



## **Software Engineering project 2023/2024**

### **Ca' Foscari University of Venice**



**Requirement Analysis**  
2.0

**AgileMasters**

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### Document Informations

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# 1. Introduction

## 1.1. Purpose of the Document

This document serves the purpose of providing a clear definition of both the **formal** and **non-formal** requirements concerning the project. We will begin by offering a concise overview of the application's functionalities.

Furthermore, the central portion of this document is dedicated to system models, with a particular focus on UML (Unified Modeling Language). UML is a modeling language that establishes a standardized notation for the elements that constitute a software system.

In the subsequent sections, we will delve into the comprehensive details of **functional** and **non-functional** requirements, as well as their measurement and specification.

## 1.2. System Functionality

The project's primary objective is to design and develop an Android application, FinanceFlow, accessible to all users with an Internet connection. FinanceFlow serves as an educational platform, guiding users through the intricacies of investing in cryptocurrencies and stocks. Key features include assistance from chatbots and a predictive model, leveraging reinforcement learning to enhance accuracy continually.

Upon registration, each user is endowed with a standard allocation of fictitious funds, allowing them the freedom to invest as they see fit. While users are welcome to pursue their investment strategies independently, the platform encourages gradual learning. To facilitate this, users have access to a curated selection of news articles related to their investments or other relevant information.

The platform also provides intuitive charts illustrating the performance of stocks and cryptocurrencies. These charts offer an overview of each user's fictitious account balance, simplifying the tracking of their investments.

A pivotal aspect of the project is the reinforcement learning-based predictive model. This model learns and improves its accuracy over time, ensuring that users receive increasingly precise predictions as they engage with the platform. This forward-looking approach empowers users with a valuable tool for making informed investment decisions.

To promote financial literacy, the platform offers extensive learning resources, including FAQs, chatbot support, and curated news. This comprehensive approach ensures that users gain a solid foundation in trading principles, allowing them to navigate the complex world of finance with confidence.

Furthermore, FinanceFlow is designed with a user-friendly interface, ensuring that users of all backgrounds can comfortably engage with the platform. The inclusive approach aims to welcome individuals at all levels of expertise, from beginners to seasoned traders.



In addition, in the event that a user depletes their allocated funds, they will be directed to the "Help" page. Here, the AI will engage the user with quizzes designed to enhance their understanding of how stocks work. For each correct answer, users will receive rewards, providing them with an opportunity to replenish their funds and resume their investment activities.

The project's commitment to providing relevant, accurate, and accessible financial information contributes to a more informed society, combating misinformation and empowering users to make sound financial decisions. By implementing these innovative features and focusing on continuous learning, "FinanceFlow" is poised to revolutionize financial education and investment practices.



## 2. Glossary

**Functionalities:** The set of operations that can be executed within the app, representing the app's capabilities.

**UML (Unified Modeling Language):** A standardized modeling language used to visualize the design of a system, often through diagrams.

**Use Case Model:** A representation in UML that showcases the different functionalities provided by the system.

**Collaboration Model:** A model that describes how different parts of the system work together and how users engage with the system and each other.

**Reinforcement Learning:** A machine learning method where a model learns by getting feedback on its actions and improves over time.

**Functional Requirements:** Descriptions of services the system should offer.

**Non-functional Requirements:** Constraints or characteristics that the system should adhere to, which are not directly related to functional behavior.

**Product Requirements:** Requirements related to how the product itself should behave.

**Requirements Metrics:** Quantifiable measures used to evaluate the system's properties and features.

**Requirements Specification:** Detailed description of the system's functional requirements.

**Requirements Traceability Matrix (RTM):** A tool that maps and tracks every requirement through its development lifecycle.

**Level System and Medals:** A gamified system where users progress through levels and earn medals.

**Community Forum:** A space within the app for users to interact and share knowledge.

**Scenario Simulations:** Simulated investment situations based on real past market events.

**Weekly/Monthly Challenges:** Timed trading challenges where users compete against each other.

**Microservice Architecture:** A method of developing software systems where each component runs as a small service, often with its own database.

**Flutter:** A framework used to develop applications for both Android and Apple devices from a single codebase.

## 3. System Models



### 3.1. Use Case Model

The Use Case Model, represented in UML (Unified Modeling Language), serves to depict the various functionalities provided by the "FinanceFlow" system. This visual representation simplifies the understanding of system interactions. We've divided the diagram into two parts for enhanced clarity, utilizing the scenario feature to define sequences of actions that describe specific interactions between actors and the system. Below each scenario, you'll find a table, each containing a description of individual functionalities.

Each table encompasses the following information:

|                |   |
|----------------|---|
| Use Case Name  | A unique identifier for the use case.   |
| Scope          | A brief description of the use case, including its purpose and boundaries.  |
| Actors         | The users or systems that interact with the system to achieve the use case goal.  |
| Preconditions  | The conditions that must be true before the use case can begin.   |
| Triggers       | The events that initiate the use case.  |
| Description    | A detailed description of the steps involved in the use case, including the interactions between the actors and the system. |
| Alternatives   | The different paths that can be taken through the use case, depending on the user's choices or system conditions.           |
| Postconditions | The conditions that must be true after the use case has successfully completed.   |
| Open Questions | Any issues left unresolved at the end of the use case.  |

|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | User Registration  |
| <b>Scope</b>          | Allow users to create an account on the FinanceFlow platform.  |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | None   |
| <b>Triggers</b>       | User clicks on the "Register" button.  |
| <b>Description</b>    | Users enter their personal information (name, email address, password) and create an account.  |
| <b>Alternatives</b>   | None   |
| <b>Postconditions</b> | If the credentials are valid, the account is created and the user can log into the app, otherwise the account is not created and the user can't access |





|                       |                 |
|-----------------------|-----------------|
|                       | FinanceFlow app |
| <b>Open Questions</b> | None            |

|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | Email Verification                                     |
| <b>Scope</b>          | Verify the user's email address.                       |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user has registered for an account.                |
| <b>Triggers</b>       | The user receives an email with a verification link.   |
| <b>Description</b>    | The user clicks on the verification link in the email. |
| <b>Alternatives</b>   | The user's email address is verified.                  |
| <b>Postconditions</b> | User account is created                                |
| <b>Open Questions</b> | None   |

|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | User Login   |
| <b>Scope</b>          | Allow users to log in to their FinanceFlow account.  |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user has registered for an account.  |
| <b>Triggers</b>       | User clicks on the "Login" button and enters their email address and password.   |
| <b>Description</b>    | The system authenticates the user's credentials and logs them into the platform. The first login gives the User a fixed amount of money. |
| <b>Alternatives</b>   | Users can choose to reset their password if they have forgotten it.  |
| <b>Postconditions</b> | User is logged into the platform.  |
| <b>Open Questions</b> | None   |

|                      |   |
|----------------------|---|
| <b>Use Case Name</b> | Select Stock for Investment                 |
| <b>Scope</b>         | Allow users to select a stock to invest in. |



|                       |  |
|-----------------------|--|
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user is logged into the platform.  |
| <b>Triggers</b>       | User selects a stock.  |
| <b>Description</b>    | The system displays the stock's current price, chart and Buy/Sell buttons.       |
| <b>Alternatives</b>   | None   |
| <b>Postconditions</b> | User confirms the investment and the system purchases the stock on their behalf. |
| <b>Open Questions</b> | User's fictitious account balance is updated to reflect the new investment.      |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | View Stock Chart Or Account Balance Chart   |
| <b>Scope</b>          | Allow users to view a stock's price chart or his personal account balance chart.  |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user has selected a stock or his account balance.   |
| <b>Triggers</b>       | User clicks on the stocks name or on the account balance preview  |
| <b>Description</b>    | The system displays a chart of the stock's price history or the chart of the account balance. Users can zoom in and out of the chart and view different time periods. |
| <b>Alternatives</b>   | None  |
| <b>Postconditions</b> | User has seen and navigate through the stock chart or account balance chart   |
| <b>Open Questions</b> | None  |

