Faculty of Computer Science and Engineering
Computer Science Department

[Real Estate System]

Introduction to Software Engineering Course
CS 281
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Team Members

Lama Abdulaziz Alfreah	4250107
Raghad Saad Alharbi	4258316
Lina Reda Alrehaily	4250102
Albatool Abdulrahman Alahmadi	4254000

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Abstract

The project it is about real estate system that provides users with a comprehensive suite of tools for managing their real estate investments. The system includes features for owner such as manage profile, manage info, selling the property and obtaining contracts. It also provides customer with access to search property, reservation and purchase, comparison, manage profile and obtaining contracts. Additionally, the system allows users to connect with each other. Also, the admin for the system have access to user management and all services of owner and customer to assist them in case of problems. The system is designed to be user-friendly and intuitive, making it easy for users of all levels of experience to take advantage of its features. One of the most important advantages of the system is dealing with the Absher system by obtaining true user information, and all contracts are sent directly to the Absher system to preserve the rights of all parties.

Chapter One: Introduction

1.1 Overview

The real estate system is an interactive application that is designed for the real estate sector. It effectively helps both the real estate companies and customers to display/search for an unlimited number of property listings on the Internet. In particular, the system provides different services to users. For example, customers can search for different types of properties (e.g., apartments, villas, buildings, etc.) in the Kingdom of Saudi Arabia, either for buying or renting.

A real estate system is a comprehensive collection of tools and procedures that can be used to manage and monitor properties. It includes software, databases, and tools for tracking properties, transactions, and relationships between properties. In addition, it may include analytics and reporting tools that can be used to measure the performance of rental properties and other assets owned by a real estate investment firm or real estate developer. A real estate system can be thought of as an infrastructure for property management operations that enables asset managers and investors to conduct business more efficiently.

1.2 Problem Definition

The real estate system is a web-based interactive and revenue-generating tool created for the real estate industry. It efficiently assists both real estate companies and customers in displaying and searching for an infinite number of property listings on the Internet. The system in particular offers a variety of services to end customers. For example, customers can search for various sorts of properties (e.g., flats, villas, buildings, etc.) in the Kingdom of Saudi Arabia, either for purchase or rental.

1.3 Description of Proposed System

The program aims to help owners and users by providing multiple services (registration, buying and selling, search...) It also aims to protect both parties because it will be approved and documented through the Absher application and will be made available on a web-based.

1.4 Process Model

Incremental development

We will use Incremental development because of The changing regulations imposed by the government on real estate owners and the conditions imposed on them, the constant changes in contracts and real estate prices, and the rapid in meeting the needs and requirements of real estate owners and tenants.

Chapter Two: System Analysis

2.1 Domain Analysis

Data gather: we collect data from different resources such as interviews, observations, and internet. After collecting the information, we define the system requirements specification

System users: the system has three types of users, admin, owner, and customer.

2.2 The Environment

It is a web-based that helps owners to register and follow up on their private real estate, also allows the user to view these properties, whether for rent or purchase, and provides the Absher application with sales and purchase contracts.

2.3 Customers and Users

- **Admin:**
  System update and user management (owner-client).

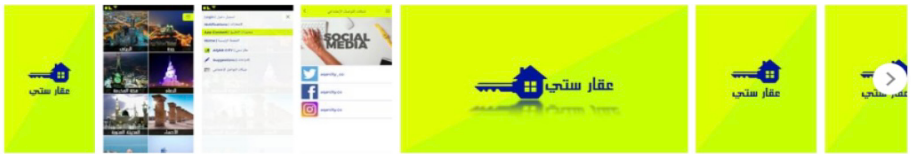
- **Owner:**
  Property specifications and rent control.

- **Customer:**
  Ability to Search for the right property and rent or buy.

2.4 Existing Systems

Next is the existing real estate management system:

1. AQAR CITY [1]:



AQAR CITY application for real estate marketing.

Application targets:

Help those owners of real estate leasing or selling also helps researchers for properties to finding the right property, according to the following categories: city, region, type of property, sale, purchase or rent or required, and according to Price And it targets all people who live in Saudi Arabia of the citizens and residents of the application, Also targets people who want to search for real estate in Saudi Arabia and the search for construction companies and design firms, and decoration and construction companies and cladding.

Application features:

Unique application of a AQAR City with many features that are lacking in real estate marketing market so that it is easier and faster than the terms of the search for the real estate and service companies within the field of real estate, as the application is easy to use and easy identification of the city is required to search also contains the most important 26 cities in Saudi Arabia.

2. Real estate CRM software[2]?

CRM software for real estate is a technology that assists real estate workers with lead creation and storage. It also aids in the management of leads, client queries, customer communications with potential clients, marketing initiatives, and sales processes. It

provides a comprehensive view of the sales pipeline, opportunity pipeline, and inventory, which are all handled through a single, centralized platform.
A real estate agent can use the program to collect customer and lead data from different sources, track client interactions, allocate leads to sales personnel, and manage duties like client meetings and site tours.

Features
1. Lead management.
2. Contact management.
3. Email marketing.
4. Marketing automation.

The difference between our system and these systems. Our system aims to document the contract with approved platforms such as Absher. It also aims to protect both parties. One of the advantages is that we will provide the service of registration, buying, selling, and searching … etc., and it is a site that helps owners follow up on their real estate and allows the user to view it.

