

## 1. Overview

This document serves as a summary of Lab 2. This includes the expected deliverables of the lab along with some revisions to the previous lab deliverables.

## 2. Deliverables

- 2.1. Refined Requirements and Use Case Models
- 2.2. Class Diagram
- 2.3. Sequence Diagram
- 2.4. Initial State Machine Diagram

### 2.1 Refined Requirements and Use Case Models

The use case diagram created in Lab 1 has been revised based on the feedback given to specify the machine learning feature of the application in Functional & Non-functional requirements, the use case diagram and the use case descriptions. **Below are the specific changes made, while the complete documents are separately attached.**

#### Functional & Non-functional Requirements

##### 2. Optimized Portfolio Calculation:

###### 2.1 Data Integration

2.1.1 Gather and integrate financial news data from diverse sources, ensuring data relevance, and comprehensiveness.

2.1.2 Acquire historical stock price data for the selected stock universe.

###### 2.2 Sentiment Analysis

2.2.1 Utilize machine learning models (e.g., Natural Language Processing techniques) to conduct sentiment analysis on news articles.

2.2.2 Assign sentiment scores (positive, negative, neutral) to each article.

Aggregate sentiment scores over a defined time period (e.g., daily, weekly).

###### 2.3 Stock Selection and Ranking:

2.3.1 Implement a machine learning-based ranking mechanism that considers sentiment scores along with other relevant factors (e.g., historical performance, fundamentals).

2.3.2 Select a pool of potential stocks based on the ranking.

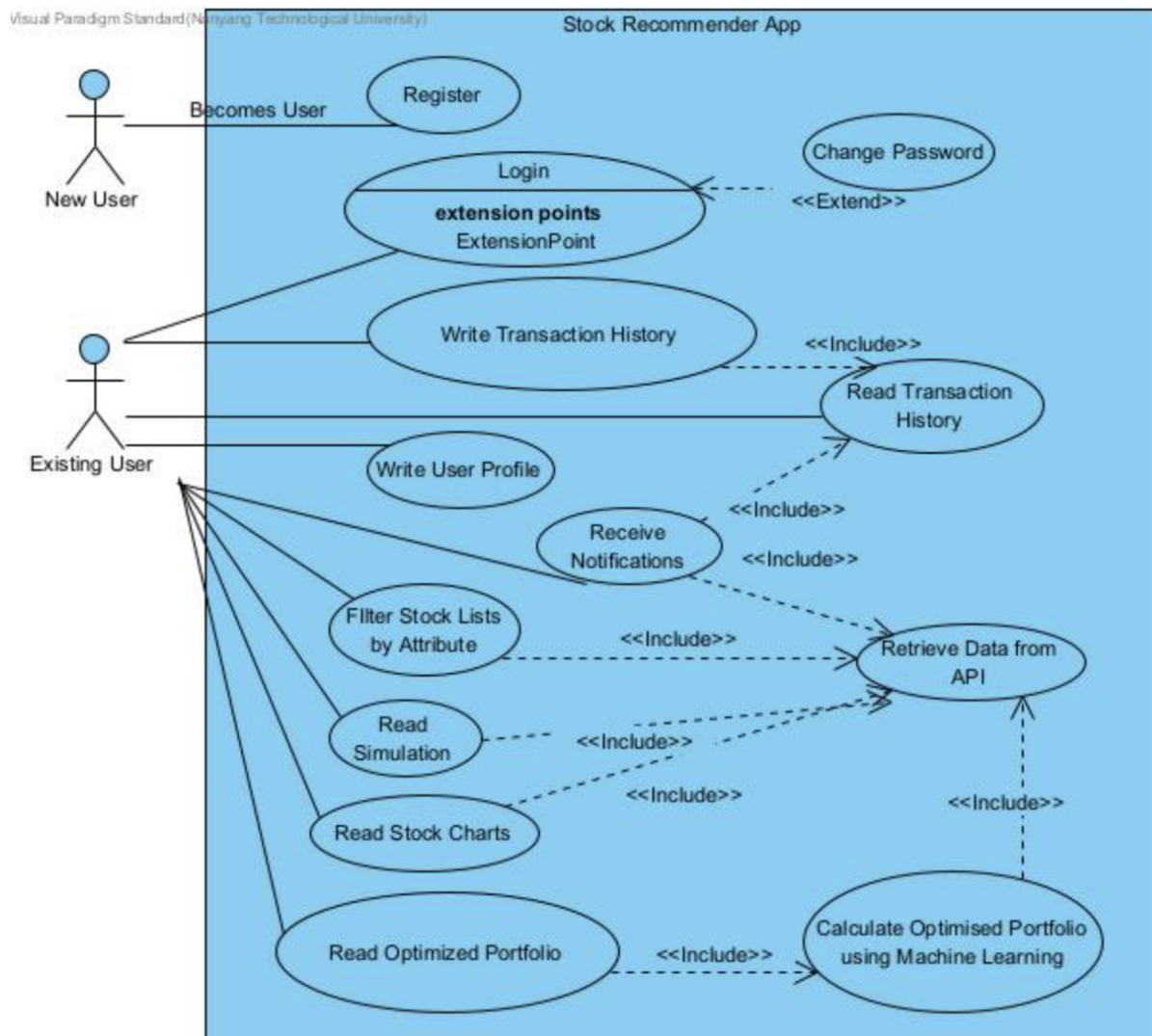
###### 2.4 Efficient Frontier Optimization

