

Guide Application and Digitalization Map of the Mobile-based Mount Marapi Climbing Route

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Abstract: Previous mountaineering guides were obtained from various sources whose validity and effectiveness were still in doubt, so that climbers had difficulty understanding the information provided. The route for climbing Mount Marapi, which is located in West Sumatra, Indonesia, is usually only a painting on the wall of the post, so climbers will have difficulty knowing and remembering the existing route. With this digitalized guide and map application, it can provide information about Mount Marapi and a complete guide for a mountain climber, as well as provide convenience in knowing the climbing route of Mount Marapi. This application also provides convenience for climbers in knowing the position of climbers when climbing. So that climbers can more easily find out the correct climbing guide and climbing routes that can be viewed at any time. This application is made based on Android with servers using PHP and MySQL programming languages, as well as the Google Maps feature that is used to display climbing routes.

1 INTRODUCTION

Mountain climbing and hiking activities are one of the activities that are currently trending. This sports activity is not only beneficial in maintaining health and body immunity, it can also maintain mental health by breathing fresh mountain air.

Indonesia is an archipelagic country that is blessed with many mountains, most of which are active volcanoes. At the beginning of 2021, there were at least 69 active volcanoes in Indonesia (Septiasputri, 2021).

Like other provinces in Indonesia, West Sumatra has 29 mountains spread over 7 regencies/cities out of 19 regencies/cities. The highest mountain is Mount Talamau with a height of 2,913 meters, while the lowest mountain is Mount Galanggang with a height of 20 meters. Both mountains are located in West Pasaman Regency (BPS, 2018).

One of the famous mountains in West Sumatra is Marapi. Mount Marapi which is administratively located in Agam Regency, West Sumatra about 24km southeast of Bukittinggi. With over 60 eruptions to its credit since the late 18th century, Marapi claims the title of the most active volcano in Sumatra. However, considering Marapi's name is derived from the ancient Minangkabau dialect meaning "Mountain of

Fire" it seems likely this complex volcano has been highly active for thousands of years. Mount Marapi is one of the popular destinations for mountain climbing lovers. This mountain has three climbing routes, namely the Batu Palano, Aia Angek, and Pariangan paths.

Mountain climbing is known to be tiring, but the challenges involved in climbing do not deter enthusiasts. It can be seen from the fans of this activity who come from all walks of life. Especially climbing Mount Marapi in West Sumatra, not only attracts local people but also from outside the city and even from abroad. The number of climbers on Mount Marapi always increases from year to year, especially during events such as the new year and the commemoration of the Republic of Indonesia's independence day.

A novice climber will find it difficult to know the guide and route of a mountain correctly. Therefore, many novice climbers must bring a guide, so that the things they doubt can be resolved. This research aims to produce an application that contains guides and digital maps for the Mount Marapi climbing route. This study uses the android mobile platform because of the ease of access for users later.

Certainly, applied and basic research are key to moving our understanding of IT and organizational agility forward (Tallon, 2019). It's all interconnected

inside the digital scene with the corresponding virtual representation. The physical flows will be mapped on digital platforms in a continuous manner (Alcacer, 2019).

1.1 Digital Map

Digital maps are representations of geographic phenomena that are stored for display and analysis by computers. Each object on a digital map is stored as a single or set of coordinates. For example, 10 objects that are the location of a point will be stored as a coordinate, while an object that is a region will be stored as a set of coordinates (Ariyanto, 2018).

Digital mapping is now ubiquitous and an increasing amount of geodata is being created by all sectors (Lauriault, 2019). Digital maps have at least 3 characteristics, namely scale (describes the level of detail of objects when the map is made), geographic references and map projection systems (determines how objects on the earth's surface (which are not actually flat) are moved or projected on the map surface in the form of a flat plane).

1.2 Geo Location Technology

Android devices generally have a Geo-Location feature that utilizes the GPS signal receiver chip embedded in the Android device or BTS Location Service (Kholishoh, 2021). Now several developed countries each have different satellite constellations for navigation systems as geo positioning service providers including GPS (owned by the US), GALILEO (owned by Europe), GLONASS (Russia), BeiDou (China) (Isyanto, 2013).

2 METHODS

In conducting this research, the Software Development Life Cycle (SDLC) method was used. SDLC is the stages carried out to build an information system through 10 stages namely Initiation, Software Concept Development, Planning, Requirement Analysis, Design, Development, Integration and Testing, Implementation, Operation and Maintenance and Disposition (Pressman, 2010; Rastogi, 2015).

For this research 5 out of 10 SDLC stages were used as illustrated in Figure 1 as follows:



Figure 1: Research Methodology.

