The Paramount Investments League

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Hyperlinks:

Webapp Link
Project Repository
Reports Repository

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Contents

1 Customer Statement of Requirements

1.1 Problem Statement

The stock market, more specifically the New York Stock Exchange(NYSE) and the Nasdaq play a pivotal role in the American economy today. Both are signals of the strength of the private sector and consumer confidence. It is thus no surprise that more and more people want to be involved in these markets and attempt to increase their own wealth.

There is however a barrier to entry for many people, both young and old in participating. That is why with Paramount Investments League we are interested in a platform for interacting with these markets and providing educational interfaces for breaking down these barriers. Users should be able to easily register with the system and begin participating immediately. They should be given an imaginary cash portfolio where they can perform basic market orders such as buy and sell. These orders to should mimic real market orders as closely as possible and should include a brokers fee. More sophisticated market maneuvers should be unlocked as the user progresses through an achievements ladder.

Paramount Investments League is geared towards a wide array of audiences and expects a variety of users with varying knowledge levels to participate. In order to maintain appeal amongst these users the platform should provide rewards to users for acheiving particular goals. We would like to replicate the idea of achievements or trophies similar to the Microsoft xBox and Sony Playstation family of systems. These achievements can award users with new abilities or additional cash to their portfolio as they rise up the achievements ladder. Users should also be able to create leagues to help further enhance the competitiveness of the game.

Leagues exist to allow multiple users to compete against a subset of the global user base with individual league rules. This allows leagues to set particular goals in order to be declared the winner. Leagues will require a cash buy-in that will be pooled together and distributed to the winner(s) as seen fit by the league creator. To help facilitate these leagues, a leader board will be created for each individual league such that users can see their progress. In addition to league leader boards, mutliple global leaderboards will be available providing specific metrics of comparison.

To help facilitate a better understanding of markets, market metrics should be available to the user through news feeds of companies in their portfolio, interactive charts, and a live ticker of current trades happening on our platform. Users should be able to have granular control of email and social media updates.

The entire experience should be unified across mobile, tablet, and the desktop and combined with the above features provide an enthralling core experience for users to learn about the stock market.

1.2 Glossary of Terms

Achievement – Any set goal reached by an investor. Achievement rewards can be managed by a league manager and may include badges, capital, equity, etc.

Transaction Ticker – Constantly updating scroll of most recent trades across the market. Users can observe market trends from global equities which may or may not already be in their portfolio.

Leaderboard – Global or league based ranking system determined by overall net worth of player.

Security – A tradable asset of any kind. Can include debts, equities, or derivatives. For the purpose of this game, we will be dealing primarily with equities.

Dividend – A payment made by a corporation to its shareholders, generally as a distribution of profit. It is usually distributed as a fixed percent of shareholder value.

Derivative – Any financial contract which derives its value from another asset or index.

- **Option** – Gives the user the option to buy or sell an asset at a specified price on or before a given date. The buyer and seller are both obligated to fulfill the transaction on the given date if the option is taken.

- **Future** - Allows the buyer to buy an asset at its current price and pay for it at that price in the future. A future is generally exchange traded. The buyer and seller are both obligated to fulfill the transaction on the given date if the future is taken.

- **Forward** – Allows the buyer to buy an asset at its current price and pay for it at that price in the future. A forward is a private agreement between buyer and seller not necessarily based around market equity. The buyer and seller are both obligated to fulfill the transaction on the given date if the future is taken.

League – A market simulation with a pre-determined rule set and several investors with a common goal to determine a winner. Goals can vary across leagues as determined by league managers. Investors can choose to opt into a private league, public league, or no league at all.

Portfolio – A detailed account of assets associated with a particular investor in a given league. Portfolios are unique to each user and will contain specific details such as earnings, losses, performance, averages, as well as detailed asset performances of equities within the given portfolio.

League manager – The league manager will have the responsibility of adding and/or removing investors from the league. League managers control settings, and victory conditions for a particular league. League managers maintain their manager status only for the league in which they have created.

Order – An investor must place an order for the purchase or sale of an asset.

Stock – A type of asset that represents equity in a company.

- **Ask Price** – The price at which a trader is willing to sell a stock.

