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Design and Implementation of an Integrated Result Processing System in a Networked Environment

Dada Olabisi Matemilayo[1], Raji Ayodele Kamaldeen[1], Oyedepo Femi Samson[1], Yusuf Ishola Tajudeen[2], Saka Tajudeen Olarenwaju[1]

[1]Department of Computer Science, Kwara State Polytechnic, Ilorin, Nigeria

[2]Curl Link Technologies, Kwara State Library Complex, Ilorin, Nigeria

Email address:

mrsdadolabisim@yahoo.com (D. O. Matemilayo), kamalayo2004@yahoo.com (R. A. Kamaldeen), Christifoy@gmail.com (O. F. Samson), yusufitresearch@gmail.com (Y. I. Tajudeen), sakataju70@yahoo.com (S. T. Olarenwaju)

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Abstract: Results processing is 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. These results are used to check the performance of each student in various courses. The current method of students' academic results processing was found to be tedious and time consuming, especially when carried out for a large number of students. This makes the entire process cumbersome and error prone. A computer software application was developed to facilitate the automated processing of the results. The software was developed using HTML5, CSS8, Java Script for client side, PHP (Hypertext Pre-Processor) as server side programming language and MySqli (My Structural Query Language Imroved) as relational database. This language was chosen because of its flexibility and features for developing online based applications. WAMP (Window Apache MySql and PHP) server was used for local hosting and testing. The data used for testing was obtained from the Department of Computer Science. The developed software was tested and found to perform well and produced expected results on completion. With this, it was possible to compute Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) for each student based on examination scores entered or uploaded. The new system offers some qualities such as reduction in the cost of processing of information, reduction in time spent in computing GPA and generating transcripts, increase in accuracy and efficiency, and elimination of redundancies.

Keywords: Result, Examination Scores, CGPA, Transcript, GPA

1. Introduction

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 [1]. 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. Student's result is a critical component of admission, transfer credit unit processing, and graduation processing [2]. A student's result is the criteria for the measurement of the student's capability in terms of academic work in school. It is also used to measure a student's capability in various courses offered by the student [1]. 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.

Reference [3] observed that when the results are processed manually, it may lead to problems such as error during computation, insecurity of results, untidy results after changes must have been effected and work load on the examination officers etc. For these reasons an effective, efficient and error free results processing system is required for proper result processing. Furthermore,

designing and implementing integrated software for result processing and transcript generation system will minimize these problems. Password was used to grant access to only authorized user(s). Corrections or changes are effected without making the work untidy. Also stress on examination officers and computer operators will be greatly reduced.

A computer software application was developed to facilitate the processing of the results. The software was developed using HTML5, CSS8, PHP (Hypertext Pre-Processor) as server side programming language and MySqli (My Structural Query Language improved). This language was chosen because of its flexibility and features for developing online based applications. WAMP (Window Apache MySql and PHP) server was used for local testing. The data used for testing was obtained from the Department of Computer Science. The software was tested and found to perform well and produced expected results.

Finally, with this, it was possible to compute Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) for each student based on examination scores entered or uploaded. The new system has some qualities such as reduction in the cost of processing of information, reduction in time spent in computing GPA and generating transcripts, increase in accuracy and efficiency, and elimination of redundancies. The system presents a single platform that can be used to manage the processing of all examination records within the institution.

Errors associated with the existing method of processing of student's results in most polytechnics in Nigeria, make it not only desirable but imperative that a networked-computerized approach be used in measuring students' progress. The existing methods being employed suffer a number of setbacks; they make the process to be time consuming, cumbersome 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. Thus an effective, efficient, stress free, speedy access and error free is required

2. Aim and Objectives

The aim of the proposed system is to design and implement computerized students' results processing and management system (that can be managed both offline and online) using Php and MySQLi as database. The objectives of the research are to:

(a) Present a single platform that will be used to manage the processing of all examination records within the Polytechnic.
(b) Design a package with simple and user friendly interface that will be easy to use by 'anybody' with little computer knowledge.
(c) Provide an effective, efficient and error free results processing system for the Polytechnic.
(d) Design an integrated result processing and transcript generation system.

3. Literature Review

There have been several studies on computerized result processing as well as transcript generation some of which are reviewed. Reference [2] designed an automated result processing system that will increase through put and reduce the response time involved in processing students result immediately after they graduate from the institution. The system enables students register courses and in turn, enable lecturers upload students results every semester.

