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Information Record Software for the Implementation of Merdeka Belajar Kampus Merdeka (MBKM) (Case Study MBKM Darmajaya)

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Abstract **-- MBKM was officially launched by the Ministry of Education, Culture, Research, and Technology (Ministry of Education and Culture) in early 2020 to build high-quality and character-driven human resources. The current support system, especially in the MBKM activities at Darmajaya University, is still insufficient. The processing of student data participating in the MBKM program is still carried out manually using Microsoft Excel or separate Google Forms applications, meaning there is no dedicated system in place. This study aims to develop an information system that can support users in providing management information system services for the MBKM program within the Darmajaya Informatics and Business Institute. This research developed using the Extreme Programming (XP) method, namely software development that pursues an object-oriented approach, which consists of several steps including the planning process (planning), the system design process (design), the process of making program coding and the testing process through program testing, so that system development is in accordance with the objectives and needs of users. The result of this research is a software or information system for implementing Merdeka Belajar - Merdeka Campus based on Mobile Web, which developed to support admission, selection, monitoring and reporting activities for management. Users can manage MBKM activities easily starting from activity registration, guidance, and MBKM activity exams through this information system. This MBKM activity information system was successfully built and can help IIB Darmajaya in managing MBKM activities. Users also consider the MBKM activity information system easy to use.**

Keywords-Darmajaya, MBKM, system, Linear Search Algorithm (*key words****)***

I. INTRODUCTION

MBKM program is one of the breakthroughs of the Ministry of Education, Culture, Research and Technology (Kemendikbudristek) in building quality and character human resources, the MBKM program is expected to be able to prepare graduates who are resilient in facing social, cultural, world of work, and technological changes that continue to develop rapidly, student competencies and skills must be strengthened in accordance with current developments.

Merdeka Learning - Merdeka Campus (MBKM) there are 8 (eight) forms of learning activities (BKP), based on Permendikbud number 3 of 2020. The form of learning activities outside of college can be participated in by all students, these programs are: (1) Student Exchange; (2) Internship / Work Practice; (3) Teaching Assistance in Education Units; (4) Research / Research; (5) Humanitarian Projects; (6) Entrepreneurial Activities; (7) Independent Study / Project; (8) Building Villages / Thematic Real Work Lectures. Students can focus on the MBKM program they are in; each student who participates in the program is entitled to a value conversion of 1 semester or the equivalent of 20 credits. [1]

MBKM Darmajaya has the main task of providing information services and managing student data in the MBKM program within the Darmajaya Institute of Informatics and Business. In carrying out its duties, MBKM Darmajaya organizes functions, among others:

1. Monitoring and evaluation of program implementation;
2. Preparation of information and reports on the implementation of activities;
3. Collection, processing and presentation of data and information;

The system support currently available especially in the MBKM Darmajaya section in supporting these operational activities is very unsupportive. Student data processing is currently still done manually using the Microsoft Excel application, which means that it does not have a special

system. Data storage facilities are still carried out using hardcopy which requires a large enough room. or not yet using an information system, so a problem arises such as the difficulty of processing and searching for student data participating in the program. As well as making it difficult for the campus to calculate the number of students participating in the program, because the number continues to grow from various study programs.

Therefore, it is important to have a system as a forum for managing the Merdeka Belajar - Kampus Merdeka Program, starting from inputting MBKM program data, student registration, monitoring and evaluating the implementation of MBKM and reporting MBKM activities. The system developed is based on Mobile Web, so it is easier and more effective and can be accessed anytime and anywhere. In addition, based on previous research conducted by (Adi Supriyatna, 2018) that

The Extreme Programming (XP) method is a software engineering process that tends to use an object-oriented approach and the target of this method is a team formed on a small to medium scale and this method is also appropriate if the team is faced with unclear requirements or very rapid changes in requirements.

II. THEORETICAL FRAMEWORK

A. *Extreme Programming*

Extreme Programming is the most commonly used part of agile software development. Extreme Programming (XP) is a software development that pursues an object-oriented approach and this method targets teams that are made on a small to medium scale and this method is also suitable when the team is faced with unclear requirements, or if there are rapid changes in requirements. The XP method simplifies the various phases of information system development to make it more efficient, adaptable and flexible. The basic values of extreme programming are: Communication, Courage, Simplicity, Feedback and Quality Work. [8]

Here is an image of the Extreme Programming model:

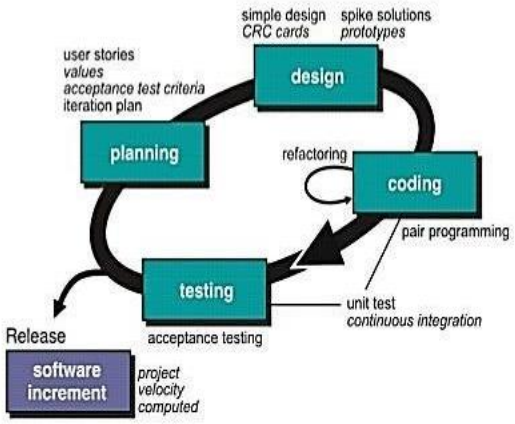


Fig. 2.1 Extreme Proramming [8]

XP uses the concept of an object-oriented approach and also has four activity frameworks, namely:

a. Planning

The Planning activity starts with gathering requirements that allow the technical members of the XP team to understand the business context of the software and get a complete picture of the required deliverables and functionality of the software being built,

b. Design

Design in XP follows the KIS ("Keep It Simple") principle. Simple designs are preferred over complex designs. Design for additional functionality is discouraged (as developers will be asked for it later). XP uses CRC (Class Responsibility Card) as an efficient mechanism for object-oriented thinking in software.

c. Coding

Once the story is developed and the initial working design is finalized, the XP team doesn't move straight into coding, but instead develops a series of unit tests to run against each story. Once unit tests are created, developers focus more on what needs to be done to pass those tests. There is nothing superfluous to add (KIS principle). Once the code is ready, it can be tested immediately, providing immediate feedback to the developer

d. Testing

After the coding stage is complete, then the system testing stage is carried out, where we know what errors occur during the application and whether the system made is in accordance with user needs.

B. *Linear Search Algorithm*

Sequential Search is also known as linear search. Linear search is one of the simplest and most basic search algorithms that works using a brute force approach and tries different ways to find the item you want. For example, find the value 36 from the data array {12, 7, 30, 28, 2, 19, 36, 21, 16, 9}. The linear search initially starts by comparing/matching the value of 36 with the first element/index [0] which is 12, because 12 does not match the search criteria (12 != 36) then the search continues by comparing the value of 36 with the next element, until the matching element is found. Namely index [6] where 36 == 36. An illustration of how linear search works can be seen in Figure 2. [9]

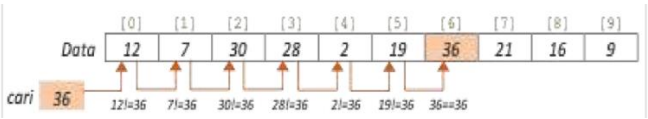


Fig. 2.2 Example of Linear Search [9]

The linear search algorithm process is as follows: [10]

1) First, the data is compared one by one with other data searched in the dataset until the data is found or not found.
2) Basically, this search just repeats the data from 1 to the number of data (n).
3) At each repetition, the 1st data is compared with the data to be searched.
4) If the data matches what you are looking for, then the data has been found. On the other hand, if until the end of repetition there is no similar data, it means that the data is not found.

Linear search algorithm sequence:

1) i <- 0
2) Meet <- false
3) As long as (not found) and (i < N) do line 4

4) If (Data[i] = key) then found <- true Otherwise i <- i + 1
5) If (Found) then i is the index of the searched data

III. METHODOLOGY

The method used is adjusted to the initial research objectives, namely to build an MBKM student data management information system with the required *website-based* system and in an effort to support the improvement of MBKM performance within the Darmajaya Informatics and Business Institute.

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

A. Software Development Method (Extreme Programing)

The method used in this research is the *Extreme Programing* model with the following stages:

a. Planing

At this stage, determine the planning to find out why the system must be made and determine how to build the system. The planning stage is also carried out to determine the things needed in the implementation of making software engineering information systems for managing student data management that participates in the web-based MBKM program carried out in the MBKM section of IIB Darmajaya.

b. Design

1) Use Case Diagram

Actors or users of this system are Admin (MBKM IIB Darmajaya) and Users (IIB Darmajaya Students).

