Fall Semester 2021-2022

Microprocessor and Interfacing

Lab Report

Digital Assignment-5

Experiment No: 6 Task No: 5

Course Code: CSE2006

Slot: L7+L8

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Submitted To: Dr. Abdul Majed KK

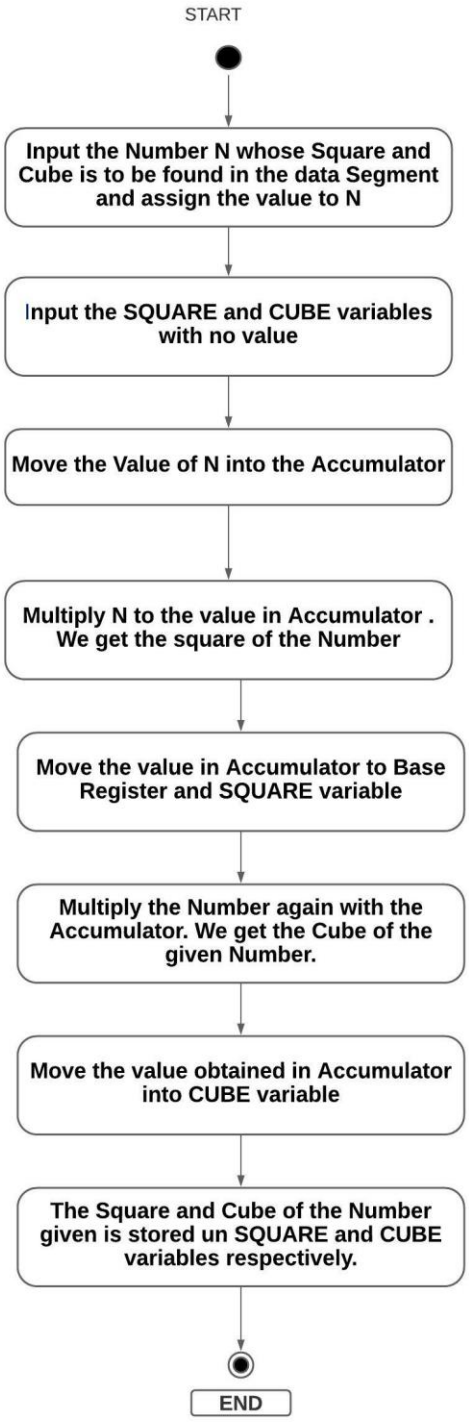
Experiment 6:

Question 1) Write an ALP program to find square and cube of a given number

ALGORITHM

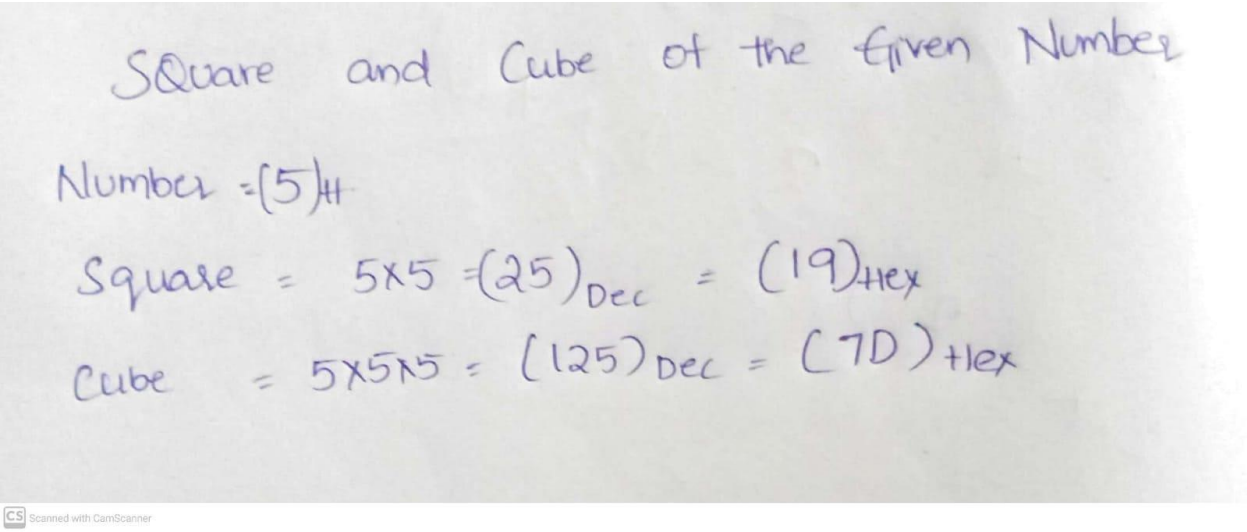
- Input the Number N whose Square and Cube is to be found in the data Segment and assign the value to N
- Input the SQUARE and CUBE variables with no value
- Move the Value of N into the Accumulator
- Multiply N to the value in Accumulator . We get the square of the Number
- Move the value in Accumulator to Base Register and SQUARE variable
- Multiply the Number again with the Accumulator. We get the Cube of the given Number.
- Move the value obtained in Accumulator into CUBE variable
- The Square and Cube of the Number given is stored in SQUARE and CUBE variables respectively.

