

Information System for Distribution of Beach Tourism Sites in Gorontalo Province with Web-Based GIS

Aditya Lapu Kalua^{*1}, Ade Yusupa², Sanriomi Sintaro³, Elrica M.I. Tutu⁴, Las D. Hutasoit⁵

^{1,3,4,5}Sistem Informasi, Universitas Sam Ratulangi, Indonesia

²Teknik Informatika, Universitas Sam Ratulangi, Indonesia

E-mail: ^{*1}adityalapu.kalua@unsrat.ac.id, ²ade@unsrat.ac.id, ³sanriomi@unsrat.ac.id,

⁴elricatutu106@student.unsrat.ac.id, ⁵lashutasoit106@student.unsrat.ac.id

Abstract

Gorontalo Province, located at the northern tip of Sulawesi Island, has high tourism potential due to its natural and cultural richness, making it an attractive destination for both domestic and foreign tourists. However, to manage and promote this tourism potential effectively, accurate and easily accessible mapping is needed for tourists and related parties. The use of a web-based Geographic Information System (GIS) is an efficient solution in presenting complete information about tourist attractions in Gorontalo because changes to the data made can be more easily accessed with the dashboard menu. The goal is to improve the promotion and service of Gorontalo tourism through the development of this information system, actively contribute to improving the management and promotion of Gorontalo tourism, and become a guideline for the development of similar systems in other tourism sectors. The test results obtained using Blackbox testing obtained good test results and had a success rate of 96% so that the application can be used properly. It is hoped that the creation of a Gorontalo tourist attraction mapping information system will continue to be developed so that it is easily accessible to local and foreign tourists.

Keywords—GIS, Information System, Tourism, Website

Submission: 30 November 2024

Accepted: 24 January 2025

Published: 31 January 2025

1. INTRODUCTION

Gorontalo Province, located at the northern tip of Sulawesi Island, has high tourism potential due to its rich natural environment and cultural richness, making it an attractive destination for domestic and foreign tourists.[1]. From stunning beaches to stunning mountains, Gorontalo offers a variety of interesting destinations for tourists. The diversity of tourist attractions along the coast of Gorontalo Province offers great potential for the tourism industry and provides an efficient information system to maximize the tourist experience and promote existing tourist destinations.[2], [3]. However, effectively managing and promoting this potential requires accurate, accessible, and up-to-date information.

Effective management and promotion of tourism potential requires accurate and easily accessible maps. One of the uses that can be done to help the community's problems is by using the website[4] and GIS[5]. The use of a web-based Geographic Information System (GIS) is an efficient solution in presenting complete information about tourist attractions in Gorontalo because changes to the data can be more easily accessed using the dashboard menu.[6], [7]. A

web-based Geographic Information System (GIS) presents a practical solution for mapping and presenting information about Gorontalo's tourist destinations. By leveraging GIS, it becomes possible to provide real-time, detailed data on locations, facilities, accessibility, and attractions, accessible via an interactive online platform. This approach enables stakeholders to make informed decisions while enhancing the tourist experience.[8], [9]. This information can be accessed in real-time via an online platform in the form of information about location, facilities, accessibility and other tourism possibilities [10]–[12].

This study aims to examine the application of web-based GIS in mapping tourist locations in Gorontalo. The research to be conducted is to conduct data collection processes, geographic information processing, web platform development, and its benefits in supporting regional tourism management and promotion, as well as providing users with comprehensive information including accessibility, facilities, and other tourism possibilities. The goal is to improve Gorontalo tourism promotion and services through the development of this information system, actively contribute to improving the management and

promotion of Gorontalo tourism, and become a guideline for the development of similar systems in other tourism sectors. It is hoped that the results of this study can provide a positive contribution to improving the management and promotion of Gorontalo tourism by considering the potential of Gorontalo tourism.[13], [14] which can be increasingly optimal and sustainable in the future. The findings of this research are expected to enhance the management and promotion of Gorontalo's tourism sector, providing a scalable model for similar applications in other regions. By addressing current challenges in information accessibility and tourism management, this study seeks to unlock Gorontalo's tourism potential in a sustainable and impactful manner.

2. RESEARCH METHODS

The RAD (Rapid Application Development) development method is a development method used in this study, it is an information system development method that is carried out in a short time, usually only requiring 30-90 days, compared to conventional methods which generally require at least 180 days. This method aims to meet user needs and expectations. However, users are often not directly involved in the development process, so the final results of the system can be different from what they expect [15]. In conducting this research, there are four stages that are passed which can be seen in Figure 1.

