Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Date: 10-02-2021

Name:	**SRN:**	**Section:**
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Week#3

Program Number: 1

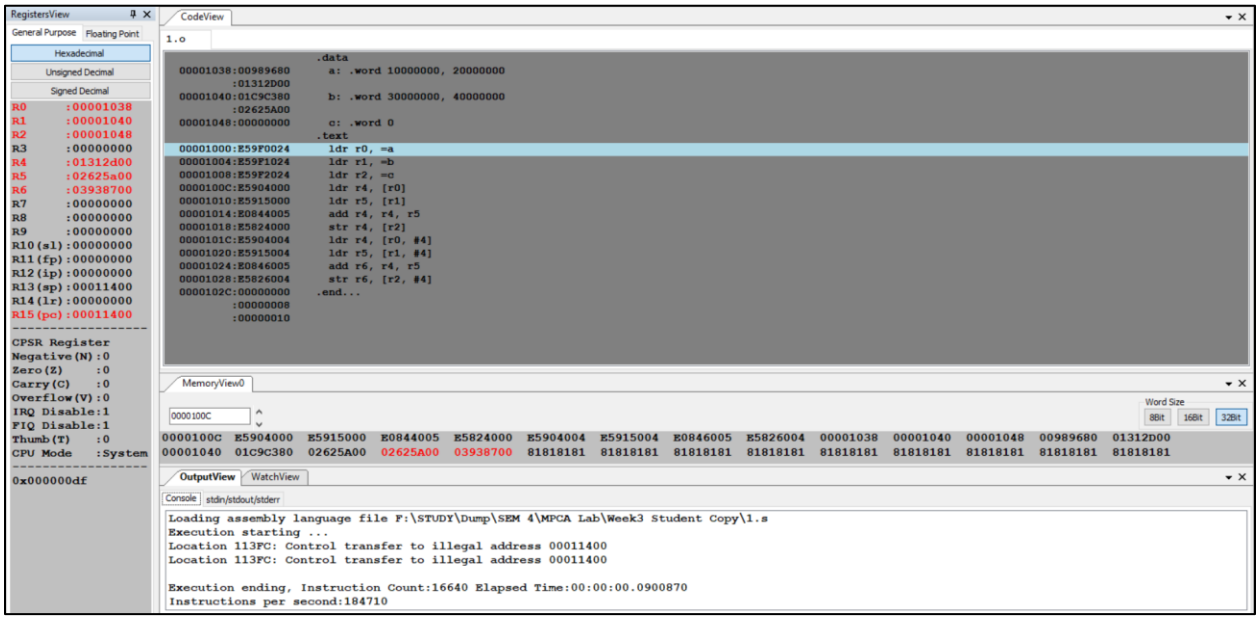
Write an ALP to add two 64-bit numbers loaded from memory and store the result in memory.

I.ARM Assembly Code for the program..

