

Matthew Moore

Dr. Bowers

CPSC 223

12/15/20

Hw9-graphanalysis

Overall Analysis:

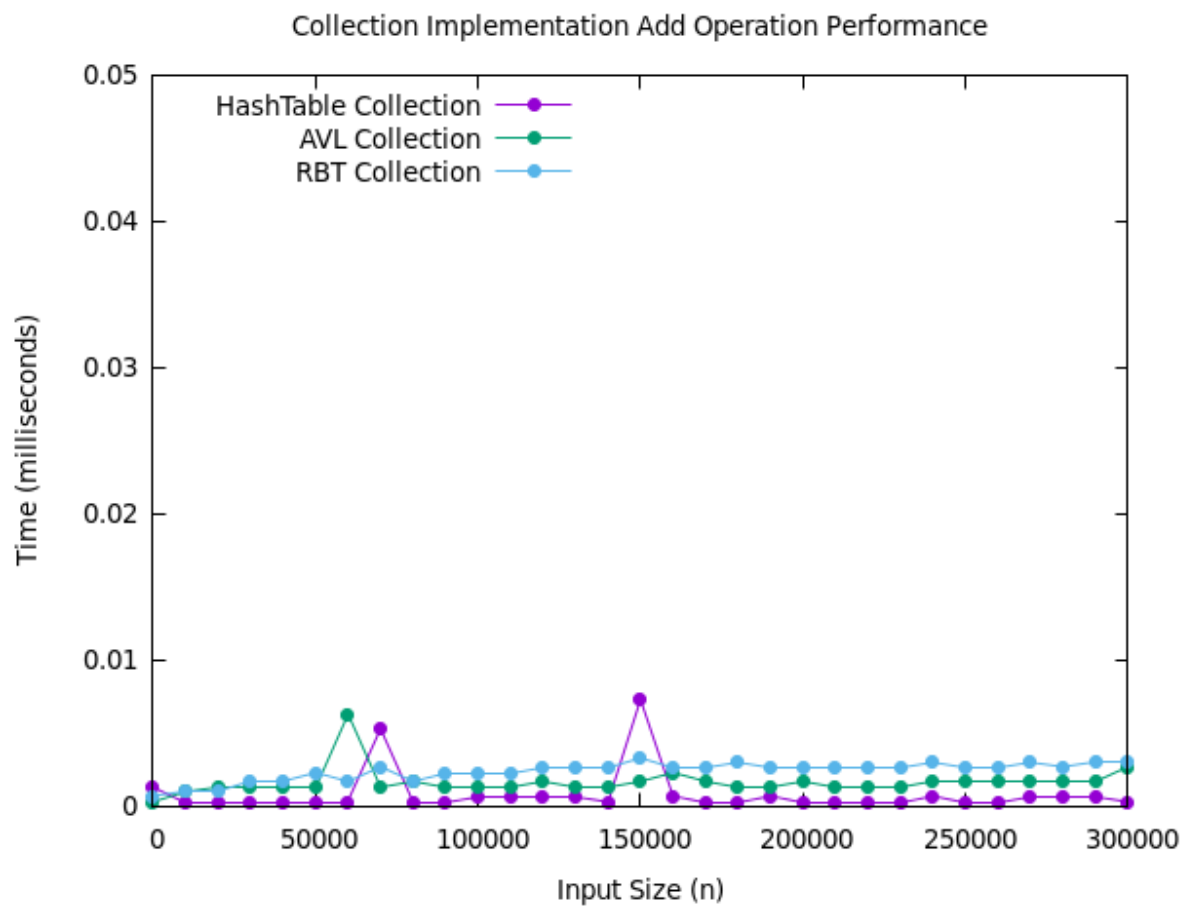
Overall, we can see that the AVL tree shows to be the most efficient collection data structure out of the three options displayed in the chart. This makes sense because as we discussed in class, the RBT Collection should be the most efficient option, yet designing the implementation that would be more efficient than an AVL structure would be quite a difficult task to accomplish. So, in our case the AVL structure is going to win in just about every operation. Meanwhile, the HashTable Collection makes a good run for the efficiency with being the most efficient for remove, add, and find value. We know that it will always be lagging when it comes to the sorting operation.

