

Tourism Location Mapping Application in Bengkalis District Using Leaflet

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ABSTRACT: The Design of Tourism Location Mapping Application in Bengkalis District Using Leaflet is one of the computerized system developments in the field of information technology due to inadequate information about tourist attractions. Obtaining information about these tourist attractions requires relying on individuals who have visited the location or incomplete mass and online media. The purpose of this application is to design a web-based Tourism Location Mapping Application in Bengkalis District Using Leaflet. This application can assist tourists who want to visit Bengkalis District to search for available tourist locations. To accurately determine the location of tourist attractions in Bengkalis District, the writer uses geojson file data, which is a collection of mapped coordinate points. Furthermore, the geojson file data will be processed using Leaflet to display a map image according to the available data. Finally, the Leaflet data will be processed again using CodeIgniter to ensure the data is displayed on the website interface.

KEYWORDS: Mapping, Leaflete, Bengkalis

I. INTRODUCTION

Digital technology has rapidly developed in recent times, and it has provided many benefits to humans. The development of digital technology, particularly in the field of computers, has led to the emergence of sophisticated software for digital image processing. This data processing technology in the form of images can be used to create a geographic information system (GIS) of the Earth's surface or its condition [1].

A geographic information system (GIS), is a computer-based information system that is used to process and store geographic data or information. The main advantage of GIS is that it allows us to view, understand, ask questions, interpret, and display spatial data in many ways that show spatial

patterns and trends in the form of maps, globes, reports, and graphs [2].

Tourism is an activity of traveling by an individual or a group of people to a specific place for recreational, personal development, or learning the unique tourist attractions within a temporary period [3]. Meanwhile, tourism encompasses various types of tourism activities supported by various facilities and services provided by the community, entrepreneurs, the central government, and local government [4]. Information about the location of tourism in Bengkalis Regency provided to local and outside communities is incomplete, and this makes many people unaware of where to find tourist attractions. Information obtained by outsiders about tourist locations usually comes from friends, relatives, and close acquaintances who have previously visited the tourist attractions. The information obtained also usually comes from online media applications or newspapers that report on the beauty of tourism in Bengkalis Regency.

In a research study titled "Web-Based Tourist Object Mapping in Promoting Tourism on Bangka Island," after completing the study, output will be generated in the form of information about the spread of tourist object locations on Bangka Island packaged in a static website [5]. Another research study titled "Designing a Web-Based Geographic Information System for Land Value Zones Using Leaflet Javascript Library" states that using Leaflet can display an interactive map with supporting features such as zooming, geocoder, popup, layer info, and control layer features. This enables the provision of geographic information that can calculate the value zone of land for buying and selling purposes [6].

In a journal titled "Geographic Information System Application as Tourism and Culinary Location Information in Yogyakarta Using PHP, MySQL, and Google Maps," culinary tourism information in Yogyakarta city can be displayed in an attractive visualization that can attract tourists

and make them users to provide other tourist information that they know to be added to this geographic information system [7].

II. METHODOLOGY

1. **Problem Identification:** This stage involves determining the problem to be addressed and the data to be used, related to the use of the Tourism Location Mapping Application in Bengkalis Regency Using Leaflet.
2. **Data Collection:** Data collection is obtained from books, journals, and the internet to design the proposed system.
3. **System Design:** At this stage, system design is carried out, including system analysis and use case diagrams. System analysis is viewed from the current system and then the proposed system.
4. **Application and Database Design:** In this design stage, determine how the interface display will be created according to the research carried out and database design according to the obtained data.
5. **Application Development:** At this stage, the Tourism Location Mapping Application program in Bengkalis Regency Using Leaflet is created.
6. **Testing:** This stage of testing is carried out to determine whether the created application runs as expected or not.

1. System Design

The result of the current system analysis is not effective enough due to the lack of information on the existing tourism locations in Bengkalis Regency. The following is the system that will be developed, as shown in Figure 1.



Figure 1. System design

2. Overall Application Design

The general application design illustrates how the application is built using geojson files until it can be displayed on a website page, as shown in figure 2.



Figure 2. Overall Application Design

i. Global Positioning System (GPS)

GPS is the only global satellite navigation system for determining location, speed, direction, and time that is fully operational worldwide [8]. GPS is used for mapping a location by taking coordinates at a specific location based on latitude and longitude lines.

ii. ArcGIS

The ArcGIS application is used to create maps based on coordinate points data obtained using GPS. After finishing creating the map, it will result in a file in the form of .shp file.

iii. GeoJSON.io

The GeoJSON.io application is used to convert the .shp file into a JSON file. The JSON file itself is a file that contains latitude and longitude values.

iv. Leaflet and Codeigniter

Leaflet merupakan Open source javascript library untuk membuat peta yang bersahabat dan interaktif [9]. Leaflet digunakan untuk menampilkan peta yang datanya diambil dari file .json. Sedangkan CodeIgniter merupakan framework PHP yang dibuat berdasarkan kaidah model View-controller [10]. CodeIgniter digunakan untuk membangun aplikasi berbasis web untuk menampilkan peta secara online dan dapat diakses oleh user

3. Use Case Diagram

The use case diagram is used to illustrate the relationship between actors and the system involved [11]. In this use case, it can be seen what functions are present in the system that is built, as shown in Figure 3.

