PDS Lab Section 05

Lab Day 4 – May 5, 2022

General Instructions:
The top two lines of each of your program must contain the following information:

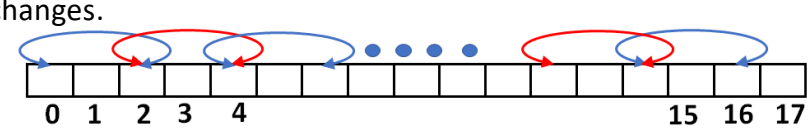
//Roll No.: <Type in your roll no.>
//Name: <Type in your name>

You have to name your C files as specified below and upload them in Moodle well before end time.

Document your programs meaningfully using appropriately named variables and sufficient amount of comments. This will have 10% of the marks.

1. Write a C program to fill a single dimensional integer array of maximum size 50 with random integral numbers in the range [10, 100] by appropriately calling the rand() library function. User will first enter the number of such random numbers to be generated (maximum 50).

   Display the array contents. Then, starting with the first (i.e., 0^{th} element in the array), interchange pairs of numbers present at consecutive even positions, only if the first is larger than the second. Count the number of interchanges made. Display the contents of the array after all the interchanges and the number of interchanges.



   For example, if the original array is [10,9,23,46,34,67,21], then the array after the interchanges would be [10,9,23,46,21,67,34], number of interchanges =1.

   Name your C program file as LD4_1_<roll_no>.c. **[5 Marks]**

2. Write a C program to achieve the following. Define an integer array **arr** of size 100. Fill the array **arr** with integral numbers in the range [10, 20] by appropriately calling the rand() library function.

   a) Display the array contents nicely formatted. **[1 Mark]**
   b) Determine the frequency with which each number in the range [10,20] occurs in the array. Display the numbers and their frequencies nicely formatted. **[4 Marks]**
   c) Determine the numbers that have the highest frequency. Display these nicely formatted. Note: Several numbers can have the highest frequency. **[5 mark]**
   [Hint: define an auxiliary integer array **int freq[11]** in which you can store the frequencies**)**

   Name your C program file as LD4_2_<roll_no>.c. **[10 Marks]**

3. Write a program that would read three strings **str1**, **str2**, and **str3** of size upto 20, 4, and 4 respectively and display the strings.
   a. First check whether **str2** occurs in **str1** as a substring and display the position of all occurrences. Do not use any string library functions. **[5 Marks]**
   b. Then replace all occurrences of **str2** by **str3** and display the newly formed string. **[5 Marks]**

Name your C program file as LD5_3_<roll_no>.c. **[5+5=10 Marks]**

4. Write a C program to read the roll number (integer), age (integer) and marks of 20 students admitted to a department. Generate random roll numbers in the range [1000,2000], age in the range [15 to 25] and marks in the range [0,100] and populate the respective arrays. (Hint: Use three one dimensional arrays for storing roll number, age, and mark.)

    a. Display the roll number, ages, and marks of all students having the same age.
    Example display:

    Roll: 1025 Age: 20 Mark:83
    Roll: 3021 Age:20 Mark:45
    . . . . . .
    Roll 2450 Age:21 Mark:47
    Roll 1975 Age 21: Mark:59

    b. Display the roll number, ages, and marks of all students having identical marks.
    Example display:

    Roll: 1027 Age: 23 Mark:85
    Roll: 3025 Age:25 Mark:85
    . . . . . .
    Roll 2459 Age:21 Mark:77
    Roll 1990 Age:23 Mark:77

    c. Sort the students according to their roll numbers and display the details nicely formatted.
    Example display:

    Roll: 1027 Age: 23 Mark:85
    Roll 1990 Age:23 Mark:77
    . . . . . .
    Roll 2459 Age:21 Mark:77
    Roll: 3025 Age:25 Mark:85

For parts a), b), and c) you can develop three separate programs. Name your C program files as LD4_4a_<roll_no>.c, LD4_4b_<roll_no>.c, and LD4_4c_<roll_no>.c **[5+5+10=20 Marks]**

Submit your .c files in Moodle against the assignment submission link for Lab Day 4.

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