

## A Development of Futsal Court Booking System

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**Abstract:** The Futsal Court Booking System was developed to increase the efficiency of the existing court booking process which still uses the manual method at the Indera Mahkota Futsal Court Center. Based on the existing system, all booking data, payment history and users' profile are stored manually in a log book which can lead to data loss and also difficult to handle. This booking system is able to display a list of customer scheduling so that users can see the availability easily and concisely. So, the system is also developed for all bookings and other data so that it can be stored in a database that will be more easily managed electronically. System development is based on prototyping model. This system provides 5 functional modules such as registration and login module, court booking module, court information management module, payment module and report module. PhP and Firebase are used as programming and database systems. This system helps Kuantan residents in particular to book futsal courts in an easy ways and more flexible way.

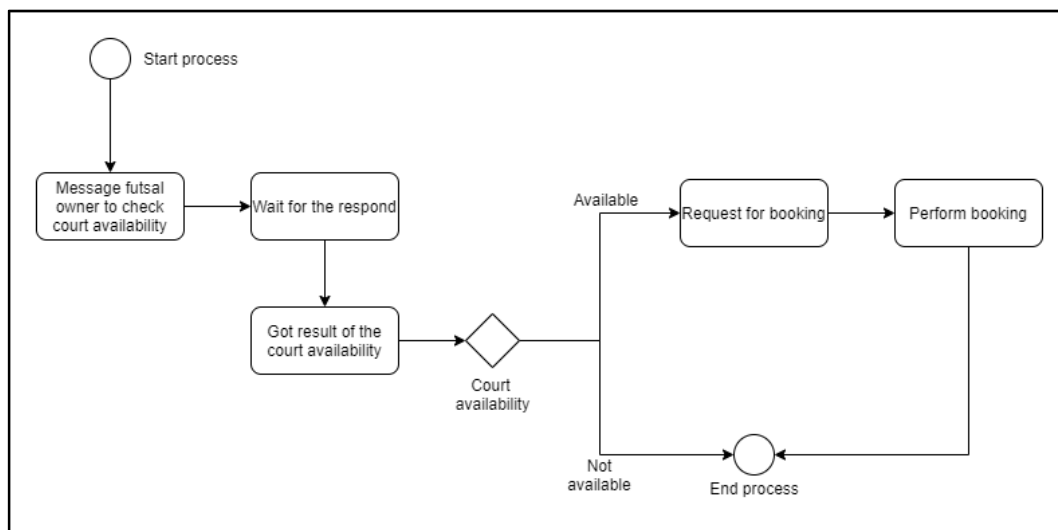
**Keywords:** Booking System, Mobile-Based System

### 1. Introduction

Nowadays, futsal has become one of the major sports in this world. It is being the favorite sport for all regardless of age especially teenagers. That is why we can see a lot of futsal court has been opened everywhere. Futsal is an association football game played on a hard court, smaller than a football pitch, and mainly indoors [1]. It has similarities to five-a-side football. It is played between two teams of five players each, one of whom is the goalkeeper [2]. Futsal is played with a smaller, harder, low-bounce ball than football. As we all know, futsal can be played anywhere such as at the field, street, and court. However, futsal court is more interesting to play than elsewhere. The court has a hard surface made of things such as wood or synthetic material. So, futsal court very needed to make players be more creative and confidence. Because the court is smaller, and players will get more touch on the ball. In futsal, players only have a second to decide what to do with the ball before the player is under high pressure.

This project was intended at the Indera Mahkota Futsal Centre which is in Kuantan, Pahang. Many other futsal courts, such as the Indera Mahkota Futsal Centre, still use a manual booking system today. The customer (player) only makes reservations by using Whatsapp, and the owner will personally

record it in a logbook. The individual determines the level of service provided by this manual system. This results in data entry discrepancies becoming more likely to occur. This is like changing details by accident. Figure 1 as-is model demonstrate how currently booking system working.



**Figure 1 : As-is model**

Sometimes, there was a clash between the two teams that had booked at same time because the staff or owner forgot to write the booking data made by one of the teams. Then to find out the vacancy of the court, the user needs to ask the staff or owner. So, users must wait the reply. When the users want to cancel the booking, this sometimes causes loss to the owner. This is because it is possible the owner has declined some of the bookings made at that time. Then the owner also had to inform the rejected applicant that there was a vacancy. Other problems, any booking no deposit required. They must pay only after the game is over. This can obviously be detrimental when there are some applicants who do not come on purpose after booked.

