H M Mythreya PES2UG20CS130 MPCA-Lab Week-3

Task 1: Write a program in ARM7TDMI-ISA to find GCD of two numbers.

a) Operands in CPU registers

```
.TEXT

MOV R0,#50

MOV R1,#20

LOOP1:

CMP R0,R1

BEQ RES

BLT LOOP2

SUB R0,R0,R1

B LOOP1

LOOP2:

SUB R1,R1,R0

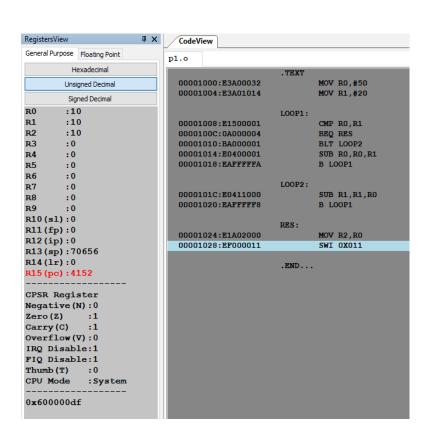
B LOOP1

RES:

MOV R2,R0

SWI 0X011
```

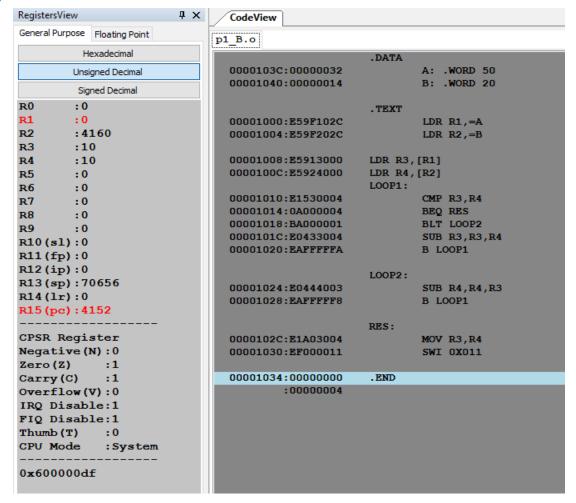
.END



b) Operands in memory locations.

```
.DATA
      A: .WORD 50
      B: .WORD 20
.TEXT
      LDR R1,=A
      LDR R2,=B
LDR R3,[R1]
LDR R4,[R2]
L00P1:
      CMP R3,R4
      BEQ RES
      BLT LOOP2
      SUB R3, R3, R4
      B LOOP1
L00P2:
      SUB R4, R4, R3
      B LOOP1
RES:
      MOV R3,R4
      SWI 0X011
```

.END



- 2) Write a program in ARM7TDMI-ISA to find the sum of N data items in the memory. Store the result in the memory location
- a) Post-indexing addressing mode.

```
.DATA
A: .WORD 23,12,16,17,5

.TEXT

LDR R0,=A

MOV R1,#0

B LOOP1

LOOP1:

LDR R2,[R0],#4

ADD R3,R3,R2

ADD R1,R1,#1

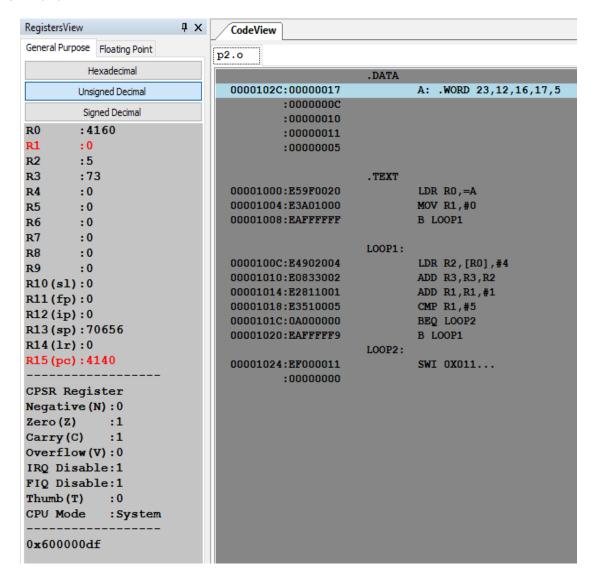
CMP R1,#5

BEQ LOOP2

B LOOP1

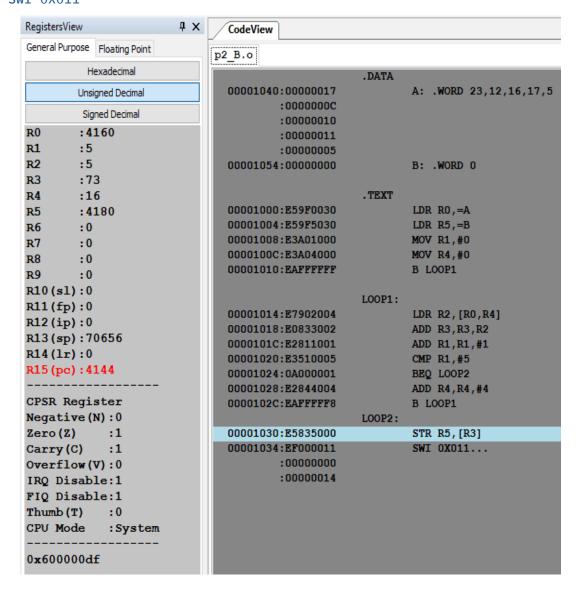
LOOP2:

SWI 0X011
```



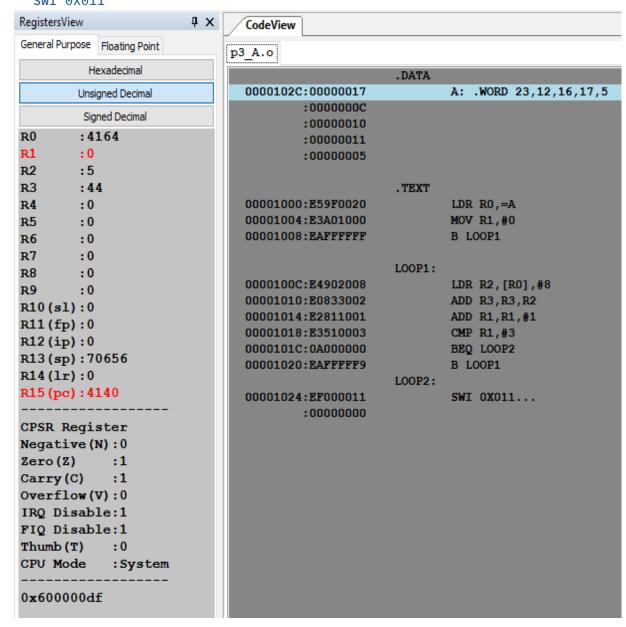
b) Pre-indexing addressing mode.

```
.DATA
      A: .WORD 23,12,16,17,5
      B: .WORD 0
.TEXT
      LDR R0,=A
      LDR R5,=B
      MOV R1,#0
      MOV R4,#0
      B L00P1
L00P1:
      LDR R2, [R0, R4]
      ADD R3, R3, R2
      ADD R1,R1,#1
      CMP R1,#5
      BEQ LOOP2
      ADD R4, R4, #4
      B LOOP1
L00P2:
      STR R5,[R3]
      SWI 0X011
```

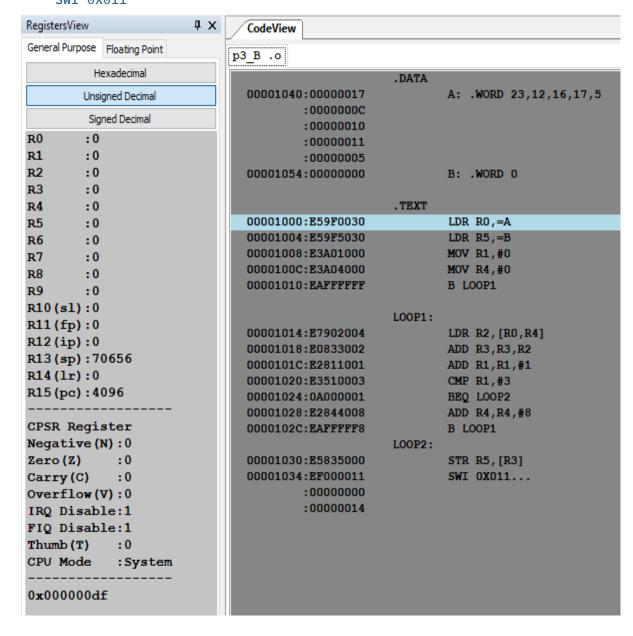


3) Write a program in ARM7TDMI-ISA to find the sum of N data items at alternate [odd or even positions] locations in the memory. Store the result in the memory location

