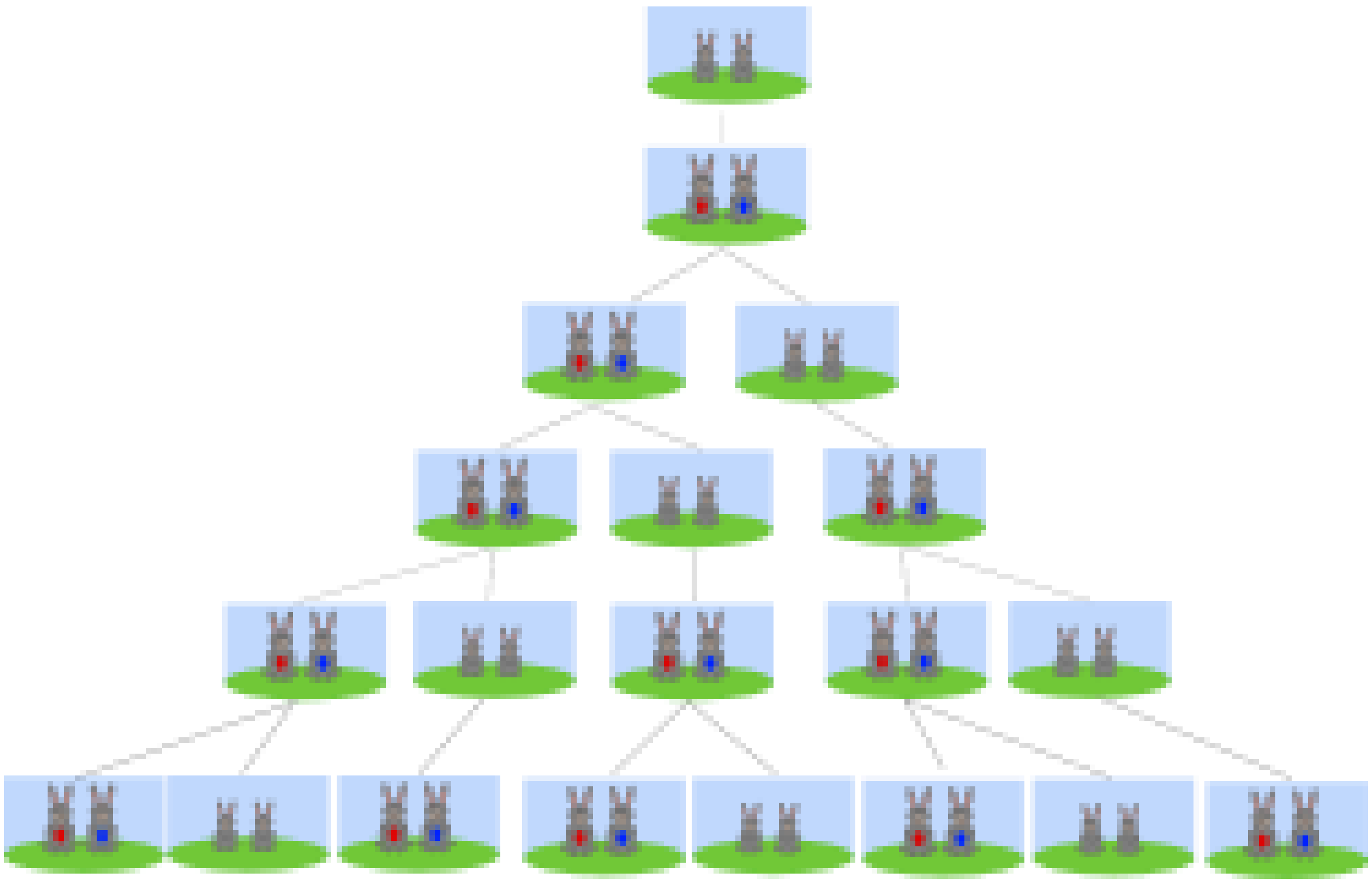
Fibonnacci Number Series



Recursion: Fibonacci

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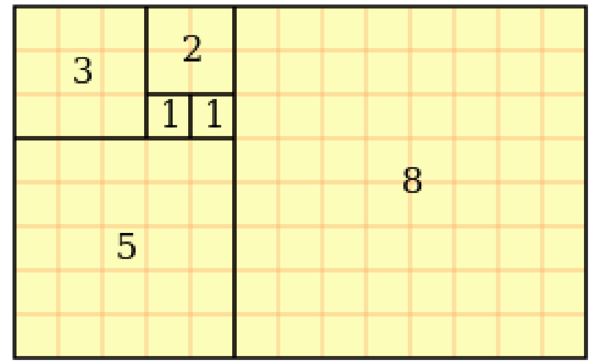

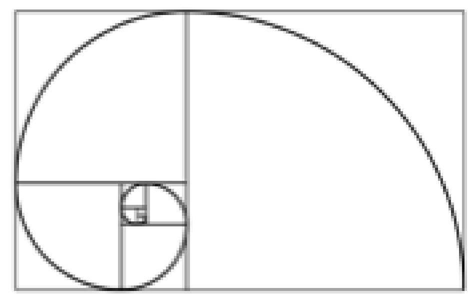

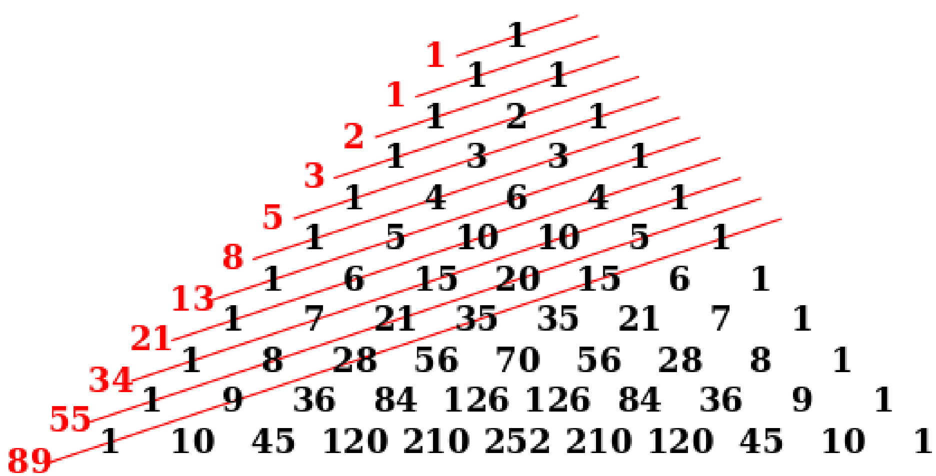

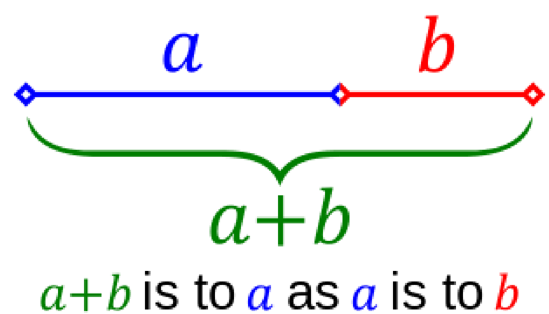

Golden Ratio: 1.6180339....

Recursion
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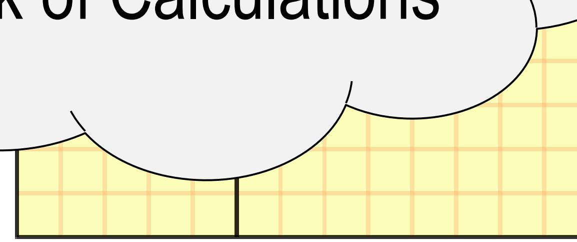

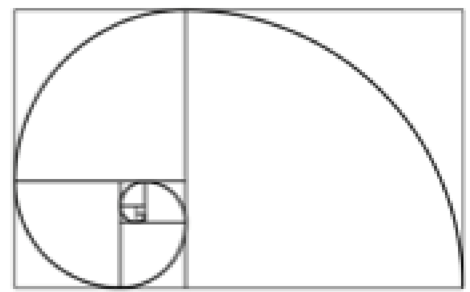

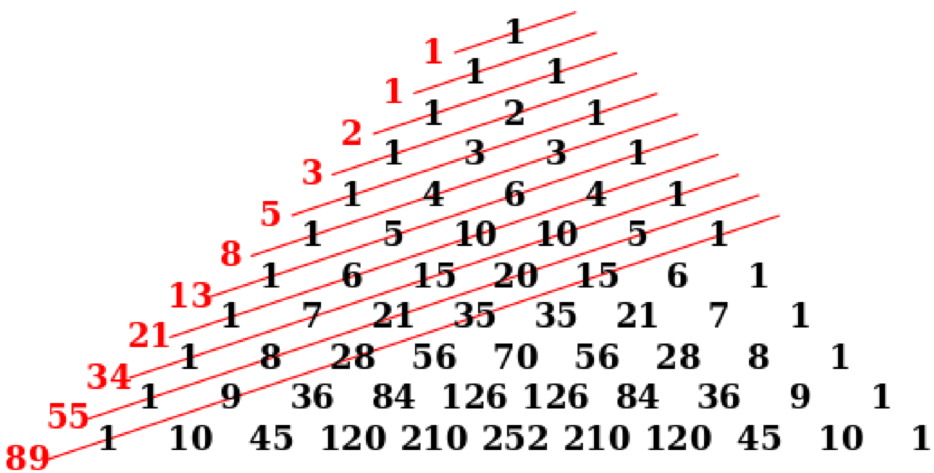

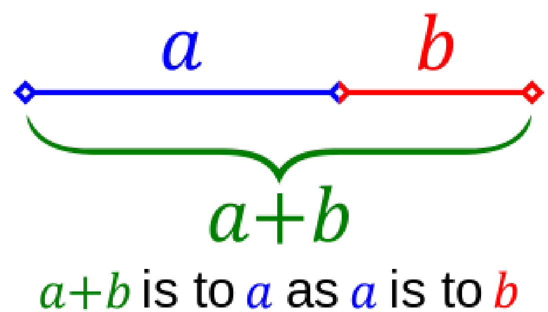

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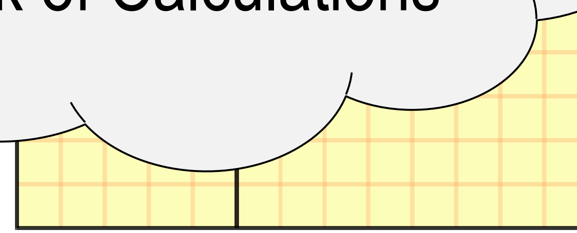

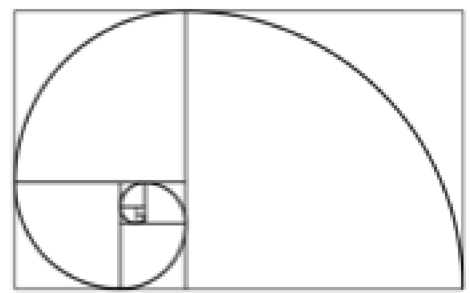

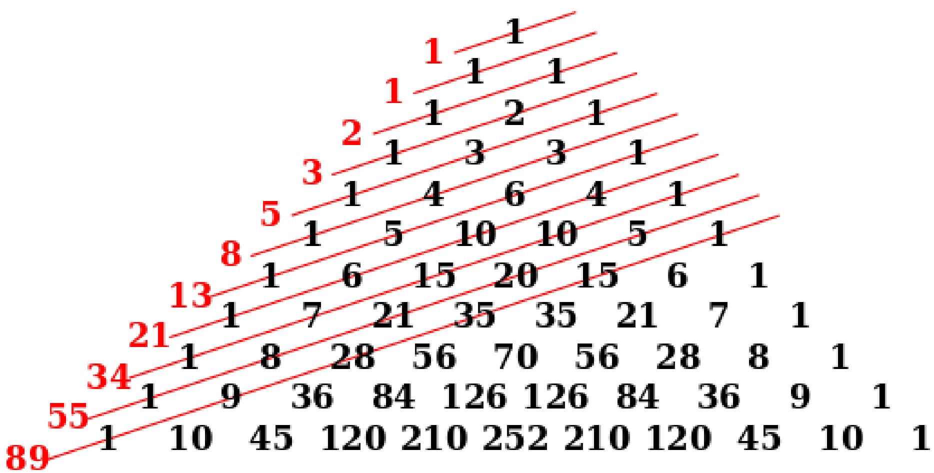

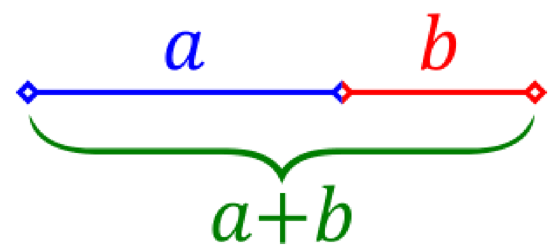

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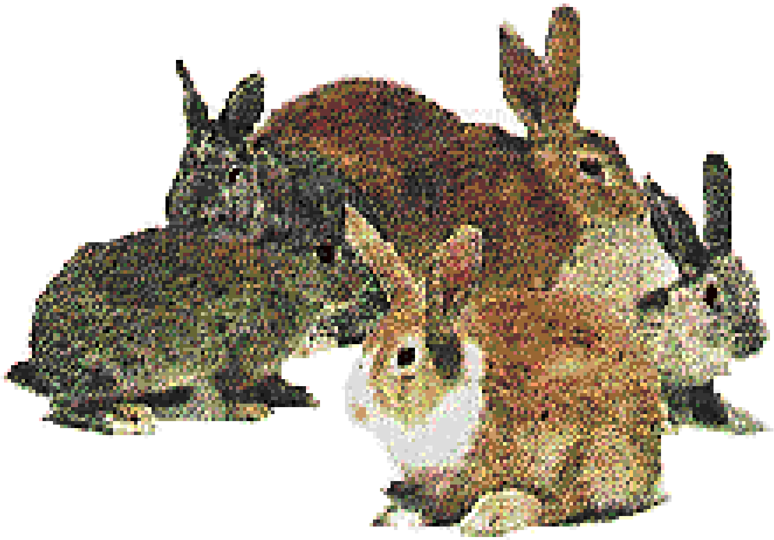

The original problem that Fibonacci investigated (in the year 1202) was about how fast rabbits could breed in ideal circumstances.

Suppose a newly-born pair of rabbits, one male, one female, are put in a field. Rabbits are able to mate at the age of one month so that at the end of its second month a female can produce another pair of rabbits.

Suppose that our rabbits **never die** and that the female **always** produces one new pair (one male, one female) **every month** from the second month on. The puzzle that Fibonacci posed was...

How many pairs will there be in one year?

Recursion: Fibonacci

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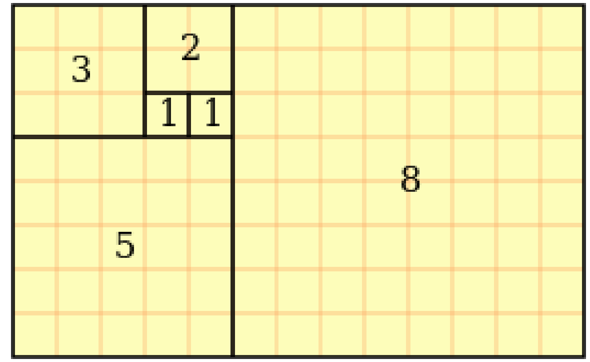

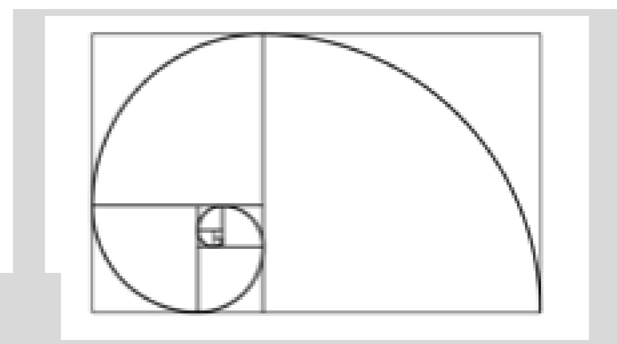

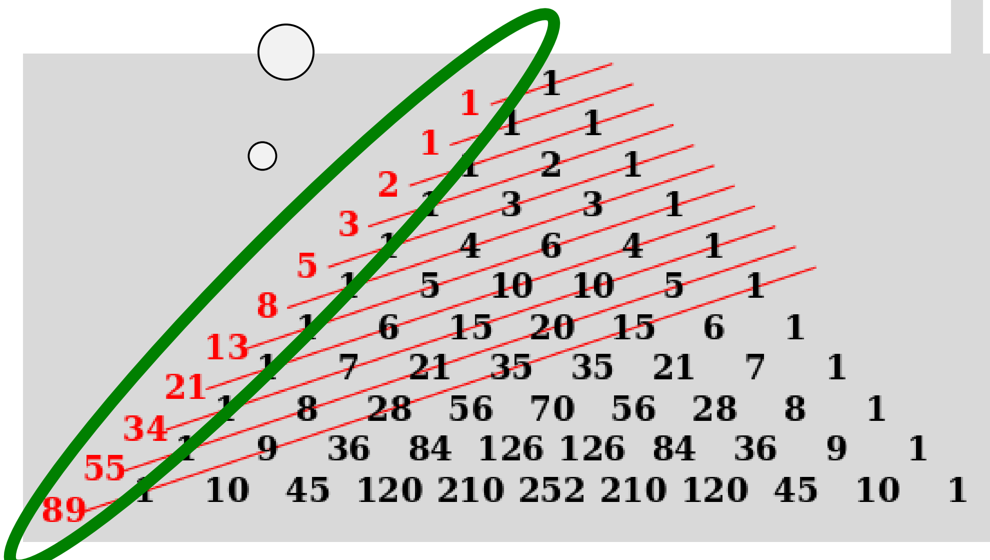

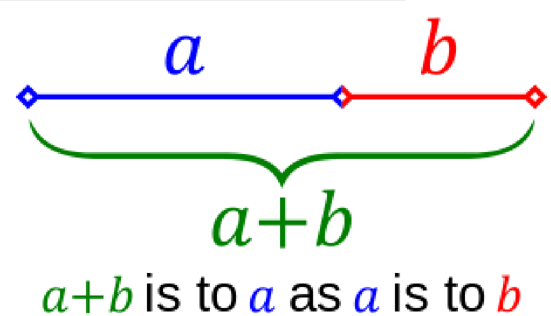

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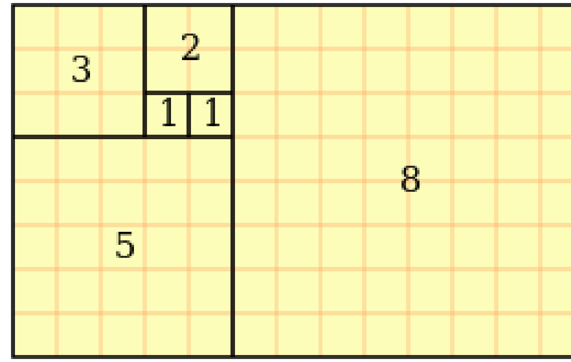

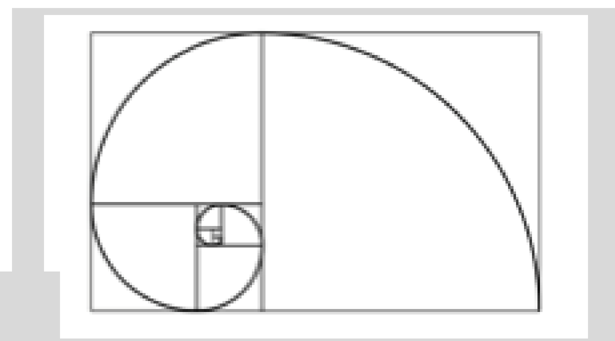

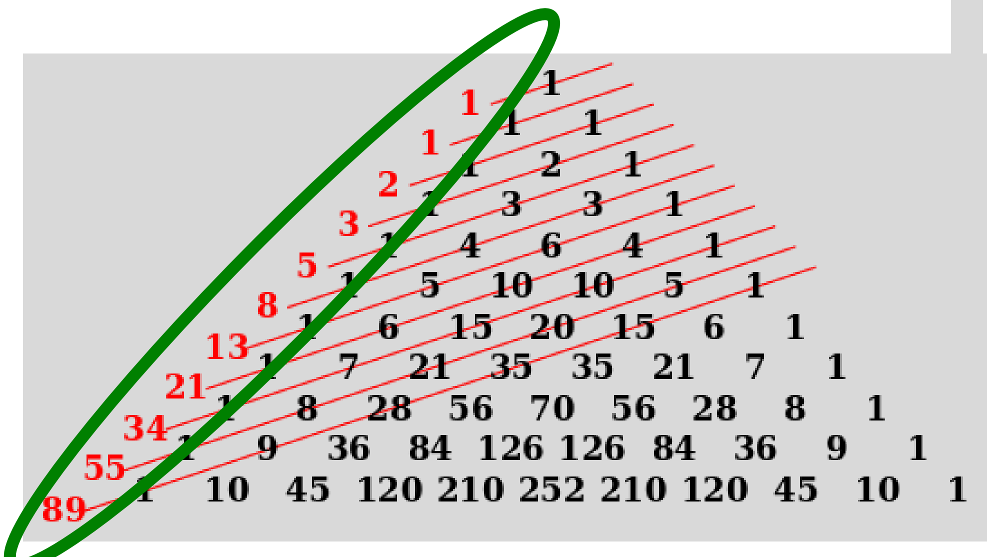

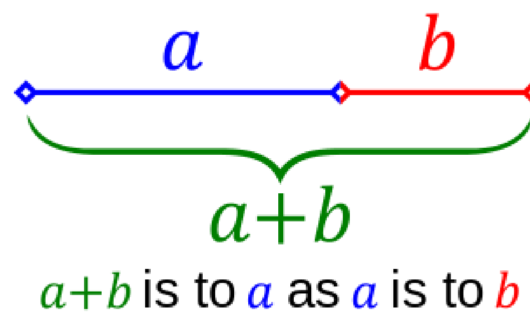

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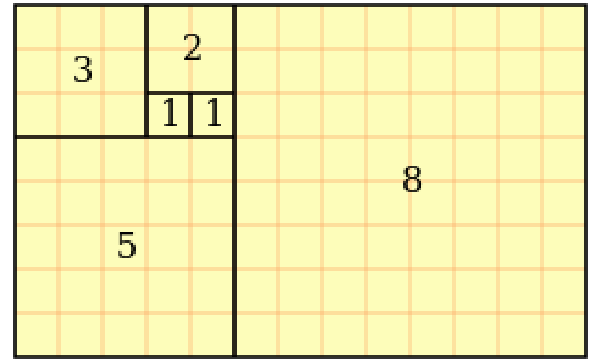

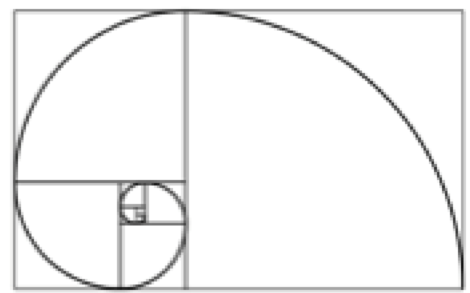

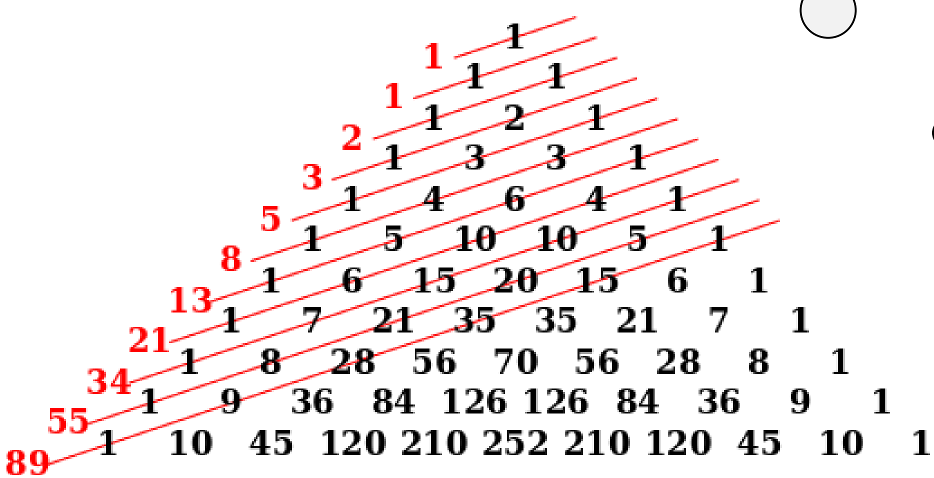

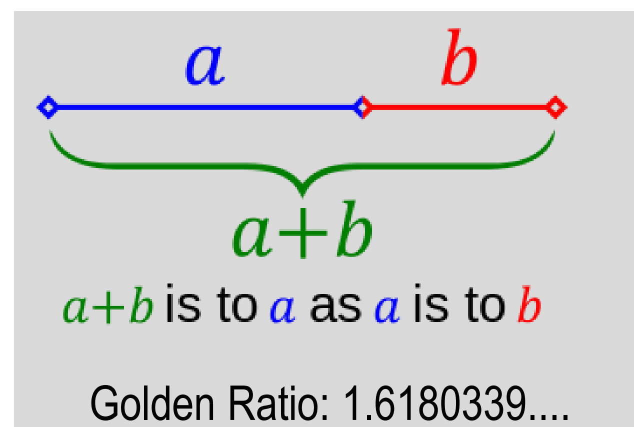

Recursion:
Fibonacci

Let's look at another example, the Fibonacci numbers, defined (two ways) as follows:

F = { 1, 1, 2, 3, 5, **8**, 13, 21, ..., **(sum of previous 2 terms)**, ... }

0 1 2 3 4 **5** 6 7

```
// returns the ith Fibonacci number

int fib(int i) {
   int lim = 2;
   if( i < lim )
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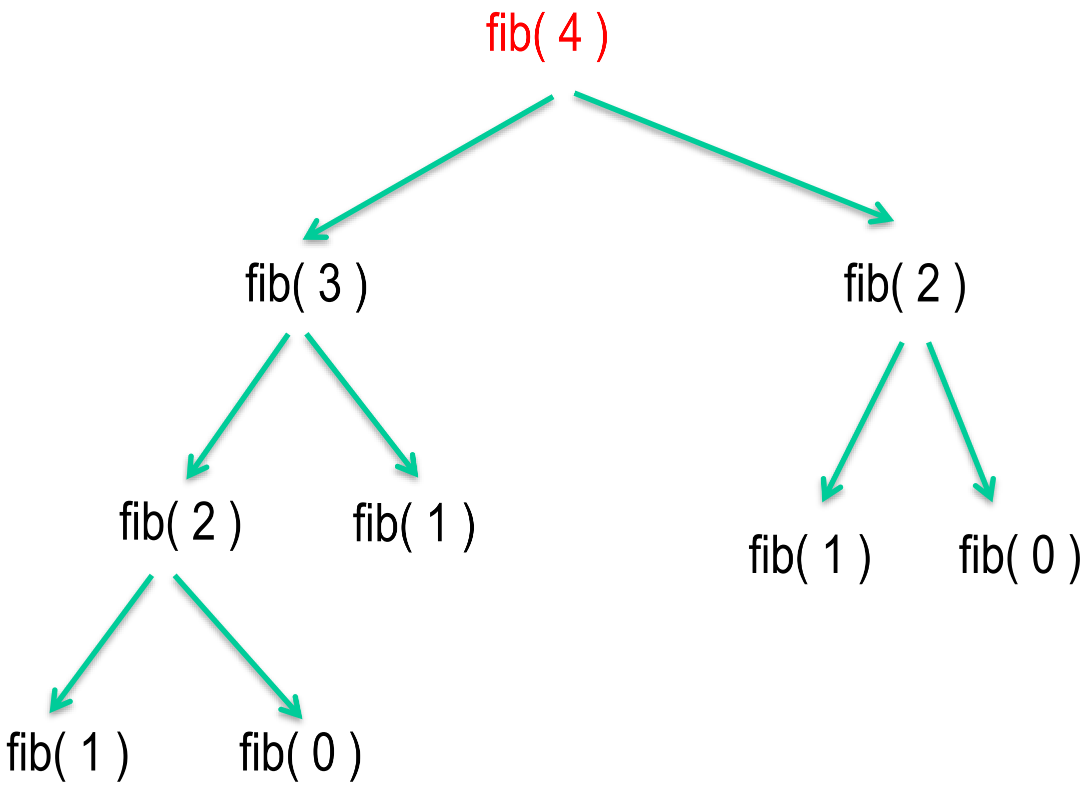
Tree of Calls to fib(4)



