

Competition Rules

Task Types

There are two types of tasks at RMI 2019:

- **Batch tasks:** solutions comprise a single source file of a computer program which reads data from the standard input and writes its answer to the standard output.
- **Manager tasks:** solutions comprise a single source file of a computer program which implements a number of functions. The program will be compiled and linked together with a manager program that calls these functions in a specified order. The Scientific Committee will provide the manager, which handles input and output and grades the solution.

Limits

For every task the following limits will be enforced on the contestants' submissions:

- **Time limit:** a limit on the total processor time the process may consume while solving a given input.
- **Memory limit:** a limit on the total amount of memory the process may have allocated at any moment. Note that this limit includes not only the variables, but also the executable code, global data, the stack etc. There is no separate limit on the stack size.
- **Source size limit:** no submitted program may exceed 50 kB in size.

All task-dependent limits will be announced in the problem statements.

Competition Equipment and Environment

The contestant machines will run a specially prepared Linux distribution. Compiler versions that will be used:

- gcc version 7.4.0, compilation command (for the program abc.c):
`gcc -DEVAL -static -O2 -o abc abc.c -lm`
- g++ version 7.4.0, compilation command (for the program abc.cpp):
`g++ -DEVAL -static -O2 -std=c++11 -o abc abc.cpp`

C++ 11 will be provided both on contestants' PC's and the evaluating system.

Installed software environment will include:

- OS: Ubuntu 18.04.3 LTS, Gnome graphical shell
- editors / IDEs: Vim, Emacs, Gedit, Nano, Geany, Code::Blocks 16.01, Eclipse
- browsers: Firefox
- utilities: GDB, Valgrind, Python, Ruby

Submitting Solutions

The contestants' submissions are evaluated by a contest system. The contest system consists of a contest server. The contestants will be able to run their solutions on the server using the test facility.

- Contestants submit solutions to the contest server via a web-based submission system running on that server. Each contestant will be assigned a username and a password for accessing the web application on the contest server.
- Submissions are evaluated on the server. The software environment on the server is as close as possible to the environment on the contestant machines. The hardware of the server is close to the hardware of the contestant machines.
- The submission facility will accept C or C++ source files, verify that the program compiles and obeys the stated limits on program source size; the submission facility will then run the program on the task test cases (different from the ones given in the task description), enforcing the relevant run-time resource constraints, grade the solutions and report the results to the contestants.
- For each task full feedback will be enabled.
- For each task at most 20 submissions are allowed.
- For each competition day at most 50 submissions are allowed, overall.

- A wait period of one minute will be enforced between submissions from the same contestant, for the same task.

The solution must terminate its execution normally in order to be graded. If the solution returns an error code different from zero, the contest system will consider that the solution had a runtime error and no points will be awarded for the corresponding test case. Therefore, solutions in C or C++ have to define the main function as 'int main' and terminate the execution with 'return 0' or 'exit(0)'.

If a contestant submits more than one solution for the same task, the best submission will be graded at the end of the contest.

It is the responsibility of the contestants to submit their solutions to the contest system before the contest is finished. We advise the contestants to reserve enough time before the end of the contest to make sure that all of their solutions are submitted.

Contestants may use the test interface of the contest system to run their submitted solutions on test data of their choice. Contestants may upload at most 50 tests per contest day, and at most 20 tests per task.

Scoring

For each task the test data will be divided into groups, with each group containing one or more test inputs. A test input is solved correctly if the submitted program produces a correct output file within the enforced limits. A group is solved correctly if each of the inputs it contains is solved correctly.

Points are awarded only for correctly solved groups of inputs. If there are partial grading rules for the problem, then the score for an input group will be the lowest among the scores for the particular test inputs contained in the group.

Feedback

For all tasks full feedback will be enabled. Every time contestants submit a solution, they receive full feedback for that submission.

