

## The Development of a Web-Based Booking System for Badminton Court in Batu Pahat

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**Abstract:** A web-based booking system for badminton courts in Batu Pahat has been implemented to help the booking process. 10 badminton courts in Batu Pahat were included in the study. Currently, customers are required to contact the person in charge of the court or visit in person to make reservations. Additionally, badminton court owners manually record bookings, leading to a risk of overlaps. To address these issues, a web-based booking system was developed to benefit badminton court owners, customers, and system administrators. One of the badminton court owners is appointed as the system administrator. The methodology used in this project is Agile to ensure the requirements are met. There are 4 modules in the developed system, including user management, court management, court reservation, and report generating. In general, the system performs as a portal that allows badminton court owners to rent their courts and customers to make reservations online easily.

**Keywords:** Badminton court, booking system, booking process

### 1. Introduction

According to a survey conducted by Statista Research Department [1], badminton is the sport that is most regularly participated by Malaysians, which is 12.19% of 81745 Malaysian respondents. This survey proves that badminton is one of the most popular sports in Malaysia. A covered court is a facility needed by badminton players or enthusiasts to play badminton without being affected by the environment and weather [2].

Based on search results from the internet and observation, it is unavailable to book badminton courts in Batu Pahat via a web-based system or application. Most badminton court owners use social media such as Facebook, and Instagram to promote their sports facilities. Customers can book badminton courts by calling the person in charge or texting him via WhatsApp. Otherwise, customers need to visit the badminton court to check the availability of the court with the owner. The existing process for booking badminton courts in Batu Pahat is done manually by badminton court owners and customers. It is possible that this may result in several issues, including the inability to check the availability of badminton courts, the potential for booking records to overlap with one another, and a dearth of resources and information that will enable consumers to make bookings.

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An online booking system allows users to make a venue or facility reservation anytime and anywhere with Internet access [3]. Therefore, this study is aimed to develop a badminton court booking system in Batu Pahat that helps the process of badminton court reservation. The system's target users are badminton court owners, customers, and system admins. Customers book court just by selecting a date and time in the system. On the other hand, badminton court owners can register an account in the system to make their court available for reservation in the system.

The first objective of this study is to design a platform that allows badminton court owners to publish their businesses and customers to make reservations. Secondly is to develop a web-based booking system for badminton courts that help to book badminton court. Thirdly is to evaluate the functionality of the developed system for badminton court owners and customers.

The following section of the paper is organized as follows: Section 2 discusses the related work and existing system. Next, Section 3 consists of the methodology used and the system analysis and design of the system. Then, Section 4 focuses on the result and discussion of the developed system. Lastly, Section 5 concludes the study and discusses future works.

## **2. Related Work**

This section discusses the related work of this study including the related term, the existing booking process in Batu Pahat, and related existing systems.

### **2.1 Online Booking System**

The online booking system is a kind of information technology implemented in many industries such as property and salons. In the property industry, an online booking system is used to advertise a property and attract more potential buyers. Additionally, it increases the competitive advantages between businesses [4]. In the salon industry, there is paperwork that develops a prototype of a booking system for customers to make appointments with their desired stylist [5]. A series of studies above agree that online booking systems reduce the complications of the traditional booking system and save the time of waiting in the queue.

### **2.2 Study of existing badminton court booking process in Batu Pahat**

In this project, the author has visited three badminton courts, including Pura Kencana Badminton Hall, JSK Badminton Hall, and Victory Sports Center to study their booking process. There are several steps taken to make court reservations. First, customers need to find information about the badminton court located at Batu Pahat from any available source such as social media or advertisements. Then, call or text the owner to inquire about the availability of badminton courts. If the owner not answering or the specific date is fully booked, the customers need to visit on-site to make reservations or find another badminton court.

Badminton court owners in Batu Pahat usually advertise their badminton court on social media or state their contact on the signboard. They will receive a phone call, WhatsApp messages, or on-site to book a badminton court. Then, they will check the badminton court schedule and reply to the customer for booking confirmation. The booking will be recorded manually.

### **2.3 Study of Existing Systems**

There are three systems that were chosen for comparison with the proposed system: Courtsite [6], Online Court Booking - Michael's Badminton Academy [7], and Champion Badminton Courts & Pro Shop [8]. Table 1 shows the comparison between the existing systems and the proposed system.

Courtsite allows sports players to book their desired sports space, and sports centre advertised their available facilities for booking. Users can make the reservation by selecting sports category, location, date, time, and duration. Users can explore and read detailed information about the sports centre. As a

sports centre owners, they can contact Courtsite's business teams to become business partners and offer their facilities for the online reservation. Courtsite allows the sports centre owner to manage booking records digitally and provide the business report for them to keep track.

Michael's Badminton Academy (MBA) has badminton courts located at Port Dickson and Bukit Puchong. The details of available facilities, services, floor plan, and location of the badminton court are stated on the website. User can select their preferred court and make reservations. Users are required to make the complete payment by credit or debit card. Besides that, the online store is available for users to buy badminton equipment such as shuttlecocks, racquets, and strings. This system offers a tournament booking bundle for organization booking. It enables event organisers to place orders for food and provides rental services for any equipment that is needed for a tournament.

Champion Badminton Courts & Pro Shop is a platform that allows users to make reservations for badminton courts and buy products online. There is information available in detail regarding the Champion Badminton Court including the location of the facility, the prices of the different halls, and a catalog of available racquets. The badminton court reservation is powered by Skedda, a space-scheduling platform. Users will receive a confirmation email and they can view their booking on the court schedule after making the reservation. In addition, organization booking, or tournament is not available in this system. Upfront payment is not required in this system.

**Table 1: Comparison between the existing system with the proposed system**

No	Features	Courtsite	Online Court Booking - MBA	Champion Badminton Courts & Pro Shop	Proposed system
1	Customer login/ register	✓	✓	✓	✓
2	Court owner login/register	✓	✗	✗	✓
3	Search badminton court	✓	✗	✗	✓
4	Badminton court information	✓	✓	✓	✓
5	Individual booking	✓	✓	✓	✓
6	Organization booking	✓	✓	✗	✓
7	Equipment shop	✗	✓	✓	✗
Payment Method					
8	i.Cash	✗	✗	✓	✗
	ii.E-wallet	✓	✗	✗	✓
	iii.Credit/debit card	✓	✓	✗	✗
9	Contact us	✓	✓	✓	✓
10	User profile	✓	✓	✓	✓
11	Court management	✓	✓	✓	✓
12	Business report	✓	✓	✓	✓

Legend: ✓= Yes      ✗= No

### 3. Methodology/Framework

The methodology used for this project is Agile methodology. This methodology is based on System Design Life Cycle (SDLC) concept. It is an iteration process that breaks up a project into several stages. It consists of five stages: brainstorming, design, development, quality assurance, and deployment [9]. Table 2 shows the summarization of activities and output in each stage.

**Table 2: Summarization of activities in each stage of Agile methodology**

No	Stage	Activities	Output
1	Brainstorming	<ul style="list-style-type: none"> <li>a. Visit badminton courts at Batu Pahat</li> <li>b. Define the problem statement, objectives, and project scope.</li> <li>c. Gather requirements from the badminton court owner and customer.</li> <li>d. Study-related topics and existing systems</li> <li>e. Comparison between the existing system and the proposed system</li> </ul>	<ul style="list-style-type: none"> <li>a. Proposal</li> <li>b. Gantt Chart</li> <li>c. Literature review</li> </ul>
2	Design	<ul style="list-style-type: none"> <li>a. Analyse user requirements</li> <li>b. Illustrate context diagram, DFD, and ERD</li> <li>c. Draw wireframe</li> <li>d. Design function module</li> </ul>	<ul style="list-style-type: none"> <li>a. Functional requirements and non-functional requirements</li> <li>b. Context diagram, DFD, and ERD</li> <li>c. Wireframe</li> </ul>
3	Development	<ul style="list-style-type: none"> <li>a. Front-end development</li> <li>b. Back-end development</li> <li>c. Database development</li> </ul>	<ul style="list-style-type: none"> <li>a. Coding</li> <li>b. Database</li> </ul>
4	Quality Assurance	<ul style="list-style-type: none"> <li>a. Functional testing</li> <li>b. Debugging</li> </ul>	<ul style="list-style-type: none"> <li>a. Test plan</li> <li>b. Test result</li> </ul>
5	Deployment	<ul style="list-style-type: none"> <li>a. Test with targeted user</li> <li>b. Gather and analyse feedback and suggestion</li> <li>c. Final testing and debugging</li> <li>d. Deliver final system to end user</li> </ul>	<ul style="list-style-type: none"> <li>a. Questionnaire</li> <li>b. User evaluation result</li> <li>c. Final complete system</li> <li>d. User manual</li> </ul>

### 3.1 Brainstorming stage

The problem faced and requirements of the badminton court booking process in Batu Pahat are collected in this stage. The proposed system’s functional and non-functional requirements are identified and presented in Table 3 and Table 4.

