Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

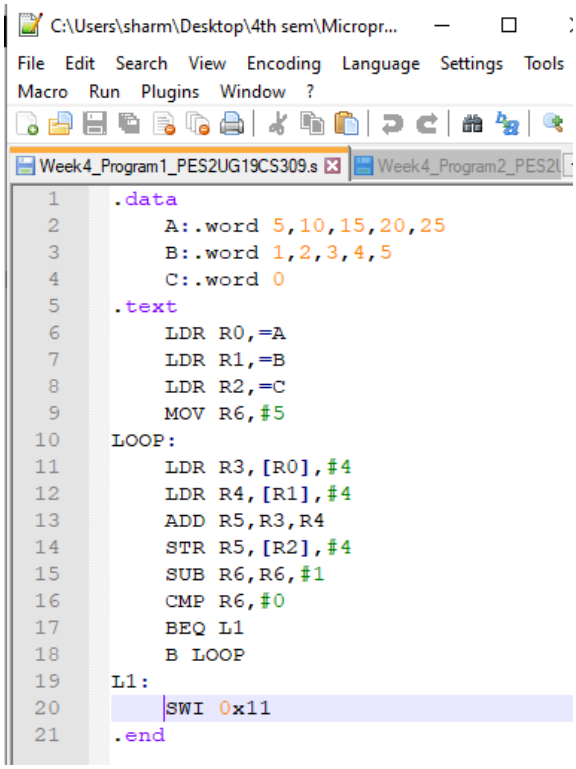
Date: 19-02-2021

Week: 4 Program Number: 1

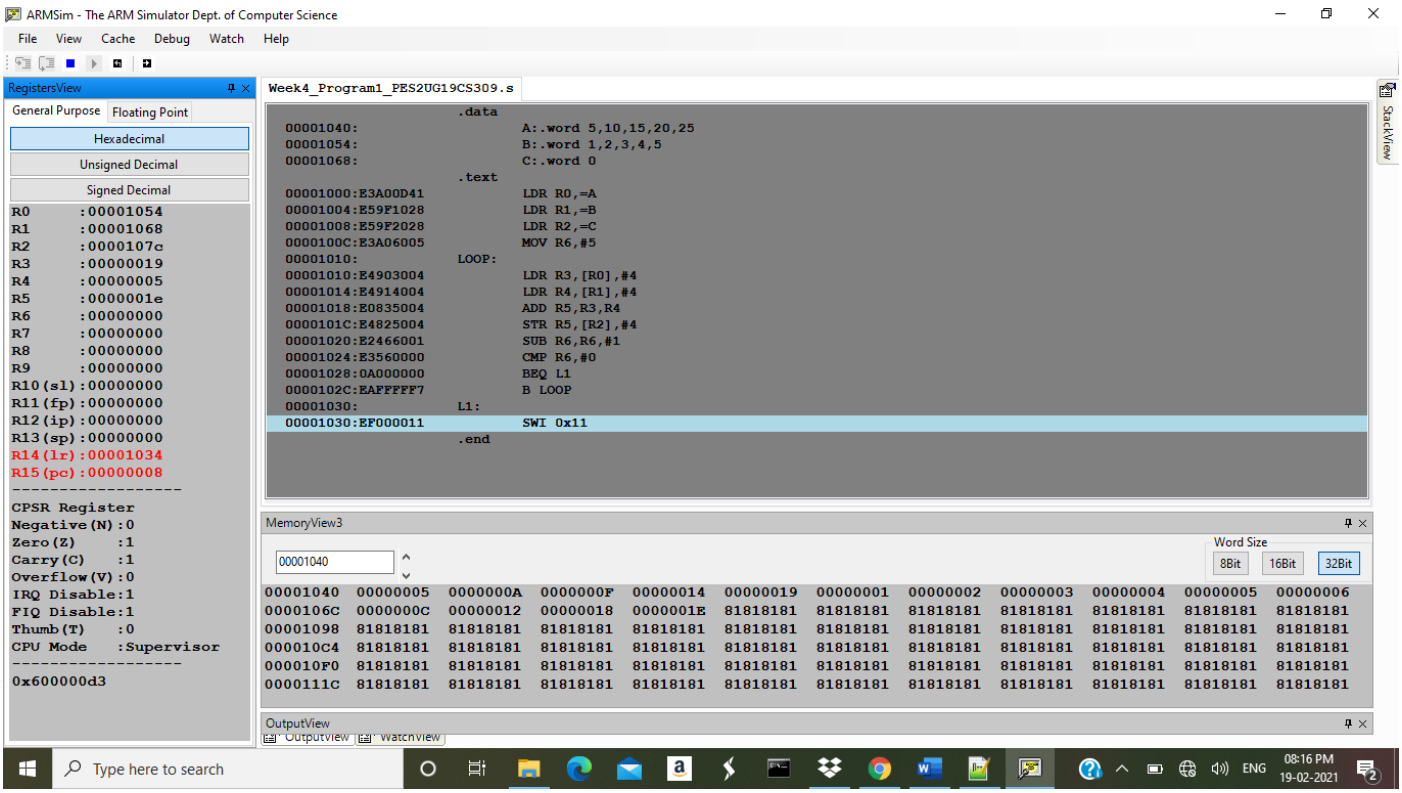
Title of the Program :

Write an ALP to implement c[i]=a[i]+b[i]

ARM Assembly Code for Program



Output Screenshot (Code, Register, Memory window)



