PES University, Bangalore
(EstablishedunderKarnatakaActNo.16of2013)
B.Tech., 4th Semester, March 2022
UE20CS252: Microprocessor and Computer Architecture
Assignment – Week 5
Last Date of Submission : 20th March 2022.

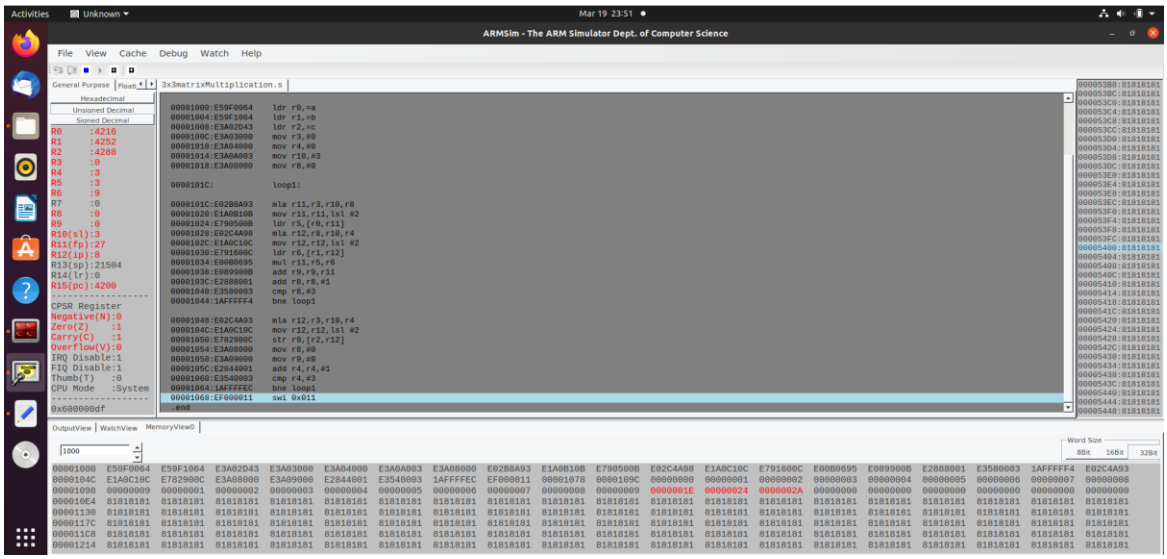
Sriram Radhakrishna PES1UG20CS435 Section : 'H'

Sl #	Question

1	Write a program in ARM7TDMI-ISA to multiply 2 matrices of order3.
	i.e., implement c[i][j]=c[i][j] + a[i][j] x b[i][j].
	a. Use MLA instruction
	b. Use MUL instruction
	
	Code :
	
	.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 0,0,0,0,0,0,0,0,0
	
	.text
	
	ldr r0,=a
	ldr r1,=b
	ldr r2,=c
	mov r3,#0
	mov r4,#0
	mov r10,#3
	mov r8,#0
	
	loop1:
	
	mla r11,r3,r10,r8
	mov r11,r11,lsl #2
	ldr r5,[r0,r11]
	mla r12,r8,r10,r4
	mov r12,r12,lsl #2
	ldr r6,[r1,r12]
	mul r11,r5,r6
	add r9,r9,r11
	add r8,r8,#1
	cmp r8,#3
	bne loop1

```
        mla r12,r3,r10,r4
        mov r12,r12,lsl #2
        str r9,[r2,r12]
        mov r8,#0
        mov r9,#0
        add r4,r4,#1
        cmp r4,#3
        bne loop1
        swi 0x011
.end
```

Screenshot :



