Platform User Guide

Version 2.1

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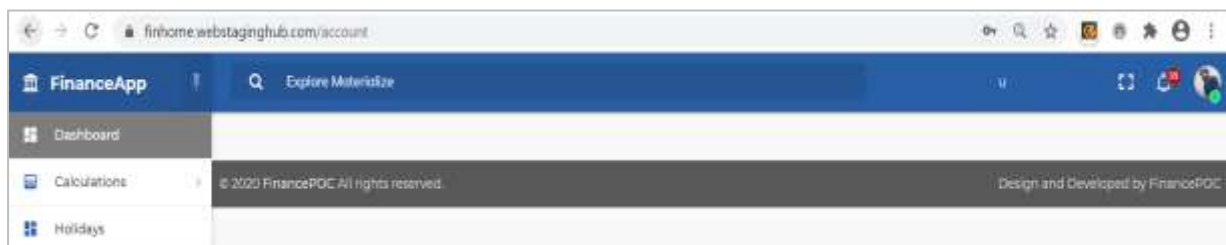
## SECTION 1: ACCESSING THE PLATFORM

1. On the website's top bar, click LOGIN to log into the platform using your credentials. If you do not have an account, then click Register and create an account.
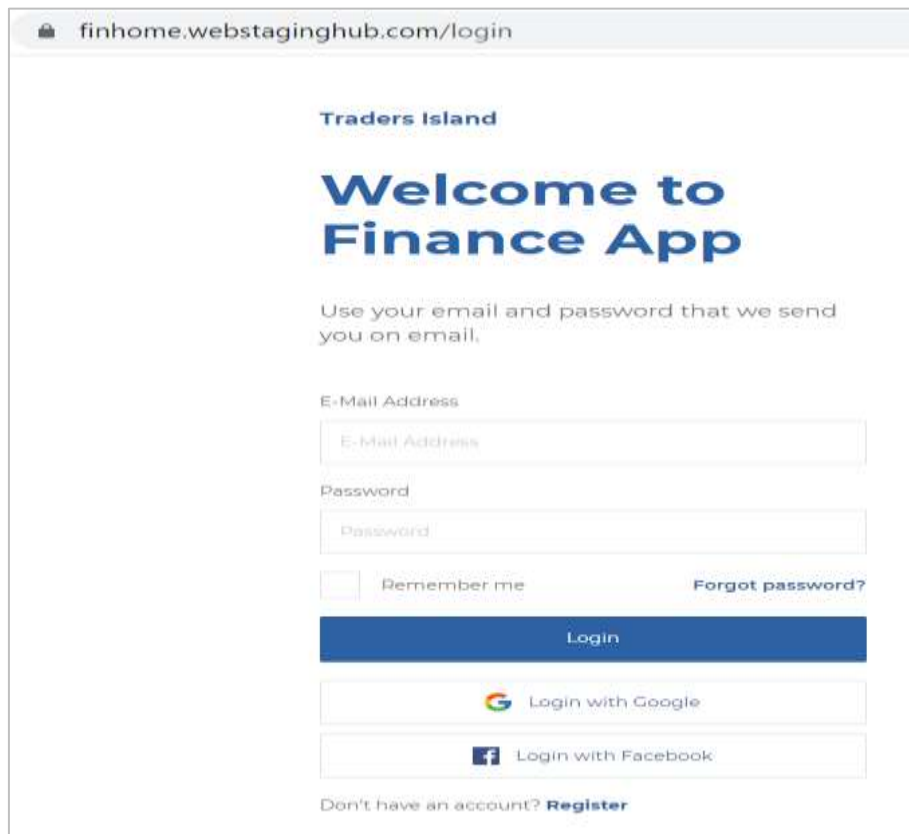
2. You should be directed to the below landing page on the platform (Dashboard).

3. To access the platform's analysis tools, click Calculations on the left-hand side. You will find two options: "All my calculations" and "Calculation preset." The former allows you to access previously saved work. You only need to click the edit button to revisit a case.
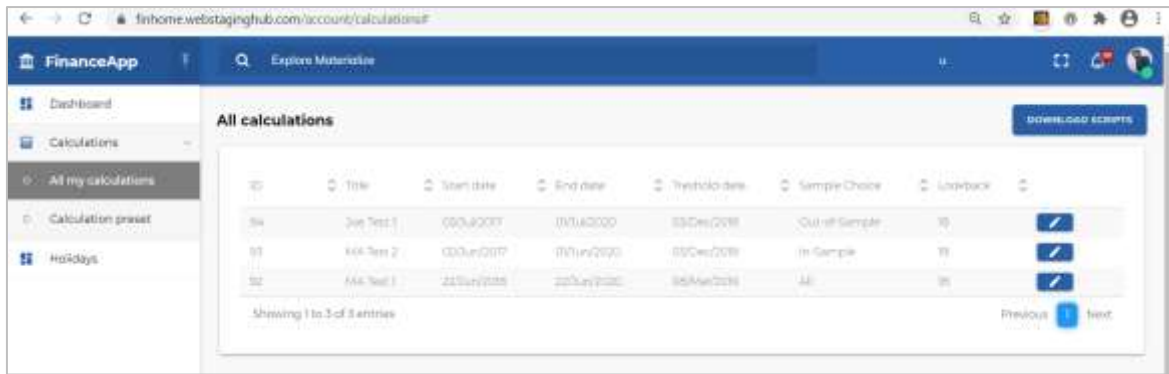
"Calculation preset" allows you to create a new calculation. Choose a type of calculation from the drop-down box. At this moment in time, the platform only offers Moving Average (MA) tools. Choose MA and you will be automatically directed to the INPUT tab.

SECTION 2: INPUT TAB

The INPUT tab is the main tab for entering inputs into the platform and sending analysis requests. After you input the required parameters, you can click one of the buttons at the bottom of the tab that will automatically build the corresponding analysis tools in separate tabs.

