42. Trapping Rain Water

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Tags	Hard
link	https://leetcode.com/problems/trapping-rain-water/
Problem Number	42

Description

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.

Approach

- Brute force approach is to find next biggest element on each left and right side of a bar `b` and then the rainwater captured by b is min(height(r_b), height(l_b)) - height(b). Complexity - O(n^2)
- Optimised approach - keep pushing the bars in a stack, while pushing if you find that top of stack is less than the bar you are pushing, this implies water can be trapped for top of stack (given the stack has one more element beside top)

```
class Solution {
public:
    int trap(vector<int>& height) {
        int len = height.size();

        stack<int> bars;
        int result = 0;

        for (int i = 0; i < len; i++) {
            // if top of stack is less than current bar then water can be captured for top of stack.
            while(!bars.empty() and height[bars.top()] < height[i]) {
                int top = bars.top();
                bars.pop();
                if (bars.empty()) break;

                int width = i - bars.top() - 1;
                int h = min(height[i], height[bars.top()]) - height[top];
                result += width * h;
            }
            bars.push(i);
        }
        return result;
    }
};
```