Applied Information Technology And Computer Science Vol. 0 No. 0 (2000) 1451-1469

AITCS

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/aitcs
e-ISSN :2773-5141

Room Renting Management System

Iu Chin Shee[1], Mohd Zaki Mohd Salikon[1*]

[1]Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

DOI: https://doi.org/10.30880/aitcs. 2022.03.02.090
Received 24 August 2022; Accepted 02 November 2022; Available online 30 November 2022

Abstract: This study aimed to discuss the development of an online management system for the Room Renting Management System. The advantage is to enable the business owner to view the total rental and the new payment received in line graph. The business owner is also able to view the total bill of the owner and tenant through the month. In this system, the waterfall model is used for the whole system. It involves six processes: requirement analysis, system design, implementation, system testing, system deployment, and system maintenance. Throughout the development process, this system takes an object-oriented approach and uses visual modelling extensively. Rapid PHP 2020 was used to develop the programming code, while HeidiSQL was used to store the data. This system design should ensure that the system is completely functioning, user-friendly, and completed within the specified time frame. The development of this system will encourage the admin to view all the details just right on the dashboard, and the significance for the user can make payment directly from the system. By the end of the project, a new room renting management system has been developed and ensures every function can be used correctly without an error.

Keywords: Room Rental, Waterfall Model, Web-Based System, Object-Oriented Approach

1. Introduction

In this modern era, it is undeniable that an advance in technology can help in improves our life. Most people will find information needed from the internet instead of books and newspapers. As the pandemic of COVID-19 has ended yet, everyone is afraid to meet or close contact with other people. Nowadays the number of cases of COVID-19 in Malaysia is rapidly decreasing as there are more than 90% adult population is fully vaccinated according to (The Star/Asia News Network, 2021). Most of the manufacturing sector companies and the industrial place are allowed to resume their operations. So, the staffs and workers need to plan or find a nearby room rental at their nearby workplace.

As the information found to from the internet, there are image, description, location, and accommodation of the room. Most business owners cannot handle the details of their owner and tenants as there're a huge number of documents and filing that need to be kept. Hence, there is a need to develop a room renting management system to solve the problems of the business owner. When there`s a large amount of data, the manual method is not recommended because the number of tenants will be increased

*Corresponding author: mdzaki@uthm.edu.my

when the business expands. Management system development is very important because it helps the business owner to generate total rental, the total payment received, the total number of expenses bill, total expenses amount, total expenses payment, the total number of owner bill, the total amount of owner, the total payment to the owner, number of tenants, the total amount of tenant, total payment from the tenant, total profit earning, total profit payment and total profit.

2. Literature Review

Leads Connect Consultancy was founded in the year 2018 by Mr. Chin Voon Chung and colleagues. Leads Connect Consultancy is a small company that consists of 2 workers such as Mr. Chin Voon Chung as CEO of the company and Mr. Cheam Kar Fatt as Marketing Manager. This company is located at Jalan Tun Razak, Kuala Lumpur. The vision of this company is to encourage more large and medium-sized enterprises. The problem can be solved easily even they are not around, reduce the number of the salesman, without any help any of the administrative assistants so that they can easily collect lists, send information, and quickly reach sales targets. The mission of this company is to collaborate with our clients in their continued success. Create highly innovative and business-centered by utilizing the latest technologies. From the year 2018 to 2021, Leads Connect Consultancy had achieved a total of 15 units and 70 rooms located in the Klang Valley area by the whole unit from the owner and rent to the tenant.

2.1 Data Management System

Data management is the act of obtaining, storing, and using information in a secure, efficient, and cost-effective way. Data management aims to assist individuals and organizations and optimize data within the confines of policy and legislation to make choices and take actions that benefit the company the most.

Data management encompasses a wide range of tasks, including creating and updating data from a variety of sources; data can be stored in different clouds; high availability and catastrophe recovery are provided; data may be used in an increasing number of apps; and data should be archived and destroyed according to retention timelines and regulatory requirements.

In addition, a good management system should be available for the bulk of the time, preferably 24 hours a day. Users have a lot of flexibility in terms of access time because they aren't restricted to a set period to utilize the system. Therefore, in the proposed system, the room rental management system is developed and allows the users to make their payments and upload their receipt as a reference through the system at any time. A management system is very important and useful for everyone as it can help essential business operations run better and more consistently under control. It also contributes to a lower percentage of data loss, and risk management has improved. Before making choices or making commitments, management might investigate numerous possibilities to see what might happen, such as the company's being able to analyze the expenses used and the profit earned throughout the month.

2.2 Comparison of Existing Systems

There are some similarities and differences between the existing systems for Montana University System (Tuition & Fees), graduation rate and degree awarded with the proposed system.

Table 1: System Comparison

Tuition and Fee System	• Admin login • User login • Data selection • Able to view update insert delete • Able to sort data
Graduate Rate System	• Admin login • User login • Data selection • Able to view update insert delete • Able to sort data
Degree Awarded System	• Admin login • User login • Data selection • Able to view update insert delete • Able to sort data
Room Rental Management System	• Admin login • User login • Upload and download documents • Data selection • Comment space • Function of generate report • Print function • Make payment • Able to view update insert delete • Able to sort data

3. Methodology/Framework

The waterfall model was utilized in this project, which includes six stages, and the table below outlines the tasks and outputs that must be completed in each step of the development process. Table 2 below shows the software development workflow that include specific phase, task and output.

Table 2: Software Development Workflow

Phase	Task	Output
Requirements Analysis	- Identify the functional system requirement and non-functional system requirement - Analyse method used for the project	- System analysis - System Requirement - Flowchart
System Design	- Use suitable programming language and Database - User Interface design of the system - Design Use Case Diagram and Class Diagram	- Interface: HTML, CSS, JavaScript - Programming Language: PHP, C++ - Database: MySQL, HeidiSQL - User Interface Design - Use Case Diagram and Class Diagram

Table 2: (cont.)

