Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Date: 27/01/2021

Name : Abhishek Aditya BS	SRN: PES1UG19CS019	Section : A

Week#____1_____Program Number: ____1___

Title of the Program

Write an ALP using ARM instruction set to add and subtract two 32 bit numbers .Both numbers are in registers.

I. ARM Assembly Code for each program

a) For Addition :

Test case 1 : Addition of 7 and -5

```
;Program using ARM instruction set to add two
32 bit numbers stored in registers

mov r0,#7  ;Storing 7 in the register r0

mov r1,#-5 ;Storing -5 in the register r1
```

```
;the result of addition of values(operands)
stored in r0 and r1 is stored in r2

add r2,r0,r1

swi 0x11
```

Test case 2 : Addition of 9 and 8

```
;Program using ARM instruction set to add two
32 bit numbers stored in registers

mov r0,#9  ;Storing 9 in the register r0

mov r1,#8 ;Storing 8 in the register r1

;the result of addition of values(operands)
stored in r0 and r1 is stored in r2

add r2,r0,r1

swi 0x11
```

b) For Subtraction :

Test case 1 : Subtraction of 18 and 11

```
;Program using ARM instruction set to subtract
two 32 bit numbers stored in registers

mov r0,#18 ;Storing value 18 in the register r0

mov r1,#11 ;Storing value 11 in the register r1

;the result of subtraction of values(operands)
stored in r0 and r1 is stored in r2
```