Clarification Requests

During the first hour of competition, contestants may submit written questions concerning any ambiguities or items needing clarification in the competition tasks. All questions regarding the problems must be submitted via the competition server, expressed either in the contestant's native language or in English.

If required, delegation leaders will translate their contestants' questions into English after they are submitted and before they are sent to the Scientific Committee. The Scientific Committee will respond to every question submitted by the contestants. Contestants should phrase their questions so that a yes/no answer will be meaningful.

Questions will be answered with one of the following:

- **yes**
- **no**

- **Answered in the task description (explicitly or implicitly):** The task description contains sufficient information. The contestant should read it again carefully.
- **Invalid question:** The question is not phrased so that a yes/no answer would be meaningful. The contestant is encouraged to rephrase the question.
- **No comment:** The contestant is asking for information that the Scientific Committee cannot give.

If contestants have questions or issues not related to the problems (e.g. computer or network problems, request for additional blank papers, etc), they should notify the staff in the contest room by raising their hand.

Announcements

In case the Scientific Committee makes verbal announcements during the competition, these announcements will also be available on the Competition Server's web interface. These announcements will be in the English language only. The web interface also shows the official time remaining in the contest.

Conduct of Contest

Submitted programs are not allowed to:

- use external libraries (e.g., crt, graph);
- access the network;
- fork;
- open and create files others than those specified in the task statement;
- attack the system security or the grader;
- execute other programs;
- change file system permissions;
- read file system information;
- make system calls not related to solving the competition task.

During the contest, contestants are not allowed to:

- access the network for anything other than communicating with the competition server;
- communicate with persons other than RMI staff;
- reveal their passwords;
- intentionally damage or endanger any part of the competition environment;
- use any printed materials and electronic devices brought by themselves with the exception of a keyboard.

Attempting any of the above actions may result in disqualification.

In the competition room, blank paper and writing utensils will be provided. On the competition days, contestants may not bring anything into the competition rooms, but:

- writing utensils,
- simple wristwatches,
- small mascots (see below),
- English dictionaries (see below).

If a contestant wants to bring small mascots or English dictionaries to the competition, these must be submitted to the technical staff during the practice competition day. Any of these will be checked and, if cleared, will be given to the contestant in the first competition day. After the first competition day, contestants must leave these items on their workstation if they want to use them during the second competition day. Once again these will be checked and, if cleared, will be given to the contestant in the second competition day. After the second competition day contestants must take any of these items with them.

Any attempt to bring any other item into the competition room will be considered cheating. In particular, during competition rounds it is strictly prohibited to bring any computing or communication devices or printed materials.

During the contest analysis, contestants are free to bring and use anything.

Appeal Process

At the end of each competition day, submitted solutions are judged using data which conforms to the specifications given in the problem statement, but which is unknown to contestants during the competition.

A Team Leader may file an appeal to the Scientific Committee before 16:00 in the afternoon of the same day.

Every appeal will be reviewed by the Scientific Committee and the team leader will be notified about the committee's decision.

In the event that a mistake is discovered in the grading of a task, the mistake will be corrected and the submissions of all contestants will be re-graded and re-scored, whether or not the scoring of that particular submission has been appealed. Note that re-scoring may result in a higher or lower score for any contestant. Should anyone's score change after grading results have been distributed, new results will be printed and distributed to them.

Medal Allocation

After the second Competition Day and before the RMI Awards Ceremony the medal distribution is determined by an automatic procedure, based on the number of points the contestants achieved. The medal awards are uniquely determined by the following rules:

1. The score necessary to achieve a gold medal is the highest score such that at least one twelfth of all contestants receive a gold medal.
2. The score necessary to achieve a silver medal is the highest score such that at least one fourth of all contestants receive a silver or a gold medal.
3. The score necessary to achieve a bronze medal is the highest score such that at least one half of all contestants receive a medal.

Each team's score will be calculated as the sum of the best three scores of its members. The final standings will be posted on the official website and the team with the highest score will be awarded the RMI Cup.