2.5 Use Case Model

2.5.1 Actors of the system

- **Admin:**

The admin is responsible for the system, managing users, and assisting owners and customers, etc.

- **Owner:**

The owner is usually the owner of the property or a company with ownership of a property who sells or leases property to another party.

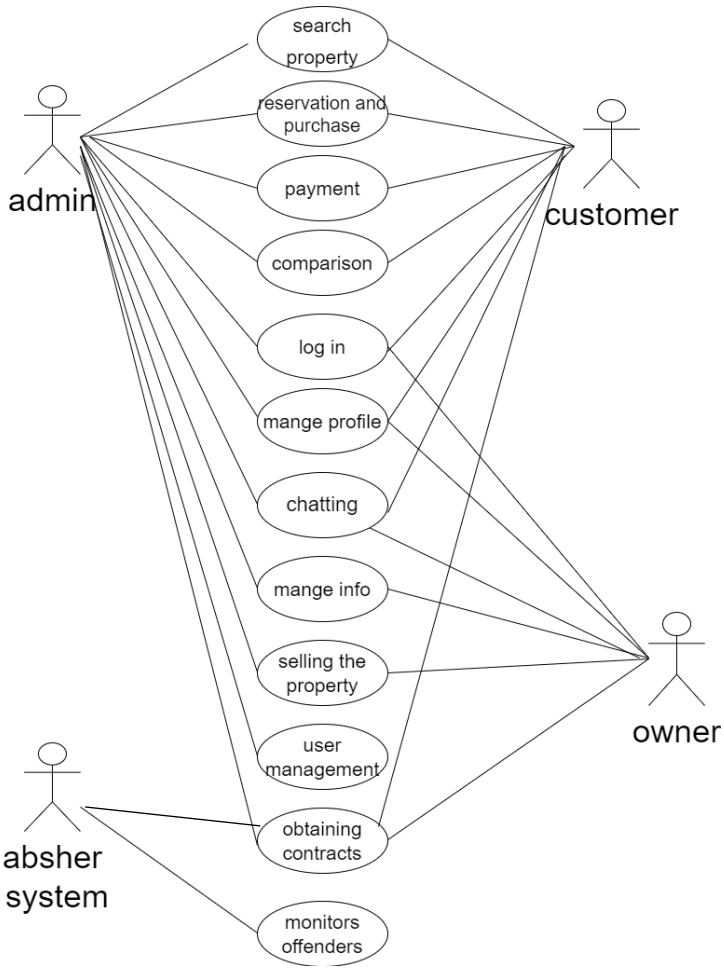
- **Customer:**

The customer is the one who purchases or rent the property from the owner.

- **Absher system:**

A government system affiliated with the Ministry of Interior that obtains contracts from the real estate system to document them in the accounts of citizens and residents to protect the rights of users. And monitor violators of regulations and fraudsters.

2.5.2 Use Case Diagram



2.5.3 Use Case Descriptions

Use Case	Login.
Actor	Admin/owner/customer.
Description	The interface offers three options for users, owner, customer, and admin. Enable each user to Enter email address or username, ID number and password. The system will check the input, if it is correct, the user will be able to log in
Pre-Condition	The login form exists.
Post-Condition	The actor logs in successfully.

Use Case	Manage profile.
Actor	Seller/buyer.
Description	This feature allows all users of the system to view, modify, update or delete the profile of his/her own. The use case begins when the actor indicates the intent to view, update or delete profile. It ends when the actor closes the user dashboard form.
Pre-Condition	1-The user dashboard record exists for editing/view. 2-The actor is logged in.
Post-Condition	The user dashboard record is added or updated.

Use Case	Mange information.
Actor	Admin/ owner.
Description	Real estate information management can be done by the owner or admin in which they have a facility to view, edit or delete it.
Pre-Condition	1-The admin/owner dashboard record exists for editing/view. 2-The actor is logged in.
Post-Condition	The user dashboard record is added or updated.

Use Case	Search Property.
Actor	Admin/customer.
Description	This use case is to find out any information about the property. Or to search for the best available property within the budget. As well as any local development plans or if there are any claims or liens on the property that may affect the home you plan to purchase. The use case begins when the actor indicates the intent to search for the property according to his/her requirement. It ends when the result is shown.
Pre-Condition	The searching form exists for searching.
Post-Condition	The property searched successfully.

Use Case	Reservation and purchase.
Actor	Admin/ customer.
Description	Reservation is an arrangement between a buyer and a seller to hold a product or service in advance of purchase based on a promised intention of future purchase made by the buyer. The purchase process is a contract in which the price of the property and other terms are agreed upon by the buyer and seller.
Pre-Condition	form for reservation and purchase are exist.
Post-Condition	Reservation and ownership of the property.

Use Case	Payment.
Actor	Admin/ customer.
Description	Payment usually begins when the buyer realizes their need for the property and prepares their specifications. Market research - through selection or a bidding process - helps determine the right property and supplier. After that, the buyer and seller negotiate the terms and conditions related to the property to be purchased.
Pre-Condition	A form showing payment methods.
Post-Condition	payment to the owner.

Use Case	Selling the property.
Actor	owner/ admin.
Description	This feature allows the owner and admin to approve the sale/rental of the property. they provide their property on the website with description So that the user can choose the right property for him.
Pre-Condition	View the item on the website.
Post-Condition	The property has been sold.

