

Design and Build an Android-Based Mobile Application for Online Badminton Court Booking

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ABSTRACT

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In this digital era, the utilization of mobile technology is increasingly crucial to provide easier and faster services for users. In the design phase, a needs analysis and literature study were conducted regarding online booking applications and badminton court systems that already exist at the Sekip Badminton Center. The user interface design was created to allow users to easily book badminton courts according to their preferred time and location. This application incorporates essential features, including user authentication system, court availability calendar, time options, court type selection, and secure payment processing to enhance user convenience and experience. This research focuses on the development of an Android-based application. Quality testing processes were carried out to ensure the application functions well, is free from errors, and provides accurate results. The result of this research is a mobile application that assists users in quickly and efficiently booking badminton courts. The application improves accessibility and effectiveness in court booking, contributing positively to the development of the sports industry, particularly in the field of badminton courts.

1. INTRODUCTION

With the advancement of information technology, competition in almost every field has become increasingly intense[1]. This has led to the emergence of various technologies, particularly Android-based applications[2]. These applications are utilized on a small, medium, and large scale, implemented on technological devices that people use in their daily lives, such as smartphones [3]. The intense competition also applies to businesses with the presence of e-business and e-commerce. Technology plays a crucial role not only as a supporter of business processes but also in the digital management of businesses within a company[4].

Digital business management also affects badminton business owners, supported by the interest of people from various backgrounds that indirectly has a significant impact on the sport of badminton. Sekip Badminton Center is one of the facilities providers located at Jl. Gereja No.36, Sei Agul, Medan Baru, Kota Medan, North Sumatra 20114, Indonesia. Sekip Badminton Center has 4 courts, all of which function effectively.

Court reservations at Sekip Badminton Center can be made by visiting the rental location directly, contacting via mobile phone, or using instant messaging applications such as WhatsApp to make reservations, scheduling, and payment for court rentals at Sekip Badminton Center. This process may lead to several challenges, such as errors in recording information, reduced accuracy in court scheduling, slow data retrieval processes, or instances of double booking at Sekip Badminton Center.

Therefore, this research is conducted with the aim of designing an application that can address the issues related to badminton court reservations, process data from the database, and implement it into an Android-based mobile application. The design of this application aims to allow users in need of badminton courts to easily carry out the reservation and scheduling processes from their smartphones. The application is provided on a mobile platform, ensuring interoperability with web-based resources that provide access to diverse information relevant to the application. It also possesses the capability for local processing to gather, analyze, and format information in the most suitable way for the mobile platform.

2. LITERATUR REVIEW

The research with the title Developing an Android-Based Mobile Application for Civic Education Learning'/ Based on validation by material experts, the developed application was very feasible to use (89.04%), and the media experts concurred with this assessment (90.78%). During the large-group trials, the application scored between 3.96 and 4.68, meaning that it provides an excellent media or platform with high feasibility for the teaching-learning process of civic education in senior high schools[5].

The research with the title Design and Development of Android Based Mobile Application for Emergency Services'. The Google Map button helps the user to track the required categorized emergency services. Integration of Google Maps API (Application Programming Interface) using Firebase

gives optimized search results which also gives the additional information such as time required to reach the desired destination, acquaintances in the nearer area, which is useful for the visitor or needy peoples to locate and use of GPS of the Mobile able track the desired service[6].

2.1 Mobile Applications

A mobile application, commonly referred to as mobile apps, is a term used to describe internet applications that run on smartphones or other mobile devices [7]. Mobile applications assist users in connecting to internet services[8], typically accessed on Personal Computers (PCs), but in a more portable manner[9].

Mobile applications are designed specifically for mobile platforms, such as iOS, Android, or Windows Mobile[10]. In many cases, mobile apps have a user interface with unique interaction mechanisms provided by the mobile platform[11]. They also offer interoperability with web-based resources, providing access to various information relevant to the app[12]. Additionally, mobile apps have local processing capabilities for data collection, analysis, and formatting in ways that are most suitable for the mobile platform[13].

2.2 Android

Android is a mobile Operating System (OS) developed by Google[14]. The Android OS is based on the Linux Kernel[15]. Android is open source, meaning developers can modify and customize the OS for each phone[16]. It provides an open platform for developers to create their own applications for various purposes[17]. Android undergoes version updates, with each version often named after a food item[18].

