CMPE451 - Final Report

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Contents

1 Final Project Assessment

This project in our view has improved all of the team members significantly. In this section we will talk about what was the project, what were the challenges beneath, whether we accomplished our milestones and what were our successes and fails.

Our project can be identified briefly such as developing an android app and a web interface for a social platform for people who would be considered as a trader of some equipment (such as stocks, money currencies and crypto-currencies) or someone who wants to follow an equipment closely.

The team is split into three as frontend team, backend team and android team. And each team had encountered quite a lot of technical challenges. In this section, rather than technical challenges, social challenges that when accomplished improves the development of the project significantly, will be mentiones. Examples for these social challenges can be given as opening/closing issues, using a formal communication channel, internal milestones in inner teams and communication approach in general between team members.

In the beginning of the project the team was not that familiar with the issue feature in our software development building platform (which was chosen as GitHub in the beginning of the project). That's why issues were neither frequently nor efficiently used. But after some time as benefits of issue usage was discovered by the team members, every team member started using issues quite efficiently.

Communication channel of the project was chosen as Slack and we believe the communication between the team members were in general smooth and open. Slack was used all through the development process frequently and was a channel of important subjects which makes identifying issues a little bit easier. Also, every team member was respectful, responsive and transparent towards each other which made communication go quite smoothly. Every team member was also rather open for feedbacks which made the team improve easily in total.

One of the challenges through this project was the arrangement of the meetings and milestones. In the beginning of this project when the team was not split into three it was little more trivial to have meeting in harmony but with different inner teams having a systematical check between teams became cumbersome. Then, as we got closer to the end of the project, we realized that having inner meetings in addition to our weekly meetings were more beneficial. Also having inner milestones is a quite important planning to have which would be our first approach if we were to do the same project all over again. Having inner milestones motivates a developer quite a lot. That is why we find it quite beneficial to have inner milestones.

There are quite a lot of mistakes that we have done, learned not to do again and plan to apply the lessons we have learned in our future work. Some of these approaches are given above as an example and there are way more than what is written that we have learned.

2 Summary of Work Done

Group Member	Contribution
Sadullah Gültekin	Project plan is designed. With other frontend team members, example templates are searched and the most useful one is selected. The template that is found is read and its inner functionalities are understood. Profile page is implemented. Editing profile page is implemented also. Changing user type(basic to trader or vice versa) and depositing money functionalies are implemented. My investment page is implemented. Following, unfollowing, sending follow request functions are implemented. Buy and sell operations on trading equipment are implemented. Portfolio creation/deletion is implemented. Also adding/removing trading equipment to a portfolio is implemented. Visiting another user's page is implemented. User story is created for second milestone presentation. Notification system is implemented. Making/Editing/Deleting/Displaying prediction is implemented. Displaying user transaction is implemented. Writing/Displaying article is implemented. Searching in Trading Equipment/User/Article/Event is implemented. Article and Event pages are implemented. Implemented other user's profile pages including article page and prediction page. Made general design updates like fixing precision of shown numbers or fixing turning time fields into human readable format.
Enes Turan Özcan	(1) Authentication system has been implemented. Admin, basic and trader roles has been defined. Creating new account, changing password, logging in & out, getting user profile information, private & public profile status, JWT authorization, data model for user and skeleton project has been implemented. (2) Alert, Comment on equipment, equipment data types and scheduled update processes and the corresponding endpoints for these functionalities have been implemented. Also a few modifications on User endpoints (i.e. setting profile privacy feature) have been made. Equipment endpoints are redesigned according to the feedback from Android and frontend teams. (3) Alert functionality (automatically buy or sell if contidions are met) has been implemented. Comments for articles are added and vote system for comments are implemented. Economic events, notification and prediction system have been created.
Burak Yüksel	Project plan is designed. An appropriate and neat frontend template is researched and selected for our project. The template chosen is examined in detail and configured in order to start developing our project. Register page and account verification functionality is implemented. Forgot password option is added to login page. Reset password page in which users who forgot their password can update their password, is implemented. Google authentication method is added to both register and login pages. Password hint tool showing what a password should contain, is implemented. Alert/order for trading equipments is added. Image annotation is added with Irmak Guzey and worked on text annotation.
Irmak Güzey	With other frontend team members, a template for the development of our web interface is searched, found and examined in details. Home and Login page designs are implemented. List of trading equipment page and detailed pages for each trading equipment type is implemented. The list page has a radar chart for comparing equipment and a line chart that includes the value of the equipment for the last 100 days. The detailed page has more detailed graphs, alert feature (which is implemented by Burak Yuksel) and comments. Comment feature is implemented to detailed trading equipment page and article page. Users are able to write, edit, like/dislike and delete comments. Image annotation feature is implemented with Burak Yuksel and worked on text annotation.
Barış Ege Sevgili	Java Spring Framework is analyzed and understood. Follow system is implemented. Portfolio System is Implemented. Related endpoints and functionalities can be investigated using `https://annotator.traderx.company/swagger-ui.html#/`. Web annotation data model deeply examined. Regarding the needs of our project and project requirements, the structure of the annotations are decided and implemented. Annotation on image as a text, as an image; Annotation on text as a text, as an image are implemented features. Where the annotation server is isolated from the main server and runs on a separate, different server, as a unique application; also has its own annotation database.

Group Member	Contribution
Burak İkan Yıldız	Follow system tables has been implemented in the database. Java Spring Framework is analyzed and understood. Follow user, get followers, can follow endpoints and functionalities have been implemented. According to feedback, error response messages have been modified and corrected. User profile page modified to conform with follow system. Article system has been implemented. The core part of the application, transactions, has been implemented. Asset tables and endpoints have been implemented. Investment(i.e. depositing/withdrawing money to/from application) has been implemented. Custom model mapper has been implemented in order to solve security issues. Amazon s3 server has been initialized and configured to use image upload. Image upload system and endpoints have been implemented. Global search system and endpoints have been implemented. According to feedbacks responses and error messages have been modified and corrected. Prepared the presentation for the final milestone.
Fatih Mustafa Kurt	Trading Equipment, User's Profile, Follow System, Authorization of user, Transaction, Alert, Comment, Annotation, Events, Prediction, Searching, features and data flow architecture have been implemented in Android Application.
Baran Deniz Korkmaz	Android: The design and implementation of the forgot password page has been carried out. The design of the user's profile has been partially implemented. The evaluation of the status of deliverables section of the report has been partially documented.
Mustafa Alparslan	Android : Investment-Asset management page is added for managing the current assets of the user. Portfolio page is updated for missing details (equipment details and deleting specific equipment) from the previous milestone. Formatted all the date fields as more human readable. Backend: A separate server setup is done for Annotation application with new database and domain.

3 List and Status of Deliverables

#	Deliverable	Due Date	Status	Explanations
1	Project Plan	29.09.2019	+	The road map of the practise app is drawn -including the example tutorial application-
2	Authentication Endpoint	10.10.2019	+	The endpoint for login and registration is implemented in the API.
3	User Follow Endpoint	25.10.2019	+	The endpoint for following users is implemented in the API.
4	User Profile Endpoint	25.10.2019	+	The endpoint for getting into the profil page is implemented in the API.
5	Authentication Interface in Android	15.10.2019	+	The interface for login and registration is implemented in Android.
6	Authentication Interface in Web Frontend	15.10.2019	+	The interface for login and registration is implemented in Web Frontend.
7	User Profile Page in Web Frontend	22.10.2019	+	The user profile page is implemented in Web Frontend.
8	Home Page in Web Frontend	22.10.2019	+	Home page is implemented in Web Frontend.
9	Login Page Update	19.11.2019	+	Google sign in functionality is added to login page.
10	Register Page Update (Google Sign in)	19.11.2019	+	Google sign in functionality is added to register page so that users will be able to fill some fields automatically by signing in to Google account.
11	Register Page Update (Google Maps)	21.11.2019	+	Latitude and longitude input fields are removed and map is added to choose location.
12	Authentication Update in Android	21.11.2019	+	Forgot password layout has been modified. Reset password functionality has been added.
13	Trader Equipment in Android	14.11.2019	+	Equipment listing and details of equipment pages are implemented.
14	Transaction in Android	21.11.2019	+	Transaction for any type of equipment is implemented.
15	Alert in Android	21.11.2019	+	Creating Alert for any type of equipment is implemented.
16	Folllowing System in Android	07.11.2019	+	Follow, unfollow, accept or reject follow request and remove follower are implemented.
17	Folllowing System in Web Frontend	14.11.2019	+	Follow, unfollow, send follow request are implemented
18	Portfolio Operations in Web Frontend	21.11.2019	+	Create, delete portfolio functions are implemented. Also add/remove trading equipment functions are implemented.
19	Buy/Sell Functionality in Web Frontend	21.11.2019	+	Buying, selling trading equipment and depositing money to the system is implemented.
20	Edit Profile Update in Web Frontend	14.11.2019	+	Editing profile page is redesigned and linked with backend api.
21	Profile Page in Web Frontend	07.11.2019	+	Entering other user's profile page is implemented. Inner functionalities of this page are not completed yet.
22	Trading Equipment in Web Frontend	21.11.2019	+	Equipment listing and details of equipment pages are implemented.

23	Event Page in Web Frontend	4.12.2019	+	Event page that lists all events is implemented
24	Article Page in Web Frontend	4.12.2019	+	Article page that lists all articles is implemented
25	Transaction in Web Frontend	1.12.2019	+	Transaction page that lists all transactions is implemented
26	Prediction in Web Frontend	10.12.2019	+	Equipment listing and details of equipment pages are implemented.
27	Notification in Web Frontend	13.12.2019	+	Equipment listing and details of equipment pages are implemented.
28	Comment Feature in Web Frontend	13.12.2019	+	Posting, editing, like/dislike, deleting comments feature is implemented.
29	Image Annotation in Web Frontend	20.12.2019	+	Image annotation listing, creating, editing deleting are implemented.
30	Article in Android	23.12.2019	+	Article listing, creating, editing, deleting are implemented.
31	Annotation in Android	23.12.2019	+	Annotation listing, creating, deleting are implemented.
32	Comment in Android	23.12.2019	+	Comment listing, creating, editing are implemented.
33	Event in Android	23.12.2019	+	Event listing is implemented.
34	Prediction in Android	23.12.2019	+	Prediction listing and creating are implemented.
35	Assets in Android	23.12.2019	+	Assets listing and selling are implemented.
36	Portfolio in Android	23.12.2019	+	Portfolio listing and creating editing and deleting are implement
37	Search in Android	23.12.2019	+	Search by username, trading equipment or article is implemente

4 Evaluation of the Status of Deliverables

4.1 General

4.1.1 Project Plan

In order to have our project plan done we needed to split our team into three groups; Web Frontend team, Android team and Backend team. Our first plan was to have the Backend team start working as soon as possible so that our frontend teams would be able to implement the functionalities properly. So the approach was to have the endpoints done as soon as possible. And then for the first month our plan was to have the authentication and the user profile parts of the project done.
Now the next step is to have the trading equipments related features done, such as buying/selling trading equipments, making predictions and creating portfolios and etc... And while having these parts done backend endpoints should again be working in the future features which are the user functions such as creating events, articles, news and more features that makes the platform a social platform. After the frontend and android parts catching up with backend, our project will be done more or less.
After these basic and main features done, there will be a need for little modifications and then the Milestone 2 and the Final Delivery will arrive.

4.2 Android

4.2.1 Authentication Interface

There are three pages existing in the authentication interface in Android: Login, Sign-Up, and Forgot Password pages. The designs of the pages have been successfully completed.

4.2.2 Authentication

The incomplete implementation of the reset password functionality has been completed. Currently, the authentication of the android team works successfully in every aspect.

4.2.3 User Profile

The user can visit profile page to update info about IBAN, username, and password. Also its possible to change the type of user between Basic and Trader (which requires adding a valid IBAN address). User profile page also has links to all user based actions including transaction history, alerts, follow requests, and portfolio.

4.2.4 Followers

The user can access to the follower details from user profile page. Page includes the exact number of user's followers and followed by the user with current follow requests. The user can allow or deny the following requests. Also user can unfollow any user from the following list or remove a follower from user's own follower list.

4.2.5 Trader Equipments

The user can select any type of equipments among stocks, cryptocurrencies and currencies. After selection the type of equipment, user can see the listed equipments with their current values in terms of USD, current stock in terms of unit. Users can look at the details of any equipment at their detail pages. The details, in this page, are comments about equipment, prediction rate of equipment, last 30 days history of equipment. User also can create alert for selected equipment or buy some units of equipment. Current status of Trading Equipment feature lacks some of functionalities defined under Project Requirements 1.1.5 and are planned to add.

4.2.6 Transaction

Transaction page is where the user starts to trade in our platform. In this page, user can buy some amount of unit which is restricted by user's deposit and current stock of equipment. User cannot make transaction which exceeds its deposit, and if the current stock is not sufficient for given amount. After specifying the amount, user can see how much value will be withdrawn from his/her deposit in terms of base which is selected by user. Transaction feature satisfy the functionality defined by requirements 1.1.7.3.

4.2.7 Alerts

Alert page is where the user can create stop/loss limits for their investment. User can navigate to creating alert page by choosing alert button on any equipment's details page. In this page, application expects from user to give an amount and a limit. User can specify which actions to make, like sell or buy. And user can specify the situation of limit, like above the limit or below the limit. Alerting feature satisfy the functionality defined by requirements 1.1.7.4.

4.2.8 Article

Our platform lets users to create article and share their ideas about equipments. Although we say the ideas related to equipments, they can be anything. Users can list currently published articles in *Articles Page*, read the article's content, annotate and comment on articles.

4.2.9 Comment

Users can comment on two type of feature on our platform, trading equipments and articles. Users can share their thoughts about the status of an equipment, or an idea about an article. They can rate other users' comments as well. If user wants to edit their comment or delete them, s/he can do this by tapping figures on the comment.

4.2.10 Annotation

On our Android Platform, users can select some part of an article's text and create text annotations. They can create multiple annotation belonging to same place of text. Annotations belonging to same place will be displayed togather.If they wish, they can delete their annotation.

4.2.11 Event

Events Page is the first screen user will see when s/he launches the application. Users can list the events with respect to their name, location and importance

4.2.12 Portfolio

Users can access to portfolio page from his/her profile can create custom lists of equipments to follow any type of equipment. Portfolios are not restricted for specific equipment type and a portfolio can be consist of mixed type of equipments from both stocks and currency. User can delete his/her portfolio even if it is not empty.

4.2.13 Asset

User can manage the assets he/she owns by buying or selling from user profile page.

4.3 Backend

4.3.1 Full functionality for Alerts

In the last milestone, users were able to set, delete or edit alerts but these alerts had no functionality. With the milestone 3, alerts now work as expected. That is, one can set alert to be notified or make transactions automatically when a defined price level of an equipment goes down or below. If notify option is specified, a notification for users will be sent and no transactions will occur. For sell an buy options, if a user is able to make such a transaction - i.e. got enough equipment to do so, system will make it automatically and will send a notification to the user concerning the transaction.

4.3.2 Annotation

The annotation service created with the final milestone. A web annotation is an online annotation associated with a web resource, typically a web page. With the annotation system, a user can add, modify or remove information from a Web resource without modifying the resource itself. The annotations can be thought of as a layer on top of the existing resource, and this annotation layer is visible to other users who share the same annotation system. Regarding the needs of our project and project requirements, the structure of the annotations are decided and implemented. Annotation on image as a text, as an image; Annotation on text as a text, as an image are the features that the service enables to registered users. The annotation server is isolated from the main server and runs on a separate, different server, as a unique application; also has its own annotation database.

4.3.3 Article

As we have described in the beginning of our project, TraderX is not going to be an ordinary trading platform that users are able to only make transactions, they would be able to share their ideas, make comments and follow other users that they find useful to follow. For this purpose, we have implement article system. In this system, users are able to create new articles about any topic they would like to , edit/delete articles they previously created or can make comments to other users' articles. Also, they are able to make their articles public or only private for followers of them. In this way, they can freely share their ideas with the world and read valuable articles to get form an opinion about different equipment, events.

4.3.4 Extension for Comments

In the last milestone, users were able to write, delete and edit comments on trading equipment only. In this milestone, we have added the facility for commenting on user articles. Also these comments can be liked or disliked.

4.3.5 Economic Events

The system gets economic events data from a third party service (http://api.tradingeconomics.com) serves it from a public endpoint. These events are updated daily and stored locally on the database. By this way, third party service is not used for each request but only once in a day.

4.3.6 Image Upload

One of the core parts of an application is to let users flexibility of customizing their ideas, their profile. In this way, we have thought that being able to upload custom images to articles to make them more interesting is an essential aspects. Also, in order to implement image annotation accompanied with text annotation, we needed images in articles. For this purpose, firstly, we have created and Amazon S3 server instance to which we can upload our images and use it as image database. After that, we have created image upload and image delete endpoints and connect our application to that server. In this way, while we are able to provide the users flexibility of customizing their articles, also we have paved the way for image annotation controller.

4.3.7 Notification

The notification service is not working like a push notification service but stores them and informs the used upon request. They can be read to mark as not new or deleted permanently. There are two types of notification:

- **Follow events:** If a user requests to follow another one, accept or decline a follow request or follow, the other user will get notification about the event.
- **Alert events:** If an alarm is set to notify, then if this alert's conditions are met the user will get notification. Also any transaction made according to alerts will inform users via notification

4.3.8 Prediction

Prediction service enables users to make prediction for trading equipment. A prediction can have either increase or decrease types. A user can make a prediction for a particular equipment only once in a day. Predictions are evaluated at the end of the day and prediction success rate is shown in the user's profile info.

4.3.9 Search

One of the main functionalities of an application is searching. As the application gets bigger, users would like to be able to search anything that they want to browse. For this purpose, we have implement searching endpoints. In this endpoints, users are able to search equipments by their name and by their abbreviation. Besides this, users can search users by their name and can search articles by tags, headers etc. This functionality make it convenient for users to find anything as the application grows.

4.4 Frontend

4.4.1 Authentication Interface

There are two pages existing in the authentication interface: Login and Registration pages. A simple template was used in Web Frontend implementation with a major modification in all of the deliverables.
Login page was in the template. But the check was made with a hard coded mock user in the template and it wasn't functioning. The authentication needed to be connected with the API. And this was done by connecting the whole system to our server and modifying the checking system. And the design of the login page was modified according to the home page afterwards.

There was no registration page at the template. Registration page was created from scratch by using the components at the template. Username, email address and a password is taken from the user, validity of them is checked and then sent to the backend. Design and connection to the backend was made after html, javascript and css files are written.

4.4.2 Changes in Authentication Interface

With the Google sign in functionality, login and register pages are changed. When users sign in to Google account:

- In login page, password field disappears and only username field should be filled to log in to our system,
- In register page, email and password fields disappear and those fields are automatically filled with information gathered from user's Google account.

Additionally, in register page, a map is added using Google Maps API to help users pick their location instead of providing latitude and longitude information manually.

4.4.3 User Profile Page

The user profile page is slightly modified on top of the template. Article, events, profile editing and more tabs are added to the interface. Articles, events and portfolios can be made through profile page. Profile photo and more information about the user can be modified though profile page.

4.4.4 Home Page

The page when user first sees in the website is the home page. When a user gets into the website there are two options for him/her, to register or to login. First, the design of this page was done and then patched into the website instead of the login page as the first page.

4.4.5 Trading Equipment

There are three types of Trading Equipment in the system: Money Currencies, Stocks and Crypto-Currencies. More information about the data that is being pulled from the API can be found in Sec. 3.3.3. Two features are implemented about the Trading Equipment in Web Frontend. One of them is the general listing of equipment. The second is detailed pages for each equipment type. Detailed explanation about these pages are as follows;

- **List of Equipment Page**: This page consists of a list of trading equipment types. Each type involves tabs for each of the equipment in that type and a radar chart for comparing the each equipment in stability, growth and value scalars. In each tab there is a graph indicating the opening values of the corresponding equipment for the last 100 days. And there are two buttons for each tab. One can buy the corresponding equipment and/or go to the detailed page for the equipment type.
- **Detailed Pages**: Each detailed page involves different graphs about the equipment in that type, setting, editing alerts feature for that equipment and comments for that equipment. Graphs include a detailed comparison of the equipment's openning/closing values for the last 20 days.

4.4.6 My Investments

In my investments page, a user can see his/her assets. Also all the money that the user has. Currently in the system a user can only deposit USD as a base currency, but we will implement other currency types later on. In this page the user can also sell his assests. When he/she sells an asset, current currency amount will increase accordingly.

4.4.7 Portfolio

In portfolio section we have two functionalities. One is creating a portfolio and one is deleting an existing one. When a user clicks to one of the buttons that is shown, a dialog pops up and ask a name to the user. By using this name, we create or delete the portfolio. We also make name checks in backend so that a portfolio can not has an empty name or a user cannot have two portfolio with the same name. Also he/she cannot delete a portfolio that doesn't exists. When the user creates a portfolio and clicks to it, he/she redirects to the portfolio page that shows the inner information of the portfolio.

In this page again we have two functionalities. One is adding an equipment and one is removing one from the current portfolio. To add an equipment a user needs to select the equipment from the shown options. To delete one, the user needs to push to the delete button shown on the very right side of related row.

4.4.8 Edit Profile

Edit profile page was designed in the previous milestone but its functionalities were not working. Now edit profile page is redesigned, linked with backend api and added some new features. Previously all features of edit profile page were visible and had different designs. But this time a dropdown feature is added so that it would seem much more clean. As a new feature changing user type from basic to trader or vice versa is added. To be able to change the type from basic to trader user needs to give his/her iban number. To the the opposite, selecting the basic user is enough. Another new feature is depositing money to the system. Currently we only allow user to add USD to the system, but later, we will turn in into more flexible design.

4.4.9 Follow System

In our system there are two ways to follow a user. Fist one is making a search in the search page and clicking to the button shown on the right side of the user's name. This button changes according to the status of the related user. If the user is not being followed, then the button will be a follow button. If the related user is already followed, then follow button will be shown. After clicking to follow button, if the requested user is private, a follow request will be send and the button will be turned into requested button. Otherwise the user will be followed automatically.

4.4.10 Buy Sell Trading Equipment

We have two pages to see trading equipment in our system. One is lists all trading equipment in our system. A user can see analyze the trading equipment and decide to buy accordingly. Second page is to see detailed information about a trading equipment. Both of these pages works perfectly fine and allows the user to buy new trading equipment

4.4.11 Notification System

In our system we don't have a notification system that works in real time. For example when a user is using our website, if s/he doesn't reload a page, or redirect to another page, new notifications don't come up. There exists a notification box on the left upper side of the web page. When there exists a new notification, red "new" symbol appears next to the notification box. When a user clicks to the notification box, the system redirects him to a new page where all new notifications are listed. There are two types of notifications, one is related with alerts, and the other one is related with follow requests. When user clicks to the "read" button next to the notification, related notification disappears.

4.4.12 Prediction System

In the "list of equipment" page, a user can make a prediction for an equipment. There exists a button at the bottom of the each type of equipment. When user clicks to that button, a dialog pops up. User selects an equipment and selects a prediction type and makes a prediction.

To view and edit a prediction user needs to go to his/her profile page and select the "My Predictions" tab. In that tab, all prediction history is shown. At the very bottom, the least predictions are shown.

A prediction is made today and it is not evaluated, then the user can edit or delete it. On the left side of the prediction there exists a edit/delete button. If the prediction is already evaluated, then the button will not be shown.

4.4.13 Transaction

In the profile page there is a transaction tab where a user can see his/her transaction history. In this tab information like transaction type, transaction date, and amount is written. There is not any other functionality that is available in this page. This is only an informative page.

4.4.14 Article

On the left navibar, there is an article button. When it is clicked, all artciles are listed in a tabular format. A user can click to "See Article" button to be redirected to read related article. Also in this page all articles can be sorted by their Title, Author and Date.

For a user to see his/her written articles, he/she needs to go to the profile page and clicks to my articles tab. In that tab, all articles that is written by that user is shown. Also write article button exists on the upper right corner which redirects user to a write article page.

4.4.15 Event

On the left navibar, there is an event button. When it is clicked, all events are listed in a tabular format. A user can get all information related with an event in this page.

4.4.16 Commenting System

The users are able to see, edit, post, like/dislike comments in viewing article and detailed trading equipment page. A list of related comments about the given article or trading equipment is received and showed to the user. Users are not able to reply one another's comments.

4.4.17 Image Annotation

Image annotation can be made in our systems' article images. A user can draw a rectangle in the image and write a comment about it. Users can see annotations of every user about that article's image. They can edit and delete their own annotations.

5 Requirements

5.1 Functional Requirements

5.1.1 User Requirements

1. Guests shall be able to only view the price of trading equipment.
2. Guests shall be able to browse economic articles, trading equipment and read comments about them.
3. Users shall be able to create an account by providing their username, e-mail, password and location using Google Maps. (implemented)
4. Registered users shall be able to login to the application by providing their username or email and password. (implemented)
5. Users should be able to sign up via Google account.
6. Already signed users should be able to sign in via Google account.
7. User shall validate account via e-mail. (implemented)
8. The users who want to be trader user shall provide their IBAN number. (implemented)
9. Users shall be able to reset their passwords if they forget their passwords by clicking "Forgot your password?" button. (implemented)
10. User shall be able to follow other users directly if the user's profile is public. (implemented)
11. User shall be able to send follow requests to users that have a private profile, and shall wait requests to be accepted.
12. User shall be able to accept or reject the following requests.
13. User shall be able to follow trading equipment.
14. User shall be able to set alerts for certain levels of trading equipment.
15. Users shall have at least one portfolio.
16. Users shall be able to create/delete their portfolios.
17. Users shall be able to change the name of their portfolios.
18. Users shall be able to add/delete new trading equipment to their portfolio.
19. Users shall be able to read/rate other users' articles, comments about trading equipment.
20. Users shall be able to write new articles and comments, make a prediction about any trading equipment, and view daily prediction rates of trading equipments.
21. Users shall be able to edit/delete their article comments.
22. Trader users shall be able to trade trading equipment.
23. Trader users shall be able to set stop/loss limits.
24. Users shall be able to make their profile public or private.
25. Users shall be able to see their own portfolios in their own profile page.

26. Users shall be able to edit their own bio in profile page.
27. Users shall be able to reach their own followers and following list and their old articles/comments. (implemented but articles/comments)
28. Users shall be able to see their own prediction success rate.
29. Users shall be able to see other users' prediction success rate in their profile.
30. Users shall be able to see other users' followers, articles, following list if the profile is public or if he/she follows him/her.
31. Users shall be able to only see other user's prediction rate if their profile is private and if he/she is not his/her friend.
32. Trading users shall have my investments page.
33. Basic users shall not have my investments page.
34. Trading users shall be able to invest on trading equipment in my investments page.
35. Trading users shall be able to create a buy order for a trading equipment for a specified rate in my investments page.
36. Trading users shall be able to set stop/loss limits on trading equipment in my investments page.
37. Users shall have a profit/loss section which is private to each user.
38. Users shall be able to see profit/loss in terms of currency chosen by user.
39. Users shall be able to manually enter investments to see calculated profit/loss.
40. Users shall be able to see news fetched from third party website.
41. Users shall be able to be redirected to third party site when click the news they would like to read in detail.

5.1.2 System Requirements

1. System shall provide a homepage for each user according to user interests.
2. System shall provide a homepage that enables registered users to see economic events, news and trading commodities that user is interested in.
3. System shall provide a navigation bar in order to enable users to switch to their profile section, articles section, news section etc.
4. System shall provide an "Events" section in which there are economic events, articles, news that is fetched from a third-party source.
5. System shall assign different significance levels for economic events.
6. Events shall be updated daily.
7. System shall support searching for users and trading equipment.
8. System shall support different type of searching criteria.
9. System shall support semantic search based on the context of information.
10. System shall support location-based search (be able to filter users based on city or district).
11. System shall support filtering events depending on their significance.
12. System shall notify users in accordance with their alerts.
13. System shall recommend articles, trading equipment, commodities for the users based on their history in the system.

14. System shall provide a "Trading" section where Trader users can buy/sell commodities, trading equipment.
15. System shall automatically detects when a trader make a transaction and update his/her portfolio.
16. System shall highlight the commodities that are trend or the user may be interested in based on his/her history.
17. System shall provide a simple, seamless and secure way for money transaction for trader users.
18. System should cooperate with 3rd party applications for money transaction and mobile payments.

5.2 Non-functional Requirements

5.2.1 Accessibility and Availability

1. The system shall have a native web and native mobile client.(implemented)
2. The system shall be deployable on a remote and manually configurable server.(implemented)
3. The website and the mobile application shall be available in English. (implemented)
4. The system shall support UTF-8(Unicode) charset. (implemented)
5. The web app shall provide support for Screen Reader applications.

5.2.2 Annotatitons

1. System shall support W3C Web Annotation Data Model and follow W3C Web Annotation Protocol so that the contents can be annotated by users.
2. System shall follow the standards introduced by the W3C.

5.2.3 Performance

1. System shall respond to request in at most 5 seconds. (implemented)
2. System shall use queue system to reduce response time. (implemented)
3. System should cache the commonly used contents to reduce response time.
4. Native Android app and web app should run smoothly and use low system resources. (implemented)

5.2.4 Privacy

1. The user shall be able to respond follow request before following is activated.
2. The user shall be able to choose whether he/she wants his/her profile to be public or private.

5.2.5 Security

1. Financial Transactions shall be reliable and secure.
2. System shall be invulnerable against potential SQL injection, XSS attacks and DDOS attacks. (implemented)
3. System shall force users to use strong passwords, which must consist of at least six characters (and the more characters, the stronger the password) that are a combination of letters, numbers and symbols. (implemented)
4. System shall protect users' information by denying any unauthorized accesses. (implemented)
5. System shall store hashed version of user sign in password and don't store the password itself in anyhow. (implemented)
6. System shall backup all data to AWS Storage after each week.
7. System shall encrypt every connection and data transfer by using latest version of TSL encryption.
8. The deployment server must be secured from any possible attack types, such as open port issues. (implemented)

6 Annotation Implementation & W3C Standard Compliance

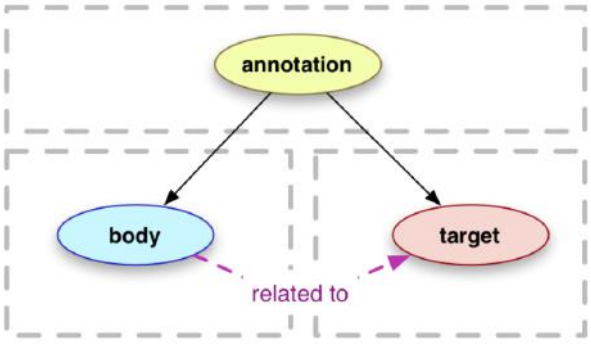
The annotation service is one of the essential parts of our project. Thus, we needed to deeply examine and follow the standards that are stated at W3C. After agreeing on the structure with respect to our needs and standards, the service is implemented.

6.1 W3C Annotation Data Model & Standards

Which can be accessed through the following link of the W3C Annotation Data Model:

- `https://www.w3.org/TR/annotation-model/`

As it is stated at the link above, The Web Annotation Data Model provides an extensible, interoperable framework for expressing annotations such that they can easily be shared between platforms, with sufficient richness of expression to satisfy complex requirements while remaining simple enough to also allow for the most common use cases.The annotation structure that we used simply includes a body and target, where body is related to the target. The details of this relationship changes according to the intention and types of the annotation.



