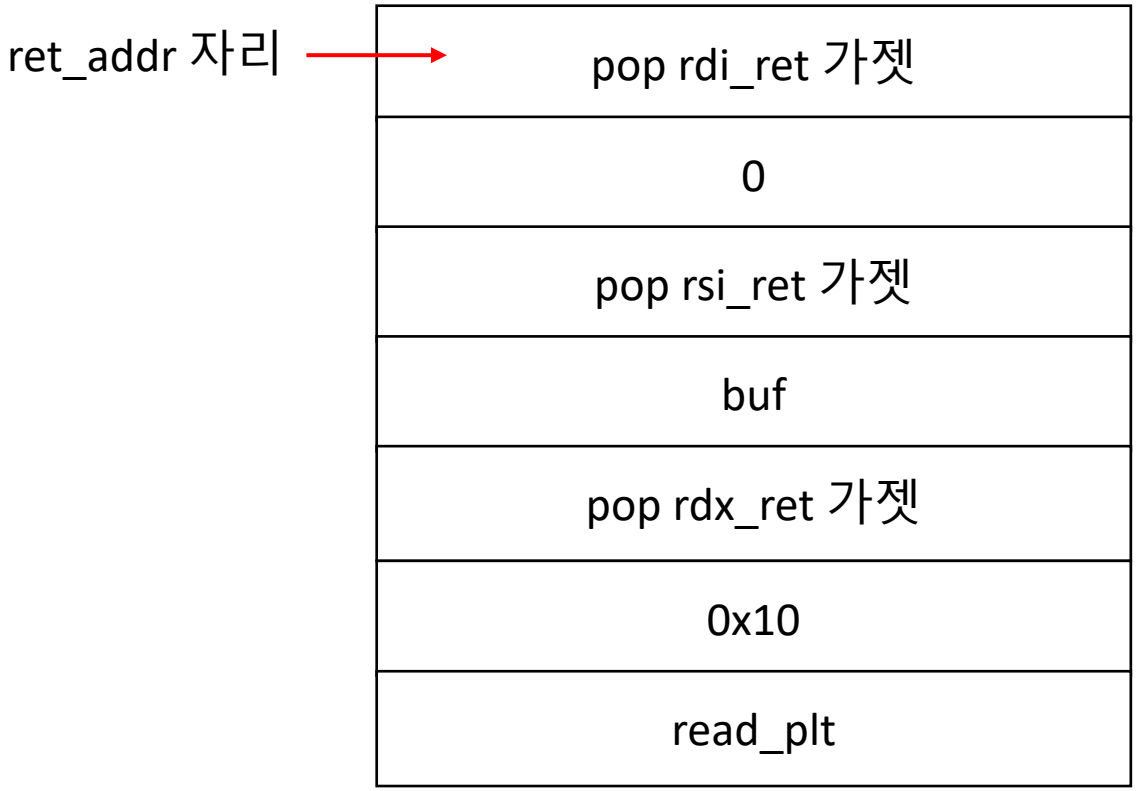
ROP_2

복습

read(0,buf,0x10);



32bit vs 64bit (x86 vs x64)

- 32bit : 함수가 매개변수를 스택에서 참조함
- 64bit: 함수가 매개변수를 “레지스터”에서 참조함

64bit rop

rdi -> rsi -> rdx -> r10 -> r8 -> r9 … 순서로 레지스터

ex)

read(0,buf,0x10);

rdi : 0

rsi : buf

rdx : 0x10

- 그렇다면, 가젯이 없다면 어떡할 것인가??

- 그렇다면, 가젯이 없다면 어떡할 것인가??

- 매개변수 3개인 함수 호출 시,
- pop rdi
- pop rsi
- pop rdx

Return to csu

- 실제로 함수가 시작될 때,

  libc_csu_init -> main() -> libc_csu_fini

```
.text:0000000000400600 loc_400600:                             ; CODE XREF:   libc csu init+54↓j
.text:0000000000400600                 mov     rdx, r15
.text:0000000000400603                 mov     rsi, r14
.text:0000000000400606                 mov     edi, r13d
.text:0000000000400609                 call    qword ptr [r12+rbx*8]
.text:000000000040060D                 add     rbx, 1
.text:0000000000400611                 cmp     rbp, rbx
.text:0000000000400614                 jnz     short loc_400600
.text:0000000000400616
.text:0000000000400616 loc_400616:                             ; CODE XREF:   libc csu init+34↑j
.text:0000000000400616                 add     rsp, 8
.text:000000000040061A                 pop     rbx
.text:000000000040061B                 pop     rbp
.text:000000000040061C                 pop     r12
.text:000000000040061E                 pop     r13
.text:0000000000400620                 pop     r14
.text:0000000000400622                 pop     r15
.text:0000000000400624                 retn
```

```
gdb-peda$ pd __libc_csu_init
Dump of assembler code for function __libc_csu_init:
   0x00000000004005c0 <+0>:     push   r15
   0x00000000004005c2 <+2>:     push   r14
   0x00000000004005c4 <+4>:     mov    r15,rdx
   0x00000000004005c7 <+7>:     push   r13
   0x00000000004005c9 <+9>:     push   r12
   0x00000000004005cb <+11>:    lea    r12,[rip+0x20083e]        # 0x600e10
   0x00000000004005d2 <+18>:    push   rbp
   0x00000000004005d3 <+19>:    lea    rbp,[rip+0x20083e]        # 0x600e18
   0x00000000004005da <+26>:    push   rbx
   0x00000000004005db <+27>:    mov    r13d,edi
   0x00000000004005de <+30>:    mov    r14,rsi
   0x00000000004005e1 <+33>:    sub    rbp,r12
   0x00000000004005e4 <+36>:    sub    rsp,0x8
   0x00000000004005e8 <+40>:    sar    rbp,0x3
   0x00000000004005ec <+44>:    call   0x400438 <_init>
   0x00000000004005f1 <+49>:    test   rbp,rbp
   0x00000000004005f4 <+52>:    je     0x400616 <__libc_csu_init+86>
   0x00000000004005f6 <+54>:    xor    ebx,ebx
   0x00000000004005f8 <+56>:    nop    DWORD PTR [rax+rax*1+0x0]
   0x0000000000400600 <+64>:    mov    rdx,r15
   0x0000000000400603 <+67>:    mov    rsi,r14
   0x0000000000400606 <+70>:    mov    edi,r13d
   0x0000000000400609 <+73>:    call   QWORD PTR [r12+rbx*8]
   0x000000000040060d <+77>:    add    rbx,0x1
   0x0000000000400611 <+81>:    cmp    rbp,rbx
   0x0000000000400614 <+84>:    jne    0x400600 <__libc_csu_init+64>
   0x0000000000400616 <+86>:    add    rsp,0x8
   0x000000000040061a <+90>:    pop    rbx
   0x000000000040061b <+91>:    pop    rbp
   0x000000000040061c <+92>:    pop    r12
   0x000000000040061e <+94>:    pop    r13
   0x0000000000400620 <+96>:    pop    r14
   0x0000000000400622 <+98>:    pop    r15
   0x0000000000400624 <+100>:   ret
```

```
0x0000000000400600 <+64>:    mov    rdx,r15
0x0000000000400603 <+67>:    mov    rsi,r14
0x0000000000400606 <+70>:    mov    edi,r13d
0x0000000000400609 <+73>:    call   QWORD PTR [r12+rbx*8]
0x000000000040060d <+77>:    add    rbx,0x1
0x0000000000400611 <+81>:    cmp    rbp,rbx
0x0000000000400614 <+84>:    jne    0x400600 <__libc_csu_init+64>
0x0000000000400616 <+86>:    add    rsp,0x8
0x000000000040061a <+90>:    pop    rbx
0x000000000040061b <+91>:    pop    rbp
0x000000000040061c <+92>:    pop    r12
0x000000000040061e <+94>:    pop    r13
0x0000000000400620 <+96>:    pop    r14
0x0000000000400622 <+98>:    pop    r15
0x0000000000400624 <+100>:   ret
```

```
.text:0000000000400600 loc_400600:                             ; CODE XREF:   libc_csu_init+54↓j
.text:0000000000400600                 mov     rdx, r15
.text:0000000000400603                 mov     rsi, r14
.text:0000000000400606                 mov     edi, r13d
.text:0000000000400609                 call    qword ptr [r12+rbx*8]
.text:000000000040060D                 add     rbx, 1
.text:0000000000400611                 cmp     rbp, rbx
.text:0000000000400614                 jnz     short loc_400600
.text:0000000000400616
.text:0000000000400616 loc_400616:                             ; CODE XREF:   libc_csu_init+34↑j
.text:0000000000400616                 add     rsp, 8
.text:000000000040061A                 pop     rbx
.text:000000000040061B                 pop     rbp
.text:000000000040061C                 pop     r12
.text:000000000040061E                 pop     r13
.text:0000000000400620                 pop     r14
.text:0000000000400622                 pop     r15
.text:0000000000400624                 retn
```