FLOWCHART


START
Input the Number N whose Square and Cube is to be found in the data Segment and assign the value to N
Input the SQUARE and CUBE variables with no value
Move the Value of N into the Accumulator
Multiply N to the value in Accumulator . We get the square of the Number
Move the value in Accumulator to Base Register and SQUARE variable
Multiply the Number again with the Accumulator. We get the Cube of the given Number.
Move the value obtained in Accumulator into CUBE variable
The Square and Cube of the Number given is stored un SQUARE and CUBE variables respectively.
END

Design and Calculations:

Input the Number N whose Square and Cube is to be found in the data Segment and assign the value to N.Input the SQUARE and CUBE variables with no value.Move the Value of N into the Accumulator.Multiply N to the value in Accumulator . We get the square of the Number.Move the value in Accumulator to Base Register and SQUARE variable.Multiply the Number again with the Accumulator. We get the Cube of the given Number.Move the value obtained in Accumulator into CUBE variable.The Square and Cube of the Number given is stored in SQUARE and CUBE variables respectively.

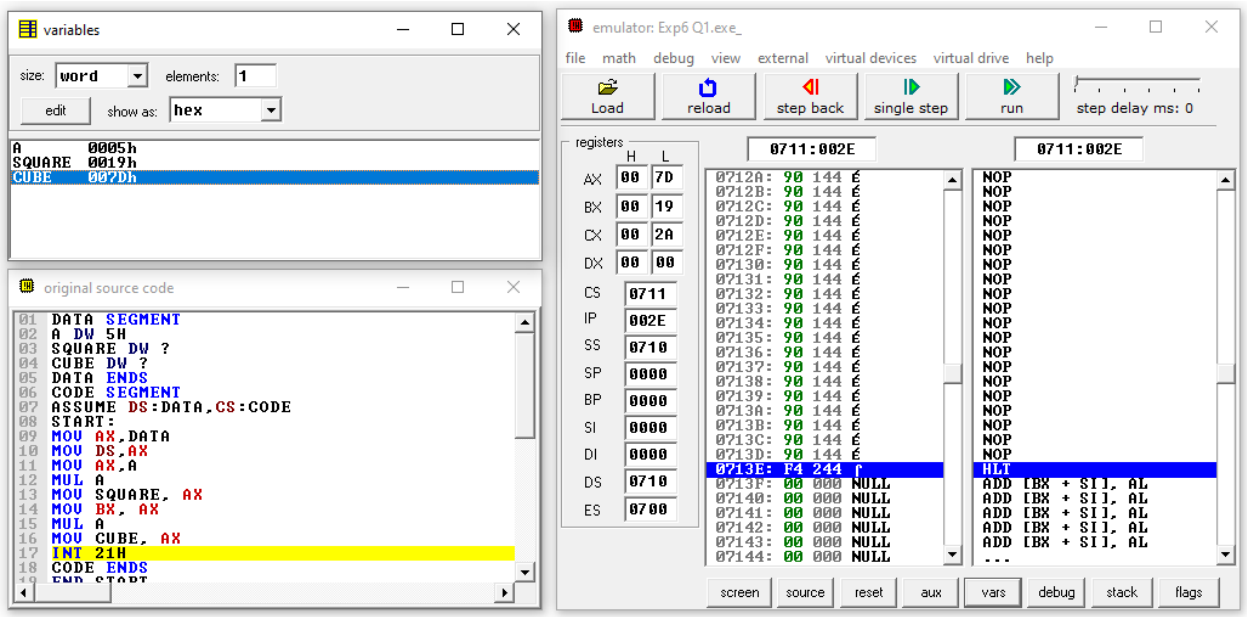


Program Code:

```
DATA SEGMENT
A DW 5H
SQUARE DW ?
CUBE DW ?
DATA ENDS
CODE SEGMENT
    ASSUME DS:DATA,CS:CODE
START:
    MOV AX,DATA
    MOV DS,AX
    MOV AX,A
    MUL A
    MOV SQUARE, AX
    MOV BX, AX
    MUL A
    MOV CUBE, AX
    INT 21H
CODE ENDS
END START
```

```
01  DATA SEGMENT
02  A DW 5H
03  SQUARE DW ?
04  CUBE DW ?
05  DATA ENDS
06  CODE SEGMENT
07          ASSUME DS:DATA,CS:CODE
08  START:
09          MOV AX,DATA
10          MOV DS,AX
11          MOV AX,A
12          MUL A
13          MOV SQUARE, AX
14          MOV BX, AX
15          MUL A
16          MOV CUBE, AX
17          INT 21H
18  CODE ENDS
19  END START
```

Output:



Result and Inference:

The value in the Accumulator is the Cube of the number given and Square of the number is stored in Counter Register. We can see that SQUARE(0019H) and CUBE (007DH) variables are filled with values of square andd cube of the number(0005H) given

Question 2)

If Reg. No is 20BCE0043 then address location of Data is 2043 and Data is 43(decimal).

