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Booking System and Procedures for UTHM House Rental Application in Parit Raja

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Abstract: UTHM House Rental Application (UTHM HRApp) is a mobile-based application that will act as a third-party software mainly to help ease the business processes of students making rent in Parit Raja. The project will adapt with throwaway prototyping methodology. The application is an initiative for *Kolej Kediaman Luar Kampus* (KKLK) to oversee *Pelajar Tanpa Asrama* (PTA) students more conveniently and provide them with necessary rent records as a reference for future usage. The application will cover house rents inside the proximity of the Parit Raja area only. The application will be designed using an object-oriented approach. The app will be developed by using Flutter Technology. It uses dart language as the main programming language. Firebase is considered to be the database handler for this project. It is with high hopes that the UTHM HRApp will be used by students to have a better experience renting houses in Parit Raja.

Keywords: PTA students, landlords, Flutter, dart, Firebase, UTHM HRApp

1. Introduction

Before delving into the main details of the project, it is compulsory to have a brief knowledge of what the project is about. Therefore, to explain further, the existing process of renting a house in Parit Raja and the issue faced during the process is crucial to pinpoint.

The existing process is by joining a WhatsApp group and asking around if there is any vacancy on any rental property. A few individuals will tend to the rent seeker and a slight chance that they will get landlord contact with vacant rent. Even if they succeeded, the rent option provided may not satisfy them.

The main issue with renting with this modus operandi is students can get scammed easily by "landlords". Reports of scammed students are recorded being around 20 reports this semester according to the Deputy Director 2 of *Kolej Kediaman Luar Kampus* (KKLK). This will hugely impact the student's mental fortitude to continue being a proud UTHM student.

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Thus, the users involved in this project are as follows; PTA students and *Kolej Kediaman Luar Kampus* (KKLK) staff. Documents that will contribute to the development of the application are Tenancy Agreement from landlords that follows the National Land Code (Act 56 of 1965). Storing data is used by using the Firebase Cloudstore. The main software used for the project is Visual Studio Code and Figma (for its UI presentation only).

The solution provided is to filter out real landlords carefully and attentively. A collaboration with *Kolej Kediaman Luar Kampus* (KKLK) staff is the main key to the success of the project. The app will only promote rental property from trusted landlords. A scam by these landlords can be reported in the application and further action will be taken.

2. Related Works

2.1 UTHM House Rental Application

For a while searching the vast space of the internet, only one official related work is found within the published space of documents namely the http://publisher.uthm.edu.my website. Table 1 below shows the current found document related to the current UTHM HRApp project.

Table 1: Previous Study by Mohd Rafiq Misyam

Author(s): Year	Project Approach	System's Programming Language
Mohd Rafiq Misyam, 2021	Structured Approach	Hypertext Pre-processor (PHP) Hypertext Mark-up Language (HTML) MySQL database

2.2 Comparable Existing System

Three existing systems including the said related work system mentioned in 2.1 was investigated. Table 2 gives a summary of the features that are available in the existing system.

Table 2: Comparisons between Existing Systems

Modules	Speedhome	PropertyGuru Malaysia	2021 House Rental Management System	UTHM HRApp
System Type	Web-based Mobile App	Web-based Mobile App	Web-based	Mobile App Web-based
Log In and Sign Up Module	Available	Available	Available	Available
View Houses Module	Available	Available	Available	Available
Search Houses Module	Available	Available	Not available	Available
Filter Houses Module	Available	Available	Not available	Available

Modules	Speedhome	PropertyGuru Malaysia	2021 House Rental Management System	UTHM HRApp
Rent House Module	Available	Available	Available	Available
Set New Landlord Module	Available	Available	Not available	Available
Set Rent House Module	Available	Available	Available	Available
Contact Landlord	Available	Available	Not available	Available
Manage Students and Landlords Module	Not available	Not available	Available	Available
Submit Complaint	Available	Available	Available	Available
Manage Complaint	Available	Available	Available	Available

3. Methodology

The throwaway prototyping model is used in the current research to develop the house rent system with the purpose of ensuring the system can be iterated along the application development. Throwaway prototyping methodology is similar to prototyping methodology. However, the prototyping is done in a more experimental way and is discarded before the actual system is developed. The methodology chosen is categorized as an iterative development.