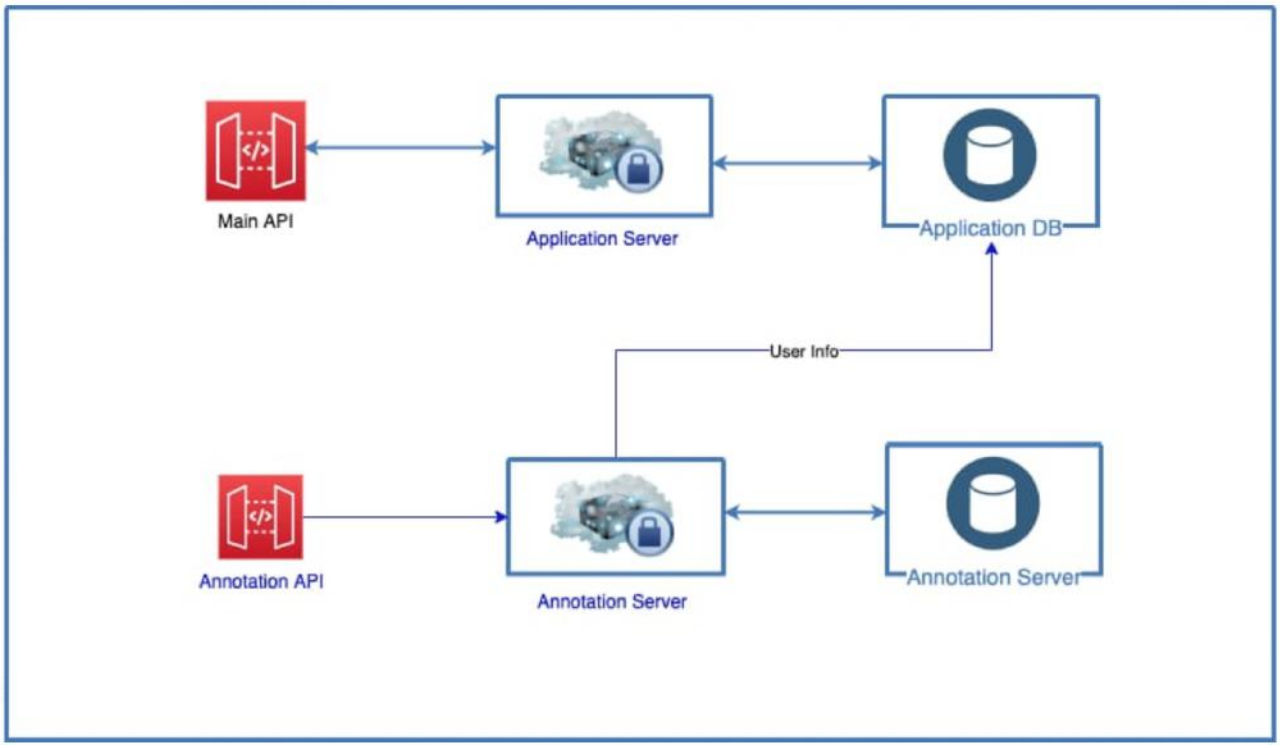
The annotation data model that we have strictly ensured the compliancy with is stated below:

Model

Term	Type	Description
@context	Property	The context that determines the meaning of the JSON as an Annotation. The Annotation must have 1 or more `@context` values and `http://www.w3.org/ns/anno.jsonld` must be one of them. If there is only one value, then it must be provided as a string.
id	Property	The identity of the Annotation. An Annotation must have exactly 1 IRI that identifies it.
type	Relationship	The type of the Annotation. An Annotation must have 1 or more types, and the `Annotation` class must be one of them.
Annotation	Class	The class for Web Annotations. The `Annotation` class must be associated with an Annotation using `type`.
body	Relationship	The relationship between an Annotation and its Body. There should be 1 or more `body` relationships associated with an Annotation but there may be 0.
target	Relationship	The relationship between an Annotation and its Target. There must be 1 or more `target` relationships associated with an Annotation.

6.2 Annotation Server & Main Server High Level Abstraction

As a best practice, we have implemented our annotation service as a different stand-alone application. It has its own server that is deployed separately and also own database. When a user annotates an image or text from an article or reads an annotation that is made on an article, all details are kept in and get from the database of annotation server. The diagram can simplified as follows:



When a user wants to make an annotation, using either web-ui or android, the related request been directed to the Annotation server and handled there. Created data is kept in the Annotation Database. Similarly, when a user views an article, all annotations related to that article are fetched from the annotation database, using annotation server.

6.3 Annotation Endpoints

All of the endpoints that are implemented can be found in swagger page of the annotator service, from the following link. `https://annotator.traderx.company/swagger-ui.html#/`

Annotation : Annotation Controller — Show/Hide | List Operations | Expand Operations

GET	/annotation/all	Get all annotations
GET	/annotation/all/{articleId}	Get all annotations of an article
POST	/annotation/create	Create an annotation for an article
DELETE	/annotation/delete	Delete annotation
DELETE	/annotation/delete/{articleId}	Delete all annotations of an article
POST	/annotation/update	Update a your own annotation
GET	/annotation/{id}	Get annotation

6.4 Annotation Types & Structure

In this section, the structures of the different options of annotations that can be used in our system. Simply, the structure of an Annotation object. Details of the objects used in formatting are as follows:

- Selecting a portion of a text: "TextPositionSelector":
  - `https://www.w3.org/TR/annotation-model/#text-position-selector`
- Selecting a portion of an image: "<id of the article> #xywh=100,100,300,300":
  - x: x axis of the center
  - y: y axis of the center
  - w: width of the selected area
  - h: height of the selected area
- Annotation as TEXT Body to TEXT Target

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": <Id of the annotation>,
  "type": "Annotation",
  "creator": "https://traderx.company/user/<username>/profile",
  "created": "2015-01-28T12:00:00Z",
  "modified": "2015-01-29T09:00:00Z",
  "body":
    {
      "type": "Text",
      "value": "Lorem ipsum dolor sit amet"
    }
  "target": {
    "type": "Text",
    "id": <Id of the article>,
    "selector": {
      "type": "TextPositionSelector"
      "start": 412,
      "end": 455
    }
  }
}
```

- Annotation as TEXT Body to IMAGE Target

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": <Id of the annotation>,
  "type": "Annotation",
  "creator": "https://traderx.company/user/<username>/profile",
  "created": "2015-01-28T12:00:00Z",
  "modified": "2015-01-29T09:00:00Z",
  "body":
    {
      "type": "Text",
      "value": "Lorem ipsum dolor sit amet"
    }
  "target": {
      "type": "Image",
      "id": "<id of the article>#xywh=100,100,300,300"
  }
}
```

.

- Annotation as IMAGE Body to TEXT Target

```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": <Id of the annotation>,
  "type": "Annotation",
  "creator": "https://traderx.company/user/<username>/profile",
  "created": "2015-01-28T12:00:00Z",
  "modified": "2015-01-29T09:00:00Z",
  "body":
    {
      "type": "Image",
      "value": "url_of_the_image"
    }
  "target": {
    "type": "Text",
    "id": <Id of the article>,
    "selector": {
      "type": "TextPositionSelector",
      "start": 412,
      "end": 795
    }
  }
}
```

.

- Annotation as IMAGE Body to IMAGE Target

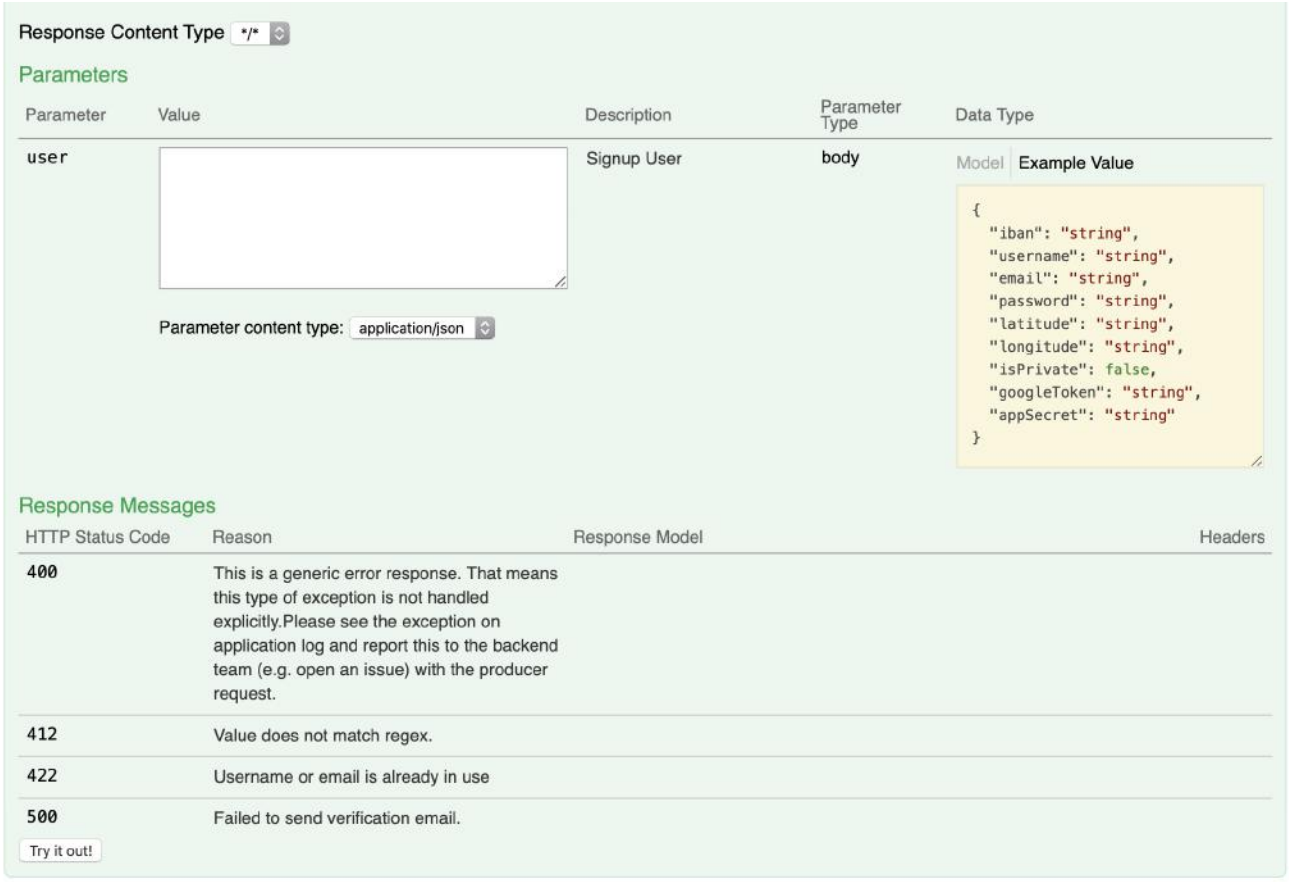
```
{
  "@context": "http://www.w3.org/ns/anno.jsonld",
  "id": <Id of the annotation>,
  "type": "Annotation",
  "creator": "https://traderx.company/user/<username>/profile",
  "created": "2015-01-28T12:00:00Z",
  "modified": "2015-01-29T09:00:00Z",
  "body":
    {
      "type": "Image",
      "value": "url_of_the_image"
    }
  "target": {
      "type": "Image",
      "id": "<id of the article>#xywh=100,100,300,300"
  }
}
```

7 API Documentation

For the API Documentation of our project -rather than writing all the information for the endpoints manually, we use Springfox suite to create API Documentation automatically when our application is run. The Springfox suite of java libraries are all about automating the generation of machine and human readable specifications for JSON APIs written using the spring family of projects. Springfox works by examining an application, once, at runtime to infer API semantics based on spring configurations, class structure and various compile time java Annotations. For an endpoint, if you annotate and define the parameters and explanations for these parameters properly they show up on the documentation page with the corresponding data format for both request (i.e. Request parameter, path parameter or body parameter) and response. Once you configure the "Docket" in the application, for each endpoint annotated with Swagger annotations there will be a manual page describing the endpoint on the document. Here is an example:

```
79
80 @PostMapping("")
81 @ApiOperation(value = "Registers a new user to the system.")
82 @ResponseStatus(HttpStatus.OK)
83 @ApiResponses(value = {
84         @ApiResponse(code = 400, message = GlobalExceptionHandlerController.
               GENERIC_ERROR_RESPONSE),
85         @ApiResponse(code = 422, message = "Username or email is already in use"),
86         @ApiResponse(code = 412, message = "Value does not match regex."),
87         @ApiResponse(code = 500, message = "Failed to send verification email.")})
88 public StringResponseWrapper signup(@ApiParam("Signup User") @RequestBody UserDataDTO user)
       {
89     return new StringResponseWrapper(signupService.signup(modelMapper.map(user, User.class),
           user.getAppSecret()));
90 }
```

Then the corresponding API documentation for this endpoint will look like the following:



As can be seen on the right, "UserDataDTO" object is converted to JSON format and field types are denoted. Also possible response messages and status codes are shown at the end. This rescues backend team from the burden of writing down all the document for all endpoints. Further, it helps us not forget to include an endpoint for a particular one since they are created automatically. Here is the API documentation screenshot of our project. It also can be seen on the website from the documentation link.

- API Documentation
  - https://api.traderx.company/swagger-ui.html
- JSON API Documentation
  - https://api.traderx.company/v2/api-docs
- Convert JSON to v2 Swagger API Documentation
  - https://editor.swagger.io

Alert : Alert Controller	Show/Hide | List Operations | Expand Operations
Annotation : Annotation Controller	Show/Hide | List Operations | Expand Operations
Article : Article Controller	Show/Hide | List Operations | Expand Operations
Asset : Asset Controller	Show/Hide | List Operations | Expand Operations
Comment : Comment Controller	Show/Hide | List Operations | Expand Operations
Economic Events : Event Controller	Show/Hide | List Operations | Expand Operations
Equipment : Equipment Controller	Show/Hide | List Operations | Expand Operations
Follow : Follow operations	Show/Hide | List Operations | Expand Operations
image-upload-controller : Image Upload Controller	Show/Hide | List Operations | Expand Operations
Investment : Investment Controller	Show/Hide | List Operations | Expand Operations
Login : Sign in raleted operations	Show/Hide | List Operations | Expand Operations
Notifications : Notification Controller	Show/Hide | List Operations | Expand Operations
Password : Password related operations	Show/Hide | List Operations | Expand Operations
Portfolio : Portfolio Controller	Show/Hide | List Operations | Expand Operations
Predictions : Prediction Controller	Show/Hide | List Operations | Expand Operations
Search : Search Controller	Show/Hide | List Operations | Expand Operations
Sign out : Logout Controller	Show/Hide | List Operations | Expand Operations
Signup : Sign up related operations	Show/Hide | List Operations | Expand Operations
Transaction : Transaction Controller	Show/Hide | List Operations | Expand Operations
trial : Trial Controller	Show/Hide | List Operations | Expand Operations
Users : Operations about users	Show/Hide | List Operations | Expand Operations

8 Project Plan

1		**Implementation for part I**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
2		**Backend**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
3		**Auth**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
4		Register Endpoint	3 days?	10/1/19 8:00 AM	10/3/19 5:00 PM		Enes Turan Özcan
5		Login Endpoint	3 days?	10/3/19 8:00 AM	10/7/19 5:00 PM		Barış Ege Sevgili
6		Login Endpoint (With Google)	4 days?	10/7/19 8:00 AM	10/10/19 5:00 PM		Burak İkan Yıldız
7		Register Endpoint	2 days?	10/10/19 8:00 AM	10/11/19 5:00 PM		Enes Turan Özcan
8		Logout Endpoint	3 days?	10/11/19 8:00 AM	10/15/19 5:00 PM		Barış Ege Sevgili
9		**Frontend**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
10		**Auth**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
11		Register Page	5 days?	10/1/19 8:00 AM	10/7/19 5:00 PM		Sadullah Gültekin
12		Login Page	4 days?	10/7/19 8:00 AM	10/10/19 5:00 PM		Irmak Güzey
13		Profile Page	4 days?	10/10/19 8:00 AM	10/15/19 5:00 PM		Burak Yüksel
14		**Android**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
15		**Auth**	11 days?	**10/1/19 8:00 AM**	**10/15/19 5:00 PM**		
16		Register Page	5 days?	10/1/19 8:00 AM	10/7/19 5:00 PM		Fatih Mustafa Kurt
17		Login Page	4 days?	10/7/19 8:00 AM	10/10/19 5:00 PM		Mustafa Alparslan
18		Profile Page	4 days?	10/10/19 8:00 AM	10/15/19 5:00 PM		Baran Deniz Korkmaz
19		**Testing**	1.333 day...	**10/16/19 8:00 AM**	**10/17/19 10:40 AM**	**2;9;14**	
20		Test For Backend	1.333 days?	10/16/19 8:00 AM	10/17/19 10:40 AM	2	Barış Ege Sevgili;Burak İkan Yıldız;Enes Turan Özcan
21		Test For Frontend	1.333 days?	10/16/19 8:00 AM	10/17/19 10:40 AM	9	Burak Yüksel;Irmak Güzey;Sadullah Gültekin
22		Test For Android	1.333 days?	10/16/19 8:00 AM	10/17/19 10:40 AM	14	Baran Deniz Korkmaz;Fatih Mustafa Kurt;Mustafa Alparslan
23		Milestone I	1 day	10/22/19 8:00 AM	10/22/19 5:00 PM	19	
24		**Implementation for part II**	17 days?	**10/23/19 8:00 AM**	**11/14/19 5:00 PM**	**23**	
25		**Backend**	11 days?	**10/23/19 8:00 AM**	**11/6/19 5:00 PM**		
26		**Profile**	3 days?	**10/23/19 8:00 AM**	**10/25/19 5:00 PM**		
27		Follow System	3 days?	10/23/19 8:00 AM	10/25/19 5:00 PM		Enes Turan Özcan
28		Profile Privacy	3 days?	10/23/19 8:00 AM	10/25/19 5:00 PM		Enes Turan Özcan
29		**Trading Equipment**	6 days?	**10/25/19 8:00 AM**	**11/1/19 5:00 PM**		
30		Follow Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Barış Ege Sevgili
31		Buy/Sell Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Barış Ege Sevgili
32		Prediction Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Burak İkan Yıldız
33		Set Alert Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Burak İkan Yıldız
34		Profit/Loss Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Enes Turan Özcan
35		Comment Endpoint	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Burak İkan Yıldız
36		**Portfolio**	3 days?	**11/4/19 8:00 AM**	**11/6/19 5:00 PM**	**26;29**	
37		Create/Delete Endpoint	3 days?	11/4/19 8:00 AM	11/6/19 5:00 PM		Barış Ege Sevgili
38		Add/Remove Trading Equipment Endpoint	3 days?	11/4/19 8:00 AM	11/6/19 5:00 PM		Barış Ege Sevgili
39		Follow Endpoint	3 days?	11/4/19 8:00 AM	11/6/19 5:00 PM		Burak İkan Yıldız
40		**News**	6 days?	**10/23/19 8:00 AM**	**10/30/19 5:00 PM**		
41		Get News Data	6 days?	10/23/19 8:00 AM	10/30/19 5:00 PM		Enes Turan Özcan
42		Comment Endpoint	6 days?	10/23/19 8:00 AM	10/30/19 5:00 PM		Barış Ege Sevgili
43		**Frontend**	17 days?	**10/23/19 8:00 AM**	**11/14/19 5:00 PM**		
44		**Profile**	3 days?	**10/23/19 8:00 AM**	**10/25/19 5:00 PM**		
45		Profile Page	3 days?	10/23/19 8:00 AM	10/25/19 5:00 PM		Sadullah Gültekin
46		**Trading Equipment**	6 days?	**10/25/19 8:00 AM**	**11/1/19 5:00 PM**		
47		Trading Equipment Page	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Irmak Güzey
48		Buy/Sell/Follow Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Burak Yüksel
49		Prediction Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Sadullah Gültekin
50		Alert Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Irmak Güzey
51		Profit/Loss Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Burak Yüksel
52		**Portfolio**	3 days?	**11/4/19 8:00 AM**	**11/6/19 5:00 PM**	**44;46**	
53		Portfolio Page	3 days?	11/4/19 8:00 AM	11/6/19 5:00 PM		Sadullah Gültekin
54		**News**	6 days?	**11/7/19 8:00 AM**	**11/14/19 5:00 PM**		
55		News Page	6 days?	11/7/19 8:00 AM	11/14/19 5:00 PM		Irmak Güzey

56		**Android**	11 days?	**10/23/19 8:00 AM**	**11/6/19 5:00 PM**		
57		**Profile**	3 days?	**10/23/19 8:00 AM**	**10/25/19 5:00 PM**		
58		Profile Page	3 days?	10/23/19 8:00 AM	10/25/19 5:00 PM		Mustafa Alparslan
59		**Trading Equipment**	6 days?	**10/25/19 8:00 AM**	**11/1/19 5:00 PM**		
60		Trading Equipment Page	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Fatih Mustafa Kurt
61		Buy/Sell/Follow Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Baran Deniz Korkmaz
62		Prediction Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Mustafa Alparslan
63		Alert Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Fatih Mustafa Kurt
64		Profit/Loss Section	6 days?	10/25/19 8:00 AM	11/1/19 5:00 PM		Baran Deniz Korkmaz
65		**Portfolio**	3 days?	**11/4/19 8:00 AM**	**11/6/19 5:00 PM**	**57;59**	
66		Portfolio Page	3 days?	11/4/19 8:00 AM	11/6/19 5:00 PM		Mustafa Alparslan
67		**News**	6 days?	**10/23/19 8:00 AM**	**10/30/19 5:00 PM**		
68		News Page	6 days?	10/23/19 8:00 AM	10/30/19 5:00 PM		Mustafa Alparslan
69		**Testing**	5.667 day...	**11/15/19 8:00 AM**	**11/22/19 2:20 PM**	**25;43;56**	
70		Test For Backend	0.667 days?	11/15/19 8:00 AM	11/15/19 2:20 PM	25	Barış Ege Sevgili;Burak İkan Yıldız;Enes Turan Özcan
71		Test For Frontend	0.667 days?	11/15/19 8:00 AM	11/15/19 2:20 PM	43	Burak Yüksel;Irmak Güzey;Sadullah Gültekin
72		Test For Android	0.667 days?	11/22/19 8:00 AM	11/22/19 2:20 PM	56	Baran Deniz Korkmaz;Fatih Mustafa Kurt;Mustafa Alparslan
73		Milestone II	1 day?	11/26/19 8:00 AM	11/26/19 5:00 PM	69	
74		**Implementation for part III**	9 days?	**11/27/19 8:00 AM**	**12/9/19 5:00 PM**	**73**	
75		**Backend**	9 days?	**11/27/19 8:00 AM**	**12/9/19 5:00 PM**		
76		**Event**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
77		Event Page	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Burak Yüksel
78		**Article**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
79		Create/Delete Endpoint	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Barış Ege Sevgili
80		Rate/Comment Endpoint	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Burak İkan Yıldız
81		**Search**	2 days?	**12/5/19 8:00 AM**	**12/6/19 5:00 PM**	**76;78**	
82		Search Trading Equipment Endpoint	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Enes Turan Özcan
83		Search Articles Endpoint	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Barış Ege Sevgili
84		Search Events Endpoint	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Burak İkan Yıldız
85		Search Users Endpoint	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Enes Turan Özcan
86		**Annotation**	3 days?	**12/5/19 8:00 AM**	**12/9/19 5:00 PM**	**76;78**	
87		Annotation Endpoint	3 days?	12/5/19 8:00 AM	12/9/19 5:00 PM		Enes Turan Özcan
88		**Frontend**	9 days?	**11/27/19 8:00 AM**	**12/9/19 5:00 PM**		
89		**Event**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
90		Event Page	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Burak Yüksel
91		**Article**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
92		Article Page	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Sadullah Gültekin
93		**Search**	2 days?	**12/5/19 8:00 AM**	**12/6/19 5:00 PM**	**89;91**	
94		Search Bar	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Irmak Güzey
95		Result Page	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Burak Yüksel
96		**Annotation**	3 days?	**12/5/19 8:00 AM**	**12/9/19 5:00 PM**	**89;91**	
97		Annotate Profile	3 days?	12/5/19 8:00 AM	12/9/19 5:00 PM		Sadullah Gültekin
98		Annotate Trading Equipment	3 days?	12/5/19 8:00 AM	12/9/19 5:00 PM		Irmak Güzey
99		Annotate News/Event/Article	3 days?	12/5/19 8:00 AM	12/9/19 5:00 PM		Burak Yüksel
100		**Android**	8 days?	**11/27/19 8:00 AM**	**12/6/19 5:00 PM**		
101		**Event**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
102		Event Page	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Burak Yüksel
103		**Article**	6 days?	**11/27/19 8:00 AM**	**12/4/19 5:00 PM**		
104		Article Page	6 days?	11/27/19 8:00 AM	12/4/19 5:00 PM		Baran Deniz Korkmaz
105		**Search**	2 days?	**12/5/19 8:00 AM**	**12/6/19 5:00 PM**	**101;103**	
106		Search Bar	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Fatih Mustafa Kurt
107		Result Page	2 days?	12/5/19 8:00 AM	12/6/19 5:00 PM		Baran Deniz Korkmaz
108		**Testing**	0.667 day...	**12/10/19 8:00 AM**	**12/10/19 2:20 PM**	**75;88;100**	
109		Test For Backend	0.667 days?	12/10/19 8:00 AM	12/10/19 2:20 PM	75	Barış Ege Sevgili;Burak İkan Yıldız;Enes Turan Özcan
110		Test For Frontend	0.667 days?	12/10/19 8:00 AM	12/10/19 2:20 PM	88	Burak Yüksel;Irmak Güzey;Sadullah Gültekin
111		Test For Android	0.667 days?	12/10/19 8:00 AM	12/10/19 2:20 PM	100	Baran Deniz Korkmaz;Fatih Mustafa Kurt;Mustafa Alparslan
112		Final Delivery	1 day?	12/10/19 2:20 PM	12/11/19 2:20 PM	108	

9 User Scenarios

Donald is an economist. He always follows the latest events occuring in the world, related to economics. He is very successful in predicting the trends of economic assets, especially EURO (93% prediction rate). He also want to trade dynamically. To do so he uses buy/sell orders actively. As a daily routine he checks for the economical events from the traderx web site. As he sees an important event about stability of currencies from events, he corrects his buy orders on JPY,EUR and USD accordingly. And he makes predictions on those currencies. As he has a prediction on USD already, he faces with a pop up that says he already has a prediction on USD, he corrects his prediction from his profile predictions section. He checks an article about dollar and wants to make an annotation on a point of the graph of dollar, and he does so. Then he decides to write an article on dollar and japanese yen. He creates an article on dollar but he needed to get on a train so he leaves of his pc and goes with his android mobile phone. He writes article about JPY on his phone and annotates a part of a text context that he thinks as important. Then he searches for his article about dollar and replies the comments that are made on his article. He likes a comment and goes offline.

- Frontend User scenario
  - Donald logs in to the system with his username and password and gets to his profile page directly
    - Goes to the events section and checks an important event, marked as 3 stars.
    - He goes to money currencies page
    - He makes clicks make prediction for JPY,EUR and USD
    - A pop up about error comes out
    - He goes to his profile page and predictions section
    - He corrects his prediction on USD
    - He goes to article section
    - Views an article on USD.
    - Selects an area of the graph using selector.
    - Types the text: "Here is the peak point that you need to consider".
    - Clicks "annotate" and completes annotation on image.
    - Navigates to article section and writes an article on dollar.
    - Clicks publish and completes writing the article
  - Donald logs out from the system using Logout button at his profile page.
- Android User scenario
  - He logs in to the system with his username and password and gets to his profile page directly
    - He navigates to the article section
    - Clicks "create article" and writes his article.
    - Clicks "upload image" button
    - Uploads an image for the article using "downloaded images" button.
    - Picks an image from his gallery, about japanese yen, clicks upload.
    - Completes writing article and clicks publish.
    - He makes an annotation on a text context, by double clicking.
    - Fills the annotation body as "here is the key point of the article"
    - Clicks "create annotation" button and completes annotating.
    - Searches for his article using "search toolbar"
    - Clicks the article name and views the article.
    - He replies a comment about his article.
    - He dislikes a comment that is too offensive.
  - He logs out from the system using logout button at his profile page

10 Code Structure

We have three main projects to develop, Web app, Android app and Backend app. Each projects has its own directory under the github repository, which are located as frontend/Traderx, android/Traderx, backend/Traderx. We have dedicated group members to each projects. Every member is responsible for his/her dedicated project's issues, bugs, and implementing new features.

We are using branch system to differ applications development from each other. Therefore, we have three main branches in addition to master branch, these are frontend-dev, android-dev, backend-dev. This branching system offers great flexibility to track the development of apps independently from other apps developments. If a new feature will be added to a application, a new branch will be opened which is branched from related application's development branch. Since our applications are started to development yet, we do not have a main development branch which will be the parent of three application development branches. As the main functional requirements are met by apps, we will create a main development branch which differs from master branch. Master branch always will be containing a bug free application.

Hot-fixes, which must be merged into master immediately, are branched from master. After merging hot-fixes into master branch, other development branches pulls this fixes into their branch. With this method, we can offer fixes quickly to production application. All these opened branches merged into its parent branch by opening a pull request. If these pull requests are merging into development branch, reviewers will be set application's dedicated group members.

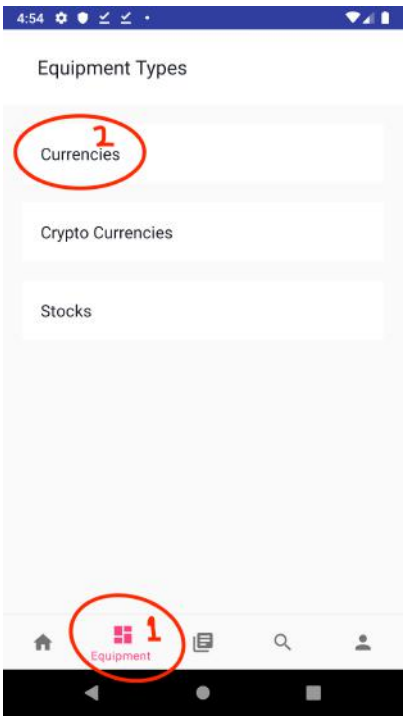
We are using Github issue system to state the app's bugs, discuss the topics to decide the best. This issue system helps a lot to our application developments. For example, if a group member forgets something which was decided so long ago, he/she can find the related issue and remember the reasonings behind the decision.

