Group 2
4/26/2017

SP3

Demo Username: prof
Demo Password: abc123
URL: https://web.njit.edu/~ajw38/frontpage.html

This project is a simulated online stock portfolio management system. Users can deposit money and use that money to purchase stocks. Users can also withdraw money and check their balance. The money deposited is kept separate from the actual stock portfolio, and therefore does not factor into the portfolio value. Users can only buy stocks from the Dow 30 and Nifty 50, and these purchases are always done on January 17th, 2017 (using stock prices from that date). Users sell stocks at the current-date's stock prices, however, so they can see the returns as though they had actually purchased the stocks on January 17th and sold them today. When viewing their portfolio online, users will be viewing the current stock prices, not the January 17th prices. Users can also download a csv file representing their stock portfolio. All transactions are recorded and the user can review them online. They are dated and timestamped. The buy-stocks transactions are dated 1/17/2017, while the sell-stocks transactions (and cash deposits/withdrawals) are all dated with the current, actual transaction date. The user can only purchase a maximum of 10 different stocks - a maximum of 7 domestic stocks and a maximum of 3 foreign stocks. After having purchased 7 or more different stocks, users cannot sell to less than 7 - they are limited to a minimum of 7 different stocks. New users can create an account. The admin account can also create user accounts. Each user account can have one stock portfolio. A user can also delete his/her account, and the admin account can delete any user account.

Finally, users can choose to have their portfolio's optimized. The optimization algorithm is based on Equal Risk Contribution. It will buy and sell shares of the various stocks the user currently owns, but will never sell all shares of any one stock. It optimizes the domestic stocks and foreign stocks separately, as though they were in two separate portfolio.The optimization function buys and sells stocks at the current date (and these transactions are recorded, and stamped with the current date). Users can download a csv report on the optimization, with before-and-after data, including the risk contributions of each stock and the portfolio beta and returns. The risk contributions of the optimized portfolio will not be exactly equal, because that would require the buying and selling of fractional shares of each stock. We round the number of shares that must be bought and sold to the nearest integer. This algorithm is more effective, and its benefits are more apparent, when dealing with relatively large amounts of shares. The returns, risks, and betas are calculated using two years worth of daily historical stock price data. The indices used for beta calculations are the Dow 30 (for the domestic, Dow 30 stocks) and the Nifty 50 (for the foreign, Nifty 50 stocks). While the portfolio beta and portfolio returns aren't used in the optimization function, they are still calculated and presented to the user as they are important metrics to observe in any portfolio.

The risk contribution of each stock is its risk multiplied by its portfolio weight. Since we optimize domestic and foreign stocks separately, the risk contributions presented are risk multiplied by domestic portfolio weight and risk multiplied by foreign portfolio weight, for domestic and foreign stocks, respectively. The function attempts to perform optimization with as little change in overall portfolio value as possible. In other words, the system of equations used to calculate the amount of shares of each stock that must be bought/sold includes this equation:

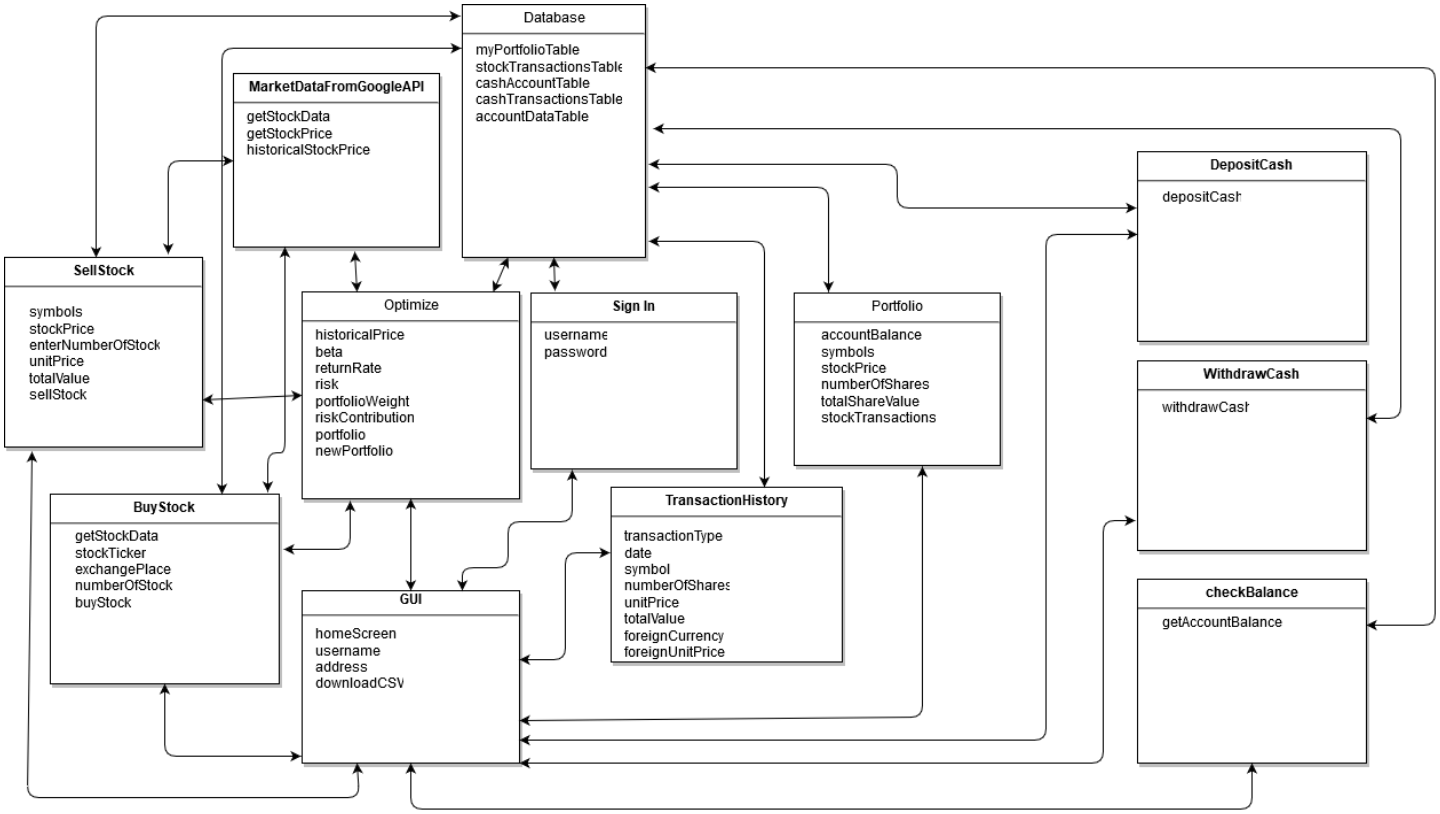
$0=d(S_1)*V_1+d(S_2)*V_2+...+d(S_n)V_n$

where S_1 is the amount of shares of stock 1, $d(S_1)$ is the change in amount of shares of stock 1, and V_1 is the share value of stock 1. The other equation that makes up this system of equations is this:

$(d(S_1)+S_1)*R_1*V_1=(d(S_n)+S_n)*R_n*V_n$

where R_1 is the risk of stock 1. This equation is derived from the fact that the risk contributions of each stock must be equalized. With this system of equations, we solve for all $d(S_n)$, round them to the nearest integers, and optimize the portfolio. Our component diagrams can be seen below.

Component Relationship Diagram:



Component Interaction Diagram: Portfolio Optimizer