**Table 3: Functional requirements**

No	Functional Requirements	User
1	Allow register and log in with the correct email and password.	All users
2	Allow there are different roles assigned to the three categories of users.	All users
3	Allow performing CRUD actions on their profile including passwords.	All users
4	Allow CRUD on the badminton court details.	Badminton court owner
5	Allow for managing the badminton court availability.	Badminton court owner
6	Allow approval or rejection of the reservation.	Badminton court owner
7	Allow keeping track of the booking record.	Badminton court owner
8	Allow viewing of all related information about badminton court.	Customers
9	Allow making reservations by individual or organization booking.	Customers
10	Allow viewing of their booking status and history.	Customers
11	Allow non-refundable canceling bookings.	Customers
12	Allow approval or rejection of business account applications.	Administrator
13	Allow add or delete actions to the badminton court owner and customer account.	Administrator

**Table 4: Non-functional requirements**

No	Requirements	Description
1	Usability	a. User-friendly interface. b. Always tell the user the current status of their actions. c. Show the error message when there is invalid input or action.
2	Operational	Able to run on any web browser with a given URL.
3	Performance	Respond to users in a relatively time without system failure or interruption.
4	Security	a. Ensure the user login with the correct email and password. b. Hash the user password in the database. c. Force users to enter specific formats for several fields such as phone number and email.

3.2 Design stage

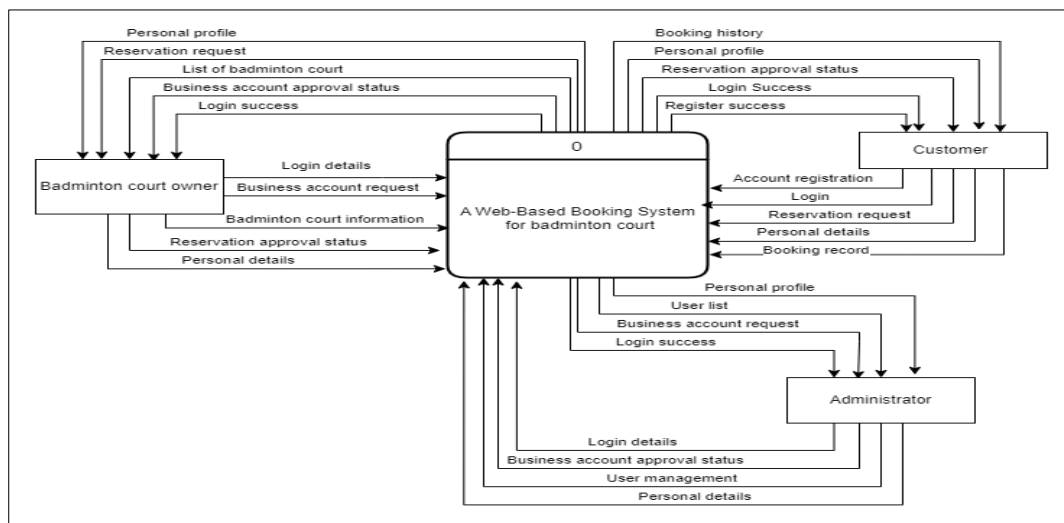
The purpose of this stage is to illustrate several diagrams for the proposed system including flowcharts, Data Flow Diagrams (DFD), Entity Relationship diagrams (ERD), and interface design.

3.2.1 Flowcharts

A flowchart is a useful tool for showing the process of a complex system or activity clearly in a graphical view. There are three flowcharts (See Appendix A) are generated for each of the categories of users to show the flow of using the system and the tasks that they able to perform.

3.2.2 DFD

Figure 1 shows the context diagram of the proposed system also known as DFD Level 0 which illustrates the input and output dataflow between entities and processes. There are three user categories in the proposed system: badminton court owners, customers, and administrators. The DFD Level 1(See Appendix B) decomposed the context diagram into several detailed processes.



**Figure 1: Context diagram of the booking system**

3.2.3 ERD

ERD is a structured diagram that presents the data organization and relationship between entities. There are seven tables in the ERD and each of the tables contains a primary key and establishes a relationship between tables shown in Figure 2.

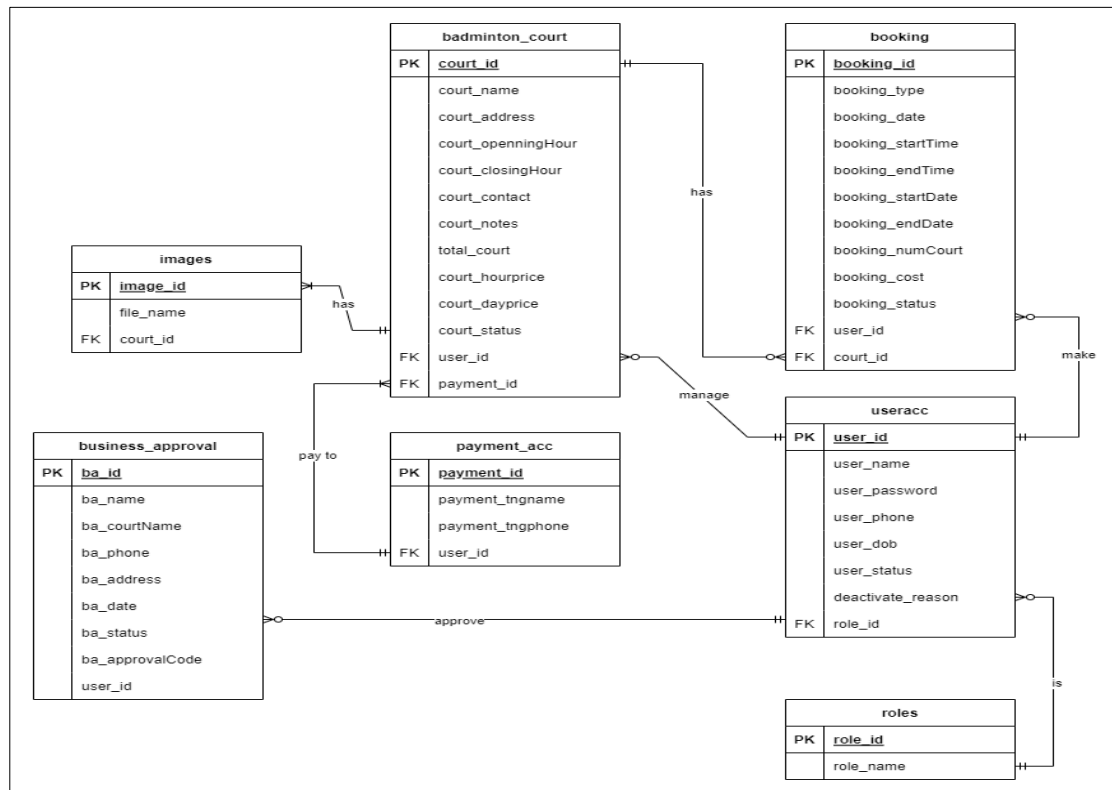


Figure 2: ERD of the booking system

### 3.2.4 Interface design

The interface design of the system is illustrated using wireframes. Figure 3 shows the wireframe of the badminton court list page for customers. Customers can view detailed information about badminton courts or make a reservation by clicking the button.

