

Rentomate

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<i>Signature</i>	<i>Date</i>	<i>Name</i>
	4/1/2022	Engr Ahsan Shah

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1 INTRODUCTION

1.1. PURPOSE

Real Estate has been an emerging sector in technology for the past five years however there is not a proper platform for renting sector of real estate. The main purpose of this project is to provide end-users (tenants and homeowners) with a platform that caters to their needs properly by automating the whole process due to which time and physical effort look for a

home or put a home up for rent is greatly reduced as well as introduce a mediator to resolve any conflicts that may arise before or after going through either of the processes.

1.2. PRODUCT SCOPE

This system basically has two end users i.e., tenants and homeowners. It basically provides tenants a platform where they could go through an extended list of homes to rent from. It also includes a filtering mechanism through which tenants can easily look for what they are interested in rather than going through the whole list. It also provides a platform to homeowners who are looking to put their houses up on rent by giving them a rent approximation feature where they can add features of their houses and according to those features an approximate rent will be generated which would give them an idea which they could use to their benefit while negotiating with potential tenants.

Table 1: Terms used in this document and their description

Name	Description
Tenants	People looking to rent houses
Home Owners	People putting their house up on rent
Project	Refers to Rentomate
Users	Refers to both tenants and home owners

2 OVERVIEW

THE OVERALL DESCRIPTION

Problem Statement

Real Estate has been neglected by technology for a long time especially home renting sector as there is not a single platform available that streamlines home renting process. However, with the paradigm shift in technology it is about time that this changes so that the renting process becomes effective, and people included in this process can go through it smoothly and hassle free.

Overall Description

The solution to the above-mentioned problem statement is Rentomate. It is a web-based home-renting platform. Although there are other platforms in existence however, they are mainly focused on buying and selling of houses and just plain ads for homes on rent with 3rd party intervention like property dealers. The aim of this system is not only to give exclusivity to the end users but also automate the home-renting process completely and securely but also make the process efficient, effective and hassle free.

PRODUCT PERSPECTIVE

This system consists of two main end users i.e., Tenants and Homeowners. Product's perspective from both point of views is as following:

Tenants

They access the system as a platform where they can search for houses according to their preferences and after finding a house, they can negotiate the price with the homeowner and finalize the deal.

Homeowners

They access the system as a platform where they can put their houses up for rent and when a tenant is interested in their house, they can negotiate the terms and finalize the deal.

PRODUCT FUNCTIONS

System Functions are as follows:

First off when the users access the website for the first time, they must sign up for which they have to provide all the required information like CNIC, email, Name etc. System also provides the users to manage their accounts where they can update their information. System not only incorporates a filtration mechanism which helps going through the house listings in an efficient manner but also a Recommender System that operates on Content-based filtering which shows relevant houses to the user based on their preferences. System also provides homeowners with a feature where they can manage their properties as well as use a prediction analysis algorithm based on machine learning that will help them approximate the rent of their property. Chatting platform is another function integrated into the system through which both end users can communicate and strike a deal that best suits them. Safe payment gateways have also been incorporated into the system for secure transactions with alerts which notifies both end users if a payment is either due or has been paid depending on the end user.

USER CHARACTERISTICS

This system has two end users i.e., tenants and homeowners. For the users to access the system properly is that they should know how to basically operate a computer and should be able to understand English. User Interface is friendly enough to guide the user.

2.5 CONSTRAINTS

This system does not come with a lot of constraints. The only core constraint to access the system is stable internet connection along with a computer that can access the web is required.

ASSUMPTIONS AND DEPENDENCIES

This system basically automates the home renting process which has some legal aspect attached to it so one of the dependencies is that a deal between homeowner and tenant cannot go through unless they provide a signed affidavit along with a police report as currently there are no APIs available. Another dependency is of verifying the user when they sign-up on the website since NADRA hardly provides access to the verification API to personal businesses.

3 STATE OF THE ART

Existing Systems

- Zameen.com
- Graana.com

Comparison Between Rentomate and Existing System

1.1.1 Existing systems

The existing systems and our system both provide with listing of the property and allow the users to filter to get the desired properties.

1.1.2 Exclusive features

Rentomte provides with the features that automate the process of mediation payment suggestion to fully guide the user.

1.1.3 Payment System

Our platform handles the flow of cash between rental and owner. It automatically gets cash from tenant and transfers it to owner. It ensures timely payment with exclusive deals to ease the rent payment.

3.2.4 Price prediction

Using modern technologies predict the price of a house an idea to the user how much rent should be charged plating the need of a deal.

3.2.5 Document Management

The system consists of management of the documents of a house to ensure authenticity of the houses on our site.

4 USER/SYSTEM REQUIREMENTS

External Interface Requirements

User Interfaces

User Interfaces will be divided into three main categories, namely the administrator who has the privileged access to the system functions, the landlord who wishes to manage their listings of property and tenants who want to browse the listing of the property and communicate with the landlord. The admin dashboard allows access of the database. The homepage will show the listings along with their details. Finally, the Property Listing page will show the properties listed by tenants and their status.

Hardware Interfaces

The product will require a use of a computing device such as PC, mobile phone tablet etc. An active internet connection is required.

Software Interfaces

The product will use machine learning models to process data. The output of will be saved onto the database and users can interact with the system via the web dashboard.

Communication Interfaces

All communications between users will be done via the web dashboard

5 Functional Requirements

- **Authentication: (FR1)**

- I. For registration, the user will first select his/her role (Landlord & Tenant), and provide required information including email, address, phone number, CNIC, etc.
- II. The user needs to provide the code sent to their phone number and email for verification.
- III. The user will be able to login after providing their username/email and password.
- IV. The user will be able to logout of their account.
- V. For the recovery of password, the recovery link will be sent to the registered email of the user.

- **Account Management: (FR2)**

- I. The user will be able to update his/her profile information including phone number, email, address, profile picture and password etc.
- II. For updating the email and phone number, the user must provide the verification code sent to their phone number and email.

- III. The landlord will be able to keep track of all rented and active properties along with total earning made on the platform.
- IV. The landlord and tenant will be able to keep track of all the invoice of rent received and paid.

- **Filtration System: (FR3)**

- I. The user will be able to filter out the houses by any of the following attributes:
 - a. Location
 - b. Area covered by the property
 - c. Property type and sub-property type
 - d. Pricing range
 - e. Amenities (Water supply, Shared accommodation, garage, and supply of gas, etc.)
 - f. Number of bedrooms, bathrooms and furnished, etc.
- II. The platform recommender system will use content-based filtration and recommend properties according to user's requirements.

- **Property Management: (FR4)**

- I. Landlord will be able to add new properties by providing required information for instance property address, City, State, proposed renting price, number of bedrooms and bathrooms, and amenities, etc.
- II. Landlord will be able to edit/delete any active property listed by him/her.
- III. Landlord and tenant can see and print all invoices received for a particular property.
- IV. Tenant can use platform's AI model for the prediction of the renting price of particular property.
- V. Tenant can request maintenance request by providing necessary information regarding the issue they are facing.

- **Communication & Deal: (FR5)**

- I. Both landlord and tenant will be able to communicate on the platform's chatting system.
- II. For making a deal, both parties need to provide all the necessary and legal documents along with a signed affidavit provided by the platform.

