

# Financial Programming

## *Individual Project – Financial Dashboard*

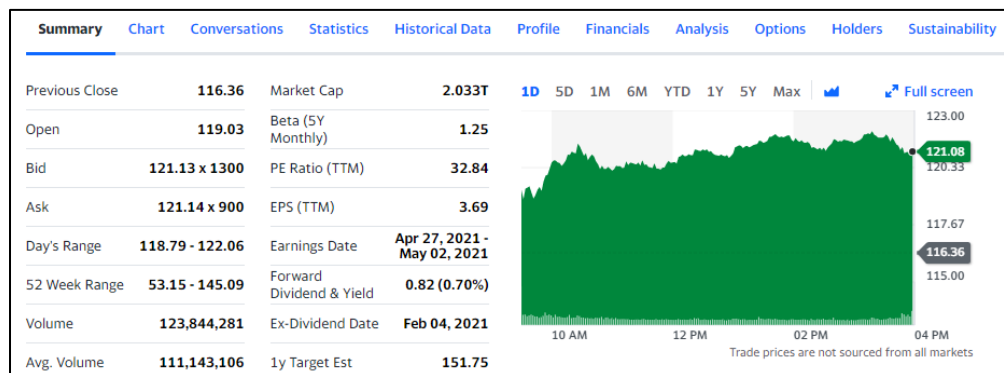
The project is a Python programming assignment where the student is required to construct a dashboard to present the financial data extracted from Yahoo Finance service [1] together with some financial analyses.

### Purpose

The main purpose of this assignment is to assess the student's Python programming skills on the these following criteria: (1) the ability to build a complete Python application (i.e. collect, process and present data); (2) the ability to learn and apply new Python libraries; (3) the ability to demonstrate advanced financial analyses.

The student needs to fulfill the following tasks:

- Collect data from Yahoo Finance service using Python library: **yahoo\_fin** [2]
- Construct a dashboard using Python library: **streamlit** [3]. The dashboard must include the following items:
  1. Header (or Sidebar):
    - A dropdown menu to select the stock names from S&P 500.
    - An “Update” button to download and update stock data.
  2. Tab 1: Summary
    - Collect and present the information of the stock similar to the tab Yahoo Finance > Summary [4].
    - In the chart, there should be an option to select different duration of time i.e. 1M, 3M, 6M, YTD, 1Y, 3Y, 5Y, MAX. It is not necessary to go below 1 month (1M) of duration. For simplicity, the time intervals should be fixed at 1 Day.



### 3. Tab 2: Chart

- Collect and present the stock price similar to the tab Yahoo Finance > Chart. The chart should be able to:
  - o Select the date range for showing the stock price.
  - o Show the stock price for different duration of time i.e. 1M, 3M, 6M, YTD, 1Y, 3Y, 5Y, MAX. It is not necessary to go below 1 month (1M) of duration.
  - o Switch between different time intervals i.e. Day, Month, Year. It is not necessary to go below 1 Day time interval.
  - o Switch between line plot and candle plot for the stock price.
  - o Show the trading volume at the bottom of the chart.
  - o Show the simple moving average (MA) for the stock price using a window size of 50 days.



### 4. Tab 3: Statistics

- Collect and present the statistics of the stock similar to the tab Yahoo Finance > Statistics [5].

