Rocky Mountain Regional Competition

University of Saskatchewan Site Instructions

Site Director: Chris Dutchyn (dutchyn@cs.usask.ca)
Regional Contest Director: Warren McEvoy (wmacevoy@gmail.com)

2–3 November 2018
This page intentionally left blank.
Welcome to the University of Saskatchewan site for the 2018 Rocky Mountain Regional Competition, part of the ACM International Collegiate Programming Contest. We are honoured to host in celebration of the 50th anniversary of the founding of our Computer Science department. This is a chance for you and your teammates to demonstrate your problem-solving and programming prowess. Competition will be intense: more than XX teams from XX different universities will be competing at five different sites across two provinces and eight states.

Our schedule for events is given in Table 1. Note that an orientation and a debriefing surround each of the competitions (practice and regional).

Table 1: Schedule of Events

<table>
<thead>
<tr>
<th>Friday – November 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registration</strong></td>
</tr>
<tr>
<td><strong>Supper</strong></td>
</tr>
<tr>
<td><strong>Practice Session</strong></td>
</tr>
<tr>
<td><strong>Welcome and Orientation</strong></td>
</tr>
<tr>
<td><strong>Practice Competition</strong></td>
</tr>
<tr>
<td><strong>Debriefing</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saturday – November 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
</tr>
<tr>
<td><strong>Regional Competition</strong></td>
</tr>
<tr>
<td><strong>Orientation</strong></td>
</tr>
<tr>
<td><strong>Regional Competition</strong></td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td><strong>Coaches – Spinks 386</strong></td>
</tr>
<tr>
<td><strong>Scoreboard Disabled</strong></td>
</tr>
<tr>
<td><strong>Debriefing</strong></td>
</tr>
<tr>
<td><strong>Banquet and Awards</strong></td>
</tr>
<tr>
<td><strong>door prizes during meal</strong></td>
</tr>
<tr>
<td><strong>Problem Solution Sketches</strong></td>
</tr>
<tr>
<td><strong>Results and Awards</strong></td>
</tr>
</tbody>
</table>
Regional Instructions

Practice session supper and the competition lunch are come and go as you please; you are permitted to bring food to the computers – avoid spilling or damaging the machines.

The banquet dinner is on the second floor of Marquis Hall, south-east of Thorvaldson.

1 Rules

This competition is regulated by the rules and procedures set out at the ACM ICPC website, https://icpc.baylor.edu/regionals/rules. A brief summary of some of these rules is given below.

In this competition, your team (of at most three qualified students) will be given three (3) copies of several programming problems: some will be simple, others will be quite difficult. But each problem has equal weight; solving a simple problem counts as much as solving a difficult one. You must solve as many of them as you can, in any order, and in the shortest amount of time you can.

Solutions to problems submitted for judging are called runs. Each run is judged as accepted or rejected by a judge, and the team is notified of the results. General notification of accepted runs may be suspended at an appropriate time to keep the final results secret. The time of that suspension is noted in the schedule above.

A contestant may submit a claim of ambiguity or error in a problem statement by submitting a clarification request to a judge. If the judges agree that an ambiguity or error exists, a clarification will be issued to all contestants. The judges may choose not to respond to a clarification request, if they believe that no ambiguity or error exists. Do not pause your efforts awaiting a reply — it may take some time before a clarification is posted, or may never arrive.

1 A student is qualified iff he/she
• is willing and able to compete in the World Finals, and
• is enrolled at least half-time in a degree program at the sponsoring institution (excepting internships, co-op programmes, and exchange students), and
• competes for only one institution during a contest year, and
• has not competed in two World Finals and not competed in five Regional Contests,
• and began post-secondary studies in 2014 or was born after 1995.

