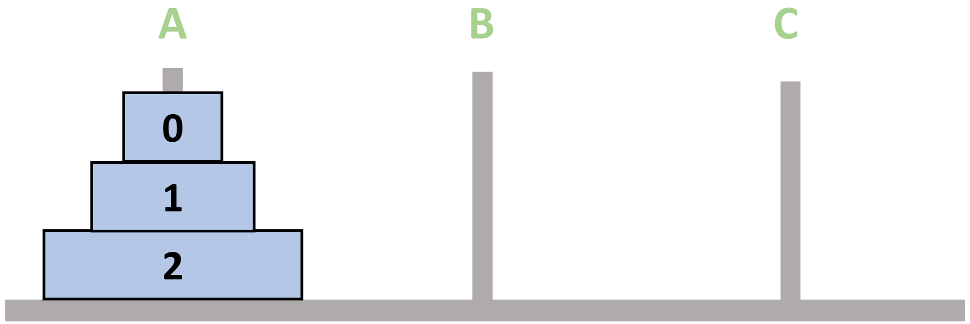
Towers of Hanoi

(Algorithmic Problems)

Towers of Hanoi



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STACK

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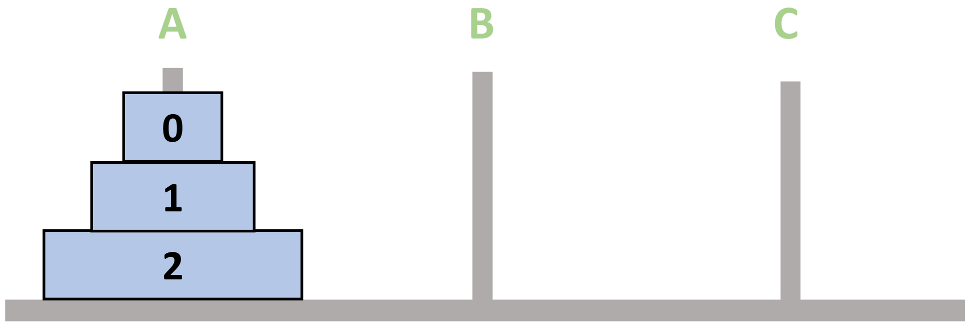

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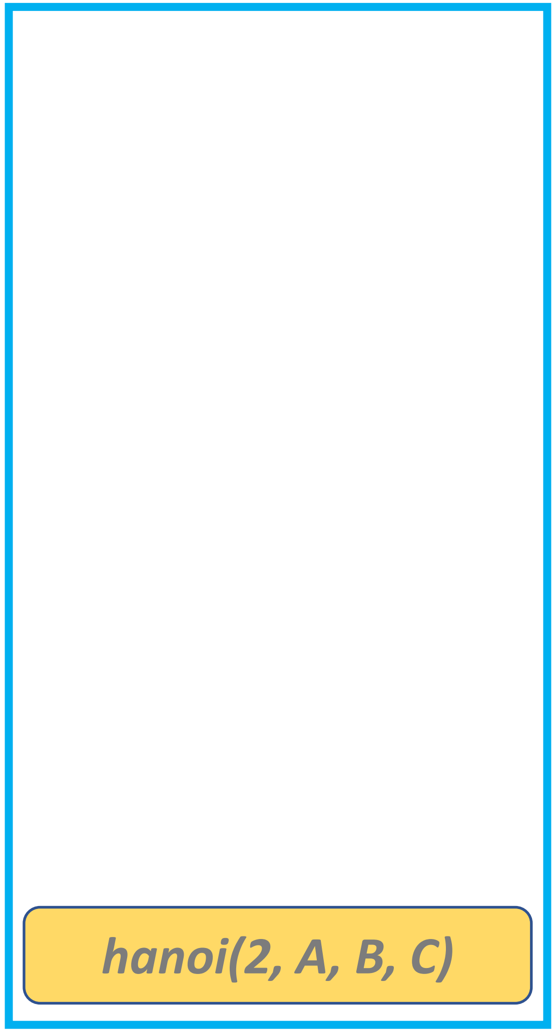

hanoi(2, A, B, C)

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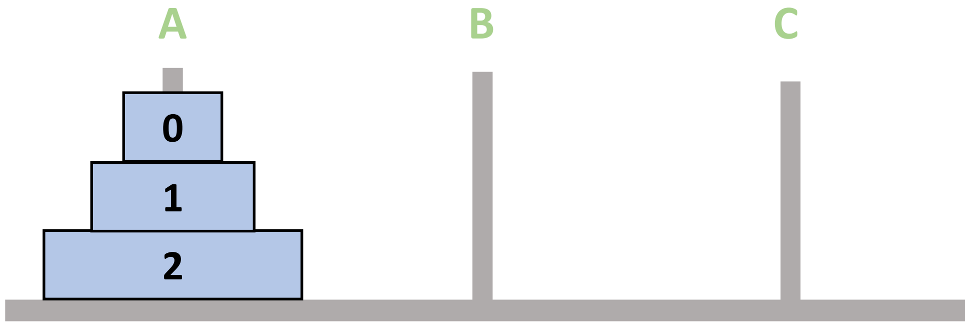

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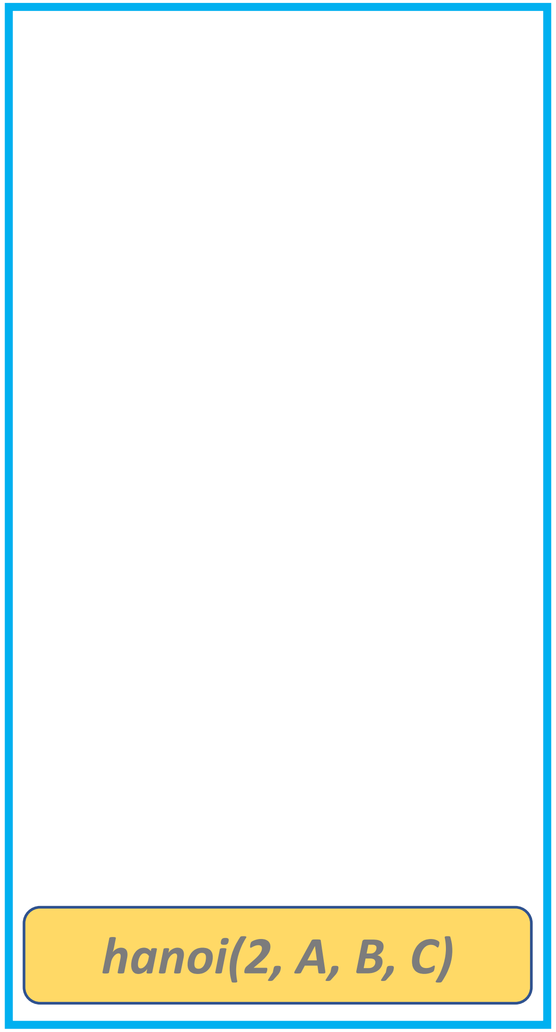

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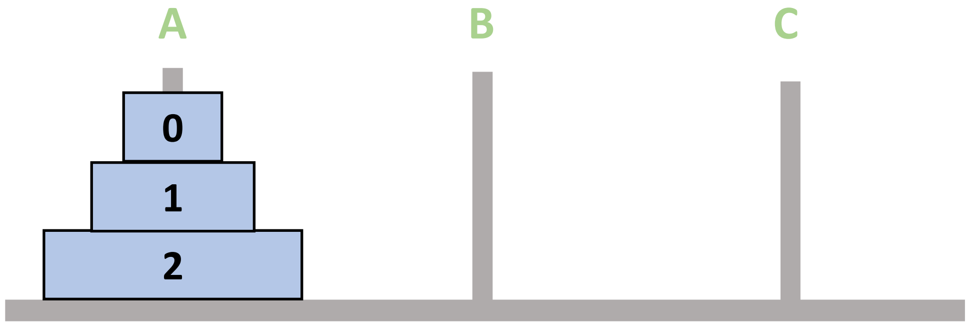

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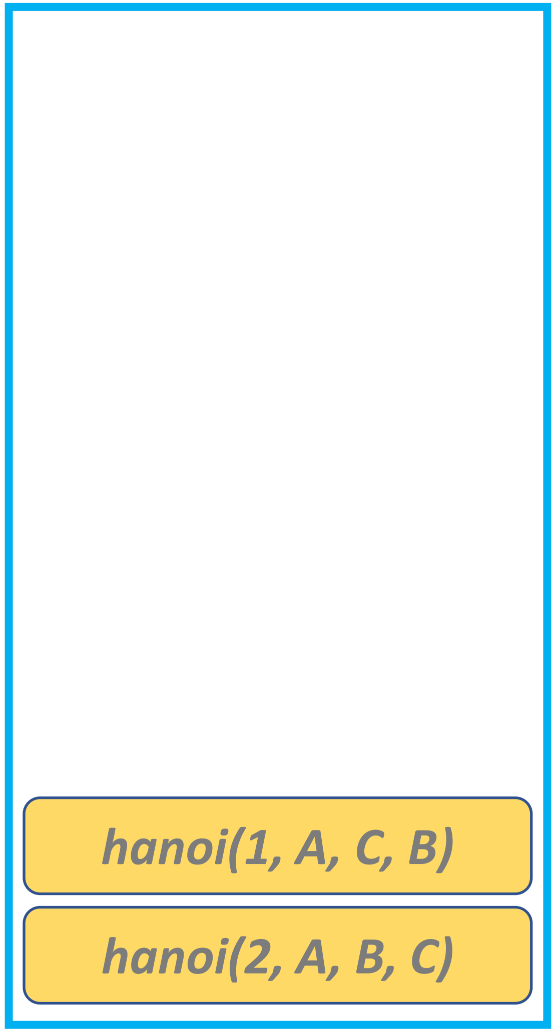

hanoi(1, A, C, B)

hanoi(2, A, B, C)

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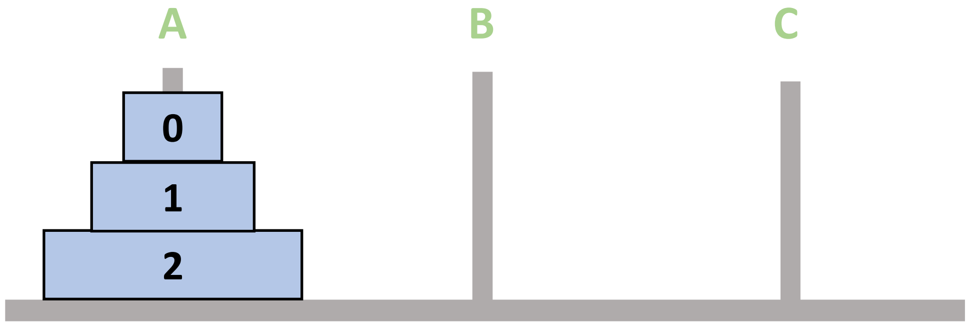

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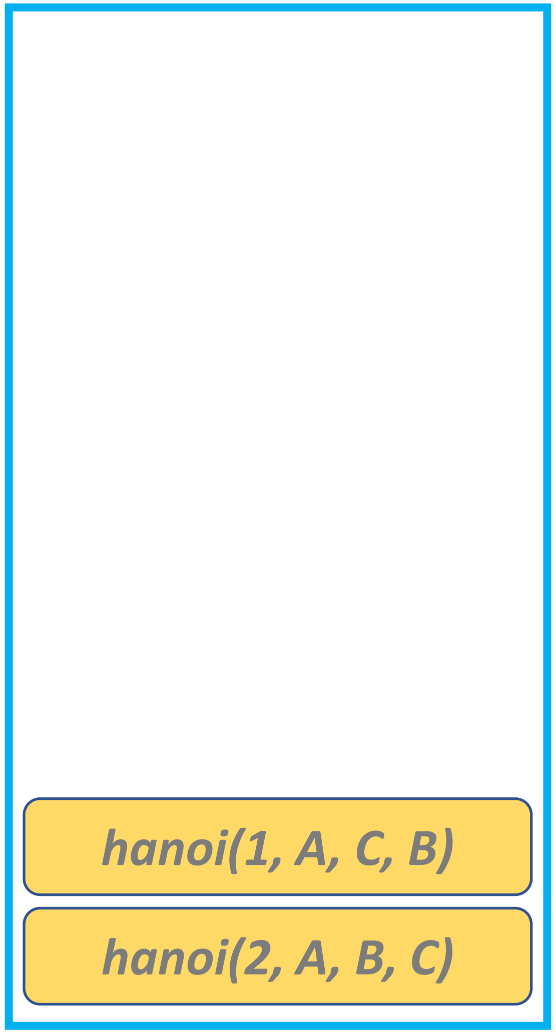

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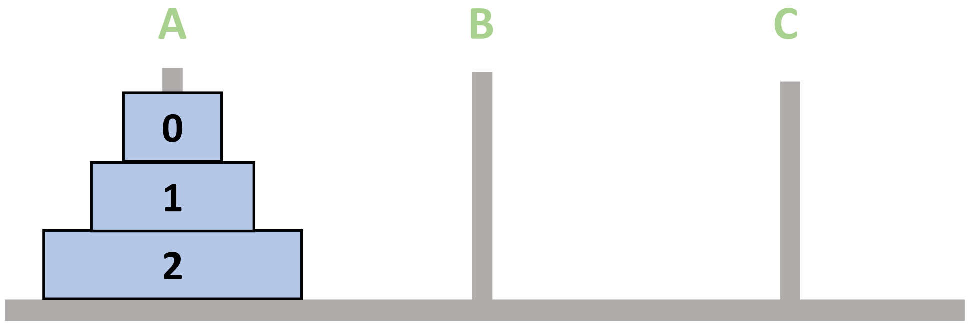

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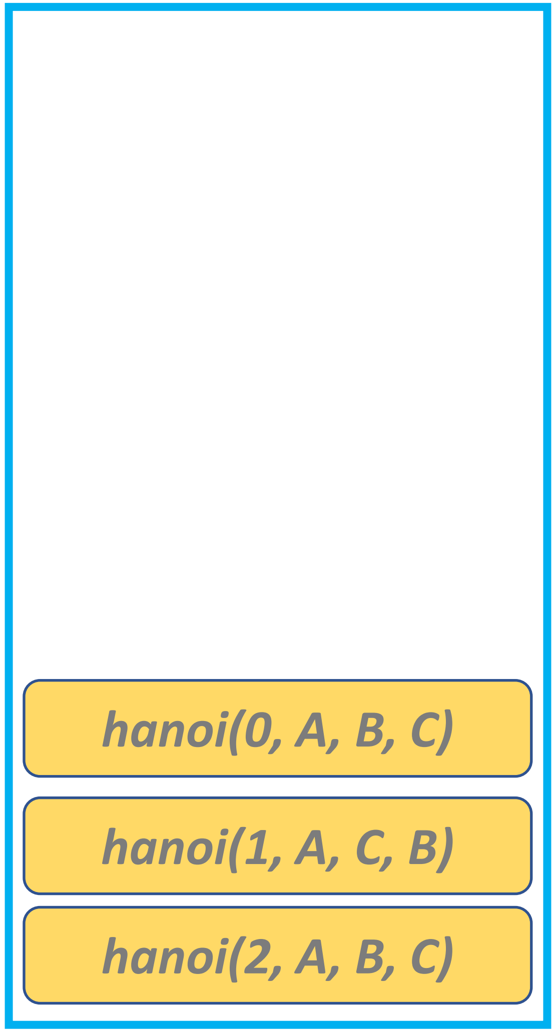

hanoi(0, A, B, C)

hanoi(1, A, C, B)

hanoi(2, A, B, C)

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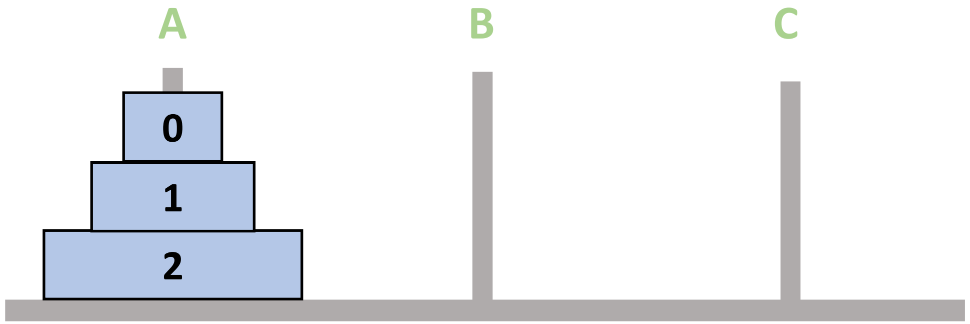

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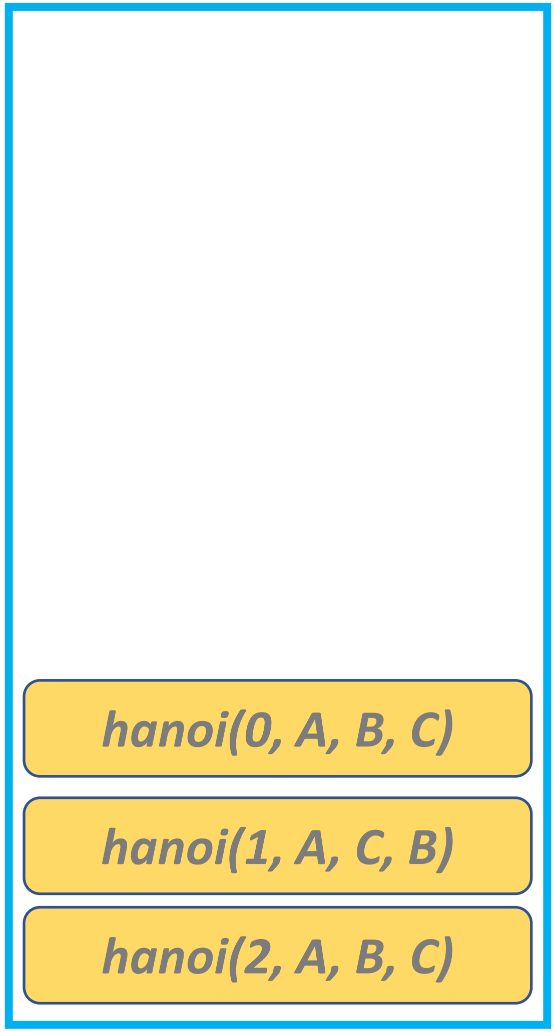
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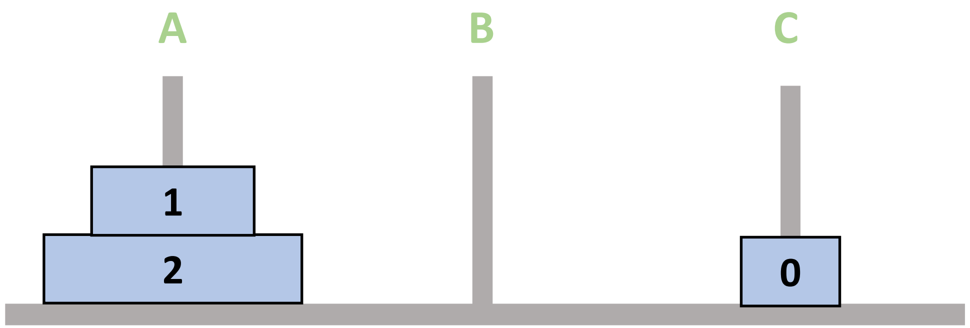

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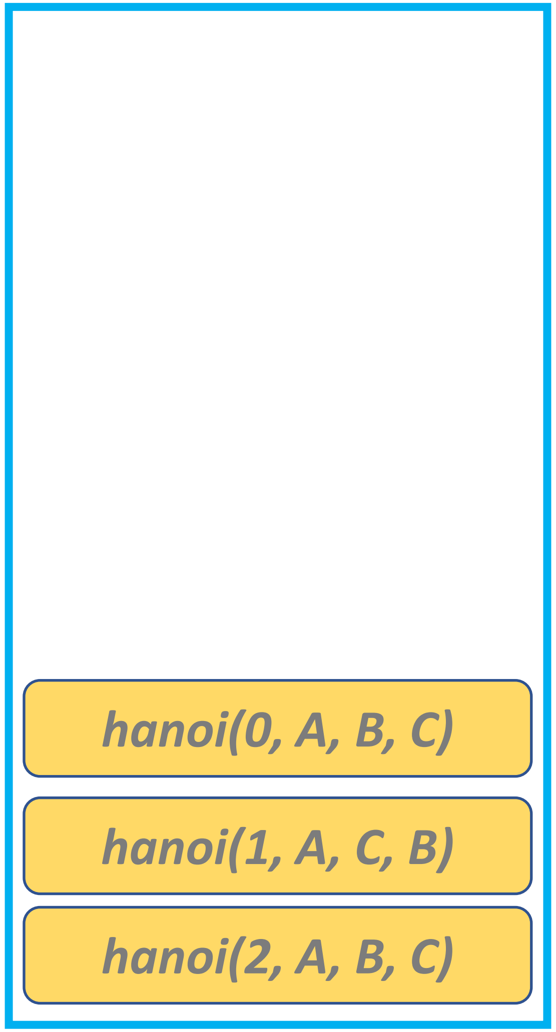

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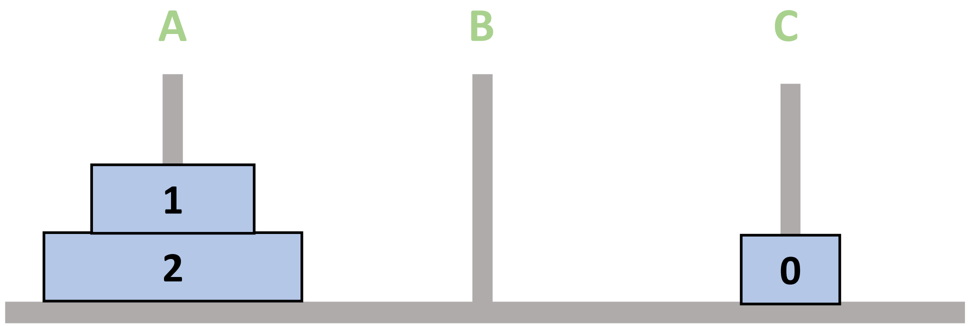