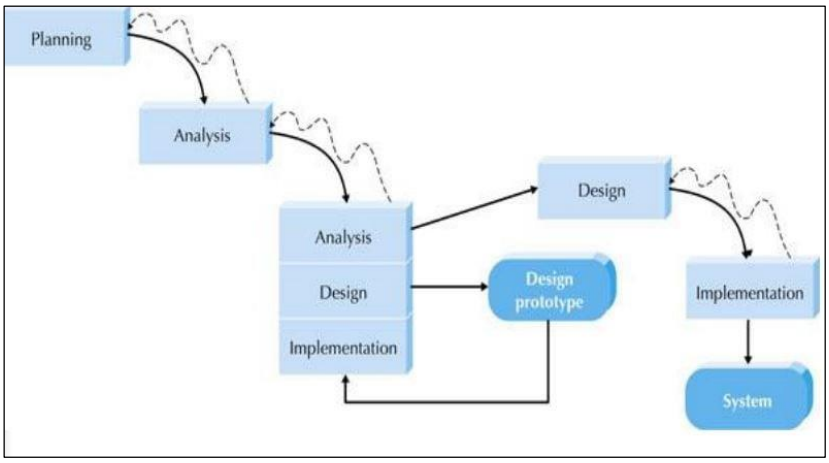

Figure 1: Throwaway Prototyping (Hideo Kodama, Charles Hull 1980)

3.1 Throwaway Prototyping Phases

Table 3 shows the lists of activities taken during each of the phases listed in the prototyping model for the UTHM House Rental App project.

Table 3: Activities and Phases of Throwaway Prototyping

Phases	Activities
Planning Phase	Collect requirements for developing the system including the existing systems problems, project scope, objective and the methodology for the project. Planning the Gantt Chart for the project.
Analysis Phase	Analyse all relevant information collected during Planning Phase. Develop a literature review on a couple of important aspects between the module in existing system and other similar systems. Choosing a suitable programming language for project. Planning a suitable platform for the project.
Iteration Analysis Phase	Analyse all errors and new requirements during the previous iteration. Record any errors and new discoveries along the iteration process.
Iteration Design Phase	Design and redesign use case diagram, activity diagrams and class diagram based on previous analysis phase. Design and redesign database structure and the user interface of the project.
Iteration Implementation Phase	Develop and redevelop code for the system. Take note for each errors and bugs found on each iterations.
Design Phase	Finalize design for use case diagram, activity diagrams and class diagram based on previous iterations. Finalize database structure and the user interface of the project.
Implementation Phase	Finalize code for the system. Document for each errors and bugs fixed. Finalize the prototype.
Testing Phase	The system is tested robustly to detect other erros and bugs. To ready the system for publish.

4. Results and Discussion

This section discusses the functional requirements and non-functional requirements of system, structured approach system design included the use case diagram, activity diagrams and class diagrams. In addition, system user interface design will also be featured in this section.

4.1 Functional Requirements

Table 4 shows the functional requirements for UTHM HRApp. It will be listed as modules accompanied with its main functions. The modules states are Log In and Sign Up, View House, Wish

House, Rent House, Manage Rent House, Manage Landlords, Ban Students, Submit Complaint, and Manage Complaint.

Table 4: Functional Requirements of UTHM HRApp

Modules	Functions
Log In and Sign Up	Students can Sign Up as new users. Students can Log In as registered users. Admin can Log In as Registered admins however unable to register themselves. To register new Admin, the new admin must contact the developer for registration.
View House	Students can view houses on the homepage. Submodules included are filter house and search house.
Wish House	Students able to save interested houses as future reference as Wished House. Wished House can be removed and added anytime.
Rent House	Students able to rent final chosen house. Upon rent, a status of approve rent or cancel is provided. Contact Landlord is included as submodule.
Submit Complaint	Students can submit complaint from dissastifaction of rental property or landlord's services.
Manage Rent House	Admin can add, update or delete rental properties.
Manage Landlords	Admin can add, update or delete landlords.
Ban Students	Admin can ban or unban students. Admin cannot edit or delete students. To delete a student permanently, Admin must contact developer to proceed.
Manage Complaint	Admin can update status of complaints from students. Admin can delete complaints if seem necessary.

