



## Creation of an Android-Based AM Futsal Field Rental Application Using Flutter and JS Node with Midtrans Integration as a Payment Gateway

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### Abstract

In the modern era, technology has facilitated various aspects of life, including in the sport of futsal, which often requires an optimal training ground. Currently, Futsal AM South Tangerang still uses manual methods for field bookings, resulting in inaccurate reports and limited access. To overcome this problem, this research aims to develop an Android-based futsal field rental application using Flutter and Node.js with Midtrans integration as a payment gateway. The research method used is SDLC (Software Development Life Cycle) with Waterfall model, including planning, analysis, design, implementation, and testing. The results show that the developed application improves the efficiency of the rental process, simplifies data management, and provides a better user experience through integrated features such as login, registration, and payment. Black box testing ensures that the application runs well and is reliable in handling various usage scenarios. This application is expected to simplify the futsal field rental process and overcome the obstacles faced by users and admins.

**Keywords:** Futsal, Flutter, Node JS, rental, android, React JS.

### Introduction

In today's modern era, technology has made it easier for humans in various aspects of life. One of them is exercise, exercise is an activity that aims to train the body for physical and spiritual health (Rasikhah & Adriansyah, 2022). Many technological innovations have been applied in various sports fields, one of which is futsal. Futsal is a team sport played by five players in each team with a field measuring about 38-42 meters long and 15-25 meters wide (Paturahman et al., 2021).

In futsal, each team needs an optimal training ground to hone their skills and prepare themselves for the match. Futsal is very popular because each team can easily rent a field to practice and compete against other teams. Through regular matches, teams can measure their abilities and evaluate them to continue to improve (Muhaqiqin & Rikendry, 2021).

The high interest in futsal has triggered business competition in the field of field rental, where service providers compete to offer the best facilities, such as international standard courts and a modern and practical booking system. This competition drives innovation to attract customers' attention, such as providing membership packages, special discounts, or additional services such as cafes and rest areas. In this situation, understanding consumer needs and the ability to provide a satisfying experience are key to maintaining competitiveness in the midst of increasingly fierce competition.

One example is Futsal AM South Tangerang, which until now has not utilized technology to the fullest to manage field bookings. Processes that are carried out conventionally are often difficult for customers, especially those who live far away, and have the potential to cause errors in reporting due to delays. To overcome these obstacles, Android-based applications are present

as a solution, allowing for a faster and more efficient ordering process. This application can also be equipped with interesting features, such as memberships that provide various exclusive benefits, including field price discounts, access to schedule changes. In the digital era, this kind of feature not only improves service efficiency but also provides added value for customers, thereby strengthening the competitiveness of the field rental business (Puntadewa et al., 2022).

Android is a Linux-based operating system that is widely used on touchscreen smartphones and tablets. The platform allows developers to create a wide range of apps that are compatible with Android devices. Apps on Android are designed to process data according to certain rules or programming languages (Saputra & Kurniawati, 2021). Android apps can make the booking process easier by providing a user-friendly interface and features such as field availability, booking, and payment (Pamungkas & Kusdiwelirawan, 2020). Therefore, an Android-based system that uses SDLC is needed to make it easier to rent futsal courts. This system will assist the team in searching, selecting, and renting fields efficiently.

System Development Life Cycle (SDLC) is a method used by developers to design and build systems. This method involves a variety of system engineering models that cover several important stages. First, the planning stage involves research and interviews with relevant resource persons to understand the needs of the system. Furthermore, the analysis stage focuses on analyzing business processes in the organization. Then, at the design stage, the system is designed based on the results of the analysis. The implementation stage follows by transforming the design into a working system. Finally, the testing stage is carried out to ensure that the system that has been built works as expected (Jamal & Kusnadi, 2022).

Currently, Futsal AM still uses books as a data storage medium, with an ordering process that can only be done directly at the location or by phone. This manual method is prone to recording errors, data loss, and difficulty finding information quickly when needed. In addition, this method does not support the needs of customers who want convenience and flexibility in making orders, especially in the digital era where fast access through electronic devices is the main need. This has the potential to reduce the attractiveness of Futsal AM in the midst of increasingly modern and technology-based business competition.

## Method

This research method uses the SDLC Waterfall model for the development of an Android-based futsal field rental application. The stages include planning, needs analysis (functional and non-functional), system design (including UML, ERD, and database design), implementation, and hosting. The Flutter and Express.js frameworks are used alongside MySQL as databases, while VSCode and Laragon support application development. The app's key features include automated reservations, schedule management, and payment integration with Midtrans. The implementation process includes coding the interface and backend, while hosting ensures the application is accessible online by users and admins.

## Results and Discussion

### BlackBox Trial

This stage is the Trial Stage *of the Decision Table* which aims to identify obstacles in the use of the features that have been developed as well as check for logical errors in the source code.

Feature testing on the futsal field rental application uses the Blackbox Testing method. This technique is applied to identify bugs and ensure that the developed features are in accordance with the expected criteria. The following are the results of testing on the AM futsal field rental application in South Tangerang.

