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Software Design Description

AGRICROWD

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1. INTRODUCTION

1.1. Purpose

This Software Design Document (SDD) defines the detailed software design and architecture of the "Agricrowd" platform. Agricrowd is designed to facilitate the more efficient distribution of financial support and resources in the agricultural sector, providing farmers and agricultural entrepreneurs with the necessary tools and resources to realize innovative projects. This document provides in-depth information required to understand the functional and technological aspects of the platform, guiding developers, designers, and project managers. By comprehensively addressing the system's components, interfaces, data structures, security policies, and user interactions, it offers a clear understanding and consistent vision across all aspects of the project. The goal is to position the Agricrowd platform as a sustainable and effective solution, overcoming current challenges in the agricultural sector. This will enable agricultural projects to reach a broader investor base, fostering innovation and development in the agricultural sector and ultimately contributing to global food security.

1.2. Scope

This SDD comprehensively addresses the software components, technological framework, functionality, and user interactions of the "Agricrowd" platform. The scope includes the system's architecture, data models, user interface design, security measures, performance requirements, scalability strategies, and future development pathways. It is designed to provide a clear explanation of how the platform offers a solution for various types of users, the technological infrastructure of this solution, and how users will interact with the platform.

1.3. Glossary

Term	Definition
Agricrowd	Agricultural crowdfunding platform.
Software Design Document (SDD)	A document outlining software design.
Blockchain	Distributed ledger technology for secure and immutable data recording.
Investee	Typically the project or entrepreneur seeking funds.
Investor	An individual or organization providing capital to projects or ventures.
Smart Contract	Self-executing contracts running on a blockchain, triggered by specific conditions.
Cryptocurrency	Digital or virtual currency secured using encryption techniques.
Wallet	Secure digital asset storage for blockchain transactions.
React	React is an open-source JavaScript library for building user interfaces on web applications, known for its efficiency in rendering and managing dynamic, interactive components.

1.4. Overview of Document

This section provides a concise summary of the document's structure and content, offering readers a clear guide to the information and details they will encounter in the following sections. It also outlines the purpose of each section and its role in the overall development process of the "Agricrowd" project. By doing so, this section provides readers with a comprehensive understanding of what to expect as they navigate through the document and presents a general framework for the design and development process of "Agricrowd."

1.5. Motivation

"Agricrowd" has been designed in response to the current challenges and opportunities in the agricultural sector. This section elaborates on the sources of inspiration behind the project, its objectives, and its long-term vision. It provides an in-depth perspective on how "Agricrowd" aims to transform the agricultural sector, offer new opportunities to farmers and entrepreneurs, and create value for investors. Additionally, it emphasizes the project's social impact, its potential to promote sustainable agricultural practices, and how it intends to bring together the global agricultural

community. The Motivation section highlights that "Agricrowd" is not just a technological initiative but also possesses a comprehensive social mission.

2. SYSTEM DESIGN

The system design of Agricrowd has been thoughtfully and thoroughly planned to meet the functional and technological requirements of the platform. This section details the fundamental architectural building blocks, components, and their interrelationships within Agricrowd. The system design is meticulously prepared to ensure that users can use the platform efficiently, securely, and effectively.

2.1. Architectural Design

The architectural design of Agricrowd lays the foundation for the agricultural crowdfunding platform and effectively brings together farmers and investors. Utilizing modern and scalable technologies (Node.js, React, MongoDB, and Ethereum), the platform enables users to easily create, showcase, and fundraise for projects. With a focus on security and efficiency, Agricrowd provides a transparent and reliable environment to meet the financing needs of the agricultural sector.

2.1.1. Problem Description

Agricrowd is a crowdfunding platform aimed at addressing a fundamental issue in the agricultural sector — the limited access to financing for farmers and agricultural entrepreneurs. The constraints of traditional financing methods pose significant barriers, particularly for small-scale farmers and new ventures. The platform seeks to tackle this problem by presenting these users' projects to a broad investor base and facilitating the fundraising process. The primary challenge is creating a reliable, accessible, and transparent environment that meets the varying needs of different user groups such as farmers, entrepreneurs, and investors. Agricrowd aims to fulfill these needs, thereby fostering sustainable growth and supporting innovative projects in the agricultural sector.

2.1.2. Technologies Used

Agricrowd utilizes modern and powerful technologies to create an effective crowdfunding platform in the agricultural sector. The technologies selected to meet the needs for performance, scalability, and security include:

- *Frontend:* React - Offers dynamic and responsive user experiences. Its component-based architecture allows for the rapid and efficient development of user interfaces. [1]
- *Backend:* Node.js - Provides robust data processing and API services, ensuring the platform operates quickly and reliably. Node.js is particularly adept at managing high concurrent transactions. [2]
- *Database:* MongoDB - An ideal choice for flexible data structures and fast query responses. It effectively manages large data sets and offers high performance. [3]

- *Blockchain:* Ethereum - Used for smart contracts and secure transactions. Ethereum's widely-adopted platform ensures transparent and reliable fund management. [4]
- *MetaMask Wallet:* Enables users to easily interact with the Ethereum network. It's a fundamental tool for managing crypto assets and interacting with smart contracts. [5]
- *Solidity and Remix:* Solidity is the preferred language for developing Ethereum smart contracts. Remix is a web-based IDE used for the development, testing, and deployment of these contracts. [6]
- *IPFS and Pinata:* Distributed file storage solutions. IPFS offers efficient data storage, while Pinata provides easy access and management. Together, they optimize the platform's data storage and access processes. [7]
- *Blockchain Test Networks (Sepolia, etc.):* Ethereum's test networks are used to test smart contracts and transactions before they are deployed on the main network. These networks help identify errors and security vulnerabilities early in the development process, ensuring the platform is safer and more effectively presented to users. [8]

The integration of these technologies makes Agricrowd a reliable, accessible, and transparent crowdfunding platform for farmers, entrepreneurs, and investors in the agricultural sector. Each technology has been carefully selected and implemented to enhance the overall performance and user experience of the platform.