- **Payment Management: (FR6)**

- I. The platform supports multiple payment methods. Both landlord and tenant need to provide their banking details. All the rent will be paid through the platform.

- **Admin Support & Alerts: (FR7)**

- I. The platform will send multiple notifications and alerts to both landlord and tenant. The alerts may include when a certain rent has been paid or the due date is coming.

- II. Both parties can contact the admin for any query or information they are interested in.

Functional Requirements with Traceability information

Each requirement will have a separate table

Requirement ID	FR1		Requirement Type		Functional		Use Case #		1
Status	New		Agreed-to	-	Baselined	-	Rejected	-	
Parent Requirement #									
Description	Registration and Authentication is required prior to using the system								
Rationale	It is necessary to prevent unauthorized access to the data								
Source					Source Document		-		
Acceptance/Fit Criteria	The user will have access to their dashboard								
Dependencies									
Priority	Essential	X	Conditional	-	Optional	-			
Change History									

Requirement ID	FR2		Requirement Type		Functional		Use Case #		1
Status	New		Agreed-to	-	Baselined	-	Rejected	-	
Parent Requirement #	Authentication								
Description	Management of all information related to account								
Rationale	This is necessary to keep track of information and keeping in up to date								
Source					Source Document		-		
Acceptance/Fit Criteria	The user can see the status of the property and invoices								
Dependencies									

Dependencies							
Priority	<i>Essential</i>	X	<i>Conditional</i>	-	<i>Optional</i>	-	
Change History							

Requirement ID	FR5		Requirement Type		Functional		Use Case #		2	
Status	New		Agreed-to	-	Baselined	-	Rejected	-		
Parent Requirement #										
Description	Communication System between landlord and tenant									
Rationale	It is necessary for users to establish means of contact in case of any query									
Source					Source Document		-			
Acceptance/Fit Criteria	Allows users to chat with each other and assisting in making a deal									
Dependencies										
Priority	Essential	X	Conditional	-	Optional	-				
Change History										

Requirement ID	FR6		Requirement Type	Functional		Use Case #	3	
Status	<i>New</i>		<i>Agreed-to</i>	-	<i>Baselined</i>	-	<i>Rejected</i>	-
Parent Requirement #								
Description	Payment system to collect rent and miscellaneous fees							
Rationale	It is necessary for to streamline the process of collecting dues							
Source					Source Document	-		

Acceptance/Fit Criteria	Users can receive or pay rent and other fees						
Dependencies							
Priority	<i>Essential</i>	X	<i>Conditional</i>	-	<i>Optional</i>	-	
Change History							

Requirement ID	FR7		Requirement Type		Functional		Use Case #		3
Status	New		Agreed-to	-	Baselined	-	Rejected	-	
Parent Requirement #									
Description	Administration support carries the duties of alerting concerned users with information and responding to user queries								
Rationale	It is necessary to inform users regarding their status on various things								
Source					Source Document		-		
Acceptance/Fit Criteria	Users shall be able to get informed when rent has been paid or arrival of due date.								
Dependencies									
Priority	Essential	X	Conditional	-	Optional	-			
Change History									

6 Nonfunctional Requirements & Software System Attributes

Performance

Performance here means the time it takes to handle a request. The app should be performant throughout the life. There max time for serving request should never be greater than one second.

Security

This refers to the measures taken to protect the privacy of the user. Another important consideration is to avoid ransomware attack such as database encryption. To ensure this we are using following techniques:

- JWT tokens for Authentication and Authorization
- SSL to avoid eavesdrop attack
- API endpoints require authorization
- Ports remapping to avoid attack on components of the software.
- Minimum ports are exposed to public. Private networks are used to communicate between database and server.

Scalability

Scalability refers to the ability to increase the number of requests it can handle. Our app should allow both vertical scaling as well as horizontal scaling. For vertical scaling we would simply increase the capacity of the server. However, if the number of users are increasing exponentially we can use more machines to run server on. Automation tools would be used to perform this. Ansible, Kubernetes and docker would be used that automatically increase the capacity or increase the number of servers when required.

Availability

- The servers should be up 100% of the time (24/7).
- Canary deployment method used to be used to avoid downtime. This deployment method deploys new code to just few servers at first and if there is breaking change the other servers would still work lowering the risk of downtime.

Accuracy

The server should be accurate in sense that it should correctly identify the roles and allow only authorized persons to access things. Furthermore, the data of the users must be accurate as to avoid fraudulent transactions in app.

Usability

It should have a beginner friendly UI.

- The app can be accessed through:

- Any Web Browser
- Android OS
- iOS/ iPad OS

Data Integrity

Accuracy means that the data stored in database should be logical. For example, a CNIC number cannot contain alphabets. To ensure this data validation will be applied at servers.

Maintainable

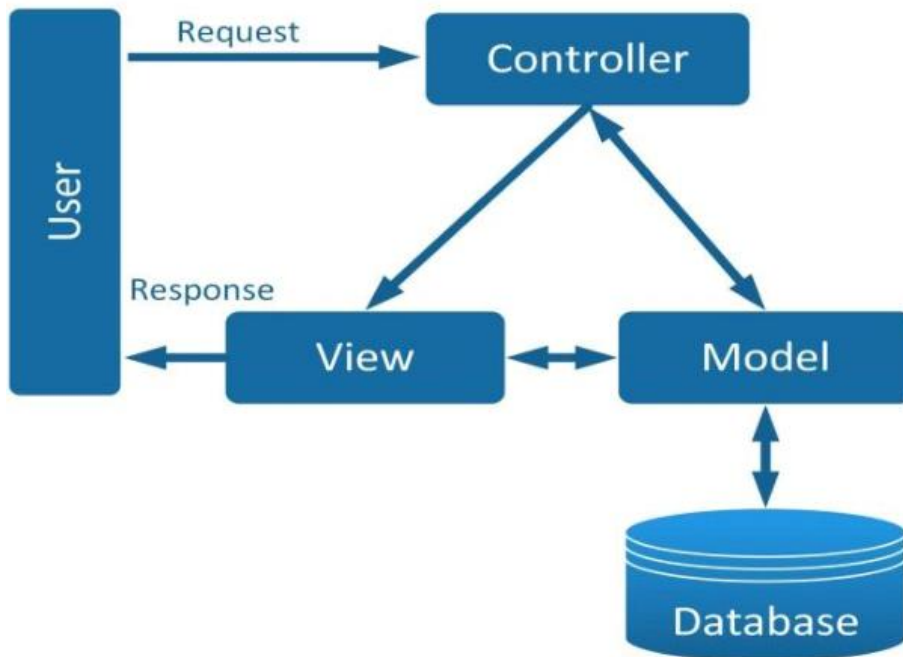
Our app should be architecture such that it allows easy addition of new features without affecting the core app. Instead of monolithic architecture in which all functionality is written as a single app we would split app into components which will communicate through APIs. This technique will enable us to scale the product better as well as new features can easily be added without disturbing the current setup.