Output Table

A: .word 5, 10, 15, 20, 25 **B: .word 1,2,3,4,5** **C: .word 0, 0, 0, 0, 0**	
After Execution The content of array C is	
6	00000006
12	0000000C
18	00000012
24	00000018
30	0000001E

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4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

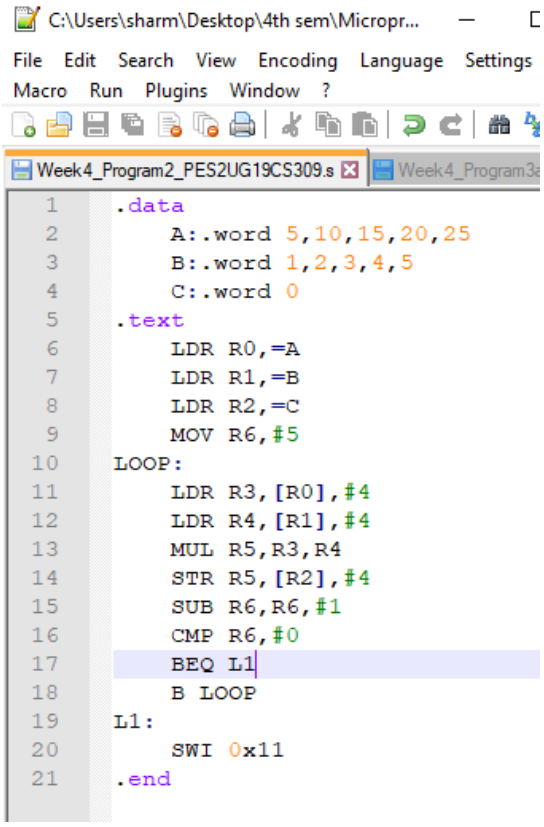
Date: 19-02-2021

Week: 4 Program Number: 2

Title of the Program :

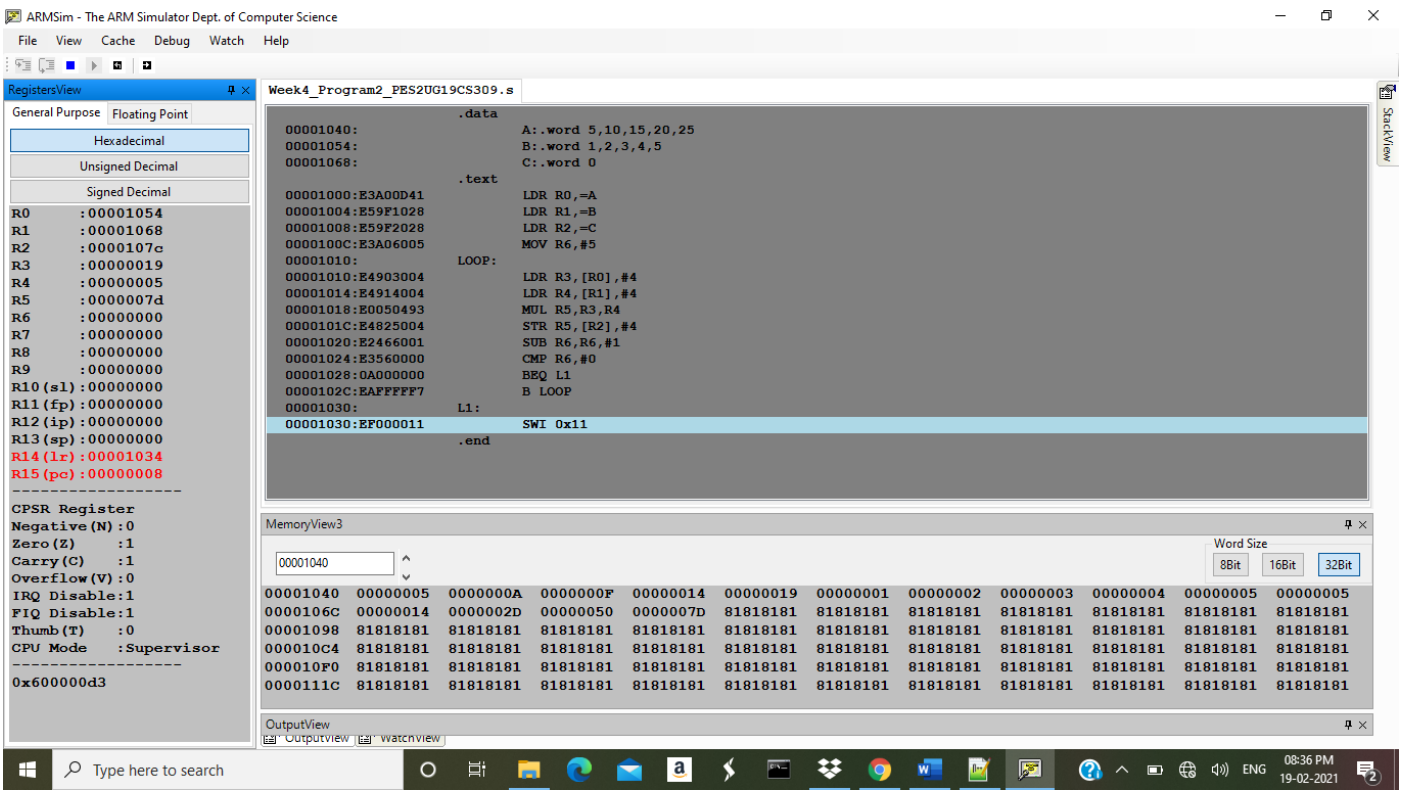
Write an ALP to implement c[i] = a[i] * b[i]

