Development of Automated Result Management System for Anambra State Polytechnic, Mgbakwu

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Citations - APA

In Nigerian higher institutions, student's performance is primarily assessed through end of semester examinations. Currently Anambra State Polytechnic (ANSPOLY), Mgbakwu students result and transcripts are generated on a spreadsheet application, from the submitted hardcopies of the results from various departments; students accessed their result through a printed copy displayed on the notice board. With the rate of admissions into various departments in ANSPOLY, the existing manpower struggles to effectively manage the increased workload, making the process tedious, capital intensive, time consuming, and prone to error. ANSPOLY Automated Result Management System, which through an online result uploads, automatically compute students' result, generate Transcript and allow students to view result online, was introduced to enhance the process. This will eradicate time, energy, material and space consumption and improve standard and result integrity. The study is based on qualitative analysis with Structured System Analysis and Design Methodology (SSADM). The software will be developed using VB.net to implement the front end, PHP, Hypertext Marked up language (HTML), Java Script and CSS will be used for the backend while MySqli (My Structural Query Language Improved) as the relational database. WAMP (Window Apache MySql and PHP) server used for local hosting and testing. The software when tested, accurately compute Student's Grade Point Average (GPA), Cumulative Grade Point Average (CGPA), automatically generate Transcripts, and grant Students access to their results online.

ABSTRACT

Keywords: *Examination Scores; Automated Result Management System; Anambra State; Structured System Analysis and Design Methodology (SSADM)*

Introduction

Scholarly consensus supports that students' academic performance evaluation and assessment are the criteria for the measurement of their capability in terms of academic work in school. It is also used to measure a student's capability in a given course. According to Huber & Helm (2020) Continuous Assessment is an educational policy in which students are examined continuously over the duration of their education, the results of which are taken into account after leaving school. A result is an official school document that details a student's academic record, including the courses taken and the grades earned.

Results processing can be understood as an ongoing process of converting data such as scores, grade points, and credit units into clear and meaningful information, like statements of results and transcripts. This information is essential for evaluating each student's performance across various courses (Alshehri, Rutter & Smith, 2020).

The findings of the study conducted by MacCann et al. (2020) suggest that a student's result serves as a benchmark for assessing their academic abilities within the school. It is also used to evaluate their performance in the various courses they have taken. Without an effective results processing system, the purpose of producing results may not be fulfilled, and any errors made during the process could lead to significant issues. This study was carried out to verify the existing process involved in generating and processing students' assessment report by lecturers and Instructors of Anambra State Polytechnic, Mgbakwu and to seek a way of enhancing the system for effective operations. Reports indicate that manual processing of results at Anambra State Polytechnic, Mgbakwu, results in problems such as computation errors, insecurity of results, disorganized outputs after modifications, and a heavier workload for examination officers. consequently, an effective, efficient, and error-free results processing system is crucial for proper management of students' results. This system is developed to efficiently handle result processes by creating a user friendly result uploading system for lecturers, accurately computes the Student's GP, GPA and CGPA, automatically generate the Student's transcript from the uploaded results, create a web based portal where common result processing challenges can be tackled without much stress from the staff and students and design a report response system that will quickly generate and display student's result as requested.

Review of Related Literature

The use of computers for information processing enables several capabilities, including instant access to students' personal and course information, real-time updates of student data, automatic calculation of Grade Point Average (GPA), generation of graduation lists, monitoring of failed courses, maintaining up-to-date records of the entire student body, storing course details such as course codes, descriptions, units, and scores for GPA computation, and creating user-friendly data entry screens for ease of use (Hulser et al., 2023).

Mazadu et al.. (2022) capture the core of a student information system by defining Student Management Information Systems (SMIS) as "an integrated software package that manages supports, and offers inquiry, analysis, and communication tools to organize student accountability data into information that supports the educational process."

According to Ezenma et al. (2014), Results processing is a continuous process of converting data (inform of scores, grade points, credit units etc) into a definite, concrete and meaningful information such as individual course result sheet, statement of result, transcripts etc.

