage used black box testing. Black box testing results were obtained from validation by system experts, website experts, and user tests with the qualification "Very Eligible."

Keywords: Recommendation Systems, Books, Content-Based Filtering, TF-IDF, Cosine Similarity

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1. INTRODUCTION

Its use has increased significantly in the era of increasingly rapid information and communication technology advances. Information and communication technology (ICT) is defined as computing devices that can be used to present, process, and manipulate data (Parsaorantua et al., 2017: 3). The application of ICT has spread widely in various institutions, including educational institutions. The use of ICT in educational institutions has excellent potential to provide accurate and relevant information to students. ICT includes multiple forms of data, such as text, video, images, and sound, which can be used for decision-making in the learning process and school administration. A critical aspect of the application of ICT in education is that library services are increasingly integrated with this technology (Siswanto et al., 2022: 102).

Moreover, Libraries in the educational context are defined as a work unit that includes several aspects, such as collection development, user services, collection processing, and maintenance of facilities and infrastructure (Afriyanti & Retnoningsih, 2022: 293). One of the primary services provided by libraries is book lending facilities. In the era of rapid globalization, developments in information technology enable libraries

to utilize ICT to make work more accessible, practical, faster, and more efficient. One of the problems faced in the library environment is the low level of interest in reading, especially in Indonesia. Data from the United Nations Educational, Scientific and Cultural Organization (UNESCO) shows that Indonesia ranks low in interest in reading worldwide (Adhiyasa & Berlian, 2022). One effort to increase students' interest in reading is by recommending reading materials that suit their interests and preferences.

At this time, libraries have adopted technology to provide digital library services. Even though there is a book search system, there are still difficulties in helping students choose books that suit their interests. This is why recommendation systems become relevant in the context of digital libraries. A recommendation system is a method used to provide user recommendations or suggestions based on existing data and preferences. In schools, the library book recommendation system uses content-based filtering, which is implemented to help students find books that suit their interests and needs. This method allows the system to recommend books based on the description and user preferences. The algorithms include Term Frequency Inverse Document Frequency (TF-IDF) and Cosine Similarity.

Previous research has developed a system for recommending books with weighted tree similarity and content-based filtering, which can display recommended books according to the similarity of feature items analyzed using the Weighted Tree Similarity algorithm. Testing with five scenarios, a precision value of 88% was obtained (Alkaff et al., 2020: 193). from the results of previous research in the explanation above, it is known that the content-based filtering method in recommendation systems has several different methods. The methods commonly used are the TF-IDF and Cosine Similarity weighting techniques. This technique is used to measure the level of similarity between documents. The results of previous research are a new reference for researchers to create a library book recommendation system using the content-based filtering method and TF-IDF and Cosine Similarity weighting techniques.

Based on the problems described, the author will conduct research entitled "Library Book Recommendation System Using Content-based Filtering." This research aims to develop a library book recommendation system to help students find books according to their interests and needs, speed up transaction services for borrowing and returning books, and increase their interest in reading books. By implementing the content-based filtering method and the TF-IDF and Cosine Similarity algorithms, it is hoped that this system can provide more personalized and relevant book recommendations to improve students' experience using the school library.

2. THEORY

A. Library Book Recommendation System

In the digital information era, libraries at Vocational High Schools (SMK) face challenges in providing students with more personal and efficient services. A library book recommendation system is an approach used to improve students' reading experience by recommending books based on individual interests and preferences. As reviewed by Smith (2019), previous research shows that library book recommendation systems can increase student involvement in reading and utilizing library collections.

B. Content-Based Filtering in Recommendation Systems

One technique that is often used in developing library book recommendation systems is Content-Based Filtering. In this context, the system analyzes book characteristics and student preferences to recommend books with similar characteristics. According to Gupta et al. (2020), Content-Based Filtering utilizes book descriptions, genres, and other features to compile more accurate recommendations. Implementing Content-Based Filtering in school libraries can help students find books that suit their interests and learning needs.

C. Implementation of Recommendation Systems in Schools

Implementing a library book recommendation system in schools requires understanding student needs, information technology infrastructure, and integration with existing library systems. According to research by Rahman (2021), the use of technology in school libraries can increase the utilization of library resources. However, challenges such as the need for accurate and up-to-date data and training for library staff also need to be considered.

3. METHOD

Researchers used research and development methods, also known as research and development (R&D) methods. Researchers developed a library book recommendation system using the waterfall research model as a product development process. Researchers used the content-based filtering method, the Term Frequency Inverse Document Frequency (TF-IDF), and Cosine Similarity algorithms in developing a library book recommendation system.

The following are the stages in the model waterfall :

1. **Needs Analysis**
   The analyzing stage consists of collecting data, identifying problems for which solutions will be provided, and analyzing needs that will be achieved. Researchers analyzed the results of interviews with deputy principals and school librarians.
2. **Design**
   The stage for researchers is to create application designs in the form of user interface designs, Entity Relationship Diagram (ERD) designs for implementation into databases, and use case designs for user activities. Program Code Creation
3. **Code**
   The development stage involves implementing the design that has been created into program code through a programming language. At this stage, the researcher used Visual Studio Code to complete the program code and used the PHP programming language and MySQL database. Testing
4. **Testing**
   The stage for researchers to test products is by using black box testing and Confusion Matrix. Black box testing is carried out to ensure the system can run well and correctly according to user needs, which is tested by system experts, website experts, and users. Meanwhile, the Confusion Matrix test evaluates the algorithm used by calculating precision, recall, accuracy, and f-score.

5. Maintenance

The final stage in software development is maintenance or maintenance. This is done because it does not rule out the possibility that the created software will experience changes when it has been tested with users (users). The Waterfall research model can be seen in Figure 1.

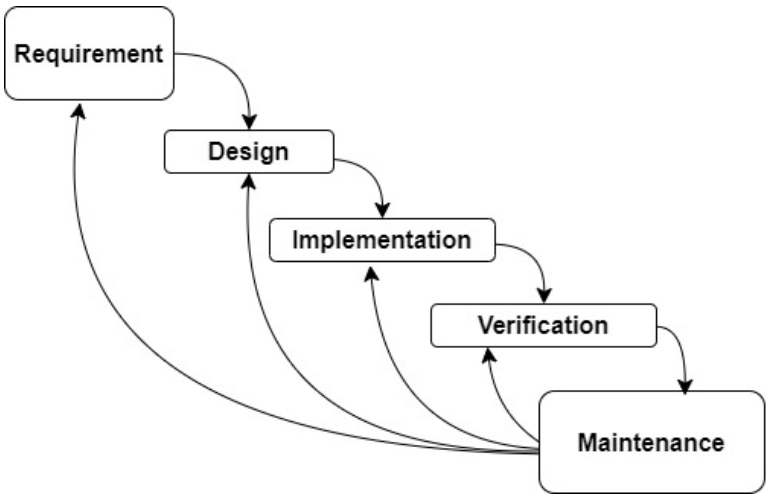

Fig 1. The Waterfall research model

Furthermore, Information Systems Library Book Recommendations Using Content-Based Filtering developed with the following stages: The first stage before creating a system is conducting a needs analysis to obtain information. Researchers analyze and collect system requirements in this process according to the information received and the required interface. Moreover, to get information on the need for creating a system, the research interviewed administrators or library managers at Darul Mustofa Bangkalan Vocational School about the existing library system at Darul Mustofa *Bangkalan* Vocational School is like.

Interviews were conducted to find out problems that arise in the library. The results of the interview explained that libraries are still manual and cannot maximize students' interest in visiting the library, students have difficulty finding books because of the lack of references that students have regarding what books should be borrowed, books are often lost because the data used to record borrowing and return transactions is not managed well because it is still written in the notebook. Apart from that, the condition of the library, which is still manual, has not been able to maximize students' potential in reading books in the library, so students' interest in reading at Darul Mustofa Vocational School is relatively low.