4.2 Use Case Diagram

Figure 2 below shows the Use Case Diagram for the UTHM HRApp project. Provided modules as mentioned in Table 4. Users of the system are Admin and Students.

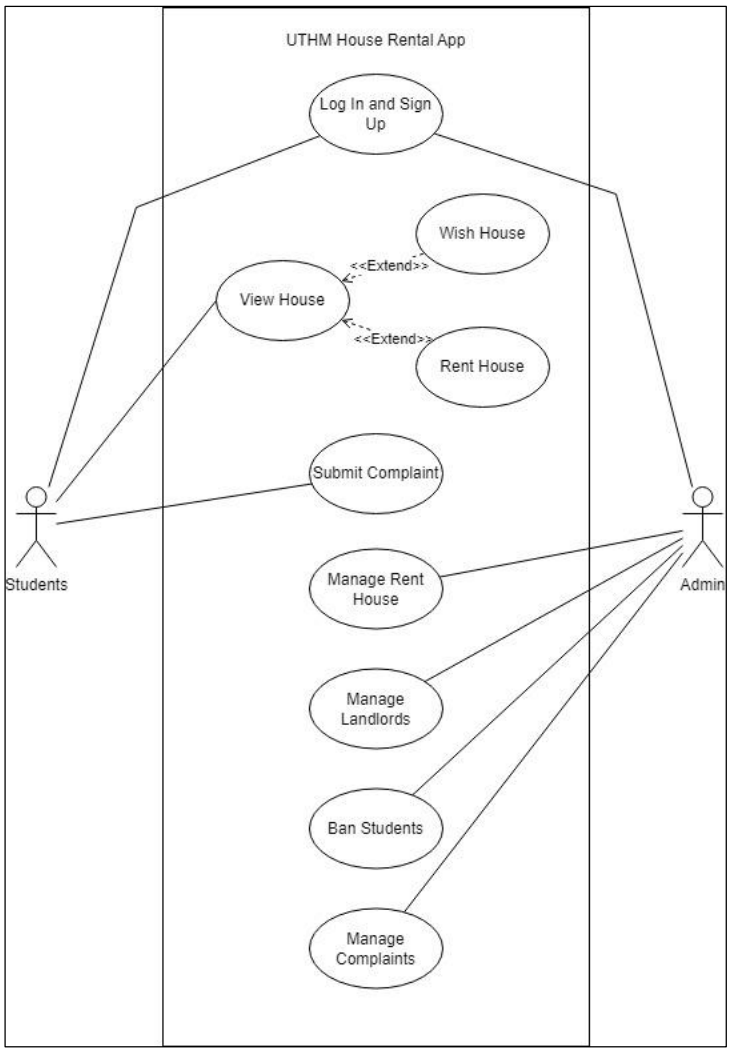

Figure 2: Use Case Diagram UTHM HRApp

4.3 Class Diagram

Figure 3 shows the Class Diagram for the UTHM HRApp project. It shows several classes namely, User, Student, Admin, Landlord, Rental House, Address, Details, Furniture, Rented House, Wished House, and Complaints.