Phase	Task	Output
System Implementation	- Development of front and back-end of the system - Solving the technical difficulties	- Proposed System
System Testing	- Test the function so that every component can run well - Test the system met with the requirements file - Test the database where data is connected well - Test the system to prevent error occur	- Tested System
System Deployment	- Delivering the system to the end-user to test the functionality of the system - Test system can run in the intended web environment	- Deployed the System
System Maintenance	- Provide support and maintenance for the system - Answering end-user's questions - Solve the system errors	- Solved System Errors

4. System Analysis and Design

System analysis is a method for gathering and evaluating data, finding faults, and disassembling a system into its constituents. When doing system analysis, the goal is to consider a system to determine its goals and objectives. It is a problem-solving method that improves the system and ensures that all of its components function successfully to achieve their goals. System design is developing a new system by upgrading an old system by specifying its modules to meet its requirement. Before making any decisions, understanding the study of the existing system and identify how computers can be utilized most effectively to ensure that the system runs as efficiently as possible.

4.1 Use case Diagram

Use-case diagrams illustrate a system's high-level functionality and scope. Use-case diagrams also show how the system, and its actors interact with one another. For example, Figure 1 below shows the interaction between the actor and its functionalities for the proposed Room Renting Management System

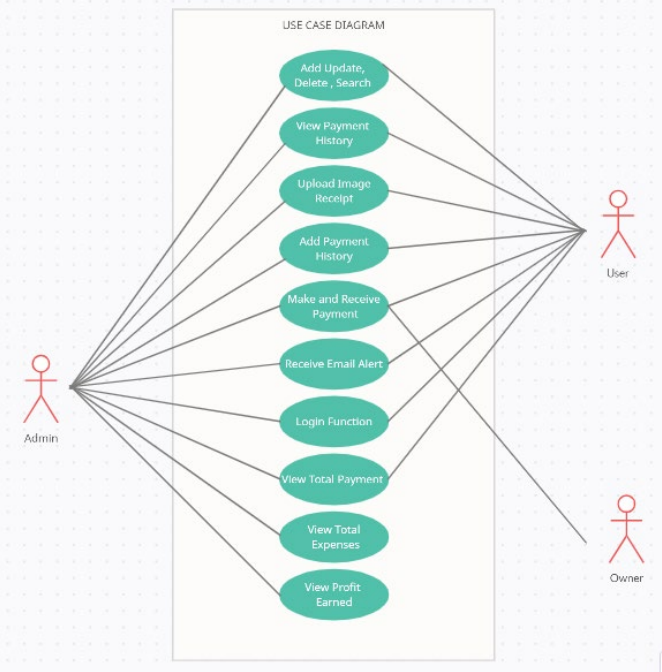

Figure 1: Use case Diagram

4.2 Use Case Specification

Use case specification is a description of the functionality of the system. The use case specification records actor-system interaction by defining how the user interacts, and the system responds and reacts. Tables 3 and 4 show the login and add tenant details case specification for the proposed system.

Table 3: Login Case Specification

Use case ID	UC-01
Use Case Name	Login
Created By	Shee
Date Created	
Actors	Admin
Description	Admin login to access the system
Preconditions	Admin required to enter their username and password
Post Conditions	Redirect to admin dashboard
Normal Flow	a) Insert username b) Insert password c) Click login button d) Redirect to admin dashboard
Alternative Flow	NONE
Exception	**Wrong username or password** 1. System show error message 2. Redirect to login page **Username are not exist** 1. System show error message 2. Redirect to login page **System error** 1. System show error message 2. Redirect to login page

Table 4: Add Tenant Details Case Specification

Use case ID	UC-02
Use Case Name	Add Tenant Details
Created By	Shee
Date Created	
Actors	Admin
Description	Admin are able to search, insert, update and delete tenant details
Preconditions	Admin required to enter tenant`s details
Post Conditions	Redirect to tenant list
Normal Flow	a) Insert tenant`s information b) Insert start date and end date for the rental c) Insert monthly rental d) Insert deposit paid e) Click insert button f) Redirect to tenant list
Alternative Flow	NONE
Exception	**Blank information** 1) System show error message 2) Redirect to tenant list

4.3 Class Diagram

The Class Diagram is used to assist in developing code for the creation of software applications. The class diagram contains the class name, attributes, operations, and the relationship between the class. For example, Figure 2 below shows the class diagram for the proposed Room Rental Management System.

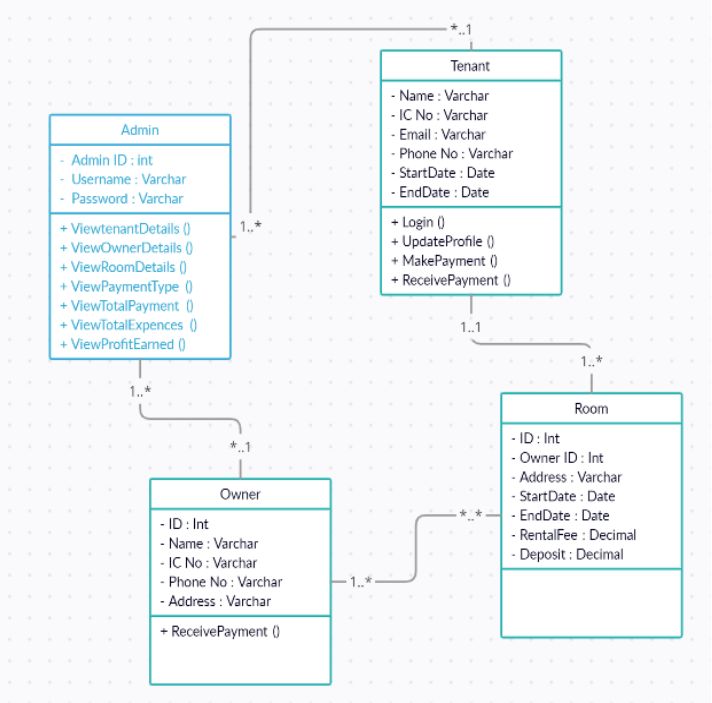

Figure 2: Class Diagram

4.4 System Design

After collecting requirements during the analysis phase, the system will go on to the design phase to complete the task. System flow charts are created at the beginning of the design phase to provide an overview of the system process flow that will be produced. The original design contributes to the acceleration of the system development process. Figure 3 below shows the flow chart for the proposed Room Rental Management System.

