

# Lab 3 preview

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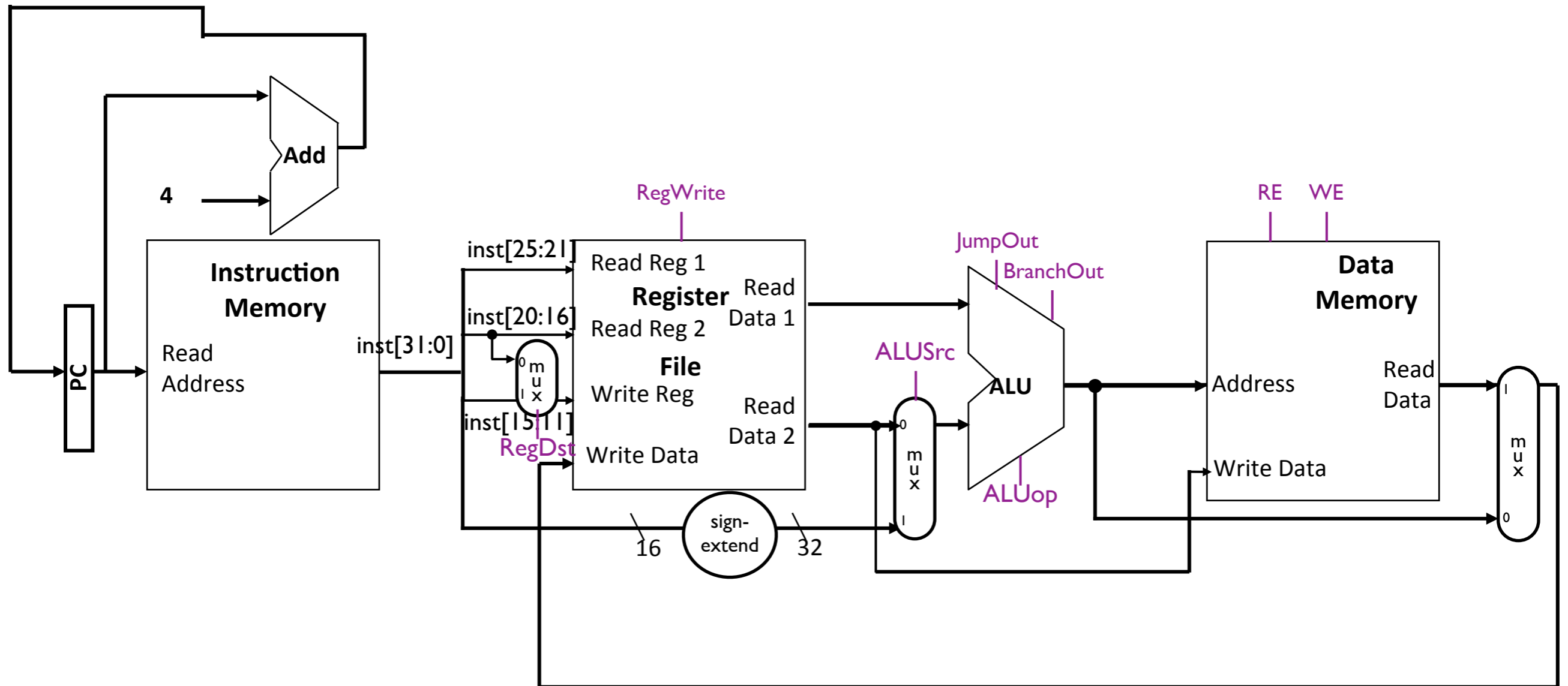
# Announcement

- Lab 2 due tomorrow
  - Interview with any of us, and send a copy of your source to the person who you interviewed with
  - Please try finishing interview before 7pm if you haven't done so.
- Lab 3 due next Thursday
  - We are having CSE141 midterm next Thursday, too.
  - Please complete the lab as soon as possible