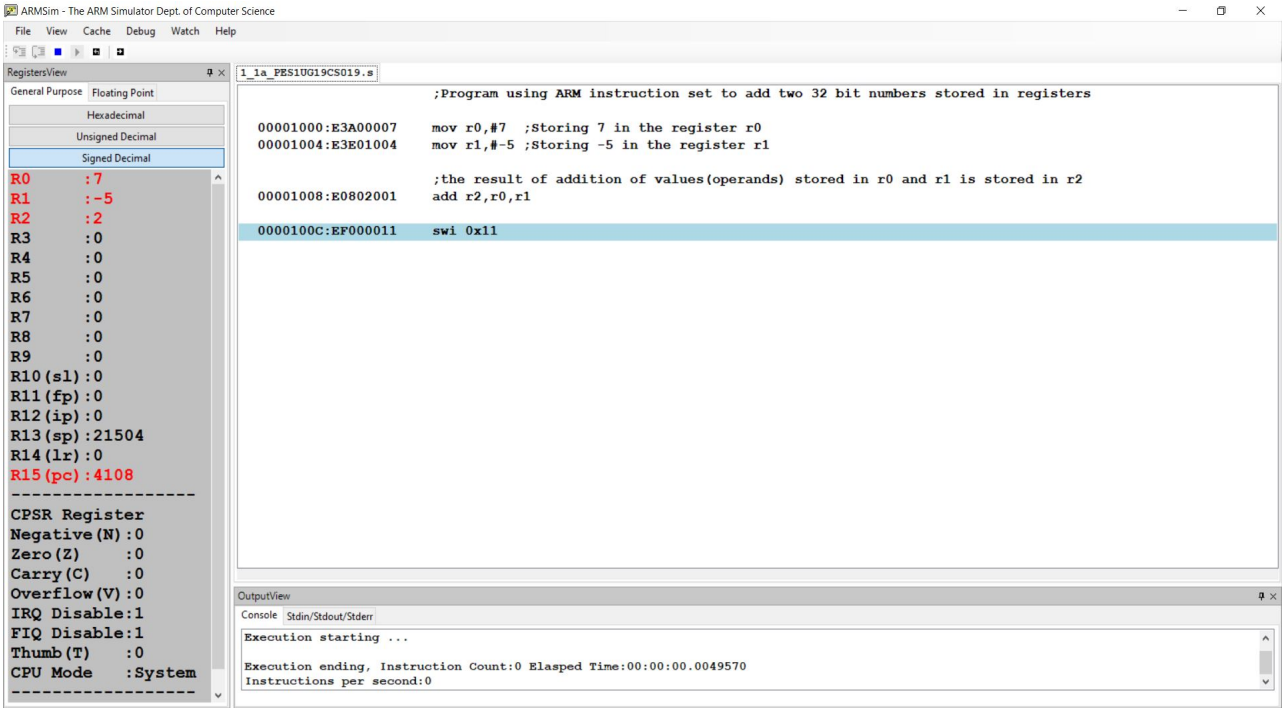
```
sub r2,r0,r1

swi 0x11
```

Test case 2 : Subtraction of -22 and 8

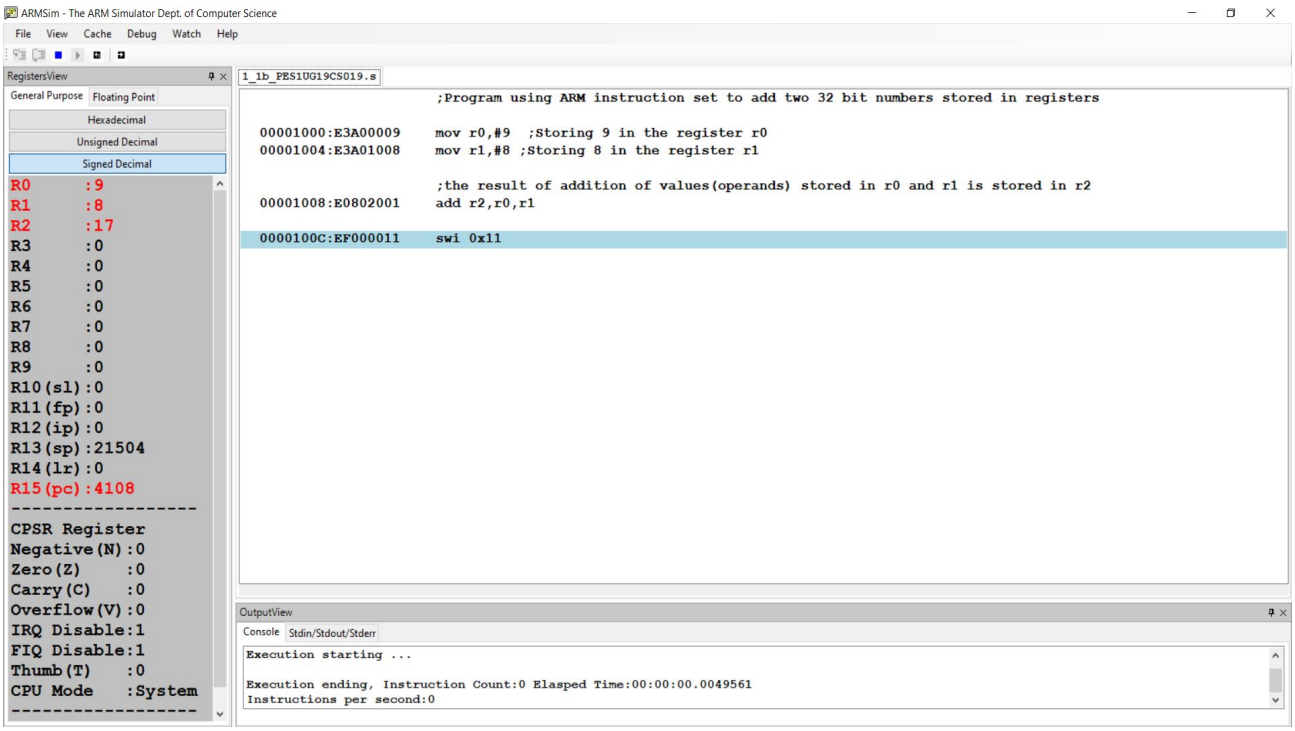
```
;Program using ARM instruction set to subtract
two 32 bit numbers stored in registers

mov r0,#-22;Storing value -22 in the register r0

mov r1,#8 ;Storing value 8 in the register r1

;the result of subtraction of values(operands)
stored in r0 and r1 is stored in r2

sub r2,r0,r1

swi 0x11
```

II. Final Output Screen Shot (Register Window, Output window)The output should be verified with 2 test cases(one example shown in class, one example of own choice)

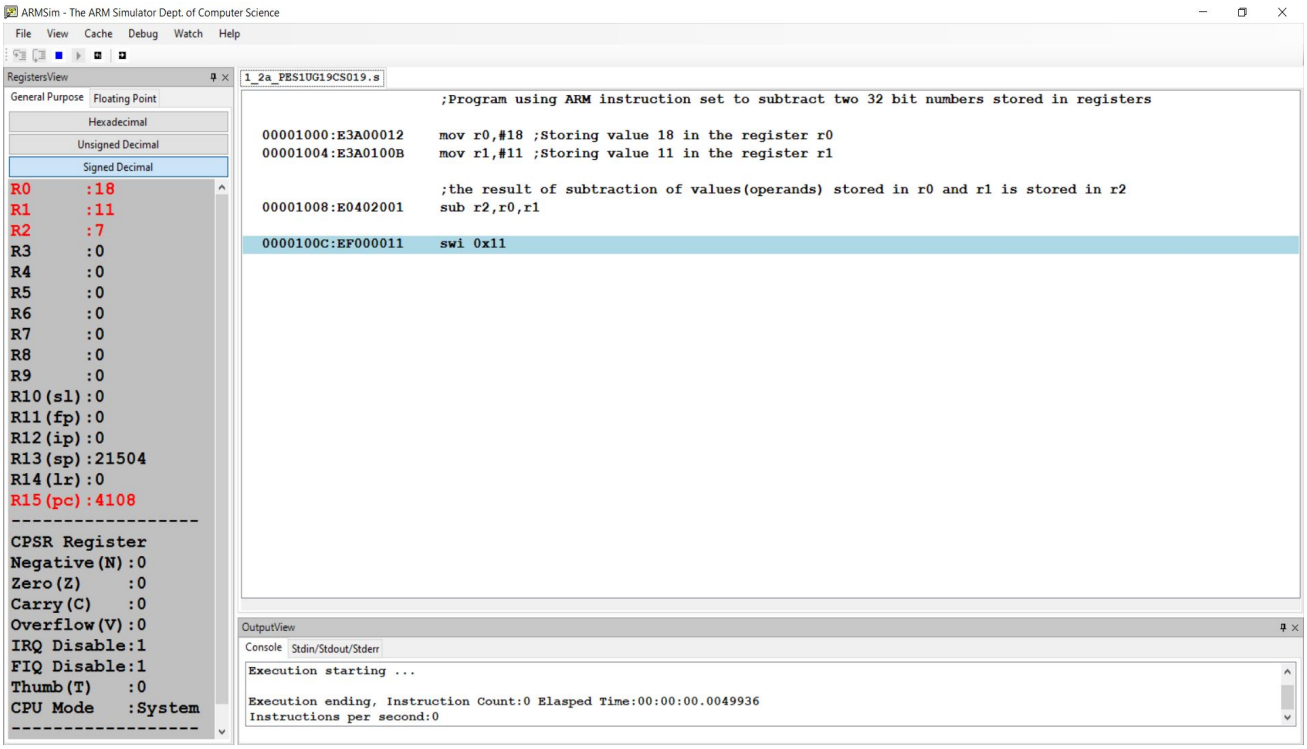
For Addition : Test case 1 : Addition of 7 and -5



