International Journal of Engineering Technologies and Management Research

A Knowledge Repository

IJETMR

DESIGN OF SUPPORTING APPLICATION FOR DECIDING THE BEST MOUNTAIN CLIMBING 'HIKING-YUK!'

Sekar Ageng Pratiwi [1], Henny Medyawati [2]
[1] Program Studi Sistem Informasi Jurusan Perangkat Lunak Sistem Informasi
[2] Universitas Gunadarma, Indonesia

Abstract:
One of the outdoor activities or mountaineering activities located in the mountainous region is one form of ecotourism that is much favored by many people, especially young people. Mountain climbing (mountain hiking) is one type of outdoor activity that is often done because there are so many mountains that are spread throughout most of the Indonesian archipelago. To anticipate subjective risks, beginner climbers are encouraged to do mountain climbing in groups, and adjust to the experience and abilities of climbers. This research developed decision support application for determining the best mountain climbing by using the web-based weighted product method. Weighted Product (WP) is a method used to solve the Multi Attribute Decision Making (MADM) problem, namely the method used in finding the most optimal alternative from several optimal alternatives with certain criteria. The application has been completed and is named "Hiking-Yuk!". The result of using the WP method is to display the best recommendations that can be used as material in the consideration and selection of mountains. Recommendations for the future Hiking-Yuk! website can be developed not only in the scope of the East Java, but can be developed for other mountains in other provinces.

Keywords: Weighted Product Method; Multi Attribute Decision Making; MADM; Mountain Climbing.

Cite This Article: Sekar Ageng Pratiwi, and Henny Medyawati. (2020). "DESIGN OF SUPPORTING APPLICATION FOR DECIDING THE BEST MOUNTAIN CLIMBING 'HIKING-YUK!'." *International Journal of Engineering Technologies and Management Research,* 7(2), 53-80. DOI: 10.29121/ijetmr.v7.i2.2020.510.

1. Introduction

One of the outdoor activities or mountaineering activities located in the mountainous region is one form of ecotourism that is popular with many groups. The most common outdoor activities are mountain climbing because many mountains are scattered throughout the Indonesian archipelago (Cendana & Azhari, 2015). Based on statistical data from Gunung Gede Pangrango National Park (TNGGP) the number of visitors in 2013 ranged from 139,767 people, and in 2016 jumped 162,184 people. (Ministry of Forestry, Statistics 2016: 88), at this time the number of mountain climbers is increasingly increasing, the high public interest in climbing activities has become so popular (Wardana, et al., 2015).

For beginner climbers, choosing the right mountain to climb should be able to adjust to the experience of climbers and the ability of the climbers themselves to be able to anticipate the risks of subjective hazards, such as fatigue, lack of knowledge and experience of climbers. Then the climbers must prepare physically, mentally, as well as information about the mountain knowledge that will be climbed such as can understand the level of difficulty of the terrain, field safety, and distance in climbing. In general, mountain climbing can be done alone or solo, but it is not recommended for beginner climbers because of the high level of difficulty and the need for teamwork (Lee, 2006). Therefore, it is recommended to do climbing in groups. Ascent in groups can allow climbers to share accommodation, and logistics, and can expand the network of friends of mountain climbers. Mountain climbers who are connected in mountain climbing organizations will find it easier to find climbing friends than climbers who are not members of the organization.

Problems that often occur are necessary to adjust the experience of climbers to determine the right mountain, and it is recommended to do climbing in groups. Therefore an information system is needed that can help climbers to determine the best mountain based on the experience of climbers, mountain heights, distance and travel time for climbing, and mountain safety, as well as a system to make it easy for climbers to find climbing friends.

1.1. Formulation of the Problem

How to design and build decision support applications determine the best mountain for mountain climbing using the web-based Weighted Product method.

1.2. Research Purposes

This study aims to design and build decision support applications to determine the best mountain for mountain climbing using the Web-based Weighted Product method. In addition, the application is expected to provide benefits, including:

1) Providing convenience for deep climbers determine the best mountain to climb.
2) Facilitating among climbers to do climbing together.
3) Give the best mountain recommendation as consideration according to the criteria
4) Provide information about Mountain in West Java.

2. Materials and Methods

The method used in the study is the Rapid Application Development (RAD) method. The RAD model is one method in SDLC. Several stages of the Rapid Application Development model are used in completing this system, namely:

1) Requirement Planning
In this phase, a user requirement was conducted by interviewing the Indonesian Mountain Guides Association (APGI), namely Rahman Mukhlis as General Secretary of the Indonesian Mountain Guides Association (APGI), starting from the system development plan to be built, to business process opportunities. In this phase it aims to solve the problem of standardized climbing from the APGI side that will be applied to the recommendation system.

2) RAD Design Workshop

Next is the RAD Design Workshop stage or design implementation, in this phase the design of models and diagrams is carried out to provide an overview of system and program activities, database design, and design of the application interface. After the design phase, the next step is the implementation of the program code using the PHP programming language with the bootstrap framework for Front-End. After the development is complete, in this phase the system is also tested using the Black Box Testing to produce the system according to the wishes.

3) Implementation

The last phase is implementation, namely the introduction of applications to users / related organizations. In this phase the implementation is done by designing a website coding by applying the WP DSS algorithm on the website. After implementing the website, then the mountain data is entered into the database to do WP calculations according to the weighting. Then do expert validation so that the system results with the assumptions of the expert are the same or as expected.

2.1. Decision Support System

Decision support system is an interactive information system that provides information, modeling, and manipulation of data (Yulianti, 2012). The system is used for decision making in semi structured situations and unstructured situations, where no one knows exactly how the decision should be made. Decision support systems are built to support solutions to a problem or to evaluate an opportunity. The decision support system application is used in decision making. Decision support system applications use CBIS (Computer Base Information Systems) that are flexible, interactive, and adaptable, developed to support solutions to specific unstructured management problems. Decision support system applications use data, provide an easy user interface, and can combine decision-making thinking. Decision support systems are intended to support management in carrying out analytical work in situations that are less structured and with less clear criteria.

2.2. Weighted Product

Weighted Product (WP) is one method used to solve MADM problems. WP is a method that uses multiplication to connect attribute ratings, where the rating of each attribute must be raised first with the corresponding weight. This process is the same as the normalization process. (Sianturi, 2013).

(Adriyendi, 2015) conducted a research on food selection decision support systems using the WP method and obtained results as a ranking using the weighted product method faster than the SAW method. Alternative results are based on food criteria and the highest value obtained from each attribute. (Ahmadi and Wiyanti, 2014) state that this weighted product method is more efficient because the time needed in the calculation is shorter. This method is also easy to apply in cases that have high subjectivity.

WP method can help in making election decisions, but the calculation using the WP method only produces the largest value that will be selected as the best alternative. The calculation will be in accordance with this method if the chosen alternative meets the specified criteria. This WP method is more efficient because the time needed in the calculation is shorter. The weight for the benefit

attribute functions as a positive power in the multiplication process, while the weight of the cost functions as a negative rank.

$$W_j = \frac{w_j}{\sum w_j} \qquad (1)$$

where: i = 1, 2, …, m;

$$\sum W_j = 1$$

Alternative preference Si:

$$S_i = \coprod_{j=1}^{n} X_{ij} W_j \qquad (2)$$

where:
i = 1, 2,… ,n dan i = 1, 2, … , n . as an atribute
Π: product
Si: score from every alternative
Xij: alternative score i to kej atribute
Wj: weight for every atribute
n: Total amount of criteria

$$V_i = \frac{\prod_{j=1}^{n} X_{ij} \ W_j}{\prod_{j=1}^{n} (X_{i*}) \ W_j} \qquad (3)$$

where:
V: vector V
X: score of criteria
W: weight of criteria
i: alternative
j: criteria
n: total of criteria
*: total of criteria which already scored by another attribute.

