

# SYSTEM REQUIREMENTS

for

“Titan Trading”

Report 1: Part 1

By

**Group #7**

Steven Adler

Kristene Aguinaldo

Timothy Liu

Nicholas Lurski

Avanish Mishra

Safa Shaikh

Brooks Tawil

Kristian Wu

David Zhang

# SYSTEM REQUIREMENTS

## Customer Statement of Requirements

### Problem Statement

Dear Group #7,

Here at the Rutgers Investments Co., our employees trade on the stock market everyday and have allowed our company to survive in the competitive field. With our current success, we are looking to train the next generation of traders and finance experts. We believe that the best way to learn about trading is by participating yourself. With experience, traders will know the right stocks to choose that can yield an average of above 10% interest each year. They will also understand the risks involved in trading, and how investing in the stock market during a market boom can exponentially increase your net worth while a market crash can cripple your investments. However, learning by doing is not the best way to approach this problem. Through this process, people can lose a lot of money with failed investments, and there are even those who do not have the financial capability to begin trading. In order to allow everyone an opportunity to experience stock market trading and learn more about the financial industry, we want to create a stock market fantasy game, and we would like to commission you to create it. Our vision is to provide a stock market fantasy game that incorporates cryptocurrency trading to aspiring investors of all experience levels.

With *Titan Trading*, investors, traders, and students of all experience levels will have a chance to interact with the stock market in a fun, competitive manner without using their actual finances. We want our game to teach the novice trader the basics of investments and give them a platform to try things out before committing to investing in real life. For the more experienced day-trader, our game will give them a chance to try out some new investment strategies, or compete against their colleagues without risking their real assets. We can bring together traders of all levels in a no risk environment where they can really learn about investment trading. The market includes a wide range of assets from commodities, bonds, currency, etc. each of which

follow different trends and trading practices. On top of the diverse investment options, there are also the tools, which include market limits, buy/sell orders, dividend pay comparisons, and graphs and data visualization tools, that investors use in their work on the market floor. Even for an experienced trader, the stock market is a complex and ever growing challenge, so being able to practice and learn using real data and tools, without risking personal loss, is what we want our game to provide.

So far, what we're asking you to do has already been done by a lot of different companies, and we want to take our product to the next level in order to give our users a more engaging way to practice trading. First, we want this program to be like a game where you compete against other people, and depending on your standings, you can earn rewards. By including the competition aspect, we hope to incentivize players to make strategic and profitable investments, instead of making risky and unrealistic trades. Furthermore, we want to have a universal league of traders that includes every user of our product. This, along with the competitive nature of the game, will provide for a more realistic trading environment for the players participating in our game. We also want to allow users to create private leagues so they can compete with people their friends or colleagues. This will allow people to participate in competitions with people of their own skill level rather than all the other people in the world. We hope that this encourages beginners to begin learning about trading with their friends, and eventually participate in real trading.

The second thing we want our product to include is to incorporate cryptocurrency trading. Today, cryptocurrencies have taken the spotlight with their exponential growth rates and the news cycle dominated by cryptocurrency analysis once Bitcoin peaked at 19,500 dollars per coin. Bitcoin is just one of the many cryptocurrencies available to the public, albeit one of the most well known ones. Cryptocurrencies still rather new to our society, but anyone can invest in them and certain coins have shown 20,000 times return for the investor. Now that the cost for one coin is so high, finding a good entry point to investing is difficult so we want to give our users the ability to practice trading cryptocurrency before deciding whether or not they want to make the investment in real life.

Although the whole premise of this project is just a game, there must be definite rules to guarantee fair play. In terms of leagues, every user registered on the website will enter a *universal league*. In this league, each user enters the stock market (without cryptocurrency) with the same buying power. To ensure that other users are not unjustly punished for playing in market slumps, this universal league will operate in seasons. At a season start, any currently registered user on the site will automatically be registered into the universal league for that season, and anyone that registers during a current season of the universal league will not be able to participate until the next season starts. The rules for the universal league should also be made to mirror the real-world as closely as possible. Other private leagues can be made by users, and these leagues will have preferences set by the league creator to dictate the rules for that game. Rules for one league may seem cheap or unfair to other players, so allowing private, customizable leagues is important to ensure that everyone plays their own fair game. These rules can include: the exclusion of certain stocks, the time needed to conduct transactions, interest, dividends, loans, and more.

This product needs to solidify competitiveness to ensure game longevity. For all leagues, leaderboards will be included to rank players. Each player's profile will record their league rankings as a way to show off his or her hard work. A universal leaderboard will also be included that factors in all seasons of the universal league as a way for users to compare each other across the website. Rewards for placing well within notable leagues will also be included, such as site announcements and extra features. Special leagues will also be provided, which only invite users that have placed extraordinarily well in the universal league. This will give a desire for users to differentiate themselves from the competition by providing a more intense league.

Although the primary motive to play the game is for the competition between users, the product should also cater to beginners to ease the learning curve. After a user has registered on the site and is currently playing in a league, the website will have several pages that serve as the game manual and help guide. These pages will display videos that explain the stock market, how to buy and sell stocks, and other general stock market essentials. Leagues other than the universal league will also be provided specifically to beginners to meet and play with other eager, newer users.

