RESULT PROCESSING SYSTEM FOR ACADEMIC INSTITUTIONS

Akaiso, L. E.[1], Ekwonwune, E.[2] and Mkpandiok, M. A.[3]

1 & 3: Maritime Academy of Nigeria, Oron, Akwa Ibom state, Nigeria.

2: Imo State University, Owerri, Imo State, Nigeria.

Abstract

Computation and preservation of students' results and information on students academic achievement in every semester is a fundamental issue for every educational institutions; as students upon successful completion of an academic calendar seeks to know their performance and the only manner to present this to students after evaluation is through the final semester results and, or transcripts. Results and transcripts processing are vital aspect of all formal education as they determine the students' level of academic attainment professionally. The observed setback in the current system of students' academic result processing motivated me into this research. The system was found to be tedious and time consuming, especially when carried out for a large number of students, in addition to making the entire process cumbersome and error prone. This study aims at designing a result processing system for Academic Institutions. The data used for the system testing were obtained from the semesters' results of ND and HND cadets in the departments of Nautical Science and Marine Engineering in Maritime Academy of Nigeria, Oron, Akwa Ibom State. Object oriented analysis and design methodology (OOADM) was adopted for this study. The programming languages used for the software implementation was hypertext mark-up language (HTML), cascading style sheet (CSS), and Java script for the front-end interface while the backend functionalities powered by hypertext pre-processor (PHP) and my structural query language (MySQL) database were also employed. It is revealed that the system was able to compute grade point average (GPA) and cumulative grade point average (CGPA) for each cadets facilitating easy access to all users anytime.

1.0 Introduction

One of the largest investments in many organizations is the creation, maintenance, and retrieval of information. It has been estimated that in an organization such as a tertiary educational community, information is highly essential for correct students' record and examination data (Emmanuel & Choji, 2012). Student information, if not properly created and stored, will cause many errors in usage (Okonigene, Ighalo & Ogbeifun, 2009). Nearly every section of the educational system requires information processing. With the use of computers for information processing, the following are possible: instant access to students'

personal and course information, instant student information updating, automatic computation of the Grade Point Average (GPA), generation of the graduating students list, monitoring of failed courses, keeping an up-to-date record of the entire student body in the institution, storing course information such as course code, course description, course unit, and scores for the purpose of GPA computation, and producing user-friendly data entry screens for ease of use. It is inopportune that some educational institutions in the developing world, such as the Universities, Colleges of Education and polytechnics in Nigeria, still operate under the manual method of record keeping and computation of GPA. Maritime Academy of Nigeria, Oron, Akwa Ibom state, Nigeria, for example, still operates on this manual method which is highly prone to errors.

Computation and preservation of students' results and information in every semester is a fundamental issue for every educational institution (Abu & Abel, 2013).These yield students' academic records, called transcript. Transcript is a certified statement detailing a student's complete academic record at the University or other higher institutions of learning (Christian, Lev, & Eugenia, 2013). In Nigeria, the education system focused strongly on examinations. Lord Fredrick Lugard, the first governor of the unified colony in 1961, set up a school inspectorate, discipline, buildings and adequacy of teaching staff were to be inspected, but the most points given to a school's performance went to the number and ranking of its examination results. This stress on examinations was still used in 1990 to judge educational results to obtain qualifications for jobs in government and the private sector (Beka & Beka, 2015). As more information is made available in a variety of formats and media and in a variety of locations, the need to manage information or data efficiently becomes more and more critical. Both staff and public users want access to stored information and want to access it more efficiently. It is the institution policy to improve both the efficiency and effectiveness of result processing operation and services through the implementation of an integrated automated database system (Grey, 2010).

The increase in students' population over the years has made the work of examination officers and other officers in charge of processing students' result a very exasperating exercise (Obiniyi & Ezugwu, 2010). These processes are to be carried out every academic session; consequently it keeps the operators in an unremitting and ever challenging cycle. Except for the use of an accurate and effective system, results computation have tendency to convey misleading information to decision makers (Ukem & Ofoegbu, 2012).Thus, several

efforts have been made to alleviate the burden on examination officers when it comes to result computation and processing (Matemilayo, Kamaldeen, & Oyedepo, 2017). Results processing can be seen as a continuous process of converting data (scores, grade points, credit units etc) into a definite and meaningful information such as statement of result, transcripts etc (Ezenma, Emmanuel & Choji, 2014). These results are used to check the performance of each student in various courses. A result is an official school report on the academic record of student, listing courses offered and grades received. It is a critical component of admission, transfer credit unit processing, and graduation processing, record of the courses taken by the student and the grades earned throughout the student's stay in the institution (Beka & Beka, 2015). Also, it is the criteria for the measurement of the student's capability in terms of academic work in school. Student's Examination result is one of the most important elements in schools. These data must be processed under critical management, while requiring simple operations for processing. The quality of result processing and period of its delivery in tertiary institution is a major determinant in measuring management and administration performance metric and hence should be given serious attention (Oyeyinka & Oladipo, 2015). The world today is moving at the speed of light and equivalent accuracy to ensure quality. This has given birth to the involvement of ICT in all facet of the economy, as it's known to introduce speed with consistent accuracy providing data output of optimum integrity (Oyeyinka & Oladipo, 2015). Result is a complete record of the student's education coursework, grades and quality points a student has earned in his stay in the institution. It provides a standard format for recording all study activities carried out by students and remains an essential tool for academic recognition. Majority of results comes into the institution in paper form through multiple points and are processed in multiple areas depending on the reason the result is requested (Beka & Beka, 2015). Until result details are entered and processed, there is no reliable way to track incoming result. This creates many problems for students and staff. Results produced are used as input for subsequent course registration, prerequisite courses eligibility, graduation eligibility and it's basically the bases for student assessment as to his/her level of anticipated preparedness (Oyeyinka & Oladipo, 2015).