In terms of the complexity of all of these we know that the RBT is pretty much identical to the AVL Collection with $\log n$ defining much of its operations as we will see in the table depicted.

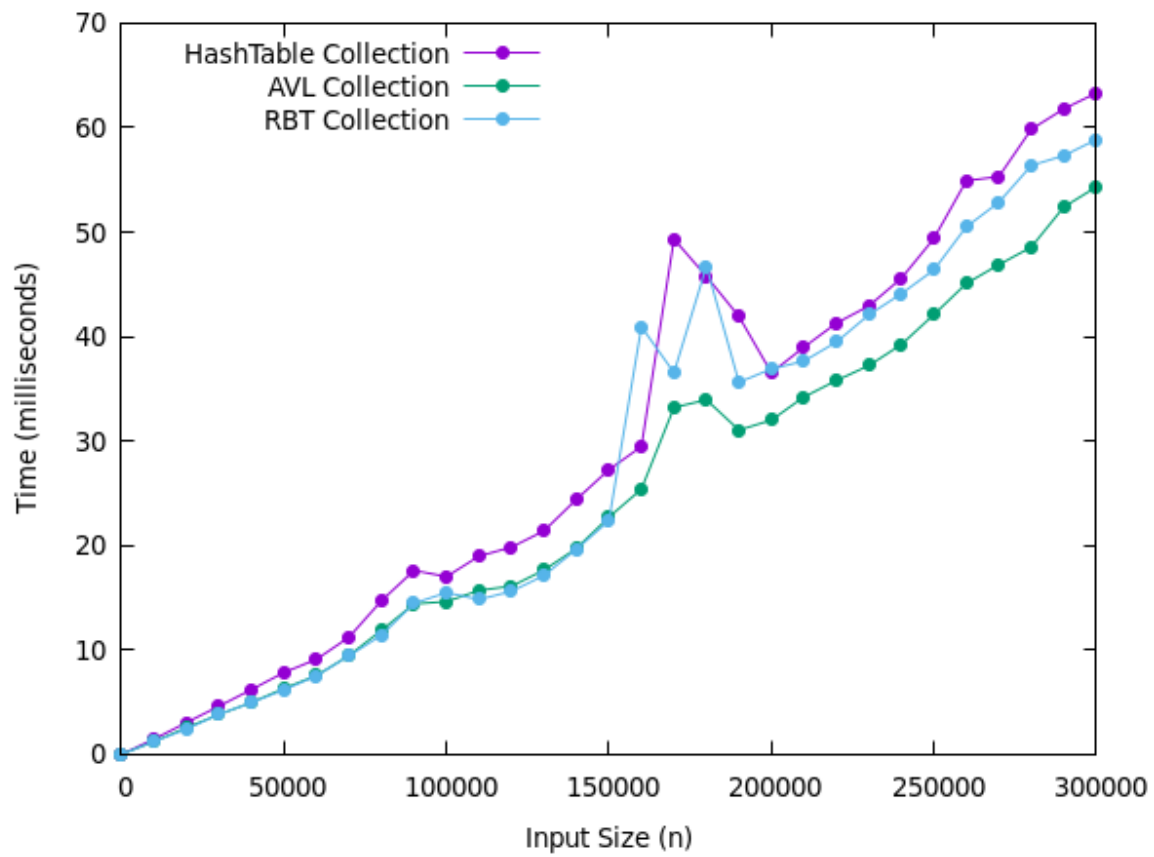
Functions	Array List	LinkedList	Sorted Array	Hash Table	AVL	BST	RBT
<u>Add</u>	$O(1)$	$O(1)$	$O(n)$	$O(1)$	$O(\log n)$	$O(n)$	$O(\log n)$
<u>Remove</u>	$O(n)$	$O(n^2)$	$O(n)$	$O(1)$	$O(\log n)$	$O(n)$	$O(\log n)$
<u>Find Val</u>	$O(n)$	$O(n^2)$	$O(\log n)$	$O(1)$	$O(\log n)$	$O(n)$	$O(\log n)$
<u>Find Range</u>	$O(n)$	$O(n^2)$	$O(n)$	$O(n)$	$O(n)$	$O(n)$	$O(n)$
<u>Sort</u>	$O(n^2)$	$O(n^2)$	$O(n)$	$O(n^2)$	$O(n)$	$O(n)$	$O(n)$