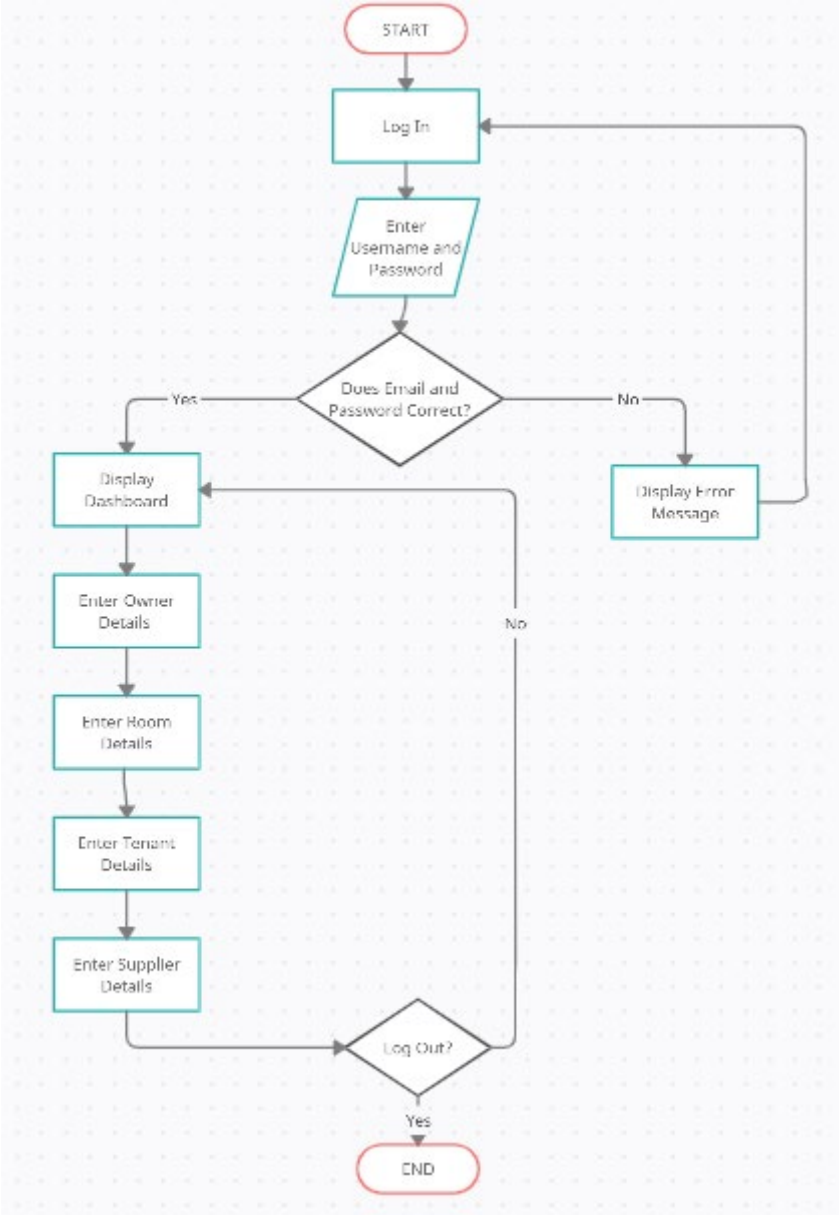

Figure 3: Flow Chart

5. Implementation and Testing

Implementation is detailing a system's development and ensuring that it is operational and meets its quality level. This methodology helps system developers determine if the system generated meets the project's criteria and initial goals. This procedure's primary objective is the delivery of a project that is logical, useful, and capable of working correctly. Meanwhile, system testing is a type of software testing that entails analyzing a software program in its whole and with all its components interconnected. The

process of testing an integrated system entails verifying that the system meets the predetermined requirements. Essentially, two types of testing may be performed at this phase: functional and user acceptance. This chapter will focus mainly on the system implementation and testing phases.

5.1 System Development

Admin is required to enter their username and password in order to get into the dashboard of the page. When the admin entered wrong either one username or password, error message will occur as “Invalid Login Credentials” and admin are required to re-enter the username and the password.

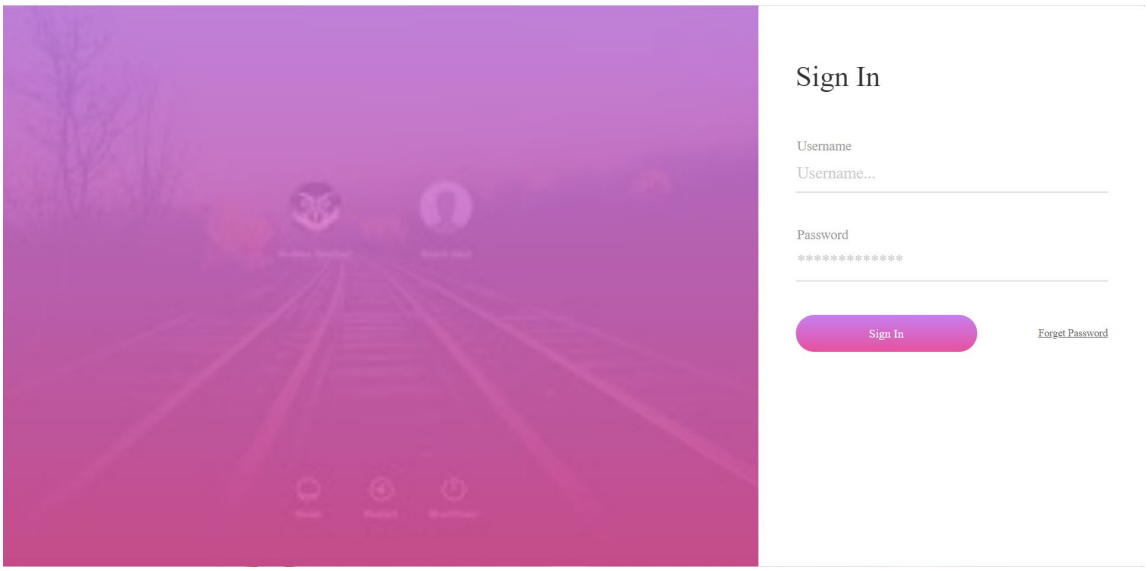

Figure 4: Admin Login Module

For tenant login, tenant is required to enter their username and password in order to get into the dashboard of the page. When the tenant entered wrong either one username or password, error message will occur as “Invalid Login Credentials” and tenant are required to re-enter the username and the password.