7 Project Design/Architecture

Architectural Design

The design of the architecture is an essential aspect of the software development process. The Architecture design provides as a basis for further drilled-down design in which components are resolved into subcomponents. The architecture design is typically at a higher level, eliminating micro-details but outlining the basic pattern of interaction between various entities and allocating a suitable position to each participating component. The depiction of software design facilitates communication among all stakeholders and the developer. The design focuses on the early design decisions that have an influence on all software engineering activity, and it is the system's final success. The software design creates a compact and easily understandable model. This model aids the system in integrating the components that interact with one another.

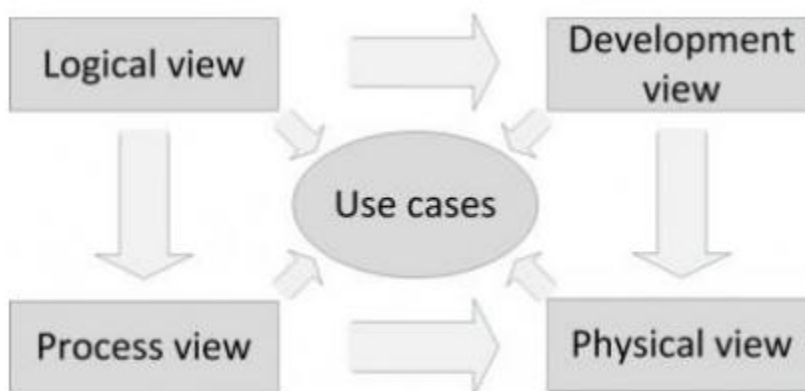
Model View Controller (MVC) architecture is the architectural design that we are using to construct this application. The diagram below illustrates it



VI.

4+1 Architecture View Model

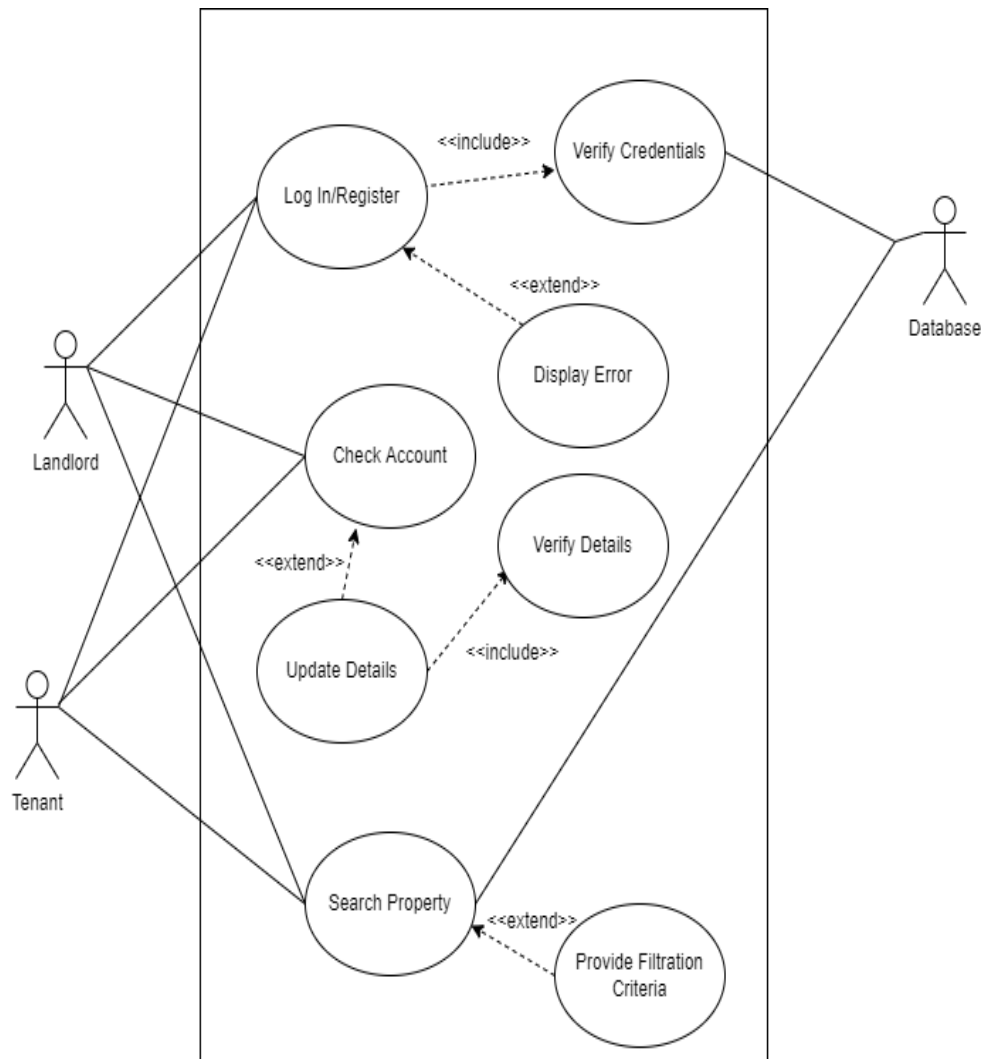
In this section, the architecture is drawn using the views defined in the “4+1” model