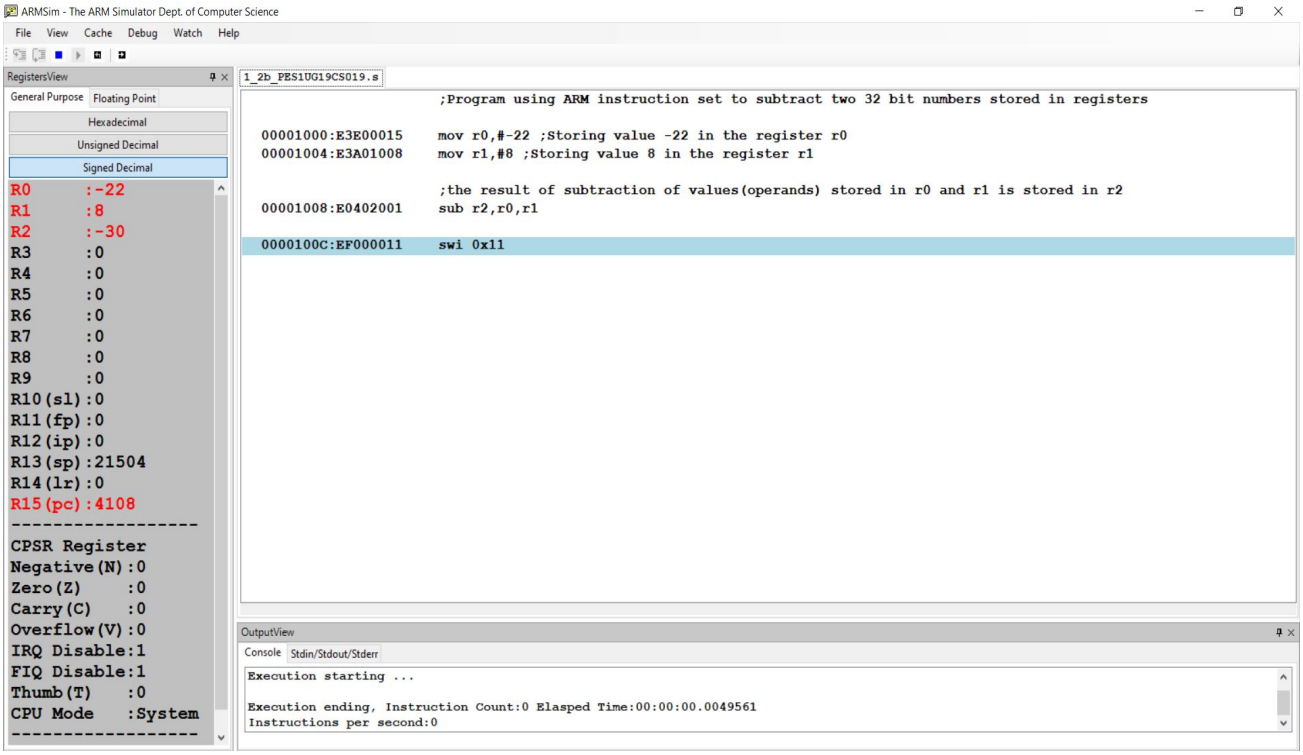
For Addition : Test case 2 : Addition of 9 and 8



For Subtraction : Test case 1 :Subtraction of 18 and 11



For Subtraction : Test case 2 :Subtraction of -22 and 8



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Name : Abhishek Aditya BS	SRN: PES1UG19CS019	Section : A

Week#____1_____Program Number: ____2___

Title of the Program

Write an ALP to demonstrate logical operations. All operands are in registers.