This research raises the topic of recommendation systems using content-based filtering methods, the TF-IDF algorithm, and cosine similarity to measure the similarity of each document. The recommendation system is designed to provide references to students and teachers about various types of books that are similar to books of interest to

the user. So, the system will display book recommendations and minimize errors in the recommendation results.

The data used in this research recommendation system is book data obtained at Darul Mustofa Bangkalan Vocational School. The book data amounts to more than 72 books. The number of books used comes from various categories ranging from general works, natural sciences, social sciences, languages, computer technology, and computer networks. The book data taken is in the form of title, author, cover, publisher, year of publication, and a description or synopsis of the book. The book description or synopsis data will be used as a variable for the dataset requirements, which will be processed from initially unstructured data into structured data. To analyze system requirements, researchers also analyzed software requirements; the software requirements obtained were as follows:

Based on this statement, a library book recommendation system must be integrated with the Internet so all school residents can access it. Based on the analysis that has been carried out, who are the users who will access the library recommendation system? The next step is to analyze functional requirements. Users who will operate include admins, teachers, and students. So, the researchers designed the non-functionality for each user as follows:

1. Admin

Admins have a role in managing data; here are the features that administrators need:

a) Login
b) Book Data
c) Logout

2. Teacher

Teachers have a role in seeking recommendations; as for the features needed by teachers:

a) Look for Recommendations
b) View Book Details
c) Return

3. Students

Students have a role in seeking recommendations; as for the features needed by students:

a) Look for Recommendations
b) View Book Details
c) Return

Furthermore, The design stage is a software design requirement that can be designed before coding. A process that focuses on data structures, software architecture, interfaces, and algorithm details. The design stage describes the appearance that will be carried out by determining the specifications and components of the library book recommendation system following the needs analysis, namely:

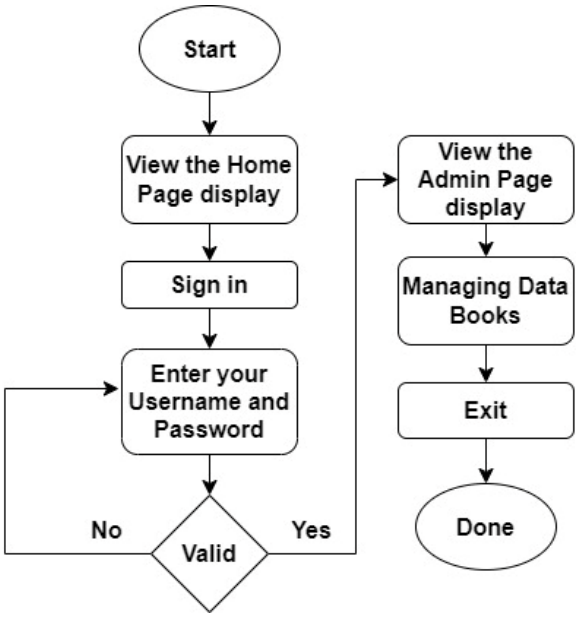

Fig 2. Admin Flowchart Image

Figure 2 is the flow of the library book recommendation system in the admin section. First, the admin goes to the website address of the library book recommendation system. Then, the admin sees the main page display. In the main display, the admin carries out the login process, where the login process enters the username and password. Next, you will successfully enter the admin page during the login process if the data entered is correct. However, if the login process fails or the username and password are entered incorrectly, the process will return to the login menu. The login process is successful; the admin goes to the admin page, which contains book data (managing book data in the form of adding, editing, viewing, and deleting data) and logs out.

Furthermore, Figure 3 explains the flowchart of the content-based filtering algorithm in the book recommendation system for the Darul Mustofa Bangkalan Vocational School library. The data used is a synopsis/summary in the SMK Darul Mustofa Bangkalan library. In the initial process, pre-processing is carried out in several stages: case folding, tokenizing, filtering, and stemming. At this stage, the data is prepared so that it does not contain meaningless text. Then, the words (terms) are weighted for each document using the TF-IDF algorithm. Where the results of the term stemming list are calculated to find the weight per word by first calculating the number of Term Frequencies (TF), then calculating the Document Frequency (DF) value, and then calculating the Inverse Document Frequency (IDF) value. Then, the TF-ID calculation process results proceed to the Cosine similarity calculation stage, namely calculating the similarity between documents. Moreover, Figure 4 is a Recommendation System Flowchart Using Content-based filtering.

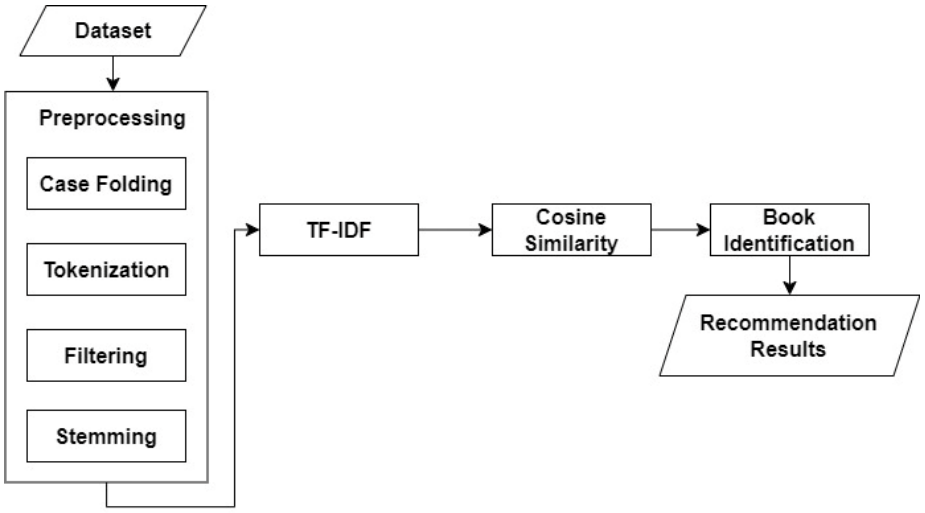

Fig 3. Flowchart Content-based filtering

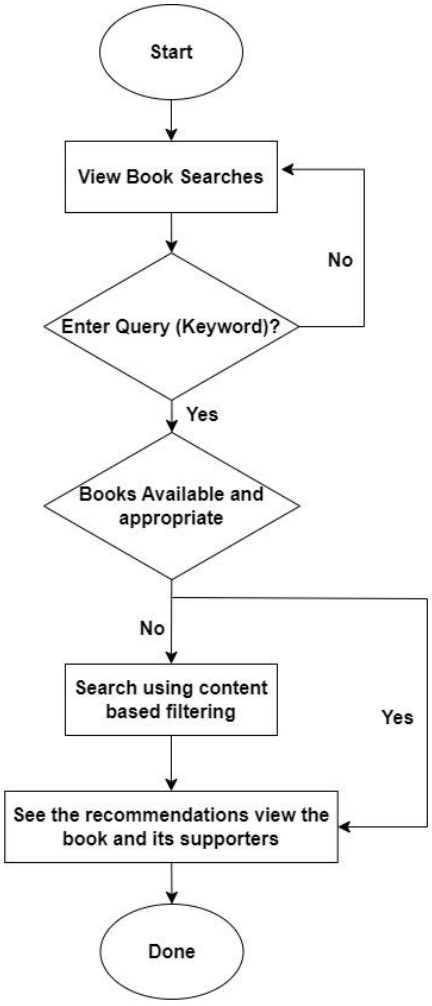

Fig 4. Recommendation System Flowchart Using Content-based Filtering

The system will display a book data search column for users. Then, the user fills in the column containing the book's topic, title, or description as expected. The expected book document will return to the book search column display page if it is unavailable. If a book is available but not suitable, the system will display recommended book titles

using content-based filtering for the user to select. If the book is available and appropriate, it will show book recommendations and their supporters.

Moreover, a use case diagram is a sequence of interactions between the system and the user. Use case diagrams can also determine what functions exist in a system and represent a system's interaction with users. Users of this research system consist of admins, teachers, and students, who can be called actors. This modeling describes the relationships between actors and ongoing use cases, defined using use-case scenarios. Moreover, Figure 5 explains that the admin can manage data as book data after successfully logging in. In the book data menu, admins can add, view, update, and delete data. In book data, admins can add book details in code, cover, title, author, publisher, year of publication, and book synopsis.

