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CS 499 Milestone 3

Enhancement Two: Algorithms and Data Structure

This artifact is project two from the course CS- 300 DSA: Analysis and Design in which I was tasked to create advising and assistance software for a fake college ABCU University by using algorithms and data structures to help students find/add/delete courses from an external CSV file. This was created during the term 2024 C4 (July-August). This artifact is the second part of the project where I used a binary search tree to effectively intake the course data, add it to the course list, then sort the course list alphanumerically with the ability to then delete a course if needed then exit the application through a user input menu. To enhance this artifact, I looked at how I could add to the user experience of this simple application by adding two additional menu options and their corresponding functions. I added the ability to add a course to a student’s schedule and then display that schedule if desired. This showcased my ability to adapt the existing data structure to include new functionality that enhanced the original scope of the project into something that was more applicable to a more real-world application. Considering the project was intended to be for a university, I thought about how my experience in schedule building software went during my time at SNHU and how my data structure in this application should align with that. I also focused on improving the efficiency of the binary search tree algorithm by focusing on efficiency upgrades and adding recursion functionality in the search and deletion methods.

This artifact helped me meet two of the computer science program outcomes. In my first submission of this project, I neglected to include sufficient code comments and did not include a detailed into comment in the header describing what the intent of the project was who built it. During my enhancement process I made sure to include a detailed introduction to the project with the application goals, programmer introduction of myself and when it was built, and an overview of the enhancements I built in the updated project. I also went through the entire application and added code comments explaining functionality throughout the data structure and functions to give new users and other developers insight into how the programs works. These additions helped me meet the outcome “Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts”. I showed that I can effectively develop and deliver professional sounding written communication through my updated code comments and project introduction that can be understood by fellow developers and other end users.

The second course outcome I achieved through this enhancement was “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 (data structures and algorithms)”. I looked at how I could improve the efficiency of this algorithm, and after researching other binary search trees, I aimed to replace the iterative nature of inserting nodes with a recursive method. This made the code cleaner and reduced potential errors in more complex traversals. I also added recursion to the search and removal logic functions to improve code management. Finally, I added a more efficient deletion algorithm with advanced error handling. This project is the most comprehensive application of data structures and algorithms in my time at SNHU, and the most applicable to real world applications. When initially considering how I would enhance this artifact I wanted to potentially build a more user friendly front end for the menu instead of the more basic command line interface (CLI) version from the original build, however I decided to be more in line with this course outcome and show that I can add to the original intent of the project in building college scheduling software, that adding more functionality was the better choice. By adding two new menu options and successfully integrating them into the existing data structure of the course menu, I showed that I followed computer science practices and standards more appropriate to this solution.

I was not confident in my first enhancement, and after reconsidering how I would address this one I believe I am now more in line with the enhancement process. When revisiting this project, I took more time to try and understand how this data structure came together and how to effectively add these new menu items without taking awhile from the flow of the binary search tree. There were some challenges with getting the course menu to display, but I feel that this artifact now is a more worthy addition to my ePortfolio.