Arising from the observed errors associated with manually processed method of students' results in most institutions including Maritime Academy of Nigeria, make it becomes imperative that automated approach be used to the full in measuring student progress. Experience has shown that the manual methods being employed in the processing of

academic results suffer a number of set-backs among which include they make the process to be tedious and time consuming especially when carried out for a large number of students, prone to error during computation, lead to examination results being published late, make the results to be untidy when changes or corrections are effected, results are insecure, and sometimes wrong results grades entered resulting in wrongly computation of students grade point average (GPA) and work load on the examination officers etc (Amadin & Ukoaha, 2014). These could lead to wrong conclusions at a class of diploma awarded thereby making some students end up with undeserved good class of certificate while others could be unfairly victimized. Without an adequate results processing system, the aim for which results are produced may not be achieved, a mistake made during the process might lead to a very big problem. For these reasons an effective, efficient and error free results processing system is required for proper result processing. Designing and implementing a computerized system will minimize these problems especially when authenticated with a username and password. With automated system, corrections or changes when effected will not make the work untidy; thereby reducing stress on examination officers (Matemilayo, Kamaldeen, & Oyedepo, 2017).

The record checking system in some higher institutions is traditionally characterized by pasting students' scores in a particular subject(s) on notice boards for the students to access; this has many drawbacks aside being stressful for both the students and lecturers, and all other stakeholders involved in the handling of students' results. Many a times, when semester results, notices and students' records are displayed on the notice board, they are more often than not vandalized. Hence, there is need to provide better and efficient alternative means of processing, preserving and displaying students' results, and academic records that is reliable than the traditional method currently in used within the tertiary institution educational system (Omilabu,Usman, Alaba & Adedeji, 2015).

Several students result computation systems have been developed for use in tertiary institutions to tackle some of these problems (Abu and Abel, 2013; Ekpenyong, 2008; Ukem and Onoyom-Ita, 2011). Eludire (2011) designed an application interface system which incorporates a Microsoft Access 2003 database for processing students' academic records. Bharamagoudar, Geeta & Totad (2013), proposes a simple interface for the maintenance of students' information. Intelligent Knowledge-Based System (IKBS) was built by Ekpenyong (2008) using various programming facilities and Microsoft Excel spreadsheet package. Critical evaluation of these systems confirmed that, most of them are not adequate to meet the

need of the tertiary institutions' challenges. Some of these systems process students' results with little errors and produce inconsistent outputs, thereby making data integrity a big challenge. Developing a computerized results processing system will provide an efficient means of processing, preserving and displaying students' results, academic records and other relevant notices to students. As part of its benefits, the system will enable stress-free, speed-up the processing of students' examination results and eradicate vandalization of students' records that have characterized the traditional method (Ukem & Onoyome, 2011).

1.1 Statement of the Problem

Accuracy and efficiency of computing, preserving and presenting of students' results and information have been major requirements of tertiary institutions and educational establishments since their creation (Akinmosin, 2014 cited in Omilabu,Usman, Alaba & Adedeji, 2015). However, this has posed several challenges and barriers to both students and other stakeholders. According to Obiniyi & Ezugwu (2010), the students' academic record is designed to provide both students and staff with numerous services, so as to assists the students in attaining their academic goals and management objectives respectively. Therefore, results processing system was built to address the above challenges and eradicate loopholes associated with accessing student results and record in tertiary institutions.

The need for students to have access to their results on time and accurately cannot be overemphasized. Scores from examination taken need to be returned to enable them know their performance in various courses written. Reliable and secure information is vital in today's education with respect to result processing. Errors associated with the existing manual method of processing of results in most tertiary institutions in Nigeria, including Maritime Academy of Nigeria, make it not only advantageous but essential that computerized approach be used to the full in measuring student's progress. This has become a vital issue as students spend so much time trying to know their Grade Point Average (GPA). The existing system of processing result encounters this problem which has led to time wasting and inaccuracy of results. Furthermore, cases of missing results have been recorded thereby making examination result processing more difficult and time consuming. Related issues also include the risk of loss of students' information in case of any disaster; the long length of time taken to process the students result; the question of how secure is the students' information and the problem of making mistakes while hurriedly entering results manually

for a large number of students; issue of errors in GPA computation and a lot more. These therefore are the rationale for this study.

1.2 Aim and Objectives of the Study

The aim of this study is to design and implement a result processing system for academic institutions that will be flexible enough to cope with periodic changes in academic policies. The study specific objectives include:

i. To develop a dynamic web client system interface for various users based on the login credential including their image.

ii. To develop a user friendly interface for moderation and correction during vetting by the stakeholders (HODs, coordinators or moderators as the case may be).

iii. To develop a user friendly score sheet report for management endorsement.

2.0 Brief literature review

In recent years, post basic institutions have seen academic value of result processing and need for it to be done internally (Oyeyinka & Oladipo, 2015). Hence, a lot documentations exist in line of the research. Emmanuel and Choji (2012) stated that the introduction of computer into information technology has massively improved the information need of organizations. Anigbogu (2000) therefore defined a computer as an electronic device capable of accepting data and instructions, processing the data based on the instructions to generate results or output in such a manner that is yet to be equaled by any other known machine to mankind. The process of school administration and in this case result processing is as already stated a time consuming and strenuous exercise prone to errors, if done manually, hence the need for us to seek out ways to lift this burden from the individuals involved in this exercise. Obiniyi & Ezugwu (2010) observed that Student enrolment in tertiary institutions is increasing at a very alarming rate. The increase in students' population over the years has made the work of administrative officer in charge of processing students' result a very tiresome exercise to deal with. The rise in the number of students in schools today has made it imperative that we continue to seek out the best and most efficient ways to handle schools and school administration. Mohini & Amar (2011) indicated that Publication of student's results in the manual system takes a very long time owing to which students remain idle for months together. Sometimes the delay in declaration of result cause heavy losses to the students as

generally they cannot join further studies or appear in competitive exams or join jobs because of the non-availability of examination result in time.

Nmaju, Nwachukwu & Ugwu (2013) also observed that many higher institutions in Nigeria still adopt the manual method of managing students' data which is time consuming and demanding, and are often prone to a variety of errors and disasters. Hence, it brings to the fore the need to properly address how these shortcomings could be resolved and improved. They further stated that the solution to these shortcomings lies in an efficient information management system, or simply, information system. Okonigene, Ighalo & Ogbeifun (2008) further stated that, with the use of computers for information processing, the following are possible: instant access to students' personal and course information, instant student information updating, automatic computation of the Grade Point Average (GPA), generation of the graduating students list, monitoring of failed courses, keeping an up-to-date record of the entire student body in the University, storing course information such as course code, course description, course unit, and scores for the purpose of GPA computation, and producing user friendly data entry screens for ease of use.

Generating and organizing data in a useful way is called data processing. In his paper, Ukem & Ofoegbu (2012) state that the errors associated with the existing manual method of processing of students results in most universities in Nigeria, make it not only desirable but imperative that computerized approach be used in measuring students' progress. According to him, the manual methods being employed suffer a number of setbacks; they make the process to be time consuming and prone to error. They lead to examination results being published late, sometimes with wrong grades being entered and students' grade point averages being wrongly computed as a result, and ultimately leading to wrong conclusions being arrived at the class of degree awarded. Some students could end up with undeserved good class of degree, while others could be unfairly victimized, bringing about frustration and bad blood. The Departments concerned, and the whole University, could become tarnished. He said the solution to the problem, therefore, is to find a method of processing examination results that would be sufficiently accurate and reasonably timely.

Eludire, (2011) observed that a number of problems associated with student academic record management include improper course registration, late release of students' results, inaccuracy due to manual and tedious calculation and retrieval difficulties/inefficiency, According to him, the development of database concept is the answer to these problems where the amount

of redundant data is reduced and the possibility that data contained on a file might be inaccurate because they were never updated. Mohini & Amar, (2011) indicated that Publication of student results in the manual system takes a very long time owing to which students remain idle for months together. Sometimes the delay in declaration of result cause heavy losses to the students as generally they cannot join further studies or appear in competitive exams or join jobs because of the non-availability of examination result in time.

1.5 Methodology

Object-oriented analysis and design methodology (OOADM) was adopted for this design. It is a popular technical approach for analyzing and designing an application, system, or business by applying object-oriented programming, as well as using visual modeling throughout the development life cycles to foster better stakeholder communication and product quality. The system was designed following the below OOADM stages /approach:

a) Object-Oriented Analysis
b) Object-Oriented Design
c) Object-Oriented Implementation

Phase 1: Object-Oriented Analysis

In this stage, the problem is formulated, user requirements are identified, and then a model is built based upon real–world objects. The analysis produces models on how the desired system should function and how it must be developed.

The requirement looked into includes:

User Functional Input Requirements:

Functional Requirement describes the use cases and actors that are found in the Enhanced Students Result Processing System. Each use case is described in details with diagrams and tables in their respective module section. These use case diagrams model the desired behavior of the system. The Functional requirement is categorized in six (6) main modules:

1. Students User Requirement Module
2. Lecturer User Requirement Module
3. Parents User Requirement Module
4. Department (H.O.D) User Requirement Module
5. Exams and Records User Requirements
6. Administrator User Requirement Module

Students User Requirement Module

Students from various locations could login with their details to perform some task with the outlined functions below:

- Create profile (Registration)
- Check Admission Status
- Check Semester result
- Process Final Clearance

- Download Statement of Results
- Register Course per semester
- Request for transcript
- Make payment for all school fees