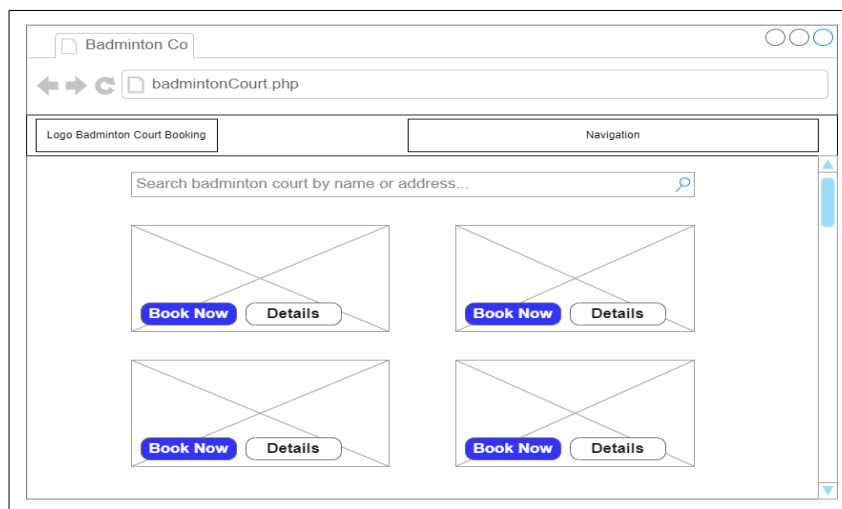


Figure 3: Wireframe of badminton court list page – Customers

### 3.3 Development stage

In this stage, the system is developed in localhost with the XAMPP server. The front-end, back-end, and database development are executed in parallel according to the design plan. Visual Studio Code is used for front-end and back-end development, and phpMyAdmin is used for database development.

### 3.4 Quality assurance stage

A testing plan for each of the function modules in the developed system is generated. All the testing results are expected to be passed. Lastly, the developer makes a thorough test of the system to evaluate whether it meets the requirements defined.

### 3.5 Deployment stage

The last stage is deployment which releases the final system to the end user. The system is tested with target users including potential customers and badminton court owners. The final system is delivered by a specific URL link and the end user is able to access the developed system.

## 4. Results and Discussion

The front end of the developed system is built using HTML, CSS, and JavaScript while the back end is built using PHP. phpMyAdmin is used as a tool to work with the MySQL database. There are three categories of users, including system admin, badminton court owners, and customers. A representative of badminton court owners in Batu Pahat is appointed as system admin. The developed system has been hosted by using InfinityFree, a free website hosting. A specific URL is given to access the developed system. The functional testing and User Acceptance testing were carried out on the developed system to evaluate whether it meet all the requirements.

### 4.1 System Implementation

Figure 4 shows the interface of the index page that all users will see. This index page provides a clear overview manual for customers and badminton court owners.



Figure 4: Interface of the index page

All categories of users will use the login interface shown in Figure 5 to log in to the system with the correct username and password. For potential customers who do not have an account, they can click the register link to register a new account.

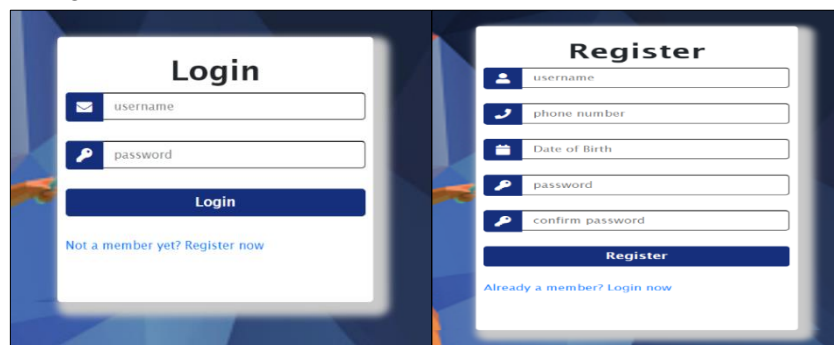
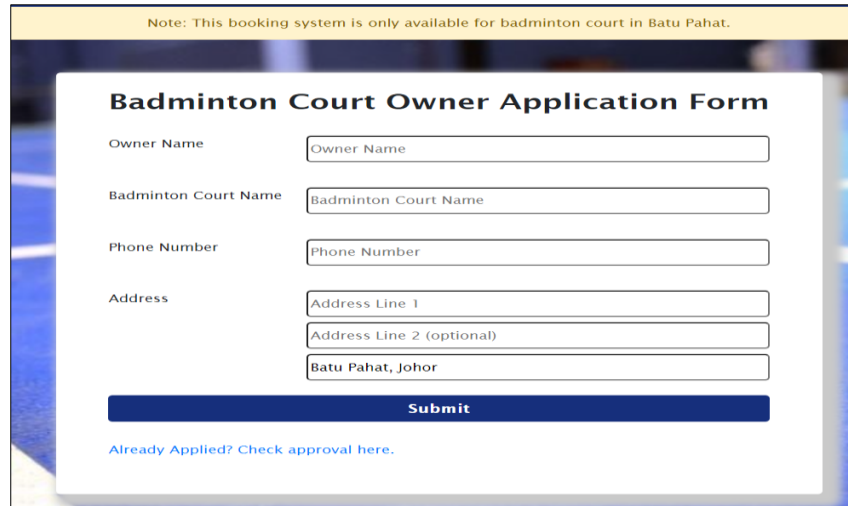
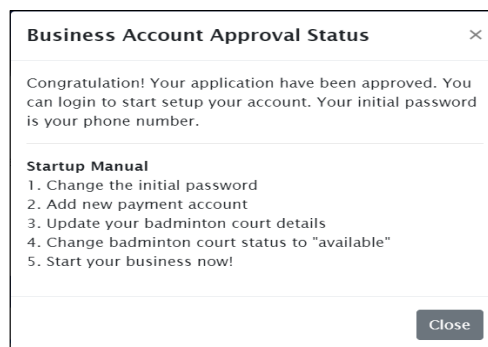


Figure 5: Interface of the login/register page

A new badminton court owner is required to fill in the business application form to apply as a business account in this system. An approval code is generated, and owners may check the approval status after 1 to 3 working days. The admin will validate the information and approve or reject the application. Figure 6 shows the interface of the business application form and Figure 7 shows the success message of the business account application.

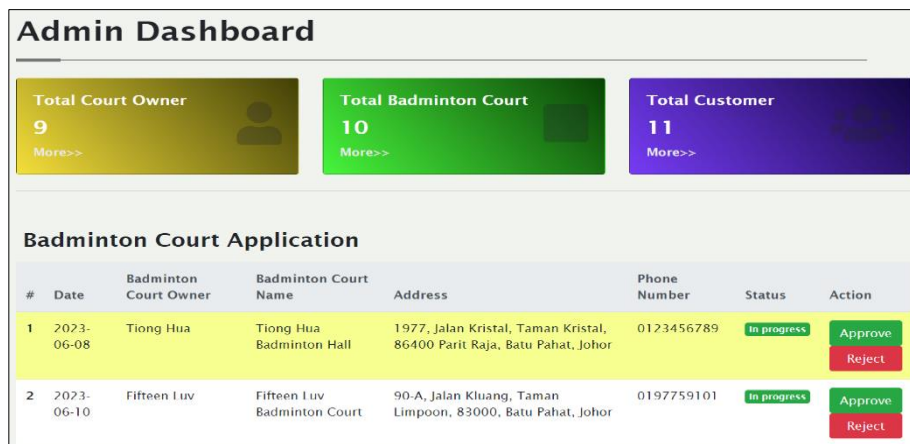


**Figure 6: Interface of the business application form**



**Figure 7: Success message of business account application**

Figure 8 shows the interface of the admin dashboard. It provides an overview of information in the system and shows the business account application that is waiting for approval. Application that exceeds 5 days and 3 days are indicated by red and yellow colour respectively. Admin can deactivate accounts of badminton court owners and customers if there is any misuse of the system or bad reputation.



#	Date	Badminton Court Owner	Badminton Court Name	Address	Phone Number	Status	Action
1	2023-06-08	Tiong Hua	Tiong Hua Badminton Hall	1977, Jalan Kristal, Taman Kristal, 86400 Parit Raja, Batu Pahat, Johor	0123456789	In progress	Approve Reject
2	2023-06-10	Fifteen I uv	Fifteen I uv Badminton Court	90-A, Jalan Kluang, Taman Limpoon, 83000, Batu Pahat, Johor	0197759101	In progress	Approve Reject

**Figure 8: Interface of admin dashboard**

Figure 9 shows the interface of the badminton court owner list page. The user list and application list can be downloaded in PDF format. Figure 10 shows the interface of the profile page. All users can update their personal info, change passwords, and delete accounts.