Reference [4] examined the inadequacies involved in the manual method of calculating Students CGPA (cumulative grade point average) and proposes a solution by developed a software Application to facilitate the automated processing of the results. The software was developed using PHP (Hypertext processor) scripting language and employing MYSQL Relational Database Management System in designing the database. The developed software was tested and work as expected.

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 [5].

Lastly, 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 automate the 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 [1].

Different Programming Languages, Programming packages and Database management systems can be used to develop result processing software for computing students GPA (Grade Point Average) and CGPA (Cumulative Grade Point Average). Microsoft Excel spreadsheet program can be used to build an Intelligent Knowledge-Based System

(IKBS), making use of various programming facilities provided by that application (Excel). The programming is hard coded into the cells, and cell referencing which could be applied to monitor and track students' performances such as cumulative points [6]. Personal Home Page Pre-Processor (PHP) is used to communicate with and manipulate the database. 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. This application, though tested and found to be working as expected, has however not been put to use widely [7].

Java is a programming language used to build programs that can work on stand-alone computers and on the internet, its primary features are 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, and Linux. MYSQL, a Relational Database Management System (RDBMS) is used to create database tables and data. MySQL is very fast, reliable, and easy to use, and its connectivity, speed, and security make it highly suited for accessing databases [8].

Moreover, there are undoubtedly several other similar Programming Languages and Database management systems in existence. Some previous work has actually been carried out using several of such programming languages and packages which prove to be working fine in this area. There is, however, always room for improvement. This new application is intended to have reduced complexity and greater ease of use, in order to enhance maintainability while still retaining good speed and accuracy.

4. Methodology

The design of the system was done using the structured system analysis and design methodology. The system was built on the web platform. The front-end interface was designed using HTML5, CSS8 and JavaScript, while the backend functionalities are powered by PHP server side scripting language and MySQLi (a relational database management system) in designing the database which runs on a web server. This language was chosen because of its flexibility and features for developing online and offline based applications. System design deals with the coordination of activities, procedures and the utilization of equipment in order to achieve the research objectives.

However, in any system design, the output is considered first because it is the desired output that will determine both the input and the procedure**.** All the components of the program (such as different subprogram/modules designed separately) were integrated together to become a single program and then test run. Figure 1 below gives the overall flowchart of the system.

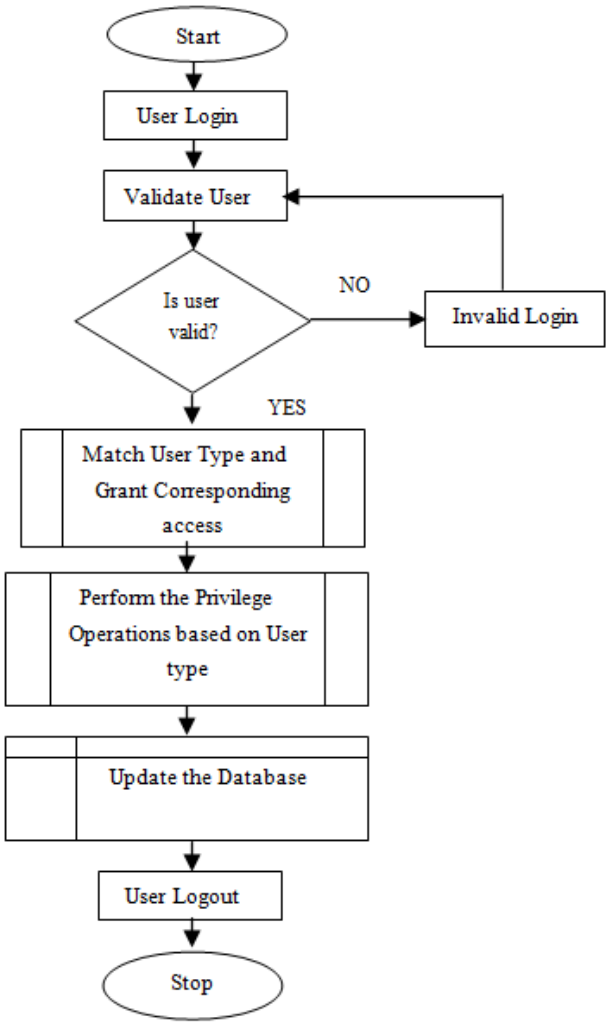


Figure 1. *The program's flow chart.*

4.1. Implementation

The developed software application was run on the system and found to operate as expected. The developed software application was run on two systems networked together with the specifications below:

(a) Microsoft Windows 7, 8, 8.1 and 10 Operating System.
(b) Intel Processor Core i3 with CPU speed of 2.50 GHz.
(c) RAM of 6.00 GB.
(d) Hard Disk of 750 GB.

