ACM-ICPC Presentation

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Disclaimer

Part of the content comes from some slides found on the web. I do not know the authors, so here are the links to the slides.

- `https://slideplayer.com/slide/1614833`.
- `https://slideplayer.com/slide/1615102`.
- `https://slideplayer.com/slide/8333198`.

Summary

Presentation of the contest

Preparation

Registration

Training

Questions

Presentation of the contest

ICPC

- ACM International Collegiate Programming Contest is probably the greatest university-level programming contest in the world.
- ACM - Association for Computing Machinery.
  - World's largest scientific and educational computing society.
  - Organizes research conferences.
  - Publishes journal.
- The contest is organized since 1977.

Credit: Wikipedia

Credit: Wikipedia

Purpose

- Provide students the opportunity to sharpen problem solving skills.
- It is not just about programming.

Format

Multi-tiered contest.

- Local contest, where each university selects its best teams.
- Regional contest (semi-finals).
- World finals.

Our region

- Africa and Arab region.
- The regional contest direction is in Egypt.
- Regional site for West Africa is in Benin.
- Contest direction in Benin, Togo, Niger, and Burkina-Faso is under Mapcom Group responsability.

World Finals

- Each year, a university is given the honor to host the finals.
- It is a great privilege.
- Reaching the finals is already an accomplishment.

Rules

- Each team consists of three (3) students from the same institute or university.
- Each team has access to one computer during the contest.
- The contest lasts five (5) hours and there are eight (8) or more problems to solve.

Restrictions and quotas

- Each student should have less than five (5) years of university education before the contest.
- Students who have previously competed in five (5) regional contests or two (2) world finals are not illegible.
- A university can have several teams qualified to a regional contest, but there is at most one team per university at the world finals.
- Read the rules at `https://icpc.global/regionals/rules`.
- Allowed languages are C, C++, Java, and Python.

Contest process

- There can be several sites for a regional contest, but there is only one for the world finals.
- On each site, teams are gathered in a room.
- There is a software that manages the contest.
  - It allows you to submit your solutions.
  - You get back the results of your submissions.
  - You can ask questions to the judges if you think something is unclear about a problem.
- There is a scoreboard.
- Each time a team solves a problem, it gets a balloon.
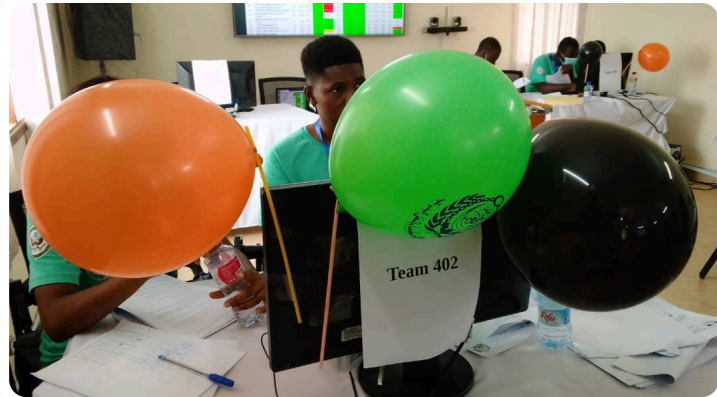
Credit: Facebook

Credit: news.itmo.ru

Credit: icpc2019.up.pt

Ranking

- First, teams are ranked based on the number of solved problems.
- When two ore more teams have the same number of solved problems, they are further ranked by time penalty.
  - For each solved problem, the number of minutes from the beginning of the contest until the correct solution was submitted.
  - For each solved problem, twenty (20) minutes for each incorrect submission before the correct solution.

Possible answers to submissions

- **Accepted**.

- **Wrong Answer** (WA). Your program does not give the correct answer.

- **Time Limit Exceeded** (TLE). Your program takes too much time. That does not mean it gives the correct answer.

- **Memory Limit Exceeded**. Your program uses too much memory. Same remark as above.

- **Runtime Error**.

- **Compilation Error**. No time penalty for this type of errors.

Strategy

Here are some tips.

- Good teamwork is essential.
    - You must be complementary and know how to work together.
    - Each member should have one or several skills.
    - Ideally, everyone should have a good programming level.
    - There is only one computer available, so it must shared.

- Once you think you have a solution to a problem, don't rush to the computer. Write solution outline one a paper. It helps a lot.

- Identify easy problems and solve them first.

- Learn to relax and don't explode under pressure.

- Enjoy the moment.

Problem categories

All areas of mathematics.

- Geometry.
- Graph Theory.
- String processing.
- Calculus.
- Optimization.
- etc.

Preparation

Preparation

Registration

Registration

In order to compete, students and coach should be registered on ICPC website.

Once your account is created, you must complete your profile.

- Name, birthdate, sex, etc.
- Academic information.
    - Your university or institute.
    - Post-secondary studies start date.
    - Branch.
    - Expected date of graduation.

With your account, you can register for a contest.

- One of the team member or the coach creates the team and add members.
- The contest organizers validate each team.
- If any of the team member did not complete its profile or does not fulfill the requirements, the team will be rejected.

Preparation

Training

An endless, beautiful journey

- You can't be an ace right from the start.
- You will need a lot of training to reach a decent level.
- It never ends. There will be always something to learn.
- It is not about winning the contest, it's all about improving and becoming a good problem solver.
- I am not saying that it is not cool to win the contest.

You must have a strong will to learn and get better. It will fuel you through your journey.

> *Success Is Going from Failure to Failure Without Losing Your Enthusiam.*
>
> —*William Chruchill*

Basic prerequisites

- English.
- You must know how to use a computer.
- The computers used during the contest run under Linux, so it's better to get used to it.
- You must know at least one of the languages of the contest.
- You must know how to compile and run programs from the command-line.
- You must also know how I/O redirection works.

More prerequisites

- DSA course.
    - You must know common data structures and algorithms.
    - You must be familiar with the notion of algorithm complexity.
- Good level in C++, Java, or Python.
    - Object-oriented programming (optional, but useful).
    - You must know your preferred language strengths and weaknesses.
    - And its standard library.
- Fast typewriting is an advantage.

Learning path

- Follow a competitive programming course.
    - Usually, universities have a dedicated course and competitive programming club.
    - Some websites offer training material (cp-algorithms.com, Geeks for Geeks).
- Read books and tutorial on recurrent topics. There is a lot of material available on the web.
- Practice and learn on competitive programming websites.
    - Codeforces.
    - Kattis.
    - Hackerrank.
- Participate in contests.
    - ACM Contests.
    - Google Codejam, Kickstart, Hashcode.
    - Facebook Hacker Cup.
- Practice and learn, over and over again.

How will we work?

- We will use Kattis (https://open.kattis.com).
    - Create an account if you don't have one.
    - Read the documentation for your language in the help section.
- T-414-ÁFLV: A Competitive Programming Course, by Bjarki Ágúst Guðmundsson. Available at https://algo.is.
- We have a WhatsApp group and a Slack workspace.

Course topics

- Data structures.
- Problem solving paradigms.
- Greedy algorithms.
- Dynamic programming.
- Graphs.
- Mathematics.
- Strings.
- Geometry.

For each chapter, there are five problems to solve and two bonus problems.

Questions