Ojo, O. (2020) stated that his goal in designing and implementing an automated Student Result Management System (RMS) for the university was to create a system capable of storing both current and historical data, organizing and analyzing this data as needed, and integrating it with other Student Information Systems (SIS) packages when necessary.

In an effort to automate the management of students' academic records, Paiva et al. (2022) investigated the shortcomings of the manual method for compiling and processing student results. They proposed a software application that facilitates the automated processing of these results, although their study concentrated on public secondary schools in Nigeria. Various programming languages, software packages, and database management systems can be utilized to create result processing software for calculating students' GPA (Grade Point Average) and

CGPA (Cumulative Grade Point Average). For example, Microsoft Excel can be employed to develop an Intelligent Knowledge-Based System (IKBS) using the application's diverse programming features. In this setup, programming can be hard-coded into the cells, with cell referencing applied to monitor and track students' performance, including cumulative points (Nair & Sharma, 2022).

Mohammad (2018) worked on Web-Based Student Result Management System for University of Mozambique where he adopted a qualitative study as his methodology, MVC architectural pattern as the web Technology, Java Programming Language as the language used with Apache Tomcat Server along with MySQL as the Database Management System to develop a multi-user system for result management system of the University.

Dada et al. (2017) researched on design and Implementation of an Integrated Result Processing System in a Networked Environment, where a computer software application was developed using HTML5, CSC8, Java Script, PHP, WAMP server and my SQLi to facilitate the automated processing of result. LVarun et al. (2021) worked on Student Result Management System, where results are provided to students in a very simple way, through the Institution Website using their roll numbers.

In Nigeria, many tertiary institutions rely on 'semi-automated' software packages that operate on stand-alone computers to manage student results and academic records. The limitations of these systems include slow response times, high error rates, inadequate storage, crashes during result processing, inconsistent outputs, and a lack of referential integrity. Thus, it can be argued that the existing systems for managing students' academic records in some intuitions lack integrity. This paper examines the shortcomings of the current methods for processing and managing students' academic records in Anambra State Polytechnic, Mgbakwu and proffers an effective solution towards the shortcomings of the current method through the development of an automated approach.

Methodology

The study adopted a qualitative analysis with Structured System Analysis and Design Methodology (SSADM), deploying some object models to analyze the existing and proposed system.

Analysis of the Existing System

In ANSPOLY, the students are appraised through continuous assessment (CA) which comprise of students' attendance marks, quize/test, assignments etc on their various courses per semester and then examination. The combination of the CA and examination makes up the students' result. The lecturer for each course compiles the grades or scores of each student which makes up the total score for the course, to know the students final grade. This assessment results are processed and generated manually by manual calculator or Using Microsoft Excel template. The designed excel template when fed in with data computes and grades students appropriately. Its design was done using the "IF" and "OR" logical functions. Each lecturer then sends a hand written/printed copy of the result to the Exams Officer, who then gets the result from the various lecturers and compiles it. When the Exams Officer is done compiling result, he then sends the result to the Departmental Board of Examiners which goes through over the result and cross -checks for errors and amendment. Then, the result is sent to Faculty Board of Examiners who goes over the result again, to check for errors and amendment before it is finally sent to Academic board which is the last body to sit and look at the result and to make decision, if the result could be approved or stepped-down for further correction. In the case where result has been proved, it is sent back to the department to post on notice board for students to view their performance. When all this is done, the result which the Academic board has approved is sent to Exams and Records, the Unit that manually enters the result in their system, compiles it to finally generate students' statement of results and transcript.
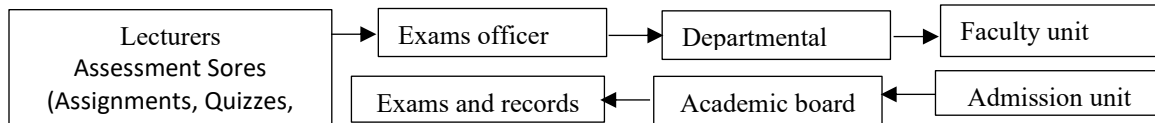
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┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐
│   Lecturers      │     │  Exams officer   │     │   Departmental   │     │   Faculty unit   │
│ Assessment Sores │ ──▶ │                  │ ──▶ │                  │ ──▶ │                  │
│(Assignments, Quizzes,│ └──────────────────┘     └──────────────────┘     └──────────────────┘
│                  │     ┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐
│                  │     │ Exams and records│ ◀── │  Academic board  │ ◀── │  Admission unit  │
└──────────────────┘     └──────────────────┘     └──────────────────┘     └──────────────────┘
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Fig 1: System Flow Diagram of the Existing System