This system is quite inconvenient to the user and owner as well. By using this current system, users need to message the owner to check the availability and to book the court. This sometimes makes users have to wait quite a long time to get a response from the owner which can waste their time if the court is not available. Sometimes, there are happens the clashing when the booking data is not organized nicely and there was recklessness from the owner. The other problem is sometimes users does not attend the book appointment which can incur losses towards the owner.

So, the new computerized system is needed to alleviate the current system. The system name is “Futsal Court Management System”. From the new system, users can check court availability easily. Users will be able to find out the time which the court is still available. Then the booking can be made through the website after considering the time and availability. This can make users not to wait for a response from the owner. So, this at once able to avoid any clashed booking.

The report consists of five sections. Section 1 describes the background of the study as a statement problem, objectives, scope, expected result and project significance. Section 2 gives description of the literature review. Section 3 explains the methodology. Section 4 presents the result and discussion Section 5 gives a summary of the project.

## 2. Related Work

Indera Mahkota Futsal Centre is one of the biggest futsal and be the focus in Kuantan. Indera Mahkota Futsal has four courts which has an international standard size. It receives a lot of customers every day to book the court. The number of customers will increase during night that is from 8.00 p.m. to 12.00 a.m. especially on the weekend. However, the current booking system that used by Indera Mahkota Futsal Centre is performed manually by keying-in the booked data in logbook. Basically, this manual system works by recording all the booking data in a logbook and will be shown on a whiteboard at the entrance.

Court Booking System for Indera Mahkota Futsal Centre was developed with native applications because native apps can provide great performance and take advantage of the latest technology, such as a GPS. Native apps also can interact with the device's operating system in ways that allow them to run faster and more flexibly than other types of apps. With native mobile app development, the app demonstrates an extremely high level of performance. Native apps are created specifically for a platform, utilizing all of the software and operating system characteristics. Because these apps have direct access to the device's hardware, such as the GPS, microphone, and camera, they are faster to execute, resulting in a better user experience.

Table 1 summarizes the comparison of 3 existing system with proposed system. Three existing systems have been examined to obtain more useful information for the proposed system development. The comparisons are between modules and features of the proposed system.

**Table 1: Comparison of 3 Existing System with Proposed System**

System	Athletes For Athletes (AFA)	Courtsite	89 Arena	Court Booking System for Indera Mahkota Futsal
Similarity	- Provides a fast and simple way to book a court - Provides Google Maps utilizes			
Log in	Email ID/Mobile Number and Password	Email and Password	No login	Email ID/Mobile Number and Password
Process Order	Choose category, date, location, time and duration	Choose category, date, location, time and duration	Choose category, date, location, time and duration	Choose date, court, time and duration
System Type	Web-based, Mobile Application	Web-based, Mobile-based	Web-based, Mobile-based	Android application
Payment	FPX Banking Online	FPX Banking, GrabPay Online	FPX Banking Online	Debit Payment
User's personal detail needed to book a court	Name, email, phone number	Name, email, phone number, payment method	Name, email, phone number	Name, email, phone number

System	Athletes For Athletes (AFA)	Courtsite	89 Arena	Court Booking System for Indera Mahkota Futsal
Court Scheduling	Available	Available	Not available	Available

### 3. Methodology

The prototype model is selected to assist project development of this futsal court booking system. Prototyping model implements the main phases that present in the 8-system development life cycle process, including five phases, which are planning phase, analysis phase, design phase, prototype development phase and the implementation phase. Every phase must fulfil the requirement specification. There are total of six phases from the prototype model. As shown in Table 2, each phase has its own assignment and output that need to produce during the entire project development. Besides that, the output had been completed within the specific days that have been given.

