

DESIGN AND IMPLEMENTATION OF A WEB-BASED ASSIGNMENT SUBMISSION AND GRADING SYSTEM

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ABSTRACT

An Online Assignment Submission and Grading System is a system contained within the electronic learning environment module that provides a more efficient means of submitting,, grading and recording assignments, as well as storing manuscripts for future referencing. The review of related works showed that most of the problems with online assignments submission systems had been dealt with, but the cumulative averaging of scores recorded for each student in multiple assignments as well as capability of administering assignments that need not to be electronically graded remain unaddressed. Hence, in this work, a Web-based Assignment Submission and Grading System capable of automatically generating cumulative averages of multiple assignments scores and allowing automatic collation and recording of manually graded assignments was developed. The developed system was designed using standard software design tools such as Use Case Diagram; block diagram and system flowchart. The system was implemented using PHP, HTML, CSS/Bootstrap, Javascript and MySQL. The evaluation of the performance of the system showed that 64 out of the 74 students engaged in system testing successfully submitted their assignments within the deadline using the web-based assignment submission and grading system while 46 of them were able to submit using the paper based system. It was also revealed that it took only an average of 1.96 minutes for the assignment scores of ten students to be collated and recorded using the web-based system, while it took a much longer time of 31.67 minutes on average to perform the same task using the paper based system. Thus, the proposed system provides a faster, more convenient and flexible means of submitting, grading and recording assignments in higher institutions of learning.

Keywords: Web-based, assignment, grading, system, submission, group, scores.

1. INTRODUCTION

Colleges, Universities, Polytechnics and other higher institutions of learning are relied upon for the training of highly skilled professionals and experts in various fields of studies which include applied and medical sciences, Agricultural sciences, Mathematics, Computer technology, Social sciences, Humanities and Accounting. Most of the courses taught at this level of education involve theoretical and practical teachings which require giving of regular assignments to evaluate the level of understanding and degree of comprehension among students (Ramnarain-Seetohul, Karim and Amir, 2012).

Meanwhile, higher education providers such as Universities, Polytechnics and Colleges are paying more attention to the quality of learning being offered their students in order to boost their image and ranking at local and international levels. These rankings are based on their performance and quality which are the main concerns of students and their future employers, and proper management of assignments given to students has been identified as one of the evolving techniques to improve quality of teaching at higher levels of education (Faez, Rahaman and Harun, 2014).

Assignment management involves collecting, marking and redistributing to students who would have submitted either individually or in groups. Online assignment submission and management (OASM) involves the use of the World-Wide Web, the internet and computers to aid the assignment management process. Some of the problems with the traditional paper-based approach to assignment management, especially when answers have to be submitted physically include distance, time, and format of submission (written or printed) (Earn My Degree, 2010). As online assignment systems have advantages like administrative effectiveness, cost effectiveness, security and accountability, improved turnaround time, ease of grading, availability of privately disseminated feedback, reduction in the use of paper and provision of an electronic store for submitted assignments (Collis, Boer and Slotman, 2001; Palmer, 2005-2006; Barker, Kortum and Miller, 2008; Yildirim, Erdogan and Cigdem, 2016).

Now, that the educational setting is moving faster and becoming more competitive, most institutions of higher learning have adopted the use of online submission and other technologies to ease their tasks, save time and to be in pace with this fast

moving information technology (IT) world (Ramnarain-Seetohul, Karim and Amir, 2012). A lot of research works have developed online systems for handling the process of administering assignments in higher institutions with remarkable benefits and some inherent shortcomings.

Ramnarain-Seetohul, Karim and Amir (2012) proposed an Online Assignment Submission System which allows the tutors to upload files and export marks to an excel sheet. It also permits downloading of files by students, students participation in online assessment and sending of submission deadlines reminders to students. The system also resolved problems like submission of same copy by each student when answering group assignments, students not remembering due dates, lack of automatic assignment notification, and limited file size for upload. The system however, did not make possible, cumulative collation of scores of multiple assignments, as well as administering assignments that could be graded manually. Faez, Rahaman and Harun (2014). proposed a web based system which helped higher institutions of learning to improve the process of managing students' assignments and projects. It allows students to communicate and discuss their projects or assignments with their supervisors / lecturers. In addition, supervisors will be able to monitor the progress of students' project. Although, it allows comments as feedback, assignments are graded electronically, and the collation of scores of multiple assignments is not allowed. Mgbefulike and Ejiofor (2018) developed an online interactive learning support system for the administration, management, uploading and delivery of lectures and training. The developed system allows the lecturers to administer only computer based tests, quizzes and assignments.

The review of related works showed that most of the problems with online assignments submission systems had been dealt with, but the cumulative averaging of scores recorded for each student in multiple assignments as well as capability of administering assignments that need not to be electronically graded remain unaddressed. Hence, in this paper, a Web-based Assignment Submission and Grading System capable of automatically generating cumulative averages of multiple assignments scores and allowing automatic collation and recording of manually graded assignments is proposed.

