Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Date: 19/02/2021

Name: SUHAN B REVANKAR	SRN:PES2UG19CS412	Section G

Week#____4_____ ProgramNumber:_____1__

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

I. ARM Assembly Code(1).

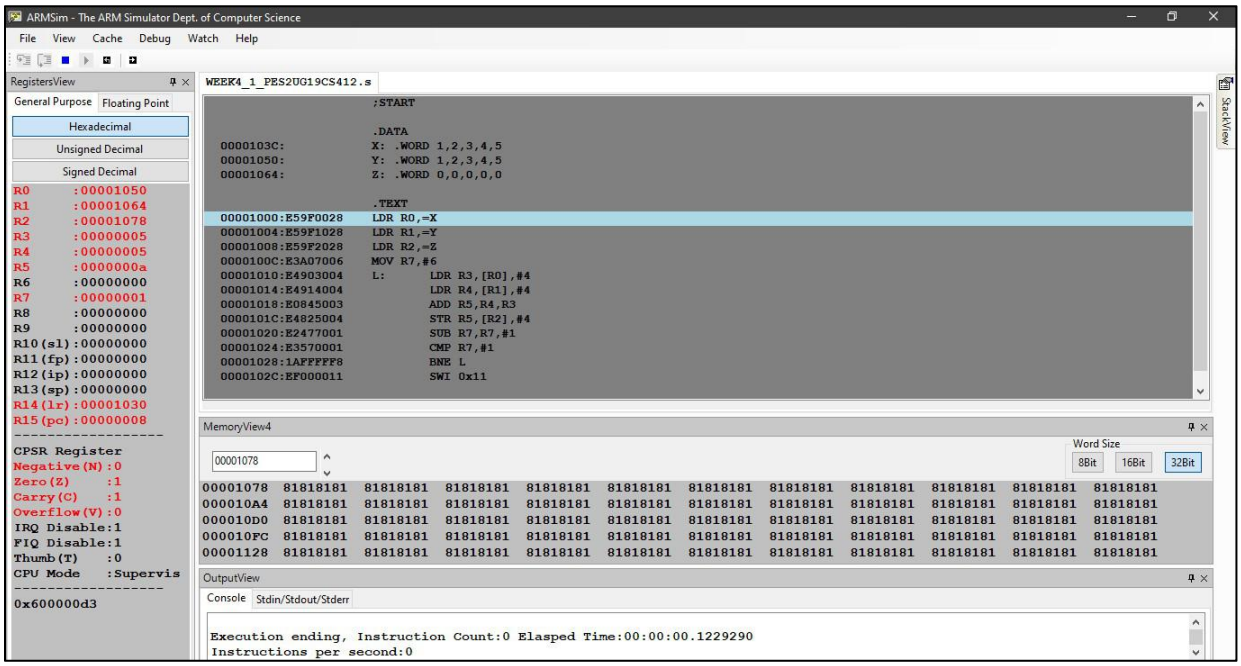
```
File  Edit  Format  View  Help
;START

.DATA
X: .WORD 1,2,3,4,5
Y: .WORD 1,2,3,4,5
Z: .WORD 0,0,0,0,0

.TEXT
LDR R0,=X
LDR R1,=Y
LDR R2,=Z
MOV R7,#6
L:      LDR R3,[R0],#4
        LDR R4,[R1],#4
        ADD R5,R4,R3
        STR R5,[R2],#4
        SUB R7,R7,#1
        CMP R7,#1
        BNE L
        SWI 0x11

;END
```

II. Output Screen Shot (One Example of yourchoice)



III. Output Table for theprogram(1)

	x: .word 1, 2, 3, 4,5 **y: .word 1, 2, 3, 4,5** **z: .word 0,0,0,0,0**	
After Execution The content of array z is		
	2	**00000002**
	4	00000004
	6	**00000006**
	8	00000008
	10	0000000A

