

Problem H: Coins on a Tree

- Time Limit: 5 sec

Problem Statement

There is an undirected tree with N vertices numbered through 1 to N . There is a coin on each vertex, and a lowercase English letter is written on each coin.

You are playing a game to collect all the N coins. You have a string S which is initially empty. You first visit the vertex 1 and then repeatedly move to an adjacent vertex. You may visit each vertex any number of times. Whenever you visit a vertex where a coin is still put, you collect the coin and append the letter on the coin to the end of S . When there is already no coin on the node you visit, you do nothing. Note that the coin on the vertex 1 is collected first.

After collecting all the N coins, you have a string S of length N . What is the lexicographically smallest possible string that S can become?

Input

The input consists of a single test case of the following format.

N
 $p_2\ p_3\ \dots\ p_N$
 $c_1c_2\ \dots\ c_N$

The first line consists of an integer N ($2 \leq N \leq 200,000$), which is the number of vertices on the tree.

The second line consists of $N - 1$ integers. Each p_i ($2 \leq i \leq N$, $1 \leq p_i < i$) represents that the vertices i and p_i are adjacent. Note that p_1 is not given.

The third line consists of a string of N lowercase English letters. The i -th letter c_i ($1 \leq i \leq N$) is the letter on the coin on the vertex i .

Output

Print the lexicographically smallest possible string that S can become after collecting all the N coins.

Sample Input 1	Sample Output 1
7 1 1 2 2 3 3 abbabac	abababc
Sample Input 2	Sample Output 2
8 1 1 3 4 3 1 7 icpcicpc	icpccipc