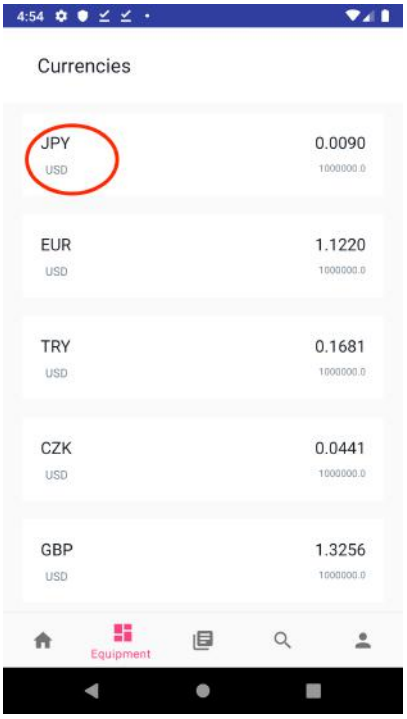
11 User Manual

11.1 Android

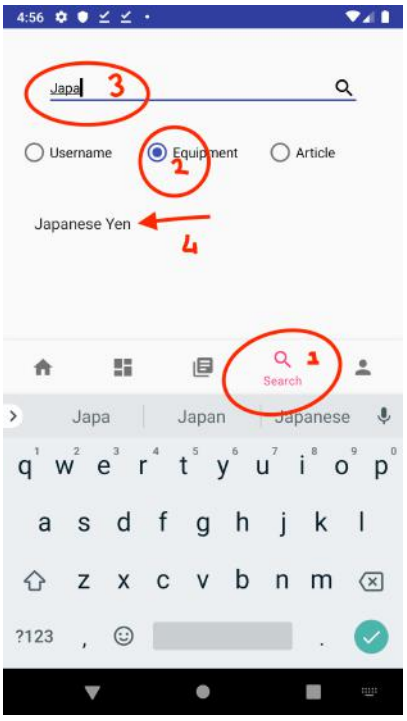
11.1.1 How to Buy or Sell an Equipment?

- **Buy an Equipment**
  You can either use the equipment tab or the search functionality to access to an equipment's page. Let's assume you want to buy Japanese Yen. Using the equipment tab click on **Currencies** and after **JPY** from the list.

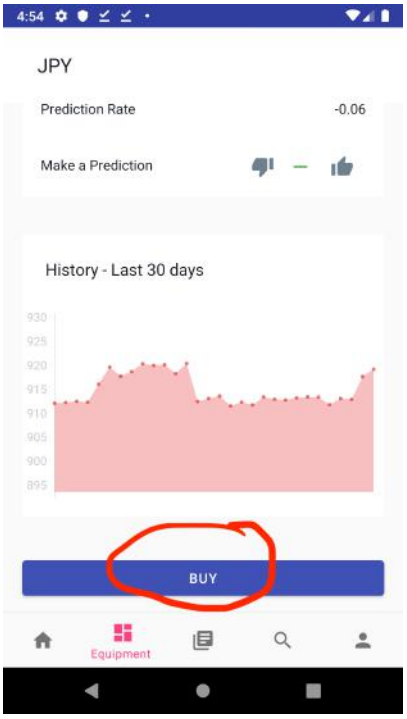




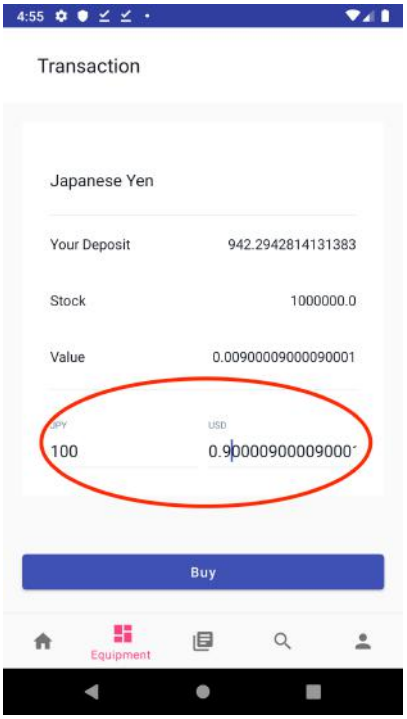
Or on Search fragment, pick equipment and search **japan**. Click on the result to go the equipment's page.



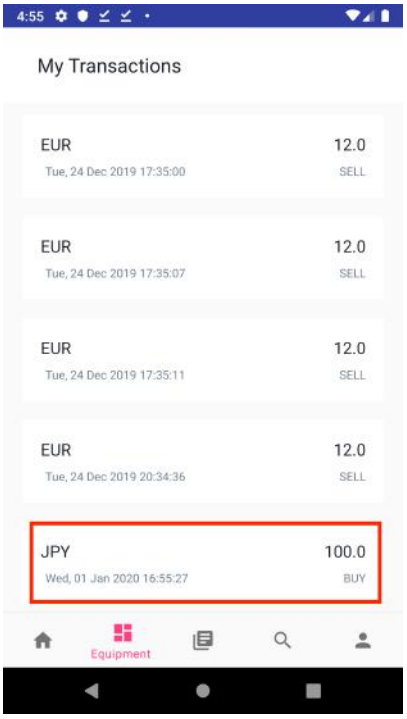
Equipment detail page includes current value, today's high-low, prediction ratios and historical data. Scroll down a bit and click on **BUY** button.



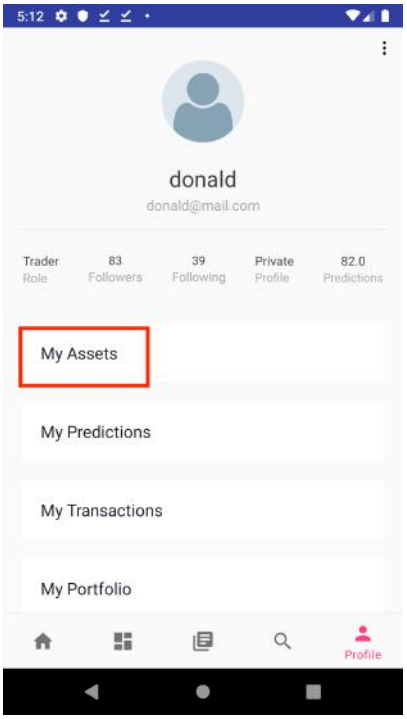
Enter an amount in either as value you want to buy or the value in USD you want to spend. We will buying 100 JPY exactly and it is entered it will show the exact value in USD.



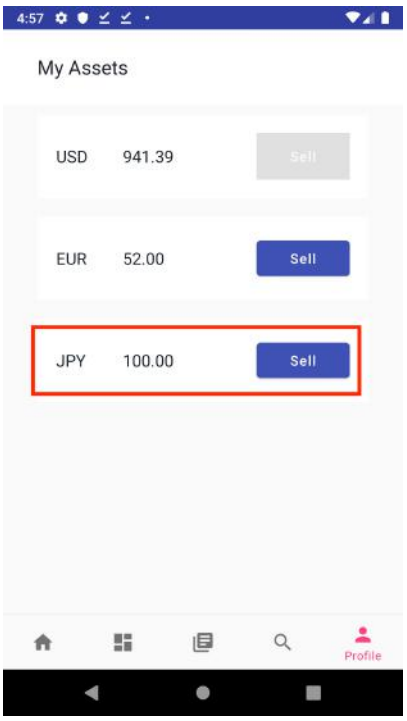
Clicking **BUY** will take us to **Transaction History** if the operation was successful.



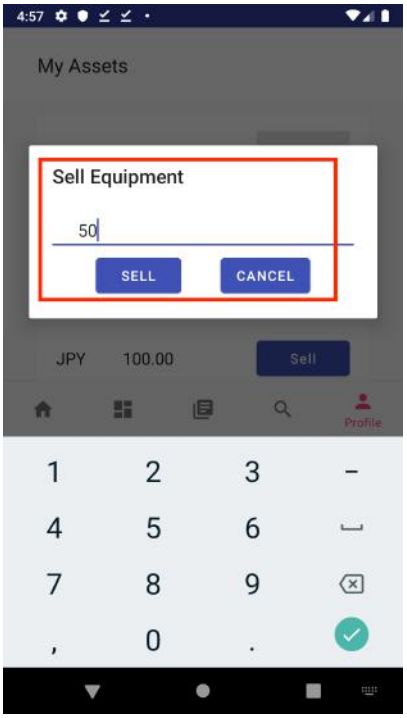
- **Sell an Equipment**
  Selling an equipment is done on the **My Assets** page. Click on **Profile** fragment and visit **My Assets** page.

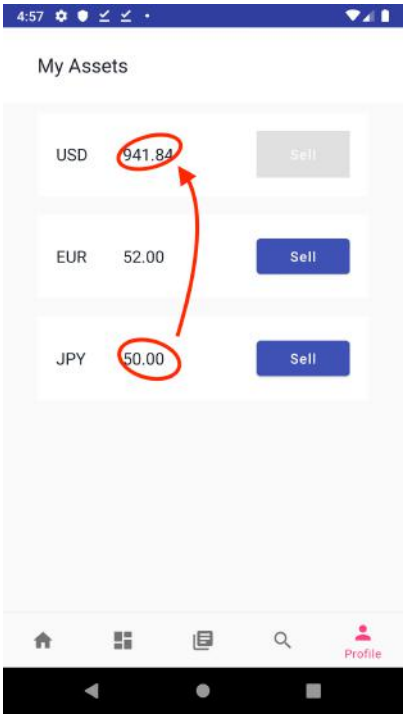


This page shows our all assets and the base currency we picked which is USD therefore we can't sell it. 100 JPY we bought can be seen on the list as well. Click the **SELL** button next to **JPY**.



Enter the amount you want to sell.





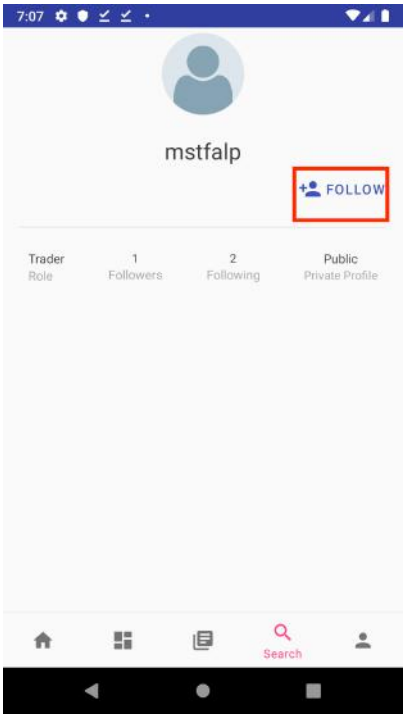
Clicking on **SELL** will convert that amount to **USD** and your assets will be updated.

11.1.2 How to Search and Follow a User?

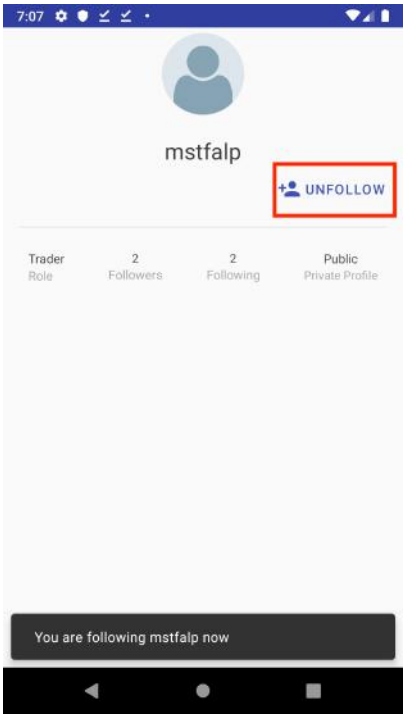
Search function in the application can be used for searching users, articles, or equipments. Access to search page from search fragment using tabs below.

On the search page write the name of the user you want to search and select username. After clicking search it will list the matching usernames. Clicking on the user will take you to the user profile page.

Follow button in the user profile page will send a follow request to that user. If the profile is public then it is accepted automatically. Otherwise you need to wait for user to accept the request manually.

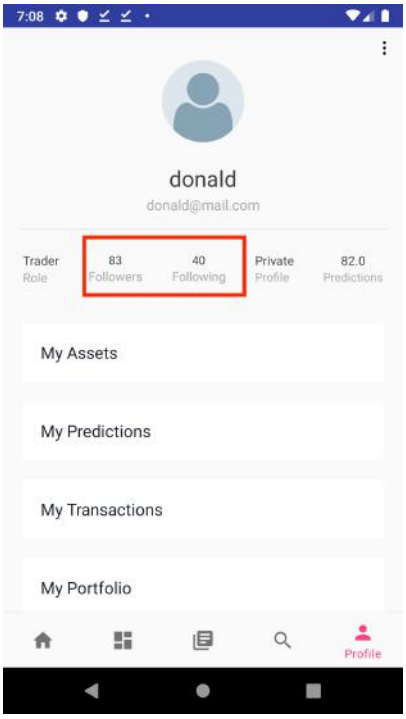


Users you follow will have the **UNFOLLOW** option enabled on their profile pages.

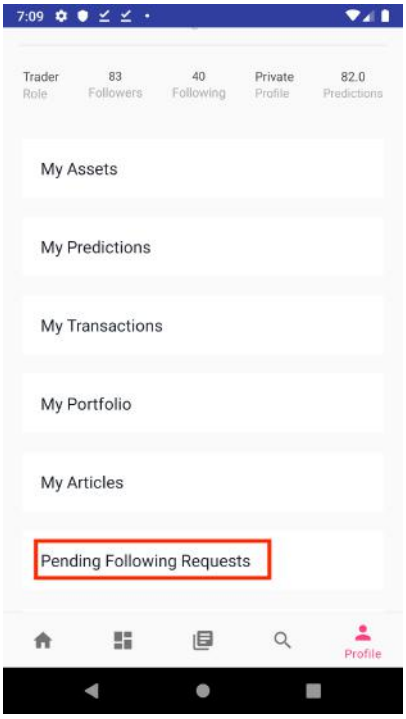


11.1.3 How to see your followers or accept follow requests?

Visit your profile page to see how many users you follow or users following you. Clicking on followers count will take you the list of your followers and the same works for the following.

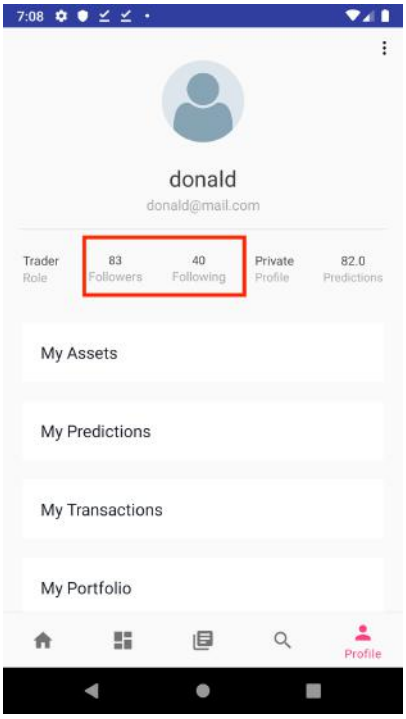


Also below you can see pending following requests if your profile is private. Users followed you have to wait for you to accept the request.

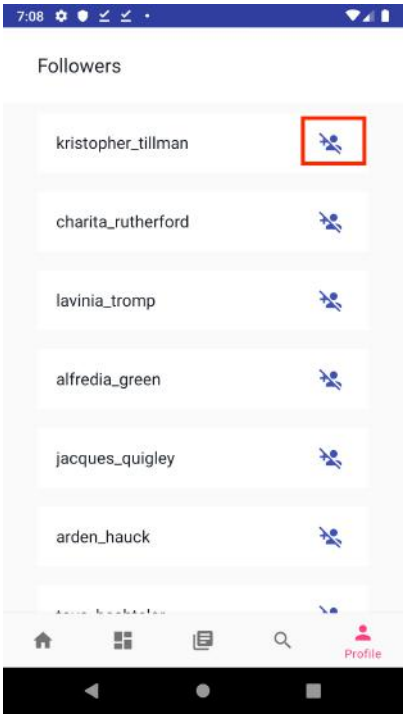


11.1.4 How to unfollow a user or remove someone from your follower list?

Visit your profile page to see how many users you follow or users following you. Clicking on followers count will take you the list of your followers and the same works for the following.

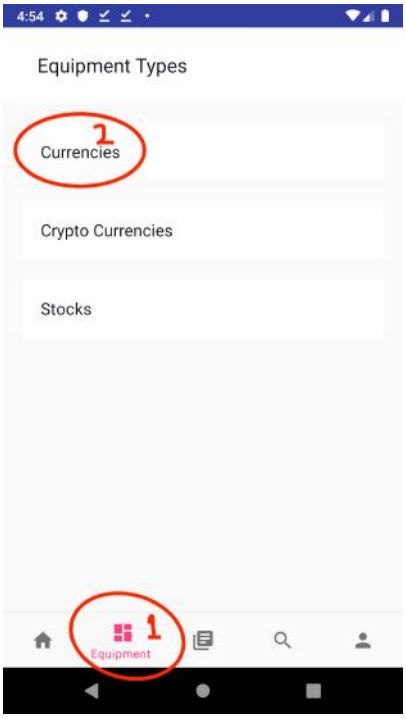


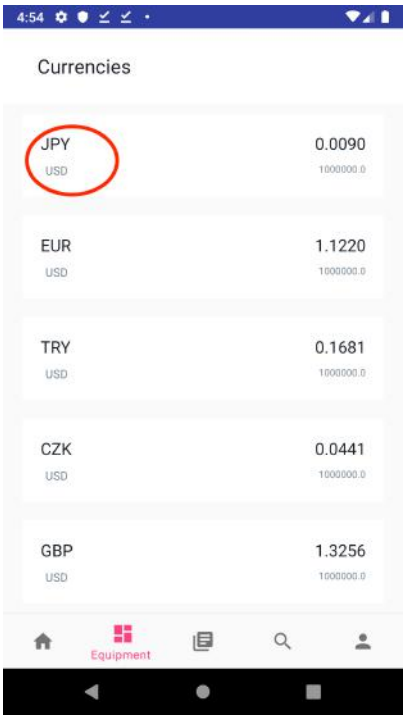
When you click on followers button and visit the **followers** page you can see users with a **unfollow** button near username. Clicking it will remove the user from following you. On the **followings** page you can use the same functionality to stop following someone.



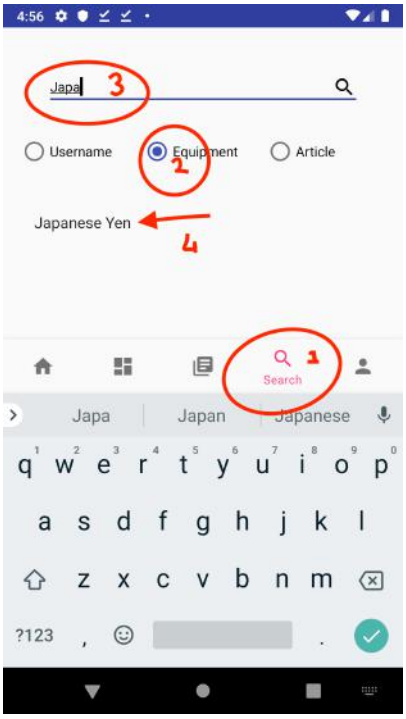
11.1.5 How to Create or Delete an Alert?

You can either use the equipment tab or the search functionality to access to an equipment's page. Let's assume you want to create an alert for Japanese Yen. Using the equipment tab click on **Currencies** and after **JPY** from the list.

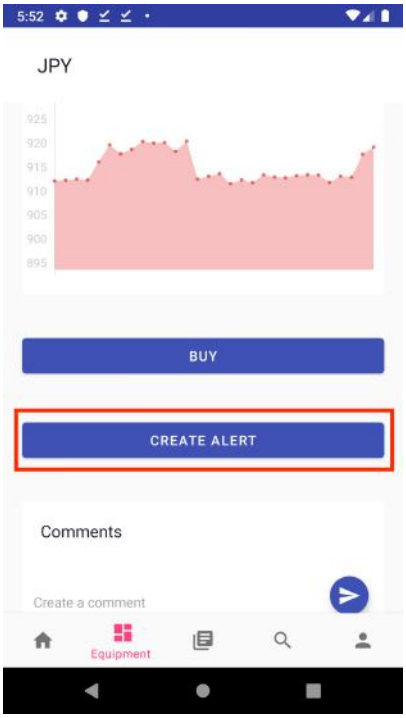




Or on Search fragment, pick equipment and search *japan*. Click on the result to go the equipment's page.



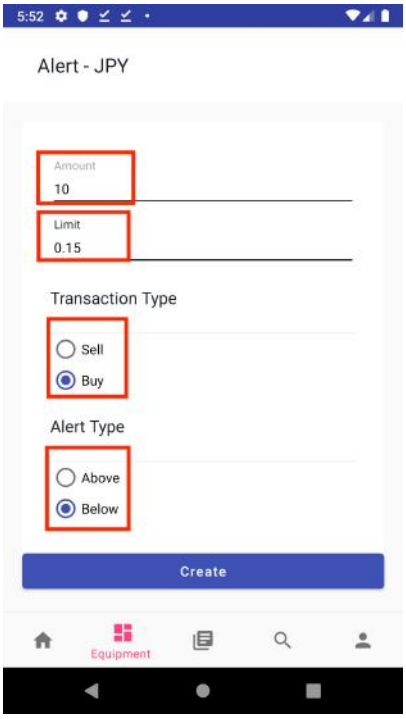
Equipment detail page includes current value, today's high-low, prediction ratios and historical data. Scroll down a bit and click on **CREATE ALERT** button.



Options for creating an alert:

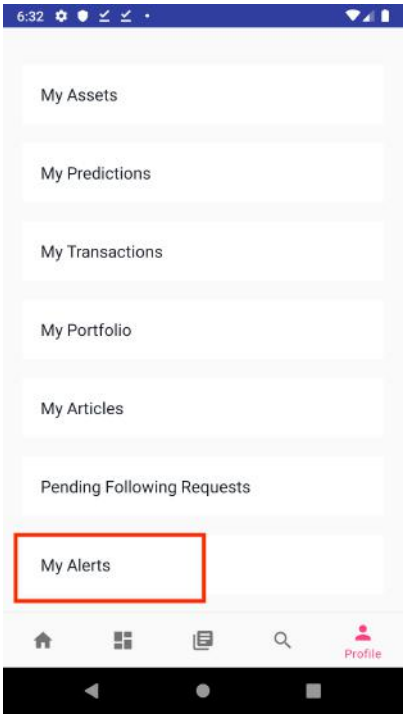
- **Amount:** the total amount you want to buy or sell
- **Limit:** the limit to trigger alert in USD value. *0.15* means this alert will trigger when *1 JPY = 0.15 USD*.
- **Transaction Type:** The transaction type you want to create
- **Alert Type:** When to trigger the alert. Using the *0.15 USD* above and alert type *below* will trigger when the value of *1 JPY is less than 0.15 USD*.

To sum up with this specific settings we will order to buy **10 JPY** with **1 JPY** is selling less than **0.15 USD**. Click the create button to finish creating the alert.



If the operation was successful it will take you to current alerts.

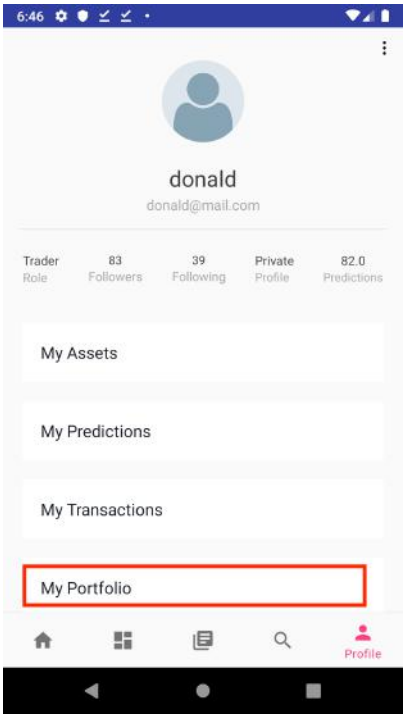
It is also possible to access this page from **Profile** fragment by clicking **My Alerts**.



If you want to delete an alert then you press and hold on the specific alert. It will open the **Delete** button and pressing on delete removes the alert.

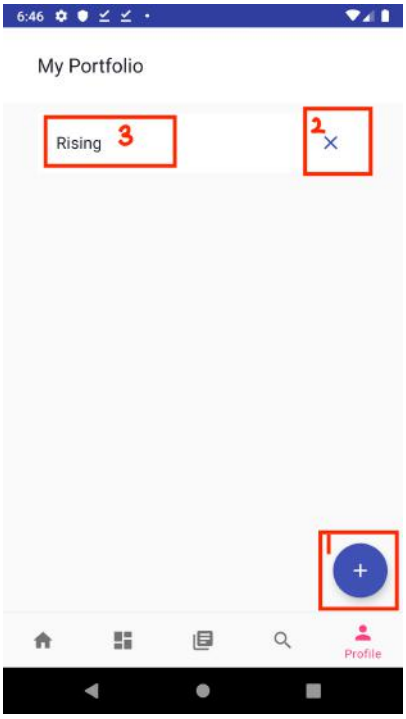
11.1.6 How to Manage Your Portfolio?

Portfolio is used for creating custom lists of equipments you want to follow closely. Access to your portfolio from **Profile** fragment by clicking on **My Portfolio**.

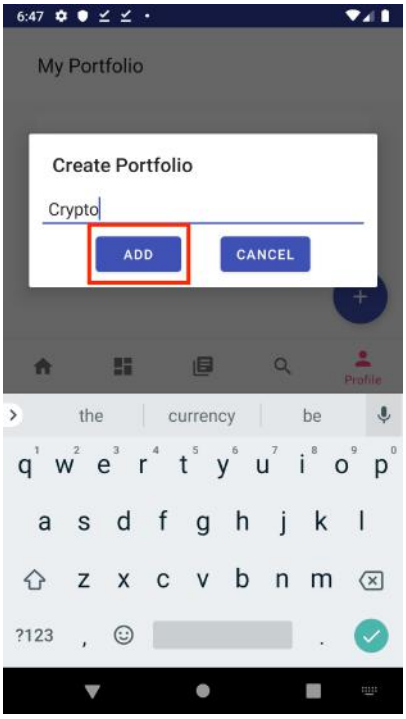


On the portfolio page:

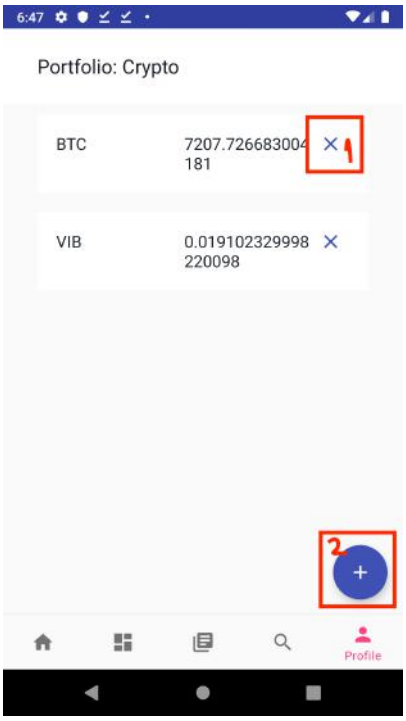
- You can add a new portfolio by clicking the plus button (marked with 1).
- You can delete a portfolio by clicking the x button (marked with 2).
- You can go to portfolio detail page by clicking on the portfolio (marked with 3).



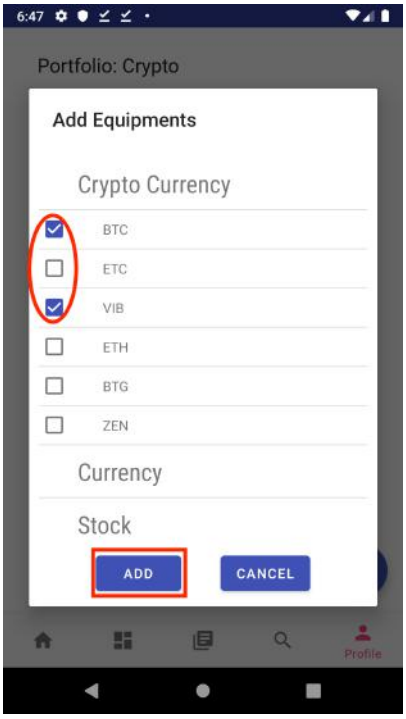
Create Portfolio page only requires the name of the portfolio and pressing **ADD** will create a new one with given name.



Detail page of a portfolio consists of any equipments you've added to follow. Equipments are listed with *name* and *current value*. Clicking the **x** button next to equipment will remove it from your portfolio. Adding new equipments to current portfolio is done by pressing + button below.

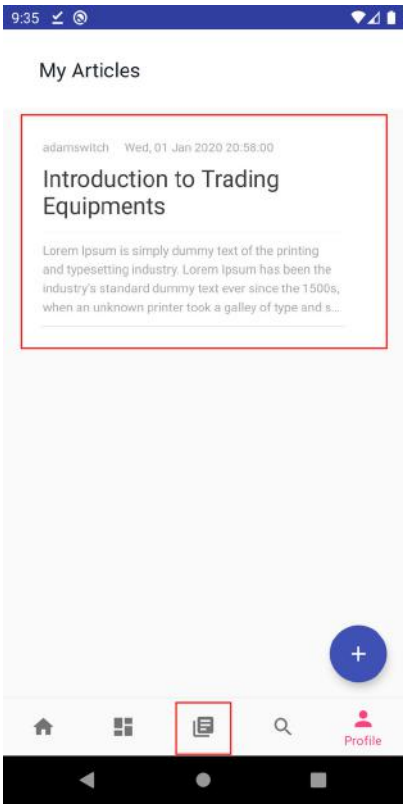


While adding equipments it's possible to add many at once. Also you can add an equipment from any type (crypto, stock, or currency) to the same portfolio.

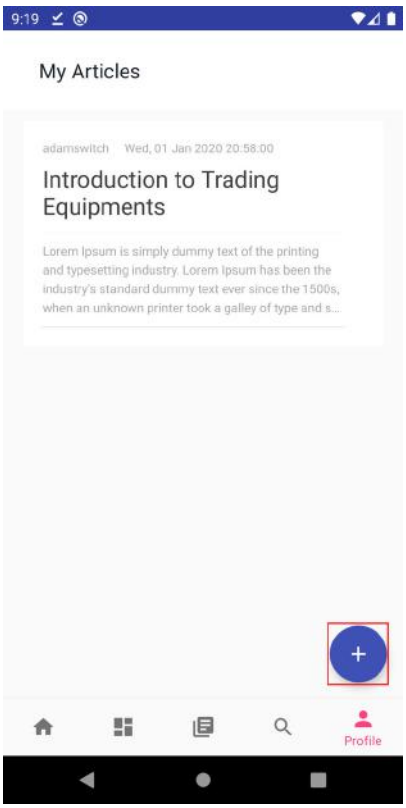


11.1.7 How to Use Article Feature

You can list all articles published by other users or you inside the articles page. You can navigate to this page from bottom navigation bar. When the articles listed in this page, you can tap any article and see its content.

