DESIGN AND IMPLEMENTATION OF COMPUTER BASED TEST SYSTEM FOR SECONDARY SCHOOLS

(A CASE STUDY OF AUCHI POLY SECONDARY SCHOOL AUCHI)

BY

SHAKA KHADIJAT

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IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF HIGHER NATIONAL DIPLOMA (HND) IN COMPUTER SCIENCE.

CERTIFICATION

I the undersigned, certify that this project work was carried out by SHAKA KHADIJAT of the Department of computer science.

I also certify that this work is adequate in scope and quality in partial fulfillment of the Requirement for the award of Higher National Diploma (HND) in computer Science.

…… ……..…….

MR. MOMODU. M **Sign/Date**

(Project Supervisor)

…… ……..

MR. AKHETUAMEN.S. **Sign/Date**

Head of Department (HOD)

Computer Science

DEDICATION

This project is dedicated to the Almighty God for his guidance, mercy and infinite Love upon us, for the completion of this program.

ACKNOWLEDGEMENT

It now gives me great pleasure to express my gratitude to Almighty Allah for aiding me to accomplish the task He sets before me, and to those who in special measure have aided me in this project.

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ABSTRACT

Computer-based testing (CBT) has emerged as one of the recent "innovative" approaches to assessments most pursued by institutions, especially secondary and tertiary institutions. CBT is lauded as the answer to having cheaper and speedier test delivery for elementary, middle, secondary and even tertiary school testing assessments which is a programmed computer test. Computer based test is a form of administering test in which the response are electronically assessed and recorded the Major objective of the project was to design and develop a Computer Based Test that would computerized the existing records management in the department of Computer Science and give direct benefit to the department in terms of fast information retrieval, enhanced decision making. The Computer Based Test was designed as a web based system and implemented using open source solutions that include MYSQL as the database, and PHP as the programming language. An extensive evaluation of the project determined that the project achieved many of its predefined objectives however, the major limitation of the project was the scope covered. From a proper analysis and assessment of the designed system, it can be concluded that the system developed is an efficient, usable and reliable computer based test.

KEYWORD: Online system, Assessment, Student, Computer Based Test

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

It is widely believed that all tests will one day be delivered on a computer of some sort. However, it is difficult to accurately predict when this day will come. It has seemingly been just around the corner since the early 1990s, signed on to computer based testing (CBT). Today, dozens of admissions, placement, certification, and licensure testing programs are administered on computer, with the number growing each year. Computer based test highly been interested and suitable in both education and pedagogical aspects. Test is one of the best methods of evaluate the knowledge and ability of an individual, starting from manual means of using paper and pencil to electronic, from oral to written, practical to theoretical and many others.

The present information technology means of examine students is the use of electronic system in place of manual paper method which was characterized by massive examination leakages, impersonations, demand for gratification by teachers, bribe taking by supervisor and invigilators of examinations.

Computer-based testing (CBT) is an efficient way for test sponsors to provide a secure, consistent environment for certification and licensure while significantly enhancing the candidate experience. It is common for testing volumes to increase

after a full conversion from paper-based testing (PBT) to CBT, often as a result of the availability of a greater number of testing locations and more flexible scheduling and testing opportunities. Migration from PBT to CBT does affect candidate behavior, however, and it is possible for some testing programs to experience brief reductions in demand triggered by candidate apprehension regarding CBT. Many institutions are beginning to re-evaluate their traditional method and have considered providing pedagogical materials through internets. Web-based testing and assessment system offer greater flexibility than the traditional approach because test could be offered at different times by students and in different locations. More importantly, questions could be shuffled having the same structure and levels but different contents. Since the inception of the secondary schools, the conduct of examinations as well as inability to release results on time, inability for some students to get their results and several incomplete results. These problems have embarrassed most secondary schools. Some students did complain and a newspaper was used to air their view, and this was the comment, "Other challenges they highlighted include delay in the release of examination results failure and delay to graduate students from secondary schools since inception and many other". It has to be stated however that these problems are not entirely the fault of the secondary school as the students also contribute immensely to the problems, these factors range from the failure of the students to write the Tutor-Marked Assignments (TMA) that

is cumulative Assessment and the secondary school results even if the students pass the examination very well; the use of mobile phone numbers in place of matriculation numbers, thus making the students grades untraceable. It is the problems associated with conventional method of writing examination that made the secondary schools to come up with the resolution in conducting the secondary school examination with the electronic model. This is believed and would put an end to the inability to release results failure to conduct of examinations. Before this decision was taken however, the secondary schools have to grapple with serious issues including the preparedness of the students to face electronic examination. Basically, CBT for secondary schools can be defined as a system that "involves the conduct of examinations through the used or the internet" E-assessment in its broadest sense is the use of information technology for any assessment related activity.

The origin of CBT would naturally be traced to the further deployment of the potential of the internet and the teachers and the internet. As students around the world establish connections to internet and teachers and students gain proficiency with navigating through the vast quantity of richly available information, the true educational potential of the World Wide Web can finally begin to understand. One of the potentials of the web is the ability to conduct examination through electronic means. CBT deployment removes series of anomalies being encountered in the manual tests. According to researchers, the CBT would remove all human errors

recorded in manual examinations and create opportunity for students to access their results immediately. If the examination is conducted through net, it be difficult for students to carry out form of examination malpractice.

Computer based testing (CBT) or computer based assessment is seen as a catalyst for changes in pedagogical methods (OECD, 2010), It is seen as a catalyst for change, bringing about a transformation in learning, pedagogy and curricula in educational institutions (Scheuermann and Pereira, 2008). In order to establish valid Computer based testing (CBT) the international Guidelines on Computer-Based and Internet-Delivered Testing (International Test Commission, 2004) state that equivalent test scores should be established for tests using the conventional paper-based mode and the new computer-based mode. This set of testing standards is supported by classical True-Score Test Theory (Allen and Yen, 1979), which is the basis of both computer-based and paper-based testing. According to this theory, someone who takes the same test in the two modes can be expected to obtain nearly identical test scores. The result of taking pencil based examination or Computer based testing has little or no difference between them. Most secondary schools in Nigeria basically use paper-based test in assessing student's performance from the junior school to Secondary school.

This sometimes results in either a last-minute increase in testing during final PBT administrations or candidate procrastination to the last available computerized

testing date. Therefore, the question facing licensing organizations is how to keep test volumes up and candidate uncertainty down when migrating from a paper-based to a computer-based test?

The key to mitigating test volume risk and ultimately driving an increase in demand is ongoing marketing, candidate education and outreach. In terms of promoting the new computerized testing program, marketing and effective communication can have an important impact on stakeholder acceptance of CBT and comfort with its use.

The set of questions often used in the CBT system are multiple choice objective test and quizzed that can be easily evaluated online in order to allay candidate fears and minimize question.

1.2 Statement of the Problem

The challenges faced with Pencil-Paper Test (PPT) or Paper based test is overwhelming, they include but not limited to exam malpractice, inaccuracy in marking, delay in marking results. These challenges do not help in the growth of the education sector of Nigeria.

Computer Based Test is economical, accurate and time bound. Primary, Secondary and Tertiary Institutions can adopt this system to solve challenges noted above. Examination bodies such as the Joint Admission and Matriculation Board (JAMB)

are already adopting a system that carters for her examinations across 500 CBT centers nationwide. This has aided the examination to curb challenges faced with the PPT system of examination.

1.3 Aim and Objectives of the study

The main aim of the research project is to design and implement an online computer based test system for secondary school. It will manage and save test result (assessment sheets on the database safely for future references).Also, students are given test according to time and there are no need of using extra materials like paper, pen etc. to achieve this aim, specific objectives of the research paper are:

- To develop a CBT system that automatically generates exam numbers for students.
- To develop a CBT system with enhanced security features to avoid exam malpractice.
- To develop a system of CBT model that is devoid of irregularities and generally fair to all applicants system.
- To design a CBT system with real time processing of results for candidates.

1.4 Significance of the study

This study is intended to assist in some small way to those practitioners who are struggling with the decision of whether to test on computer and how they might best

go about doing so. It is not intended to provide an introduction to the important methods and to the considerations that dictate use of those methods. It is far from comprehensive in this regard. To make truly informed decisions, one would need to be at least conversant if not quite familiar with the study. This is a roadmap intended to precisely direct practitioners on their journey to computerized delivery, also as a guidebook highlighting some of the landmarks they will likely visit along the way, we need to start by deciding whether the attractions of the destination outweigh the rigors of travel.

1.5 Scope of the study

This study covered the design and implementation of computer based test system for secondary school, using Auchi poly secondary school Auchi the case study

1.6 Limitations of study

Financial constraint- Insufficient fund tends to impede the efficiency of the researcher in sourcing for the relevant materials, literature or information and in the process of data collection through the internet, questionnaire and interview.

Time constraint- The researcher simultaneously engaged in this study with other academic work. This consequently cut down on the time devoted for the research work.

1.7 Definition of terms

Computer Based Test (CBT): Is the use of information technology for any assessment-related activity.

Design: Is the creation of a plan or convention for the construction of an object or a system.

