

Design and Implementation of Result Processing System for Public Secondary Schools in Nigeria

Ezenma A. Añulika
Department of Information
Technology,
National open university of Nigeria
Lafia, Nasarawa state.

Emmanuel Bala
Department of Computer Science,
College of Education, Akwanga,
Nasarawa State. Nigeria.

Choji D. Nyap
Department of Computer Science,
University of Jos, Plateau State
Nigeria.

Abstract— This research paper examined the inadequacies involved in the manual method of compiling students' result in secondary schools in Nigeria. To achieve that, preliminary investigations about the current manual record keeping were carried out at some selected secondary schools of Nasarawa state. The problems with the manual result processing were identified and a new system was proposed, designed, and implemented. In this work, a computer software application was developed to facilitate the automated processing of the results. The software was developed using PHP (Hypertext processor) programming language and MYSQL (My Structural Query Language), a relational database management system in designing the database; tested and found to have produced the expected results. Teachers do not need to draw vertical/horizontal lines on a broad sheet of paper for recording students test and exam scores, and also need not to do any form of calculations, as the system does virtually everything. Similarly, there is no need of printing result booklet for each student. Results can be printed on A4 size paper or on embossed cardboard paper cut into A4 size and which appears like a certificate and looks more beautiful at a lower cost compared to the cost of printing result booklets and the stress teachers have to undergo to prepare students results. The software will make the teacher's job less stressful by cutting down the time and effort spent on result preparation, thereby, allowing the teacher more time for teaching and other instructional issues. This new system is flexible and can be modified to suit any kind of students' record keeping and data processing in both public and private secondary schools.

Keywords- *Students Grade, Test & Exam Scores, Teachers, Software Application, Results Processing, Database.*

I. INTRODUCTION

Many schools have their own system to manage students profile and assessments. Common practice is by recording the student information in a record book. Students' information is obtained from the registration form completed by the parents when they registered their children for the first time. This practice has some weaknesses such as the longer time to search the student profile, the possibility of misplacement of record book and vulnerability of student record to be accessed by unauthorized person. In Nasarawa state public secondary schools, several assessments are prepared to evaluate student performance. Types of assessments that are common to all the secondary schools are assignments, monthly test, and end of term exams. At the end of each assignment, test and examination, the class teacher records student's marks and grades in the record book or in basic computer software such as Microsoft Excel for teachers with knowledge and access to computer. After that, the class teacher needs to determine student's position (ranking) in class based on their performances. However, it takes time to do these tasks because they need to formulate their own calculation for class position (ranking). These tasks will be much easier if all calculations for class position (ranking) can be automatically done when the teacher enter assignments, test and exams marks. Students result is the criteria for the measurement of the student's capability in terms of academic performance in the school. It is used to measure a student's capability in each subject offered by the student, because the student result is very important to the student and his/her parents, there is need to avoid common mistakes made during the result processing, this can easily be achieved by an automated result processing system, The system is an effective, efficient and error free results processing system designed and implemented for public secondary schools in Nasarawa state for proper running of the schools results processing. Therefore, the researcher developed an automated result processing system (ARP-System) in order to manage student information and assessments. This system will help school administration (principal and clerk) to manage student profile and class teacher to manage students' assessments.

Imagine a teacher compiling just 30 students results and the stress the teacher have to undergo. The teacher gets busy calculating (addition and division) each student's test and exam scores. For every student, the teacher will add what the student scored in first test, second test and exam to get the total for that subject, assume the subject is Mathematic; the teacher will repeat it for the rest subjects offered by the same student just to get all the total scores for each subject. To get the average score for this student, the teacher will have to add all the total scores for each subject offered and then divide by total number of subjects offered by the student. The same process is repeated for the remaining 29 students. After that, the teacher now orders the average scores to rank the students 1st, 2nd, 3rd ... position in the class, it does not end there. The teacher will also enter the record into each student "Report Card" then create a broad sheet called Master Sheet for all the students' records for future references. This is stressful and time consuming, in order to manage this computation and to make teachers less stressful, make their job enjoyable and to make them direct their attention on teaching is very easy with computerized system. On the other hand, Imagine one person processing 3000-7000 students result from various classes with little effort of just entering students' scores as soon as they are conducted, and results generated automatically for printing no matter the size of the students in a class/school. In each term, the system generates test and exam scores sheet with students names arranged accordingly with columns/rows created for each subject scores entering. This is given to the class teacher to fill in scores after the test or exam is conducted. It will be taken back to the system for entry and after that with just a click; the result is ready for printing.

