1. Introduction to the judge environment

2. Prefix sum/precomputation trick

## Sample Problem: Even Pairs

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- ▶ second line: a sequence  $x_0, \ldots, x_{n-1} \in \{0, 1\}$

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

$$x_i + \cdots + x_j$$

is even.

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A few points, but also a timelimit error on harder test cases!

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

## Second approach

Observation: if we know the parity of the sum

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then based on the parity of  $x_{j+1}$  we also know the parity of

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# Running time: $\Theta(n)$

## Even pairs - conclusion

## Tricks/techniques: Partial sums/Precomputing

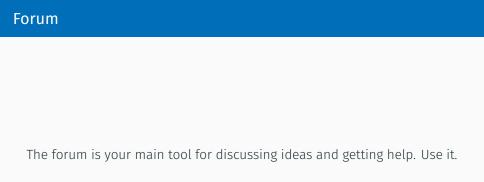
- Precomputing partial sums allows computing the sum of the elements in an interval in constant time.
- ▶ More generally, precomputing certain values can speed up the running time of an algorithm.

## Judge Results

Besides **correct**, **timelimit**, and **wrong-answer**, the judge can give the following results.

assertion-failure SIGABRT: memory screwup or assertion failure segmentation-fault SIGSEGV: memory screwup 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
```

- 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 <u>something</u>. My code is below. For some reason, when running it on the provided testcase 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 <u>something</u>. 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?

- 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. Don't rush to claim that you have found a bug

Further reading: <u>How To Ask Questions The Smart Way</u>

Learning C++ is beyond the scope of this course.

- ► True beginners should probably read a book
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- ▶ Useful in any case: <u>C++ FAQ Lite</u>

STL is part of the C++ standard library. It is important that you know

- how and when to use the classes std::vector, std::priority\_queue, std::set and std::map,
- ▶ how to do I/O using <iostream>, and
- ▶ how to use the **sort** function from the **<algorithm>** header file.

The most important things to remember:

You can find all that you need at our website: http://www.cadmo.ethz.ch/education/lectures/HS17/ algolab/index.html

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- ▶ Next Monday at 17:00, we have the first problem of the week.