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Bayadome Geotours (BATOUR) Prototype for Geosite Management at Bayah Dome Geopark, Banten

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Abstract

The objective of this study is to create a technology-driven application prototype, named "Bayadome Geotours," as a cutting-edge solution to enhance geotourism governance and environmental conservation in the Bayah Dome Geopark, Banten. This research advances the utilisation of information and geospatial technology to improve visitor experiences and bolster local community involvement. It achieves this through an emphasis on needs analysis, prototype design, implementation, and testing. The Bayadome Geotours prototype is specifically engineered to offer a dynamic and engaging tourism encounter. Geospatial navigation capabilities enable users to digitally explore geosites, while an intuitive user interface assures accessibility for visitors with different levels of knowledge. This programme offers precise and comprehensive geological information, providing a novel method to enhance comprehension of the geological resources found in the Bayah Dome Geopark. Bayadome Geotours is a good example of the value of local community involvement in geotourism administration. This application serves as both a travel guide and a venue for the exchange of knowledge, local narratives, and cultural heritage. Engaging the public in sharing information fosters a stronger connection between tourists and the environment, resulting in a beneficial influence on the preservation of geosites and the overall management of destinations. Prototype testing conducted using a unit testing methodology demonstrates the successful execution of all system functionalities. The JEST tool's test results confirm that the Bayadome Geotours application is prepared for distribution to the general user base. Nevertheless, there are obstacles in the way of effectively managing and modernising the application, as well as achieving general acceptance, that must be addressed in order to guarantee the ongoing triumph of this prototype. However, Bayadome Geotours has created significant opportunities for advancing sustainable geotourism governance.

Keywords— Bayah Dome Geopark, Bayadome Geotours, geotourism, governance, technology-based applications, unit testing.

1   Introduction

Indonesia possesses a vast array of remarkable geosites that span from Sabang to Merauke, thanks to its immense natural resources. The Bayah Dome Geopark, located in Banten, is one of the most remarkable geological assets. Bayah Dome Geopark, situated in Lebak Regency, is a region abundant in captivating natural beauty and geological variety, making it a fascinating destination for exploration. Nevertheless, there are difficulties that emerge in effectively overseeing and using this capacity in a manner that is enduring for the objectives of education, tourism, and environmental preservation. Technology is becoming more and more crucial in managing

geotourism and preserving geosites in the current digital age. Hence, the objective of this study is to create a cutting-edge application prototype called "Bayadome Geotours" that will aid in the management of geosites within the Bayah Dome Geopark in Banten. This application was specifically developed to offer visitors an immersive and engaging experience, facilitate educational opportunities, and contribute to the conservation of wildlife. Despite the considerable potential of the Bayah Dome Geopark, the task of managing geotourism effectively remains a challenge. Inadequate facilities and infrastructure, limited accessibility to information, and insufficient community engagement can impede the progress of sustainable geotourism. Hence, this study will concentrate on creating the Bayadome Geotours prototype as a remedy to enhance geosite governance in the Bayah Dome Geopark.

The primary aim of this project is to create a prototype of the Bayadome Geotours application with the purpose of enhancing geosite governance in the Bayah Dome Geopark. This application is anticipated to offer an engaging and instructive travel experience that promotes environmental conservation. In addition, this study also seeks to enhance community engagement in the conservation of geosites and maximise the economic benefits of geotourism for the local population. This research is anticipated to have a beneficial impact in multiple domains. The initial creation of the Bayadome Geotours prototype is anticipated to serve as a paradigm for efficient and enduring geotourism administration. Furthermore, this application is anticipated to enhance individuals' comprehension of the geological abundance in their vicinity, thereby promoting consciousness of the significance of preserving nature. Furthermore, by promoting tourism, there is an expectation that it will have a favourable economic outcome for the local populations.

2   Related Works

This study employs a wide range of literature to support the creation of the Bayadome Geotours prototype and enhance the management of geosites in the Bayah Dome Geopark, located in Banten. Prior research has emphasised the need to employ technology to oversee geological resources and advance environmental preservation. Prior studies on geotourism indicate that the utilisation of technological tools, such as mobile apps, can enhance the quality of visitor experiences. Research by a number of academics (references [1]–[6]) suggests that information technology can significantly affect how tourism connects with pertinent information, improves visitor engagement, and advances destination sustainability.

Geotourism research indicates that employing geospatial technologies can enhance the interpretation of geological features and deepen tourists' comprehension of geological places. The range is from 7 to 11, inclusive. Studies conducted by researchers [12]–[14] demonstrate that the utilisation of geospatial technology can enhance the efficiency of geological interpretation and facilitate the implementation of sustainable geotourism governance. Furthermore, it is crucial to take into account the scholarly research on community involvement in the administration of geotourism. Active involvement of the community is regarded as crucial in attaining sustainable geotourism. Research by [15] and [16] emphasizes the significance of involving local populations in the decision-making and administration of geological tourism sites with the aim of ensuring long-term sustainability.

Additionally, it is crucial to provide a comprehensive account of the literature that elucidates the economic prospects associated with the development of geotourism. According to research by [17]–[21], the development of geological tourism has the potential to significantly increase local revenue, stimulate the local economy, and create new employment opportunities. In summary, this material serves as a solid foundation for the creation of the Bayadome Geotours prototype. By combining information and geospatial technology with community involvement, it is possible to develop applications that enhance the visitor experience and promote sustainable and economically advantageous geotourism management for local populations in the Bayah Dome Geopark, Banten.

3   Research methods

The research methodology was formulated employing a systematic research and development approach to assure the successful attainment of the targeted objectives in the creation of the Bayadome Geotours prototype. The first phase entails doing a requirements analysis, which will involve gathering data on the state of the Bayah Dome Geopark, visitor preferences, and the challenges related to geotourism governance. Ensuring the prototype can effectively address the primary challenges is crucial at this step.

In the second stage, the prototype design of the Bayadome Geotours application will be created, encompassing the development of the concept and key features. This procedure entailed the cooperation of geologists, tourism specialists, and representatives from the local community to guarantee the precision of geological information, the fulfilment of tourist requirements, and the local significance inside the app. The design incorporates the integration of geospatial technologies, enabling users to virtually explore geosites and get comprehensive information. The implementation and testing stages will entail creating a prototype based on the agreed-upon design. The prototype

will undergo a pilot test with a select set of potential users, comprising visitors and local residents, in order to obtain input regarding the app's functionality, usability, and appeal. The process of prototype development will entail multiple iterations, which will be guided by feedback obtained in order to guarantee that the application adheres to both quality standards and user requirements.

This strategy aims to develop the Bayadome Geotours prototype in a thorough and effective manner. By engaging stakeholders throughout the whole development process, the application will not only match the expectations of tourists but also consider the distinctiveness and specific requirements of the Bayah Dome Geopark. Therefore, it is anticipated that this method can generate a successful model for enhancing geotourism governance and advocating sustainability in this area.

4   Results and Discussion

The "Bayadome Geotours" application prototype was successfully developed after undergoing a thorough development process. It serves as a solution to enhance geosite governance in the Bayah Dome Geopark, located in Banten. The research findings demonstrate the synergy achieved through the collaboration of different components, encompassing requirements analysis, prototype design, implementation, and testing. This debate will comprehensively analyse every facet of the research findings.

1)   Analysis of requirements and design of a prototype.

The primary foundation for the development of this application is a needs analysis. Information pertaining to the state of the Bayah Dome Geopark, visitor preferences, and the difficulties associated with managing geotourism has been gathered. This research identifies fundamental requirements such as precise geological data, tourist destinations, and community involvement. Subsequently, a prototype design was produced, including the expertise of geologists, tourist specialists, and representatives from the local community. The incorporation of geospatial technology is a vital aspect, enabling users to virtually navigate geosites, acquire comprehensive data, and engage in an immersive tourism encounter.