Most authorities and management of secondary schools in Nasarawa state think that the use of computer in school administration is only for the production of applications, memos and letters. There is not a single computer used in the library of these schools. Use of computers in schools cannot be over emphasised, it can help in administering the school during the admission procedures, processing examination, admission, registration, scheduling, storing of officials and students' records etc. Investigation revealed that the manual method adopted in results processing pose some problems in most secondary school in Nasarawa state. These problems can be arranged under the following heading: Poor security of documents, Untimely processing of results, and Production of inaccurate results. The Aim of this research is to develop a powerful computer application program that will ameliorate on the short-comings encountered in the student's result processing in Nasarawa state public secondary schools such as the stress of compiling students result by the teachers and errors generated in the results due to human factors thereby generating result that is accurate, timely and error free. All efforts in this research are geared towards the gathering of

sufficient information that would help in making useful suggestions for the alleviation of manual processing of results in secondary schools considering the processing speed, storage and retrieve of information facilities, to provide the management with a tool with which to cut down on the time taken to provide results of evaluations. Result will be processed and presented at the click of a button. Hence computer becomes indispensable in results processing.

A. *Manual Result Processing*

Sometimes the delay in declaration of results cause heavy losses to the students as generally they cannot join further studies or appear in competitive exams because of the non-availability of examination result in time [6]. Some of the limitations of the existing system, though not comprehensive, are as follows:

Repetition of Work: There is repetition of work in the existing system because the same data is recorded in different branches of the examination. This leads to data duplications as well as huge money is spent by the institution to purchase papers. In existing system, managing of students' record is very tedious. Retrieval of students' records through manual registers, maintaining of records and data reconciliation etc. are very time consuming.

Tempering of student Records: In manual examination system, there are chances of tempering with students records. Sometimes fake results are prepared and there is no online verification of the results. This leads to unfair practices and it mars the credibility of an institution.

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 [3]. In most cases the data generated by academic institutions are usually created in non-delineated files for use by different departments/units within the institutions with the same data appearing on several of these files. This means that a simple change of address would have to be processed in two and probably three or four places, depending on the number of other files on which these data appears. 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. Other problems associated with course system management include improper registration, late release of students' results, inaccuracy due to manual and tedious calculation, and retrieval difficulties /inefficiency. To proffer solution to the setback associated with manual system of result processing, an application called Student Academic Record Management System using Microsoft Access to handle the task of creating, storing, accessing and maintaining files and database records is developed. According to [3], the choice of Microsoft Access was

because it is simple and easy to code and available with forms and reports. It is also accessible in terms of distribution with versions of Microsoft Office. MS Access version 2003 is chosen for the implementation [4].

Some previous works that have been carried out in this area to address the problem of manual result processing are the works by [7] and that by [10].

In his work, [7] employs Microsoft Excel spread sheet program to build an Intelligent Knowledge-Based System (IKBS), making use of various programming facilities provided by that application (Excel). The central issue here is that the programming is hard coded into the cells, and cell referencing is used to monitor and track students' performance. The system has been reported to be working fine. However, it appears to be rather restrictive, and calls for substantial expertise in programming. Similarly, In the work by [10] Adobe Dreamweaver an Integrated Development Environment is used to create the Graphic User Interface and to write the codes. MYSQL Server, a Relational Database Management System, is used to create the database tables and data. Personal Home Page Pre-Processor (PHP) is used to communicate with and manipulate the database. This application, though tested and found to be working as expected, has however not been put to use widely.

A computer software application is developed in Java programming language in the form of a database, employing MYSQL Relational Database Management System to facilitate the automated processing of the results [11]. The developed software performed well and produced expected results on completion. With it, it was possible to compute Grade Point Average and Cumulative Grade Point Average for each student based on examination scores entered. The application was successfully developed, tested, and found to be working as expected. It is capable of storing and processing students' results with high speed and accuracy, and presenting output in certain required forms. It is easy to use due to the use of a GUI rather than command-line approach, reasonably secure, and enforces data integrity resulting from the use of a relational database management system. With this application, the processing of students' results can be automated to a large extent, thereby reducing processing time and increasing accuracy. The future outlook of this work is to make the application web-enabled, which would greatly enhance its use. Users could then access the application from anywhere via the Internet, and be able to carry out their work, students with proper authorization would be able to view their results on-line. According to [11], the issue of security could also be looked into, with a view to improving it so that users would have greater peace of mind, knowing that their data would not easily be compromised.