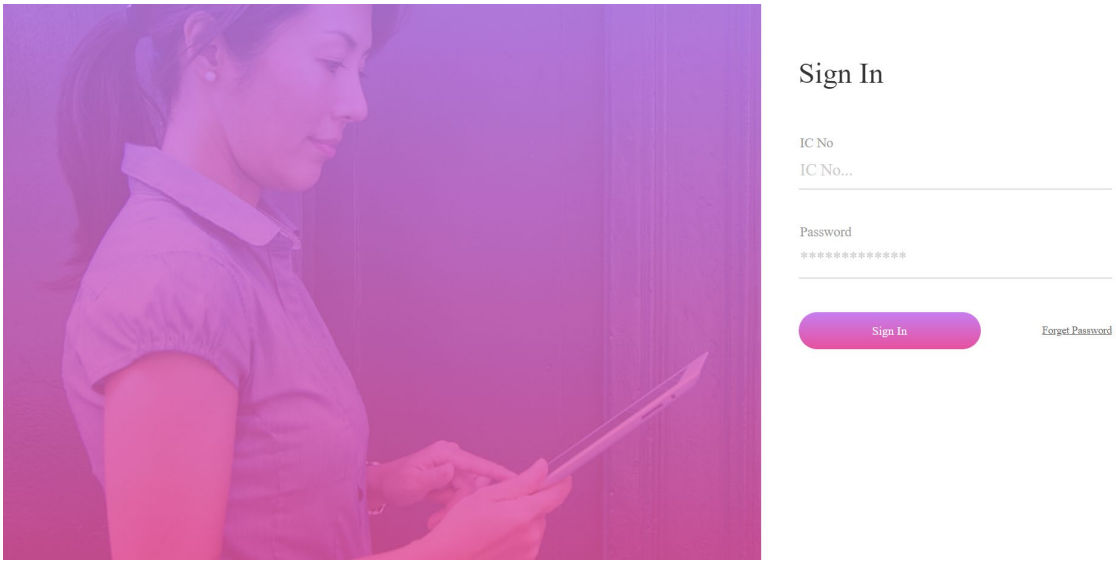

Figure 5: Tenant Login Module

It's impossible for users to find what they need if the menu bar is poor. The menu bar for the proposed system, there are some main keywords such as dashboard, profile, transaction and logout. There is dropdown menu at the profile and transaction because there are some more details keyword under it.

Figure 6: Menu Bar Module (Admin)

The menu bar for the proposed system, there are some main keywords such as user profile, raise ticket, history, payment and logout. For the tenant menu bar does not have dropdown because it only contains main field.

Figure 7: Menu Bar Module (Tenant)

The dashboard Process is an important instrument for business owners and managers. It does this by compiling all the company's key performance indicators and data into a single report that is easy to understand. They make it easier for business owners and managers to conduct frequent reviews of the wider context of business operations, drawing attention to the most significant difficulties, risks, and trends inside the company.

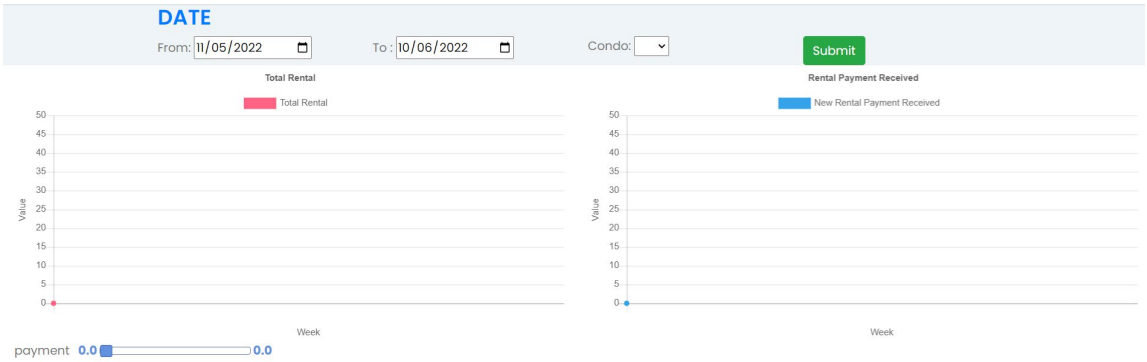

Figure 8: Admin Dashboard Module

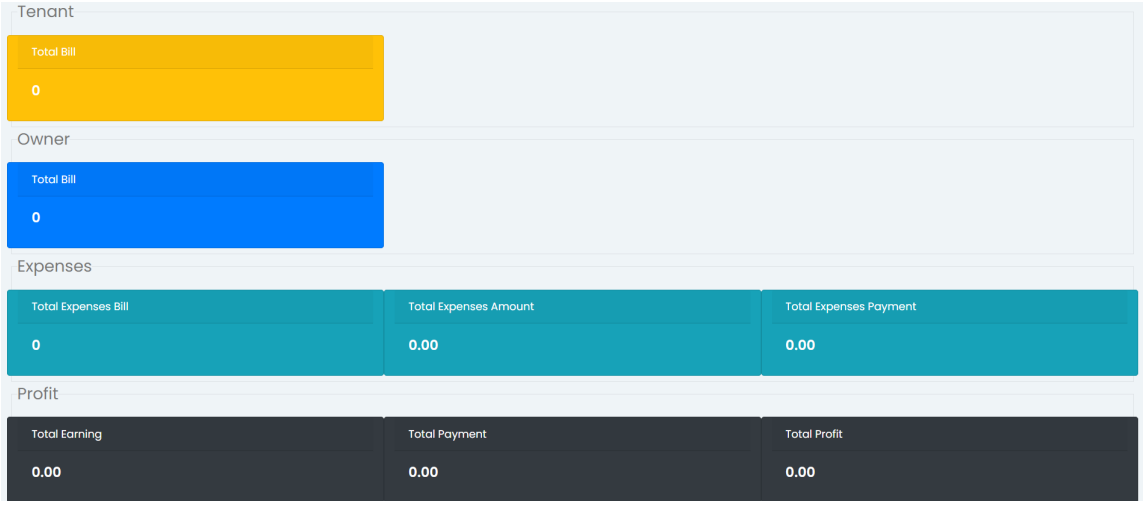

Figure 9: Admin Dashboard Module

Only one admin can be displayed at the user lists as admin can add, edit and view details. Field required for admin is username, email, phone and password.

Figure 10: User Lists Module

There are many owners can be inserted. Admin can search by typing the owners name, phone no or balance. Field required in owner is name, phone no, Ic no, address, postcode, city, state, remark, remark2, deposit, balance and status.