|                      |   |
|----------------------|---|
| <b>Use Case Name</b> | Buy Stock   |
| <b>Scope</b>         | Allow users to buy a stock.   |
| <b>Actors</b>        | User  |
| <b>Preconditions</b> | The user has selected a stock and viewed its chart and the user needs to have enough money to make the transaction. |
| <b>Triggers</b>      | User clicks on the "Buy" button.  |
| <b>Description</b>   | The system displays a confirmation screen, showing the stock's current price  |



|                       |  |
|-----------------------|--|
|                       | and the amount the user wants to invest.   |
| <b>Alternatives</b>   | None   |
| <b>Postconditions</b> | User confirms the purchase and the system purchases the stock. User's fictitious account balance is updated to reflect the new investment. |
| <b>Open Questions</b> | None   |

|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | Sell Stock   |
| <b>Scope</b>          | Allow users to sell a stock.   |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user owns the stock they want to sell.   |
| <b>Triggers</b>       | User clicks on the "Sell" button.  |
| <b>Description</b>    | The system displays a confirmation screen, showing the stock's current price and the amount the user wants to sell.      |
| <b>Alternatives</b>   | None   |
| <b>Postconditions</b> | User confirms the sale and the system sells the stock. User's fictitious account balance is updated to reflect the sale. |
| <b>Open Questions</b> | None   |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | View Account Balance  |
| <b>Scope</b>          | Allow users to view their fictitious account balance.   |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is logged into the platform.   |
| <b>Triggers</b>       | User clicks on the "Account Balance" graph.   |
| <b>Description</b>    | The system displays the user's current account balance graph and the current amount on the account. |
| <b>Alternatives</b>   | Users can view the history of their transactions and their investment performance.                  |
| <b>Postconditions</b> | None  |



|                       |      |
|-----------------------|------|
| <b>Open Questions</b> | None |
|-----------------------|------|

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Read News   |
| <b>Scope</b>          | Allow users to read news articles related to their investments and other relevant news. |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is logged into the platform.   |
| <b>Triggers</b>       | Users click on the "News" they want to read.  |
| <b>Description</b>    | The system opens the link associated with that news.                                    |
| <b>Alternatives</b>   | The article is opened on the platform.  |
| <b>Postconditions</b> | User read the article selected  |
| <b>Open Questions</b> | None  |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Ask Chatbot Question  |
| <b>Scope</b>          | Allow users to ask questions to the chatbot and receive answers.  |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is logged into the platform.   |
| <b>Triggers</b>       | User clicks on the "Chatbot" button and enters their question.  |
| <b>Description</b>    | The chatbot processes the question and provides an answer. The more the User interacts with the AI Chatbot, the more he will be rewarded. |
| <b>Alternatives</b>   | Users can continue the conversation with the chatbot to ask more questions or get clarification.  |
| <b>Postconditions</b> | None  |
| <b>Open Questions</b> | None  |

|                      |   |
|----------------------|---|
| <b>Use Case Name</b> | Button to stocks page from Account Balance                      |
| <b>Scope</b>         | Allow users to navigate to the Stocks page from Account balance |



|                       |  |
|-----------------------|--|
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user is in the Account Balance section.  |
| <b>Triggers</b>       | User clicks on the "Buy More" button.  |
| <b>Description</b>    | The system navigates the user to the Stocks page.  |
| <b>Alternatives</b>   | Users can also navigate to the Stocks page by selecting it from the bottom navigation bar. |
| <b>Postconditions</b> | User is on the Stocks page.  |
| <b>Open Questions</b> | None   |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Button to Profile page from Feed, News and Stock Page   |
| <b>Scope</b>          | Allow users to navigate to their Profile page from the Feed, News and Stock pages.            |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is on the Feed, News or Stock page.  |
| <b>Triggers</b>       | User clicks on the top-right "Profile" icon.  |
| <b>Description</b>    | The system navigates the user to their Profile page.  |
| <b>Alternatives</b>   | Users can also navigate to their Profile page by selecting it from the bottom navigation bar. |
| <b>Postconditions</b> | User is on their Profile page.  |
| <b>Open Questions</b> | None  |

|                      |   |
|----------------------|---|
| <b>Use Case Name</b> | Search Stock Button                                 |
| <b>Scope</b>         | Allow users to search for stocks on the Stock page. |
| <b>Actors</b>        | User  |
| <b>Preconditions</b> | The user is on the Stock page.                      |
| <b>Triggers</b>      | User clicks on the "Search Stock" search bar.       |



|                       |  |
|-----------------------|--|
| <b>Description</b>    | User enters the name of the stock they want to search for and clicks on the "Search" button. |
| <b>Alternatives</b>   | Users can navigate through the AI suggested stocks.  |
| <b>Postconditions</b> | The system displays a list of stocks that match the user's search query.                     |
| <b>Open Questions</b> | None   |

|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | Read a FAQ                                   |
| <b>Scope</b>          | Allow users to read a FAQ.                   |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user is on the Help page.                |
| <b>Triggers</b>       | User clicks on a FAQ.                        |
| <b>Description</b>    | The system displays the FAQ's full text.     |
| <b>Alternatives</b>   | Users can scroll through the FAQ to read it. |
| <b>Postconditions</b> | User has read the FAQ.                       |
| <b>Open Questions</b> | None   |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Click on "display all FAQs"   |
| <b>Scope</b>          | Allow users to view all FAQs on the Help page.                                    |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is on the Help page.   |
| <b>Triggers</b>       | User clicks on the "display all FAQs" button.                                     |
| <b>Description</b>    | The system displays a list of all FAQs.   |
| <b>Alternatives</b>   | Users can browse through the list of FAQs to find the one they are interested in. |
| <b>Postconditions</b> | User is viewing a list of all FAQs.   |
| <b>Open Questions</b> | None  |



|                       |  |
|-----------------------|--|
| <b>Use Case Name</b>  | Start a new conversation with AI   |
| <b>Scope</b>          | Allow users to start a new conversation with the AI assistant.                 |
| <b>Actors</b>         | User   |
| <b>Preconditions</b>  | The user is on the "Help" page.  |
| <b>Triggers</b>       | User clicks on "Start a new conversation with AI".                             |
| <b>Description</b>    | The system opens a new chat window.  |
| <b>Alternatives</b>   | Users can type in their question or request and the AI assistant will respond. |
| <b>Postconditions</b> | User is engaged in a conversation with the AI assistant.                       |
| <b>Open Questions</b> | None   |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | View/Change user profile photo  |
| <b>Scope</b>          | Allow users to view and change their profile photo from the Profile page. |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is on the Profile page.  |
| <b>Triggers</b>       | User clicks on the "Change Photo" button.                                 |
| <b>Description</b>    | The system displays a file selection dialog box.                          |
| <b>Alternatives</b>   | User selects a new profile photo and clicks on the "Open" button.         |
| <b>Postconditions</b> | The system uploads the new profile photo and updates the user's profile.  |
| <b>Open Questions</b> | User's profile photo is updated.  |

|                      |  |
|----------------------|--|
| <b>Use Case Name</b> | Display personal informations  |
| <b>Scope</b>         | Allow users to view their personal information on the Profile page.            |
| <b>Actors</b>        | User   |
| <b>Preconditions</b> | The user is on the Profile page.   |
| <b>Triggers</b>      | User clicks on the "Personal information" button.                              |
| <b>Description</b>   | The system displays the user's personal information, such as their name, email |