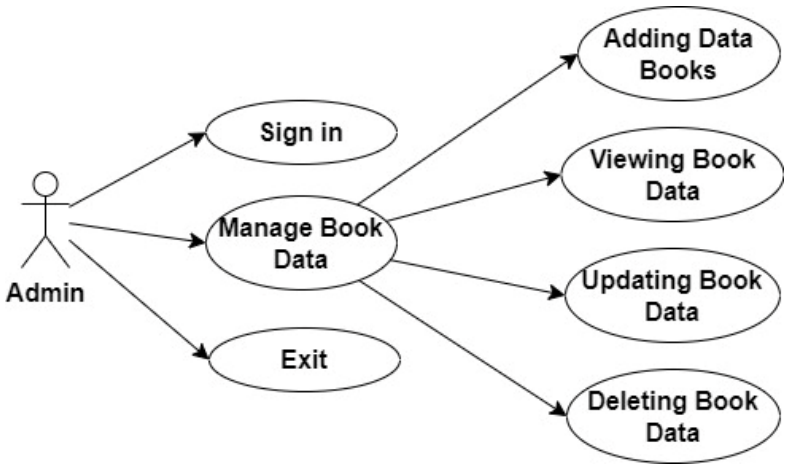

Fig 5. Use case Diagram Admin

Moreover, In the search for recommendations menu, the teacher will fill in the column with keyword input as expected. Then, the system will recommend 12 books, and the teacher can see the details of the selected book recommendations and other recommendations provided by the system. Moreover, the use case diagram teacher details are in Figure 6.

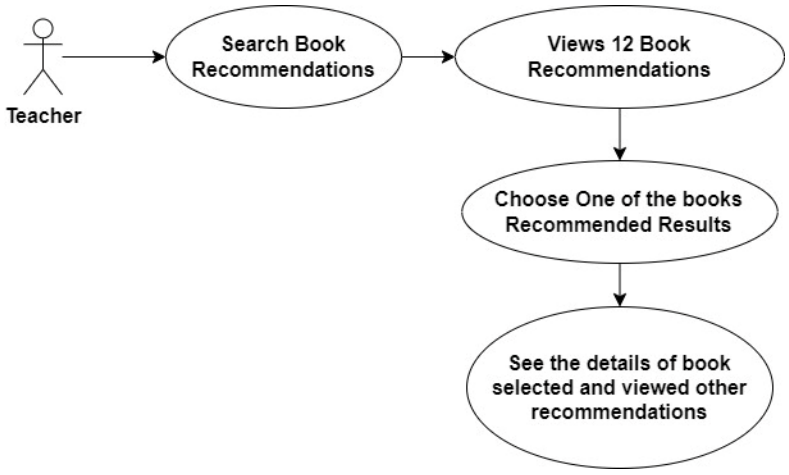

Fig 6. Use case Diagram Teacher

Moreover, In the search for recommendations menu, students will fill in the column by inputting keywords as expected. Then, the system will recommend 12 books, and the teacher can see the details of the selected book recommendations and other recommendations provided by the system. Moreover, the details of the use case student diagram are in Figure 7.

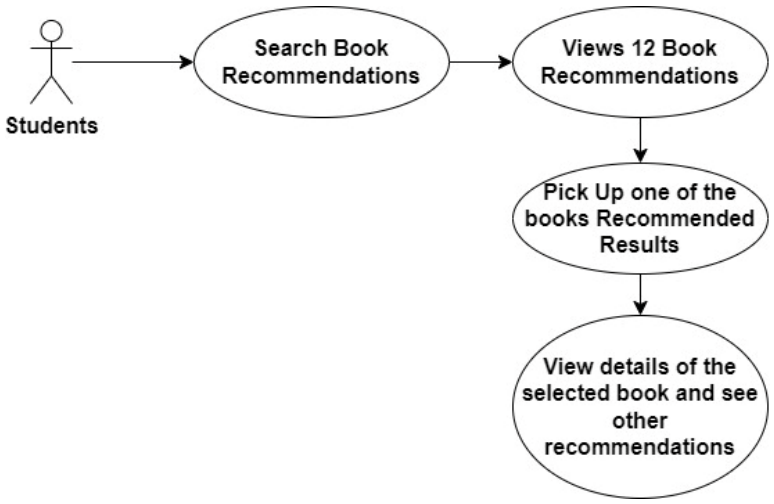

Fig 7. Use case Student Diagram

This stage involves translating the design form into code or language that machines can understand. After coding is complete, efforts are made to test the system and code created. The coding steps are shown in Figure 8.

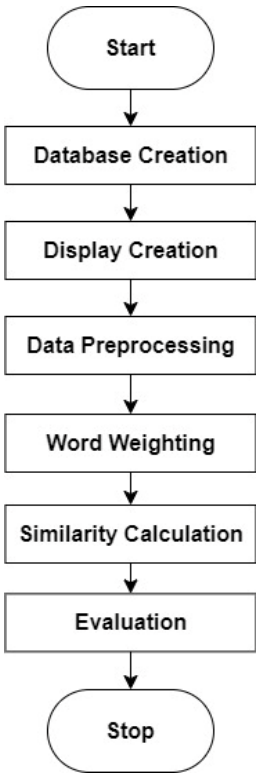

Fig 8. Illustration of the Coding Process Flow Diagram

The first stage is creating a database using MySQL in the WAMPP software package. The database created will be adjusted to the design that has been completed. Including a system for building (creating) adding data, (reading) viewing data, (updating) editing data, and (deleting) deleting data, which will later be implemented in the library book recommendation system application. Furthermore, the second stage is creating a display using the Cascading Style Sheets (CSS) framework, namely Bootstrap, JQuery, and HTML in the PHP programming language.

Moreover, Pre-processing is the most critical step in transforming initial data into more important information. Researchers use the PHP programming language to implement this pre-processing stage. Data pre-processing stages include case folding, tokenizing, filtering (stop word removal), and stemming.

a) Case folding: The initial data will be changed to lowercase, and words with characters other than the letters a to z will be removed using the PHP programming language.Tokenizing: Data from the previous stage will be separated into words using the PHP programming language.
b) Filtering (stopword removal): Data from the previous stage will be filtered for important words by removing meaningless words using the PHP programming language.
c) Stemming: The final stage of the process, which will involve changing words into essential words using the PHP programming language
d) Word Weighting: Word weighting in this study uses the TF-IDF algorithm. The formula is: if the weight obtained is greater, the frequency of occurrence will be high, but the weight will decrease if the word appears frequently in other books.
e) Similarity Calculation: The similarity calculation in this research uses the cosine similarity algorithm to calculate the similarity between documents. Cosine similarity calculation is a measure of the level of similarity between one book and another. The cosine similarity calculation is carried out by solving Eq.
f) Evaluation: Evaluation is defined as a stage for measuring the performance of a system that has been created. Data processed from the pre-processing stage, TF-IDF, cosine similarity needs evaluation to determine how accurate the system is. In this research, measurements for evaluation use the Confusion Matrix using the equation recall or sensitivity, precision, accuracy or recognition level, and f-score from the results of the book recommendation system.

4. RESULT AND DISCUSSION

The first time the implementation was implemented was the database. The database used in this system can be seen in the following Figure 9.