2. THE PROPOSED SYSTEM

This proposed system will effectively manage assignments submission, grading and recording, and secured storage of assignments manuscripts. The system will help in solving the following problems:

- (i) Lateness in submission of assignments.
- (ii) Improper accountability of assignment manuscripts
- (iii) Duplication of efforts in recording same scores for individual members of a group.
- (iv) High cost and stress of preparing voluminous hard-copy documents for submission
- (v) Inability to administer electronically collated, but manually graded assignments.

This system will help to drastically reduce the time needed to assess assignments, record and collate the overall assignment scores. It will allow students to submit assignments promptly and have guaranteed access to their assignment scripts. It will also assist in monitoring the productivity of lecturers and students by the Head of Department or whoever is assigned to be the system administrator. Thus, the system will help in enhancing the quality of learning in higher educational institutions.

The proposed system was designed using standard software design tools such as Use Case Diagram; block diagram and system flow chart. The block diagram of the modules of the proposed system is as shown in Figure 1. The system is made up of the Login module, Admin module, Lecturer module and Student module. The Login module grants access to the functionalities meant for the different users and prevent unauthorized access to the system. The functions of the other three modules will be described using the roles played by the actors; Admin, Lecturers and Students of the Use Case Model as shown in Figure 2.

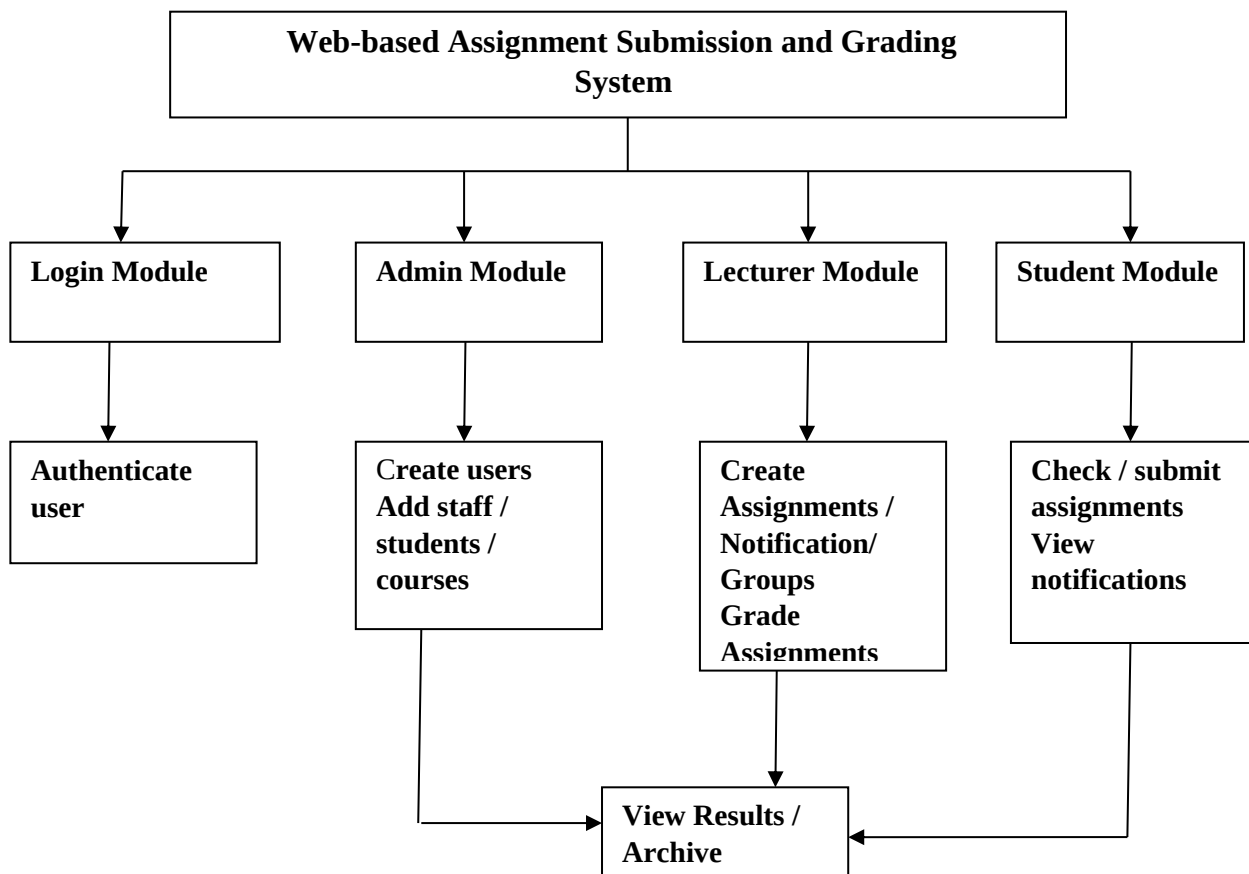


Figure 1: The Block Diagram of the Proposed System

The details of the Use Case Diagram in Figure 2 are as follows:

(i) Actor; Student, who must have username and password created by the administrator can; login to the system, register for courses, check and submit assignment, view result / archive, view articles / announcements, edit profile and logout of the system.