Extensions of eligibility for those failing the last item may be granted by the ICPC Manager. Please see the above referenced rules for details, and email the Contest Manager to request extensions.
The contest judging site, rmc18.kattis.com, gives detailed information regarding the judging process, the various languages accepted, and other rules. These are briefly excerpted here:

1.1 Judgements

When you submit a solution, the judges will reply with one of seven possible results for the submitted solution (taken from open.kattis.com):

- **Accepted** – correct, time and penalty points are accumulated.
- **Compile Error** – solution failed to compile.
- **Run Time Error** – exited with a non-zero return code.
- **Time Limit Exceeded** – took too much time.
- **Wrong Answer** – incorrect results.
- **Output Limit Exceeded** – wrote too much output.
- **Memory Limit Exceeded** – requested more memory than allowed.

There may be multiple flaws in your submission; the judges will report only one—the judging system at rmc18.kattis.com details the judging procedure. A effective rule of thumb is:

*Judges will report the first mistake they notice.*

Also, no further information is attached to the result: any compilation error messages or exceptions will not be returned with the judgement.

Runs are not allowed to:

- access the network;
- access any files except as explicitly specified in the problem statement
- attack system security;
- execute other programs or create new processes;
- change file system permissions;
- work with subdirectories;
- create or manipulate any GUI items (windows, dialog boxes, etc.);
- work with external devices (sound, printer, etc.);
- unnecessarily exhaust system resources (file handles, memory, threads, etc.)
- do anything else that can disturb the judging process and the contest.

Submissions of this kind may receive a novel result

- **Judge Error** – we will find you.

In this case, you don’t need to do anything: the contest director will — quickly — find you! Security violations will not be tolerated, and may result in immediate disqualification.
Regional Instructions

As far as possible, problems will avoid dependence on detailed knowledge of particular application areas or particular contest programming languages. In concert with previous years, and in conformity with standard practice at World Finals, all problems will expect solutions to read and write to the console. Opening and closing of files is no longer required. The judging system, based on OpenKattis, gives exemplar code for simple operations such as i/o.

A problem is solved when it is accepted by the judges. The judges are solely responsible for accepting or rejecting submitted runs. In consultation with the judges, the regional contest director determines the winners of the regional contest. The regional director and judges are empowered to adjust for or adjudicate unforeseen events and conditions.

The judges’ decisions are final.

Teams are ranked according to the most problems solved. For the purposes of awards, or in determining qualifier(s) for the World Finals, teams who solve the same number of problems are ranked by least total-time consumed.

This total time is the sum of the times consumed for each problem solved. The time consumed for a solved problem is

- the number of minutes elapsed from the beginning of the contest to the submission of the accepted run
- plus 20 penalty minutes for every rejected run for that problem regardless of submission time.

There is no time consumed for a problem that is not solved. For example, if you submit an incorrect solution to a problem at 15 minutes into competition and a corrected one 15 minutes later, your team has solved one problem and accumulated 50 points (30 minutes to accepted solution and 20 penalty minutes).

Any ties that still remain shall be broken by in favour of the team who submitted the earliest accepted solution. Should those times be the same, then the tie shall be broken in favour of the earliest second accepted solution, etc.
1.2 Languages

The judging site lists six acceptable languages, and their appropriate compilation and execution command-lines. These are summarized below: this will allow you to ascertain what libraries and language standards your code must conform to.

Note that Java VM memory limits (QQ) are determined on a problem-by-problem basis. The judging platform is a Linux containerized VM shared on a 16-processor Xeon E5-2660 with 128GB of RAM running Ubuntu.

Each team will use a single 3.4 GHz Fedora Core 28 Linux x86_64 workstation, equipped with 16 GB of RAM and the following programming utilities:

- editors: emacs 26.1, vim 8.1.450
- compilers: gcc 8.2.1, g++ 8.2.1, javac 1.8.0_181
- debuggers: gdb 8.1.1, jdb 1.8.0_181

1.3 Communications

During the competition on Saturday morning, contestants are not to communicate with anyone except competitors on their team and personnel designated by the regional contest director\(^3\). In particular, communicating with coaches is particularly frowned upon, and may result in disqualification of the contestants team. Systems support staff may advise contestants on system-related problems such as explaining system error messages. While the contest is scheduled for five hours, the regional contest director has the authority to alter the length of the contest in the event of unforeseen difficulties. Should the contest duration be altered, every attempt will be made to notify contestants in a timely and uniform manner.

