

2689. Extract Kth Character From The Rope Tree Premium

Easy Topics Companies Hint

You are given the `root` of a binary tree and an integer `k`. Besides the left and right children, every node of this tree has two other properties, a **string** `node.val` containing only lowercase English letters (possibly empty) and a non-negative integer `node.len`. There are two types of nodes in this tree:

- **Leaf:** These nodes have no children, `node.len = 0`, and `node.val` is some **non-empty** string.
- **Internal:** These nodes have at least one child (also at most two children), `node.len > 0`, and `node.val` is an **empty** string.

The tree described above is called a *Rope* binary tree. Now we define `S[node]` recursively as follows:

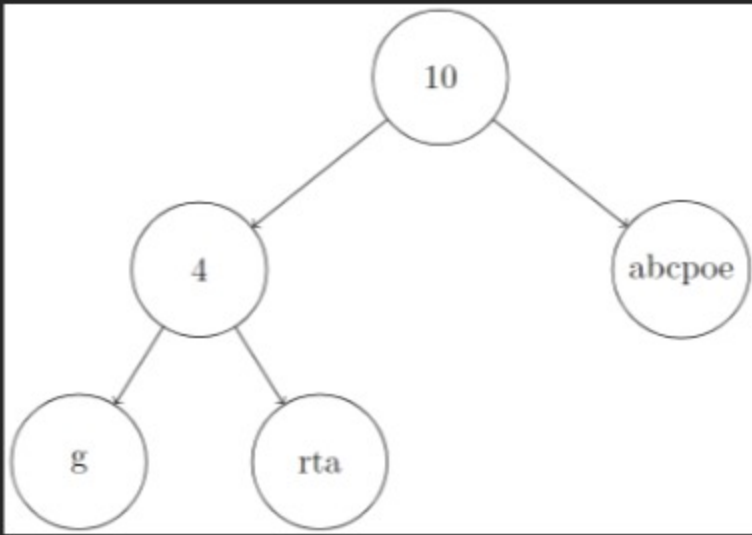
- If `node` is some leaf node, `S[node] = node.val`,
- Otherwise if `node` is some internal node, `S[node] = concat(S[node.left], S[node.right])` and `S[node].length = node.len`.

Return *k-th character of the string* `S[root]`.

Note: If `s` and `p` are two strings, `concat(s, p)` is a string obtained by concatenating `p` to `s`. For example, `concat("ab", "zz") = "abzz"`.

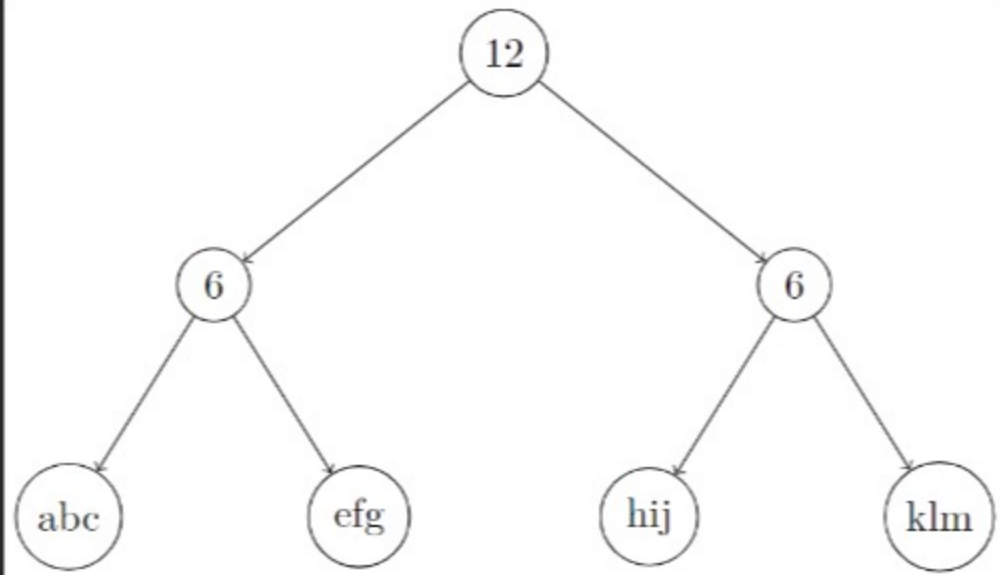
Example 1:

Input: `root = [10,4,"abcpoe","g","rta"]`, `k = 6`
Output: `"b"`
Explanation: In the picture below, we put an integer on internal nodes that represents `node.len`, and a string on leaf nodes that represents `node.val`. You can see that `S[root] = concat(concat("g", "rta"), "abcpoe") = "grtaabcpoe"`. So `S[root][5]`, which represents 6th character of it, is equal to `"b"`.



Example 2:

Input: `root = [12,6,6,"abc","efg","hij","klm"]`, `k = 3`
Output: `"c"`
Explanation: In the picture below, we put an integer on internal nodes that represents `node.len`, and a string on leaf nodes that represents `node.val`. You can see that `S[root] = concat(concat("abc", "efg"), concat("hij", "klm")) = "abcefg hijklm"`. So `S[root][2]`, which represents the 3rd character of it, is equal to `"c"`.



Example 3:

Input: `root = ["ropetree"]`, `k = 8`
Output: `"e"`
Explanation: In the picture below, we put an integer on internal nodes that represents `node.len`, and a string on leaf nodes that represents `node.val`. You can see that `S[root] = "ropetree"`. So `S[root][7]`, which represents 8th character of it, is equal to `"e"`.



Constraints:

- The number of nodes in the tree is in the range `[1, 103]`
- `node.val` contains only lowercase English letters
- `0 <= node.val.length <= 50`
- `0 <= node.len <= 104`
- for leaf nodes, `node.len = 0` and `node.val` is non-empty
- for internal nodes, `node.len > 0` and `node.val` is empty
- `1 <= k <= S[root].length`

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Hint 1

Think of recursive methods.

Hint 2

Write a recursive function that gives a node of the tree and returns S[node].

Hint 3

Call the function above on the root of the tree and get k-th character of it.

Discussion (4)