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C++

Homework Assignment #2

1. Why is the linear search also called "sequential search"?

    - It's called sequential search because it steps through each element on at a time.

2. If a linear-search function is searching for a value that is stored in the last element of a 10,000- element array, how many elements will the search code have to read to locate the value?

    - The linear search function would have to go through all element in order to find the value

3. In an average case involving an array of N elements, how many times will a linear search function have to read that array to locate a specific value?

    - The average case in a linear search function is N/2.

4. A binary search function is searching for a value that is stored in the middle element of an array. How many times will the function read an element in the array before finding the value?

    - It would only have to search the array one time to find the middle element because binary searches begin at the middle element.

5. What is the maximum number of comparison that a binary search function will make when searching for a value in a 1,000 element array?

    - The maximum number of comparisons would be 10 because 2 raised to the 10th power is 1024.

6. Why is the bubble sort inefficient for large arrays?

    - The bubble sort only sorts on element at a time, it would take much longer compared to an insertion sort.

7. Why is the selection sort more efficient than the bubble sort on larger arrays?

    - The selection sort is more efficient because it moves a value to its end position in one iteration, which would take multiple within the bubble sort.

8. The linear search algorithm steps sequentially through an array, comparing each item with the search value.

9. The binary search algorithm repeatedly divides the portion of an array being searched in half.

10. The linear search algorithm is adequate for small arrays but not larger arrays.

11. The binary search algorithm require that the arrays contents be sorted.

12. If an array is sorted in ascending order, the values are stored from lowest to highest.

13. If an array is sorted in descending order, the value are stored from highest to lowest.

14. If data are sorted in ascending order, it means they are ordered from lowest value to highest value.

    - True

15. If data are sorted in descending order, it means they are ordered from lowest value to highest value.

    - False

16. The average number of comparisons performed by the linear search on an array of N elements is N/2 (assuming the search values are consistently found).

    - True

17. The maximum number of comparisons performed by the linear search on an array of N elements is N/2 (assuming the search values are consistently found.)

    - False

18.

| Array Size —> | 50 | 500 | 10,000 | 100,000 | 10,000,000 |
|---|---|---|---|---|---|
| Linear Search (Average Comparisons) | 25 | 250 | 5,000 | 50,000 | 5,000,000 |
| Linear Search (Maximum Comparisons) | 50 | 500 | 10,000 | 100.000 | 10,000,000 |
| Binary Search (Maximum Comparisons) | 6 | 9 | 13 | 17 | 20 |