Software Requirements and Design Document

For

Group 5

Version 3.0

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1. Overview

1. We are creating a mobile application for stock recommendations. Based on price movements and news events, our app will recommend stocks and options from the NYSE and NASDAQ. We will provide any relevant information about price drops/increases. Each user may control which stocks they monitor, and will be given alerts based on "out-of-the-norm behavior" as opposed to predefined alerts. The app's GUI is implemented in Java, using Android Studio. The information from our firebase realtime database is also accessed in Java. We will use Twitter to monitor news events and Google's NLP engine to perform sentiment analysis. All backend computations will be performed using CUDA C++ for math, and Python for the Google NLP and Twitter API.

2. Functional Requirements

High Priority (1):

- The app at the minimum requires data to be pulled from Yahoo's Finance website
- Calculated results from price data must be pushed to database
- The relevant data pushed into our database from our backend server
- Data needs to be pulled from the database to the Android app
- In the server, Moving Average, Weighted Volatility, etc. are calculated
- After calculation, data is sent to our database and sorted by stock ticker symbol
- The data for 'stocks', 'calls', and 'puts' are pulled directly from the database to the Android app
- In the app, the user has the option to follow a recommended stock, or view information for the stocks in their watchlist

Mid Priority (2):

- The user may specify a twitter watchlist to use in the stock recommendation calculation
- Server calculations to give an idea of how well a stock is performing.
- Tweets are pulled using Twitter Watchlist data and sent into Google's NLP API.
- The analysis of tweets is used in the calculation of a stock's performance score.
- Securely store user password information
- RSS feeds must be passed to Google's NLP API

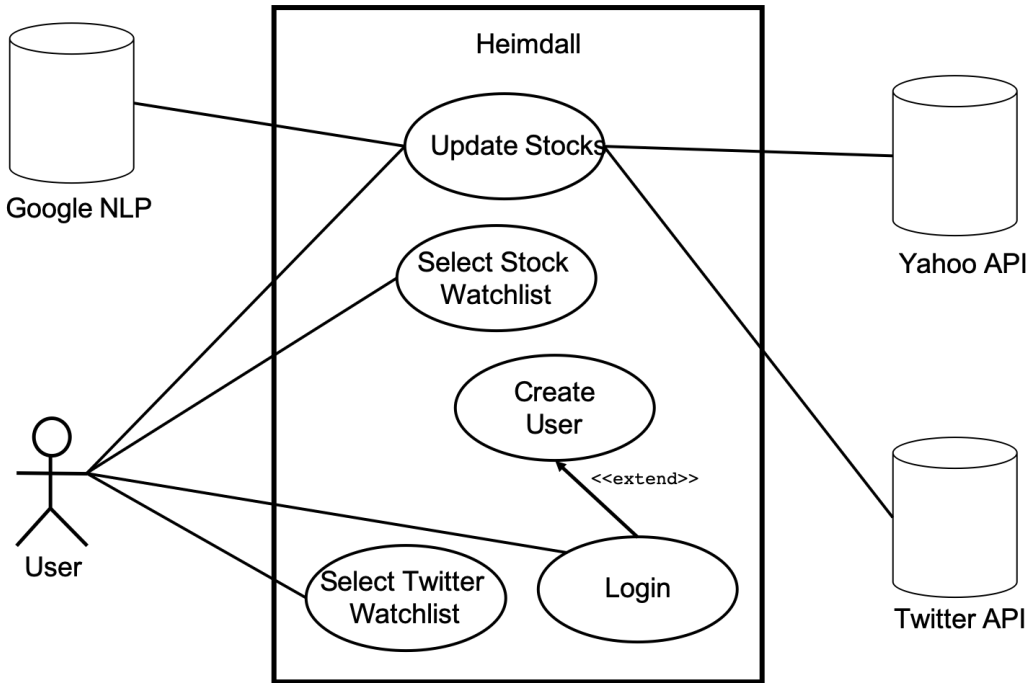
Low Priority (3):

- A user login system which stores user information such as a username and password is required
- The app interfaces directly with the database to resolve any user interaction.

