CLIMBING INFORMATION SYSTEM DESIGN WEB-BASED MOUNT GEDE PANGRANGO USING THE WATERFALL METHOD

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ABSTRACT

Mountain climbing is a popular activity among the Indonesian community. In the current digital era, websites can serve as an effective platform to facilitate communication and collaboration among mountain climbers. This research aims to design and develop a website for the Indonesian mountain climbing community using PHP, HTML, and CSS programming languages, with a case study on Mount Gede Pangrango. The research methodology includes needs analysis, website design, and implementation. The waterfall method is employed in the system development, and testing is conducted using black box testing and usability methods. In the implementation phase, coding and page design are carried out according to the pre-established design, including color selection, typography, and layout settings. This research results in a website designed and built to facilitate climbers planning to ascend Mount Gede Pangrango. After several trials, the website received overwhelmingly positive responses from respondents, with an average rating of 90%. This result indicates that the website effectively assists users in obtaining information about climbing Mount Gede Pangrango.

Keywords: *Website, Mount Gede Pangrango Climbing, Waterfall*

1. INTRODUCTION

Information systems are applications that are organized procedurally, methodically and systematically, and when used, create valuable and profitable information for managing an organization to achieve its goals. One instrument that helps management process organizational data with sufficient capacity is an information system. The benefits of this information system include ease and speed in searching for data across large data sets, as well as speed and accuracy in processing data with a fairly large capacity. This information system is very helpful for all institutions, both private and public, because of the advantages and ease and speed of data processing [1].

Many Indonesian people, especially young people, enjoy the sport of mountain climbing. The happiness that comes from climbing mountains comes from a variety of experiences, from enjoying the extraordinary natural beauty that God has created to learning valuable lessons from these experiences [2]. One of the mountains that attracts climbers is Mount Gede Pangrango. Mount Gede is part of Gede Pangrango National Park, one of five parks officially recognized as national parks in Indonesia in 1980, according to Wikipedia. This mountain is located in Cianjur and Sukabumi districts [3]. Other research that has developed websites includes websites monitoring climbers with GPS [4], [5], information media for beginner climbers [6], virtual mountain climbing applications [7], and tracking climbers with embedded systems [8]. This research still needs to be developed because the features developed do not yet fully serve the needs of climbers

Websites can be a useful tool for promoting communication and cooperation among mountaineers in the contemporary digital era. A website is a network of interconnected pages used to display text, still or moving images, animation, sound, and/or a combination of these elements in static or dynamic form [9]. Building a Web climbing object information system is an application designed to process climbing object data, which can be accessed directly by

climbers. This system aims to produce information about climbing on Mount Gede Pangrango to make it easier for climbers to get information, especially for beginner climbers.

2. RESEARCH METHODOLOGY

The method used in this research is qualitative method. The aim of qualitative research is to better understand human or societal events by providing in-depth insight from informant sources, conducting research in a natural context, and producing in-depth and complex images that can be conveyed through words. Because qualitative research is useful for analyzing natural objects (in contrast to experiments), this research is based on a post-positivist worldview. The researchers served as an important tool, and the data sources and sample selection were chosen purposively and through snowballing methods. Inductive/qualitative data analysis is used in conjunction with triangulation (combination) data collection procedures. Findings from qualitative research emphasize significance more than anything else [10].

In this research, we used a workflow as presented in Figure 1. We started with data collection to evaluation. The explanation is as follows:

1. Collecting Data
   At this stage, we collect data related to information about Mount Pangrango, including climber data, hiking trails, climber basecamp, and other data.
2. Requirement Analysis
   We carry out an analysis of the system's main requirements, where we list what system functionalities are provided. The entities involved are also discussed and given appropriate access rights. Then, ranking is carried out to determine the priority of the main requirements.
3. System Design
   The results of the requirements analysis are used to create logical and physical system designs. We design the access rights that all entities require and the data flow diagram between entities.
4. Implementing Website
   This stage is the website development stage, accomplished locally and then uploaded to hosting for testing.
5. Testing
   Testing is carried out in 2 stages, namely functional and usability testing. Functional testing is to assess feature services for all entities, while usability testing is carried out to assess ease of operation for both admins and users.
6. Evaluating
   The final stage in this research is evaluating the system to assess how good it is and how much it contributes.

