AUTOMATED TEAM PROJECT MANAGEMENT AND EVALUATION THROUGH INTERACTIVE WEB MODULES

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ABSTRACT

Team projects represent an important aspect of the microelectronic systems education. In group projects, students learn to work together, delegate responsibilities, and manage time. It is difficult for instructors to evaluate the performance of students participating in team projects. Evaluation of an individual's performance requires a fair comparison of the team's work as compared to other teams in the class. It also requires an understanding of the intra-team dynamics. The *project gradebot*, introduced in this paper, is a new, web-based learning tool that provides automated features to manage, evaluate, and grade team projects. The tool is compatible with web-based distributed learning tools that are currently in use for individualized instruction.

1. INTRODUCTION

Existing web-based distributed learning tools have proven to be effective for individualized learning. Tools such as the ECE291 gradebot [1] and Mallard [2] provide immediate feedback to students as they submit assignments through the World Wide Web. Survey results indicate that students prefer submission of on-line homework because they are given an opportunity to learn from their mistakes and interactively re-submit answers that are correct. Instructors appreciate the on-line tools because they decrease their workload by completely automating the repetitive task of grading papers and recording scores.

A new distributed learning module, called the *project gradebot*, has been developed that enables on-line management and grading of team projects. This tool runs as a Common Gateway Interface (CGI) application. This tool provides automated feedback and grading for students on the aspect of a class that involves working as a part of a team, rather than as an individual.

2. MAJOR FEATURES

The *project gradebot* has several features that enable students and instructors to manage and grade team projects though a familiar web interface. Using this software, students can create new projects, join existing projects, submit information about their project, evaluate the performance of their peers' projects, and review feedback from the instructor and their fellow classmates. Instructors use the tool to review on-line project information, enter feedback to the teams, and automatically calculate project scores.

2.1. Team Project Creation and Solicitation

The *project gradebot* includes software tools to manage the creation and membership of teams. Students use the *project gradebot* to browse the database of approved projects to find one that is compatible with their area of interest. Once a suitable project is found; the student forwards a request to the team leader to join the project. The team leader, in turn, uses the *project gradebot* to add the student to the team. If a student does not find an interesting project in the database, he or she can create a new one and become the team leader. The project solicitation phase continues until all students are assigned to a project. No intervention is needed by the instructor to manage the creation of project groups.

2.2. Team Project Development

The *project gradebot* provides an efficient mechanism for the instructor to monitor the status of the projects. As work is completed on the project throughout the semester, teams register the Universal Record Locators (URLs) referencing their documentation with the *project gradebot*. The *project gradebot*, in turn, provides the instructor with continually up-to-date, indexed list of project documentation.

Further, as a project evolves, the roles of each team member may change. Teams leaders update the *project gradebot* database to track which team members are responsible for which aspects of the project.

2.3. Team Project Evaluation

Teams publically demonstrate their projects during the last week of class. All members of the class are given the opportunity to observe, evaluate, and question the features of their fellow classmates' final projects.

After viewing all projects, students use the *project gradebot* to to evaluate: (1) the work that they performed, (2) the work that each of their team members performed, and (3) the work that each of their competing teams performed. A sample on-line evaluation form is shown in Figure 1.

Students rank each of the other projects in the categories of technical merit and accomplishments. Further, they provide comments to justify their scores. The scores are used to calculate a mean performance ranking for the project. The comments are made anonymous before they are routed to their intended recipient.

To understand the intra-team dynamics, the *project gradebot* inquires each team member of the responsibilities, contributions, technical ability, and accomplishments for each of the other members of the team. This information is forwarded only to the instructor for evaluation.