**Table 2: Software development activities and their task**

Phase	Task	Output
Planning	- Proposed the project	- Project proposal
	- Determine the project schedule, activities and output	- Develop Gantt chart
	- Identify problems, objectives and scope	
Analysis	- Collect and analyze the information	- Problems of the current system
		- Functional and non-functional requirement needed
		- Software and hardware requirements
		- UML, to-be-model
Design	- Design interface of the system by using the suitable programming language	- Requirements Traceability Matrix (RTM)
		- System architecture
		- Database design (schema and data dictionaries)
Implementation	- Transform the design into the real system by implementing the coding.	- User interface design
	- Conduct testing on the system	- System code
		- Test plan
Prototype	- Detect errors on the system and repair the system	- Prototype system (second version)
Implementation and testing	- System testing is conducted to test error of the whole system	- Complete system
	- Fix the problems until none errors in found	

### 3.1 System Requirement Analysis

Requirement analysis is the process of determine requirements that developed system needs to fulfill, or user expectation outcome from the proposed system. System requirements include functional and non-functional requirements, user requirements and system requirements. Table 3 summarizes the functional modules provided in the system.

**Table 3: System functional module**

No.	Module	Function	User
1.	Registration and Login Module	Allow users and administrator to login to the system	Administrator, Users
2.	Court Booking Module	Allow users to book court and check the information of the booking	User
3.	Court Information Management Module	Used by administrator manage courts and users' information	Administrator
4.	Payment Module	Allow users to make a payment	Users
5.	Report module	To generate booking, financial and invoice report.	Administrator

### 3.2 Functional Requirement and Non-Functional Requirements Analysis

Functional requirements define the function of the developed system, while function is described as specific behavior that convert input to output. Functional requirements in software engineering help you to capture the intended behavior of the system [3]. Table 4 shows the functional requirements of the proposed system.

**Table 4: Functional requirements**

No	Module	Description
1.	Registration and Login Module	<ul style="list-style-type: none"> <li>- The system should allow user to login into the system using registered username and password.</li> <li>- The system should only allow a user to log in as a user with a valid username and password.</li> <li>- The system should redirect user to that respective main menu upon successful login.</li> </ul>
2.	Court Booking Module	<ul style="list-style-type: none"> <li>- The system should allow users to book the court with the time of their choice.</li> <li>- The system should be able to display the booking list.</li> <li>- The system should be able to display the booking information to the user who made the booking.</li> </ul>
3.	Court Information Management Module	<ul style="list-style-type: none"> <li>- The system should allow administrators to manage court and user information.</li> </ul>

No	Module	Description
		- The system should be able to collect records that have been booked.
		- The system should be able to display whether the court is available or not.
4.	Payment Module	- The system must allow users to make payment transactions directly with the payment system.
5.	Report module	- The system should generate report for administrator.

A non-functional requirement defines the quality attribute of a software system. They represent a set of standards used to judge the specific operation of a system (3). Table 5 shows the non-functional requirements of the developed system.

**Table 5: Non-functional requirements of the developed system**

No	Requirements	Description
1.	Performance	- The system should be usable at all times
2.	Operational	- The loading time required for a website is no more than 1 minute
3.	Security	- The system should be user friendly
4.	Accessibility	- The system are a mobile-based application which accessible on the Android OS

### 3.3 User Requirement Analysis

User requirements define the expectation of user from the functionality of the system. Table 6 shows the user requirements of the developed system.

