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CS 223 - PA 1
Report

A. Problem Statement
    a. This project's direct goal is to re-introduce students to C++ programming and introduce students to the course submission process in CS 223. Programatically, this project aims to read a text file full of integers and return the lowest, highest and median integers as well as the time it took to find such numbers.

B. Algorithm Design
    a. I used the C++ standard library for my singly linked list code, I concluded that there was less opportunity for coding error if I utilize a standard/reliable library and class. To find the minimum, I return the first node in the list. Considering my linked list is sorted in ascending order, the first node will always be the minimum. I figured this would be much quicker than looping through the entire list and comparing values, as that runtime is O(n), and getting the first node is O(1).
    To find the maximum, I iterated through the list to get to the end and compare each value until I find the last/highest integer. This isn't particularly efficient but the C++ standard library doesn't offer the ability to get the last node in a singly-linked list so I was left with few options.
    To get the median value, I get the length of the list, and divide by two. That number is the index of the median, so I iterated through the list to that point and return. This is rather inefficient but there aren't too many other ways to go about getting the median value without iterating somewhat. A better data structure for this project may be an array.

C. Experimental Setup
    a. Machine Specs: MacBook (Retina, 12-inch, 2017); 1.4 GHz Intel i7; 16GB RAM
    b. How many times did you repeat each experiment before reporting the final timing statistics? I took the average values for each data point over 10 runs.
    c. OS and environment used when testing: MacOS Mojave 10.14 Beta (18A353d); C++ 11
    `gcc main.cpp -lstdc++ -std=c++11`

D. Experimental Results & Discussion
    a.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
Min	1	1	1	1	1	1
Max	4000	4000	4000	4000	4000	4000
Median	1418	1418	1418	1418	1418	1418
Insert Time	0.023765	0.023875	0.023719	0.024707	0.023745	0.0239622
Min Time	0.000137	0.000137	0.000137	0.00023	0.000138	0.0001558
Max Time	0.000139	0.000138	0.000139	0.000232	0.00014	0.0001576

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Med Time	0.039784	0.040585	0.03963	0.044931	0.039722	0.0409304

b.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
Min	14	14	14	14	14	14
Max	7999997	7999997	7999997	7999997	7999997	7999997
Median	4004493	4004493	4004493	4004493	4004493	4004493
Insert Time	19183.9	20234.6	17985.1	18862.4	19763.0	19205.8
Min Time	0.098031	0.094201	0.096293	0.083644	0.099087	0.0902512
Max Time	0.097041	0.093347	0.091083	0.098465	0.082746	0.0925364
Med Time	0.145509	0.143904	0.14642	0.147295	0.145368	0.1456992