2043	0	0	1	0	1	0	1	1
2044	0	0	0	0	0	0	1	1
2045	0	0	0	0	0	1	0	1

- Use your Reg. No for Datas.

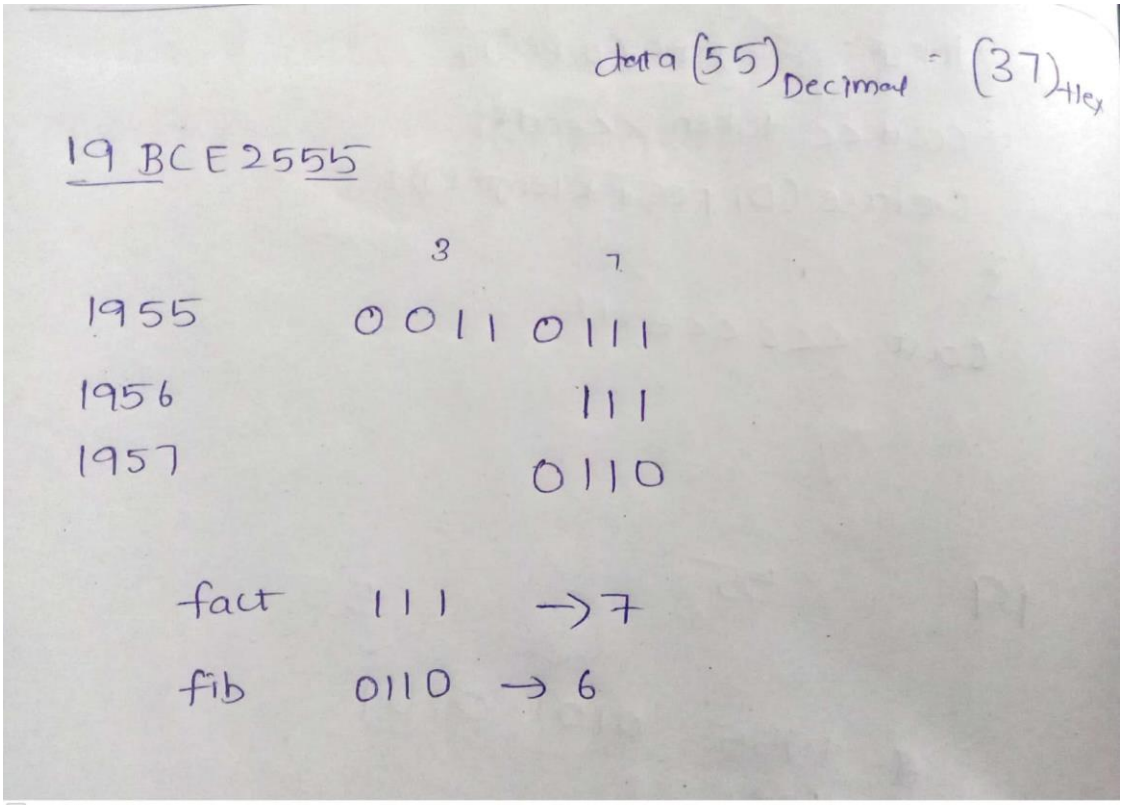
2. A Find the factorial (last three bits 0 1 1 = 3) → 1 x 2 x 3 = 6

2. B Find the fibonacci series (0 1 0 1 = 5) → 0, 1, 1, 2, 3, 5, 8,

Documents should be in the file

1. Flow chart of 2.A and 2.B
2. Handwritten Assembly Language program (ALP) of 2.A to 2.B
3. Snapshot of Typed ALP of 2.A to 2.B
4. Snapshot of Output and status of Flag register.

INITIAL CACLUTIONS WITH REGISTRATION NUMBER:



Factorial Input: 7

Fibanocci Input: 6

ALGORITHM

Factorial:

- Move the value of whose factorial to be found in to the Accumulator form the given Location.
- Move the value in Accumulator to both Base Register and Counter Register.
- Decrement both Base Register and Counter Register
- Multiply the Base Register to Accumulator and decrement the Base Register inside a loop
- Loop is repeated and Base register is multiplied to Accumulator till the counter becomes 0.
- The Factorial of the Given value is stored in Accumulator.