The biggest Vi value states that the alternative A1 is selected. The steps in calculating the WP method are as follows:

1) Multiplying all attributes for all alternative with W (weight) as rank positive for profit and value attributes negative for cost attributes.
2) The multiplication result is added to produce value in each alternative
3) Divide the value of V for each alternative with the total value of all alternative values.
4) Found the best alternative sequence that will be become a decision

2.3. PHP

PHP Hypertext Preprocessror or often called PHP is a server-side based programming language that can parse php scripts into web scripts so that from the client side it produces an attractive

display according to (Ardhana, 2012). PHP (Personal Home Page) is a programming (interpreter) which means the process of translating source lines into machine code that is understood by the computer directly when the line of code is executed. (Sibero, 2012). PHP stands for PHP Hypertext Preprocessor is a programming language that functions to build a dynamic website. PHP integrates with HTML code, meaning different conditions, HTML is used as a builder or foundation of a web layout framework, while PHP functions as a process, so that with PHP, a web will be very easy to maintain (Saputra, 2012).

2.4. Bootstrap

Open source applications in the form of a framework or framework for building dynamic websites using CSS scripting languages. Bootstrap is a tool for creating web page views that can speed up the work of a website developer or website page designer. Bootstrap is built with HTML and CSS technology that can create web page layouts, tables, buttons, forms, navigation, and other components on a website simply by calling the CSS function (class) in a defined HTML file.

2.5. PhpMyAdmin

According to Barrie (2015), PhpMyadmin is free software written in the PHP programming language used to handle MySQL administration through the Jagat Jembar network (World Wide Web). PhpMyAdmin supports various MySQL operations, including managing databases, tables, fields, relations, indices, users, permissions. Basically, managing databases with MySQL must be done by typing the command lines according to each specific purpose. PhpMyAdmin is accessed via a browser and displays a form page to log in by filling in the password. The password is useful for managing users who will use the database (Yuhendra and Yulianto, 2015).

2.6. Rapid Application Development

Hamzah et al. (2016), Pressman stated that Rapid Application Development (RAD) is a software development model with a short development cycle. The RAD model uses component-based construction with a limited range of projects. The RAD development model is one of the incremental Software Development Life Cycle (SDLC) models, especially for short processing times. This model was adapted from a high-speed version of the waterfall model for the development of each software component (Rosa and Salahuddin, 2015).

2.7. Class Diagram
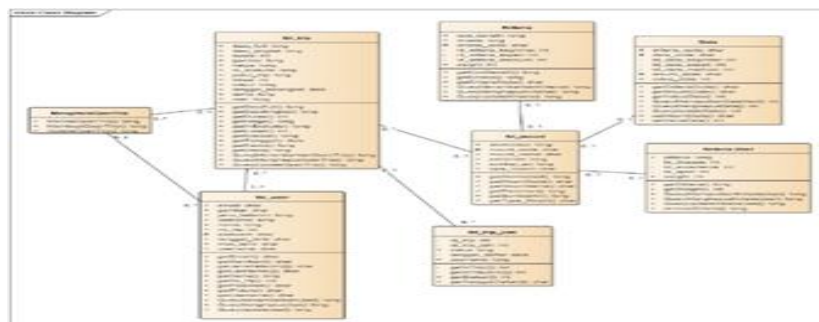
Picture 1: Class Diagram

Picture 1, is a class diagram of the Hiking-Yuk! system, explained in the class diagram there are several tables such as criteria, data, tbl_trip, user criteria, tbl_join_trip, tbl_user. Figure 23 is a class diagram design. In the class diagram of the support system, the decision to choose the best mountain for hiking, there are several classes that are related, among others, the contents of tbl_mount such as acd details, code_mount, explanation of the presence or absence of water sources, as well as the beginner, intermediate and professional categories.

2.8. ERD
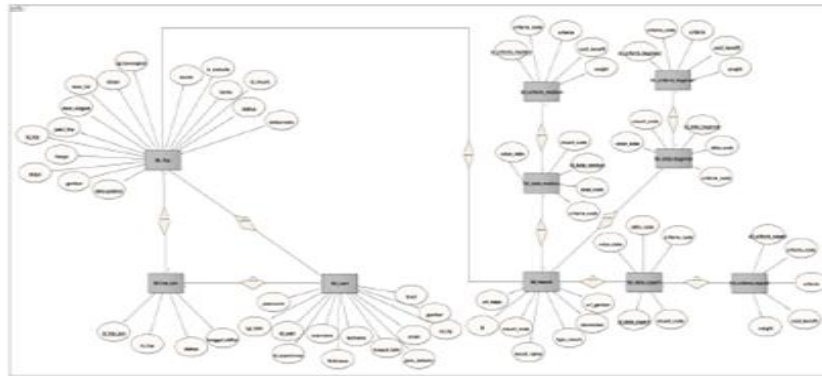
Picture 2: ERD Diagram

In Picture 2, is the Entity Relationship Diagram of the Hiking-Yuk! application and is used to draw relationships between tables.

1) Tbl_opt_sport Table

Table 1: Table from tbl_opt_sport

No	Field Name	Type / Wide	Information
1	id_sport	Integer (2)	Contains Id from Sport
2	criteria	Text	Contains Criteria from Sport
3	weight	Integer (2)	Contains Weight from Sport

2) Tbl_opt_disease Table

Table 2: Table from tbl_opt_disease

No	Field Name	Type / Wide	Information
1	id_disease	Integer (2)	Contains Id from Sport
2	criteria	Text	Contains Criteria from Sport
3	weight	Integer (2)	Contains Weight from Sport

3) Tbl_opt_experience Table

Table 3: Table from tbl_opt_experience

No	Field Name	Type / Wide	Information
1	id_experience	Integer (2)	Contains Id from Sport
2	criteria	Text	Contains Criteria from Sport
3	weight	Integer (2)	Contains Weight from Sport

3. Results and Discussions

3.1. Designing Application Programs

At this stage, the flowchart model of the application is first explained, where the application flowchart is divided into:

- Hiking-Yuk! Flowchart

In Figure 3, regarding the Hiking-Yuk! application flowchart diagram, it is explained that the user can do the first activity, namely to the start page.

The Hiking-Yuk! app and also access the recommendation feature.
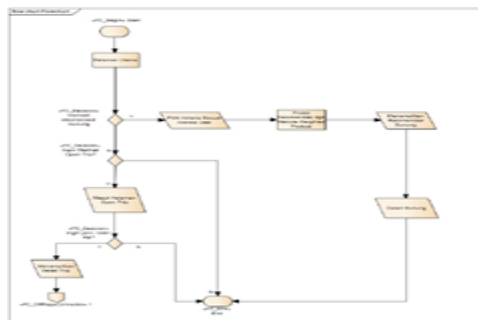
Picture 3: Hiking-Yuk! Flowchart

In the recommendation feature, users will be asked to choose criteria that have been provided by the system, such as climbing experience, how often to exercise, and history. The criteria will be chosen by the user based on the user's own condition. This is needed to display the mountain recommendations using the Weighted Product method. The final results of the recommendations will provide complete information in the form of mountain names, images, locations, mountain heights, to treklogs / mountain climbing routes.

- Open Trip Feature Flowchart

In Picture 4 regarding the Flowchart of the Hiking-Yuk! application diagram, it is explained that the user can do the first activity, namely to the Hiking-Yuk! application's home page and also access the open trip feature.

Picture 4: Flowchart Open Trip

In the open trip feature, users can make climbing trips, and other users can join the trip provided by other users (Trip Leader). To do this activity, the user is required to have a Hiking-Yuk! account.

3.2. UML Design

- Use Case Diagram

In Figure 5 about the use case diagram, explained in the use case diagram in the 'Hiking-Yuk!' application there is 1 actor, namely the user.
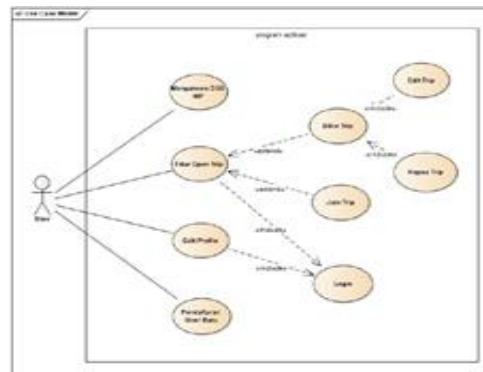

Picture 5: Use Case Diagram

Users can access the recommendations feature, and access the Open Trip feature where each user can make a climbing trip, and join other climbers' trips. To make trips and join trips, the user must log in.

