Computer Science

Contest Introduction

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Contest Director

For new coaches and contestants.

In This Session

- Contest introduction, including
  - general rules
  - contest structure and scoring
  - the hands on contest
- State written test
- Sample hands on questions

Contest Directors

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What is the Computer Science Contest?

- A competition that challenges students to apply computing and algorithmic concepts and skills
- Tests knowledge of algorithms, computation, and object oriented programming
  - using the Java programming language
- Allow students to expand their knowledge of computer science beyond what they learn in the classroom and to foster their interest in the field

Background

- Contest established in the 1990 – 91 school year
- Modeled on the College Board's Advanced Placement Curriculum for computer science
  - plus some additional topics
- Brought computers into UIL competition for the first time with the State Meet, hands-on programming
  - Modeled on ACM programming contest
  - Hands-on was later added to regional
  - pilot for hands-on approval at districts pending approval of the UIL Legislative Council in October

Programming Language

- UIL uses the same language as the AP curriculum
  - if AP changes, we will too
- Pascal for 8 years. C++ for 5 years. This is the 4th year for Java
  - language just a tool to test concepts
  - example: sorts are essentially the same

General Rules

- As with other UIL academic contests
  - Participants must meet eligibility requirements
  - A school may enter up to four contestants in district competition

Contest Structure

- Two components: individual and team
- District competition is a 45 minute written exam for both individual and team component
  - 40 questions
- Regional and state competitions consist of:
  - a 45 minute written exam, for the individual competition and the team contestants (counts for half of team score)
  - a two hour hands on programming contest for teams with 12 questions

The Individual Component

- At all levels of competition, individual places are determined solely by written exam scores.
- All contestants compete for individual honors at all levels of competition
- Individuals placing first, second, and third advance to the next level of competition

The Team Component

- At district competition team placement is determined by combined scores on the written exam.
- At the regional and state competitions team placement is determined as follows:

  top three team member written scores + hands-on score = overall team score

- First-place teams advance to the next level of competition

Team Entries and Scoring at District

- A school may enter up to four contestants at district
- A school must enter at least three contestants to participate in the team competition
- At district only the top three scores from a school are counted towards the team score, even if the school enters four contestants
- All four members of first place teams advance to the next level of competition

Scoring Rules – Written Exam

- 40 multiple choice questions
- SIX points awarded for correct answer
- TWO point deduction for each incorrect
- No points given or deducted for unanswered questions
- Questions may be skipped
- A 15 minute verification period is held prior to announcing official results
- Verification is your chance to ensure answers are correct
  - unfortunately there are occasionally errors on the test

Scoring Rules – Hands-On

- 12 programming problems
- 60 points awarded for a correct answer
- 5 points subtracted for each incorrect answer only if a team eventually gets a correct answer
- Incorrect solutions will be returned and may be reworked and resubmitted
  - judges do not provide a detailed explanation of the problem

What About Ties?

- In individual competition ties are broken by determining the highest percentage of correct answers
  - Example:
  - attempting 30 questions with 20 correct
    = 20 * 6 – 10 * 2 = 100
    percent correct = 20 / 30 = 66.7%
  - attempting 22 questions with 18 correct
    = 18 * 6 – 4 * 2 = 100 = 18 / 22 = 81.8% (wins the tie break)
- If a tie still exists it will not be broken

Ties, continued

- In district-level team competition, ties are broken by adding up the score of all team members
  - the highest score wins
  - if a tie still exists it will not be broken
- In regional and state competition, ties are broken by the team that has a higher score on the hands on portion
  - if a tie still exists the total team score on the written exam is considered
  - if a tie still exists it will not be broken

Wild Cards

- The highest scoring second place team among all districts in a given region advances to the regional meet
  - one wild card per conference
- The highest scoring second place team among all regions advances to state
  - one wild card per conference
- Districts must report their team scores with contest results on time to be eligible for the wild card

Written Contest Materials

- Pencils and erasers
- scratch paper is provided
- no calculators

Written Contest Format

- A 45 minute exam consisting of 40 multiple choice questions
- Answers are recorded on the answer sheet
- topic list provides areas covered
- old exams are also very useful for practice

Hands-On Contest - Materials

- In the hands-on only three members of a team compete
  - coach's choice
- Each team may bring two published reference texts
  - includes text books and language manuals
  - books should be reasonably free of written notes
- Each team must bring an unopened package of 12 or more preformatted floppy disks for submitting solutions to judges
  - future of disks? Writable CDs? memory sticks? networking at some sites? Thoughts?

Hands-On Contest Computers

- Each team shall be prepared to bring one computer to use for competitions
  - some sites may provided computers but check with local contest director
  - most regional sites and state require teams to bring their own computers
- printers are allowed, but not required

Hands-On - Computers

- Each team may use ONLY ONE computer
  - one monitor, one keyboard, one mouse
  - no dual monitor systems
  - you can bring a back up computer
- What software can be on the computer
  - operating system
  - standard software preloaded on new computers: office, explorer, anti-virus
  - A Java compiler and IDE
  - Built in libraries, library documentation, and help functions may be used during the contest

Hands-On Computers

- What CANNOT be on your drives:
  - solutions, data files, templates, from previous UIL competitions or any other programming competitions (TCEA)
  - Programs written for class
  - Any other program written by contestants or coaches.

