TRADICTION

CSC648 SOFTWARE ENGINEERING

SPRING 2020

TEAM 01

Milestone	Date
M2 Version V1	03/26/2020

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Data Definitions V2:

- **New User:** Users visiting the site for the very first time. They can create an account, view stock lists, know details of a particular stock, but cannot buy/sell stocks or chat with an expert.

- **Traders:** Registered Users with an account, who can view stocks, buy/sell stocks, update personal details, view transaction history, update portfolio, chat with an expert.

- **Experts:** Registered Stock experts. Can view, analyze and chat with users to provide them best advice and guidance for buying/selling stock.

- **Admin:** A registered person having full access to the site. Also, the one reviewing and approving accounts of the traders and experts.

- **Customer Support:** Dedicated 24/7 service available for the customers to answer and resolve their queries.

- **Prediction Tab:** A dedicated tab for accurate prediction of prices of a stock just by entering a stock symbol.

- **Newsfeeds:** Displaying top news related to the stock market.

- **Chat-Bot:** Traders communicate with stock experts through a chat-bot.

- **Sentiment-Analysis:** This is the part which analyzes the tweets of stock companies on twitter and returns the answer whether people are interested in companies or not.

Functional Requirements V2:

Priority 1:

UNREGISTERED USERS: -

1. Shall be able to create a new account as a trader.

    1.1. Shall be able to enter an email address of choice during registration.

    1.2. Shall be able to enter a password during registration.

    1.3. Shall have minimum password requirement of letters, numbers and special characters.

    1.4. Shall be able to enter the address during registration.

    1.5. Shall be able to enter contact number during registration.

    1.6. Shall be able to enter Social Security Number during registration.

    1.7. Shall be able to link a bank account during registration.

    1.8. Shall be able to upload bank statements during registration.

    1.9. Shall receive an Email verification upon registration.

2. Shall be able to create a new account as an expert.

    2.1. Shall be able to enter an email address of choice during registration.

    2.2. Shall be able to enter a password during registration.

    2.3. Shall have minimum password requirement of letters, numbers and special characters

    2.4. Shall be able to enter the address during registration.

    2.5. Shall be able to enter contact number during registration.

    2.6. Shall be able to enter Social Security Number during registration.

    2.7. Shall receive an Email verification upon registration.

    2.8. Shall be required to upload an expert certificate.

3. Shall be able to view news feeds.

    3.1. Shall be able to click on news articles.

    3.2. Shall be redirected to another site in a popup window.

3.3.　Shall be able to exit out of the popup window.

4.　Shall be able to view Stock lists.

4.1.　Shall be able to sort the list alphabetically.

4.2.　Shall be able to search for a list of particular stocks.

4.2.1.　Shall be able to enter text into a search field

4.2.2.　Shall be able to modify text in a search field.

4.2.3.　Shall be able to click on the search button to view results.

5.　Accounts shall be put on hold for verification from admin.

REGISTERED TRADERS: -

1.　Shall be able to login.

1.1.　Shall be able to enter an email address.

1.2.　Shall be able to enter a password.

1.3.　Shall have minimum password requirement of letters, numbers and special characters.

1.4.　Shall be able to save credentials by clicking "Remember me" checkbox.

1.5.　Shall be authenticated during login.

1.6.　Shall have the account blocked for a few hours, incase of multiple incorrect login attempts.

1.7.　Shall be prompted with a message if credentials are incorrect.

1.8.　Shall be able to recover password through mail by clicking on "Forgot Password".

2.　Shall be able to edit personal information.

2.1.　Shall be able to change their password.

2.2.　Shall be able to update their phone number.

2.3.　Shall be able to update their address.

3.　Shall be able to logout.

4.　Shall be able to view news feeds.

4.1.　Shall be able to click on news articles.

4.2.   Shall be redirected to another site in a popup window.

4.3.   Shall be able to exit out of the popup window.

5.   Shall be able to view the Stock list.

5.1.   Shall be able to sort the list alphabetically.

5.2.   Shall be able to search for a list of particular stocks.

5.2.1.   Shall be able to enter text into a search field

5.2.2.   Shall be able to modify text in a search field.

5.2.3.   Shall be able to click on the search button to view results.

REGISTERED EXPERTS: -

1.   Shall be able to login.

1.1.   Shall be able to enter an email address.

1.2.   Shall be able to enter a password.

1.3.   Shall be able to save credentials by clicking "Remember me" checkbox.

1.4.   Shall be authenticated during login.

1.5.   Shall be prompted with a message if credentials are incorrect.

1.6.   Shall be able to recover password through mail by clicking on "Forgot Password".

2.   Shall be able to edit personal information.

2.1.   Shall be able to change their password.

2.2.   Shall be able to update their phone number.

2.3.   Shall be able to update their address.

3.   Shall be able to logout.

4.   Shall be able to view news feeds.

4.1.   Shall be able to click on news articles.

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5.   Shall be able to view the Stock list.