(ii) Actor; Lecturer, who must be a course lecturer with a valid username and password created by the administrator can; login to the system, edit profile, create assignments / announcements, grade submitted assignments, view results / archive and logout of the system.

(iii) Actor; Admin, who must have a good understanding of the system as well as having adequate technical expertise, can; login to the system, add / edit courses, add / edit lecturers and students, assign lecturers to courses, view assignment results / archive and log out of the system.

Dynamic web development, which enables users to interact more with the website further than just reading pages, was used for the web design. This requires three main tiers namely; web server, server-side codes (using an appropriate server side programming language and a database (Microsoft, 2013).

The proposed web-based assignment submission and grading system contains about twenty web pages (both static and dynamic) which include student login page, lecturer login page, admin login page, student homepage, assignment grading page, result page, assignment archive page, admin dashboard and so on. Sublime text was used for the design of the web pages. The system flow chart and database design are as shown in Figures 3 and 4 respectively.

The lecturer module of the proposed system was designed to allow lecturers create both individual and group assignments, create assignment groups, grade answers and process assignment scores. Multiple assignment questions with spaces for short answers, as well as questions requiring answers that will be uploaded by students can also be created. Each of the multiple questions has an insertion box at its bottom right corner where the score received for the answer is entered by the lecturer. The system then automatically generates and records the total score for the student immediately the submit button is clicked. For the other type, where answers are submitted by uploading document files, the downloaded answer document has only one insertion box where the score for the assignment will be entered.

