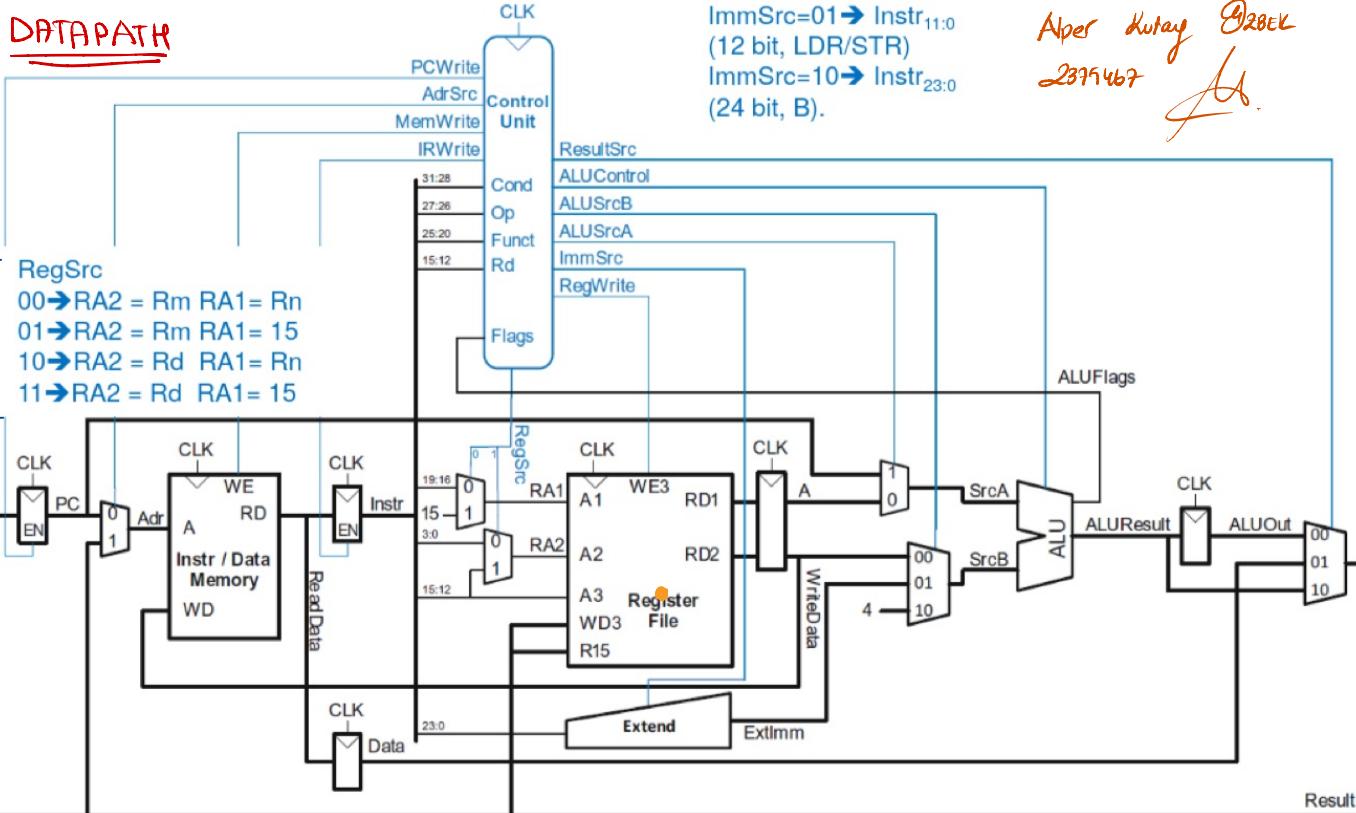
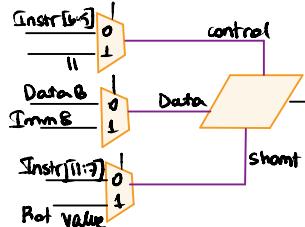
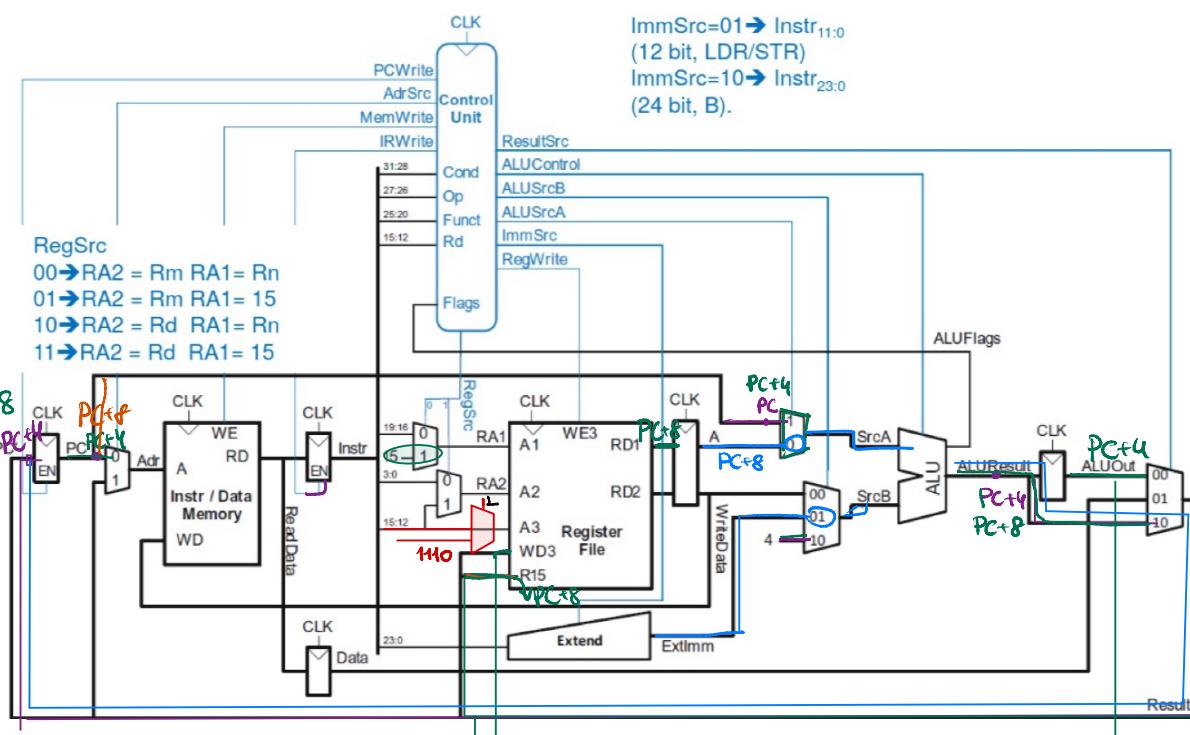


mov

I used 3 mux's and one shifter between register B and 4-L Mux



00 point of Mux Select → Instr[25] ⇒ I
I have not made any changes in the first two stages at the final stage I made change which are above but I faced a error about Pcwrite therefore I change Pcwrite
 $PC_WE = PC_{write} \mid (RD[1] \& RD[1] \& RD[1] \& RD[1] \& RD[1] \& RD[1])$

Cycle 1

PCwrite = 1
ALUSRC A = 1
ALUSRC B = 10
ResultSRC = 10
IRwrite = 1
R14 ← PC+4
RegSRC = x1 → RA1 = 15

Cycle 2

PCwrite = 0
ALUSRC A = 1
ALUSRC B = 10
ResultSRC = 10
IRwrite = 0
R14 ← PC+4
RegSRC = x1 → RA1 = 15