The requirement analysis for Students Requirement module can be transformed into the following use case diagram as shown Figure 1.
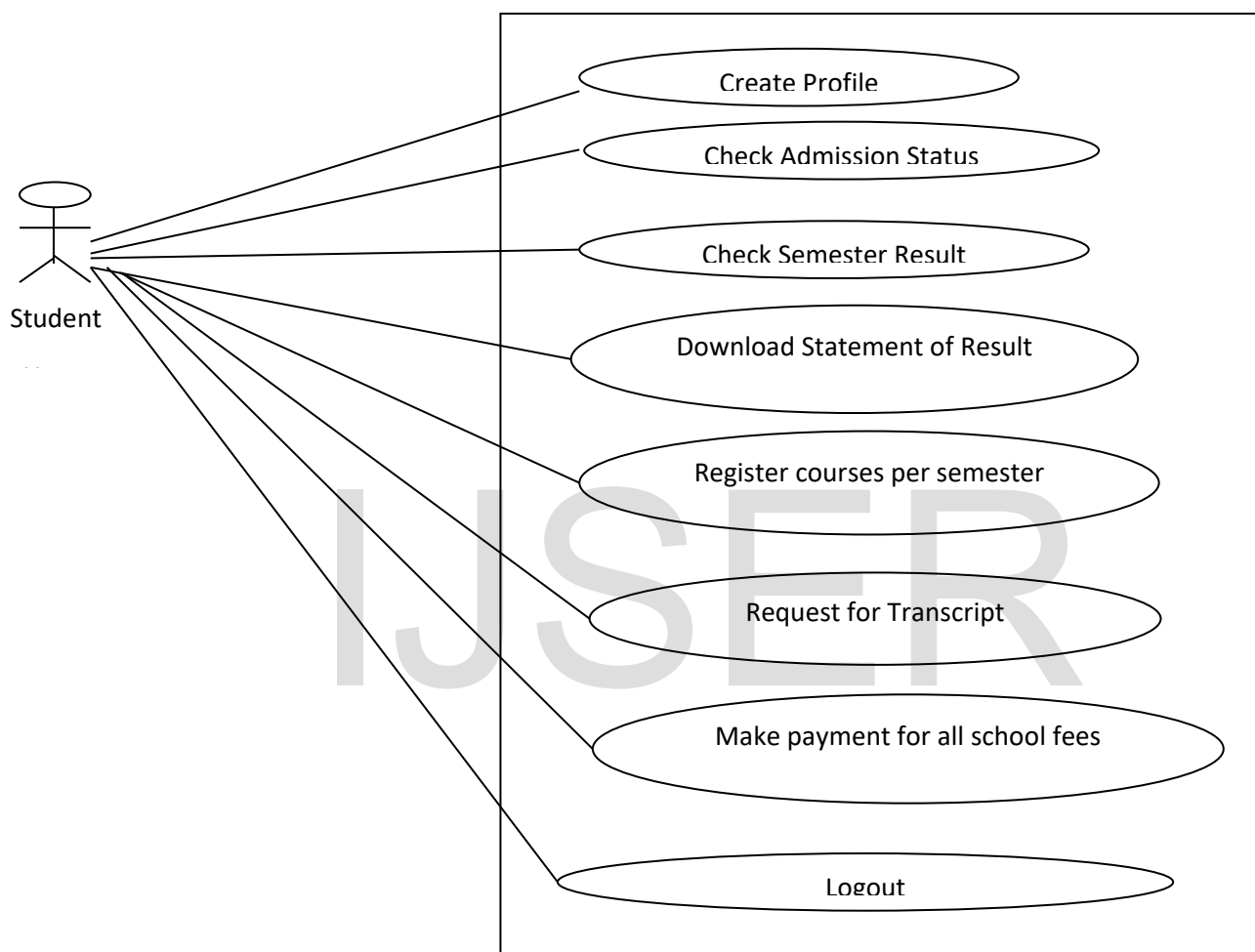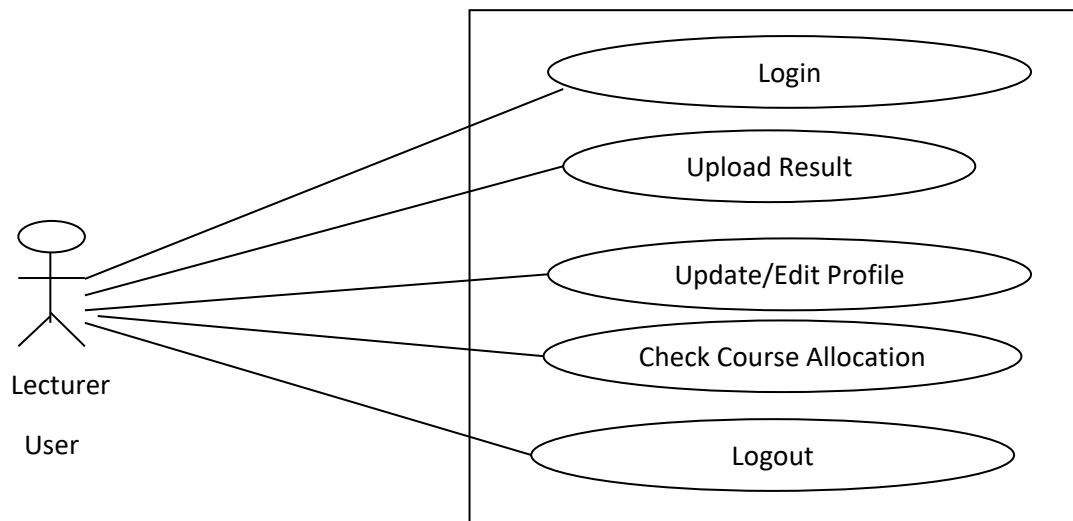

Figure 1: Student User Module Use Case Diagram

Lecturer User Requirement Module

The requirement analysis for Lecturers Requirement module can be transformed into the following use case diagram as shown Figure 2.

Figure 2: Lecturer User Module Use Case Diagram

Parents User Requirement Module

Parents have access to academic performance of their wards; their user requirement analysis module can be transformed into the following use case diagram as shown Figure 3.
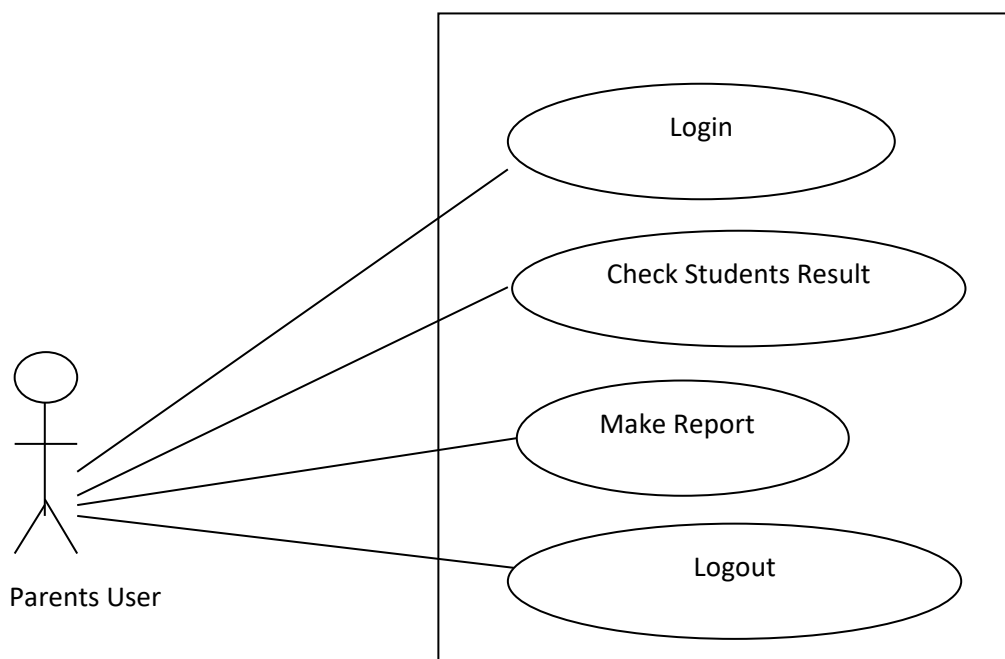