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                    ┌──────────────────────────┐
                    │ Students Marks (CA, Exams)│
                    └──────────────────────────┘
                                 │
                                 ▼
                    ┌──────────────────────────┐
                    │   Lecturers Score sheet   │
                    └──────────────────────────┘
                  ┌──────────────┼──────────────┐
                  ▼              ▼              ▼
       ┌──────────────────┐ ┌──────────────┐ ┌──────────────┐
       │Department Format │ │Exams Officer │ │Students' format│
       │                  │ │   report     │ │              │
       └──────────────────┘ └──────────────┘ └──────────────┘
                                 │              │
                                 ▼              ▼
                          ┌──────────────┐ ┌──────────────────────┐
                          │ School format│ │Exams and records format│
                          └──────────────┘ └──────────────────────┘
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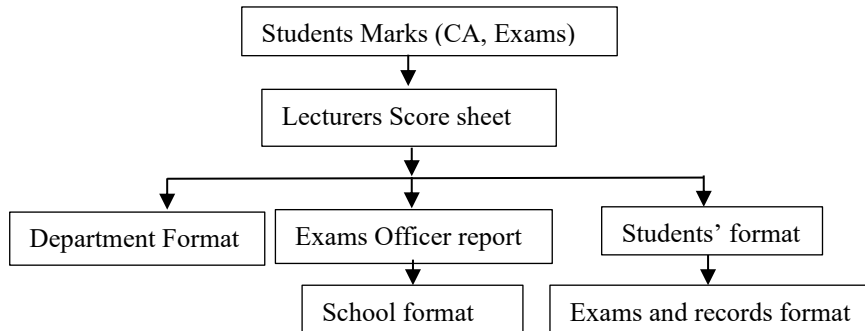
Fig 2: Architecture of the Existing System

Analysis of the Proposed System

The Enhanced Students' Assessment Processing System automates all operations and administrative activities related to course registration, assessment scores computations, result processing and all students' reports generations. Thus, the basic activities carried out in a manual system are performed by the system. The system has four users, the students, Lecturers/Instructors, Exams Officers and the Exams/Records Unit. The primary source of student's list comes from the admission list. The admission list is typed in an excel spreadsheet and submitted to the administrator. He uploads the file into the MYSQL database for storage. When a student comes to register for courses, he logs into the students' module with his/her registration number. After logging in, a form opens with a welcome message. This is to show that this student has logged into the software. At this level, a student is given access to register courses, registration is stored into the database in a registration table.

Lecturers have access to manage student module. During course works the lecturers/Instructors signed in to the system and call up the biometric attendance module. At this stage, students use their registration numbers and fingers to mark attendance with a portable fingerprint scanner during or after the lecture. This module is designed in such a way that it may not require the lecturer's supervision. The Lecturers/Instructors also used the manage student's module to input the continuous assessment and examination scores of each student in a particular course. After this the system automatically calculates the grade, GPA, CGPA for each student in a particular course, semester and academic year respectively. With this, the lectures can print the student course sheet while the student is able to view all his results together with the scores, grade and GPA for a particular course or semester result. More so, the managed student module is designed/programmed in such a way lecture could use it offline or online. During offline operations, data inputted are saved in local database which automatically synchronized with the network server database when it's connected online. This gives the lecturers the feasibility of working with or without network connection. Exams Officer has access to exams officers' module. In this module he/she accesses all the courses under his control. He uses this module to generate and prints his reports such as composite sheets, Semester broadsheet report, and students' semester result and students' carryover courses in a semester.