Implement: To put (a decision, plan, agreement, etc.) into effect.

E-Marking System: Given the examiner a possibility of checking and marking the answer sheet directly on a computer screen rather than reading paper documents.

E-Learning: Is the computer and network enabled presence of transfer of skills and knowledge.

Cryptography: Is the practice and study of techniques for secure communication in the third parties (called adversaries).

Result Integrity: Is the concept of consistency of action, values, methods, measures, participles, expectations and outcomes of examination process.

CHAPTER TWO
LITERATURE REVIEW

2.1 Review of Related Literature

There is a growing body of research focused on developing better ways to Manage CBT system. Some of these researches focused on various section of the system. (Schramm, 2008) looked at an e-learning web based system that could simply offer and grade mathematical questions with infinite patience. Therefore it needs the capability for input and output of mathematical formula, the dynamic generation of Plots and the generation of random expression and numbers.

(Al-Bayati and Hussein, 2008) presents an applied Generic software of Multiple kinds of CBT package; this package of CBT materials of this package is translated into language of H1 persons like sign language and finger spelling. The idea of the Generic software is to present an empty templates to the teacher who would like to develop his required CBT for the needful topic (mathematics, English language, science, etc.) and desired set of exam kinds (multiple choices, matching between words, fill in works etc.).

Computer Based Test system is an effective solution for mass education evaluation (zhenmingeta1, 2003) they developed a novel online examination system based on a Browser/Server framework which comes out the test (examination) and auto—grading for objective questions and operating questions such as programming,

operating Microsoft windows, editing Microsoft word, Excel and PowerPoint, etc. Another paper (He, 2006) presents a web-based educational assessment system by applying Bloom's taxonomy to evaluate students learning outcomes and teacher instructional practices in real time. The system performance is rather encouraging with experimentation in science and mathematics course of two local high schools. Computer Based Test is a difficult part of e-learning security (Huszti and patlio, 2008). The paper describes the anonymity, secrecy, robustness, correctness without the existence of a trusted unity party. (Ayo et al, 2007) proposed a model for CBT system in Nigeria where all applicants are subjected to online examination. (Gaytan, 2007) presented a detailed unhistorical background of CBT online education, with regards to its current status, its potentials and limitations that could lead to the advancement of the scholarship of teaching learning. Furthermore, the Nigeria National 1T policy, which was formulated in the year 2000 is responsible for the monumental developments across the various sectors of the economy.

The vision is to make Nigeria an IT capable country in Africa and a key player in the information society. Its primary mission is to "use it" for: education; creation of wealth; poverty eradication; etc. (Ajayi, 2005).

The project includes the provision of VSAT to the 774 local governments in the country, and the installation of the necessary infrastructures particularly, fiber optic backbone across the nation.

The CBT systems develop by (fagbola et al, 2013) was an online examination system that assesses students using multiple questions set by the teachers and is capable of grading students accordingly. The system is expected to provide an effective solution for mass student evaluation and provides functionalities such as auto-submission of examination on expiration of set time, auto-grading of students and examination result report generation. The waterfall model of software development life cycle was adopted and the conceptual design (activity diagram, the use cases, the data flow diagram and the entity-relationship diagram) were presented.

(Tascieta1, 2014) proposed an online examination system architecture which provides for integrated management of an examination main functionalities. These include question pool deration and update, examination authorizing, execution and evaluation, management of the feedback from students, along with ensuring use of analysis reports related to the questions and examination created by an intelligent agent in the decision-making processes.

The system architecture includes Administration, implementation, finalization, and support layer. A monitoring agent was designed to help students through creating reports. Analysis on this system at sakarya University Turkey, show that the proposed intelligent agent supports online examination system, detects problems that may arise and enables the instructors to make decision more easily on such problems in a shorter time. The expect system which uses the IFTHEN construct is

expected to expand to include additional intelligent features with the aim of resolving different problems. The use of ICT in the assessment of students has evolved over time and will continue to advance due to its effectiveness. Earlier works on CBT system have been towards the recording and notification of the students final examination score. However, this work, in addition to the notification of the students final score, also presents the students' scores in other forms of assessment.

(Emery and Abu, 2006) developed an on line website for tutoring and examination of economic courses. This novel software tool was used online examination and tutorial application of the syllabus of economic course so as to ensure that students study all the concepts of economics.

So the proposed software is structure from two major modules: the first one was an online website to review and make self-test for all materials of economic courses. The second part is an online examination using a large database bank of questions through to maximum evaluations can be obtained.

The developed software offers the following features;

a. Instructors could add any further questions to maximize the size of the bank of questions.

b. Different examination for each students with randomly selected questions from the back of questions can be done.

c. Different reports for the instructors, students and class's etc. Can be obtained.

d. Several students can take their exams simultaneously without any problem inside and outside their campus. The proposed software has been designed to work based on the client server architecture.

2.2 Computer Based Test System

The CBT system is a system that "involve the conduct of test (exam) through the web or the intranet" through the definition of Wikipedia is that of E-assessment, it is related to examination E-assessment in its broadest sense in the use of information technology for any assessment related activity. The origin of CBT system would naturally be traced to the further deployment of the potential of the internet. (EL emery and Alsondos, 2006).

(Awosiyan, 2010) quoting prof. OluJegede the vice chancellor of noun, says that: CBT system was introduce to address series of anomalies being encountered in the manual test. He said that the CBT system would remove all human errors recorded manual examination and create opportunity for student to assess their result immediately. With this we have remove so many hiccups in the complication of

answer script and movement of examination paper from one part of the country to another.

(Ayo et al, 2007) also say that CBT system reduce the large proportion of workload on examination, training, grading and reviewing, thus bringing the ability for the institution to release examination result in record time. This is because where the lecturer would spend weeks marking script manually, the computer would grade the students as soon as they finish their paper.

2.3 Computer Based Test System in Nigeria.

In Nigeria very few schools have stated using the CBT system for their test/exams including some university like Auchi polytechnic and some other secondary school and university. The internet was setup in CBT centers containing 50 to 200 computer system and a server. Another observation made was that most of these centers are being managed by the integrity of the results.

2.4 Advantages of CBT (Computer Based Test)

CBT system simplifies the process by which examinations are delivered, taken and scored electronically. It entails questions are deployed onto computer workstations (intranet and internet) and candidate answering the question on to the computer. The process of writing test (exams) is thus completely paperless. It is sometimes referred to as e-exam or CBA (computer-based Assessment). Advocates for the CBT system

models argue that it not time-consuming but rather time saving, (Mc Cormack and Jones, 1998) and identify these advantages:

- Time saving, as assessments can be created using tools and adapted and reused as needed. They can be distributed and collected using a web-based system which saves development and distribution time.
- Reduces turnaround time; as the system enables assessment to be corrected by computers.
- Reduces resources needed by replacing human resources with computer resources.
- Keeping records of results that be stirred centrally as assessed by interested parties, such as students and staff.
- A key element in computer-based testing is that fewer people are required to supervise each examination. This will result in considerable cost savings.
- Increasing ease with data can be used as corrected assignments corrected and stored electronically can be analyzed easier and the data can be used in spread sheets and other statistical packages.

2.5 Benefits of CBT System

- low long costs
- Instants feedback to student

- Greater flexibility with respect to location and timing
- Enhanced question on styles which incorporate interactivity and multimedia.
- Create a paperless situation.
- Improve reliability (machine marking is such reliable than human marking)
- Greater storage efficiency and tens of thousands of answer scripts can be stored on a server compared to the physical space required for paper scripts.

2.6 Security guard Line for CBT System

The authority of secondary schools and university maintained examination administration and security stand standards that are designed to assure that all candidates are provided the same opportunity to demonstrate their abilities.

The assessment center is continuously monitored by audio and video surveillance equipment for security purpose. The following security procedures are applied during the examination.

- Test/exams are proprietary, cameras, notes, tape recorders, Personal Digital Assistants (PDAS), pagers or cellular phones are not allowed the testing room use of a cellular phone or other electronic device is strictly prohibited and will result in dismissal from the examination and forfeiting the entire registration fee.

- No guests, visitors or family members are allowed in the fasting room reception areas.
- No personal belongings are allowed in the assessment center. Only key and wallets may be taken into the testing room. The testing center is not responsible for items left in the school area.
- Eating, drinking or smoking is not permitted in the assessment center.
- Candidates may take a break whenever they wish, but they are not allowed to take additional time to make up for times lose during breaks.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 Introduction

This chapter identifies the functionality and performance of the present system (understudy) with a view of initializing software development plan for the system. Also, it shows the description of the requirement, the existing system as well as the proposed system. It also shows the design of the system.

System Analysis is the process of examining a system for the purpose of providing solution to a problem.

3.2 Methods of Data Collection

In order to meet research objective, data which has been collected for analysis purpose are of primary and secondary in nature but study is more based on secondary data.

Primary Data Source: Primary source refers to the sources of collecting original data in which the researcher made use of empirical approach such as personal interview and observations. The primary source of data collection adopted for this research is the interview method.