Users can also manage trips that have been made by the user. To make a trip user is required to have an account first, if you do not have a user account must register a new account first on the sign up page.

- Activity Diagram

1)   Login
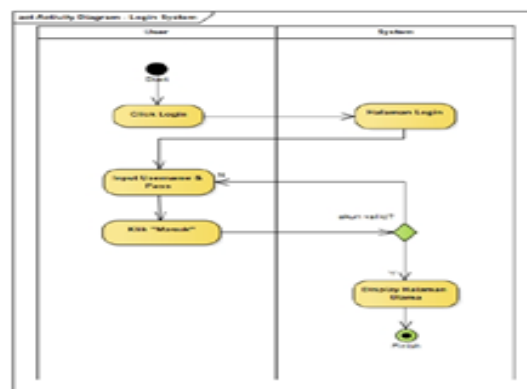
Picture 6: Login Diagram Activity

In Picture 6 is an activity diagram when the user logs in to the system, the user must fill in the username and password form that was registered previously. If the data entered is valid, then the user can use the open trip feature in the 'Hiking-Yuk!' application. If it is invalid, a notification will appear that the data entered is incorrect, then it will display the login page again.

2)　　　Recommendation Menu
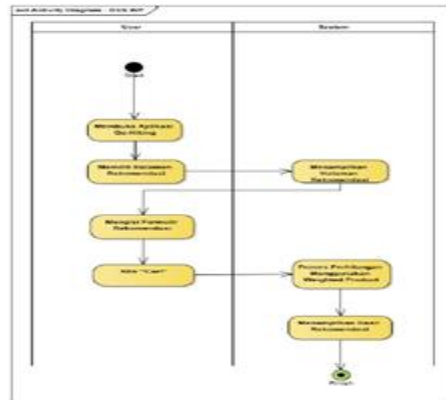
Picture 7: Activity Recommendation Diagram

In picture 7, about the Recommended Feature Diagram. In this Recommendation menu, users can choose the criteria provided by the system, the criteria chosen must be in accordance with the user's own condition. The criteria referred to as climbing experience, how often to exercise in one week, and history of the disease of the climber. The selection of mountain recommendations uses a Decision Support System (SPK) with the Weighted Product (WP) method which the system will adjust the weight with the criteria that has been inputted by the user / user condition.

3)　　　Register a New Account
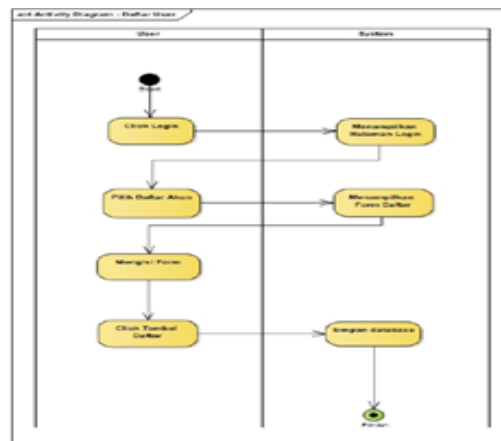
Picture 8: Register a New Account Activity Diagram

In picture 8, is an activity diagram for registering a new account. Users who do not have a Hiking-Yuk! account can create a new account by clicking the "Login" button and then selecting the "Register Account" button, fill in the form, then click "register" so the system will store it in the database and the new account registered can already be used.
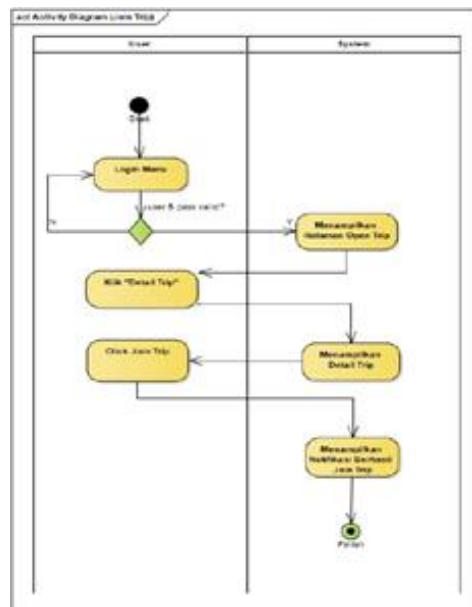
4)   See Trip Details
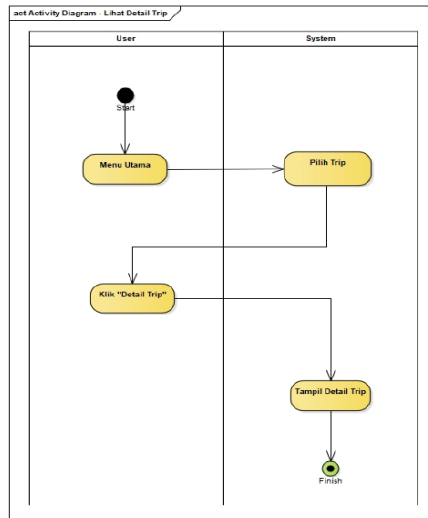
Picture 9: Activity Trip Detail Diagram

Picture 9, is an activity diagram when the user sees the trip details. In this page the user can see the trip details according to the user's choice. The trip details are mountain information you want to climb, as well as information from the user (trip leader) that made the trip.

5)   Join Trip

Picture 10: Activity Diagram Join Trip

Picture 10, is an activity diagram when the user wants to join a trip. Users are required to have an account to access this feature, after the user has logged in the system will display an open trip page that has trips made by other users. After the user determines the trip, click "Trip Details", then click "Join Trip", the system will automatically save user data into the trip.

6)   Make a Trip
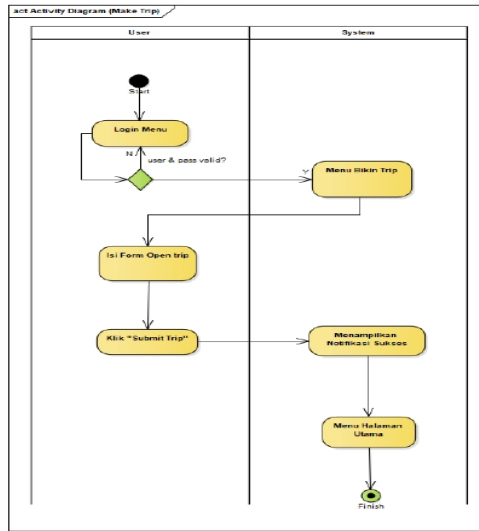
Picture 11: Activity Diagram Making a Trip

Picture 11, is the activity of making a new trip. To make a trip, the user is required to login first. Login, the user will be directed to fill in the open trip form, such as information about the trip you want to make, mountain selection and trip description, after completing all forms the user needs to click 'Submit' to make the new trip appear on the web page.

