Vivian Do
CSC 3210 | CRN 90913
Nov 03 2021

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:

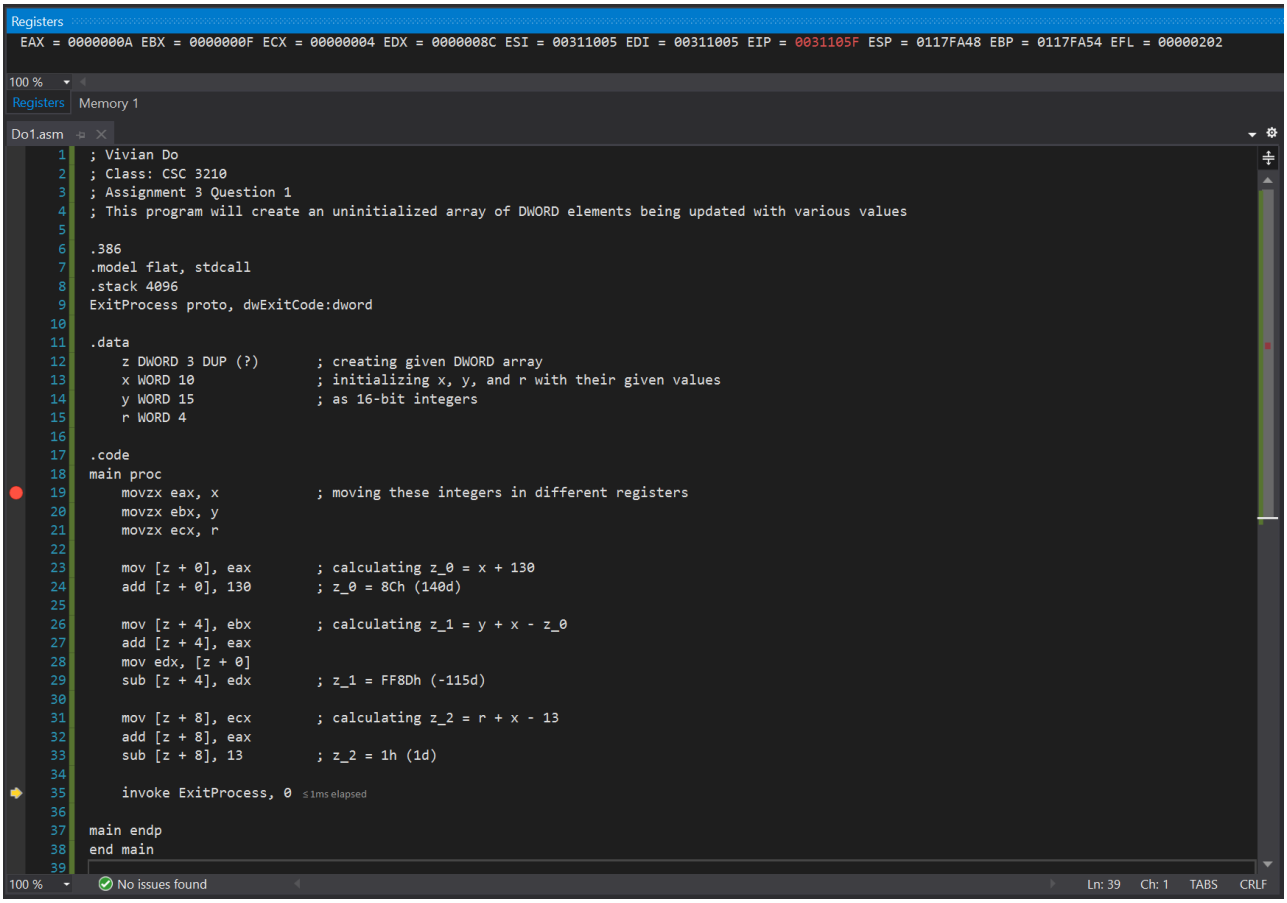
1. (5 points) Write an assembly program to compute the following expressions

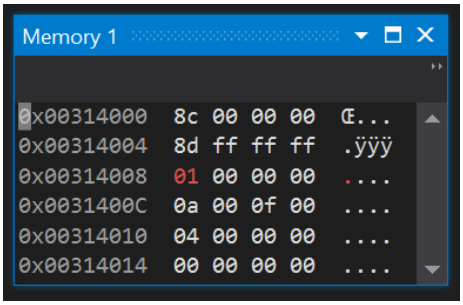
- Create a DWORD array named 'z' of size 3 using DUP operator. Leave the array 'z' uninitialized. You can denote the items in the array as $[z_0, z_1, z_2]$, where z_0 is the first item, z_1 is the second item, z_2 is the third item
- Update each array item using the following expressions.

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

- 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).

Screenshot(s):

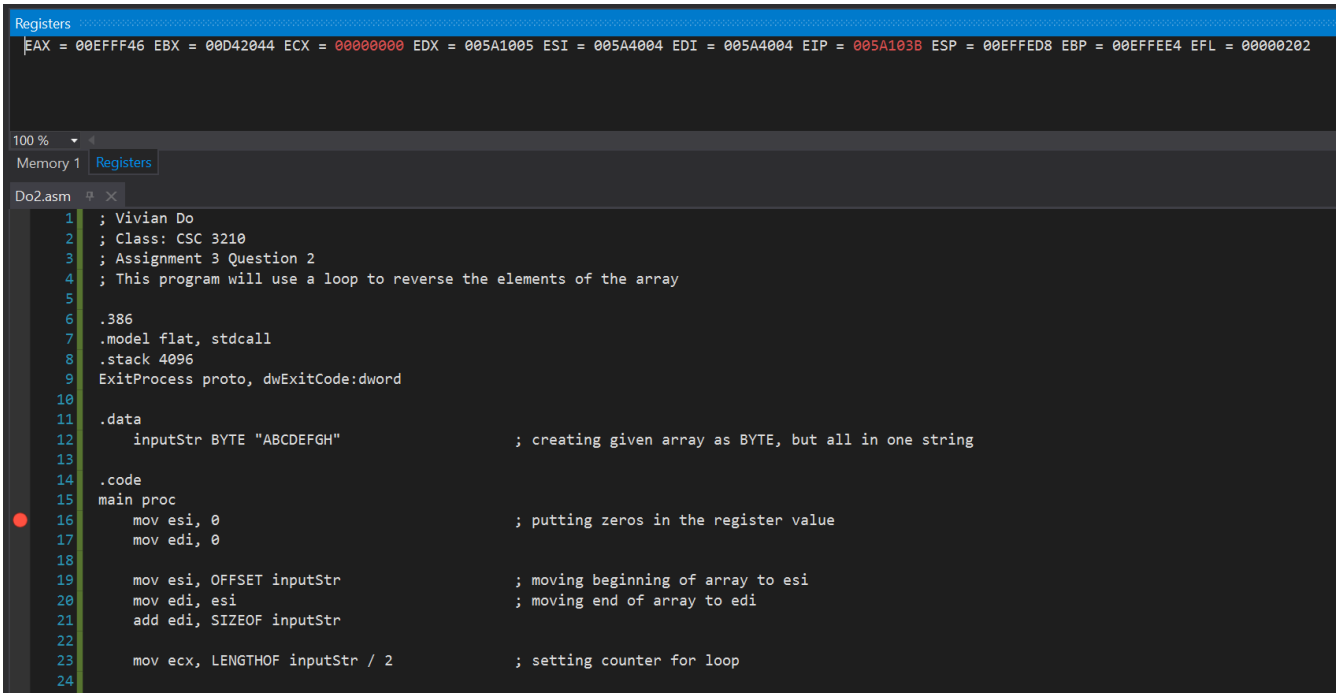


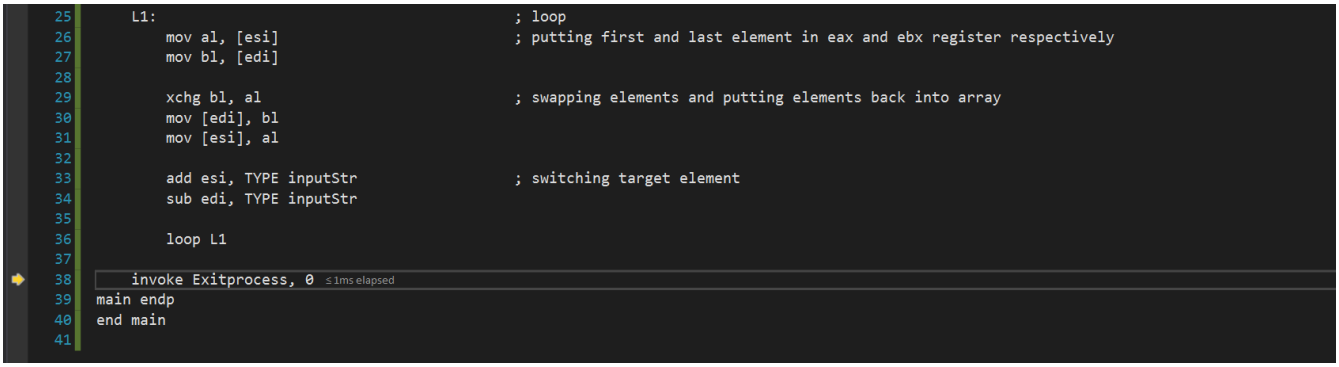


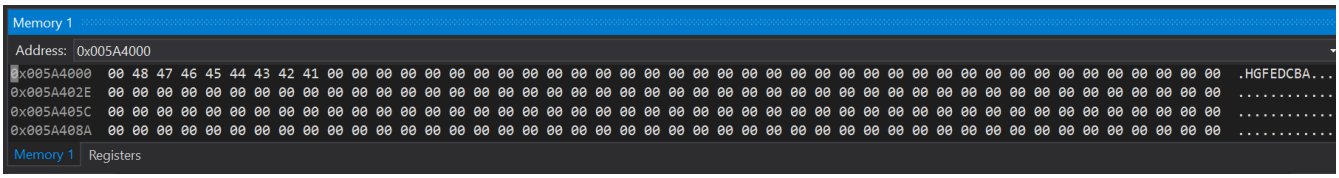
2. (5 points) Use a loop instruction with indirect addressing to solve the problem.

- 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*.

Screenshots:



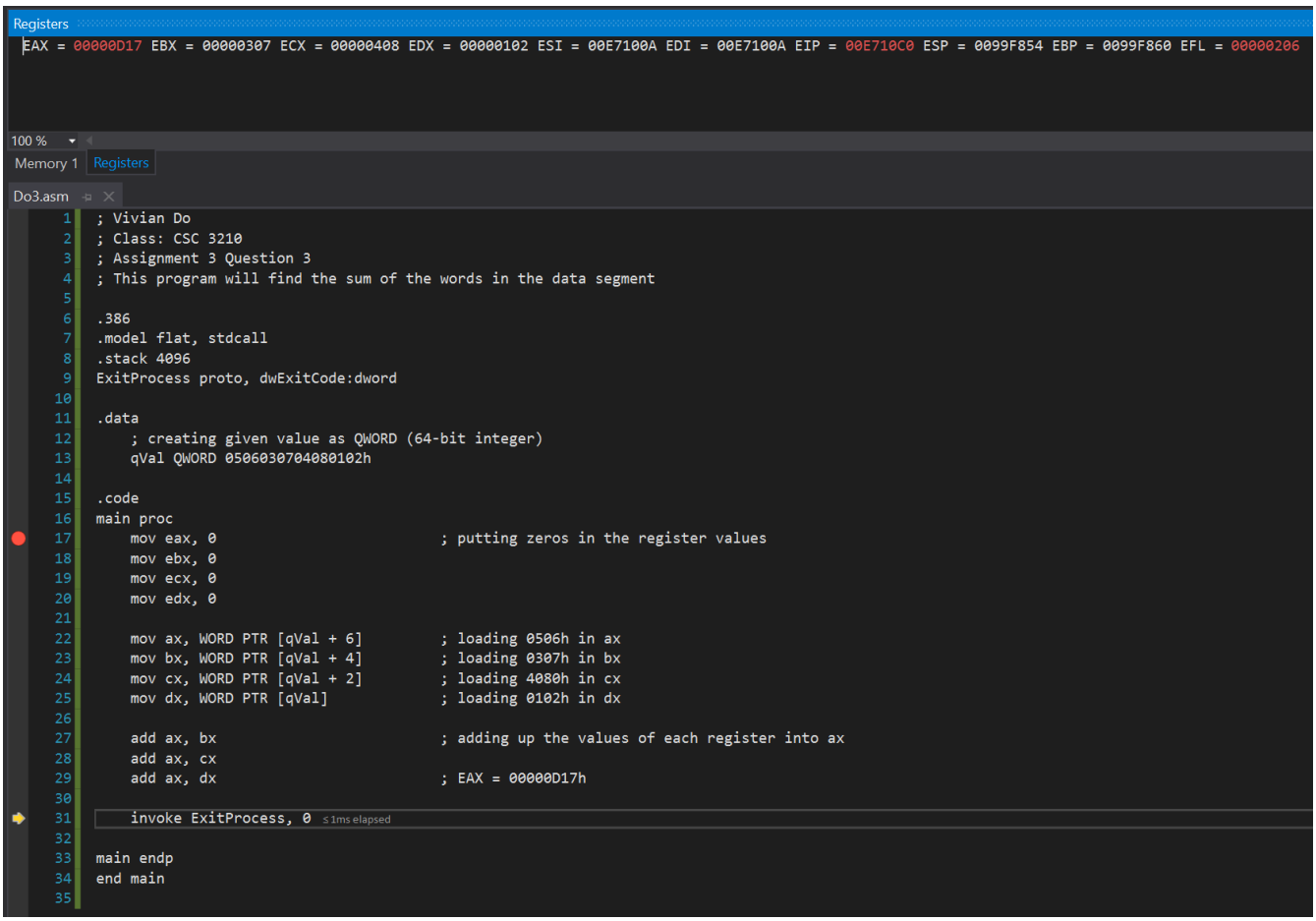


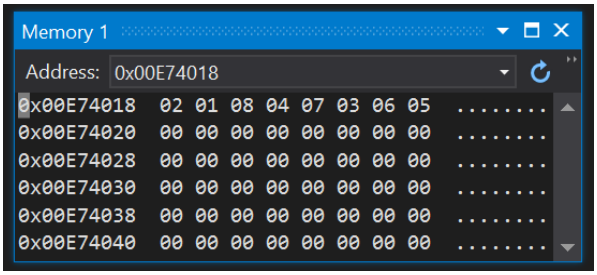


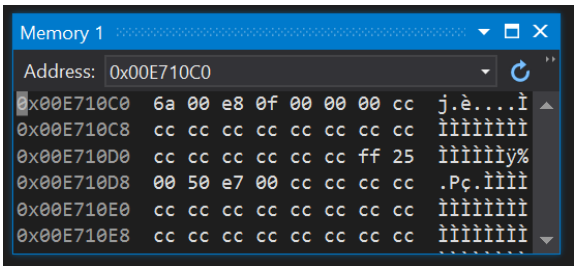
3. (5 points) Write an assembly program that does the following:

- 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.

Screenshot:







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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.