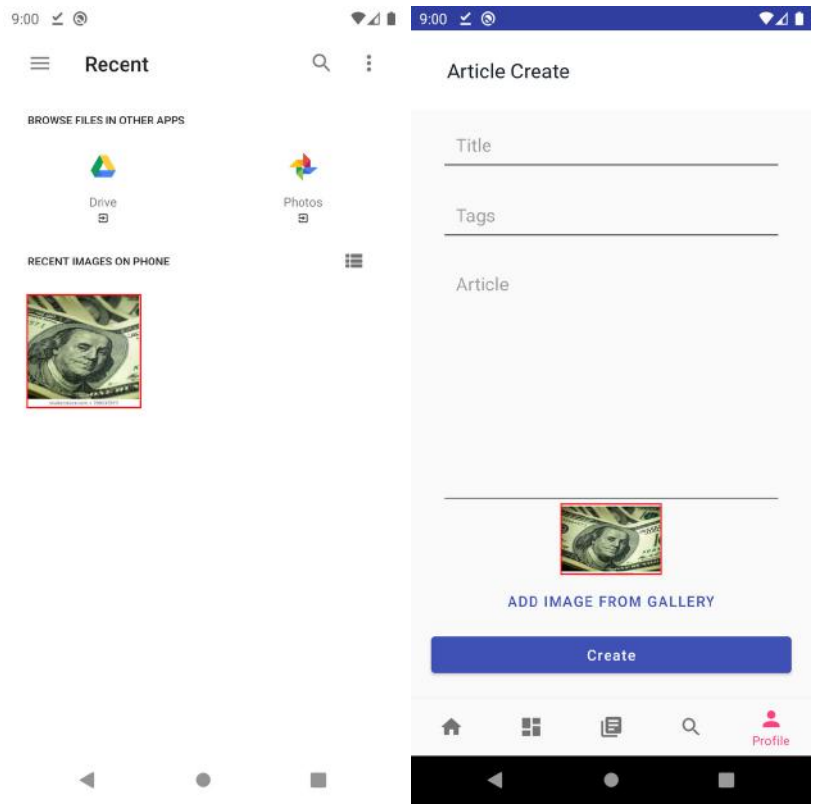


When you visit *Articles* page or *My Articles* page, there is a button at the bottom right corner, which lets you click and go to *Article Create* page.

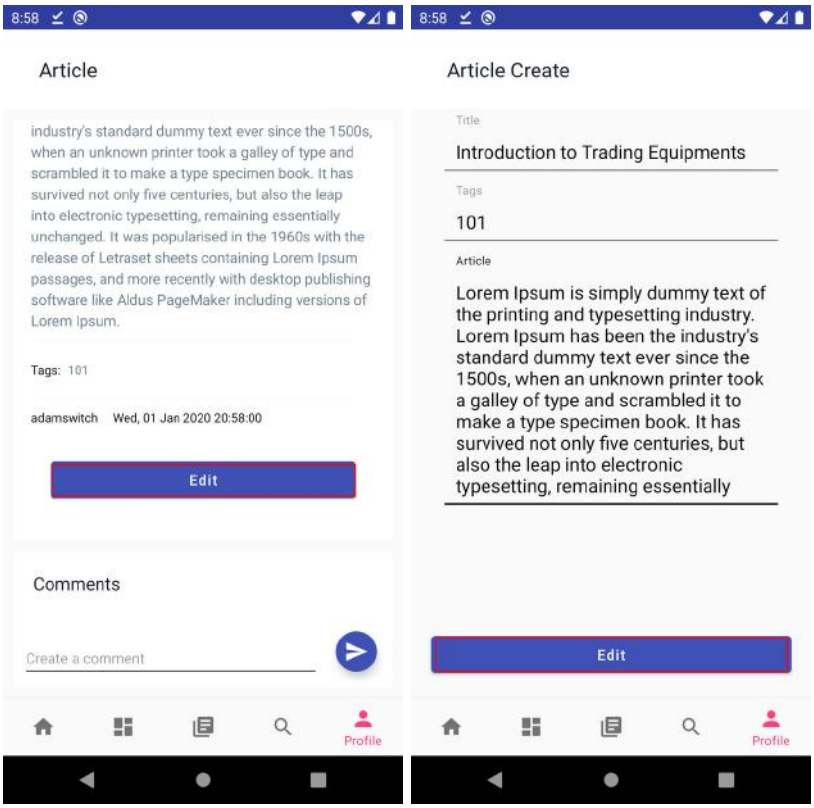


Inside the *Article Create* page, you have to fill three fields to create an article, these are title, article body and an image. *Tags* field is optional, and every tag you want to add should be seperated with a comma, like *valid, tagging*. After filling required fields, you can tap to *Create* button and publish your article.

An image to article can be added by tapping to *Add Image From Gallery* button. It will let you choose a image from your phone.



If you want to edit your published article, you can do that by tapping *Edit* button in *Article Content Page*. It will navigate you to, *Article Edit Page*, which is similar to *Article Create Page*. The fields are already filled by your article data. You cannot change the image of an article.

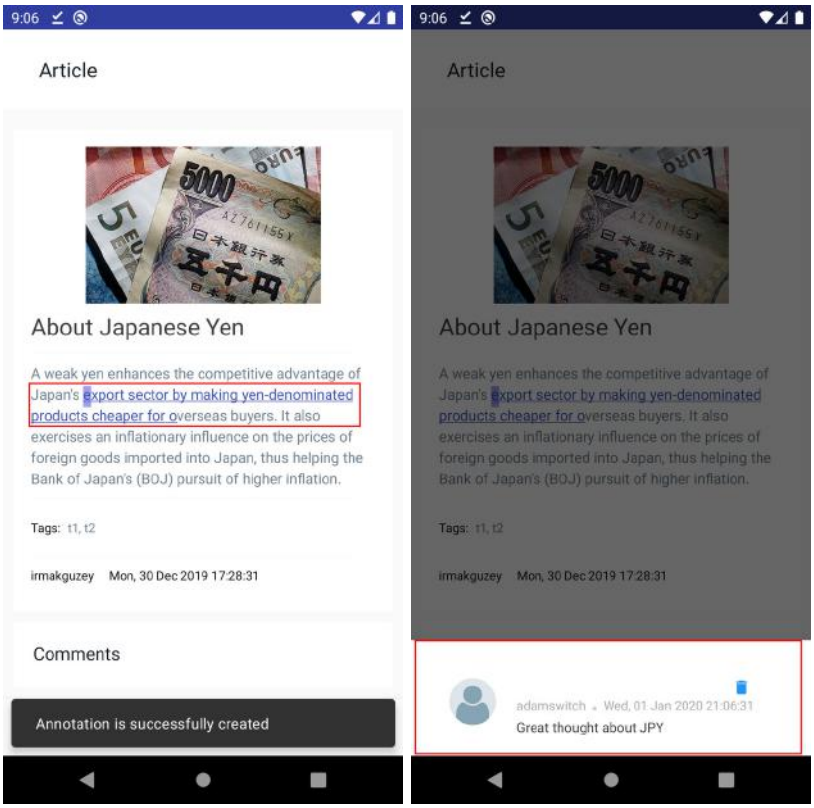


11.1.8 How to Use Annotation Feature

Annotation can be created through article's content page. Inside the *Article's Content Page*, if you apply a long tap to the body of article, a text selection tool will appear. You can select the portion of body to annotate. After finishing the selection of text, you can tap to button, *Annotate*, at top right corner.

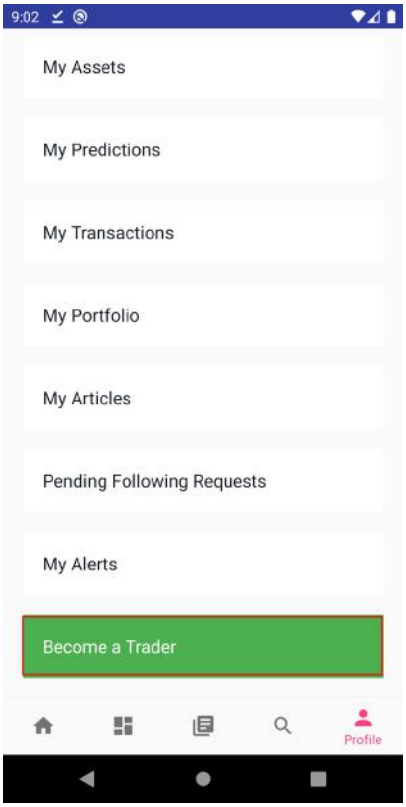
Tapping to *Annotate* button will bring a bottom sheet to write some annotation and publish it. After writing some annotation, you can tap to *Create* button and publish your annotation.

After successfull publish, your annotation will appear on the body of article. You can tap to your annotation and see its content. If more than one annotation lay on your annotation, you will see all of them. Beginning of an anntotation is indicated by a solid purple, and its selection is indicated by a purple colored text.

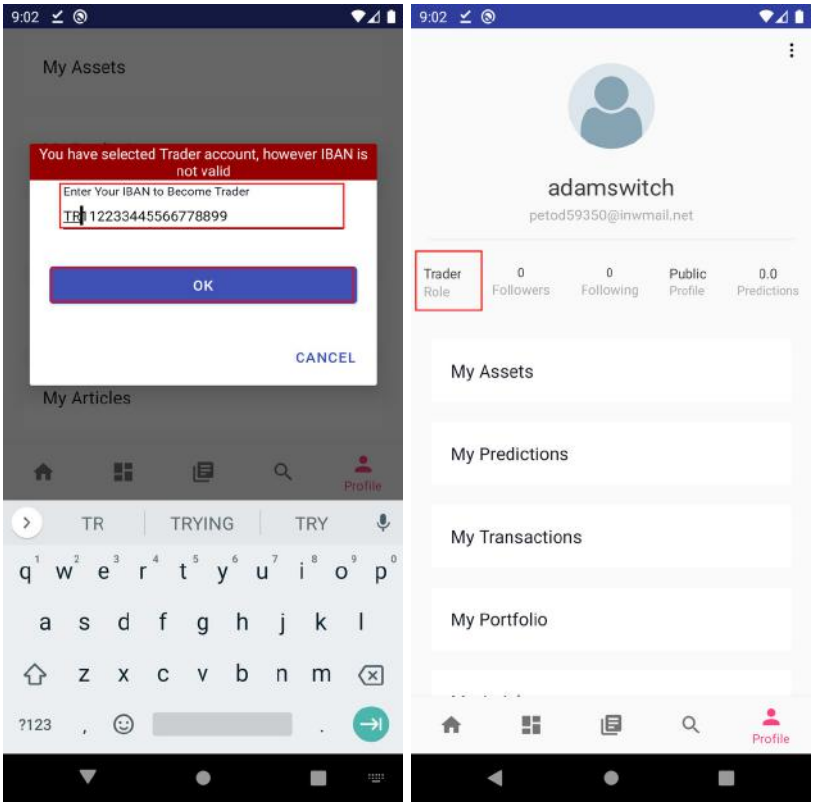


11.1.9 How to Become a Trader

In your *User Profile Page*, you can see a green button which contains *Become a Trader* text, if you are not already a *Trader User*.

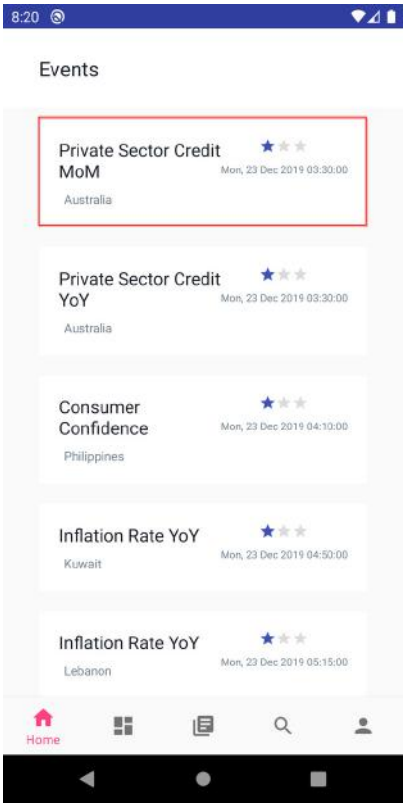


When you tap to this button, a dialog will appear and wait from you a valid IBAN number. If entered value is not valid, you will get an error which indicates that your IBAN is not valid. After entering a valid IBAN number, you can tap to *OK* button and become a *Trader User*. You can see it through your *User Profile* page, you may need to refresh the page.



11.1.10 How to Use Events Feature

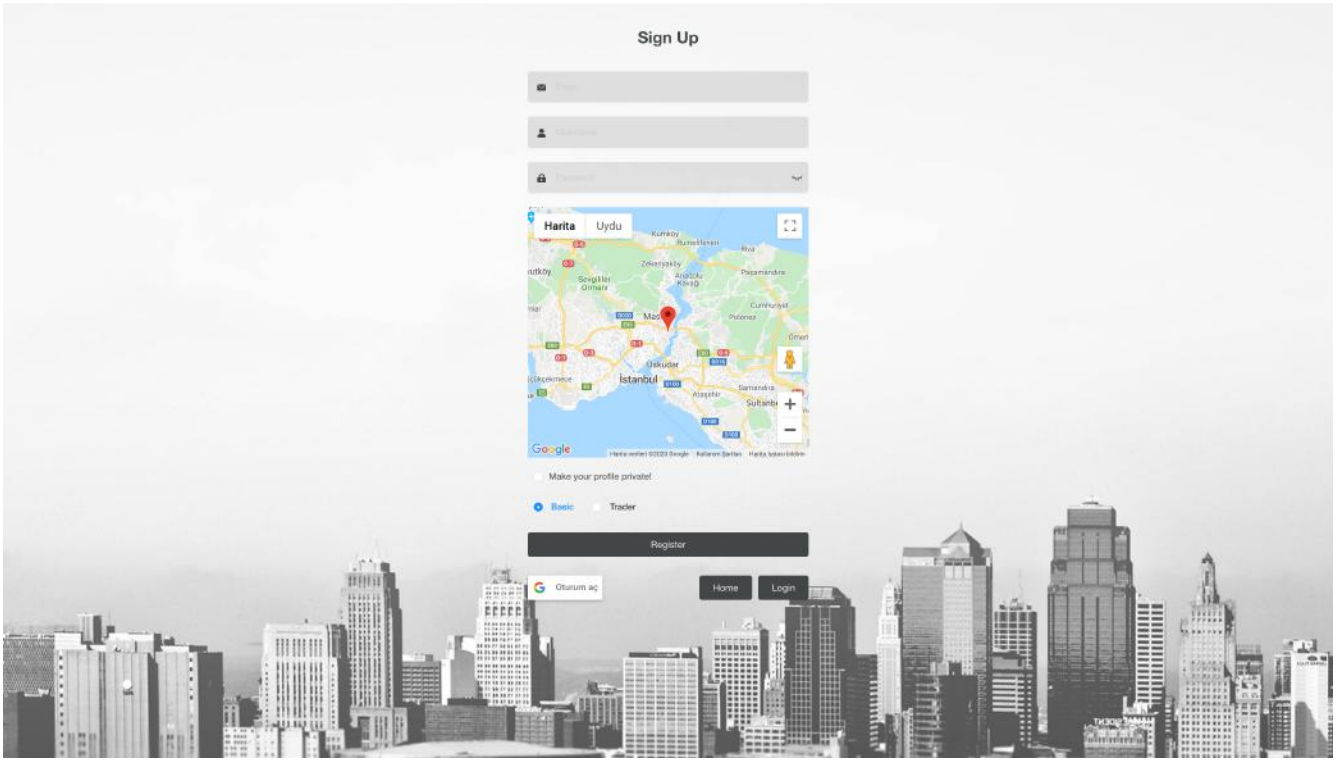
When you launch the application, first screen meets you is *Events Page*. In this page, you can see the name of the event, its location and importance.



11.2 Frontend

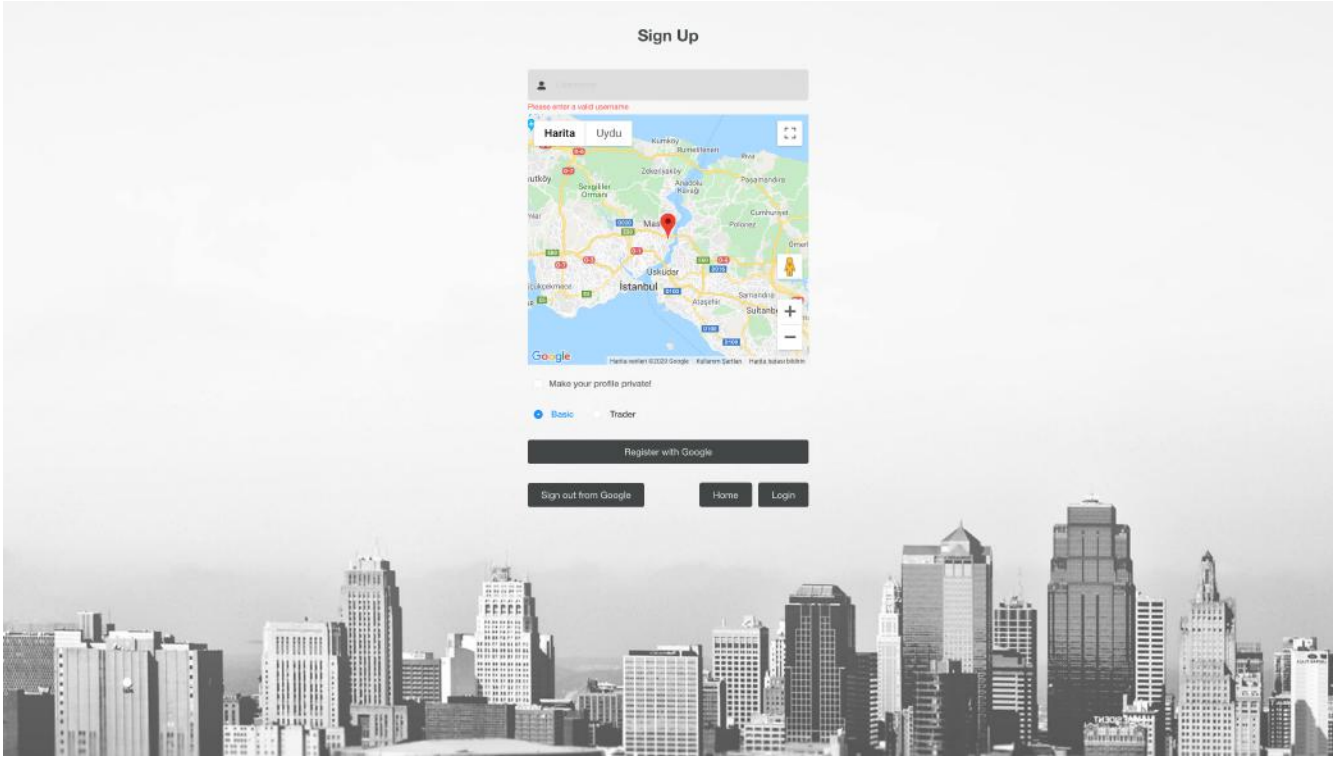
11.2.1 Register

A user can register our system via google account or via e-mail verification system. To register via e-mail verification system, user needs to enter his/her e-mail address, username, password. Then selects a location from the map. Afterward, selects whether the user be private or public. Finally, if the user wants to be a trader, clicks to the trader button and enters his/her IBAN number.



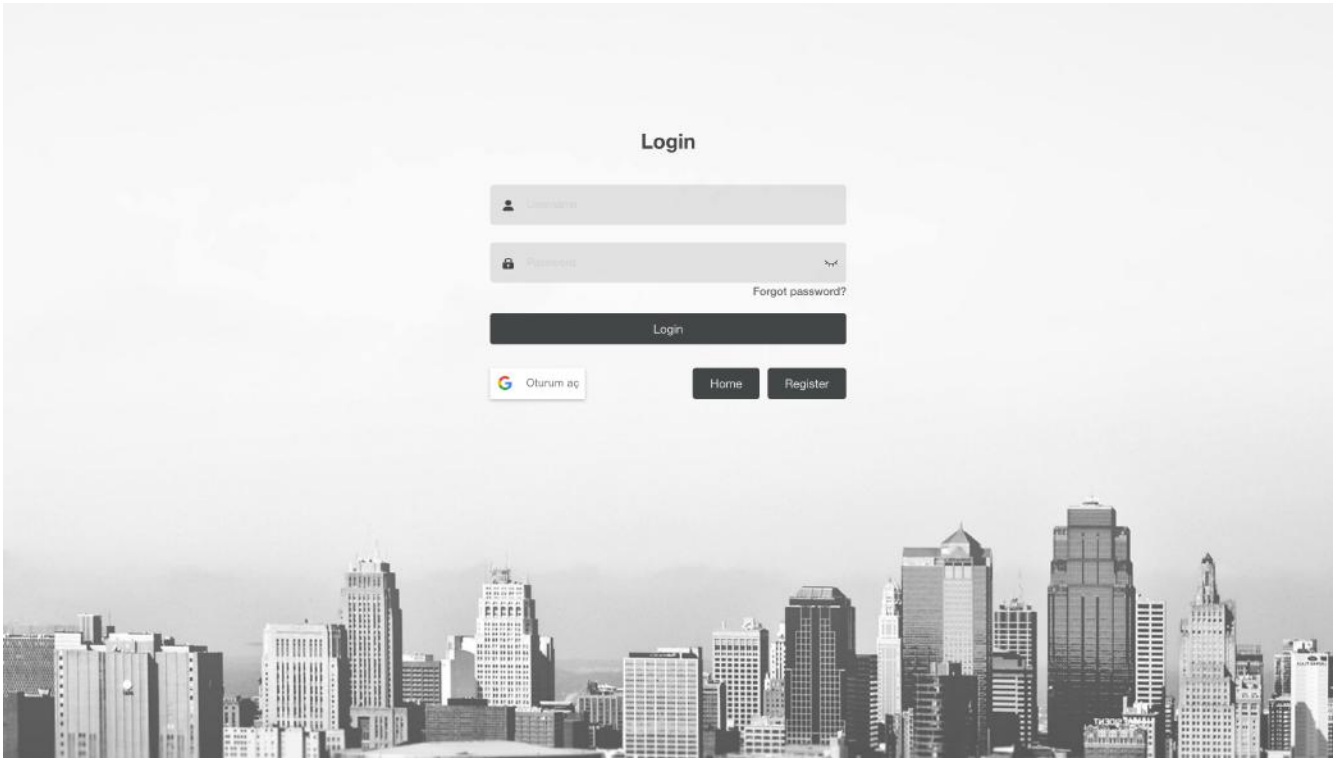
11.2.2 Register With Google

Another way to register our system is using google sign in functionality. If the user clicks to "register with google" button some field in the register fields disappears. The remaining fields are username, location from map, private/public checkbox, basic/trader checkbox. The user doesn't need to enter his/her e-mail address and password anymore.



11.2.3 Login

To login our system, there are two ways: one is with google, and the other one is with username and password. To login with username and password, the user needs to enter his/her username and passwords to given fields and clicks to login button.

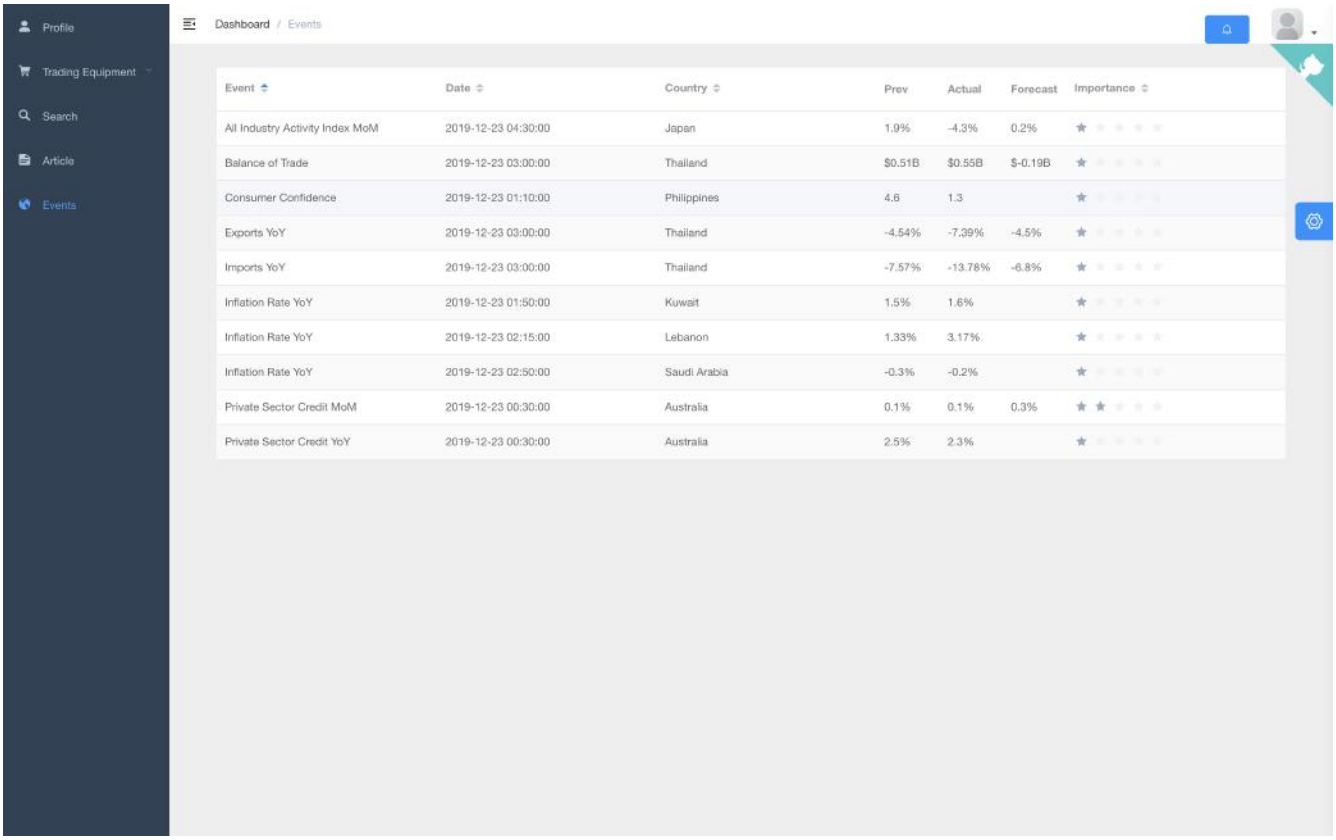


11.2.4 Login With Google

To login with google, the user needs to click login with google button and enters his/her user name before clicking to the login button.

11.2.5 Events

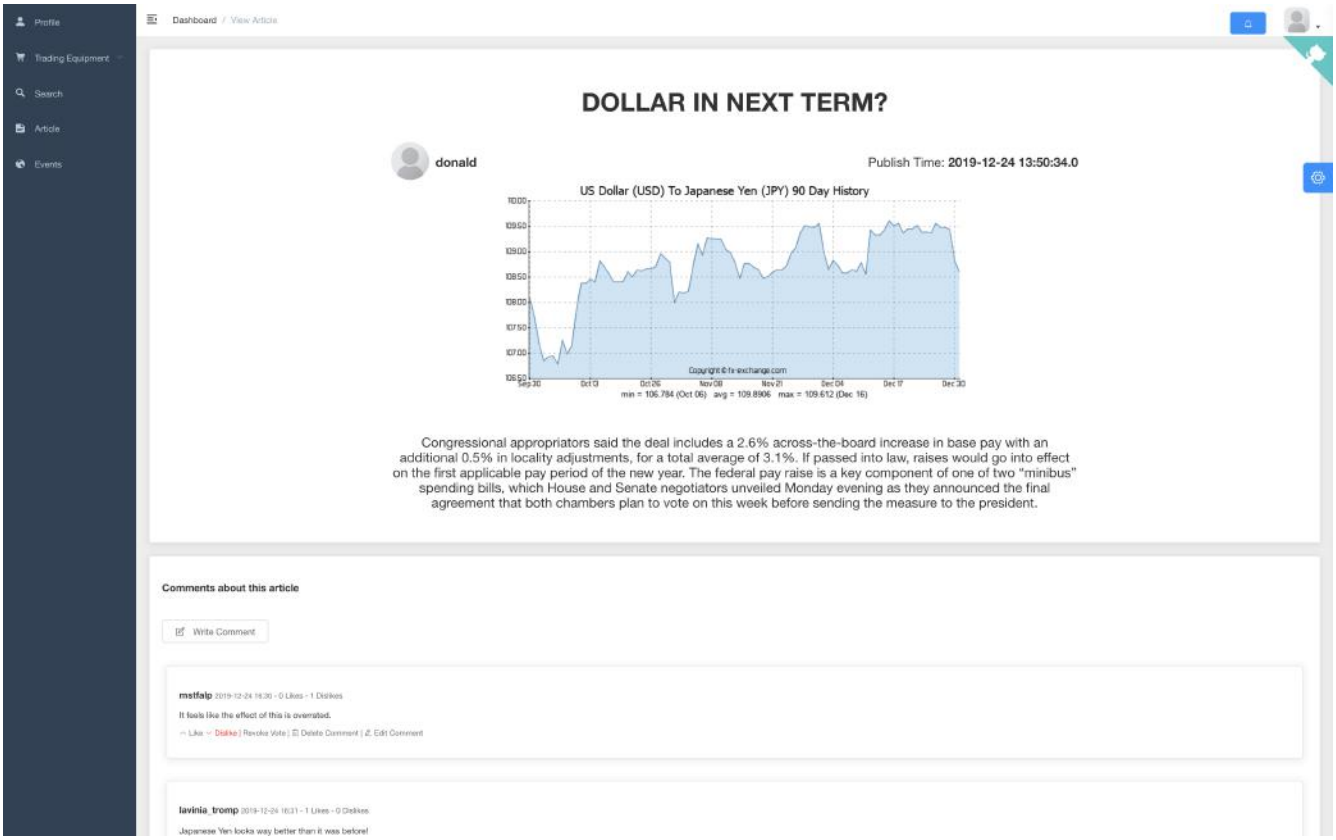
In the left navbar, there is an event button which redirects user to the event page. In this page, the user can see all events and their details.