The development of this application prototype was built on the Android platform in order to fulfil the geopark management requirements of the Bayah Dome Geopark Management Agency, located in Lebak Regency, Banten Province. In addition, this technology can be utilised to oversee tourism operations within the Bayah Dome Geopark region, thereby facilitating the local government's objectives of promoting sustainable economic growth. The system is named Bayadome Geotours, commonly referred to as BATOUR.

The BATOUR programme comprises two components: the front-end and the back-end. On the front-end, general users and tourists utilise it, accessing a range of features. The features in question encompass geodiversity, cultural diversity, biodiversity, the availability of homestay services, geoproducts, transportation services, tour packages, and information on events and activities at tourist destinations. In addition, the front-end of the platform also offers features to identify the presence of local tourism awareness communities and groups (POKDARWIS), access visit statistics for each geodiversity, obtain information on the most popular geodiversities, and make bookings for homestay services and tour packages that are directly linked to business actors.

The back-end component is utilised by the Bayah Dome Geopark Management Agency, business entities, and Pokdwarwis. The Bayah Dome Geopark Management Agency deploys its representatives to authenticate and examine the business entities that have registered on the application. The purpose of this is to ensure the reliability and accuracy of the tourist information provided on the application. This involves verifying and confirming different pieces of information and events transmitted by business entities within the application. The Bayah Dome Geopark Management Agency also possesses functionalities for the management of geodiversity, cultural diversity, and biodiversity data.Business entities and Pokdarwis on the backend have the capability to oversee and control many aspects of the homestay services, including tour packages, geoproduct management, tourist information and events, transport services, and other related services.

The Batour software is compatible with all Android devices. Users will engage with the system through a GUI (Graphical User Interface) that is dependent on their user access privileges. Figure 1 depicts the use case diagram for BATOUR. The front end module's functional decomposition is illustrated in Figure 2, whereas Figure 3 displays the functional decomposition of the back end module.
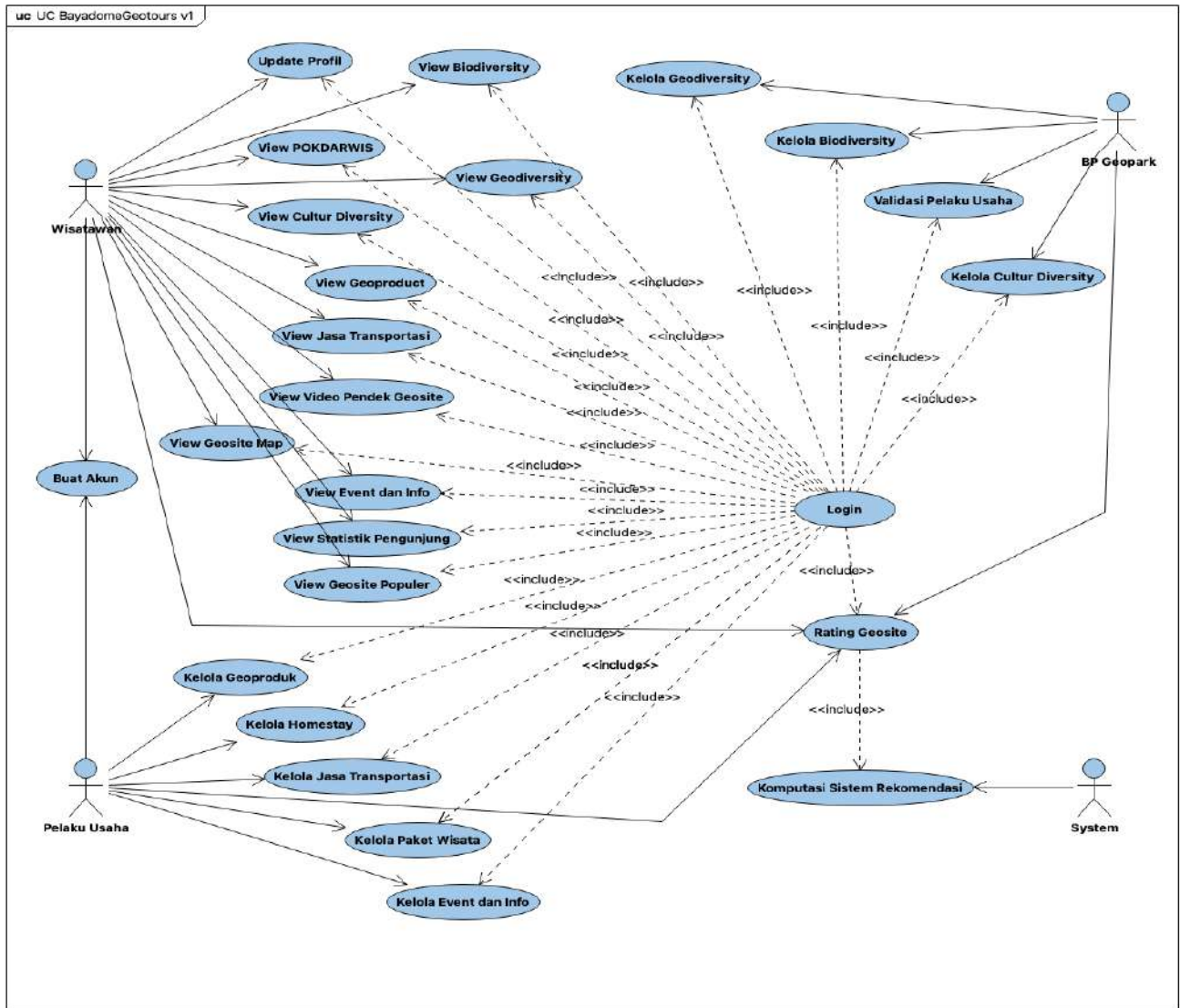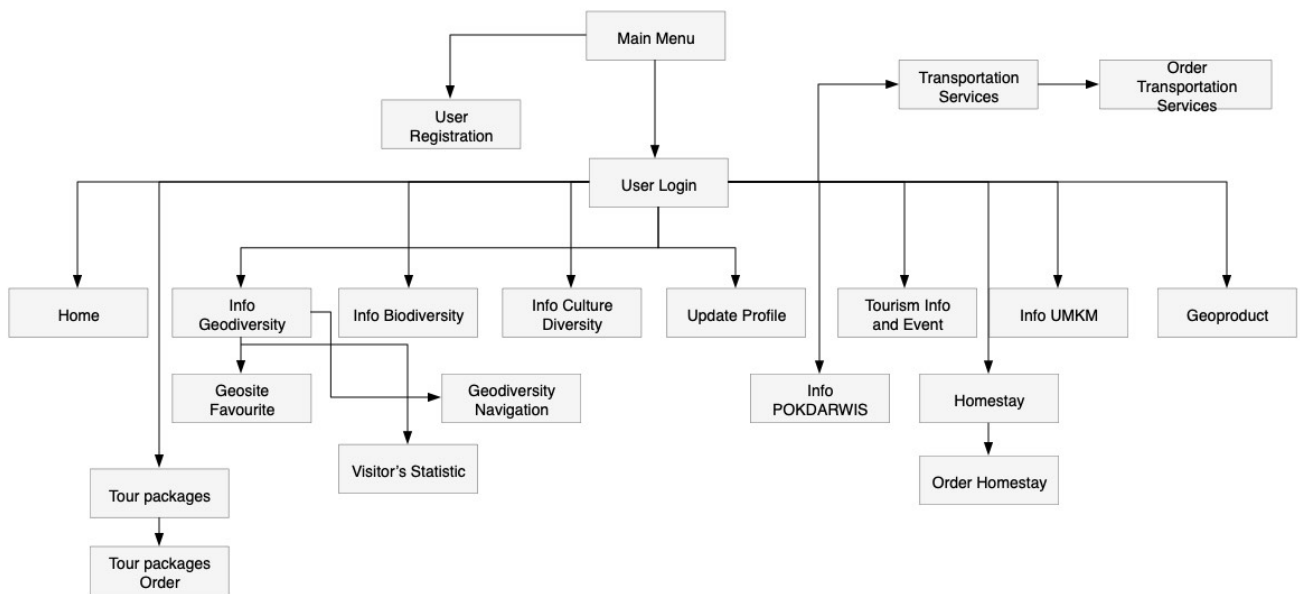
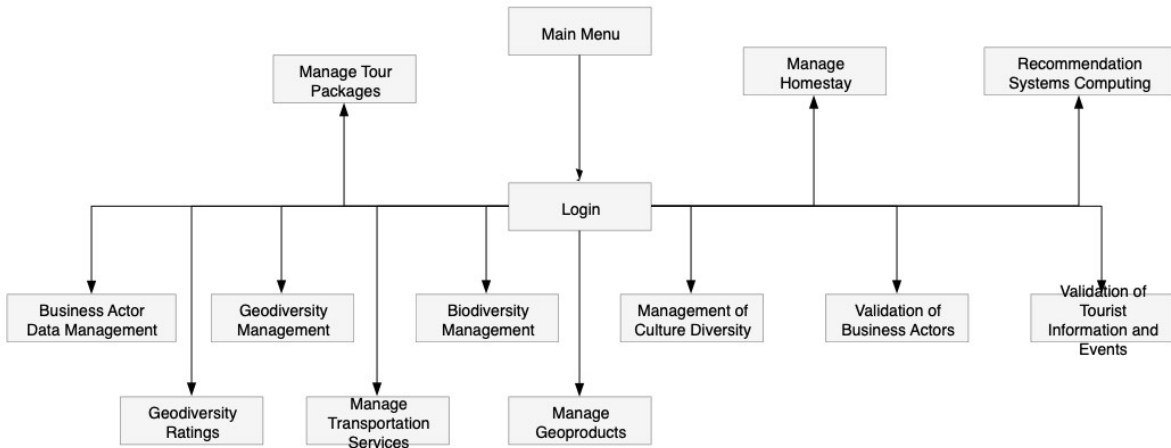Figure 1. Diagram use case of BATOUR

