第11次組語實習課

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2023 Advanced Mixed-Operation System (AMOS) Lab.

Tamkang University
Department of Electrical and Computer Engineering
No.151, Yingzhuan Rd., Tamsui Dist., New Taipei City 25137, Taiwan (R.O.C.)

目錄

第三次作業

2023 Advanced Mixed-Operation System (AMOS) Lab.

Tamkang University
Department of Electrical and Computer Engineering
No.151, Yingzhuan Rd., Tamsui Dist., New Taipei City 25137, Taiwan (R.O.C.)

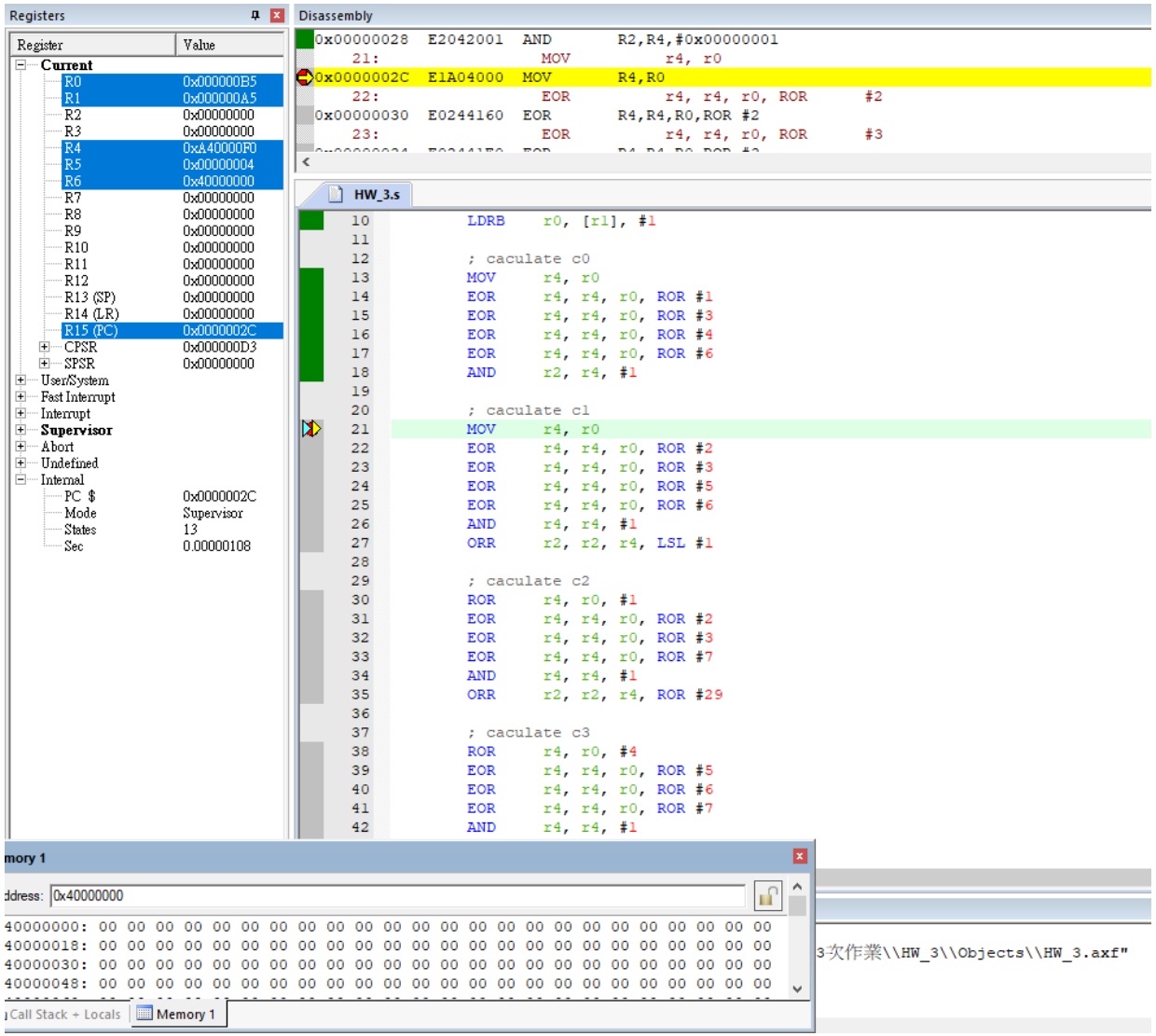
評分標準

- 八個結果截圖(80%)
  - 第一次迴圈(五個截圖)
  - 第二～四次迴圈(各一個)
- 四個手算過程(20%)

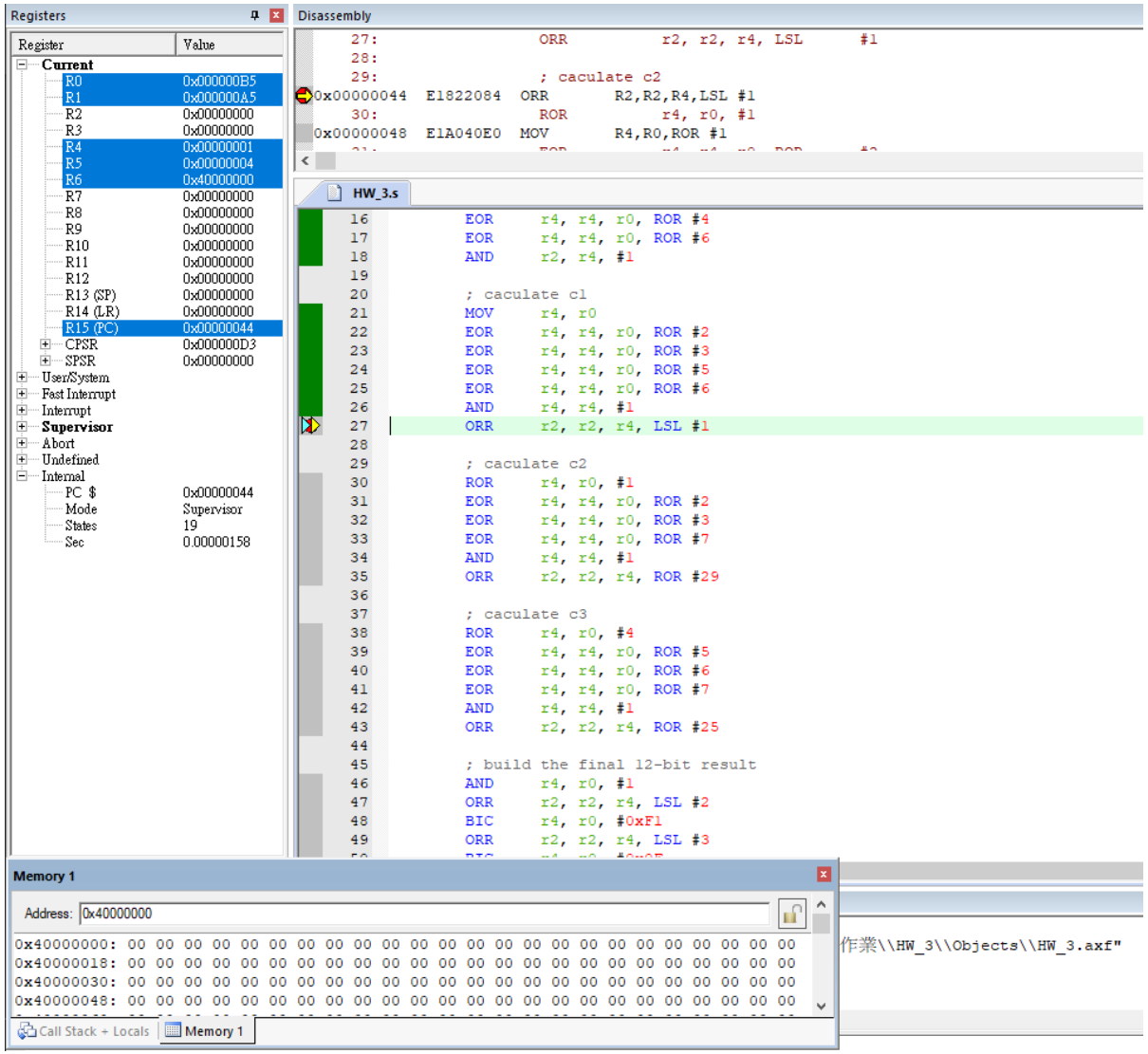
不計分
程式碼沒有學號、姓名
暫存器模糊不清楚
暫存器視窗沒拉開
暫存器數值不正確

