

**Metropolitan University of Tirana
Faculty of Computer Science and IT**

**Master of Science in Artificial Intelligence
– Cybersecurity**

Property Management System Documentation

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PMS System

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1. Executive Summary

1.1 Project Overview

In our current era, technology has become an essential part of our lives. Its importance is such that we cannot fathom the difficulties that would arise if it were to malfunction even for a brief 30 seconds. With just a click of a button or the touch of a pad, people can traverse multiple locations from the comfort of their homes.

The integration of technology has pervaded all aspects of our lives, ranging from commonplace to advanced occupations. Consequently, even one of our most basic necessities, finding a suitable home for ourselves or our loved ones, has undergone a radical transformation. This project aims to offer a platform that allows buyers, sellers and renters to connect and conduct real estate transactions online.

The user-friendly interface, coupled with advanced search and filter options, provides an exceptional experience for users in their quest for a perfect home. Additionally, by furnishing comprehensive property listings replete with high-quality images and detailed descriptions and by linking the platform to virtual tours we can offer an unparalleled experience to users.

Moreover, what sets this platform apart is its capability to facilitate real-time communication between interested buyers or sellers and the agents assigned to that property. The platform employs advanced security measures that protect against data theft and ensure that user information is secure.

1.2 Purpose and Scope of this Specification

The primary objective of this software is to replicate the relationship between a buyer or seller and a real estate agent, eliminating the need for physical communication. By offering this web application, we aim to revolutionize the real estate industry by enabling property purchases with a mere click of a button.

Our website provides users with a comprehensive property search, allowing them to apply various filters to narrow down their search results and find the ideal property that best suits their needs. Whether users are seeking a spacious apartment, a luxurious villa or a cozy bungalow they can rely on our platform to deliver the most relevant and accurate results.

Our website's search function is simplified, user-friendly, and has a simple style that improves the user

experience. To guarantee that the search results are pertinent, current, and correct, we use sophisticated algorithms. Additionally, we use cutting-edge technologies like virtual tours, which let users explore the property virtually from the comfort of their homes.

We also think it's important to foster a community of users with comparable tastes and interests. Our platform offers tools like social networking and forums that let users engage with one another and exchange ideas and thoughts on real estate-related topics. This improves user experience overall and encourages a sense of community among users.

In conclusion, our software aims to revolutionize the real estate industry by offering a platform that replicates the relationship between buyers and sellers and real estate agents, without the need for physical communication. Our user-friendly interface, advanced search filters and innovative technologies provide a seamless and efficient user experience.

2. Product/Service Description

Our website boasts a vast database of properties, including houses, apartments, condos, and townhouses. With detailed property descriptions, high-quality images, and virtual tours, you can get a real sense of what each property has to offer before even stepping inside.

You can filter your search results based on location, price, size, number of bedrooms and bathrooms, and many other factors, to find the perfect home that meets your needs. Plus, we offer advanced search options that allow you to search by specific features such as swimming pools, outdoor spaces, and more.

In addition to a comprehensive property search, our website provides valuable information about the real estate market in your desired location. You can stay up to date with the latest market trends, price changes, and new listings. We also provide insightful articles and guides to help you navigate the home buying process and make informed decisions.

Our website is also designed to make the home buying process as seamless as possible. We provide helpful tools such as mortgage calculators, real estate agent search, and even virtual tours of properties. Plus, our user-friendly platform allows you to save your favorite properties and keep track of your search history.

Whether you're a first-time home buyer or a seasoned investor, our real estate website is the perfect tool to help you find your next property. With our comprehensive database of properties, advanced search options, and valuable market insights, you can simplify your home search process and find your dream home with ease. Start your search today and take the first step towards your new home!

2.1 Product Context

The software's main purpose is to make it easier for people to find houses according to their preferences. It is an independent website with 3 levels of users: user, agent, admin. Users can just see candidate houses for them or take part in auctions or such activities. Agents are the second level users, they can post new properties or modify information about them. Next are admins which have every right the website makes possible. They can post, modify or delete properties and create or remove agents.

2.2 User Characteristics

The type of users that will be interacting with the website are as follows:

- Homebuyers: These users are interested in buying a new home or property and are looking for listings that match their preferences, such as location, price, and size.
- Renters: These users are looking for rental properties, such as apartments, condos, or houses, and are interested in finding listings that match their budget and preferences.
- Investors: These users are interested in buying properties as an investment, such as rental properties, vacation homes, or commercial properties.
- Real Estate Agents: These users are real estate professionals who help homebuyers, renters, and investors find properties that meet their needs. They may use the website to search for properties for their clients or to list properties they are representing.
- Mortgage Brokers: These users are professionals who help homebuyers and investors secure financing for their property purchases. They may use the website to connect with potential clients or to provide information about mortgage products.
- Homeowners: These users may use the website to research the value of their current property or to explore other properties in their area.
- Relocation Specialists: These users may use the website to help clients who are moving to a new area find suitable housing options.
- Property Managers: These users are responsible for managing rental properties and may use the website to search for new tenants or to list available units.
- Developers: These users are interested in acquiring land or existing properties for development, such as building new homes or commercial buildings.
- Contractors: These users may use the website to find new projects, such as remodeling or renovation work, or to connect with property owners who need repairs or maintenance services.

2.3 Assumptions

- It is assumed that some actions performed behind the scenes are performed regularly according to law.
- It is assumed that an agent can be created only by an admin and no one else can change its information. In case of changes the admin is notified.
- It is assumed that all agents and admins will be trained to use the software to know their duties and limits of reach.
- It is assumed that agents and admins will have computers/laptops in their offices.
- It is assumed that agents and admin will have a stable internet connection in their offices.

2.4 Constraints

- All agents and admins of a website must have a computer/laptop during working hours in order for them to do their work.
- Knowledge of website tasks and capabilities is mandatory for agents and admins. Each agent and admin must know what they can and should do for them not to interfere in each other's work. The better the knowledge, the better the performance.
- Since the software is a web-based application, stable internet connection in the offices is a must. The internet is needed mainly because the data should be fetched from the database over the internet. So, changes to the database will not be reflected on the website if there is no connection. Also, in order for users to get in touch with agents through the chats they need internet.
- We offer a precise location of each property so Google Satellite should be available all the time in order for Google Maps to work anytime.

2.5 Dependencies

Based on the attributes of our database, here are the relationships and dependencies that can be identified:

- Users: This attribute represents the people who use the real estate website. Users can be buyers, sellers, or both. They can create accounts, browse properties, save favorites, and contact agents. The Users attribute has a many-to-many relationship with the Properties attribute, as users can be interested in multiple properties, and each property can have multiple interested users.
- Admin: This attribute represents the administrators of the real estate website. Admins are responsible for managing the website, handling user accounts, moderating listings, and overseeing auctions. The admin attribute has a one-to-many relationship with the Users attribute, as admins can manage multiple users, but each user is managed by only one admin.
- Properties: This attribute represents the real estate properties listed on the website. Properties can be houses, apartments, land, commercial buildings, or any other type of real estate. Each property has a unique identifier, along with attributes such as address, price, description, and media. The Properties attribute has a many-to-one relationship with the Agents attribute, as each property can be listed by only one agent, but each agent can list multiple properties.
- Agents: This attribute represents the real estate agents who list properties on the website. Agents can be individuals or agencies, and they are responsible for creating and managing property listings. The Agents attribute has a one-to-many relationship with the Properties attribute, as each agent can list multiple properties, but each property can be listed by only one agent.
- Area: This attribute represents the geographical areas where the properties are located. Areas can be cities, neighborhoods, zip codes, or any other geographical region. The Area attribute has a many-to-one relationship with the Properties attribute, as each property is located in only one area, but each area can have multiple properties listed.
- Auctions: This attribute represents the auctions held for certain properties listed on the website. Auctions can have a start and end date, along with bidding rules and requirements. The Auctions attribute has a one-to-one relationship with the Properties attribute, as each auction is held for only one property, and each property can have at most one auction associated with it.
- In summary, the Users attribute has a many-to-many relationship with the Properties attribute, while the Admin attribute has a one-to-many relationship with the Users attribute. The Properties attribute has a many-to-one relationship with the Agents attribute and the Area attribute. Finally, the Auctions attribute has a one-to-one relationship with the Properties attribute.

3. Requirements

3.1 Functional Requirements

There are 4 levels of priority in the functional requirements:

- Priority level 1 – highest priority, critical (requirement must be completed at the early stages)
- Priority level 2 – high priority (requirement should be completed around the early stages)
- Priority level 3 – medium priority (requirement should be completed before the ending stages)
- Priority level 4 – lowest priority (requirement can be completed any time)

Req Nr.	Requirement	Comments	Priority	Date	Reviewed/Approved
FR_01	The software should provide different views for different access levels from users.	The user, agent and admin will have different views.	1	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_02	The passwords should be stored securely in the database.	The passwords will be hashed before being entered in the database.	1	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_03	A normal user can change their username and password.	Users can change certain fields of information in their account without requesting access from the admin.	2	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_04	Real Estate agents can change any field in their user accounts, besides deleting their accounts.	Just like normal users, real estate agents can change their account information.	2	15/04/2025	Darling Selita Daniel Figu
FR_05	Any non-registered user can create their account themselves by using the sign-up form.	A sign-up form will be available for users to register.	1	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu

FR_06	Non-users cannot have access to some of the functionalities of the real estate website.	There are some features, like contacting an agent, that will not be available to non-registered users.	2	15/04/2025	Darling Selita Daniel Figu
FR_07	Any user (registered or not) can use the mortgage calculator to get a rough estimate of their payments.	A mortgage calculator page will be available. By just filling in the fields, you can get the	3	15/04/2025	Darling Selita Daniel Figu Frenkli Koleci
FR_08	A user should be able to view all the available properties.	This feature is also available only to registered users.	2	15/04/2025	Darling Selita Daniel Figu Frenkli Koleci
FR_09	A user should be able to view all the available agents.	Another feature that is available only to registered users.	2	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita
FR_10	A registered user can make an enquiry/request for a personal meeting with one of the available agents.	In case that a user wants to set up a meeting with an agent, they can make an inquiry on the website and then they will be waiting for an answer.	2	15/04/2025	Darling Selita Daniel Figu
FR_11	Users can choose to participate in auction or open house events.	For registered users, special events to attend will be available.	3	15/04/2025	Darling Selita Daniel Figu
FR_12	Agents must be able to add new properties to the database.	Agents must be allowed to access the properties in the database, by adding new ones.	1	15/04/2025	Darling Selita Daniel Figu
FR_13	Agents can delete properties from the database.	It is true that agents can delete properties, but they can still remain in the database.	1	15/04/2025	Darling Selita Daniel Figu

FR_14	Agents can create new events, which are available only to registered users.	Agents are responsible for creating events, such as auctions or open houses.	2	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_15	Every user should be able to view the general information of the real estate website/brokerage	The general information of the real estate brokerage will be available to every user. More specific information will be restricted from non-registered users.	3	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_16	Registered users can leave feedback for the agents.	This is another feature exclusive to registered users. They can leave feedback.	3	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_17	Registered users can leave feedback for the properties.	Exclusive feature to registered users.	2	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_18	The admin can view the information of any user.	The admin is viewed as the entity that is responsible for the maintenance of the website (the IT professional), but also as someone who can assist the real estate brokerage.	1	15/04/2025	Darling Selita Aleksandros Sinani Daniel Figu
FR_19	The admin can delete accounts of users any time.	The admin has full access to the database. The accounts are not really deleted. They are just not available any longer.	1	15/04/2025	Darling Selita Daniel Figu
FR_20	The admin can delete properties in the database.	The admin can delete the properties. He can still access them, but to the other users, it will seem as if the deleted properties are no longer available.	1	15/04/2025	Darling Selita Daniel Figu

FR_21	The admin can view the statistics of the real estate brokerage.	The statistics of the brokerage are available to the admin.	2	15/04/2025	Darling Selita Daniel Figu
FR_22	The instances in the database will not really be deleted.	As it is mentioned above, the entities in the database will not really be deleted, they are just not going to be available to a certain range of users.	2	15/04/2025	Darling Selita Daniel Figu
FR_23	Agents cannot access the information of the users.	Agents do not have access to the information of the users in the database.	2	15/04/2025	Darling Selita Daniel Figu
FR_24	The sign-up information provided by the user will be validated.	In order to prevent sql injection, the information coming from the sign-up form.	1	15/04/2025	Darling Selita Daniel Figu
FR_25	The information entered by the agents will be validated.	Every information provided by the agents will be validated and filtered to prevent sql injection.	1	15/04/2025	Darling Selita Daniel Figu
FR_26	The information coming from the sign-in form will be validated.	While logging in, the credentials will be validated and filtered.	1	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita
FR_27	A simple integrated chat-bot	A simple interactive chat-bot will be available. Its structure is supposed to be simple.	3	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita
FR_28	reCAPTCHA	It will be used to check if the one interacting with the website is a real human being.	3	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita
FR_29	The website should be responsive.	A user should be able to open the website on different devices.	1	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita

FR_30	The website should be user-friendly in design and easy to learn.	The views for the users are supposed to be user-friendly in design.	1	15/04/2025	Frenkli Koleci Daniel Figu Darling Selita
FR_31	Frequently Asked Questions	This page has the frequently asked questions and the answers to them. It is available to all the users.	4	15/04/2025	Darling Selita Daniel Figu
FR_32	Filtering the search	When searching for properties, one can filter the search. This feature is typically available only for registered users.	2	15/04/2025	Darling Selita Daniel Figu
FR_33	Renting services	A user, besides buying and selling, can rent a property.	2	15/04/2025	Darling Selita Daniel Figu
FR_34	Affordability Calculator	The affordability calculator can help users determine what they can afford in terms of buying. It is different from the mortgage calculator due to giving more general results.	3	15/04/2025	Darling Selita Daniel Figu
FR_35	The Help page	In case a user is unfamiliar with the website and is finding it difficult to use it, they can use the HELP page to get a general idea of how the website works and the services they can get.	4	15/04/2025	Darling Selita Daniel Figu Frenkli Koleci Aleksandros Sinani
FR_36	Integrated map in the website	For better experience, an integrated map will be available on the website.	3	15/04/2025	Darling Selita Daniel Figu
FR_37	Loan Options	A user can open the “Loan Options” page to check the different loan lenders.	2	15/04/2025	Darling Selita Daniel Figu

FR_38	Printing the properties information in a PDF.	If a user wants to save a property's information locally, they can save it in PDF format.	4	15/04/2025	Darling Selita Daniel Figu
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3.2 Non-Functional Requirements

3.2.1 Product Requirements

3.2.1.1 User Interface Requirements

The user interface for the web applications should be compatible with any browser in order for the user to access it from Desktop or Mobile. In addition to the functions required, we are going to describe the characteristics of each interface. The User interface could be grouped in 5 main interfaces:

1. Log in/Sign up Interface

The “Log in” and “Sign up” interface has a completely different and simple design form the main page, with only the essential information needed in the center.

The Log in menu:

- It requires only the “username/email” and “password” of the user in their respective fields.
- Contains a link for if the user forgets the password labeled “Forgot Password?”.
- It has a link for new users to sign up which redirects to the Sign-up page.
- Lastly, we have the “Login” button that checks the validity of the username/email and password to then redirect to their designated pages (Client, Agent or Admin).

The Sign-up menu: It has many fields to fill to needed information of the user on a real estate website. The fields are:

- “Name” requires the name of the user.
- “Surname” requires the surname of the user.
- “Email” requires a valid email from the user.
- “Age” requires the age of the user, since age is a big factor in the real estate agency. This is a much-needed information also the form only allows numbers to be entered on this field.

- “Address” requires the location of the user to understand more of the area that the user will need to search for a potential house.
- “Username” requires a username from the user to make the login process a little easier.
- “Password” Requires a password from the user to login to their account. It has specific requirements like it must be 8 characters long, must contain at least one number and one letter and no symbols.

2. Main page Interface

The main page holds all its information on one site. There's no need to redirect to another site unless we go to the login interface. All the links present just scroll to their respective section on the main page.

These sections are:

“HEADER”-The header contains:

- The logo of the website
- Name of the website” Patagonia Estate”
- A navbar with the nav links HOME, ABOUT, SERVICE, PROPERTY, BLOG, CONTACT that changes into a drop down menu in the mobile interface while in the desktop interface it's just fully displayed in the header.
- The login button that redirects to the login menu

“HOME”-It is the start of the page that contains a static image and a slogan to introduce newcomers to what this website is about

“ABOUT”-It contains some information and key points of the company, to give an idea of what the business offers to its buyers

“SERVICE”-Displays some of the services that the company has to offer.

“PROPERTIES” -On this section we have used PHP to load the images from the database and then display them on this file. This visualization is done by using a horizontal scrollbar which displays each property, its image, its price, its agent that sells it and other features that are related to a building

“BLOG”- We have created a mini blog to show some recent feed about some properties.

“CONTACT”-We have a contact section where we have used the input fields to create a PDF from the website. The general description is shown below:

Contact section is a form, with the post method, where we get the contact information (name, email, number and the message). In the PHP file, pdf_generator, we access the variables and perform validation with regex (also fulfilling another requirement in our project). In order to generate the pdf, we have used fpdf, which makes it simple to create a pdf file. The file is saved locally at a folder specified for the pdf files. The name of the file is defined by the time, so they are going to be unique. The file is generally simple, just the variable names and their values. You have to just fill in the fields and then click the button to write the message.

3. Client interface

The header bar contains:

- The client profile picture,
- “Welcome Mr./Mrs. “*Client name*” text,
- “Log out” button that will terminate the current session and will resent the user to the main page.
- A “Cart” button that displays all the products added to the cart by the client.

The search bar contains quick search options like: Location, Building Area, Agent Id. Then show the results containing one of these options that you choose.

Main page consists of listed houses for sale containing information like pictures of the property that's listed, Agent Id for the agent that's responsible of the property and a Buy button that puts the property in the cart section.

4. Admin Interface:

The admin interface will have a superuser. The superuser is the only one with access to change everything, look up every data , edit it and add new ones. This interface will have:

- **A status bar** – this will show the number of houses sold or rented
- **A sales chart** – the sales chart will show data about the income and loss of the company
- **A rank chart** – this will show the data about the agents with the highest number of selling and renting and therefore creating a leaderboard
- **A user table** – This table will show the data for all the users from client to agent
- **An edit button** – The admin is able to edit the data for the user since only the admin has the ability to

change the status of user for example from user to agent

- **An add new button** – The admin can add a new user
- **Delete** – The admin can delete all the data for the user
- **A property table** – This table will show the data for all the properties listed for sell or rent
- **Add new property** – Except for the agent or the user the admin is also able to add a new property listing
- **Edit property** – The admin can edit the property data if some mistake is made during the listing of the property by some other user
- **Delete property** – This will delete the property from the database
- **A search bar** which will be able to show all the users or properties based on some filters
- **The header** will have the name of the user and a profile picture.

3.2.1.2 Learnability

Because it affects how fast and easily visitors can learn to navigate and engage with the site, learnability is a crucial need for a website. A user-friendly website can result in better user experience, greater user happiness, and higher levels of engagement.

- Agents should be able to master using the system within a few minutes.
- The clients will know what they're in for from the start since everything is explained on the main page.
- In case of an error, a specific and detailed message will be shown to the user for him to understand what went wrong.
- The buying process is easy, and the agents will always be there for the clients to help them fill in any questions they have, be it for the property, the company or the website in general.

3.2.1.3 Accessibility

The accessibility features of the website are defined as shown below:

- Each user is provided with his/her username and password at the time they are registered at the system.
- The agents have control over the clients they see fit for them by sorting age and location.
- Admin can see which agent is selling the most and the current clients so they can manage the website more efficiently.
- Main page has all the information in one page having everything easily accessible.

3.2.1.4 Efficiency

Because it affects how fast and easily users can complete tasks and access information on the site, efficiency is a crucial criterion for a website. An effective website can result in better user experience, greater

user satisfaction, and higher levels of engagement. Below are some of the features that make our real estate website efficient.

- Admin can see the total earnings in real time.
- Admin also has all the important stats grouped up on the dashboard
- Clients have their age and location to find the best fit agents for them
- The search bar helps clients sort out the property they want to buy.
- No delay is supposed to occur when a user performs an operation.
- Each operation will be completed within minutes of making the request.

3.2.1.5 Memorability

The memorability requirement for a website refers to how easily users can remember the website's content, design, and functionality after their initial visit. A memorable website is one that users can recall and return to with ease, without having to rely on external references like bookmarks or search engines. Below you can find some other memorability features:

- The website is intuitive; hence, it is not a problem if you ‘vaguely remember’ how to use it.
- The unique design makes it different and memorable from other sites.
- The user interfaces are designed to be easy understandable by the user (pictures, icons, buttons, descriptions etc.)

3.2.1.6 Errors

It is important to prevent errors from happening on the website. Errors range from operation failure, SQL injection, etc. In our website we have added the step of information validation and filtering to avoid SQL injection and other errors. Below you can find other features mentioned:

- There are measures that keep everyone from entering wrong information in the database.
- If an error occurs it can be edited and corrected immediately.
- A validation process is followed for every piece of information inserted on the website to prevent errors from happening in the database.

3.2.1.7 Satisfaction

- The system is user-friendly, and it is very easy to use for newcomers, clients, agents and administrators.
- The errors are minimized, so satisfaction in terms of operation completion is relatively high.

3.2.1.8 Capacity

The database will only have to hold important information, so the size won't be affected by unnecessary stuff. Also, we make sure that all the houses sold would not have much but enough pictures to show their worth and if the client is interested, he can contact the agent for more pictures, making the website less bloated with images. It is of importance to mention that when deleting instances from the database, they are not really going to be removed from the database, instead, they are not going to be available to the other users, except from the administrator. This can be said also for the agent, probably only for the property.

3.2.2 Organizational Requirements

3.2.2.1 Availability

Considering that it is a website application, it is supposed to be available throughout the day, 24/7. This can be achieved by buying a hosting service if you want to have access to a reliable service. Alternatively, there are websites that offer free hosting, which is a satisfactory solution for the initial stages of the deployment.

- The website will be available 24 hours per day.
- Considering that the website is responsive, for most types of devices such as tablets, smartphones and computers, users can use almost any device to access the website.
- The website may be prone to change with time to comply with the users' preferences. This will not affect the performance of the website, and neither will it interrupt any kind of service on the website.
- Maintenance may be scheduled or not.

The website services will be available almost all the time. Taking as an example the WhatsApp mobile application, it performs any backup operation at the time it is least used in specific time-zones, which is a clever solution. This is the approach that can be followed for our website. Information will not be saved locally, so it introduces the challenge of finding the most appropriate time 'globally' to push or make any updates. This can be achieved also by making use of the DNS server features.

3.2.2.2 Latency

The latency of the Real Estate website does not really depend on factors other than the internet connection. Considering the structure of how API requests are performed, it may depend on the complexity of the

implementation of the API. The database may enforce/introduce additional latency in the website's services. This is supposed to happen in cases when the number of instances in the database is so large that it makes it difficult to go through every instance in a short time.

The factors that the latency of the website depends on the most:

- Internet connection.
- Database complexity and size.
- Code implementation complexity.

3.2.2.3 Monitoring

The website has some features that will be monitored and changed periodically if necessary. In order to avoid any error-prone scenarios the implementation will be reviewed constantly by making efforts to make improvements to the code. The validation and authentication parts of the website are of utmost importance, meaning that more emphasis is placed on the security measures.

- The system is built in such a way that the code can be tested continuously and changed if any error is encountered.
- The validation is important and if more efficient ways are found, they are to be implemented, and the website will be updated.

3.2.2.4 Maintenance

The website is based on simple technologies which make it easier to maintain and incorporate changes. The user will be informed of any scheduled changes that may interfere with the website's operation.

- The technologies used are relatively simple to grasp, making it easier to introduce change to the code.
- In case of any error, the user is to be informed immediately about scheduled maintenance services.
- Depending on how the website is hosted, for instance with remote servers, the database will be always accessible by the website's requests and operations.

3.2.2.5 Operations

As is already mentioned in the previous sections of the documentation, especially in the functional requirements. For transparency purposes some of the most important features and operations of the website are listed below:

1. User Registration: The website should allow users to register for an account by providing basic information such as name, email address, and password.
2. User Profile Management: The website should allow users to manage their profiles, update personal information, and change passwords.
3. Property Listings: The website should allow the real estate company to list properties for sale or rent, including images, descriptions, and other relevant details.
4. Property Search: The website should allow users to search for properties based on location, price range, size, and other relevant criteria.
5. Property Detail Pages: Each property should have a dedicated page that provides detailed information about the property, including images, floor plans, and other relevant details.
6. Contact Form: The website should have a contact form that allows users to send inquiries about properties they are interested in.
7. Newsletter Subscription: The website should allow users to subscribe to a newsletter to receive updates on new properties and other relevant news.
8. Account Management: The website should allow the real estate company to manage user accounts, including creating new accounts, editing user information, and deleting accounts if necessary.
9. Sales and Orders Management: The website should allow the real estate company to manage sales and orders, including generating invoices and entering payments.
10. Pricing Management: The website should allow the real estate company to set pricing levels for different consumer groups based on a set of parameters.
11. Credit Card Payment Processing: The website should allow users to make credit card payments and store credit card information securely.
12. Inventory Management: The website should allow the real estate company to manage inventory, including adding and removing products, recording supplier orders, and maintaining a list of suppliers.

13. Purchasing Management: The website should allow the real estate company to oversee the delivery of procurement orders and manage vendor partners.

3.2.2.6 Standards Compliance

Real Estate websites are not a new concept; however, our product introduces some innovative features. Considering that the real estate market is a huge market, some pre-existing regulations must be taken into consideration. Misinformation is one of the most problematic issues, which can result in serious penalties. The technologies used should be sufficient to prevent security breaches on the website. Regulations may be adapted from the room of commerce in Albania for the real estate market.

3.2.2.7 Portability

Our product is web-based. In other words, there is no need to be concerned about the portability of our product since it is available online (being hosted on a server). The website is designed to be responsive to the device it is being accessed from. It can be opened from a smartphone, tablet or computer. What a user might need to access the website are:

- Internet connection.
- A device such as a smartphone, tablet or computer.

The website will operate the same regardless of the device it is being accessed from.

3.2.3 External Requirements

3.2.3.1 Security

Regulatory Requirements:

1. The website must comply with all relevant regulations and industry standards.
2. Personal data entered/generated by users must be kept safe and secure in compliance with privacy and personal data regulations, such as GDPR.
3. The website must notify users in the event of a data breach and have a data protection officer (DPO) in accordance with GDPR regulations.

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Security Requirements for Patagonia Real Estate Website:

1. Browser Support: The website should support the latest versions of popular browsers.
2. Server Technologies: The website should be developed using standard server technologies that are supported by most platforms.
3. Language and Frameworks: The website should be developed using PHP for the back-end and HTML, CSS, and JavaScript for the front-end.
4. Mobile Accessibility: The website should be accessible from any browser with an internet connection, including computers, laptops, and mobile devices.
5. Access Control: The website should have role-based access control to ensure that only authorized users can access sensitive information.
6. Data Encryption: The website should use data encryption to protect sensitive information such as credit card details and user passwords.
7. Regular Updates: The website should be regularly updated to ensure that it is secure and free of vulnerabilities.
8. Backup and Recovery: The website should have a backup and recovery plan to ensure that data is not lost in the event of a system failure or other disaster.

3.2.3.2 Protection

To protect the website from security breaches, some of the features have validation incorporated as a utility function. Information entered by the user is checked first so as to prevent SQL injection, one of the most prevalent cases of security issues. The measures that have been taken to ensure the protection of the website are:

- Hashing of the passwords. The passwords entered by the users while signing up are hashed and saved as such in the database. No plain-text password will be shown in the database.
- Validation of the information entered from the user. The website offers services that require the user to enter information in specific fields. If validation was not used, then SQL injection could happen.

3.2.3.3 Authorization and Authentication

The services that the website offers are not accessible by everyone. The authentication uses the username and the hashing of the password. Authorization checks the level of access that the user has and gives access to certain actions for the user if they are authorized to perform them.

- Authenticating the user by checking the username and the password (with hashing).
- Authorization occurs by checking the access of the user, there are several ways this can be implemented.

3.3 Domain Requirements

In order for the website to exist and to be up and running, a remote server is used, making the website available and accessible. There are no specific requirements for the user to access the website, besides having an account. The technologies used in this product are HTML, CSS, JAVASCRIPT, PHP, SPRING BOOT, meaning that the

user need not worry about any technical requirements. Some of the services/features are available only for registered users. This measure makes sure that only the registered users can enter information. If it was different, then the website would be prone to more security issues.

4. Software Design / Diagrams

4.1 Requirements Analysis

4.1.1 User Scenarios

4.1.1.1 User Scenarios List

Nr.	Name	Description
US_01	User logs in	Users: Classified into normal users, agents and the admin.
US_02	Change Username	Users: All the users of the three levels of access can change their username.
US_03	Change Password	Users: All the users of the three levels of access can change their password.
US_04	Change email	Users: All the users can change their email after being logged in to their account
US_05	Change status	Admin: The admin can change the status of the user by upgrading them to an agent or admin
US_06	Change address	Users: All the users can change their address if any possible changes have happened
US_07	View Properties' List	The agent and admin can view all properties.
US_08	Make an enquiry	The registered user can make an enquiry for an agent.
US_09	Search Agent	The registered users can search for agents.
US_10	Search Property	Registered users, agents and admin can search for properties.

