



# Baltic Olympiad in Informatics

## *Competition Rules*

Palanga, 2014



# Competition Rules

BOI 2014 is an individual competition between contestants from nine participating countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland and Sweden. Each country is allowed to send up to six contestants.

## 1.1 Competition Schedule

The competition days of BOI 2014 are Sunday, 27th of April, and Monday, 28th of April. On each competition day the contestants will have five hours to complete three tasks.

There will be a Practice Competition held on Saturday, 26th of April, to familiarise the contestants with the contest environment, including workstations and the grading system. The solutions submitted during the Practice Competition will be evaluated, but the results will not be considered in the final ranking.

## 1.2 Environment and Supplies

For competition each contestant will have a desk with a workstation.

The following software will be available on all workstations:

1. Linux Distribution: Debian Wheezy 32-bit, LXDE.
2. Web browsers: Firefox.
3. Terminal emulators: lxterminal, xterm.
4. Editors: joe, vim, gvim, eclipse-cdt, emacs, lazarus, gedit, nano, scite, codeblocks, geany, fp.
5. Compilers and interpreters: gcc/g++ 4.7.1, fpc 2.6.0, python 2.7.3/3.2.3 debuggers: gdb 7.4.1, ddd 3.3.12.
6. Documentation for Pascal, C, C++, STL.

Blank, grid paper and pens will be available in the competition room. Contestants can bring pens, pencils and erasers with them.

If a contestant wishes to bring a keyboard or mouse with wired USB connector or small mascots or English dictionaries to the competition, these must be submitted to the Technical Staff during the Practice Competition. Any of these will be checked and, if cleared, will be provided to the contestant during the contest. After the first competition day, the contestant must leave these items on his or her table if (s)he wants to use them during the second competition day. After the second competition day the contestant must take any of these items with him or her.

## 1.3 Tasks

The tasks posed at BOI 2014 are intended to be of algorithmic nature. That is, the focus is on designing correct and efficient algorithms.

Each task will be divided into one or more subtasks, each worth a portion of the total points.

## 1.4 Solutions

Unless otherwise stated in the task description, the solution of a task is a program written in the Pascal or C++ language. Both C++03 and C++11 versions are supported. The program submitted by a contestant must be contained in a single source file.

Solutions will have to fit within time and memory limits specified for every task separately. The memory limit is on the overall memory usage including executable code size, stack, heap, etc. Limits are applied to individual test runs.

Unless otherwise stated in the task description, submissions are required to read data from standard input and write to standard output.

## **1.5 Starting the Competition**

When contestants enter the competition room at the beginning of the competition, their workstations will be switched on. Competition tasks will be inside envelopes next to the workstations. The account details needed to access the grading system will be given to each contestant in the envelope with the tasks. Contestants are not allowed to open the envelopes or touch the workstations until the start signal is given.

Each contestant's task descriptions and technical information are presented in English and in his or her native language if such translation is prepared by his or her team leader. In case of any discrepancies, the English text is binding and official.

## **1.6 Assistance and Requests**

During the competition communication is allowed only with room supervisors and the Scientific Committee.

Contestants may submit questions, technical support requests and perform printing. A contestant may ask a room supervisor for assistance at any time. The supervisors will NOT answer questions about the competition tasks, but will deliver paper, printouts, attend to hardware problems, help to find toilets, etc.

If a contestant encounters problems with hardware, (s)he can request help from the room supervisor. In case of hardware failure, extra time will be granted to a contestant but this will cover only the amount of time needed to replace the hardware.

Questions must be submitted using a special form in the grading system in English or in the contestant's native language.

In the latter case the Scientific Committee will give answer to the question only after the question is translated to English by the team leader. Contestants should phrase their questions so that a yes/no answer would be meaningful. Questions will be answered with one of the following:

1. “YES”
2. “NO”
3. “ANSWERED IN TASK DESCRIPTION (EXPLICITLY OR IMPLICITLY)” — The task description contains sufficient information. The contestant should read it again carefully.
4. “INVALID QUESTION” — The question is most likely not phrased so that a yes/no answer would be meaningful. The contestant is encouraged to rephrase the question.
5. “NO COMMENT” — The contestant is asking for information that the Scientific Committee cannot give.

The Scientific Committee will answer every question submitted by contestants. This may take some time, so the contestant should continue working while waiting for the answer to a given question. The contestant shall not be involved in the discussion.

In case of similar questions submitted by several contestants, the Scientific Committee may give an announcement via the grading system or by presenting it in competition rooms.