2.1.3. Data Flow Diagram

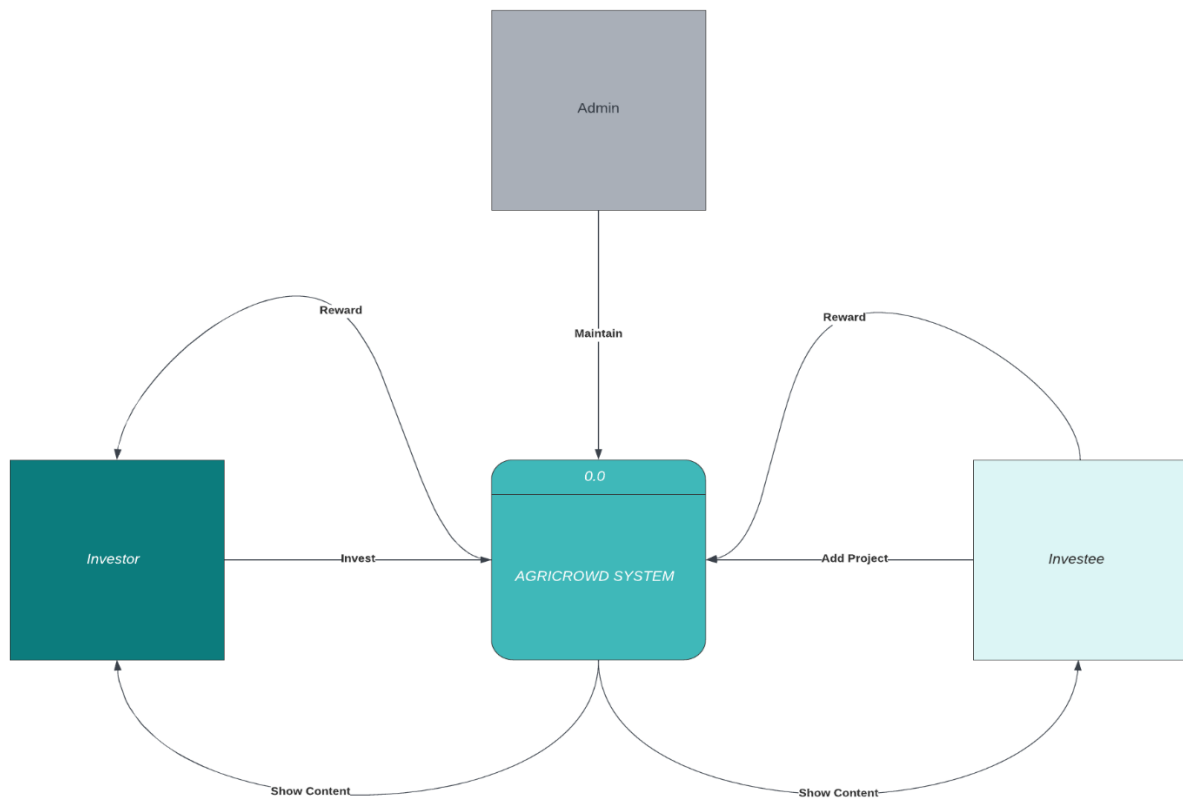


Figure 1 Context Diagram - DFD Level-0

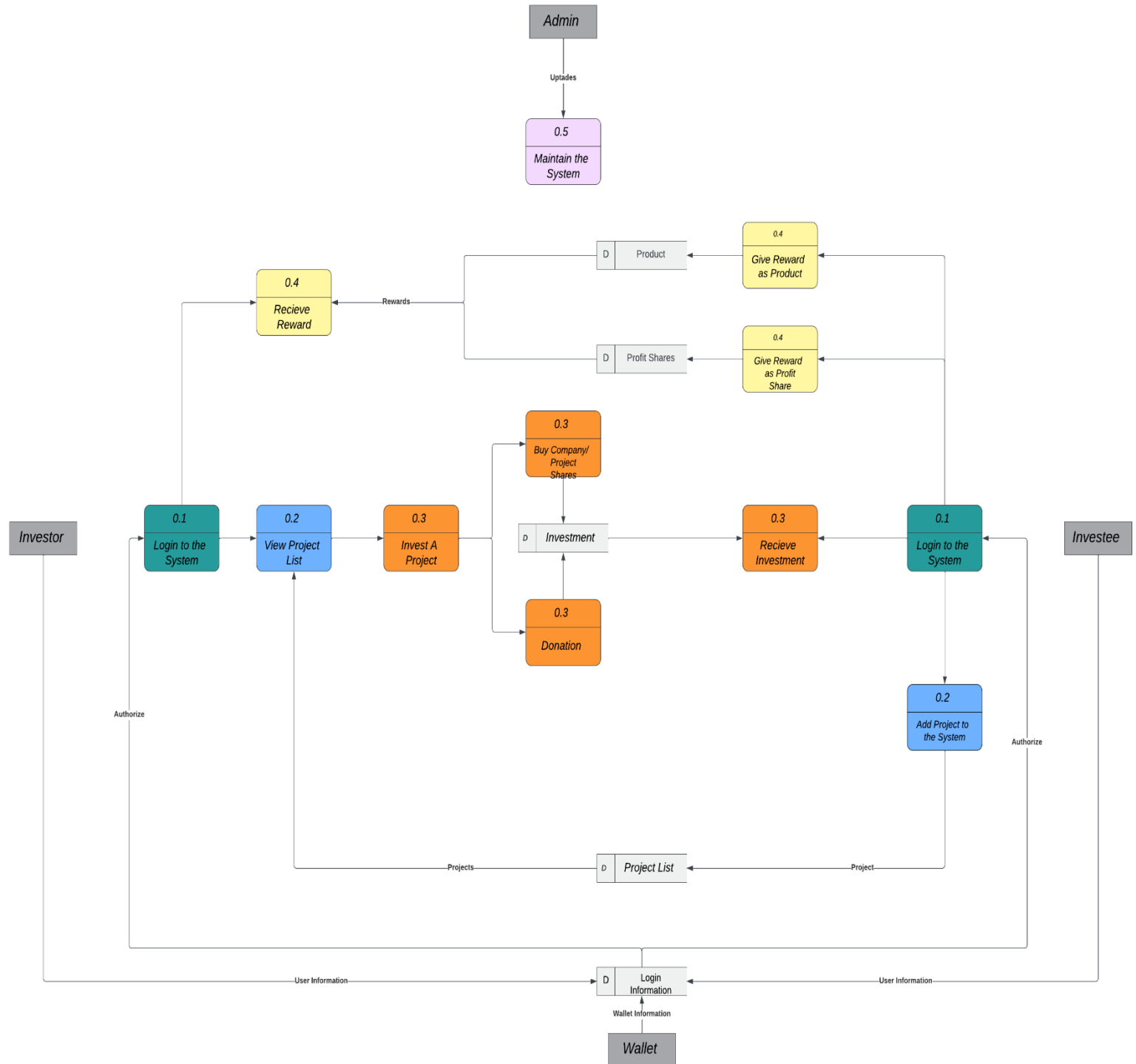