Exams/Records Unit: Use the System to Generate the Students' Statement of Result and Transcript

This unit only has access to print reports module, after all the necessary conditions are melt and approvals given. The software is designed by articulating the manual processes and automating the processes. The emphasis in the operation of the system is assessment and examination scores/marks inputs or edit can only be carried out by the lecturers/Instructors, this will guarantee security and integrity of students' data and records.

The automation is carried out by presenting each manual data process as data objects. The data objects represent real-world entities e.g. course registration. It has a set of attributes or properties and operations that can be carried out on it. The object-oriented software captures the various data objects of the system and establishes relationships and interaction among the objects. In the result processing system, data objects are represented as a class object. The classes are: student class; course class; registration class; result class and administration class. Each class is an entity of its own with a known set of characteristics and operations that can be performed on it.

The proposed system will be deployed on a Network; the media will be wired and wireless. The Users which includes students, lecturers, exams/records unit will use their id and password to login and access their interface to perform required activities.
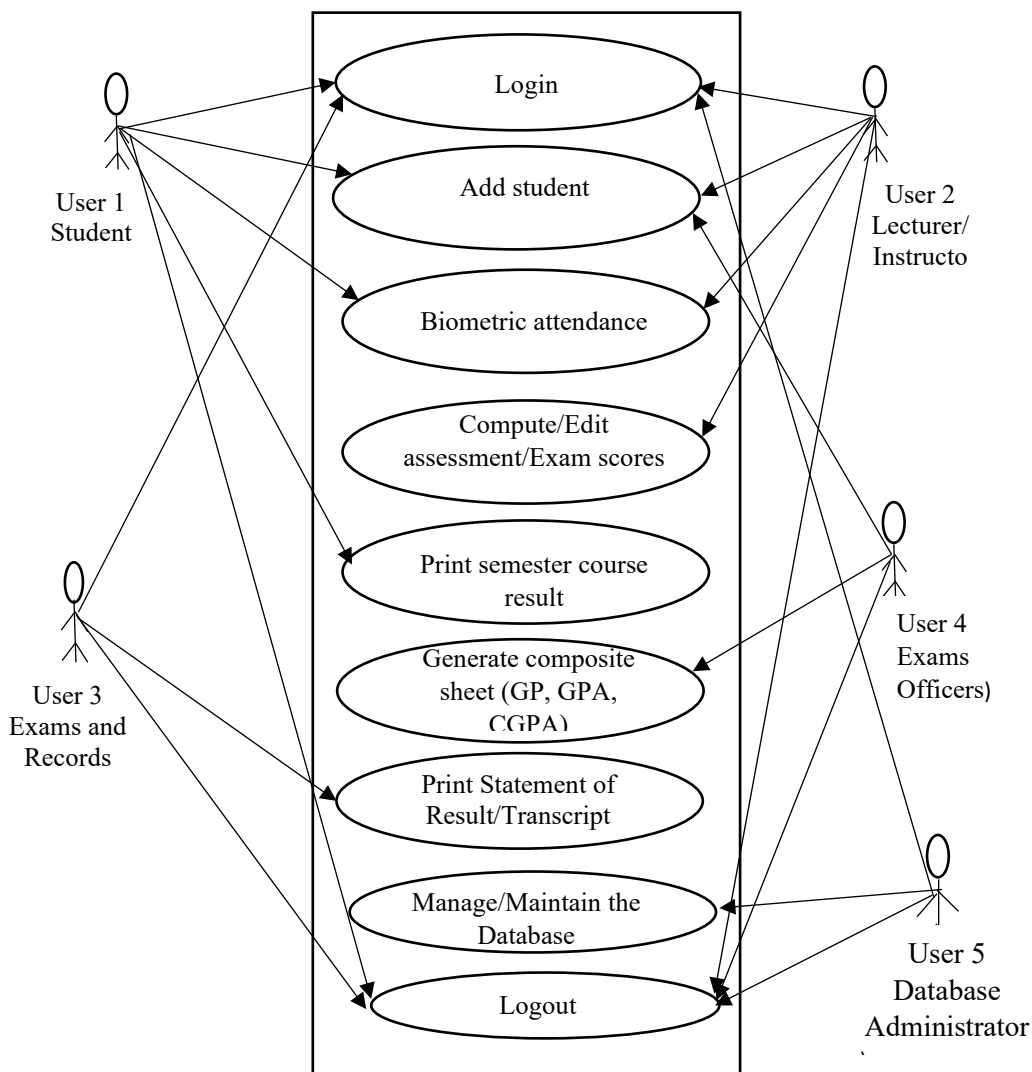