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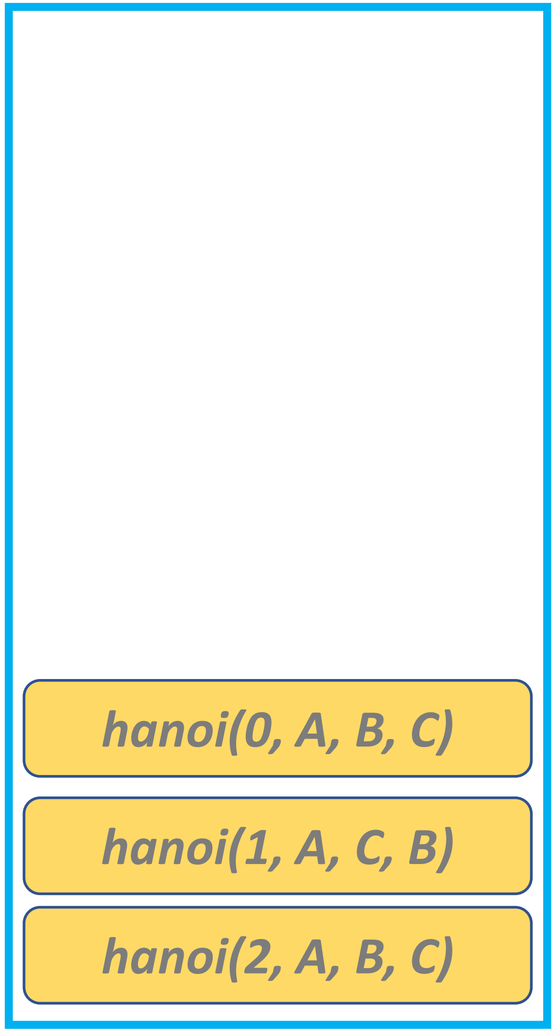

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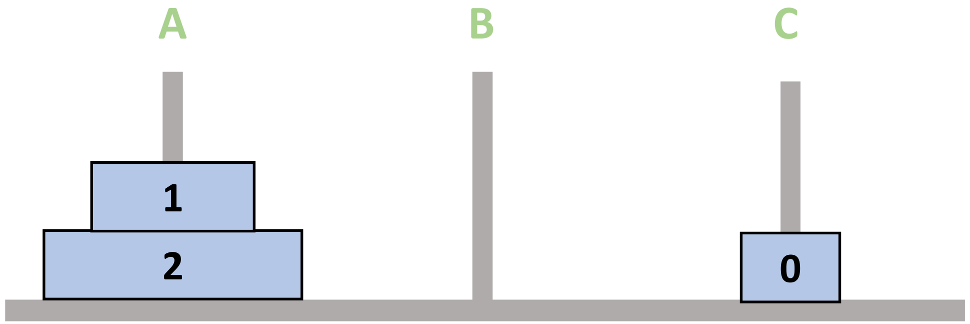

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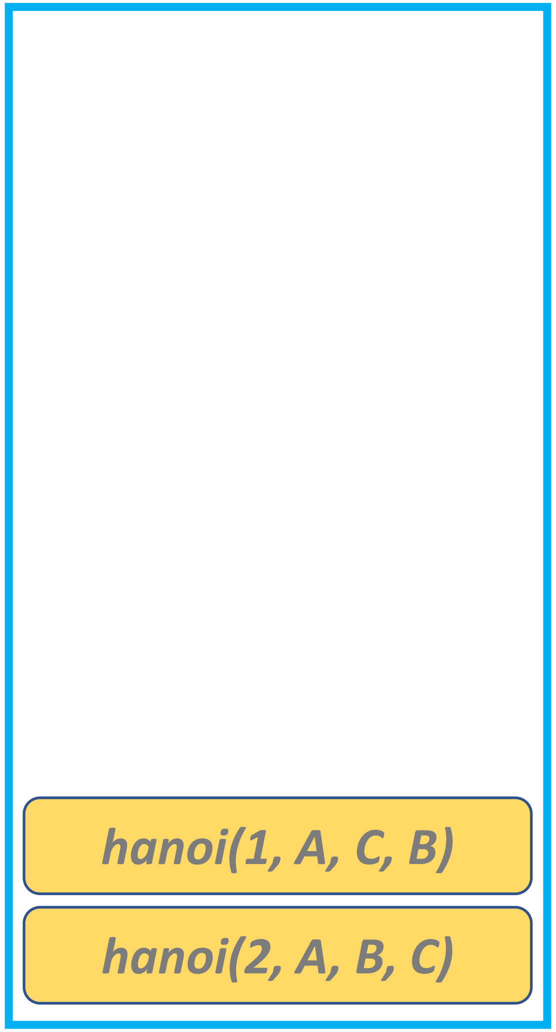

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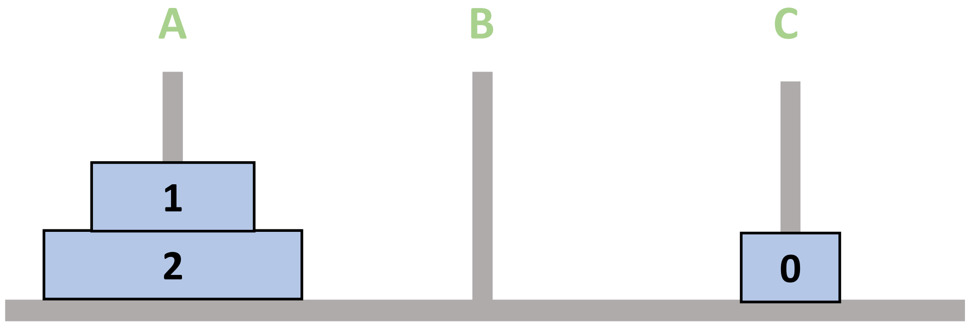

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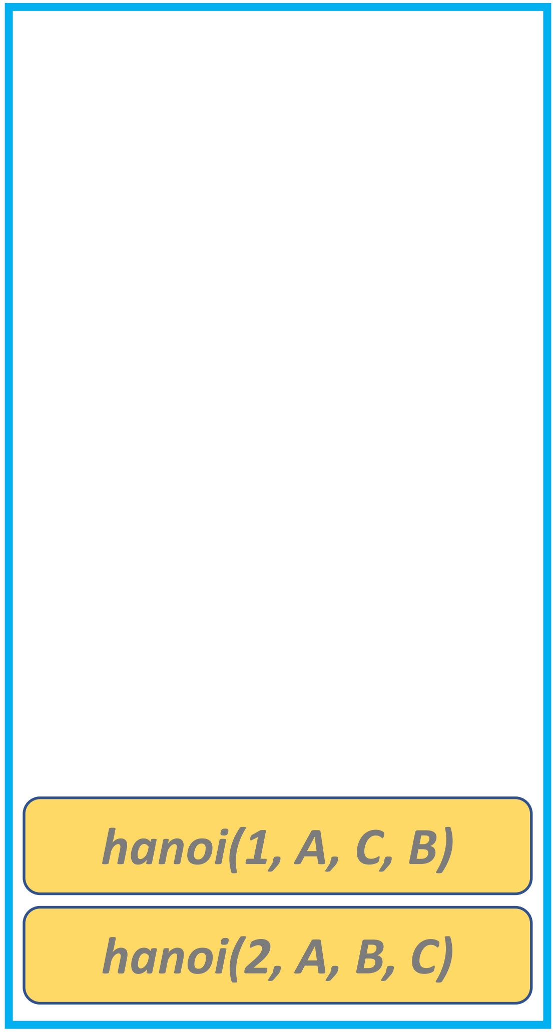

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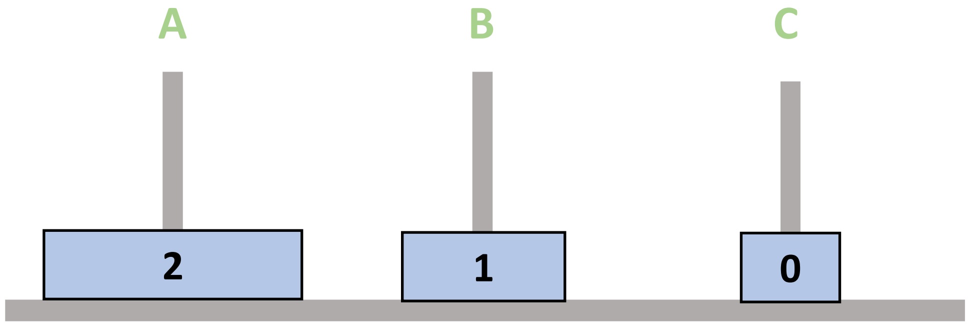

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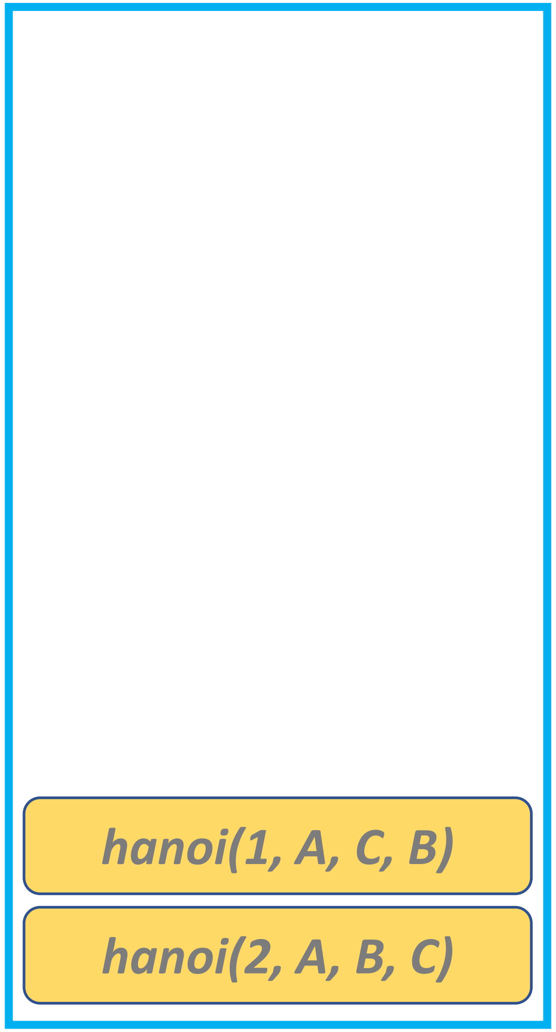
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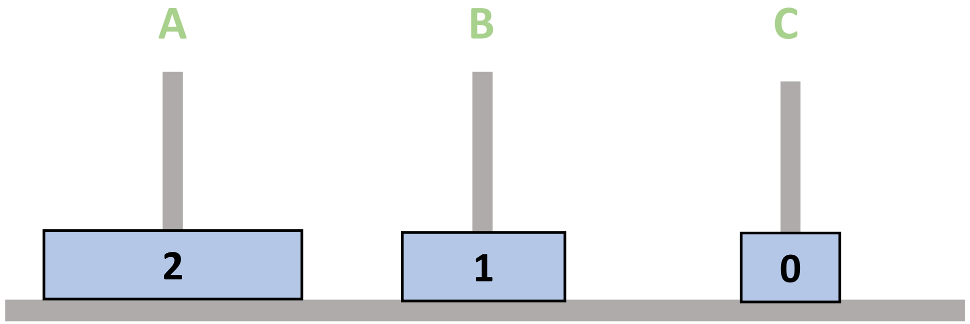

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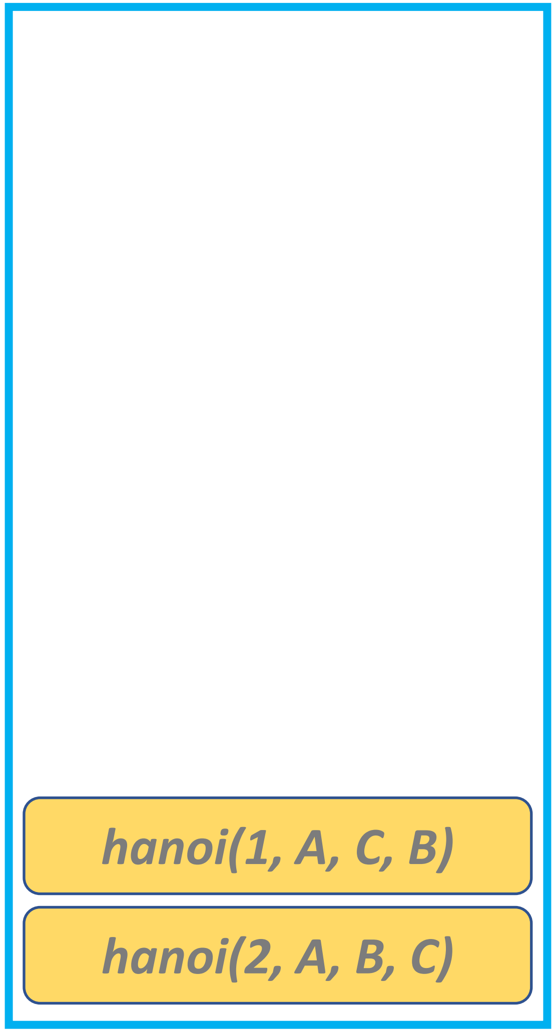

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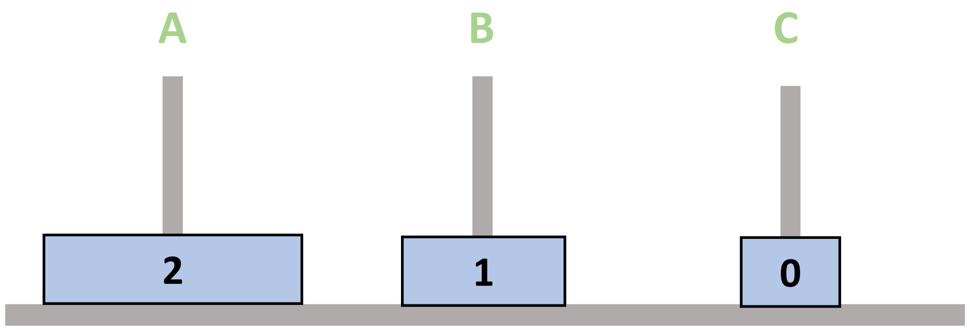

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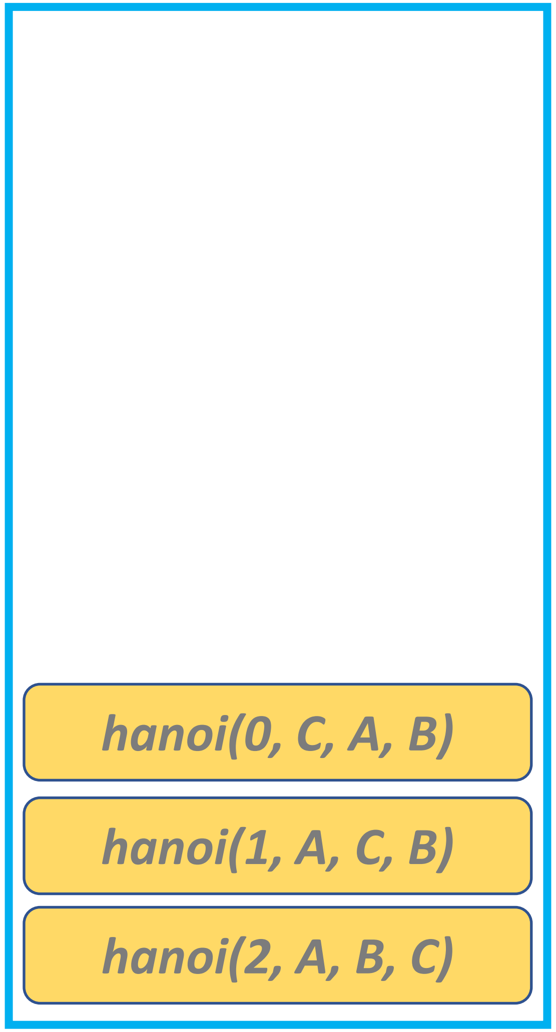
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hanoi(2, A, B, C)

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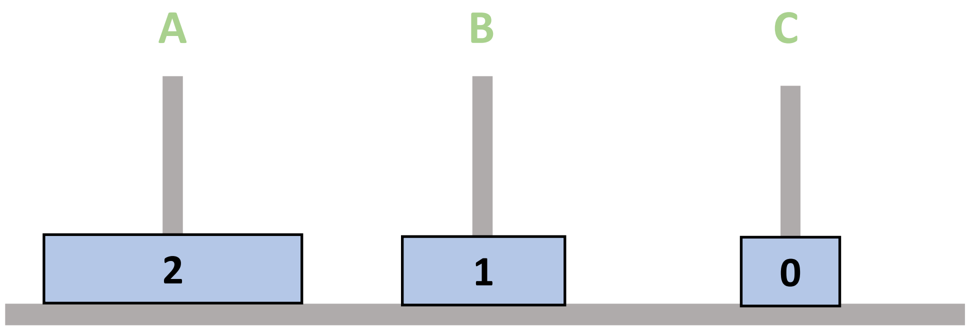

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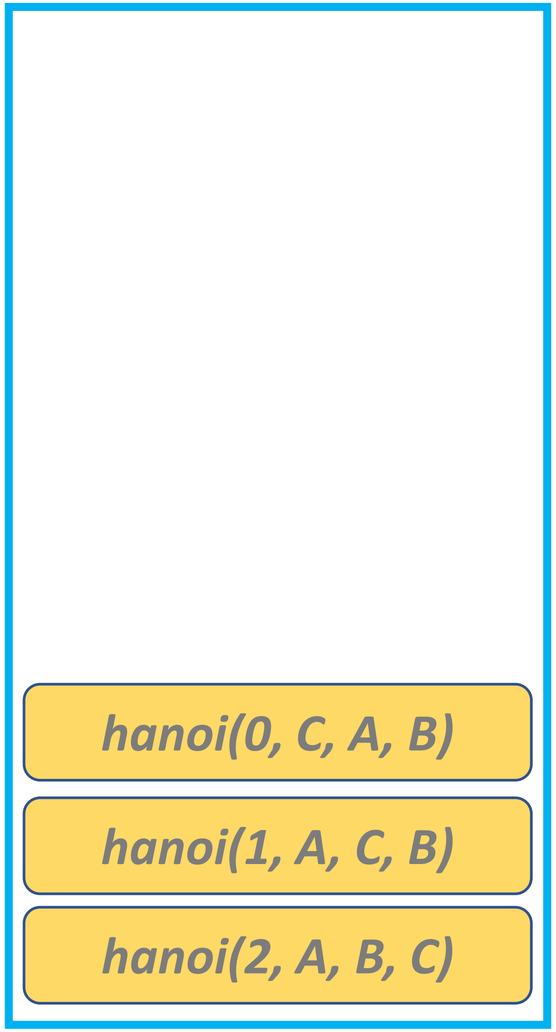

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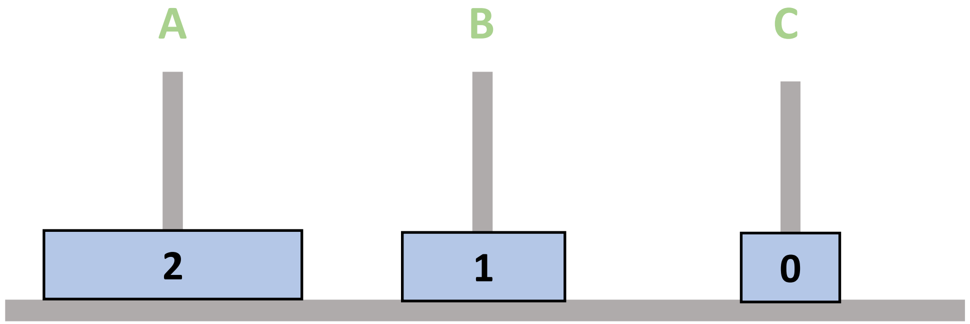

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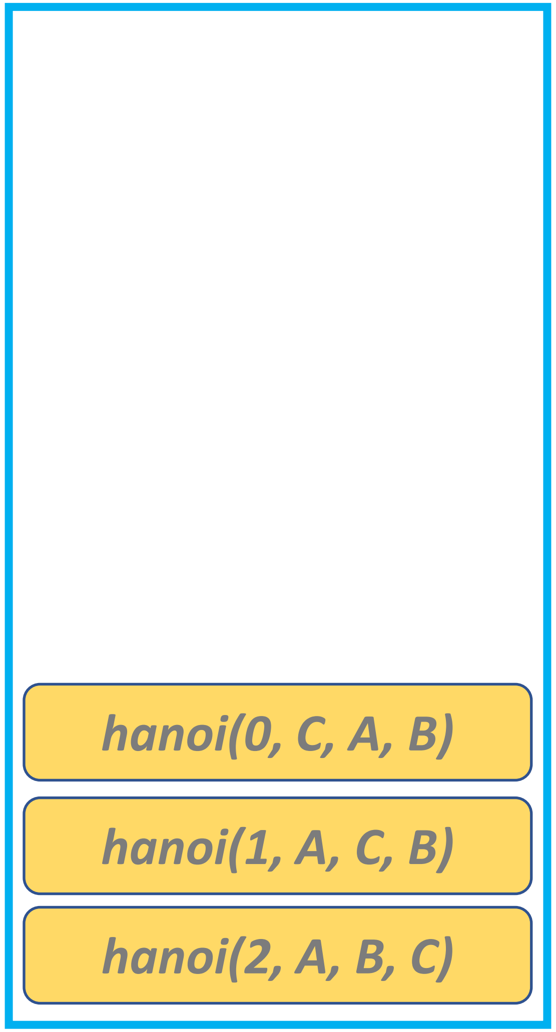

