

## D2. Kirk and a Binary String (hard version)

time limit per test: 1 second  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

The only difference between easy and hard versions is the length of the string. You can hack this problem if you solve it. But you can hack the previous problem only if you solve both problems.

Kirk has a binary string  $s$  (a string which consists of zeroes and ones) of length  $n$  and he is asking you to find a binary string  $t$  of the same length which satisfies the following conditions:

- For any  $l$  and  $r$  ( $1 \leq l \leq r \leq n$ ) the length of the longest non-decreasing subsequence of the substring  $s_l s_{l+1} \dots s_r$  is equal to the length of the longest non-decreasing subsequence of the substring  $t_l t_{l+1} \dots t_r$ ;
- The number of zeroes in  $t$  is the maximum possible.

A non-decreasing subsequence of a string  $p$  is a sequence of indices  $i_1, i_2, \dots, i_k$  such that  $i_1 < i_2 < \dots < i_k$  and  $p_{i_1} \leq p_{i_2} \leq \dots \leq p_{i_k}$ . The length of the subsequence is  $k$ .

If there are multiple substrings which satisfy the conditions, output any.

### Input

The first line contains a binary string of length not more than  $10^5$ .

### Output

Output a binary string which satisfied the above conditions. If there are many such strings, output any of them.

### Examples

input	Copy
110	
output	Copy
010	
input	Copy
010	
output	Copy
010	
input	Copy
0001111	
output	Copy
0000000	
input	Copy
0111001100111011101000	
output	Copy
0011001100001011101000	

### Note

In the first example:

- For the substrings of the length 1 the length of the longest non-decreasing subsequence is 1;

### Codeforces Round #581 (Div. 2)

Finished

Practice



### → Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ACM-ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

### → Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

### → Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

### → Submit?

Language: GNU G++11 5.1.0

Choose file: 选择文件 未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

### → Problem tags

data structures greedy math strings  
\*2100

No tag edit access

### → Contest materials

- For  $l = 1, r = 2$  the longest non-decreasing subsequence of the substring  $s_1 s_2$  is 11 and the longest non-decreasing subsequence of the substring  $t_1 t_2$  is 01;
- For  $l = 1, r = 3$  the longest non-decreasing subsequence of the substring  $s_1 s_3$  is 11 and the longest non-decreasing subsequence of the substring  $t_1 t_3$  is 00;
- For  $l = 2, r = 3$  the longest non-decreasing subsequence of the substring  $s_2 s_3$  is 1 and the longest non-decreasing subsequence of the substring  $t_2 t_3$  is 1;

- Announcement (en) ☐
- Tutorial (en) ☐

The second example is similar to the first one.

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