Programming Project - Report

Outline (of design)

For this project we were provided with a large data file filled with stocks and another with their respective businesses. We chose to implement the idea of a stock browser program where the user can view information about each individual business and their stocks. Our initial idea was to take a more simple approach to the user interface and make it easy for the user to navigate and explore the program and to also put into use the features we had implemented. In following this approach we landed on the idea of having a 'Main Screen' which simply listed out the businesses in a comprehensible and readable manner, this opened the floor to adding a 'scrolling feature' which facilitated breathless and smooth exploration of all the data available to the user. We also listed various sorting methods on the main screen which opened a magnitude of ways to view the data available in a way that suited your particular needs at a given time.
(See Image 1 at end of pdf)

On this Main Screen the user could then enter an alternative screen which displayed the unique characteristics of the business which had just been selected. On this screen the user could find the most recent data collected about the businesses and its stocks, see the data displayed in an easily comprehensible manner, such as a graph which could be seamlessly adjusted to display a variance of data over different time periods.
(See Image 2 at end of pdf)

Team Management

When we began our project we decided we needed to assign everyone a part of the project to get working on. Since our project needed two "screens" we split everyone up into two groups by assigning two people to the "Main Screen" and two people to the "Info Screen". The outline was as follows:

- **Main Screen -** Matthew Thompson and Cian O'Grady
- **Info Screen -** Cian Jinks and Eimhin Campbell Carroll

However, after the first week we lost all contact with Cian O'Grady and so the "Main Screen" was left to just Matthew. We had some specific design ideas for the styling of each screen and so we began to work on those separately:

- **Data Management and Main Screen Stock List -** Matthew Thompson
- **Info Screen Displayed Data -** Eimhin Campbell Carroll
- **Info Screen Graph** - Cian Jinks

As the project moved along we each took up other minor tasks as needed.

Individual Contributions

Eimhin:

On week one we met to set up a clear vision for the project. We examined other apps for the stock market and came up with a mock drawing of the layout. We decided to have one homepage where all stocks would be displayed with their essential information e.g. Ticker, Name, Value etc. By clicking on one of these stocks you would be brought to a different screen that went into more detail on that stock. We split up into two teams, Matthew was to work on the main screen and I, Eimhin was to work with Cian Jinks on the second screen we dubbed the "Info Screen". *(See Image 3 at end of pdf for early prototype)*

I began by working on the layout of the screen while Cian focused on the graph which would be central to the page. Once the layout was solid, I moved onto working with that data point and business class created when we loaded the initial data. I worked through null pointer exceptions, different lengths of data and businesses completely lacking data to create a generic class. This class could be created by passing in a business and would display the info of that business. At this stage I wanted to do more comparisons on the data. To do this I wanted to have the user select a date range they were interested in and then the page would update to display the statistics for that period. I realised this was going to be very difficult to do at the stage where my page was implemented as you would have to go through every date string and find the stock data relevant to that period. To solve this, I sorted the data as it was added to the stocks array in each business. Sorting by date where index 0 was the most recent data for that stock. This made the data much easier to process. I then started working on the mechanic for selecting the date. I designed a date box where when clicked you could scroll through the dates. This worked great and looked great working with the graph straight away. The one issue was the speed of the scroll was rather slow for going back years at a time. I added a plus and minus to either side of the date when clicked to allow the user to jump forward or back a year. Once satisfied with this date box I began to work on adding a second one to change the end date. This created lots more issues as they had to remain in the same order even when a user attempted to jump a year or scroll. This was all done

using my widgets class which was a generic template for any widget. I had already used it to create the back button linking this page back to the main screen. Feeling the page was a bit static I created a rotating text box that faded in and out switching between stats. This could also be paused if the user wished. I then added some pre-set ranges for the page that could be selected (One week, one month etc.).

At this stage the Info Screen was practically finished but we needed a bit more work on the main screen. I added more sort functions to the Business Comparison class and created more widgets to sort the main screen with. I added a sort of radial selection button to display the most recent sort. Then I developed a highlight method for the businesses on the main screen. Unfortunately the program was starting to feel a bit laggy so we looked at some optimisations. I moved all the loading of data and fonts to setup if they weren't there already and tried to cut back on 'for' loops in places such as 'mouseMoved'. Finally, I focused on finer details such as text aligns, colouring and fonts.

Cian:

After our initial planning and design brainstorming in week one I had my first big task to begin working on. I was assigned to work on our graph for display on the "Info Screen". To allow seamless integration with however Eimhin chose to implement the "Info Screen" I knew I needed to make my graph a class of its own that had a draw method and could be instantiated within his "Info Screen". It also needed to be resizable so he could place it anywhere on the screen and fit it into anywhere on the screen. As for the type of graph I chose a line graph for simplicity.

I began by creating a simple constructor which took in a Business Object to display as well as an x, y, width and height and setting these variables to some local instance variables. Next came my first big challenge. We had decided during the original designing phase of our project that the time frame of stocks the graph displayed for a business would be somehow controllable. Therefore we needed some way in which to handle comparing the dates associated with each stock. Therefore I set about making a static "Time" class which would handle any comparison of dates needed within our program. (I also thought this would be useful for the other group members). To do so I converted the dates from the data file, which were stored as Strings, into seconds offset from January 1st, 1950 stored as longs. With this complete I could finally get back to my graph by adding two new parameters to the constructor to take in a "StartDate" and an "EndDate".