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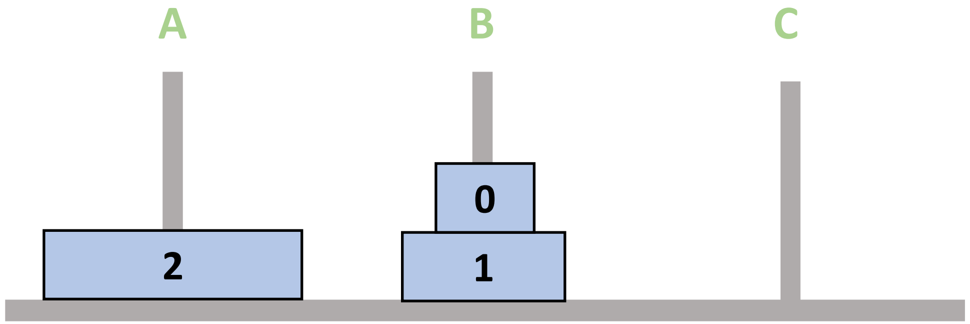

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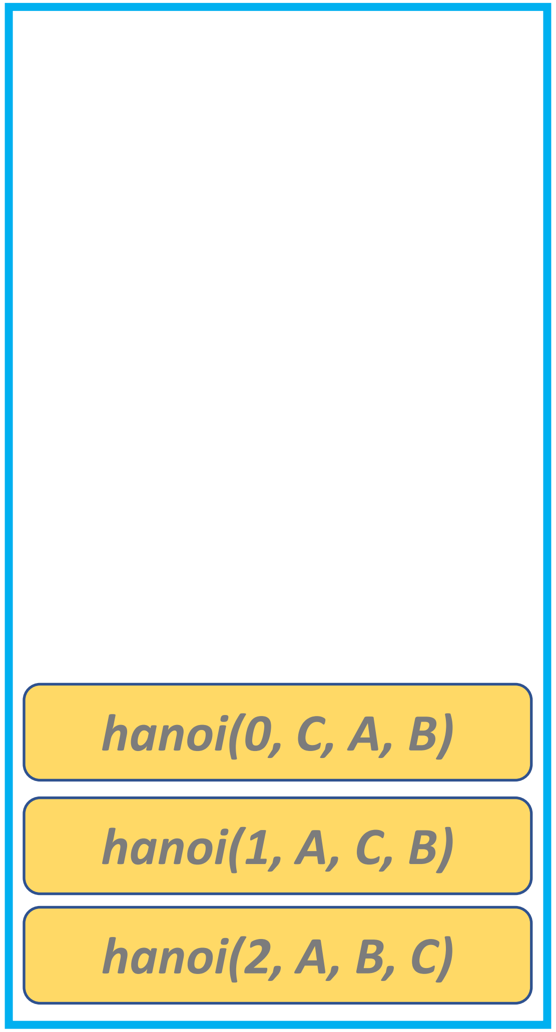

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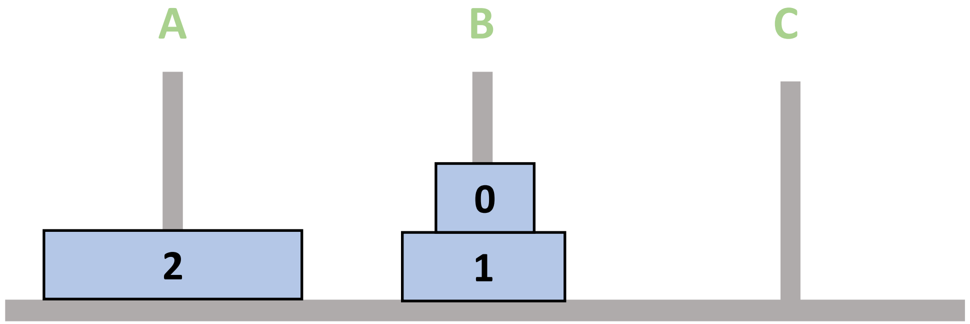

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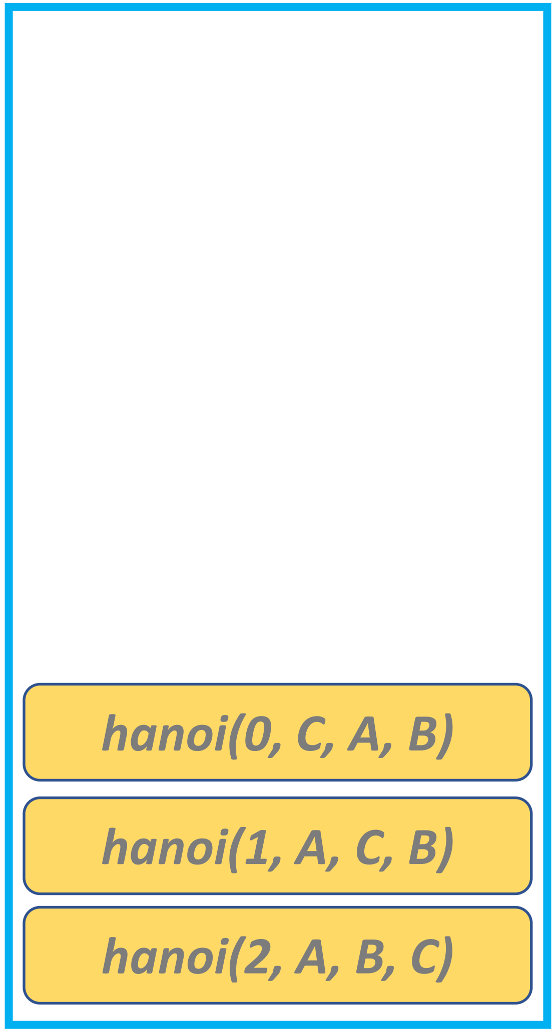

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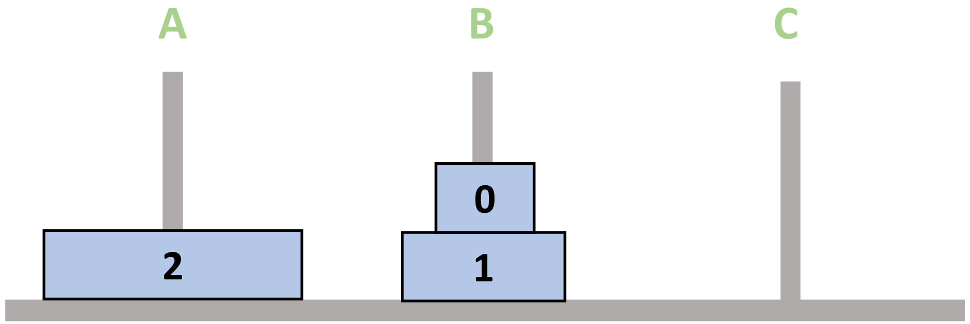

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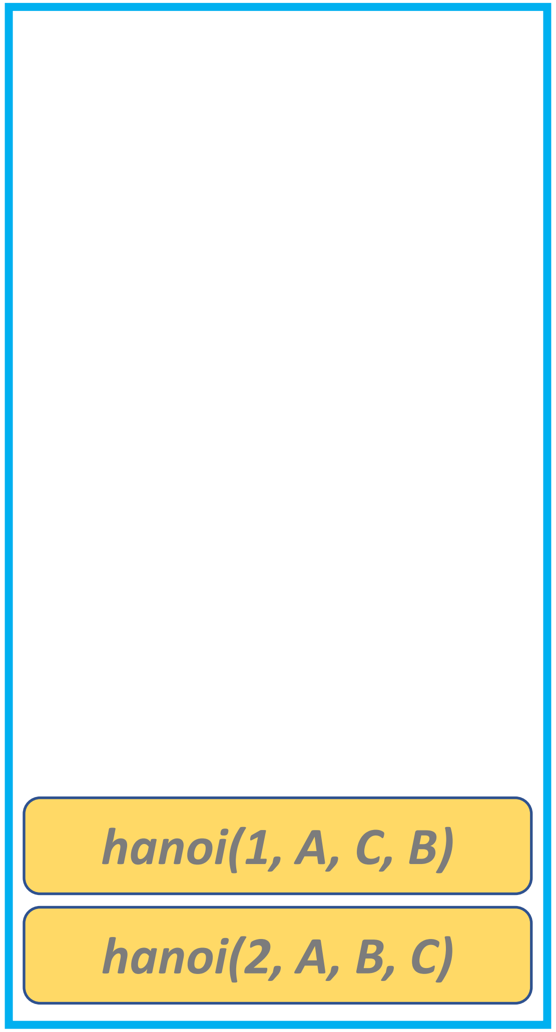

hanoi(1, A, C, B)

hanoi(2, A, B, C)

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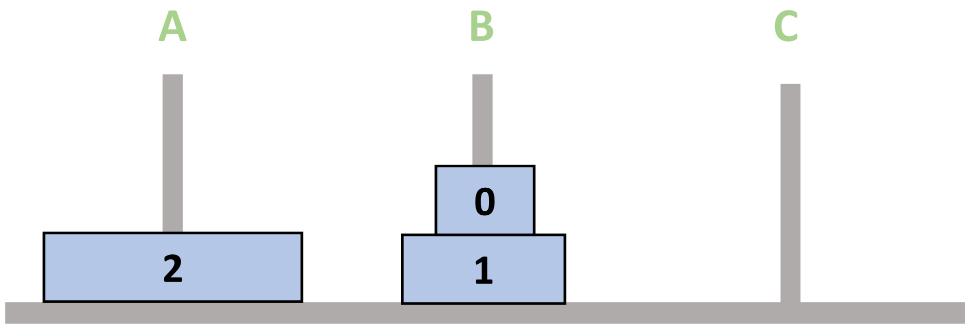

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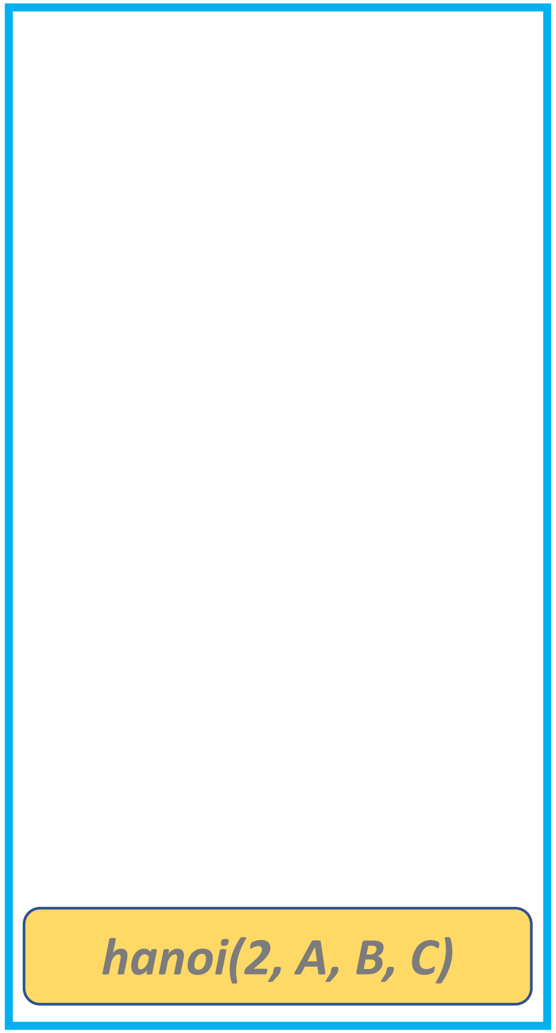

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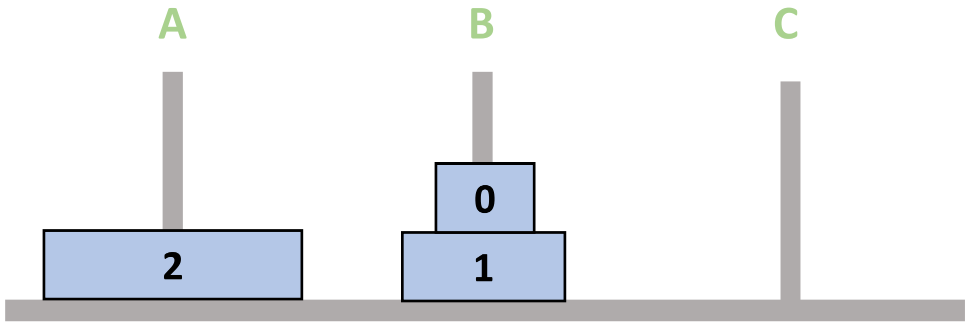

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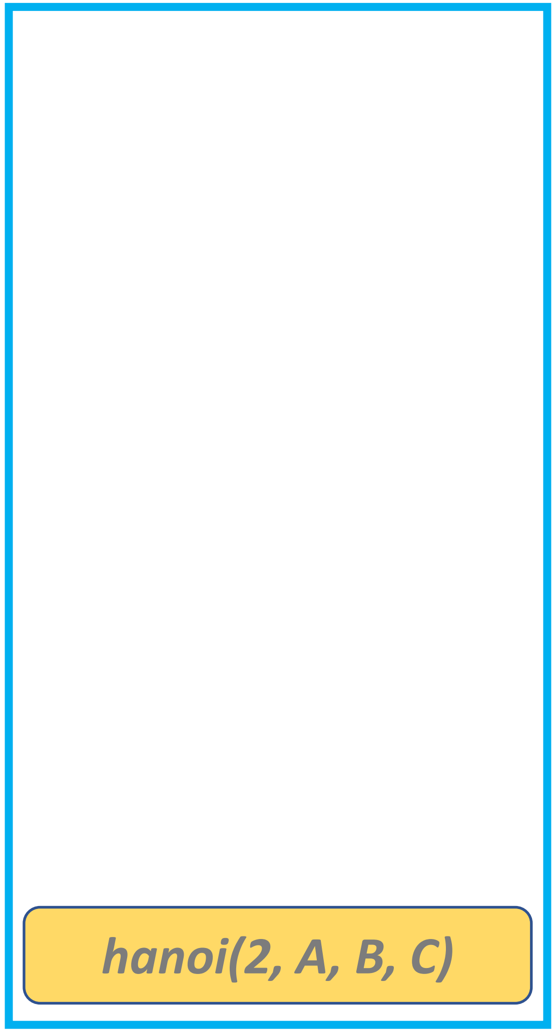

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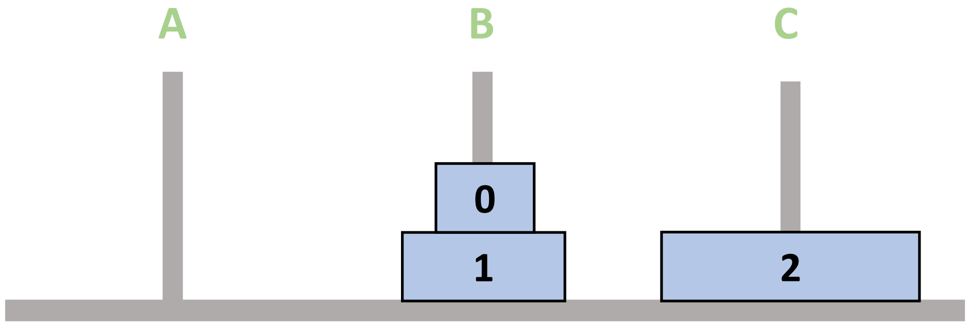

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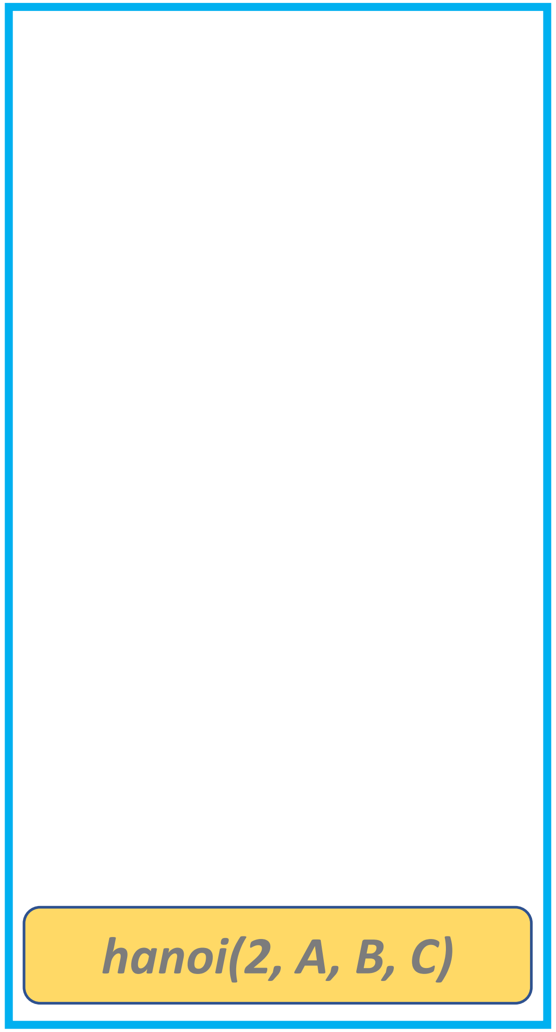

hanoi(2, A, B, C)

STACK

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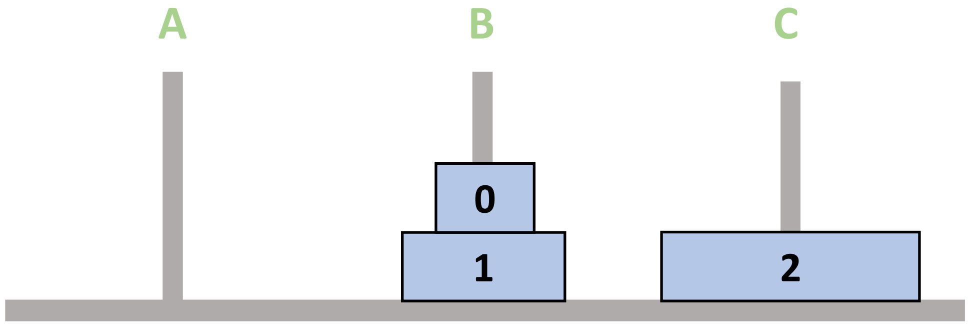

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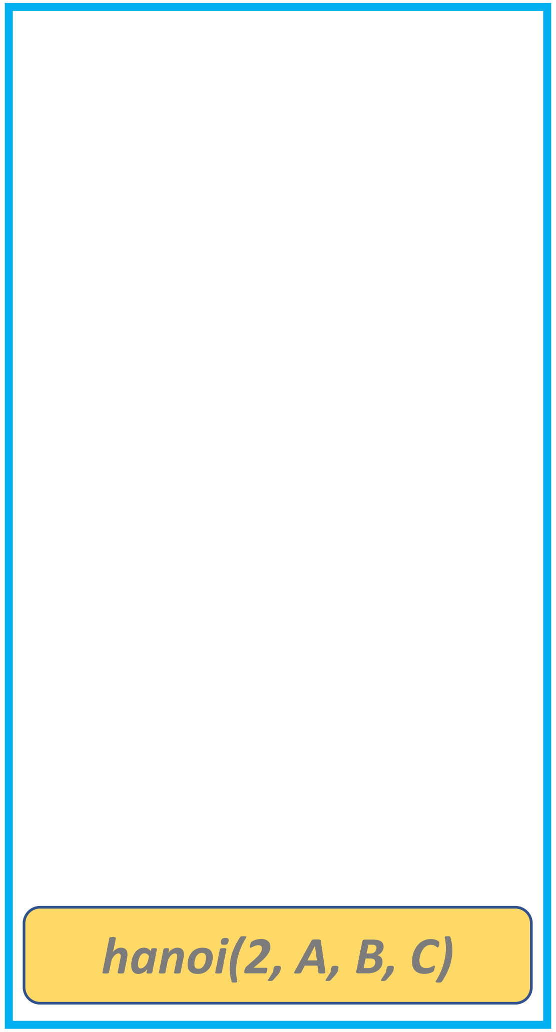

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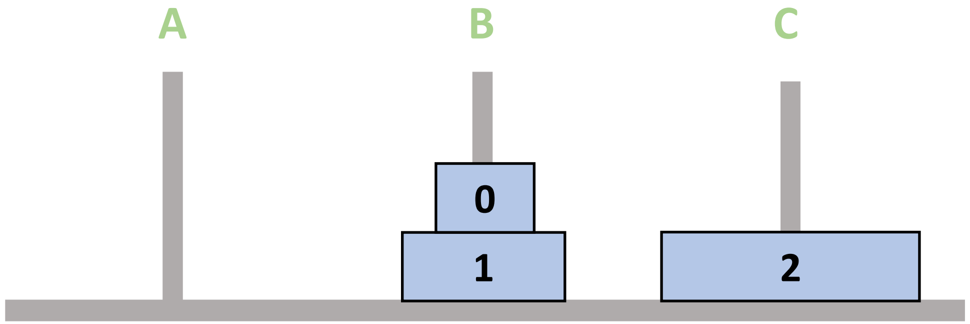

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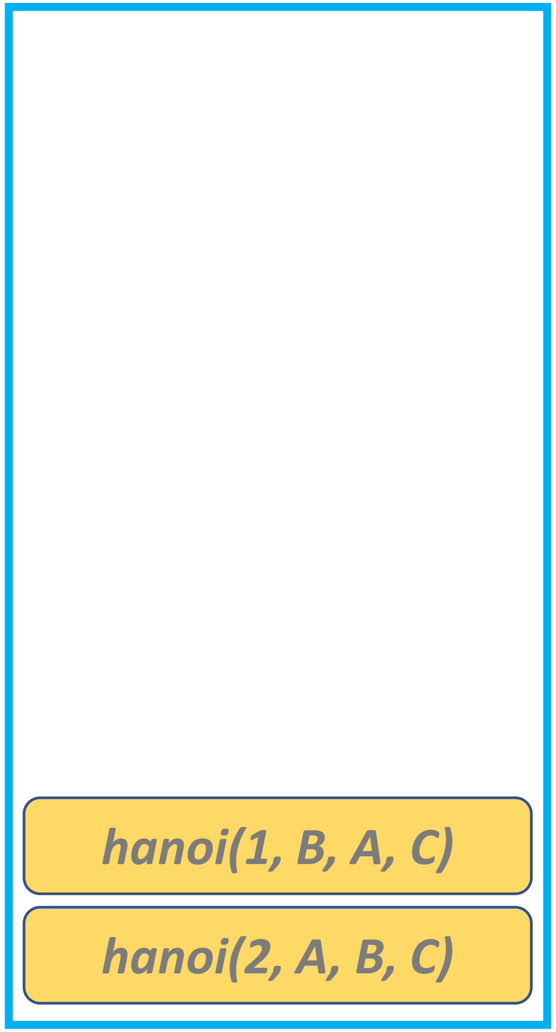

hanoi(1, B, A, C)

hanoi(2, A, B, C)