The overall aim of this game is to both educate users about the stock market and to provide a competitive environment for enthusiasts to demonstrate their market skills, while not being as cutthroat as the real world market. The advantage over current stock market games will be the ability to trade cryptocurrencies, a more refined competitive aspect, and a beginner-friendly environment.

Sincerely,

The Rutgers Investments Co.

## **Glossary of Terms**

**League** - A collection of aspiring investors participating in an instance of a stock market simulation. Each league will come with its own pre-determined rule set and goals. A winner will be determined at the end of a season.

**Universal** - Every investor will be automatically slated into this league. It will involve all active users on the program.

**Private** - League will be created and maintained by a League Administrator.

**League Administrator** - The creator of a private league. He/she will be responsible for inviting participants and designating the ruleset including victory conditions and timespan. Users are only admins for the league he/she has created.

**Cryptocurrency** - A form of virtual currency that uses cryptography to secure transactions, regulate the generation of units of currency, and verify transfer of assets. It is susceptible to volatile prices.

**Investor** - One who puts money to use through purchases with the expectation of profits

**Assets** - Property owned by company or person, in our case, the user. It is regarded as having value.

**Commodity** - A basic good such as a food, metal, or agricultural product that investors can buy and sell.

**Bonds** - A fixed monetary investment that an investor loans for a defined period of time at a specific interest rate

**Buy Order** - Tool in the game used to purchase stock or cryptocurrency. It will automatically handle acquisition of assets. Buying power will update to reflect this transaction.

**Sell Orders** - Tool in the game used to sell stock or cryptocurrency. It will automatically handle the sales of assets. Buying power will update to reflect transaction.

**Limit Orders** - Tool in the game used to set a maximum purchase price or minimum sale price for assets. If these conditions are not met, the transaction will not occur.

**Dividends** - A distribution of a company's earnings to a class of its shareholders. It can be given as cash payments, stock shares, or property.

**Buying Power** - Amount of free spending money available for use for an investor.

**Market Slumps** - A period of time where share prices and trading volume are reduced due to declining stock prices.

**Season** - A division of the year marked by changes in weather and daylight hours. This will be used as the length of time for the Universal League. Approximately three months.

## User Stories

Identifier	User Story	Point Value
ST-1	As a user, I can create an account by registering my email address with the website in order to save my information and play history.	2
ST-2	As a user, I can login to my account through a login page so I can verify my credentials via my username and password.	1
ST-3	As a user, I can view an About page that details information about the team who developed <i>Titan Trading</i> to learn more about the motivation behind this product.	2
ST-4	As a user, I can view an Instruction/FAQ page that details different features of the application in order to receive guidance on how to play the game.	2
ST-5	As a user, I will automatically be entered into a universal league - league in which all users compete - with a fixed starting balance so I can immediately start gameplay and make transactions.	4
ST-6	As a user, I can join a league either by creating a new league and becoming a league manager or by being invited to a league by another league manager, with the exception of the universal league.	4
ST-7	As a user, I can create a private league with up to 20 members and automatically be designated as a league manager upon league creation in order to manage league details and rules.	3
ST-8	As a league manager, I should be able to set rules for my league, including a starting balance and league name, in order to manage gameplay among a smaller group.	3

ST-9	As a league manager, I should be able to invite other users by email address or username to start a competition with additional players in my league.	2
ST-10	As a league manager, I would like to create private cryptocurrency leagues that only allow trading of cryptocurrency in order to isolate the volatile market of cryptocurrency from the regular market. This can be designated as a setting during league creation.	4
ST-11	As a league manager, I can set an end date for each of my privately owned leagues in order to define the end of the game.	1
ST-12	As a league manager, I can post or send announcements to the members of my league.	3
ST-13	As a user, I can access a Leagues page that allows me to see the leagues I am competing in, my rank and balance in each league, and my statistics so I can keep track of my progress.	3
ST-14	As a user, I can view a page with current stock market trends so I can make an educated decision about which stock to buy.	3
ST-15	As a user, I can change my personal information and avatar to personalize what my profile looks like to other users and how it is displayed on leaderboards.	3
ST-16	As a user, I can view a leaderboard for each of my leagues that ranks the top 10 people with the most money in the league, and it must update once a day at midnight.	4
ST-17	As a user, I should receive notifications for selected stocks to know when they have exceeded or dropped past a threshold value set by me.	5
ST-18	As a user, I can access a transaction page in order to buy new stocks and sell stocks that I own.	9
ST-19	As a user, I can search companies either by their full name or acronym so I do not have to spend extra time searching for a company.	2
ST-20	As a user, I can receive accomplishment trophies once I reach specific milestones and achievements within the universal league so I am motivated to continue playing.	4
ST-21	As a visiting user, I should be able to view the home page, as well as view the statistics for the universal league (even if I do not have an account) in order to view the competition the game provides.	2



ST-22	As a site administrator, I can view and delete inactive leagues to remove unwanted data.	3
ST-23	As a site administrator, I can access data about site statistics, including the number of users, active and non-active leagues, most and least traded stocks, and transaction details in order to display accurate statistics on my website.	8
ST-24	As a user, I can view a glossary page that will tell me the key terms needed to start investing.	1
ST-25	As a user, I can view an investing guide page that will tell me how the stock market and cryptocurrency work and how to invest properly.	1

## Non-Functional Requirements

### Functionality

In order to be able to accommodate for a growing user base we will be creating our web application around a Postgresql database, which is known in the software industry for its ease of scale. Additionally we will be creating private leagues that up to 20 people can join with their friends in order to make the game more personal for users. We will also be using password hashing and salting in order to protect user credentials.

