Assignment 10 (Advance Programming)

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118. Pascal's Triangle

Given an integer numRows, return the first numRows of Pascal's triangle.

In Pascal's triangle, each number is the sum of the two numbers directly above it as shown:

Example 1:

Input: numRows = 5

Output: [[1],[1,1],[1,2,1],[1,3,3,1],[1,4,6,4,1]]

Example 2:

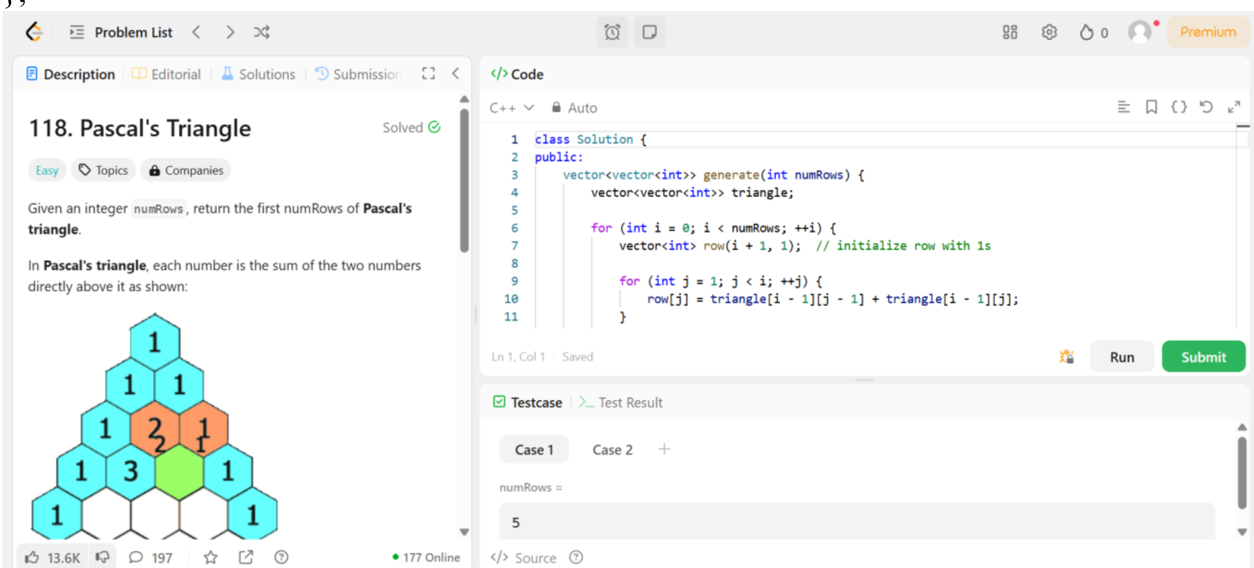
Input: numRows = 1

Output: [[1]]

Solution:

```
class Solution {
public:
    vector<vector<int>> generate(int numRows) {
        vector<vector<int>> triangle;

        for (int i = 0; i < numRows; ++i) {
            vector<int> row(i + 1, 1);  // initialize row with 1s
```

```
            for (int j = 1; j < i; ++j) {
                row[j] = triangle[i - 1][j - 1] + triangle[i - 1][j];
            }

            triangle.push_back(row);
        }

        return triangle;
    }
};
```



461. Hamming Distance

The Hamming distance between two integers is the number of positions at which the corresponding bits are different.

Given two integers x and y, return the Hamming distance between them.

Example 1:

Input: x = 1, y = 4

Output: 2

Explanation:

1   (0 0 0 1)