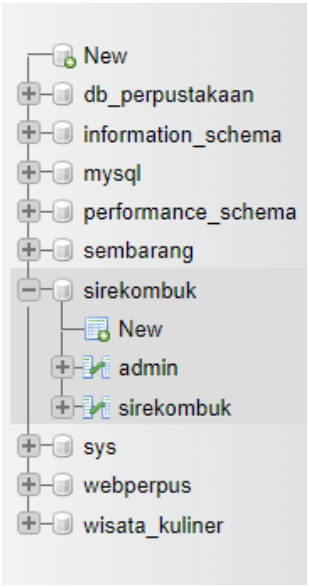

Fig 9. Image Recommendation Database

The name of the *database* that is used is '*sirekombuk*.' The database consists of several tables that will be used for some data. The detailed data can be seen in Figure 10.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id_admin	int			No	None			Change Drop More
2	username	varchar(100)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
3	password	varchar(100)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
4	nama	varchar(100)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
5	foto	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More

Fig 10. Admin Table Image

This admin table is used to accommodate data regarding admin data. This table consists of several columns, namely (a) "*id_Admin*" as the *primary key* (main key), (b) "username," (c) "password," which contains the admin password, and (d) "name" which contains the admin's name, (e) and "photo" contains the admin's photo. The table can be seen in Figure 11.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id_sirekombuk	int			No	None		AUTO_INCREMENT	Change Drop More
2	judul_buku	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	Tahun	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
4	Sinopsis	longtext	utf8mb4_0900_ai_ci		No	None			Change Drop More
5	Sampul	varchar(200)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	Penulis/Penerbit	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
7	ISBN	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More

Fig 11. The Specific data field of the *Sirekombuk* table

The *sirekombuk* table is used to accommodate data regarding book data. This table consists of several columns, namely (a) "*id_sirekombuk*" as the *primary key* (main key), (b) "*book_title*," which contains the title of the book, (c) "password" which contains the year the book was published, (d) "synopsis" which contains a brief description of the book, (e) "author/publisher" contains the author's name and publisher, (f) "cover" contains the cover of the book, and (g) "ISBN" contains the ISBN of the book.

This library book recommendation system was developed using the PHP programming language. The following is implementing a library book recommendation system using the content-based filtering method at the beginning of development, which has not gone through the testing stage and has not received corrections and revisions from system experts, websites, or users.

A. Admin Page

The admin page has several main features, including a Login Page, index, etc. Moreover, this page can be accessed by users as admins by accessing the link "http://localhost/sirekombuk/login.php" after the main page. After that, when the admin/other user clicks, it will go to the admin-only index page, as shown in Figure 12.

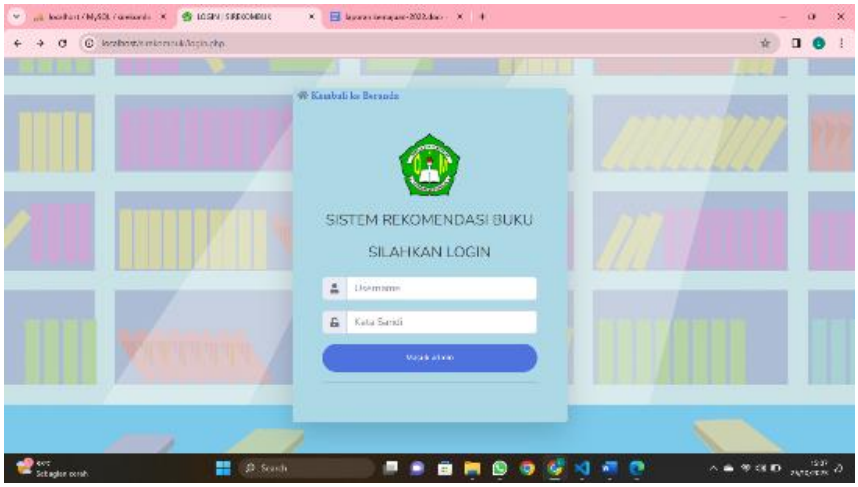

Fig 12. Login Page Image

Moreover, This menu is the main page after the admin logs in. This page will inform you of the amount of book data added by accessing the link "http://localhost/sirekombuk/Admin/index.php. "

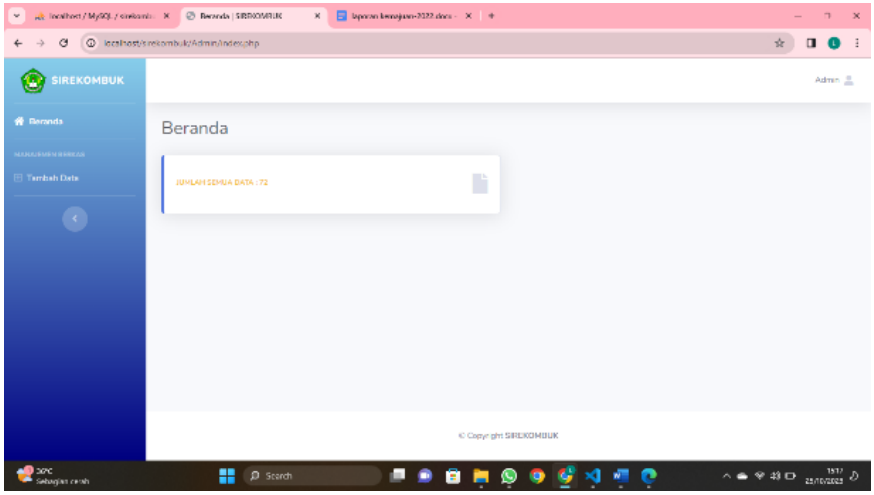

Fig 13. Main page image for admin only

This page has several sidebar menus containing several other menus, namely the Home page; this menu is a menu that, when clicked by the admin, will go to the admin-specific index page as in Figure 13. Moreover, the Add Data Menu will contain all book data. This menu will appear if the admin has accessed "*Kelola_buku.php*." On the Manage Books Admin page, there is a book data display, and we can add book data, view book details, edit books, and delete book data. To add data, you can access the link http://localhost/sirekombuk/Admin/kelola_buku.php; the Page image Manage Books can be seen in Figure 14.

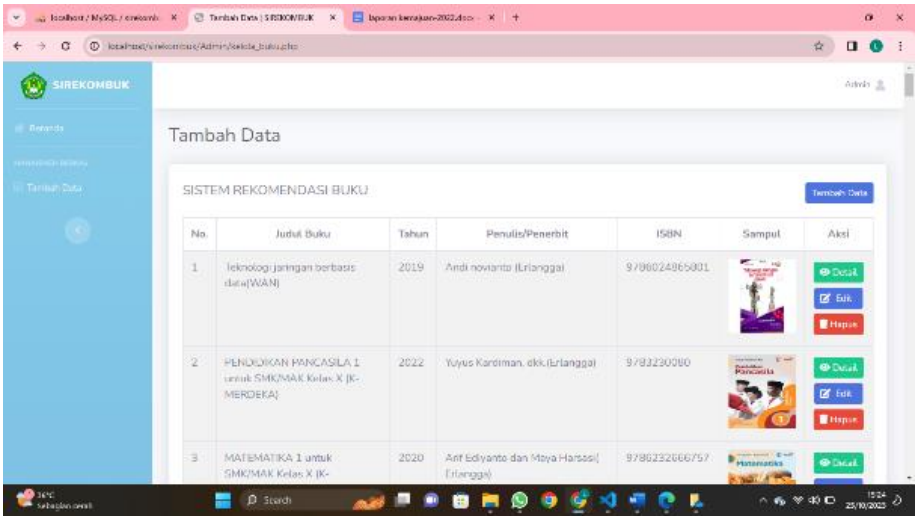

Fig 14. Page Image Manage books

Moreover, to add data, click the button in the top right corner, then add book data, namely book title, year of publication, author and publisher, ISBN, synopsis, and book cover.

