

## Development of Rental House Mobile Application

Siti Zulaikha Ab Rahman<sup>1</sup>, Ruhaya Ab Aziz<sup>1\*</sup>

<sup>1</sup>Faculty of Computer Science and Information Technology,  
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

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**Abstract:** University students need either a college or a rented house as a place to live throughout their studies. UiTM Kota Bharu does not provide college for students, thus students need to find a house to stay. Hence, a rental house search system using a mobile application is built to help the searching and making initial decision. The case study of this project is conducted at UiTM Kota Bharu. The development methodology of this project is a prototype model. The software IDE used is Android Studio, programming language used is Java and database used is Firebase. The System users are Non Resident Community Unit (NRC) as administrator, student and homeowner as public users. This system consists of six modules which are registration and login module, advertisement module, search module, booking module, profile module and report module. The result of this project will help students find a comfortable home.

**Keywords:** rental house, searching, mobile application.

### 1. Introduction

Housing has a central importance to quality of life with considerable economic, social, cultural and personal significance. Though a country's national prosperity is usually measured in economic terms, increasing wealth is of diminished value unless all can share its benefits and if the growing wealth is not used to redress growing social deficiencies, one of which is housing [1]. Access to affordable housing has been a long-standing issues for households in most cities. Across the world, approximately 1.2 billion people live in rented accommodation [2]. Housing plays a huge role in revitalizing economic growth in any country, with shelter being among key indicators of development. Due to the economic problem faced by some of them, they had to rent a house instead of owning their own house and land. With the increasing demand for rental housing in some places, the price of rental housing is also getting higher and higher. House rent price was influenced by factors such as number of bedrooms and location [3]. However, there are also rental houses that offered cheap prices, but their equipment and services

are not good or bad. Tenants' rights are poorly respected, especially in the informal settlements that provide most of the accommodation to low-income renters [4].

UiTM Kota Bharu is located in the middle of the city where the rental house prices in that area are quite expensive and not suitable for student. The price of rental house in the area is quite expensive since the area is the main city in Kelantan where there is a lots of malls like Aeon Mall, KB Mall, Platinum Mall, Tesco Supermarket, and other facilities in that area. Houses located in the central business district had the highest median house rent price. Since the area is provided with various types of facilities, the price of rental houses in the area becomes quite expensive compared to other areas and the price is not suitable for student. Therefore, it is quite difficult to find cheap rental houses that fits students' budget in that area.

In the current process, most of UiTM Kota Bharu students face difficulties to rent a house. Some of them were looking for a house through advertising, website, and social media such as Twitter, Instagram, Facebook etc. But some of them found that the houses offered were expensive and exceeded their budget as students. They should be wise to seize the opportunity if they find a rental house at a cheap price because the house might be sold in a short time. The information provided about the house was also unclear and unsatisfactory. Students find it difficult to contact the homeowner due to lack of information. Most of freshman or junior students have low chance to get a house since they are not familiar to the system or process of finding a house and they also need to compete with other senior students.

The whole process of house searching have a lot of weakness because it takes a lot of efforts and time to find a suitable house that fit student's demand. It is hard for students to find a house because there were not a lot of rental house opening in social media. Sometimes homeowner do not update the house that they advertise on social media and causing confusion among the tenants. There are also some scammers who masquerade as homeowners but actually not. The scammer usually finds new students as their victims because they know that new students have no experience in renting a house. However, there are also owners who offer rental houses at the low price with a complete home furnishing and very suitable for students' budget. The only problem is that the student does not know how to find a rental house with lower prices in the middle of the city. Students have to seize the offer quickly or they will get a rental house at an expensive price.

Hence, a rental house system is built to help UiTM students to find a house to rent easily without need to waste time, energy and money. Students can compare house prices from different owner and choose the one that fits their demand. This system will make it easier for students as they do not have to go out to find a house. This will also save energy and student time. This ideal for students since they have a busy schedule and do not have much free time.

This article is organized into five sections. The first part is an introduction describing the context of the project. The second section describes the analysis of the relevant work. In the third section, the methodology is explained. The implementation and testing of this system are described in the fourth section, in the last section, a conclusion with some instruction for future employment is given.

## **2. Related Work**

## 2.1 Case Study: House Renting System

UiTM Kota Bharu is University Technology Mara Cawangan Kelantan (UiTMCK)'s second campus that established on 2007 in Kota Bharu, Kelantan. UiTM Kota Bharu is located in the middle of the city where Kota Bharu serves as the state capital and royal seat of Kelantan. Kota Bharu is a prosperous commercial center, and there are many commercial buildings in the area. UiTM Kota Bharu is located right at the mall area, the distance between UiTM Kota Bharu with Platinum mall and Aeon Mall is about 5 minutes' walk. Therefore, this area is not a residential area. It is very difficult to find rental houses in this area.

UiTM Kota Bharu does not provide accommodation for students due to its limited area. Therefore, students have to find a rental house and rent a house to live. However, as this area is commercial center area and not a residential area, the process of finding a rental house in this area is quite difficult. House rental in this area also quite expensive for student. Students usually use the convenience of applications such as Facebook to find a rental house, but sometimes the rental process a bit difficult since sometimes turned out that the application already expired or no longer on offer. Student also find it difficult to differentiate the price of the house with another house since the information provided is not details and student need to call one by one homeowner just to know the price of the house.

## 2.2 Study of Existing Related Systems

Mobile application is one of the most concerned and rapidly developing areas [5]. With the advances of technology nowadays, various rental house application has been developed to help tenants find rental house more easier, effective and also with no cost needed. Three existing system are studied and analyzed to get more information to develop a Rental House Mobile Application for UiTM Kota Bharu. The chosen existing systems are Mudah.my, PropertyGuru Malaysia and Speedhome. After the studying, three of this existing systems has a lot in common except they do not have booking function. Rental House UiTM KB have the booking function that help student to book the house first to make sure the house still available. The booking then will be decided by homeowner either homeowner want to approve or reject the booking, because some homeowner have their own tenants criteria they want to rent their house. Thus Rental House UiTM KB give the homeowner the opportunities to decide the tenants of their house. Table 1 show the comparison between the three existing system with the proposed system.

