

# **COMP4601 - Final Project**

**Alexander Nguyen (100908039)**

**Redwan Wadud (100873111)**

**4/16/2020**

## **Abstract**

A simplified cryptocurrency portfolio tracking application with an easy to use interface. Users now have the essential tools to completely manage their cryptocurrency portfolio all in one place. Supporting over 100 of the top cryptocurrencies, users will receive real-time data from reputable crypto market sites. From Bitcoin, Ethereum, Ripple, Litecoin and many more, access to real-time prices and market information will ensure users never miss out on their next investment opportunity. Simplifying the investor portfolio, investors of all skill levels can have full control over their cryptocurrency holdings, even allowing them to track their investments in their desired real-world currency.

## **Introduction**

Whether you are selling the highs or buying back the lows, being organized is essential for any crypto investor trying to stay up to date with current market trends. Gone are the days of manual excel sheets entry, having a reliable crypto portfolio tracker has become a staple tool in any investors success.

With hundreds of trackers made available, having a good portfolio management system is crucial for making justifiable investment decisions. However, trying out all the available apps and software to find the most suitable is not a practical solution.

Our goal for this project is to simplify the cryptocurrency portfolio management tracker to the essentials. Creating an application that will accommodate investors of all levels. Utilizing many of the strategies and techniques taught in COMP4601, our application will sophisticatedly crawl and fetch real-time data from cryptocurrency market cap ranking sites, present the live data in a user-friendly manner using RESTful API and web services giving the users a clear view of their investments in real-time. As a potential bonus feature, we will discuss the possibility of incorporating a recommendation system to allow users to connect with one another.

Throughout this report, we will explore the different aspects of our application and provide a breakdown of the implementation of the system. To start, we will include prerequisite information that users should first understand. We will then explore a company that is leading the industry in customizable portfolio management trackers and investigate what makes them a success.

After that, we will provide a detailed description of our solution to the common problem of overcomplicated investment tools, here we will include material such as requirements,

architecture, and testing for a pure software problem. This report will also provide data analysis as well as the algorithms and methodology used for analyzing performance.

This report will conclude with a discussion of the achievements found throughout the project as well as the areas that require improvement. A section discussing future works will describe the potential of this project, given that it was to continue.

## **Background**

Before we dive into the implementation details, it is important for readers to have a base understanding of cryptocurrency. A cross between a currency and a digital asset. Simply stated, cryptocurrency is a new form of digital money. Like a regular government-based currency, you can use it to pay for things. Like a digital asset, you can invest in it for long-term gains. Unlike regular currency, you are not buying a currency, you are buying the idea behind the coin, which is supported by an underlying decentralized blockchain technology. [6] Cryptocurrencies eliminate the use of middlemen, transactions are faster, easier and require less or no additional transaction fees.

Next, let's cover what cryptocurrency portfolio tracking apps are and how they can benefit any serious investor. With the increasing number of institutions entering the crypto market, cryptocurrency portfolio tracking apps are on the rise. A portfolio tracker can make a huge difference for investors holding crypto long term, as well as those trading on a regular basis.

A cryptocurrency portfolio represents a collection of investments a trader/investor owns across different types of crypto assets. A portfolio reflects the trader's/investor's style, risk tolerance, and key components of their market strategy. To maintain a portfolio, cryptocurrency portfolio tracker apps have been developed to allow users to view your assets in a various wallet and on exchanges. Trackers eliminate the hassle of having to manually manage your assets by synchronizing their cryptocurrency wallet. [4]

## **Related Work**

Blockfolio - A free online application that tracks bitcoin and altcoin prices across multiple exchanges, and allows for users to monitor their current portfolio. A cryptocurrency portfolio tracking solution that is available on Android and IOS. Quickly gaining a strong reputation in the space, the company has attracted more than 4.5 million users and is showing good growth. [2]

The application is completely free to download and does not require users to share personal details. Data is stored centrally on a server.

Other features that Blockfolio provides to their users is the ability to chart and receive price notifications. Charting allows users to price cryptocurrencies against the global market.