3. RESEARCH METHOD

To ensure that nothing is overlooked in this research, the stages conducted in the study are systematically outlined in Figure 1.

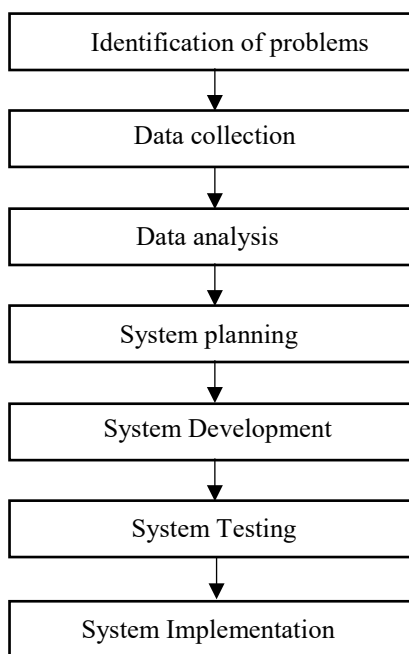


Figure 1. Research Framework

3.1 Problem Identification

The process of renting and booking badminton courts is currently done by physically visiting the rental venue, contacting via mobile phone, or using instant messaging applications such as WhatsApp. The lack of efficiency in this process increases the likelihood of encountering various challenges, such as errors in information recording, reduced accuracy in court scheduling, slow data retrieval processes, and the occurrence of double bookings.

3.2 Data Collection

Research data collection is performed using various methods, including:

- a. Literature Review (Library Research)
Collecting data that supports and relates to the research by reading relevant literature. The process starts from data collection, system design, program development, to the preparation of the research report.
- b. Field Study (Field Research)
Conducting a direct study at the workplace or directly related to the field in an objective manner, involving:
- c. Interview
Direct face-to-face data collection and information gathering from respondents.
- d. Observation
Direct research on the object being studied to gain a clear understanding of the ongoing system.

3.3 Data Analysis

Systematic analysis of data from literature review and field study to provide conclusions and support proposals that facilitate users and field managers in conducting badminton court reservations more flexibly and computerized.

3.4 System Design

Illustrating the design of the online badminton court booking system and the design of the Android-based mobile application using Unified Modeling Language (UML). This is done to assist in the development of the Android-based mobile application for booking badminton courts.

3.5 System Development

Building an Android application to facilitate users in online booking and renting of badminton courts.

3.6 System Testing

Testing the system to evaluate its fundamental aspects, ensuring that the mobile application for booking badminton courts functions correctly.

3.7 System Implementation

Completing the approved system design, including testing processes, installation, and initiating system usage."The way that section titles and other headings are displayed in these instructions, is meant to be followed in your paper.

4. RESULTS AND DISCUSSION

4.1 Data Analysis

The following are data related to badminton court bookings at Sekip Badminton Center:

follows:

Table 1. The Operational Schedule of the Court

Fields	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
L-1	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	08:00-21:00	08:00-21:00
L-2	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	08:00-21:00	08:00-21:00
L-3	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	09:00-22:00	08:00-21:00	08:00-21:00
L-4	09:00-18:00	09:00-18:00	09:00-18:00	09:00-18:00	09:00-18:00	08:00-21:00	08:00-21:00

Table 2. The Court Booking Fee

Time	L-1	L-2	L-3	L-4
08:00 – 09:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
09:00 – 10:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
10:00 – 11:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
11:00 – 12:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
12:00 – 13:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
13:00 – 14:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
14:00 – 15:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
15:00 – 16:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
16:00 – 17:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
17:00 – 18:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
19:00 – 20:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
20:00 – 21:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000
21:00 – 22:00	Rp.60.000	Rp.60.000	Rp.60.000	Rp.60.000

