CS 315-01 RISC-V Assembly 3

Lab 02 due tonight Sep 10 th 11:59
Lab 02 exam problems due tomorrow
Wed Sep 11 th 11:59

Arrays
Functions

Arrays

Pointers

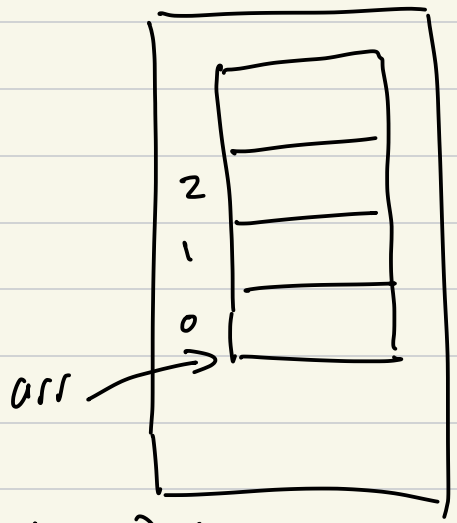
```
a0 - int *arr;

lw t0, (a0)
add t1, t1, t0
addi a0, a0, 4 ←
```

Array indexing

```
int arr[3]
```

Question:

```
x = arr[i];
```




```
int arr_get_c(int arr[], int i) {
    return *(arr + i);
}
```

3

```
# a0 - int arr[]
# a1 - int i
arr_get_s:
    li t0, 4
    mul t1, t0, a1
    add t2, a0, t1
    lw t3, (t2)
    mv a0, t3
    ret
```

byte offset

```
# t1 = t0(4) * a1(i)
# t2 = a0(arr) + offset t1
```

a0(arr) ← base

```
arr_get_s:
    li t0, 4
    mul t0, t0, a1
    add t0, a0, t0
    lw t0, (t0)
    mv a0, t0
    ret
```

RISC-V Assembly Functions

Simple functions

```
func_s:
```

arguments in a0, a1, a2, ..
return value in a0
8 args or less

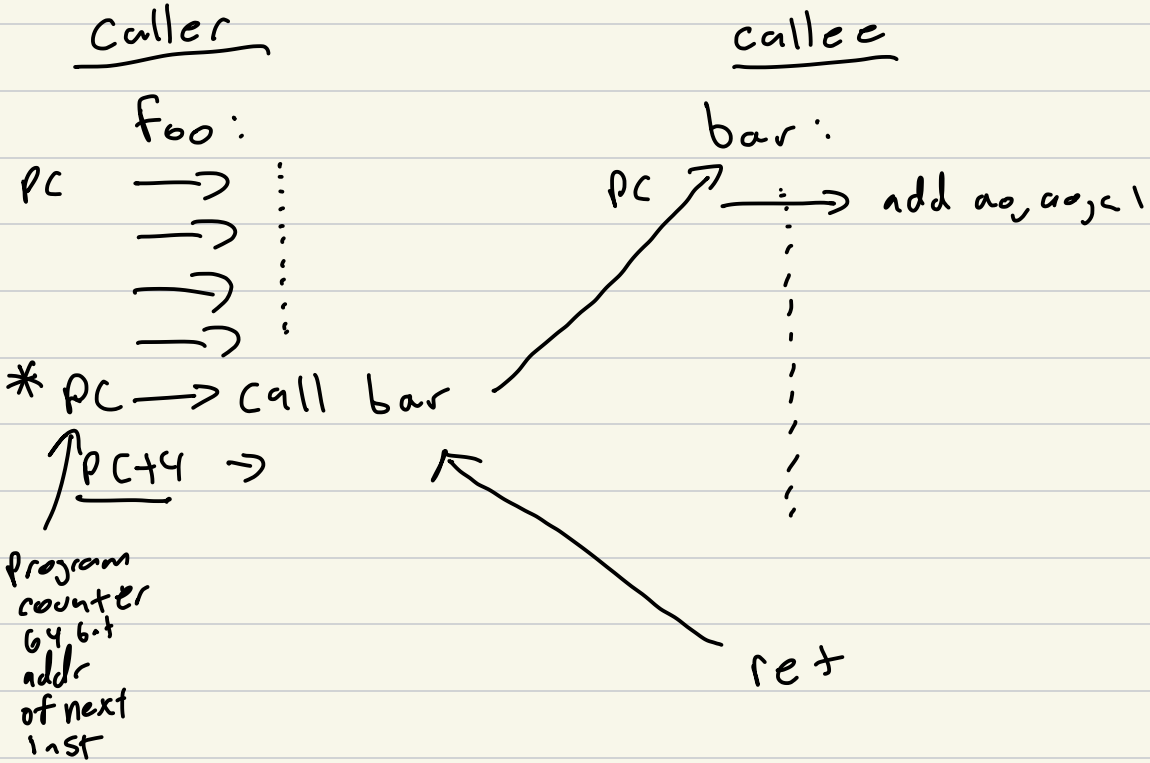
Only use a or t registers

no calls to other functions

```
    ret
```

"leaf" function

Complex functions



call:

1) updates RA (return address) to PC+4

2) updates PC to addr of first instruction in callee

ret:

1) Set PC to RA

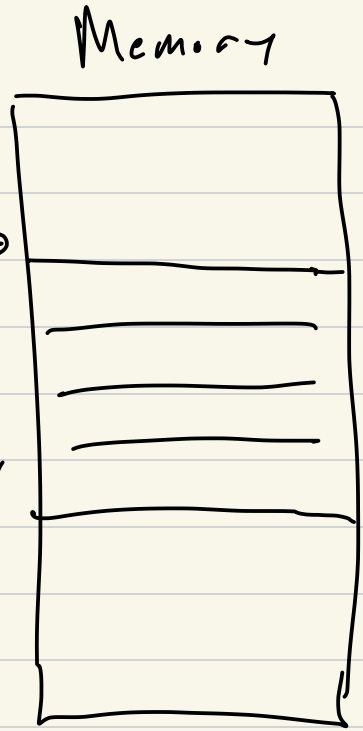
Stack

SP

stack pointer

top of stack

SP



Stack allocation

addi SP, SP, -16

Stack deallocation

addi SP, SP, 16