1.s

```
.data
  a: .word 10000000, 20000000
  b: .word 30000000, 40000000
  c: .word 0
.text
  ldr r0, =a
  ldr r1, =b
  ldr r2, =c
  ldr r4, [r0]
  ldr r5, [r1]
  add r4, r4, r5
  str r4, [r2]
  ldr r4, [r0, #4]
  ldr r5, [r1, #4]
  add r6, r4, r5
  str r6, [r2, #4]
.end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

a: .word 10000000, 20000000 b: .word 30000000, 40000000		
	Upper 32 bits	**Lower 32 bits**
a: .word	20000000 **(00989680)**	10000000 **(01312D00)**
b: .word	40000000 **(01C9C380)**	30000000 **(02625A00)**
c: .word	60000000 **(02625A00)**	40000000 **(03938700)**

Program Number: 2

Write an ALP to copy n numbers from Memory Location A to Memory Location B

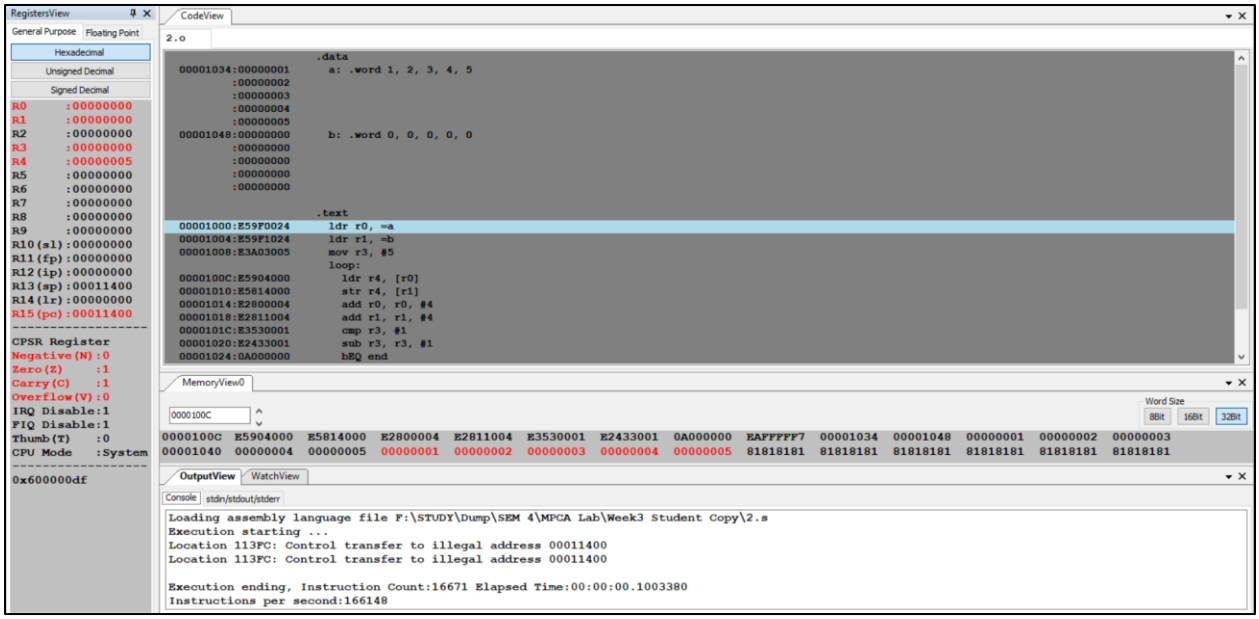
I.ARM Assembly Code for the program.

2.s

```
.data
  a: .word 1, 2, 3, 4, 5
  b: .word 0, 0, 0, 0, 0

.text
  ldr r0, =a
  ldr r1, =b
  mov r3, #5
  loop:
    ldr r4, [r0]
    str r4, [r1]
    add r0, r0, #4
    add r1, r1, #4
    cmp r3, #1
    sub r3, r3, #1
    bEQ end
    b loop
end:
  .end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

.data a: .word 1, 2, 3, 4, 5 b: .word 0, 0, 0, 0, 0	
1st Iteration	a: .word 1, 2, 3, 4, 5 b: .word 1, 0, 0, 0,0
2nd Iteration	a: .word 1, 2, 3, 4, 5 b: .word 1, 2, 0, 0, 0
3rd Iteration	a: .word 1, 2, 3, 4, 5 b: .word 1, 2, 3, 0, 0
4th Iteration	a: .word 1, 2, 3, 4, 5 b: .word 1, 2, 3, 4, 0
5th Iteration	a: .word 1, 2, 3, 4, 5 b: .word 1, 2, 3, 4, 5