7)   Edit Trip
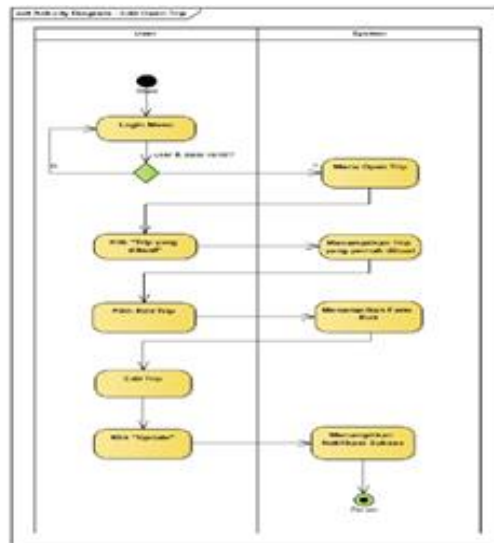
Picture 12: Edit Trip

Picture 12, Is an Activity Diagram of the edit trip process. To edit a trip, the user must log in first. After logging in, on the open trip menu click the "Trip made" button, then the system will display the trip that was made by the user, then select one of the trips you want to edit, after editing trip data click "Update" then the system will display successful notification.
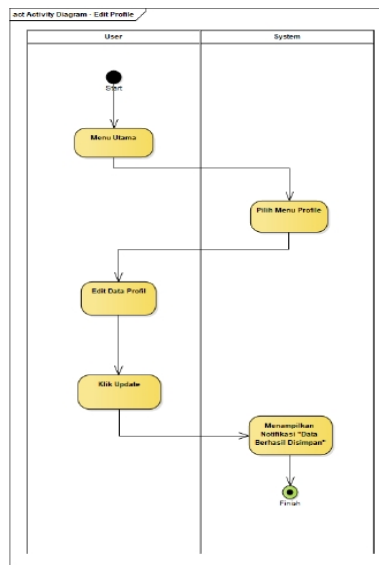
8) Delete Trip
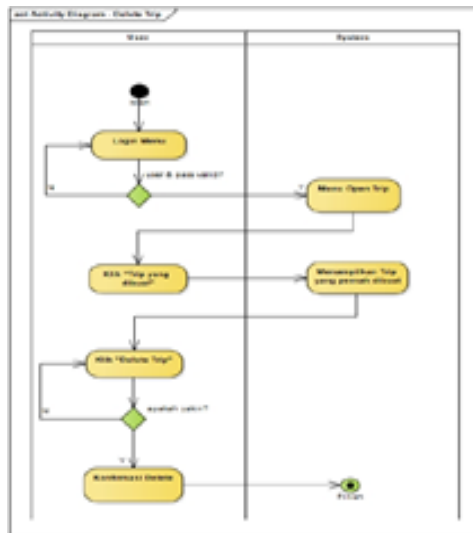
Picture 13: Delete Trip

Picture 13, describes the Delete Trip process. To delete a trip the user enters the open trip page and then clicks "Trip made", then the system will display the trip that was made, the user only needs to select the "delete trip" button on the trip that you want to delete.

9) Editing Profile

Picture 14: Edit Profile Activity Diagram

Picture 14, is the activity of changing profiles. The user has logged in. The user selects the profile menu or user name. After that the system displays the profile page. Users can directly edit the profile directly on the profile page, by clicking on one of the forms that you want to change. The user selects the 'Update' button and the change data is saved to the database. The system displays changes in data and the user can see changes in profile data.

10)   Log Out
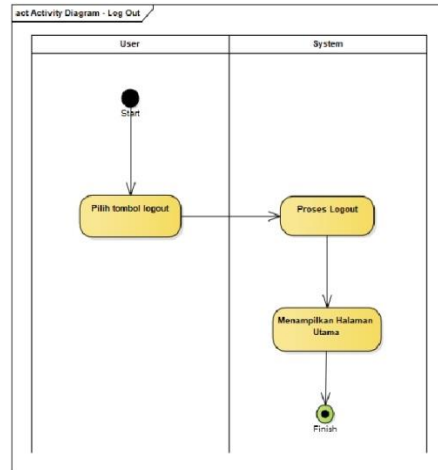
Picture 15: Activity Diagram Logging Out

Picture 15, is a Logout activity. The user selects the 'logout' button on the menu bar after which the system will log out the account. To do the logout process, the user is required to log in and have a Hiking-Yuk! account first.
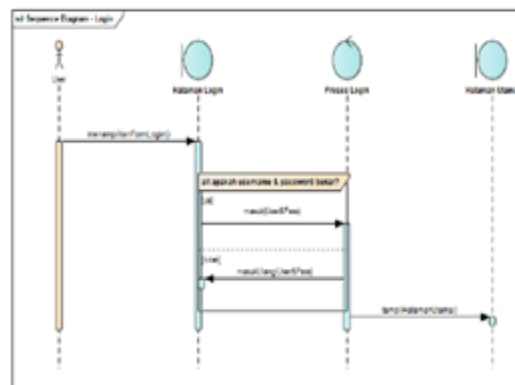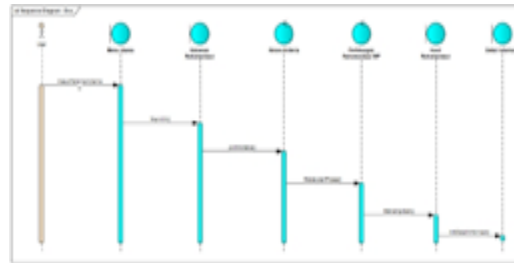
3.3. Sequence Diagram

1)   Login

Figure 16: Sequence Login Diagram

Picture 16, is a login diagram sequence process. When a user logs in, the application will send to the database the data that is entered by the user, then the system will perform a validation process based on the input username and password. If the system has declared valid, it will display the main page, if the system declares invalid it will repeat the login process from the input username and password again. On the login page the user can choose whether to log in directly or want to create a new account again, to create a new account the user can select the register button, and fill in some forms. The form that is filled in by the user must match the identity of the user, after filling out the form the user can select the register button, and a pop up will appear as a sign if the user has successfully registered.

new account. Then the user can log in with a new user that has been registered before. All accounts that have been registered will be entered into the system database.

2)   Recommendation page

Picture 17: Weighted Product Sequence

In Figure 17 describes the Sequence of Recommended Process Diagrams (Weighted Products). Users choose input criteria according to the system specified, the criteria that the user input will categorize according to the user's condition included in the category of beginner, medium, expert climbers.

3)   Register a New Account
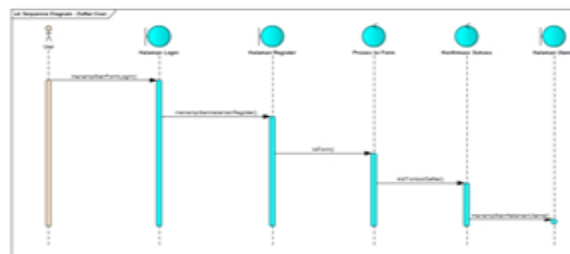
Picture 18: Account Registration Sequence Diagram New

Picture 18, is a new account registration sequence diagram. Users who do not have a Hiking-Yuk! account can create a new account by clicking the "Login" button and then selecting the "Register Account" button, fill in the form, then click "register" so the system will store it in the database and the new account registered can already be used.
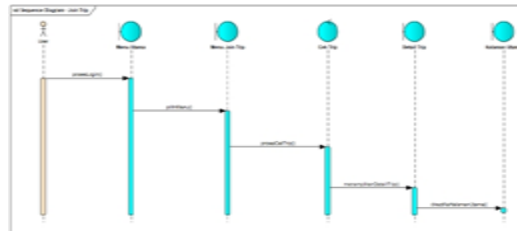
4)   Trip Details
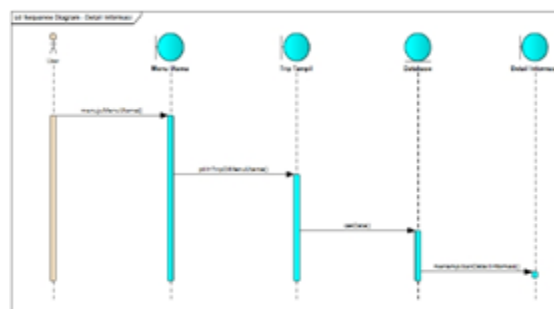
Picture 19: Sequence Trip Detail Chart

Picture 19, is a detailed trip sequence Sequence. To see trip details, the user needs to choose one of the trips, then click "Trip Details", the system will display the trip details chosen by the user.

5)　　Join Trip

Picture 20: Sequence Diagram Join Trip

Picture 20, is an activity diagram when the user wants to join a trip. Users are required to have an account to access this feature, after the user has logged in the system will display an open trip page that has trips made by other users. After the user determines the trip, click "Trip Details", then click "Join Trip", the system will automatically save user data into the trip.

