Web-CAT: Automatically Grading Programming Assignments

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ABSTRACT
This demonstration introduces participants to using Web-CAT, an open-source automated grading system. Web-CAT is customizable and extensible, allowing it to support a wide variety of programming languages and assessment strategies. Web-CAT is most well-known as the system that "grades students on how well they test their own code," with experimental evidence that it offers greater learning benefits than more traditional output-comparison grading. Participants will learn how to set up courses, prepare reference tests, set up assignments, and allow graders to manually grade for design.

Categories and Subject Descriptors
K.3.2 [**Computers and Education**]: Computer and Information Science Education—*Computer science education*; D.2.5 [**Software Engineering**]: Testing and Debugging—*Testing tools*

General Terms
Verification

Keywords
Assessment, evaluation, marking, feedback, programming assignment, automated grading, manual grading

1. INTRODUCTION
Web-CAT, the Web-based Center for Automated Testing, is a tool that provides rapid, directed comments on student work. It is the most widely used open-source automated grading system for full-scale programming assignments, currently used by 23 separate institutions with more adopters every semester. Web-CAT won the 2006 Premier Award, recognizing high-quality, non-commercial courseware for engineering education.

Web-CAT is famous for grading students on how well they test their own code, and many instructors use it with assignments where students are responsible for writing and turning in their own software tests. This approach encourages students to write software tests for their own work and empowers students with the responsibility of demonstrating the correctness and validity of their own programs. As a result, students learn more and produce higher-quality code. By writing their own plug-ins, instructors can use any assessment method they wish, and apply their own feedback generation techniques as well.

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2. DEMONSTRATION GOALS
The primary goal of this demonstration is to introduce participants to Web-CAT using live examples, providing enough information for one to decide whether Web-CAT is appropriate for use in a given course, and for one to get started using available resources on-line. The demonstration includes:

- An overview of Web-CAT's features, and a description of how it is typically used for Java and C++ assignments.
- A walkthrough of a set of reference tests for a simple Java assignment.
- A live demonstration of how to set up a simple course and uploading a roster of student account.
- A live demonstration of how to set up an assignment and configure processing options for the most frequently used Java grading plug-in.
- A live demonstration of making a student submission.
- A live demonstration of using the WYSIWYG interface for commenting on and marking up student code by hand.

3. ADDITIONAL RESOURCES
Web-CAT is an open-source project housed on SourceForge. It is distributed under the GNU Public License and available from its home site at http://web-cat.org. Support for adopters is provided through this web site via the Web-CAT Wiki. This community-editable resource includes the Web-CAT Cookbook, which provides instructions on how to address many common issues and situations that new adopters frequently encounter. Participants can use this resource to explore more about Web-CAT after the conference, get installation instructions, and download binary distributions. The cookbook also includes several screen-capture movies of common procedures to complement the demonstration. A quick tour is available at:

http://web-cat.org/WCWiki/SubmissionWalkthrough

4. REFERENCES
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