- **以最後繳交的版本為準**
- **遲交者成績 = 原始成績*0.5**

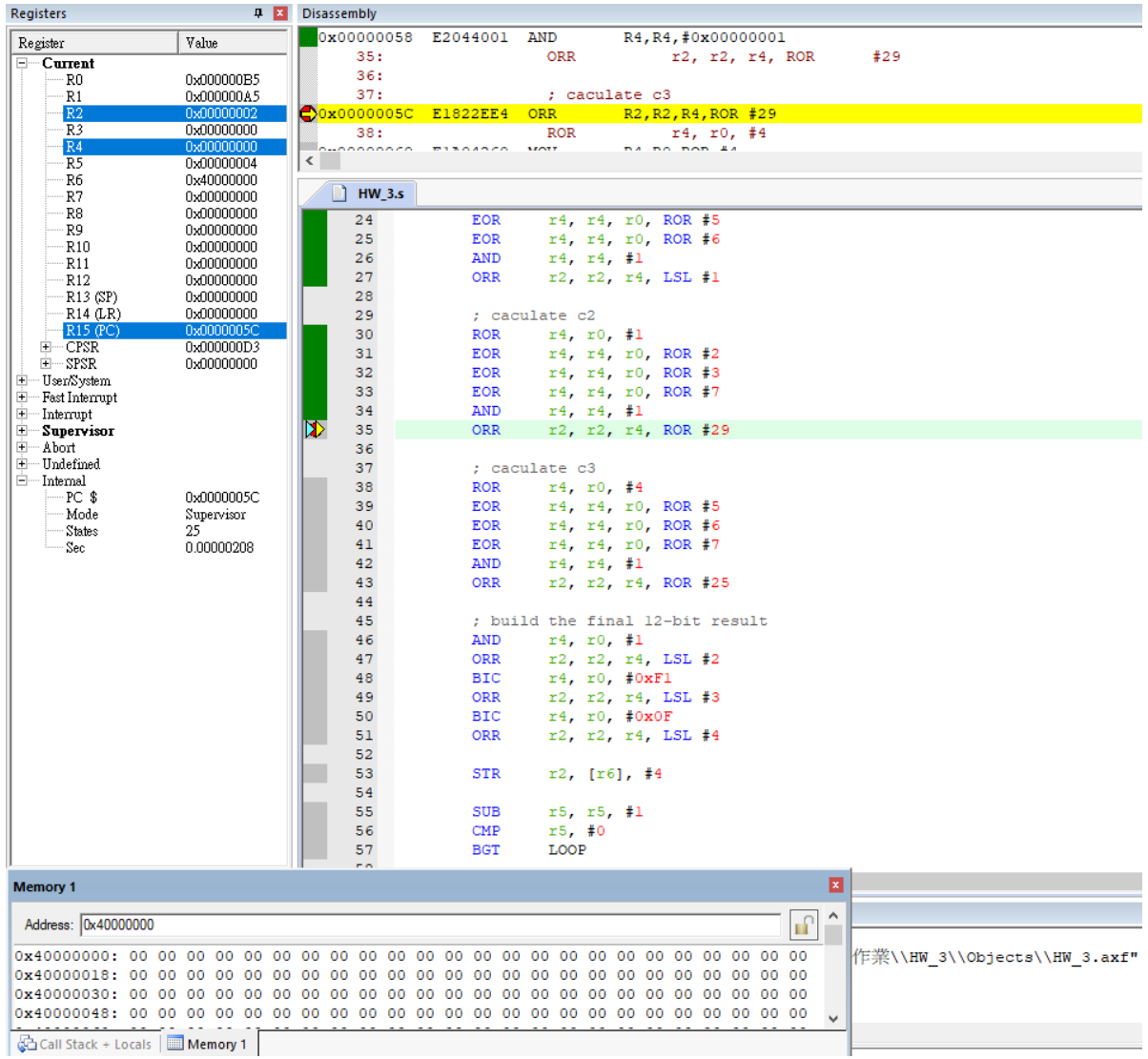
解答(1/8)


Registers
Register
Value
Current
R0 0x000000B5
R1 0x000000A5
R2 0x00000000
R3 0x00000000
R4 0xA40000F0
R5 0x00000004
R6 0x40000000
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x0000002C
CPSR 0x000000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x0000002C
Mode Supervisor
States 13
Sec 0.00000108
Disassembly
0x00000028 E2042001 AND R2,R4,#0x00000001
21: MOV r4, r0
0x0000002C E1A04000 MOV R4,R0
22: EOR r4, r4, r0, ROR #2
0x00000030 E0244160 EOR R4,R4,R0,ROR #2
23: EOR r4, r4, r0, ROR #3
HW_3.s
10 LDRB r0, [r1], #1
11
12 ; caculate c0
13 MOV r4, r0
14 EOR r4, r4, r0, ROR #1
15 EOR r4, r4, r0, ROR #3
16 EOR r4, r4, r0, ROR #4
17 EOR r4, r4, r0, ROR #6
18 AND r2, r4, #1
19
20 ; caculate c1
21 MOV r4, r0
22 EOR r4, r4, r0, ROR #2
23 EOR r4, r4, r0, ROR #3
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
35 ORR r2, r2, r4, ROR #29
36
37 ; caculate c3
38 ROR r4, r0, #4
39 EOR r4, r4, r0, ROR #5
40 EOR r4, r4, r0, ROR #6
41 EOR r4, r4, r0, ROR #7
42 AND r4, r4, #1
mory 1
ddress: 0x40000000
40000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
3次作業\\HW_3\\Objects\\HW_3.axf"