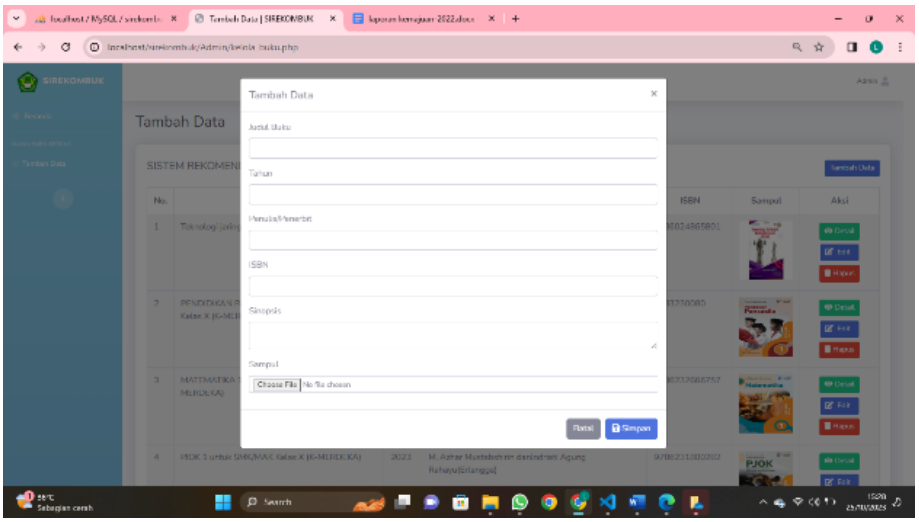

Fig 15. Screenshot of the Add Data Page

If the admin presses the "Add" button, it will go to the capital to add skill program data, as in Figure 15. When the admin presses the "Add" button, the data will automatically be added to the *database* and skills pages. However, when you press the "Cancel" button, it returns to the Manage Books page. There is a notification saying, "Successfully adding data." Moreover, Figure 15 is a Screenshot of the Add Data Page, and Figure 16 is an example of an image of the Add Data Book Page that was successfully added.

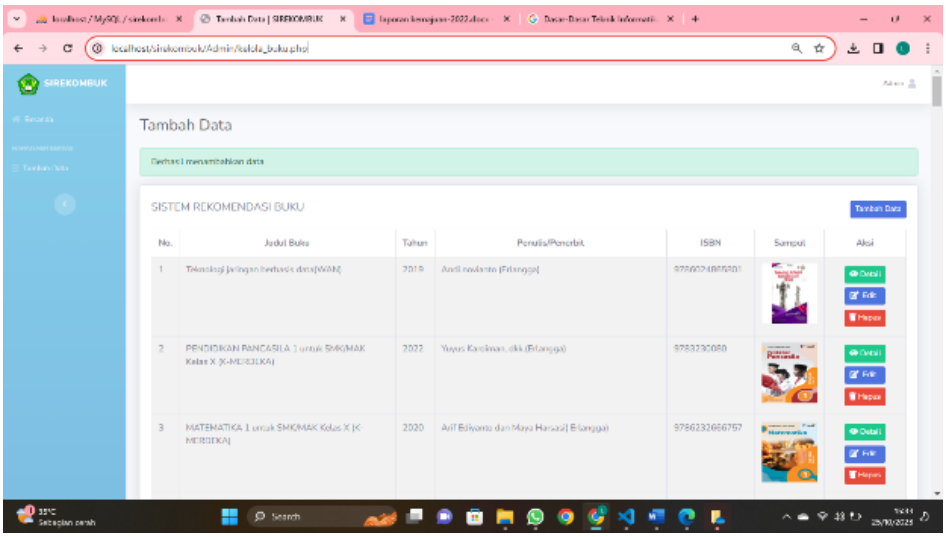

Fig 16. Image of the Add Data Book Page that was successfully added

Then, when the admin presses the "detail" button, the admin will be directed to the "*detail.php*" page to see the book's details. The display of this page can be seen in Figure 16. When the admin presses the "Details" button, the data will automatically change, and when pressing the "Back" button, it will return to the add data page. Figure 17 is an image of the Book Details page example.

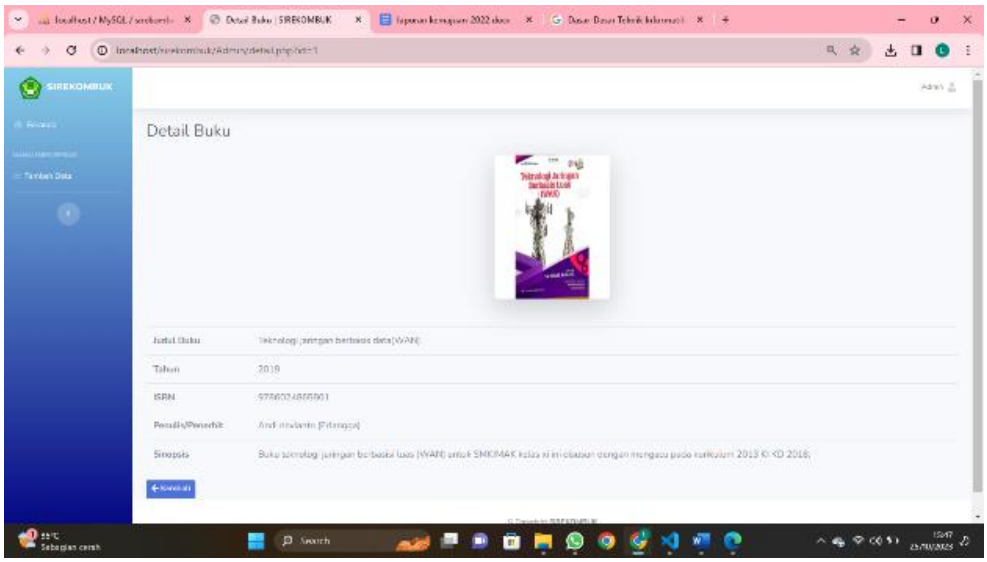

Fig 17. Image of Book Details Page

Then, when the admin presses the "edit" button to change the book data, the display of this page can be seen in Figure 17. When the admin presses the "edit" button, the data will automatically change, and when the "Back" button is pressed, it will return to the Manage book page. The Edit page is required for editing purposes, as shown in Figure 18. Moreover, Figure 19 is an image of the Add Book Data page that has been successfully edited. There is a notification saying, "Successfully editing data."

