Programming Puzzles and Competitions

CIS 4900 / 5920
Spring 2009
Introduction

• Instructor: Dr. Ted Baker
• Teaching Assistants:
  - Daniel Rosenthal
  - Andre Rodriguez
• Office: LOV 207

• Course website: http://www.cs.fsu.edu/~baker/pc/
Introduction

• Class meetings:
  Friday 12:30-1:45pm, LOV 103
Course Goals

• To prepare those students who are willing and eligible to compete in the ACM ICPC Regionals Contest
• To teach students how to solve algorithmic puzzles and problems by writing computer programs
• This course is intended to be fun! :-}
Two Components of the Course Name

- Programming Competitions: Online or in-person programming contests (more details in a moment)

- Programming Puzzles: Algorithmic problems (i.e. solvable by an “efficient” algorithm), of which contest problems are examples
Programming Contests

- FSU ACM Programming Contests
- ACM ICPC
- TopCoder SRMs
- Google Code Jam
FSU ACM Programming Contests

- FSU ACM is a local student organization at FSU
- Frequency: 1 per semester
- Eligibility requirements: Current FSU student, faculty member, or alumnus.
FSU ACM Programming Contests

• Format: 6 problems, 3 hours
• Rank determined first by number solved, then by total time taken to solve (with penalty for incorrect submissions)
ACM ICPC

• ICPC stands for International Collegiate Programming Contest

• Frequency:
  - Regionals: 1 per year (October)
  - World Finals: 1 per year (April)
ACM ICPC

• Eligibility requirements: Must be born after 1985.
• Format: 10 problems, 5 hours
• Rank determined first by number solved, then by total time taken to solve (with a penalty for incorrect submissions)
TopCoder SRM

- SRM stands for “Single Round Match”
- Frequency: 1 every couple weeks
- Eligibility requirements: (none?)
- Format: 3 problems, 2 hours
- Rank determined by score (more about this later)
Google Code Jam

• Frequency: 1 per year (in the summer)
• Eligibility requirements: Must be 13 or older and not a current Google employee (or immediate family member of one).
• Residency
More About Contest Format

- TopCoder SRMs and Google Code Jam are online, individual contests
- FSU ACM and ACM Regionals contests are in-person team contests (up to 3 people/team), where the entire team shares one computer (problem sets in hard copy)
More About Contest Format

• Programming environment for ACM Contests contests is Linux (Ubuntu)
Programming Contests (Reviewed)

- FSU ACM Programming Contests
- ACM ICPC
- TopCoder SRMs
- Google Code Jam
Programming Puzzles

• In this context, 'puzzles' are just generalizations of the problems found at programming contests, and are irrespective of contest strategies such as programming under time pressure, sharing a computer effectively, etc.
What We Hope You Learn From This Course

• Gain exposure to programming contests
• Learn to solve problems with algorithms
• Learn the difference between an API and a programming language
• Learn how to use a programming language and a limited API to solve problems rather than relying excessively on APIs
What We Hope You Learn From This Course

MOST IMPORTANTLY:

• Learn to use what you know to solve problems, rather than being intimidated by what you (potentially) don’t know
Some Notes About (In)efficient Programming

• Time is often spent debugging when the problem was not well understood by the author of the program
• Large software systems (e.g. Linux) can be an exception to this, where bugs may be caused by inadequate API knowledge
Comments

• This class is planned to be enjoyable for everybody
• If at any point it does not meet your expectations (too easy, too difficult, etc.), please let us know and we will try to adjust it
About Dr. Baker

• Full professor teaching at FSU for 35 yrs
• Was on POSIX, The Single Unix Specification, and Ada standards committees
• Director of Undergraduate Studies for the Computer Science Department
• Conducts research in real-time systems
About Me

• Senior (undergraduate) computer science & math major
• Participated in 8 total ACM programming contests (5 local and 3 regional)
About Andre

• B.S. in Computer Science & Pure Mathematics (FSU 2007)
• Currently working towards Masters in Computer Science
Our ACM Team

- Me
- Keenan Pepper (senior in physics & math)
- Andre
- Steven Bronson (sophomore in computer science & math)
Our ACM Team

- In October 2008, we placed 9th out of about 70 teams at the ACM ICPC Southeast USA Regional contest (teams from Florida, Georgia, and Mississippi)
Fall 2008 FSU ACM Programming Contest

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Solved</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>team1</td>
<td>3</td>
<td>416</td>
</tr>
<tr>
<td>2</td>
<td>team272</td>
<td></td>
<td>233</td>
</tr>
<tr>
<td>3</td>
<td>team8</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>team9</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td>5</td>
<td>team7</td>
<td>1</td>
<td>125</td>
</tr>
<tr>
<td>6</td>
<td>team121</td>
<td></td>
<td>145</td>
</tr>
<tr>
<td>7</td>
<td>team2</td>
<td>1</td>
<td>165</td>
</tr>
<tr>
<td>8</td>
<td>team171</td>
<td></td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>team100</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
Practice Contest

- contest simulation...