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Tourist Geographic Information System in Baturaden

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Abstract

As the largest archipelago country in the world, Indonesia has many tourist attractions. One of the tours in Indonesia is tourism in the Baturaden area. To increase tourism promotion and management, a supporting application is needed, one of which is by using WebGIS. This WebGIS application is then used as a medium for spatial information for mapping tourism in Baturaden. The method used in this research is to use the Agile model development method using BlackBox testing. The results of this study are in the form of a WebGIS application prototype for tourism mapping in Baturaden, which is declared valid using BlackBox testing. As the largest archipelago country in the world, Indonesia has many tourist attractions. One of the tours in Indonesia is tourism in the Baturaden area. To increase tourism promotion and management, a supporting application is needed, one of which is by using WebGIS. This WebGIS application is then used as a medium for spatial information for mapping tourism in Baturaden. The method used in this research is to use the Agile model development method using BlackBox testing. The results of this study are in the form of a WebGIS application prototype for tourism mapping in Baturaden, which is declared valid using BlackBox testing.

Keywords: Baturraden, Geographic Information System, Leaflet JS.

I. INTRODUCTION

Indonesia is the largest archipelagic country in the world and Southeast Asia and has a vast area that stretches from Sabang to Merauke [1]. One of the countries with various natural resources is Indonesia which has many tourist objects that must be promoted [2]. One of the sectors favouring the development of a region is the tourism sector [3]. Tourism can increase state income, contribute to foreign exchange and absorb labour. Local governments are expected to utilize natural resources and cultural diversity optimally [4].

One of the objects most visited by tourists for holidays is tourist attractions [5], one area with high tourism potential is Baturraden [6]. Baturraden is a sub-district located under the foot of Mount Slamet, precisely in Banyumas Regency, with fascinating tours [7], educational tours, water tours, and historical tours. Educational tours such as Baturaden Botanical Gardens, Ketenger Tourism Village, Baturaden Lokawisata, while water tourism such as Curug Telu, Curug Bidadari, Curug Bayan, Curug Cipendok, Shower Pitu, Silent Lake, as for historical tours such as the Panglima Besar Jenderal Soedirman Museum, Puppet Museum Sendhang Mas BRI Museum [8].

Baturraden is located at the foot of Mount Slamet at an altitude of 640m above sea level. The distance from Purwokerto to Baturraden is 14 kilometres [9]. The average number of visitors to the Baturraden Loka tourism object in 2010-2012 was 396,323, the average number of visitors to the Baturraden Loka tourism object in 2013-2015 was 426,192, while the average number of visitors to the Baturraden Loka tourism object in 2016-2018 was 629,022 [10]. From the data obtained, it can be concluded that Baturaden Lokawisata is a tourist attraction that is very popular with tourists.

The tourism potential in Baturaden still has to be improved, one of which is the use of Geographic Information Systems (GIS) as a medium of information. GIS in tourism can help improve decision making and planning[11]. Planning taken by the government or the surrounding community using GIS can be used as a reason for decision making as one of the data. The maximum use of GIS by using internet media can provide critical data and information on services in tourism marketing[12].

From the data obtained, it can be concluded that the Baturaden Lokawisata is a tourist attraction in great demand by tourists. However, tourists who visit Baturraden are not only local tourists. Many tourists are from outside the region, even outside the province. Still, many tourists do not know the layout of what destinations are in Baturaden. Therefore, this research aims to develop a website geographic information system in the Baturraden area using the LeafletJS JavaScript library, with the hope of helping and making it easier for website users who want to know and know about tourist attractions in Baturraden and related information. [13].

II. LITERATURE REVIEW

A. *Related Research*
Several studies are used as previous research that is used as a research reference. The previous researches were about WebGIS. The research used included Geographic Information System (GIS) For Green Park Using Leaflet Js, WebGIS-Based Application Of Kota Pekanbaru Klenteng Application, and Web-Based Geographic Information System for Spatial Patterns in Bunaken National Marine Park Area.

WebGIS-Based Application Of Kota Pekanbaru Klenteng Temples[13] is research on making WebGIS map temples in Pekanbaru city. WebGIS application created using the PHP programming language by adding Leaflet JS. application development method using the System Development Life Cycle (SDLC). This application makes it easier for people to find places of worship, which in this study specifically is a temple.

The research entitled Tourism in the City of Bandung and Web-Based Geographic Information System for Spatial Patterns in Bunaken National Marine Park Area[16] is research on making WebGIS for spatial pattern information in Bunaken National Park. This study aims to provide spatial data related to the spatial pattern of Bunaken National Park. WebGIS development using the Rapid Application Development (RAD) method with testing using a questionnaire with several respondents 50 people. The data displayed is data using SHP data which then uses a JS leaflet made for digital map display.