3. RESULTS AND DISCUSSIONS

3.1 System Implementation

The final step in creating an application system is system implementation. Administrators and users can use the completed system after the analysis, design, coding and testing phases are complete.

System implementation refers to the step in the software development cycle where previously planned and designed software begins to be transformed into a functional form. This is an important stage in the development cycle. System implementation is also a serious phase in software development that requires attention to detail, careful testing, and good communication between developers, users, and other stakeholders [11].

3.1.1 Admin Dashboard

The admin dashboard consists of several page: login page, a dashboard page, website identity, websote menu, website menu, website page, admin data, news page, category, playlist. On the login page we can enter the username, password and security code provided by the admin. On this dashboard page there is data regarding the number of news stories, the number of existing pages, as well as the number of agendas and there is also graphic information on user visits. The results are as presented in Figure 2 and Figure 3. On this page the admin can change information about the website's identity such as telephone number, Google Maps location, description, social media, email and logo, as presented in Figure 4. On website menu page there is information about the menu on the website and the admin can add a new menu to the website as in Figure 5.
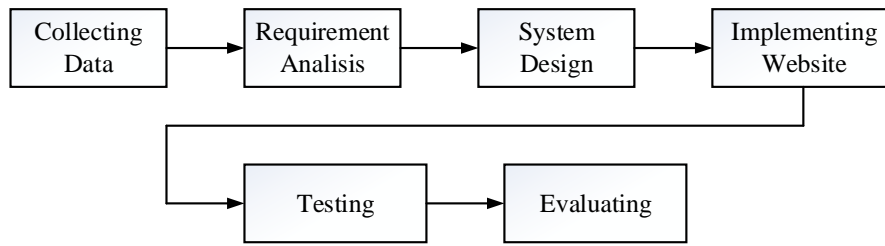
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┌─────────────┐     ┌─────────────┐     ┌─────────────┐     ┌─────────────┐
│ Collecting  │ ──▶ │ Requirement │ ──▶ │   System    │ ──▶ │Implementing │
│    Data     │     │  Analisis   │     │   Design    │     │   Website   │
└─────────────┘     └─────────────┘     └─────────────┘     └─────────────┘
                          │                                        │
                          ▼                                        │
                    ┌─────────────┐     ┌─────────────┐           │
                    │   Testing   │ ◀── │  Evaluating │ ◀─────────┘
                    └─────────────┘     └─────────────┘
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Figure 1. Research workflow

