Eidgenössische Technische Hochschule Zürich
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Systems@ETH Zürich

SYSTEMS PROGRAMMING AND COMPUTER ARCHITECTURE
A little Quiz

a) The register rax currently has value 0. Which of the following statements are true?

(a) Executing movq (%rax), %rcx will cause a segmentation fault.
(b) Executing leaq (%rax), %rcx will cause a segmentation fault.
(c) Executing movq %rax, %rcx will cause a segmentation fault.
(d) Executing addq $8, %rsp will increase the stack allocation by 8 bytes.

b) Which of the following lines of C produce the same outcome as `lea 0xffffffff(%esi),%eax`?

(a) `*(esi-1) = eax`
(b) `esi = eax + 0xffffffff`
(c) `eax = esi - 1`
(d) `eax = *(esi -1)`

c) Which of the following statements are valid, which are not and why?

(a) `movl(, %eax, 4), %ebx`
(b) `movl 15, (%ebx)`
(c) `movl %eax, 655`

d) Which of the following values of `%eax` would cause the jump to be taken?

```
test \%eax, \%eax
jne 3d<function+0x3d>
```

(a) 1
(b) 0
(c) Any value
(d) no value

e) What does the `leave` instruction do? Write down an equivalent assembly.

f) Translate the following C Code to Assembly

```c
// input: int x (in %rdi)
// output int y (in %rax)
int func(int x) {
    int y = 0;
    if (x > 0) {
      y = 10;
    }
    y += 5;
    return y;
}
```

g) Translate the following C Code to Assembly

```
// input: int x, int y (in %rdi, %rsi)
// output int z (in %rax)

int func(int x, int y) {
    int z = 0;
    while (z <= y) {
      z +=3*(x+1);
    }
    return z;
}
```

h) Translate the following Assembly code to C

```
func(int, int):
        pushq   %rbp
        movq    %rsp, %rbp
        movl    %edi, -4(%rbp)
        movl    %esi, -8(%rbp)
        movl    -4(%rbp), %eax
        cmpl    -8(%rbp), %eax
        jle     .L2
        movl    -4(%rbp), %eax
        jmp     .L3
.L2:
        movl    -8(%rbp), %eax
.L3:
        popq    %rbp
        ret
```

```
int func(int x, int y) {

}
```

Hint: Where are the arguments located?

Some questions are based on exam question of CMU.
`http://www.cs.cmu.edu/afs/cs/academic/class/15213-s10/www/exams.html`