Récursivité
- Définition: voir « Récursivité ».

ITI 1120
Module 11: Recursion

Objectives:

- Definition and illustrations
- Elements of a recursive function
- recursion model
- Examples

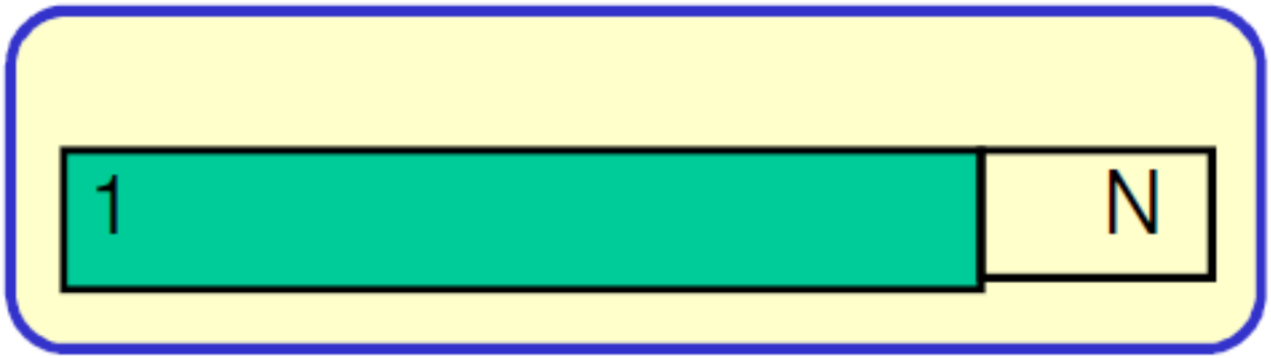
Sum of integers – the iterative method

- Sum of integers numbers from 1 to N:

```
def Sum(int N) :
        sum = 0
        for i in range(N):
                sum, = sum + i
        return sum
```

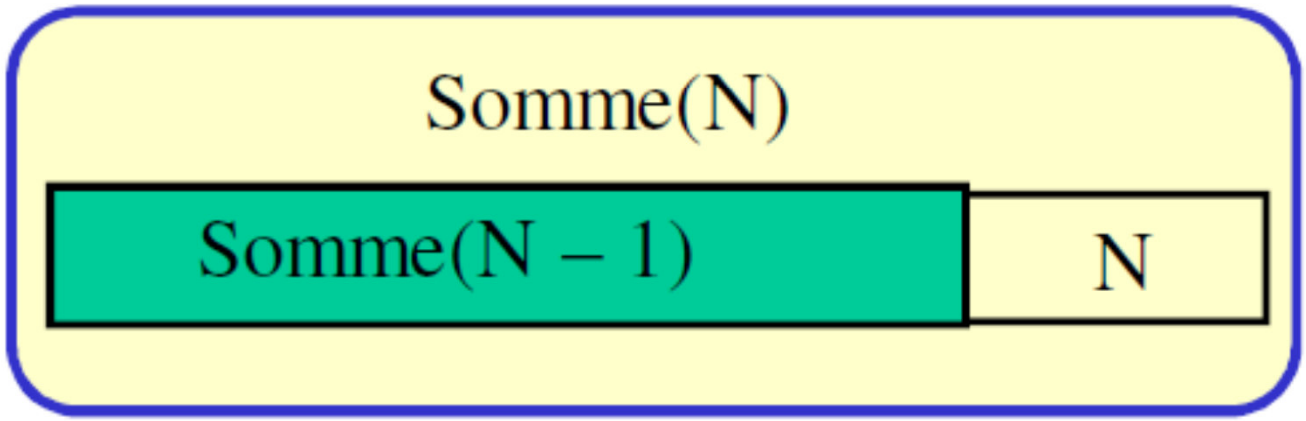
Recursion

- Recursion is a problem resolution technic. It involves a decomposion of a problem P in sub-problems smaller and easier to solve.
- With the recursion the sub-problems are of the same type as the problem P, but in a simpler version.
- Example 1 of recursion (base case): what is the sum of numbers beween 1 and N?