On website page there is information about the pages on the website and the admin can also change, delete or add new pages via this menu as in Figure 6. In Admin data page is used to edit admin data such as name, email, telephone number and photo, and can also be used to edit admin access as in Figure 7. On news page the admin can add the latest news, change and delete news that already exists on the website as in Figure 8.
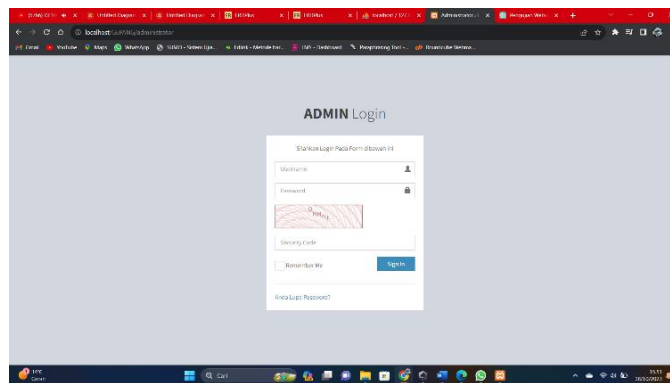
Figure 2. Admin Login Page
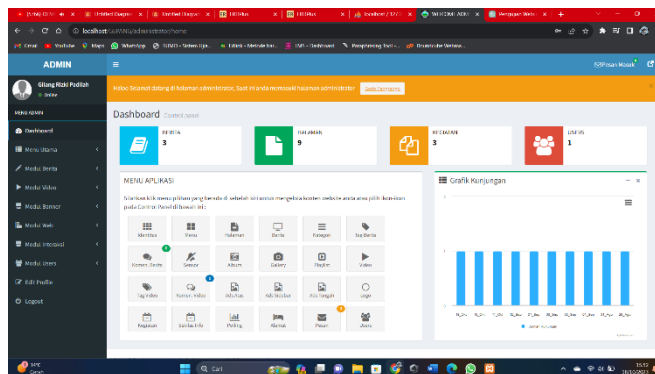
Figure 3. Admin Dashboard Page
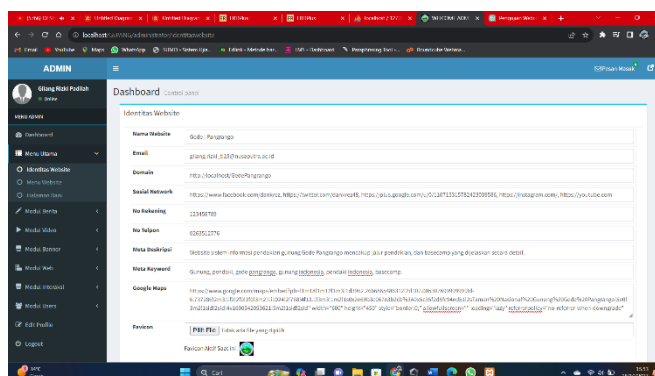
Figure 4. Website identity
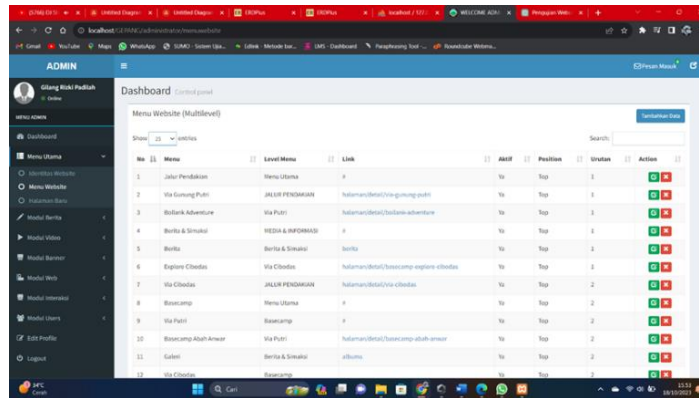
Figure 5. Website Menu
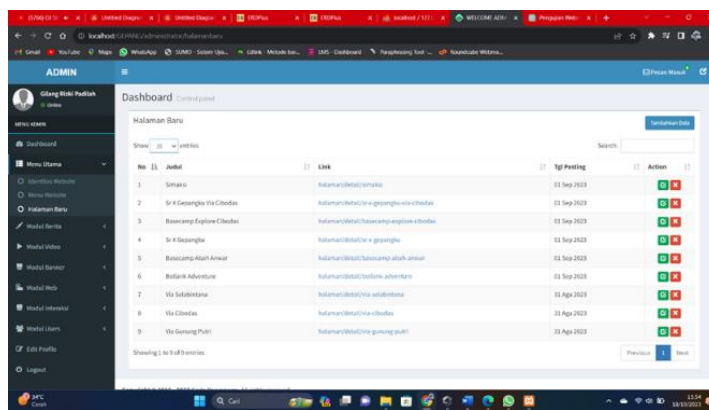
Figure 6. Website Page
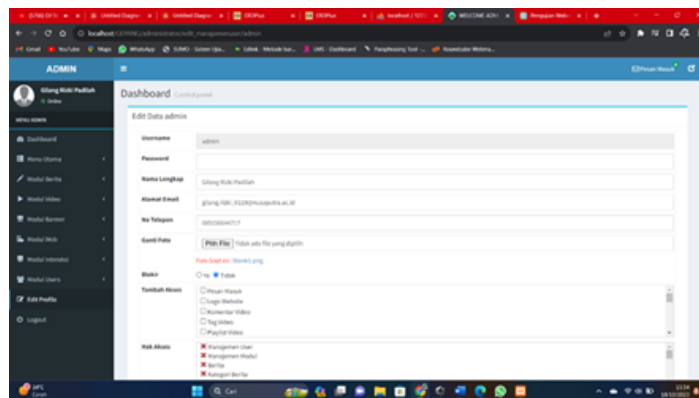
Figure 7. Admin Data Edit Page