Event	Date	Country	Prev	Actual	Forecast	Importance
All Industry Activity Index MoM	2019-12-23 04:30:00	Japan	1.9%	-4.3%	0.2%	★
Balance of Trade	2019-12-23 03:00:00	Thailand	$0.51B	$0.55B	$-0.19B	★
Consumer Confidence	2019-12-23 01:10:00	Philippines	4.6	1.3		★
Exports YoY	2019-12-23 03:00:00	Thailand	-4.54%	-7.39%	-4.5%	★
Imports YoY	2019-12-23 03:00:00	Thailand	-7.57%	-13.78%	-6.8%	★
Inflation Rate YoY	2019-12-23 01:50:00	Kuwait	1.5%	1.6%		★
Inflation Rate YoY	2019-12-23 02:15:00	Lebanon	1.33%	3.17%		★
Inflation Rate YoY	2019-12-23 02:50:00	Saudi Arabia	-0.3%	-0.2%		★
Private Sector Credit MoM	2019-12-23 00:30:00	Australia	0.1%	0.1%	0.3%	★ ★
Private Sector Credit YoY	2019-12-23 00:30:00	Australia	2.5%	2.3%		★

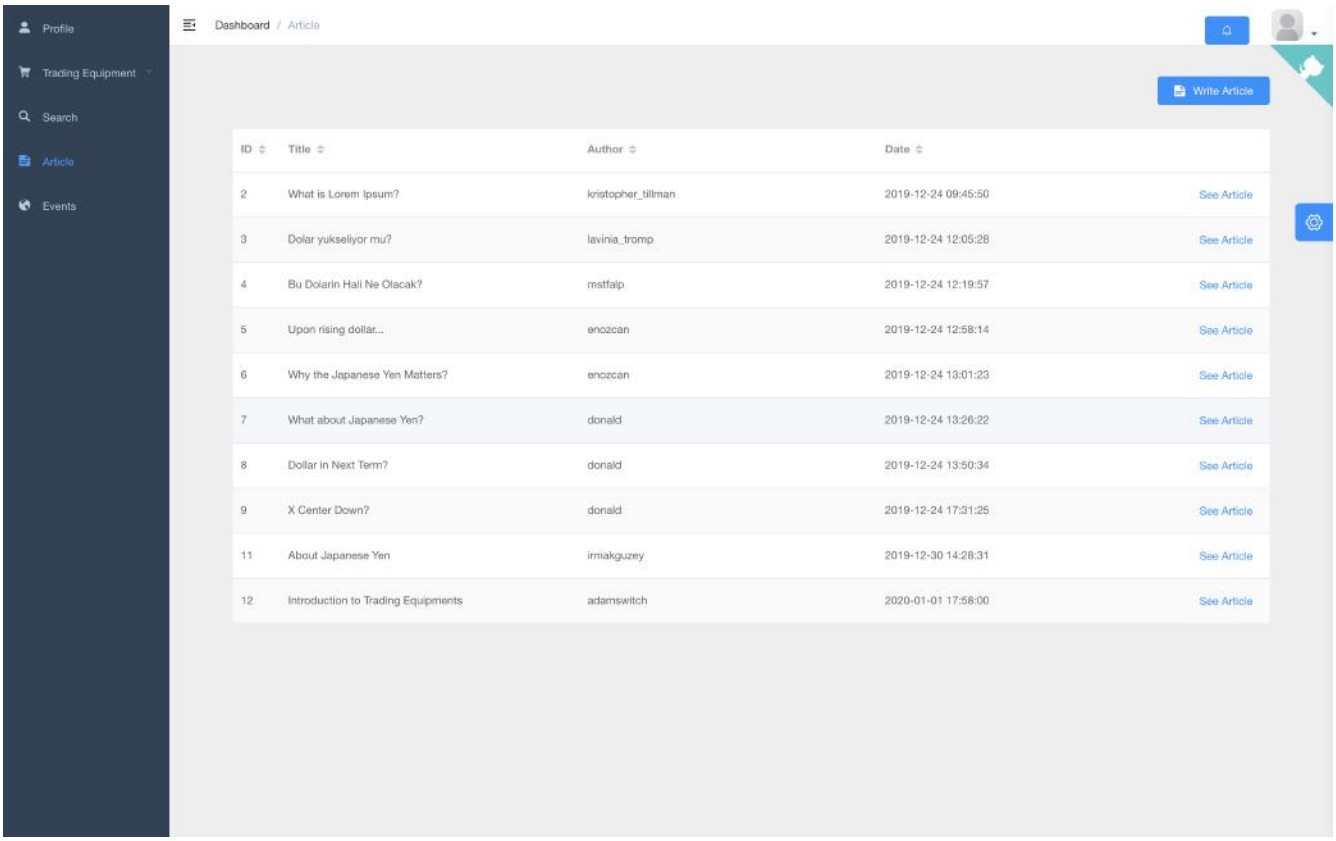
11.2.6 List All Articles

In the left navbar, there is an article button which redirects user to the article page. In this page the user can see all articles in a tabular format and also sort all articles according to their author, title and date. Finally, if user wants to read the article itself or get more information about it, he/she can click to see article button to read the article.



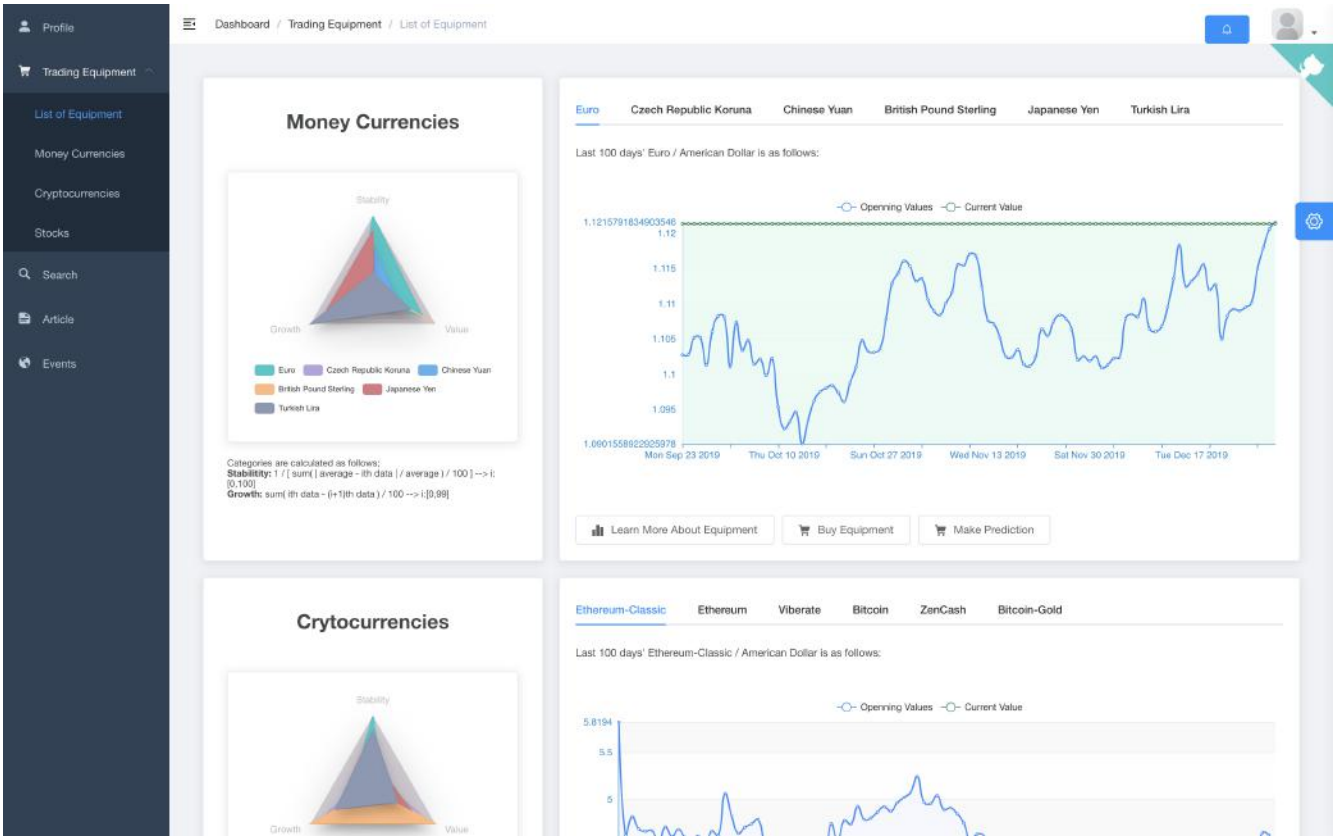
11.2.7 Read An Article

When user clicks to "see article" button, the system redirects him/her to the article page. In this page the user can read the article, can see its related image, can read/create/delete comment to that article. Finally create annotations for text and image.



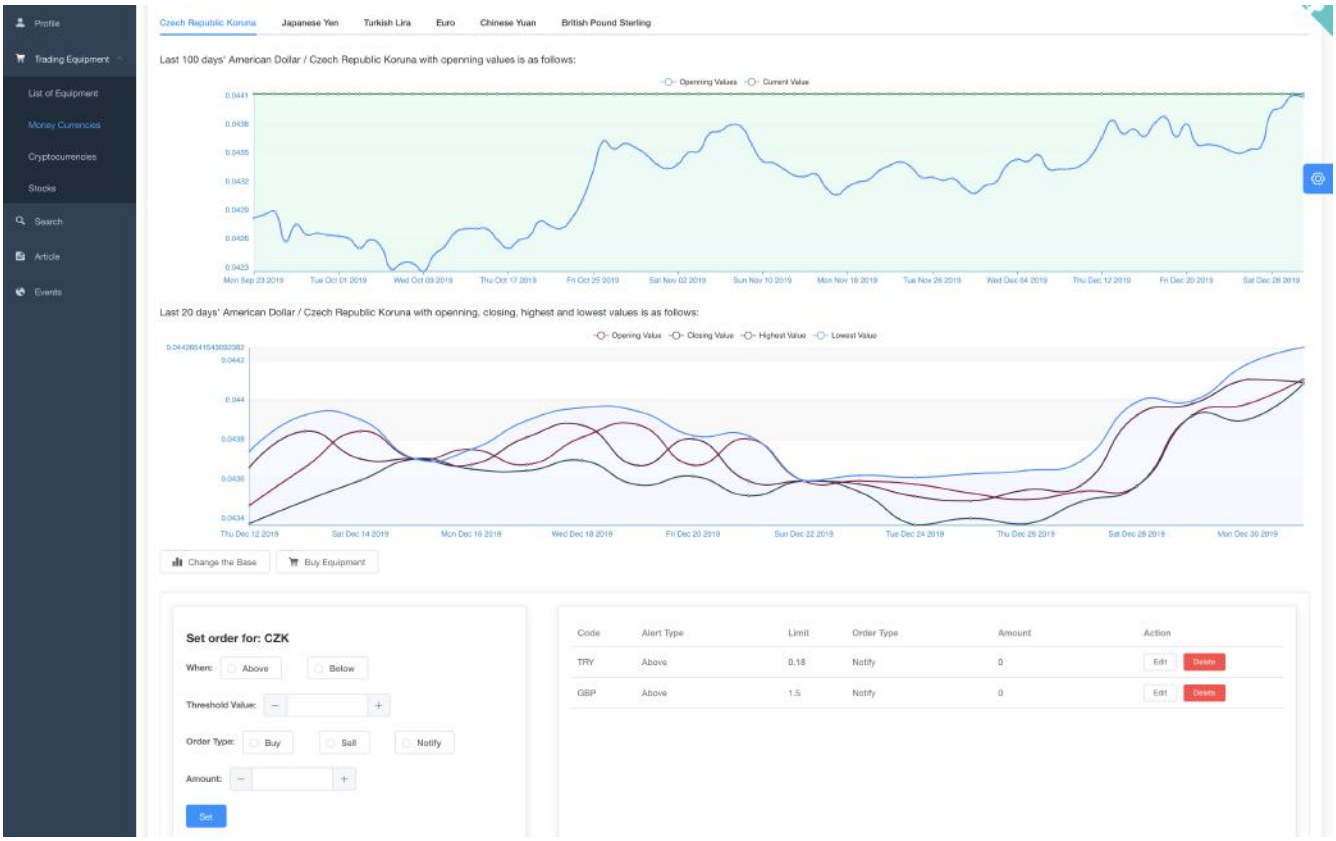
11.2.8 List Of Equipment

Users can see three different trading equipment types by going List of Equipment page from the navbar under Trading Equipment tab. In this page, users can see an evaluation of all trading equipment belonging to a single type, graphs of each trading equipment, buy them, make predictions, and can be redirected to detailed page of specific type of trading equipment.



11.2.9 Detailed Page of a single type of Trading Equipment

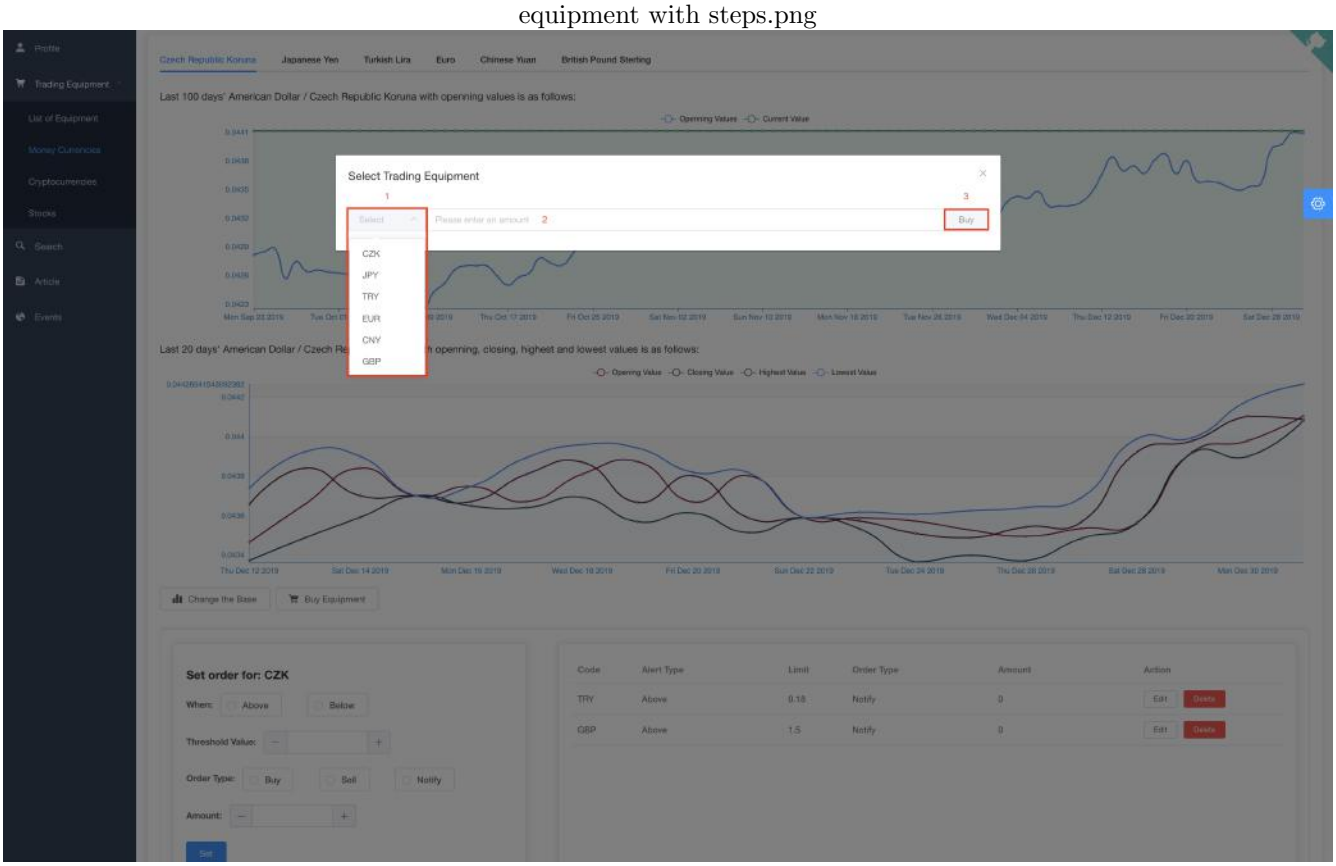
Other than List of Equipment page, there are three pages under Trading Equipment tab on the navbar. Those are the specific page related to a single type of trading equipment. Below, there is a figure showing the page of money currencies. In this page, there are two graphs showing last 20 and 100 days' values of the trading equipment selected. Also, users can buy trading equipment from this page using Buy Equipment button under the graphs. Below, there is a section to set/edit/delete alerts/order which will be explained later. Finally, there is a comment section where users can view comments written about the selected trading equipment and/or write their own comments.



11.2.10 Buy Trading Equipment

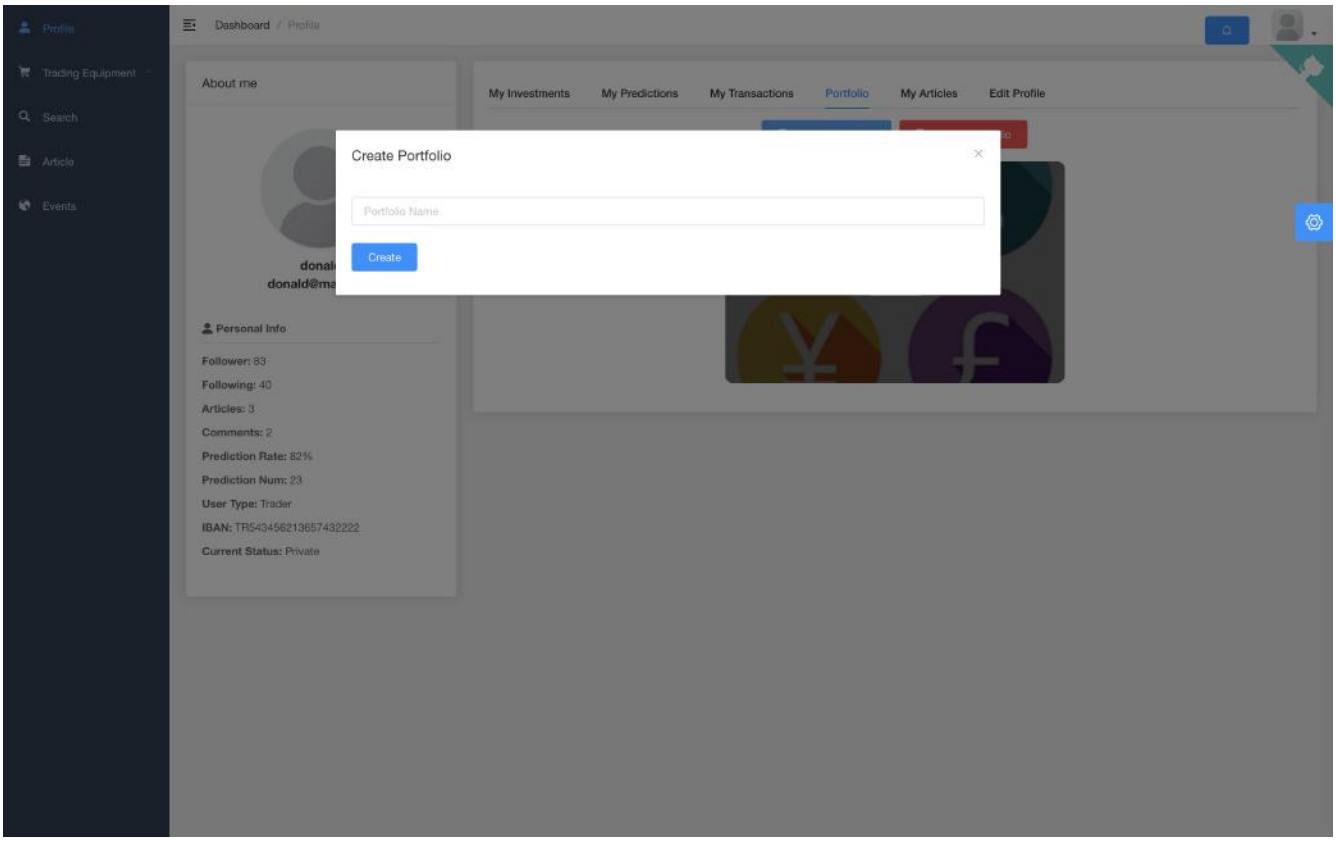
A dialog opens up when user presses a Buy Equipment button. From that dialog users can buy a trading equipment after selecting the trading equipment to buy, the typing the amount, and finally pressing Buy button.

equipment with steps.png



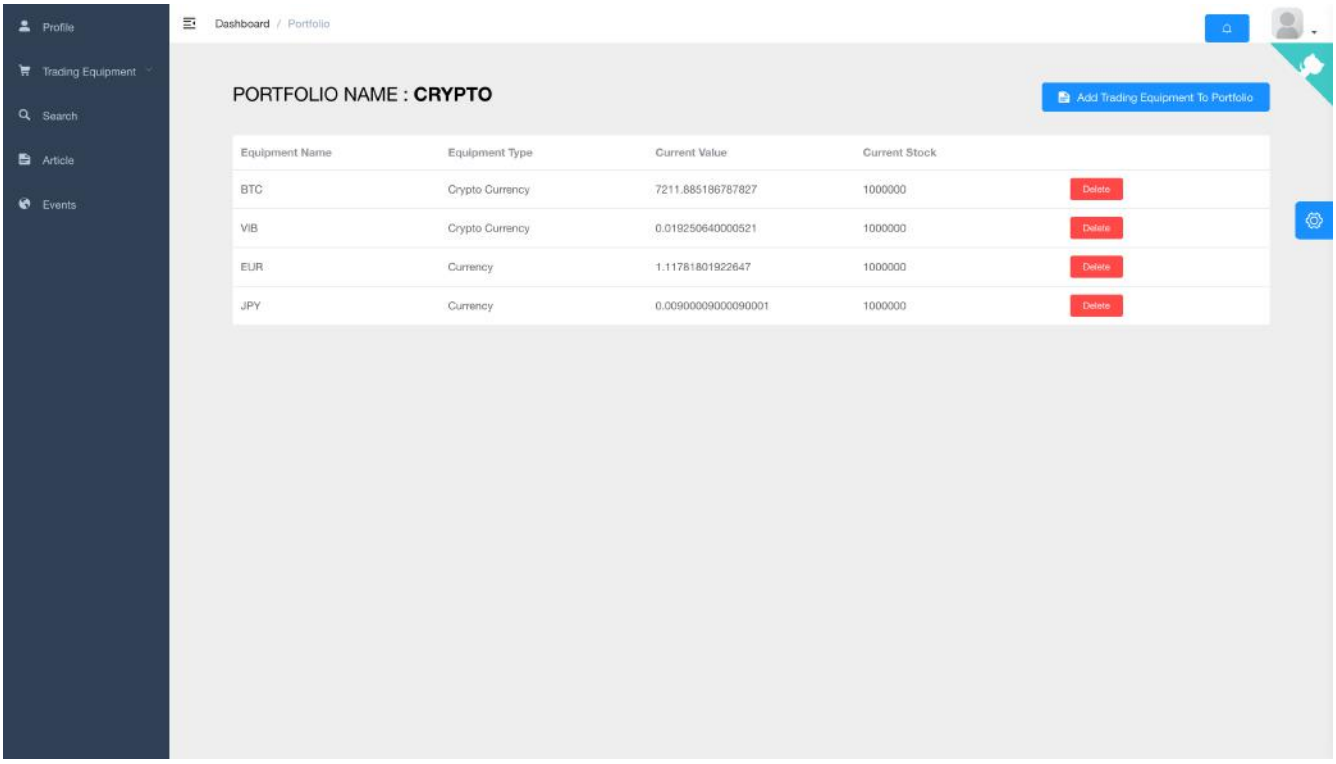
11.2.11 Create Portfolio

To create a portfolio, a user needs to go to the profile page and portfolio tab. When he/she clicks to the "create portfolio" button, a dialog shows up for user to enter a portfolio name. After writing a portfolio name and clicking the create button, portfolio is created



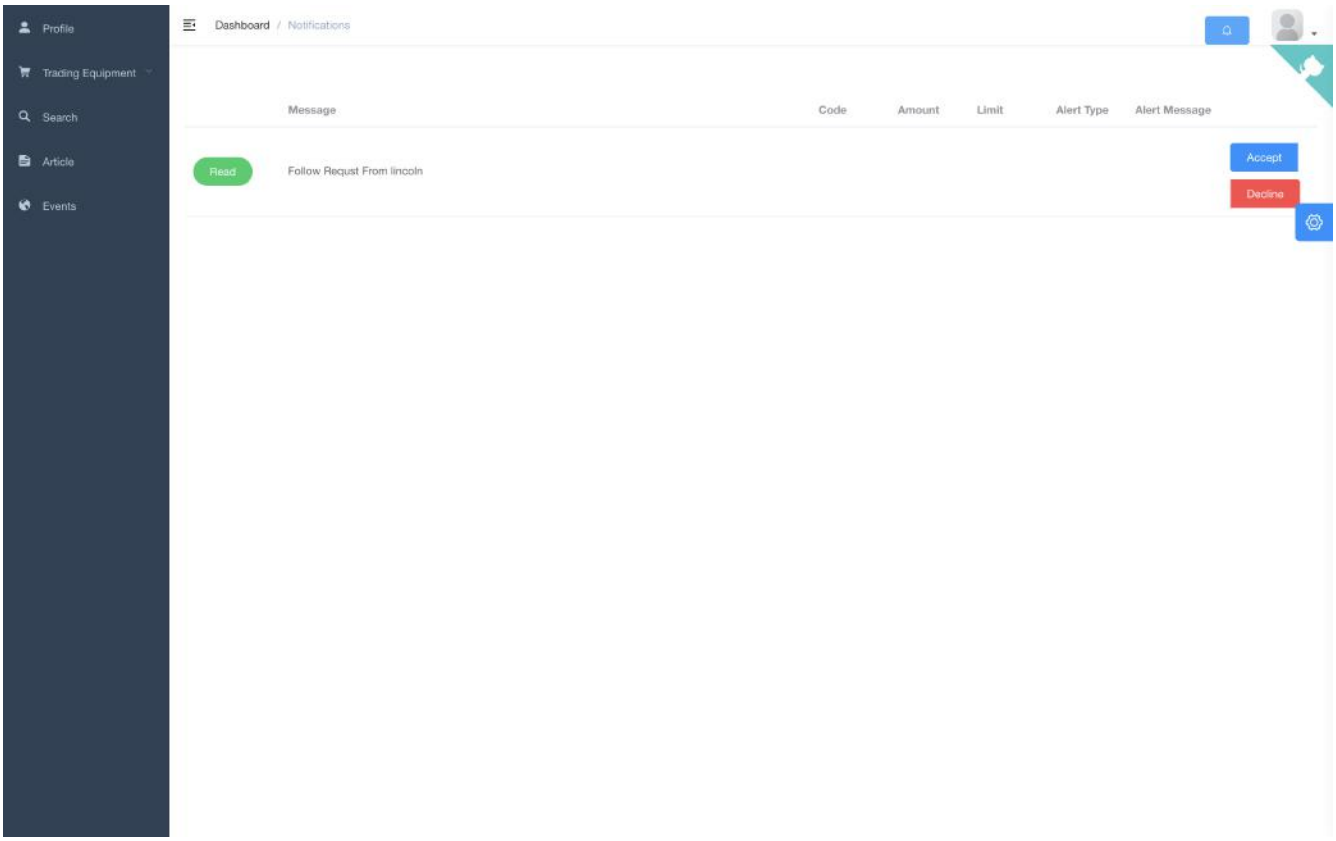
11.2.12 View Portfolio

In the portfolio page, the user can add and delete trading equipment to their portfolio. To add an equipment, the user needs to click "add trading equipment to portfolio" button. Then a dialog shows up. After selecting couple of equipment, the user clicks to "add to portfolio" button and adds the selected elements to the related portfolio. To delete the element from the portfolio, the user can click to delete button on the right side of the equipment name



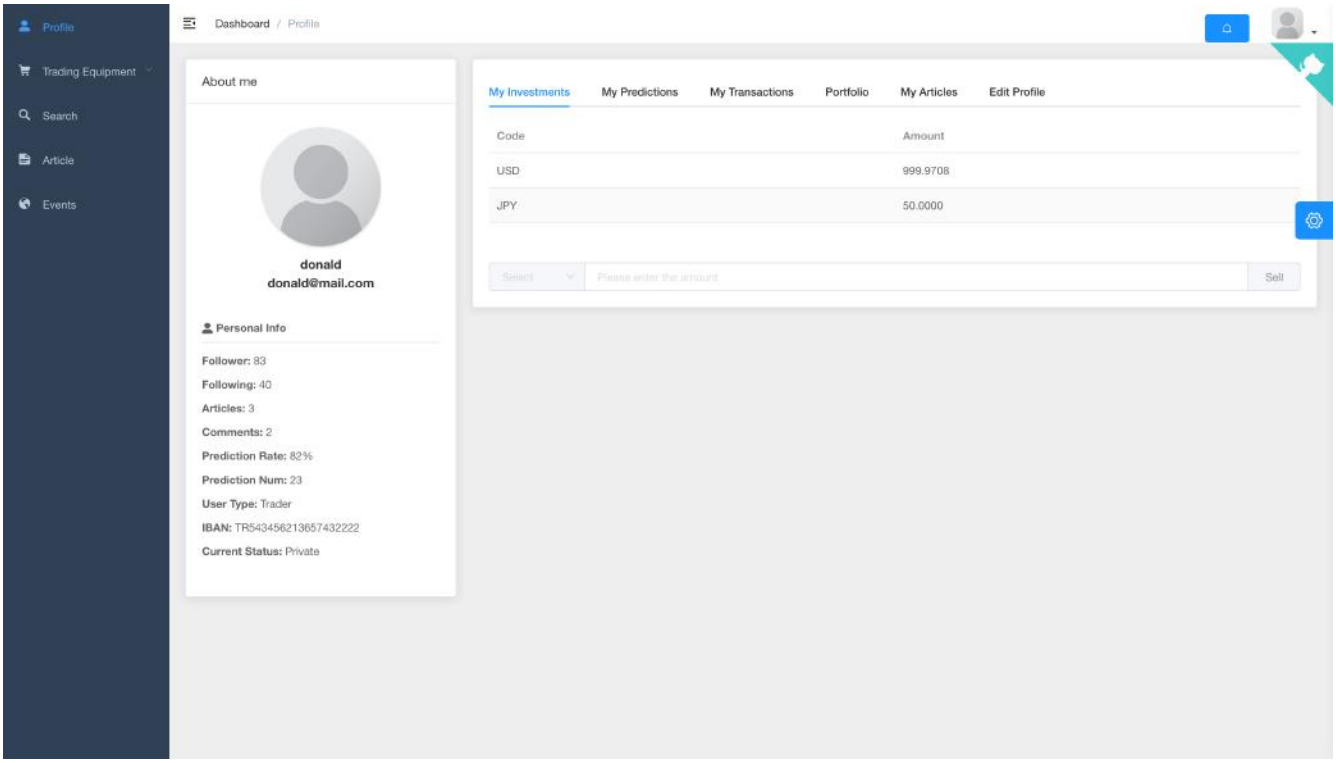
11.2.13 Notification

On the right top corner there is a notification box. If there is a new notification, red "new" label show up. When user clicks to the notification box, the system redirects him/her to the notification page. In this page all new notifications are listed. If user clicks to "read" button the related notification turns into "read" position and disappears from new notifications list.