Hands-On Judging

- Computer setup for judging will vary from site to site
  - Most sites will have judging stations in a room separate from the contest room
  - other arrangements possible
- Check with your host site ahead of time to find out what procedures will be used
  - if using a mac your host site may require you to bring another mac as for the judging station

Hands On Judging

- contestants submit Java source code
- judges recompile and run on test cases
- No major problems with using Java thus far

Hands-On Contest Format

- A two hour programming contest consisting of 12 problems
  - vary degrees of difficulty, but all worth 60 points
  - finding the easy ones is part of the competition
- Plan to arrive early to allow time to set up equipment and have systems verified
- Prior to the beginning of the contest teams will work a simple dry run problem
  - a system check for contestants and judges

Hands-On Contest Format

- Typically, contestants work in one room while judges work in another
- teams submit solutions on disk as they finish them along with a run sheet
  - runners transport disks and other items between contestants and judges
- When a team submits a correct solution, the judges return an acceptance form

Hands-On Contest Format

- When a team submits an incorrect solution, the judges return the disk and run sheet
  - general comment on problem
    - syntax error
    - runtime error
    - failed test case
    - exceeded time limit
    - NO information on why solution is incorrect
  - teams may rework the solution and resubmit it

Hands-On Contest Format

- Teams can submit a clarification form if they believe the problem is unclear
  - many times the answer will be read the question
  - judges will not explain unfamiliar concepts during the competition
- Standings may be posted periodically during the course of the contest

Hands-On Contest Strategy

- Break up the problem pack
- find the easy problems
- one person working on easy problem on computer
- two others working other problems on paper
- problems may be worked in any order
- Know when to give up on a problem
  - computer time is a scarce resource

Returning Papers

- If there are no unresolved questions then at the district level entries may be returned no sooner than the end of the contest on the Saturday of the respective district week

If there are no unresolved questions then at the regional level entries may be returned to the contestants at the conclusion of the regional meet.

Frequently Asked Questions

- can team contestants receive individual awards if they did not place in the individual competition at the previous level competition
  - Yes. Team contestants are in the mix for individual honors, even if they did not place in the top three at the previous level of competition

Frequently Asked Questions

- Do contestants who advance only as individuals participate in the hands-on contest?
  - no. Contestants who advance as individuals only take the written test at the next level of competition

Frequently Asked Questions

- If a team gets a solution correct on the second or third or later try do they still receive the 5 point deduction?
  - Yes

Frequently Asked Questions

- What if one of our team members is sick or otherwise unable to compete at regionals or state? May we substitute?
  - Yes. Advancing teams may insert a substitute for one and ONLY ONE team member who is unable to compete at the next level of competition.
  - If more than one member is unable to compete the alternate team will advance
- Can substitutes win individual awards?
  - Yes

Preparing for the Contest

- References, Books

Preparing for The Contest – Online Resources

- UIL
  - www.uil.texas.edu
- My UIL web site
  - www.cs.utexas.edu/~scottm/uil
- Links to
  - java compiler and IDEs
  - second party materials
  - references
  - online programming problems

Preparing for the Contest - Books

- Big Java
  - Cay Horstmann, Wiley Publishing, www.wiley.com.
- How to Prepare for the AP Computer Science Exam (Barron's Review)
  - Roselyn Teukolsky, Barron's Educational Series, www.barronseduc.com
- Java: How to Program
  - Deitel & Deitel, Prentice Hall Publishing, www.prenhall.com
- Java Language Specification
  - James Gosling, et al., Sun Microsystems, java.sun.com.
- Your classroom textbook.

Preparing for the Contest Development Tools

- IDE (interactive development environments) are tools that allow you to write Java programs
- You don't have to use one
- You can use which ever one you want
- Demos of
  - command line
  - textpad
  - Eclipse
  - BlueJ

IDE Information

- Eclipse
  - www.eclipse.org
  - http://www.cs.utexas.edu/~scottm/cs307/handouts/installingEclipse.html (Download instructions)
  - http://www.cs.utexas.edu/~scottm/cs307/handouts/Eclipse%20Help/EclipseIntroduction.html (Basic use instructions)

IDE Information

- BlueJ
  - http://www.bluej.org/
  - http://www.cs.utexas.edu/~scottm/cs307/handouts/BlueJ.html (Installing BlueJ)
  - http://www.cs.utexas.edu/~scottm/cs307/handouts/BlueJProjectInstructions.html (Using BlueJ)

IDE Information

- TextPad (not free)
  - http://www.textpad.com/
  - really a text editor with the capability to compile and run Java programs
- JCreator
  - http://www.jcreator.com/
  - LE version is free

Preparing for the Contest
Practice problems

- TopCoder
  - http://www.topcoder.com/
  - http://www.topcoder.com/tc?module=Static&d1=hs&d2=home (online high school contest and practice problems)
- Programming Challenges
  - http://acm.uva.es/problemset/
  - online problems and judges

Questions and Discussion

2006 State Test

- Questions 1 – 10
- Reference Sheet
  - use this to help answer questions
  - examples: Questions 23, 24, and 30
- Bitwise operators
  - 27
  - operators ^, |, and &

Programming Problems

- Regional Packet
- Setting up to read from a file
  - see my UIL page (http://www.cs.utexas.edu/users/scottm/uil/index.htm)
- Problems 12, 1, 11, 6