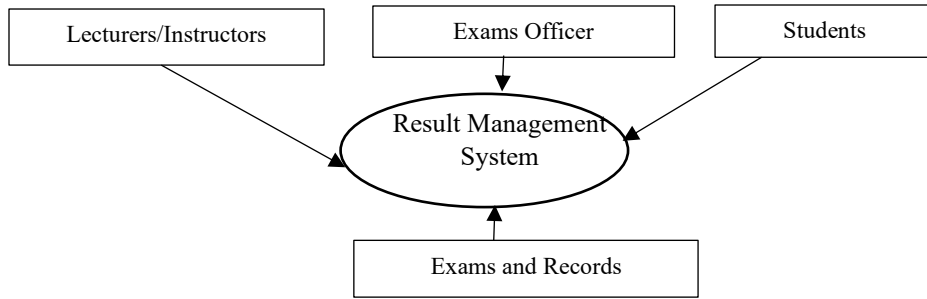Figure 3: Use Case diagram of the proposed system

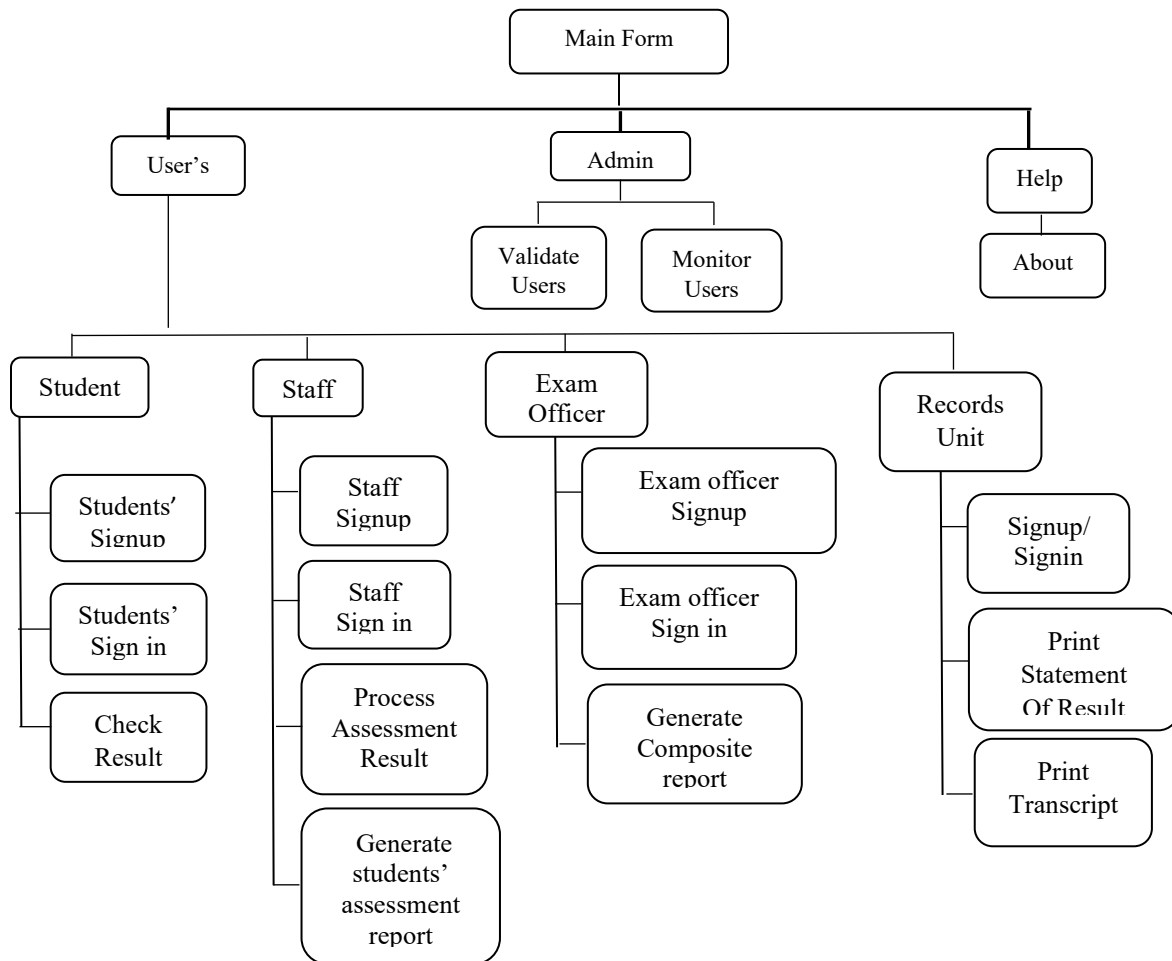Figure 4: Typical Layout of the Proposed System

