Introduction to Computer Science Lab II

CIEE102, Spring 2021

Lab 8

1. The following C functions accept two parameters from the calling program. One is the array to be sorted and the other is the size of the array. Print the entire array after each pass (i.e. the order of elements stored in the array has been changed). The function should return the total number of comparisons for the sorting.

   a. Write a C function that performs the "bubble sort" on all elements stored in an array. Print the entire array after each pass.

   b. Write a C function that performs the "insertion sort" on all elements stored in an array.

   c. Write a C function that performs the "selection sort" on all elements stored in an array.

   d. Write a main function that

      I. Read the unsorted array data (from a text file, "data.txt"), i.e. a set of integers. Print all integers in the unsorted array in original order. Print the output of "bubble sort".

      II. Read the unsorted array data (from a text file, "data.txt"), i.e. a set of integers. Print all integers in the unsorted array in original order. Print the output of "insertion sort".

      III. Read the unsorted array data (from a text file, "data.txt"), i.e. a set of integers. Print all integers in the unsorted array in original order. Print the output of "selection sort".

2. a. Write a C function that performs the "binary search" on elements stored in an array. The function accepts three parameters from the calling program. The first one is the array to be searched (from Problem 1.), the second one is the size of the array, and the last one is the number (the search key) to be found. The function should return the position of the searched element, if not found, return -1. Print each subarray during the binary search process. The middle element in each subarray is marked with an asterisk (*) to indicate the element to which the search key is compared.

   b. Write a main function that

      I. Read the sorted array data (from a text file, "Sorted_data.txt" which can be obtained from the problem 1.), i.e. a set of integers.

II. Randomly select an integer from the text file, "Sorted_data.txt", and use the integer as a search key for "binary search" as well as print the search result.

III. Select an integer as a search key from the keyboard, and use the integer as a search key for "binary search" as well as print the search result.