PES UNIVERSITY

Department of Computer Science & Engineering (AI & ML)
Microprocessor & Computer Architecture Lab

Lab 2 Programs

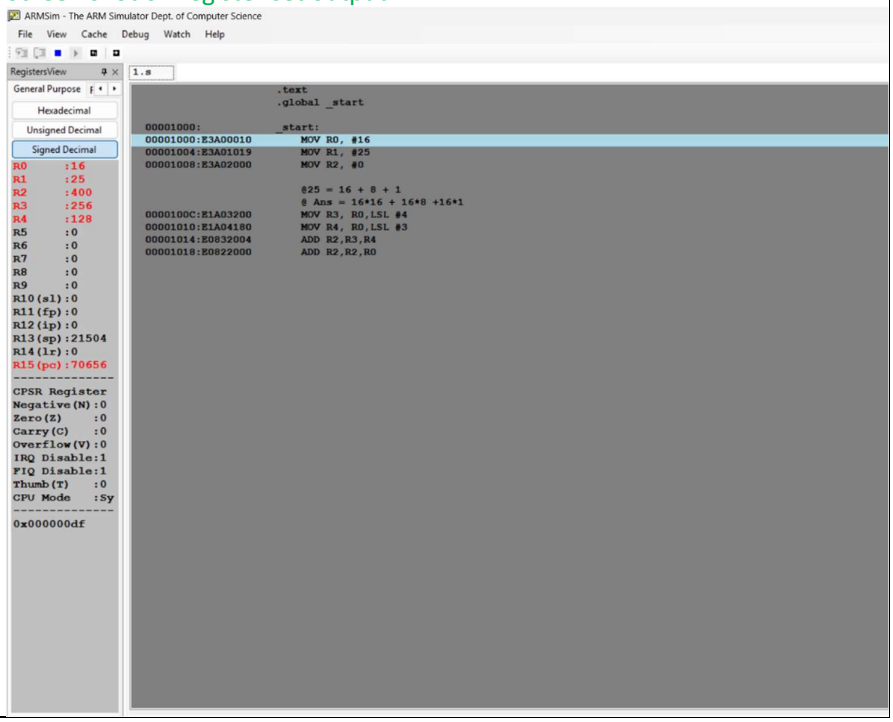
UE23CS251B

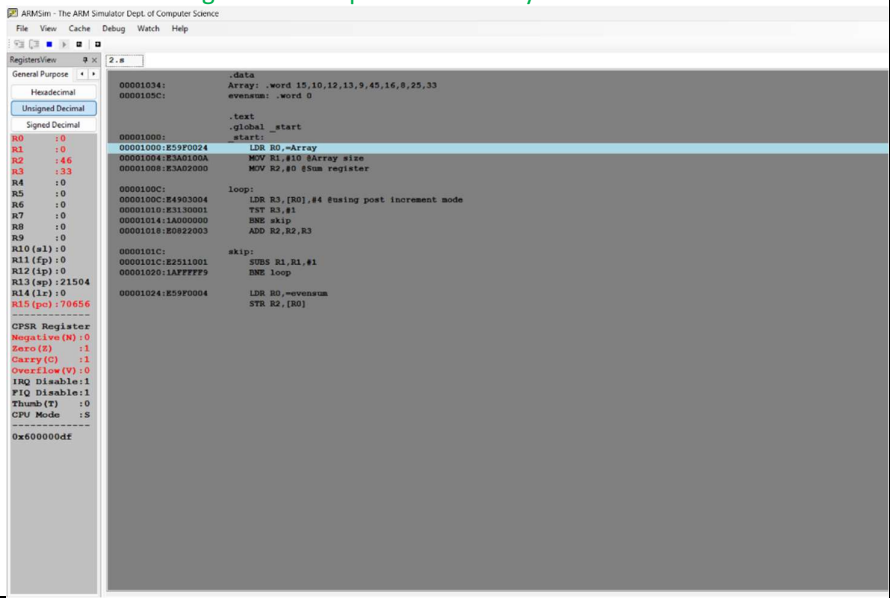
1 Write an ALP using ARM7TDMI to perform to multiplication of 16X25 without using MUL instructions.
(Hint: barrel shifter instructions.)
(Note :any number can be considered as multiplier)

Program screen shot:

```
.text
.global _start

_start:
   MOV R0, #16
   MOV R1, #25
   MOV R2, #0

   @25 = 16 + 8 + 1
   @ Ans = 16*16 + 16*8 +16*1
   MOV R3, R0,LSL #4
   MOV R4, R0,LSL #3
   ADD R2,R3,R4
   ADD R2,R2,R0
```