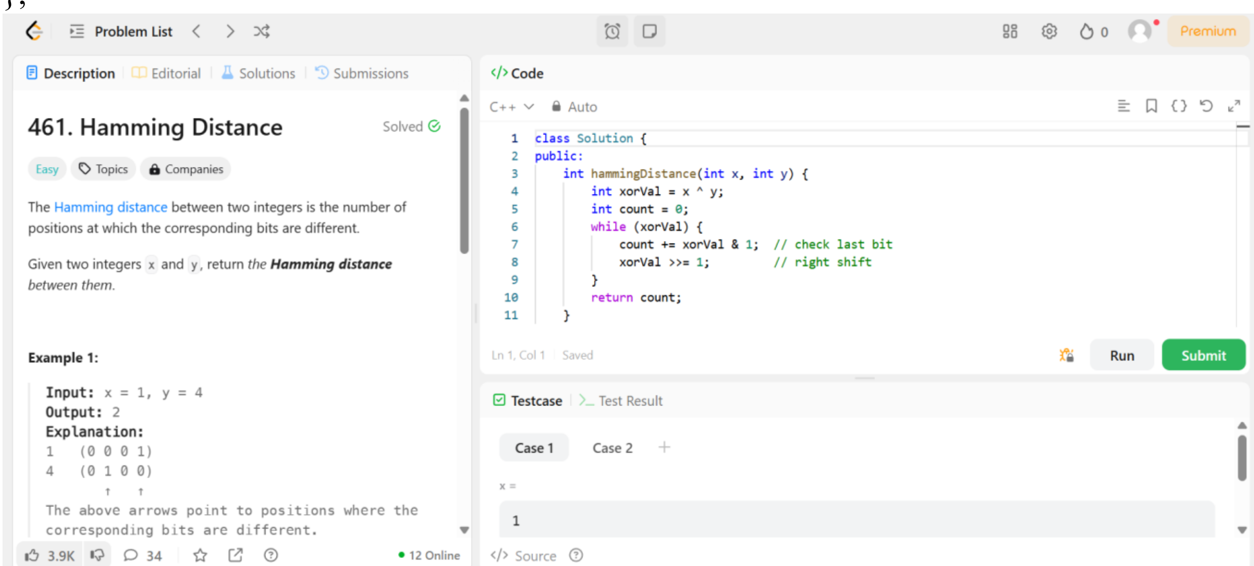
4   (0 1 0 0)

       ↑   ↑

The above arrows point to positions where the corresponding bits are different.

Solution:

```
class Solution {
public:
    int hammingDistance(int x, int y) {
        int xorVal = x ^ y;
        int count = 0;
        while (xorVal) {
            count += xorVal & 1;  // check last bit
            xorVal >>= 1;         // right shift
        }
        return count;
    }
};
```



621. Task Scheduler

You are given an array of CPU tasks, each labeled with a letter from A to Z, and a number n. Each CPU interval can be idle or allow the completion of one task. Tasks can be completed in any order, but there's a constraint: there has to be a gap of at least n intervals between two tasks with the same label.

Return the minimum number of CPU intervals required to complete all tasks.

Example 1:

Input: tasks = ["A","A","A","B","B","B"], n = 2

Output: 8

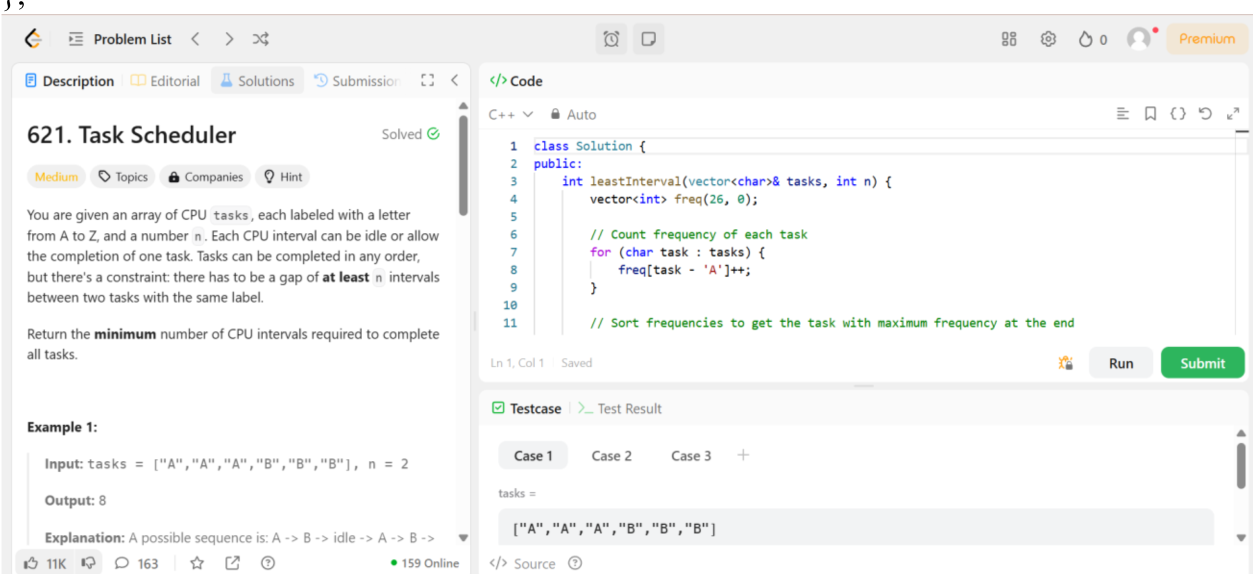
Explanation: A possible sequence is: A -> B -> idle -> A -> B -> idle -> A -> B.