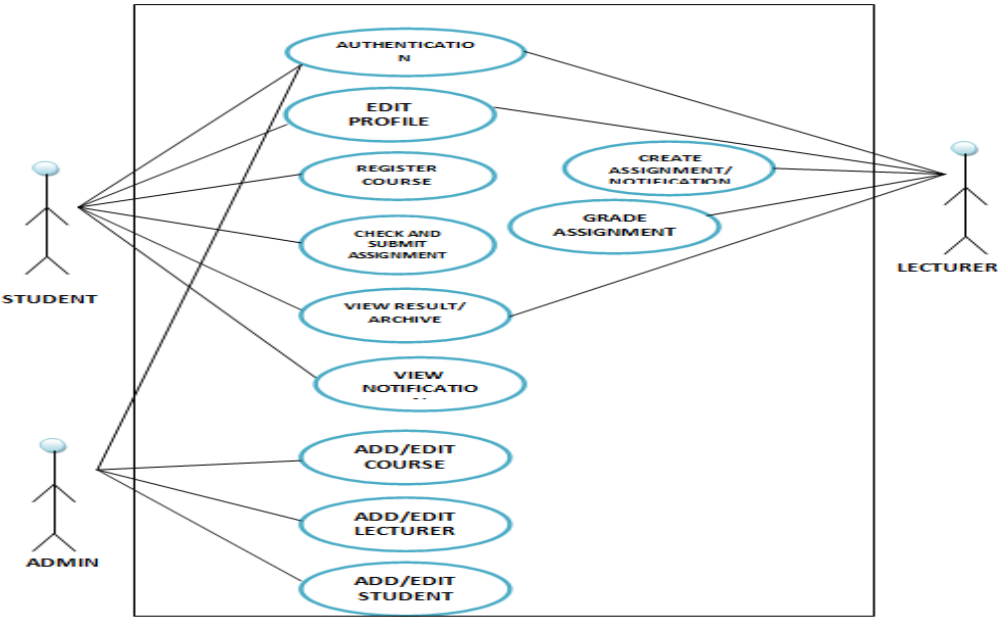


Figure 2:
System
User
Case
Diagram

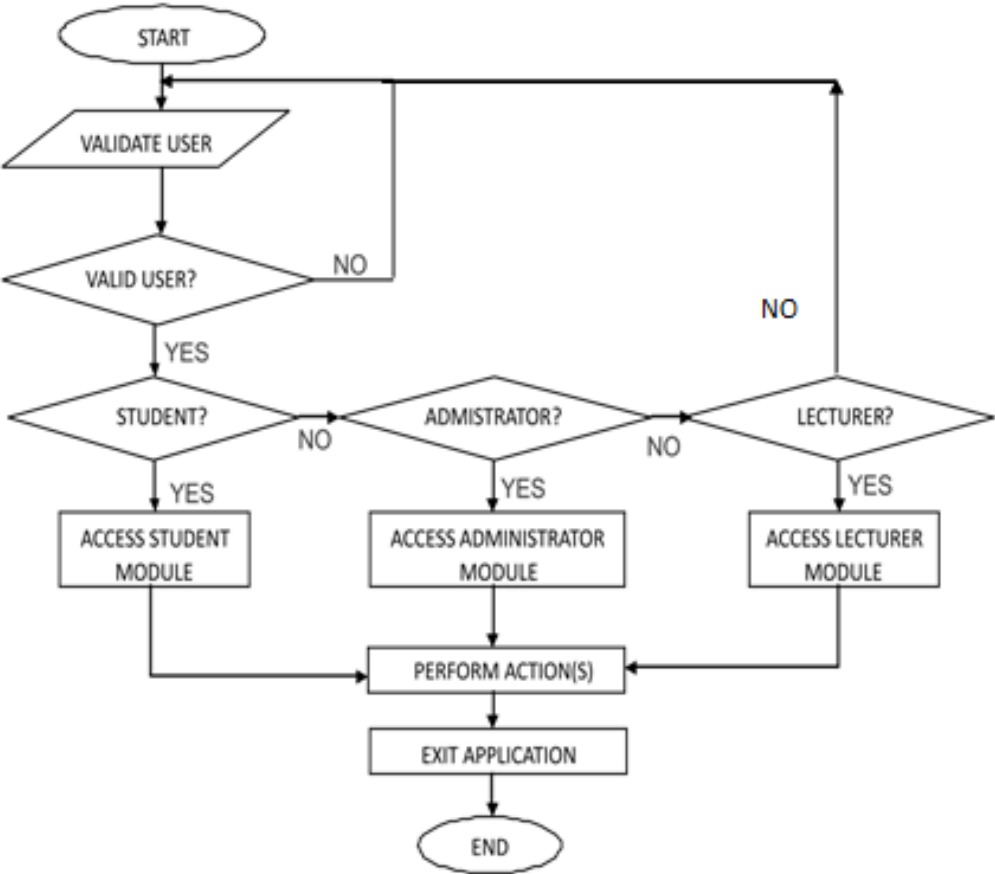


Figure 3: System Flow Chart

Figure 5 shows the admin login page through which the admin module can be accessed by the administrator, who can from there select admin functions to be performed. Figure 6(a) shows the lecturer login page where the lecturer can access the lecturer home page by supplying a valid username and password. The lecturer can then perform his / her roles by activating

the appropriate function(s). Figure 6(b) depicts the student home page which can be accessed from the student login page. Here, the student can view notifications, upload and submit assignments, view results and achieves and so on.

Figure 7(a) represents the assignment creation page, where the lecturer can create assignments and groups, create announcements and send notifications. Lastly, figure 7(b) shows the results sheet page which displays the scores recorded for students in both individual and group assignments.