4.2. System Testing

Testing of the newly developed system is important because it enables the developer access how end users interact with the system and note the possible bottlenecks for immediate correction. This application was tested with past students' academic records sourced from the Department of Computer Science, Kwara State Polytechnic, Ilorin. Students' academic records from 2014/2015, 2015/2016 and 2016/2017 sessions were used for testing. The overall remarks from the users confirmed that the system is able to eliminate the shortcomings of the existing system with high level of efficiency, accuracy, speed and stress free.

5. Discussion of Results

The developed software application was run on the system and found to operate as expected. The computer software application is required to be independent of any platform. Figure 1 show the home page when the program is started.

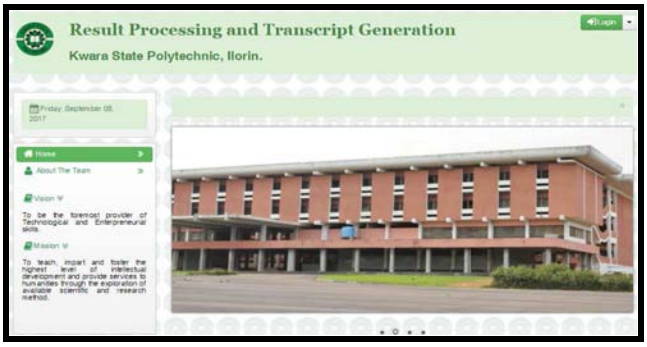


Figure 2. *Screenshot showing Home Page.*

User needs to login before user can have access to the package. There are different categories of user and the user type determines the operations they can perform. Different privileges are given to different types of users.

Figure 3. *Screenshot showing Login Page.*

The login window requests a valid username and password from User to be able to gain access into the software.

a. The Directors can create user account for Head of Department in his/her institute and assign role for them.
b. The Heads of Departments must have a valid user name and password and can perform the following functions:
   1. Create users account for Examination Officer, Part time Coordinator and Data Entry Operator in his/her department as well as assigning roles for them.
   2. Manage courses offered in the Department, manage students' data in the Department, view results and manage staff data in his/her department.
c. The Departmental Examinations Officer should have the authentication of the HOD. He/she can perform the following functions for Full Time:

   1. Enter student's scores (or bulk upload) and view students' grades as it is in the raw score sheet.
   2. Process student's results in the department, which includes calculating the GPA and CGPA.
   3. View all the students' results in management approved format (Agreed marked sheet).
d. The Part Time Coordinator should have the authentication of the HOD. He/she can perform the same functions as Department Examination Officer but only for Part time.
e. The Data Entry Operator can only enter student's scores with the supervision of HOD or Examination Officer.
f. The Exams and Record unit can only view available result and generate transcript when required.

After successful log-in as Departmental Examinations Officer or Part Time coordinator, the User can:

1. Manage Courses
2. Manage Students Data
3. Manage Results
4. Modify Login Details

Figure 4. *Screenshot after Successful Login Page.*

A. Manage Courses
(a) User can add new course(s) and,
(b) View Available courses.

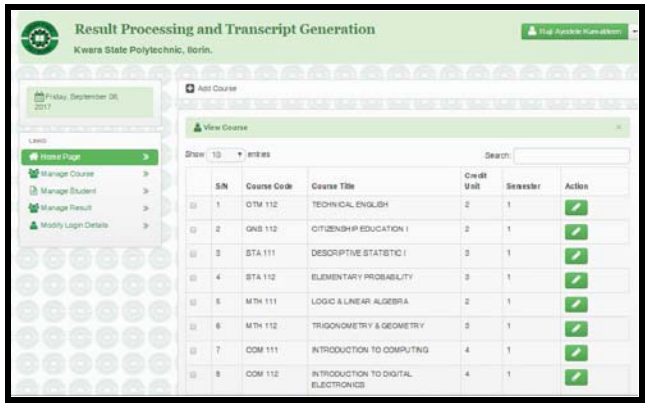


Figure 5. *Manage Courses Option.*

B. Manage Students Data
(a) User can add new Student Record(s) and,
(b) View available Students' Record.

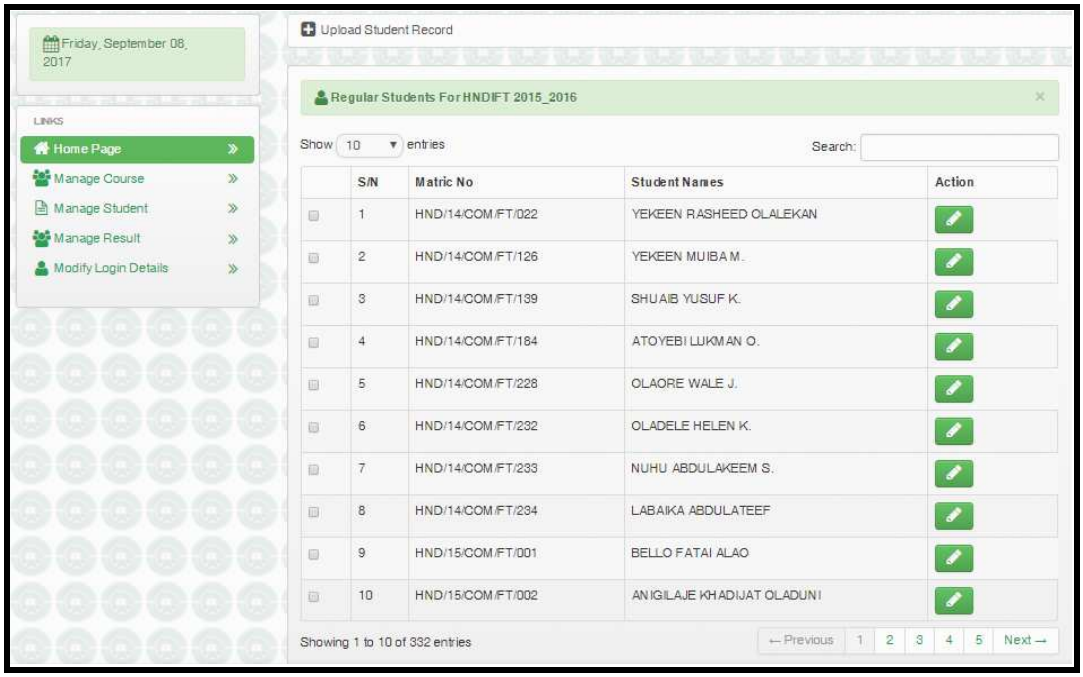


Figure 6. *View Student Record Option.*

A. Manage Results

(a) User can add new Result(s).

(b) View and Process Available Results in different types for example Semester, Sessional, Diploma, Graduand List, Carry Over, or Repeaters.

