

# A UNIVERSITY EXAMINATION WEB APPLICATION BASED ON LINEAR-SEQUENTIAL LIFE CYCLE MODEL

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**Abstract:** *E-examination application has been used as communication and information remedy to the paper-related examination approach. The application is efficient, time-saving and resourceful. The E-examination is designed to improve examination process among educational institutions. The system can be used to conduct varying examination questions including theory-based and multiple-choice formats. In this study, an application that offers an equitable security and accuracy in examination conduct were developed. The objective of this application is to enable students to attempt examination online via intranet or the internet, using Windows Operating System. The application was also designed with the use of web-related database backend including Hypertext Preprocessor, Hypertext Markup Languages, My Structured Query Language and Cascading Style Sheet, Javascript The system ensures uniform accessibility to the web browser and enables the system to run on varied operating models. It is very robust and cheap. E-examination system can be improved utilizing integrated biometric applications including face*

*recognition and fingerprint for security and effectiveness.*

**Keywords:** *E-examination, lecturer, student, administrator, answers, paper-related*

## 1. Introduction

In Nigeria, the paper-related examination was the only approach being used in conducting examination since a decade ago and is not effective. This method has varied limitations currently where millions of Nigerians are sitting for general courses examination in the tertiary institutions and a Unified Tertiary Matriculation Examination (UTME). Presently, for evaluation of mass education, the electronic examination has been adjudged to be more effective compared with the paper-related ones. This application has been designed for many establishments such as Banks, Schools, Private and Government institutions for enrollment intentions, where both written

examinations by the users and results are produced online [1]. The E-examination has improved tremendously with accurate results, adequate security, effective questions randomization, and the users can be automatically logged off at the required cessation period [1]. The online examination has been described as the procedures of writing examination questions uploaded online, the candidates attempted the questions while the answers are forwarded instantaneously via intranet or the internet. The results can be analyzed spontaneously and printed out or viewed. This type of examination system is very imperative and beneficial by testing the student's knowledge and skills in using Computer Technology. The E-examination is conducted with ease compared with the conventional paper-based examinations where the use of writing materials such as biros papers, pencils, and many examination invigilators are in vogue. Electronic examination system can enhance academic standards, while the conventional examination involves extra efforts both on the invigilators and students.

With this technology, multiple choice questions enable students to pick one answer only from various options obtainable. In the traditional paper-related examination, however, the question papers are too bulky and create a greater burden for both lecturers and students [2, 3]. [4] highlighted the challenges of Paper and Pencil Test (PPT) and Paper-Based Test (PBT). The bottlenecks are the risks during transportation of the examination officials and the candidates to the examination venues, missing, delayed and manipulations of results as well as huge investment in logistics and examination materials. Moreover, the paper-related examinations caused different types of errors, consumption time and other resources. Paper-based transactions in the banking industries lead to fraudulent and very stressful.

Conducting examination in educational sectors is aimed to discover a learner's knowledge, intellectual competence, and skills imparted after a specific period [5]. It is observed that many developing countries did not embrace the Information and Communication Technology (ICT) opportunity that will enhance socio-economic

and cultural statuses. Nonetheless, many industrial and educational sectors presently are acquainted with the significance of ICT [6]. [7] contrived a web-based system for students to learn and attempt examination questions online in 'Economics' course. [8] invented the examination automation application using the Java-sustained browser which can be accessed easily via any platforms for both students and Lecturers. [9] devised the intranet-related examination application for students and staff only within the Campus of Covenant University, Nigeria. The web runs on a Microsoft.net framework depending wholly on the Microsoft tools such as ASP (Active Server Page).NET that is used simultaneously with a web server. ADO (Active Data Objects).NET and Microsoft Structured Query Language (Microsoft SQL) are exploited for database interaction. A database has been described as assortment of related data. [10] also conceived the web examination system with numerous open source tools including Hypertext Markup Languages (HTML) that utilized formulating interface application. The database engine used was My Structure Query Language (MySQL), while server-side scripting language applied was Hypertext Preprocessor (PHP). This application is used in conducting examinations, marking the questions and collating answers as well as generating the results instantly. This system also acclimates various examination types such as multiple choice questions and fill in the blank spaces with an auto-grading module. [11] evolved a web-related examination application online using multiple choice questions and the results revealed instantly with the use of ASP.NET and HTML as Graphics User Interface. ASP was applied as the page of HTML indicating scripts of minor embedded programs that are administered on of the Microsoft Web server before the page is sent to the end users. Microsoft Structured Query Language (SQL) and ADO.NET run as a database back end, while C# maneuvers the server-side [12, 13]. [14] explicated examination malpractice as any illegal avenue of receiving unwarranted grades or marks solitarily or in alliance with others including fellow students, invigilators, parents, teachers and supervisors prior, during or after beginning the examination. The authors fashioned an application that can improve an online examination with