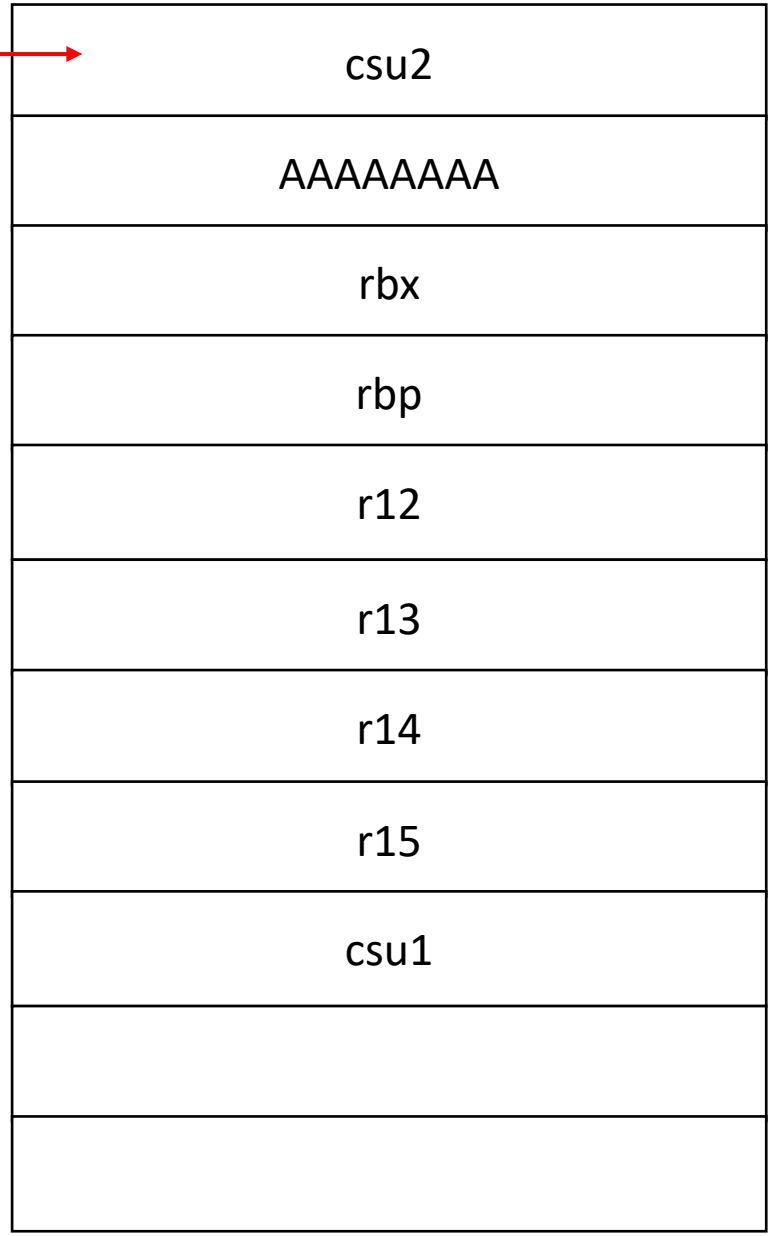
```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

ret_addr 자리



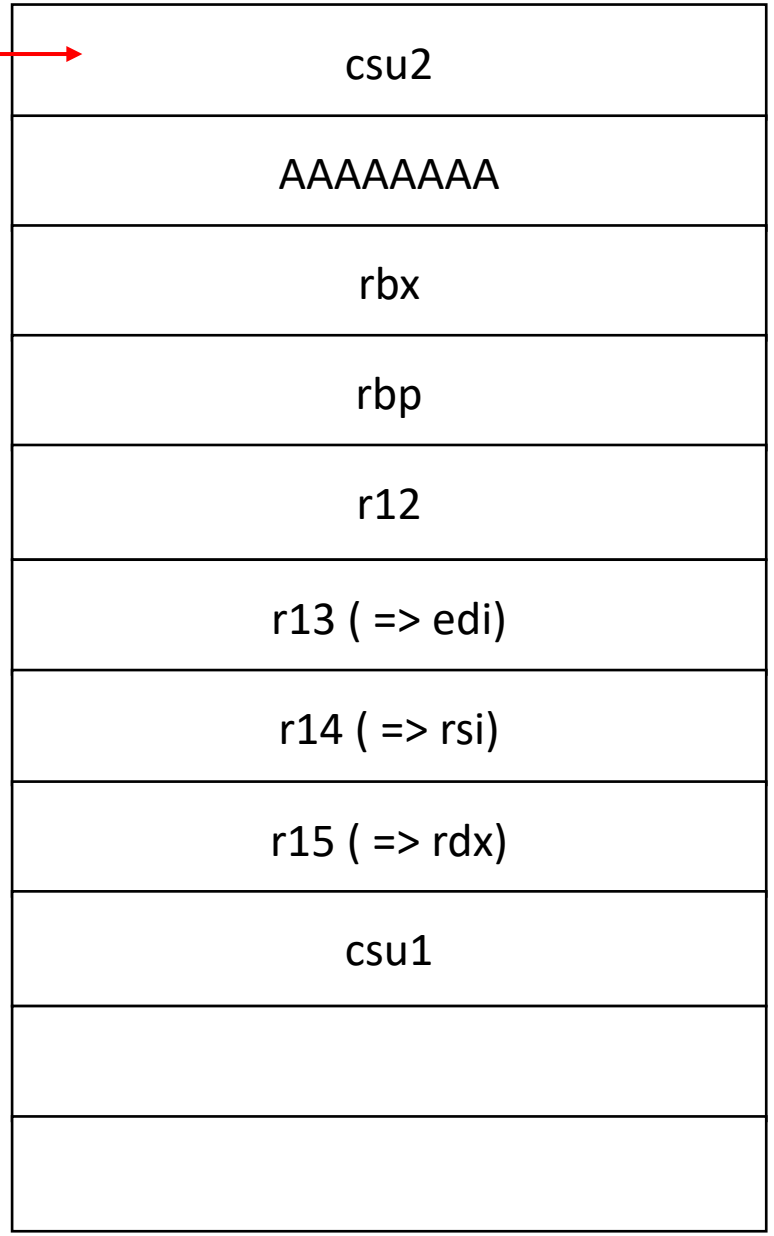
```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

ret_addr 자리



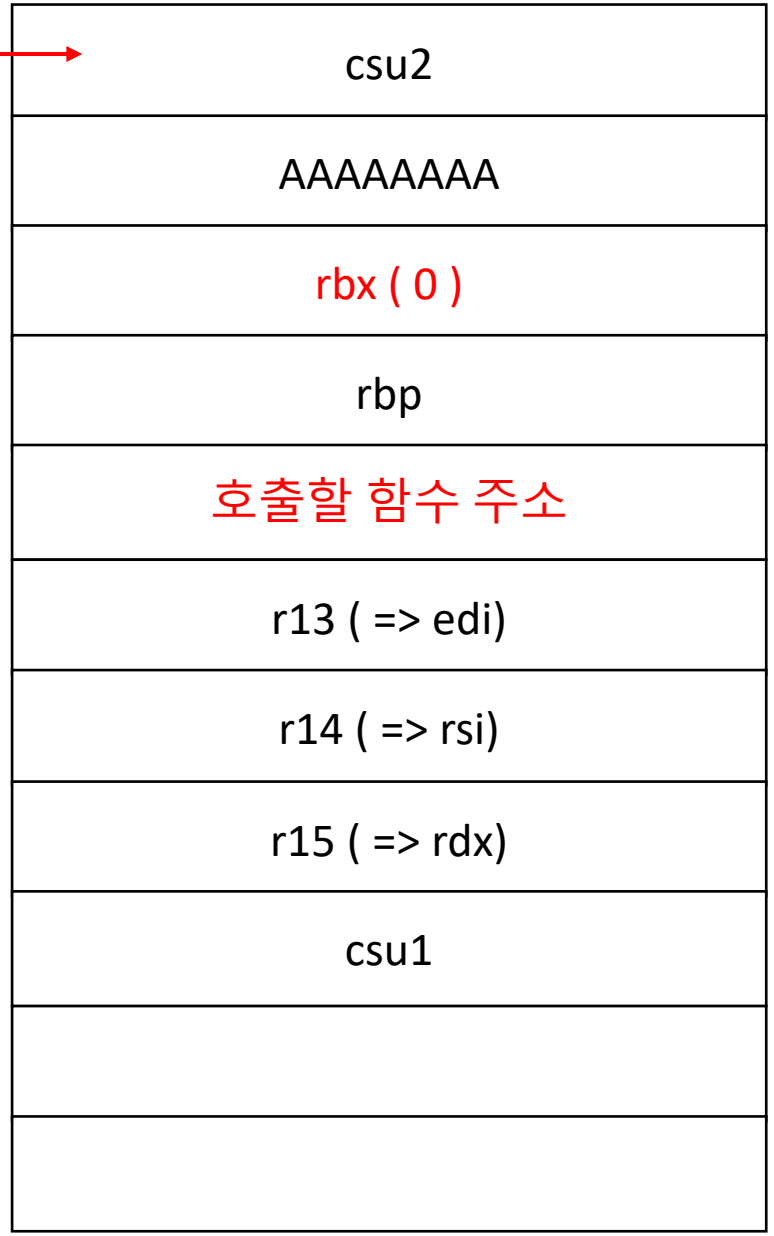
```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

ret_addr 자리



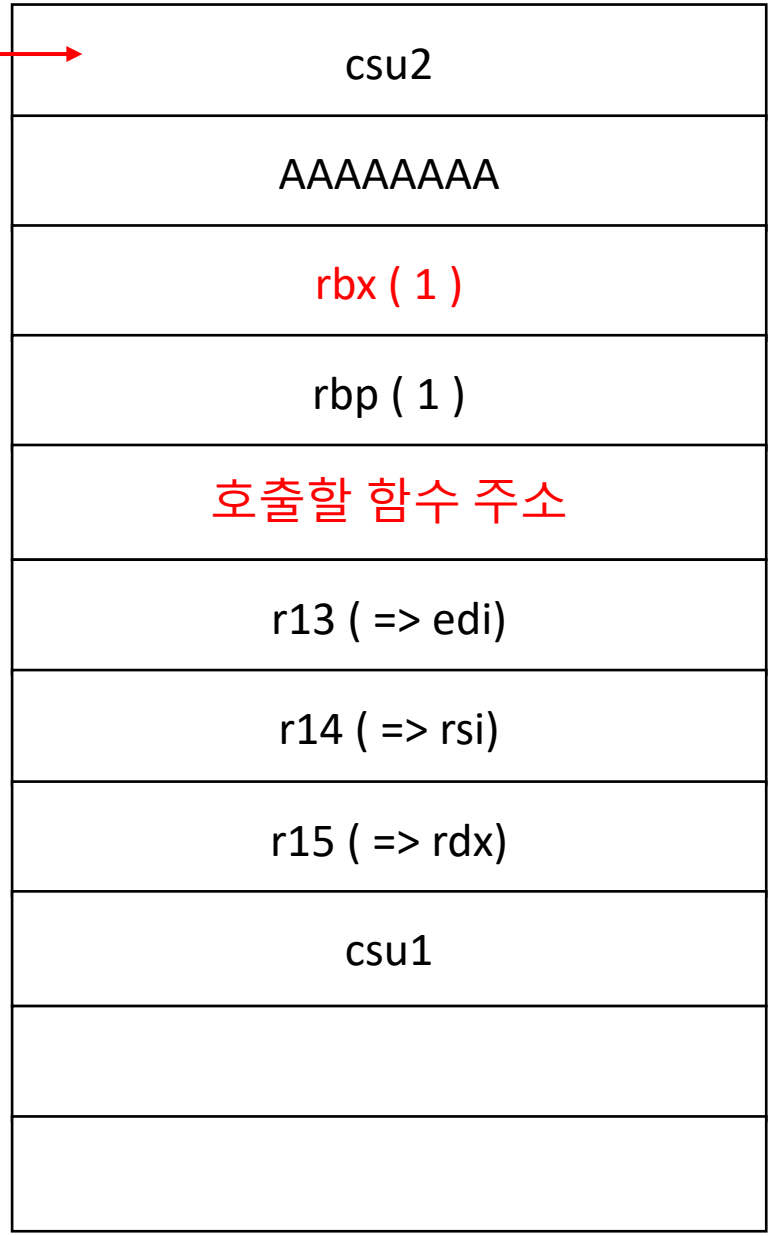
```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