I. ARM Assembly Code for each program

Test case 1 : 12 in r0 register and 4 in r1 register

```
;Demonstration of Logical AND,OR,OR,XOR,NOT operations

mov r0,#12 ;Storing value 12 in r0

mov r1,#4 ;Storing value 4 in r1


;Logical AND operation

and r2,r0,r1
```

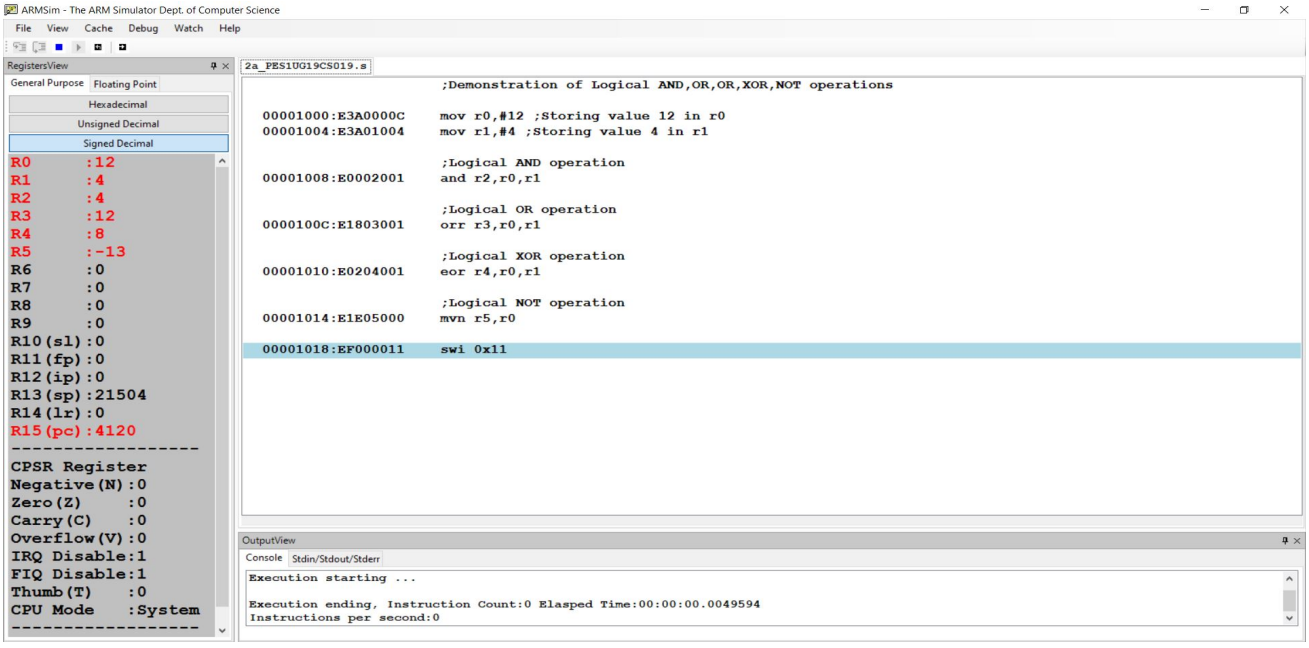
```
;Logical OR operation

orr r3,r0,r1

;Logical XOR operation

eor r4,r0,r1

;Logical NOT operation

mvn r5,r0

swi 0x11
```