Use Case	User management.
Actor	Admin.
Description	Enables the admin to add a user, delete a user and modify user data.
Pre-Condition	1-The admin dashboard record exists for add/delete/modify. 2-The actor is logged in.
Post-Condition	The admin dashboard record is added or deleted.

Use Case	Comparison.
Actor	Customer/admin.
Description	The real estate comparison service is available to customer and admin to help them find the right property for them faster, Where the user enters the specifications of the real estate he wants, and then the system shows him specifications that match his requirements.
Pre-Condition	list of required specification.
Post-Condition	the required specifications are found faster.

Use Case	Chatting.
Actor	Admin/owner/customer.
Description	Chat service is available to all users to provide opportunities for communication between customers and owners for inquiries and trying to get a suitable price, etc.
Pre-Condition	The user dashboard record exists for chatting.
Post-Condition	communication between customers and owners.

Use Case	Obtaining contracts.
Actor	Admin/owner/customer/ Absher system.
Description	All users can obtain an electronic copy documenting the purchase or rental contract signed by both parties, the customer, and the seller.
Pre-Condition	The Terms of the contract are clear.
Post-Condition	Both users have a copy of the contract.

Use Case	Monitor offenders.
Actor	Absher system.
Description	offenders monitoring service is available to the Absher system and admin to punish them, such as cases of occupation or non-payment of due fees...
Post-Condition	The full right of the system to make decisions and punish violators.

2.5.4 Functional Requirements

- **Log in:**

The interface offers three options for users, owner, customer and admin.
Enable each user to Enter email address or username, ID number and password.

- **Manage Profile:**

All users can view, update or delete the profile of his/her own.

- **Manage information:**

Real estate information management can be done by the owner or admin in which they have a facility to view, edit or delete it.

- **Search Property:**

Customer and admin have the facility to search the best available property within the budget based on:

- The area covered by property.
- City.
- Location.
- Price range.

- **Reservation and purchase:**

It enables the admin and customer to reserve or buy a property.

- **Payment:**

The admin and customer were able to pay the amount of the property to the owner.

- **Selling the property:**

The owner and admin were able to approve the sale/rental of the property.

- **User management:**

Enables the admin to add a user, delete a user and modify user data.

- **Comparison:**

The real estate comparison service is available to customer and admin to help them find the right property for them faster.

- **Chatting:**

Chat service is available to all users to provide opportunities for communication between customers and owners for inquiries and trying to get a suitable price, etc.

- **Obtaining contracts:**

All users can obtain an electronic copy documenting the purchase or rental contract signed by both parties, the customer and the seller.

- **Monitor offenders**

offenders monitoring service is available to the Absher system and admin to punish them, such as cases of occupation or non-payment of due fees...

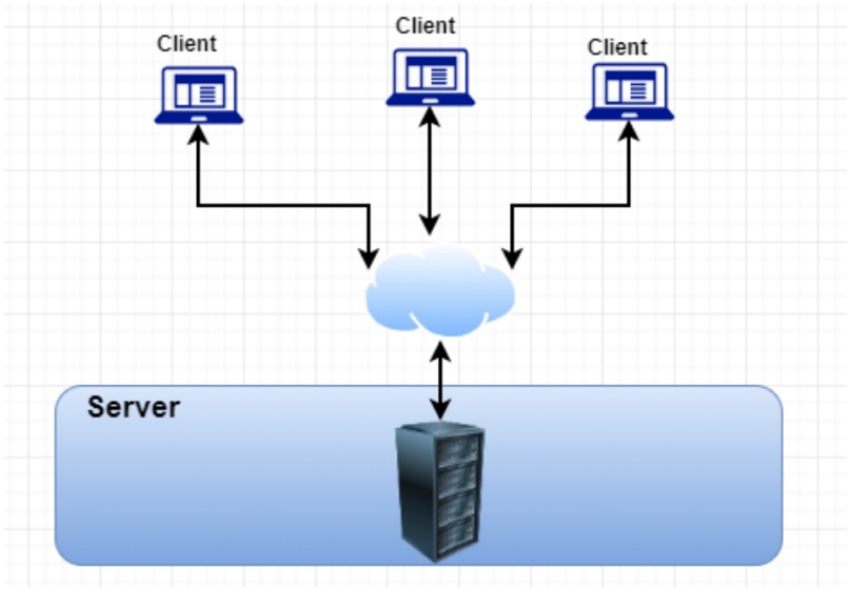
2.5.5 Non-Functional Requirements

- **Performance.**
- **Speed.**
- **Size.**
- **Easy to use.**
- **Reliability.**
- **Robustness.**
- **Portability.**

Chapter Three: System Design

3.1 System Architecture

The appropriate architecture pattern is client server pattern.



