Rope II

Suggestions

Definition

- A rope is an augmented binary tree that is used to represent very long strings
- Each leaf node in the rope stores a small part of the string
- Each node p is augmented with the length of the string represented by the rope rooted at p

Suggestion

Maintain a full binary tree
where each non-leaf node
has two non-empty children

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Suggestion

Familiarize yourself with the string methods of the library class

Suggestion

Several public methods require a private, recursive counterpart, including the Constructor

Suggestion

Tackle the three optimizations last

Suggestion

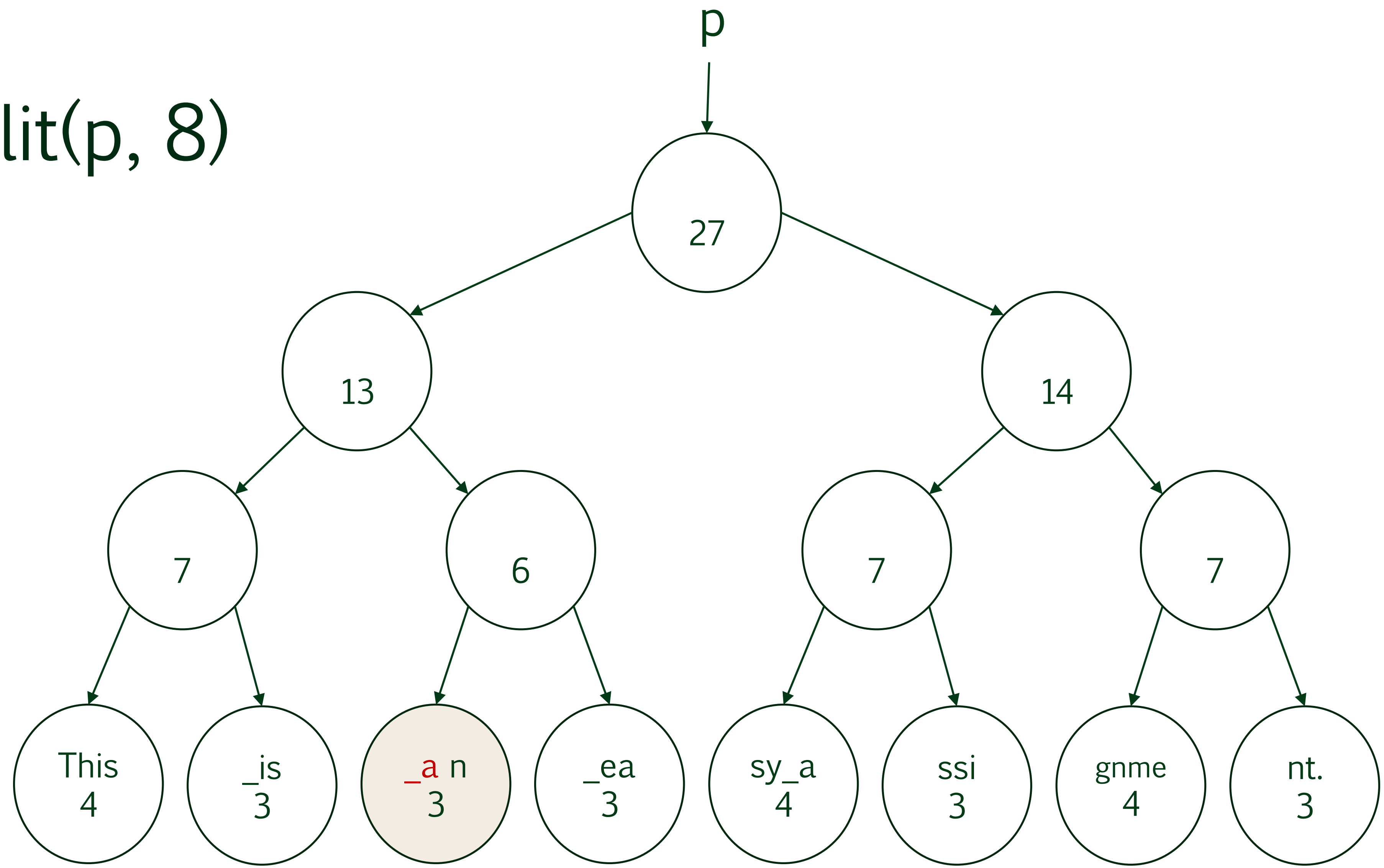
The Split method may be implemented as

Node Split (Node p, int i)