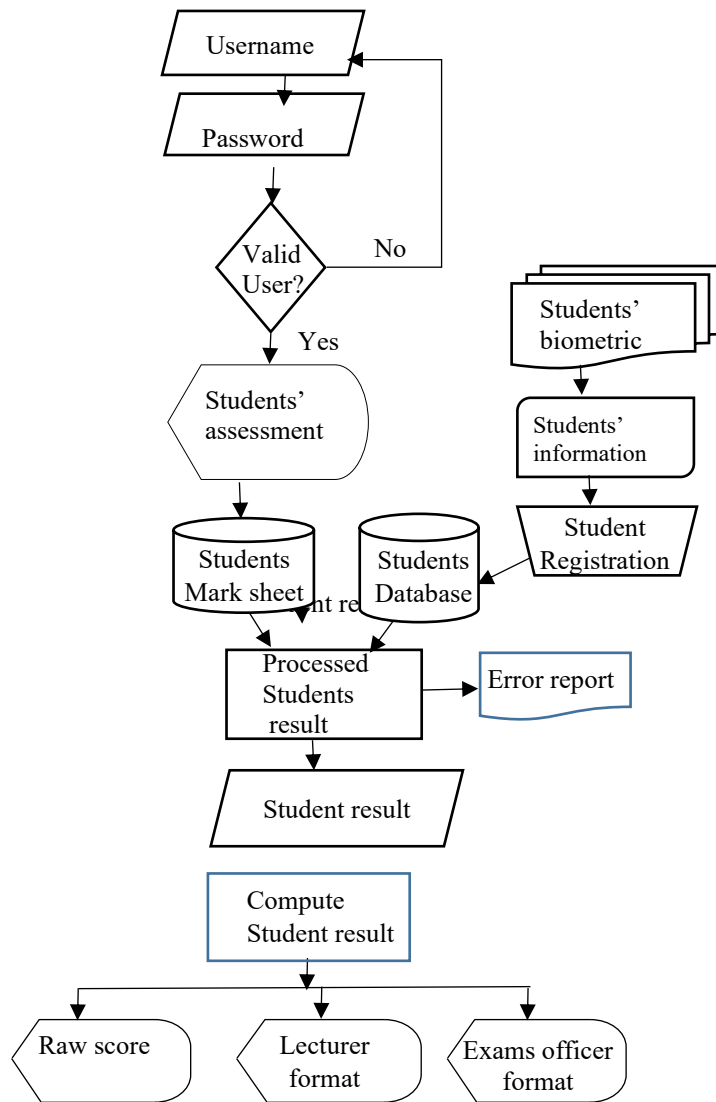Fig 5: High level model of the proposed system