Now I had to calculate my axis for the graph. I wanted the x axis to be the time frame and I wanted the price of the stock on the Y axis. But I ran into a problem. How would I determine what the max value should be? To do this I added some functions to our

already made “Business” class which would return me the highest priced stock over a given time period. Then within the graph I would use this value plus 20% of itself to leave a bit of room at the top. I made the bottom of the y axis (the lowest price) zero. With this in place I now had to get all the stocks within the timeframe and position them respective to their price and time on the graph. I added another function to the “Business” class for getting the stocks in a given time period and stored those in the graph’s class. Now for positioning. This turned out to be the biggest challenge of all when it came to implementing a graph. I struggled to find a way to normalise the price of a stock into a y position on the screen/graph. Ultimately I came up with a formula for doing so and gave it its own respective function called “GetYForStock(double price)”. I also made one for the x position based on the date of the stock called “GetXForStock(double price)”. With these in place I was able to position every stock on the graph as a red dot for a given time period based on their price and date. From here it was quite easy to draw green lines connecting each stock to turn it into a line graph as I had originally envisioned.

With the basics of the line graph in place it was time to implement some information. I started by labelling the X and Y axis with some pricing intervals and the time period shown. This was simply data already known to the graph however the pricing intervals consisted of 5 lines which ranged from 0 to the stocks max price and were evenly spaced (calculating the values for the in between lines was as simple as just getting multiples of maxPrice/5). The final addition to my graph came in the form of more detailed information about each stock. I added some checks to see which stock your mouse was closest to on the graph and depending on which one it would create a box with some exact information about that stock. With that the “Info Screen Graph” was complete.

At this point in time there were still some weeks left to work on the project so I made some more minor additions such as some more helper functions in the Time and Business classes. My final big contribution to the project was in the form of a “Preview Graph” for Matthew’s “Main Screen”. Since I had already worked out much of the math and code for a line graph before with my “Info Screen Graph” I was able to just make the “Preview Graph” a subclass of it and implement it relatively quickly. The only differences being the axises were not labelled and you could not hover over individual stocks or select a time frame to display.

Matt:

At the conclusion of our first group meeting we had decided to split up the workload in a manner which allowed me to work on the initial screen in the program, of which displayed a small snippet of information about each business and also facilitated a key

linking mechanism between this initial ‘Main’ screen and the screen which other group members were working on which then displayed more info about that particular business to the user.

Initially the first thing which I wanted to implement on the Screen was an overarching and comprehensible way of displaying the data which the user would have accessible to them. In light of this I decided on a vertical listing of all businesses in which the data relating to a single business would then be displayed horizontally. I did this by navigating through an Array which was created in our set up method and then using various offsets to display the data in a neat and tidy manner.

Once I was satisfied with the data that was being displayed and how it was being displayed, I decided to start working on handling user interaction within the screen. To do this I did some reflection on the work that had been done prior to reading week and put what I had learnt into action. Using the concept of widgets, I gave each business a unique event handler, and then created a widget which was unique to each business which could then be displayed on the screen and was user interactable.

Once I had the ground work placed down I could start adding additional features to the program. I got to work on implementing a Search feature to the program. This allowed the user to search by ticker name and have the ticker then returned to them if there was a match in our dataset. I also then got to work on adding in various sorting methods for the data set. I decided to add in methods to sort the dataset by alphabetical order and by the highest price that a business had reached, from high to low. Once all these sorting methods were implemented I decided to add in a drop down menu from which they could be accessed, this freed up some space for displaying more useful info about the businesses and gave the program a more modern feel. During the project I also got to work with team members on implementing various ideas to the Main Screen and taking feedback on board, with the help of Eimhin we were able to implement a smoother scrolling feature than the one I had originally implemented on my own, this really made the whole dataset a lot easier to navigate.

Towards the end of time of working on the project I began working on the efficiency of the program, I was able to reduce the amount of loops and found various ways to make the program smoother and have a much more instant feel to it, rather than the slightly delayed response time of previous versions.

Image 1

Image 2

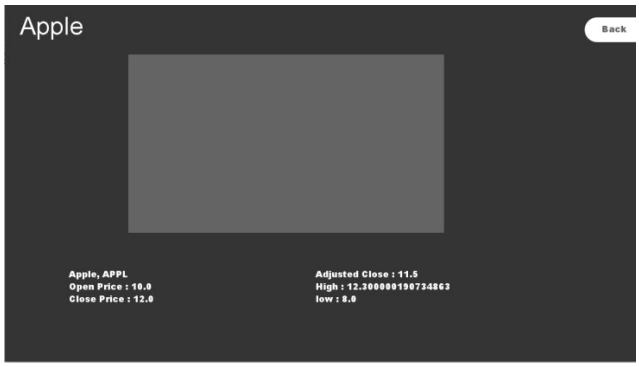

Image 3