Secondary Data Source: Secondary data is the data that already exists which has been collected by some other person or organization for their use, and is generally made available to other researcher free. In addition, some other data has been collected from journal papers including both online and journal papers sourced in the library, books, the Internet, magazines and newspaper articles and official statistics. However, secondary data may not always answer that specific question of a researcher

The methods adopted in the collection and gathering Data and Information for the project include, interview, Reference, and written texts.

3.2.1 Interview Method

This was done between the researcher and some management staff in authorities. Reliable facts were gotten based on the questions posed to them by the researcher.

3.2.2 Reference to Written Text

Computer Based Test information documentations were studied and a lot of information concerning the system in question was obtained. Some forms that are necessary and available were assessed. Also internet downloads was made to obtain some text materials.

3.3 Analysis of the Existing System

The existing system is done manually for up keeping of the details of the person who are registered already. It is very difficult for some secondary schools to get enough examination class rooms and enough seats and writing materials. Also, it is difficult for the students to write exams in the appropriate manner or good conductive environment for conducting an exam.

This system is required to prepare registration question paper for students and requires printing a lot of number manually. To calculate how many students required and verification of details of the students in a month by hand is very difficult.

This requires quiet a lot of time and wastage of money as it requires quiet a lot of manpower to do that.

3.3.1 Advantages of the Existing System

i. The existing system don’t need electricity or batteries to used

ii. They are easily portable and be used in any setting

iii. You don’t have to make a hard copy of your work

iv. You can correct mistakes easily with an eraser

v. The written words are more easily traced

3.3.2 Disadvantages of the Existing System

i. The existing system is very time consuming
ii. It 1s very difficult to analyze the exam manually
iii. To take exam of more candidate, more invigilators are required but no need of invigilator in case of CBT exam
iv. Results are not precise as calculation and evaluations are done manually
v. The changes of paper leakage are more in current system as compared to proposed system
vi. Result processing takes more time as it is done manually

3.4 Overview of the Proposed System

Secured CBT exams are one of the most difficult challenges in learning securities. The relevance of the CBT proposed for any academic institution implies that different security mechanisms must be applied in order to preserve some security properties during different examination stages. We are proposing a CBT system that makes use of cryptography for protecting question in order to achieve the desired security levels at every exams stage.

The first stage is that all the principal actors in this system (student, teacher and administrators) have to be registered.

After the registration, the teachers can now use their status to send directly the prepared questions and answer keys (encrypted) to the question server (data based). The students can now go to the CBT exams, enter and also use their status to login

and take the CBT.

The question is decrypted in the question pool before randomly sent to the students system. They can easily access their results immediately after the exams. The timing and grading systems are automatic.

There is another module that take care of students complains and correction checking. Data that can be read and understood without any special measures is called plaintext or clear text. The method of disguising plaintext in such a way as to hide its substances is called encryption.

3.4.1 Merit of the Proposed System

i. Reduction of madness of breaches of examination security.
ii. Instant feedback to students
iii. Ability to track and display the time remaining on the examination
iv. No cost for printing and data entry
v. It reduces paper
vi. Automated analysis of results of entire candidates
vii. Computer based Testing (CBT) has emerged as one of the recent innovative approaches to assessments by Examination Bodies.
viii. Skills needed to act efficiently in technology rich environments can only be accessed through CBT.

3.4.2 Demerit of the Proposed System

i. Not all students can use the computer very well

ii. The costs to set up an electronic assessment system can cost thousands

iii. Due to power failure the computer may not work.

iv. Complexity of software.

v. System malfunctioning occasioned by bad hard drive

3.5 System Design

System design is concerned with the specification of the algorithm that implements the function and the actual inter connection among functions and data structure.

A function is designed in terms of their input and output at each level of the hierarchy. While describing a function, emphasis is on the descriptions of what is done rather that how it was done.

3.6 System Modeling

Unified Modeling Language (UML) was employed to model the behavioral attributes and the functional components and modules of the application. Use case diagrams, flow chart diagrams and Activity diagrams were used to represent the functional requirements, structure and behavioral pattern of the information system.

3.6.1 Use Case Diagrams

Use case diagram is employed here to specify the functionality of the Application; it was used to illustrate the way the system and it users will interact to achieve its objective.

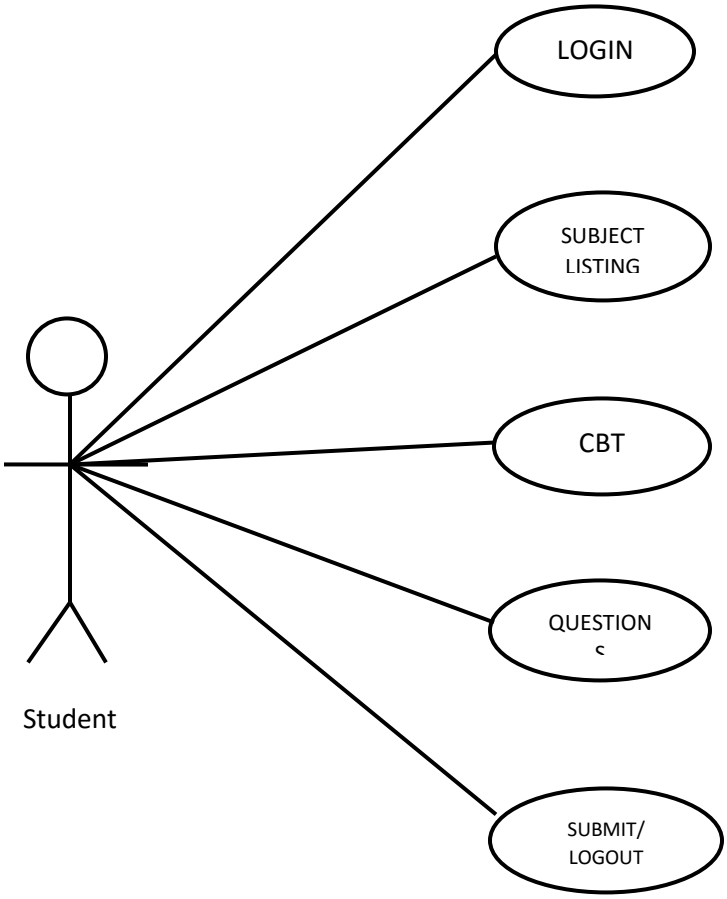

Fig. 3.1: Student Use case Diagram

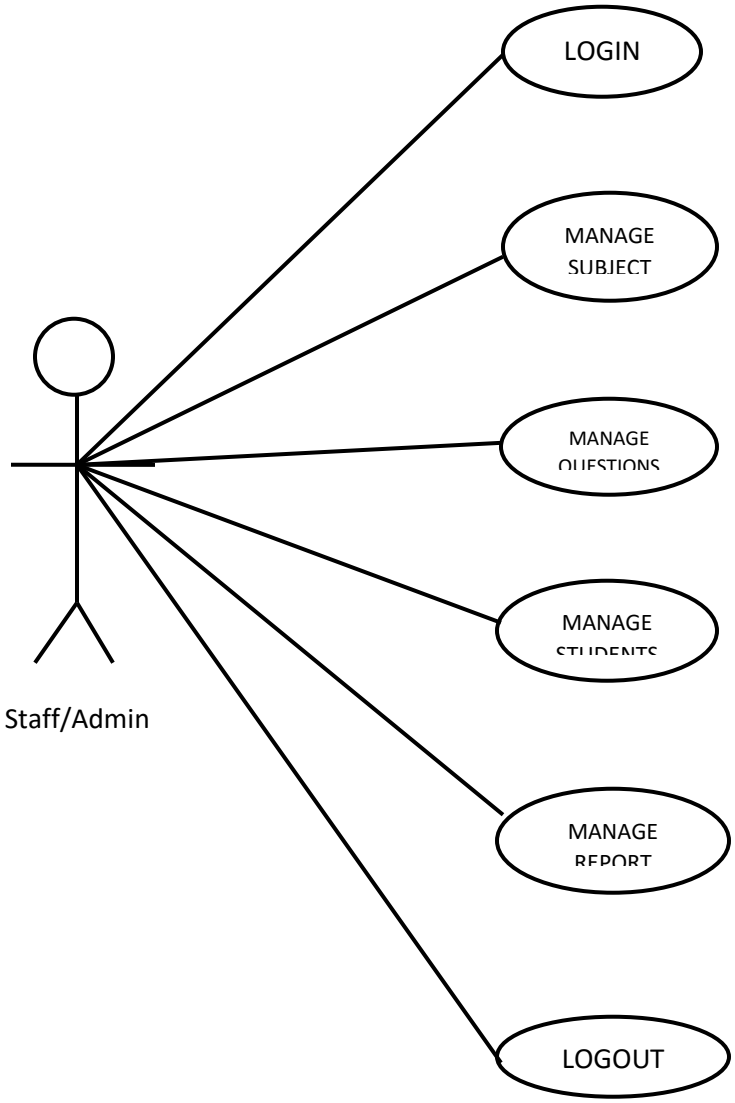

Fig. 3.2: Staff/Admin Use case Diagram

3.7 Database Design

The design is made to accommodate, database design, representation, character type, field size and decimal where necessary. The operational data base is designed below using Microsoft Access.

