Computer Science Department
California State University, Fullerton

CPSC 240-01/02 Computer Organization and Assembly Language
Quiz 01
12:00 pm to 1:15 pm
Monday, October 7, 2024

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Note:

- University regulations on academic honesty will be strictly enforced.
- You have 75 minutes to complete this Quiz.
- Open books, slides and sample programs.
- Turn off or turn vibration your cell phone.
- Use “yasm” assembler to assemble the source code.
- Use “ld” linker to link the object code
- Use “ddd” debugger to simulate the executable code.
- Each student can only submit solution once, and secondary submissions will not be graded. If you have submitting problems, please inform your instructor before you leave the classroom.
- Any content submitted after the due date will be regarded as a make-up quiz.

Quiz 01

1. Download the “CPSC-240-01 Quiz 01.docx” document.
2. Convert the following C/C++ variable declarations and arithmetic operations to x86-64 assembly language. Use the “yasm” assembler to assemble the program, the “ld” linker to link the object code, and the “ddd” debugger to simulate the executable code.
   NOTE: variable sizes and program functions should be equivalent to C/C++ instructions.

```
signed short num1 = +30000;      //16-bit signed variable
signed short num2 = +20000;      //16-bit signed variable
signed short num3 = -3333;       //16-bit signed variable
signed int sum = 0               //32-bit signed variable
signed short quo = 0;            //16-bit signed variable
signed short rmd = 0;            //16-bit signed variable
sum = int(num1 + num2);
quo = sum / num3;
rmd = sum % num3;
```

3. After assembling and linking, run the DDD/GDB debugger to display the simulation results of the decimal values of num1, num2, num3, sum, quo, and rmd in GDB panel before terminate program.
4. Insert source code and the simulation results (GDB panel) to the bottom of the document.
5. Save the file in pdf or docx format and submit the pdf or docx file to Canvas before the deadline.
6. Deadline is 1:15 pm on 10/07/2024.

[Copy and paste your assembly source code here:]

```
; quiz1.asm;
; signed short num1 = +30000;
; signed short num2 = +20000;
; signed short num3 = -3333;
; signed int sum = 0;
; signed short quo = 0;
; signed short rmd = 0;
; sum = int(num1 + num2);
```

```
; quo = sum / num3;
; rmd = sum % num3;

section .data
SYS_exit     equ 60
EXIT_SUCCESS      equ 0
num1          dw 30000
num2          dw 20000
num3          dw -3333
sum       dd 0
quo       dw 0
rmd       dw 0

section .text
      global _start
_start:
      mov      ax, word[num1]
      add ax, word[num2]
      adc dx, 0

      mov      [sum], ax
      mov      [sum+2], dx

      mov      ax, [sum]
      mov      dx, [sum+2]
      mov      bx, word[num3]
      idiv bx

      mov      word[quo], ax
      mov      word[rmd], dx
```

```
mov     rax, SYS_exit
mov     rdi, EXIT_SUCCESS
syscall
```

[Attach GDB window with all memory data here:]