ret_addr 자리



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

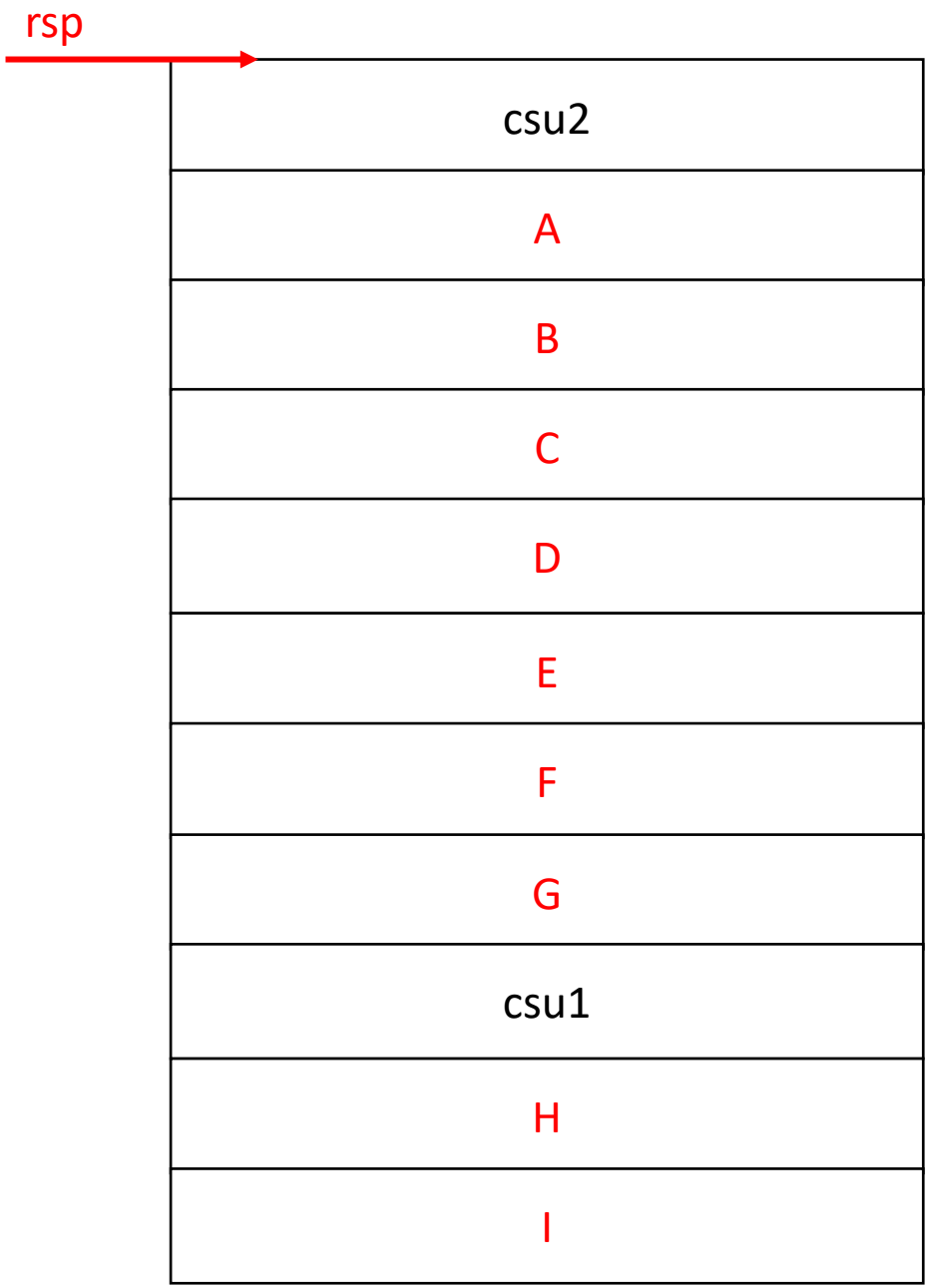
csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx:
rbp:
r12:
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

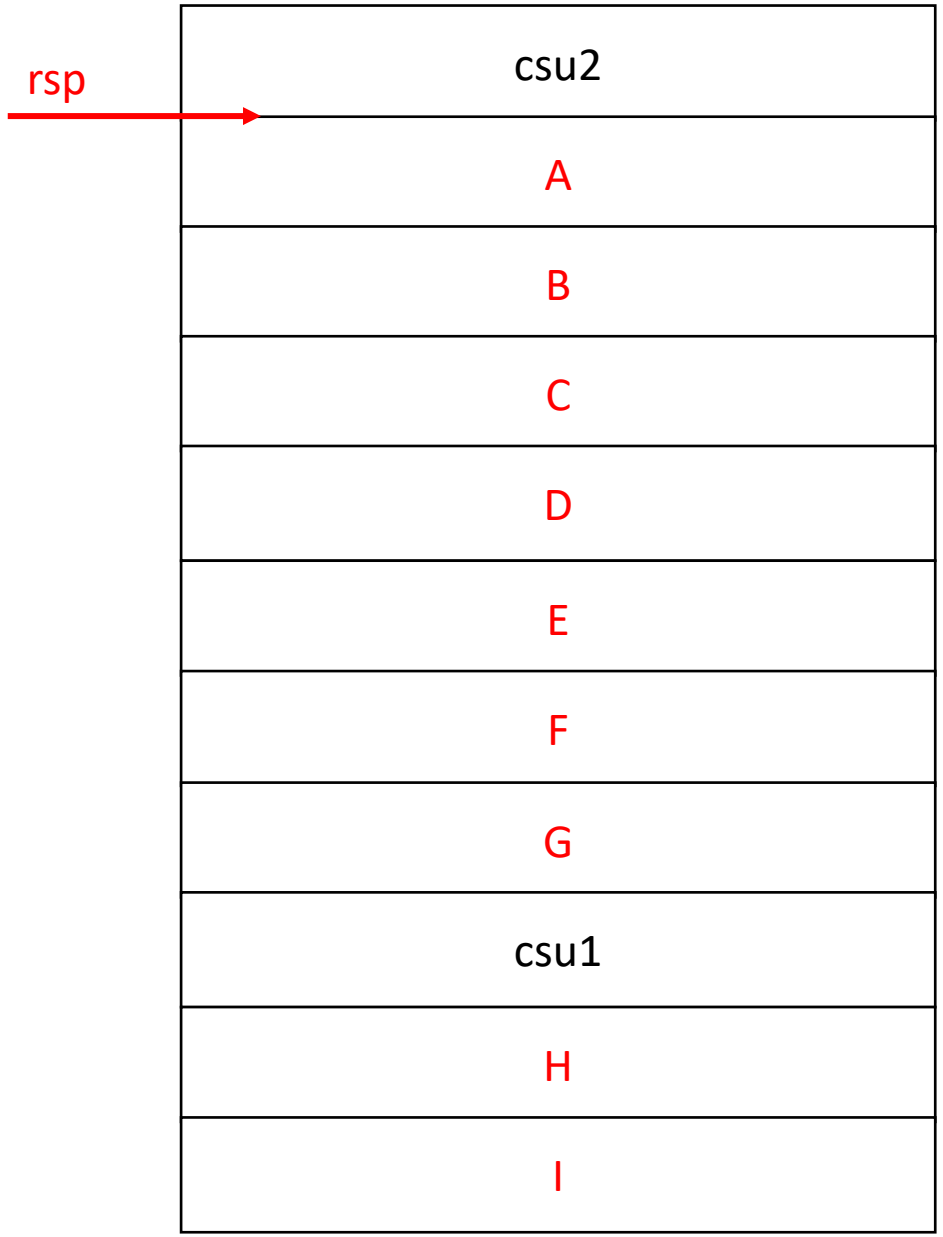
rip

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx:
rbp:
r12:
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

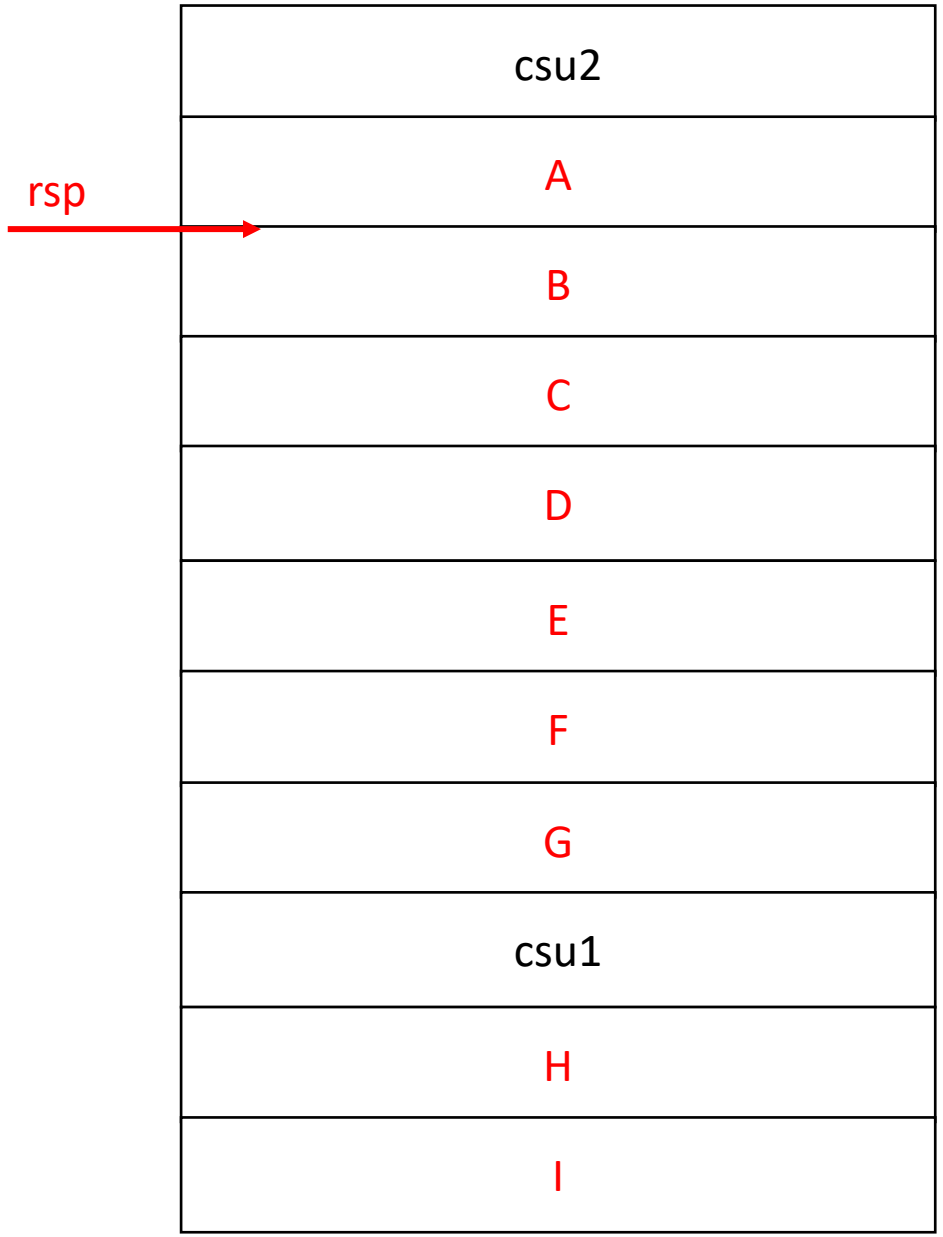
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