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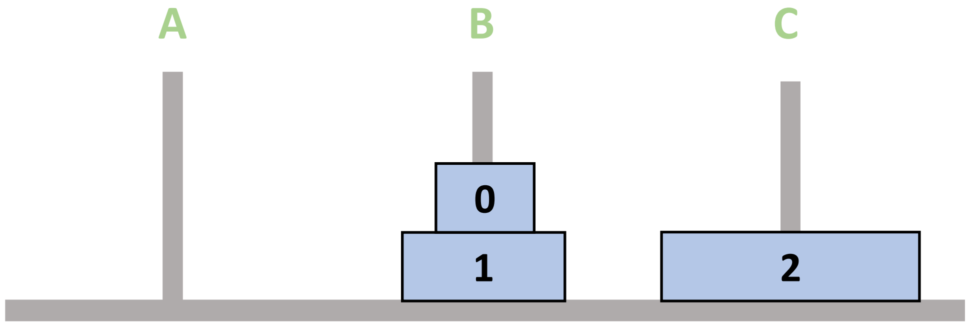

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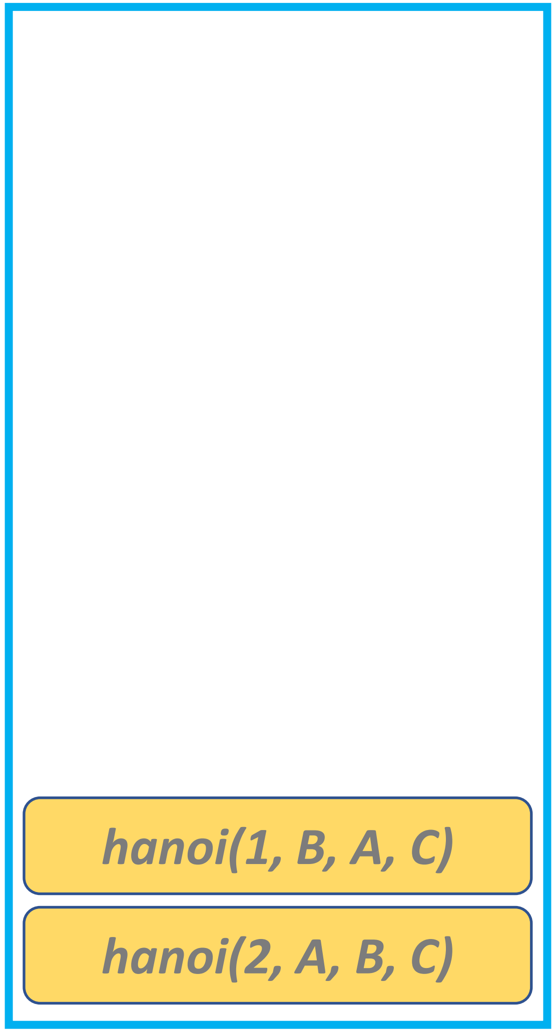

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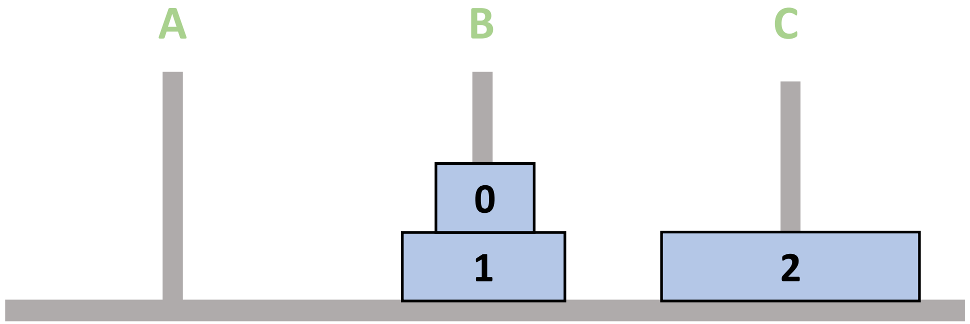

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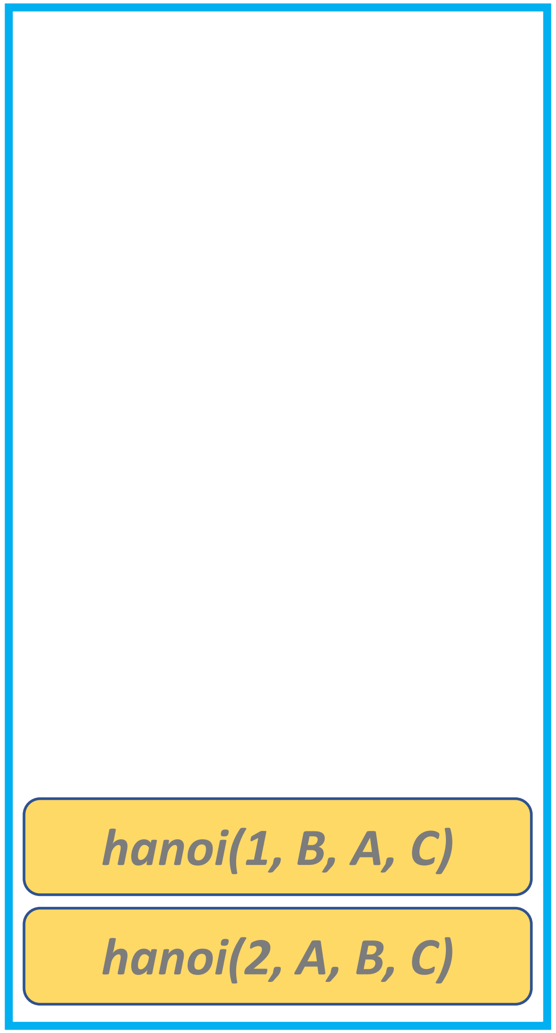
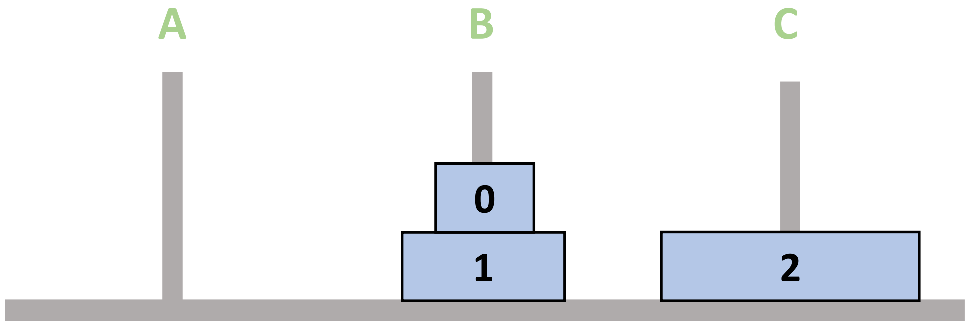


hanoi(1, B, A, C)

hanoi(2, A, B, C)

STACK

Towers of Hanoi



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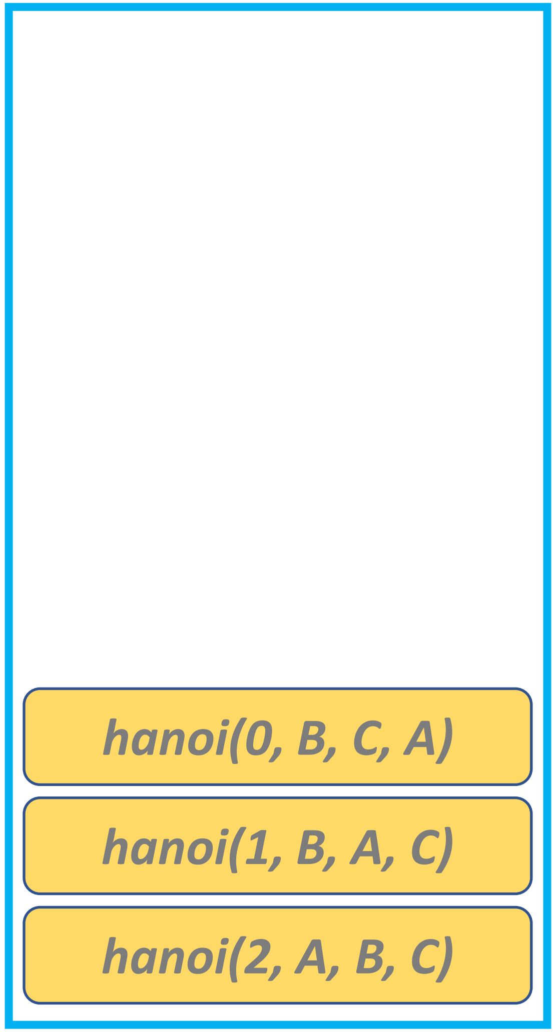


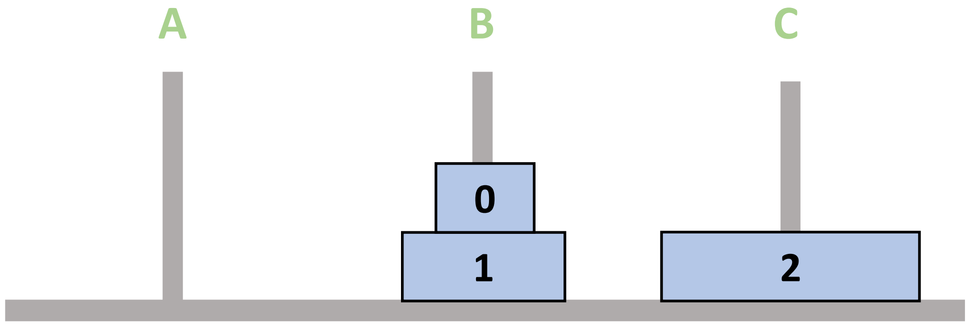
hanoi(0, B, C, A)

hanoi(1, B, A, C)

hanoi(2, A, B, C)

STACK

Towers of Hanoi



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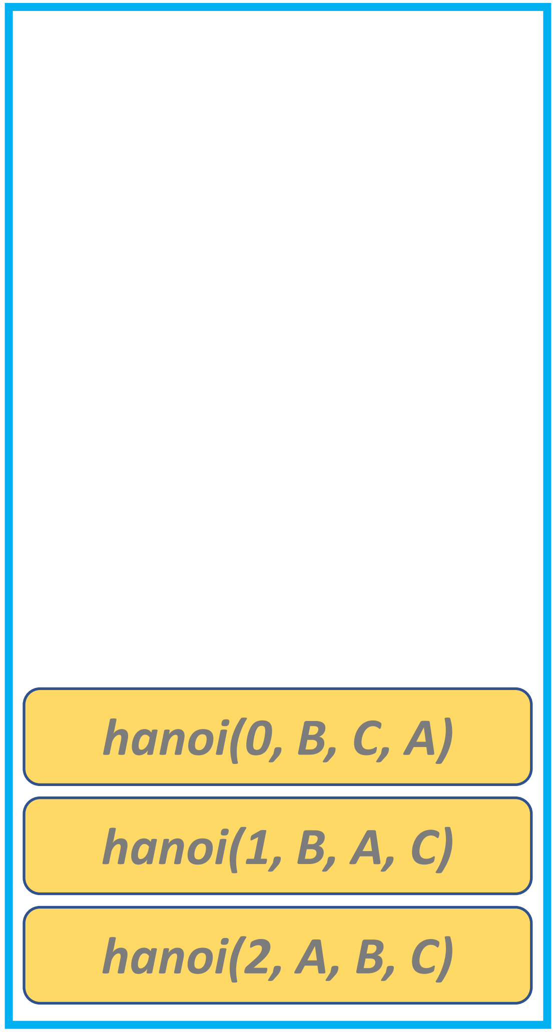

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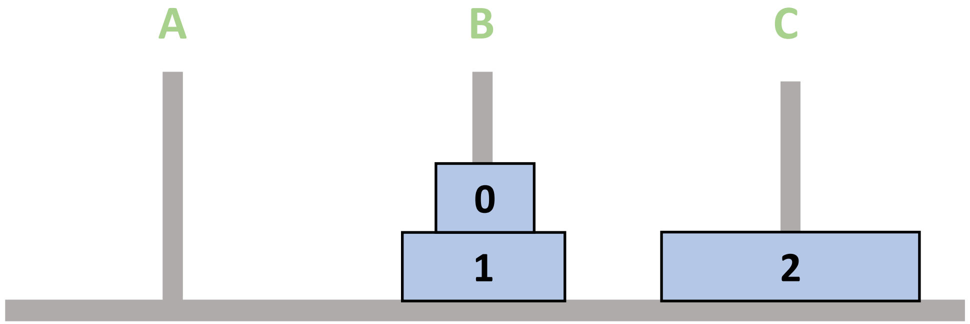
STACK

Towers of Hanoi



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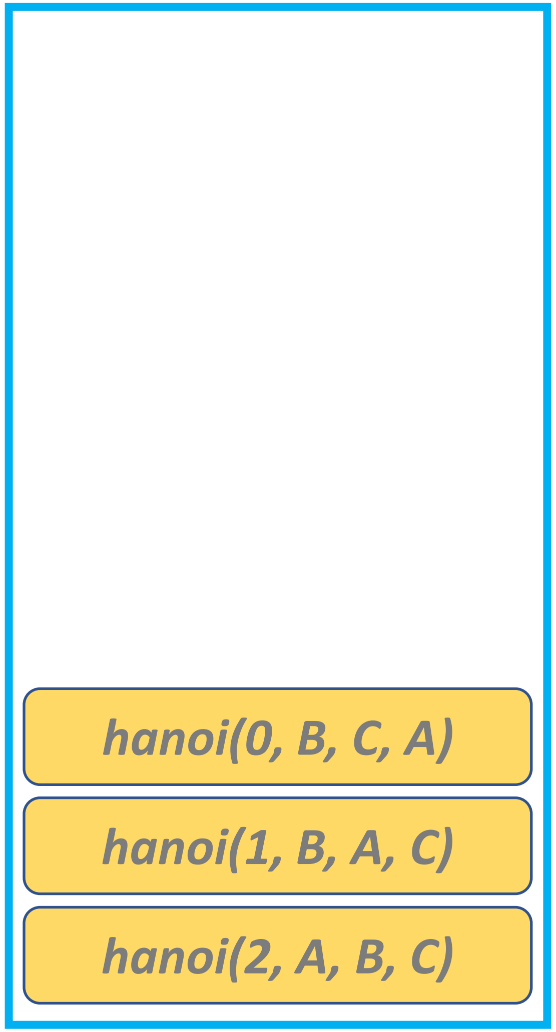

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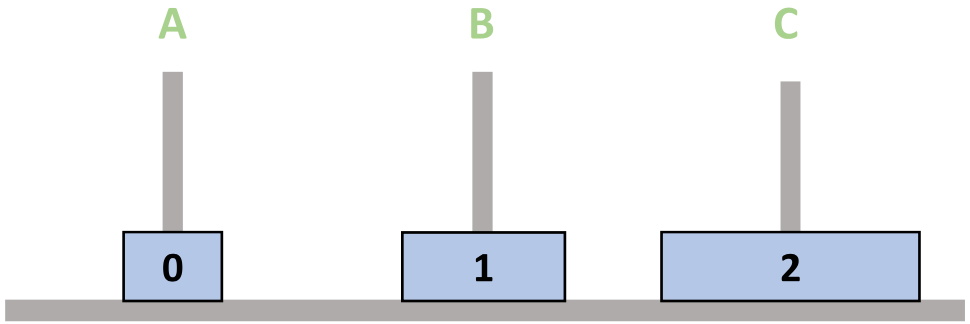
STACK

Towers of Hanoi



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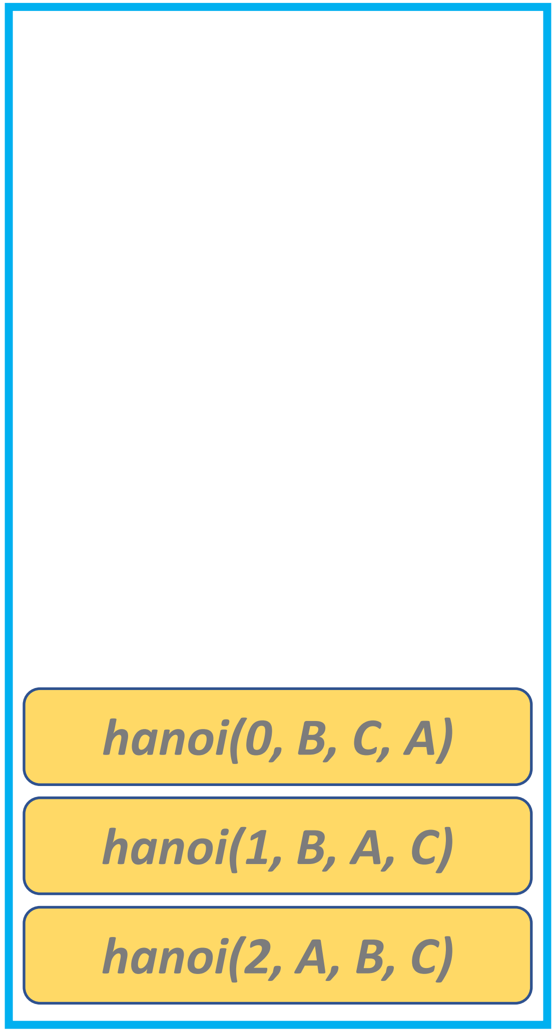

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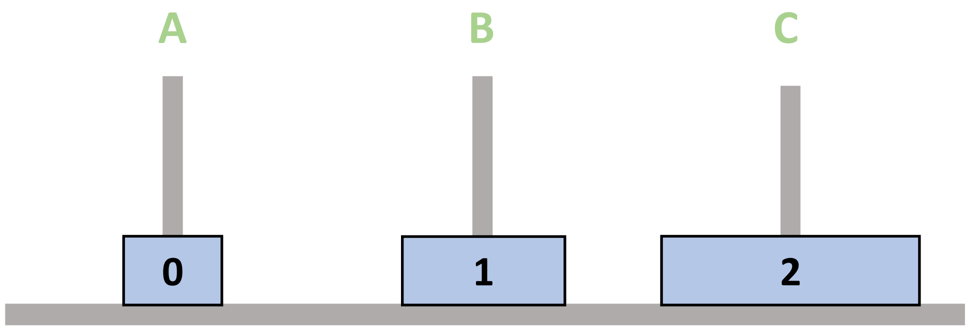
STACK

Towers of Hanoi



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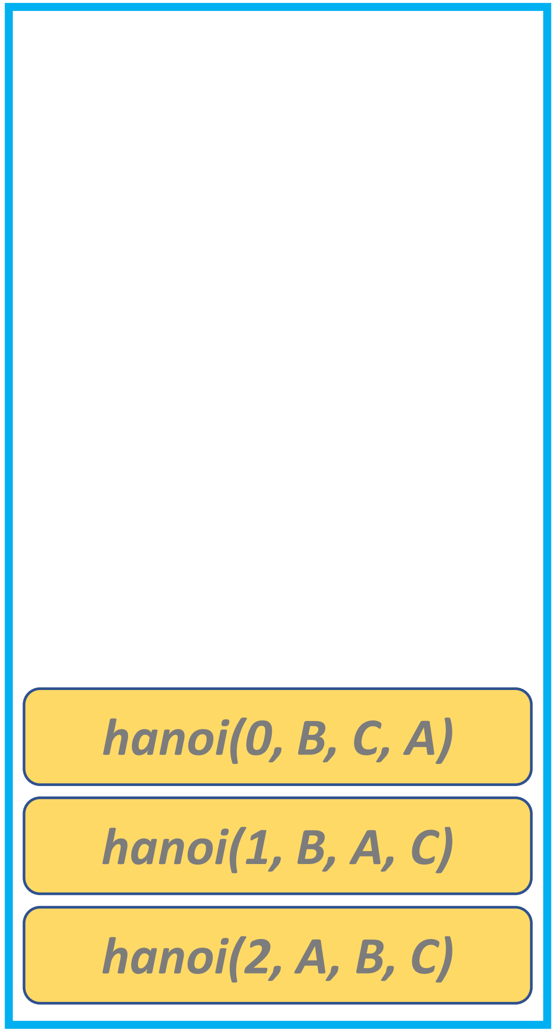

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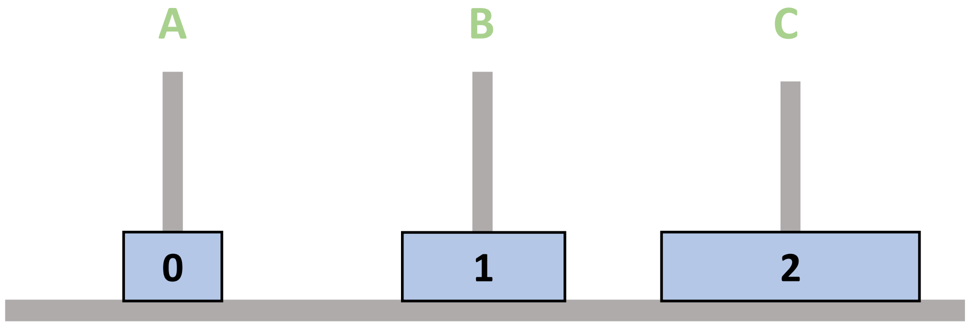
Towers of Hanoi