Cycle 3

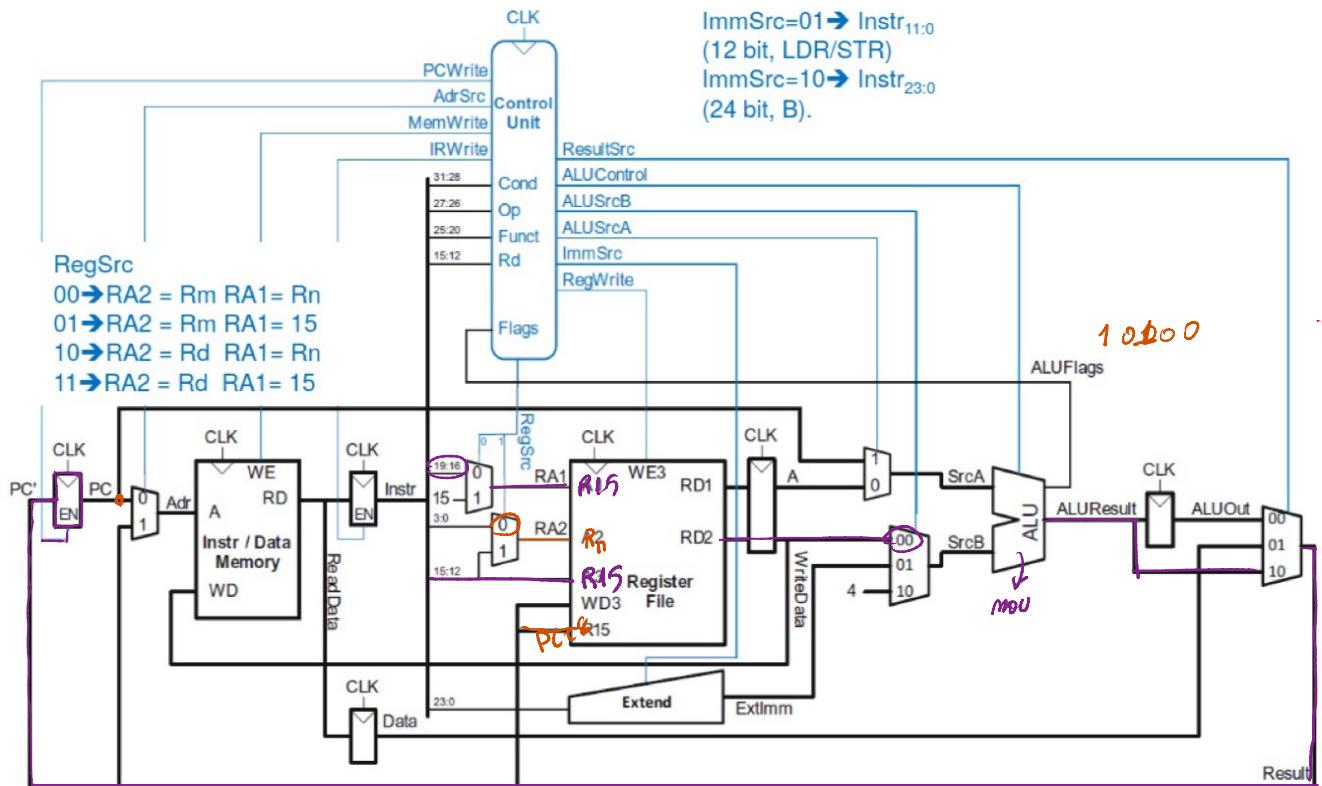
ALUSRC A = 0
ALUSRC B = 01
ResultSRC = 10
PCwrite = 1

L

AluOut

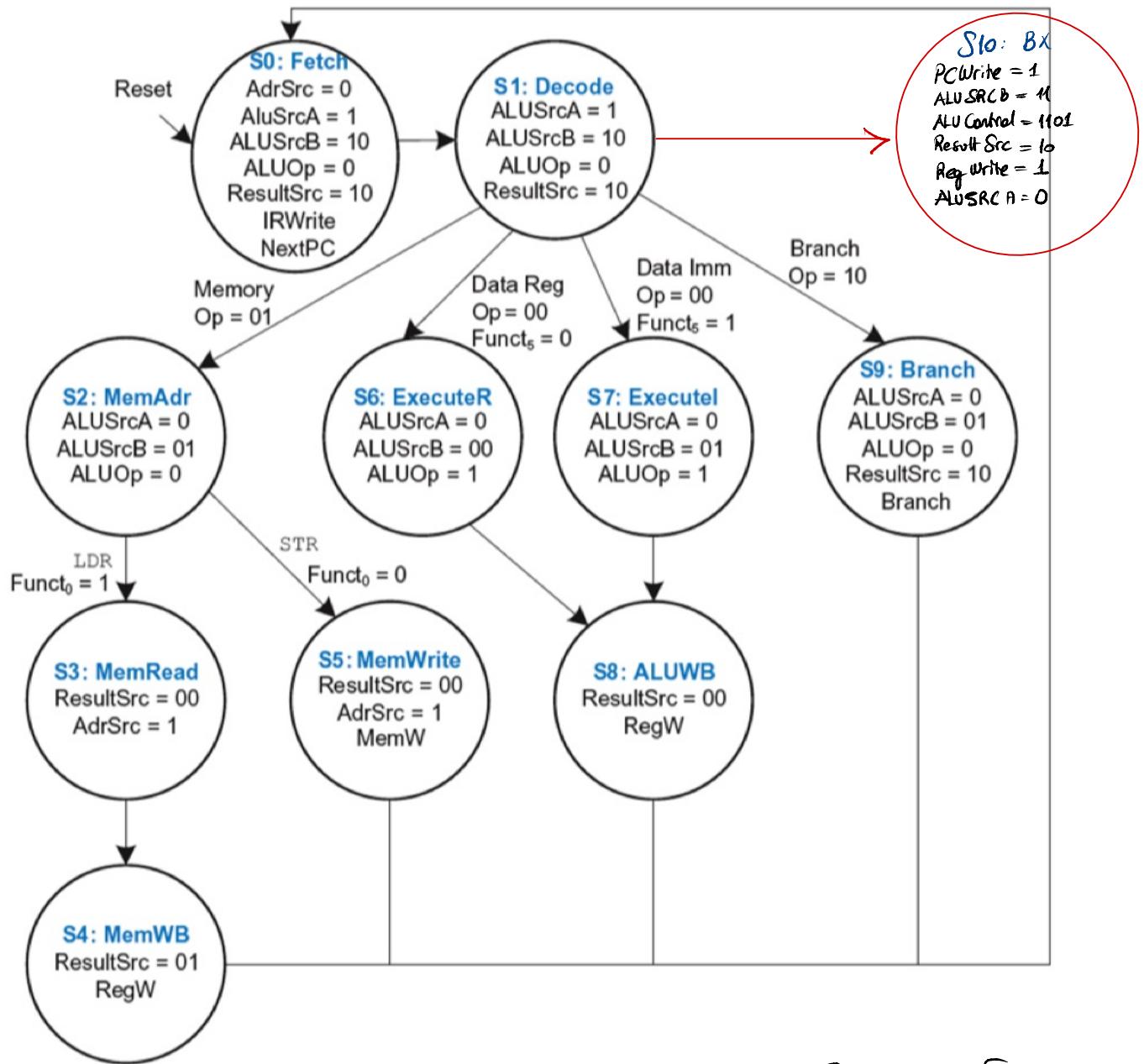
Result

Bx



I did not mux changes for Bx in data path however I did changes in controller and I explained it in controller part.