Table 1: Student Registration Table

FIELD	FIELD TYPE	FIELD SIZE
STUDENT ID	TEXT	20
LAST NAME	TEXT	50
FIRST NAME	TEXT	50
MIDDLE INITIAL	TEXT	1
DETAILS	TEXT	50
DATA REGISTER	DATE/TIME	15
YEARLEVEL	TEXT	50
CLASS	TEXT	50
COURSE	TEXT	20

Table 2: User info Table

FIELD	DATA TYPE	SIZE
USER ID	Bigint	20
USERNAME	Varchar	50
PASSWORD	Varchar	50

Table3: Class info Table

FIELD NAME	DATA TYPE	SIZE
CLASS ID	Int	20
CLASS NAME	Varchar	50

Table 4: Subject Info Table

FIELD NAME	DATA TYPE	SIZE
CLASS ID	Int	20
CLASS NAME	Varchar	50
CLASS REG	Int	20

Table 5: Question info Table

FIELD NAME	DATA TYPE	SIZE
QUESTION ID	Int	20
QUESTION	Varchar	300
A	Varchar	100
B	Varchar	100
C	Varchar	100
D	Varchar	100
CORRECT	Varchar	20

3.8 Architectural Design

The propose system presents a 3-tier architecture comprising the presentation tier, the logic tier and the database tier. The presentation tier offers an interface to the user; the logic tier serves as the middleware that is responsible for processing the user's requests, while the database tier serves as the repository of a pool of thousands of questions. It also consists of other modules for authentication (using user Name/Registration Number and Password) and computing results. This is the architecture used by all the CBT system center visited within Nigeria and it is also the same architecture that was used even in just little modification. This type of

architecture did not give security issues too much attention and impersonation is very likely.

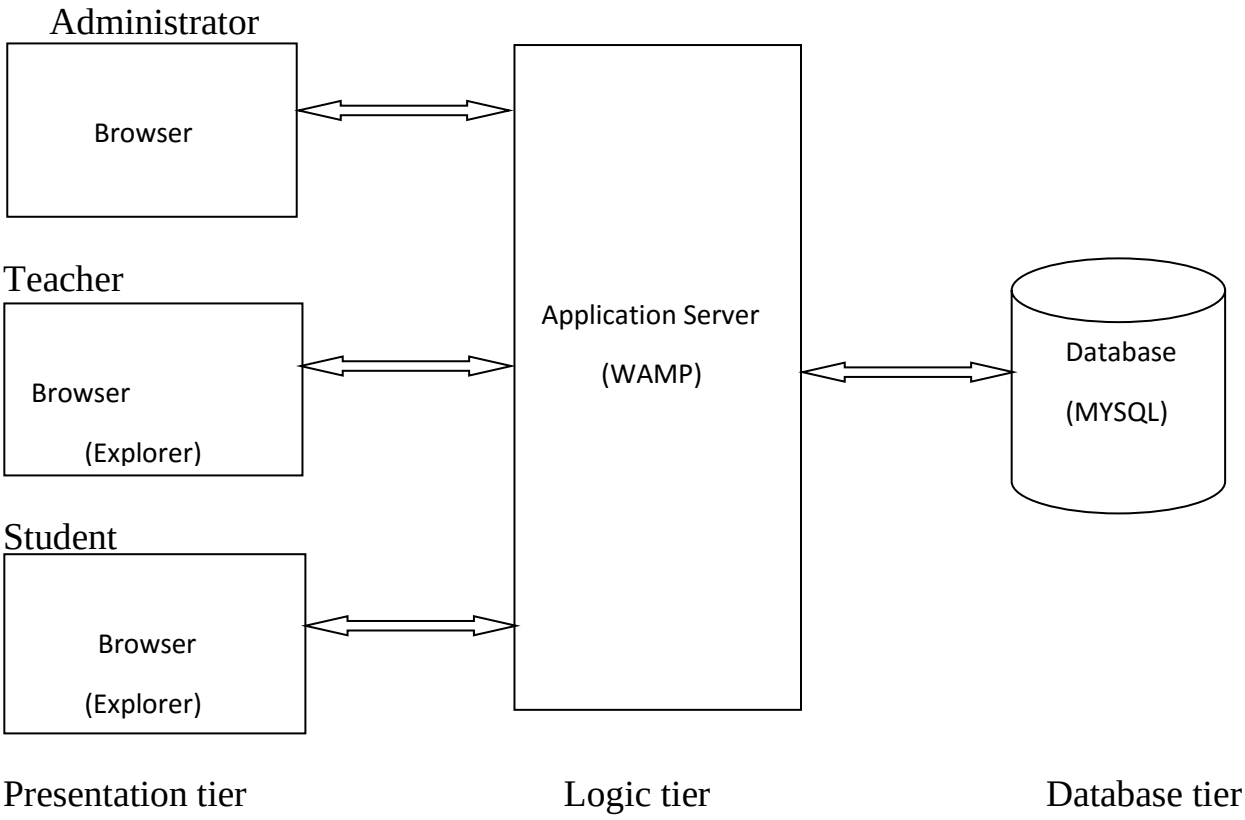

Fig. 3.3: Architectural Design

3.8.1 Program Flowchart

Program flowchart is the detailed diagram representing the flow to solve a particular problem of the program.

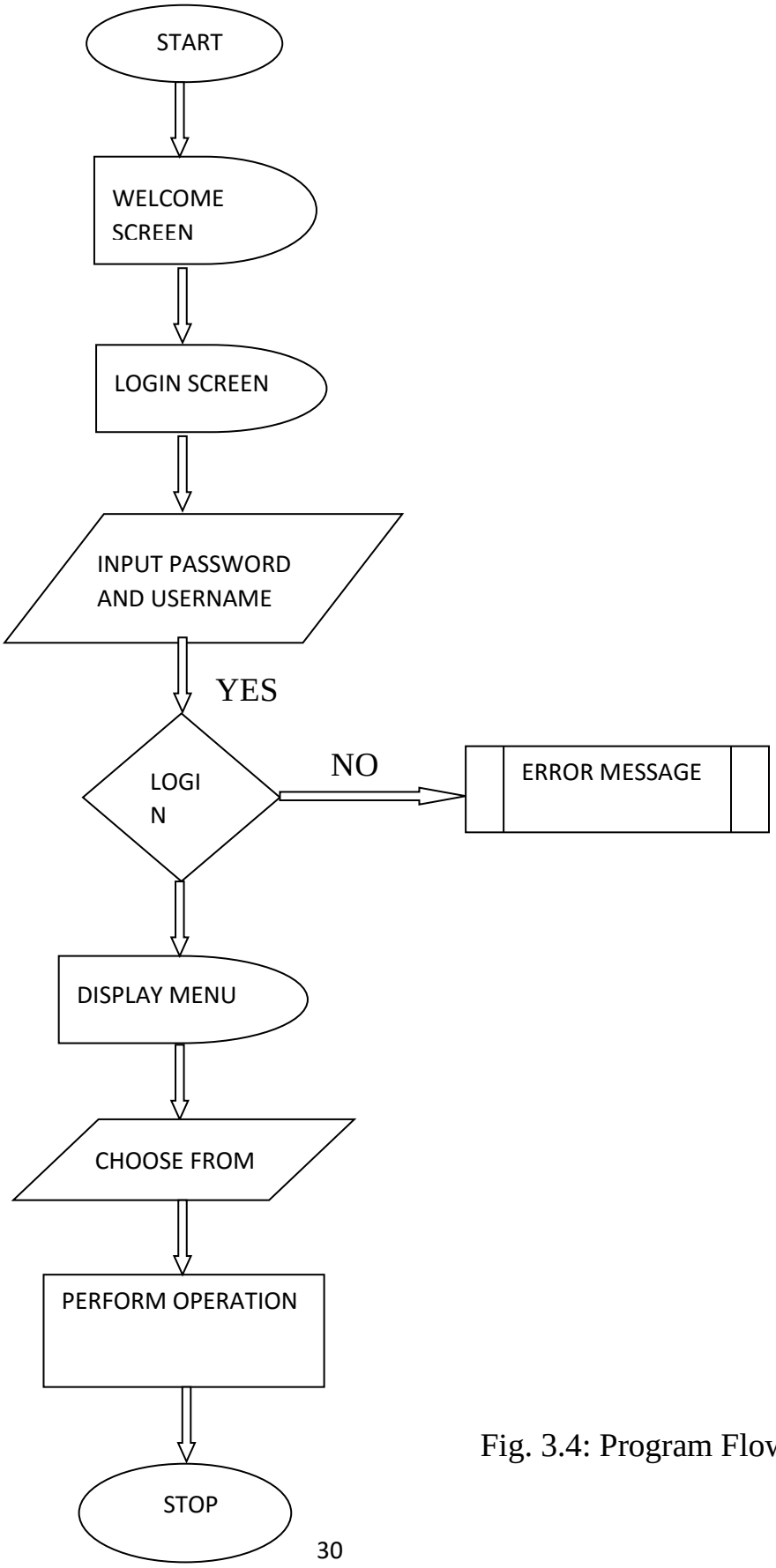

Fig. 3.4: Program Flowchart

3.8.2 System Flowchart

System flowchart is the graphical representation of the flow of data in the system and represents the work process of the system

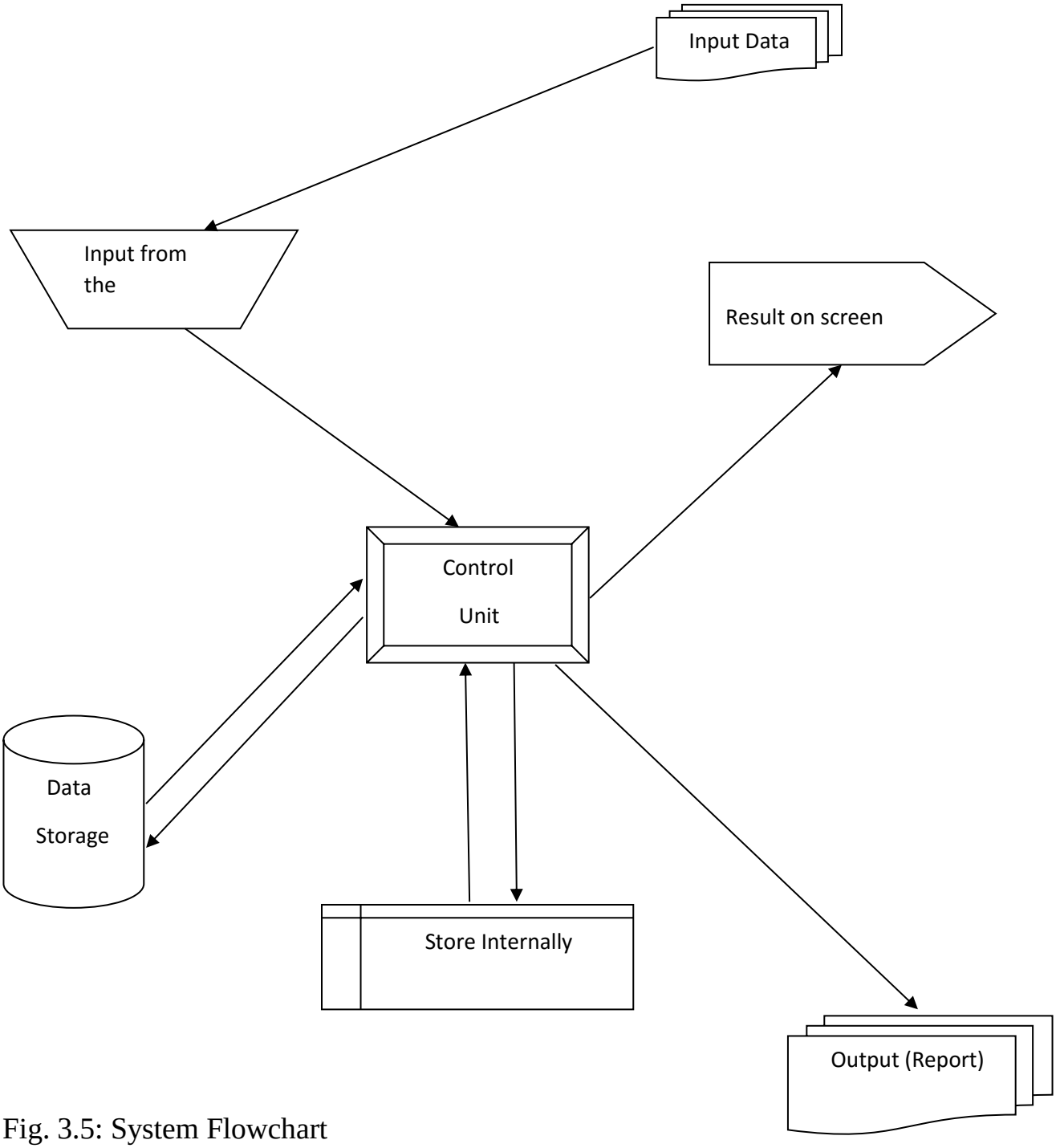

Fig. 3.5: System Flowchart

3.9 Input Design

In this approach, the input mediums are the computer, mouse and the keyboard to make selections. The word Input refers to the data which the user submits to the computer. It can be done through the computer keyboard or mouse. But in this research, the keyboard will be needed more than the mouse for a favorable output. This is because of the principle of GIGO which states that what you input into the computer is what you will expect as output.

This input of the new system design is made such that the variables needed are made in such a way the computer will recognize them.

3.10 Output Design

The term applies to any information produced by an information system, whether printed or displayed. When analyzing a design, computer output are identified as specific output that is needed to meet the information requirements, select methods for presenting information create documents, report or other formats that contain information produced by the system.

CHAPTER FOUR

SYSTEM IMPLEMENTATION

4.1 System Implementation

This covers a detailed documentation of how the system has been developed in a step-by-step manner. It clearly illustrates the implementation process, describes the interfaces and features of the entire system. It also covers the components and unit testing as well as the integration of the system. Software component testing involves integrating one or more system components functions or features and then testing this integrated system.

Component testing involves Validation and Verification. Validation is the test phase which answers the question ‘did we build the right system to ensure that the end product suits the need of the customers. This phase employed the use of prototypes, which is a copy of an object, made on a smaller scale than the original. Prototypes have been used to gather requirements from the users and the prototype was subjected to tests till a functional system was evolved. Verification phase answers the question ‘did we build the system right by subjecting the application to quality control activities throughout its life cycle to ensure that interim deliverables meet their input specification. The system has been verified to meet input specifications from users by verifying login details among others. The software has several

components, which were integrated and tested for functionality. They include Home Page, Login Page, Welcome Page, Question Page, etc.

After implementing the codes to meet the specification requirements, the entire system was tested. The system components that were tested include database, process, interface, and the server for the system. In testing the database, it was ensured that the database captures the specified fields according to their respective attributes, and that the storage and retrieval functions responded properly. All the tables carrying the bugs reports and projects were easily accessible by the system administrator. In process testing, the system started and ensured to work acceptably well, all necessary links working and linking to intended locations. Other features such as the comments sending from the clients to the admin and vice versa were tested and ensured that messages sent were meaningful. In interface testing, it was ensured that there was a link for user who does not really know how to navigate around the system, and all links were ensured to lead appropriate page providing enriched user experience.

Almost all of the functions of the application run on the WAMP server, which is responsible for communicating with web browser. MySQL relational database server stores the information the application requires and PHP was used as a middleware.

4.2 System Requirements

4.2.1 Hardware Requirements

- Minimum of Duo Core Microprocessor Computer System is required.
- Minimum RAM of 1GB required.
- Mobile Devices such as phones with Internet Access
- MODEM
- Printer (Optional)
- Database Server
- Internet Service Provider (ISP)

4.2.2 Software Requirements

- Operating system - Windows XP and above, Android OS and Mac OS
- Database - MYSQL is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write.
- Development tools and Programming language- HTML is used to develop web pages with CSS, Java Script for validation and JSP for sever side scripting.

4.3 System Development

The phases of software development life cycle were followed in a non-linear fashion. The output of planning phase derived the input for analysis phase which in turn gave the output for design. The output of the design brought the input for the implementation phase. The output of implementation phase was also used as input for the maintenance phase. The maintenance phase determined the need for system re-engineering and it completed the software development life cycle (SDLC). The system analysis and design adopted a mix of structured system analysis and design (SSADM) methodology (Tanner, 2008) and object oriented analysis and design (OOADM) methodology (Sharma and Sawai, 2011).

4.3.1 System Change Over Plan

This is the process of changing from old information system to the newly designed, developed and installed system. There are four major methods of system changeover, namely: Parallel Running Method, Direct Cut-over Method, Pilot Approach and Phased Approach.

The method which has been chosen for use is very important in system implementation as it might affect the workability of the system at any time. In the case of the new system, it is hereby recommended that the parallel changeover plan should be used. In the parallel approach, both the old and the new systems are

operated alongside each other for a number of cycles until the new system has been proved to be operating reliably and correctly, then the old system will phased out.

4.3.2 System Testing

After the Information System was fully implemented, a series of test was conducted to determine the effectiveness and efficiency of the various Functionalities, the usability test was done, and performance testing was also performed.

4.3.2.1 Functionality Testing

Table 4.1: List of Functional Testing cases

ID	**Test Cases**	**Expected output**	**Actual Output**
Student	Login	Expected to be Logged in	Was Successful
	View profiles	Expected the Student Dashboard to be updated with new Update	Was Successfully Updated
	Questions	Display Subject questions	Questions was displayed

Admin	Login	Successfully Logged In	Was Successful
	View Update	Update display	Successfully Displayed
	Evaluate data and manage records and Users	Expected to be evaluated with no hitches	Was successful

4.3.2.2 Usability Testing

The System was easy to use in terms of navigation and performing task as all text cases made positive statements.