GENERIC PARAMETERS

These parameters will be used by different parts of the model.

- Title: name under which this analysis case will be saved.
- Rounding: number of figures after the decimal.
- Current date: today's date; it can be changed but it only serves as a reference point.
- Ticker: stock symbol as listed on the stock exchange.
- Historical Data:
  - Start date: start date of the whole data set.
  - End date: end date of the whole data set.
- Analysis Data:
  - Analysis start date: start data of the cross-sectional data that you want to analyse. It must fall after Historical Data "Start date."
  - Analysis end date: end date of the cross-sectional data that you want to analyse. It must fall before Historical Data "End date."
- Holiday Dates: There are two ways to set holiday dates.
  1. You can click the Holidays menu item on the left, which takes you into a separate page.

> To add a new date, enter "User holiday date" and "User holiday title" (description) in the designated data fields and click the "+" button.
> To delete an existing date, click "x" button.
> The table on this page will be updated as well as the "Holiday Dates" section on the INPUT tab.

2. You can update the "Holiday Dates" section on the INPUT tab directly.
> To add a new date, click the "+" button and input the date in the designated box.
> To add several dates, click the "+" button and input the series of dates with only one space between each in the designated box. For example,

> To delete an existing button, press the delete button on its right.
> The "Holiday Dates" section on the INPUT tab will then be updated accordingly.

- MA-Specific Parameters:
  > Lookback period: choose a number that is less than (Analysis Data End date – Analysis Data Start date).
  > Price: choose the type of price you would like to analyse (Open, High, Low, Close, Volume, Adj Close); default = "Close."

- Choice of Functions:
  > MA Calculation: methodology of calculating the moving average for the analysis data set. The user has to choose at least one approach.
    ✓ SMA via Formula: calculates SMA using a visible formula.
    ✓ EMA via Formula: calculates EMA using a visible formula.
    ✓ SMA Js Function: calculates SMA using Javascript function (invisible formula).
    ✓ EMA Js Function: calculates EMA using Javascript function (invisible formula).
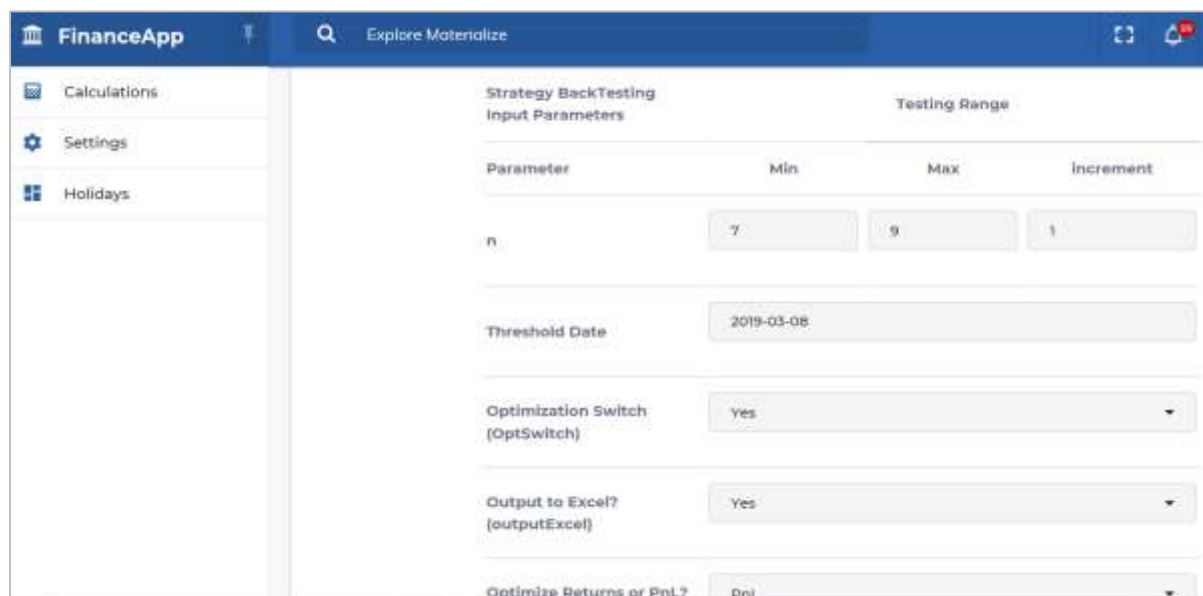
- ✓ SMA Python Function: calculates SMA using Python code (in the back end).
- ✓ EMA Python Function: calculates EMA using Python code (in the back end).
- ➢ MA Speed Improvement: holds only for Python functions. Speed improvement can be based on C order, F order or Cython calculation in Python (back-end code). The user must choose at least one function.
  - ✓ SMA Python Function (C order): calculates SMA using Python – C order.
  - ✓ SMA Python Function (F order): calculates SMA using Python – F order.
  - ✓ SMA Python Function (Cython): calculates SMA using Python – Cython.
  - ✓ EMA Python Function (C order): calculates EMA using Python – C order.
  - ✓ EMA Python Function (F order): calculates EMA using Python – F order.
  - ✓ EMA Python Function (Cython): calculates EMA using Python – Cython.

