Stock Prediction App

Program Requirements

CS361 HW 1

Open	52.28	Div yield	-
High	52.81	Prev close	51.71
Low	49.47	52-wk high	52.81
Mkt cap	56.07B	52-wk low	19.05
P/E ratio	266.77		

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Specifications

Functional Specifications

1. A User can search for a stock by its ticker symbol. (e.g. INTC)
2. A User can search for a stock by its name. (e.g. Intel)
3. A User can search for a stock by category. (e.g. Technology)
4. The Software will get the selected stock's historical values for the last 1 year.
5. The Software will analyze the historical data to generate a prediction.
6. The Software will display the prediction from the above analysis along with the historical data in a line graph.
7. A User can create an account.
8. A User can save a stock to their account.
9. A User can login to their account to go to their dashboard.
10. A User's saved stocks will show up on their account dashboard.
11. A User can click on a stock on their dashboard to go to that stock's prediction page.

Non-functional Specifications

1. The Software will use Alpha Vantage[1]'s API to get stock data.
2. The Software will use an LSTM algorithm[2] to predict stock value.
3. The Software will use Python / TensorFlow to generate the prediction.
4. The Software will use HTML / CSS / JS to provide a website interface.
5. A User will be able to login in under 5 seconds.
6. The Software will display the prediction to the User in under 5 seconds[3].

[1] https://www.alphavantage.co/

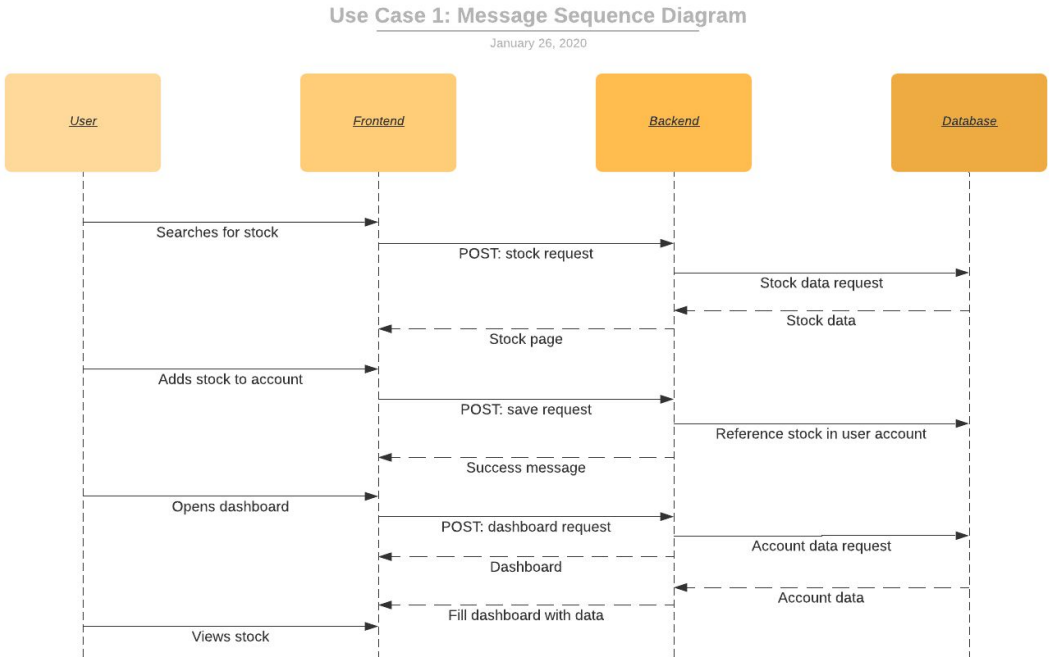
[2] https://towardsdatascience.com/using-lstms-for-stock-market-predictions-tensorflow-9e83999d4653

[3] The time to generate a prediction is currently unknown.