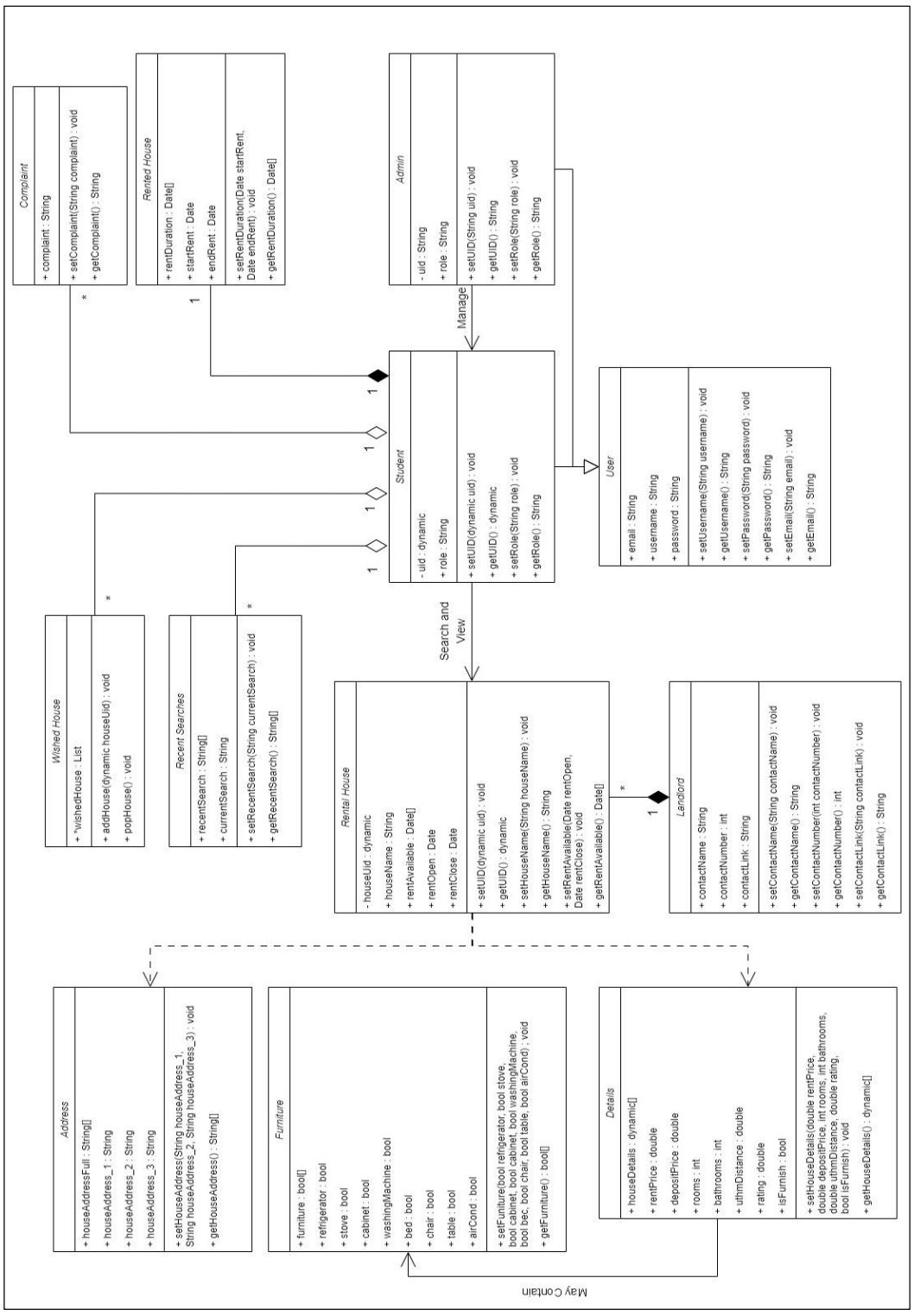

Figure 3: Class Diagram UTHM HRApp

4.4 User Interfaces

Figure 4 to 9 below shows user interfaces that is implemented into UTHM HRApp.

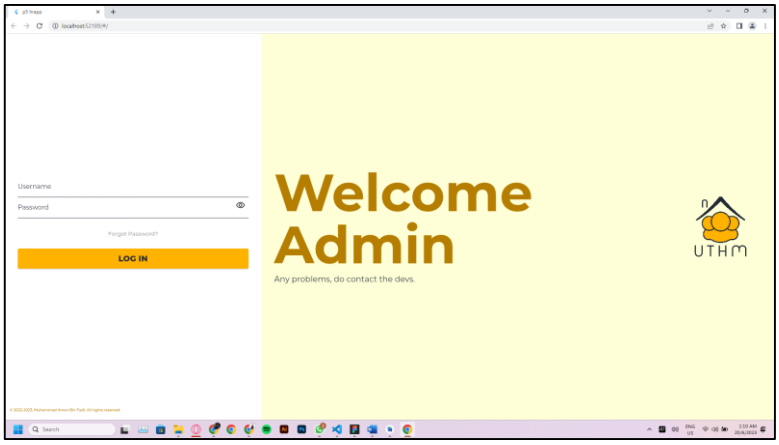

Figure 4: Log In Admin

Figure 4 shows the Log In Admin Page that is on the webpage. Admin can log in and also click forgot password if admin had forgotten their password.

