

EE2361 - Lecture 10

9/28/16

Homework 1
is due

Subroutines

PIC24 subroutines

Two ways to pass parameters

- call by value ✓
- call by reference

Call by value

- copies of the values ^{in the caller} passed to the subroutine are what the subroutine works with
⇒ won't change original values

Call by Reference

- the subroutine has access to the original values and can change them.

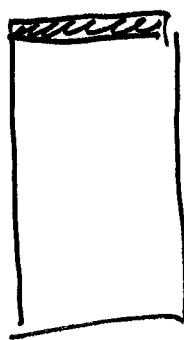
First - some more about the stack

Two registers are used with the stack

W14 \Rightarrow contains the FP

W15 \Rightarrow contains the SP

stack frame
for a "function"



SP (W15)

FP (W14)

In the stack
frame

- parameters
- local variables
- saved registers
- Return Address
- Old Frame Pointer

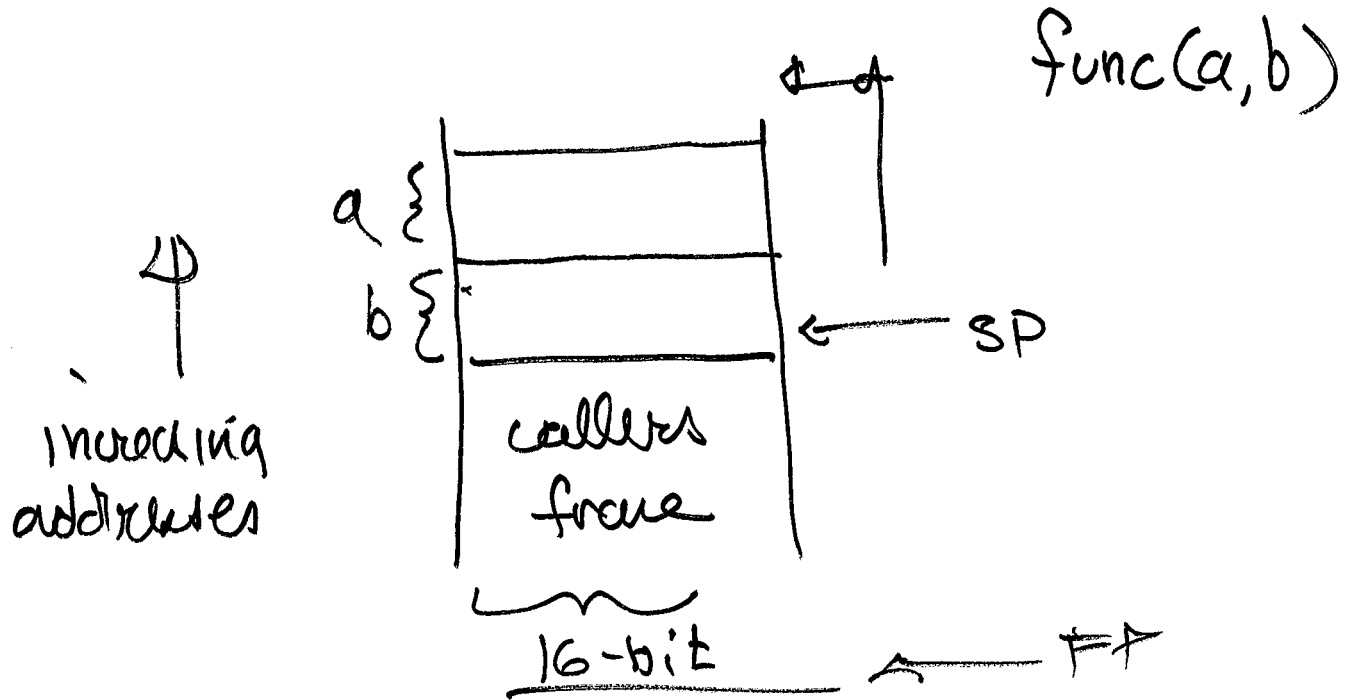
At the level of C-code

Suppose we have

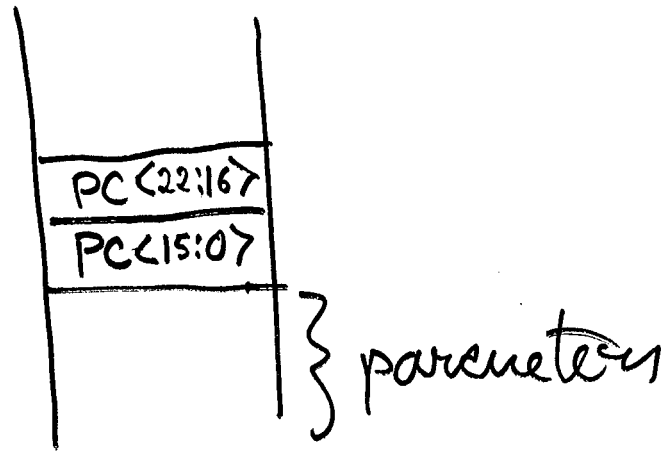
$$c = \text{func}(a, b)$$

The parameters are pushed on the stack ~~in reverse order~~ in right-to-left order as they appear.

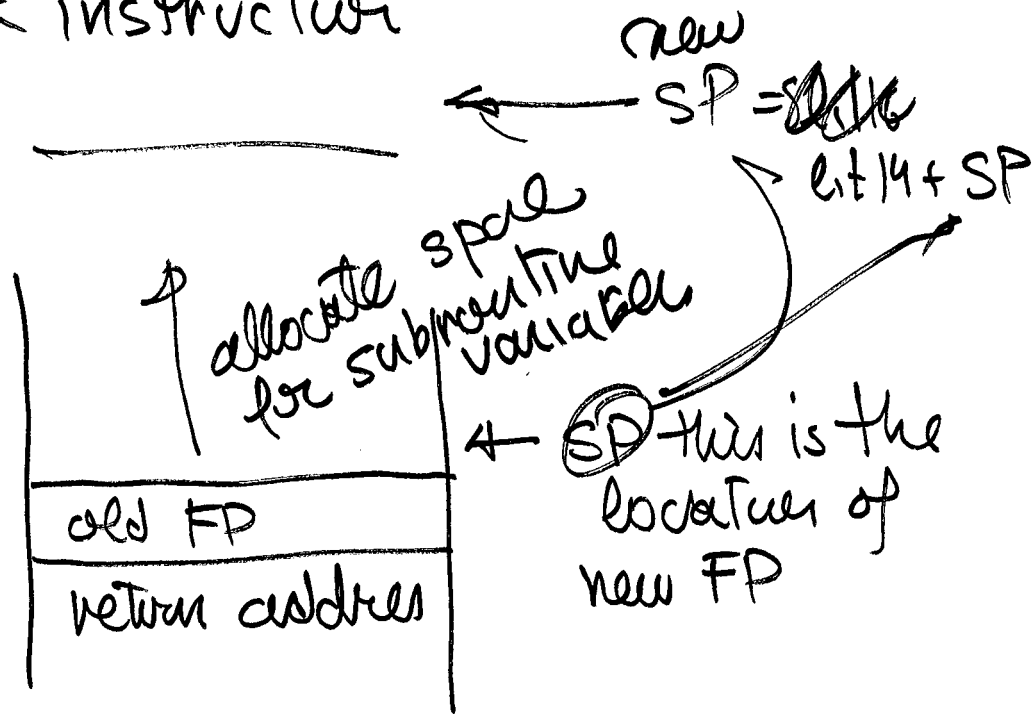
In the caller we push the parameter on the stack as



Then the CAHL or RCALL instruction
is executed



The LNK instruction



After RCALL or CALL we execute the first instruction in the subroutine

Need to do some housekeeping

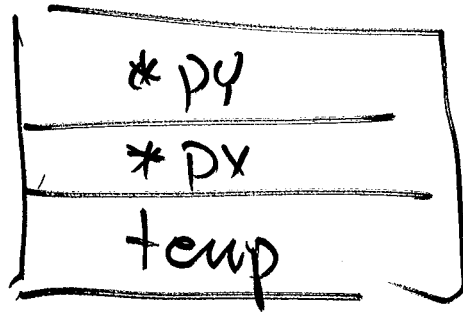
⇒ save the old frame pointer and update the frame pointer to a new value

⇒ need to allocate space for variables

For SWAP

~~Ans~~

w 14



} 6 bytes