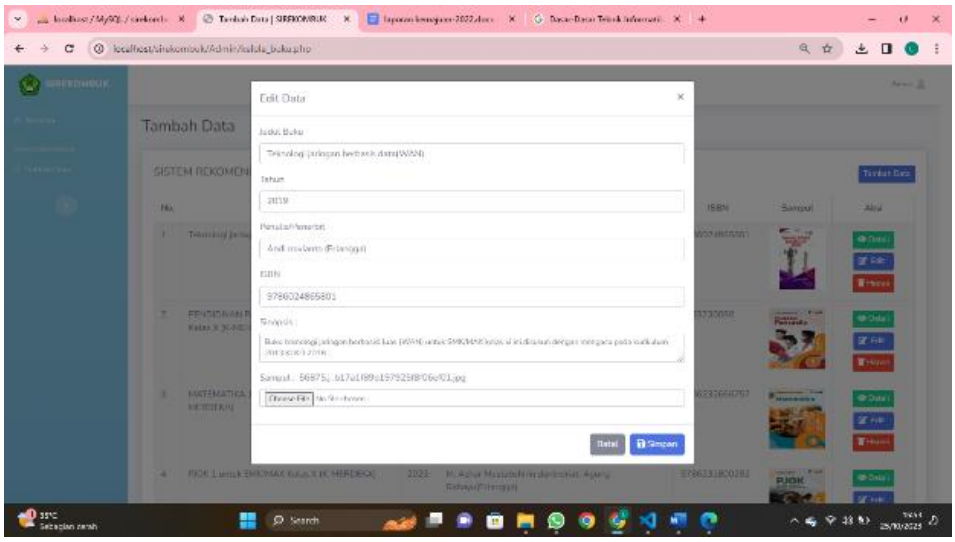

Fig 18. Book Edit Page Image

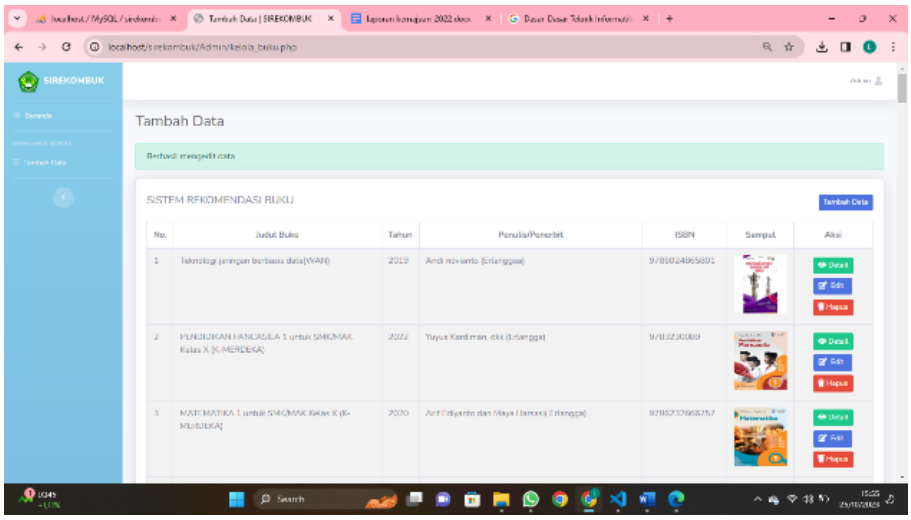

Fig 19. Image of the Add Book Data page that has been successfully edited

Meanwhile, if the admin presses the "delete" button, there will be a successful notification when the data is successfully deleted, as shown in Figure 20. Then, it will automatically return to the Manage Books page. Figure 20 is an example of a book delete page. Moreover, Figure 21 is an example of a notification that the book data deletion process has been successful. There is a notification saying, "Successfully deleting data."

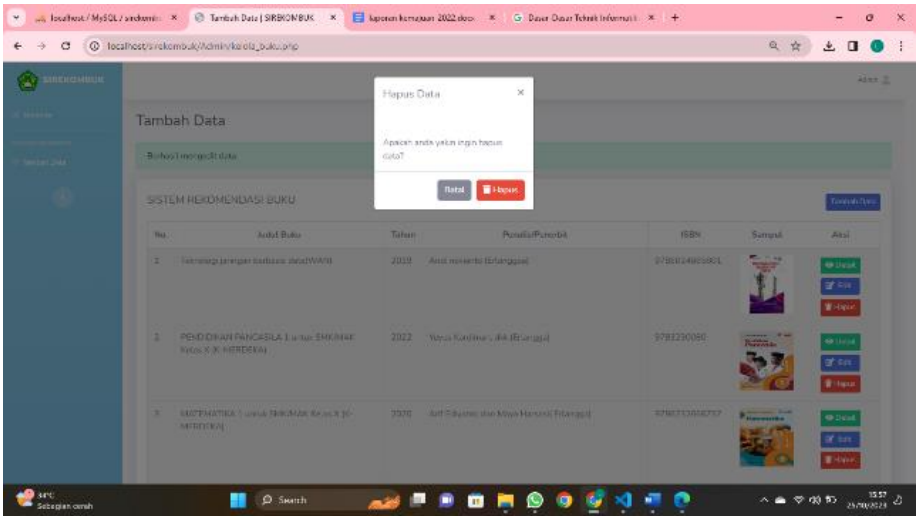

Fig 20. Book delete page.

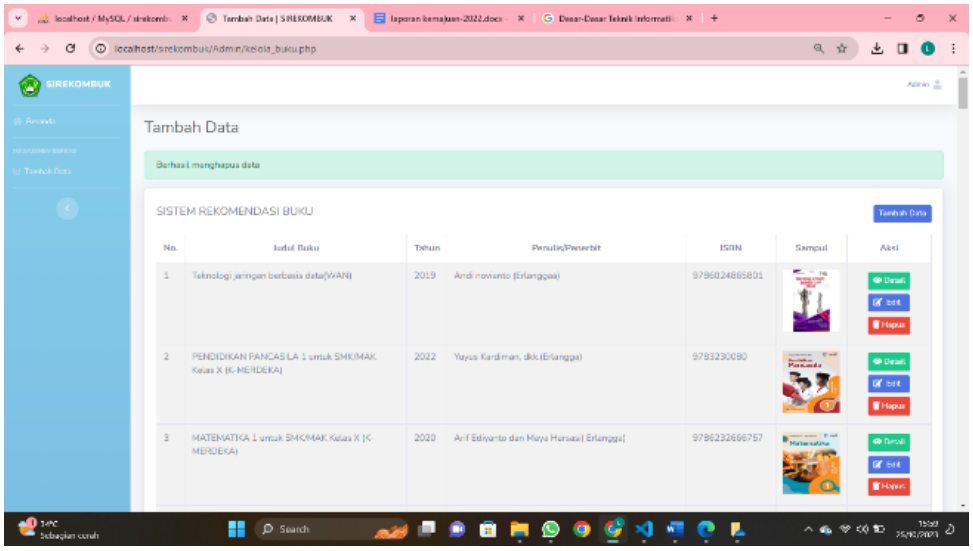

Fig 21. The Delete Book Data page that has been successfully deleted

On this page, when the admin wants to exit, he can click exit and will be given instructions to leave and return; he will remain on the admin page, and if he leaves, he will return to the "*login.php*" page. Moreover, Figure 22 is an example of an Exit page, and Figure 23 is an example of an Exit and Cancel process page.

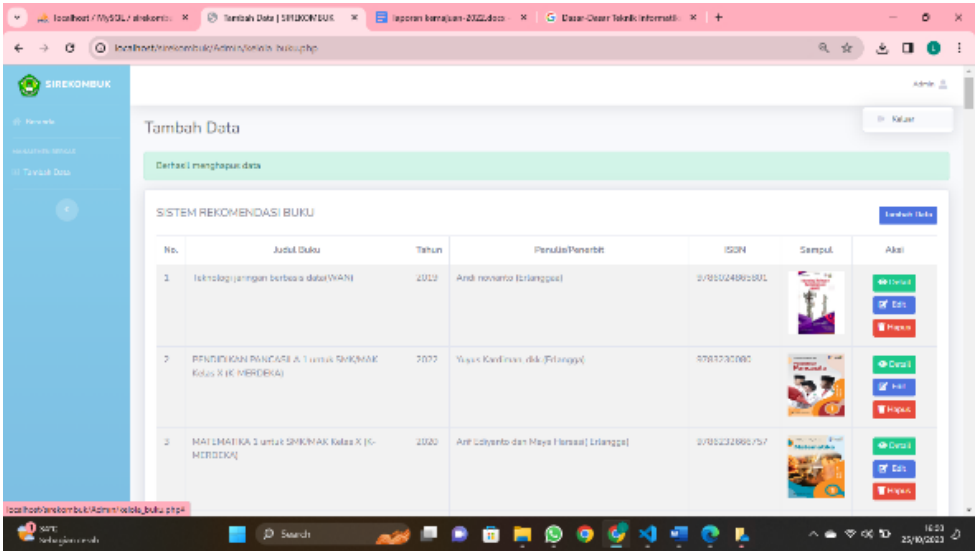

Fig 22. The Exit Page

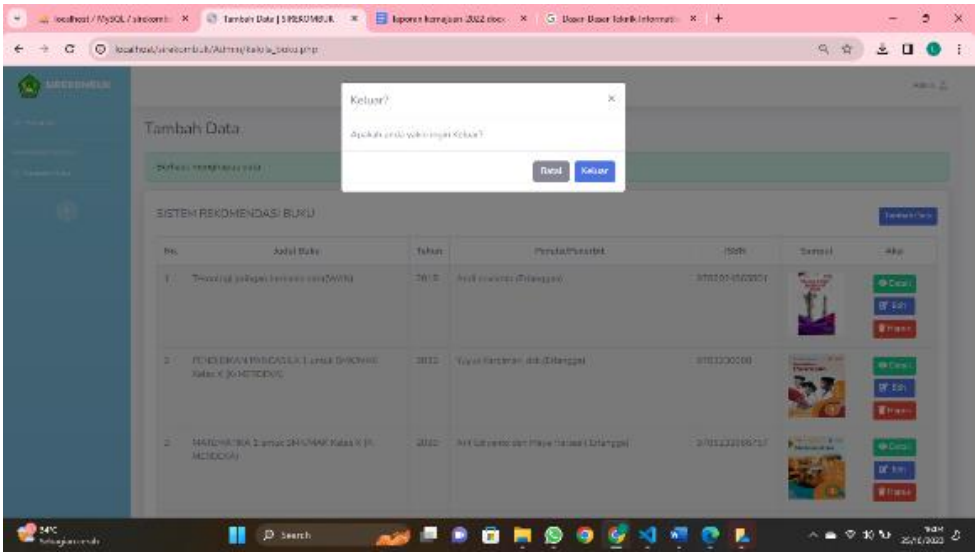

Fig 23. The Exit or Cancel Page

Moreover, the general user page here can be accessed by all users who want to access the Darul Mustofa Bangkalan Vocational School book recommendation system. The initial display of this page can be seen in the following Figure 24.