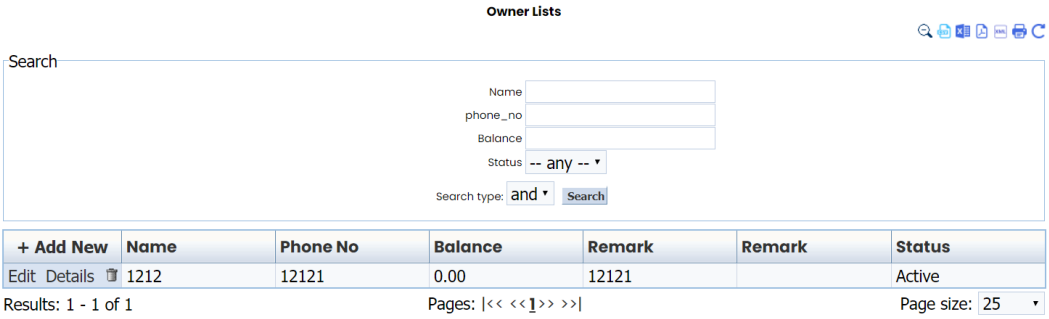

Figure 11: Owner Lists Module

There are many condos can be inserted. Admin can search by typing the condo name, owner name or contract end and from. Field required in condo list is name, address, postcode, start date, end date, remark, remark2, rental, deposit, and status.

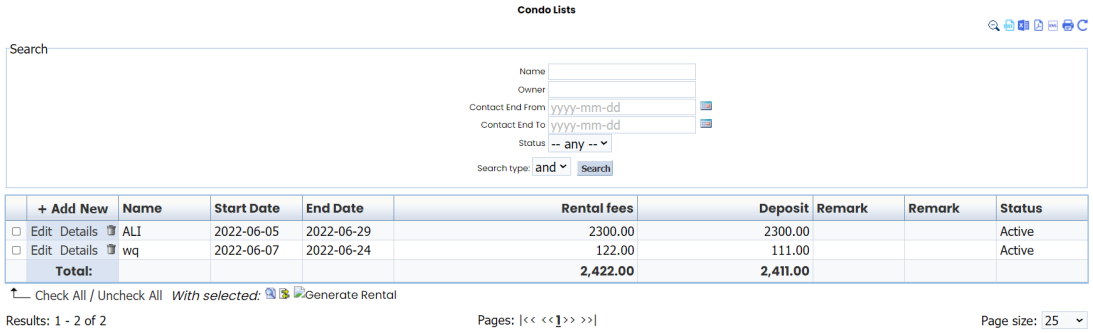

Figure 12: Condo Lists Module

There are many rooms can be inserted. Admin can search by typing the room name or Ic. Field required in room list is name, email, phone, password, street 1, street2, postcode, city, state, country, condo, start date, end date, remark, rental, deposit, tenant and status.

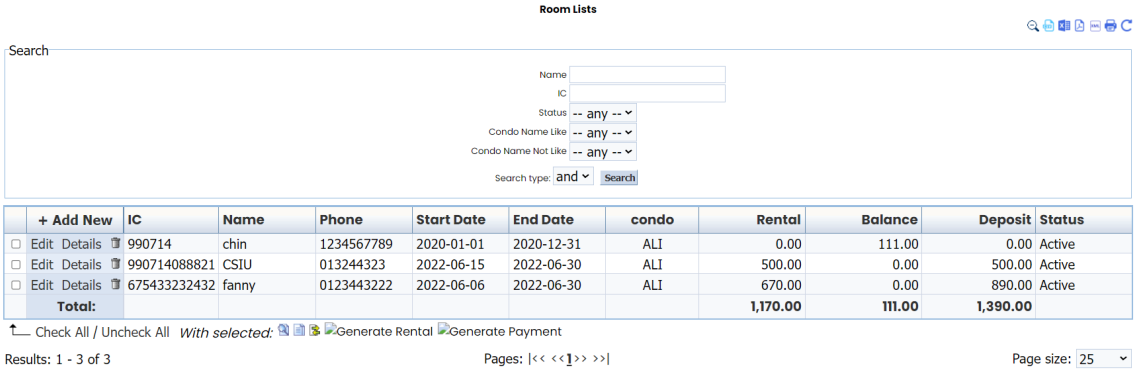

Figure 13: Room Lists Module

There are many tenants can be inserted. Admin can search by typing the tenant's name or Ic. Field required in room list is name, Ic no, email, phone, password, street 1, street2, postcode, city, state, country and status.

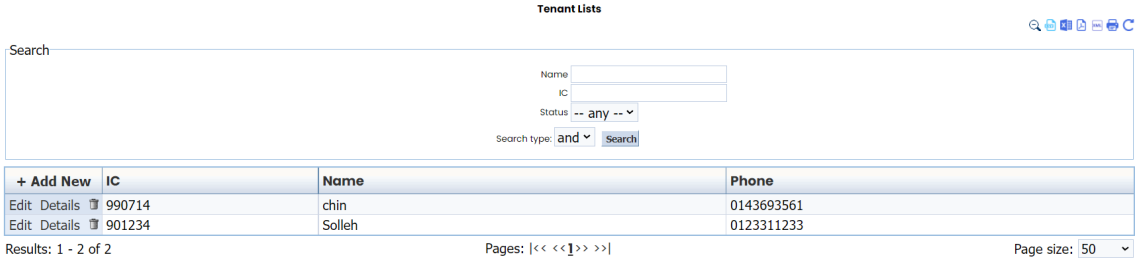

Figure 14: Tenant Lists Module

There are many suppliers can be inserted. Admin can search by typing the supplier's name or phone no. Field required in room list is name, phone no, Ic no, address, postcode, city, state, remark, remark2 and status.