- **Bid Price** – The price a trader is willing to pay for a stock.

- **Bid-Ask Spread** – The bid-ask spread describes the difference in price between the bid and the ask. These two prices are marginally different, but always with the ask being the more expensive of the two. It represents the friction inherent in trading a stock.

Ticker Symbol – an abbreviation used to uniquely identify publicly traded shares of a particular stock on a particular stock market.

Symbol List – a list of a market/several market's ticker symbols.

Market Order – Any order placed for immediate market transaction.

- **Buy** – User has elected to purchase a particular stock and has placed a bid for that stock.

- **Sell** – User has elected to sell a particular stock and has posted an ask price for it.

- **Short** – Typically used by an investor who expects the value of a stock to decrease. The investors borrows shares of a particular stock and sells them at market price. The investor is responsible for the increased value as well should the stock's value increase.

Limit - An investment which will only take place at a given price. An investor placing a buy limit will place a maximum amount the pay and an investor place a sell limit will place a minimum value for which the stock be sold. Limit orders are not guaranteed to ever process, and only do when the particular limit is reached.

Stop – Orders which are activated if a particular stop falls below or rises above a particular price. It is used to minimize gains and losses for the investor.

Share – A small percentage of a given company which can purchased or sold from other traders.

2 System Requirements

2.1 User Stories

Identifier	User Story	Weight
ST-1	As a user, I can create an account without registering with the website in order to participate in Paramount Investment League.	10 pts
ST-2	As a user, I can access the application across multiple platform paradigms so that I may continue to participate when I don't have access to a desktop computer.	10 pts
ST-3	As a user, I can join or create leagues with self-selected goals so that I may compete with others in a simulated stock market environment based on near real-time stock data.	10 pts
ST-4	As a user, I can search for companies by stock symbol and be presented with their current financial information so that I may research future investments.	6 pts
ST-5	As a user, I can browse a companies profile and view the performance data over a configurable span of time so that I may determine whether or not I want to invest in them.	6 pts
ST-6	As a user, I can buy or sell stocks so I may build my portfolio.	10 pts
ST-7	As a user, I can earn badges(achievements) that reward me with additional capital or new features for accomplishing predefined tasks.	10 pts
ST-8	As a user, I can manage my portfolio within a league to track my investments.	8 pts
ST-9	As a user, I can visually track my finances via graphs and charts so I may more easily manage my portfolio.	4 pts

ST-10	As a user new to the stock market, I will have access to an educational interface that teaches me about the stock market via pop-up dialogues.	6 pts
ST-11	As a user, I can see trades being made by all other users in real-time via a stock-ticker like marquee so I may have a quick overview of current trends.	3 pts
ST-12	As a user, I can see the performance of other users' portfolios so I may observe the investment habits of others.	2 pts
ST-13	As a user, I can view a portfolio leader board so I may have a summary of relative performance between users in my league.	1 pt
ST-14	As a user, I can opt to receive periodic e-mail notifications of my stock performance or trades so I may be kept up to date even when not actively viewing the site.	3 pts
ST-15	As a user, I can additionally link my account with social media sites so I may share my fantasy league experience with friends.	1 pt
ST-16	As a league manager, I can add league rules, a league name, and a league logo to personalize my league.	8 pts
ST-17	As a league manager, I may invit I want to join,and assign.	8 pts
ST-18	As a league manager, I can create league announcements.	4 pts
ST-19	As a site administrator, I can view reports of and delete leagues that are inactive.	2 pts
ST-20	As a site administrator, I may post front page news or announcements.	3 pts
ST-21	As a site administrator, I may have access to a user count, number of active leagues, total leagues, quantity of daily transactions, the most/least popular stocks, and newly created so I may have reliable site statistics.	9 pts

2.2   Nonfunctional Requirements

Functionality

Additional features for security will be enabled through the use of a OpenID and OAuth through a third-party library. There exists several packages for the purpose of authentication and authorization of users. Key authentication features are the ability to encrypt and store passwords, provide recovery options for users that have forgotten their password, and store a cookie to validate the session.