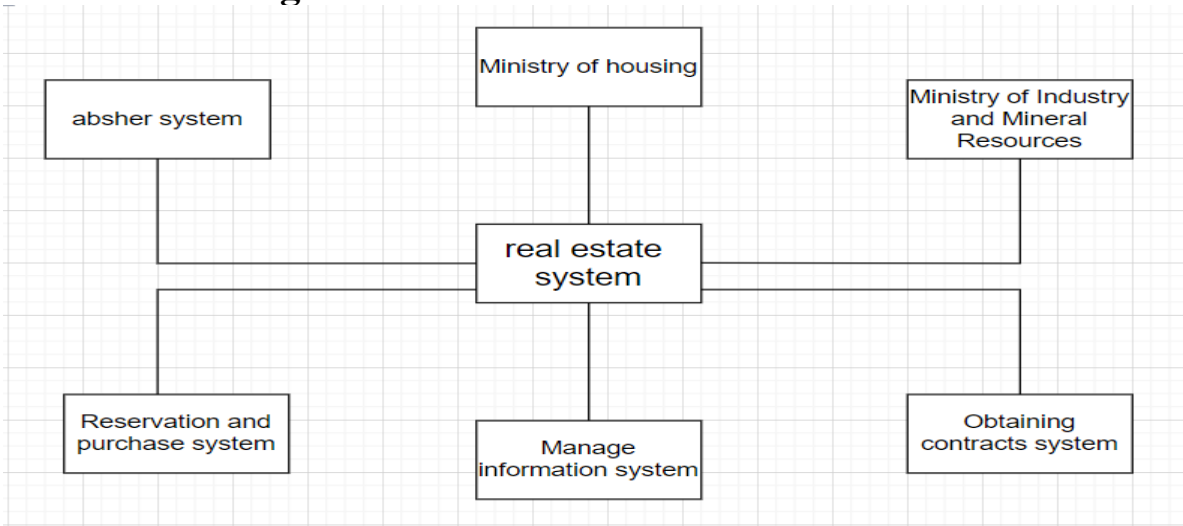
The reason we chose client pattern is because it has several advantages, including:
-Centralization: The fundamental benefit of a client-server network is that it allows for centralized management. All the information you can find in one place. Because the network administrator has complete control over management and administration, this is extremely advantageous. Any issue that arises throughout the whole network may be resolved in one location. It also becomes easier to upgrade data.

-Adaptability: Customers can easily expand the number of clients or servers. Because the server is centralized, there are no concerns regarding authorization to network resources growing in size. As a result, the setups only require a small number of people.

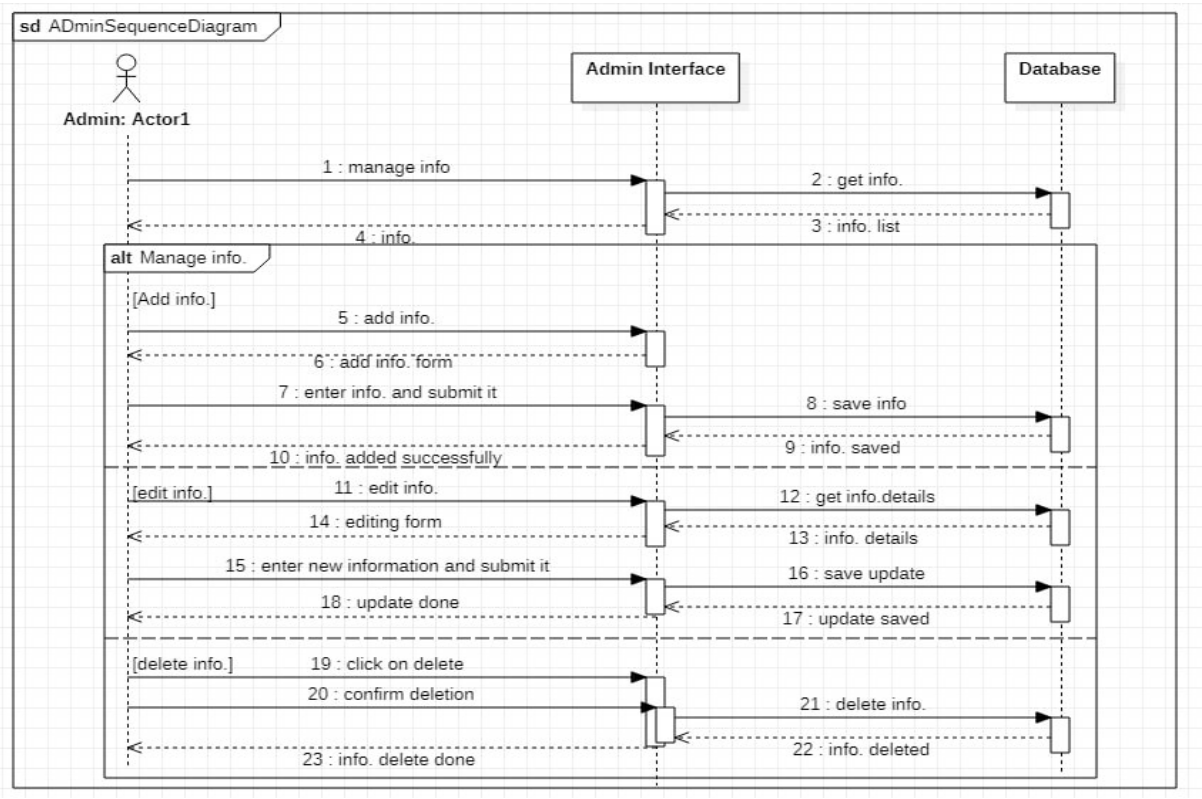
-Protection: Because of the centralized design of a client-server network, data is adequately secured. So only if you're an authorized user can you access the data within login and password as well as two-factor authentication. In addition, if the data is lost, the records can be recoverable quickly with one backup.

