Nash Ellis

CS-499

Dr. Ogoh

09/28/25

Milestone Three: Enhancement Two: Algorithms and Data Structure

The artifact I selected for the algorithms and data structures enhancement is my Vector Sorting Assignment from CS-300: DSA Analysis and Design, which I completed around March of 2025. This C++ program allows the user to interact with the application through number key inputs. Pressing 1 imports and loads bid data from a CSV file, 2 displays all loaded bids, 3 sorts the bids using selection sort (from the original code), 4 sorts the bids using quick sort (also from the original code), 5 sorts the bids using merge sort, and 6 sorts the bids using the C++ Standard Library’s std::sort function. Finally, pressing the 9 key exits the program.

I chose this artifact because I enjoyed it, as well as found it particularly important to algorithms and data structures. This project and class were designed to explore and analyze different sorting algorithms and data structures. During this class, I concluded that vectors and dynamic arrays are some of the best data structures available. I chose to improve the vector sorting assignment, since it is so useful in real-world scenarios with much larger projects and costs. The sorting algorithms used were required for the assignment, so I decided to use sorting methods that are safer, more efficient, and more accurate. I used the sorting methods that professionals use, which is C++’s standard sort (std::sort), and I also added merge sort to the program as well. Additionally, I made improvements to the input validation, since there was no input validation at all previously. I also added some error handling, as well as changed the clock() function to the chrono library for more precise measurements of time. I hope the improvements I have made to the program demonstrate my abilities as a developer, as well as with algorithms and data structures.

I met the courses outcome to “design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices”, which I chose in Module One. The enhancements that I made are closely aligned with this course outcome, and I incorporated this course outcome into my decision making. I do not have any updates to my outcome-coverage plan.

Enhancing this artifact was a fun challenge. I enjoy not following strict guidelines, allowing me to interpret things differently and implement different solutions that I see fit. Working on this enhancement, I learned the importance of time complexity. I made it my goal to make improvements to the time complexity, with a focus on larger datasets, which have real-world applications. The biggest problem I faced was incorporating the merge sort and std::sort, it was kind of challenging, having never done it before, but I persevered with the help of resources like Stack Overflow, YouTube, and Google. Though, it did take some trial and many errors to succeed. Overall, I learned a lot through the enhancement of this assignment, and I hope to apply what I have learned to future projects.