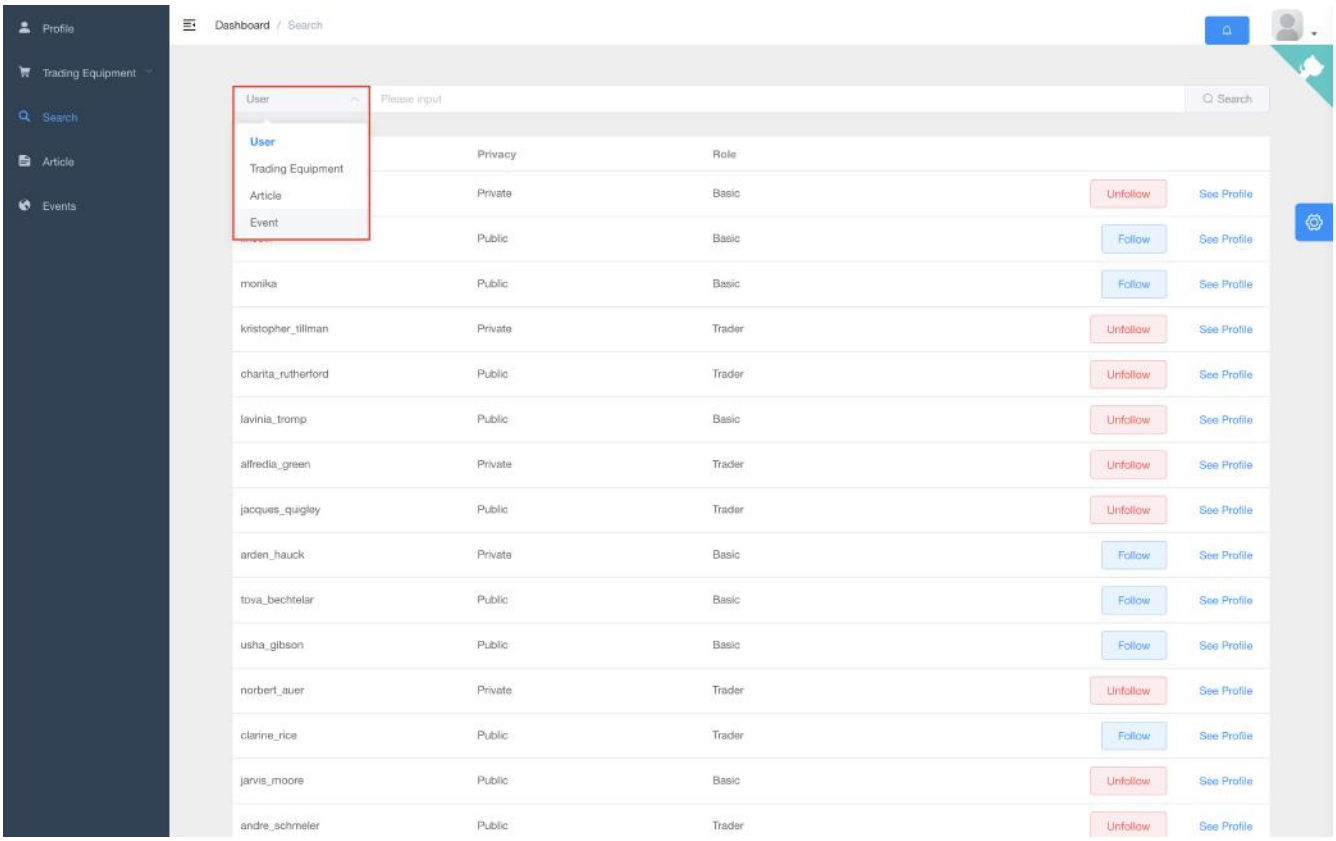
11.2.14 Profile

In the profile page a user can see all information related with himself/herself. On the left hand side, there exists a user card having the information like username, e-mail, prediction success rate, follower number, following number, etc. On the right hand side there is a pane with multiple tabs. These tabs are "my investments", "my predictions", "my transactions", "portfolio", "my articles" and "edit profile". In the "my investments" page a user can see his/her assets. In the "my predictions" page, a user can see his/her predictions and also can edit or delete the ones that are not evaluated yet. In the "my transactions" page a user can see all transaction history. In the "portfolio" a user can create/delete new portfolio. In the "edit profile" page, a user can edit his/her profile.



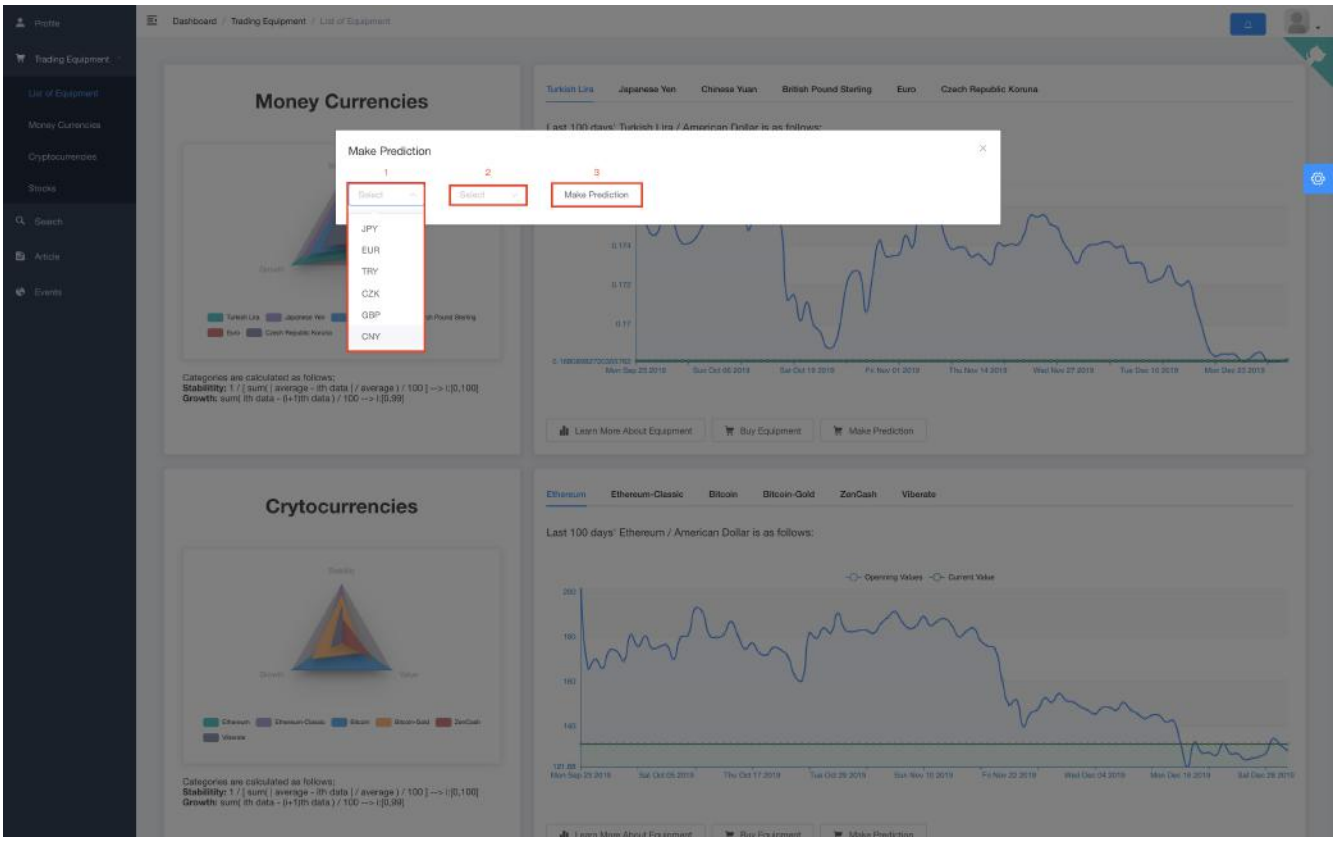
11.2.15 Search

On the left side of the page there is a search page. When the user clicks to this button, the system redirects him/her to the search page. In the search page there is a search bar and a drop down menu that shows the search criterias. These criterias are "User", "Article", "Trading Equipment" and "Event". According to the selected criteria, the system searches the written text in different data. Shown search results differ from criteria to criteria but all of the results are written into the tabular format and shown at the below of the search bar



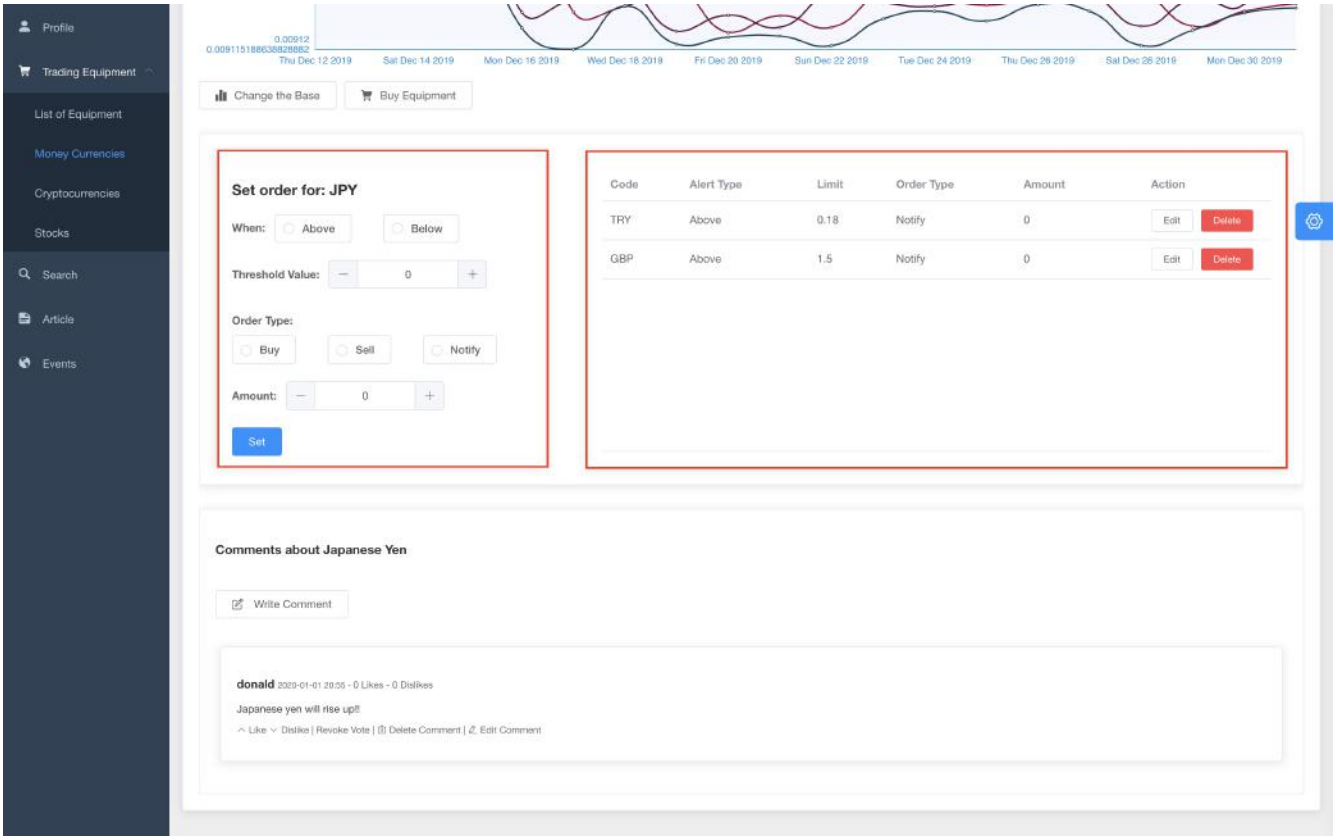
11.2.16 Prediction

In the list of equipment page, under the each graphic, there is a make prediction button that users can make prediction about the future of any trading equipment's value. When the button is pressed, a dialog as can be seen in the figure below, shows up. A trading equipment and the predicted behavior should be selected. Predictions are evaluated at the end of the day. Users can view their predictions from My Predictions tab in profile page. Users can edit their predictions from the same page, unless they have already been evaluated.



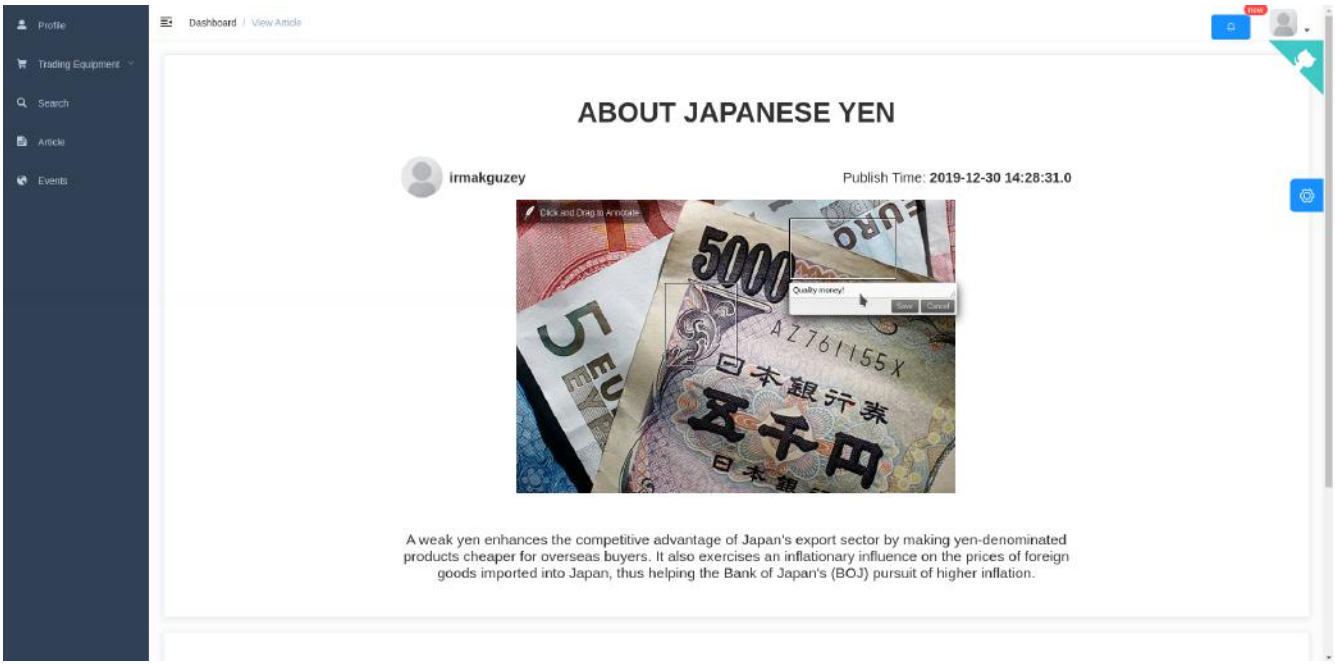
11.2.17 Alert/Order

In detailed trading equipment pages above the comment section, there is a part that users can set alerts/orders for specific trading. On the left, there is card for creating alerts/orders. On the right, the list of alerts/orders set by user are shown. Using buttons on the table, users can edit alerts/orders from the dialog opening when edit button is pressed, and/or delete them directly.

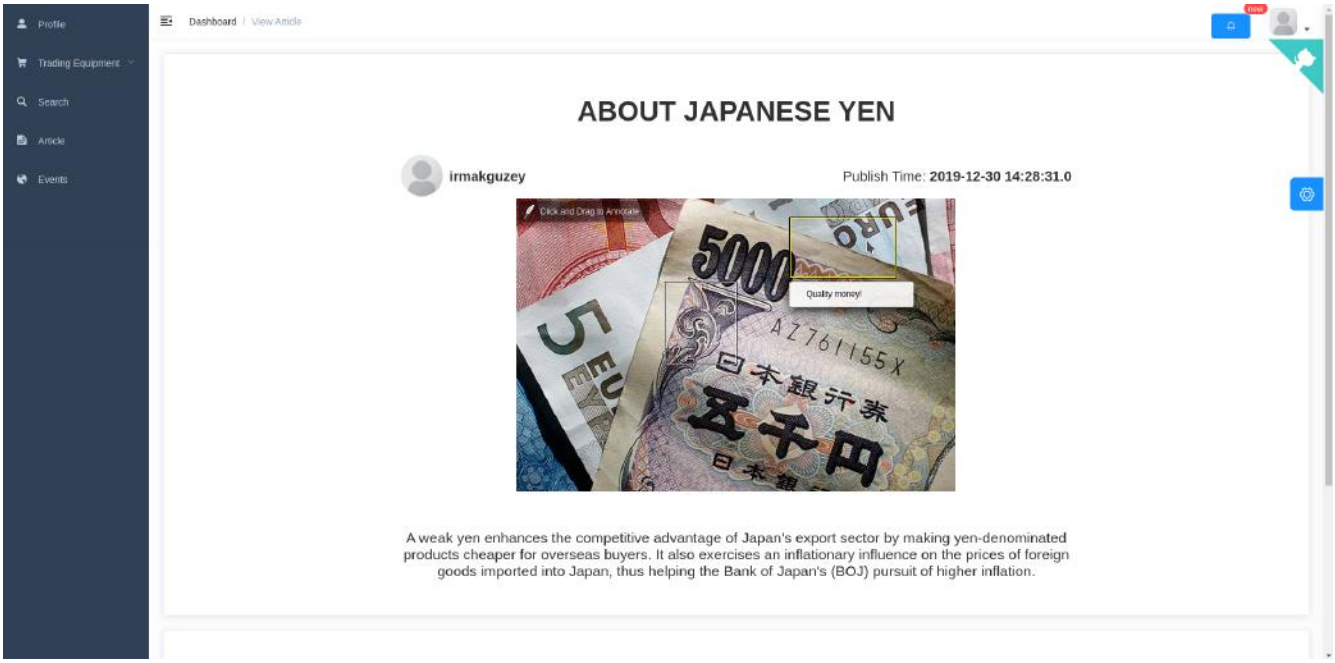


11.2.18 Image Annotation

Images in articles can be annotated by users. To annotate an image, one should simply start drawing a rectangle with mouse. After drawing a rectangle, an input field opens under the area drawn. Annotation text should be written inside that field and Save button should be pressed to save the annotation.



Saved annotations can be seen by hovering into the rectangle of annotation. Additionally, annotations can be edited by clicking the edit button. A user can edit other users' annotations but any modification made on a annotation that belongs to another user, is not applied and lost when the page is refreshed. On the other hand, modifications made by the owner of the annotation is applied and updated text is shown when the page is refreshed.



12 System Manual

12.1 Backend

The system is built on Spring Framework v1.5.6 and MySQL v8.0.13 is used for the database. DDL and DML operations are performed via Hibernate ORM and Java Persistence packages.

12.1.1 Running the application

- To restore the DB dump, make sure MySQL8 is installed on your computer and MySQL server is running.
- 'Maven 3.x' must be installed on your device and your 'Java' version must be 8. Make sure you have these requirements before the next step.
- Run the following with your DB username as parameter (find the files at https://github.com/bounswe/bounswe2019group6/tree/master/backend):
  $ sh restore.sh $username
- Enter password on propmt if you have one.
- Fill the required fields (passwords etc.) on TraderX/src/main/resources/application.yml first. In order to use the service running with full functionality, all fields must be filled with valid values.
- Run the following to start up the server: $ cd TraderX $ mvn spring-boot:run
- Once you see the below line at the end of logs, you are all set:
  INFO 1 — [main] cmpe451.group6.Group6BackendService: Started Group6BackendService in 29.651 seconds (JVM running for 30.688)

12.1.2 API Documentation

You can find the API documentation at https://api.traderx.company/swagger-ui.html. Annotations are included in the above link but to see its documentation on annotation server, visit https://annotator.traderx.company/swagger-ui.html.

You can find the details about backend system below. There exist three packages in the system:

12.1.3 Authentication

Contains all user registration requirements. Login, logout, password change, sign up, getting profile data, sending email to users, JWT token check operations are handled here. Token checks are performed via ServletFilter provided by JavaEE platform. A following scenario for signing up and logging in is below:

- **1) Sign up:** After required information is checked if it's valid, user is saved to the system and a verification mail is sent. If user is used Google sign up, then verification is ignored and counted as valid directly. Once user verifies the account via mail, it can log in to the system.
- **2) Log in:** If a user tries to login with correct username and password match, a JWT token is sent back to the user. From then on, the user can access private endpoints with that token. A user can have 10 tokens simultaneously. This prevents a user to spam our token system.
- **2) Log out:** The user's token will be invalidated.

12.1.4 Helpers

Frequently used and necessary utility methods are stored here.

12.1.5 Rest

All rest services other than user registry are stored in this package. Each service has its sub packages in a certain format:

- **Controller:** Contains endpoint controllers. All endpoints are defined here.
- **Model:** Data model of the system objects. javax.persistance utility is used to create database objects. Also, data transfer objects are also defined here.
- **Service:** Core of the service. All operations (verification of parameters, insertions, deletions, updates, etc.) are performed here.
- **Repository:** The connection of the system with database. All queries are located here as interface methods using the JpaRepository.

Services defined in the system:

- **Alert** Creates alerts and performs alert evaluations when an equipment is updated. The evaluation is done asynchronously.
- **Annotation** Annotation on image as a text, as an image; Annotation on text as a text, as an image features are handled by this service, on its own. Whereas the annotation server is isolated from the main server and runs on a separate, different server, as a unique application; also has its own database. The service is a separate end to end service in a sense.
- **Article** Create/Delete/Edit/Show/Get articles services implemented and handled here. The visibility of articles is set according to users' preferences.
- **Asset** Asset can be defined as the currencies, equipment etc. that users have. All assets and its corresponding amounts are stored and handled here.
- **Aws** Image upload system to Amazon s3 server is handled here. In order to handle it amazonaws services api is used.
- **Comment** Comments for equipment and articles are handled here. Also this service enables users to like or dislike comments.
- **Equipment** All trading equipments are initialized and updated here. The equipmet values are updated hourly and their historical values are updated daily. On application startup, if an equipment does not exist in DB then it's initialized once with the scheduled tasks. The reason for scheduling here is due to restrictions of third party service.
- **Event** Events are saved and served here. They are updated daily at 8 A.M.
- **Follow** The system allows user to follow each other. Depending on the privateness of the profile (public/private) a user can directly follow a user/ send a follow request and also can accept/reject a follow request that are sent from other users. All details are handled here.
- **Investment** Investment is simply can be thought as depositing and withdrawing money from the system. Then, this money can be used to make transactions. Also, in this system users are able to see their profits, all investments etc.
- **Notification** Notifications are created here but calls to create them are made from other services (Follow and Equipment).
- **Portfolio** A portfolio is grouping of financial assets such as currencies, assets, cryptocurrencies, commoditites etc. With respect to project requirements, our service let a user group these assets in a portfolio. A user can easily track items in specified portfolio, where he/she can access all the information about all items in the portfolio. All details of the service are handled here.
- **Predict** Predictions take place here. Their evaluation mechanism exists here and called from EquipmentService when a value is updated for an equipment.

- **Search** Search system completely takes place here. Whenever a user search for something in system, this service is called. It helps to get results of searched keyword according to similarity.
- **Transaction** The core part of the TraderX, transactions, is handled here. This service helps users to buy/sell equipment and stores each users' transaction history.

13 Design Documents

13.1 Mockups

13.1.1 Mockup 1

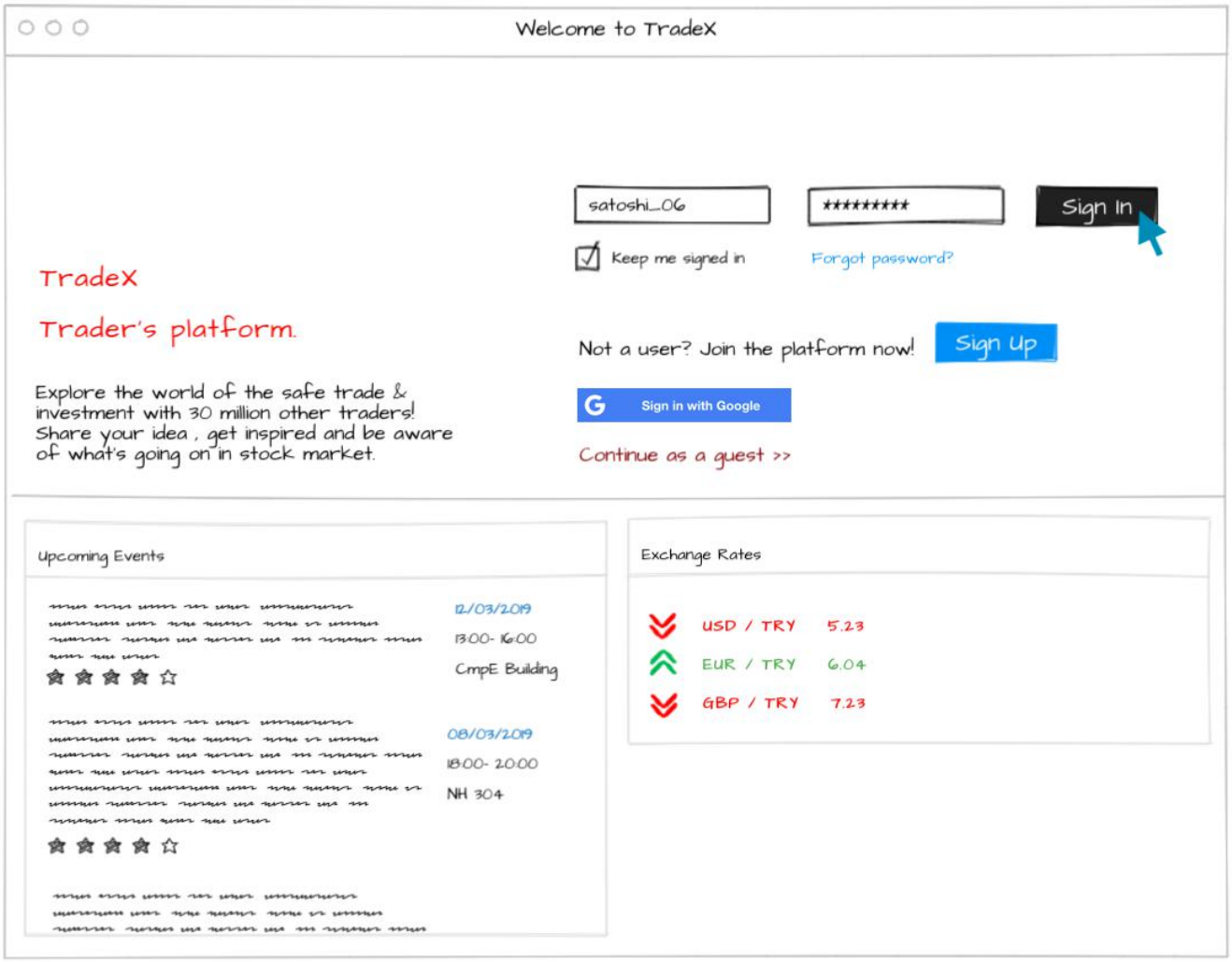


Figure 1: Already signed in user logins the system.

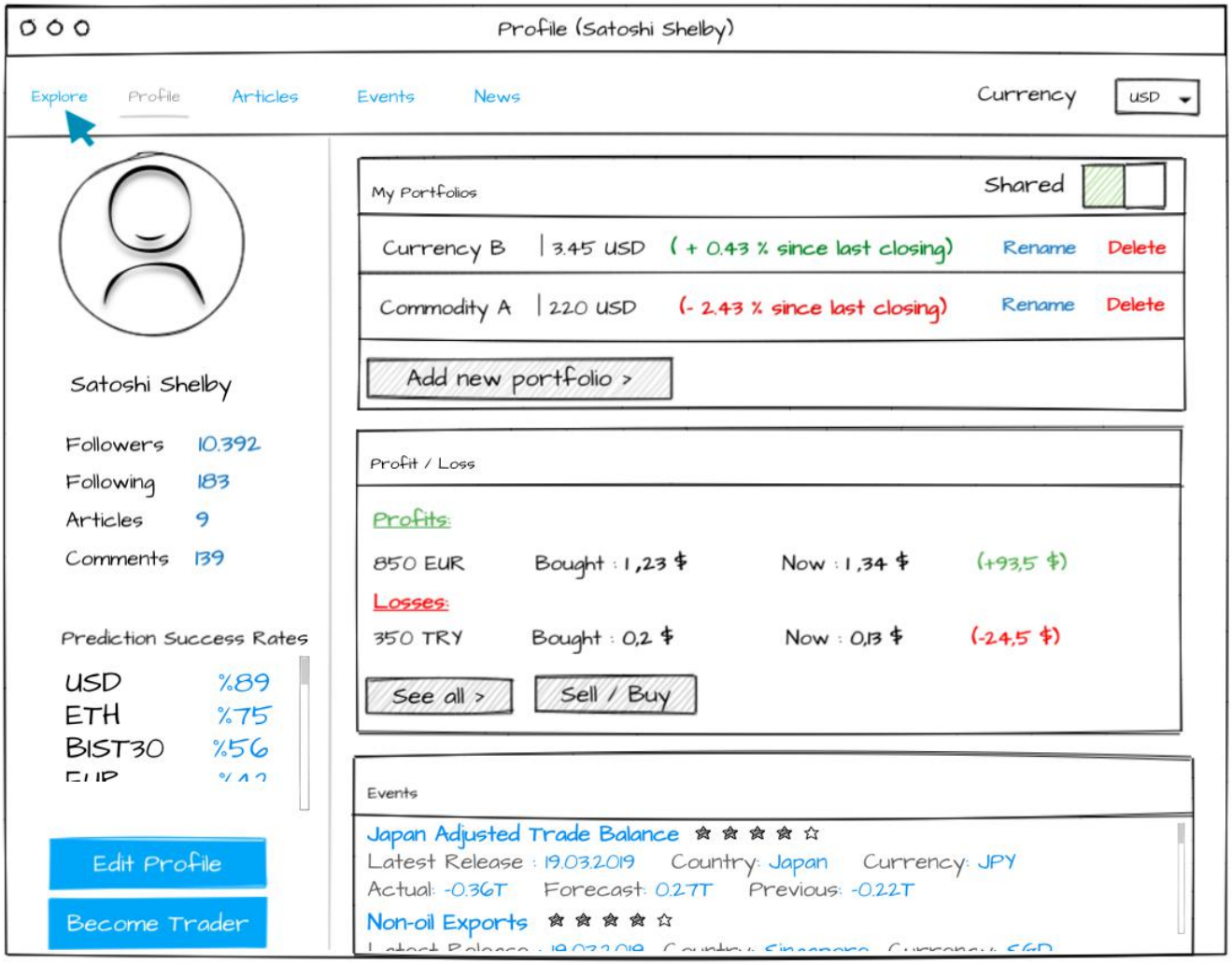


Figure 2: After he logs in, the system directs him to his profile page and he goes crazy about 10K+ followers.

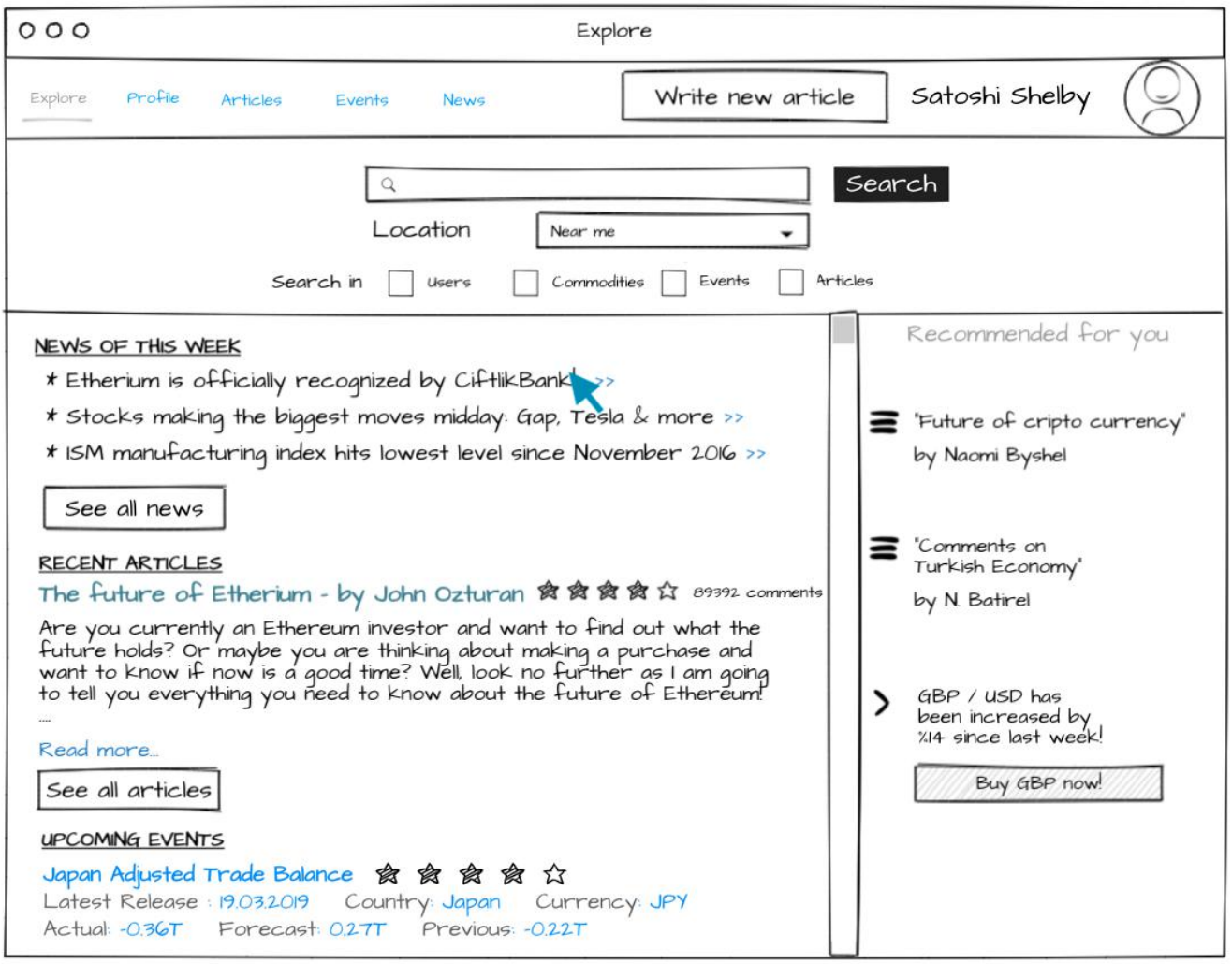


Figure 3: He navigates to Explore page to see what happens in stock market.