ARM Assembly Code for Program




```
1   .data
2       A:.word 5,10,15,20,25
3       B:.word 1,2,3,4,5
4       C:.word 0
5   .text
6       LDR R0,=A
7       LDR R1,=B
8       LDR R2,=C
9       MOV R6,#5
10  LOOP:
11      LDR R3,[R0],#4
12      LDR R4,[R1],#4
13      MUL R5,R3,R4
14      STR R5,[R2],#4
15      SUB R6,R6,#1
16      CMP R6,#0
17      BEQ L1
18      B LOOP
19  L1:
20      SWI 0x11
21  .end
```

Output Screenshot (Code, Register, Memory window)



Output Table

a: .word 5, 10, 15, 20, 25 **b: .word 1,2,3,4,5** **c: .word 0, 0, 0, 0, 0**	
After Execution The content of array C is	
5	00000005
20	00000014
45	0000002D
80	00000050
125	0000007D

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4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

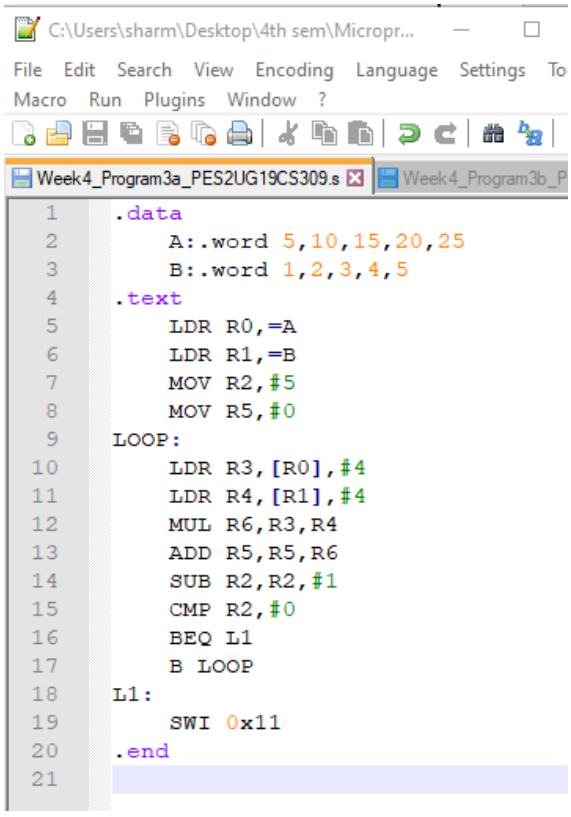
Date: 19-02-2021

Week: 4 Program Number: 3a

Title of the Program :

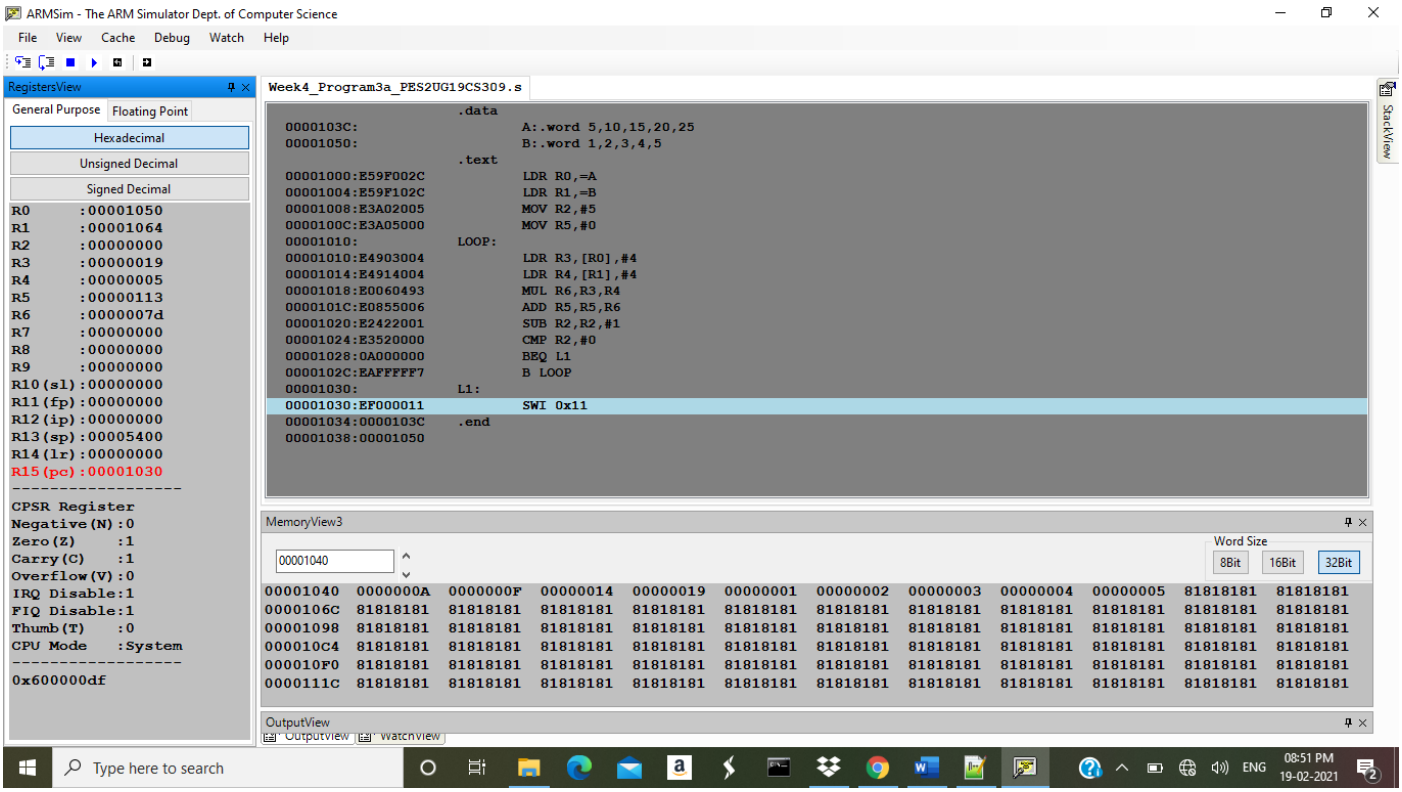
Write an ALP to perform Convolution using MUL instruction (Addition of multiplication of respective numbers of loc A and loc B) such that the value ∑(a[i]*b[i]) is computed.