Fig 6: The Proposed Student Result Processing

Mathematical Specification of Grading according to National Board for Technical Education (NBTE) Grading System

Attendance percentage is defined as the percentage of the total attendance of a student in a given academic semester for a particular course. In Anambra State Polytechnic, Mgbakwu, a 75% attendance is required.

Average Student Semester Course Work Attendance ($ASSCWA$**)** $= \frac{D}{T}$

Where D = the aggregate number of **attendance** of a student during a semester coursework

T = the number of days of contacts for the course during that semester.

Maximum Marks Allocations:

Students' biometric attendance (SA) =10%; Assessment (A) = 10%; Quiz (Q) = 10%

Practical Assignment (PA) 10% (for Practical Courses)

Continuous Assessment (CA) = SA+A+Q = 10+10+10 = 30 % for non-Practical courses

Continuous Assessment (CA) = SA+A+Q = 10+10+10 + 10 = 40 % for Practical courses

 Examination (E) = 70% for non-Practical courses or 60% for Practical courses

Total = CA+E = (30+70) 0r (40 + 60) = 100% respectively.

Unified Grading System
Table 1: Grade Placement for Examination Raw Scores

Credit Units	% Raw Scores	Grades	GP
Vary according to contact hours assigned to each course per week per semester, and according to load carried by students.	75 and above	A	4.00
	70 – 74	AB	3.50
	65 – 69	B	3.25
	60 – 64	BC	3.00
	55 – 59	C	2.75
	50 - 54	CD	2.50
	45 - 49	D	2.25
	40 - 44	E	2,00
	Below 40	F	0.00

Total GP = Sum of GPs of all Registered Courses

TGP for each Semester $= \dfrac{\text{Total GP (TGP)}}{\text{Total CU}}$

Cumulative GPA (CGPA) for ND I $= \dfrac{\text{(TGP SEMESTER I)} + \text{(TGP SEMESTER II)}}{2}$

Final CGPA $= \dfrac{\text{(CGPA ND I)} + \text{(CGPA NDII)}}{2}$

Classification of Diplomas: the final Cumulative Grade Point Average (CGPA) is determined as follows:

Table 2: Class (Level of Pass)

Class (Level of Pass)	CGPA
Distinction	3.50 and Above
Upper Credit	3.00 – 3.49
Lower credit	2.50 – 2.99
Pass	2.00 – 2. 49
Fail	Below 2.00

System Design

Control Center/Main Menu

It is designed to have three main sections: the login window, the main menu and sub menus. The login window requests a valid user name and password from the user to be able to gain access into the software.
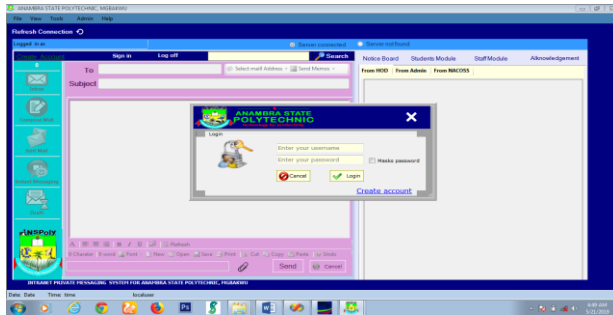
Fig 7: Screen Shoot of Validates User Account.

Biometric Attendance Sub Menu: This sub-menu is used to capture students' data or record into the database, such as students fingerprint, surname, first name, other name and registration number.