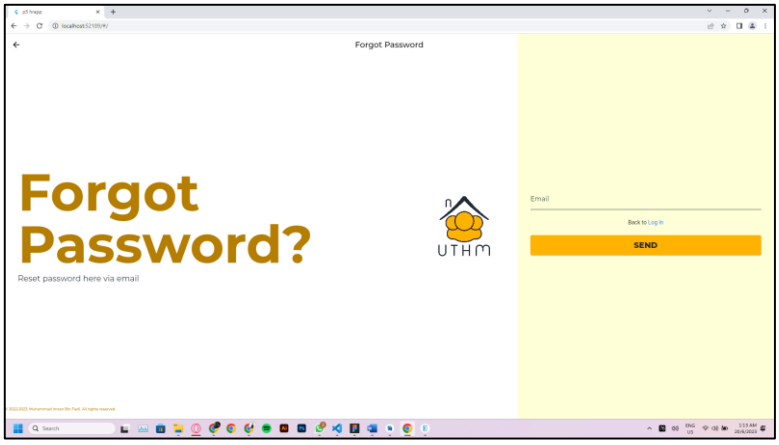

Figure 5: Forgot Password

Figure 5 shows Forgt Password Admin Page that will send a password reset email notification to the administrator. Upon clicking the email notification, admin can reset new password.

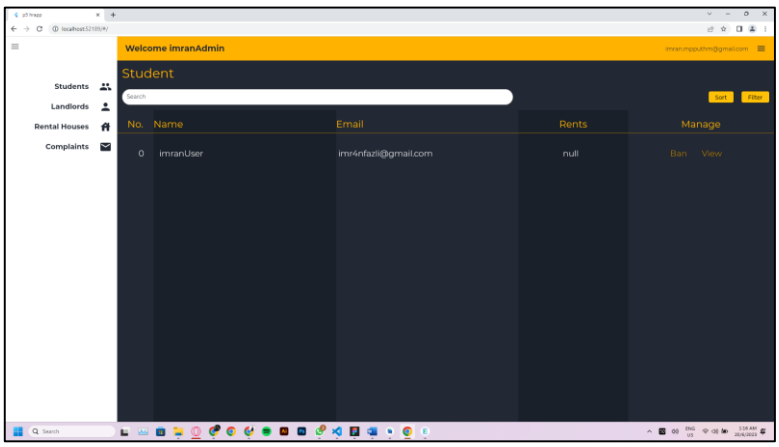

Figure 6: Manage Students, Landlords, Rental Houses and Complaints

Figure 6 shows the basic admin home page that includes a side navigation bar of Students, Landlords, Rental Houses, and Complaints.

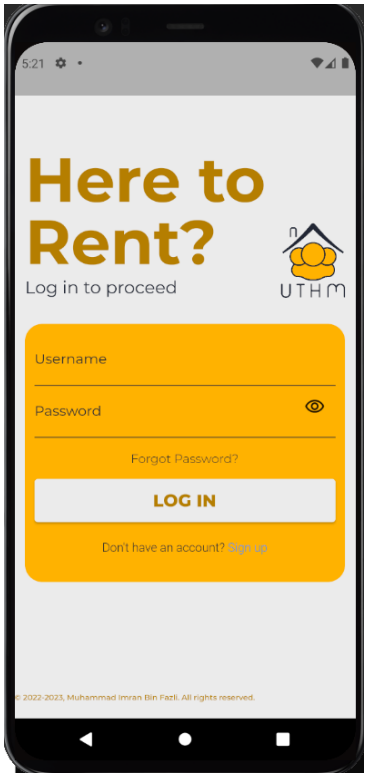

Figure 7: Log In Student

Figure 7 shows the Log In User Page for users to log in into the application in mobile. User can also redirect to Sign Up Page and Forgot Password Page if deemed necessary.