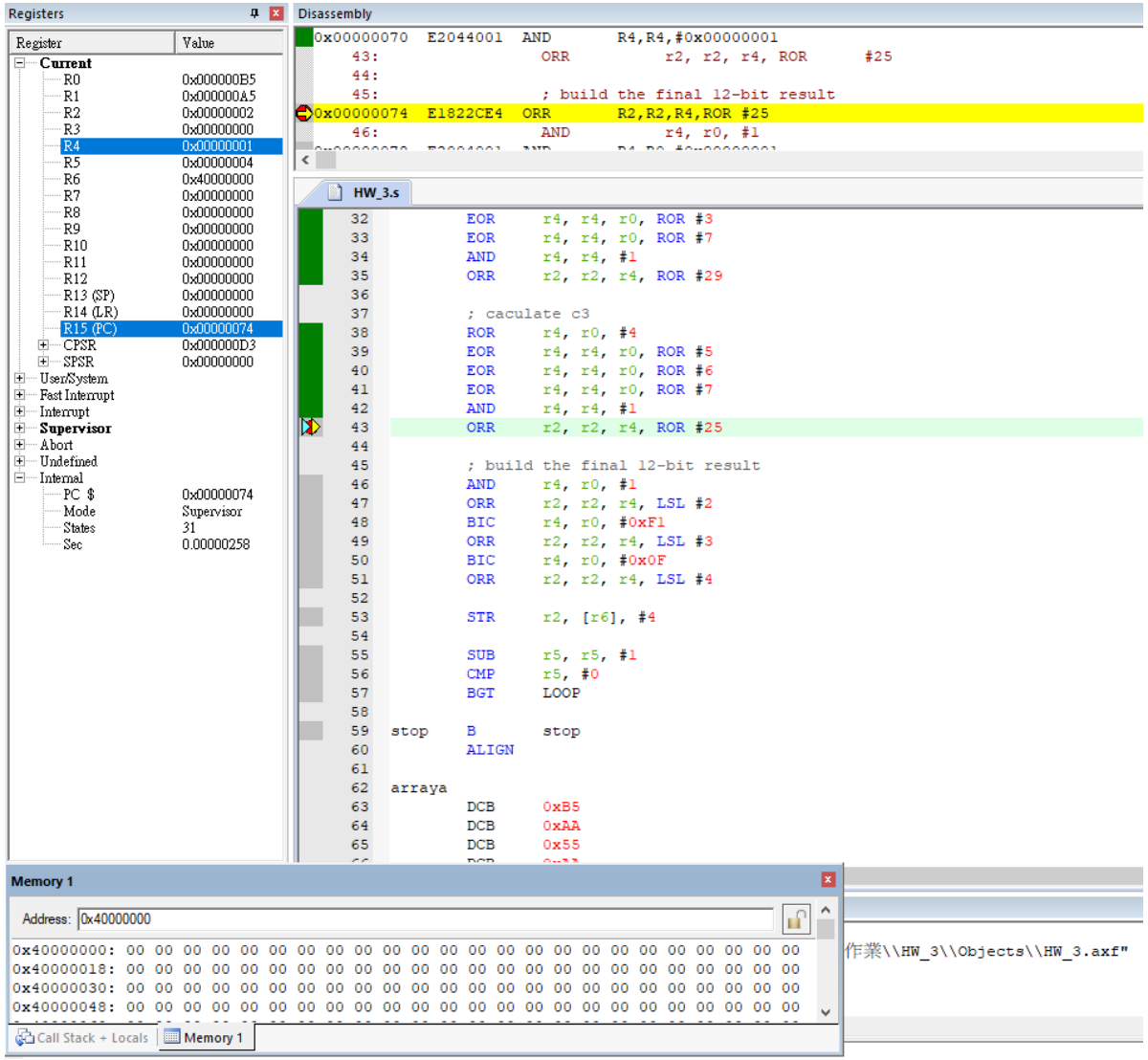
解答(2/8)


Registers
Register
Value
Current
R0 0x000000B5
R1 0x000000A5
R2 0x00000000
R3 0x00000000
R4 0x00000001
R5 0x00000004
R6 0x40000000
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x00000044
CPSR 0x000000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x00000044
Mode Supervisor
States 19
Sec 0.00000158
Disassembly
27: ORR r2, r2, r4, LSL #1
28:
29: ; caculate c2
0x00000044 E1822084 ORR R2,R2,R4,LSL #1
30: ROR r4, r0, #1
0x00000048 E1A040E0 MOV R4,R0,ROR #1
HW_3.s
16 EOR r4, r4, r0, ROR #4
17 EOR r4, r4, r0, ROR #6
18 AND r2, r4, #1
19
20 ; caculate c1
21 MOV r4, r0
22 EOR r4, r4, r0, ROR #2
23 EOR r4, r4, r0, ROR #3
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
35 ORR r2, r2, r4, ROR #29
36
37 ; caculate c3
38 ROR r4, r0, #4
39 EOR r4, r4, r0, ROR #5
40 EOR r4, r4, r0, ROR #6
41 EOR r4, r4, r0, ROR #7
42 AND r4, r4, #1
43 ORR r2, r2, r4, ROR #25
44
45 ; build the final 12-bit result
46 AND r4, r0, #1
47 ORR r2, r2, r4, LSL #2
48 BIC r4, r0, #0xF1
49 ORR r2, r2, r4, LSL #3
Memory 1
Address: 0x40000000
0x40000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