4.3.2.3 Compatibility Testing

The system was optimized to adapt into all platforms (e.g. Mobile or Wide Screen view) for the Members and borrowers/public, while the system admin would need a computer system for proper view of functionalities and updates to the information system. The information system is compatible with most web browsers e.g. Firefox, Google Chrome, Opera, UC browsers, Opera, Microsoft Edge and Internet Explorer.

4.4 Choice of Programming Language

The development of the prototype hinged on different open source tools for developing loan management system such as XAMPP for windows and Dreamweaver; XAMPP caters for web and database server and Dreamweaver caters for interface design; where necessary other open source tools were also used during the design phase and the developed system was hosted in other open source tools.

4.5 Program/Interface Designs

It discusses each of the functionalities performed by different users of the system. The Computer Based Test (CBT) components are graphically explained.

Home Page: This is the first a student and the public sees on they visit the site.

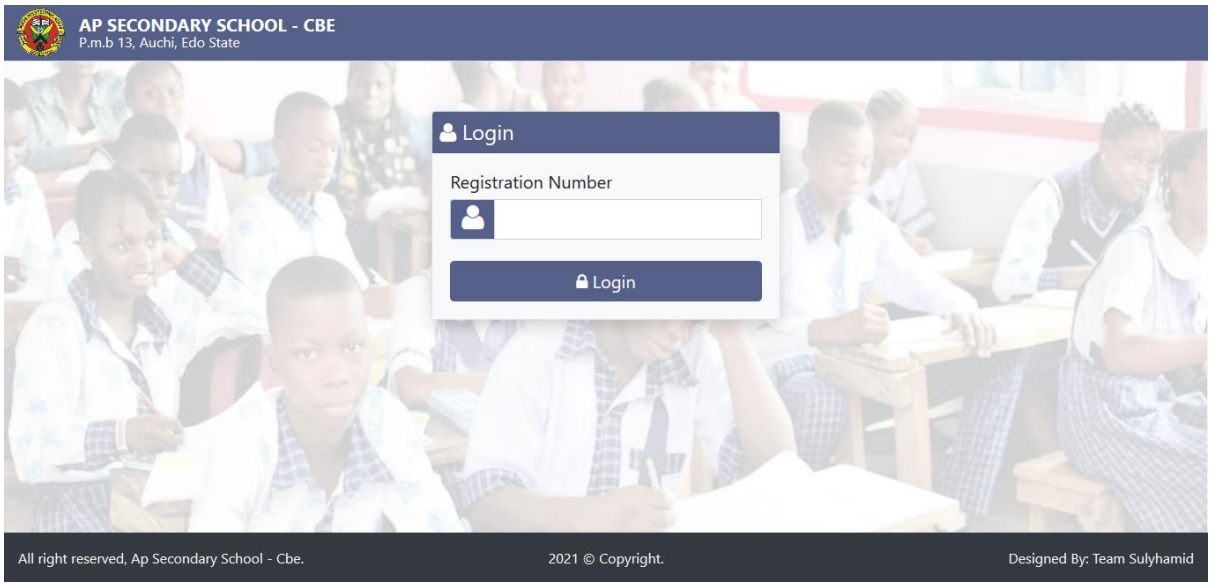

Fig. 4.1: Home Page

Welcome Page: This is the page that displays the subjects to be taken and the student's info.

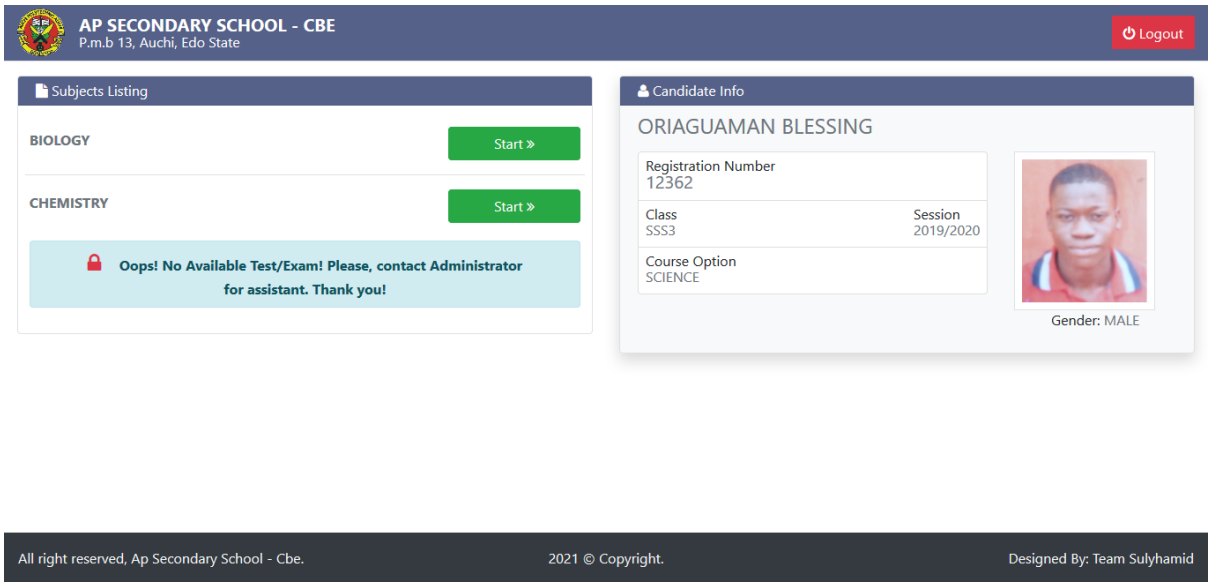

Fig. 4.2: Welcome Page

Question Page: This page is the test page that displays the subject question one at a time.

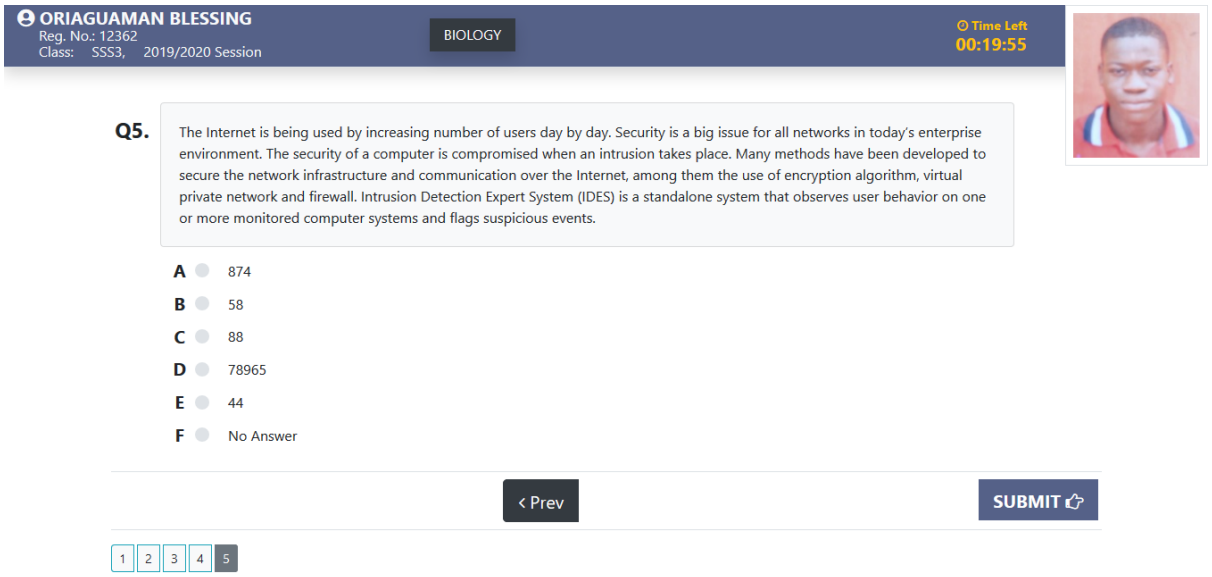

Fig. 4.3: Question Page

4.6 Software Testing

Software testing is done to evaluate if the user requirement identified during the Software Requirement Specification (SRS) have been implemented in an end software product or prototype. It is normally done throughout out the life cycle of the software (i.e. during development, at the end of development when it is ready to be installed in production environment and at the time when it is in use by the end user). In order to obtain the feedback from users, a testing evaluation form was issued to a sample of user, a scenario was drawn to facilitate and guide the performance of some tasks / functionalities on the system, and some evaluation questions were drawn to evaluate the functionality and usability of the system.

