Smart Tourism Village Application on Android Platform: A Case Study - Serangan Tourism Village, Bali-Indonesia

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Abstract: Serangan Village is one of the tourism villages in Bali which is growing towards advanced and technological tourism villages. It has almost all the tourism potential in the area, culinary, lodging, tourist attractions, and art shops. In contrast to this situation, the Serangan Village does not have yet a mobile-based application to promote and increase the volume of their village tourism businesses. This reasearch is aimed to development a smart tourism application based on android platform using prototyping approach. The back-end application used SLIM framework based on PHP. The application also used multiple web services and Javascripts programming language for the front-end.

1 INTRODUCTION

Serangan Village is one of the tourism villages in Bali which is growing towards advanced and technological tourism villages. Serangan Village was declared as a tourist village by regulation of the Decree of the Mayor of Denpasar Number 188.45/472/HK/2015. According to the Minister of Tourism of the Indonesian Republic on The Guide of National Program of Community Empowerment (PNPM Mandiri) of Tourism, a tourism village can be stated as a village designed consciously or naturally having the capability to attract visitors to come because of the natural and cultural attraction potencies.

The Serangan Village has almost all the tourism potential in the area, culinary, lodging, tourist attractions, and art shops. Here promotion using information technology is very important to increase tourist visits, to increase sales and income of the village. Most people in Serangan Village are active users both for social media or other mobile-based applications (Asri et al., 2020). In contrast to this situation, the Serangan Village does not have yet a

mobile-based application to promote and increase the volume of their village tourism businesses.

According to GlobalStats in 2020, the mobile operating system market share in a worldwide android operating system is 72,18% and 90,85% in Indoenesia compared to other operating systems. Based on these statistical data, the android operating system smartphone is the smartphone that is well known   worldwide   today   compares   to   other smartphone operating systems.

Based on this facts, this research develops an application to promote the tourism potential of the Serangan Village through an android-based application. The application developed is an application that integrates the management process and promotion of village tourism potential resources. Application management will be carried out together between the village and the villagers. We called this application is Smart Tourism Village Application. Villagers can manage and promote their businesses through smartphones.

The application provides the information needed and gives an overview to the tourist. As a smart tourism village application, the village can manage

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and supervise all tourism businesses in their village through the application. Furthermore, villagers who own a tourism business can promote their business through the application. They can also market and sell their products. The application helps tourists get all information about Serangan Village, including culinary, tourism attractions, art shops, and lodging information. It can also give the location information of the tourism destinations on the village using Google Maps.

2 RELATED WORKS

Android-based applications to support tourism have been widely developed, both in Indonesia and throughout the world. Each application has a specificity according to its designation. The application features are usually designed not only for product promotion but also to give the location information of a tourist attraction respectively. These applications using GPS (Global Positioning System) technology to guide tourists to the location via their smartphone.

Android-based application development, especially in the field of tourism, was developed by many researchers. Tamil Nadu Tourism E-Gudide was develop to provide tourism information to the tourists for better places in one instant (Jithin et al., 2018). The application claimed to be able to reduce the time for tourists to find better tourism spots. An android application of mapping the tourism potential of Karanganyar Village Banyuwangi has been deployed using GPS technology. The application purposed to spread information and to enhance the marketing the tourism potential of the village worldwide (Idhom et al., 2019).

In Nigeria, a tourist guide android-based application has been developed to provide information for tourists. The development is to address the challenges of where and how to get the information. The purpose of the application is to give the tourist adequate, complete, and current information (Sadiku et al., 2019). An E Tourism-Guide also was deployed in Sabang City, Indonesia. The application using the android platform. The application can provide tourist information In Sabang City fast and accurately even without a tour guide or coming to the information center directly (Wali et al., 2019). The development of tourism applications using the android platform is the right choice considering a large number of android smartphone users.

Digitization of tourism businesses can bring a tourism village into a smart tourism village. The digital platform's development makes the variety and volume of products in the tourism business increase. Hence the services and tourism experiences also increase respectively, and it can cause the increasing transaction speed, market awareness, and market feedback (Pranita et al., 2020).