Demilitarized Zone (DMZ) model in a firewall technology. The aim of the DMZ is to bring in additional security layer with a local area network (LAN) in an establishment, and this is very important based on speed and cost [15, 16]. [17] ascertained that education application will continue to be dependent on mobile devices and wireless environments in the near future [18]. The authors invented a cheap and robust web application based on linear-sequential-life cycle model using Cascading Style Sheet (CSS), MySQL, PHP, HTML and Javascript as the database backend that can be run on various operating systems.

## **2. Methodology**

Waterfall Software Development Life Cycle (SDLC) model was the methodology approach adopted for this research. The SDLC also referred as Linear Sequential Life Cycle model is employed for designing building and for maintenance of information on the computer software. SDLC is very famous, very simple to comprehend, and appreciable for small projects. It ensures production of many functions in a predictable manner with high quality, fewer resources and time. SDLC comprises of series of phases where output in a phase leads to an input of the next phase. At the requirement phase, the end users (lecturers and students) interviewed to ascertain their prospects opinions and the prospect of the system. In the design phase, the system design and architecture were developed to meet the need of end users using data flow, use cases and context diagrams. On the implementation phase, the graphical user interface was created with the use of PHP, CSS, HTML, MySQL and JavaScript servers as the database. On the testing stage, the workability of different units were tested and incorporated into the system and maintained appropriately. In using SDLC model, the inventors need to have an idea what to build and should be able to proffer solutions to the problems encountered. Adequate program planning following critically SDLC model connotes comprehension of developmental documentation and structure as well as coding. These could assist particular needs of various users, and also enhance easier errors detection.

## **3. Technologies Used**

### **3.1 HTML**

HTML is a backbone language of any website. It operates on various platforms including CSS and JavaScript for web page effectiveness and efficiency.

### **3.2 CSS**

CSS is utilized in formatting web page layout, defining table sizes and text styles on the web pages, similar to HTML. The CSS separates the web document contents (using any markup language software) from its presentation (utilizing CSS). Many benefits can be derived from CSS, especially a better flexibility and improved content accessibility. Moreover, CSS gives a regime of control over the different presentation of the document features. It assists saving presentation time and reducing the software complexity. CSS not only enables the same HTML to be displayed in varied styles but also put on an option in choosing different rule schemes and styles based on the needs.

### **3.3 JavaScript**

JavaScript is a lightweight and renowned scripting language immemorial. JavaScript, can be described as World Wide Web (WWW) Scripting Language. It combined different Web form validations and functionalities browser detections and formation of cookies among others. Currently, JavaScript being well-liked and powerful scripting languages, supported most web browsers such as Opera, Firefox and Internet Explorer. It is always used in client-side web development. JavaScript also allows web pages to be dynamic and interactive. It impels most scripting languages, particularly Java that directly implanted into the code of HTML.

### **3.4 PHP**

The PHP script is an open-source program applied in designing and implementing websites. It is a formidable scripting language that utilized several software technologies like online business

software content management application, developmental tools in dynamic websites and chats software custom applications. It can build dynamic and interactive websites with effortlessness which can be inserted directly into the heart code of HTML. It is also appropriate with different web servers such as Microsoft’s IIS and Apache. PHP can be operated on the web on the server as it tolerates many databases such as MySQL, Generic ODBC, Solid, Oracle. MySQL is commonly used among other databases.

**3.5 SQL**

SQL is an American National Standards Institute (ANSI) that allows access and manipulation of the databases. SQL can insert, retrieve and delete records from a database, execute queries update records in a database, create new databases tables, and stored procedures in databases, and set permissions on procedures, tables, and views.