The research entitled Geographic Information System (GIS) For Mapping Green Park Using Leaflet Js [14] is research on making WebGIS for green open areas in Tegal city. This study aims to provide information related to green open spaces in the city of Tegal. The method used to develop WebGIS is using the waterfall method. The data displayed is data using SHP data which then uses a JS leaflet made for digital map display.

B. *WebGIS*
Geographic Information System is a system that is made in such a way to store, analyse, and display information containing spatial data [14]. Spatial data is divided into two models, namely vector data model and raster data model. Raster data comes from remote sensing systems, and geographic surfaces are displayed in grids (pixels) or images. In contrast, vector data is described by utilising discrete objects to represent spatial features on the earth's surface, consisting of points, lines, polygons [16]. WebGIS is a system designed using a

particular programming language, then showing certain areas along with reviews of these attractions in the form of a website [6], It is easily accessible by many people. The purpose of WebGIS is to make it easier for people to recognize and know geographic locations in detail [13].

WebGIS is developed based on the website using the PHP programming language by adding LeafletJS as a library to implement digital maps. PHP is a programming language consisting of a line of code that will be displayed in a browser used to develop dynamic websites [13]. The creator of PHP, Rasmus Lerdorf, was created in 1995. The latest version of PHP is version 8.1. Large company websites built using PHP include Facebook, Wikipedia, Tumblr, Slack and many others [4]. LeafletJS is an open-source JavaScript library with an API to make it easier for a developer [13]. LeafletJS has many features such as markers, popups, zoom, and so on that can be implemented on both desktop and mobile platforms [14].

III. RESEARCH METHODS

In this study, the application development method uses the agile model development method with testing using the BlackBox test. The Agile method is a software development method that prioritises the readiness to change during the software development process [17]. The Agile methodology is needed when the developed software needs changes and repairs quickly [18]. The Blackbox method is carried out to ensure whether the software produces output by the design and needs of the software [19]. The Blackbox method focuses on aspects of software functionality [20]. The flowchart of designing this website with the Agile method, the flowchart illustrated in Figure 1.
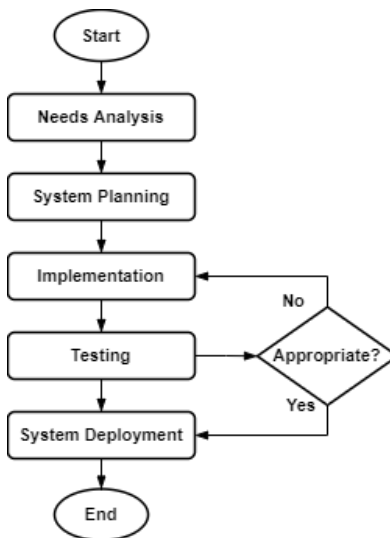

Fig. 1. Research Flowchart

The description of the steps of the research flowchart are:

A. *Needs Analysis*

In this section, a needs analysis is carried out by sorting out the needs in this study based on a priority scale.

B. *System Planning*

In this section, design and create a concept. To explain these aspects, use UML (Unified Model Language), namely making Use Case Diagrams and Activity Diagrams.
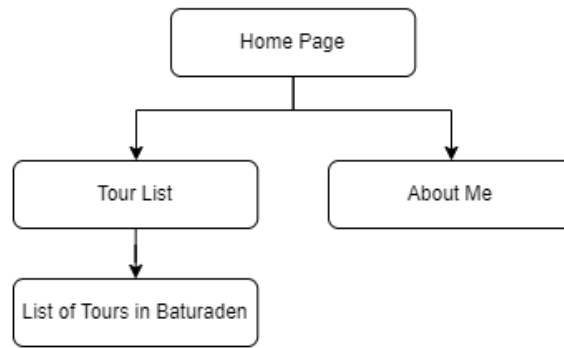
Fig. 2. Website Structure