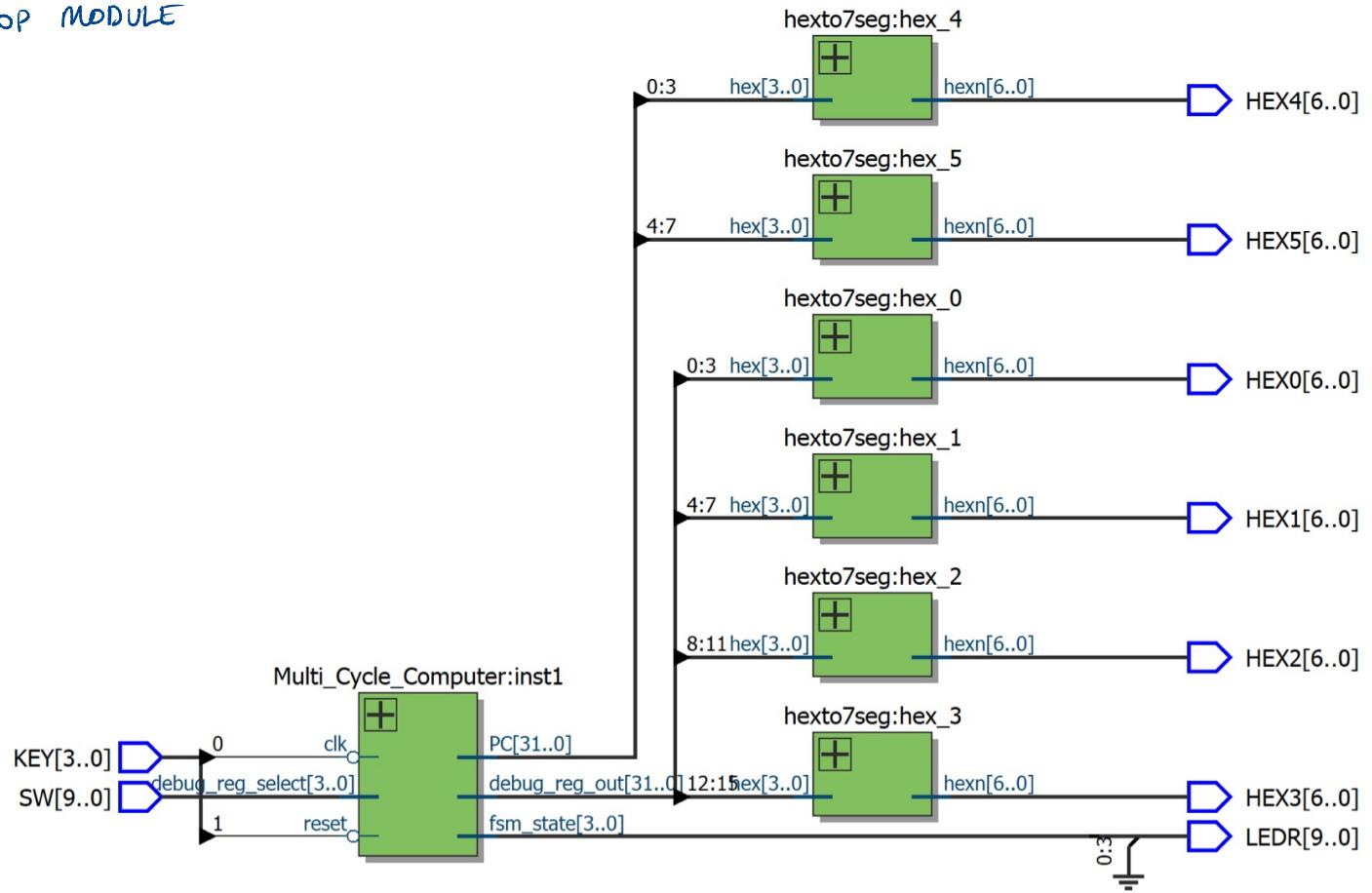
CONTROLLER



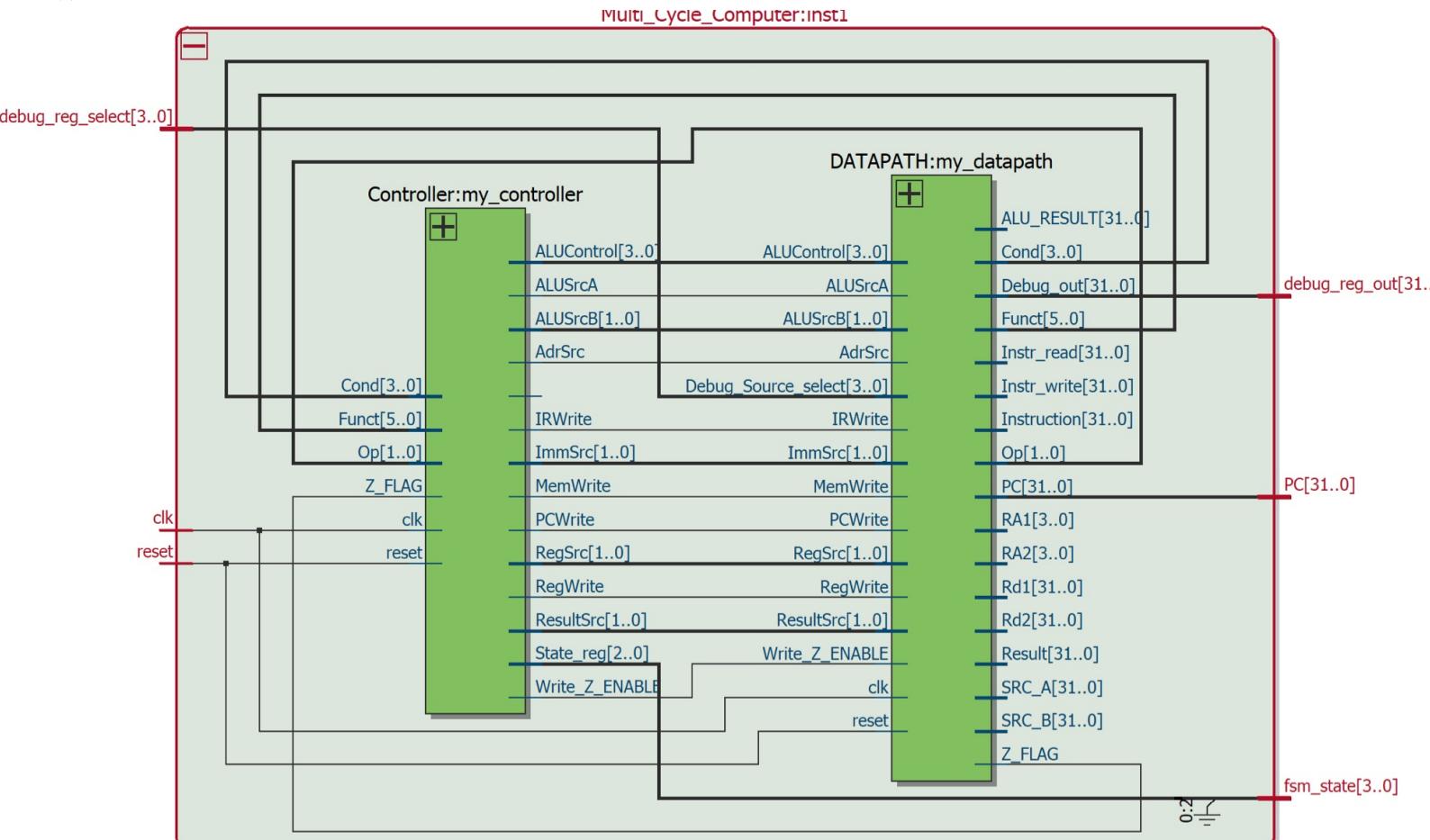
I have written controller as a FSM with a graph above. In addition, I added a new state to that which is called "BX". The reason is that BX has constant instruction bits with op code 00. Therefore I added this stage to op=00 part of controller.

Also I have created a stage register. It is reset by two other registers which are called op-done and reset. "reset" is connected to input but "op-done" is controlled in main logic. When the instruction is on the last stage op-done=1 and it makes "stage-reg" 0. Otherwise Stage-reg keeps increasing every stage.