Usability

A key point in the design of this application is ease of use and appeal to the users. The application should be interactive, informative and consistent across multiple platform paradigms. Additionally the application will be used to provide the educational interfaces noted in ST-9 which should be able to be toggled on and off so that users can always view the information again.

Reliability

In order to ensure that there is no confusion to the user in the case of the internet or server failure, all transactions end with a final confirmation, and no changes to the account are made until after this confirmation. The user's portfolio will thus always be in a consistent state and will be restored when the user is able to log back in. A user that leaves the application and returns later will still be logged in. Server failure should also be dealt with by keeping backups of user data. Proper care should also be taken to handle a situation where a particular stock source is not available (i.e. Yahoo Finance).

Performance

In order to have a great performance, the website should be as lightweight as possible by keeping hardware demands to a minimum on both the client and server sides. For it to be efficient, any task initiated by the user should be completed in a timely manner. The web server should be able to serve concurrent requests especially when a large number of users are logged in. Any frameworks used should be lightweight but consideration should be taken not to prematurely optimize.

Supportability

It should be feasible to extend pr update any server components and include improved versions of modules which can be installed only by administrators. For scaling purposes, it should be made easy to include an additional number of servers to achieve load balancing. The system should be platform independent so that it is easy to move to newer technologies or the next versions of web server. The system itself should also be backed up to a remote server for the sole purpose of extending functionality and testing new features in a controlled environment.

3 Functional Requirements Specification

3.1 Stakeholders

The target demographic for the software described tends to be centered on students and first time investors. That being said, it is likely to see the software expand to take a large role in both university and pre-university classrooms, as a means of teaching general financial concepts. It would not be unlikely to see the game further expand to a larger range of users than other similar software due to increased functionality, addition of achievement and leaderboards, and ability to join with or without league functionality. Specifically, the addition of achievements leaves the user with the desire to return and spend additional time trading on the software.

The league will be a free service with the intention of eventually moving to a subtle-advertisement platform which will have no impact on the user. Once a substantial enough user-base is generated, it will not be unlikely to see advertisements begin to commence in order to bring revenue to the company. As a free service (with eventual advertisements) we expect the platform to attract the greatest number of users, and due to increased functionality, keep said users on the platform for the greatest amount of time. The software is targeted not only at students and potential investors, but at nearly everyone who desires to gain a greater understanding of the financial industry as well as those who would simply like to practice trading before executing in the real market.

3.2 Actors and Goals

Guest

A visitor to the website who has either not logged in or just a simple visitor

– Register and create an account using OpenID/OAuth2

– View the latest trades

Investor

A user who has an account in our servers and is logged in to their account

– Research the latest updates in the market

– View their portfolio

- Execute orders of any kind

- Join/create a league

- Take part in competitions

League Administrator

Manages the leagues that they have created

- Can set league to be public/private

- Set the rules for the league

Database System

Holds the information for the accounts of all users

- Insert information as accounts are created

- Push data back to views about users/events

- Store new data about about users/events

Financial API

Gives the stocks in our database up to date prices

- Fetch real world information and update our database accordingly

Site Administrator

Manages the overall website

- Ensure fair competition between leagues/players

Browser

The middleman between user and system

- Present data to the user

- Retrieve data from the user

Yahoo! Finance

The unit that knows about current financial statistics

- Retrieve data about stocks

Queueing System

A subsystem for scheduling orders so as not to block user interactions.

– Place orders to be executed or canceled asynchronously

– Schedule events and mailings for system

4 User Interface Specification

4.1 Preliminary Design

The user interface (UI) for Paramount Invesments Leagues will act as a command center for users to interact with their portfolio, leagues they are a part of, and conduct research on potential orders. More specifically, the command center will act as the primary; but not the only; view for users to interact with the system. The command center will provide a snapshot of the users current portfolio and its value, their global rank, a dash to perform market orders, a news feed, and a graphing dash in order to quick analysis of stock performance. The UI will persist a users global rank across all views as well as a ticker of current trades being placed through the Paramount Investment League.

The UI should be lightweight so as not to burden our more restrictive target platforms of mobile and tablet. The colorscheme will be chosen to be easy on the viewer, though this is subjective, the colorscheme will be a basic pallet of grey/black/white/blue, tending toward pastel and web supported colors.