- a. Requirement Analysis
Requirements analysis is the process of analyzing and developing user requirements for web-based information systems and creating functional requirements documents
- b. Design
Design is a process that focuses on the design of creating a web-based system with a coding process
- c. Development
Development is the stage of converting the design into a complete information system such as: preparing case files and procedures, system testing, creating databases, creating program code, and others.
- d. Integration and Testing
Integration and testing are stages to find out whether the information system made is in accordance with the functional document specifications or not.
- e. Implementation
After analyzing user requirements, design, coding, the finished system will be used by the user

3 RESULT AND DISCUSSION

3.1 Requirement Analysis

Climbing to Mount Marapi is done because of a hobby or just want to conquer the terrain of Mount Marapi. This activity takes a lot of energy and time from planning to climbing to the top of the mountain. The problem when climbing is that climbing information is hard to get, because climbers have to ask many people or a guide to make sure the information is correct. So that climbers will be confused to ensure accurate information because they find differences from various sources.

Based on the existing problem factors, the need for the application of the Guide and Map for Digitizing the Mount Marapi Ascent Route is as follows:

- a. This application helps users find information about the history, location, condition, and pictures of Mount Merapi.
- b. This application helps users find climbing guidelines such as physical preparation for climbing, climbing equipment and supplies, climbing regulations, first aid in accidents (first aid) during climbing, and Mount Marapi

climbing routes equipped with google maps function.

The list of application requirements specifications can be seen in Table 1 below

Table 1: System Requirement Specifications.

SRS-ID	System Requirement Specification
F-01	Users can see history, location, pictures and conditions about Mount Marapi.
F-02	Users can see the route of the Mount Marapi hiking trail through the Google Maps application
F-03	Users can view climbing guides such as mountain climbing techniques, survival to get water, packaging of goods, and necessary equipment
F-04	Users can find out the correct Mount Marapi climbing regulations
F-05	Users can find out the use of existing climbing equipment.
F-06	Admin can manage mountain data such as editing, deleting and adding about mountains to be displayed.
F-07	Admin can manage climbing equipment data such as adding, editing and deleting equipment to be displayed.
F-08	Admin can manage hiking trail data such as editing, adding, and deleting existing trails.
NF-01	The application is easy to use
NF-02	The application has an attractive appearance

3.2 Design

The application is designed to be accessed online via an Android-based mobile phone. From the menu structure design in Figure 2, there are eight main menu options if accessing is done online, namely the menu about Marapi, climbing guides, hiking trails, assistance and about applications. On the climbing guide menu there will be a list of other menus, namely climbing preparation, climbing equipment, climbing regulations, and other guides. The climbing preparation menu consists of 3 choices of information that can be seen, namely physical preparation, packaging of goods, and climbing preparation. The equipment menu contains information on the equipment needed when climbing according to the selected category. Other guide menus will contain information about first aid, climbing techniques, survival to get water, survival plants, and making fire.

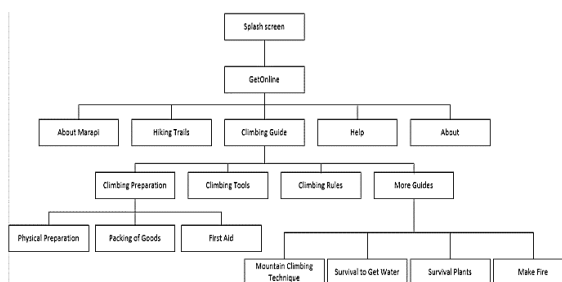


Figure 2: Online Application Menu Structure Design.

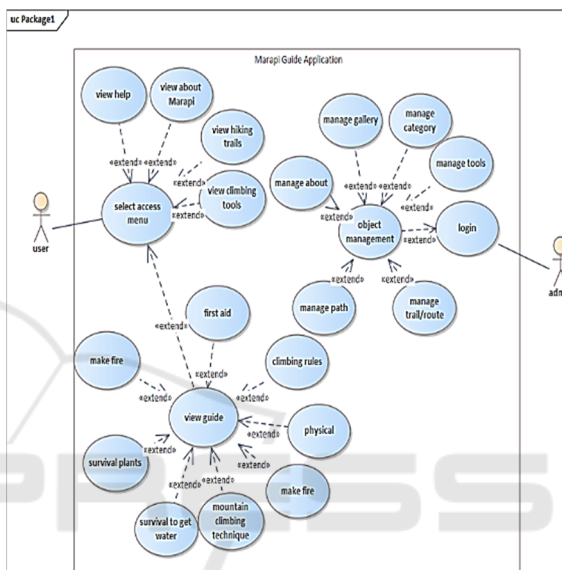


Figure 3: Use Case Diagram.

This research also uses use case diagrams to define the features contained in the system and also shows the interaction between actors and the system. The actors who play a role are users and system admins, and the system is the Guide Application and Digitization Map of the Mount Marapi Ascent Route.

3.3 Development

To develop a climbing guide application, several hardware specifications are needed, including from the Android side. When making the application, it requires minimum hardware specifications, namely the SDK version on Android is 16 with Android version 4.1 (Jelly Bean) 4.5 inch screen. The application is implemented on android with the ASUS brand model ASUS_Z00VD android version 5.1 (Lollipop) with kernel version 3.10.72 queen@scmbuild #2 Wed Oct 21 14:11:53 CST 2015. The maximum hardware specification is sdk version which is 23 with android version 6.0 (marshmallows).