Figure 2. Front End Module

Figure 3. Back End Module

2) Implementation

The implementation of the Android-based Bayadome Geotours application encompasses numerous crucial phases, commencing with code development, user interface (UI) design, and test planning. Initially, during the code development phase, the development team must choose an appropriate programming language, such as Kotlin or Java, and utilise Android Studio as an integrated development environment. The software code must have functionalities such as interactive maps, navigation, and the integration of geospatial data. When implementing this feature, developers must prioritise Android development principles such as modularity, security, and performance.

Moreover, UI design plays a crucial role in delivering a satisfactory user experience. The UI/UX design team was tasked with developing a user-friendly layout, incorporating icons and colours that align with the Bayadome Geotours concept, and ensuring that the interface is compatible with various Android devices. Effective design enhances the appeal of the application and facilitates user-friendly navigation of tourism information. Figure 4a and Figure 4b depict the visual representation of the BATOUR application's login page and user dashboard, respectively.
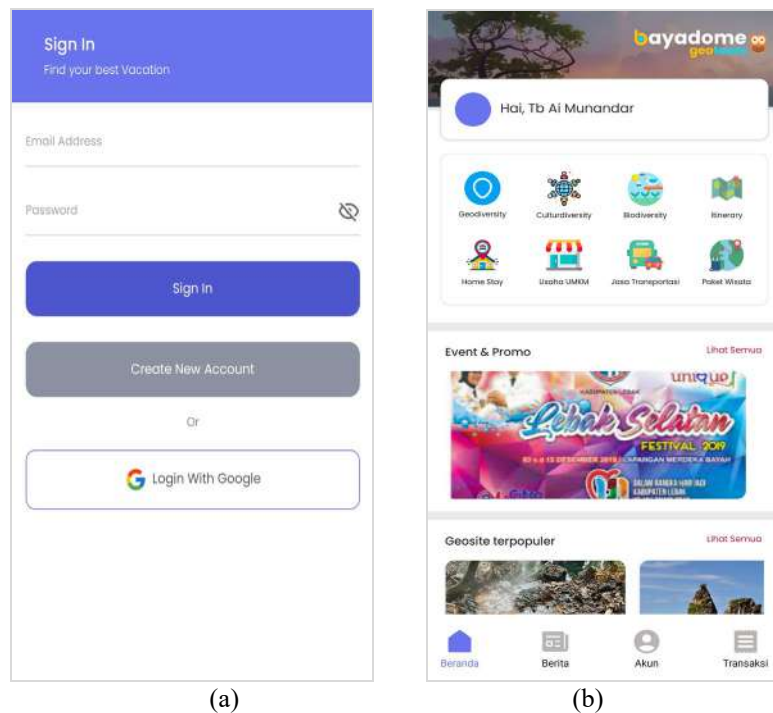

(a) (b)
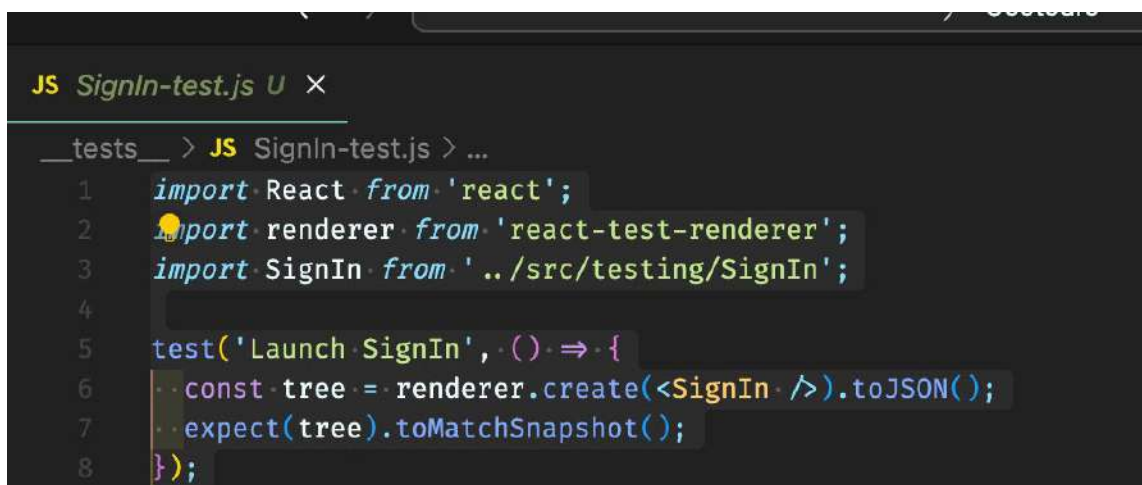
Figure 5. Login (a) and User Dashboard Page (b)

The testing plan for the Bayadome Geotours application was executed using a unit testing technique with the aid of JEST tools. The process of unit testing commences with the installation of the JEST framework. JEST is a framework that is built on open source technology and is specifically designed for doing unit tests on mobile applications, with a focus on the front-end layer. This tool is constructed using JavaScript and is commonly employed for developing web applications based on React and React Native.In order to utilise JEST, it is necessary to configure it in accordance with the coding practices of the developer. Subsequently, generate a test script for every individual module, function, or system unit that requires testing. The generated script is thereafter executed; if any issues persist, modify the script and rectify it iteratively until the unit testing outcomes are comprehensive.