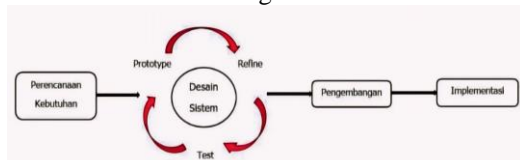


Figure 1. RAD method

Each paragraph can consist of several subparagraphs written with numbering as shown in the following section. The minimum number of pages is 10 pages and the maximum is 12 pages of A4 size.

2.1. Requirements Planning

The stages carried out in carrying out the Needs planning are mapping the area that will be used as a research site, we take the longitude and latitude of every location that we needed in this research. We collect this data as a digital data set and keep it for the next step.

Afer then the research continue to looking at the Needs for software and hardware needed to develop the existing website

application. We use PHP as a main programming language and MySQL as the database, for the hardware we use a standard laptop with i7 gen 3 processor and 16gb of ram.

After all datas is obtained, the next stage is to design the system to be developed.

2.2. Desain

The first step taken in creating a design is to describe a use case diagram, one of which can be seen in Figure 2.

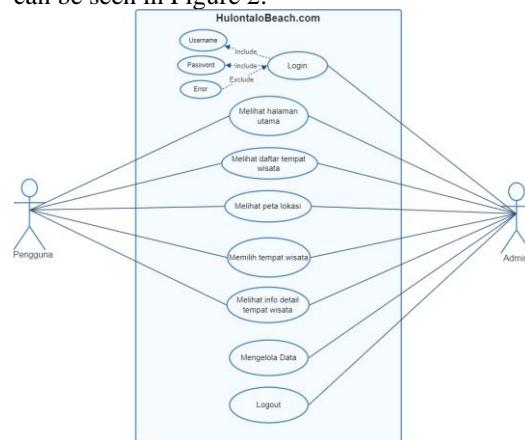


Figure 2. Use Case of the system being built

In Figure 2, users can see the main page, and other pages except for data processing. Data processing can only be done by Admin who must log in to the system first. After the Use Case diagram is created, the next step is to create an Activity Diagram, one of which can be seen in Figure 3.

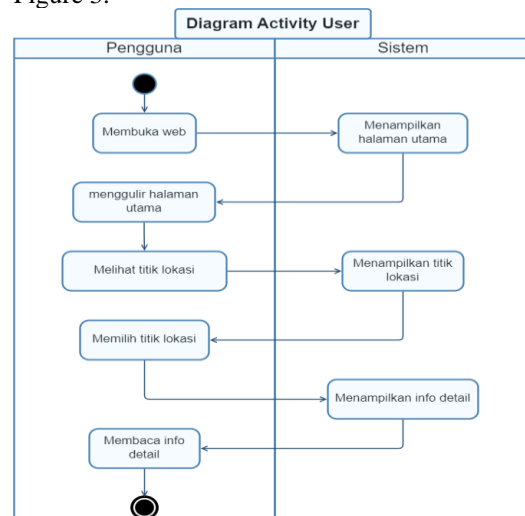


Figure 3. User Activity Diagram

In Figure 3, When the user opens the web and the system displays the main page, the user can scroll the main page to see and select the Location point, then the system will display the existing Location points and display detailed information from the Location point selected by the user. After the design of the activity diagram is complete, the next step is to create a database that is described using ERD[16] which can be seen in Figure 4.

