CS6314.501-Team 3- Online Stock Market

Bulls Or Bears Investors

Team Members

Akhila Kancharana (axk180025)

Diksha Chhabra (dxc180003)

Nishitha Vellalachervu(nxv170011)

Naga Ramya Sruthi Doddi(nxd180005)

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1. Introduction

Stock market is obviously one of the most popular topics for people nowadays, but what is it anyway? It is not always clear what it is referring to. Is the stock market a place? Or is it something different? To many people it is just a totally abstract concept. The term “stock market” is actually a concept for the mechanism that enables the trading of company stocks, other securities, and derivatives.

The stock market, more specifically the New York Stock Exchange(NYSE) and the NASDAQ play a pivotal role in the American economy today. Both are signals of the strength of the private sector and consumer confidence. It is thus no surprise that more and more people want to be involved in these markets and attempt to increase their own wealth. There is however a barrier to entry for many people, both young and old in participating. That is why with Bulls Or Bears Investors we are interested in a platform for interacting with these markets and providing easier UI for stock transactions. Users can easily register with the system and begin participating immediately. They should be given an payment portal where they can perform basic market orders such as buy and sell. These orders to should mimic real market orders as closely as possible.

2. Project Description

Stock market is a trending way of doing business for a number of people around the globe. Hence, there are traders who provide platform for the users to buy/sell stock shares for various companies. Our website is named “Bulls Or Bears Investors” as Our website facilitates to buy/sell shares online, maintain a cart, keep track of his/her bought stocks and also the transactions he/she made. Our website also facilitates the admin to add/modify/delete company and see all the transactions which all the users made.

2.1. User Functionalities

2.1.1 Register

- The register page is the beginning page of our project and from there we are redirected to the login page if the registration is successful.
- There are certain fields in our registration page, where the user has to enter details such as name, username, email id, password , gender and phone number

- The user should enter a username that does not exist already , that is if it is in the database , also a valid email id should be entered or else there will a prompt saying to enter valid credentials
- Also the password rules such as the length of the password , containing special characters , upper and lower case letters should be satisfied.
- If the criteria for all the fields are satisfied , then the user is directed is to the login.php page otherwise the user is directed to the register.php

2.1.2 Login and Logout

- A user will be able to login into the website with his/her username and password.
- After successful login the user will be able to view the website else it will show the error message if the user doesn't exist or if the password is wrong.
- There is also a signup button where user is redirected to register page.
- In the logout page once the user logout his session will be disabled and redirects to the login page.

2.1.3 User Profile

- The user after login can always view his/her profile which has all the details of the user.
- He/She can edit or update their information in this page.

2.1.4 Search and Filter

- The user can search for a particular company by selecting the company name from the dropdown box in the search bar.
- The user can sort the page in either ascending and descending order of company name or price of the stock.

2.1.5 Pagination

- Pagination refers to the concept of breaking a large set of data in smaller chunks so that it can easily be absorbed both by the application and the user.
- Pagination in web applications is usually controlled by a code, which typically orders dataset items from newest to oldest.
- In Bulls or bears website, the pagination technique follows the limit of displaying six companies per page according to the sort/search filter or the style in which companies are added to database.

2.1.6 Cart/Checkout

User can select the stocks and put them into his cart for checking out all the items at once. User can update the quantity and delete items from the cart.
For checkout, there are 2 ways:

1. Single item checkout from the index page
2. Multiple item checkout from the cart page

There are options for users to select payment modes (though it is just a dummy page). All the validations for card number, etc are done in the page. After clicking Submit on checkout button, the items are bought/sold by the user.

2.1.7 Transaction History

- In the transaction, it is different for each user, we have two functions.One of them is bought and the other is sold
- The items that a particular user has bought is shown in the form of tables with other attributes such as price , the number of quantities , company name etc.
- Similarly, the items that are sold are also displayed including other details such as price, the number of quantities sold , company name etc

2.1.8 User Stocks

- This displays the list of items that are left in the inventory after buying and selling of a particular user.
- The details that are displayed are company name, number of user stocks that are left with the user.

2.1.9 Stock Prediction (Special Feature of the Website)

User can see a 'predicted' price for the next day for each stock shown on the website. We used the Markov Model to make the prediction.
Markov Model:

- The Markov process is a random process characterized as memory less: the next state depends only on the current state and not on the sequence of events that preceded it.
- A sequence of states: X1, X2, X3, … such that P(Xk+1 = y|X1 = x1…..,Xk = xk) = P(Xk+1 = y|Xk = xk) P(Xk+1 = y | Xk = x) = P(X2 = y |X1 = x)
- The transition from X_{t-1} to X_t depends only on X_{t-1} (Markov Property).
- Markov chains are often described by a directed graph, where the edges are labelled by the probabilities of going from one state to the other states.

For this:

- We have collected 1 year of data to train HMM(Hidden Markov Models) for each company and stored in the database **(from NASDAQ Website). → Put reference**
- The first thing we did was to apply moving averages to create an approximate evaluation of the data.
- We then found a difference data set to apply Markov Chains to. We took the difference of the closing price and the moving average price. These differences were going to be what we applied Markov Chains to.
- Using the difference between the forecasted and actual prices enabled us to make our predictions for the possibility of where future prices may lie. These moving averages were calculated for both opening and closing prices for an interval (called i) of 3 days.
- After the moving averages were calculated for the set of stock prices, the difference between each actual price and the moving average of each individual day was calculated. This information is what we would use to predict future stock prices.
- We then focused on binning each of the difference prices into four intervals set within the larger interval from the lowest difference price to the highest difference price.
- The bins were calculated using the following formula: K = sqrt(N), where K is the total number of bins and N stands for the total number of readings taken into consideration.
- The width of each bin is calculated using the following formula, w = (max value – min value) / K, where ‘max value’ and ‘min value’ refers to the max and min of the difference (between the actual value and the moving average).
- The intervals were then calculated based on quartile calculations (i.e at intervals of N/4, 2N/4 and 3N/4).
- Each of the intervals was labelled P1, P2, P3, P4 respectively.
- After the intervals were established for each data set of difference prices, each individual difference price was labelled as to which interval it fell in.
- Once each difference price was labelled with its corresponding interval, the number of transitions for each individual difference price interval to the next difference price interval was counted. The number of points belonging to each interval was also recorded.
- After this, the transition matrix was developed where each entry of the matrix is supposed to be the probability of the data points moving from, or transitioning from, one state to another, with the states corresponding to the appropriate rows and columns.
- Our transition matrix is represented by Q.

