

CS 11 Data Structures and Algorithms

Assignment 15: Sorting and Searching

Skip to Main Content

Assignment 15.1 [55 points]

There is no programming assignment this week. You'll be working with pencil and paper to demonstrate your knowledge of searching and sorting algorithms (or you could use a word processor or even spreadsheet, of course).

40 63 64 2 87 62 45 66 99 30 31 57

Show the state of the array above after each pass through the array using the following sorting algorithms. (In other words, use the method used in lecture to show how each sorting algorithm sorts the numbers above.) Also, for each algorithm, state the average big-O running time estimate. For quicksort, use the middle item in the list as the pivot.

1. Selection Sort
2. Bubble Sort (No swap flag. In other words, no stopping early when the list is sorted.)
3. Insertion Sort (Don't start this yet -- I may decide not to require it.)
4. Merge Sort
5. Quicksort (Don't start this yet -- I'm deciding which item you should use as the pivot.)

6. List each number from the unsorted list above that will be examined if a linear search is used to search for the number 62. Also state the average big-O running time estimate for a linear search.

Here the numbers are sorted:

02 30 31 40 45 57 62 63 64 66 87 99

7. List each number from the list above that will be examined if a binary search is used to search for the number 99.

8. List each number from the list above that will be examined if a binary search is used to search for the number 52. Note that 52 is not in the list. That doesn't change anything. There is still a sequence of numbers that are examined until the algorithm determines that it isn't there.

9. State the average big-O running time estimate for binary search.

Submit Your Work

If possible, get an electronic copy of your assignment (e.g., scan it or take a picture of it) and submit it using the Assignment Submission link. Otherwise, you could bring it to me or drop it off in the Computer Studies Department or mail it to me.

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