COMPETITIVE PROGRAMMING

Ishani Parekh

What is it ?

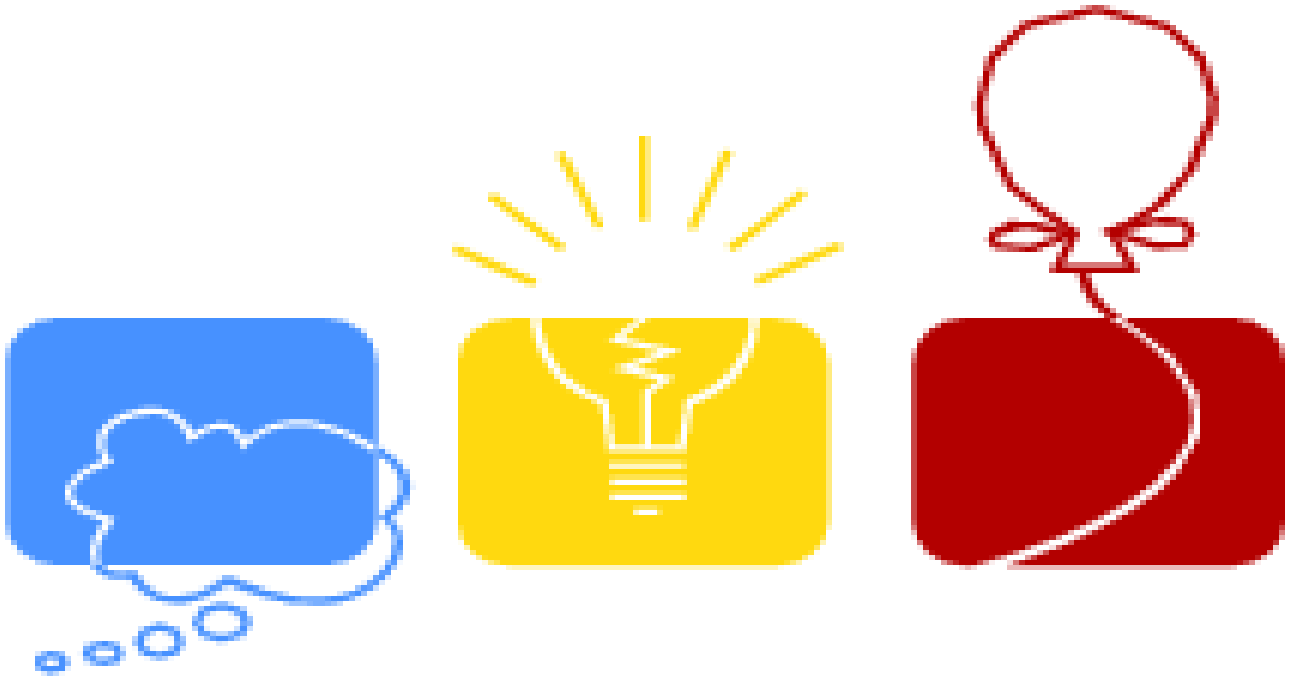
- Writing programs to solve problems in a contest environment.
- One has limited time to solve problems. Ranging from a few hours to a few days.
- Team participation or Individual.

What do these contests test ?

- Algorithm Skills (Must !)
- Basic Math Skills
- Programming Skills
- Speed (Good typing speed helps)
- Creativity
- Debugging Skills (For challenge phase)

Some Prestigious contests

- ACM – ICPC
- Google Code Jam
- Topcoder Open
- Facebook Hacker Cup (Recent)



acm International Collegiate Programming Contest

IBM event sponsor

ACM - ICPC

- It is like the Olympics for Programming.
- Students who win these contests are some of the finest brains in the world and are instantly recognized by top institutions (companies, academia)

Rules -1

- Online Contest - National level (around 1000 teams)
- Onsite Contest - National level (around 130 teams)
- World Finals (around 2-3 teams selected from India)

Rules - 2

- Team Contest (max size:3)
- Languages : C/C++/Java
- Time : 5 hrs
- One machine
- Set of around 10 problems.
- Ranking is based on number of problems solved with penalty for wrong submissions.

What do you gain?

- Improve your logical and analytical skills.
- Good point to mention in CV.
- Improve your network of friends who are also interesting in programming.
- Recognition.
- Most importantly, have fun. Onsite contests also plan excursions.

Where to practice

- Topcoder (highly recommended)
- SPOJ
- Codeforces
- Codechef
- UVa
- USACO

A Typical Problem

- http://www.spoj.pl/problems/AGGRCOW/
- Problem Statement
- Input
- Output
- Constraints (you don't check for this. It will be satisfied by the input)
- Time Limit (typically ~10^7 operations under 1s)
- Memory Limit (typically 64 MB at runtime)

Contest System

- Each problem has a problem setter.
- He writes the problem, generates input test cases and their corresponding **correct** outputs.
- Your program takes input and generates output in the format specified in the problem.
- Outputs of your program will be compared with the correct outputs.

Responses from the judge

- http://www.spoj.pl/status/
- Accepted
- Wrong Answer
- Time Limit Exceeded
- Compilation error
- Segmentation fault (SIGSEGV)
- …
- …

Tips for good performance

- Maintain pre-written templates for
  - Standard algorithms
  - Necessary headers, functions etc. (eg. all #includes and macros in c++)
- Indent your code
  - If you use Vim editor, configure your .vimrc file for your programming language. Use the visual mode to indent code.

Tips for good performance

- Use functions/methods wherever possible to avoid repetition of code.
- Solve the problem on paper first. Then only code.
- Write test cases for the problem and test your logic and program with those test cases before submitting.
  - Test your program for the worst case. Use “time” command to check the running time of your programs in linux.

Tips for good performance

- Know the contest rules before you compete.
- Take risks and don’t panic ☺.
- Read contest editorials/explanations after the contest is over.
- Solve your questions by
  - Thinking yourself or searching the internet.
  - Asking friends.
  - Visiting forums.

Resources

- Topcoder Tutorials
- Topcoder Forums
- Google Code Jam
- Codechef Wiki

Demo

- Topcoder Arena.