

Άσκηση 3η (Ακ. Έτος 2011-2012)

A. Χωρίς ROB

OP	IS	EX	WR	Σχόλιο
LD F0,8(R1)	1	2 - 6	7	Miss A[1] → Fetch A[0]A[1] in block 0
LD F1,8(R2)	2	3 - 7	8	Miss B[1] → Fetch B[0] B[1] in block 1
ADDD F4,F4,F0	3	8 - 10	11	RAW (F0)
MULD F4,F4,F1	4	12 -17	18	RAW (F1, F4)
ADDI R4,R4,#1	5	6	9	CDB conflicts, R4 → 1
ANDI R5,R4,#1	6	10	12	RAW (R4), CDB conflict, R5 → 1
SUBI R5,R5,#1	7	13	14	RAW(R5), R5 → 0
BEZ R5, L1	8	15	16	RAW(R5), stall λόγω branch εντολής
ADDI R1,R1,#8	17	18	19	
ADDI R2,R2,#8	18	19	20	
SUBI R6,R6,#1	19	20	21	R6 → 1
BNEZ R6,LOOP	20	22	23	RAW(R6), stall λόγω branch εντολής
LD F0,8(R1)	24	25 - 29	30	Miss A[2] → Fetch A[2]A[3] in block 2
LD F1,8(R2)	25	26 - 30	31	Miss B[2] → Fetch B[2] B[3] in block 3
ADDD F4,F4,F0	26	31 - 33	34	RAW (F0)
MULD F4,F4,F1	27	35 - 40	41	RAW (F1, F4)
ADDI R4,R4,#1	28	29	32	R4 → 2, CDB conflict
ANDI R5,R4,#1	29	33	35	RAW (R4), CDB conflict, R5 → 0
SUBI R5,R5,#1	30	36	37	RAW(R5), R5 → -1
BEZ R5, L1	31	38	39	RAW(R5), stall λόγω branch εντολής
ADDI R1,R1,#8	40	41	42	
LD F0, 8(R1)	41	43 - 44	45	RAW(R1), Hit A[3]
ADDD F4,F4,F0	42	46 - 48	49	RAW(F0)
ADDI R1,R1,#8	43	44	46	CDB conflict
ADDI R2,R2,#8	44	45	47	CDB conflict
SUBI R6,R6,#1	45	46	48	CDB conflict, R6 → 0
BNEZ R6,LOOP	46	49	50	RAW(R6), stall λόγω branch εντολής
ADDD F4,F4,F0	51	52 - 54	55	FP ADD RS → full
ADDD F4,F4,F5	56	57 - 59	60	
ADDI R8,R8,#1	57	58	59	

B. Με ROB

OP	IS	EX	WR	CMT	Σχόλιο
LD F0,8(R1)	1	2 - 6	7	8	Miss A[1] → Fetch A[0]A[1] in block0
LD F1,8(R2)	2	3 - 7	8	9	Miss B[1] → Fetch B[0] B[1] in block1
ADDD F4,F4,F0	3	8 - 10	11	12	RAW (F0)
MULD F4,F4,F1	4	12 -17	18	19	RAW (F1, F4)
ADDI R4,R4,#1	5	6	9	20	CDB conflicts, R4 → 1
ANDI R5,R4,#1	6	10	12	21	RAW (R4), CDB conflict, R5 → 1
SUBI R5,R5,#1	7	13	14	22	RAW(R5), R5 → 0
BEZ R5, L1	8	15	16	23	RAW(R5), history = 0 & pred = NT, res = T
ADDI R1,R1,#8	10	11	13		integer RS full, CDB conflict, flush @ cycle 16
LD F0,8(R1)	11	14 -			Miss A[2] → Fetch A[2]A[3] in block2, ROB Full, flush @ cycle 16
ADDD F4,F4,F0	13				RAW (F0 instr10), ROB Full, flush @ cycle 16
ADDI R1,R1,#8	17	18	19	24	
ADDI R2,R2,#8	18	19	20	25	
SUBI R6,R6,#1	19	20	21	26	R6 → 1
BNEZ R6,LOOP	20	22	23	27	RAW(R6), history = 1 & pred = NT, res = T
ADDD F4,F4,F0	21	22 -			FP ADD RS → full, flush @ cycle 23
LD F0,8(R1)	24	25 - 26	27	28	Hit A[2]
LD F1,8(R2)	25	26 - 30	31	32	Miss B[2] → Fetch B[2] B[3] in block3
ADDD F4,F4,F0	26	28 - 30	32	33	RAW (F0), CDB conflict
MULD F4,F4,F1	27	33 - 38	39	40	RAW (F1, F4)
ADDI R4,R4,#1	28	29	30	41	R4 → 2
ANDI R5,R4,#1	29	31	33	42	RAW (R4), CDB conflict, R5 → 0
SUBI R5,R5,#1	30	34	35	43	RAW(R5), R5 → -1
BEZ R5, L1	31	36	37	44	RAW(R5), history = 1 & pred = T, res = NT
ADDI R1,R1,#8	32	33	34		flush @ cycle 37
ADDI R2,R2,#8	34	35	36		integer RS full, flush @ cycle 37
SUBI R6,R6,#1	35	36	37		no CDB conflict, ROB → full, flush @ cycle 37
ADDI R1,R1,#8	38	39	40	45	
LD F0, 8(R1)	39	41 - 42	43	46	RAW(R1), Hit A[3]
ADDD F4,F4,F0	40	44 - 46	47	48	RAW(F0)
ADDI R1,R1,#8	41	42	44	49	CDB conflict
ADDI R2,R2,#8	42	43	45	50	CDB conflict
SUBI R6,R6,#1	43	44	46	51	CDB conflict, R6 → 0
BNEZ R6,LOOP	44	47	48	52	RAW(R6), history = 0 & pred = T, res = NT
LD F0, 8(R1)	45	46 -			Miss A[4] → Fetch A[4]A[5] in block4, flush @ cycle 48
LD F1, 8(R2)	46	47 - 48			Hit B[3], flush @cycle 48
ADDD F4,F4,F0	47				RAW(F0), ROB full, flush @ cycle 48
ADDD F4,F4,F0	49	50 - 52	53	54	FP ADD RS → full
ADDD F4,F4,F5	54	55 - 57	58	59	
ADDI R8,R8,#1	55	56	57	60	