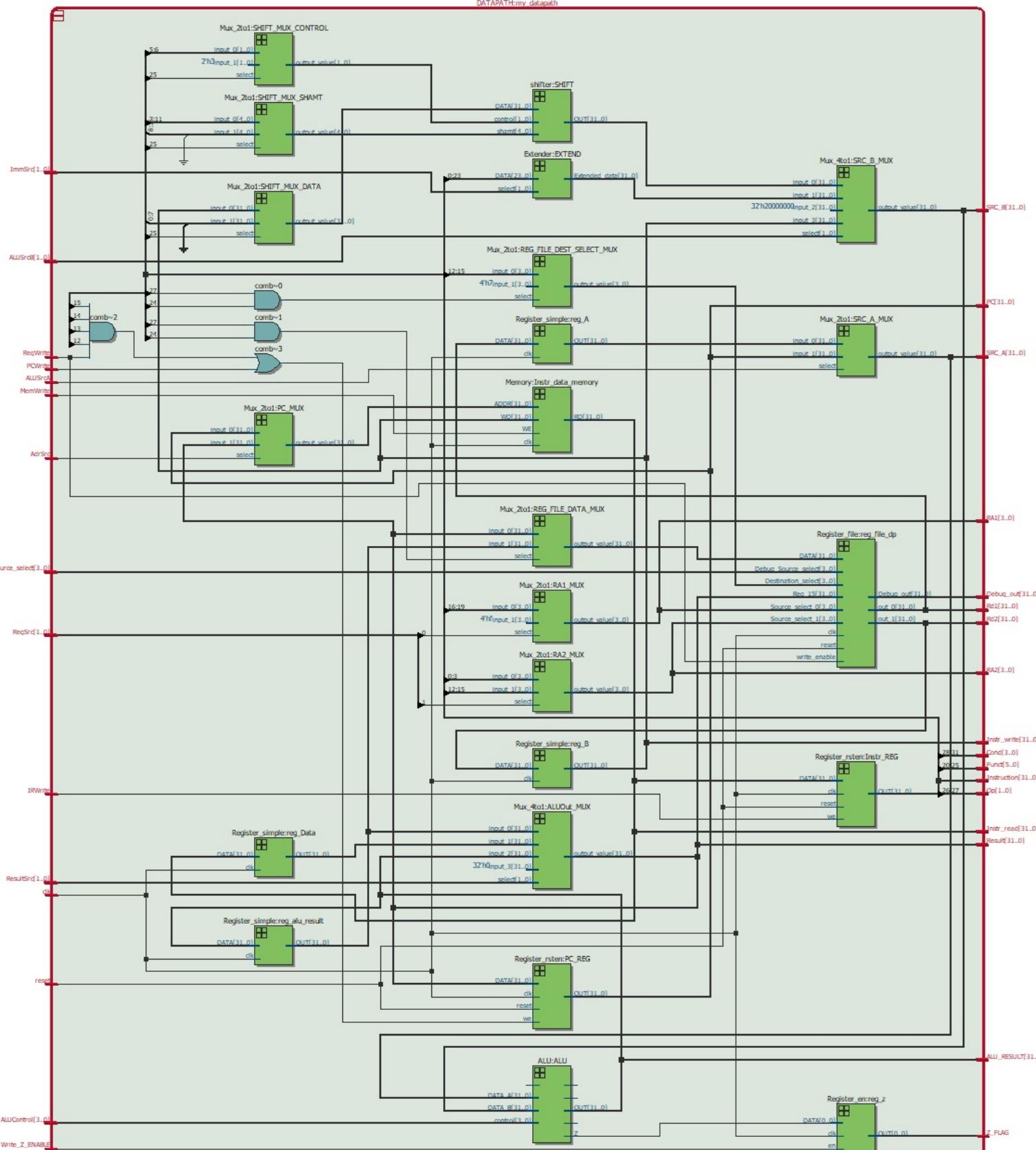
Top MODULE



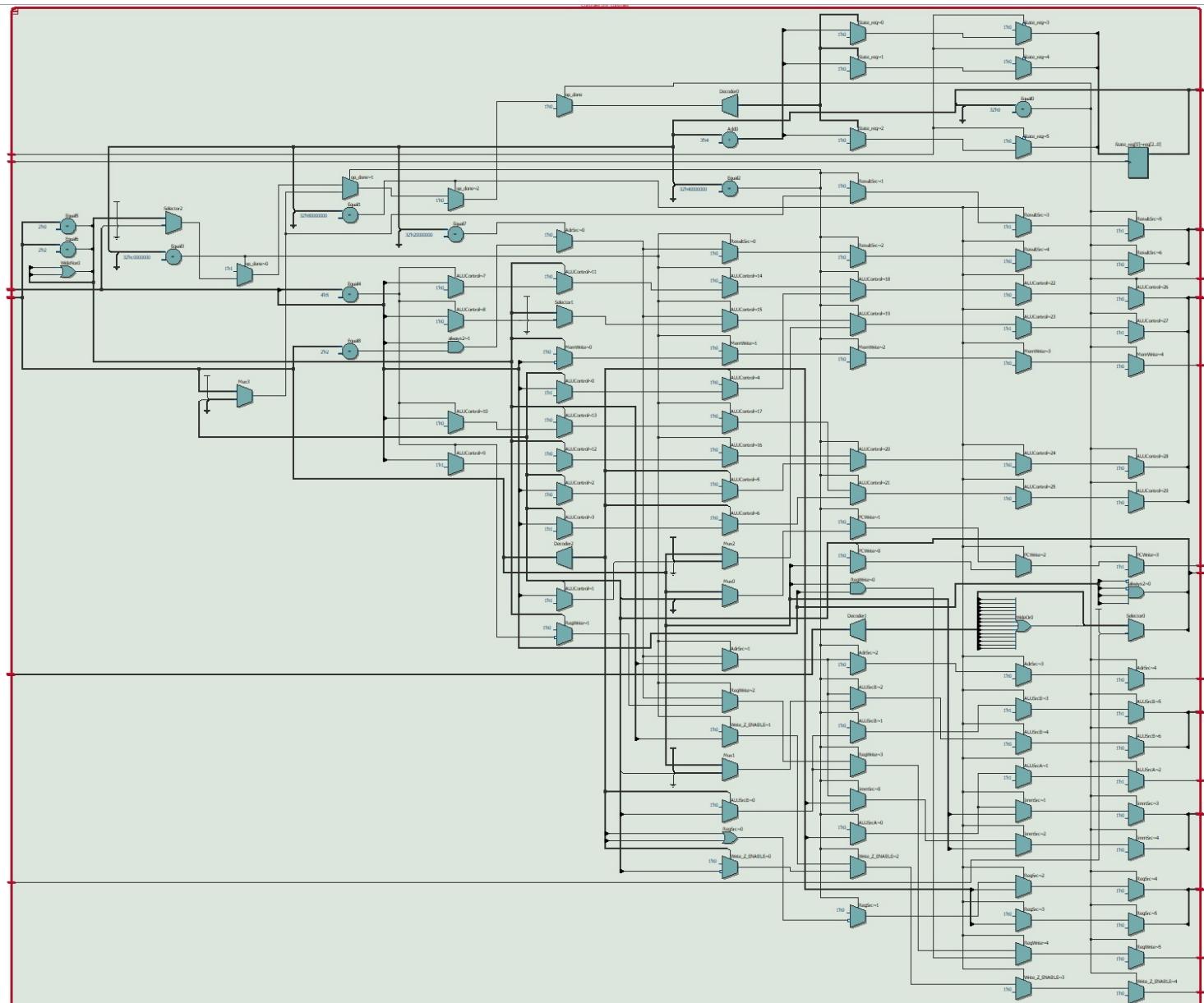
MULTI CYCLE COMPUTER



DATAPATH



CONTROLLER



5000.00ns DEBUG Performance Model ***** Instruction No: 0 *****

5000.00ns DEBUG Performance Model ***** Current Instruction *****

5000.00ns DEBUG Performance Model Binary string:111000111010000000100000010011

5000.00ns DEBUG Performance Model Operation type Data Processing

5000.00ns DEBUG Performance Model cond:E

5000.00ns DEBUG Performance Model Immediate bit:1

5000.00ns DEBUG Performance Model cmd:D

5000.00ns DEBUG Performance Model Set bit:0

5000.00ns DEBUG Performance Model Rn:0 Rd:1

5000.00ns DEBUG Performance Model rot:0 imm8:19

15000.00ns DEBUG Performance Model ***** Positive Clock Edge: 0 *****

25000.00ns DEBUG Performance Model ***** Positive Clock Edge: 1 *****

35000.00ns DEBUG Performance Model ***** Positive Clock Edge: 2 *****

40000.00ns DEBUG Performance Model ***** DUT DATAPATH Signals *****

40000.00ns DEBUG Performance Model ***** DUT Controller Signals *****

45000.00ns DEBUG Performance Model ***** Positive Clock Edge: 3 *****

50000.00ns DEBUG Performance Model ***** Performance Model / DUT Data *****

50000.00ns DEBUG Performance Model PC:0x4 PC:0x4

50000.00ns DEBUG Performance Model Register0: 0x0 0x0

50000.00ns DEBUG Performance Model Register1: 0x13 0x13

50000.00ns DEBUG Performance Model Register2: 0x0 0x0

50000.00ns DEBUG Performance Model Register3: 0x0 0x0

50000.00ns DEBUG Performance Model Register4: 0x0 0x0

50000.00ns DEBUG Performance Model Register5: 0x0 0x0

50000.00ns DEBUG Performance Model Register6: 0x0 0x0

50000.00ns DEBUG Performance Model Register7: 0x0 0x0

50000.00ns DEBUG Performance Model Register8: 0x0 0x0

50000.00ns DEBUG Performance Model Register9: 0x0 0x0

50000.00ns DEBUG Performance Model Register10: 0x0 0x0

50000.00ns DEBUG Performance Model Register11: 0x0 0x0

50000.00ns DEBUG Performance Model Register12: 0x0 0x0

50000.00ns DEBUG Performance Model Register13: 0x0 0x0

50000.00ns DEBUG Performance Model Register14: 0x0 0x0

50000.00ns DEBUG Performance Model Register15: 0x8 0x8

50000.00ns DEBUG Performance Model ***** Instruction No: 1 *****

50000.00ns DEBUG Performance Model ***** Current Instruction *****

50000.00ns DEBUG Performance Model Binary string:11100000100000010010000000000001

50000.00ns DEBUG Performance Model Operation type Data Processing

50000.00ns DEBUG Performance Model	cond:E
50000.00ns DEBUG Performance Model	Immediate bit:0
50000.00ns DEBUG Performance Model	cmd:4
50000.00ns DEBUG Performance Model	Set bit:0
50000.00ns DEBUG Performance Model	Rn:1 Rd:2
50000.00ns DEBUG Performance Model	shamt5:0 sh:0 Rm:1
55000.00ns DEBUG Performance Model	***** Positive Clock Edge: 4 *****
65000.00ns DEBUG Performance Model	***** Positive Clock Edge: 5 *****
75000.00ns DEBUG Performance Model	***** Positive Clock Edge: 6 *****
80000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
80000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
85000.00ns DEBUG Performance Model	***** Positive Clock Edge: 7 *****
90000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
90000.00ns DEBUG Performance Model	PC:0x8 PC:0x8
90000.00ns DEBUG Performance Model	Register0: 0x0 0x0
90000.00ns DEBUG Performance Model	Register1: 0x13 0x13
90000.00ns DEBUG Performance Model	Register2: 0x26 0x26
90000.00ns DEBUG Performance Model	Register3: 0x0 0x0
90000.00ns DEBUG Performance Model	Register4: 0x0 0x0
90000.00ns DEBUG Performance Model	Register5: 0x0 0x0
90000.00ns DEBUG Performance Model	Register6: 0x0 0x0
90000.00ns DEBUG Performance Model	Register7: 0x0 0x0
90000.00ns DEBUG Performance Model	Register8: 0x0 0x0
90000.00ns DEBUG Performance Model	Register9: 0x0 0x0
90000.00ns DEBUG Performance Model	Register10: 0x0 0x0
90000.00ns DEBUG Performance Model	Register11: 0x0 0x0
90000.00ns DEBUG Performance Model	Register12: 0x0 0x0
90000.00ns DEBUG Performance Model	Register13: 0x0 0x0
90000.00ns DEBUG Performance Model	Register14: 0x0 0x0
90000.00ns DEBUG Performance Model	Register15: 0xc 0xc
90000.00ns DEBUG Performance Model	***** Instruction No: 2 *****
90000.00ns DEBUG Performance Model	***** Current Instruction *****
90000.00ns DEBUG Performance Model	Binary string:1110000000000010011000000000010
90000.00ns DEBUG Performance Model	Operation type Data Processing
90000.00ns DEBUG Performance Model	cond:E
90000.00ns DEBUG Performance Model	Immediate bit:0
90000.00ns DEBUG Performance Model	cmd:0
90000.00ns DEBUG Performance Model	Set bit:0