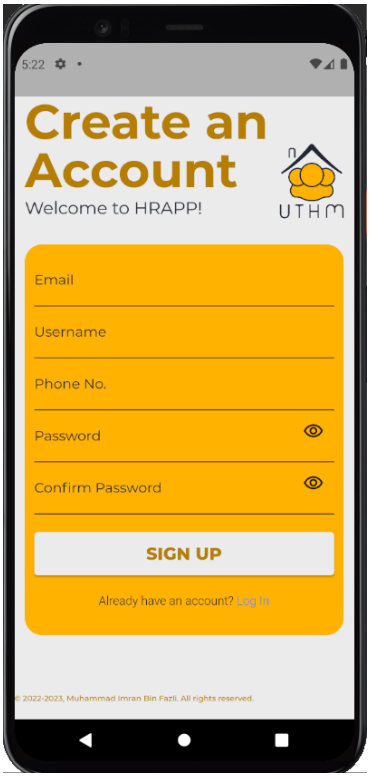

Figure 8: Sign Up

Figure 8 shows the Sign Up User Page that users can register new account. The registration also implements validations that prevent users from entering wrong information.

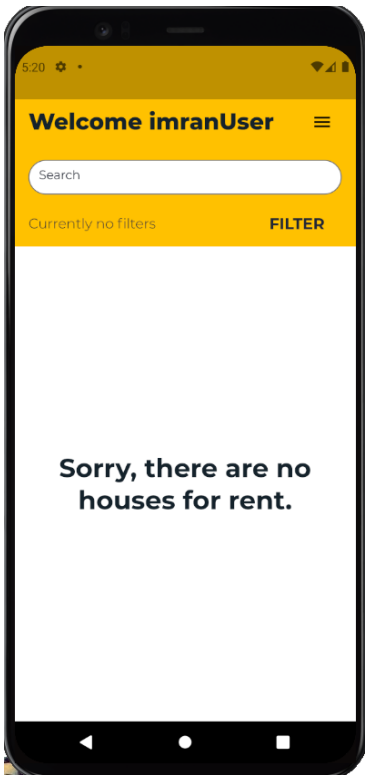

Figure 9: View House

Figure 9 shows the default home page for the application UTHM HRApp. The figure above currently has no houses to view as there are no landlords to view.

4.5 Functionality Testing

Functional testing is used to ensure UTHM HRApp produces the same results that the end-user requires. It entails assessing and comparing each software functional requirements to the business processes. Furthermore, functional testing verifies the software's usefulness and compatibility with other devices.

Table 5: Test Plan for Log In and Sign Up Module

No.	Test Cases	Expected Output	Actual Result
1	Users input data for registration are validated	Sign Up is successful and a snackbar will show ‘Success’	As Expected
2	Users input data for logging in are validated	Log In is successful and a snackbar will show ‘Success’	As Expected
3	Users have incomplete data inputs	Log In or Sign Up is unsuccessful and snackbar will show ‘Failed’	As Expected
4	Users requests a reset password email	An email will be sent to the user’s email account	As Expected

No.	Test Cases	Expected Output	Actual Result
5	Users validate account by email	Users account will be validated an is able to use the application	As Expected

Table 6: Test Plan for View House Module

No.	Test Cases	Expected Output	Actual Result
1	Users scroll the screen to view more houses	The screen moved and more houses are viewed	As Expected
2	Users view a selected house	Page is redirected to another page with the house's details	As Expected
3	Users search a house	Page refreshes and loads in match results	As Expected
4	Users filter houses	Page refreshes and loads in match results	As Expected
5	Users slide to view more options	A drawer will be loaded	As Expected

Table 7: Test Plan for Wish and Rent House Module

No.	Test Cases	Expected Output	Actual Result
1	Users tap heart icon to add to wishlists	The wished houses section for the user will be updated	As Expected
2	Users tap 'RENT NOW' on the house page to start rent	The rent houses section for the user will be updated to 'Pending Status'	As Expected
3	Users update status for the rent house as 'Accepted' or 'Declined'	The rent houses section for the user will be updated to 'Accepted' or 'Declined' corresponds to the users decission	As Expected

Table 8: Test Plan for Submit Complaint Module

No.	Test Cases	Expected Output	Actual Result
1	Users tap 'Contact Us' option in drawer menu	Submit Complaint page will load	As Expected
2	Users enter valid data and a complaint	The complaint will be sent to the admin via email	As Expected

