

Qixiang Chao

CS 2420

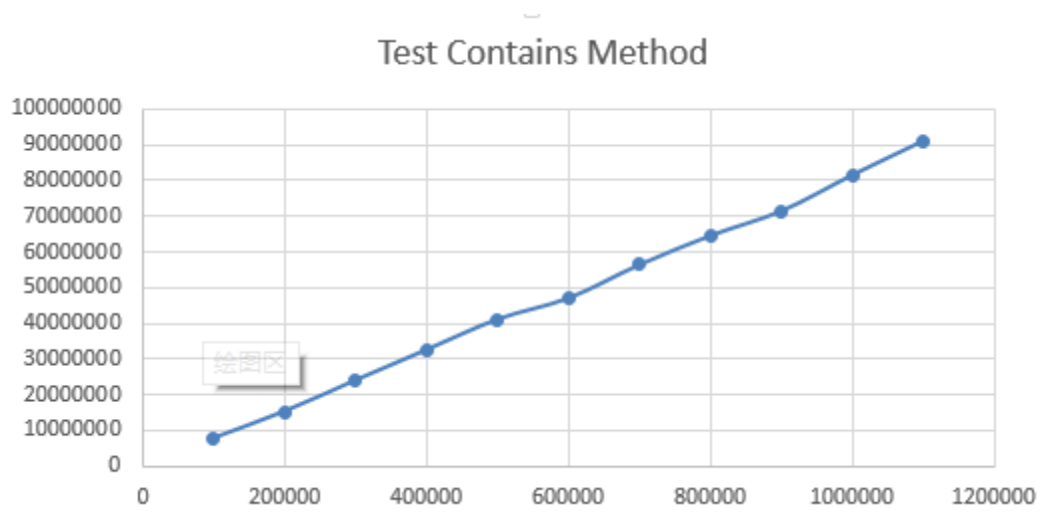
Analysis Paper

1. My partner is Jin He, and I will submit this assignment.
2. The last time, I mainly played the role as a navigator and also this time. Because I think he mainly plays as a driver and I play as navigator will make our group work more efficient. But we often switch the role because when we met some difficult problems, I will be a driver so that my partner can work with logical problems and give me ideas. Then, I can implement his idea. I would like to switch the role often because I think we might good at different aspects. So, if we meet some difficult problems, we might switch the role to overcome the problems.
3. During this group work, I found that my partner is very good at analyzing problems and can always think out good ideas to solve the problem. He is efficient at writing code so he always plays the role as a driver. We finished assignment2 last time and made a nice work, so I decide cooperate with him next time.
4. We have used the “ArrayList”, the “LinkedList” and the “MySortedSet” to compare each other. So we used the “for-loop” to add 100000 elements into each collection to test these collections. Finally, we got the result. The “ArrayList” cost 16 milliseconds to implement the “add()” method. However, the “LinkedList” cost 19 milliseconds and “MySortedSet” cost 33 milliseconds. Actually, I know that the “ArrayList” and “MySortedSet” need to cost plenty of times to enlarge the size and copy the elements that had already existed in the original collection to a new

collection which has larger size, but the “LinkedList” doesn’t. Consequently, I think to use the Java List would be more efficient, especially the “ArrayList”. It means the “ArrayList” is more suitable to implement the “add()” method. When we consider the program development time, I think if we need a sorted collection and without any duplicate. The “MySortedSet” is more suitable because we do not need to write any sorting method or judge whether duplicate appear. If not, we can use the Java List to finish the program.

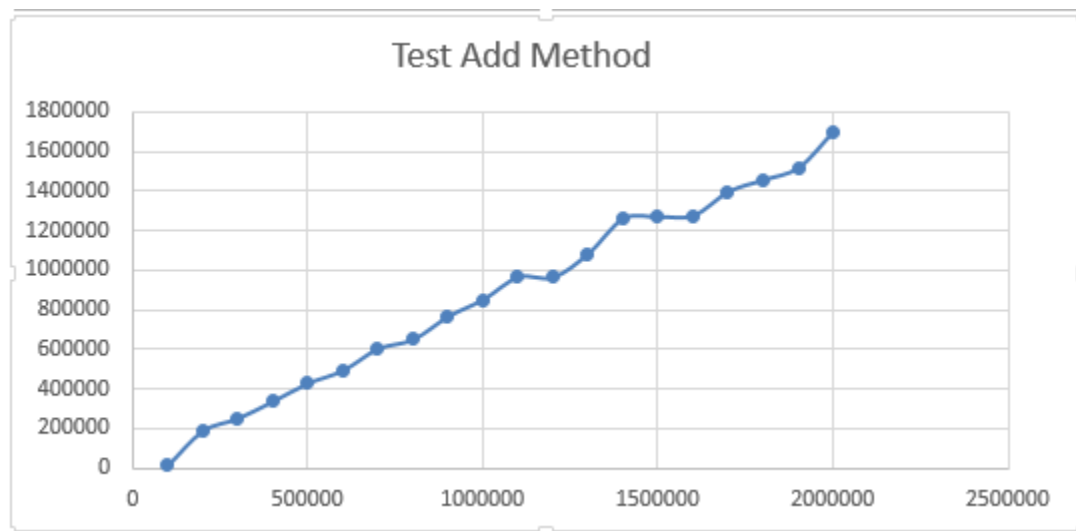
5. I think the time complexity of the “contains” method in the “MySortedSet” class is $O(\log N)$. Because we used the binary search for the “contains” method. The contains method used the binary search and the complexity should be $O(\log N)$.

6. In order to test the “contains” method, we used the “TimingExperiment8” in project “lab1”. We used double nested loop to test this method. First, we add 100000 elements into the set. Then we used another loop to call and test the “contains” method. Finally, we used Excel tool to draw the growth rate curve and got the picture below:



Actually, we expected a logarithmic graph because the time complexity of the contains method is $O(\log N)$, but we got a linear-like curve finally. The reason that we suspected is the time complexity cannot be an accurate $\log N$ graph because the time complexity is approximate and rough. So, I still think this graph is matching my prediction in question 5.

7. In order to test the add method, we used the “random” method to add a random numbers in the set and then remove. Finally, we got the result below:



This graph shows under the worst case to test the add method and we expect the time complexity is $O(N)$. So, we got a linear graph eventually.

8. In order to finish this assignment, I have cost about fifteen hours on the assignment.