CS 61A Lecture 9

Friday, September 16

The Sequence Abstraction

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The sequence abstraction is shared among several types.

Tuples are Sequences

(Demo)

Box-and-Pointer Notation for Nested Pairs

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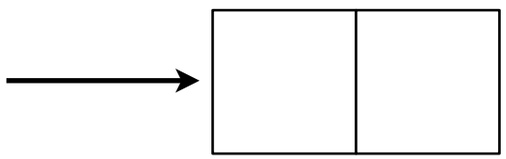

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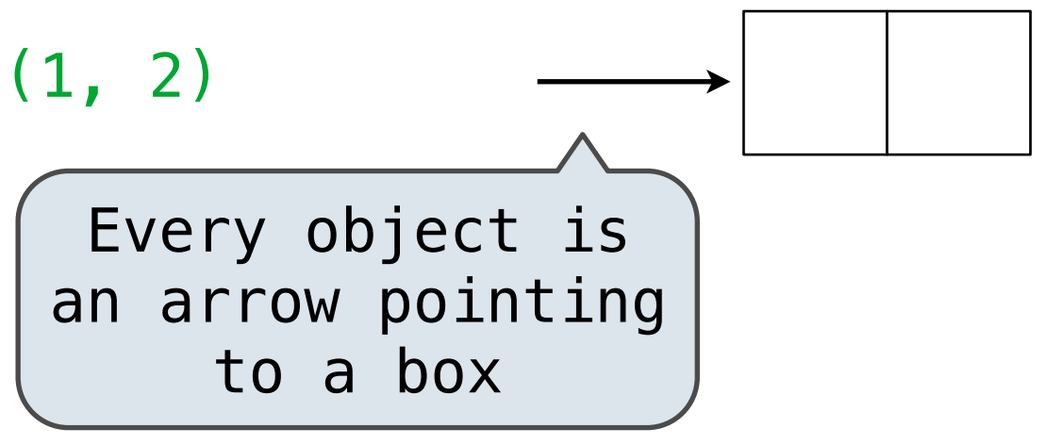

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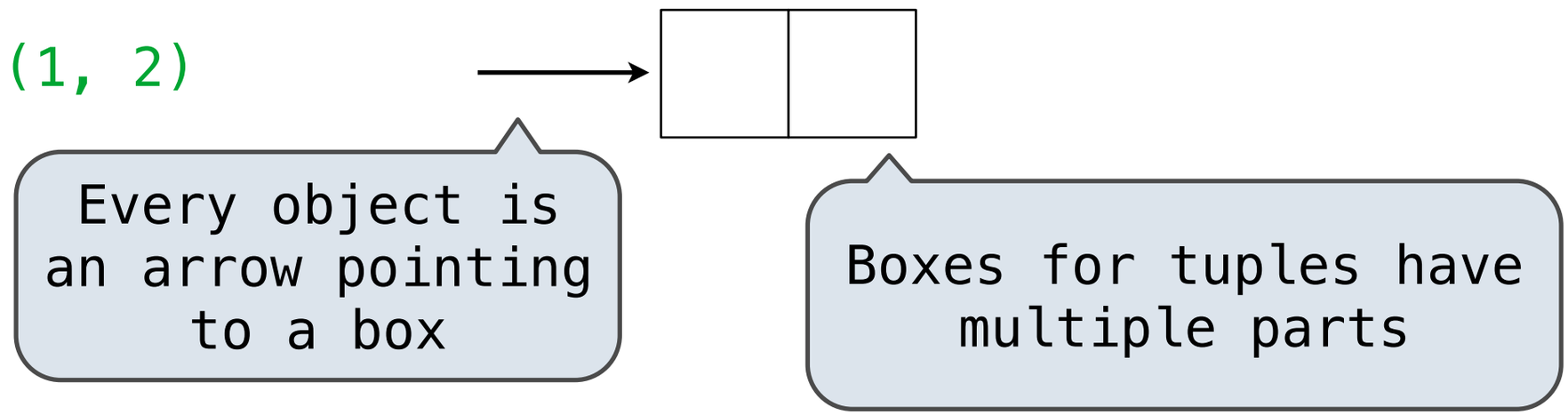

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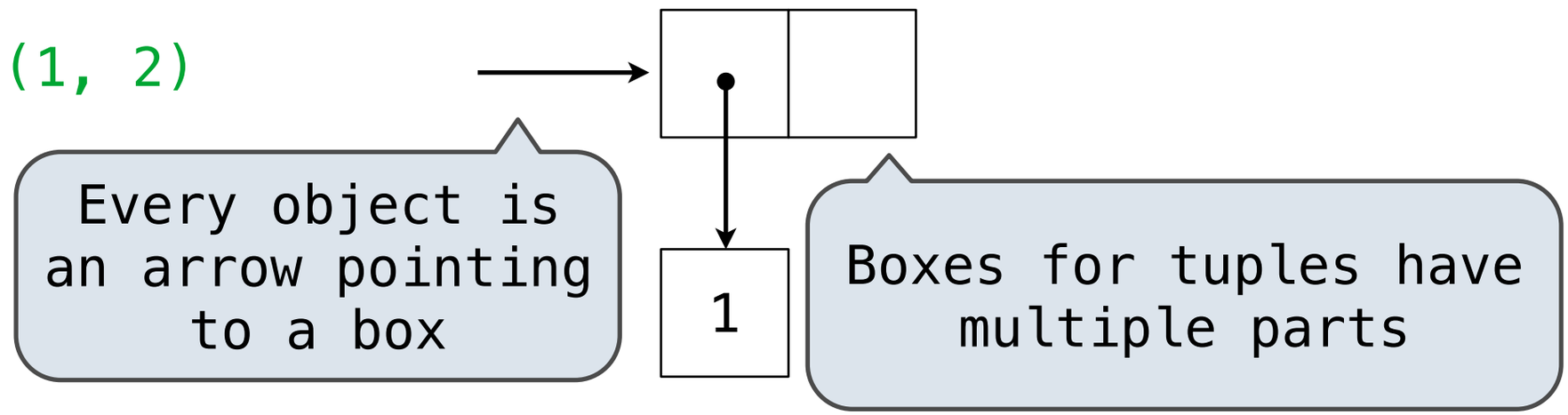

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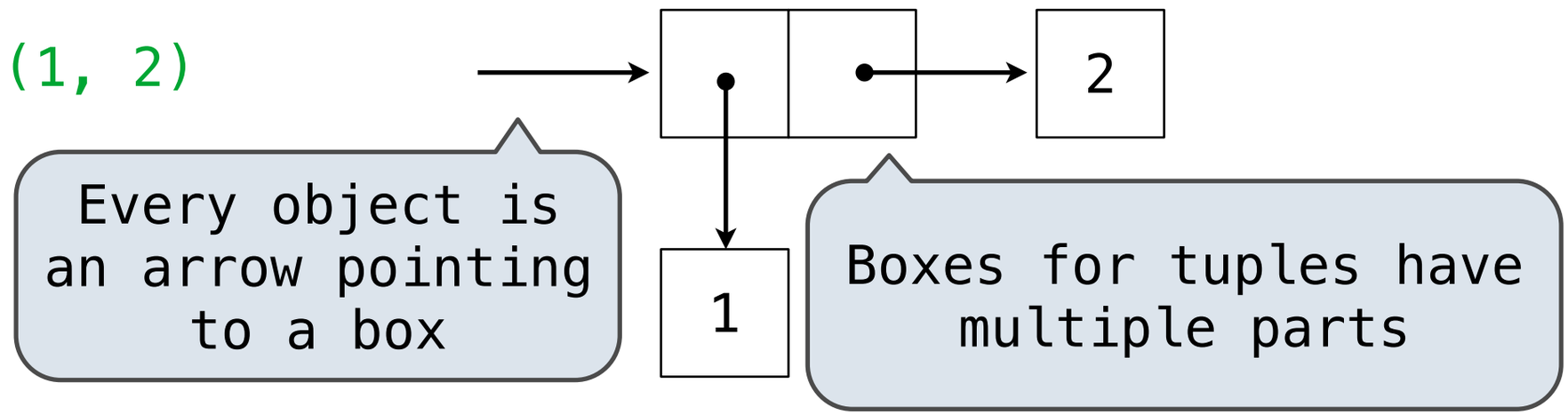

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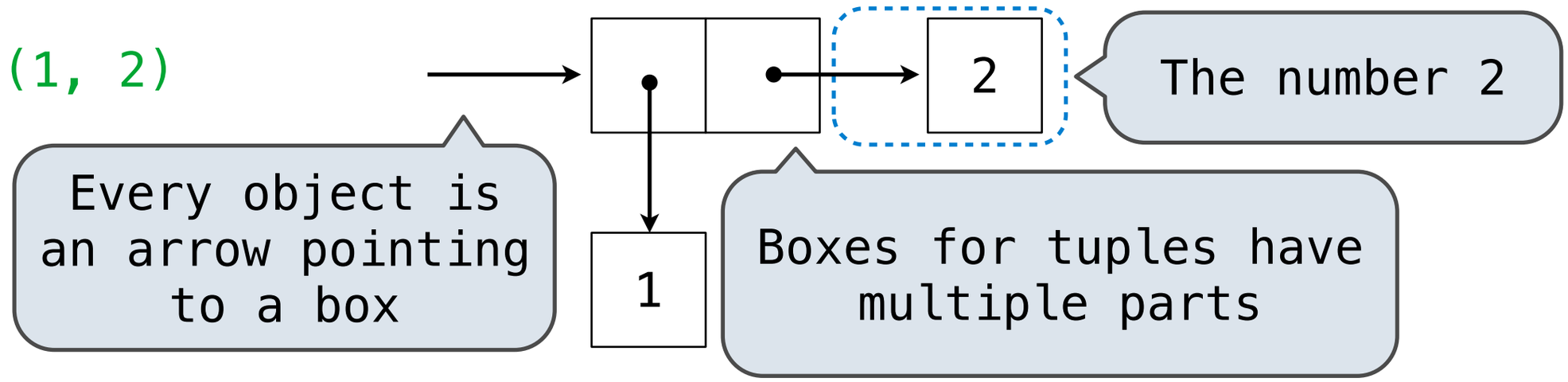

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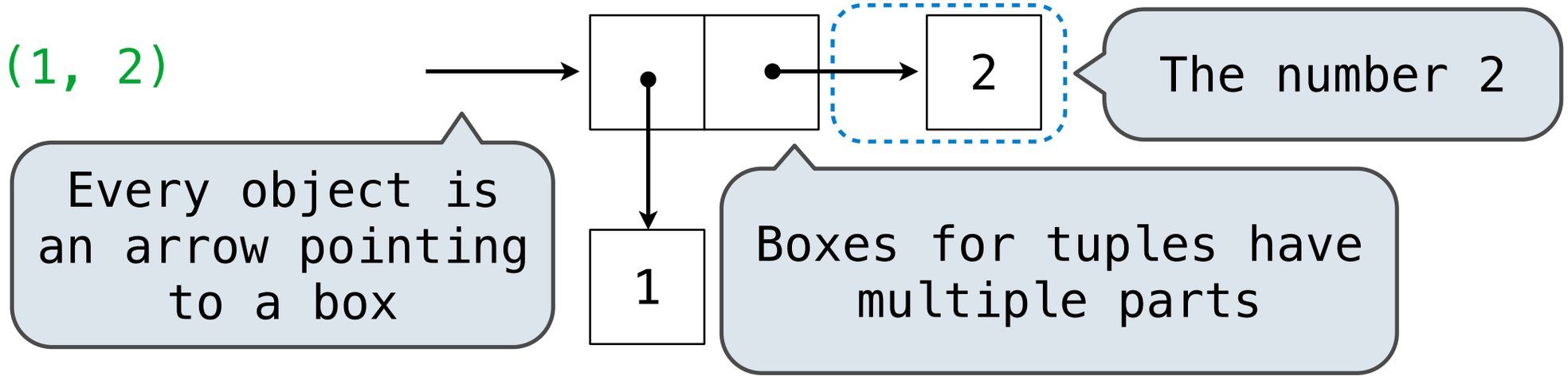


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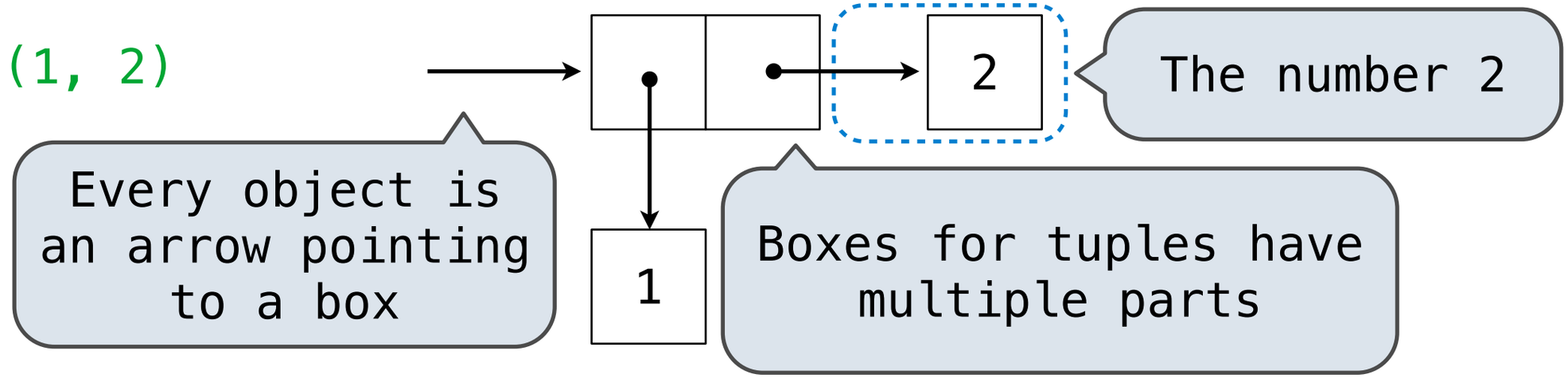

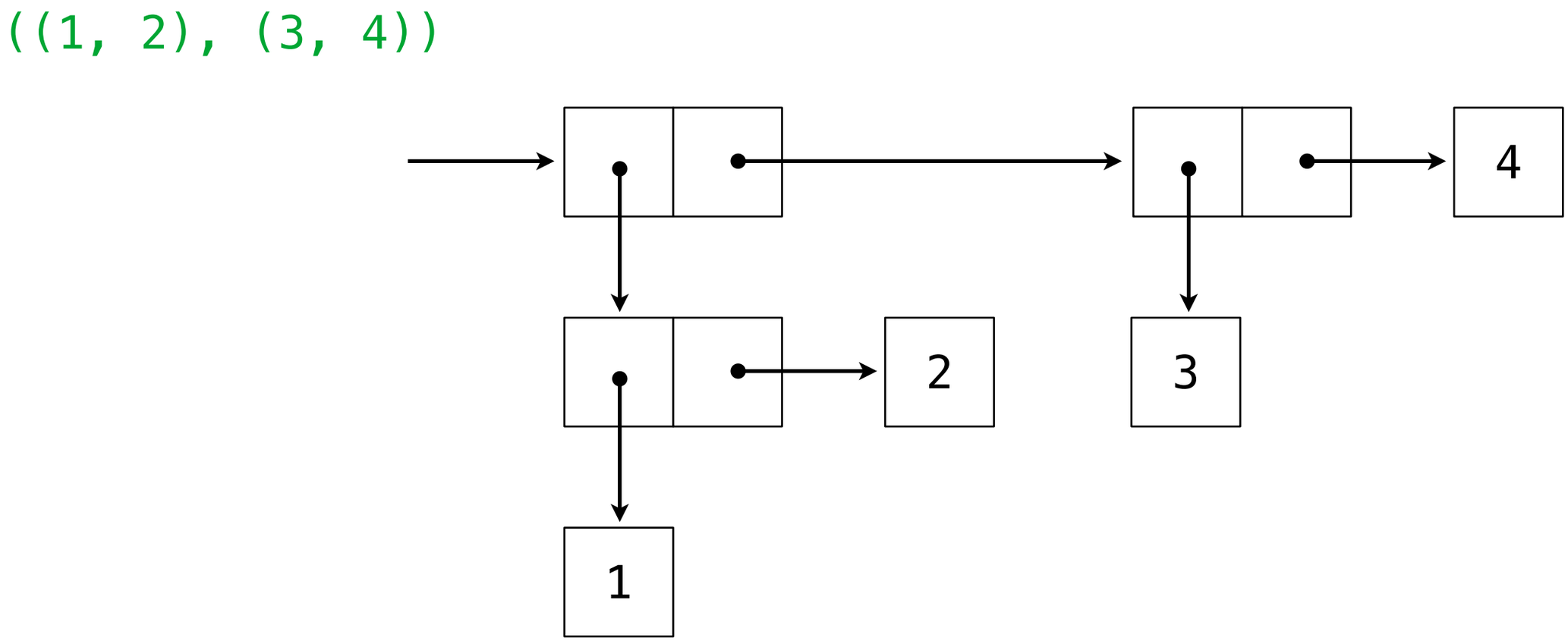

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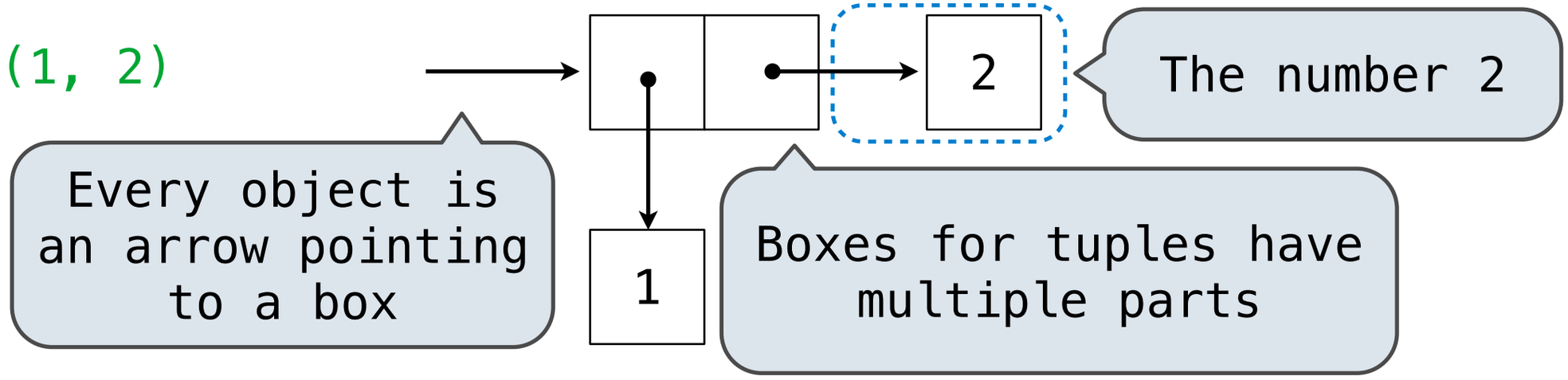