90000.00ns DEBUG Performance Model Rn:1 Rd:3

90000.00ns DEBUG Performance Model shamt5:0 sh:0 Rm:2

95000.00ns DEBUG Performance Model **** Positive Clock Edge: 8 ****

105000.00ns DEBUG Performance Model **** Positive Clock Edge: 9 ****

115000.00ns DEBUG Performance Model **** Positive Clock Edge: 10 ****

120000.00ns DEBUG Performance Model ***** DUT DATAPATH Signals *****

120000.00ns DEBUG Performance Model ***** DUT Controller Signals *****

125000.00ns DEBUG Performance Model **** Positive Clock Edge: 11 ****

130000.00ns DEBUG Performance Model ***** Performance Model / DUT Data *****

130000.00ns DEBUG Performance Model PC:0xc PC:0xc

130000.00ns DEBUG Performance Model Register0: 0x0 0x0

130000.00ns DEBUG Performance Model Register1: 0x13 0x13

130000.00ns DEBUG Performance Model Register2: 0x26 0x26

130000.00ns DEBUG Performance Model Register3: 0x2 0x2

130000.00ns DEBUG Performance Model Register4: 0x0 0x0

130000.00ns DEBUG Performance Model Register5: 0x0 0x0

130000.00ns DEBUG Performance Model Register6: 0x0 0x0

130000.00ns DEBUG Performance Model Register7: 0x0 0x0

130000.00ns DEBUG Performance Model Register8: 0x0 0x0

130000.00ns DEBUG Performance Model Register9: 0x0 0x0

130000.00ns DEBUG Performance Model Register10: 0x0 0x0

130000.00ns DEBUG Performance Model Register11: 0x0 0x0

130000.00ns DEBUG Performance Model Register12: 0x0 0x0

130000.00ns DEBUG Performance Model Register13: 0x0 0x0

130000.00ns DEBUG Performance Model Register14: 0x0 0x0

130000.00ns DEBUG Performance Model Register15: 0x10 0x10

130000.00ns DEBUG Performance Model ***** Instruction No: 3 *****

130000.00ns DEBUG Performance Model ***** Current Instruction *****

130000.00ns DEBUG Performance Model Binary string:11101010000000000000000000000000

130000.00ns DEBUG Performance Model Operation type Branch (except Bx)

130000.00ns DEBUG Performance Model Link bit:0

130000.00ns DEBUG Performance Model imm24:0

135000.00ns DEBUG Performance Model **** Positive Clock Edge: 12 ****

145000.00ns DEBUG Performance Model **** Positive Clock Edge: 13 ****

150000.00ns DEBUG Performance Model ***** DUT DATAPATH Signals *****

150000.00ns DEBUG Performance Model ***** DUT Controller Signals *****

155000.00ns DEBUG Performance Model **** Positive Clock Edge: 14 ****

160000.00ns DEBUG Performance Model ***** Performance Model / DUT Data *****

160000.00ns DEBUG Performance Model	PC:0x14	PC:0x14
160000.00ns DEBUG Performance Model	Register0: 0x0	0x0
160000.00ns DEBUG Performance Model	Register1: 0x13	0x13
160000.00ns DEBUG Performance Model	Register2: 0x26	0x26
160000.00ns DEBUG Performance Model	Register3: 0x2	0x2
160000.00ns DEBUG Performance Model	Register4: 0x0	0x0
160000.00ns DEBUG Performance Model	Register5: 0x0	0x0
160000.00ns DEBUG Performance Model	Register6: 0x0	0x0
160000.00ns DEBUG Performance Model	Register7: 0x0	0x0
160000.00ns DEBUG Performance Model	Register8: 0x0	0x0
160000.00ns DEBUG Performance Model	Register9: 0x0	0x0
160000.00ns DEBUG Performance Model	Register10: 0x0	0x0
160000.00ns DEBUG Performance Model	Register11: 0x0	0x0
160000.00ns DEBUG Performance Model	Register12: 0x0	0x0
160000.00ns DEBUG Performance Model	Register13: 0x0	0x0
160000.00ns DEBUG Performance Model	Register14: 0x0	0x0
160000.00ns DEBUG Performance Model	Register15: 0x18	0x18
160000.00ns DEBUG Performance Model	***** Instruction No: 5 *****	
160000.00ns DEBUG Performance Model	***** Current Instruction *****	
160000.00ns DEBUG Performance Model	Binary string:11100001101000000100000100000001	
160000.00ns DEBUG Performance Model	Operation type Data Processing	
160000.00ns DEBUG Performance Model	cond:E	
160000.00ns DEBUG Performance Model	Immediate bit:0	
160000.00ns DEBUG Performance Model	cmd:D	
160000.00ns DEBUG Performance Model	Set bit:0	
160000.00ns DEBUG Performance Model	Rn:0 Rd:4	
160000.00ns DEBUG Performance Model	shamt5:2 sh:0 Rm:1	
165000.00ns DEBUG Performance Model	***** Positive Clock Edge: 15 *****	
175000.00ns DEBUG Performance Model	***** Positive Clock Edge: 16 *****	
185000.00ns DEBUG Performance Model	***** Positive Clock Edge: 17 *****	
190000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****	
190000.00ns DEBUG Performance Model	***** DUT Controller Signals *****	
195000.00ns DEBUG Performance Model	***** Positive Clock Edge: 18 *****	
200000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****	
200000.00ns DEBUG Performance Model	PC:0x18	PC:0x18
200000.00ns DEBUG Performance Model	Register0: 0x0	0x0
200000.00ns DEBUG Performance Model	Register1: 0x13	0x13
200000.00ns DEBUG Performance Model	Register2: 0x26	0x26

200000.00ns DEBUG	Performance Model	Register3: 0x2	0x2
200000.00ns DEBUG	Performance Model	Register4: 0x4c	0x4c
200000.00ns DEBUG	Performance Model	Register5: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register6: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register7: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register8: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register9: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register10: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register11: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register12: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register13: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register14: 0x0	0x0
200000.00ns DEBUG	Performance Model	Register15: 0x1c	0x1c
200000.00ns DEBUG	Performance Model	***** Instruction No: 6 *****	
200000.00ns DEBUG	Performance Model	***** Current Instruction *****	
200000.00ns DEBUG	Performance Model	Binary string:11100000010000010101000100100010	
200000.00ns DEBUG	Performance Model	Operation type Data Processing	
200000.00ns DEBUG	Performance Model	cond:E	
200000.00ns DEBUG	Performance Model	Immediate bit:0	
200000.00ns DEBUG	Performance Model	cmd:2	
200000.00ns DEBUG	Performance Model	Set bit:0	
200000.00ns DEBUG	Performance Model	Rn:1 Rd:5	
200000.00ns DEBUG	Performance Model	shamt5:2 sh:1 Rm:2	
205000.00ns DEBUG	Performance Model	***** Positive Clock Edge: 19 *****	
215000.00ns DEBUG	Performance Model	***** Positive Clock Edge: 20 *****	
225000.00ns DEBUG	Performance Model	***** Positive Clock Edge: 21 *****	
230000.00ns DEBUG	Performance Model	***** DUT DATAPATH Signals *****	
230000.00ns DEBUG	Performance Model	***** DUT Controller Signals *****	
235000.00ns DEBUG	Performance Model	***** Positive Clock Edge: 22 *****	
240000.00ns DEBUG	Performance Model	***** Performance Model / DUT Data *****	
240000.00ns DEBUG	Performance Model	PC:0x1c	PC:0x1c
240000.00ns DEBUG	Performance Model	Register0: 0x0	0x0
240000.00ns DEBUG	Performance Model	Register1: 0x13	0x13
240000.00ns DEBUG	Performance Model	Register2: 0x26	0x26
240000.00ns DEBUG	Performance Model	Register3: 0x2	0x2
240000.00ns DEBUG	Performance Model	Register4: 0x4c	0x4c
240000.00ns DEBUG	Performance Model	Register5: 0xa	0xa
240000.00ns DEBUG	Performance Model	Register6: 0x0	0x0

