

02393 C++ Programming Exercises

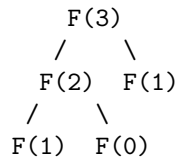
Assignment 11

Hand-in via <https://dtu.codejudge.net/02393-e17/assignment/>

Fibonacci Write a program that, given a non-negative integer n , provides some information about the computation of the straightforward implementation of the Fibonacci function $F(n)$ recursively defined as follows

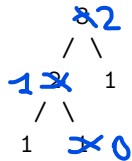
$$F(0) = 0 \quad F(1) = 1 \quad F(n) = F(n-2) + F(n-1)$$

For example if the input is 3, a recursive implementation of $F(n)$ would result in the following tree of recursive calls:



We want to know all Fibonacci numbers computed, the size of the tree, its height and the number of leafs (i.e. nodes without sub-trees, which in this case correspond to the base cases of the recursive formulation).

The numbers should be provided in pre-order. That is, if we replace the calls $F(i)$ by their result the tree would look like this:



And the pre-order traversal of such a tree would be 3 2 1 1 1.

The format of the output should look like this:

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Call tree in pre-order: 3 2 1 1 1
Call tree size: 5
Call tree depth: 3
Call tree leafs: 3
```

Use a tree structure to build first the tree of recursive calls and then output the required information using the tree structure.