3) *Test Results*

During system unit testing, several system functions will undergo testing, encompassing:

a. The initial screen that appears when an application is launched. A splash screen is an initial page that is displayed when a user launches an application for the first time.

b. Log in. Upon clicking the SignIn button, the user will be directed to a login page. To access the main page of the Bayahdome application, the user is required to input their email and password.

c. Enrol. Users who do not possess an account can establish one by using the Register page.

d. Authenticate using Google credentials. This page is used when the user desires to authenticate using an email generated from Google Email (Gmail).

e. Residence. This page serves as the primary interface for the user upon successful authentication. This page will display the following information in the application menu: user profile, events and promotions, a list of the most popular geosites, statistics on geosite visits, and a list of the most recent visitors to the application.

f. Geodiversity refers to the variety and range of geological features and processes found within a specific area. a webpage that will present comprehensive information regarding biodiversity.

g. Cultural variety is present. a webpage that will present comprehensive information regarding cultural diversity.

h. The variety of life forms in a given area. a webpage that will present comprehensive information regarding biodiversity.

i. Travel plans. a webpage that will present detailed information regarding the travel schedule.

j. Home Stay. This website will present information regarding HomeStay.

k. Micro, Small, and Medium Enterprises (MSMEs). an interface that will present comprehensive details regarding micro, small, and medium enterprises (MSMEs).

l. Tour Packages. This page will include details regarding various tour packages.

m. Latest information or updates, a webpage that will offer up-to-date information on news curated by the Bayahdome administration.

n. Account. This page serves as a platform for users to administer their accounts, including tasks such as modifying passwords and altering profile pictures.

o. Regarding. This page serves as a source of information for users regarding the Bayahdome application.

Out of the 15 menus available in the Bayahdome application, the test result indicates a PASS. This signifies that the application is performing effectively in terms of its functionality. Figure 6 represents a test script for a specific function within the sign-in system, whereas Figure 7 displays the overall results of the unit testing.


```js
import React from 'react';
import renderer from 'react-test-renderer';
import SignIn from '../src/testing/SignIn';

test('Launch SignIn', () => {
  const tree = renderer.create(<SignIn />).toJSON();
  expect(tree).toMatchSnapshot();
});
```

Figure 6. Sign in module testing script

```
> yarn jest
yarn run v1.22.19
$ /opt/homebrew/var/www/Project/android/Geotours/node_modules/.bin/jest
 PASS  __tests__/Biodiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/JasaTransportasi-test.js
  › 1 snapshot written.
 PASS  __tests__/LoginWithGoogle-test.js
  › 1 snapshot written.
 PASS  __tests__/Geodiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/Tentang-test.js
  › 1 snapshot written.
 PASS  __tests__/HomeStay-test.js
  › 1 snapshot written.
 PASS  __tests__/PaketWisata-test.js
  › 1 snapshot written.
 PASS  __tests__/UsahaUmkm-test.js
  › 1 snapshot written.
 PASS  __tests__/Register-test.js
  › 1 snapshot written.
 PASS  __tests__/Itinerary-test.js
  › 1 snapshot written.
 PASS  __tests__/CulturDiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/SplashScreen-test.js
  › 1 snapshot written.
 PASS  __tests__/Berita-test.js
  › 1 snapshot written.
 PASS  __tests__/Beranda-test.js
  › 1 snapshot written.
 PASS  __tests__/SignIn-test.js
  › 1 snapshot written.
 PASS  __tests__/Akun-test.js
  › 1 snapshot written.

Snapshot Summary
 › 16 snapshots written from 16 test suites.

Test Suites: 16 passed, 16 total
Tests:       16 passed, 16 total
Snapshots:   16 written, 16 total
Time:        1.338 s
Ran all test suites.
✨  Done in 2.23s.
```

Figure 7. Test results for overall system function.

During the unit testing phase of the Bayahdome application system, a number of system functions were prioritised for testing. The splash screen is the initial page that is displayed when the user opens the application. Splash screens have a crucial function in creating an initial impression for users, and conducting tests will guarantee that the appearance adheres to design criteria and is free from any problems that could impact the user's experience. Additionally, the SignIn function is examined to verify that users can effortlessly access the login page. Upon clicking the SignIn button, users are automatically taken to a login page where they are required to input their email and password. Testing encompasses input validation, authentication, and error handling to guarantee the login process operates seamlessly and securely.

Subsequently, an examination was conducted on the Register functionality, which permits users to generate a novel account in the event that they do not own an existing one. The primary emphasis is on input validation, data

security, and a seamless registration process to provide a favourable user experience. The LoginWithGoogle function is tested to verify the functionality of allowing users to authenticate using their Google email (Gmail) credentials. Testing encompasses the integration of Google services, the management of authorization, and the handling of users who possess Google accounts. In addition, the homepage, which serves as the primary page following successful user sign-in, undergoes testing to verify the proper functioning of various elements, including the application menu, user profile, events and promotions, list of the most popular geosites, geosite visit statistics, and list of recent visitors.

Testing is conducted to verify that each page can accurately present information pertaining to the subject matter, including geodiversity, cultural diversity, biodiversity, itineraries, home stays, MSME businesses, tour packages, news, accounts, and about sections. Testing encompasses the verification of data, the arrangement of pages, and the operational aspects associated with each category. The test results for these menus indicate that all system functions have successfully passed testing with a "pass" status. This suggests that the Bayahdome programme is functioning effectively in terms of its functionality. Figure 6 depicts a graphical depiction of the script used for testing the functionality of the sign-in system. On the other hand, Figure 7 displays the outcomes of the unit testing conducted on the complete programme. This verifies that the entire application has undergone comprehensive testing and has successfully fulfilled the established criteria. Therefore, these favourable test outcomes establish a foundation of assurance for consumers that the Bayahdome application not only presents a range of useful functionalities but also ensures a dependable and secure user experience. Each testing process, from the splash screen to the About page, plays a crucial role in guaranteeing the general excellence and efficiency of the application.

5   Conclusion

In summary, the system unit testing conducted on the Bayahdome application, which is based on the Android platform, has yielded favourable outcomes. Specifically, all 15 system functions have successfully passed the test and have been assigned a PASS status. The sequence of tests indicates that the Bayahdome application has effectively included the anticipated functionality and performs satisfactorily overall. Initially, conducting tests on the SplashScreen verifies that the application's introductory page offers a satisfactory initial encounter and adheres to recognised design norms. The SignIn and Register procedures undergo testing to guarantee a seamless experience for new users during the login and registration process. Additionally, LoginWithGoogle is examined to ensure its correct interaction with Google accounts. Testing conducted on the main page, namely the Home page, demonstrates that all relevant information pertaining to the application menu, user profile, events and promotions, list of highly frequented geosites, geosite visit statistics, and recent visitors list is displayed correctly, ensuring an acceptable user experience.

In addition, every individual page, such as Geodiversity, Culturdiversity, Biodiversity, Itinerary, Home Stay, MSME Business, Tour Packages, News, Account, and About, has undergone thorough testing to ensure that the Bayahdome application can accurately and appropriately present information pertaining to each respective topic, meeting expectations. According to the positive overall results, the Bayahdome application development team has succeeded in creating a stable and functional Android application that is in line with its intended purpose. These findings instill users with the assurance that the application can be trusted to deliver pertinent information regarding tourist locations and other associated attributes. This is shown in Figure 6 and Figure 7, which show the comprehensive unit testing results and a graph of the Sign In test script. These images clearly show that every part of the system has been thoroughly tested. This ensures that not only each individual feature of the app is functioning correctly, but also that the programme as a whole fulfils the quality benchmarks established by the development team. Therefore, this comprehensive assessment verifies that the Android-based Bayahdome Geotours application is fully prepared for launch, ensuring users will have a gratifying and dependable experience when accessing information about tourism sites provided by the programme.

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Current Issue

Vol. 2 No. 1 (2024): January - April 2024

Editorial

Dear Readers,

Welcome to **Volume 2, Issue number 1**, spanning the months of January to April 2024. As we embark on this new year, we are thrilled to present an array of insightful and cutting-edge articles that delve into the dynamic world of information technology and computer science.

