WEB-BASED TEMPLATE FOR CREATING ONLINE TESTS

Diem M. Nguyen
Department of Mathematics and Statistics
Bowling Green State University
Bowling Green, OH 43403
dnguyen@bgnet.bgsu.edu

Introduction

Distance learning and instruction have been widely used by many universities and colleges around the nation since the last decade. As a result, there is a great demand for the implementation of online assessment for the purpose of evaluating the distance learning program, assessing student performance, providing alternative practices, and admitting and placing new students in appropriate courses (Linn, 2002). Among different online assessment software, online mathematics assessment is still in the process of developing and improving its accessible features.

In this article, the author will introduce a new Web-based mathematics assessment (WebMA) template that is currently being developed by the author and a group of researchers at Bowling Green State University (BGSU) and Texas A&M University for creating online tests. Since there is currently no perfect online mathematics exams software that fits the demand of all the different users, as a leader and developer of both WebMA and the online mathematics placement exams project (MPE) that has been successfully launched in the fall of 2003 at BGSU, the author will first convey some experiences in the process of implementation. From there, an illumination of front and back layers of the online mathematics exams will be extracted. Consequently, the author will describe how the forthcoming WebMA can help online developers to overcome difficulties in creating and publishing a complete online mathematics exam.

Online Mathematics Assessment and Its Current Possible Barriers

Some possible barriers may vary at different university systems and for different purposes of assessing. The author chooses to describe the most common barriers in the context of the online mathematics placement exams, which also includes the administrative process. The flagship MPE project would be a good source for the illumination since it serves as a large-scale standardized assessment. Indeed, there are approximately five thousand students that have been admitted for the undergraduate program every academic year at BGSU. The university uses the results of the MPE in combination with each student SAT or ACT scores, and high school transcript to place students in appropriate mathematics courses. There are three different versions of the MPE for students with different mathematics backgrounds. Each version contains thirty-five multiple-choice questions. Students are allowed to take the MPE up to three times and take any version that fits their background most. The latest result is used for the

has already been online, if it is in the multiple-choice or matching format, a set of CGI script needs to be constructed to read student selected choices, map them to the previous coded correct choices, and count the number of matches to generate a total score. Another two sets of PHP and CGI scripts are also needed to enable the authenticated students to access the MPE, capture student names and identifications, and post them with their exam results to a storage file. Writing all these PHP and CGI script files requires sufficient computer programming knowledge that may be beyond what most mathematicians and/or system administrators can possibly handle.

How the Forthcoming WebMA Can Aid the Process of Online Implementation

Major coding difficulties described in the above section currently exist as barriers to many online exam developers as well as system administrators. Because of this reason, WebMA template has been developed with an effort of keeping the process of online exam implementation and administration from combating with difficult and complex coding by making the process as simple as manipulating all web forms. Indeed, WebMA handles all the front and back layers of web transactions, including creating and exporting exams and recording student responses, manages student records and passwords, keeps track of the number of times a student has taken each exam, sets exam time duration, and stamps the date and time of submission. In using WebMA, the developer needs only a standard web browser to embed the online exams. There is no coding process required for the implementation. Figure 1 demonstrates how each exam and its questions will be created and implemented.