Figure 3: Parents User Module Use Case Diagram

Department User Requirement Module

In every institution, head of departments represent each department and hence the entire activities within the department. Therefore this module must be handled by the HOD to perform the outlined task as shown in figure 4 of the use case diagram below:
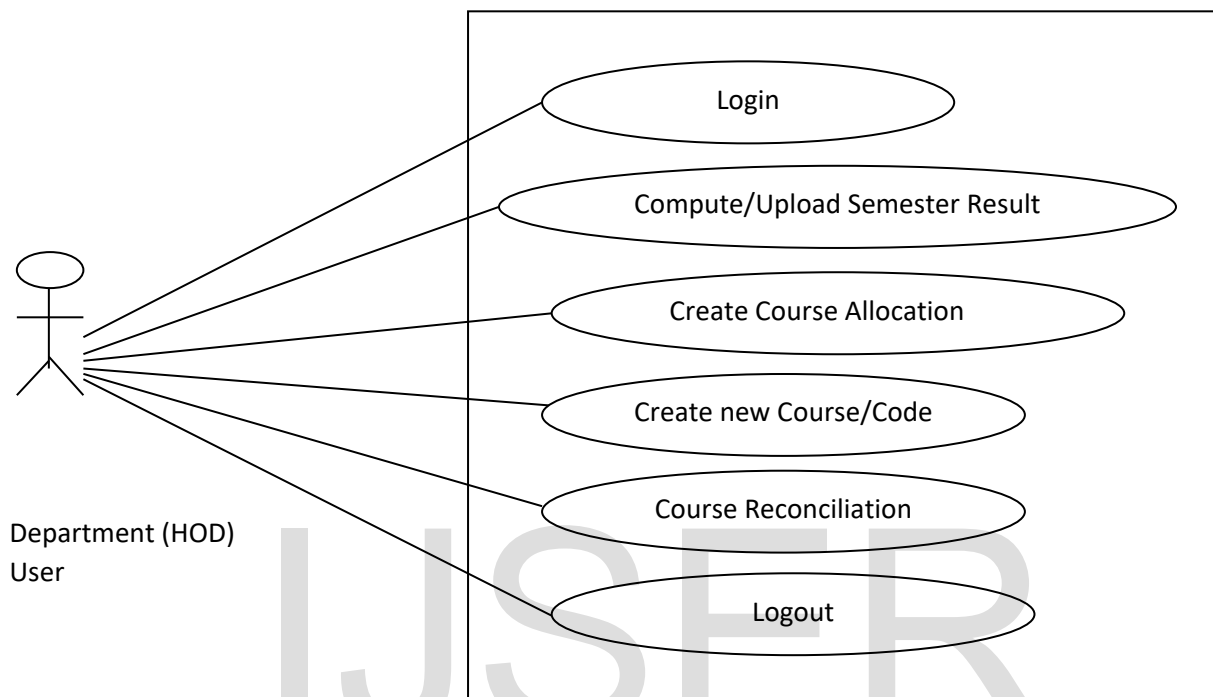

Figure 4: Department (HOD) User Module Use Case Diagram

Exams and Records User Requirements Module

The examination and records unit is one of the units under academic affairs department. The department is responsible for anything result, admission processes, and transcript processing. Therefore looking at the processing of results and transcript, a user must check to confirm students request via payment before commencing the processing and sending if need arise. The duties of the user at the exams and records unit is shown in the use case diagram below:
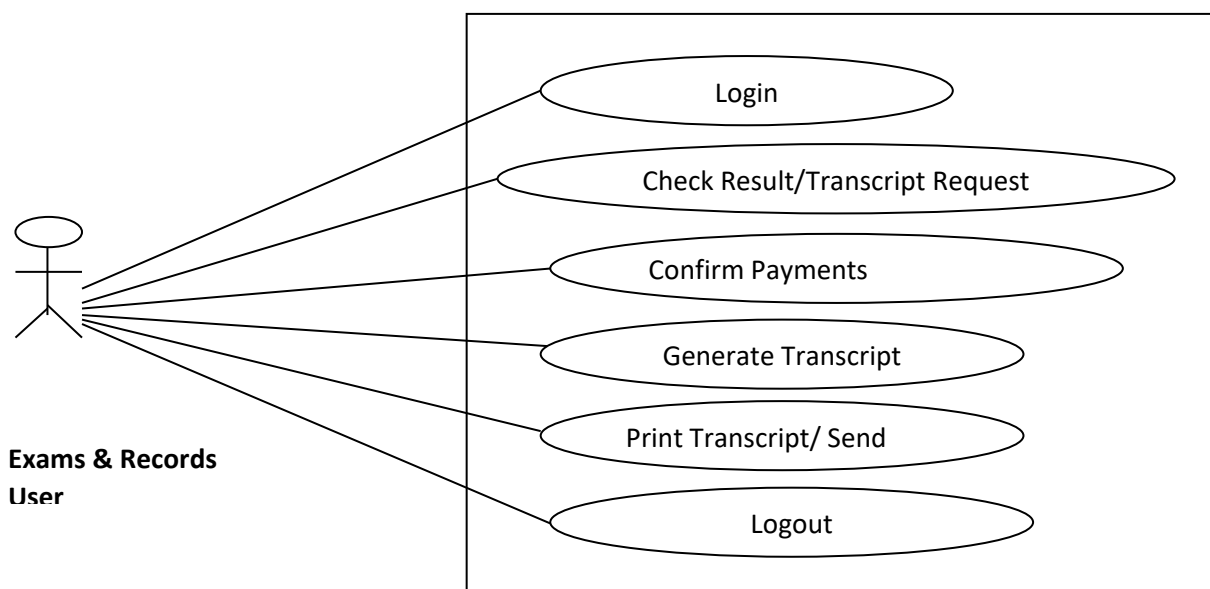
Figure 5: Exam & Records User Module Use Case Diagram