**Table 1: Comparison between the three existing system and the proposed system**

Features/System	PropertyGuru Application	Speedrent Application	Mudah.My Application	Rental House Mobile Application for UiTM Kota Bharu
System Platform	Online	Online	Online	Online
User Registration	Required	Required	Required	Required for homeowner only.
User Login	Required	Required	Required	Required
Update user profile	Allowed	Allowed	Allowed	Allowed
Filter the searching section	Allowed	Allowed	Not Allowed	Allowed

Features/System	PropertyGuru Application	Speedrent Application	Mudah.My Application	Rental House Mobile Application for UiTM Kota Bharu
View house description	Allowed	Allowed	Allowed	Allowed
View homeowner profile	Allowed	Allowed	Allowed	Allowed
Book the house	Not Allowed	Not Allowed	Not Allowed	Allowed

### 3. Methodology/Framework

There are total seven phases from the prototype model shown in Table 2. Each phases have 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: Phase and Activity During System Development**

Phase	Activity	Deliverables
Planning	Tack scheduling, identify problem, scope and objectives.	Gantt Chart Proposal
Analysis	Collect and analyse the information	Requirements DFD, ERD, RTM Flowchart or to be model
Design	Design interface of the whole system by using the correct programming language.	System architecture Database Scheme. Data dictionaries. System interface design.
Implementation	Conduct testing on the system and repair the fault of the system.	Code program.
Prototype 1	Detect errors on the system and fix the problem.	Prototype system.
	Repeat from planning phase until implementation phase.	
Prototype 2	Detect system's error again and fix the existing system.	Prototype system.
Presentation	Present the system in front the panel.	Final report. Complete system.

The functional modules of the system are summarized in Table 3. It contains six modules which are login and registration, advertisement module, search module, booking module, profile module and report module. System analysis is a needs analysis to determine the specifications for system. The functional requirements for this system are presented in Table 4, non-functional requirements in Table 5 and user requirements in Table 5.

**Table 3: System functional module**

Module	Function	User
Login/Registration Module	User need to register(Homeowner)/login before get to access the system.	Administrator Student Homeowner
Advertisement Module	Contains house description and details. Allow homeowner to add, delete or update their advertisement. Student can view the house advertisement Student can click on house advertisement	Student Homeowner
Search Module	Student can search for the house the want. Student can filter the search section.	Student
Booking Module	Student can see the list of booking and also the status of booking. Homeowner can accept or reject student booking.	Student Homeowner
Profile Module	Contains user personal information. User can always update their personal information.	Student Homeowner
Report Module	Can see the list of homeowner registered	Administrator

**Table 4: Functional requirements**

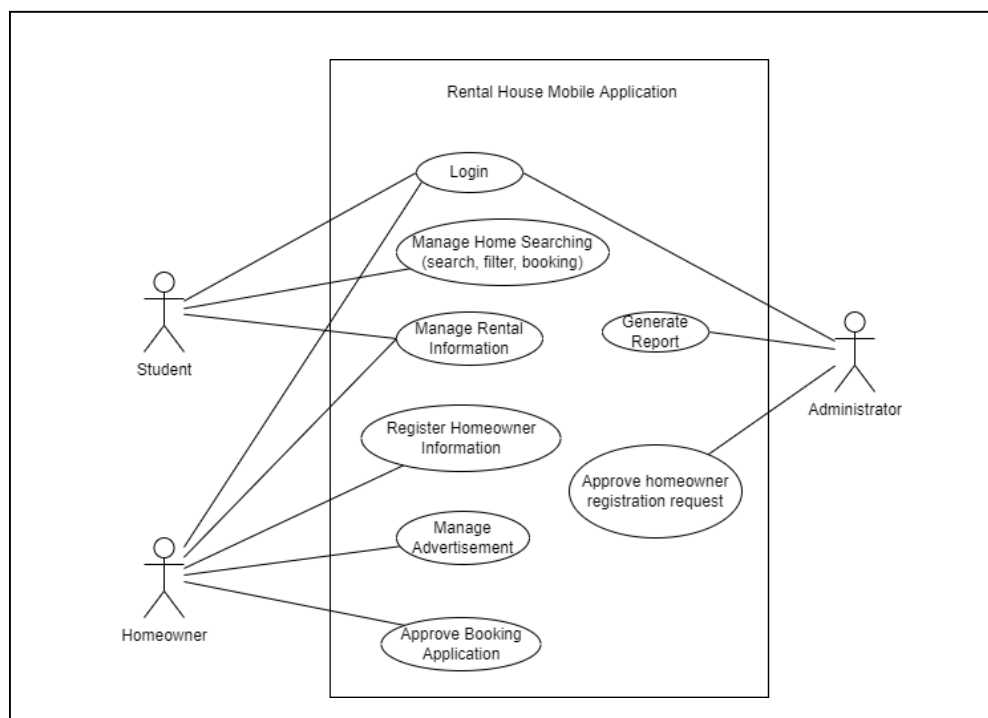
Module	Description
Login /Registration Module	The system should allow user to login into the system using registered username and password. The system should only allow a user to log in as a user with a valid username and password. The system should alert the user for any invalid input. The system should redirect user to that respective main menu upon successful login.
Advertisement Module	The system should allow homeowner to add, delete and update their advertisement The system should allow homeowner to see all the list of their advertisement The system should allow student to click on advertisement The system should allow student to “like” and comment on the advertisement
Search Module	The system should allow students to search for advertisement
Booking Module	The system should allow students to booking the house they want The system should allow students and homeowner to view the list of their booking

Module	Description
	The system should allow homeowner to accept/reject students' booking.
Profile Module	The system should allow students to see homeowners' profile. The system should allow homeowners to see students' profile The system should perform the information of the users .
Report Module	The system should allow admin to see the list of homeowner registered