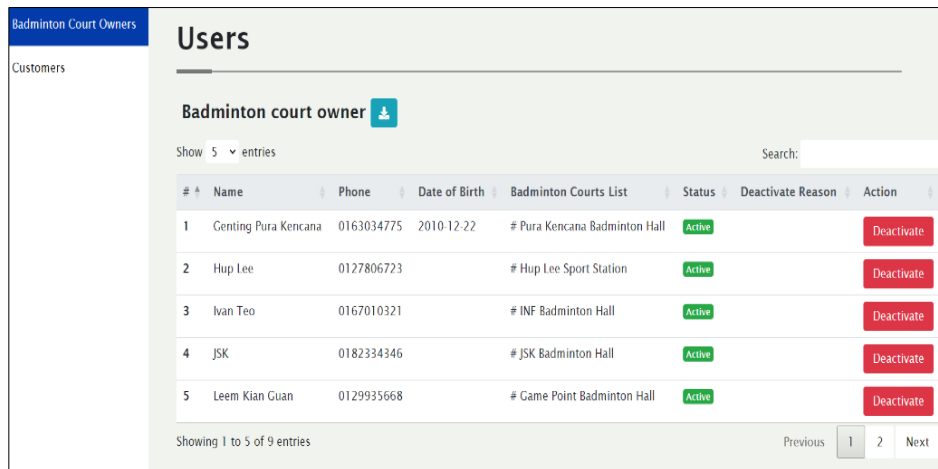


Figure 9: Interface of badminton court owner list page

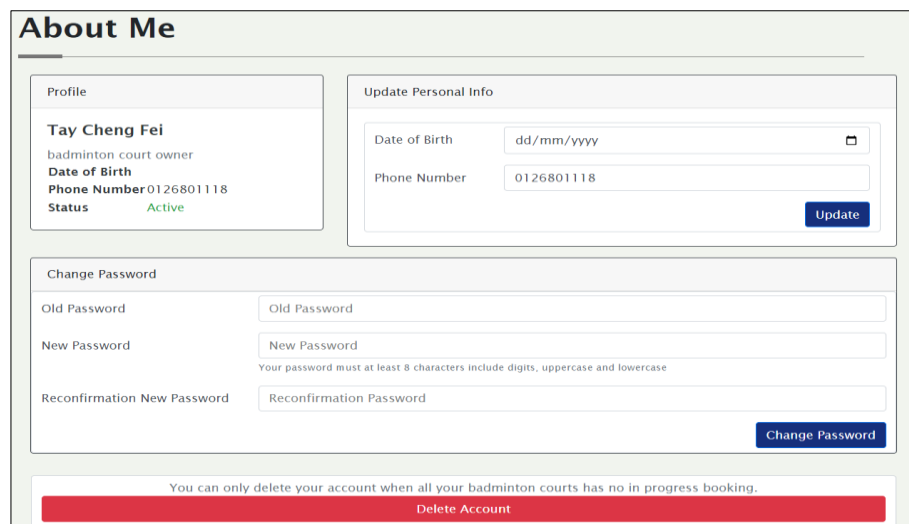


Figure 10: Interface of the profile page

Figure 11 shows the interface of the owner’s dashboard. It provides the yearly business summary for the owner. If there is an upcoming booking tomorrow, a reminder will show on the dashboard page to alert the owner for checking their TNG account whether they have received the deposit payment.

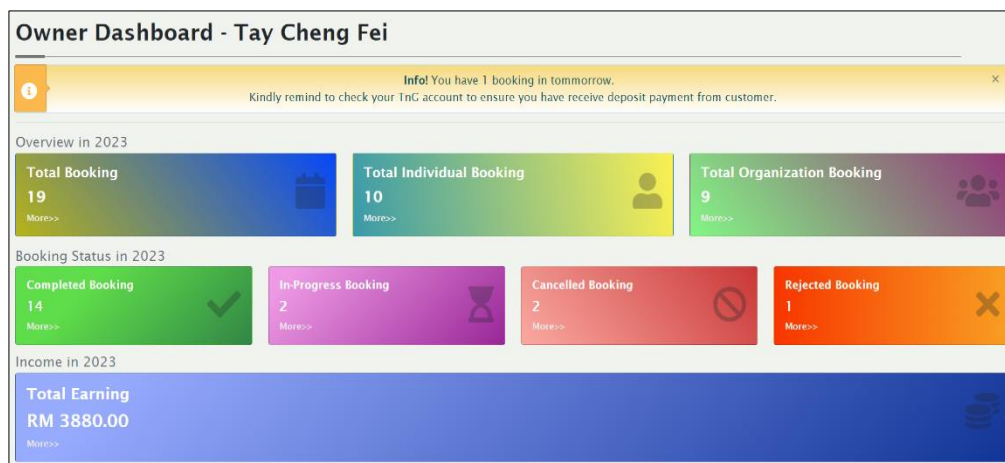


Figure 11: Interface of the owner dashboard page

Otherwise, owners can reject the booking on the booking record page shown in Figure 12. Figure 13 shows the interface of the badminton court page. The owner is able to update the details and availability status of badminton courts. The availability of badminton court status can only change to available when all the required information is filled in. In addition, the owners can add TNG account details to receive deposit payments.

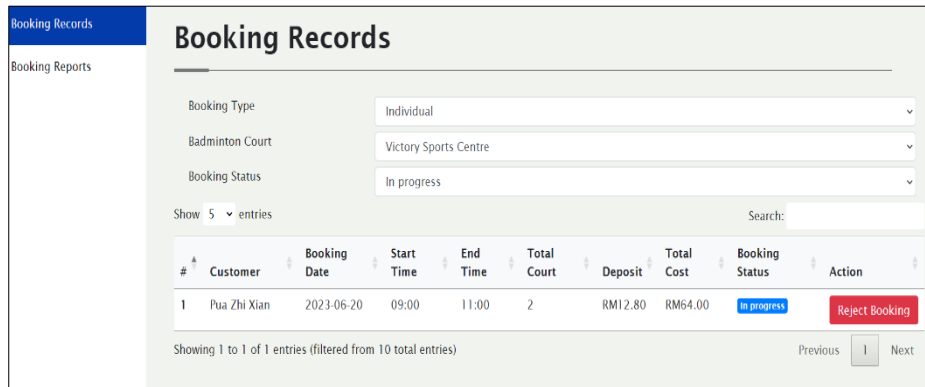


Figure 12: Interface of the booking records page

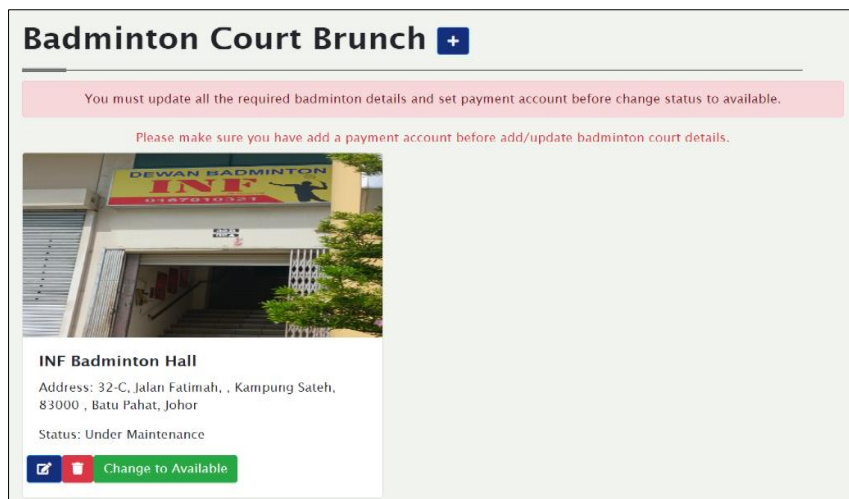


Figure 13: Interface of the badminton court page

Figure 14 shows the interface of the report filter page. The owner can set the condition to generate the business report shown in Figure 15.