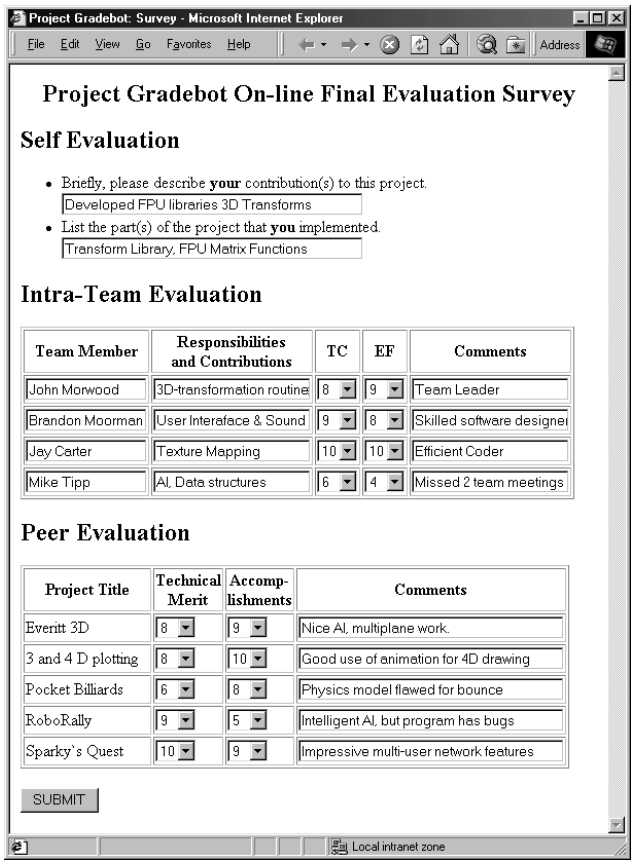

Figure 1. Project Gradebot Survey Query

2.4. Data Mining

The *project gradebot* mines the data collected by each of the students to provide the instructor with a condensed summary of individualized performance. Results of the self-evaluation, the intra-team evaluation, and the inter-team evaluation are presented in one page, as shown in Figure 2.

3. SOFTWARE IMPLEMENTATION

The *project gradebot* is implemented as a Common Gateway Interface (CGI) program. The code is invoked when students or instructors select options from the project menu. All data transactions are performed via SQL to a SQL database server. This features allows immediate gradebook updates, and provides complete compatibility with the other modules described in [1].

The *project gradebot* code is implemented as a collection of C++ classes. The software for this project was originally developed under Linux operating system on an PC-compatible computer. The software however can be recompiled to run on any standard UNIX platform or Windows NT server.

4. RESULTS

The *project gradebot* described in this paper provides completely paperless management, evaluation, and grading of team projects. Thus far, this new tool has been used by 277 students during three semesters of the ECE291 course at the University of Illinois.

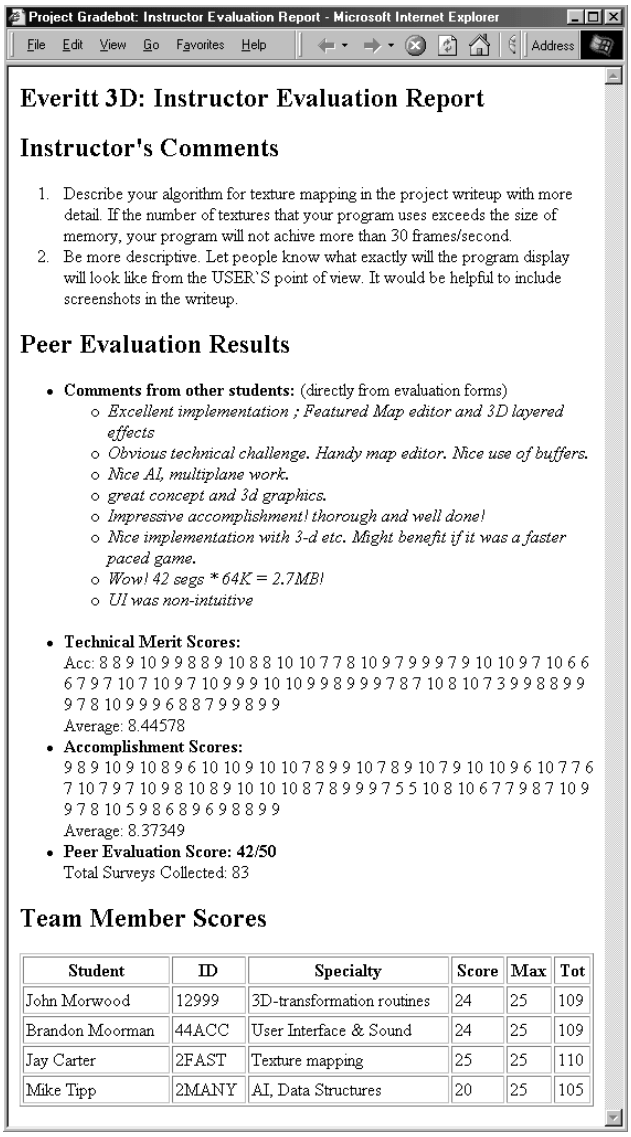

Figure 2. Project Gradebot Survey Query

The broad class of features that are supported by this software make this tool useful for management of many other types of team projects. As a modular CGI component, the software can be easily integrated with other web-based learning tools.

REFERENCES

[1] Lockwood, John W., "Distributed Learning via the World Wide Web Through Interactive Modules," *IEEE Computer Society International Conference on Microelectronic Systems Education (MSE'97)*, Arlington, VA, July 21-23 1997.

[2] Swafford, M.L., Brown, D.J., "Mallard: Asynchronous Learning on the World-Wide Web," 1996 ASEE Annual Conference Proceedings, Session 2632.