2.4.1 Utilize machine learning to estimate expected returns and volatility (standard deviation) for each selected stock.

2.4.2 Generate a range of potential portfolios with varying asset allocations, including those that maximize returns for a given level of risk and those that minimize risk for a given level of return.

2.4.3 Apply machine learning optimization techniques, such as Mean-Variance Optimization, to identify the portfolio that best fits the user's risk-return preferences.

### Use Case Diagram



### Use case Descriptions

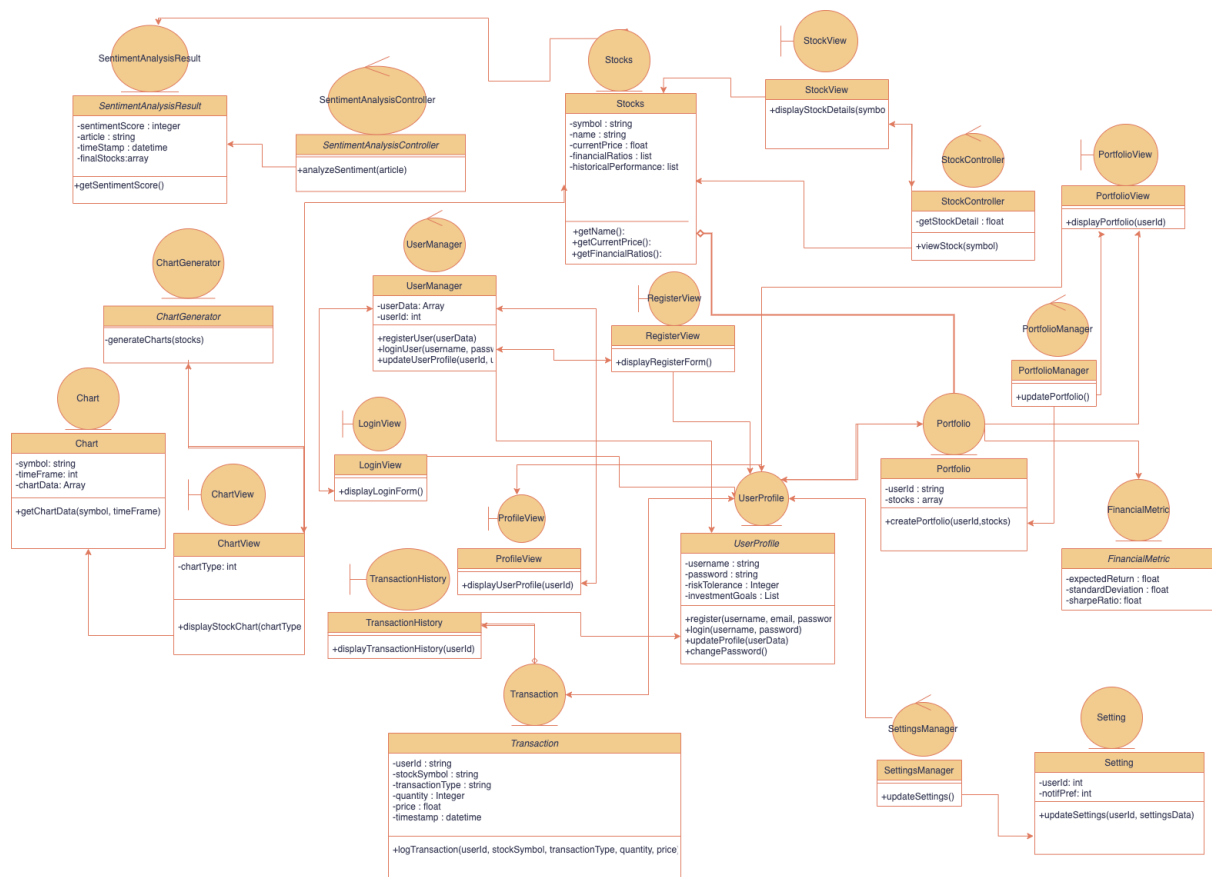
#### **View Optimised Portfolio**

1. The user accesses the “My Optimised Portfolio” tab
2. The system fetches parameters set by the user: user preference, risk tolerance, investment goal