Administrator User Requirement Module

Administrator module is the module that enables administrators to configure and maintain various variables in the system. This module will allow administrators to configure general information and assign user role to other users. The administrator can:

1. Open New Account
2. Block or unblock account
3. Trace fraud
4. Grant Privilege to various user

System user with administrator role is the user with super user role to the entire School portal. This category of user will have the full administrative access rights to each module in the system. The administrator is the "gatekeeper" of the proposed system who creates user profiles for the system and is responsible for restricting the access to other users. The administrator can add as many users as needed and he is the key person who will assign user to different role of the system. The Administrator Module requirements analysis can be transformed into the use case diagram as shown in figure 3.6.
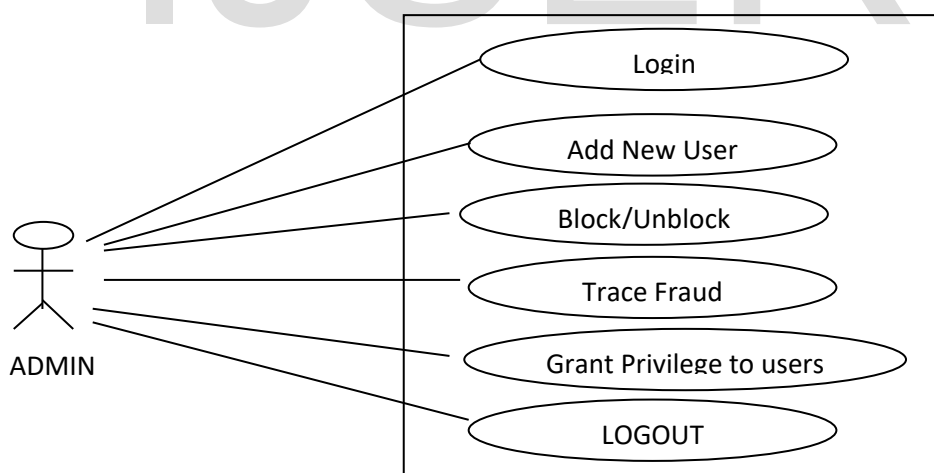
Figure 6: Administrator Module Use Case Diagram

Phase 2: Object-Oriented Design

Object-oriented design includes two main stages, namely, system design and object design.

System Design

In this stage, the complete architecture of the desired system is designed. The high level model shown below described the architectural design of the new system.
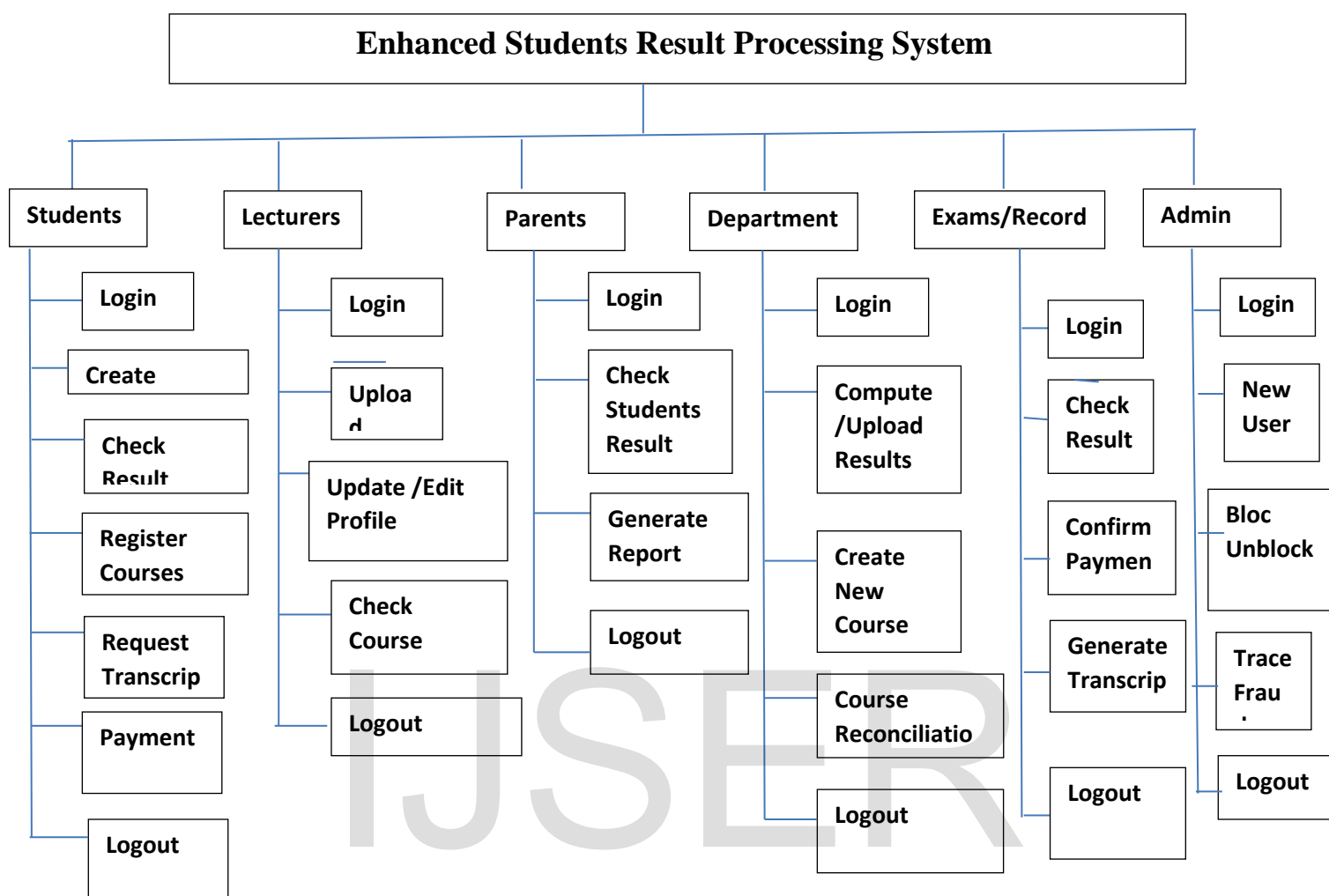
Figure 7: The Architecture Design of the Proposed System