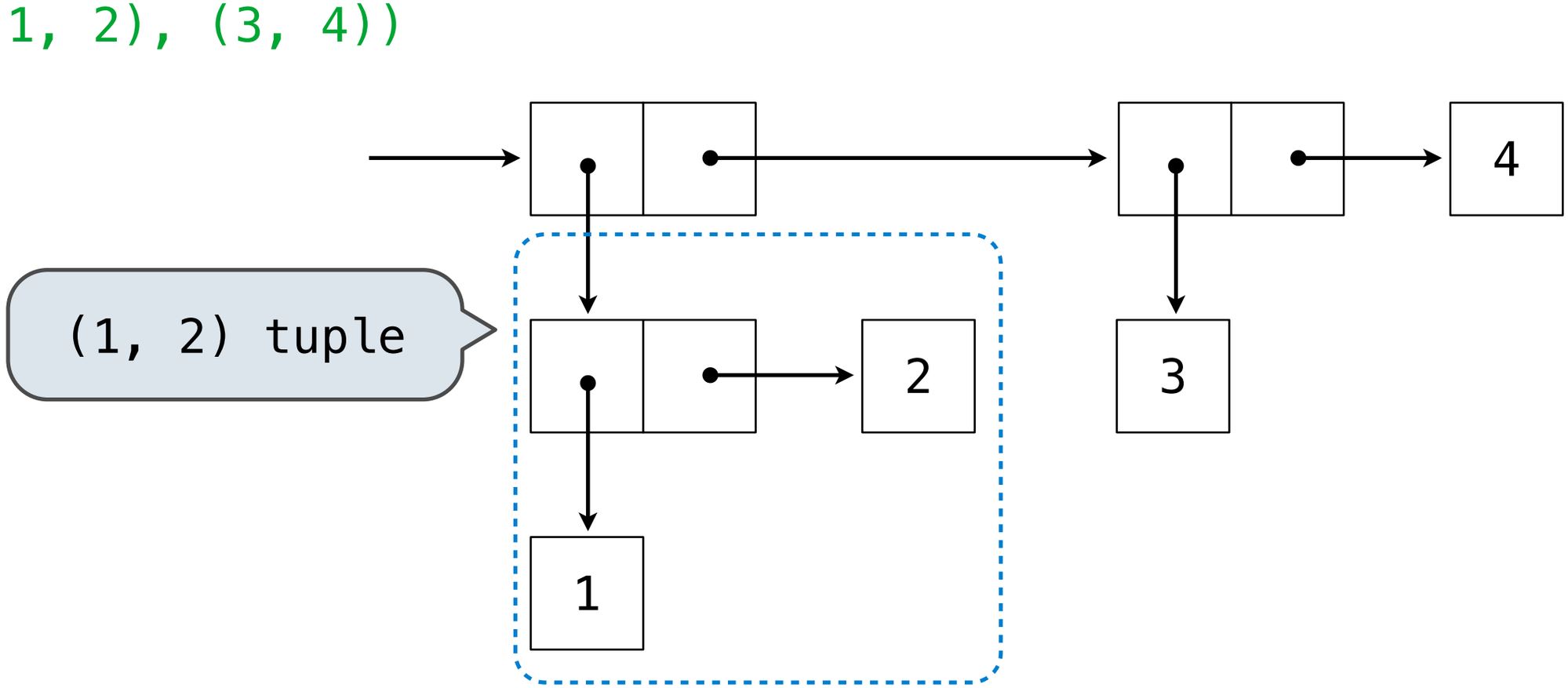

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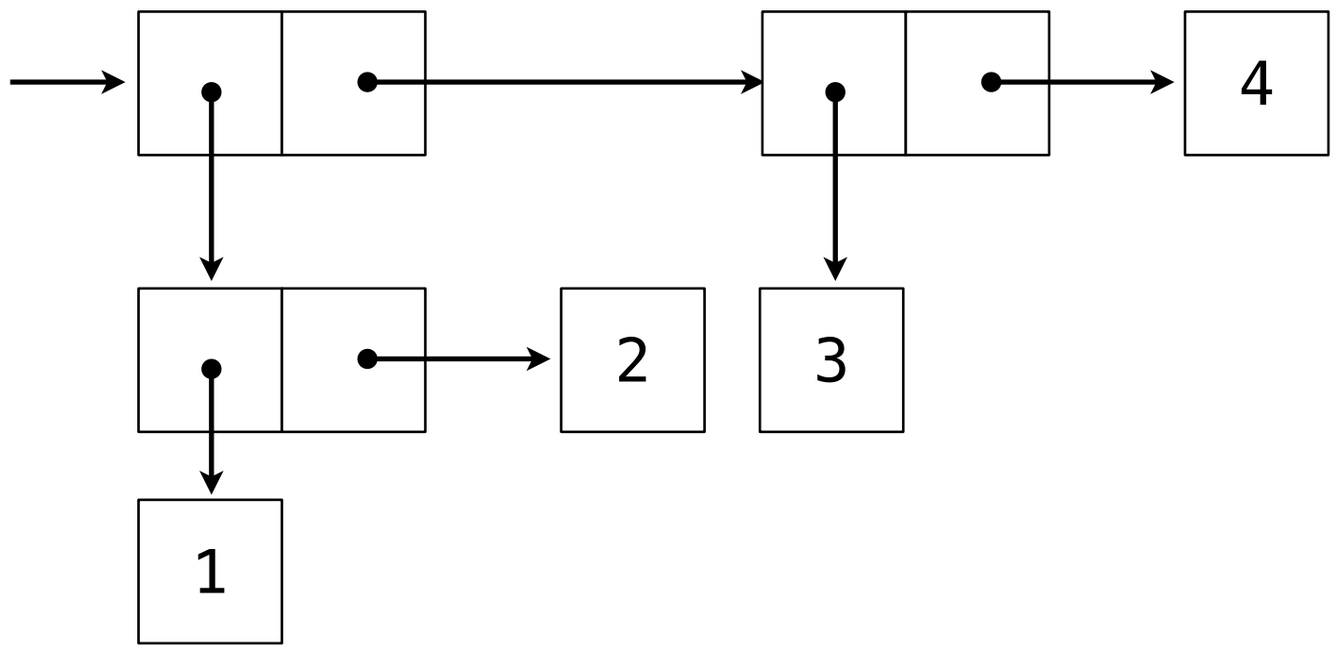

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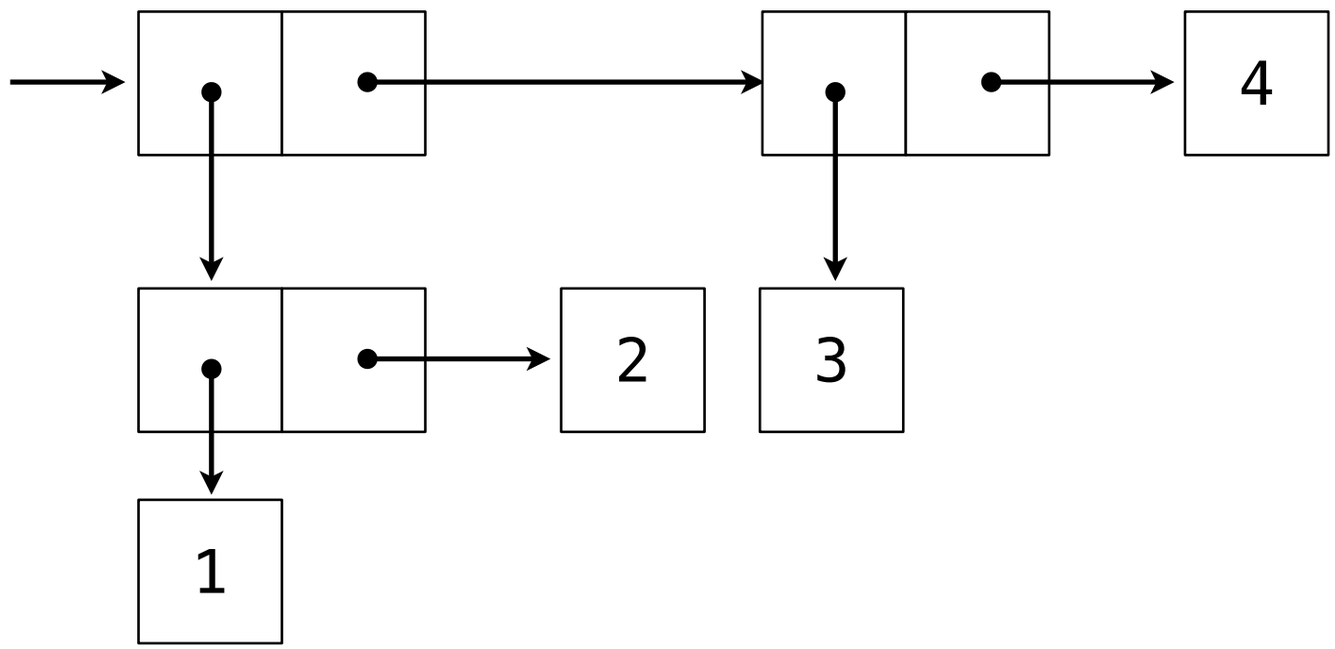

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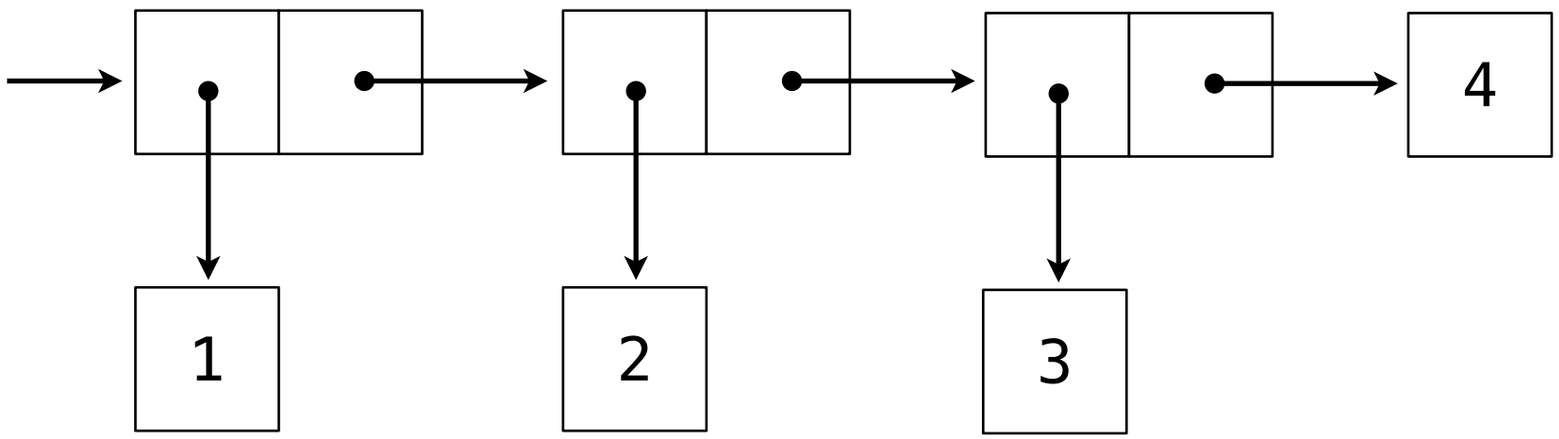


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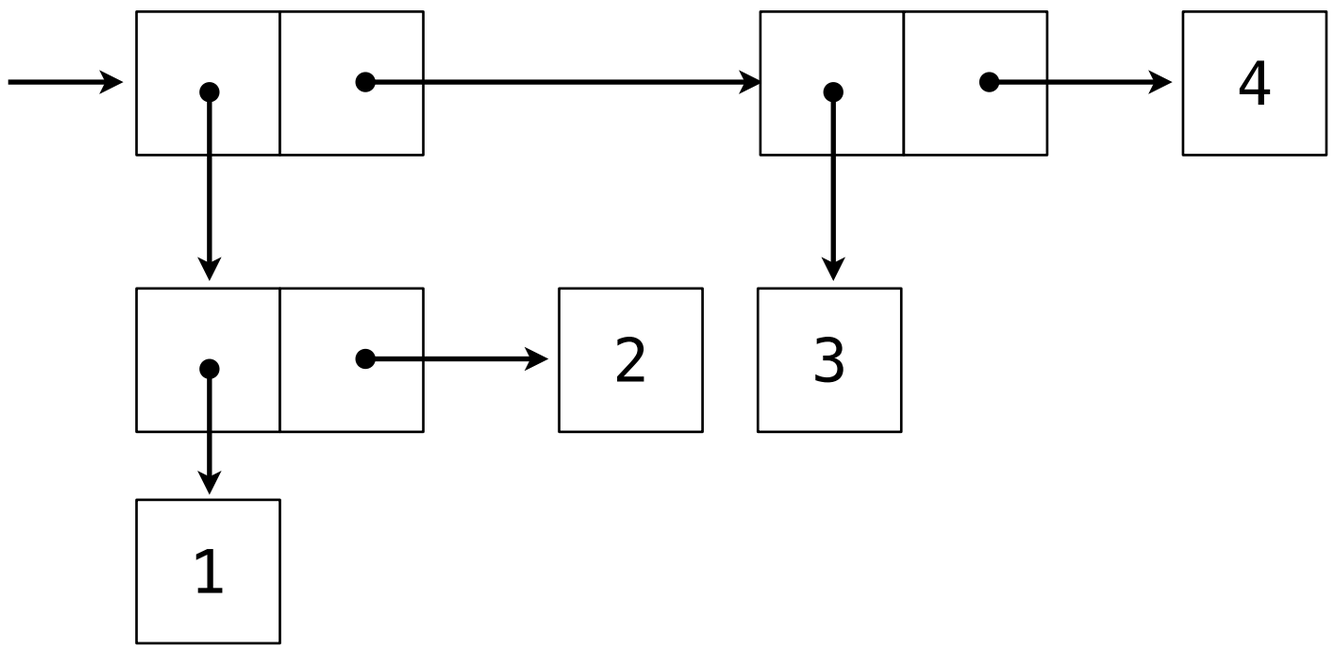