The smart village concept is derived from the smart city, which is the use of ICT is a main part of the development process. An example of developing a smart city android-based application is Klaten Smart City. This application provides information about Klaten, including events and other information. One of the features is tourism destinations. The feature provides information about tourist sites in the city, and user can share their experiences using the submenu My data (Sari & Rachmawati, 2021). The application provides a lot of data related to the city, the smart tourism village application. The data provided is the data that needed in tourism activities in the village.

3 RESEARCH METHOD

The development method used to deploy this application is the evolutionary prototyping approach.

3.1 Evolutionary Prototyping

Figure 1 shows the evolutionary prototyping approach. The approach is the iterative evolutionary prototyping processt hat receives certain inputs, performs a few steps, and delivers output artifacts (Nacheva, 2017).
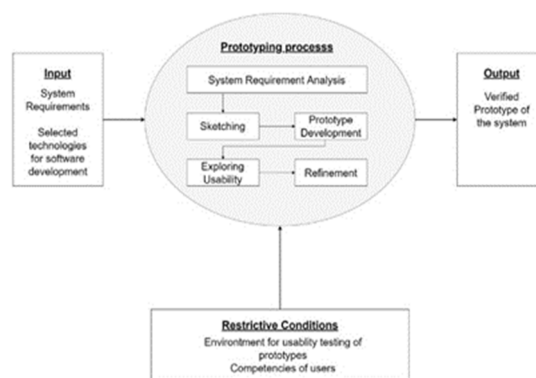

Figure 1: The Evolutionary Prototyping Approach.

3.1.1 System Requirements

The system requirement in this research is by doing direct observations of the Serangan tourist village. The actors, features, and system behaviors are set in this phase.

Table 1 shows the tourism businesses owned by the villagers and by the village itself

Table 1: Tourism Businesses in the village.

Tourism Business	Main activities	Products
Culinary	Selling	Food and beverage
Art Shop	Selling and ordering	Handicrafts, cloths, and paintings
Lodging	Booking and Rental	Rooms and services
Tourism destination spot	Promoting and ticketing	Attractions
Cultural event	Promoting and ticketing	Events

The potential actors(users) of the application shows in Table 2.

Table 2: Potential actors (users).

Actors (users)	Role
Village	Village admin
Villagers	Business owner
Tourists	Guest

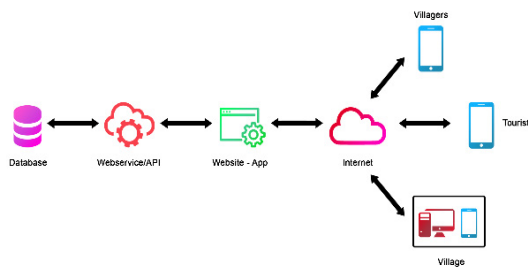The system architecture is designed as follows.

Figure 2: The system architecture.

Figure 2 shows three users who can access the application, in which the village has a role as an admin who manages the entire application. The users can access the smart tourism village application by installing the application on their smartphones.

After the system requirements are set, the next step is to choose the technologies or programming languages that will be used in development. The selection of programming technology and language is based on the goals of the application. Either the application is designed to be able to connect with other applications WhatsApp or Facebook.

3.1.2 Prototyping Process

There are several phases in prototyping processes as follows:

- System requirement analysis. After gathering the data and the technologies and programming languages afterward, we need to analyze the features and user's roles.

- Sketching. The sketching phase is corresponds with develop a plan. This phase the usecase, database are designed. Figure 3 shows the use case diagram of the villager as well as.
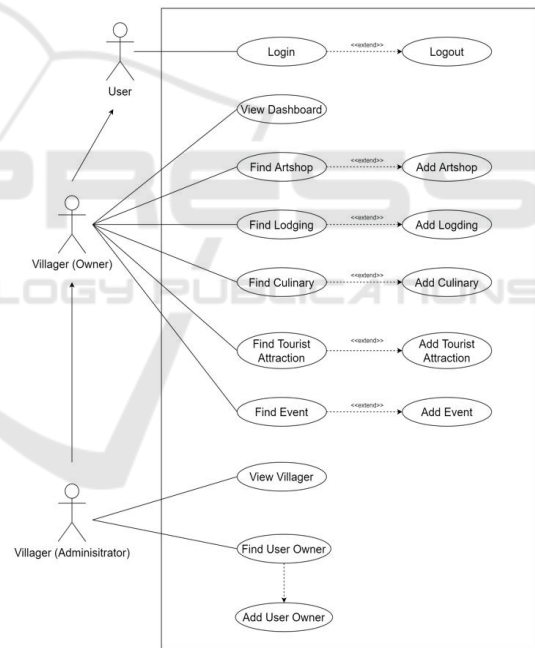

Figure 3: The Use Case of the Villagers.