Use Cases & MSDs

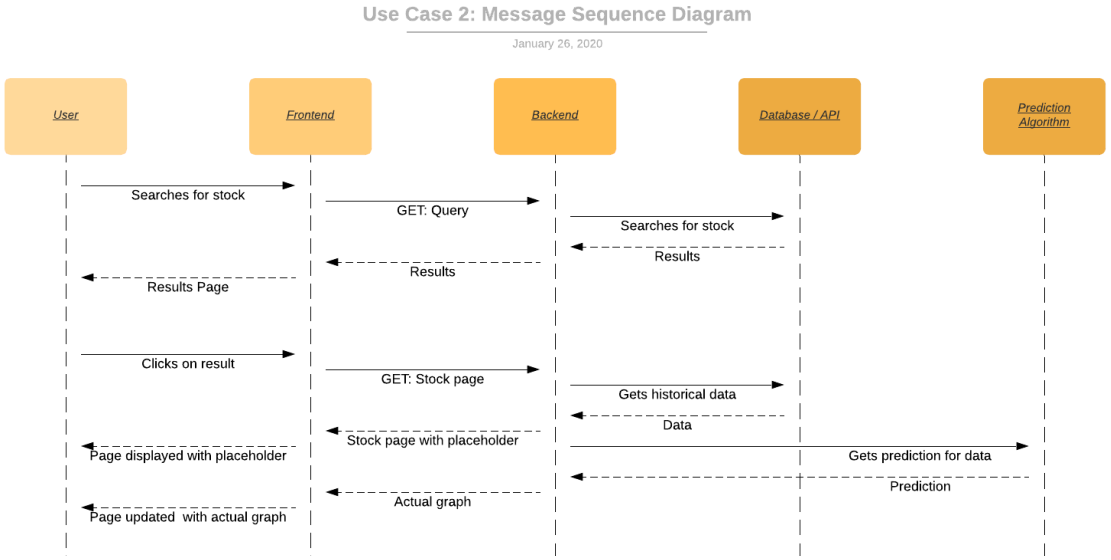
Use Case 1: Saving a Stock to a User's profile

1. Scope:
    a. Stock prediction web-app
2. Level:
    a. User-goal level
3. Actors:
    a. User
4. Stakeholders and Interests:
    a. Users: want to be able to save their stocks to their account for convenience and easy access
5. Preconditions:
    a. User is logged in
    b. User's device is connected to the internet
    c. User can view the desired stock
6. Postconditions:
    a. The stock is saved to the user's account
    b. The user can view the stock on their dashboard
7. Main Success Scenario:
    a. User searches for the desired stock, whether by ticker symbol, name, or category
    b. User views the stock
    c. User interacts with the software to add the stock to their account
    d. Software displays a success message to the User
    e. The User can now view the stock on their dashboard
8. Extensions:
    a. User device loses internet connectivity while attempting to add a stock
        i. Software displays an error message
        ii. User may reconnect to the internet and try again
    b. Software experiences a different error while attempting to add a stock
        i. Software displays an error message
        ii. User may try again



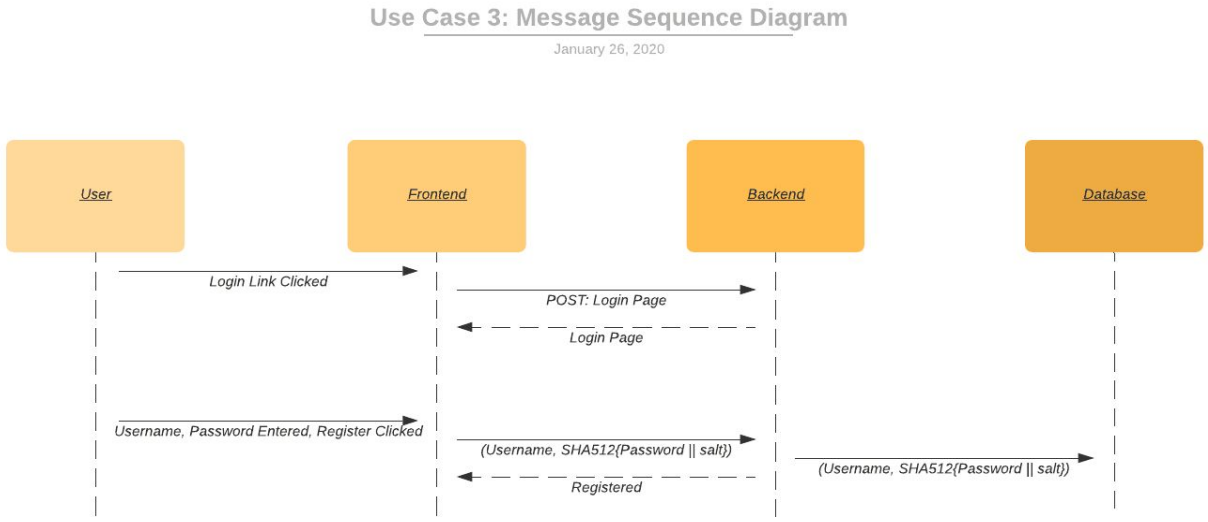
Use Case 2: Generating Prediction for Stock