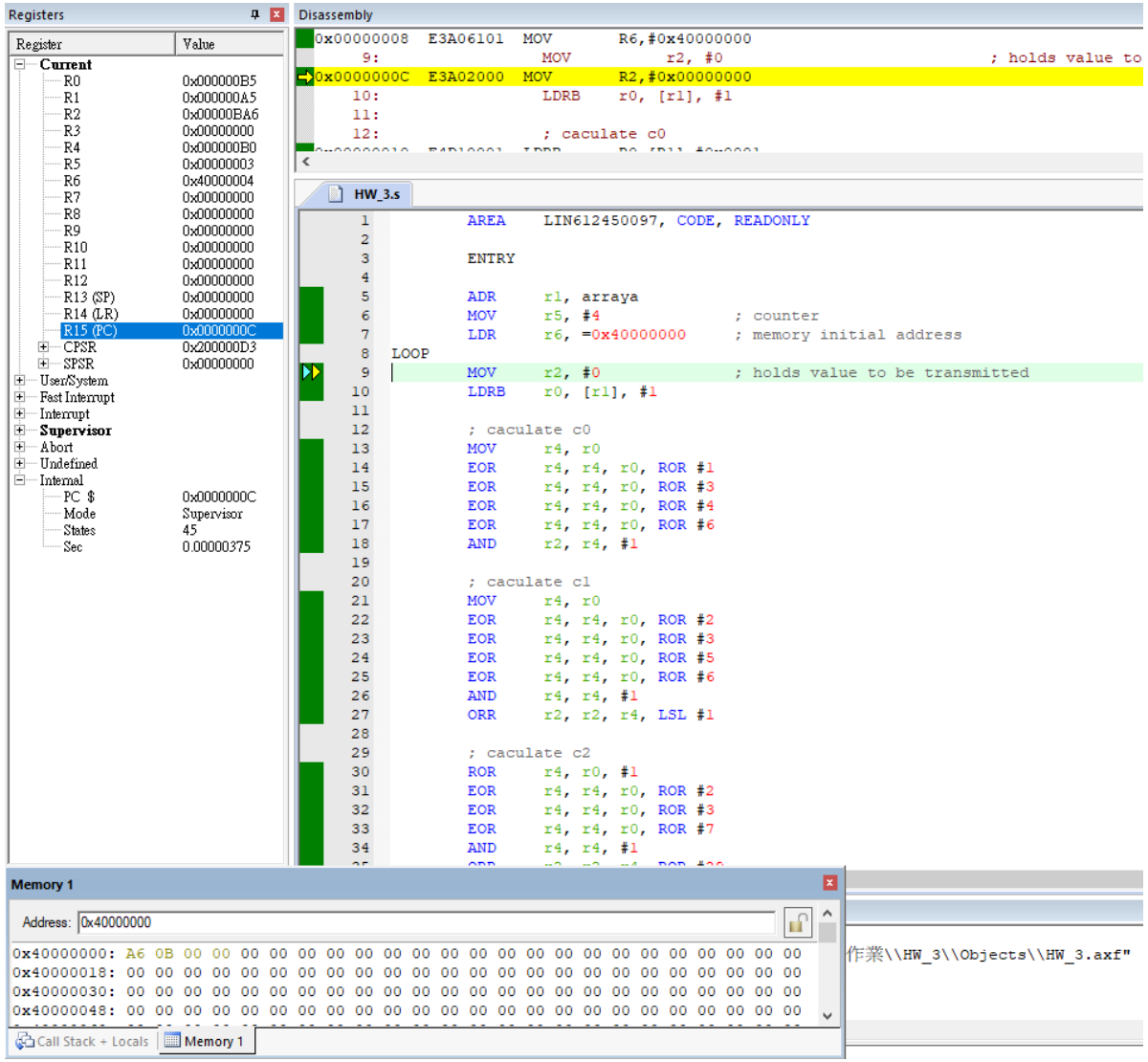
解答(3/8)


Registers
Register
Value
Current
R0 0x000000B5
R1 0x000000A5
R2 0x00000002
R3 0x00000000
R4 0x00000000
R5 0x00000004
R6 0x40000000
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x0000005C
CPSR 0x000000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x0000005C
Mode Supervisor
States 25
Sec 0.00000208
Disassembly
0x00000058 E2044001 AND R4,R4,#0x00000001
35: ORR r2, r2, r4, ROR #29
36:
37: ; caculate c3
0x0000005C E1822EE4 ORR R2,R2,R4,ROR #29
38: ROR r4, r0, #4
HW_3.s
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
35 ORR r2, r2, r4, ROR #29
36
37 ; caculate c3
38 ROR r4, r0, #4
39 EOR r4, r4, r0, ROR #5
40 EOR r4, r4, r0, ROR #6
41 EOR r4, r4, r0, ROR #7
42 AND r4, r4, #1
43 ORR r2, r2, r4, ROR #25
44
45 ; build the final 12-bit result
46 AND r4, r0, #1
47 ORR r2, r2, r4, LSL #2
48 BIC r4, r0, #0xF1
49 ORR r2, r2, r4, LSL #3
50 BIC r4, r0, #0x0F
51 ORR r2, r2, r4, LSL #4
52
53 STR r2, [r6], #4
54
55 SUB r5, r5, #1
56 CMP r5, #0
57 BGT LOOP
Memory 1
Address: 0x40000000
0x40000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

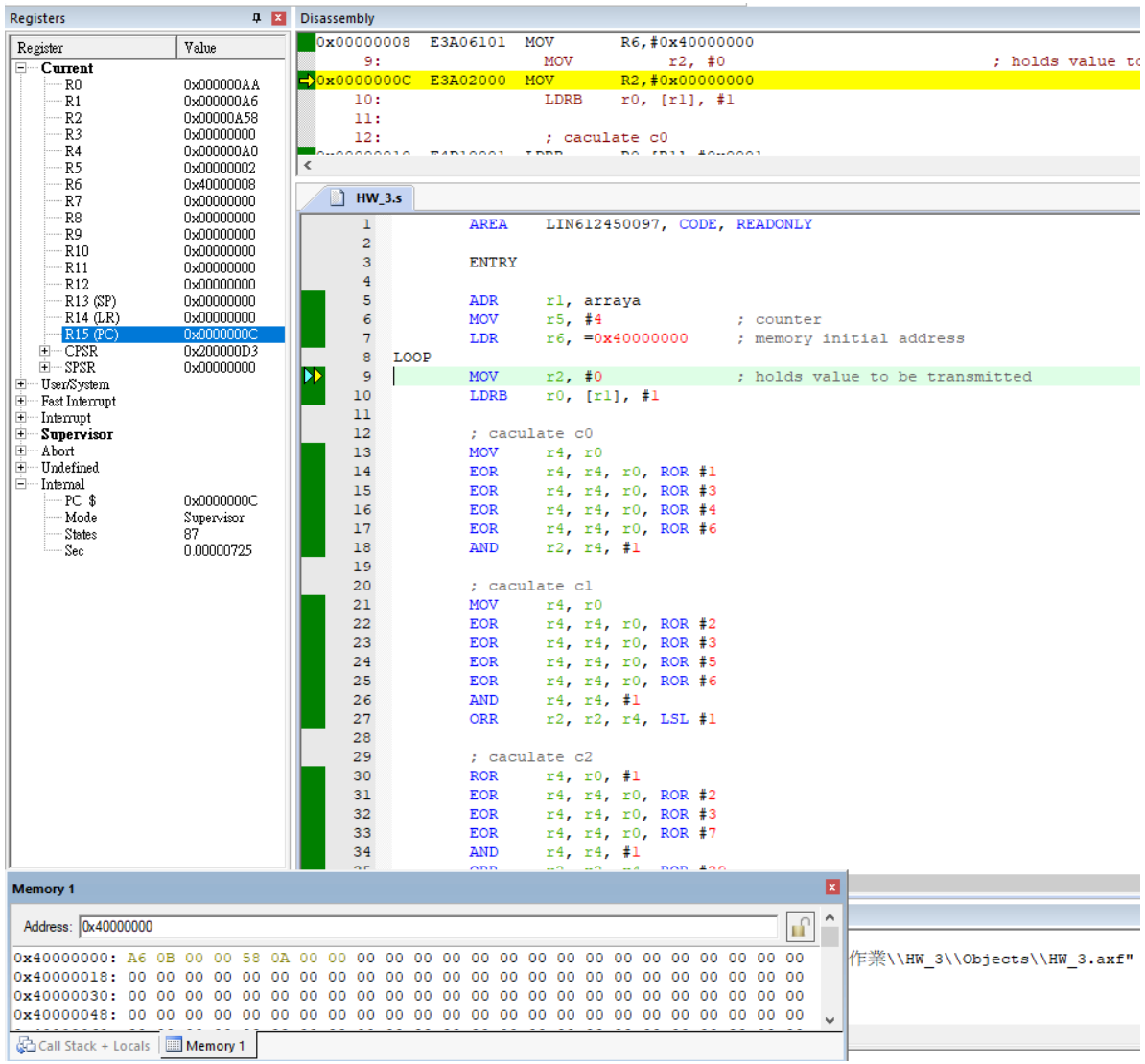
解答(4/8)