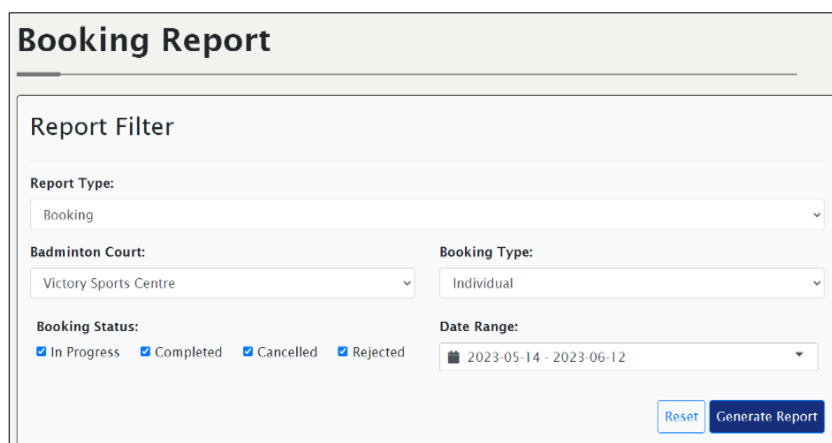


Figure 14: Interface of the report filter page

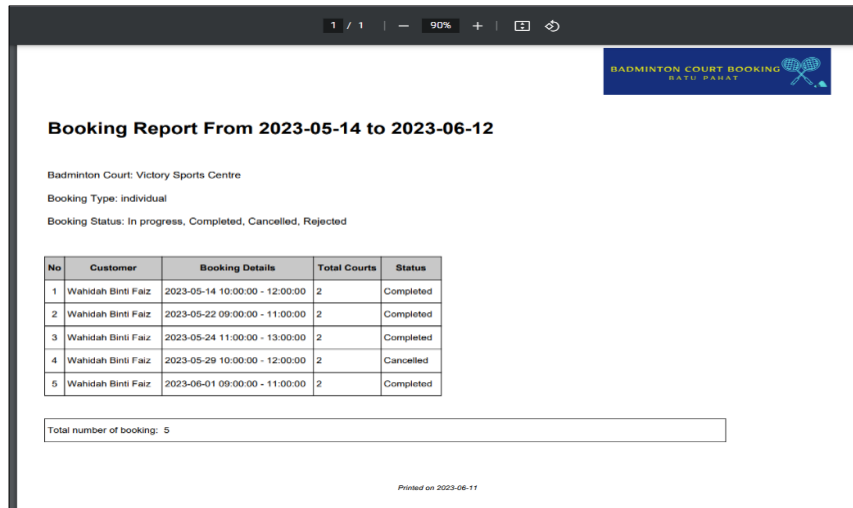


Figure 15: Booking report in PDF format

Figure 16 shows the interface of the badminton court list page in customer view. Customers can click the badminton court to view information such as business hours, and pricing shown in Figure 17.

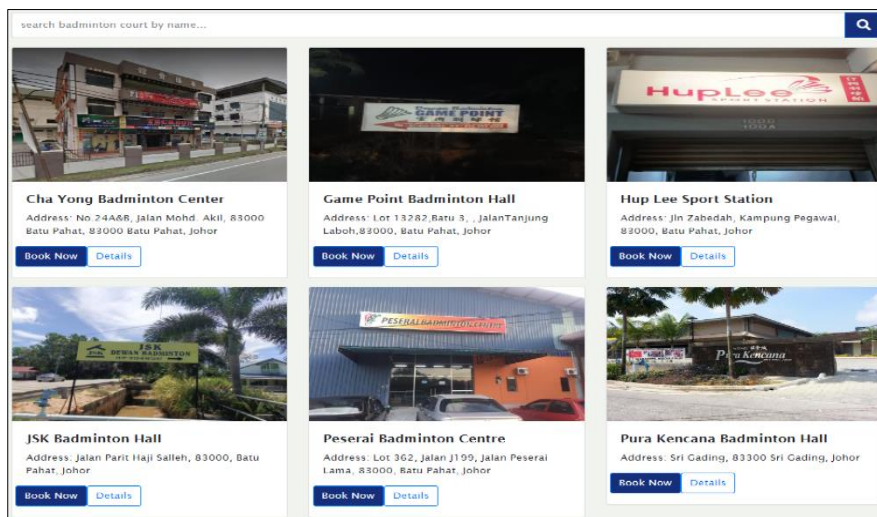


Figure 16: Interface of the badminton court list page – Customer

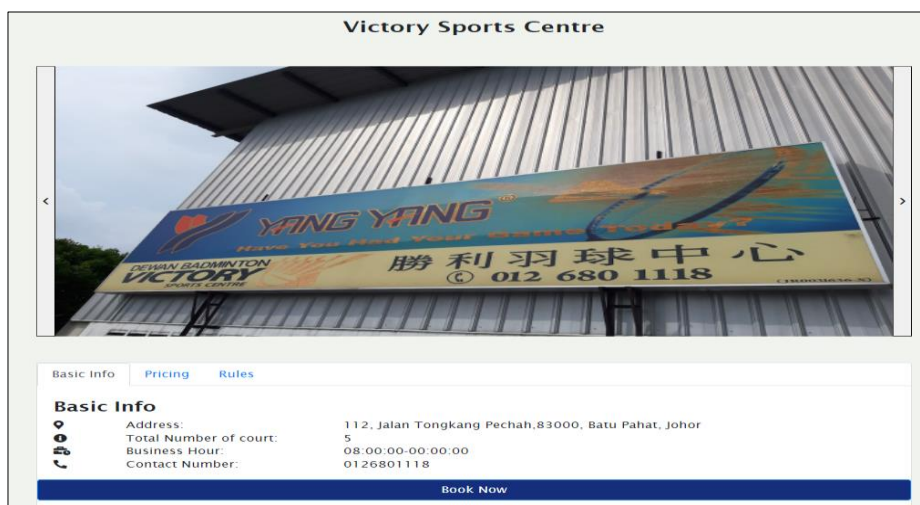
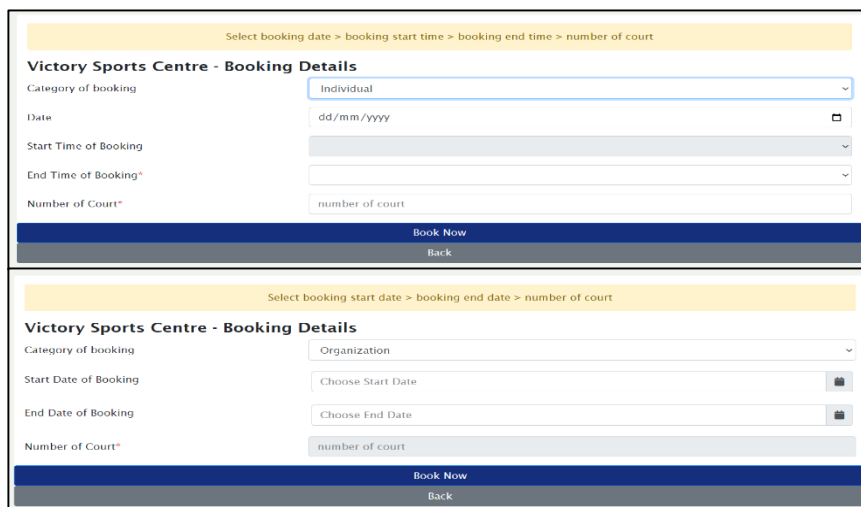
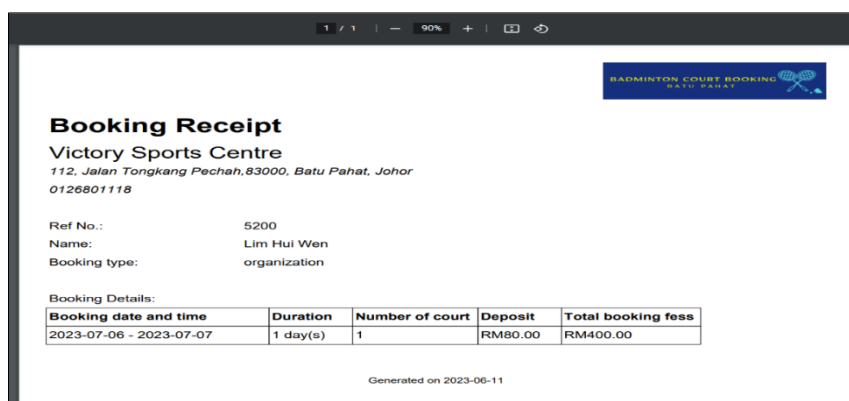


Figure 17: Interface of the badminton court details page

Figure 18 shows the interface of individual and organization booking forms. The customer is required to fill in all the fields for making the reservation. The booking can be canceled one day before the booking date, but the deposit is non-refundable. Figure 19 shows the booking receipt in PDF format.



**Figure 18: Interface of the badminton court details page**



**Figure 19: Booking receipt in PDF format**

## 4.2 Testing

Functional testing and User Acceptance Testing are carried out after the development of the system is completed. It is essential to measure whether that developed system has met the requirements.

### 4.2.1 Functional testing

Each of the functional modules in the developed system is tested with the list of test plans. Table 5 shows the list of test plans and results.

