Computer Organization - Quiz 3

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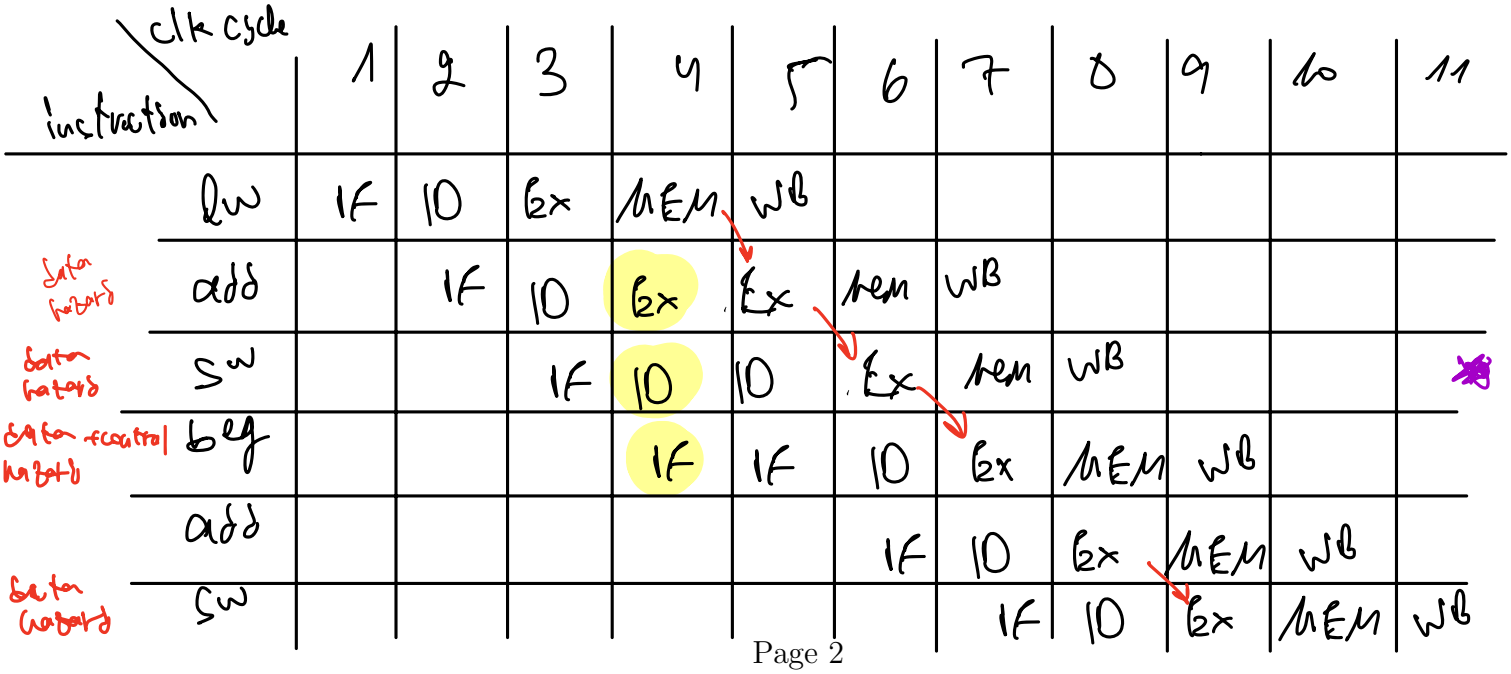
- Please write your ID number on top of the first page.
- The assignment consists of **one** question with **three** subsections.
- Write the solutions in the space provided below the relevant section. If you need extra space, please use the back of the page.
- Please make sure your answers are clear and readable.

Question

Consider the following sequence of instructions in MIPS assembly language:

Label	Instruction	Comment
	lw $t0, 0($s0)	# load word from memory into $t0
	add $t1, $t0, $s1	# add $t0 and $s1, store result in $t1
	sw $t1, 4($s0)	# store word in memory
	beq $t1, $zero, Label	# branch to Label if $t1 is equal to 0
	add $t2, $t1, $t3	# add $t1 and $t3, store result in $t2
	sw $t2, 8($s0)	# store word in memory
Label:		
	...	# other instructions

Based on the code above, answer the questions given below.



1. Identify and describe any **data** hazards that occur in this sequence of instructions.

- first add - we don't have $t0 on time
- first sw - we don't have the value we need to store
- beq - $t1 don't hold yet the value.
- second sw - $t2 is written on the previous instruction.

2. Identify and describe any **control** hazards that occur in this sequence of instructions.

- beq - we don't know if we need to jump to Label and we're already fetching the next instruction.

3. Suggest **one** technique that could be used to minimize the impact of one of the hazards that you identified in the previous sections on the performance of the MIPS pipeline processor.

- forwarding - on the most of the data hazards were described, forwarding prevents the need to stall (exception is first data hazard)