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CS-310-T5510 Collaboration and Team Project

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6-2 Submit Project One **Runtime Analysis**

**Evaluate the run-time and memory of data structures that could be used to address the requirements. Now that you have analyzed all three data structures, make a recommendation for which data structure you will plan to use in your code. Provide justification for your recommendation, based on the Big O analysis results and your analysis of the three data structures.**

The complexity of operations on Hash table is O(1). And the hash table consumes memory because some part of the hash table is never used, and also consumes more storage memory for the list of key (course) in the hash table. And if the Hash table’s list of key (course) is too long, the search time can be O(n) in the worse case.

This is the advantage of the binary search tree structure, the complexity of this search algorithm is O(logn), with the worst case when all nodes have only right children or only left children, the complexity is O(n), we can see in this worst case the binary tree will represent an array structure. With Balanced Binary Search Tree, all the search operation, inserting operation, and delete operations can be guaranteed in O(log n) time.

Binary search tree is the most advantage for the faster time. the complexity of this search algorithm is O(logn) with N is number of node on the tree. We can add many different locations in the tree, adding an element to the tree encounter to the algorithm O(logn +k) which k represent the element. The tree is divided and all the courses are eliminated and divided in half until the course is search and print out, the runtime will be shortern.