Shiv Nadar Institution of Eminence, Delhi, NCR

Lab sheet for CSD101 (Introduction to computing and Programming)

Semester of Implementation: Monsoon, 2024

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Instructions:

1. Once you complete the assignment, please show it to the TA.
2. Students must come to the lab and must show the assignments in the designated lab hours. Day-to-day lab performances will be recorded and will carry 15% weightage in internal assessment.
3. Lab will start in exact time. Students should enter the lab and take a seat 5 minutes before.
4. It is recommended to use LINUX platform for execution of the program.
5. Batch change to show the assignments WILL NOT be allowed.
6. Malpractice (in ANY form) will attract heavy penalties.
7. A useful link: https://www.w3schools.com/c/index.php

Lab Assignment 8

Deadline: 27-10-2024 (11:55 PM) for Monday batch

29-10-2024 (11:55 PM) for Wednesday batch

30-10-2024 (11:55 PM) for Thursday batch

31-10-2024 (11:55 PM) for Friday batch

Total Marks: 100

Objective: Programs based on Recursion

Steps to run C program

Step 1: gedit filename.c

Step 2: Compiling using GCC compiler

We use the following command in the terminal for compiling our filename.c source file

$ gcc filename.c –o filename

Step 3: Executing the program

After compilation executable is generated and we run the generated executable using the below command.

$ ./filename

Q1. The Quest for the Hidden Manuscript

Background:
You are Arya, a young historian passionate about ancient texts and manuscripts. A long-lost letter in an ancient library reveals that a hidden manuscript, containing the wisdom of revered sages, is buried in one of several locations across India. Each potential location is encoded as an integer on an ancient map, which is sorted in ascending order within an array.

Your goal is to locate the exact location of the manuscript using a recursive binary search.

Task:
Write a C program that implements a recursive binary search to determine the index of a specific treasure location. If the location does not exist in the array, return -1.

Input:
Sorted array of locations: {2, 6, 9, 12, 23, 31, 44, 56, 72, 89, 97}
Enter the potential location of the hidden manuscript you want to search for: 56

Output:
Success! The manuscript is hidden at index: 8

Input:
Sorted array of locations: {2, 6, 9, 12, 23, 31, 44, 56, 72, 89, 97}
Enter the potential location of the hidden manuscript you want to search for: 91

Output:
Alas! No manuscript was found at that location.

Q2. Fibonacci Allowance Savings Plan

Background:

You receive a monthly allowance from your parents. They encourage you to save for your future educational expenses like textbooks, supplies, and even fun extracurricular activities. To make saving more fun and effective, they propose that you save money according to the Fibonacci sequence.

The Fibonacci sequence starts with 0 and 1, and each subsequent number is the sum of the two preceding ones. This means that in month 0 you save 0, in month 1 you save 10, in month 2 you save 10, in month 3 you save 20, in month 4 you save 30, and so on.

Task:

Write a C program to compute the amount you will save in the *n*-th month of your allowance recursively. This will be based on the computation of *n*-th Fibonacci number.

Input:

Enter the month number (starting from 0) to calculate your savings: 8

Output:

For month 8, based on the Fibonacci savings strategy, you will save: INR 210

Your total savings after 8 months will be: INR 540

Complementary Assignment for self-practice

Q3. Write a recursive function in C programming to find sum of all natural numbers between 1 to n.

Input:

Input lower limit: 1

Input upper limit: 10

Output: Sum of natural numbers from 1 to 10 = 55.

Q4. Write a C program to find the factorial of a number using a recursive function.

Input:

Enter the number: 4

Output:

Factorial of the number is: 24

Submission Format:- You have to upload: (1) The source code in the following format in a zipped folder: Assgn8_RollNo.zip. Inside the zipped folder save each program with Assgn6_task#_RollNo.c

Note: Please follow this naming convention mentioned above.

Grading Policy:- The policy for grading this assignment will be - (1) show to TA 66 marks (2) Code submission with indentation: 34 marks.

- All submissions are subject to plagiarism checks. Any case of plagiarism will be dealt with severely.