US_11	Agent Logs in	The same process as a normal user would log in.
US_12	Add Property	An action accessible only by agents and the admin.
US_13	View Property List	An action accessible only by agents and the admin.
US_14	Create an auction/open house event	The agent can create auction events and open house events.
US_15	Update Property Information	Property information can be updated by agents and the admin.
US_16	Post a new property	The agent or a client can post a new property and list it as for sale or for rent
US_17	Sell a property	The agent can sell a property
US_18	Administrator logs in	The same process as a normal user would log in.
US_19	View Agent List	An action accessible to the normal registered user and the administrator.
US_20	View Agent Profile	This action is available only for registered users and the admin.
US_21	View Statistics	The agent and the admin can view the statistics.
US_22	User Logs out (for all three levels of access)	Valid for the three levels of access. (log out in the same way)
US_23	Rent a property	The agent can rent a property to a client and remove it from the property listings
US_24	Answer the live chat	The available agent can answer to the questions done through the live chat option
US_25	Search by location	The user can search for a property based on location
US_26	Search by building area	The client can search for a property based on building area

US_27	Search by agent ID	The client can search for a property based on the agent id associated with each agent
US_28	Delete user	A feature available only to the admin privileges where the admin can delete a user
US_29	Add user	Admin can create a new user and set its status
US_30	Edit user data	Admin can edit the user data if any mistake was made
US_31	Delete property	The admin and agent are able to delete the property from the listing
US_32	Edit property	The admin can change the data of a property
US_33	Sign up	A new user can sign up by entering the required data and creating an account as a client

4.1.1.2 User Scenarios Extended

User Scenario 1:

- ❖ **Name:** User logs in
- ❖ **Extended Description:**
 - User chooses his entry : user/agent/admin
 - User is redirected to the login page
 - User enters his username and password
 - User checks the reCaptcha ‘I am not a robot’
 - User presses the login button
 - If data is correct the user's profile is displayed
 - If data is not correct a message will be shown in the screen and user repeats the process from step b.(sent back to the login page)

User Scenario 2:

- ❖ **Name:** Change Username
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User chooses the menu “Change Username”

- User types his password to confirm "identity"
- User presses the button “Save Changes” after putting the new username
- If the password is correct and username meets criteria the user is notified via a message "Changes saved"
- In case the password is wrong or username does not meet criteria the user is shown error message "Username not changed check criteria or password"

User Scenario 3:

- ❖ **Name:** Change password
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User chooses the menu “Change Password”
 - User types his old password and his new password (2 times)
 - User presses the button “Save Changes”
 - If the old password is correct and if the new password is the same in both fields and meets criteria the user is alerted: “Password was changed successfully!”
 - In case the old password is wrong or the new password is not the same in both fields or does not meet criteria then the user is alerted: “Password was not changed. Please try again.”

User Scenario 4:

- ❖ **Name:** Change email
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User chooses the menu “Change email”
 - User types his old email and his new desired email and his password for confirming his "identity" (2 times)
 - User presses the button “Save Changes”
 - If the password is correct an confirming email is sent to the new email. When confirmed user is alerted "Email changed"
 - If password is not correct then user is shown an error message "password not correct"

User Scenario 5:

- ❖ **Name:** Change status
- ❖ **Extended Description:**
 - Admin logs in following the steps in US_01.
 - Admin chooses the menu “Change status”
 - Admin types his password to confirm his identity

- Admin enters the username of user or agent which wants to change status and upgrades its status to user agent or admin.
- If username corresponds to a username in database its status is changed and a message is shown "status changed successfully"
- If username does not correspond to a username in database then an error message is shown "Status not changed.User not found"

User Scenario 6:

- ❖ **Name:** Change address
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User chooses the menu “Change Address”
 - User types his password to confirm identity and enters the new address
 - User presses the button “Save Changes”
 - If the password is correct the user is alerted: “Address was changed successfully!”
 - In case the password is wrong then the user is alerted: “Address was not changed. Please try again.”

User Scenario 7:

- ❖ **Name:** View property´s list
- ❖ **Extended Description:**
 - Admin/Agent logs in following the steps in US_01.
 - Admin/Agent chooses the menu “View property´s list”
 - Admin/Agent types his password to confirm identity
 - A list of all properties is shown with their respective details.

User Scenario 8:

- ❖ **Name:** Make an enquiry
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User uses the tab make an enquiry in the front page
 - Users can make an inquiry about an agent or property.

User Scenario 9:

- ❖ **Name:** Search Agent
- ❖ **Extended Description:**

- User logs in following the steps in US_01.
- User chooses the menu “Search Agent”
- User types the username of the agent
- User presses the button “Search”
- If the username exists the agent’s profile appears
- If the username does not exist an error message is shown to the user "Agent not found. Try again"

User Scenario 10:

- ❖ **Name:** Search Property
- ❖ **Extended Description:**
 - User logs in following the steps in US_01.
 - User chooses the menu “Search Property”
 - User types the property's unique "number"
 - User presses the button “Search”
 - If the "number" exists the property appears together with its details
 - If the number does not exist an error message is shown to the user "Property not found. Try again"

User Scenario 11:

- ❖ **Name:** Agent logs in
- ❖ **Extended Description:**
 - User chooses his entry as agent
 - User is redirected to the login page
 - User enters his username and password
 - User checks the reCaptcha ‘I am not a robot’
 - User presses the login button
 - If data is correct the agent’s profile is displayed
 - If data is not correct a message will be shown in the screen and user repeats the process from step b.(sent back to the login page)

User Scenario 12:

- ❖ **Name:** Add Property
- ❖ **Extended Description:**
 - The admin or agent logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Property Management" or "Listings" section.
 - In this section, they click on the "Add Property" or "Create Listing" button to open the new property creation form.
 - They fill in the required fields for the new property, such as address, property type, price, description, and photos.
 - They may also be asked to provide additional information, such as the number of bedrooms, bathrooms, building area, and any unique features or amenities.
 - After completing the form, they click on the "Save" or "Create" button to submit the new property data.
 - The website processes the request and creates a new property listing with the specified information.
 - The admin or agent receives a notification or confirmation message that the new property listing has been successfully created.

User Scenario 13:

- ❖ **Name:** View Property List
- ❖ **Extended Description:**
 - The admin or agent logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Property Management" or "Listings" section.
 - In this section, they can view a list of all properties, including relevant details such as address, price, property type, status, and agent information.
 - They can also filter or sort the property list based on various criteria, such as location, price range, date added, or property type.
 - By clicking on individual property listings, they can access more detailed information, edit the property data, or delete the listing.

User Scenario 14:

❖ **Name: Create an auction/open house event**

❖ **Extended Description:**

- The agent logs into the real estate website using their unique credentials.
- Once logged in, they navigate to a dedicated "Events" or "Open Houses & Auctions" section.
- In this section, they click on the "Create Event" or "Schedule Open House/Auction" button to open the new event creation form.
- They fill in the required fields for the new event, such as the event type (auction or open house), associated property, date, time, and any additional information or instructions for attendees.
- They may also be asked to provide the event's location, which could be the property address or a different venue.
- After completing the form, they click on the "Save" or "Create" button to submit the new event data.
- The website processes the request and creates a new auction or open house event with the specified information.
- The agent receives a notification or confirmation message that the new event has been successfully created and can now be promoted to potential attendees.

User Scenario 15:

❖ **Name: Update Property Information**

❖ **Extended Description:**

- The admin or agent logs into the real estate website using their unique credentials.
- Once logged in, they navigate to the "Property Management" or "Listings" section.
- In this section, they can view a list of all properties and their relevant details.
- They identify the property whose information they want to update by searching for specific criteria, such as the address or property ID.
- After locating the desired property, they click on the "Edit" or "Modify" button associated with the property listing.
- An edit form appears, displaying the property's current information and allowing the admin or agent to make changes to any editable fields, such as price, description, photos, or status.
- They make the necessary changes to the property information and click on the "Save" or "Update" button to submit the updated information.
- The website processes the request and updates the property listing with the modified data.
- The admin or agent receives a notification or confirmation message that the property information has been successfully updated.

User Scenario 16:

- ❖ **Name: Post a new property**
- ❖ **Extended Description:**
 - The agent or client logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Post a Property" or "Add Listing" section.
 - In this section, they click on the "Add Property" or "Create Listing" button to open the new property submission form.
 - They fill in the required fields for the new property, such as address, property type, price, description, and photos.
 - They may also be asked to provide additional information, such as the number of bedrooms, bathrooms, building area, and any unique features or amenities.
 - They specify whether the property is for sale or for rent by selecting the appropriate option.
 - After completing the form, they click on the "Submit" or "Create" button to submit the new property data.
 - The website processes the request and creates a new property listing with the specified information, pending approval by an admin or agent.
 - The agent or client receives a notification or confirmation message that the new property listing has been successfully submitted and is awaiting approval.

User Scenario 17:

- ❖ **Name: Sell a property**
- ❖ **Extended Description:**
 - The agent logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Property Management" or "Listings" section.
 - In this section, they can view a list of all properties and their relevant details.
 - They identify the property they want to mark as sold by searching for specific criteria, such as the address or property ID.
 - After locating the desired property, they click on the "Edit" or "Modify" button associated with the property listing.
 - An edit form appears, displaying the property's current information and allowing the agent to change the property's status to "Sold" or a similar designation.
 - They update the property status and click on the "Save" or "Update" button to submit the updated information.
 - The website processes the request and updates the property listing with the new status, removing it from the active listings.
 - The agent receives a notification or confirmation message that the property has been successfully marked as sold.

User Scenario 18:

❖ **Name:** Administrator logs in

❖ **Extended Description:**

- The administrator visits the real estate website and navigates to the "Login" or "Sign In" page.
- They enter their unique email address or username and password associated with their admin account in the provided fields.
- They click on the "Login" or "Sign In" button to submit their credentials.
- The website processes the request, verifies their admin status, and grants them access to the admin panel or dashboard.
- Once logged in, the administrator can manage various aspects of the website, such as users, property listings, events, and other administrative tasks.

User Scenario 19:

❖ **Name:** View Agent List

❖ **Extended Description:**

- The registered user or administrator logs into the real estate website using their unique credentials.
- Once logged in, they navigate to the "Agent List" or "Our Agents" section.
- In this section, they can view a list of all agents, including relevant details such as agent name, photo, contact information, and a short bio.
- They can also filter or sort the agent list based on various criteria, such as location, specialization, or experience.
- By clicking on individual agent names or photos, they can access more detailed information about the agent, including their profile and any associated property listings.

User Scenario 20:

- ❖ **Name:** View Agent Profile
- ❖ **Extended Description:**
 - The registered user or administrator logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Agent List" or "Our Agents" section.
 - In this section, they identify the agent whose profile they want to view by searching for specific criteria, such as name or location.
 - After locating the desired agent, they click on the agent's name or photo to access the agent's profile page.
 - The agent's profile page displays more detailed information, such as the agent's full bio, contact information, social media links, customer reviews, and a list of associated property listings.
 - The registered user or admin can use this information to learn more about the agent's expertise, experience, and available properties, helping them decide whether to work with the agent for their real estate needs.

User Scenario 21:

- ❖ **Name:** View Statistics
- ❖ **Extended Description:**
 - The agent or administrator logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Statistics" or "Analytics" section.
 - In this section, they can view various data and insights related to the website's performance, property listings, and user interactions.
 - The statistics may include information such as the number of active property listings, the number of properties sold or rented, total revenue generated, website traffic and user behavior, and other key performance indicators.
 - The agent or admin can filter or customize the statistics based on specific timeframes or other criteria to gain a better understanding of trends, performance, and areas for improvement.
 - These insights can help the agent or admin make data-driven decisions to enhance the website's functionality, improve property listings, and better serve clients.

User Scenario 22:

- ❖ **Name:** User Logs out (for all three levels of access)
- ❖ **Extended Description:**
 - The user (client, agent, or administrator) navigates to the "Logout" or "Sign Out" button or option, which is typically located in the top-right corner of the screen or in a dropdown menu under the user's profile.
 - The user clicks on the "Logout" or "Sign Out" button or option to initiate the logout process.
 - The website processes the request, logs the user out of their account, and returns them to the public-facing home page or login screen.
 - As a result, the user's session ends, and they can no longer access any restricted or personalized content on the website.
 - To regain access to restricted or personalized content, the user must log in again using their unique credentials.

User Scenario 23:

- ❖ **Name:** Rent a property
- ❖ **Extended Description:**
 - The client browses the website's property listings and identifies a property they are interested in renting.
 - The client clicks on the "Rent" or "Inquire" button associated with the property, which directs them to a contact form.
 - The client fills in their contact information and any additional comments or questions regarding the rental process and submits the form.
 - The real estate agent receives the client's inquiry and contacts the client to discuss the rental process, property availability, and any other relevant details.
 - The agent and client reach an agreement on the rental terms, and the client provides the necessary documentation and payment.
 - The agent finalizes the rental agreement and provides the client with a copy of the contract and any other necessary documents.
 - Once the rental process is completed, the agent logs into the website's backend system and updates the property status to "Rented" or "Unavailable."
 - The property is automatically removed from the public listings on the website, and potential clients can no longer inquire about it.

User Scenario 24:

- ❖ **Name:** Answer the live chat
- ❖ **Extended Description:**
 - A potential client or existing customer visits the real estate website and has questions or needs assistance.
 - The user notices a "Live Chat" button or widget on the website and clicks on it to initiate a conversation.
 - A chat window opens, and the user types their question or request in the message input field.
 - The website's system automatically sends a notification to all available agents, informing them of the new live chat request.
 - The first available agent clicks on the notification and is taken to the chat interface where they can view the user's question or request.
 - The agent types a response to the user's message and sends it through the chat interface.
 - The user receives the agent's response in the chat window and can continue the conversation by typing and sending additional messages.
 - The agent and user engage in a conversation, with the agent providing assistance, answering questions, and addressing any concerns the user might have.
 - Once the user's questions or concerns are resolved, the agent politely ends the conversation by asking if there's anything else they can help with and wishing the user a great day.
 - The live chat session is closed, and both the user and agent can return to their respective tasks.

User Scenario 25:

- ❖ **Name:** Search by location
- ❖ **Extended Description:**
 - A user visits the real estate website, looking for properties in a specific location.
 - The user navigates to the "Property Search" page or uses a search bar prominently displayed on the homepage.
 - On the "Property Search" page, the user is presented with various search filters, including a "Location" filter.
 - The user can search by location in multiple ways: a. By entering a city, neighborhood, or street name into a search box b. By selecting a predefined area from a dropdown menu or list c. By using an interactive map, where they can zoom in, pan, or draw a search area
 - After specifying their desired location, the user can optionally apply additional filters such as property type, price range, number of bedrooms, etc., to further refine their search.
 - The user clicks on the "Search" or "Apply Filters" button to initiate the search.
 - The website processes the search query and displays a list of properties that match the user's selected location and other specified criteria.
 - Each property listing includes relevant information such as photos, descriptions, prices, and contact details for the real estate agent.
 - The user can click on individual property listings to view more details, save them for later, or contact the agent to inquire about the property.

User Scenario 26:

- ❖ **Name:** Search by building area
- ❖ **Extended Description:**
 - A client visits the real estate website, interested in finding properties that meet their desired building area requirements.
 - The client navigates to the "Property Search" page or uses a search bar prominently displayed on the homepage.
 - On the "Property Search" page, the client is presented with various search filters, including a "Building Area" filter.
 - The client can input their preferred minimum and maximum building area (usually in square feet or square meters) in the appropriate fields or use a slider to define the desired range.
 - After specifying their desired building area, the client can optionally apply additional filters such as location, property type, price range, number of bedrooms, etc., to further refine their search.
 - The client clicks on the "Search" or "Apply Filters" button to initiate the search.
 - The website processes the search query and displays a list of properties that match the client's selected building area range and other specified criteria.
 - Each property listing includes relevant information such as photos, descriptions, prices, and contact details for the real estate agent.
 - The client can click on individual property listings to view more details, save them for later, or contact the agent to inquire about the property.

User Scenario 27:

- ❖ **Name:** Search by agent ID
- ❖ **Extended Description:**
 - A client visits the real estate website, looking for properties managed by a specific agent, knowing their agent ID.
 - The client navigates to the "Property Search" page or uses a search bar prominently displayed on the homepage.
 - On the "Property Search" page, the client is presented with various search filters, including an "Agent ID" filter.
 - The client enters the agent ID in the appropriate field or selects it from a list of available agents.
 - After specifying the agent ID, the client can optionally apply additional filters such as location, property type, price range, number of bedrooms, etc., to further refine their search.
 - The client clicks on the "Search" or "Apply Filters" button to initiate the search.
 - The website processes the search query and displays a list of properties associated with the specified agent ID and other specified criteria.
 - Each property listing includes relevant information such as photos, descriptions, prices, and contact details for the real estate agent.
 - The client can click on individual property listings to view more details, save them for later, or contact the agent to inquire about the property.

User Scenario 28:

❖ **Name:** Delete user

❖ **Extended Description:**

- The admin logs into the real estate website's admin panel using their unique credentials.
- Once logged in, the admin navigates to the "User Management" or "Accounts" section.
- In this section, the admin can view a list of all registered users, including their names, contact information, roles, and other relevant details.
- The admin identifies the user they want to delete by searching for their name, email, or any other identifying information.
- After locating the desired user, the admin clicks on the "Delete" or "Remove" button associated with the user's account.
- A confirmation prompt appears, asking the admin to verify their intention to delete the user account.
- The admin confirms their decision by clicking on the "Yes" or "Confirm" button in the prompt.
- The website processes the request and permanently deletes the user account and all associated data.
- The admin receives a notification or confirmation message that the user account has been successfully deleted.

User Scenario 29:

❖ **Name:** Add user

❖ **Extended Description:**

- The admin logs into the real estate website's admin panel using their unique credentials.
- Once logged in, the admin navigates to the "User Management" or "Accounts" section.
- In this section, the admin clicks on the "Add User" or "Create User" button to open the new user creation form.
- The admin fills in the required fields for the new user, such as name, email, password, contact information, and user role (e.g., agent, client, or admin).
- The admin can also set the user's status, such as "Active" or "Inactive," to determine if the user can access the website and perform actions according to their assigned role.
- After completing the form, the admin clicks on the "Save" or "Create" button to submit the new user data.
- The website processes the request and creates a new user account with the specified information and settings.
- The admin receives a notification or confirmation message that the new user account has been successfully created.

User Scenario 30:

- ❖ **Name:** Edit user data
- ❖ **Extended Description:**
 - The admin logs into the real estate website's admin panel using their unique credentials.
 - Once logged in, the admin navigates to the "User Management" or "Accounts" section.
 - In this section, the admin can view a list of all registered users, including their names, contact information, roles, and other relevant details.
 - The admin identifies the user whose data they want to edit by searching for their name, email, or any other identifying information.
 - After locating the desired user, the admin clicks on the "Edit" or "Modify" button associated with the user's account.
 - An edit form appears, displaying the user's current data and allowing the admin to make changes to any editable fields, such as name, email, contact information, role, or status.
 - The admin makes the necessary changes to the user data and clicks on the "Save" or "Update" button to submit the updated information.
 - The website processes the request and updates the user account with the modified data.
 - The admin receives a notification or confirmation message that the user data has been successfully updated.

User Scenario 31:

- ❖ **Name:** Delete property
- ❖ **Extended Description:**
 - The admin or agent logs into the real estate website using their unique credentials.
 - Once logged in, they navigate to the "Property Management" or "Listings" section.
 - In this section, they can view a list of all properties, including relevant details such as address, price, property type, and status.
 - They identify the property they want to delete by searching for specific criteria, such as the address or property ID.
 - After locating the desired property, they click on the "Delete" or "Remove" button associated with the property listing.
 - A confirmation prompt appears, asking them to verify their intention to delete the property listing.
 - They confirm their decision by clicking on the "Yes" or "Confirm" button in the prompt.
 - The website processes the request and permanently deletes the property listing and all associated data.
 - They receive a notification or confirmation message that the property listing has been successfully deleted.

User Scenario 32:

- ❖ **Name:** Edit property
- ❖ **Extended Description:**
 - The admin logs into the real estate website's admin panel using their unique credentials.
 - Once logged in, they navigate to the "Property Management" or "Listings" section.
 - In this section, they can view a list of all properties and their relevant details.
 - They identify the property whose data they want to edit by searching for specific criteria, such as the address or property ID.
 - After locating the desired property, they click on the "Edit" or "Modify" button associated with the property listing.
 - An edit form appears, displaying the property's current data and allowing the admin to make changes to any editable fields, such as price, description, photos, or status.
 - The admin makes the necessary changes to the property data and clicks on the "Save" or "Update" button to submit the updated information.
 - The website processes the request and updates the property listing with the modified data.
 - The admin receives a notification or confirmation message that the property data has been successfully updated.

User Scenario 33:

- ❖ **Name:** Sign up
- ❖ **Extended Description:**
 - A new user visits the real estate website and decides to create an account as a client.
 - They navigate to the "Sign Up" or "Register" page, which presents them with a registration form.
 - The user fills in the required fields, such as name, email, password, and contact information.
 - They may also be asked to provide additional information, such as their preferences for property types, locations, or price ranges.
 - The user confirms that they have read and agree to the website's terms of service and privacy policy by checking the appropriate box or toggling a switch.
 - They click on the "Sign Up" or "Create Account" button to submit their registration data.
 - The website processes the request and creates a new user account with the specified information.
 - The user receives a confirmation email with a link to verify their email address. They click on the link to complete the registration process.
 - Once their email address is verified, the user can log in to the website and access features available to clients, such as saving favorite properties, contacting agents, and receiving property recommendations.

4.1.2 User Cases

Name	User logs in
Summary	User enters personal information to access his account.
Actor	User/Agent/Admin
Description	User gains access to his account after inserting the correct username and password.
Precondition	User must have a registered account and before entering his information(username and password) he must choose his entry(User,agent or admin)
Alternatives	User can login to only one account at time and have only one role but admins or agents can have more than one account because they may be regular users(search for properties). If username or password is not correct then user is redirected to the login page
Post Condition	User is logged in to his respective account

US_01 – User Logs In

Name	Change Username
Summary	User goes to the menu and chooses change username
Actor	User/Agent/Admin
Description	User enters his password to verify his identity and changes his username
Precondition	User must be logged in,password should be correct and username must be unique from the others
Alternatives	If password is not correct or username already taken then username is not changed
Post Condition	Username is changed successfully

US_02 – Change Username

Name	Change password
Summary	User goes to the menu and chooses change password
Actor	User/Agent/Admin
Description	User types the old password then the new one 2 times to make the change
Precondition	Users must be logged in. The old password should be typed correctly and both fields with the new password should match. Also the new password should be different from the old one and it should follow the validation rules.
Alternatives	If the old password is not correct or the new password does not match in both fields or does not meet criteria then the changes are not saved. User is told to try again.
Post Condition	Password is changed successfully

US_03 – Change password

Name	Change email
Summary	User goes on the menu and chooses change email
Actor	User/Agent/Admin
Description	User enters his password to verify identity and enters new email
Precondition	User must be logged in. Password must be correct. New email must be verified before changes are saved.

Alternatives	If password is not correct or new email is not confirmed then changes will not be saved
Post Condition	Email changed successfully

US_04 – Change email

Name	Change status
Summary	Admin changes the status of users or agents.
Actor	Admin
Description	Admin chooses the user or agent and changes its role in the website.
Precondition	Admin must be logged in. Admin must verify identity by typing his password. The username of the user or agent he wants to change status must correspond to one in the database.
Alternatives	If password is not correct or username does not correspond with an account in database then changes are not saved
Post Condition	Status changed successfully

US_05 – Change status

Name	Change address
Summary	Users can change their living addresses due to changes

Actor	User/Agent/Admin
Description	Users choose on the menu change address and enters the new one
Precondition	User must be logged in to his account. User must type password correctly to confirm his identity. Address must be an existing one.
Alternatives	If password is not typed in correctly or the new address consists of route names or cities than do not exist then changes are not saved
Post Condition	Address updated

US_06 – Change address

Name	View properties list
Summary	User sees the whole list of properties
Actor	Admin/Agent
Description	User chooses on the menu view properties list and the whole properties are listed with their respective informations.
Precondition	User must be logged in to his account. User must enter his password correctly.
Alternatives	If password is not correct then the list is not shown
Postcondition	The list of properties is shown

US_07 – View properties' list

Name	Make an enquiry
Summary	User can enquire about an agent or property
Actor	User
Description	User uses the “make an enquiry” tab in the front page
Precondition	User must be logged in to his account. User must enter a correct username of agent or correct info about a property he wants to enquire about
Alternatives	If information is not correct then no results will be shown
Postcondition	Agent or property is shown

US_08 – Make an enquiry

Name	Search Agent
Summary	Users search for agents
Actor	User
Description	User chooses search an agent on the menu and enters his username
Precondition	User must be logged in to his account. The username he enters must correspond to one of the agents in the database
Alternatives	If the username does not correspond to one in database then no agents are shown

Postcondition	Agent's profile appears
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US_09 – Search Agent

Name	Search Property
Summary	User search for properties
Actor	User
Description	User chooses on the menu search for property and enters its unique ID
Precondition	User must be logged in. The property ID must correspond to one in the database.
Alternatives	If property ID does not correspond to one in the database then no property is shown
Postcondition	The property is shown with its respective details

US_10 – Search Property

Name	Agent logs in
Summary	Agent gains access to his account

Actor	Agent
Description	User chooses agent as his entry and enters its username and password
Precondition	Agent must have a registered account. Username and password must be typed in correctly
Alternatives	If username and password are not correct then the agent does not gain access to his account and is redirected to the login page again.
Postcondition	Agent logs in to his account

US_11 – Agent logs in

Name	Add property
Summary	Agents and admins can add a property to the listings.
Actor	Agents / Admins
Description	An action accessible only by agents and the admin. It lets the above-mentioned users to add a property to the listings.
Precondition	The user should be logged in into their agent or admin accounts and have an existing listing in order to add another property into it.
Alternatives	If the user is sure to make the necessary changes and add another property, he will have the option to Save Changes or Cancel otherwise.
Post Condition	A new property is added to the database.

US_12 – Add property

Name	View Property List
Summary	The agents and admins can view the list of properties that they have created.
Actor	Agents / Admins
Description	An action accessible only by agents and the admin. It gives the above-mentioned users to view the list of properties added.
Precondition	To view the property list, the users should have already created a listing of properties.
Alternatives	The agents or admins should have an existing listing even if there aren't any properties added yet.
Post Condition	It shows the entire property list with its contents within.

US_ 13– View Property List

Name	Create an auction / open house event
Summary	Creates auctions or open house events for a certain property for people to bid.
Actor	Agent
Description	The agent can create auction events and open house events. These auctions will be held for a specific property and everyone that is interested can bid for them.
Precondition	<p>The user must be logged in as an agent.</p> <p>The user must have the necessary permissions to create an auction or open house event.</p> <p>The user must have access to the property listing for which the event is being created.</p> <p>The property listing must be valid and active on the website.</p>
Alternatives	<p>If the user does not have the necessary permissions to create an auction or open house event, they will not be able to access the feature.</p> <p>If the user is not logged in as an agent or admin, they will need to log in or create an account with the appropriate permissions.</p>

	<p>If the property listing is not valid or active, the user will not be able to create an event for that property and will need to update the listing information or contact an admin to resolve any issues.</p> <p>If the user wants to create an event for a property that is not yet listed on the website, they will need to create a new listing before creating an event.</p> <p>If the user wants to create an event for multiple properties, they will need to create a separate event for each property.</p>
Post Condition	It opens and makes available an auction or an open house event.

US_14—Create an auction/open house event

Name	Update property information
Summary	This use case involves updating the information of a property listing.
Actor	Agents / Admins
Description	Property information can be updated by agents and the admin.
Precondition	<p>The user must be logged in as an agent or admin.</p> <p>The user must have the necessary permissions to update property information.</p> <p>The user must have access to the property listing they want to update.</p> <p>The property listing must be valid and active on the website.</p>
Alternatives	<p>If the user does not have the necessary permissions to update property information, they will not be able to access the.</p> <p>If the property listing is not valid or active, the user will not be able to update the information for that property and will need to update the listing information or contact an admin to resolve any issues.</p> <p>If the user wants to update information for a property that is not yet listed on the website, they will need to create a new listing before updating the information.</p> <p>If the user wants to update multiple properties, they will need to update each property listing separately.</p>

Post Condition	<p>The updated property information is saved in the database and is reflected on the property listing page on the real estate website.</p> <p>If the update was successful, the user will receive a confirmation message. If the update was not successful, the user will receive an error message with details on what went wrong.</p>
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US_15– Update Property Information

Name	Post a new property
Summary	This use case involves posting a new property listing on the website.
Actor	Agent / Client
Description	The agent or a client can post a new property and list it as for sale or for rent.
Precondition	<p>The user must be logged in as an agent or as a client.</p> <p>The user must have the necessary permissions to post a new property.</p> <p>The user must have access to all the necessary information about the property, such as photos, description, location, and pricing.</p>
Alternatives	<p>If the user is not logged in as an agent or client, they will need to log in or create an account with the appropriate permissions.</p> <p>If the necessary information about the property is not available, the user will not be able to post the property and will need to gather all the required information before proceeding.</p>
Post Condition	<p>The new property listing is saved in the database and is displayed on the website.</p> <p>If the posting was successful, the user will receive a confirmation message. If the posting was not successful, the user will receive an error message with details on what went wrong.</p>

US_16– Post a new property

Name	Sell a property
Summary	This use case involves selling a property that is listed on the website.
Actor	Agents / normal users
Description	It makes the necessary procedures of selling a certain property that is listed and is available.
Precondition	<p>The user must be logged in as an agent or as a normal user on the website.</p> <p>The user must have the necessary permissions to sell a property.</p> <p>The property must be listed on the website and be active.</p> <p>The user must have access to all the necessary information about the property, such as the buyer's information, contract details, and payment information.</p>
Alternatives	<p>If the user is not logged in, they will need to log in or create an account with the appropriate permissions.</p> <p>If the property is not listed on the website or is not active, the user will not be able to sell the property and will need to update the listing or contact an admin to resolve any issues.</p> <p>If the user does not have all the necessary information about the buyer, contract, or payment, they will not be able to complete the sale and will need to gather the required information before proceeding.</p>
Post Condition	The property is marked as sold on the real estate website.

The sale transaction is completed.

If the sale was successful, the user will receive a confirmation message. If the sale was not successful, the user will receive an error message with details on what went wrong.

US_17– Sell a property

Name	Administrator logs in
Summary	This use case involves an administrator logging in to the website's administrative interface and its special features and privileges.
Actor	Admin
Description	The admin would follow the same rules as a normal user would, by entering valid credentials on the login page.
Precondition	The administrator must have a valid username and password for the administrative interface. The administrative interface must be accessible via a web browser or other interface.
Alternatives	If the administrator does not have a valid username and password, they will not be able to log in and will need to contact another administrator or follow the password recovery process. If the administrator does not have a stable internet connection, they may experience difficulties logging in and may need to troubleshoot their connection or try again later.
Post Condition	The administrator is logged in to the administrative interface and has access to the website's administrative features.