rip

csu2

rbx:
rbp:
r12:
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

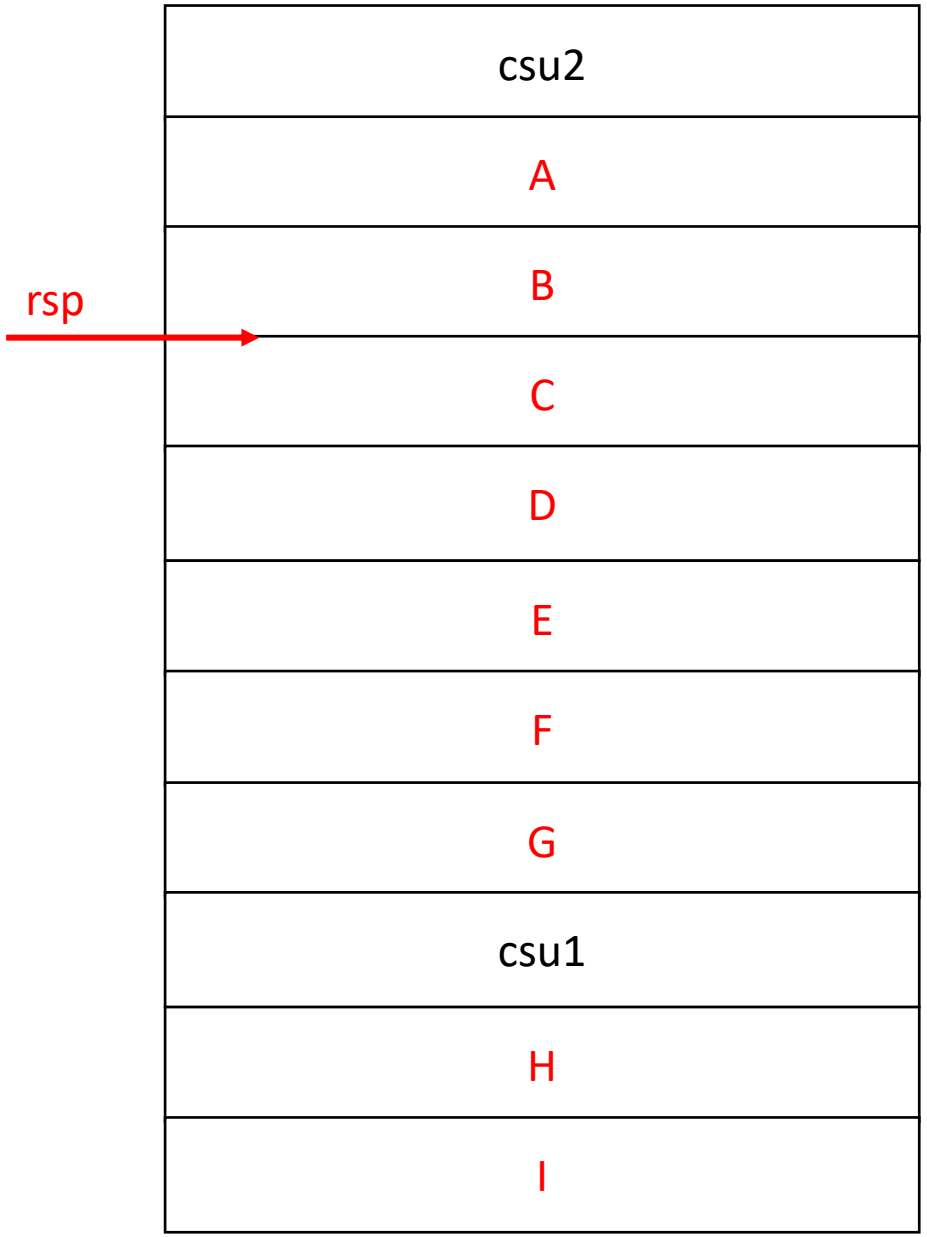
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp:
r12:
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

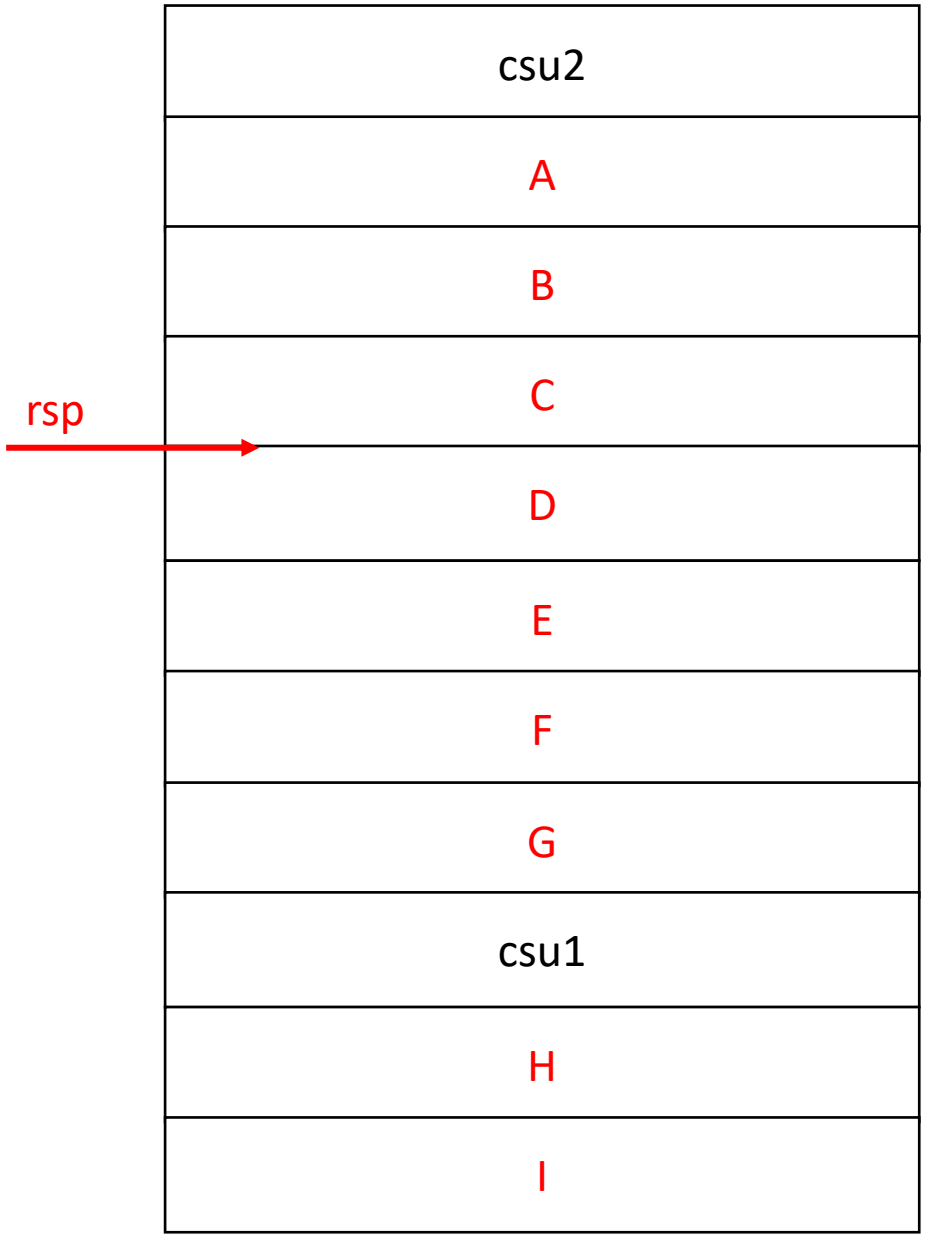
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp: C
r12:
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