ARM Assembly Code for Program




```
1   .data
2       A:.word 5,10,15,20,25
3       B:.word 1,2,3,4,5
4   .text
5       LDR R0,=A
6       LDR R1,=B
7       MOV R2,#5
8       MOV R5,#0
9   LOOP:
10      LDR R3,[R0],#4
11      LDR R4,[R1],#4
12      MUL R6,R3,R4
13      ADD R5,R5,R6
14      SUB R2,R2,#1
15      CMP R2,#0
16      BEQ L1
17      B LOOP
18  L1:
19      SWI 0x11
20  .end
21
```

Output Screenshot (Code, Register, Memory window)



Output Table

	a: .word 5, 10, 15, 20, 25 b: .word 1,2,3,4,5
R5	(5*1)+(10*2)+(15*3)+(20*4)+(25*5) = 275= 0x0113

Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

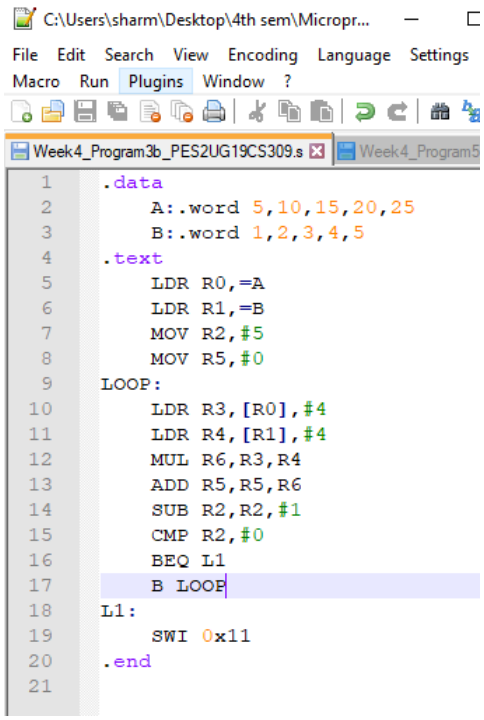
Date: 19-02-2021

Week: 4 Program Number: 3b

Title of the Program :

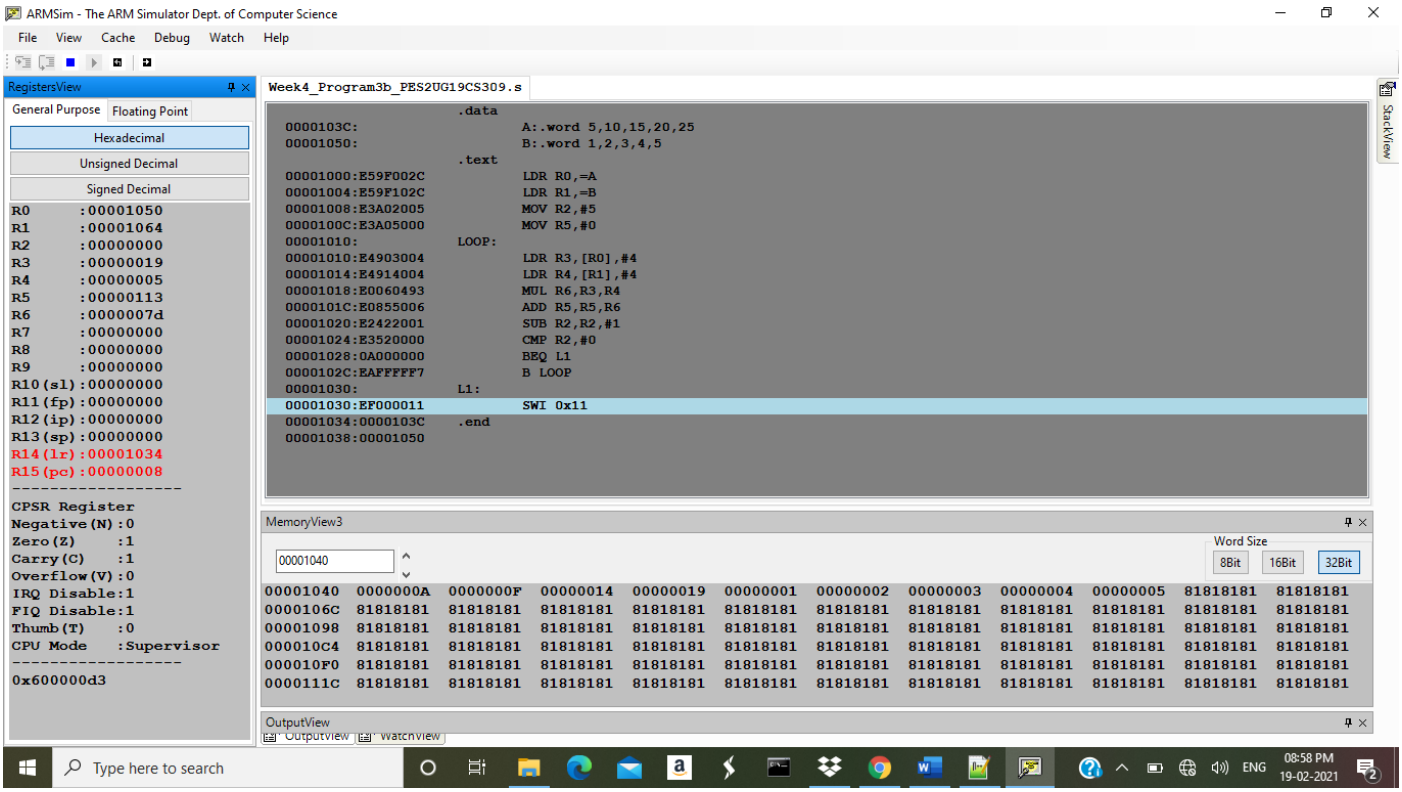
Write an ALP to perform Convolution using MLA instruction (Addition of multiplication of respective numbers of loc A and loc B).