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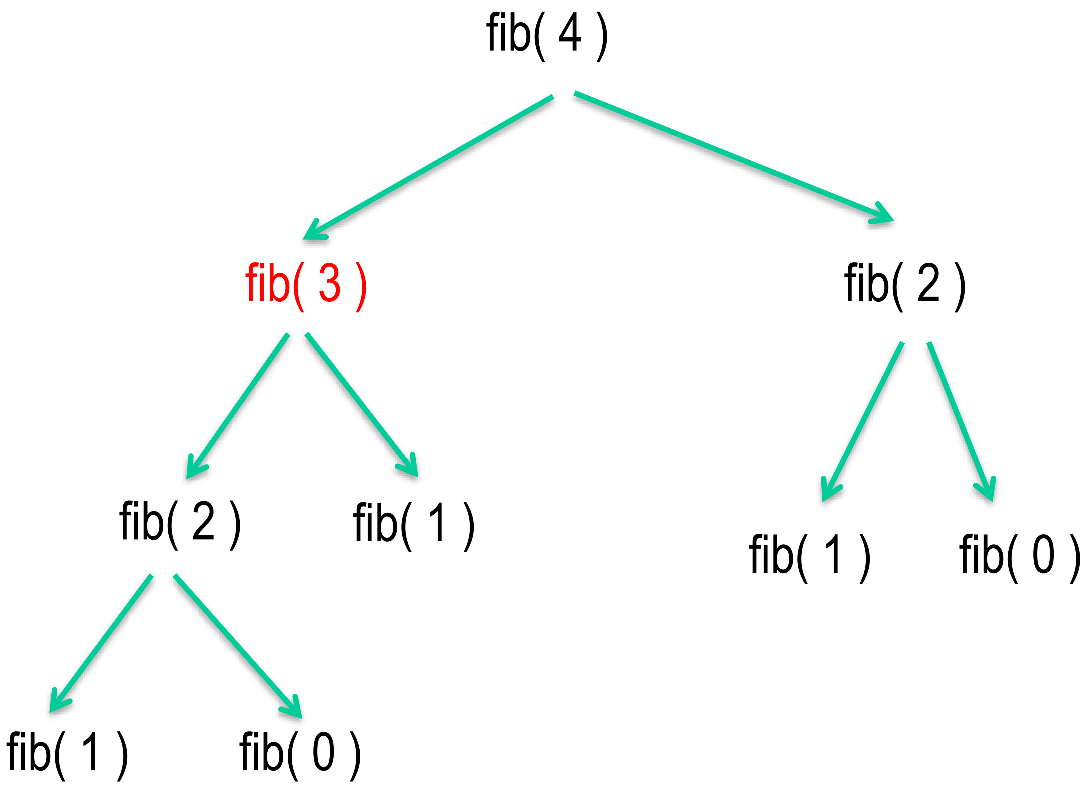

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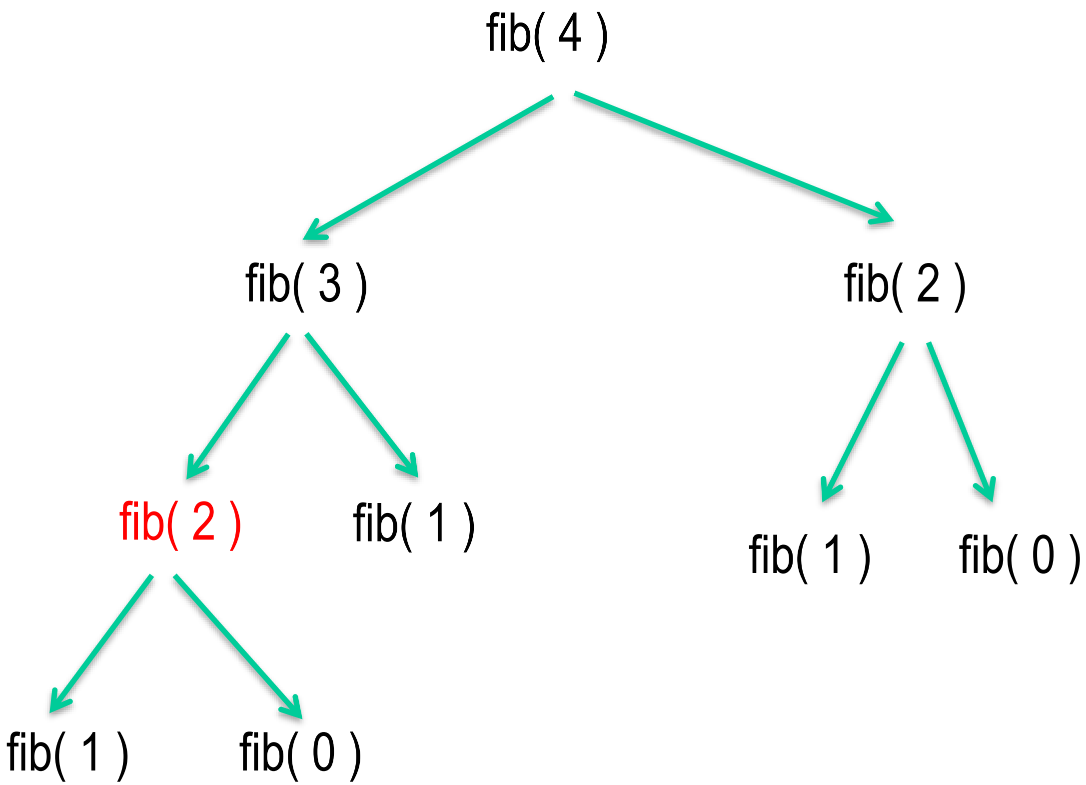

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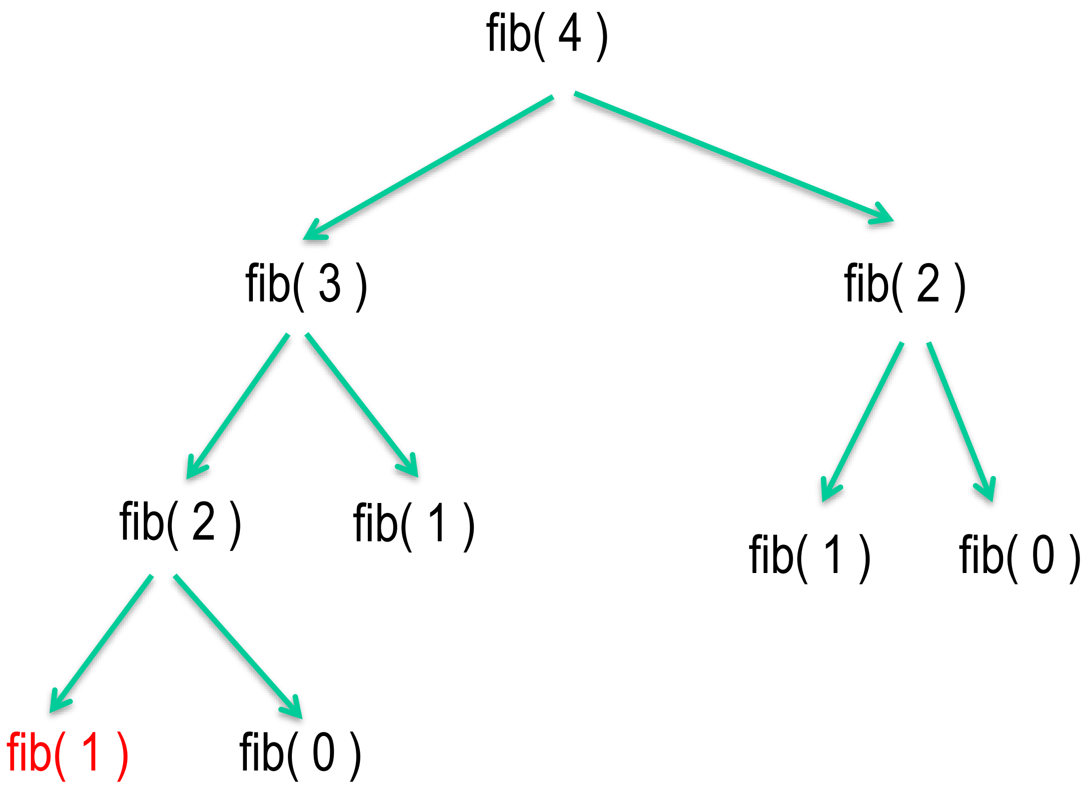

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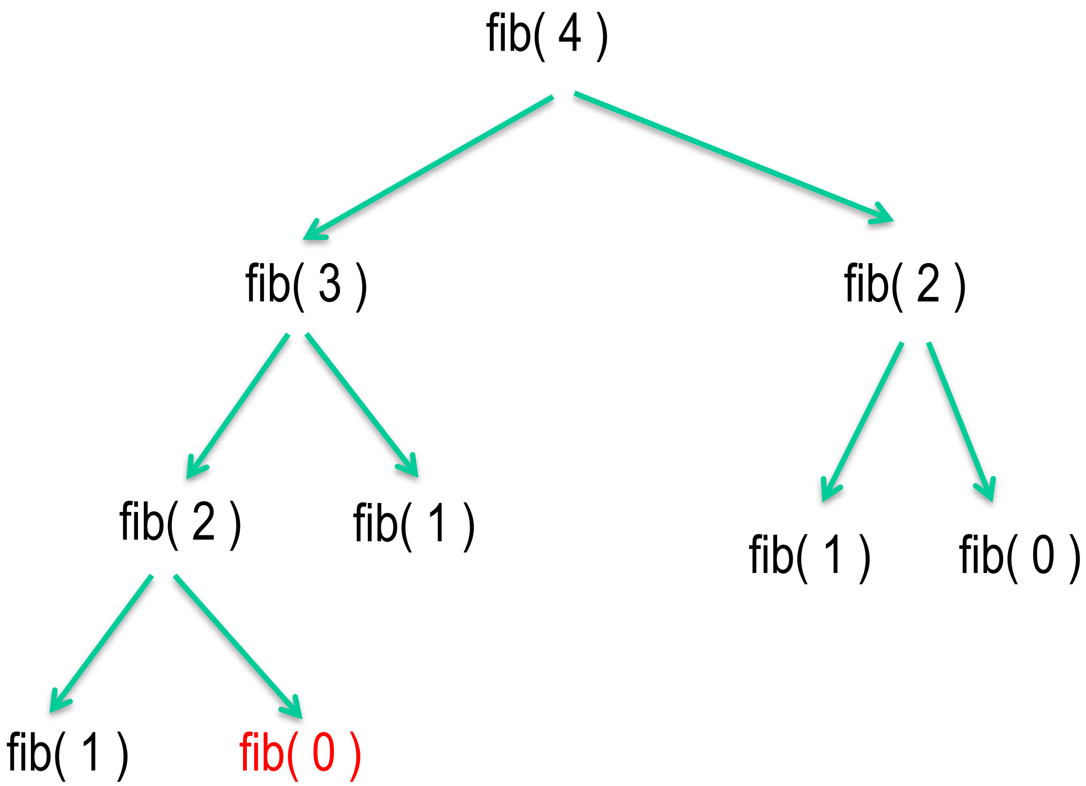

