AN ONLINE WEB STREAMING SERVICE FOR BITCOIN EXCHANGES

Project Progress

THE UNIVERSITY OF SYDNEY

Information Technology Capstone Project

COMP5703

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1. PROGRESS & ACHIEVEMENTS

This progress status report will only be addressing the progress status of the main deliverable of this project (the web application) and defined in the proposal as

"A Web Application allowing the comparison of cryptocurrencies market data (price, volume, and liquidity of order books) for the BTC/USD pair from two different exchanges by using different visualisation techniques such as candle and market depth charts."

Progress Status

A list of screenshots showing the current state of the web application is provided below.

A detailed list of what has been completed, and what has not, has also been provided below. Uncompleted tasks are provided with an estimate of their completion rate.

Screenshots

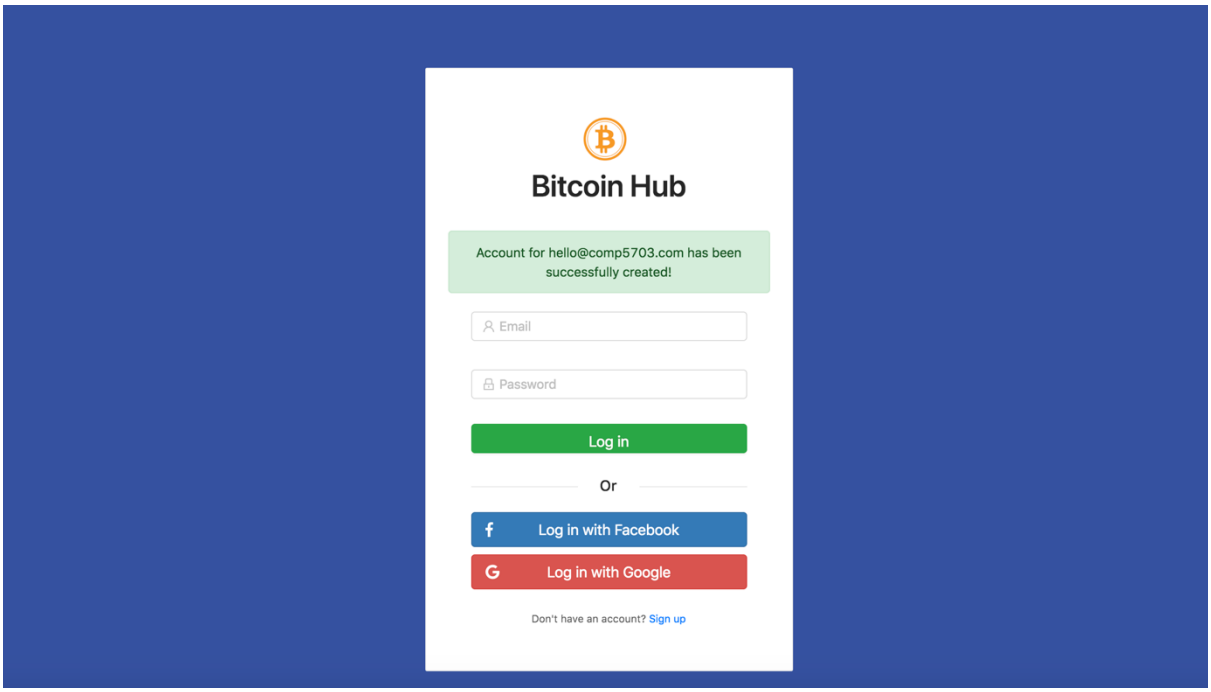

Figure 1: Login Screen Showing a Successful Registration Message

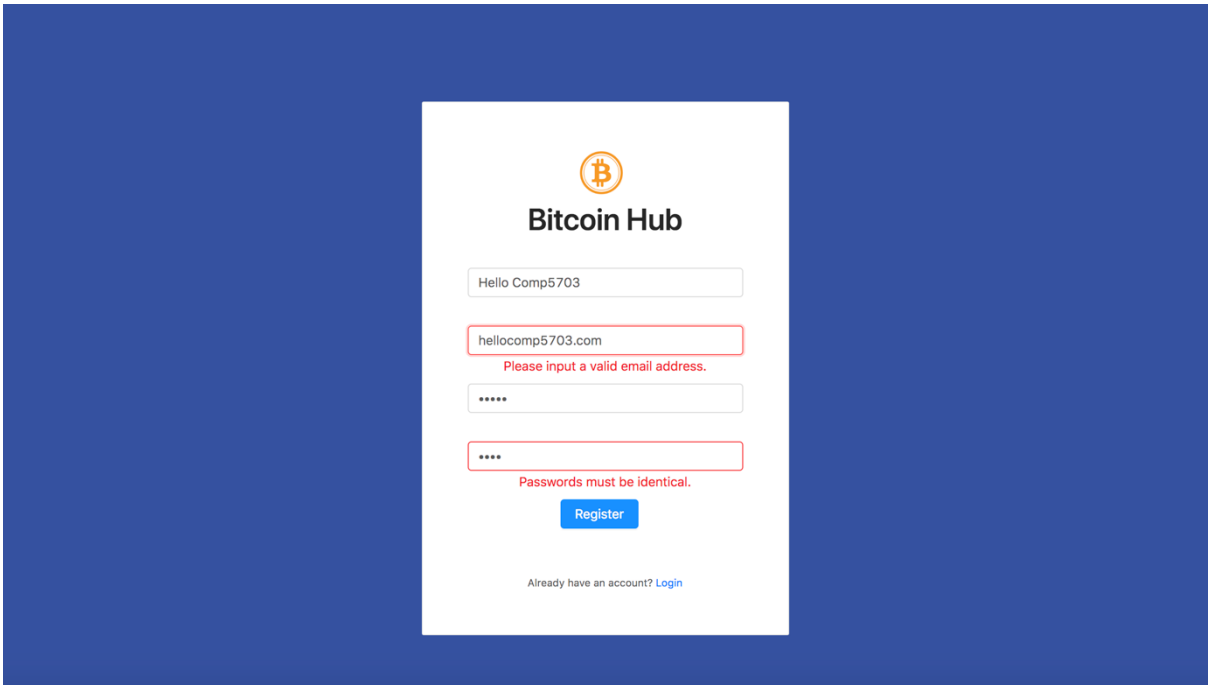

Figure 2: Registration Page Showing Input Checks

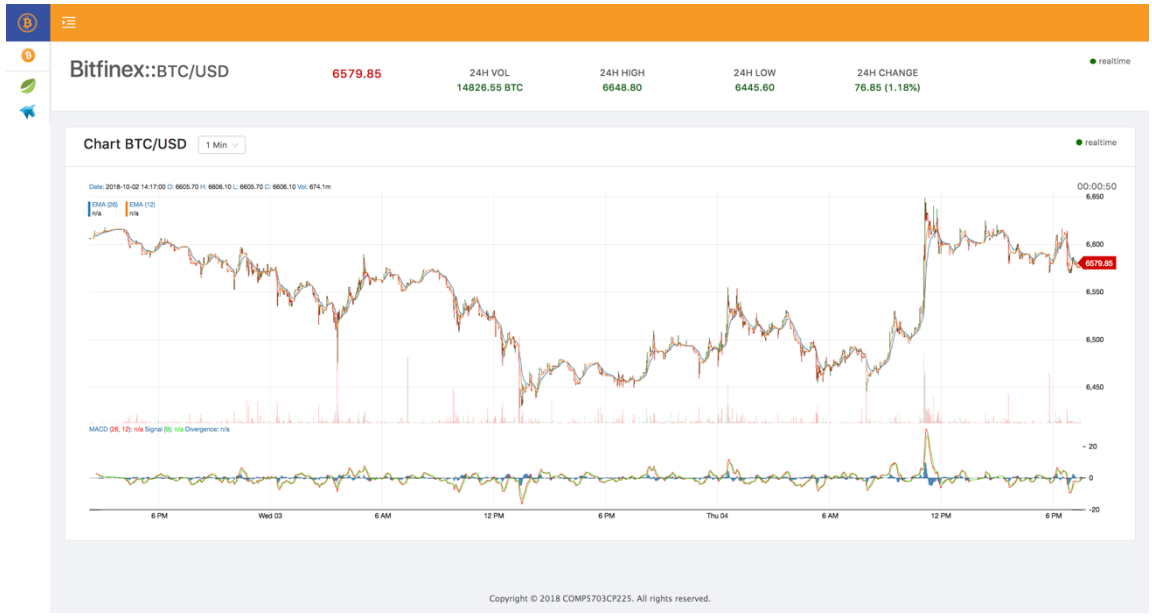

Figure 3: Market Info Screen for Bitfinex – BTC/USD

Figure 4: Real-time Indicator - connected (left) disconnected (right)