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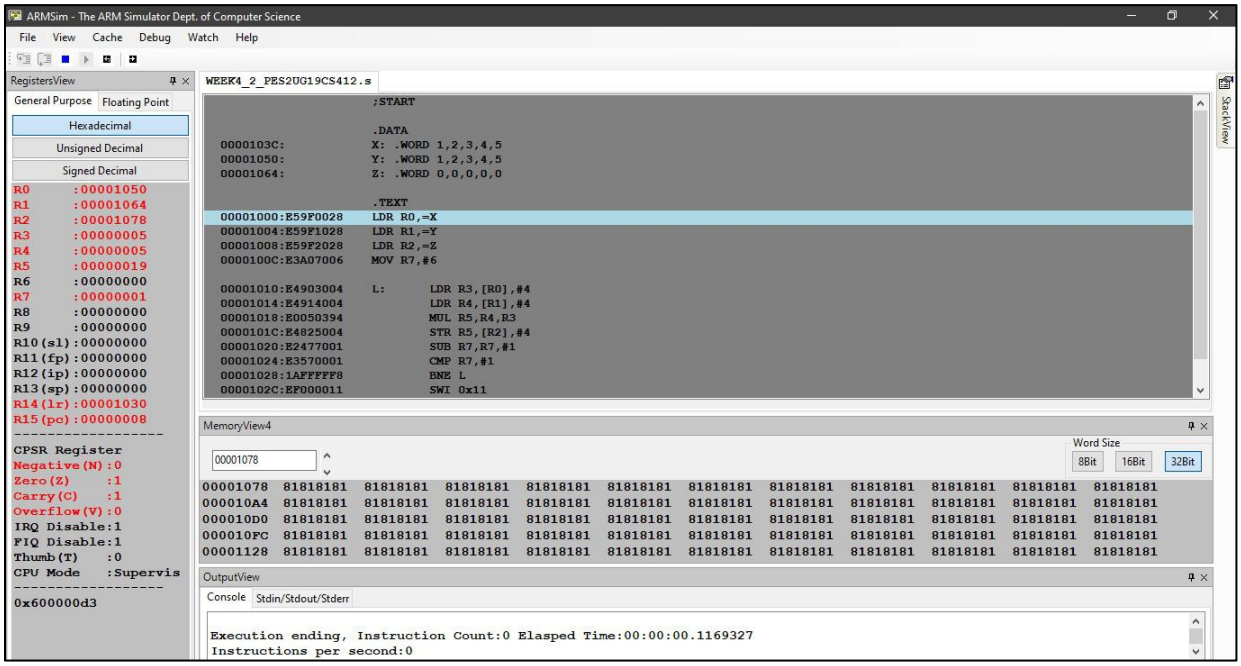
Week#____4_____ ProgramNumber:_____2__

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

I. ARM Assembly Code(2).

```
File  Edit  Format  View  Help
;START

.DATA
X: .WORD 1,2,3,4,5
Y: .WORD 1,2,3,4,5
Z: .WORD 0,0,0,0,0

.TEXT
LDR R0,=X
LDR R1,=Y
LDR R2,=Z
MOV R7,#6

L:      LDR R3,[R0],#4
        LDR R4,[R1],#4
        MUL R5,R4,R3
        STR R5,[R2],#4
        SUB R7,R7,#1
        CMP R7,#1
        BNE L
        SWI 0x11

;END
```

II. Output Screen Shot (One Example of yourchoice)



III. Output Table for theprogram(2)

	x: .word 1, 2, 3, 4,5 y: .word 1, 2, 3, 4,5 z: .word 0,0,0,0,0	
After Execution The content of array z is		
	1	**00000001**
	4	00000004
	9	**00000009**
	16	00000010
	25	00000019

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Week#____4_____ ProgramNumber:_____3__