240000.00ns DEBUG Performance Model	Register7: 0x0	0x0
240000.00ns DEBUG Performance Model	Register8: 0x0	0x0
240000.00ns DEBUG Performance Model	Register9: 0x0	0x0
240000.00ns DEBUG Performance Model	Register10: 0x0	0x0
240000.00ns DEBUG Performance Model	Register11: 0x0	0x0
240000.00ns DEBUG Performance Model	Register12: 0x0	0x0
240000.00ns DEBUG Performance Model	Register13: 0x0	0x0
240000.00ns DEBUG Performance Model	Register14: 0x0	0x0
240000.00ns DEBUG Performance Model	Register15: 0x20	0x20
240000.00ns DEBUG Performance Model	***** Instruction No: 7 *****	
240000.00ns DEBUG Performance Model	***** Current Instruction *****	
240000.00ns DEBUG Performance Model	Binary string:11100001100000110110000101100011	
240000.00ns DEBUG Performance Model	Operation type Data Processing	
240000.00ns DEBUG Performance Model	cond:E	
240000.00ns DEBUG Performance Model	Immediate bit:0	
240000.00ns DEBUG Performance Model	cmd:C	
240000.00ns DEBUG Performance Model	Set bit:0	
240000.00ns DEBUG Performance Model	Rn:3 Rd:6	
240000.00ns DEBUG Performance Model	shamt5:2 sh:3 Rm:3	
245000.00ns DEBUG Performance Model	***** Positive Clock Edge: 23 *****	
255000.00ns DEBUG Performance Model	***** Positive Clock Edge: 24 *****	
265000.00ns DEBUG Performance Model	***** Positive Clock Edge: 25 *****	
270000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****	
270000.00ns DEBUG Performance Model	***** DUT Controller Signals *****	
275000.00ns DEBUG Performance Model	***** Positive Clock Edge: 26 *****	
280000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****	
280000.00ns DEBUG Performance Model	PC:0x20	PC:0x20
280000.00ns DEBUG Performance Model	Register0: 0x0	0x0
280000.00ns DEBUG Performance Model	Register1: 0x13	0x13
280000.00ns DEBUG Performance Model	Register2: 0x26	0x26
280000.00ns DEBUG Performance Model	Register3: 0x2	0x2
280000.00ns DEBUG Performance Model	Register4: 0x4c	0x4c
280000.00ns DEBUG Performance Model	Register5: 0xa	0xa
280000.00ns DEBUG Performance Model	Register6: 0x80000002	0x80000002
280000.00ns DEBUG Performance Model	Register7: 0x0	0x0
280000.00ns DEBUG Performance Model	Register8: 0x0	0x0
280000.00ns DEBUG Performance Model	Register9: 0x0	0x0
280000.00ns DEBUG Performance Model	Register10: 0x0	0x0

280000.00ns DEBUG Performance Model	Register11: 0x0	0x0
280000.00ns DEBUG Performance Model	Register12: 0x0	0x0
280000.00ns DEBUG Performance Model	Register13: 0x0	0x0
280000.00ns DEBUG Performance Model	Register14: 0x0	0x0
280000.00ns DEBUG Performance Model	Register15: 0x24	0x24
280000.00ns DEBUG Performance Model	***** Instruction No: 8 *****	
280000.00ns DEBUG Performance Model	***** Current Instruction *****	
280000.00ns DEBUG Performance Model	Binary string:1110000110100000011111001000110	
280000.00ns DEBUG Performance Model	Operation type Data Processing	
280000.00ns DEBUG Performance Model	cond:E	
280000.00ns DEBUG Performance Model	Immediate bit:0	
280000.00ns DEBUG Performance Model	cmd:D	
280000.00ns DEBUG Performance Model	Set bit:0	
280000.00ns DEBUG Performance Model	Rn:0 Rd:7	
280000.00ns DEBUG Performance Model	shamt5:28 sh:2 Rm:6	
285000.00ns DEBUG Performance Model	***** Positive Clock Edge: 27 *****	
295000.00ns DEBUG Performance Model	***** Positive Clock Edge: 28 *****	
305000.00ns DEBUG Performance Model	***** Positive Clock Edge: 29 *****	
310000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****	
310000.00ns DEBUG Performance Model	***** DUT Controller Signals *****	
315000.00ns DEBUG Performance Model	***** Positive Clock Edge: 30 *****	
320000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****	
320000.00ns DEBUG Performance Model	PC:0x24	PC:0x24
320000.00ns DEBUG Performance Model	Register0: 0x0	0x0
320000.00ns DEBUG Performance Model	Register1: 0x13	0x13
320000.00ns DEBUG Performance Model	Register2: 0x26	0x26
320000.00ns DEBUG Performance Model	Register3: 0x2	0x2
320000.00ns DEBUG Performance Model	Register4: 0x4c	0x4c
320000.00ns DEBUG Performance Model	Register5: 0xa	0xa
320000.00ns DEBUG Performance Model	Register6: 0x80000002	0x80000002
320000.00ns DEBUG Performance Model	Register7: 0xffffffff8	0xffffffff8
320000.00ns DEBUG Performance Model	Register8: 0x0	0x0
320000.00ns DEBUG Performance Model	Register9: 0x0	0x0
320000.00ns DEBUG Performance Model	Register10: 0x0	0x0
320000.00ns DEBUG Performance Model	Register11: 0x0	0x0
320000.00ns DEBUG Performance Model	Register12: 0x0	0x0
320000.00ns DEBUG Performance Model	Register13: 0x0	0x0
320000.00ns DEBUG Performance Model	Register14: 0x0	0x0

320000.00ns DEBUG Performance Model	Register15: 0x28 0x28
320000.00ns DEBUG Performance Model	***** Instruction No: 9 *****
320000.00ns DEBUG Performance Model	***** Current Instruction *****
320000.00ns DEBUG Performance Model	Binary string:11100101100000010010000001010101
320000.00ns DEBUG Performance Model	Operation type Memory
320000.00ns DEBUG Performance Model	Load bit:0
320000.00ns DEBUG Performance Model	Rn:1 Rn:2
320000.00ns DEBUG Performance Model	imm12:85
325000.00ns DEBUG Performance Model	***** Positive Clock Edge: 31 *****
335000.00ns DEBUG Performance Model	***** Positive Clock Edge: 32 *****
345000.00ns DEBUG Performance Model	***** Positive Clock Edge: 33 *****
350000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
350000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
355000.00ns DEBUG Performance Model	***** Positive Clock Edge: 34 *****
360000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
360000.00ns DEBUG Performance Model	PC:0x28 PC:0x28
360000.00ns DEBUG Performance Model	Register0: 0x0 0x0
360000.00ns DEBUG Performance Model	Register1: 0x13 0x13
360000.00ns DEBUG Performance Model	Register2: 0x26 0x26
360000.00ns DEBUG Performance Model	Register3: 0x2 0x2
360000.00ns DEBUG Performance Model	Register4: 0x4c 0x4c
360000.00ns DEBUG Performance Model	Register5: 0xa 0xa
360000.00ns DEBUG Performance Model	Register6: 0x80000002 0x80000002
360000.00ns DEBUG Performance Model	Register7: 0xffffffff8 0xffffffff8
360000.00ns DEBUG Performance Model	Register8: 0x0 0x0
360000.00ns DEBUG Performance Model	Register9: 0x0 0x0
360000.00ns DEBUG Performance Model	Register10: 0x0 0x0
360000.00ns DEBUG Performance Model	Register11: 0x0 0x0
360000.00ns DEBUG Performance Model	Register12: 0x0 0x0
360000.00ns DEBUG Performance Model	Register13: 0x0 0x0
360000.00ns DEBUG Performance Model	Register14: 0x0 0x0
360000.00ns DEBUG Performance Model	Register15: 0x2c 0x2c
360000.00ns DEBUG Performance Model	***** Instruction No: 10 *****
360000.00ns DEBUG Performance Model	***** Current Instruction *****
360000.00ns DEBUG Performance Model	Binary string:11100101100100111000000001100110
360000.00ns DEBUG Performance Model	Operation type Memory
360000.00ns DEBUG Performance Model	Load bit:1
360000.00ns DEBUG Performance Model	Rn:3 Rn:8