**Table 5: List of test plans and result**

No.	Test Plans	Expected Result	Actual Result
<b>User Management Module</b>			
1	User login with correct username and password	Login successfully and redirect to the home/dashboard page based on the roles.	Passed
2	User presses the login button without filling in the username and password.	Show an alert message to ask the user to input the required field.	Passed
3	User fills in an incorrect username or password.	Show an error message that tells the user's username or password is incorrect.	Passed

**Table 5: (cont.)**

No.	Test Plans	Expected Result	Actual Result
4	User access the page by URL without login credentials.	Show an error message and redirect the user to the login page to login into their correct roles.	Passed
5	Customer fill in all required fields in the registration form.	A new account was created successfully and allowed users to log in.	Passed
6	Customer did not fill in all the required fields in the registration form.	Show an error/alert message to ask for user input again.	Passed
7	Customers register a new account with the username that already exists.	Show an alert message to tell the user the username already exists.	Passed
8	Owner fills in all the required fields in the business account application form in a proper format.	Show applied successful modal that contains approval code. The approval code can be downloaded in PDF format.	Passed
9	Owner did not fill in all the required fields or improper input.	Show an error message to ask for user input again.	Passed
10	Owner applies for the badminton court that already exists.	Show an alert message to tell the user this badminton court already exists.	Passed
11	Owner checks the application approval status with the owner's name and approval code.	Show the modal that tells the user the status of the application.	Passed
12	Owner checks application using forget approval code form.	Show the modal that tells the user the status of the application.	Passed
13	Admin views the business account application list.	Display the list of business account applications.	Passed
14	Admin approve/reject the business account application.	Shows the info message of approve/reject successful.	Passed
15	Admin views the list of customers/owners.	Display the list of badminton court owners/customers.	Passed
16	Admin deactivates the customer's/owner's account.	Ask for the admin's confirmation before deactivating the account. The active and delete account buttons are shown.	Passed
17	Admin activates the deactivated account of owner/customers.	Active successful.	Passed
18	Admin delete the deactivated account of badminton court owner/customers.	Ask for the admin's confirmation before deleting the account.	Passed
19	Users edit their profile details/change passwords/delete accounts.	Edit/change/delete successfully.	Passed
<b>Court Management Module</b>			
20	Owner CRUD on payment account details	CRUD successfully.	Passed
21	Owner edits the court's information.	Edit successful.	Passed
22	Owner adds a new badminton court.	Add successfully.	Passed
23	Owner changes the badminton court's status to available while all the required information is filled in.	Badminton court status becomes available and added to the badminton court list of customer views.	Passed
24	Owner changes the badminton court's status to available without filling in all the required fields.	Shows an error message and ask the user to fill in all required field.	Passed
25	Owner changes the badminton court status to under maintenance.	Badminton court status becomes under maintenance and remove from the badminton court list of customer view.	Passed

**Table 5: (cont.)**

No.	Test Plans	Expected Result	Actual Result
26	Owner deletes the badminton court.	Ask for the owner's confirmation before deleting the badminton court.	Passed
<b>Court Reservation Module</b>			
27	Customer clicks the details button to view the court's information.	Display badminton court information.	Passed
28	Customer clicks the book now button without login.	Show the modal to ask the user to log in/register before making a reservation.	Passed
29	Customer clicks the Book Now button.	Redirect the user to the booking details page.	Passed
30	Customer selects individual booking. Then, selects the booking date, start time, end time, and number of courts, in sequence.	Show the input field for individual booking. The date before the current date is disabled. Based on the selected booking date, display the available time. Then, set the maximum input in the field of the number of courts.	Passed
31	Customer selects the organization booking. Then, selects the booking start date, end date, and number of courts, in sequence.	Show the input field for organization booking. The date before the current date is disabled. Based on the selected start date, the date before the selected date is disabled. Then, set the maximum input in the field of the number of courts.	Passed
32	Customer clicks the book now button to submit the booking details form.	Show the booking details and the details of the payment account.	Passed
33	Customer clicks the complete button to confirm the booking.	Booking successful without overlapping with other booking records.	Passed
34	Customer clicks the cancel booking button.	Ask customer's confirmation before canceling the booking.	Passed
35	Customer views the booking status.	Display the status of the booking on the booking history page.	Passed
36	Customer prints the booking receipt.	print successfully in PDF format.	Passed
37	Owner clicks the booking record page.	Display the list of booking records.	Passed
38	There is an upcoming booking tomorrow.	Show an info message to remind the owner to check their TNG account.	Passed
39	Owner rejects the customer's booking.	Reject successful.	Passed
40	The current date is later than the booking date.	All the in-progress bookings updated to completed status.	Passed
<b>Report Generating Module</b>			
41	Admin views the overview report in the admin dashboard.	Display the overview information of the system and the latest business account application that waiting for approval.	Passed
42	Admin clicks the download button in the list of customers/owners/business applications page.	The list of customers/owners/business applications is downloaded in PDF format.	Passed
43	Customer filters the booking record with individual type and in-progress status on the booking history page.	Display the in-progress individual booking history.	Passed
44	Owner views the overview report in the owner dashboard.	Display the annual summary of the owner's business.	Passed

**Table 5: (cont.)**

No.	Test Plans	Expected Result	Actual Result
45	Owner selects the booking report, badminton court, booking type, booking status, and date range in the report filter.	Generate the PDF report with all accurate conditions. The report is downloadable.	Passed
46	Owner selects the sales report and other conditions in the report filter.	Generate the PDF report with all accurate conditions. The report is downloadable.	Passed
47	Owner selects the conditions, but no records match the conditions that the owner selected.	Show an alert message to tell the users no booking report generated with the conditions selected.	Passed

#### 4.2 Analysis of User Acceptance Testing

User acceptance testing was carried out by distributing the questionnaire using Google Forms. The purpose of this questionnaire is to gather feedback about the user interface and functionality of the developed system from admins, badminton court owners, and customers. A total of 33 replies were received, 4 are from admin, 8 are from badminton court owners, and 21 are from customers. There are two evaluation sections in the questionnaire which are user interface and functionality for each category of user. For the user interface section, ranking 1 is highly unsatisfied, and ranking 5 is highly satisfied. For the functionality section, ranking 1 is strongly agree and 5 is strongly disagree. Table 6 and Table 7 show the overall evaluation results for user interface and functionality, respectively. Based on the evaluation results, it can be concluded that the majority of respondents are satisfied with the interface design and functionality of the developed system.

**Table 6: Overall evaluation results - user interface**

No	Features	Ranking					Total
		1	2	3	4	5	
1	The overall design of the interface	0	0	0	13	20	33
2	Font size and font colour in the system	0	0	0	11	22	33
3	Theme colour in the system	0	0	3	11	19	33
4	Navigation of the system	0	0	0	13	20	33
5	Responsiveness of interactive elements (button, link)	0	0	0	10	23	33

**Table 7: Overall evaluation results - functionality for each category of user**

No	Features	Ranking					Total
		1	2	3	4	5	
Functionalities – System Administrator							
1	Admin login with the admin role in a secure manner.	0	0	0	1	3	4
2	The system provides clear overall information on the main page of the admin.	0	0	1	1	2	
3	The admin can easily approve or reject the business approval application by clicking the button.	0	0	0	2	2	4
4	The admin can deactivate and delete the account of a badminton court owner/customer.	0	0	0	1	3	4
5	The admin can easily download the list of badminton court owners/customers in PDF format.	0	0	0	3	1	4
6	The admin can easily edit their personal details, change password and delete account.	0	0	0	2	2	4

**Table 7: (cont.)**

No	Features	Ranking					Total
		1	2	3	4	5	
<b>Functionalities – Badminton Court Owners</b>							
1	Owners can easily apply as business partners in the system by filling in the business application form.	0	0	0	3	5	8
2	The system provides a clear user manual for owners.	0	0	1	1	6	8
3	Owner login with owner role in a secure manner.	0	0	0	5	3	8
4	The system provides a clear overall report on the main page of the owner.	0	0	0	5	3	8
5	The system shows helpful and timely reminders to remind owners can deposit payment one day before the booking.	0	0	0	4	4	8
6	The owner can easily add, update, and delete their TNG payment details into the system.	0	0	0	5	3	8
7	The owner can easily add a new badminton court brunch, edit the details and update the status availability of the badminton court.	0	0	0	6	2	8
8	The system allows the owner to manage booking in an organized manner without overlap issues.	0	0	1	4	3	8
9	The payment method is suitable and enough.	0	0	1	4	3	8
10	The generated PDF report for booking and sales allows the owner to keep track of their business easily.	0	0	1	2	5	8
11	The owner can easily edit their personal details, change password and delete account.	0	0	0	2	6	8
<b>Functionalities – Customers/Potential Customers</b>							
1	Customers can easily register a new account.	0	0	0	8	13	21
2	Customer login with customer role in a secure manner.	0	0	0	6	15	21
3	The system provides a clear user manual for customers.	0	0	1	4	16	21
4	The information about the badminton court provided is useful for customers.	0	0	1	4	16	21
5	The process of booking a badminton court is clear and intuitive.	0	0	0	7	14	21
6	The payment method is suitable and enough.	0	0	2	9	10	21
7	The customer can easily view their booking history.	0	0	0	6	15	21
8	The customer can easily edit their personal details, change password and delete account.	0	0	1	6	14	21

In addition, there are several suggestions collected from the respondents. There are two respondents who reflect that lack of search functionality on the badminton court list. Moreover, respondents also suggest adding notification modules for owners when there is a new incoming booking. In the payment method, there is a suggestion to provide more payment options. In short, most respondents vote very likely to recommend this system to their friends, colleagues, and family.

