

Data Structure & Algorithms Fibonacci Series

Fibonacci series generates the subsequent number by adding two previous numbers. Fibonacci series starts from two numbers – **F₀** & **F₁**. The initial values of F₀ & F₁ can be taken 0, 1 or 1, 1 respectively.

Fibonacci series satisfies the following conditions –

$$F_n = F_{n-1} + F_{n-2}$$

Hence, a Fibonacci series can look like this –

F₈ = 0 1 1 2 3 5 8 13

or, this –

F₈ = 1 1 2 3 5 8 13 21

For illustration purpose, Fibonacci of F₈ is displayed as –

1 1

1 1 2 3 5 8 13 21

Fibonacci Iterative Algorithm

First we try to draft the iterative algorithm for Fibonacci series.

```
Procedure Fibonacci(n)
  declare  $f_0$ ,  $f_1$ , fib, loop

  set  $f_0$  to 0
  set  $f_1$  to 1

  display  $f_0$ ,  $f_1$ 

  for loop  $\leftarrow$  1 to n

    fib  $\leftarrow$   $f_0$  +  $f_1$ 
     $f_0 \leftarrow f_1$ 
     $f_1 \leftarrow$  fib

    display fib
  end for

end procedure
```

To know about the implementation of the above algorithm in C programming language, click [here](#) .

Fibonacci Recursive Algorithm

Let us learn how to create a recursive algorithm Fibonacci series. The base criteria of recursion.

```
START
Procedure Fibonacci(n)
  declare  $f_0$ ,  $f_1$ , fib, loop

  set  $f_0$  to 0
  set  $f_1$  to 1

  display  $f_0$ ,  $f_1$ 

  for loop  $\leftarrow$  1 to n

    fib  $\leftarrow$   $f_0$  +  $f_1$ 
     $f_0 \leftarrow f_1$ 
     $f_1 \leftarrow$  fib

    display fib
  end for

END
```

To see the implementation of above algorithm in c programming language, [click here](#) .