### Usability

We will be using Django, which is a Python web-application platform in order to create our website's Model View Controller. Along with this we will be using Bootstrap to create a good looking website that will be smooth and easy to navigate and use.

### Reliability

We will be prototyping our website on a heroku instance, and deploy it to Amazon Web Services (AWS) for maximum uptime. All transactions will be performed and verified server side and not client side so that someone could not cheat and manipulate the trades going on. We will also keep backups of user data in case of a server failure.

### Performance

Since we are using Postgresql, we have the ability to scale up and provide for a large number of users on the fly with great ease. Additionally, python makes efficient web-server applications so we will not have to worry all that much about demands on the server.

### Supportability

Python provides a lot of debug tools, and provides a lot of information when things go wrong which will benefit us greatly when debugging our program. We will also be able to

provide users with error messages when things do go wrong so that they know that their trade has not gone thru or various other errors that could happen.

## On-Screen Appearance Requirements

On-screen appearance requirements detail requirements related to the user interface experience and are written from an objective perspective. These requirements have been separated into two categories: all site requirements and page-to-page requirements. All site requirements are those that apply to every single page across the website domain, while page-to-page requirements are those specific to different web pages.

We have brainstormed the formats for 5 different types of web pages: the homepage, dashboard page, individual league page, buy page, and sell page. We also intend to include a custom 404 not-found page, FAQ page, glossary page, and instruction page, whose requirements are also listed below.

### All Site Requirements

Identifier	Requirement	Points
OSR-1	Every page will have navigational tabs at the top of the screen to access the home, about (dropdown with about us, FAQ page, instruction page, glossary), and dashboard, as well as a drop down menu to access their profile settings or log out.	1
OSR-2	Every page should contain a stock-ticker footer showing growing and declining stocks.	1
OSR-3	Every page will have the logo of <i>Titan Trading</i> in the top left corner.	1

### Page to Page Requirements

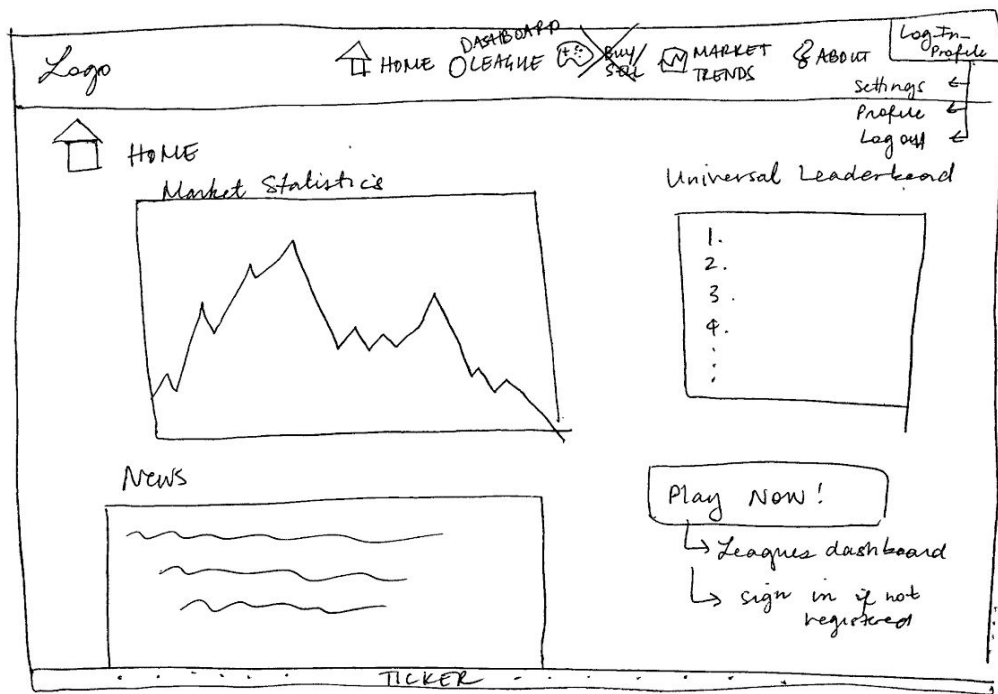
Identifier	Requirement	Points
OSR-4	A custom 404 not found page will be displayed to a user when they try to access a URL/URI that does not exist or is not designed for them to be accessing.	1