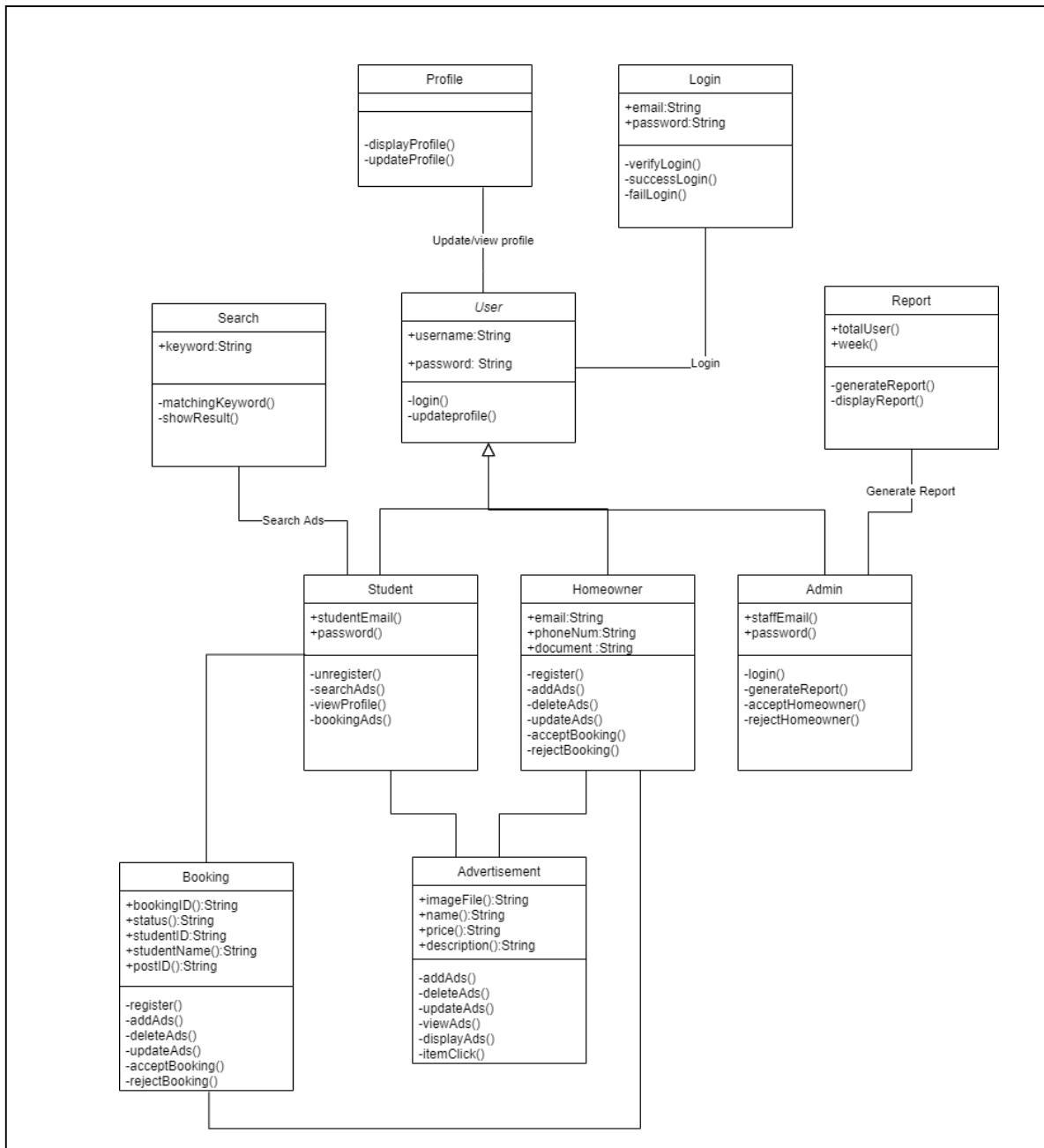
**Table 5: Non-functional requirements of the developed system**

Requirements	Description
Performance	The system should be usable at all times
Operational	The loading time required for the application is no more than 1 minute
Security	The system should be user friendly
Cultural and political	The system should be able to work on any mobile phone.

System design describes the overall structure or flow of the system including the functions of the system. Figure 1 shows a use case diagram that represents the entire activities of the house rental searching. Figure 2 shows the class diagram.

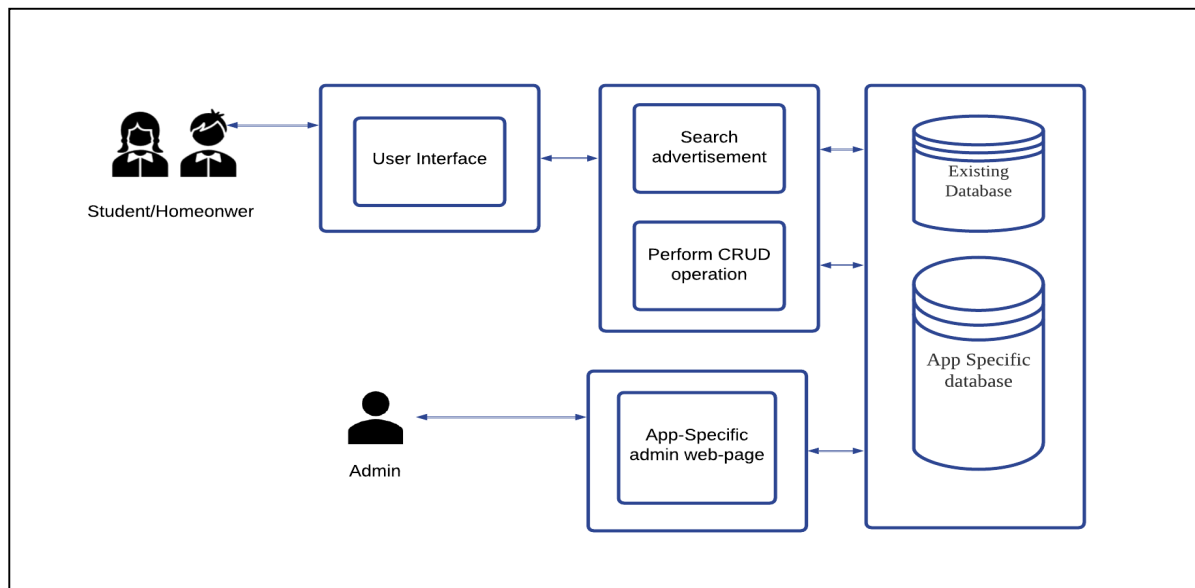


**Figure 1: Rental House Use Case Diagram**



**Figure 2: Rental House Class Diagram**

System architecture is a conceptual model that describes the structure and behavior of many components and subsystems, such as various software applications, network devices, hardware, and even other system hardware. Figure 3 is the system architecture for the House Rental UiTM Kota Bharu.