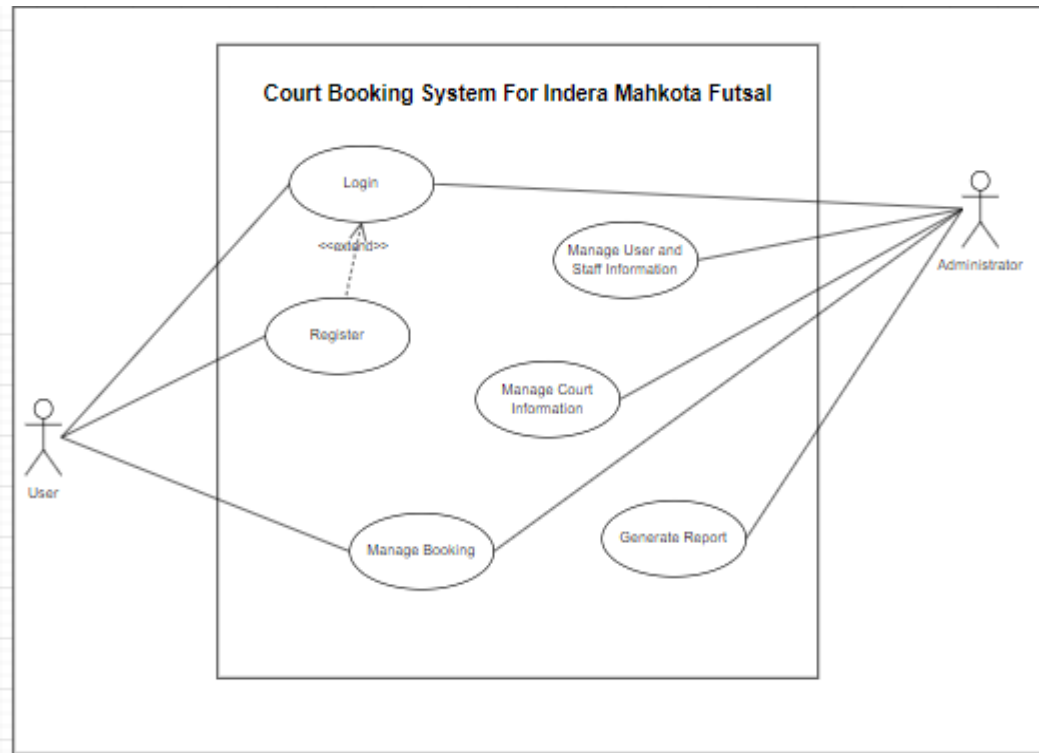
**Table 6: User requirements of the developed system**

No.	User Requirements
1.	All users must be able to enter a valid id and password to enter the system
2.	Users should be able to perform a booking
3.	Users should be able to view the court information before booking
4.	Users should be able to register before using the system
5.	Administrator should be able to manage courts', and users' information
6.	Administrator and should be able to view booked information
7.	Administrator should be able to view and edit their own profiles
8.	Administrator should be able to see the reports generated by the system
9.	Users should be able to perform payment of booking made

### 3.4 Use Case Diagram

Figure 2 shows the use case diagram that represents the overall activity of the new system. The purpose of use case diagram is to capture the dynamic aspect of a system. The actors of this diagram are users, and administrator. All of the actors will perform the registration and login process to enter the system.

Users can perform the booking by select the court and date. Administrator will manage the book made by users.



**Figure 2: Use Case Diagram of Proposed System**

### 3.5 Class Diagram

Class diagram is the most used UML diagram in the field of software engineering design. It is called as a main building block of any object-oriented solution. Usually, it illustrates the classes in a system, attributes and operations of each class and also the relationship between each class. Figure 3 shows the class diagram of the proposed system

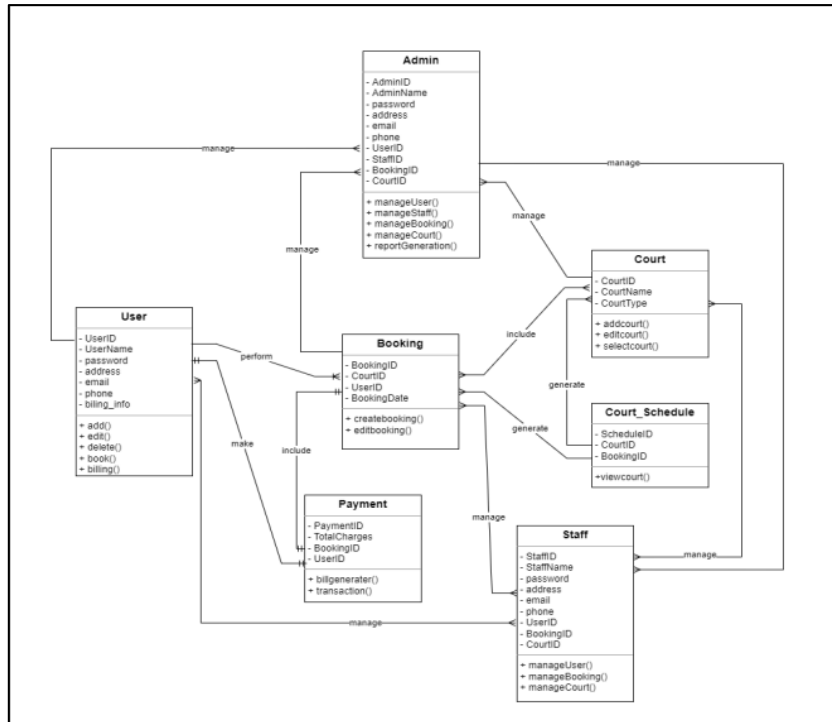


Figure 3: Class Diagram

### 3.6 To-Be Model

This futsal court booking system was developed at the end of this project. The system will able the users to book their reservations easily. Users also can get sufficient details and information about the futsal during the short time. Figure 4 is the to-be model below shows how the new system will be working.

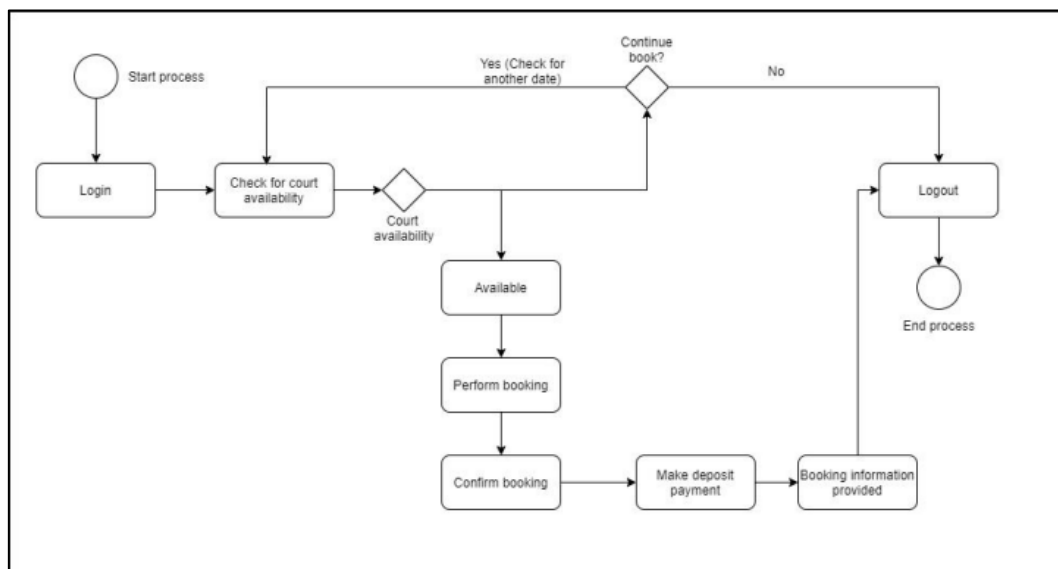
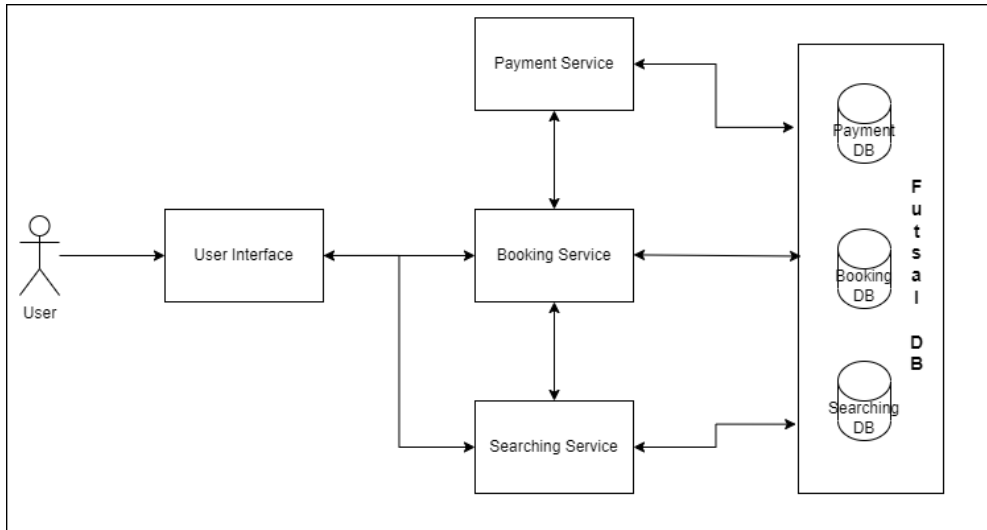


Figure 4: To-be Model of proposed system

### 3.7 System Design

Systems design is the process of defining the architecture, product design, modules, interfaces, and data for a system to satisfy specified requirements. A system's architecture specifies the primary components, their relationships (structures), and how they interact with one another. Figure 5 shows the design architecture of users of the proposed system.





