**Spring 2021 FRE-GY 6883 Financial Computing Quiz 2**

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Write one page document to outline how you could use staged delivery model to manage your FRE-GY6883 Team Project. Your document should have brief description for **requirement analysis**, **architectural design** and **3 delivery stages** (if we write or draw instead of typing, you could use your phone to take a picture of your answer and upload the image).

**Requirement analysis:** The general requirements of this program is shown below

1. Retrieve historical price data of Russell 1000 stocks and IWB from Yahoo Finance using libcurl library.
2. Handling EPS estimate and price information with appropriate classes.
3. Implement matrix / vector calculation using classes, member functions, and operator overloading.
4. Store corresponding stock information in STL map with stock symbol as keys.
5. Divide stocks into 3 groups: beat, meet, miss with thresholds.
6. Calculate expected AAR, AAR STD, CAAR, CAAR STD for 3 groups of stocks.
7. Plot CAAR for 3 groups in one graph using Excel Driver or gnuplot.

**Architectural design:**

1. Workflow (main function)
   1. First, we have a main engine that controls all of the actions the user can choose from.
   2. Then the main engine will be initialized and load all the stock information into the memory.
   3. Then the program will prompt the main menu and ask the user to choose from the menu.
   4. The user can traverse the menu or exit the program.
2. Action flow (menu)
   1. Enter N.
   2. Pull information for one stock.
   3. Show AAR, AAR-SD, CAAR and CAAR-STD for one group.
   4. Show the excel or gnuplot graph with car for all 3 groups.
   5. Exit the menu.
3. Class flow (class design)
   1. MainRun: The int main function that runs.
   2. MainEngine: The engine for all the actions in int main function.
   3. FetchData: Fetch stock data from Yahoo finance.
   4. Calendar Manager: Calculates trading days, handles N calculations, finding previous days, etc.
   5. StockData: The data structure that stores stock information.
   6. Vector: A vector class that handles the vector calculation with overloaded operators +-.
   7. Matrix: A matrix class that handles the calculation of matrix.
   8. Utils: Necessary functions that handles the combine of StockData vectors and STL map.

**First delivery stage**

* Retrieve stock data from Yahoo Finance and sort the stocks into beat, meet, and miss groups with standards based on earnings surprises.
* Generate random selections of stocks in each group with bootstrap algorithm to ensure the fairness of the calculation.
* To inform the customer on the benchmark’s trend and quarterly earnings reports’ impact on stock price, calculate CAAR (cumulated returns on the first T days) for each of the groups as well as other statistics (AAR, AAR-SD, CAAR and CAAR-STD).

**Second delivery stage**

* Generate gnuplot and excel graph of all of the CAAR results to visualize the result and deliver to a file for the customer’s further usage.

**Third delivery stage**

* Design a menu inside MainEngine where customers can choose their actions and can inquiry specific information of a single stock, all historical stock information, as well as retrieving the plot and numbers of CAAR results for the three groups.