Web-Based Library Application With Brute Force Algorithm Implementation In The Search Module

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Abstract

The library is a means that can support the student learning process so that it must be well organized. However, the data management in the library of SMK Negeri 1 Bakung is still in the books. Data management includes visitor data, book data, and loan transaction data. Besides, students take a long time when looking for the books they need and cannot find out what books are available if they do not come directly to the library. Based on the problems that have been mentioned, a web-based library application is needed. The application is created using the Codeigniter Framework and the Mysql database as data storage by applying the brute force algorithm in the search module. Test results from 10 trials using several search keywords, The brute force algorithm gets an average running time of 0.1631 seconds. Search time speed is influenced by the number of words entered and the form of words in Indonesian and English.

Keywords: *Applications, Libraries, Brute Force Algorithms, Search*

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1. INTRODUCTION

The library is a facility that can support the student learning process. Therefore, the library must be well organized in order to facilitate the learning process at school. The management of library data at SMK Negeri 1 Bakung is still in conventional form. The data management includes book data, library visitor data, and library book borrower data management which is still recorded in the books. The results of data management resulted in many obstacles to be faced, such as errors in recording, inaccurate data reported, and the length of time to search for data when data was needed. Apart from these problems, students will also take a long time in the process of searching for books and cannot find out what books are in the library.

Based on the problem, there is a solution by making web-based applications. Applications created using the Codeigniter framework with the application of the brute force algorithm. A

brute force algorithm is one of the methods in searching for data. Based on the description, the writer takes the title "Web-Based Library Application with Application of Brute Force Algorithm in the Search Module". The application is expected to be able to help admin in data management. Besides that, it can also help students find out what books are available and speed up the search for the books needed.

2. RESEARCH METHODS

2.1. Brute Force Algorithm

The brute-force algorithm is an algorithm used to match patterns with all text between 0 and nm to find the existence of a text pattern. Brute force algorithms solve problems very simply, directly and clearly. The brute force algorithm is a technique commonly used when the compiler of the algorithm considers getting the solution of the problem directly as it is (Sarno, 2012) (in Heny Pratiwi, 2016). [1]

In detail, the steps used by the brute force algorithm to match strings are as follows (in Heny Pratiwi, 2016):

1. The brute force algorithm starts to match the pattern from the beginning of the text.
2. From left to right, the brute force algorithm will match the character per character of the pattern with the corresponding characters in the text, until one of the following conditions is met:
   a. The characters in the pattern being compared match then the search is complete.
   b. If there is a mismatch between pattern and text, then the search is not suitable and has not been successful.
3. Then the brute force algorithm continues to shift the pattern by one to the right, and repeats step 2 until the pattern is at the end of the text.

2.2. Library

According to Sutarno NS (2003: 7), a library is a room, part of a building/building, or the building itself, which contains a collection of books, which are arranged and arranged in such a way that they are easy to find and use whenever necessary for the reader.. [2]

2.3. Codeigniter

According to Elislab (2013) (in Herdianto 2014: 14) Codeigniter is a framework for building PHP-based web applications. Codeigniter provides many libraries for common functions, simple interface, and logical structure. [3]

2.4. Flow chart

Flow chart are steps to solve problems that are written in the form of a particular symbol which will show the flow of a program logically. Besides being needed as a communication tool, this flow chart is also needed as a documentation tool (Lamhot Sitorus, 2015: 14). [4]

2.5. DFD (Data Flow Diagram)

Data flow diagrams (data flow diagrams - DFD) are diagrams that use symbols to present entities, processes, data flows, and data storage associated with a system. Entities in DFD are external objects in the system being modeled (Dewi and Arnos, 2007: 79). [5]

2.6. ERD (Entity Relationship Diagram)

Entity Relationship Diagram (ERD) is a diagram used to design tables which will later be implemented in the database. ERD is formed based on 3 elements, namely entities, attributes and relationships (Feri and Fajri, 2015: 100). [6]

