**Milestone Three**

Ian Pruter

Southern New Hampshire University

CS 499: Computer Science Capstone

Professor Brooke Goggin

July 22, 2021

**Algorithms and Data Structure**

The artifact was the Task portion of the Mobile Application project from the CS 320: Software Testing, Automation, and Quality Assurance class. The assignment was never supposed to be an application, but loosely resembled three, almost identical, applications that allow users to perform, in memory, CRUD operations on contacts, tasks, and appointments. The purpose of the assignment was to learn unit testing. The Task portion was created February 7th, 2021. I selected this item because it included a lot of fundamental programming concepts like CRUD, unit testing, thorough exception handling, but mostly because of its linked list data structure. The data structure provided a great opportunity to swap out the list with a binary search tree and a tree balancing algorithm in the create() method. The CRUD methods and unit tests had to be adapted to work with recursion-based methods as opposed to Javas built in list methods. I thought this would be a great opportunity to showcase my skills in working with more advanced data structures and algorithms. Making them from scratch as appose to importing Java methods, shows that I understand the logic behind complex data structures like binary search trees and how they work at a lower level. It also demonstrates that I’m able to customize data structures to suit the specific needs of the program. The original program was improved as it’s now more efficient with large data sets. A balanced binary search tree searches in a logarithmic pattern as opposed to a linear pattern across time.

I met course outcomes such as applying algorithms to meet a computing solution of making my old program more efficient. I also applied well founded techniques such as recursion that gives the program more flexibility in sorting data than conventional control structures would. The program is also oriented around security with its use of robust exception handling in the class objects and unit testing scripts. I met all of the course objectives I had planned in Milestone One. I wasn’t sure if I would be able to add the balancing algorithm which went smoother than expected. I have no updates planned, unless instructed otherwise. I learned a lot about recursion and pointers during the process. I ran into a lot of challenges on this enhancement. I had a shallow understanding of binary search trees prior to the assignment so it wasn’t conceptually difficult. However, there were a lot of challenges with syntax issues and making sure all lines of code where in the right place to get the program to traverse the tree correctly. Nothing stood out as particularly difficult, but it was overall a much harder assignment than Milestone Two.