University Interscholastic League

Computer Science

Contest Introduction

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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 & Test Writers

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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
  - Programming was later added to regional and district and is also now included with UIL invitational materials

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. And now several years in 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 the district competition

Contest Structure

- Two components: individual and team
  - The same contestants from a school compete in both components
- District, Regional and State competitions consist of:
  - a 45 minute, 40-question written exam, for the individual competition and the team contestants (counts for half of team score)
  - a two hour, 12-problem hands on programming contest for teams

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

- ALL team members MUST take the written exam
  - Three members participate in programming
- At all levels of competition team placement is determined as follows:

  top three team member written scores + programming score = overall team score
- First-place and wild card teams advance to the next level of competition

Team Entries and Scoring

- A school may enter up to four contestants
- A school must enter at least three contestants to participate in the team competition
- The top three written exam scores from a school are counted towards the team score plus the score from programming
- All four members of first place teams advance to the next level of competition

Participation Requirements

- ALL contestants MUST take the written exam at all levels of competition
- Teams MUST participate in programming in order to qualify for team placement or advancement
  - Exception – if only one team is entered in the district contest, conducting the programming session is encouraged but not required (if two or more are entered, programming is mandatory)

Scoring Rules – Written Exam

- 40 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 that grading and tabulation are correct

Scoring Rules – Programming

- 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 why a solution is incorrect

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

    percent correct = 18 / 22 = 81.8% (wins the tie break)
- If a tie still exists it will not be broken

Ties, continued

- In team competition, ties are broken by the team that has a higher score on the programming 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 region
- 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 questions
  - Questions 1-38 are multiple choice
  - Last two questions are free response
    - These will have discrete short answers
- Answers are recorded on the answer sheet
- Topic list provides areas covered
  - Specifies topics for first 15 questions and last 5
- Old exams are very useful for practice

Programming - Materials

- In programming three members of a team participate
  - coach's choice
- Each team may bring two published reference texts
  - includes textbooks and language manuals
  - books should be reasonably free of written notes
- For “sneaker net” contests, each team must bring media for submitting solutions to judges, typically USB flash drives.
  - Bring several flash drives (at least 3 or 4), since some drives may still be in the judging room when a team has another solution ready to submit
  - Smaller capacity drives are fine – better to have more drives than larger capacity

Programming - Computers

- Each team shall be prepared to bring one computer to use for competitions
  - some sites may provide computers but check with local contest director
  - most district sites, regional sites and state require teams to bring their own computers
  - Mac users may need to bring an additional computer for the judging station
- printers are allowed, but not required

Programming - Computers

- Each team may use ONLY ONE computer
  - one monitor, one keyboard, one mouse
  - no dual monitor or dual keyboard/mouse systems
  - you can bring a backup 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

Programming - Computers

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

Programming - 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
  - Most regional sites and the state contest use a networked contest system
- Check with your host site ahead of time to find out what procedures will be used

Programming - Judging

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

Programming Contest Format

- A two hour programming contest consisting of 12 problems
  - varying 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
  - not necessary for all teams to complete the dry run successfully before beginning the contest

Programming Contest Format

- Typically, contestants work in one room while judges work in another nearby room
- Teams submit solutions as they finish them over the contest network or on a flash drive (along with a run sheet)
  - for “sneaker net” contests, runners transport materials between contestants and judges
- For a correct solution, judges return an acceptance notice over the network, or return the flash drive and an acceptance form

Programming Contest Format

- When a team submits an incorrect solution, the judges respond over the network or return the flash drive 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

Programming Contest Format

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

Programming Contest Strategy

- Break up the problem pack
- Find the easy problems
- One person working on an 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 <u>sooner</u> than the end of the last contest day of the district week
- If there are no unresolved questions then at the regional level entries <u>may</u> be returned to contestants at the end of the day on Saturday of region weekend

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 programming?
  - 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 – Online Resources

- UIL
  - www.uiltexas.org/academics/computer-science
- Includes resource page with links to
  - java compiler and IDEs
  - second party materials
  - references
  - online programming problems

Preparing for the Contest - Books

- Building Java Programs
  - Stuart Reges & Marty Stepp, Pearson, www.pearson.com
- Introduction to Java Programming
  - Y. Daniel Liang, Pearson, www.pearson.com
- Java Language Specification
  - https://docs.oracle.com/javase/specs/
- 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 whichever one you want
- Demos of
  - command line
  - textpad
  - Eclipse
  - BlueJ

IDE Information

- Eclipse
  - http://www.eclipse.org
- BlueJ
  - http://www.bluej.org/

Preparing for the Contest
Practice problems

- TopCoder
  - http://www.topcoder.com/
- Programming Challenges
  - https://uva.onlinejudge.org/
  - online problems and judge
- Coding Bat
  - http://codingbat.com/

Preparing for the Contest
Practice problems

- USA Computing Olympiad
  - http://www.usaco.org/
- Project Euler
  - https://projecteuler.net/

Practice Test 2018

- Review Questions
- Reference Sheet
  - use this to help answer questions
- Topics List
  - check the CS page of the UIL website for the final 2018-2019 list

Questions

- http://www.uiltexas.org/academics/computer-science