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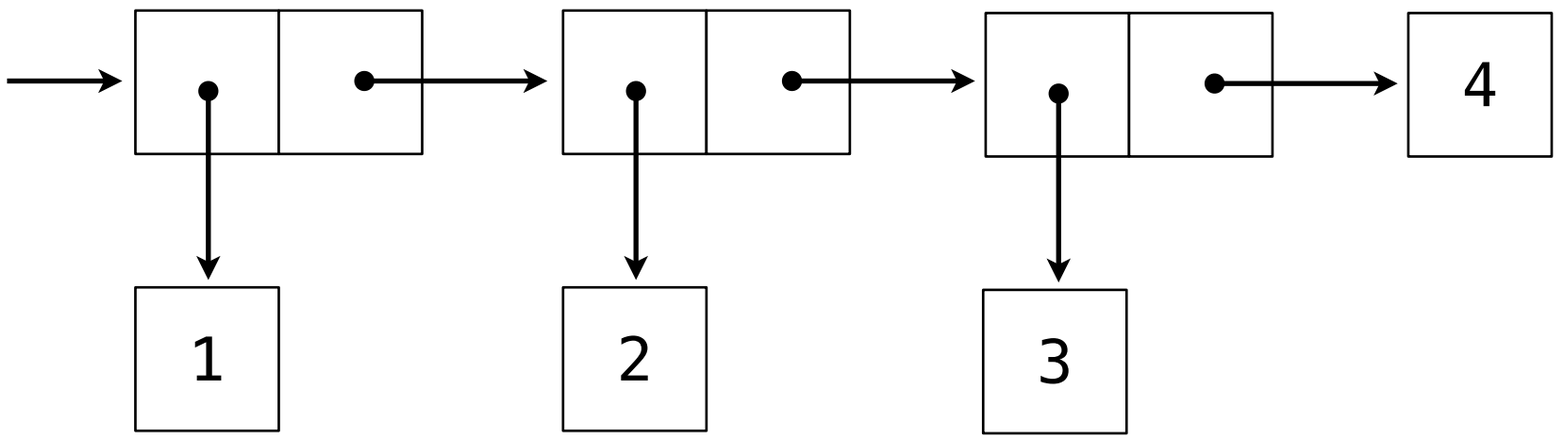


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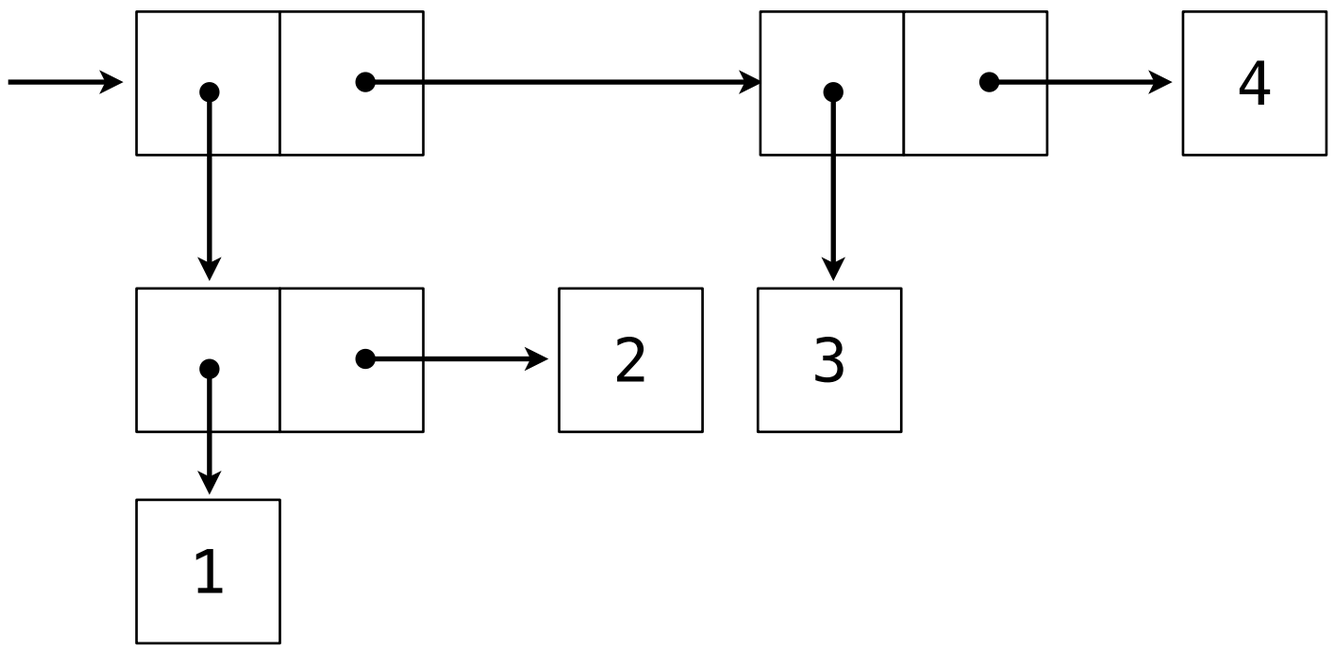

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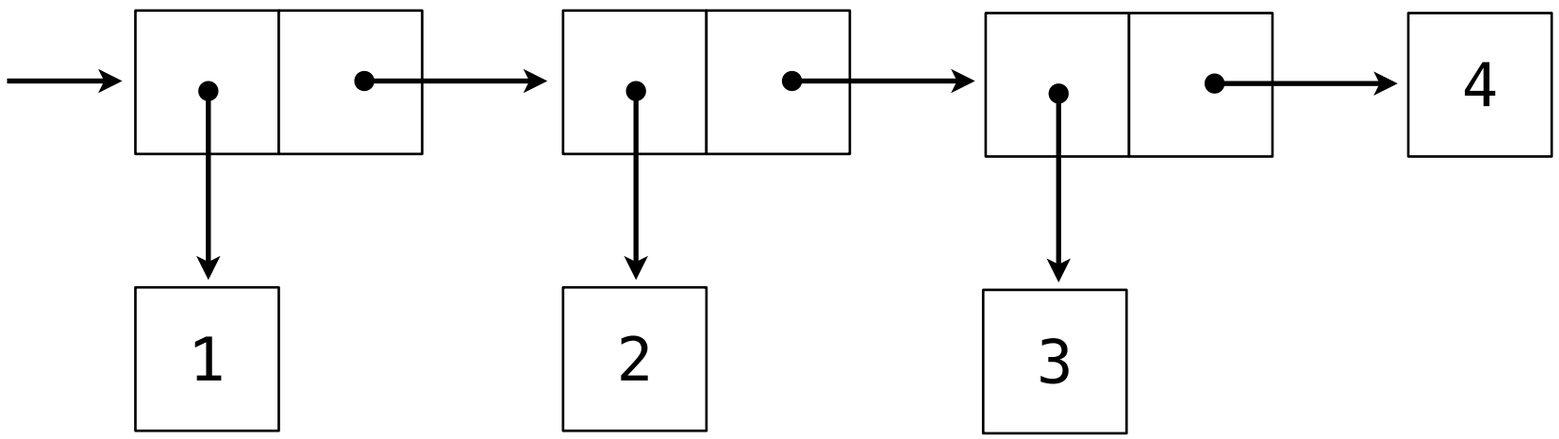


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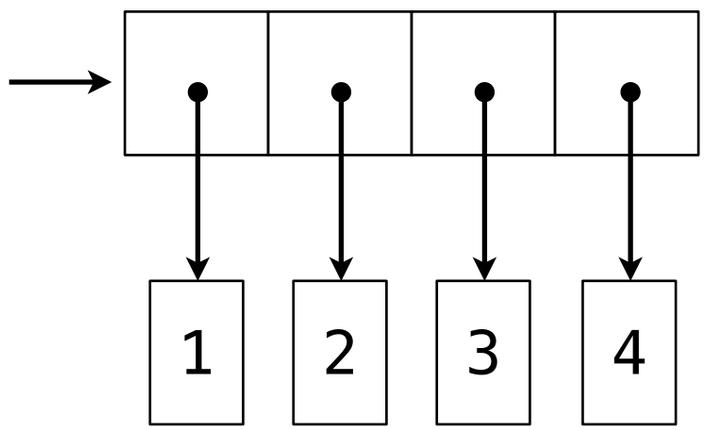


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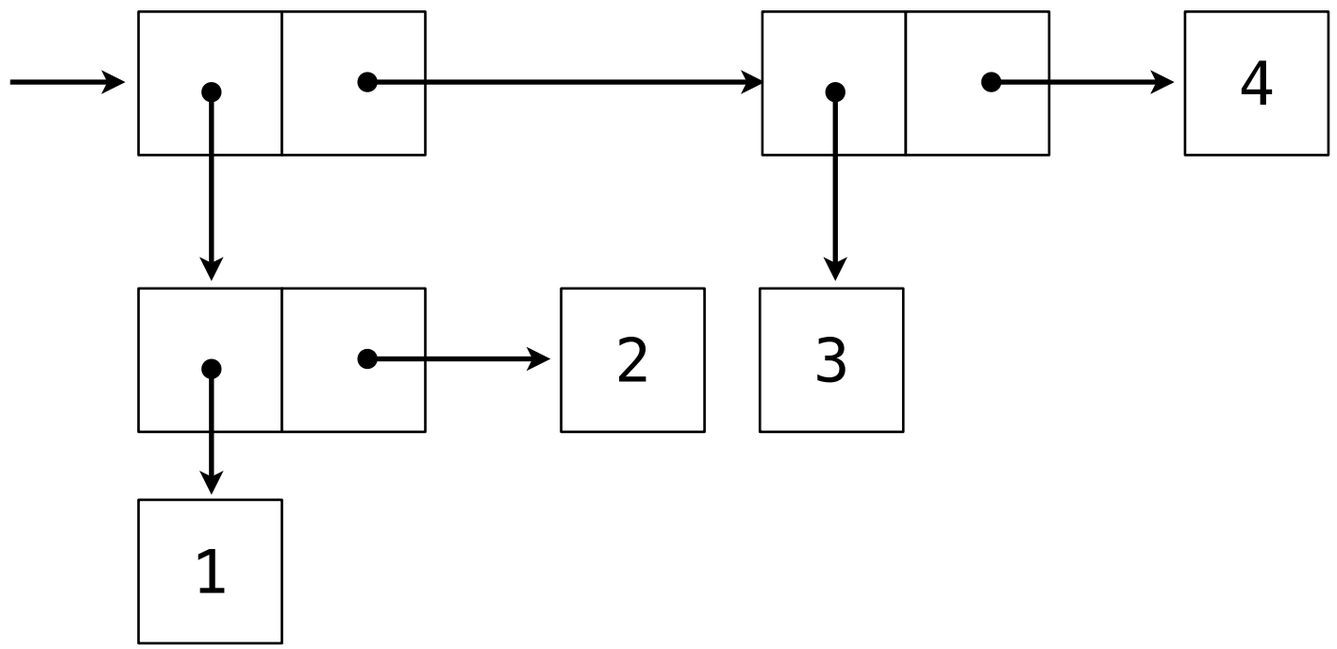

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Tuples can contain tuples as elements

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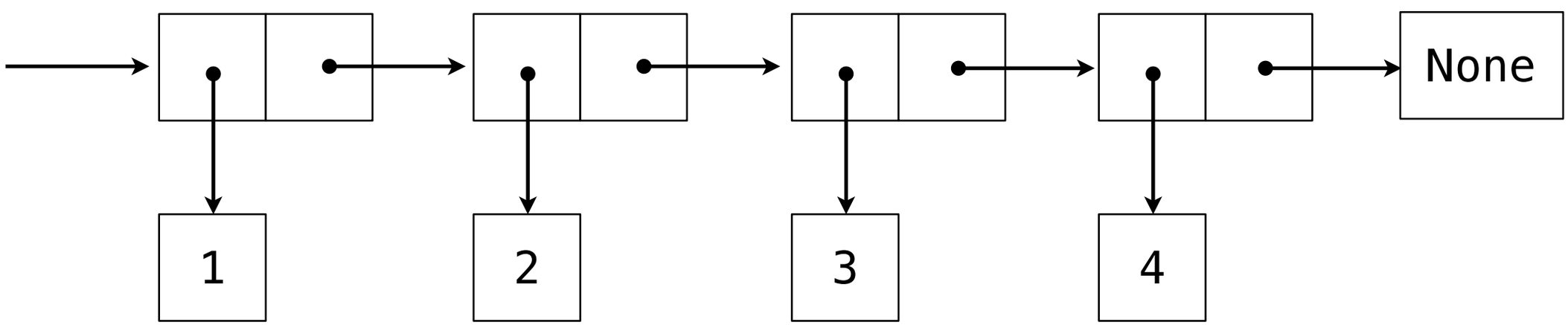
- `first(s)` returns `f`, and
- `rest(s)` returns `r`, which is a recursive list.

Implementing Recursive Lists with Pairs



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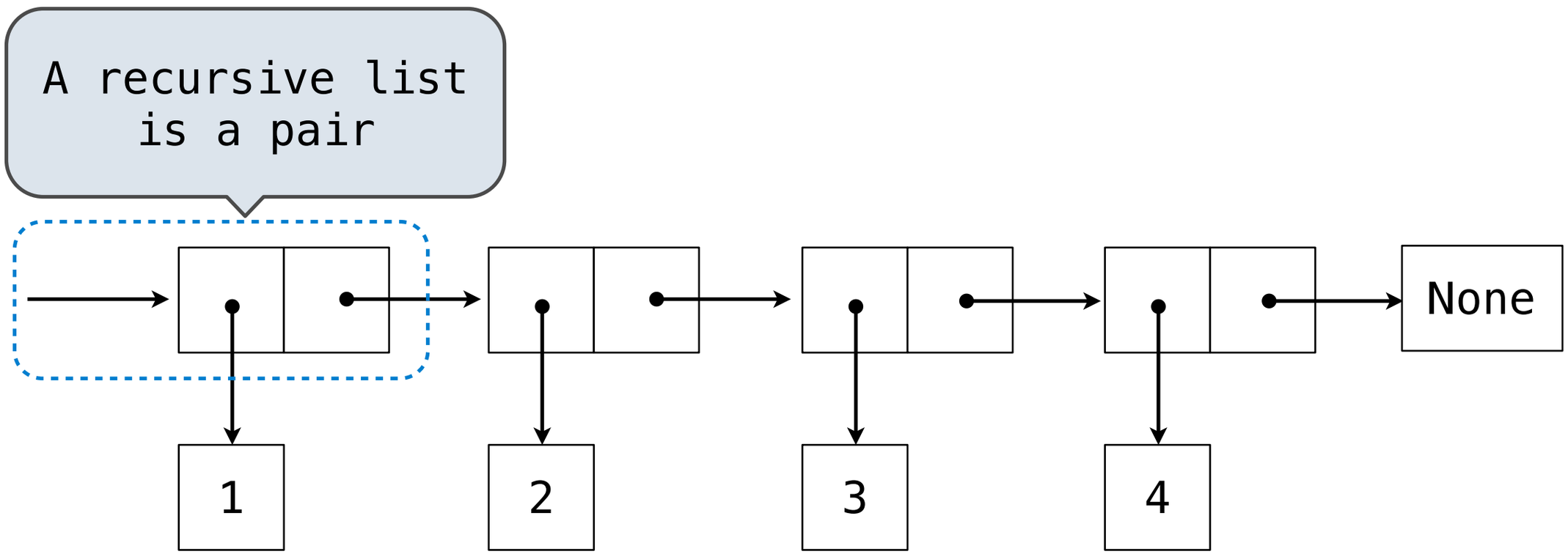

