ECE/CS 252
Intro to Computer Engineering

Week 07 Discussion

1

IR = 0001 0000 1000 0100

- Instruction:

- Initial Processor State:
  - PC = 0x3013
  - NZP = 010
  - Register File:
    R0 = 0x0001
    R1 = 0x0010
    R2 = 0x0005
    R3 = 0x0001
    R4 = 0xFFFE
    R5 = 0x0002
    R6 = 0xFFFF
    R7 = 0x0008

2

IR = 0101 0010 0011 1111

- Instruction:

- Initial Processor State:
  - PC = 0x3013
  - NZP = 010
  - Register File:
    R0 = 0x0003
    R1 = 0x0010
    R2 = 0x0005
    R3 = 0x0001
    R4 = 0xFFFE
    R5 = 0x0002
    R6 = 0xFFFF
    R7 = 0x0008

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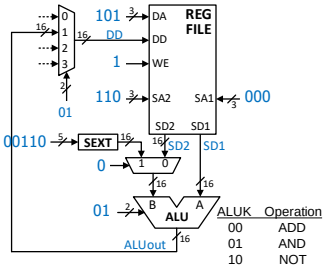
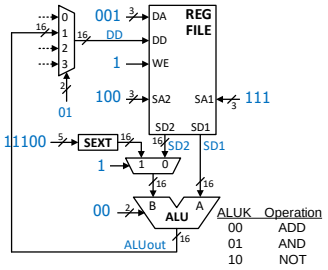
What Is The Instruction?



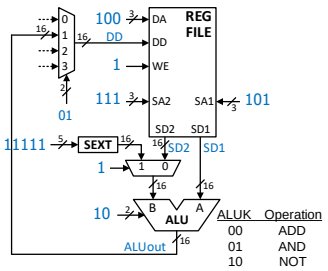
4

What Is The Instruction?



5

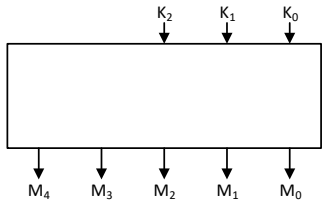
What Is The Instruction?



6

Sign Extension Hardware

- Design the hardware to sign-extend a 3-bit 2's-complement number (K) to 5 bits (M)



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Programming the LC-3

- Create a program to perform R4 ← R3 × 10_{10}

Version 1 | **Version 2**

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Programming for LC-3

- Test it using PennSim for the following values:
  - Initial R3 = 1 Does it work?
  - Initial R3 = 0 Does it work?
  - Initial R3 = -1 Does it work?
  - Initial R3 = x2000 Does it work?

- **What if it didn't work?**

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Wrapping Up

- Up Next:
  - LC-3 Data Movement Instructions
- Remember your videos and reading
  - Including the video quiz!
- Practice programming!
  - See post-exercise practices on Canvas
  - Remember – programmers don't just write code – they test and debug too!
- Questions?