B The Need for Automated Result Processing System in Schools

With automated result processing in an institution of learning, there will be lots of benefits to derive which will provides the necessary conveniences for the students, Lecturers and managements in the school. The benefit of computerize test taking, marking and result publication cannot be overemphasis, [2] identify the following as benefit of computerize test taking, Marking and results publication:

(i) Automation Minimize Human Intervention: There will be lesser human intervention (as much as possible) in result processing by automating all the concerned activities.

(ii) Automation Facilitate Management: The Computerized Statistical Analysis of Data will facilitate the management to see trends in result at various levels. Management Information System (MIS) reports will facilitate the Top Level Management to make strategic decision in favour of the institutions and students.

(iii) Automation Minimizes Redundancy: The use of Relational Database Management System for storage of students' data will help in minimizing the redundancy in database in addition to maintain consistency, integrity and security of data.

In an educational community, information is highly essential for correct students' record and examination data. Student information, if not properly created and stored, will cause many errors in usage. Nearly, every section of the educational system requires information processing [9]. This new system is flexible and can be modified to suite any kind of record keeping and data processing.

C Description and Analysis of the Existing System

Results are compiled by each teacher according to the subjects he or she handles by calculating (addition and division) each student's Test and Exam scores. For every student in question, The teacher will add what the student scored in 1st & 2nd Test and Exam to get the total for that subject, for example in Mathematics, teacher repeats this process for the rest of subjects offered by the same student just to get all the total scores for each subject. To get the average score for this student, the teacher will further add all the total scores for each subject offered then divide by total number of subjects offered by the student. The whole process is repeated for the remaining 29 students. After that is done, the teacher starts looking for the highest average score and the one that follows and so on to get (1st, 2nd, 3rd, 4th30th positions in the class). it does not end there, the teacher later enter the record into each student "Report Card" and also create a broad sheet called Master Sheet for all the students' records for future references. This process of result compilation is very stressful and time consuming. Problems associated with the existing system are as follows: (a) Inaccuracy: The results produced by the manual system may not be accurate due to calculations which involve ordinary calculator and human reasoning. (b) Lack of security of results: The results processed are stored

in files. These files are sometimes attacked by insects such as termites or other pest (c) Late processing of results: The short period of time available for the processing of results, makes the teachers involve in a period of very tough work, As a result of this most of the times the results are produced late (d) Production of ineffective results: As a result of miscalculations in the manual results processing system the results produced are ineffective.

D Proposed System

The computerization of secondary school results processing system has the following importance;

(a) Efficiency:- Because of the ever increasing number of students enrolling in secondary schools, it is becoming progressively harder to cope with the paper worked involved in the manual system of processing. A computerized system will make the job a lot more efficient and students will obtain their results soon after the marking of the scripts is completed.

(b) Accuracy: As in all manually operated systems there are often errors to a very negligible degree, and when they do occur, can be easily identified and corrected. This is achieved by the use of interactive processing.

(c) Retrieve ability:- In the manual system information are stored in files, these information can be retrieved by searching for the file that contains it, but with the use of computers one need to do is to punch a few keys on the key board or simply click the mouse and the information is retrieved.

(d) Safety and security: information stored in the computer is safe from animals, insects and intruders. Also a password can be used to make program assessable to only authorized persons.

The developed software application was run on the system and found to operate as expected: The login screen is as shown in Figure 1, enables the user to enter his \ her password in order to login.

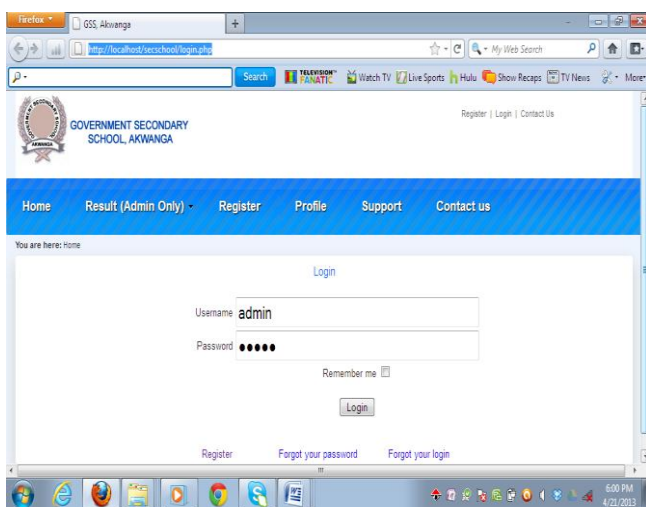


Figure.1: Log in Page (Validates User Account before Access is granted)