In this issue, our contributors have explored a diverse range of topics within the realm of data science, offering readers a comprehensive view of the latest developments and innovations. From the foundations of data analytics to the intricacies of sentiment analysis, clustering, classification, forecasting, and geosite analysis, our authors have left no stone unturned in their pursuit of knowledge and understanding.

The field of data science continues to evolve at a rapid pace, and this edition reflects the ongoing commitment of researchers and practitioners to push the boundaries of what is possible. The articles featured here not only showcase the current state-of-the-art but also offer valuable insights that can shape the future trajectory of data science.

We invite you to explore the contents of this volume, which promise to inspire, inform, and challenge your perspectives on the ever-expanding world of data. Whether you are an academic, a professional in the field, or simply someone with a keen interest in the subject, we believe you will find these contributions both engaging and thought-provoking.

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As we move forward into 2024, we remain dedicated to providing a platform for the exchange of knowledge and ideas within the data science community. We express our gratitude to the authors, reviewers, and editorial team who have contributed to the success of this volume. Your collective efforts have ensured the high quality and relevance of the content presented here.

Thank you for being a part of our journey. We look forward to continuing to bring you valuable insights and perspectives in the exciting and ever-evolving field of data science. We extend our gratitude to the authors and reviewers who have contributed their expertise to make this issue possible, and we invite our readers to engage with these groundbreaking papers as we collectively strive to advance the frontiers of Information Technology and Computer Science Applications.

Published: 04-02-2024

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Bayadome Geotours (BATOUR) Prototype for Geosite Management at Bayah Dome Geopark, Banten

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Abstract

The objective of this study is to create a technology-driven application prototype, named "Bayadome Geotours," as a cutting-edge solution to enhance geotourism governance and environmental conservation in the Bayah Dome Geopark, Banten. This research advances the utilisation of information and geospatial technology to improve visitor experiences and bolster local community involvement. It achieves this through an emphasis on needs analysis, prototype design, implementation, and testing. The Bayadome Geotours prototype is specifically engineered to offer a dynamic and engaging tourism encounter. Geospatial navigation capabilities enable users to digitally explore geosites, while an intuitive user interface assures accessibility for visitors with different levels of knowledge. This programme offers precise and comprehensive geological information, providing a novel method to enhance comprehension of the geological resources found in the Bayah Dome Geopark. Bayadome Geotours is a good example of the value of local community involvement in geotourism administration. This application serves as both a travel guide and a venue for the exchange of knowledge, local narratives, and cultural heritage. Engaging the public in sharing information fosters a stronger connection between tourists and the environment, resulting in a beneficial influence on the preservation of geosites and the overall management of destinations. Prototype testing conducted using a unit testing methodology demonstrates the successful execution of all system functionalities. The JEST tool's test results confirm that the Bayadome Geotours application is prepared for distribution to the general user base. Nevertheless, there are obstacles in the way of effectively managing and modernising the application, as well as achieving general acceptance, that must be addressed in order to guarantee the ongoing triumph of this prototype. However, Bayadome Geotours has created significant opportunities for advancing sustainable geotourism governance.

Keywords— Bayah Dome Geopark, Bayadome Geotours, geotourism, governance, technology-based applications, unit testing.

1 Introduction

Indonesia possesses a vast array of remarkable geosites that span from Sabang to Merauke, thanks to its immense natural resources. The Bayah Dome Geopark, located in Banten, is one of the most remarkable geological assets. Bayah Dome Geopark, situated in Lebak Regency, is a region abundant in captivating natural beauty and geological variety, making it a fascinating destination for exploration. Nevertheless, there are difficulties that emerge in effectively overseeing and using this capacity in a manner that is enduring for the objectives of education, tourism, and environmental preservation. Technology is becoming more and more crucial in managing

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Bayadome Geotours (BATOUR) Prototype for Geosite Management at Bayah Dome Geopark, Banten

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Abstract

The objective of this study is to create a technology-driven application prototype, named "Bayadome Geotours," as a cutting-edge solution to enhance geotourism governance and environmental conservation in the Bayah Dome Geopark, Banten. This research advances the utilisation of information and geospatial technology to improve visitor experiences and bolster local community involvement. It achieves this through an emphasis on needs analysis, prototype design, implementation, and testing. The Bayadome Geotours prototype is specifically engineered to offer a dynamic and engaging tourism encounter. Geospatial navigation capabilities enable users to digitally explore geosites, while an intuitive user interface assures accessibility for visitors with different levels of knowledge. This programme offers precise and comprehensive geological information, providing a novel method to enhance comprehension of the geological resources found in the Bayah Dome Geopark. Bayadome Geotours is a good example of the value of local community involvement in geotourism administration. This application serves as both a travel guide and a venue for the exchange of knowledge, local narratives, and cultural heritage. Engaging the public in sharing information fosters a stronger connection between tourists and the environment, resulting in a beneficial influence on the preservation of geosites and the overall management of destinations. Prototype testing conducted using a unit testing methodology demonstrates the successful execution of all system functionalities. The JEST tool's test results confirm that the Bayadome Geotours application is prepared for distribution to the general user base. Nevertheless, there are obstacles in the way of effectively managing and modernising the application, as well as achieving general acceptance, that must be addressed in order to guarantee the ongoing triumph of this prototype. However, Bayadome Geotours has created significant opportunities for advancing sustainable geotourism governance.

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1 Introduction

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geotourism and preserving geosites in the current digital age. Hence, the objective of this study is to create a cutting-edge application prototype called "Bayadome Geotours" that will aid in the management of geosites within the Bayah Dome Geopark in Banten. This application was specifically developed to offer visitors an immersive and engaging experience, facilitate educational opportunities, and contribute to the conservation of wildlife. Despite the considerable potential of the Bayah Dome Geopark, the task of managing geotourism effectively remains a challenge. Inadequate facilities and infrastructure, limited accessibility to information, and insufficient community engagement can impede the progress of sustainable geotourism. Hence, this study will concentrate on creating the Bayadome Geotours prototype as a remedy to enhance geosite governance in the Bayah Dome Geopark.

The primary aim of this project is to create a prototype of the Bayadome Geotours application with the purpose of enhancing geosite governance in the Bayah Dome Geopark. This application is anticipated to offer an engaging and instructive travel experience that promotes environmental conservation. In addition, this study also seeks to enhance community engagement in the conservation of geosites and maximise the economic benefits of geotourism for the local population. This research is anticipated to have a beneficial impact in multiple domains. The initial creation of the Bayadome Geotours prototype is anticipated to serve as a paradigm for efficient and enduring geotourism administration. Furthermore, this application is anticipated to enhance individuals' comprehension of the geological abundance in their vicinity, thereby promoting consciousness of the significance of preserving nature. Furthermore, by promoting tourism, there is an expectation that it will have a favourable economic outcome for the local populations.

2 Related Works

This study employs a wide range of literature to support the creation of the Bayadome Geotours prototype and enhance the management of geosites in the Bayah Dome Geopark, located in Banten. Prior research has emphasised the need to employ technology to oversee geological resources and advance environmental preservation. Prior studies on geotourism indicate that the utilisation of technological tools, such as mobile apps, can enhance the quality of visitor experiences. Research by a number of academics (references [1]–[6]) suggests that information technology can significantly affect how tourism connects with pertinent information, improves visitor engagement, and advances destination sustainability.