3. Non-functional Requirements

- Unified Design -
  - Max of two fonts used throughout the entire app
  - App format that follows common conventions (e.g. To reset a password, click the 'Reset Password' link because this is similar to other popular apps)
  - Page to page design is similar (e.g. Back button always in top left corner and leads to last screen)
  - Primary and Secondary colors defined to keep a similar design from page to page
- Stock analysis refresh rate should be at most 1 minute
- Passwords must not stored using plain text.

4. Use Case Diagram



2. Textual descriptions of use cases:

- *Update Stocks*
    1. **Unique name:** Update Stocks
    2. **Participating actors: User, Google NLP, Yahoo API, Twitter API**
    3. **Entry conditions: User** views watchlist in Android application
    4. **Exit conditions:** New stock information is updated and displayed in application
    5. **Flow of events:**
        - **User** views watchlist in Android application
        - All stock information is updated in database using information from the **Google NLP**, **Yahoo API**, and **Twitter API**
        - New information is displayed to **User** in application
    6. **Special requirements:** None

- *Login*
    1. **Unique name:** Login
    2. **Participating actors: User**
    3. **Entry conditions: User** selects login button on the welcome screen
    4. **Exit conditions: User** is either granted or denied login access
    5. **Flow of events:**
        - **User** goes to login screen and types credentials
        - **User** presses the login button
        - Database is queried for matching login credentials
        - If matching credentials are found, **User** is allowed access; otherwise, access is denied
    6. **Special requirements:** None

- *Create User*
    1. **Unique name:** Create User
    2. **Participating actors: User**
    3. **Entry conditions: User** selects new account button on the login screen

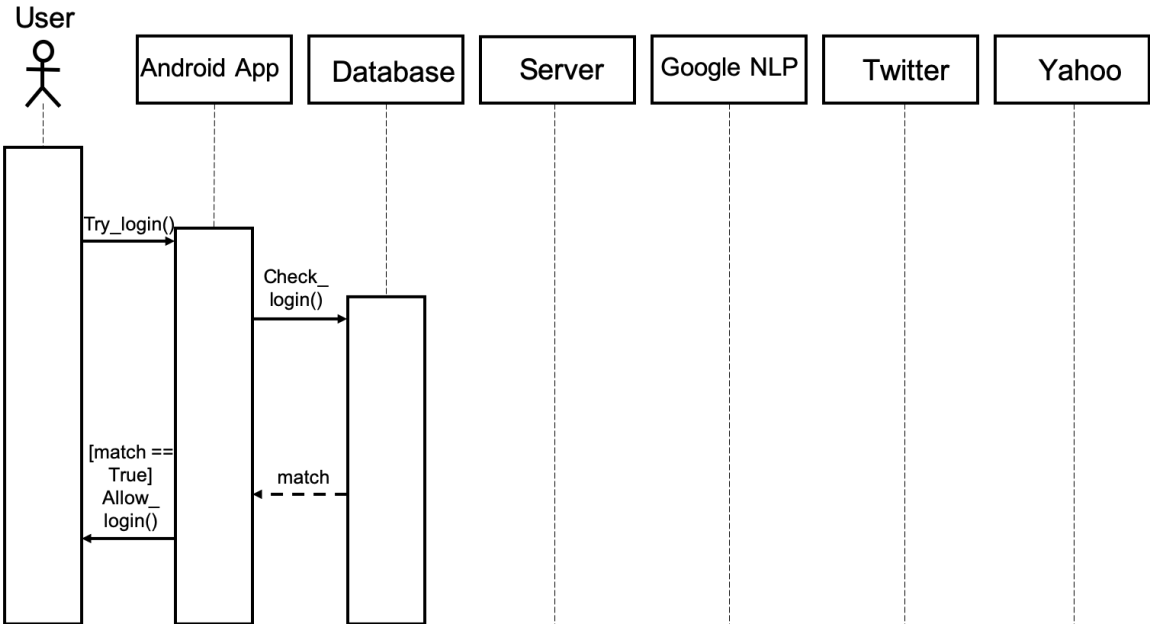
4. **Exit conditions:** Either a new **User** is created, or permission is denied
5. **Flow of events:**
    - **User** goes to login screen and selects create new account
    - **User** inputs information to create new account
    - Database is queried for matching login credentials
    - If no matching emails are found, a new **User** is created and a confirmation email is sent; otherwise, access is denied
6. **Special requirements:** None

