SACO Competition Rules

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Competition Dates

The Final Round SACO competition will take place from Friday September 14 (Arrival Day) to Tuesday September 18 (Departure Day). The First Competition Day is Saturday, September 15th, and the Second Competition Day is Sunday, September 16th. There will be a practice session before the first competition.

Competition Equipment

The competition machine (SCILAB A) is an Intel Celeron processor with a standard US keyboard, a mouse, and a colour screen.

Paper and writing utensils will be provided. Competitors may NOT take any material such as computing equipment (including calculators, communication devices, cell-phones, organisers, PDAs, digital cameras), books, manuals, written or printed materials, or digital media (diskettes, CD-ROMs, flash drives etc) into the competition area. A competitor who is in possession of this type of material in the competition room may be disqualified.

Programming Environment

The following programs will be available:

- GCC compiler for C and C++, version 3.4, with the Dev - C++ IDE
- Free Pascal 2.0 with the included IDE
- The Sun JDK 1.5 with Eclipse IDE
- Python 2.5, with the included IDE (IDLE)
- GNU Emacs.

The marking system will use the same versions of all compilers and interpreters.

The competitor should be familiar with the programming package of his/her choice, including the use of libraries, units or classes. The competitor should be able to execute programs, change the working directory and manage files, and use a web browser.

Additional tools may be available for assisting the competitors with the tasks. *Documentation about the computing environment, which does not reveal the nature of the tasks, will be made available at the practice session.*

Competition Tasks

All of the tasks in SACO are designed to be algorithmic in nature. There are two types of tasks: tasks for which a solution comprises a single source file of a computer program, and tasks for which the solution comprises a set of output data files.

Efficiency plays an important role in some tasks. Whenever efficiency of algorithmic computations is important, it will be possible to score at least 50% with at least one correct but inefficient algorithm. It is important, therefore, for competitors to attempt a task even if the

competitor does not know how to solve the hardest possible test cases.

Tasks for which a program source file is requested as a solution:

When a program source file is required as a solution, the program source provided by the competitor must be contained in a single source file. The task documentation will specify:

- the input and output data format and value ranges;
- smaller value ranges valid for at least 50% of the test cases;
- the resource limitations for the computations (e.g. CPU time, memory);
- any other constraints on the program behaviour.

Tasks for which a set of output files is requested as a solution

When a set of output data files is required as a solution, no program source should be handed in. The input data files are obtained from the hand-in system. The task documentation will specify the input and output data format.

Input and output data:

In all tasks, input and output data consists of a sequence of items. An item is a string of printable non-white-space characters (ASCII code from 33 through 126). An item may represent an integer or a general string; the meaning of each item will be given in the task specification.

Spaces and end-of-line characters separate items. The format of the input data will be given in the task specification. The output data files should be formatted strictly according to the task-specific instructions. However, the grading system scores output files in such a way that extra white space (spaces and end-of-line characters) between or around items is ignored.

Practising

The competition computers will be available for practice during Saturday morning. All competitors must take part in the practice session on Saturday. Before each competition round, the computers will be assigned randomly to the competitors (with a different assignment each time).

Competition Procedures

The following procedures will be adopted during the competition.

Starting the competition:

Competitors will be ushered in to the competition room, 5 minutes before the competition starts. A randomly chosen computer is assigned to each competitor (with a different assignment each time). The computer will be powered up and will display a login window. The competition envelope containing the task definitions and other necessary information will be in front of the computer. Competitors are not allowed to touch the keyboard or open the envelope until the start signal is given. At the starting signal, competitors may open their envelopes and use their computers.

Questions:

During the first hour of competition, competitors may submit written questions concerning any ambiguities or points needing clarification in the competition tasks. Questions must be submitted

on the provided Clarification Request Forms. The questions are submitted to the Scientific Committee.

The Scientific Committee will answer every question submitted by the competitors. Since this may take some time, competitors should continue working while waiting for the answer to their questions. The only responses which will be given are "YES", "NO," and "NO COMMENT"; If the committee feels that the contestant has not understood the task, they may choose to provide extra explanatory text. Competitors should nevertheless phrase their questions so that a yes/no answer will be meaningful. Competitors will not be involved in or exposed to discussion regarding their questions.

