National University of Computer and Emerging Sciences

Programming Fundamentals Lab (CL1002)

Date: 14th Oct 2024

Course Instructor(s)

Mr. Shaheer Ahmed, Mr. Ashir

Lab Mid Exam (A)

Total Time: 90 minutes
Total Marks: 20
Total Questions: 03

Semester: FL-2024
Campus: Karachi
Dept: Computer Science (CS)

Submission Instructions:

- You must comment your student ID on top of each file. (Line#1 of your code).
- Name the file for each question according to Roll No e.g. **k24-xxxx_Q1.c, k24-xxxx _Q2.c** etc.
- Submission is via a client software so open the application present on the Desktop.
- Enter your username as **24K-xxxx** and its assigned password (**Default is Fast1234**).

CLO # 1: Understand and Analyze flowcharts, PAC (Process-Activity-Control) charts, and IPO (Input-Process-Output) models to represent system workflows and these diagrams into algorithm and pseudocode implementation.

Question 1. Convert the following PAC chart to C-code. **[5 marks]**

Column	*Detail*
Given Data (Inputs)	Starting number
Required Results (Outputs)	Number of steps to reach 1
Processing	-Initialize a step counter starting from zero. Repeat the process until the number becomes 1: -If number is even, divide by 2 -If number is odd, multiply by 3 and add 1 -Increment the step counter after each operation. -End the process once the number reaches 1.
Conditions	Number > 1; Check if even or odd

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CLO # 1: Understand and Analyze flowcharts, PAC (Process-Activity-Control) charts, and IPO (Input-Process-Output) models to represent system workflows and these diagrams into algorithm and pseudocode implementation.

Q1. Convert the following IPO chart to C-code. **[5 marks]**

Given Data (Inputs)	Processing	Required Results (Outputs)
An integer number n	Check if n is a three-digitnumber or not. If true, If n is a three-digit number then check if the sum of thefirst and third digit is equal to the second digit or not. Example: 143 First digit is 1, third digit is 3. Addition of 1 and 3 is equal to 4 which is second digit.	True or false

Note: Solve the question using loops.

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CLO # 2: Gain hands on experience in writing code that provides the use of logical and bitwise operators to perform efficient data manipulation and apply decision and nested decision structures in control flow to create dynamic, condition-based logic within C-code.

Q2. Your city bank has updated its credit card policy, and they need your help to create a C program that checks whether a user has exceeded their credit limit. The program should begin by gathering essential information from the user, including their account number, the beginning balance for the month, and a list of purchases made during the month along with their respective charges. The user should also provide the total amount of credits applied to their account and the allowable credit limit. To streamline this process, the program should prompt the user for the number of items purchased and calculate the total charges for all items entered.

After collecting all necessary information, the program will compute the new balance using the formula:

New Balance = (Beginning Balance + Total Charges) − Total Credits

New Balance= (Beginning Balance + Total Charges) −Total Credits

Once the new balance is calculated, the program should determine if it exceeds the user's credit limit. If the limit is exceeded, the program will display the customer's account number, the credit limit, the new balance, and a message indicating how much the limit has been exceeded (e.g., "Credit limit exceeded by 123.74."). Please ensure the program is user-friendly and provides clear prompts throughout the input process. **[7 marks]**

Sample Input:

Enter your account number: 123456
Enter your beginning balance for the month: 500.00
Enter the number of items purchased this month: 3
Enter the charge for item 1: 150.00
Enter the charge for item 2: 75.50
Enter the charge for item 3: 30.25
Enter the total credits applied to your account this month: 50.00
Enter your allowed credit limit: 600.00

Sample Output:

Account Number: 123456
Credit Limit: 600.00
New Balance: 705.75
Credit limit exceeded by 105.75.

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CLO # 3: Understand and implement code utilize loops for iteration and arrays for data storage and manipulation, demonstrating efficient traversal and management of elements in C-code, while optimizing control flow and enhancing program efficiency.

Q3. Imagine a local school organizing a math competition for students. The teachers want to create a challenge where students must identify and print a sequence of numbers based on specific rules. The task is to take a range of numbers as input from the students and then generate a list of numbers that follows this pattern: after every five odd numbers, there should be one even number.

To keep things organized, the teachers want to store this sequence of numbers in an array so that it can be displayed later. Write a C program that implements this sequence. The program should prompt the user to enter the starting and ending numbers for the range, then generate the required sequence, and finally display the numbers stored in the array. **[8 marks]**

Sample Input:
Enter the starting number of the range: 1
Enter the ending number of the range: 20

Sample Output:
The generated sequence is:
1 3 5 7 9 10 11 13 15 17 18 19