**Figure 5: System Design Architecture**

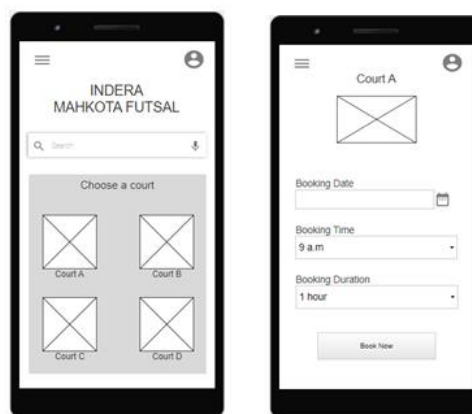
### 3.8 Database Design: Schema Data

The database scheme is listed as follows:

- i. User (UserID, UserName, password, address, email, phone)
- ii. Admin (AdminID, AdminName, password, address, email, phone)
- iii. Booking (BookingID, BookingDate, duration)
- iv. Court (CourtID, CourtName, CourtType)
- v. Court\_Schedule (ScheduleID)
- vi. Payment (PaymentID, TotalCharges)

### 3.9 User Interface (UI) Design

User interface (UI) design is the process designers use to build interfaces in software or computerized devices, focusing on looks or style. The aim is to create interfaces which users find easy to use and pleasurable. Court Booking System for Indera Mahkota Futsal is a mobile application. So, the user interface of the system is designed for Android mobile devices with the focus on maximizing usability and user expectation. The figures below show the sketch of user interface design for the proposed system. Figure 6 show the wireframe of booking page of the proposed system.



**Figure 6: Booking Page**

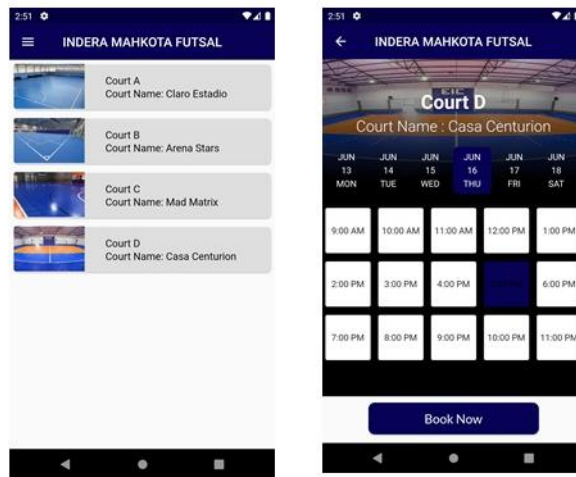
## 4. Result and Discussion

### 4.1 System Implementation

Systems implementation refers to the steps taken to finish the design in the authorized systems design document, as well as test, install, and start using the application. Indera Mahkota Booking Application was develop using a Flutter framework by Visual Studio Code. The Flutter framework consists of both a software development kit (SDK) and their widget-based UI library [4]. By working with the Flutter framework will use the Dart programming language to create mobile apps. There are some of the interfaces related to login and registration module, court booking module, court information management module, payment module, notification module and report module.

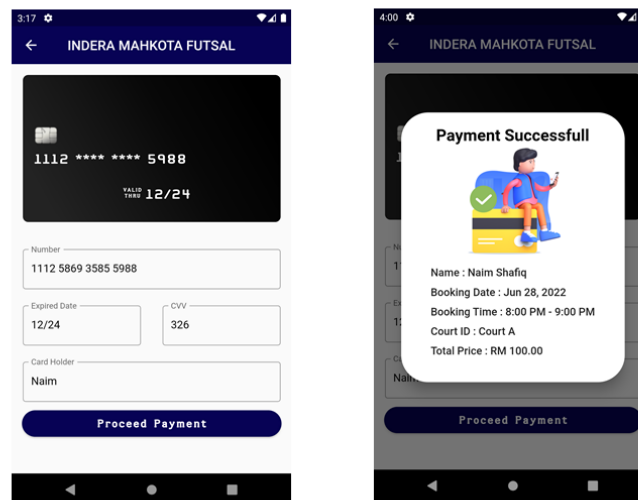
Firstly, users need to log in the application before start booking the court. For any new users, they need to register an account first. After log in to the application, user will be redirect to application's homepage. There is an option for users to choose either directly to the booking page or view the booking

schedule first. Figure 7 shows booking module that display list of the court and choose the booking date.