6)　　Edit Trip
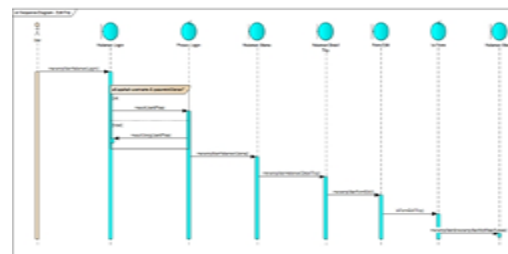
Picture 21: Sequence Diagram Edit Trip

Picture 21, is a Sequence of the edit trip process diagram. To edit a trip, the user must log in first and have made a trip on the open trip page. After logging in, on the open trip menu click the "Trip made" button, then the system will display the trip that was made by the user, then select one of the trips you want to edit, after editing the system will display the data form from that trip, then the user just needs to edit one of the data you want to change, then click "Update" so the system will display a successful notification.
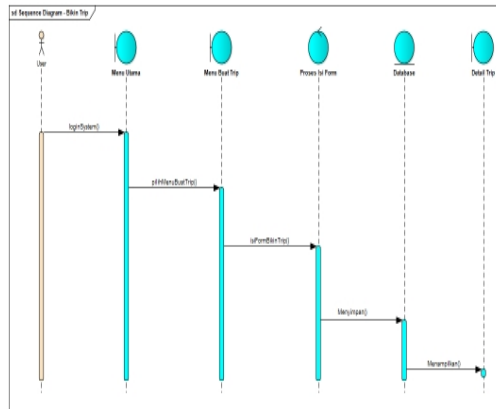
7)　　Join a Trip
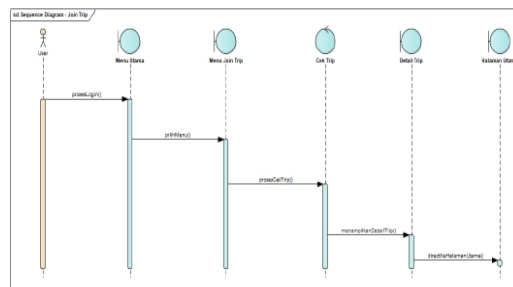
Picture 22: Sequence Diagram Join Trip

Picture 22, a join trip sequence diagram, the user will go to the open trip page. Users can choose one trip provided by another user, and click the 'join trip' button on the trip detail page.
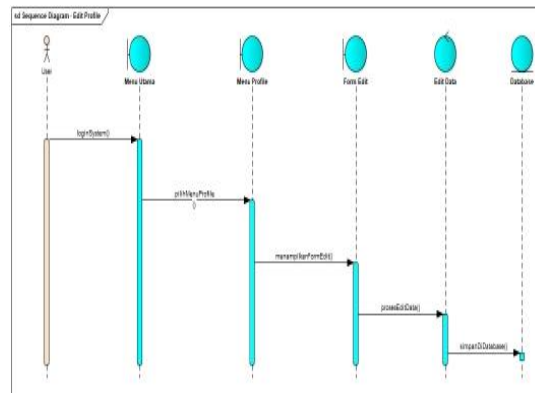
8)   Make a Trip

Picture 23: Sequence Diagram Make a Trip

Picture 23, is a process diagram of making a trip. To make the trip process, the user must log in first, if the user does not have an account then the user can create a new account first. If they have logged in, the user can immediately create a new trip by filling out the form provided by the system.

9)   Edit Profile

Picture 24: Sequence Edit Profile Diagram

Picture 24, is a profile edit diagram. To access the edit profile page the user must enter the profile menu page. If so, the user can immediately change the user's data and click 'update' if you have edited the profile. Users must log in first to be able to edit the profile. The way to edit the profile is. The user selects the profile menu or user name. After that the system displays the profile page. Users can directly edit the profile directly on the profile page, by clicking on one of the forms that you want to change. The user selects the 'Update' button and the change data is saved to the database. The system displays changes in data and the user can see changes in profile data.
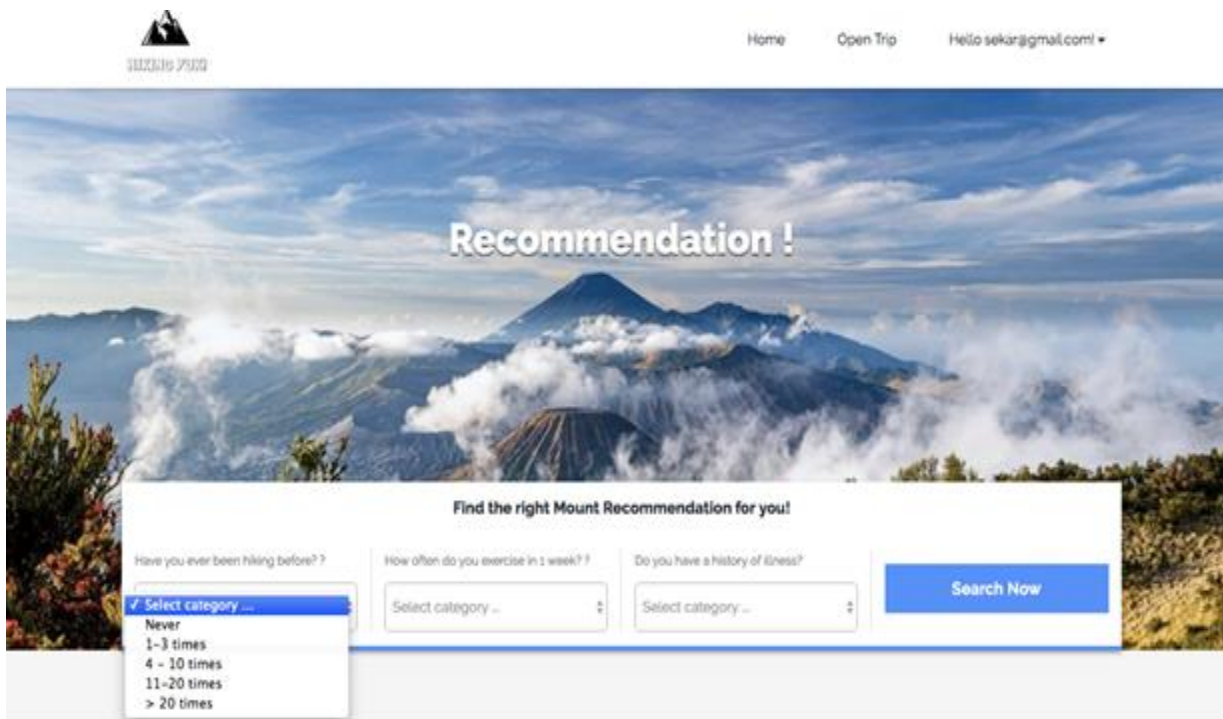
3.4. Interface Implementation