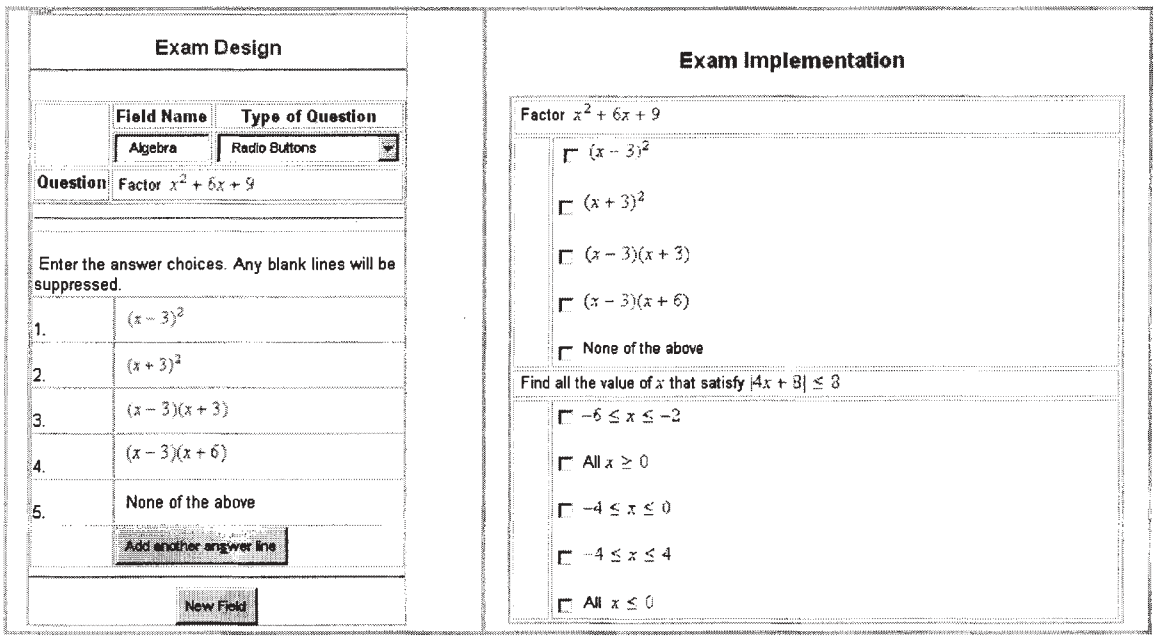

Figure 1: Exam Design and Implementation

On the same context, an administrator can do all administration tasks easily via a web browser. No special packages or modules are required for the supporting server. The administrator can add or delete student, or upload a whole list of students to the database system without the requirement of database programming skill. With WebMA database structure, students can also be listed in different groups, and each group can be authenticated to take different exams. Figure 2 shows how student passwords and their records are generated and managed by the administrator.

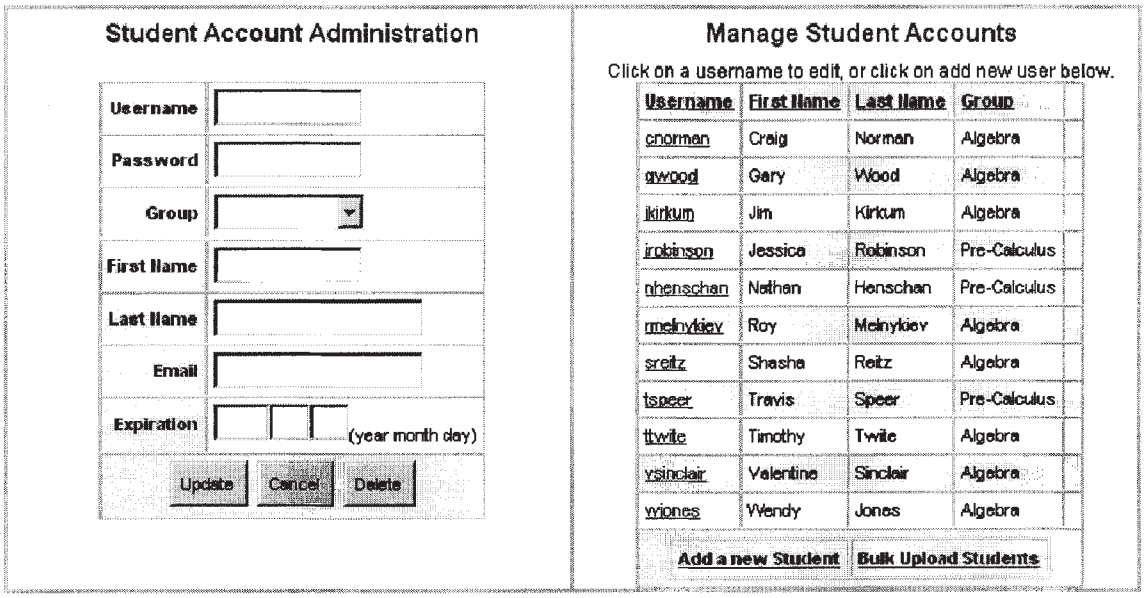

Figure 2: Student Account Administration and Management

Regarding exam question formats, WebMA provides templates for different types of exam questions – multiple choice, true-false, matching, and short answer. The developer only needs to make a selection from the type of question in the box provided by the exam design file as showed in Figure 1, then the desired exam will be automatically created and implemented. Once the exam is ready for launching, the developer can simply change the exam file to an active status, and a web location of the exam will be automatically generated according to the exam file name and its sequence number. Since it appears as a complete online application, WebMA launches itself well on both Windows and Mac OS platforms. Regarding mathematical typesets, WebMA takes both text and image files. All images can be saved in a designated directory with automatic or manual sequential numbers or file names. With a complete web-based feature, WebMA applications can work independently and without the requirement of interface with any other mathematics software. But for that feature, even though WebMA does include the short answer question format, it needs a manual setting of the grading scheme. Hence, the same as many other current mathematics software, WebMA cannot handle the automatic grading

for short answer questions efficiently. Nevertheless, with some embedded mathematics formulae, WebMA does provide an automatic statistical result for each exam as well as its individual items. Results for different mathematical fields can also be sorted and printed in a bar graph for comparison and research purposes.

Conclusion

WebMA is an innovative web-based application that provides online exam developers with an alternative and accessible tool. Though it does not help to resolve the problem of grading mathematics short answer, WebMA lands itself well on the multiple-choice, matching, true-false questions and survey formats. Particularly WebMA is designed to streamline many barriers in the programming and administrative processes of the implementation, and help novice developers to create and publish online exams with an automatic data capturing and a highly structured administrative system.

Reference

Linn, D. (2002). Using electronic assessment to measure student performance: Issue brief. *Education policy studies division.* Retrieved on May 1, 2002 from: http://www.nga.org/center/divisions/1,1188,C_ISSUE_BRIEF^D_3126,00.html.