This application provides price notifications which alerts users when there has been a significant shift in the market, making it convenient for users as they no longer have to constantly watch the charts themselves.

Blockfolio includes news aggregators and coin customizers as additional features for their users. News aggregator is a one stop shop for all cryptocurrency news and coin customizer tailor the application to ensure that users are only tracking the coins that are relevant to their portfolio.

Overall, Blockfolio is becoming a cryptocurrency investor's tool of choice and is considered one of the most appealing applications on the market. [1]

## **Methodology**

In this section, we will discuss our approach and the solution to the problem. First, we utilized an open source crawler called Cheerio to crawl and retrieve important data from a CoinMarketCap which is the world's most-referenced price-tracking website for crypto assets. [5]

Cheerio Scraper is a ready-made solution for crawling web sites using plain HTTP requests. It retrieves the HTML pages, parses them using Cheerio Node.js library and lets us extract any data from them.

Cheerio is a server-side version of the popular jQuery library. It does not require a browser but instead constructs a DOM from a HTML string, then provides us with an API to work with the DOM. [3]

In conjunction with Cheerio, we used Puppeteer which is a Node library that provides us with a high-level API that enables us to control Chrome over the DevTools Protocol. [9] Puppeteer also allows us to execute common browser actions programmatically. Puppeteer is a useful tool for automating, testing and scraping web pages over a headless or headful mode.

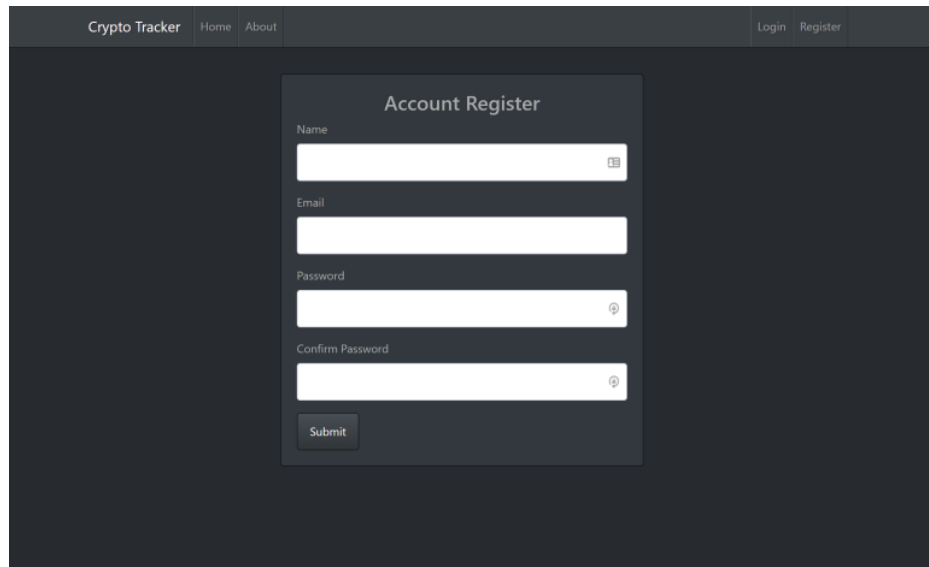
Puppeteer enabled us to evaluate JavaScript on the scraped page and fetch dynamically generated content. To preserve system resources and not appear as a red flag to the scraped website, we limited the scraping process to 5 minute intervals.

Once we could scrape CoinMarketCap for relevant content, we store the data in MongoDB (A cross-platform document-oriented database program).

Once we stored all the necessary data in a database, we developed an API for the front end to interact with. Bootstrap 4 and JQuery was used to develop the front end.

