South Pacific Competitive Programming Association

wisetech global

imc

Problem E
Avaricious Neologism

timelimit: 1 second

The University of Central Florida, publisher of the Central Florida English Dictionary, has hired you to invent some new words for their next edition. You get paid by the letter, so ideally you would like to create the longest word you can. However, you can't just use any random arrangement of letters, since in English, some pairs of letters (also known as bigrams) aren't allowed to be adjacent in a word (such as "cf" or "hk"). UCF has given you a list of pairs of letters that are allowed to appear next to each other, in that order, in a valid word. Your goal is to construct the longest word possible.

The Problem: Given a list of allowed bigrams, construct a longest word possible (if one exists) or indicate that an infinitely long word can be constructed. For a word to be allowed, every pair of adjacent characters in the word must appear in the list of allowed bigrams.

Input

The first line of input contains a single integer, n ($1 \leq n \leq 26^2$), representing the number of allowed bigrams. The next n lines each contain a string s consisting only of 2 lowercase letters, representing a bigram that is allowed to appear in the word. It is guaranteed that all given bigrams are unique.

Output

The first line of output should be a single integer, l, representing the longest possible length of a valid word, or -1 if that length would be infinite. If $l \neq -1$, the second line of output should be a single string of length l, representing a valid word of maximal length. If there are multiple answers, any valid answer will be accepted.

Sample Input 1	Sample Output 1
4 sp ht pt hs	4 hspt

Sample Input 2	Sample Output 2
1 aa	-1

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