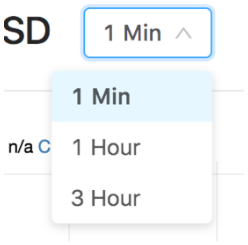

Figure 5: Dropdown Box to Switch Between Candlestick Chart Intervals

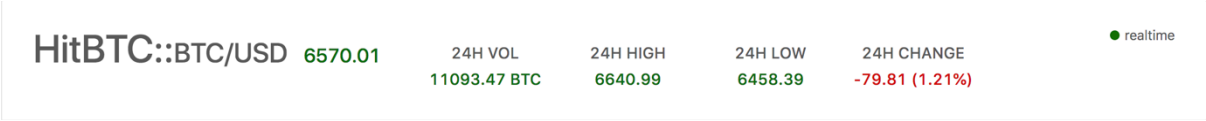

Figure 6: HitBTC Basic Real-time Market Info Data

Completed

1) The application has a login and registration page with feedback messages and input checks (Figure 1 and Figure 2).

2) The application is retrieving, processing, and storing in a database, real-time and historical financial data (price and volume) for the BTC/USD market for the Bitfinex exchange. This includes both basic market data and data necessary to draw candle stick charts (Figure 3).

3) The application is retrieving, processing, and storing basic market data in real-time for the BTC/USD market from HitBTC (Figure 6).

4) The application has functions and fail safes to ensure the integrity and completeness of the data retrieved from the exchanges.

5) The application has a real-time API to provide real-time basic market data to the interface for Bitfinex and HitBTC (Figure 6).

6) The application has a real-time API to provide the interface with the necessary data to draw candlestick charts for three intervals: 1 minutes, 1 hour, and 3 hours (Figure 3 and Figure 5).

7) The application has “real-time indicators” to inform users of the real-time status of the data (Figure 4).

8) The interface provides basic market data for Bitfinex and HitBTC: current price, volume in 24h, lowest price in 24h, etc. (Figure 3 and Figure 6).

9) The interface has a candle stick chart with different indicators (MACD, moving averages) combined with a volume chart (Figure 3).

10) The candlestick chart can be zoomed and panned.

11) A dropdown box is provided for users to switch between different interval for the candlestick chart (Figure 5).

12) The different components are colour coded to allow users to know if prices are up or down with a quick glance.

13) The interface has been created with React to allow reduced loading times between pages for a better user experience.

14) The layout and colour scheme of the user interface have been chosen to be appealing to users.

Uncompleted:

1) Retrieval and storage of the order book data for BTC/USD from the Bitfinex exchange (50% completed).

2) Retrieval of price and volume data from the HitBTC exchange (80 % completed).

3) Retrieval and storage of the order book data for BTC/USD for the HitBTC exchange (50% completed).

4) Orderbooks visualisations components (10 % completed).

5) Retrieval of market info from coinmarketcap.com (0 % completed)

6) Dashboard Page (10 % completed).

7) Profile Page (10 % completed).

8) Social media logins integration (70% completed).

