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CS 499

Module 4 Narrative

The enhanced artifact is a hash table implementation originally written for CS 300 (Structures and Algorithms, Analysis and Design). It makes use of a hash table and CSV parser to efficiently retrieve, read, parse, store, and display bid data from a CSV sheet.

The hash table was effective at dealing with a limited data set but used chaining for collision resolution and could not be resized dynamically. This would naturally result in performance issues in instances of a growing data set. I enhanced the artifact by improving collusion handling using open addressing with linear probing, rather than chaining. This reduces memory fragmentation and improvement performance. I also implemented dynamic resizing and optimized the hash function itself via multiplicative string hashing. These changes cut down significantly on the number of lines in the artifact, as the program now requires fewer pointers and no recursive node traversal.

Three course outcomes were focused on for this implementation. Those were efficient data structure utilization, algorithmic thinking, and code maintainability and scalability. Efficient data structure utilization was met by implementing optimized hashing and dynamic resizing. Algorithmic thinking was covered via a transition to open addressing and multiplicative hashing. Finally, code maintainability and scalability were satisfied through a new modular implementation that will make future modifications easier.

Linear probing has an issue with excessive clustering, so implementation required testing to determine when resizing should occur. Attention was paid to performance, to decide which hashing strategy was best optimized for the showcased artifact. A major lesson learned was the effectiveness of refactoring. The new implementation uses far fewer lines of code and overall represents a better implementation for the artifact’s intended functionality.