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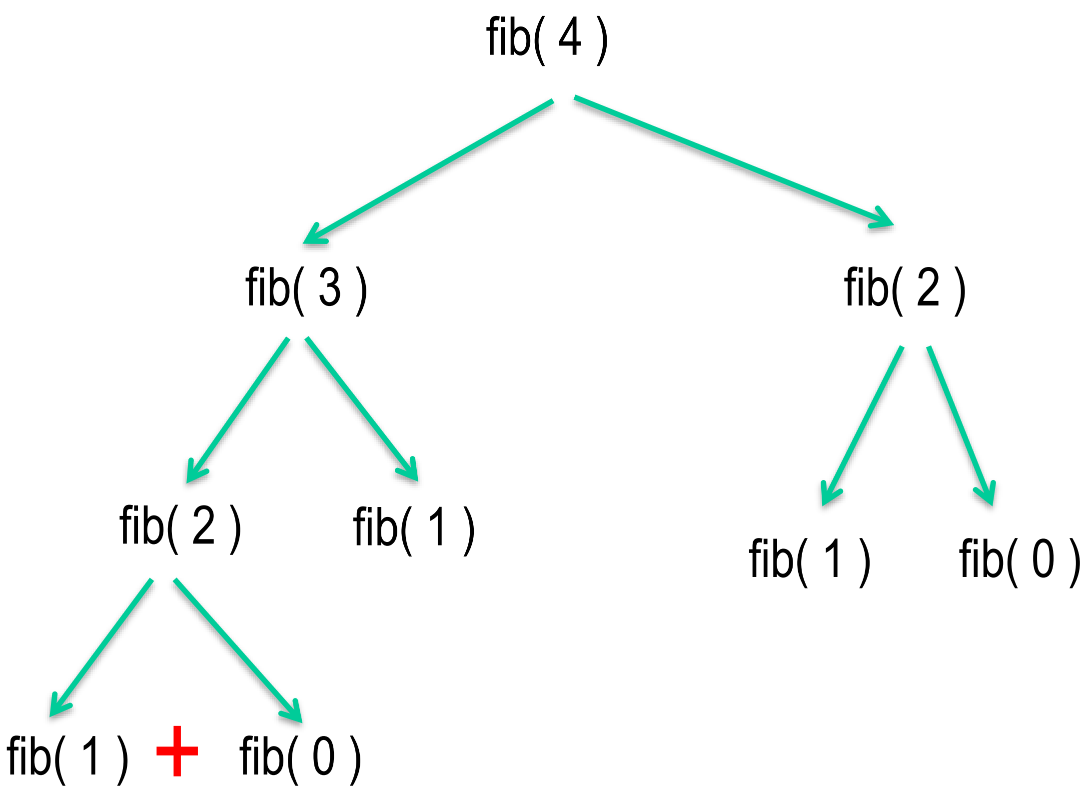

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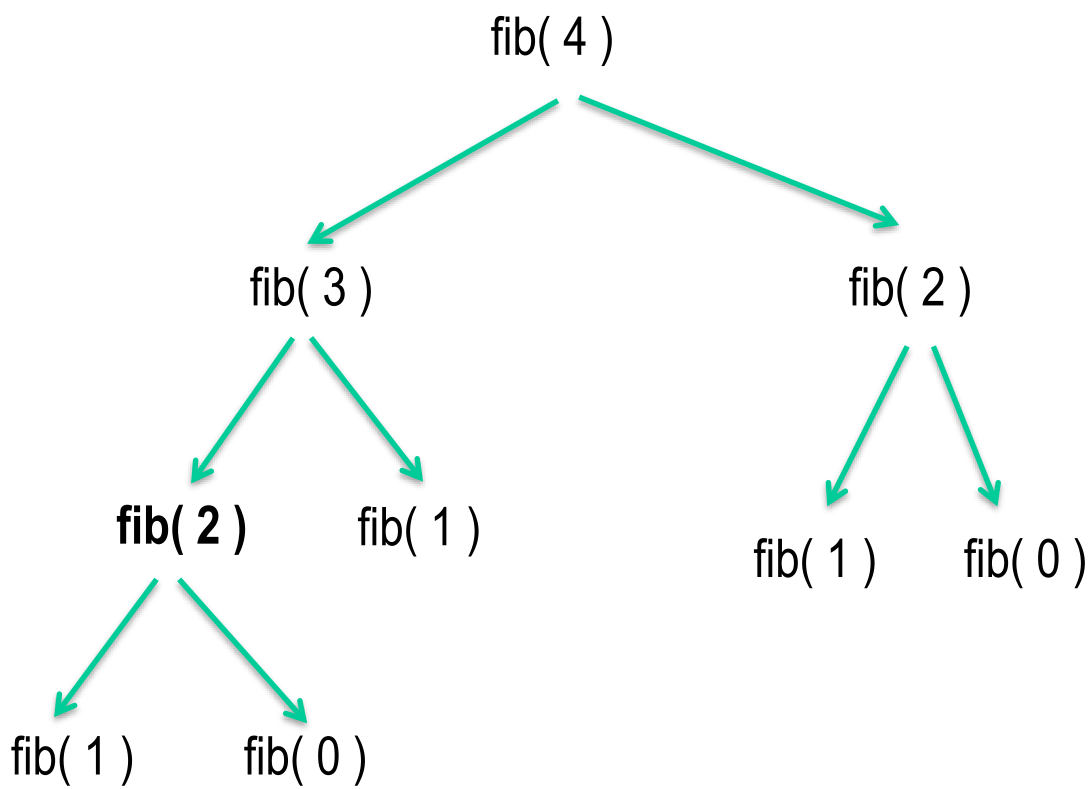

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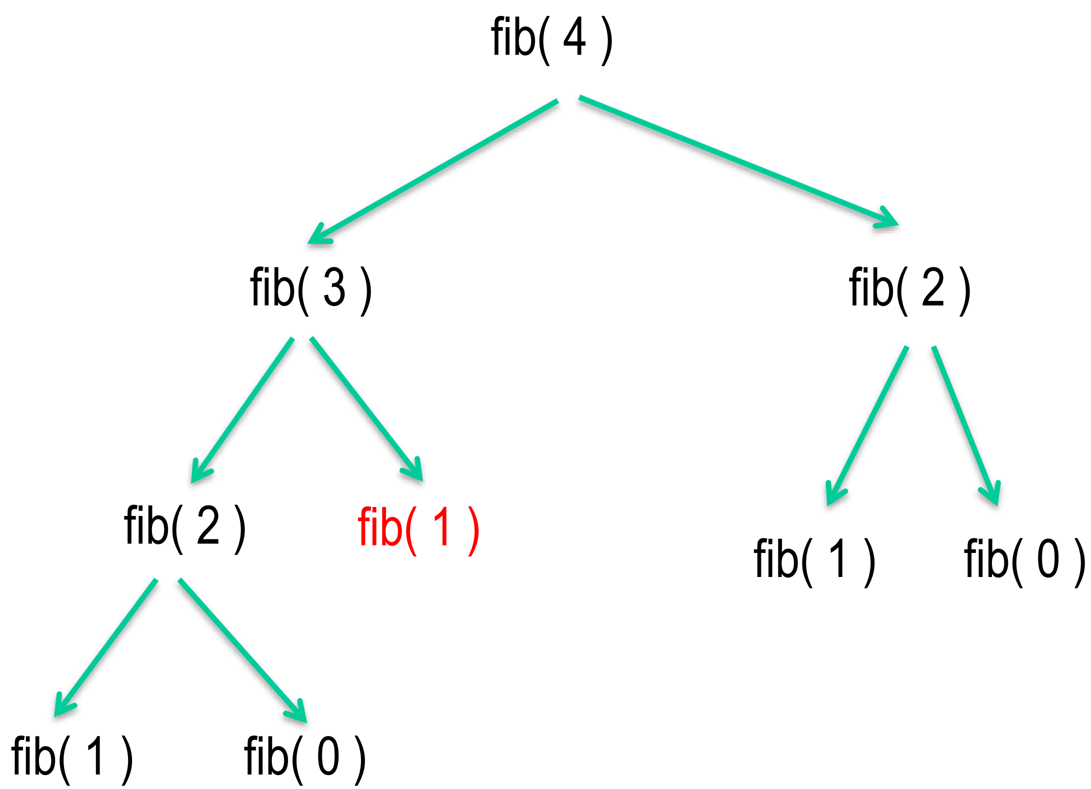

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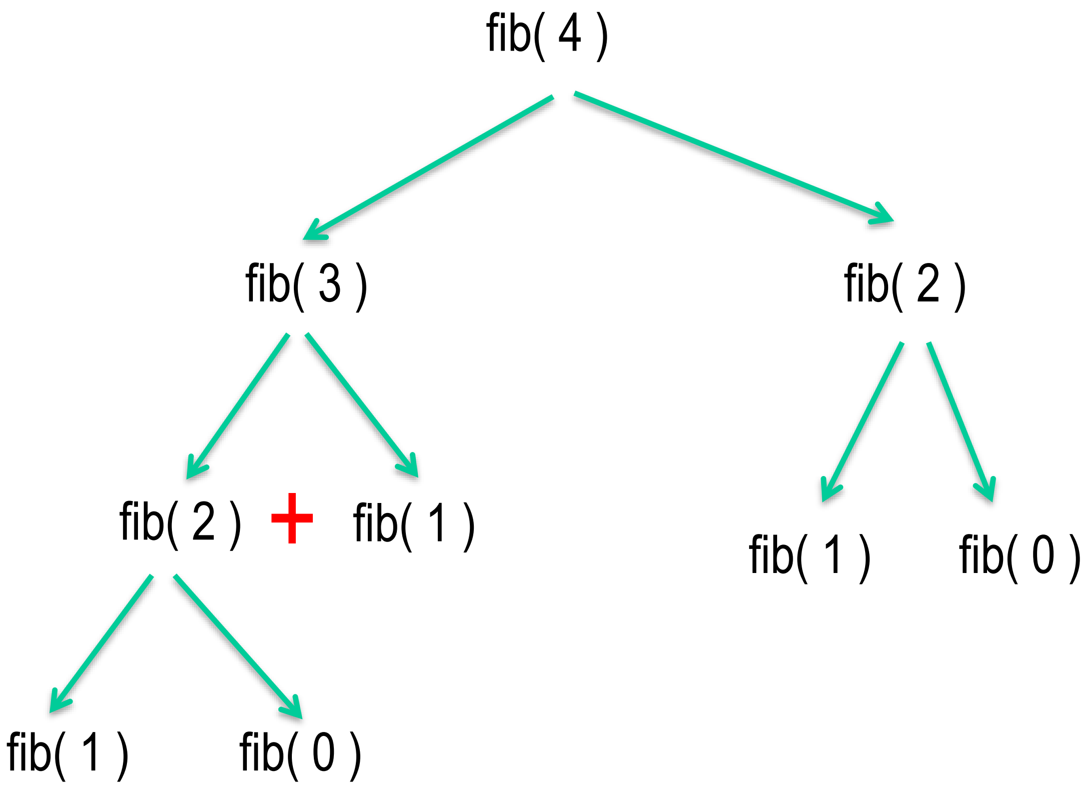