3. The system retrieves top stocks using Sentiment Analysis
4. The system retrieves historical data for the specified stocks from the Yahoo Finance API

5. The system calculates the Sharpe ratio from the data collected and backtests the portfolio
6. The system displays a list of stocks to purchase or sell and their respective recommended amounts
7. If the user selects “Accept New Portfolio”, the corresponding transactions are automatically logged into their transaction history

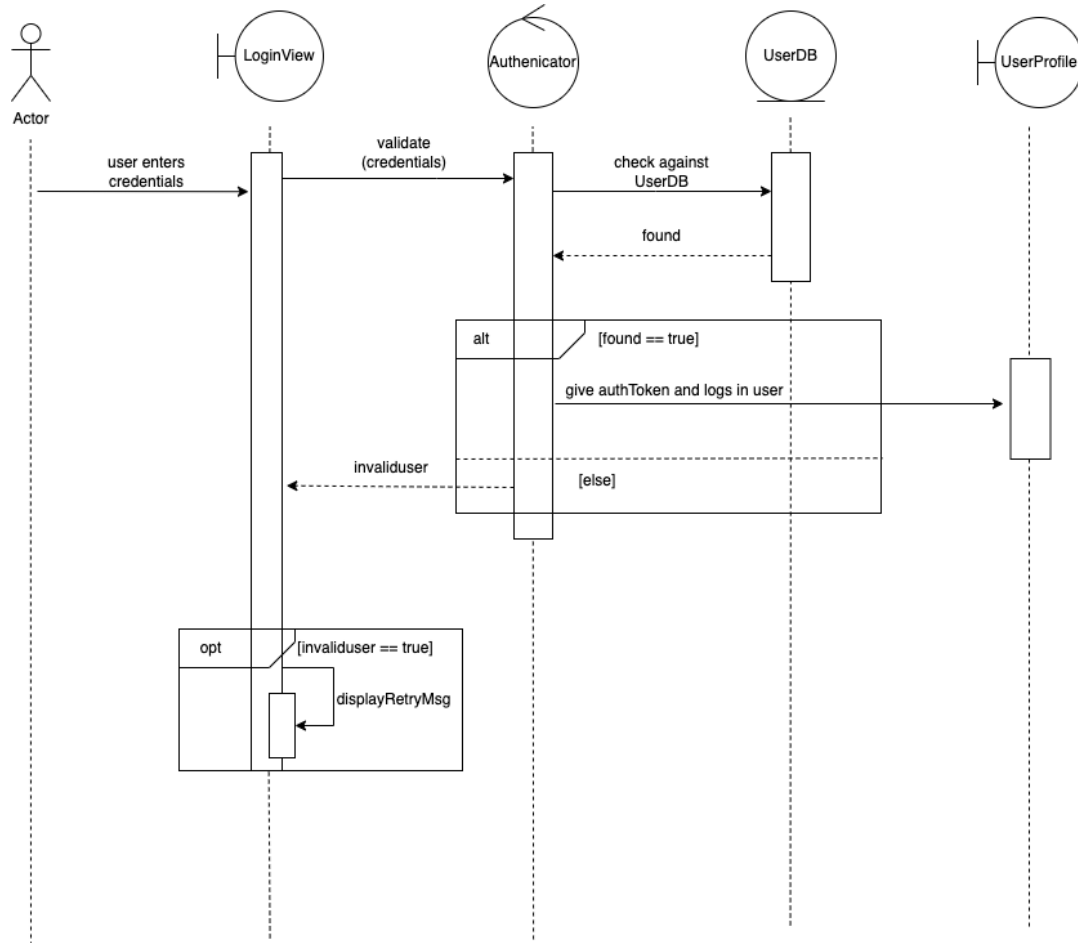
## 2.2 Class Diagram

The class diagram for the conceptual and dynamic model is shown as below. It includes the entity, boundary and controller classes.