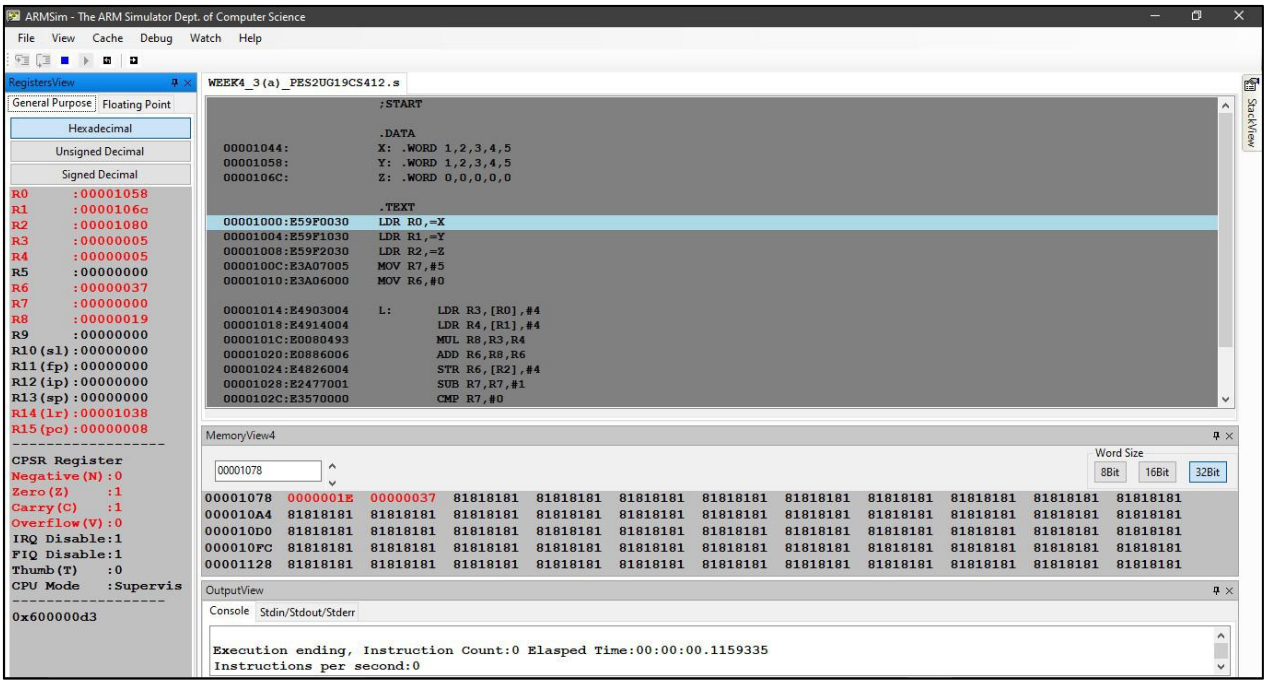
a. **Write an ALP to perform Convolution using MUL instruction (Addition of multiplication of respective numbers of loc A and locB)**
b. **Write an ALP to perform Convolution using MLA instruction (Addition of multiplication of respective numbers of loc A and loc B).**