If the password entered is valid, then the user is able to gain access to the main window/page. The main page/window has a single menu, which is the main menu call home page. The home page contain sub menus (commands) namely; the Admin, Results, Register, Profile, supports and contact us. When any of the sub-menus is clicked, a drop down menu appears with different options for selection, For example, if the Result Command is clicked, a drop down menu with options such as Register student, view subject, view students and view results appears as shown in Figure 2.

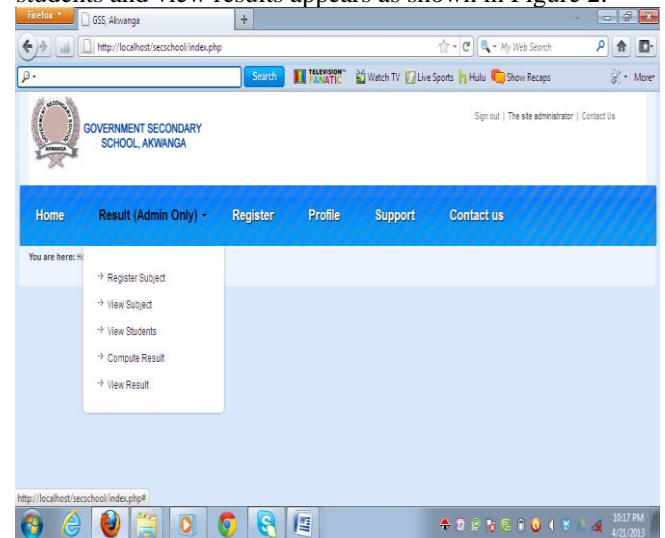


Figure 2. Sub-Menu Showing a Drop down Menu

a) Register Subject: Display a window for registering new subjects and give option to select the class in which the subject is offered as shown in figure 3

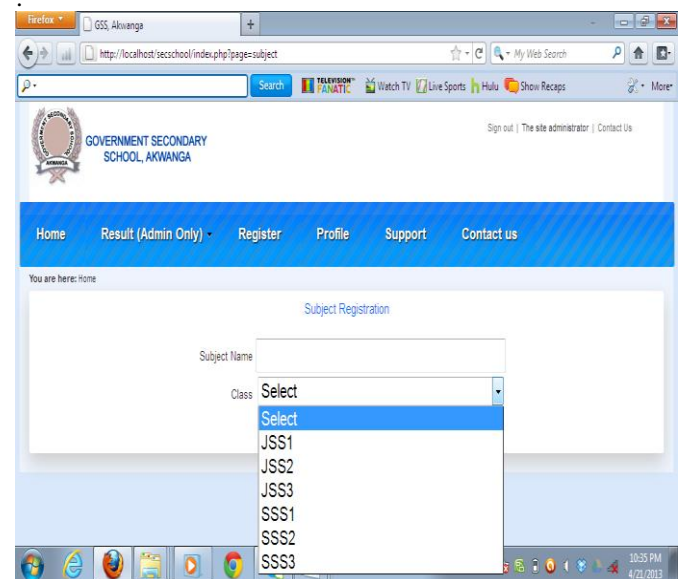


Figure 3 Drop down menu showing classes

b) View Subject: Shows all registered subjects for each class selected, as shown in figure 4.

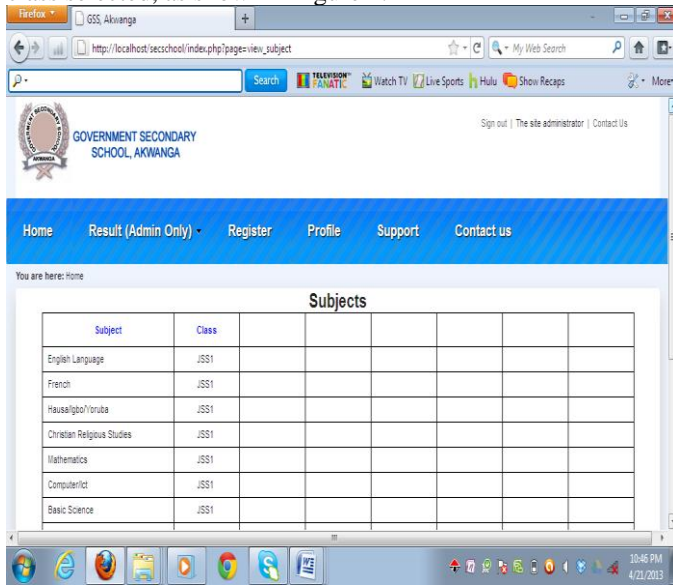


Figure 4. Window for registering subjects

d) Compute results: Display a window for computation of results for each student in a class as shown in figure 5.