|                       |   |
|-----------------------|---|
|                       | address, date of birth, and phone number.                       |
| <b>Alternatives</b>   | None  |
| <b>Postconditions</b> | User is viewing their personal information on the Profile page. |
| <b>Open Questions</b> | None  |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Change personal informations  |
| <b>Scope</b>          | Allow users to change their personal information on the Profile page.                   |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is in the Personal information section.  |
| <b>Triggers</b>       | User clicks on the "Edit" button next to the personal information they want to change.  |
| <b>Description</b>    | The system displays an editing field for the selected personal information.             |
| <b>Alternatives</b>   | User enters the new value for the personal information and clicks on the "Save" button. |
| <b>Postconditions</b> | The system updates the user's personal information.                                     |
| <b>Open Questions</b> | User's personal information is updated.   |

|                       |   |
|-----------------------|---|
| <b>Use Case Name</b>  | Display the about us page   |
| <b>Scope</b>          | Allow users to navigate to the About Us page from the Profile page. |
| <b>Actors</b>         | User  |
| <b>Preconditions</b>  | The user is on the Profile page.                                    |
| <b>Triggers</b>       | User clicks on the "About Us" button.                               |
| <b>Description</b>    | The system navigates the user to the About Us page.                 |
| <b>Alternatives</b>   | None  |
| <b>Postconditions</b> | User is on the About Us page.                                       |
| <b>Open Questions</b> | None  |





|                |   |
|----------------|---|
| Use Case Name  | Display the user guide  |
| Scope          | Allow users to navigate to the User Guide page from the Profile page. |
| Actors         | User  |
| Preconditions  | The user is on the Profile page.                                      |
| Triggers       | User clicks on the "User Guide" button.                               |
| Description    | The system navigates the user to the User Guide page.                 |
| Alternatives   | None  |
| Postconditions | User is on the User Guide page.                                       |
| Open Questions | None  |

|                |  |
|----------------|--|
| Use Case Name  | Click on a pre-existing conversation with AI                                 |
| Scope          | Allow users to resume a previous conversation with the AI assistant.         |
| Actors         | User   |
| Preconditions  | The user is on the "Help" page.  |
| Triggers       | User clicks on a pre-existing conversation.                                  |
| Description    | The system opens the conversation window and displays the previous messages. |
| Alternatives   | Users can continue the conversation with the AI assistant.                   |
| Postconditions | User is engaged in a conversation with the AI assistant.                     |
| Open Questions | None   |

|               |   |
|---------------|---|
| Use Case Name | Click on a category news button that lists all the news of that category                    |
| Scope         | Allow users to navigate to a page that lists all the news articles for a specific category. |
| Actors        | User  |
| Preconditions | The user is on the News page.   |
| Triggers      | User clicks on a category news button.  |



|                |   |
|----------------|---|
| Description    | The system navigates the user to a page that lists all the news articles for that category. |
| Alternatives   | Users can browse through the list of news articles and select one to read.                  |
| Postconditions | User is viewing a list of news articles of a specific category.                             |
| Open Questions | None  |

|                |   |
|----------------|---|
| Use Case Name  | User out of money   |
| Scope          | Allow users who are out of money to take a quiz to learn more about stocks.   |
| Actors         | User, AI Assistant  |
| Preconditions  | User is out of money.   |
| Triggers       | User goes out of money.   |
| Description    | The "Help" page becomes the only page accessible. Here the AI will display a quiz to help the user understand how stocks. |
| Alternatives   | None  |
| Postconditions | The user has an amount of money proportional to the correct answers given.  |
| Open Questions | None  |

### 3.2. Collaboration Model

In the context of "FinanceFlow," our collaboration model is integral to providing users with a well-rounded educational experience and enabling a sense of community within the application. While "FinanceFlow" primarily focuses on empowering users with financial knowledge, the collaboration model is designed to foster a collaborative environment, albeit in a different manner compared to conventional social features like chats or comments. Key aspects of our collaboration model include:

#### 1. User-Centric Engagement:

- **FinanceFlow** emphasizes a user-centric approach, where each user's journey is a solitary yet enriched experience. Users can explore and invest in cryptocurrencies and stocks independently, allowing them the freedom to develop their strategies.

#### 2. Gradual Learning and Knowledge Sharing:



- The platform encourages gradual learning by providing access to a curated selection of news articles and educational resources. While users do not directly interact with each other, they indirectly share knowledge through the platform's educational content.

### 3. User Data and Predictive Model:

- The collaborative aspect of "FinanceFlow" is reflected in the reinforcement learning-based predictive model. This model leverages collective user data to continuously enhance its accuracy. Users, in their individual interactions with the app, contribute to the collective intelligence that informs the model's predictions.

Our collaboration model is focused on ensuring that the collective actions of users contribute to the overall improvement of the platform's predictive capabilities. While there are no direct user-to-user interactions such as chats or data libraries, the collaborative element is embedded in the way the predictive model learns and evolves over time based on the collective behavior of all users.



## 4. Functional and Non-functional Requirements

As for the requirements, they can be divided into two categories: **functional requirements** and **non-functional requirements**. The former are concerned with describing the services that the system offers, while the latter will have the purpose of providing strong constraints on the services, particularly if they are not complied with they could compromise the functionality of the system, rendering it effectively unusable. To ensure the robustness and relevance of these requirements, active engagement with end users and stakeholders is an integral part of our process. Through surveys, interviews, and collaborative sessions, we actively gather and validate requirements, ensuring that the system aligns closely with the needs and expectations of its intended users.

Both functional and non-functional requirements will be specified in the following sections, reflecting the insights and input obtained through this inclusive and iterative requirement gathering process.

### 4.1. Functional Requirements

Functional requirements outline the main functions and features that the application must provide to meet the users' needs and achieve the intended goal. These requirements are:

- **Services** offered by the app: The app aims to provide users with the ability to invest in various assets, with advice based on analysis and predictions about market trends.
- App **behavior** under given conditions: For example, how the app provides feedback to users through a chatbot, how it handles authentication, and how it responds to specific interactions such as buying and selling.
- **Results** provided by the app based on specific inputs: This could refer to how the app provides predictions on market trends or presents relevant financial news based on user preferences or actions.

In the following chapter, we will explore each of these functional requirements in detail, ensuring that the app meets user expectations and provides an optimal user experience.