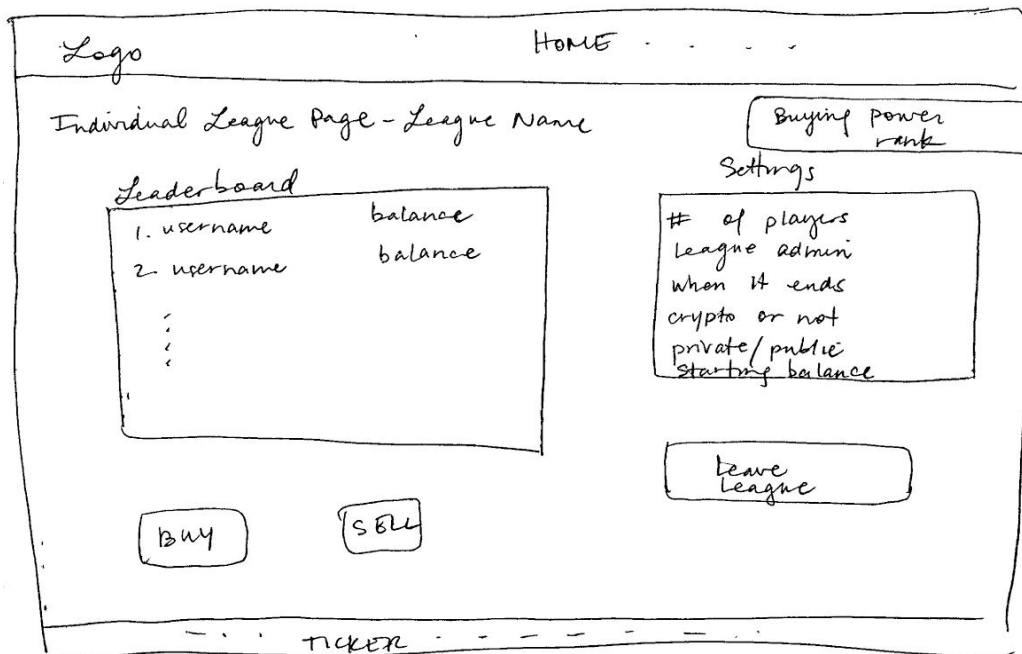
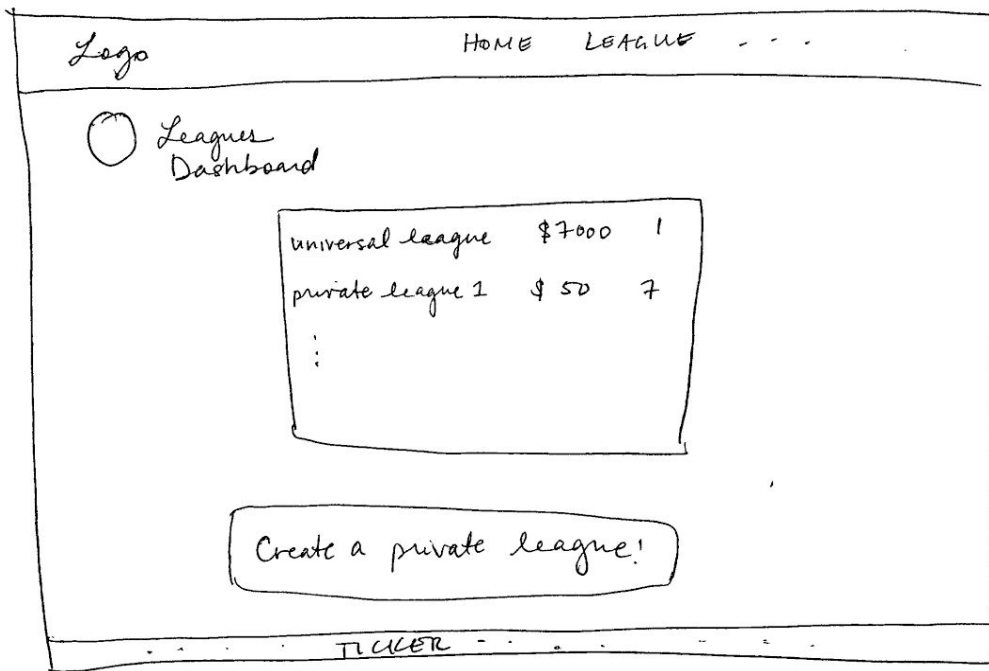
OSR-5	The homepage should include current market trends and articles, as well as the leaderboard for the universal league.	3
OSR-6	The dashboard page should contain a list of leagues the user is competing in and a button to create a new private league.	2
OSR-7	Every individual league page should present information about the user's current buying power, total worth, and rank within the league.	2
OSR-8	Every individual league page should present buttons to buy or sell stocks.	1
OSR-9	Every individual league page should present a leaderboard of the top ranking players within the league and a list of league settings, eg: league end date, starting balance, league administrator, etc.	3
OSR-10	The buy page should present information about the user's current buying power, total worth, and rank within the league.	2
OSR-11	The buy page should contain a widget that will return market statistics about the stock the user searched for.	2
OSR-12	The buy page should present a form that allows the user to submit buy orders.	2
OSR-13	The sell page should present information about the user's current buying power, total worth, and rank within the league.	2
OSR-14	The sell page should have a portfolio of all the stocks the players owns within a specific league and should have a button to submit sell orders.	4
OSR-15	The FAQ page should include the mission statement behind TITAN TRADING.	4
OSR-16	The FAQ page should present answers to common questions such as, "What is the Universal League? What is a private League? I'm new to investing, is there a place I can go to learn more about stocks? What is cryptocurrency and how is it involved in our game?"	3