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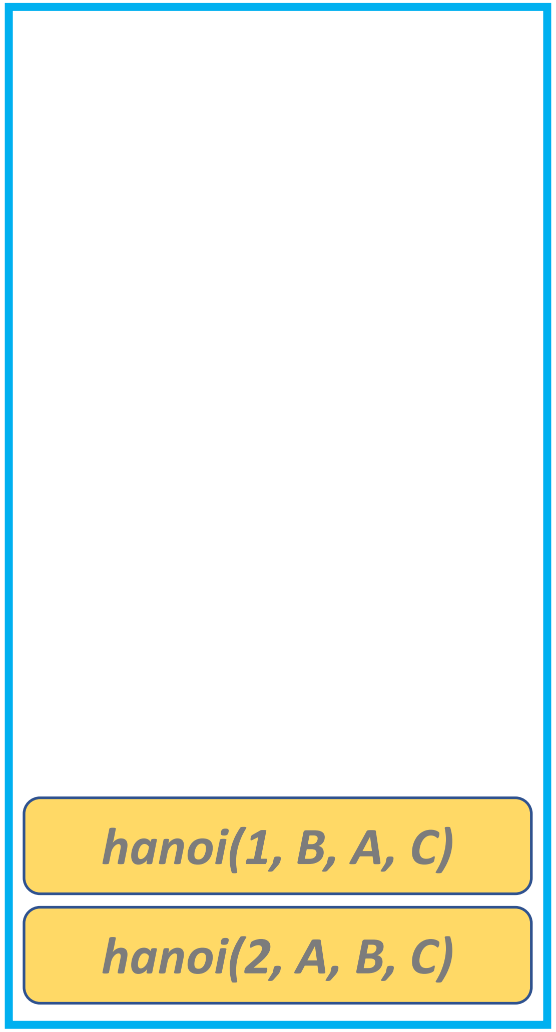
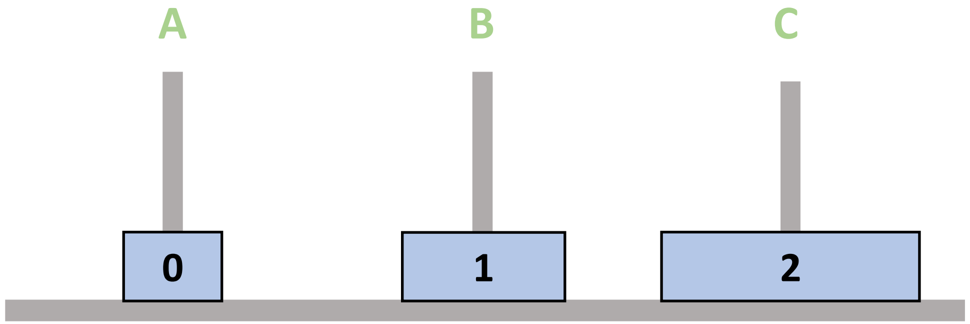


STACK

Towers of Hanoi



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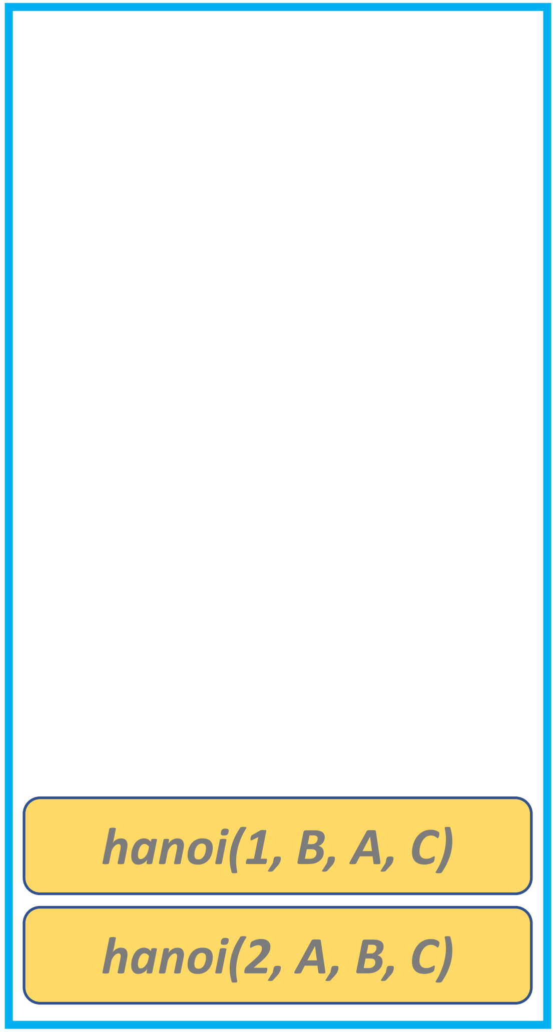
hanoi(1, B, A, C)

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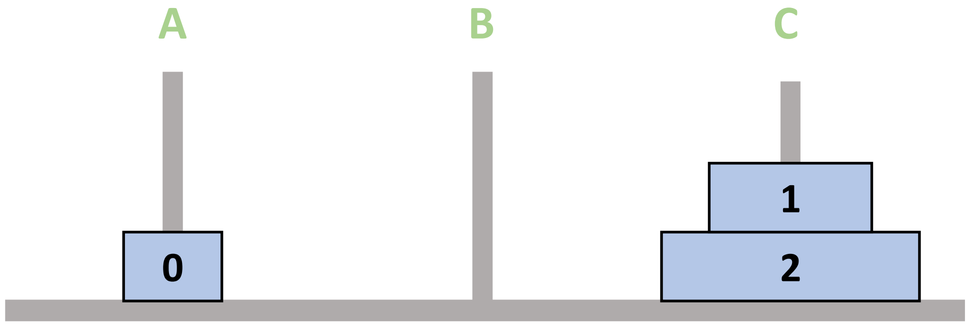
STACK

Towers of Hanoi



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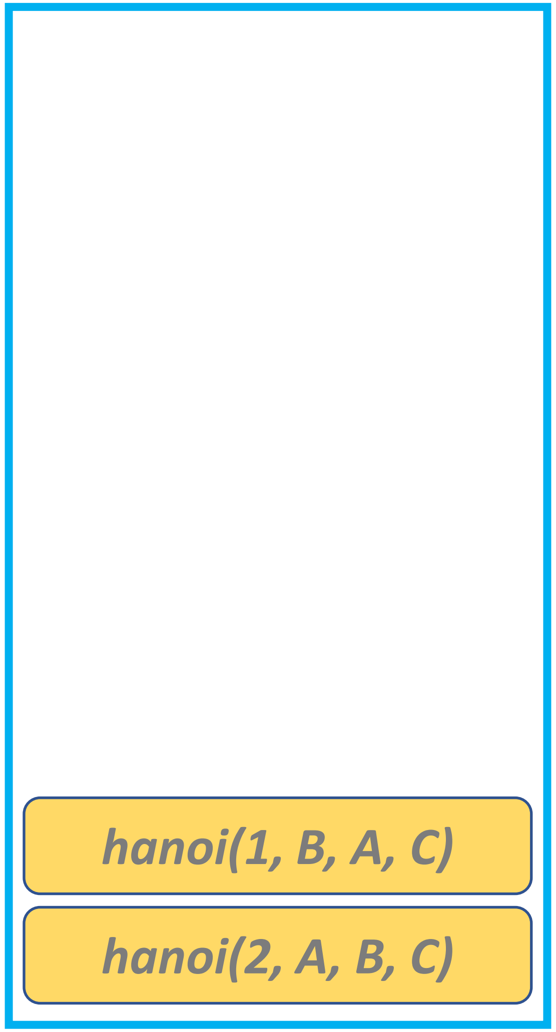

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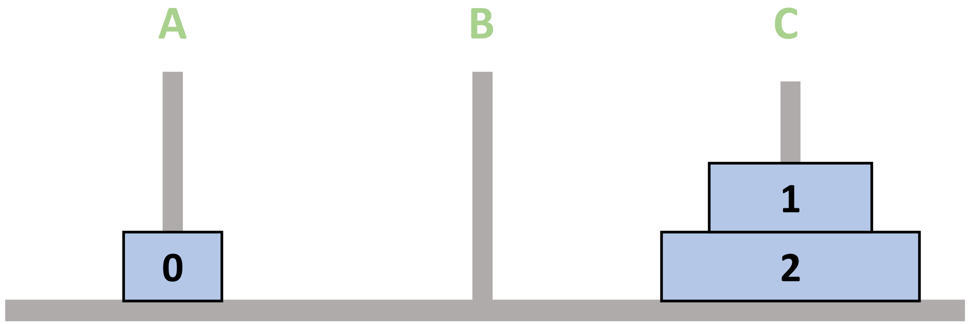
STACK

Towers of Hanoi



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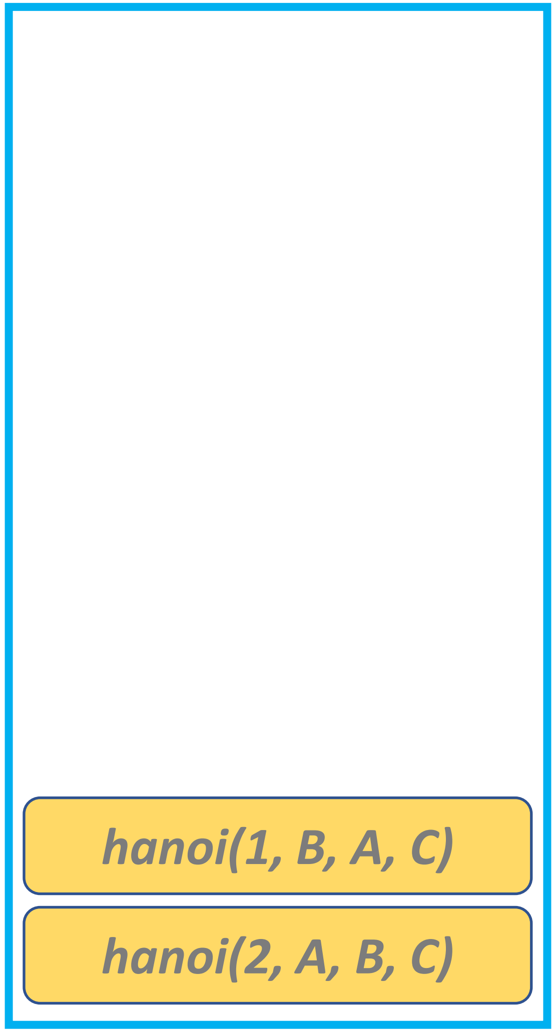

hanoi(1, B, A, C)

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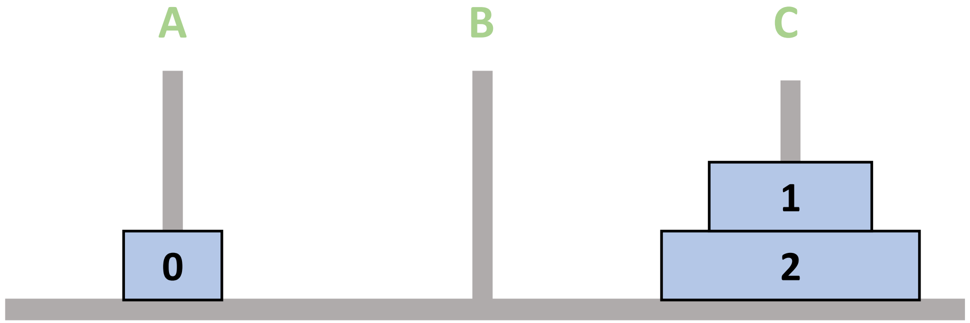
STACK

Towers of Hanoi



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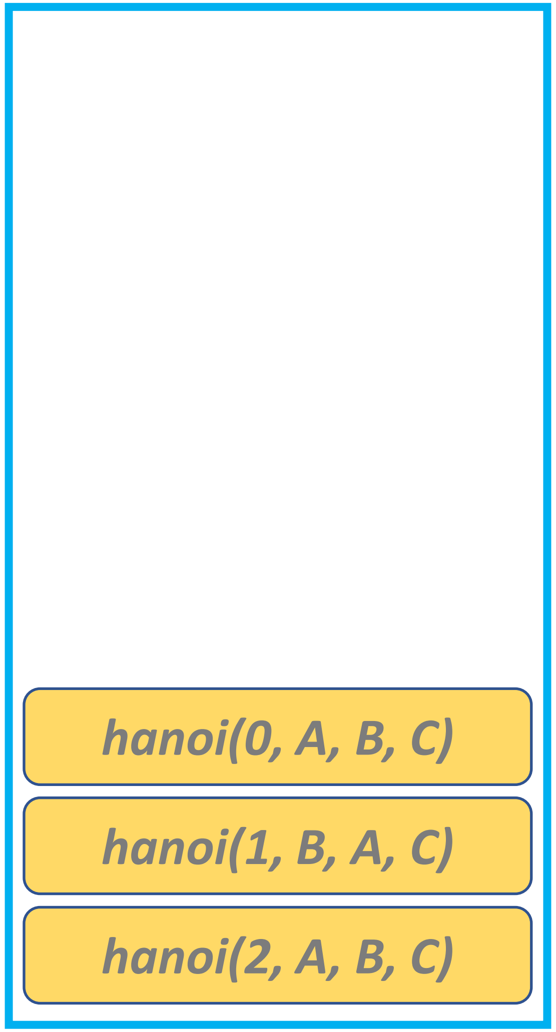
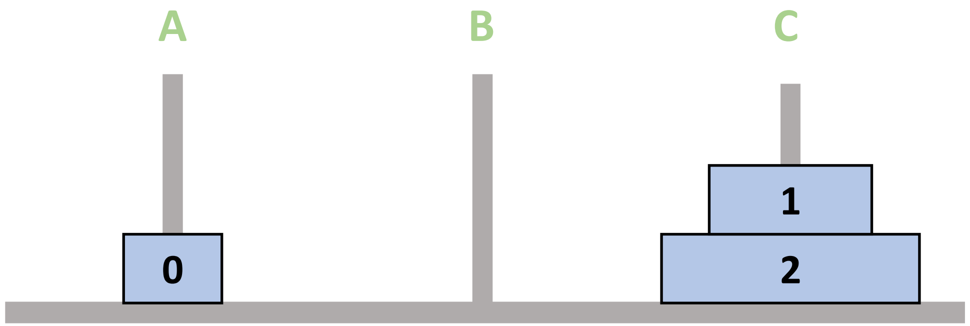


STACK

Towers of Hanoi



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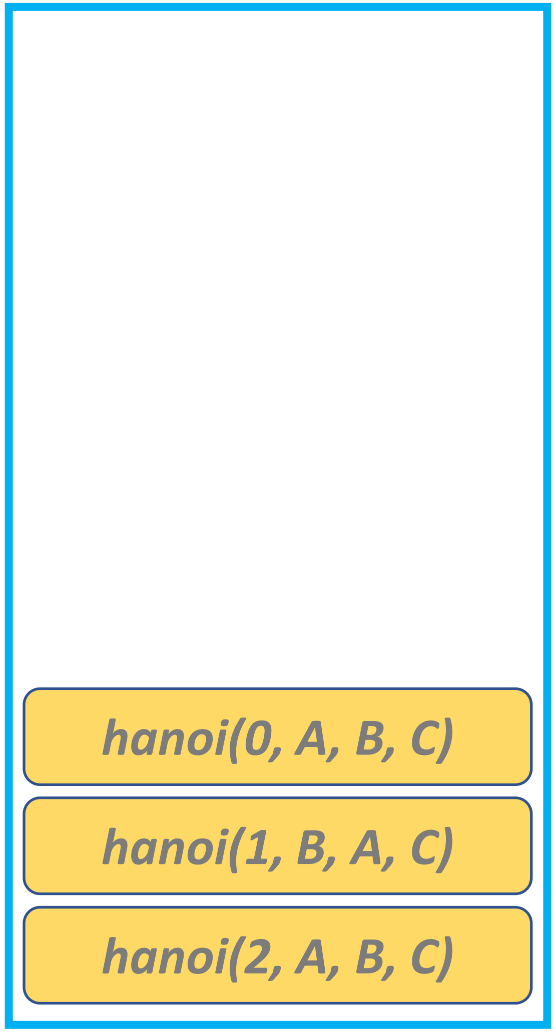


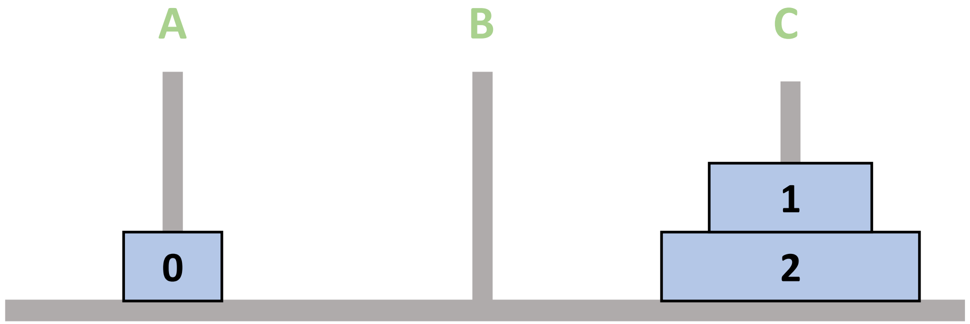
hanoi(0, A, B, C)

hanoi(1, B, A, C)

hanoi(2, A, B, C)

STACK

Towers of Hanoi



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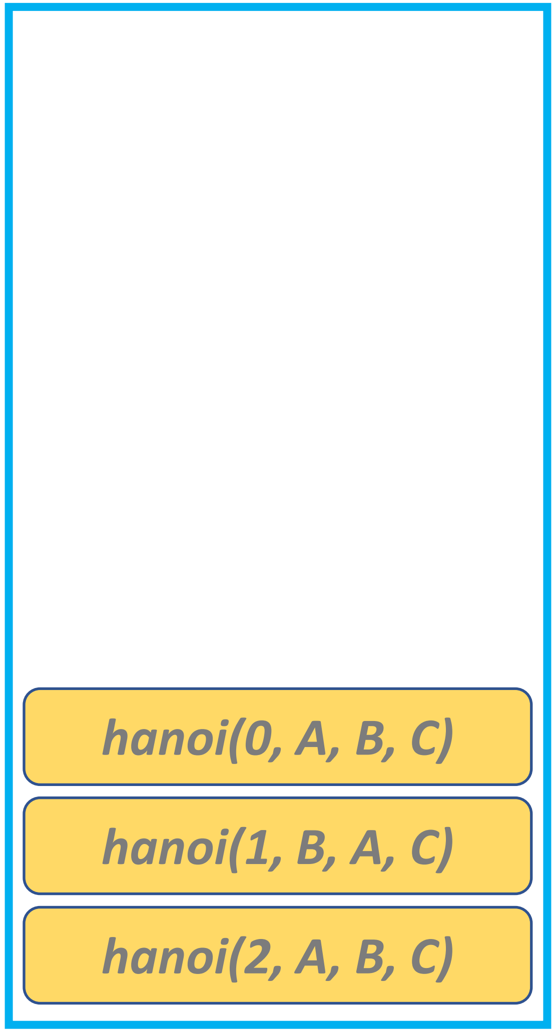

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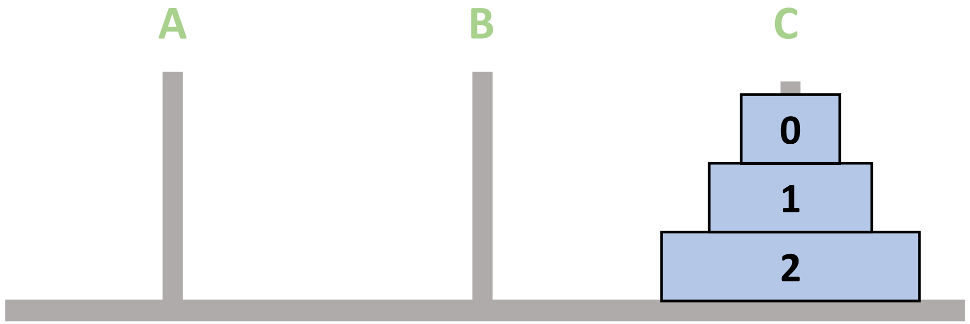
STACK

Towers of Hanoi



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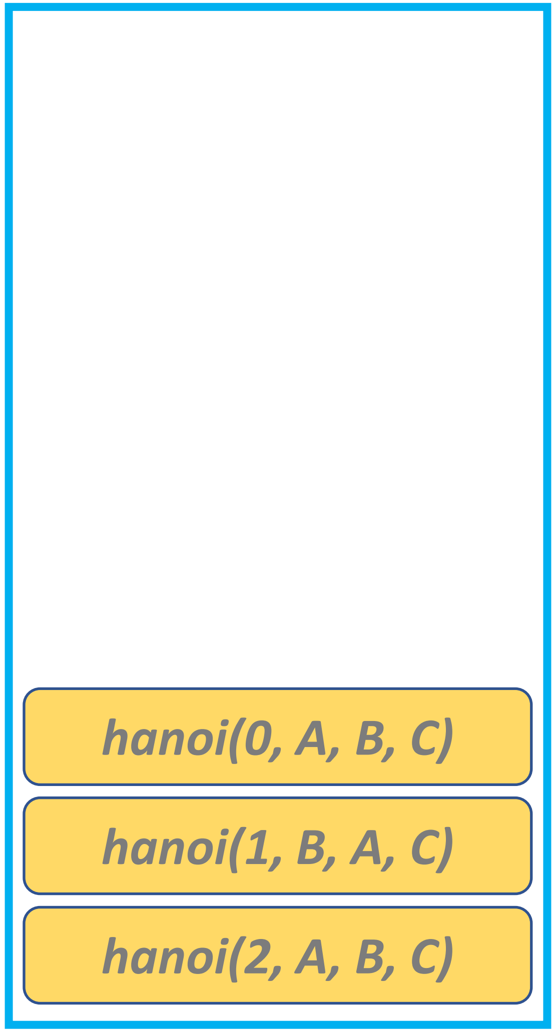