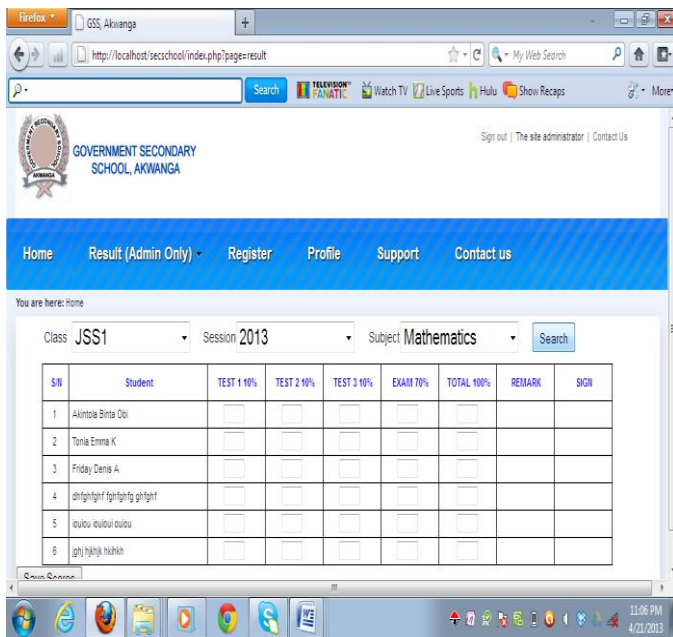


Figure 5. Window for computing results

e) View Result: Display each student result indicating the scores of each subject for the student and his/her position in class. See figure 6.

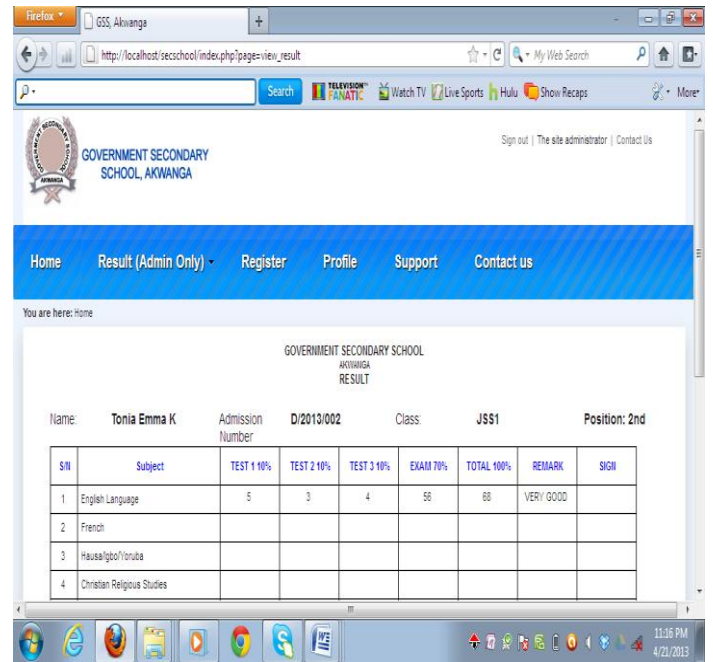


Figure 6. Window display student's result

(f) Register- sub menu: If the sub menu Register is click, a window appears and gives the user opportunity to capture the record of each student in the school such as the name, surname, other name, sex, and date of birth of the student as shown in figure 7.

