



COMPUTER BASED TEST SYSTEM FOR MAI IDRIS ALOOMA POLYTECHNIC GEIDAM, YOBE STATE WITH EMPHASIS ON RESULT INTEGRITY AND ACCURACY

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KeyWords

Computerized examination system, Database, E-exam, Data Integrity, Paper-based test, PHP MySQL, Results.

ABSTRACT

Technology has braced e-examinations positively for some years now, and has gradually improved the e-examination system over the years. However, some institutions in the developing countries are still using the manual system of conducting examination. This manual system of writing examination has a lot of disadvantages which include time consumption and examination malpractices, hence the need for a better, faster and more reliable means of examining students. The objective of this paper is to provide a report on e-exams system that will enhance security and result integrity that would be implemented. The implemented system was modelled using Unified Modelling Language (UML) diagrams such as Use Case diagram, Activity diagrams. The linear life cycle model (waterfall model), used to plan the activities and stages of the report has helped to provide a detailed and well documented report. The system was developed using HTML, PHP/MySQL, and JAVA scripts/ JQuery and also WAMP as the local testing server database. With the e-examination system, the process of conducting examinations and result processing will be fast and reliable. More so, the level of security and integrity is achieved.

Introduction

Educational system is the backbone of every country and also gives foundation to the younger generation to be open minded and get knowledge of various fields which have a lot of impact to the development of every nation. Advanced technology available today can play a crucial role in reformation of education-related processes to promote solidarity among students, teachers, parents and the school staff.

As a result of the development of Internet technology, online examination has become an effective complement to traditional examination. It is a common knowledge that students are extremely prone to cheating under the traditional method, which could affect the fairness of examination. The pen and paper method of writing examination, which has been ongoing for decades, may not be pleasing for use because of the problems usually associated including examination venue capacity constraints, lack of comfort for examination candidates, delay in the release of results, examination malpractices, cost implication of printing examination materials and human fault.

Problem Statement (Current System)

Currently Mai Idris Aloomaa Polytechnic is using the manual method of conducting examination and grading the students, thus taking long period of time to perform the task. Subsequently there is no substantial way so far that will assure you that examination malpractices are not happening. In the current system, students are expected to queue in-front of the examination hall to be searched and scrutinized before getting into the hall. Thus, it leads to so many delays before the commencement of the examination.

Another major issue is that of impersonation, where someone will sit and write for another person. This type of problem sometimes happens with the knowledge of some of the security personnel that are there, thus it will be hard to recognize whether the student that is writing the exam is genuine/real or not.

Related Literature

[13] Proposed a web based online examination system that carries out the examination and auto-grading for students' exams. The system facilitates conducting exams, collection of answers, auto marking the submissions and production of reports for the test. It supports many kinds of questions. It was used via Internet and is therefore suitable for both local and remote examination. The system could help lecturers, instructors, teachers and others who are willing to create new exams or edit existing ones as well as students participating in the exams. The system was built using various open source technologies AJAX, PHP, HTML and MYSQL database. An auto-grading module was generalized to enable different exam and question types. The system was tested in the Mansoura university quality assurance centre. The test proved the validity of using this kind of web based systems for evaluates students in the institutions with high rate of students. (Emary and Abu, 2006), presented an online website for tutoring and e-examination of economic course. The basic aim of authors of the paper to present a novel software tool can be used for online examination and tutorial application of the syllabus of economic course. The main interests of authors of the paper is to produce a software through it we make sure that students have studied all the concepts of economics. So, the proposed software is structured from two major modules: The first one was an online website

to review and make self-test for all the material of economic course. The second part is an online examination using a large database bank of questions through it the level of students can be evaluated immediately and some statistical evaluations can be obtained.

Electronic exam is a difficult part of e-learning security. (Sanjay and Arvind 2016) described a cryptographic scheme that possesses security requirements, such that authenticity, anonymity, secrecy, robustness, correctness without the existence of a Trusted Third Party. The authors of the paper proposed protocol that provides students a receipt, a proof of a successful submission, and it is based on existence of anonymous return channels.