Registers
Register
Value
Current
R0 0x000000B5
R1 0x000000A5
R2 0x00000002
R3 0x00000000
R4 0x00000001
R5 0x00000004
R6 0x40000000
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x00000074
CPSR 0x000000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x00000074
Mode Supervisor
States 31
Sec 0.00000258
Disassembly
0x00000070 E2044001 AND R4,R4,#0x00000001
43: ORR r2, r2, r4, ROR #25
44:
45: ; build the final 12-bit result
0x00000074 E1822CE4 ORR R2,R2,R4,ROR #25
46: AND r4, r0, #1
HW_3.s
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
35 ORR r2, r2, r4, ROR #29
36
37 ; caculate c3
38 ROR r4, r0, #4
39 EOR r4, r4, r0, ROR #5
40 EOR r4, r4, r0, ROR #6
41 EOR r4, r4, r0, ROR #7
42 AND r4, r4, #1
43 ORR r2, r2, r4, ROR #25
44
45 ; build the final 12-bit result
46 AND r4, r0, #1
47 ORR r2, r2, r4, LSL #2
48 BIC r4, r0, #0xF1
49 ORR r2, r2, r4, LSL #3
50 BIC r4, r0, #0x0F
51 ORR r2, r2, r4, LSL #4
52
53 STR r2, [r6], #4
54
55 SUB r5, r5, #1
56 CMP r5, #0
57 BGT LOOP
58
59 stop B stop
60 ALIGN
61
62 arraya
63 DCB 0xB5
64 DCB 0xAA
65 DCB 0x55
Memory 1
Address: 0x40000000
0x40000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

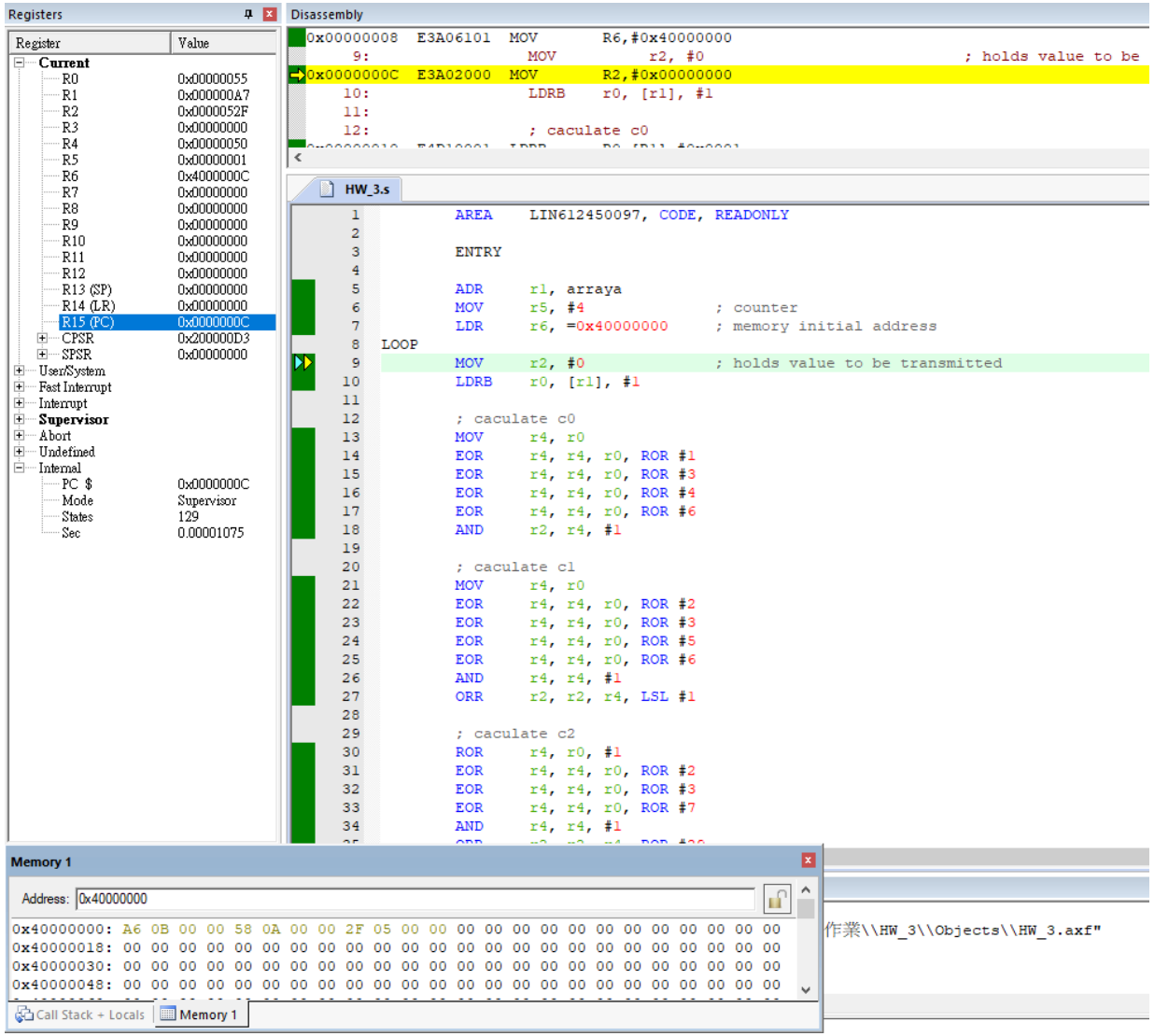
解答(5/8)


