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LICENSE'S THESIS

Title:

***Design and Implementation
of a Real Estate Agency Website***

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الملخص:

في ظل التحول الرقمي المتسارع الذي يشهده العالم اليوم يشهد قطاع العقارات تطورًا جوهريًا. إذ تعاني الطرق التقليدية في إدارة المعاملات العقارية من عدة إشكالات أبرزها ضعف الكفاءة، وقلة الشفافية، وصعوبة الوصول إلى المعلومات. ومن هذا المنطلق يُقدم هذا المشروع منصة إلكترونية ديناميكية وذكية تهدف إلى تحديث وتسهيل نشاط وكالات العقارات. تسعى المنصة إلى رقمنة وتوحيد العمليات الأساسية مثل عرض العقارات، إدارة العملاء، متابعة العروض، وتيسير التواصل بين البائعين، المشترين ومديري الوكالة. ومن خلال واجهة استخدام سهلة وإتاحة الوصول الفوري إلى البيانات تساهم المنصة في تحسين اتخاذ القرار وزيادة فعالية التسويق وتبسيط الإجراءات. وقد تم توجيه تطوير هذه المنصة خصيصًا لتناسب السوق العقارية الجزائرية التي لا تزال في بدايات التحول الرقمي. وارتكزت عملية الإنشاء على دراسة دقيقة للاحتياجات المحلية مع توظيف تقنيات الويب الحديثة لضمان القابلية للتوسع، والأمان، والأداء العالي. ويمكن الهدف النهائي في توفير حل شامل يدعم المهنيين العقاريين ويُحسن تجربة المستخدم من خلال الابتكار والأتمتة.

Abstract:

In today's rapidly evolving digital world the real estate sector is undergoing a fundamental transformation. Traditional methods of property management and transactions often suffer from inefficiency, lack of transparency, and limited accessibility. In response to these challenges, this project presents a dynamic and intelligent web platform designed to modernize the operations of real estate agencies. The platform aims to centralize and digitize key processes such as property listing, customer management, offer tracking, and communication between buyers, sellers, and administrators. by providing a user-friendly interface and real-time data access, the platform enhances decision-making, increases visibility and simplifies transactions. This system is particularly tailored to the Algerian real estate market, where digital solutions are still emerging. The platform was developed based on a thorough analysis of local needs and constraints, and implemented using modern web technologies to ensure scalability, security, and performance. Ultimately, the goal is to deliver an all-in-one solution that supports real estate professionals and improves client satisfaction through innovation and automation.

Résumé:

Dans un monde numérique en constante évolution, le secteur de l'immobilier connaît une transformation profonde. Les méthodes traditionnelles de gestion et de transaction immobilières souffrent souvent d'inefficacité, de manque de transparence et d'un accès limité à l'information. Face à ces défis, ce projet propose une plateforme web dynamique et intelligente visant à moderniser les opérations des agences immobilières.

La plateforme permet de centraliser et de numériser les processus clés tels que la publication des biens, la gestion des clients, le suivi des offres, ainsi que la communication entre vendeurs, acheteurs et administrateurs. Grâce à une interface conviviale et un accès en temps réel aux données, elle facilite la prise de décision, améliore la visibilité des biens et simplifie les transactions.

Ce système a été spécialement conçu pour s'adapter au marché immobilier algérien, encore en phase de transition numérique. Le développement de la plateforme repose sur une analyse approfondie des besoins locaux et des contraintes existantes et a été réalisé en utilisant des technologies web modernes afin de garantir la scalabilité, la sécurité et la performance.

L'objectif final est de fournir une solution tout-en-un qui soutient les professionnels de l'immobilier et améliore la satisfaction des clients grâce à l'innovation et à l'automatisation.

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Dedication:

To those who, after Allah, have played a vital role in helping me reach this stage of my life,

*To my dear parents, symbols of sacrifice and affection, who never hesitated to support me both morally and financially, and who were the primary motivation behind my persistence and dedication,
To my mother, whose prayers were the light that guided my way, and to my father, who taught me the meaning of commitment and perseverance,*

I dedicate this work as a token of gratitude, appreciation, and loyalty.

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I dedicate to you the fruit of this modest effort, asking Allah to make it beneficial and to let it be the first step on a promising academic and professional path.

/ Guedda Mohammed-Nadji

/ Salhi Abd-Ennour

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General Introduction:

The Internet has played an incredible and rapidly expanding role in facilitating transactions in recent years, primarily through the development of websites. It serves as a powerful tool for promoting specific products using diverse advertising methods that continue to evolve daily. Beyond marketing, the Internet helps organize business relationships between sellers and clients, providing all necessary tools to complete transactions successfully and securely - from initial listing to final agreement.

In Algeria, before the advent of virtual real estate agencies online, all property transactions required investors to physically visit traditional real estate offices. This approach resulted in significant losses of time and money due to limited advertising and communication channels, with only traditional media like newspapers or small posters available for listings.

However, with increasing Internet adoption, Algeria has gradually embraced web-based commerce, effectively eliminating many of these challenges. Despite this digital shift, existing e-commerce real estate platforms remain limited in both quantity and quality, typically offering only basic information browsing and search functions within restricted consultation frameworks. To address these limitations, we have designed and developed an effective dynamic commercial website that enables Algerian investors to buy, sell, and rent properties (houses, land, etc.) online through a simple and efficient interface. Our platform facilitates secure negotiations between all users while serving as a digital mediator connecting sellers, buyers, and renters across the network. For this web application's design, we employed the simplified Unified Process (UP) development method based on UML modeling language. Implementation utilized the following programming languages and tools:

Front-End: HTML, CSS , JavaScript Bootstrap

Back-End : Node.js, express.js .Database: PostgreSQL.

This thesis comprises a general introduction, Three main chapters, And a general conclusion,
Structured as follows:

CHAPTER I: Existing System Study

CHAPTER II: Modeling and Design

CHAPTER III: Achievement

CHAPTER I:

Existing System Study

1. Introduction:

Since its inception in 1969, the Internet has fundamentally reshaped the way individuals access information, communicate and exchange knowledge, making it one of the most transformative technological advances in modern history. It has evolved from a technical infrastructure to an indispensable component in multiple domains of daily life, including education, the economy, governance, media, and socio-cultural interaction.

The web has gone through four main evolutionary stages up to the present time:

- Web 1.0 (Static Web)
- Web 2.0 (Dynamic/Social Web)
- Web 3.0 (Smart/Interactive Web)
- Web 4.0 (Ultra-Intelligent Web)

Each stage signifies a qualitative leap in both technology and user interaction models, redefining how humans interface with digital systems. This study investigates the development of an electronic platform aimed at managing real estate agency operations as part of the broader initiative to digitize this critical sector. It is based on empirical observations gathered through field visits to existing real estate agencies (*the souf agency*), allowing for a thorough analysis of real-world workflows, documentation processes, transaction methods, and existing system limitations.

The primary goal is to diagnose current challenges in property management and client dealings and to offer a practical solution through the design and implementation of a secure, intelligent, and comprehensive real estate management platform. The proposed solution is intended to enhance operational efficiency and significantly improve user experience for both clients and administrative staff.

2. Steps in creating websites:

Building a website is a comprehensive project that unfolds over several critical stages:

2.1. Design phase:

This phase involves determining the type of website (static, dynamic, e-commerce) content types, data sources, target audience, website structure (site map), visual identity, and preparing all materials and content before starting development.

2.2. Development phase:

Converting designs into actual web pages using frontend technologies (HTML, CSS,

JavaScript, and frameworks like React and Vue.js) and backend technologies (PHP, Python, Node.js, and frameworks like Laravel, Django, Express.js) while connecting the website to a database (such as PostgreSQL or MongoDB). Functionality is tested to ensure compatibility across different devices and browsers.

2.3. Domain name association:

Selecting and purchasing a suitable domain name, then linking it to the server's IP address via DNS settings, and ensuring the connection is successful.

2.4. Hosting and website launch:

Choosing the type of hosting (shared or dedicated), where shared hosting is suitable for small websites, while dedicated hosting provides higher performance and greater control for larger sites. Managed hosting can also be used to simplify technical management.

2.5. Search Engine Optimization (SEO) and promotion:

Improving the website's visibility in search engine results to easily attract targeted clients when searching for services or properties online.

3. General objectives of the real estate website:

3.1. Provide a platform to showcase properties available for sale or rent:

This goal represents the core of the platform, allowing users (whether individuals or real estate agents) to post listings of available properties. The platform should feature a clear visual and data-driven interface for properties, including images, map locations, and prices.

3.2. Enable users to search for properties using multiple criteria:

Advanced search is a key tool that helps users filter results based on their preferences, such as:

property type (apartment, villa, land, office, etc.), geographic location, price

3.3. Facilitate communication between sellers and buyers or tenants:

Direct interaction between parties is essential for completing transactions. This can be achieved through:

Submitting offers and interacting with them, notifications and alerts, option to share contact information (e.g., phone number or email) while maintaining privacy

3.4. Manage real estate transactions securely and efficiently:

This includes ensuring information safety and data confidentiality, with features such as:

- Tracking property status (reserved, listed, sold, etc.)
- A system for storing records and transaction history
- Anti-fraud tools and personal data protection

3.5. Provide tools for account and content management:

The platform should include management interfaces for users (both individuals and real estate agents), including:

- Ability to edit or delete listings
- Personal or business account management
- A dashboard to monitor performance and improve content

4. Target audiences:

4.1. Visitors:

These are general users who access the platform without necessarily having an account.

Main actions:

- Browse property listings.
- Use the search functionality to filter properties based on specific criteria.
- View images, locations, and prices.

4.2. Investors (Sellers / Landlords)

-These are property owners or authorized agents who wish to list their real estate for sale or rent.

Main actions:

- Add new property listings, complete with descriptions, images, pricing, and location details.
- Edit or remove existing listings as needed.
- Manage inquiries or requests from interested buyers or tenants.
- Track listing performance (e.g., views, messages received).

4.3. Website administrator (Web master):

The administrator ensures the platform functions smoothly and maintains the quality and security of content.

Main actions:

- Oversee and moderate all user activity and content.
- Manage the platform's archive and listings database.
- Delete or suspend unwanted or malicious user accounts.
- Ensure compliance with terms of use and protect against misuse or spam.

5. work environment:

Our project was carried out at the Souf Real Estate Agency, a well-established organization in the local property market. The agency is structured into several key departments, each playing a vital role in the overall workflow. At the forefront is the reception office, which serves as the primary point of contact for clients. Here, visitors are welcomed, their initial inquiries are addressed, and they are guided to the appropriate services based on their needs.

Behind the reception lies the services office, which forms the operational backbone of the agency. This office is responsible for managing the core services offered, such as property listings, client consultations, market evaluations, and transaction processing. The services office is headed by the experienced real estate broker, Alali Sidiq.

Working alongside him is the real estate agent, Elias Zlasi. Together, they form a dynamic team, alternating responsibilities to cover both internal administrative tasks and external fieldwork. Their duties include completing legal and financial transactions, providing expert

advice to clients, conducting property inspections, and handling negotiations between buyers, sellers, landlords, and tenants. This collaborative approach ensures that all aspects of the agency's operations are managed efficiently and professionally, offering clients a comprehensive and seamless real estate experience.

6. Current workflow:

6.1. Initial card for the client:

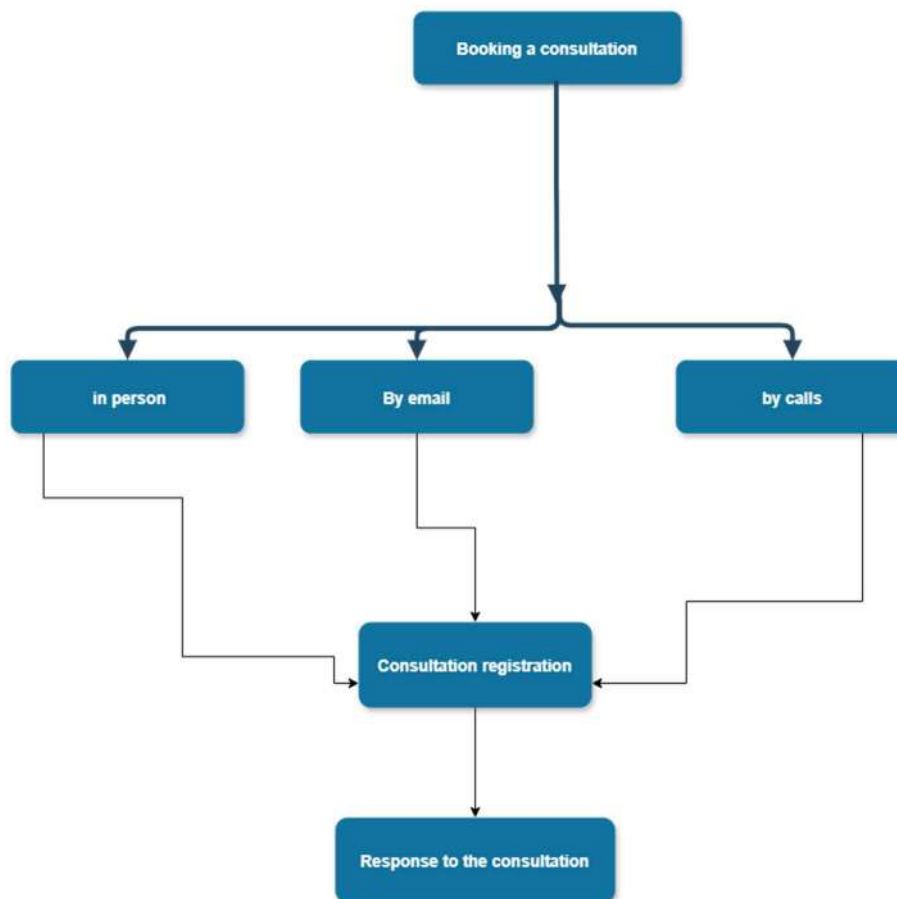


Figure 1-1 is a diagram that illustrates initial card for the client

VI.2. Response to requests:

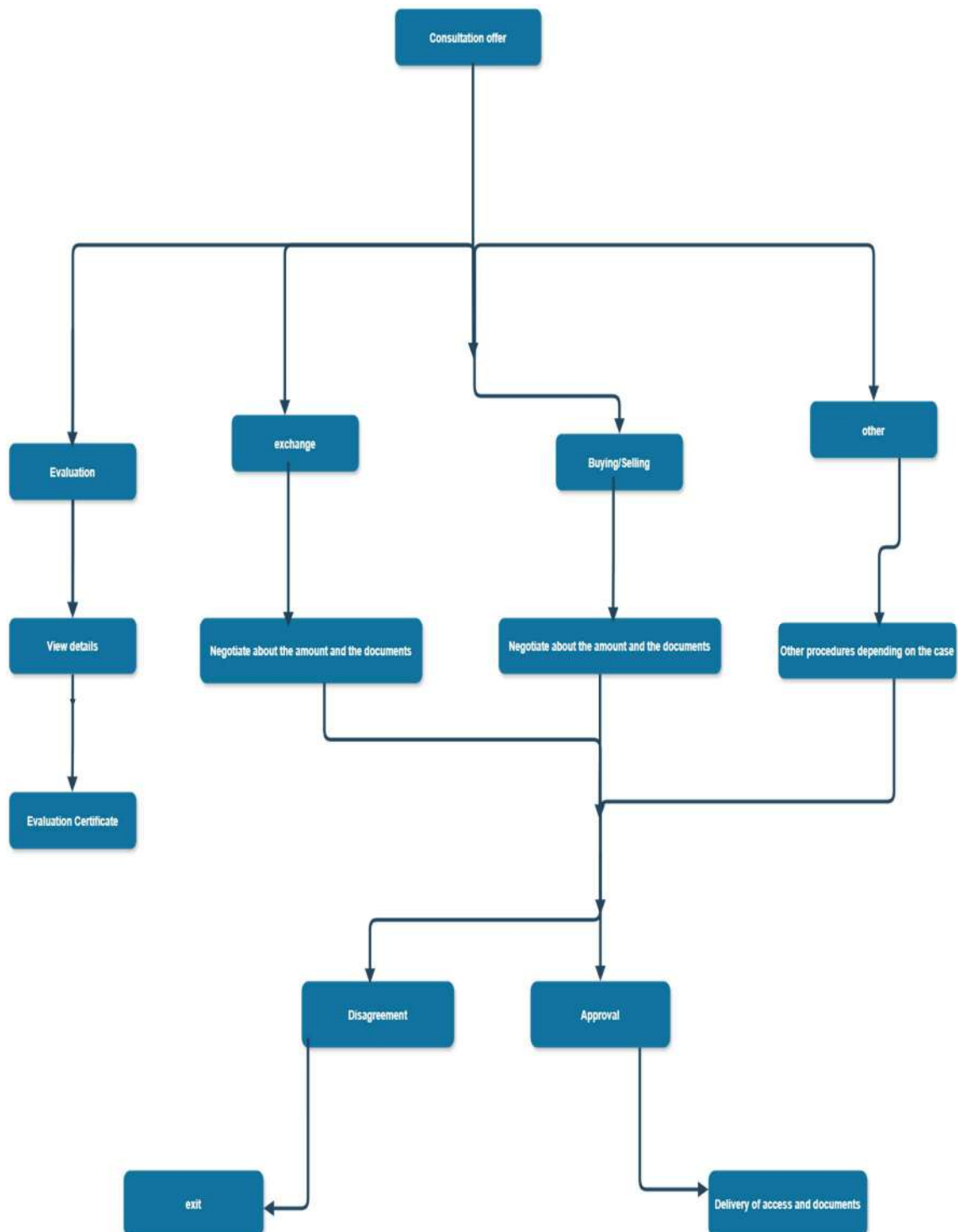


Figure 2-1 is a diagram that illustrates response to requests

VI.3. Property management:

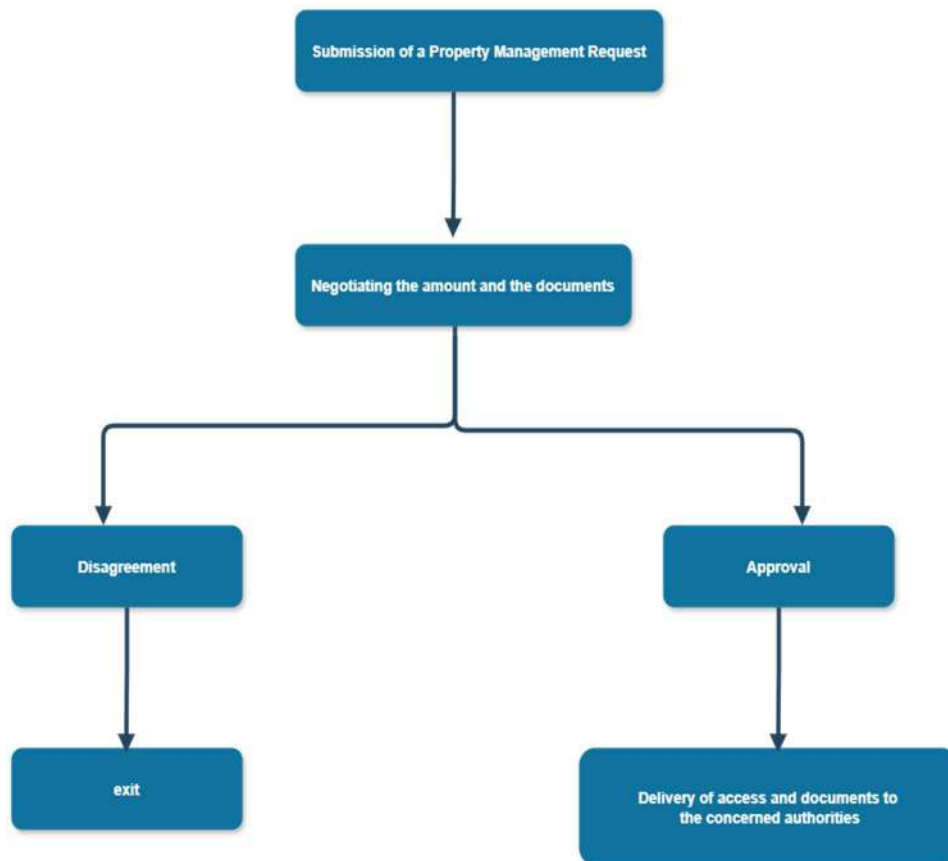


Figure 3-1 is a diagram that illustrates property management:

VII. Document analysis:

Document title	Content	The goal
Initial card for the customer	-Preliminary information about the type of service, -customer information, -service date -property information, and other notes or conditions.	Take the type of service, knowing the type of transaction for response.
Customer complex	-Service certificate and client information, -service date -amount , - payment number, -property information and signature.	The contract represents the agreement between the agency and the client and gathers all service information.
Receipt received	-Client information, -service - date transaction number -amount, and signature.	Certificate of service provision and transaction preservation
Contract document	-Client information - date, -property information, -agreed contract information, and signature.	The contract represents the agreed-upon legal guarantees.
Assessment Certificate	Client information - date, property information, evaluation information, and signature	An appraisal certificate for the property used in the labor market.

Table 1-1 document analysais

VIII. Examples of real estate platforms:

Among the most well-known real estate platforms in Algeria are Ouedkniss Immobilier, Lkeria, and Baytic.

Ouedkniss Immobilier offers a user-friendly interface and a vast database of properties for sale, rent, and purchase. It allows users to filter results by location, price, and property type, with listings updated almost daily. However, it lacks direct communication with agencies and a proper user review system.

Lkeria, on the other hand, is a specialized platform dedicated solely to real estate. It provides legal articles, buyer/renter advice, and a reliable search function. It also supports direct communication via email or phone. Despite these strengths, its outdated interface and limited user interaction reduce its overall appeal.

Baytic stands out for its modern and attractive design. It allows both individuals and agencies to post property listings and also provides additional services such as construction and loan support. However, it has a more limited geographic coverage. Additionally, not all listings are verified, which may affect reliability.

IX. Functional and Non-Functional Requirements for the Real Estate Management System

It is to provide the website for services and requirements:

IX.1. Functional Requirements:

Feature	Attachments
property management	display/add / edit / delete properties, upload images, descriptions, price, legal info.
client management	register data, track interactions and transaction history.
appointment system	schedule property visits, send notifications.
contract management	generate contracts, record payments, track transaction status.
ad publishing	auto-publish listings on the website and external platforms.
admin dashboard	reports, kips, logs, performance tracking.

Table 2-1 Functional requirements:**IX.2. Non-functional requirements:**

Aspect	Details
security	data encryption, role-based access control.
usability	intuitive ui, responsive design for all devices.
performance	fast load times, support for concurrent users.
reliability	stable operations, data protection, auto-save.
scalability	easily add new features and modules.
maintenance	frequent updates and technical support.

Table 3-1 Non-functional requirements**IX.3. Real estate workflow issues and solutions:**

Issue	Description	Proposed solution
dependence on paperwork	difficulty in storing documents, risk of loss or damage, and lack of efficient archiving.	digitize all property and client records into a centralized electronic database.
repetitive manual processes	time-consuming tasks due to redundant data entry and lack of automation.	implement automated workflows for contracts, appointments, and client communication.

weak coordination between departments	delays in communication between departments, double-booking appointments or duplicate client handling.	integrate a unified scheduling and communication system accessible by all departments.
delayed client communication	reliance on phone calls or in-person visits, no notification or reminder system in place.	use automated email/sms notifications and an integrated chat system within the platform.
lack of a centralized database	information scattered across notebooks, files, or devices, making it hard to track history.	create a centralized and secure database system accessible by authorized users.
lack of tracking and analysis	no kpis, difficult to make data-driven decisions or evaluate performance.	develop an analytics dashboard to monitor kpis and generate reports automatically.
data security issues	unauthorized access to sensitive files, no regular data backups.	implement role-based access control and automated backup solutions.
scalability limitations	traditional systems do not support growth or easy integration of new features.	adopt a scalable cloud-based architecture with modular design for future enhancements.

Table 3-1 Real estate workflow issues and solutions**X. Conclusion:**

This chapter provided a comprehensive overview of designing a real estate agency website, from defining goals and user roles to analyzing internal workflows. It addressed key challenges such as delays and poor coordination, and proposed digital solutions based on clear functional and non-functional requirements. The chapter concluded with a comparison of Algerian real

CHAPTER II:

Modeling and Design

I. Introduction:

After completing the analysis of the existing system and understanding the range of tasks it offers to users, this chapter represents a pivotal step in the project's development. It relies on UML (Unified Modeling Language) as an effective tool to model various aspects of the system based on newly acquired insights from a detailed and realistic study. The goal of this chapter is to deepen our comprehensive understanding of the system's nature and requirements by presenting a set of diagrams that help visually and structurally represent its behavior and architecture.

In this context, we will rely on four key UML diagrams:

- Use Case Diagram.
- Activity Diagram.
- Class Diagram.
- Sequence Diagrams

These diagrams play a vital role in clarifying system requirements, ensuring proper and efficient design, and guiding the development team to focus on critical aspects in the upcoming phases of the project.

II. The Unified Modeling Language (UML):

Is a general-purpose visual [modeling language](#) that is intended to provide a standard way to visualize the design of a system.^[1]

UML provides a standard notation for many types of diagrams which can be roughly divided into three main groups: behavior diagrams, interaction diagrams, and structure diagrams [1].

III. Use Case Diagram:

A Use Case Diagram is a type of Unified Modeling Language (UML) diagram that represents the interaction between actors (users or external systems) and a system under consideration to accomplish specific goals. It provides a high-level view of the system's functionality by illustrating the various ways users can interact with it [2].