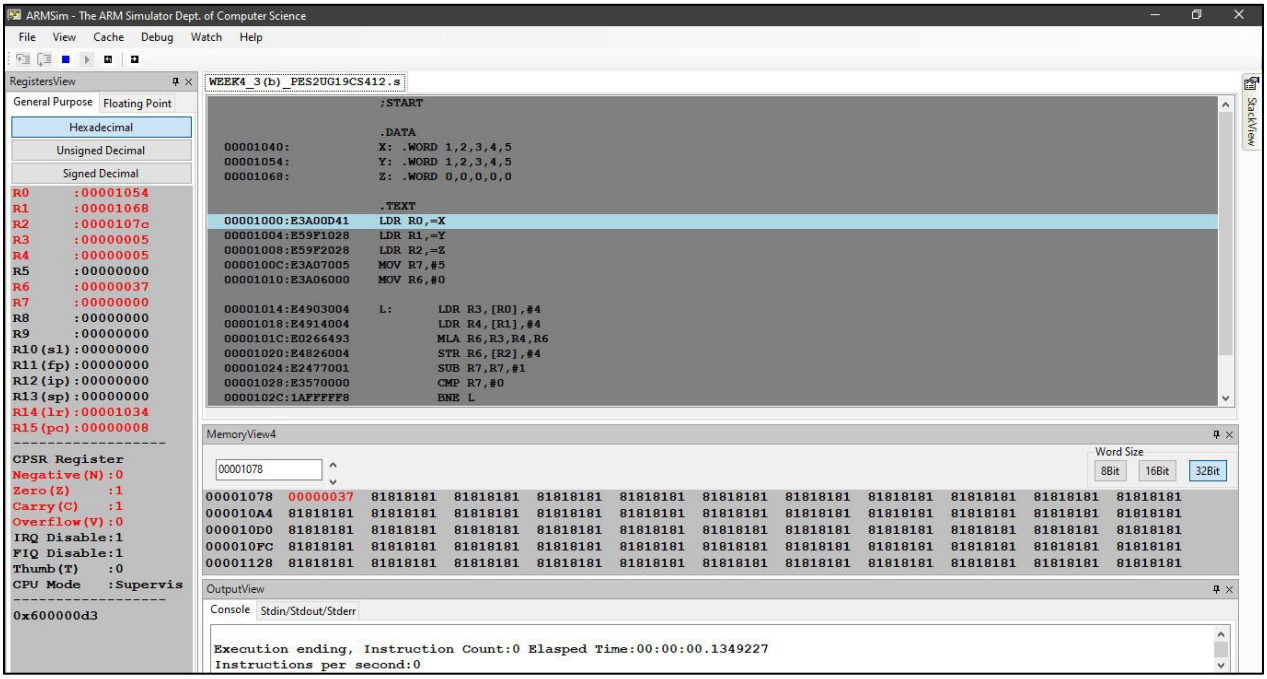
I. ARM Assembly Code(3).

```
File  Edit  Format  View  Help
;START

.DATA
X: .WORD 1,2,3,4,5
Y: .WORD 1,2,3,4,5
Z: .WORD 0,0,0,0,0

.TEXT
LDR R0,=X
LDR R1,=Y
LDR R2,=Z
MOV R7,#5
MOV R6,#0

L:      LDR R3,[R0],#4
        LDR R4,[R1],#4
        MUL R8,R3,R4
        ADD R6,R8,R6
        STR R6,[R2],#4
        SUB R7,R7,#1
        CMP R7,#0
        BNE L
        SWI 0x11

;END
```

```
File  Edit  Format  View  Help
;START

.DATA
X: .WORD 1,2,3,4,5
Y: .WORD 1,2,3,4,5
Z: .WORD 0,0,0,0,0

.TEXT
LDR R0,=X
LDR R1,=Y
LDR R2,=Z
MOV R7,#5
MOV R6,#0

L:      LDR R3,[R0],#4
        LDR R4,[R1],#4
        MLA R6,R3,R4,R6
        STR R6,[R2],#4
        SUB R7,R7,#1
        CMP R7,#0
        BNE L
        SWI 0x11

;END
```

II. Output Screen Shot (One Example of yourchoice)





III. Output Table for theprogram(3)

	a: .word 1, 2, 3, 4,5 b: .word 1, 2, 3, 4,5
R6	(1*1)+(2*2)+(3*3) +(4*4)+(5*5) =3000=00000037

	a: .word 1, 2, 3, 4,5 b: .word 1, 2, 3, 4,5
R6	(1*1)+(2*2)+(3*3) +(4*4)+(5*5) =3000=00000037

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Name: SUHAN B REVANKAR	SRN: PES2UG19CS412	Section G

