

CIS 351 Sample SS3 Problem

29 March 2022

SS3: Operation of Single Cycle CPU

Answer the questions below with respect to Figure 1.

- (a) For each instruction below, list the value on the `RegDest` control wire. *Explain your reasoning.* (The explanation is the important part. Convince me you did more than memorize the table.) Use “X” for “Don’t Care” where appropriate.

add	addi	lw	sw	beq	j

- (b) What is the purpose of the value on wire G? Describe the information it contains when executing a `lw` instruction. (To be clear, I’m looking for the *purpose* of the information, not the specific value.). “This value is not used for this instruction” a valid choice.

- (c) What is the purpose of the value on wire J? Describe the information it contains when executing a `j` instruction. (To be clear, I’m looking for the *purpose* of the information, not the specific value.). “This value is not used for this instruction” a valid choice.

Name: _____

- (d) What is the width (in bits) of the wire labeled J? Explain your reasoning / how you know this.
- (e) Suppose wire I breaks and provides unreliable values. Which of the following instructions will continue to function correctly? Explain your reasoning. `add`, `addi`, `lw`, `sw`, `beq`, `j`
- (f) Suppose component R breaks and provides unreliable values. Which of the following instructions will continue to function correctly? Explain your reasoning. `add`, `addi`, `lw`, `sw`, `beq`, `j`

(solution)

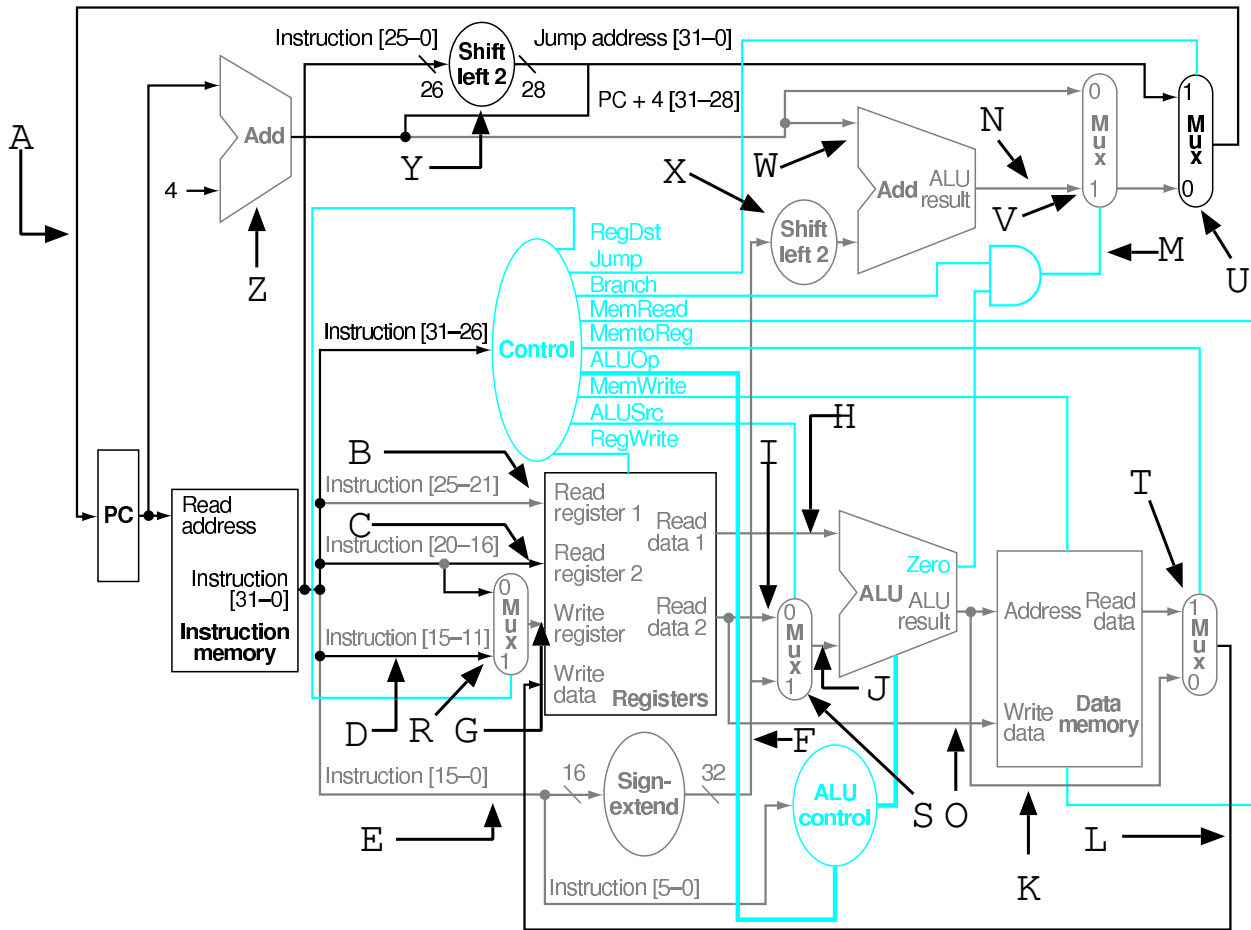


Figure 1: Single Cycle CPU with labeled points