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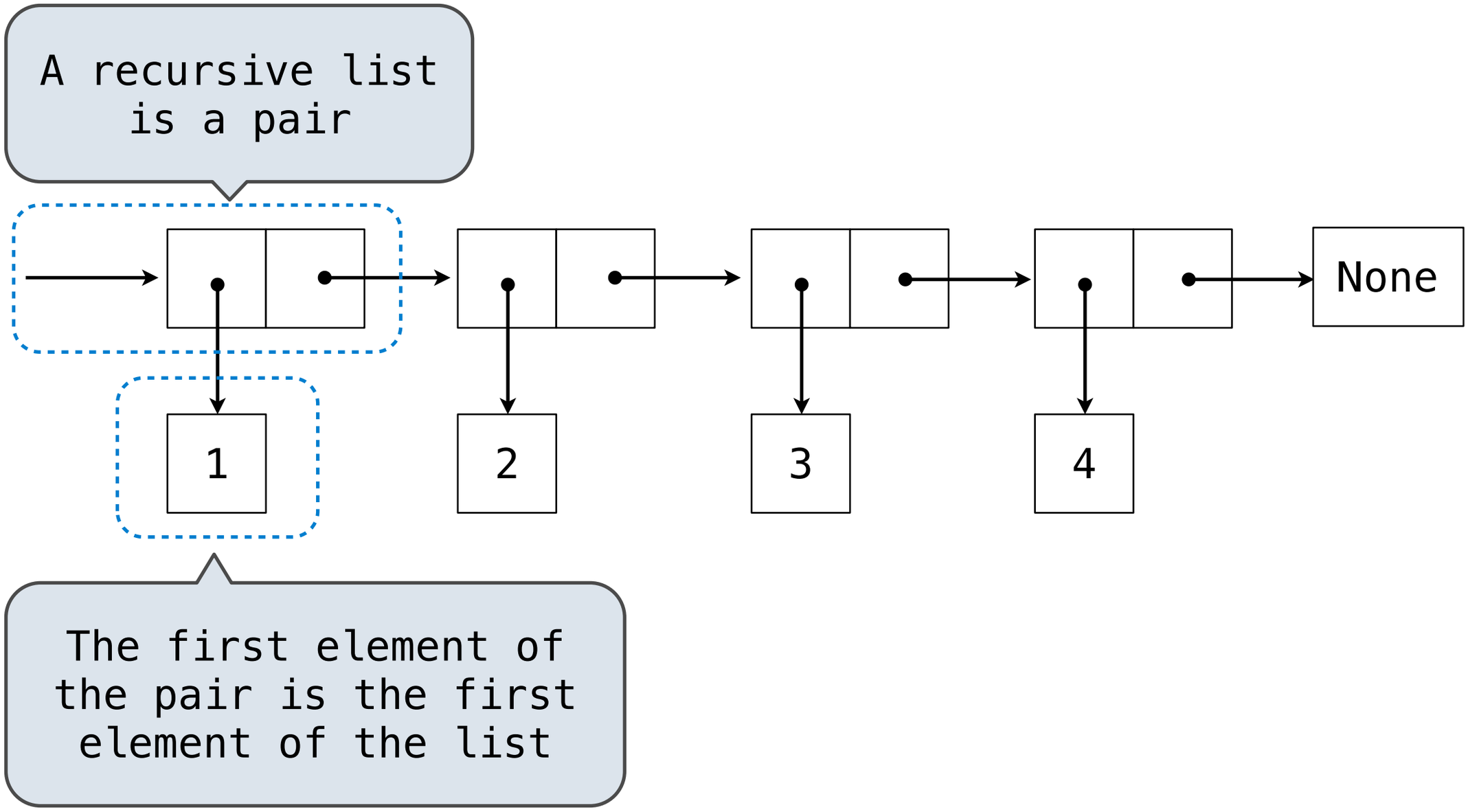

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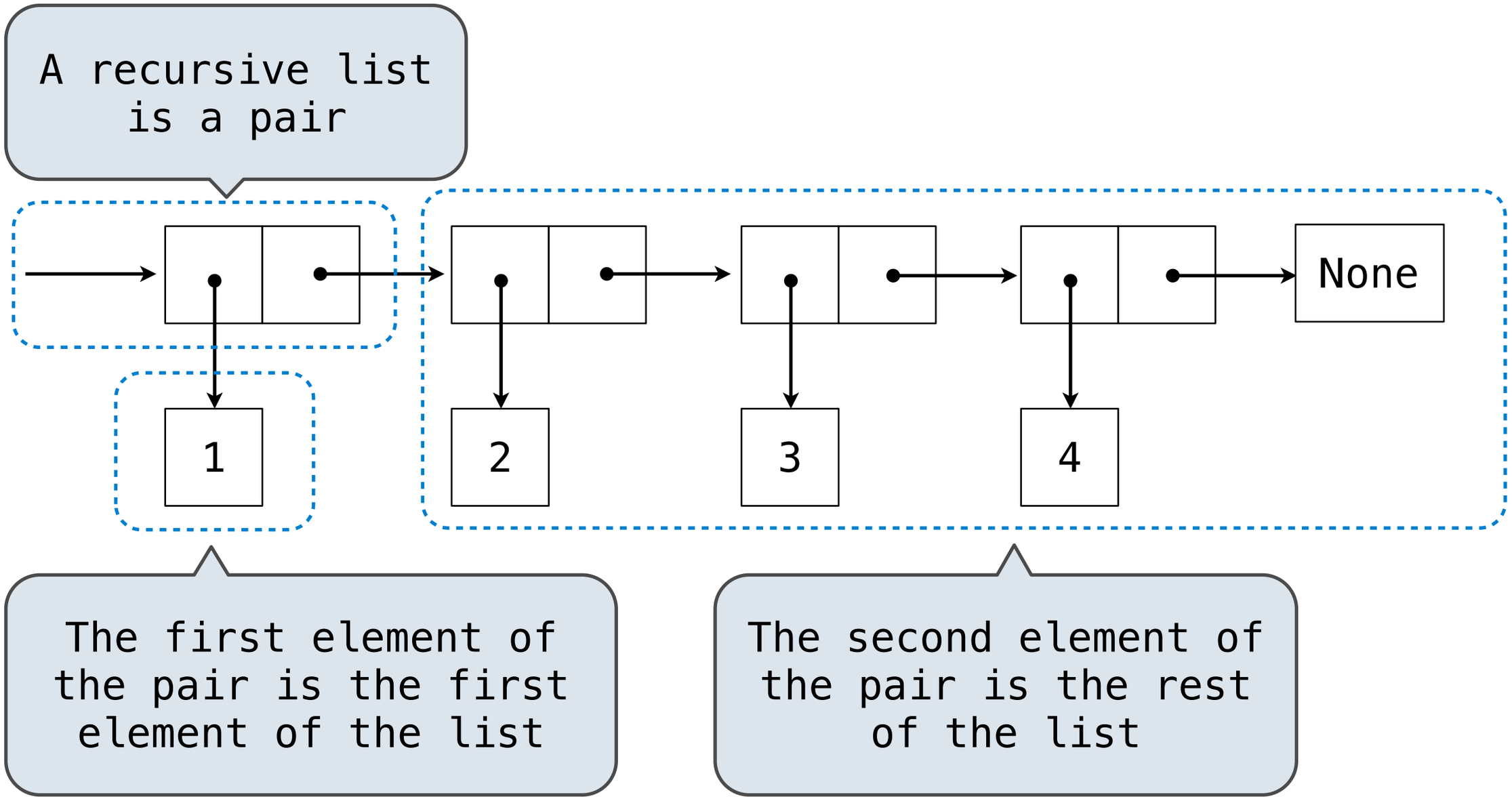

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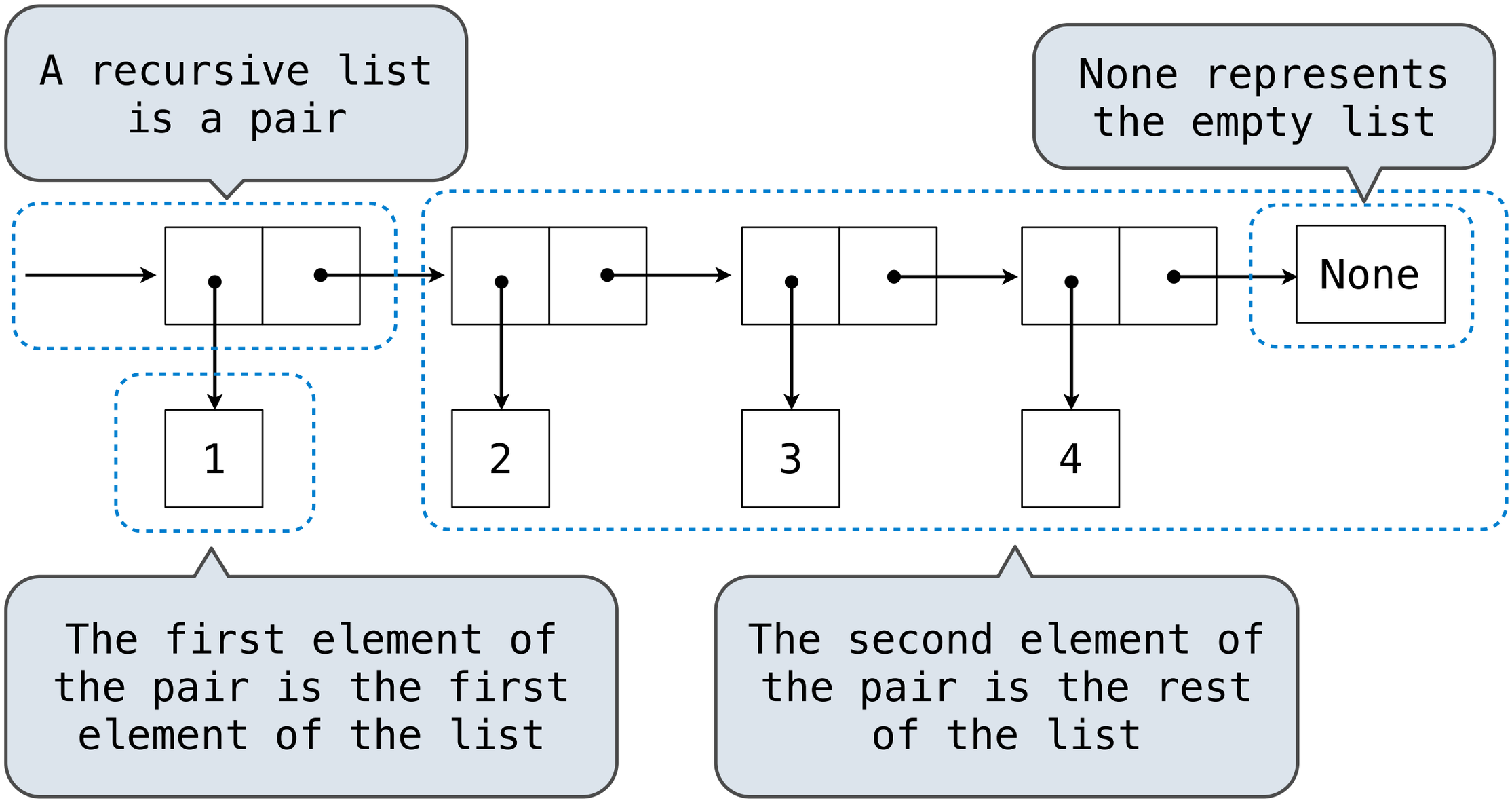

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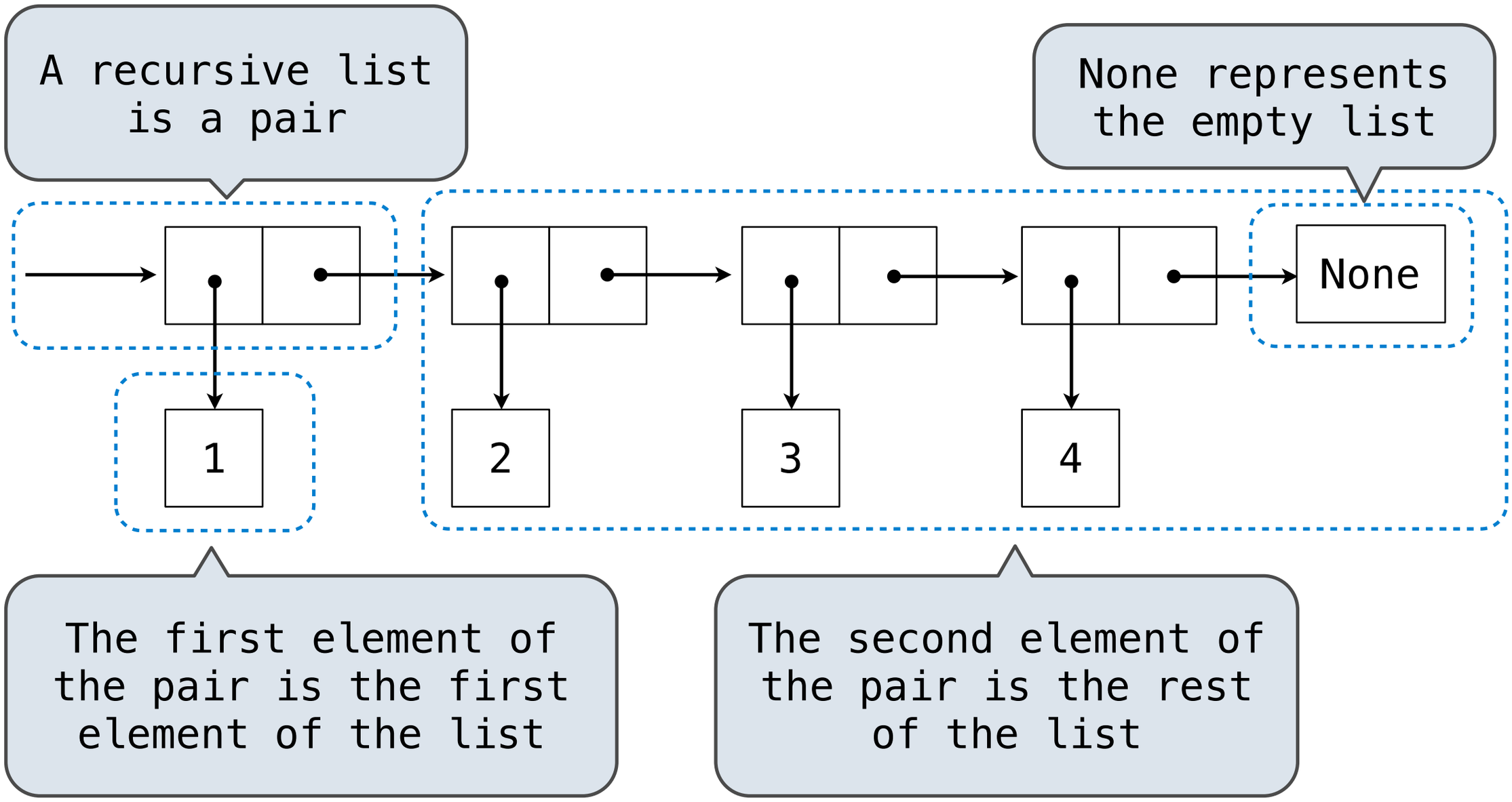

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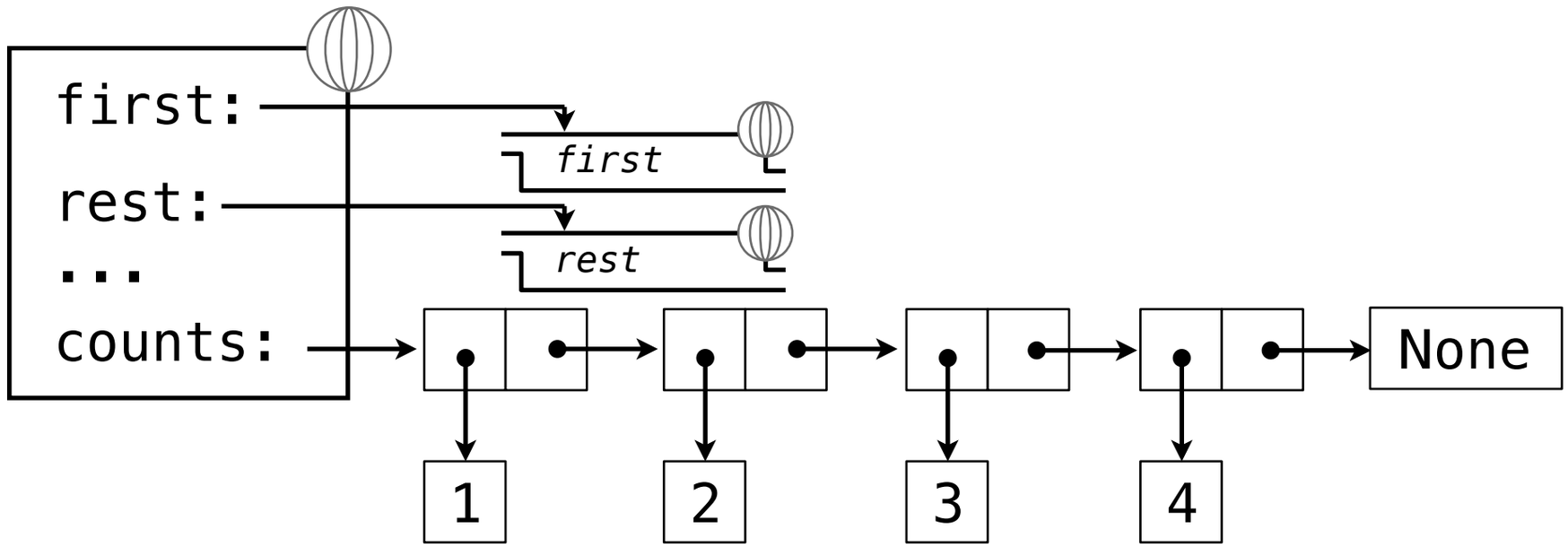