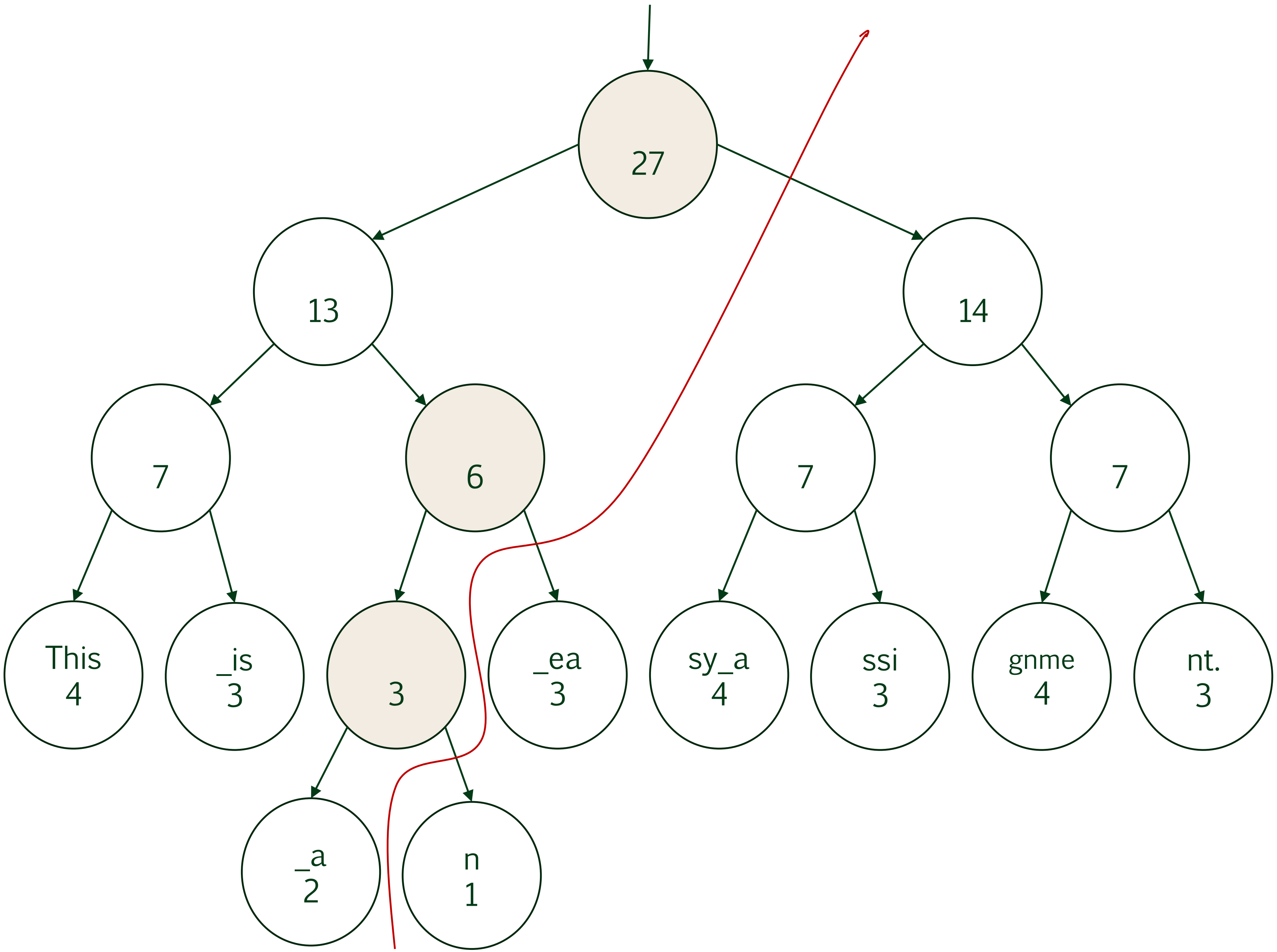
which returns the root of the Rope that represents the right side of the split

p then becomes the root of the Rope that represents the left side of the split

Split(p, 8)