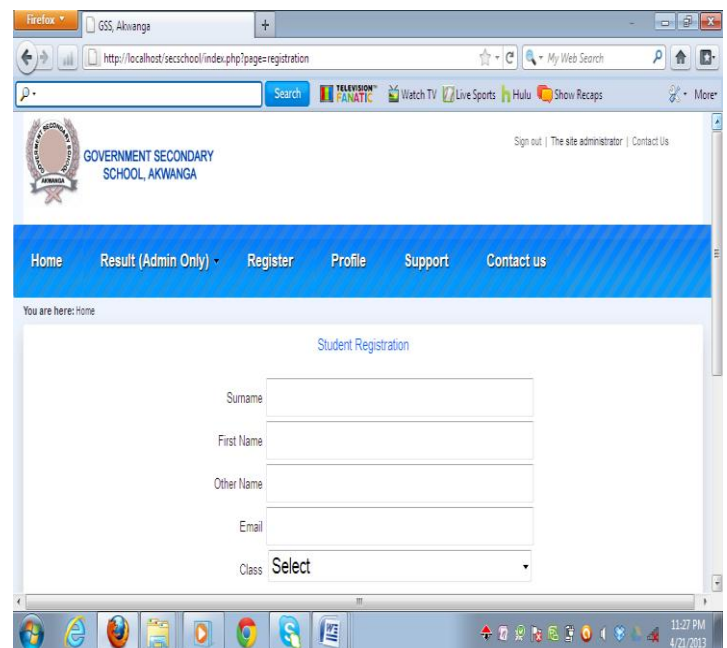


Figure 7. Window for Registering Students

The application provides a simple and convenient approach to the processing of students' results, It is reasonably secure

because, due to password protection, no unauthorized person can gain access to alter the data. The information obtained from the system has a reasonably high degree of accuracy, because all the computations are automated. Any errors found would probably be those introduced by human error in the keying in of the raw scores. Computations are carried out very speedily by the system, once all raw are entered, then required information is available almost immediately.

II. METHODOLOGY

The application was developed in the form of a database, using a Relational Database Management System (RDBMS). The decision to implement the application in the form of a database was informed by the consideration that various types of data would need to be held, and a database approach would be more appropriate due to the advantages that the database file system has over other forms of file systems [6]. According to Researcher [5], A database management system permits organizations to efficiently create databases for different applications by database administrators (DBAs) and any of other specialists. [5] reiterated that Database management system allows many user application programs to simultaneously access the same database that is called concurrency. Researcher [6] also employed Adobe Dreamweaver, an Integrated Development Environment, to create the Graphic User Interface and to write the codes, MYSQL (My Structured Query Language), a Relational Database Management System (RDBMS) to create the database tables and Personal Home Page Pre-Processor (PHP), a Scripting language to communicate with and manipulate the database. The primary features of the PHP are that it is object-oriented and a cross platform language. By cross platform, it means that the programs can run across several platforms such as Microsoft Windows, Apple Macintosh, Linux, and so on.

A. Method of Data Collection

A thorough investigation of functional requirement of the present system and finding out whether the requirements and objective of the system are being achieved was made in order to obtain detailed facts about the application area to be re-designed. Direct observation and examination of documents were carried out.

B Input, Processing and Output Analysis of the Existing System

The input, processing and output sub system of the conventional system is treated blow.

(i) Input Analysis: Four assessment test are conducted, one assessment has to suit the convenience period of two weeks or in any way as to suit the convenience of both teachers

and the students alike. The first two assessments conducted in a term are summarized as the second summary. The first and second summaries jointly weigh forty percent. At the end of the term examinations are conducted. This weighs sixty percent. The first and second summaries and the examination score serves as input to the system.

(ii) Processing Analysis: The scores from the first and second summaries and the examination score is added together to give a total score. The total score in each subject is then graded according to the grading criteria used in the school. The total score in each subject is then added and divided by the number of subjects offered.

The result obtained from the students average score and is used to determine the students' position in the class. The student with the highest average score takes the first positions, the second to the highest takes second position etc.

(iii) Output Analysis: The outputs of the system is the students sheet document which contains the students name and surname, the students class, term the subjects offered by the student, the score and grade of the student for each subject, students average score and position in the class.

C. Manual Data Preparation and Computation

Before any meaningful computational analysis can be achieved, proper data and inventory must be taken. A list of all students with information such as name, registration number, date of birth, sex, nationality, state of origin, religion, etc., of each student in a class should be created [1]. This agree with the manual method of preparing student result in public secondary school in Nasarawa state as shown in the table 1 below.

Table 1 below shows student result sheet as used in Nasarawa state public secondary schools see figure.8.