Use cases

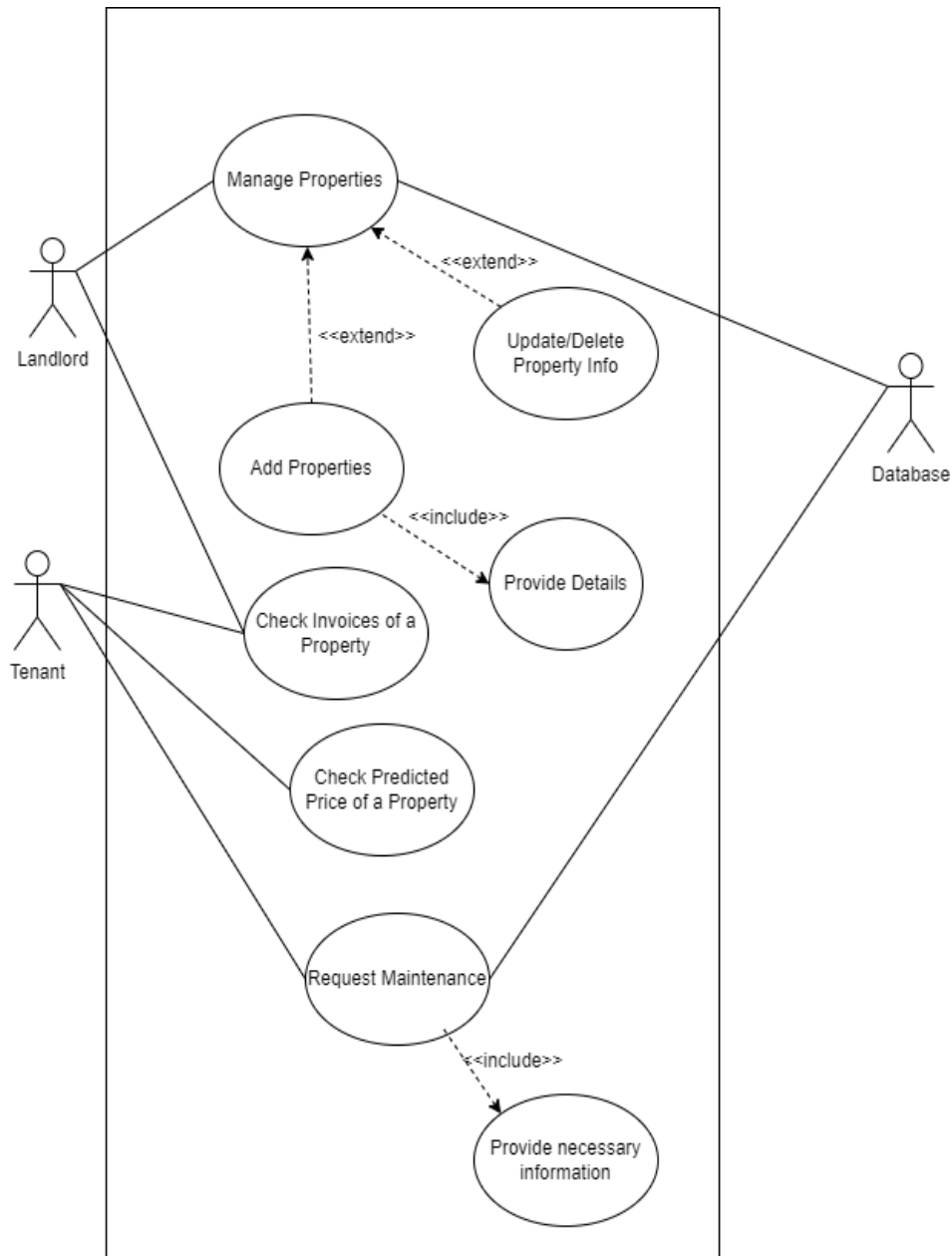
Use case 1

This use case maps the FR1, FR2, FR3



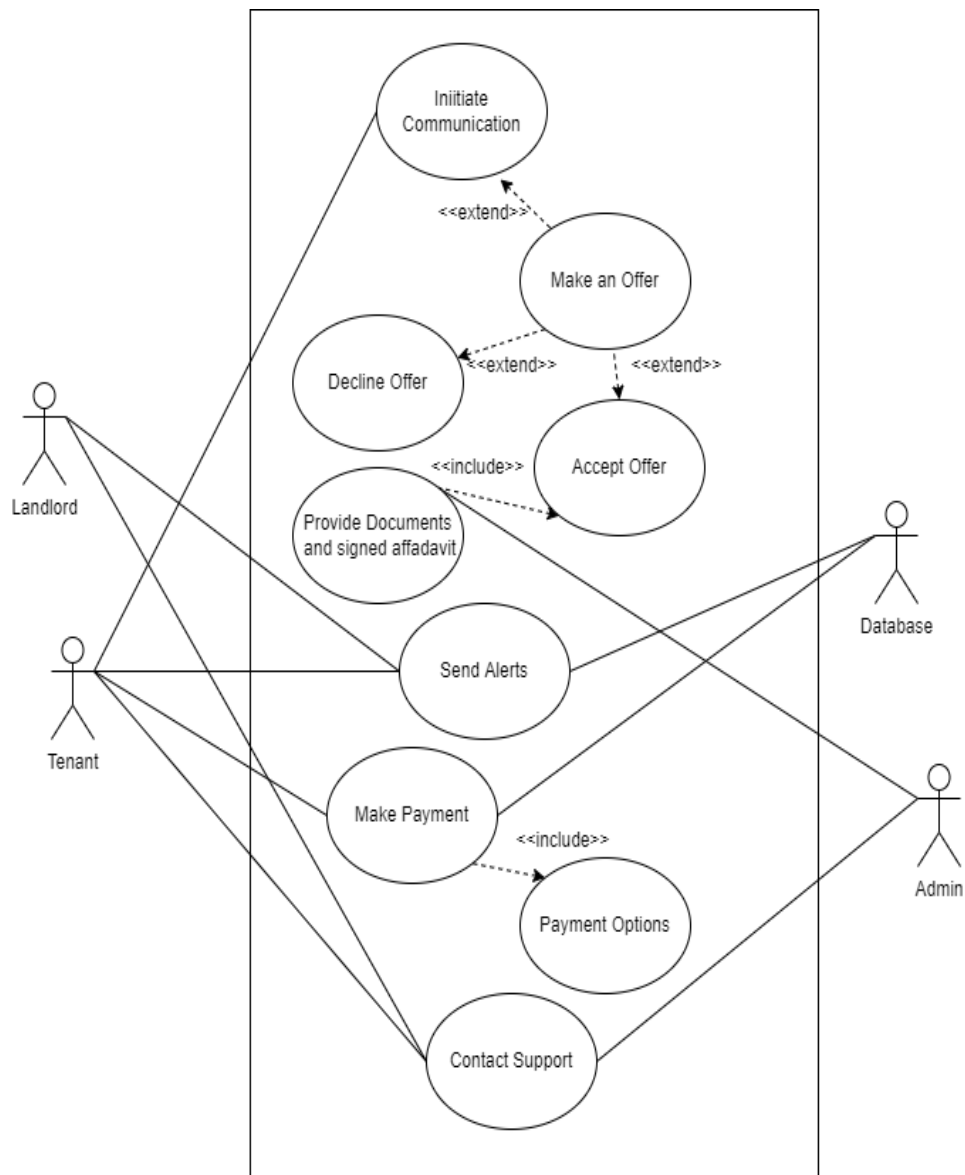
Use case 2

This use case maps the FR4, FR5