- *Select Stock Watchlist*
    1. **Unique name:** Select Stock Watchlist
    2. **Participating actors: User**
    3. **Entry conditions: User** goes to stock list in application and selects add option
    4. **Exit conditions:** New company is added to **User's** stock list
    5. **Flow of events:**
        - **User** goes to stock list in application and selects add option
        - **User's** existing list is queried to check for matching stocks
        - If no matching stock is found, data is pulled from **Yahoo API** and added into the database containing the **User's** stock watchlist
    6. **Special requirements:** None

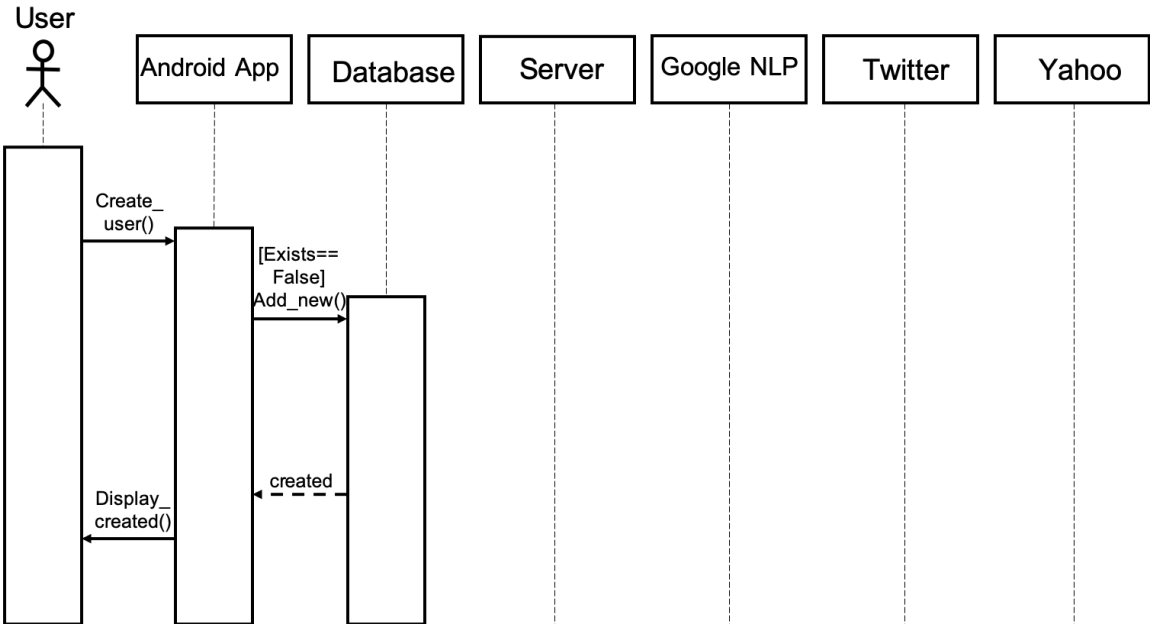
- *Select Twitter Watchlist*
    1. **Unique name:** Select Twitter Watchlist
    2. **Participating actors: User**
    3. **Entry conditions: User** goes to twitter watchlist in application and selects add option
    4. **Exit conditions:** New search term is added to **User's** twitter watchlist
    5. **Flow of events:**
        - **User** goes to twitter watchlist in application and selects add option
        - **User's** existing list is queried to check for matching twitter terms
        - If no matching term is found, data is pulled from **Twitter API** and added into the database containing the **User's** Twitter watchlist
    6. **Special requirements:** None