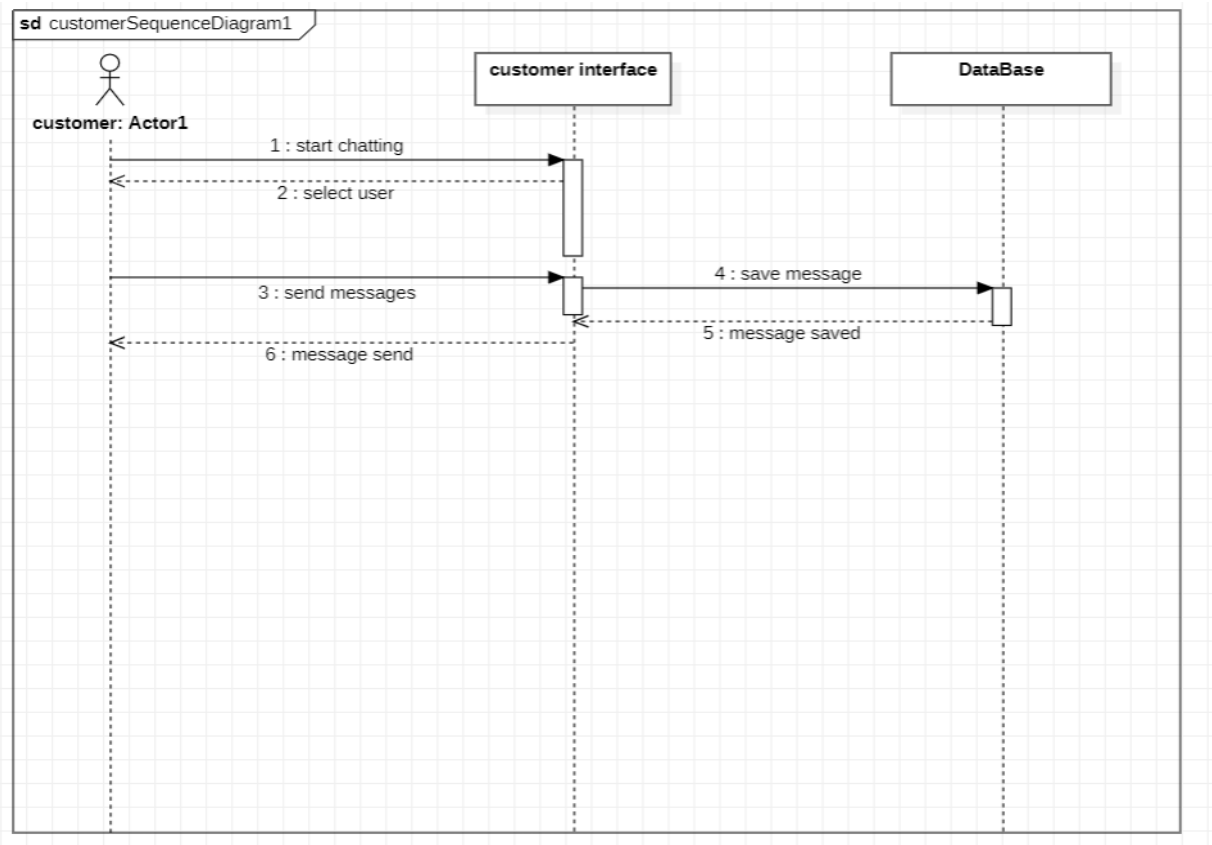
-Operation: It is simple to handle files because they are all kept on a single server. A client-server network can simply monitor and access necessary file records.