The UI will be built on top of Twitter's open source Bootstrap CSS framework to help facilitate deleriving content to the three target platforms, desktop, mobile, and tablet. Bootstrap provides a mobile first design philosophy, but can be customized to target specific platforms.

Landing Page and Login

Paramount Invesment League is designed around allowing users to easily begin using the service, also know as "zero effort" resgistration. In order to accomplish this, the system does not require the user to register a new user name/account with our system, but instead piggybacks on OpenID and OAuth allowing users to use their Google, Facebook, Twitter, and other OpenID/OAuth accounts to login. You'll also notice that upon initial visit, the header is empty providing no navigation, this may be relaxed in the future to allow the user to explore some of the features of the website that don't require user authentication such as stock research. (*See figure 3.1*)

Global Header

The header (*see Figure 3.2*)across the website will remain persistant across the website once the user is logged into the system. Navigation is done between essentially 4 views in the following order, My Portfolio, Stock, League, Leaderboard,. These names are placeholders and will most likely be
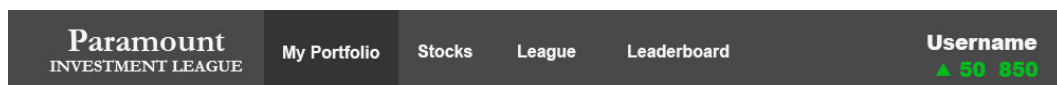
Figure 4.1: First iteration of Landing/Login page.

Figure 4.2: Preliminary design for a global header. This users is up 50 spots for the day.

My Portfolio, My Leauges, Leaderboards, Analyze Assets. The 'My Leagues' and 'Leaderboards' will be turned into drop downs as users expand into leagues to allow quick navigation.

The website name will also navigate to My Portfolio. The username will be replaced by the users actual username, and below it will be the users global rank. The rank will be highlighted in red or green depending on whether they have improved their position on the day, or it has declined. It will also indicate how many spots they have moved.

Global Ticker

One interesting feature of Paramount Investment Leagues will be its active ticker at the bottom of the website. This ticker will be seen in all views, including the Landing Page once there is enough volume to keep the ticker full. The ticker serves two goals, one for new users, and one for existing users. The first goal is to entice new users to participate by demonstrating that the app is being widely used. The second goal is to give a snapshot to existing users of assets that are "on
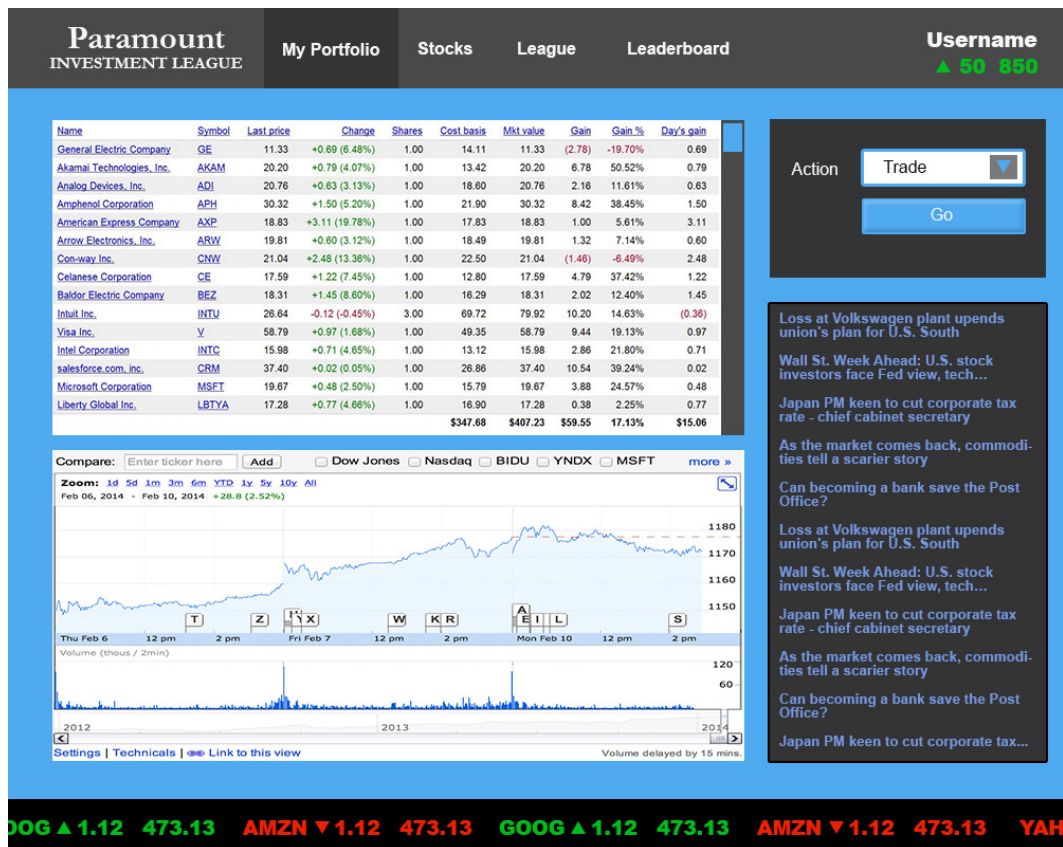
Figure 4.3: The preliminary design of the 'My Portfolio' view.

