

# 2905. Count Paths That Can Form a Palindrome in a Tree

## Difficulty : Hard

<https://leetcode.com/problems/count-paths-that-can-form-a-palindrome-in-a-tree>

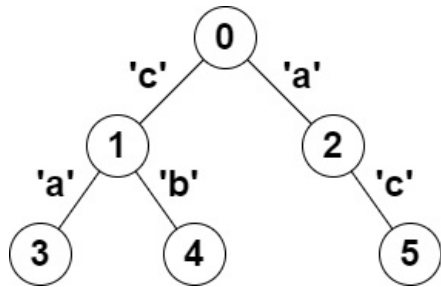
You are given a **tree** (i.e. a connected, undirected graph that has no cycles) **rooted** at node 0 consisting of  $n$  nodes numbered from 0 to  $n - 1$ . The tree is represented by a **0-indexed** array `parent` of size  $n$ , where `parent[i]` is the parent of node  $i$ . Since node 0 is the root, `parent[0] == -1`.

You are also given a string `s` of length  $n$ , where `s[i]` is the character assigned to the edge between  $i$  and `parent[i]`. `s[0]` can be ignored.

Return the number of pairs of nodes  $(u, v)$  such that  $u < v$  and the characters assigned to edges on the path from  $u$  to  $v$  can be **rearranged** to form a **palindrome**.

A string is a **palindrome** when it reads the same backwards as forwards.

### Example 1:



**Input:** `parent = [-1,0,0,1,1,2]`, `s = "acaabc"`

**Output:** 8

**Explanation:** The valid pairs are:

- All the pairs (0,1), (0,2), (1,3), (1,4) and (2,5) result in one character which is always a palindrome.
- The pair (2,3) result in the string "aca" which is a palindrome.
- The pair (1,5) result in the string "cac" which is a palindrome.
- The pair (3,5) result in the string "acac" which can be rearranged into the palindrome "acca".

### Example 2:

**Input:** `parent = [-1,0,0,0,0,0]`, `s = "aaaaa"`

**Output:** 10

**Explanation:** Any pair of nodes  $(u,v)$  where  $u < v$  is valid.

### Constraints:

- $n == \text{parent.length} == \text{s.length}$
- $1 \leq n \leq 10^5$
- $0 \leq \text{parent}[i] \leq n - 1$  for all  $i \geq 1$
- `parent[0] == -1`
- `parent` represents a valid tree.
- `s` consists of only lowercase English letters.