**Figure 3: System Architecture**

The database scheme for the House Rental Mobile application is listed as follows:

- i. Student (address, currentemail, imageprofile, major, studID, studemail, studmatric, studname, studphone, year).
- ii. Login (email, password)
- iii. Homeowner (address1, address2, email, id, imageprofile, name, occ, phone).
- iv. Admin (staff\_email, staff\_fax, staff\_name, staff\_pic, staff\_pos, staff\_tel).
- v. Advertisement (postID, address1, address2, bathroom, bedroom, build, desc, furnish, image, kitchen, location, park, price, size, title, type)
- vi. Booking (bookingID, status).
- vii. Report (repID, repDesc).

The design of the proposed system will be exhibited in the form of pictures. Design for the several parts of interfaces are shown in Figure 4 to Figure 10.



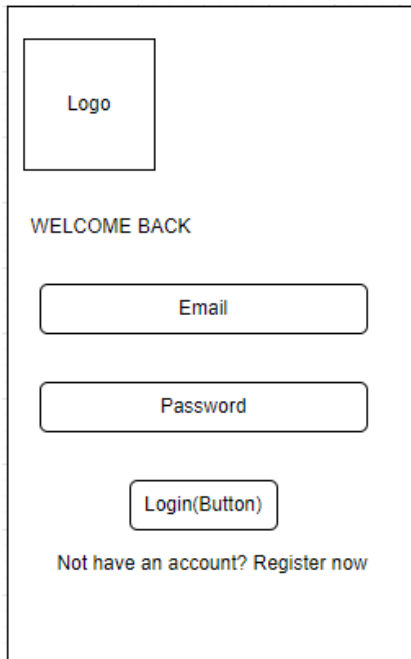


Figure 4: Login

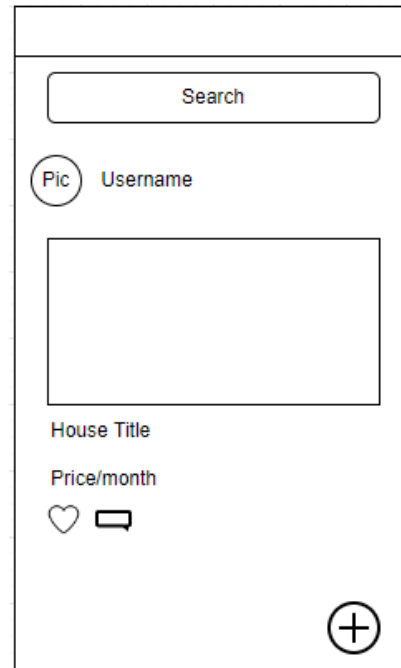


Figure 5: Home page

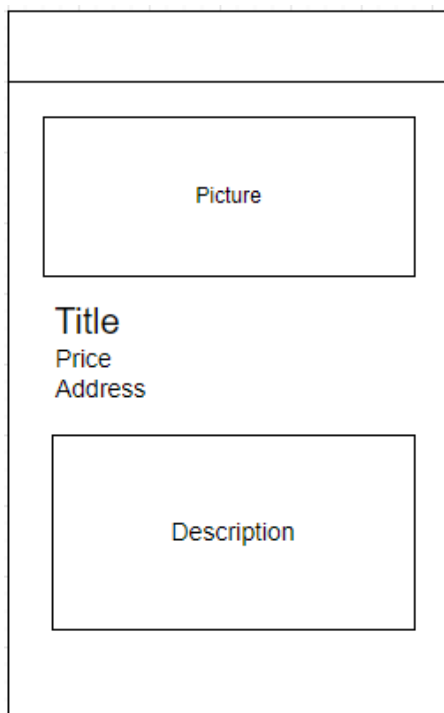


Figure 6: Advertisement page

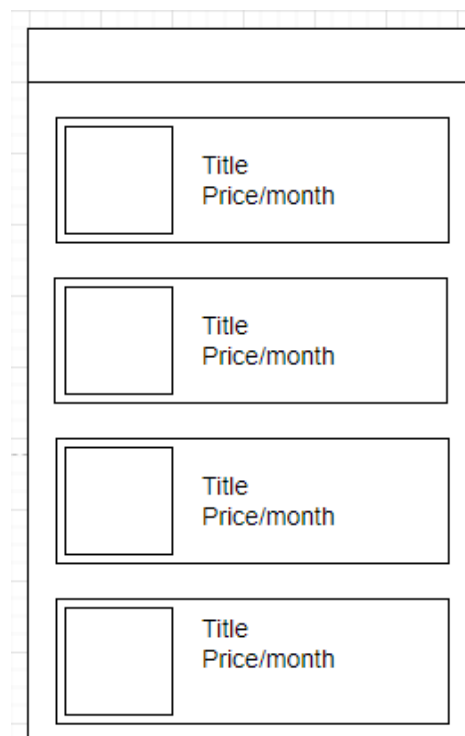


Figure 7: Advertisement list

House Title  
Price/month  
House ID

status(pic)

House Title  
Price/month  
House ID

status(pic)

House Title  
Price/month  
House ID

status(pic)

Figure 8: Student Booking Page

Student's name  
Student personal email

Accept Reject

Student's name  
Student personal email

Accept Reject

Student's name  
Student personal email

Accept Reject

Figure 9: Homeowner Booking Page

Homeowner name  
Phone num  
ID  
PDF File

Approve Reject

Homeowner name  
Phone num  
ID  
PDF File

Approve Reject

Homeowner name  
Phone num  
ID  
PDF File

Approve Reject

Figure 10: Homeowner Registration Request List

Figure 9: Homeowner Booking Page

#### 4. Results and Discussion

Testing is an important process that needs to be done as the system will soon be released. Testing process becomes imperative process to maintain a quality product running well [6]. The testing must be done in order to make sure all the requirement has been meet and to make sure the system work properly without any problem. The testing has been done using test case and also user acceptance testing.