News category menu functions to add categories for a product that will be included on the website as in   Figure 9. The video playlist is used to group videos uploaded to the website so that they are more organized and neat and make it easier for users to search for videos according to existing playlists as in Figure 10. On video page the admin can add new videos related to the website created, delete and edit them as in Figure 11.
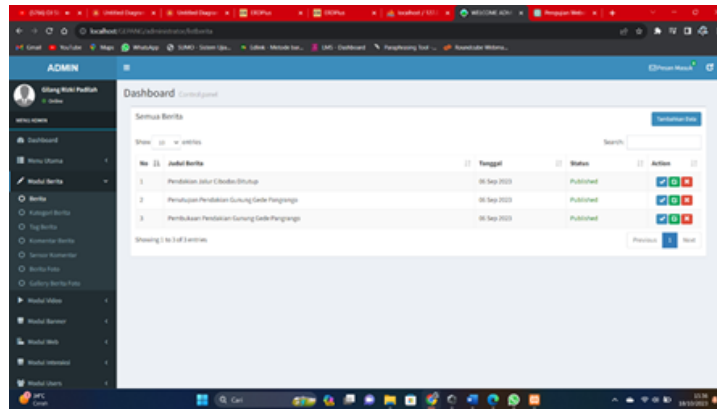
Figure 8. News page
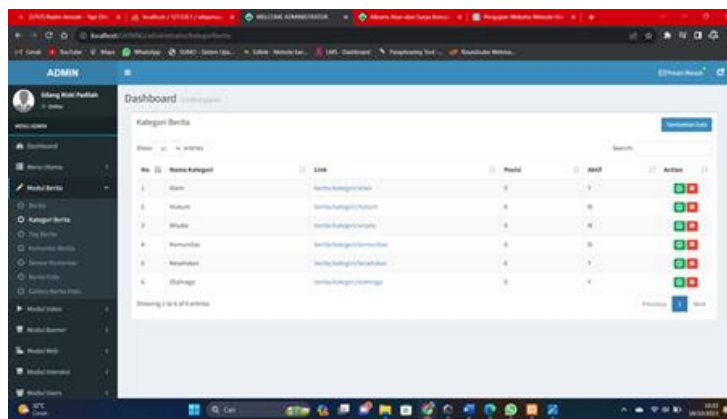
Figure 9. News Category
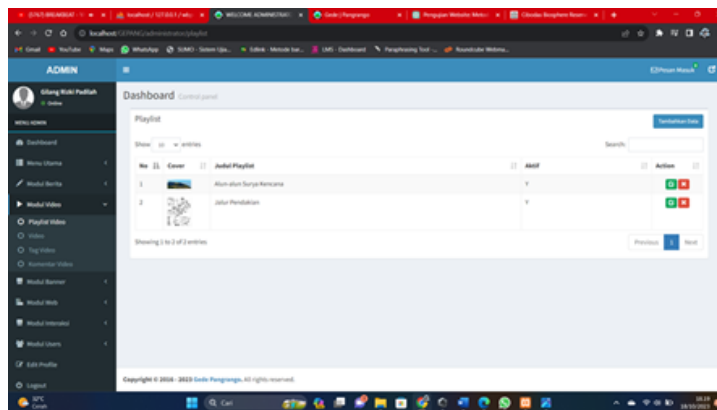
Figure 10. Video playlist

