Even Fibonacci Numbers

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The Fibonacci Sequence can be defined by the following recurrence relation:

$$F_n = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ F_{n-1} + F_{n-2} & \text{if } n > 1 \end{cases}$$

The sum of all even Fibonacci numbers less than X can be written as:

$$\sum_{\substack{F_i < X \\ F_i \text{ is even}}} F_i$$

Complexity Analysis

Each Fibonacci number in the Fibonacci sequence can be generated in constant space, as only the two previous numbers are needed and can be discarded as the sequence progresses. Giving a space complexity of:

$$O(1) \text{ space}$$

Generating the Fibonacci sequence is a linear time operation, and checking the pairity of each Fibonacci number is a constant time operation, giving an overall time complexity of:

$$O(n) \text{ time, where n is the number of Fibonacci numbers generated}$$