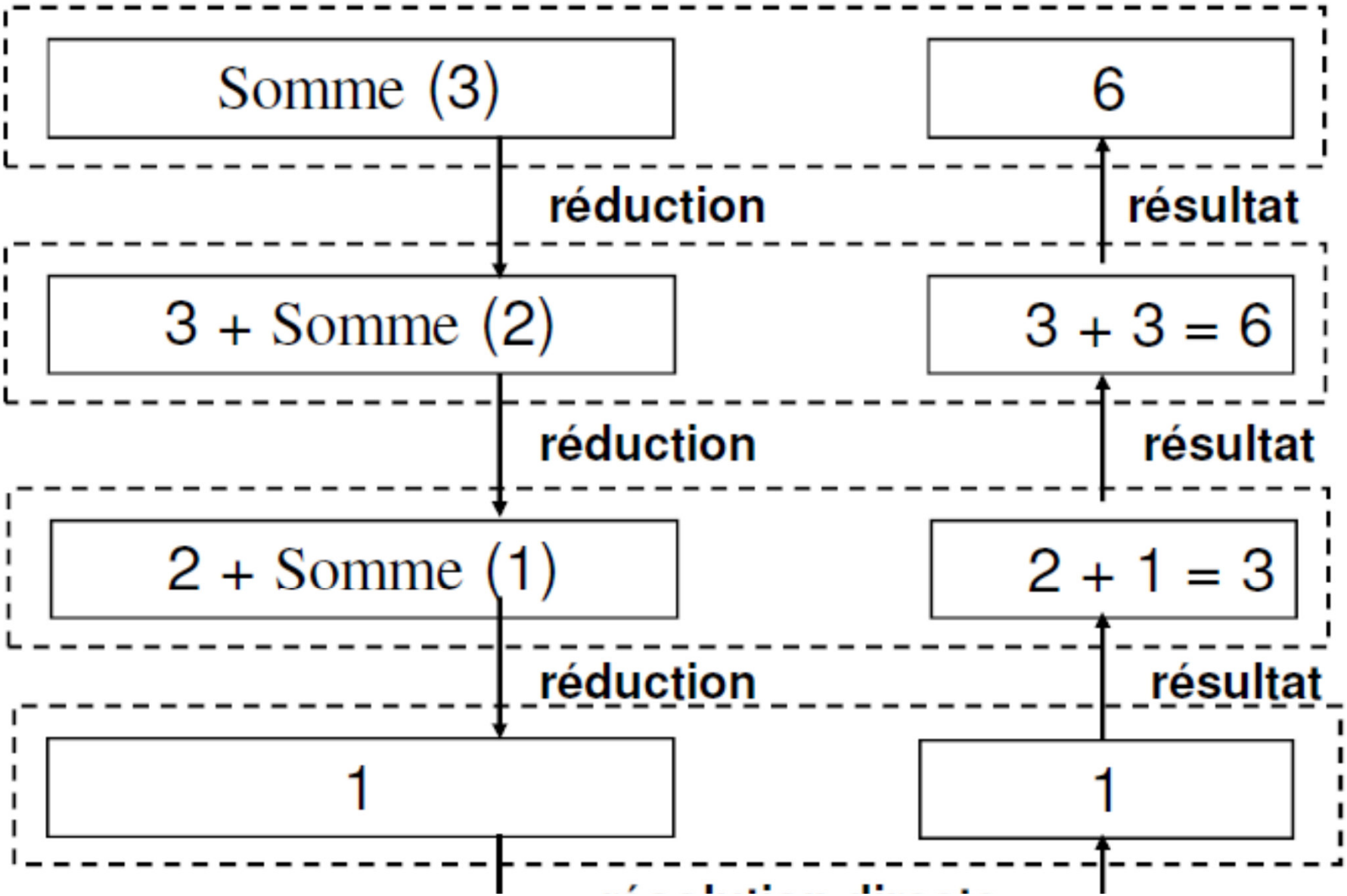


1. Somme (4) = 4 + Somme (3)
2. Somme (3) = 3 + Somme (2)
3. Somme(2) = 2 + Somme (1)
4. Somme(1) = 1

$$\text{Somme}(N) = \begin{cases} 1 & N = 1 \\ N + \text{Somme}(N-1) & N > 1 \end{cases}$$



Example for Sum(3)