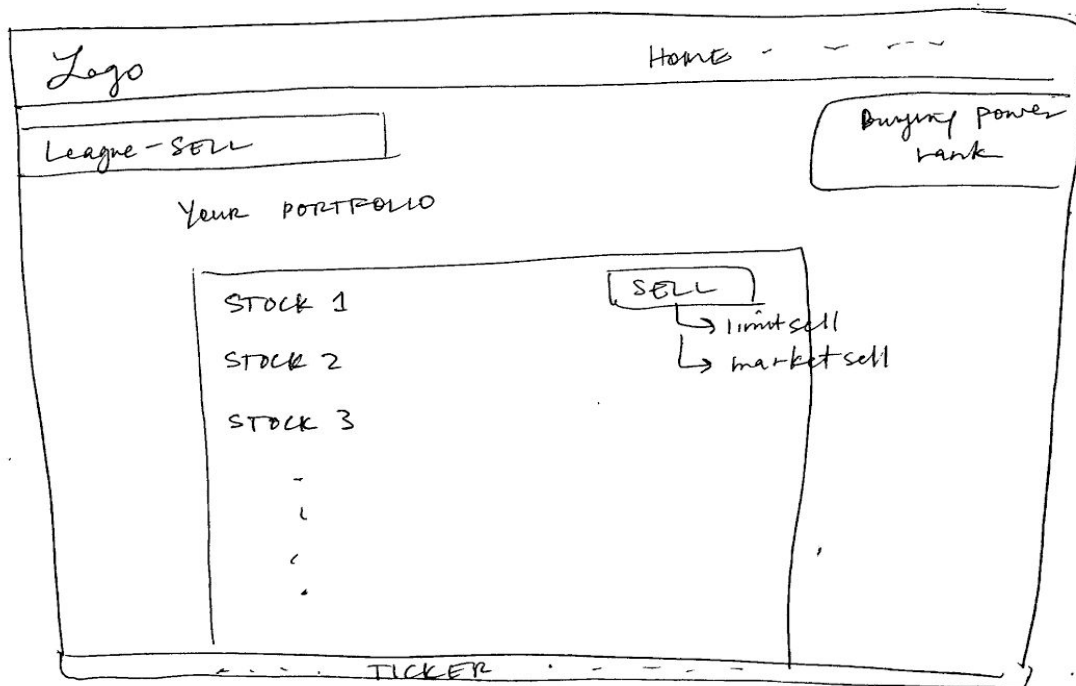
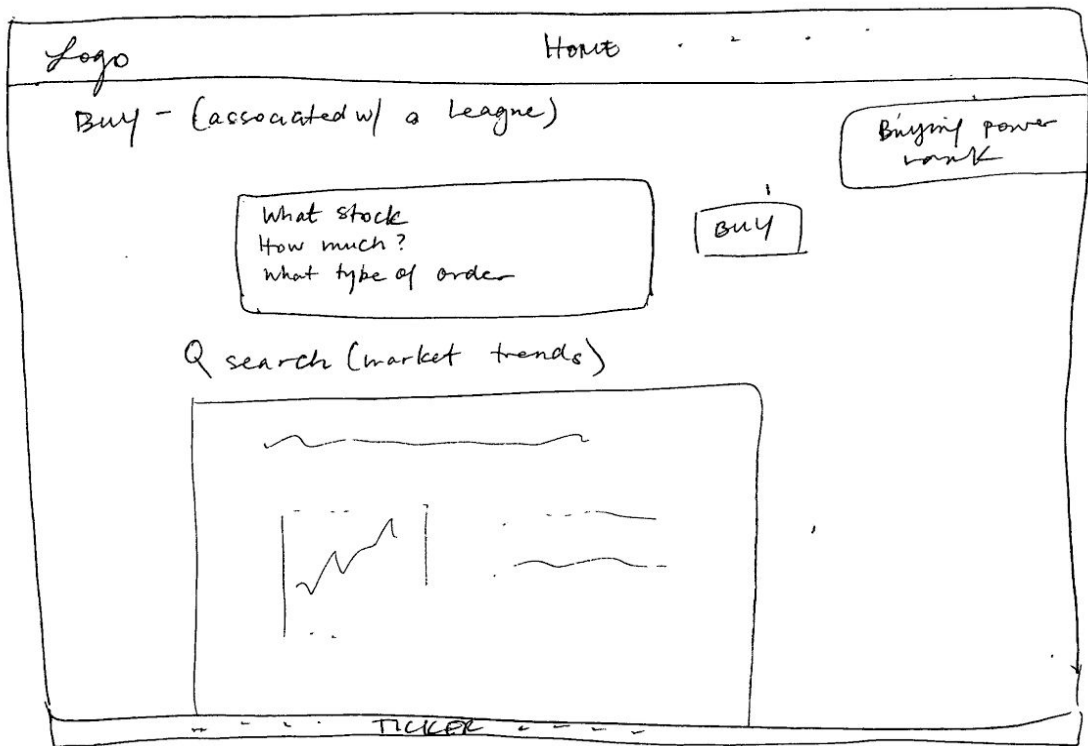
OSR-17	The glossary page will have a list of trading terms and definitions that will be sorted alphabetically.	2
OSR-18	The instruction page should have screenshots of how to buy/sell stocks, create/delete private leagues, buy/sell cryptocurrency within the game.	3.5

### Sketches of User Webpages:

Brainstormed sketches of Titan Trading webpages are shown below. They include: the homepage, the leagues dashboard page, an individual league page, buy page, and sell page.