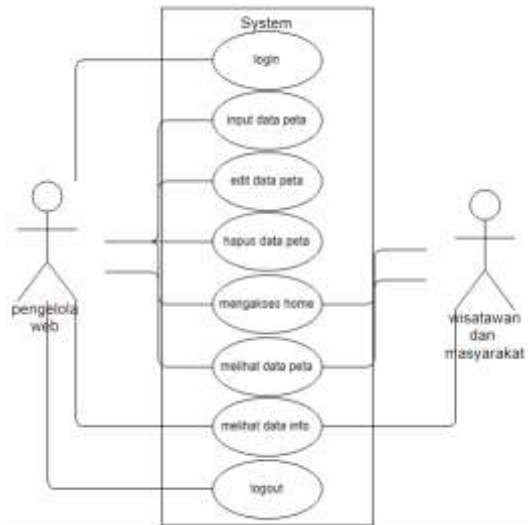


Figure 3. Use Case Diagram

III. RESULT

This research produced a tourism location mapping application in Bengkalis Regency using leaflet which is useful for viewing the existing tourism locations in Bengkalis Regency. In this application, users can view tourism locations that have been input by the admin, view information about each tourism location, and access travel routes from the Google Maps feature.

1. The results of Admin and User Interface Design
 - a. Login Interface

Page login is used by the admin to access the admin page within the application. To be able to login, the admin needs to enter their email and password. The login page can be seen in figure 5.



Figure 4. Login interface

- b. Admin Home Page

The admin home page can be accessed after the admin successfully logs in. The admin home page will display menus to manage the website and display the inputted tourism locations in the form of maps. The admin home page can be seen in Figure 5.



Figure 5. Admin Home Page

- c. Tourism Admin Page

The Pariwisata page displays the data of tourism locations that have been successfully inputted by the admin. The Pariwisata page can be seen in Figure 6.



Figure 6. Tourism page

2. Results of User Interface Design

The home page for users displays a map that has been marked with tourist location. If the user wants to view information about the marked location, the user can simply click on the marker on the map. The user's home page has three different map views: satellite mode, streets mode, and grayscale mode that can be changed when the user clicks on the base map layer menu in the right corner of the user's display. The user's home page with satellite mode, streets mode, and grayscale mode can be seen in Figures 7, 8, and 9.



Figure 7. User Interface Display Page in Satellite Mode.

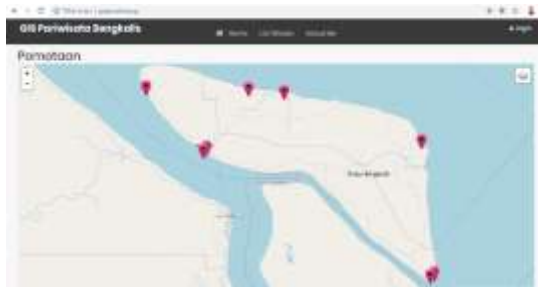


Figure8. User Home Page in Streets Mode



Figure9. Page of User Interface in Grayscale Mode.



Figure10. PopUp interface

The popup page will appear after the user clicks on the marker on the map, the popup will

display information about the name of the tourist location and show action buttons for details and route to the tourist location. The popup page can be seen in the above picture 10.



Figure11. Detail information

The tourism detail page will appear if the user clicks on the detail action in the popup page. This page displays detailed information based on the desired tourism location data. The tourism detail page can be seen in figure 12 above.

IV. DISCUSSION

Black box testing is a software testing method that focuses on the functionality of an application, especially on input testing, to determine whether the application works as expected or not [12]. In this testing method, the tester does not have access to the internal workings of the application but only evaluates the input and output of the system. The author used black box testing to determine the validity and reaction of the system to inputs.

Test Cases and Correct Results (correct data)				
No	Testing Scenario	Expected Results	The test results	Conclusion
1	Admin fills in the login data by entering the registered email and password.	If the login data is correct, then the admin will be directed to the admin page.	Correct login data, the system redirects to the admin page.	Success
Test Cases and Correct Results (wrong data)				
2	Admin enters login data by entering an email and password that is not registered yet.	If the entered data is incorrect, the system will display an error message and the data will not be	The system displays an error message and the data is not processed.	Failed

processed.

From the results of the application testing using the black box method, it can be concluded that the system runs normally and works according to the design. This is indicated when the system receives inputs that are in accordance with the system's process, the system will run correctly. Conversely, when the system receives inputs that do not comply, the system process will not run correctly because it follows the input rules applied to the textbox.

V. CONCLUSION

Based on the discussion above, it can be concluded that the tourism location mapping application in Bengkalis Regency using Leaflet as information about tourism locations for tourists and the public. This application is built using the Codeigniter framework so that when there are changes or additions to features in the application, it can be done easily and can be run on smartphones or laptops connected to the internet, with the condition that the location permission is activated. From the results of testing the application using black box method, it can be concluded that the system runs normally and works according to the design. This is marked when the system receives appropriate inputs, the system process will run correctly, and when the system receives inappropriate inputs, the system process will not run correctly because it complies with the input rules applied to the textbox.

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