Weekly Contest - 5

402. Remove K Digits

Solved

Medium · Topics · Companies

Given string num representing a non-negative integer `num`, and an integer `k`, return *the smallest possible integer after removing* `k` *digits from* `num`.

Example 1:

> **Input:** num = "1432219", k = 3
> **Output:** "1219"
> **Explanation:** Remove the three digits 4, 3, and 2 to form the new number 1219 which is the smallest.

Example 2:

> **Input:** num = "10200", k = 1
> **Output:** "200"
> **Explanation:** Remove the leading 1 and the number is 200. Note that the output must not contain leading zeroes.

Example 3:

> **Input:** num = "10", k = 2
> **Output:** "0"
> **Explanation:** Remove all the digits from the number and it is left with nothing which is 0.

1 4 3 2 2 1 9 , K=3

Maintain a monotonic Stack

Stack → 1219

9 for(digit : number)

1 while(k>0 and ! stack empty and stack(top) > digit)

2 K:0 pop from stack

2 push digit into stack, k--;

3 K=1

4 K=2 Stack now contains the answer

1

```
class Solution {
    public String removeKdigits(String num, int k) {
        int n = num.length();
        if (k == n) return "0";

        char[] stack = new char[n];
        int stackTop = -1;
        int remove = k;

        for (char digit : num.toCharArray()) {
            while (remove > 0 && stackTop >= 0 && stack[stackTop] > digit) {
                stackTop--;
                remove--;
            }
            stackTop++;
            stack[stackTop] = digit;
        }

        int nonZeroStart = 0;
        while (stack[nonZeroStart] == '0' && nonZeroStart < n - k - 1)
            nonZeroStart++;
        return String.valueOf(stack, nonZeroStart, n - k - nonZeroStart);
    }
}
```

401. Binary Watch

Solved

Easy · Topics · Companies · Hint

A binary watch has 4 LEDs on the top to represent the hours (0-11), and 6 LEDs on the bottom to represent the minutes (0-59). Each LED represents a zero or one, with the least significant bit on the right.

- For example, the below binary watch reads `"4:51"`.

Given an integer `turnedOn` which represents the number of LEDs that are currently on (ignoring the PM), return *all possible times the watch could represent*. You may return the answer in **any order**.

The hour must not contain a leading zero.

- For example, `"01:00"` is not valid. It should be `"1:00"`.

The minute must consist of two digits and may contain a leading zero.

- For example, `"10:2"` is not valid. It should be `"10:02"`.

Try every possible time combination

Check if bit count of Hour + bit count of minute = turned on

```
public static List<String> readBinaryWatch(int turnedOn) {  2 usages  Nazmul Hasan
    List<String> answer = new ArrayList<>();
    StringBuilder time = new StringBuilder();
    for (int hour = 0; hour < 12; hour++) {
        for (int minute = 0; minute < 60; minute++) {
            if (Integer.bitCount(hour) + Integer.bitCount(minute) == turnedOn) {
                time.setLength(0);
                time.append(hour).append(":");
                if (minute < 10) time.append(0);
                time.append(minute);
                answer.add(time.toString());
            }
        }
    } return answer;
}
```

403. Frog Jump

Solved

Hard · Topics · Companies

A frog is crossing a river. The river is divided into some number of units, and at each unit, there may or may not exist a stone. The frog can jump on a stone, but it must not jump into the water.

Given a list of `stones` positions (in units) in sorted **ascending order**, determine if the frog can cross the river by landing on the last stone. Initially, the frog is on the first stone and assumes the first jump must be `1` unit.

If the frog's last jump was `k` units, its next jump must be either `k - 1`, `k`, or `k + 1` units. The frog can only jump in the forward direction.

Example 1:

> **Input:** stones = [0,1,3,5,6,8,12,17]
> **Output:** true
> **Explanation:** The frog can jump to the last stone by jumping 1 unit to the 2nd stone, then 2 units to the 3rd stone, then 2 units to the 4th stone, then 3 units to the 6th stone, 4 units to the 7th stone, and 5 units to the 8th stone.

Example 2:

> **Input:** stones = [0,1,2,3,4,8,9,11]
> **Output:** false
> **Explanation:** There is no way to jump to the last stone as the gap between the 5th and 6th stone is too large.

