CSC 3210 – Assignment #3
Fall 2021
11/03/21 11:59 PM

Objective: Learn memory organization/layout, data transfer concepts and instructions, direct memory access, memory allocation.

Requirements:

1. **(5 points) Write an assembly program to compute the following expressions**

   - Create a DWORD array named 'z' of size 3 using DUP operator. Leave the array 'z' uninitialized. You can denote the items in the array as $[z_0, z_1, z_2]$, where z_0 is the first item, z_1 is the second item, z_2 is the third item
   - Update each array item using the following expressions.

$$z_0 = x + 130$$
$$z_1 = y + x - z_0$$
$$z_2 = r + x - 13$$

   - Where x, y, r are 16-bit integer memory *variables*.
   - x = 10, y = 15, r = 4
   - Use mov, movzx, movsx, add, sub instructions only.
   - (hint: Do not alter the value of x, y and r during the computation. Transfer them to appropriate registers to do computation)
   - At the end, open memory window to see the variable z stored in memory (little endian format).
   - If you code correctly, $z_0 = 140$ in decimal, $z_1 = -115$ in decimal, $z_2 = 1$ in decimal
   - Use the debugger to verify your answer.
     - **Submit the following:**
       - Rename the asm file using your last name as Lastname1.asm
       - Screenshot of the code and memory window showing the content of the variable z (little endian format).

2. **(5 points) Use a loop instruction with indirect addressing to solve the problem.**
   - Do not copy the elements to any other array.
   - Use the LOOP and XCHG instruction.
   - The input array, *inputStr* contains elements: "A", "B", "C", "D", "E", "F", "G", "H".
   - The array's elements after running the program should look like: "H", "G", "F", "E", "D", "C", "B", "A".
     - **Submit the following:**
       - Rename the asm file using your last name as Lastname2.asm
       - Screenshot of the code and memory window showing the content of the variable *inputStr*.

3. **(5 points) Write an assembly program that does the following:**
   - Define the following value **0506030704080102h** in the .data segment using the 64-bit unsigned identifier named qVal.
   - **You can subdivide the qVal value into 4 words – 0506, 0307, 4080, 0102**
   - **Extract these words from qVal using PTR operator.**
   - Find the sum of the words. The sum should be D17h.
   - Store the result in any 16-bit register.
   - The direction of adding two words goes from left to right.
     - **Submit the following:**
       - Rename the asm file using your last name as Lastname3.asm
       - Screenshot of the code and memory window showing the result in a 16-bit register.

Note:

- **Comment header** for .ASM files:

  Student: Full name

  Class: CSC3210

  Assignment#: 3

  Description: This program ………….
- Follow the program standards as presented in your book. Pay more attention to code comments and consistent indentation.
- Create a new project for every question. Do not use one project with multiple .asm files.