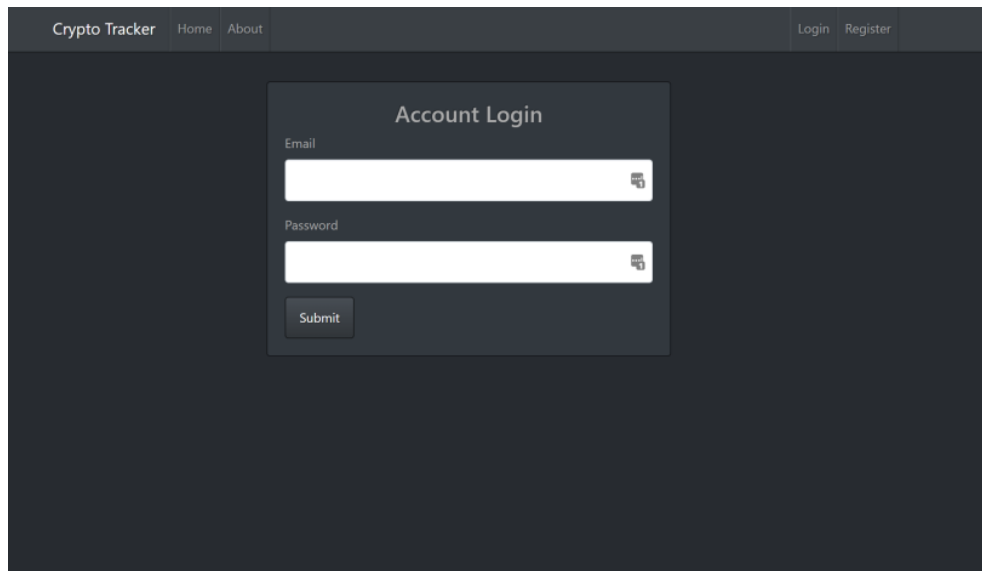
To ensure that our application met the base requirements of today's security standards, we implemented a simple login system.

Below, we will discuss the landing pages.

The image shows a web application interface with a dark theme. At the top, there is a navigation bar with links for 'Crypto Tracker', 'Home', 'About', 'Login', and 'Register'. The 'Register' link is highlighted. In the center, there is a form titled 'Account Register'. The form contains four input fields: 'Name', 'Email', 'Password', and 'Confirm Password'. Each field has a small icon on the right side of the input box. Below the input fields is a 'Submit' button.

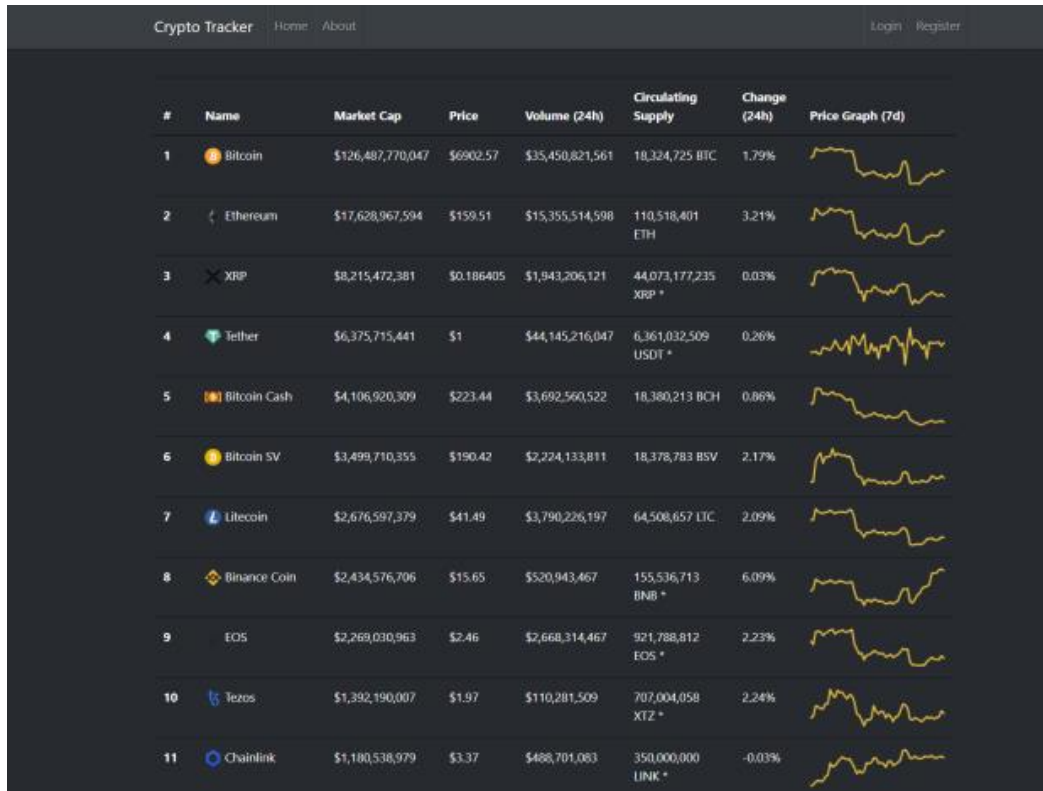
**Figure 1. Account Registration Page.**