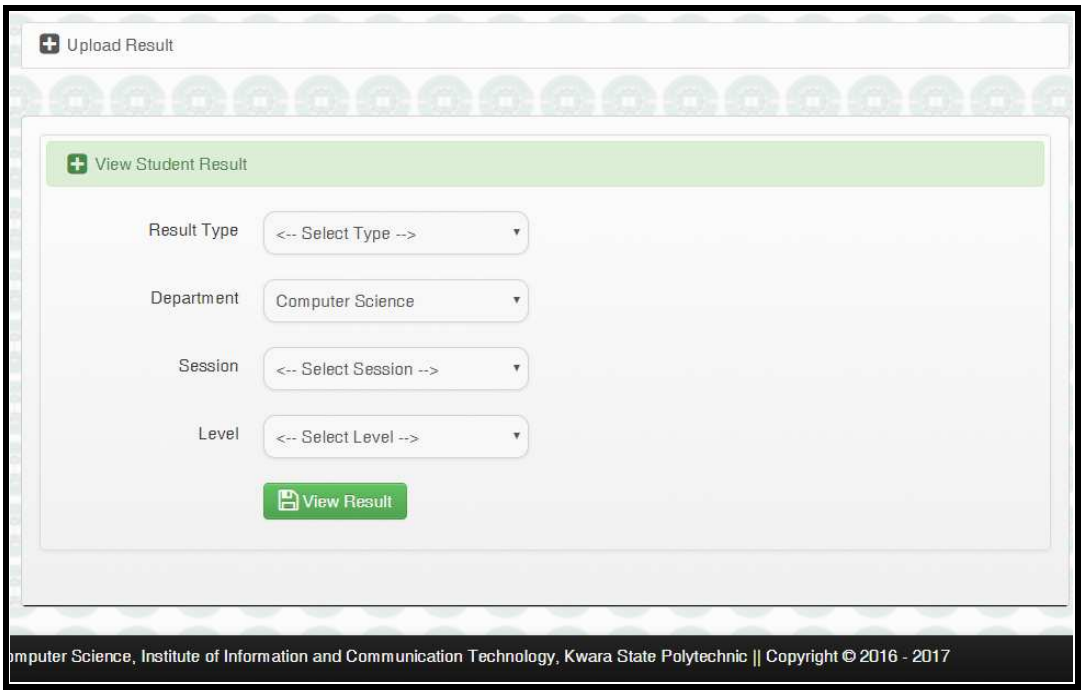
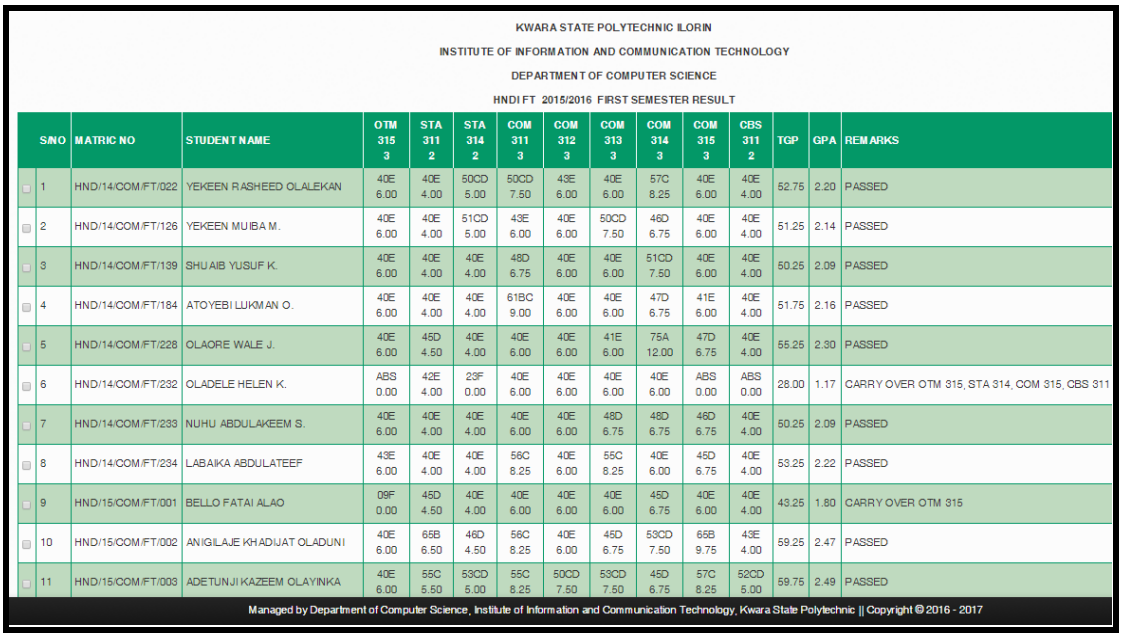