Assistance:

Competitors may ask for assistance at any time. The committee members will not answer questions about the competition tasks, but will deliver Clarification Request Forms, help locate toilets and refreshments, and assist with computer problems.

Printing:

Competitors will **not** be able to print during the competition.

Backups:

The network fileserver has redundant storage. There are no backup facilities, so competitors should make copies of important files before overwriting them.

Test execution:

For tasks that require programs as solutions, a competitor will be able to submit a solution along with an input file for test execution. The test execution system will compile and execute the program under Linux, enforcing the resource limitations for the particular task. The program output, the execution time, and possibly error messages will be displayed. The test system will be turned off 5 minutes before the end of the competition. This is done to improve the hand-in response at the crucial hand-in time.

Test execution will not be available for tasks that require a set of output files as the solution.

Submitting:

Competitors will be able to submit their solutions through a facility provided in the competition environment. For tasks that require programs as solutions, the submission facility will verify that the program compiles and obeys the stated limits on source code size and compile time. It will run the program on a simple test case that is given in the task description, enforcing the relevant run-time resource constraints. If the submission produces the correct output, then the submission is accepted for grading. For tasks that require output data files as solutions, the submission facility will accept all submissions for grading without checking them.

Competitors may submit any number of times for each task; each accepted submission replaces any other submissions of that task by that competitor. The last accepted submission by a competitor for a task is officially graded in a separate process and competitors will not be informed about the results until after the competition.

Ending the competition round:

Warnings will be given with 15 minutes remaining in the round (a verbal announcement "15

minutes"), 5 minutes remaining (a verbal announcement "5 minutes") and 1 minute remaining (a verbal announcement "1 minute"), and the end of the round will be announced (a verbal announcement "end of competition round").
At the announcement ending the round, competitors must immediately stop working, without switching off their computers. Competitors should then wait at their desks without operating their computers or touching anything on their desks; an additional announcement will be made instructing them to leave their tables and exit the competition room. At this point, competitors may take with them the contents of their competition envelopes.

Grading

The grading system evaluates the submitted tasks after the competition round. For tasks that require programs as solutions, the submitted source files will be re-compiled under Linux, enforcing the source file size and compilation time constraints. The compiler options are as follows:

- Pascal: `-ap -vw -O2 -Xs`
- C/C++: `-pipe -Wall -O2 -s -lm`
- Java: `-g:none`
- Python: `-O -O`

The source file may be at most 4MB, may take at most 30 seconds to compile, and may not cause the compiler to consume more than 64MB of memory.

The grading system will then execute the compiled program under Linux, enforcing the task-specific run-time resource constraints. Typically, there will be a CPU run-time limit and a limit on total memory use. Every limit applies independently for each test case; if any limit is exceeded, no points will be awarded for that test case. The actual limits will be specified in the task materials. If the submission facility accepts a program, that only means that the program compiled successfully and it correctly solved the simple test case, within the resource constraints, but no more. In particular, it does not mean that the program would obey the resource constraints when given different input. The grading results and evaluation data used for grading will be made available to each competitor. Appeals requesting re-grading can be submitted to the Evaluation Committee.

Other Information

A competitor trying to

- interfere with another competitor's activities,
- break the installations or evaluation facilities,
- harmfully interfere with the running of the competition in any way
- communicate in any way during a competition round with anyone other than the competition staff

will be disqualified from the competition.

The competition computers are connected via a local area network for submitting solutions and running test executions. Competitors are not allowed to access the network for any other purpose or with any tools other than the tools provided by the organisers. Even sending a single 'ping' command is strictly prohibited. The competition staff should be contacted for help with any suspected network problems. Also, competitors are not allowed to make any material accessible to the network from their computers.

Submitted programs

Are not allowed to:

- access the network,
- fork or execute external programs,
- create files other than those required in the task definition,
- attack the system security or the grader,
- attempt to execute other programs,
- change file system permissions, and
- read file system information other than the input file given in the task description.

A competitor whose program attempts any of the above may be disqualified.