IMPLEMENTATION OF ANDROID-BASED SYSTEM THROUGH HAVERSINE METHODS FOR BABY CARE SERVICES

by Wasilah Wasilah

IMPLEMENTATION OF ANDROID-BASED SYSTEM THROUGH HAVERSINE METHODS FOR BABY CARE SERVICES

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Abstract: The baby care businesses were developing rapidly together with the rapid-growing technology and the lifestyle of people recently. There were several baby care businesses with various facilities in Bandar Lampung, e.g., spa, haircut, make up, hair dye, and others. The problem statement of this study was that 1) the customers had to come to the baby care location to buy the products so that it caused a long queue and made inconvenience for customers because the Covid-19 outbreak were still happening; 2) there was also no information regarding the closest way to reach the baby care location so that it confused the customers. The objective of this study was determining the closest way through the Haversine formula. The Haversine formula was used to determine the location through the geo-location technology (API from Google Map) based on the latitude and longitude coordinates of its location. The system development method used in this study was through the prototype model used to fulfill the users' needs for the system. The result of this study was that the system was able to provide information on the closest way from the user location to baby care locations and to display the types of provided services, prices, and order service for the babies. This system was expected to support the effective and efficient business processes.

Keywords: Haversine, Baby Care Services, Prototype, Android-Based System.

1. INTRODUCTION

In this modern era, the development of information technology in the world showed increasing progress, especially in the field of Mobile Technology. This development enshrined certain aspects of life. Various mobile applications had sprung up in order to fulfill and facilitate the high demand of human needs. The development of the baby care service business developed rapidly by following changes in the technology and the way people viewed their lifestyle. Moreover, babies and toddlers also felt the available services in baby care. The baby satisfaction was the main concern for this baby care service so that the baby care service must be trained through the Haversine Method. The customers were expected to be able to see the closest distance between their house and the location of the baby care service. Besides, the booking process was also expected to facilitate the customers so that the booking time through the application was run anytime and anywhere and the customers did not need to queue for a long time. The use of information technology in this matter was done to provide online-ordering facilities so that it was able to support the effective and efficient business processes. A system was developed to search for the baby care places. The Haversine method was very suitable, especially for the systems related to the the location of the baby care service. The Harvesine method was used to calculate navigation and to find the arc distance between two points (User and Owner) on the ball from

longitude and latitude. The output was the closest distance between the Baby Care service location and the users' house.

2. METHOD

a. Harversine Formula

The Haversine Formula Theorem was the important equation in the field of navigation used to find the arc distance between two points on a sphere from longitude and latitude. This was a special form of spherical trigonometry (law of haversine) by looking for the side and angle relationships of a triangle in a spherical plane. This formula was first discovered by Jamez Andrew in 1805 and was first used by Josef de Mendoza y Rios in 1801. The term haversine itself was coined in 1833 by Prof. James Inman. Josef de Mendoza y Rios used haversine for the first time in his study on "Major Problems of Nautical Astronomy", Proc. Royal Soc, Dec 22. 1796. Haversine was used to find distances between stars.

Haversine Formula was the important equation in the navigation system. This haversine formula generated the shortest distance between two points seen on a ball taken from longitude (longitude) and latitude (latitude). Haversine formula was the application of the concept of trigonometry. The Haversine formula was the important equation in navigation which generated a large circle distance between two points (latitude and longitude) on the surface of the sphere (earth) based on longitude and latitude. The use of this formula was accurate enough for most calculations. It also ignored the elevation of hills and the depths of valleys on the earth's surface [8]. The form of the Haversine Formula was seen below:

$$\Delta lat = lat2 - lat1$$
$$\Delta long = long2 - long1$$
$$\alpha = \sin^2\left(\frac{\Delta lat}{2}\right) + \cos(lat1) \times \cos(lat2) \times \sin^2\left(\frac{\Delta long}{2}\right)$$
$$c = 2 \times atan2\left(\sqrt{\alpha}, \sqrt{1-\alpha}\right)$$
$$d = R \times c$$

Figure 1. Haversine Formula

R = Earth radius / Earth radius of 6371 (km).
Δlat = the amount of change in latitude (destination latitude - user latitude).
lat1 = position of the user's latitude.
lat2 = position latitude of the destination location.
$\Delta long$ = magnitude of change in longitude (longitude of objectives - longitude of user).
c = axes intercept calculation
d = distance between 2 points (km).