**4. Conceptual Design**

The conceptual design depicts the outlines conducted with the use of data flow and case diagrams.

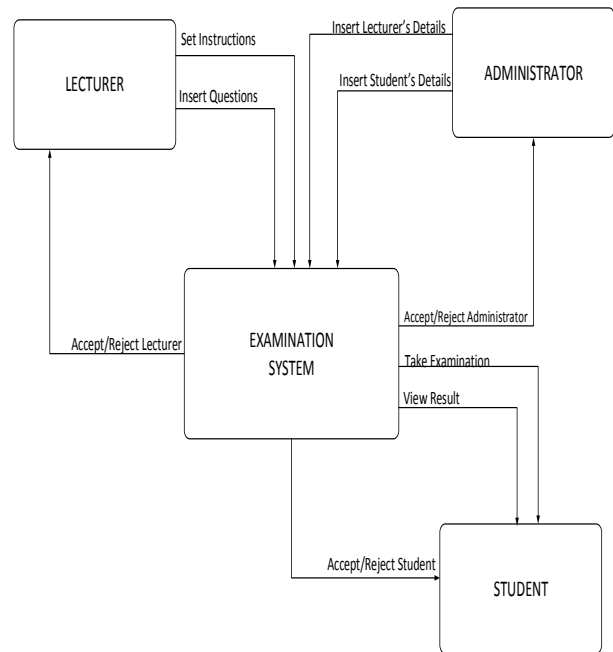
**4.1 Data Flow Diagram**

Data flow diagram shows the interrelationship among different system entities (Fig. 1). The “Administrator” entity is accountable for inserting the details of students and lecturers to the application. The “Student” entity allows the conduct of the examination immediately the student is accessible to the application. The “Lecturer” entity uploads the questions into the database by utilizing any desired question formats and configures examination instructions, questions, and correct options.

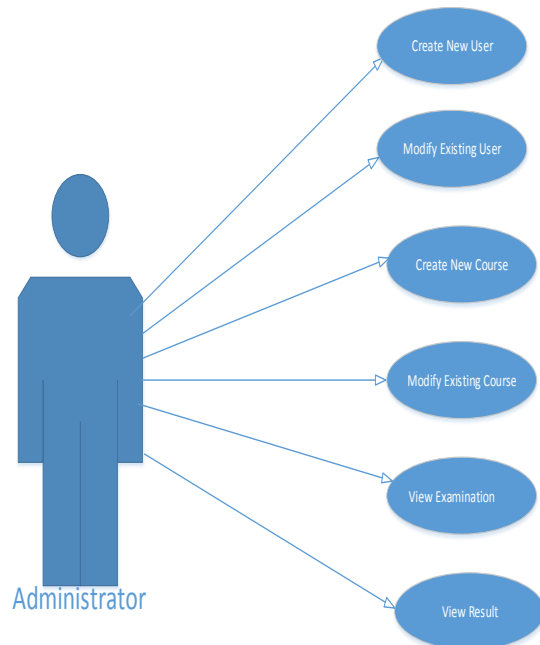
**4.2 Use Case Diagrams**

Three actors (lecturer, student and administrator) were involved in the case diagrams. Fig. 2 illustrates administrator undertakings on the system by introducing the new user (student or lecturer ), moderating current user, including the

new course, moderating course contents, viewing questions of the examination and results.

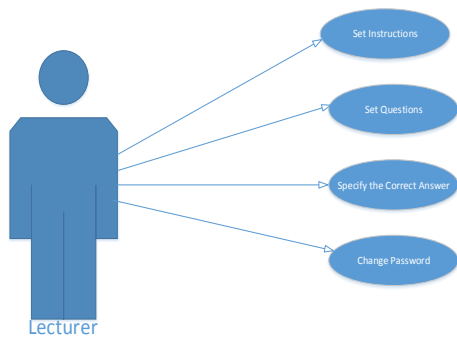


**Figure 1: Data Flow Diagram**



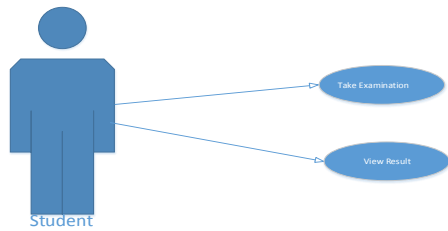
**Figure 2: Administrator Use Case Diagram**

Figure 3 demonstrates the undertakings of setting questions and instructions of the examination, changing passwords and modifying the questions.