Fig 8: Biometric Attendance Sub Menu

Academic Transcript of Sunday, Samuel Ndarake: Reg. No. ND/CS/2021/015

Anambra State Polytechnic, Mgbakwu |

Surname: Sunday

Other Names: Samuel Ndarake

Reg N0: ND/CS/2021/015

Department: Computer Science

Program: ND

Date of Adm: 2021

Gender: Male

Page 1 of 2   NATIONAL DIPLOMA PROGRAMME TRANSCRIPT OF ACADEMIC RECORD

FORM 'F'

Sunday, Samuel Ndarake (ND/CS/2021/015)

ND/CS/2021/015 Semester One, year 2021

SN	COURSE CODE	COURSE TITLE	CU	GP	UNIT POINT	TOTAL	GRADE
1	COM 112	Introductions To Digital Electronics	3.0	3.00	9.0	64.0	BC
2	COM 113	Introduction To Programming	4.0	4.00	16.0	80.0	A
3	COM 114	Statistics For Computing 1	2.0	4.00	8.0	77.0	A
4	COM 115	Computer Application Packages 1	3.0	3.50	10.5	73.0	AB
5	MTH 111	Logic And Linear Algebra	2.0	3.00	6.0	61.0	BC
6	GNS 101	Use Of English 1	2.0	2.50	5.0	54.0	CD
		TOTAL	16		54.5	409.0	

Fig 10: Screen shot of Result Sample

NATIONAL DIPLOMA PROGRAMME TRANSCRIPT OF ACADEMIC RECORD

FORM 'F'

Sunday, Samuel Ndarake (ND/CS/2021/015)

ND/CS/2021/015 Semester One, year 2021

SN	COURSE CODE	COURSE TITLE	CU	GP	UNIT POINT	TOTAL	GRADE
1	COM 112	Introductions To Digital Electronics	3.0	3.00	9.0	64.0	BC
2	COM 113	Introduction To Programming	4.0	4.00	16.0	80.0	A
3	COM 114	Statistics For Computing 1	2.0	4.00	8.0	77.0	A
4	COM 115	Computer Application Packages 1	3.0	3.50	10.5	73.0	AB
5	MTH 111	Logic And Linear Algebra	2.0	3.00	6.0	61.0	BC
6	GNS 101	Use Of English 1	2.0	2.50	5.0	54.0	CD
		TOTAL	16		54.5	409.0	

GRADE POINT AVERAGE(G.P.A):   3.41

ND/CS/2021/015 Semester Two, year 2021

SN	COURSE CODE	COURSE TITLE	CU	GP	UNIT POINT	TOTAL	GRADE
1	COM 121	Programming Using C Language	3.0	4.00	12.0	80.0	A
2	COM 123	Programming Language Using Java 1	3.0	4.00	12.0	81.0	A
3	COM 124	Data Structure And Algorithms	3.0	4.00	12.0	89.0	A
4	COM 125	Introduction To Systems Analysis And Design	3.0	4.00	12.0	78.0	A
5	COM 126	Pc Upgrade & Maintenance	3.0	3.50	10.5	73.0	AB
6	GNS 128	Citizenship Education 11	2.0	2.50	5.0	51.0	CD
7	GNS 228	Research Methods	2.0	3.50	7.0	74.0	AB
		TOTAL	19		70.5	526.0	

GRADE POINT AVERAGE(G.P.A):   3.71

Fig 11: Screen shot Student Transcript

Summary

Evaluation is an important yardstick for judging the quality of students. It plays a vital role in the educational system. It is a means of recognizing the extent to which we have been successful in imparting during teaching and learning processes. The research paper delved in the design and implementation of a software application, meant to ease the processing and evaluation of student's result in Anambra State Polytechnic, Mgbakwu and institution of such kind. The application is capable of storing and processing students' results with high speed and accuracy, and presenting output in required formats. The 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 it is user friendly, secure and enforces data integrity resulting from the use of a relational database management system. With this application, problems associated with student academic record management such as improper course registration, late release of students' results, inaccuracy due to manual and tedious calculation and retrieval difficulties and inefficiency is eliminated.

Conclusion

In conclusion, this project presents a software application that is capable of storing and processing students' results with high speed and accuracy. 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.

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