1) Application Main Page
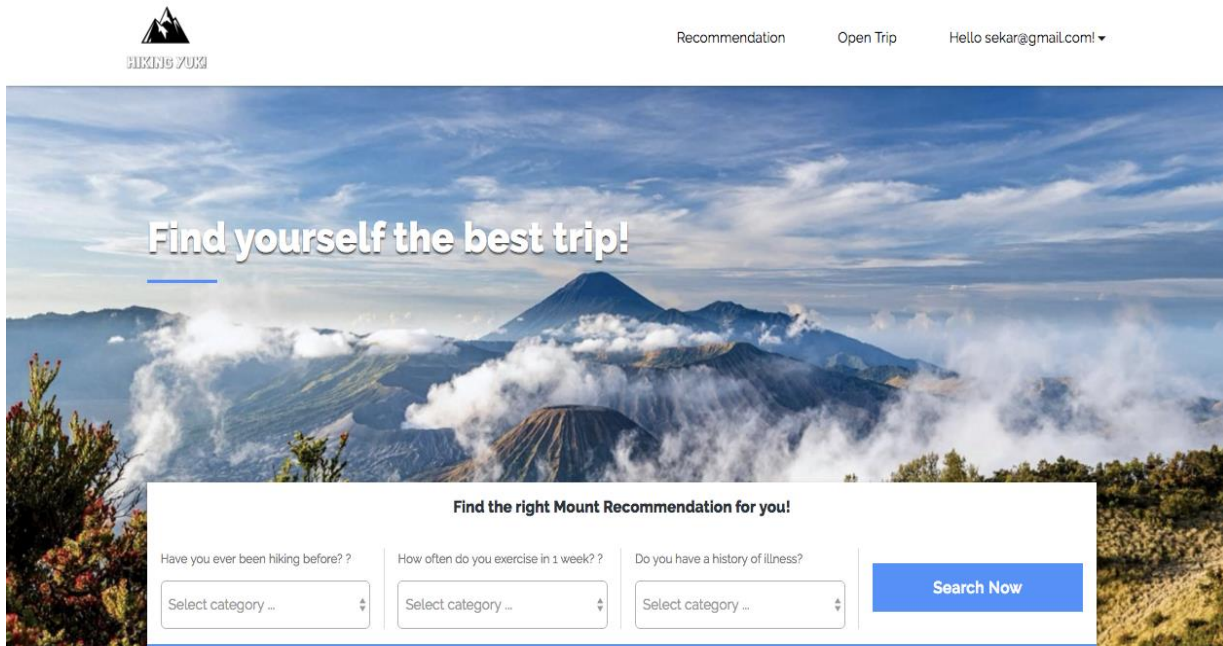
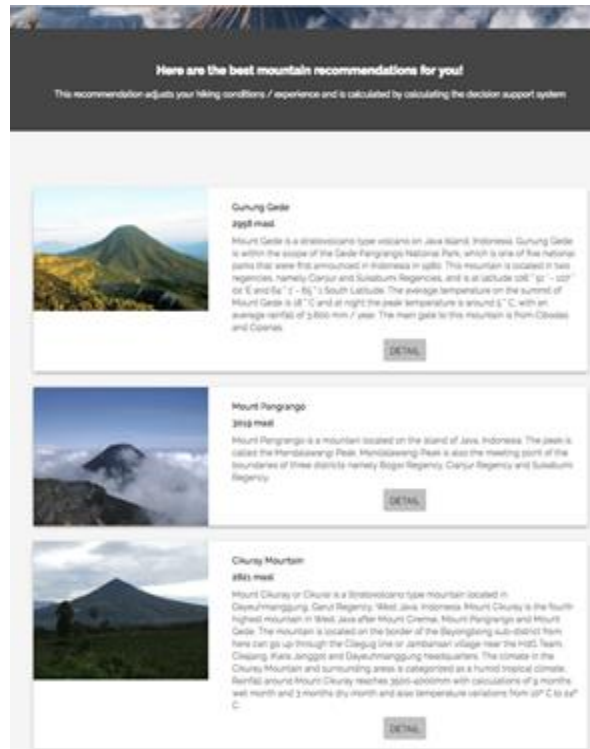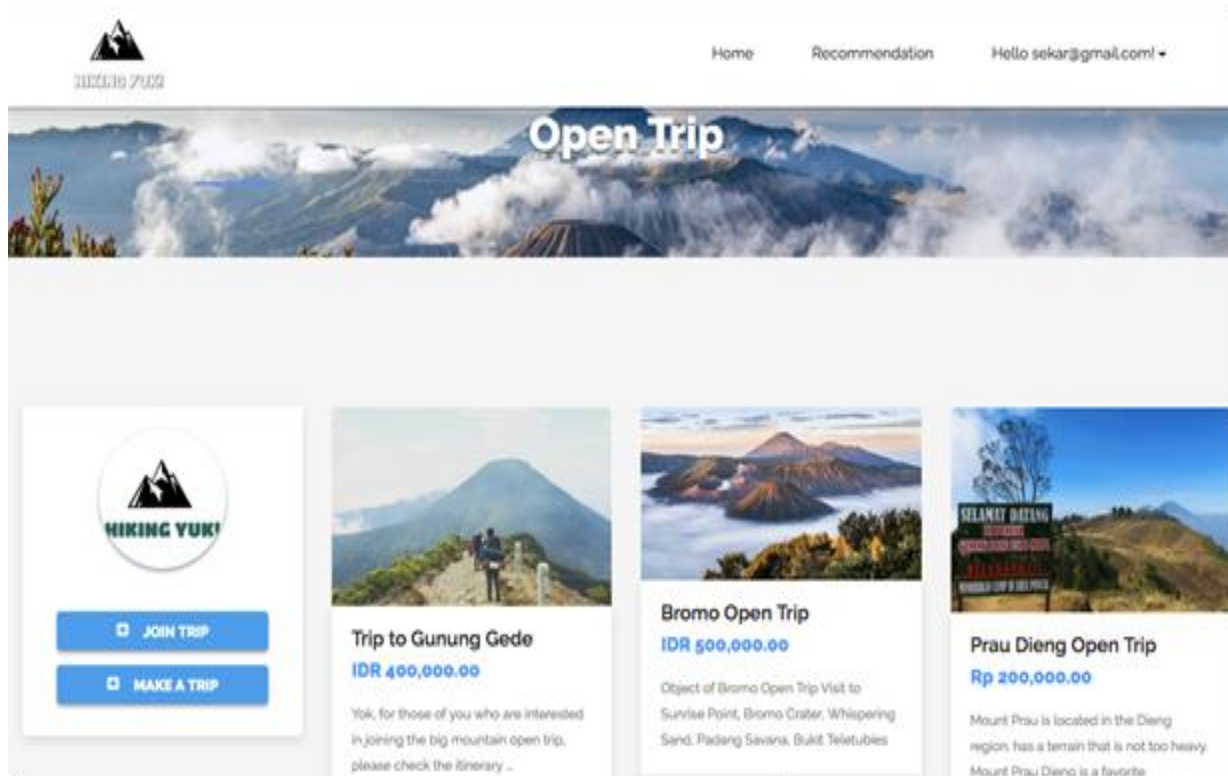Picture 25: Main Page

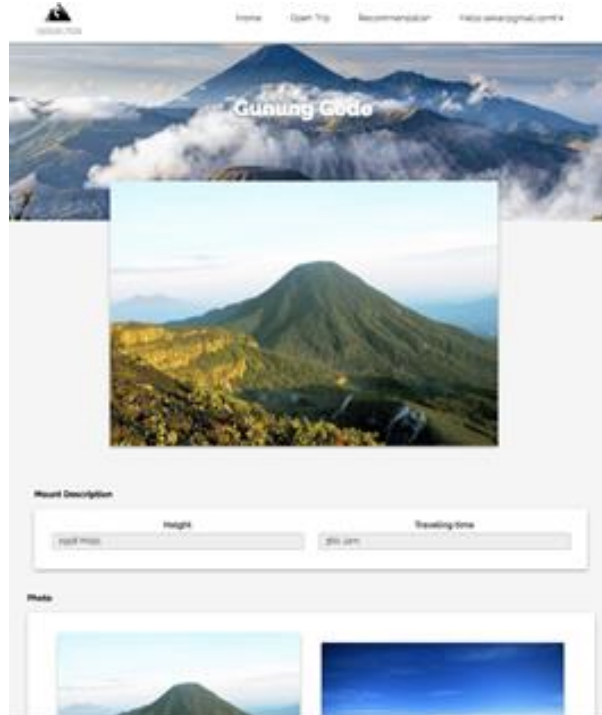2) Recommendation Menu

Picture 26.1: Page Recommendation

Picture 26.2: Page Recommendation List Page

3) Open Trip page

Picture 27: Open Trip page

4) Mountain Detail List Page

Picture 28: Mountain Detail List Page

5) Detail Trip
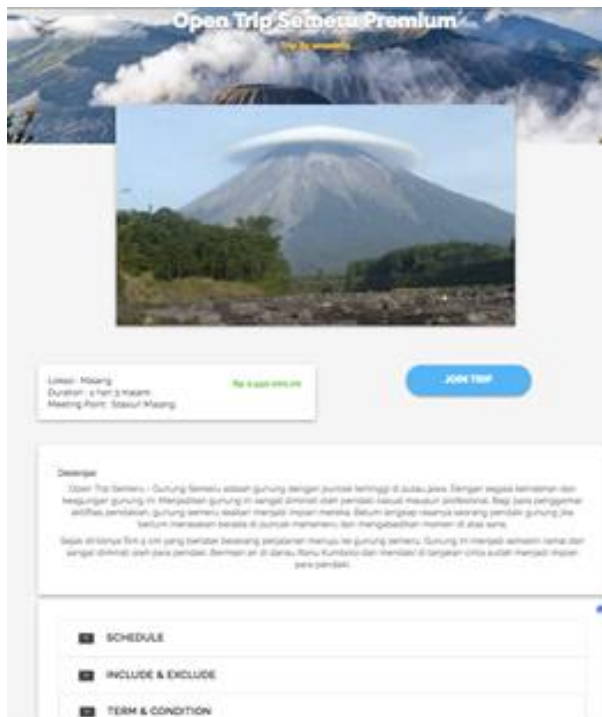
Picture 29: Detail Trip Page