Strategy Input Parameters

iStrategy	Sample Choice
1	All

Model Choice (modelName)	Specific Model Choice (iMethod)
MovingAverage	SMA

Python Speed Improvement (s)	Optimization Switch (optSwitch)	Output to Excel? (outputExcel)
none	No	Yes

Use Model Sheet for Manual Calc?	Optimize Returns or P&L? (iOpt)
No	PnL

SPECIFIC PARAMETERS

- Strategy Input Parameters:
  - ➢ iStrategy: read-only. It specifies the type of trading strategy under analysis.
  - ➢ Model Choice (modelName): choose the broad model that you would like to analyse. Currently, only the Moving Average (MovingAverage) is implemented.
  - ➢ Specific Model Choice (iMethod): narrow down your model choice, e.g. if modelName is MovingAverage, iMethod can be SMA or EMA.
  - ➢ Sample Choice (sampleChoice): choose the data sample from the whole set on which to carry out the analysis (In-Sample, Out-of-Sample, All-Set).
  - ➢ Python Speed Improvement (s): choose whether you would like to improve speed (different compiler) in Python (None, C Order, F Order, Cython).
  - ➢ Optimisation Switch (optSwitch): this parameter is set to "No" in order to directly calculate the strategy outcome given the current parameters, as opposed to optimising. This parameter cannot be changed.
  - ➢ Output to Excel? (outputExcel): this parameter is set to "Yes" in order to allow writing the details of the interim calculation to Excel. This parameter cannot be changed.
  - ➢ Use Model Sheet for Manual Calc? (useModelSheet): This parameter is set to "No" since the strategy is to be calculated using internal calculation, rather than the model "MA" tab results. This parameter cannot be changed.
  - ➢ Optimise Returns or P&L? (iOpt): Returns/P&L, default = P&L; "Build Strategy" outputs both P&L and Returns given input parameters and the current strategy implementation, so it does not matter which choice you opt for. The code is anyway hard coded to revert to Returns.
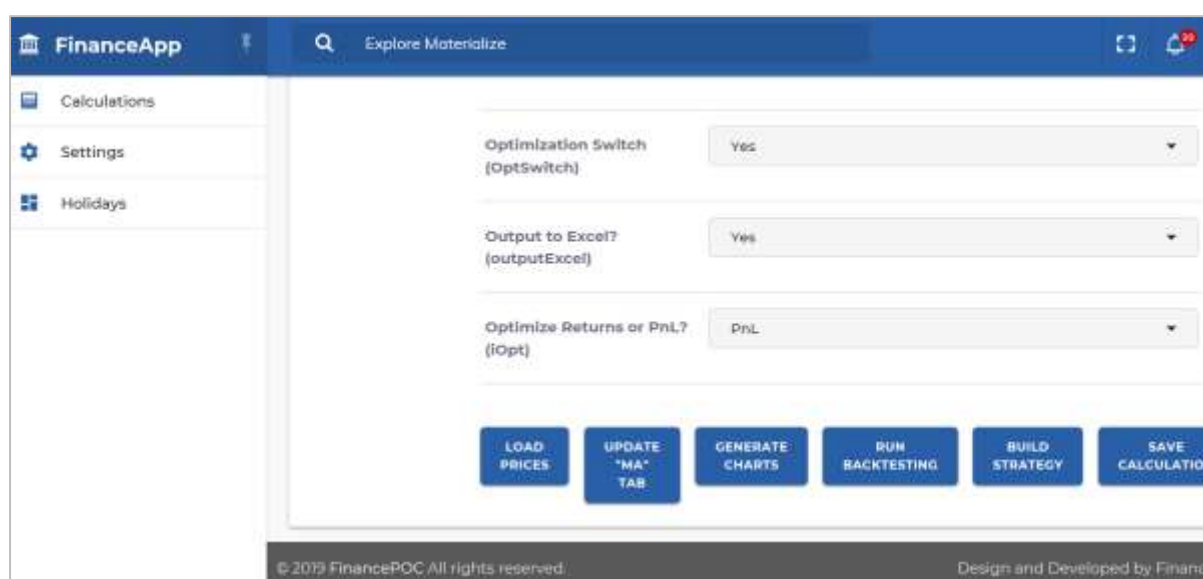
- Strategy BackTesting Input Parameters:
  - n: choose a range for the lookback period over which the model will loop; you need a minimum value, a maximum value and the increment which will be added at every step (Min, Max and Increment); Min < Max, Increment <= (Max – Min), Max <= (Analysis Data End Date – Analysis Data Start Date).
  - Threshold Date: date; < Analysis Data Start Date and > Analysis Data End Date; (threshold – Analysis Data Start Date) > lookback period n. This date splits the analysis data set.
  - Optimisation Switch (OptSwitch): this parameter is set to "Yes" to allow backtesting. This parameter cannot be changed.
  - Output to Excel? (outputExcel): this parameter is set to "Yes" in order to allow writing the details of the interim calculation to Excel. This parameter cannot be changed.
  - Optimise Returns or PnL? (iOpt): this parameter allows you to choose whether to optimise "P&L" or "Returns"; default = "P&L".

- Buttons

➢ <LOAD PRICES>: Loads Historical Prices, retrieved from Yahoo! Finance, into the HISTORICAL DATA tab.

➢ <UPDATE "MA" TABS>: creates the MA TAB with SMA/EMA calculation, based on MA-Specific Parameters.

➢ <GENERATE CHARTS>: generates model/price charts and outputs them into the CHARTS tab.

➢ <RUN BACKTESTING>: runs Strategy Back-Testing to get optimal parameters by optimising "Returns" or P&L," based on Strategy BackTesting Input Parameters.

➢ <BUILD STRATEGY>: shows the detailed, step-by-step strategy calculation using each approach: visible Formulae, Js functions and Python functions, based on Strategy Input Parameters.

➢ <SAVE CALCULATION>: allows you to save the current calculation run.

SECTION 3: HISTORICAL DATA TAB

The platform allows retrieving data directly from Yahoo! Finance through the INPUT tab or by uploading an xlsx or csv file directly onto the HISTORICAL DATA tab. Note that to be able to upload data onto the HISTORICAL DATA tab from a file, the file has to conform to certain specifications, as shown in "Download Template" at the top right of the HISTORICAL DATA tab. Please ensure your file follows the same order of columns as the template.