Figure 1, users will use this form to register and create an account with our application. Here, users will provide basic details and create a password for their account.

The image shows a web application interface with a dark theme. At the top, there is a navigation bar with links for 'Crypto Tracker', 'Home', 'About', 'Login', and 'Register'. The 'Login' link is highlighted. In the center, there is a form titled 'Account Login'. The form contains two input fields: 'Email' and 'Password'. Each field has a small icon on the right side of the input box. Below the input fields is a 'Submit' button.

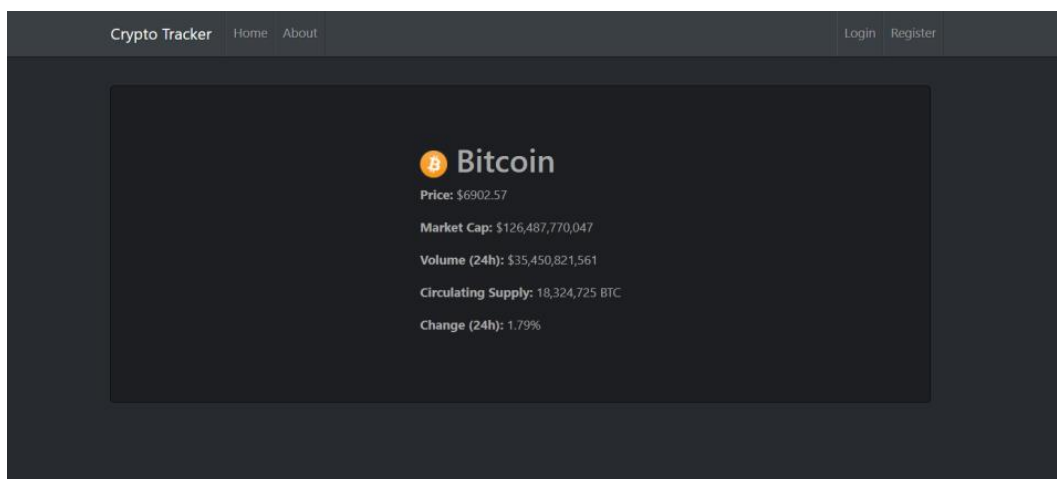
**Figure 2. Account Login Page.**

Figure 2 illustrates the login system. Users will enter in their email and password to gain access to the application and personal account. The login feature was developed using bradtraversy's node\_passport\_login open source project as developing a login system from scratch was not the goal of the project. [7]