##### 4.1 Test Cases

Test case is a document that includes set of test data, description and expected results develop for a particular test scenario in order to verify compliance against the specific requirements available in the list of the system requirements. Table 6 describes the test cases derived from system requirement specifications, description of test cases and the expected outcomes of the specific test case.

**Table 6: Test Cases**

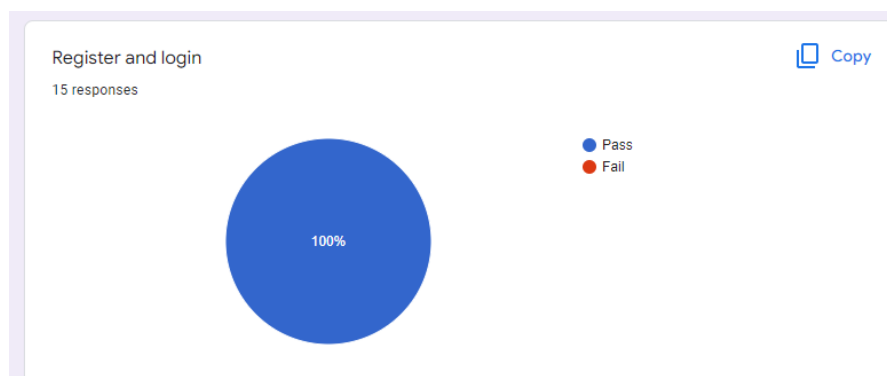
TEST CASE	SOFTWARE REQUIREMENT	DESCRIPTION	OUTPUT
STD_TEST_100	SRS_REQ_100	REGISTRATION AND LOGIN	PASS/FAIL
STD_TEST_100_001	SRS_REQ_101 SRS_REQ_103	User login into the system and show the error message if login invalid	PASS
STD_TEST_100_002	SRS_REQ_102 SRS_REQ_104 SRS_REQ_105	Users sign in into the system with a valid information and show error message if registration not successful.	PASS
STD_TEST_100_003	SRS_REQ_106	Admin approve/decline homeowner registration	PASS
STD_TEST_100_004	SRS_REQ_107	System store user information in database once registration successful	PASS
STD_TEST_200	SRS_REQ_200	HOMEOWNER PROFILE	PASS/FAIL
STD_TEST_200_001	SRS_REQ_201	System shows profile view	PASS
STD_TEST_200_002	SRS_REQ_202 SRS_REQ_203	Users edit and update profile.	PASS

TEST CASE	SOFTWARE REQUIREMENT	DESCRIPTION	OUTPUT
STD_TEST_200_003	SRS_REQ_204	Users click on “save” button to save the changes.	PASS
STD_TEST_200_004	SRS_REQ_205	System display error message if updated information is invalid	PASS
STD_TEST_200_005	SRS_REQ_206	System store updated information in database.	PASS
STD_TEST_300	SRS_REQ_300	BOOKING	PASS/FAIL
STD_TEST_300_001	SRS_REQ_301	System show available house advertisement	PASS
STD_TEST_300_002	SRS_REQ_302	Students choose desired house.	PASS
STD_TEST_300_003	SRS_REQ_303	Students book desired house.	PASS
STD_TEST_300_004	SRS_REQ_304	Students cancel booking	PASS
STD_TEST_300_005	SRS_REQ_305	System shows booking list.	PASS
STD_TEST_400	SRS_REQ_400	ADVERTISEMENT	PASS/FAIL
STD_TEST_400_001	SRS_REQ_401	Homeowner add new advertisement.	PASS
STD_TEST_400_002	SRS_REQ_402	Homeowner delete advertisement.	PASS
STD_TEST_400_003	SRS_REQ_403	Homeowner update advertisement.	PASS
STD_TEST_400_004	SRS_REQ_404	Homeowner enter house information.	PASS
STD_TEST_400_005	SRS_REQ_405	System store the information in database.	PASS
STD_TEST_400_006	SRS_REQ_406	System shows advertisement list.	PASS
STD_TEST_400_007	SRS_REQ_407	Student can click on advertisement posted	PASS
STD_TEST_400_008	SRS_REQ_408	Student can comment on advertisement	PASS
STD_TEST_400_009	SRS_REQ_409	Student can “like” the advertisement	PASS
STD_TEST_500	SRS_REQ_500	SEARCH	PASS/FAIL

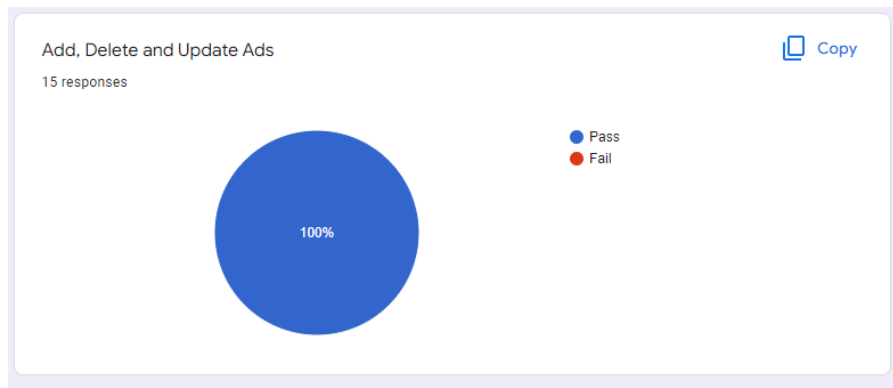
TEST CASE	SOFTWARE REQUIREMENT	DESCRIPTION	OUTPUT
STD_TEST_500_001	SRS_REQ_501	Users can click on search field	PASS
STD_TEST_500_002	SRS_REQ_502	Users can click on filter search button	PASS
STD_TEST_500_003	SRS_REQ_503	User can see the categories for search	PASS
STD_TEST_500_004	SRS_REQ_504	User can type in keyword	PASS
STD_TEST_500_005	SRS_REQ_505	System show result of the search	PASS
STD_TEST_600	SRS_REQ_600	REPORT	PASS/FAIL
STD_TEST_600_001	SRS_REQ_601	Systems show report page.	PASS