1. Scope:
    a. Stock prediction web-app
2. Level:
    a. User-goal level
3. Actors:
    a. User
4. Stakeholders and Interests:
    a. Users: want to be able to predict a stock's value
5. Preconditions
    a. User has website open in browser
    b. User's device is connected to the internet
6. Postconditions
    a. User has received stock prediction
7. Main Success Scenario
    a. User goes to website.
    b. User enters a stock symbol in the search bar.
    c. User selects the stock's page in the search result.
    d. The Software will display the stock page with a blank graph.
    e. The Software will get historical stock data from the API.
    f. The Software will pass the historical data into the prediction algorithm.
    g. The algorithm will produce a prediction line.
    h. The Software will produce a graph with the historical data and the prediction.
    i. The Software will replace the placeholder graph with the generated graph.
8. Extensions:
    a. User device loses internet connectivity while attempting to add a stock
        i. Software displays an error message
        ii. User may reconnect to the internet and try again
    b. Software experiences a different error while attempting to add a stock
        i. Software displays an error message
        ii. User may try again

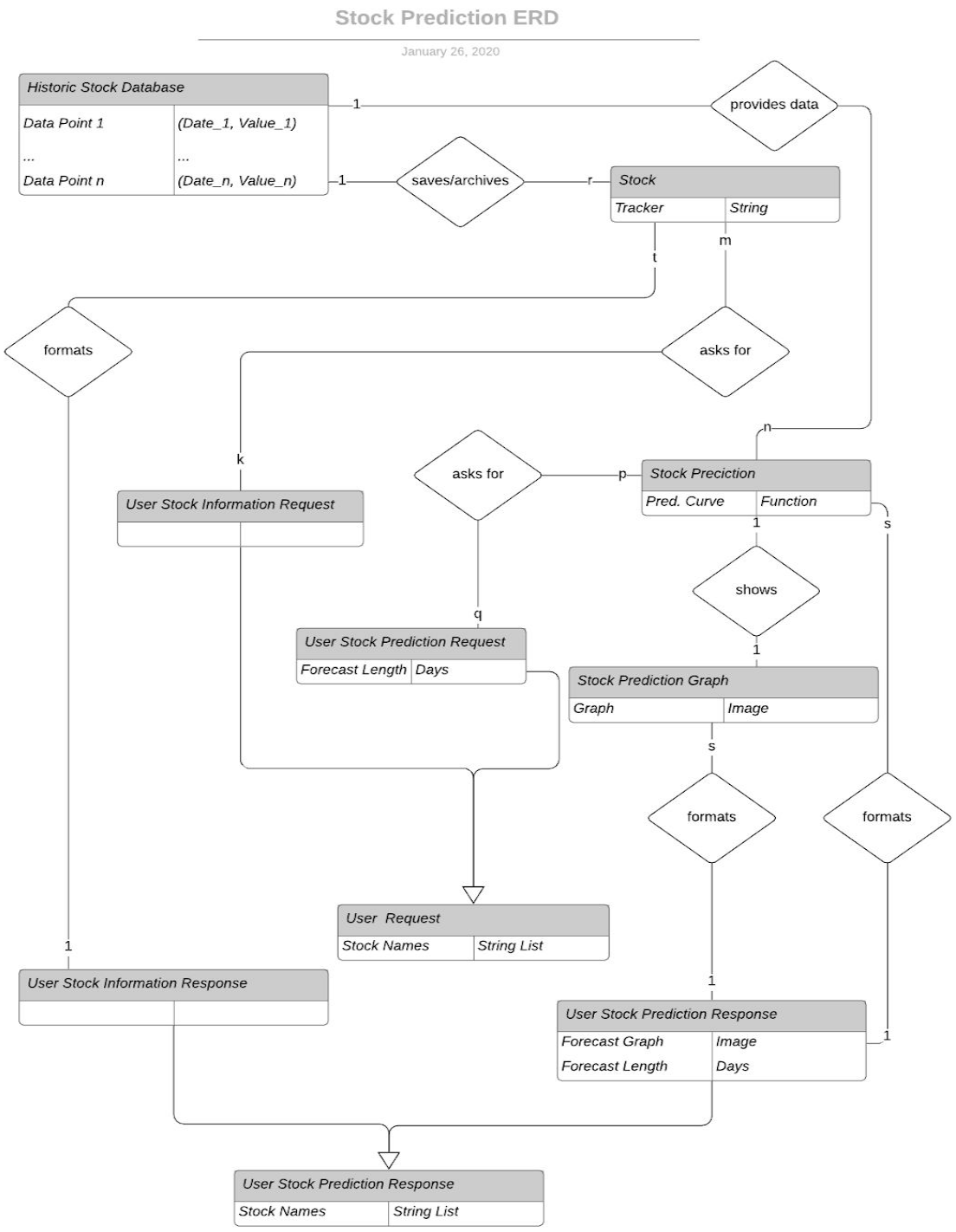


Use Case 3: Creating an Account

1. Scope:
    a. Stock prediction web-app
2. Level:
    a. User-goal level
3. Actors:
    a. User
4. Stakeholders and Interests:
    a. Users: want to be able to save their stocks to their account for convenience and easy access
    b. Therefore, users want an account to save such data.
5. Preconditions:
    a. User's device is connected to the internet
    b. User has an email address.
6. Postconditions:
    a. User has an account with a username (email) and password.
7. Main Success Scenario:
    a. User opens the website
    b. User clicks on the login/register button
    c. User enters their desired username(email) and password
    d. User registers an account with their email and their password
    e. User can now log in with their email and password
8. Extensions:
    a. User device loses internet connectivity while attempting to add a stock
        i. Software displays an error message
        ii. User may reconnect to the internet and try again
    b. Software experiences a different error while attempting to add a stock
        i. Software displays an error message
        ii. User may try again



ERD Diagram


Stock Prediction ERD
January 26, 2020
Historic Stock Database
Data Point 1
(Date_1, Value_1)
...
...
Data Point n
(Date_n, Value_n)
provides data
saves/archives
Stock
Tracker
String
formats
asks for
User Stock Information Request
asks for
Stock Preciction
Pred. Curve
Function
shows
User Stock Prediction Request
Forecast Length
Days
Stock Prediction Graph
Graph
Image
formats
formats
User Request
Stock Names
String List
User Stock Information Response
User Stock Prediction Response
Forecast Graph
Image
Forecast Length
Days
User Stock Prediction Response
Stock Names
String List