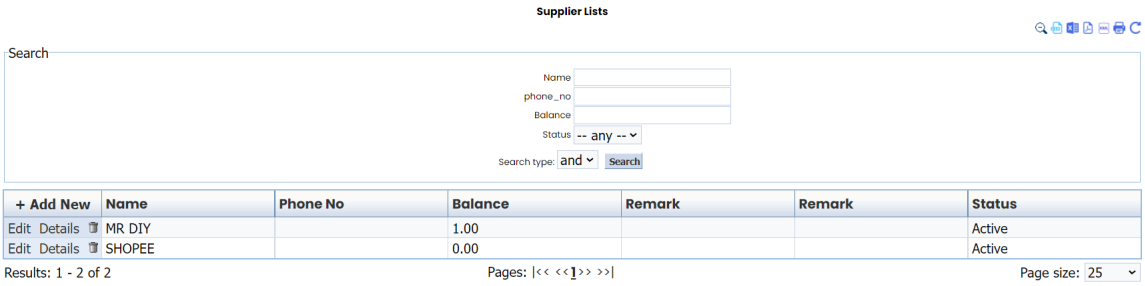

Figure 15: Supplier List Module

There are many payments type can be inserted. Admin can search by typing the payment type name. Field required in room list is name and status.

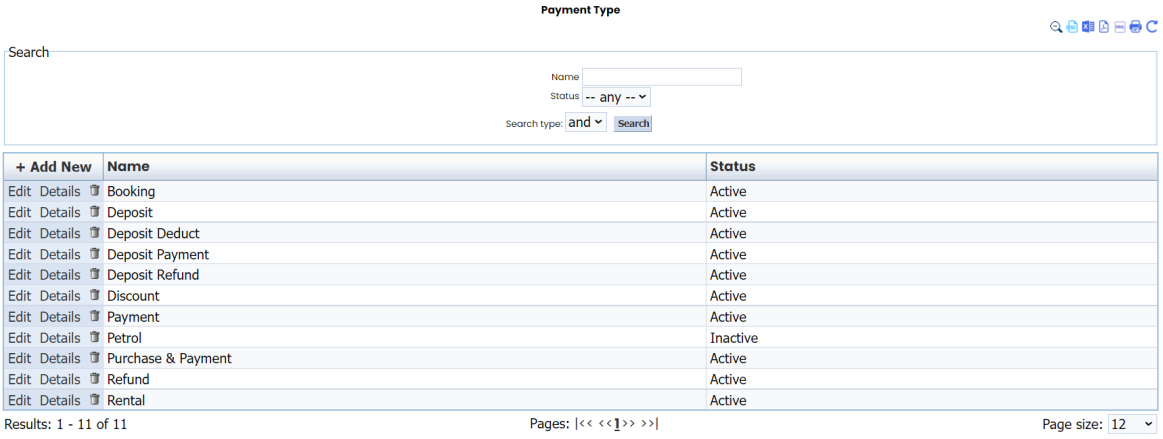

Figure 16: Payment Type Module

There are many tenants' transaction can be inserted. Admin can search by typing the tenant's name, rental from and to or payment type. Field required in room list is room, payment type, receipt, receipt no, date, remark, add, deduct, tenant and status.

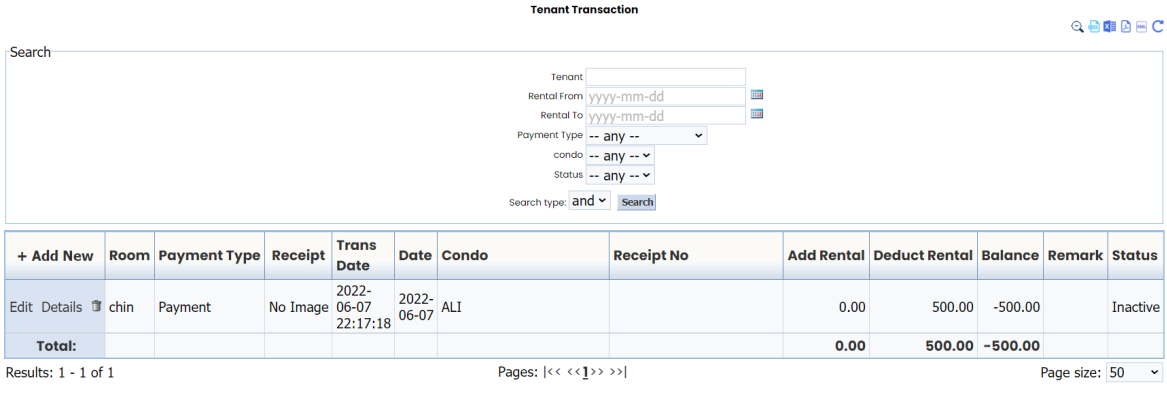

Figure 17: Tenant Transaction Module

There are many owners' transaction can be inserted. Admin can search by typing the owner's name, rental from and to or payment type. Field required in room list is owner, payment type, date, remark, receipt no, add, deduct, tenant and status.

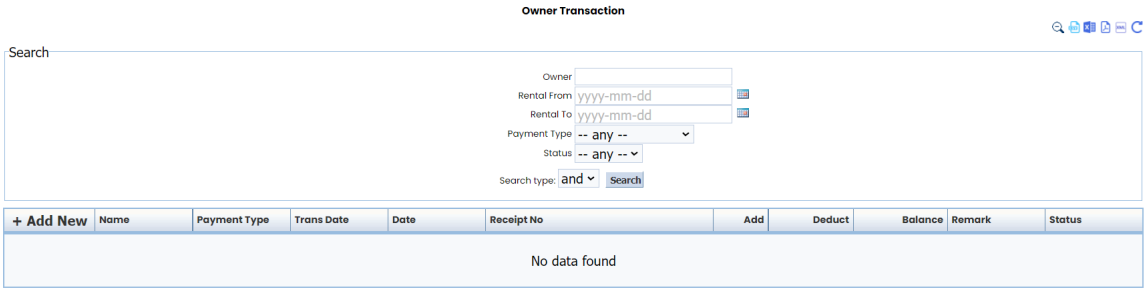

Figure 18: Owner Transaction Module

There are many suppliers' payment can be inserted. Admin can search by typing the supplier's name, from and to date, payment type or condo name. Field required in room list is payment receipt, payment date, receipt no, supplier, condo, total, payment, comments and status.

