Istanbul Technical University
Department of Computer Engineering

15.05.2020

BLG 322E – Computer Architecture
Assignment 2 Solutions

Solution A (50 Points)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
LDL $00(R3), R1	IF	DR	EX	ME	WB																		
LDL $04(R3), R2		IF	DR	EX	ME	WB																	
NOOP			IF	DR	EX	ME	WB																
NOOP				IF	DR	EX	ME	WB															
ADD R1, R2, R1					IF	DR	EX	ME	WB														
LDL $08(R3), R4						IF	DR	EX	ME	WB													
NOOP							IF	DR	EX	ME	WB												
NOOP								IF	DR	EX	ME	WB											
SUB R1, R4, R1									IF	DR	EX	ME	WB										
BRU LAST_OP										IF	DR	EX	ME	WB									
NOOP											IF	DR	EX	ME	WB								
NOOP												IF	DR	EX	ME	WB							
LDL $10(R3), R2													IF	DR	EX	ME	WB						
NOOP														IF	DR	EX	ME	WB					
NOOP															IF	DR	EX	ME	WB				
ADD R1, R2, R1																IF	DR	EX	ME	WB			
NOOP																	IF	DR	EX	ME	WB		
NOOP																		IF	DR	EX	ME	WB	
STL $104(R3), R1																			IF	DR	EX	ME	WB

Total amount of penalty is 10 clock cycles.

Solution B (50 Points)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LDL	$00(R3), R1	IF	DR	EX	ME	WB													
LDL	$04(R3), R2		IF	DR	EX	ME	WB												
LDL	$08(R3), R4			IF	DR	EX	ME	WB											
BRU	LAST_OP				IF	DR	EX	ME	WB										
ADD	R1, R2, R1					IF	DR	EX	ME	WB									
LDL	$10(R3), R2						IF	DR	EX	ME	WB								
NOOP								IF	DR	EX	ME	WB							
SUB	R1, R4, R1								IF	DR	EX	ME	WB						
NOOP										IF	DR	EX	ME	WB					
NOOP											IF	DR	EX	ME	WB				
ADD	R1, R2, R1											IF	DR	EX	ME	WB			
NOOP													IF	DR	EX	ME	WB		
NOOP														IF	DR	EX	ME	WB	
STL	$104(R3), R1														IF	DR	EX	ME	WB

Total amount of penalty is 5 clock cycles.

It’s one solution to this question. You may find any other solution that gives the same amount of penalty.