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402. Remove K Digits

Notes

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Two algorithms with detailed explaination

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(/pingo) pingo (/pingo) ★ 40

The first algorithm is straight-forward. Let's think about the simplest case: how to remove 1 digit from the number so that the new number is the smallest possible? Well, one can simply scan from left to right, and remove the first "peak" digit; the peak digit is larger than its right neighbor. One can repeat this procedure k times, and obtain the first algorithm:

```
string removeKdigits(string num, int k) {
        while (k > 0) {
            int n = num.size();
            int i = 0;
            while (i+1<n && num[i]<=num[i+1])  i++;
            num.erase(i, 1);
            k--;
        }
        // trim leading zeros
        int s = 0;
        while (s<(int)num.size()-1 && num[s]=='0')  s++;
        num.erase(0, s);

        return num=="" ? "0" : num;
    }
```

The above algorithm is a bit inefficient because it frequently remove a particular element from a string and has complexity O(k*n).

One can simulate the above procedure by using a stack, and obtain a O(n) algorithm. Note, when the result stack (i.e. res) pop a digit, it is equivalent as remove that "peak" digit.

```
string removeKdigits(string num, int k) {
        string res;
        int keep = num.size() - k;
        for (int i=0; i<num.size(); i++) {
            while (res.size()>0 && res.back()>num[i] && k>0) {
                res.pop_back();
                k--;
            }
            res.push_back(num[i]);
        }
        res.erase(keep, string::npos);

        // trim leading zeros
        int s = 0;
        while (s<(int)res.size()-1 && res[s]=='0')  s++;
        res.erase(0, s);

        return res=="" ? "0" : res;
    }
```

Notes

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pinkfloyda (/pinkfloyda) ★ 350 Apr 9, 2017, 5:14 PM

Nice solution, but would you mind share some thinking processes of how to come up with the solution to look for the peak value. When I first came across this problem, I go into a totally different solution which turns out to be wrong.

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shenghanfang (/shenghanfang) ★ 0 Mar 30, 2017, 4:20 AM

thanks a lot！！

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SNSN2033 (/snsn2033) ★ 0 Jan 9, 2017, 6:53 PM

Brief and clear explanation, thanks!

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