After completing task A, you must wait two intervals before doing A again. The same applies to task B. In the 3rd interval, neither A nor B can be done, so you idle. By the 4th interval, you can do A again as 2 intervals have passed.

Solution:

```
class Solution {
public:
    int leastInterval(vector<char>& tasks, int n) {
        vector<int> freq(26, 0);

        // Count frequency of each task
        for (char task : tasks) {
            freq[task - 'A']++;
        }

        // Sort frequencies to get the task with maximum frequency at the end
        sort(freq.begin(), freq.end());

        int maxFreq = freq[25];  // Highest frequency
        int maxFreqCount = 1;

        // Count how many tasks have the same maximum frequency
```

```
        for (int i = 24; i >= 0; i--) {
            if (freq[i] == maxFreq) {
                maxFreqCount++;
            } else {
                break;
            }
        }

        // Calculate the minimum time using the greedy formula
        int partCount = maxFreq - 1;
        int partLength = n - (maxFreqCount - 1);
        int emptySlots = partCount * partLength;
        int availableTasks = tasks.size() - (maxFreq * maxFreqCount);
        int idles = max(0, emptySlots - availableTasks);

        return tasks.size() + idles;
    }
};
```



191. Number of 1 Bits

Given a positive integer n, write a function that returns the number of set bits in its binary representation (also known as the Hamming weight).

Example 1:

Input: n = 11

Output: 3

Explanation:

The input binary string 1011 has a total of three set bits.

Example 2:

Input: n = 128

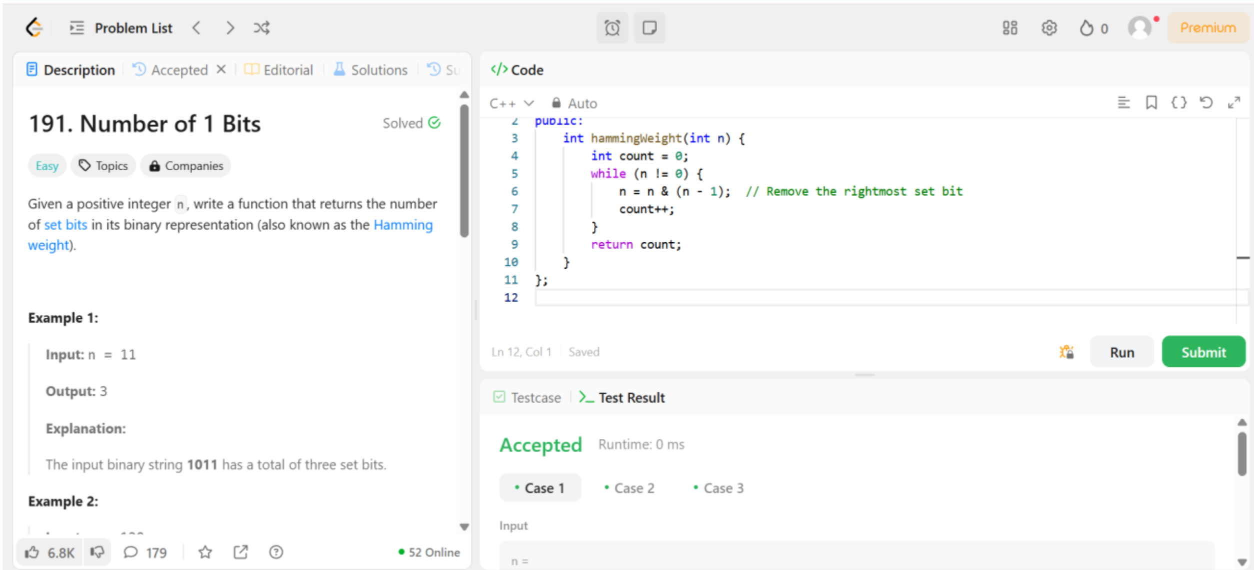
Output: 1

Explanation:

The input binary string 10000000 has a total of one set bit.

