

Please consider this programming problem:

Given a positive integer  $N$ . Calculate the Fibonacci series till the number  $N$ . If  $N$  is a part of the series, include  $N$  as well.

Provide an example solution for the problem in the Python language.

Certainly! The Fibonacci series is a sequence of numbers where each number is the sum of the two preceding ones, usually starting with 0 and 1. Here's a Python function to generate the Fibonacci series up to a given number  $N$ , including  $N$  if it is part of the series.

```
python Code kopieren

def fibonacci_upto_n(N):
    fib_series = [0, 1] # Starting with the first two numbers of the Fibonacci sequence
    while True:
        next_fib = fib_series[-1] + fib_series[-2] # Calculate the next Fibonacci number
        if next_fib > N: # If the next Fibonacci number exceeds N, break the loop
            break
        fib_series.append(next_fib) # Otherwise, append the number to the series

    return fib_series

# Example usage:
N = 21
result = fibonacci_upto_n(N)
print("Fibonacci series up to", N, "is:", result)
```

#### Explanation:

- We start with a list `fib_series` containing the first two Fibonacci numbers `[0, 1]`.
- We then enter a loop where we calculate the next Fibonacci number by adding the last two numbers in the series.
- If the next Fibonacci number exceeds  $N$ , we exit the loop.
- If the next Fibonacci number is less than or equal to  $N$ , it is appended to the list.
- Finally, the list containing the Fibonacci sequence up to  $N$  is returned.

#### Example Output:

For  $N = 21$ :

```
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Fibonacci series up to 21 is: [0, 1, 1, 2, 3, 5, 8, 13, 21]
```

In this example, since 21 is part of the Fibonacci series, it is included in the output.

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