Table 9: Test Plan for Manage House, Landlords, Students, and Complaints Module

No.	Test Cases	Expected Output	Actual Result
1	Admin ban a user	User is banned	As Expected
2	Admin unbanned a user	User is unbanned	As Expected
3	Admin add new landlord	A landlord and a house will be added	As Expected
4	Admin add new house	A house will be added	As Expected
5	Admin delete a landlord	The landlord and houses by the landlord will be deleted	As Expected
6	Admin delete a house	The house will be deleted	As Expected
7	Admin reply a complaint	'Reply to Complaint' email will be sent to the user's email	As Expected
8	Admin archive a complaint	The complaint is archived	As Expected
9	Admin delete a complaint	The complaint is deleted	As Expected

4.6 User Acceptance Testing

User Acceptance Testing (UAT) for UTHM HRApp is a testing in which 12 users verifies and accepts the software system before it is published. After functional, integration, and system testing, UAT is performed in the final step of testing. In Figure 10, 11, 12, 13, 14, and 15, Scale 1 indicates that the user is strongly unsatisfied with the features and Scale 5 indicates that user is strongly satisfied with the features.

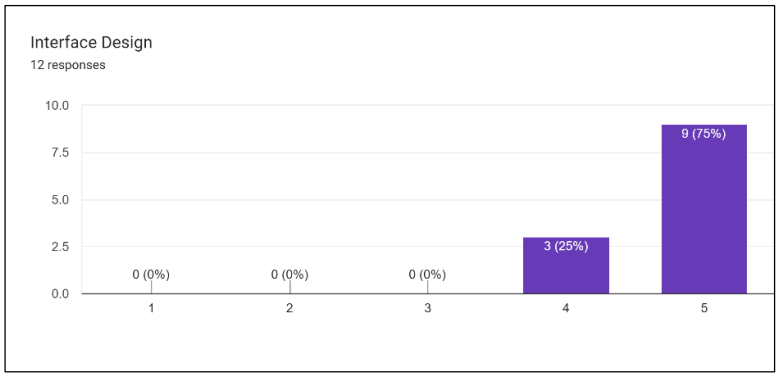

Figure 10: Interface Design Evaluation

Figure 10 shows the interface design evaluation. It is based on the overall design for the design interface and the layout of the application.

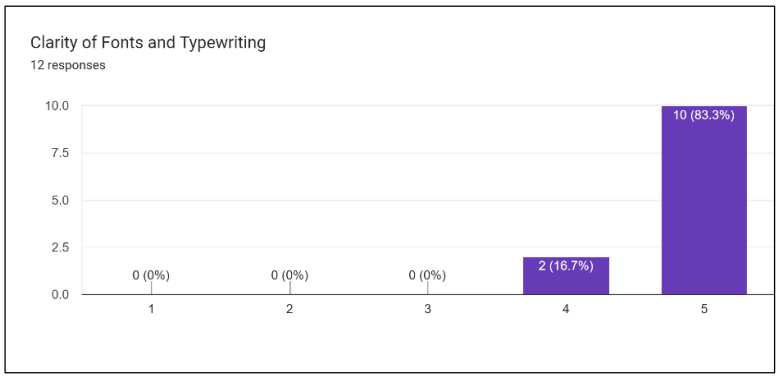

Figure 11: Clarity of Fonts and Typewriting Evaluation

Figure 11 shows the clarity of fonts and typewriting evaluation. It is based on the fonts used for the application and the content written in the application.

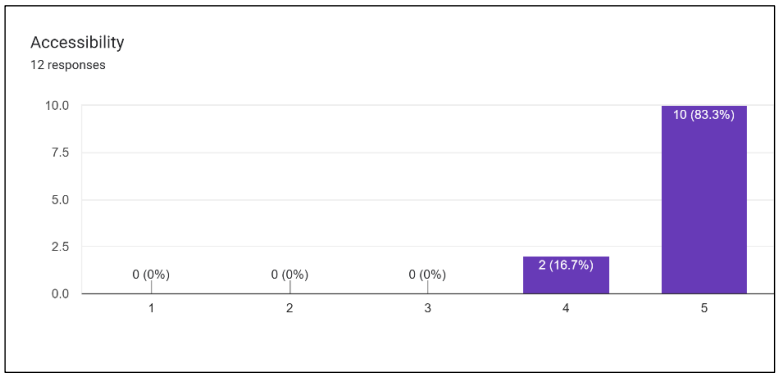

Figure 12: Accessibility Evaluation

Figure 12 shows the accessibility evaluation. It is based on the accessibility of certain page directories and other features such as search and filter.