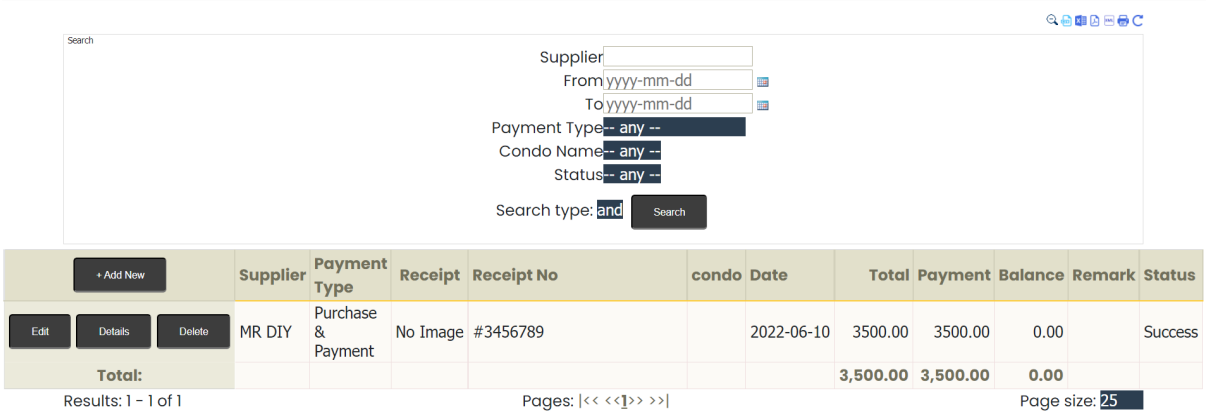

Figure 19: Supplier Transaction Module

For user profile, tenant can view, edit and update their status where tenant can edit specific field only such as email, phone or password.

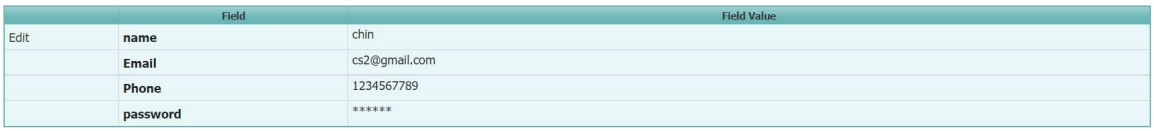

Figure 20: Tenant Profile Module

For raise ticket, tenant is able to upload image, raised ticket date and comments.

Figure 21: Tenant Raise Ticket Module

For payment history list, tenant can view, update, search and edit payment history. Tenant can search by sing rental date. Tenant can upload receipt payment, update the payment date, receipt number, payment amount and comment.

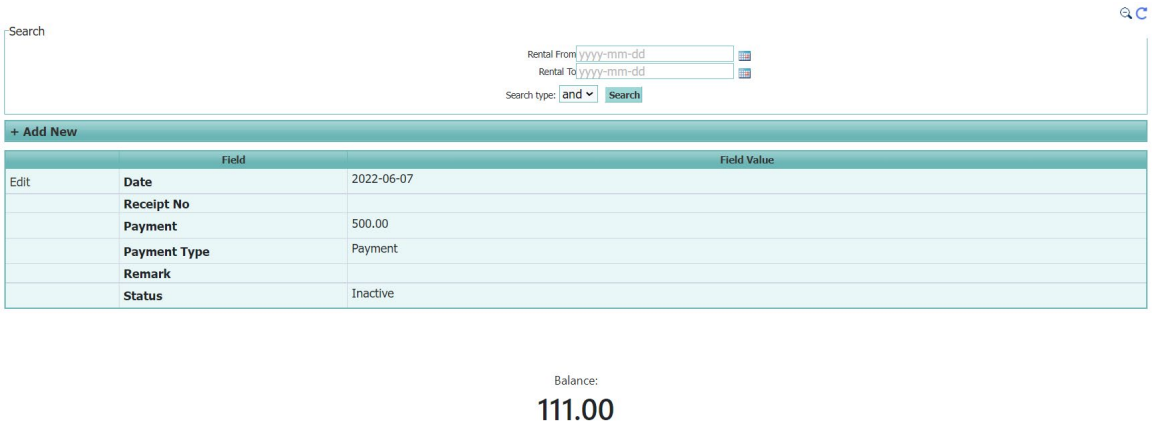

Figure 22: Tenant History List Module

5.2 **System Testing**

System testing is a level of software testing in which an entire, integrated system is examined. In the next part, two types of testing, namely functional testing and user acceptability testing, will be conducted to determine whether the Room Renting Management System meets the defined criteria.

5.2.1 **Functional Testing**

Functional testing is a method of software testing that is utilized in the process of developing software to ensure that the final product satisfies all the requirements mentioned in Chapter 4 about both its functionality and its non-functionality. Functional testing is a procedure that provides a software application with all the functionality outlined in the functional requirements for that application. During the testing phase, the user interface design, the database, and the functioning of the proposed system will be examined. Because of this, most test plans are developed by carrying out relevant test cases.

Table 5: Testing Results for Login Function (Admin)

	Test Cases	Expected Output	Actual Output
1	Admin login with correct username and password	Login successful and redirect to admin dashboard	As expected
2	Incorrect username or password	Error messages occur and require admin to login again	As expected

Table 6: Testing Results for Login Function (Tenant)

	Test Cases	Expected Output	Actual Output
1	Tenant login with correct Ic no and password	Login successful and redirect to tenant dashboard	As expected
2	Incorrect Ic no or password	Error messages occur and require tenant to login again	As expected

Table 7: Testing Results for Database Connection

	Test Cases	Expected Output	Actual Output
1	Add, update data for user list	Data successful altered in database	As expected
2	Add, update data for condo list	Data successful altered in database	As expected
3	Add, update data for owner list	Data successful altered in database	As expected
4	Add, update data for room list	Data successful altered in database	As expected
5	Add, update data for tenant list	Data successful altered in database	As expected
6	Add, update data for supplier list	Data successful altered in database	As expected
7	Add, update data for payment type list	Data successful altered in database	As expected
8	Add, update data for tenant transaction list	Data successful altered in database	As expected
9	Add, update data for owner transaction list	Data successful altered in database	As expected
10	Add, update data for supplier payment list	Data successful altered in database	As expected
11	Add, update data for user profile	Data successful altered in database	As expected
12	Add, update data for raise ticket list	Data successful altered in database	As expected
13	Add, update data for payment history list	Data successful altered in database	As expected

Table 8: Add, Update, Search, View and Delete Function for User Lists (Admin)