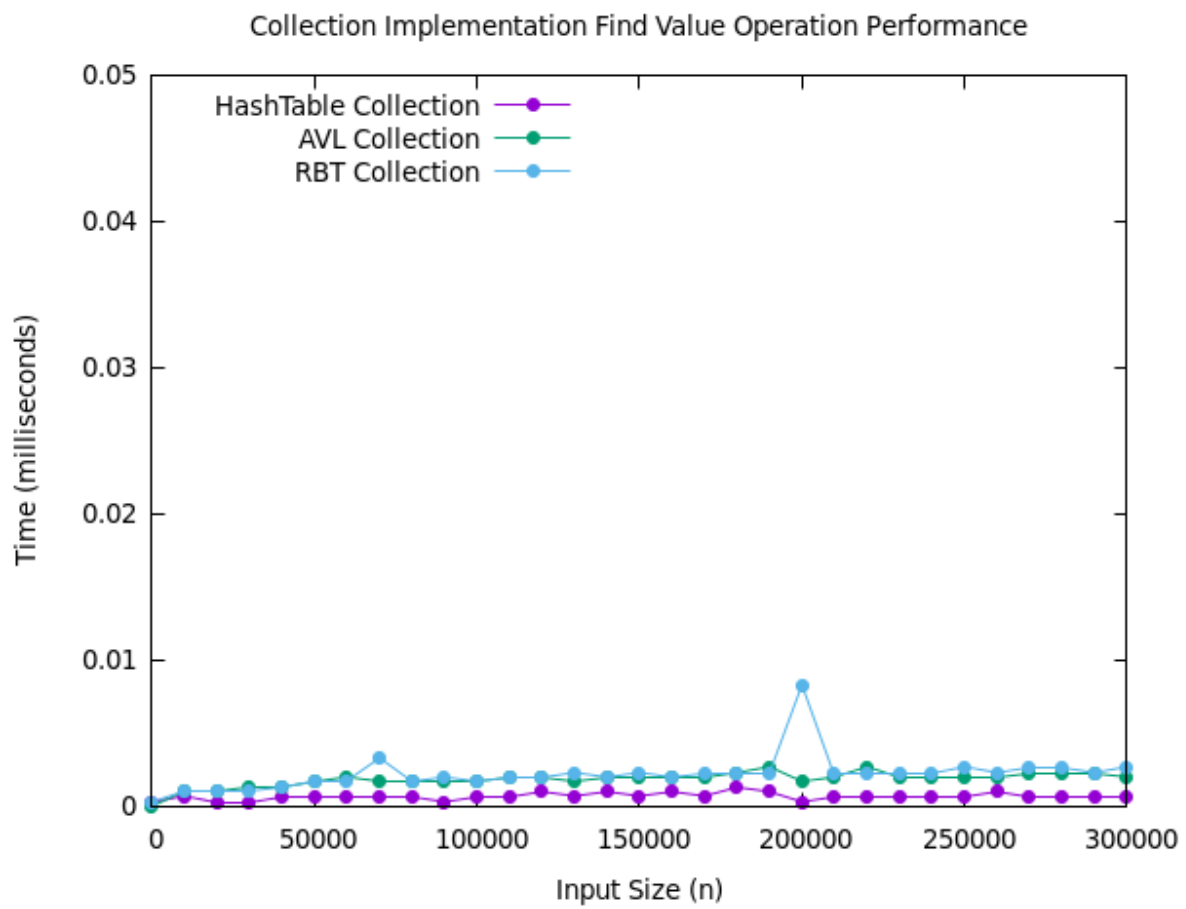
Implementation Problems:

I found one of the most difficult problems with previous assignments to be the performance tests and getting those to work effectively. In this assignment I built very complex added tests that would target all sorts of potential problems to make sure my code was working really soundly. I found the hardest part of the assignment was designing effective tests that would work to attack every possible weak spot in my program. I think I did a pretty good job with this. So, by the time I got all of the tests I created to pass, I had no problems with any of the performance tests. I learned how important it is to have very effective tests of the code.

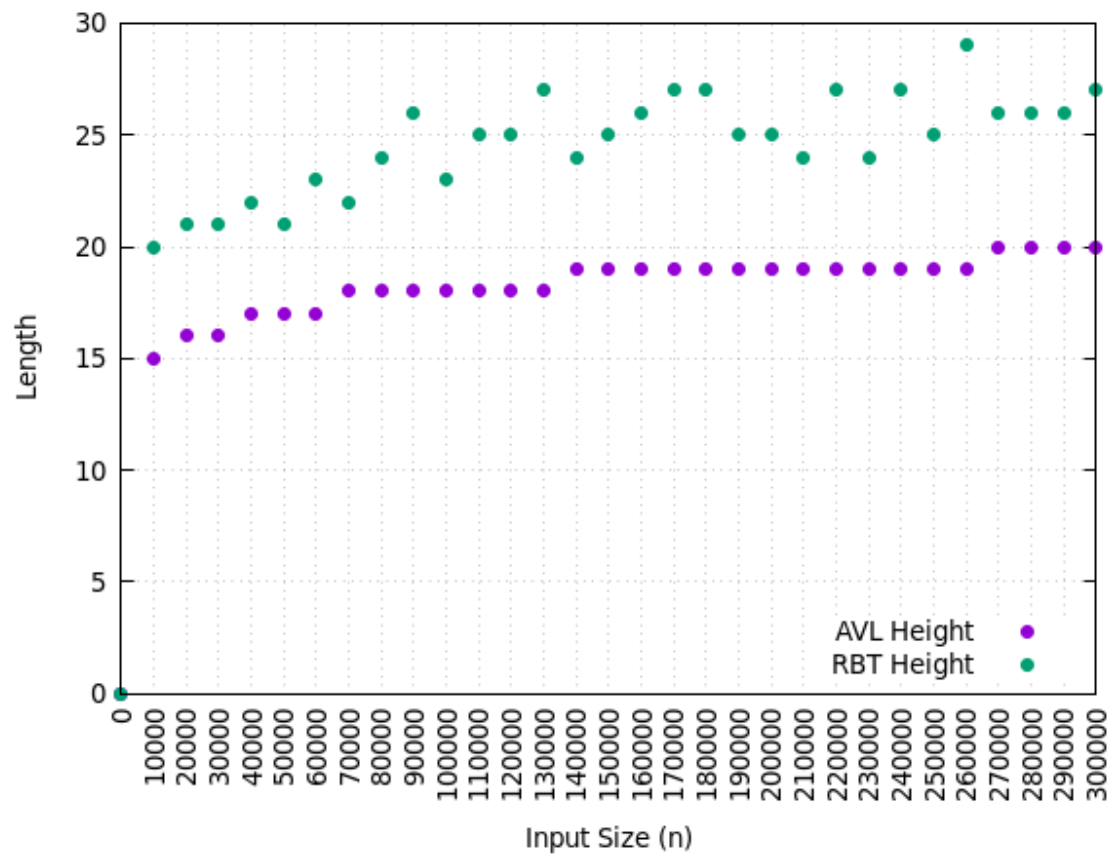


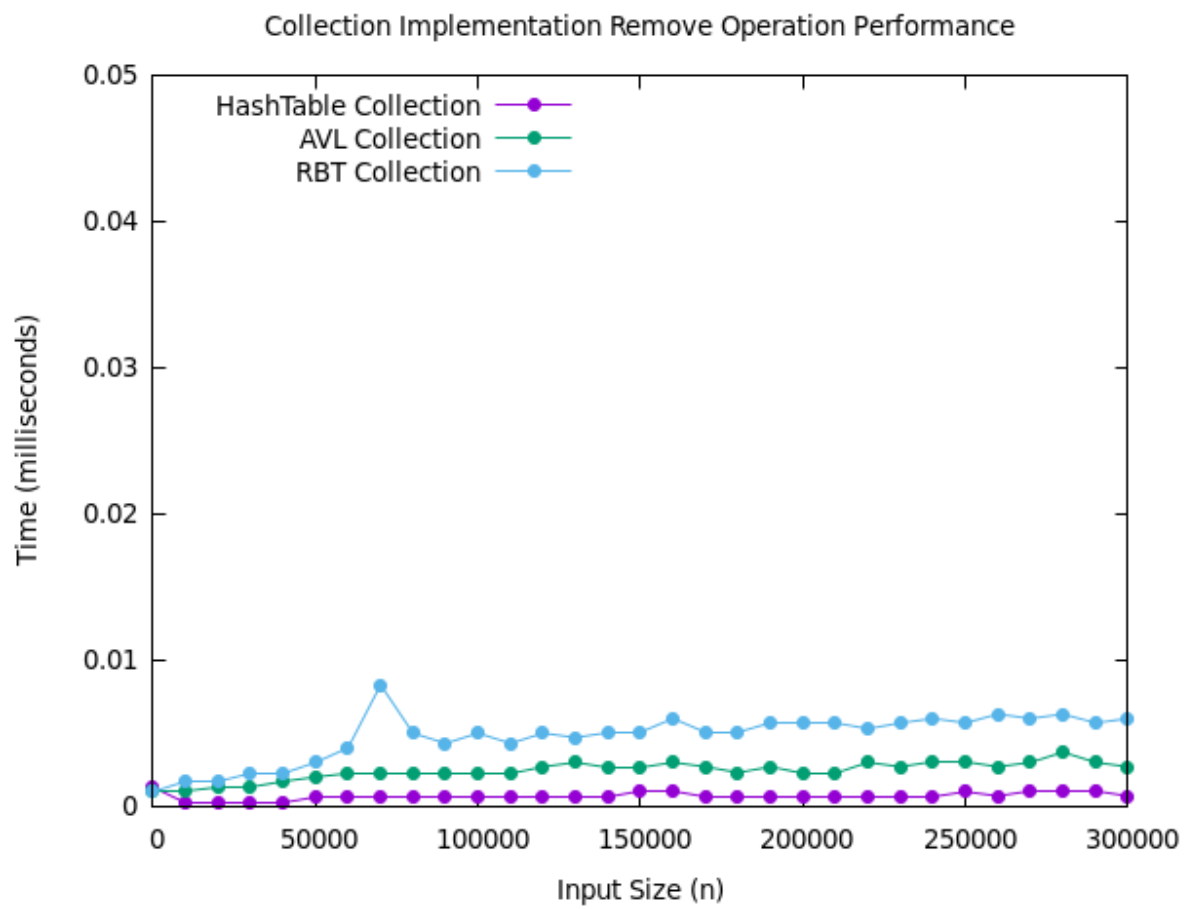
Collection Implementation Find Range Operation Performance





Statistics and Information





Collection Implementation Sort Operation Performance