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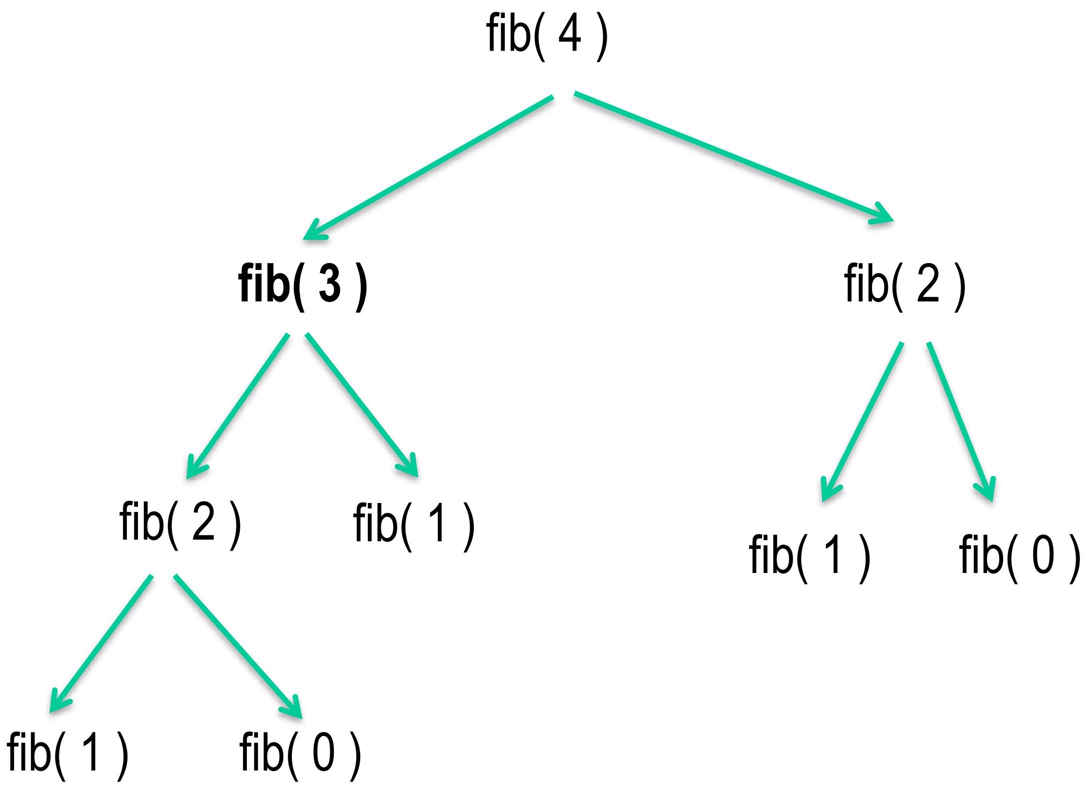

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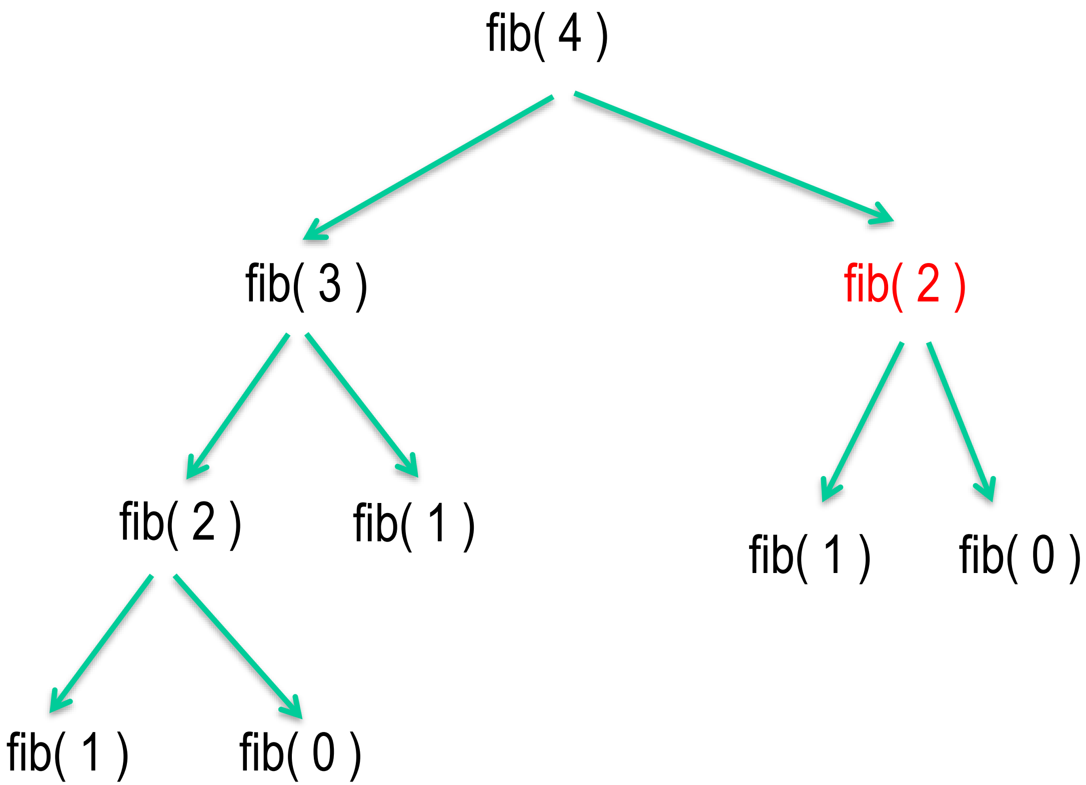

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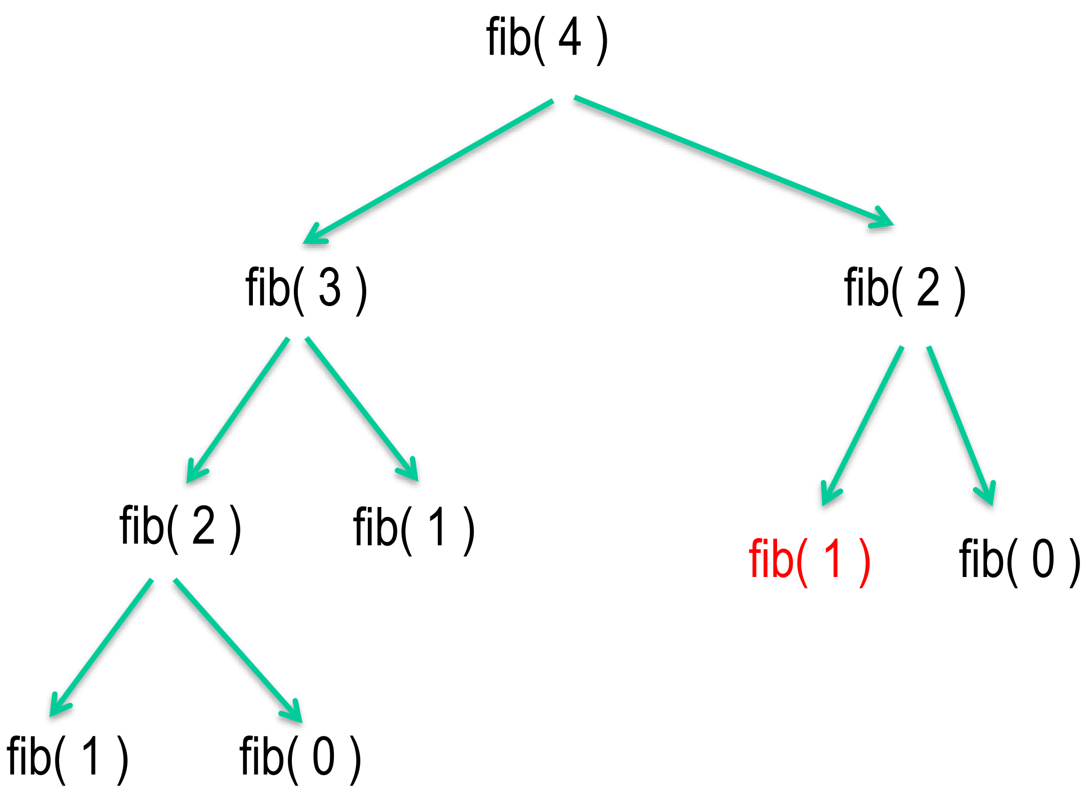

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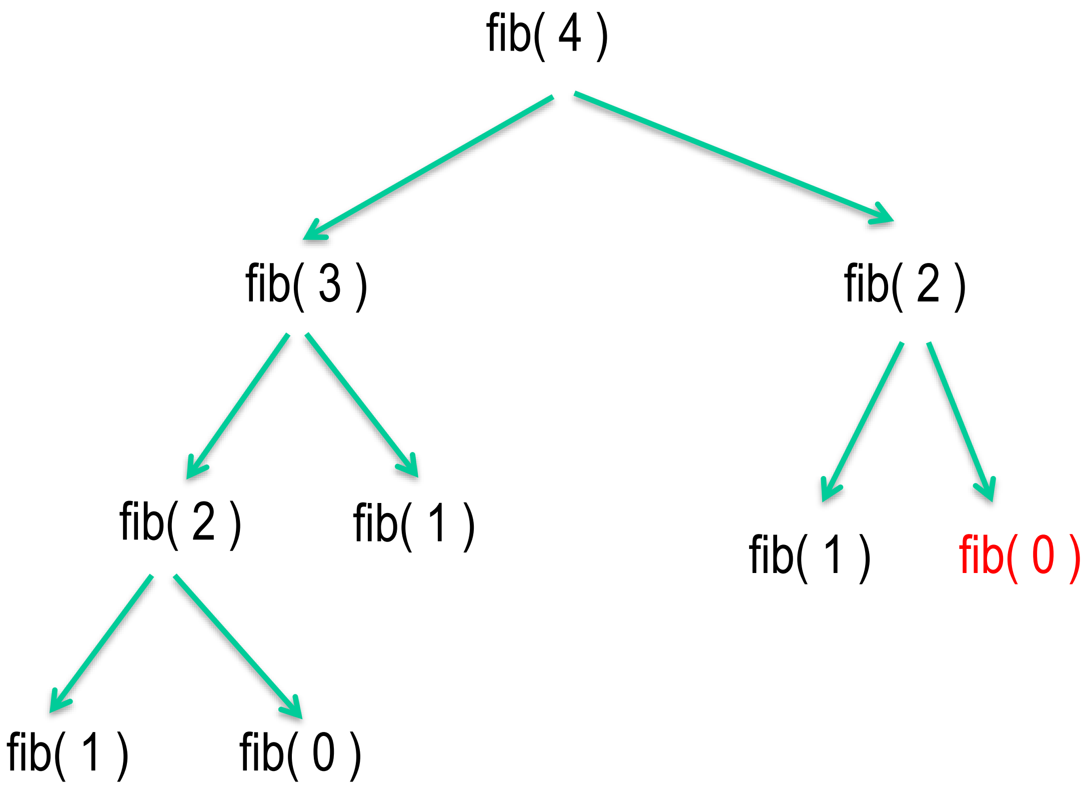