Every requirement will be described in a table structured as follows:

|                   |  |
|-------------------|--|
| <b>ID</b>         | Unique identifier for each functional requirement. It follows the format <FR-XX> where <b>FR</b> stands for Functional Requirement and <b>XX</b> is a 2 digit progressive number |
| <b>Use case</b>   | The use case in the UML diagram to which we are referencing  |
| <b>Definition</b> | Section in which the function of the system will be specified by defining the type of inputs and outputs, including the behavior that correlates the two.                        |
| <b>Reason</b>     | The reason why the requirement has been chosen   |



|                   |  |
|-------------------|--|
| <b>Influences</b> | Specifies the what needs to happen in order for the service provided by the requirement to work  |
| <b>Priority</b>   | Describes the priority it should have so as to enable the adherence to timelines without hindering the proper completion of the project. |

In addition, columns will be colored based on the requirement priority (high, medium, low)

Here's the list of functional requirements:

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-01   |
| <b>Use case</b>   | User Registration   |
| <b>Definition</b> | The system should give the option of creating a new account for a user who is using the application for the first time. Mandatory entry of a valid email address, phone number, first and last name will be required. |
| <b>Reason</b>     | Every user that wants to use the app must have an account, otherwise the system can't let him access the app.   |
| <b>Influences</b> | The user must have an account in order to use the services offered by the app   |
| <b>Priority</b>   | High  |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-02   |
| <b>Use case</b>   | Email verification  |
| <b>Definition</b> | The system prompts the user to verify the account via a verification link sent by email.          |
| <b>Reason</b>     | Ensure the user creating the account really has access to the email account.                      |
| <b>Influences</b> | Without confirming email address the account can't be created and the person can't access the app |
| <b>Priority</b>   | High  |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-03   |
| <b>Use case</b>   | User login  |
| <b>Definition</b> | The system needs to allow the user to access the app to use the services.             |
| <b>Reason</b>     | If the login wasn't allowed, the user wouldn't be able to login and therefore use the |



|                   |   |
|-------------------|---|
|                   | app   |
| <b>Influences</b> | An account for that user must exist to perform the login action |
| <b>Priority</b>   | High  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-04  |
| <b>Use case</b>   | Select stock for investment  |
| <b>Definition</b> | Enables users to browse, search, and select specific stocks they are interested in investing.  |
| <b>Reason</b>     | To give users the flexibility to choose their investment options and make informed decisions based on their preferences and market research. |
| <b>Influences</b> | The user's investment strategy, diversification of the user's portfolio, and potential return on investment.                                 |
| <b>Priority</b>   | High   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-05  |
| <b>Use case</b>   | View stock chart or account balance chart  |
| <b>Definition</b> | Provides users with graphical representations of stock performance over time or the progression of their account balance.      |
| <b>Reason</b>     | Visual aids help users understand market trends and the health of their investments, allowing for better investment decisions. |
| <b>Influences</b> | The user's understanding of market trends, investment decisions, and overall financial planning.                               |
| <b>Priority</b>   | High   |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-06   |
| <b>Use case</b>   | Buy a stock   |
| <b>Definition</b> | Enables users to purchase stocks they have selected, specifying the number of shares and confirming the transaction.    |
| <b>Reason</b>     | To facilitate the primary purpose of the application, which is to invest in stocks. Purchasing is a core functionality. |



|                   |  |
|-------------------|--|
| <b>Influences</b> | The user's investment portfolio, potential return on investment, and the overall market dynamics (as buying impacts stock demand). |
| <b>Priority</b>   | High   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-07  |
| <b>Use case</b>   | Sell stock   |
| <b>Definition</b> | Allows users to sell stocks from their portfolio, specifying the number of shares and confirming the transaction.                                    |
| <b>Reason</b>     | To provide users with the flexibility to liquidate their investments based on market conditions, personal financial needs, or investment strategies. |
| <b>Influences</b> | The liquidity of the user's portfolio, potential for realized gains or losses, and the overall market dynamics (as selling impacts stock supply).    |
| <b>Priority</b>   | High   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-08  |
| <b>Use case</b>   | View account balance   |
| <b>Definition</b> | Enables users to view the current balance of their account, reflecting the value of their holdings and any cash reserves.              |
| <b>Reason</b>     | To keep users informed about their financial standing and the value of their investments, which can guide future investment decisions. |
| <b>Influences</b> | Users' understanding of their financial health, investment decisions, and potential further deposits or withdrawals.                   |
| <b>Priority</b>   | High   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-09  |
| <b>Use case</b>   | Read news  |
| <b>Definition</b> | To keep users informed about market dynamics, company updates, and global economic trends that can influence investment decisions. |
| <b>Reason</b>     | To keep users informed about market dynamics, company updates, and global economic trends that can influence investment decisions. |



|                   |  |
|-------------------|--|
| <b>Influences</b> | Users' understanding of the market, investment strategies, and individual stock choices based on current events. |
| <b>Priority</b>   | Medium   |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-10   |
| <b>Use case</b>   | Ask chatbot questions   |
| <b>Definition</b> | Allows users to interact with an AI-powered chatbot to ask questions, seek advice, or get clarity on app functionalities.   |
| <b>Reason</b>     | To offer real-time support and guidance, enhancing user experience and confidence in using the app.                         |
| <b>Influences</b> | User satisfaction, understanding of app functionalities, and potentially investment decisions based on the advice received. |
| <b>Priority</b>   | High  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-11  |
| <b>Use case</b>   | Button to stock page from account balance  |
| <b>Definition</b> | Allows users to navigate directly to the stock page from their account balance view with a dedicated button.                         |
| <b>Reason</b>     | To provide users with a streamlined experience, making it easier to switch between checking their balance and viewing stock details. |
| <b>Influences</b> | User navigation experience, potential for increased stock viewing and transaction activities due to ease of access.                  |
| <b>Priority</b>   | Low  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-12  |
| <b>Use case</b>   | Button to profile page from feeds, news, stock page  |
| <b>Definition</b> | Enables users to swiftly navigate to their profile page from various sections of the app, such as the Feed, News, or Stock Page, via a dedicated button. |
| <b>Reason</b>     | To ensure consistent navigation and allow users to quickly access their profile settings or information from different parts of the app.                 |





|                   |   |
|-------------------|---|
| <b>Influences</b> | User navigation experience, accessibility to personal profile settings and details. |
| <b>Priority</b>   | Medium  |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-13   |
| <b>Use case</b>   | Search stock button   |
| <b>Definition</b> | Provides users with a button that initiates a stock search functionality, allowing them to find specific stocks by name, ticker, or other criteria. |
| <b>Reason</b>     | To allow users to quickly locate and access information on specific stocks without browsing through extensive lists.                                |
| <b>Influences</b> | Efficiency of user experience, potential for increased stock viewing, and transaction activities due to ease of finding stocks.                     |
| <b>Priority</b>   | Medium  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-14  |
| <b>Use case</b>   | Read a FAQ   |
| <b>Definition</b> | Enables users to select and view answers to frequently asked questions about the app's functionalities, investment strategies, or other relevant topics. |
| <b>Reason</b>     | To provide users with immediate answers to common queries, reducing the need for contacting support and enhancing self-service capabilities.             |
| <b>Influences</b> | User understanding of the platform, reduced support requests, and increased user confidence in using the app.  |
| <b>Priority</b>   | Medium   |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-15   |
| <b>Use case</b>   | Click on "display all FAQs"   |
| <b>Definition</b> | Provides users with a button to view the entirety of the FAQ section, displaying all questions and answers in a comprehensive list or grid. |
| <b>Reason</b>     | To offer users an overview of all available FAQs, ensuring they don't miss out on any crucial information.                                  |
| <b>Influences</b> | User experience in the FAQ section, potential for reduced support requests, and   |



|          |                              |
|----------|------------------------------|
|          | improved user understanding. |
| Priority | Low                          |

|            |  |
|------------|--|
| ID         | FR-16  |
| Use case   | Start a new conversation with AI   |
| Definition | Allows users to initiate a new interaction or conversation thread with the AI-powered chatbot.             |
| Reason     | To provide users with real-time support, advice, or information by interacting with the AI chatbot.        |
| Influences | User experience in seeking support or advice, potential for improved decision-making based on AI guidance. |
| Priority   | High   |

|            |  |
|------------|--|
| ID         | FR-17  |
| Use case   | View/change user profile picture   |
| Definition | Provides users the capability to view their current profile picture and offers an option to change or update it. |
| Reason     | To allow users to personalize their profile and enhance their identity within the platform.                      |
| Influences | User personalization experience, recognition of user's identity in community features or interactions.           |
| Priority   | Low  |