6) Making a Trip

Picture 30: Making a Trip

7) Mountain Detail Page
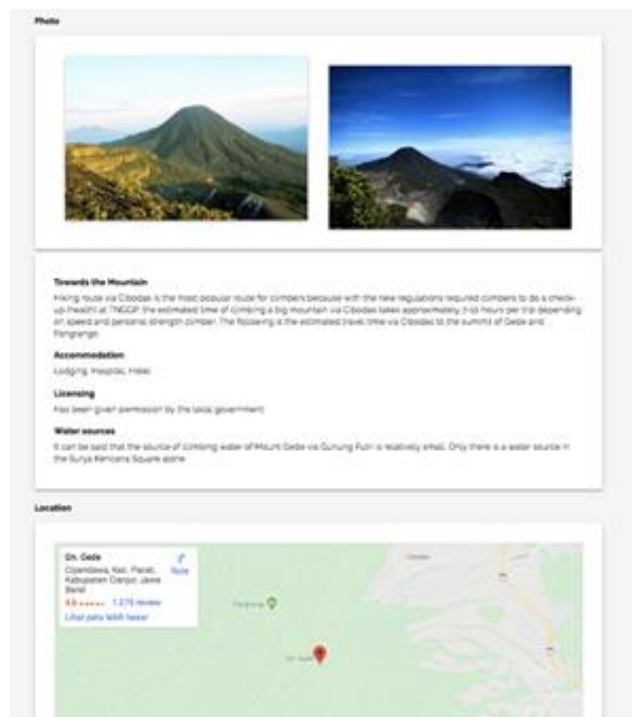
Page 31: Mountain Detail Page

8) Login Page
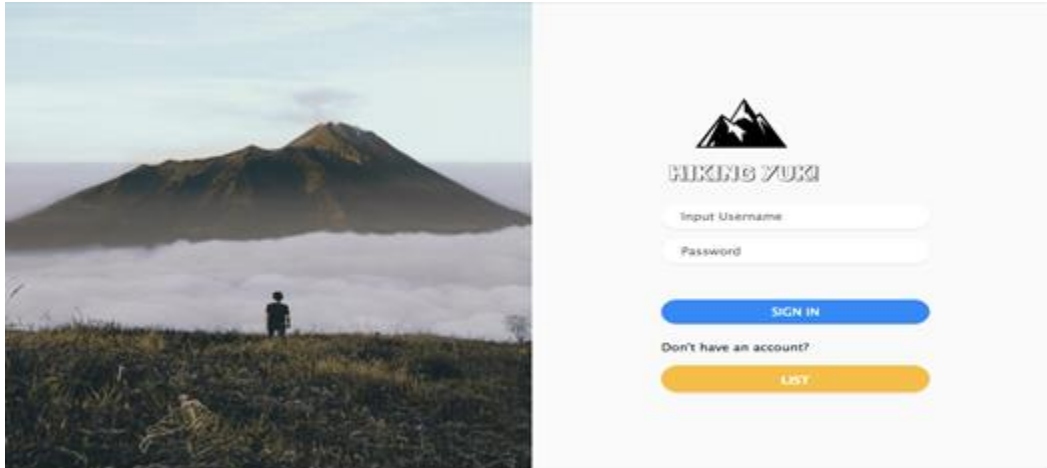
Picture 32: Login Page

9) Profile Page
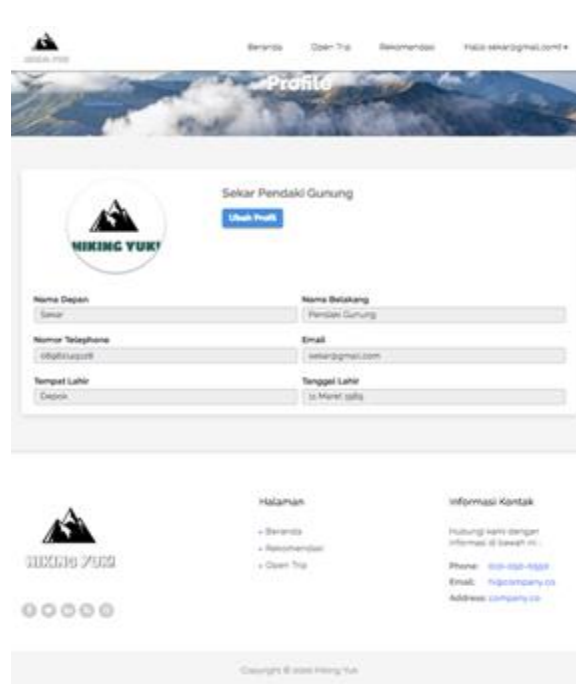
Picture 33: Profile Page

3.5. Designing A Weighted Product Method

For beginner climbers, choosing the right mountain to climb must adjust to the experience and ability of the climber itself to anticipate subjective risks. Climbers need to prepare physically, mentally, and information about mountain knowledge that will be climbed such as understanding the level of difficulty of the terrain, safety, & distance traveled. Therefore in this final project will discuss the decision support system in the selection of the best mountain for hiking which is

expected to help the novice climbers in the selection of mountains that fit their conditions and experiences. The method used in decision making for the best mountain selection for hiking is the Weighted Product (WP) method.

System analysis and WP method calculation:

1) Determine the types of criteria in mountain selection. In this study, the criteria needed to choose the best mountain:

- Height
- Track Distance
- Traveling time
- Security

2) To get a mountain recommendation, the user is required to choose criteria according to the user's own condition.

The following is a table of reference values from experience, physical / sports conditions, medical history:

Table 4: Experience Table

Experience	Nilai
Never	0
1 – 3 Times	28
4 – 10 Times	42
11 – 20 Times	56
>20 Times	70

(Source: APGI, Rahman Muklis, 2019)

Table 5: Physical/ Sports Conditions Table

Physical / Sports	Nilai
Never	0
2 – 3 Times / Week	5
4 – 5 Times / Week	10
6 Times / Week	15
Every Day	20

(Source: Corbin et al,2008)

Table 6: Disease History Table

Disease History	Nilai
There Is	0
There Is No	10

(Source: APGI,Rahman Muklis, 2019)

The system will add up the input criteria for the user, and the system will categorize whether the user entered into Beginner, Medium, or Expert.

The following is a category level table:

Table 7: Category Table

Category	Nilai
Beginner	<= 30
Medium	<= 60
Expert	>61

3) Determine the weight of each alternative on each criterion. The determination of the weight of each criterion has been determined by the Indonesian Mountain Guides Association (APGI).