1. Use Case Diagram

   The use case diagram illustrated in Figure 3 shows the user's relationship with the system [21], as well as an overview of the use of this website.
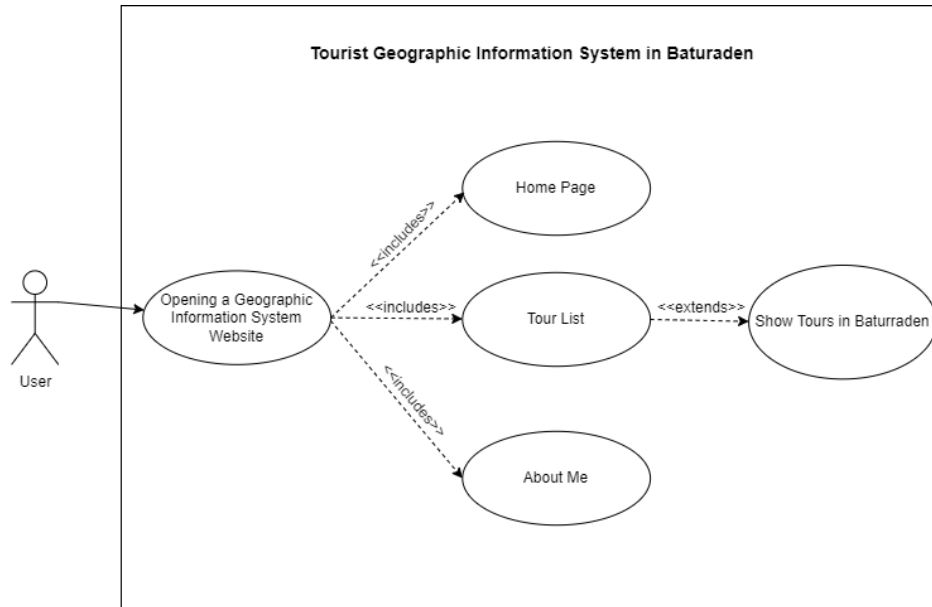

Fig. 3. Use Case Diagram

2. Activity Diagram

   The activity diagram illustrated in Figure 4 depicts the activity between the user and the system [22]. Starting from the user opening the website, then continuing with displaying the homepage, when the user selects the tourist list menu, the system will display the location of the tourist attraction and the details of the tourist attraction.
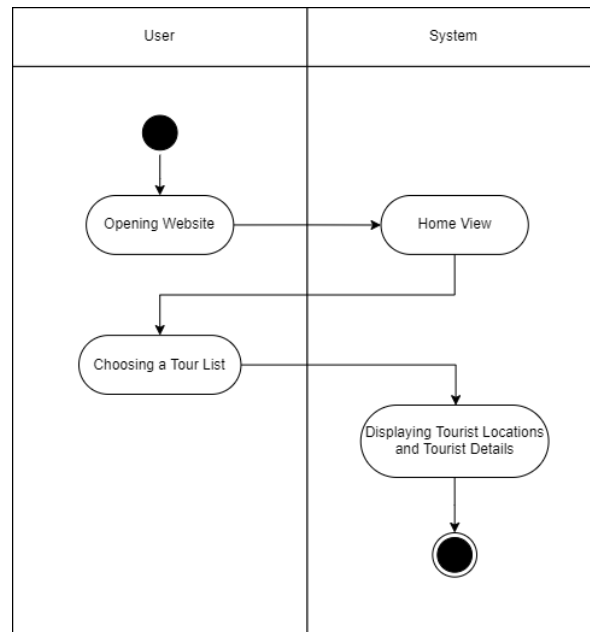
Fig. 4. Activity Diagram

3. Website View

   Create a low fidelity website by applying the concepts that have been designed previously. Starting from the low fidelity homepage, which contains text, images and two buttons, namely the Travel List button and the About Me button, which is illustrated in Figure 5.
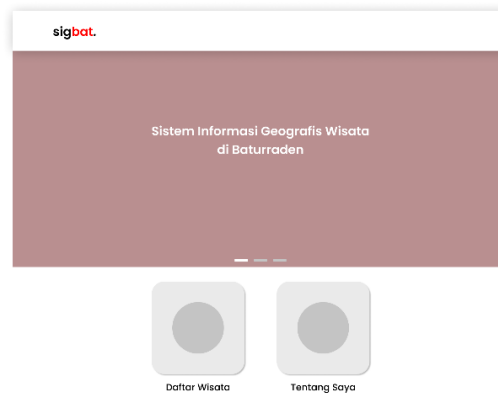

Fig. 5. Low Fidelity Homepage

The next low fidelity design is the Tour List which contains a navbar header and maps using OpenStreetMap, illustrated in Figure 6.
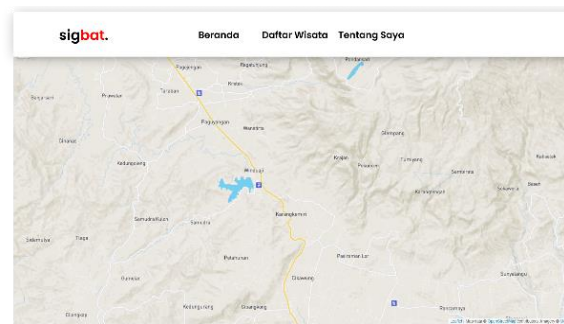