2.7. System planning

1. Flow chart

Flow chart or application system steps are in the image below. Image 2.1 is a system flowchart for admins, while image 2.2 is a system flowchart for users.
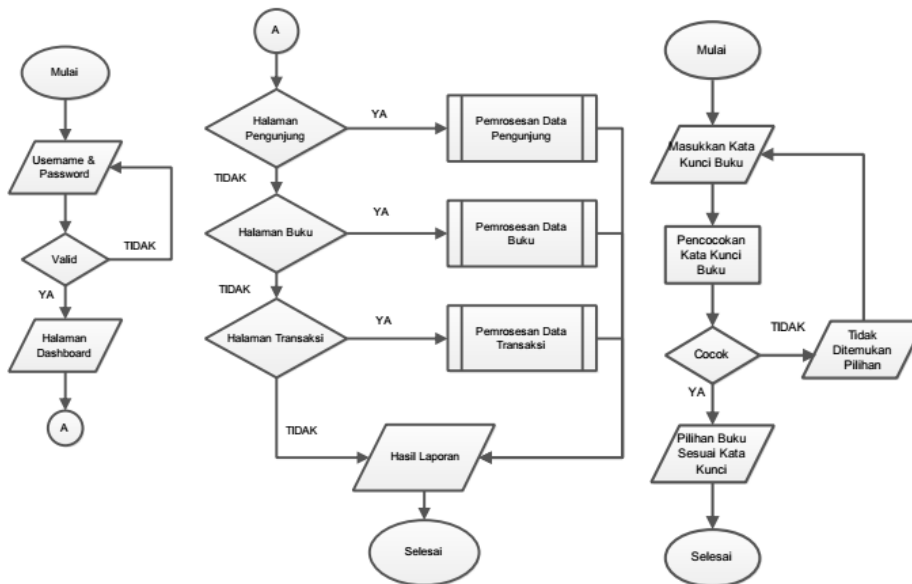

Image 2.1 Admin Flowchart   Image 2.2 User Flowchart

2. DFD (Data Flow Diagram)

Image 2.3 below is an application flow diagram

Image 2.3 DFD

3. ERD (Entity Relationship Diagram)

Image 2.4 below is a table design along with the attributes used in the system. The table consists of visitors (no (as primary key), name, class, department and visit date), book (no (as primary key), code, title, author, publisher, year, category, description, rack number), transaction (id (as primary key), name, class, department, book_title, borrow_date, return_date, borrow books status, fine and phone number) and admin (id (as primary key), username, password).

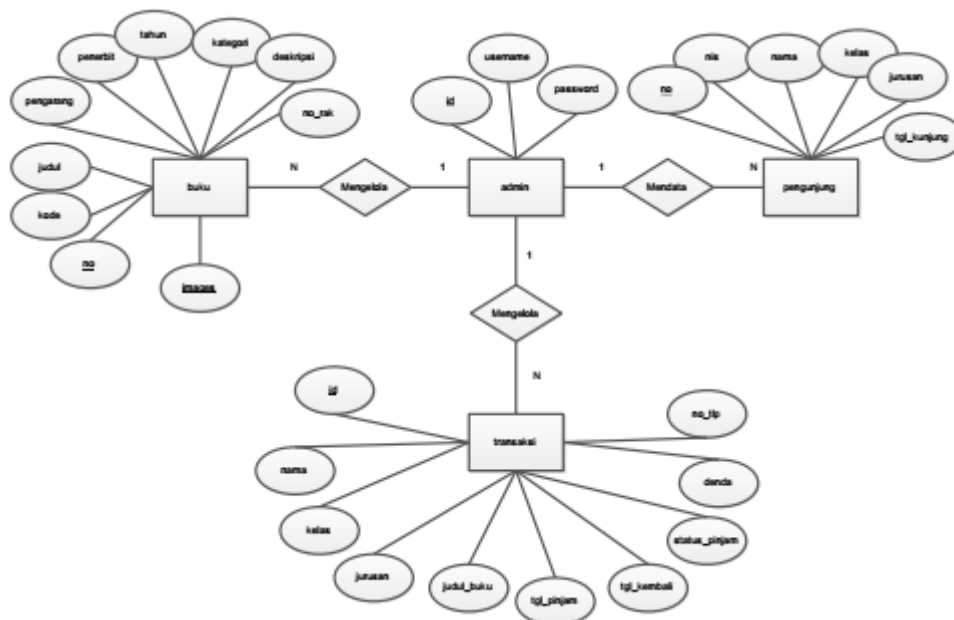Image 2.4 ERD

4. Layout Design

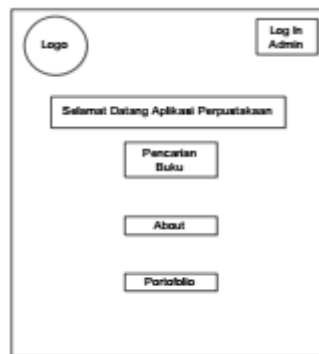Image 2.5 to Image 2.7 below is a system layout design