Program Number: 3

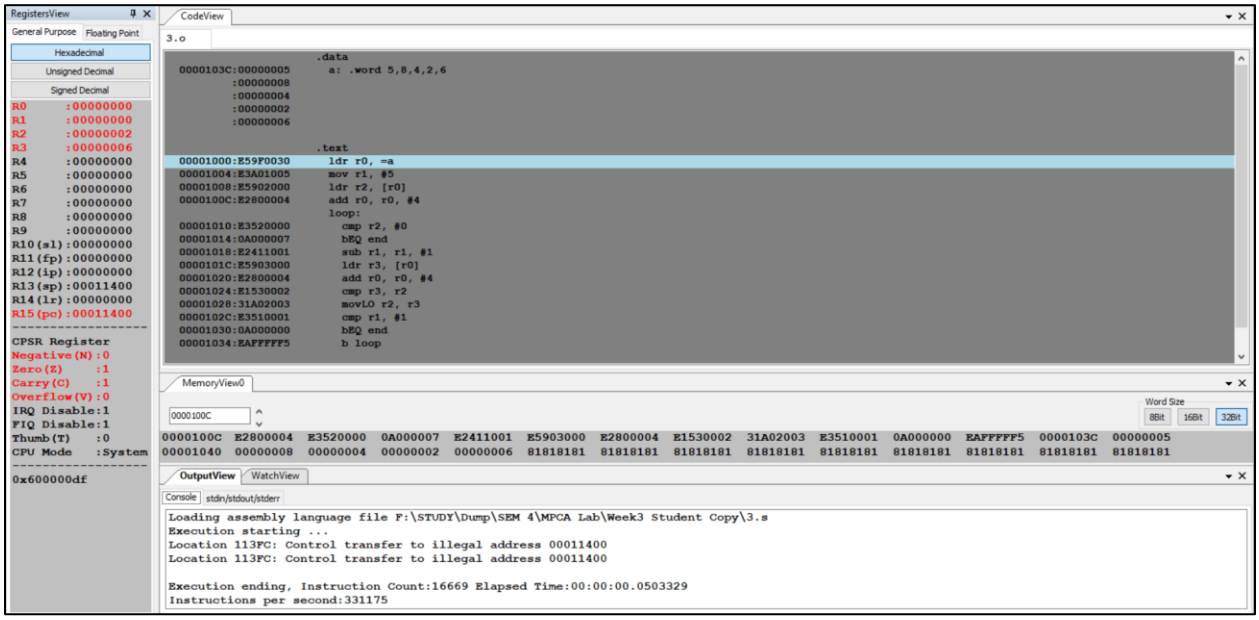
Write an ALP to find smallest number in an array of n 32-bit numbers

I.ARM Assembly Code for the program.

3.s

```
1   .data
2     a: .word 5,8,4,2,6
3
4   .text
5     ldr r0, =a
6     mov r1, #5
7     ldr r2, [r0]
8     add r0, r0, #4
9     loop:
10      cmp r2, #0
11      bEQ end
12      sub r1, r1, #1
13      ldr r3, [r0]
14      add r0, r0, #4
15      cmp r3, r2
16      movLO r2, r3
17      cmp r1, #1
18      bEQ end
19      b loop
20
21  end:
22    .end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

a: .word 5, 8, 4, 2, 6	
1st Iteration	R2=5, R3=8 (R3>R2)
2nd Iteration	R2=5, R3=4 (R3<R2)
3rd Iteration	R2=4, R3=2 (R3<R2)
4th Iteration	R2=2, R3=6 (R3>R2)
Smallest number 2 is present in R2	

Program Number: 4a

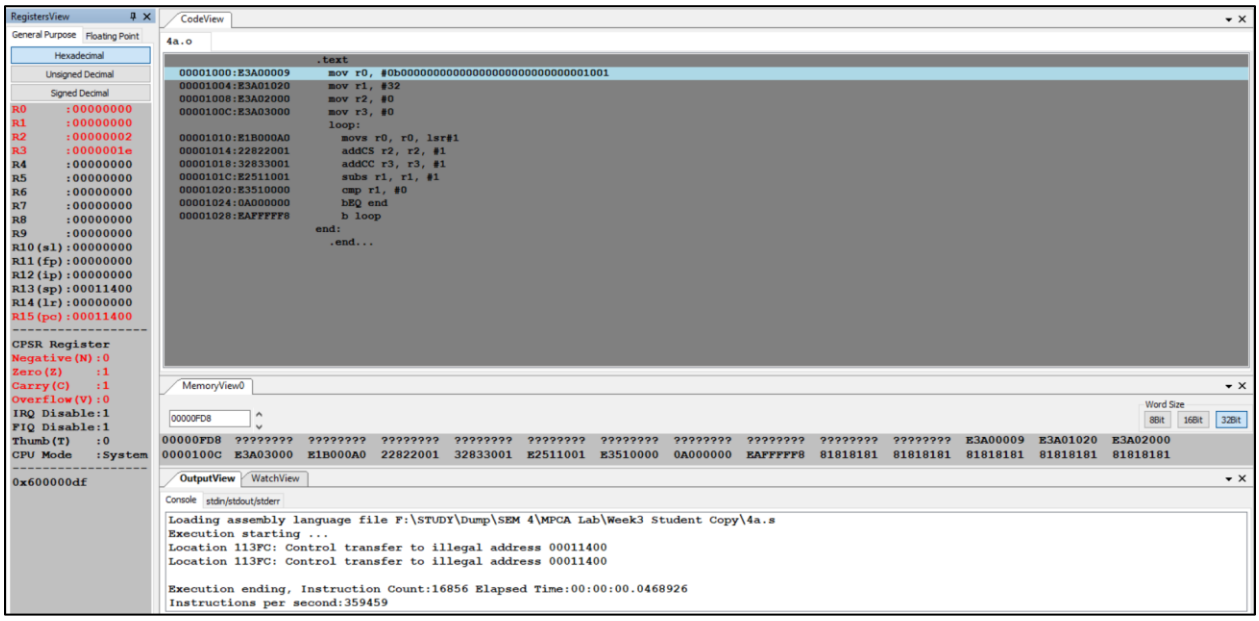
Write an ALP to count the number of 1's and 0's in a given 32-bit number.

I.ARM Assembly Code for the program.

4a.s