Test case 2 : 5 in r0 register and 6 in r1 register

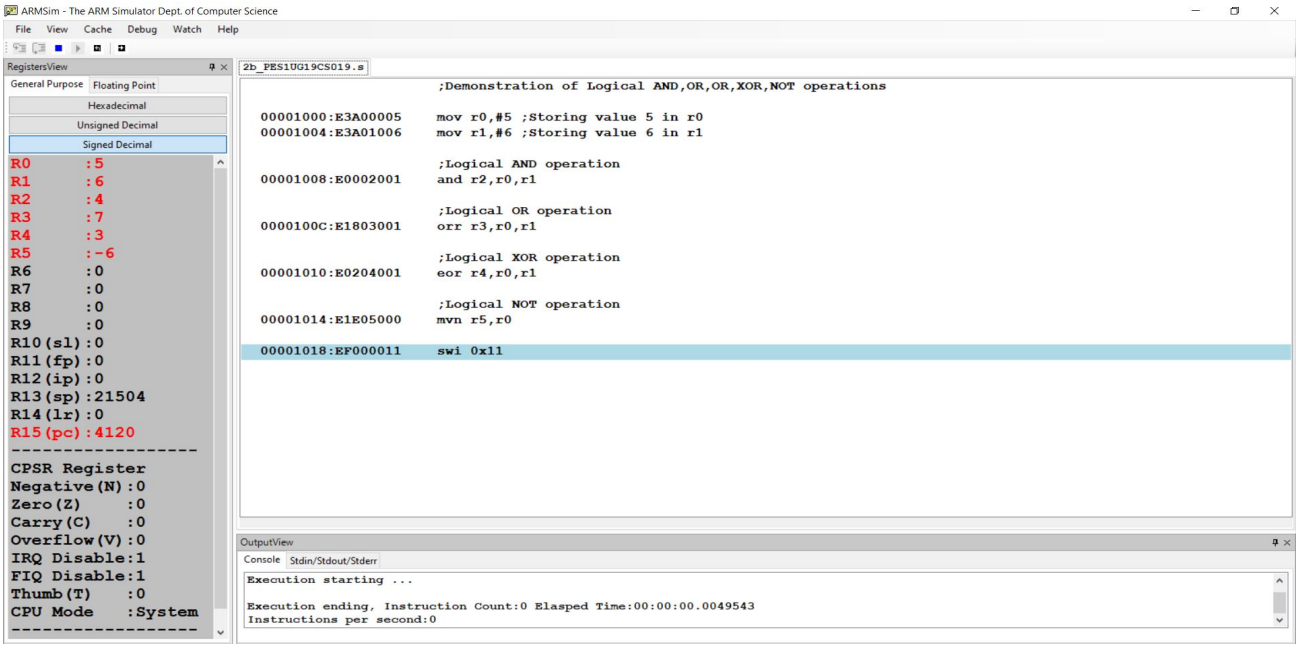
```
;Demonstration of Logical AND,OR,OR,XOR,NOT
operations

mov r0,#5 ;Storing value 5 in r0

mov r1,#6 ;Storing value 6 in r1

;Logical AND operation

and r2,r0,r1

;Logical OR operation

orr r3,r0,r1

;Logical XOR operation

eor r4,r0,r1

;Logical NOT operation

mvn r5,r0

swi 0x11
```

II. Final Output Screen Shot (Register Window, Output window)The output should be verified with 2 test cases(one example shown in class, one example of own choice)

(1) Test case 1 : 12 in r0 register , 4 in r1 register



(2) Test case 2 : 5 in r0 register , 6 in r1 register



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Date: 27/01/2021

Name : Abhishek Aditya BS	SRN: PES1UG19CS019	Section : A

Week#____1_____Program Number: ____3___

Title of the Program

Write an ALP to add 5 numbers where values are present in registers.

I. ARM Assembly Code for each program

Test case 1 :12 in r0,6 in r1,3 in r2,8 in r3 ,1 in r4

```
;Adding 5 values(operands) present in registers r0,r1,r2,r3,r4

mov r0,#12 ;Storing value 12 in r0

mov r1,#6 ;Storing value 6 in r1

mov r2,#3 ;Storing value 3 in r2

mov r3,#8 ;Storing value 8 in r3

mov r4,#1 ;Storing value 1 in r4
```

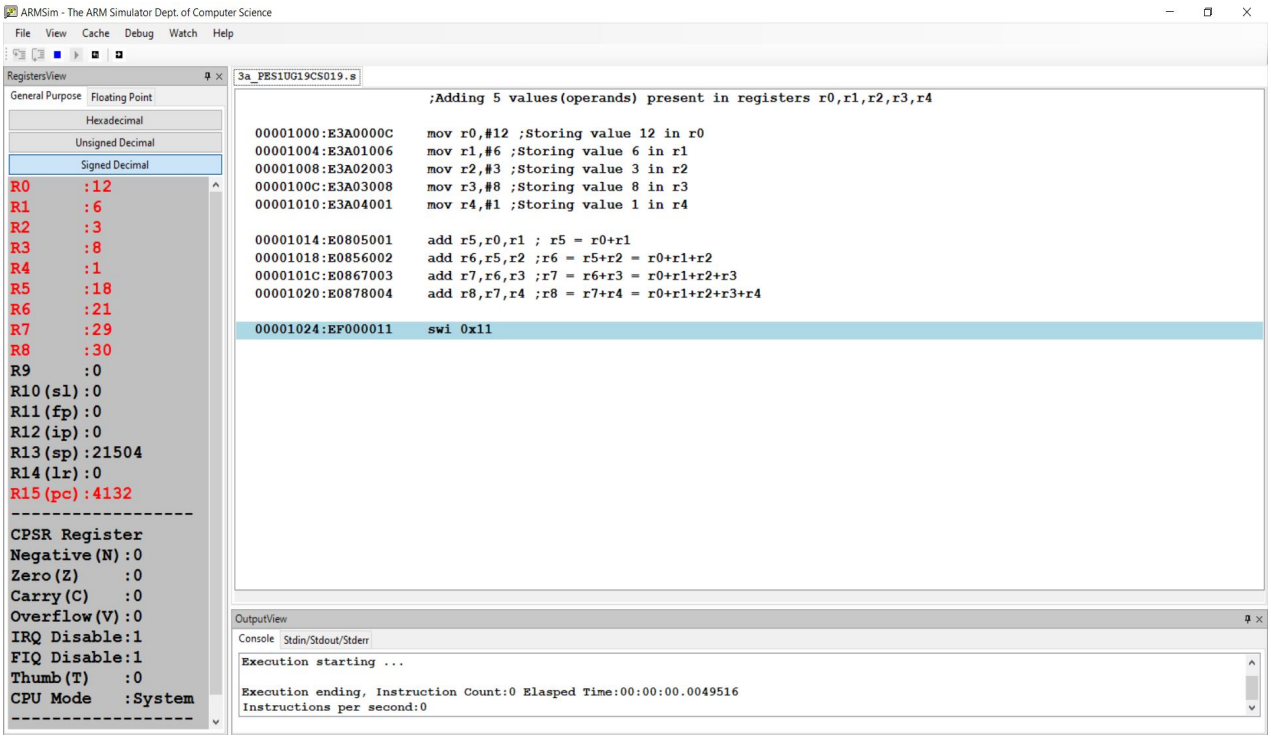
```
add r5,r0,r1 ; r5 = r0+r1

add r6,r5,r2 ;r6 = r5+r2 = r0+r1+r2

add r7,r6,r3 ;r7 = r6+r3 = r0+r1+r2+r3

add r8,r7,r4 ;r8 = r7+r4 = r0+r1+r2+r3+r4

swi 0x11
```