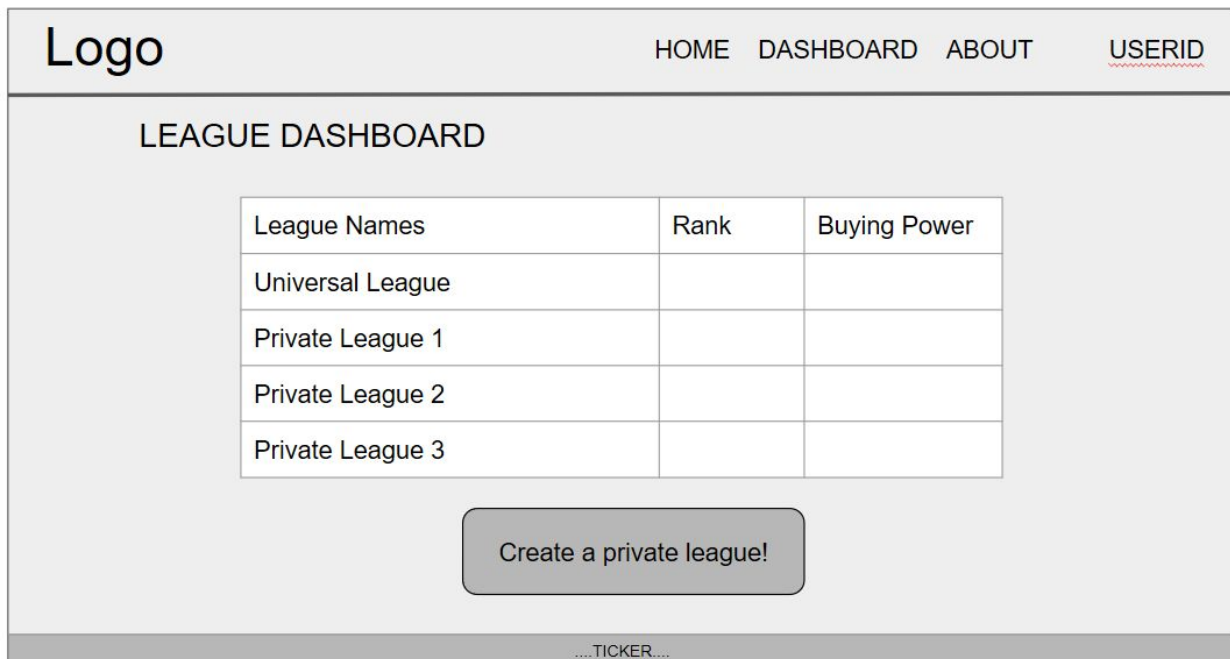
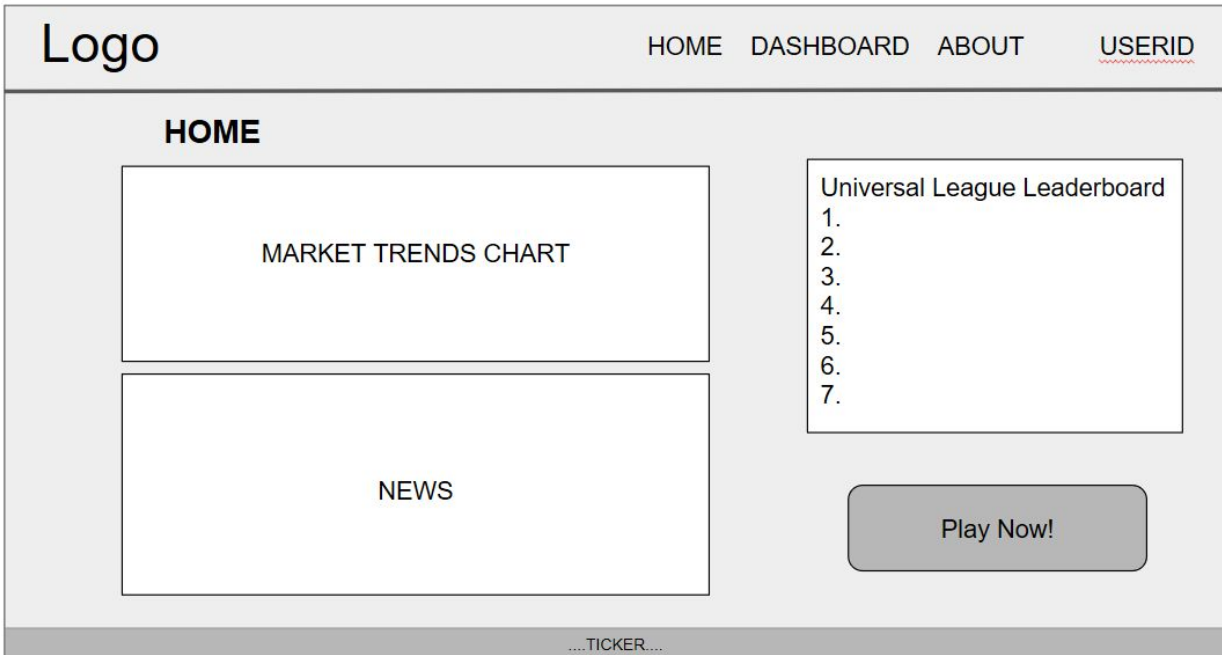






## First Draft UI Electronic Representation:

After finalizing a first draft of the UI layout, we made an electronic representation.



Logo

HOME DASHBOARD ABOUT USERID

Individual League Page

\$BUYING POWER  
RANK/\$TOTAL WORTH

LEADERBOARD

User ID	Rank	Buying Power
User 1	1	\$--.--
User 2	2	\$--.--
User 3	3	\$--.--
User 4	4	\$--.--

BUYSELL

League Settings

- End date
- League administrator
- Starting balance
- Crypto or not
- 

Leave League

....TICKER....

Logo

HOME DASHBOARD ABOUT USERID

Individual League Page - BUY PAGE

\$BUYING POWER  
RANK/\$TOTAL WORTH

BUYING FORM

- How much
- What time of buy order?
- What stock?

Search widget

SEARCH MARKET TRENDS WIDGET

....TICKER....



Logo

HOME DASHBOARD ABOUT USERID

Individual League Page - SELL PAGE

\$BUYING POWER  
RANK/\$TOTAL WORTH

YOUR PORTFOLIO

1. STCK  
2. STCK  
3. STCK  
4. STCK  
5. ...

SELL

SELL

SELL

SELL

....TICKER....

## Acceptance Tests

Acceptance tests that the customer will run to check that the system meets the requirements are as follows. Note, however, that these test cases provide only a coarse description of how a requirement will be tested. Acceptance tests will follow a naming convention of AT-X.Y where 'X' is the number of the requirement that is being tested, and 'Y' is the number for the given test. Following the requirements table the following acceptance tests have been formulated:

### Acceptance Tests for ST-1

**AT-1.1** - Register into the system using a valid email address and fill out required information.  
(Pass: New account information is registered in database)

### Acceptance Tests for ST-2

**AT-2.1** - Using a pre-existing account, log in using a correct email and password.(Pass: User information is able to be pulled based on the logged in user)

**AT-2.2** - Attempt to log in with an incorrect email and password. (Pass: The system rejects an incorrect combination of email and/or password)

### Acceptance Tests for ST-3

**AT-3.1** - Have a test user navigate to the about page and attempt to give a summary of the product based on information on the about page. Match this user description to some standard description given by the development team. (Pass: The test user description matches closely to the desired developer description)

#### Acceptance Tests for ST-4

**AT-4.1** - Have a test user, unfamiliar with the product, navigate to the FAQ and attempt to understand and answer their questions using the given FAQ. (Pass: No questions that are obvious are left unanswered and not on the FAQ)

#### Acceptance Tests for ST-5

**AT-5.1** - A new user is automatically entered into the universal league, and their statistics are viewable on a global leaderboard. (Pass: User A is able to see the standing of User B on the global leaderboard)

**AT-5.2** - A given logged in user is able to check their own standing in the universal league. (Pass: User A can navigate to the global leaderboards and see their standing)

#### Acceptance Tests for ST-6

**AT-6.1** - A league administrator can invite others to join the league over email.

**AT-6.2** - A league administrator can invite others to join the league using an existing username.

**AT-6.3** - Non pre-registered users can sign up for the website and join a league they were invited to over email.

**AT-6.4** - Pre-registered users can sign up for the website and join a league they were invited to over email or through their existing username.

(Pass cases all involve seeing a user either register and be shown as a player in the league, or an already registered user is put into the league.)

#### Acceptance Tests for ST-7

**AT-7.1** - Ensure that any user can create their own league, becoming the league administrator. (Pass: the user creating the league is placed as a player and is given league administrative permissions.)

**AT-7.2** - League should be limited to the 20 player limit.

**Acceptance Tests for ST-8**

**AT-8.1** - Preferences and settings for a given league are set upon creation. (Pass: The league admin can set the settings of the league upon its creation.)

**AT-8.2** - Certain preferences for a given league are changed after the creation of the league. (Pass: Settings not critical to be set at the creation can be adjusted.)

**Acceptance Tests for ST-9**

See **AT-6.3** and **AT-6.5**

**Acceptance Tests for ST-10**

**AT-10.1** - Ensure that when creating a league, the administrator is able to specify the use of cryptocurrencies in the league. (Pass: The setting is marked and the league will use cryptocurrencies instead of stock information)

**Acceptance Tests for ST-11**

See **AT-8.1** and **AT-8.2** for preference setting. This is simply another preference to set and ensure that it is active.

**Acceptance Tests for ST-12**

**AT-12.1** - League administrator can write up their own message or use a predefined message for certain actions.

**AT-12.2** - Announcements can be sent by the league administrator to the players in the league (Pass: Users receive notification and message from the admin)

**Acceptance Tests for ST-13**

**AT-13.1** - A user can navigate from any point on the website to their leagues page.

**AT-13.2** - Ensure that a user can clearly see the leagues that they are a part of.

**AT-13.3** - Ensure that a user get statistics and information regarding each league.

(Pass: For each of these the pass is straightforward and involves proper displaying of the information for a given user by the system and the ability for the user to navigate the UI.)