Table 1 Result sheet

Name: Emanuel Bala	Term: 1st	Year: 2010
Class : SS2	Score	Grade
Subject		
English	63	Credit
Mathematics	74	Distinction
Biology	83	Distinction
Chemistry	76	Distinction
Physics	57	Credit
Agriculture	49	Pass
Economic	95	Distinction
Average mark : 71		
Position : 2nd		

Figure 8: Student manual result sheet

D. Materials and Methods

The system is designed and implemented such that the following are carried out during its use:

- (a) User validation: To be able to use the software, staffs are to be registered by the Administrator with a default username and password on the first login to the software.
- (b) Usage: At the end of the term (first or second), staff will login to the software and enter students' raw scores for any subject they taught. Staff can also view results already submitted, if they want, or change their password when desired. Finally, the Vice principal (Academic) can view all staff, students and course registration, as well as be able to view any student's result irrespective of the student's class hence he becomes the ADMIN. Unlike the form masters who only have access to the compute results module were he/she can compute results for his/her class while any other person can only view the result sheet as shown in the flow of the Program Logic. see figure 9.

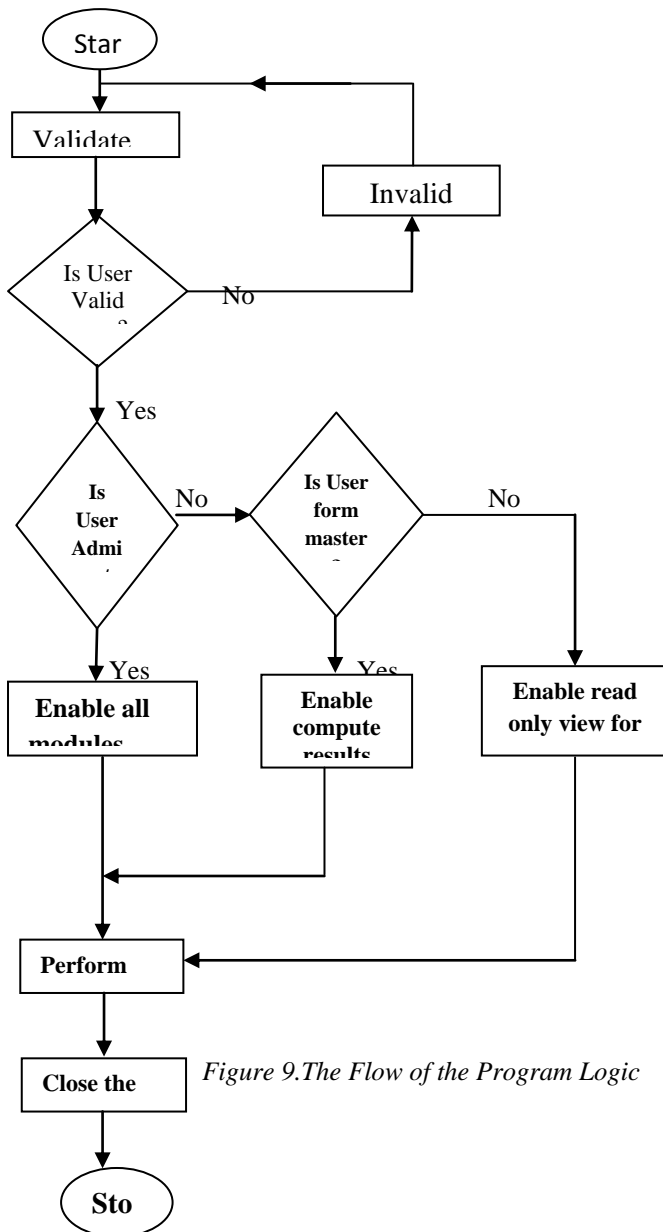


Figure 9. The Flow of the Program Logic

E. Results and Discussions

The computer software application is required to be independent of any platform; It is designed to have three main sections, namely: the login window, the main menu and sub menu. The login window requests a valid user name and password from the Administrator to be able to gain access into the software.

The Administrator is any staff that is authorize by the management of the school to be in charge of exams and records unit (e.g the Director of studies), hence he should have a valid user name and password created by him to be able to login to the software.

(a) The Login:

The login form/window enables the user to enter his \ her password. If the password entered is valid, the software will then display the main menu. But if the password is not valid the user will be denied access to the program.

(b) The Main menu:

The main menu contains dashboard and panel, on the dashboard sub menu which serves as a link to all other modules in the program, the sub menu are; Home, Results, Register, profile, supports and contact us. While the panel holds the forms for capturing data and display query result.

