**Project Report 4**

**Problem Statement:**

The goals of this programming assignment were to write a queue and stack class for taking in a vector object and to run stress tests on both methods of storing information to compare their CPU times. The program inputs are six different menus options (1-6) and a input to close the program. The program outputs where the printed queue or stack and the time it took for each respective test to run. The only error handling needed was to not allow anything other than integers be inputted.

**Design:**

I chose to run the CPU time comparisons individually as opposed to running both queue and stack at the same time with the same number of iterations. As far as implementing a vector object into a queue and stack class, there is not too much to change outside of what was provided for this assignment. This program features a queue class and stack class, a random function, and a time function. No algorithms were used. Although writing the code this way added a little more time to compile results, there was no real computational difference between the two.

**Implementation:**

My implementation process was smooth besides some slight changes to the queue class because of the structure of the data that was to be analyzed. The fact of vectors not having a hard-coded size changed the way the classes would work as both ways of organizing data usually require some sort of size to operate accordingly. The preset methods that came with the vector, queue, and stack class such as .begin(), .end(), .front(), etc. helped remedy this problem. The sample code included header files for a queue and stack class. This sample code made creating the source files a much easier and understandable task.

**Testing:**

I tested my program with mainly integers while also including different types of data like characters and strings. I tested all features of the menu (1-6) showing the program working according to what was asked in the homework document. Inputting a character, string, or any other datatype besides an integer resulted in the program notifying the user of a input error. Most things worked as expected, the program has a cosmetic issue when string are inputted, but it stills functions correctly.

**Conclusion:**

Homework 4 resulted in a program that stress tests and analyzes run times between queues and stacks. The programming project was a success besides the fact that it was submitted late. Next time I would turn this project in within a more timely measure, but would try to follow the same implementation process as it decreased the time it took to complete the program a sufficient amount. The project took five hours to complete over a four-day period.