5.1.   Shall be able to sort the list alphabetically.

5.2.   Shall be able to search for a list of particular stocks.

5.2.1. Shall be able to enter text into a search field

5.2.2. Shall be able to modify text in a search field.

5.2.3. Shall be able to click on the search button to view results.

ADMIN: -

1. Shall be able to login.

    1.1. Shall be able to enter an email address.

    1.2. Shall be able to enter a password.

    1.3. Shall be authenticated during login.

Priority 2:

UNREGISTERED USERS: -

1. Shall be able to view a particular stock in detail.

    1.1. Shall be able to click on the individual stock.

    1.2. Shall be redirected to a detailed stock page.

    1.3. Shall be able to refine parameters for graph

        1.3.1. Shall be able to refine the length of time displayed on the graph.

        1.3.2. Shall be able to refine the graph to show the open prices.

        1.3.3. Shall be able to refine the graph to show the close prices.

REGISTERED TRADERS: -

1. Shall be able to view a particular stock in detail.

    1.1. Shall be able to click on the individual stock.

    1.2. Shall be redirected to a detailed stock page.

    1.3. Shall be able to refine parameters for the graph.

        1.3.1. Shall be able to refine the length of time displayed on the graph.

        1.3.2. Shall be able to refine the graph to show the open prices.

        1.3.3. Shall be able to refine the graph to show the close prices.

2. Shall be able to view the portfolio.

    2.1. Shall be able to show a summary of the portfolio for the day.

        2.1.1. Shall be able to show all stocks owned.

        2.1.2. Shall be able to show gains and losses from purchase price.

    2.2. Shall be able to sell stock.

        2.2.1. Shall be able to enter a quantity of stock to sell.

3. Shall be able to buy stocks by clicking on the buy button on the stock details page.

    3.1. Shall be able to enter quantities of stocks to buy.

4. Shall be able to access the payment gateway.

    4.1. Shall be able to purchase using a bank account on record.

        4.1.1. Shall be needed to verify bank account information.

5. Shall be able to view the transaction history.

    5.1. Shall be able to view the stock name of the stock bought.

    5.2. Shall be able to view the purchasing price of stock bought.

    5.3. Shall be able to view the quantity of stock bought.

    5.4. Shall be able to view the date of stock bought.

    5.5. Shall be able to view the time of stock bought.

6. Shall be able to add interested stocks to a wishlist.

    6.1. Shall be able to receive email notifications if stocks reach a certain price threshold.

7. Shall be able access the prediction tab to know the estimated price for a stock.

    7.1. Shall be able to enter a symbol of stock.

    7.2. Shall be able to click on a predict button.

        7.2.1. Shall be shown the predicted opening price for the stock the following day.

REGISTERED EXPERTS: -

1. Shall be able to view a particular stock in detail.

1.1. Shall be able to click on the individual stock.

1.2. Shall be redirected to a detailed stock page.

1.3. Shall be able to refine parameters for graph

    1.3.1. Shall be able to refine the length of time displayed on the graph.

    1.3.2. Shall be able to refine the graph to show the open prices.

    1.3.3. Shall be able to refine the graph to show the close prices.

ADMIN: -

1. Shall be able to logout.

2. Shall be able to view details entered by traders.

3. Shall be able to view details entered by experts.

4. Shall be able to put traders' accounts on hold for verification.

5. Shall be able to put experts' accounts on hold for verification.

6. Shall be able to accept trader accounts.

7. Shall be able to reject trader accounts.

8. Shall be able to accept expert accounts.

9. Shall be able to reject expert accounts.

Priority 3:

UNREGISTERED USERS: -

1. Shall be able to contact customer support for queries.

    1.1. Shall be able to click on the customer support tab.

        1.1.1. Shall be able to contact via phone.

        1.1.2. Shall be able to contact via mail.

            1.1.2.1. Shall be able to enter an email address in the email field.

            1.1.2.2. Shall be able to enter a message in the message field.

            1.1.2.3. Shall be able to receive an acknowledgment email.

        1.1.3. Shall be able to contact via chat support.

            1.1.3.1. Shall be able to see the number of people waiting in the queue.

1.1.3.2.   Shall be able to see an estimated waiting time for response.

1.1.3.3.   Shall be able to see the time spent in the queue.

1.1.3.4.   Shall be able to send a message to the support agent.

1.1.3.5.   Shall be able to receive a message from the support agent.

REGISTERED TRADERS: -

1.   Shall be able to chat with an expert.

    1.1.   Shall be able to see the number of people waiting in the queue.

    1.2.   Shall be able to see an estimated waiting time for response.

    1.3.   Shall be able to see the time spent in the queue.

    1.4.   Shall be able to send a message to the expert.

    1.5.   Shall be able to receive a message from the expert.

REGISTERED EXPERTS: -

1.   Shall be able to chat with traders.

    1.1.   Shall be able to navigate to the chat tab.

        1.1.1.   Shall be able to view all traders in the queue.

        1.1.2.   Shall be able to communicate with the trader that is first in the queue.

            1.1.2.1.   Shall be able to send messages to the trader.

            1.1.2.2.   Shall be able to receive messages from the trader.

            1.1.2.3.   Shall be able to end the session with the trader.

2.   Shall be able access the prediction tab to know the estimated price for a stock.

    2.1.   Shall be able to enter a symbol of stock.

    2.2.   Shall be able to click on a predict button.

        2.2.1.   Shall be shown the predicted opening price for the stock the following day.

ADMIN: -

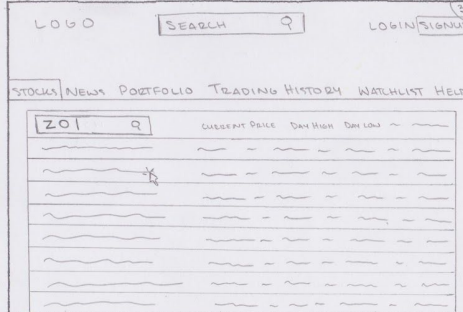No Priority 3 functional requirements for admin

UI Mockups and Storyboards (High level only):
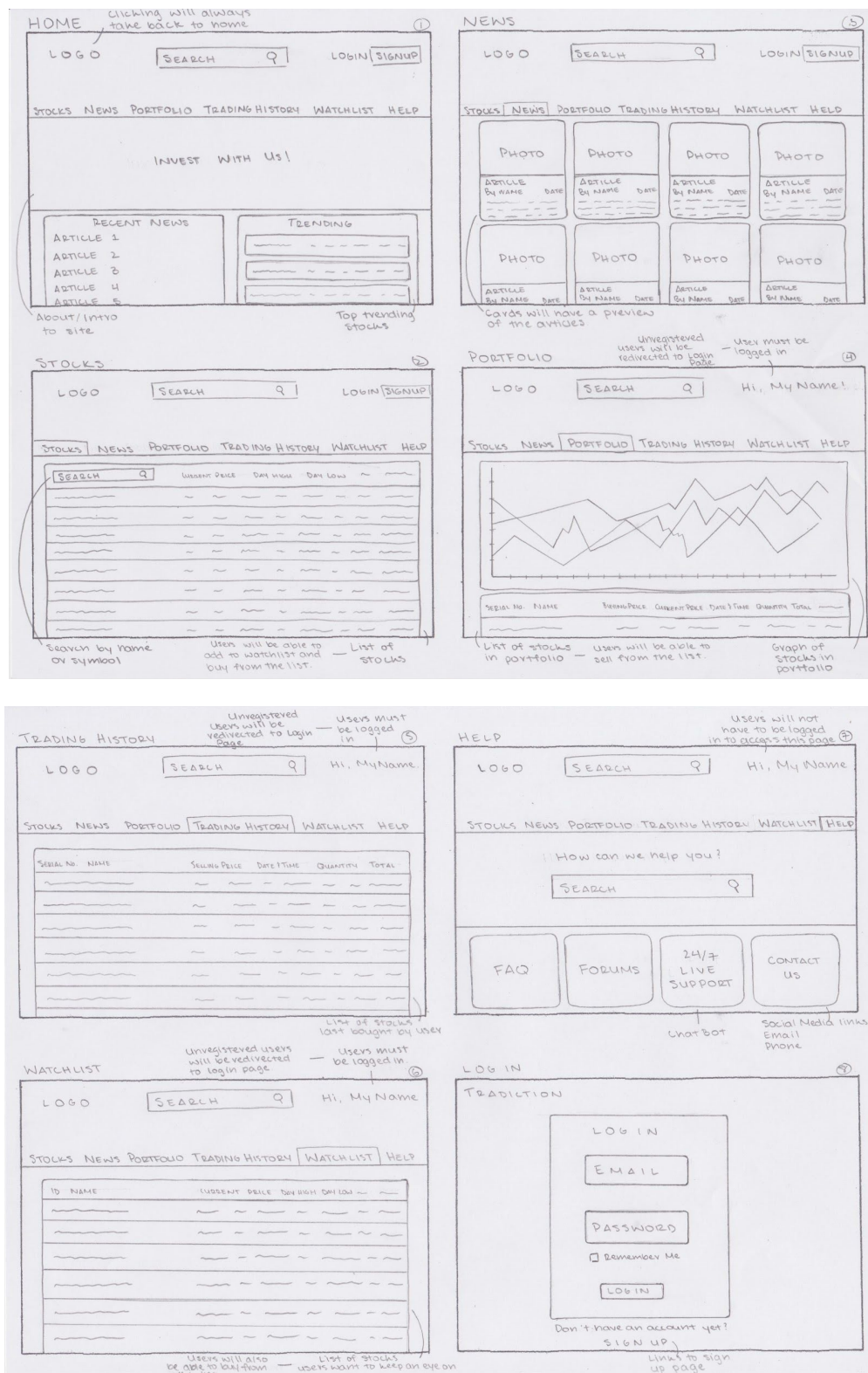
Joanna is a student in an investment class. Her professor assigns the class to create fake portfolios given a certain amount of money. Her goal is to net the largest return on investment.