#### Acceptance Tests for ST-14

**AT-14.1** - Statistics about individual stocks can be navigated to.

**AT-14.2** - Market trends can be navigated to and viewed using graphs and data visualization.

**AT-14.3** - A user can navigate the UI and easily reach the market trends page

#### Acceptance Tests for ST-15

**AT-15.1** - From the user account page, view the current profile picture and allow for selection of a new profile picture.

**AT-15.2** - User should also be allowed to change their display name.

**AT-15.3** - Other personal information on the account page should be changeable.

(Pass: Successful change of any of the information on the account)

#### Acceptance Tests for ST-16

**AT-16.1** - A specific league's leaderboard can be navigated to and is displayed to the user.

**AT-16.2** - The timing system updates the current standings at midnight of each trading day, or at the end of the trading day. (Pass: League 'A' is given new standings and updates automatically based on the time of day)

#### Acceptance Tests for ST-17

**AT-17.1** - Notification of stock price drops below/above a certain level, automatically set. (Pass: Uses holding the stock or interested in a stock are notified when an pre-set threshold is met.)

#### Acceptance Tests for ST-18

**AT-18.1** - Users can navigate to the transactions page.

**AT-18.2** - Users can buy stock from the transactions page.

**AT-18.3** - Users can sell stock from the transactions page.

#### Acceptance Tests for ST-19

**AT-19.1** - Search functionality supports stock tickers and full company names. (Pass: The system can successfully return the company page based on a predetermined list of companies of varying popularity)

#### Acceptance Tests for ST-20

**AT-20.1** - A user's achievements can be navigated to and viewed.

**AT-20.2** - Notifications for getting an achievement are properly distributed and displayed.

**AT-20.3** - Achievement progress is properly tracked and displayed.

#### Acceptance Tests for ST-21

**AT-21.1** - A user that is not logged in is served the home page.

**AT-21.2** - The home page displays the global leaderboard, which a non-logged user can still view. (Pass: A non-logged in user is served no user specific data and is instead given the standard homepage.)

#### Acceptance Tests for ST-22

**AT-22.1** - Site administrators have ultimate ability to view and delete leagues (Pass: A site administrator account deletes a league that they are not a part of)

#### Acceptance Tests for ST-23

**AT-23.1** - Visualization about the backend active users, number of leagues, stock trades and transaction details can be accessed by any site admin. (Pass: An admin is able to view a transaction in any given league on multiple occasions. A site admin can view the data for any randomly given league.)

#### Acceptance Tests for ST-24

**AT-24.1** - Glossary page can be navigated to from anywhere on the site.

#### Acceptance Tests for ST-25

**AT-25.1** - Investing guide page can be navigated to from anywhere on the site.

**AT-25.2** - The investing guide provides a good getting started point and offers plenty of resources for a novice trader to learn and grow. (Pass: Give a novice test user access to the guide and perform a user test. The guide should provide the novice a starting point where they would feel comfortable jumping into using the product.)

## Project Breakdown

Below are the various areas of development we have decided to group our application into. These groupings are a rough division of labor, and a common infrastructure will be used by all team members to have code that is compatible with the entire application.

### User Login and Email Management

Avanish Mishra will develop the infrastructure to allow users to set up accounts and login with their email and personal information. See **ST-1** and **ST-2**.

### League Management

#### League Creation and Invitations

Nicholas Lurski will develop the interface to create leagues, designate them as crypto-leagues or not, and invite other users to a newly created league using email identification. See **ST-6**, **ST-7**, **ST-9**, **ST-10**, and **ST-12**.

#### League Rules and Settings

Brooks Tawil will develop the system's rules, settings and preferences interface. Preferences are set on a league and user level and can vary widely. See **ST-8**, **ST-15** and **ST-22**.

#### Player Records

Safa Shaikh will develop the infrastructure to keep track of player records and information pertinent to the league, including buying power and rank. See **ST-5**, **ST-7**, **ST-13**, **ST-20**, **OSR-7**, **OSR-10**, and **OSR-13**.

### Transactions

#### "Buy" Transactions

Timothy Liu will develop the UI that will allow users to buy stocks of their choice. This will include developing the individual buy page described by on-screen requirements **OSR-10**, **OSR-11**, **OSR-12** as well as all buying functionality listed in story **ST-18**.

#### "Sell" Transactions

Kristene Aguinaldo will develop the capability to sell currently owned stocks and assets. This will include developing the individual sell page described by on-screen requirements **OS-13** and **OS-14**, as well as all selling functionality listed in story **ST-18**.

### **Market Trends and Widgets**

Kristian Wu will develop the widgets that display current market trends and relevant articles. This will include graphs for trending stocks and those that the individual search for described in **OSR-5**, **OSR-11**, and **ST-14**.

### **Stock Data and Search Capability**

Steven Adler will enable users to search up various stocks by name or ticker symbol. This includes retrieving stock data at the time of buys and sells and keeping a database of which stocks are traded. See **ST-17**, **ST-19**, **ST-23**, and **OSR-11**.

### **Leaderboards and Ranking**

David Zhang will implement the interface to sort and rank users in a leaderboard for each league. Sorting algorithms should conform to league settings. The universal league leaderboard will rank by total asset value. See **ST-16**, **OSR-5**, and **OSR-9**.

## **References**

[GitHub Repository](#)