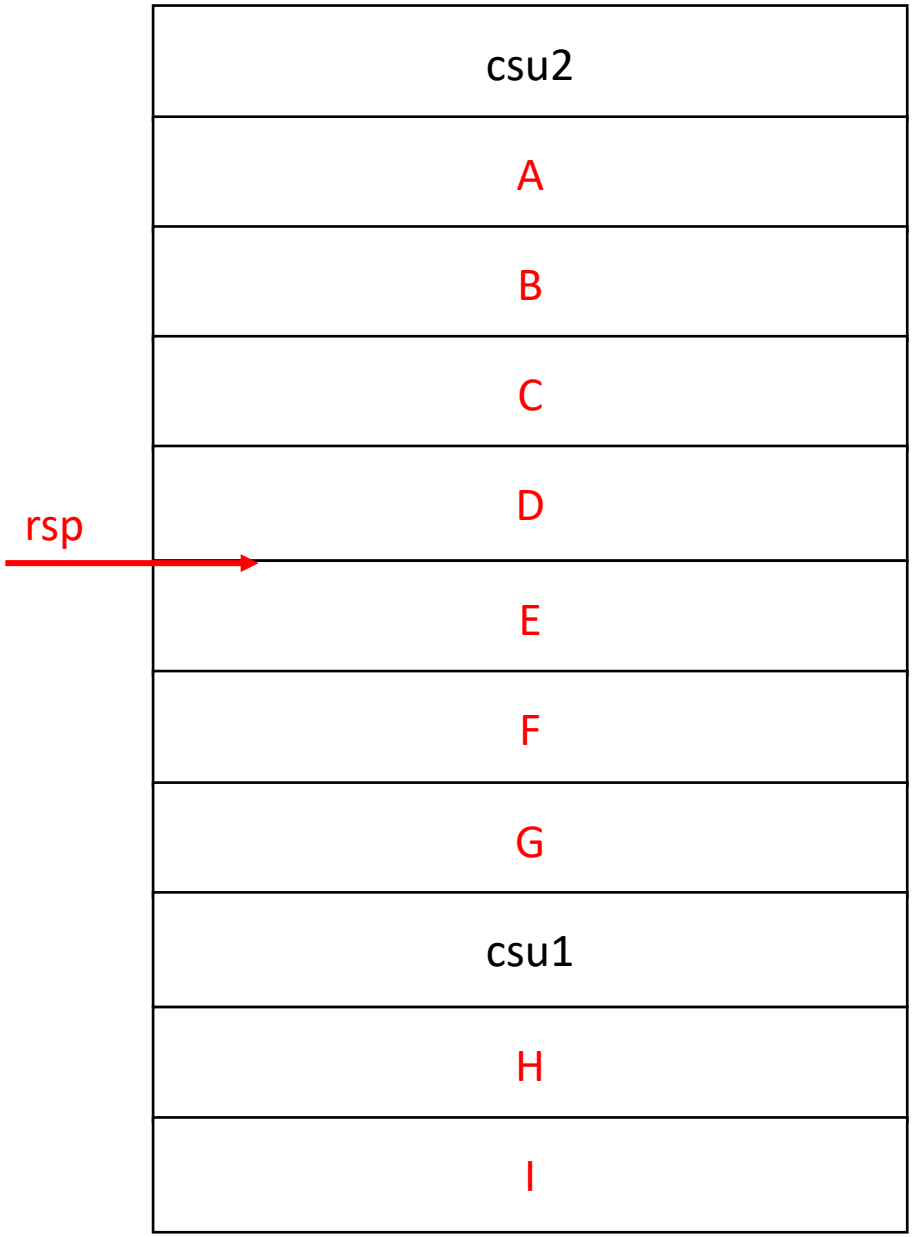
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp: C
r12: D
r13:
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

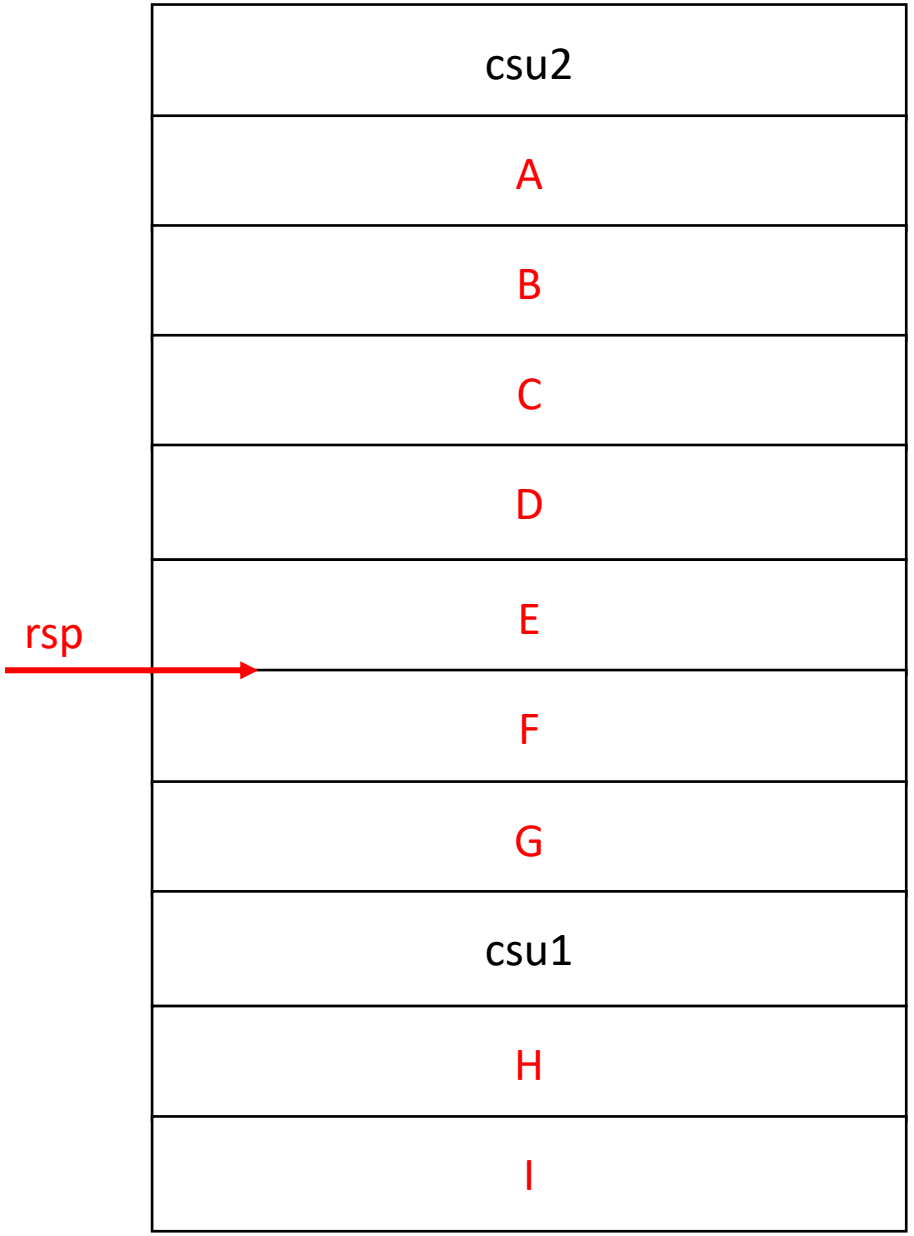
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp: C
r12: D
r13: E
r14:
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

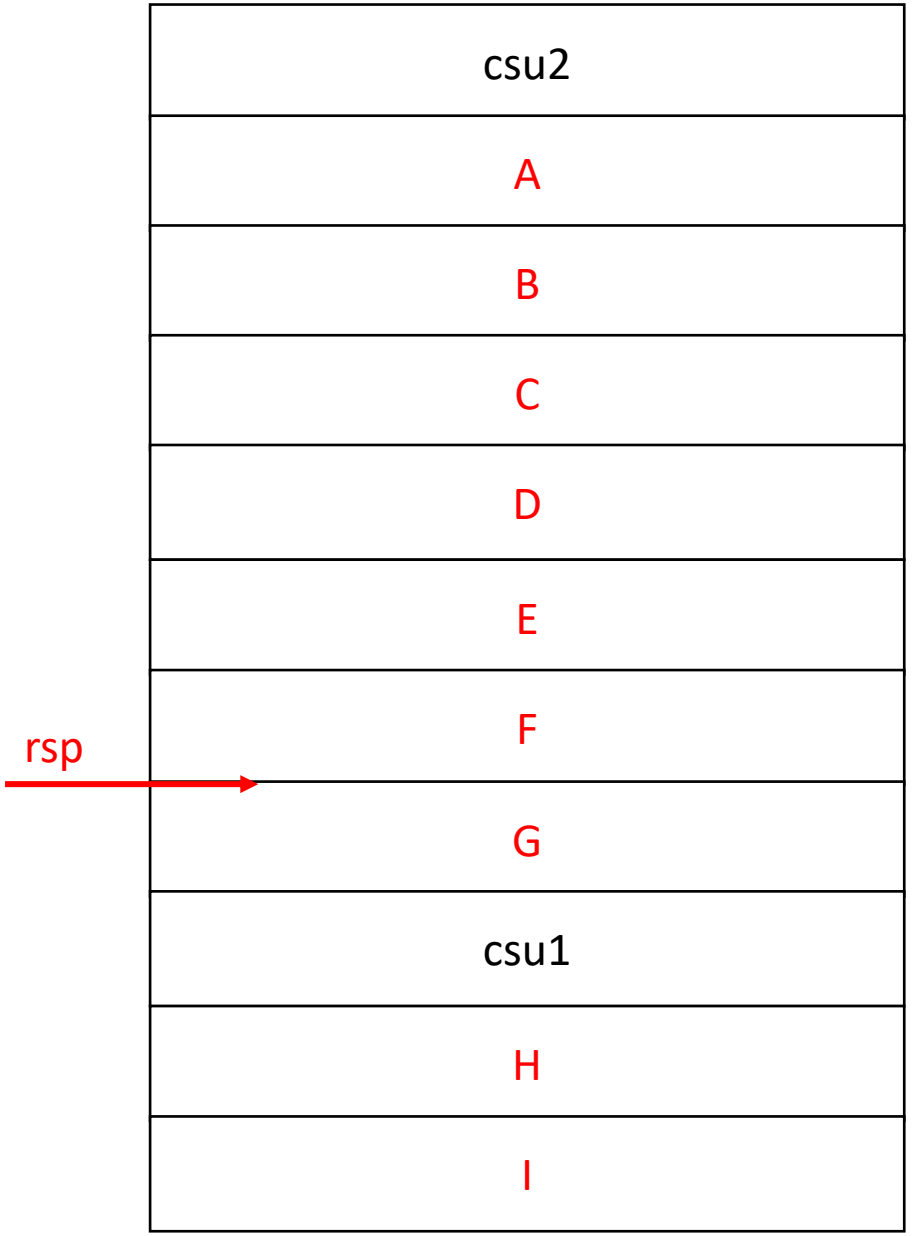
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15:

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

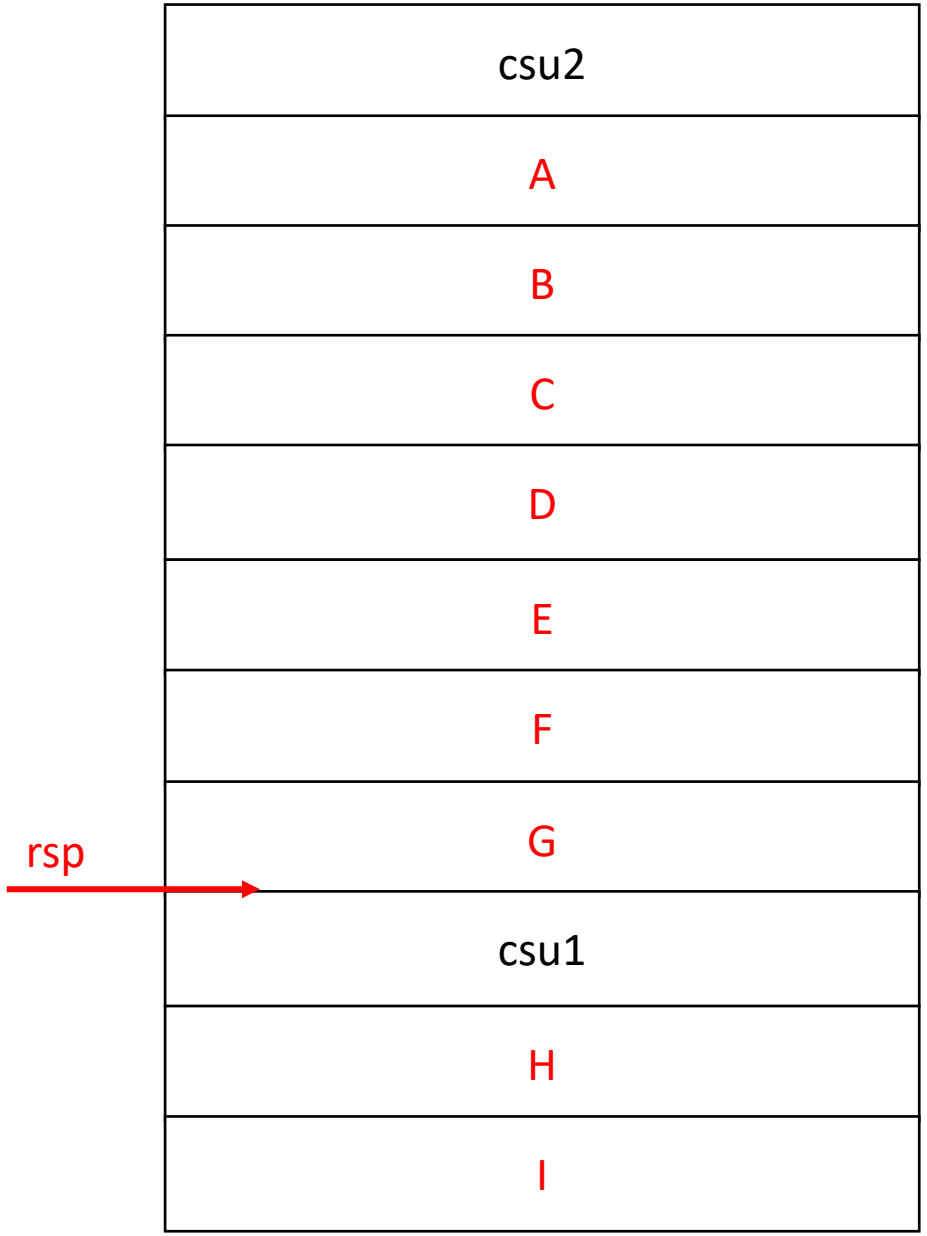
```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rip

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx:
rsi:
edi:



rip

csu1

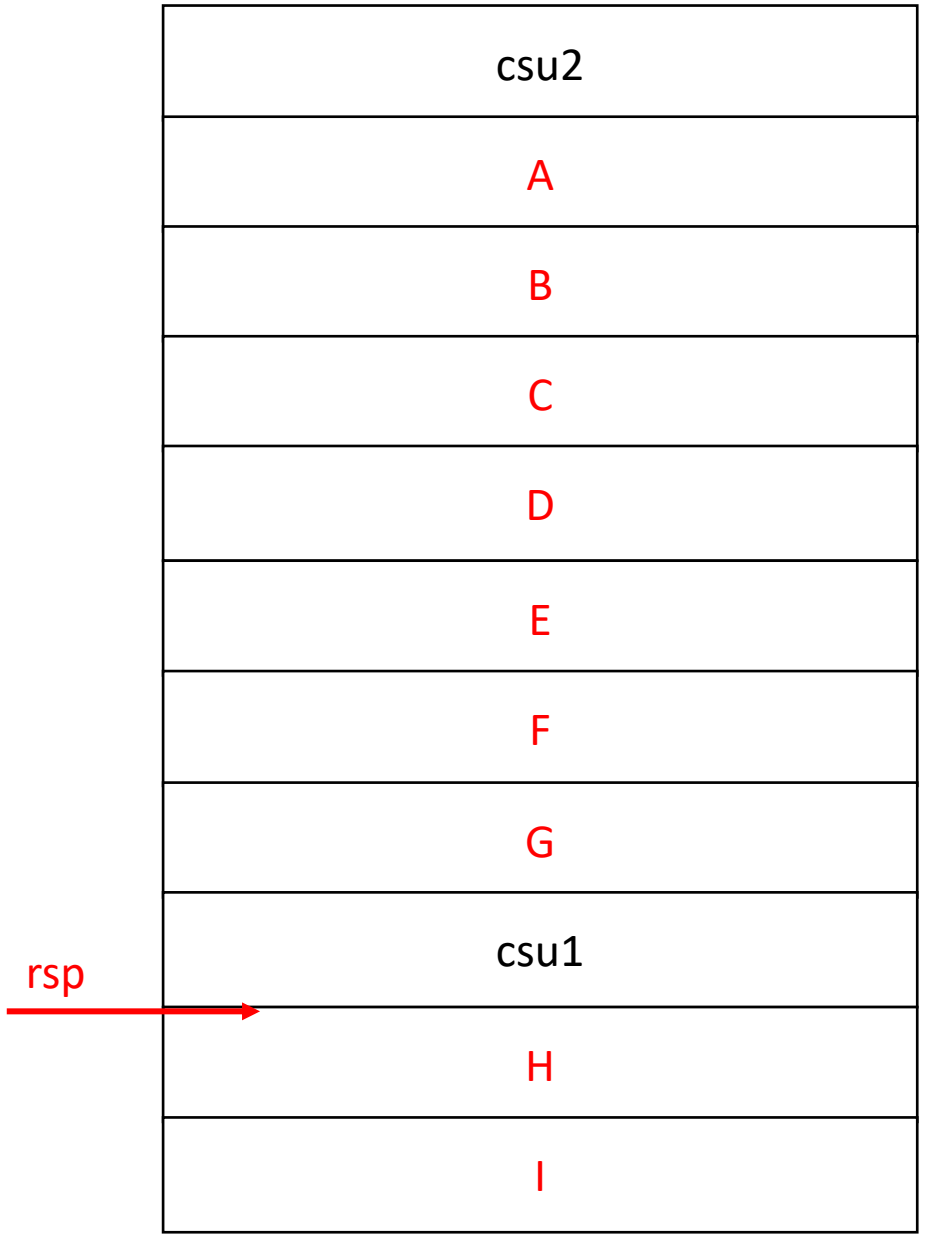
```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu2

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx:
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

rip

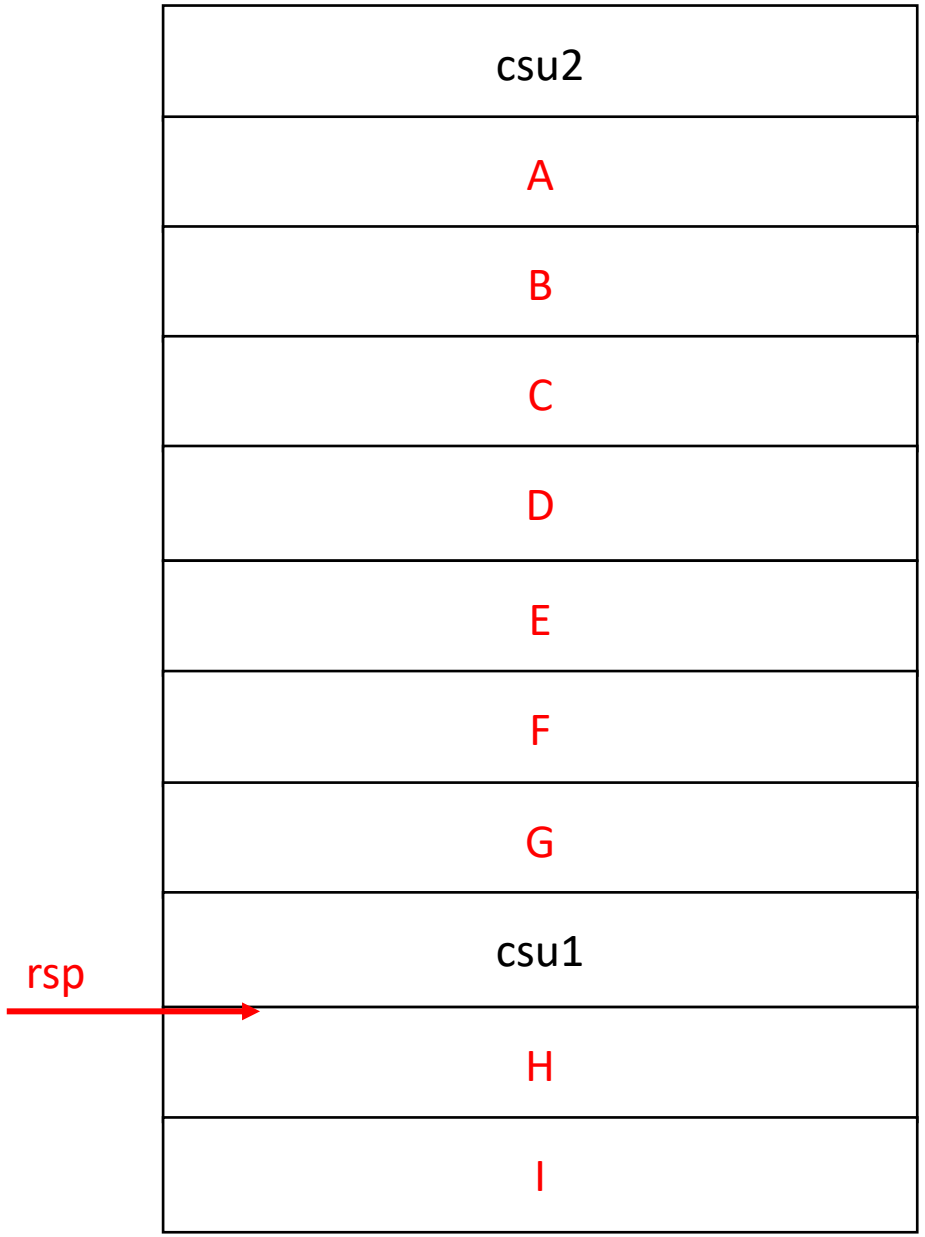
csu1

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi:
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