## 5. Conclusion

In short, a web-based booking system for badminton courts is a platform for making and managing badminton court booking for badminton court owners and customers in Batu Pahat has been successfully developed and achieved all objectives. Badminton court owners can manage their businesses digitally while customers have a variety of choices on badminton courts and make reservations easily.

Although all modules of the system have been successfully developed, the system still has limitations. The filtering of badminton courts is not comprehensive enough. The search bar only accepts searches for badminton court names. Second, customers transfer deposit payments to the owner's TNG

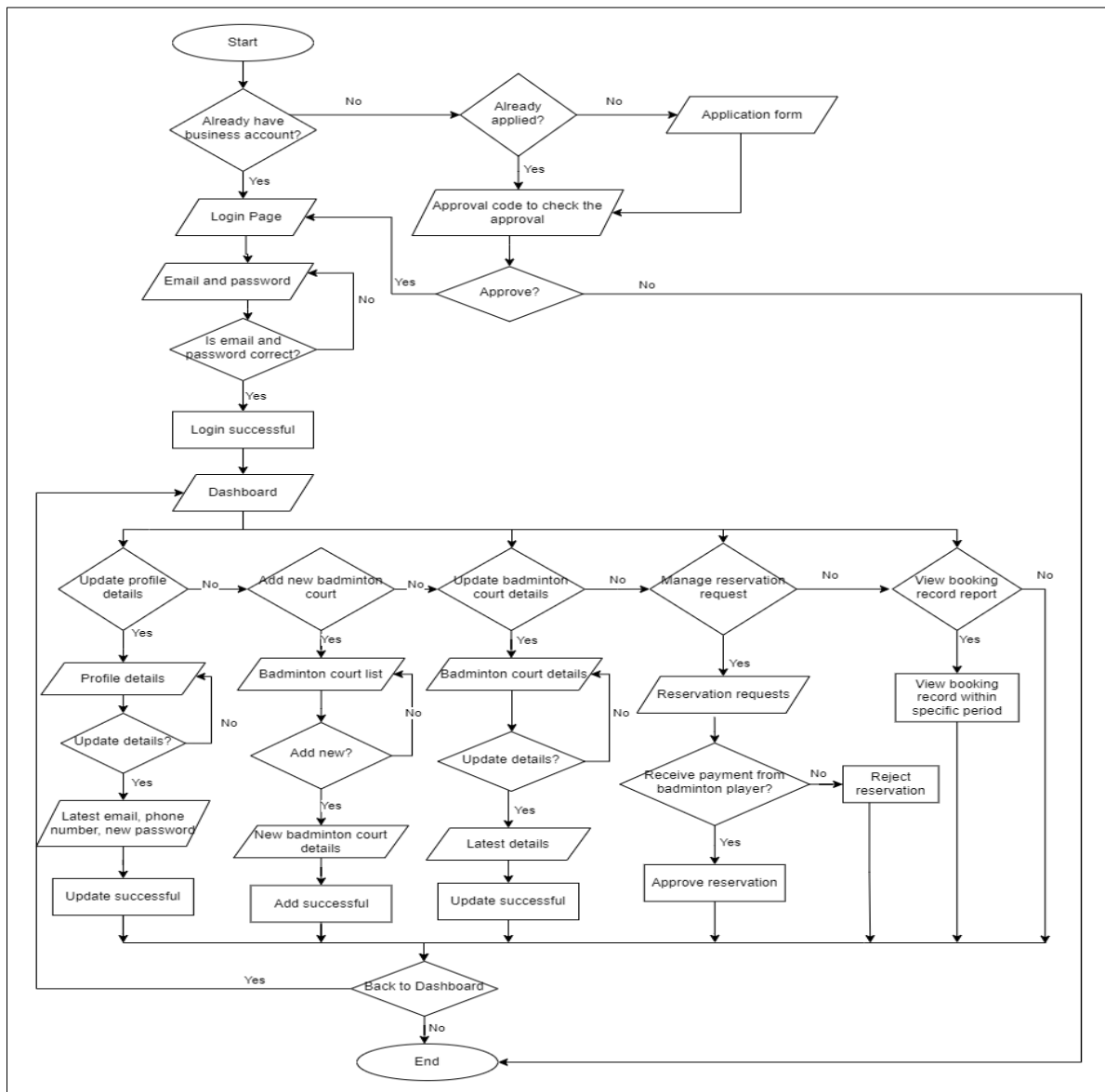
account manually. Therefore, badminton court owners need to check their accounts regularly to avoid loss. Moreover, the system has a shortage of notifications. In addition, the PDF report is shown in the table. The report module is lacking visual presentation such as graphs and bar charts.

Therefore, there are several improvements that can take action to overcome the limitations. One of the future works is to enhance the search function on badminton courts as well as add an advanced filter that enables customers to filter the badminton court with the price range, and availability on a particular date. Next, add an online payment module to offer a variety of payment options. An improvement to overcome the lack of notifications is to send email notifications to the users of the system when something happens. Lastly, generate a graph and bar chart in the generated report. The report is clear and intuitive for badminton court owners to keep track of their business.