Summary Chart Conversations Statistics Historical Data Profile Financials Analysis Options Holders Sustainability		
<div> <div>Indicators Comparison Date Range 1D 5D 1M 3M 6M YTD 1Y 2Y 5Y Max Interval 1D Candle Draw</div> <div> <div>AAPL 61.67 MA(50,C,MA,0) 75.67</div> <div> <div>Open 59.94</div> <div>High 62.50</div> <div>Low 59.28</div> <div>Close 61.67</div> <div>Volume 300.23M</div> <div>% Change 17.60%</div> </div> </div> </div>		
<div> <div>Valuation Measures</div> <div> <div>Market Cap (intraday) <sup>5</sup></div> <div>2.03T</div> <div>Enterprise Value <sup>3</sup></div> <div>1.99T</div> <div>Trailing P/E</div> <div>32.84</div> <div>Forward P/E <sup>1</sup></div> <div>25.87</div> <div>PEG Ratio (5 yr expected) <sup>1</sup></div> <div>2.02</div> <div>Price/Sales (ttm)</div> <div>6.91</div> <div>Price/Book (mrq)</div> <div>30.76</div> <div>Enterprise Value/Revenue <sup>3</sup></div> <div>6.76</div> <div>Enterprise Value/EBITDA <sup>6</sup></div> <div>23.35</div> </div> </div>		
<div> <div>Trading Information</div> <div> <div>Stock Price History</div> <div> <div>Beta (5Y Monthly)</div> <div>1.25</div> <div>52-Week Change <sup>3</sup></div> <div>63.12%</div> <div>S&amp;P500 52-Week Change <sup>3</sup></div> <div>32.58%</div> <div>52 Week High <sup>3</sup></div> <div>145.09</div> <div>52 Week Low <sup>3</sup></div> <div>53.15</div> <div>50-Day Moving Average <sup>3</sup></div> <div>131.32</div> <div>200-Day Moving Average <sup>3</sup></div> <div>123.20</div> </div> </div> </div>		
<div> <div>Share Statistics</div> <div> <div>Avg Vol (3 month) <sup>3</sup></div> <div>111.14M</div> <div>Avg Vol (10 day) <sup>3</sup></div> <div>135.87M</div> <div>Shares Outstanding <sup>5</sup></div> <div>16.79B</div> </div> </div>		
<div> <div>Financial Highlights</div> <div> <div>Fiscal Year</div> <div>Sep 25, 2020</div> </div> </div>		
<div> <div>Abbreviation Guide:</div> <div> <div>mrq - Most Recent Quarter</div> <div>ttm - Trailing Twelve Months</div> <div>yoY - Year Over Year</div> <div>lty - Last Fiscal Year</div> <div>fye - Fiscal Year Ending</div> </div> </div>		
<div> <div>Footnotes</div> <div> <div><sup>1</sup> Data provided by Thomson Reuters.</div> <div><sup>2</sup> Data provided by EDGAR Online.</div> <div><sup>3</sup> Data derived from multiple sources or calculated by Yahoo Finance.</div> <div><sup>4</sup> Data provided by Morningstar, Inc.</div> <div><sup>5</sup> Shares outstanding is taken from the most recently filed quarterly or annual report and Market Cap is calculated using shares outstanding.</div> <div><sup>6</sup> EBITDA is calculated by Capital IQ using methodology that may differ from that used by a company in its reporting.</div> </div> </div>		

## 5. Tab 4: Financials

- Collect and present the financial information of the stock similar to the tab Yahoo Finance > Financials [6].
- There should be an option to select between Income Statement, Balance Sheet and Cash Flow.
- There should be an option to select between Annual and Quarterly period.

[Summary](#)
[Chart](#)
[Conversations](#)
[Statistics](#)
[Historical Data](#)
[Profile](#)
[Financials](#)
[Analysis](#)
[Options](#)
[Holders](#)
[Sustainability](#)

Show:
Income Statement
Balance Sheet
Cash Flow

Annual
Quarterly

Income Statement
All numbers in thousands

Expand All

Breakdown	TTM	9/29/2020	9/29/2019	9/29/2018	9/29/2017
> Total Revenue	273,857,000	274,515,000	260,174,000	265,595,000	229,230,000
Cost of Revenue	169,277,000	169,559,000	161,782,000	163,756,000	141,040,000
Gross Profit	104,580,000	104,956,000	98,392,000	101,839,000	88,180,000
> Operating Expense	37,442,000	38,668,000	34,462,000	30,941,000	26,840,000
Operating Income	67,138,000	66,288,000	63,930,000	70,898,000	61,340,000
> Net Non Operating Interest Inc...	1,052,000	890,000	1,385,000	2,446,000	2,878,000
> Other Income Expense	127,000	-87,000	422,000	-441,000	-133,000
Pretax Income	68,317,000	67,091,000	65,737,000	72,903,000	64,080,000
Tax Provision	9,893,000	9,680,000	10,481,000	13,372,000	15,730,000
> Net Income Common Stockhold...	58,424,000	57,411,000	55,256,000	59,531,000	48,350,000
Diluted NI Available to Com Stock...	58,424,000	57,411,000	55,256,000	59,531,000	48,350,000
Basic EPS	-	0.0033	0.003	0.003	0.003