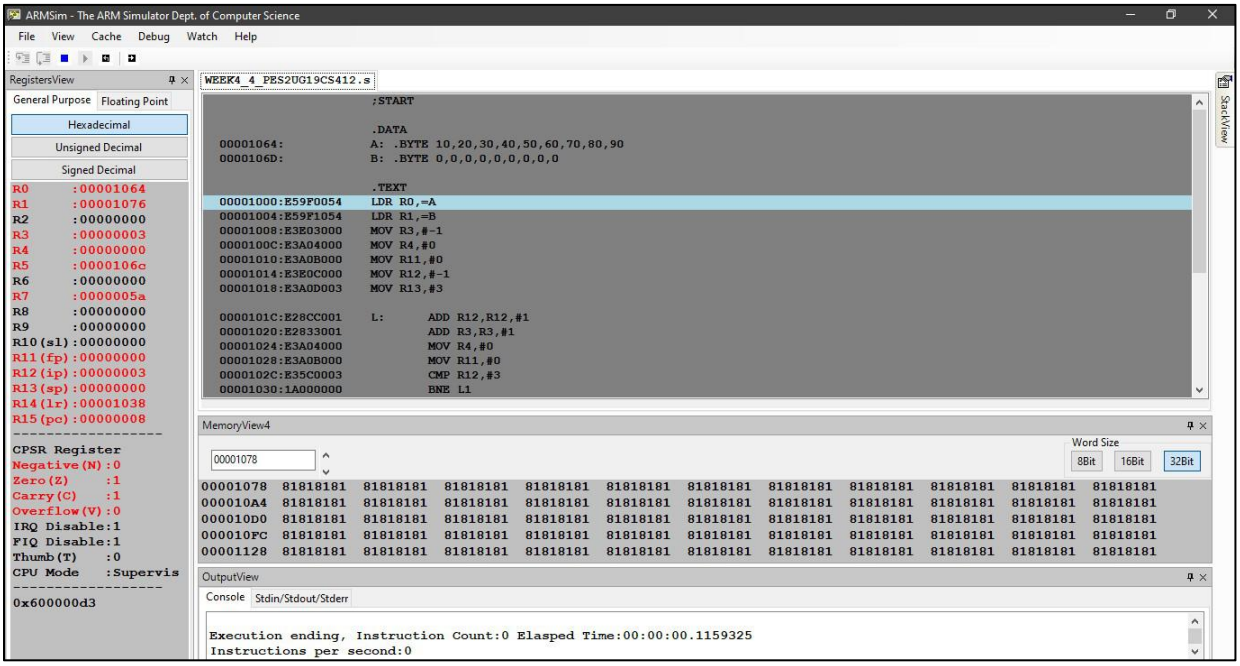
Week#____4_____ ProgramNumber:_____4_

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

I. ARM Assembly Code(4).

```
File  Edit  Format  View  Help
;START

.DATA
A: .BYTE 10,20,30,40,50,60,70,80,90
B: .BYTE 0,0,0,0,0,0,0,0,0

.TEXT
LDR R0,=A
LDR R1,=B
MOV R3,#-1
MOV R4,#0
MOV R11,#0
MOV R12,#-1
MOV R13,#3

L:      ADD R12,R12,#1
        ADD R3,R3,#1
        MOV R4,#0
        MOV R11,#0
        CMP R12,#3
        BNE L1
        SWI 0x011

L1:     MLA R5,R3,R13,R4
        ADD R5,R5,R0
        LDRB R7,[R5]
        STRB R7,[R1],#1
        ADD R4,R4,#1
        ADD R11,R11,#1
        CMP R11,#3
        BNE L1
        BEQ L
;END
```

II. Output Screen Shot (One Example of yourchoice)



III. Output Table for theprogram(4)

Before execution	a:.word 10,20,30,40,50,60,70,80,90	b: .word 0
After Execution	0000000A	0000000A
	00000014	00000014
	0000001E	0000001E
	00000028	00000028
	00000032	00000032
	0000003C	0000003C
	00000046	00000046
	00000050	00000050
	0000005A	0000005A

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4th Semester, Academic Year 2020-21

