CPSC 240: Computer Organization and Assembly Language

Assignment 02, Fall Semester 2024

CWID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Quiz Questions:**

From the textbook "X86-64 Assembly Language Programming with Ubuntu," study quiz questions 8, 9, 10, and 11 on page 120. Students do not need to submit answers to the quiz questions as they are found in Appendix D of the textbook.

**Programming:**

1. Download the “CPSC-240 Assignment02.docx” document.
2. Design a 16-bit addition program "addition.asm", and use assembly language to realize the function of the following C++ instructions. NOTE: variable sizes and program functions should be equivalent to C/C++ instructions.  
    unsigned short num1 = 0xFEDC; // use dw to declare 16-bit variable  
    unsigned short num2 = 0x1234; // use dw to declare 16-bit variable  
    unsigned int sum = 0; // use dd to declare 32-bit variable  
    sum = int(num1 + num2);
3. Assemble the "addition.asm" file and link the "addition.o" file to get the "addition" executable file.
4. Run the "addition" file with the GDB debugger to display the simulation results of num1 and num2, as well as the simulation results of sum.
5. Insert source code (addition.asm) and simulation results (GDB debugger window) of the memory (num1, num2, and sum) in the document. Use calculator or hand calculation to verify the simulation results.
6. Design a 16-bit subtraction program "subtraction.asm", and use assembly language to realize the function of the following C++ instructions. NOTE: variable sizes and program functions should be equivalent to C/C++ instructions.  
    signed short num1 = 0x1234; // use dw to declare 16-bit variable  
    signed short num2 = 0xFEDC; // use dw to declare 16-bit variable  
    signed int dif = 0; // use dd to declare 32-bit variable  
    dif = int(num1 - num2);
7. Assemble the "subtraction.asm" file and link the "subtraction.o" file to get the "subtraction" executable file.
8. Run the "subtraction" file with the GDB debugger to display the simulation results of num1 and num2, as well as the simulation results of diff.
9. Insert source code (subtraction.asm) and simulation results (GDB debugger window) of the memory (num1, num2, and dif) in the document. Use calculator or hand calculation to verify the simulation results.
10. Save the file in pdf format and submit the pdf file to Canvas before the deadline.

[Insert addition source code here]

[Insert addition simulation result here]

[Insert the addition result verification here]

[Insert subtraction source code here]

[Insert subtraction simulation result here]

[Insert the subtraction result verification here]