|            |   |
|------------|---|
| ID         | FR-18   |
| Use case   | Display personal information  |
| Definition | Shows users a detailed view of their stored personal information, such as name, email, date of birth, etc |
| Reason     | To provide transparency about what personal data is stored and allow users to review their details.       |
| Influences | User's confidence in data management, clarity on personal data, potential needs for                       |



|          |                         |
|----------|-------------------------|
|          | updates or corrections. |
| Priority | Medium                  |

|            |  |
|------------|--|
| ID         | FR-19  |
| Use case   | Change personal information  |
| Definition | Allows users to modify or update specific pieces of their personal information.  |
| Reason     | To ensure that users can keep their details up-to-date, correcting any inaccuracies or making adjustments as needed.                       |
| Influences | Accuracy of user data, user's confidence in managing their information, and potential effects on personalized features or recommendations. |
| Priority   | Medium   |

|            |  |
|------------|--|
| ID         | FR-20  |
| Use case   | Display the "About Us" page  |
| Definition | Offers users a dedicated page or section that provides information about the platform, its mission, team, history, and other relevant details. |
| Reason     | To build trust and provide transparency about the platform's origins, goals, and the team behind it.   |
| Influences | User's understanding of the platform, trust in the service, and potential engagement or loyalty.   |
| Priority   | Low  |

|            |  |
|------------|--|
| ID         | FR-21  |
| Use case   | Display the user guide   |
| Definition | Provides users with access to a comprehensive guide detailing how to use the platform, its features, and best practices. |
| Reason     | To assist users in navigating and utilizing the platform effectively, especially those new to the application.           |
| Influences | User onboarding experience, understanding of platform functionalities, and overall user satisfaction and efficiency.     |



|                 |        |
|-----------------|--------|
| <b>Priority</b> | Medium |
|-----------------|--------|

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-22   |
| <b>Use case</b>   | Click on a pre-existing conversation with AI  |
| <b>Definition</b> | Allows users to reopen and continue a previous interaction or conversation thread with the AI-powered chatbot.                          |
| <b>Reason</b>     | To enable users to revisit past interactions, retrieve past advice or answers, and maintain a history of their queries.                 |
| <b>Influences</b> | User experience in seeking continuous support, potential for improved decision-making based on past AI guidance, and ease of reference. |
| <b>Priority</b>   | Medium  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-23  |
| <b>Use case</b>   | Click on a category news button that lists all the news of that category   |
| <b>Definition</b> | Provides users the option to view news articles or updates specifically categorized under a chosen topic or category.  |
| <b>Reason</b>     | To allow users to streamline their news consumption based on their interests or the relevance of specific financial categories.  |
| <b>Influences</b> | User's information consumption experience, potential for more informed investment decisions based on category-specific news, and overall engagement with the platform's content. |
| <b>Priority</b>   | Medium   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-24  |
| <b>Use case</b>   | User out of money  |
| <b>Definition</b> | Detects when a user's account balance is insufficient for a desired transaction (like buying a stock) by preventing the transaction and presenting the option to take quizzes. |
| <b>Reason</b>     | The user's fictitious money balance is zero  |
| <b>Influences</b> | The user's fictitious money balance is added money, depending on the quizzes results   |



|                 |      |
|-----------------|------|
| <b>Priority</b> | High |
|-----------------|------|

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-25  |
| <b>Use Case</b>   | System maintenance notification  |
| <b>Definition</b> | Users should receive timely notifications for system maintenance or downtimes. |
| <b>Reason</b>     | To keep users informed about any interruptions and maintain trust.             |
| <b>Priority</b>   | Medium   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-26  |
| <b>Use Case</b>   | User platform guide  |
| <b>Definition</b> | Provides users with access to a comprehensive guide detailing how to use the platform, its features, and best practices. |
| <b>Reason</b>     | Assist users in navigating and utilizing the platform effectively, especially those new to the application.              |
| <b>Priority</b>   | Medium   |

|                   |  |
|-------------------|--|
| <b>ID</b>         | FR-27  |
| <b>Use Case</b>   | Reopening and continuing previous interaction  |
| <b>Definition</b> | Allows users to reopen and continue a previous interaction or conversation thread with the AI-powered chatbot.       |
| <b>Reason</b>     | Enable users to revisit past interactions, retrieve past advice or answers, and maintain a history of their queries. |
| <b>Priority</b>   | Medium   |

|                   |   |
|-------------------|---|
| <b>ID</b>         | FR-28   |
| <b>Use Case</b>   | Browsing news by category   |
| <b>Definition</b> | Provides users the option to view news articles or updates specifically categorized under a chosen topic or category. |
| <b>Reason</b>     | Allow users to streamline their news consumption based on their interests or the                                      |



|          |   |
|----------|---|
|          | relevance of specific financial categories. |
| Priority | Medium                                      |

## 4.2. Non-functional Requirements

Non-functional requirements concern the behavior properties of the system; they can be critical because they could make the system useless if they are not met. They are written in a way that they can be easily verified because they must be quantified.

They are specified below with a division between product, process and external.

Every non functional requirement will be described in a table structured as follows:

|                   |  |
|-------------------|--|
| <b>ID</b>         | Unique identifier for each functional requirement. It follows the format < <b>NFR-XX</b> > where <b>NFR</b> stands for Non Functional Requirement and <b>XX</b> is a 2 digit progressive number. |
| <b>RF</b>         | Specifies the referred functional requirement.   |
| <b>Definition</b> | Description of the requirement.  |
| <b>Reason</b>     | The reason why the requirement has been chosen.  |
| <b>Influences</b> | Specifies what the requirement triggers.   |
| <b>Priority</b>   | Describes the priority it should have so as to enable the adherence to timelines without hindering the proper completion of the project.   |

In addition, columns will be colored based on the requirement priority (high, medium, low)

Here's the list of non functional requirements:

### 4.2.1. Product Requirements

Product requirements specify how the product should behave in terms of usability, efficiency (performance and space), reliability, and portability.

The following tables describe the requirements regarding reliability, i.e., the ability to meet the technical specifications for operation over time:

|                   |   |
|-------------------|---|
| <b>ID</b>         | NFR-01  |
| <b>FR</b>         | –   |
| <b>Definition</b> | The application should have a response time of less than 2 seconds for 95% of its |



|                   |   |
|-------------------|---|
|                   | operations.   |
| <b>Reason</b>     | To ensure a smooth and efficient user experience without noticeable delays. |
| <b>Influences</b> | User satisfaction, usability of the platform.                               |
| <b>Priority</b>   | High  |

|                   |   |
|-------------------|---|
| <b>ID</b>         | NFR-02  |
| <b>FR</b>         | –   |
| <b>Definition</b> | The system should support at least 1,000 concurrent users.          |
| <b>Reason</b>     | To ensure scalability and handle peak user loads.                   |
| <b>Influences</b> | System performance, scalability, user experience during peak times. |
| <b>Priority</b>   | High  |

|                   |   |
|-------------------|---|
| <b>ID</b>         | NFR-03  |
| <b>FR</b>         | –   |
| <b>Definition</b> | All features should be thoroughly documented in the user guide.                         |
| <b>Reason</b>     | To provide users with resources to understand and utilize all platform functionalities. |
| <b>Influences</b> | User understanding, reduced need for support, improved user experience.                 |
| <b>Priority</b>   | Medium  |

|                   |  |
|-------------------|--|
| <b>ID</b>         | NFR-04   |
| <b>FR</b>         | –  |
| <b>Definition</b> | The application should adhere to accessibility standards, ensuring it's usable by people with disabilities |
| <b>Reason</b>     | To ensure inclusivity and meet regulatory standards for digital accessibility.                             |
| <b>Influences</b> | User inclusivity, regulatory compliance, broader user base.  |
| <b>Priority</b>   | High   |



|                   |  |
|-------------------|--|
| <b>ID</b>         | NFR-05   |
| <b>FR</b>         | –  |
| <b>Definition</b> | The user interface should be intuitive and require minimal training for a new user to get started. |
| <b>Reason</b>     | To ensure ease of use and reduce the learning curve for new users.                                 |
| <b>Influences</b> | User onboarding experience, user satisfaction, reduction in support queries.                       |
| <b>Priority</b>   | Medium   |