3.2 Context diagram

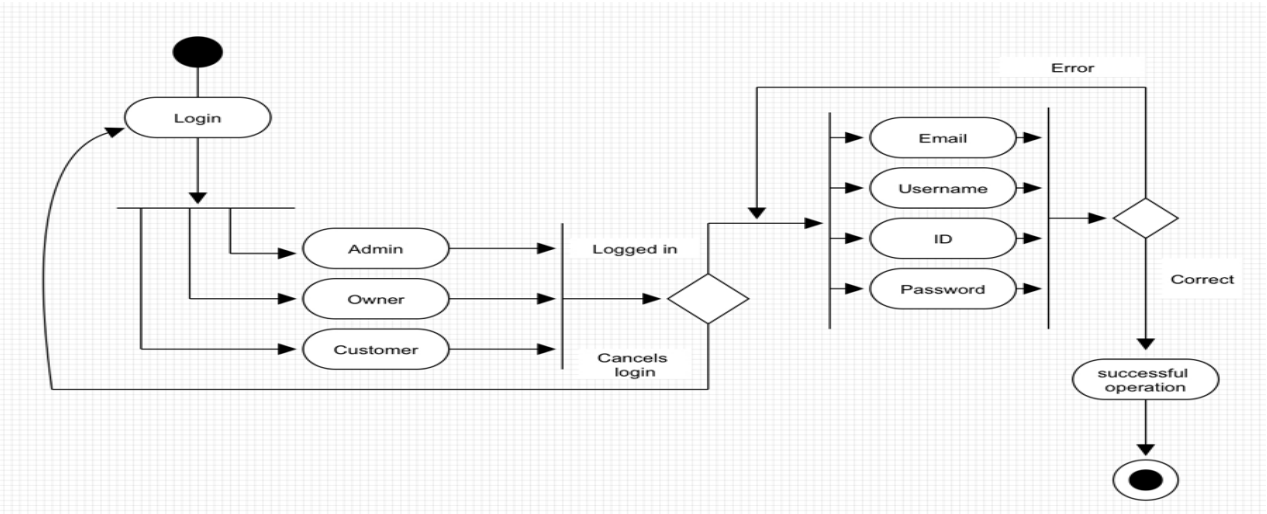


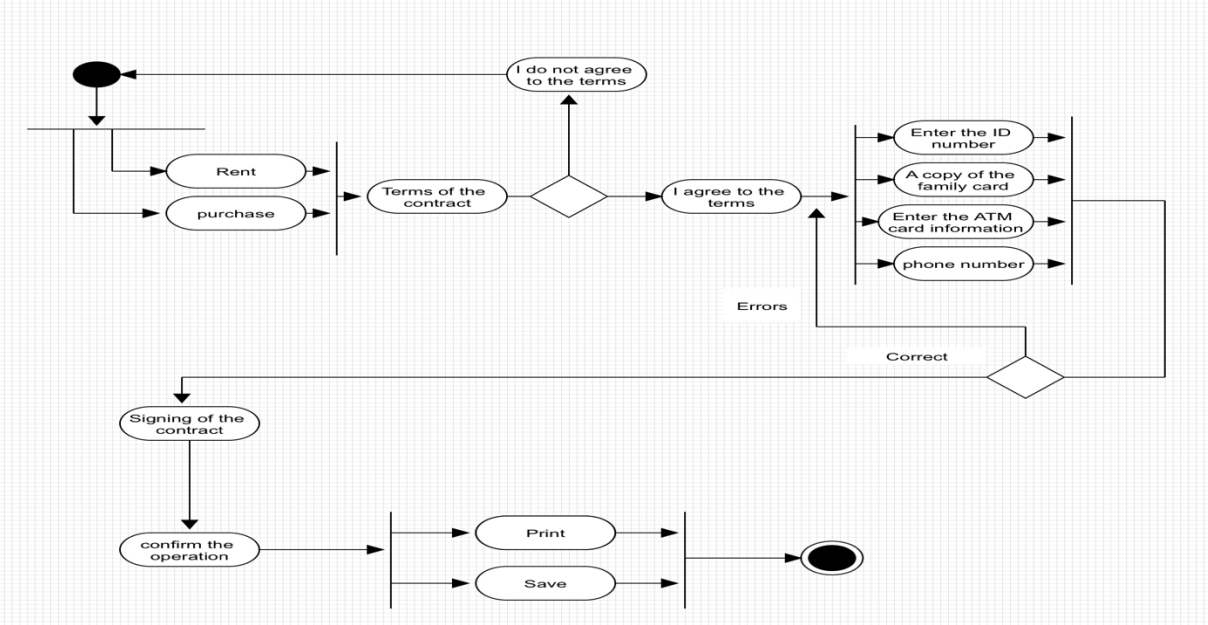
3.3 Sequence Diagrams



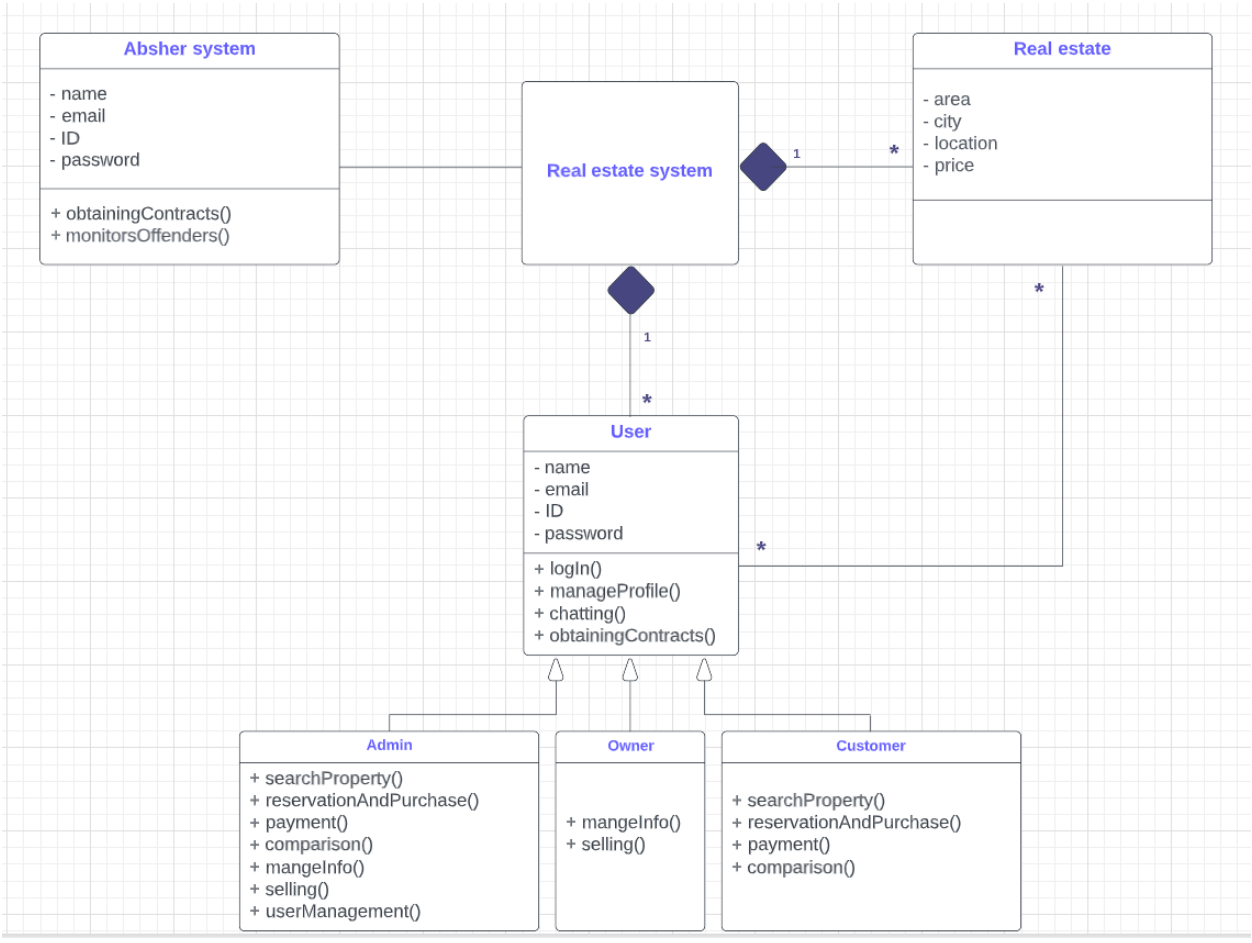


3.4 Activity Diagram