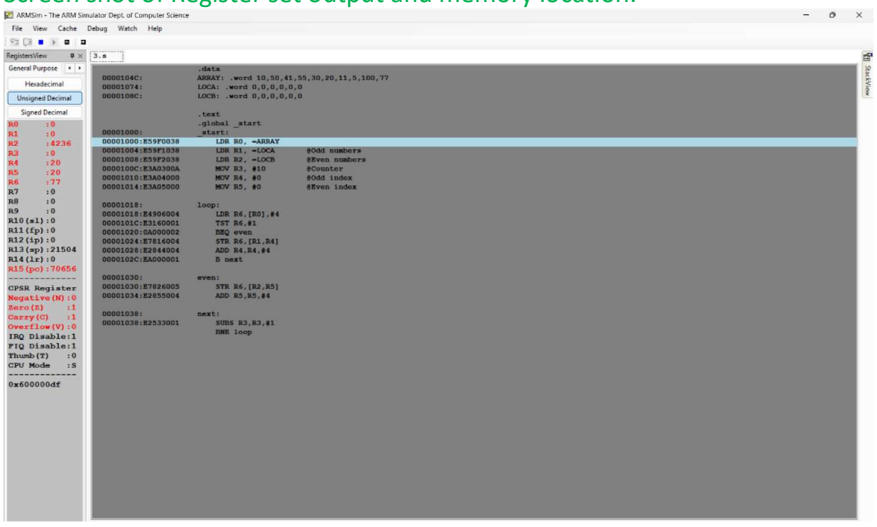
Screen shot of Register set output:



2	Write an ALP using ARM7TDMI to add only even numbers stored in memory location for a given set of numbers and store the sum in the memory location.
	
	Array:.WORD 15,10,12,13,9,45,16,8,25,33
	evensum:.WORD
	
	Program screen shot:
	
	.data
	Array: .word 15,10,12,13,9,45,16,8,25,33
	evensum: .word 0
	
	.text
	.global _start
	_start:
	LDR R0,=Array
	MOV R1,#10 @Array size
	MOV R2,#0 @Sum register
	
	loop:
	LDR R3,[R0],#4 @using post increment mode
	TST R3,#1
	B*NE* skip
	ADD R2,R2,R3
	
	skip:
	SUBS R1,R1,#1
	B*NE* loop
	
	LDR R0,=evensum
	STR R2,[R0]
	
	Screen shot of Register set output and memory location:
	 

3	Write a ALP using ARMTDMI-ISA to store odd and even numbers in separate memory locations starting from LOCA and LOCB respectively
	
	ARRAY: .word 10,50,41,55,30,20,11,5,100,77
	LOCA: .word 0,0,0,0,0,0
	LOCB: .word 0,0,0,0,0,0
	
	Program screen shot:
	
	.data
	ARRAY: .word 10,50,41,55,30,20,11,5,100,77
	LOCA: .word 0,0,0,0,0,0
	LOCB: .word 0,0,0,0,0,0
	
	.text
	.global _start
	_start:
	LDR R0, =ARRAY
	LDR R1, =LOCA @Odd numbers
	LDR R2, =LOCB @Even numbers
	MOV R3, #10 @Counter
	MOV R4, #0 @Odd index
	MOV R5, #0 @Even index
	
	loop:
	LDR R6,[R0],#4
	TST R6,#1
	B*EQ* even
	STR R6,[R1,R4]
	ADD R4,R4,#4
	B next
	
	even:
	STR R6,[R2,R5]
	ADD R5,R5,#4
	
	next:
	SUBS R3,R3,#1
	B*NE* loop

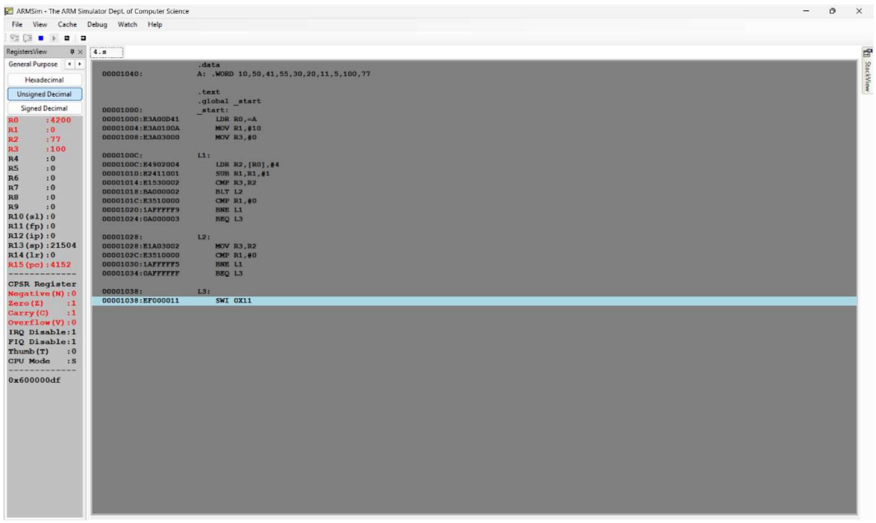
Screen shot of Register set output and memory location:



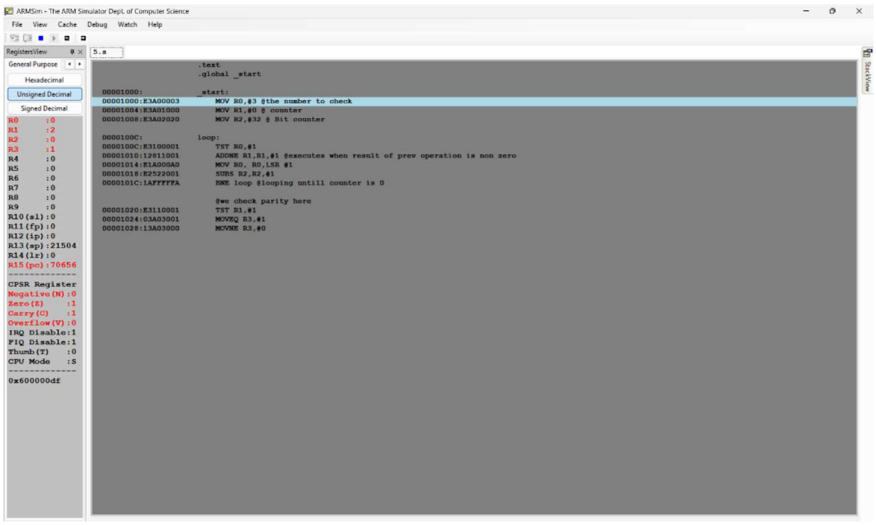
4 Write an ALP using ARM7TDMI to find the largest number from a given set of numbers:
A: .word 10,50,41,55,30,20,11,5,100,77

Program screen shot:

```
.data
A: .WORD 10,50,41,55,30,20,11,5,100,77

.text
.global _start
_start:
   LDR R0,=A @load A
   MOV R1,#10 @count
   MOV R3,#0 @greatest element

L1:
   LDR R2,[R0],#4
   SUB R1,R1,#1
   CMP R3,R2
   BLT L2
   CMP R1,#0
   BNE L1
   BEQ L3

L2:
   MOV R3,R2
   CMP R1,#0
   BNE L1
   BEQ L3

L3:
   SWI 0X11
```

	Screen shot of Register set output and memory location: 
	Assignments Questions

5	Write an ALP using ARM7TDMI to find whether the given number is even parity.
	
	Program screen shot:
	.text
	.global _start
	
	_start:
	MOV R0,#3 @the number to check
	MOV R1,#0 @ counter
	MOV R2,#32 @ Bit counter
	
	loop:
	TST R0,#1
	ADD*NE* R1,R1,#1 @executes when result of prev operation is non zero
	MOV R0, R0,LSR #1
	SUBS R2,R2,#1
	B*NE* loop @looping untill counter is 0
	
	@we check parity here
	TST R1,#1
	MOV*EQ* R3,#1
	MOV*NE* R3,#0

	Screen shot of Register set output: 

6	Write an ALP using ARM7TDMI to multiplication of 38X72 without using MUL instructions.
	(Hint: barrel shifter instructions.)
	(Note :any number can be considered as multiplier)
	
	Program screen shot:
	
	.text
	.global _start
	
	_start:
	@38X72 multiplication
	@do not use MUL
	@method 1: try using 2#pow method
	MOV R0,#38 @first number
	MOV R1,#72 @second number
	MOV R5,R0 @store first number in R5
	MOV R0,#0 @result
	@72 = 64 + 8 (2^6 + 2^3)
	@38*72 = 38*64 + 38*8
	
	MOV R3,R5,LSL #6 @38*64
	MOV R4,R5,LSL #3 @38*8
	ADD R2,R3,R4 @final result in R2

Screen shot of Register set output: