

## Program to Calculate Nth Fibonacci number

This program will calculate Nth Fibonacci number. “N” should be read from the keyboard. The program will accept the input number then will check its Fibonacci value for particular index. for reference, please find below table.

$n =$	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	...
$x_n =$	0	1	1	2	3	5	8	13	21	34	55	89	144	233	377	...

we can pass any number here and according to that it will show the result.

Fibonacci's sequence is characterized by the fact that every number after the first two is the sum of the two preceding ones. For Example:

**0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 ,....so on**

### Program Execution Steps:

We are performing following steps to execute and build the logic in program.

We will Initialize the stack frame and after that we will pass the code for user input via keyboard. This input will be the index value for which we want to find Fibonacci number. This number would be passed to stack and then we will call the function which will calculate the nth Fibonacci number.

We will have a function called fibbNum, which will work in 2 parts. one is working for 0 and 1 and other part is part2 which will work for other inputs.

## Program code screenshot:

```
EASy68K Editor/Assembler v5.16.01 - [untitled1.x68]
File Edit Project Options Window Help

*-----*
* Title       : Calculate Nth Fibonacci number
* Written by  : Kunal Goyal
* Date       : 05/03/2021
* Description: This program will calculate Nth Fibonacci number. "N" should be read from the keyboard.
*             The program will accept the input number then will check its Fibonacci value for particular index
*-----*

ORG      $1000
Start:|

LOOP     LEA      MESSAGE,A1
        move.b   #14,D0
        trap     #15

        * Stack frame initialization
        movea.l  #1,a2

        * Read number from keyboard
        move.b   #4,d0
        trap     #15

        * Move it to stack
        move.l   d1,-(sp)

        * Call the function
        bsr      fibbNum

        * Pop the fib from the stack and store to fib
        adda.l   #4,sp
        move.l   d0,fib

        * Print the result
        move     #3,d0
        move.l   fib,d1
        trap     #15

SIMHALT

* Declare variables

* Declare variables
fib: ds.l 1

fibbNum:

        * Allocating space and frame
        move.l   a2,-(sp)
        move.l   sp,a2
        suba.l   #4,sp

        * Move number to d0
        move.l   8(a2),d0

        * Check number is 0
        cmp.l    #0,d0

        * if not 0 branch to part1
        bne      part1

        * Return 0 if number is 0
        move.l   #0,d0

        * Deallocation
        move.l   a2,sp

        * Restore
        move.l   (sp)+,a2

        * Return
        rts

part1:
        * Move number to do
        move.l   8(a2),d0
```

```

* Check number is 1
cmp.l #1,d0

* Branch to part 2 if not equal
bne    part2

* Return 1 if number is 1
move.l #1,d0

* Deallocate
move.l a2,sp

* Restore
move.l (sp)+,a2

* Return
rts

part2:

* Move number to d0
move.l 8(a2),d0

* Subtract one from the number
sub.l #1,d0

* Push it to the stack
move.l d0,-(sp)

* Compute fib(number-1)
bsr    fibbNum

* Pop number-1 from the stack
adda.l #4,sp

* Store the result of fib(number-1) to d0
move.l d0,-4(a2)

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        bsr    fibbNum

* Pop number-1 from the stack
adda.l #4,sp

* Store the result of fib(number-1) to d0
move.l d0,-4(a2)

* Move number to d0
move.l 8(a2),d0

* Subtract one from the number
sub.l #2,d0

* Push it to the stack
move.l d0,-(sp)

* Compute fib(number-2)
bsr    fibbNum

* Pop number-1 from the stack
adda.l #4,sp

* Compute fib(number-1)+fib(number-2)
add.l -4(a2),d0

* Deallocate
move.l a2,sp

* Restore
move.l (sp)+,a2

rts

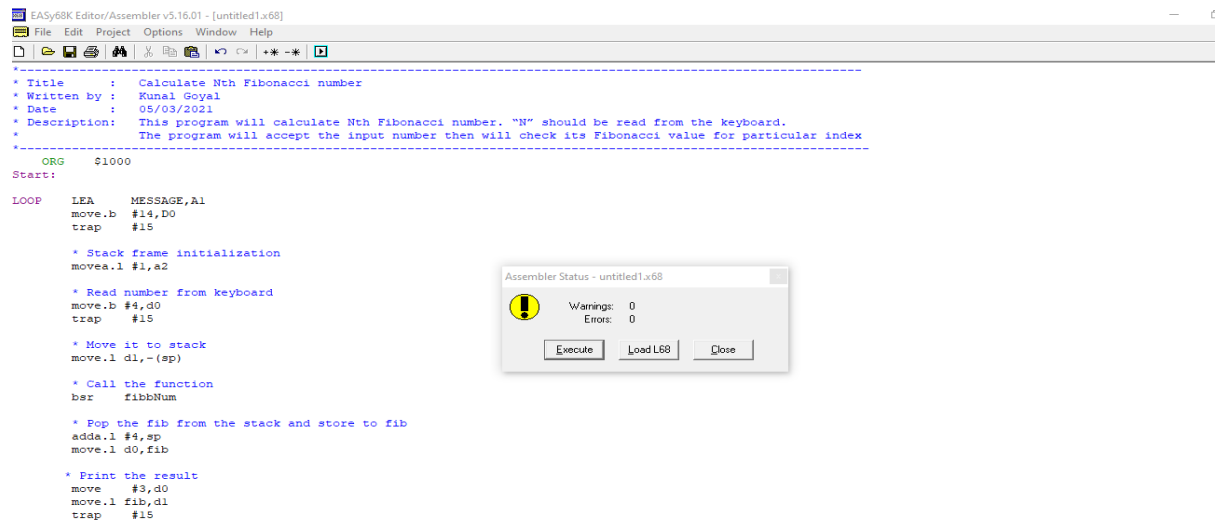
CR      EQU      $0D
LF      EQU      $0A |

MESSAGE DC.B      'Enter a index value between 0 and 20 to Get Fib Number: ',0

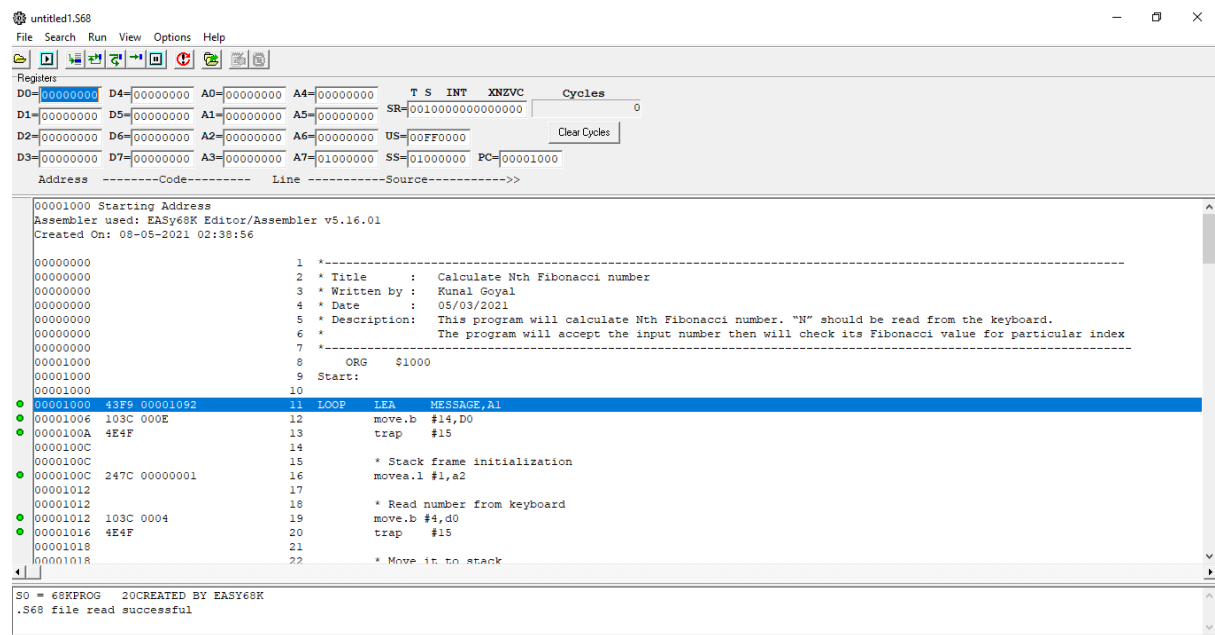
```

**Error Count while debugging:**

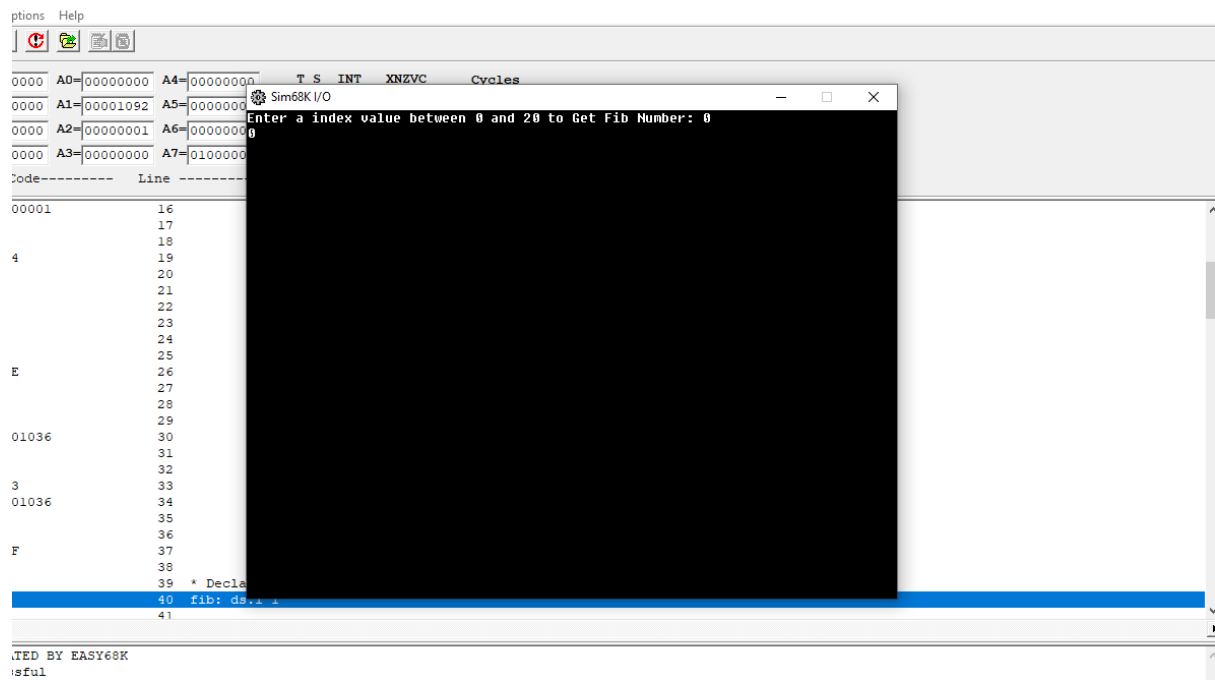
Total number of errors: 0  
Total numbers of warning: 0



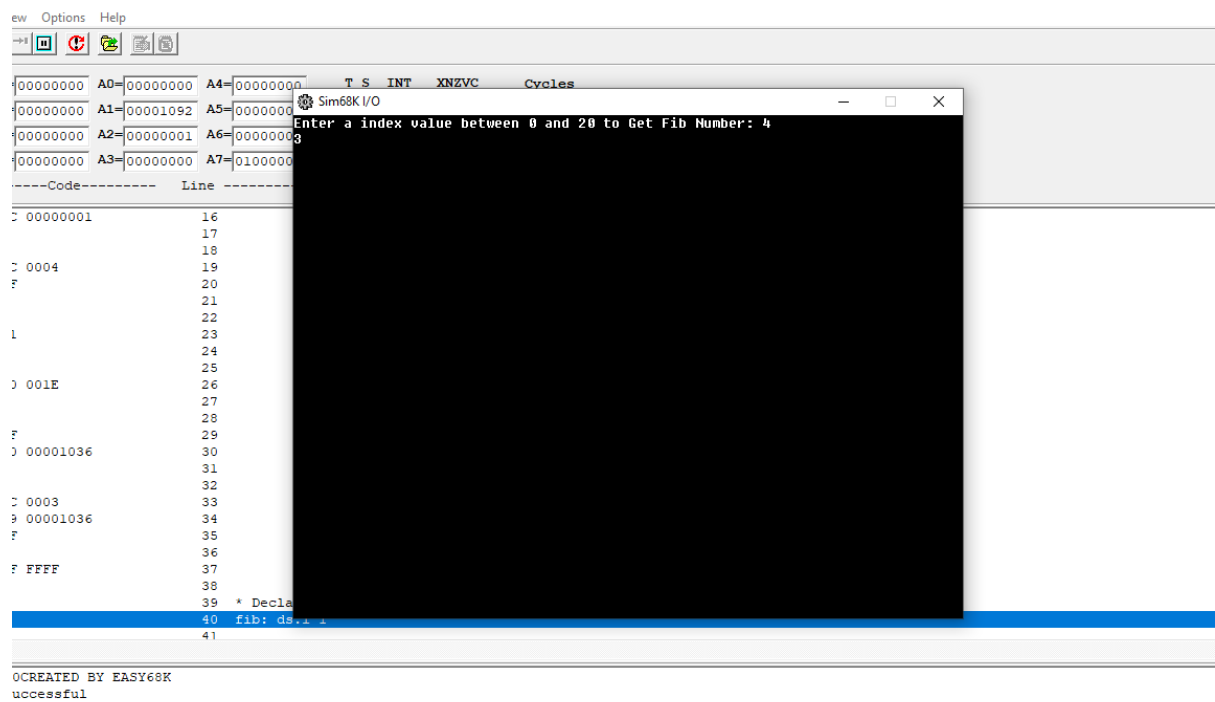
## Execute Screen:



## Output Screenshots:



Output for index value 0



Output for Index Value 4

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View Options Help
[Icons]

D4=00000000 A0=00000000 A4=00000000 T S INT XNZVC Cycles
D5=00000000 A1=00001092 A5=00000000 Sim68K I/O
D6=00000000 A2=00000001 A6=00000000 Enter a index value between 0 and 20 to Get Fib Number: 8
D7=00000000 A3=00000000 A7=01000000 21

-----Code----- Line -----
247C 00000001 16
103C 0004 17
4E4F 18
2F01 19
6100 001E 20
588F 21
23C0 00001036 22
303C 0003 23
2239 00001036 24
4E4F 25
FFFF FFFF 26
39 * Decle 27
40 fib: d5,2 28
41 29

20CREATED BY EASY68K
d successful
```

Output for Index value 8

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View Options Help
[Icons]

D4=00000000 A0=00000000 A4=00000000 T S INT XNZVC Cycles
D5=00000000 A1=00001092 A5=00000000 Sim68K I/O
D6=00000000 A2=00000001 A6=00000000 Enter a index value between 0 and 20 to Get Fib Number: 14
D7=00000000 A3=00000000 A7=01000000 377

-----Code----- Line -----
7C 00000001 16
3C 0004 17
4F 18
01 19
00 001E 20
3F 21
00 00001036 22
3C 0003 23
39 00001036 24
4F 25
FF FFFF 26
39 * Decle 27
40 fib: d5,2 28
41 29

20CREATED BY EASY68K
successful
```

Output for Index value 14

The screenshot shows a 68K assembly simulator window. A dialog box titled "Sim68K I/O" is open, displaying the text "Enter a index value between 0 and 20 to Get Fib Number: 20" and the output "6765". The background window shows assembly code and register values. The registers D4, D5, D6, and D7 are all 00000000. The registers A0, A1, A2, A3, A4, A5, A6, and A7 contain various values. The code is in assembly language, with comments and instructions. The output at the bottom shows "Fib: d8=6765".

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003 D4=00000000 A0=00000000 A4=00000000 T S INT XNZVC Cycles
004 D5=00000000 A1=00001092 A5=00000000 Sim68K I/O
005 D6=00000000 A2=00000001 A6=00000000 Enter a index value between 0 and 20 to Get Fib Number: 20
006 D7=00000000 A3=00000000 A7=01000000 6765
007
008 -----Code----- Line -----
009 247C 00000001 16
010 .2 17
011 .2 18
012 103C 0004 19
013 .6 4E4F 20
014 .8 21
015 .8 22
016 2F01 23
017 .A 24
018 .A 25
019 6100 001E 26
020 .E 27
021 .E 28
022 588F 29
023 23C0 00001036 30
024 .6 31
025 .6 32
026 303C 0003 33
027 .A 2239 00001036 34
028 4E4F 35
029 12 FFFF FFFF 36
030 12 37
031 .6 38
032 39 * Decla
033 40 fib: d8=6765
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