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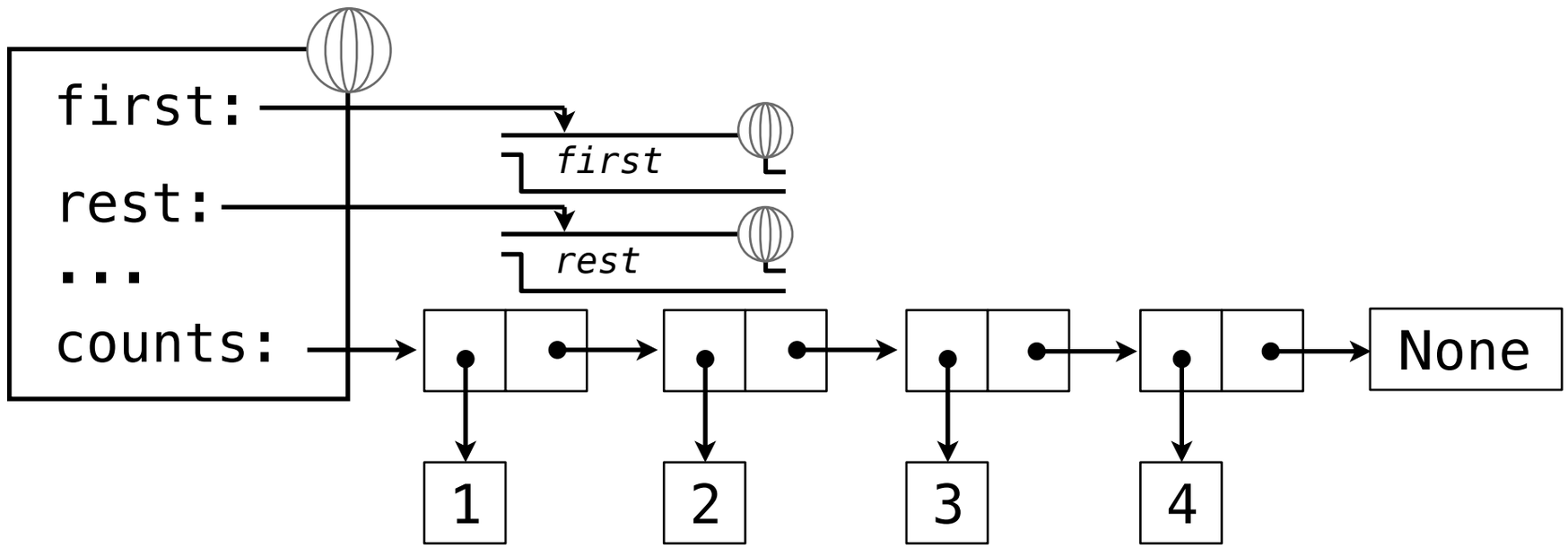

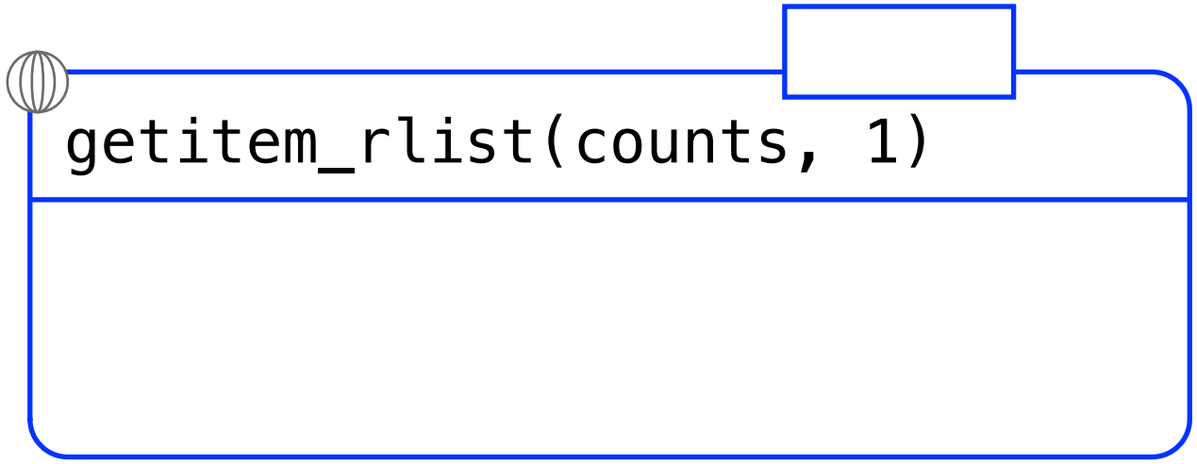

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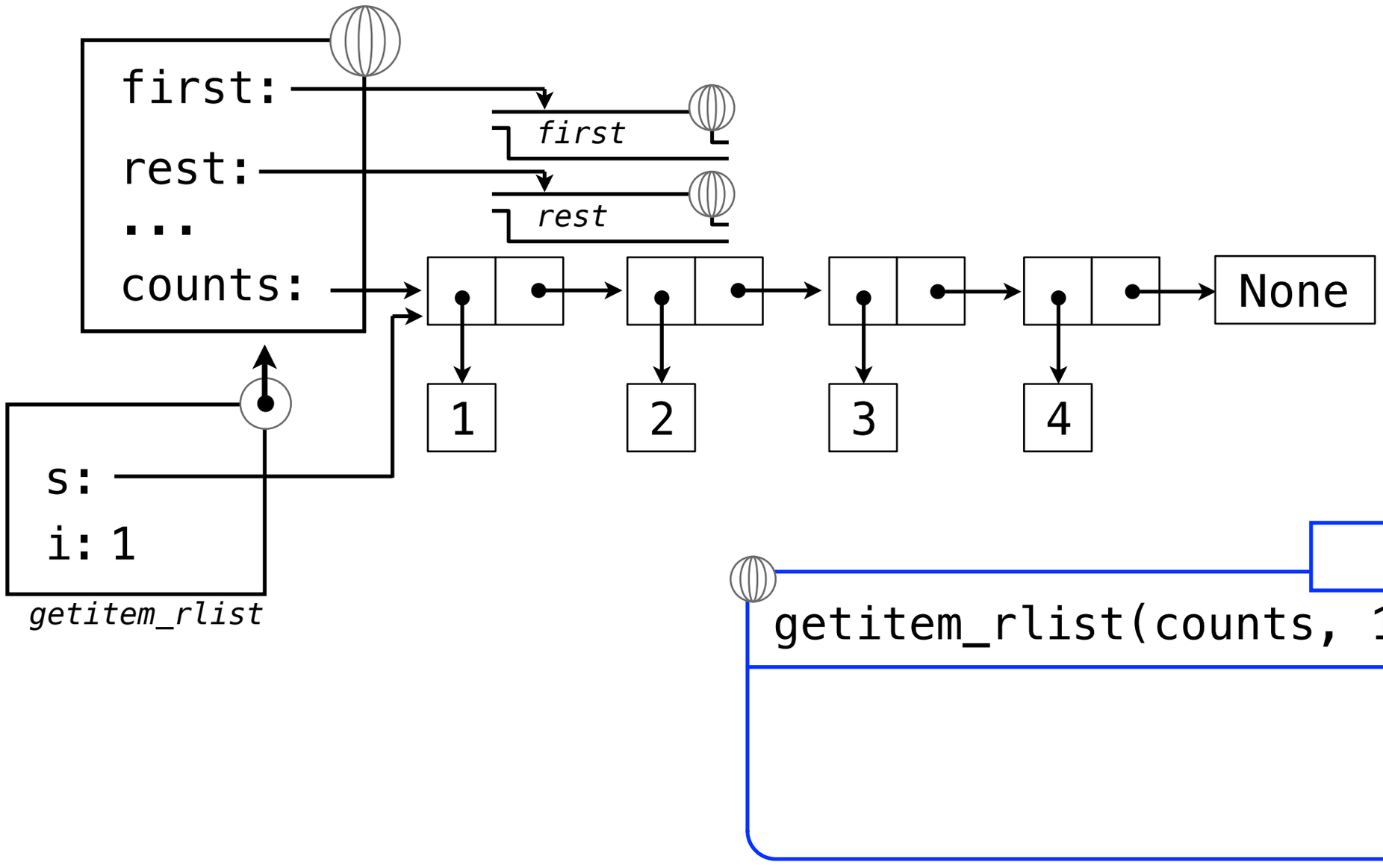

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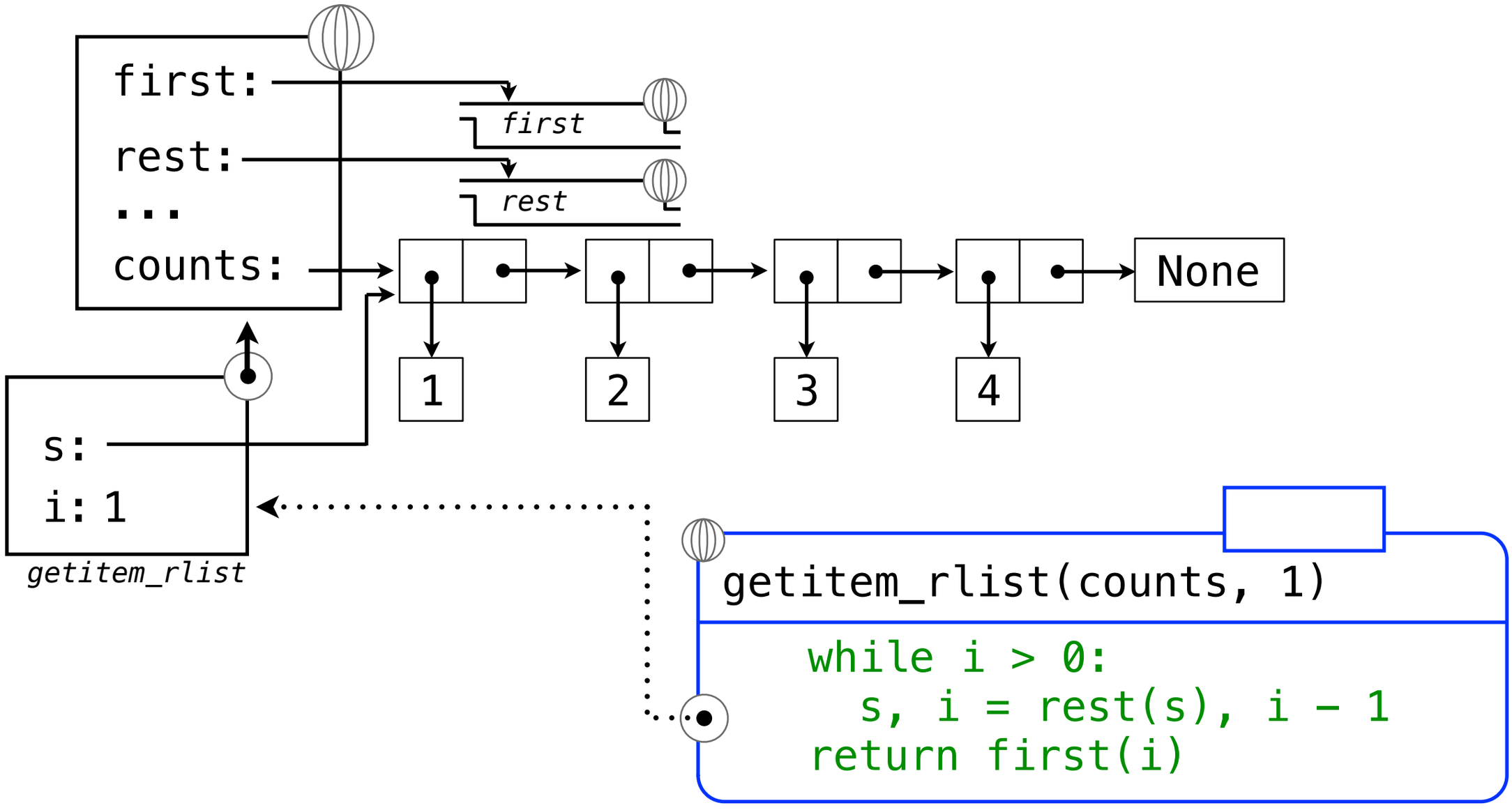

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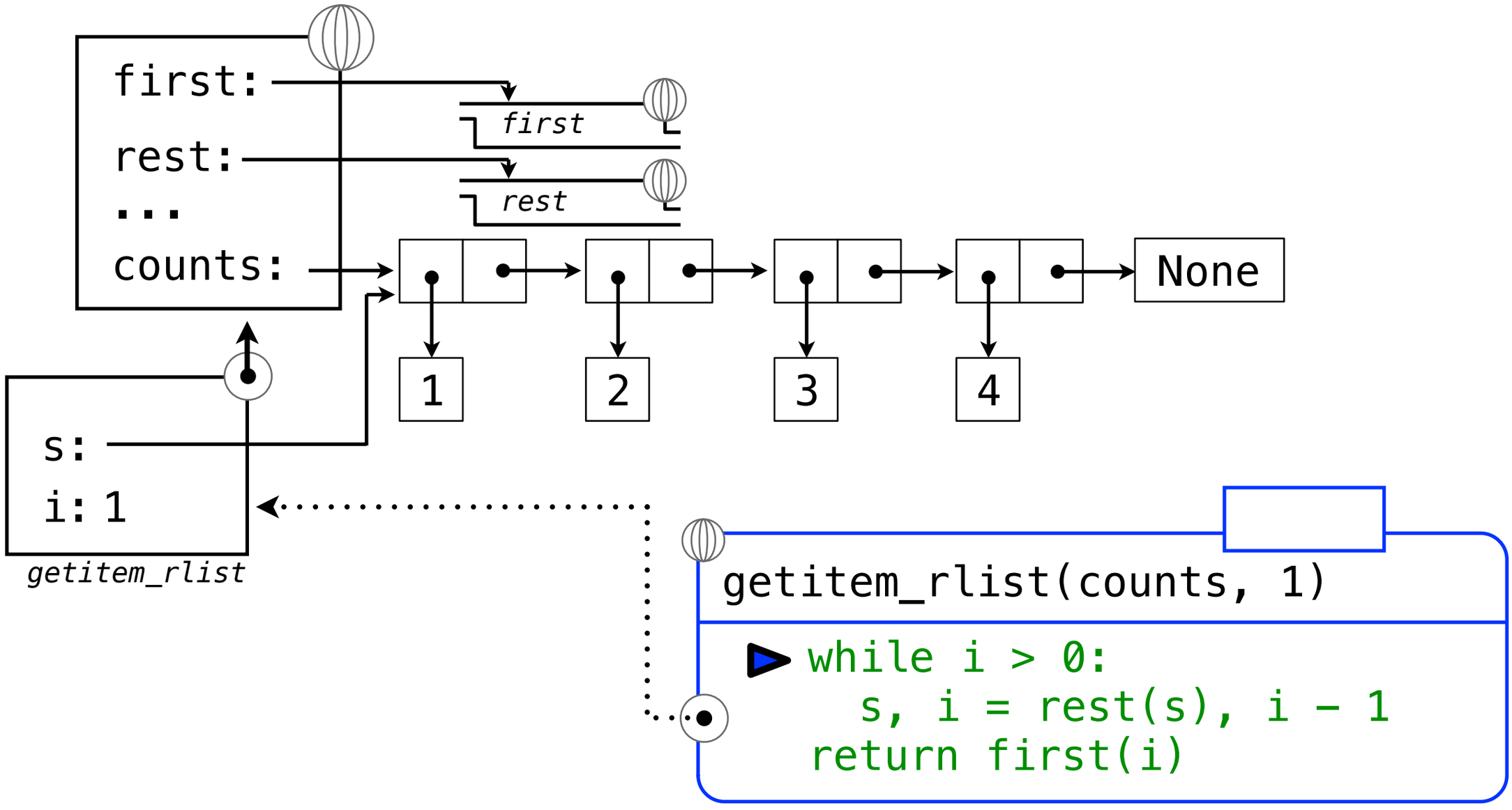