Test case 2 :71 in r0,10 in r1,32 in r2,5 in r3 ,13 in r4

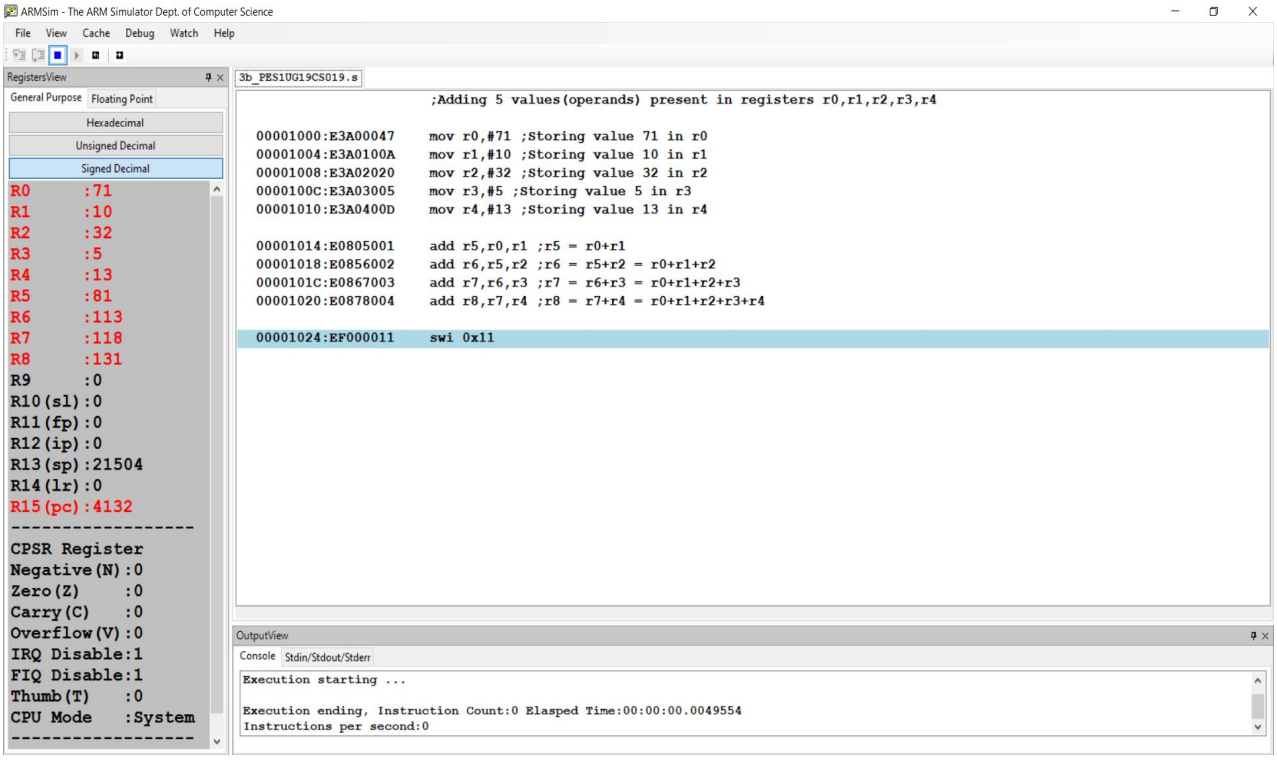
```
;Adding 5 values(operands) present in registers
r0,r1,r2,r3,r4

mov r0,#71 ;Storing value 71 in r0

mov r1,#10 ;Storing value 10 in r1

mov r2,#32 ;Storing value 32 in r2

mov r3,#5 ;Storing value 5 in r3

mov r4,#13 ;Storing value 13 in r4

add r5,r0,r1 ;r5 = r0+r1

add r6,r5,r2 ;r6 = r5+r2 = r0+r1+r2

add r7,r6,r3 ;r7 = r6+r3 = r0+r1+r2+r3

add r8,r7,r4 ;r8 = r7+r4 = r0+r1+r2+r3+r4

swi 0x11
```