Figure 3 DFD Level-2

2.1.4. Activity Diagram

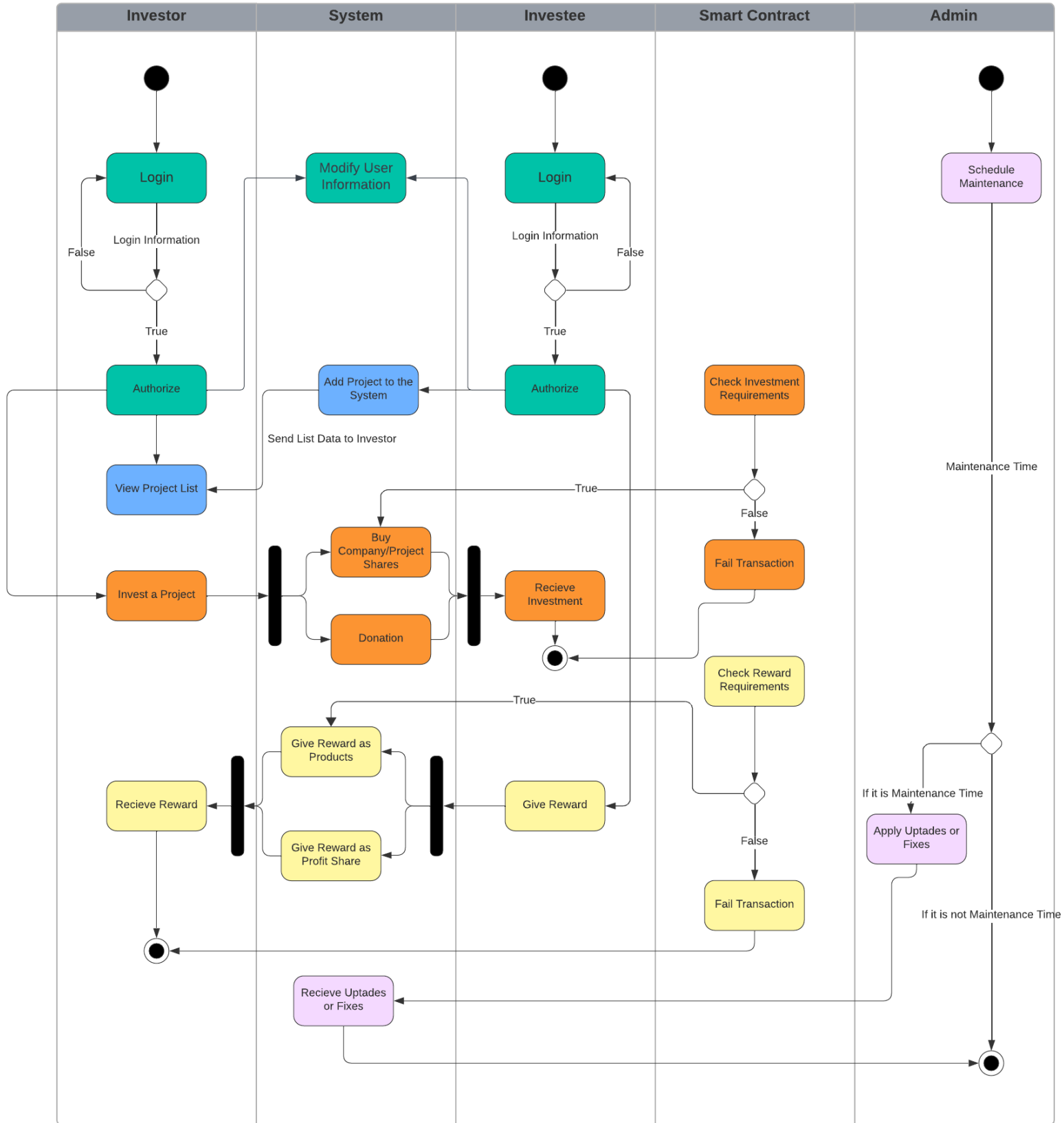
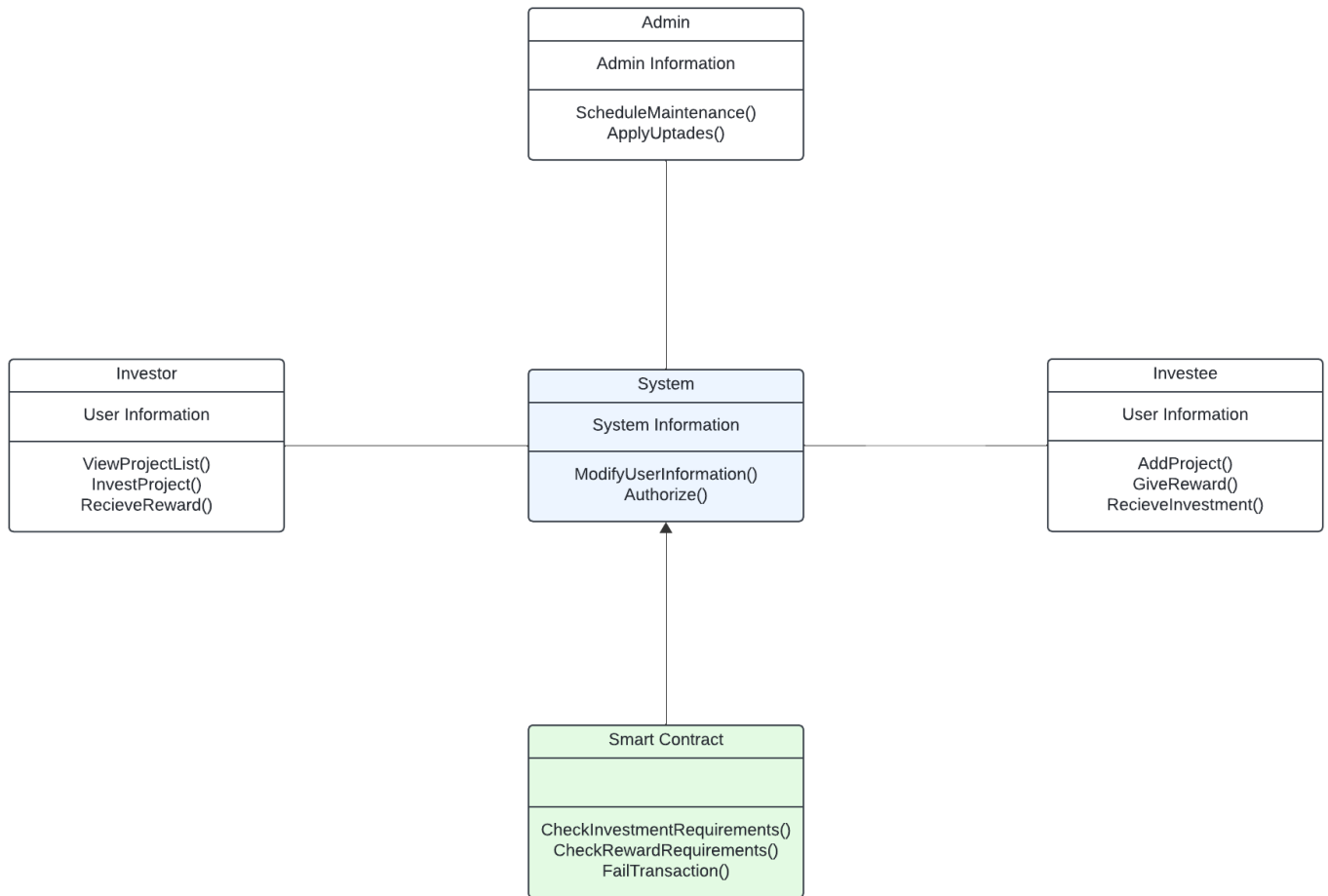


Figure 4 Activity Diagram

2.1.5. Class Diagram



2.1.6. Sequence Diagram

2.1.6.1. Register Sequence Diagram

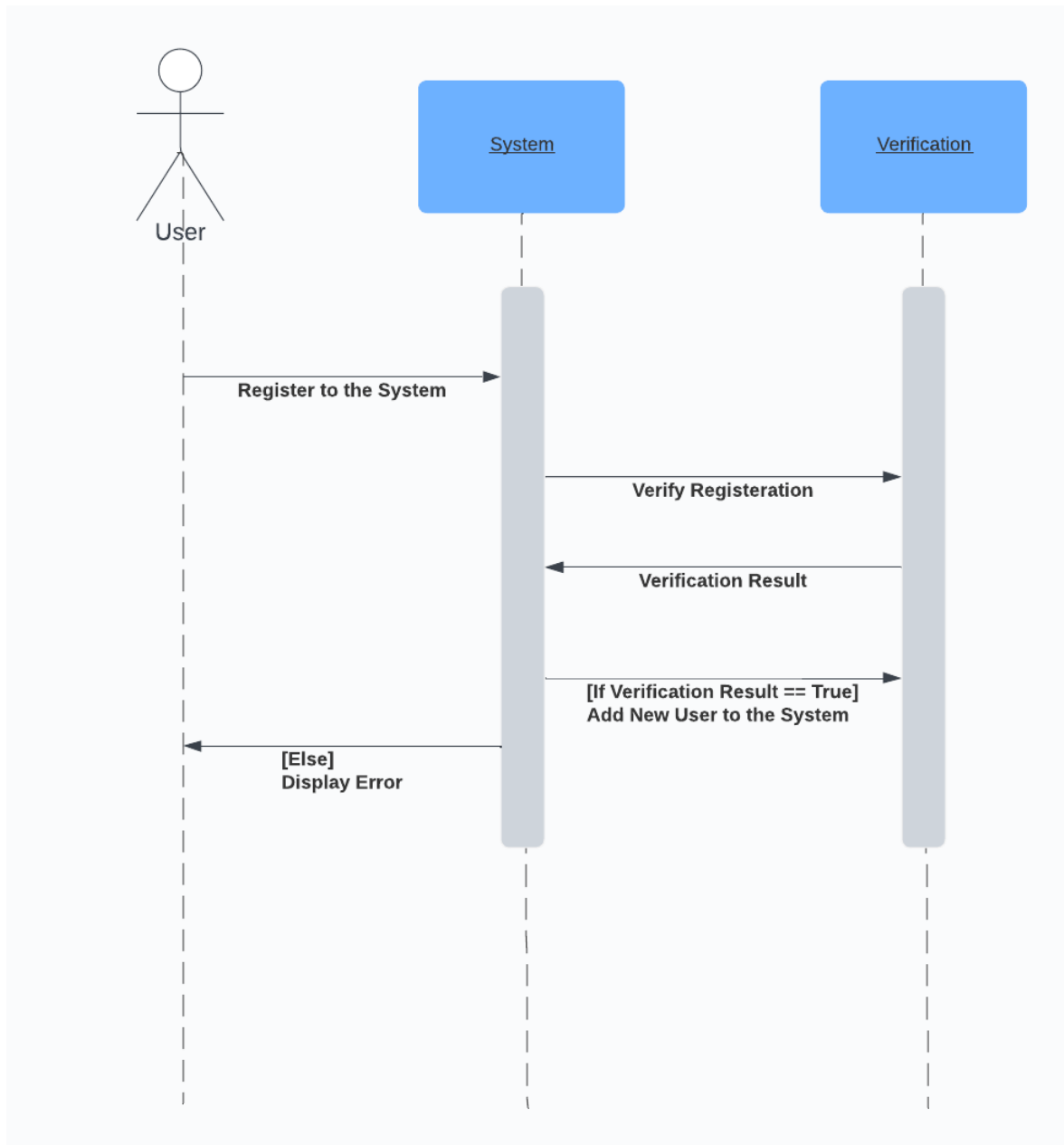


Figure 5 Register Sequence Diagram

2.1.6.2. Login Sequence Diagram

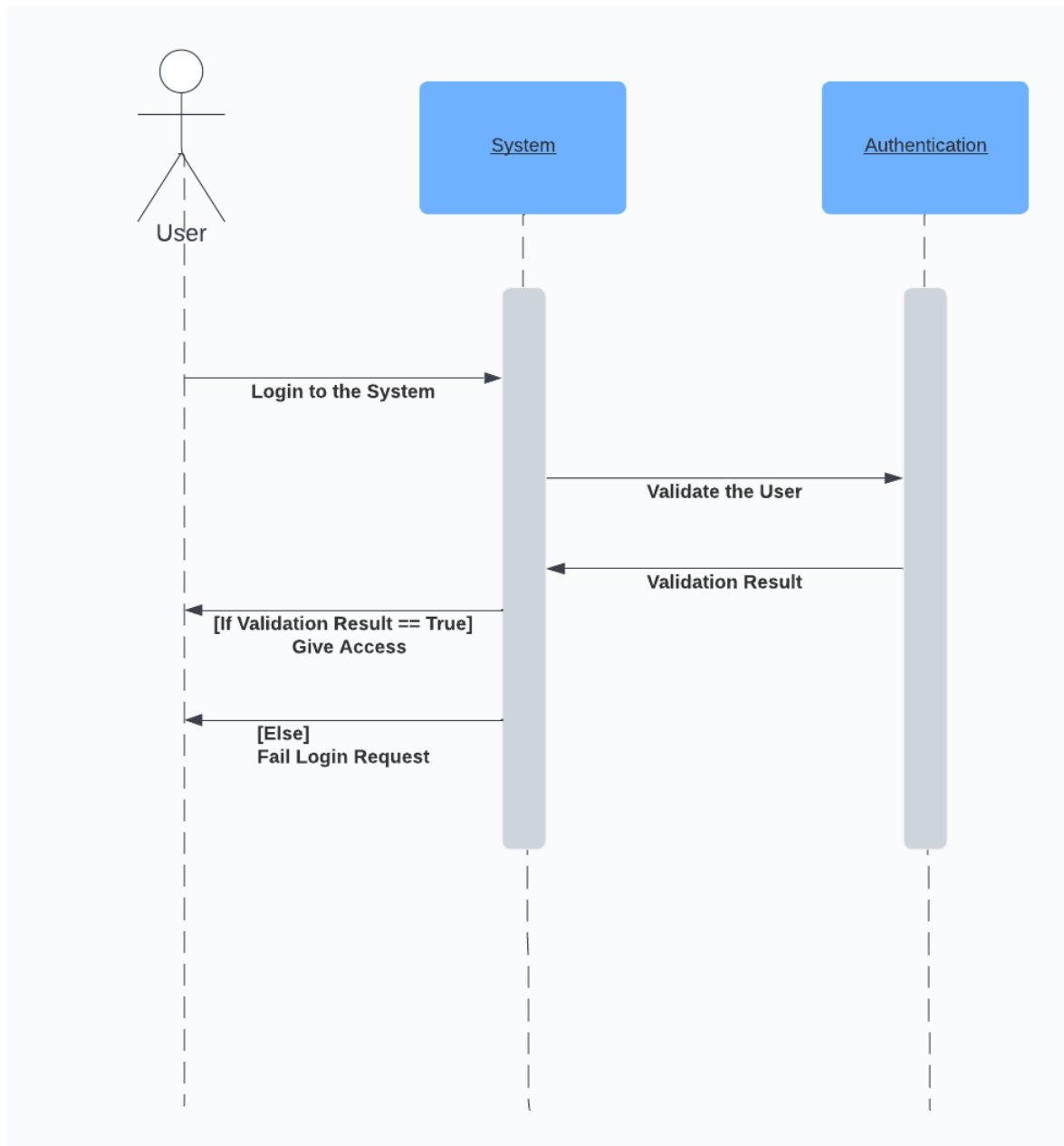


Figure 6 Login Sequence Diagram

2.1.6.3. Add Project Sequence Diagram

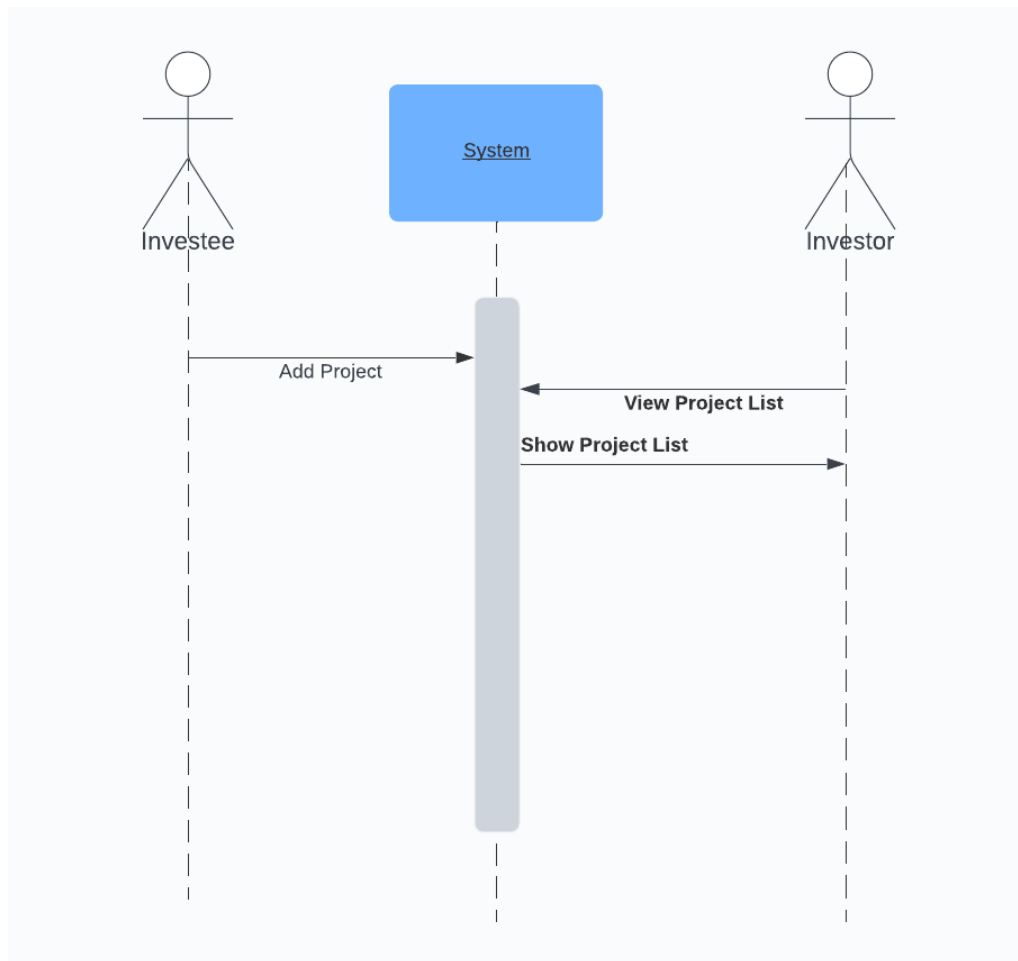


Figure 7 Add Project Sequence Diagram

2.1.6.4. Investment Sequence Diagram

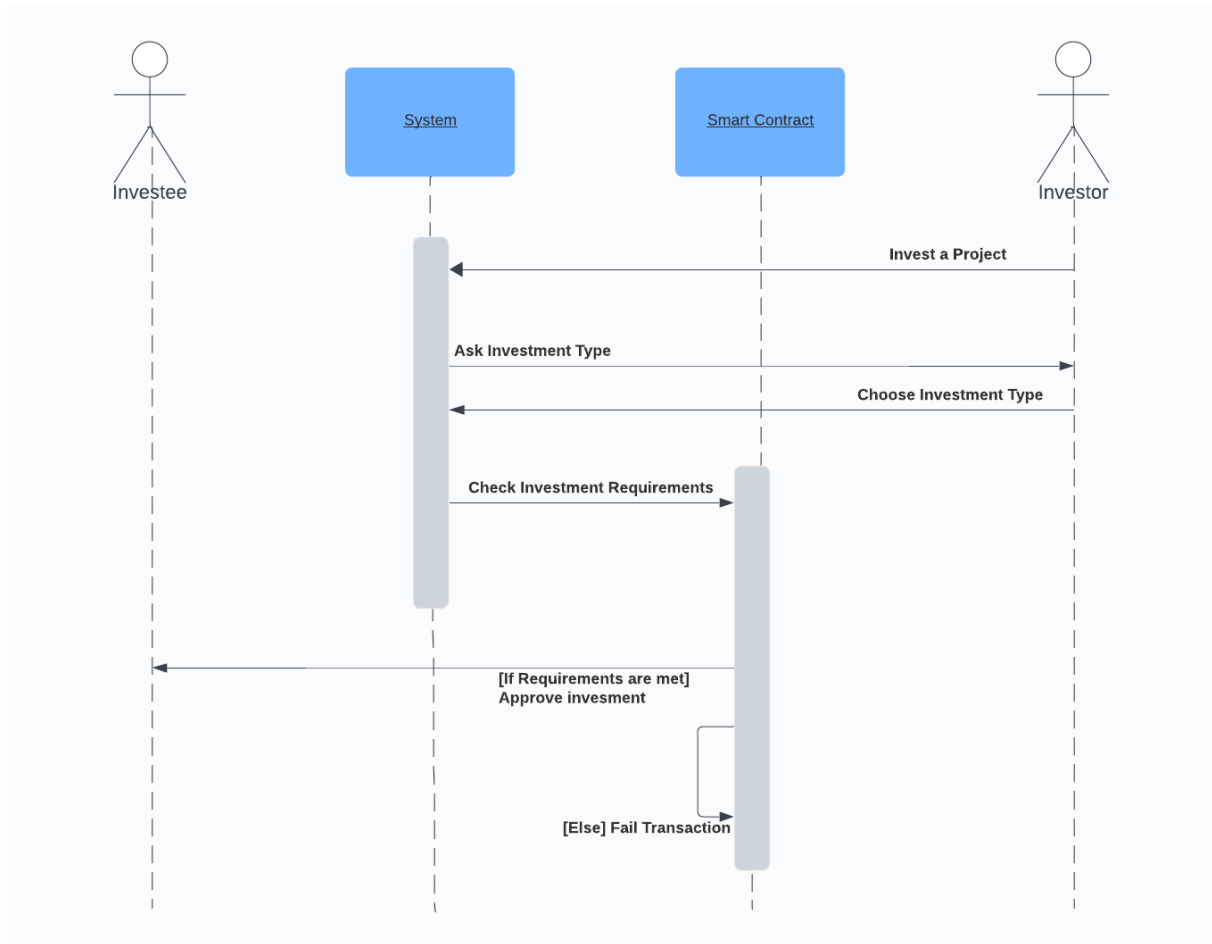


Figure 8 Investment Sequence Diagram

2.1.6.5. Giving Recieving Reward Sequence Diagram

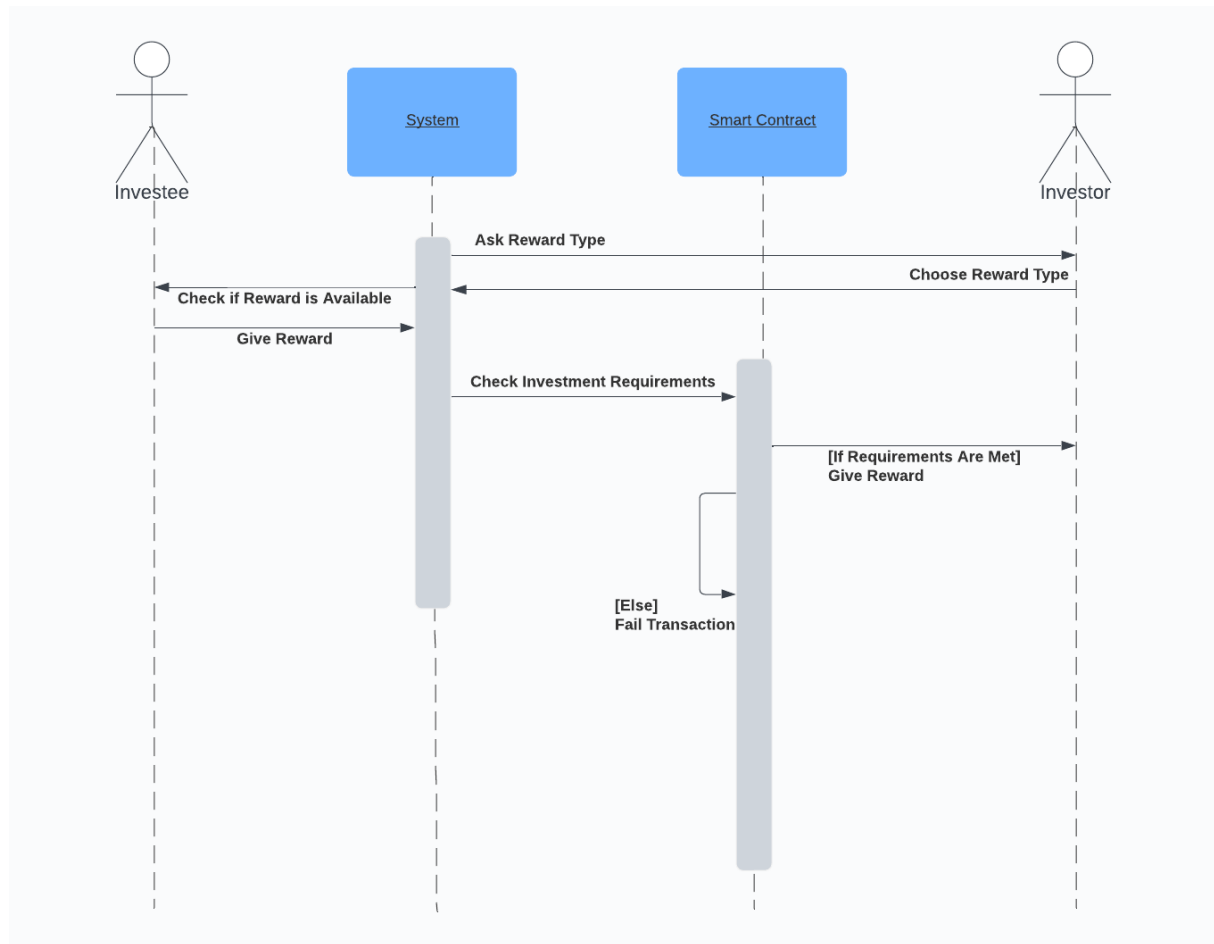