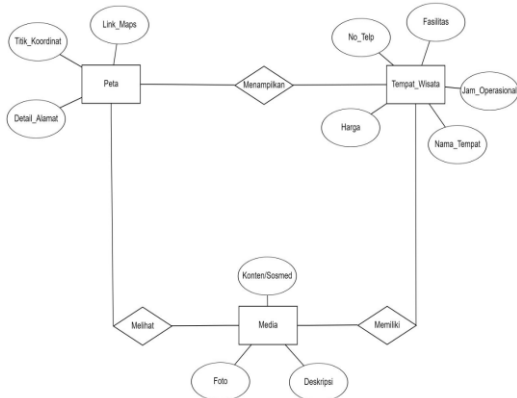


Figure 4. Entity Relationship Diagram

2.3. Development

At this stage, the program code is written according to the design that was previously made. We used PHP as a main programming language and MySQL for the database. Figure 5 shown below is PHP code that we use to display data based by longitude and latitude of some locations that already saved in database.

```

1 <?php
2 require "koneksi.php";
3 $sql = "SELECT Nama_Tempat, Titik_Koordinat FROM data_tempat_wisata";
4 $result = $con->query($sql);
5
6 $locations = array();
7
8 if ($result->num_rows > 0) {
9     while($row = $result->fetch_assoc()) {
10         $koordinat = explode(",", $row["Titik_Koordinat"]);
11         if (count($koordinat) == 2) {
12             $latitude = floatval(trim($koordinat[0]));
13             $longitude = floatval(trim($koordinat[1]));
14             $locations[] = array($row["Nama_Tempat"], $latitude, $longitude);
15         }
16     }
17 }
18 }
19 ?>
    
```

Figure 5. PHP Code Program

After the program code is finished and can be run using white box testing[16], the next step is to implement it, which in the last step will be black box testing [17], [18].

3. RESEARCH RESULTS

3.1. Implementation

The next stage is to implement the website that has been developed, to then be tested

in order to see the best results from the existing application. One of the displays of the website that has been developed can be seen in Figure 6.

DAFTAR TEMPAT WISATA	
NO	NAMA TEMPAT WISATA
1	Pantai Batubarani
2	Dulangan Beach
3	Kuremal Beach Resort
4	Pantai Biluhu Timur
5	Wisata Pantai Kaisamanu

Figure 6. Tourist Attraction Data Display.

In Figure 6, tourist attraction data is displayed, namely the name and address of the tourist attraction which can make it easier for users to see the list of tourist attraction names. Another page display that can be seen is detailed information about the tourist attraction which can be seen in Figure 7.

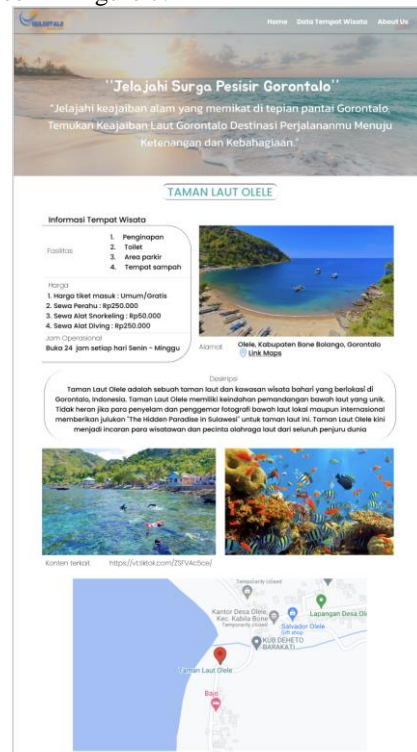


Figure 7. Detailed View of Tourist Attractions

In Figure 7, detailed information about tourist attractions is displayed. This page contains the name of the tourist attraction, operating hours, prices, facilities, addresses, descriptions of the tourist attractions, location points and if available the page will display video content that discusses the tourist attractions. Next

is the dashboard display that can only be opened by the Admin to update data on existing tourist destinations. The admin dashboard can be seen in Figure 8.

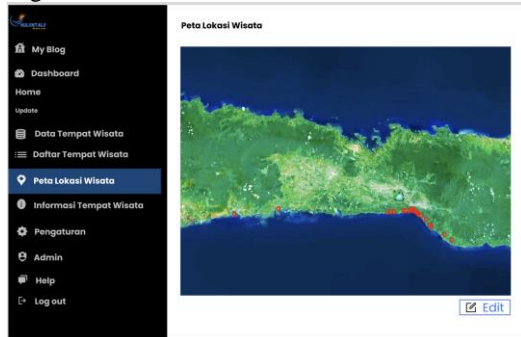


Figure 8. Manage Admin Content View

In Figure 8, the admin can enter and change the data needed to present information related to tourist attractions that have been compiled in the Needs Planning stage, here the admin can also exit by pressing the Log Out button to then see the website display as a user. Another display on the admin menu is the List of Tourist Attractions which can be seen in Figure 9.