II. Final Output Screen Shot (Register Window, Output window)The output should be verified with 2 test cases(one example shown in class, one example of own choice)

(1) Test case 1 :12 in r0,6 in r1,3 in r2,8 in r3 ,1 in r4



(2) Test case 2 :71 in r0,10 in r1,32 in r2,5 in r3 ,13 in r4



Microprocessor and Computer Architecture Laboratory

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4th Semester, Academic Year 2020-21

Date: 27/01/2021

Name : Abhishek Aditya BS	SRN: PES1UG19CS019	Section : A

Week#____1_____Program Number: ____4___

Title of the Program

Write an ALP using ARM instruction set to check if a number stored in a register is even or odd. If even, store 00 in R0, else store FF in R0

I. ARM Assembly Code for each program

Test case 1 : value 3 is stored in register r1

```
;To check if a number stored in a register is even or odd

;If the number is even then store 00 in r0 else store FF in r0

mov r1,#3 ;value 3 is stored in the register r1

ands r2,r1,#1 ;performing Logical and of value stored in r1 & 1 and updating flags
```

```
cmp r2,#0 ;Checking if the value in r2 is 0 ,
by comparing the value in r2 and 0

beq label ;If the value in r2 is 0, then the
number is even, jump to label

mov r0,#0xFF ;If the number is odd, store FF in r0

b end ;jump to end, after storing

label: mov r0,#0x00 ;If the number is even,
store 00 in r0

end: swi 0x11
```

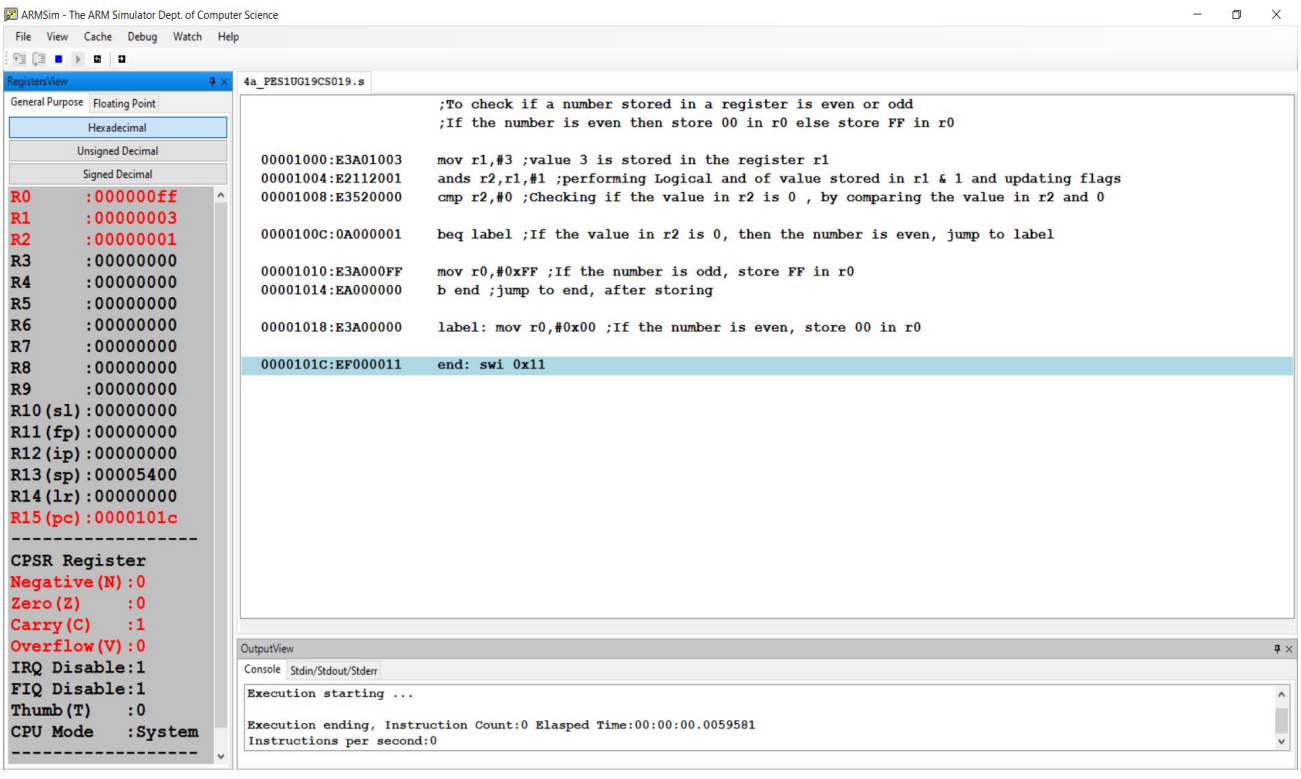
Test case 2 : value 12 is stored in register r1

```
;To check if a number stored in a register is
even or odd

;If the number is even then store 00 in r0 else
store FF in r0

mov r1,#12 ;value 12 is stored in the register r1

ands r2,r1,#1 ;performing Logical and of value
stored in r1 & 1 and updating flags

cmp r2,#0 ;Checking if the value in r2 is 0 ,
by comparing the value in r2 and 0

beq label ;If the value in r2 is 0, then the
number is even, jump to label

mov r0,#0xFF ;If the number is odd, store FF in r0

b end ;jump to end, after storing
```