Joanna browses Facebook when she comes across an ad for Tradiction. She thinks it might be good to use as it looks clean and easy to use.

Joanna searches for each stock and clicks on them to check the details. Once she decides which ones to choose, she adds them to her dashboard.

Joanna sees the details of an individual stock.
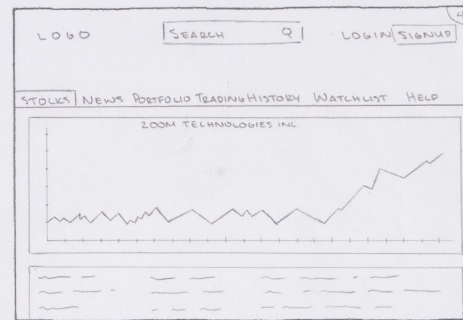
John discusses stocks with his friend over the phone. His friend recommends a site called Tradiction, and John decides to check it out.

John goes to Tradiction and checks the stocks list. On the site, he is able to sort the list by different categories. He decides to sort by top earners and top losers.

Karen talks to her friend on the phone. Her friend recommends she invests in a company called Zoom.
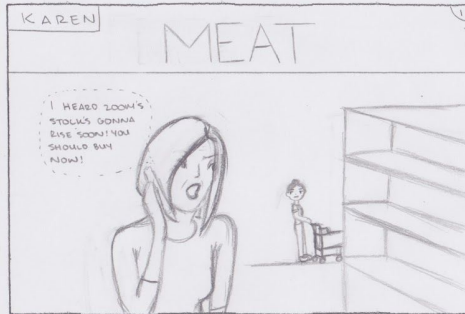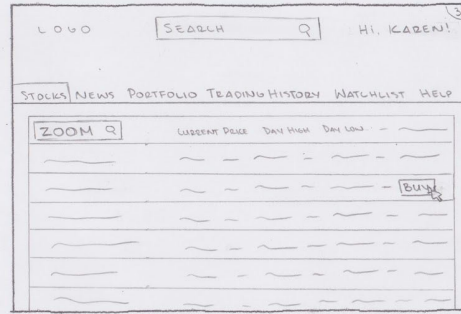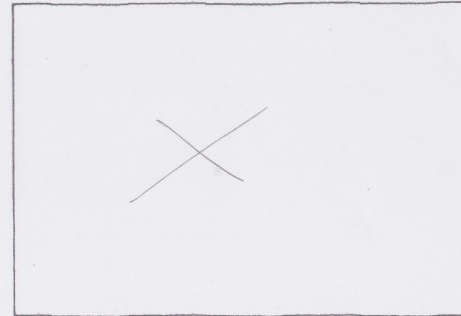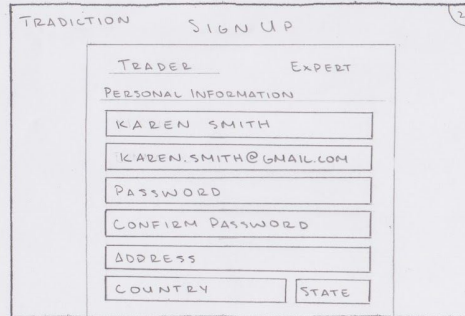
KAREN

I MEAT

I HEARD ZOOM'S STOCKS GONNA RISE SOON! YOU SHOULD BUY NOW!

Karen creates an account so she can start investing

TRADITION   SIGN UP

TRADER   EXPERT

PERSONAL INFORMATION

KAREN SMITH

KAREN.SMITH@GMAIL.COM

PASSWORD

CONFIRM PASSWORD

ADDRESS

COUNTRY   STATE

Karen wants to add some stocks to her portfolio so she searches each of them and adds them from the list.

LOGO   SEARCH Q   HI, KAREN!

STOCKS NEWS PORTFOLIO TRADING HISTORY WATCHLIST HELP

ZOOM Q   CURRENT PRICE DAY HIGH DAY LOW

BUY

Kevin is browsing online when he comes across an interesting forum post. He clicks on it because he's curious and wants to get into investing.

KEVIN

reddit

I FOUND THIS SITE CALLED TRADITION!

He gets redirected to the login page, so he clicks signup underneath to get to the right page. He then signs up as a trader.