Figure 4: The news about Etherium catches his fancy and he starts reading more about that.

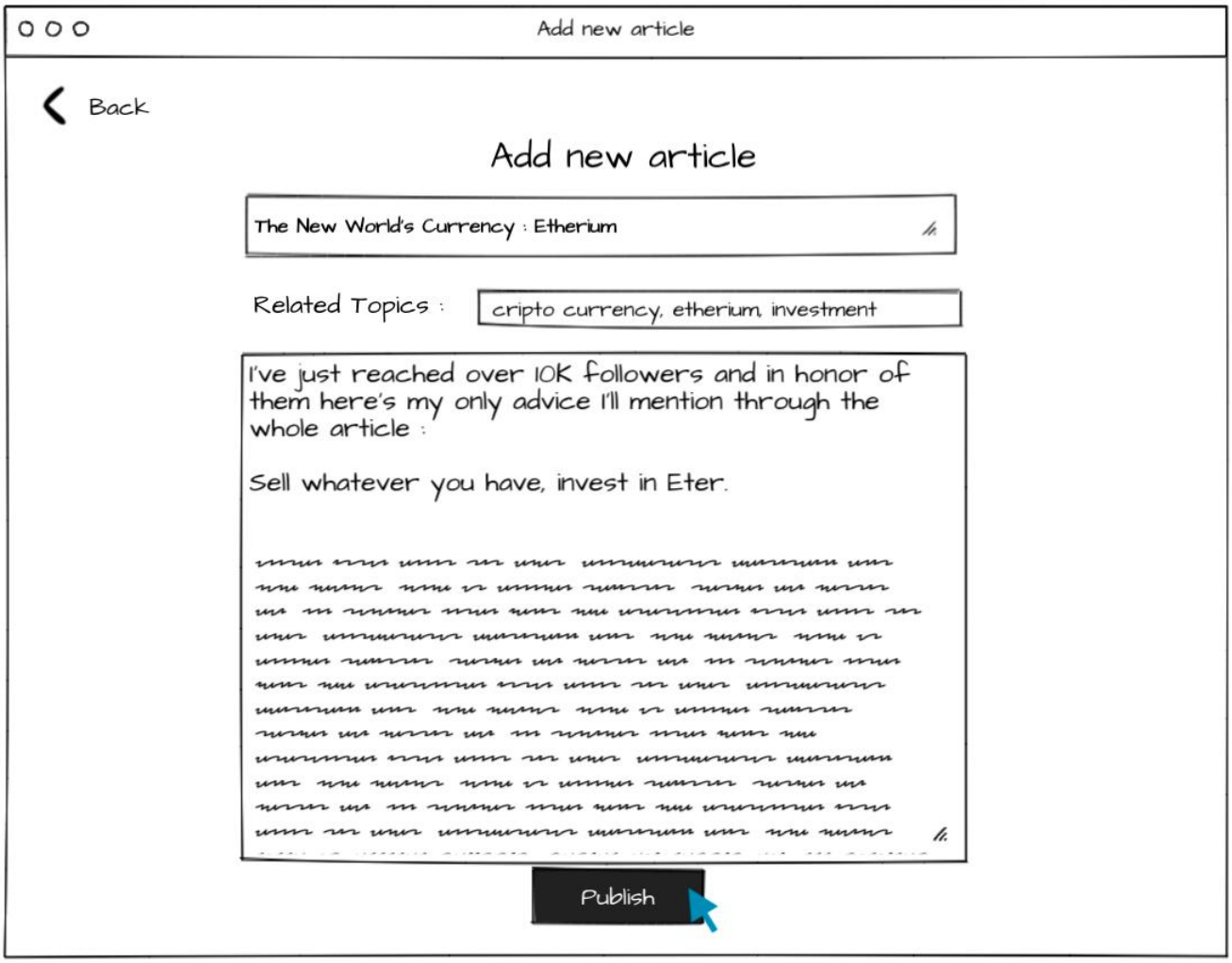


Figure 5: Then he decides to write an article about investing in Etherium as a gift to his 10K+ followers.

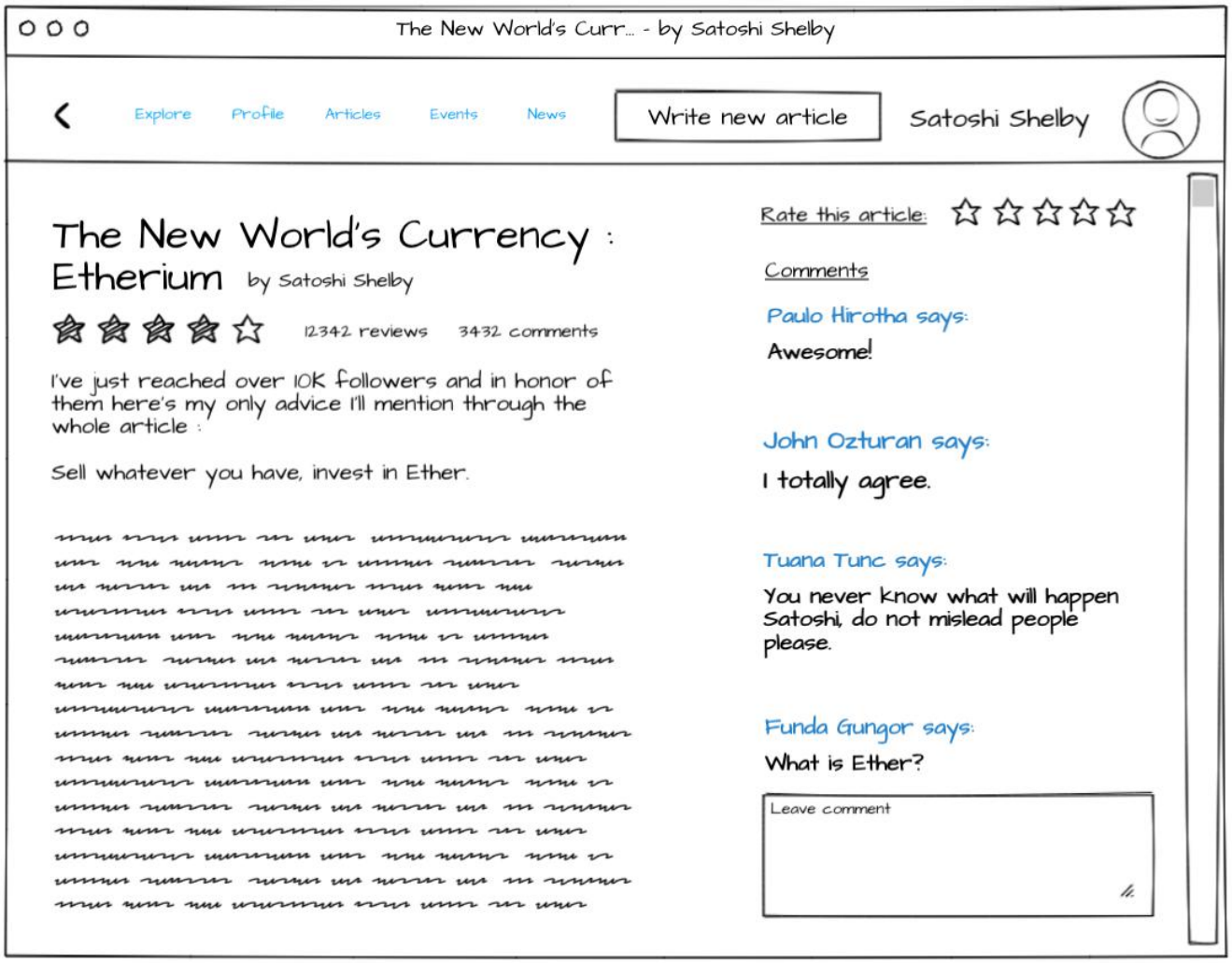


Figure 6: After a short time he publishes his article, thousands of feedbacks are given.

13.1.2 Mockup 2

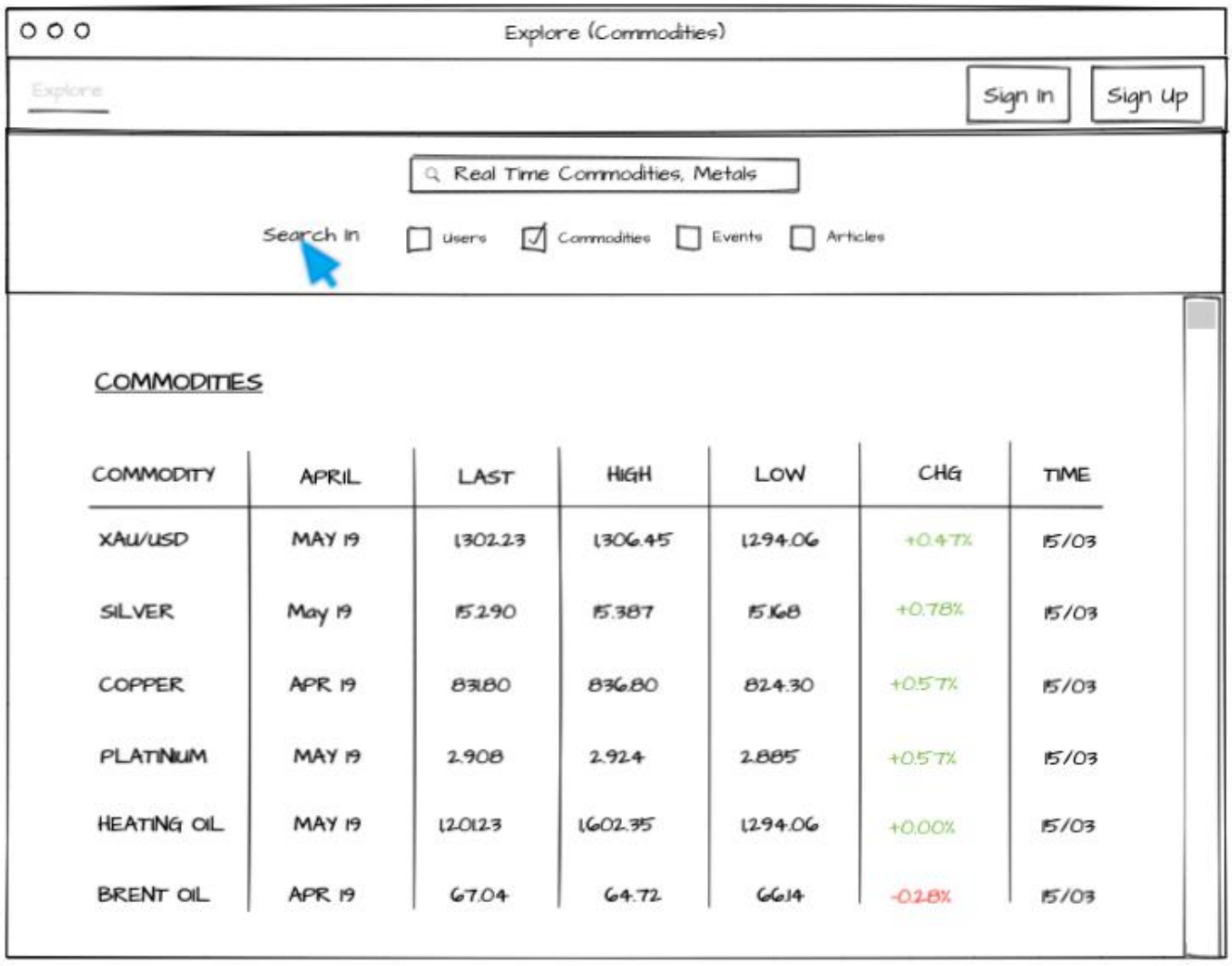


Figure 7: Guest enters for the first time to the system. Then he searches for the currency and views the price of them.

Figure 8: Guest also browses some articles and reads the comment of those to get an idea about the things that he can invest

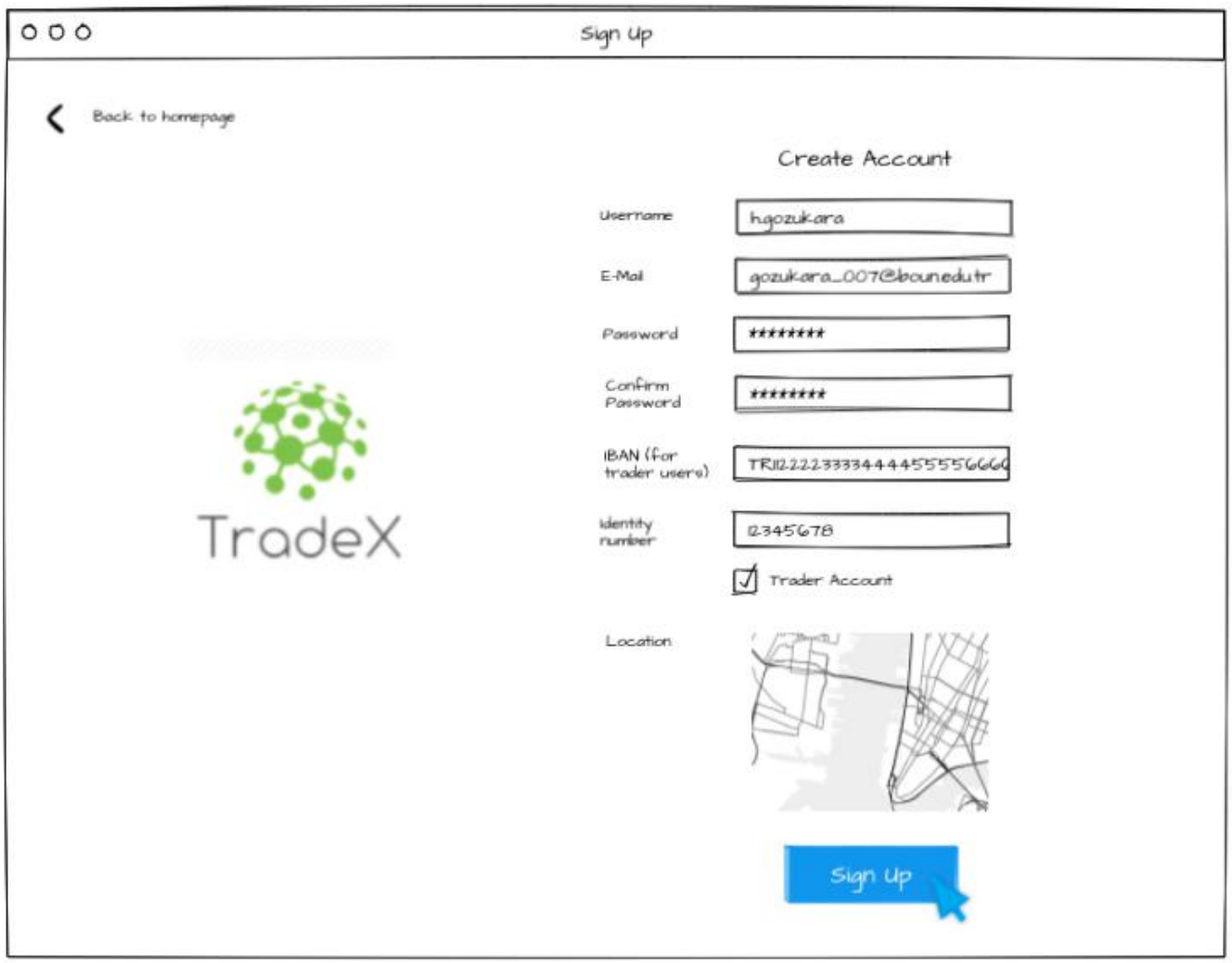


Figure 9: Guest decides to sign up and enters his personal information in order to utilize his money and make a profit

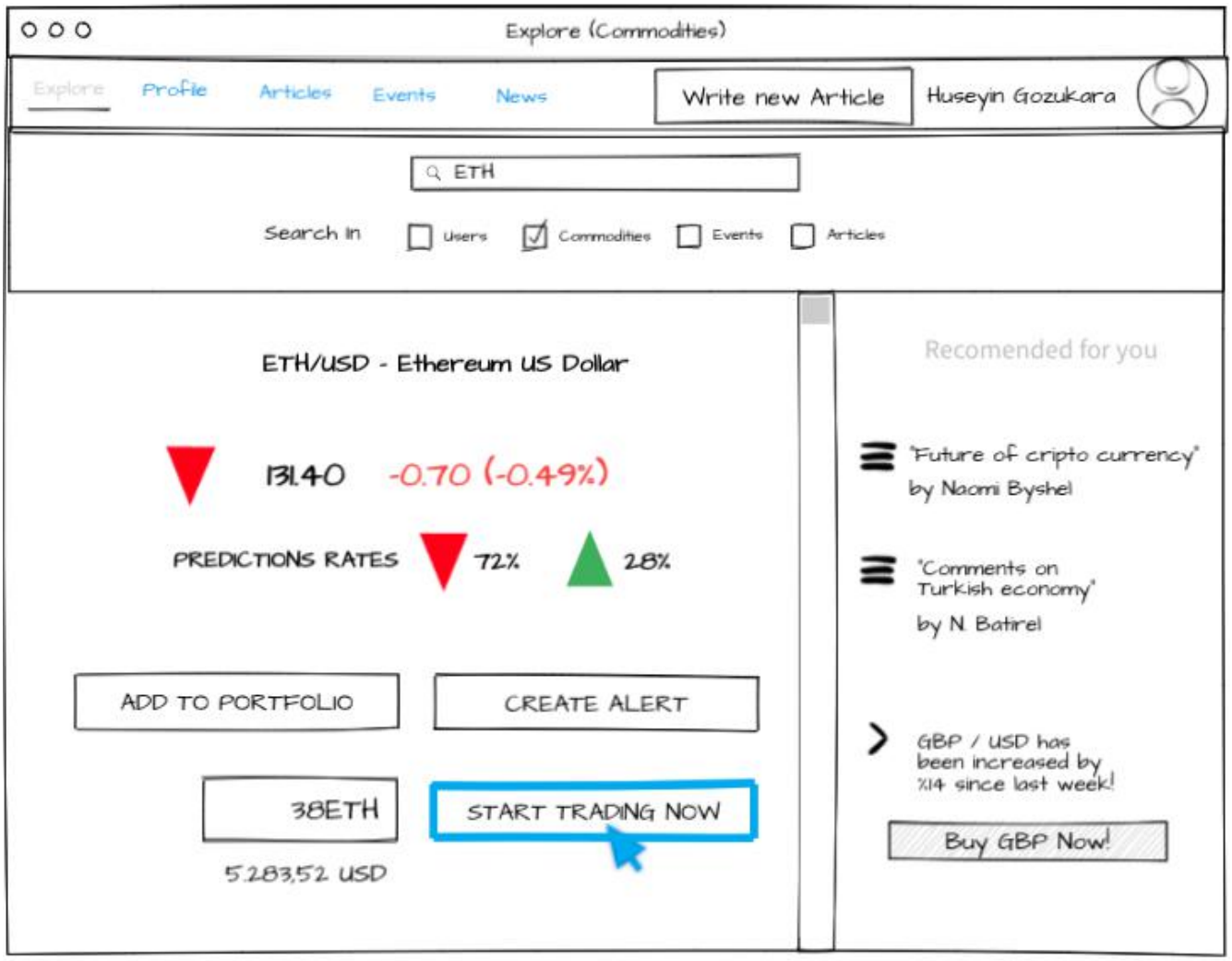


Figure 10: The user sees that %72 of the predictions about Ethereum's daily price are downward. Then creates a 38ETH buy order at rate 131 ETH/USD

13.1.3 Mockup 3

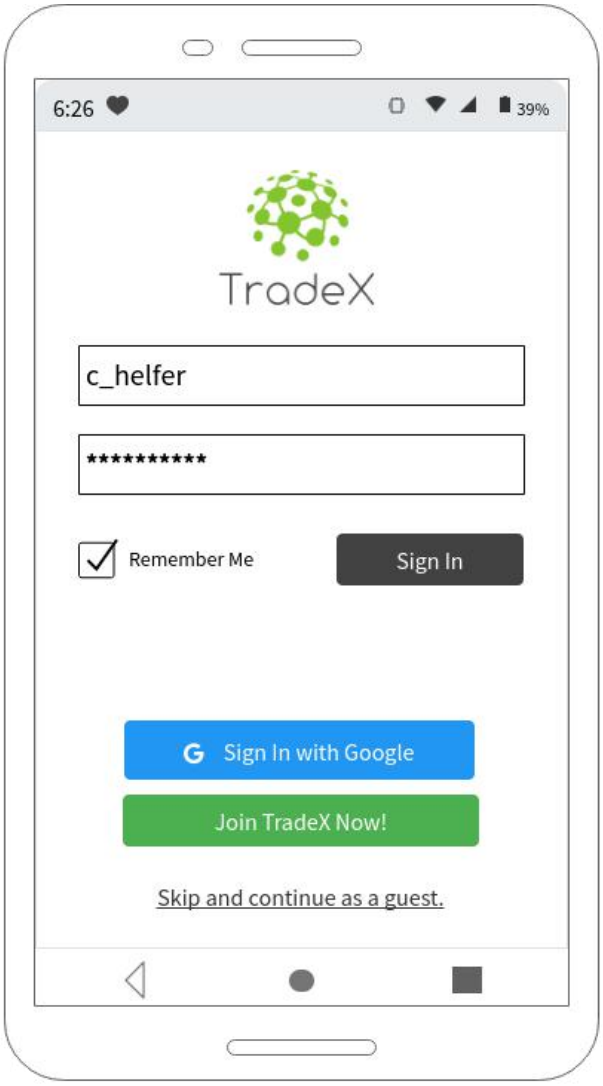


Figure 11: She runs the app logs in entering her username and password.

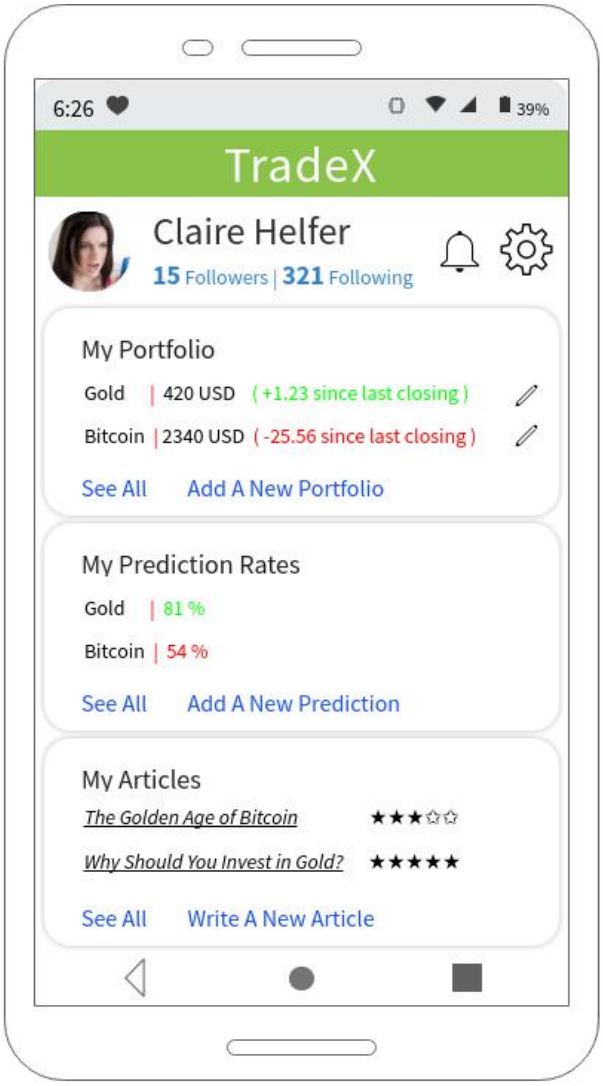


Figure 12: She opens her profile to review her portfolio and profits/losses from the last investment she made; buying American Dollars and Bitcoin.

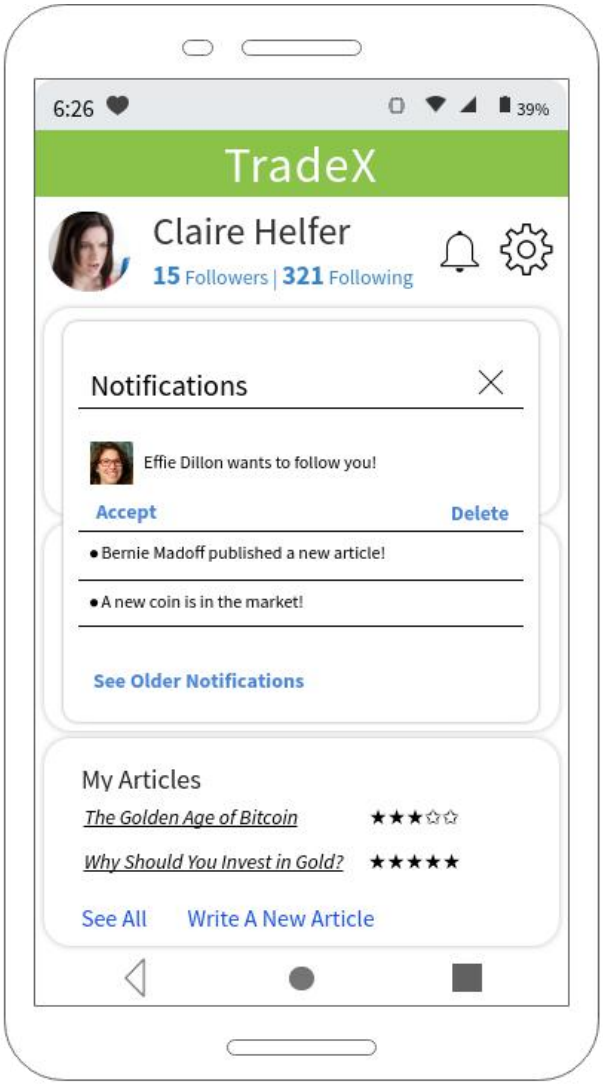


Figure 13: She sees a new follow request from Effie Dillon, someone she doesn't know. And she declines the request.

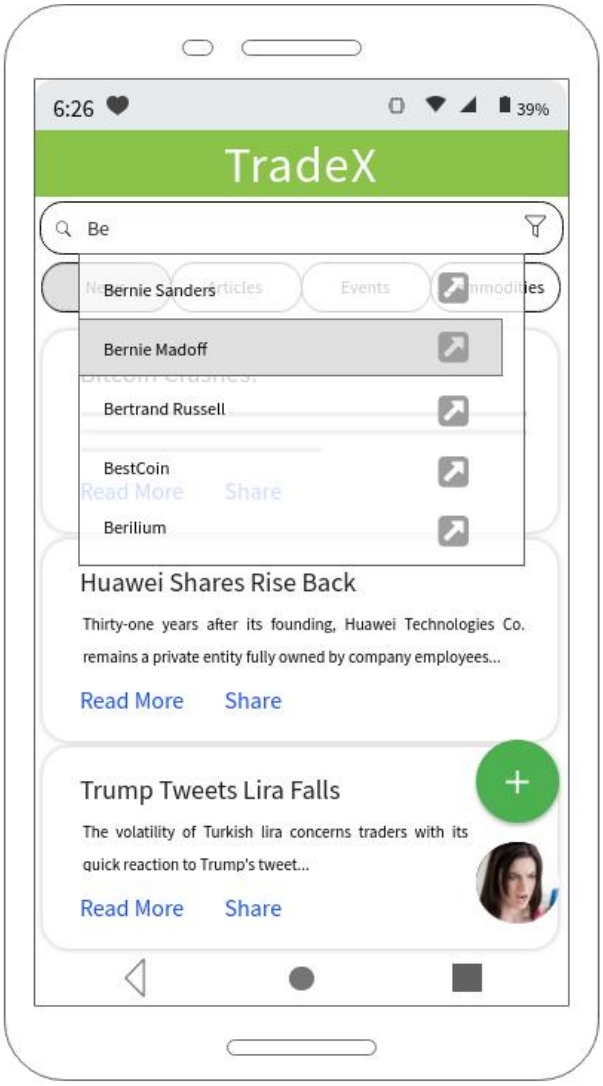


Figure 14: After logging in she sees the explore page where she can make a search. She wants to search for her neighbor Bernie Madoff. As she types "be" she receives several suggestions including her neighbor.

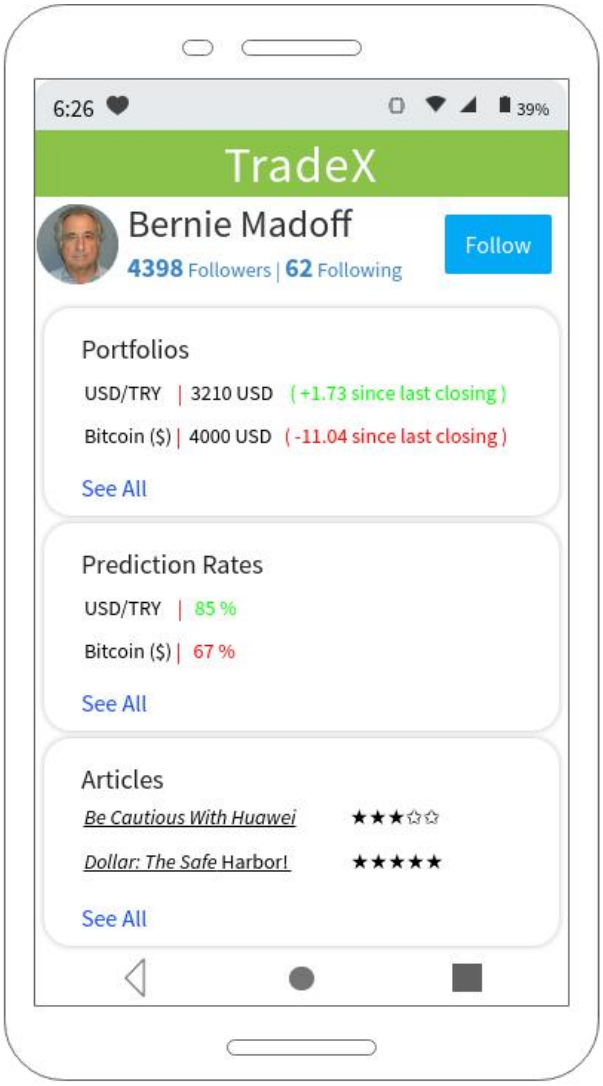


Figure 15: She taps on his name and goes to his profile which is public. She sees that he has a success rate of %85 for American Dollar in his Profit/Loss page.