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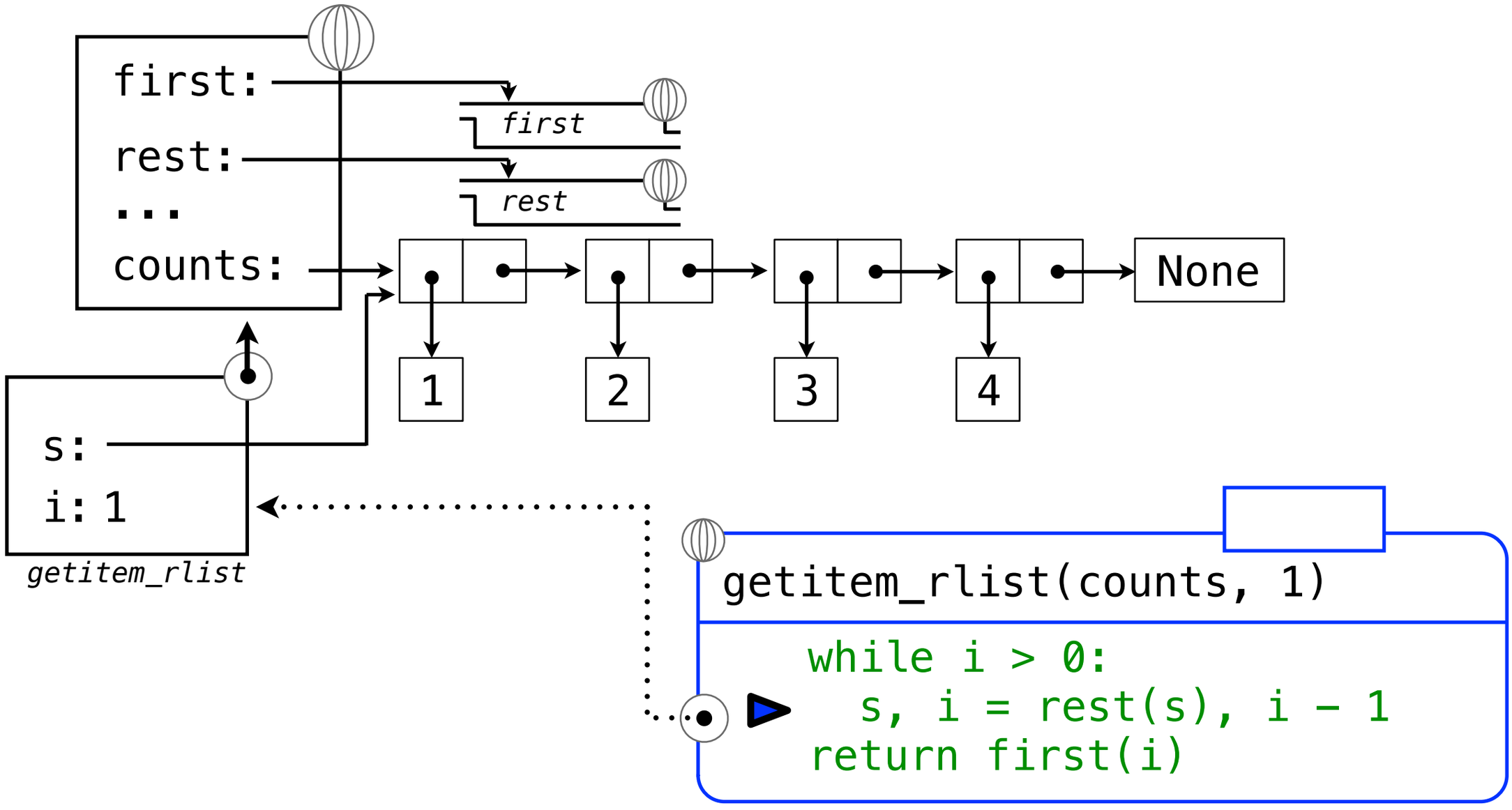

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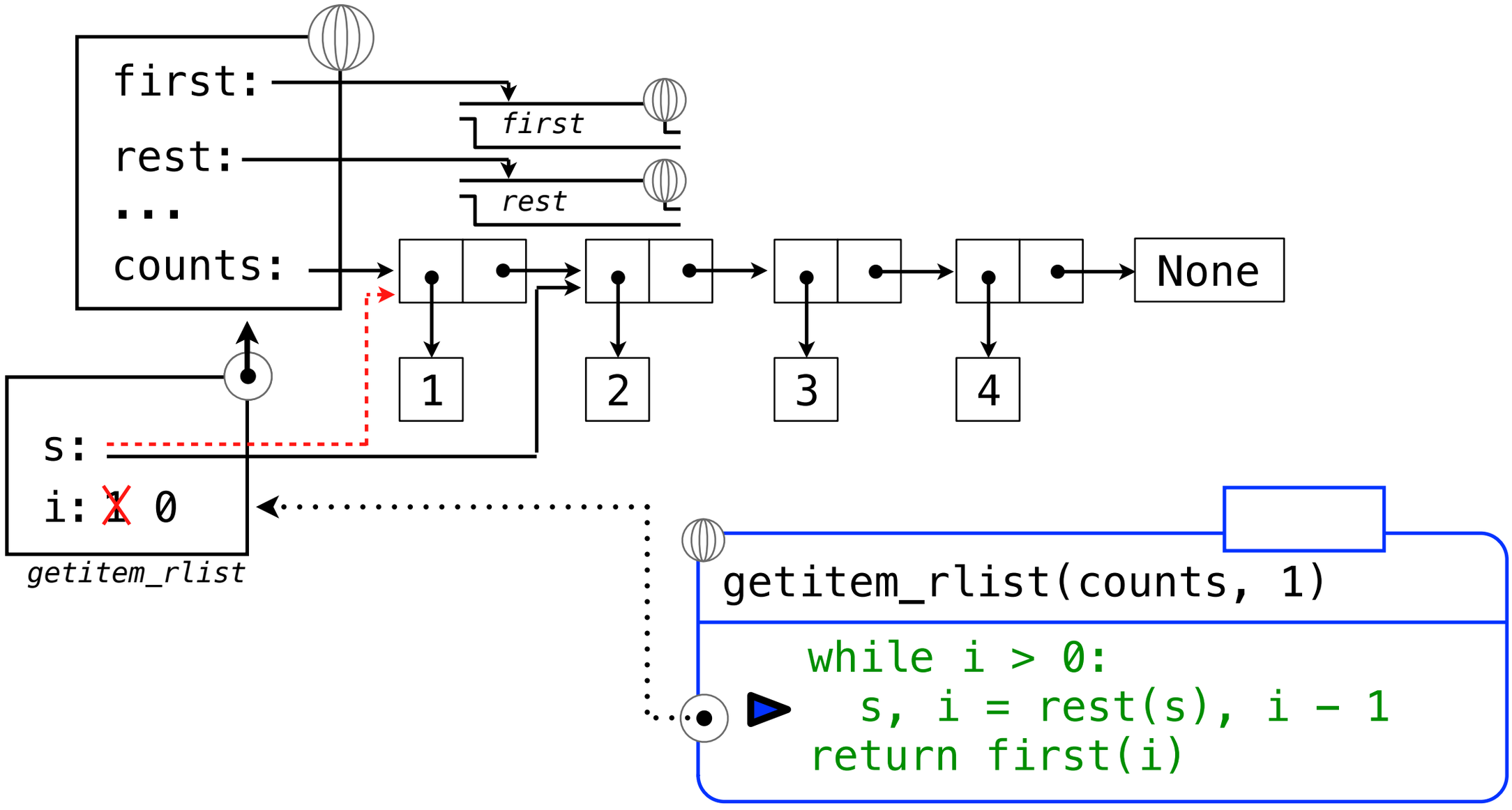

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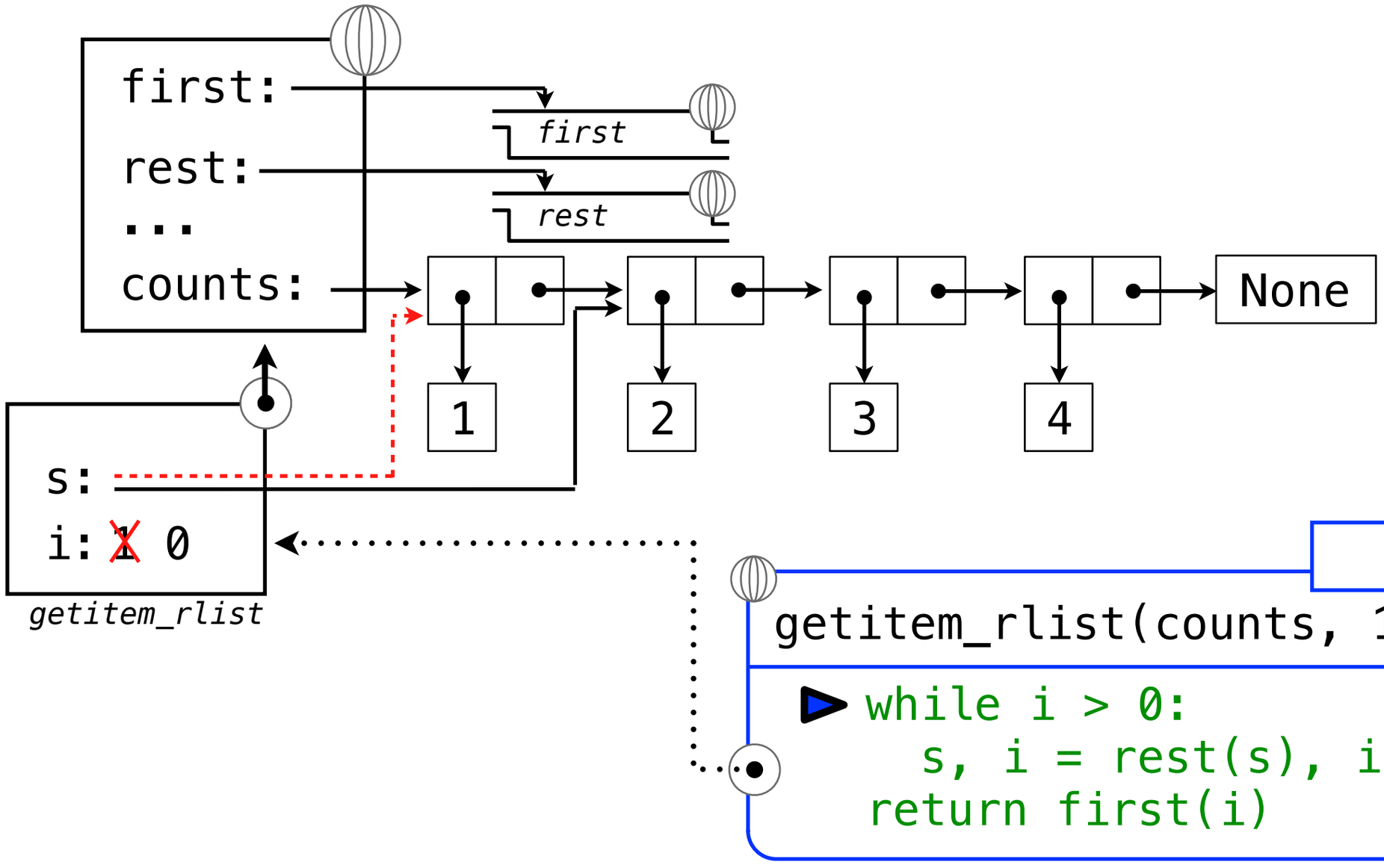

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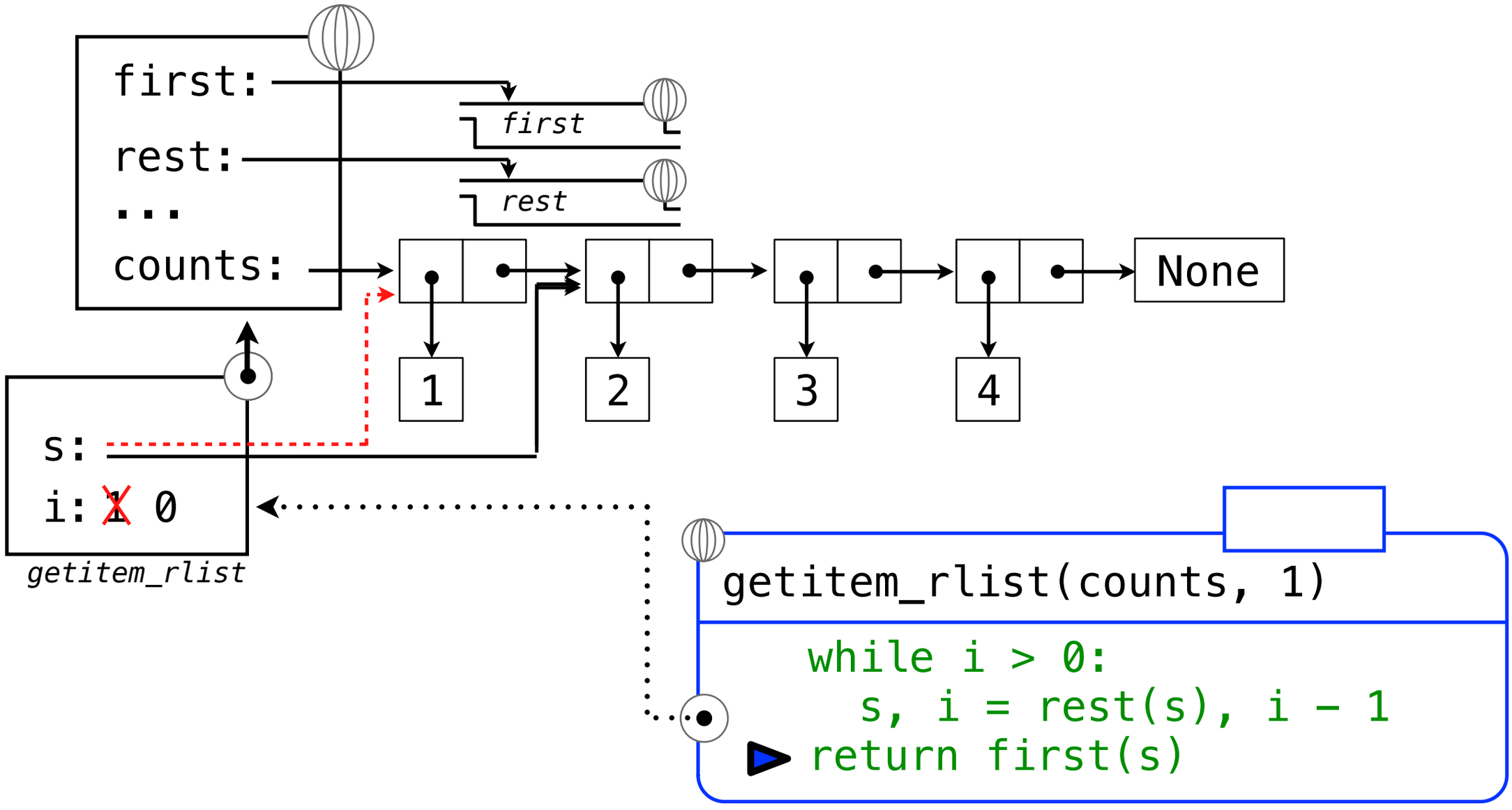

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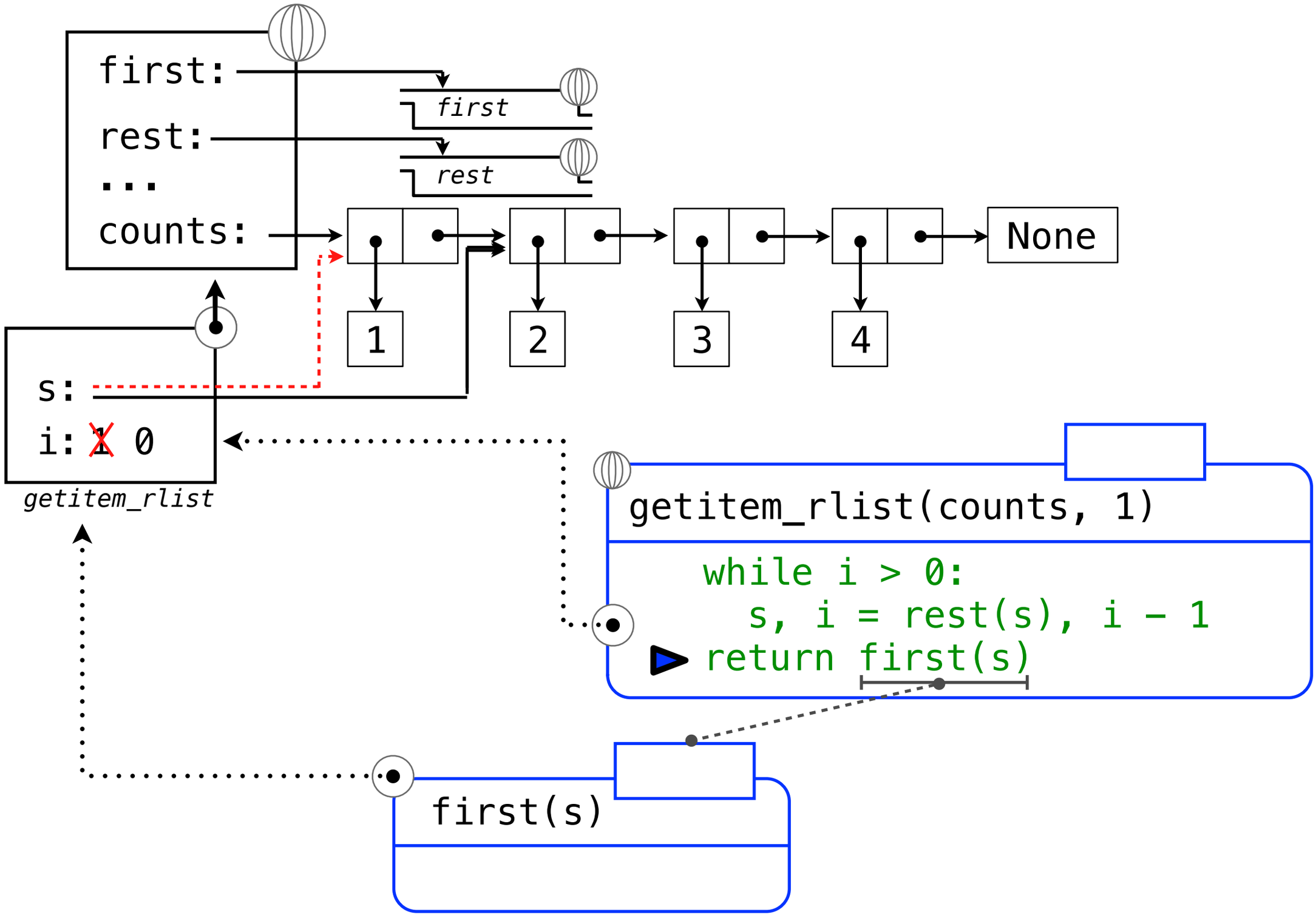