(c) Register Sub Menu:

This sub-menu is use for capturing fresh students' data or record into the data base such as students surname, first name, other name, class, e-mail, date of birth, sex and admission year/number. It handles students Registration at the beginning of the first term especially because it's the term in which fresh students are registered into the school. The student's personal information are all captured in this menu.

(d) The Results Sub Menu:

This sub menu contains modules such as register subject, view subject, view students, compute results, and view results. Clicking on any of these modules, operation takes place.

(e) Register subject module:

All subjects offered by students in the school are captured and recorded into the data base in this module.

(f) View subject module: All subjects registered into the data base can be viewed in this module.

(g) View students module: All registered students in the database are viewed in this module

(h) Compute results module: This module allows the students' Scores to be captured for the purpose of results computation. In fact this is the modules that handle the result processing.

(i) View results module: This module displays each student result or report sheet as the case may be, the result sheet can be printed from this module as well.

(j) Edit module: This module allows the already entered data about students to be modified in case of errors or updates.

(k) Exit module: This module allows the application/system to be terminated.

III CONCLUSION

The research paper culminated in the design and implementation of a software application, meant to ease the processing of students' results in secondary schools. The application was successfully developed, tested, and found to be working as expected. It is capable of storing and processing students' results with high speed and accuracy, and presenting output in certain required forms. It has some qualities such as reduction in the cost of processing; reduction in time spent in computing student's first and second term results, generating position in class for each student and elimination of duplication of effort which makes it overshadow the manual system of students record keeping. The new system is flexible and can be modified to suite any kind of record keeping and data processing. It uses graphical user interface (GUI) rather than command-line approach, hence is easy to use, reasonably secure, and enforces data integrity resulting from the use of a relational database management system. With this application, the processing of students' results can be automated to a large extent, thereby reducing processing time and increasing accuracy.

REFERENCES

- [1] Abel U. O and Abu M. (2013) Data Analysis and Result Computation (DARC) Algorithm for Tertiary Institutions . *Journal of Computer Engineering (IOSR-JCE)* e-ISSN: 2278-0661, p-ISSN: 2278-8727 Volume 14, Issue 3 PP 63-69. Internet :<www.jatit.org>. Accessed on 11/8/2013 www.iosrjournals.org
- [2] Atabong, T. A. , Okpala, M. C., Abondem, A. L. and Essombe1, C. E.(2010). Eliminating Examination Malpractice in Africa with Automated Test Taking, Marking and Result Printing. *Tropical Journal of Biomedical and Allied Sciences Research* 4(1)2010
- [3] Eludire, A.A. (2011).The Design and Implementation of Student Academic Record ManagementSystem. *Research Journal of Applied Sciences, Engineering and Technology* 3(8):707-712,
- [4] Microsoft Corporation, 2003. Microsoft Office 2003 Step-by-Step Learning Kit. Internet: <<http://mspress.microsoft.com/>> Accessed on 11/7/2012
- [5] Mohd. M. and Sultan H. (2013) A DBMS Integration with Cloud Computing. *European Journal of Computer Science and Information Technology* Vol.1, No. 1, pp. 23-29. Internet :<www.jatit.org>. Accessed on 11/8/2013
- [6] Mohini .B, and Amar. J. S, (2011). Automated Integrated University Examination System *Himachal Pradesh University Journal*.
- [7] Moses E. Ekpenyong.(2008). "A Real-Time IKBS for students results computation" *International Journal of physical Sciences (Ultra scientist of physical sciences)* Volume 20, Number3(M), September-December, 2008. Available:<http://www.mySQL.com>.(July 22,2012)
- [8] MySQL: Internet:<<http://www.mySQL.com>,> Accessed on 22/7/2012
- [9] Okonigene, R.E., Ighalo, G.I., Ogbeifun, E., (2008). Developed Personal Record Software . *The Pacific Journal of Science and Technology* .9(2):407-412.
- [10] Ukem , E. O. and Onoyom-Ita, E. O, (2011). A Software Application For The Processing Of Students Results; *Global Journal of Pure and Applied Sciences* Volume 17 No. 4
- [11] Ukem, E. O. and Ofoegbu, F. A (2012). A Software Application for University Students Results Processing. *Journal of Theoretical and Applied Information Technology*. Vol. 35 No.1 . Internet :<www.jatit.org>. Accessed on 2/07/2012