# Project 6
# Stock Portfolio Management System

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Github: https://github.com/comp3300-comp9900-term-3-2019/capstone-project-js-victory-group

Team Name: JS Victory Group

## Abstract

Rather than developing an advanced application related to new technologies recently emerging in the industry (such as some of the other project proposals), this project is to construct a rather traditional application – Forex portfolio management system for financial investment. The final implementation will be similar with Yahoo finance but focus on foreign exchange and it is a Web-based application. The data will based on Google finance, Yahoo finance and the Alpha Vantage which given by lecturer. Project may also use some open sources or external software libraries, tools as well as service.

# Contents

## Background (Nan Zhou)

Portfolio is a set of securities. Manager of portfolio always expect to compose different securities to hedge its risk or acquire more return. Basically, people in financial market obey the same principle “do not put all the eggs into one basket”. Which means traders prefer to choose multiple securities to diversify potential risk. Portfolio theory is based on such requirement.

Among all the available securities (bonds, foreign exchange, notes and derivates). Foreign exchange is an ideal choice for portfolio manager. FX market is the largest market in the world which millions of trades happened every day. It is decentralized and took less effect from government policy. Are these difference make it possible to predict a change of the market. A trader can adjust portfolio according to news and indicator. Essential information is available for every trader in FX market.

Automatic trade is wide applied in foreign exchange. MetaTrader 4 is one of the most popular automatic trade software. User need to set parameters and indicators. Then software will monitor market and find out profitable trades. These years artificial intelligence bring new possibility to this area. Corporations and researchers devote themselves to develop a well-function AI trader. Analysis and prediction based on AI is another hot spot in money market. AI Analysis has been considered in design. It will be an extension function in our project.

Now most portfolio management software has same functions. Customer can view graphs and news. Then make transactions. User can write program for automatic trade as well. However, most trade software does not have good extensions. For instance, OANDA (https://www1.oanda.com) do not accept outer indicator. Users are only allowed to use pre-existing indicator.

Our group aim to focus on foreign exchange market. Rather than stock market, foreign exchange is more suitable to hedge risk. It is also the biggest part in financial market.

## Aim (Jie Shang)

The aim for the project is to develop a foreign exchange management WebApp which focus on user to check the foreign exchange rate and bank interests (including the lending rate and deposit rate). The WebApp should be friendly and effectively for user to use. A beautiful and concise user interface is also one of the standards for this project. Security problem will only be concerned in the design plan but not implement in the following 7 weeks.

The foreign exchange data will base on Alpha Vantage API (https://www.alphavantage.co) and the bank interest data may crawl from government bank websites or business bank websites. The basic functions for the WebApp should allow user to set their own profile, follow the foreign exchange, show the graphs as well as foreign exchange comparison. But as this product is specially used for arbitragers so the analysis and forecasting are another two big functions in this product, it might contain the bank lending rate graphs, bank deposit interest graphs for two foreign exchange which can help the user easily to calculate the profit.

## Epics

- Epic1: Login / Register

The Login and Register epic is a part of feature for account management. It enables the users to create their own account and fill in their personal information. The account of the users should be login in while they use this portfolio management system.

1. Each user can sign up with only one account.
2. Username, password, phone number, E-mail and password hint question are necessary to be offered for register.
3. Considering the customers’ privacy, all the user information is saved encrypted in database system.

- Epic2: Setting

  This epic offers the entry of account management, UI customization feature. Users can change their personal information here as well as the number of titles and the navigate bar.

- Epic3: Search & Add Foreign Exchange

  In order to monitor the forex information, users need to add their preferred forexes into their portfolio in advance. The feature of add forex should be embedded into the search bar feature. It allows customers to search and add their preferred forex. Every user can add unlimited number of forex and customize the order of the display. In addition, for every forex in the portfolio of every user, they can appoint some special foreign exchange rate point. If these points are reached, the system can E-mail them as a notification.

  1. Users can add unlimited number of forexes of different countries.
  2. Search feature and add forex feature are combined.
  3. E-mail notification feature can help customers monitor their forex on real-time when they are not login in the management system.

  All the data of forexes are come from the Alpha Vantage API. Due to the limitation of Vantage API, after obtain the data, it will be saved into our own database. We will use the PostgreSQL as the DBSM in this project.

- Epic4: Display Graph (Jie Shang)

  This feature will allow user to visualize one of the foreign exchange rates so it can be easier for user to do some search and analysis. The graph will take the most place of the UI and the graph should be concise but also including all the most important information about the forex.

  1. User can select the one forex to be displayed.
  2. User can visualize the exchange rate trend curve within 30 minutes (default).
  3. User can change the default time period of the trend curve (1month/1week/1day etc.).
  4. Graph might can be displayed in different color according to the trend.

  All the data that the graph need comes from the Alpha Vantage API. Colorful graph will be implemented if time is enough but the single color trend curve should be fully implemented.

- Epic5: Compare Foreign Exchange (Jie Shang)

  This feature is the enhance of the epic 6, it allows user to choose more than one forex and the chart can show on the same graph. User can use this feature to compare the trend of the different forex and can do some complex analysis or prediction.