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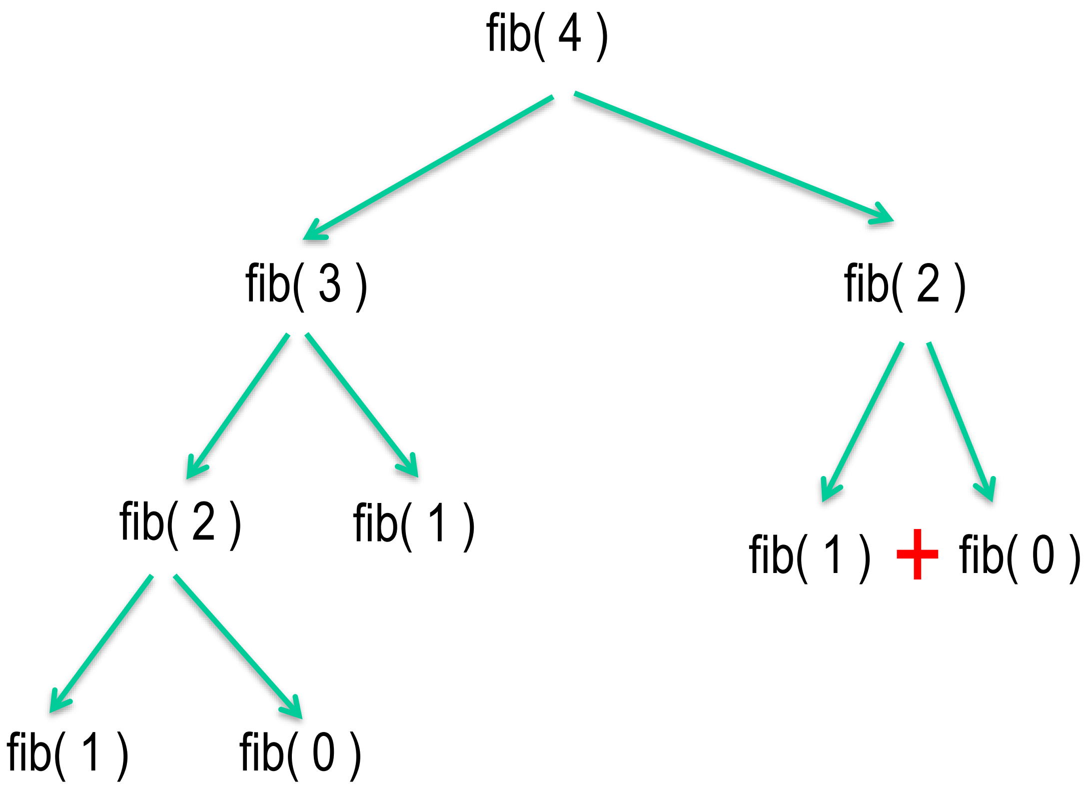

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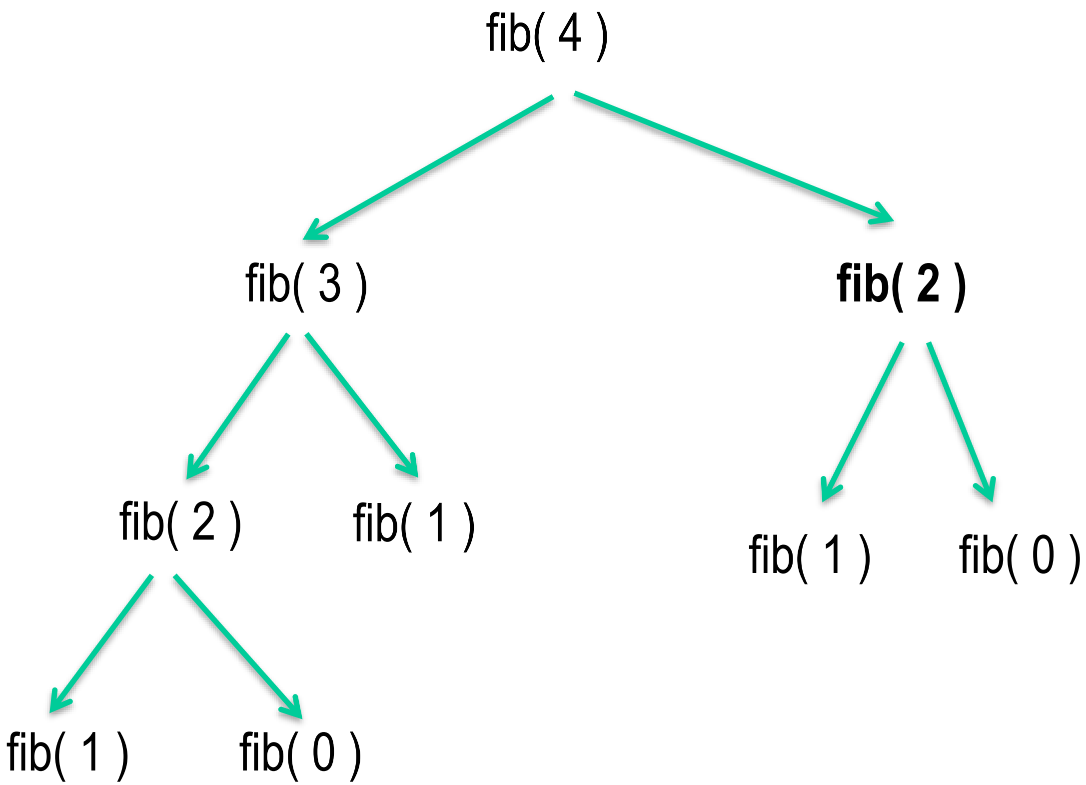

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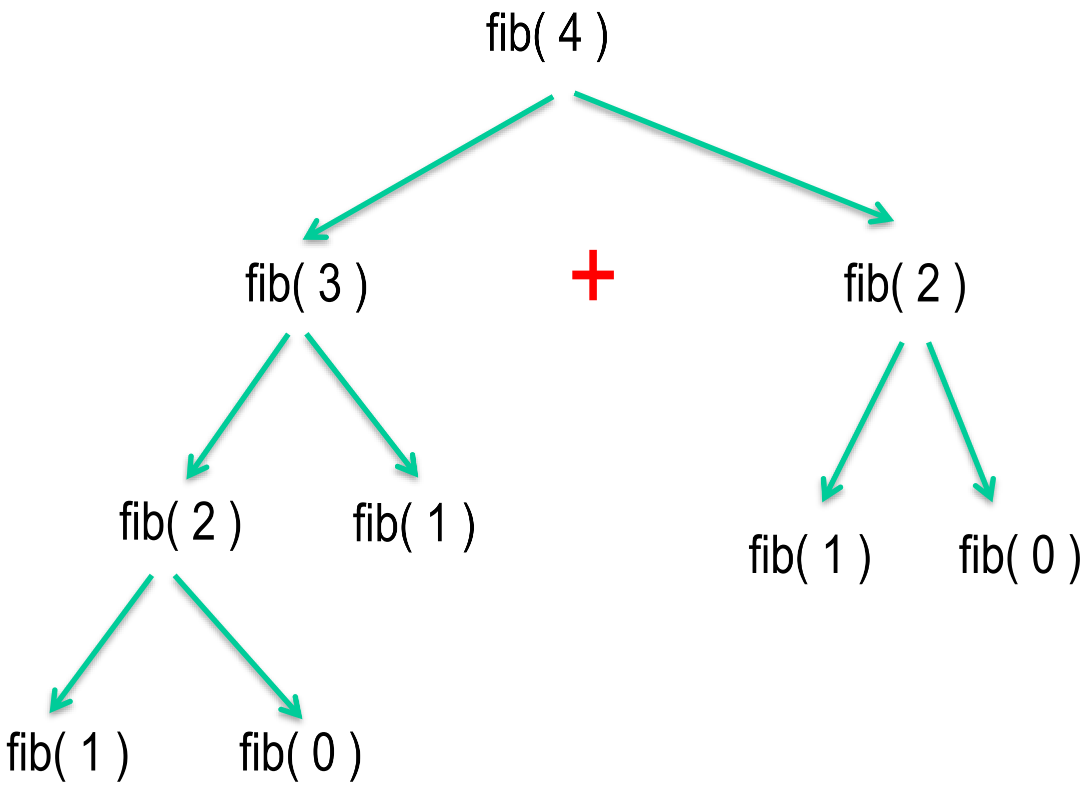

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