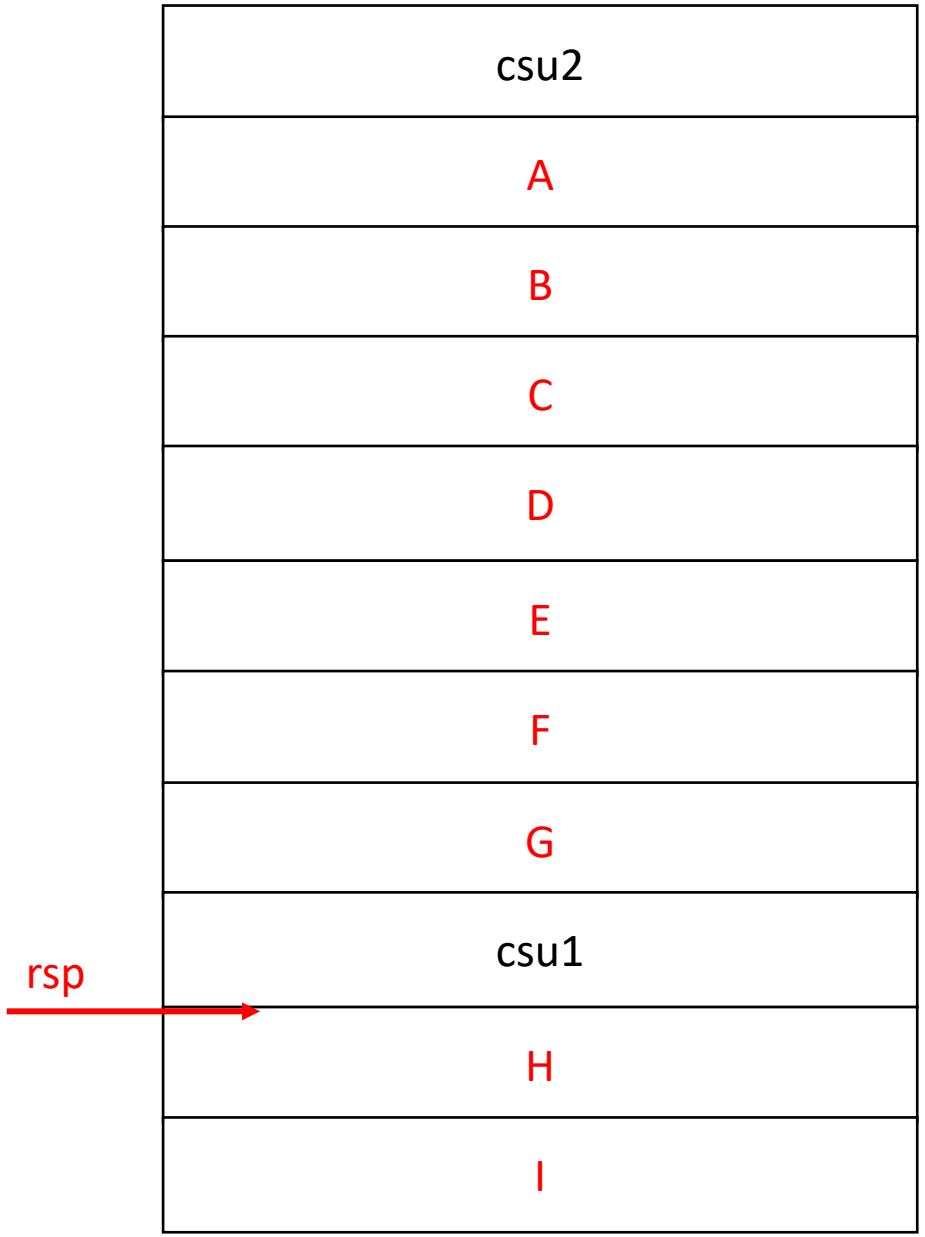
rip

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi: F
edi:



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

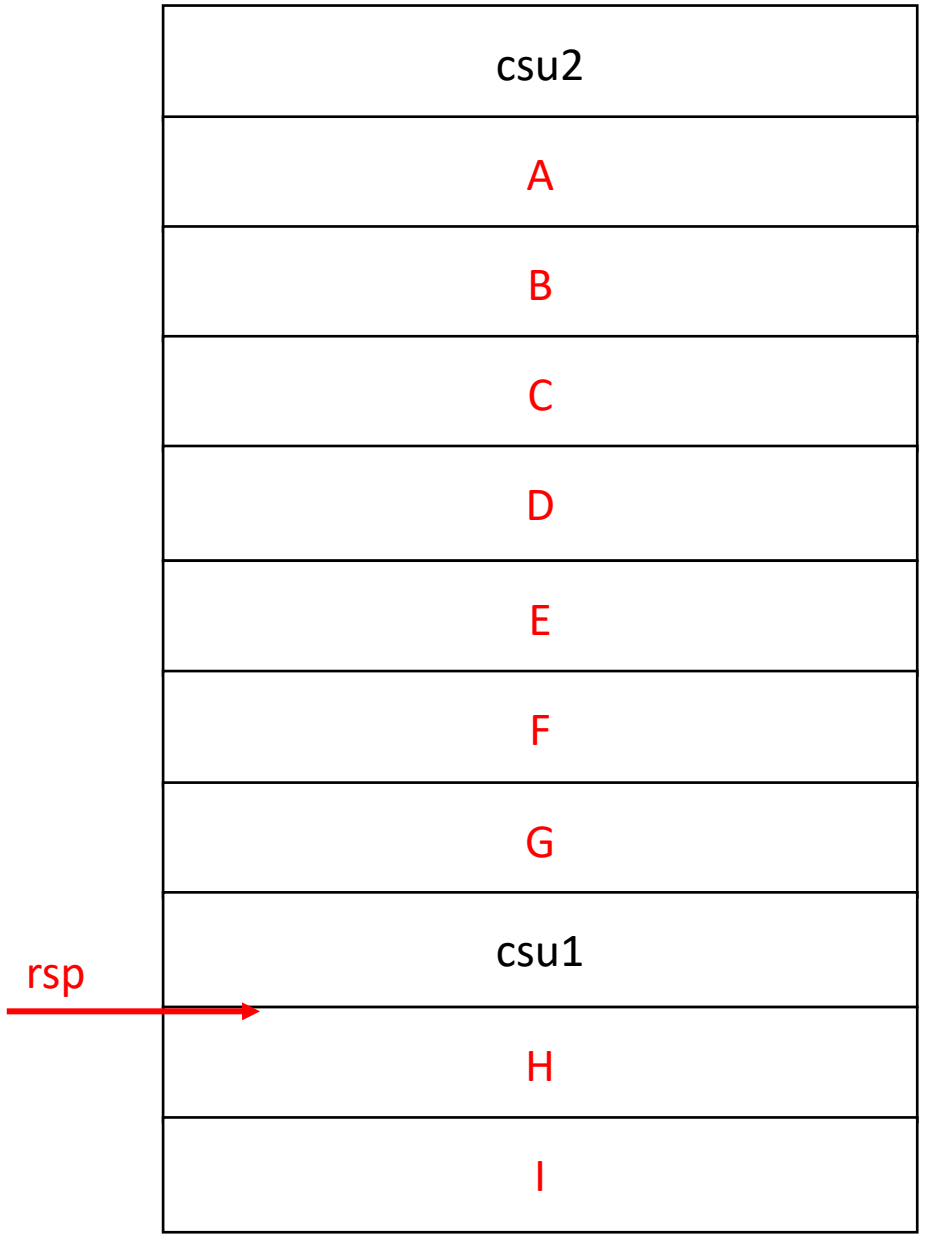
rip

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi: F
edi: E



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

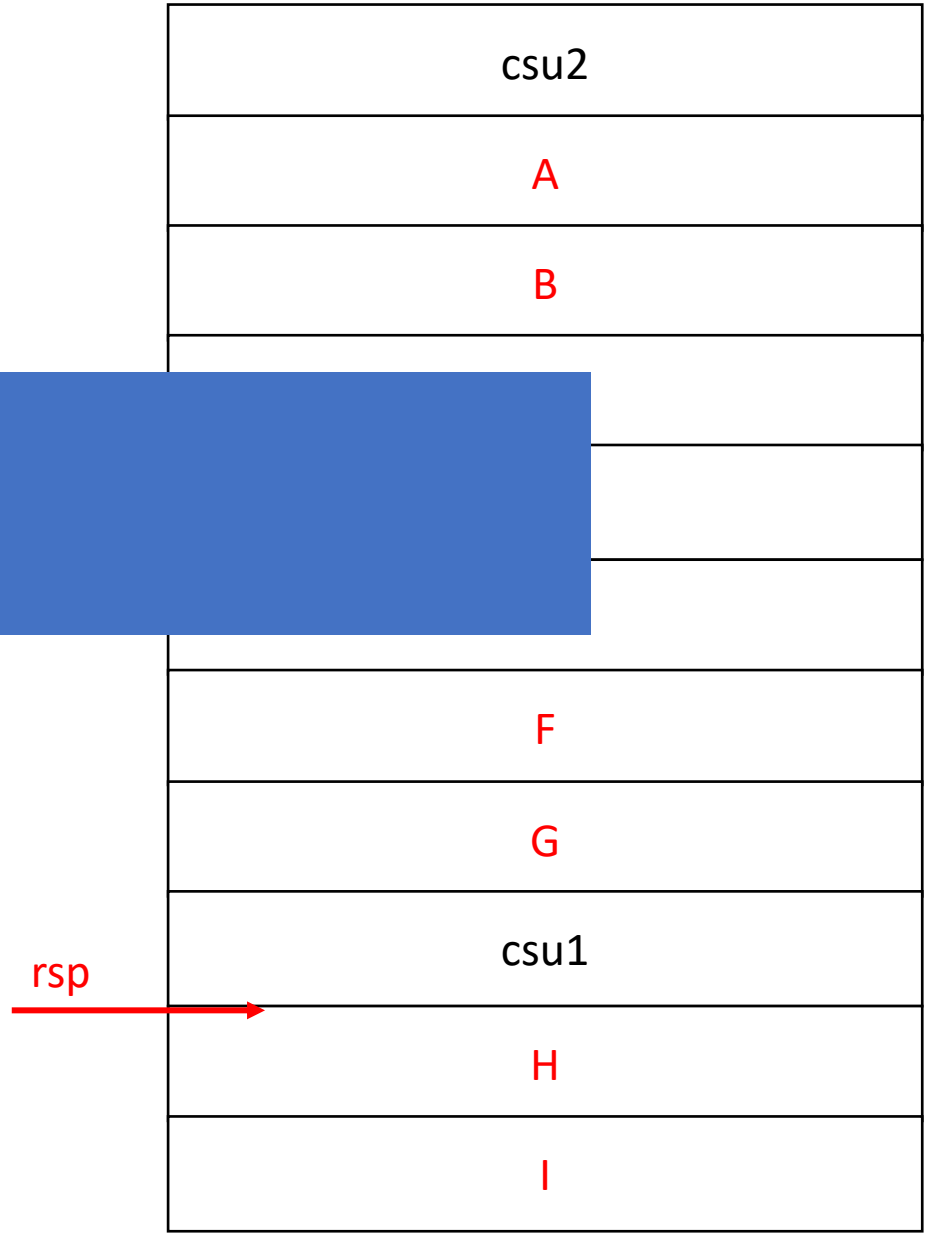
rip

```
add
pop
pop
pop
pop
pop     r14
pop     r15
retn
```

