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CSE-140 HW 4 - 1

I1 addi \$sp, \$sp, -8 // I1
SW \$ra, 4(\$sp) // I2
SW \$a0, 0(\$sp) // I3
Slti \$t0, \$a0, 1 // I4
addi \$t0, \$t0, 1 // I5
addi \$sp, \$sp, 8 // I6

1st Stage: Instruction Fetch (IF)
2nd Stage: Instruction Decode (ID)
3rd Stage: Execute (EX)
4th Stage: Memory access (MA)
5th Stage: Write Back (WB)

a) We don't have a forwarding unit. The hazard detection unit stalls instructions to resolve hazards. How many cycles would it take to execute the code?

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
I1	IF	ID	EX	MA	WB									
I2		IF	ID			EX	MA	WB						
I3			IF	ID					EX	MA	WB			
I4				IF	ID	EX	MA	WB						
I5					IF	ID	EX	MA	WB					
I6						IF	ID	EX	MA	WB				

14 clockcycles is what it takes to execute the code above

b) Repeat, but assume that we also have a forwarding unit that forwards data from EX/MEM to EXE and from MEM/WB to EXE

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10				
I1	IF	ID	EX	MA	WB									
I2		IF	ID	EX	MA	WB								
I3			IF	ID	EX	MA	WB							
I4				IF	ID	EX	MA	WB						
I5					IF	ID	EX	MA	WB					
I6						IF	ID	EX	MA	WB				

It takes 10 clock cycles to execute