The banner page is used to adjust the banner on the website home page, such as changing the banner image, title and description as in Figure 12. The latest activity menu is used to add the latest activities that have been carried out such as meetings and so on as in Figure 13.
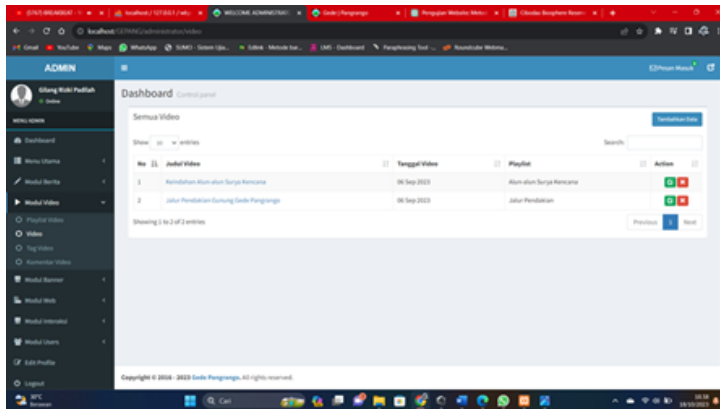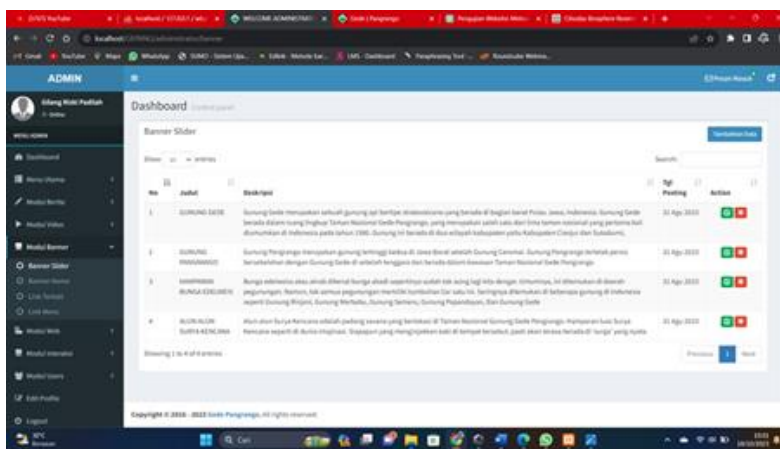
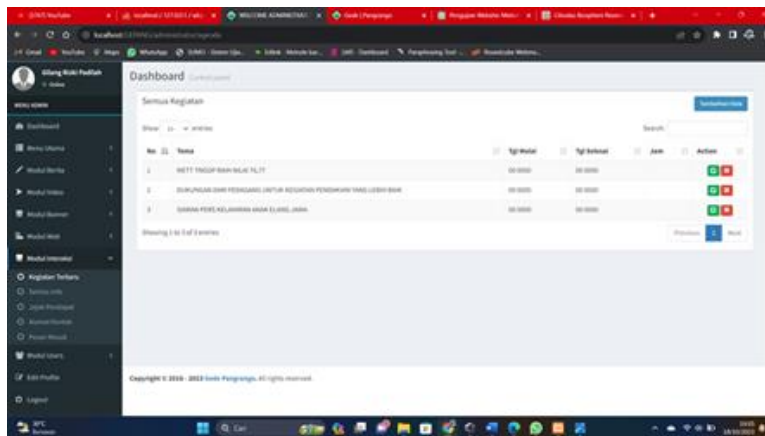*Figure 11. Video page*