	If the login was successful, the administrator will be directed to the administrative dashboard. If the login was not successful, the administrator will be prompted to re-enter their credentials or follow the password recovery process.
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US_18– Administrator Logs in

Name	View agent list
Summary	This use case involves displaying and viewing a list of all the agents registered on the real estate website.
Actor	Normal user / admin
Description	An action accessible to the normal registered users and the administrator. It displays the list of all agents that are registered as agents on the website.
Precondition	The user must be logged in as an admin or as a normal user on the website. There should be existing agents that are registered as such.
Alternatives	If the user does not have an account or is logged in, they will not be able to access the feature.
Post Condition	A list of all the agents registered on the real estate website is displayed to the user. If the agent list is lengthy, pagination or filtering options may be available to help the user find specific agents or navigate the list more easily.

US_19– View Agent List

Name	View Agent profile
Summary	This use case involves viewing the profile of a specific agent on the website.

Actor	Normal users / agents / admins
Description	This action is available only for registered users and the admin. Its purpose is to open the profile of a certain agent and see their information.
Precondition	<p>The user must be logged in on the real estate website.</p> <p>The agent whose profile the user wishes to view must be registered on the website.</p> <p>The agent must have made their profile information public and visible to other users.</p>
Alternatives	<p>If the agent is not registered on the website, the user will not be able to view their profile.</p> <p>If the agent has not made their profile information public, the user will not be able to view their profile.</p> <p>If the user is not logged in, they will need to log in or create an account before they can view an agent's profile.</p>
Post Condition	<p>The user can view the agent's profile, which may include information such as the agent's name, contact information, areas of expertise, professional experience, and any properties they have listed or sold.</p> <p>The user may be able to contact the agent directly from their profile using a contact form or phone number/email address provided on the profile.</p>

US_20– View Agent Profile

Name	View statistics
Summary	This use case involves viewing statistics related to the real estate website's performance, such as website traffic, user engagement, and sales data.
Actor	Admin
Description	This use case allows the admin to open and view the statistics of various data related to the website.
Precondition	<p>The user must be logged in as an admin on the real estate website.</p> <p>The user must have the necessary permissions to view the statistics.</p>

Alternatives	If the user does not have the necessary permissions to view the statistics, they will not be able to access the feature and will need to contact an admin to request access. If the user is not logged in as an admin, they will need to log in or create an account with the appropriate permissions.
Post Condition	The user can view various statistics related to the real estate website's performance, such as the number of unique visitors, pageviews, bounce rate, user engagement metrics, and sales data. The statistics may be displayed in various formats, such as tables, graphs, and charts, and may be filterable or sortable to allow the user to analyze the data in different ways. The user may be able to export the statistics data in various formats, such as CSV or PDF, for further analysis or reporting.

US_21 – View Statistics

Name	User logs out (for all three levels of access)
Summary	This use case involves a user logging out of the website.
Actor	Normal users, agents, admin
Description	Valid for the three levels of access. (Log out in the same way).
Precondition	The user must be logged in on the real estate website.
Alternatives	If the user is not logged in, they will not be able to log out.
Post Condition	The user is logged out of the website and all their session information is cleared. The user is redirected to the website's homepage or a login page.

US_22 – User Logs Out (for all three levels of access)

Name	Rent a property
Summary	The agent can rent a property to a client and remove it from the property listings.
Actor	Agent, Client
Description	After the client has chosen a property, he can rent it by pressing the rent button and after communicating with the agent to have it approved and removed the property from the listing
Precondition	The agent must have a property listed as available to rent and a client willing to rent it.
Alternatives	The agent can rent the property with a lower price than listed by negotiating with the customer.
Post Condition	The client rents a property and the property is removed from the listing

US_23 - Rent a property

Name	Answer the live chat
Summary	The available agent can answer to the questions done through the live chat option
Actor	Agent
Description	The questions asked by a client are sent to the available agent at the integrated “LiveChat” feature in the website and answer them.
Precondition	The client must ask a question in “LiveChat”
Alternatives	The frequently asked questions can be answered automatically by a bot

Post Condition	A notification will come to the client that the question is answered.
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US_24 - Answer the live chat

Name	Search by location
Summary	The user can search for a property based on location
Actor	Client
Description	The client can filter the desired area for a property by adding the location they want.
Precondition	The client isn't satisfied with the current suggested results so he searches for his own and the location must be inside the area that the real estate company manages.
Alternatives	He can search other details except the location
Post Condition	The results show the properties based on the location the client entered.

US_25 - Search by location

Name	Search by building area
Summary	The client can search for a property based on building area
Actor	Client

Description	The client can filter the desired building area for a property by adding the dimensions they want.
Precondition	The client isn't satisfied with the current suggested results so he searches for his own and the dimensions must be entered with the exact and realistic format.
Alternatives	He can search other details except the building area
Post Condition	The results show the properties based on the dimensions the client entered.

US_26 - Search by building area

Name	Search by agent ID
Summary	The client can search for a property based on the agent id associated with each agent
Actor	Client
Description	The client searches for the agent ID they desire since they want to work with that agent specifically and it shows the results.
Precondition	The client wants the results of the properties managed specifically by their desired agent ID and the agent ID must exist in the database.
Alternatives	He can search other properties managed by other agents.
Post Condition	The results show the properties based on the agent ID the client entered.

US_27 – Search by agent ID

Name	Delete user
Summary	A feature available only to the admin privileges where the admin can delete a user
Actor	Admin
Description	The admin has an option to delete any user in the database that he seems fit for such an action.
Precondition	The user must already exist in the database.
Alternatives	The user can willingly delete his own account.
Post Condition	The user deleted will no longer exist in the database.

US_28 – Delete user

Name	Add user
Summary	Admin can create a new user and set its status
Actor	Admin
Description	The admin has an option to add a user in the database and set the access level of the user to either a client or an agent.
Precondition	The user mustn't exist in the database.
Alternatives	The user can willingly create his own account if he's a client.
Post Condition	The user added will be added to the database and login.

US_29 - Add user

Name	Edit user data
Summary	Admin can edit the user data if any mistake was made
Actor	Admin
Description	The admin edits the user's data for any purpose, like changing from client to agent, their name, the profile picture, etc.
Precondition	The admin must have a reason to change the users data
Alternatives	The user themselves can try to change their data to their ability.
Post Condition	The user data changes to the ones desired by the admin.

US_30 - Edit user data

Name	Delete property
Summary	The admin and agent are able to delete the property from the listing
Actor	Admin, Agent

Description	Admin and the agents can delete any property from the listing for any reason they see fit.
Precondition	The property must already exist in the database
Alternatives	The property can be dropped in the database using sql code
Post Condition	The property is successfully deleted from the listing.

US_31 - Delete property

Name	Edit property
Summary	The admin can change the data of a property
Actor	Admin
Description	The admin can edit the property information however he wants due to an error or to changes happened to the property
Precondition	The property must exist in the database
Alternatives	We can delete the property we want to edit and re enter it with the information we want
Post Condition	The property is changed with the information the admin wanted.

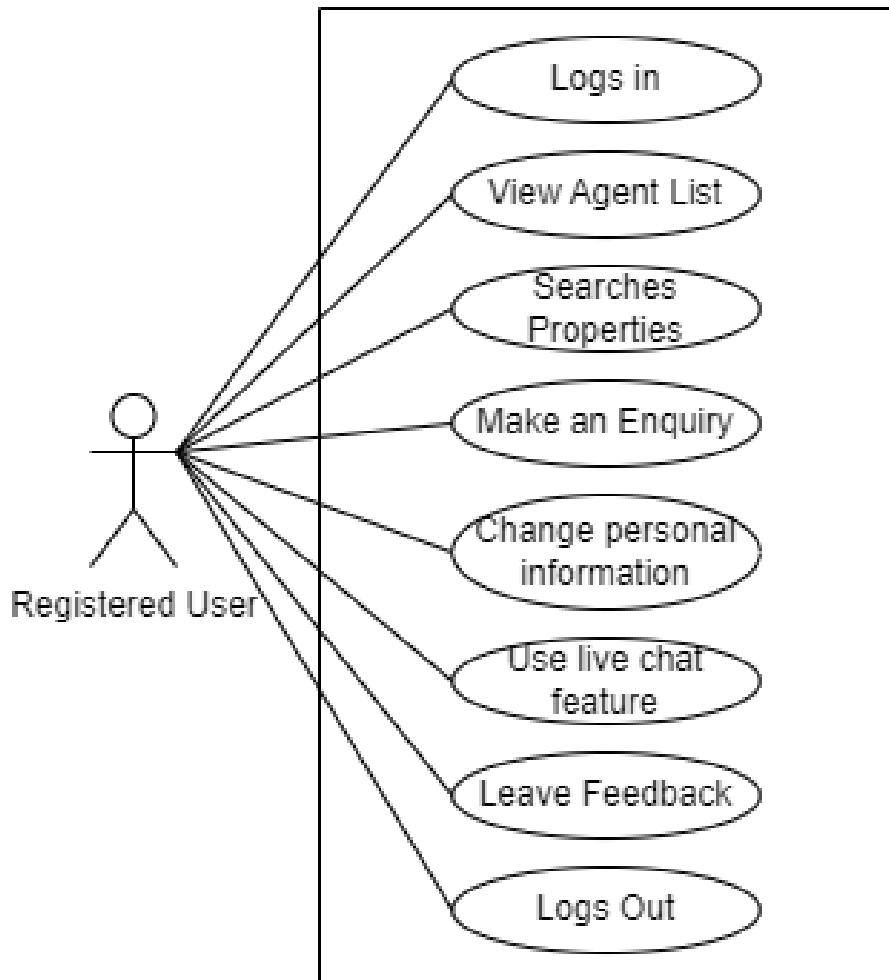
US_32 - Edit property

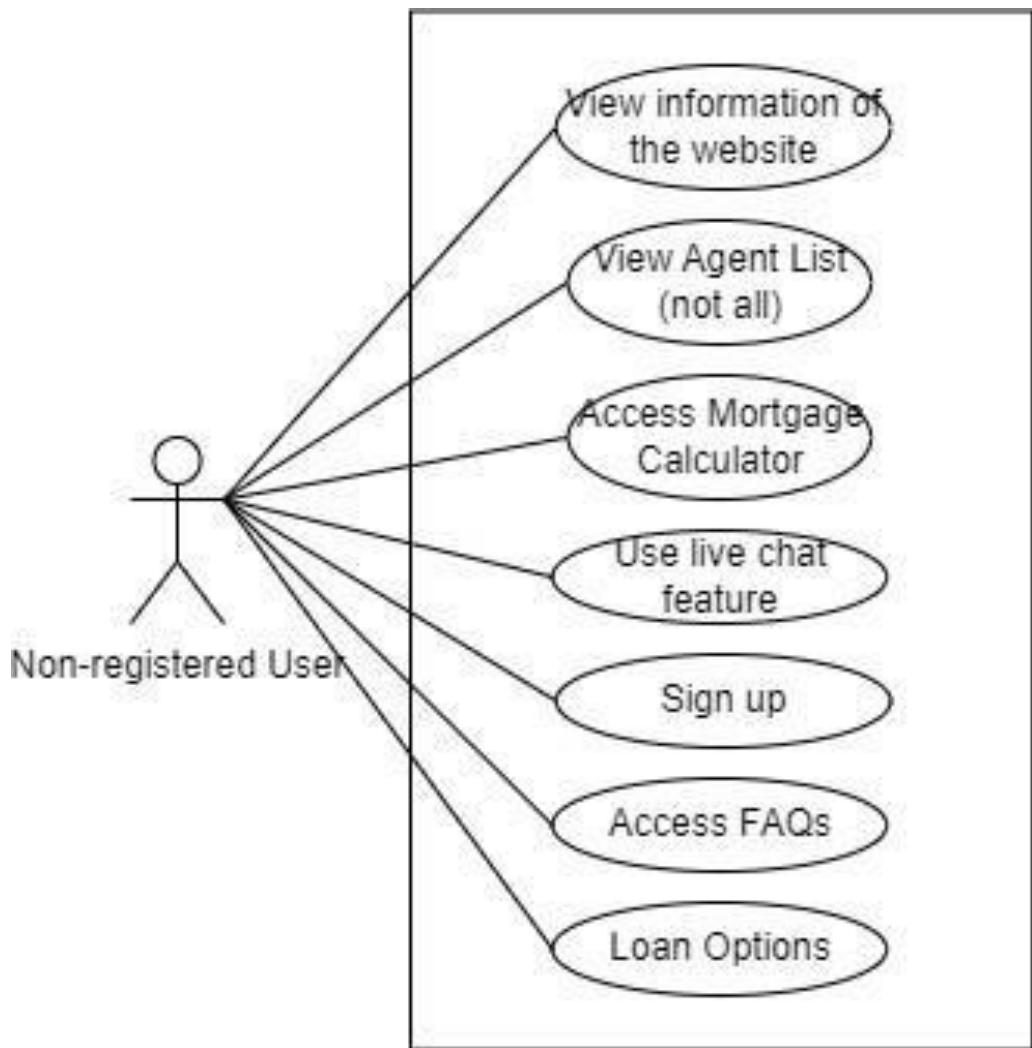
Name	Sign up
Summary	A new user can sign up by entering the required data and creating an account as a client
Actor	User
Description	The user after completing the form can be added to the database and have his own personal account
Precondition	The user must want to open an account and be correct with the information entered in the form
Alternatives	The user can just browse in guest mode although he won't get access to all the features the registered users have.
Post Condition	A new user has been added to the database and can login into his account.

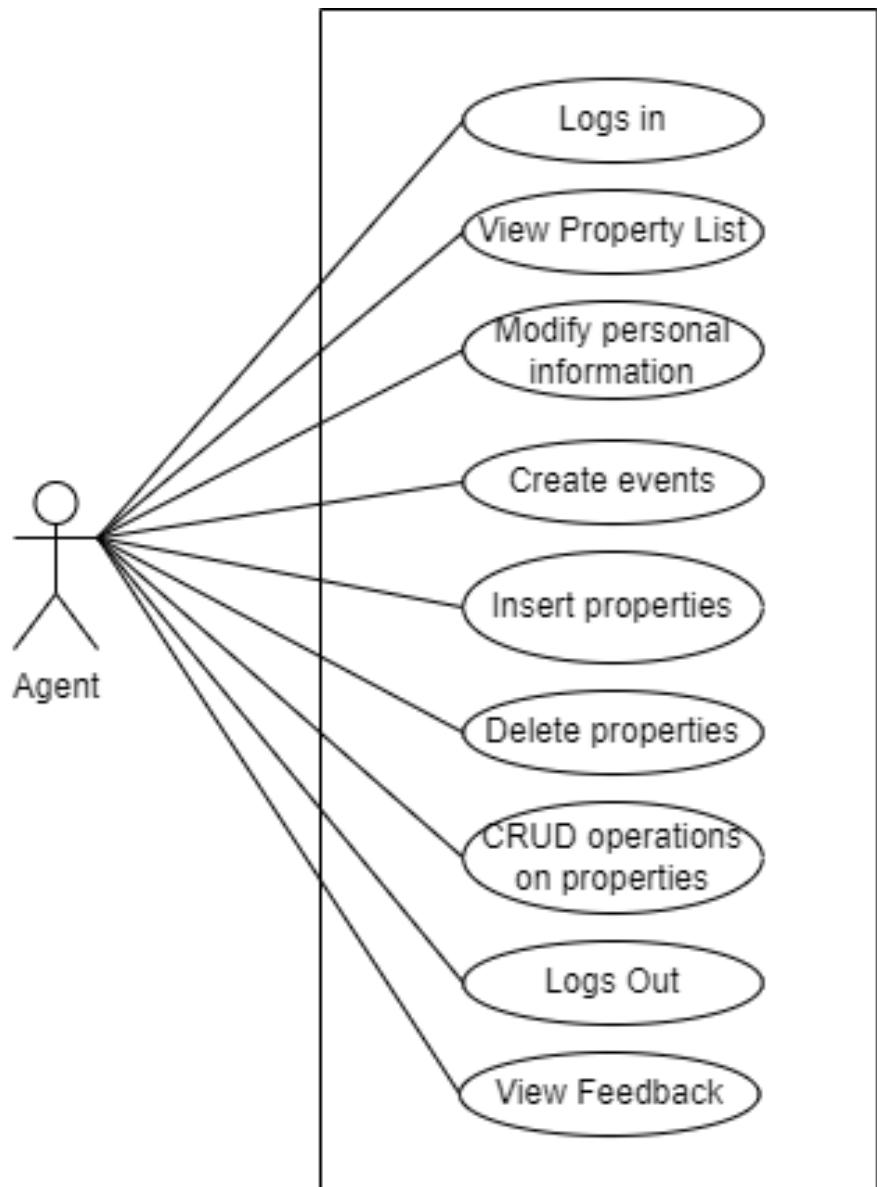
US_33 - Sign up

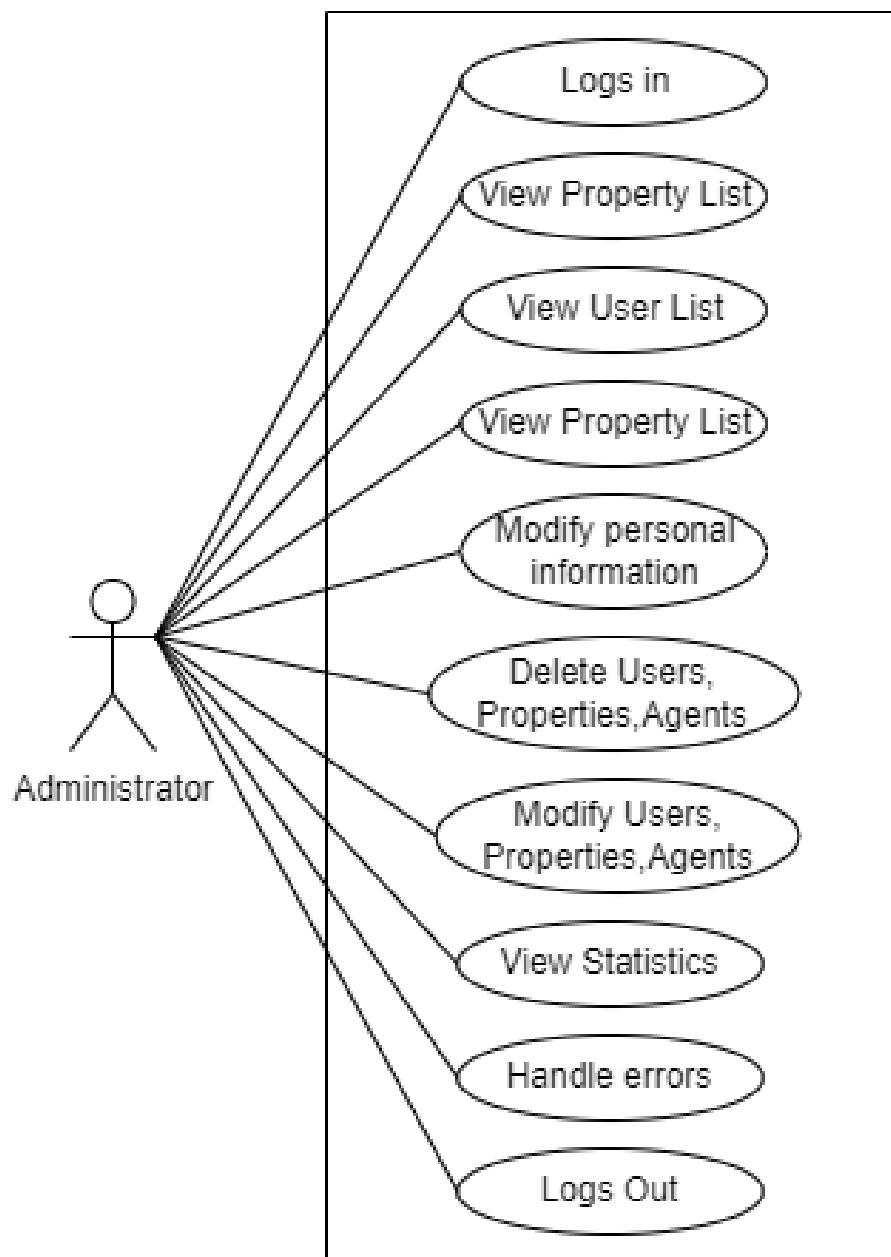
4.2 Behavioral Diagrams

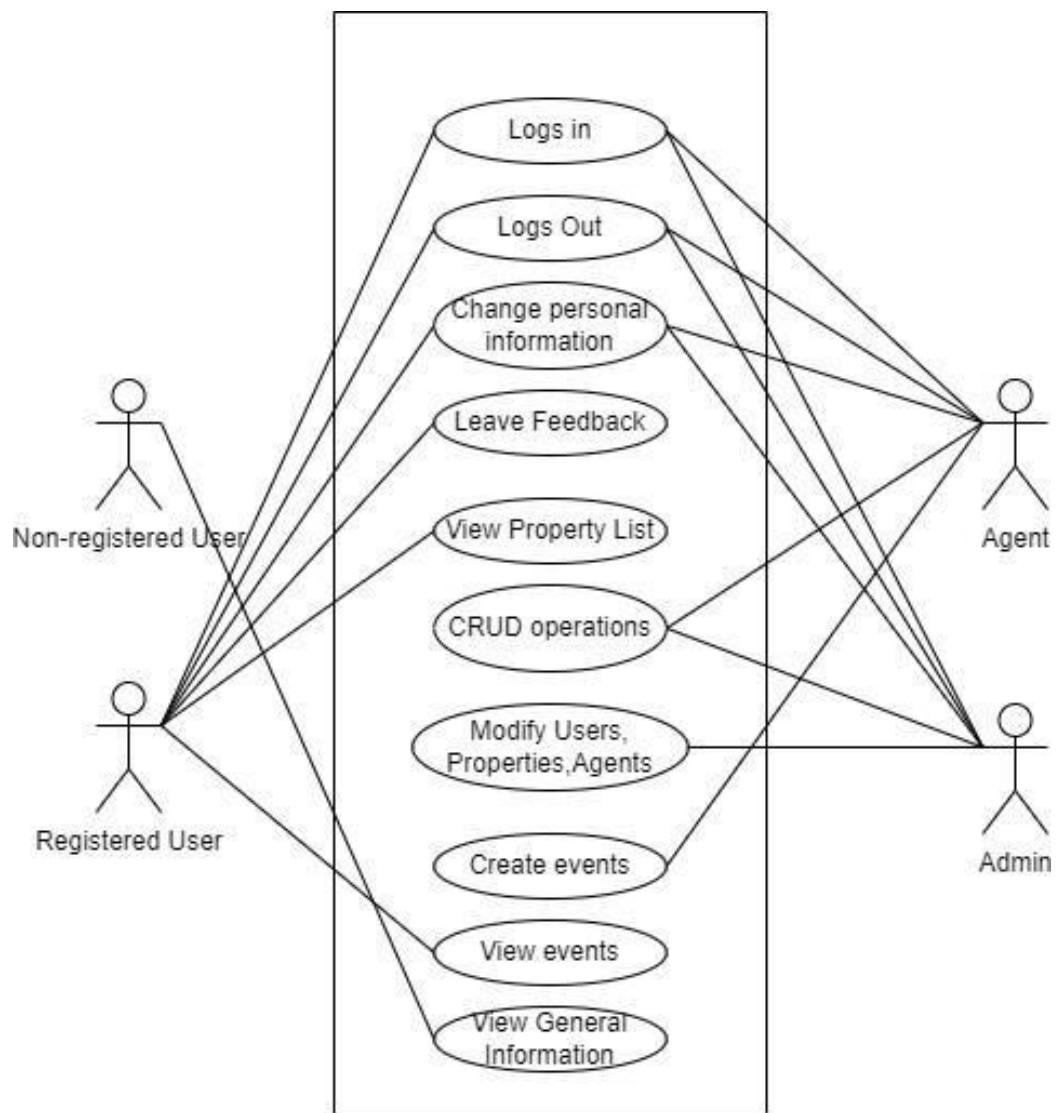
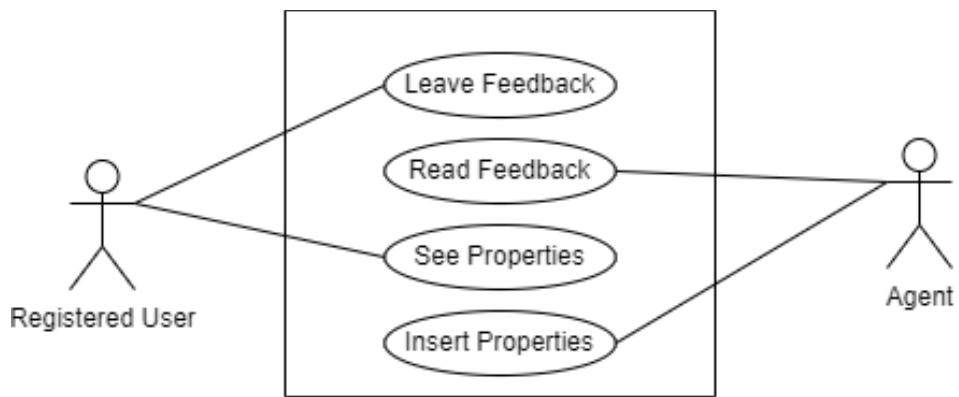
4.2.1 Use Case Diagrams