4.6.1 Software Testing Guide (Functional Requirement Testing)

Table 4.2: Software Testing Guide

SN	Testing Step	Expected outcome	Pass/Fail	User Comments
1.	**Login:** To enter into a system click the login button, from the login form click the "Login".	The system allows the user to enter into the system if the username,	Pass	The functionality is OK

	The login depends on the role of the user for example system administrator and Student. Then enter username and password and click enter to Login into a system.	password and to prompt user to re-enter username and password if they are not correct.		
2.	**Add:** In the Computer Based Test (CBT) System, admin can add different types of record as per his/her role. The record to enter ranges from goal, purposes, output, activities and theme - just to mention a few	The details of record of the project are added in a proper database if they are entered in right format. After being entered they can be viewed at any time.	Pass	The functionality is well designed

3.	**Delete:** To delete the record from the database the database administrator can delete the row corresponding to records he / she want to delete.	The system delete the record if it is done successful	Pass	The functionality is well designed
4.	**Search:** To search the details of the student, click the search button.	The system should return the result of the search and give an alert if the result not found or there is error.	Pass	The functionality is good
5.	**View Reports:** To view records from the database click view report button, then it will open.	The system to display the details of the project as specified by the end-user.	Pass	The functionality is good

The functionality testing involved testing interface pages, codes/commands and the database. During this test, users tested the interface pages and commands of the system. System testing involved different strategies for evaluating the functionality of the system. This testing was first done as unit testing and then as integrated testing. After all these tests, the software developers were conversant that the white-box, black-box and grey-box testing were executed professionally.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

This research work was simply about designing and implementing of computer base test portal (CBT) for secondary school who wishes to conduct exam testing. This system is a way of improving educational activities and the advantage of a CBT database have been clearly stated which support they need for an E-exam system.

In summary, the objective of this study was to eliminate the tedium associated with the existing manual system as earlier stated in the problem definition in chapter on, with the provision of a system that is readily available, portable in terms of disk size and provide portals with ability to make entry into the system if placed on server.

5.2 Conclusion

The developed system would solve the associated problems with the tradition methods. With CBT, it is possible to space the period of examination without compromising quality and integrity of the examination.

The system has the potentials to reduce human interference, impersonation, bribe taking by teachers, invigilators and supervisors, too much paper work and examination leakages and also reduce the number of invigilators needed for

invigilating and drastically reduce examination malpractice as applicants are duly authenticated online, real time before taking the examination and the result released immediately after the examination. Especially, security will be more effective since the system includes an authentication system, picture capture and data encryption and decryption has been added to the existing design.

However, for the system to be adopted on a large scale, efforts should be intensified to ascertain it's disadvantaged on accounts of IT illiteracy, by taking ICT training to the nooks and crannies of country.

Consequently, more investment is required in the areas of infrastructural human development.

Candidates screening is now online and real time. The system has tendencies of increasing computer literacy, online learning and network security awareness. The result integrity could also be enhanced if the candidates have access to instant result checking.

If CBT is introduced into other secondary schools, it will go a long way to control and check examination malpractices and all fraudulent acts associated with the manual process of writing examination. The popularity of this system has the possibility of popularizing e-learning and online education. This system was developed using PHP programming language and MYSQL database

5.3 Recommendation

Future research may be fruitful by examining students' attitudes and psychological aspects associated with the proposed solution of CBT user's authentication. Furthermore, future research may look at the economic issues associated with implementation of such solution.

- Introduction of other forms of question types such as theory based questions and diagrammatic question to make the test questions more diverse.
- Enhancement of the security of the system so that students can take examinations online at a specified time.
- Inclusion of course material so that these can be assessed by the student online
- Automatic delivering of the students login details to their mobile phones or email address

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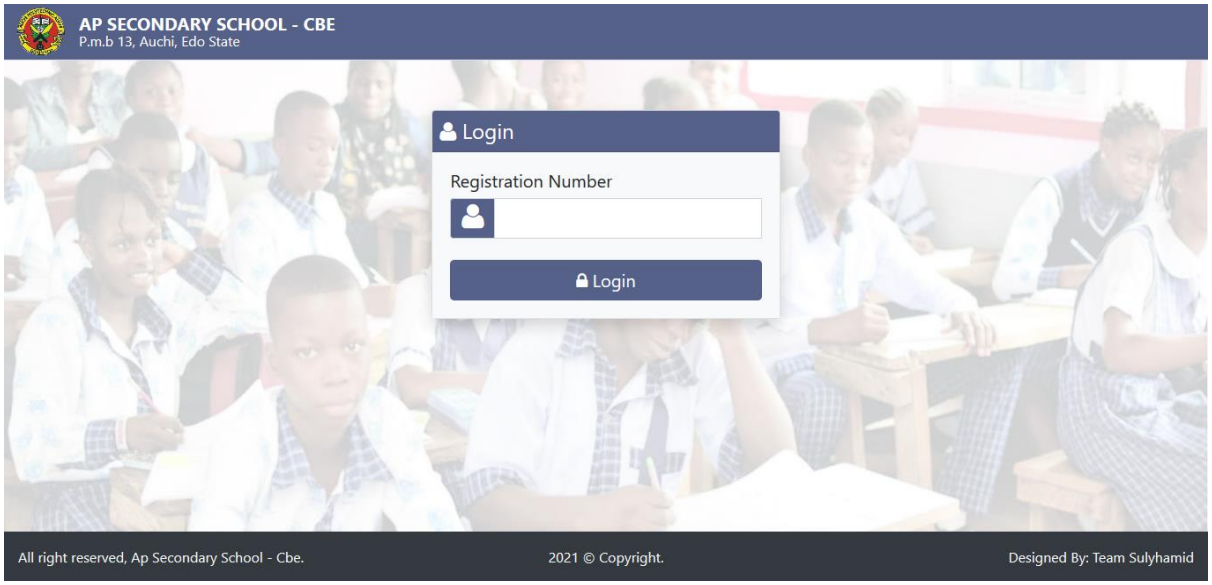
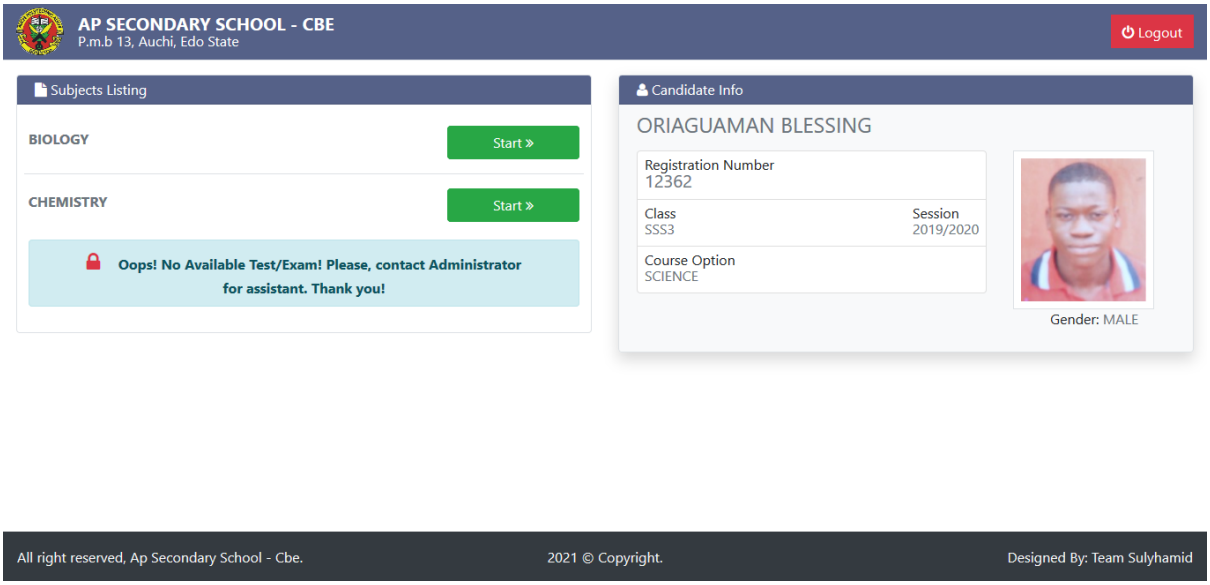
APPENDIX I

INDEX PAGE





S

ORIAGUAMAN BLESSING
Reg. No.: 12362
Class: SSS3, 2019/2020 Session

BIOLOGY

Time Left
00:19:55

Q5. The Internet is being used by increasing number of users day by day. Security is a big issue for all networks in today's enterprise environment. The security of a computer is compromised when an intrusion takes place. Many methods have been developed to secure the network infrastructure and communication over the Internet, among them the use of encryption algorithm, virtual private network and firewall. Intrusion Detection Expert System (IDES) is a standalone system that observes user behavior on one or more monitored computer systems and flags suspicious events.