2. OBSTACLES

The obstacles in this project are mostly technical. The team is inexperienced and decided to take on many challenges with this project. A list of the main technical challenges encountered is provided below:

1) React

The team wanted to use a JavaScript library called React to build the interface of the application. Using React would provide a better user experience by reducing loading times between pages and allow for a more responsive and dynamic application. No one in the team had any experience using React and a lot of hours had to be spent learning it.

Tools related to building with React (such as Webpack) also had to be learned.

Finally, there was also some confusion and discussion on how to arrange the structure of code and where it would be placed in regard to the back-end code.

2) Real-time data

The team wanted to (a) store real-time data and (b) provide real-time data to the interface of the application. WebSocket was the technology chosen for that because of its suitability. Again, the team had no experience using that technology. We had to go through different iterations and test different implementations of that technology. Different implementation provides different "built-in" features such as namespaces and rooms that we did not know we would need at the start of the project. Finally, Socket.io and WS were the chosen implementations.

3) Real-time Candlestick Chart / Charts

One of the main features of the application are charts. The team wanted to include a candlestick chart, that would be fed real-time data and be updated in real-time. We went through many different libraries before finding the ones used now (react-stockcharts). Previous libraries were either too complex or not easily customisable to achieve what we wanted to do. A lot of trials and experiments were involved in this process. It also took some time to figure out how to update the data of the chart in real-time while also displaying and keeping previous historical data, without resending the whole dataset for every update.

There are still challenges left concerning charts such as the amount of data being able to be sent/displayed at one time.

4) Social Media Logins

The team wanted the application to allow users to use their social media accounts to login. The original social websites chosen (Facebook and Twitter) had extra requirements that could not be met (privacy policy, strict usage of the https protocol, etc). We decided to switch into Google and GitHub which do not have such restrictions.

5) General Learning Curve / Misallocated Resources

As described above, lack of experience combined with a steep learning curve associated with learning new technologies were big obstacles to this project. Some communication issues with team members regarding the actual completion, or not, of some tasks were also involved. Both resulted in a misallocation of resources for the completion of critical tasks which eventually led to a delay of both the critical tasks and their dependencies.

These issues were eventually resolved. Resources were reallocated in order to have to the project back on schedule.

3. DEVIATION TO TIMELINE

A list of the main tasks that experienced delays or modification of the timeline is provided below. Most of the deviations below originated from the delay of a few tasks on the critical path. As a result, tasks depending on the completion of the critical tasks were delayed.

1) Storage of Real-time and Historical Financial Data

a) Candlestick Chart Data

Planned Completion: End of Sprint 1
Actual Completion: End of Sprint 2 (for Bitfinex)

This task was on the critical path. It was a pre-requisite for a lot of tasks, some of which are mentioned below. This task has been delayed because of technical difficulties. Once this issue has been confirmed, more resources were allocated to this task to have it completed as quickly as possible. Part of it has been reassigned.

b) Order Book Data

Planned Completion: End of Sprint 2
Actual Completion: N/A

As with the task above, technical difficulties arose. Also, priority was given to the storage of the candle chart data before starting this task. The candle chart storage tasks got delayed resulting in a delay of the start of this task.

This task should be close to completion now. If it is not the case, more resources will have to be allocated quickly as this task now needs to be done by the end of sprint 3 at the latest.

2) React Visualisation Components

a) Candlestick Chart

Planned Completion: End of Sprint 2
Actual Completion: Middle of Sprint 3

The first working version of the candlestick chart component was scheduled to be ready by the end of sprint 2. This was not the case. The back-end functions supporting that component were not ready. This resulted in complications in the development and testing of this already difficult to make component (as mentioned in the previous section).
This task was quickly completed once the dependency issue was resolved.

b) Order book Visualisations (Tables and Market Depth Chart)

Planned Completion: End of Sprint 2
Actual Completion: N/A

The delivery of the initial iteration of an order book visualisation component was planned to be ready at the end of sprint 2. Unfortunately, this task was delayed as the back-end functions supporting that component were not ready.

Additionally, difficulty arose with the creation of the candlestick chart component mentioned above. Available resources were focused on resolving issues with the candlestick chart component first.

