

Nirbhay Sharma (B19CSE114)

Digital Systems Lab - 3

part - 1

the .s file and .c file has been simulated on keil successfully

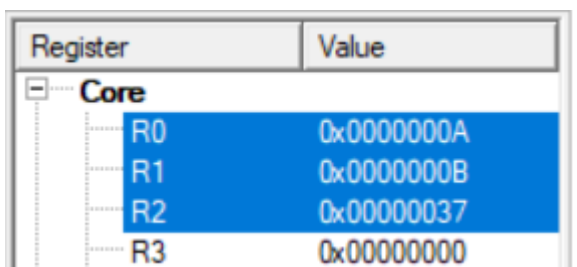
part - 2

Approach for question - 1

```
area sumn, code
export __main
__main
    MOV     R0, #10

    MOV     R1, #0
    MOV     R2, #0
LOOP
    CMP     R1, R0
    BGT     stop
    ADD     R2, R2, R1
    ADD     R1, R1, #1
    B       LOOP
stop B stop
end
```

1. run the loop till n
2. add the value to the result
3. store the result in the register



Register	Value
R0	0x0000000A
R1	0x0000000B
R2	0x00000037
R3	0x00000000

we can see that the value in R2 is 0x37 (55) which is the sum till 10

Approach for question - 2

```
AREA mydata, DATA, READONLY
array1 DCD 1, 2, 3
       DCD 4, 5, 6
```

```

        DCD      7,8,9
    area mydata1 , DATA

array2 DCD      0,0,0
        DCD      0,0,0
        DCD      0,0,0
    AREA mycode, CODE, READONLY
    EXPORT __main

__main

        ldr      r0, =array1
        ldr      r1, =array2
        mov r2, #0
        mov r3, #0

loop1
        cmp r2,#3
        bge endloop
        mov r3, #0

loop2
        cmp r3,#3
        bge contloop1
        ; r2 -> i , r3 ->j
        ; todo -> r1[i][j] = r0[j][i]
        ; r4 -> address of r1[i,j]
        mov r4, #3
        mov r5, #4
        mul r4,r4,r2
        add r4,r4,r3
        mul r4,r4,r5
        add r4, r4,r1

        ; r5 -> address of r0[j,i]
        mov r6,#3
        mul r6,r3,r6
        add r6,r6,r2
        mul r6,r6,r5
        add r6,r6,r0
        ldr r7,[r6]
        ;storing the transpose
        str r7,[r4]

        add r3,r3,#1
        B loop2

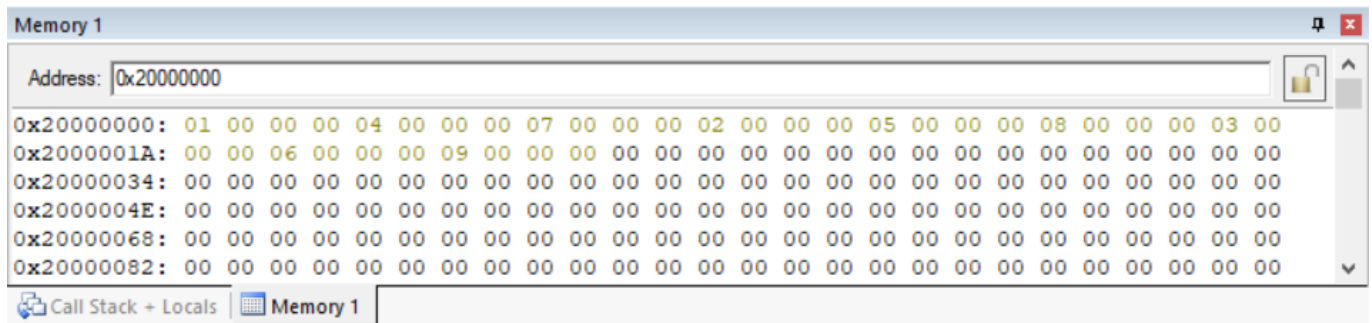
contloop1
        add r2,r2,#1
        B loop1

endloop
        ldr r10,=array2
        B stop
stop B stop

```

END

1. here row major method is used
2. first allocate the memory of array using DCD
3. run two loops and store the transpose of the array into another array which is also stored in memory location
4. the output result is shown below



here we can see that the array stored (1,4,7,2,5,8,3,6,9) which is the transpose of (1,2,3,4,5,6,7,8,9) in row major fashion