Figure 4 shows the use case diagram of the tourist. The use case diagram mapping the activities of users, which is realized by the features of the application.
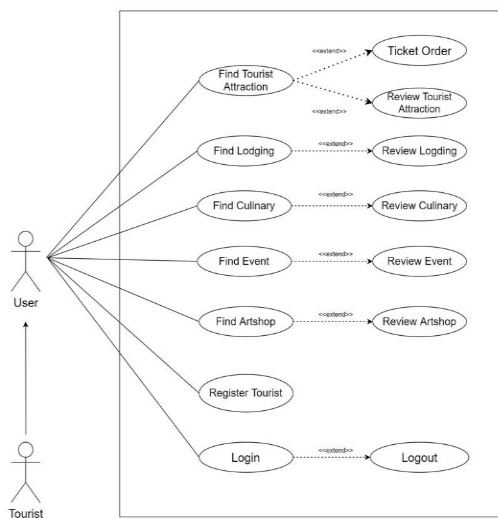
Figure 4: The use case of the tourist.

The relational table diagram in back-end application is shown in Figure 5.
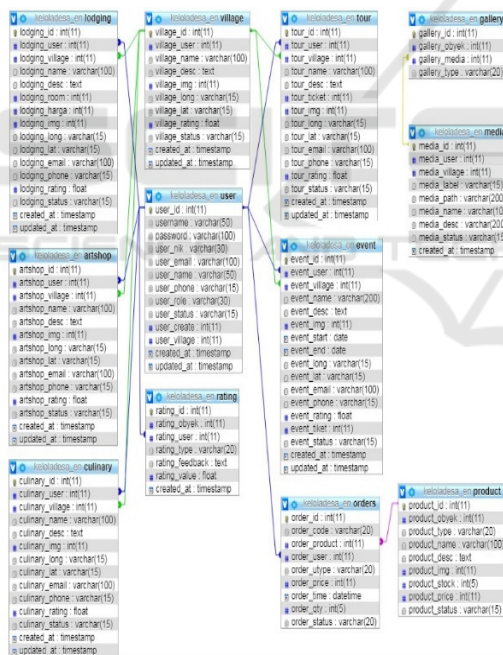

Figure 5: The relational table diagram.

- Prototyping development. The back-end application is fully built, then the front application is developed.

Prototyping processes is iterative process. After the prototyping meets the requirement, it is ready to be tested and then released to the client.

3.2 Testing

There are two main testing methods, white box and black box testing in software development. White box testing is sometimes called structural testing. It is based on the information derived from the source code of a test case. The white box testing must be run by a tester that has with programming skill. Black box testing is also called functional testing. The testing run is based on the system functions that have been determined at the requirements phase. The black box testing tester does not have to has a specific programming skill. Hence is the main advantage of black box testing (Nidhra & Dondeti, 2012).

Smart tourism village application is tested using black box testing. The application is parted into several unit testing, those are village profile, art

Table 3: Black box testing results of the login and village units.

Scenario	Expected results	Testing result	Status
Username : (empty) Password : (empty)	The system will display a message: username is required	The system displays a message: username is required	success
Username: (empty) Password : admin	The system will display a message: username is required	The system displays a message: username is required	success
Username : email address Password : (empty)	The system will display a message: invalid data	The system displays a message: invalid data	Success
Username : email address Password : text	The system will accept the input and proceed.	The system accepts the input and proceed.	Success
Log out	The system will display the landing page	The system displays the landing page	Success
Login as admin, Click menu : village	The system will show the village profile	The system shows the village profile	Success
Login as admin, Click menu : edit/update	The system will display updated village profile	The system displays updated village profile	Success

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shops, lodging, culinary, tourist attraction, and event unit. Table 3 shows the black box testing results of the application.

Other advantages are the testing is carried out by the third party to avoid developer bias, and it's efficient when we run the black box testing for the larger system (Verma et al., 2017). Due to the ease and advantages of using black testing, this test is generally used in various cases. Black box testing became the preferred choice for testing software or information systems. An example of using black-box testing is the madrasah e-learning system. The system is parted into several units with various testing scenarios. There are login, class setting, computer-based test, and student learning evaluation testing unit (Sutiah & Supriyono, 2021).

