CS61B Spring 2016 Secret Section 8 Worksheet

Tutor Team

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Complete the following problems to the best of your ability. Feel free to work together on them, but try them on your own first!

1 Ready, Set, Sort!

Given the following set of numbers, write out how each of the sorts would sort the following data:

50, 75, 82, 33, 90, 21, 18, 2, 133, 17
Please note that these solutions are not the only valid solution, but may be one of many

(a) Insertion
33, 50, 75, 82, 90, 21, 18, 2, 133, 17
21, 33, 50, 75, 82, 90, 18, 2, 133, 17
18, 21, 33, 50, 75, 82, 90, 2, 133, 17
2, 18, 21, 33, 50, 75, 82, 90, 133, 17
2, 17, 18, 21, 33, 50, 75, 82, 90, 133

(b) Selection
2, 75, 82, 33, 90, 21, 18, 50, 133, 17
2, 17, 82, 33, 90, 21, 18, 50, 133, 75
2, 17, 18, 33, 90, 21, 82, 50, 133, 75
2, 17, 18, 21, 90, 33, 82, 50, 133, 75
2, 17, 18, 21, 33, 90, 82, 50, 133, 75
2, 17, 18, 21, 33, 50, 82, 90, 133, 75
2, 17, 18, 21, 33, 50, 75, 90, 133, 82
2, 17, 18, 21, 33, 50, 75, 82, 133, 90
2, 17, 18, 21, 33, 50, 75, 82, 90, 133

(c) Quicksort
33, 21, 18, 2, 17, 50, 75, 82, 90, 133
21, 18, 2, 17, 33, 50, 75, 82, 90, 133
18, 2, 17, 21, 33, 50, 75, 82, 90, 133
2, 17, 18, 21, 33, 50, 75, 82, 90, 133

(d) Merge sort
50, 75, 33, 82, 21, 90, 2, 18, 17, 133
33, 50, 75, 82, 2, 18, 21, 90, 17, 133
33, 50, 75, 82, 2, 17, 18, 21, 90, 133
2, 17, 18, 21, 33, 50, 75, 82, 90, 133

2 Sort Sleuth

You are given a tool that sorts lists of size 10,000 using a sort of your choosing:

1. Insertion Sort
2. Heap sort
3. Quick sort
4. Merge sort
5. Selection sort

Unfortunately, the sorts have been shuffled around and labeled: Alpha, Gamma, Delta, Epsilon, Zeta in the tool's user interface. Fortunately, you're able to play around with the tool and gather data on different types of lists orderings:

Label	Random order	Ordered	Almost ordered	Reversed	Sort
Alpha	24,841,174 comparisons 24,831,175 movements 43ms runtime	9,999 comparisons 0 movements <1ms runtime	13,065 comparisons 3,066 movements <1ms runtime	50,004,999 comparisons 49,995,000 movements 82ms	Insertion
Gamma	258,518 comparisons 124,259 movements 2ms runtime	273,912 comparisons 131,956 movements 4ms runtime	272,676 comparisons 131,338 movements 2ms runtime	243,392 comparisons 116,696 movements 2ms runtime	Heap
Delta	154,728 comparisons 80,467 movements 1ms runtime	49,995,000 comparisons 50,004,999 movements 608 ms runtime	34,537,103 comparisons 34,540,569 movements 399ms runtime	49,995,000 comparisons 25,004,999 movements 349ms runtime	Quicksort
Epsilon	120,534 comparisons 180,528 movements 27ms runtime	64,608 comparisons 124,602 movements 17ms runtime	66,358 comparisons 126,352 movements 12ms runtime	69,008 comparisons 129,002 movements 15ms runtime	Merge
Zeta	49,995,000 comparisons 77,183 movements 87ms runtime	49,995,000 comparisons 0 movements 89 ms runtime	49,995,000 comparisons 3,066 movements 87ms runtime	49,995,000 comparisons 25,000,000 movements 83ms runtime	Selection

3 Switching Sorts

Your sorting function has broken in such a chaotic fashion that is switching algorithms every 2 iterations! See if you can identify each algorithm it switches to:

Timestep	Data	Sort
Start	gsw hou lac por okc dal sas mem cle det atl bos mia cha tor ind	
1	dal cle det atl bos cha gsw hou lac por okc sas mem mia tor ind	
2	cle atl bos cha dal det gsw hou lac por okc sas mem mia tor ind	Quicksort
3	atl cle bos cha dal det gsw hou lac por okc sas mem mia tor ind	
4	atl bos cle cha dal det gsw hou lac por okc sas mem mia tor ind	Selection
5	atl bos cle cha dal det gsw hou lac por okc sas mem mia ind tor	
6	atl bos cle cha dal det gsw hou lac por okc sas mem ind mia tor	Insertion
7	atl bos cha cle dat det gsw hou lac por okc sas ind mem mia tor	
8	atl bos cha cle dat det gsw hou lac okc por sas ind mem mia tor	Merge