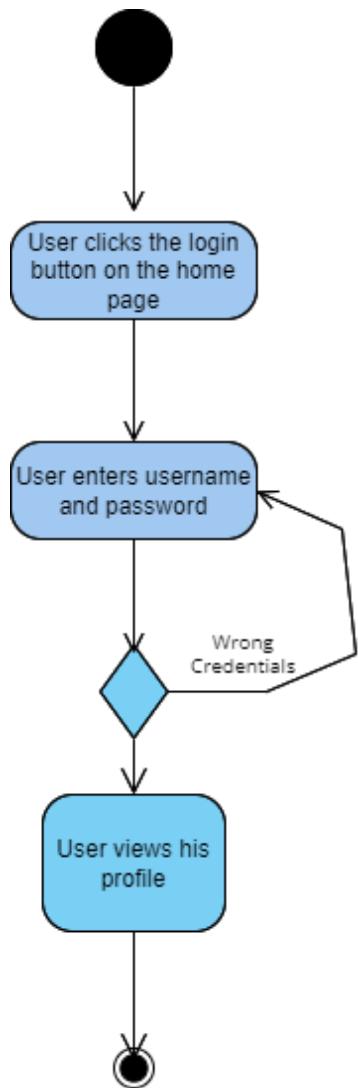


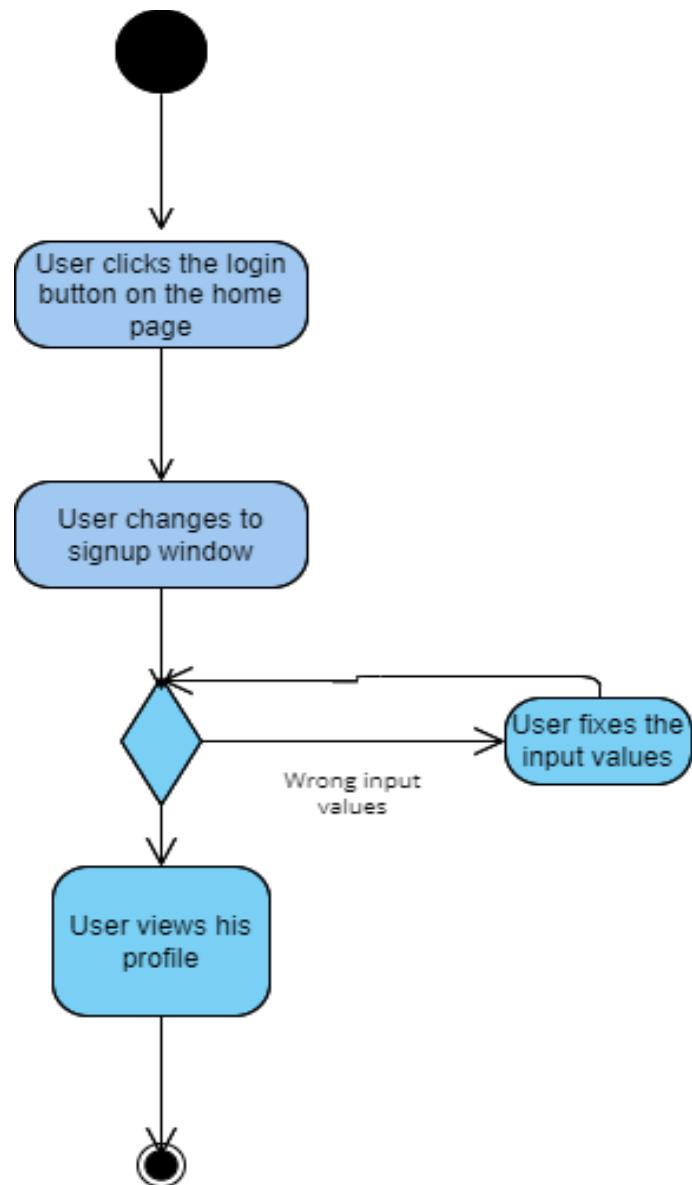


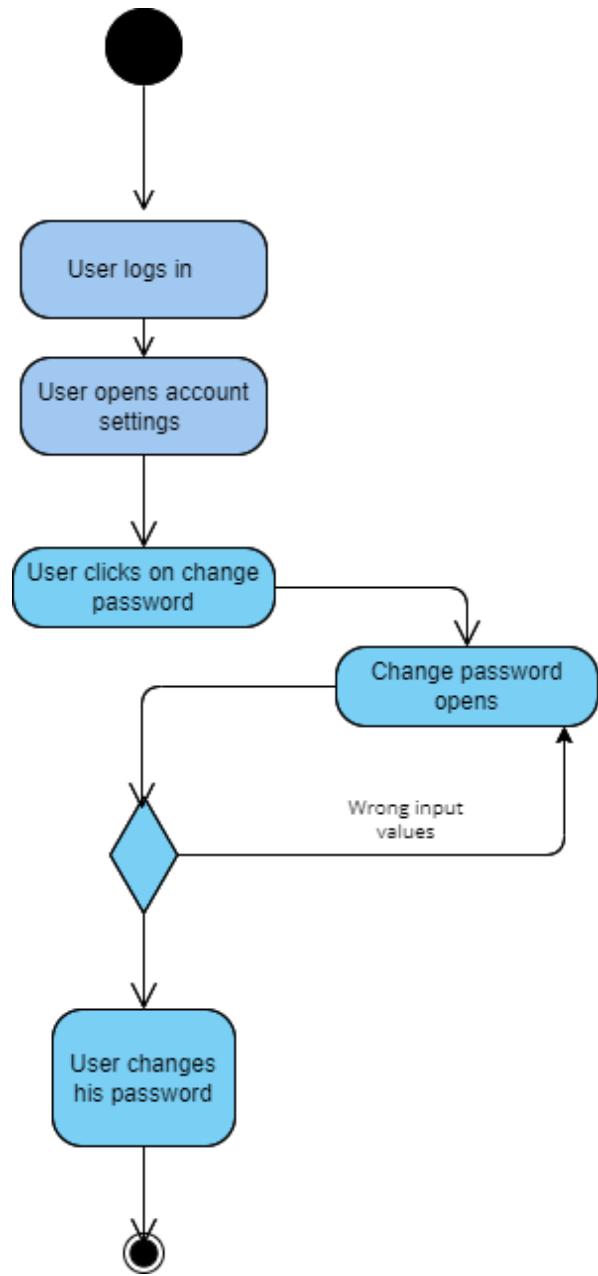


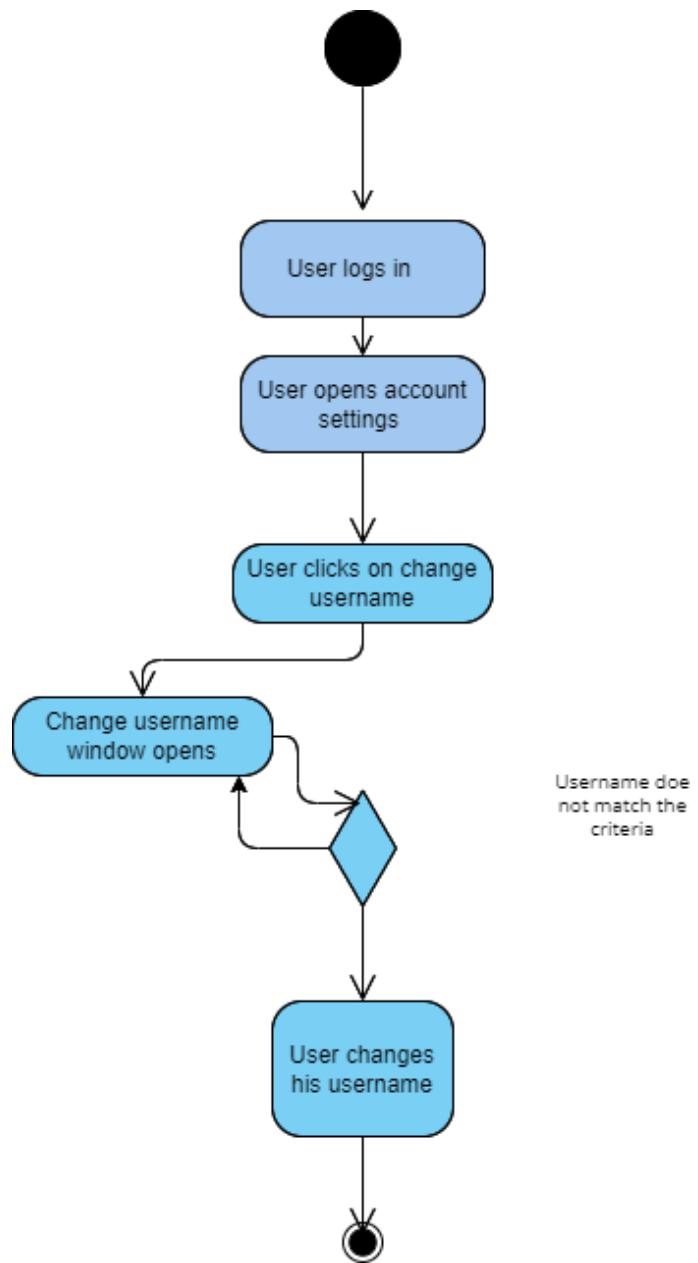


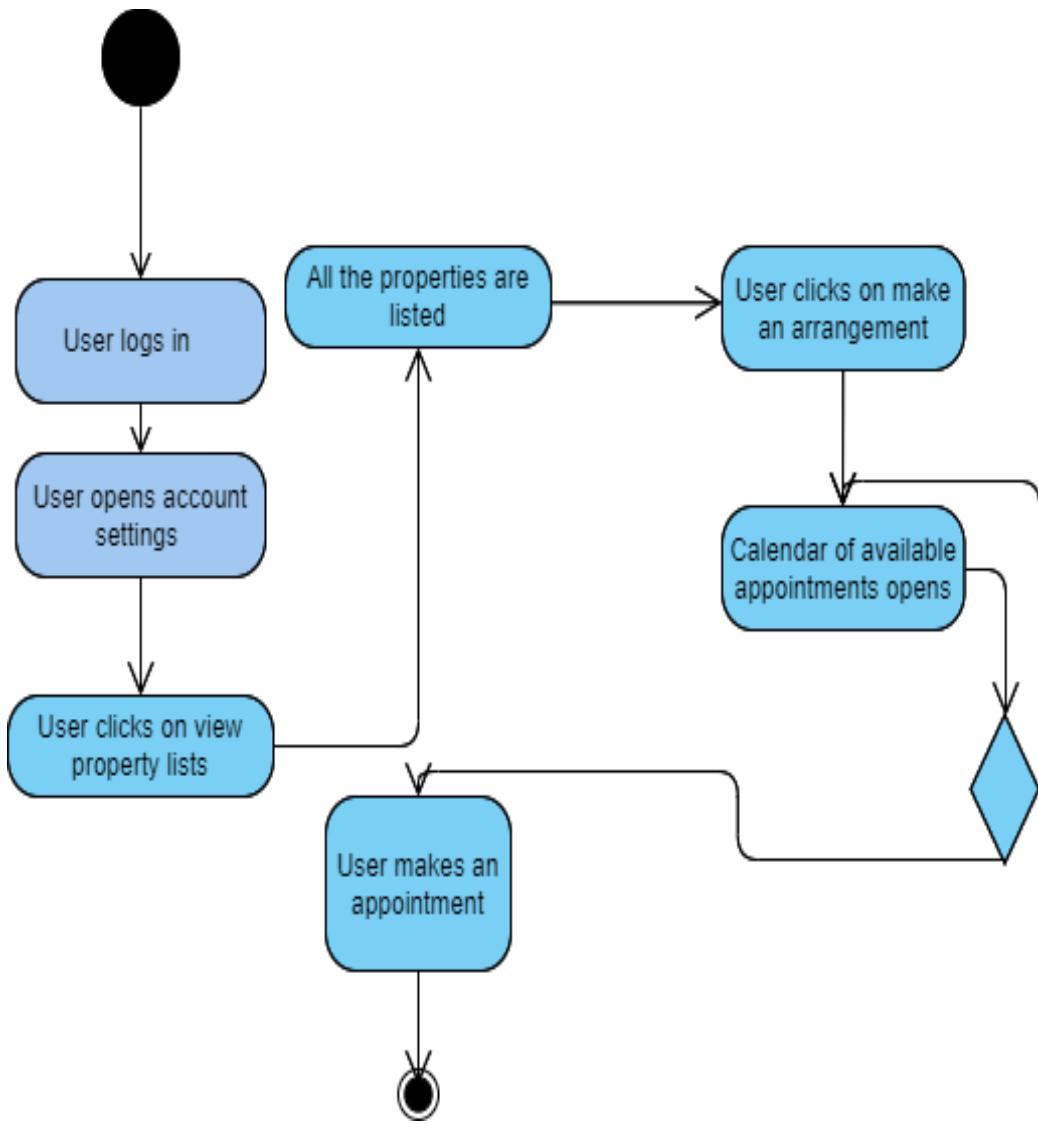
4.2.2 Activity Diagram

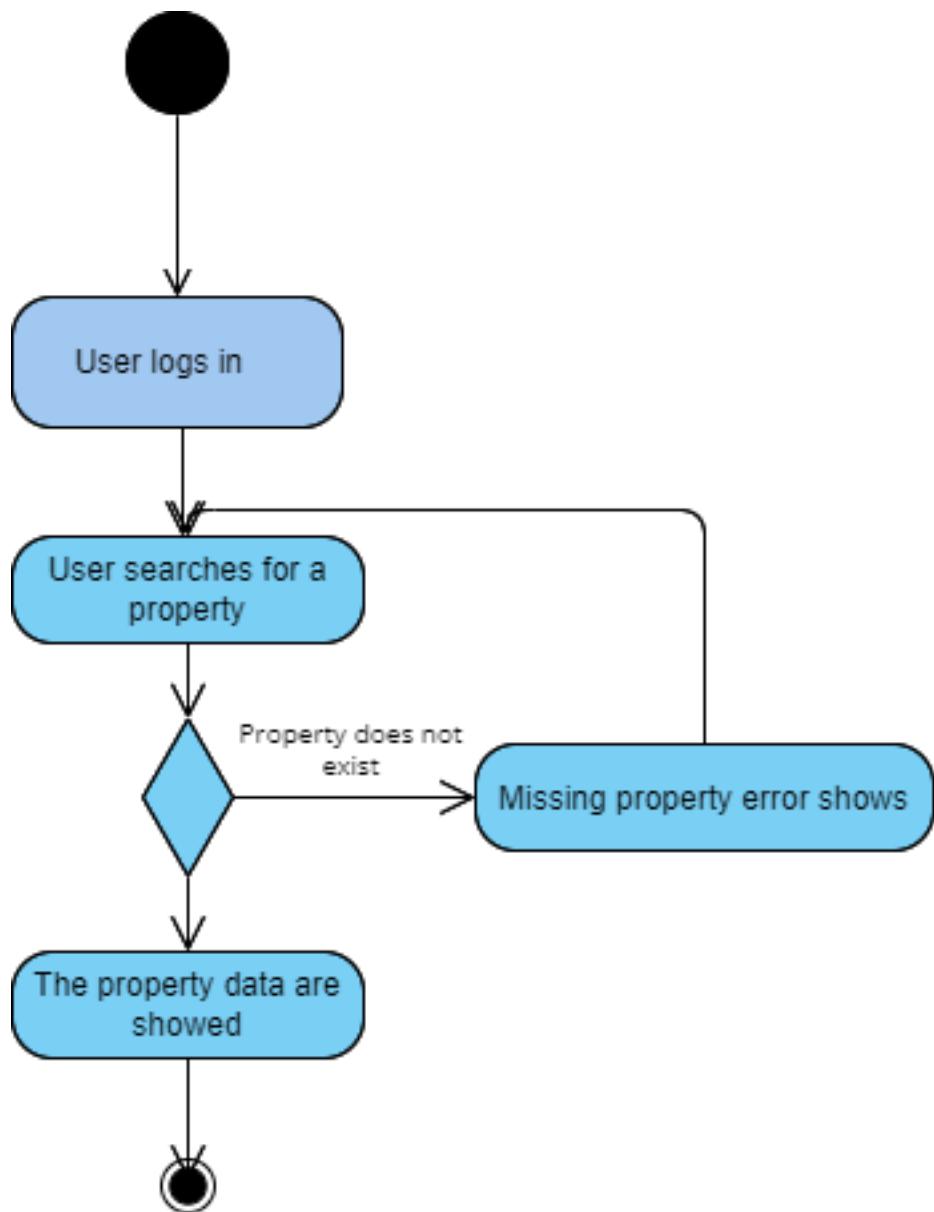


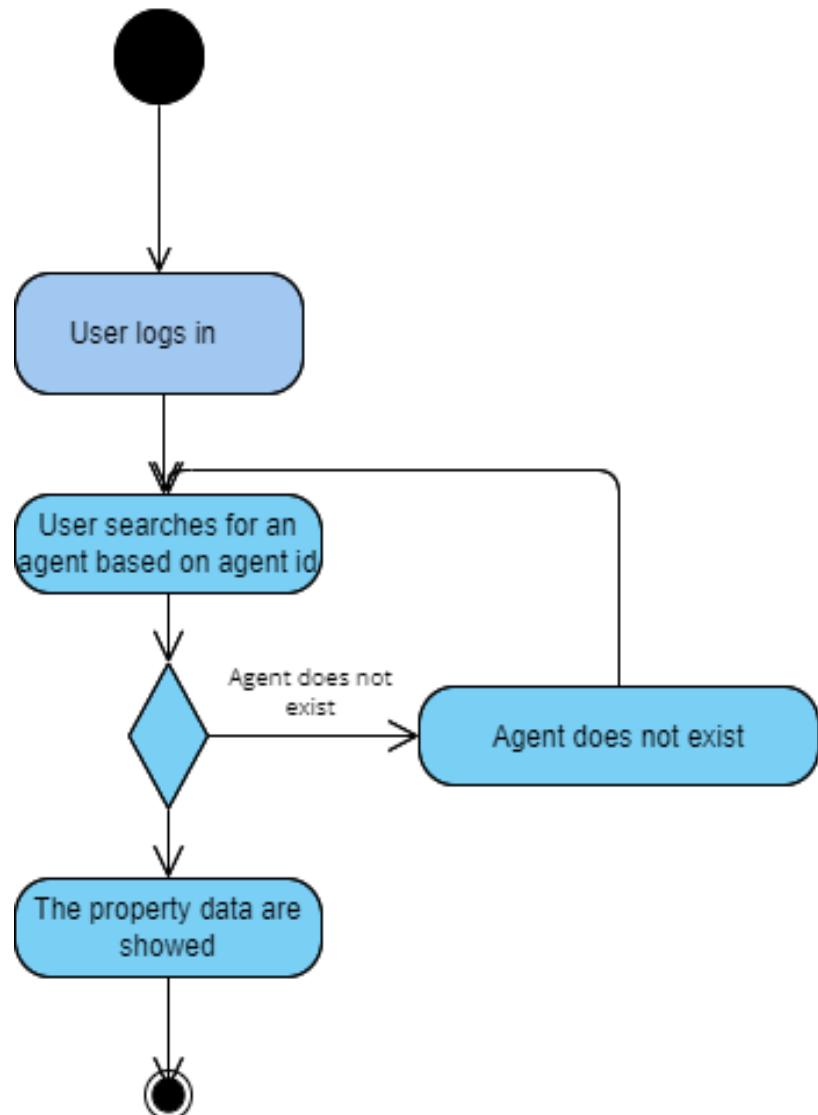


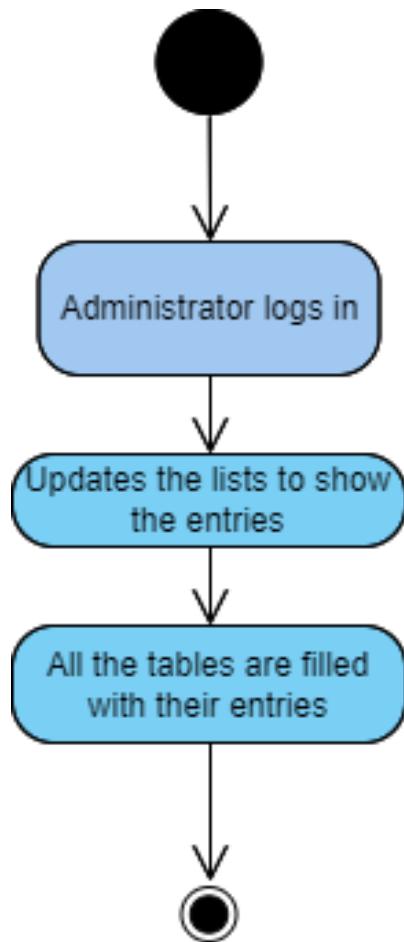


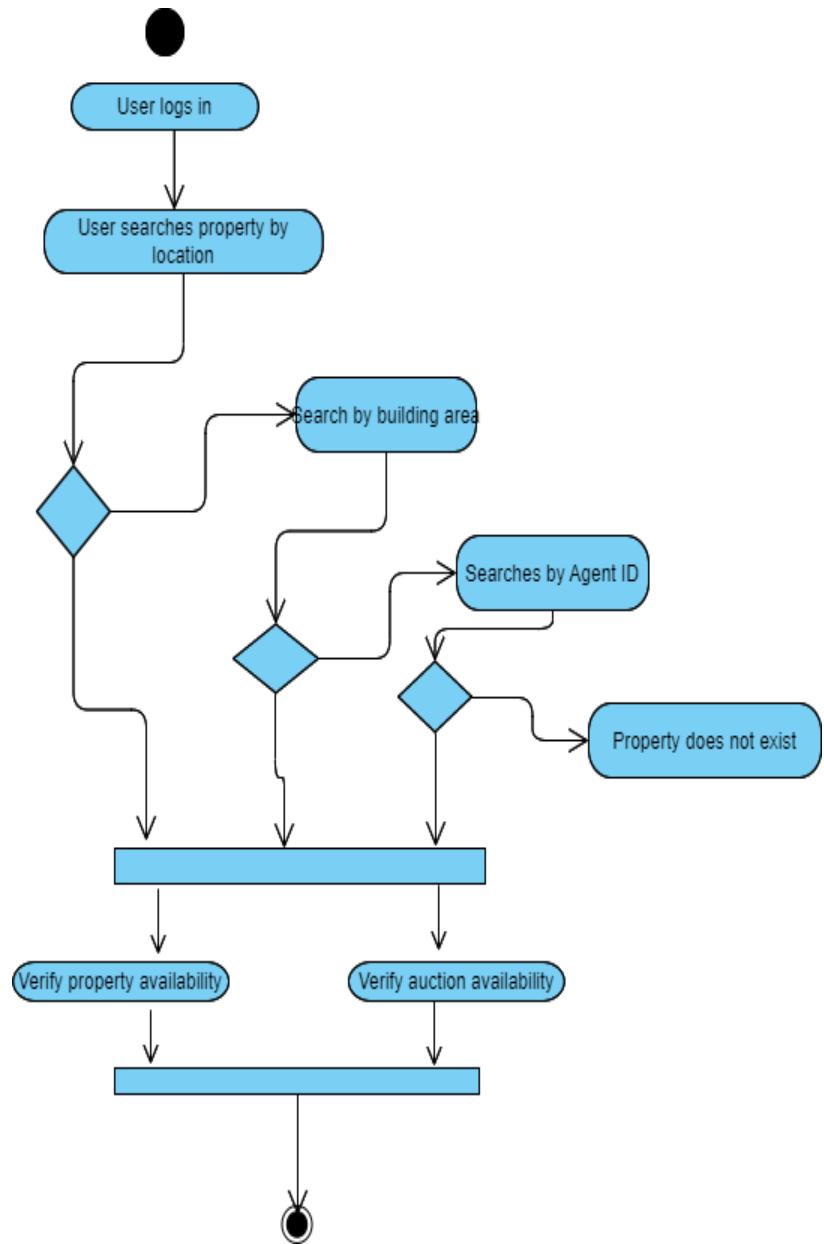


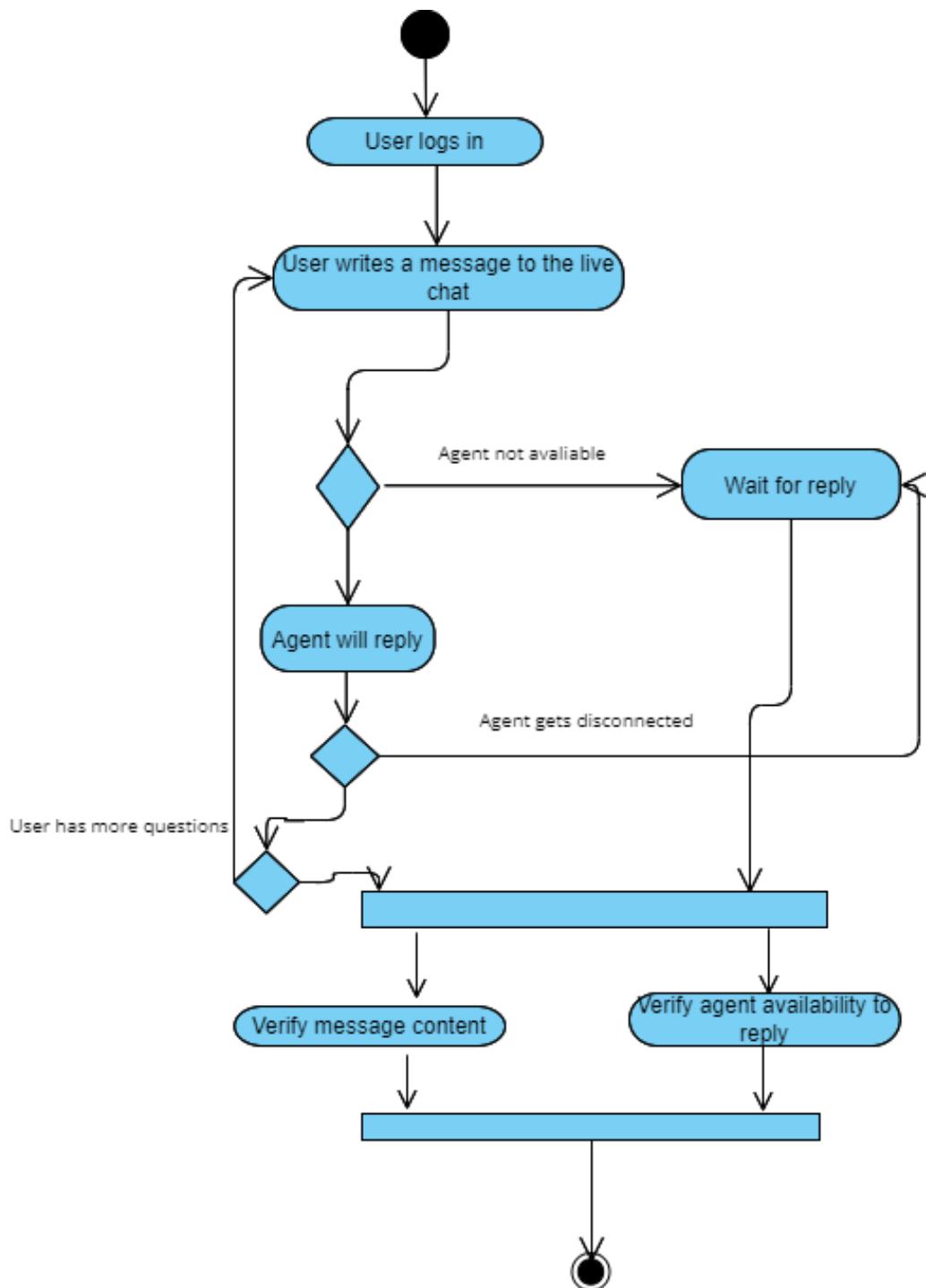


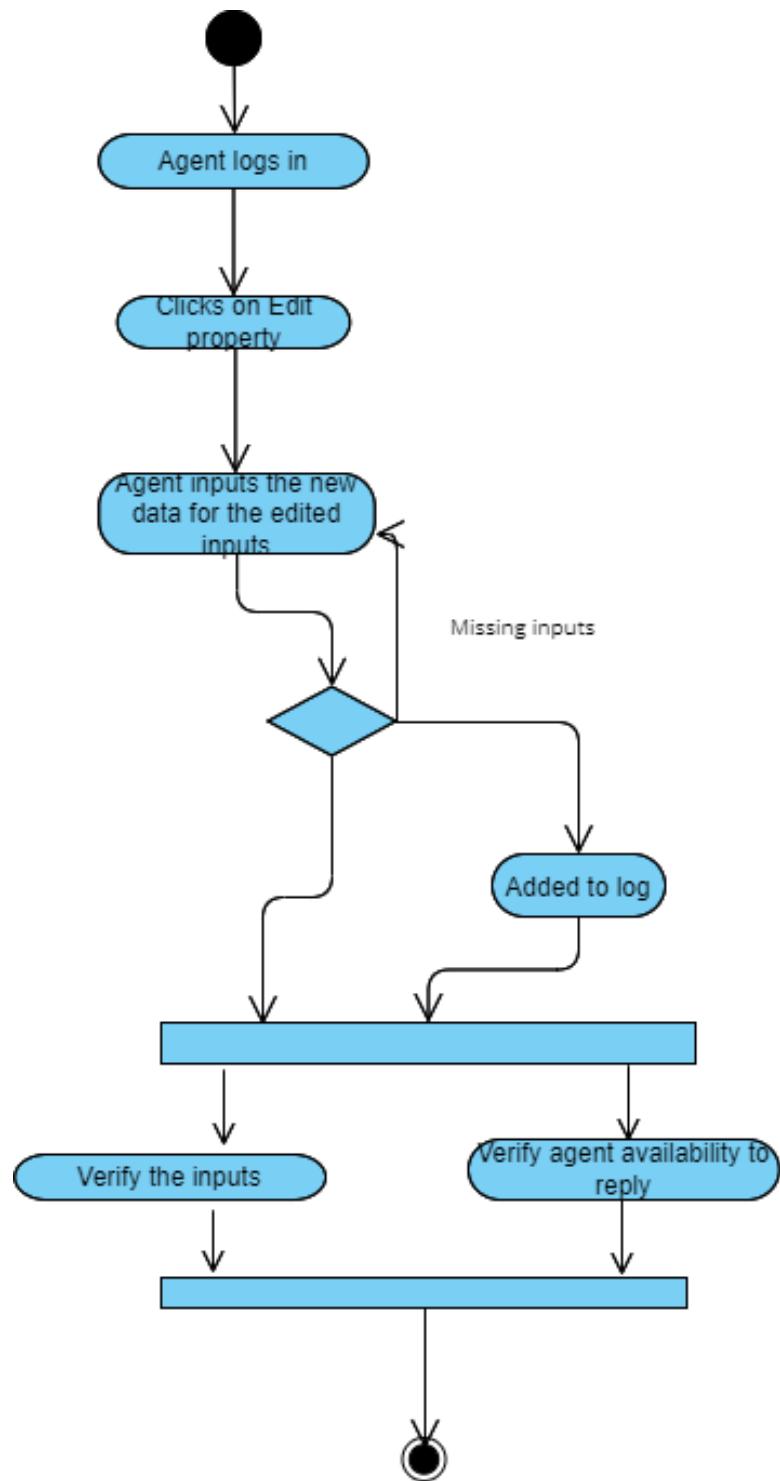


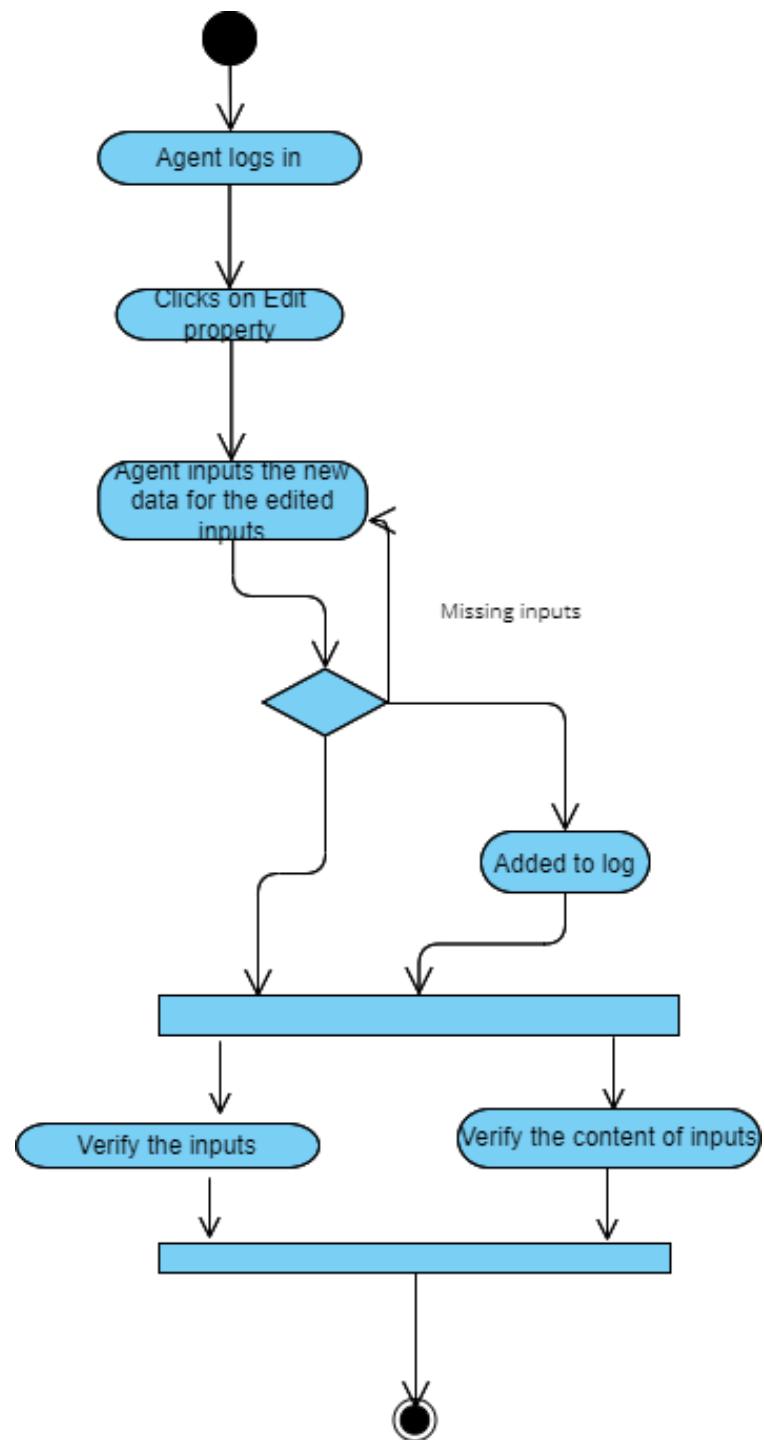


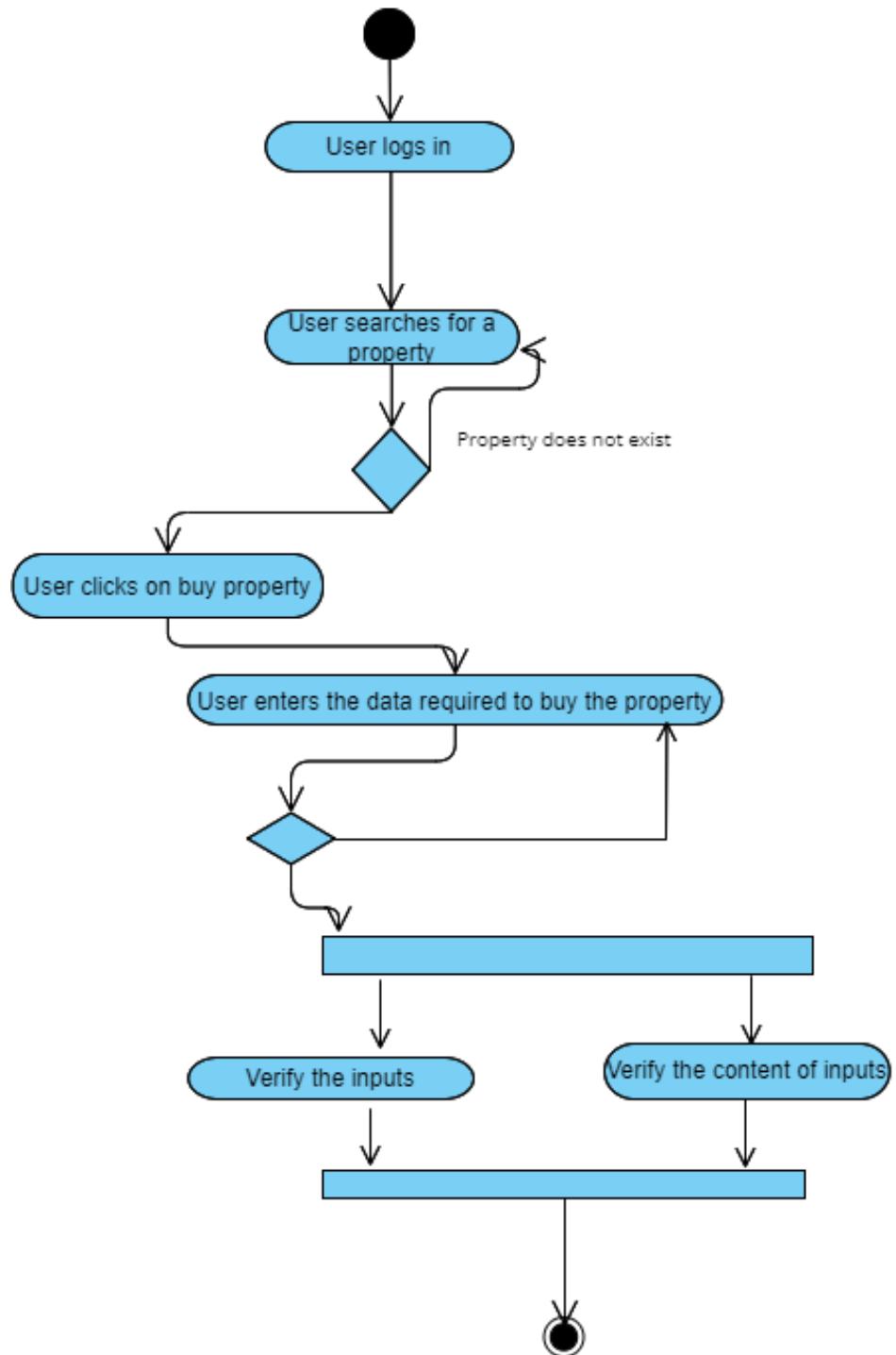




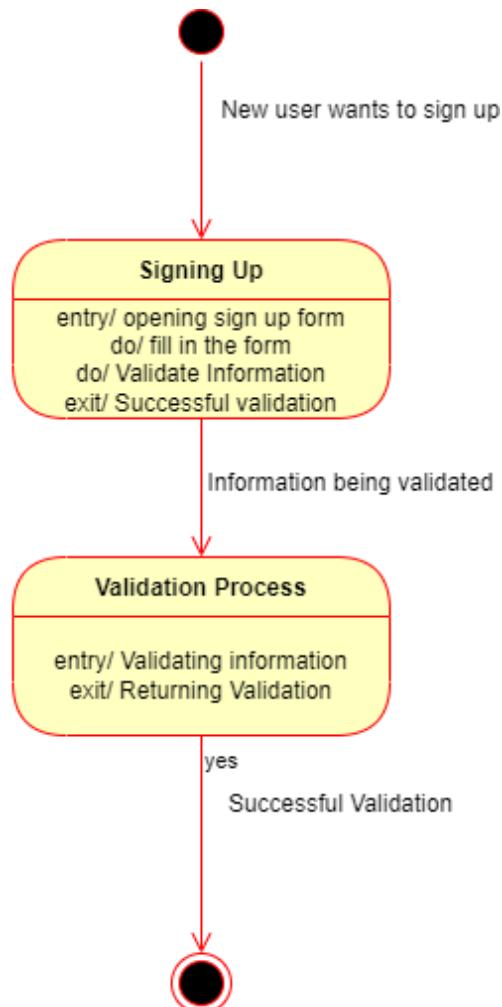


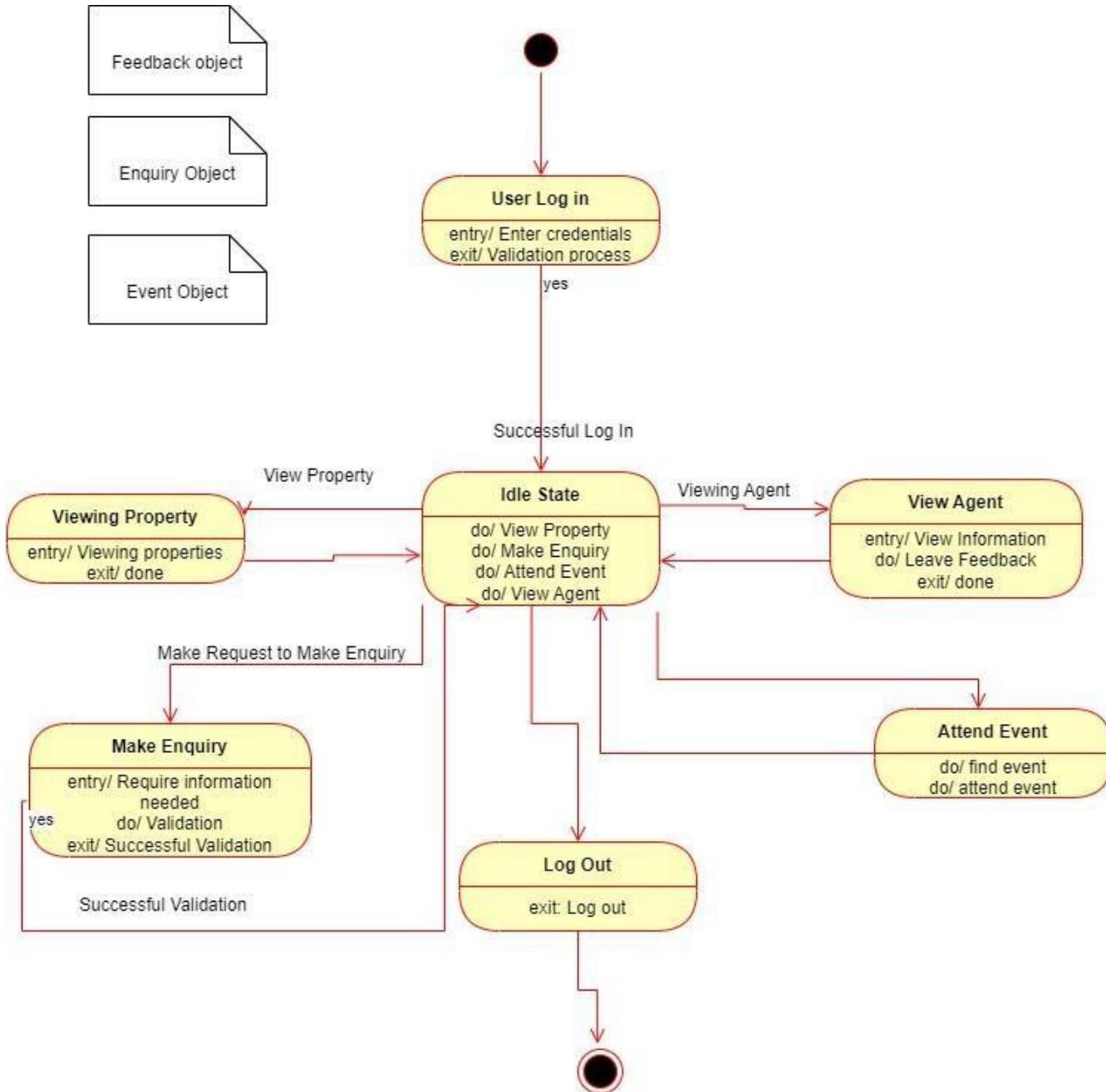


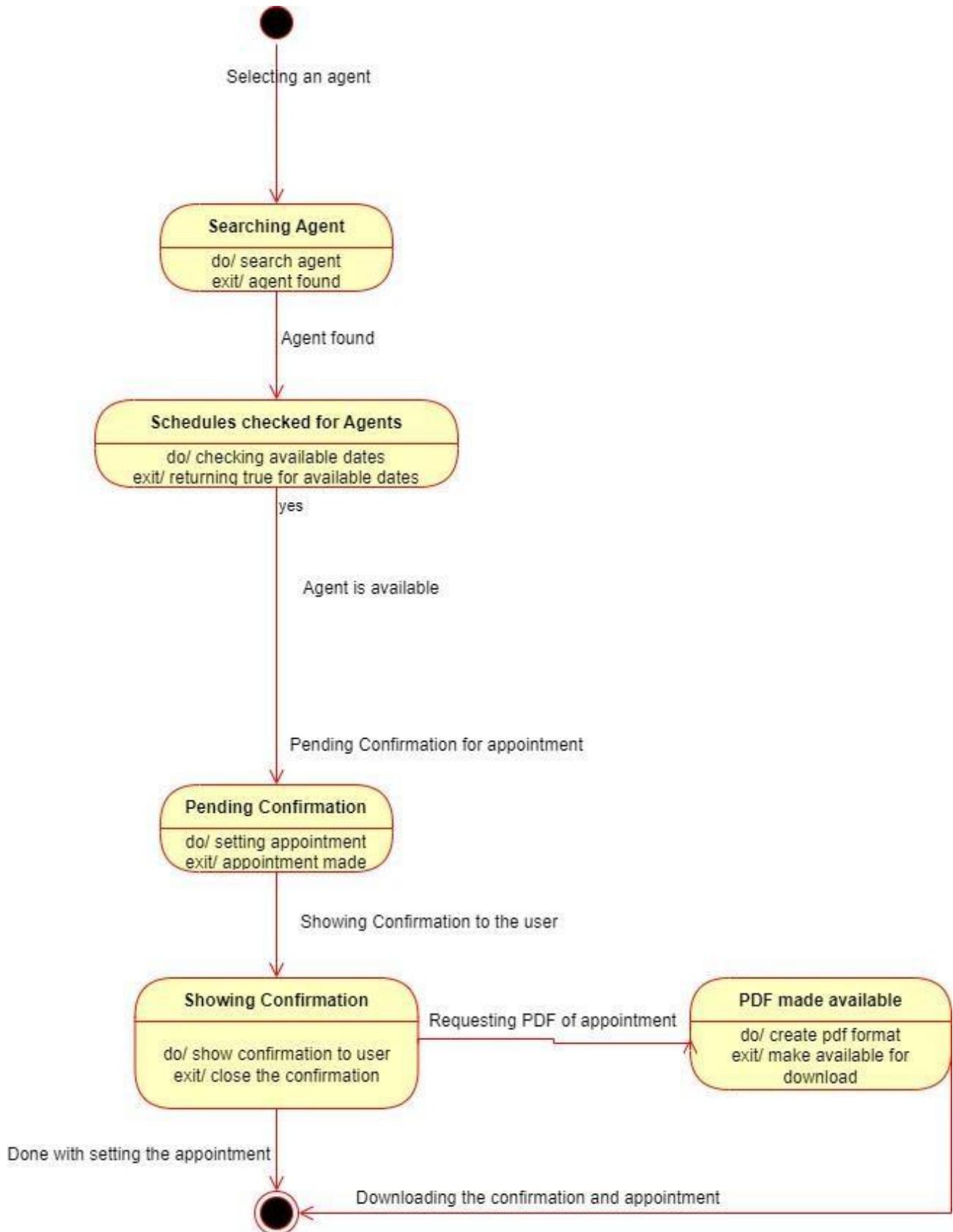


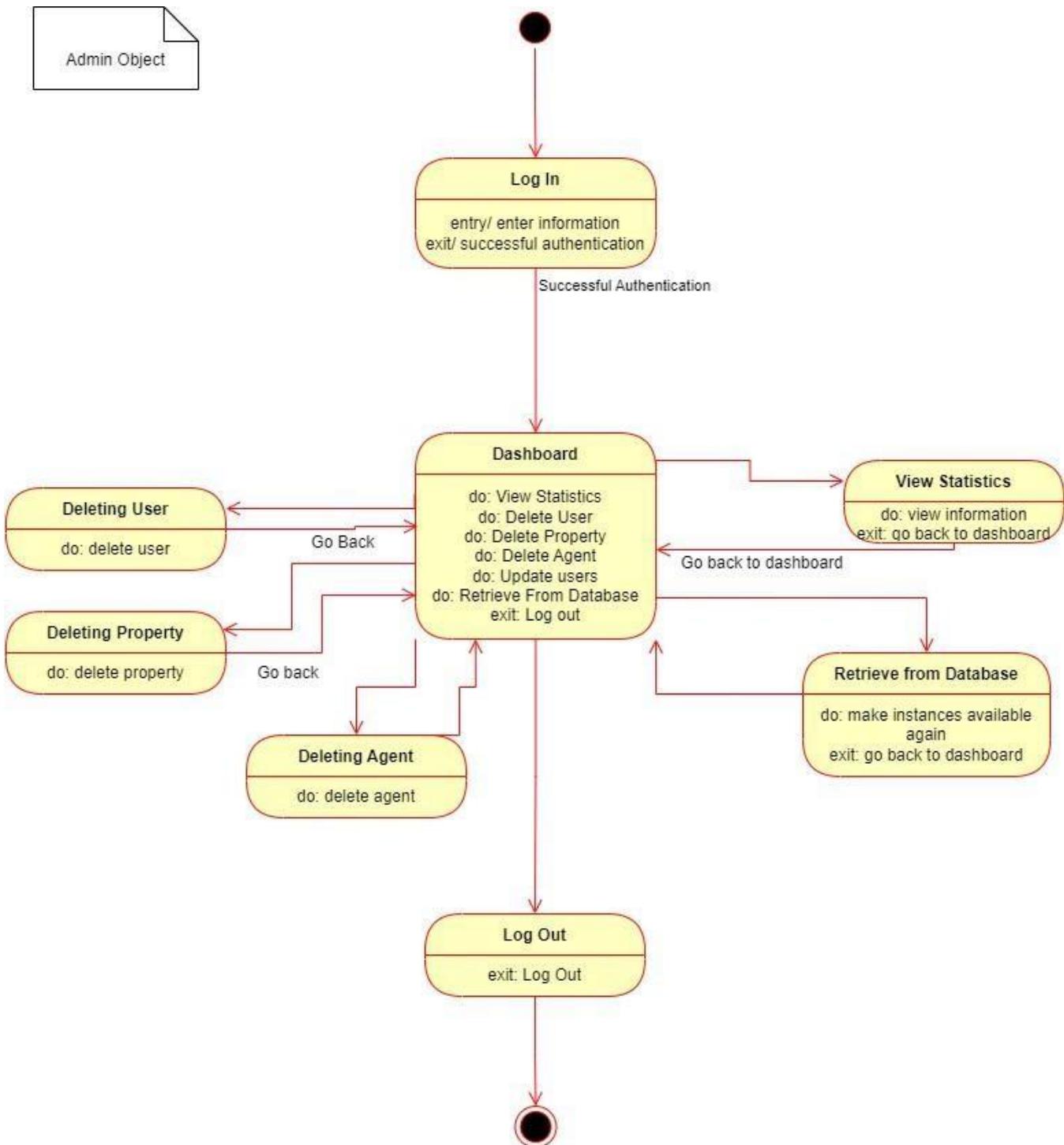


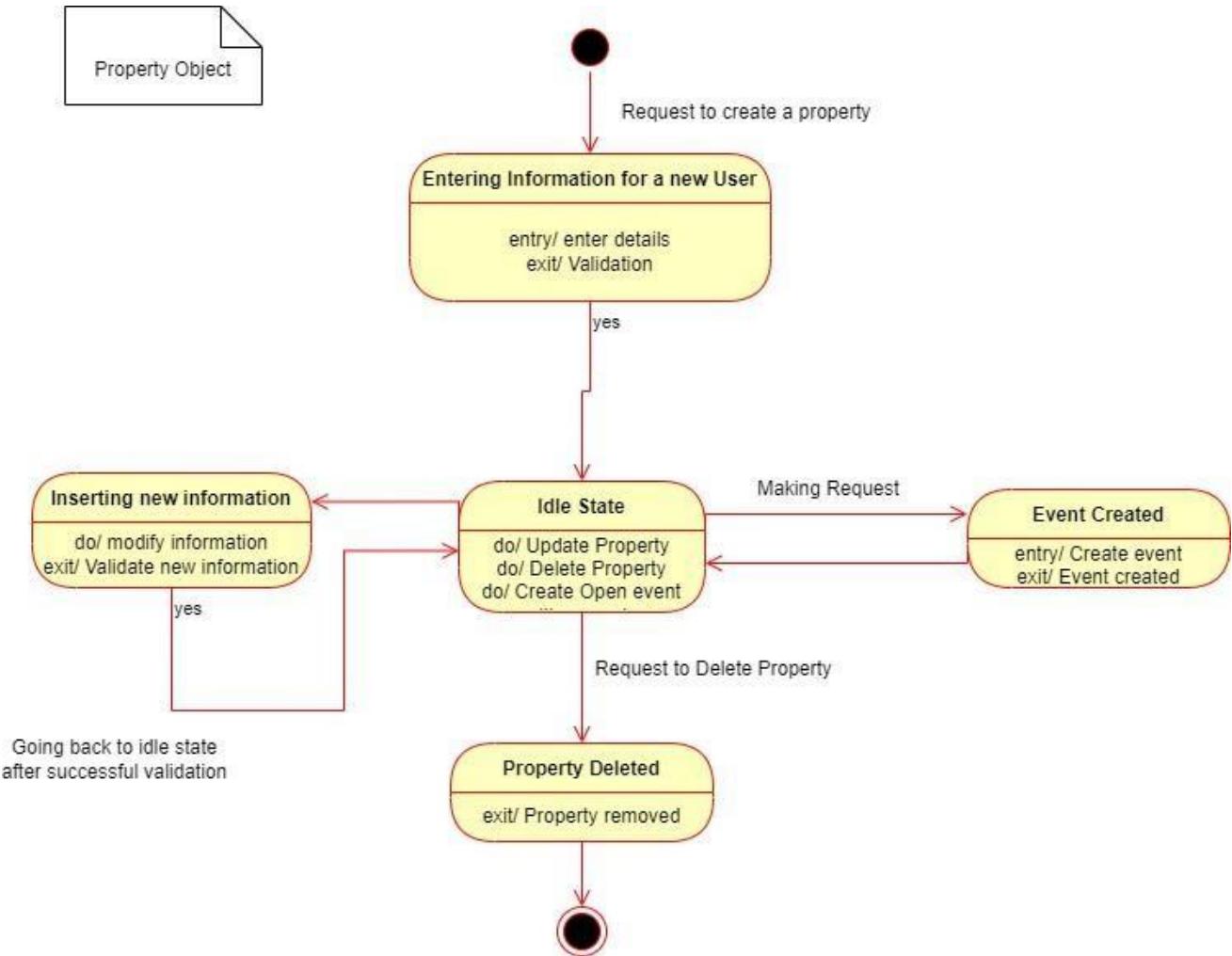
4.2.3 State Diagrams





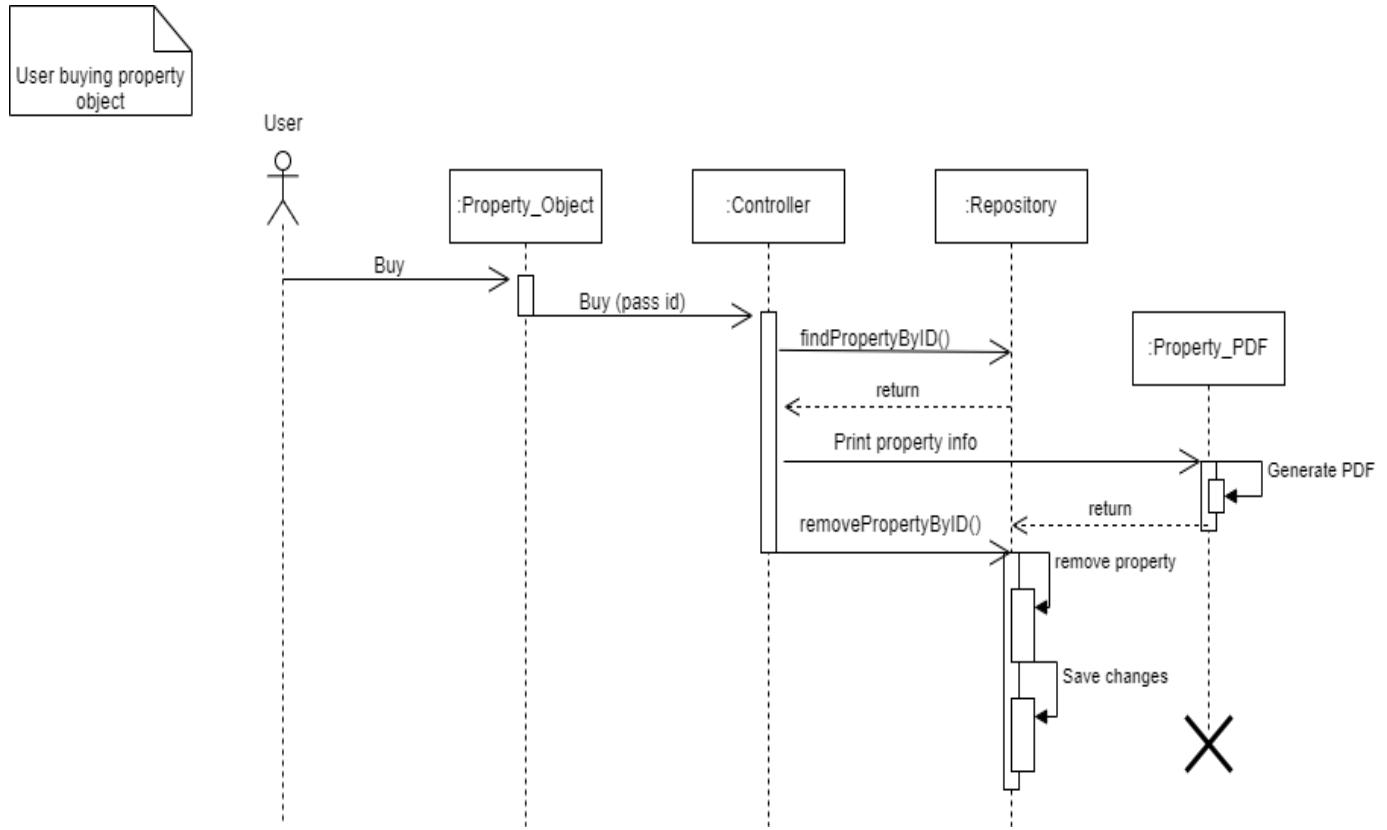






4.2.4 Sequence Diagrams

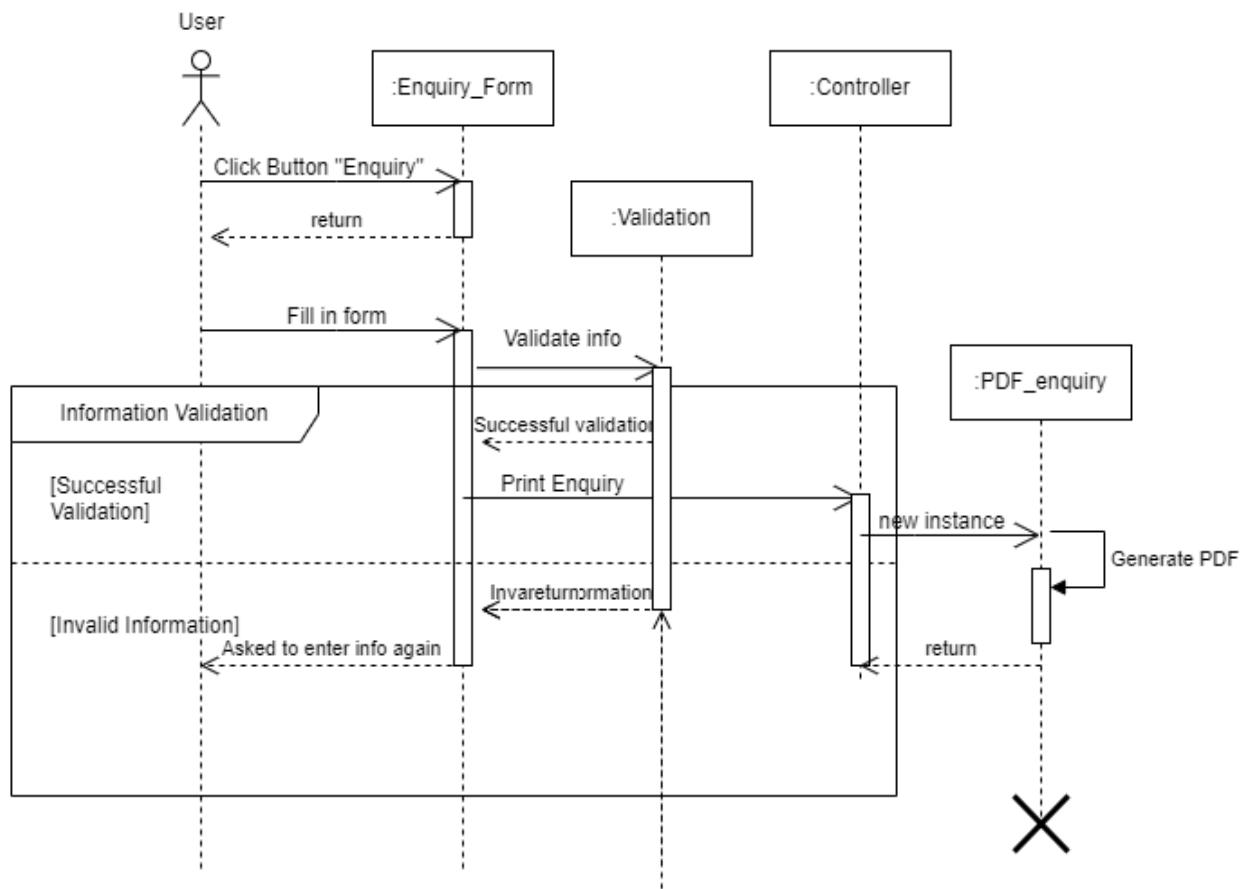
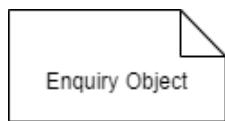
Title: User buying a property



Description:

When a user wants to buy a property, he/she must click “Buy”. The Controller class then comes into action. We use the method `findById()`. The controller should have access to the database, but instead, in order to make things more practical, a Repository is used. In backend, when dealing with CRUD operations from http requests, usually, instead of accessing the database directly, a repository is used. When the operation is finished, the repository has a method called `saveChanges()`, which is supposed to make the necessary changes to the database. At the end, a pdf report will be printed for the user who bought the property.

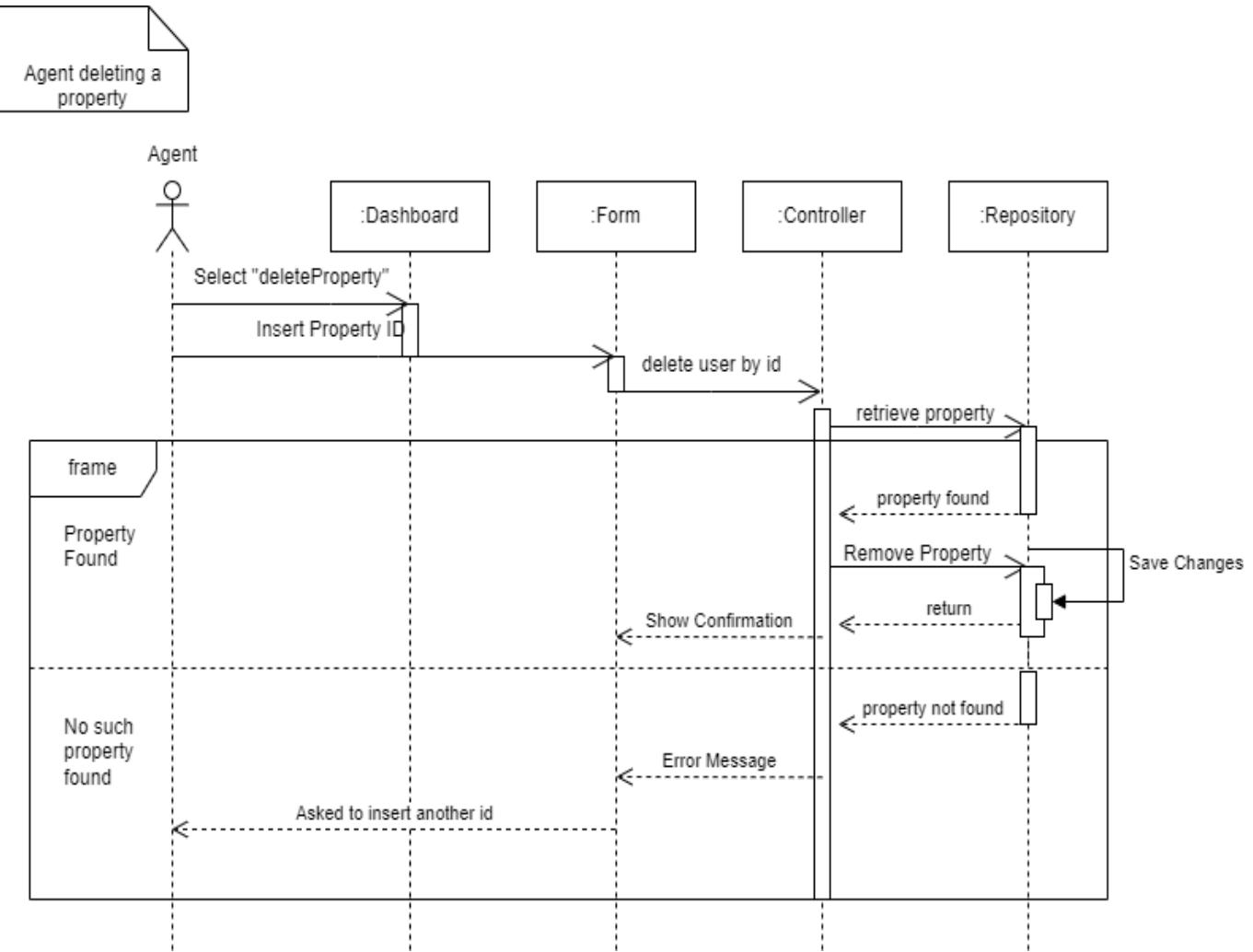
Title: User making an enquiry



Description:

An enquiry is meant to be a verbal request from the user to the intended receiver (either the admin or agent). After filling in the information needed for the form to be complete, a validation process is needed. This is done for the sake of security reasons. If the information passes the validation process then it can go on further, passing the control to the controller which further prints a copy of the enquiry.