Fig. 6. Low Fidelity Tour List

The last low fidelity design is the About Me page which contains a navbar header and information related to website developers, which is illustrated in Figure 7.
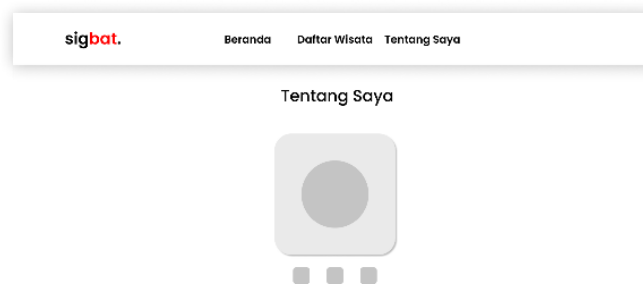

Fig. 7. Low Fidelity About Me

C. *Implementation*

This website development uses QGIS, XAMPP and Visual Studio Code. The programming language used is PHP (Hypertext Preprocessor) and the Leaflet JS JavaScript library.

D. *Testing*

The testing section uses the BlackBox method to find errors in the program [20], which focuses on functionality by trying all aspects of this website [23].

E. *Deployment*

In the deployment section, the website that has been tested will be used and circulated with a specific purpose.

IV. RESULTS AND DISCUSSION

A. *Implementation*

The tourist geographic information system in Baturraden is displayed in the form of a website by displaying the coordinates of various types of tourist objects in the Baturraden area. The home page contains a list of tours and about me, which is illustrated in Figure 6.
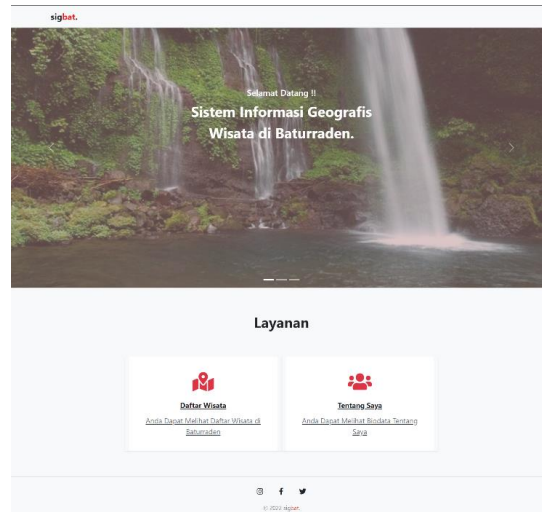

Fig. 8. Homepage

On the Tour List menu, users can see the coordinates and details of tourist attractions in Baturraden, which are illustrated in Figure 7.
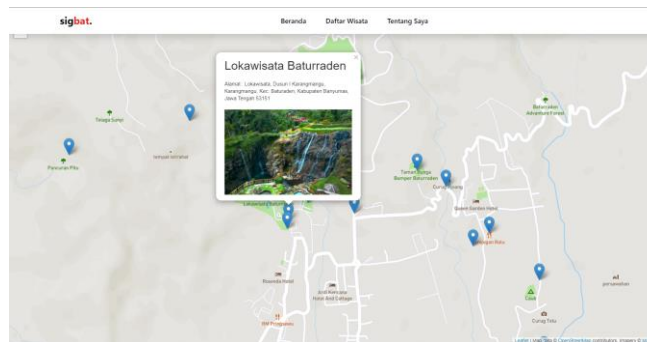

Fig. 9. Tour List

On the About Me menu, users can see information related to the developer of this website which is illustrated in Figure 8.
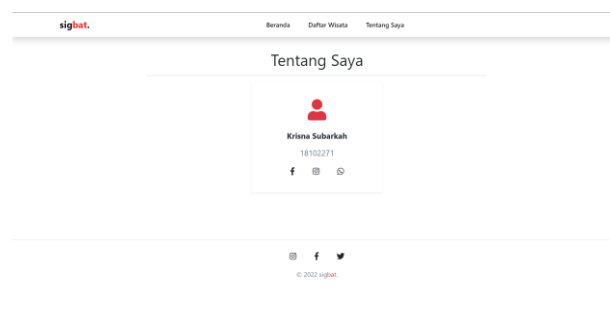

Fig. 8. About Me

B. *Functionality Testing*

Functionality testing is displayed in the form of a table presented in Table 1.

TABLE I
FUNCTIONALITY TESTING

No	Page	Description
1	Home Page	Succeed
2	Travel Listing Page	Succeed
3	Travel Details Popup	Succeed
4	About Me Page	Succeed

V. CONCLUSION

Based on the results of this research, the author can conclude that using the LeafletJS JavaScript library with Agile development methods and BlackBox testing methods in making this website, all aspects can work according to design and concept, and users can use this website to find out various types of objects tourist attractions are located in Baturraden by displaying the coordinates and details of the tourist attraction.

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