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CS-499 Computer Science Capstone

Professor Conlan

Southern New Hampshire University

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**Milestone Three**

**Briefly describe the artifact. What is it? When was it created?**  
The artifact I selected is my Project Two created in CS 300: Data Structures and Algorithms. The program allows academic advisors at ABC University to load course data from a file, view all courses, and search for specific courses and prerequisites.

**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 algorithms and data structure? How was the artifact improved?**  
I selected this artifact because it shows my understanding of how different data structures affect program performance. Originally, the project used only a std::vector with linear search for course lookups. For this enhancement, I added an unordered\_map (hash table) to store courses for O(1) average-case lookup performance. This demonstrates my ability to improve efficiency and scalability through proper data structure selection.

**Did you meet the course outcomes you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**  
Yes, this enhancement directly meets the outcome of designing and evaluating computing solutions using algorithmic principles (Course Outcome 3). It also reinforces my ability to apply tools and techniques (Course Outcome 4). I remain on track with my original outcome coverage plan.

**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?**  
Through this enhancement, I learned how hash tables differ from vectors in terms of efficiency and when it makes sense to use them. The biggest challenge I faced was integrating the new data structure without breaking the existing functionality, since vectors were still needed for displaying all courses in order. I overcame this by maintaining both structures: the vector for iteration and the hash table for fast lookups. This gave me practice in balancing trade-offs when combining data structures in software design.