Quiz 4-Machine Programming II

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**Attempt 3**

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**Submission View**

Your quiz has been submitted successfully.

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| --- | --- | --- |
| **Question 1** |  | 2 / 2 points |

Consider the following assembly instructions and select the C function that generates it:

funcX:  
    leaq    (%rdi,%rdi,4), %rax  
    leaq    -10(,%rax,4), %rax  
    ret

Question options:

|  |  |  |
| --- | --- | --- |
|  | long func1(long n){     return n \*16-10; } | |
|  | long func1(long n){     return n \*20 -10; } | |
|  | long func1(long n){     return n \*9-10; } | |
|  | long func1(long n){     return n \*8 -10; } | |
| **Question 2** |  | 1 / 4 points | |

Match the C functions with their respective assembly codes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | \_\_2\_\_ | movl    16(%rdi), %eax     ret | | \_\_1\_\_ | movzbl    4(%rdi), %eax     ret | | \_\_3\_\_ | movl    %edi, %eax     sall    $4, %eax     ret | | \_\_4\_\_ | leal    0(,%rdi,4), %eax     ret | |  | |  |  | | --- | --- | | **1**. | int fun1(int \*a) {      return a[4]; } | | **2**. | int fun2(int a) {      return a\*4;  } | | **3**. | int fun3(int a) {      return a<<4;  } | | **4**. | char fun4(char \*a) {      return a[4];  } | | |
| **Question 3** | |  | 4 / 4 points | |

Consider the following assembly instructions and select the C function that generates it:

functionX:  
    imulq    %rsi, %rdi  
    imulq    %rcx, %rdx  
    subq    %rdx, %rdi  
    movq    %rdi, %rax  
    salq    $6, %rax  
    ret

Question options:

|  |  |  |
| --- | --- | --- |
|  | long functionX(long a, long b, long c, long d){       long e = a\*b;      long f = c\*d;                      return (e-f)\*6;  } | |
|  | long functionX(long a, long b, long c, long d){       long e = a\*b;      long f = c\*d;                      return (e-f)\*64;  } | |
|  | long functionA(long a, long b, long c, long d){       long e = a\*b;      long f = c\*d;                      return (f-e)\*6;  } | |
|  | long functionA(long a, long b, long c, long d){       long e = a\*b;      long f = c\*d;                      return (f-e)\*64;  } | |
| **Question 4** |  | 2 / 2 points | |

"ja" and "jb" instructions are used for jumping if the last "flag changing" instruction was on unsigned numbers.

Question options:

|  |  |  |
| --- | --- | --- |
|  | True | |
|  | False | |
| **Question 5** |  | 2 / 4 points | |

Reconstruct the C code by looking at the assembly code below:

**Make sure not to put any space characters in your answers.**

myfunction:  
    movq    $1, %rax  
    cmpq    $1, %rdi  
    ja    .L8  
    ret  
.L8:  
    subq    $8, %rsp  
    shrq    %rdi  
    call    myfunction  
    addq    $1, %rax  
    addq    $8, %rsp  
    ret

unsigned myfunction2(unsigned n){        
    if (\_\_\_\_\_blank1\_\_\_\_\_\_\_)   
        return 1;    
      
    else {          
        return 1 + myfunction2(\_\_\_\_blank2\_\_\_\_);       
    }   
}

blank1:

\_\_\_n>1\_\_\_

blank2:

\_\_\_n/2\_\_\_

|  |  |  |
| --- | --- | --- |
| **Question 6** |  | 1 / 1 point |

In C, conditional moves are used because they do not require control transfer and branches are very disruptive to instruction flow.

Question options:

|  |  |  |
| --- | --- | --- |
|  | True | |
|  | False | |
| **Question 7** |  | 2 / 2 points | |

GCC converts the branching code into conditional moves because they are always safe to use.

Question options:

|  |  |  |
| --- | --- | --- |
|  | True | |
|  | False | |
| **Question 8** |  | 0 / 1 point | |

register r12 is a caller-saved register.

Question options:

|  |  |
| --- | --- |
|  | True |
|  | False |
|  |  |