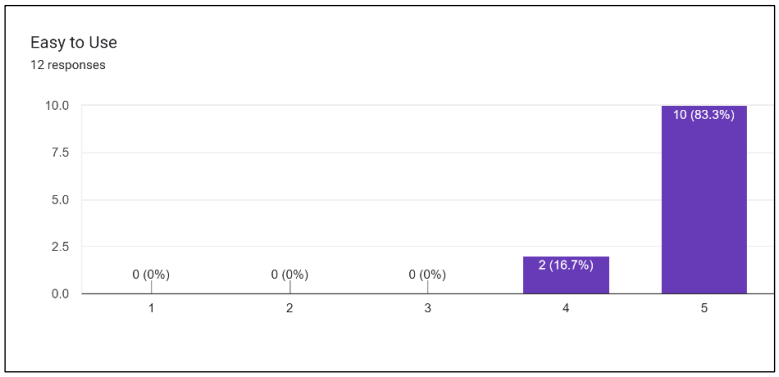

Figure 13: Easy to Use Evaluation

Figure 13 shows the easy to use evaluation. It is based on how long does it take for the user to understand on how to navigate the pages of the application.

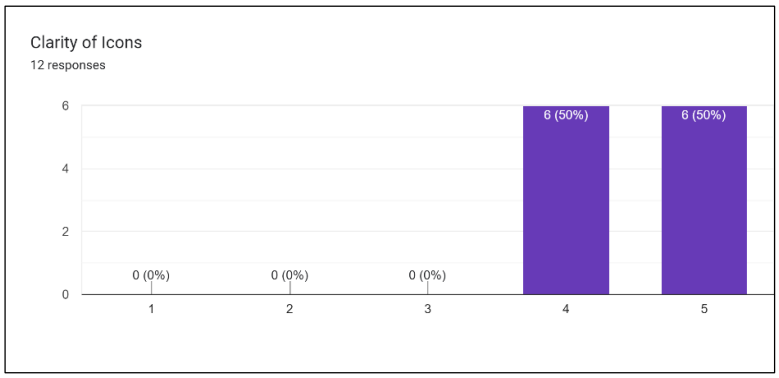

Figure 14: Clarity of Icons Evaluation

Figure 14 shows the clarity of icons evaluation. It is based on the icons used on certain features of the application that is suitable for the user to understand what the feature does.

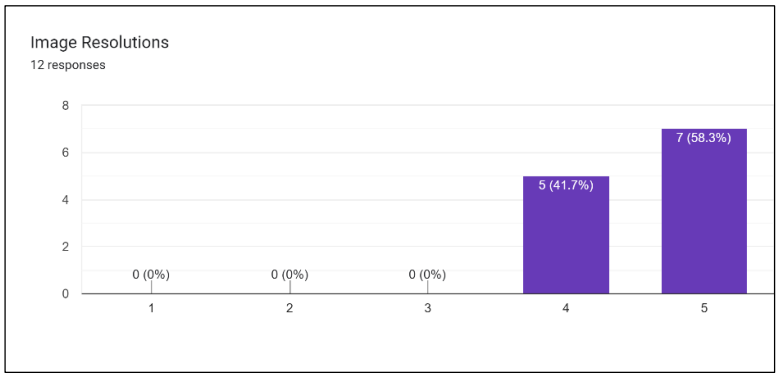

Figure 15: Image Resolutions Evaluation

Figure 15 shows the image resolution evaluation. It is based on how the user perceived the house images. It varies from able to see details to unable to load the image properly due to certain circumstances.

5. Conclusion

In conclusion, the UTHM HRApp has several advantages such as it can help students to rent houses that is considered legit and not a hoax. Students can quickly save a list of promising houses as future references. The app also hugely contributes in records rent data from students. However, there are some

limitations of this application such as it will only present its layout in portrait mode. Other than that, the application doesn't have its landlords as its user due to experience and age gap of the user. Landlords are surveyed and they find that using an application for management may hinder their business processes. Hence, some recommendation of improvement in the future can be made such as improve the user interfaces design and expand its use through the development of desktop application that can be applied to this prooject. UTHM HRApp hopefully can be a huge help to UTHM students to help them rent houses in the future.

Acknowledgement

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