#### 4.2.2. Process Requirements

Process requirements address deliveries, implementation and standards.

|                   |  |
|-------------------|--|
| <b>ID</b>         | NFR-06   |
| <b>FR</b>         | –  |
| <b>Definition</b> | Regular backups of user data and transaction histories should be taken every month.. |
| <b>Reason</b>     | To prevent data loss and ensure data recovery in case of any failures.               |
| <b>Influences</b> | Data integrity, user trust, operational continuity.                                  |
| <b>Priority</b>   | High   |

#### 4.2.3. External Requirements

External requirements are related to interoperability and ethical and legal requirements (privacy and security).

They also arise from factors external to the system and its development process

|                   |   |
|-------------------|---|
| <b>ID</b>         | NFR-07  |
| <b>FR</b>         | FR-01, FR-03  |
| <b>Definition</b> | All personal data should be encrypted both in transit and at rest. This includes adhering to the General Data Protection Regulation GDPR standards for data protection and privacy. Encryption ensures that user data is secure and confidential, preventing unauthorized access or breaches. |
| <b>Reason</b>     | Data security, user trust, regulatory compliance. Ensuring compliance with GDPR not only enhances data security but also fosters user trust by demonstrating a  |





|                   |   |
|-------------------|---|
|                   | commitment to protecting their personal information. It addresses regulatory requirements, reducing the risk of legal consequences and penalties. |
| <b>Influences</b> | Data security, user trust, regulatory compliance.   |
| <b>Priority</b>   | High  |



## 5. Requirements Metrics

The Requirements Matrix serves as a beacon, guiding the development process and ensuring alignment with our core objectives. By defining properties integral to each feature and associating them with quantifiable metrics, we pave the path for systematic evaluation and refinement. This chapter elucidates these properties and their corresponding metrics, providing a clear blueprint for stakeholders to gauge the project's progress and outcomes.

### 5.1. Properties and Metrics

The table below represents a comprehensive list of properties derived from the project's objectives, each associated with specific metrics that allow for evaluation and monitoring.

| Property                   | Metric   |
|----------------------------|--|
| AI-driven Financial Advice | <ul style="list-style-type: none"><li>- Accuracy of advice (%)</li><li>- Response time (seconds)</li><li>- Data sources integrated</li><li>- User feedback rating</li></ul>          |
| User-centric News Platform | <ul style="list-style-type: none"><li>- User engagement rate (%)</li><li>- News update frequency</li><li>- Relevance accuracy (%)</li><li>- User customization options</li></ul>     |
| Portfolio Simulation       | <ul style="list-style-type: none"><li>- Simulation accuracy (%)</li><li>- Historical data range (years)</li><li>- Projection range (years)</li><li>- Scenario flexibility</li></ul>  |
| Financial Chatbot          | <ul style="list-style-type: none"><li>- User satisfaction rate (%)</li><li>- Query resolution time (seconds)</li><li>- Topics covered</li><li>- User interaction frequency</li></ul> |

### 5.2. Properties Description

The second table delves deeper into each property, exploring its sub RNF (Reliability, Non-functionality, Flexibility) and the corresponding metrics.

| Property                   | RNF               | Metric  |
|----------------------------|-------------------|---|
| AI-driven Financial Advice | Reliability       | <ul style="list-style-type: none"><li>- Consistency of advice across users (%)</li><li>- Error rate (%)</li></ul> |
|                            | Non-functionality | <ul style="list-style-type: none"><li>- System uptime (%)</li><li>- Latency in fetching real-time data</li></ul>  |



|                            |                   |   |
|----------------------------|-------------------|---|
|                            | Flexibility       | <ul style="list-style-type: none"> <li>- Ease of integrating new data sources</li> <li>- Adaptability to market changes</li> </ul>                |
| User-centric News Platform | Reliability       | <ul style="list-style-type: none"> <li>- News accuracy (%)</li> <li>- System uptime (%)</li> </ul>  |
|                            | Non-functionality | <ul style="list-style-type: none"> <li>- Average loading time (seconds)</li> <li>- Notification delay (seconds)</li> </ul>                        |
|                            | Flexibility       | <ul style="list-style-type: none"> <li>- Customizability of news feed</li> <li>- Support for multiple news sources</li> </ul>                     |
| Portfolio Simulation       | Reliability       | <ul style="list-style-type: none"> <li>- Historical data accuracy (%)</li> <li>- Consistency in simulation results (%)</li> </ul>                 |
|                            | Non-functionality | <ul style="list-style-type: none"> <li>- Speed of simulation (seconds)</li> <li>- Data refresh rate</li> </ul>                                    |
|                            | Flexibility       | <ul style="list-style-type: none"> <li>- Ability to add new simulation scenarios</li> <li>- Support for multiple financial instruments</li> </ul> |
| Financial Chatbot          | Reliability       | <ul style="list-style-type: none"> <li>- Consistency of answers (%)</li> <li>- Accuracy in answering (%)</li> </ul>                               |
|                            | Non-functionality | <ul style="list-style-type: none"> <li>- Multi-platform support</li> <li>- Chatbot response time (seconds)</li> </ul>                             |
|                            | Flexibility       | <ul style="list-style-type: none"> <li>- Ease of updating knowledge base</li> <li>- Multilingual support</li> </ul>                               |



## 6. Requirements Specification

The requirements specification contains the precise and detailed description of the functional requirements of the system. Human language is put aside to favor the use of a more technical language to impose uniformity on the specification.

Each requirement will follow the format specified in the table below:

|                |   |
|----------------|---|
| ID             | A unique identifier for the requirement.                                  |
| RF             | The requirement type.   |
| Specifics      | A detailed description of the requirement.                                |
| Pre-condition  | The conditions that must be met before the requirement can be fulfilled.  |
| Post-Condition | The conditions that must be met after the requirement has been fulfilled. |
| Side effects   | Any unintended or unexpected consequences of the requirement.             |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-01  |
| <b>RF</b>             | FR-01  |
| <b>Specifics</b>      | The application at his first start allows the user to create an account.             |
| <b>Pre-condition</b>  | The application should be correctly downloaded from the Google Play Store.           |
| <b>Post-Condition</b> | User's data will be elaborated to create an account. The confirmation email is sent. |
| <b>Side effects</b>   | None   |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-02   |
| <b>RF</b>             | FR-03   |
| <b>Specifics</b>      | The system allows the user to access the app to use the services. |
| <b>Pre-condition</b>  | The user has a valid account and is logged in.                    |
| <b>Post-Condition</b> | The user can use all the features and services of the app.        |
| <b>Side effects</b>   | None  |