No	Nama Wisata	Alamat	Jam Operasional	Fasilitas	Harga Tiket	Titik koordinat	Deskripsi	Aktivitas
1.	Pantai Batuak	F3UP+Q88 Pantai Batuak, Batuak, Kec. Kaila Bone, Kabupaten Bone, Sulawesi Selatan 9011	24 jam	• Pantai - Rp 100.000/3 org • Jarak Jarak • Restroom • Jarak Jarak • Jarak Jarak	Rp1.000/orang	0.482008,123.08 55675	Pantai Batuak adalah sebuah pantai yang memiliki pasir putih yang halus dan air yang jernih.	Edit Delete
2.	Dulang Beach	F28W+554, Bangs, Kec. Batuak, Kabupaten Bone, Sulawesi Selatan 9012	24 jam	• Pantai • Jarak Jarak • Restroom • Jarak Jarak • Jarak Jarak	Rp1.000/orang	0.482008,123.08 55675	Pantai Dulang adalah sebuah pantai yang memiliki pasir putih yang halus dan air yang jernih.	Edit Delete
3.	Kunir Beach	Batuak, Kec. Kaila Bone, Kabupaten Bone, Sulawesi Selatan 9011	24 jam	• Pantai (Rp 100.000/3 org) • Jarak Jarak • Restroom • Jarak Jarak • Jarak Jarak	Rp1.000/orang	0.482008,123.08 55675	Pantai Kunir adalah sebuah pantai yang memiliki pasir putih yang halus dan air yang jernih.	Edit Delete

Figure 9. Admin Tourist Attractions List View

In Figure 9, the admin can add or change the data in the website that has been developed, on this page the admin can also see a list of tourist attractions that have been inputted into the system. The last step taken in this study is to test the system using black box testing. Based on the results of the tests that have been carried out by involving several experts in the computer field, it is concluded that this application is able to run well according to the designed functionality. The experts gave a positive assessment of the application's performance, indicating that the system is stable, reliable, and meets its development objectives.

4. DISCUSSION

After the development of the website application, testing was conducted using

blackbox testing. Five experts participated in the process, performing five tests on each page. The results revealed varying levels of performance across components. For instance, the CRUD functionality achieved an 80% acceptance rate, primarily due to inconsistencies in data validation and user interface responsiveness, which were identified during the testing process. The results can be seen in Table I.

	Observations and results	Conclusion
Main Menu	Showing main page	100% accepted
Admin Menu	Showing admin page	100% accepted
Data	CRUD	80% accepted
Display Data	Displays a list of tourist attractions	100% accepted
Detail	Showing details of tourist attractions	100% accepted

Table I: Website Testing Summary

These findings align with the study's objectives, particularly in improving tourism management and user experience. Addressing the identified issues will enhance the system's usability and reliability, ensuring it meets the needs of stakeholders effectively. The tests carried out obtained a success rate of 96% so that the application developed can still be said to be good.

5. CONCLUSION

A web-based Geographic Information System (GIS) was developed to enhance the dissemination of detailed information about coastal tourist locations in Gorontalo, featuring interactive maps and real-time data updates. The system provides comprehensive details such as facilities, prices, images, and descriptions, addressing the challenges of fragmented tourism information. With a 96% success rate from Blackbox testing, the system ensures reliable performance and significantly improves user experiences by simplifying travel planning. Additionally, it supports tourism management by enabling data-driven decisions and promotes the local economy by increasing the accessibility and appeal of Gorontalo's coastal attractions for both local and international tourists.

6. SUGGESTION

Even though the application being developed uses responsive web techniques, the

GIS development that is being carried out can still be developed using features that can facilitate direct access to the application on a smartphone.