#### 4.2 User Acceptance Testing

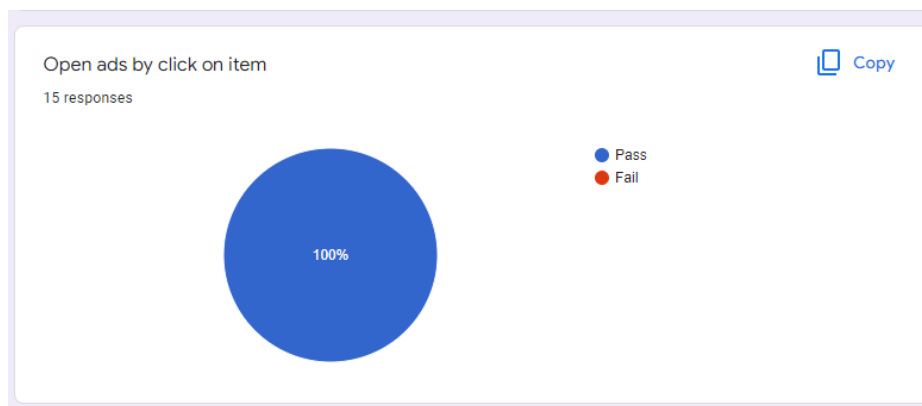
User acceptance testing is performed to ensure the system meets client's expectations and requirements. The system deliverable or prototype are accessed by clients as well as the end users of the system to observe the users' activities and business operations. User Acceptance Testing is conducted with the aim of developing confidence of the user in the software product [7]. 15 respondent was choose to participate in the testing. Feedback regarding the testing are collected from end users using Google Form. This feedback is collected in order to make further improvements on the prototype before delivering the final products or system. Figure 5.20 show the user feedback about registration and login.



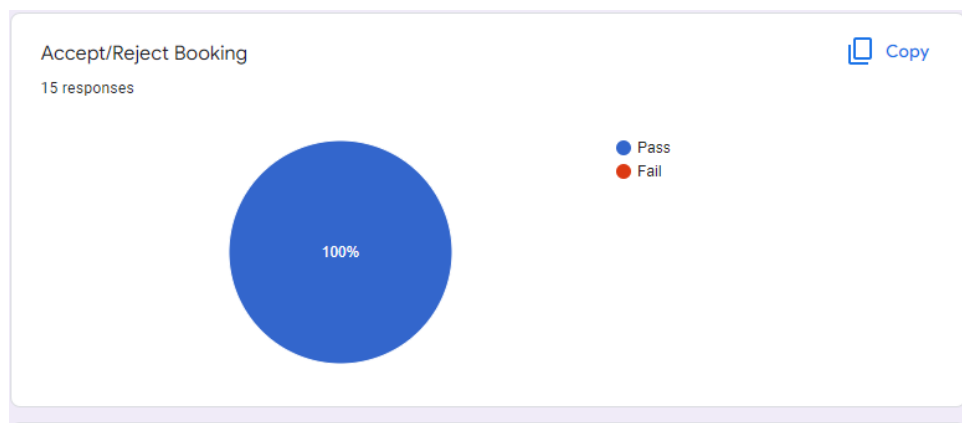
**Figure 11: Register and Login**



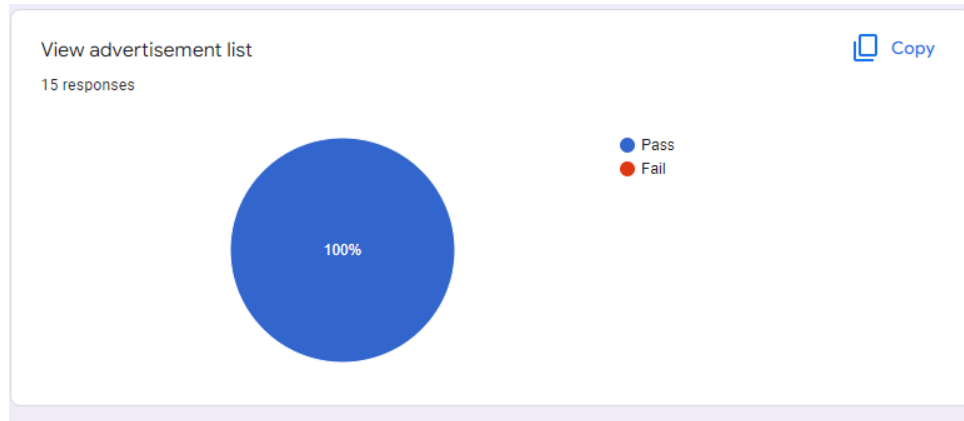
**Figure 4.12: Add, Delete and Update Ads**