- We iteratively compute Q2, Q3, Q4, ……., Q8.
- Then we have considered the steady state probability of being in a particular state as 1, that is, we form 4 steady state probability matrices to tell us the probability or possibility of the stock price lying in a particular range.
- Hence, We compute the ‘steady state probability of the main matrix lying in the all the intervals, P1, P2, P3, P4. and whichever is higher represents the price for tomorrow for that stock.

2.2. Administrator Functionalities

Administrator is one more user who has access to all pages like any other user and also has specific privileges to more pages related to maintenance of data in the website. The admin who has knowledge related to stock market, can create new companies to start sales for that specific company. The admin can also view the present companies present in the website. He can edit/delete information for a specific company. The administrator can also view the sales happened in the past and check the bought and sold stocks for individual companies.

2.2.1. View All Stocks

- View All stock functionalities is an admin privilege page which is used to view all companies added by the admin.
- This page shows a table of companies which has company name, descrition, NASDAQ symbol.
- The admin can select any company to edit by using pencil icon or can delete the company by clicking on the trash icon.
- Once the company is deleted, the company is removed from the company UI table, but it is soft deleted from the company table in database.

2.2.2. Add New Stocks

- The Add new stocks functionality is an admin privilege page which is used to add new companies to database.
- This page has a form which is to add name, NASDAQ symbol, description of company, and choose image.
- On clicking save button, we can save the companies to database. On clicking reset button, the page will reset.

2.2.3. Delete Stock

- Admin can delete a company from the website. In the view companies page there is delete icon beside every company this button enables him to delete the company from the website.
- The company deleted will not be viewed in the website, but it doesn't delete in the database. This is done by adding a flag value in the database.

2.2.4 Update Stock

- Admin can anytime update the details of a company in the website with the select button in the view companies page.
- The page has form containing all the details of a company - company name, NASDAQ symbol, description of the company and button to choose the image file.
- All these details will be updated in the database and are reflected in the website.

2.2.5 Sales History

- Admin can view the complete sales and transactions made in the website by all the users.
- Admin can see the total bought stock and sold stock separately with the details containing company name, number of transactions, price and quantity of stocks.

2.3 Restrictions

- Once a company is added, refresh button should be clicked to get the stock data like price, open, high low etc.,
- If a new stock is added, then it's prediction won't be shown since it's past data is not available and needs to be downloaded.
- User has to click on refresh button to update the stock data like the price, open, high low etc., as we have a limited number of api calls for a free version.
- There is only a single admin with username 'admin'.
- The company image name should be same as the company name.
- The image should not be present in the img folder, before adding it.
- The stock market stops at 4pm. So after that no price updates would be seen and also no change in up arrows(showing price increase on index page).

3. Database Design

Person

id	name	gender	username	email	pass	phone	delete_flag

PK → id

Company

id	name	description	symbol	image	delete_flag

PK→ id

Company_details

company_id	price	open	high	low	last_trade_day	previous_close	difference	delete_flag

PK and FK → company_id

Cart

id	userId	company_id	total_price	buy_sell	quantity	delete_flag

PK→ id , FK→userId, companyId

User_stocks

id	userId	companyId	num_shares	delete_flag

PK→ id, FK→ userId,companyId

User_transaction

id	userId	amount	transactionDate	paymentMode	delete_flag

PK→ id, FK→ userId

Transaction_details

id	transactionId	companyId	price	buy_sell	quantity	delete_flag

PK→ id, FK→ transactionId, companyId

4. Languages and Software

Frontend:

1) HTML5
2) CSS3
3) Bootstrap - v4.1.3
4) Javascript - v3.3.1
5) JQuery - v3.3.1
6) AJAX - v3.3.1

Backend:

1) Php 5 - v5.6
2) MySQL(phpMyAdmin) - v5.0.12

IDE:

1) JetBrains PhpStorm - v2018.3.5

Server:

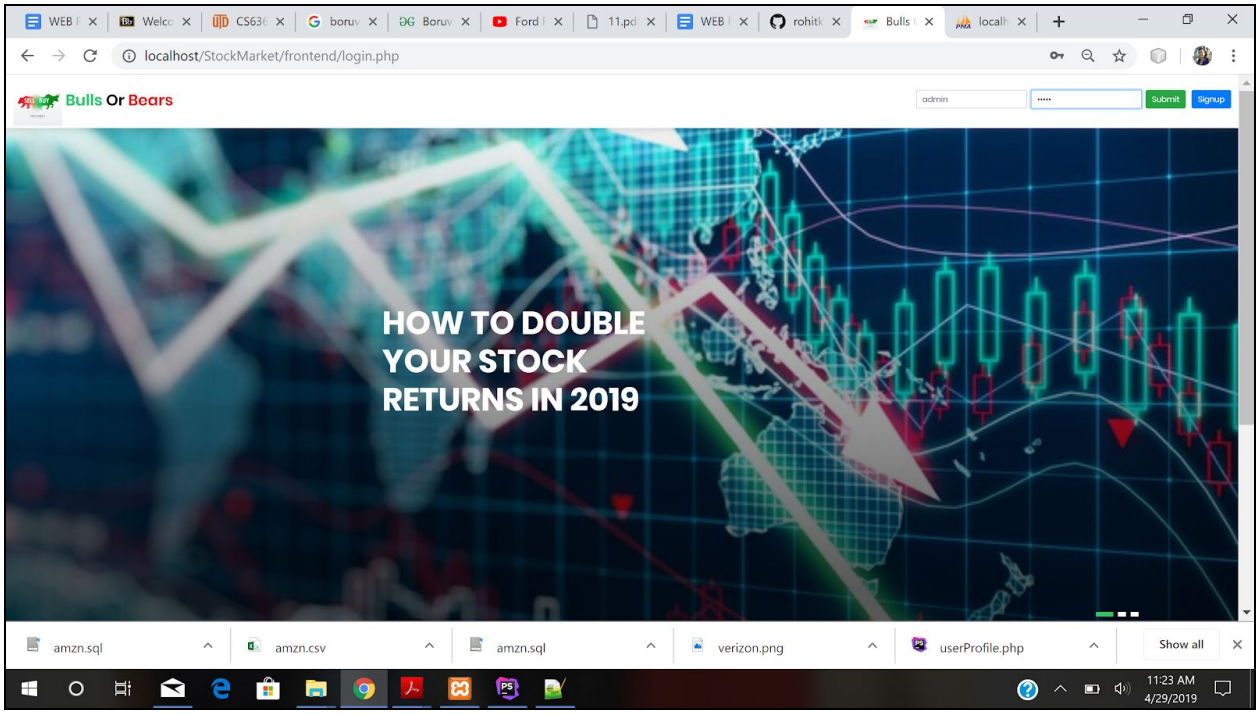
1) XAMPP - v7.3.3

Version Control:

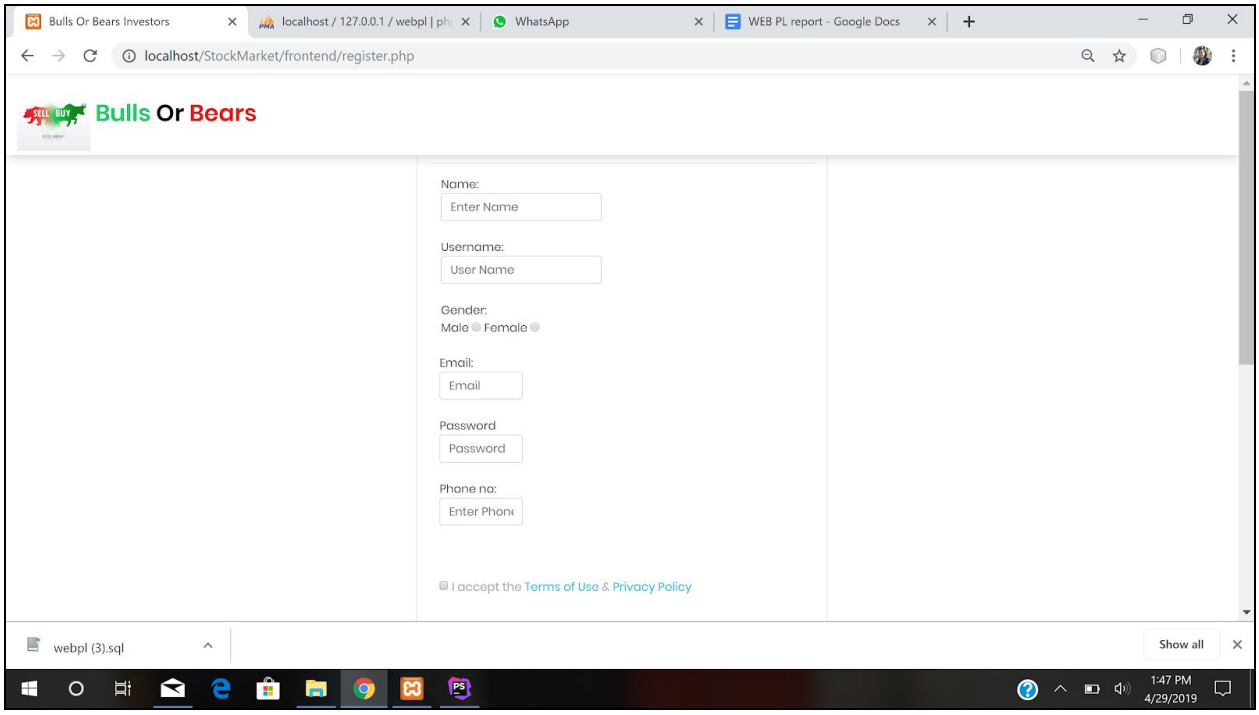
1) GitHub

5. Screenshots

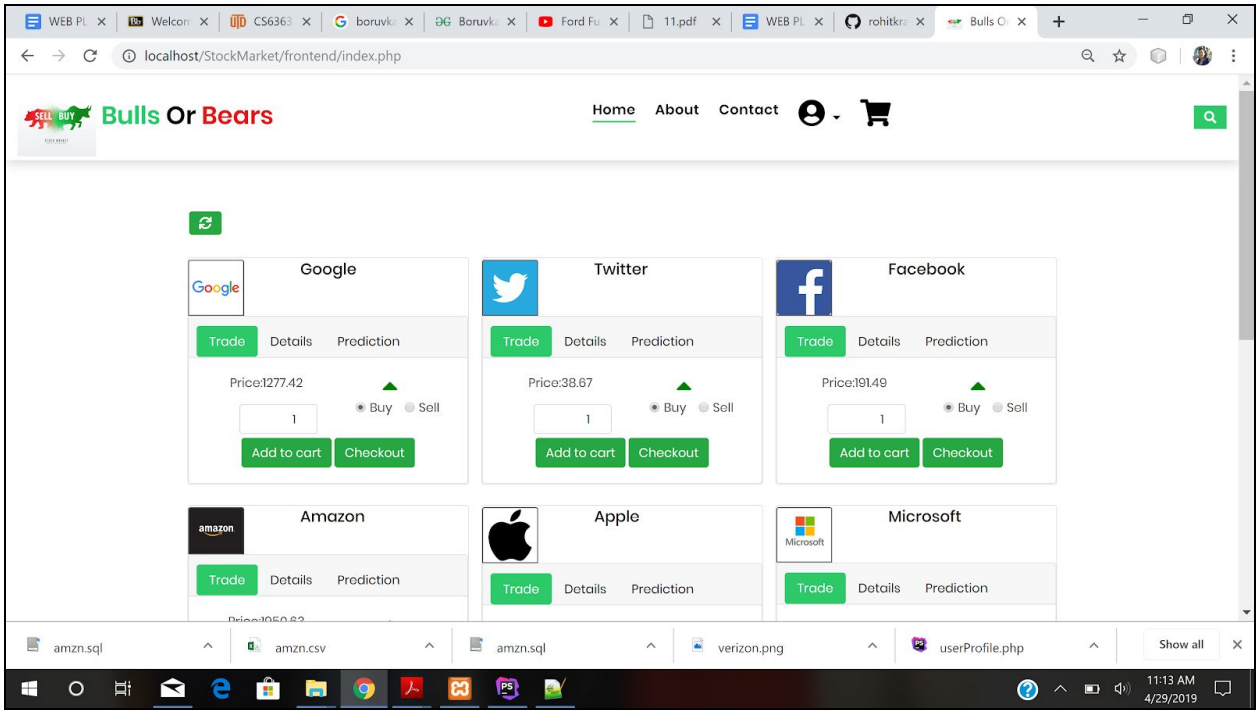
1.a. Login Page



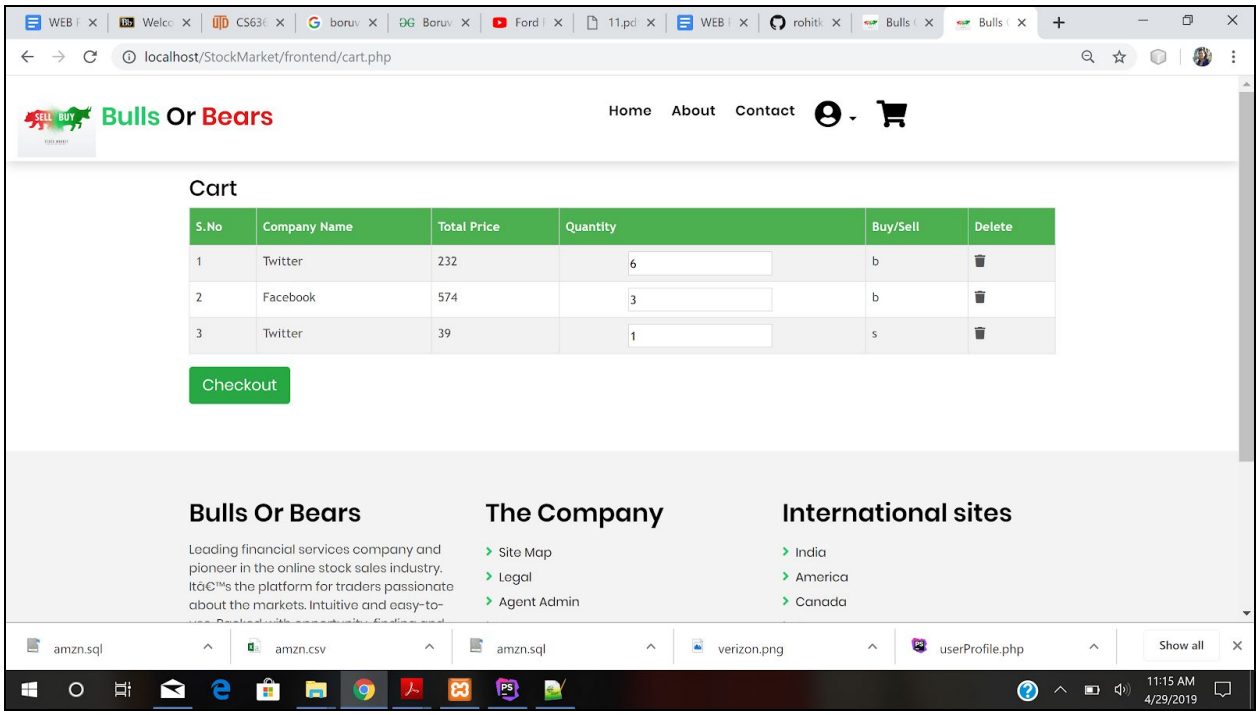