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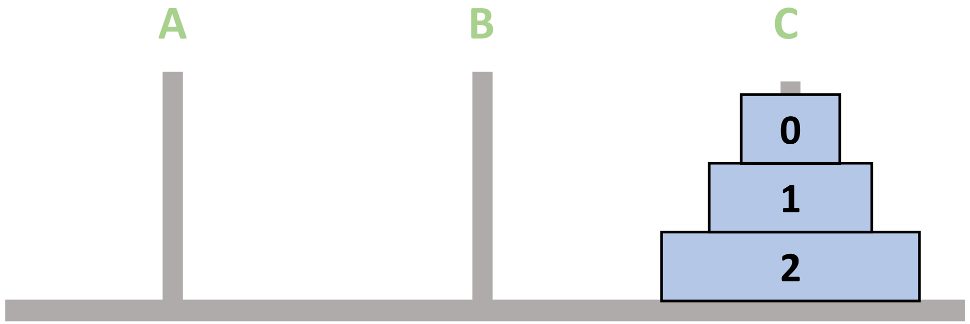
STACK

Towers of Hanoi



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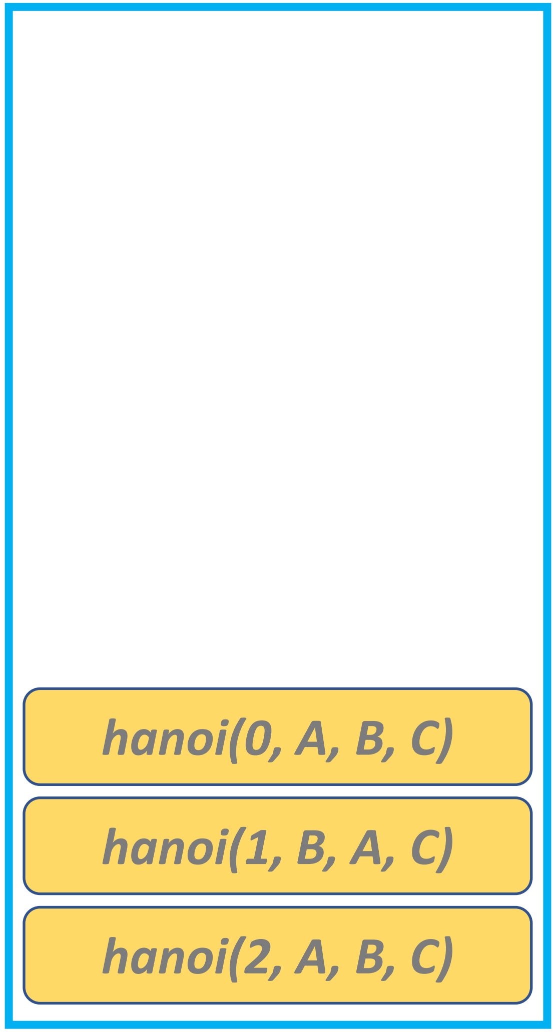
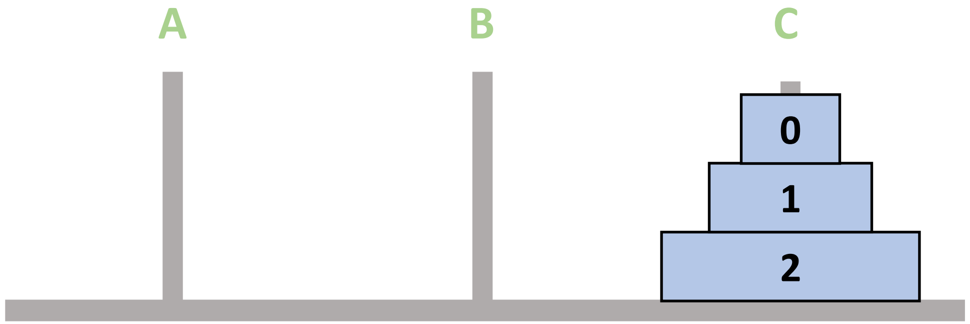


STACK

Towers of Hanoi



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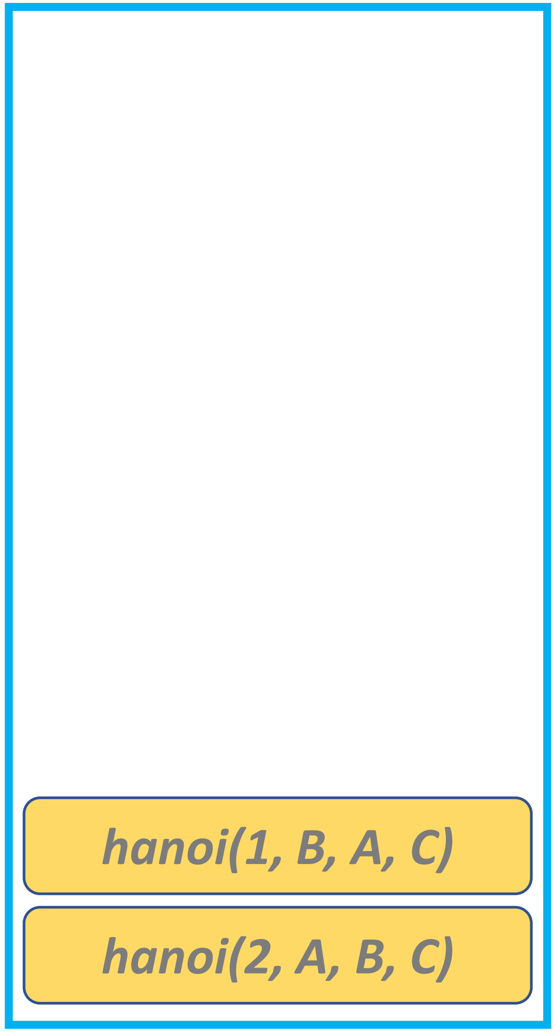
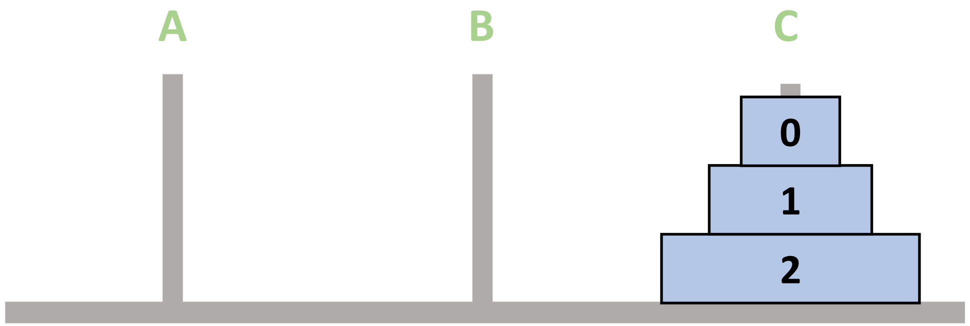


STACK

Towers of Hanoi



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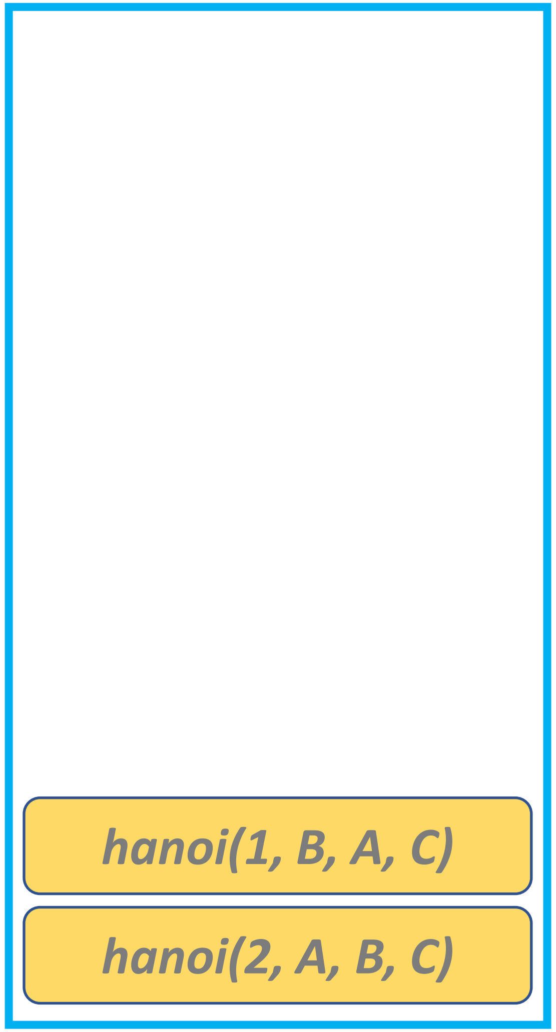
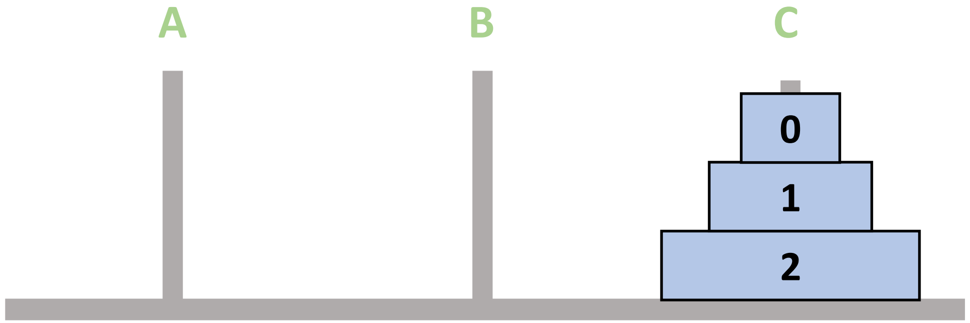


hanoi(1, B, A, C)

hanoi(2, A, B, C)

STACK

Towers of Hanoi



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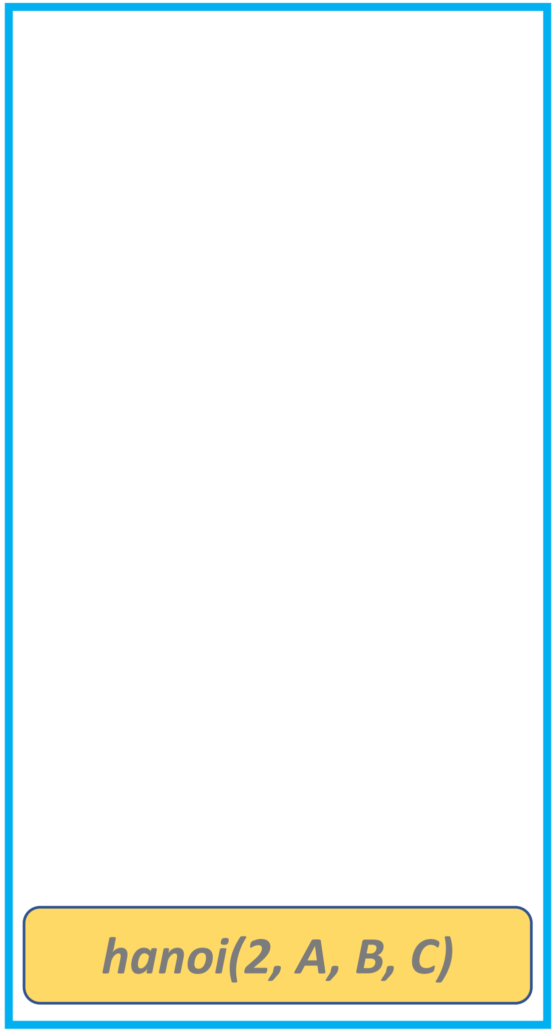
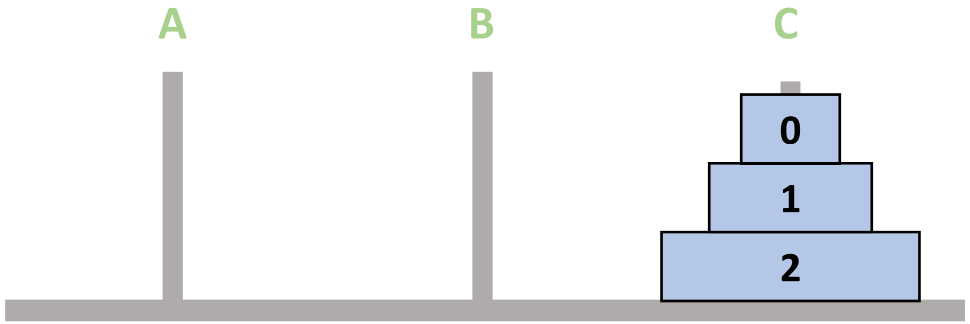


hanoi(2, A, B, C)

STACK

Towers of Hanoi



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STACK

Factorial Function

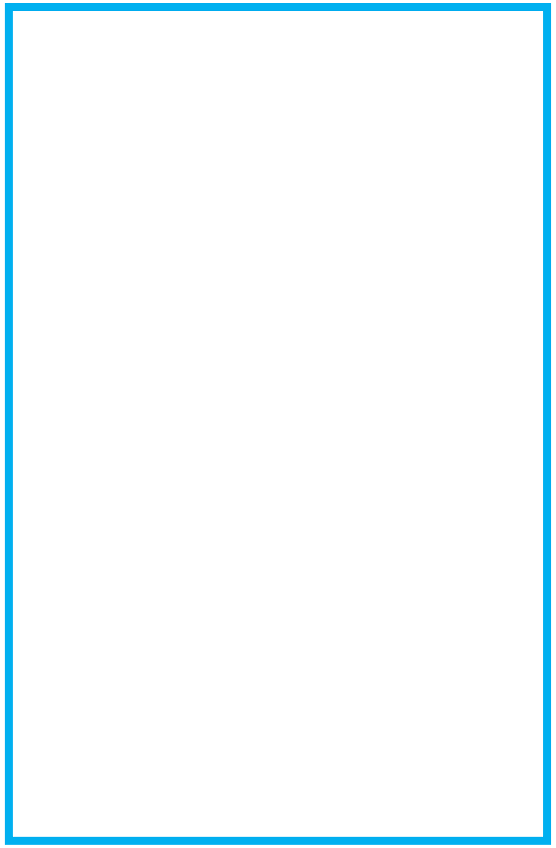
(Recursion Visualization)

Factorial Function

```
def factorial(n):

    if n==1:
        return 1

    res = factorial(n-1)
    result = n * res
    return result
```



STACK

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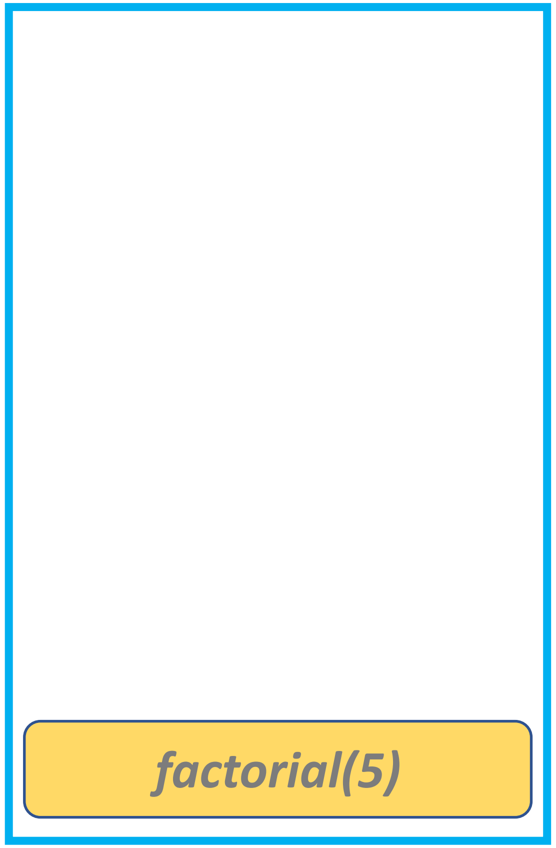

STACK

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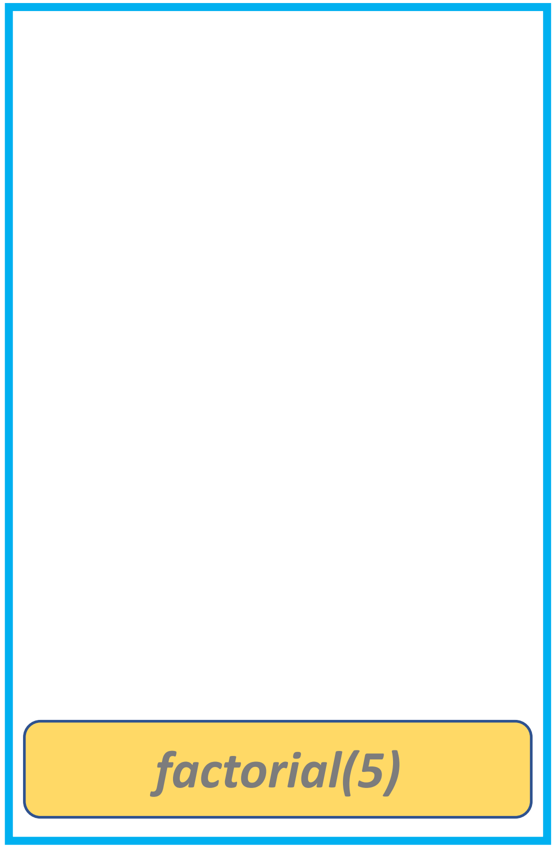

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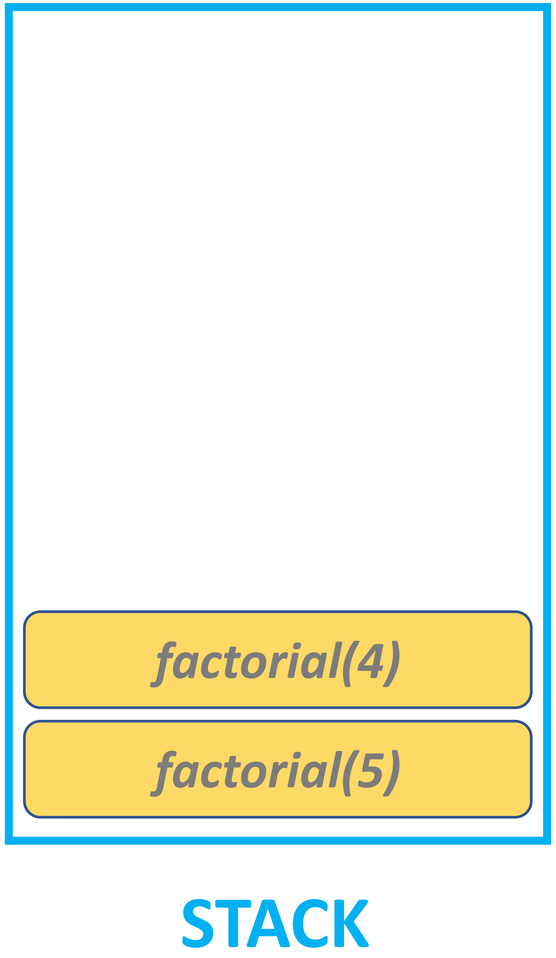

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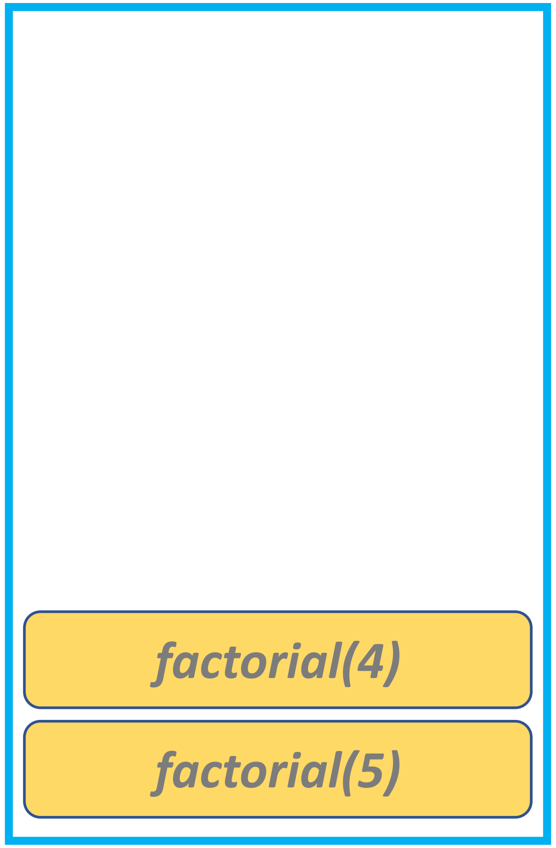

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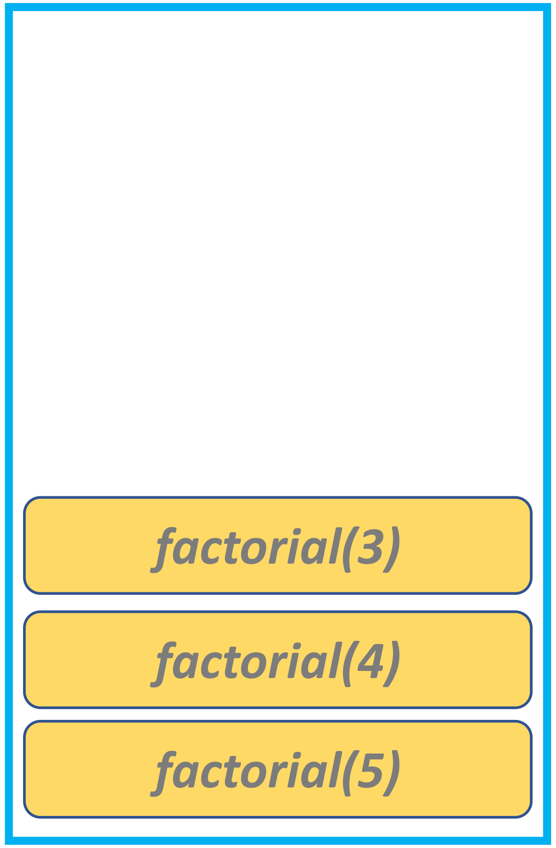