Assuming indices start at 0



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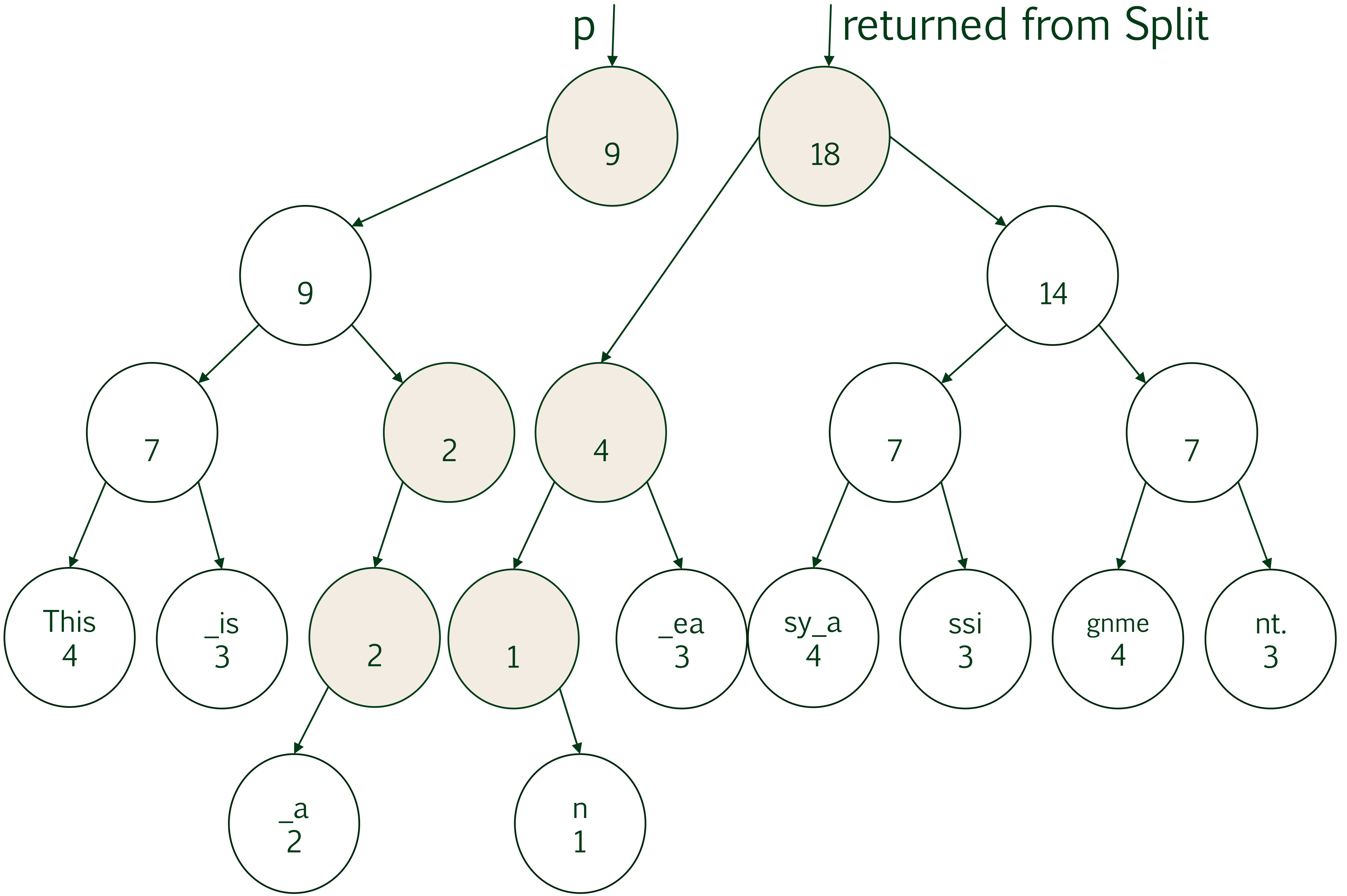
3
_ea 3
sy_a 4
ssi 3
gnme 4
nt. 3
_a 2
n 1