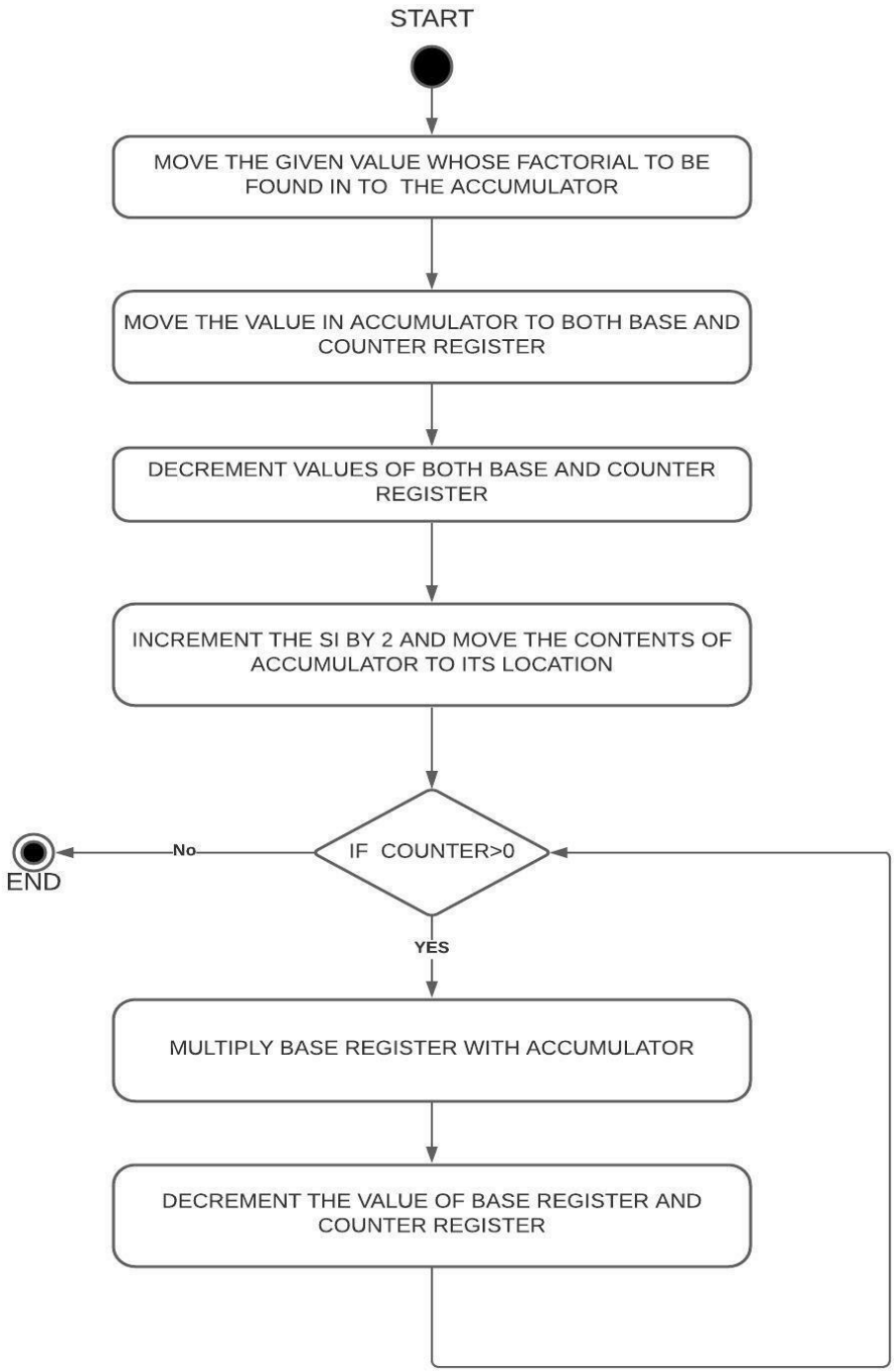
Fibanocci:

- Input the value of the whose Fibanocci series to be found from the given Location.
- Move 500h to SI and input 00h to that location([SI])
- Increment the SI value and input 01h to it
- Move the N value into counter
- Run a loop if counter >0
- Move the value at SI-1 location to Accumulator
- Add the Value at Location SI to the Accumulator
- Increment the SI value
- Move the value in Accumulator to location of SI
- Decrement the counter