Figure 12. Banner Slider Page

Figure 13. Recent Activities Page

The Contact Address page the admin can change, add or delete addresses added to the website, and the admin can also change the telephone number listed as in Figure 14. The user manager page is used by the admin that can add an account for a new admin or user and limit what access is allowed for the admin or new user as in Figure 15.
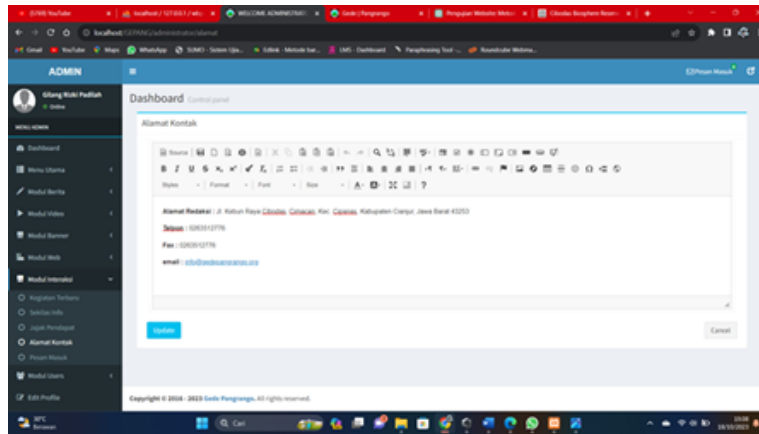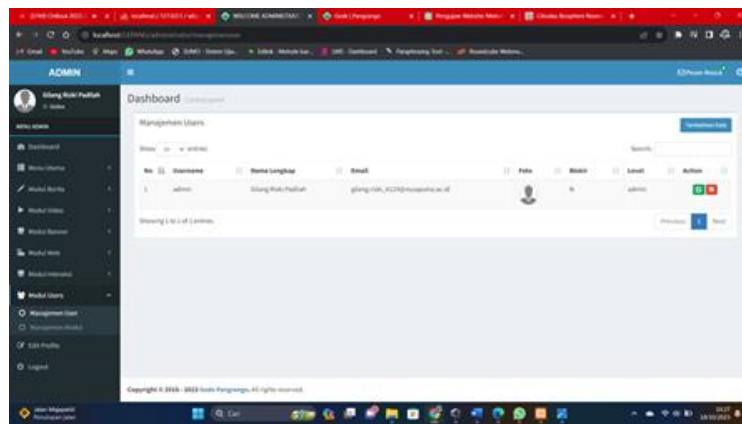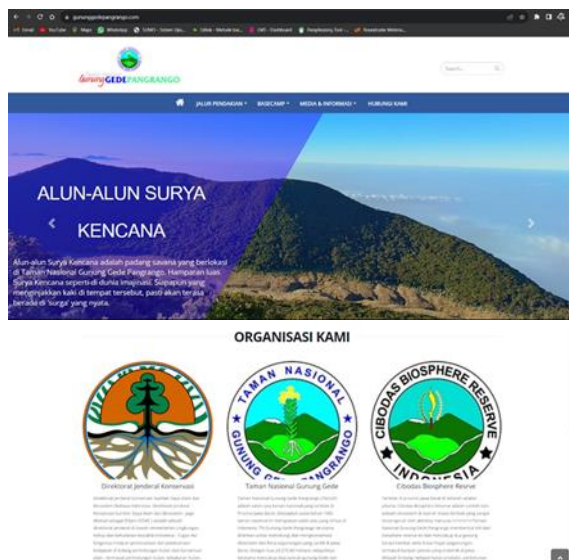
Figure 14. Contact Address Page