Geotourism research indicates that employing geospatial technologies can enhance the interpretation of geological features and deepen tourists' comprehension of geological places. The range is from 7 to 11, inclusive. Studies conducted by researchers [12]–[14] demonstrate that the utilisation of geospatial technology can enhance the efficiency of geological interpretation and facilitate the implementation of sustainable geotourism governance. Furthermore, it is crucial to take into account the scholarly research on community involvement in the administration of geotourism. Active involvement of the community is regarded as crucial in attaining sustainable geotourism. Research by [15] and [16] emphasizes the significance of involving local populations in the decision-making and administration of geological tourism sites with the aim of ensuring long-term sustainability.

Additionally, it is crucial to provide a comprehensive account of the literature that elucidates the economic prospects associated with the development of geotourism. According to research by [17]–[21], the development of geological tourism has the potential to significantly increase local revenue, stimulate the local economy, and create new employment opportunities. In summary, this material serves as a solid foundation for the creation of the Bayadome Geotours prototype. By combining information and geospatial technology with community involvement, it is possible to develop applications that enhance the visitor experience and promote sustainable and economically advantageous geotourism management for local populations in the Bayah Dome Geopark, Banten.

3 Research methods

The research methodology was formulated employing a systematic research and development approach to assure the successful attainment of the targeted objectives in the creation of the Bayadome Geotours prototype. The first phase entails doing a requirements analysis, which will involve gathering data on the state of the Bayah Dome Geopark, visitor preferences, and the challenges related to geotourism governance. Ensuring the prototype can effectively address the primary challenges is crucial at this step.

In the second stage, the prototype design of the Bayadome Geotours application will be created, encompassing the development of the concept and key features. This procedure entailed the cooperation of geologists, tourism specialists, and representatives from the local community to guarantee the precision of geological information, the fulfilment of tourist requirements, and the local significance inside the app. The design incorporates the integration of geospatial technologies, enabling users to virtually explore geosites and get comprehensive information. The implementation and testing stages will entail creating a prototype based on the agreed-upon design. The prototype

will undergo a pilot test with a select set of potential users, comprising visitors and local residents, in order to obtain input regarding the app's functionality, usability, and appeal. The process of prototype development will entail multiple iterations, which will be guided by feedback obtained in order to guarantee that the application adheres to both quality standards and user requirements.

This strategy aims to develop the Bayadome Geotours prototype in a thorough and effective manner. By engaging stakeholders throughout the whole development process, the application will not only match the expectations of tourists but also consider the distinctiveness and specific requirements of the Bayah Dome Geopark. Therefore, it is anticipated that this method can generate a successful model for enhancing geotourism governance and advocating sustainability in this area.

4   Results and Discussion

The "Bayadome Geotours" application prototype was successfully developed after undergoing a thorough development process. It serves as a solution to enhance geosite governance in the Bayah Dome Geopark, located in Banten. The research findings demonstrate the synergy achieved through the collaboration of different components, encompassing requirements analysis, prototype design, implementation, and testing. This debate will comprehensively analyse every facet of the research findings.

1)   Analysis of requirements and design of a prototype.

The primary foundation for the development of this application is a needs analysis. Information pertaining to the state of the Bayah Dome Geopark, visitor preferences, and the difficulties associated with managing geotourism has been gathered. This research identifies fundamental requirements such as precise geological data, tourist destinations, and community involvement. Subsequently, a prototype design was produced, including the expertise of geologists, tourist specialists, and representatives from the local community. The incorporation of geospatial technology is a vital aspect, enabling users to virtually navigate geosites, acquire comprehensive data, and engage in an immersive tourism encounter.

The development of this application prototype was built on the Android platform in order to fulfil the geopark management requirements of the Bayah Dome Geopark Management Agency, located in Lebak Regency, Banten Province. In addition, this technology can be utilised to oversee tourism operations within the Bayah Dome Geopark region, thereby facilitating the local government's objectives of promoting sustainable economic growth. The system is named Bayadome Geotours, commonly referred to as BATOUR.

The BATOUR programme comprises two components: the front-end and the back-end. On the front-end, general users and tourists utilise it, accessing a range of features. The features in question encompass geodiversity, cultural diversity, biodiversity, the availability of homestay services, geoproducts, transportation services, tour packages, and information on events and activities at tourist destinations. In addition, the front-end of the platform also offers features to identify the presence of local tourism awareness communities and groups (POKDARWIS), access visit statistics for each geodiversity, obtain information on the most popular geodiversities, and make bookings for homestay services and tour packages that are directly linked to business actors.

The back-end component is utilised by the Bayah Dome Geopark Management Agency, business entities, and Pokdwarwis. The Bayah Dome Geopark Management Agency deploys its representatives to authenticate and examine the business entities that have registered on the application. The purpose of this is to ensure the reliability and accuracy of the tourist information provided on the application. This involves verifying and confirming different pieces of information and events transmitted by business entities within the application. The Bayah Dome Geopark Management Agency also possesses functionalities for the management of geodiversity, cultural diversity, and biodiversity data.Business entities and Pokdarwis on the backend have the capability to oversee and control many aspects of the homestay services, including tour packages, geoproduct management, tourist information and events, transport services, and other related services.