## **1.7 Delivering the Solutions**

Contestants submit their solutions using the grading system and use it to view the status of their submissions. Each contestant

can make at most one submission for each task per minute at most 100 submissions per task in total.

When a solution is submitted, it will appear in the system, but there may be a few minutes delay before it is graded. Once it is graded, the contestant will be able to view summary results of a few sample tests. If these results are satisfactory, the contestant may release test the submission. This shows the results of the submission on the official tests for all subtasks. To release test a submission, it is necessary to forfeit a release token. Contestants will be given one release token per task every 20 minutes. At any time, at most three tokens can be saved up for each task.

In the event of technical failure that leads to some contestants not receiving feedback for their release tested tasks, the rules regarding the allowed frequency of submissions and release testing may be changed. In such event students will be notified via the grading system and a live announcement.

Submissions are graded whether or not they are release tested. If a contestant runs out of tokens, (s)he will not be able to obtain feedback, but can continue to submit and the last submission will count towards the final grading.

Each input scenario in the grading system will have one of the following outcomes:

1. Correct
2. Wrong answer
3. Run-time error (or out of memory)
4. Time limit exceeded

The grading system will show the running time and memory used by the contestant's solution. No information on the actual data or the output produced by the contestant's solution will be given to the contestant.

The contestant may deduce from the feedback his or her provisional score for the task. However, there is a small chance that the score may change due to appeals, or indeterminacy of the contestant's submission. Indeterminacy may arise intentionally due to the use of pseudo-random number generators, or unintentionally due to programming bugs or marginal running time. Moreover, in the event of technical failure or incorrect test data, all submissions may be re-graded during contest after the problem has been fixed, and this may change the score. If submissions are re-graded, contestants will be notified via the grading system and/or a live announcement.

## 1.8 Grading

Each subtask will be considered solved if every test in it is solved correctly and within time and memory limits. A submission will receive positive score only for subtasks that it solves.

The score for each task will be the maximum of any released submissions and the last submission, whether the last submission is released or not. Submissions may be re-graded many times, and the final score will be that yielded by the final grading.

Grading procedures can be overridden in the task description.

## 1.9 Ending the Competition

Contestants will be given a warning both 30 and 10 minutes before the end of the competition. After the end of the competition, contestants must immediately stop working and no further submissions are allowed.



## 1.10 Cheating

Any of the actions outlined below are considered illegal:

1. Using any printed materials, except official BOI 2014 materials or any electronic devices or data carriers, except official BOI 2014 equipment.
2. Bringing to competition room any electronic devices or data carriers.
3. Using a workstation or an account assigned to someone else.
4. Communicating in any form to other contestants or people other than BOI 2014 staff.
5. Tampering with or compromising the grading system.
6. Attempting to store information in any part of the file system other than the home directory for their account or the /tmp directory.
7. Attempting to access any machine on the network or the Internet, other than the grading system.
8. Attempting to reboot or alter the boot sequence of any workstation.
9. Any other actions that is deemed by the Scientific Committee as intentionally aimed at gaining unfair advantage over other contestants.

Moreover, the following rules apply:

1. Submissions must not attempt to access any files on the file system.

2. Submissions must be single-threaded and must not fork.

Performing illegal actions or breaching any of the rules outlined above may be considered cheating and may result in disqualification.

## 1.11 Appeal Process

After each competition day every team leader will receive detailed results of his or her team's contestants. There will be time allocated to check results on the grading system.

In case of any disagreement with the results the team leader may submit written appeal in English. In case of incorrect tests, the incorrect tests are removed and the scores of all contestants are updated.

Scientific Committee answers each appeal in the written form and gives a short report to team leaders about all appeals received after each contest day.

## 1.12 Medal Allocation

After competition all contestants are ranked in descending order with respect to their final scores. Medals are allocated according to the following algorithm.

1. *Score for gold medal* is greatest score where at least  $1/12$  of contestants has final score equivalent or greater than this. All contestants whose final score is at least score for gold medal will receive gold medal and diploma.
2. *Score for silver or gold medal* is greatest score where at least  $1/4$  of contestants has final score equivalent or greater than this. All contestants whose final score is at least score

for silver or gold medal and who are not awarded by gold medal and diploma (as described above) will receive silver medal and diploma.

3. *Score for medal* is least score where at most  $1/2$  of contestants has final score equivalent or greater than this. All contestants whose final score is at least score for medal and who are not awarded by gold or silver medal and diploma (as described above) will receive bronze medal and diploma.

Only official contestants are counted when calculating the medal boundaries.