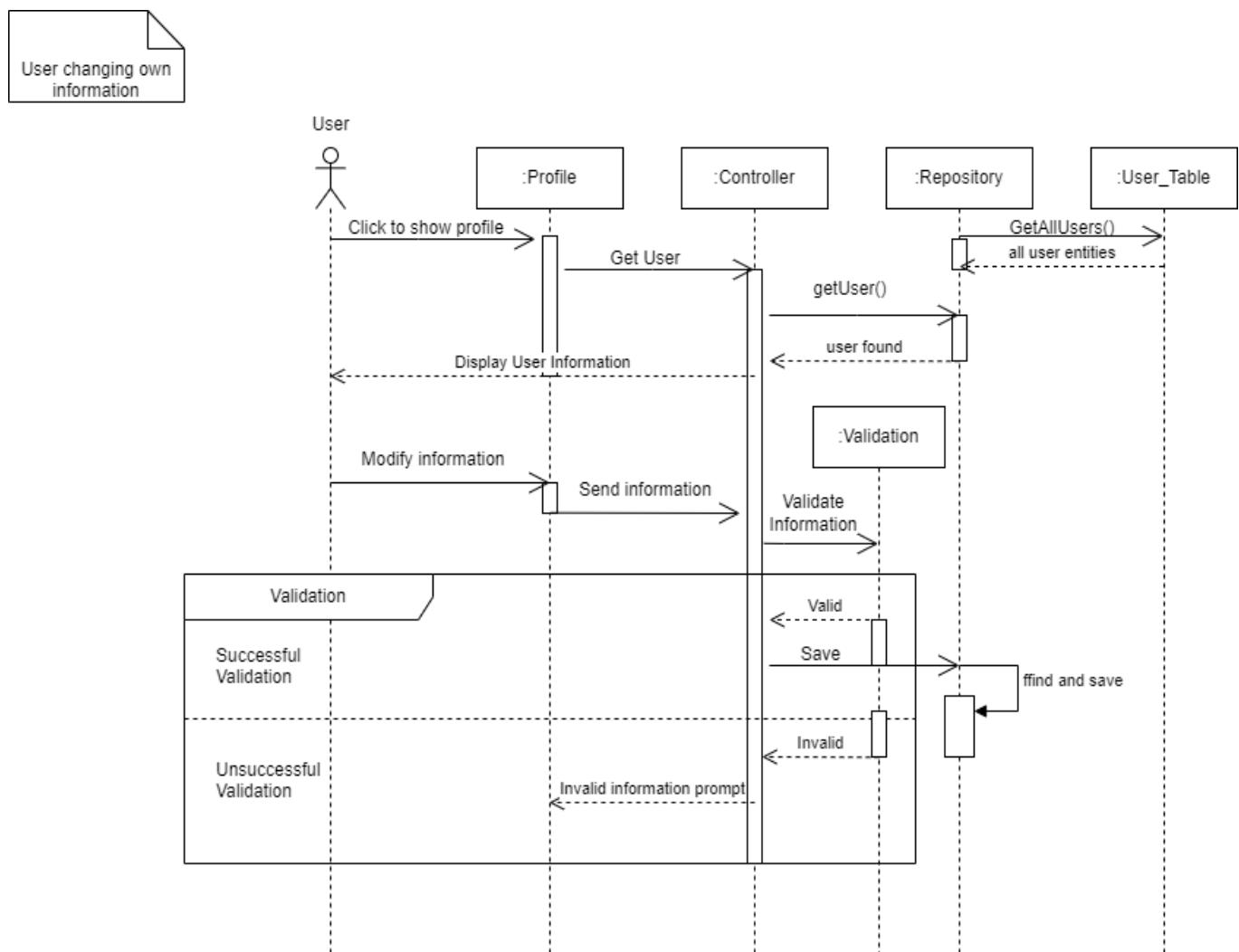
Title: Agent deleting property by ID



Description:

This sequence diagram represents the necessary steps followed to delete a property by specifying the id number from the agent. First the agent opens the dashboard and then he/she clicks on “Delete Property”. They then insert the ID of the property intended to be deleted. The frame is used to determine the two scenarios, one if the property with that ID is found and the other case when no such property is found. If the property is found, it is deleted by using the Repository as mentioned above and then the changes are saved in the database via data migration.

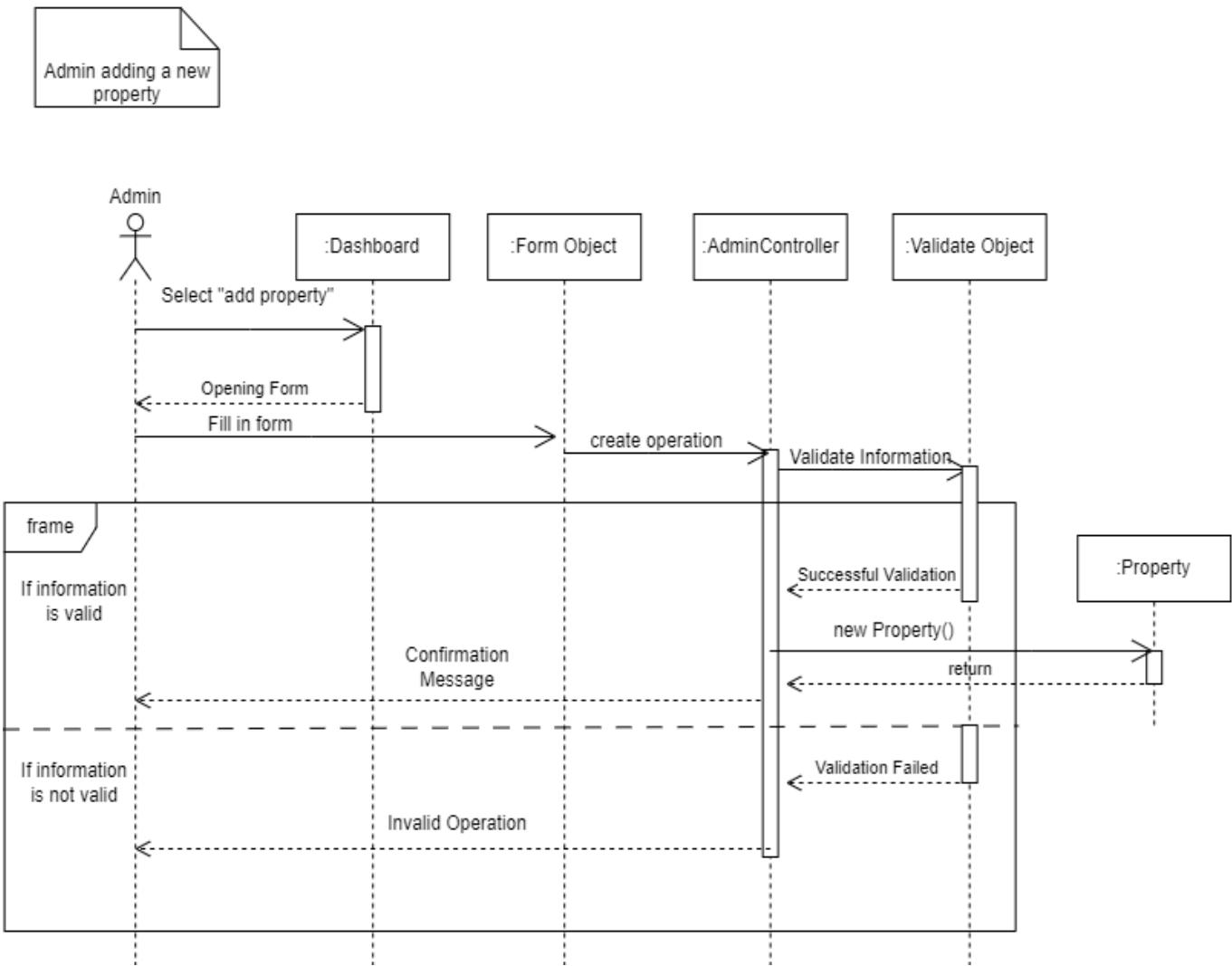
Title: User changing information



Description:

In this case the user intends to change personal information. When the form is filled, the new information has to undergo the validation process. If it doesn't pass that process, then the user has to enter new information that complies with the regulations regarding security measures.

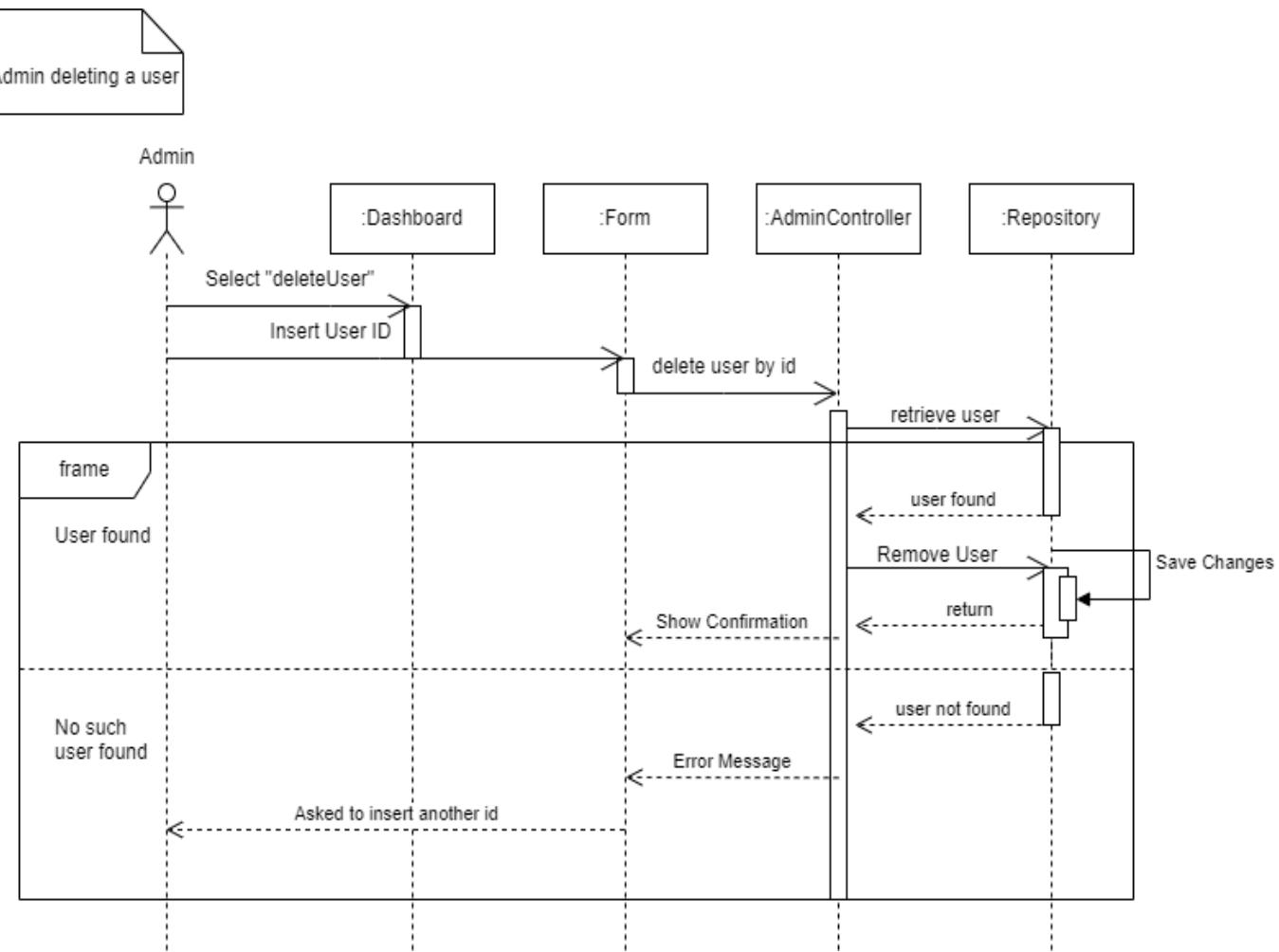
Title: Admin adding new property



Description:

This sequence diagram represents the steps followed by the agent to add a new property. It is somehow the same process, filling in the form, going through the validation process. If the information doesn't comply with what the programmer thought to be security-policy abiding information, then the agent will have to enter the information for that property again. If everything is okay, then the new property will be added to the repository and by using the migration process it will be saved to the database.

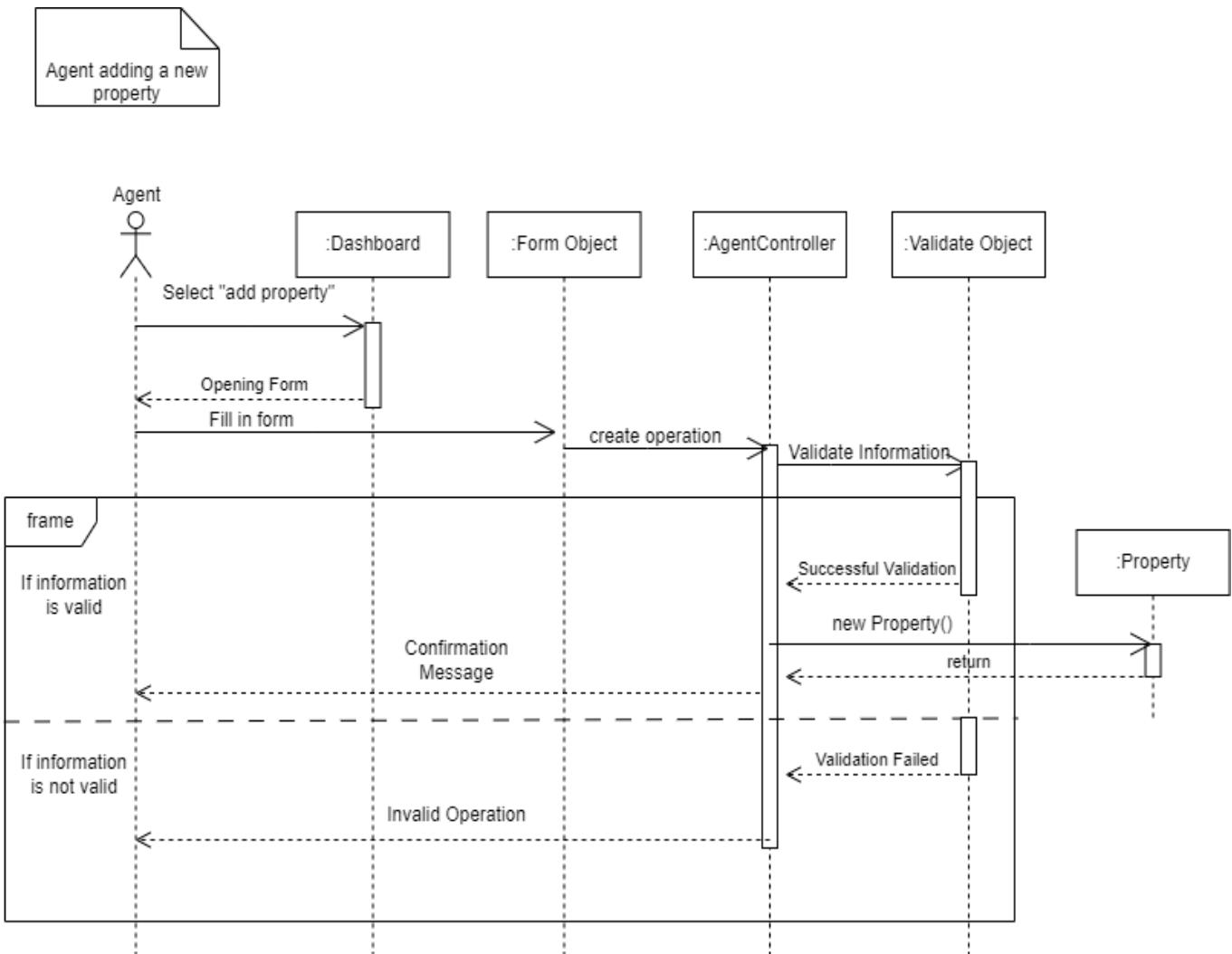
Title: Admin deleting user by id



Description:

This is very similar to the sequence diagram for the process of deleting a property by id. In this diagram, the admin should insert the id of the user they want to delete. If it is found, the user will be deleted, otherwise the admin will have to enter another id that is actually valid.

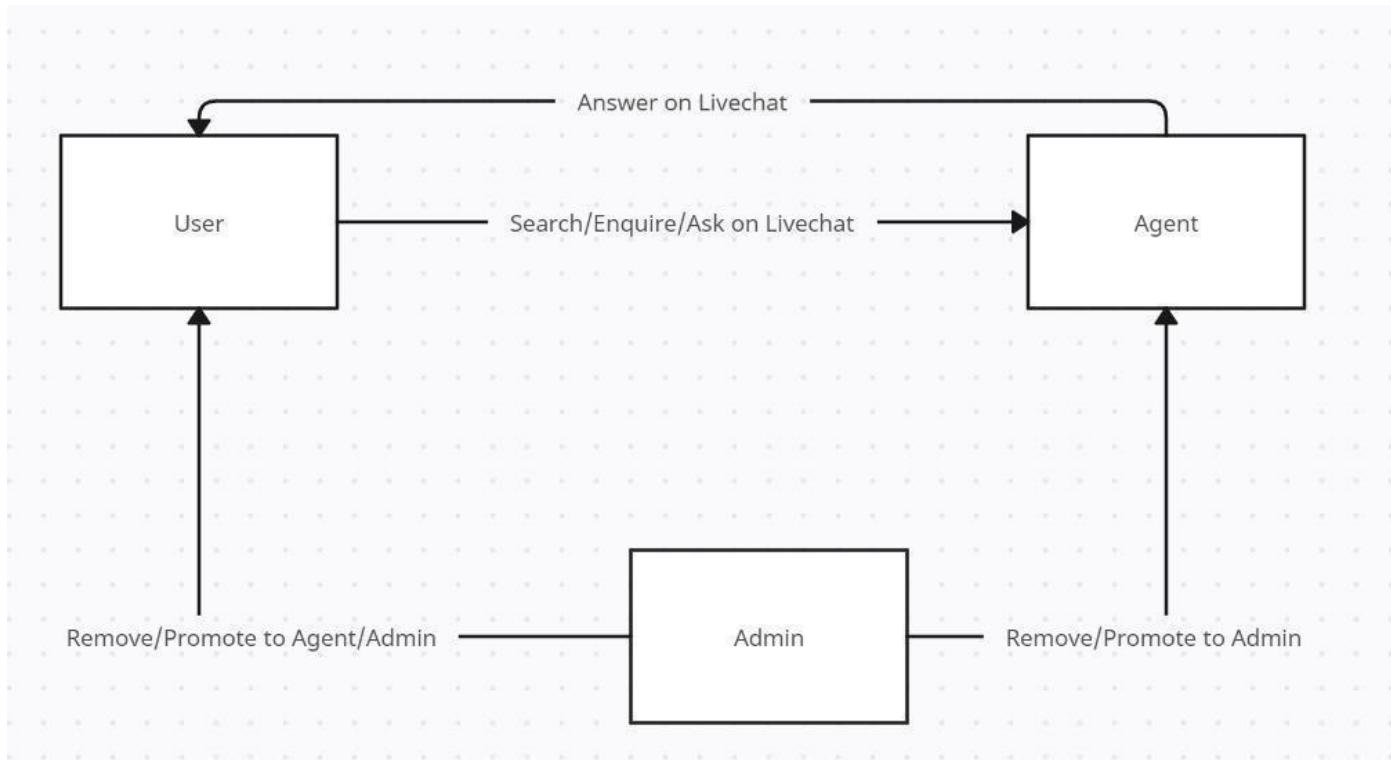
Title: Agent adding new property

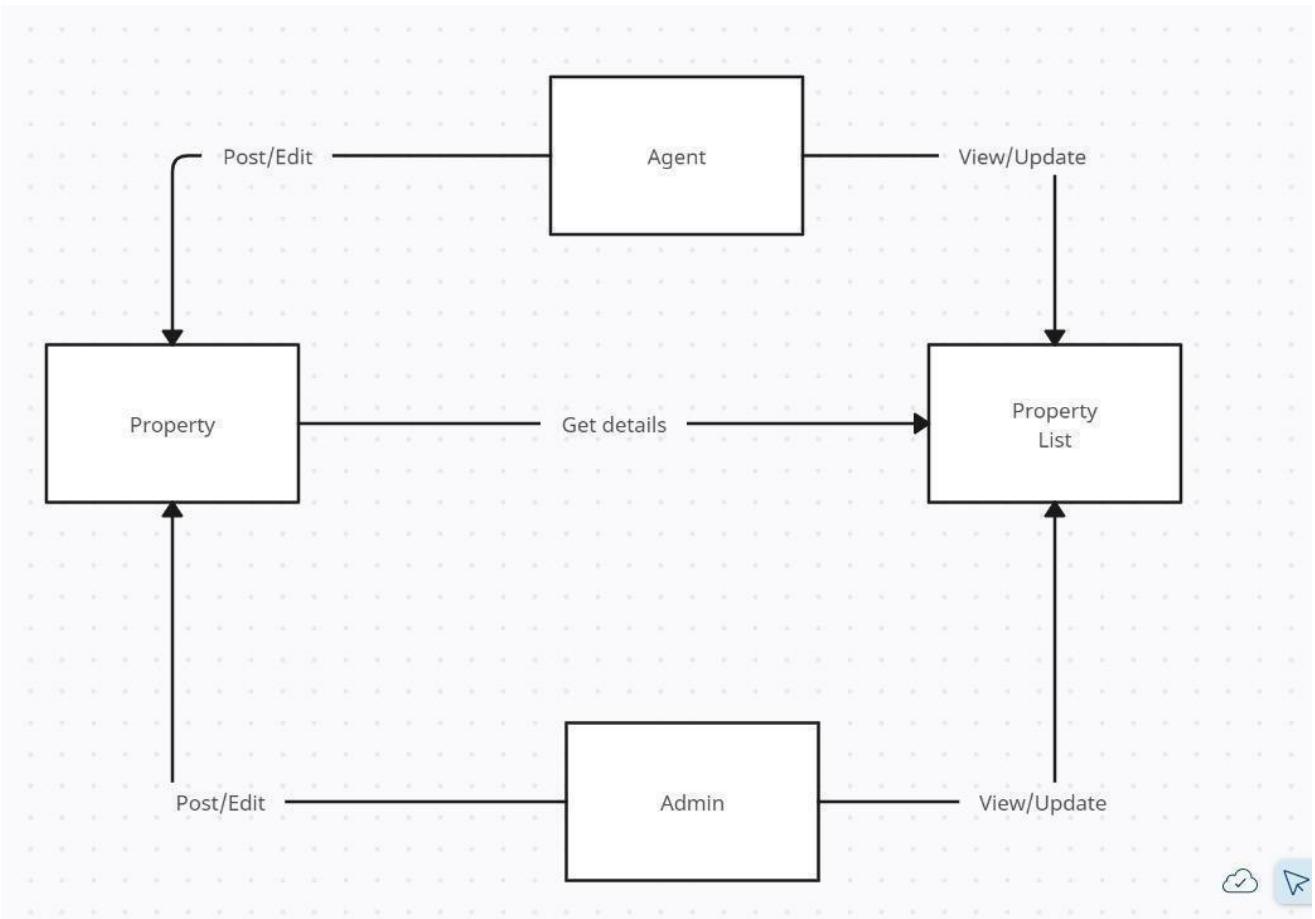


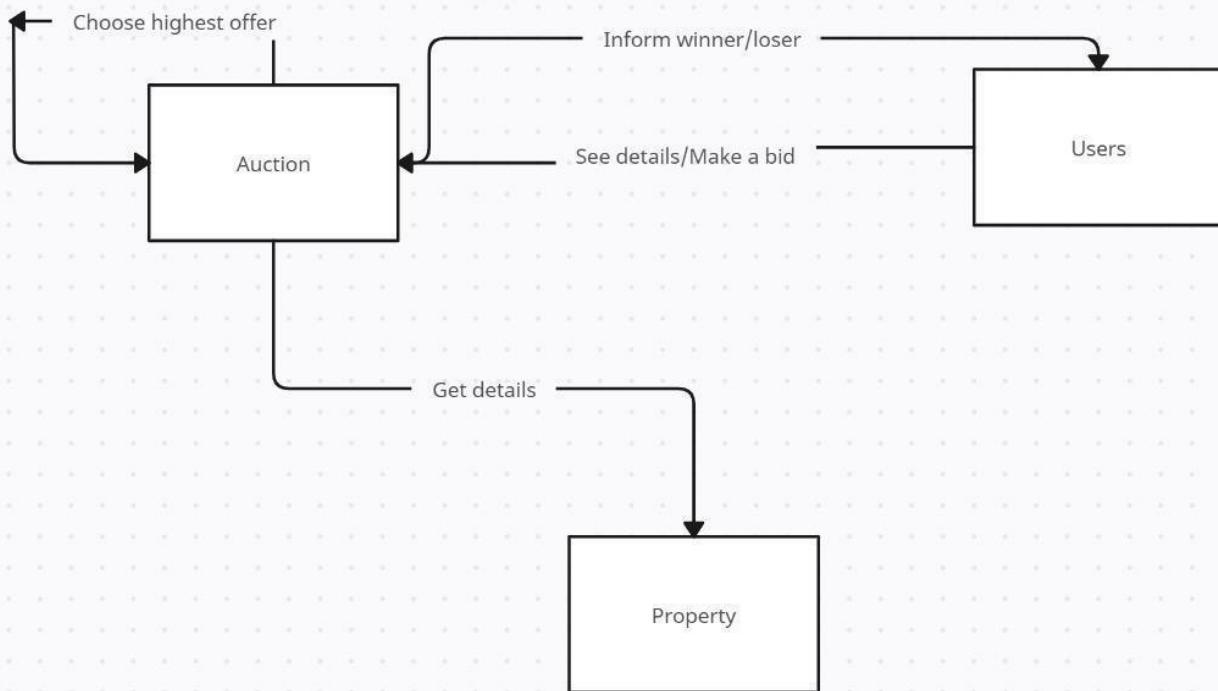
Description:

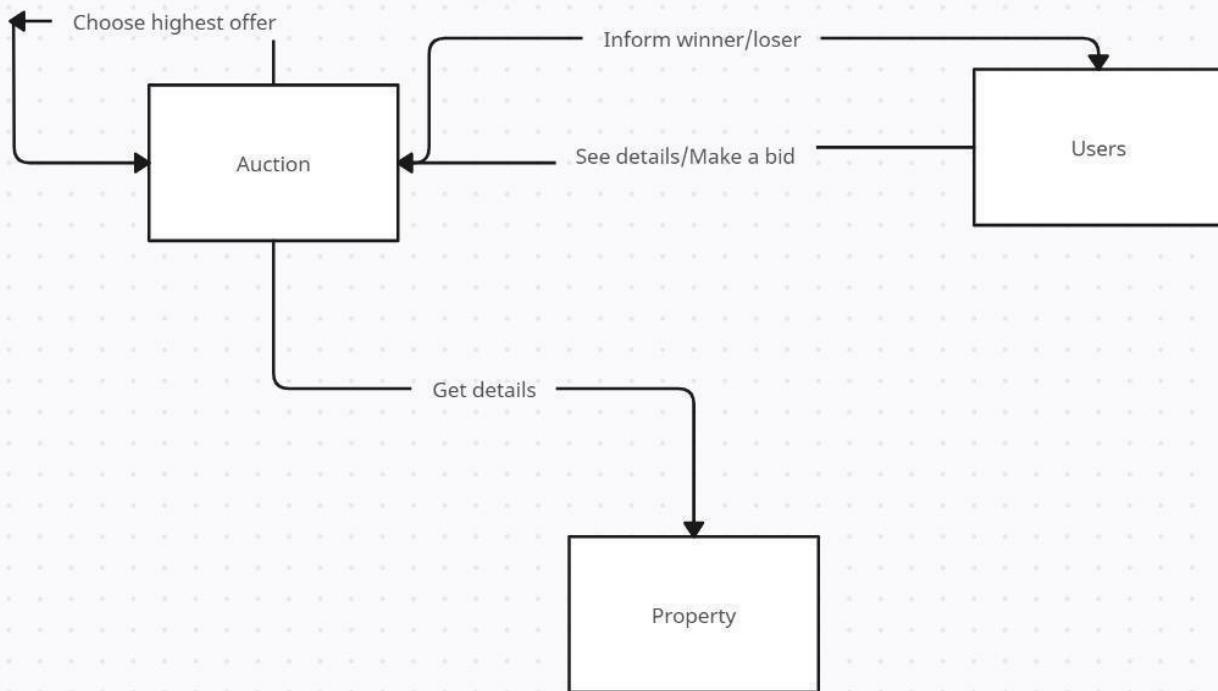
An agent adding a new property is quite similar to an admin adding a new property, both of them have access to such an operation. The information will be passed through the validation process and then the control will be passed to the Controller, which in turn will create a new entity of Property. Even though it is not shown in the diagram above (because it is intuitively understandable) the new property will be added to the Repository and then saved to the Database.