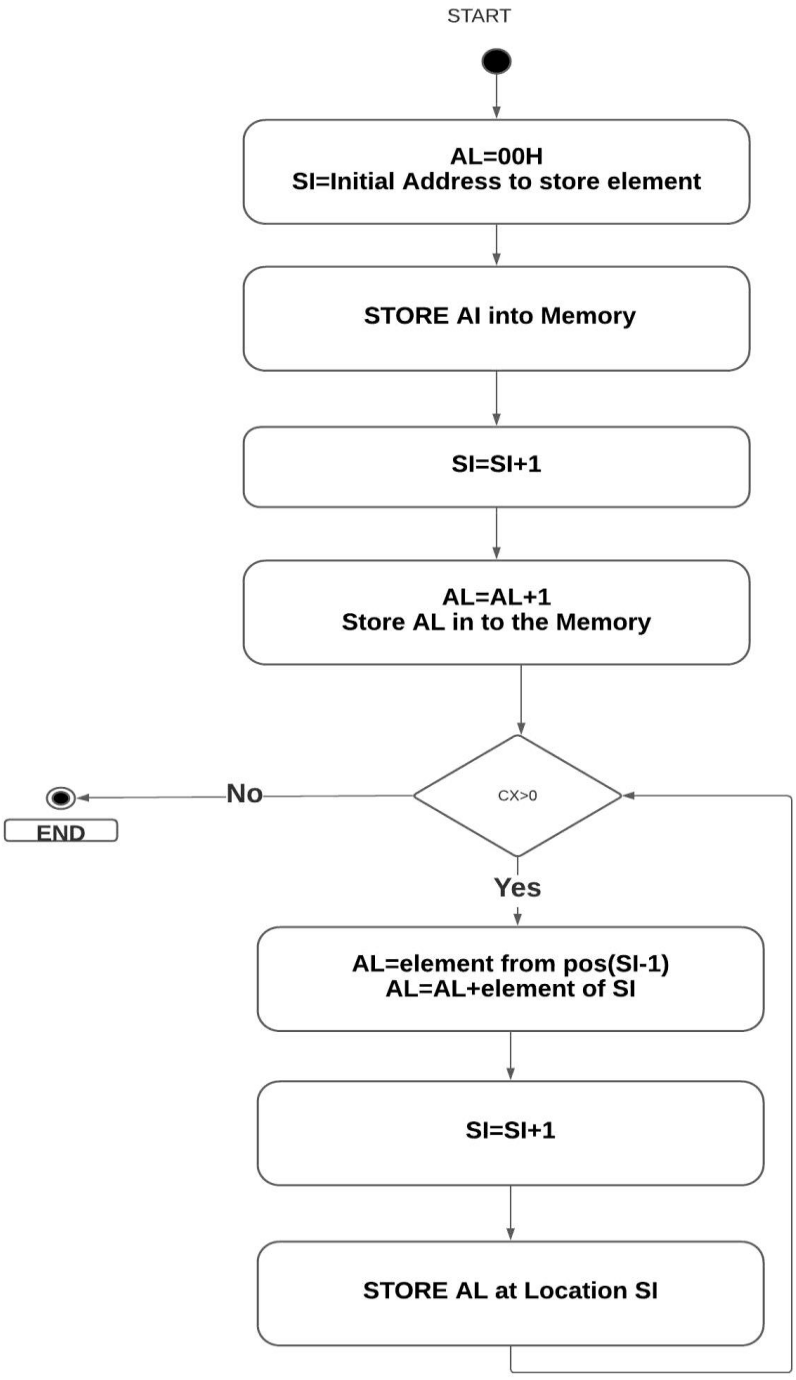
- **Repeat Loop**

FLOWCHART

Factorial:



Fibanocci:


START
AL=00H
SI=Initial Address to store element
STORE AI into Memory
SI=SI+1
AL=AL+1
Store AL in to the Memory
CX>0
No
END
Yes
AL=element from pos(SI-1)
AL=AL+element of SI
SI=SI+1
STORE AL at Location SI

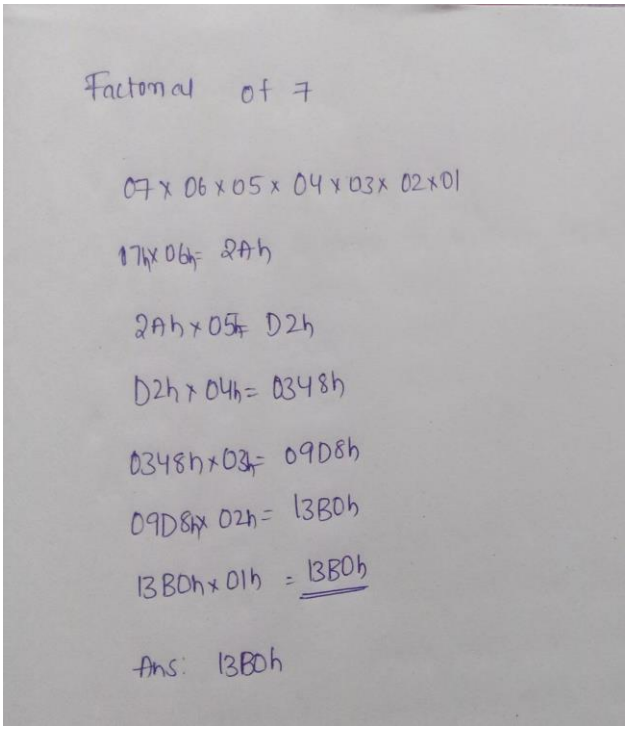
Factorial

Design and Calculations:

Here we input the value from location 1956h in to the accumulator and Move the value from Accumulator to Base Register and Counter Register and Decrement the value of both Base and Counter registers and run a loop and Multiply the Base register . And decrement the Base Register and loop is repeated until the counter becomes 0

Calculations:

7*6*5*4*3*2*1=13B0[Hex] (5040[Dec])