### Testing the User Login Feature

The results of the test on the login feature have successfully met all the conditions. Information from the test results can be seen in Table 1.

**Table 1. User Login Feature Test Results**

Testing	Expected results	Test results	Conclusion
Log in by Entering <i>your username</i> and <i>password</i> correctly	Successfully login and enter the main page	Successfully login and enter the main page	Succeed
Login by Entering <i>username</i> and <i>password</i> incorrectly	Failed to log in and get an error message	Failed to log in and get an error message	Succeed

### Testing the User Register Feature

The results of the test on the register feature have successfully met all the conditions. Information from the test results can be seen in Table 2.

**Table 2. User Register Feature Test Results**

Testing	Expected results	Test results	Conclusion
Registration by entering the correct data	Successful registration	Successful registration	Succeed
Registration without filling in data	Unsuccessful registration and getting an error message	Unsuccessful registration and getting an error message	Succeed
Register with <i>an existing</i> username	Unsuccessful registration and getting an error message	Unsuccessful registration and getting an error message	Succeed
Register by entering a phone number less than 11 (eleven)	Unsuccessful registration and getting an error message	Unsuccessful registration and getting an error message	Succeed
Registration by entering a password confirmation different from the password	Unsuccessful registration and getting an error message	Unsuccessful registration and getting an error message	Succeed

### Testing the User Field Messaging Feature

The results of testing on the field messaging feature have successfully met all the conditions. Information from the test results can be seen in Table 3.

**Table 3. Test Results of User Field Messaging Feature**

Testing	Expected results	Test results	Conclusion
Field booking with valid data	The order is successfully created and goes to the checkout page	The order is successfully created and goes to the checkout page	Succeed
Field booking with a reserved time	The booking was rejected and I got the message "booking on that date already exists"	The booking was rejected and I got the message "booking on that date already exists"	Succeed
Field bookings with dates in the past	The order is rejected and gets the message "The date and time of the booking should not be less than the current time."	The order is rejected and gets the message "The date and time of the booking should not be less than the current time."	Succeed
Field booking with blank data	Order rejected and gets "all fields must be filled" popup	Order rejected and gets "all fields must be filled" popup	Succeed

### Testing the User Payment Feature

The results of testing on the payment feature have successfully met all the conditions. Information from the test results can be seen in Table 4.

**Table 4. User Payment Feature Test Results**

Testing	Expected results	Test results	Conclusion
Pay with available payment methods and pay before the end time	Payment is successful and get notified of the transaction	Payment is successful and get notified of the transaction	Succeed
Payment at the end of the payment time	Payment cannot be made	Payment cannot be made	Succeed

### Feature Testing View User Schedule

The results of the test on the view schedule feature have successfully met all the conditions. Information from the test results can be seen in Table 5.

**Table 5. Test Results of the View User Schedule feature**

Testing	Expected results	Test results	Conclusion
View Schedules with Valid Fields and Dates	A popup list of order names and times will appear	A popup list of order names and times will appear	Succeed
View Schedule Without Choosing a Field	Nothing happened	Nothing happened	Succeed
View a schedule without entering a date	Nothing happened	Nothing happened	Succeed
View Schedules with Dates in the Past	Can't select a date option less than today	Can't select a date option less than today	Succeed

### Testing the Change User Schedule Feature

The results of the test on the reschedule feature have successfully met all the conditions. Information from the test results can be seen in Table 4.6.

**Table 6. Test Results of the Change User Schedule Feature**

Testing	Expected results	Test results	Conclusion
Change the schedule with a valid date and time	A "booking successfully updated" message appears and is directed to the activity page	A "booking successfully updated" message appears and is directed to the activity page	Succeed
Change Schedule to Date in the Past	Can't select a date option less than today	Can't select a date option less than today	Succeed
Change Schedule to Booked Time	Getting a "booking on that date already exists" message	Getting a "booking on that date already exists" message	Succeed

### Testing the Edit User Profile Feature

The results of the test on the profile edit feature have successfully met all the conditions. Information from the test results can be seen in Table 7.

**Table 7. Test Results of the Edit User Profile Feature**

Testing	Expected results	Test results	Conclusion
Edit a Profile with valid data	The message "Data successfully updated" appears and is directed to the profile edit page	The message "Data successfully updated" appears and is directed to the profile edit page	Succeed
Edit a profile with blank data	A popup alert appears "field must be filled in"	A popup alert appears "field must be filled in"	Succeed
Edit a profile with invalid data	An error message appears according to the mistake made	An error message appears according to the mistake made	Succeed

### Admin Login Feature Testing

The results of the test on the login feature have successfully met all the conditions. Information from the test results can be seen in Table 8.