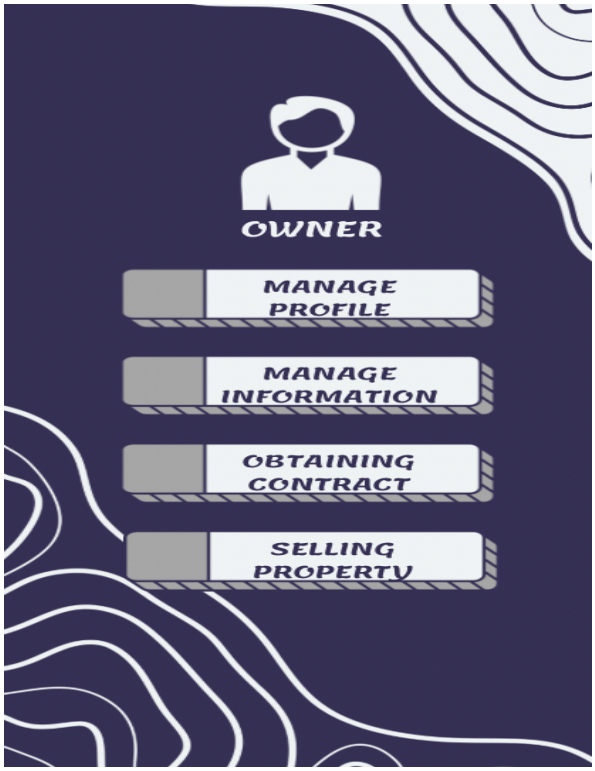


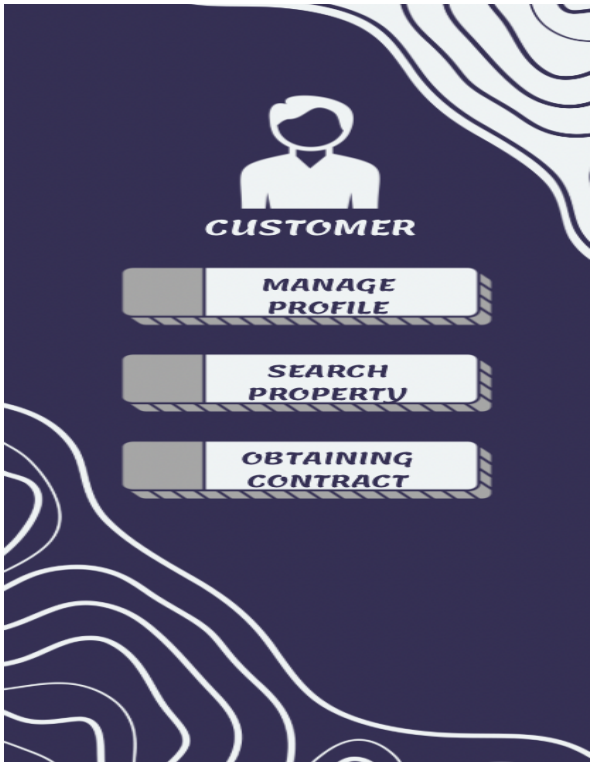
3.5 Class Diagram

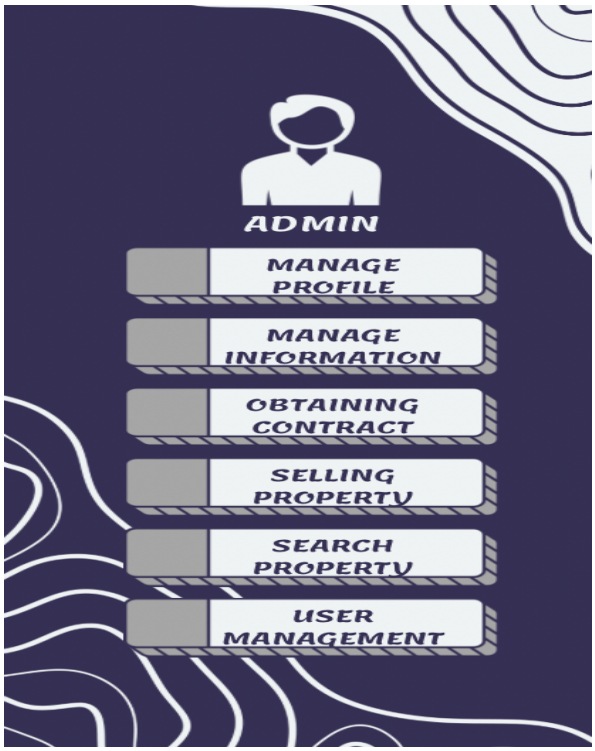


Chapter Four: Implementation (Optional)