	Test Case	Expected Output	Actual Output
1	Add, update, search, view and delete username	Successful add, update, search, view and delete username	As expected
2	Add, update, search, view and delete email	Successful add, update, search, view and delete email	As expected
3	Add, update, search, view and delete phone number	Successful add, update, search, view and delete phone number	As expected
4	Add, update, search, view and delete password	Successful add, update, search, view and delete password	As expected
5	Auto generate password	Provide auto generate recommended password	As expected

Table 9: Add, Update, Search, View and Delete Function for Payment Type Lists (Admin)

	Test Case	Expected Output	Actual Output
1	Add, update, search, view and delete name	Successful add, update, search, view and delete name	As expected
2	Add, update, search, view and delete status	Successful add, update, search, view and delete status	As expected

Table 10: Update and View Function for User Profile (Tenant)

	Test Case	Expected Output	Actual Output
1	View name	Successful display name	As expected
2	Update and view email	Successful update and view email	As expected
3	Update and view phone number	Successful update and view phone number	As expected
4	Update and view password	Successful Update and view password	As expected
5	Auto generate password	Provide auto generate recommended password	As expected

Table 11: Add and View Function for Raise Ticket (Tenant)

	Test Case	Expected Output	Actual Output
1	Add and view image on any defect	Successful add and view image on any defect	As expected
2	Add and view raise ticket date	Successful add and view raise ticket date	As expected
3	Add and view comment	Successful add and view comment	As expected

Table 12: Add, Update, View and Delete Function for Payment History List (Tenant)

	Test Case	Expected Output	Actual Output
1	Add, update, view and delete payment receipt	Successful add, update, view and delete payment receipt	As expected
2	Make payment	Successful Make payment	As expected
3	Add, update, view and delete payment date	Successful add, update, view and delete payment date	As expected
4	Add, update, view and delete payment amount	Successful add, update, view and delete payment amount	As expected
5	Add, update, view and delete comment	Provide add, update, view and delete comment	As expected

Table 13: Export Document Function (Admin)

	Test Case	Expected Output	Actual Output
1	Export to Excel (.csv)	Able to export document to Excel (.csv)	As expected
2	Export to Excel (.xls)	Able to export document to Excel (.xls)	As expected
3	Export to PDF	Able to export document to PDF	As expected
4	Export to XML	Able to export document to XML	As expected
5	Print documents	Able to print document	As expected

5.2.2 **User Acceptance Testing**

The user acceptance test is the final part of the software testing process for this project. Its purpose is to validate that the system can do the specified tasks in real-world situations. Several authorities conduct the user acceptability test on the proposed system for managing room rentals. The two owners of Leads Connect Consultancy are the individuals who participate in the test. The gathered, analyzed, and

graphed test results are then presented. The user acceptance testing is conducted via google form and divided into three sections: user interface evaluation, admin system features evaluation, and tenant system features evaluation. Ranking 1 shows that the customer is highly dissatisfied with the requested features, while five indicates that the user is delighted with the requested characteristics. The user acceptability test is conducted between Tables 14 to 16.

Table 14: Results for User Interface Evaluation

	Features	Rank					Total
		1	2	3	4	5	
1	User Interface Design					2	2
2	Text Style (font size, Color)				1	1	2
3	Navigation				2		2

Table 15: System Features Evaluation (ADMIN)

	Features	Rank					Total
		1	2	3	4	5	
1	Login and Logout Function				1	1	2
2	Menu Function					2	2
3	Condo, Room, Owner Function				1	1	2
4	Tenant, Supplier, Payment Type Function				2		2
5	Room, Owner, Supplier Payment Function				2		2

Table 16: System Features Evaluation (TENANT)

	Features	Rank					Total
		1	2	3	4	5	
1	Login and Logout Function				1	1	2
2	Menu Function				1	1	2
3	User Profile Function				2		2
4	Raise Ticket Function				2		2
5	Payment and History Display Function				2		2

6. Conclusion

In conclusion, based on the system requirements, scopes, and user needs, the proposed system has met its objectives. Although it is discovered that the suggested system has some limitations, it may be improved in future work by putting in more effort to provide users with a better user interface design and a more reliable platform environment.

Acknowledgment

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

References

[1] The Straits Time. "Over 90% of Malaysia's adult population fully vaccinated against Covid-19", 11 October 2021. Retrieved from: https://www.straitstimes.com/asia/se-asia/malaysia-administered-129518-covid-19-jabs-on-sunday-9002-of-adult-population-now-fully

[2] SDLC Waterfall Model "What Is SDLC Waterfall Model? 27 September 2021. Retrieved from: https://www.softwaretestinghelp.com/what-is-sdlc-waterfall-model/

[3] Restructuring The Montana University System, 10 May 2014. Retrieved from: http://mtprof.msun.edu/Fall1993/Baker2.html

[4] Montana University System, 26 June 2012. Retrieved from: https://www.mus.edu

[5] Data Management Platform, Oracle 1995, 2021. Retrieved from: https://www.oracle.com/database/what-is-data-management/

[6] Relational Database, IBM Corporation 2001, 2010. Retrieved from: https://www.ibm.com/docs/en/zos-basic-skills?topic=zos-what-is-database-management-system

[7] Benefits of a Management Information, 08 November 2018. Retrieved from: https://bizfluent.com/about-5672242-benefits-management-information-system-.html

[8] Student Enrolment Higher Education, Solver reserved 2010. Retrieved from: https://www.solverglobal.com/report-budget-forecast-and-dashboard-template-glossary/higher-education-student-enrollment-dashboard/

[9] Waterfall Model, 07 February 2019. Retrieved from: https://searchsoftwarequality.techtarget.com/definition/waterfall-model

[10] What is SDLC Waterfall Model, 30 November 2021. Retrieved from: https://www.softwaretestinghelp.com/what-is-sdlc-waterfall-model/

[11] Gantt Chart in Project Management, 03 May 2021. Retrieved from: https://www.smartsheet.com/content/gantt-chart-pros-cons

[12] Gantt Chart Benefits and Tools, Retrieved from: https://www.proofhub.com/articles/gantt-charts

[13] Waterfall Model Phases, 12 February 2019. Retrieved from: https://rezaid.co.uk/sdlc-waterfall-model/ Zulqadar (2021), SDLC Waterfall Model: The 6 phases you need to know about

[14] Software Testing, 18 October 2021. Retrieved from: https://www.toolsqa.com/software-testing/waterfall-model/ Sharma (2021), What is Waterfall Model in Software Development Life Cycle | SDLC