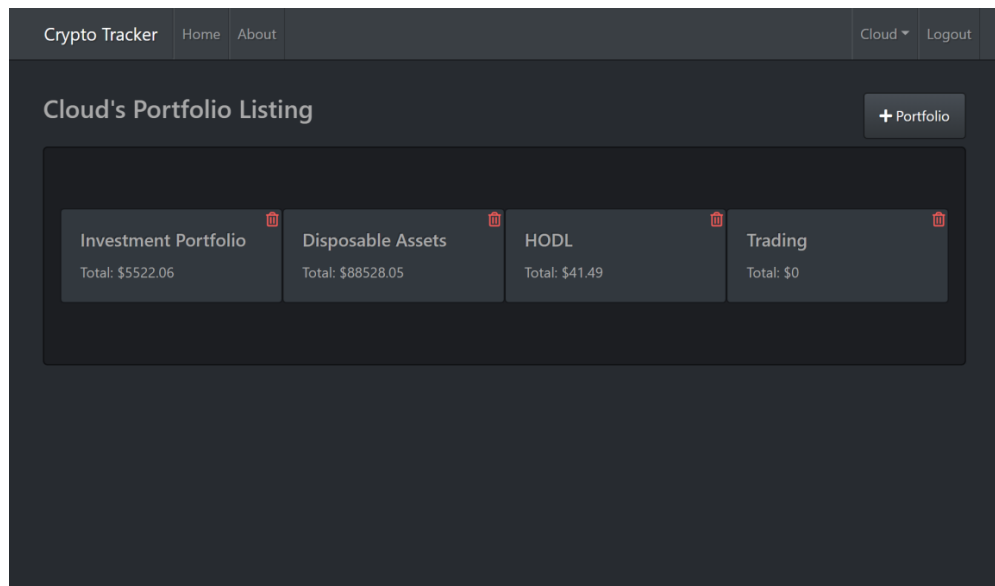


**Figure 3. Crypto Tracker Homepage.**

Figure 3 demonstrates the homepage that users will first see once they have successfully logged in. Here, we have provided users with market information from 100 of the top cryptocurrencies. Including the columns and graphs shown in figure 3 allows investors to get an informative overview of the market and make predictions as to how the trends will continue. Clicking on any of the cryptocurrency names will provide a detailed synopsis of the selected cryptocurrency as shown in figure 4.



**Figure 4. Cryptocurrency Details**



**Figure 5. Portfolio Listing**

Figure 5 illustrates user's ability to manage multiple portfolios at once, giving each collection a unique name to differentiate them.

