

# EE2361 - Lecture 13

10/5/16

→ • PIC24 (16-bit) Programmers Reference  
Manual  
Programming is ASM + stack frame

→ • Data sheet for the PIC24FJ6400<sup>GA</sup> Z  
CPU & Memory • XC16 C compiler Users guide

Exam Format ⇒ closed book, closed notes,  
supplied proctor, calculator permitted

# Brief Review

Microcontrollers  $\Rightarrow$  PIC24 CPU

$\Rightarrow$  Memory Program Memory  
Data Memory

Basic instructions

3 classes - data transfer (mov)

arithmetic & logic (add)

control (bra)

Addressing modes

literal  
register direct

x1234  
w1

indirect - several types [w2+]

## Programmers Model

- These are all the registers you have access to as a programmer
- PC - program counter
- 16 working registers  $W0, \dots, W15$
- SR - status register
  - ⇒ N, OV, Z, C (PC)

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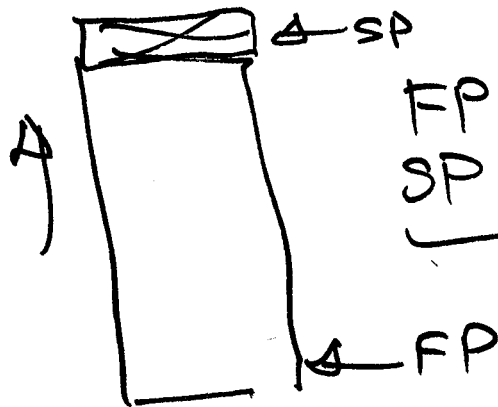
Some of these registers have special codes (FP, SP, ~~RA~~)  
 $W14$   $W15$

# Data Structures - Stack

Format of the stack used with  
XC16  $\Rightarrow$  discussed in programmers ref  
manual

Ink #4

Stack Frame  $\Rightarrow$  one for each  
function



FP (register W14)

SP (register W15) next stack element

What goes on stack?

local variables  
parameters  
return address  
previous FP

# Assembler

.set ALLVar 0x0123

## Assembly files

→ instructions (pneumics)

label: add w1, w2, w3 ; for fun

→ directives

\* .bss, .text, .data, .end etc.

important sections

ex: .bss

ALLVar: .word 4

.eqv  
.set

# Assembly process

Little endian

What is involved from the original assembly code file to the "image" that goes into flash memory on the  $\mu C$