Figure 15. User Manager

3.1.2 Website
The website that users will see consists of a homepage, hiing route, bace camp, and contact us. The homepage page displays the menus on the website and some information about Mount Gede Pangrango, as presented in Figure 16.
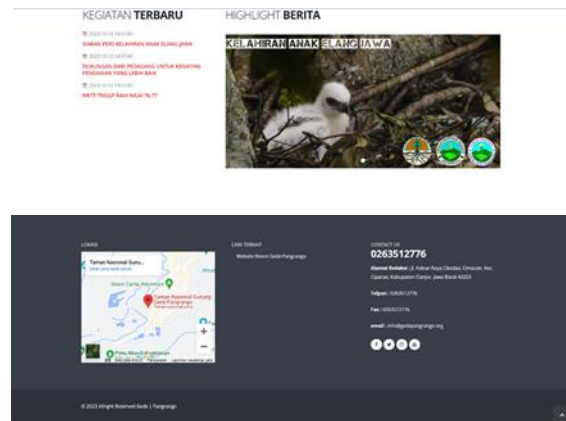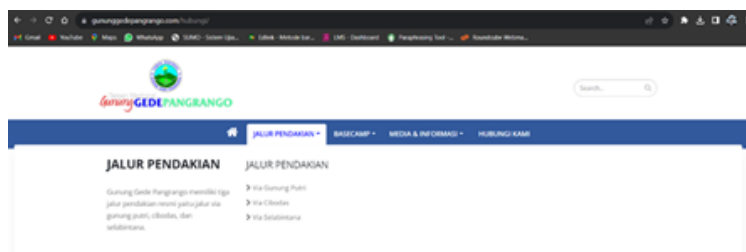
Figure 16. Home page

Figure 17. Hiking Route Menu

Figure 18. Basecamp menu

Figure 19. Media & Information Menu

The hiking rute menu will display the existing climbing routes for climbing Mount Gede Pangrango, as presented in Figure 17. The basecamp menu displays information on several basecamps and grouped them based on their respective climbing routes, as presented in Figure 18.
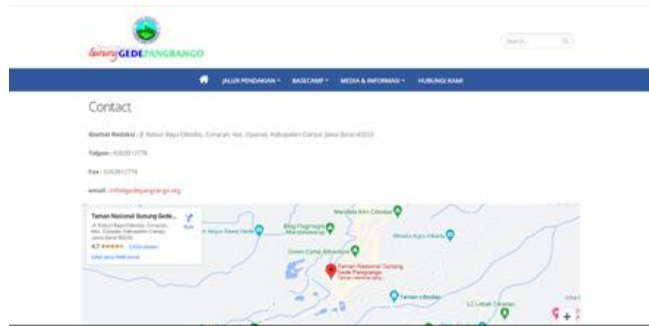
Figure 20. Contact Us Menu

The media and information menu displays information related to Mount Gede Pangrango and information regarding viewing fees and regulations that must be obeyed, as presented in Figure 19. In the contact menu there is information regarding contacts who can be contacted such as email and telephone number, as presented in Figure 20.
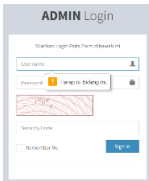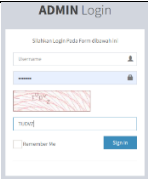
3.2 Test Method
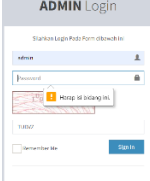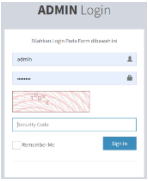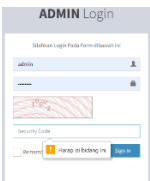
Blackbox testing is a type of software testing where the program's functional requirements are the main focus. This test operates by ignoring the control structure and focusing on domain information. Software engineers can create a set of input conditions for black box testing that will test all of a program's functional requirements. The benefit of using blackbox testing is that it eliminates the need for testers to be knowledgeable in a particular programming language. By approaching testing from the user's perspective, unclear or inconsistent requirements specifications can be uncovered. In this method, testers and programmers work together [12].

3.2.1 Functional Testing

A testing technique called functional testing is used to ensure and guarantee that a system operates in accordance with the requirements and expectations that have been stated by users or related parties. Functional testing in this context aims to verify that a system operates accurately and pro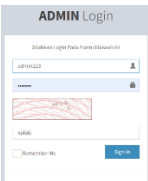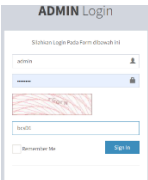duces expected results by testing various aspects of the system's features or functions. This testing technique uses a number of test cases intended to evaluate various system functionalities. Examples that might fall under this testing are testing input and output, verifying business rules, testing user interface integration, and testing various scenarios and conditions that may arise in real-world usage. By using functional testing, the testing team can find problems, defects, or differences between the expected and actual functionality of the system [13].

