

# CS 315-02 Lab RISC-V Assembly 4

## Functions Continued

RISC-V Registers      64 bits  
   8 bytes

x0    zero      always zero (0)

x1    ra      return address

x2    sp      stack pointer

x3    gp      ] not going to use these

x4    tp

a      a0-a7      args and return value

t      t0-t6      temp

s      s0-s11      saved

Caller-saved regs

a0-a7, t0-t6, ra

callee-saved regs

s0-s11, sp

PC

program  
counter



# Typical function call steps (complex)

- (1) Allocate stack space  
add:  $sp, sp - X$        $X \geq 16$   
 $X \% 16 == 0$   
multiple of 16
- (2) Save RA on stack  
sd ra, (sp)
- (2b) Save any callee-saved regs
- (3) computation
- (4) save any "used" callee-saved regs
- (5) put values into args:  $a0, a1, \dots$
- (6) call func
- (7) use/store  $a0$  (return value)
- (8) restore callee-saved regs from step (4)
- (9) computation

- (10) put return value into a0
  - (11) restore any callee-saved regs
  - (12) restore ra
  - (13) deallocate the stack  
addi sp, sp, X
  - (14) ret
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