- **A** 874
- **B** 58
- **C** 88
- **D** 78965
- **E** 44
- **F** No Answer

< Prev

SUBMIT

1 2 3 4 5

APPENDIX II

SOURCE CODE

Index Page

```
<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title>Auchi Polytechnic Secondary - CBE</title>
<link href="apcbe/css/bootstrap.min.css" rel="stylesheet" type="text/css" />
<link href="apcbe/css/fontawesome-all.css" rel="stylesheet" type="text/css" />
<link href="apcbe/css/navbar.css" rel="stylesheet" type="text/css" />
</head>

<body class="bg-light">
        <header class="shadow">
                <div class="navbarnavbar-expand bg-dark">
                        <imgsrc="apcbe/images/aplogo.png" width="60" height="60" alt=""
class="mr-4" />
<span class="h2 text-light font-weight-bold" style="line-height:22px;">
        Auchi Polytechnic Secondary, Auchi<br />
<span class="text-warning h5">P.M.B 13, Auchi - Edo State.</span>
</span>
</div>
        </header>
```

```
        <main role="main" class="container-fluid py-5">
                <div class="container">
        <div class="row">
        <div class="col-lg-5 col-md-5 col-sm-6 m-auto py-5">
        <div class="card">
        <div class="card-header h5 pt-2 pb-1">
        <i class="fa fa-user-alt h4"></i> User Login
</div>

<div class="card-body">
        <div class="err alert alert-danger mb-2 d-none"></div>

<div class="input-group mb-2">
<div class="input-group-prepend">
<span class=" input-group-text">
<i class="fa fa-user-alt"></i>
</span>
</div>
<input type="text" name="usern" id="usern" class="form-control form-control-range"
placeholder="Username" />
</div>

<div class="input-group mb-3">
<div class="input-group-prepend">
<span class=" input-group-text">
<i class="fa fa-key"></i>
</span>
```

```
</div>
<input type="password" name="passn" id="passn" class="form-control form-control-range"
placeholder="Password" />
</div>

<button type="button" name="btnLogin" id="btnLogin" class="btnbtn-secondary float-right">
        <i class="fa fa-lock"></i> Login
</button>
</div>
</div>
</div>
</div>
</div>
        </main>

<footer class="fixed-bottom border-top bg-secondary p-3 text-center">
        <div class="col-lg-12 col-md-12 text-light">
        <span class="float-right">
        Designed by: Sulyhamid, Auchi Polytechnic
</span>
        &copy; Copyright 2020.
</div>
</footer>
<script type="text/javascript" src="apcbe/js/jquery.min.js"></script>
<script type="text/javascript" src="apcbe/js/jquery.admin.login.js"></script>
</body>
</html>
```

Logout page

```
<?php
	session_start();
	session_unset();
	session_destroy();
	header('location:index.php');
?>
```

User Panel Page

```
<?php
	include_once('apcbe/conf/config.inc.php');
	if(!isset($_SESSION['user_username'])){
		header('location:index.php');
	}

?>

<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title><?php echo $apTitle;?> - CBE</title>
<link href="apcbe/css/bootstrap.min.css" rel="stylesheet" type="text/css" />
<link href="apcbe/css/fontawesome-all.css" rel="stylesheet" type="text/css" />
<link href="apcbe/css/navbar.css" rel="stylesheet" type="text/css" />
<style type="text/css">
	.nav-link:hover{
```

```
            border-radius: 10px;
            box-shadow: 1px 0px 4px 5px #000000;
        }
</style>
</head>

<body class="bg-light">
        <header class="shadow bg-dark">

            <div class="navbarnavbar-expand">
                <imgsrc="apcbe/<?php echo $apLogo;?>" width="60" alt="" class="mr-4"
/>
<span class="h4 text-light font-weight-bold" style="line-height:22px;">
        <?php echo $apTitle;?><br />
<span class="text-warning h6"><?php echo ucwords(strtolower($apAddress));?></span>
</span>

<div class="collapse navbar-collapse position-absolute" style="right:120px;">
<ul class="navbar-nav px-3">
<li class="nav-item dropdown">
<a class="nav-link dropdown-toggle" href="#" id="settings" data-toggle="dropdown" aria-
haspopup="true" aria-expanded="yes"><?php echo $_SESSION['user_fullname'];?></a>
<div class="dropdown-menu" aria-labelledby="settings">
<a class="dropdown-item border-bottom" href="?changepassword">
        <i class="fa fa-key"></i> Change Password
</a>
<a class="dropdown-item" href="logout.php"><i class="fa fa-power-off"></i> Logout</a>
</div>
```

```
</li>
</ul>
</div>
</div>
        </header>

        <main role="main" class="container-fluid py-5">
                <div class="container">
        <div class="row">
<?php
                        if(isset($_REQUEST['changepassword'])){?>
        <div class="col-lg-5 col-md-5 col-sm-6 m-auto py-5">
        <div class="card">
        <div class="card-header h5 pt-2 pb-1">
        <i class="fa fa-user-alt h4"></i> Password Update
</div>

<div class="card-body">
        <div class="err alert alert-danger mb-2 d-none"></div>

<div class="input-group mb-2">
<div class="input-group-prepend">
<span class=" input-group-text">
<i class="fa fa-key"></i>
</span>
</div>
```

```
<input type="password" name="pass_1" id="pass_1" class="form-control form-control-range" placeholder="Old Password" />

</div>


<div class="input-group mb-3">

<div class="input-group-prepend">

<span class=" input-group-text">

<i class="fa fa-key"></i>

</span>

</div>

<input type="password" name="pass_2" id="pass_2" class="form-control form-control-range" placeholder="New Password" />

</div>


<div class="input-group mb-3">

<div class="input-group-prepend">

<span class=" input-group-text">

<i class="fa fa-key"></i>

</span>

</div>

<input type="password" name="pass_3" id="pass_3" class="form-control form-control-range" placeholder="Confirm Password" />

</div>


<a href="?home" class="btnbtn-light border-secondary">

        <i class="fa fa-times"></i> Cancel

</a>
```

```
<button type="button" name="btnPassUpdate" id="btnPassUpdate" class="btnbtn-secondary
float-right">
        <i class="fa fa-edit"></i> Update
</button>
</div>
</div>
</div>
<?php
                        }
                        else{
                        ?>
<div class="col-lg-12 col-md-12 col-sm-12 p-0">
        <div class="row">
        <a href="apcbe/" class="col-lg-3 col-md-3 col-sm-4 nav-link p-2">
<div class="rounded bg-primary text-white text-left shadow p-3">
        <div class="m-auto text-center">
        <i class="fa fa-users-cog" style="font-size:102px;"></i><br />
</div>

<i class="fa fa-caret-right"></i> Main Section<br />
<i class="fa fa-caret-right"></i> Test/Exam Section<br />
<i class="fa fa-caret-right"></i> Import/Export Section<br />
<i class="fa fa-caret-right"></i> Tools Section<br />
</div>
</a>

        <a href="ant/" class="col-lg-3 col-md-3 col-sm-4 nav-link p-2">
```

```
<div class="rounded bg-primary text-white text-left shadow p-3" >
        <div class="m-auto text-center">
        <i class="fa fa-cogs" style="font-size:102px;"></i><br /><br />
</div>

<i class="fa fa-caret-right"></i> Test/Exam Report<br />
<i class="fa fa-caret-right"></i> Test Settings<br /><br />
</div>
</a>

        <a href="ant/" class="col-lg-3 col-md-3 col-sm-4 nav-link p-2">
<div class="rounded bg-primary text-white text-left shadow p-3" >
        <div class="m-auto text-center">
        <i class="fa fa-bars" style="font-size:102px;"></i><br /><br />
</div>

<i class="fa fa-caret-right"></i> Register Department<br />
<i class="fa fa-caret-right"></i> Test Reports<br /><br />
</div>
</a>

        <a href="ant/" class="col-lg-3 col-md-3 col-sm-4 nav-link p-2">
<div class="rounded bg-primary text-white text-left shadow p-3" >
        <div class="m-auto text-center">
        <i class="fa fa-indent" style="font-size:102px;"></i><br /><br /><br />
</div>
```

```
<i class="fa fa-caret-right"></i> Others<br /><br />
</div>
</a>
</div>
</div>
<?php
                        }
                        ?>
</div>
</div>
        </main>

<footer class="fixed-bottom border-top bg-secondary p-3 text-center">
        <div class="col-lg-12 col-md-12 text-light">
        <span class="float-right">
        User: <?php echo $_SESSION['user_role'];?>
</span>
        &copy; Copyright 2018.  MIS, Auchi Polytechnic
</div>
</footer>
<script src="apcbe/js/jquery-slim.min.js"></script>
<script src="apcbe/js/popper.min.js"></script>
<script src="apcbe/js/util.js"></script>
<!--<script src="../apcbe/js/modal.js"></script>-->
<script src="apcbe/js/bootstrap.min.js"></script>

        <script type="text/javascript" src="apcbe/js/jquery.min.js"></script>
```

```
<script type="text/javascript" src="apcbe/js/jquery.admin.login.js"></script>
</body>
</html>
```

Verify Login Page

```
<?php
	require_once('apcbe/conf/config.inc.php');

	$usern=str_replace('~','&',$_POST['usern']);
	$passn=md5(str_replace('~','&',$_POST['passn']));

	$sql=$cons->query("SELECT * FROM ".$tab13." WHERE user_username='".$usern."'
AND user_password='".$passn."'");
	if(!$sql){
		echo $cons->error;
	}
	else{
		$row=$sql->fetch_assoc();
		if($sql->num_rows == 0){
			echo 'Incorrect Username or Password!';
		}
		else{
			$_SESSION['user_username']=$usern;
			$_SESSION['user_fullname']=$row['fullname'];
			$_SESSION['user_staffid']=$row['staff_id'];
			$_SESSION['user_role']=$row['role'];

			echo 'success';
```

```
                }
        }
?>
```