the move" so that they can attempt to remain competetive. The ticker can be seen at the bottom of all the figures.

My Portfolio

The 'My Portfolio' (*see Figure 3.3*) view of the website will act as the command center for a user wanting to get news about companies/assets in their portfolio, perform an order, or conduct quick graphical anaylsis of assets in their portfolio and compare them to any other asset available for trade through the platform.

More importantly, it provides a snapshot of the users portfolio including a scrollable list of all the assets inside the portfolio and a summary of said assets. In the future, assets will be 'clickable' and will take the user to a summary page of that asset, but that is not planned for the initial 2 iterations.

Leagues

The 'League' (*see Figure 3.4*) view will present a user that isn't a part of a league the ability to create a new league of join an existing league. Not shown in *Figure 3.4* is the view that a user
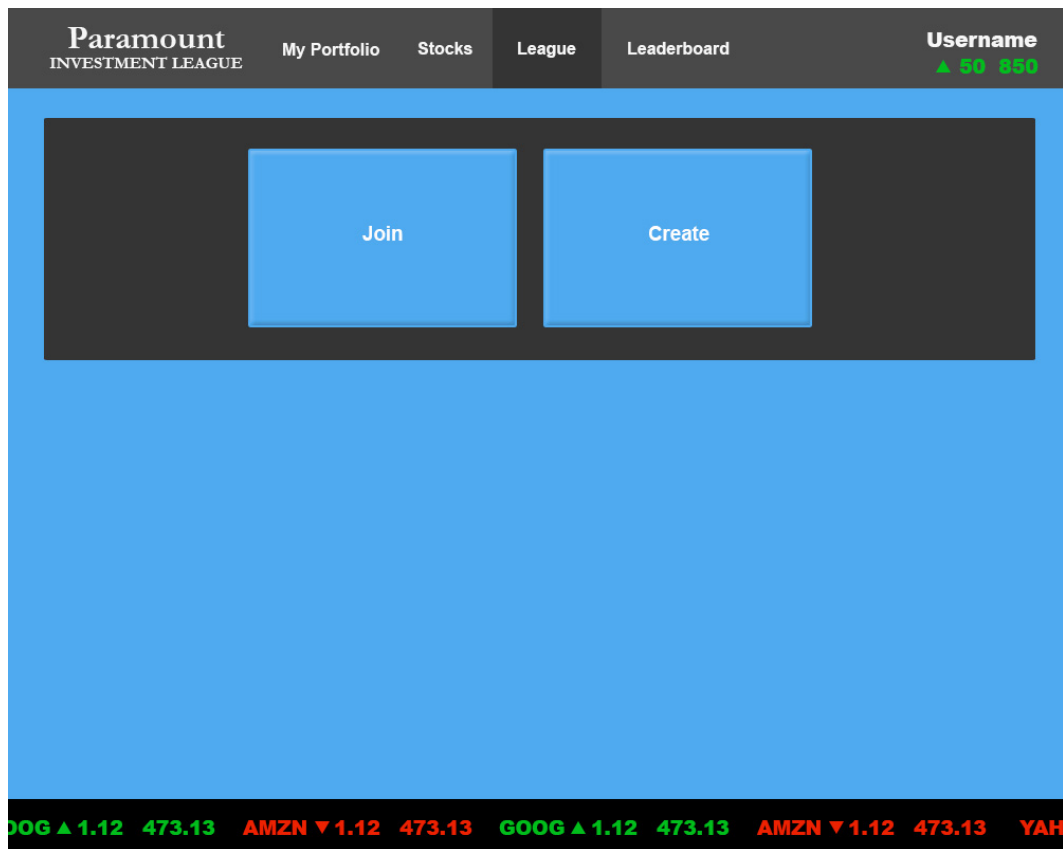
Figure 4.4: This is the league creation/join view. This would be the view presented to a user that is a part of no league yet.