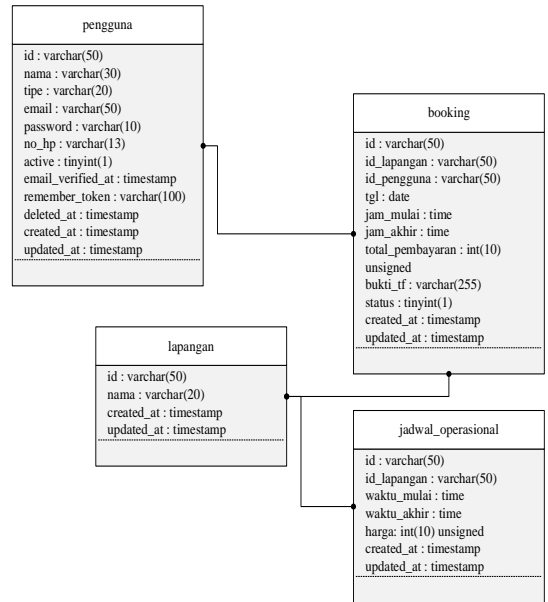


Figure 3. Class Diagram

The system interface design aims to facilitate the design of the online booking interface for badminton courts at Sekip Badminton Center, as described in the form of a HIPO (Hierarchy plus Input-Process-Output) diagram.

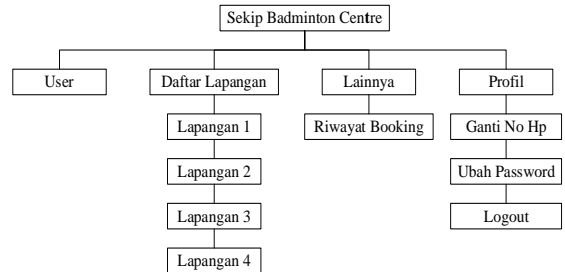


Figure 4. HIPO Diagram

4.2 System Design

In the development of a complex Android-based mobile application, modeling is essential to facilitate the design process. In this stage, the use of Unified Modeling Language (UML) is required as the modeling language. The models employed include:

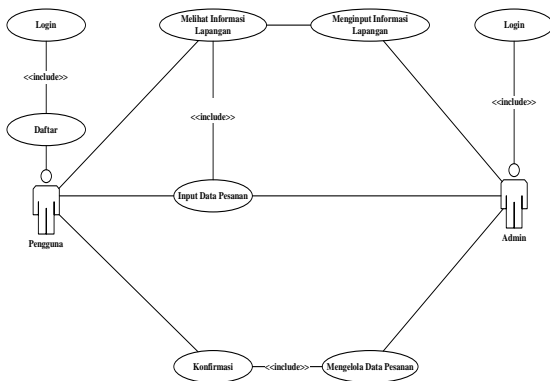


Figure 2. Use Case Diagram

The Class diagram is used to visualize the class structure of a system. It illustrates the rules and responsibilities of entities that determine the system's behavior. The Class diagram plays a role in capturing the structure of all classes that form the created architecture. The Class diagram for the online booking system of badminton courts at Sekip Badminton Center is as

5. SYSTEM IMPLEMENTATION

5.1 User Interface

The user login page is the initial page when the user first opens the system, as shown in Figure 5

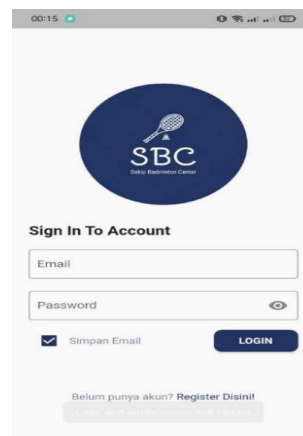


Figure 5. User Interface

After logging in, the main page interface will appear, as shown in Figure 6.



Figure 6. User Dashboard

Select one of the available courts, complete the information related to court booking. Afterward, check court availability and validate the payment, as shown in Figure 7.



Figure 7. Booking Page

After completing the entire booking process, users can review the booking history, as seen in Figure 8.



Figure 8. Booking History

5.2 Admin Interface

The admin login page is the initial page when the admin first opens the system, as seen in Figure 9.

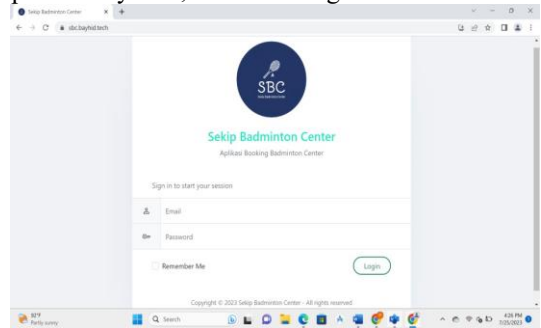


Figure 9. Admin Login Interface

Afterward, the admin dashboard page will appear, as shown in Figure 10.