A team may be disqualified by the regional contest director for any activity that jeopardizes the contest, including (but not limited to) dislodging extension cords, submissions which pose unnecessary risk to the contest systems, unauthorized modification of contest materials, possession of unauthorized materials, or distracting behavior.

\(^3\)Of course, in medical emergencies and other life-threatening situations, communication should be established with anyone, and then we can (hopefully) live with the outcomes.
Table 2: Languages Details (Judging Platform)

<table>
<thead>
<tr>
<th>Language (command)</th>
<th>Version</th>
<th>Suffix</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNU C (gcc)</td>
<td>7.3.0</td>
<td>.c</td>
<td>-g -02 -std=gnu99 -static files -lm</td>
</tr>
<tr>
<td>GNU C++ (g++)</td>
<td>7.3.0</td>
<td>.cc</td>
<td>-g -02 -static -std=gnu++14</td>
</tr>
<tr>
<td>Open JDK (javac)</td>
<td>1.8.0_181</td>
<td>.java</td>
<td>-encoding UTF-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>compiler flags:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>runtime flags:</td>
</tr>
<tr>
<td>PyPy Python 2 (python2)</td>
<td>2.7.13</td>
<td>.py</td>
<td>none</td>
</tr>
<tr>
<td>Kotlin (kotlin)</td>
<td>1.1.4-3</td>
<td>.kt</td>
<td>-d path -Djava.io.tmpdir=someTempDir</td>
</tr>
</tbody>
</table>

Table 3: Languages Details (Local Platform)

<table>
<thead>
<tr>
<th>Language &amp; Version</th>
<th>Command</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNU C 8.2.1</td>
<td>gcc</td>
<td>.c</td>
</tr>
<tr>
<td>GNU C++ 8.2.1</td>
<td>g++</td>
<td>.cc</td>
</tr>
<tr>
<td>OPEN JDK 1.8.0_181</td>
<td>javac</td>
<td>.java</td>
</tr>
<tr>
<td></td>
<td>java</td>
<td>.class</td>
</tr>
<tr>
<td>PyPy Python2 2.7.15</td>
<td>python or python2</td>
<td>.py</td>
</tr>
<tr>
<td>CPYTHON Python3 3.6.6 anaconda</td>
<td>python3</td>
<td>.py</td>
</tr>
<tr>
<td>Kotlin (kotlin)</td>
<td>IntelliJ ide plugin</td>
<td>.kt</td>
</tr>
</tbody>
</table>

Note carefully that the local python command defaults to Python 2.
1.4 Complaints, Appeals, and Remedies (excepted from the official rules)

If irregularities or misconduct are observed during the contest, team members or coaches should bring them to the attention of the contest officials so that action may be taken as soon as possible. After the conclusion of the contest and the results have been made public, coaches may file complaints or appeals as follows:

Within 1 day
The coach may file a complaint by sending an email containing a text message with no enclosures to the Contest Manager. The Contest Manager will forward the complaint to the Regional Contest Director, Super Regional Director, and Director of Regional Contests, copying the coach.

Within 2 more days
The Regional Contest Director shall respond to the complaint.

Within 1 more day
The coach may file an appeal by sending email to the Contest Manager who will forward the appeal to the Appeals Committee copying the coach and Regional Contest Director.

Within 2 more days
The Appeals Committee will investigate the circumstances of the appeal and notify the coach and Regional Contest Director of their decision.

This process is governed as follows:

- The results of the regional contest are not final until the complaints and appeals process has run its course.
- Only coaches may file complaints and appeals.
- An appeal must be based on one or more of the following circumstances:
  - violations of the Rules,
  - misconduct by teams, or
  - gross misconduct by contest officials with intent to do harm.
- The decisions of the judges are final. Specifically, a decision on a problem submission MAY NOT be appealed.
- The Appeals Committee overturns decisions only under extraordinary circumstances.

manager@icpc.global
Regional Instructions

- The decision of the Appeals Committee is final.
- No additional finals invitations will be given to remedy a complaint.
- All complaints will be acknowledged.