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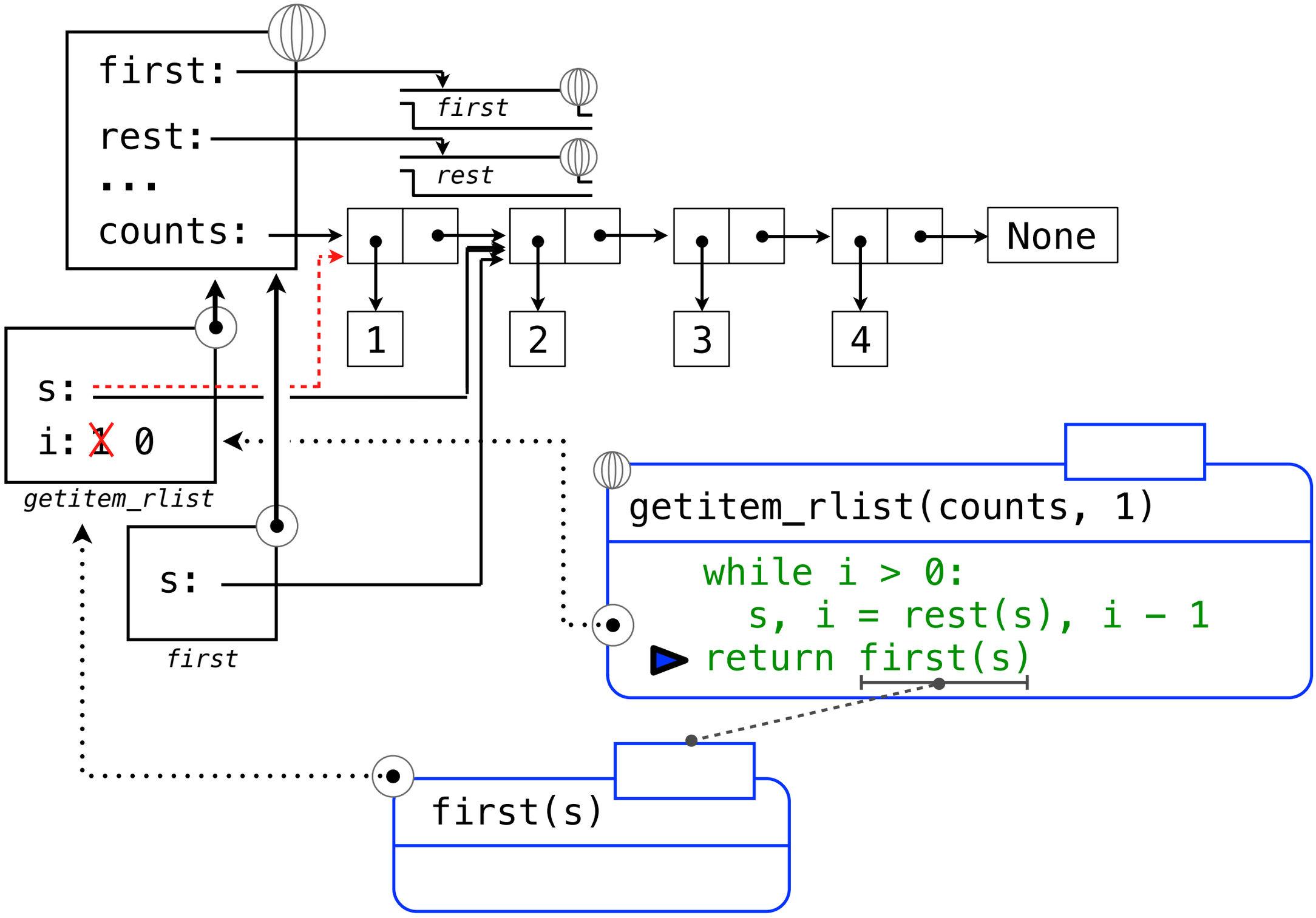

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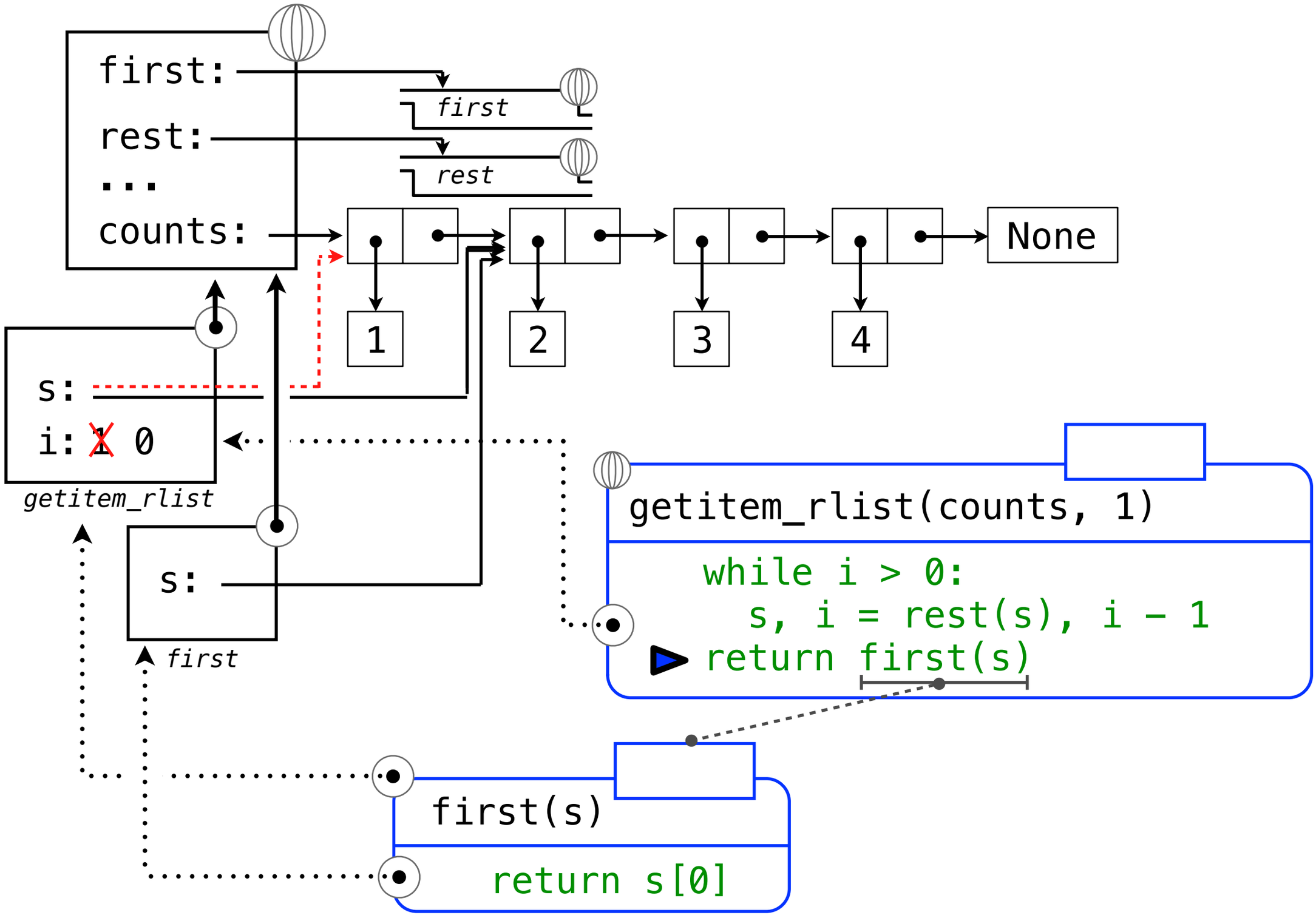

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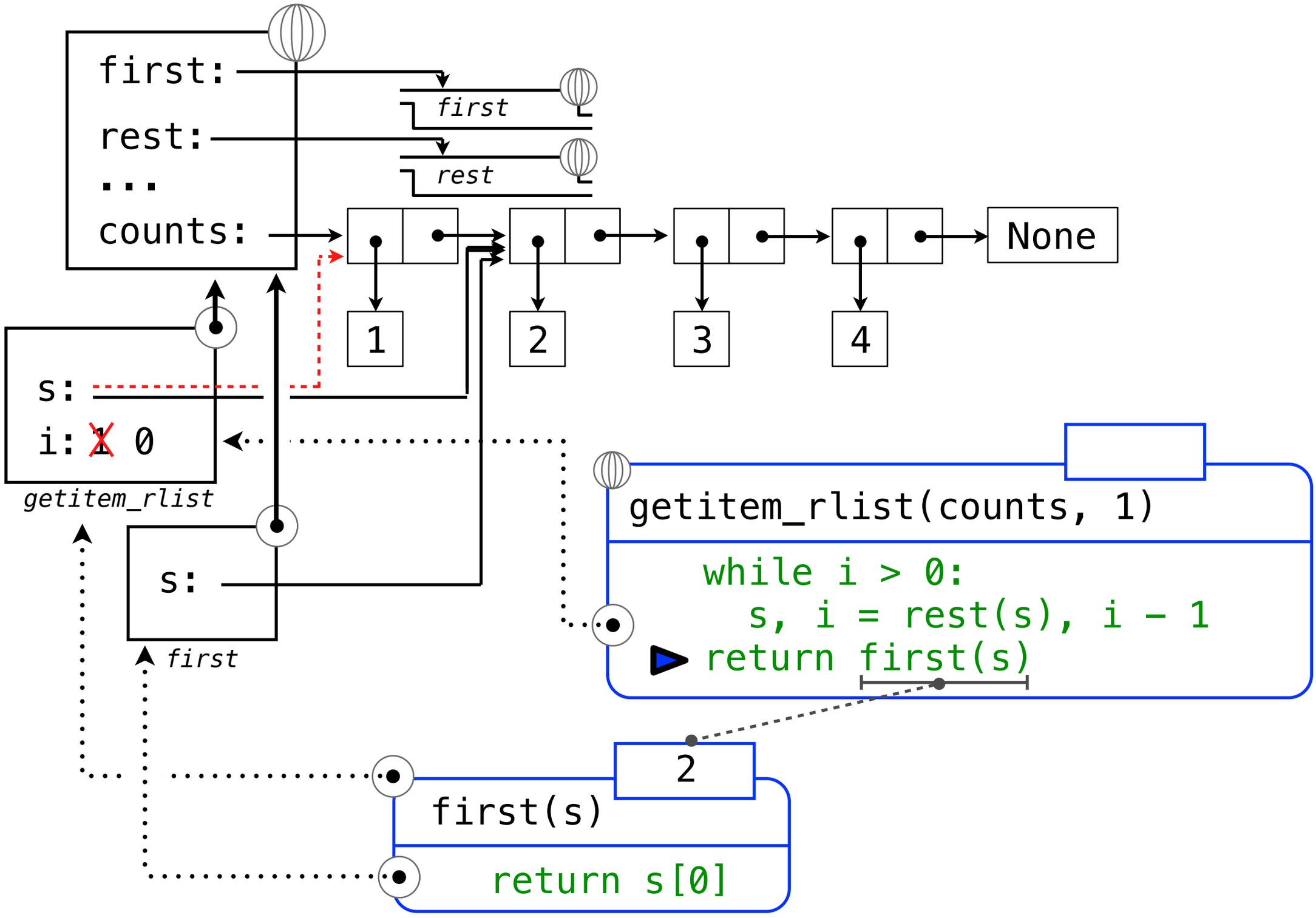

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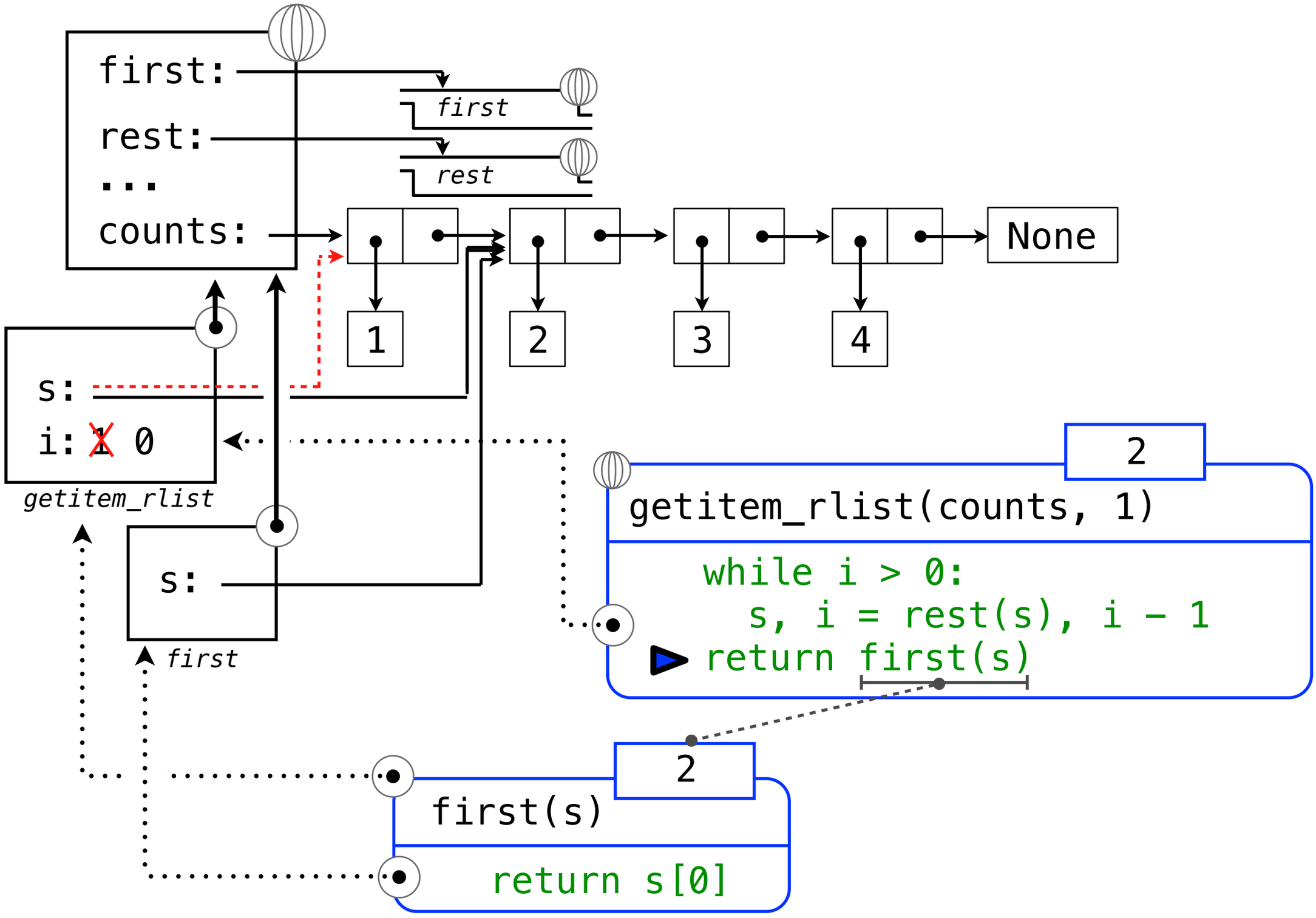

Sequence Iteration

(Demo)

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(Demo)

```
def count(s, value):
    total = 0
    for elem in s:
        if elem == value:
            total = total + 1
    return total
```

Name bound in the first frame of the current environment

For Statement Execution Procedure

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```
for <name> in <expression>:
    <suite>
```

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2. For each element value in that sequence, in order:

   A. Bind <name> to that value in the local environment.

   B. Execute the <suite>.

Sequence Unpacking in For Statements

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>>> pairs = ((1, 2), (2, 2), (2, 3), (4, 4))
>>> same_count = 0
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A sequence of
fixed-length sequences

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        if x == y:
            same_count = same_count + 1

>>> same_count
2
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Sequence Unpacking in For Statements

A sequence of fixed-length sequences

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A sequence of fixed-length sequences

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```

A name for each element in a fixed-length sequence

Each name is bound to a value, as in multiple assignment

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>>> for x, y in pairs:
        if x == y:
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>>> same_count
2
```

The Range Type

A sequence of consecutive integers is a range.*

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* Ranges can actually represent more general sequences, too.