Date:19/02/2021

Name: SUHAN B REVANKAR	SRN:PES2UG19CS412	Section G

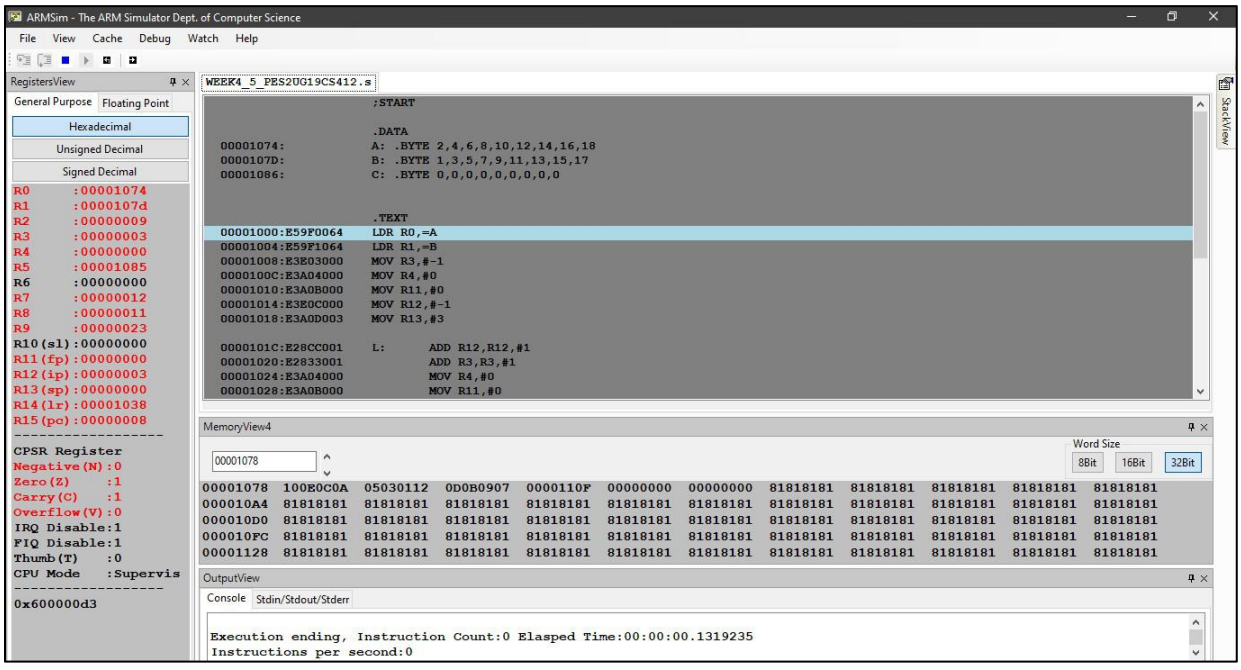
Week#____4_____ ProgramNumber:_____5_

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

I. ARM Assembly Code(5).

```
File  Edit  Format  View  Help
;START

.DATA
A: .BYTE 2,4,6,8,10,12,14,16,18
B: .BYTE 1,3,5,7,9,11,13,15,17
C: .BYTE 0,0,0,0,0,0,0,0,0


.TEXT
LDR R0,=A
LDR R1,=B
MOV R3,#-1
MOV R4,#0
MOV R11,#0
MOV R12,#-1
MOV R13,#3

L:      ADD R12,R12,#1
        ADD R3,R3,#1
        MOV R4,#0
        MOV R11,#0
        CMP R12,#3
        BNE L1
        SWI 0x011

L1:     MLA R5,R3,R13,R4
        ADD R5,R5,R0
        LDRB R7,[R5]
        MLA R5,R3,R13,R4
        ADD R5,R5,R1
        LDRB R8,[R5]
        ADD R9,R8,R7
        STRB R9,[R2],#1
        ADD R4,R4,#1
        ADD R11,R11,#1
        CMP R11,#3
        BNE L1
        BEQ L
;END
```

II. Output Screen Shot (One Example of yourchoice)



III. Output Table for theprogram(5)

Before execution	a:.word 2,4,6,8,10,12,14,16,18	b:.word 1,3,5,7,9,11,13,15,17,	c:.word 0
After Execution	00000002	00000001	00000003
	00000004	00000003	00000007
	00000006	00000005	0000000B
	00000008	00000007	0000000F
	0000000A	00000009	00000013
	0000000C	0000000B	00000017
	0000000E	0000000D	0000001B