However, (Hoffman et. al. 1996) proposed an exam system for testing student in the software engineering courses and that system is used offline. (McGough et. al. 2001) proposed a browser-based exams system to prove of concept. That system does not support full interactivity and it does not support different languages it's also designed for computer science students. (Ji-hoon Lee et. al, 2000) proposed exam generator program which helps both users and instructors. The system is built for generating exams for fundamental engineering students. The exam is designed taking into consideration one type of exams which is Multiple Choice Questions. (Raymound et. al, 2001) proposed a web based Multiple Choice Exams. This exam supports only this type of questions and does not support Arabic as an exam language. (Jelica et. al, 2001) proposed a system that provides teachers with efficient means of generating and scoring tests with multiple choice answers. This system is inevitable in evaluating student's knowledge at massive examinations. (Jordi et. al., 2004) presented a secure electronic examination protocol. Using wireless technology, they propose a trade-off solution between examination security and examination flexibility. (Mikel et. al., 2005) proposed an exam tool that is based on multiple choice questions. This tool is designed for only computer science students. (Zhang et. al. 2006) proposed a web-based operational skills examination and evaluation system for computer courses. (Chien Lin et. al. 2007) designed a prototype automatic quiz generation system for a given English text to test learner comprehension of text content and English skills. After the emergence of modern technologies in the field of Information Technologies (IT), virtual learning has attained a new form. (Hernán-Losada et. al, 2008) addressed the combined use of automatic grading and the test-driven approach from a pedagogical view. (Horea et. al., 2004) presented the main aspects and implementation of an online multiple choice examination system with general chemistry issues for student evaluation.

System Design and Implementation

The system was designed based on the concept of System Development Life Cycle (SDLC) and also it provides a detailed description of the current system and finally, the description of the proposed new system will be highlighted and modelled using Unified Modelling Language (UML) tools like Use case diagram and Activity diagram.

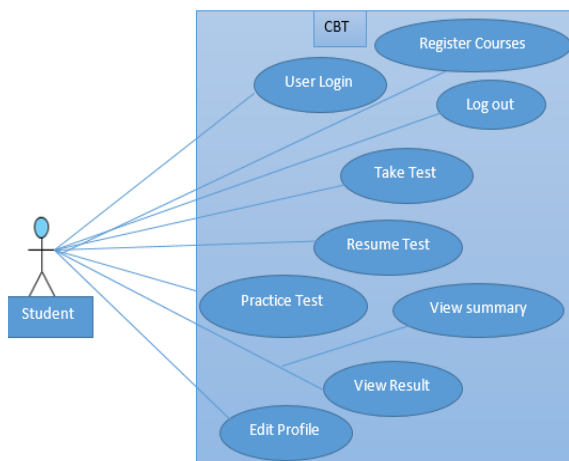


Figure 1: Use Case Diagram for Student

Use case Definitions:

Name	Documentation
 Student	The primary user of the CBT system
 CBT	The CBT System Application
 User login	This constitute of the log-in details for student to have access to the CBT system
 Register	This function allows the student to register for the CBT exam and for his/ her profile to be activated.
 Edit profile	This function allows the student to edit his profile and make changes to his personal details.
 Register Crs	This function allows student to add the courses for the CBT
 Practice test	This function allows the student to take some practice questions before undergoing the actual exam.
 View Summary	This function allows the student to view the summary of questions answered before submitting
 Take test	This function allows the student to take the available test he/ she registered for

 Resume test	This function allows the student to continue with an ongoing exam after some technical difficulties
 View Result	This function allows the student to view his scores and result summary
 Log out	This function allows the student to log out of the CBT system