ARM Assembly Code for Program




```
1   .data
2       A:.word 5,10,15,20,25
3       B:.word 1,2,3,4,5
4   .text
5       LDR R0,=A
6       LDR R1,=B
7       MOV R2,#5
8       MOV R5,#0
9   LOOP:
10      LDR R3,[R0],#4
11      LDR R4,[R1],#4
12      MUL R6,R3,R4
13      ADD R5,R5,R6
14      SUB R2,R2,#1
15      CMP R2,#0
16      BEQ L1
17      B LOOP
18  L1:
19      SWI 0x11
20  .end
21
```

Output Screenshot (Code, Register, Memory window)



Output Table

	a: .word 5, 10, 15, 20, 25 **b: .word 1,2,3,4,5**
R5	(5*1)+(10*2)+(15*3)+(20*4)+(25*15) = 275 = 0x0113

Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

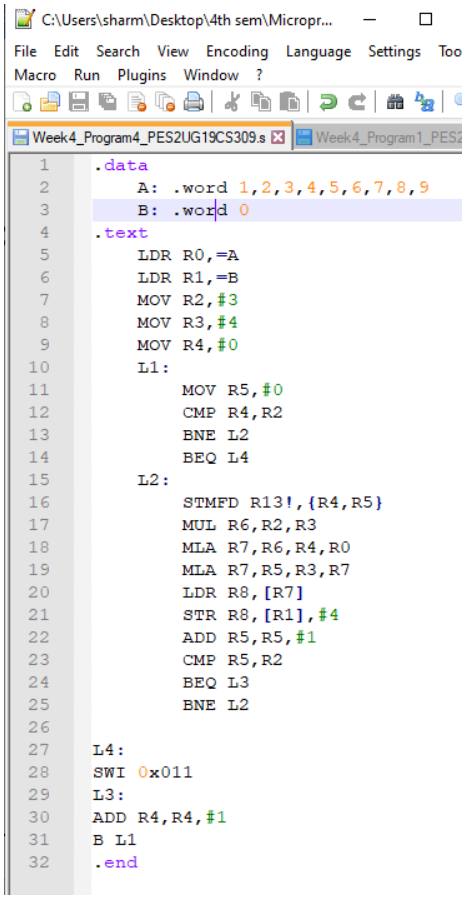
Date: 19-02-2021

Week: 4 Program Number: 4

Title of the Program :

Write an ALP to read from a 2D array such that B=a[i] [j]

