1. Introduction to the judge environment

2. Prefix sum/precomputation technique

## Sample Problem: Even Pairs

#### Input:

- $\blacktriangleright$  first line: a positive integer n
- $\blacktriangleright$  second line: a sequence  $x_0, \ldots, x_{n-1} \in \{0, 1\}$

## Sample Problem: Even Pairs

#### Input:

- ightharpoonup first line: a positive integer n
- second line: a sequence  $x_0, \ldots, x_{n-1} \in \{0, 1\}$

**Output:** a single line containing the number of pairs  $0 \le i \le j < n$  such that

$$x_i + \cdots + x_j$$

is even.

Input: n=4

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A: 0 1 1

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Interval (red) sum = 0

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Interval (red) sum = 2

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A few points, but also a **TIMELIMIT** error on harder test sets!

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- ▶ this type of analysis is **very important** in this course

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Running time:  $O(n^2)$ 

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# Running time: O(n)

## **Even Pairs - Conclusion**

#### Technique: Partial sums/Precomputing

- ► Precomputing partial sums allows computing the sum of the elements in an interval in constant time.
- ► More generally, precomputing certain values can speed up the running time of an algorithm.

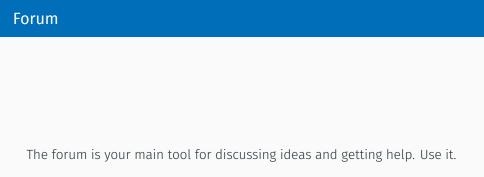
## Judge Feedback

Besides **CORRECT**, **TIMELIMIT**, and **WRONG-ANSWER**, the judge can give the following feedback:

ASSERTION-FAILURE SIGABRT: memory screw-up or assertion failure SEGMENTATION-FAULT SIGSEGV: memory screw-up (e.g. out-of-bounds)

**RUN-ERROR** nonzero exit status

**FORBIDDEN** bad syscall or other safety



Of course, you will only learn if you first try to solve the problems **on** your own.

1. Apply spoiler warnings

#### Example

#### SPOILER <<<

Set this text to have a white foreground. It will then be invisible unless marked. The <<< ... >>> exploit a bug in the email plugin to also remove the text in plain-text email.

>>>

- 1. Apply spoiler warnings
- 2. Describe the problem, not your guesses or summaries

### Example

**Bad** When I compile, it tells me it cannot find it.

Good When I run g++ -o foo foo.cpp, I get

bash:  $g++\302\240-o'$ : command not found

- 1. Apply spoiler warnings
- 2. Describe the problem, not your guesses or summaries
- 3. Code: describe what fails and what you expect instead

## Example

Bad The code below doesn't work. Help?

Good I am trying to solve Problem 1. I tried strategy something. My code is below. For some reason, when running it on the provided test case it emits no solution instead of 1. What am I doing wrong?

- 1. Apply spoiler warnings
- 2. Describe the problem, not your guesses or summaries
- 3. Code: describe what fails and what you expect instead
- 4. Code: post minimal examples

## Example

**Bad** When I call .foo() on a vector, it segfaults. Bug!

Good I am trying to something. The code is below. I get a segfault in the line that calls .foo(), but if I remove that line the program continues. What am I doing wrong?

- 1. Apply spoiler warnings
- 2. Describe the problem, not your guesses or summaries
- 3. Code: describe what fails and what you expect instead
- 4. Code: post minimal examples
- 5. Do not rush to claim that you have found a bug

C++

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It is important that you know certain parts of the C++ standard library, such as:

- ► how to do I/O using <iostream>,
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