III.1 Main actors in the real estate agency system:

Actor	Use Cases
Client (Buyer / Renter)	- Log in / Create account - Search for properties (filters: price, location, size, type) - Book property visit - Communicate with agent (chat, call, inquiry) - Submit purchase or rental offer - Upload required documents (ID, proof of income) - Rate property and agent after visit - Manage profile (update data, delete account)
Owner (Seller / Landlord)	- Log in / Create account - Add new property (upload images, description, price) - Edit or delete property listing - Manage visit requests (approve/reject) - Communicate with potential clients - Update property status (sold/available) - View transaction history
Administrator	- Log in (agent/administrator account) - Manage client properties (display/add/edit/delete) - Schedule visits and coordinate appointments - Follow up on deals (negotiations, docs) - Create property performance reports - Communicate with clients and owners - Manage electronic contracts (upload/sign/share) - Approve accounts (agents/owners) - Monitor content (remove ads, ban users) - Handle complaints/disputes - Update site policies - Generate platform statistics (users, deals) - Database maintenance and backup

Table 1-2 Main actors in the real estate agency system

III.2 Use case diagrams:

III.2.1 Use case of client:

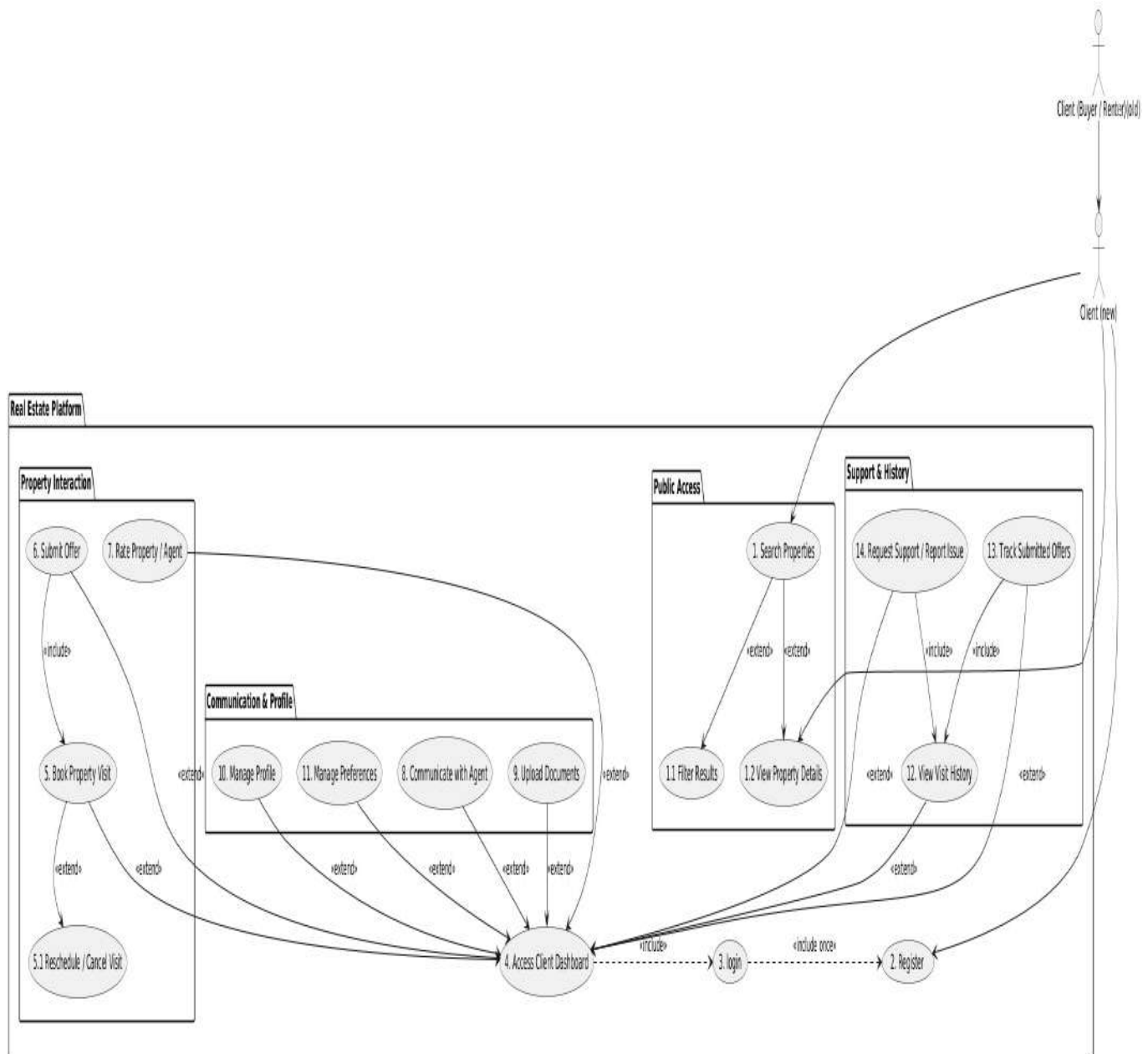


Figure 1-2 Use case of client

III.2.2. Use case of owner:

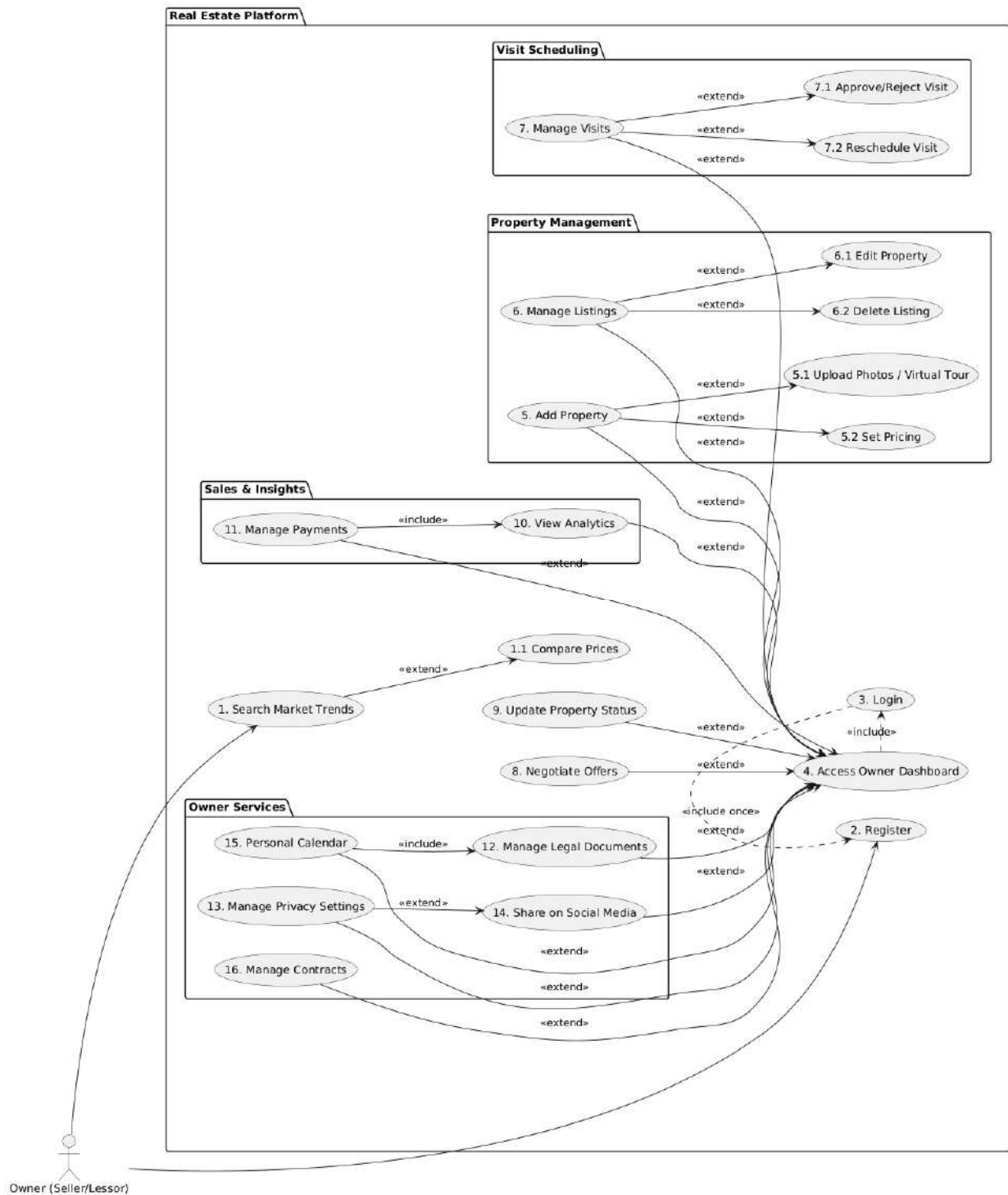


Figure 2-2 use case of owner

III.2.3. Use case of admin:

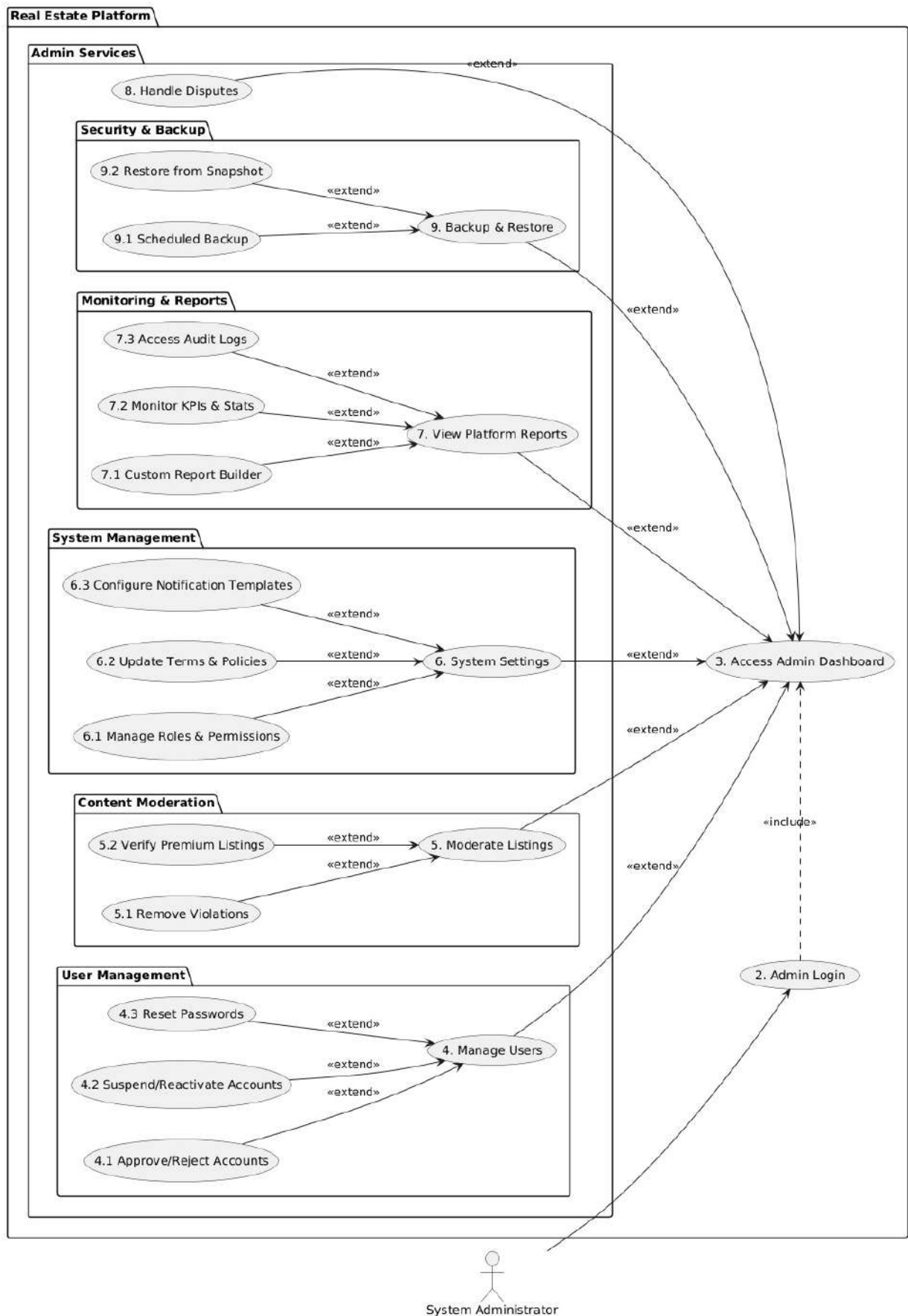


Figure 3-2 use case of admin

III.2.3. Use case of all actors in the system:

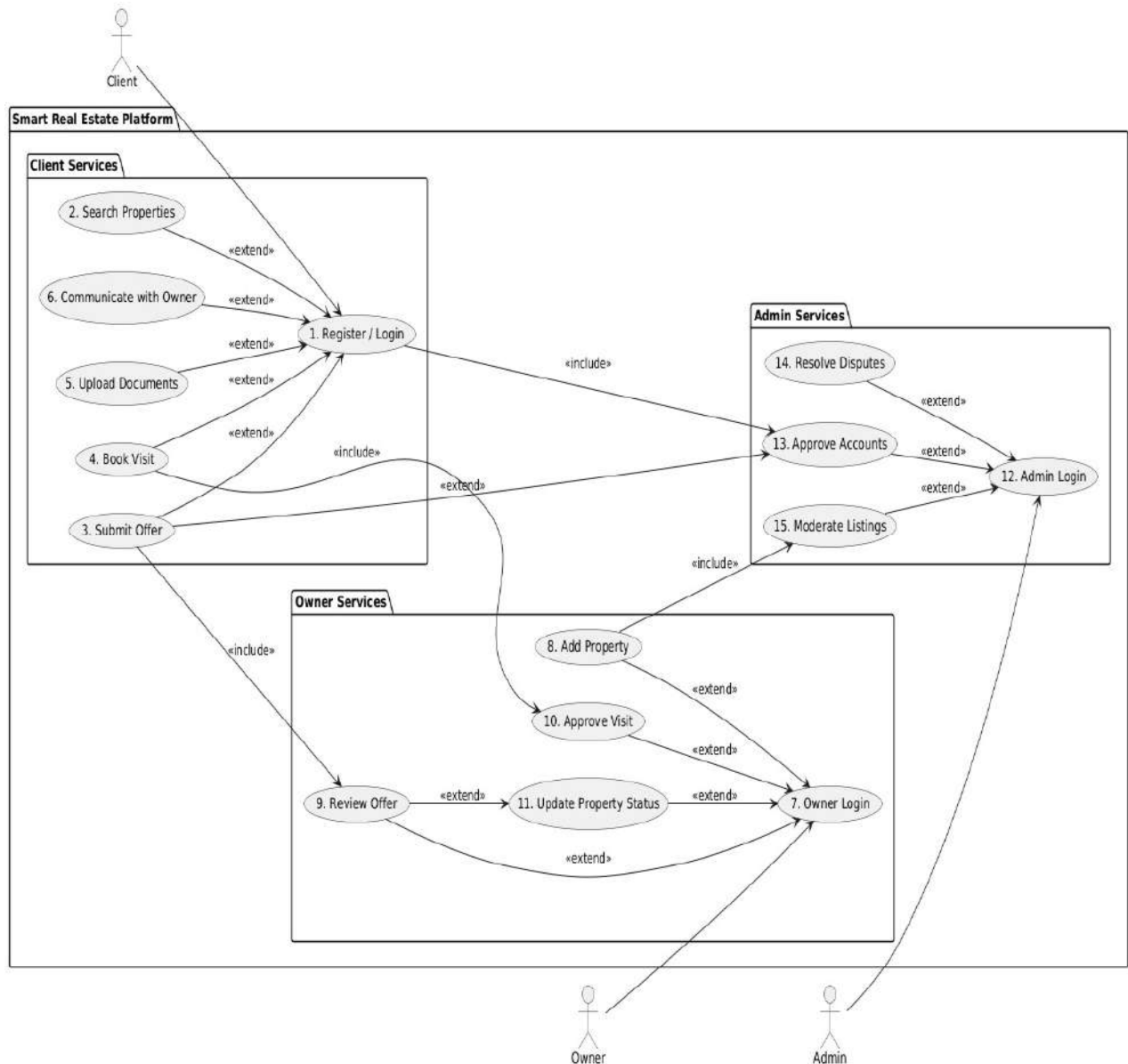


Figure 4-2 Use cases for all actors in the system

IV.3. Explanation of the use cases:

IV.3.1. Explanation of the use cases for the client:

Table 2-2 Explanation of the use cases for the client

Use Case	Description
Register / Login	Sign up or log in to access platform features
Access Client Dashboard	Access the user's control panel
Search Properties	Search for available properties on the platform
Filter Results	Apply filters to narrow search results (optional)
View Property Details	View property details (photos, location, price, description, etc.) (optional)
Book Property Visit	Schedule a property viewing appointment
Reschedule / Cancel Visit	Modify or cancel a viewing appointment (optional)
Submit Offer	Submit a purchase or rental offer for a property
Rate Property / Agent	Rate the property or agent after a transaction
Communicate with Agent	Contact the agent or property owner for inquiries
Upload Documents	Upload required documents (ID, proof of income, etc.)
Manage Profile	Update personal information (name, phone number, etc.)
Manage Preferences	Set search preferences (city, property type, price range, etc.)
View Visit History	View history of previous property visits
Track Submitted Offers	Monitor the status of submitted offers
Request Support / Report Issue	Request technical support or report legal/technical issues

IV.3.2. Explanation of use cases for the owner:

Table 3-2 Explanation of use cases for the owner

Use Case	Description
Login / Register	Allows owners to create an account or log in to access the control panel
Access Owner Dashboard	Access to a dashboard containing property management tools and services
Search Market Trends	Search real estate market trends to view analytical information
Compare Prices	Compare prices between similar properties in the same area
Add Property	Add a new property for rent or sale
Upload Photos/Virtual Tour	Upload property photos or virtual tours (optional)
Set Pricing	Set property price based on market criteria (optional)
Manage Listings	Manage listed properties
Edit Property	Modify property information
Delete Listing	Remove property from the platform
Manage Visits	Manage property viewing appointments with interested clients
Approve/Reject Visit	Approve or decline viewing requests (optional)
Reschedule Visit	Reschedule appointments (optional)
Negotiate Offers	Negotiate with clients regarding submitted offers
Update Property Status	Update property status (sold, rented, available)
View Analytics	View property statistics and reports
Manage Payments	Track financial transactions related to properties
Manage Legal Documents	Upload or modify property legal documents
Manage Privacy Settings	Manage account or property privacy settings
Share on Social Media	Share property on social media platforms (optional)
Personal Calendar	Organize property-related appointments and viewings
Manage Contracts	Create or modify property sale/rental contracts

IV.3.3. Explanation of usage cases for the admin:

Use Case	Description
Admin Login	Administrator login to access admin control panel
View Public Listings	Browse real estate listings available to the public without login required
Generate Market Report	Create real estate market reports based on platform data (extends View Public Listings)
Access Admin Dashboard	Central interface containing full system management and control tools
Manage Users	Manage user accounts registered on the platform
Approve/Reject Accounts	Approve or reject new or pending user accounts (extends Manage Users)
Suspend/Reactivate Accounts	Temporarily suspend or reactivate user accounts (extends Manage Users)
Reset Passwords	Reset user passwords upon request or in emergency situations
Moderate Listings	Review property listings to ensure compliance with platform policies
Remove Violations	Remove listings containing violations or inappropriate content
Verify Premium Listings	Verify paid/premium listings for quality assurance before publishing
System Settings	Manage system configurations (payment gateways, SEO, email settings, etc.)
Manage Roles & Permissions	Create and update user roles and permissions for system staff
Update Terms & Policies	Update platform terms of service and privacy policies
Configure Notifications	Customize notification templates (emails, instant alerts, etc.)
View Platform Reports	Access comprehensive reports on platform performance and user activity
Custom Report Builder	Create customized reports based on administrator-defined criteria
Monitor KPIs & Statistics	Track key performance indicators (KPIs) and daily metrics
Access Audit Logs	Review activity logs for transparency and auditing purposes
Handle Disputes	Mediate user disputes (property complaints, transaction issues)
Backup & Restore	Perform data backups or restoration when needed
Scheduled Backup	Configure automated scheduled backups (extends Backup & Restore)
Restore from Snapshot	Restore data from specific saved points (extends Backup & Restore)

Table 4-2 Explanation of usage cases for the admin:

V. Activity diagrams:

Activity diagrams show the steps involved in how a system works, helping us understand the flow of control. They display the order in which activities happen and whether they occur one after the other (sequential) or at the same time (concurrent). These diagrams help explain what triggers certain actions or events in a system.

An activity diagram starts from an initial point and ends at a final point, showing different decision paths along the way [3].

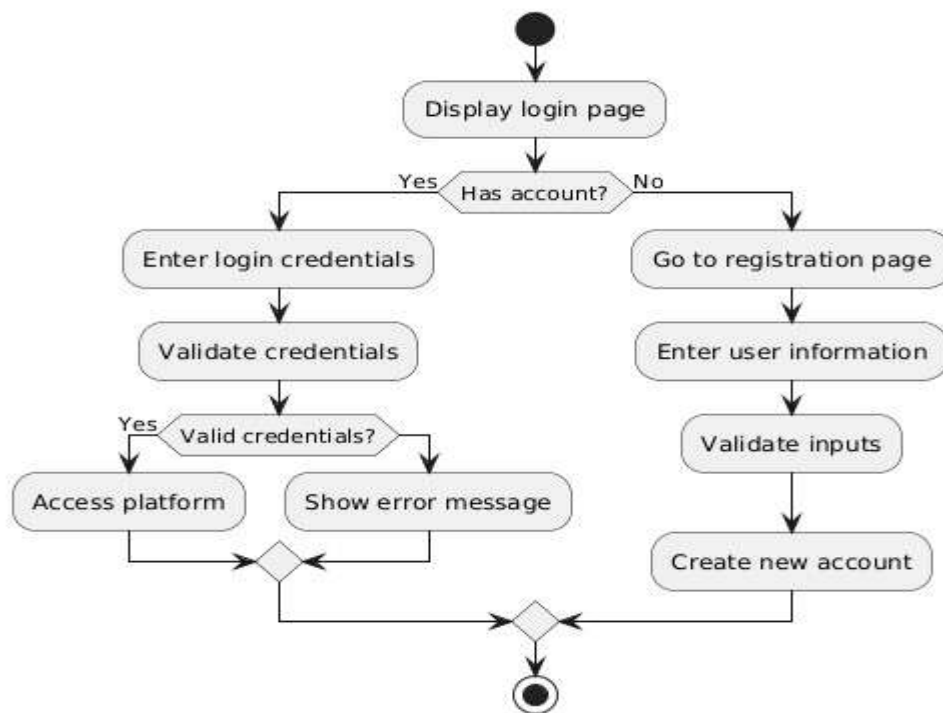


Figure 5-2 Activity diagram register / login of the client / owner or admin

V.1. Activity diagrams for the client:

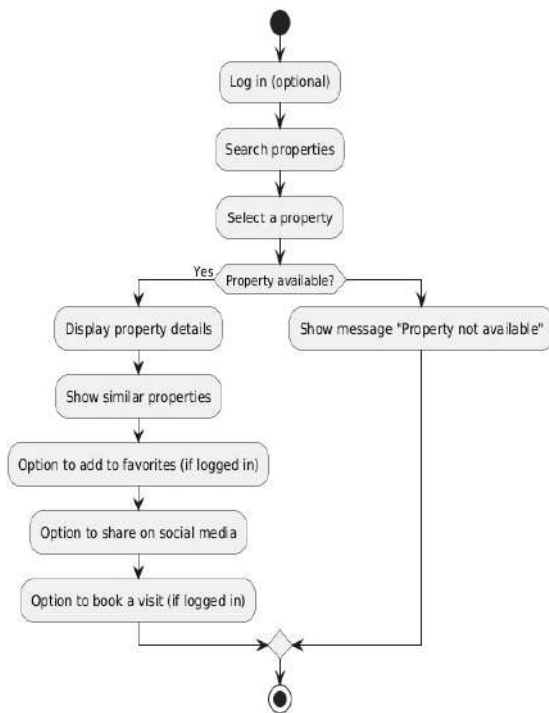


Figure 6-2 Activity diagram search for a property

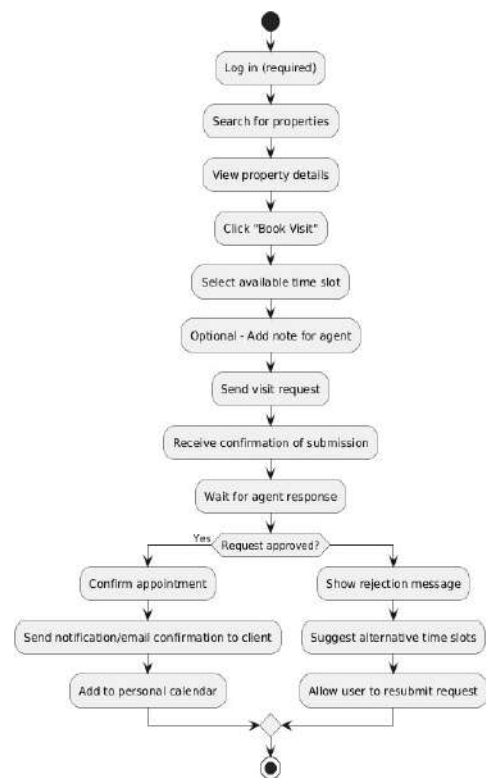


Figure 7-2 Activity diagram book a visit to a property



Figure 8-2 Activity diagram: Send a purchase / rental seller offer

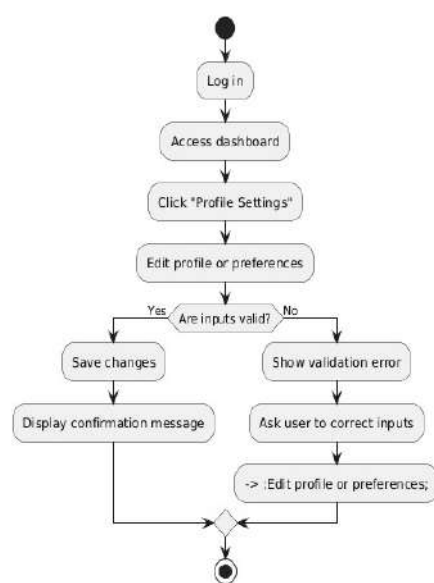


Figure 9-2 Activity diagram: Manage personal account

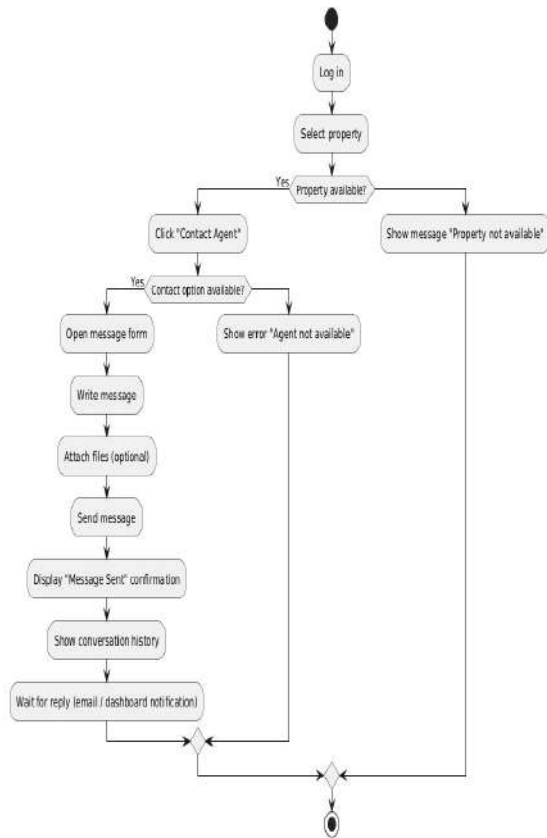


Figure 10-2 Activity diagram: Communicate with the agent

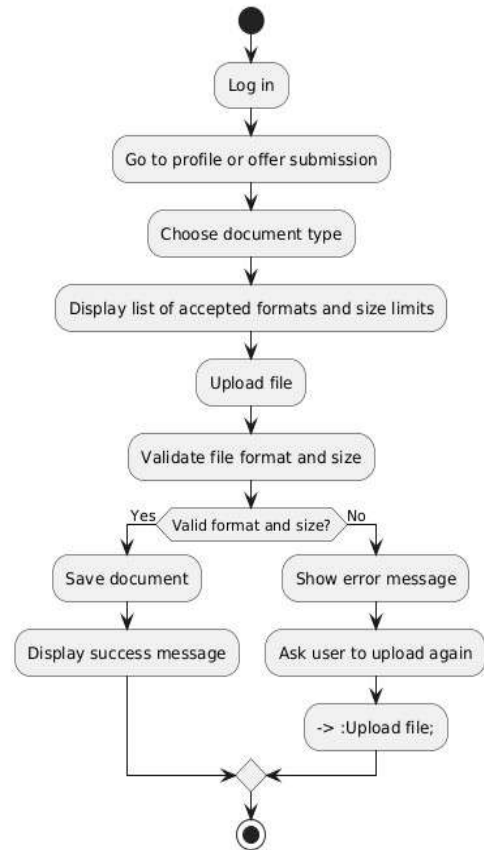


Figure 11-2 Activity diagram: Upload documents

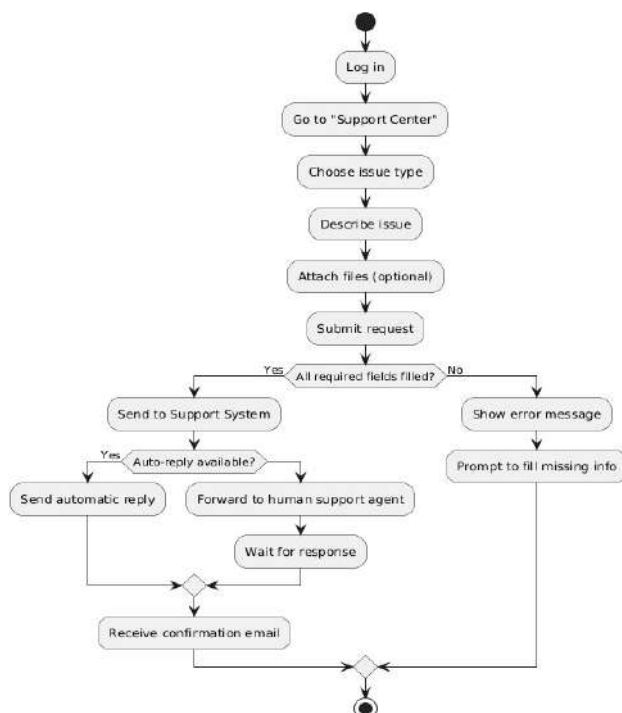


Figure 12-2 Activity diagram: Request support / report an issue

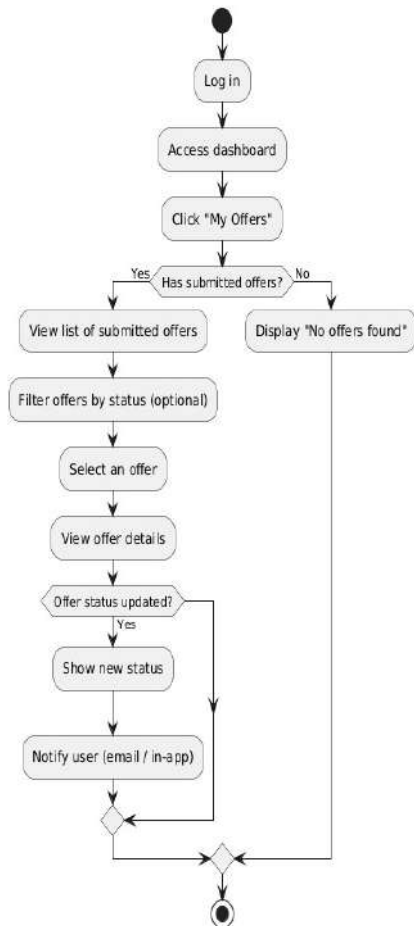


Figure 13-2 Activity diagram: Follow up on sent offers

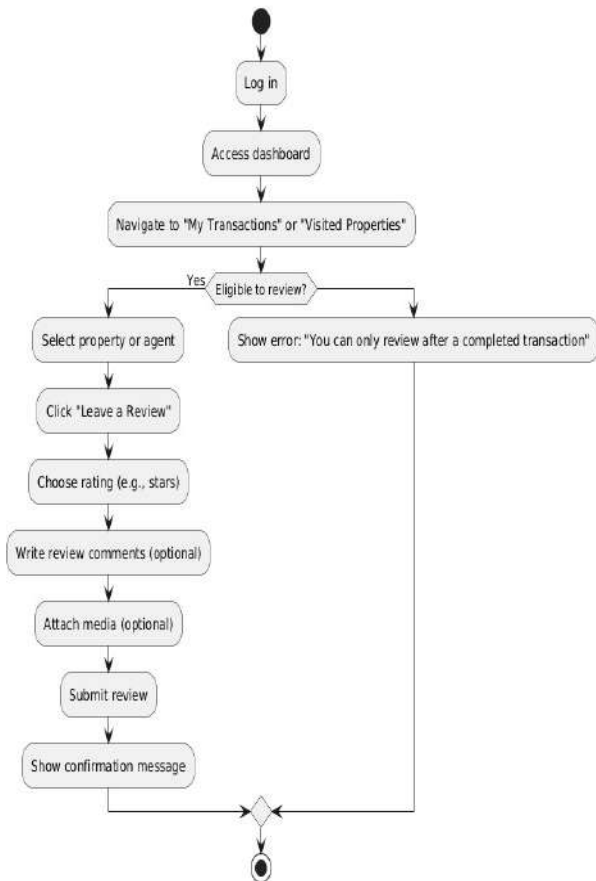


Figure 14-2 Activity diagram: Evaluate a property or agent

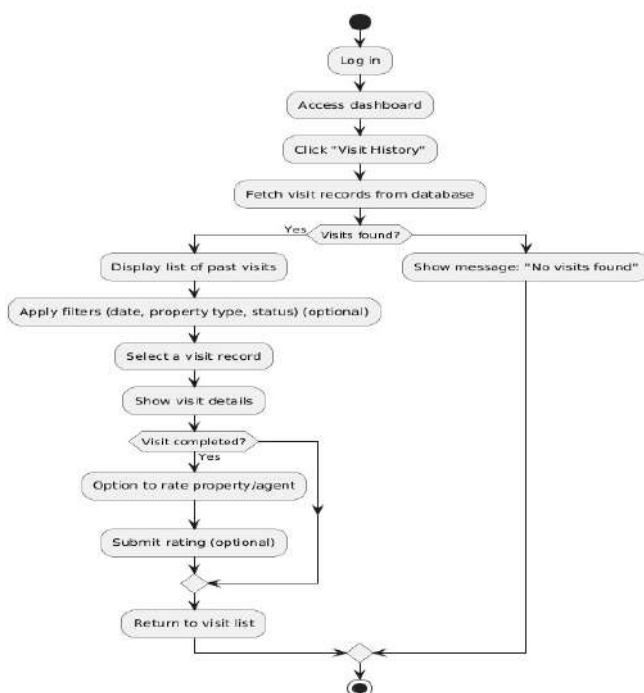


Figure 15-2 Activity diagram: View visit history

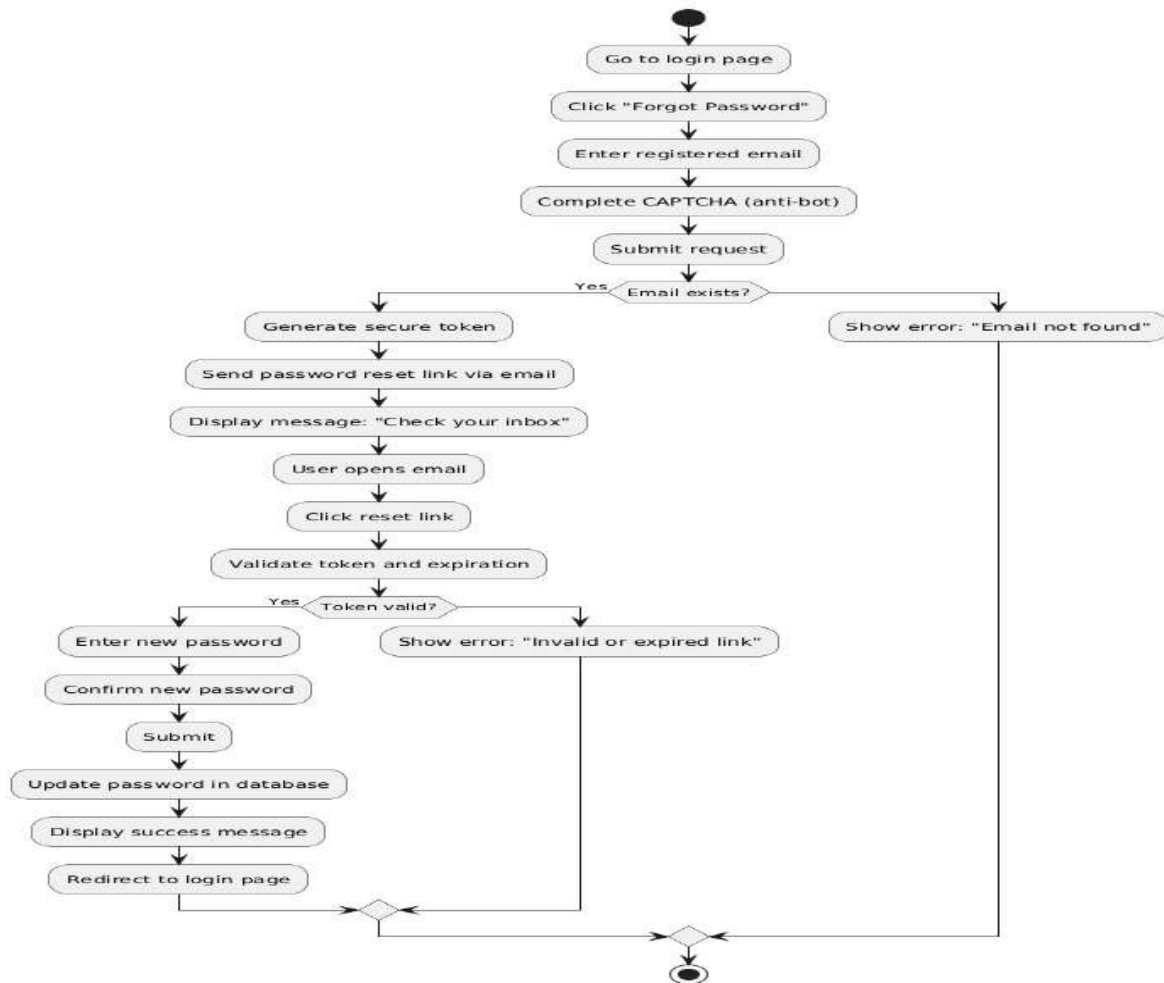


Figure 16-2 Activity diagram: Reover password

V.2. Activity diagrams for the owner:

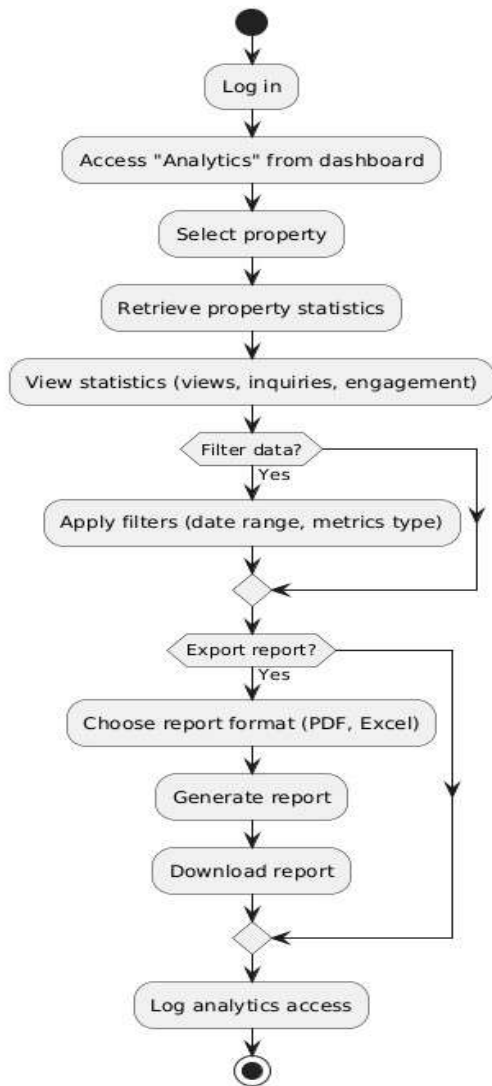


Figure 17-2 Activity diagram: View analytics

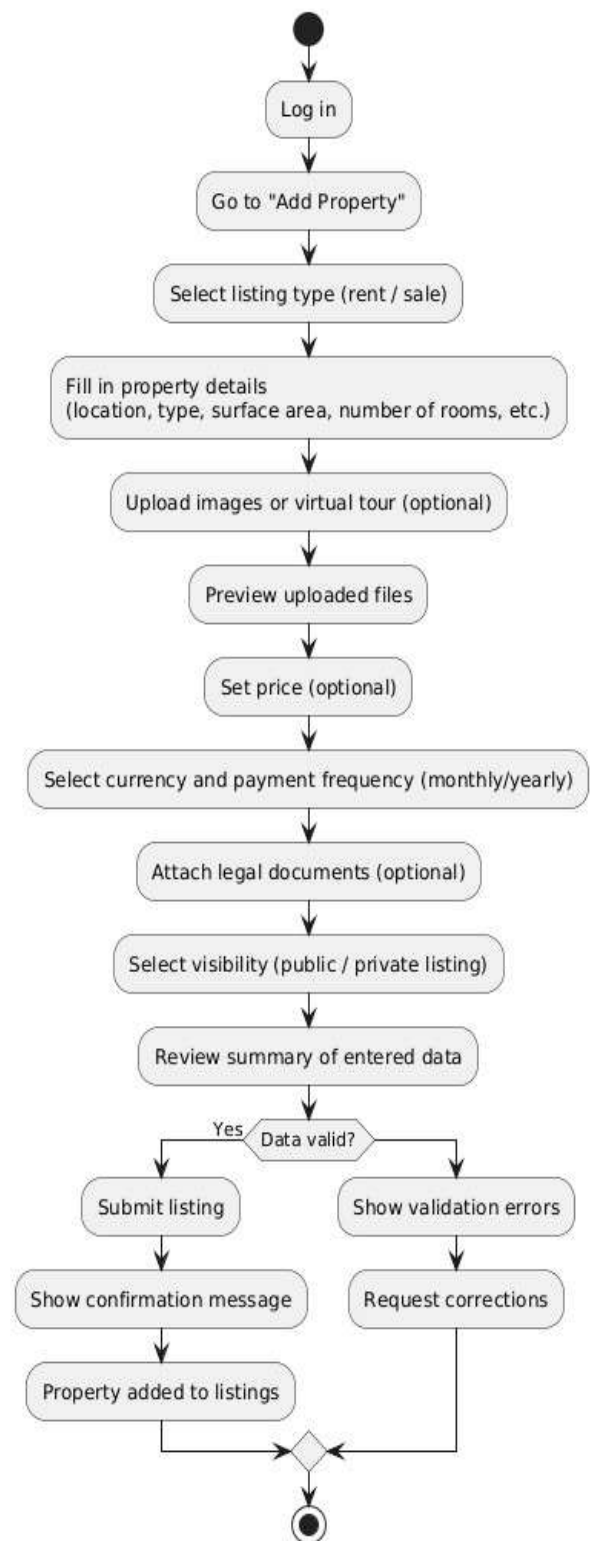


Figure 18-2 Activity diagram: Add property

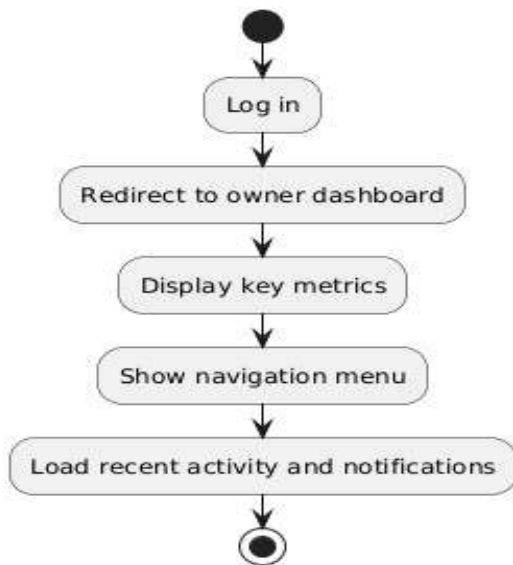


Figure 19-2 Activity Diagram: Access owner dashboard

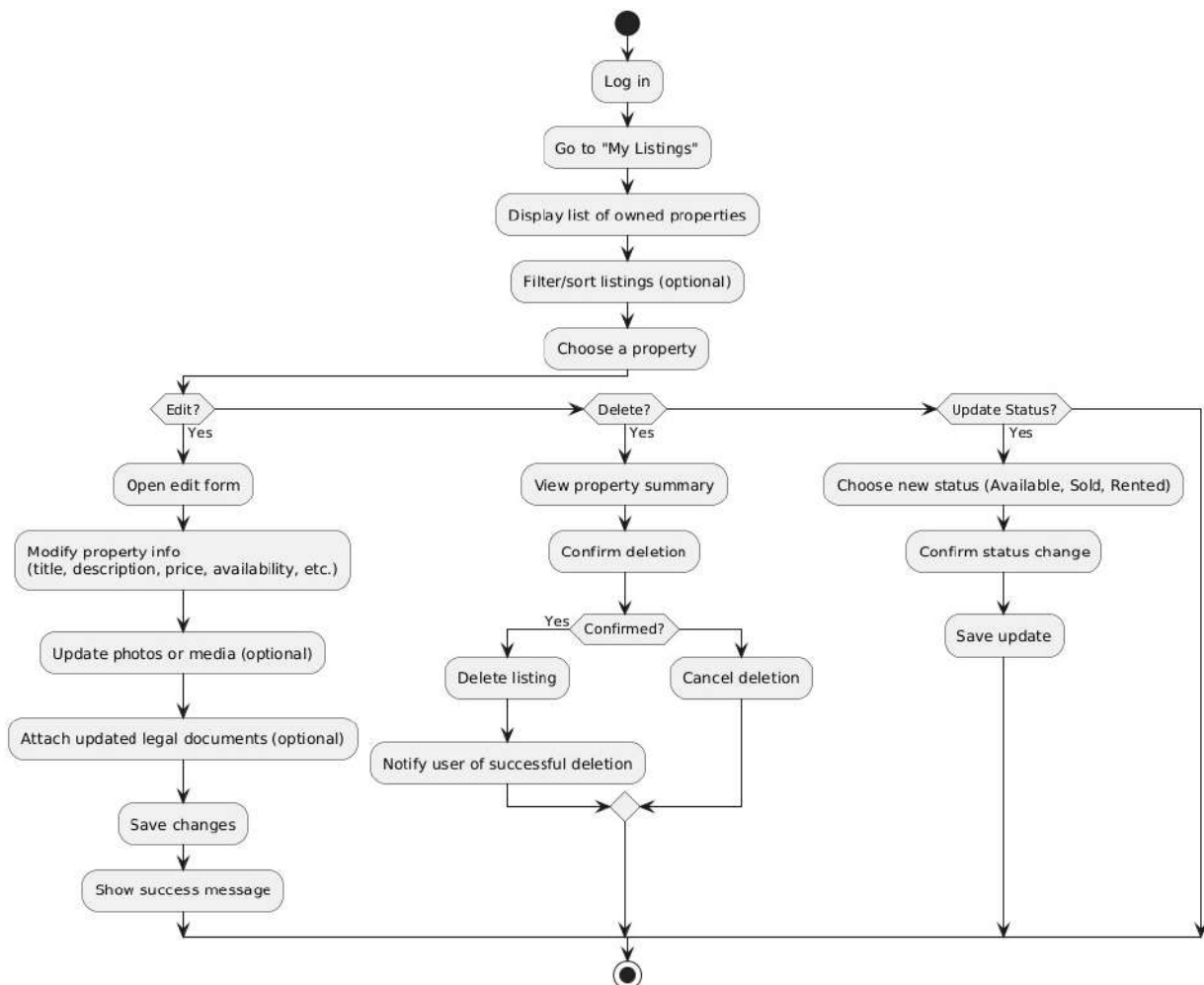


Figure 20-2 Activity diagram: Manage listings

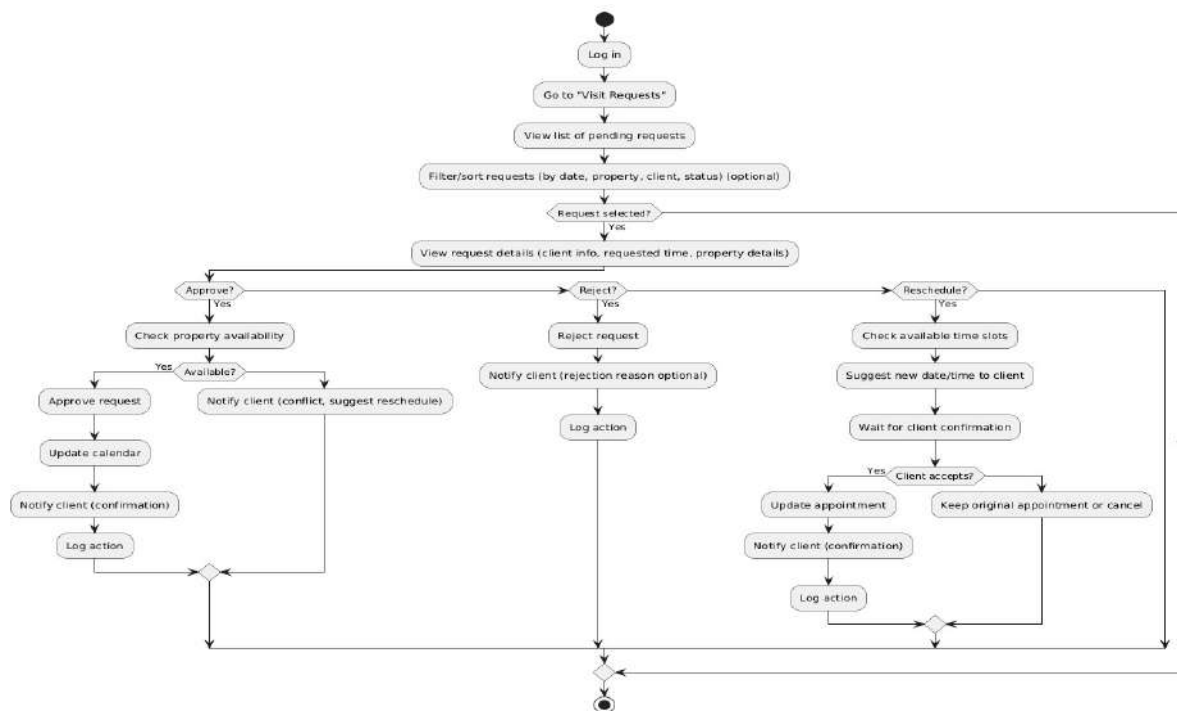


Figure 21-2 Activity diagram: Manage visits

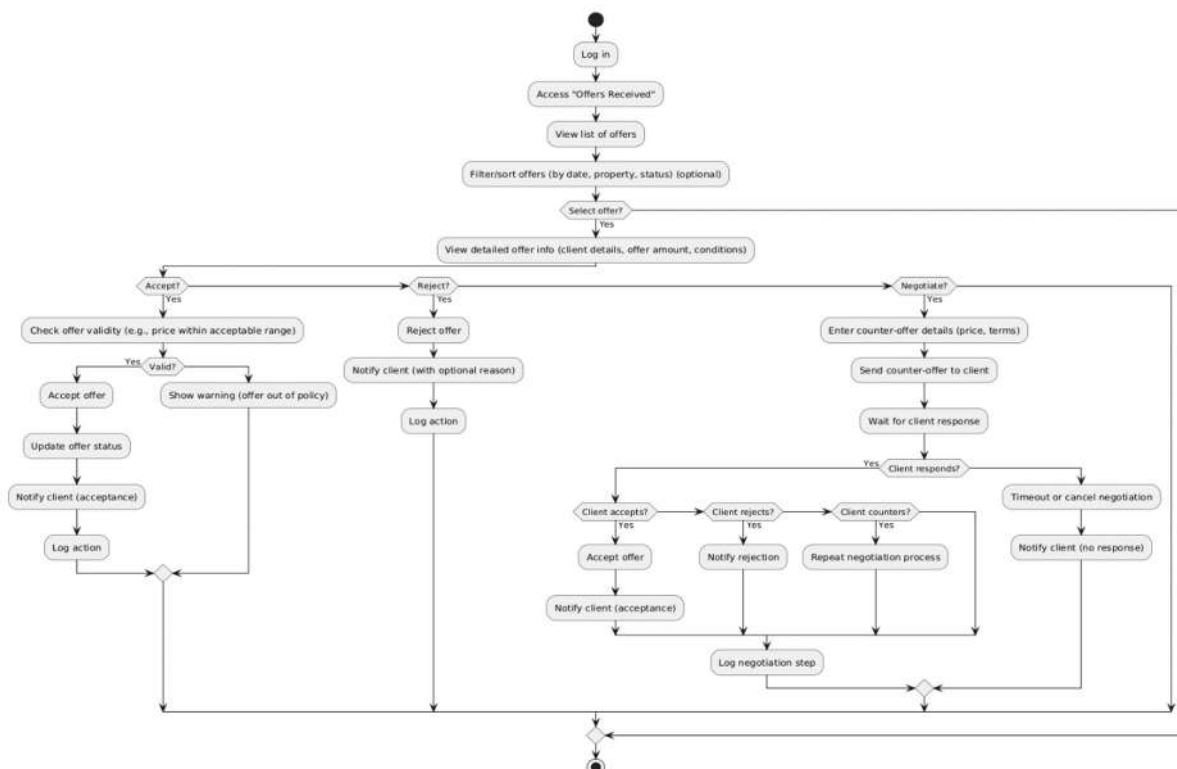


Figure 22-2 Activity diagram: Negotiate offers

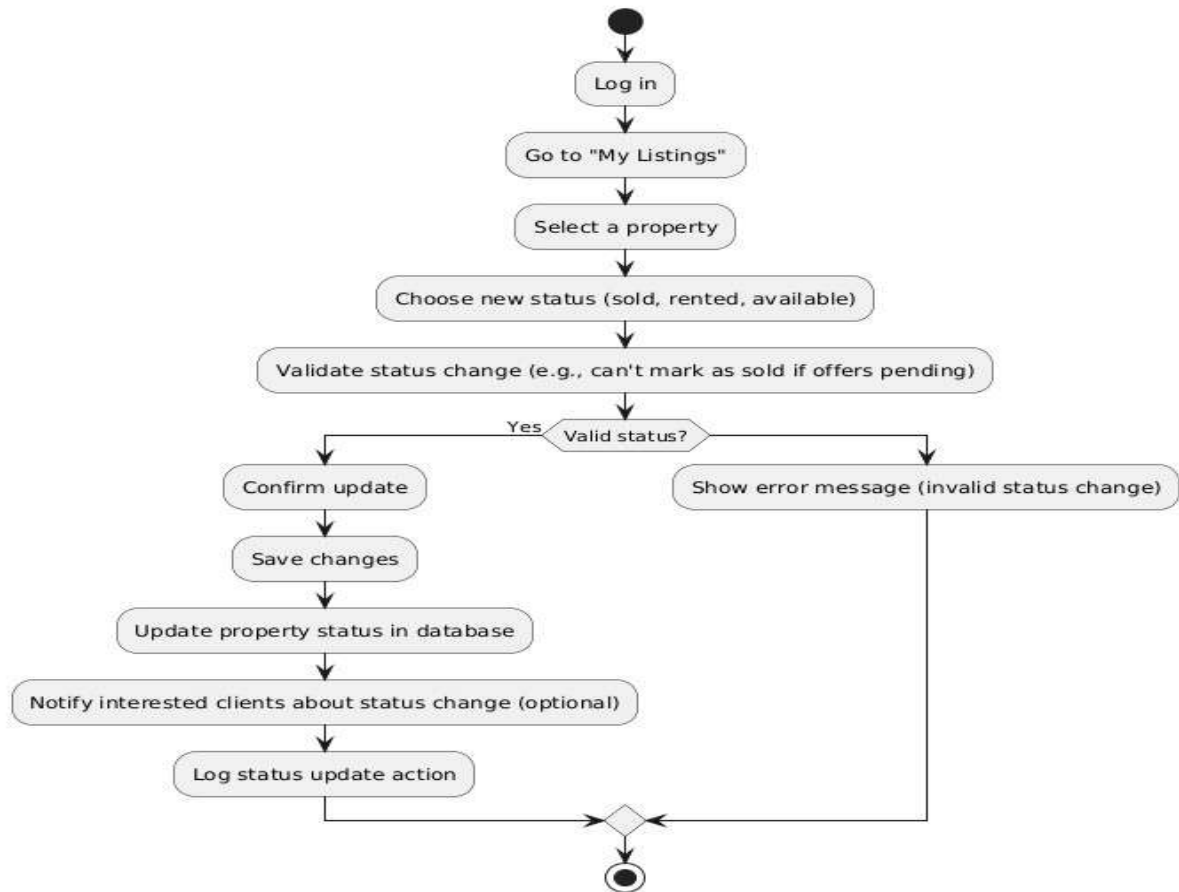


Figure 23-2 Activity diagram: Update property status

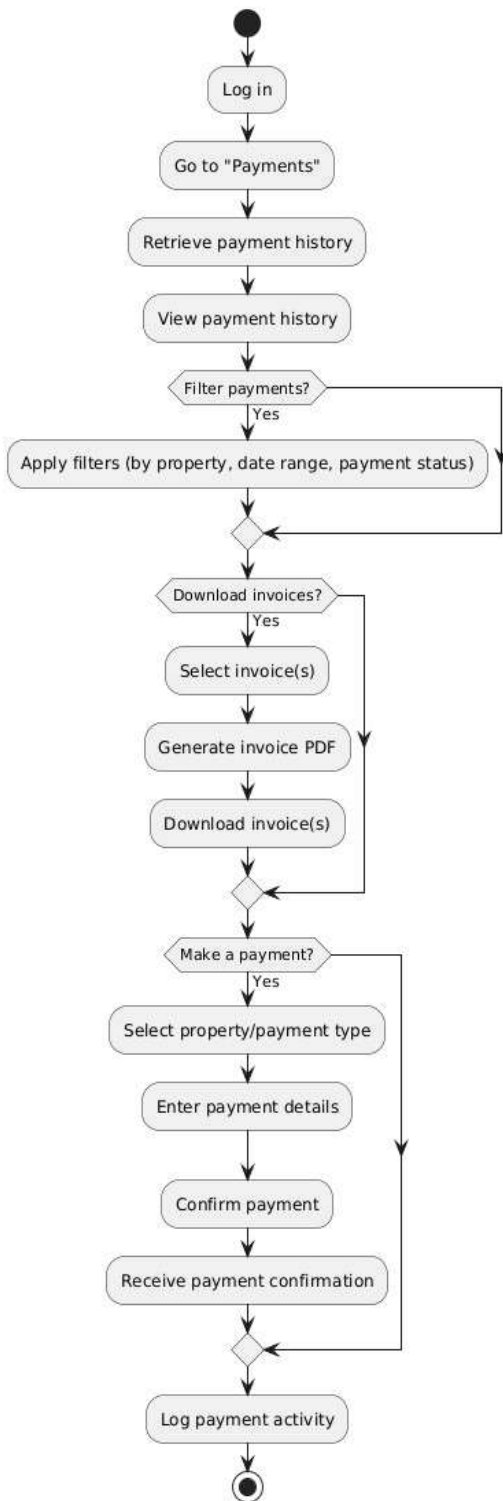


Figure 25-2 Activity diagram: Manage payments

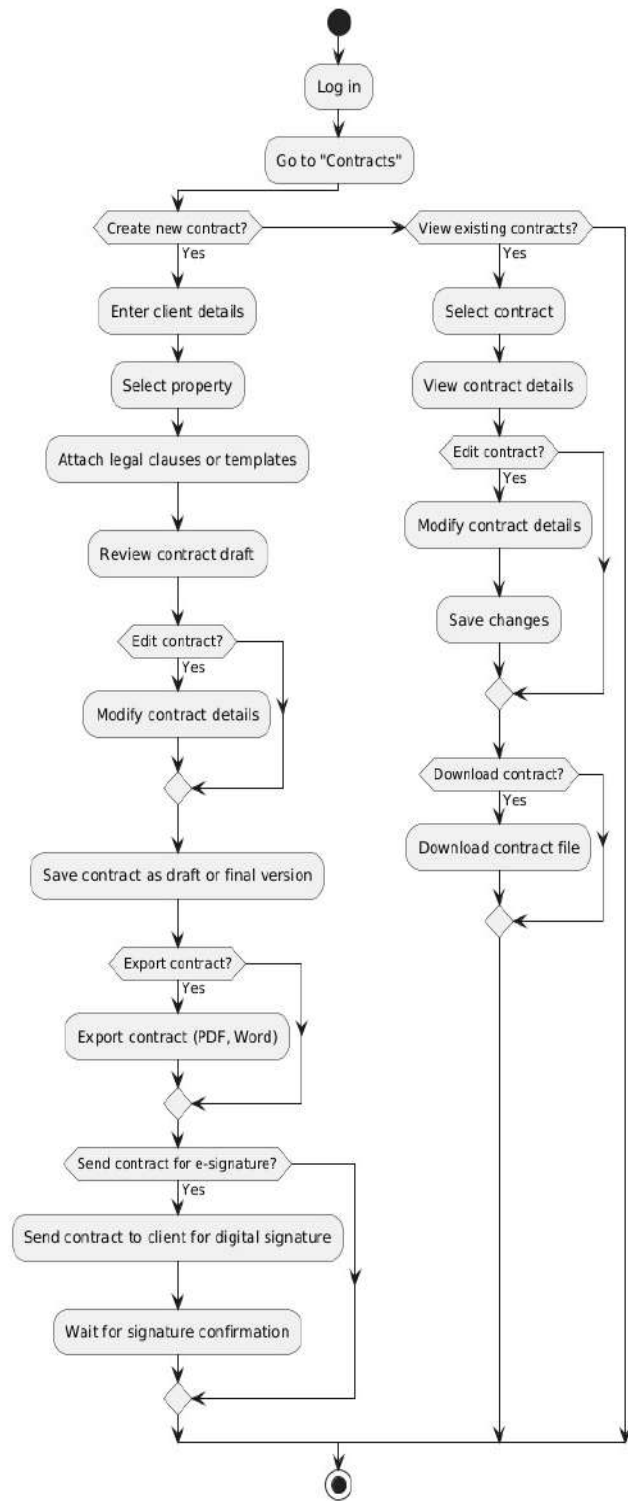


Figure 24-2 Activity diagram:
Manage contracts

V.3. Activity diagrams for the admin:

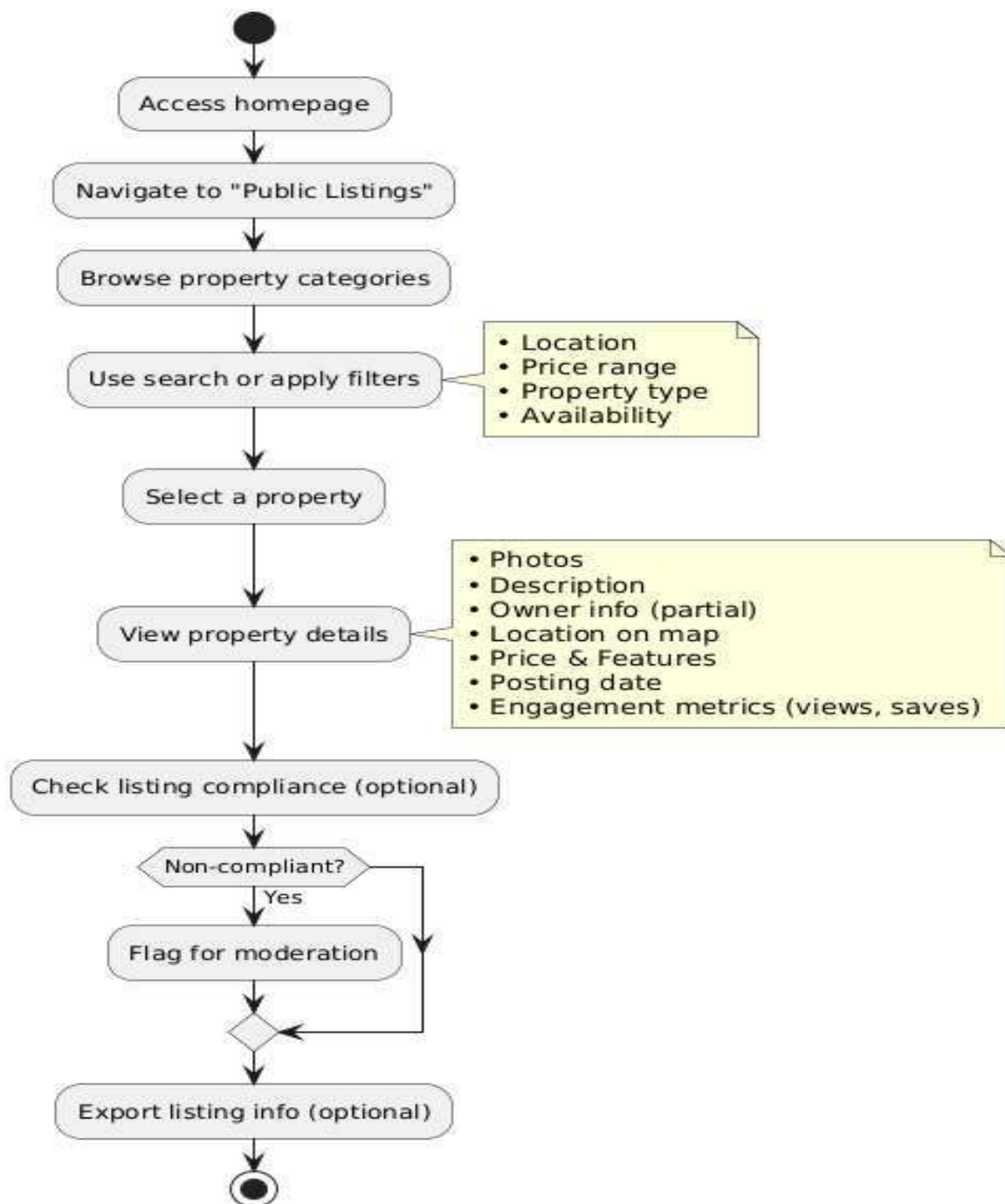


Figure 225-2 Activity diagram: View public listings

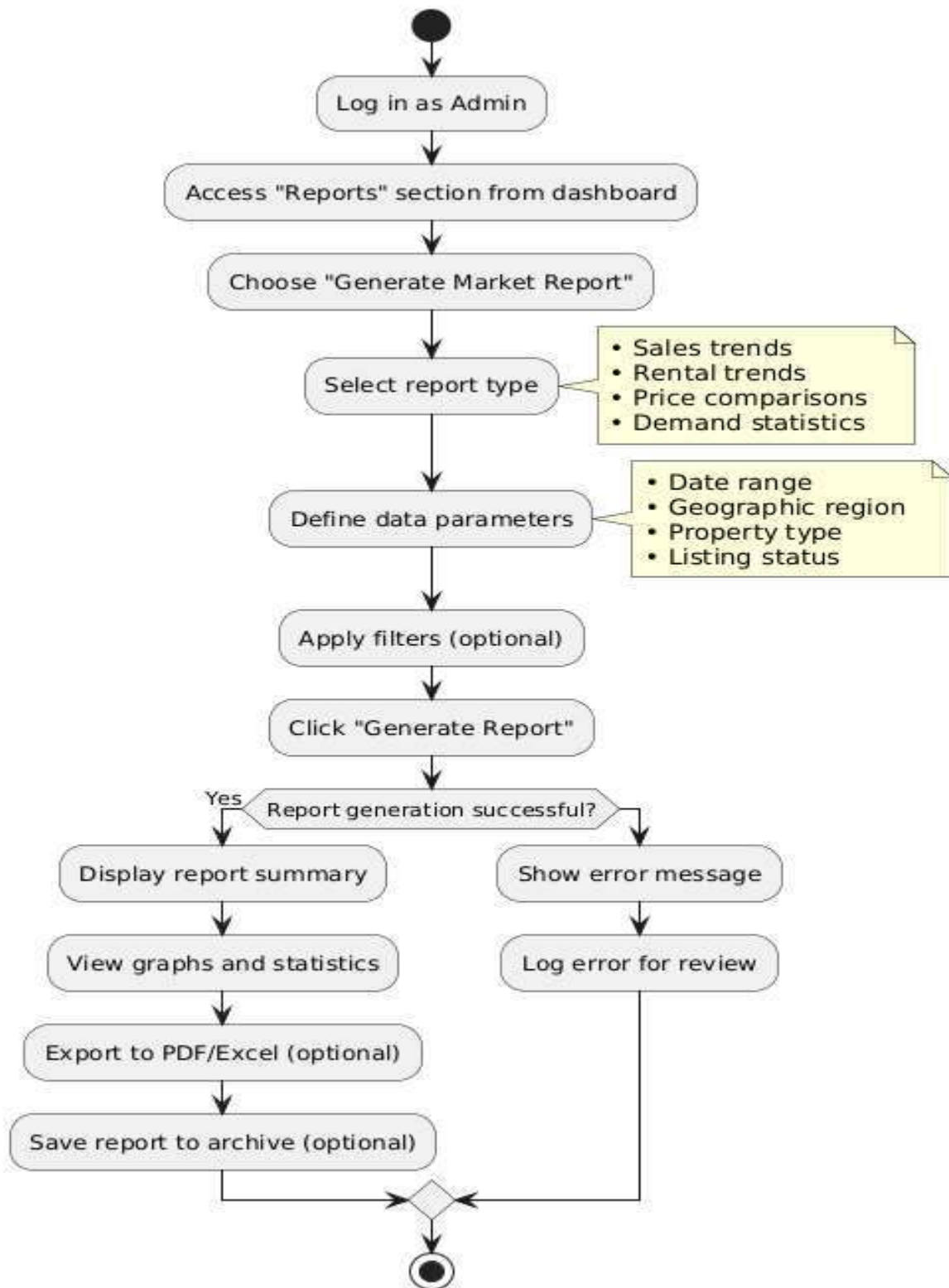


Figure 26-2 Activity diagram: Generate market report

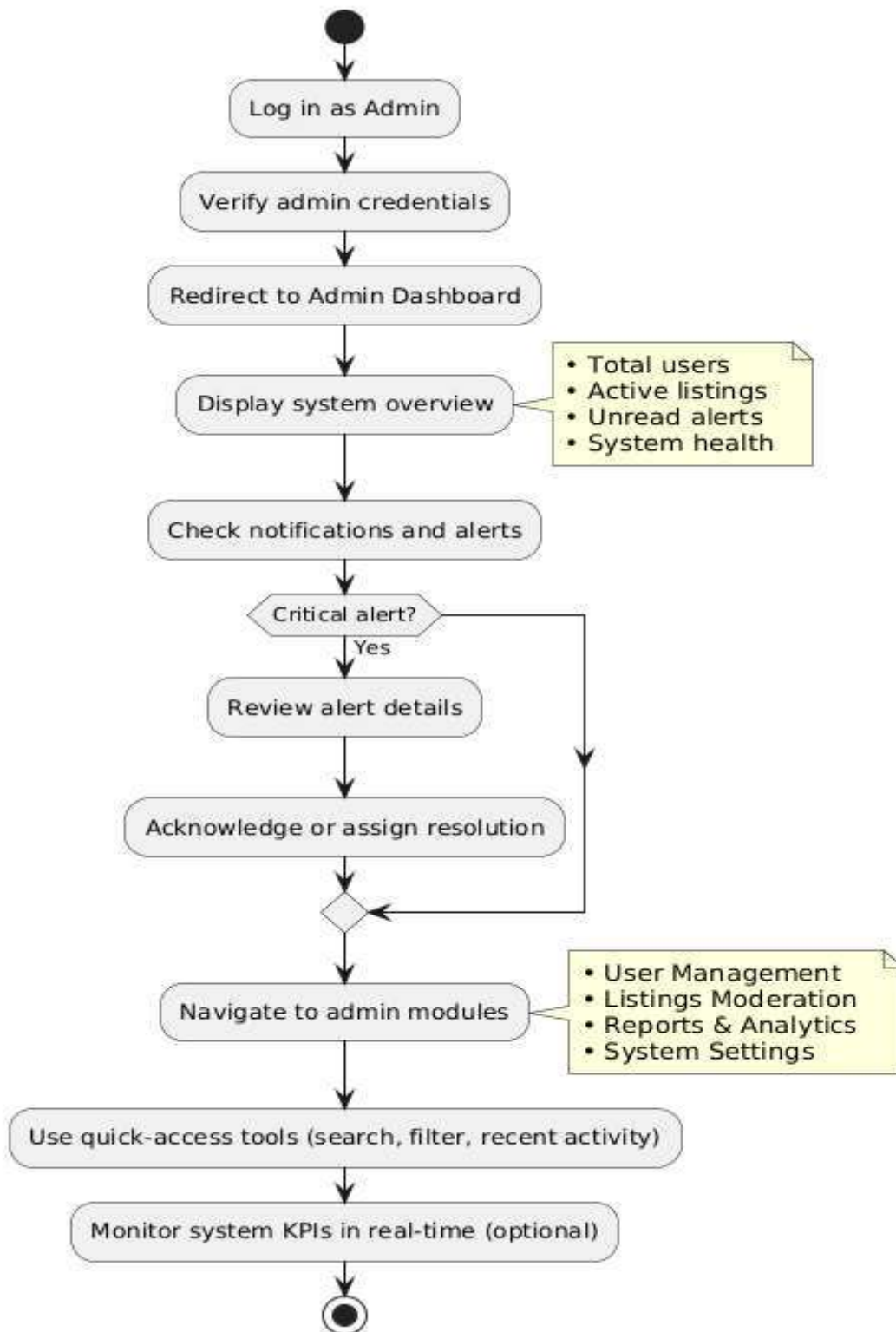


Figure 27-2 Activity diagram: Access admin dashboard

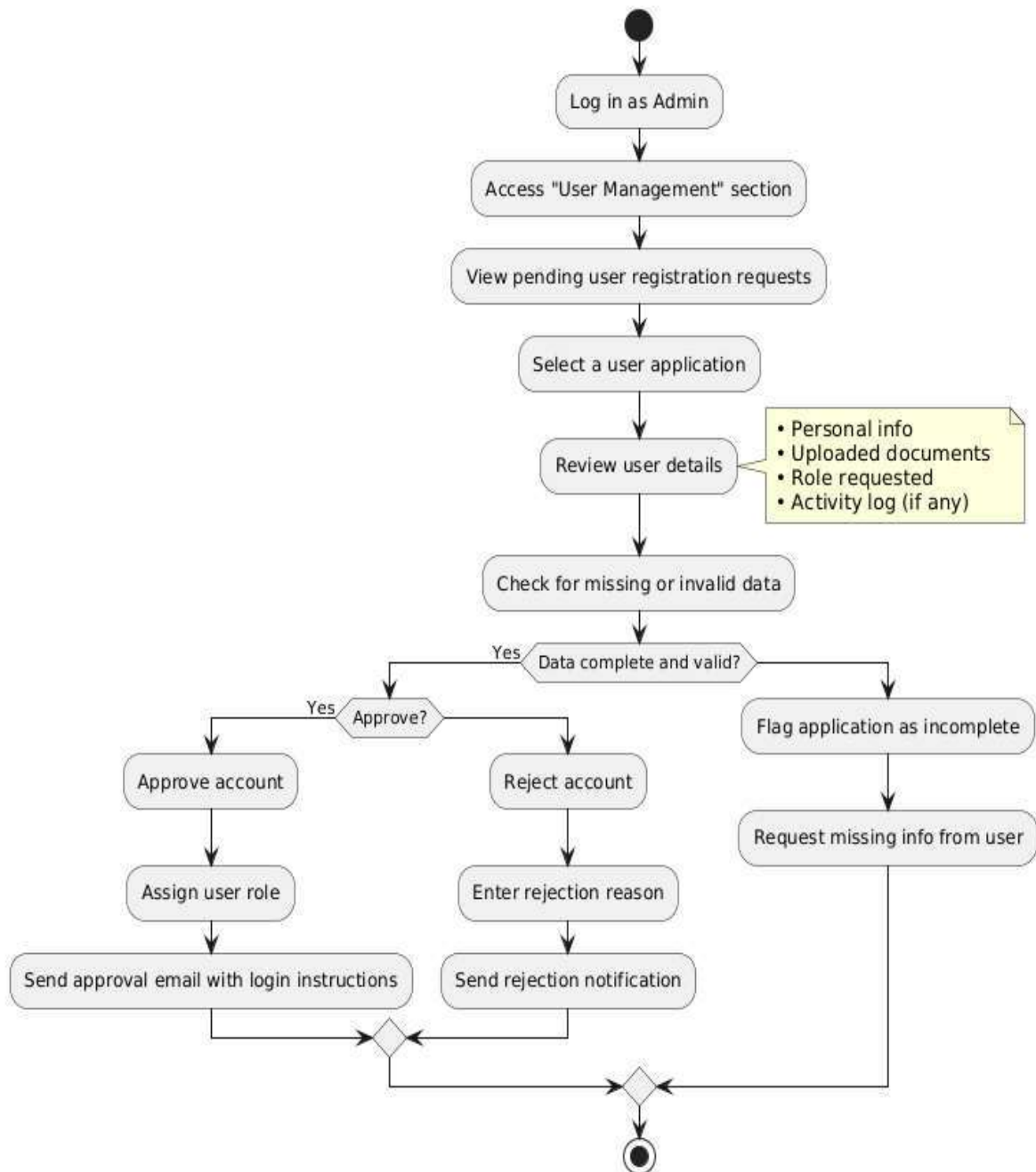


Figure 28-2 Activity diagram: Approve/reject user accounts

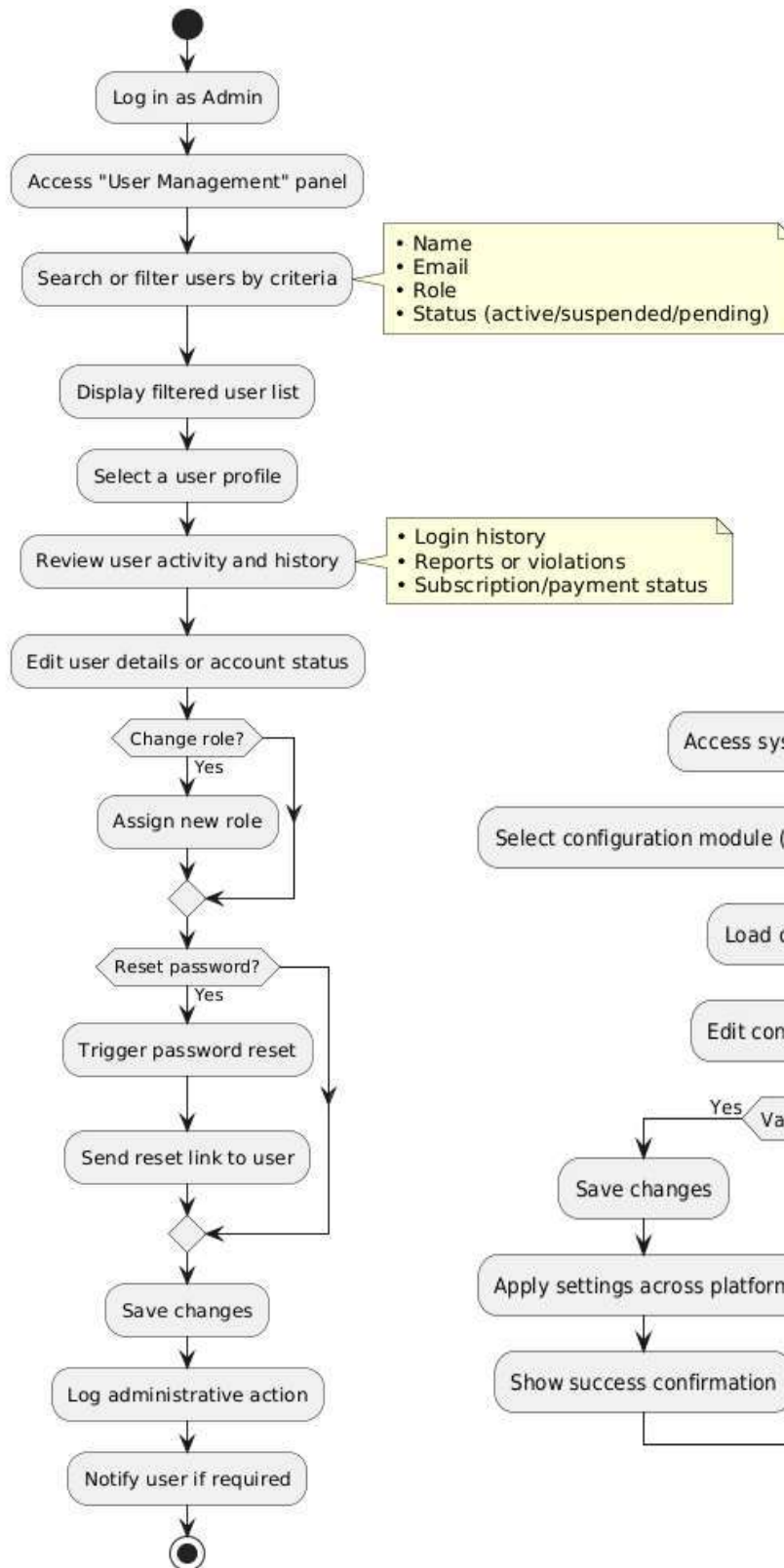


Figure 29-2 Activity diagram: Manage users

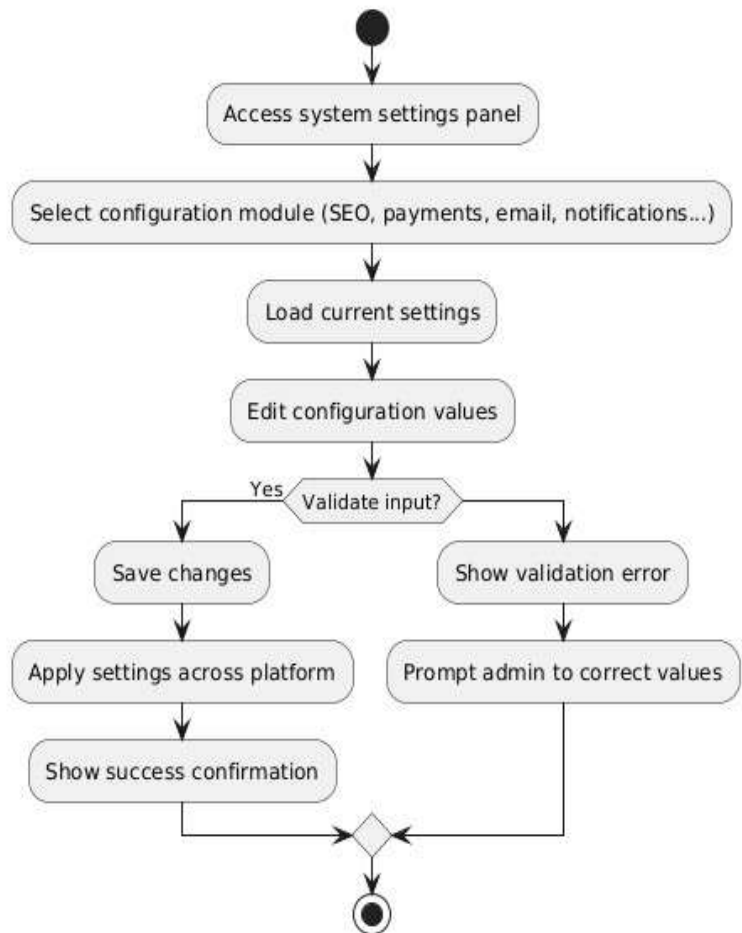


Figure 30-2 Activity diagram:
Manage system settings

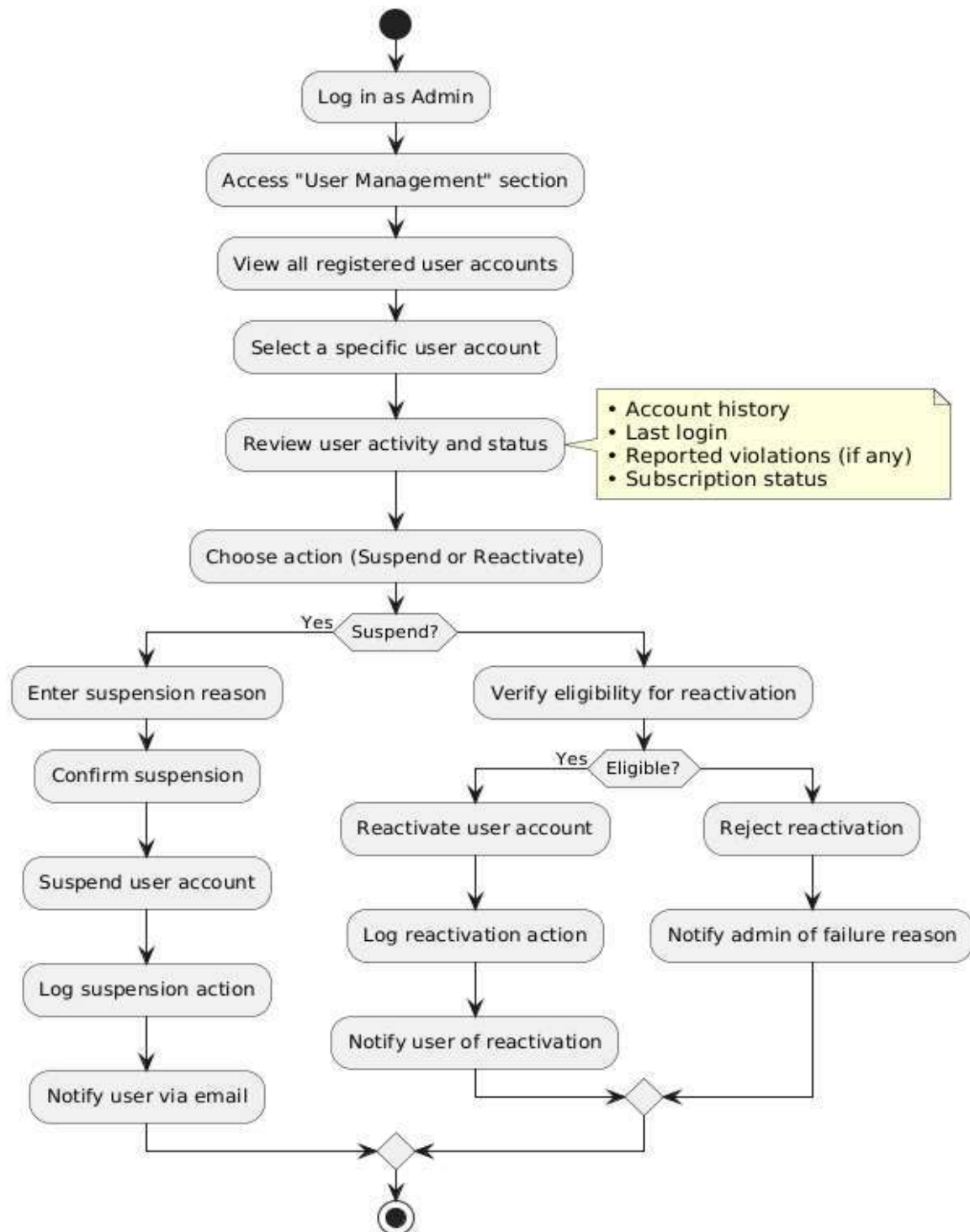


Figure 31-2 Activity diagram: Suspend/Reactivate user account

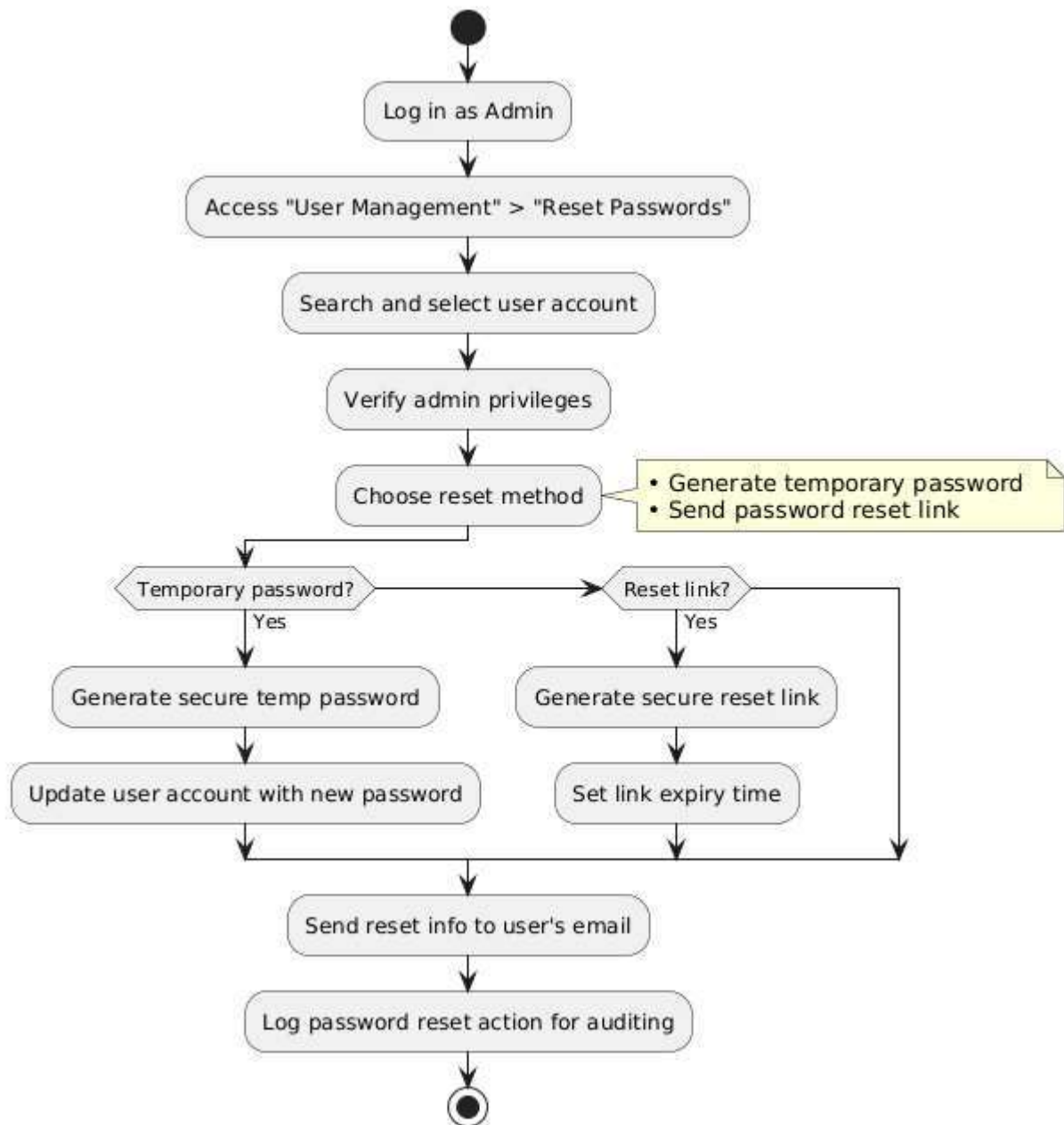


Figure 32-2 Activity diagram: Reset passwords

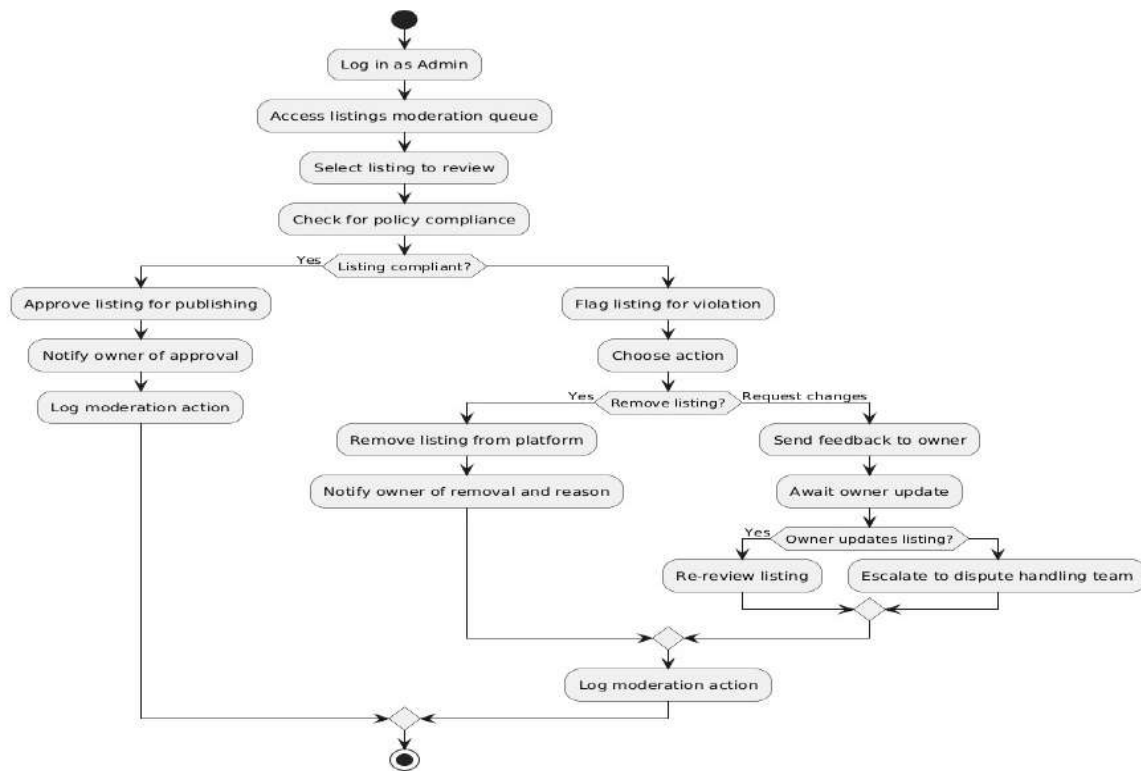


Figure 33-2 Activity diagram: Moderate listings



Figure 34-2 Activity diagram: Delete user account

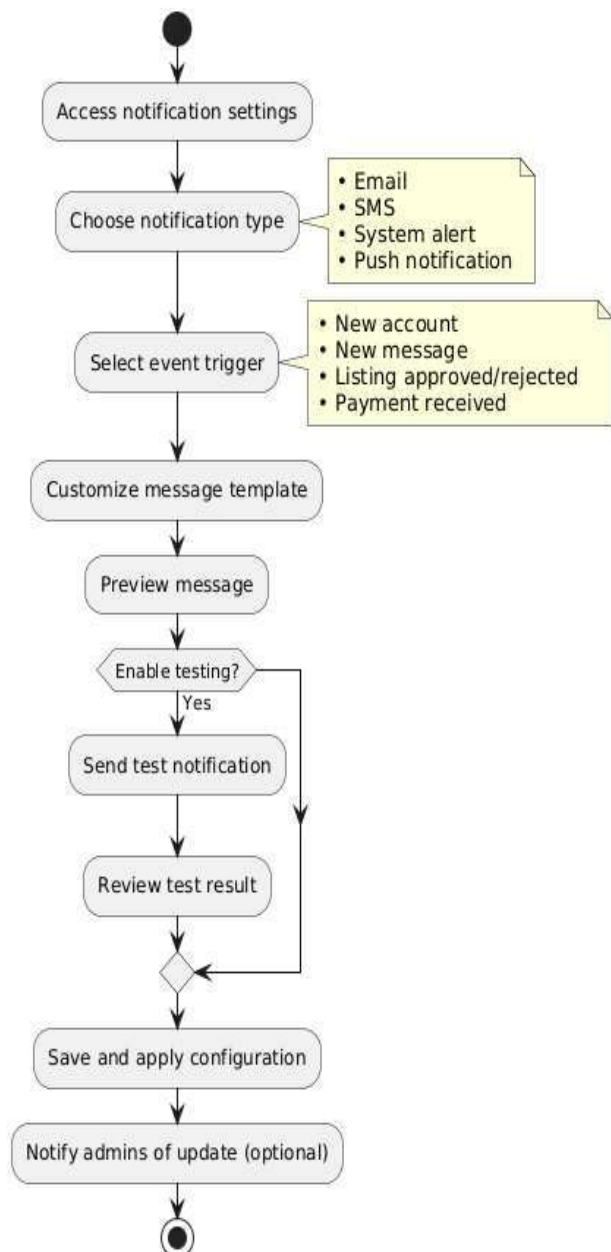


Figure 35-2 Activity diagram:
Configure notifications

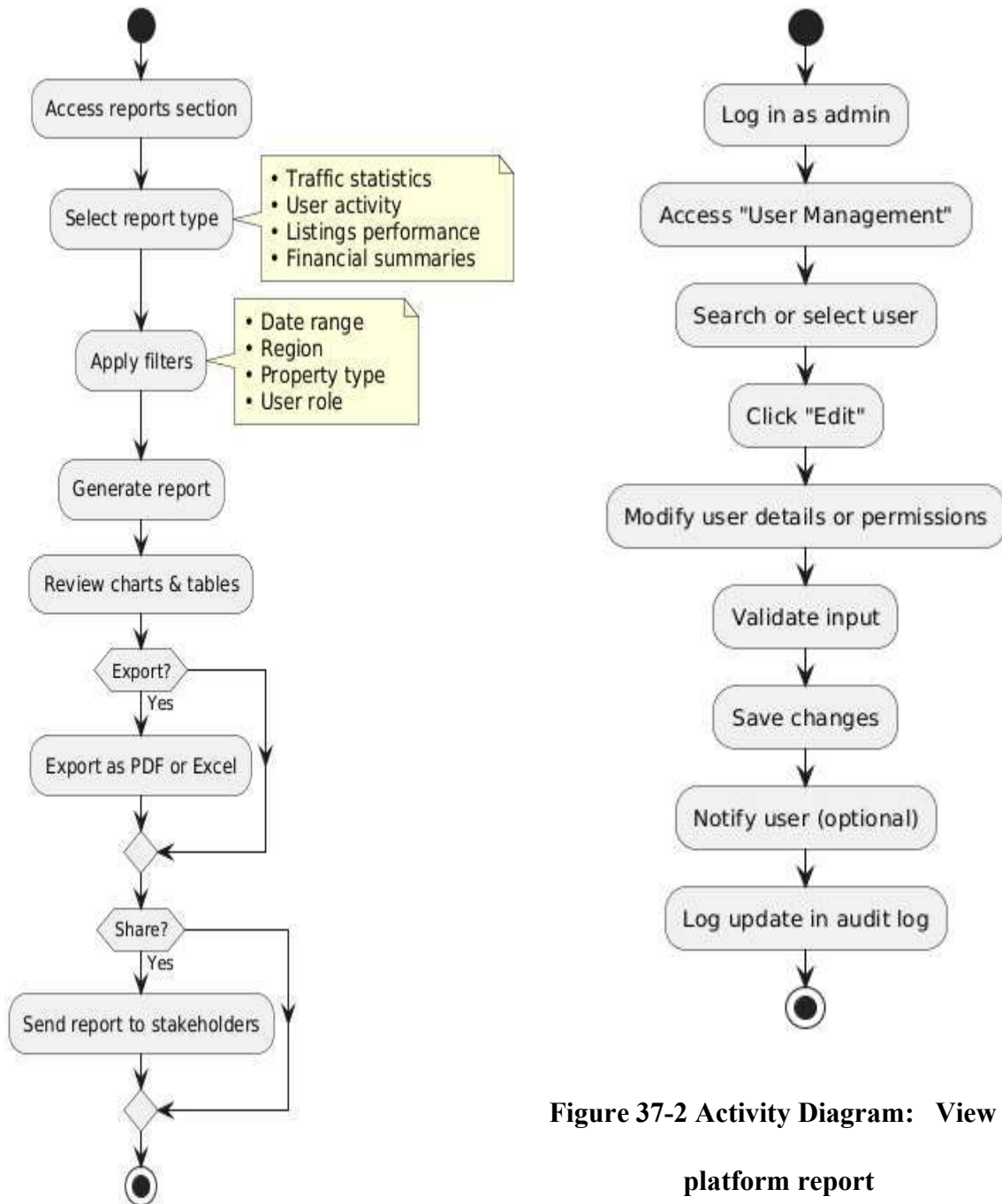


Figure 37-2 Activity Diagram: View platform report

Figure 36-2 Activity diagram:

Edit existing user

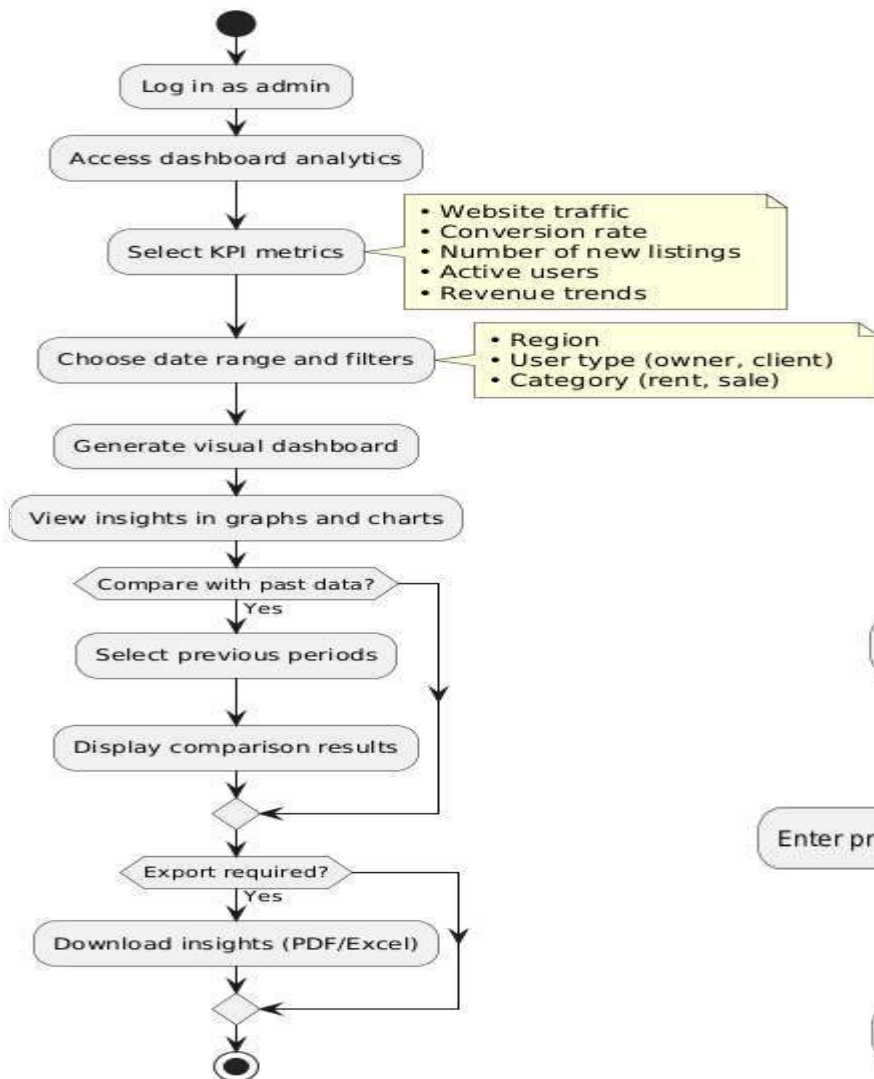


Figure 38-2 Activity diagram:
Monitor KPIs and Statistics

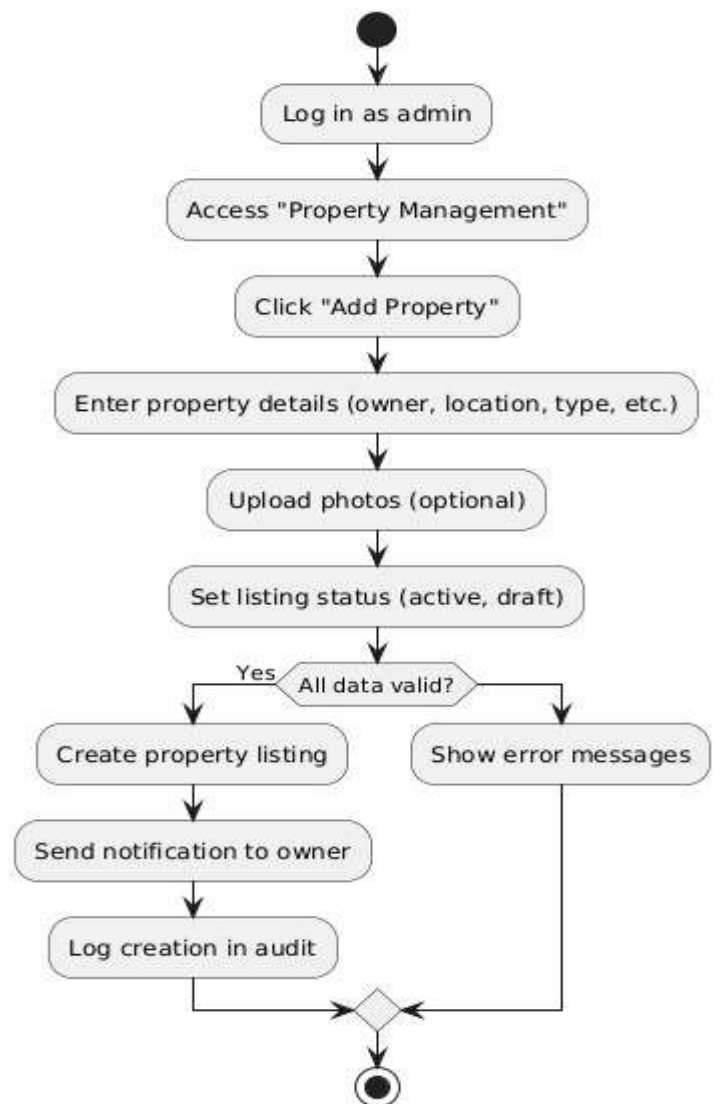


Figure 39-2 Activity diagram:
Add new property

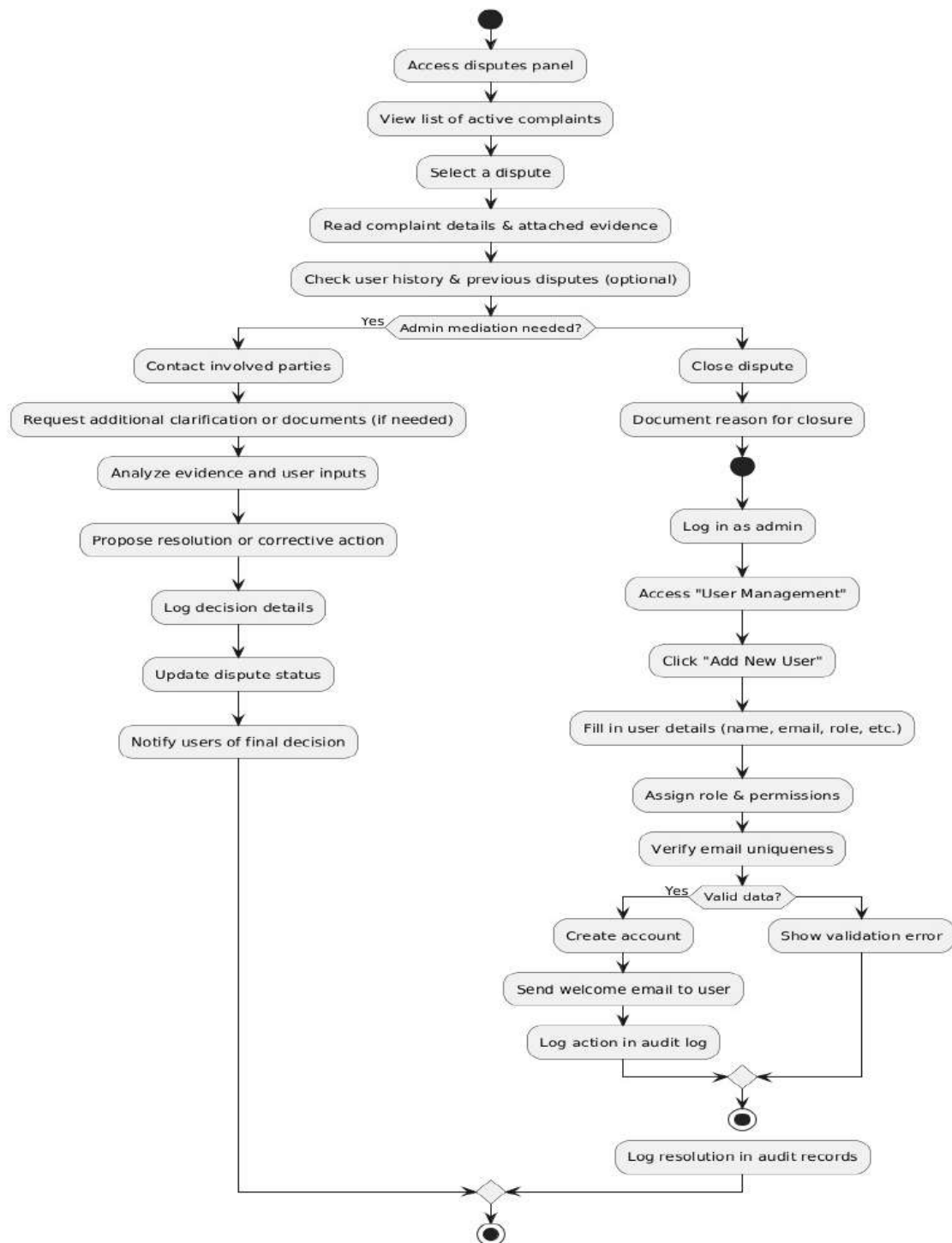


Figure 40-2 Activity diagram: Add new user

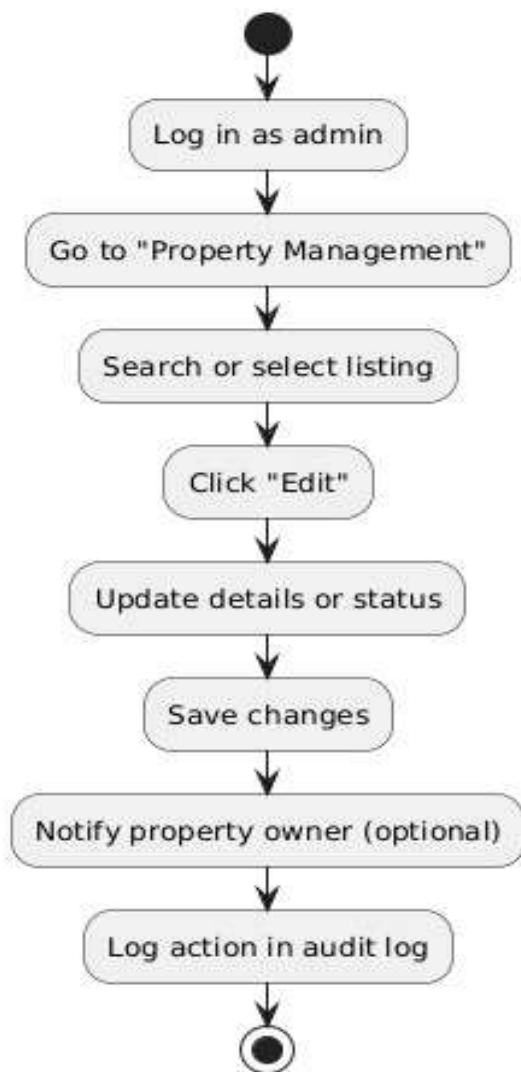


Figure 41-2 Activity diagram:

Edit property listing

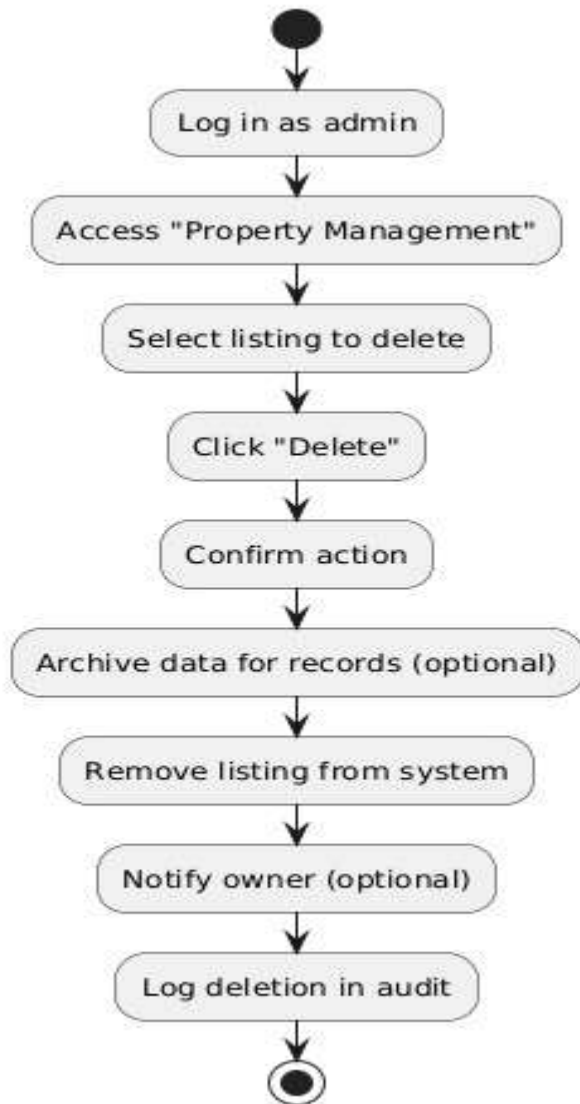


Figure 42-2 Activity diagram:

Delete property listing

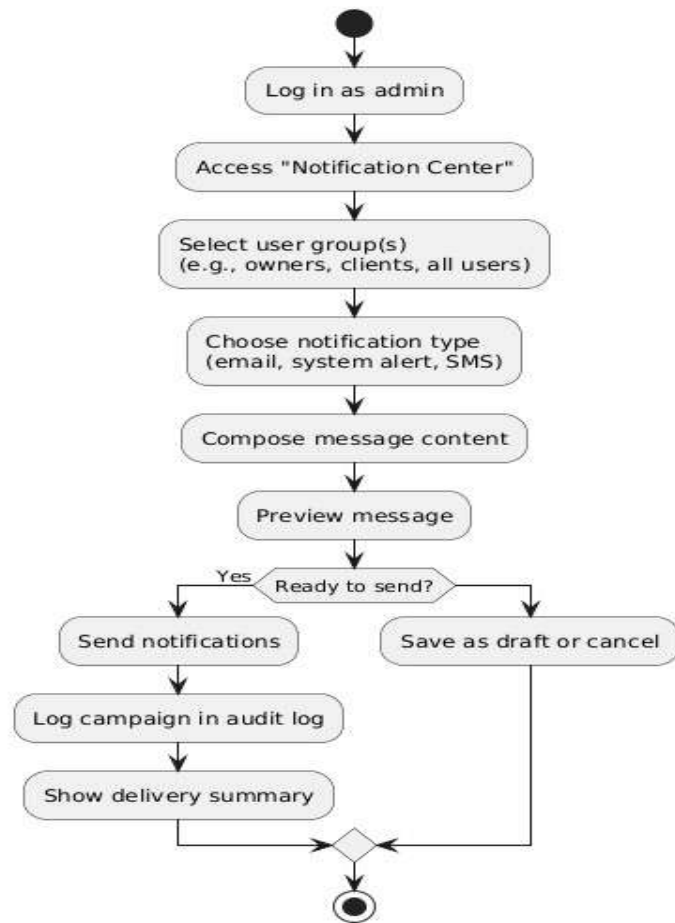


Figure 43-2 Activity diagram: Send message notifications to users

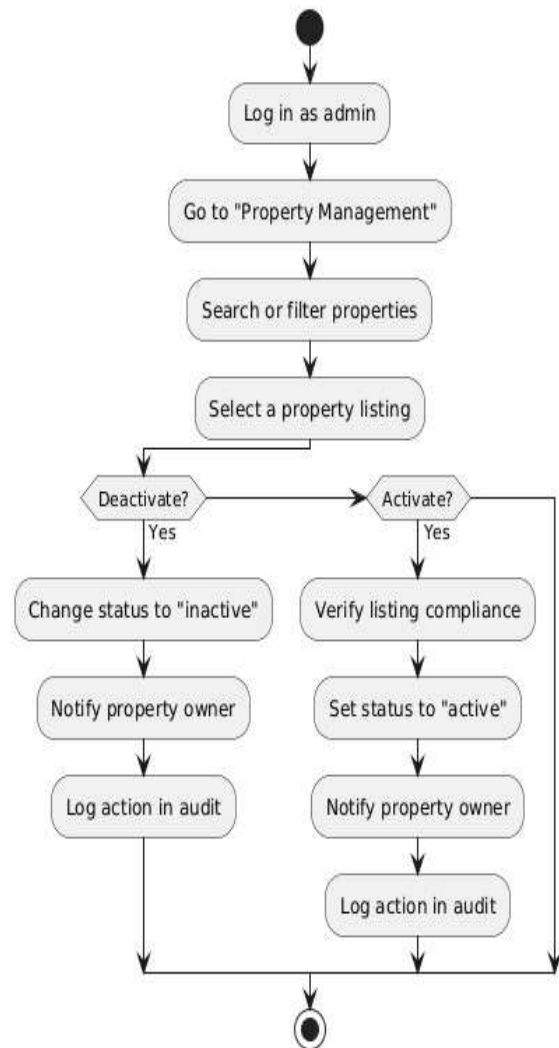


Figure 44-2 Activity diagram: Activate / Deactivate property listings

VI. Sequence diagrams:

Sequence diagram: A sequence diagram is a UML representation that provides a detailed visualization of the interactions between objects or components, focusing on their sequential order and timing. It illustrates dynamic behavior by showing how objects interact, helping to communicate system behavior [4].

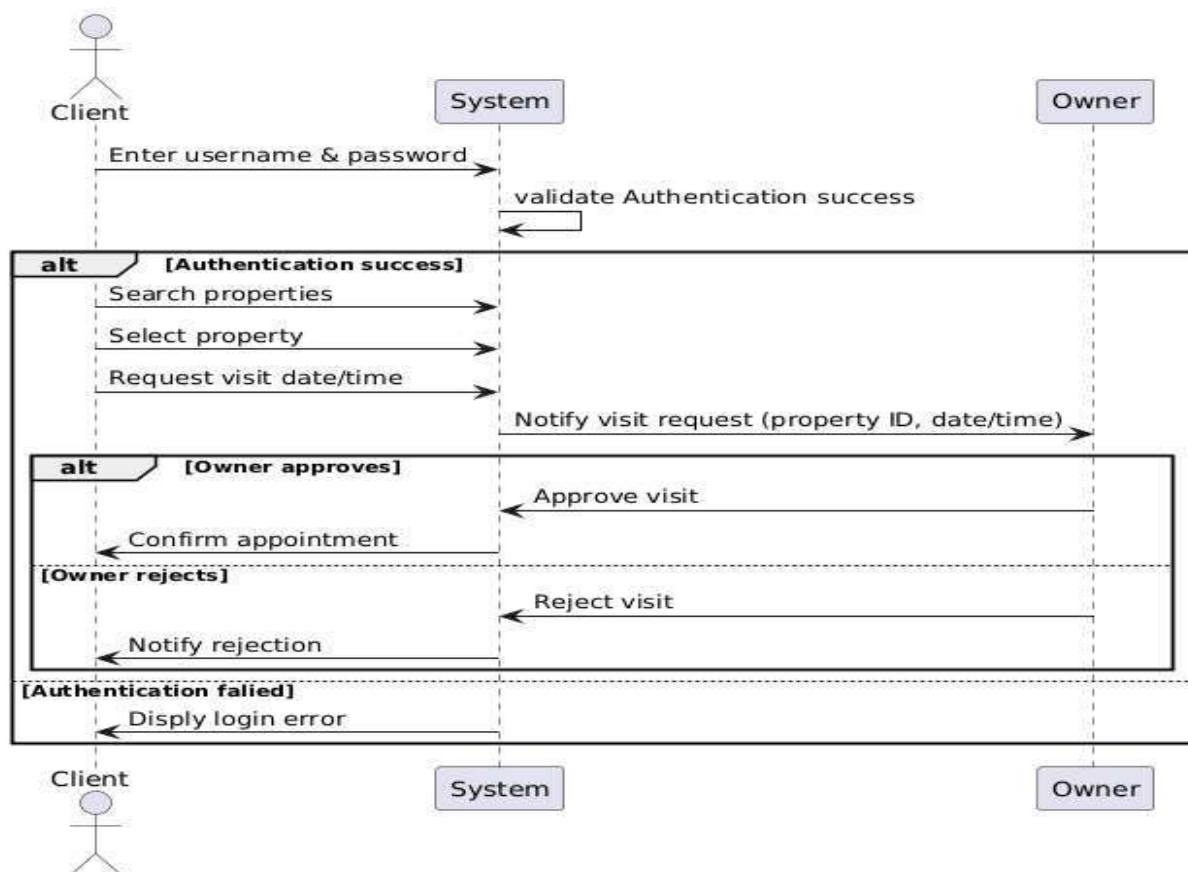


Figure 45-2 Sequence diagram: Booking an appointment to visit a property

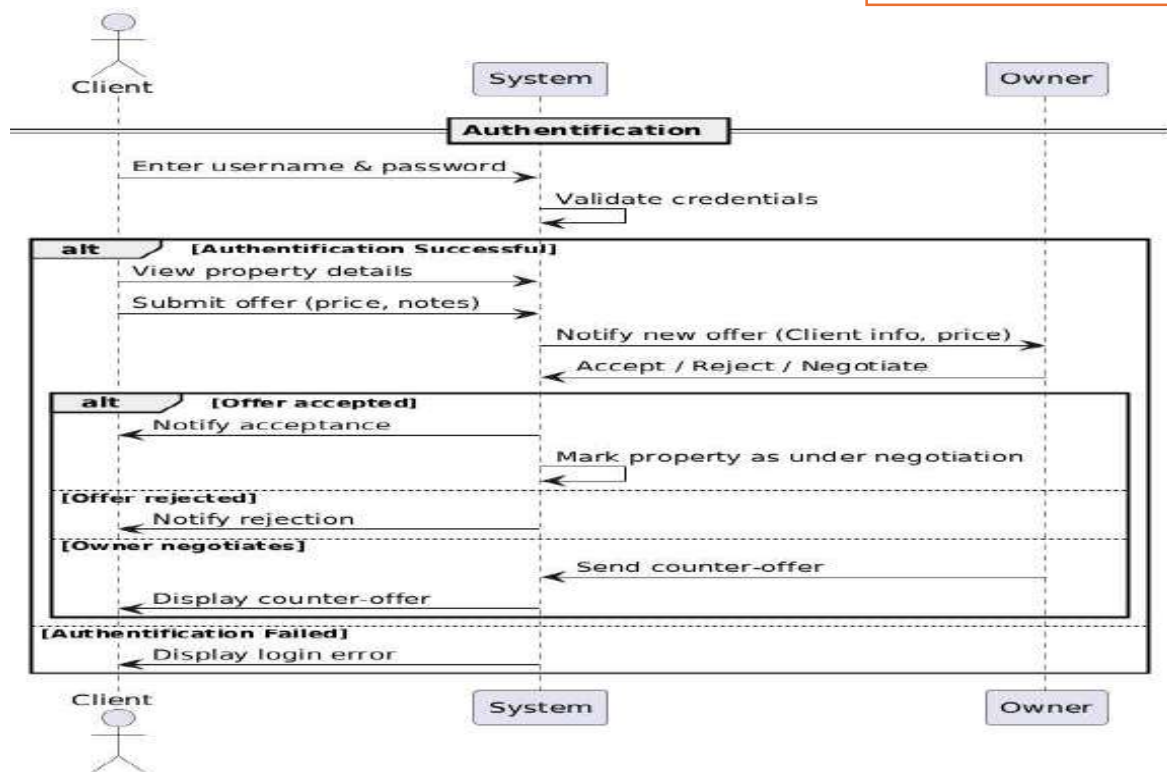


Figure 46-2 Sequence diagram :Presenting a purchase offer / search

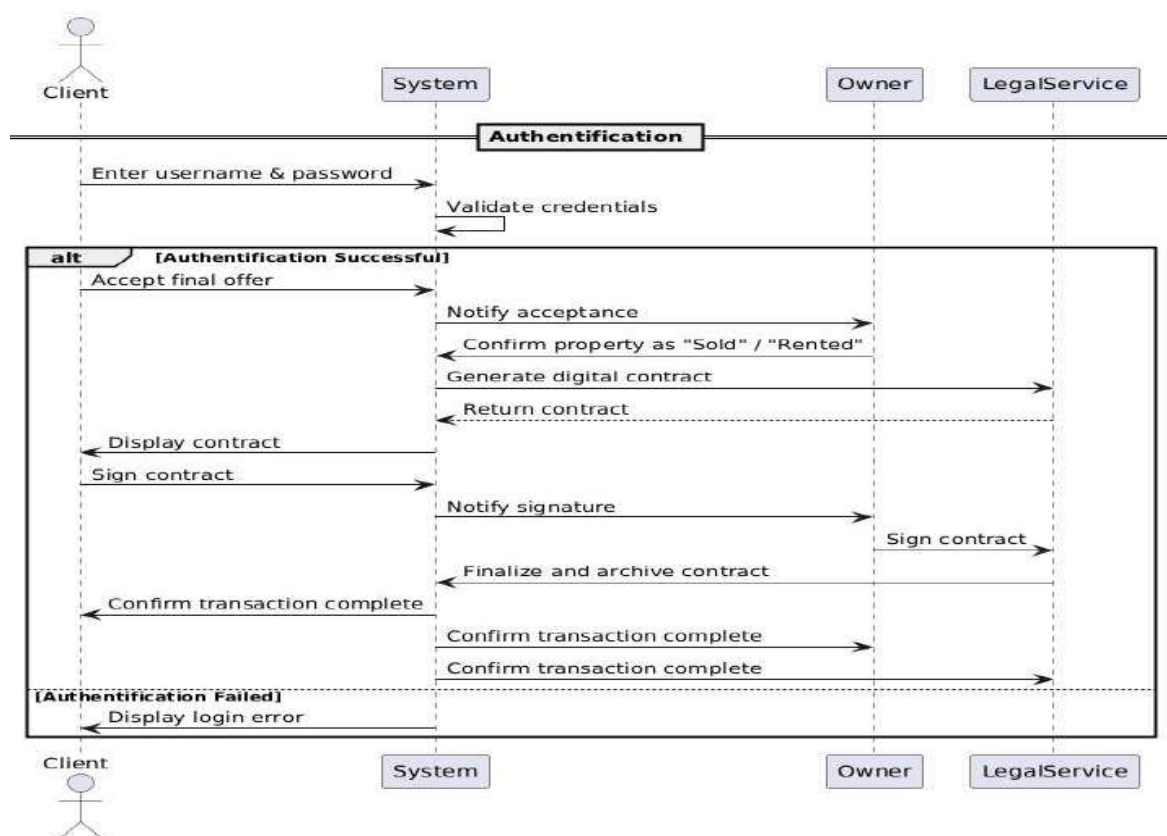


Figure 47-2 Sequence diagram: Completing the transaction and signing the contract

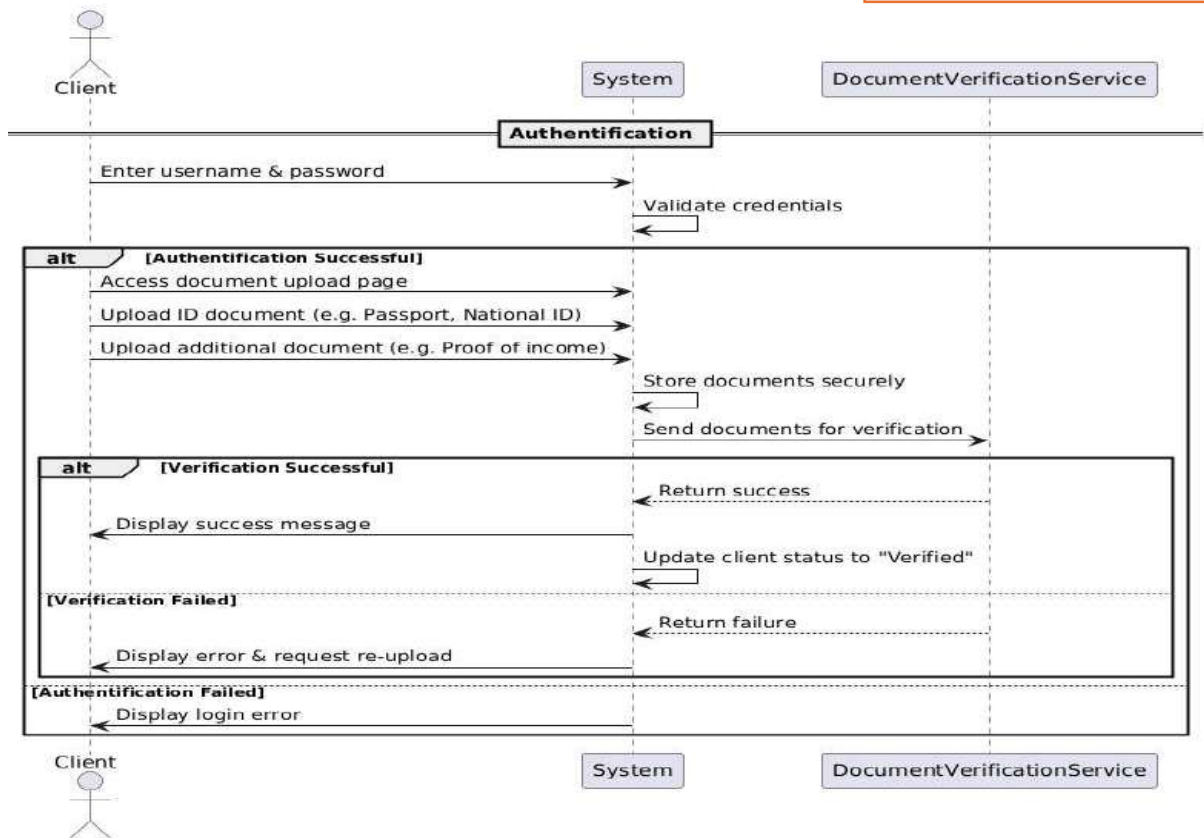


Figure 48-2 Sequence diagram: Uploading user documents for verification

VII. Class diagram:

Class diagram are a type of UML (Unified Modeling Language) diagram used in software engineering to visually represent the structure and relationships of classes within a system i.e. used to construct and visualize object-oriented systems[5].