Recursion Steps

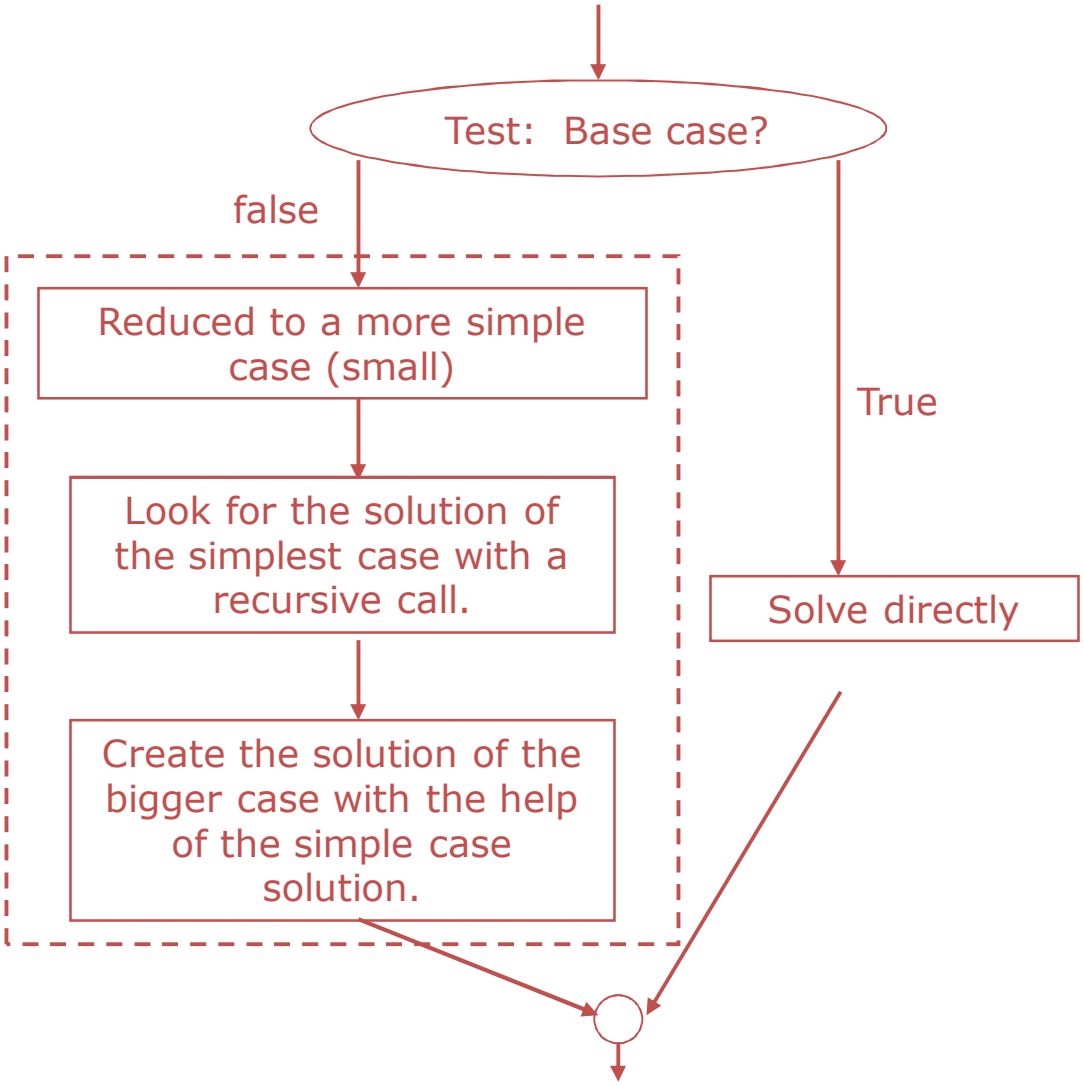
There are 3 composantes in the recursion:

1. A test to find out if the problem is simple enough to be solved directly (in a non recursive way): the base case.

2. the solution to the simple problem.

3. A solution to the problem that includes a solution to one (or more) smaller versions of the same problem or « general solution »

Recursion Model



Recursive functions

1. A recursive function is a function that calls itself!

2. A recursive function must have at least one outgoing condition that can be satisfied.

3. Omitting the base case can lead to an unlimited series of calls.

Recursion example

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