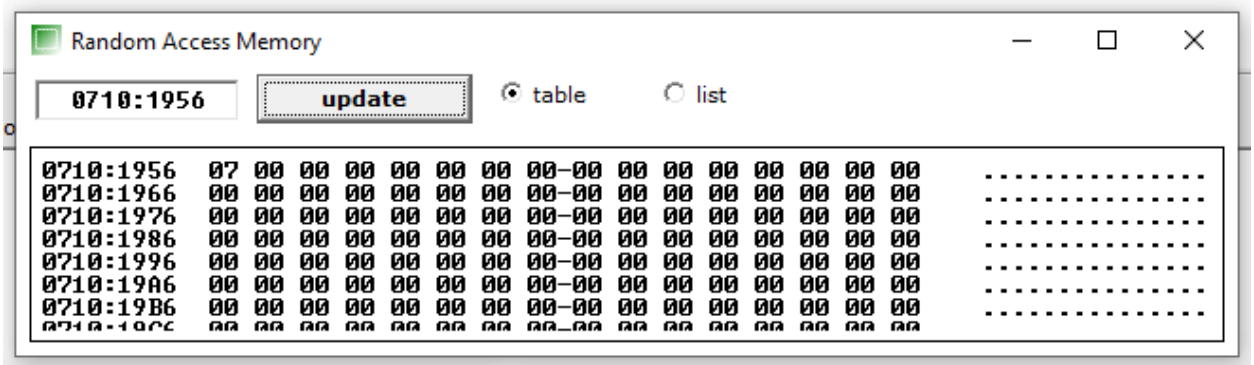
Program Code:

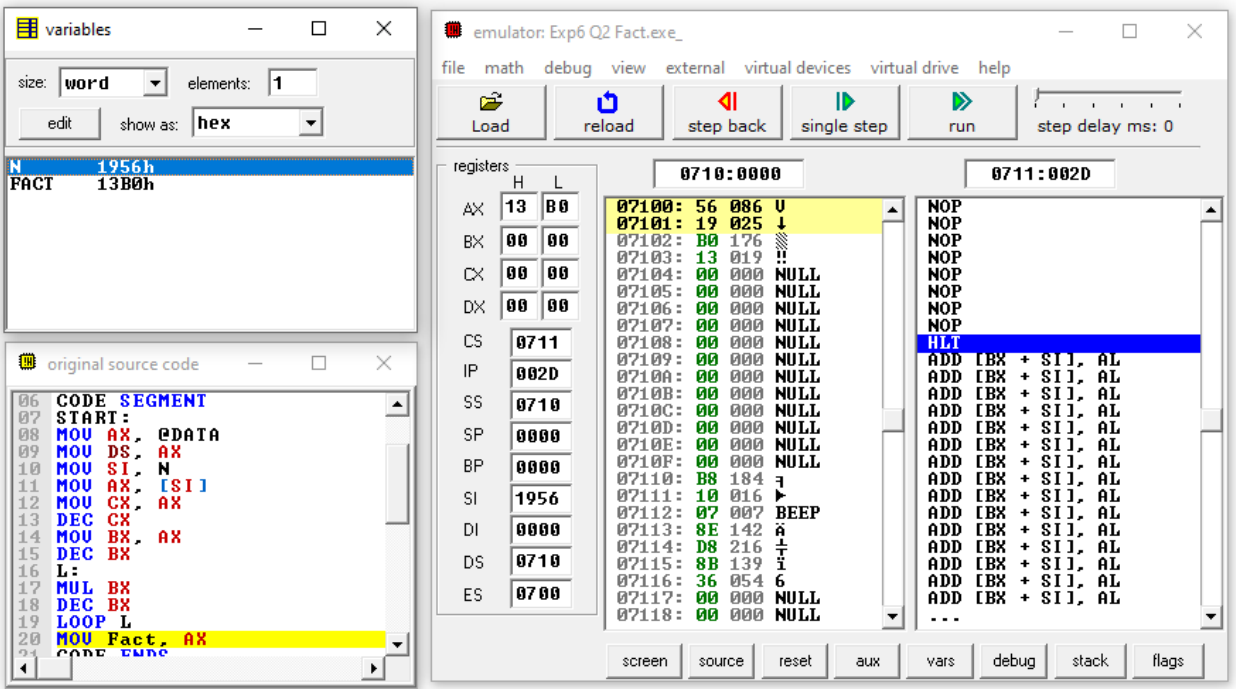
```
Assume CS: Code DS: Data
DATA SEGMENT
   N DW 1956h
   Fact DW ?
   DATA ENDS
CODE SEGMENT
   START:
   MOV AX, @DATA
   MOV DS, AX
   MOV SI, N
   MOV AX, [SI]
   MOV CX, AX
   DEC CX
   MOV BX, AX
   DEC BX
   L:
   MUL BX
   DEC BX
   LOOP L
   MOV Fact, AX
   CODE ENDS
END START
```

```
01  Assume CS: Code DS: Data
02  DATA SEGMENT
03      N DW 1956h
04      Fact DW ?
05      DATA ENDS
06  CODE SEGMENT
07      START:
08      MOV AX, @DATA
09      MOV DS, AX
10      MOV SI, N
11      MOV AX, [SI]
12      MOV CX, AX
13      DEC CX
14      MOV BX, AX
15      DEC BX
16      L:
17      MUL BX
18      DEC BX
19      LOOP L
20      MOV Fact, AX
21      CODE ENDS
22  END START
23
```

OUTPUT:

Memory Location:





Result and Inference:

-The Factorial of 7 (5040[dec]-> 13B0[hex]) 13B0 is stored in Accumulator and in Fact Variable.