**Acknowledgment**

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**Appendix A**



**Figure 20: Flowchart – Badminton court owner**

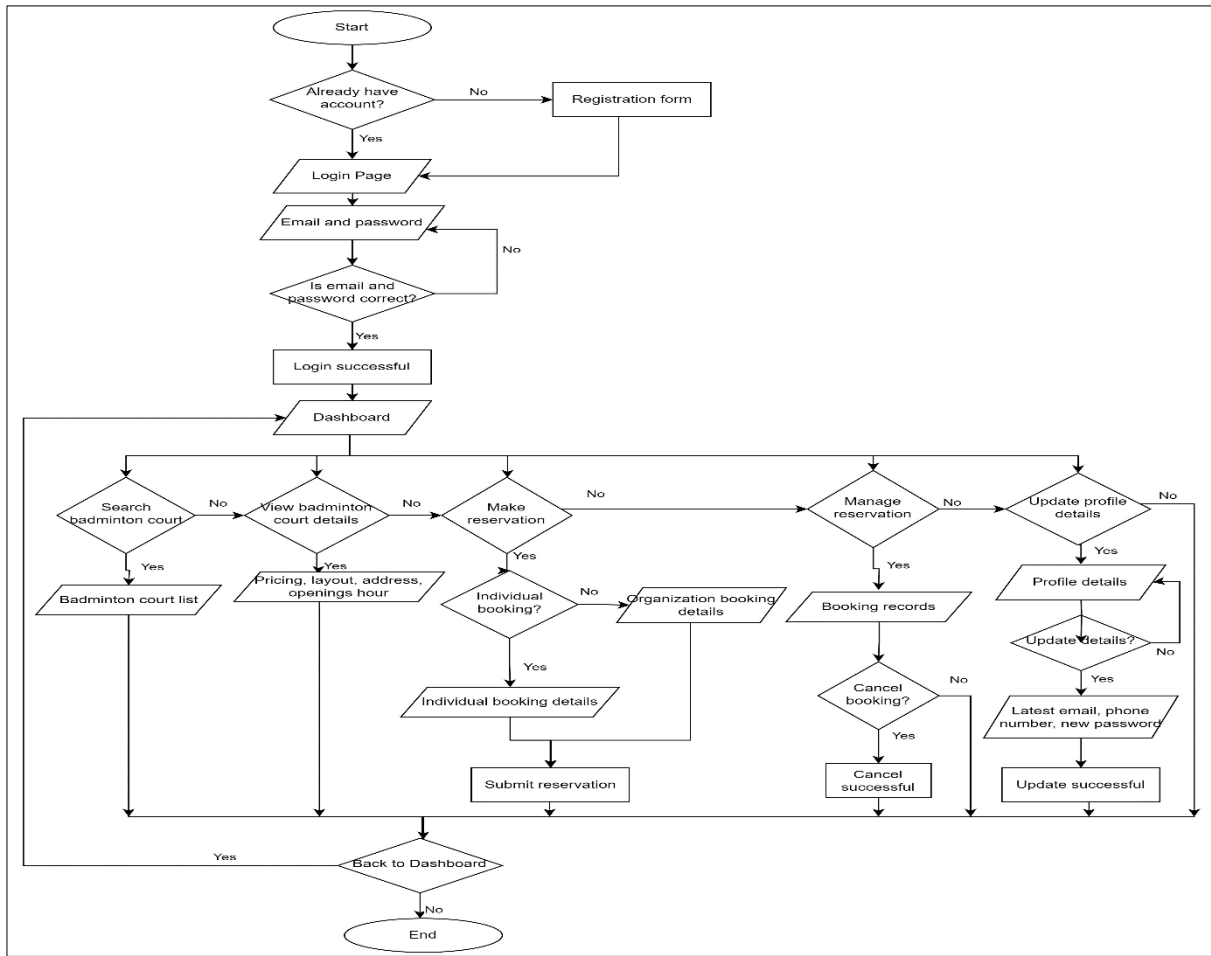


Figure 21: Flowchart – Customers

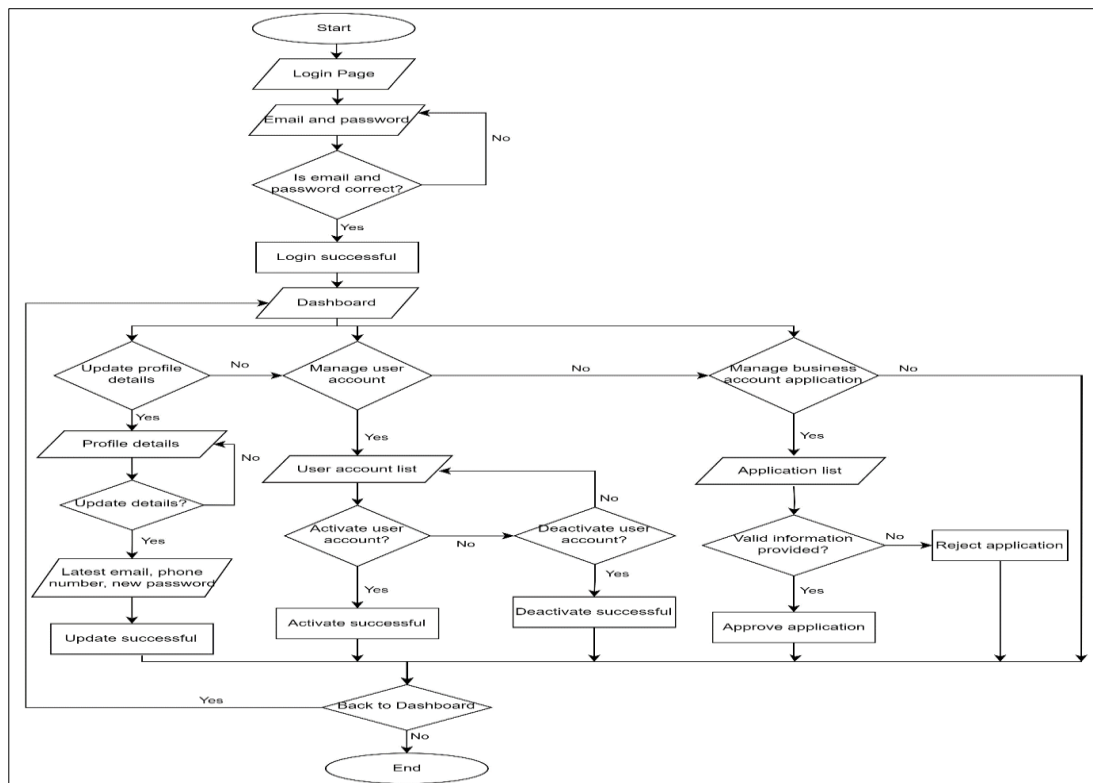
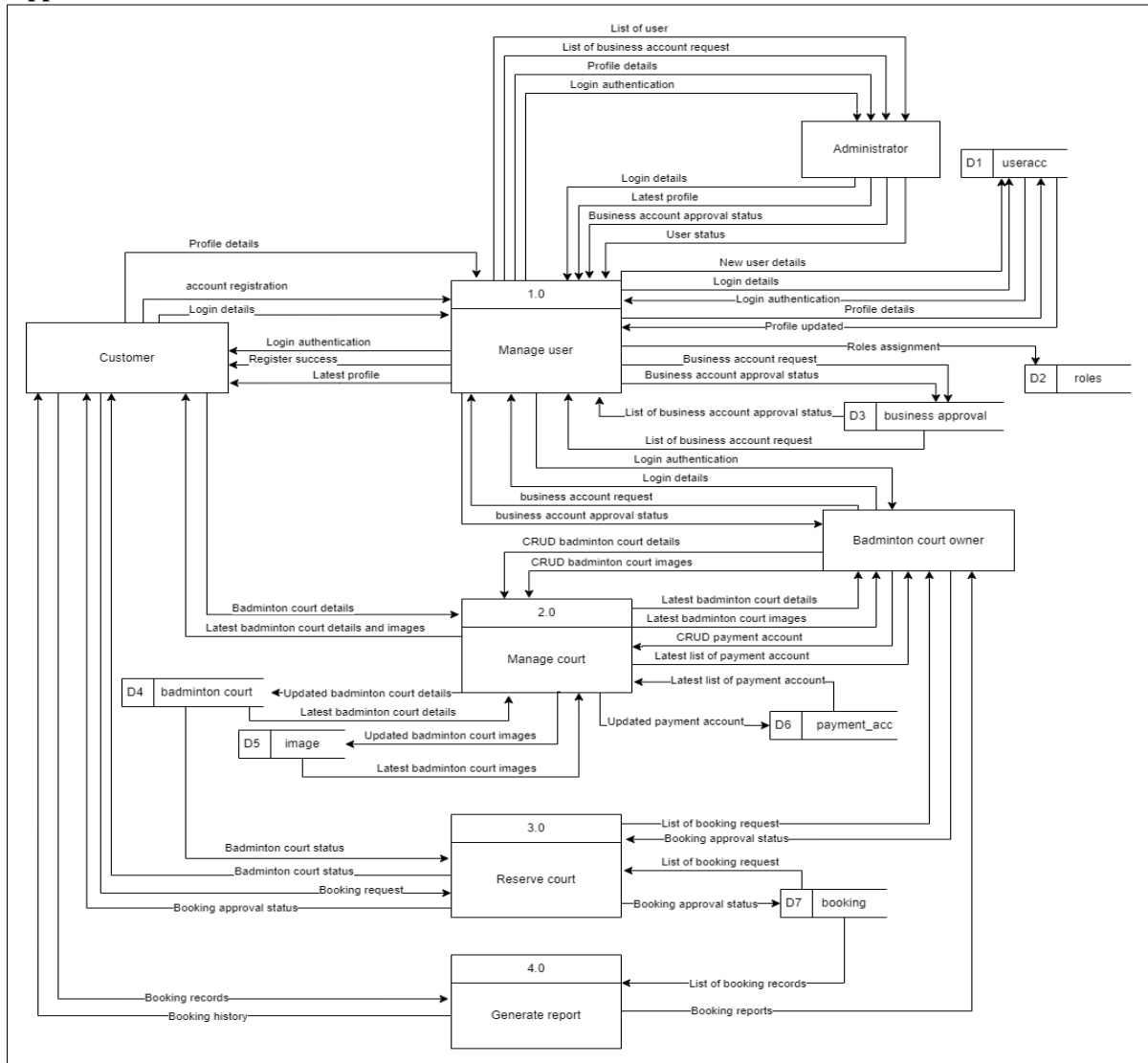


Figure 22: Flowchart – System Admin

**Appendix B**



**Figure 23: DFD Level 1 of the developed system**

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