**Computer Science Department**

**California State University, Fullerton**

CPSC 240 Computer Organization and Assembly Language

Quiz 03

Thursday, November 10, 2022

Student Name:

Last 4 digits of ID:

**Note:**

* University regulations on academic honesty will be strictly enforced.
* You have 75 minutes to complete this Quiz.
* Close books, slides, and turn off the computer.
* Turn off or turn vibration your cell phone.
* Any content submitted after the due date will be regarded as a make-up quiz.

1. What would be in the **ax, bx,** and **dx** registers after execution? What would be in **num1, num2,** and **num3** memories before and after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

section .data

num1 dw 7

num2 dw 3

num3 dw 0

section .text

global \_start

\_start:

mov ax, word[num1]

mov bx, word[num2]

mul bx

mov word[num3], ax

(30 points)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Memory | Offset | Value (Hex) | |  | Register | Value (Hex) |
|  |  | before(initial) | after |  |  | after execution |
| num3 | +1 |  |  |  | ax |  |
| num3 | +0 |  |  |  | bx |  |
| num2 | +1 |  |  |  | dx |  |
| num2 | +0 |  |  |  |  |  |
| num1 | +1 |  |  |  |  |  |
| num1 | +0 |  |  |  |  |  |

1. What would be in the **ah, al, bl,** and **cl** registers after execution. What would be in the **mul3** memory before and after execution? Show answer in hex, full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

section .data

mul3 db 0

section .text

global \_start

\_start:

mov cl, 3

next:

mov ah, 0

mov al, cl

mov bl, 3

div bl

cmp ah, 0

jne skip ;if(ah != 0) goto skip

inc byte[mul3]

skip:

inc cl

cmp cl, 7

jne next ;if(cl != 7) goto next

(12 points)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Memory | Offset | Value (Hex) | |  | Register | Value (Hex) |
|  |  | before(initial) | after |  |  | After execution |
| mul3 | +0 |  |  |  | ah |  |
|  |  |  |  |  | al |  |
|  |  |  |  |  | bl |  |
|  |  |  |  |  | cl |  |

1. What would be in the **al** and **rsi** registers after execution. What would be in the **num** and **sum** memory before and after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

section .data

num db 9, 5, 3, 6, 8

sum db 0

section .text

global \_start

\_start:

mov al, 0

mov rsi, 0

next:

add al, byte[num+rsi]

inc rsi

cmp rsi, 5

jne next ;if(rsi != 5) goto next

mov byte[sum], al

(28 points)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Memory | Offset | Value (decimal) | |  | Register | Value (Hex) |
|  |  | before (initial) | after |  |  | After execution |
| sum | +0 |  |  |  | al |  |
| num | +4 |  |  |  | rsi |  |
| num | +3 |  |  |  |  |  |
| num | +2 |  |  |  |  |  |
| num | +1 |  |  |  |  |  |
| num | +0 |  |  |  |  |  |

1. What would be in the **rax, rdi, rsi,** and **rdx** registers after execution? What would be in the **str1** and **str2** memory and **Terminal Window** after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

%macro print 2

mov rax, 1

mov rdi, 1

mov rsi, %1

mov rdx, %2

syscall

%endmacro

section .data

str1 db "abc", 10

str2 db "123"

section .text

global \_start

\_start:

print str1, 4

print str2, 3

(22 points)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Memory | Offset | Value (character) | |  | Register | Value (Hex) |
|  |  | before (initial) | after |  |  | After execution |
| str2 | +2 | '3' |  |  | rax |  |
| str2 | +1 | '2' |  |  | rdi |  |
| str2 | +0 | '1' |  |  | rsi |  |
| str1 | +4 | 10 |  |  | rdx |  |
| str1 | +2 | 'c' |  |  |  | |
| str1 | +1 | 'b' |  |  |
| str1 | +0 | 'a' |  |  |

Terminal window: (6 points)