**Figure 3:** Lecturer Use Case Diagram

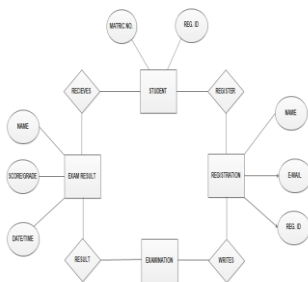
In Fig. 4, questions for the examination are taken and the results are viewed.



**Figure 4:** Student Use Case Diagram

**4.3 Entity-Relationship Diagram**

Fig. 5 shows an Entity-Relationship Diagram (ERD), a data modeling method which graphically reveals the association among places, events, objects, people, or concepts in information application. It is a representational and conceptual model utilized in depicting an infrastructure of entity framework. It is not only very significant in developing a better design of databases, but also being utilized in the logical data model of high-level, that is worthwhile in creating a conceptual database design.



**Figure 5:** Entity-Relationship Diagram

**4.4. Database Design**

The database performs a significant position in virtually all facets of computers usage such as E-commerce, E-library, E-law, E-business, E-engineering, E-medicine, and E-education. MySQL databases owned by Oracle are utilized in designing database back-end of a system. It is an open source and free but licensed. It is well suitable for small and medium web pages and also supplies SQL database. It is mostly accessible on an assigned hosting packages and could be easily launched with a Unix, Windows and Linux environments. The database structure includes:

**Table 1** Registration

Column	Type	Null
id	int(11)	No
fname	varchar(50)	No
lname	varchar(50)	No
mail	varchar(40)	No
password	varchar(11)	No
validity	int(11)	No

Table 1 demonstrates new students details registering on the system.

**Table 2** Questions

Column	Type	Null
id	int(11)	No
question	varchar(100)	No
a	varchar(40)	No
b	varchar(40)	No
c	varchar(40)	No
d	varchar(40)	No
answer	varchar(10)	No

Table 2 illustrates the examination questions entries of the examination questions, answers, and corresponding options.

**Table 3 Result**

Column	Type	Null
id	int(11)	No
name	varchar(30)	No
matric	varchar(30)	No
reg_no	varchar(30)	No
score	varchar(10)	No

Table 3 depicts the name, matriculation numbers, results of the student.

**Table 4 Answer**

Column	Type	Null
id	int(11)	No
a1	varchar(5)	No
a2	varchar(5)	No
a3	varchar(5)	No
a4	varchar(5)	No
a5	varchar(5)	No
a6	varchar(5)	No
a7	varchar(5)	No
a8	varchar(5)	No
a9	varchar(5)	No
a10	varchar(5)	No
a11	varchar(5)	No
a12	varchar(5)	No
a13	varchar(5)	No
a14	varchar(5)	No
a15	varchar(5)	No
a16	varchar(5)	No
a17	varchar(5)	No
a18	varchar(5)	No
a19	varchar(5)	No
a20	varchar(5)	No
a21	varchar(5)	No
a22	varchar(5)	No
a23	varchar(5)	No
a24	varchar(5)	No
a25	varchar(5)	No
a26	varchar(5)	No
a27	varchar(5)	No
a28	varchar(5)	No
a29	varchar(5)	No
a30	varchar(5)	No

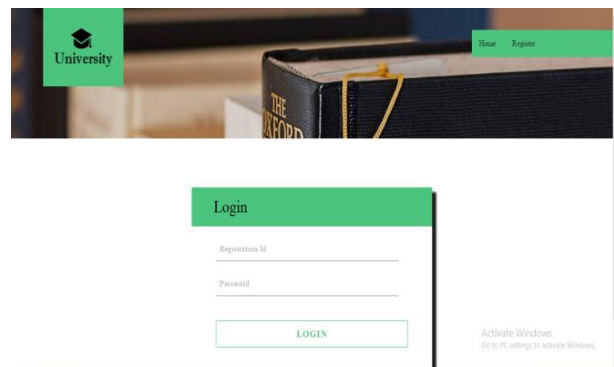
Table 4 shows the right answers of the questions installed on the database.