```
.text
  mov r0, #0b00000000000000000000000000001001
  mov r1, #32
  mov r2, #0
  mov r3, #0
  loop:
    movs r0, r0, lsr#1
    addCS r2, r2, #1
    addCC r3, r3, #1
    subs r1, r1, #1
    cmp r1, #0
    bEQ end
    b loop
end:
  .end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

r0= 0b00000000000000000000000000001001		
r1	**32**	
r2	**After execution**	**2 (=2 in hex)**
r3	**After execution**	**30 (=1e in hex)**

Program Number: 4b

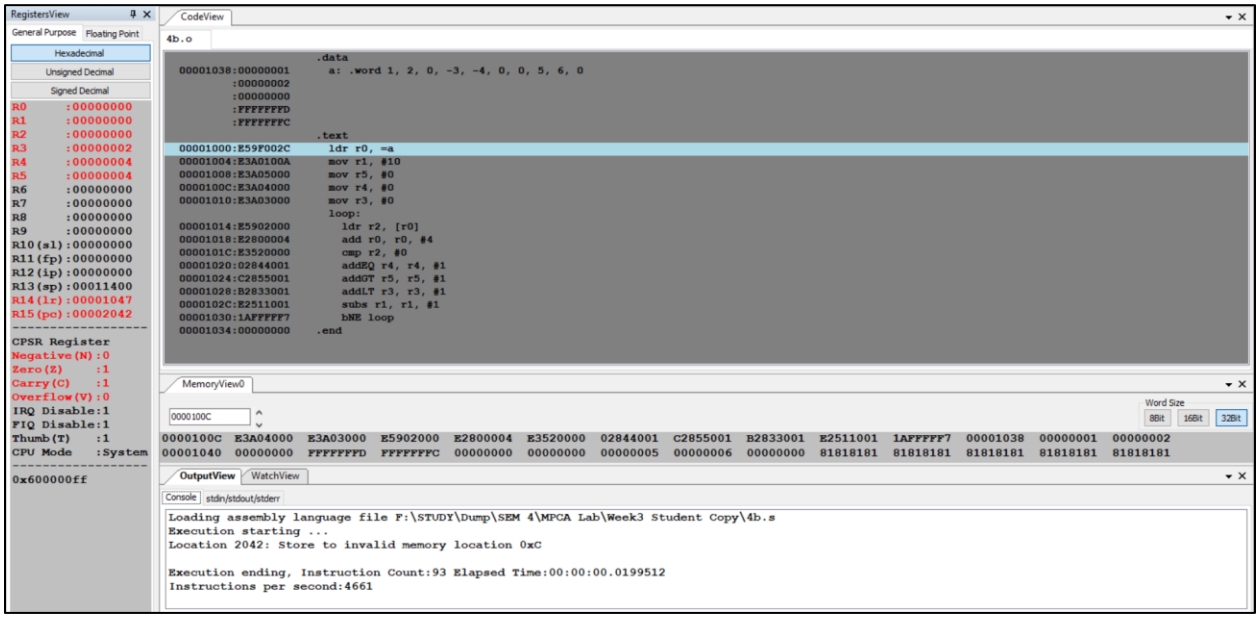
Write an ALP to find the number of zeroes, positive and negative numbers in a given array

I.ARM Assembly Code for the program.