who is a part of a league. This view will still persist the join/create dialogues, but will also present a list of all the leagues that user is a part of, their rank within said league, and their movement within said league.

Leaderboards

The 'Leaderboards' (*see Figure 3.5*) view will present the user with a partial view of the full leaderboard for a given league, or for every user. It will show their rank, their movement, the value of their portfolio as well as the same stats for all other users around them. The view will be scrollable if there are more records then can be displayed, and will center the user in the middle of the view unless they are at the top or bottom of the board.

Asset Analysis

The 'Stocks' view (*see Figure 3.5*) will be renamed to more align its function with its name, which is to analyze assets. It will a more in depth way of anaylzing an asset versus what is available in the 'My Portfolio' view. There will be a news feed at the bottom of assets that you are searching for. There will also be a more formal analysis of asset data presented including P/E ratio, 52 week

Figure 4.5: Here is the leaderboard view which will be the same for both leagues and global leaderboards. This view represents a global leader board. The colorscheme of this view here is incomplete and will fall inline with the remainder of the site.

range, Volume, EPS, etc. This isn't shown in the figure, but will one-half to two-thirds of the space that has been set aside for the news feed.

This is also one of the views and functionalities that has been identified to not require the user to be logged in. While it will not be availble to non-users in the intial product, it can be made available in future releases.

4.2 User Effort Estimation

Several of the most common usage scenarios for Paramount Investment Leagues:
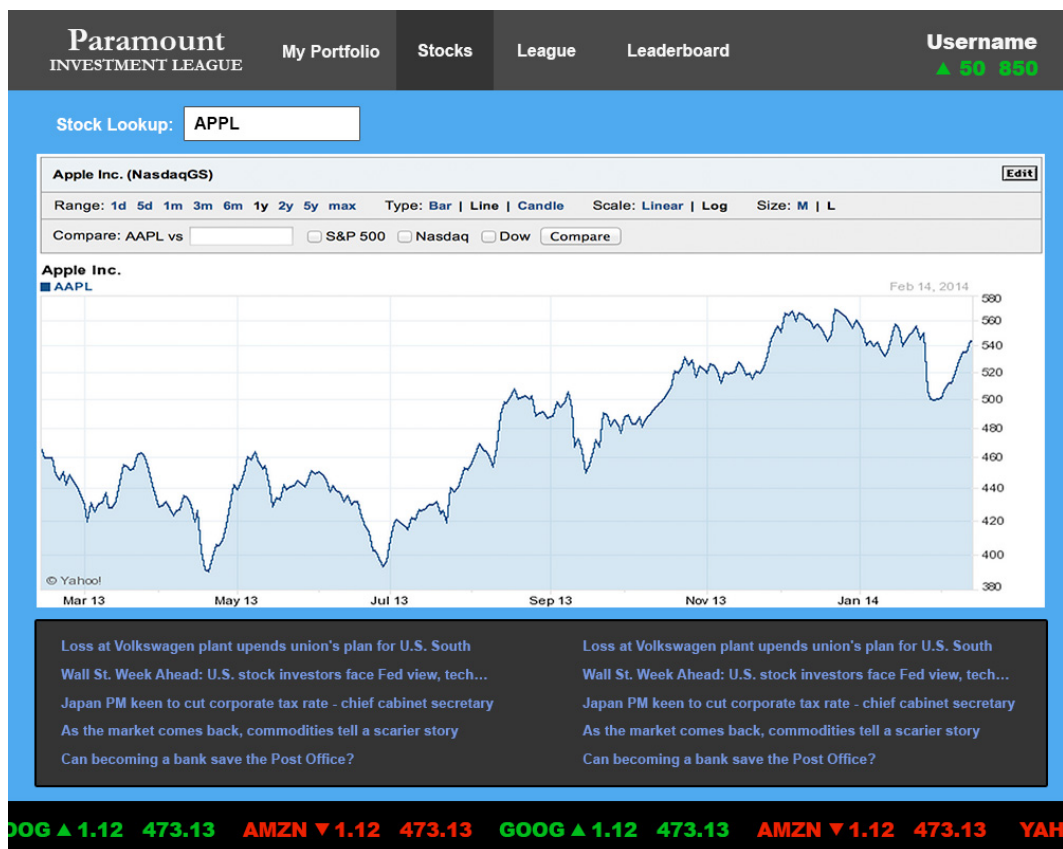
Figure 4.6: The preliminary view for asset anaylsis.