Figure 7. *View Result Option.*



KWARA STATE POLYTECHNIC ILORIN

INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

HND I FT 2015/2016 FIRST SEMESTER RESULT

S/NO		MATRIC NO	STUDENT NAME	OTM 315 3	STA 311 2	STA 314 2	COM 311 3	COM 312 3	COM 313 3	COM 314 3	COM 315 3	CBS 311 2	TGP	GPA	REMARKS
	1	HND/14/COM/FT/022	YEKEEN RASHEED OLALEKAN	40E 6.00	40E 4.00	50CD 5.00	50CD 7.50	43E 6.00	40E 6.00	57C 8.25	40E 6.00	40E 4.00	52.75	2.20	PASSED
	2	HND/14/COM/FT/126	YEKEEN MUIBA M.	40E 6.00	40E 4.00	51CD 5.00	43E 6.00	40E 6.00	50CD 7.50	46D 6.75	40E 6.00	40E 4.00	51.25	2.14	PASSED
	3	HND/14/COM/FT/139	SHUAIB YUSUF K.	40E 6.00	40E 4.00	40E 4.00	48D 6.75	40E 6.00	40E 6.00	51CD 7.50	40E 6.00	40E 4.00	50.25	2.09	PASSED
	4	HND/14/COM/FT/184	ATOYEBI LUKMAN O.	40E 6.00	40E 4.00	40E 4.00	61BC 9.00	40E 6.00	40E 6.00	47D 6.75	41E 6.00	40E 4.00	51.75	2.16	PASSED
	5	HND/14/COM/FT/228	OLAORE WALE J.	40E 6.00	45D 4.50	40E 4.00	40E 6.00	40E 6.00	41E 6.00	75A 12.00	47D 6.75	40E 4.00	55.25	2.30	PASSED
	6	HND/14/COM/FT/232	OLADELE HELEN K.	ABS 0.00	42E 4.00	23F 0.00	40E 6.00	40E 6.00	40E 6.00	40E 6.00	ABS 0.00	ABS 0.00	28.00	1.17	CARRY OVER OTM 315, STA 314, COM 315, CBS 311
	7	HND/14/COM/FT/233	NUHU ABDULAKEEM S.	40E 6.00	40E 4.00	40E 4.00	40E 6.00	40E 6.00	48D 6.75	48D 6.75	46D 6.75	40E 4.00	50.25	2.09	PASSED
	8	HND/14/COM/FT/234	LABAIKA ABDULATEEF	43E 6.00	40E 4.00	40E 4.00	56C 8.25	40E 6.00	55C 8.25	40E 6.00	45D 6.75	40E 4.00	53.25	2.22	PASSED
	9	HND/15/COM/FT/001	BELLO FATAI ALAO	09F 0.00	45D 4.50	40E 4.00	40E 6.00	40E 6.00	40E 6.00	45D 6.75	40E 6.00	40E 4.00	43.25	1.80	CARRY OVER OTM 315
	10	HND/15/COM/FT/002	ANIGILAJE KHADIJAT OLADUNI	40E 6.00	65B 6.50	46D 4.50	56C 8.25	40E 6.00	45D 6.75	53CD 7.50	65B 9.75	43E 4.00	59.25	2.47	PASSED
	11	HND/15/COM/FT/003	ADETUNJI KAZEEM OLAYINKA	40E 6.00	55C 5.50	53CD 5.00	55C 8.25	50CD 7.50	53CD 7.50	45D 6.75	57C 8.25	52CD 5.00	59.75	2.49	PASSED

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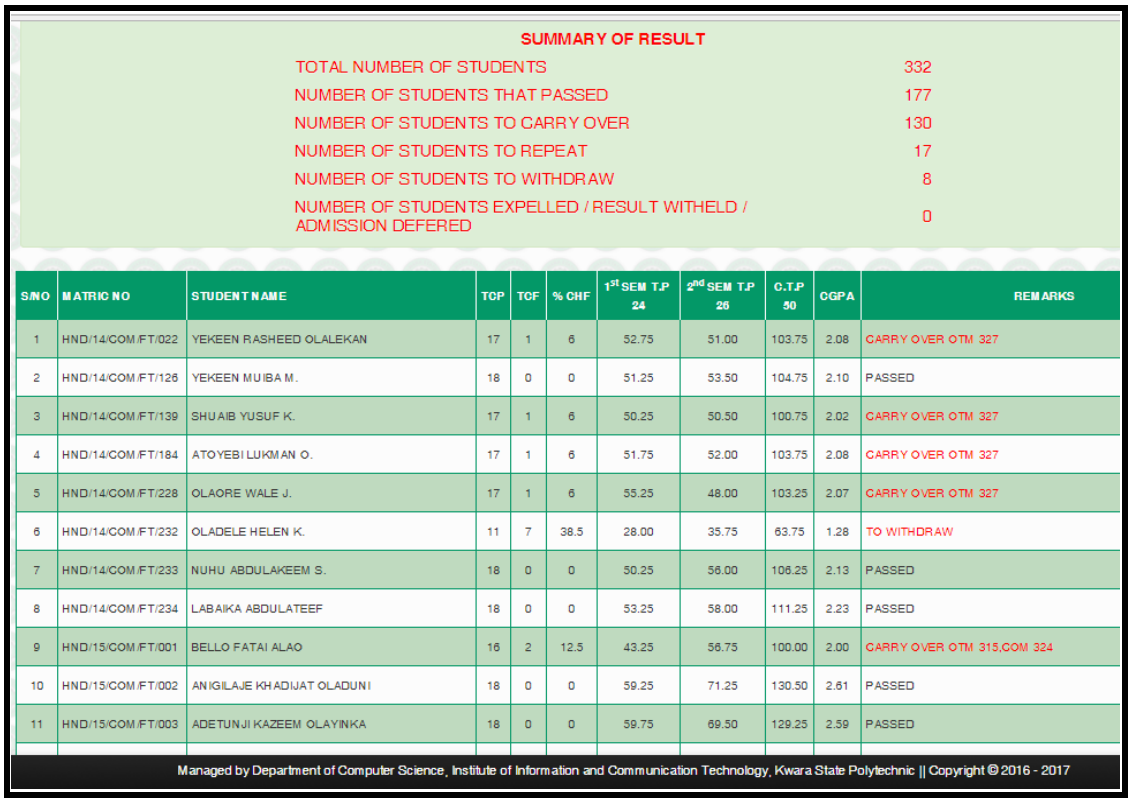
Figure 8. *Sample Semester Result.*