REFERENCES

- [1] S. J. SENDOW, E. N. Walewangko, and D. S. M. Engka, "Analisis Perbandingan Daya Saing Sektoral Di Provinsi Sulawesi Utara Dan Provinsi Gorontalo Periode Tahun 2018-2022," *J. Pembang. Ekon. DAN Keuang. Drh.*, vol. 25, no. 1, pp. 83–99, 2024.
- [2] A. L. Kalua, S. Pondaag, and F. Mohune, "Sistem Informasi Pemetaan Objek Wisata Pesisir Kota Manado, Kota Bitung, dan Kab. Minahasa Utara Berbasis Web," *J. Inf. Technol. Softw. Eng. Comput. Sci.*, vol. 1, no. 3, pp. 84–94, 2023.
- [3] A. L. Kalua, G. E. M. Pongantung, and D. T. Salaki, "Sistem Informasi Pariwisata Daerah Kabupaten Minahasa Selatan Berbasis Web GIS," *J. Ilm. Sist. Inf. Akunt.*, vol. 3, no. 1, pp. 24–32, 2023.
- [4] D. Yusuf, "Sistem Informasi Perawatan Berkala Pada Mesin Pabrik Berbasis Web," *NUANSA Inform.*, vol. 17, no. 1, pp. 136–143, 2023.
- [5] A. Suharso, "Algoritma Haversine pada Sistem Informasi Geografis: Tinjauan Literatur Sistematis: Tinjauan Literatur Sistematis," *NUANSA Inform.*, vol. 17, no. 2, pp. 135–143, 2023.
- [6] B. Widodo, "Perancangan Sistem Informasi Persediaan Barang Pada Toko 'Semarang Helmet' Berbasis Web." UNIVERSITAS KHATOLIK SOEGIJAPRANATA, 2023.
- [7] I. Akbar, Z. Niqotaini, and A. R. Fauzi, "Analisis Dan Perancangan Sistem Penjualan Pada Toko XYZ Berbasis Web Dan Mobile Menggunakan UML," *NUANSA Inform.*, vol. 17, no. 2, pp. 71–82, 2023.
- [8] L. J. Sánchez-Aparicio *et al.*, "Web-GIS approach to preventive conservation of heritage buildings," *Autom. Constr.*, vol. 118, p. 103304, 2020.
- [9] A. L. Kalua, W. W. Kalengkongan, S. Sintaro, S. T. Sulung, S. Goma, and S. M. Raintung, "Pembuatan Website Profil Dengan Foto 360 pada Sma Katholik Laurentius Sebagai Media Pengenalan Sekolah," *J. Soc. Sci. Technol. Community Serv.*, vol. 4, no. 2, pp. 302–307, 2023.
- [10] S. Sintaro, "Permodelan Sistem Informasi Pembelian dan Penjualan Berbasis Website," *J. Ilm. Inform. dan Ilmu Komput.*, vol. 1, no. 1, pp. 25–32, 2022.
- [11] S. Sintaro, A. Surahman, S. C. W. Ngangi, W. W. Kalengkongan, and A. B. Johanes, "Sistem Informasi Pengenalan Kampus dengan Foto 360 Berbasis Website," *J. Data Sci. Inf. Syst.*, vol. 1, no. 1, pp. 32–40, 2023.
- [12] S. Setiawansyah, D. T. Lestari, and D. A. Megawaty, "SISTEM INFORMASI PKK BERBASIS WEBSITE MENGGUNAKAN FRAMEWORK CODEIGNITER (STUDI KASUS: KAMPUNG PURWOEJO)," *J. Inform. dan Rekayasa Perangkat Lunak*, vol. 3, no. 2, pp. 244–253, 2022.
- [13] A. F. Nusi, D. Talib, and S. Sunarti, "Potensi Pantai Kurenai Sebagai Daya Tarik Wisata Bahari Di Kabupaten Gorontalo," *Tulisan Ilm. Pariwisata*, vol. 5, no. 2, pp. 50–57, 2022.
- [14] M. Pauweni, T. Rahayu, M. E. Winarno, Z. Amali, and H. Setyawati, "Potensi Pariwisata Olahraga Di Provinsi Gorontalo," *Bajra J. Keolahragaan*, vol. 1, no. 1, pp. 31–42, 2022.
- [15] T. Pricillia, "Perbandingan metode pengembangan perangkat lunak (waterfall, prototype, RAD)," *J. Bangkit Indones.*, vol. 10, no. 1, pp. 6–12, 2021.
- [16] S. M. Pulungan, R. Febrianti, T. Lestari, N. Gurning, and N. Fitriana, "Analisis Teknik Entity-Relationship Diagram Dalam Perancangan Database," *J. Ekon. Manaj. dan Bisnis*, vol. 1, no. 2, pp. 143–147, 2023.
- [17] M. N. Ichsanudin, M. Yusuf, and S. Suraya, "Pengujian Fungsional Perangkat Lunak Sistem Informasi Perpustakaan Dengan Metode Black Box Testing Bagi Pemula," *STORAGE J. Ilm. Tek. dan Ilmu Komput.*, vol. 1, no. 2, pp. 1–8, 2022.
- [18] I. R. Munthe, B. H. Rambe, R. Pane, D. Irmayani, and M. Nasution, "UML Modeling and Black Box Testing Methods in the School Payment Information System," *J. Mantik*, vol. 4, no. 3, pp. 1634–1640, 2020.