

**Tinotenda Rodney Alfaneti**

**Intermediate Computer Programming**

**C++ Individual Project**

**Reflection**

As a Java Developer, using C++ to work on this project was an exciting and insightful experience to get a background in memory allocation and pointers. Many of the things I was overlooking, like creating a memory location using the new keyword and leaving everything in the hands of the Garbage collector. The project gave me an excellent overview of what happens in memory and how I can utilize that to improve my code. It was also interesting to learn that in C++, primitive types like integers or characters can be passed by reference by utilizing pointers. However, the learning was not smooth flow. Initially, I planned to change the same project I once wrote from Java to C++ line by line. Along the way, I realized that there were better approaches for me to learn the intricacies of C++. Also, as an aspiring software engineer, that is not how other professional software engineers tackle real-life projects. The ideal approach was to develop a pseudocode, research syntax, and start writing the code. I used the project I did in Java to come up with a pseudocode. After I came up with the pseudocode, I started researching the C++ data structures, algorithms, and syntaxes I would need for the project. The examples include learning about queues, reading and writing to files, maps and sets, bread-first search algorithms, and exceptions. After grasping the concepts and the syntax, I also spent time understanding how to implement pointers to remove the repetitive work I was doing in passing by value. After acquiring enough knowledge about the syntax and pseudocode, I started implementing it.

Though it changed a bit because of the edge cases, I did not capture while designing my pseudocode, like a column in the CSV with an invalid data type like "\N." The most challenging bugs were the segmentation fault and out-of-memory errors, which arose due to my use of pointers. What the debugging taught me was how to effectively use pointers to make my code faster and to make my code readable. For example, I will just access the data in memory by passing by value instead of reading a file when doing the route search. If I am to redo the project again, I will look for a team member to do the project with to improve my team working skills and quicken the process. Working on the extra credit also gave me a chance to understand the haversine function and how distance can be calculated using longitude and latitude.