Table 1: Student Use case Diagram Definitions

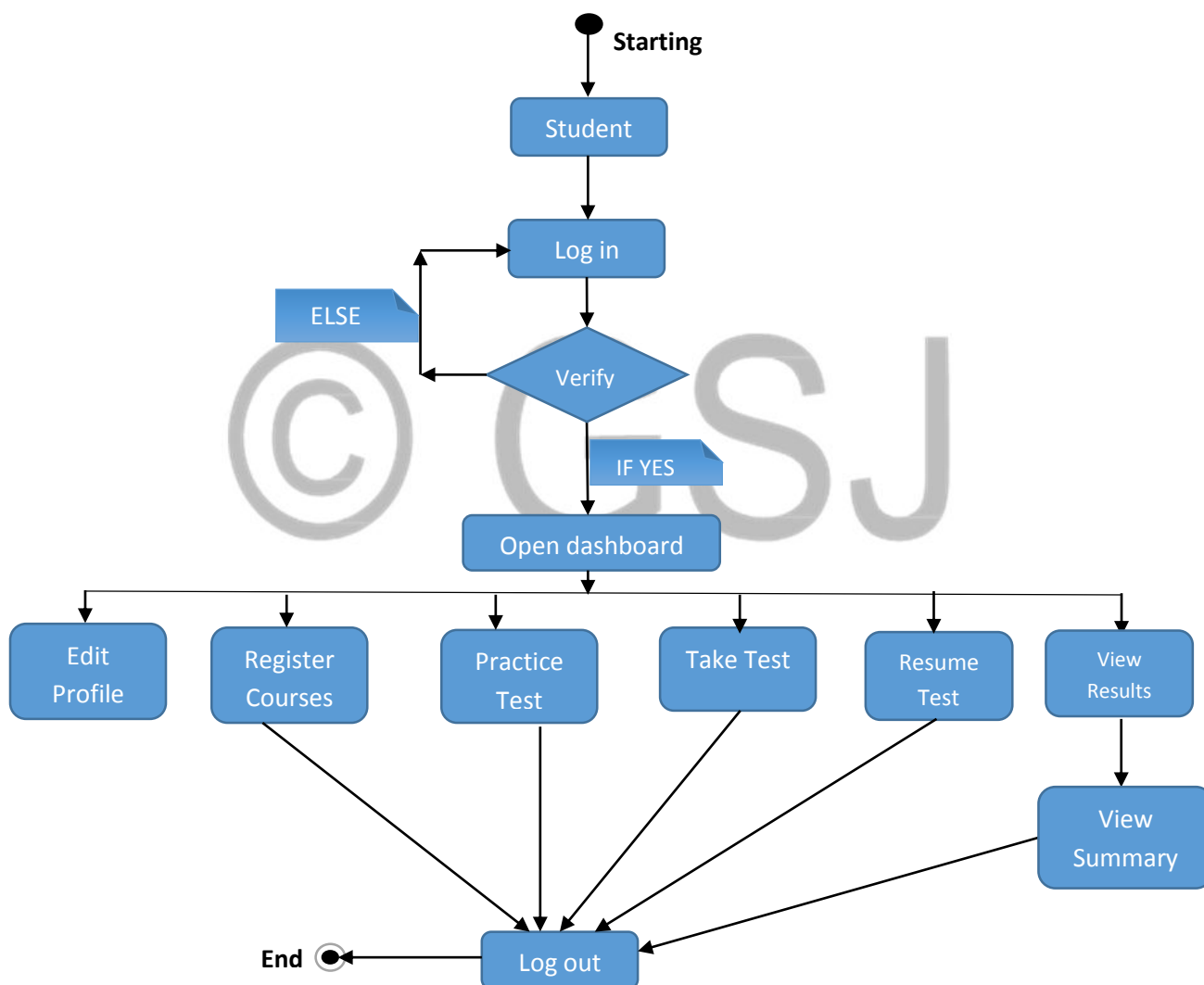


FIGURE 2: Activity diagram for CBT

The activity diagram in figure 2 above shows the different steps that are involved in the computer based test system and the conditions are displayed.

Interface Design



Figure 3: Log in page.

In figure 3 above, it displays the login page for the student to enter their log in details in order to have access to the e-exam dashboard.