After creating an android application for a climbing guide application, the application can be accessed on an android smartphone. This climbing guide application is recommended for use on Android version 5.1 (Kitkat). To use this application, you should also use an Android smartphone with a screen size of 5.0 inches. The minimum specification to use this application is Android version 4.1 (Jelly Bean) and a minimum screen size of 4.0 inches.

3.4 Integration and Testing

The climbing guide application is implemented on an android smartphone. Display Android User Interface Access is the main page display android. On this main page the user will see 2 access menus, namely the Get Online menu and the Get Offline menu. In each access menu, there will be 7 menus presented in the form of a sliding menu. The available menus are the homepage menu, the Marapi menu, the climbing guide menu, the hiking trail menu, the help menu, and the application menu. The sliding menu display for each access menu can be seen from Figure 4.



Figure 4: Application Access Menu.

At this time the application is only available in one type of language, namely Indonesian language or Bahasa. The online access menu provides a menu with information that requires an internet network, while the offline access menu provides a menu that can be accessed without an internet network.

For online access, it has information and submenus from 5 main menus, such as:

1. About Marapi Menu
The information about Mount Marapi will be displayed after the user selects the menu about Marapi.
2. Climbing Guide Menu
The guide menu which is accessed online has a list of menu options, namely the climbing preparation menu, climbing equipment, climbing regulations, and other guides.

3. Hiking Trail Menu

The hiking trail menu that is accessed online will be displayed on Google Maps which has set points or posts on the route on the Koto Baru route. Each marker has an info window that displays some of the information on the selected point

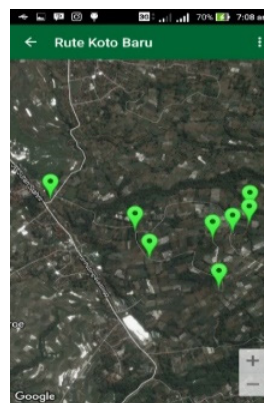


Figure 5: Hiking Trail Menu.

The hiking trail menu on the access shown in Figure 5 is in the form of Google Maps. The path shown is the Koto Baru route with a total of 27 points or posts, so there are 27 markers on the online hiking trail map.

4. Help Menu

The help menu will display information about contacts who can be contacted in the event of an accident requiring assistance from the Command Post, namely the Ranger Command Post team, as well as telephone contacts for the Command Post who are always on standby if they need help in the form of information, guides, or assistance to help climbers who have difficulty climbing.

5. About Application Menu

This menu contains an explanation of the application in general.

3.5 Implementation

The application has been tested to determine the climbing route of Mount Marapi, with the following results:

- a. If the user or climber selects a point on the route and presses the route guide button, the application will provide the correct route direction. From Figure 6, it is known that the marker shows the selected point, the blue dot indicates the position of the user or climber.

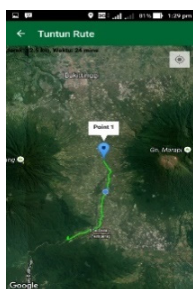


Figure 6: Guide the Route at Point One.

- b. In the user's position, when making a movement when the route guide page is running, the position or blue point on the application will also move according to the user's journey.

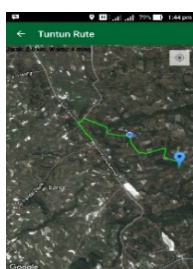


Figure 7: User Position Movement.

- c. Route Guidance that shows a green line on the road can only be done up to the Marapi post. Meanwhile, if you have made a climb, the route guidance will only be shown by the movement of the climber's position or by looking at the marker point that has been set whether it is close to the climber's position or not (according to point blue).



Figure 8: Route Guidance.

In Figure 8 it will be seen that the blue dot indicating the position of the climber will move if the climber makes a move as well. If the climber has arrived at the marker or point it will look like Figure 9 below.

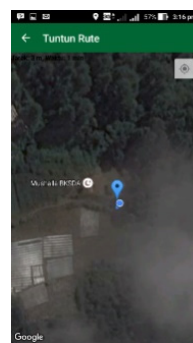


Figure 9: Climber's Position Has Reached The Point.

At some point there are problems with the internet connection, but the climber's position will continue to move if the application has been run previously when there is an internet connection.

4 CONCLUSIONS

This research has succeeded in developing an application guide and map for the Digitization of the Mount Marapi Climbing Route that can be accessed by users using an Android-based mobile phone. This application can be accessed online or offline, but offline, it cannot provide hiking routes from the point where the user is located. The application is recommended to run well on at least Android 5.1 (kit kat). The application has many menus that can make it easier for climbers to climb including knowing the position of climbers from the mountain to be climbed. To find out this climbing route can only be done online so it needs good internet access. Further research is needed to produce applications that can connect between users so that it will be easier to search for lost climbers.

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