**Programming Project Report**

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Date: 3/23/20

**Academic Integrity Statement:** I pledge that I have neither given nor received unauthorized help on this programming assignment.

**Problem Statement:**

The goal of this programming project is to gain experience using stacks and queues with the vector class. This program will take in the amount of operations the user would like to run. It will output it took each method, as well as what was in the method when it was done, and how many times it added something or removed something. I made my program set the number of operations to 1000 if cin failed.

**Design:**

My design decisions included classes and implementing everything in waves. I used stacks and queues as our data structures. I used for loops to implement my algorithms for adding and removing data from the vectors, as well as printing that data out. The pros of using stacks and queues is that they are extremely fast and efficient when used correctly, the con is having to figure out how to implement and use them.

**Implementation:**

For my midpoint I created all skeleton functions and got my program to compile. I started with the professor’s stack and queue header files. I implemented my stack methods from scratch, making sure to compile periodically. Because this is pretty much just the vector class it was pretty easy and went by pretty fast. For the queue file I also started from scratch but used the professor’s “circular queues” power point slide to guide me. I did my midpoint on March 22nd and finished the program on March 23rd.

**Testing:**

I tested my program using numbers. The normal inputs were 1, 10, 100, 1000, 10000, 100000, 10000000, and 100000000. The special cases included random non-number characters and numbers that were way too big. The normal cases worked fine; they just gradually took longer. The special cases also worked, because in my program if the program didn’t understand the input it ran 1000 operations.

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Description automatically generatedFor 100,000,000 I disabled having the program output the contents.

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Description automatically generatedAverage run time (excel sheet). All times are in seconds.

**Conclusions:**

Overall this project was a success. I wouldn’t do anything differently if I had to do it again. This project took me about 5 hours to complete.