Problem 2791: Count Paths That Can Form a Palindrome in a Tree

Problem Information

Difficulty: Hard
Acceptance Rate: 46.73%
Paid Only: No
Tags: Dynamic Programming, Bit Manipulation, Tree, Depth-First Search, Bitmask

Problem Description

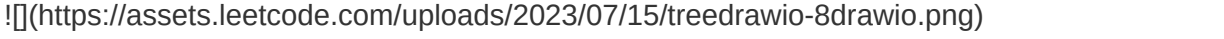
You are given a **tree** (i.e. a connected, undirected graph that has no cycles) **rooted** at node `0` consisting of `n` nodes numbered from `0` to `n - 1`. The tree is represented by a **0-indexed** array `parent` of size `n`, where `parent[i]` is the parent of node `i`. Since node `0` is the root, `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], s = "aaaaa" **Output:** 10 **Explanation:** Any pair of nodes (u,v) where u < v is valid.

Constraints:

* `n == parent.length == s.length` * `1 <= n <= 105` * `0 <= parent[i] <= n - 1` for all `i >= 1` * `parent[0] == -1` * `parent` represents a valid tree. * `s` consists of only lowercase English letters.

Code Snippets

C++:

```
class Solution {
public:
long long countPalindromePaths(vector<int>& parent, string s) {

}
};
```

Java:

```
class Solution {
public long countPalindromePaths(List<Integer> parent, String s) {

}
}
```

Python3:

```
class Solution:
def countPalindromePaths(self, parent: List[int], s: str) -> int:
```