Figure 9 Giving Recieving Reward Sequence Diagram

2.1.6.6. Maintenance Sequence Diagram

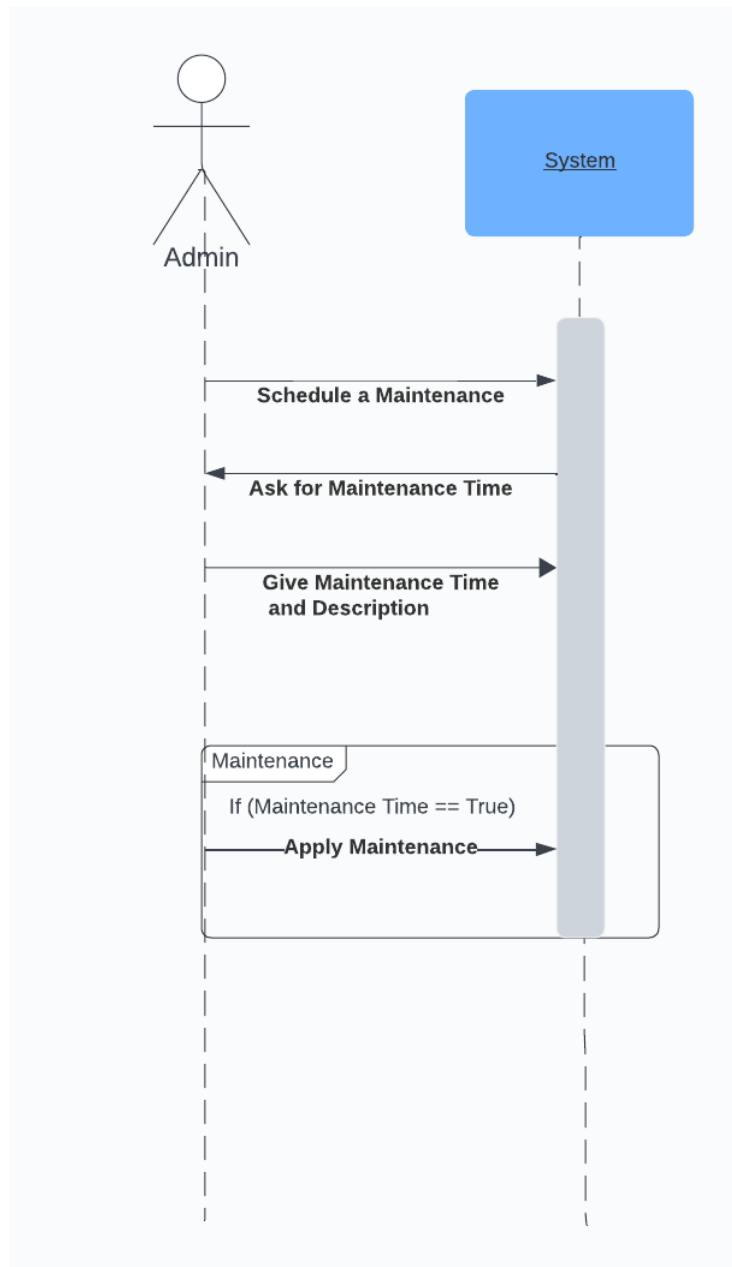


Figure 10 Maintenance Sequence Diagram

3. USER INTERFACE DESIGN



Figure 11 Main Page

In Figure 5, we can generally see the purpose of the project, and it is the first page we encounter when entering the site.