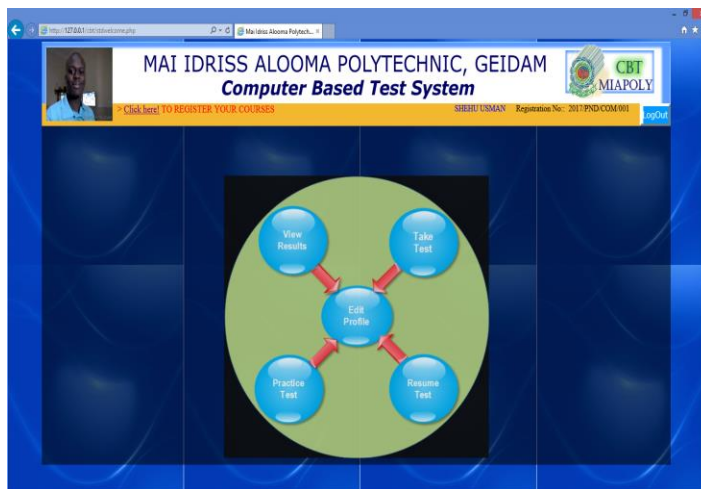


Figure 4: Selected dashboard page from the e-exams system.

The dashboard page allows you to choose from the module and perform the process of conducting the computer based test.

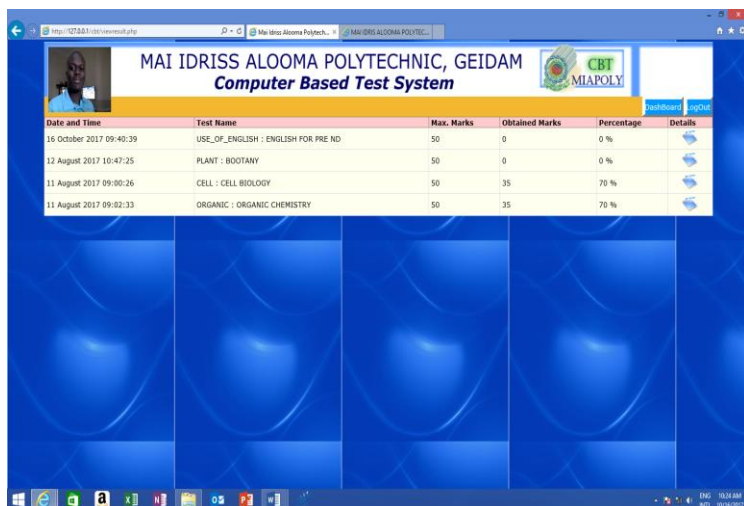


Figure 5: CBT system showing availability of test to be conducted.

From figure 5 above, it displays the validity of each and every test available to be taken by the examiner. The examiner will choose from the option the subject to be taken and the timer will start counting when the questions comes up.

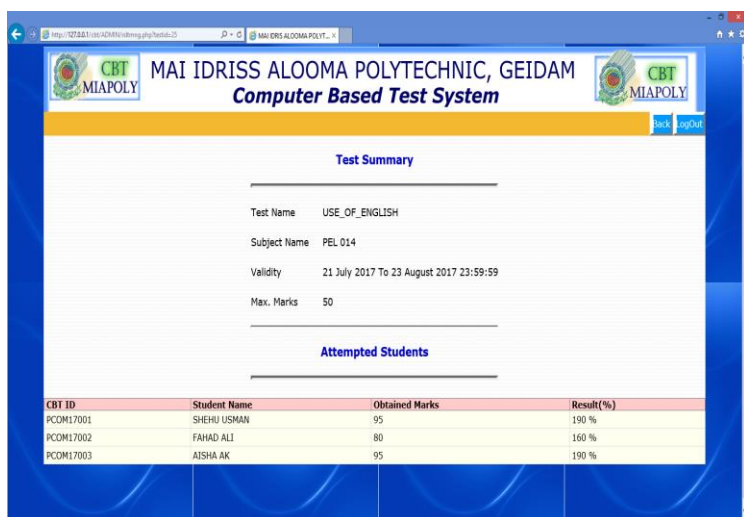


Figure 6: CBT system showing test summary

From figure 6 above, the CBT system will generate an automatic result and display the summary for that test that has been taken. The number of students will be displayed alongside their marks obtained and the percentage.

Conclusion

The main aim of this project is to develop an E-exams system with the emphasis on security and result integrity for Mai Idris Aloomaa Polytechnic, Geidam. The key functional objectives of the project include:

- To implement e-exams system that will be able to assess the performance of students.
- To introduce a method that will solve the problem of examination malpractice.