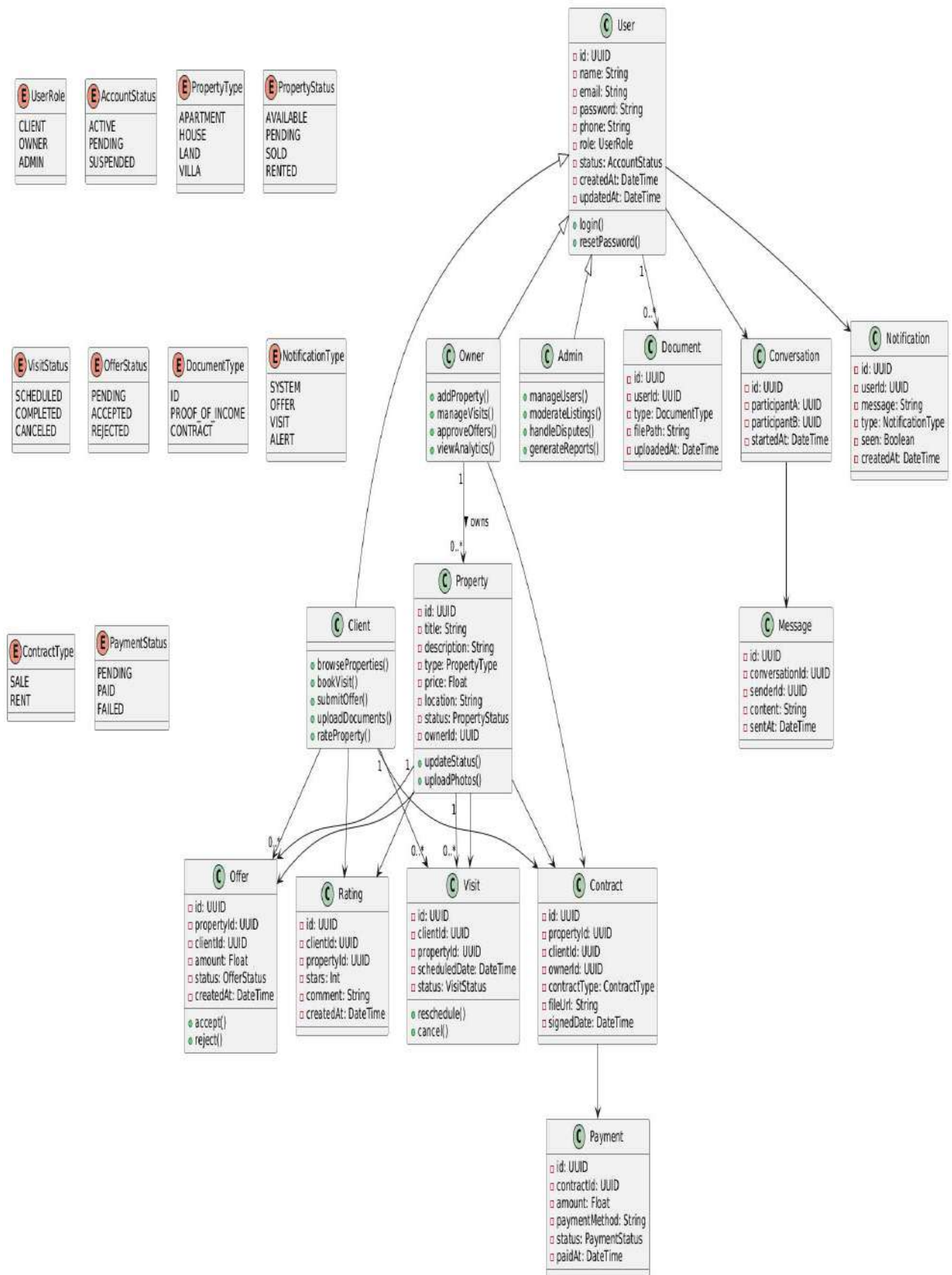


Figure 49-2 Users Class diagram

VIII. Relational model:

User (user_id, user_password, user_role, name, phone_number, email, status, created_at, updated_at)

Client (client_id, #user_id)

Owner (owner_id, #user_id)

Admin (admin_id, user_id)

Property (property_id, owner_id, title, description, type, price, location, status, created_at, updated_at)

Visit (visit_id, #client_id, #property_id, scheduled_date, status, created_at)

Offer (offer_id, #property_id, #client_id, amount, status, created_at)

Document (document_id, #user_id, type, file_path, uploaded_at)

Rating (rating_id, #client_id, #property_id, stars, comment, created_at)

Conversation (conversation_id, #participant_a_id, #participant_b_id, started_at)

Message (message_id, #conversation_id, #sender_id, content, sent_at)

Notification (notification_id, #user_id, message, type, seen, created_at)

Contract (contract_id, #property_id, #client_id, #owner_id, contract_type, file_url, signed_date)

Payment (payment_id, #contract_id, amount, payment_method, status, paid_at)

IX. Conclusion:

This modeling phase has provided a structured and comprehensive representation of the Real Estate Platform through a variety of UML diagrams, including use case diagrams, activity diagrams, sequence diagrams, and class diagrams. These models have served as essential tools to visualize system functionalities, user interactions, and data flow in a clear and standardized manner. By detailing the relationships between key entities such as Users, Properties, Offers, Visits, Documents, and Contracts, the modeling process has enabled the formulation of a coherent and normalized database structure. Furthermore, and clarified the interaction constraints between different user roles (Clients, Owners, and Admin).

Finally, this modeling stage establishes a solid analytical foundation for the development and implementation phase

CHAPTER III:

Implementation

I. Introduction:

Having finished modeling in UML, we will start in this chapter by presenting the details of the web application. First, we will introduce the development languages and tools for the web application, represented by HTML, CSS, and JS. Then, we discuss the environment, including express.js (EJS), VS, Node.js, Firebase, Bootstrap, and PostgreSQL as the database.

II. The development languages and tools :

HTML (HyperText Markup Language):

is the standard markup language used to structure and design web pages. It defines how text, images, and multimedia content are displayed in a web browser[6].

CSS (Cascading Style Sheets):

is a language designed to simplify the process of making web pages presentable[7].

JavaScript:

[JavaScript](#) is a powerful and flexible programming language for the web that is widely used to make websites interactive and dynamic. JavaScript can also able to change or update HTML and CSS dynamically. [JavaScript](#) can also run on [servers](#) using tools like [Node.js](#), allowing developers to build entire applications with it [8].

Node.js :

is a powerful, open-source, and cross-platform JavaScript runtime environment built on [Chrome's V8 engine](#)[9].

Express.js:

is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications[10].

Visual Studio:

Is an **Integrated Development Environment(IDE)** developed by Microsoft to develop Desktop applications, GUI(Graphical User Interface), console, web applications, mobile

applications, cloud, and web services, etc. With the help of this IDE, you can create managed code as well as native code. It uses the various platforms of Microsoft software development software like Windows store, Microsoft Silverlight, and Windows API, etc. It is not a language-specific IDE as you can use this to write code in C#, C++, VB(Visual Basic), Python, JavaScript, and many more languages. It provides support for 36 different programming languages. It is available for Windows as well as for macOS[11].

Firestore:

a product of Google, is a powerful platform that enables developers to build, manage, and scale applications with ease. It simplifies app development by offering a secure and efficient backend, eliminating the need for server-side programming. Firestore supports multiple platforms, including Android, iOS, web, and Unity, making it a versatile solution for developers[12].

Bootstrap:

is the most popular CSS Framework for developing responsive and mobile-first websites[13].

PostgreSQL:

is a powerful, open source object-relational database system that uses and extends the SQL language combined with many features that safely store and scale the most complicated data workloads. The origins of PostgreSQL date back to 1986 as part of the [POSTGRES](#) project at the University of California at Berkeley and has more than 35 years of active development on the core platform [14].

III. System explanation:

The interface of the real estate agency website was built using core web development technologies. The structural foundation relies on HTML5 to organize the website's content and its various elements such as property listings, contact forms, and detail pages.

For design and styling, CSS3 was used along with the Bootstrap framework, which provides fast-loading, responsive user interfaces that adapt to different screen sizes.

JavaScript adds interactivity and dynamism to the site through features like updating property listings without page reloads, validating form data, and creating visual effects that enhance

user experience. The interfaces were developed using Visual Studio Code, which offers comprehensive tools for efficient and fast development.

On the server side (Back-End), Node.js was used along with the Express.js library to build REST APIs that connect the frontend with the database.

Core property data is stored in PostgreSQL due to its powerful handling of complex queries. The platform also utilizes Firebase services for backend tasks such as cloud storage, hosting the website via Firebase Hosting, and managing media files using Firebase Storage.

The workflow begins with local front-end development, followed by uploading the code to a version control system, and finally deploying the application using Firebase services.

Users interact with an intuitive interface backed by a robust backend that enables the smooth and secure execution of all property display and management operations.

IV. The main interfaces of the application:

IV.1. The main interfaces of the user:

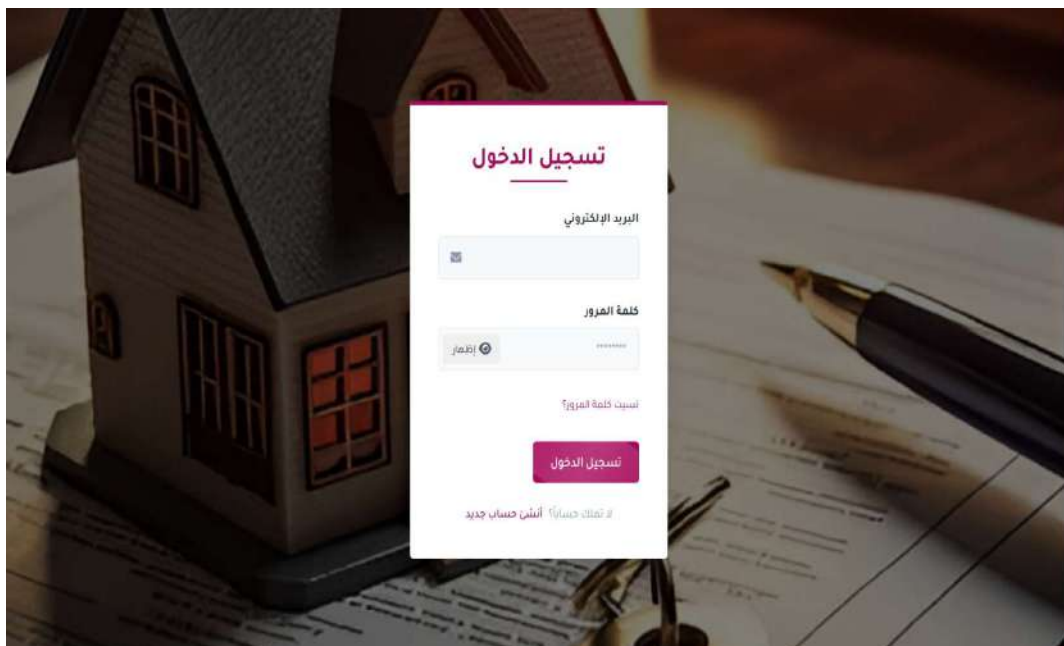


Figure 1-3 Login user

Figure 2-3 Register user

Figure 3-3

Property details

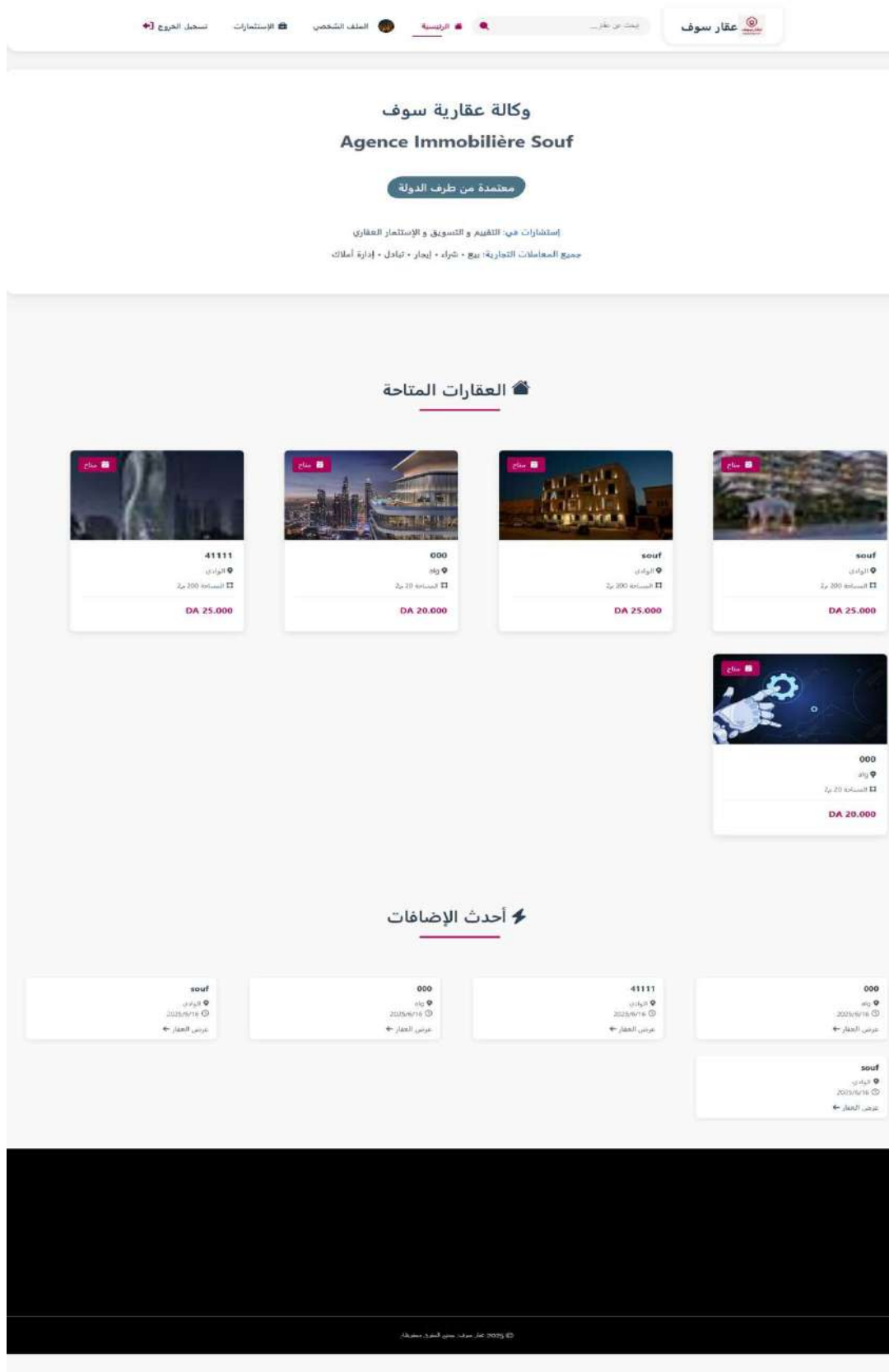


Figure 4-3 Start page

العرض (واجب)

الهاتف

ملاحظات إضافية

أدخل أي تفاصيل إضافية

رسل العرض

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Figure 5-3 Offer buy

العرض (واجب)

الإيجار

ملاحظات إضافية

أدخل أي تفاصيل إضافية

رسل العرض

© 2025 كل حقوق محفوظة. جميع الحقوق محفوظة.

Figure 6-3 Offer rent

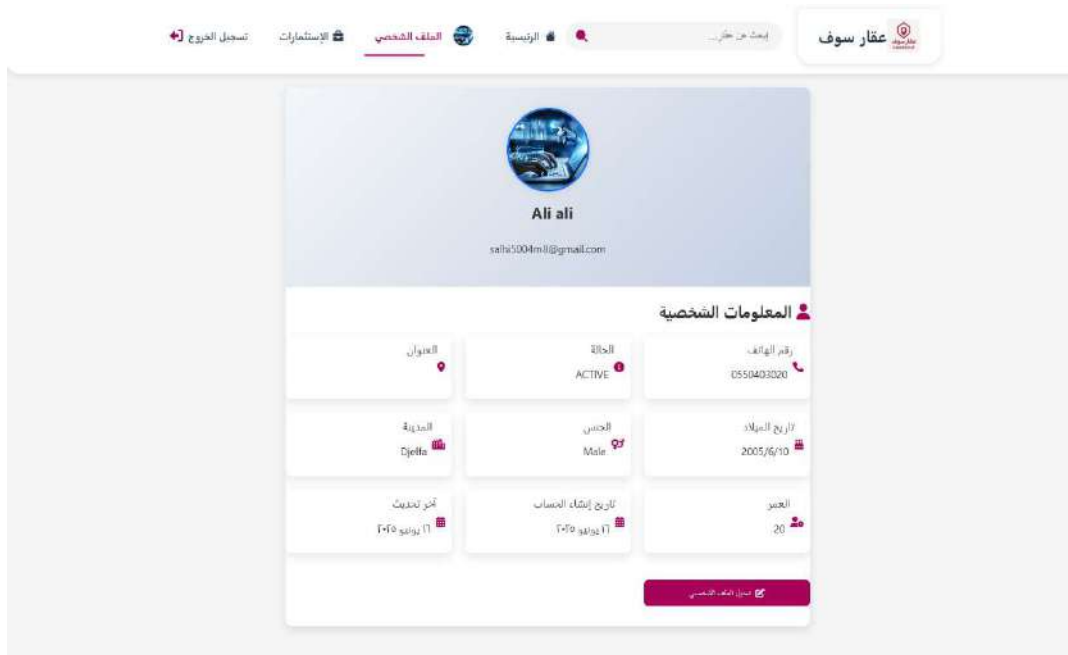


Figure 7-3 User profile

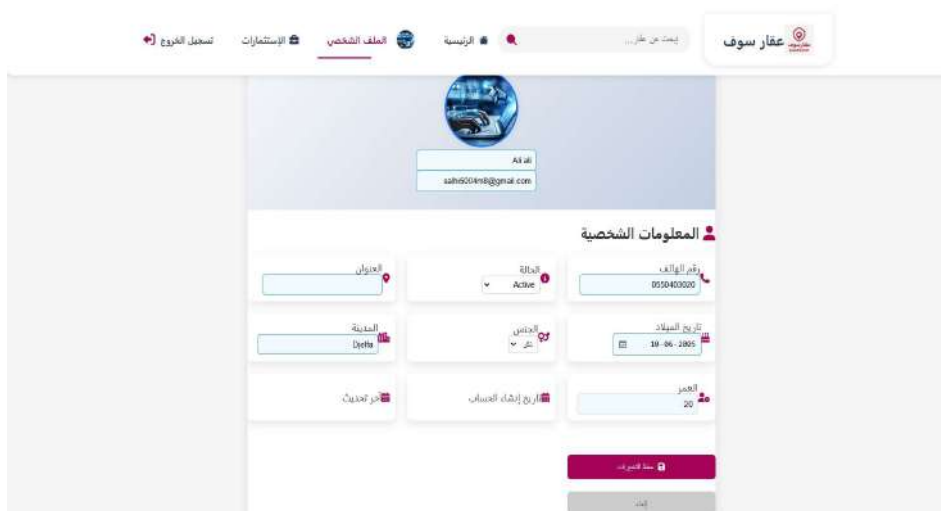


Figure 8-3 User update profile

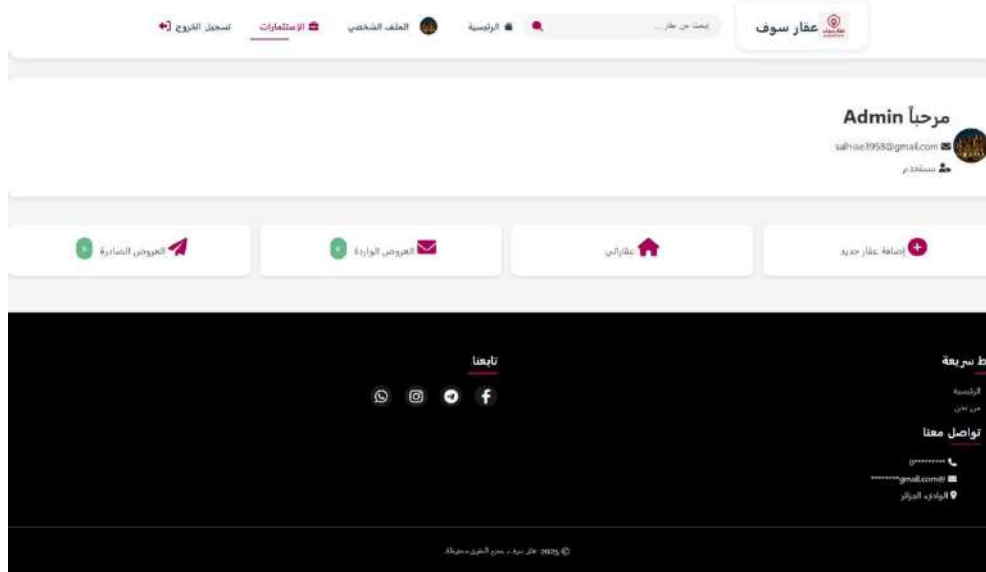


Figure 9-3 User project

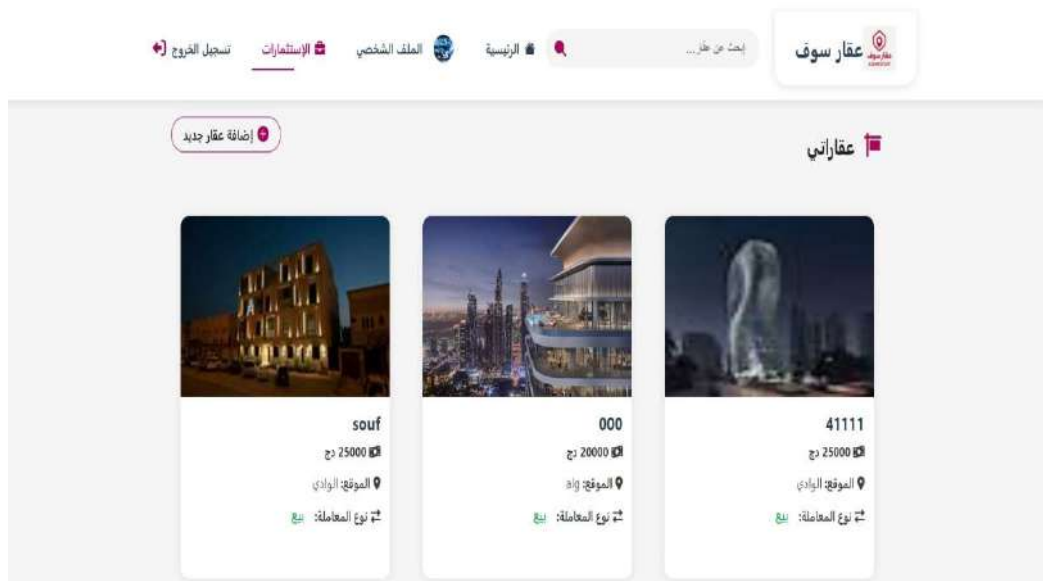


Figure 10-3 User properties

تسجيل الخروج | الإستثمارات | الملف الشخصي | الرئيسية |

بحث عن عقار...

عقار سوف

إضافة عقار جديد

المعلومات الأساسية

عنوان العقار*
 مثال: فيلا رقم 5 للبيع في حي الفرحان

وصف العقار*
 وصف مفصل للعقار...

التفاصيل الفنية

السعر (د.س.)*
 مثال: 1500000

الموقع*
 مثال: الرياض، حي النخيل

المساحة*
 مثال: 200 م²

عدد الغرف*
 مثال: 3

عدد الحمامات
 مثال: 2

سنة البناء
 مثال: 2015

الطابق
 مثال: 1

نوع المعاملة
 اختر نوع المعاملة

نوع العقار*
 اختر نوع العقار

الصور*
 اختيار ملفات | لم يتم اختيار ملف
 الصورة الأولى هي الصورة الأساسية

رقم الهاتف*
 مثال: 966501234567

إنهاء | حفظ العقار

تابعنا

رابط سريعة
 الرئيسية
 من نحن

تواصل معنا
 0900000000
 0000000@gmail.com
 الدمام، الدمام

© 2025 عقار سوف. جميع الحقوق محفوظة.