The appeal will be automatically rejected if the above procedure is not followed.

1.5 Advancing to World Finals

Teams qualify to advance to the World Finals through Regional Contests and by satisfying all rules posted as noted above. Summarizing the details,

- To qualify for the World Finals, the coach and all team members must be fully registered before competing in a regional event.
- Only one team from a given institution may advance to the World Finals.
- No team member on the qualifying team may have competed as a contestant in two previous World Finals.
- The coach of a qualifying team is the point-of-contact prior to and during World Finals activities. The coach must complete certification at the Team Certification Web Site within five business days of notification of advancing to World Finals.
- A team advancing to the World Finals will be comprised of the same three members as when it qualified.

The 2019 World Finals will be hosted by the University of Porto, in the eponymous city in Portugal, from March 31 – April 5, 2019.

1.6 Permitted Resources

Contestants are permitted to bring any paper reference materials they wish; but electronic aids are prohibited, including

- watches and smart-watches and fitbits,
- calculators,
- PDAs,
- cellphones,
• and memory keys.

Use of unauthorized materials will result in immediate disqualification. To ensure no infractions occur, please leave your electronic devices outside of the competition area – your coach can sequester them, or we will lodge them with a staff member (at your risk).

Internet access will be restricted during the competition; external access will be to

• the judging system (https://rmc18.kattis.com)

• C and C++ reference material (http://cppreference.com),

• Java reference material (http://docs.oracle.com/javase/8/docs),

• Python reference material (http://docs.python.org), and

• Kotlin reference material (http://kotlinlang.org),

Access to C++ Standard Template Library (boost) documentation, and JavaDoc will be provided locally also, as well as all UNIX man pages.

Competitors are not permitted to speak to the judges directly during the contest and may not enter the judging area.

1.7 Printing

Competitors must not approach the printers: competition staff will act as couriers and bring printed output to you.

Only the officials will have access to the printing station.

Program source is to be sent to the printer named spinks360. Printing is still being figured out...

If you are having system difficulties, please ask one of the contest staff for help immediately. Don’t waste contest time trying to figure out system problems yourself. Please notify a staff member if your output is delayed.

Use the practice session to familiarize yourself with all features of the competitions systems: submit incorrect runs, request clarifications, and attempt printing. This will prepare you for the actual competition.
1.8 Submission Application

Submissions will be done through an internet connection to the judging system, at

https://rmc18.kattis.com

refer to Figure 1. Your team account username and password for the submission system will be supplied to us by the regional contest director. You must either:

1. drag and drop a source code file—if you follow usual naming conventions, the system might figure out the language in use:
   - .c means C source
   - .cc means C++ source
   - .java means Java source

   But python requires you to ensure you selected the right dialect (Python2 or Python3).

2. copy-and-paste the source code—in which case you must select the correct language, otherwise it likely will not compile and you’ll be penalized for an wrong submission.

Figure 1: The Submission System
Regional Instructions

Please check that you’re submitting the correct file as a solution to the correct problem with the correct language selected. Otherwise, it is an invalid solution and penalties apply.

Sponsors
The ACM International Collegiate Programming Competition would not happen without generous sponsorship. Our sponsors are

Good Luck!

- October 31, 2018: Kotlin available in IntelliJ IDE
- October 24, 2018: initial release
2 Maps

The nearest public parking is Lot 5, heated and underground in the Agriculture Building, at a cost of $1 per hour. Lot 4 is also available for public parking at $6 per entry/exit anytime, and Lot G is available (for the same price) but only after 5PM on Friday. Your best bet is Lot F, which is free after 5PM on Friday. See Figure 2 for orientation. The pay parking is highlighted in blue, the free after-hours parking (lot F) is green and the Spinks addition where the competition is held is in red.

Figure 2: Locations At USaskatchewan