CS-499

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## Narrative for Enhancement Two: Algorithms and Data Structure

**Briefly describe the artifact. What is it? When was it created?**

The artifact I chose for Category Two is “***Course planner program***” from the CS 300: Data Structures and Algorithms course at Southern New Hampshire University. This program loads course data from a file, organizes it using an unordered map, and allows users to view course information and prerequisites. The original purpose of the artifact was to demonstrate the ability to implement and manipulate data structures, specifically focusing on efficient data storage and retrieval using C++. The artifact was created during the course, showcasing my progress in understanding and applying data structures.

**Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?**

I selected this artifact for my ePortfolio because it not only demonstrates my proficiency in implementing and manipulating complex data structures but also showcases my ability to enhance existing code to improve functionality and user experience. This project highlights my skills in C++ programming, which is a critical language in the field of software development, especially when dealing with data structures and algorithms. The specific components that showcase my skills include:

* **Unordered Map Usage:** The initial implementation of the project demonstrates my ability to use an unordered map for efficient data storage and retrieval. That showcases my ability to use complex structures.
* **Linked List Implementation:** The enhancement of the project includes the addition of a linked list to handle courses. This demonstrates my ability to implement dynamic data structures that allow for efficient insertions and deletions.
* **Algorithmic Thinking:** The sorting of course numbers to print the course list in alphanumeric order showcases my ability to implement sorting algorithms and understand their importance in organizing data for better readability and usability.

**The artifact was improved by:**

* **Linked List Addition:** The primary enhancement was the addition of a linked list data structure. It allows dynamic insertion and deletion of courses, which was not possible with the unordered map alone.
* **Inserting and Removing Courses:** I added options for users to insert and remove courses from the linked list. This required implementing methods for appending, prepending, and removing nodes in the linked list.
* **Improved User Interface:** The menu was expanded to include options for adding and removing courses. This improvement involved designing a user-friendly interface that guides the user through the process of managing the course data.

**Did you meet the course objectives you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

Yes, I believe I met the course objectives I planned to meet with this enhancement in Module One. The enhancements align with the key learning outcomes of the course, demonstrating my ability to design, implement, and enhance data structures and algorithms effectively. By adding a linked list to handle dynamic course insertion and deletion, I addressed the need for flexible data management. Additionally, improving user interactivity by allowing users to add, remove, and search for courses demonstrates a practical application of these data structures in a user-centric program. These improvements align with my initial plans for outcome coverage, and no further updates to my outcome-coverage plans are necessary at this time.

**Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

The process of enhancing and modifying the artifact was both challenging and enlightening. I learned how to effectively implement and integrate a linked list with an unordered map, which required a deeper understanding of both data structures. One of the significant challenges I faced was ensuring the linked list operations, such as insertion and deletion, worked seamlessly with the existing data retrieval mechanism of the unordered map using file handling. Debugging and testing these operations was crucial to maintaining the integrity of the program.

**The following course outcomes were achieved:**

1. **Design and Evaluate Computing Solutions (Data Structures and Algorithms):**

* **Original Code:** Implemented the use of an unordered map for efficient storage and retrieval of course data.
* **Enhanced Code:** Added a linked list to handle dynamic course insertion and deletion, showcasing an understanding of different data structures and their trade-offs. This directly aligns with designing and evaluating computing solutions using algorithmic principles and computer science practices.

1. **Demonstrate an Ability to Use Well-Founded and Innovative Techniques (Software Engineering/Design):**

* **Original Code:** Provided a basic implementation for loading, storing, and displaying course data.
* **Enhanced Code:** Improved the system with more advanced data structures (linked list) and added functionalities (insert and remove courses). These enhancements illustrate the application of innovative techniques and tools to implement robust and scalable software solutions.

1. **Design, Develop, and Deliver Professional-Quality Communications:**

* **Original Code:** Included basic comments and a simple menu for user interaction.
* **Enhanced Code:** Improved code readability and organization with detailed comments and a more comprehensive menu. This demonstrates the ability to deliver clear and technically sound written professional code.

Overall, the process of enhancing the artifact provided valuable insights into the practical application of data structures, and involved overcoming challenges related to efficient data management and program organization.