|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-03   |
| <b>RF</b>             | FR-03   |
| <b>Specifics</b>      | The system allows the user to access the app to use the services. |
| <b>Pre-condition</b>  | The user has a valid account and is logged in.                    |
| <b>Post-Condition</b> | The user can use all the features and services of the app.        |
| <b>Side effects</b>   | None  |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-04   |
| <b>RF</b>             | FR-04   |
| <b>Specifics</b>      | Enables users to browse, search, and select specific stocks they are interested in investing. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.  |
| <b>Post-Condition</b> | The user selects a stock to invest in.  |
| <b>Side effects</b>   | The system displays the stock's information and allows the user to invest.                    |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-05   |
| <b>RF</b>             | FR-05   |
| <b>Specifics</b>      | Provides users with graphical representations of stock performance over time or the progression of their account balance. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.  |
| <b>Post-Condition</b> | The user selects a stock or their account balance and views the corresponding chart.                                      |
| <b>Side effects</b>   | None  |



|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-06  |
| <b>RF</b>             | FR-06  |
| <b>Specifics</b>      | Enables users to purchase stocks they have selected, specifying the number of shares and confirming the transaction. |
| <b>Pre-condition</b>  | The user is logged in, has a valid account, and has sufficient funds to purchase the desired quantity of shares.     |
| <b>Post-Condition</b> | The user confirms the purchase and the shares are added to their portfolio.  |
| <b>Side effects</b>   | The user's account balance is updated to reflect the purchase.   |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-07   |
| <b>RF</b>             | FR-07   |
| <b>Specifics</b>      | Allows users to sell stocks from their portfolio, specifying the number of shares and confirming the transaction. |
| <b>Pre-condition</b>  | The user is logged in, has a valid account, and owns the desired quantity of shares.                              |
| <b>Post-Condition</b> | The user confirms the sale and the shares are removed from their portfolio.                                       |
| <b>Side effects</b>   | The user's account balance is updated to reflect the sale.  |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-08   |
| <b>RF</b>             | FR-08   |
| <b>Specifics</b>      | Enables users to view the current balance of their account, reflecting the value of their holdings and any cash reserves. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.  |
| <b>Post-Condition</b> | The user selects to view their account balance and the system displays it.  |
| <b>Side effects</b>   | None  |

|           |       |
|-----------|-------|
| <b>ID</b> | RS-09 |
| <b>RF</b> | FR-09 |



|                       |  |
|-----------------------|--|
| <b>Specifics</b>      | To keep users informed about market dynamics, company updates, and global economic trends that can influence investment decisions. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.   |
| <b>Post-Condition</b> | The user selects to view news and the system displays a list of articles.  |
| <b>Side effects</b>   | The user may read the articles to stay informed about the market and make more informed investment decisions.                      |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-10   |
| <b>RF</b>             | FR-10   |
| <b>Specifics</b>      | Allows users to interact with an AI-powered chatbot to ask questions, seek advice, or get clarity on app functionalities. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.  |
| <b>Post-Condition</b> | The user types in a question or query and the chatbot responds.   |
| <b>Side effects</b>   | The user may receive answers, advice, or guidance on how to use the app.  |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-11  |
| <b>RF</b>             | FR-11  |
| <b>Specifics</b>      | Allows users to navigate directly to the stock page from their account balance view with a dedicated button. |
| <b>Pre-condition</b>  | The user is logged in and viewing their account balance.   |
| <b>Post-Condition</b> | The user clicks on the button to navigate to the stock page.   |
| <b>Side effects</b>   | The user is taken to the stock page where they can view and search for stocks.                               |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-12  |
| <b>RF</b>             | FR-12  |
| <b>Specifics</b>      | Enables users to swiftly navigate to their profile page from various sections of the app, such as the Feed, News, or Stock Page, via a dedicated button. |
| <b>Pre-condition</b>  | The user is logged in and viewing any page in the app.   |
| <b>Post-Condition</b> | The user clicks on the button to navigate to their profile page.   |



|                     |   |
|---------------------|---|
| <b>Side effects</b> | The user is taken to their profile page where they can view and edit their personal settings and information. |
|---------------------|---|

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-13   |
| <b>RF</b>             | FR-13   |
| <b>Specifics</b>      | Provides users with a button that initiates a stock search functionality, allowing them to find specific stocks by name, ticker, or other criteria. |
| <b>Pre-condition</b>  | The user is logged in and viewing any page in the app.  |
| <b>Post-Condition</b> | The user clicks on the button to search for a stock.  |
| <b>Side effects</b>   | The user is able to enter search criteria and view a list of matching stocks.   |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-14  |
| <b>RF</b>             | FR-14  |
| <b>Specifics</b>      | Enables users to select and view answers to frequently asked questions about the app's functionalities, investment strategies, or other relevant topics. |
| <b>Pre-condition</b>  | The user is logged in and viewing any page in the app.   |
| <b>Post-Condition</b> | The user clicks on a FAQ to view the answer.   |
| <b>Side effects</b>   | The user is able to read the answer to their question.   |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-15   |
| <b>RF</b>             | FR-15   |
| <b>Specifics</b>      | Provides users with a button to view the entirety of the FAQ section, displaying all questions and answers in a comprehensive list or grid. |
| <b>Pre-condition</b>  | The user is logged in and viewing the FAQ section.  |
| <b>Post-Condition</b> | The user clicks on the button to display all FAQs.  |
| <b>Side effects</b>   | The user is able to view a list or grid of all FAQs.  |

|           |       |
|-----------|-------|
| <b>ID</b> | RS-16 |
|-----------|-------|





|                       |  |
|-----------------------|--|
| <b>RF</b>             | FR-16  |
| <b>Specifics</b>      | Allows users to initiate a new interaction or conversation thread with the AI-powered chatbot. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.   |
| <b>Post-Condition</b> | The user clicks on a button to start a new conversation with the AI chatbot.                   |
| <b>Side effects</b>   | A new conversation window opens, allowing the user to interact with the AI chatbot.            |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-17  |
| <b>RF</b>             | FR-17  |
| <b>Specifics</b>      | Provides users the capability to view their current profile picture and offers an option to change or update it. |
| <b>Pre-condition</b>  | The user is logged in and has a valid account.   |
| <b>Post-Condition</b> | The user clicks on their profile picture or selects the option to change their profile picture.                  |
| <b>Side effects</b>   | The user is able to view their current profile picture and upload a new one.                                     |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-18   |
| <b>RF</b>             | FR-18   |
| <b>Specifics</b>      | Display personal information  |
| <b>Pre-condition</b>  | The user is logged in and has an account.                                   |
| <b>Post-Condition</b> | The user's personal information is displayed in a clear and concise manner. |
| <b>Side effects</b>   | None  |

|                       |  |
|-----------------------|--|
| <b>ID</b>             | RS-19  |
| <b>RF</b>             | FR-19  |
| <b>Specifics</b>      | Change personal information                              |
| <b>Pre-condition</b>  | The user is logged in and has an account.                |
| <b>Post-Condition</b> | The user's personal information is updated successfully. |



|              |      |
|--------------|------|
| Side effects | None |
|--------------|------|

|                |   |
|----------------|---|
| ID             | RS-20   |
| RF             | FR-20   |
| Specifics      | Display the "About Us" page                                     |
| Pre-condition  | The user is logged in and has an account.                       |
| Post-Condition | The "About Us" page is displayed in a clear and concise manner. |
| Side effects   | None  |

|                |  |
|----------------|--|
| ID             | RS-21  |
| RF             | FR-21  |
| Specifics      | Display the user guide                                     |
| Pre-condition  | The user is logged in and has an account.                  |
| Post-Condition | The user guide is displayed in a clear and concise manner. |
| Side effects   | None   |

|                |   |
|----------------|---|
| ID             | RS-22   |
| RF             | FR-22   |
| Specifics      | Click on a pre-existing conversation with AI                                      |
| Pre-condition  | The user is logged in and has interacted with the AI-powered chatbot in the past. |
| Post-Condition | The previous conversation thread is reopened and displayed.                       |
| Side effects   | None  |

|               |  |
|---------------|--|
| ID            | RS-23  |
| RF            | FR-23  |
| Specifics     | Click on a category news button that lists all the news of that category |
| Pre-condition | The user is logged in and has an account.                                |



|                       |  |
|-----------------------|--|
| <b>Post-Condition</b> | A list of news articles categorized under the selected topic or category is displayed. |
| <b>Side effects</b>   | None   |

|                       |   |
|-----------------------|---|
| <b>ID</b>             | RS-24   |
| <b>RF</b>             | FR-24   |
| <b>Specifics</b>      | User out of money   |
| <b>Pre-condition</b>  | The user's fictitious money balance is zero.  |
| <b>Post-Condition</b> | The user is presented with the option to take quizzes and learn with AI to receive rewards and restart investing. |
| <b>Side effects</b>   | The user's fictitious money balance may be reset, depending on the quiz results.                                  |