CALL (D + B * 8)
인자 : (E , F , G)

rbx: B
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi: F
edi: E



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

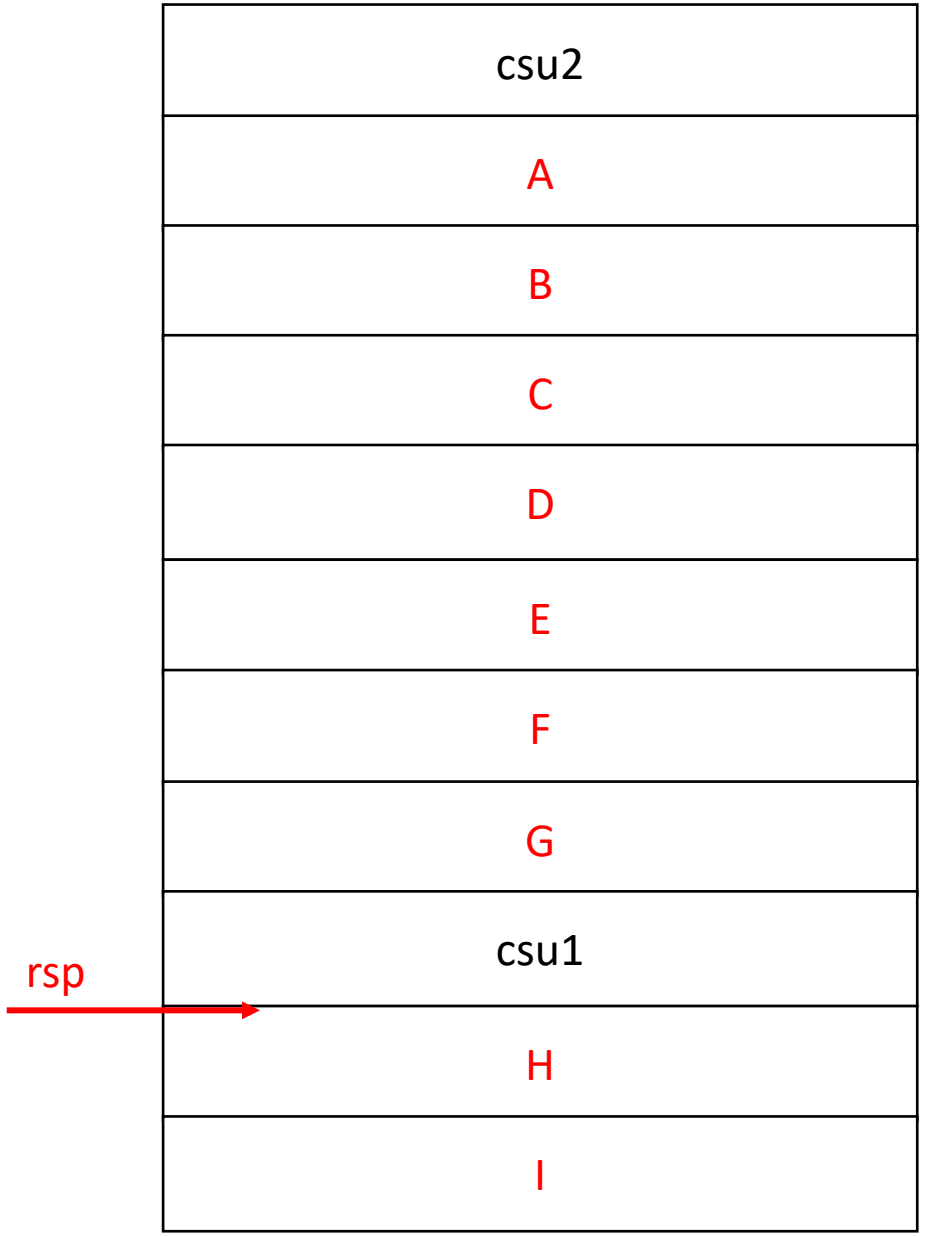
rip

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx: B +1
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi: F
edi: E



```
mov     rdx, r15
mov     rsi, r14
mov     edi, r13d
call    qword ptr [r12+rbx*8]
add     rbx, 1
cmp     rbp, rbx
jnz     short loc_400600
```

csu1

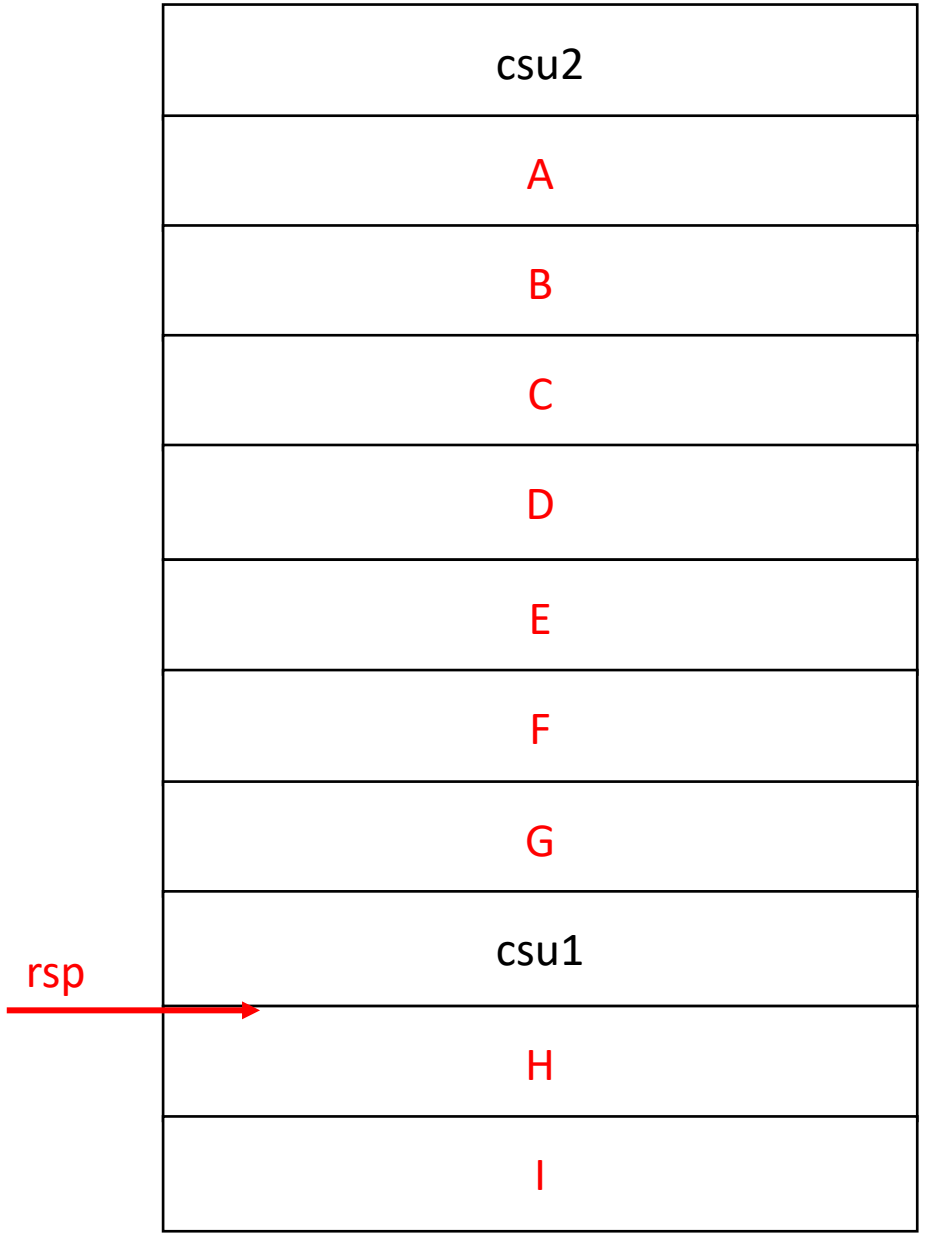
rip

```
; CODE
add     rsp, 8
pop     rbx
pop     rbp
pop     r12
pop     r13
pop     r14
pop     r15
retn
```

csu2

rbx: B +1
rbp: C
r12: D
r13: E
r14: F
r15: G

rdx: G
rsi: F
edi: E




csu2
0
0
1
호출할 함수 주소
매개변수 1
매개변수 2
매개변수 3
csu1
다시 위의 행위 반복
아무거나 7개
csu1
main 함수

과제

디스어셈블러 Ghidra 개인적으로 익혀보기
(다른 디스어셈블러 쓰는 사람은 해당 X)

HackCTF – RTC

+ 방학에 시간 많으니, wargame 사이트 하나 꾸준히 풀어보세요