1. To Load data from Yahoo! Finance:

Input through the "INPUT" tab

1. Define Ticker and Historical data "Start date" and "End date."
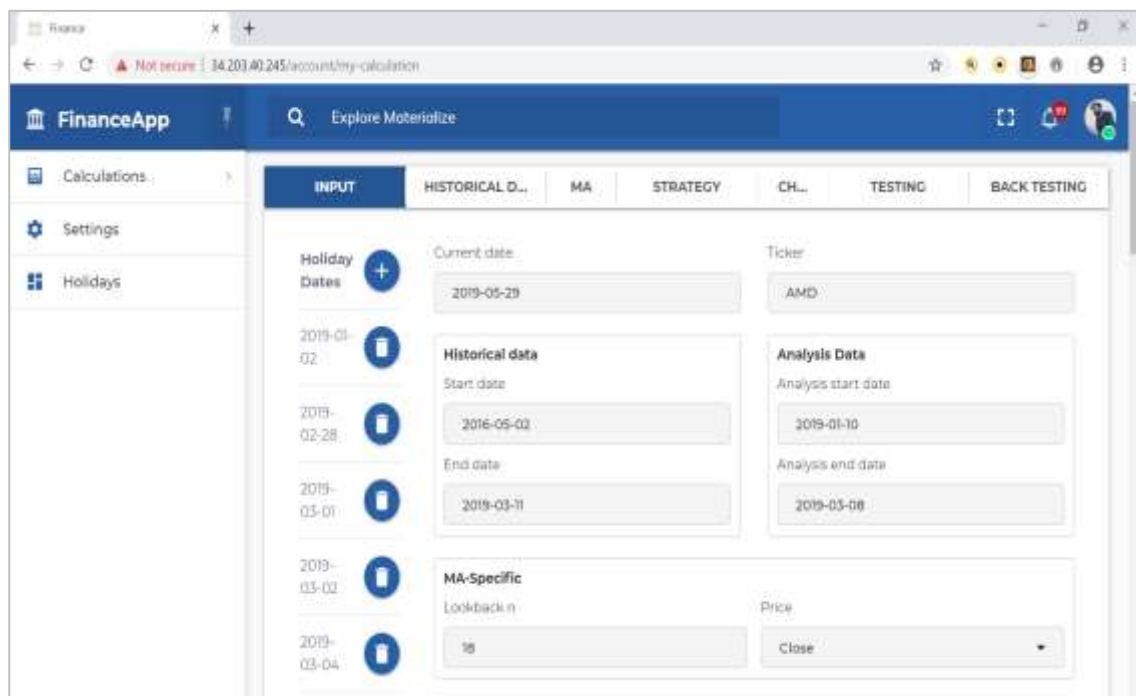
2. Click <LOAD PRICES> at the bottom of the page. You will get the following message.
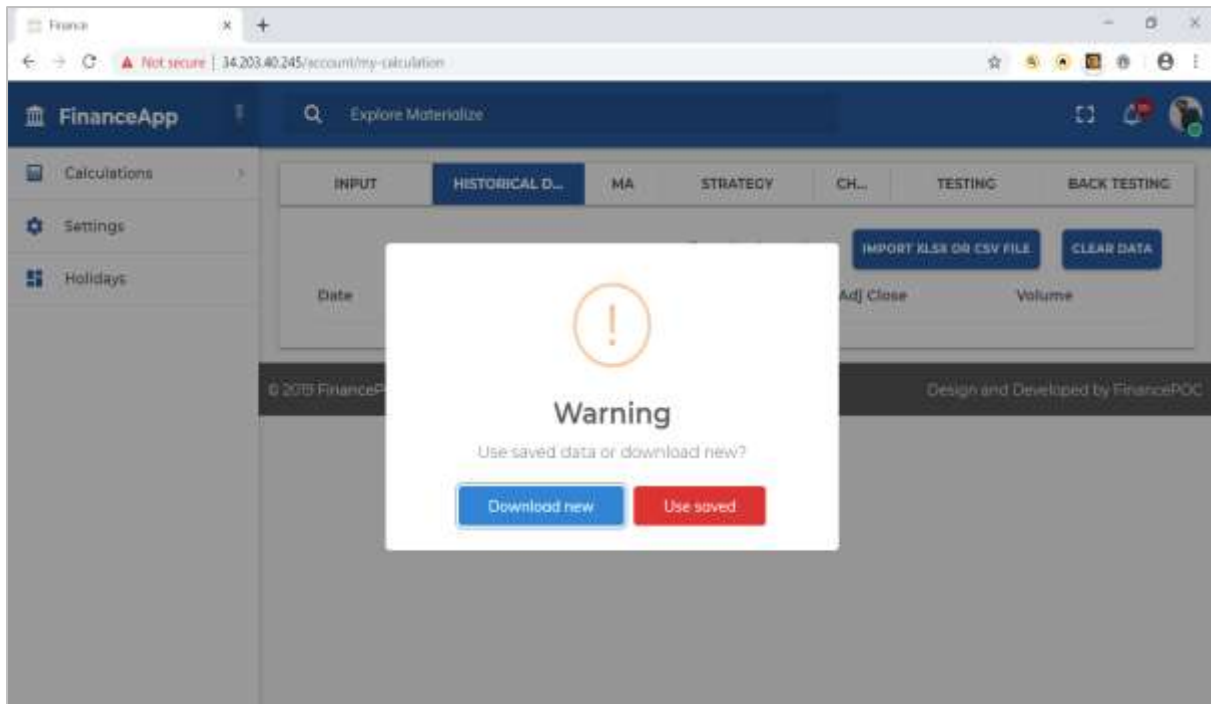
3. Click "Download new" and the platform will take you to the HISTORICAL DATA tab. You may need to wait a bit depending on the size of your data set.