Object Design

At this phase, the data flow diagram of the proposed system was modeled ensuring that all new classes are created from scratch, incorporation of other classes (modules) in the existing system and means of information flow between the classes are covered. Figure 3.8 shows the Enhanced Students Result Processing System diagram between classes:
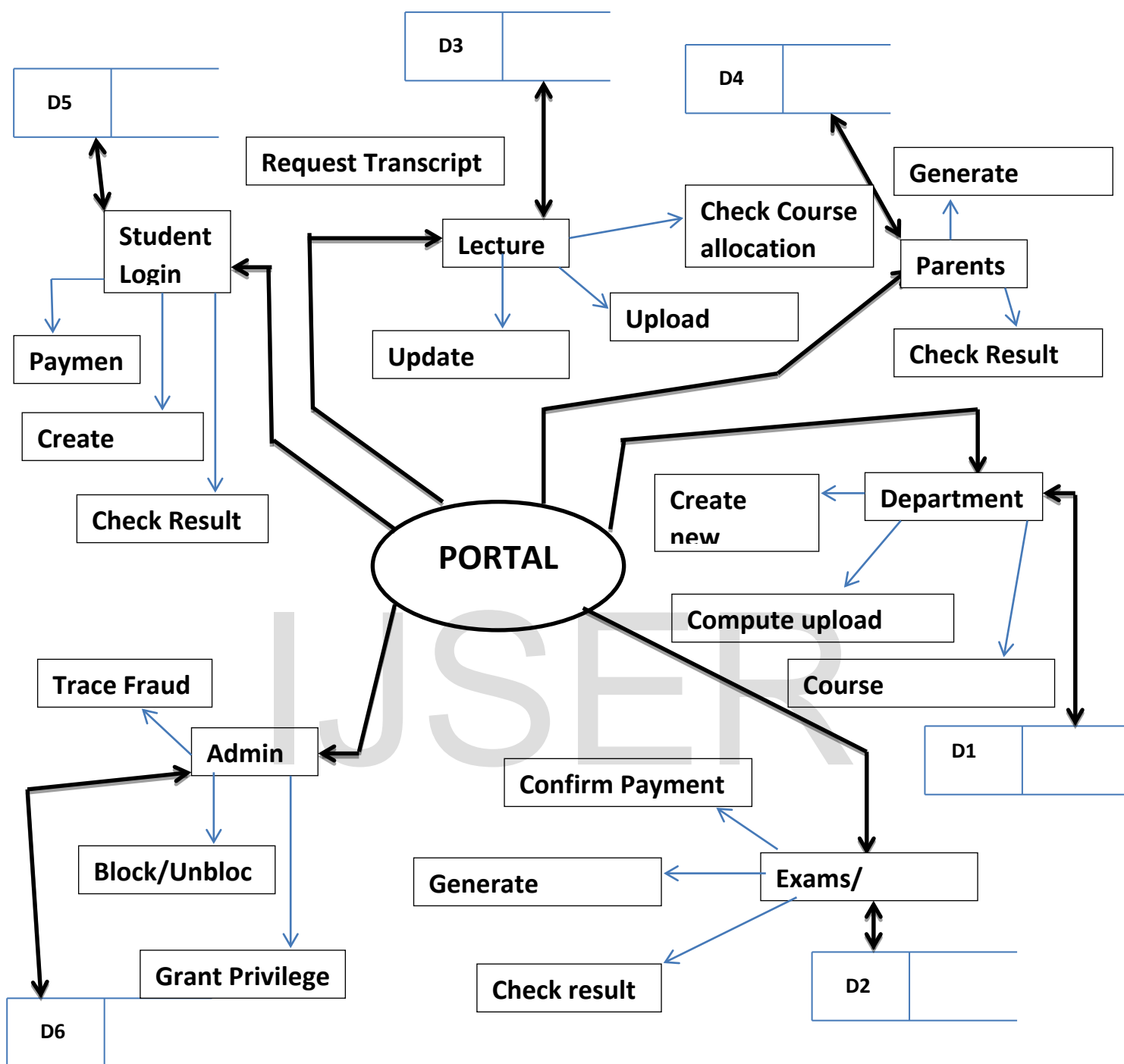
Figure 8: Data Flow Diagram of the Proposed System

Phase 3: Object-Oriented Implementation and Testing

In this stage, the design model developed in the object design is translated into code in an appropriate programming language or software tool. The databases are created and the specific hardware requirements are ascertained. Once the code is in shape, it is tested using specialized techniques to identify and remove the errors in the code.

Programming Language Specifications

For an interactive, user friendly interface to be designed, the following programming language was considered for the coding of the proposed system both for the development of the Front-end and Back-end.

- **Front-end Program Coding**

The front end development which was the link (interface) between the users of the system and the back-end of the application was done with the following programming languages:

      a. Hypertext Markup language (HTML)
      b. Cascading Style Sheet (CSS)
      c. Java-Script

Note that: the JavaScript language is used to enhance user and system interaction. It monitors events of action between the application and the end users.

- **Back-end Program Coding**

The back end development which ensures that any request made from the front-end was serviced accordingly as they come in. Languages used were:

      a. Hypertext Preprocessor (Php),
      b. My-Structural Query Language (MySQL).

MySQL was used to design and manage the Students data in various databases.