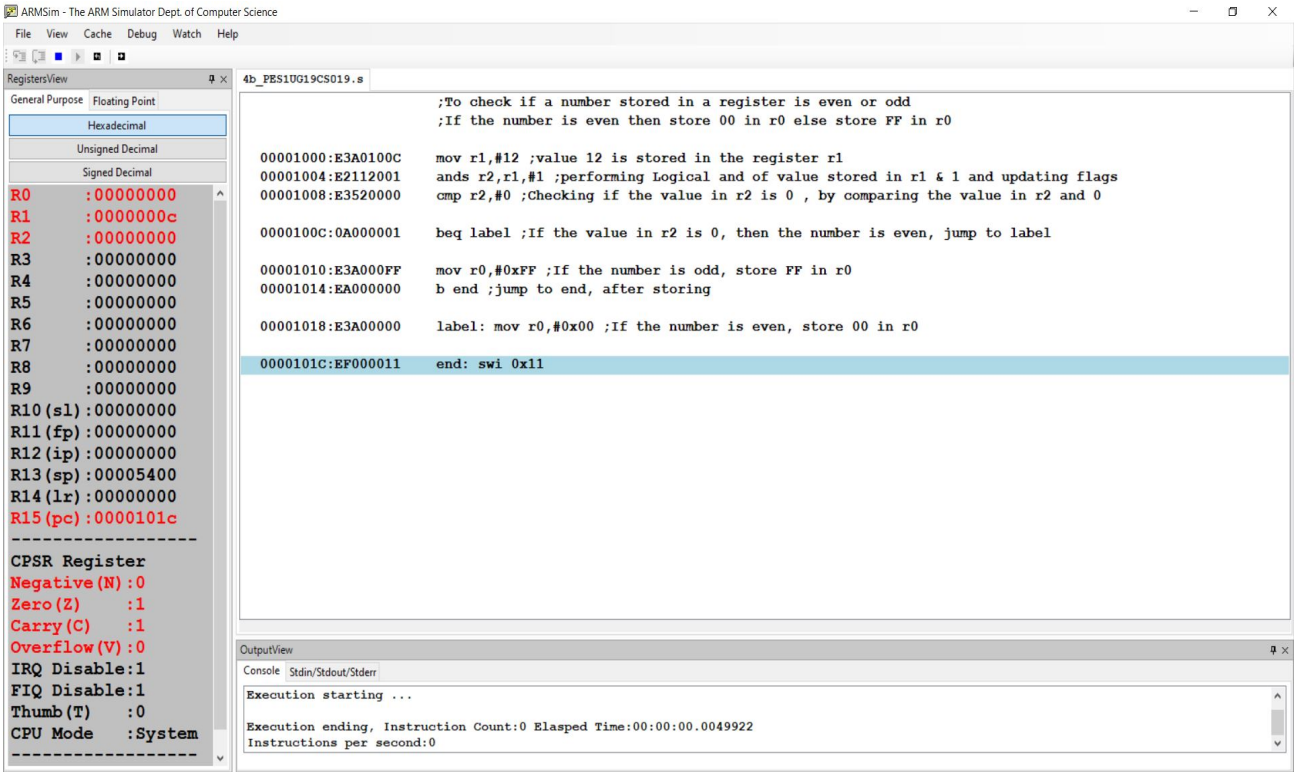
```
label: mov r0,#0x00 ;If the number is even, store 00 in r0

end: swi 0x11
```

II. Final Output Screen Shot (Register Window, Output window)The output should be verified with 2 test cases(one example shown in class, one example of own choice)

Test case 1 : value 3 is stored in register r1



Test case 2 : value 12 is stored in register r1



Disclaimer:

- The programs and output submitted is duly written, verified and executed by me.
- I have not copied from any of my peers nor from the external resource such as internet.
- If found plagiarized, I will abide with the disciplinary action of the University.

Signature : Abhishek Aditya BS

Name : Abhishek Aditya BS

SRN : PES1UG19CS019

Section : A

Date : 27/01/2021