3) Social Logins

Planned Completion: End of Sprint 1-2
Actual Completion: N/A

The ability for users to login using social media accounts was originally planned to be delivered as early as the end of sprint 1 or 2. Unfortunately, complications (detailed in the previous section) with the implementation of that function appeared.

Additionally, difficulties in other critical areas forced the team to focus on those areas first as they had a higher priority. As a result, this task has been bumped down the list.

4. TIMELINE

As explained in the project proposal, the project follows an agile methodology. Specific tasks done during each sprint are assigned at the start of the sprint. The start and end of the development sprints have not changed since this project has a fixed deadline.

Section 4.2 provides an overview of tasks that were assigned in previous sprints but couldn't be completed during that sprint.

A more detailed list of the remaining tasks of the project and their estimated completion rate can be found in section 1.

4.1 Milestones

Milestone	Description	Planned Date
Project Start-Up Session Completed – Initial Product Backlog Created	The team has been formed and understands the objectives of the project. High-level design decisions have been completed. Initial set of features to start development iterations	29/08/2018
Project Proposal Submission and Approval	The project proposal submitted has been approved.	Week 5 (27/10/2018 – 02/11/2018)

Start of Development Iterations	See Section 4.2 for more details.	29/08/2018
Progress Report	Progress report on obstacles encountered, deviation to the planned timeline, etc.	05/10/2018 by 5pm
End of Development Iterations	See Section 4.2 for more details.	22/10/2018
Web Application Demonstration to Clients	Presentation to clients of the final release of the web application.	Week 13 (22/10/2018 - 26/10/2018)
Final Release to Clients Submitted	The files for the final release of the web application have been transferred to the clients. Project can be closed.	26/10/2018 by 5pm
Final Report	More details will be provided in a later stage of the project.	26/10/2018 by 5pm

4.2 Sprints

Iteration	Description	Start Date	End Date
Sprint 1	▪ Account creation and registration functions. ▪ Basic layout implementation. ▪ First test implementation of candlestick chart. ▪ ~~Storage of Candlestick chart data for Bitfinex.~~ ⇨ **Technical difficulties. Not delivered on time. Moved to Sprint 2.** ▪ ~~Storage of Candlestick chart data for HitBTC.~~	29/08/2018	12/09/2018

	⇨ **Technical difficulties. Not delivered on time. Moved to Sprint 2.** ▪ ~~Social Logins.~~ ⇨ **Technical difficulties Moved to Sprint 2.**		
Sprint 2	▪ Front-end interface enhancements. ▪ Storage of candlestick chart data for Bitfinex. ⇨ **Task reassigned.** ▪ ~~Storage of Candlestick chart data for HitBTC.~~ ⇨ **Not completed on time.** ▪ Storage of order book data for Bitfinex and HitBTC. ⇨ **Moved to Sprint 3.** ▪ Order book visualisation component ⇨ **Moved to Sprint 3. Pre-requisite not completed** ▪ WebSocket APIs for front-end. ▪ ~~Social Logins.~~ ⇨ **Resource reassigned to Higher Priority Task. Moved to Sprint 3.** ▪ First iteration of Candlestick chart. ⇨ **Delayed – pre-requisite task not completed on time. Using test data to try to make up for it.**	12/09/2018	26/09/2018
Sprint 3	Optional features implementation. ▪ Social Logins ▪ Profile page. ▪ Front-end enhancements (done) ▪ Login and registration component improvement (done)	26/09/2018	10/10/2018

	▪ Bitfinex historical and real-time candlestick data storage (done) ▪ Candlestick chart component (done) ▪ Market info component (done) ▪ Candlestick chart and market info component API for frontend (done) ▪ HitBTC historical and real-time Candlestick data storage ▪ Bitfinex and HitBTC order book data storage. ▪ Orderbook visualisation components. ▪ Dashboard page		
Sprint 4	Web application finalisation.	10/10/2018	22/10/2018

4.3 Gantt Chart