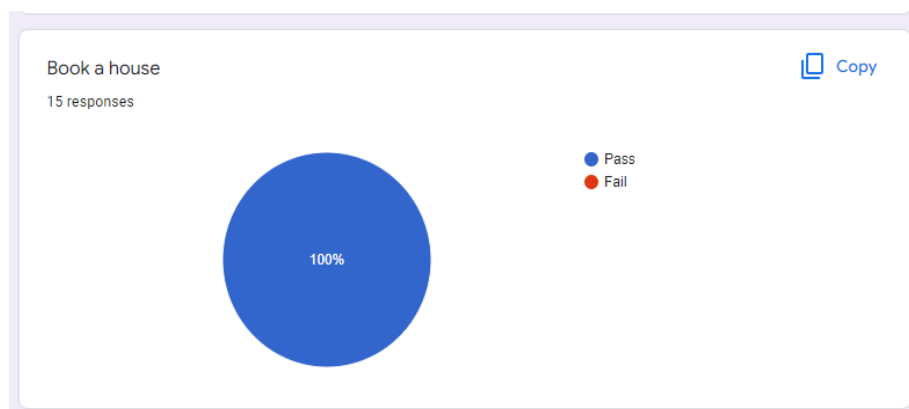
**Figure 4.13: Open ads by click on item**



**Figure 4.14: Accept/Reject Booking**



**Figure 4.15: View Advertisement List**



**Figure 4.16: Book a House**

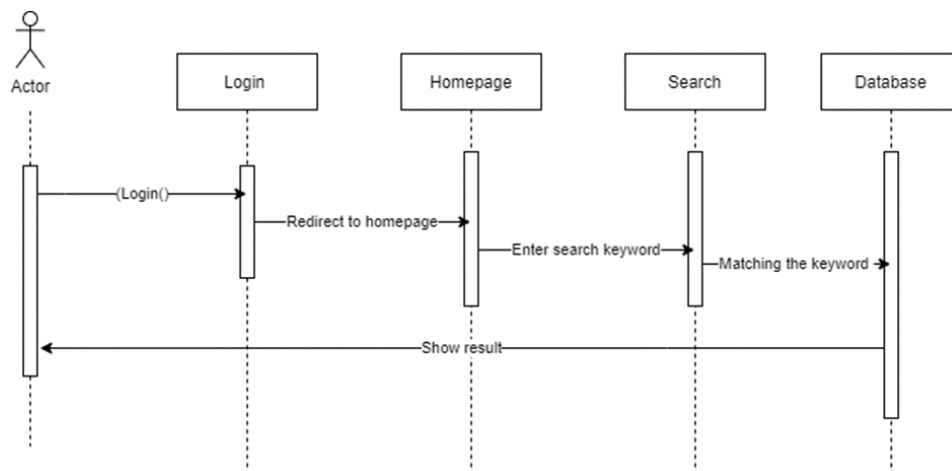
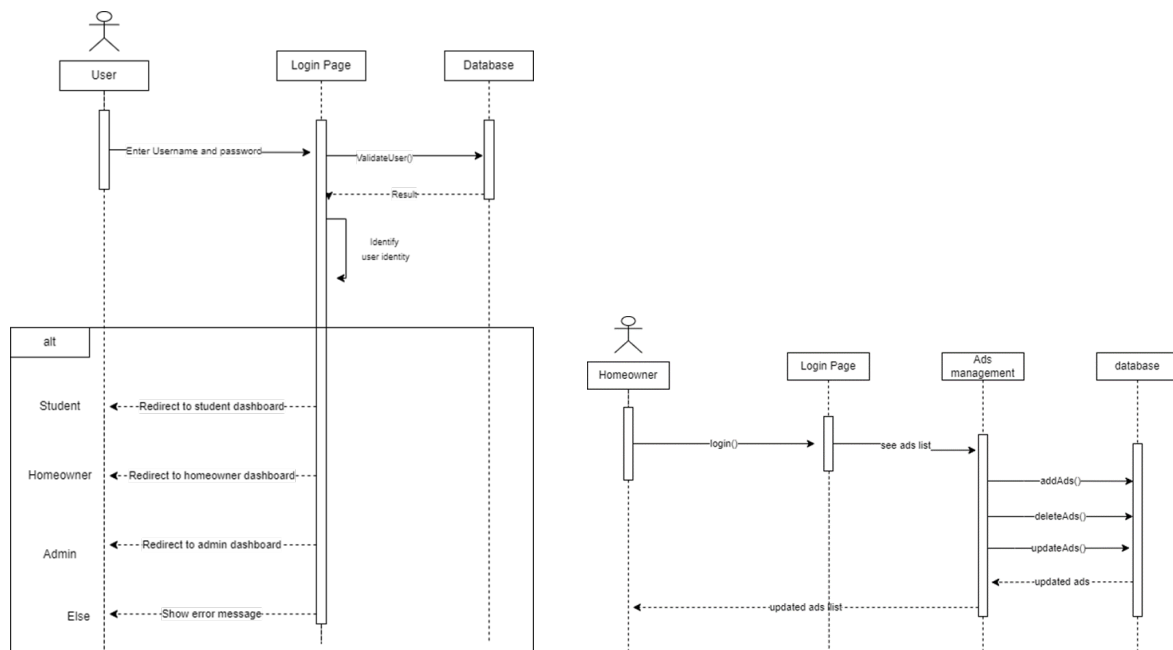
## 5. Conclusion

Rental House UiTM KB is a mobile-based application that designed and developed to help students of UiTM KB to find the house to rent. This project has shown that how human today rely on technology to facilitate their need and organize their work. Student can search or survey for house easily without need to waste time, energy and money. Student also can book for the house they want easily without need to contact the homeowner. Homeowner also can view all the advertisement they have posted and can update the advertisement anytime. Although the objectives and system requirements of the system have been achieved and fulfilled, there are still several disadvantages or limitation that could happen through the system. For example the system only allow homeowner that age 18 to 70 to register into the system. Other than that, user are not allow to create new account using same email. Besides that, users cannot make a deposit or pay the payment online since the system does not have the online payment function. Overall, the system already met the requirements and the system working properly. The system is developed using prototyping approach as a development cycle. The software use to develop this system is Android Studio IDE. While for the database the system used Firebase database to store all the data.