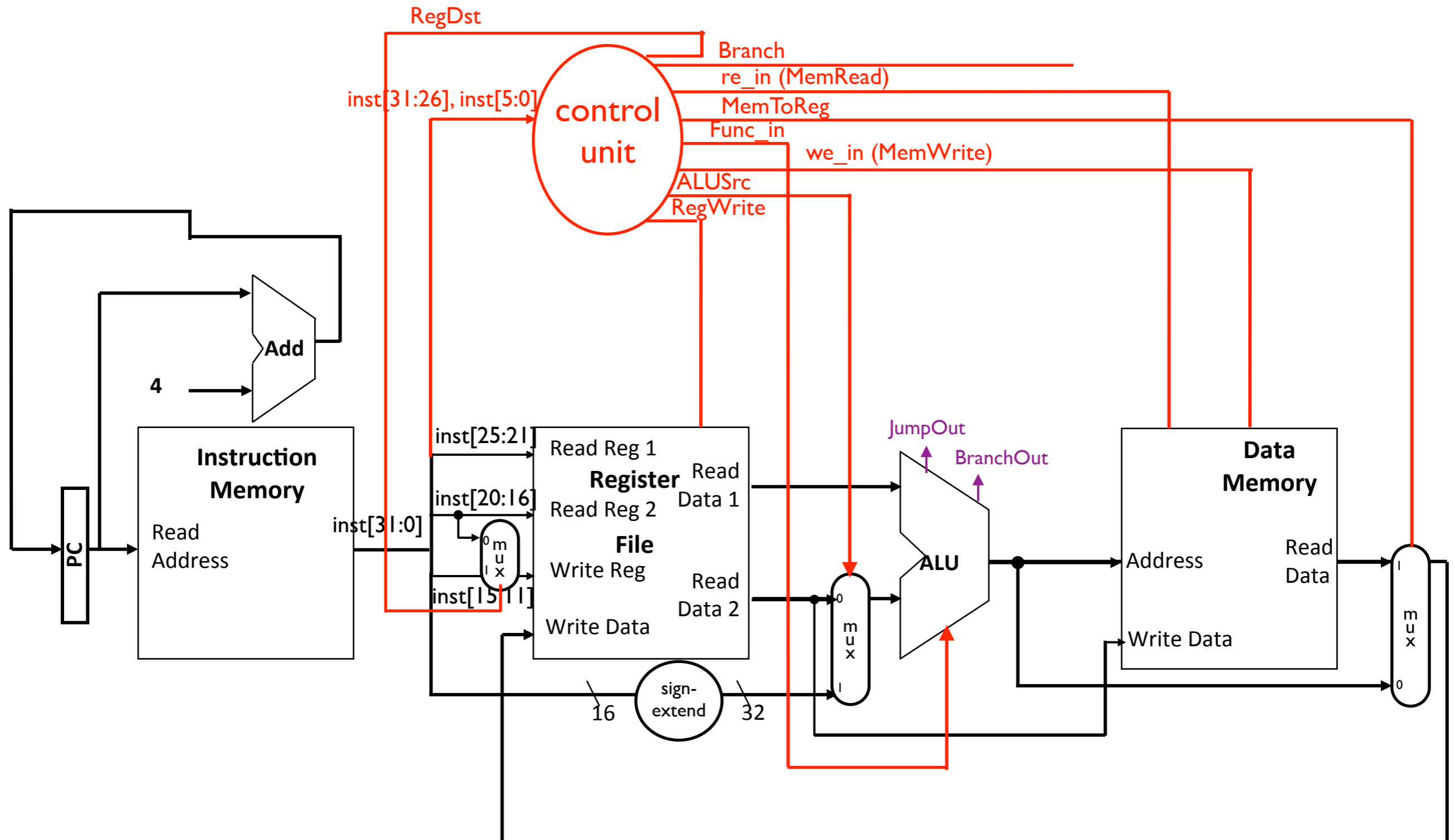
# In Lab 3...

- You will be adding a control unit on top of the datapath in the previous lab.
  - The processor will support lw, sw, add, addi, sub, and, or nor, xor
  - No branch yet

# Lab 2: single-cycle datapath



# Lab 3: adding control to Lab2!



# Control Unit

- We need to support lw, sw, add, addi, sub, and, or, nor, xor.

instruction				control unit output							
	type	opcode inst[31:26]	funct inst[5:0]	func_in	RegDst	ALUSrc	RegWrite	MemRead	MemWrite	MemToReg	Branch
lw	I	0x23		100000	0	1	1	1	0	1	0
sw	I	0x2b		100000	X	1	0	0	1	X	0
add	R	0	0x20	100000	1	0	1	0	0	0	0
addi	I	0x8		100000	0	1	1	0	0	0	0
sub	R	0	0x22	100010	1	0	1	0	0	0	0
and	R	0	0x24	100100	1	0	1	0	0	0	0
or	R	0	0x25	100101	1	0	1	0	0	0	0
nor	R	0	0x27	100111	1	0	1	0	0	0	0
xor	R	0	0x26	100110	1	0	1	0	0	0	0

# Benchmarks

- In this lab, we provide the following benchmark programs
  - <http://cseweb.ucsd.edu/classes/su14/cse141L-a/Media/lab3/lab3-test.zip>
  - <http://cseweb.ucsd.edu/classes/su14/cse141L-a/Media/lab3/nbhelloworld.zip>
  - No branches
  - Start with PC 0x400000
    - That's why the default PC is 0x400000
    - But depends on your hardware design, you may have to make it 0x3FFFC.

# Hello, world

.text

```
__start:
addi  $10,$0,0x4000
sub  $20,$0,$10
sub  $20,$20,$10    # $20 should now contain 0xffffc000
sub  $20,$20,$10    # $20 should now contain 0xffff8000
sub  $20,$20,$10    # $20 should now contain 0xffff0000

addi  $10,$0,0x48    # $10 is now 'H'
sw   $10,12($20)    # write word

addi  $10,$0,0x65    # 'e'
sw   $10,12($20)    # write word

addi  $10,$0,0x6C    # 'l'
sw   $10,12($20)    # write word
```

why are we doing this?





# PCSpim

- A MIPS Simulator
- Demo

# Interview questions

- Simulate No-Branch Hello World for 1 us
- Show the waveforms
- Repeat the above, simulate for 5 us
- Report the Fmax, total # of LEs, total registers

# Q & A