4b.s

```
.data
  a: .word 1, 2, 0, -3, -4, 0, 0, 5, 6, 0
.text
  ldr r0, =a
  mov r1, #10
  mov r5, #0
  mov r4, #0
  mov r3, #0
  loop:
    ldr r2, [r0]
    add r0, r0, #4
    cmp r2, #0
    addEQ r4, r4, #1
    addGT r5, r5, #1
    addLT r3, r3, #1
    subs r1, r1, #1
    bNE loop
.end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

a:.word 1, 2, 0, -3, -4, 0, 0, 5, 6, 0	
R3	**2**
R4	**4**
R5	**4**

Program Number: 5

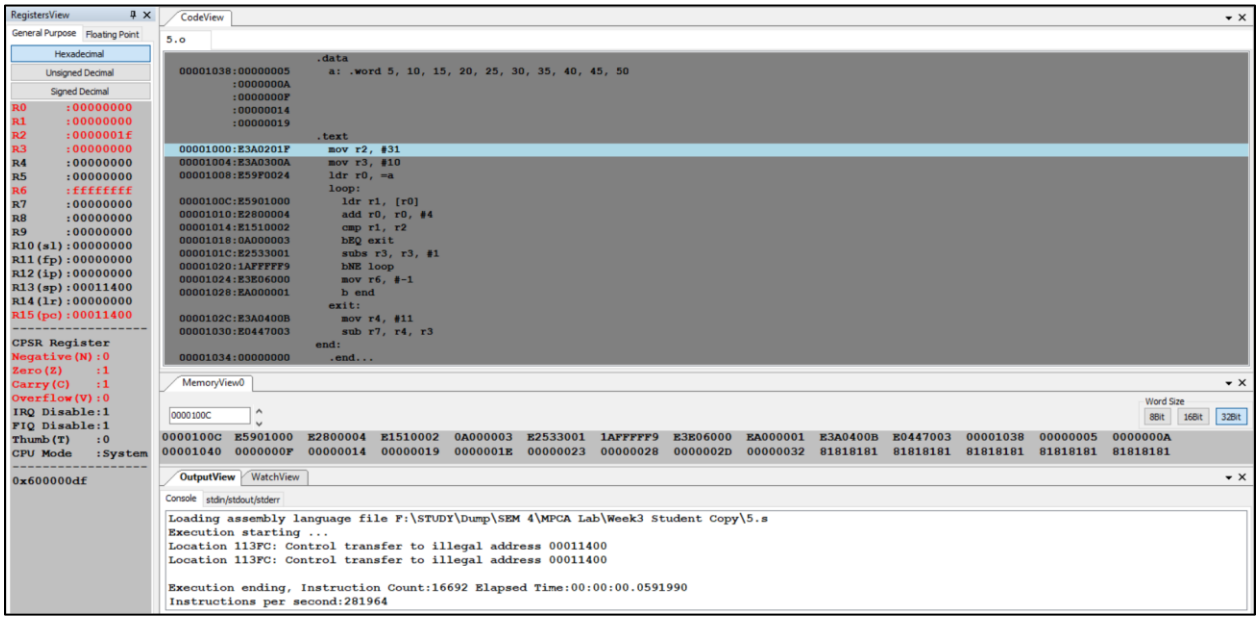
Write an ALP to check whether a given number is present in array using Linear Search (Without SWI 0x02), if found move +1 to R6 and key position to R7 else move -1 to R6 (if number not found)

I.ARM Assembly Code for the program.

5.s

```
.data
  a: .word 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
.text
  mov r2, #31
  mov r3, #10
  ldr r0, =a
  loop:
    ldr r1, [r0]
    add r0, r0, #4
    cmp r1, r2
    bEQ exit
    subs r3, r3, #1
    bNE loop
    mov r6, #-1
    b end
  exit:
    mov r4, #11
    sub r7, r4, r3
end:
  .end
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