Hardware and Software Requirements

Hardware

(a)   A computer System with the following specification 200 GB Hard disk, 2GB Ram, Pentium M (intel)
(b)   Printer
(c)   Uninterruptible power supply (UPS)
(d)   Stabilizers
(e)   Power generating set
(f)   LCD Monitors

Software Requirement

(a)   Windows XP, SP2, 7, 8, 10
(b)   Web Browsers (Firefox, Opera, Chrome etc.)
(c)   Server (WAMP, XAMPP, GLASS FISH)
(d)   MYSQL Driver

Usability/Functionality Test

This is a test performed on an entire system in the context of a functional requirement specification (FRS) and/or a system requirement specification (SRS). Functionality testing, test not only the design, but also the behavior and ever the believed expectations of the customer. It is also intended to test up to and beyond the bounds defined in the software/Hardware requirement specification

1.6 Conclusion

This application is meant to ease the processing of students' results in tertiary institutions. The application will be capable of storing and retrieving academic records with high speed and accuracy, and present useful information to its users. Its qualities would reduce the cost of processing students results (an example, the cost of purchase of papers), reduce the time spent in the computation of student's grades and the eliminate duplication of resources in terms of manpower and infrastructure. The system will provides an efficient means of processing, preserving and displaying students' results, academic records and other relevant notices to students. As part of its benefits, it is going to be stress-free and speed-up the processing of students' examination results showing students' image. Finally, the system will be flexible and runs on a web browser, reasonably secure, enforces data integrity from the use of a relational database management system. In addition, it will minimize data redundancy and will be user friendly.

References

Abel, U. O., & Abu, M. (2013). *Data Analysis and Result Computation (DARC) Algorithm for Tertiary Institutions..* Journal of Computer Engineering (IOSR-JCE), Volume 14, Issue 3 PP 63-69.

Akinmosin J. (2014). *Automated Students Result Management System Using Oracle's Database, Forms and Reports*, Journal of Information Engineeringand Applications, www.iiste.org.Vol.4, No.11

Amadin, F. & Ukaoha, k. C. (2014). *Computerized result processing system:* A case study of the department of computer science, University of Benin.

Anigbogu, S. O., (2000). *Computer Application and Operation*, (1st ed, Vol. 1, No. 2, pp 30). Awka: Optimum Press.

Bamigbola, O.M., Olugbara, O.O. & Daramola, J.O. (2011)**.** *An Object-Oriented Software Model for Students' Registration and Examination Result Processing in Nigerian Tertiary Institutions.*

Beka, A. P. & Beka, F. T. (2015). *Automated result processing system: A Case study of Nigerian University,* International Journal for Research in Emerging Science and Technology, Vol. 2, Issue-9.

Bharamagoudar, S. R., Geeta, R, B. & Totad, S. G., (2013). *Web-based Student Information Management System.* International Journal of Advanced Research in Computer and Communication Engineering, (Vol. 2, Issue 6). www.ijarcce.com

Christian, C., Lev, T., & Eugenia, T. (2013). *Secure and Convenient ComputerizedTranscript System*, http://citeseerx.ist.psu.edu.

Eludire A. A., (2011). *The Design and Implementation of Student Academic Record Management System*. Research Journal of Applied Sciences, Engineering and Technology, Vol.3, No.8, Pp.707-712.

Emmanuel, B. & Choji, D. N., (2012)**.** *A software Application for Colleges of*

Education Students Results Processing. Journal of Information Engineering and Applications. Vol 2, No. 11.

Ekpenyong, M. E., (2008). *A Real-Time IKBS for Students Results Computation*. Journal of Ultra Scientist of Physical Sciences: International, Journal of Physical Sciences 20 (3): 627-632.

Ezenma A. A., Emmanuel B, & Choji D. N., (2014). *Design and Implementation ofResult Processing System for Public Secondary Schools in Nigeria*,International Journal of Computer and Information Technology, Volume 03 .

Grey, S. (2010). *Mode of processing result System*, Himachal Pradesh University Journal. Pp 127-134.

Matemilayo, D. O., Kamaldeen, R. A. & Oyedepo, F. S. (2017). *An Online Result Processing and Transcript Generation System,*Journal of Research and Development Studies Vol. 5. No.1

Mohini, B. & Amar, J. S. (2011). *Mode of processing result system.* Himachal Pradesh University Journal. Pg 123.

Nmaju, O., Nwachukwu, E. O. & Ugwu, C., (2013). *A Noval Web-based Student Academic Records Information System.* West African Journal of industrial and Academic Research, Vol. 7, No. 1.

Obiniyi, A. A. & Ezugwu, E. A. (2010). *Design and Implementation of Students' Information System for tertiary Institutions using neural networks: An Open Source Approach,* International Journal of Green Computing, 1(1).

Okonigene, R. E., Igalo, G. L. & Ogbeifun, E. (2009). *Developed Personal Record Software*. The Pacific Journal of Science and Technology, 9(2):407-412.

Omilabu, A. A., Usman, O. L., Alaba, O. B. & Adedeji, O. B., (2015). *Digital Repository Results processing (DRARP) system: An Implementation.* Journal of Science Education and research (JOSER). Vol. 1 No. 2.

Oyeyinka, I.K. & Oladipo, O. (2015). *Development of Multi-Modal Result Processing Software for Tertiary Institution*, Communications on Applied Electronics (CAE), Foundation of Computer Science (FCS), New York, USA Volume 1 (5) – www.caeaccess.org

Ukem, E. O., & Ofoegbu, F. A. (2012). *A Software Application for University*

Students Results Processing, Journal of Theoretical and Applied Information Technology**,** Vol. 35 No.1

Ukem, E. O. & Onoyom-Ita, E. O. (2011)**.** *A software Application for the Processing of Students Results.* Global Journal of Pure and Applied Sciences, Vol. 17, no.4, 2011: 487-502.