Interview Cake

Overlapping Subproblems

A problem has **overlapping subproblems** if finding its solution involves solving the *same* subproblem multiple times.

As an example, let's look at the fibonacci squence (the series where each number is the sum of the two previous ones—0,1,1,2,3,5,8...).

If we wanted to compute the nth fibonacci number, we could use this simple recursive algorithm:

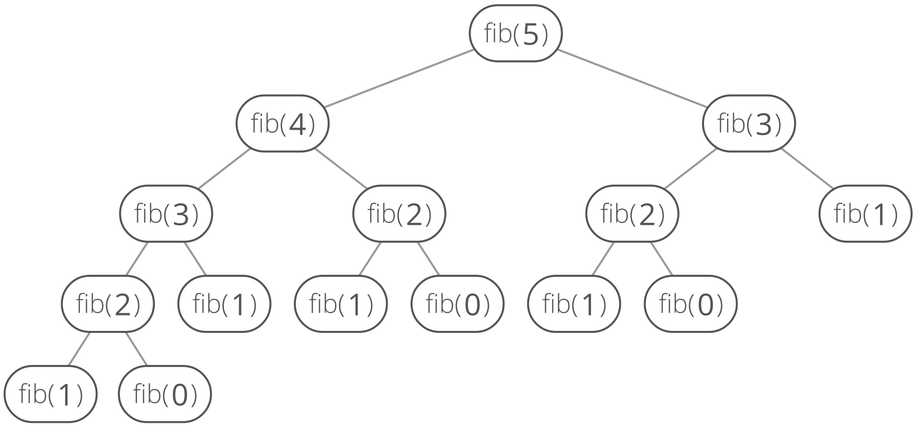
C# (beta) ▾

```
public int Fib(int n)
{
    if (n == 0 || n == 1)
    {
        return n;
    }

    return Fib(n - 1) + Fib(n - 2);
}
```

We'd call `Fib(n-1)` and `Fib(n-2)` **subproblems** of `Fib(n)`.

Now let's look at what happens when we call `Fib(5)`:



Our function ends up recursively calling `Fib(2)` ***three times***. So the problem of finding the nth fibonacci number has overlapping subproblems.

See also:

- Memoization (/concept/memoization)
- Bottom-Up Algorithms (/concept/bottom-up)

Overlapping Subproblems/Dynamic Programming Coding Interview Questions

5✔ Making Change »

Write a function that will replace your role as a cashier and make everyone rich or something. keep reading »

(/question/coin)

15✔ Compute nth Fibonacci Number »

Computer the nth fibonacci number. Careful--the recursion can quickly spin out of control! keep reading »

(/question/nth-fibonacci)

16✓ **The Cake Thief »**

You've hit the motherload: the cake vault of the Queen of England. Figure out how much of each cake to carry out to maximize profit. keep reading »

(/question/cake-thief)

All Questions ➡ (/all-questions)