CG2007/EE2007E Microprocessor Systems
Dept of ECE, NUS Singapore
(AY 2011/2012 Semester II)

Mini Project – 1

This is an **individual** project. Read the following description of the problem statement carefully.

Declare an array ***MASTER*** of 20 integer (byte) elements with initial values as 0s. Our aim is to populate this array with 0s and 1s randomly. Do the following:

Create two arrays **Array1** and **Array2** of lengths 9 and 16, respectively, and store integers (manually) randomly in the range [1, 20] in the arrays. Make sure that all elements are distinct and at least 5 elements must be strictly greater than a value 10. Your arrays may look like this after this step:

Array1 = {2, 10, 5, 9, 18,…} (9 elements)
Array2 = {7, 3, 18, 12, 19, 10…} (16 elements)

Perform the following experiments:

(**Expt1**): Consider the elements of Array1 as the locations in which a 1 or 0 to be put in MASTER array using the following rule.

- Read an element from Array1;
- If the element is strictly less than 10, then

put a '1' in MASTER array at a location corresponding to the value of the element;

- Repeat this for all elements of Array1;

Example:
First element from Array1 is 2; Since the value of this element is less than 10, MASTER[2] = 1; Observe that MASTER[5] = MASTER[9]=1 as well.

(i) Display the contents of the MASTER;
(ii) Display the offset addresses of the array elements that are 1s.
(iii) Consider MASTER array now. From alternate locations, starting from the first location (element), extract 10 elements and form a WORD1.
(iv) Display this WORD1;
(v) Indicate if this WORD1 is an ODD parity WORD (as "odd") or an EVEN parity WORD(as "even").

(**Expt2**): Repeat Expt1 with Array2 (instead of Array1) and perform (i) – (v) above. In this case, denote the word formed at the step (iii) as WORD2.

(**Expt3**): Compute the SQUARE of the **Hamming distance** between the words WORD1 and WORD2. Display your answer as "Square of the HD is:___ ".

Hamming distance Example:

W1= 1001 W2= 0111

HD(W1,W2) = **sqrt**[$(1-0)^2$ + $(0-1)^2$ +$(0-1)^2$ +$(1-1)^2$] = sqrt[3]

SQUARE of HD(W1,W2) = 3.

Requirements:

1. Entire code should be properly documented; Description of variables used must be explicitly shown;
2. Clearly identify the Data Segment and Code Segment portions;
3. Each sub-problem above should be identified separately and your displayed results must have sufficient clarity;
4. For every experiment put the screen capture of the results for all cases systematically.
5. Your report should contain – Name, Matric Number, Code, and Results;
6. Provide a separate "Readme.txt" file that describes how to run your program and to generate the results. This is for us to test your code and see the results;
7. **Checklist:** Put the following in a zip file – Your code, Report, Readme.txt files; Name your file as: "Your Matric Number.zip"
8. Submit the zip file via IVLE "Lab Report Submission" folder -> CG2007Mini_Project_1 (for CG2007) and in the folder EE2007EMini_Project_1 (for EE2007E).

9. Deadline for submission – **February 24, 2012**;

Important Note: If required, you may be called to demonstrate your code by running and performing the experiments. Copying should be **strictly** avoided. If any report is found copied, then the candidate must face the disciplinary action from the Dept/University.