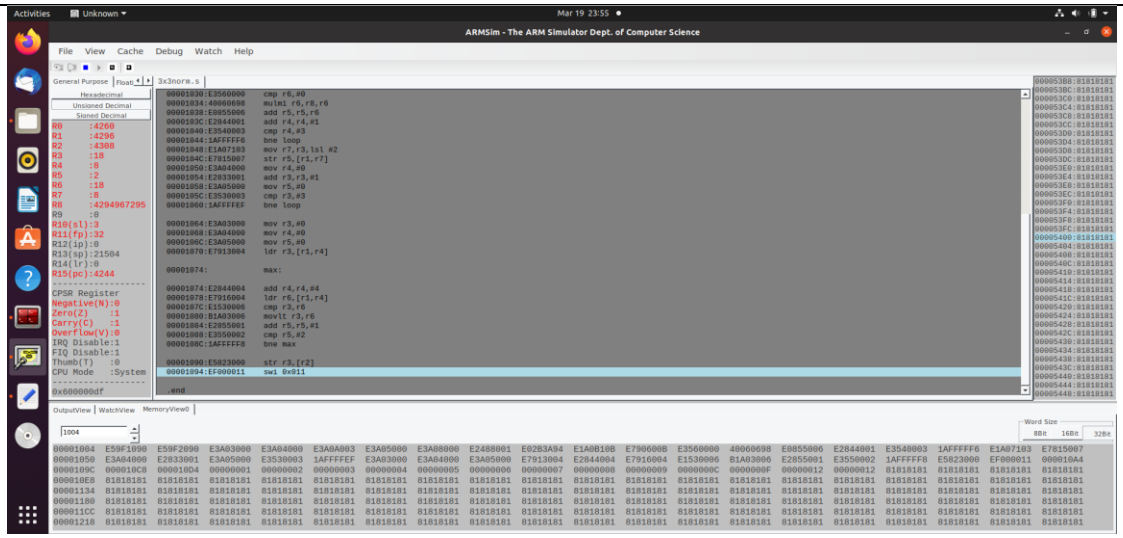
2 Write a program in ARM7TDMI-ISA to find the NORM of a square matrix of order n

Code :

```
.data

    a: .word 1,2,3,4,5,6,7,8,9
    b: .word 0,0,0
    c: .word 0

.text
    ldr r0,=a
    ldr r1,=b
    ldr r2,=c
    mov r3,#0
    mov r4,#0
    mov r10,#3
    mov r5,#0
    mov r8,#0
    sub r8,r8,#1
```

```
loop:

    mla r11,r4,r10,r3
    mov r11,r11,lsl #2
    ldr r6,[r0,r11]
    cmp r6,#0
    mulmi r6,r8,r6
    add r5,r5,r6
    add r4,r4,#1
    cmp r4,#3
    bne loop
    mov r7,r3,lsl #2
    str r5,[r1,r7]
    mov r4,#0
    add r3,r3,#1
    mov r5,#0
    cmp r3,#3
    bne loop

    mov r3,#0
    mov r4,#0
    mov r5,#0
    ldr r3,[r1,r4]

max:

    add r4,r4,#4
    ldr r6,[r1,r4]
    cmp r3,r6
    movlt r3,r6
    add r5,r5,#1
    cmp r5,#2
    bne max

    str r3,[r2]
    swi 0x011

.end
```

Screenshot :



3 Write a program in ARM7TDMI-ISA to find the ROWSUM of a matrix

Code :

```
.data

        a: .word 1,2,3,4,5,6,7,8,9
        b: .word 0,0,0

.text

        ldr r0,=a
        ldr r1,=b
        mov r2,#0
        mov r3,#0
        mov r10,#3
        mov r4,#0

loop:

        mla r11,r2,r10,r3
        mov r11,r11,lsl #2
        ldr r5,[r0,r11]
        add r4,r4,r5
        add r3,r3,#1
        cmp r3,#3
        bne loop

        mov r6,r2,lsl #2
        str r4,[r1,r6]
        add r2,r2,#1
        mov r3,#0
        mov r4,#0
        cmp r2,#3
        bne loop

        swi 0x011
```

.end

Screenshot :