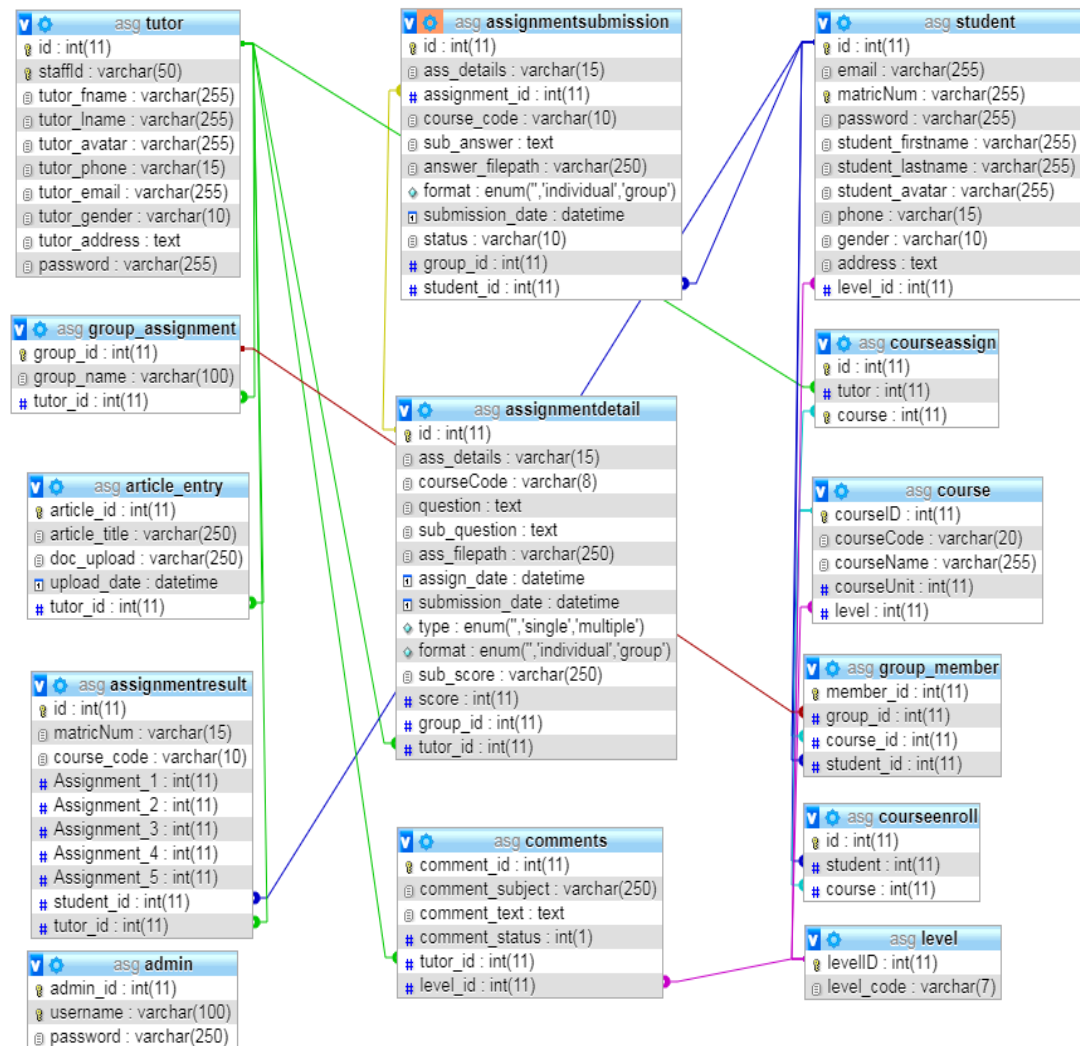


Figure 4: System Database Design

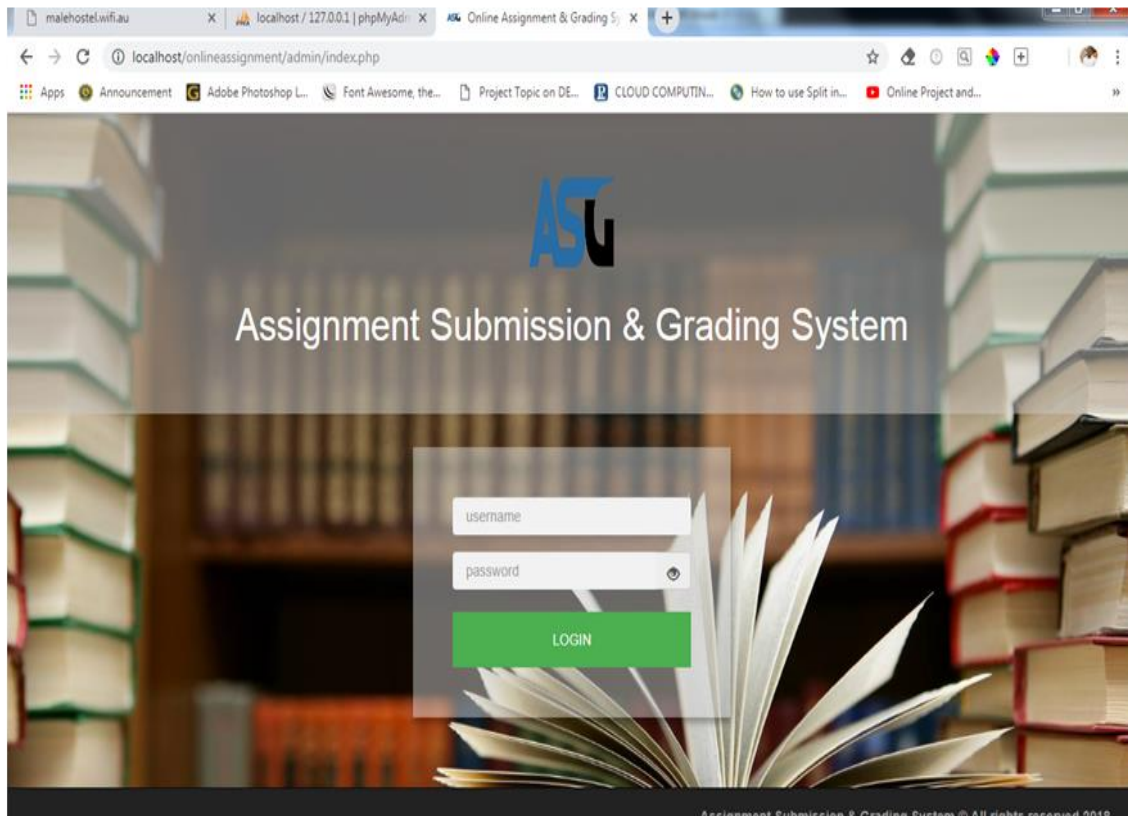


Figure 5: Admin Login Page

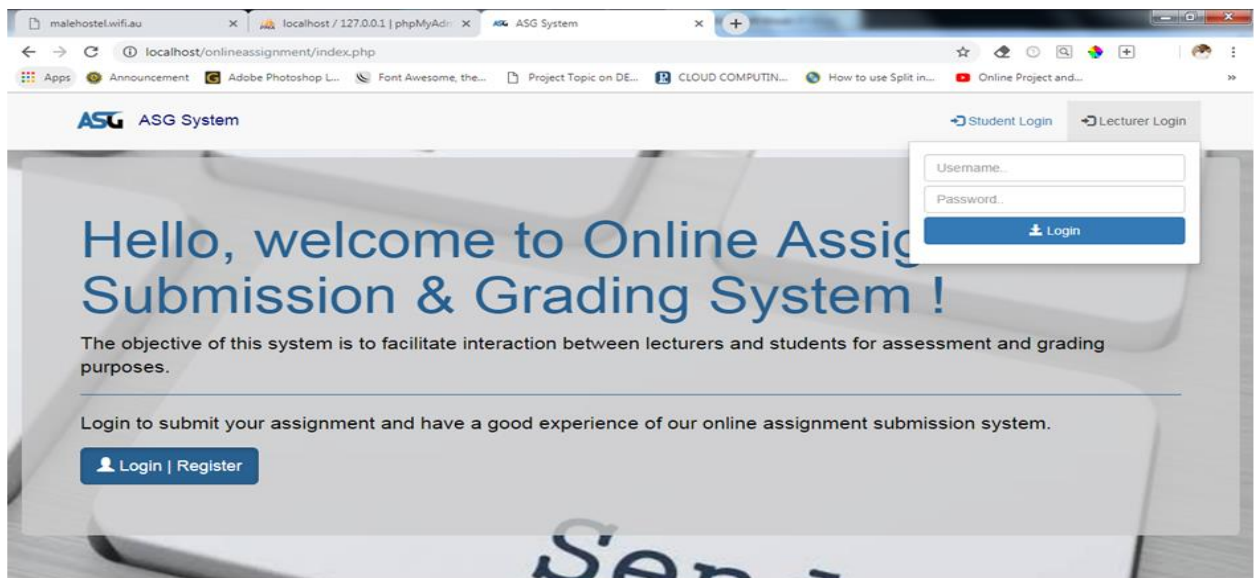


Figure 6(a): Lecturer Login page

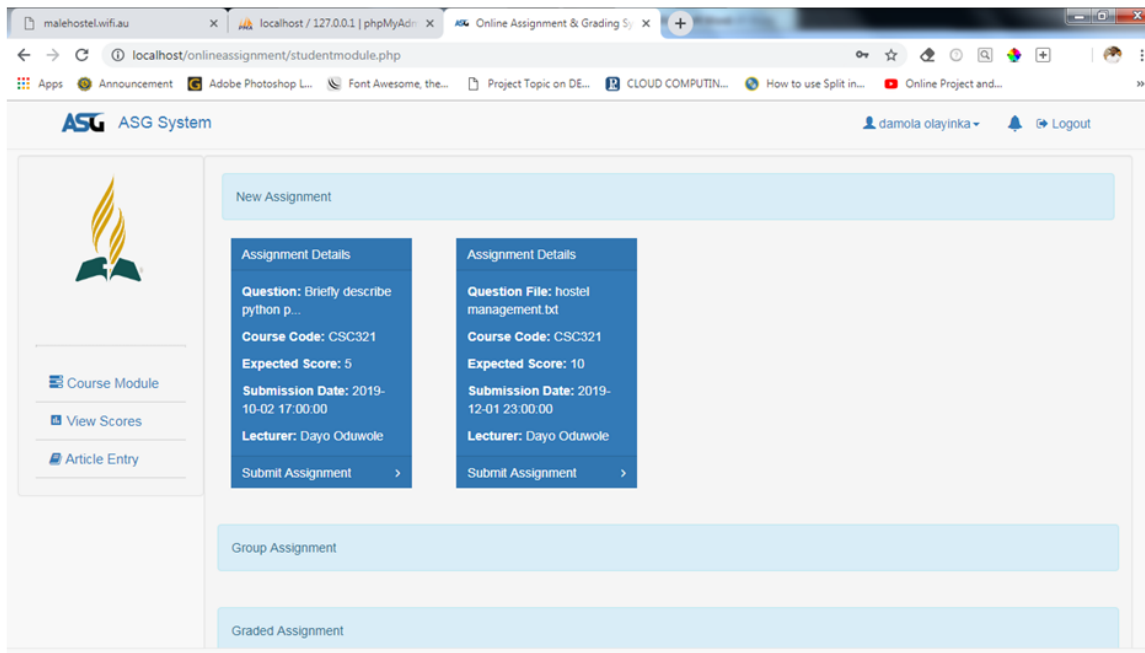


Figure 6(b): Student Home Page

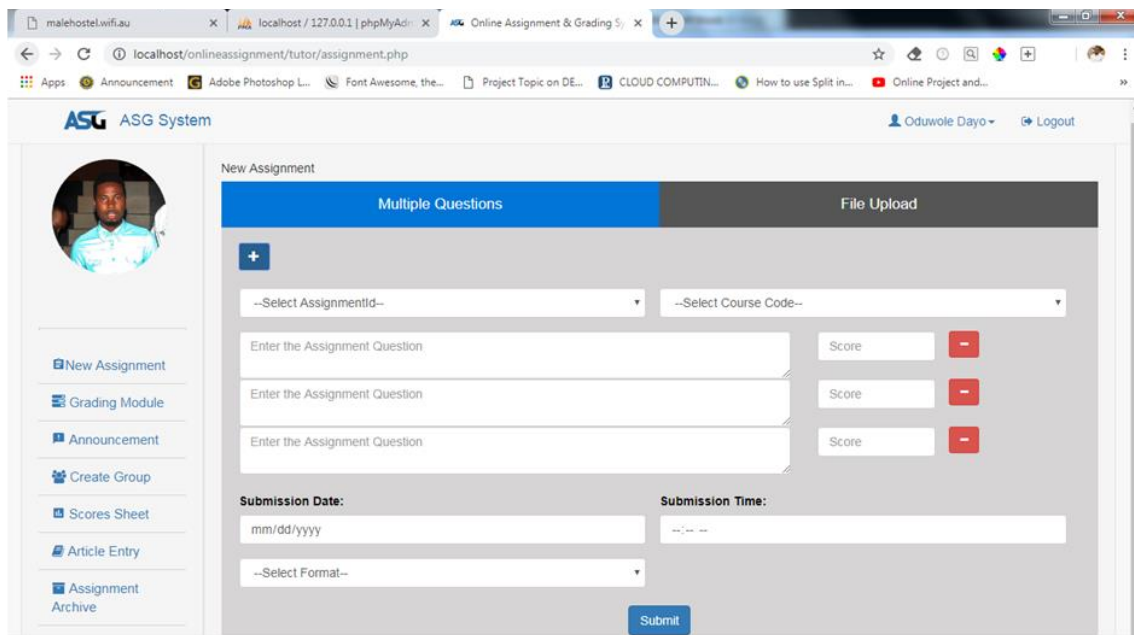


Figure 7(a): Assignment Creation Page

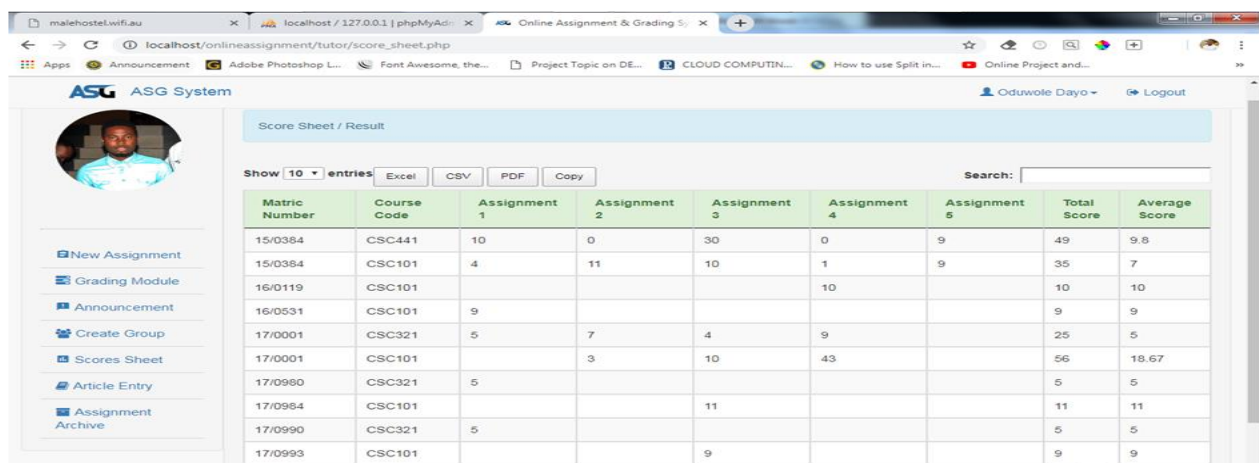


Figure 7(b): Result Sheet Page

The web-based assignment submission and grading system was tested with a CIS 222 (Database Development) assignment given to 200 Level students of Adeleke University, Ede, Osun State, Nigeria. Both the web-based system and the existing paper-based method were used to administer a three-question assignment on seventy-four students offering CIS 222 with a seventy-two hour submission deadline. Assignments scripts of ten students were also graded and recorded by six lecturers using both web-based and paper based systems.

The performance of the web-based system was evaluated by comparing the number of students that successfully submitted their assignments within the stipulated time using the web-based system with the paper based system. Also, the time taken to collate and record assignment scores of 10 students using both systems was recorded and compared, with the assumption that there will be no network connectivity problem during the time of experimentation.. The results of using the developed web-based assignment submission and grading system and the existing paper based approach for submitting, grading and recording CIS 222 assignment of 200 Level Computer Science students of Adeleke University, Ede, Osun state, Nigeria are as presented in Tables 1 and 2 respectively. The graphical representations of the results are as shown in figures 8 and 9.

Table 1: Table showing the number of students that successfully submit assignments within the set deadline for the proposed and paper based systems.

System	Number of students offering CIS 222	Number of successful students	Number of unsuccessful students
Paper Based	74	46	28
WASG System	74	64	10

Table1 and Figure 8 show that 64 out of the 74 students that registered for the course successfully submitted their assignments within the deadline using the web-based assignment submission and grading system while 46 of them of were able to submit using the paper based system. This indicates that the number of students that successfully submitted using the proposed web-based system is much higher than that of the paper-based system.