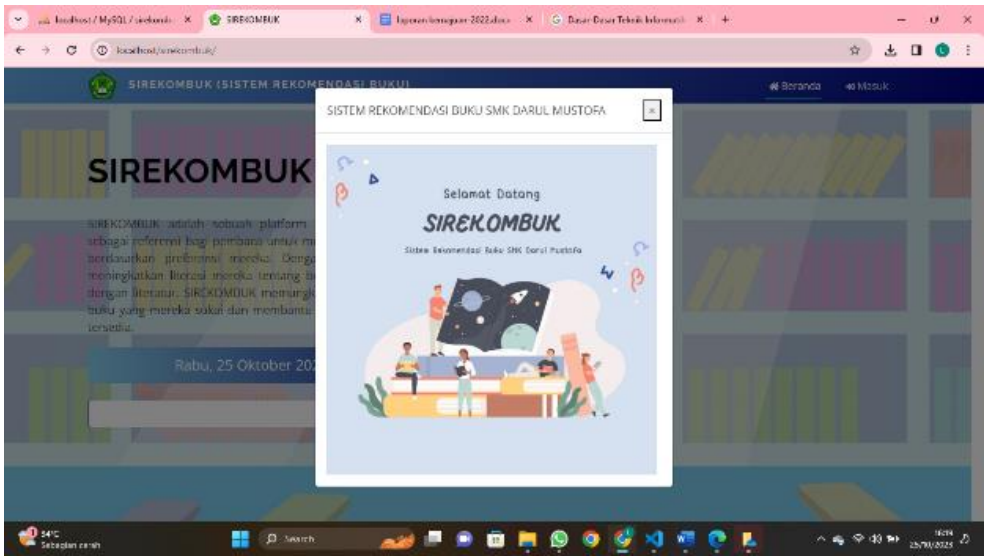

Fig 24. User Page Initial Display

Furthermore, there is a Home and Login navbar for the Home navbar itself, which contains the home page, which has information about SIREKOMBUK, and the day, date, year, hour, minute, and second, to Login itself is the admin login page. Figure 25 is an example of a Home Display of the *Sirekombuk* web page.

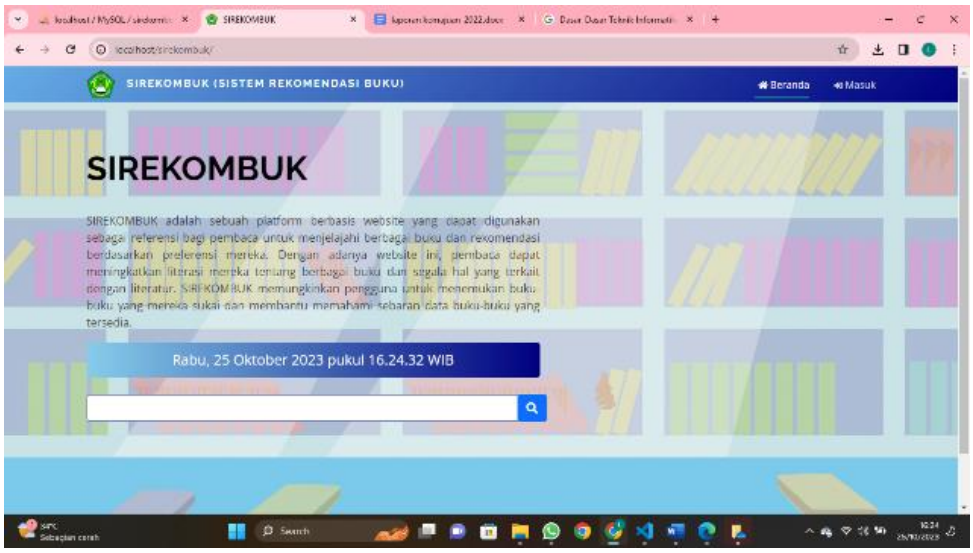

Fig 25. Home Display of *Sirekombuk* web page.

Furthermore, in the search for recommendations menu, teachers and students can search for books by entering keywords (topics) for the books they want to search for. The system will display books according to the keywords entered by the teacher and students. This search process is following user preferences to be given recommendations based on item descriptions. The system will carry out a recommendation process using the content-based filtering method and the TF-IDF algorithm and cosine similarity. Figure 26 shows the search page of Sirekombuk in detail.

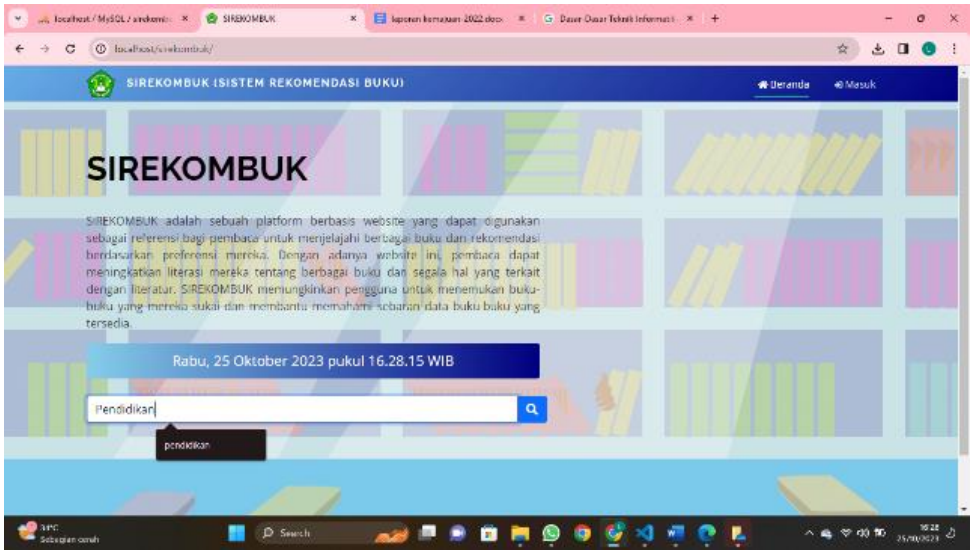

Fig 26. Search Page of *Sirekombuk*

Moreover, after teachers and students enter keywords for the books they want to search for in the search results menu, the system will display 12 books that match the keywords. The 12 books are displayed through data processing and calculations using the TF-IDF and cosine similarity algorithms. The highest score will be included in the top

10 books that will be recommended. Figure 27 is a Search Page Result example of *Sirekombuk.* If the book is not found, a notification will appear that the book was not found, as shown in Figure 28.