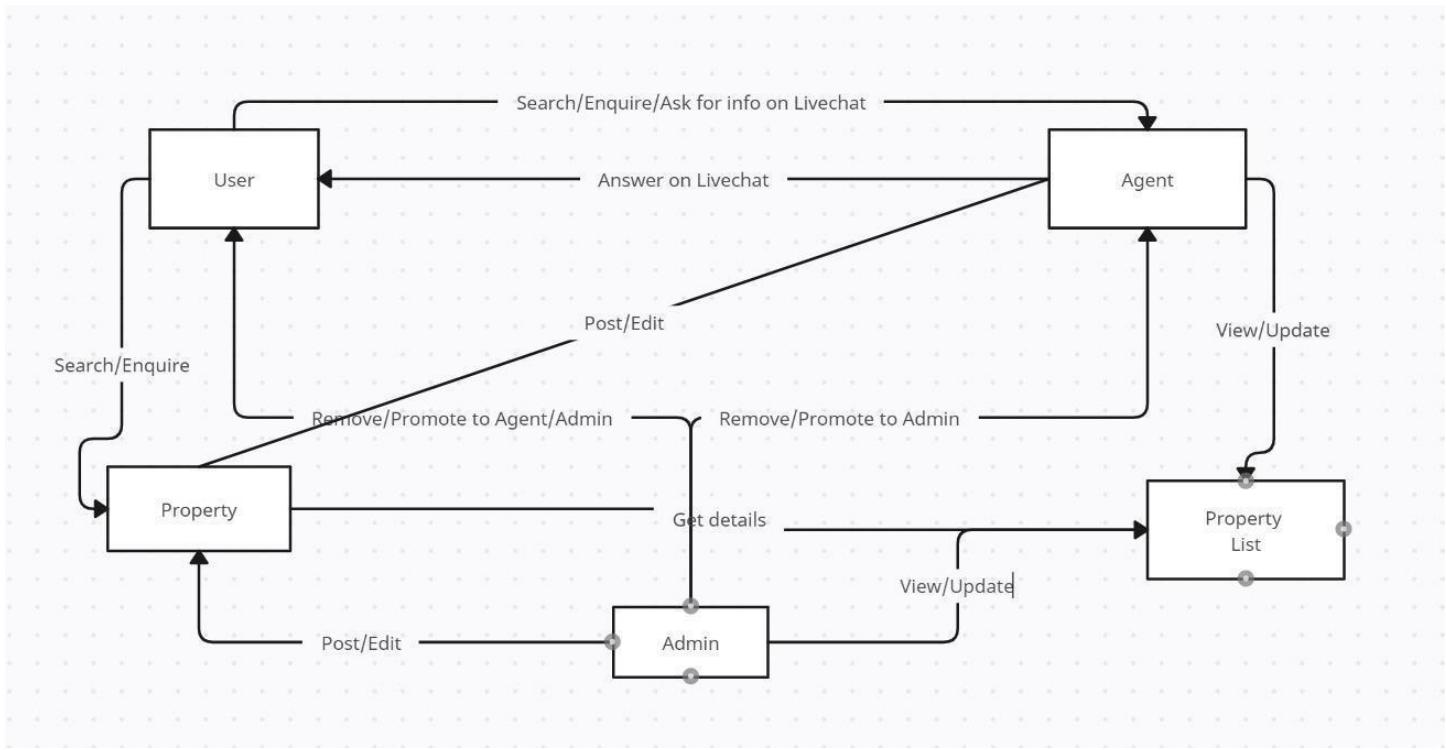
4.2.5 Collaboration Diagrams



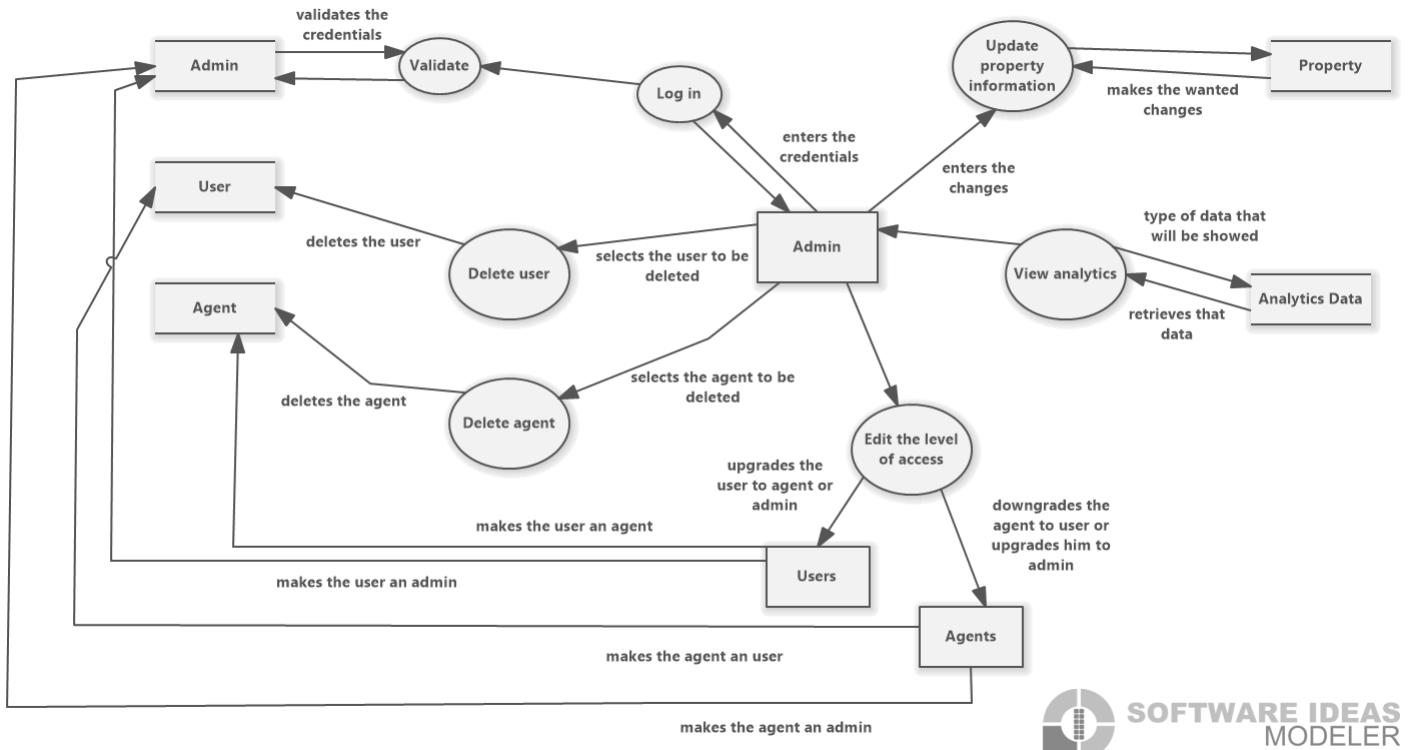




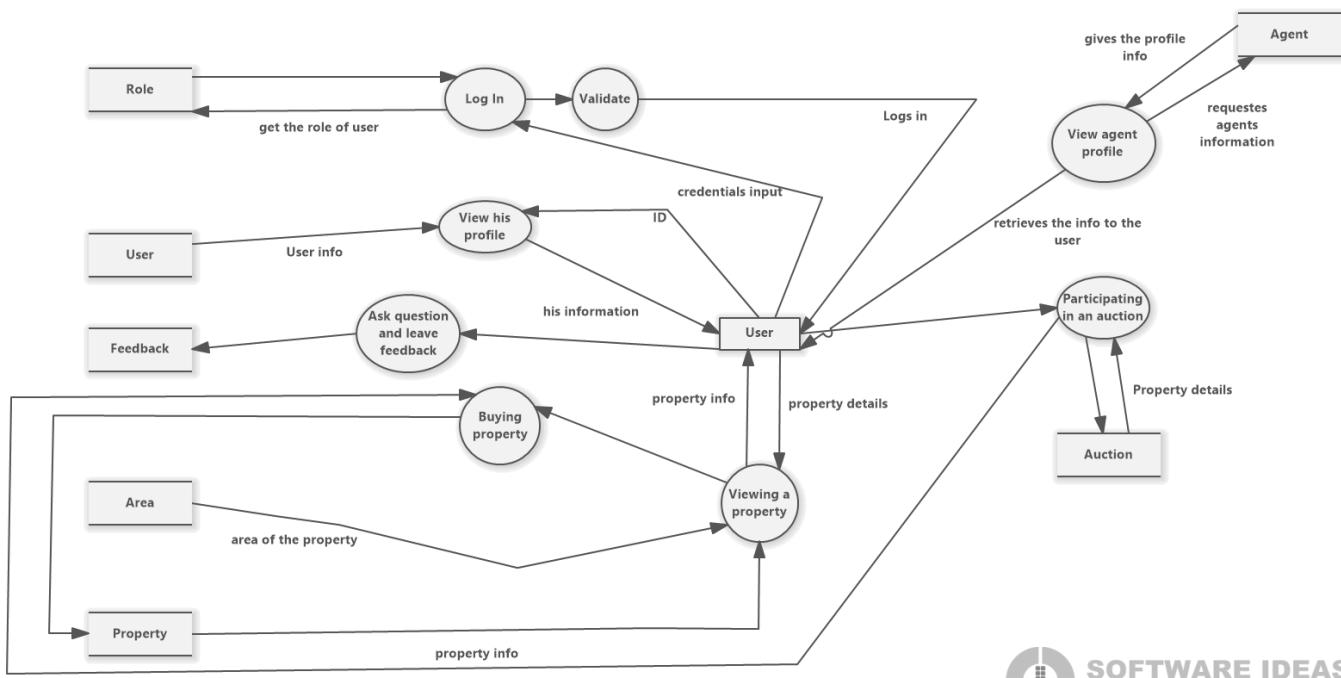




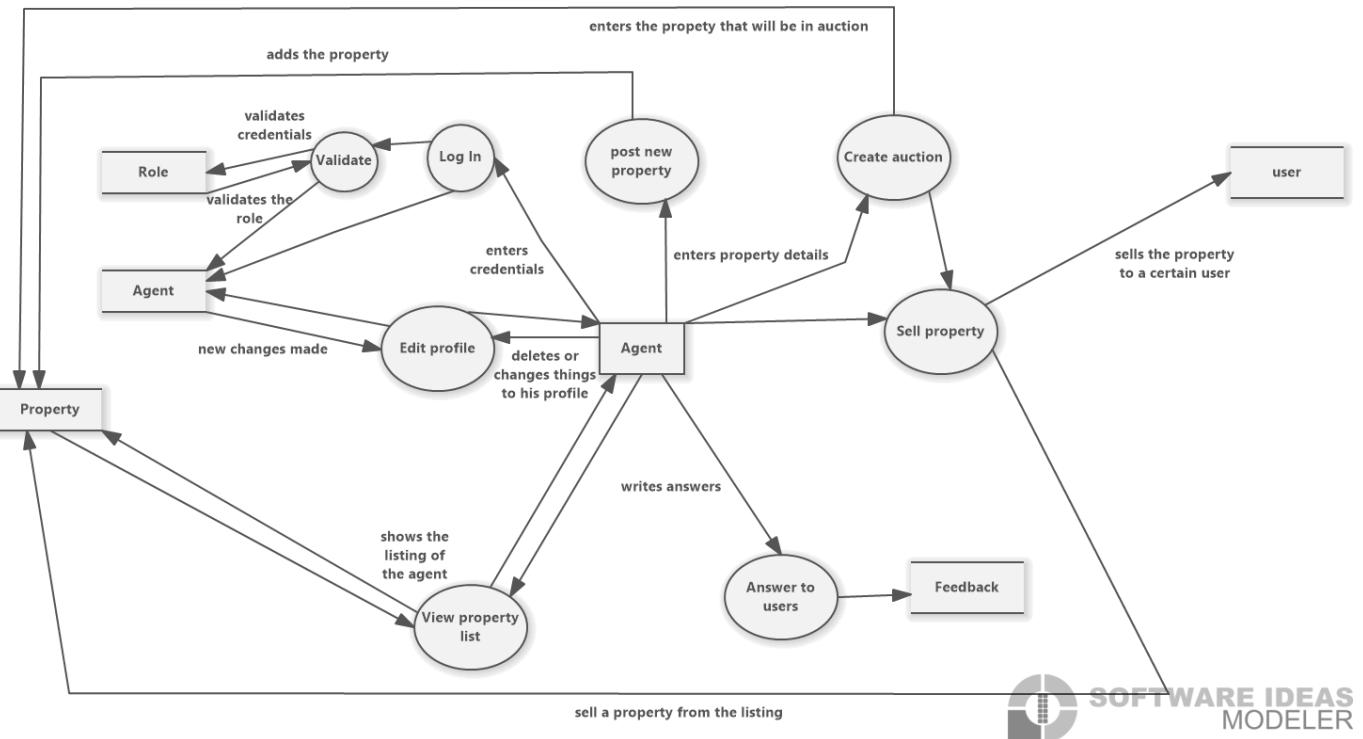
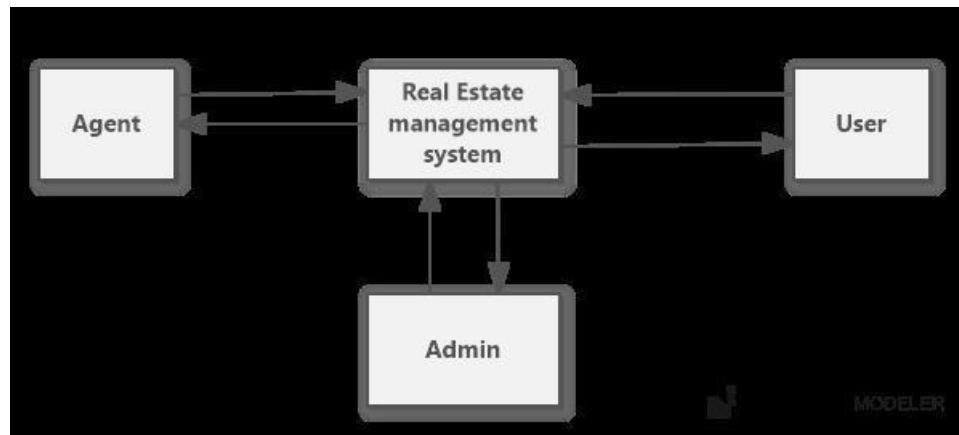
4.3 Data Flow Diagrams



