Optimal Merge Pattern

Problem

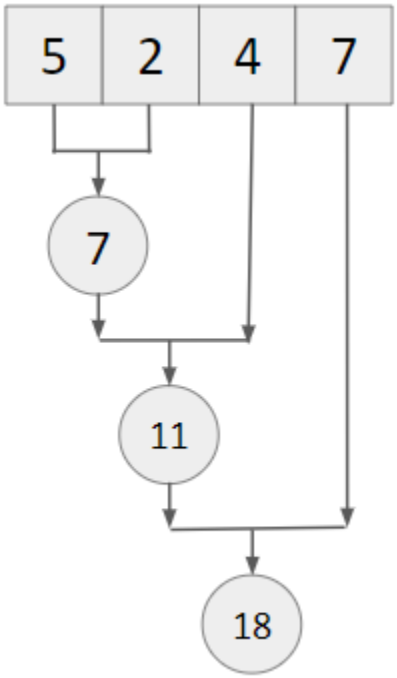
You are given n files, with their computation times in an Array. You can perform the following operation

Operation:

Choose/ take any two files, add their computation times and append it to the list of computation times. {Cost = Sum of computation times}

Do this until we are left with only one file in the array. We have to do this operation so that we can get the minimum cost finally.

Example

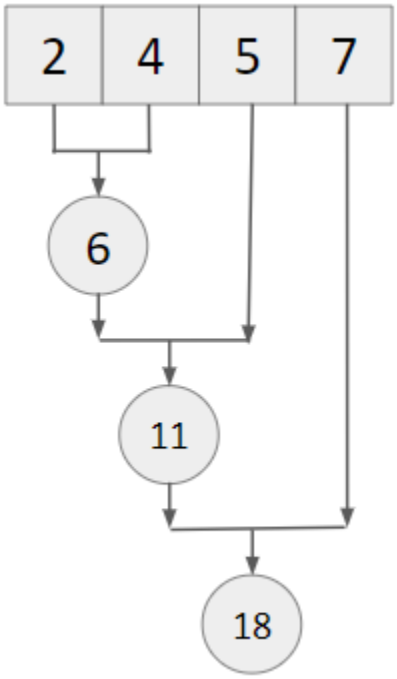


Cost = 7 + 11 + 18 = 36 {may not be minimum}

Approach

1. Push all elements to a min heap.
2. Take the top 2 elements one by one, and add the cost to the answer. Push the merged file to the min heap.
3. When a single element remains, output the cost.

Dry Run



Cost = 6 + 11 + 18 = 35 {minimum}

Code

```
#include<bits/stdc++.h>
using namespace std;
#define int long long

signed main() {
    int n; cin >> n;

    vector<int> a(n);
    for(int i=0; i<n; i++) {
        cin >> a[i];
```

```
    }

    priority_queue<int, vector<int>, greater<int>> minheap;
    for(int i=0; i<n; i++) {
        minheap.push(a[i]);
    }

    int ans = 0;

    while(minheap.size() > 1) {
        int e1 = minheap.top();
        minheap.pop();
        int e2 = minheap.top();
        minheap.pop();

        ans += e1 + e2;
        minheap.push(e1 + e2);
    }

    cout << ans << endl;
    return 0;
}
```