<u>Output on the "HISTORICAL DATA" tab</u>

Data is sorted in chronological order.

First few records:

Last few records:

2. To upload data from an xlsx or csv file:

   i. Click "CLEAR DATA" on the HISTORICAL DATA tab.
   ii. Click "IMPORT XLSX OR CSV FILE" on the HISTORICAL DATA tab.
   iii. Choose your file. For example, assume we have a file called "TWTR.xlsx":

   The data in "TWTR.xlsx" (07-Nov-2013 until 13-May-2019) has been downloaded from Yahoo! Finance. It can be found on the same path referred to above. After clicking the data-upload button ("IMPORT XLSX OR CSV FILE") on the HISTORICAL DATA tab, there may be a bit of a waiting time depending on the length of the data set after which one should be able to view data records on this tab.

First few records on the HISTORICAL DATA tab:

Last few records:

Comparing the data on the HISTORICAL DATA tab to "TWTR.xlsx", we can see that the data matches. For example, the first few records in "TWTR.xlsx" are:

And the last few records in "TWTR.xlsx" are:

iv. To upload another file, click "CLEAR DATA" on the HISTORICAL DATA tab first and then upload the file as above.
v. Use the same approach to upload a ".csv" file.

STRESS TESTING

Model Limitation: as the below stress testing show, the platform does not have the capability yet of automatically loading data from Yahoo! Finance when the data set is extremely large but it is possible to upload the data through a file (as described above).

This section shows an example of how the platform responds to requests of very large data sets (spanning over 30 years). Citigroup (C) has been chosen and the corresponding data set spans 03-Jan-1977 until 29-May-2019.

1. Load data from Yahoo! Finance:

   <u>Input through the INPUT tab:</u> the platform fails this test. It returns an error.
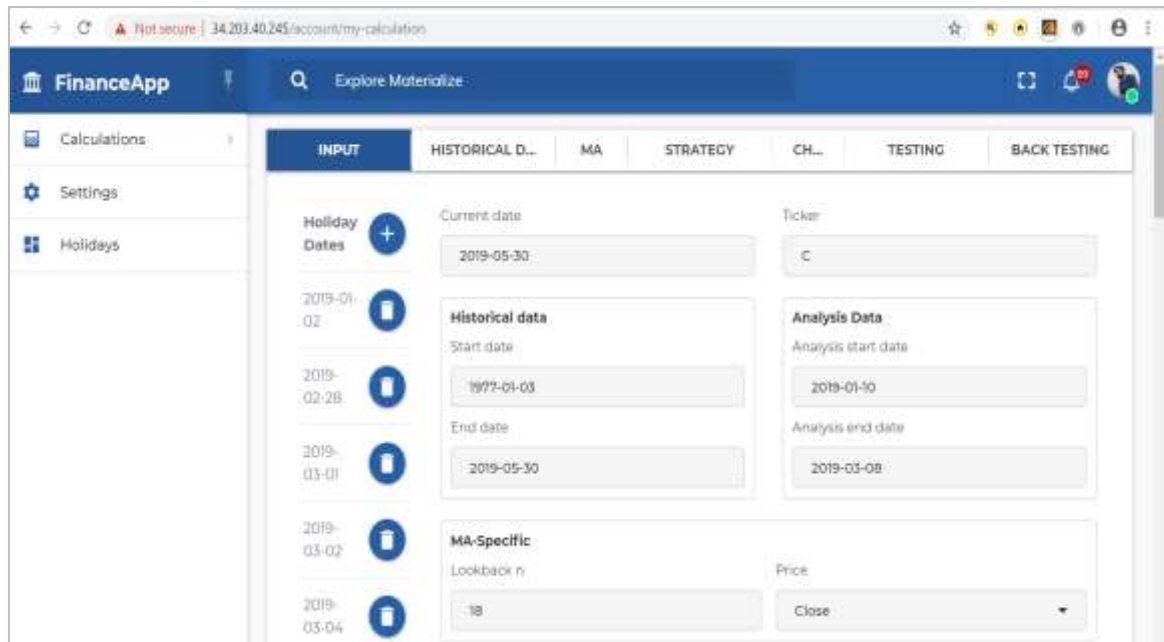
   Click "LOAD PRICES" on the INPUT tab. The following error message is returned:
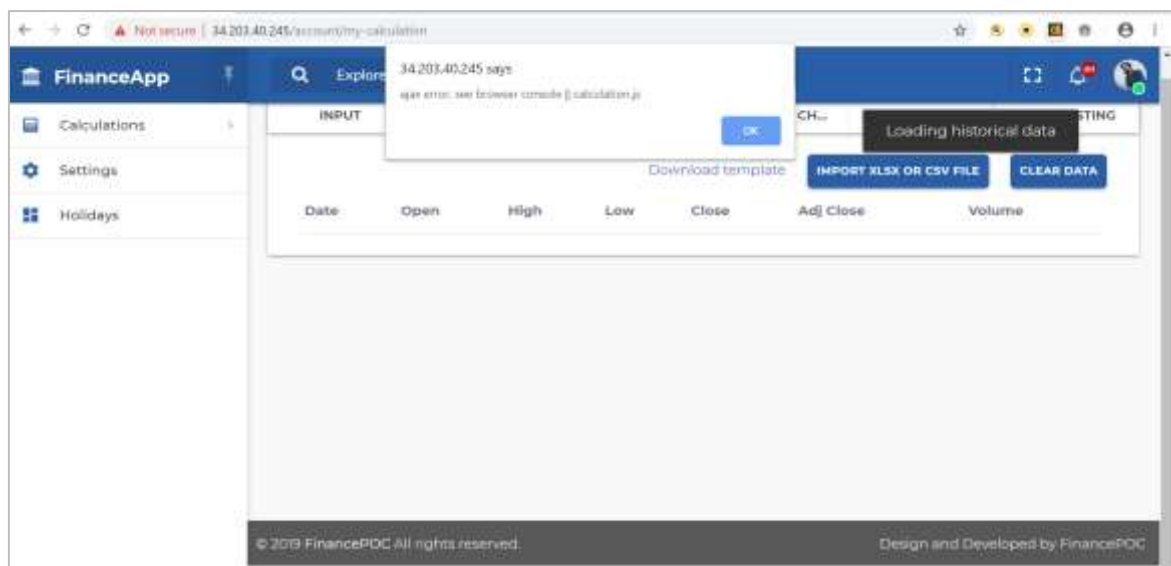
2. Click "CLEAR DATA" on the HISTORICAL DATA tab.