TRADITION

LOG IN

EMAIL

PASSWORD

☐ Remember Me

LOG IN

Don't have an account yet!
SIGN UP
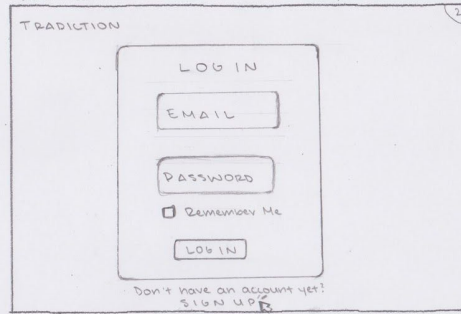
Kevin navigates to the Help page and chooses the 24/7 Live Support option.

LOGO   SEARCH Q   HI, KEVIN!

STOCKS NEWS PORTFOLIO TRADING HISTORY WATCHLIST HELP

How can we help you?

SEARCH Q

FAQ   FORUMS   24/7 LIVE SUPPORT   CONTACT US
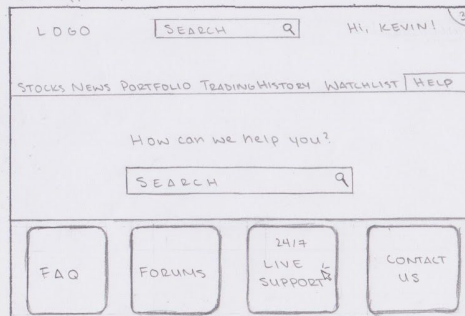
Kevin chats with an expert and asks for advice on what he should do. He multitasks with the chat window on the side.

LOGO   SEARCH   EXPERT CHAT

STOCKS NEWS PORTFOLIO TRADE H

SEARCH Q

Sanjay discusses with his friend about wanting to get into investing. His friend recommend using Tradiction and tells him how much he's made investing with them.
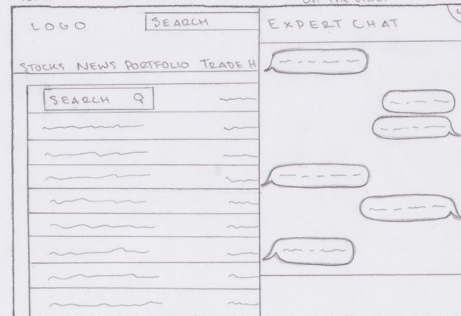
After hearing of his friend's success, Sanjay decides to make an account.

Sanjay navigates to the stock list and selects a stock. He clicks on the expert category to chat with an expert.

Sanjay discusses with an expert on his selections and asks questions on what he should do.

Sanjay scrolls through some stocks and can't buy some of them because they are above his budget. He adds the ones he's interested in to his watchlist by clicking the plus sign.

1 week later, Sanjay comes back and checks on the stocks on his watchlist. He decides which ones he wants to buy and clicks "buy".

Sanjay navigates to his watchlist and selects "predict" to use the prediction functionality.
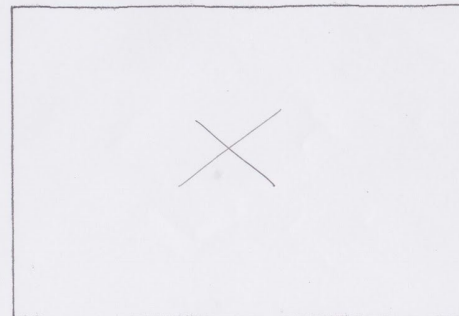
High-level Database Architecture and Organization:

Business Rules
1. A user can create one trader account.
2. A user can create one expert account.
3. Users can login to the website.
4. Traders may buy one or more stocks.
5. Traders may sell one or more stocks.
6. A user can view one stock in detail at a time.
7. A trader can add one stock to the wishlist at a time.
8. A trader can view one prediction of a stock at a time.
9. An expert can view one prediction of a stock at a time.
10. An expert can write one review of a stock at a time.

Entities, Attributes, and Relationships
- **Strong Entities:**
    - Trader
        - trader_id: PK
        - name: composite (first name, last name)
        - bank_statement
        - routing_number
        - account_number
        - address: composite (house number, street name, street type, city, state, postal code)
        - phone_number: composite (area code, prefix, line number)
        - email_address: composite (local part, domain)
        - password
        - SSN
    - Expert
        - expert_id: PK
        - name: composite (first name, last name)
        - address: composite (house number, street name, street type, city, state, postal code)
        - phone_number: composite (area code, prefix, line number)
        - email_address: composite (local, domain)
        - password
        - expert_cert
        - SSN

- **Weak Entities:**
    - Detail
        - stock_id: PK

-
  -
    - ■ stock_name
    - ■ symbol
    - ■ volume
    - ■ price
    - ■ open
    - ■ prev_open
    - ■ close
    - ■ prev_close