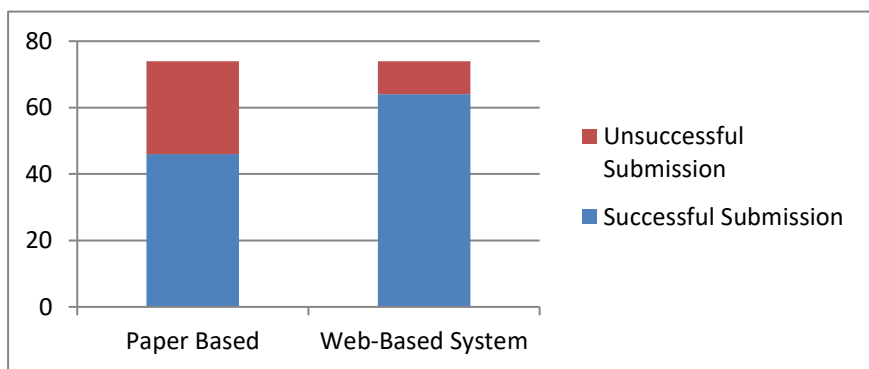


Figure 8: Graph of number of students that successfully submitted assignments within the set deadline for the proposed and paper based systems.

Table 2: Table showing the time taken to collate and record CIS 222 assignment scores of 10 students using the Paper Based and Web-Based Assignment Submission and Grading Systems.

Lecturer Number	Web-based Score Collation and Recording Time (Minutes)	Paper Based Score Collation and Recording Time (Minutes)
1	2.01	30.00
2	1.66	33.00
3	1.85	35.00
4	1.90	29.00
5	2.11	31.00
6	2.23	32.00

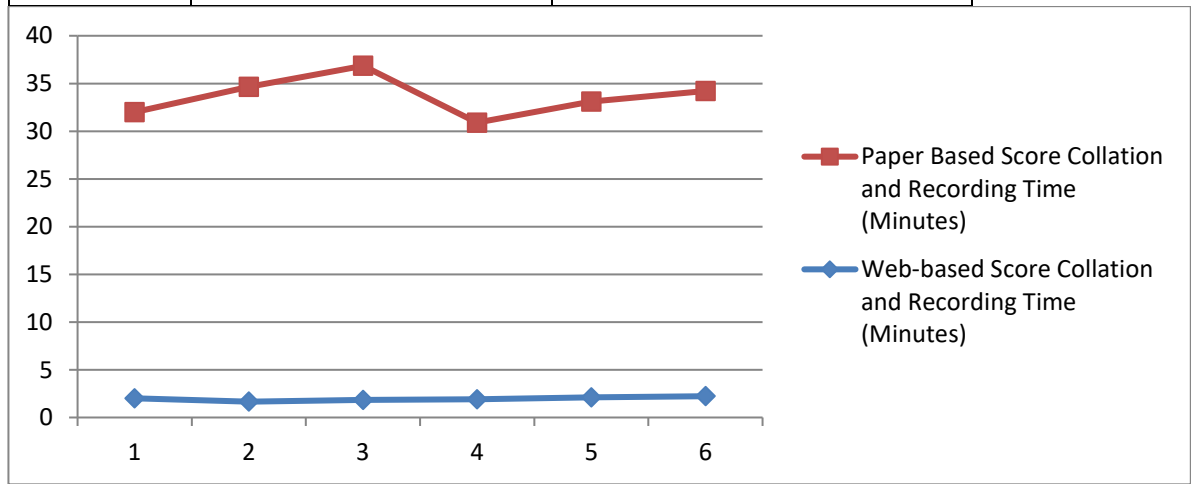


Figure 9: Graph of time taken to grade and record CIS 222 assignments using the Paper based and Web-based Assignment Submission and Grading Systems.

Table 2 and figure 9 are the table and graph showing the time taken to collate and record a three-question CIS 222 assignment of ten 200 level Computer science students of Adeleke University, Ede, Osun State, Nigeria respectively. It is shown from the table and graph that it took only an average of 1.96 minutes for the assignment scores of the ten students to be collated and recorded using the web-based while it took a much longer time of 31.67 minutes on average to perform the same task using the paper based system. It is also noticed in figure 9 that the time spent on collation and recording of scores by the six lecturers are close for the web-based system, but are more different for the paper based system. This can be reasoned to have been as a result of the insignificant impact of human differences on the web-based system, since it requires lesser human intervention as opposed to paper based system which is greatly affected by individual differences.

4. CONCLUSION

In this work, a Web-based Assignment Submission and Grading System capable of generating cumulative averages of multiple assignments scores and allowing automatic collation and recording of manually graded assignment scores was designed and implemented.

It is therefore, concluded from the results of performance evaluation of the system that the proposed web-based system provides a faster, more convenient and flexible means of submitting, grading and recording assignments.

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