4 RESULT AND DISCUSSION

Back-end application was deployed using the SLIM framework based on PHP. SLIM framework is used to write the web services. The back-end application was deployed using the SLIM framework based on PHP. A SLIM framework is used to write the web services. The framework can connect multiple applications that can not share the same resources (Martin et al., 2014). The SLIM framework has good performance at speed and lightness compared with other frameworks for back-end applications, hence the Laravel framework (Sunardi & Suharjito, 2019).

Table 4 shows the front-end development tools. Hence the middleware application used multiple web services with a message broker

Table 4: The front-end development tools.

Category	Tools
Platform	Microsoft Windows, Android SDK 17
IDE	Android Studio, Visual Studio Code
Technology	Web Services, JSON, Axios, Nuxt, Capacitor
Database	MySQL
Programming Language	JavaScript
API	Leaflet API, Google Maps API, Facebook API, WhatsApp API

Figure 6 shows the smart tourism village application's home page.

Figure 6: The application's home page.

Firstly, users must install the smart tourism village application into their smartphones to get the application's access. Then the home page will show the profile of Serangan Village. Users can browse all the information about Serangan Village by clicking a menu or an icon on the application. Figure 7 shows the features of the application. Those are Desa (village), Beranda (dashboard), Obyek Wisata (tourist attraction), Penginapan (lodging), Artshops, Kuliner (culinary), and Events.

Figure 7: The application's features.

The culinary page is shown in Figure 8. Users can find the information about culinary by clicking Kuliner in the application.

Figure 8: The culinary page.

Each feature is completed with a location map and sharing buttons to social media. The tourists can guided to the location by clicking the location button, also turn on the GPS on their smartphone. If the tourists want to know about the cultural events in Serangan Village they can click the Events button. Tourists can read the event's information via this feature. Tourists can find the lodging in the village and booking the lodging their needed by clicking the Penginapan (lodging) feature.

The villagers can manage their tourism businesses via smartphones also. They can add new products and input pictures or photos of the products. They can also receive the orders through the application installed.

Figure 9 shows the village admin page of the application.
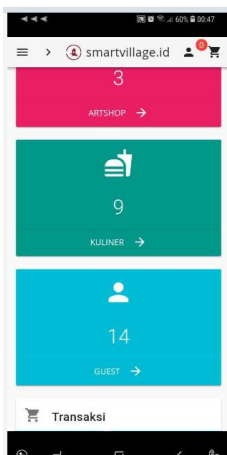

Figure 9: The village admin page.

The village admins can manage and monitor the tourism business in the village via the installed application on their smartphones. The admins can monitor how many tourism businesses are registered,

and add a new tourism business to the application. The admin also can get the transaction volume information of the tourism business managed by the village. The smart tourism village application was deployed according to the specific requirements of the Serangan Village as shown in Table 1. We used multiple web services to deploy social media sharing and find location features.

The goal of the application is to make Serangan a smart tourism village, that can promote village tourism potentials. As a tourism village, Serangan must have a strong will to manage and promote its potentials using ICT. The application is featuring with social media sharing. Tourists can share their experiences through social media. The aim of featuring applications with social media sharing is to get splash and fast promotion doing by the tourist. Todays the power of social media promotions can bring big impact on the product's marketing.

Unlike e-tourism application that only provides one or two features, the android based smart tourism village application provides many features to accommodate the tourism businesses. Village and villagers can manage, monitor, and promote their businesses with their own. Village and villagers can manage, monitor, and promote their businesses on their own. This is an essential thing of being a smart village.

Future works, an integrated smart tourism application can be deployed to connect many tourism villages in the same area or a province. They can link the databases to share information and give goog services to the customer. A payment gateway can be added to the application, in which the application can give payment method flexibility.

5 CONCLUSIONS

The smart tourism village application of Serangan Village has many features, to accommodate various tourism businesses in the village. Village and villagers can manage and promote their business through the application. It is like a one-stop application for tourists to visit Serangan Village.

The back-end application used SLIM framework based on PHP. The application also used multiple web services and Javascripts programming language for the front-end.

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