  1. User can choose to show more than one forex from user's following list.
  2. User can easily distinguish the two different forexes.

  All the data will come from Alpha Vantage API and will be implemented by the front end. This feature will be implemented if the project developed follow the schedule.

- Epic6: Analysis and Forecasting (Diming Zou)

  Arbitragers needs lots of market information, such as bank interest and exchange rate, to make a successful foreign exchange deal, however the data of information comes from several different data sources and not easy to be collected.

  The analysis and forecasting functions may reduce the information collection cost.

  The project will have these functions below:

  1. Analysis part will provide the essential information (bank interest, exchange rate, market situations) of the foreign exchange arbitrage for the arbitrage trader.

2. Forecasting part will provide some useful functions (risk prediction and profit prediction) which can support arbitrage trader to make a trade decision.

Our team plans to achieve the analysis function by web crawlers which can automatically crawl above data per seconds and synchronously display them on the analysis website.

Also, the forecasting function will use machine learning or deep learning, for example using natural language processing to estimate the impact of news on market and using or using long short-term memory to make a regression of exchange rate.

- Epic7: Trading System (Jie Shang)

This feature allows user to buy/sell forex, check the transaction history, see the details of the transaction as well as the transaction profit and loss.

1. User can check the transaction history which including the time, amount, order number, etc. all the information should be displayed in a concise, neat format.
2. User can check the transaction details by click the specific transaction history. Details should contain the time, bank information, amount, forex information etc.
3. User can check the transaction profit and loss information from the system, also the account amount information can be showed in the functions.

User can achieve buy/sell functions in the virtual system but the security problem is not considered at this stage. The transactions may be transferred between the team members.

If time is enough, first two functions should be fully implemented and the third function can be implemented while developing the first two, so it does not need to be a single function.