## 7. Requirements Traceability Matrix

The Requirements Traceability Matrix is a crucial tool in software engineering and project management that ensures every specified requirement for a system can be traced from its origin through its development lifecycle. Essentially, the Requirements Traceability Matrix provides a visual representation of the relationship between requirements, ensuring that no requirement is overlooked and that all are duly implemented and validated.

This matrix offers several benefits:

- **Comprehensive Overview:** At a glance, stakeholders can understand which requirements have been addressed and which are pending.
- **Change Management:** The matrix aids in handling changes to requirements, ensuring that any change's ripple effects are well understood.
- **Verification and Validation:** RTM ensures that all requirements are verifiable and have corresponding validation tests, ensuring product quality.
- **Accountability and Transparency:** It provides a clear lineage for each requirement, ensuring that every requirement is justified, sourced, and tracked. In the subsequent sections, the matrix will detail each requirement's relationships, giving a holistic view of the project's status and its alignment with initial objectives.

| FR-   | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| FR-01 | X  | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-02 |    | X  | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-03 |    |    | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |
| FR-04 |    |    |    | X  |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-05 |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-06 |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | X  |
| FR-07 |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-08 |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-09 |    |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    | X  |    |
| FR-10 |    |    |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-11 |    |    |    |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FR-12 |    |    |    |    |    |    |    |    |    |    |    | X  |    |    |    |    | X  | X  | X  |    | X  |    |    |    |
| FR-13 |    |    |    |    |    |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |
| FR-14 |    |    |    |    |    |    |    |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |
| FR-15 |    |    |    |    |    |    |    |    |    |    |    |    |    | X  | X  |    |    |    |    |    |    |    |    |    |



|        |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
|--------|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|---|---|---|---|---|---|---|---|--|
| FR-16  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  | X |   |   |   |   |   | X |   |  |
| FR-17  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  | X |   |   |   |   |   |   |   |  |
| FR-18  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   | X |   |   |   |   |   |   |  |
| FR-19  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   | X |   |   |   |   |   |  |
| FR-20  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   | X |   |   |   |   |  |
| FR-21  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   | X |   |   |   |  |
| FR-22  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   | X |   |   |  |
| FR-23  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   | X |   |  |
| FR-24  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   | X |  |
| NFR-01 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-02 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-03 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   | X |   |   |  |
| NFR-04 |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-05 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-06 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-07 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-08 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-09 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-10 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |
| NFR-11 |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |   |   |   |   |   |   |   |   |  |



## 8. System Evolution

As the digital landscape continually evolves, so too must our applications adapt and grow to meet emerging demands and harness new technological advancements. This chapter delves into the prospective enhancements and modifications envisaged for **FinanceFlow** in its future iterations. While the current system provides a robust foundation for users to explore the world of trading and finance, there's always room for further refinement and expansion.

Within this chapter, you'll find a curated list of potential enhancements and features. These proposals are grounded in both user feedback and a forward-looking perspective on how trading and financial education might evolve in the coming years. From gamified elements like a level system and medals to fostering a vibrant community through forums, the ideas presented here serve as a roadmap for **FinanceFlow's** continued growth and evolution.

Understanding that technology and user needs are ever-changing, this chapter underscores our commitment to continuous improvement and our aspiration to consistently offer an unparalleled user experience.

- **Level system and medals:**
  - **Description:** Users progress through various levels as they become more active and informed on the platform. Each level could have a set of objectives or missions, such as completing a certain number of quizzes, reading a specified amount of articles, or achieving a particular return on their virtual investments. Upon reaching certain milestones, users are awarded medals of different materials (bronze, silver, gold) based on the difficulty of the achievement.
  - **Benefits:** This gamified system encourages users to continue learning and to remain active on the platform. It also provides a sense of accomplishment and visual recognition through medals, further incentivizing user engagement.
  - **Implementation:** In addition to designing the leveling system, notifications and badges could be introduced to acknowledge user achievements. A dashboard might also display earned medals, progress, and upcoming goals.
- **Community forum:**
  - **Description:** A space within the app where users can interact with one another. They can share advice, ask questions, discuss investment strategies, or share educational resources.
  - **Benefits:** Promotes collaborative learning and builds a community of users helping one another. It can also help keep users engaged and active within the app.
  - **Implementation:** In addition to creating a forum, features like upvote/downvote, post or comment reporting, and the ability to follow specific users or topics could be introduced.
- **Scenario simulations:**



- **Description:** Users can test their investment strategies in scenarios based on real past market events. For example, how they would have handled the 2008 financial crisis or the exponential rise of cryptocurrencies in 2017.
  - **Benefits:** Offers users a safe environment to learn from history and understand how certain events impact markets.
  - **Implementation:** It would involve developing scenarios based on historical data, allowing users to "invest" according to that data, and then seeing the outcomes of their decisions.
- 
- **Weekly/monthly challenges:**
    - **Description:** Trading challenges where users can compete in specific scenarios or with certain constraints to see who achieves the best returns.
    - **Benefits:** These challenges can help users stay active and engaged, while testing and refining their investment skills in a competitive yet friendly environment.
    - **Implementation:** Develop scenarios or themes for challenges, have a leaderboard for users, and reward challenge winners with badges or other virtual incentives.

By incorporating these features, **FinanceFlow** can not only be educational but also engaging and fun for its users.



## 9. Appendices

### 9.1. Database Requirements

The backend will be developed using a microservice architecture. Thus, each component will own an isolated database, with only the information required by each service.

A brief summary of each microservice and the corresponding databases:

- **Authentication service:** Will be required to store user related information, such as credentials, subscription plans, and permissions.
- **Chatbot service:** Will be required to store past conversations. A user will be able to access past-conversations and continue from any point.
- **News service:** Will only hold information in memory as a short lived cache. No database will be required for this service. The only interactions needed from this service are API calls to major news outlets.
- **Forecasting service:** Will be required to store time-series data of each ticker. With such a huge amount of different tickers, and incredibly high granularity, the only option to efficiently make predictions on such data (e.g. training machine learning models on it), will require a custom storage system developed just for this purpose.

Other services might be developed in the future to enhance the experience of the application, but will all follow a similar pattern. Each service will only store its relevant information using the most appropriate database for the job.

### 9.2. Device Requirements

The user facing application will be written using Flutter, a framework to develop platform agnostic applications. Thus, both Android and Apple devices will be supported.

The Android application will require a minimum Android version of 5.0 and between 40MB and 50MB of storage space. Additional space of up to 100MB will be required for local storage and caches.

The IOS application will require a minimum version of IOS 11 or later, with a similar footprint in terms of storage size.

Networking and possible biometrics information will be required to interact with the service and authenticate using either fingerprints or Face ID.





## 10. References

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