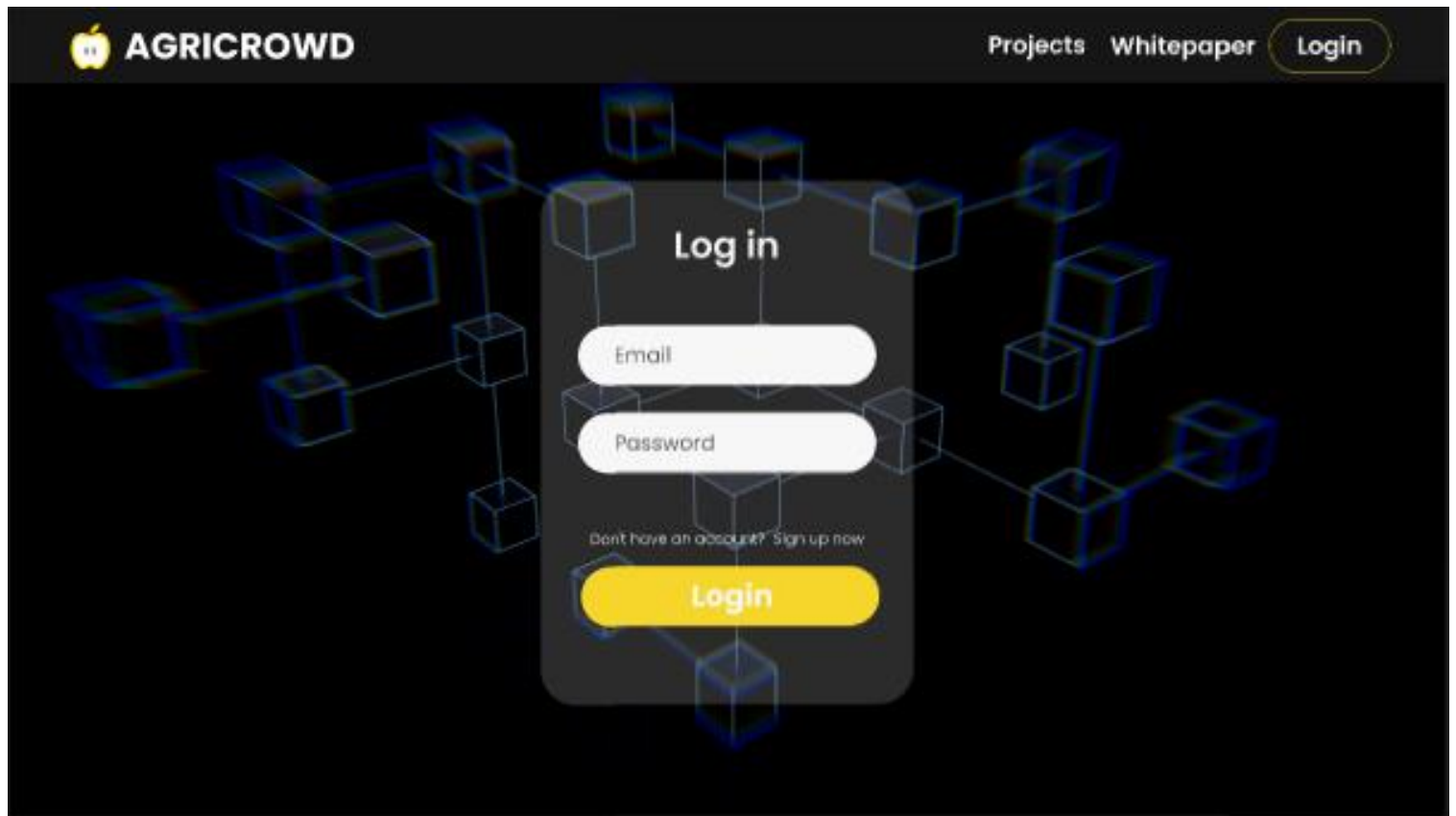


Figure 12 Login Page

In Figure 6, there is a section where we can register to view projects in the system and make investments. This is also the area where we can log in to the system.

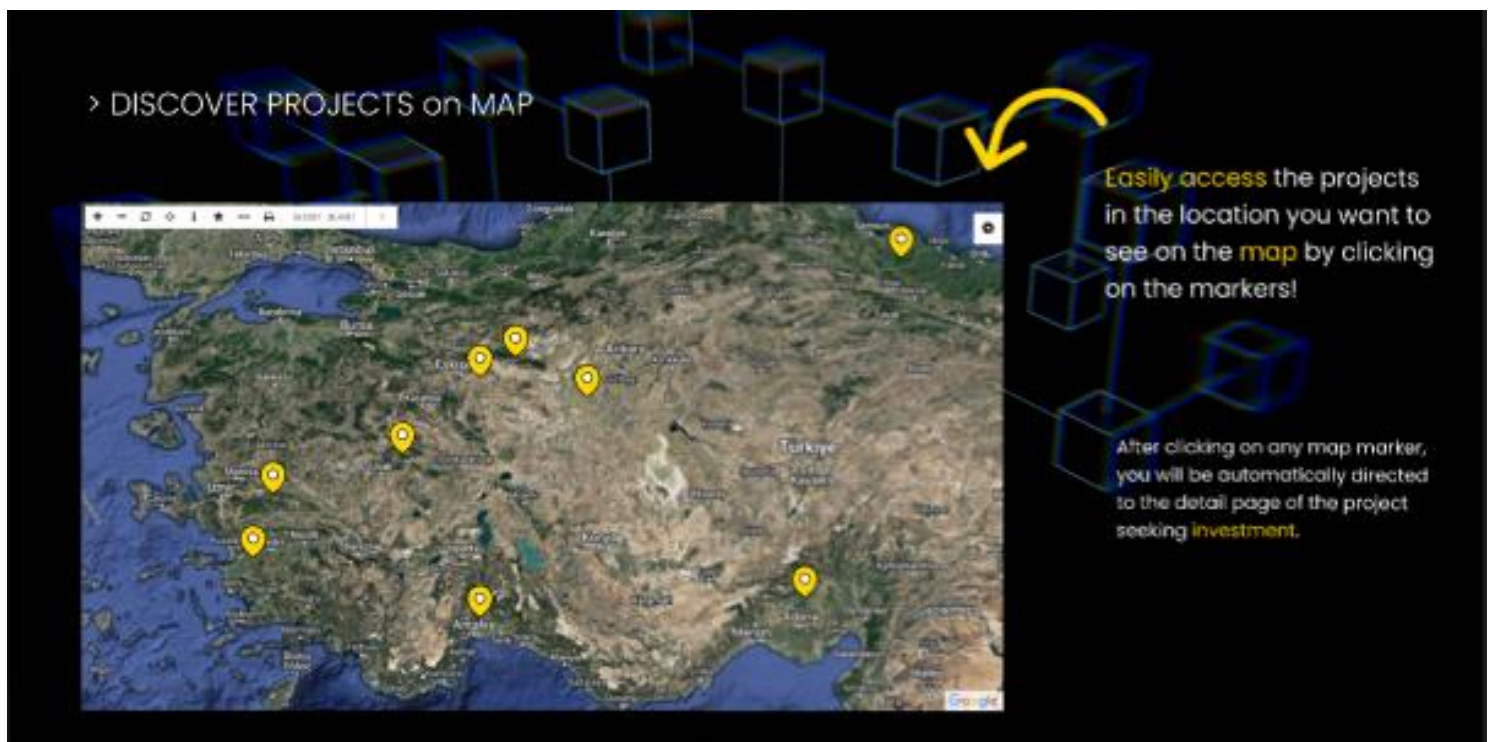


Figure 7 Projects on Map

In Figure 7, there is a mapping system where we can obtain information about the exact locations and progress of existing projects.