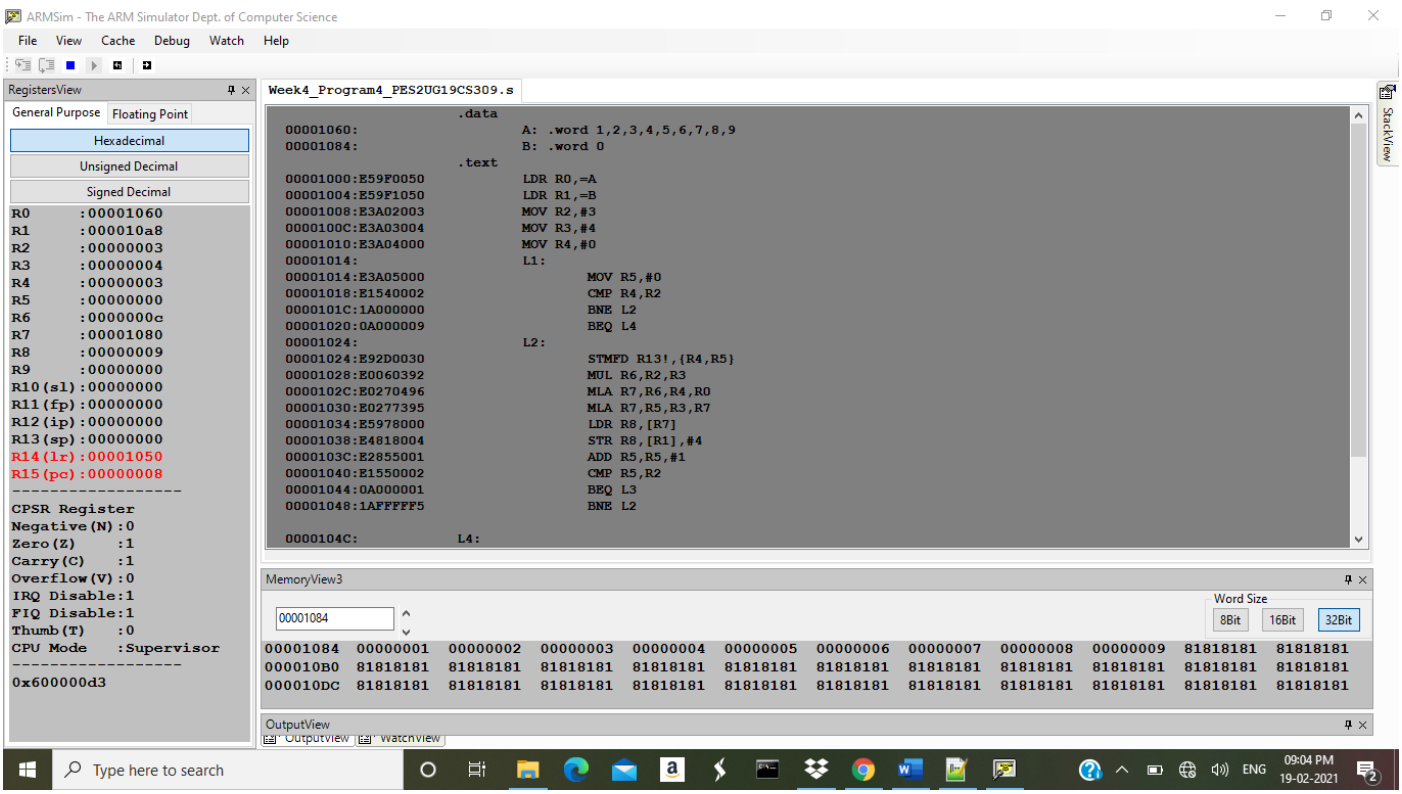
ARM Assembly Code for Program




```
.data
    A: .word 1,2,3,4,5,6,7,8,9
    B: .word 0
.text
    LDR R0,=A
    LDR R1,=B
    MOV R2,#3
    MOV R3,#4
    MOV R4,#0
    L1:
        MOV R5,#0
        CMP R4,R2
        BNE L2
        BEQ L4
    L2:
        STMFD R13!,{R4,R5}
        MUL R6,R2,R3
        MLA R7,R6,R4,R0
        MLA R7,R5,R3,R7
        LDR R8,[R7]
        STR R8,[R1],#4
        ADD R5,R5,#1
        CMP R5,R2
        BEQ L3
        BNE L2

L4:
SWI 0x011
L3:
ADD R4,R4,#1
B L1
.end
```

Output Screenshot (Code, Register, Memory window)



Output Table

Before execution	a:.word 1,2,3,4,5,6,7,8,9	b:.word 0
After Execution	00000001	00000001
	00000002	00000002
	00000003	00000003
	00000004	00000004
	00000005	00000005
	00000006	00000006
	00000007	00000007
	00000008	00000008
	00000009	00000009

Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Name: R Sharmila	SRN: PES2UG19CS309	Section: E

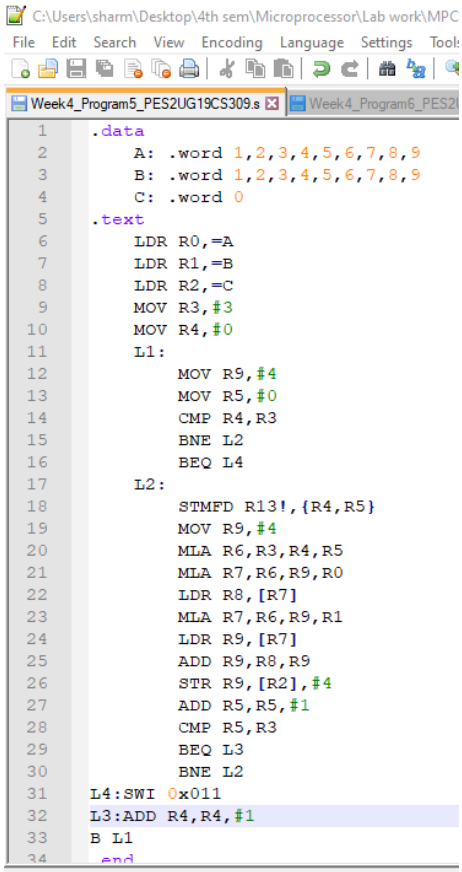
Date: 19-02-2021

Week: 4 Program Number: 5

Title of the Program :

