Department of

Computer Science and Engineering

Title: Problem Analysis and Algorithm Design

Computational Thinking and Problem Solving

CSE 100

Green University of Bangladesh

Objectives:

1. Familiarization with algorithm
2. To analyze a problem with computational thinking
3. To design the algorithm for that problem

Problem Analysis:

Algorithm:

In computer programming terms, an algorithm is a set of well-defined instructions to solve a particular problem. It takes a set of input(s) and produces the desired output.

For example-

An algorithm to add two numbers:

1. Take two number inputs
2. Add numbers using the "+" operator
3. Display the result

Properties of Algorithm:

- It should terminate after a finite time
- It should produce at least one output
- It should take zero or more input
- It should be deterministic means giving the same output for the same input case
- Every step in the algorithm must be effective.

1. **Problem Description:** Add two numbers entered by the user

   Algorithm:

   Step 1: Start

   Step 2: Declare variables num1, num2, and sum.

   Step 3: Read values num1 and num2.

   Step 4: Add num1 and num2 and assign the result to sum.

   $sum \leftarrow num1 + num2$

Step 5: Display sum

Step 6: Stop.

2. **Problem Description:** Find the factorial of a number

   Algorithm:

   Step 1: Start

   Step 2: Declare the variables num, factorial and i

   Step 3: Initialize variables

   factorial ← 1

   i ← 1

   Step 4: Read the value of num

   Step 5: Repeat the steps until i == num

   *5.1: factorial ← factorial*i*

   5.2: i ← i+1

   Step 6: Display factorial

   Step 7: Stop

3. **Problem Description:** Find the Fibonacci Series till the term is less than 50

   Algorithm:

   Step 1: Start

   Step 2: Declare the variables first_term, second_term, and temp

   Step 3: Initialize variables

   first_term ← 0

   second_term ← 1

   Step 4: Display first_term and second_term

   Step 5: Repeat the steps until second_term < 50

   5.1: temp ← second_term

5.2: second_term ← second_term + first_term

5.3: first_term ← temp

5.4: Display second_term

Step 6: Stop

Discussion and Conclusion

Based on the focused objectives, be familiar with algorithm and able to design the algorithm of a given problem. The additional lab exercise made me more confident in the fulfillment of the objectives.

Lab Task (Please implement yourself and show the output to the instructor)

1. Find the largest number among three numbers
2. Check whether a given number is even or odd
3. Check whether a year is a leap year or not
4. Print numbers from 1 to n.
5. Swap two numbers using a third variable

Lab exercise (submit as a report)

1. Check whether a number is prime or not
2. Calculate the summation of even numbers from 1 to n
3. Check whether a triangle is equilateral, isosceles, or scalene.
4. Print multiplication table of a given number n
5. Find the Fibonacci series of first n terms.

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