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CS-300-11105-M01 DSA: Analysis and Design 2024 C-3

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**8-1 Journal: Portfolio Submission**

My main task for Project One was to examine the memory and runtime properties of various data structures. I specifically looked at how well binary search trees, hash tables, and vector data structures performed throughout insertion, deletion, searching, and sorting processes.

I created each data structure and performed a variety of operations on them using various input sizes in order to approach this problem. I then calculated each operation's execution time and memory use to determine its scalability and efficiency. Using this method gave me insights into how various data structures function in various situations and made me realize how crucial it is to choose the appropriate data structure for a given task.

While working on the project, I had trouble understanding the subtleties of runtime complexity analysis and memory management. However, I get beyond these challenges by conducting in-depth study, getting advice from my loved ones, and experimenting with different approaches. By being persistent and looking at multiple strategies, I was able to improve my understanding of algorithms and data structures.

**Project Two: Sorting and Printing Courses**

Creating a program that prints a list of Computer Science program courses in alphanumeric order was the challenge for Project Two. The objective was to show that one could construct algorithms for data manipulation and sorting with proficiency.

I used the hash table data structure to effectively store and retrieve course information in order to solve this issue. To make sure the software generates the required output in a comprehensible fashion, I put sorting algorithms into practice and arranged the courses alphabetically. I was able to solidify my grasp of sorting algorithms and have hands-on experience with hash tables through this assignment.

This project broadened my perspective on software design by highlighting how crucial it is to select the right data structures and algorithms in order to maximize maintainability and performance. I created a program that satisfies the requirements while still being readable and flexible by carefully choosing the hash table to store course material and using effective sorting algorithms.

All in all, working on these projects has improved my capacity to develop effective and maintainable software solutions, which has advanced my programming skills. I have gained a deeper grasp of data structures and algorithms via thorough investigation and experimentation, which has helped me build programs that are not just functional but also scalable, readable, and flexible enough to meet changing needs.