The Batour software is compatible with all Android devices. Users will engage with the system through a GUI (Graphical User Interface) that is dependent on their user access privileges. Figure 1 depicts the use case diagram for BATOUR. The front end module's functional decomposition is illustrated in Figure 2, whereas Figure 3 displays the functional decomposition of the back end module.
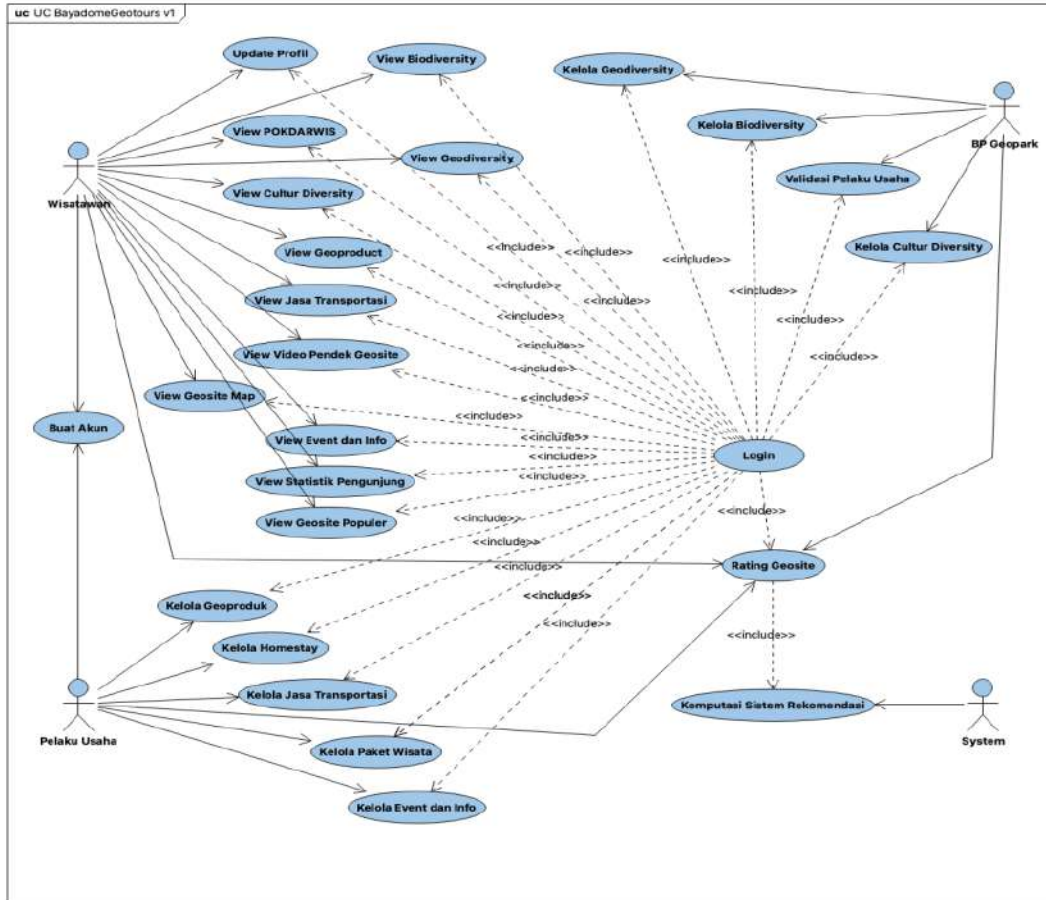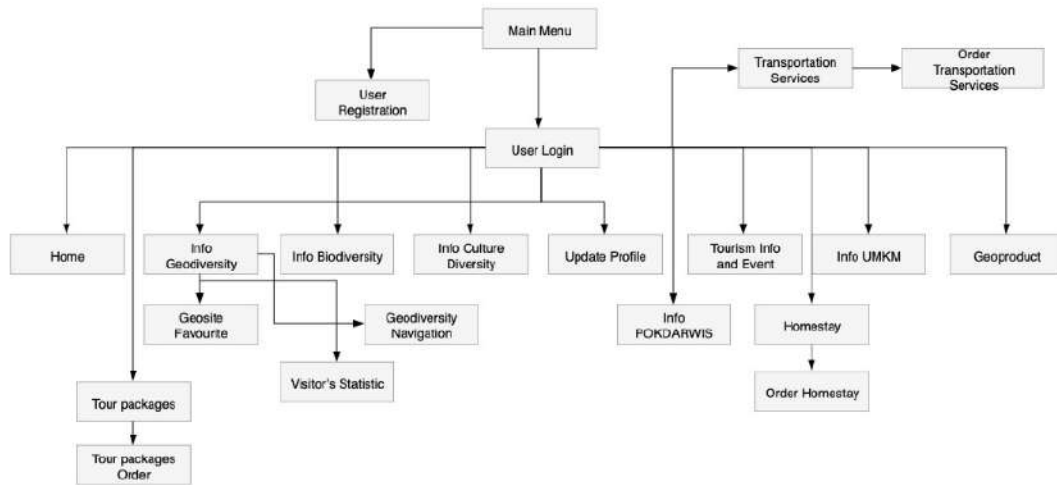
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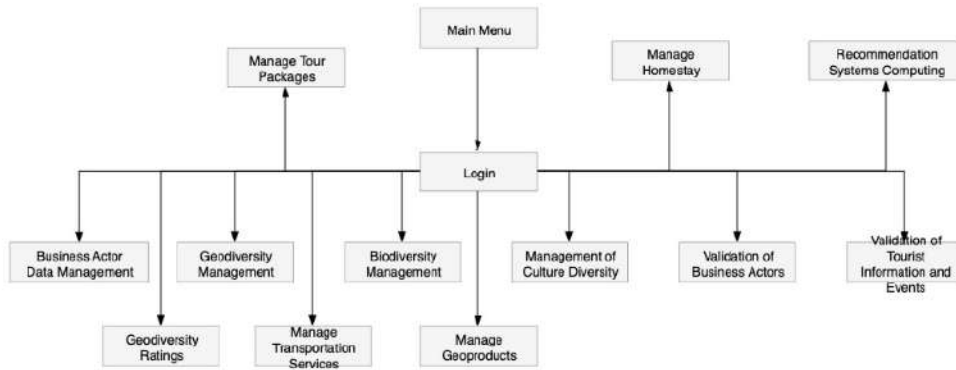

Figure 2. Front End Module

Figure 3. Back End Module

2) Implementation

The implementation of the Android-based Bayadome Geotours application encompasses numerous crucial phases, commencing with code development, user interface (UI) design, and test planning. Initially, during the code development phase, the development team must choose an appropriate programming language, such as Kotlin or Java, and utilise Android Studio as an integrated development environment. The software code must have functionalities such as interactive maps, navigation, and the integration of geospatial data. When implementing this feature, developers must prioritise Android development principles such as modularity, security, and performance.

Moreover, UI design plays a crucial role in delivering a satisfactory user experience. The UI/UX design team was tasked with developing a user-friendly layout, incorporating icons and colours that align with the Bayadome Geotours concept, and ensuring that the interface is compatible with various Android devices. Effective design enhances the appeal of the application and facilitates user-friendly navigation of tourism information. Figure 4a and Figure 4b depict the visual representation of the BATOUR application's login page and user dashboard, respectively.
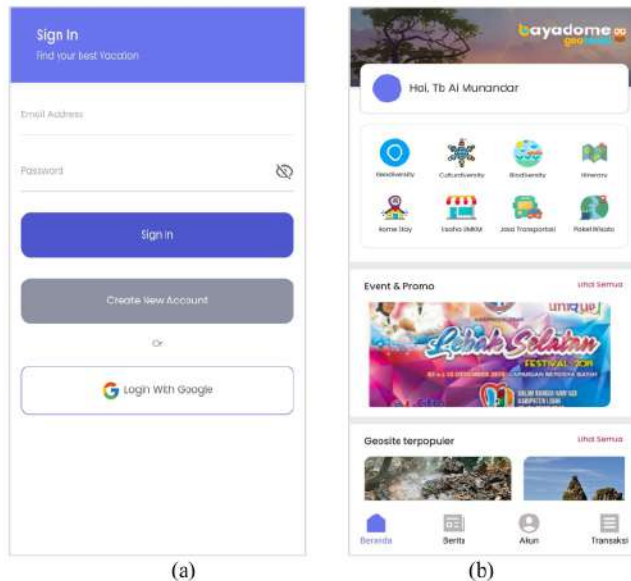

(a)   (b)

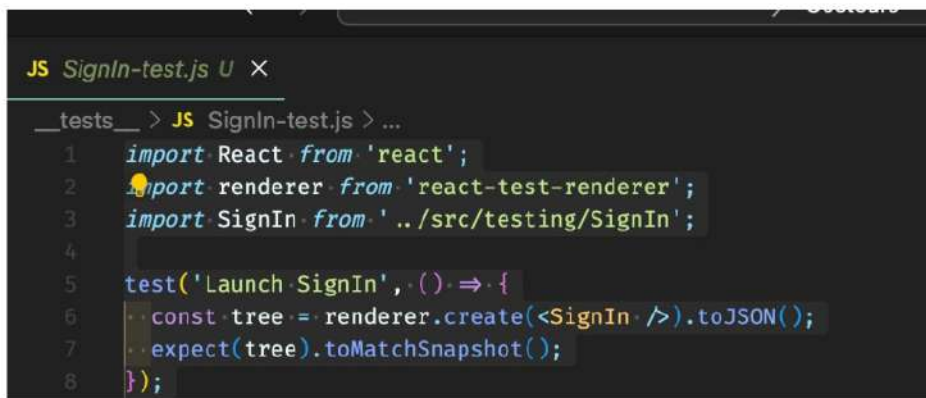Figure 5. Login (a) and User Dashboard Page (b)

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The testing plan for the Bayadome Geotours application was executed using a unit testing technique with the aid of JEST tools. The process of unit testing commences with the installation of the JEST framework. JEST is a framework that is built on open source technology and is specifically designed for doing unit tests on mobile applications, with a focus on the front-end layer. This tool is constructed using JavaScript and is commonly employed for developing web applications based on React and React Native.In order to utilise JEST, it is necessary to configure it in accordance with the coding practices of the developer. Subsequently, generate a test script for every individual module, function, or system unit that requires testing. The generated script is thereafter executed; if any issues persist, modify the script and rectify it iteratively until the unit testing outcomes are comprehensive.