Table 1. Functional Testing

No	Testing Scenarios	Expected results	Conclusion
1	Empty your username, password, security code, then immediately click the "Sign In" button	The system will reject and display the message "Please fill in this field" in the username column Test result: 	Valid
2	Leave the username blank, fill in the password and fill in the security code, then immediately click the "Sign In" button *Test cases*:	The system will refuse and will display the message "Please fill in this field" in the username column Test result:	Valid

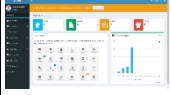|			
3	Empty the password, fill in the username and security code, then immediately click the "Sign In" button *Test cases*: 	The system will refuse and will display the message "Please fill in this field" in the password column Test result: 	Valid
4	Empty the security code, fill in the username and password, then immediately click the "Sign In" button *Test cases*: 	The system will refuse and will display the message "Please fill in this field" in the security code column Test result: 	Valid
5	Enter the wrong username or password, and the correct security code, then immediately click the "Sign In" button *Test cases:* 	The system will refuse and will display the message "Incorrect Username or Password!!" Test result: 	Valid
6	Enter the wrong security code, with the correct username and password, then immediately click the "Sign In" button *Test cases*: 	The system will refuse and will display the message "Incorrect Security Code!" Test result: 	Valid

7	Enter the correct username, password and security code, then immediately click the "Sign In" button *Test Cases*: 	The system will immediately redirect to the admin dashboard page Test result: 	Valid

Table 2. Likert Scale

Likert Scale	Information	Score
SS	Strongly agree	5
S	Agree	4
Neutral	Neutral	3
Q	No	2
STS	Strongly Disagree	1

Table 3. Questionnaire every question

Question	Total Score	Percentage	Criteria
1	225	90%	Strongly agree
2	229	91.6%	Strongly agree
3	225	90%	Strongly agree
4	219	87.6%	Strongly agree
5	219	87.6%	Strongly agree
6	221	88.4%	Strongly agree
7	214	85.6%	Strongly agree
Average Percentage		90%	Strongly agree

3.2.2 Usability Testing

One method used in usability evaluation is usability testing, where the product is tested on actual users. The objectives of this testing include problem detection, collecting qualitative and quantitative data, measuring product usefulness and efficiency, and assessing user satisfaction. There are ten usability testing methods that researchers can adopt in this evaluation process, such as Thinking-Aloud Protocol, Shadowing Method, Co-Discovery Learning, Coaching Method, Question-Asking Protocol, Teaching Method, Retrospective Testing, Performance Measurement, Remote Testing, and Eye Tracking [14]. Usability testing was carried out by giving questionnaires to 50 people. The next step is to determine the percentage of each question filled in by respondents.

$$Presentase\ Usability = \frac{(Total\ Skor)}{(Nilai\ Maksimal)} x100 \qquad (1)$$

The Table 3 shows the results of the questionnaire regarding respondents' agreement on each question.

Based on the results of the usability test above, there are percentage results for each question, the first question got a result of 90%, the second question 91.6%, the third question 90%, the fourth question 87.6%, the fifth question 87.6%, sixth question 88.4%, seventh question 85.6%. Of the seven questions included in the criteria of strongly agree with an average percentage of 90%, it can be concluded that all respondents' answers are very good with the existence of the information system website for climbing Mount Gede Pangrango.

4. CONCLUSION

After the author carried out several series of stages such as planning, designing, implementation and reaching the testing stage, finally the Information System Website for the Indonesian Climber Community was successfully built

using the Waterfall method with the case study of Mount Gede Pangrango. This system was built with the aim of helping climbers get information when they want to climb Mount Gede Pangrango.

The results of the blackbox testing procedure meet the system requirements. In addition, it can be concluded that respondents gave a very high assessment of the system, with criteria showing significant agreement with the system, based on usability testing results which showed an average percentage of 90%. So this website can be used by any party who wants to access information about Mount Gede Pangrango.

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