Intro to Competitive programming

Oliver-Matis Lill

February 14, 2017

Introduction

- In competitive programming you compete by solving algorithmic/programming problems
- Problems generally test algorithmic knowledge, problem solving and programming skill
- As a result competitive programming provides a convinient and fun way to develop these skills
- Many contests are sponsored by various companies and used for recruiting

Examples

code jam

printf("hello, world!\n");

Hosted by Google
1-25th place: Free trip to Dublin
1st place: 15000 USD
2nd place: 2000 USD
3rd place: 1000 USD

Hosted by Facebook
1-25th place: Free trip to Seattle
1st place: 10000 USD
2nd place: 2000 USD
3rd place: 1000 USD

Content

- The problems cover a lot of topics
- Most important is an extensive knowledge of algorithms
- The algorithmic topics go from basic, like *Dijkstra*, *Kruskals*, etc to very complicated, like *Min-Cost Max-Flow* and *Fast Fourier Transform*
- Since you need to implement and combine them, programming skill is also important
- From mathematics it's useful to know a lot of *Number Theory*, reasonable amount of *Geometry* and some *Probability Theory*
- Experience with mathematical proofs is very useful

Format

- Generally you have a set of problems and a time limit
- Short 2-3h contests require quick thinking, fast coding and a lot of experience
- Long multi-day contests require persistence and wide knowledge
- Generally about half of the effort goes into figuring out mathematical properties of the problem and the other half into coding
- Contests have problems of a wide range of difficulties

The Value

- It provides a structured way to train algorithmic problem solving and programming skill
- You can pick problems best suited to your skill level
- It gives you a lot of interesting stuff to code
- It will grant you the experience of competing in the global stage
- It will make job/internship interviews easy for you
- Recruiters use contests to scout potential employees

Benefits for Me

- I have written more than a 100000 lines of code
- I have learned a lot about algorithms and how to solve hard problems in a more elegant and readable fashion
- Google recruiters have contacted me
- A Quadrature Capital recruiter contacted me through Codeforces
- They covered my flight to London
- The interview was trivial for me, I got the internship
- The Quadrature Capital internship terms are:
  1. 3000 EUR/month
  2. Paid accomodation
  3. Free breakfast
  4. We work on the 33rd floor of the Leadenhall Building

The Leadenhall Building

The Leadenhall Building

Tips

- Get a good base knowledge in algorithms from a course/book/MOOC
- Don't neglect solving hard problems
- Try to actively learn the topics you encounter in contests
- The de facto language of competitive programming is C++
- Learn to use the standard library properly
- Use competitive programming to practice writing more elegant and readable code