3. Click "IMPORT XLSX OR CSV FILE": Choose "C.xlsx":

   This file can be found on this path "..\Yahoo Data\C.xlsx". The data in "C.xlsx" (03-Jan-1977 until 29-May-2019) has been downloaded from Yahoo! Finance. It can be found on the same path referred to above. After clicking the data-upload button ("IMPORT XLSX OR CSV FILE") on the HISTORICAL DATA tab, there may be a bit of a waiting time depending on the length of the data set after which one should be able to view data records on this tab.

First few records on the HISTORICAL DATA tab:

Last few records:

Comparing the data on the HISTORICAL DATA tab to "C.xlsx", we can see that the data matches. For example, the first few records in "C.xlsx" are:

And the last few records in "C.xlsx" are:

4. Click "CLEAR DATA" on the HISTORICAL DATA tab: this will take a while.

5. Click "IMPORT XLSX OR CSV FILE": Choose "C.csv":

This file can be found on this path "..\Yahoo Data\C.csv". The data in "C.csv" (03-Jan-1977 until 29-May-2019) has been downloaded from Yahoo! Finance. It can be found on the same path referred to above. After clicking the data-upload button ("IMPORT XLSX OR CSV FILE") on the HISTORICAL DATA tab, there may be a bit of a waiting time depending on the length of the data set after which one should be able to view data records on this tab.

First few records on the HISTORICAL DATA tab:

Last few records:

Comparing the data on the HISTORICAL DATA tab to "C.csv", we can see that the data matches. For example, the first few records in "C.csv" are:

And the last few records in "C.csv" are:

SECTION 4: MA TAB

The platform (like the spreadsheet) fully automates the calculation of a stock's moving average (Simple Moving Average SMA and Exponential Moving Average EMA) using different implementation methods, ensuring the correctness of results as well as allowing the exploration of the most efficient method. The user enters input data in the INPUT tab (similarly to the Input worksheet) and clicks the corresponding button to automatically launch the MA tab (the equivalent of the MA worksheet).

INPUT

1. Enter the stock symbol in the box underneath "Ticker" as well as Historical data "Start date" and "End date" in the corresponding boxes. Load Historical Data.
2. Enter "Analysis start date" and "Analysis end date."
3. Enter MA-Specific parameters: lookback period "Lookback n" and price type "Price."
4. Choose the desired functions or implementation tools to calculate the moving average.
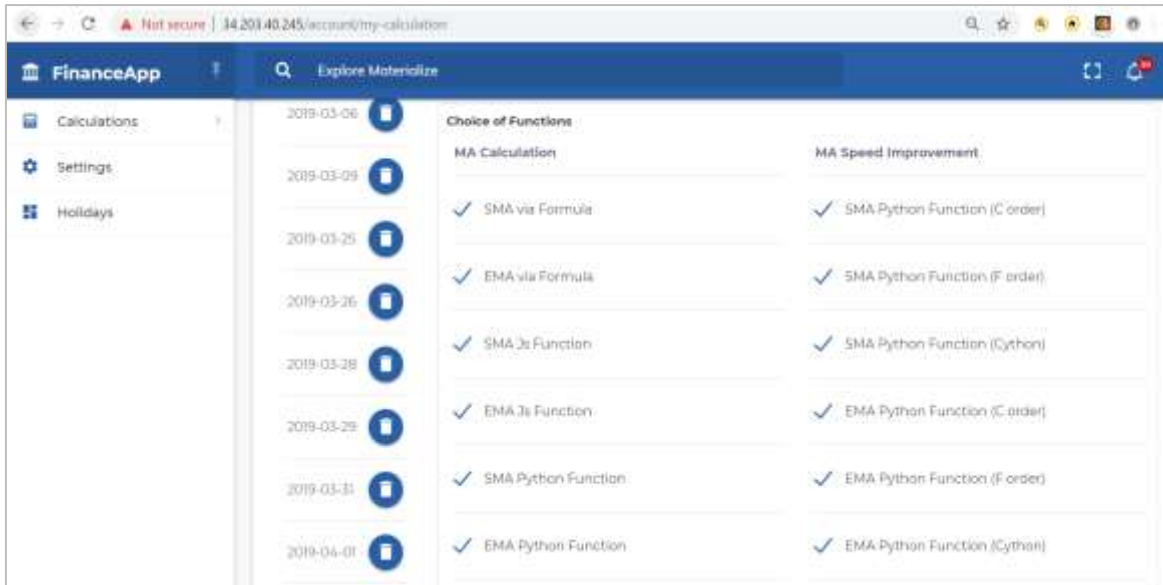
** For more on the definitions of the input parameters, refer to section 2 above.

5. Click the corresponding button to launch the MA tab.

OUTPUT

First few records:

Last few records:

** To upload another file or change symbol or historical dates, click "CLEAR DATA" on the HISTORICAL DATA tab first.

STRESS TESTING

Model Limitation: as mentioned earlier, the platform does not have the capability yet of automatically loading data from Yahoo! Finance when the data set is extremely large but it is possible to upload the data through a file (as described above).