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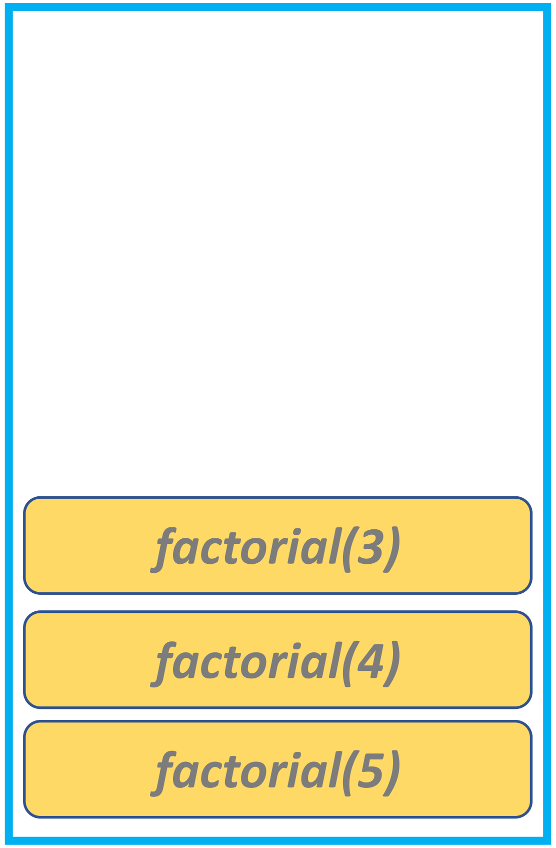

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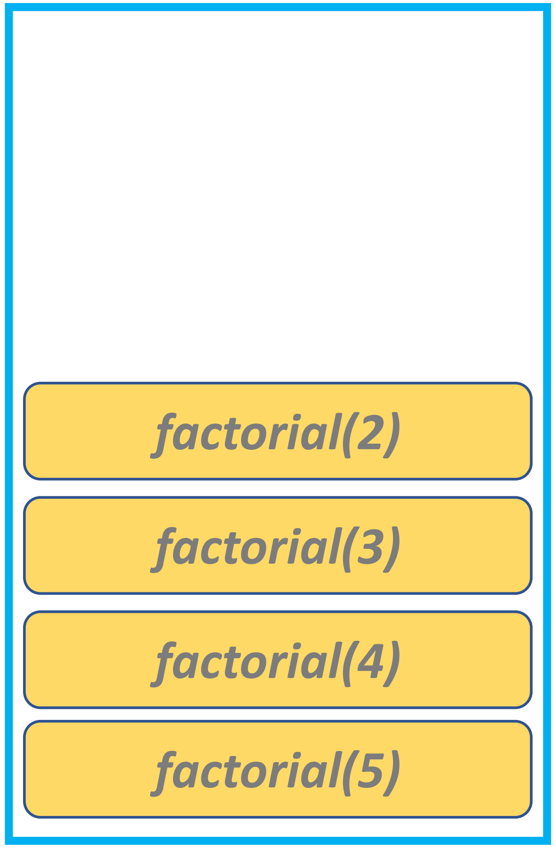

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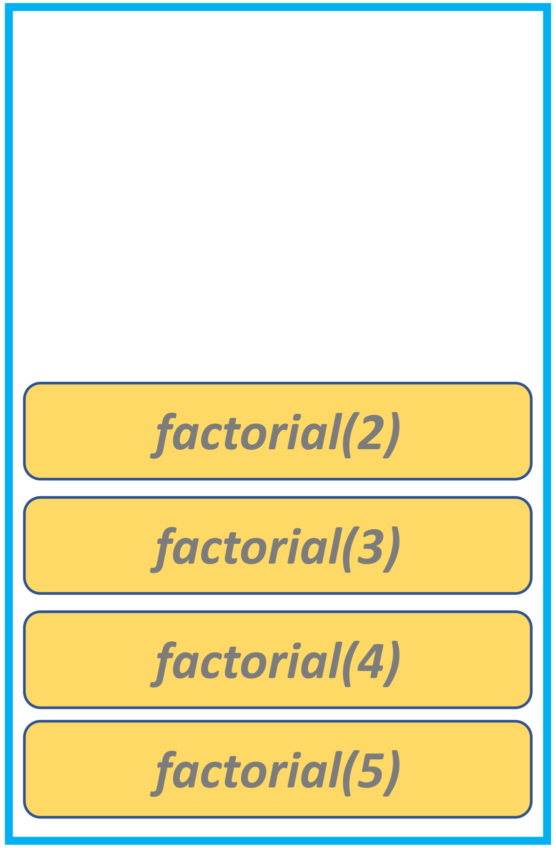

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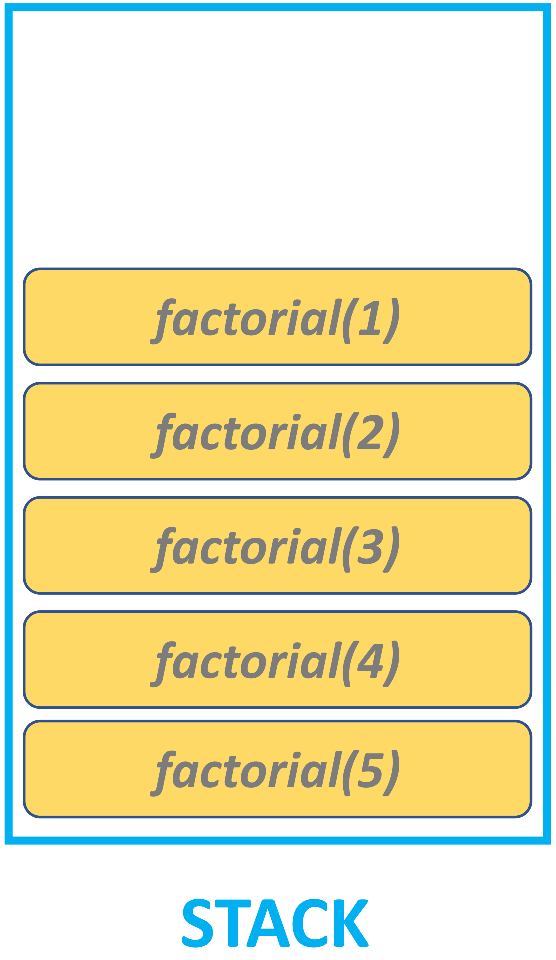

factorial(1)

factorial(2)

factorial(3)

factorial(4)

factorial(5)

STACK

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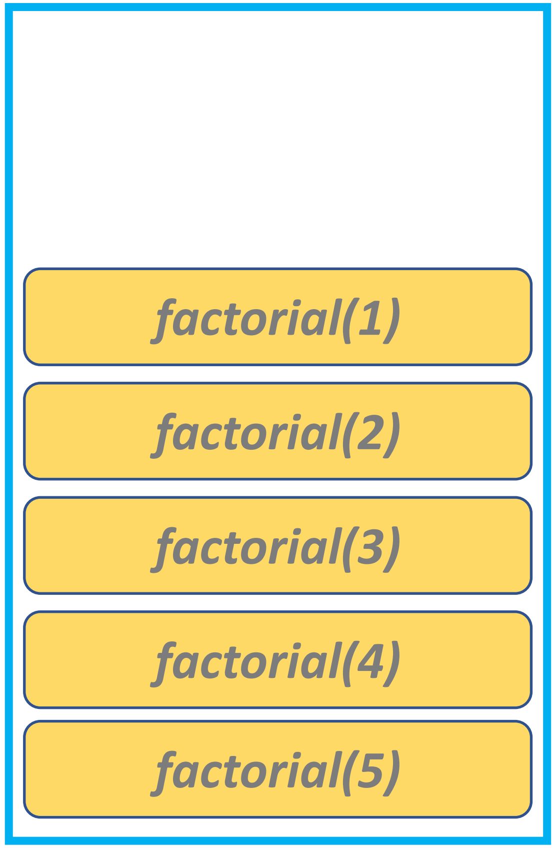

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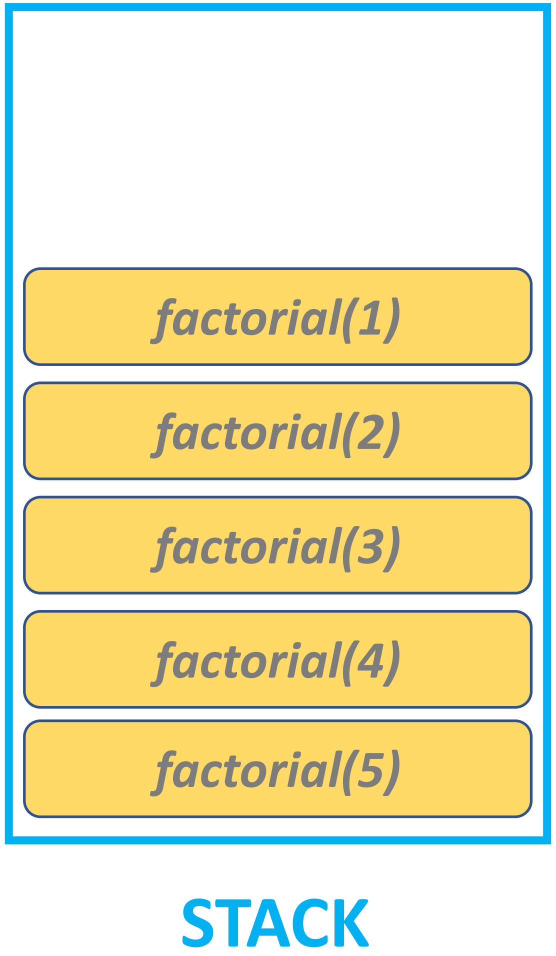

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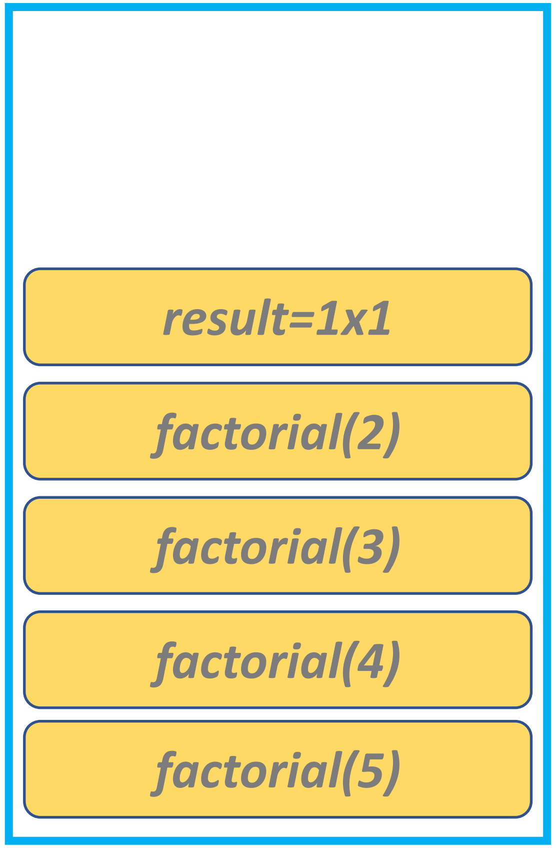

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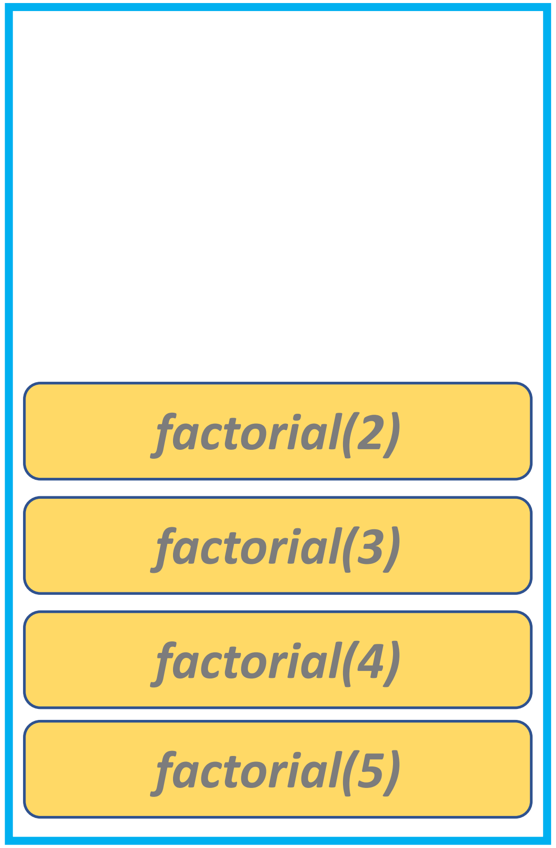

factorial(2)

factorial(3)

factorial(4)

factorial(5)

STACK

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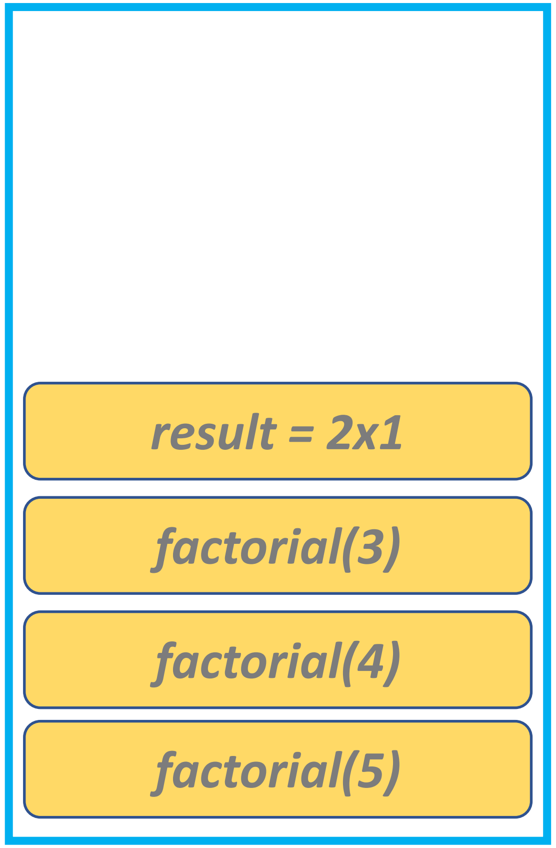

result = 2x1

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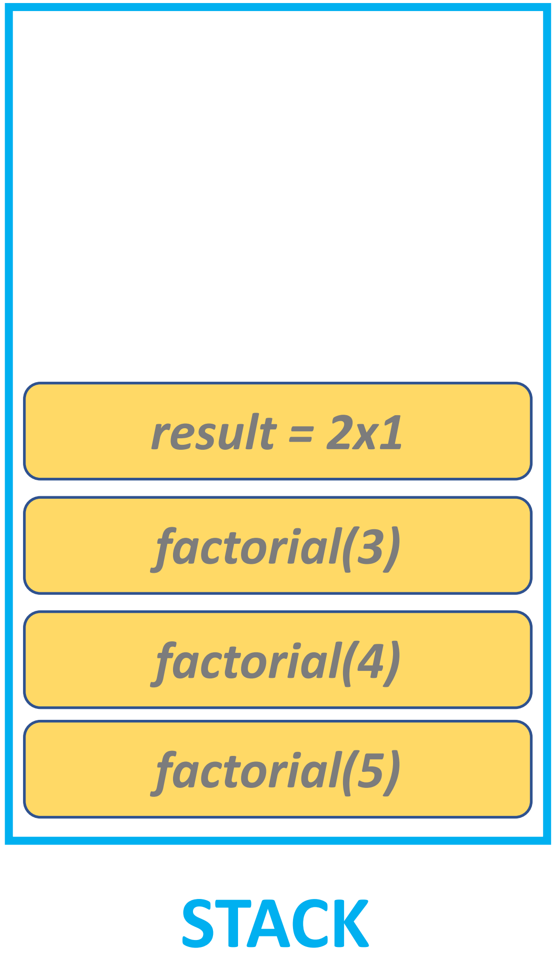

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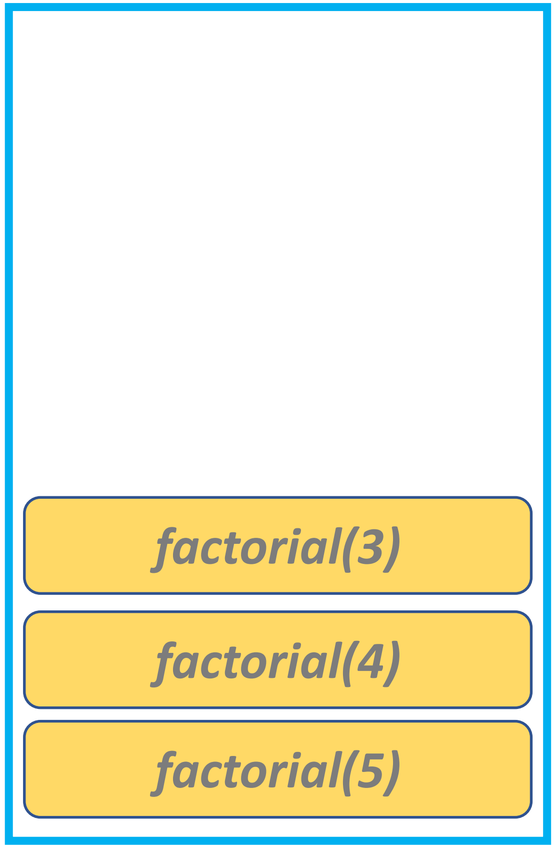

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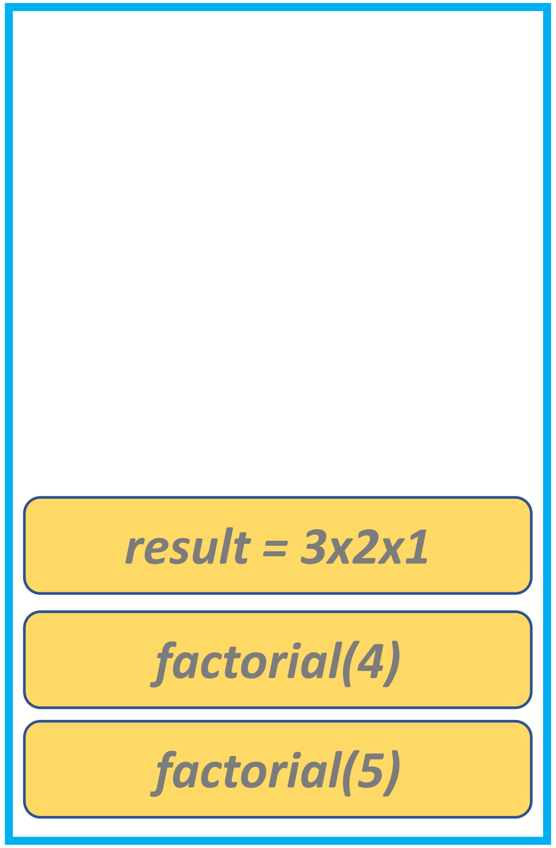

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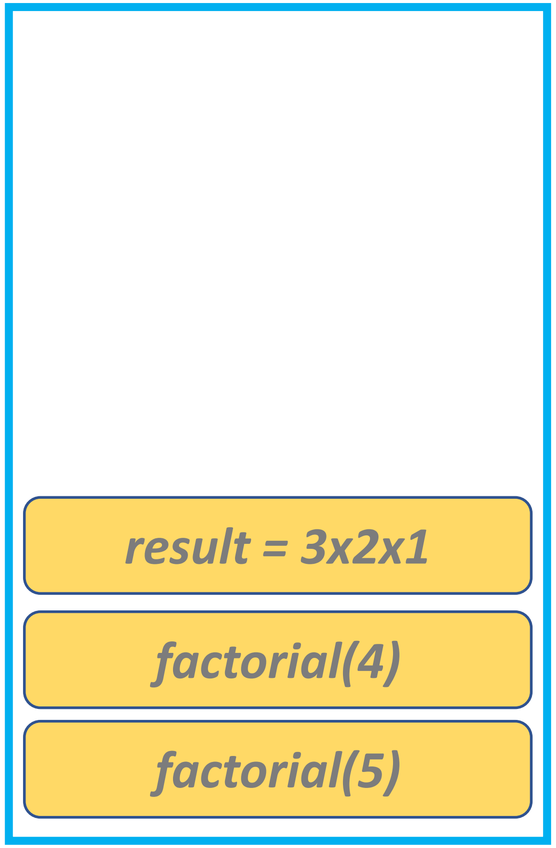

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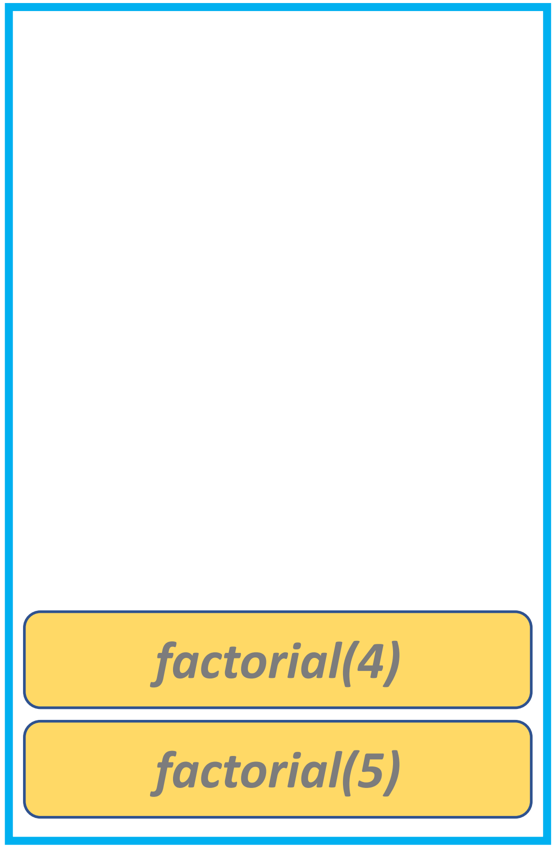

