Preston Futaba

Prof. Smallberg

CS 32

7 March 2023

1e) When k==2 and 5 MAGIC values are pushed back onto v2, our iterator is invalidated. So, iterator p doesn't contain the additional 5 MAGIC values and thus k does not reach 10.

3) Calling insert on a Coord causes the Set to check if that Coord is already in the Set using the == operator and checks the order by calling insertBefore and compares Coords using the < operator. Both the == and < are undefined operators for the Coord class thus causing an error, while int and string have default functionality of these operators.

4b) The listAll function could not be implemented recursively if it had only one parameter because the next calls would not be able to track the full path of the file. A lack of path parameter would make it impossible to return the full path; basically we cannot traverse a tree without knowing the path we are on.

5a) The time complexity is O(N^3). The maximum number of operations due to each of the three nested for loops is N times per loop. So computing N(N(N)) yields N^3.

5b) The time complexity is O(N^3). The variable i in the second for loop still reaches a maximal value of N when i = N-1 which is why the time complexity is the same.

6a) The time complexity is O(N^2). The for loop is called a max N times. The get function in the for loop will take a maximum of N calls to find a certain value. The insert function in the for loop eventually calls findFirstAtLeast which could operate up to an integer \* N amount of times. So an N(integer \* N) gives us O(N^2).

6b) The time complexity is O(N log N). As commented in the provided code, the sort algorithm of the Set class is an O(N log N) algorithm. This is greater than the N iterating for loop, thus we arrive at N log N.

6c) Both the while loop and for loop run a maximum number of N times, so the time complexity is O(N).