Solution:

```
class Solution { public:
   int hammingWeight(int n) {
int count = 0;        while (n !=
0) {            n = n & (n - 1);
count++;
      }       return
count;
};
```



42. Trapping Rain Water

Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.

Example 1:

Input: height = [0,1,0,2,1,0,1,3,2,1,2,1]

Output: 6

Explanation: The above elevation map (black section) is represented by array [0,1,0,2,1,0,1,3,2,1,2,1]. In this case, 6 units of rain water (blue section) are being trapped.

Solution:

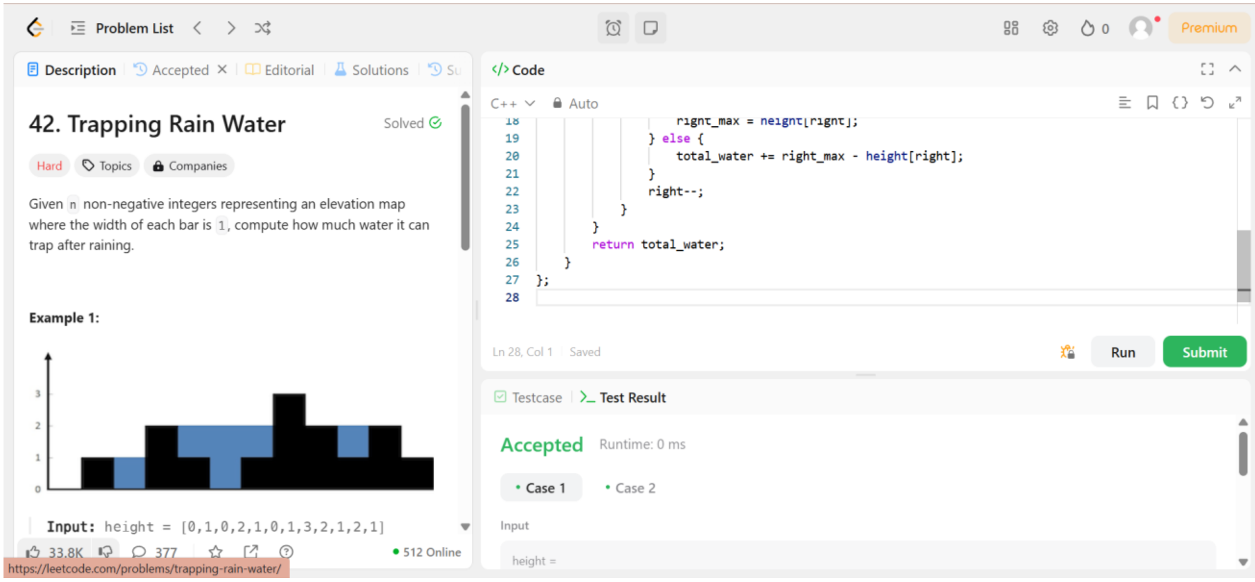
class Solution { public:

int trap(vector<int>& height) {

int n = height.size(); if (n ==

0) return 0; vector<int>

```
left_max(n, 0);         vector<int>
right_max(n, 0);

        left_max[0] = height[0];
for (int i = 1; i < n; ++i) {
            left_max[i] = max(left_max[i-1], height[i]);
        }

        right_max[n-1] = height[n-1];
for (int i = n-2; i >= 0; --i) {
            right_max[i] = max(right_max[i+1], height[i]);
        }

        int total_water = 0;
for (int i = 0; i < n; ++i) {

            total_water += min(left_max[i], right_max[i]) - height[i];
        }

        return total_water;
    }
};
```



Problem List
Premium
Description
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42. Trapping Rain Water
Solved
Hard
Topics
Companies
Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.
Example 1:
3
2
1
0
Input: height = [0,1,0,2,1,0,1,3,2,1,2,1]
33.8K
377
512 Online
https://leetcode.com/problems/trapping-rain-water/
} else {
total_water += right_max - height[right];
}
right--;
}
}
return total_water;
}
};
Ln 28, Col 1
Saved
Run
Submit
Testcase
Test Result
Accepted
Runtime: 0 ms
Case 1
Case 2
Input
height =