The above platform screenshots show an example of a stress test. The platform is able to perform MA calculation for all approaches/functions/implementation methods correctly for this example correctly.

VERY LARGE DATA SET
As mentioned earlier, it is not possible so far to load a large data set spanning more than 25 years directly from Yahoo!finance. But it is possible to load an external xlsx or csv file with a data set that spans more than 25 years directly by clicking the "LOAD XLSX OR CSV FILE" button on the **HISTORICAL DATA TAB**. Update Analysis start and end dates on the "INPUT" tab (make sure you change historical

data start and end dates so that they are within error check bounds). It is also not possible to copy the results in the MA TAB (by clicking the "COPY" button) in the presence of such a large data set.

OUTPUT

The output can be seen in the MA tab. It can be copied and/or download as an Excel file or csv file. To do so, click "COPY", "EXCEL" or "CSV" buttons respectively on the top left corner of the MA tab. For downloaded file, view the file icon in the bottom left corner of the sheet.

SECTION 5: CHARTS TAB

The platform (like the spreadsheet) generates charts of a stock's price as well as its moving average (Simple Moving Average SMA and Exponential Moving Average EMA) without the need to update the MA tab beforehand. It plots stock prices using candlesticks and moving averages using lines. However, depending on the screen resolution, only MA line may show due to the minuscule difference between SMA and EMA values. It displays stock price data, SMA and EMA for every point at which the mouse hoovers. You should enter input data in the INPUT tab, and click the "LOAD PRICES" button followed by "GENERATE CHARTS" to automatically launch the CHARTS tab (the equivalent of the "Charts" worksheet).

INPUT
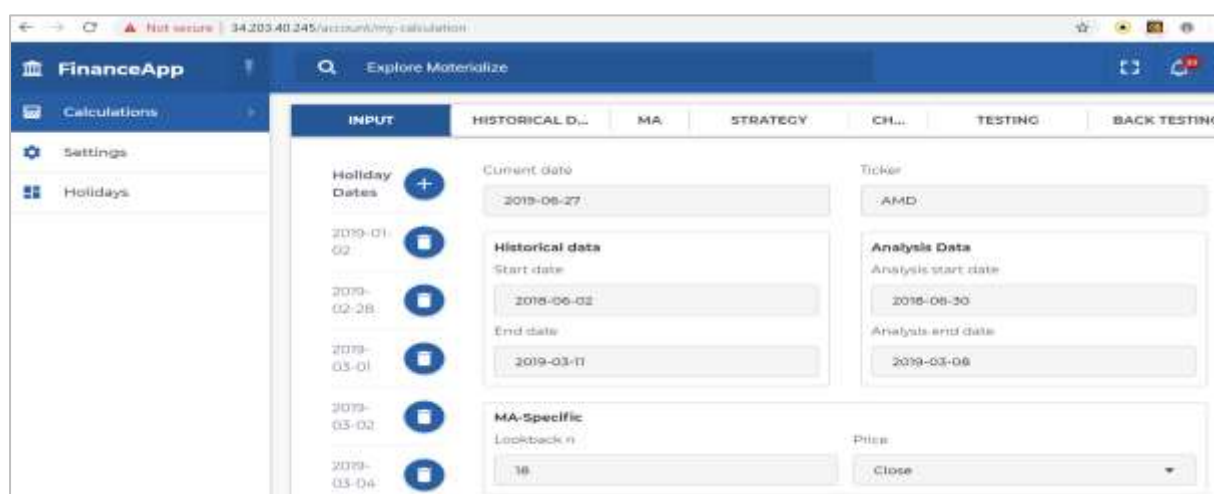
6. Clear the cache on the browser.
7. Enter the stock symbol in the box underneath "Ticker" as well as Historical data "Start date" and "End date" in the corresponding boxes. Load Historical Data as per "User Guide_HISTORICAL DATA TAB.docx."
8. Enter "Analysis start date" and "Analysis end date."
9. Enter "MA-Specific" parameters: lookback period "Lookback n" and price type "Price."
10. Click <LOAD PRICES> to load historical data.

11. Click <UPDATE "MA" TAB>
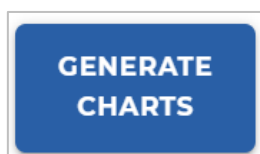
Note that, by construction, you do not need to update the MA tab first as SMA and EMA calculations will be done internally, after which they would be sent out to the CHARTS tab.

OUTPUT

CHARTS tab:

STRESS TESTING

The candlesticks will naturally not show as clearly for a very large data set as they would for a smaller one. Also, depending on the screen resolution, only one moving average line will show (instead of both SMA and EMA lines showing). However, the date, stock price HLOC, SMA and EMA values will show at every point the mouse hovers on.

SECTION 6: STRATEGY TAB

The platform (like the spreadsheet) fully automates the calculation of a stock's strategy results using different implementation methodologies for the moving average/Python performance optimisation (Simple Moving Average SMA and Exponential Moving Average EMA), ensuring the correctness as well as transparency of results. You should enter input data in the INPUT tab (similarly to the "Input" worksheet) and click the corresponding button <BUILD STRATEGY> to automatically launch the STRATEGY tab (the equivalent of the "Strategy" worksheet).