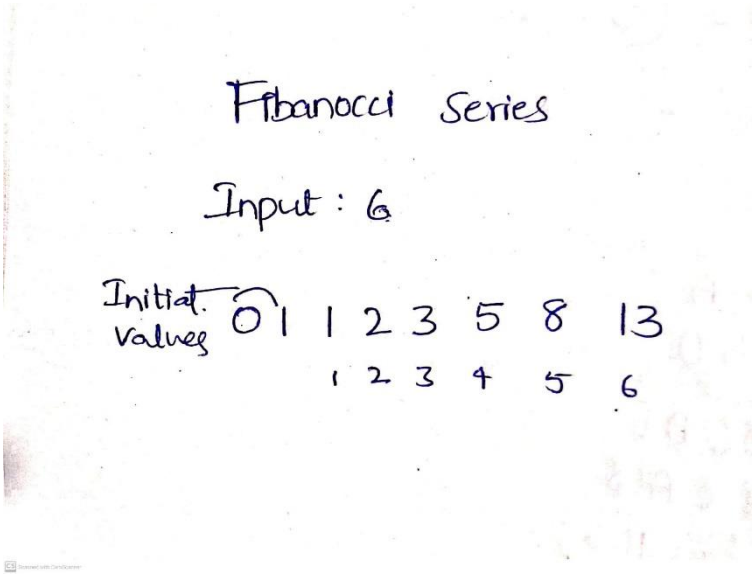
-Both Base and Counter Registers becomes 0.

Fibanocci:

Design and Calculations:

We can observe that DS=0710h from fig1.Then we collected data from Memory location 1957h.To generate Fibonacci sequence, we are putting the 00H and 01H into memory at first. Then we are taking the limit from

location offset 500. We input the N value in to the counter and.Now we are taking number from previous location, then add it with the value of current location, after that storing the result into next location, till the counter becomes 0



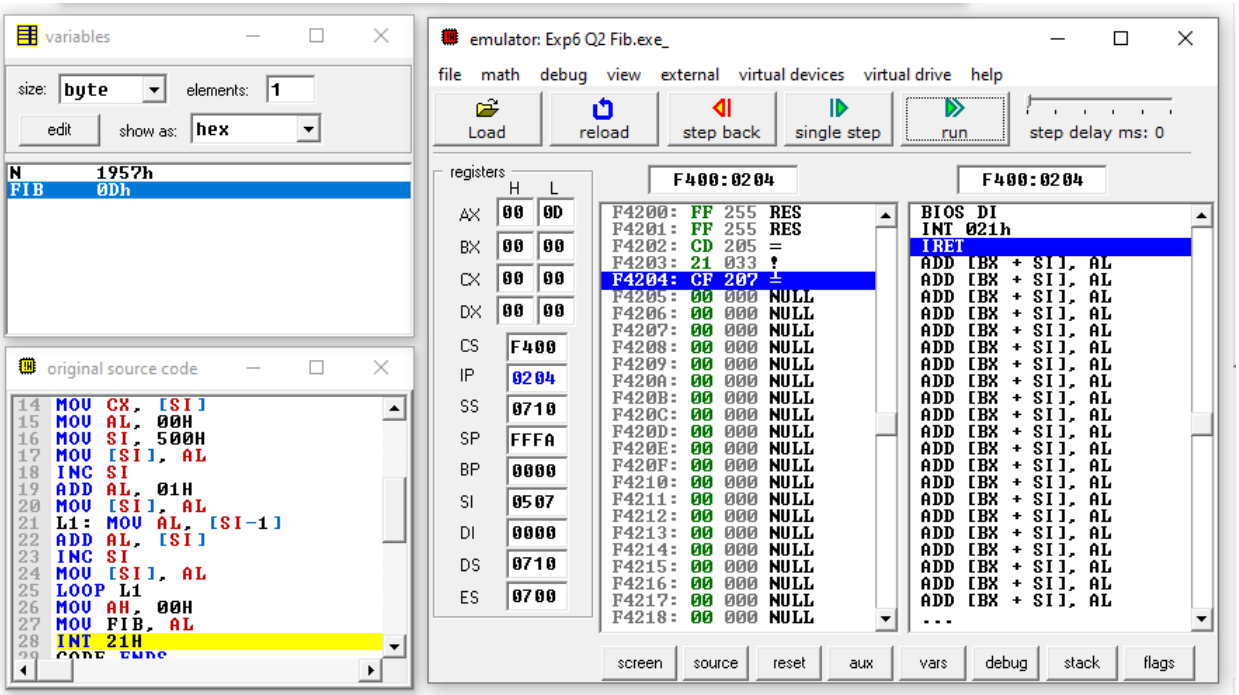
Program Code:

```
ASSUME DS:DATA,CS:CODE

DATA SEGMENT
  N DW 1957h
  FIB DB ?
  DATA ENDS

CODE SEGMENT
    START:
```

```
    MOV AX,DATA
    MOV DS,AX
    MOV AX, N
    MOV SI, AX
    MOV CX, [SI]
    MOV AL, 00H
    MOV SI, 500H
    MOV [SI], AL
    INC SI
    ADD AL, 01H
    MOV [SI], AL
 L1: MOV AL, [SI-1]
    ADD AL, [SI]
    INC SI
    MOV [SI], AL
    LOOP L1
    MOV FIB, AL
    INT 21H
    CODE ENDS

END START
```