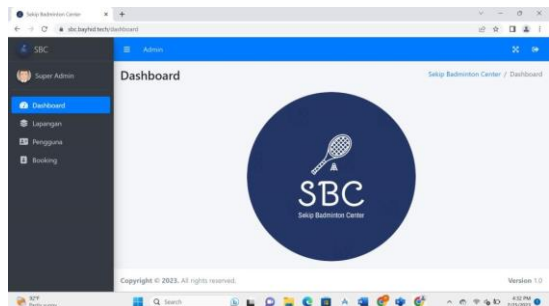


Figure 10. Admin Dashboard Interface

Select the 'Field' menu, and a list of courts will appear, as shown in Figure 11.

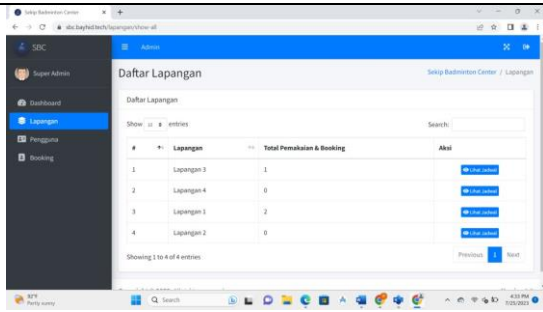


Figure 11. List of Courts Page Interface

Select the 'Users' menu, and a list of users will appear, as shown in Figure 12.

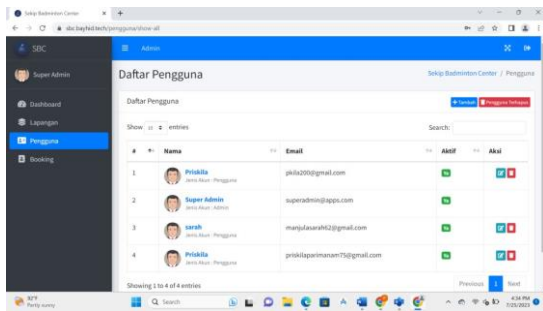


Figure 12. List of Users Page Interface

Select the 'Booking' menu, and a list of bookings will appear, as shown in Figure 13.

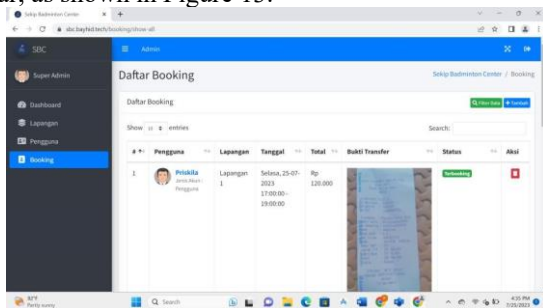


Figure 13. List of Bookings Page Interface

After that, the admin can take confirmation actions on the list of bookings, as seen in Figure 14.

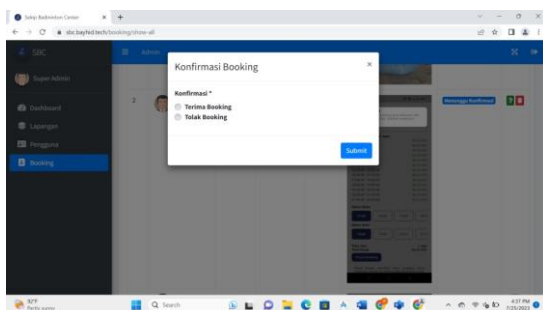


Figure 14. Booking Confirmation Interface

6. CONCLUSIONS AND RECOMMENDATION

Conclusion from the implementation of this research:

1. The Mobile Online Booking System for renting Badminton Courts at Sekip Badminton Center based on Android has been successfully implemented.
2. The Android-based Mobile Booking Application for Badminton Courts at Sekip Badminton Center has been designed and developed.

Research recommendations:

1. Addition of a direct communication feature (live chat) to facilitate users in contacting the staff.
2. Addition of a notification feature (reminder).
3. Consideration for the addition of a direct payment feature.

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