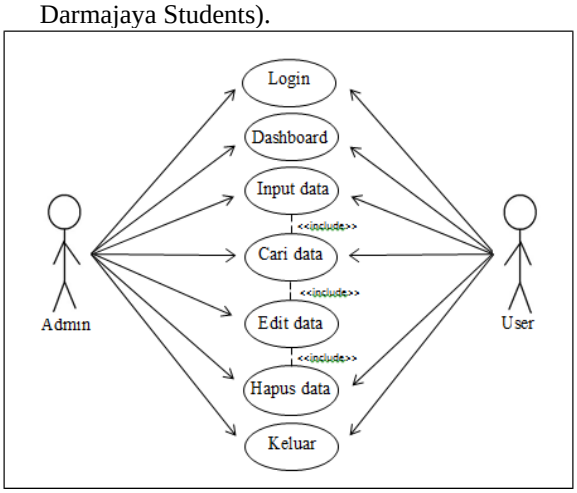


Fig 3.1 Use case diagram

2) Activity Diagram

Activity Diagram of data search done by admin can be seen in the picture below:

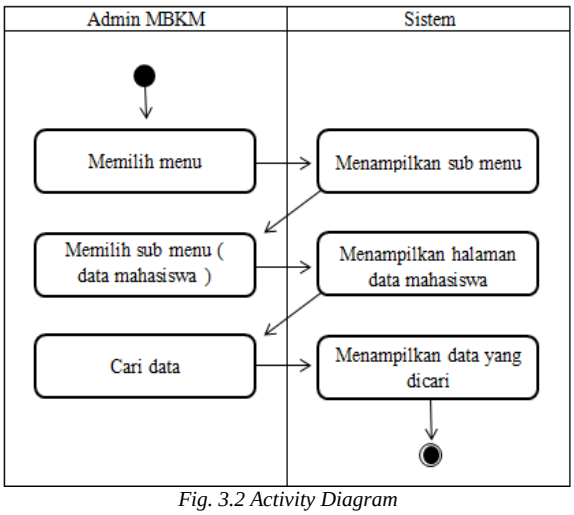


Fig. 3.2 Activity Diagram

c. Coding

In the application stage, the process of translating data or solving problems that have been designed is carried out.

d. Testing

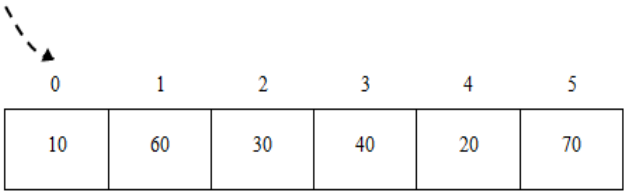
After all stages have been completed, the next step is to test the program to find out whether there are errors or not in the program that has been made.

B. Linear Search Algorithm

Researchers used a linear search algorithm as an algorithm for searching student data on the system. This algorithm was chosen because it can perform a simple search in a fast time.

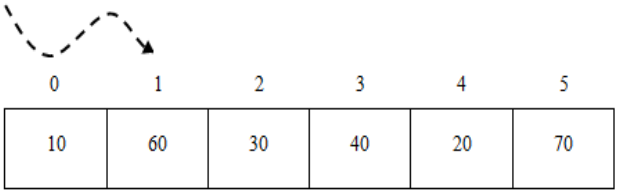
For example, we will search for "20" data, then the search process with the linear search algorithm is as follows:

a) First, the search starts from the first data element in the row.



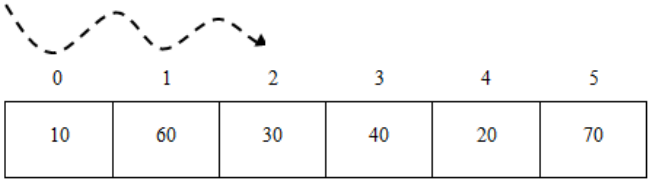
N = 20 : X = 20
I = 1 (10) : Meet = *False*
While (10 <= 20) *And Not* (*False*) → *True*
If (20 = 10) Then → *False*
I = 0 + 1 = 1

b) The data is not found, the search continues to the second data element of the row



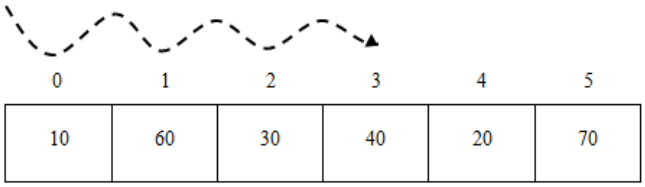
While (60 <= 20) *And Not* (*False*) → *True*
If (20 = 60) Then → *False*
I = 1 + 1 = 3

c) No data found, search continues to the third row element data



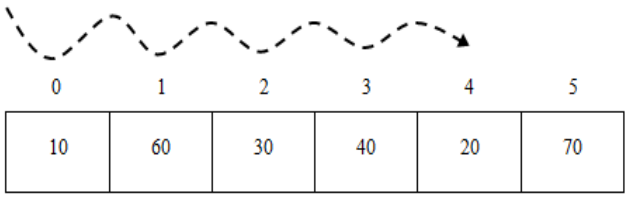
While (30 <= 20) *And Not* (*False*) → *True*
If (20 = 30) Then → *False*
I = 2 + 1 = 3

