HUST

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HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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Applied Algorithm Lab

Max even sub-sequence

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Max even sub-sequence

- Given a sequence of n integers $a_1, \ldots, a_n$.
- A subsequence of a consists of continuous elements of a

  (for example, ai, ai+1, . . . ,aj).
- The weight of a subsequence is defined to be the sum of its elements. A subsequence is called even-subsequence if its weight is even.
- Find the even-subsequence of a having largest weight.

Input

```
8
4 -5 2 4 -8 2 3 1
```

Output

```
6
```

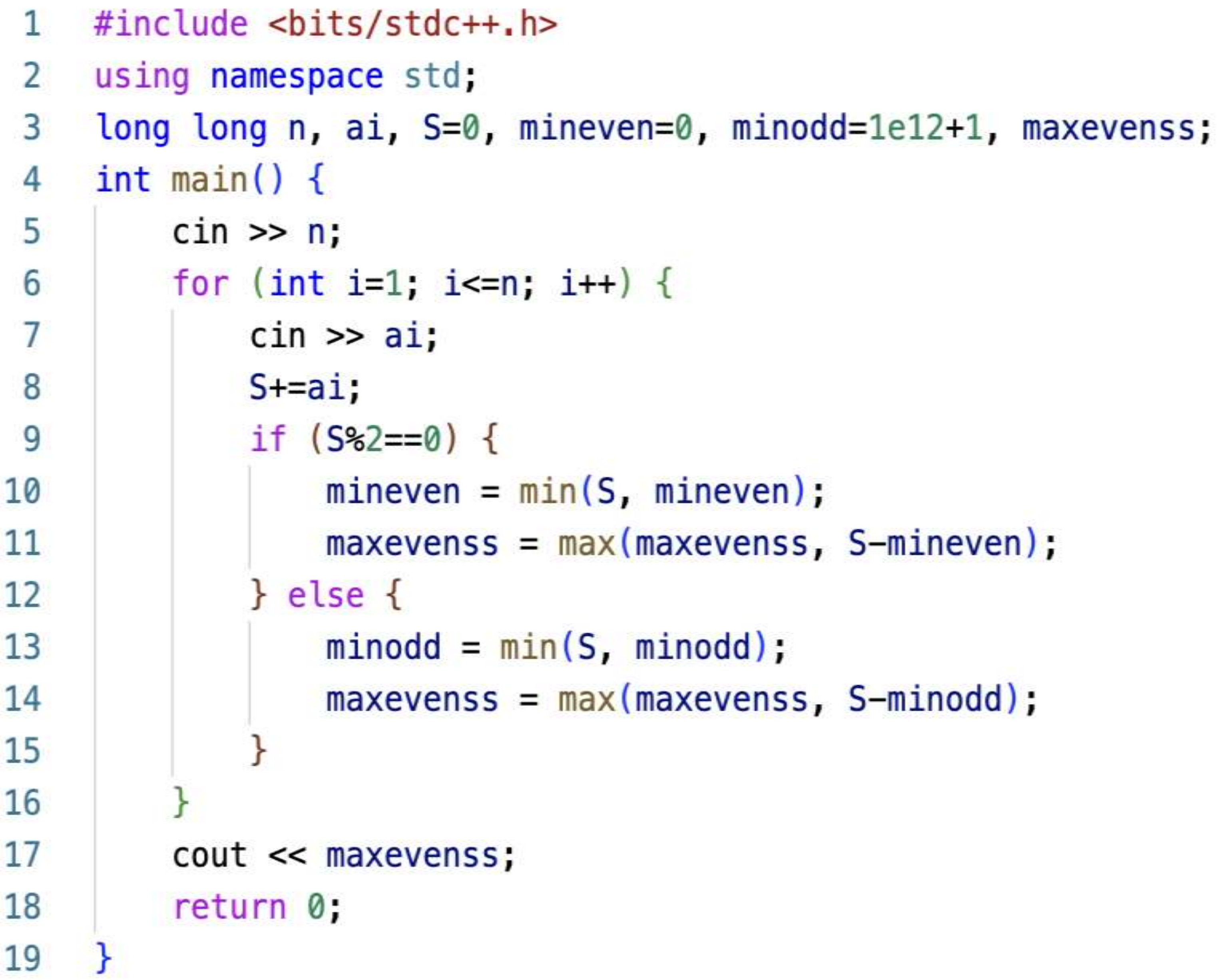
Max even sub-sequence

- Idea to solve: dynamic programming
- Construct a cumulative array S, where S[i] is sum of from a[1] to a[i].
  - Let f[i][0] be minimal S[j] with 1 <= j <= i and j is even.
  - Let f[i][1] be minimal S[j] with 1 <= j <= i and j is odd.
  - Formula:
    - f[i][0] = min(S[i], f[i – 2][0]), with i is even;
    - f[i][1] = min(S[i], f[i – 2][1]), with i is odd;
- Return:

$$\max_{i:1\to n}(S[i] \ - f[i][i \%2])$$

- Complexity: O(n).

Max even sub-sequence - Implementation



```cpp
#include <bits/stdc++.h>
using namespace std;
long long n, ai, S=0, mineven=0, minodd=1e12+1, maxevenss;
int main() {
    cin >> n;
    for (int i=1; i<=n; i++) {
        cin >> ai;
        S+=ai;
        if (S%2==0) {
            mineven = min(S, mineven);
            maxevenss = max(maxevenss, S-mineven);
        } else {
            minodd = min(S, minodd);
            maxevenss = max(maxevenss, S-minodd);
        }
    }
    cout << maxevenss;
    return 0;
}
```

THANK YOU !