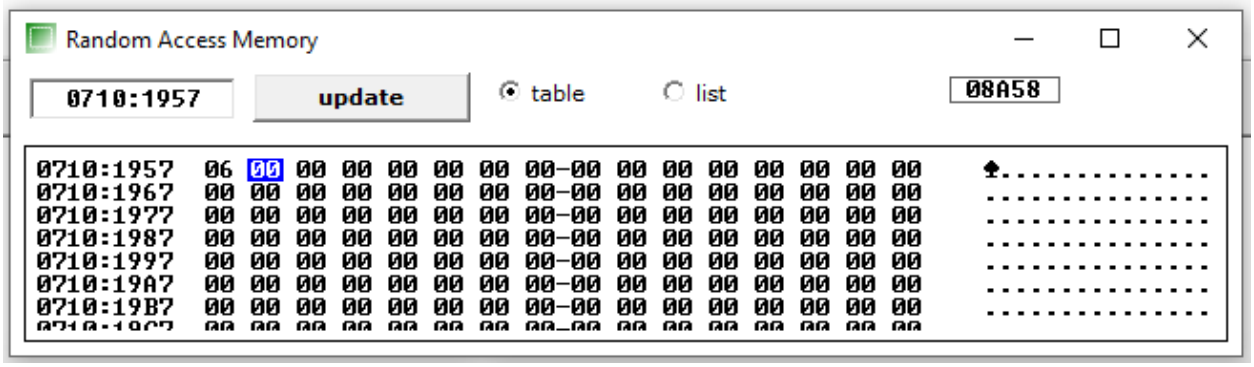
```
01  ASSUME DS:DATA,CS:CODE
02
03  DATA SEGMENT
04     N DW 1957h
05     FIB DB ?
06     DATA ENDS
07
08  CODE SEGMENT
09        START:
10        MOV AX,DATA
11        MOV DS,AX
12        MOV AX, N
13        MOV SI, AX
14        MOV CX, [SI]
15        MOV AL, 00H
16        MOV SI, 500H
17        MOV [SI], AL
18        INC SI
19        ADD AL, 01H
20        MOV [SI], AL
21     L1: MOV AL, [SI-1]
22        ADD AL, [SI]
23        INC SI
24        MOV [SI], AL
25        LOOP L1
26        MOV FIB, AL
27        INT 21H
28        CODE ENDS
29
30  END START
31
```

Output:

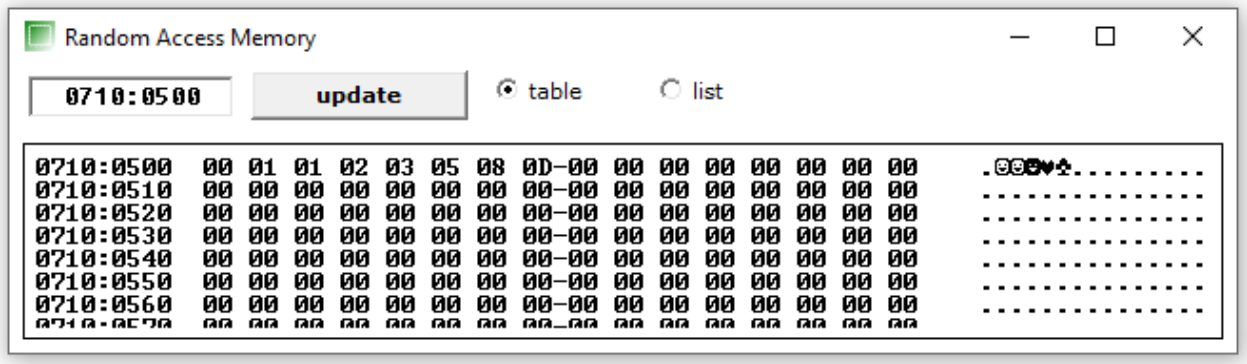


Memory Location:

BEFORE (INPUT):



AFTER:



Result and Inference:

We can observe that DS=0710h.

Then we collected data from Memory location 1957h

We have the list of Fibanocci series for N=6 we have DS=0710 and they are located from 0710:0500 to 0710:0507(00,01,01,02,03,05,08,0D)