360000.00ns DEBUG Performance Model	imm12:102
365000.00ns DEBUG Performance Model	***** Positive Clock Edge: 35 *****
375000.00ns DEBUG Performance Model	***** Positive Clock Edge: 36 *****
385000.00ns DEBUG Performance Model	***** Positive Clock Edge: 37 *****
395000.00ns DEBUG Performance Model	***** Positive Clock Edge: 38 *****
400000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
400000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
405000.00ns DEBUG Performance Model	***** Positive Clock Edge: 39 *****
410000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
410000.00ns DEBUG Performance Model	PC:0x2c PC:0x2c
410000.00ns DEBUG Performance Model	Register0: 0x0 0x0
410000.00ns DEBUG Performance Model	Register1: 0x13 0x13
410000.00ns DEBUG Performance Model	Register2: 0x26 0x26
410000.00ns DEBUG Performance Model	Register3: 0x2 0x2
410000.00ns DEBUG Performance Model	Register4: 0x4c 0x4c
410000.00ns DEBUG Performance Model	Register5: 0xa 0xa
410000.00ns DEBUG Performance Model	Register6: 0x80000002 0x80000002
410000.00ns DEBUG Performance Model	Register7: 0xffffffff8 0xffffffff8
410000.00ns DEBUG Performance Model	Register8: 0x26 0x26
410000.00ns DEBUG Performance Model	Register9: 0x0 0x0
410000.00ns DEBUG Performance Model	Register10: 0x0 0x0
410000.00ns DEBUG Performance Model	Register11: 0x0 0x0
410000.00ns DEBUG Performance Model	Register12: 0x0 0x0
410000.00ns DEBUG Performance Model	Register13: 0x0 0x0
410000.00ns DEBUG Performance Model	Register14: 0x0 0x0
410000.00ns DEBUG Performance Model	Register15: 0x30 0x30
410000.00ns DEBUG Performance Model	***** Instruction No: 11 *****
410000.00ns DEBUG Performance Model	***** Current Instruction *****
410000.00ns DEBUG Performance Model	Binary string:1110000101010010000000000000001000
410000.00ns DEBUG Performance Model	Operation type Data Processing
410000.00ns DEBUG Performance Model	cond:E
410000.00ns DEBUG Performance Model	Immediate bit:0
410000.00ns DEBUG Performance Model	cmd:A
410000.00ns DEBUG Performance Model	Set bit:1
410000.00ns DEBUG Performance Model	Rn:2 Rd:0
410000.00ns DEBUG Performance Model	shamt5:0 sh:0 Rm:8
415000.00ns DEBUG Performance Model	***** Positive Clock Edge: 40 *****
425000.00ns DEBUG Performance Model	***** Positive Clock Edge: 41 *****

435000.00ns DEBUG Performance Model	***** Positive Clock Edge: 42 *****
440000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
440000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
445000.00ns DEBUG Performance Model	***** Positive Clock Edge: 43 *****
450000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
450000.00ns DEBUG Performance Model	PC:0x30 PC:0x30
450000.00ns DEBUG Performance Model	Register0: 0x0 0x0
450000.00ns DEBUG Performance Model	Register1: 0x13 0x13
450000.00ns DEBUG Performance Model	Register2: 0x26 0x26
450000.00ns DEBUG Performance Model	Register3: 0x2 0x2
450000.00ns DEBUG Performance Model	Register4: 0x4c 0x4c
450000.00ns DEBUG Performance Model	Register5: 0xa 0xa
450000.00ns DEBUG Performance Model	Register6: 0x80000002 0x80000002
450000.00ns DEBUG Performance Model	Register7: 0xffffffff8 0xffffffff8
450000.00ns DEBUG Performance Model	Register8: 0x26 0x26
450000.00ns DEBUG Performance Model	Register9: 0x0 0x0
450000.00ns DEBUG Performance Model	Register10: 0x0 0x0
450000.00ns DEBUG Performance Model	Register11: 0x0 0x0
450000.00ns DEBUG Performance Model	Register12: 0x0 0x0
450000.00ns DEBUG Performance Model	Register13: 0x0 0x0
450000.00ns DEBUG Performance Model	Register14: 0x0 0x0
450000.00ns DEBUG Performance Model	Register15: 0x34 0x34
450000.00ns DEBUG Performance Model	***** Instruction No: 12 *****
450000.00ns DEBUG Performance Model	***** Current Instruction *****
450000.00ns DEBUG Performance Model	Binary string:0001101000000000000000000010010
450000.00ns DEBUG Performance Model	Operation type Branch (except Bx)
450000.00ns DEBUG Performance Model	Link bit:0
450000.00ns DEBUG Performance Model	imm24:18
450000.00ns DEBUG Performance Model	Current Instruction is not executed
455000.00ns DEBUG Performance Model	***** Positive Clock Edge: 44 *****
465000.00ns DEBUG Performance Model	***** Positive Clock Edge: 45 *****
470000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
470000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
475000.00ns DEBUG Performance Model	***** Positive Clock Edge: 46 *****
480000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
480000.00ns DEBUG Performance Model	PC:0x34 PC:0x34
480000.00ns DEBUG Performance Model	Register0: 0x0 0x0
480000.00ns DEBUG Performance Model	Register1: 0x13 0x13

480000.00ns DEBUG Performance Model	Register2: 0x26	0x26
480000.00ns DEBUG Performance Model	Register3: 0x2	0x2
480000.00ns DEBUG Performance Model	Register4: 0x4c	0x4c
480000.00ns DEBUG Performance Model	Register5: 0xa	0xa
480000.00ns DEBUG Performance Model	Register6: 0x80000002	0x80000002
480000.00ns DEBUG Performance Model	Register7: 0xffffffff8	0xffffffff8
480000.00ns DEBUG Performance Model	Register8: 0x26	0x26
480000.00ns DEBUG Performance Model	Register9: 0x0	0x0
480000.00ns DEBUG Performance Model	Register10: 0x0	0x0
480000.00ns DEBUG Performance Model	Register11: 0x0	0x0
480000.00ns DEBUG Performance Model	Register12: 0x0	0x0
480000.00ns DEBUG Performance Model	Register13: 0x0	0x0
480000.00ns DEBUG Performance Model	Register14: 0x0	0x0
480000.00ns DEBUG Performance Model	Register15: 0x38	0x38
480000.00ns DEBUG Performance Model	***** Instruction No: 13 *****	
480000.00ns DEBUG Performance Model	***** Current Instruction *****	
480000.00ns DEBUG Performance Model	Binary string:00001010000000000000000000000000	
480000.00ns DEBUG Performance Model	Operation type Branch (except Bx)	
480000.00ns DEBUG Performance Model	Link bit:0	
480000.00ns DEBUG Performance Model	imm24:0	
485000.00ns DEBUG Performance Model	***** Positive Clock Edge: 47 *****	
495000.00ns DEBUG Performance Model	***** Positive Clock Edge: 48 *****	
500000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****	
500000.00ns DEBUG Performance Model	***** DUT Controller Signals *****	
505000.00ns DEBUG Performance Model	***** Positive Clock Edge: 49 *****	
510000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****	
510000.00ns DEBUG Performance Model	PC:0x3c	PC:0x3c
510000.00ns DEBUG Performance Model	Register0: 0x0	0x0
510000.00ns DEBUG Performance Model	Register1: 0x13	0x13
510000.00ns DEBUG Performance Model	Register2: 0x26	0x26
510000.00ns DEBUG Performance Model	Register3: 0x2	0x2
510000.00ns DEBUG Performance Model	Register4: 0x4c	0x4c
510000.00ns DEBUG Performance Model	Register5: 0xa	0xa
510000.00ns DEBUG Performance Model	Register6: 0x80000002	0x80000002
510000.00ns DEBUG Performance Model	Register7: 0xffffffff8	0xffffffff8
510000.00ns DEBUG Performance Model	Register8: 0x26	0x26
510000.00ns DEBUG Performance Model	Register9: 0x0	0x0
510000.00ns DEBUG Performance Model	Register10: 0x0	0x0