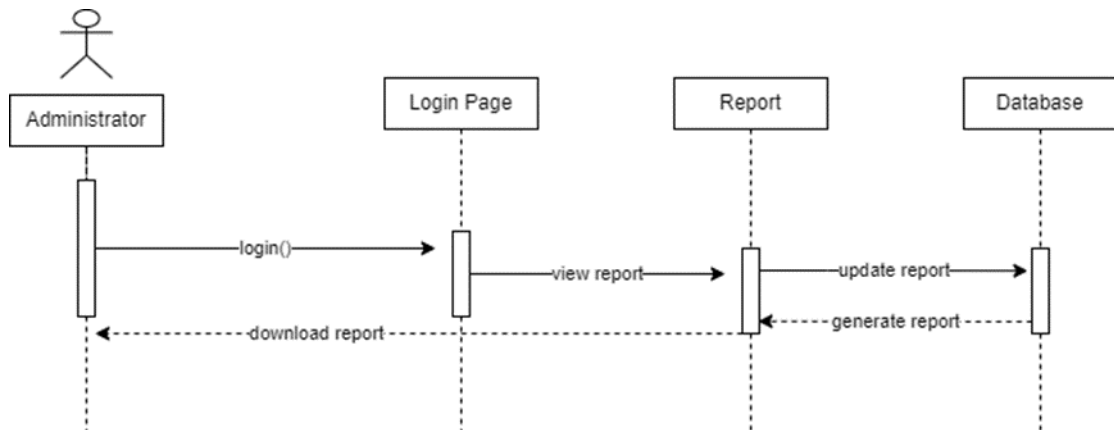
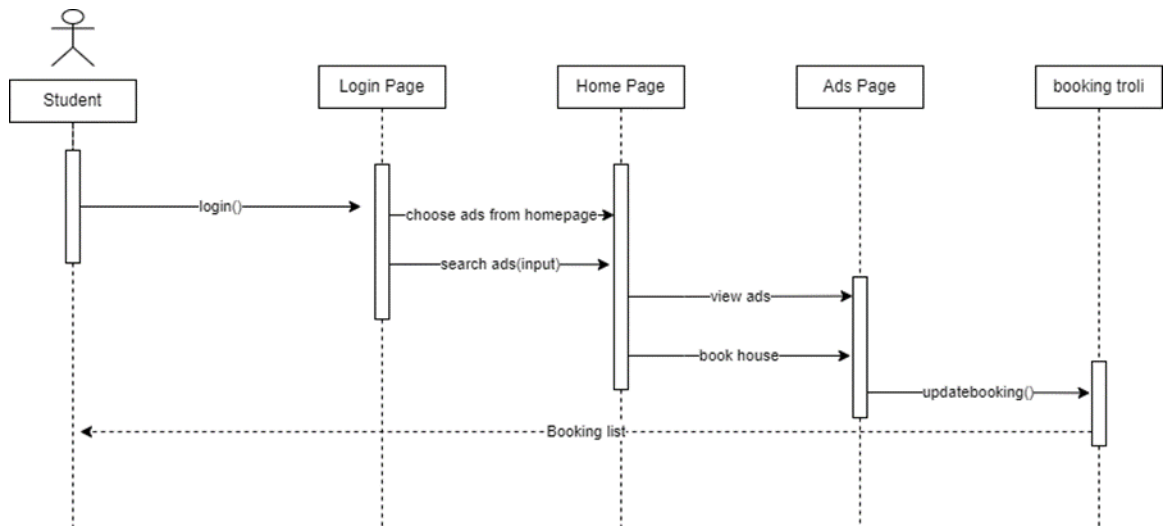
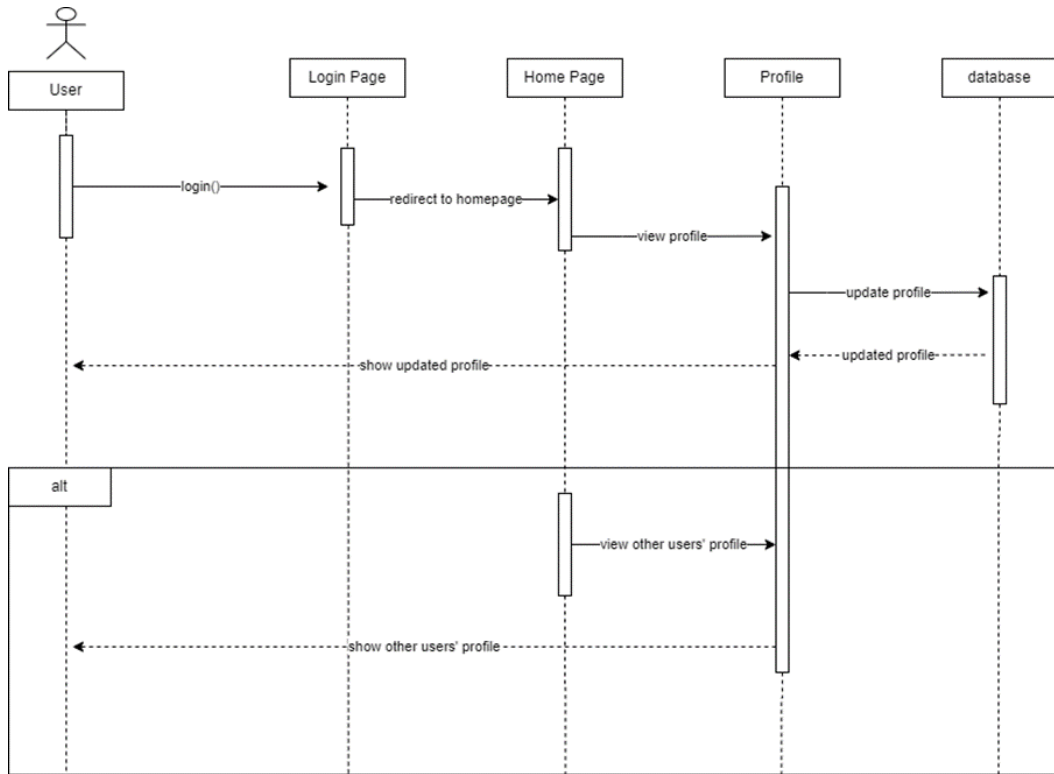
## Acknowledgment

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## Appendix A (Optional)







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