1.b. Register



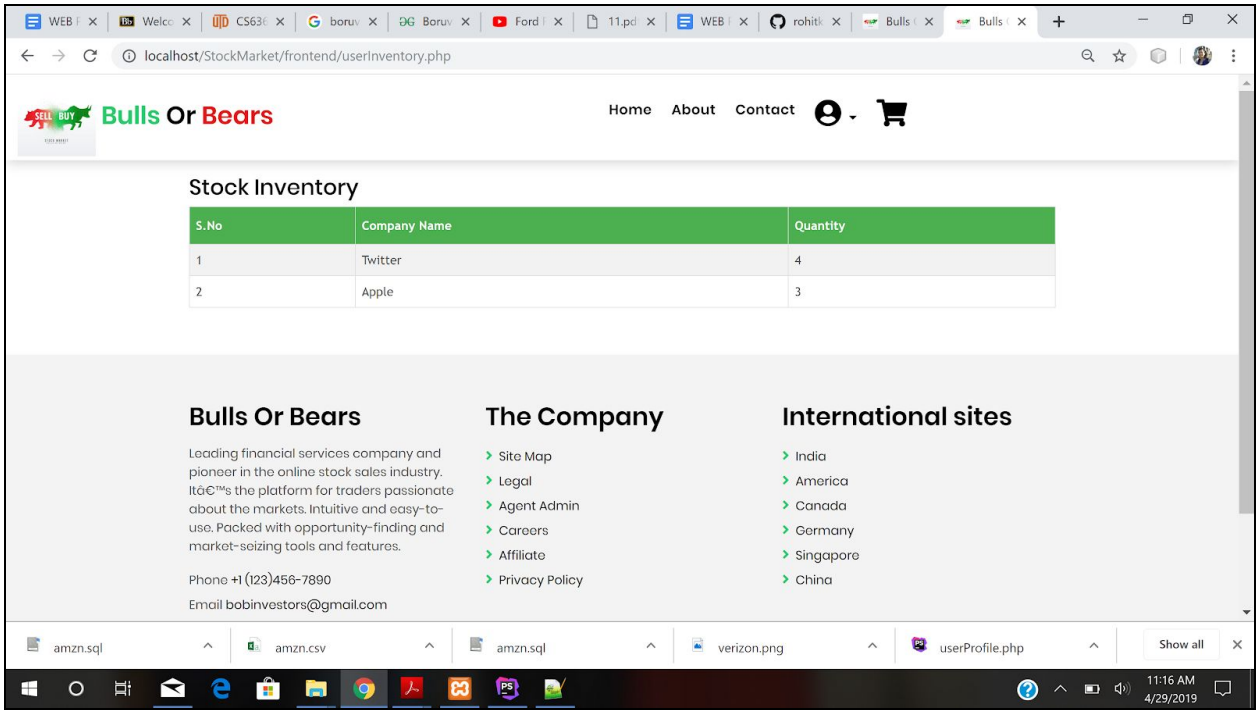
2. Index Page



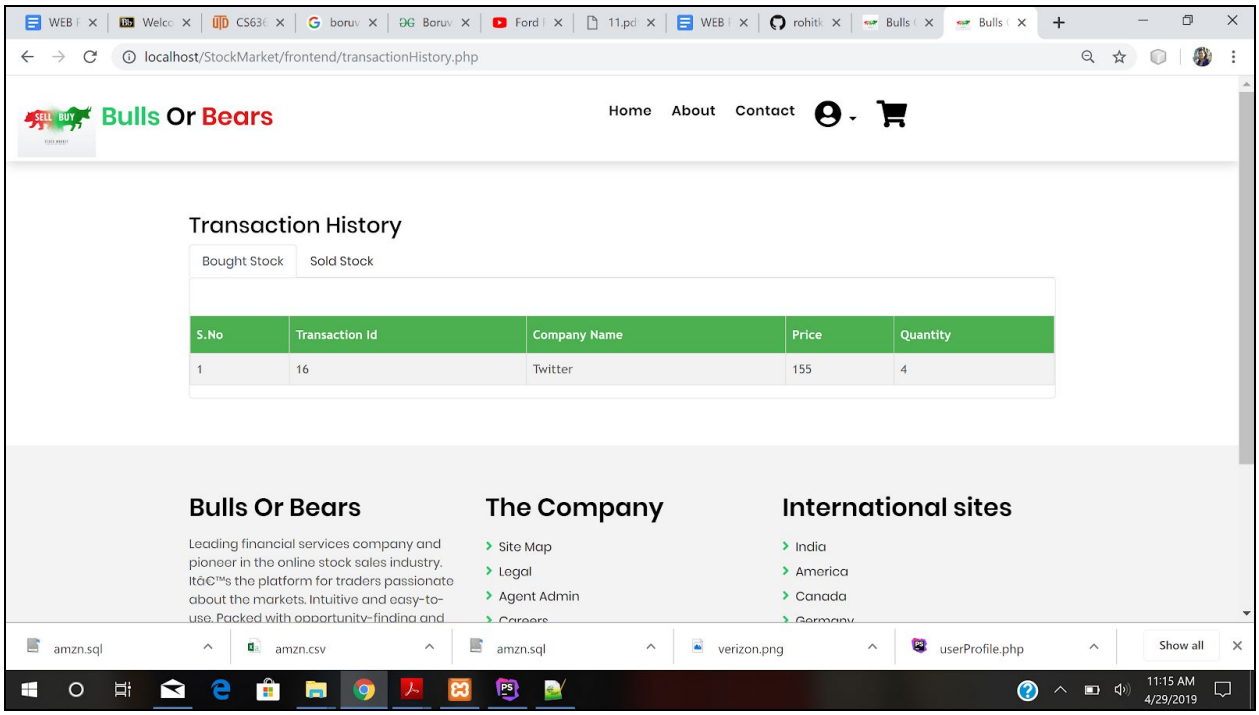
3. Cart



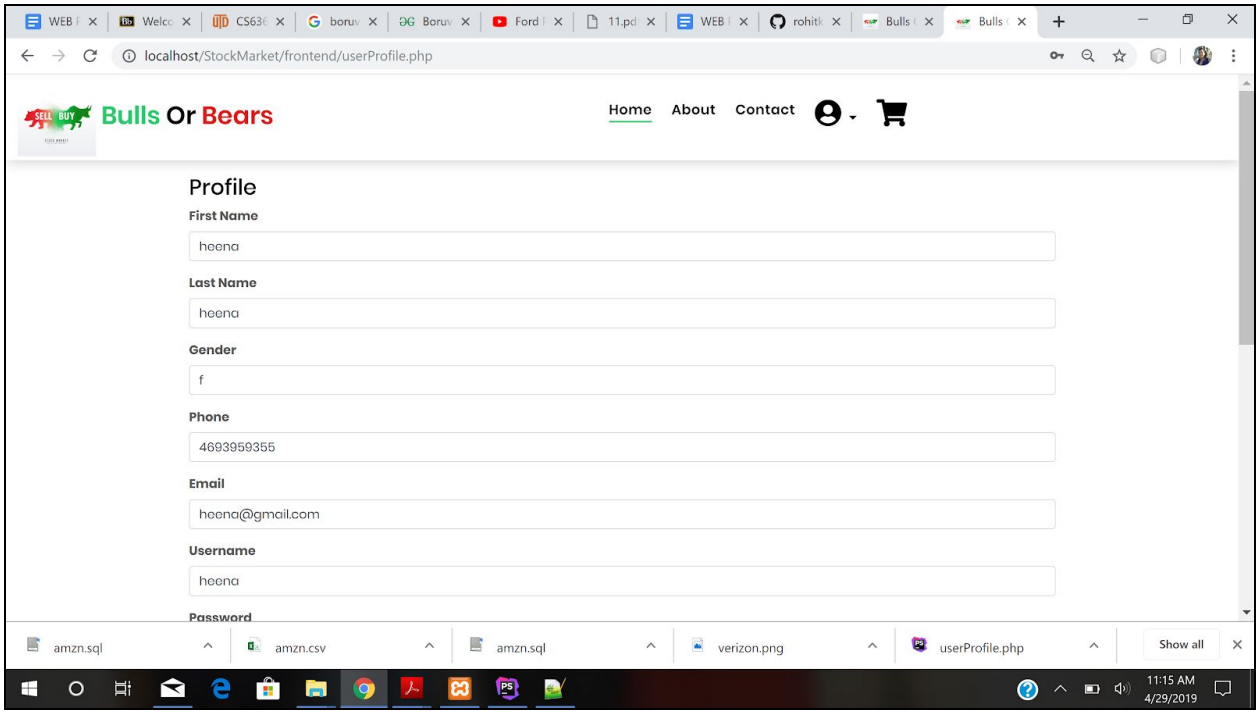
4. Stock Inventory



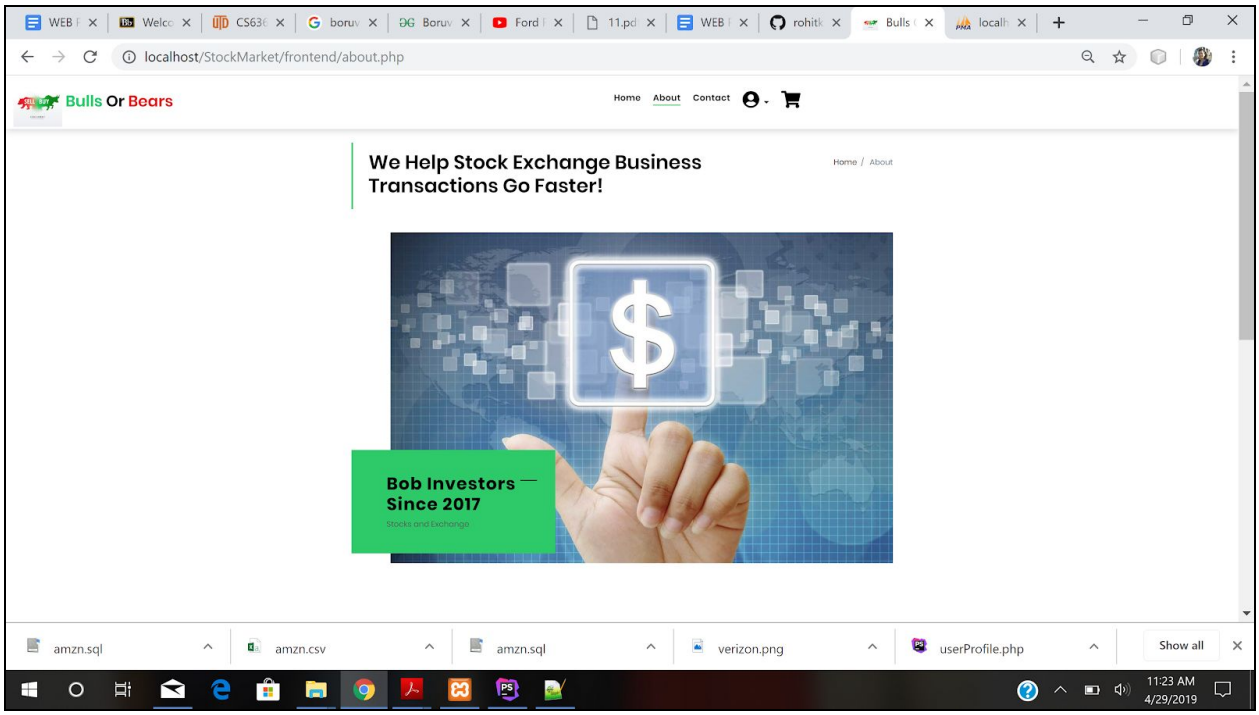
5. Transaction History



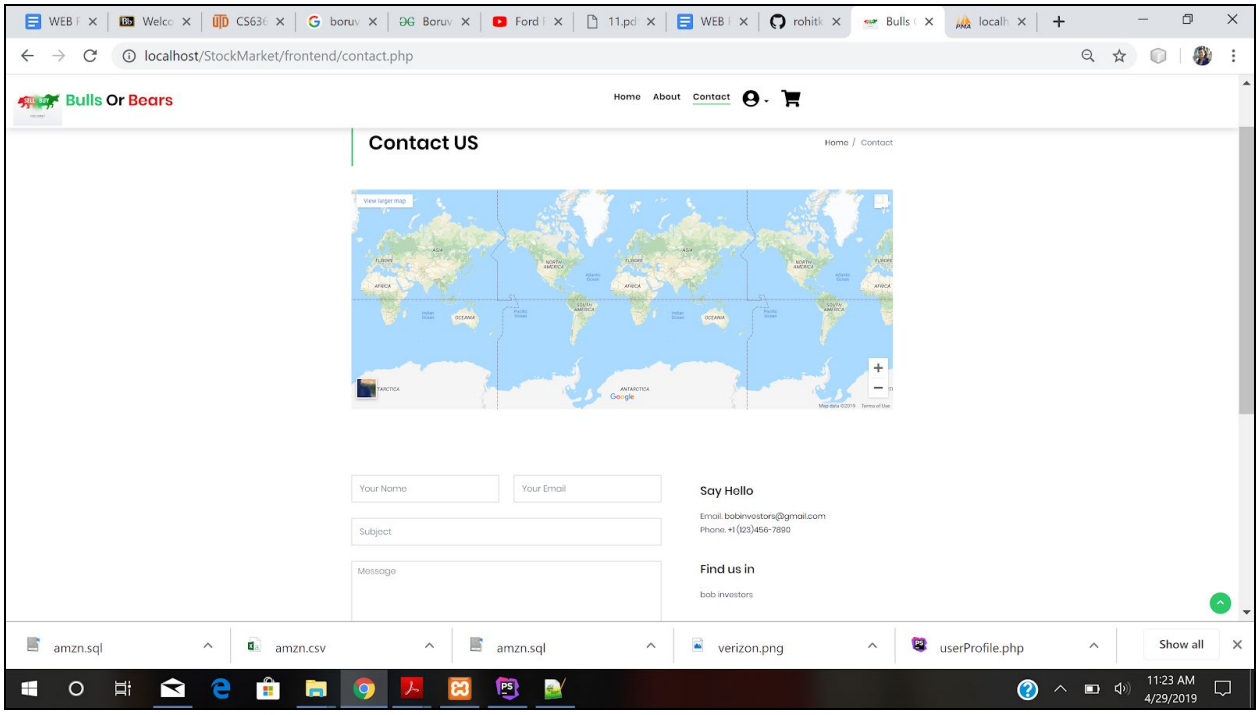
6. User Profile



7. About Page

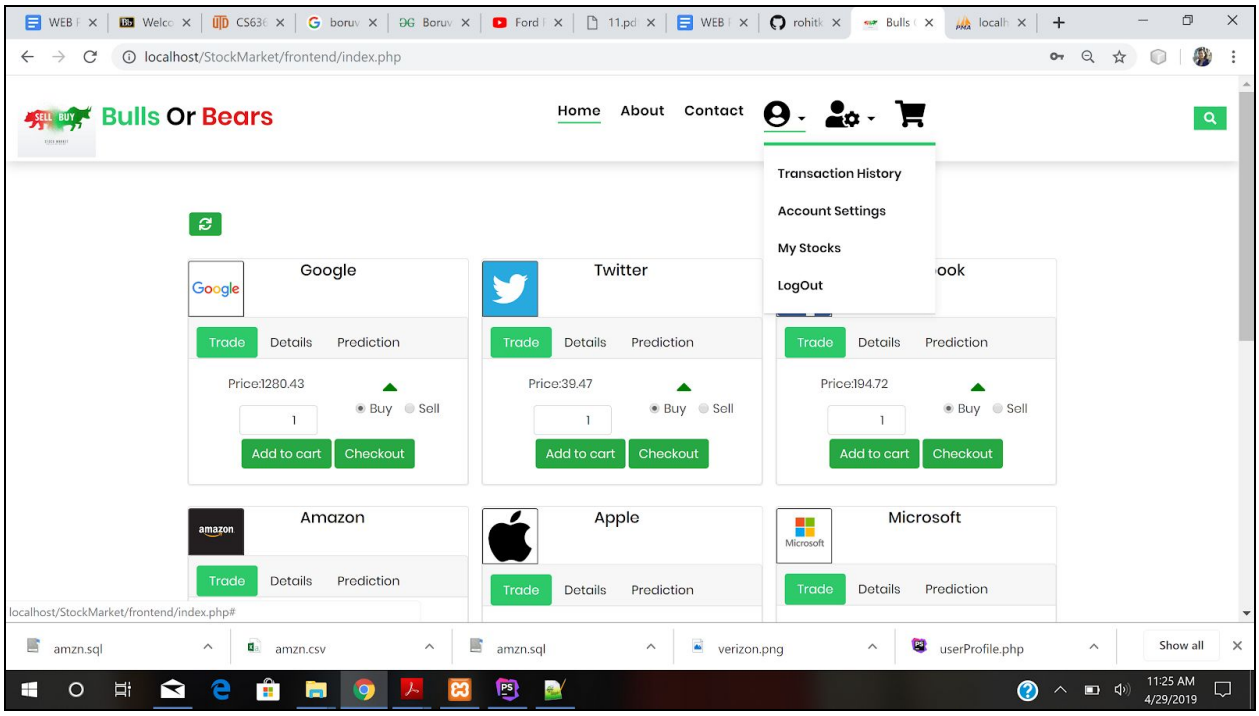


8.Contact us Page

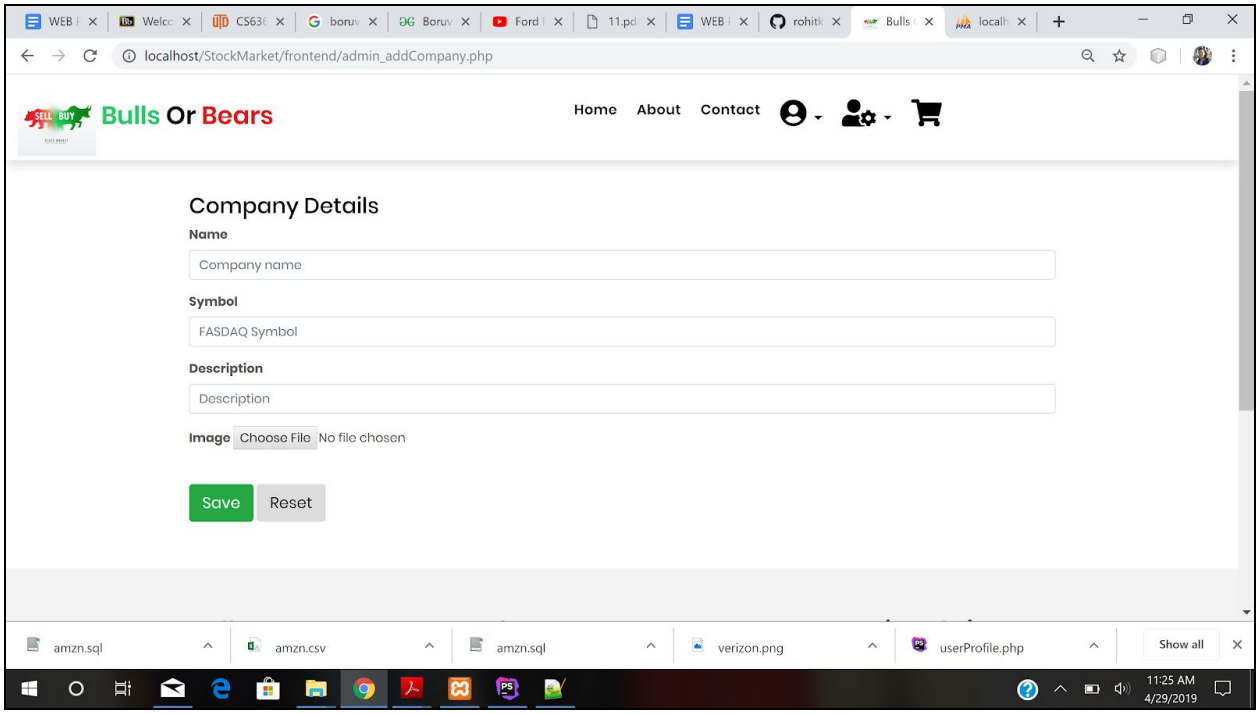


Admin Functionalities:

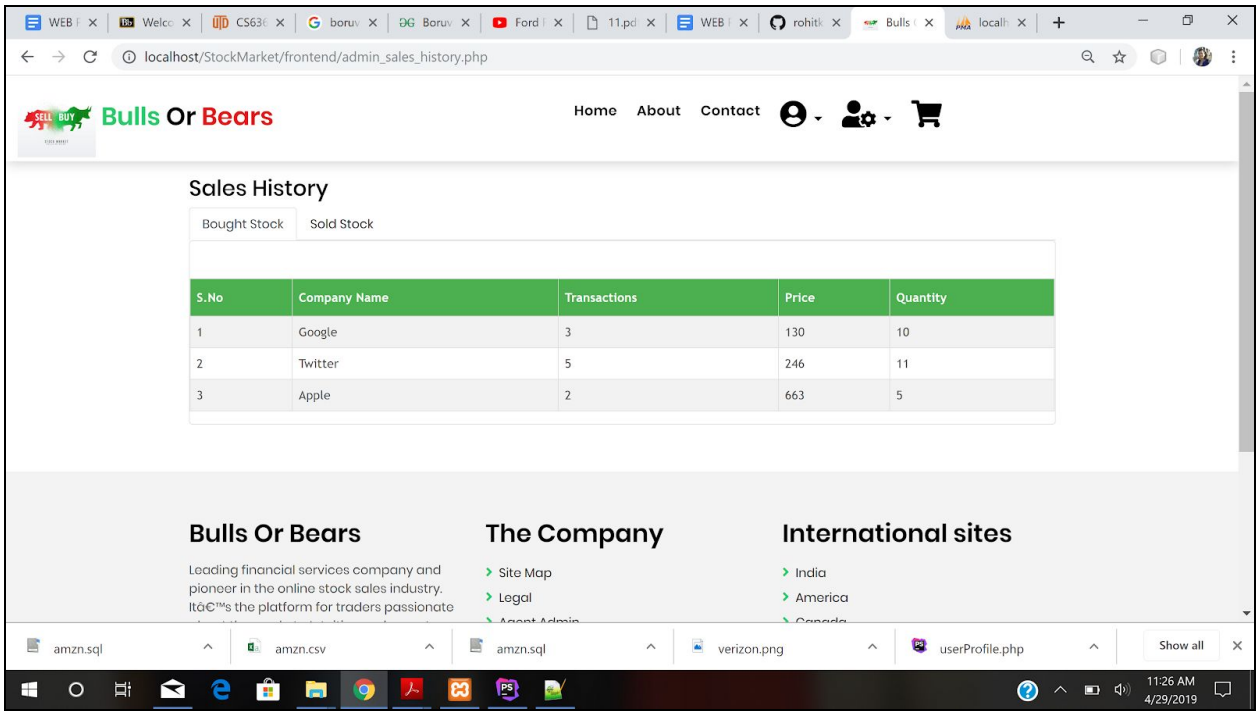
1. Index Page



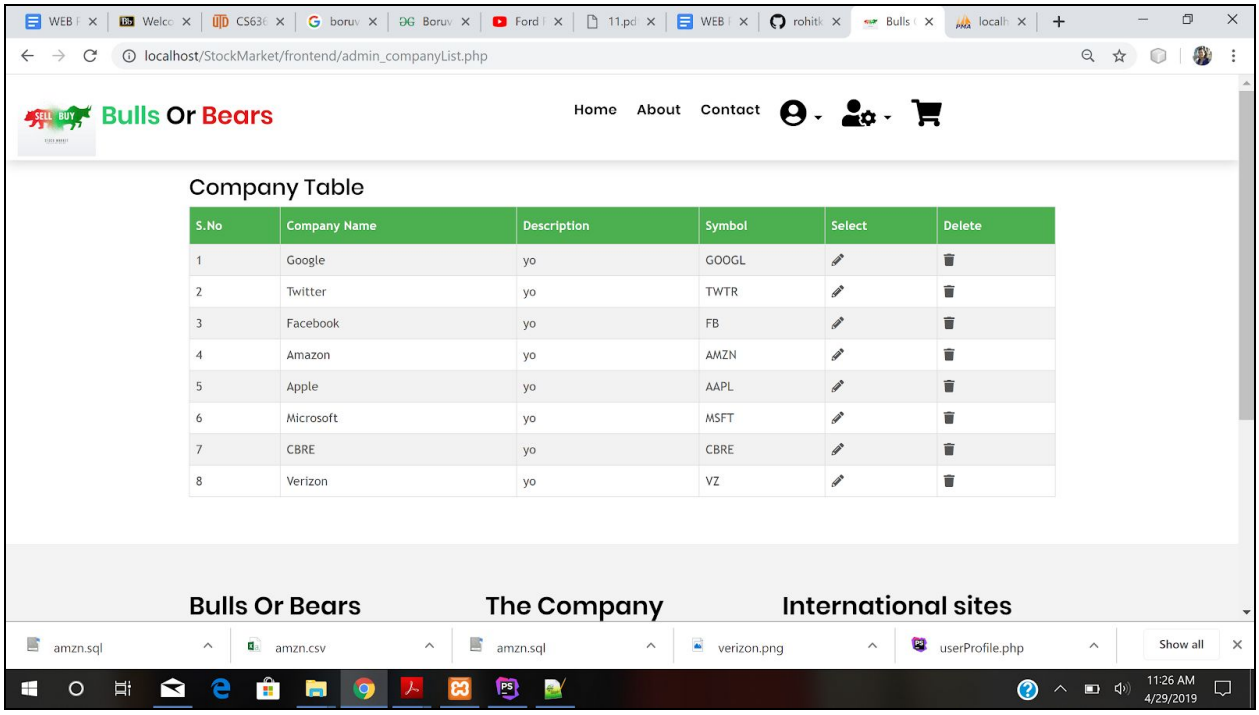
2. Add New Company



3. View Sales History



4. View/Edit all companies



6. Team Members and Work Division

1) Akhila Kancharana → Cart, User Payment, Index Page, Pagination, Payment Page, Admin Pages, Contact Page, About Page, DB Design
2) Diksha Chhabra → Index Page, Pagination, Payment page, User transaction history, Admin pages, Stock Prediction, DB Design
3) Nishitha → Sessions , Registration , code testing, Db Design
4) Ramya Sruthi → Login, Logout, User Profile and code testing, Db Design

7. References

1. https://www.nasdaq.com/quotes/historical-quotes.aspx
2. https://pypi.org/project/iexfinance/
3. https://www.w3schools.com/
4. https://www.jetbrains.com/phpstorm/