4.1 User Interface Prototype


OWNER
MANAGE PROFILE
MANAGE INFORMATION
OBTAINING CONTRACT
SELLING PROPERTY


CUSTOMER
MANAGE PROFILE
SEARCH PROPERTY
OBTAINING CONTRACT


ADMIN
MANAGE PROFILE
MANAGE INFORMATION
OBTAINING CONTRACT
SELLING PROPERTY
SEARCH PROPERTY
USER MANAGEMENT


SEARCH
SEARCH FILTER
City:
LOCATION:
PRICES RANGE :

Chapter Five: Testing (Optional)

5.1 Test Cases

Software testing is an important component of software quality assurance since it provides the final assessment of specification, design, and code generation. It is the process of putting a program to execution using a Real Estate Management System.
The primary goal is finding errors. Testing ensures that the software does not fail and that it operates in accordance with its specifications and in the manner that the end user expects. This can be accomplished using various software testing techniques, which provide systematic guidance for designing tests that exercise the internal logic of the software components, as well as the program's input and output domains, in order to uncover errors in the program's function, behavior, and performance.

To find system faults, the following software testing methodologies were used:
1. Unit testing.
2. Integration testing.
3. white box testing.
4. Black box testing.
5. Acceptance testing (Alpha & Beta testing).

Test 1 login checking	
Input:	1-user name . 2-password. 3- ID number.
Tests:	1-Check whether a user will be able to log in with a valid username and password. 2-Check whether a user can log in with a valid username but an invalid password. 3- Check the login functionality when the required fields (username and password) are empty and the Submit button is pressed. 4-Make sure to test the 'Forgot Password' feature. 5- Verify the ID number, if it is available in Absher.
OutPut:	Ok or an error message indicating that the user or password is wrong.

Test 2 Search property	
Input:	Property name.
Tests:	1-Verify that the search results are relevant to the search query. 2-Test that the search results are displayed correctly when no results are found. 3-Try different search terms and check that the correct results are returned each time.
OutPut:	The details of the property, if they exist, otherwise an no results found message
Test 3 Payment	
Input:	1-credit card number. 2-expiration date. 3-security code. 3-Name on the card.
Tests:	1-Verify that the card number is correct. 2-Verify that the expiration date is correct. 3- Verify that the Security code is correct. 4-Verify that the name on the card is correct.
OutPut:	Ok or Error message.
Test 4 selling the property	
Input:	1- type of property. 2- Price of property. 3- details pf the property.
Tests:	1-Verify the sale advertisement. 2-Verify that the entries are correct 3-Verify that the user will see the offer in its details.
OutPut:	Ok or Error Message.

Chapter Six: Conclusion

6.1 Summary

The world of real estate is very wide, so its presence in one system will benefit the entire community, and the system was designed to suit everyone in terms of ease of use and clarity of all tools. many government departments (such as the housing census...) can benefit from this system. What distinguishes the system is that it deals with the Absher system, obtains user information from it, and contracts are sent to it to preserve the rights of both parties (owner, customer).

6.2 Lessons Learnt

1- It is impossible to come up with ideas the first time.
2- Time management.
3- Working with the team.
4. Understand software engineering more.
5- How to coordinate tasks to deliver the project on time.
6- The same part, but each member of the work team interpreted it in his own way.
7- Searching and using different program to designee the UML diagram.

6.3 Challenges and Limitations

Challenges:

1. Finding the right resources to complete the project.
2. Time management and meeting deadlines.
3. Working with a team and coordinating tasks.
4. Staying motivated and focused on the project goals.
5. Understanding complex concepts and applying them to the project.
6. Keeping up with new technologies and trends in the field of study.
7. Learning how to use new software or tools related to the project.
8. Presenting report in a clear and concise manner for assessment purposes.
9. Balancing project with other academic work or family responsibilities.
10. Dealing with stress and pressure associated with project.

Limitations:

1. Limited access to resources such as UI application.
2. Limited time available for research due to competing commitments.
3. Limited knowledge of subject matter due to lack of experience.
4. Limited access to experts in the field who can provide guidance or advice on the project.
5.Limited understanding of certain concepts related to the project due to language barriers.

6.4 Future Work

1. Develop this system to be accurately predict the future value of properties based on current market trends and data.
2. Create an automated chatbot that can answer basic questions about properties and provide more detailed information when needed.
3. Implement a virtual reality feature that allows users to explore properties in 3D before making a purchase decision.
4. Develop an AI-powered search engine that can suggest properties based on user preferences and past searches.
5. Develop an automated system for tracking rental payments and issuing reminders when payments are due or late.
6. Create a feature that allows customers to compare properties side-by-side to make more informed decisions about their purchases or rentals.

6.5 Reference

[1] (2023). aqar city. Available at: http://www.aqarcity.net/
[2] jeff white ,(2023). The Best Real Estate CRM Of 2023. Available at: https://www.forbes.com/advisor/business/software/best-real-estate-crm/