d) No data found, search continues to the fourth row element data

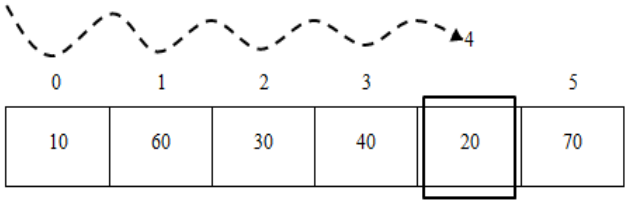


While (40 <= 20) *And Not* (*False*) → *True*
If (20 = 40) Then → *False*
I = 3 + 1 = 4

e) No data found, search continues to the fifth row data element



While (20 <= 20) *And Not* (*False*) → *True*
If (20 = 20) Then → *Thrue*
Meet = *Thrue*
If (*Thrue*) *Then*



Print 20. "found"

The data was found on the fifth row and the linear algorithm search worked well.

IV. Result and Discussion

A. *Results*

The results of the study are the results of software design and implemented into a web-based application. Here are the results of the application that has been designed:

1) *Dashboard Page*

The dashboard page displays statistics of IIB Darmajaya students in the MBKM program.

Fig.4.1 Dashboard page

2) *Registration and Login Page*

The registration page can be used by students who do not yet have an MBKM Darmajaya account, the login page includes admin and student logins (multi-user).

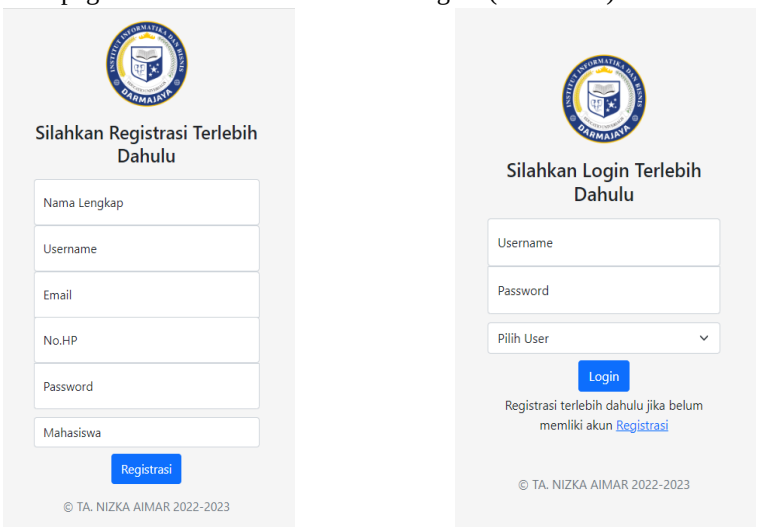


Fig. 4.2 Registration & Login Page

3) *Home Page*

The main page covers the meaning and benefits of MBKM as well as MBKM statistics at IIB Darmajaya.

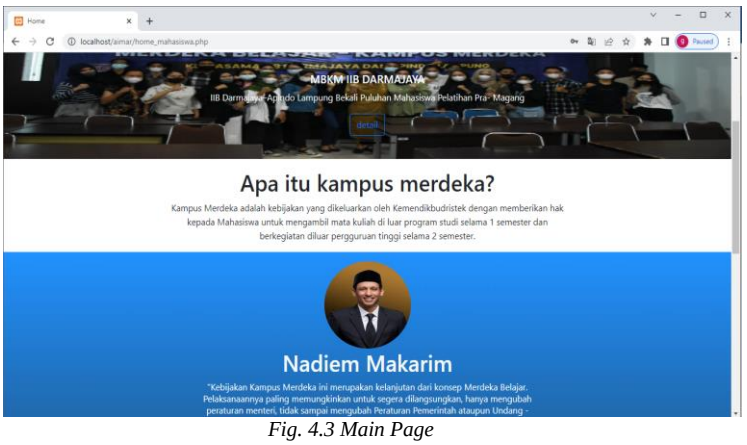


Fig. 4.3 Main Page

4) Program List Page

The program list page will display all MBKM programs according to the programs found on the independent campus in an orderly manner.

