Problem ID: classifiedchars

Your friend Dexter has come up with a CTF challenge that he has asked you to solve. He has written down a hidden character sequence of length n consisting of lowercase letters a-z and has challenged you to find his sequence. The only way for you to obtain information about the sequence is by asking queries about consecutive substrings. For each such query Dexter tells you the number of unique characters occurring in that substring. To make the task more challenging, Dexter has limited the number of queries you may ask.

Of course, the information gained from the queries may not be enough to uniquely determine the hidden sequence, as you could always create another solution by permuting the letters of the alphabet. For instance, you would never be able to distinguish cocoa from mimic, no matter how many queries you ask. For this reason, Dexter has told you that you should output the lexicographically minimal correct answer (e.g. output abcb instead of icpc).

> **Did you know that … ?**
>
> …Capture The Flag (CTF) competitions have become very popular in the last few years? If you're motivated to solve cybersecurity puzzles and gain awesome experience (and prizes!), CTFs may be one of the most fun and engaging things you can do (other than competing in the ICPC of course). From reverse engineering to cryptography, from web vulnerabilities to binary exercises, networking, and forensics, you can work on diverse challenges suited for almost every level.

Interaction Protocol

Your submission will be interacting with a special program called the *grader*. This means that the output of your submission is sent to the grader and the output of the grader is sent to the standard input of your submission. This interaction must follow a specific protocol:

The grader will first send an integer n ($1 \leq n \leq 10\,000$), the length of the hidden sequence. The positions in the sequence are numbered from 1 to n.

Your submission must send requests of the following two types:

- One line of the form "? i j" ($1 \leq i \leq j \leq n$). The grader will respond with the number of unique characters that can be found at positions from i to j, inclusive.
- One line of the form "! s", where s is a string consisting of exactly n lowercase letters, the hidden word determined by your submission.

After every request you should *flush* the standard output to ensure that the request is sent to the grader. For example, you can use fflush(stdout) in C++, System.out.flush() in Java, sys.stdout.flush() in Python, and hFlush stdout in Haskell.

Your submission may send at most $300\,000$ requests of the first type.

Your submission must send exactly one request of the second type. After sending this request, it must terminate with exit code 0 as usual.

Your submission will be accepted if it follows the protocol above and it guesses the hidden word correctly. If it sends any invalid request or guesses incorrectly, it will be judged as "Wrong Answer".

The hidden word for each test case is fixed in advance, that is, the grader will *not* adaptively pick the word based on your requests.

Read	Write
4	
	? 1 4
3	
	? 1 2
1	
	? 3 4
2	
	? 2 4
3	
	! aabc