510000.00ns DEBUG Performance Model	Register11: 0x0	0x0
510000.00ns DEBUG Performance Model	Register12: 0x0	0x0
510000.00ns DEBUG Performance Model	Register13: 0x0	0x0
510000.00ns DEBUG Performance Model	Register14: 0x0	0x0
510000.00ns DEBUG Performance Model	Register15: 0x40	0x40
510000.00ns DEBUG Performance Model	***** Instruction No: 15 *****	
510000.00ns DEBUG Performance Model	***** Current Instruction *****	
510000.00ns DEBUG Performance Model	Binary string:111010110000000000000000000000010	
510000.00ns DEBUG Performance Model	Operation type Branch (except Bx)	
510000.00ns DEBUG Performance Model	Link bit:1	
510000.00ns DEBUG Performance Model	imm24:2	
515000.00ns DEBUG Performance Model	***** Positive Clock Edge: 50 *****	
525000.00ns DEBUG Performance Model	***** Positive Clock Edge: 51 *****	
530000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****	
530000.00ns DEBUG Performance Model	***** DUT Controller Signals *****	
535000.00ns DEBUG Performance Model	***** Positive Clock Edge: 52 *****	
540000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****	
540000.00ns DEBUG Performance Model	PC:0x4c	PC:0x4c
540000.00ns DEBUG Performance Model	Register0: 0x0	0x0
540000.00ns DEBUG Performance Model	Register1: 0x13	0x13
540000.00ns DEBUG Performance Model	Register2: 0x26	0x26
540000.00ns DEBUG Performance Model	Register3: 0x2	0x2
540000.00ns DEBUG Performance Model	Register4: 0x4c	0x4c
540000.00ns DEBUG Performance Model	Register5: 0xa	0xa
540000.00ns DEBUG Performance Model	Register6: 0x80000002	0x80000002
540000.00ns DEBUG Performance Model	Register7: 0xffffffff8	0xffffffff8
540000.00ns DEBUG Performance Model	Register8: 0x26	0x26
540000.00ns DEBUG Performance Model	Register9: 0x0	0x0
540000.00ns DEBUG Performance Model	Register10: 0x0	0x0
540000.00ns DEBUG Performance Model	Register11: 0x0	0x0
540000.00ns DEBUG Performance Model	Register12: 0x0	0x0
540000.00ns DEBUG Performance Model	Register13: 0x0	0x0
540000.00ns DEBUG Performance Model	Register14: 0x40	0x40
540000.00ns DEBUG Performance Model	Register15: 0x50	0x50
540000.00ns DEBUG Performance Model	***** Instruction No: 19 *****	
540000.00ns DEBUG Performance Model	***** Current Instruction *****	
540000.00ns DEBUG Performance Model	Binary string:111000010010111111111100011110	
540000.00ns DEBUG Performance Model	Operation type BX	

540000.00ns DEBUG Performance Model	Rm: 14
545000.00ns DEBUG Performance Model	***** Positive Clock Edge: 53 *****
555000.00ns DEBUG Performance Model	***** Positive Clock Edge: 54 *****
560000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
560000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
565000.00ns DEBUG Performance Model	***** Positive Clock Edge: 55 *****
570000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
570000.00ns DEBUG Performance Model	PC:0x40 PC:0x40
570000.00ns DEBUG Performance Model	Register0: 0x0 0x0
570000.00ns DEBUG Performance Model	Register1: 0x13 0x13
570000.00ns DEBUG Performance Model	Register2: 0x26 0x26
570000.00ns DEBUG Performance Model	Register3: 0x2 0x2
570000.00ns DEBUG Performance Model	Register4: 0x4c 0x4c
570000.00ns DEBUG Performance Model	Register5: 0xa 0xa
570000.00ns DEBUG Performance Model	Register6: 0x80000002 0x80000002
570000.00ns DEBUG Performance Model	Register7: 0xffffffff8 0xffffffff8
570000.00ns DEBUG Performance Model	Register8: 0x26 0x26
570000.00ns DEBUG Performance Model	Register9: 0x0 0x0
570000.00ns DEBUG Performance Model	Register10: 0x0 0x0
570000.00ns DEBUG Performance Model	Register11: 0x0 0x0
570000.00ns DEBUG Performance Model	Register12: 0x0 0x0
570000.00ns DEBUG Performance Model	Register13: 0x0 0x0
570000.00ns DEBUG Performance Model	Register14: 0x40 0x40
570000.00ns DEBUG Performance Model	Register15: 0x44 0x44
570000.00ns DEBUG Performance Model	***** Instruction No: 16 *****
570000.00ns DEBUG Performance Model	***** Current Instruction *****
570000.00ns DEBUG Performance Model	Binary string:1110001110100000000111000110011
570000.00ns DEBUG Performance Model	Operation type Data Processing
570000.00ns DEBUG Performance Model	cond:E
570000.00ns DEBUG Performance Model	Immediate bit:1
570000.00ns DEBUG Performance Model	cmd:D
570000.00ns DEBUG Performance Model	Set bit:0
570000.00ns DEBUG Performance Model	Rn:0 Rd:0
570000.00ns DEBUG Performance Model	rot:14 imm8:51
575000.00ns DEBUG Performance Model	***** Positive Clock Edge: 56 *****
585000.00ns DEBUG Performance Model	***** Positive Clock Edge: 57 *****
595000.00ns DEBUG Performance Model	***** Positive Clock Edge: 58 *****
600000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****

600000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
605000.00ns DEBUG Performance Model	***** Positive Clock Edge: 59 *****
610000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
610000.00ns DEBUG Performance Model	PC:0x44 PC:0x44
610000.00ns DEBUG Performance Model	Register0: 0x330 0x330
610000.00ns DEBUG Performance Model	Register1: 0x13 0x13
610000.00ns DEBUG Performance Model	Register2: 0x26 0x26
610000.00ns DEBUG Performance Model	Register3: 0x2 0x2
610000.00ns DEBUG Performance Model	Register4: 0x4c 0x4c
610000.00ns DEBUG Performance Model	Register5: 0xa 0xa
610000.00ns DEBUG Performance Model	Register6: 0x80000002 0x80000002
610000.00ns DEBUG Performance Model	Register7: 0xffffffff8 0xffffffff8
610000.00ns DEBUG Performance Model	Register8: 0x26 0x26
610000.00ns DEBUG Performance Model	Register9: 0x0 0x0
610000.00ns DEBUG Performance Model	Register10: 0x0 0x0
610000.00ns DEBUG Performance Model	Register11: 0x0 0x0
610000.00ns DEBUG Performance Model	Register12: 0x0 0x0
610000.00ns DEBUG Performance Model	Register13: 0x0 0x0
610000.00ns DEBUG Performance Model	Register14: 0x40 0x40
610000.00ns DEBUG Performance Model	Register15: 0x48 0x48
610000.00ns DEBUG Performance Model	***** Instruction No: 17 *****
610000.00ns DEBUG Performance Model	***** Current Instruction *****
610000.00ns DEBUG Performance Model	Binary string:1110001110100000111000000010000
610000.00ns DEBUG Performance Model	Operation type Data Processing
610000.00ns DEBUG Performance Model	cond:E
610000.00ns DEBUG Performance Model	Immediate bit:1
610000.00ns DEBUG Performance Model	cmd:D
610000.00ns DEBUG Performance Model	Set bit:0
610000.00ns DEBUG Performance Model	Rn:0 Rd:15
610000.00ns DEBUG Performance Model	rot:0 imm8:16
615000.00ns DEBUG Performance Model	***** Positive Clock Edge: 60 *****
625000.00ns DEBUG Performance Model	***** Positive Clock Edge: 61 *****
635000.00ns DEBUG Performance Model	***** Positive Clock Edge: 62 *****
640000.00ns DEBUG Performance Model	***** DUT DATAPATH Signals *****
640000.00ns DEBUG Performance Model	***** DUT Controller Signals *****
645000.00ns DEBUG Performance Model	***** Positive Clock Edge: 63 *****
650000.00ns DEBUG Performance Model	***** Performance Model / DUT Data *****
650000.00ns DEBUG Performance Model	PC:0x10 PC:0x10

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650000.00ns DEBUG Performance Model      Register0: 0x330    0x330
650000.00ns DEBUG Performance Model      Register1: 0x13     0x13
650000.00ns DEBUG Performance Model      Register2: 0x26     0x26
650000.00ns DEBUG Performance Model      Register3: 0x2     0x2
650000.00ns DEBUG Performance Model      Register4: 0x4c    0x4c
650000.00ns DEBUG Performance Model      Register5: 0xa     0xa
650000.00ns DEBUG Performance Model      Register6: 0x80000002 0x80000002
650000.00ns DEBUG Performance Model      Register7: 0xffffffff8 0xffffffff8
650000.00ns DEBUG Performance Model      Register8: 0x26    0x26
650000.00ns DEBUG Performance Model      Register9: 0x0     0x0
650000.00ns DEBUG Performance Model      Register10: 0x0    0x0
650000.00ns DEBUG Performance Model      Register11: 0x0   0x0
650000.00ns DEBUG Performance Model      Register12: 0x0   0x0
650000.00ns DEBUG Performance Model      Register13: 0x0   0x0
650000.00ns DEBUG Performance Model      Register14: 0x40   0x40
650000.00ns DEBUG Performance Model      Register15: 0x14   0x14
651000.00ns INFO  cocotb.regression    Multi_cycle_test passed
651000.00ns INFO  cocotb.regression
*****
** TEST           STATUS SIM TIME (ns) REAL TIME (s) RATIO (ns/s) **
*****
** Multi_Cycle_Test.Multi_cycle_test PASS 651000.00      0.11  6033249.60 **
*****
** TESTS=1 PASS=1 FAIL=0 SKIP=0          651000.00      0.26  2539966.48 **
*****

```

```

make[1]: Leaving directory '/c/Users/alper/Desktop/EE/EE5-2/EE446/Prelim/Exp3/EE446_EXP3_2375467_code/CocoTB/Test'
(base) PS C:\Users\alper\Desktop\EE\EE5-2\EE446\Prelim\Exp3\EE446_EXP3_2375467_code\CocoTB\Test>

```