    - ○ Wishlist
      - ■ wishlist_id: PK
      - ■ stock_id: FK
      - ■ add_stock
      - ■ remove_stock
    - ○ Prediction
      - ■ prediction_id: PK
      - ■ Stock_id: FK
      - ■ date: multi-value (mother, day, year)
      - ■ predicted_price
    - ○ Review
      - ■ expertreview_id: PK
      - ■ expert_id: FK
      - ■ Review
      - ■ Sentiment_result
      - ■ date: multi-value (month, day, year)
    - ○ Invoice
      - ■ invoice_id: PK
      - ■ stock_id: FK
      - ■ quantity
      - ■ date: multi-value (month, day, year)
      - ■ price
      - ■ status
- **Relationships:**
  - ○ create, login, buy, sell, view, add, remove, write, is_a

Entity Relationship Diagram (ERD)

Database Model (DBM)

user
- userid INT
- username VARCHAR(45)
- Expert_expert_id INT
- Trader_trader_id INT
- StockDetail_stock_id INT
- Indexes

Expert
- expert_id INT
- firstname VARCHAR(45)
- lastname VARCHAR(45)
- Address VARCHAR(45)
- phone_number INT
- expert_cert VARCHAR(45)
- SSN INT
- Prediction_prediction_id INT
- Indexes

StockDetail
- stock_id INT
- stock_name VARCHAR(45)
- symbol VARCHAR(45)
- volume INT
- price DECIMAL(2)
- open DECIMAL(2)
- prev_open DECIMAL(2)
- close DECIMAL(2)
- prev_close DECIMAL(2)
- Indexes

ExpertReview
- expertreview_id INT
- expertreview VARCHAR(45)
- Expert_expert_id INT
- Expert_Prediction_prediction_id INT
- Review_expertreview_id INT
- Indexes

Trader
- trader_id INT
- firstname VARCHAR(45)
- lastname VARCHAR(45)
- bank_statement VARCHAR(45)
- routing_number INT
- account_number INT
- SSN INT
- Indexes

Sell
- sell_id INT
- stock_id VARCHAR(45)
- Invoice_invoice_id INT
- Trader_trader_id INT
- Indexes

Review
- expertreview_id INT
- expert_id INT
- Review VARCHAR(45)
- Sentiment_result VARCHAR(45)
- date DATE
- Expert_Account_account_id INT
- Indexes

Wishlist
- wishlist_id INT
- stockid INT
- add_stock DATE
- remove_stock DATE
- Trader_trader_id INT
- Trader_Account_account_id INT
- Indexes

Buy
- buy_id INT
- stock_id INT
- Trader_trader_id INT
- Invoice_invoice_id INT
- Indexes

Invoice
- invoice_id INT
- stock_id INT
- quantity INT
- date DATE
- price INT
- status VARCHAR(45)
- Indexes

Prediction
- prediction_id INT
- Stock_id INT
- date DATE
- prediction_price INT
- Indexes

Reasoning for DBMS
The DBMS that we have decided to use is MySQL because it is a DBMS that I have familiarity with.

Media storage
The URL to the files will be stored in the database.

Search/filter architecture and implementation
The filter functionality will be implemented on the stock list page where users can enter a search string (generally, a stock name or stock symbol), and will get back the result of the stock list from the database with matching substring to that search string. Then, the user can select a stock of his/her choice.

High-level APIs and Main Algorithms

API : -

Payment: Payment gateway for the traders and experts interested in buying stocks. Can buy a particular stock from it's detailed page by clicking on the "BUY" button, redirecting the user to a new tab where the user can select the quantity of stocks to buy.

Newsfeeds: The home page displays links to the trending stock news in the market and when clicked, redirects users to a tab with detailed information about the news.

Twitter: This API fetches twitter comments related to the particular stock and performs sentiment analysis giving out results of how the stock is performing for past days.

Chatbot: It uses socket I/O to enable communication traders and experts.

Email: Important updates regarding wishlisted stocks will be sent to users via Email.