5. Class Diagram and/or Sequence Diagrams

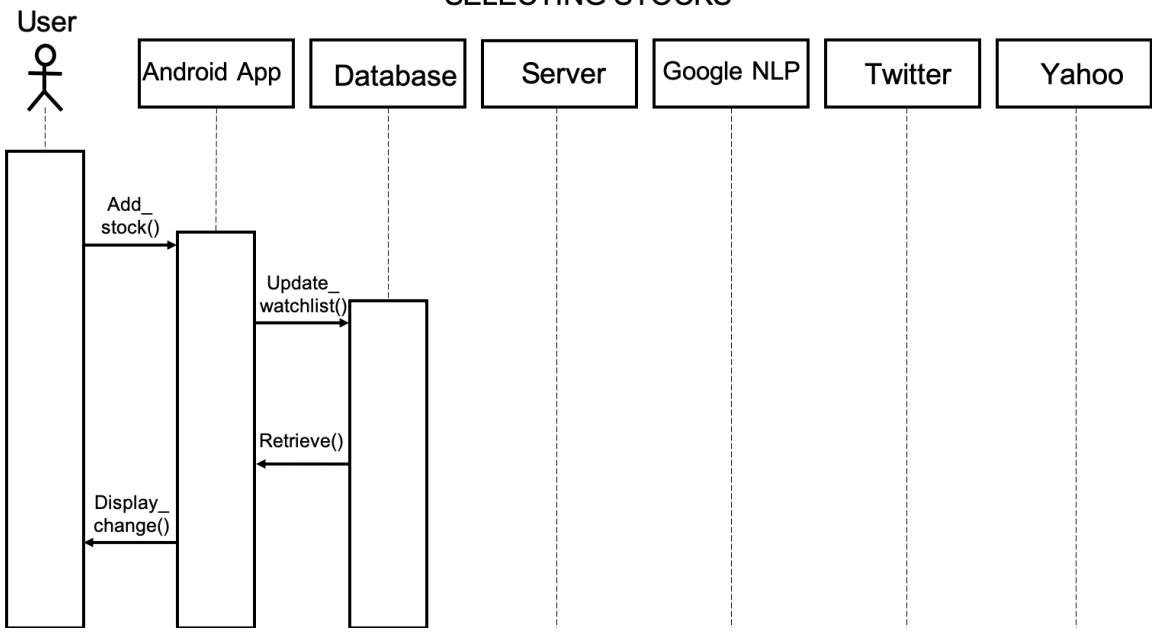
LOGIN



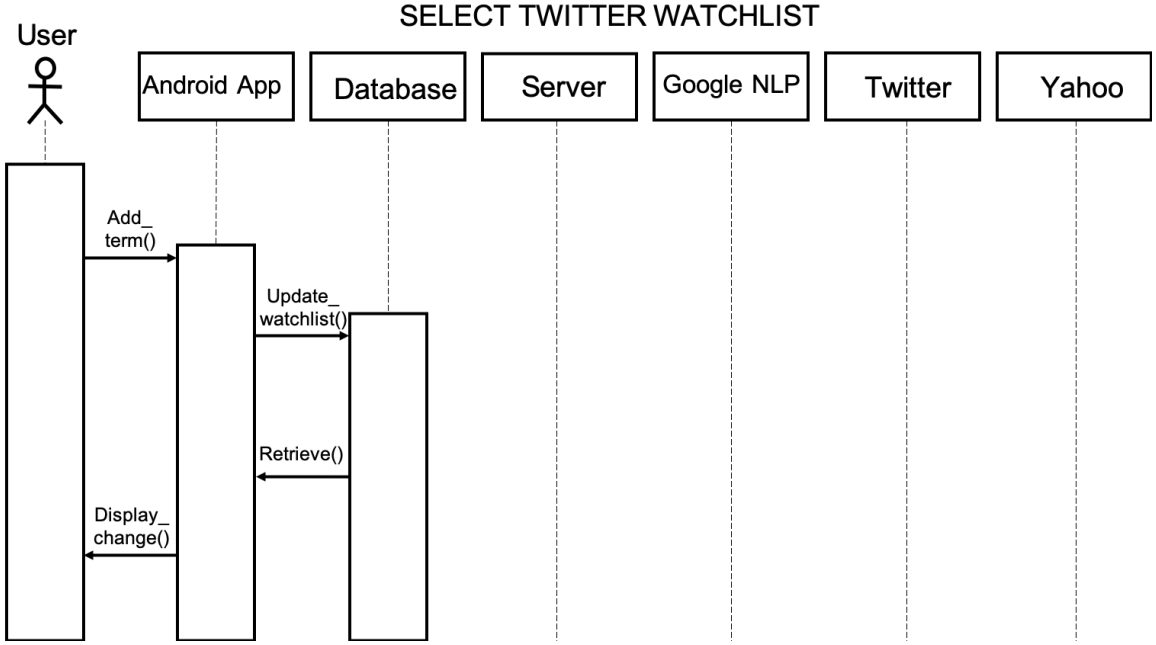
CREATE NEW USER

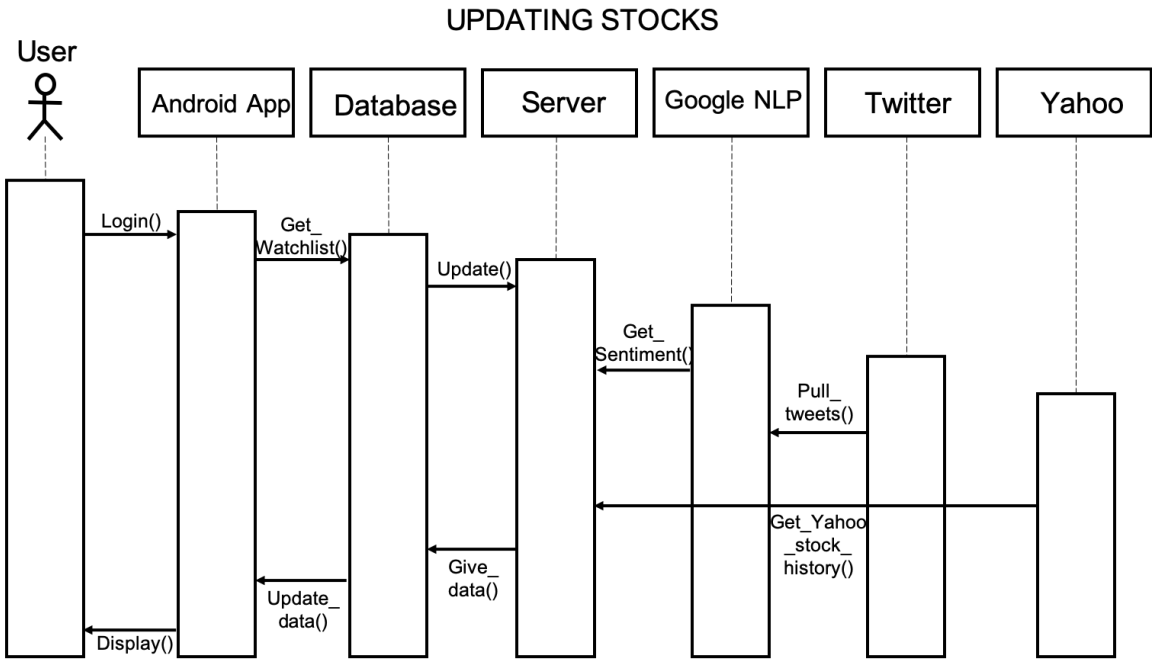


SELECTING STOCKS



SELECT TWITTER WATCHLIST





3.

6. Operating Environment

Our users will interact with the Android app interface, which uses data from our database. The database must pull the stock analyses from our backend server, which contains the actual data that we want to show users. Our backend server is using mathematical formulas to rate stock performance based on stock history. Stock performance ratings are also based on Twitter feed sentiment analysis, which is pulled from a program that will also be running on the backend server.

Twitter -> Google NLP -> Backend Server
Yahoo -> Backend Server : Mathematical Formulas[takes in data from Yahoo and NLP] -> Database
Database <-> Android App

7. Assumptions and Dependencies

- Yahoo's Stock API properly updating and allowing data to be pulled
- Twitter for Python library pulling tweets
- Firebase Database remains full of up to date information
- Google's NLP processing our data
- Our backend server processing the stock data that we push, and returning the analyzed data back
- The UI may look different on other phones than what we test on, which could be an issue if an element doesn't fit on the screen