A:.WORD 5, 10, 15, 20, 25, 30, 35, 40, 45, 50		
		HEX value
R2	**KEY =31**	**1F**
R3	**COUNT =10**	
R0	**Address of A**	**00001038**
R3	**After Execution =0** **R6= -1** **(key not present)**	

Program Number: 6

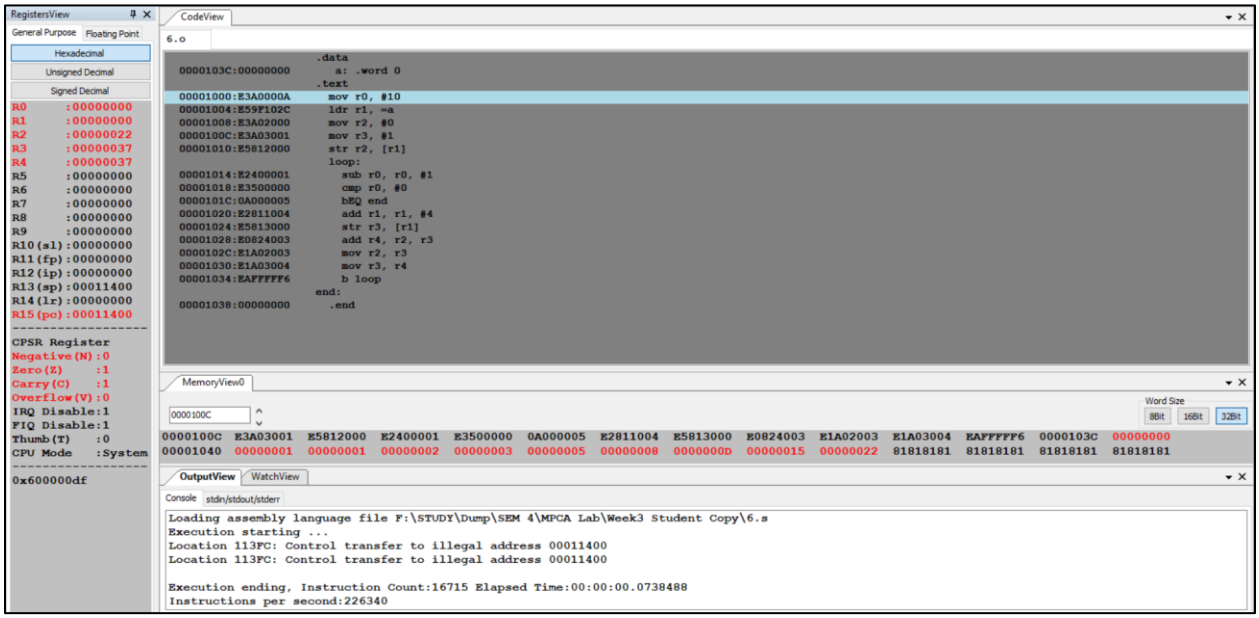
Write an ALP to generate Fibonacci Series and store them in an array

I.ARM Assembly Code for the program.

6.s

```
1   .data
2      a: .word 0
3   .text
4     mov r0, #10
5     ldr r1, =a
6     mov r2, #0
7     mov r3, #1
8     str r2, [r1]
9     loop:
10      sub r0, r0, #1
11      cmp r0, #0
12      bEQ end
13      add r1, r1, #4
14      str r3, [r1]
15      add r4, r2, r3
16      mov r2, r3
17      mov r3, r4
18      b loop
19  end:
20    .end
21
```

II.Output Screen Shot (One Example of your choice)



III.Output Table for the program

FIBONACCI SEQUENCE		
R0	**Fibonacci Count**	**10**
R1	**Address of A**	**0000103C**
R2	**Initially 0**	**0**
R3	**Initially 1**	**1**
R4	**1st Iteration**	**0 + 1 = 1**
R4	**2nd Iteration**	**1 + 1 = 2**
R4	**3rd Iteration**	**2 + 1 = 3**
R4	**4th Iteration**	**3 + 2 = 5**
R4	**5th Iteration**	**5 + 3 = 8**
R4	**6th Iteration**	**8 + 5 = 13= 0000000D**
R4	**7th Iteration**	**13 + 8 = 21= 00000015**
R4	**8th Iteration**	**21 + 13 = 34 = 00000022**

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.

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