p
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Observation

Splits only occur at right children

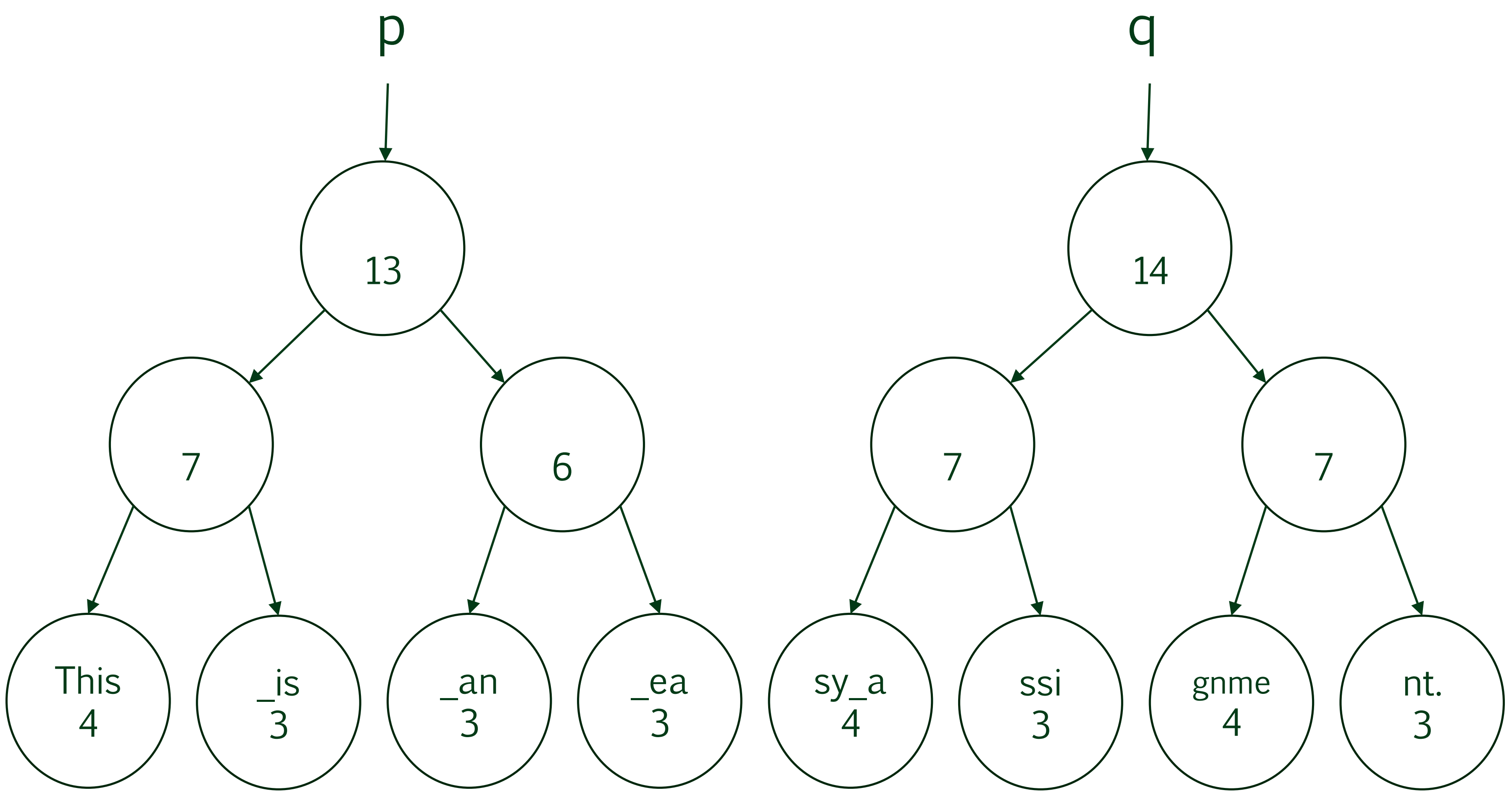
Suggestion

The Concatenate method may be implemented as:

Node Concatenate (Node p, Node q)

which returns a Node whose left and right subtrees are p and q

Note: p or q could be null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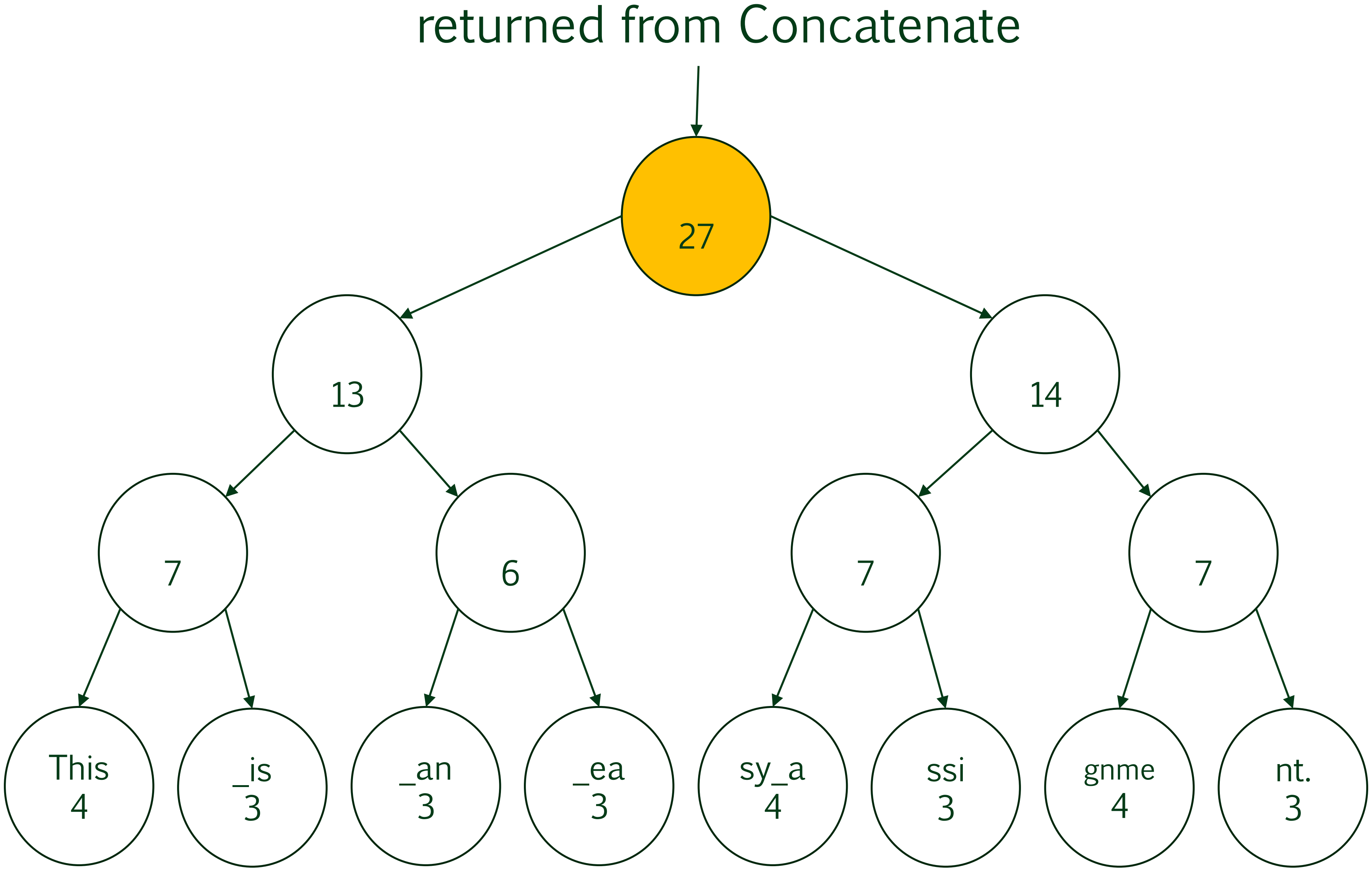
returned from Concatenate
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nt.
3

Suggestion

Do not concatenate with an empty Rope (null)
The binary tree would not be full otherwise

Suggestion

The Substring method can be implemented using two Splits (cf Delete) and two concatenations to reconstruct the Rope

or

The Substring method can be implemented by repeatedly using the CharAt method (but fewer grades will be awarded)

Suggestion

To insert a string at the beginning of a rope pass an index of –1 and treat it as a special case

Suggestion

Draw up your test cases even before you program

They help to guide your implementation

Suggestion

Test a method at a time

Suggestion

Document methods before
you implement them
It also helps to guide your implementation

Suggestion

This is a challenging assignment
Start early
Expect to spend days programming

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