a) Post-indexing addressing mode. .DATA A: .WORD 23,12,16,17,5 .TEXT LDR R0,=AMOV R1,#0 B LOOP1 L00P1: LDR R2, [R0], #8 ADD R3, R3, R2 ADD R1,R1,#1 CMP R1,#3 BEQ LOOP2 B LOOP1 L00P2: SWI 0X011



```
b) Pre-indexing addressing mode.
.DATA
      A: .WORD 23,12,16,17,5
      B: .WORD 0
.TEXT
      LDR R0,=A
      LDR R5,=B
      MOV R1,#0
      MOV R4,#0
      B LOOP1
L00P1:
      LDR R2, [R0, R4]
      ADD R3, R3, R2
      ADD R1, R1, #1
      CMP R1,#3
      BEQ LOOP2
      ADD R4, R4, #8
      B L00P1
L00P2:
      STR R5, [R3]
      SWI 0X011
```



4)Write a program in ARM7TDMI-ISA to search for an element in an array. Store 00 if the search is unsuccessful and 01 if the search is successful in the register.

a) Linear-Search (Found condition)

.DATA

ARRAY: .WORD 17,20,6,25,1

SEARCH: .WORD 20 RESULT: .WORD 0

.TEXT

LDR R0,=ARRAY LDR R1,=SEARCH LDR R5,=RESULT MOV R2,#0

LDR R4,[R1] L00P1:

CMP R2,#5
BEQ FINISH
LDR R3,[R0],#4
CMP R3,R4
BEQ FOUND
ADD R2,R2,#1

FOUND:

MOV R6,#0 STR R6,[R5] B END

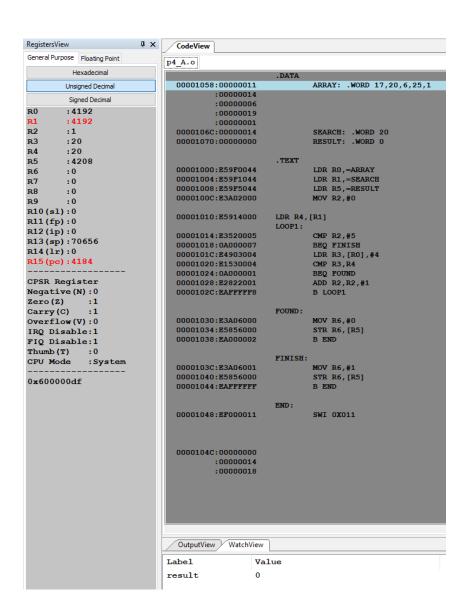
B LOOP1

FINISH:

MOV R6,#1 STR R6,[R5] B END

END:

SWI 0X011



Not found Condition:



a) Binary-Search (Found condition) .DATA ARRAY: .WORD 1,6,17,20,25 SEARCH: .WORD 6 RESULT: .WORD 0 T X CodeView RegistersView General Purpose Floating Point p4 B.o .TEXT Hexadecimal 0000109C:00000000 RESULT: .WORD 0 LDR R0, = ARRAY Unsigned Decimal . TEXT LDR R1,=SEARCH Signed Decimal 00001000:E59F0070 LDR RO,=ARRAY :4228 LDR R7,=RESULT 00001004:E59F1070 LDR R1,=SEARCH R1 :4248 00001008:E59F7070 LDR R7,=RESULT MOV R2,#1 R2 :1 0000100C:E3A02001 MOV R2,#1 MOV R3,#4 R3 :2 00001010:E3A03004 MOV R3,#4 R4 :6 00001014:E5914000 LDR R4, [R1] : 4 LDR R4, [R1] LOOP1: R6 :6 00001018:E1520003 CMP R2,R3 **R7** : 4252 L00P1: 0000101C:0A000011 BEQ FINISH R8 :0 CMP R2,R3 00001020:E0825003 ADD R5,R2,R3 R9 :0 00001024:E1A050A5 MOV R5, R5, LSR #1 **BEQ FINISH** R10(s1):0 00001028:E1A05105 MOV R5, R5, LSL #2 R11(fp):0 ADD R5, R2, R3 0000102C:E7906005 LDR R6, [R0,R5] R12(ip):0 00001030:E1540006 CMP R4,R6 MOV R5, R5, LSR #1 R13(sp):70656 00001034:0A000002 BEQ FOUND R14(lr):0 MOV R5, R5, LSL #2 00001038:BA000004 BLT LESSTHAN R15 (pc): 4216 0000103C:CA000006 BGT GREATERTHAN LDR R6, [R0, R5] 00001040:EAFFFFF4 B LOOP1 CPSR Register CMP R4,R6 Negative(N):0 **BEQ FOUND** Zero(Z) 00001044:E3A08000 MOV R8,#0 **BLT LESSTHAN** 00001048:E5878000 STR R8, [R7] Carry (C) Overflow (V):0 0000104C:EA000008 **BGT GREATERTHAN** IRQ Disable:1 B L00P1 FIQ Disable:1 00001050:E1A03005 MOV R3,R5 FOUND: Thumb (T) : 0 00001054:E1A03123 MOV R3,R3,LSR #2 CPU Mode :System MOV R8,#0 00001058:EAFFFFEE B LOOP1 STR R8, [R7] 0x600000df B END 0000105C:E1A02005 00001060:E1A02122 MOV R2,R2,LSR #2 00001064:EAFFFFEB B LOOP1 LESSTHAN: FINISH: MOV R3,R5 00001068:E3A08001 MOV R8,#1 MOV R3,R3,LSR #2 0000106C:E5878000 STR R8, [R7] B END 00001070:EAFFFFF **B LOOP1** 00001074:EF000011 SWI 0X011 **GREATERTHAN:** MOV R2, R5 MOV R2, R2, LSR #2 B L00P1 OutputView WatchView Label Value FINISH: 0 MOV R8,#1 result

STR R8, [R7]

SWI 0X011

B END

END:

Not Found Condition:

RegistersView 7 2	CodeView	
General Purpose Floating Point	p4_B.o	
Hexadecimal	0000109C:00000000	RESULT: .WORD 0
Unsigned Decimal		mavm
Signed Decimal	00001000:E59F0070	.TEXT D LDR RO,=ARRAY
R0 :4228	00001000:E59F1070	
R1 :4248	00001004:E59F7070	
R2 :1	0000100C:E3A02001	
R3 :1	00001010:E3A03004	MOV R3,#4
R4 :5		
R5 :4	00001014:E5914000	
R6 :6		LOOP1:
R7 :4252	00001018:E1520003	
R8 :1	0000101C:0A000011	-
R9 :0	00001020:E0825003	
R10(sl):0	00001024:E1A050A5 00001028:E1A05105	, , , , , , , , , , , , , , , , , , ,
R11(fp):0	00001026:EIA05103	
R12(ip):0	00001030:E1540006	
R13(sp):70656	00001034:0A000002	•
R14(lr):0	00001038:BA000004	
R15 (pc): 4212	0000103C:CA00000	BGT GREATERTHAN
	00001040:EAFFFFF	B LOOP1
CPSR Register		
Negative(N):0		FOUND:
Zero(Z) :1	00001044:E3A08000	
Carry(C) :1	00001048:E5878000	,
Overflow(V):0	0000104C:EA000008	B END
IRQ Disable:1		LESSTHAN:
FIQ Disable:1	00001050:E1A03005	
Thumb(T):0	00001050:BIA03003	•
CPU Mode : System	00001058:EAFFFFE	* * * =
0. 600000 15		
0x600000df		GREATERTHAN:
	0000105C:E1A02005	MOV R2,R5
	00001060:E1A02122	MOV R2,R2,LSR #2
	00001064:EAFFFFE	B LOOP1
		PINICH.
	00001068:E3A08001	FINISH: L MOV R8,#1
	00001060:E5878000	
	00001070:EAFFFFF	
		END:
	00001074:EF000011	
	:00000000	
	:00000014	
:00000018		
	OutputView WatchVi	iew
	Label	Value
	result	1