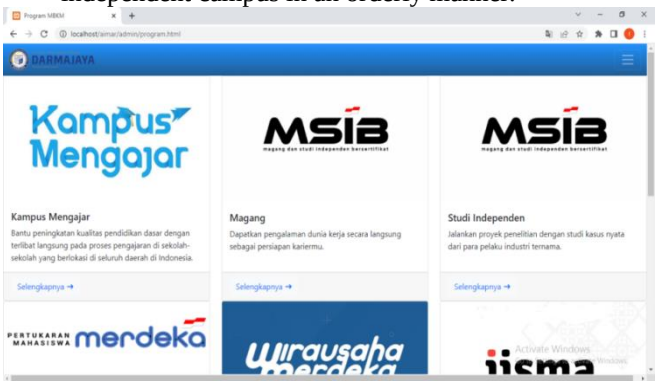


Fig. 4.4 Program List Page

5) Student Data Page

Student Data Page (Student), can only view and search student data.

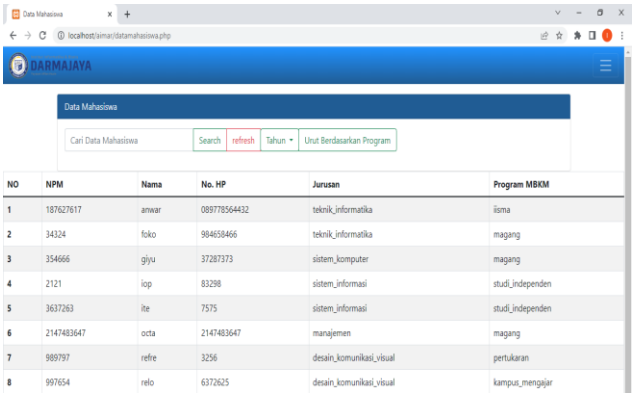


Fig. 4.5 Student Data Page

B. *Discussion*

In order to obtain maximum results from the application of the system that has been built, it is important to carry out the testing process first. This test is intended to evaluate the results of the MBKM IIB Darmajaya integrated system with the black box testing method.

1) Test Plan

Here are some test plans that are carried out in order to find out whether the system runs as desired or there are still errors in the system.

Table 4.1 Admin Page Testing

Requirements that are tested	Test item	Test type
Admin login	Admin logs into the system	Black Box
Validate student data	Admin validates whether the student passed or not	Black Box
Add student placement data	Admin adds placement data on graduating students	Black Box
Search student data	Admin searches for student data	Black Box
Delete student data	Admin deletes student data	Black Box

Table 4.2 User Page Testing

Requirements that are tested	Test item	Test type
MKBM account list	Students register before logging in	Black Box
Student login	Students login to the system	Black Box
List of MBKM Programs	Students register for the MBKM program that will be followed	Black Box
Edit data	Students change data if they enter the wrong data	Black Box
Search Student data	Students search for data	Black Box

2) Test Cases and Results

Here are some test cases and the results of the tests:

Table 4.3 Admin page test results

Requirement	Test scenario	Expected results	Test results
Login	Login input (if correct)	Display the dashboard page	As per
	Login input (if false)	Login failed statement appears	
Validate student data	Validate student data (if passed)	Student data appears in the graduated table	As per
	Validate student data (if not passed)	The student's daa does not appear in the table	
Add student placement data	Add student placement data (if correct)	The placement in the student data table will appear	As per
	Add student placement data (if wrong)	An error statement will appear	
Search student data	Search for student data (if correct)	Display the student data searched	As per
	Search student data (if wrong)	Data not displayed	
Delete student data	Delete student data (if true)	Student data deleted	As per
	Delete student data (if incorrect)	An error statement will appear	

Table 4.4 User page test results

Requirement	Test scenario	Expected results	Test results
Register	MBKM account list (if correct)	Login page displayed	As per

	MBKM account list (if wrong)	Registration failed statement appears	
Login	Login input (if correct)	Display the dashboard page	As per
	Login input (if false)	Login failed statement appears	
List of MBKM programs	Apply for MBKM program (if correct)	Data is successfully inputted into the system	As per
	Apply for MBKM program student (if wrong)	An error statement will appear	
Edit data	Edit data (if correct)	Data edited successfully	As per
	Search student data (if wrong)	An error statement will appear	
Search student data	Search for student data (if correct)	Display the student data searched	As per
	Search student data (if wrong)	Data not displayed	

V. CONCLUSION

Based on the results of the analysis and discussion that has been carried out, several conclusions can be drawn, among others, as follows:

1. Users can manage MBKM activities easily starting from activity registration, guidance, and MBKM activity exams.
2. This MBKM activity information system was successfully built and can help IIB Darmajaya in managing MBKM activities.
3. The system is built based on a website, so that it can be accessed anywhere and anytime through their respective devices.
4. The MBKM activity information system is considered very easy to use by users.
5. Based on the testing and evaluation process of the program by users, it states that users are satisfied with the existence of this MBKM activity information system.

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