Crypto Tracker Home About Cloud Logout

### Disposable Playground

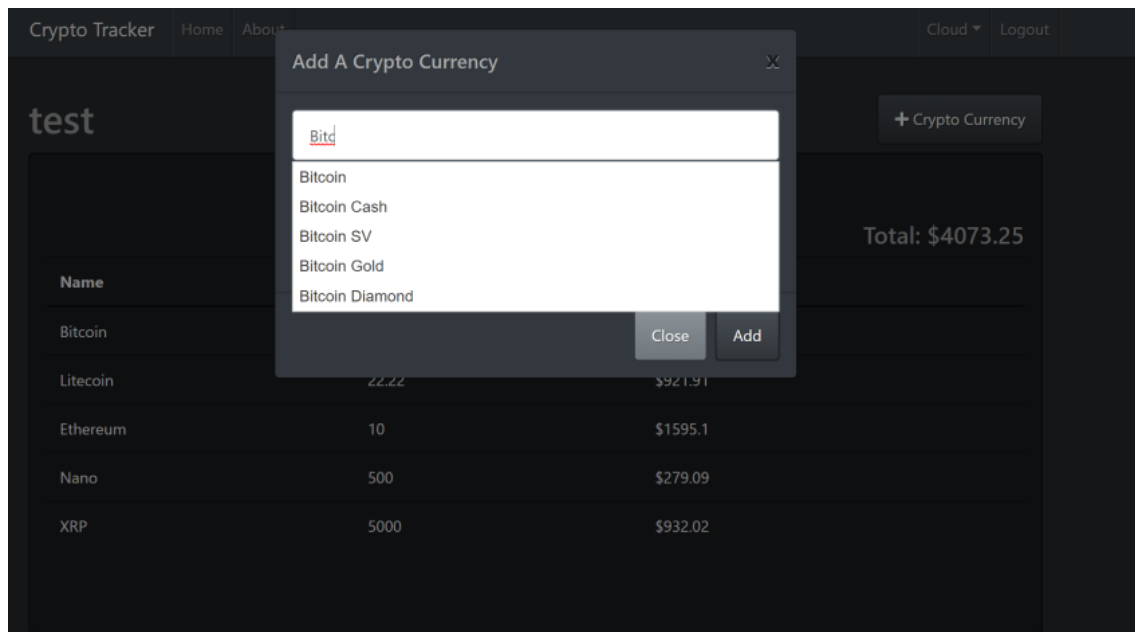
+ Crypto Currency

Total: \$4970.69

Name	Amount	Value (USD)
Bitcoin	0.099	\$683.35
Litecoin	22.22	\$921.91
Ethereum	10	\$1595.1
Nano	500	\$279.09
XRP	8000	\$1491.24

**Figure 6. Investment Portfolio**

The user investment portfolio is shown in figure 6, it is here that users will manage their personal cryptocurrency wallets. With this simplistic user-interface, users can perform basic CRUD functions on any of their assets.



**Figure 7. Add A Crypto Currency**

Users will be able to add crypto currencies using the “+ Crypto Currency” button. Upon clicking the add button, users will be presented with a suggestive search bar which will present to the user possible options as they continue to type. [10] Lastly, the application will convert the user’s cryptocurrency holdings to any desired real-world currency — CAD, USD, etc. [8]

Real time exchange rates are fetched from the <https://openexchangerates.org/> API service. [11] Using the money.js client side JavaScript library, we were able to convert currencies with ease.

A live version of the web app can be found at <http://178.128.232.180:3000/>

## Technologies to use:

```
"dependencies": {
  "bcryptjs": "^2.4.3",
  "cheerio": "^1.0.0-rc.3",
  "connect-flash": "^0.1.1",
  "cookie-parser": "~1.4.4",
  "debug": "~2.6.9",
  "ejs": "^3.0.2",
  "express": "~4.16.1",
  "express-ejs-layouts": "^2.5.0",
  "express-session": "^1.17.0",
  "http-errors": "~1.6.3",
  "method-override": "^3.0.0",
  "mongoose": "^5.9.9",
  "morgan": "~1.9.1",
  "passport": "^0.4.1",
  "passport-local": "^1.0.0",
  "puppeteer": "^2.1.1",
  "request": "^2.88.2",
  "redis": "^3.0.2"
},
```

**Figure 8. Technologies Used**

## Discussion

Using the crawling tools taught in COMP4601, we ran into some difficulties when trying to crawl JavaScript generated content as using a standard crawler couldn't retrieve dynamic content. We successfully overcame this hurdle by implementing a custom scraper using Cheerio and Puppeteer, where we were able to then manipulate the DOM elements.

## Conclusion and Further Work

In conclusion, investors need to keep track of all their purchases and sales, they want to know whether they are turning a profit or not, and they need to stay organized so that they can review their results at the end of the year. With so many tools and tracking applications available now a day, it is easy to get overwhelmed. Therefore, we've created a simplified cryptocurrency portfolio tracking app that is mobile friendly and sticks to the essential features needed by any investor.

Time permitting, we were going to incorporate a recommender system in our application that would have allowed users to add friends. Recommendations would be made based on the top performing currencies of the user's friends.



## References

- [1] <https://3commas.io/blog/best-cryptocurrency-portfolio-tracker-apps>
- [2] <https://blockfolio.com/>
- [3] <https://cheerio.js.org/>
- [4] <https://coiniq.com/cointracker-review/>
- [5] <https://coinmarketcap.com/>
- [6] <https://www.dummies.com/personal-finance/investing/cryptocurrency-investing-for-dummies-cheat-sheet/>
- [7] [https://github.com/bradtraversy/node\\_passport\\_login](https://github.com/bradtraversy/node_passport_login)
- [8] <https://github.com/blazeworx/flagstrap>
- [9] <https://github.com/puppeteer/puppeteer>
- [10] <https://jqueryui.com/autocomplete/>
- [11] <https://openexchangerates.org/>