The Report

Problem Statement

The assignment let us use one of the data structures – Linked list, to store integer values after reading a file and sort it on the way. On the process, we record the time that takes to insert all the integers and find min, max, and median values.

Algorithm design

I created one private static method that sorts the integers as they passed as a parameter one by one. After I finished sorting the list, it's easier to get the required numbers (min, max, med). I've used listIterator, which is more flexible to access the list so that I can use its functions. First, I created an object intListIterator to sort the numbers inside the while loop. In one of my 3 cases, if the intListIterator.next() is equal to the integer accepted as a parameter, it returns false. Then if the intListIterator.next() is greater, I'll swap the numbers by using a function set() after I assign intListIterator() index to a variable so that I can add it later after being replaced by the integer. The last case will be to leave it as it is. After I finish sorting, I'll use peekFirst() for min and peekLast() for max. Lastly, I have to make sure if the size of the list is even or not for the median. We can use for loop as an alternative, but we won't have enough functions that minimize our time to do those tasks effectively. It would have been much easier to use another pointer to just swap when we compare numbers.

Experimental setup

CPU maker – Intel CPU speed – 1.5 GHz RAM Available – 5.5 GB

Hard Drive – SSD

O/S – Windows

Java version – 14.0.2

- For testing input1.txt, I repeated 13-15 times to ensure that the time for each output is close enough to be exact.
- While testing input2.txt, it took longer at first, like 30+ mins but as I tried to modify the algorithm, it started to show results quicker.

Experimental Results & Discussions

Input1.txt

Med: 2056.5

min: 1

Max: 4000

time_insert: 56.453 milliseconds.

time_min: 0.5385 milliseconds.

time_max: 0.0871 milliseconds.

time_med: 16.3969 milliseconds.

Input2.txt

Med: 4003689.0

min: 75

Max: 7999925

time_insert: 209438.3967 milliseconds.

time_min: 0.3379 milliseconds.

time_max: 0.0593 milliseconds.

time_med: 23.0604 milliseconds.

- The input2.txt took about 5 min to show the results.
- The program handles input1.txt very well but needs to use more advanced data structures to shorten the time for input2 file.

References

- Starting out with Java. From control structures through objects/Tony Gaddis, Haywood Community College.—6th edition.
- https://www.geeksforgeeks.org/linkedlist-set-method-in-java/#:~:text=set()%20method%20is%20used,of%20the%20set()%20method.
- https://docs.oracle.com/javase/7/docs/api/java/util/LinkedList.html
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