Registers
Register
Value
Current
R0 0x000000B5
R1 0x000000A5
R2 0x00000BA6
R3 0x00000000
R4 0x000000B0
R5 0x00000003
R6 0x40000004
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x0000000C
CPSR 0x200000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x0000000C
Mode Supervisor
States 45
Sec 0.00000375
Disassembly
0x00000008 E3A06101 MOV R6,#0x40000000
9: MOV r2, #0 ; holds value to
0x0000000C E3A02000 MOV R2,#0x00000000
10: LDRB r0, [r1], #1
11:
12: ; caculate c0
HW_3.s
1 AREA LIN612450097, CODE, READONLY
2
3 ENTRY
4
5 ADR r1, arraya
6 MOV r5, #4 ; counter
7 LDR r6, =0x40000000 ; memory initial address
8 LOOP
9 MOV r2, #0 ; holds value to be transmitted
10 LDRB r0, [r1], #1
11
12 ; caculate c0
13 MOV r4, r0
14 EOR r4, r4, r0, ROR #1
15 EOR r4, r4, r0, ROR #3
16 EOR r4, r4, r0, ROR #4
17 EOR r4, r4, r0, ROR #6
18 AND r2, r4, #1
19
20 ; caculate c1
21 MOV r4, r0
22 EOR r4, r4, r0, ROR #2
23 EOR r4, r4, r0, ROR #3
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
Memory 1
Address: 0x40000000
0x40000000: A6 0B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

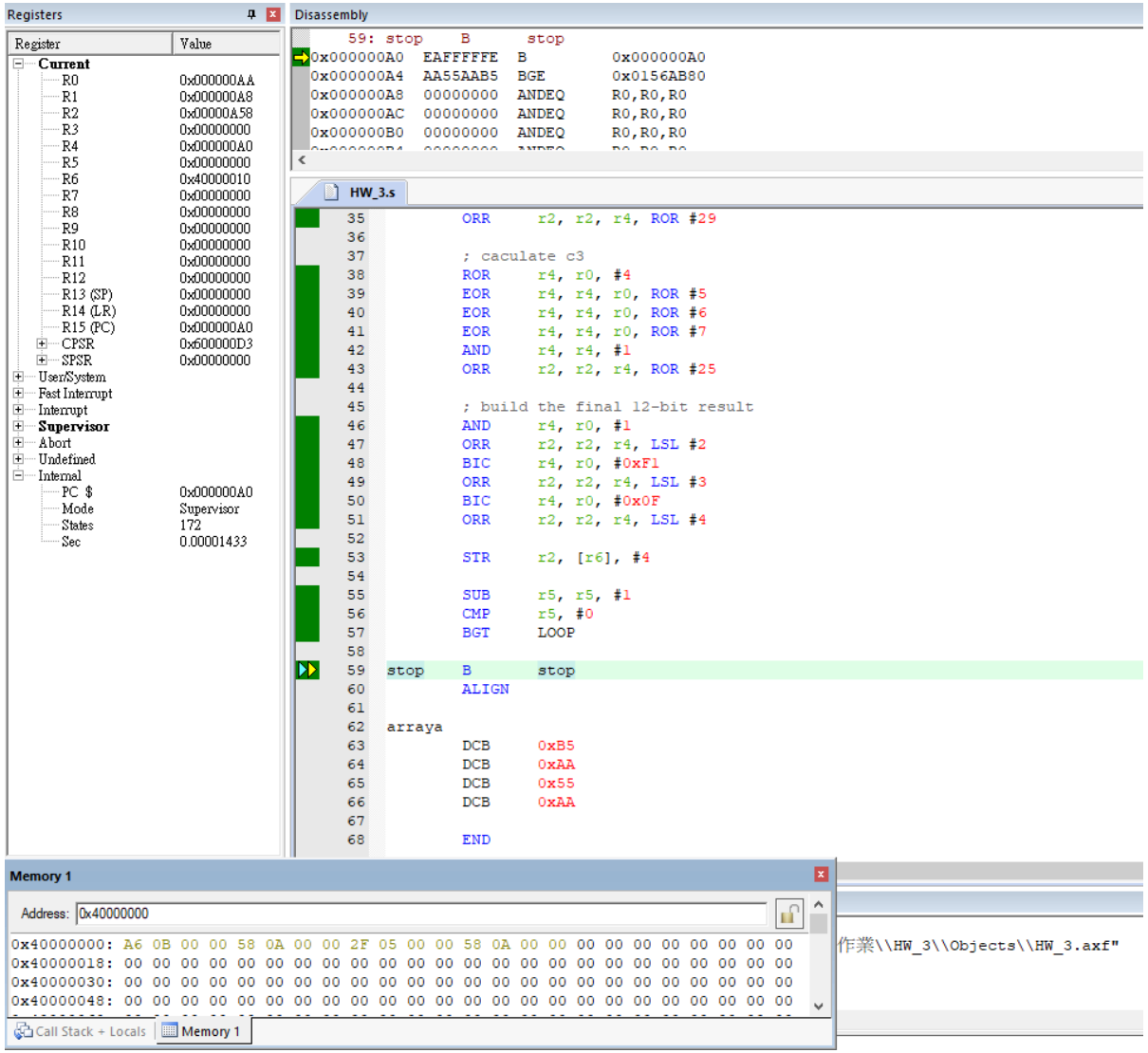
解答(6/8)


Registers
Register
Value
Current
R0 0x000000AA
R1 0x000000A6
R2 0x00000A58
R3 0x00000000
R4 0x000000A0
R5 0x00000002
R6 0x40000008
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x0000000C
CPSR 0x200000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x0000000C
Mode Supervisor
States 87
Sec 0.00000725
Disassembly
0x00000008 E3A06101 MOV R6,#0x40000000
9: MOV r2, #0 ; holds value to
0x0000000C E3A02000 MOV R2,#0x00000000
10: LDRB r0, [r1], #1
11:
12: ; caculate c0
HW_3.s
1 AREA LIN612450097, CODE, READONLY
2
3 ENTRY
4
5 ADR r1, arraya
6 MOV r5, #4 ; counter
7 LDR r6, =0x40000000 ; memory initial address
8 LOOP
9 MOV r2, #0 ; holds value to be transmitted
10 LDRB r0, [r1], #1
11
12 ; caculate c0
13 MOV r4, r0
14 EOR r4, r4, r0, ROR #1
15 EOR r4, r4, r0, ROR #3
16 EOR r4, r4, r0, ROR #4
17 EOR r4, r4, r0, ROR #6
18 AND r2, r4, #1
19
20 ; caculate c1
21 MOV r4, r0
22 EOR r4, r4, r0, ROR #2
23 EOR r4, r4, r0, ROR #3
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
Memory 1
Address: 0x40000000
0x40000000: A6 0B 00 00 58 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
作業\\HW_3\\Objects\\HW_3.axf"
Call Stack + Locals
Memory 1

解答(7/8)