## Solution Architecture (Diming Zou)

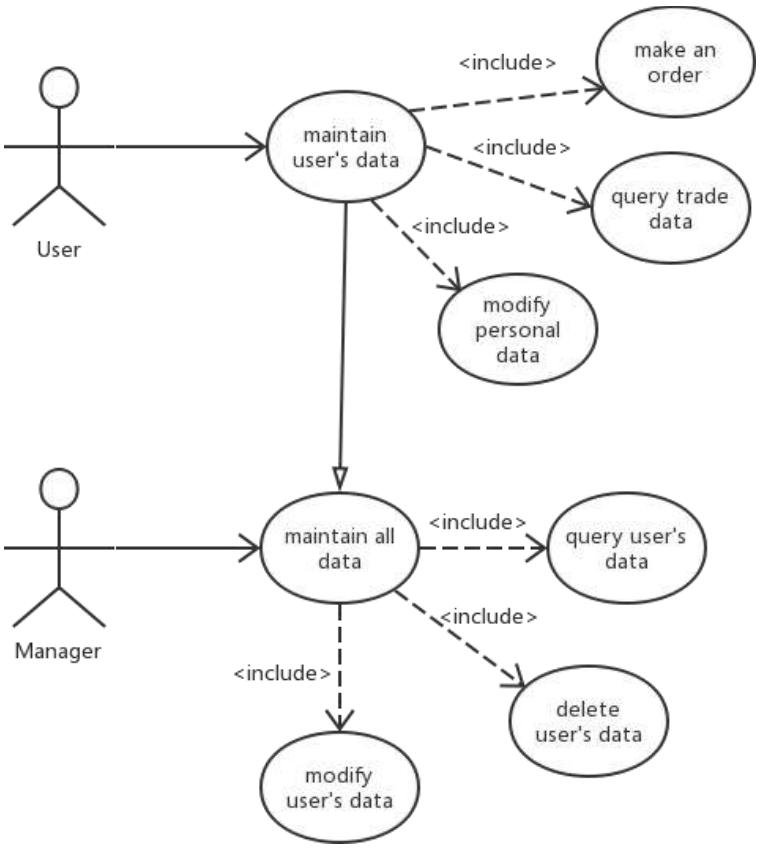


Figure 1. Use case diagrams

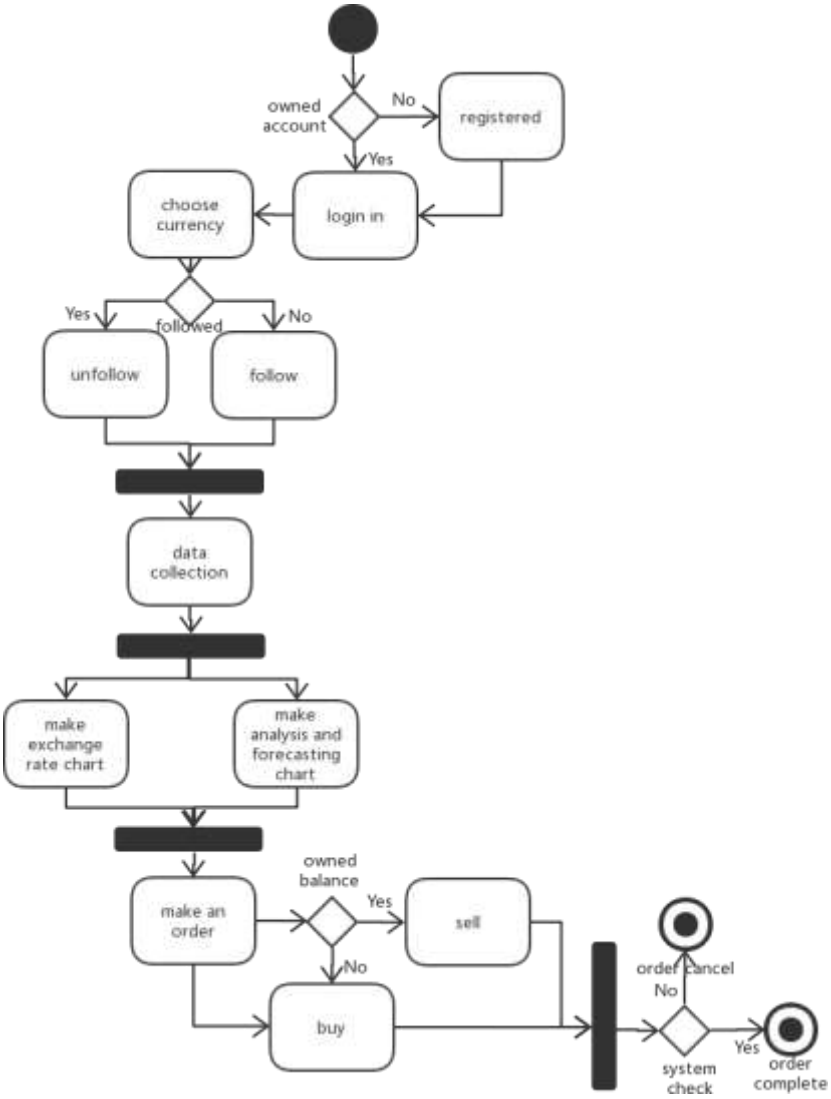


Figure 2. Activity diagrams

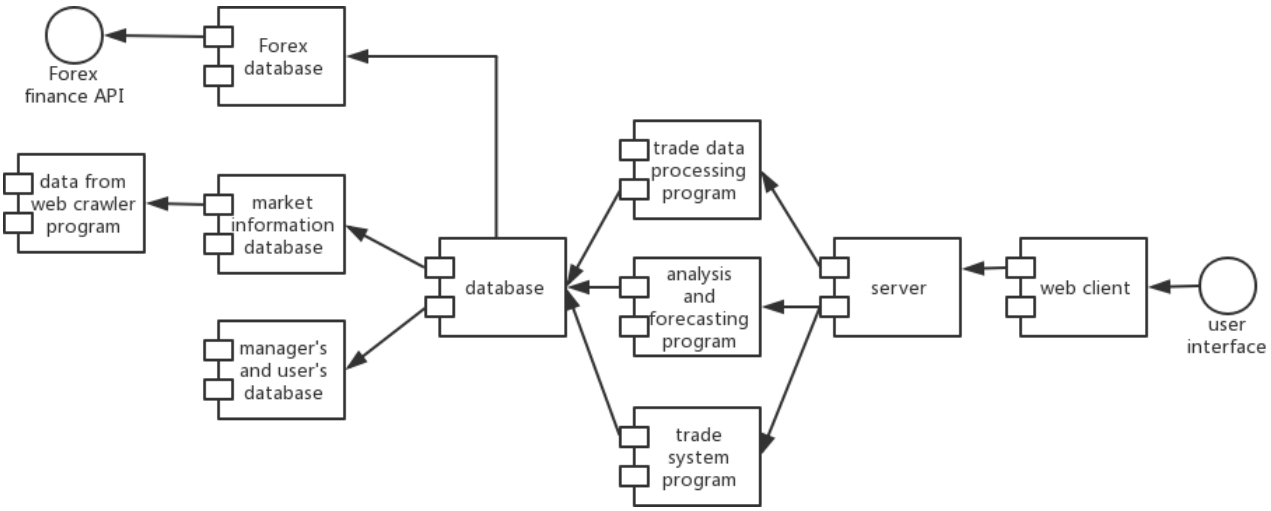


Figure 3. Component Diagram

## Team (Jie Shang)

| | |
|---|---|
| Jie Shang | Python, JavaScript, SQL, C |
| Nan Zhou | Python, Java, SQL, JavaScript, C |
| Diming Zou | Python, Machine Learning, Deep Learning, SQL |
| Bo Li | Python, Machine Learning, Data Mining, SQL, C, |

## Schedule (Jie Shang)

| | |
|---|---|
| week 1-3 | Group formation, topic chosen |
| week 4-5 | Finish epic 1, 2 and discuss epic 3,4 |
| week 6-7 | Finish epic 3, 4 and discuss epic 5,6 |
| week 7-8 | Finish epic 5 and tried to finish 6, then discuss epic 7 |
| week 9-10 | Finish epic6, 7 as much as possible. Submit final report and presentation |