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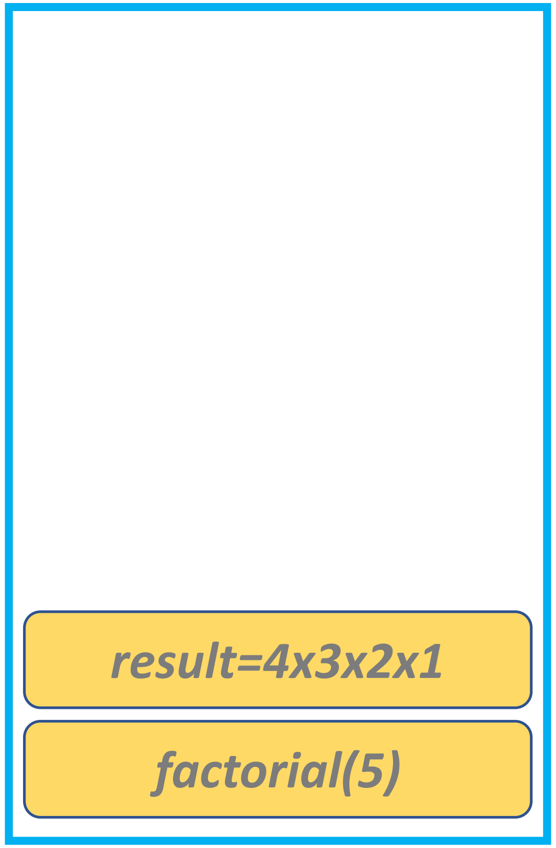

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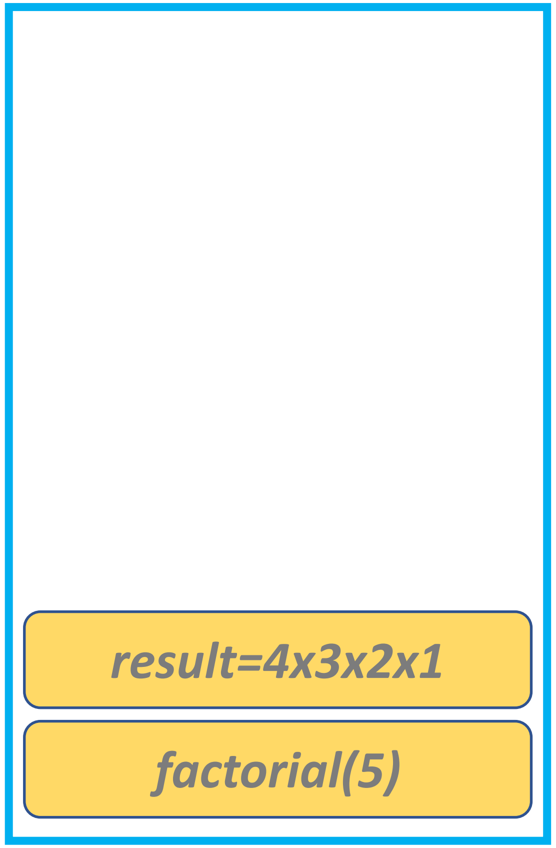

result=4x3x2x1

factorial(5)

STACK

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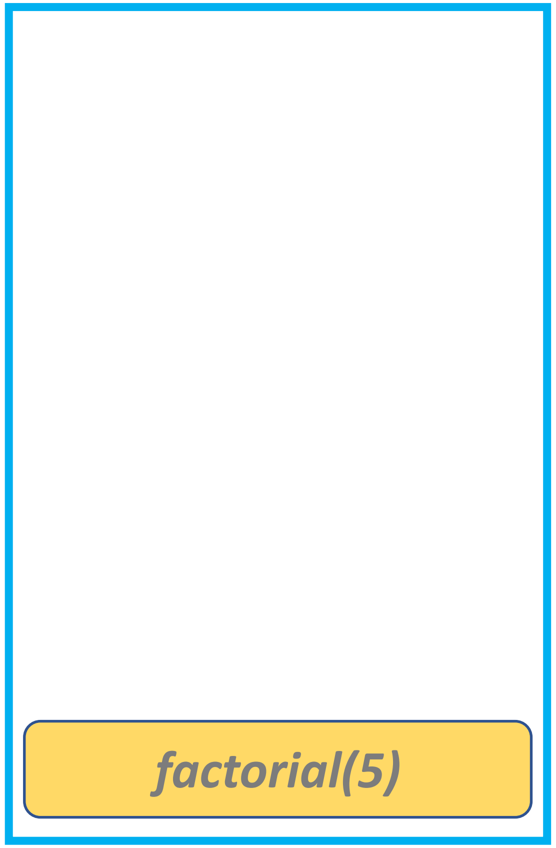

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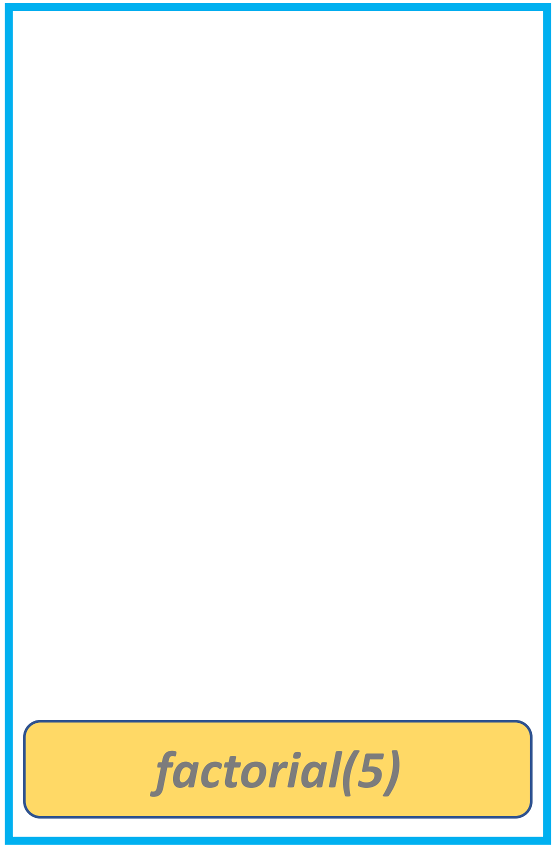

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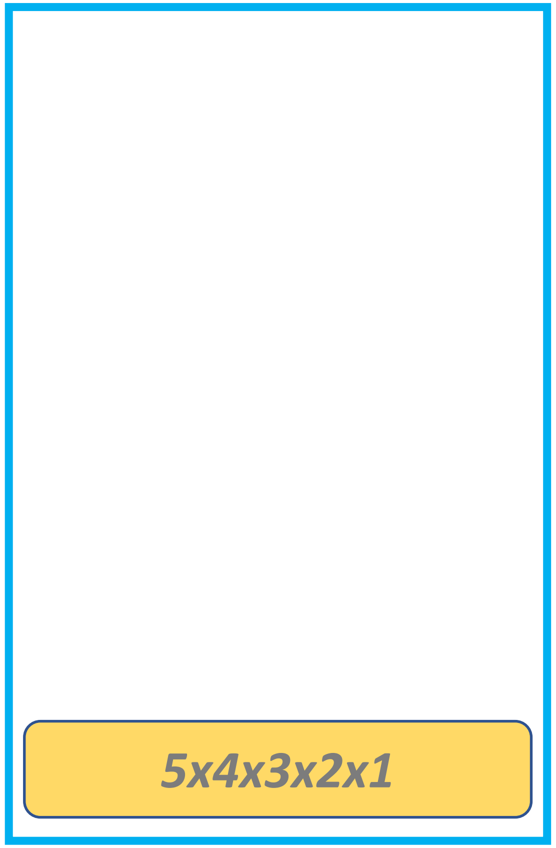

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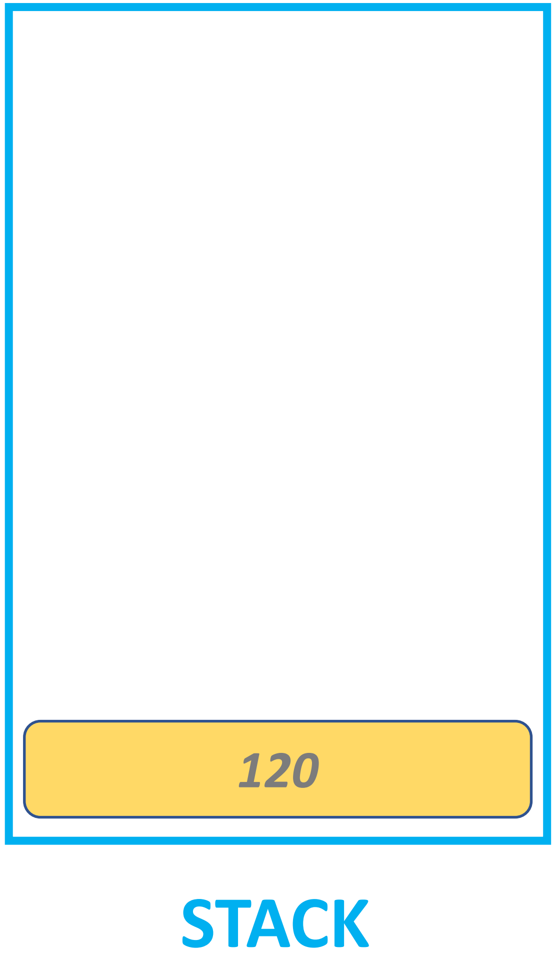

120

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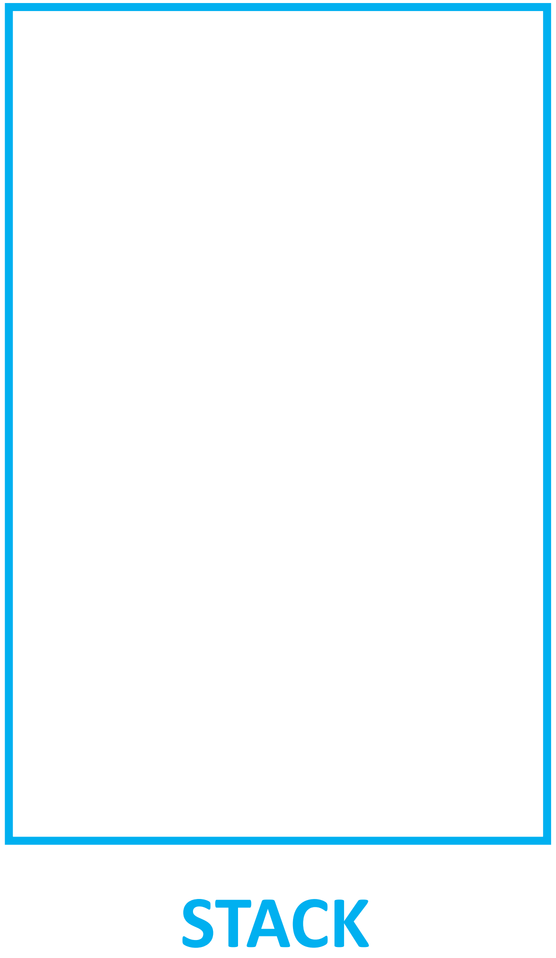

Search Algorithms

(Linear Search)

Linear Search

- **linear search** (sequential search) is a method for finding an item (element) in an unsorted list
- the algorithm makes **N** comparisons in worst-case
- hence the running time complexity is **O(N)** linear
- not that practical as we can achieve **O(logN)** or even **O(1)** running time with binary search and hash-tables

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if we want to find an unknown item in a one-dimensional array (linear search)

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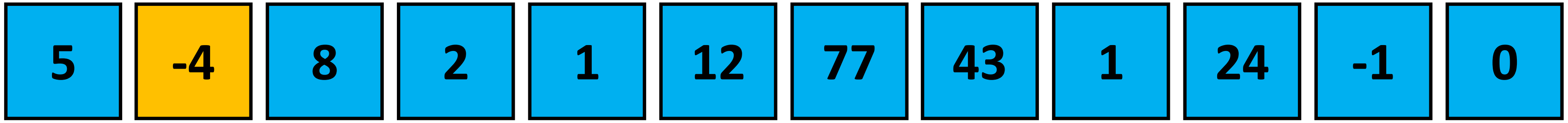

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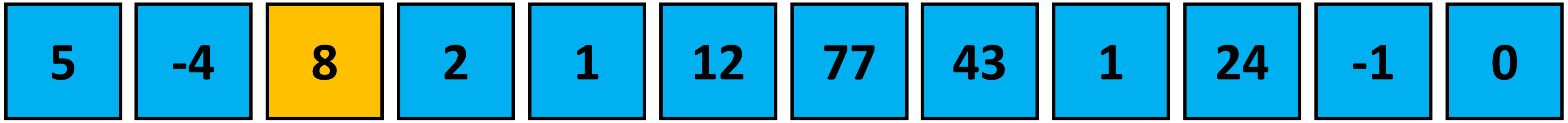

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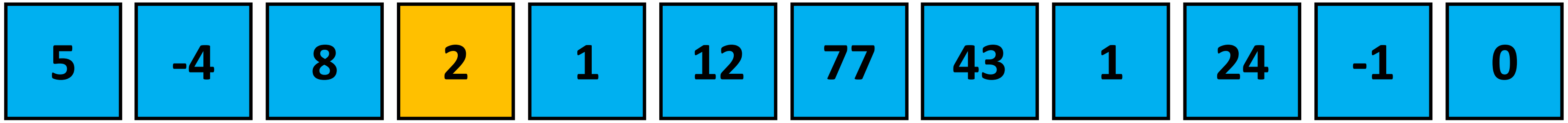

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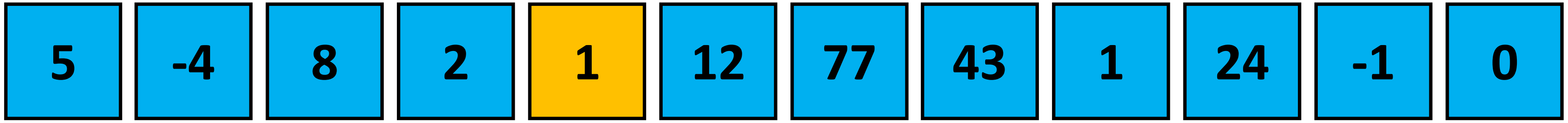

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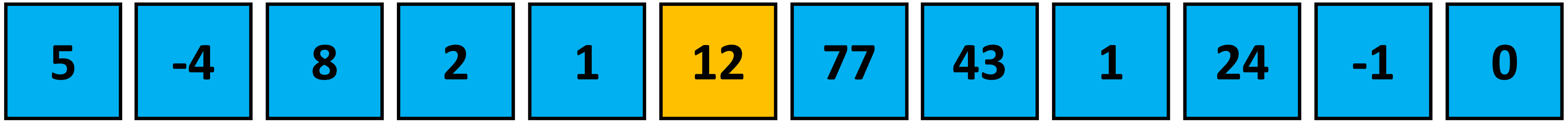

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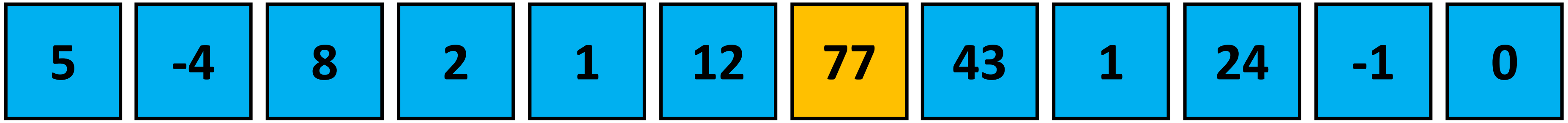

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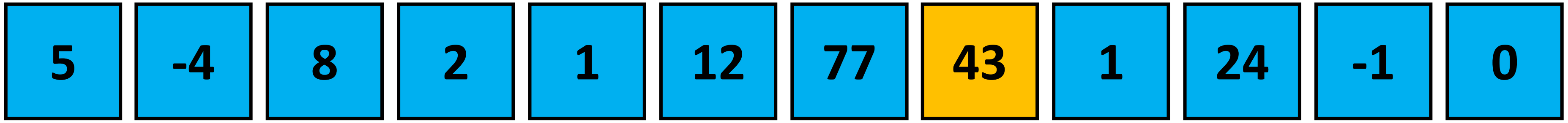

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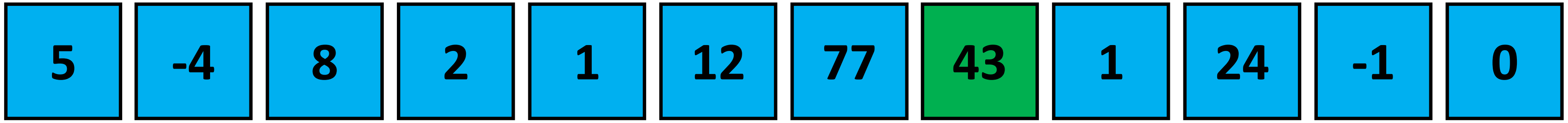

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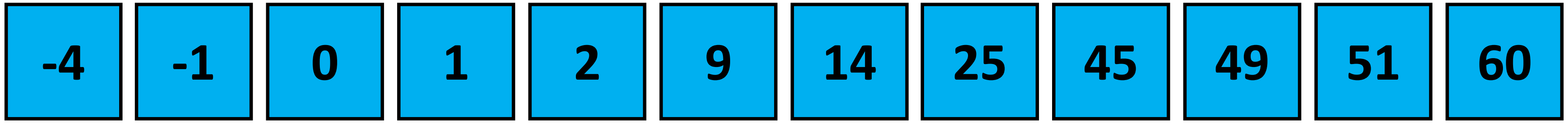

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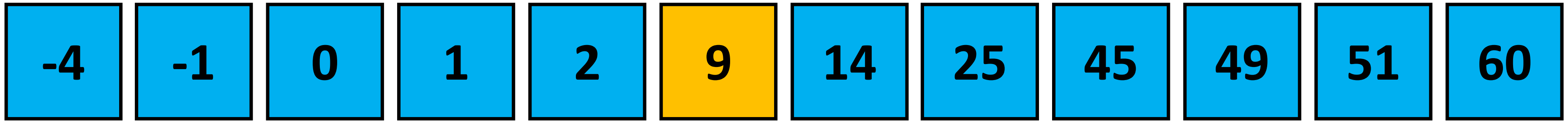

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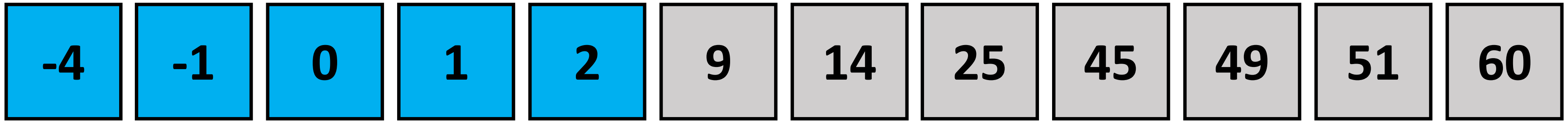

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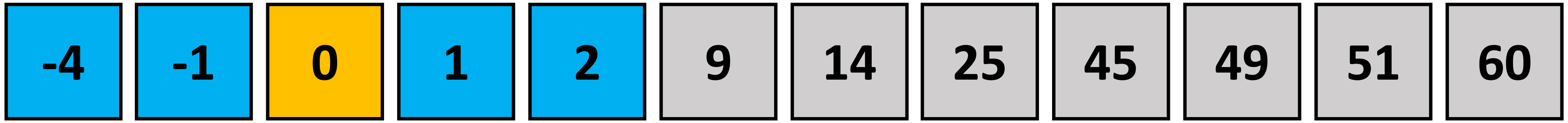

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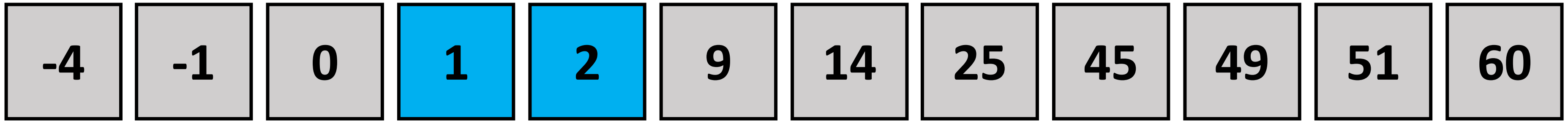

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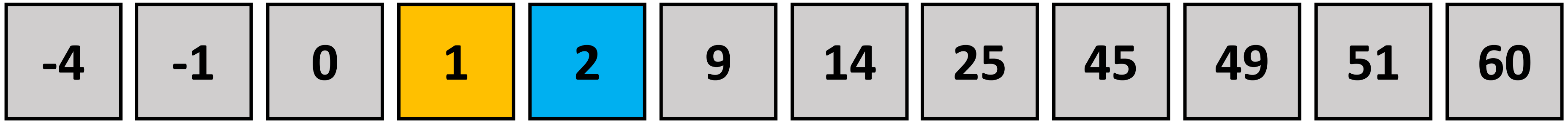

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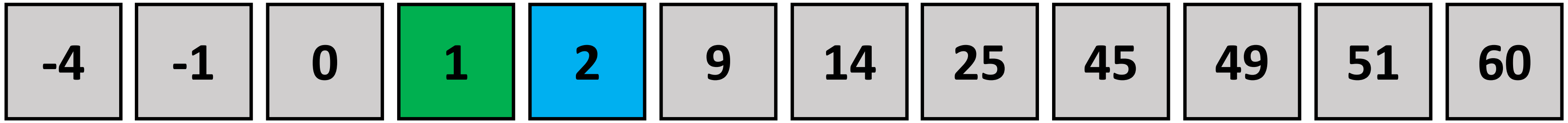

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