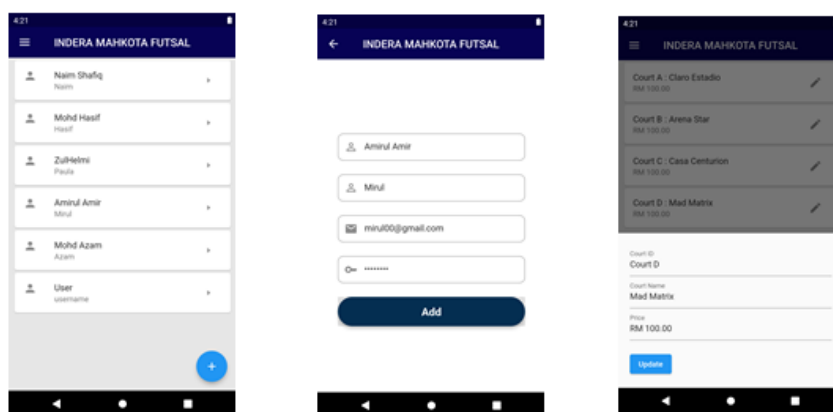
**Figure 7: Booking Module**

After done the booking process, users have to proceed their booking with make a payment. Figure 8 shows payment module for users to confirm their booking.



**Figure 8: Payment Module**

On behalf of the administrator as well, admin can view user, court and booked court lists. Admin also can add user manually and edit the court information. Figure 9 shows information management module for admin.



**Figure 9: Information Management Module**

## 4.2 System Testing

System Testing is a level of testing that validates the complete and fully integrated software product [5]. Indera Mahkota Futsal Centre Booking System is tested and documented using functional system testing in order to discover whether the system contain any errors or bugs and meets the project requirements. Table 7 shows the system testing information that been conducted by Indera Mahkota Futsal Centre owner’s Mr. Sheikh Qodri.

**Table 7: System Testing**

ID	Requirements		Descriptions	Result
Registration/Login STD_TEST_100_001	SRS_REQ_101,	-	Users able to login into the application	Successful
Registration/Login STD_TEST_100_002	SRS_REQ_102	-	System display error message if there any invalid information	Successful
Registration/Login STD_TEST_100_003	SRS_REQ_103	-	New users able to register new account	Successful
CourtBooking STD_TEST_200_001	SRS_REQ_201	-	Users able to choose court from court lists	Successful
CourtBooking STD_TEST_200_002	SRS_REQ_201	-	Users able to choose booking date	Successful
CourtBooking STD_TEST_200_003	SRS_REQ_202	-	System able to highlight any unavailable court with chosen date	Successful
CourtBooking STD_TEST_200_003	SRS_REQ_203	-	Users able to view their booking history	Successful

ID	Requirements		Descriptions	Result
CourtBooking STD_TEST_200_004	SRS_REQ_204	-	Users able to view court booking schedule	Successful
Payment STD_TEST_300_001	SRS_REQ_301	-	Users able to view booking details before make payment	Successful
Payment STD_TEST_300_002	SRS_REQ_302	-	System able to display booking receipt after payment	Successful
Payment STD_TEST_300_003	SRS_REQ_303	-	System able to display error message for invalid bank details	Successful
InfoManagement STD_TEST_400_001	SRS_REQ_401	-	Admin able to manage users information	Successful
InfoManagement STD_TEST_400_002	SRS_REQ_402	-	Admin able to manage court information	Successful
Report STD_TEST_500_001	SRS_REQ_501	-	System allow admin to view and generate statistical report	Successful

## 5. Conclusion

In a conclusion, after developing this system, it succeeds in achieving its objectives. The objective of this project is to develop a application of court booking system for Indera Mahkota Futsal which are easier for users and owner itself. The output of this system is the users can book the court in easy way. The system also can produce a report based on daily slots that have been booked, so it can help the futsal owner to manage their business. Hopefully, this system can meet the user expectation and can give a better system solution to develop the futsal court booking system in the future.

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