

Lab session 4: Searching and Sorting

Objective

The objective of **lab session 4** is

- To identify the two most important operation of computer: searching and sorting
- To analyze the types of searching and sorting operation
- To implement the searching and sorting algorithm

Pre-lab Exercise

1. The most known algorithm that start at the beginning and walk to the end, testing for a match at each item:
 - A. Insertion sorting
 - B. Linear searching
 - C. Binary searching
 - D. Selection sorting
2. Which of the following is false about binary search?
 - A. It is a fast search algorithm
 - B. Cuts search range in half each iteration
 - C. The data collection should be in the sorted form
 - D. Start at the middle most element
3. Referring the below picture, determine which elements will be compared to 37. Using
 - A. Binary search algorithm
 - B. Linear search algorithm



4. Show how the binary search algorithm searches for 27 in the list 5, 6, 8, 12, 15, 21, 25, 31.

- A. How many comparisons will be required?
 - B. How many comparisons will be required in case of linear search?
- 5. Show how the insertion sort algorithm will sort the list: 5, 12, 25, 31, 15, 6, 8, 21. A.
How many comparisons will be required?
 - B. How many comparisons will be required in case of bubble sort?
- 6. What is the maximum number of comparison required for a list of 10 numbers (for each phase) using bubble sorting algorithm?
- 7. Show how the selection sort algorithm will sort the list: 5, 12, 25, 31, 15, 6, 8, 21. A.
How many comparisons will be required?
 - B. How many comparisons will be required in case of bubble sort?
- 8. Which type of sorting can implement using the below procedures
 - Step 1: Get a list of unsorted numbers
 - Step 2: Set a marker for the unsorted section at the front of the list
 - Step 3: Repeat steps 4 - 6 until one number remains in the unsorted section
 - Step 4: Compare all unsorted numbers in order to select the smallest one
 - Step 5: Swap this number with the first number in the unsorted section
 - Step 6: Advance the marker to the right one position
 - Step 7: Stop
 - A. Insertion sort
 - B. Bubble sort
 - C. Selection sort
 - D. It is not sorting algorithm

In-lab Exercise

- 9. Write three programs in C++ to find out the minimum and maximum value from the given array using?
 - A. Insertion sort (2 functions: insertion_max and insertion_min)
 - B. Selection sort (2 functions: selection_max and selection_min)

C. Bubble sort (2 functions: bubble_max and bubble_min) **Given**

Array: 6, 5, 3, 1, 8, 7, 2 4

10. Write a C++ program for binary search using **recursion**?

Post-lab Exercise

11. Which searching algorithm is efficient? How?

12. Identify the best case and the worst case for the three sorting algorithm

- A. Insertion sort
- B. Selection sort
- C. Bubble sort

13. Bubble Sort Algorithm

- A. Which number is definitely in its correct position at the end of the first phase?
- B. How the number of comparison does required changes as the pass number increase?
- C. How does the algorithm "know" when the list is sorted?