Definitions

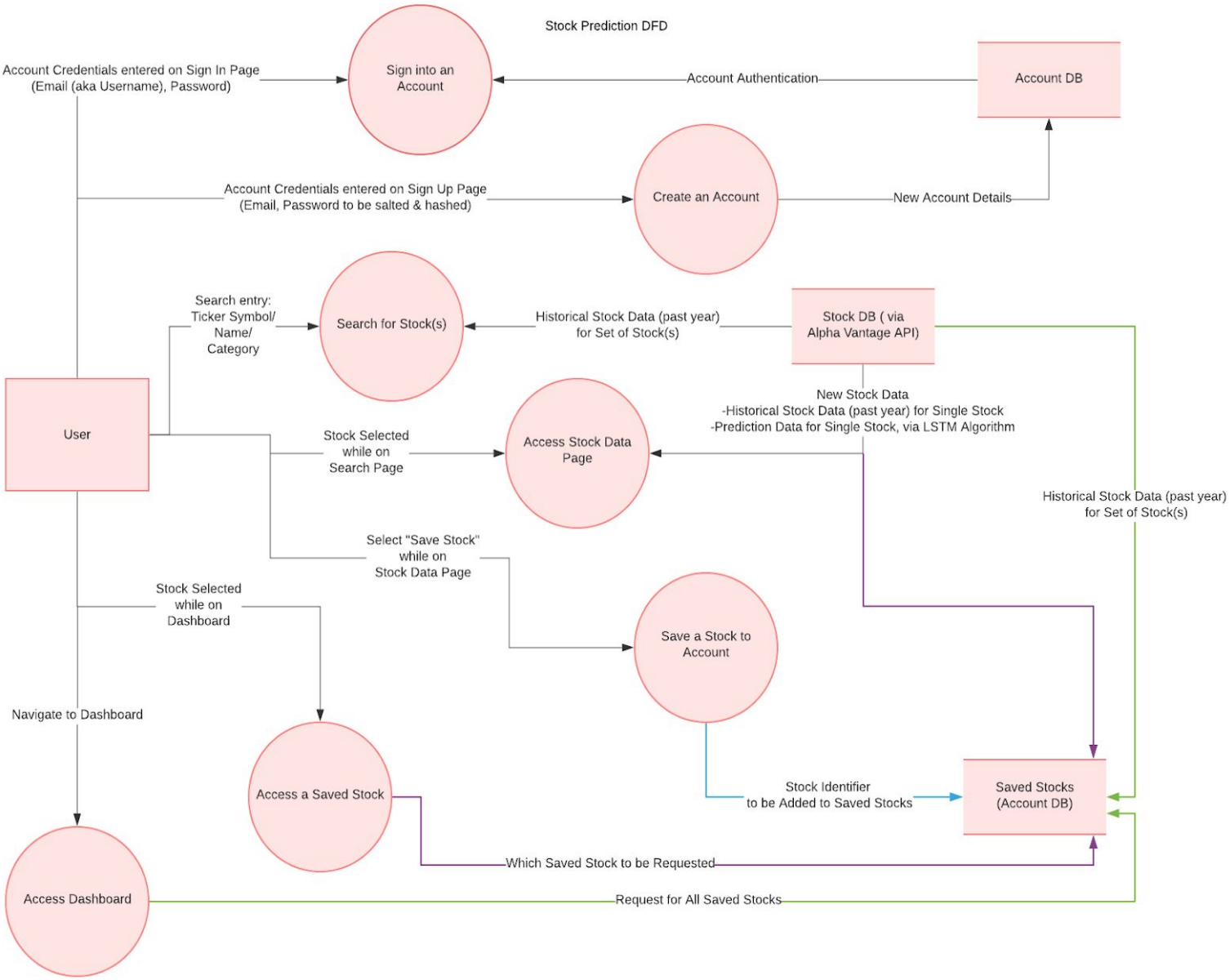
Functional Definitions

1. The system can display a list of available stocks to predict when requested by the user
2. The system can display a default welcome page to the first time user
3. The system can return a list of stocks to the user when the user searches for a certain category of stock (i.e. Tech)
4. The system can determine if the ticker symbol entered is valid
    a. If the ticker does not exist, the system can communicate that to the user
    b. If the ticker does exist, the system can allow the user to select that ticker as one to track and predict
5. The user can search stocks by type
6. The user can register an account with their credentials.
7. The system can store the credentials encrypted, with passwords salted and hashed, in a database
8. The user can make an authentication request by logging in
9. The server can reliably, correctly answer an authentication request by checking the credentials against the database
10. After a user registers, they are automatically logged in.
11. After a user logs in successfully, they are redirected to the home page.
12. The user can store stocks of interest to them when logged in, associated with their account.
13. The user can request retrieval of their saved stocks of interest
14. The system will allow the user to store stocks of interest to the user in a database, and retrieve them at the user's request
15. The user can view the forecasted stock prices for a given ticker according to the latest available data to the system
16. The system can retrieve up-to-date data to generate it's prediction from
17. The system can generate a prediction for a stock given the latest data on that stock ticker
18. The system can issue errors if inappropriate pages are requested

Non-functional Definitions

1. The system will display a website
2. The system's website will include a search bar at the top where the user can search for stocks by ticker or by category.
3. When the user is not logged in, the website will display a banner informing the user that they can log in to save their preferred stocks.
4. The website will present a login / register option
    a. This option will lead to a page where the user can login by filling the username and password fields, or where the user may register by filling out a username and password.
    b. This login/register page will display the outcome of any operation.
5. The user can see their saved stocks of interest under their profile
6. The prediction graph when shown includes a plot of past data, and a clear delineation between the past and predicted data.

Data Flow Diagram



Contributions

Customer

- We met with customer Ghaith Shan after class on 1/23/2020.
- We have maintained communication with our customer on Discord since 1/16/2020.

Team members

- Felix Brucker: Document Creation, Data Flow Diagram, Proofreading
- Robert Detjens: Functional Specifications, Non-functional Specifications, ERD Revision, Use Case 2, Use Case 2 MSD
- Remi Kendig: Use Case 1, Data Flow Diagram
- Dominykas Zobakas: ERD Revision, Use Case 1 MSD
- Lyell Read: ERD First Draft, Document Formatting, Customer Contributions, Functional Definitions, Non-Functional Definitions, Use Case 3, Use Case 3 MSD