Milestone Three: Algorithms and Data Structures

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CS 499 Capstone

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Algorithms and Data Structures Narrative

Artifact

This artifact is from the course CS 300 Data structures and algorithms which I took a little over a year ago. DSA taught me the fundamentals of well, data structures and algorithms. This course was a very important one throughout my career here at SNHU. The artifact itself was the final project for that course. It allowed me to show my proficiency with vectors. I was given a text file that was prewritten with course and my responsibility was to create a vector and populate that vector with the courses from the text file. The user was able to load the courses into the vector, print the course list, and search a course name with the given course number.

Why I Chose This Artifact

I chose this artifact from CS 300 because there is no better way to showcase my proficiencies with data structures and algorithms than from the course that educated me on them. The specific components of the artifact that showcase my skills include the creation of the vector itself, how I was able to insert information into it, utilize that populated vector, and incorporate it into a small program. This artifact was improved by implementing code that allows the user to add a course via user input of course number and name. Then the newly added course would be part of the course list/vector to be searched up and displayed.

Course Objectives

The course objectives of using algorithmic principles and applying my knowledge, skills, and available tools to solve a computing problem was met with this artifact enhancement. I successfully implemented the ability to add courses to a text file and into a functioning vector. The user is able to input any course they wish so that it will be displayed as part of the course

list. After implementing this insertion algorithm, I was able to identify that it did not impact performance or speed of the program. The time complexity, Big O notation, of this algorithm would be O(1) because it does not impact the performance of the program regardless of the accepted input. With that said, I was able to design and code a compact insertion algorithm that did not affect program performance, while greatly improving the ABCU course advising program from its original state. Lastly, security was implemented with input validation when selecting a menu option. The screenshots below show the process of inserting a custom course, loading the vector up with the new information, and listing the updated course list.

```
D:\CS 499 Capstone\CS 300 DSA\ProjectTwoABCU\x64\Debug
                                                    ABCU Advising
                                             1. Load Data Structure
       ABCU Advising
                                             2. Print Course List
                                             3. Print Course Information
1. Load Data Structure
                                             4. Enter a New Course
2. Print Course List
                                             5. Exit
. Print Course Information
                                             Enter your choice:
1. Enter a New Course
5. Exit
                                             CSCI100, Introduction to Computer Science
Enter your choice:
Please enter the course number (No Spaces). CSCI101, Introduction to Programming in C++
IT140
                                             CSCI200, Data Structures
Please enter the course name.
Intro to Scripting
                                             CSCI300, Introduction to Algorithms
      ABCU Advising
                                             CSCI301, Advanced Programming in C++
1. Load Data Structure
                                             CSCI350, Operating Systems
2. Print Course List
Print Course Information
                                             CSCI400, Large Software Development
4. Enter a New Course
5. Exit
                                             DAD220, Intro to Database Structure
Enter your choice:
                                             IT140, Intro to Scripting
```

```
ABCU_Advising_Program_Input.txt - Notepad

File Edit Format View Help

MATH201,Discrete Mathematics
CSCI300,Introduction to Algorithms,CSCI200,MATH201
CSCI350,Operating Systems,CSCI300
CSCI101,Introduction to Programming in C++,CSCI100
CSCI100,Introduction to Computer Science
CSCI301,Advanced Programming in C++,CSCI101
CSCI400,Large Software Development,CSCI301,CSCI350
CSCI200,Data Structures,CSCI101
DAD220,Intro to Database Structure
IT140,Intro to Scripting
```

Reflection

The process of enhancing this artifact was a difficult one but it has taught me a lot about perseverance and determination. If I am stuck, I can research concepts, solutions, troubleshooting and more to aid me in solving any problem. The first big challenge I faced when working on this artifact was that when I attempted to insert a course with user input, it would overwrite the whole text file instead of adding to it. So, I did some research and found the solution of appending user input to an already written text file. The next challenge I faced was that the user input was not being fully read, the first word of the course name was always being cut off. Cin.get() and getline() fixed that problem.