

Data Structures (CS201)

Lab Assignment 1 (Ungraded)

August 1, 2022

Instructor: Anil Shukla

Due: August 04, 11:59 pm

Note: Ungraded means the marks will not be counted for the final grading.

Note: Place proper comments in your source code.

Note: Write in C only. C++ is not allowed for this particular lab.

Note: The instructions for submitting the assignment is mentioned in the google classroom. Carefully read the same and follow the instructions.

Note: At the end, find some test cases for each problem.

- (1) Write a C program to convert a given decimal number into its 2's complement representation. The program first ask the user to enter a number and then print its 2's complement representation nicely. See some test cases at the end. Assume that you are working with 32 bits machine.
- (2) Write a C program to convert a sequence of binary numbers into its equivalent decimal number. Interpret the sequence as a 2's complement representation. The program first ask user to enter a sequence of bits of arbitrary lengths (but ≤ 32 bits). Then your program should first save this sequence in a 32 bit format without changing the original value and print the same. Then print its original decimal value. See some test cases at the end.
- (3) Write a C function to count and print the number of 1-bits in its integer argument. Again your program should ask the user to enter an integer number. Your program should run correctly regardless of the machine.
Hint: The given integer can be a negative number as well. The C programming language uses 2's complement to represent an integer.

Test Cases:

Test Cases for (1):

Enter Number: 8

2's complement representation of 8 is: 0000 0000 0000 0000 0000 0000 0000 1000

Enter Number: -1

2's complement representation of -1 is: 1111 1111 1111 1111 1111 1111 1111 1111

Enter Number: -64

2's complement representation of -64 is: 1111 1111 1111 1111 1111 1111 1100 0000

Test Cases for question (2):

Enter sequence of binary strings: 1111111

Equivalent 32 bit format while interpreting as 2's complement: 1111 1111 1111 1111

1111 1111 1111 1111

Equivalent decimal number: -1

Enter sequence of binary strings: 0100

Equivalent 32 bit format while interpreting as 2's complement: 0000 0000 0000 0000
0000 0000 0000 0100

Equivalent decimal number: 4

Enter sequence of binary strings: 10000000

Equivalent 32 bit format while interpreting as 2's complement: 1111 1111 1111 1111
1111 1111 1000 0000

Equivalent decimal number: -128

Test Cases for question (3): (Assuming 32 bits machine)

Input: -8

Output: 29

Input: 8

Output: 1

Input: -1024

Output: 22