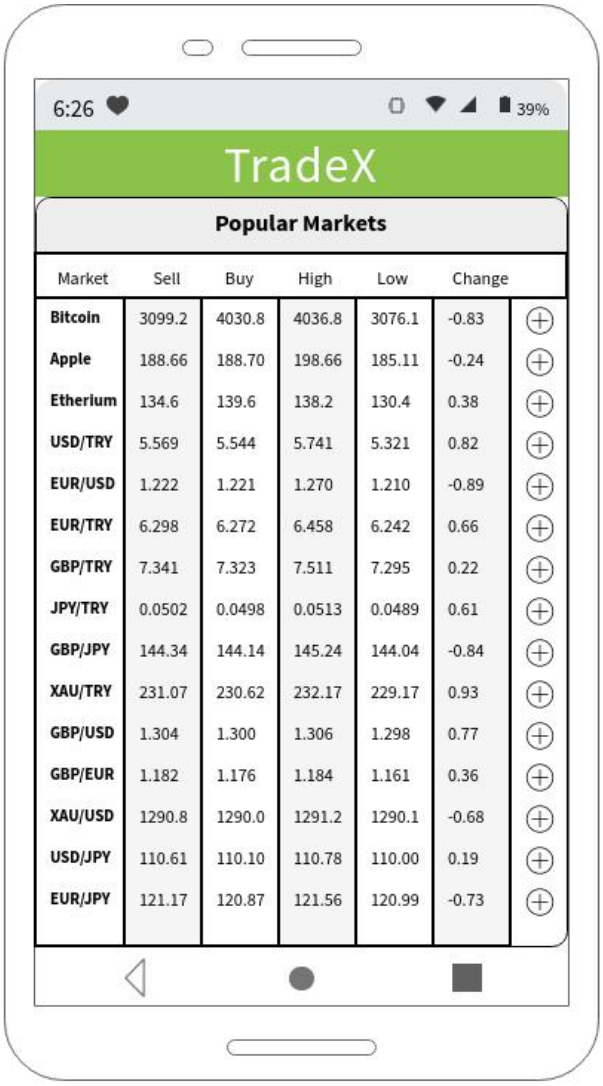


Figure 16: Then she goes to the Investments page. She intends to make a new buy order.

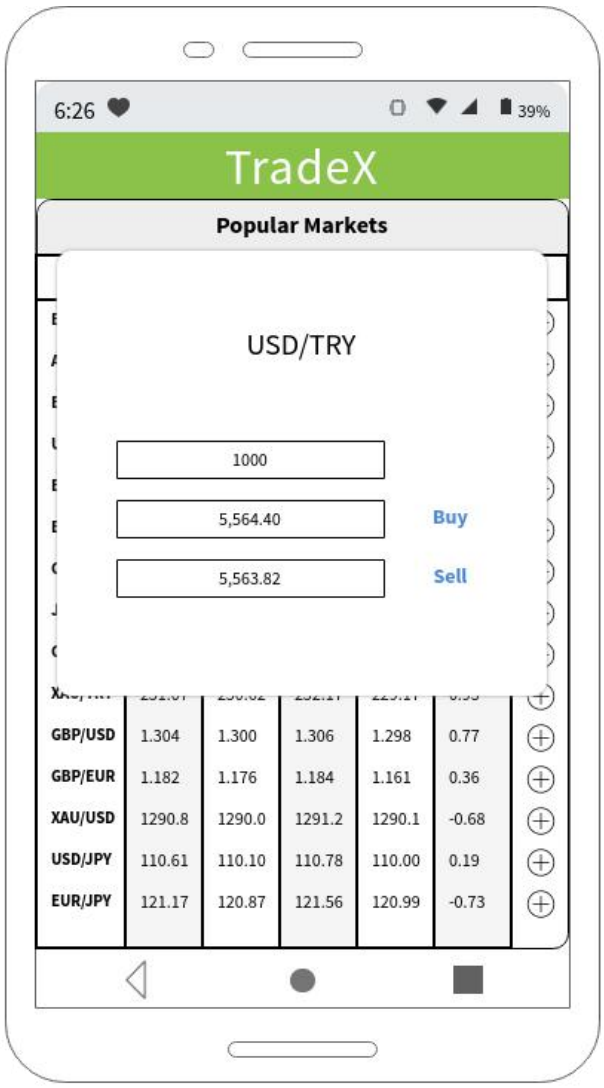
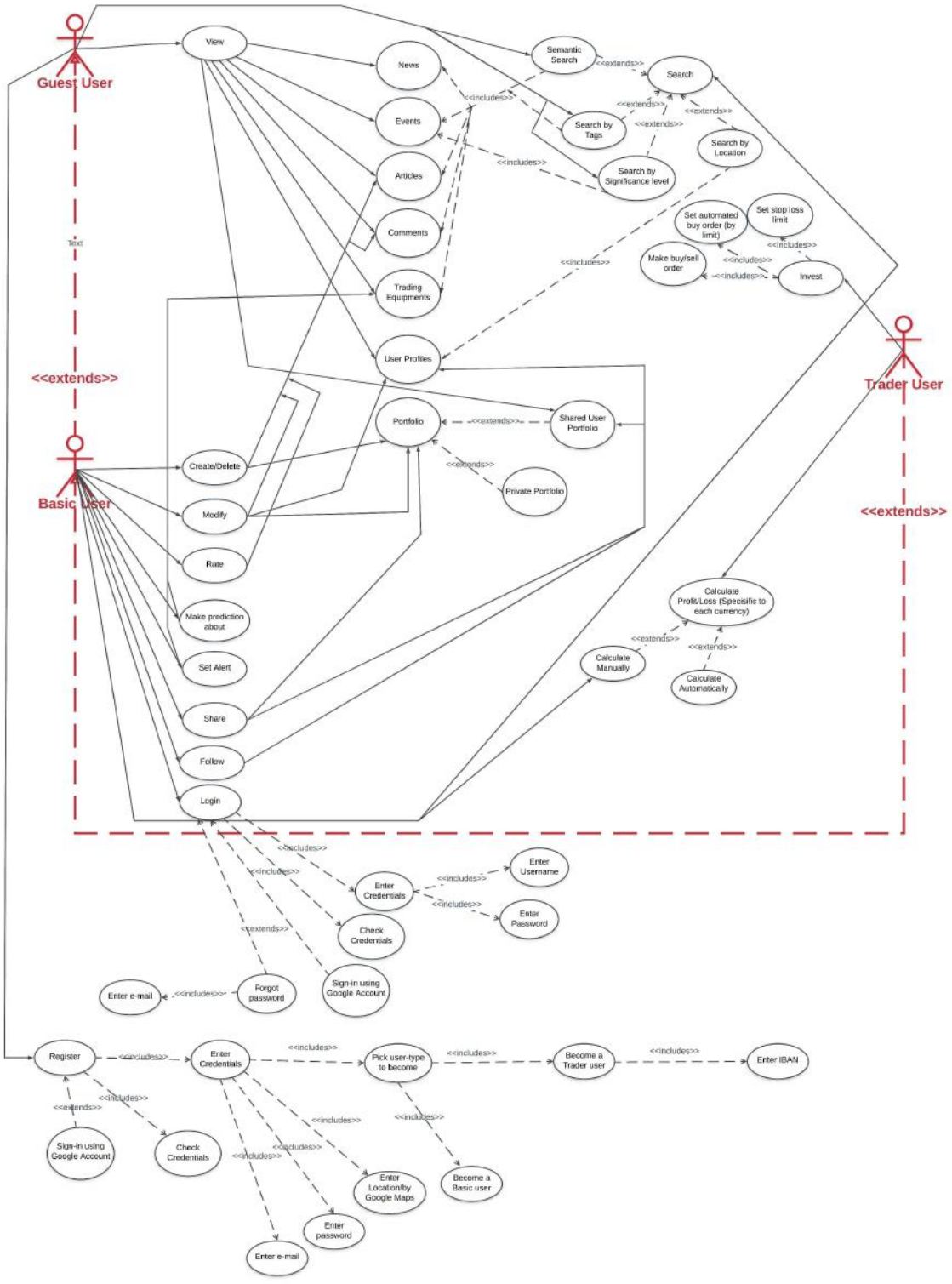


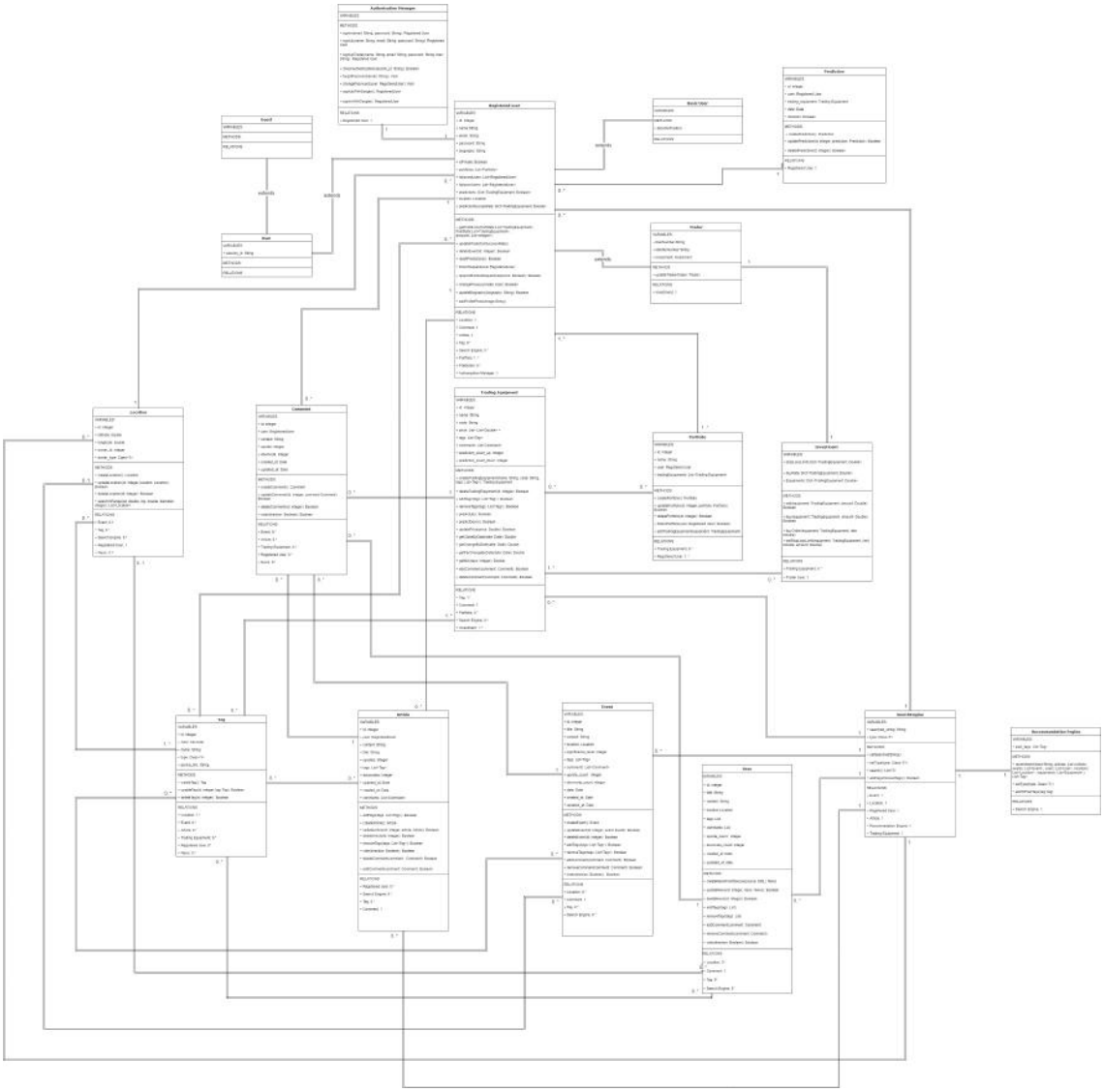
Figure 17: And she makes a buy order for a 1000 dollars.

13.2 Diagrams

13.2.1 Use Case Diagram



13.2.2 Class Diagram



13.2.3 Sequence Diagrams

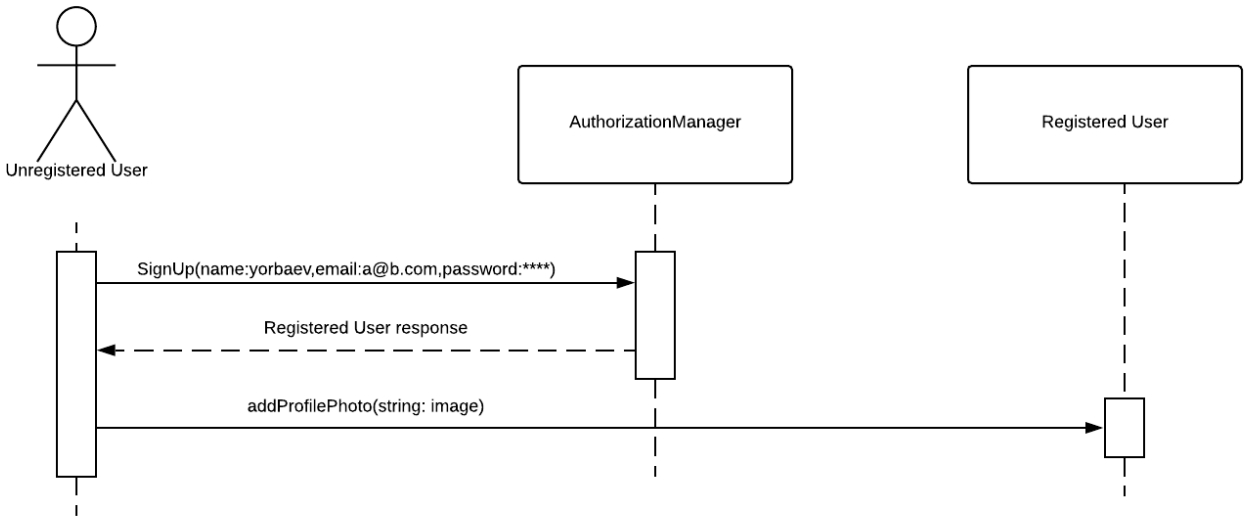


Figure 18: Sign Up / Start Customizing Profile

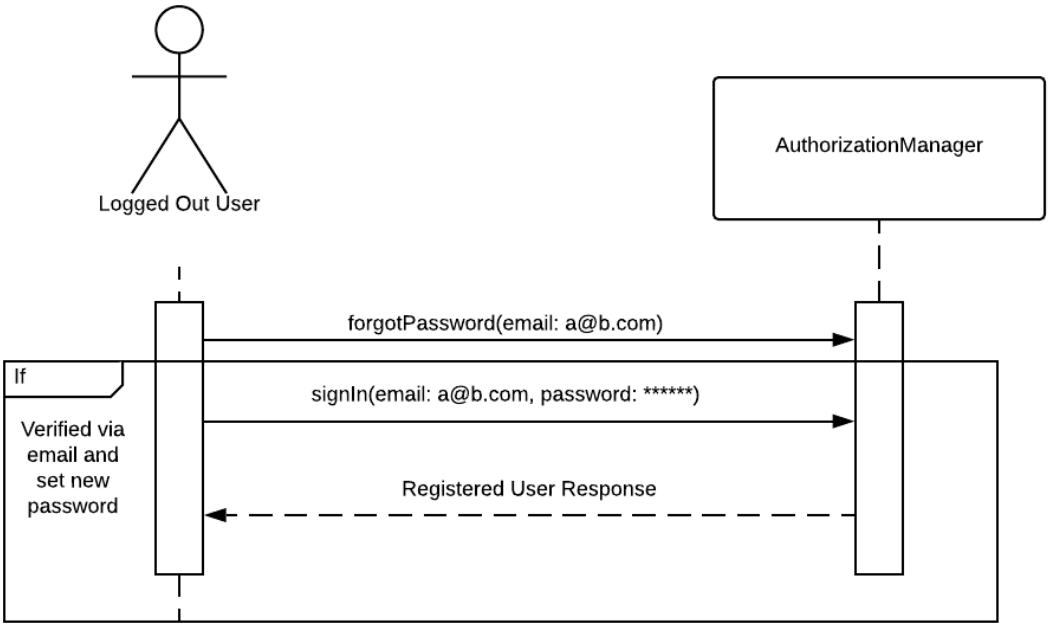


Figure 19: Forgot / Reset Password

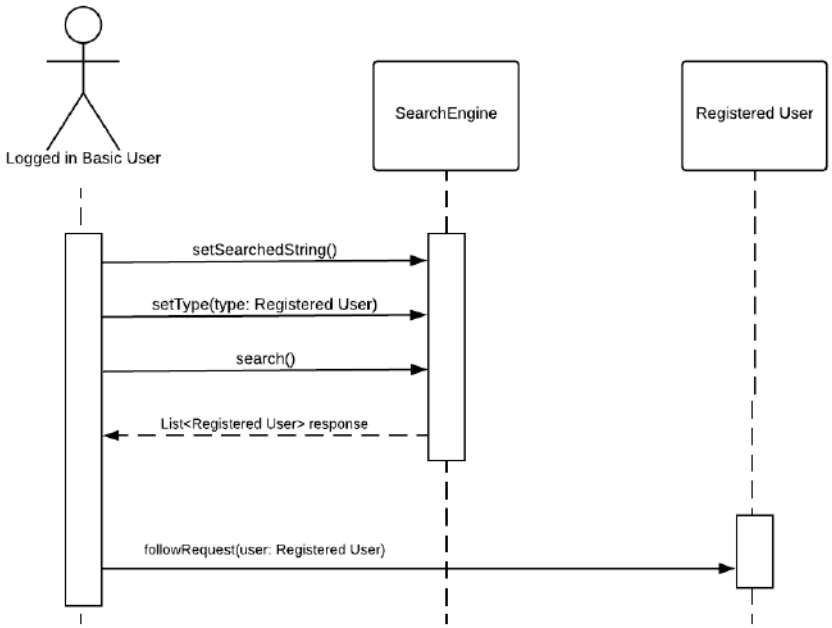


Figure 20: Follow User

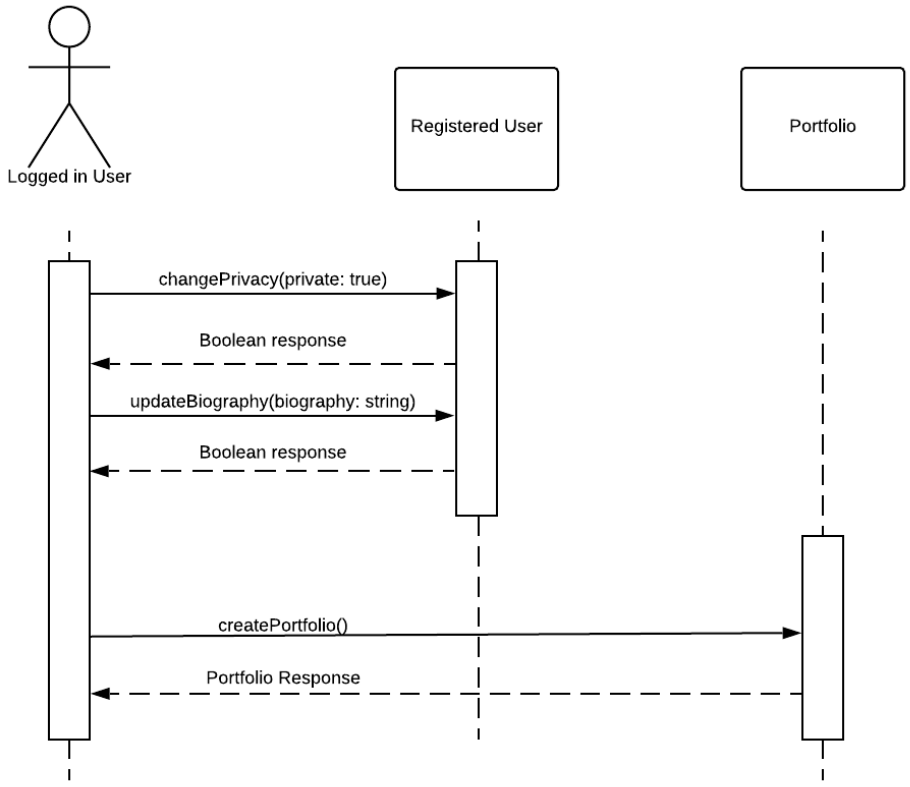


Figure 21: Edit Profile / Create Portfolio

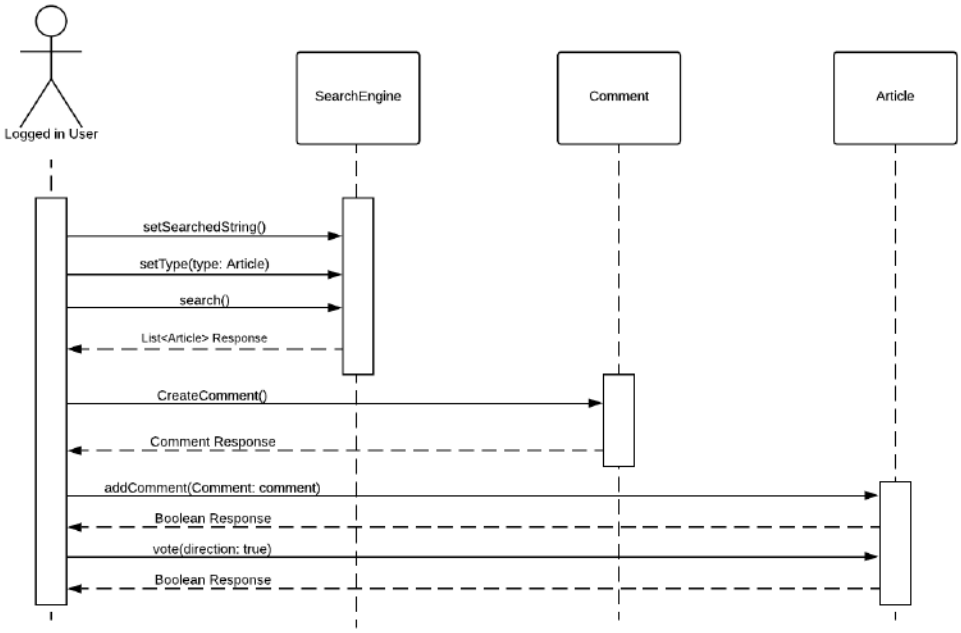


Figure 22: Comment on Article

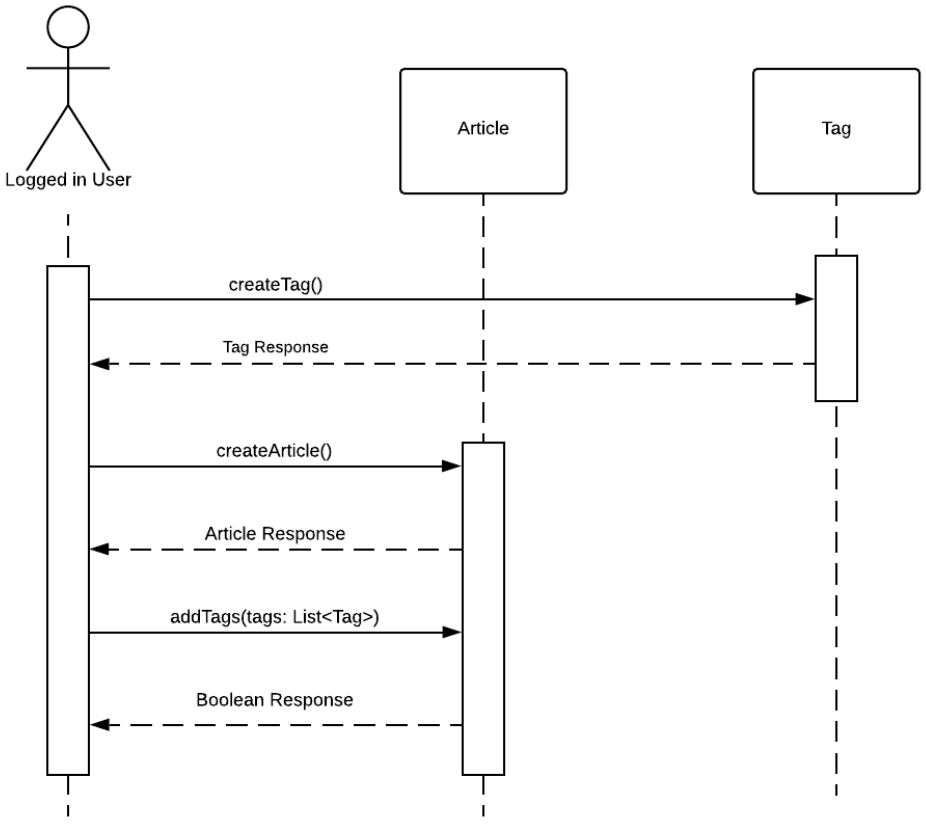


Figure 23: Create New Article

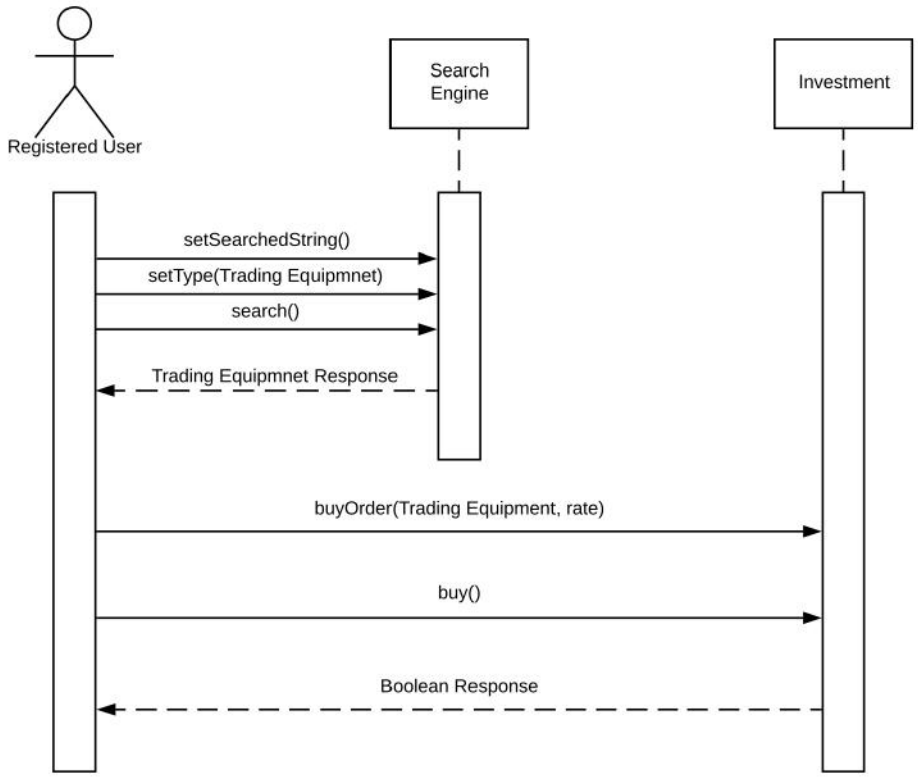


Figure 24: Make investment

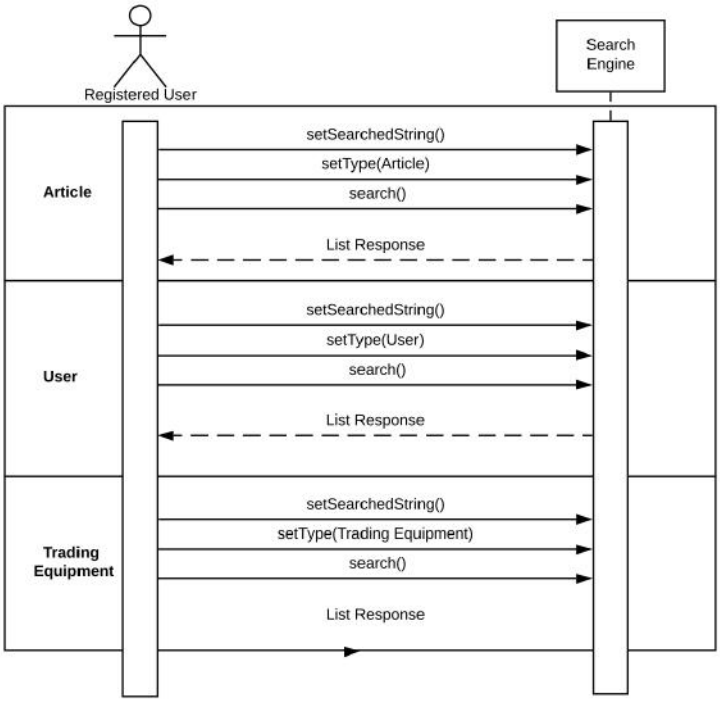


Figure 25: Search with filter

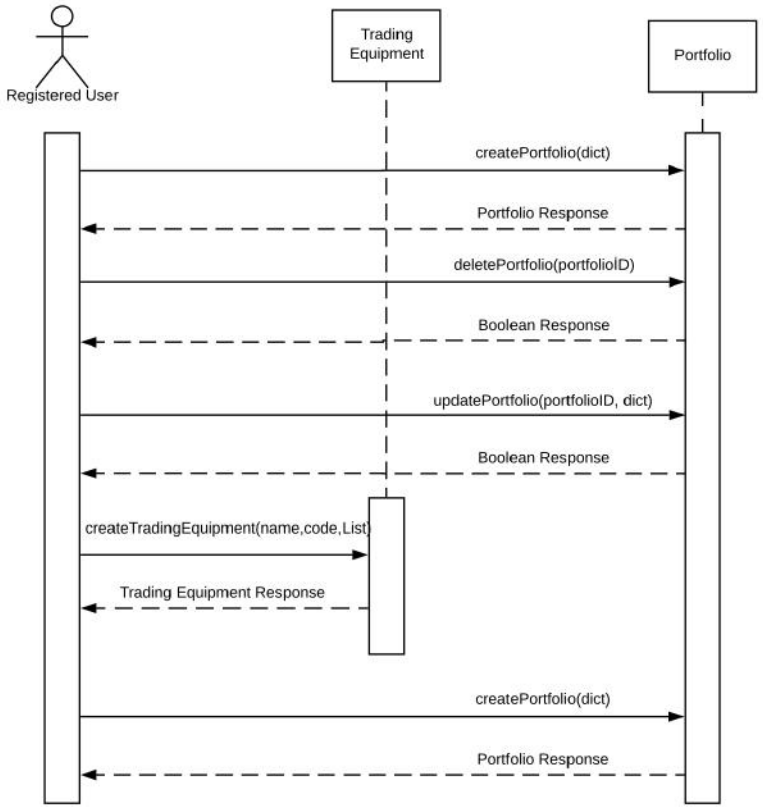


Figure 26: Portfolio creation & editing