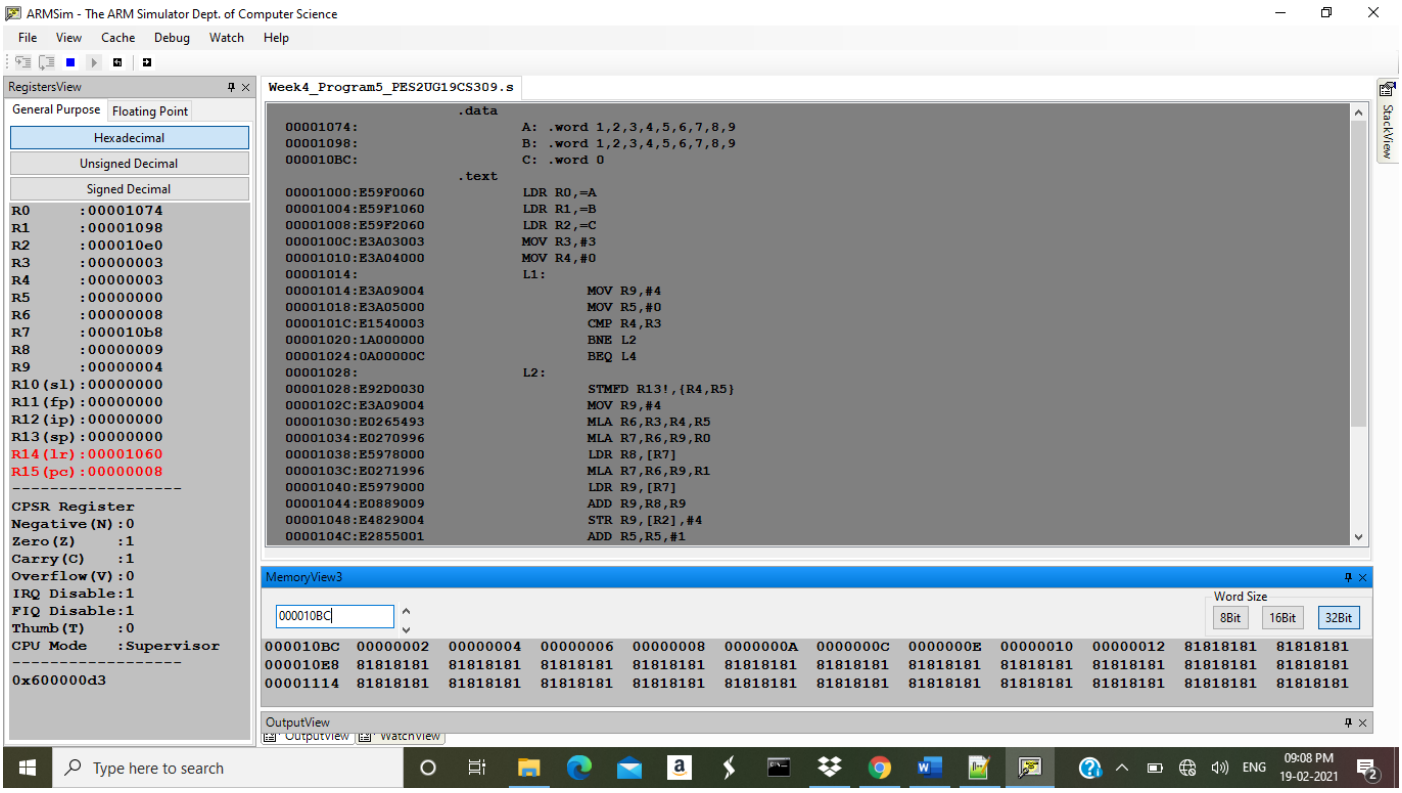
Write an ALP to implement C[i][j]=a[i][j]+b[i][j]

ARM Assembly Code for Program




```
.data
    A: .word 1,2,3,4,5,6,7,8,9
    B: .word 1,2,3,4,5,6,7,8,9
    C: .word 0
.text
    LDR R0,=A
    LDR R1,=B
    LDR R2,=C
    MOV R3,#3
    MOV R4,#0
    L1:
        MOV R9,#4
        MOV R5,#0
        CMP R4,R3
        BNE L2
        BEQ L4
    L2:
        STMFD R13!,{R4,R5}
        MOV R9,#4
        MLA R6,R3,R4,R5
        MLA R7,R6,R9,R0
        LDR R8,[R7]
        MLA R7,R6,R9,R1
        LDR R9,[R7]
        ADD R9,R8,R9
        STR R9,[R2],#4
        ADD R5,R5,#1
        CMP R5,R3
        BEQ L3
        BNE L2
L4:SWI 0x011
L3:ADD R4,R4,#1
B L1
.end
```

Output Screenshot (Code, Register, Memory window)



Output Table

Before execution	a:.word 1,2,3,4,5,6,7,8,9	b:.word 1,2,3,4,5,6,7,8,9	c:.word 0
After Execution	00000001	00000001	00000002
	00000002	00000002	00000004
	00000003	00000003	00000006
	00000004	00000004	00000008
	00000005	00000005	0000000A
	00000006	00000006	0000000C
	00000007	00000007	0000000E
	00000008	00000008	00000010
	00000009	00000009	00000012

Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

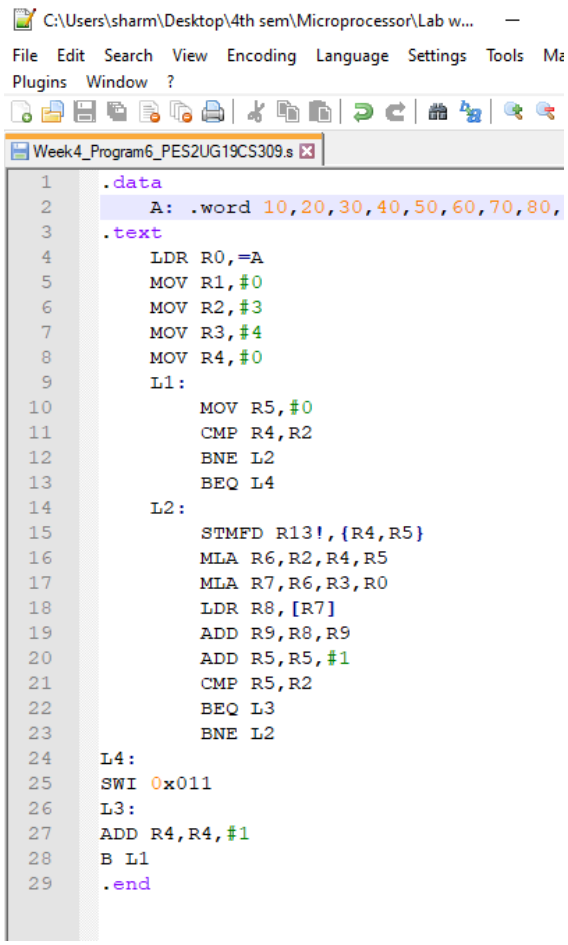
Name: R Sharmila	SRN: PES2UG19CS309	Section: E