Usage Scenario	Clicks	Keystrokes
Login & Register	2-3	0-1
Place an Order	4-6	2-12
Join a League	3-4	0-50
Create a new League	6-7	11-100
Analyze Asset	2	2-5
View Leaderboard	2	0

Login & Register

Assume the user has come to the domain and wishes to Login if already registered, or register if already a user:

- **Navigation:**

  1. Click on OpenID icon (Google, Facebook, Twitter, etc).
  2. Click on your account (optional for multiaccounts).
  3. Click on login, or hit enter.

Place an Order

Assume the user has already logged in and they wish to place an order:

- **Navigation:**

  1. Navigate to 'My Portfolio', 0-1 clicks.

- **Data Entry:**

  1. Select order type from drop down, 2 clicks
  2. Click textbox to enter asset name. 1 click
  3. Enter assets name eg: 'G', 'O', 'O', 'G', 1-4 keystrokes
  4. Press tab to specify number of shares, 1 keystroke (user could also execute 1 click)
  5. Enter the number of shares, 1-7 keystrokes
  6. Click execute, 1 click

Join a League

Assume that the user wishes to join a league and is logged in:

- **Navigation:**

  1. Click on League, 1 click
  2. Click on Join, 1 click

- **Data Entry:**

  1. Click on a League, or enter its name, 1 click or up to 50 keystrokes
  2. Click on confirmation dialogue, 1 click

Create a League

Assume that the user wishes to create a league and is logged in:

- **Navigation:**

  1. Click on League, 1 click
  2. Click on Create, 1 click

- **Data Entry:**

  1. Enter its name, 1-50 keystrokes
  2. Select ruleset from dropdown, 2 clicks
  3. Fill in parameters, 1-2 clicks and 10-50 keystrokes
  4. Click on confirmation dialogue, 1 click

Analyze an Asset

Assume that the user is logged in and they want to start an in depth analysis of an asset:

- **Navigation:**

  1. Click on Stock, 1 click

- **Data Entry:**

  1. Click on the textbox for entering an asset name, 1 click
  2. Enter an asset name, 1-4 keystrokes
  3. Hit enter, 1 keystroke

View Leaderboard

Assume that the user has logged in and wants to veiw a leaderboard:

- **Navigation:**

  1. Click on Leaderboard, 1 click
  2. Click on Select Legue/Global, 1 click

5 Project Management

5.1 Report 1 Contributions

Category	Points	Names					
		David P	David K	Jesse Z	Evan B	Eric J	Chris M
Project Management	10 Points	0%	0%	0%	0%	0%	0%
Customer Requirements	9 Points	0%	0%	0%	0%	0%	0%
System Requirements	6 Points	0%	0%	0%	0%	0%	0%
Functional Requirements	30 Points	0%	0%	0%	0%	0%	0%
User Interface Specifications	15 Points	0%	0%	0%	0%	0%	0%
Domain Analysis	25 Points	0%	0%	0%	0%	0%	0%
Plan of Work	5 Points	0%	0%	0%	0%	0%	0%