Registers
Register
Value
Current
R0 0x00000055
R1 0x000000A7
R2 0x0000052F
R3 0x00000000
R4 0x00000050
R5 0x00000001
R6 0x4000000C
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x0000000C
CPSR 0x200000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x0000000C
Mode Supervisor
States 129
Sec 0.00001075
Disassembly
0x00000008 E3A06101 MOV R6,#0x40000000
9: MOV r2, #0 ; holds value to be
0x0000000C E3A02000 MOV R2,#0x00000000
10: LDRB r0, [r1], #1
11:
12: ; caculate c0
HW_3.s
1 AREA LIN612450097, CODE, READONLY
2
3 ENTRY
4
5 ADR r1, arraya
6 MOV r5, #4 ; counter
7 LDR r6, =0x40000000 ; memory initial address
8 LOOP
9 MOV r2, #0 ; holds value to be transmitted
10 LDRB r0, [r1], #1
11
12 ; caculate c0
13 MOV r4, r0
14 EOR r4, r4, r0, ROR #1
15 EOR r4, r4, r0, ROR #3
16 EOR r4, r4, r0, ROR #4
17 EOR r4, r4, r0, ROR #6
18 AND r2, r4, #1
19
20 ; caculate c1
21 MOV r4, r0
22 EOR r4, r4, r0, ROR #2
23 EOR r4, r4, r0, ROR #3
24 EOR r4, r4, r0, ROR #5
25 EOR r4, r4, r0, ROR #6
26 AND r4, r4, #1
27 ORR r2, r2, r4, LSL #1
28
29 ; caculate c2
30 ROR r4, r0, #1
31 EOR r4, r4, r0, ROR #2
32 EOR r4, r4, r0, ROR #3
33 EOR r4, r4, r0, ROR #7
34 AND r4, r4, #1
Memory 1
Address: 0x40000000
0x40000000: A6 0B 00 00 58 0A 00 00 2F 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

解答(8/8)


Registers
Register
Value
Current
R0 0x000000AA
R1 0x000000A8
R2 0x00000A58
R3 0x00000000
R4 0x000000A0
R5 0x00000000
R6 0x40000010
R7 0x00000000
R8 0x00000000
R9 0x00000000
R10 0x00000000
R11 0x00000000
R12 0x00000000
R13 (SP) 0x00000000
R14 (LR) 0x00000000
R15 (PC) 0x000000A0
CPSR 0x600000D3
SPSR 0x00000000
User/System
Fast Interrupt
Interrupt
Supervisor
Abort
Undefined
Internal
PC $ 0x000000A0
Mode Supervisor
States 172
Sec 0.00001433
Disassembly
59: stop B stop
0x000000A0 EAFFFFFE B 0x000000A0
0x000000A4 AA55AAB5 BGE 0x0156AB80
0x000000A8 00000000 ANDEQ R0,R0,R0
0x000000AC 00000000 ANDEQ R0,R0,R0
0x000000B0 00000000 ANDEQ R0,R0,R0
HW_3.s
35 ORR r2, r2, r4, ROR #29
36
37 ; caculate c3
38 ROR r4, r0, #4
39 EOR r4, r4, r0, ROR #5
40 EOR r4, r4, r0, ROR #6
41 EOR r4, r4, r0, ROR #7
42 AND r4, r4, #1
43 ORR r2, r2, r4, ROR #25
44
45 ; build the final 12-bit result
46 AND r4, r0, #1
47 ORR r2, r2, r4, LSL #2
48 BIC r4, r0, #0xF1
49 ORR r2, r2, r4, LSL #3
50 BIC r4, r0, #0x0F
51 ORR r2, r2, r4, LSL #4
52
53 STR r2, [r6], #4
54
55 SUB r5, r5, #1
56 CMP r5, #0
57 BGT LOOP
58
59 stop B stop
60 ALIGN
61
62 arraya
63 DCB 0xB5
64 DCB 0xAA
65 DCB 0x55
66 DCB 0xAA
67
68 END
Memory 1
Address: 0x40000000
0x40000000: A6 0B 00 00 58 0A 00 00 2F 05 00 00 58 0A 00 00 00 00 00 00 00 00 00 00
0x40000018: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x40000048: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Call Stack + Locals
Memory 1
作業\\HW_3\\Objects\\HW_3.axf"

1205正課複習

2023 Advanced Mixed-Operation System (AMOS) Lab.

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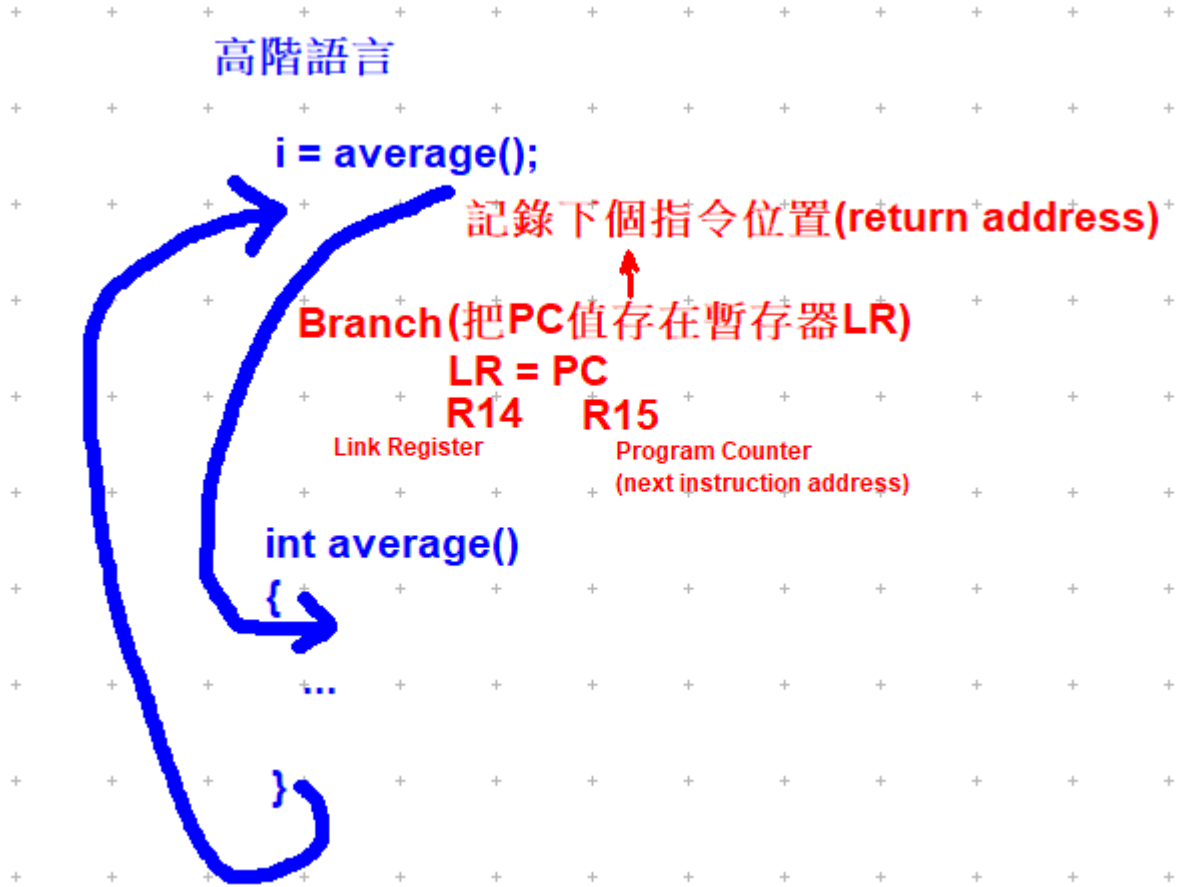
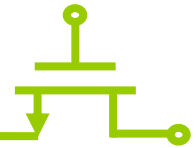
第四次作業-整理