Date: 19-02-2021

Week: 4 Program Number: 6

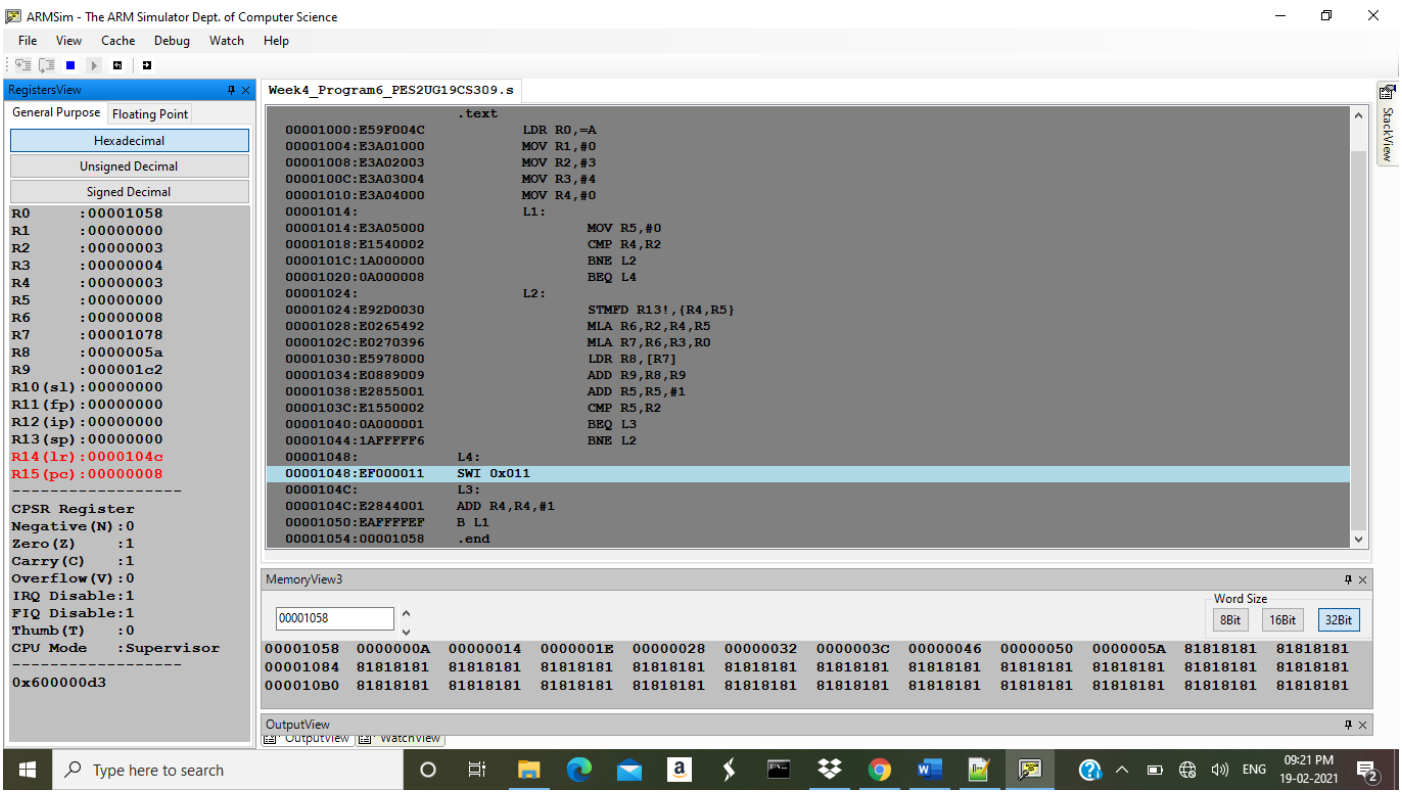
Title of the Program :

ARM Assembly Code for Program




```
.data
    A: .word 10,20,30,40,50,60,70,80,
.text
    LDR R0,=A
    MOV R1,#0
    MOV R2,#3
    MOV R3,#4
    MOV R4,#0
    L1:
        MOV R5,#0
        CMP R4,R2
        BNE L2
        BEQ L4
    L2:
        STMFD R13!,{R4,R5}
        MLA R6,R2,R4,R5
        MLA R7,R6,R3,R0
        LDR R8,[R7]
        ADD R9,R8,R9
        ADD R5,R5,#1
        CMP R5,R2
        BEQ L3
        BNE L2
L4:
SWI 0x011
L3:
ADD R4,R4,#1
B L1
.end
```

Output Screenshot (Code, Register, Memory window)



Output Table

Before execution	**a:.word 10,20,30,40,50,60,70,80,90**		
After Execution	**Addition result**	**450**	**1C2**

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.

Name: R Sharmila
Signature: Sharmila
SRN: PES2UG19CS309
Section: E
Date: 19-02-2021