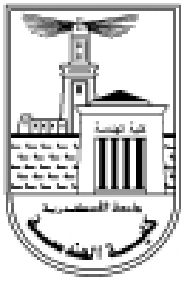
Alexandria University

Faculty of Engineering
SSP- Program.
Summer Course



Assignment (1)

Assigned: 12/7/2014
Due: 18/7/2014
Prof. Dr. Magdy A. Ahmed

Data Structures *CE233*

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(1) Represent the following decimal numbers as 32 bits integers (with sign included and as two's complements representation and as BCD:

100, -100, 17, -17, 100000000000

(2) In 16 bits fixed point representation:

Sign: 1 bit
Integer part: 9 bits
Fractional part: 6 bits
Explain how the following numbers are stored:
2.5, 511, -511, 512, 511.75, 1.000001

(3)What is the Maximum (worst) chopping error and the Relative Chopping error if the following numbers are saved using the previous fixed point representation:
Numbers of order 500
Numbers of order 1000

(4) Using 24-bit, what are the largest and smallest integers that can be represented

a) Signed magnitude binary integer,

b) Two's complement notation,

c) binary-coded decimal form

(5)Express the following integers in 16-bit two's complement :

a) 27 b) 7 c) -7 d) 256

e) 44 f) -50 g) 1 i) -1

(6)Express the values given above in packed decimal storage representation (*BCD*) .

More Exercises:

(1) Interpret the following bit strings as binary positive integers, binary integers in two's complement notation, and binary-coded decimal integers. If a setting cannot be interpreted as a binary- coded decimal integer, explain why.

a) 1001 1001 b) 1100 1100 c) 0001 0001 0001

d) 0111 1101 e) 0101 0101 f) 1000 0001 0101

(2) How would you interpret the 8-bit signed integer 0101 1101 in each of the following systems :

i- sign and magnitude ,

ii- two's complement ,

iii- binary-coded decimal.

(3)Integer data in a certain computer are represented using two's complement in 16-bit word ;

i- What is the range of integer data that can be represented ?

ii- Give the representation of the following integers :

a) – 255 b) – 27 c) 13

(4)In what ways is it less efficient to represent integers as packed (BCD) decimal rather than as binary integers?

Approximately how many bits would be required to represent values as large as 1,000,000,000,000 in each of the two representations ?

(5) What is the Maximum (worst) chopping error and the Relative Chopping error

if the following numbers are saved:

Numbers of order 1000

Numbers of order 10^{-15}

Numbers of order 10^{+15}

Lab(1):

1) Write an algorithm that reads in value of an amount of money in dollar and then find and prints the minimum number of notes required to represent this amount. Assume that the currency system has notes with values of 50, 20, 10, 5, and 1 dollar.
2) Write a program to encrypt (تشفير)a text in file:
   - Read characters from the file
   - For printable characters replace each character, except the last one, by its successor, replace the last printable character by the first one.
   - Print both the original and ciphered files.

3) Write a program to decrypt (فك الشفرة) a text in file coded as described in question 2

4) Write a program to read a text file and then print the frequency of occurrence of each printable character in the file.