	00000010	0000000F	000000 1F
	00000012	00000011	000000 23

. **Microprocessor and Computer ArchitectureLaboratory**

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Date: 19/02/2021

Name: SUHAN B REVANKAR	SRN: PES2UG19CS412	Section G

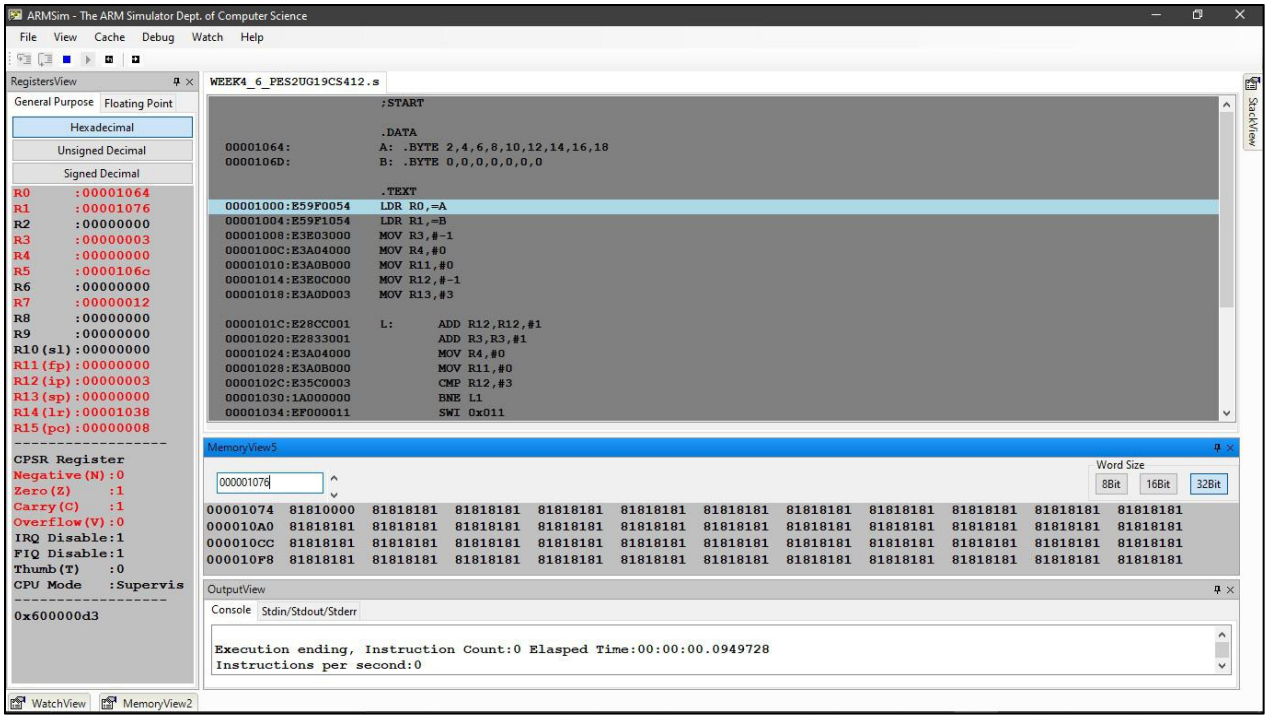
Week#____4_____ ProgramNumber:_____6_

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

I. ARM Assembly Code(1).

```
File  Edit  Format  View  Help
;START

.DATA
A: .BYTE 2,4,6,8,10,12,14,16,18
B: .BYTE 0,0,0,0,0,0,0,0

.TEXT
LDR R0,=A
LDR R1,=B
MOV R3,#-1
MOV R4,#0
MOV R11,#0
MOV R12,#-1
MOV R13,#3

L:      ADD R12,R12,#1
        ADD R3,R3,#1
        MOV R4,#0
        MOV R11,#0
        CMP R12,#3
        BNE L1
        SWI 0x011

L1:     MLA R5,R3,R13,R4
        ADD R5,R5,R0
        LDRB R7,[R5]
        STRB R8,[R1],#1
        ADD R4,R4,#1
        ADD R11,R11,#1
        CMP R11,#3
        BNE L1
        BEQ L
;END
```

II. Output Screen Shot (One Example of yourchoice)



III. Output Table for theprogram(1)

Before execution	**a:.word 2,4,6,8,10,12,14,16,18**		
After Execution	**Addition result**	**45**	**5A**

Disclaimer:

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

Signature: suhanb

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Section: G
Date: 19/02/2021