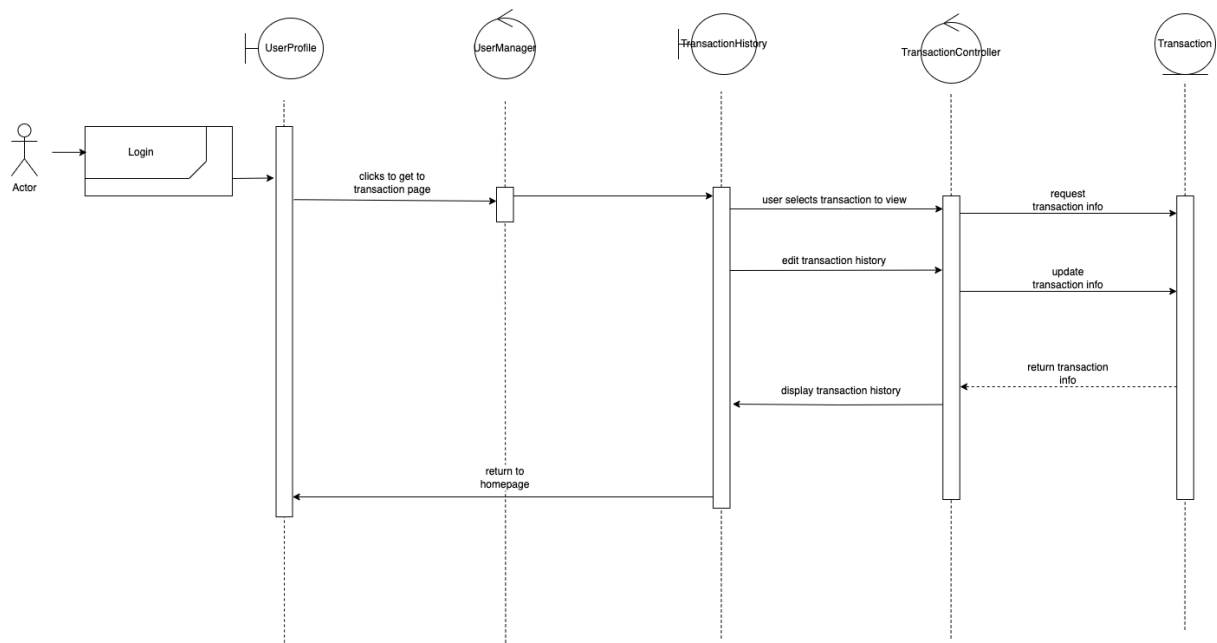


## 2.3 Sequence Diagrams of some Use Cases

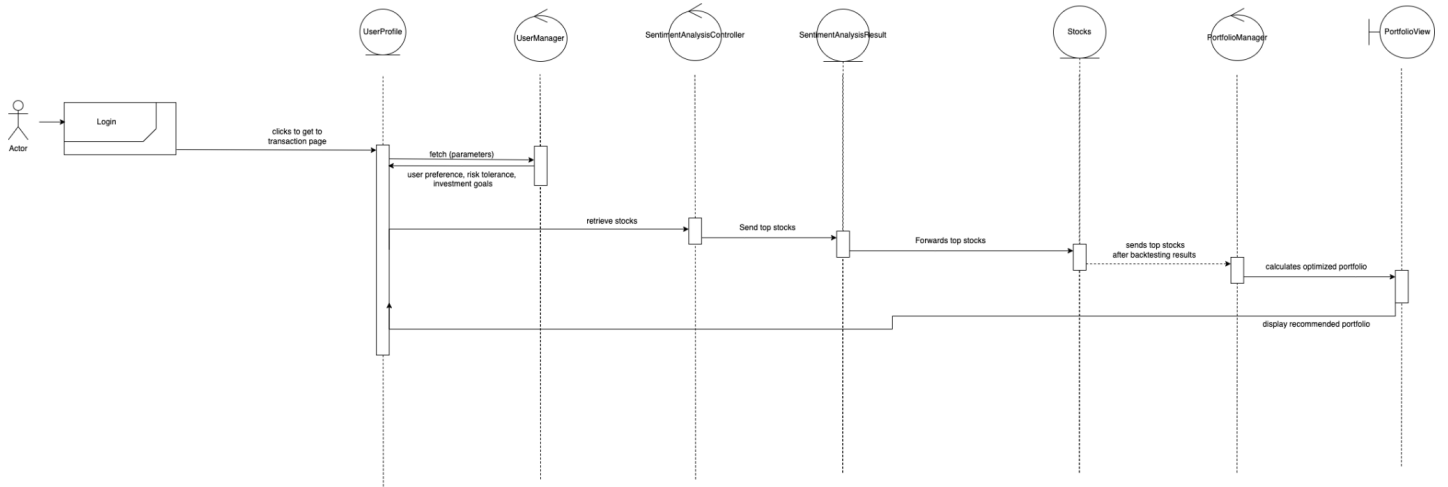
### Login



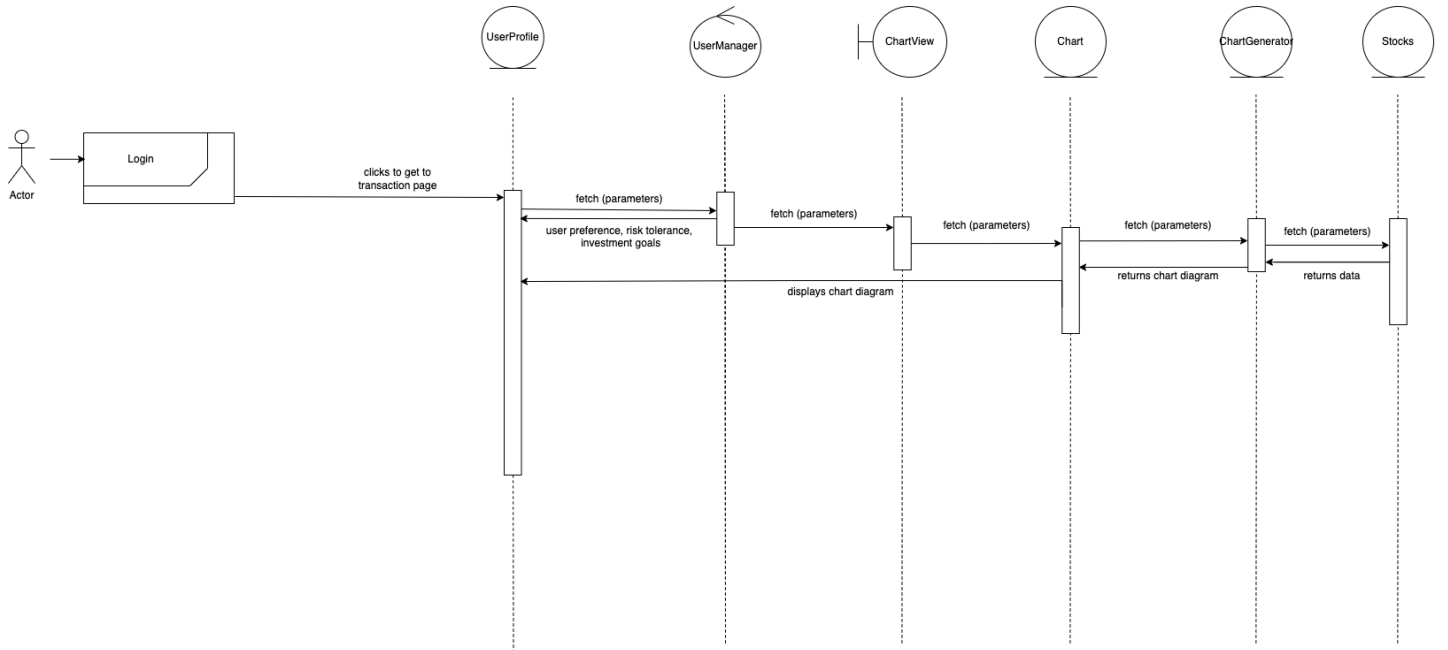
### Transaction History



## Optimise Portfolio



## Display Charts



## 2.4 Initial State Machine Diagram

The initial dialog map(State Machine Diagram) is illustrated below