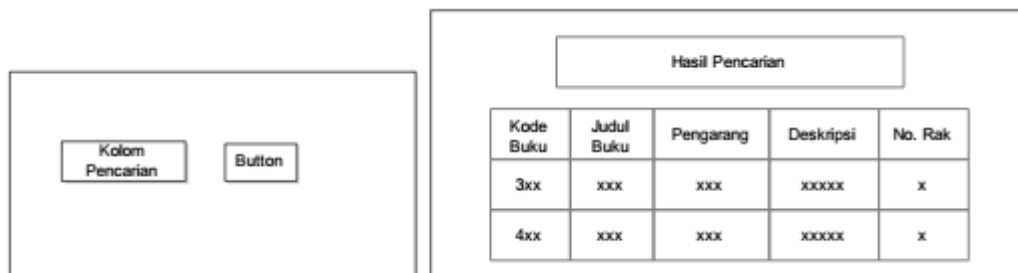Image 2.5 Application Home Page Design

Figure 2.6 Admin Display Design

Figure 2.7 User Display Design

3. RESULTS AND DISCUSSION

3.1. Implementation

1. **Application Home Page View**

Image 3.1 Application Home Page View

In image 3.1 is the application's Home page. There are two buttons, namely the book search button (user) used to go to the book search page, and the login admin button used to log in to the admin page. There is also an about which contains a brief description of the application and a portfolio containing several photos.
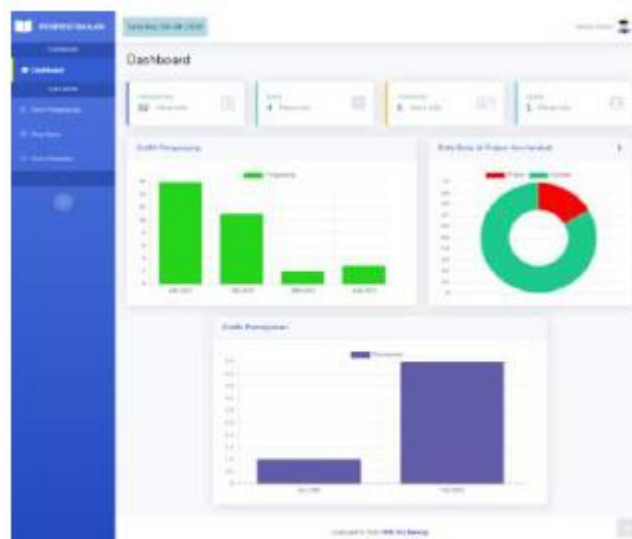
2.   **Admin Page Views**

Image 3.2 Admin page

Image 3.2 is the admin page. On the admin page, there is a menu of visitor data, book data, and borrowing transaction data. There is also a chart of loan transactions and a graph of the number of visitors each month.

3.   **User Display**

a. **Book Search page**

Image 3.3 Book Search Page

Image 3.3 is a book search page. This search uses keywords with the book title, author, publisher, category, and year.

b. **Book View page**

Image 3.4 Book View Page

Image 3.4 is a page view of the book. This page contains a list of books containing images, book titles, authors, book descriptions, and book stock.

c. **Search Results page**

Image 3.5 Search Results Page

Image 3.5 is a page display of book search results on the user's side. This page contains search results based on the title of the book you are looking for it. This page displays a book code, book title, book stock, author, book description, and bookshelf number

3.2. Testing

The test results in this study are the running time of each word search using the brute force algorithm. As for more details, see table 4.1 below:

Table 4.1 Running Time Results

No	Pattern	Running Time (second)
1	desain	0.1588
2	english	0.1873
3	express bahasa	0.1494
4	erlangga	0.1582
5	matematika	0.1659
6	perikanan	0.1482
7	produksi pakan	0.1750
8	andi	0.1649
9	2016	0.1688
10	laut	0.1545
TOTAL		**1.6310**
Rata-rata		**0.1631**

Based on the results of the running time in the table above, it can be seen that the fastest time to search using the keyword "perikanan" is 0.1482 seconds. Meanwhile, the longest search time using the keyword "english" with 0.1873 seconds. So the speed in the search can be affected by the number of words entered for the search and the form of words in Indonesian and English

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that are as follows:

1. This library application is built by the system design that has been made, namely flowchart, DFD, ERD, and application display design. Making this application uses the Codeigniter Framework and MYSQL database which is used for data storage. The library application uses the application of the brute force algorithm in the search process.

2. In a book search with ten trials using several search keywords such as title, author, publisher, category, and year, the brute force algorithm obtained an average result of 0.1631 seconds. Search time speed is influenced by the number of words entered for the search and the form of words in Indonesian and English.

5. SUGGESTION

Based on the results of the conclusions that have been described, the following suggestions can be taken:

1. Added feature to export PDF per date period and export to Excel.
2. Added features for borrowing that can be directly accessed and filled by Students

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