SOFTWARE IDEAS
MODELER



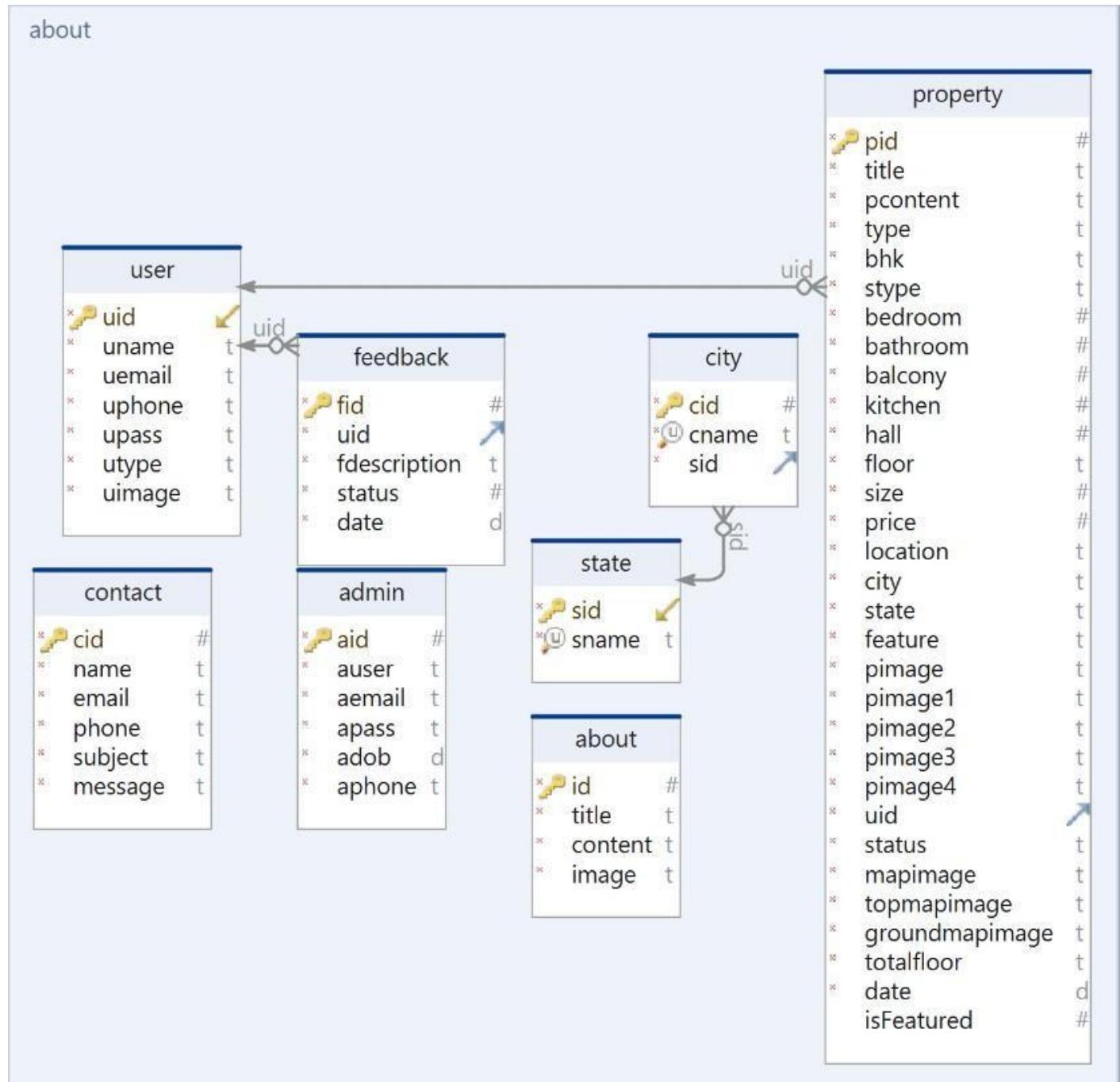
SOFTWARE IDEAS
MODELER



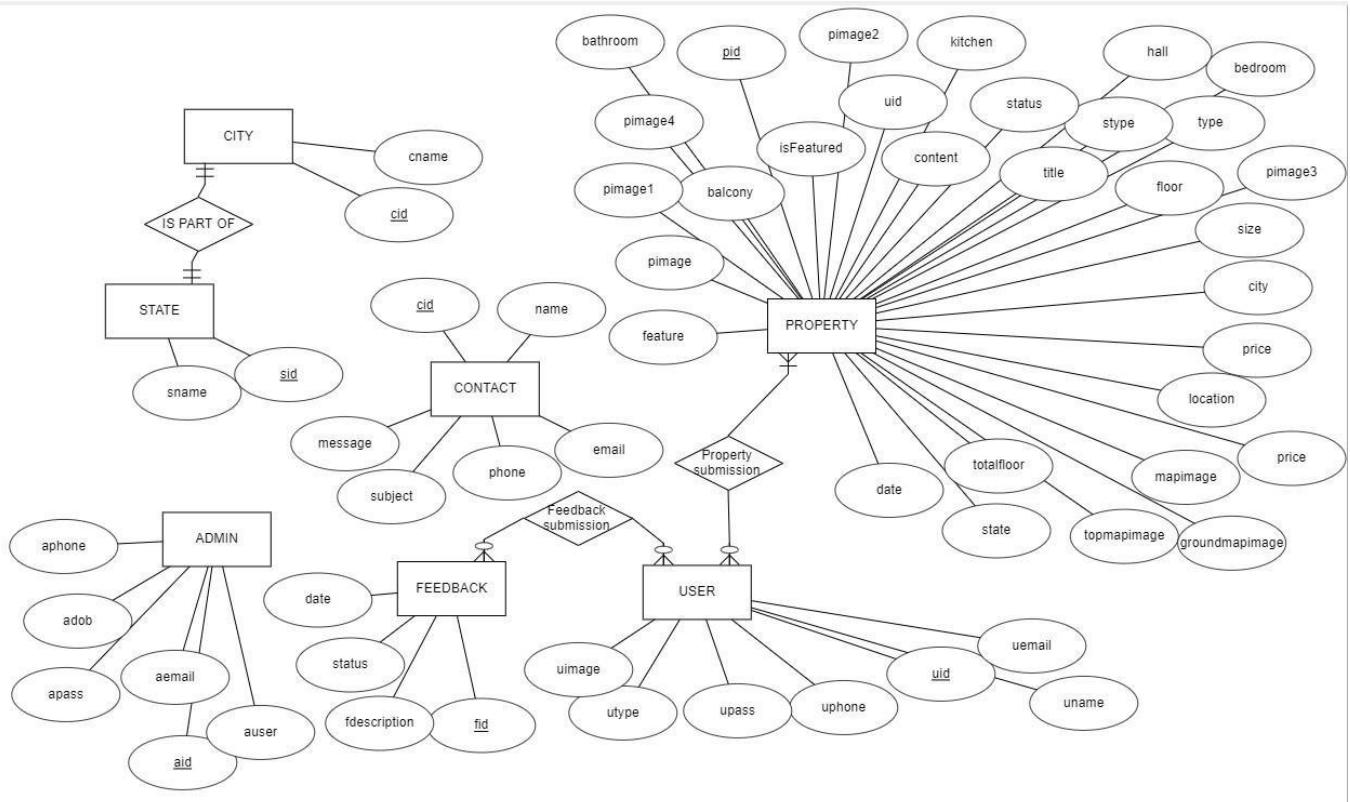
SOFTWARE IDEAS
MODELER

4.4 Entity Relation

4.4.1 Database Schema Design

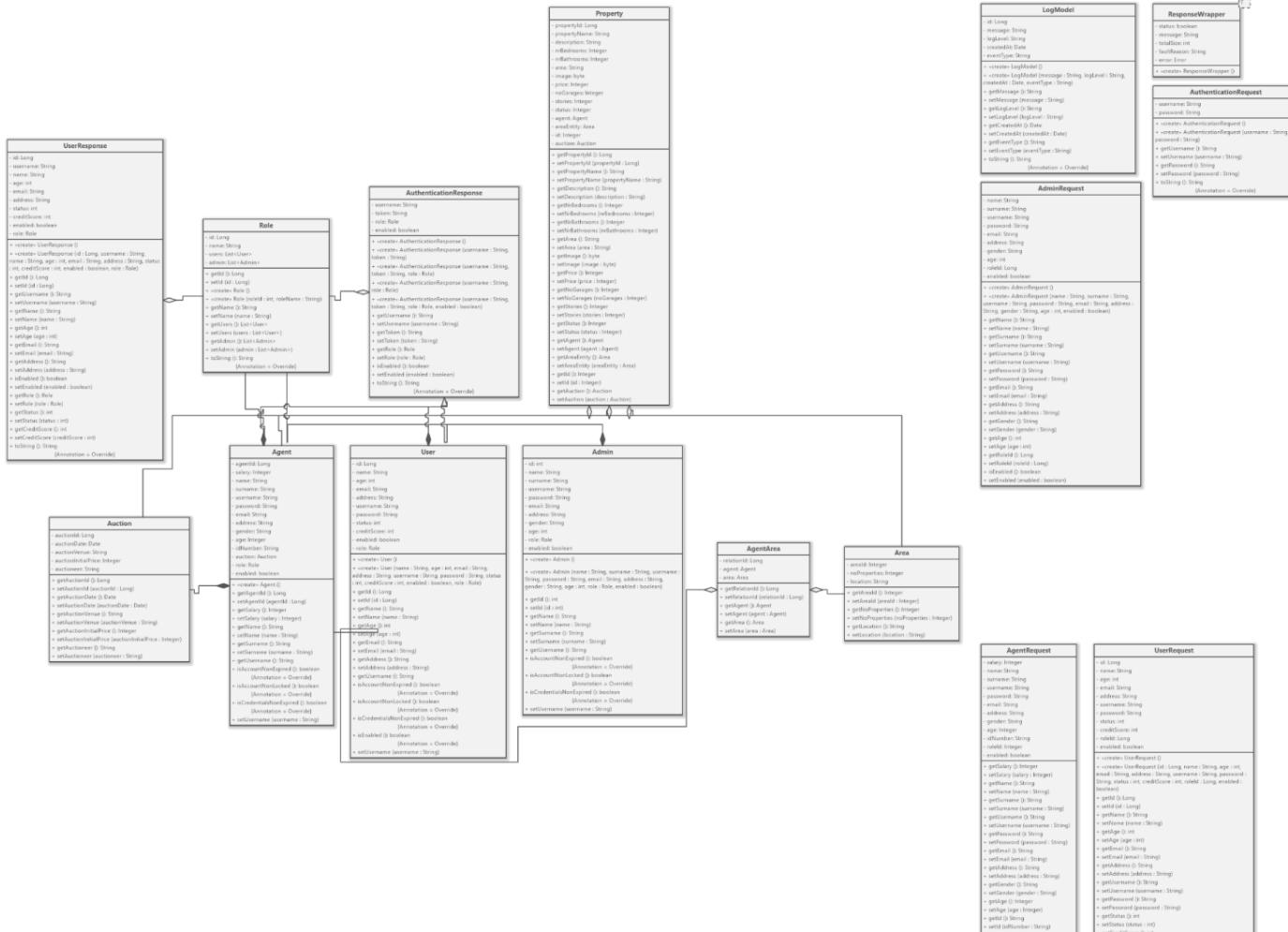


4.4.2 Entity Relation Design

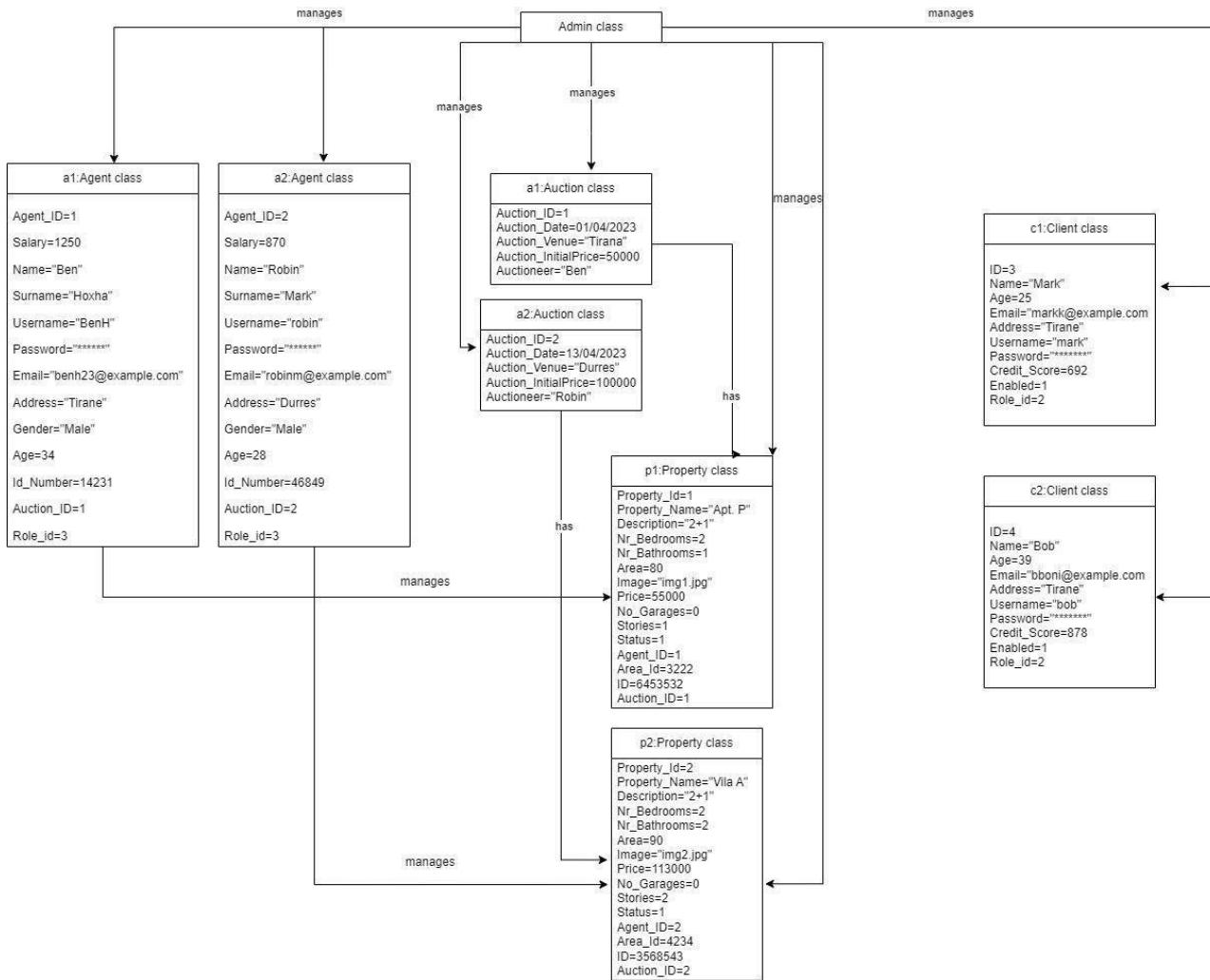


4.5 Structural Diagrams

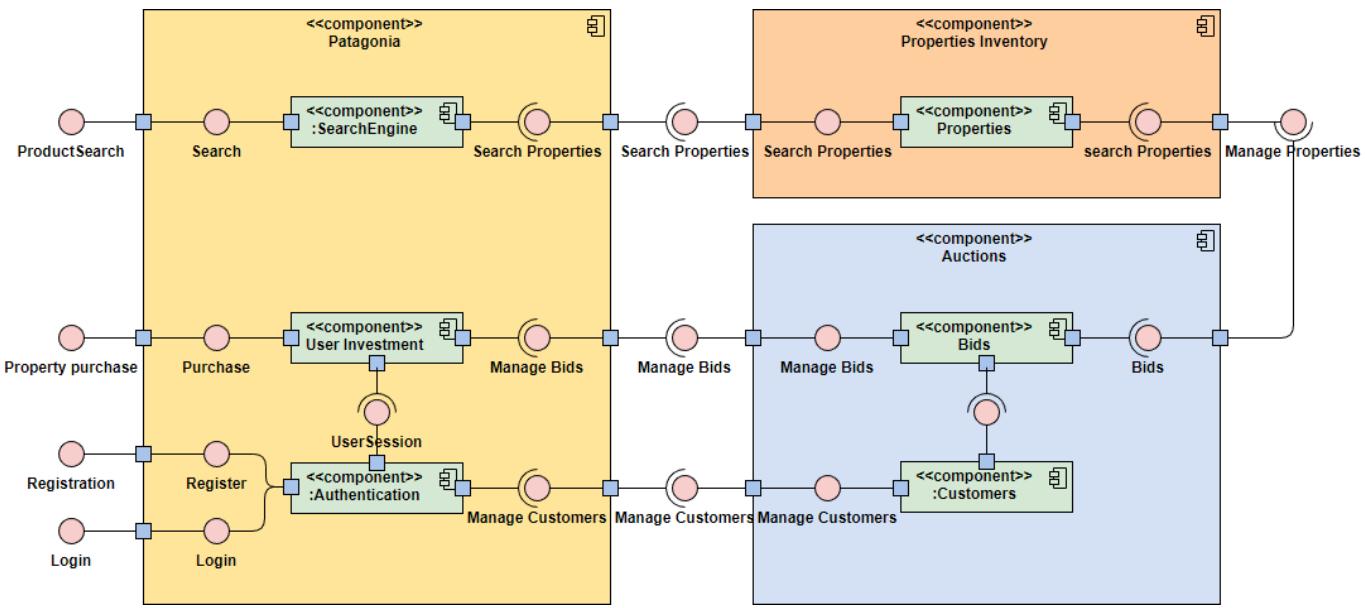
4.5.1 Class Diagrams



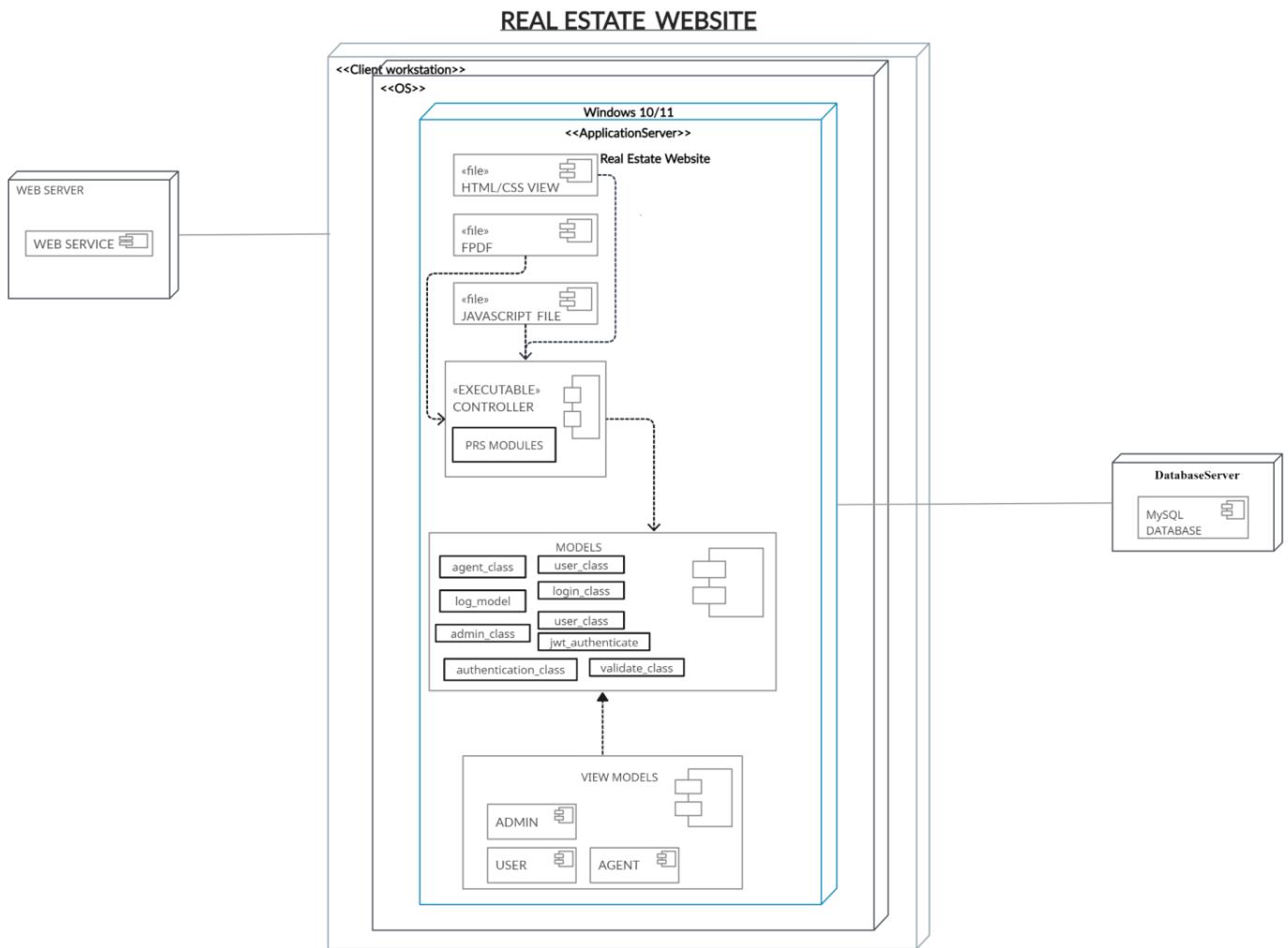
4.5.2 Object Diagrams



4.5.3 Component Diagrams



4.5.4 Deployment Diagram



5. Implementation Technology

Patagonia Real Estate website is a website based on simple technologies in order to make it easier to make modifications. The technologies that have been used are HTML, CSS, JavaScript, Bootstrap, jQuery, PHP, Spring Boot. The project was mainly divided into two parts, the front-end and the back end. The team was assigned tasks in groups, one group for the frontend and the other remaining members for the backend. In cases when there was no clear distinction between the frontend and backend team members would work together for the code to work. Everyone was asked to initially try the code in their laptops/computers locally before committing to the main branch in github.

For the user interface of our product we asked for the idea of every team member and decided to keep things simple. In that manner it is easier for the user to grasp the idea of how the website works. The server side of the project, or known as the backend, we used PHP scripting and Spring Boot. The reason for using PHP for some of the website's functionalities is because of some pre-existing infrastructure. When a request is initiated from the website, it is handled by PHP scripts which in turn invokes the endpoints of the Spring Boot server that is running. The general structure of the project is simple, but highly functional.

An alternative way of hosting the website is by using XAMPP server, in the case when the backend is based solely on PHP. It can be used for demonstration purposes but nevertheless is exceptionally functional. Any request that will be handled by the backend technology, in case it contains information inserted by the user, has to undergo a validation process, to ensure that no harmful text is inserted into the fields of the website.

The database MySQL is handled by phpMyAdmin. It is practical and very similar to MySQL Workbench in functionality. In the following pages, after the project planning section, you can find screenshots of the final version of the product.

Potagonia Estate

Login | Register

REALESTATE

Home About Contact Properties Agent Login/Register

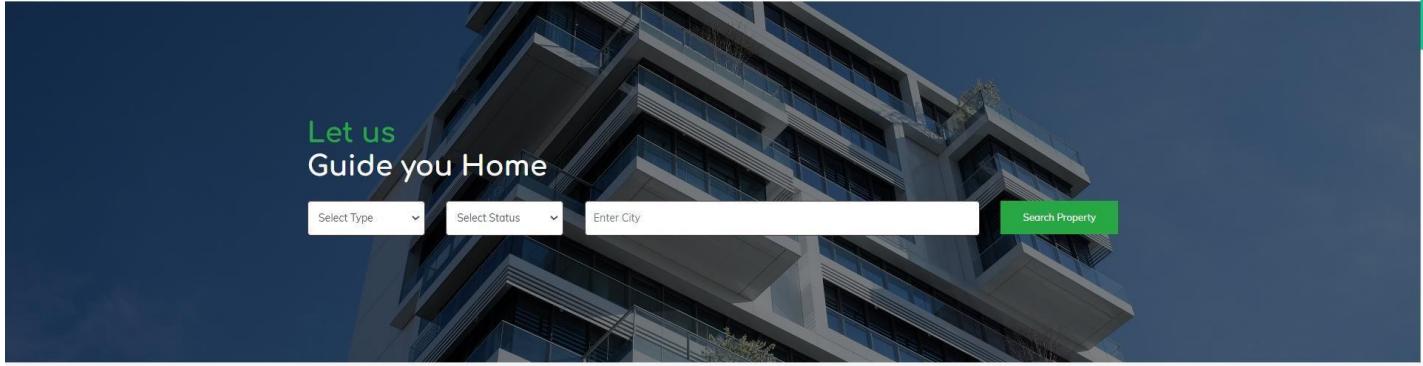
Submit Property

Let us Guide you Home

Select Type Select Status Enter City Search Property

What We Do

Selling Service Rental Service Property Listing Legal Investment



REALESTATE

Home About Contact Properties Agent Login/Register

Submit Property

Recent Property

For Sale

New

\$250000
520 Sqft

Beach Villa
Durrës

520 6 3 1 6
Sqft Beds Baths Kitchen Balcony

By: Agent 07-06-2023

For Sale

New

\$125000
210 Sqft

Lake Villa
Tirane

210 3 2 1 3
Sqft Beds Baths Kitchen Balcony

By: Agent 07-06-2023





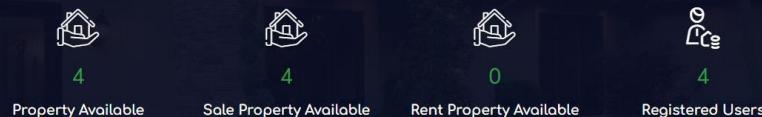
How It Work



Discussion

Files Review

Acquire



Popular Places

Testimonial



Support

Forum

Terms and Condition

Frequently Asked Question

Contact

Quick Links

About Us

Featured Property

Submit Property

Our Agents

Contact Us

Tirana

+355 12 345 6789

+355 12 345 6789

help@realestate.com

[f](#) [t](#) [g+](#) [in](#) [r](#)

About Us

This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project.

This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project. (codeastro.com) This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project. This is a demo about us page for this project.

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Support

Forum

Terms and Condition

Frequently Asked Question

Quick Links

About Us

Featured Property

Submit Property

Contact Us

Tirana

+355 12 345 6789

+355 12 345 6789

Patagonia Estate

Login | Register



Home

About

Contact

Properties

Agent

Login/Register

Submit Property



Lake Villa

Tirane

By: Agent

07-06-2023



Beach Villa

Durres

By: Agent

07-06-2023

Instalment Calculator

\$	Property Price
€	Duration Year
%	Interest Rate

Calculate Instalment

Featured Property



Beach Villa

Durres



Lake Villa

Tirane

Recently Added Property

3rd Party : No

Elevator : Yes

CCTV : Yes

Water Supply : Ground Water /
Tonk

Floor Plans

Floor Plans



[Home](#) [About](#) [Contact](#) [Properties](#) [Agent](#) [Login/Register](#)

[Submit Property](#)

EMI Calculator

Term	Amount
Amount	\$250000
Total Duration	5 Months
Interest Rate	2.5%
Total Interest	\$6250
Total Amount	\$256250
Pay Per Month (EMI)	\$51250

Patagonia Estate

Login | Register

REAL ESTATE

Home About Contact Properties Agent Login/Register

Submit Property

Agent

agent
Real Estate - Agent

agent_3
Real Estate - Agent

agent_4
Real Estate - Agent

Patagonia Estate

Login | Register

REAL ESTATE

Home About Contact Properties Agent Login/Register

Submit Property

Login

Access to our dashboard

Login

OR

Don't have an account? [Register](#)



Register

Access to our dashboard

 Your Name* Your Email* Your Phone* Your Password* User Agent

User Image

 Choose File No file chosen[Register](#)

OR

Already have an account? [Login](#)

USER LISTED PROPERTY

Home > User Listed Property

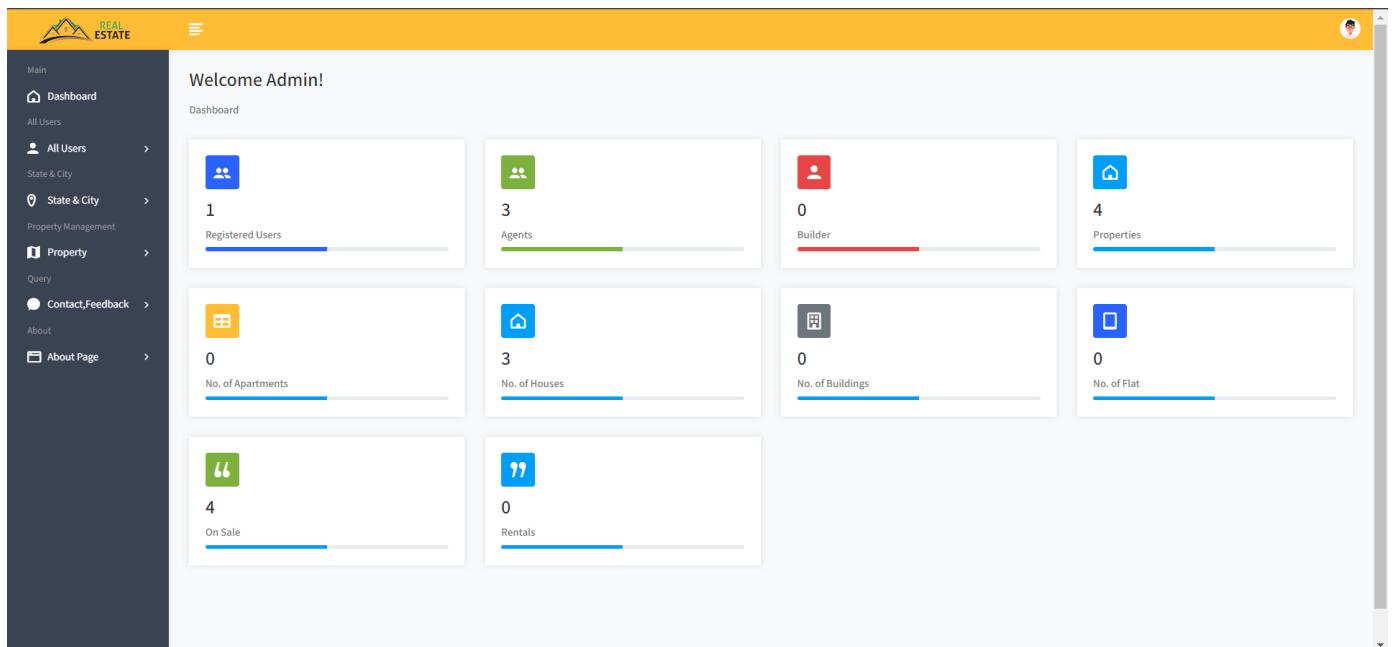
User Listed Property

Properties	BHK	Type	Added Date	Status	Update	Delete
Lake Villa 📍 Tirane \$ 125000	2	For Sale	2023-06-07 23:27:30	Available	Update	Delete
Beach Villa 📍 Durres \$ 250000	2	For Sale	2023-06-07 23:31:48	Available	Update	Delete

Admin Login Panel

Access to our dashboard

Login



REAL ESTATE

Main

[Dashboard](#)

All Users

[All Users](#)

[State & City](#)

[Property](#)

[Contact,Feedback](#)

About

[About Page](#)

Agent

Dashboard / Agent

Agent List

#	Name	Email	Contact	Utype	Image	Action
1	agent	agent@gmail.com	+123456789	agent		Delete
2	agent_3	agent_3@gmail.com	+123456789	agent		Delete
3	agent_4	agent_4@gmail.com	+123456789	agent		Delete

Showing 1 to 3 of 3 entries

REAL ESTATE

Main

[Dashboard](#)

All Users

[All Users](#)

[State & City](#)

[Property](#)

[Contact,Feedback](#)

About

[About Page](#)

Property

Dashboard / Property

Property View

Title	Type	BHK	S/R	Area	Price	Location	Status	Added Date
Beach Villa	villa	2	sale	520	250000	Durres	available	2023-06-07 23:31:48
Lake Villa	house	2	sale	210	125000	Tirane	available	2023-06-07 23:27:30
Zills Home	house	4 BHK	sale	1869	219690	39 Bailey Drive	available	2022-07-22 22:29:20
Zills Home	house	4 BHK	sale	1869	219690	39 Bailey Drive	available	2022-07-22 22:29:20

Showing 1 to 4 of 4 entries

Add Property Details

Property Detail

Title:

Content:

Property Type

Selling Type:

Bathroom: Enter Bathroom (only max 3 by 3)

Kitchen: Enter Kitchen (only max 3 by 3)

Price & Location

Area:

Price:

City: Enter City

State:

Feature:

* Important: Please Do Not Mention Below Content Until Change Page To New or Details and Do Not Add More Details.

File Edit View Insert Format Tools Table

Rooms

Bedrooms:

Balcony:

Hall:

Area

Total Area: Enter Total Area (only max 3 by 3)

Area Size: Enter Area Size (in sqft)

Address:

Image & Status

Image 1: Choose File Select

Image 2: Choose File Select

Image 3: Choose File Select

Image 4: Choose File Select

Status: Selected Status

Ground Floor Plan Image: Choose File Select

Is Published? Select...



Profile

Feedback Form

Full Name

Contact Number

Your Feedback:

Send Feedback



Name: User
Email: user@gmail.com
Contact: +123456789
Role: User

Content

Formats -

0 WORDS POWERED BY TINY

Property Type	Select Type	*100000	Select
Selling Type	Select Status	Bedroom	Enter Bedroom (only no 1 to 10)
Bathroom	Enter Bathroom (only no 1 to 10)	Balcony	Enter Balcony (only no 1 to 10)
Kitchen	Enter Kitchen (only no 1 to 10)	Hall	Enter Hall (only no 1 to 10)

Price & Location

Floor	Select Floor	Total Floor	Select Floor
Price	Enter Price	Area Size	Enter Area Size (in sqrt)
City	Enter City	Address	Enter Address
State	Enter State		

Contacts

📍 Address
Tirane

📞 Call Us
+355 12 345 6789

✉️ Email Address
help@realestate.com

Get In Touch

Your Name*	Email Address*
Phone	Subject
Type Comments...	

Send Message

6. Project Planning

The project was developed using Trello software as the main organizational means. In order to define the tasks for each group member we created a board in Trello and posted the tasks every week. Most of the tasks had fixed deadlines, because they were critical, whereas other tasks had flexible deadlines, due to them not being crucial to the project. Below are some screenshots taken from the Trello board we have used to organize the workflow of the project.

The screenshot shows the Trello interface for the 'Software Engineering' board. At the top, there's a green header bar with a white 'S' icon and the board name 'Software Engineering'. A small lock icon indicates it's private. Below the header, there's a section titled 'Your boards' with a thumbnail for the 'Work division every week' board, which features a space-themed image and the text 'Work division every week'. To the right of this is a button labeled 'Create new board'. At the bottom left, there's a link 'View closed boards'.

It is obvious that the work was organized by determining which tasks are to be done, which ones are finished, and what other tasks can be assigned to team members who finish their tasks before the deadline.

In the following page you can find the specifications of the project planning.

Project Name: PMS (Property Management System)

Members: Daniel Figu, Darling Selita, Aleksandros Sinani, Frenkli Koleci

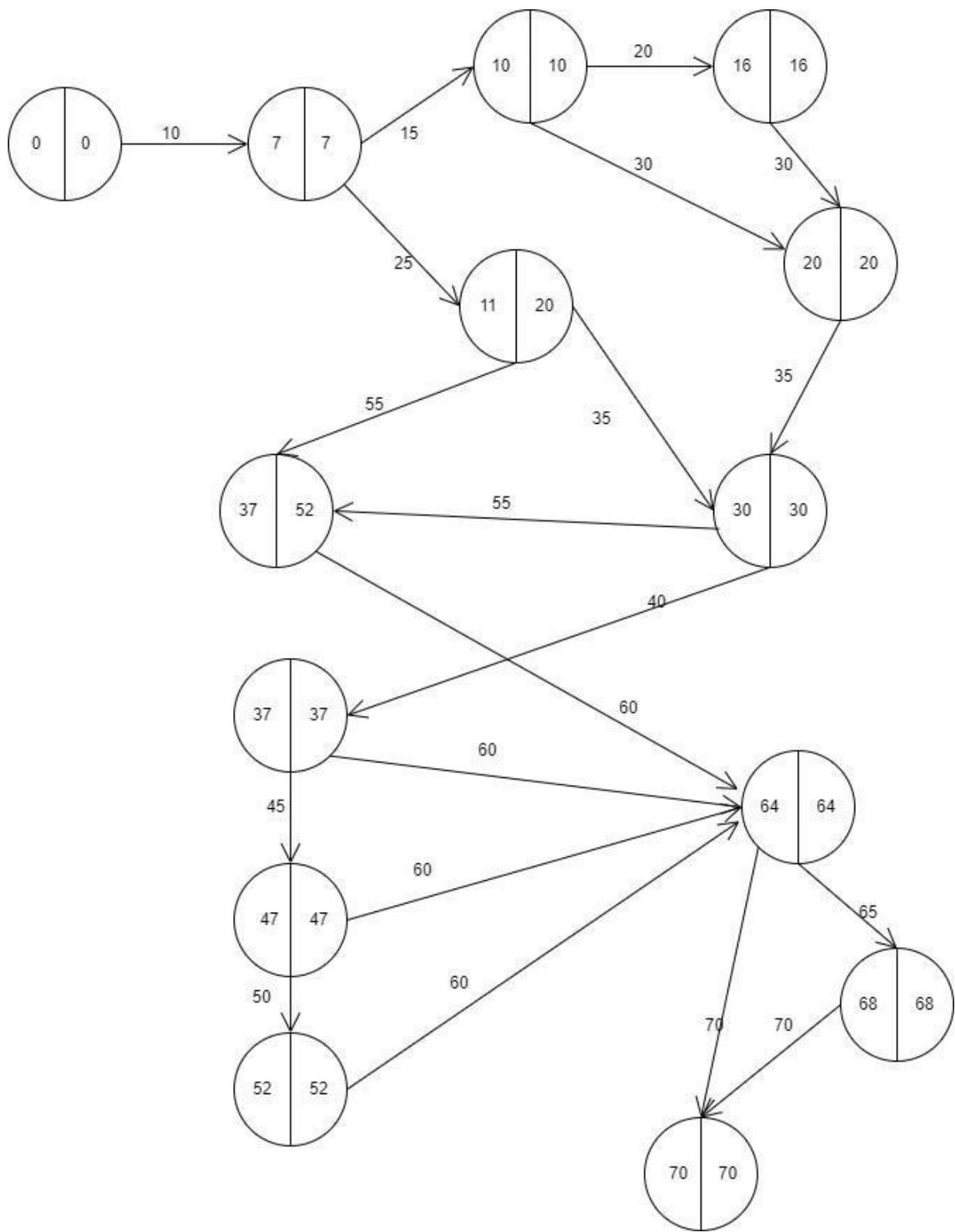
Real start and end dates: 18/03/2025 - 07/06/2025 Real

total days: 81 days

Estimated total days: 83 days

Network Analysis

Nr.	Activity	Duration (Days)	Dependencies
10	Choosing Project Topic	7	-
15	Feasibility/Assessment Study	3	10
20	Product Description	6	15
25	Functional Requirements Non-Functional Requirements	4	15
30	User Scenarios Use Cases	4	15, 20
35	Activity Diagram State Diagrams Data Flow Diagram Entity Relation Diagram	10	25, 30
40	Sequence Diagrams Collaboration Diagrams	7	35
45	Class Diagram Object Diagram Component Diagram Deployment Diagram	10	40
50	Requirements' Assessment	5	45
55	Product Design	7	25, 35
60	Code Implementation	12	40, 45, 50, 55
65	Testing	4	60
70	Product Deployment	2	60, 65



0	7	10	20	30	37	47	52	64	68	70
10										
	15									
	25									
		20								
		30								
		35			40					
					45					
						50				
				55				60		
								65		
									65	

7. Appendix - Implementations

```
        <div class="tab-content pt-4" id="pills-tabContent">
            <div class="tab-pane fade show active" id="pills-home" role="tabpanel" aria-labelledby="pills-home">
                <div class="row">

                    <?php $query=mysql_query($con,"SELECT property.*, user.username,user.usertype,user.usimage FROM `property`,user WHERE property.uid=user.uid ORDER BY date DESC LIMIT 9"); 
                    while($row=mysql_fetch_array($query))
                    {
                       

                    <div class="col-md-6 col-lg-4"> --> FOR MORE PROJECTS visit: codastro.com -->
                        <div class="featured-thumb hover-zoomer mb-4">
                            <div class="overlay-black overflow-hidden position-relative">
                                <div class="featured bg-success text-white">New</div>
                                <div class="title bg-success text-white text-capitalize"><?php echo $row['5'];?></div>
                                <div class="price text-primary"><b><?php echo $row['13'];?></b></div> <div class="text-white"><?php echo $row['12'];?></div> Sqft</span></div>
                            </div>
                            <div class="featured-thumb-data shadow-one">
                                <div class="p-1">
                                    <h5 class="text-secondary hover-text-success mb-2 text-capitalize"><a href="propertydetail.php?pid=<?php echo $row['0'];?>>"><?php echo $row['1'];?></a></h5>
                                    <span class="location text-capitalize"><i class="fa fa-map-marker-alt text-success"></i> <?php echo $row['14'];?></span></div>
                                <div class="bg-gray quantity px-4 pt-4">
                                    <ul>
                                        <li><span><?php echo $row['12'];?></span> Sqft</li>
                                        <li><span><?php echo $row['6'];?></span> Beds</li>
                                        <li><span><?php echo $row['7'];?></span> Baths</li>
                                        <li><span><?php echo $row['9'];?></span> Kitchen</li>
                                        <li><span><?php echo $row['8'];?></span> Balcony</li>
                                    </ul>
                                </div>
                            </div>
                            <div class="p-4 d-inline-block w-100">
                                <div class="float-left text-capitalize"><i class="fas fa-user text-success mr-1"></i> <?php echo $row['uname'];?></div>
                                <div class="float-right"><i class="far fa-calendar-alt text-success mr-1"></i> <?php echo date("d-m-Y", strtotime($row['date']));?></div>
                            </div>
                        </div>
                    </div>
                    <?php } ?>
                </div>
            </div>
        </div>
    </div>
    <div class="row">
        <div class="col-12 text-center">
            <h3>Recent Properties ...</h3>
        </div>
    </div>
    <div class="full-row living bg-one overlay-secondary-half" style="background-image: url('images/pixels-gustavo-fring-4148842.jpg'); background-size: cover; background-position: center center; background-repeat: no-repeat;">
        <div class="container">
            <div class="row">
                <div class="col-md-12 col-lg-6">
                    <div class="living-list pr-4">
                        <h3 class="pb-4 mb-3 text-white">Why Choose Us</h3>
                        <ul>
                            <li class="mb-4 text-white d-flex">
                                <i class="flaticon-reward flat-medium float-left d-table mr-4 text-success" aria-hidden="true"></i>
                                <div class="pl-2">
                                    <h5 class="mb-3">Top Rated</h5>
                                </div>
                            </li>
                            <li class="mb-4 text-white d-flex">
                                <i class="flaticon-real-estate flat-medium float-left d-table mr-4 text-success" aria-hidden="true"></i>
                                <div class="pl-2">
                                    <h5 class="mb-3">Experience Quality</h5>
                                </div>
                            </li>
                            <li class="mb-4 text-white d-flex">
                                <i class="flaticon-seller flat-medium float-left d-table mr-4 text-success" aria-hidden="true"></i>
                                <div class="pl-2">
                                    <h5 class="mb-3">Experienced Agents</h5>
                                </div>
                            </li>
                        </ul>
                    </div>
                </div>
            </div>
        </div>
    </div>

```

```

111 > cityedit.php > ...
1   $error="";
2   $msg="";
3   if(isset($_POST['insert']))
4   {
5     $cid = $_GET['id'];
6
7     $ustate=$_POST['ustate'];
8     $ucity=$_POST['ucity'];
9
10    if(!empty($ustate) && !empty($ucity))
11    {
12      $sql="UPDATE city SET cname = '{$ucity}' ,sid = '{$ustate}' WHERE cid = {$cid}";
13      $result=mysqli_query($con,$sql);
14      if($result)
15      {
16        $msg=<p class='alert alert-success'>City Updated</p>;
17        header("Location:cityadd.php?msg=$msg");
18      }
19      else
20      {
21        $msg=<p class='alert alert-warning'>City Not Updated</p>;
22        header("Location:cityadd.php?msg=$msg");
23      }
24    }
25    else{
26      $error = "<p class='alert alert-warning'>* Please Fill all the Fields</p>";
27    }
28  }
29 ?>

```

```

80   $navigation.each(function() {
81     $dropdown.on('click', function(e){
82       if($window.width() < 1100){
83         if($(this).parent('.dropdown').hasClass('visible')){
84           // $(this).parent('.dropdown').children('.dropdown-menu').first().stop(true, true).slideUp(300);
85           // $(this).parent('.dropdown').removeClass('visible');
86           window.location = $(this).attr('href');
87         }
88       else{
89         e.preventDefault();
90         $(this).parent('.dropdown').siblings('.dropdown').children('.dropdown-menu').slideUp(300);
91         $(this).parent('.dropdown').siblings('.dropdown').removeClass('visible');
92         $(this).parent('.dropdown').children('.dropdown-menu').slideDown(300);
93         $(this).parent('.dropdown').addClass('visible');
94       }
95       e.stopPropagation();
96     });
97   });
98
99   $('body').on('click', function(e){
100     $dropdown.parent('.dropdown').removeClass('visible');
101   });
102
103   $window.on('resize', function(){
104     if($window.width() > 991){
105       $('.dropdown-menu').removeAttr('style');
106       $('.dropdown ').removeClass('visible');
107     }
108   });
109 });
110
111 // Auto active class adding with navigation
112 $window.on('load', function () {
113   var current = location.pathname;
114   var $path = current.substring(current.lastIndexOf('http://unicoderbd.com/') + 1);
115   $('.navbar-nav a').each(function (e) {

```