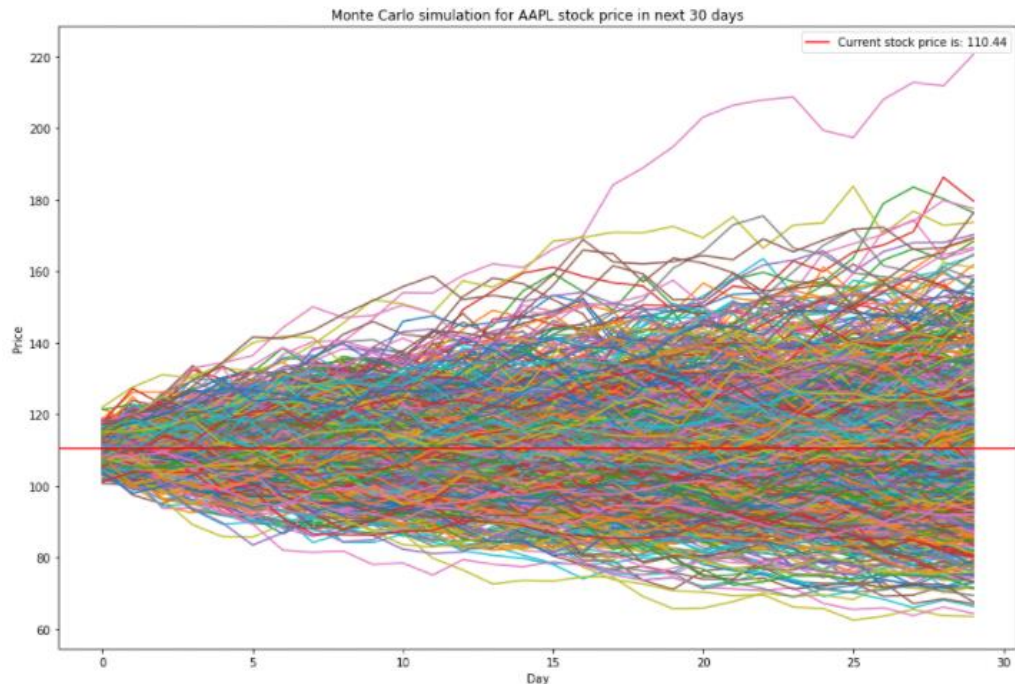
## 6. Tab 5: Analysis

- Collect and present the analysis information of the stock similar to the tab Yahoo Finance > Analysis [7].

Summary Chart Conversations Statistics Historical Data Profile Financials <b>Analysis</b> Options Holders Sustainability				
Currency in USD				
<b>Earnings Estimate</b>	Current Qtr. (Mar 2021)	Next Qtr. (Jun 2021)	Current Year (2021)	Next Year (2022)
No. of Analysts	30	28	39	37
Avg. Estimate	0.98	0.82	4.45	4.68
Low Estimate	0.85	0.7	4.1	3.64
High Estimate	1.09	0.98	4.89	5.5
Year Ago EPS	0.64	0.64	3.28	4.45
<b>Revenue Estimate</b>	Current Qtr. (Mar 2021)	Next Qtr. (Jun 2021)	Current Year (2021)	Next Year (2022)
No. of Analysts	27	25	35	33

7. Tab 6: Monte Carlo simulation

- Conduct and present a Monte Carlo simulation for the stock price in the next n-days from today.
- The number of simulations should be selected from a dropdown list of n = 200, 500, 1000 simulations.
- The time horizon should be selected from a dropdown list of t = 30, 60, 90 days from today.
- Estimate and present the Value at Risk (VaR) at 95% confidence interval.



8. Tab 7++: Any additional financial analyses.

Submission

- A project folder including:
  - The Python script file(s) (\*.py) of the dashboard.
  - A short PPT (5-10 slides) describing the functions of the dashboard.
  - A 5min presentation about the functions of the dashboard. The presentation can be record using MS PowerPoint or Panopto [9].

Evaluation

The project will be evaluated on:

- The functions of the dashboard and the quality of the Python script [90%]
- The quality of the PPT and presentation [10%]

## Timeline

- Deadline: 15 November 2021

## Note

- The dashboard does not have to be identical to the given Yahoo Finance examples. As long as it covers the required items and functions, it is perfectly fine.
- It is not necessary to make the dashboard updated in real-time. Using an “Update” button to refresh the data is good enough.
- To avoid being blocked from Yahoo Finance, the student should not repeatedly request much data in a short period of time.
- Finally, using the work (text or programming scripts) of other people without citing the source is considered as plagiarism, and is strictly prohibited.

## Reference

[1] Yahoo Finance. Link: <https://finance.yahoo.com/>

[2] yahoo\_fin Documentation. Link: [http://theautomatic.net/yahoo\\_fin-documentation/#tickers\\_sp500](http://theautomatic.net/yahoo_fin-documentation/#tickers_sp500)

[3] Streamlit documentation. Link: <https://docs.streamlit.io/>

[4] Yahoo Finance > Summary. Link: <https://finance.yahoo.com/quote/AAPL/?p=AAPL>

[5] Yahoo Finance > Statistics. Link: <https://finance.yahoo.com/quote/AAPL/key-statistics?p=AAPL>

[6] Yahoo Finance > Financials. Link: <https://finance.yahoo.com/quote/AAPL/financials?p=AAPL>

[7] Yahoo Finance > Analysis. Link: <https://finance.yahoo.com/quote/AAPL/analysis?p=AAPL>

[8] Stock Analysis. Link: <https://stockanalysis.com/stocks/aapl/>

[9] Panopto Express: A Free Online Screen Recorder for Everyone. Link: <https://www.panopto.com/record/?origin=nav>