Homework 6

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Without Unrolling

Note that we are only able to use the values of $t0 and$t1 two iterations after the lw instructions execute.

Cycle	1st Issue(Branch/ALU)	2nd Issue(lw/sw)
1		lw $t0, 0(s0)
2		
3	addi $s0,s0, 4	lw $t1, 0(t0)
4	bne $s0,s2, Loop	
5	add $t1,s1, $t1	
6		sw $t1, 0(t0)

Number of cycles = (cycles per iter * number of iters) + cycles for last instruction = 6 * 200 + 4 = 1204

With Unrolling

Note that if we make 2 copies of the loop body, we increment the program counter by 8 in each iteration.

Cycle	1st Issue(Branch/ALU)	2nd Issue(lw/sw)
1		lw $t0, 0(s0)
2		lw $t2, 4(s0)
3		lw $t1, 0(t0)
4	addi $s0,s0, 8	lw $t3, 0(t2)
5	add $t1,s1, $t1	
6	bne $s0,s2, Loop	sw $t1, 0(t0)
7	add $t3,s1, $t3	
8		sw $t3, 0(t2)

Number of cycles = (cycles per iter * number of iters) + cycles for last instruction = 8 * 100 + 4 = 804