3) *Test Results*

During system unit testing, several system functions will undergo testing, encompassing:

a. The initial screen that appears when an application is launched. A splash screen is an initial page that is displayed when a user launches an application for the first time.
b. Log in. Upon clicking the SignIn button, the user will be directed to a login page. To access the main page of the Bayahdome application, the user is required to input their email and password.
c. Enrol. Users who do not possess an account can establish one by using the Register page.
d. Authenticate using Google credentials. This page is used when the user desires to authenticate using an email generated from Google Email (Gmail).
e. Residence. This page serves as the primary interface for the user upon successful authentication. This page will display the following information in the application menu: user profile, events and promotions, a list of the most popular geosites, statistics on geosite visits, and a list of the most recent visitors to the application.
f. Geodiversity refers to the variety and range of geological features and processes found within a specific area. a webpage that will present comprehensive information regarding biodiversity.
g. Cultural variety is present. a webpage that will present comprehensive information regarding cultural diversity.
h. The variety of life forms in a given area. a webpage that will present comprehensive information regarding biodiversity.
i. Travel plans. a webpage that will present detailed information regarding the travel schedule.
j. Home Stay. This website will present information regarding HomeStay.
k. Micro, Small, and Medium Enterprises (MSMEs). an interface that will present comprehensive details regarding micro, small, and medium enterprises (MSMEs).
l. Tour Packages. This page will include details regarding various tour packages.
m. Latest information or updates, a webpage that will offer up-to-date information on news curated by the Bayahdome administration.
n. Account. This page serves as a platform for users to administer their accounts, including tasks such as modifying passwords and altering profile pictures.
o. Regarding. This page serves as a source of information for users regarding the Bayahdome application.

Out of the 15 menus available in the Bayahdome application, the test result indicates a PASS. This signifies that the application is performing effectively in terms of its functionality. Figure 6 represents a test script for a specific function within the sign-in system, whereas Figure 7 displays the overall results of the unit testing.


```
JS SignIn-test.js U  ✕

__tests__ > JS SignIn-test.js > ...
  1   import React from 'react';
  2   import renderer from 'react-test-renderer';
  3   import SignIn from '../src/testing/SignIn';
  4
  5   test('Launch SignIn', () ⇒ {
  6     const tree = renderer.create(<SignIn />).toJSON();
  7     expect(tree).toMatchSnapshot();
  8   });
```

Figure 6. Sign in module testing script

```
> yarn jest
yarn run v1.22.19
$ /opt/homebrew/var/www/Project/android/Geotours/node_modules/.bin/jest
 PASS  __tests__/Biodiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/JasaTransportasi-test.js
  › 1 snapshot written.
 PASS  __tests__/LoginWithGoogle-test.js
  › 1 snapshot written.
 PASS  __tests__/Geodiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/Tentang-test.js
  › 1 snapshot written.
 PASS  __tests__/HomeStay-test.js
  › 1 snapshot written.
 PASS  __tests__/PaketWisata-test.js
  › 1 snapshot written.
 PASS  __tests__/UsahaUmkm-test.js
  › 1 snapshot written.
 PASS  __tests__/Register-test.js
  › 1 snapshot written.
 PASS  __tests__/Itinerary-test.js
  › 1 snapshot written.
 PASS  __tests__/CulturDiversity-test.js
  › 1 snapshot written.
 PASS  __tests__/SplashScreen-test.js
  › 1 snapshot written.
 PASS  __tests__/Berita-test.js
  › 1 snapshot written.
 PASS  __tests__/Beranda-test.js
  › 1 snapshot written.
 PASS  __tests__/SignIn-test.js
  › 1 snapshot written.
 PASS  __tests__/Akun-test.js
  › 1 snapshot written.

Snapshot Summary
 › 16 snapshots written from 16 test suites.

Test Suites: 16 passed, 16 total
Tests:       16 passed, 16 total
Snapshots:   16 written, 16 total
Time:        1.338 s
Ran all test suites.
✨  Done in 2.23s.
```

Figure 7. Test results for overall system function.

During the unit testing phase of the Bayahdome application system, a number of system functions were prioritised for testing. The splash screen is the initial page that is displayed when the user opens the application. Splash screens have a crucial function in creating an initial impression for users, and conducting tests will guarantee that the appearance adheres to design criteria and is free from any problems that could impact the user's experience. Additionally, the SignIn function is examined to verify that users can effortlessly access the login page. Upon clicking the SignIn button, users are automatically taken to a login page where they are required to input their email and password. Testing encompasses input validation, authentication, and error handling to guarantee the login process operates seamlessly and securely.

Subsequently, an examination was conducted on the Register functionality, which permits users to generate a novel account in the event that they do not own an existing one. The primary emphasis is on input validation, data

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security, and a seamless registration process to provide a favourable user experience. The LoginWithGoogle function is tested to verify the functionality of allowing users to authenticate using their Google email (Gmail) credentials. Testing encompasses the integration of Google services, the management of authorization, and the handling of users who possess Google accounts. In addition, the homepage, which serves as the primary page following successful user sign-in, undergoes testing to verify the proper functioning of various elements, including the application menu, user profile, events and promotions, list of the most popular geosites, geosite visit statistics, and list of recent visitors.

Testing is conducted to verify that each page can accurately present information pertaining to the subject matter, including geodiversity, cultural diversity, biodiversity, itineraries, home stays, MSME businesses, tour packages, news, accounts, and about sections. Testing encompasses the verification of data, the arrangement of pages, and the operational aspects associated with each category. The test results for these menus indicate that all system functions have successfully passed testing with a "pass" status. This suggests that the Bayahdome programme is functioning effectively in terms of its functionality. Figure 6 depicts a graphical depiction of the script used for testing the functionality of the sign-in system. On the other hand, Figure 7 displays the outcomes of the unit testing conducted on the complete programme. This verifies that the entire application has undergone comprehensive testing and has successfully fulfilled the established criteria. Therefore, these favourable test outcomes establish a foundation of assurance for consumers that the Bayahdome application not only presents a range of useful functionalities but also ensures a dependable and secure user experience. Each testing process, from the splash screen to the About page, plays a crucial role in guaranteeing the general excellence and efficiency of the application.

5 Conclusion

In summary, the system unit testing conducted on the Bayahdome application, which is based on the Android platform, has yielded favourable outcomes. Specifically, all 15 system functions have successfully passed the test and have been assigned a PASS status. The sequence of tests indicates that the Bayahdome application has effectively included the anticipated functionality and performs satisfactorily overall. Initially, conducting tests on the SplashScreen verifies that the application's introductory page offers a satisfactory initial encounter and adheres to recognised design norms. The SignIn and Register procedures undergo testing to guarantee a seamless experience for new users during the login and registration process. Additionally, LoginWithGoogle is examined to ensure its correct interaction with Google accounts. Testing conducted on the main page, namely the Home page, demonstrates that all relevant information pertaining to the application menu, user profile, events and promotions, list of highly frequented geosites, geosite visit statistics, and recent visitors list is displayed correctly, ensuring an acceptable user experience.

In addition, every individual page, such as Geodiversity, Culturdiversity, Biodiversity, Itinerary, Home Stay, MSME Business, Tour Packages, News, Account, and About, has undergone thorough testing to ensure that the Bayahdome application can accurately and appropriately present information pertaining to each respective topic, meeting expectations. According to the positive overall results, the Bayahdome application development team has succeeded in creating a stable and functional Android application that is in line with its intended purpose. These findings instill users with the assurance that the application can be trusted to deliver pertinent information regarding tourist locations and other associated attributes. This is shown in Figure 6 and Figure 7, which show the comprehensive unit testing results and a graph of the Sign In test script. These images clearly show that every part of the system has been thoroughly tested. This ensures that not only each individual feature of the app is functioning correctly, but also that the programme as a whole fulfils the quality benchmarks established by the development team. Therefore, this comprehensive assessment verifies that the Android-based Bayahdome Geotours application is fully prepared for launch, ensuring users will have a gratifying and dependable experience when accessing information about tourism sites provided by the programme.

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