**Table 8. Admin Login Feature Test Results**

Testing	Expected results	Test results	Conclusion
Login with a valid username and password	Successfully login and enter the dashboard page	Successfully login and enter the dashboard page	Succeed
Log in with a blank username or password	A popup alert appears "field must be filled in"	A popup alert appears "field must be filled in"	Succeed
Log in with user username and password	"User does not have access permissions" error message	"User does not have access permissions" error message	Succeed

### Feature Testing Add Admin Field

The results of the test on the field addition feature have successfully met all the conditions. Information from the test results can be seen in Table 9.

**Table 9. Test Results of the Add Admin Field Feature**

Testing	Expected results	Test results	Conclusion
Adding fields with valid data	A popup "successfully added a field" popup appears then it goes directly to the field management page	A popup "successfully added a field" popup appears then it goes directly to the field management page	Succeed
Adding a field without filling in all the required data	The message "enter data" appears	The message "enter data" appears	Succeed
Adding fields with invalid data	An error message appears according to the mistake made	An error message appears according to the mistake made	Succeed

### Admin Field Edit Feature Testing

The results of the test on the field edit feature have successfully met all the conditions. Information from the test results can be seen in Table 10.

**Table 10 Test Results of the Admin Field Edit Feature**

Testing	Expected results	Test results	Conclusion
Edit fields with valid data	A popup "successfully changed the field" appears and then goes	A popup "successfully changed the field" appears and then goes	Succeed

Testing	Expected results	Test results	Conclusion
	directly to the field management page	directly to the field management page	
Edit a field with invalid data	An error message appears according to the mistake made	An error message appears according to the mistake made	Succeed

### Testing the Add Admin Reservation Feature

The results of testing on the add reservation feature have successfully met all the conditions. Information from the test results can be seen in Table 11.

**Table 11. Test Results of the Add Admin Reservation Feature**

Testing	Expected results	Test results	Conclusion
Add a reservation with valid data	Proceed to the next process according to the payment method	Proceed to the next process according to the payment method	Succeed
Add a reservation with blank data	"Enter data" error message	"Enter data" error message	Succeed
Add a reservation at a reserved time	The booking was rejected and I got the message "booking on that date already exists"	The booking was rejected and I got the message "booking on that date already exists"	Succeed
Add a reservation with missing username data	The message "Username not found" appears	The message "Username not found" appears	Succeed

### Testing the Feature of Adding Admin Membership Products

The results of testing on the membership product add-on feature have successfully met all the conditions. Information from the test results can be seen in Table 12.

**Table 12. Test Results of the Add Membership Product Feature**

Testing	Expected results	Test results	Conclusion
Add membership products with valid data	A popup appears "successfully added"	A popup appears "successfully added"	Succeed
Add a membership product with blank data	"Enter data" error message	"Enter data" error message	Succeed
Add a membership product with invalid data	An error message appears according to the class performed	An error message appears according to the class performed	Succeed

### Testing the Add Admin Member Feature

The results of testing on the add member feature have successfully met all the conditions. Information from the test results can be seen in Table 13.

**Table 13. Test Results of the Add Admin Member Feature**

Testing	Expected results	Test results	Conclusion
Add members with valid data	Proceed to the next process according to the payment method	Proceed to the next process according to the payment method	Succeed
Add members with blank data	"Enter data" error message	"Enter data" error message	Succeed
Add a member with invalid data	An error message appears according to the class performed	An error message appears according to the class performed	Succeed

### Testing the Add Admin Account Feature

The results of the test on the add account feature have successfully met all the conditions. Information from the test results can be seen in Table 14.

**Table 14. Test Results of the Add Admin Account Feature**

Testing	Expected results	Test results	Conclusion
Add an account with valid data	A popup appears "successfully added"	A popup appears "successfully added"	Succeed
Add an account with blank data	"Enter data" error message	"Enter data" error message	Succeed
Add an account with invalid data	An error message appears according to the class performed	An error message appears according to the class performed	Succeed

### Admin Account Edit Feature Testing

The results of the test on the account edit feature have successfully met all the conditions. Information from the test results can be seen in Table 4.15.

**Table 15. Test Results of the Admin Account Edit Feature**

Testing	Expected results	Test results	Conclusion
Edit Accounts with valid data	A "successfully modified" popup appears	A "successfully modified" popup appears	Succeed
Edit an account with blank data	"Enter data" error message	"Enter data" error message	Succeed

Testing	Expected results	Test results	Conclusion
Edit an account with invalid data	An error message appears according to the class performed	An error message appears according to the class performed	Succeed

## Conclusions

The results of testing and implementing the futsal field rental system using the SDLC method show that this system makes it easier for managers to convey promotions, schedules, and special offers to users, so that it can increase rental interest. In addition, admins can manage field data, schedules, and reservations in a more structured manner through add, edit, and delete features. The integration of login, registration, and payment features with Midtrans provides secure and real-time transactions, thereby increasing user convenience. Overall, the system meets functional needs, improves service quality, and provides a better user experience. The SDLC method has proven to be effective in the development of this system and can be a reference for similar developments in the future.

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