- To bring high quality way of conducting examination and also use facial recognition (picture) to authenticate student that are conducting the examination
- To develop a system that will use data encryption in order to protect the questions sent by the course tutor.

No project is totally perfect, but the overview of the project was partly successful. All the functional requirements of the system were achieved after a successful testing as described in the evaluation chapter, though the artefact did not possess all the features of an e-exams system but it performs its intended functions correctly. The non-functional requirement of the project that is providing a documented report on the whole development process was achieved successfully within the expected duration having completed all the milestones of the project at the predefined time. Also, for the functional objectives of the project, the developing tools used also leads to a successful achievement of the functional objectives using developing tools PHP/MySQL, JAVA scripts, Notepad ++ and HTML implemented with WAMP serve as reviewed in chapter 2.

The design tools used for the project provides a greater flexibility in designing the database, also the server side scripting language used (PHP) plays a vital role because it communicates with both the web site and the database and there is no need to implement a lot of query or coding to make the communication. Furthermore, the methodology chosen for the project provides a great advantage in producing a good report because it ensures each development stage must be completed before proceeding to the next level which provides a great flexibility, a simplified and linear step by step development without any strictness. However, this leads to a successful design, implementation, testing and the objectives of the project.

Problems Encountered

The problem encountered during the development process is that of learning new technologies that are required for a successful development of the artefact. The researchers took time to rectify each program errors and debug it and in some cases, effort is pushed in on research and tutorials on the programming language because it is the key to a successful artefact. PHP is very easy to learn and understand, there many tutorials, books and codes for different functions available online at no cost which also helped to clarify how to develop a web application with many functionalities. Another problem regarding the new technology is that of implementing MySQL queries within the PHP codes. The SQL query written to automatically update the number of subjects offered and to be taken in the exams which the researchers went through the codes to see how to add each module that will enable the software to have accommodate more subjects as time goes on. This problem therefore delayed the project for a while due to some compilation errors in the syntax, a lot of time was spent trying to uncover the error and the syntax was somehow correct but where to paste the query within the code PHP is causing some technical error to the web page. However, the problem was solved after several rounds of trial; the SQL query needs to be placed after declaration of the form variables and the function is working as expected. Lastly, there was an issue of theft and missing hardware which delay the whole project until a back-up process was initiated and some of the device been purchased.

Future Enhancement

As discussed in the evaluation chapter, the general requirements for this project were successful, that is designing an interface that inherits the basic features of an E-exams system and designing an interface according to interface design principles and guidelines. Even though the functional requirements of the artefact are working correctly as expected, there are again room for further enhancement and improvements of the artefact. The following points highlight the future enhancements of the project:

- The artefact should inherit most of the main features of an E-exams system with newly improved functionalities
- The artefact's interface should be improved following all the key guidelines and principles of HCI as well as the principles of display design.
- Improve in using thumb-print verification in authenticating the candidate
- Inclusion of diagrams and graphs in the question page of the portal.

Reflection

Reflection on Technology

The project exposed the student with a wide range of project management strategies software testing techniques and also, modelling and developing tools. Design tools like PHP is the most widely used scripting language and the student is willing and has developed interest to boost his experience and knowledge of using PHP.

The development environment used (Dreamweaver) makes the web design process easier, especially when codes are developing some bugs. Dreamweaver is built in with some functions that help the user to implement if there any difficulties, such functions include session management, user authentication and record deleting function.

Reflection on learning

Prior to a successful completion of the project, the researchers had gained different new skills and experience which will undoubtedly be put in use for future projects. The skills acquired includes: project management skills, programming skills and problem solving skills.

These skills acquired are vital for future studies. Practicing the developing models, waterfall model enables the development to provide a detailed report of each development phase and also to fulfil the client's requirement by ensuring each project phase must be complete and accurate (Verification and Validation) before proceeding on to another development stage. The problem solving skills acquired is the research skills which is vital to the writing up of the project especially the report's primary research that is the literature review. Finally, this project has helped the researcher with the possibility to apply acquired knowledge and experience into practice specifically writing skills and programming skills, and also to review the latest web development technologies and framework.