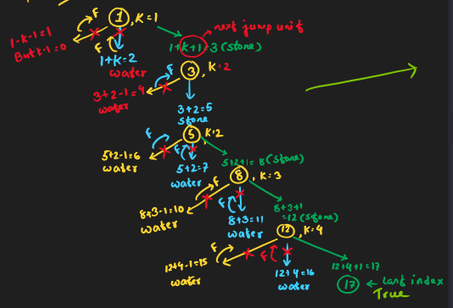
Frog at ①, jump unit k

jump at index s(i)+k-1 · jump to index s(i)+k · jump to index s(i)+k+1

1) k-1 can not be ≤0 as the frog can only jump forward

2) s(i)+k or s(i)+k+1 = last index → Return true

Always ① stones[1] always 1




```
private static HashMap<Integer, Integer> map;  4 usages

public static boolean canCross(int[] stones) {  2 usages  Nazmul Hasan
    if (stones[1] != 1) return false;
    map = new HashMap<>();
    int n = stones.length;

    for (int i=0; i<n; i++)
        map.put(stones[i], i);

    return solve(stones, idx: 1, n, prevJump: 1, new Boolean[n+1][n+1]);
}
private static boolean solve(int[] stones, int idx, int n, int prevJump, Boolean[][] dp) {
    if (idx == n-1) return true; // reached the end of the river
    if (idx >= n) return false; // out of bound

    if (dp[idx][prevJump] != null) return dp[idx][prevJump];

    // the frog can jump k-1, k, k+1 units
    boolean answer = false;
    for (int nextJump = prevJump-1; nextJump <= prevJump+1; nextJump++) {
        if (nextJump > 0) {
            // since the frog can only jump in the forward direction
            int nextStone = stones[idx] + nextJump;
            if (map.containsKey(nextStone)) // get the index of next jump
                answer = solve(stones, map.get(nextStone), n, nextJump, dp);
            if (answer) break;
        }
    }
    return dp[idx][prevJump] = answer;
}
```

400. Nth Digit

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Given an integer `n`, return the n^{th} digit of the infinite integer sequence `[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ...]`.

Example 1:

> **Input:** n = 3
> **Output:** 3

Example 2:

> **Input:** n = 11
> **Output:** 0
> **Explanation:** The 11^{th} digit of the sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ... is a 0, which is part of the number 10.

Constraints:

- `1 <= n <= 2^31 - 1`

Let n : 250

Tier1 1 ~ 9 = 9-1+1 = 9 numbers of digit 1

9×1 = 9 digit

Tier2 10 ~ 99 = 99-10+1 = 90 numbers of digit 2

90×2 = 180 digits

Tier3 100 ~ 999 = 999-100+1 = 900 numbers of digit 3

900×3 = 2700 digits ← 180+9 = 189

as n: 250, n is of Tier 3

Step 1 : Find the tier (range) ← 100 ~ 999

Step 2 : Find the number 250 - 189 = 61 th digit of tier 3

Step 3 : Find the digit

number = start + remaining digits / tier = $10^{(tier-1)}$ + remaining digits / tier

120 th number of tier3 = 119

remainder = 61 % 3 = 1

number = 100 + 61/3 = 120

if remainder 0, last digit of number

else Return the number[remainder] ← 0 based str

```
public static int findNthDigit(int remainingDigits) {  2 usages
    long tier = 1;
    long digits = 9; // number of digits in this tier
    long start = 1;

    // Step 1 -> Find the tier
    while (remainingDigits > tier * digits) {
        remainingDigits -= (int) (tier * digits);
        start *= 10;
        digits *= 10; // 9 90 900 .....
        tier++;
    }
    // Step 2 -> Find the number
    long tierNumber = remainingDigits / tier;
    long remainder = remainingDigits % tier;

    // Step 3 -> Find the digit
    if (remainder == 0) { // answer is the last digit of previous number
        String numberStr = String.valueOf( i: start + tierNumber - 1);
        System.out.println(numberStr);
        return numberStr.charAt(numberStr.length()-1) - '0';
    } else { // answer is the digit of current number
        String numberStr = String.valueOf( i: start + tierNumber);
        return numberStr.charAt((int) (remainder - 1)) - '0';
    }
}
```