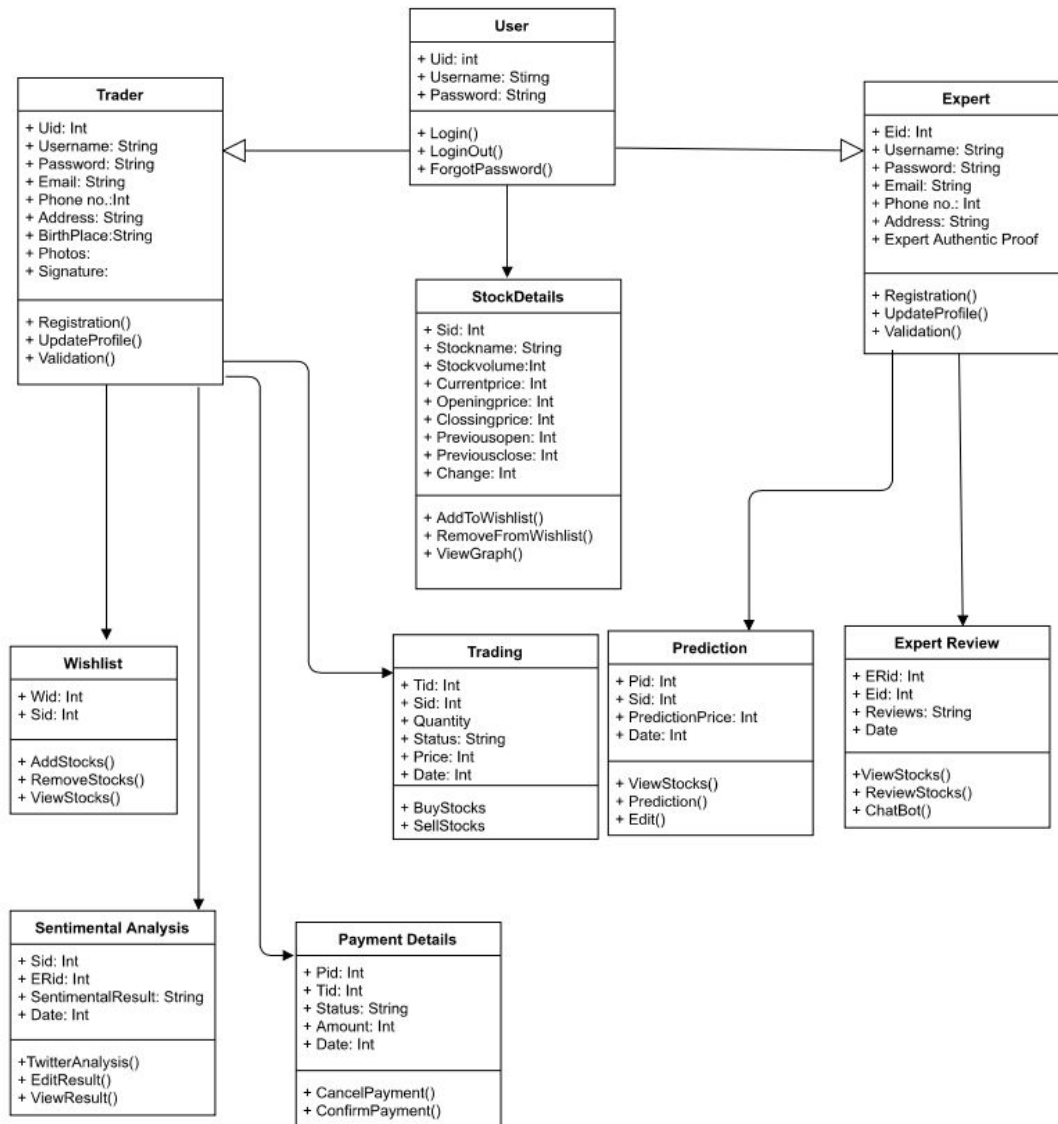## Main Algorithms: -

Prediction: We will be implementing machine learning algorithms on stock data collected for the past few years and will be predicting the opening price of the stock for the next day.
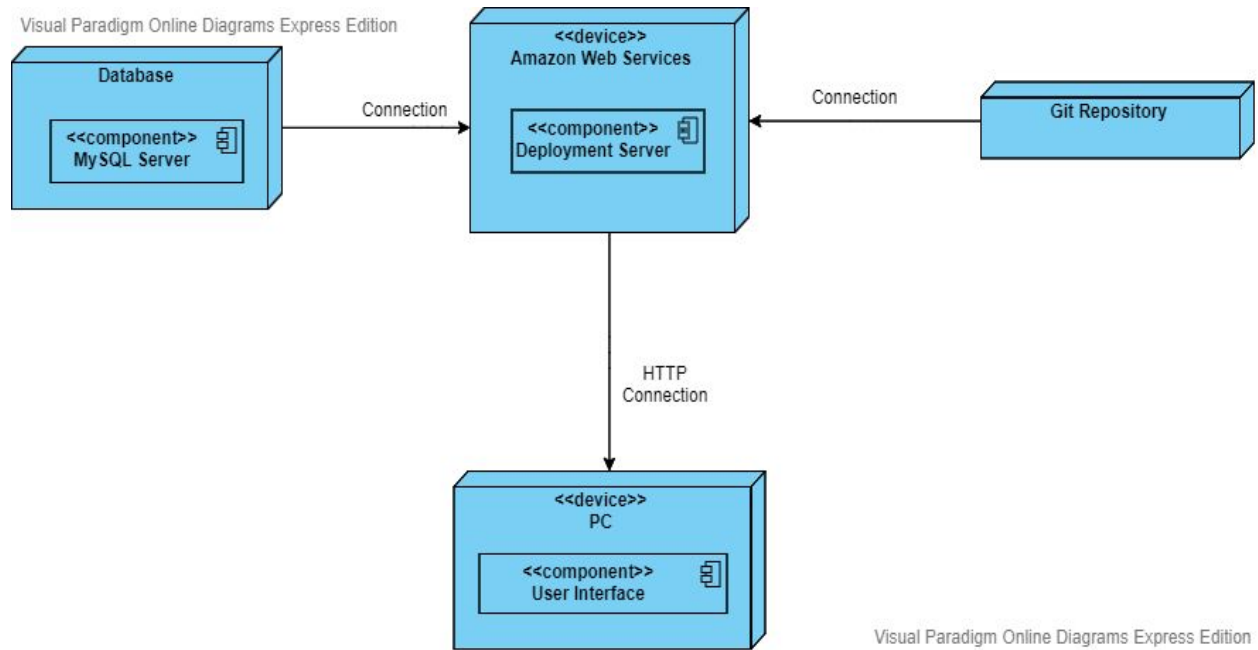
Sentiment Analysis: Collected twitter comments for the stock will be passed through this algorithm for supporting the predicted price, displaying the output as positive, negative or neutral.