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..., -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...
```

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range(-2, 2)
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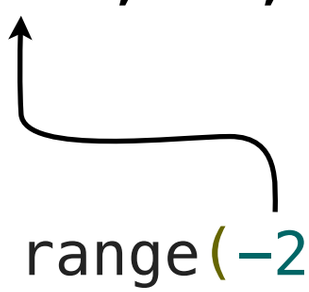

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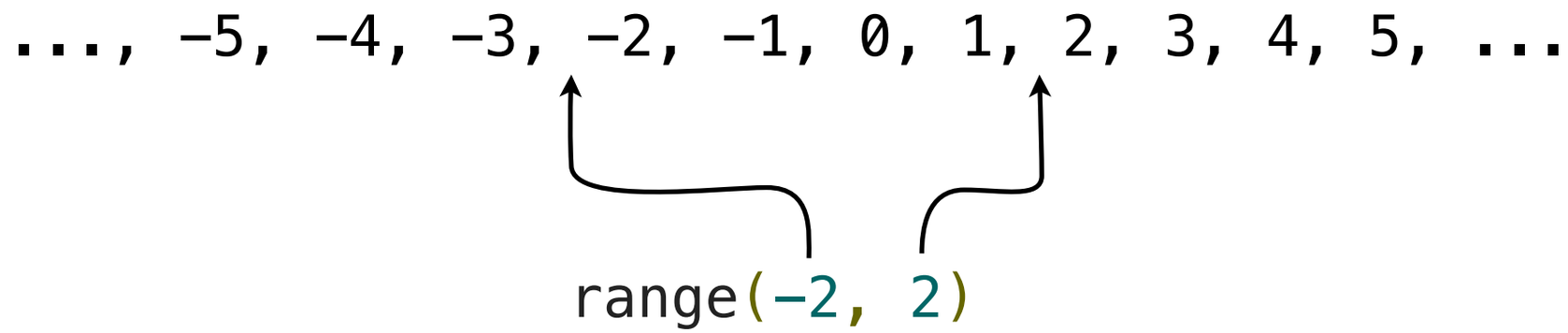

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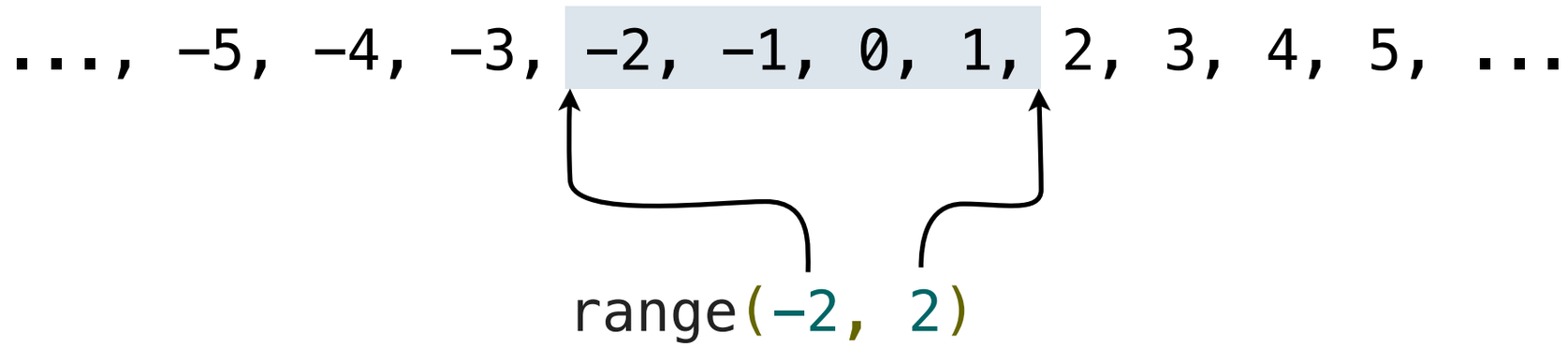

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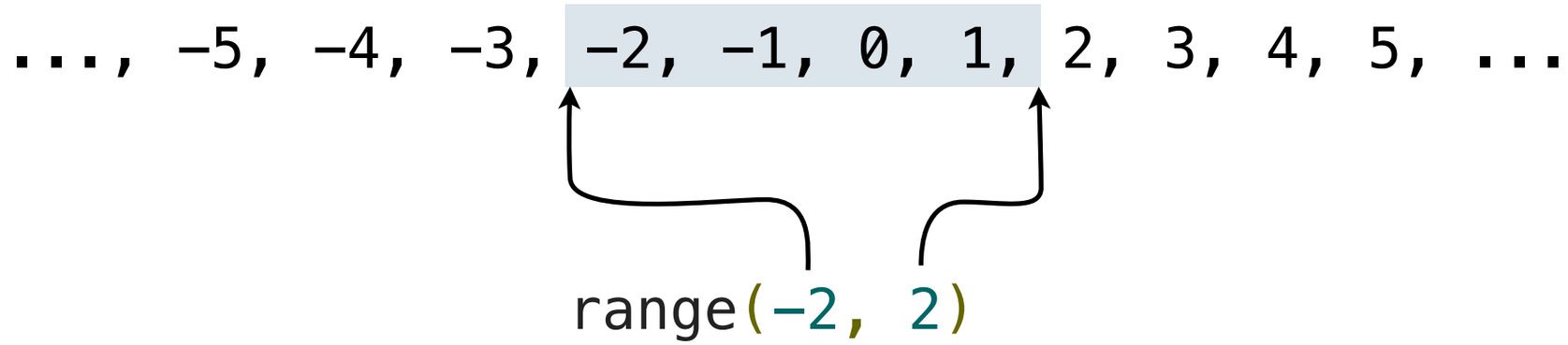

Length: ending value − starting value

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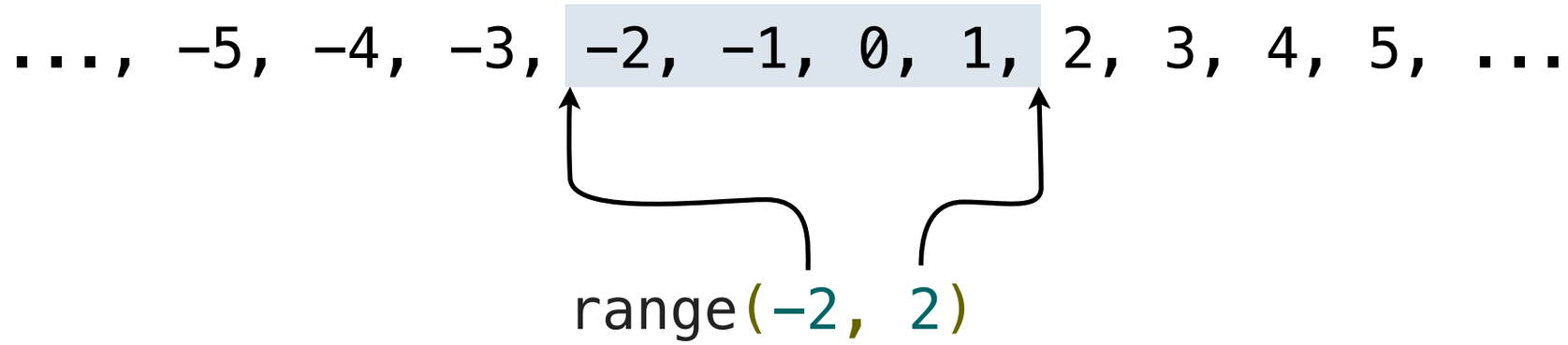

Length: ending value − starting value

Element selection: starting value + index

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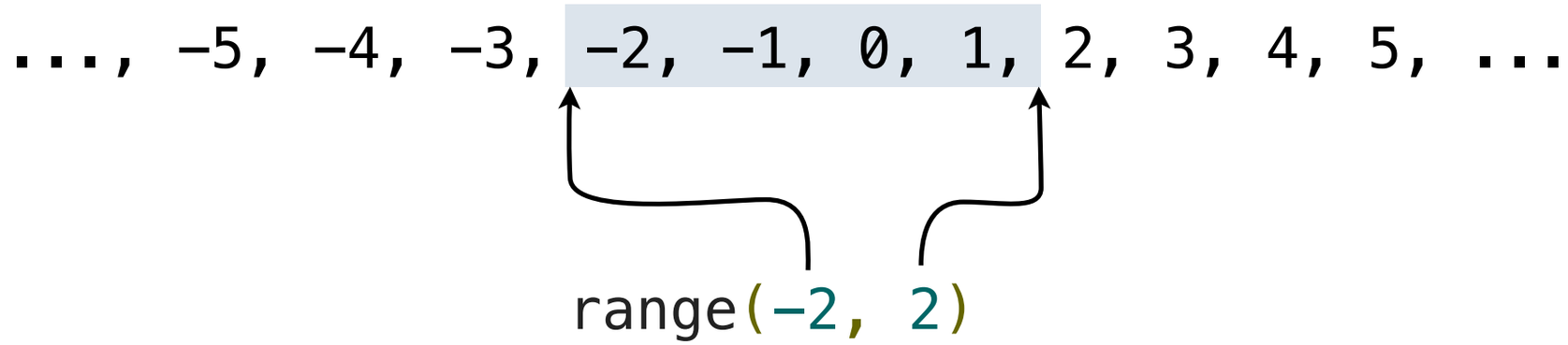

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>>> tuple(range(-2, 2))
(-2, -1, 0, 1)

>>> tuple(range(4))
(0, 1, 2, 3)
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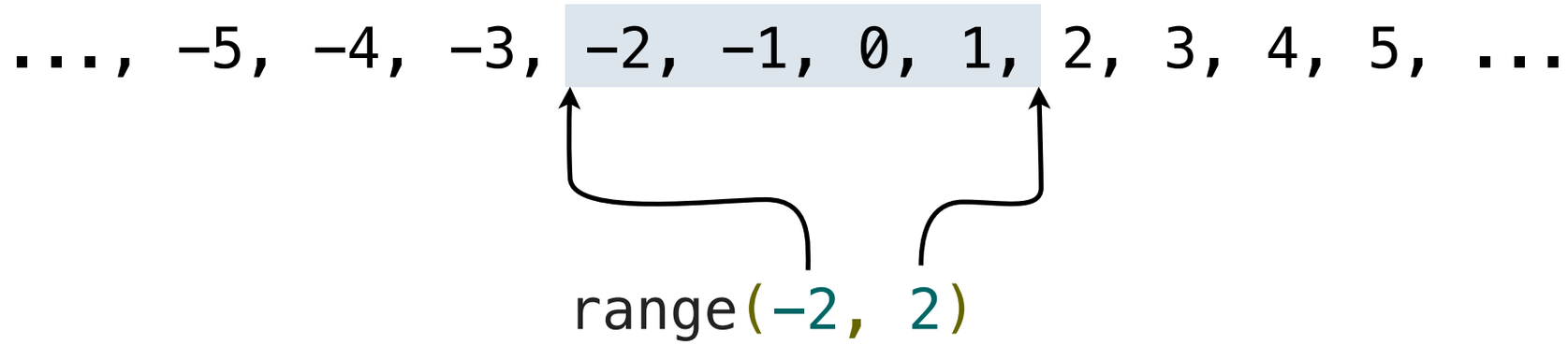

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Tuple construction

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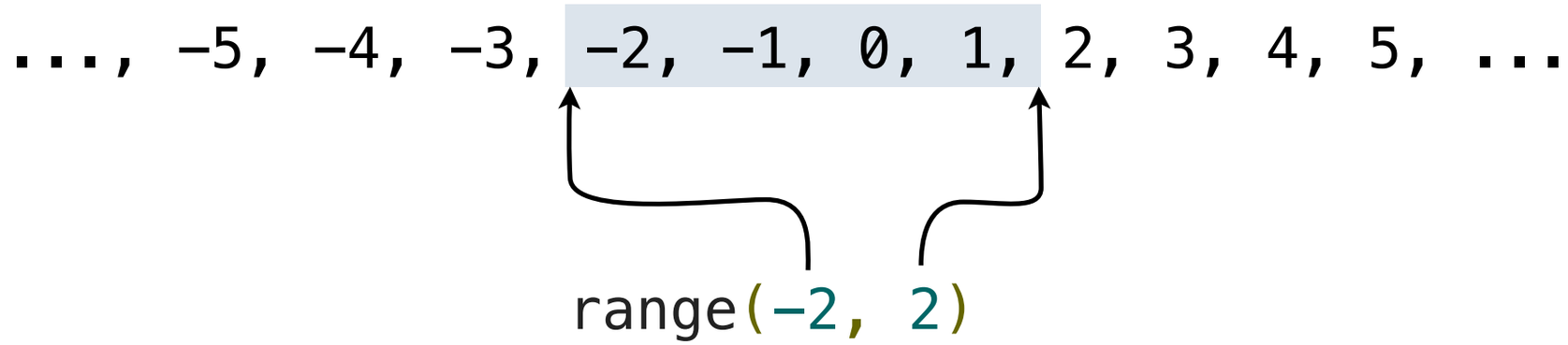

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Tuple construction

Default starting value

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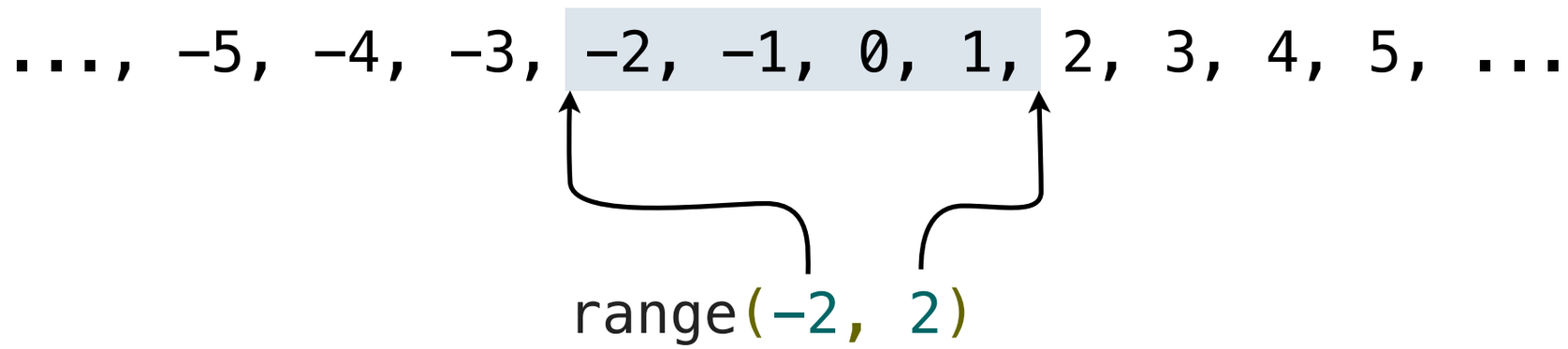

Length: ending value − starting value

(Demo)

Element selection: starting value + index

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(-2, -1, 0, 1)

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The Python sequence abstraction has two more behaviors!

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True
>>> 1828 not in digits
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Slicing.

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Membership.

```
>>> digits = (1, 8, 2, 8)
>>> 2 in digits
True
>>> 1828 not in digits
True
```

Slicing.

```
>>> digits[0:2]
(1, 8)
>>> digits[1:]
(8, 2, 8)
```