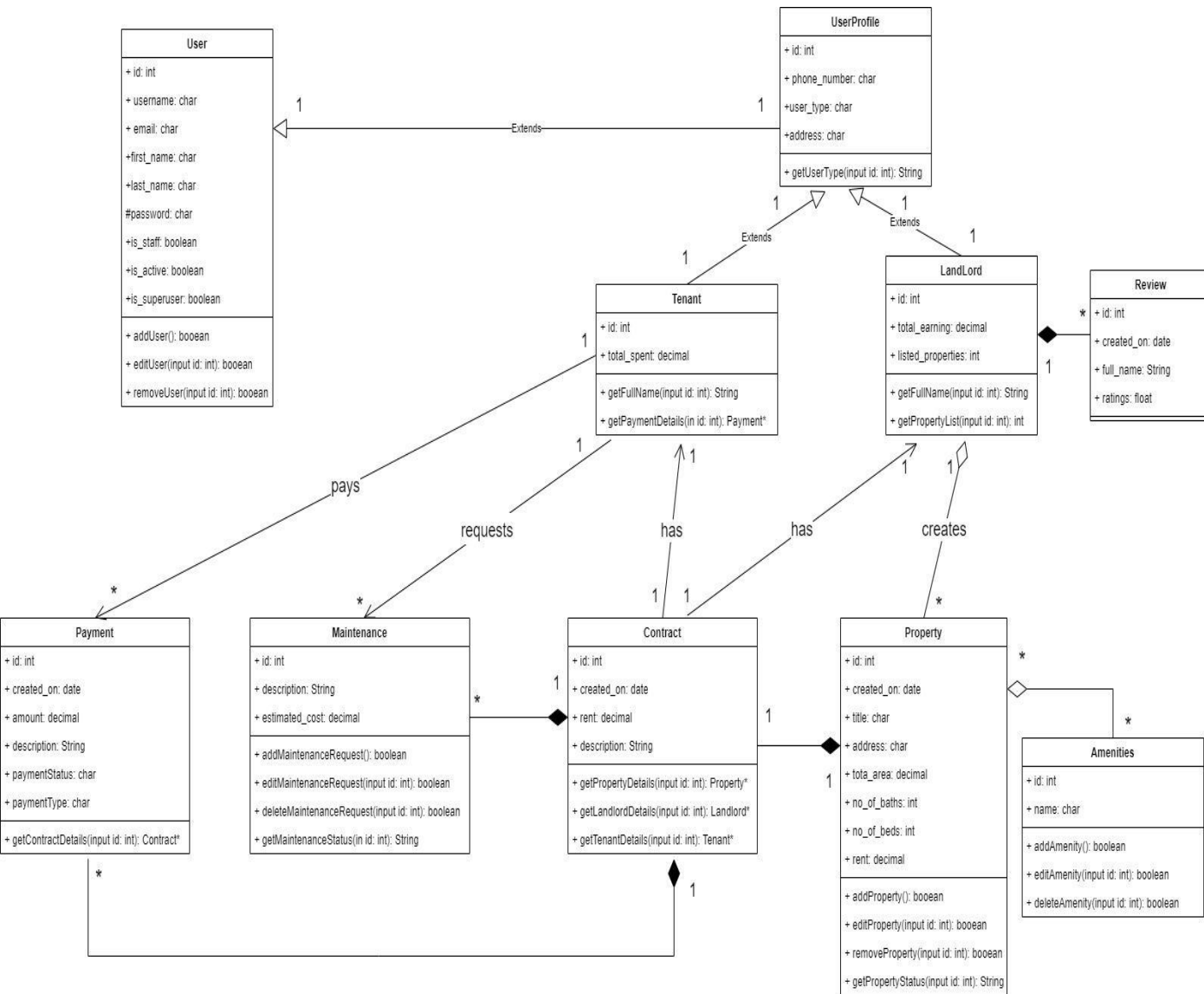
Use case 3

This use case maps the FR6, FR7

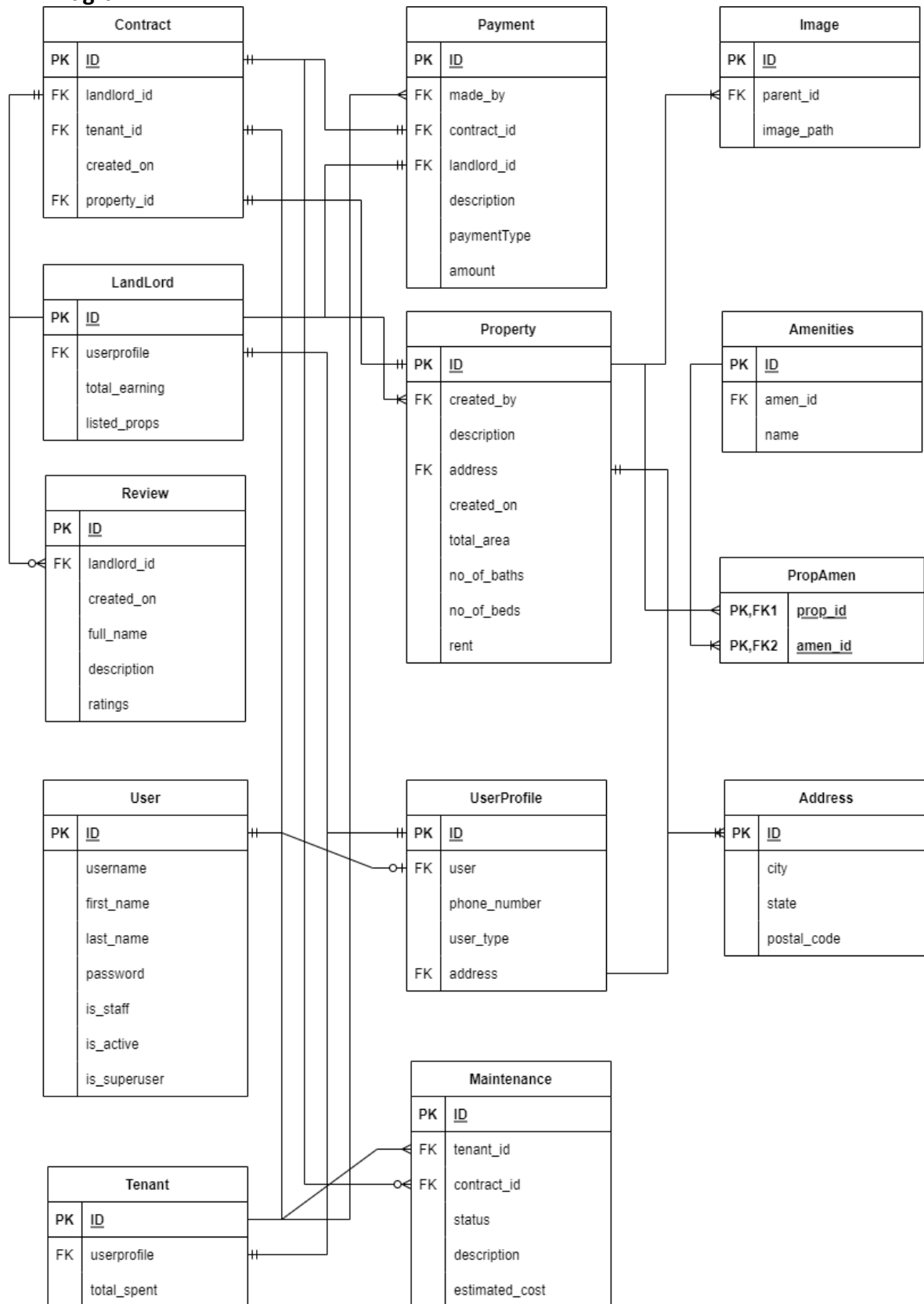


Logical view

Class diagram:

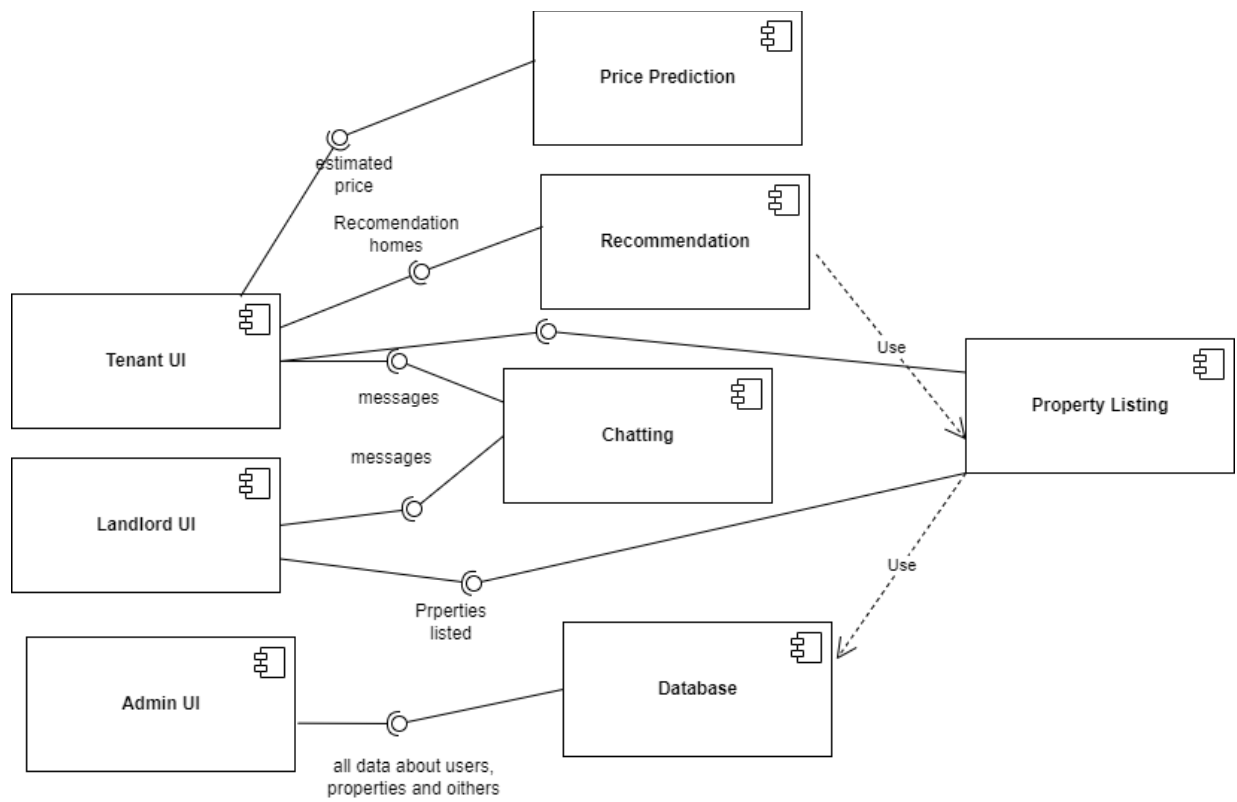


ERD Diagram:



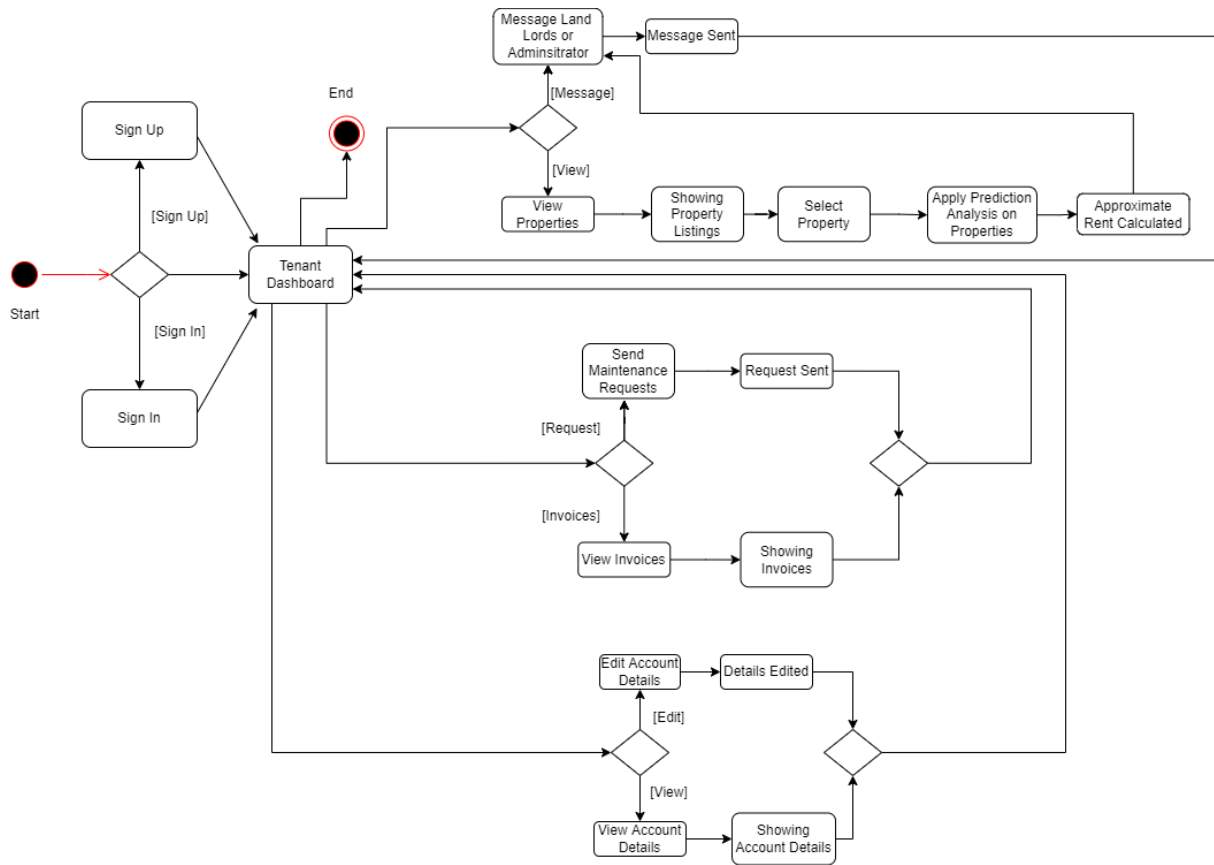
Development view:

Component Diagram

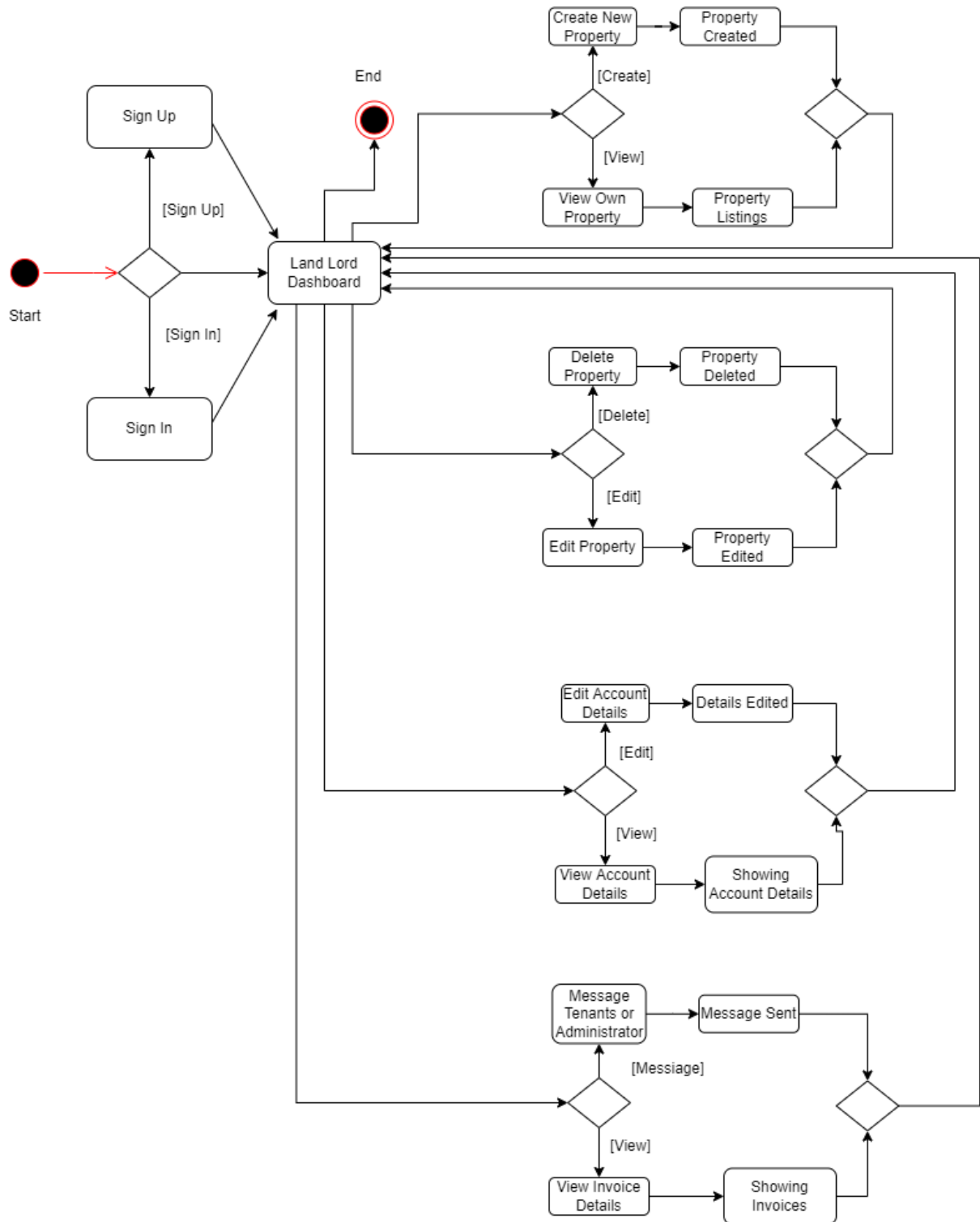


Process view:

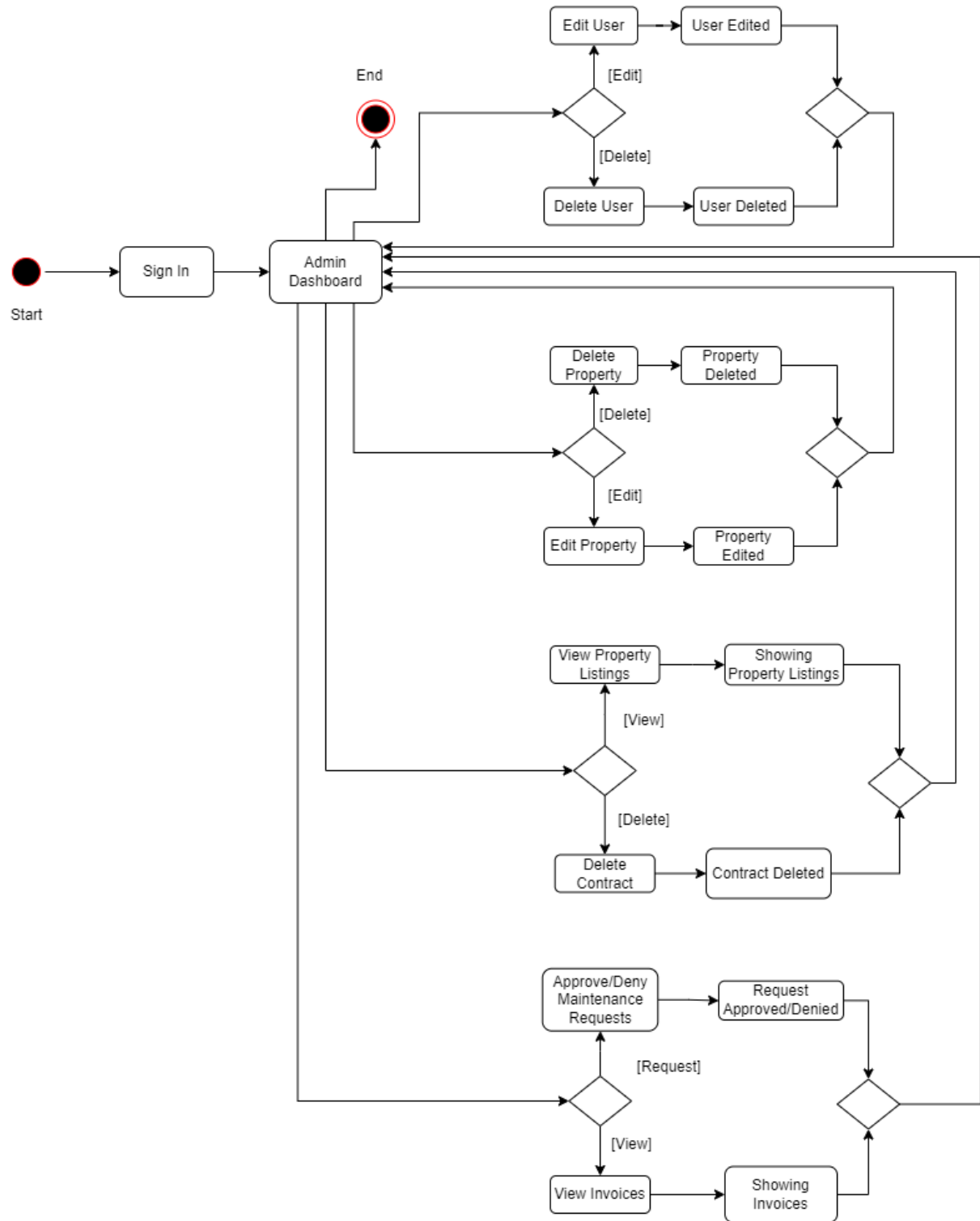
Activity diagram of tenant



Landlord Activity Diagram

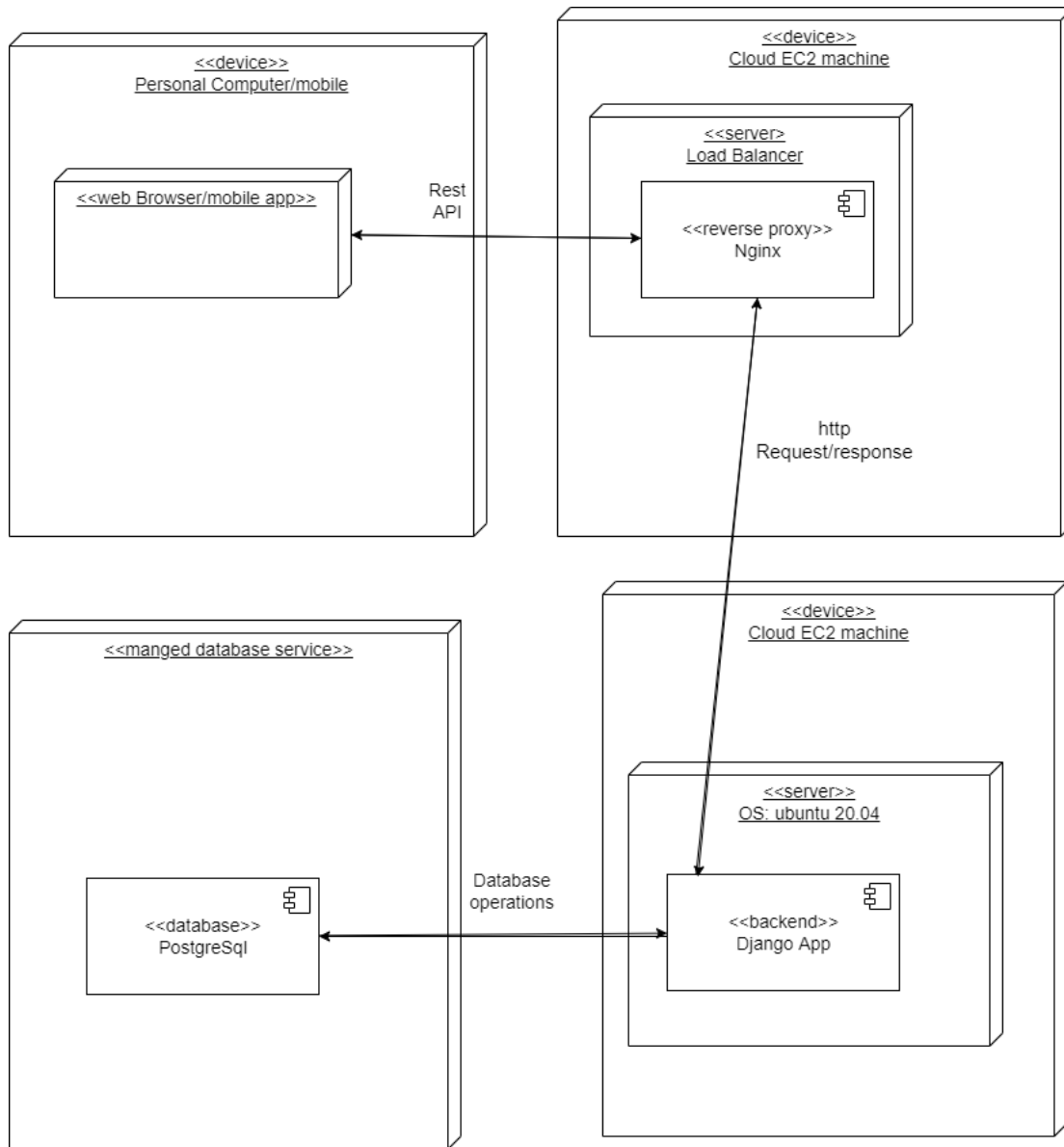


Administrator Activity Diagram



Physical View

Deployment View



User Interface Design

The user interfaces are the primary means of interaction between a user and a system, allowing the user to engage with the system without having to worry about the backend logic, which is neatly concealed from view. The key advantage of MVC, which has been used by the application, is that it separates display from functionality, making things much cleaner. Views

allow us to display a flexible and consistent interface to users, and to update it as needed without having to worry about internal business constraints. With graphical components, the user interface is meant to be simple to use. The text is straightforward, clear, and easy to read. The choice of colors is based on a theme, making it more appealing

Registration Page



Register

A few clicks away from renting your dream house

First Name

Last Name

Email

Role

Password

Confirm Password

☐ I agree to all Terms, Privacy Policy & Fees

Create Account

Already, have an Account? [Log in](#)

Login Page



Login

Landlords grow rich in their sleep without working, risking or economizing

Username

Enter your username...

Password

Enter your password...


☒ Remember me


[Reset Password?](#)


Log in to your account

Don't have an account yet? [Join RentoMate Now](#)

Landlord Dashboard

HomeView PropertiesHow it Works

Usama








Usama Nawaz
Landlord

- Dashboard
- My Profile
- Submit New Property
- Messages
- Contact Support
- Sign Out

12
Listed Properties

05
Already On Rent

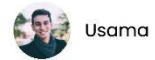
\$5K
Total Earned

Property	Posted On	Status	
 Block D, Model Town Lahore, Punjab PKR 25000/mo	10 October, 2021 2 Days Ago	Rented	View Detail
 Ghazi Road Lahore, Punjab PKR 19000/mo	1 October, 2021 12 Days Ago	Active	View Detail
 Nishtar Colony Lahore, Punjab PKR 40000/mo	1 September, 2021 27 Days Ago	Active	View Detail
 Wateen Society Lahore, Punjab PKR 37000/mo	1 August, 2021 19 Days Ago	Rented	View Detail
 DHA, Phase V Lahore, Punjab PKR 80000/mo	1 August, 2021 19 Days Ago	Active	View Detail

Property Listing:



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Search Properties...

Property Type

[House](#) [Commercial](#)
[Apartment](#) [Plot](#)

Bedrooms

[1](#) [2](#) [3](#) [4+](#)

Bathrooms

[1](#) [2](#) [3](#) [4+](#)

Price Range PKR 12K-15k, 5k



Furnishing

[Furnished](#) [UnFurnished](#)

Amenities

- ☒ Water Supply
- ☐ Shared Accomodation
- ☒ Supply of Gas
- ☒ Garage

[Reset](#) [Apply](#)



PKR 25000/month

Recommended

Block C, Model Town

Lahore, Punjab

3 Beds 4 Baths 07 Marlas

Look no further as we have listed the best Bungalow just for you! This could be your chance to buy such a precious real estate asset. Don't miss out on these 7 Marla units.



Block F, Johar Town

Lahore, Punjab

5 Beds 4 Baths 06 Marlas

PKR 21000/mo



Cavalry Ground, Gulberg

Lahore, Punjab

4 Beds 4 Baths 10 Marlas

PKR 30000/mo



Phase 1, Ghazi Road

Lahore, Punjab

6 Beds 7 Baths 15 Marlas

PKR 55000/mo



Gulshan-e-Ravi

Lahore, Punjab

4 Beds 5 Baths 08 Marlas

PKR 27000/mo

Main Page:

Easy way to find a perfect property

We provide a complete service for the sale, purchase or rental of real estate

Location
Select your city



Property Type
Choose property type



Rent Range
Choose a price range

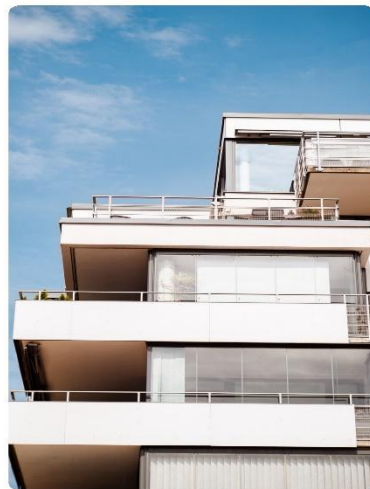


Featured Properties



Why you should rent your dream house with us?

From moving in to moving out, we will be managing your entire process and keep you posted!



Document Management

From lease documents to invoices, keep track of all documents on RentoMate.



Rental Payments

Let's eliminate hectic process of managing rentals. Pay & Collect rents online through RentoMate.



Maintenance Requests

Rather than a call when you're at dinner with family, learn about maintenance issues in RentoMate.

Get your dream house

Family is number one, and comfortable is number two. That two thing must be together. Let's start!

Join Us Now



