National University of Computer and Emerging Sciences
Karachi

Lab Final Exam

Fall 2023

Course Code: CL1002
Course Name: Programming Fundamental Lab
Instructor(s): Yasir, Atiya
Date: 11th Dec 2023
Total Time: 2 hours
Total Marks: 50
Student ID:
Section:

INSTRUCTIONS:

- Carefully read the following instructions before attempting the paper.
- Except your Roll No and Section, DO NOT WRITE anything on this paper.
- The Exam consists of 3 questions on 2 printed sides of 1 page.
- In case of any ambiguity, you may make assumptions, but your assumption must not contradict any question.

SUBMISSION INSTRUCTIONS:

- You must comment your student ID on top of each file.
- Name the .c file for each question according to Roll_No e.g. k23xxxxQ1.c, k23xxxxQ2.c etc.
- Create a folder with the name K23XXXX accroding to your student id.
- Put all your C files (1 for each question) in the above folder. Then paste this folder on the local share.
- Submissions are on local storage that can be accessed using win+R keys and entering \\172.16.5.43

QUESTION 1: FILING AND FUNCTIONS.....[LLO: 4, TIME: 40 MINS, POINTS: 15]

You are developing a C program that performs advanced string manipulations on a text file for a text editor. Your task is to implement the two functions to perform tasks listed below on the text file.

1. **Longest Words**: Identify the 3 longest strings and surround them with <L>and return array of 3 strings that contains them.
2. **Concatenate Strings**: Concatenate all the words surrounded with <s> and <\s> into one word and replace them, also remove the surrounding <s> tag.

Your C program must read from the text file named input.txt and write back the modified version according to above rules in output.txt. Print the 3 longest words on console. You can assume that no line is longer than 80 characters.

INPUT FILE

```
Video provides a powerful way to help you prove your point.
When you click Online Video, you can paste in the embed code
for the video you want to add. You can <s>also type a<\s> keyword
to search online for the video that best fits your document.
To make your document professionally produced, <s>Word provides</s>
header, footer, cover page, and text box designs that complement.
```

OUTPUT FILE

```
Video <L>provides<L> a powerful way to help you prove your point.
When you click Online Video, you can paste in the embed code
for the video you want to add. You can alsotypea keyword
to search online for the video that best fits your document.
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header, footer, cover page, and text box designs that <L>complement<L>.
```

QUESTION 2: STRUCTURES .....[LLO: 4, TIME: 30 MINS, POINTS: 15]

Create a C program that helps students calculate SGPA and CGPA. Student will provide the following input via console, course_id, gpa, credit_hours, semester_number. SGPA is product sum of gpa and credit_hours divided by the sum of credit_hours for a particular semester. CGPA is same but for all the courses. For repeated course_id count the one with highest gpa for CGPA, also remember to include the credit_hours only once when taking sum of credit_hours. You must use structures to hold information for one course. Make an array of this structure to store information of all courses.

Input Sample	Output Sample
101 3.00 3 1 102 2.33 3 1 108 1.33 1 1 108 2.33 1 2 201 3.33 3 2 202 3.67 1 2 245 2.00 3 2	Semester 1 : 2.47 Semester 2 : 2.75 CGPA : 2.71

QUESTION 3: DMA AND POINTERS .....[LLO: 3, TIME: 50 MINS, POINTS: 20]

There is famous Conjecture in mathematics that says that every even integer greater than 2 has the property that it is the sum of two prime numbers (at-least 1 pair, there can be more than 1). Like, For the even number 8, the Goldbach pair is (3, 5) because 3 + 5 = 8. For 12, the Goldbach pair is (5, 7) because 5 + 7 = 12. Similarly, for 28, one Goldbach pair is (5, 23) because 5 + 23 = 28, and also (11, 17) because 11 + 17 = 28. Computers have been used extensively to test this conjecture. No counterexample has been found to disprove this conjecture till date. Give implementation to the function definition below that finds all Goldbach pairs for all the **n** even numbers passed as pointer argument. The function returns a pointer to memory location of an 2D-Array containing pairs of goldbach pairs for the integer numbers at **even_numbers** with last pair being -1 -1(neccessarly)

```
int** goldbach_pairs(int* even_numbers, int n);
```

Use the above function in a C program that takes list of even numbers from the user until he types -1. After which the above function should be used and the pairs returned through the memory location should be printed.

Input Sample	Output Sample
8 12 28 50 -1	(3, 5) (5, 7) (5, 23) (11, 17) , (7, 43) (13, 37) (19, 31) (-1,-1)