INPUT

1. Enter the stock symbol in the box underneath "Ticker" as well as Historical data "Start date" and "End date" in the corresponding boxes. Load Historical Data by clicking

2. Enter "Analysis start date" and "Analysis end date."
3. Enter MA-Specific parameters: lookback period "Lookback n" and price type "Price."
4. Enter "Strategy Input Parameters".
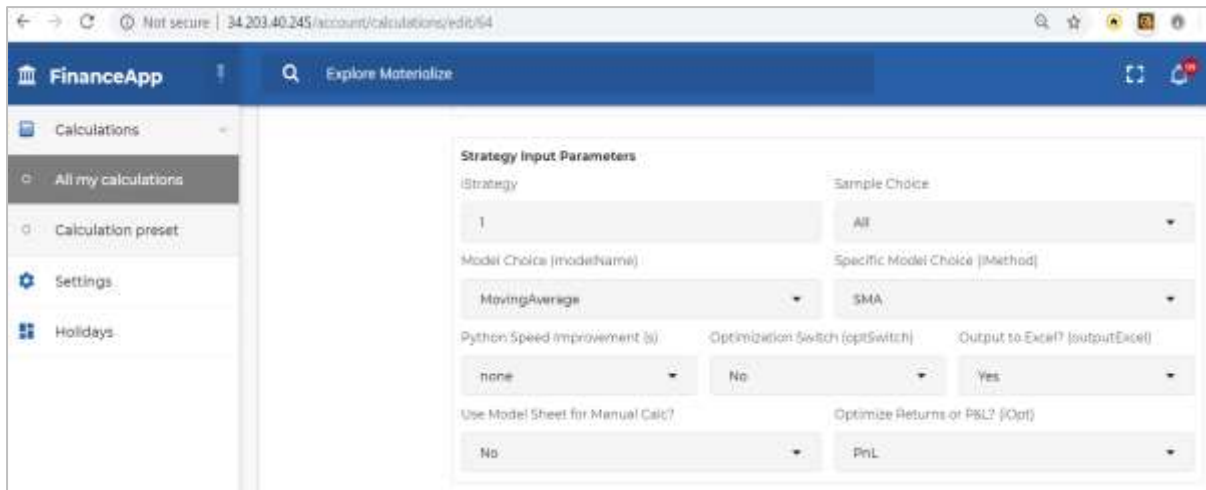
** For more on the definitions of the input parameters, refer to section 2 above.

** Keep "Optimization Switch (optSwitch)" set to "No" and "Output to Excel? (outputExcel)" to "Yes."

5. Enter "Threshold Date." (under "Strategy BackTesting" parameters)

6. Click the <BUILD STRATEGY> button to launch the STRATEGY tab.

OUTPUT

The output can be seen in the STRATEGY tab. It can be copied and/or download as an Excel file by clicking "EXPORT ALL" at the top right side of the STRATEGY tab. For the downloaded file, view the file icon in the bottom left corner of the sheet. Please note that, depending on the speed of your internet and the size of the file, it can take one hour or so to download the file.

You should see three tables (Excel Strategy, JS Strategy and Python Strategy)

First few records (Excel Strategy):

Last record and summary table (Excel Strategy):

First few records (JS Strategy):

Last record and summary table (JS Strategy):

First few records (Python Strategy):

Last record and summary tables (Python Strategy):

** To upload another file or change symbol or historical dates, click "CLEAR DATA" on the HISTORICAL DATA tab first.

STRESS TESTING

Model Limitation: as mentioned earlier, the platform does not have the capability yet of automatically loading data from Yahoo! Finance when the data set is extremely large but it is possible to upload the data through a file (as described in the above document).
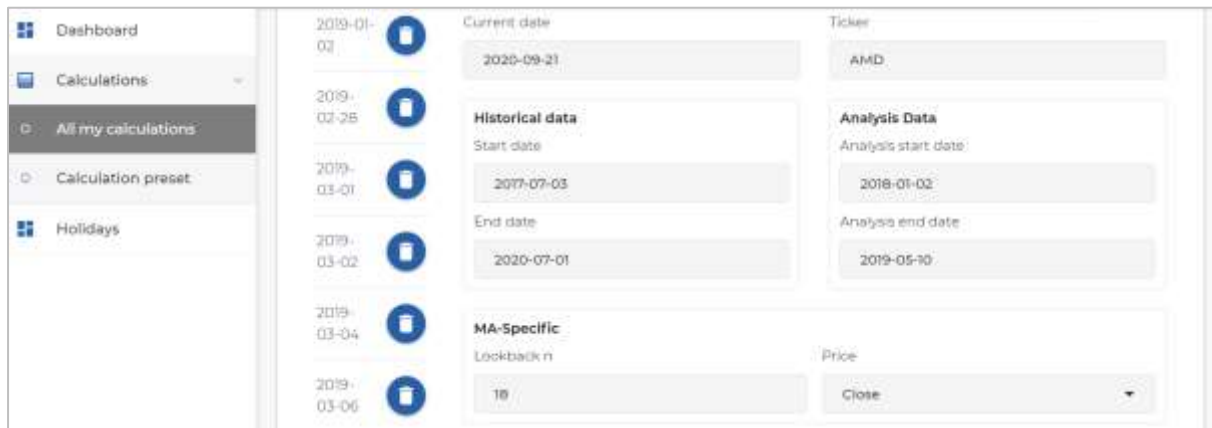
VERY LARGE DATA SET

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SECTION 7: BACKTESTING TAB

In this tab, you will see the results of strategy back-testing fro iStrategy = 1. As with our tabs, you will enter relevant data in the INPUT tab and then click the corresponding button <RUN BACKTESTING> at the bottom of the INPUT tab.

INPUT

1. Enter the stock symbol in the box underneath "Ticker" as well as Historical data "Start date" and "End date" in the corresponding boxes. Load Historical Data by clicking

2. Enter "Analysis start date" and "Analysis end date."
3. Enter MA-Specific parameters: lookback period "Lookback n" and price type "Price."
4. Enter "Strategy BackTesting Input Parameters".

** For more on the definitions of the input parameters, refer to section 2 above.

5. Click on the <RUN BACKTESTING> button at the bottom of the page to launch the BACKTESTING tab.

OUTPUT

The results are displayed in the BACKTESTING tab. You should get the results for the optimised PnL or Returns for each individual sample set and each individual function. You can also download Excel© files for interim calculation. For example,