b. Designing System

The actors involved in the application of Android-based Baby Care Services in Bandar Lampung were: user, administrators, and owner. Users were as service users, administrators were as system manager, and the owners were as owner of baby care. The system was seen on Figure 2.
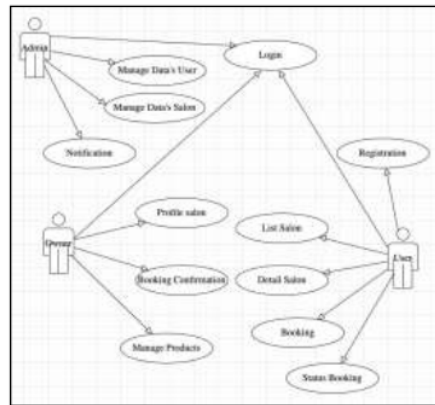
Figure 2. Use Case Diagram Application

According to Figure 2, The Use Case Diagram System scenario description was seen on table 1 and table 2.

Table 1. Description of Actors.

No	Actors	Description
1	Users	People who wanted to find the location and to book the baby care services.
2.	Administrators	The person managed all the procedures on the system.
3.	Owners	Baby care managers or owners.

Table 2. Use Case Diagram Application Scenarios.

Actor	No	Scenario	System
User	1	Enter the password and username	1. If password and username did not exist, register first. 2. Entering the baby care application.
	2	Starting a Booking	1. Choosing the nearest baby care from the user's location 2. Choosing a booking. 3. Filling out the booking form

	3	Booking Status	1. Choosing the booking status menu. 2. Clicking cancel if you want to cancel.
Admin	1	Enter the username and password	1. Conducting Data Validation 2. Entering the systems
	2	Managing User Data	Adding, deleting, and editing data user.
	3	Managing Baby care Data	Adding, deleting, and editing baby care data
	4	Sending Notification	The admin sent notifications to users
Ower	1	Enter the password and username	1. If password and username did not exist, register first 2. Entering the baby care application
	2	Booking Confirmation	1. Owner confirmed the order if there was an order. 2. Owner canceled the order if it did not comply with the rules
	3	Product Data Managed	Administrators added, deleted, and edited product data.
	4	Baby Cary Profil	The owner edited the baby care profile according to the conditions.

3. RESULT AND DISCUSSION

The stage of the application implementation was the result of the software design into the application program. At this stage, the output of the baby care application was explained.

a. Main Menu Application
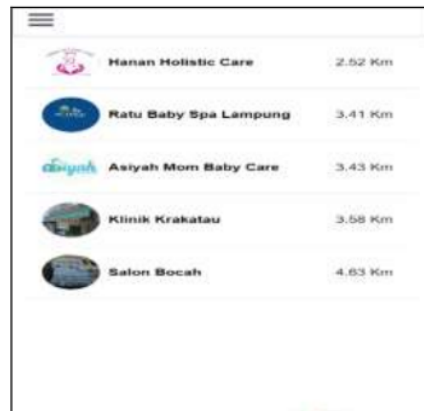Baby care application had a main menu as it was seen on Figure 3.

Figure 3. Main Menu

b. Registration Menu.

This registration page was used by the users to be able to access the baby care applications in Bandar Lampung. The registration page interface was seen on Figure 4.

Figure 4. Registration Menu

c.   Menu Registration Form

A registration form was provided by the developers to be able to access the features of the application and to become a member or customer of this baby care application. The registration form was seen on Figure 5.

Figure 5. Registration Form

d.   Menu Order (Booking)

The ordering menu was the menu used by the customer to put an order. The customer must fill in the order form.

Figure 6. Booking Form

The online ordering services allowed customers to order services anywhere and anytime without coming and queuing to the location for a long time. This really supported the achievement of better service quality. Meanwhile, the information facility about the shortest distance to the maintenance location facilitated the customers to arrive at the location in a fast time.

4. CONCLUSION

The conclusions of this study are that The Baby Care application is developed through a prototype model system development method. By applying the Harvesine method in this application, the customers can find out the closest distance from a baby daycare in Bandar Lampung. Baby Care Orders are packaged via a mobile-based application. The entire ordering process is done through online mode so that it facilitates the customers to order babysitting services. This has a positive impact on both customers and baby care owners. The expected improvement in service quality creates the increasing customer satisfaction and the number of orders.

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