- Step1：自己創造七組12-bit value
  - 一組正確
  - 四組錯一個checksum bit(分別錯C0、 C1、 C2、 C3)(改checksum bit)
  - 兩組錯兩個checksum bit(一組錯C0與C3，另一組錯C1與C2)(改data bit)
- Step2：把12-bit value中的8-bit data取出
- Step3：將分離出來的原始8-bit data，找出checksum bits
- Step4：比較12-bit value中之checksum bits與8 data bits計算出之checksum bits
- Step5：checksums錯誤的處理規則
  - 沒有錯誤的與有一個錯誤的→直接取出8-bit data存入r6
  - 兩個錯誤的→找出錯誤的data bit，將該bit反向，再取出8-bit data存入r6

p.109 Subroutine(Procedure/Function)



p.109 Subroutine(Procedure/Function)



註記回來的地方

Branch and Link

MOV PC, LR
MOV R15, R14

可以寫成

Branch and Exchange

Ex：
BX R5
PC <-> R5

```
                AREA Example, CODE
                ENTRY                       ; mark first instruction
                BL      func1               ; call first subroutine   LR = PC
                BL      func2               ; call second subroutine
stop            B       stop                ; terminate the program
func1           LDR     r0, =42             ; => MOV r0, #42
                LDR     r1, =0x12345678     ; => LDR r1, [PC, #N]
                                            ; where N=offset to literal pool 1
                LDR     r2, =0xFFFFFFFF     ; => MVN r2, #0
                BX      lr                  ; return from subroutine   PC <-> LR
                LTORG                       ; literal pool 1 has 0x12345678
func2           LDR     r3, =0x12345678     ; => LDR r3, [PC, #N]
                                            ; N=offset back to literal pool 1
                ;LDR    r4, =0x87654321     ; if this is uncommented, it fails.
                                            ; Literal pool 2 is out of reach!
                BX      lr                  ; return from subroutine
BigTable
                SPACE 4200                  ; clears 4200 bytes of memory,
                                            ; starting here
                END                         ; literal pool 2 empty
```

Load program into memory
and 1st instruction address into PC

Instruction Cycle：
1. Fetch next inst.(from memory according PC)
2. Update PC
3. Decode
4. Execute

p.109 Subroutine(Procedure/Function)

```
                AREA Example, CODE
                ENTRY                       ; mark first instruction
                BL      func1               ; call first subroutine
                BL      func2               ; call second subroutine
stop            B       stop                ; terminate the program
func1           LDR     r0, =42             ; => MOV r0, #42
                LDR     r1, =0x12345678     ; => LDR r1, [PC, #N]
                                            ; where N=offset to literal pool 1
                LDR     r2, =0xFFFFFFFF     ; => MVN r2, #0
                BX      lr                  ; return from subroutine
literal pool origin
                LTORG                       ; literal pool 1 has 0x12345678
func2           LDR     r3, =0x12345678     ; => LDR r3, [PC, #N]
                                            ; N=offset back to literal pool 1
                ;LDR    r4, =0x87654321     ; if this is uncommented, it fails.
                                            ; Literal pool 2 is out of reach!
                BX      lr                  ; return from subroutine
BigTable
                SPACE 4200                  ; clears 4200 bytes of memory,
                                            ; starting here
                END                         ; literal pool 2 empty
literal pool number
                0x12345678
```

指定literal pool位置，因為N不能太大。

若有假想的指令且未指定literal pool位置，則數值會存在END後面。

p.110 FIGURE 6.6

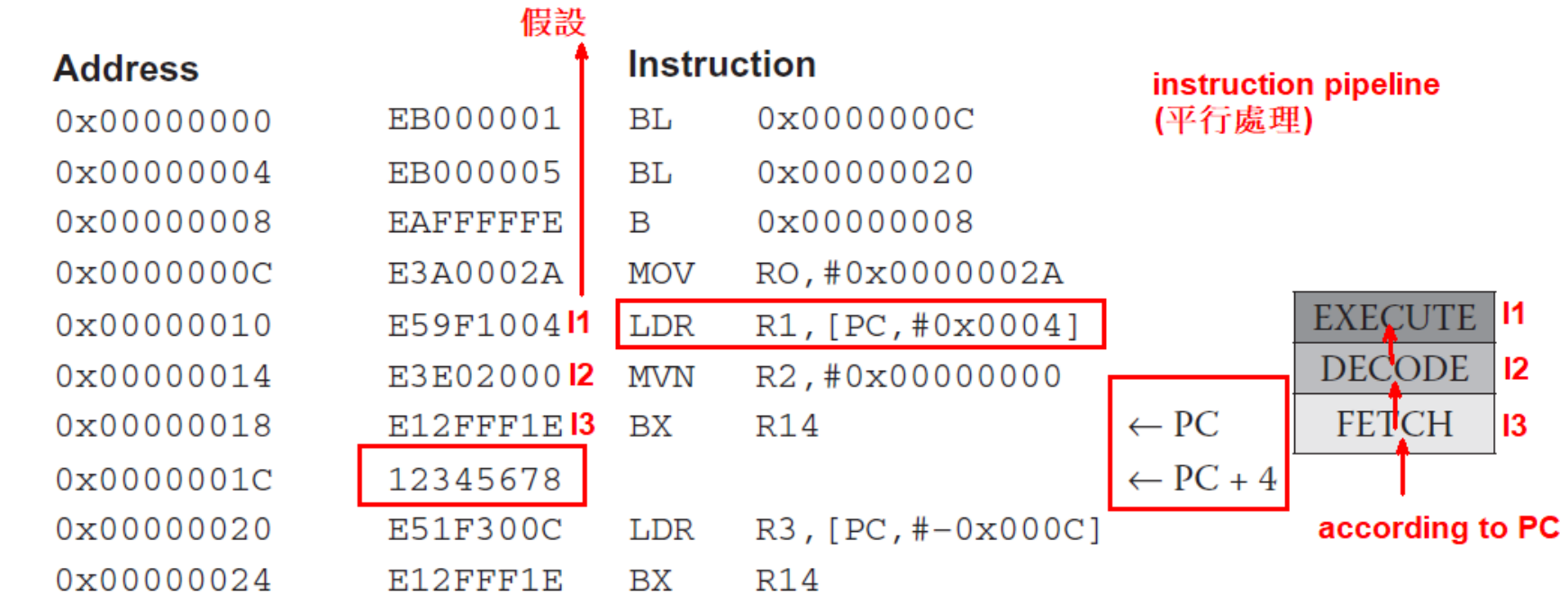


FIGURE 6.6 Disassembly of ARM7TDMI program.

Q&A

Thanks for your attention !!