References

- [1] Chi-Chien Pan et al, Secure online examination architecture based on distributed firewall, e-Technology, e-Commerce and eService, 2004 IEEE International Conference on , 28-31 March 2004 ,533 – 536
- [2] Daniel Hoffman, Paul Strooper, and Peter Walsh, "Teaching and Testing", Proceedings of the 9th Conference on Software Engineering Education, Page: 248 ,1996 ISBN:0-8186-7249-8 IEEE Computer Society Washington, DC, USA.
- [3] Hernán-Losada, I., Pareja-Flores, C., & Velazquez-Iturbide, A. J. (2008, July). Testing-based automatic grading: A proposal from Bloom's taxonomy. In *Advanced Learning Technologies, 2008.ICALT'08. Eighth IEEE International Conference on* (pp. 847-849). IEEE.
- [4] Ibrahim M. M. EL Emary and Jihad. A. A. Abu Al Sondos (2006), "An Online Website for Tutoring and E-Examination of Economic Course", *American Journal of Applied Sciences* 3 (2): Page 1715-1718, ISSN 1546-9239
- [5] I.M.M. Emary El and J.A.A. Abu (2006), "An Online Website for Tutoring and E-Examination of Economic Course", *American Journal of Applied Sciences* 3 (2): Page 1715-1718, ISSN 1546-9239
- [6] JelicaProticeI, DraganBojie ', and Igor Tartalja, " test: Tools for Evaluation of Students' Tests- A Development Experience", October10 - 13, 2001 Reno, NV 31" ASWIEEE Frontiers in Education Conference.
- [7] Ji-hoon Lee, Kurt Gramoll. "Internet-based Exam Generator for Practice Review of the Fundamentals in Engineering Exam". A thesis Submitted to The Graduate Faculty in partial fulfilment of the requirements for the degree of MASTER OFSCIENCE BY JI-HOON LEE Norman, Oklahoma 2000, and School of Aerospace and Mechanical Engineering.
- [8] Jordi Herrera-Joancomartí, JosepPrieto-Blázquez, JordiCastellà-Roca Estudis d'Informàtica i Multimedia, "A secure electronic examination protocol using wireless networks", *Proceedings of the International Conference on Information Technology: Coding and Computing (ITCC'04)*
- [9] Li-Chun Sung, Yi-Chien Lin and Meng Chang Chen, "An Automatic Quiz Generation System for English Text Seventh IEEE International Conference on Advanced Learning Technologies (ICALT 2007).
- [10] Liang Zhang, Yue-ting Zhuang¹, Zhen-ming Yuan², Guo-hua Zhan², A Web-Based Examination and Evaluation System for Computer Education ", *Proceedings of the Sixth International Conference on Advanced Learning Technologies (ICALT'06)*, 2006 IEEE.
- [11] Magdi Z. Rashad, Mahmoud S. Kandil, Ahmed E. Hassan, and Mahmoud A. Zaher (2010), "An Arabic Web-Based Exam Management System", *International Journal of Electrical & Computer Sciences IJECS-IJENS* Vol: 10 No: 01. Page 48-55.
- [12] McGough, J.; Mortensen, J.; Johnson, J.; Fadali, S., "A web-based testing system with dynamic question generation", *Frontiers in Education Conference, 2001. 31st Annual Volume 3, Issue, 2001*Page(s):S3C - 23-8 vol.3.
- [13] MikelKerejeta, MikelLarrañaga, Urko Rueda, Ana Arruarte, Jon. A.Elorriaga, " TOKA: A Computer Assisted Assessment ToolIntegrated in a Real Use Context", *Proceedings of the Fifth IEEE International Conference on Advanced Learning Technologies (ICALT'05)*.
- [14] M.Z. Rashad, M.S. Kandil, A.E. Hassan and M.A. Zaher (2010), "An Arabic Web-Based Exam Management System", *International Journal of Electrical & Computer Sciences IJECS- IJENS* Vol: 10 No: 01. Page 48-55.
- [15] Raymond Lister, Peter Jerram, "Design for Web-Based On Demand Multiple Choice Exams Using XML *Proceedings of the IEEE International Conference on Advanced Learning Techniques (ICALT'01)*, 2001 IEEE.