SUMMARY OF RESULT

TOTAL NUMBER OF STUDENTS	332
NUMBER OF STUDENTS THAT PASSED	177
NUMBER OF STUDENTS TO CARRY OVER	130
NUMBER OF STUDENTS TO REPEAT	17
NUMBER OF STUDENTS TO WITHDRAW	8
NUMBER OF STUDENTS EXPELLED / RESULT WITHELD / ADMISSION DEFERED	0

S/NO	MATRIC NO	STUDENT NAME	TCP	TCF	% CHF	1st SEM T.P 24	2nd SEM T.P 26	C.T.P 50	CGPA	REMARKS
1	HND/14/COM/FT/022	YEKEEN RASHEED OLALEKAN	17	1	6	52.75	51.00	103.75	2.08	CARRY OVER OTM 327
2	HND/14/COM/FT/126	YEKEEN MUIBA M.	18	0	0	51.25	53.50	104.75	2.10	PASSED
3	HND/14/COM/FT/139	SHUAIB YUSUF K.	17	1	6	50.25	50.50	100.75	2.02	CARRY OVER OTM 327
4	HND/14/COM/FT/184	ATOYEBI LUKMAN O.	17	1	6	51.75	52.00	103.75	2.08	CARRY OVER OTM 327
5	HND/14/COM/FT/228	OLAORE WALE J.	17	1	6	55.25	48.00	103.25	2.07	CARRY OVER OTM 327
6	HND/14/COM/FT/232	OLADELE HELEN K.	11	7	38.5	28.00	35.75	63.75	1.28	TO WITHDRAW
7	HND/14/COM/FT/233	NUHU ABDULAKEEM S.	18	0	0	50.25	56.00	106.25	2.13	PASSED
8	HND/14/COM/FT/234	LABAIKA ABDULATEEF	18	0	0	53.25	58.00	111.25	2.23	PASSED
9	HND/15/COM/FT/001	BELLO FATAI ALAO	16	2	12.5	43.25	56.75	100.00	2.00	CARRY OVER OTM 315,COM 324
10	HND/15/COM/FT/002	ANIGILAJE KHADIJAT OLADUNI	18	0	0	59.25	71.25	130.50	2.61	PASSED
11	HND/15/COM/FT/003	ADETUNJI KAZEEM OLAYINKA	18	0	0	59.75	69.50	129.25	2.59	PASSED

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Figure 9. *Sample Sessional Result.*

6. Conclusions

An automated information management system makes information management much more convenient and efficient. This application is meant to ease the processing of students' results in tertiary institutions with similar grading system. The application will be capable of storing and retrieving academic records with high speed and accuracy, and presenting useful information to its users. Its qualities are the reduction in the cost of processing students results (an example would be the cost of purchase of papers) reduction in the time spent in the computation of student's grades and the elimination of duplication of resources in terms of manpower and infrastructure.

The system 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 stress-free and speed-up the processing of students' examination results. Finally, the system is flexible and runs on a web browser. It is reasonably secure, enforces data integrity from the use of a relational database management system, it also minimizes data redundancy and it is user-friendly. With this application, the processing of students' results is automated, thereby reducing processing time and increasing accuracy.

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