High-level UML Diagrams

Class Diagram

User
+ Uid: int
+ Username: Stirng
+ Password: String

+ Login()
+ LoginOut()
+ ForgotPassword()

Trader
+ Uid: Int
+ Username: String
+ Password: String
+ Email: String
+ Phone no.:Int
+ Address: String
+ BirthPlace:String
+ Photos:
+ Signature:

+ Registration()
+ UpdateProfile()
+ Validation()

Expert
+ Eid: Int
+ Username: String
+ Password: String
+ Email: String
+ Phone no.: Int
+ Address: String
+ Expert Authentic Proof

+ Registration()
+ UpdateProfile()
+ Validation()

StockDetails
+ Sid: Int
+ Stockname: String
+ Stockvolume:Int
+ Currentprice: Int
+ Openingprice: Int
+ Clossingprice: Int
+ Previousopen: Int
+ Previousclose: Int
+ Change: Int

+ AddToWishlist()
+ RemoveFromWishlist()
+ ViewGraph()

Wishlist
+ Wid: Int
+ Sid: Int

+ AddStocks()
+ RemoveStocks()
+ ViewStocks()

Trading
+ Tid: Int
+ Sid: Int
+ Quantity
+ Status: String
+ Price: Int
+ Date: Int

+ BuyStocks
+ SellStocks

Prediction
+ Pid: Int
+ Sid: Int
+ PredictionPrice: Int
+ Date: Int

+ ViewStocks()
+ Prediction()
+ Edit()

Expert Review
+ ERid: Int
+ Eid: Int
+ Reviews: String
+ Date

+ViewStocks()
+ ReviewStocks()
+ ChatBot()

Sentimental Analysis
+ Sid: Int
+ ERid: Int
+ SentimentalResult: String
+ Date: Int

+TwitterAnalysis()
+ EditResult()
+ ViewResult()

Payment Details
+ Pid: Int
+ Tid: Int
+ Status: String
+ Amount: Int
+ Date: Int

+ CancelPayment()
+ ConfirmPayment()

High-level Deployment Diagram:

Key Risks

Schedule risk:

Given the difficulty and amount of work required to have a functional stock market app, we may have difficulties creating a fully functional stock market application, including all priority 1, priority 2, and some priority 3's.

To resolve this risk, we plan on scheduling bi-weekly meetings on Zoom to discuss our implementation strategy, and implementing weekly sprints for building out our application functionality. We plan on starting with all of priority 1 before moving on to priority 2. If there is enough time, we plan on implementing features from priority 3.

Teamwork risk:

Given the Covid-19 pandemic, we are forced to work at home and collaborate primarily using Zoom. Not having face-to-face meetings may introduce complacency, reduce productivity, and may produce a lower quality of work.

To resolve this risk, the team lead will implement bi-weekly meetings, in addition to meetings within small teams that are designated for the application implementation. The team lead will have a set list of requirements for each meeting and require meeting minutes to ensure that we align with our itinerary and can deliver a working product by the end of the scheduled timeline.

Project Management

A combination of Trello, Slack, Zoom, and in-person meetings were used to manage the progress of milestone 2. Trello was utilized by showing progress of sub-tasks by their assignees. Those with specific roles were informed to leave comments and questions on their cards and moved the cards as they progressed with the task. Slack was used as the primary form of communication within the team. An individual slack channel was used to schedule any meetups or discuss any questions or issues. In-person meetups were the primary form of group interaction between people sharing the same sub-tasks. If the team lead/project manager wasn't present, the group sent meeting minutes to the lead so that he was on the same page. In addition to the in-person meetups, weekly zoom meetings were conducted to align all team members. Specifically, Zoom was used to answer any questions that people may have had, rebalance the workload if necessary, and to set goals for the upcoming week.

Moving forward, we will likely use the same tools mentioned above. There were no issues with the way things are running and the tools used were successful in streamlining the collaboration process.