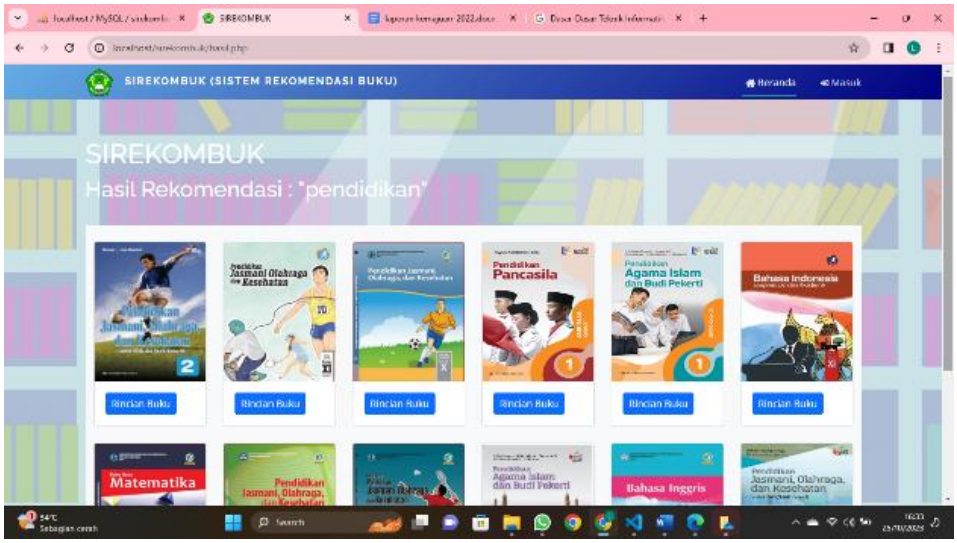

Fig 27. Search Page Result example of *Sirekombuk*

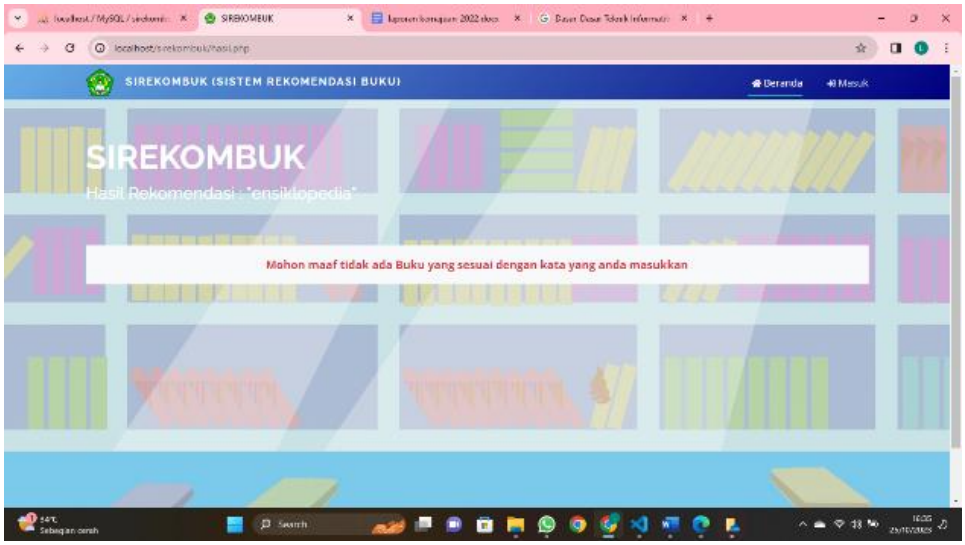

Fig 28. Missing Search Page Result example of *Sirekombuk*

In the search results details menu, after 12 book recommendations are displayed, teachers and students can see the details of the books they want to see. Details of the book with a book synopsis. In the search results details menu, there are other recommendations. Where the recommendation is obtained when the teacher or student looks at the details of the book chosen, these other recommendations are adjusted to the books the teacher or student chose. Calculations were carried out using the content-based filtering method, the TF-IDF algorithm, and cosine similarity. Then, four other book

recommendations are displayed. Moreover, Figure 29 is a detail of recommended books and other recommendations.

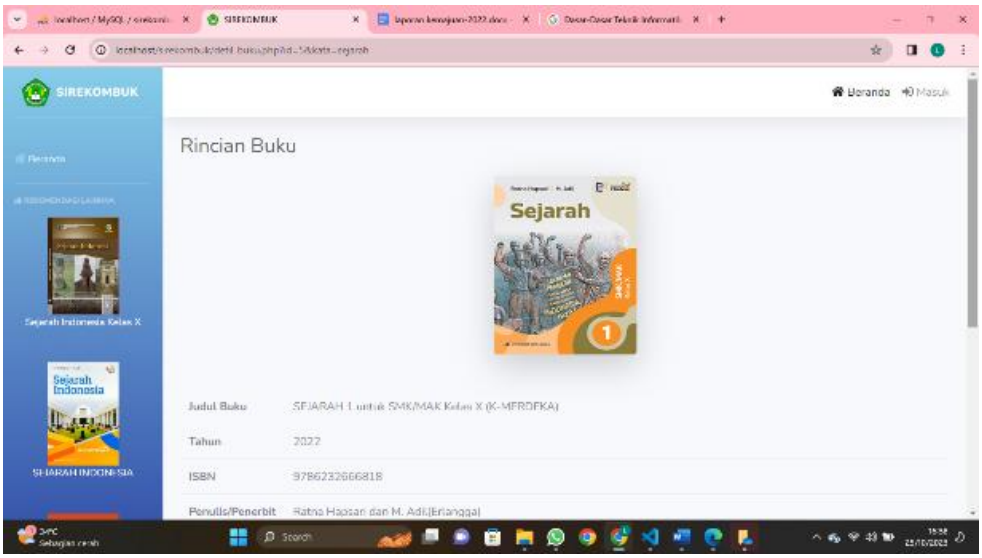

Fig 29. Details of recommended books and other recommendations

Finally, the program testing stages are carried out using the Black Box Testing method. Namely consisting of Website Expert testing, User testing, and System expert testing. The following is an example of a successful website expert test. Table 1 shows the assessment results and rating scale in detail.

Table 1. Assessment result and rating scale of the Sirekombuk Web Application

No	Assessment	Rating Scale				
		SS (Score 5)	S (Score 4)	RR (Score 3)	TS (Score 2)	STS (Score 1)
1	Clarity of menu or navigation used		v			
2	Appropriateness of menu naming or navigation used		v			
3	Suitability of menu size or navigation displayed.	v				
4	Accuracy of menu layout settings displayed		v			
5	Accuracy of color selection of display design	v				
6	Accuracy of font selection	v				
7	Accuracy of font size selection		v			
8	Accuracy of background color selection	v				

No	Assessment	Rating Scale				
		SS (Score 5)	S (Score 4)	RR (Score 3)	TS (Score 2)	STS (Score 1)
9	Color harmony of letters and background	v				
10	Image clarity	v				
11	Accuracy of the size of the displayed image		v			
12	Ease of system operation	v				
13	Ease of accessing information	v				
14	Display of the information presented		v			
15	Overall website appearance	v				

Based on the assessment of product trial results from students, it was stated that the percentage score obtained was 91.4%. Suppose it is included in the response assessment conversion table. In that case, it is concluded that the test results of the school information system product are within the qualifications**"very worth it"** to be used. The final product developed in this research is a Library Book Recommendation System Using Content-Based Filtering. The advantage of the library book recommendation system that has been developed is that the system can provide book recommendations based on keywords or topics desired by the user. If the user does not have a clear reference for the information they are looking for, the user can search for recommendations by entering a topic into the system.

5. CONCLUSION AND SUGGESTION

Based on the results of interface testing and testing using the black box method, it can be concluded that this application runs well and follows the design that has been created. The implementation of the book recommendation system was also successful. System interface testing was carried out on 15 Darul Mustofa Vocational School students. Based on calculations using a Likert scale, the system gets a final score of 91.4%, which means "very feasible." This system can be used as a book recommendation system at Darul Mustofa Vocational School.

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the same discipline, especially how to make WEB-based applications with a dynamic and attractive GUI that is also easy to understand.

AUTHOR CONTRIBUTIONS

All Authors are responsible for building Conceptualization, Methodology, analysis, investigation, data curation, writing—original draft preparation, writing—review and editing, visualization, supervision of project administration, funding acquisition, and have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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