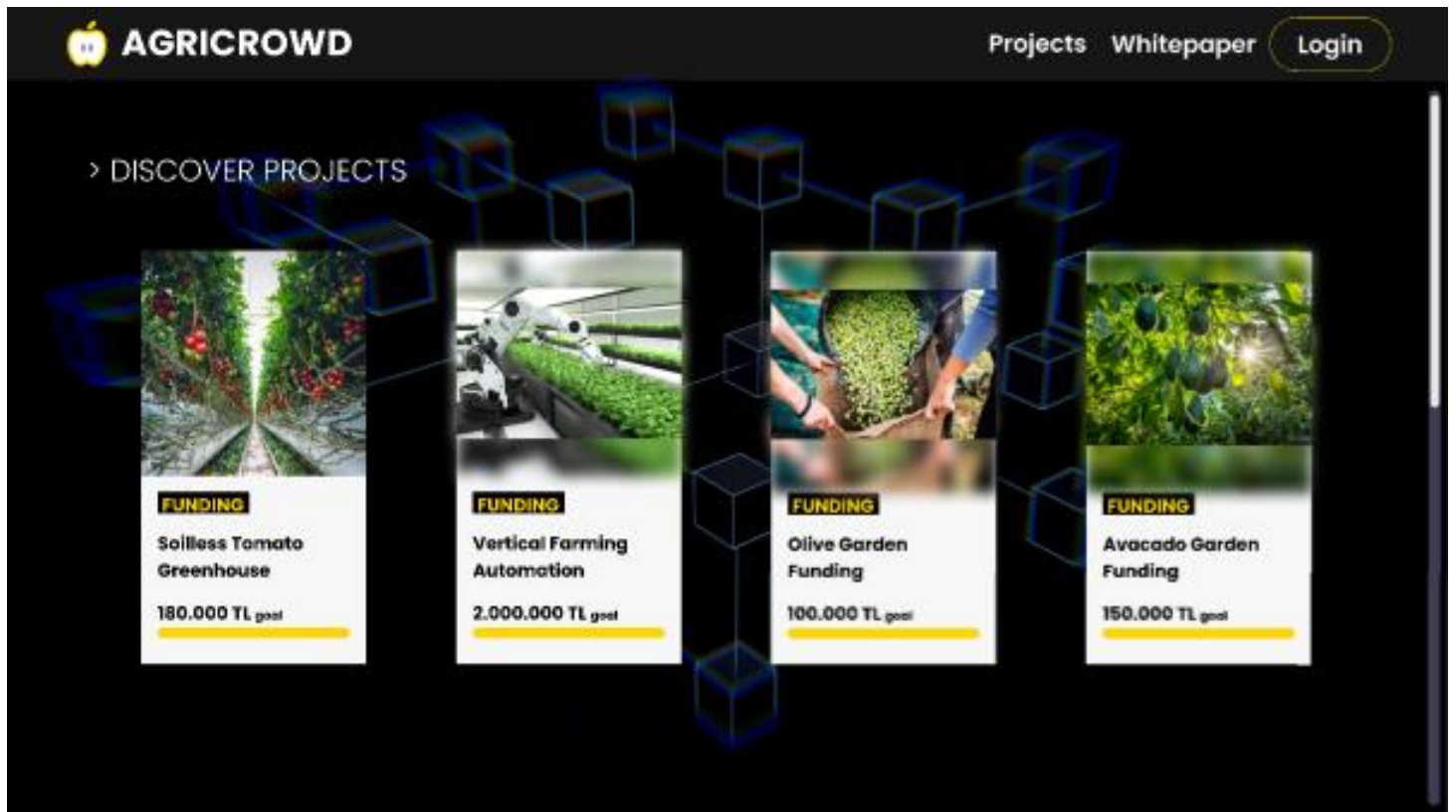


Figure 8 Discover Projects Page

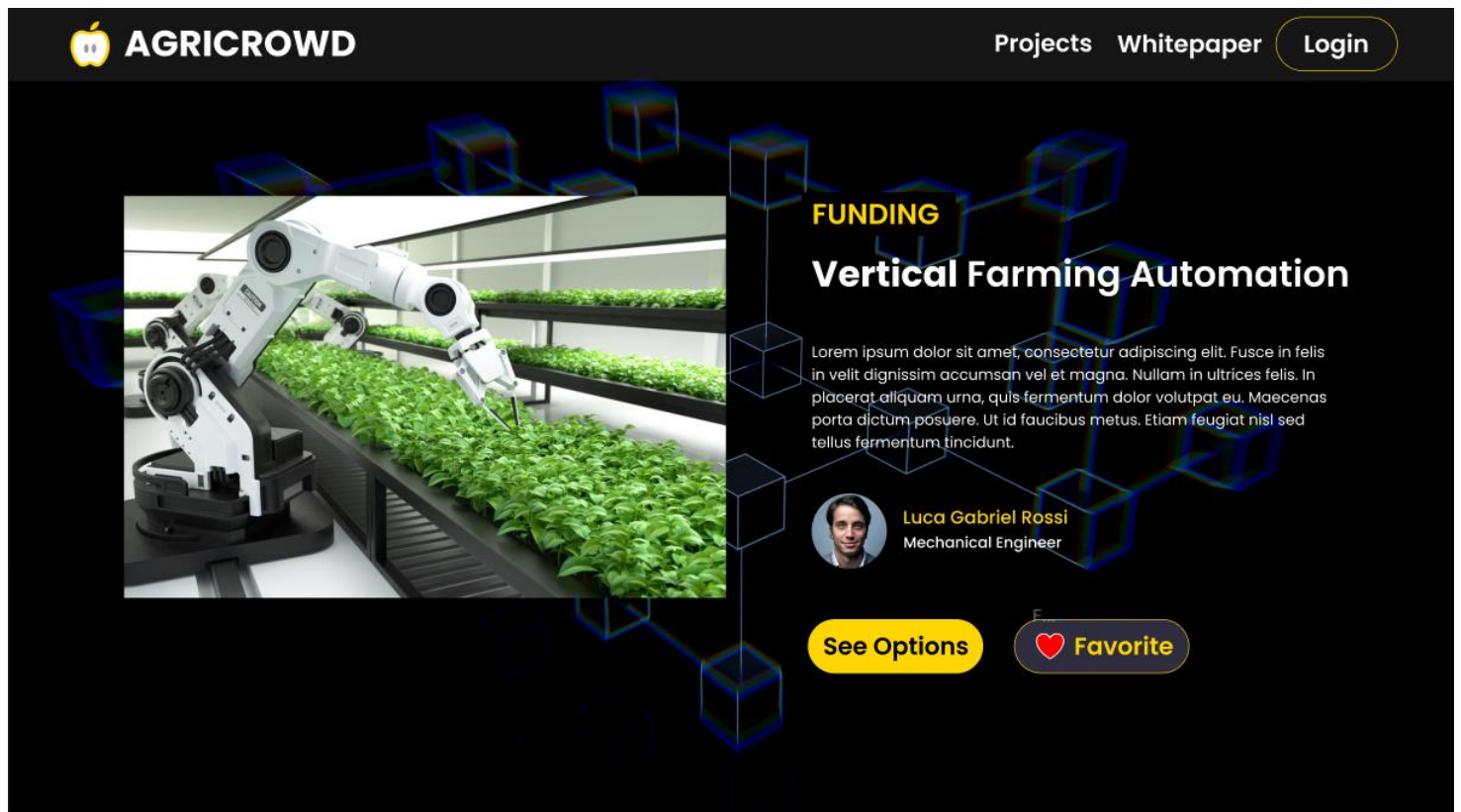


Figure 9 Project Description

In Figure 9, there is a page where the user can see the details of the project they selected in the project selection screen. With the 'see option,' they can explore investment choices, and with the 'favorite' button, they can add the project to favorites for future reference.



Figure 10 Whitepaper

In Figure 10, we have our whitepaper document that outlines the working principle, application areas, and advantages of our product.

4. REFERENCES

- [1]. Facebook. "React - A JavaScript library for building user interfaces."
<https://reactjs.org/docs/getting-started.html>
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- [3]. Reference: MongoDB, Inc. "MongoDB Documentation." <https://docs.mongodb.com/>
- [4]. Buterin, Vitalik. "Ethereum Whitepaper." <https://ethereum.org/en/whitepaper/>
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- [7]. Protocol Labs. "IPFS Documentation." <https://docs.ipfs.io/>
- [8]. Ethereum.org. "Ethereum Test Networks." <https://ethereum.org/en/developers/docs/networks/>