Figure 11-3 Add property

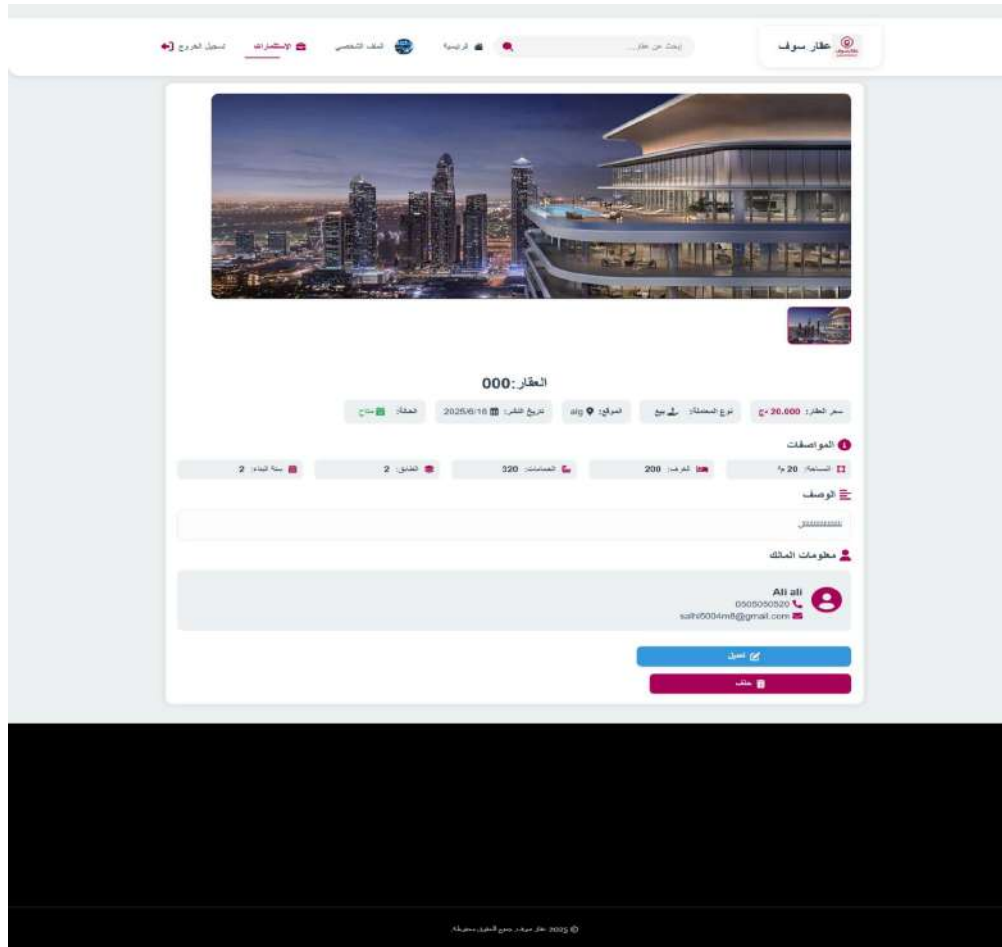


Figure 12-3 Property details

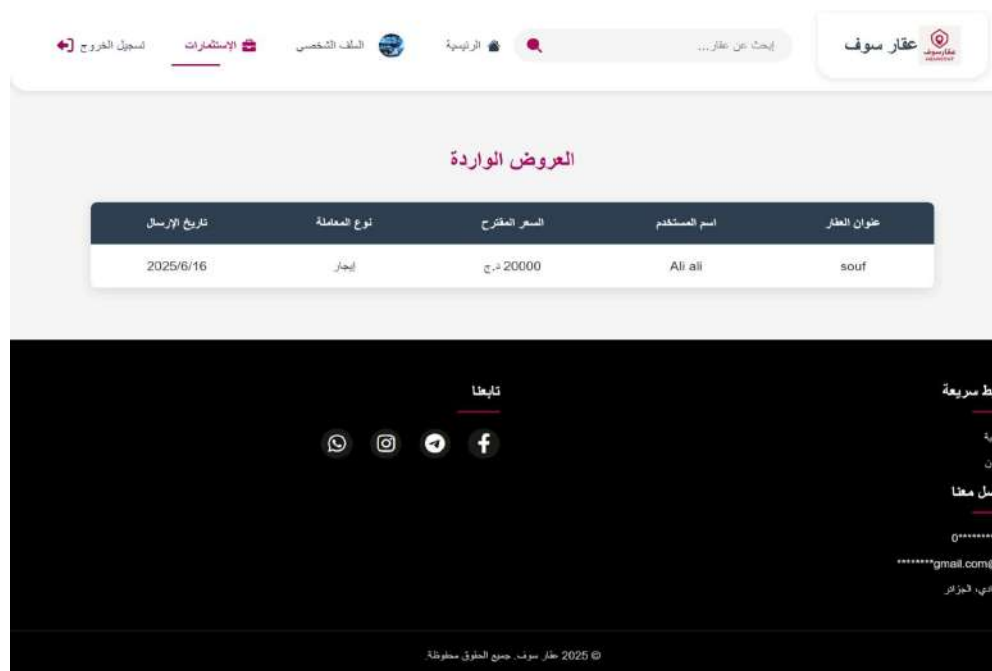


Figure 13-3 Incoming Offers

تفاصيل عرض الإيجار

اسم العميل:	souf
البريد الإلكتروني:	All ali
رقم الهاتف:	sah5004mb@gmail.com
رقم الهاتف:	00605050520
القيمة المقترحة:	20000
مدة الإيجار:	6
ملاحظات:	true
التاريخ الإرسال:	2025/6/16

تايخا

[واتساب](#)
[انستغرام](#)
[تويتر](#)
[فيسبوك](#)

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Figure 14-3 Offer details

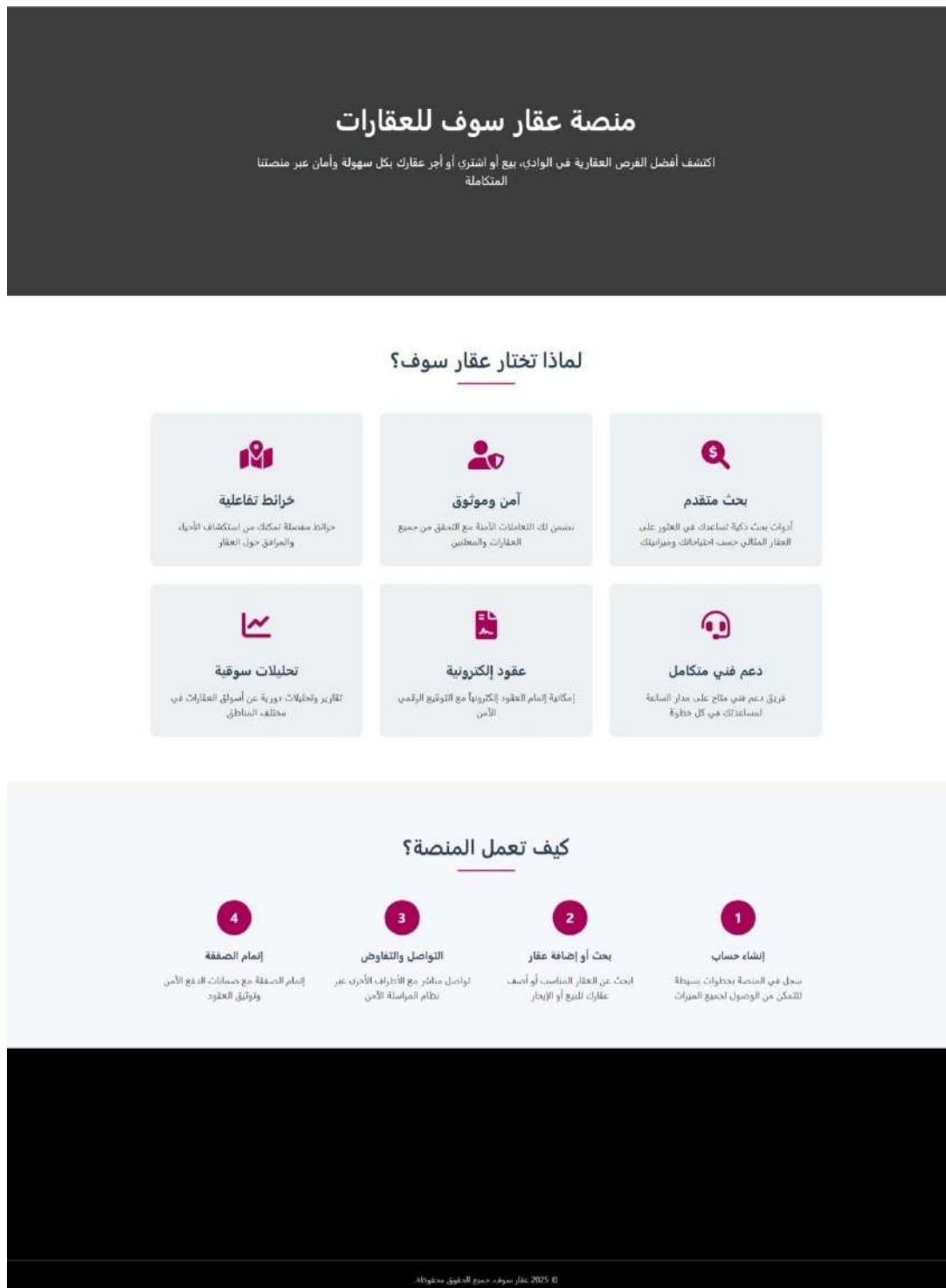


Figure 15-3 Howus page

IV.2. The main interfaces admin pages:



Figure 16-3 Login admin page

رقم المستخدم	الاسم الكامل	البريد الإلكتروني	الحالة	آخر تعديل	الملاحظات
1	Ali ali	sah2004m@gmail.com	ACTIVE	June 16, 2025 4:36 PM	
2	Ali ali	sah2005@gmail.com	ACTIVE	June 16, 2025 5:35 AM	
3	Ali ali	sah2006@gmail.com	ACTIVE	June 16, 2025 5:34 AM	
4	abc12345	sah2007@gmail.com	ACTIVE	June 14, 2025 10:01 AM	
5	abc1236	sah2008@gmail.com	ACTIVE	June 14, 2025 9:44 AM	
6	abdoou sahi	sah@gmail.com	ACTIVE	June 12, 2025 8:01 PM	
7	Admin	sah2009@gmail.com	ACTIVE	June 16, 2025 1:07 PM	

Figure 17-3 Users page

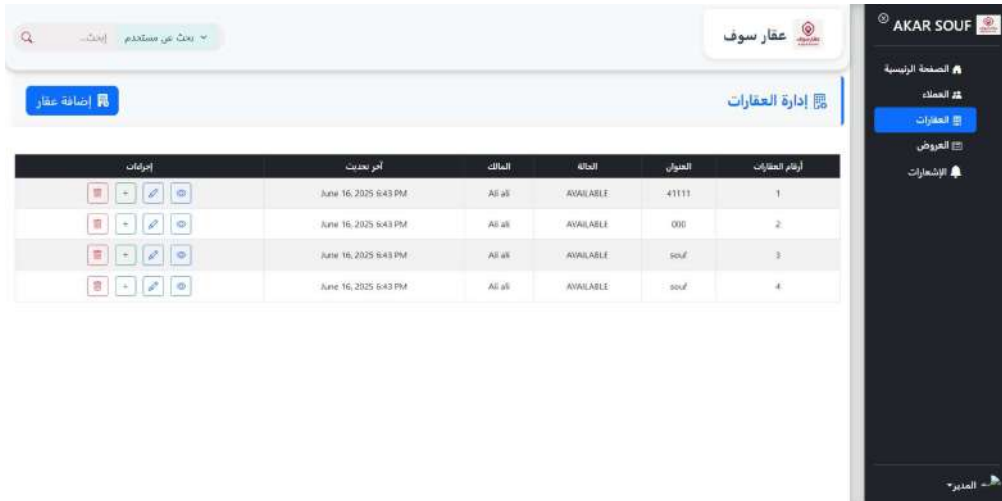


Figure 18-3 Properties page

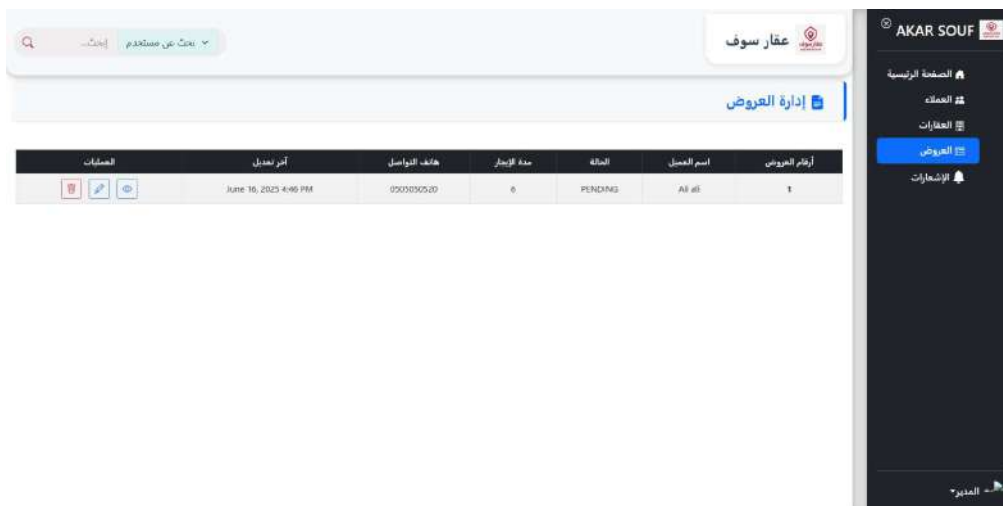


Figure 19-3 offers page

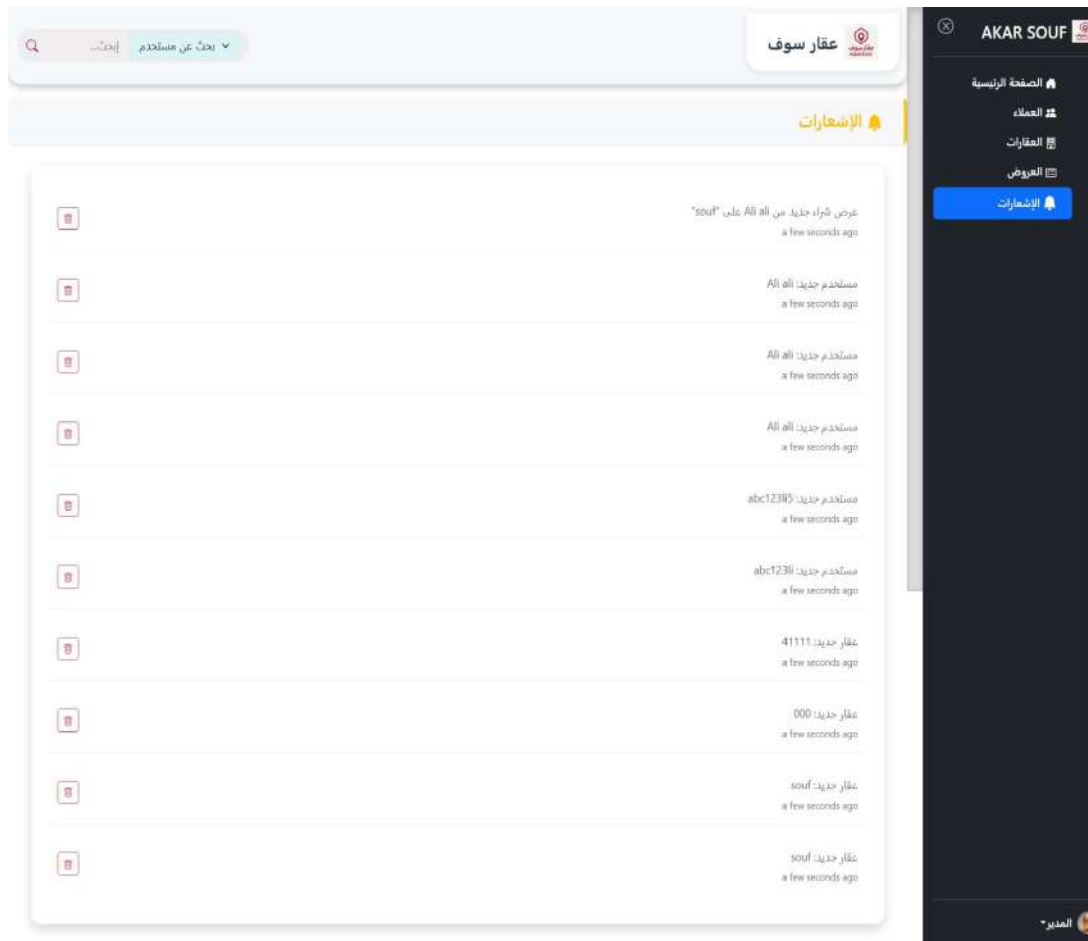


Figure 20-3 Notification page

معلومات Ali ali 

معرف المستخدم: adff3ae0-5ad7-4c72-8494-904391bfa5a9

الاسم الكامل: Ali ali

رقم الهاتف: 0550403020

البريد الإلكتروني: salhi5004m8@gmail.com

الجنس: ذكر

العمر: 20 سنة

المدينة: Djelfa

تاريخ الإنشاء: June 16, 2025 8:11 AM

آخر تعديل: June 16, 2025 4:36 PM

Figure 21-3 User details page

AKAR SOUF

الرئيسية

العملاء

العقارات

العروض

الإشعارات

المدیر

عقار سوف

تعديل بيانات المستخدم Ali ali

الاسم الكامل: Ali ali

البريد الإلكتروني: salhi5004m8@gmail.com

رقم الهاتف: 0550403020

العمر: 20

الجنس: Male

المدينة: Djelfa

الصورة الحالية: تحديث الصورة (اختياري)

اختار الملف

لم يتم اختيار ملف

حذف المستخدم

تحديث البيانات

Figure 22-3 Update user

AKAR SOUF

الرئيسية

العملاء

العقارات

العروض

الإشعارات

المدیر

عقار سوف

إضافة مستخدم

الاسم الكامل: مثال: حسن

البريد الإلكتروني: *****@gmail.com

كلمة المرور: *****

رقم الهاتف: 011987899

العمر: 30

المدينة: اختر المدينة

الجنس: اختر الجنس

صورة المستخدم: اختيار الملف

لم يتم اختيار ملف

إرسال

إلغاء

Figure 23-3 Add user

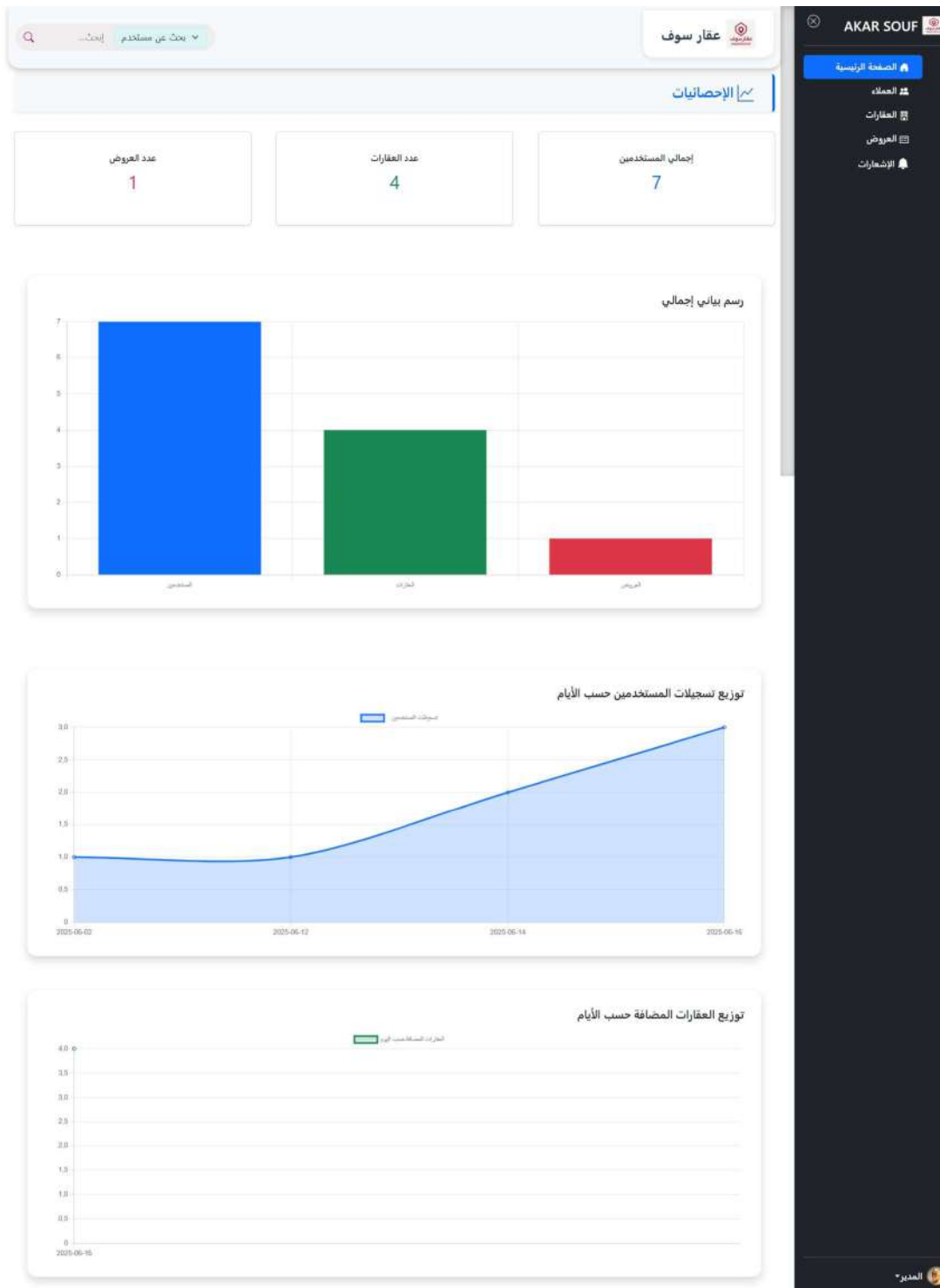


Figure 24-3 Statistics page

مل العقار: 4111

العنوان: الوادي

الوصف: ٥ممممممممممم

النوع: APARTMENT

نوع المعاملة: SALE

السعر: 25000 دج

المساحة: 200 م²

عدد الغرف: 4

الحمامات: 1

التاريخ: سنة البناء: 2000

رقم الهاتف: 0505050520

المالك: Ali

الحالة: AVAILABLE

تاريخ الإضافة: June 16, 2025 4:28 PM

آخر تعديل: June 16, 2025 4:28 PM

الصورة:



Figure 25-3 Property details

AKAR SOUF

الصفحة الرئيسية

التقارير

المعرض

الإشعارات

تدبير العقار

المعلومات الأساسية

عنوان العقار*
41111

وصف العقار*
ممنمممممممممم

التفاصيل الفنية

الموقع*
الوادي

المساحة*
200

عدد الغرف*
4

عدد الحمامات
1

سنة البناء
2000

نوع العقار*
شقة

نوع المفاضلة
تيج

رقم الهاتف*

الإيميل*

الصور الحالية:

الحديث الصور (اختياري)

الحالة
ملاح

أحدث الصور (اختياري)
لم يتم اختيار ملف
اختيار ملفات

أترك التعليق فارلا إذا كنت لا تريد تغيير الصور

Figure 26-3 Update property

إضافة عرض جديد

بيانات العرض

رقم الهاتف: 055xxxxxxx
 الحالة: قيد الانتظار
 الضلع (إرسال): 100000
 البريد الإلكتروني*: example@mail.com

ملاحظات إضافية
 أدخل أي تفاصيل إضافية هنا...

إلغاء | حفظ العرض

AKAR SOUF

- الصفحة الرئيسية
- المعاملات
- العقارات
- العروض
- الإشعارات

المدير

Figure 27-3 Add offer

تفاصيل العرض

معلومات العميل

رقم العميل: adff3ae0-5ad7-4c72-8494-904391bfa5a9
 الاسم: Ali ali
 البريد الإلكتروني: sahi5004m8@gmail.com
 رقم الهاتف: 0505050520

معلومات العقار

رقم العقار: oed51dbf-3e66-4e89-a944-17dbf9d242dc
 اسم المالك: Ali ali
 حالة العقار: AVAILABLE
 العنوان: souf
 نوع المعاملة: RENT
 المساحة: 200 م²
 المرفق: الوادي
 السعر: 25000 ج.
 تاريخ الإضافة: June 16, 2025 6:57 PM
 آخر تحديث: June 16, 2025 6:57 PM

تفاصيل العرض

رقم العرض: 13be3fa0-73fb-4877-b8aa-3341fbc3e5ed
 القيمة المعروضة: 20000 ج.
 الحالة: PENDING
 مدة الإيجار: 6
 ملاحظات: true
 تاريخ الإنشاء: June 16, 2025 4:46 PM
 آخر تعديل: June 16, 2025 4:46 PM

حفظ العرض

AKAR SOUF

- الصفحة الرئيسية
- المعاملات
- العقارات
- العروض
- الإشعارات

المدير

Figure 28-3 Offer details

AKAR SOUF

الرئيسية
العملاء
العقارات
العروض
الإشعارات

تعديل العرض

قيمة العرض: 20000

معمولة: 5%

مدة الإيجار: 6

ملاحظات: true

رقم الهاتف: 0505050520

إلغاء | حفظ التعديلات

Figure 29-3 Offer update

AKAR SOUF

الرئيسية
العملاء
العقارات
العروض
الإشعارات

Admin
saibhae3958@gmail.com

المعلومات الشخصية

رقم الهاتف: 0776318995222

العنوان: RIGURBA00

الجنس: Male

العمر: 55

آخر تحديث: 16 يونيو 2020

الحالة: ACTIVE

تاريخ الميلاد: 2005/3/1

المدينة:

تاريخ إنشاء الحساب: 1 يونيو 2020

تعديل الملف الشخصي

Figure 30-3 Admin profile

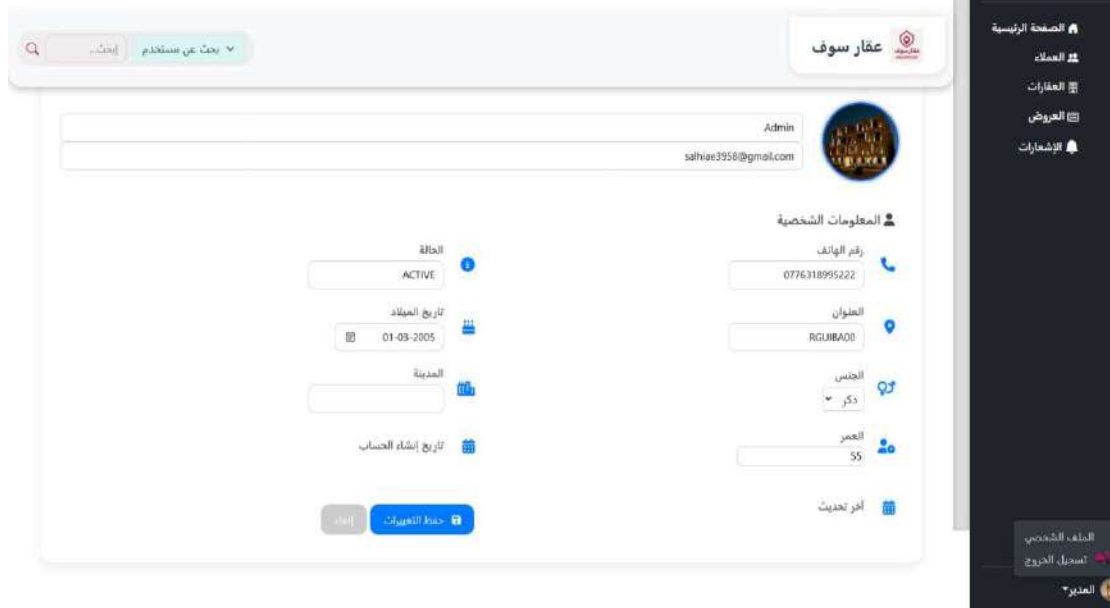


Figure 31-3 Update admin profile



Figure 32-3 Search by user



Figure 33-3 Search by properties

V. Conclusion :

After completing the implementation of the designed models and transforming them into functional components within the application, we presented the practical aspect of the project by showcasing the development stages and the tools used. Then we created the site, represented by both the front-end, which provides users with an effective and seamless experience, and the back-end, which ensures secure and reliable management of data and transactions.

General Conclusion:

In the context of the rapidly accelerating global digital transformation, adopting smart and innovative solutions has become essential for modernizing traditional sectors, with real estate being one of the most important. This study focused on the design and development of an integrated electronic platform for managing real estate agencies, starting with a comprehensive analysis of the current system and an in-depth study of its functional and technical requirements. This was followed by modeling the core functions using Unified Modeling Language (UML) diagrams to ensure clarity in design and structure. The project then progressed to the implementation phase, utilizing the latest web technologies to build a strong, user-friendly, and scalable platform. Particular emphasis was placed on ensuring that the platform supports the ongoing development of real estate transactions and enables efficient tracking and management of the real estate market, contributing to the company's growth and enhancing its competitive capability. This project aims to be a foundational step for future digital initiatives in the real estate sector and a valuable reference for developers and institutions wishing to create similar platforms.

References:

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