# NetExam: A Web-Based Assessment Tool for ABET2000

*Fred DePiero*[1]

***Abstract*** *— NetExam is a web-based testing engine. In addition to automated testing and grading capabilities, NetExam computes statistics that are tied directly to program outcomes, for ABET2000 assessment purposes. NetExam provides advantages over scantron-style testing as it also presents statistics on program outcomes on the web. This facilitates review and black board-style comments by program constituents. Also, all of the exam generation, grading, statistics and program assessment features are integrated into the web-based system. First usage is planned for the 2001-2002 academic year.*

*Index Terms — ABET2000, ASP, Network-Based Testing, World Wide Web Application*

## WEB-BASED ABET ASSESSMENT

To aide in the assessment process, NetExam provides a mechanism by which data analyses can be viewed on the web, and then tagged with comments that are shared in a bulletin-board style. Comments are time/date stamped along with their author, to provide the documentation needed for ABET assessment purposes. Using this mechanism, Faculty members and other constituents can identify areas that need improvement. Web viewing was intended to be a convenience feature, and to promote distributed discussions.

## DATA ANALYSES TIED TO ASSESSMENT OF PROGRAM OUTCOMES

Exam results are logged in a database. SQL Queries [1] have been defined to compute statistics that measure program outcomes. For example, a set of questions has been designed to help test the outcome of how well students are prepared to become design engineers. This assessment category is further subdivided into analog design, digital design, and so forth. Program outcomes are evaluated via average pass rates computed for a specific subset of the database questions.

A target pass rate has also been established. As students take exams the actual pass rate is updated and compared against the target. Constituents may examine all of these data on web pages, and make comments. Results are sorted by pass rates, to highlight problem areas.

Database queries have also been setup to determine the correlation between pass rates in different technical areas. This may help quantify the effectiveness of prerequisite material. It would also be revealing to perform a clustering analysis to quantify the prototypical student(s). A goal is to use NetExam for testing at different stages in the curriculum.

The testing scenario envisioned will take advantage of the time available at the first meeting of a lab course. Students would be selected at random and then tested on any prior material. This will permit assessment data to be collected across the curriculum. Settling time and retention time can then be evaluated, for example.

## WEB-BASED TESTING TO AUTOMATE THE EXAMINATION PROCESS

The NetExam server generates exams on demand, drawing from a database. Questions are randomly selected from given subject categories, and possible answers appear in a randomized order. Exam content includes text and graphics, and is presented in a series of web pages. Students can jump from page to page, or jump to the next (previous) unanswered question. When a student completes the exam, it is submitted back to the server for automatic grading.

Security for the system is achieved via the physical security of lab rooms. Both server and client machines are kept on a private network, within locked lab rooms.

## DYNAMIC QUESTION DATABASE

Several strategies are under consideration to create and maintain the database of questions needed for NetExam. Ideally, the exam content should respond dynamically to the changing character of the student body, and to program changes. And, ideally, it should not impose too high a work load on the Faculty.

One possibility is to have students pose questions that would then be reviewed by faculty. On-going student involvement in the exam definition process would not only provide a large database of questions, but would also provide an adaptive mechanism that would help the assessment process track student abilities. Note the source of questions should be expanded to all constituents, for ABET assessment purposes.

## PROJECT DEVELOPMENT AND STATUS

NetExam was created using Active Server Pages (ASP) [2]. ASP routines execute on the server, prior to returning the web page to the browser. ASP is very useful for database queries, and for computing statistics. Beta tests are targeted for the end of the 2000-2001 academic year. An initial database of questions was created as a class project in a graduate-level seminar course.

## REFERENCES

[1] Yarger, R. Y., Reese, G., King, T., *MySQL & mSQL*, O'Reilly, 1999.

[2] Weissinger, A., K., *ASP in a Nutshell – A Desktop Quick Reference,* O'Reilly, 2nd ed., 2000.

[1] Fred DePiero, Cal Poly State University, Electrical Engineering Department, San Luis Obispo, CA 93407 fdepiero@calpoly.edu