The following table of each weight is based on the climber category:

Table 8: Beginner Category/ Beginner

Beginner Category/Beginner	Weight
Height	40
Distance	30
Time	20
Safety	10

Table 9: Middle Category/ Medium

Middle Category/ Medium	Weight
Height	30
Distance	20
Time	40
Safety	10

4) As has been suggested by the Indonesian Mountain Guides Association (APGI) to determine the security of a mountain the most notable thing is water sources & road guidance. Therefore, reference values are made for the security sub criteria such as table 9, below:

Table 10: Safety Sub Criteria

Safety Sub Criteria	Score
No Road Directions and No Water Sources	10
Water Sources	50
Road Directions	80
Road Directions and Water Sources	100

5) Calculate the weight of each criterion using the formula, w = the selected weight:

$$W_j = \frac{w_j}{\sum w_j}$$

where: i = 1, 2, …, m; $\sum W_j = 1$; W   = Criteria weight/subcriteria

6) Preference calculations for each alternative with the formula:

$$S_i = \coprod_{j=1}^{n} X_{ij} W_j$$

where:
i = 1, 2,… ,n dan i = 1, 2, … , n . as an atribute
Π: product
Si: score from every alternative
Xij: alternative score i to kej atribute
Wj: weight for every atribute
n: total amount of criteria

7) Produce recommendations with ranking based on equations.

$$V_i = \frac{\prod_{j=1}^{n} X_{ij} \; W_j}{\prod_{j=1}^{n} (X_{i*}) \; W_j}$$

Where:
V: vector V
X: score of criteria
W: weight of criteria
i: alternative
j: criteria
n: total of criteria
*: total of criteria which already scored by another attribute

In implementing the weighted product method, one of the examples is when a user gets the Expert Climber category. Examples of user input can be seen in the table below:

Step 1: Users choose the criteria according to the user's conditions and climbing experience:

Table 11: Input User

1	2
Form	*Input User*
"Have you ever been hiking before?"	4 – 10 times *(Score: 42)*
"How often do you exercise in 1 week ?"	Every Day *(Score: 20)*
"Do you have a history of illness ?"	There Is No *(Score: 10)*
	TOTAL SCORE: 72 (The Expert Climber Category)

The weight used is 'Professional / Expert' weight. The following weights are used Weight for Climber Category.

Table 12: Professional Category/ Expert

Professional Category/*Expert*	Weight
Height	20
Distance	30
Time	10
Keamanan	40

Table 13: Mountain Alternative Data for Professional Category/ Expert

Alternative	Height (C1)	Track Distance (C2)	Traveling Time (C3)	Safety (C4)
A1 (Mount Papandayan)	2622	1400	720	100
A2 (Mount Cikuray)	2821	8300	480	80
A3 (Mount Pangrango)	3019	1000	480	100
A4 (Mount Cirema)	3078	1530	600	80
A5 (Mount Kendang)	2608	800	420	10
A6 (Mount Gede)	2958	8400	360	100

Step 2: Make weight repairs first. The initial weight is W = (20, 30, 10, 40) will be corrected so that the total weight $\Sigma W_j = 1$, with W is the weight of each of the criteria that the User enters.

$$W_j = \frac{w_j}{\Sigma w_j}$$

Where: i   = 1, 2, …, m;

$$\Sigma W_j = 1$$
W = Weight of Criteria

$$W = \frac{20}{20 + 30 + 10 + 40} = 0,2$$

$$W = \frac{30}{20 + 30 + 10 + 40} = 0,3$$

$$W = \frac{10}{20 + 30 + 10 + 40} = 0,1$$

$$W = \frac{40}{20 + 30 + 10 + 40} = 0,4$$

In table 14, fix the weight of the User input:

Table 14: Weight Improvement

Criteria	Scale of Importance	Weights Improvement
Height	20	0,2
Track Distance	30	0,3
Traveling Time	10	0,1
Safety	40	0,4

Step 3: Then the next step is to calculate vector S, S is the value of each alternative. This calculation is done by multiplying all attributes (criteria) for an alternative with W (weight). Next is how to calculate vector S:

$$S_i = \coprod_{j=1}^{n} X_{ij} W_j$$

where:
i = 1, 2,… ,n dan i = 1, 2, … , n . as an atribute
Π: product
Si: score from every alternative
Xij: alternative score i to kej atribute
Wj: weight for every atribute
n: total amount of criteria

S1 = (2622−0,2) (1400−0.3) (720−0.1) (1000.4) = 0.038610178
S2 = (2821−0,2) (8300−0.3) (480−0.1) (800.4) = 0.042394335
S3 = (3019−0,2) (10000−0.3) (480−0.1) (1000.4) = .043241749
S4 = (3078−0,2) (10000−0.3) (480−0.1) (1000.4) = 0.033912493
S5 = (2608−0,2) (8000−0.3) (420−0.1) (100.4) = 0.019208195
S6 = (2950−0,2) (8400−0.3) (360−0.1) (1000.4) = 3,604529404

Step 4: After getting the vector S value, then determine the ranking of alternative tourist destinations by dividing the value of V (vector value used for ranking) for each alternative with the total value of all alternative values (vector S). Following is the calculation calculation using equation V:

To find the best alternative is done by the equation:

$$V_i = \frac{\prod_{j=1}^{n} X_{ij} \ W_j}{\prod_{j=1}^{n} (X_{i*}) \ W_j}$$

where:
V: vector V
X: score of criteria
W: weight of criteria
i: alternative
j: criteria
n: total of criteria
*: total of criteria which already scored by another atribute

$$V1 = \frac{0.17201948}{0.224452357} = 0.17201948$$

$$V2 = \frac{0.18887899}{0.224452357} = 0.18887899$$

$$V3 = \frac{0.19265447}{0.224452357} = 0.19265447$$

$$V4 = \frac{0.15108994}{0.224452357} = 0.15108994$$

$$V5 = \frac{0.08557805}{0.224452357} = 0.08557805$$

$$V5 = \frac{0.020977907}{0.224452357} = 0.20977907$$

After calculating the vector V value, the biggest value is the best alternative. The following are the ranking results of alternative tourist destinations:

Table 15: Ranking

Ranking	Alternative	System Results
1	Mount Gede	0.20977907
2	Mount Pangrango	0.19265447
3	Mount Cikuray	0.18887899
4	Mount Papandayan	0.17201948
5	Mount Ciremai	0.15108994
6	Mount Kendang	0.08557805

The results of the ranking in table 15 state that the alternative of Mount Gede is the best suggestion for Users, the second best is Mount Pangrango.

4. Conclusions and Recommendations

The conclusions obtained in this research that the application has been completed and is namely "Hiking-Yuk!". This application has decision support system to determine the best mountain for hiking with the application of the weighted product method. The system can be used as an alternative solution or considerate by climbers in determine the best mountain for hiking. All the results of recommendations on Hiking-Yuk system, have been validate by expert climbers from the Association Indonesian Mountain Guides (APGI). The results of the weighted product calculation on the simulation of the tested data indicate that the highest / highest vector V ranking is the best alternative mountain destination. This result based on input from the level of importance of criteria by the user. Recommendations for the development Hiking-Yuk! Website, that this website can be developed not only in the scope of the East Java, but can be developed for other mountains in other provinces.

References

[1] Adriyendi, 2015. Multi-Attribute Decision Making Using Simple Additive Weighting and Weighted Product in Food Choise. MECS, pp. 8-14
[2] Ahmadi dan Wiyanti, D., 2014. Implementasi Weighted Product (WP) dalam Penentuan Penerima Bantuan Langsung Masyarakat PNPM Mandiri Perdesaan. Procedding Seminar Nasional Aplikasi Teknologi Informasi (SNATI), Yogyakarta.
[3] Cendana, M. & Azhari, S., 2015. Sistem Multiagen untuk Pengklasteran Pendaki Menggunakan K-Means. IJCCS, Vol.9, No.1, pp. 43-52.
[4] Lee, D., 2006. A Mountain Feeling: the Narrative Construction of Meaning and Self Through a Commitment to Mountaineering in Aotearoa/New Zealand. Doctoral Thesis, Department of Management Monash University.

[5] Rosa dan Salahuddin, M., 2015. Rekayasa Perangkat Lunak Terstruktur dan Berorientasi Objek. 3 ed. Bandung: Informatika Bandung.

[6] Sianturi, I., 2013. Sistem Pendukung Keputusan Untuk Menentukan Pemilihan Jurusan Siswa Dengan Menggunakan Metode Weighted Product (Studi Kasus : SMA Swasta HKBP Doloksanggul). Informasi dan Teknologi Ilmiah (INTI), Vol.1, No.1, pp. 19-22.

[7] Wardana, R. A., Kahar, S. & Suprayogi, A., 2015. Penyajian Peta Jalur Pendakian Gunung Rinjani Berbasis Platform Android. Jurnal Geodesi Undip, Vol.4, No.2, pp. 94-100.

[8] Weber, K., 2001. Outdoor Adventure Tourism: A Review of Research Approaches, Vol.28, No.2, pp. 360-377.

*Corresponding author.
E-mail address: sekarageng.p@ gmail.com/henmedya@ staff.gunadarma.ac.id