## 5. Simulation and Result

For testing the consistency and correctness and of the application, the implementation module was simulated using a local host with Apache server. Various interfaces are highlighted in the screen shots.

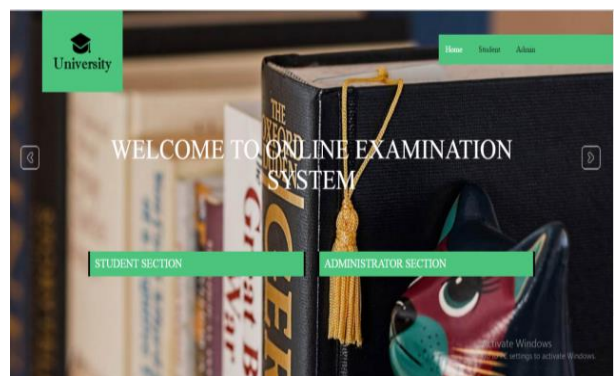
### 5.1 The Login Page

Fig. 5 illustrates the verification page in which the examinee inputs passwords and registration identity card (ID) numbers. This allows the user to access the questions and results. During the process of registration, the ID numbers are usually generated spontaneously by the system.

**Figure 5:** Login page

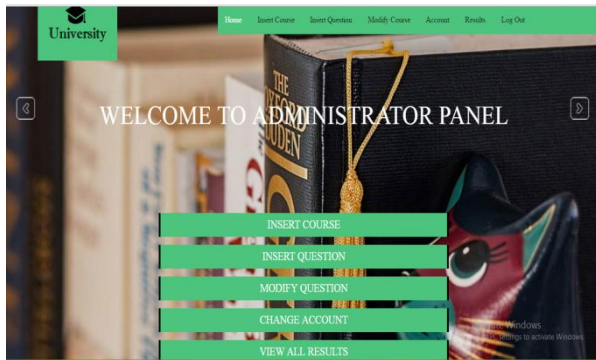
### 5.2. The Home Page

Fig. 6 indicates the loading page where the domain name is inputted. The student section is clicked by the students to attempt the examination questions, while administrator section is clicked by the administrator.

**Figure 6:** Home Page

### 5.3 The Administrator Home Page

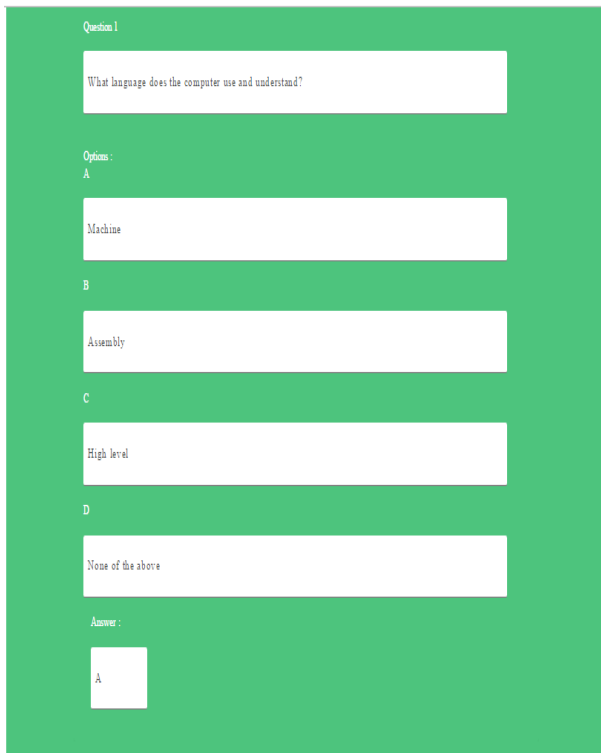
Fig. 7 enables the administrator to change password and account username, slot in new course/ examination questions, delete /edit questions, editing/ viewing courses and view the results.



**Figure 7:** Administrator Home Page

### 5.4. The Insert Page

Fig. 8 permits the administrator to add respective answers of the examination questions and options.



**Figure 8:** The Insert Page

### 5.5 The Question Page

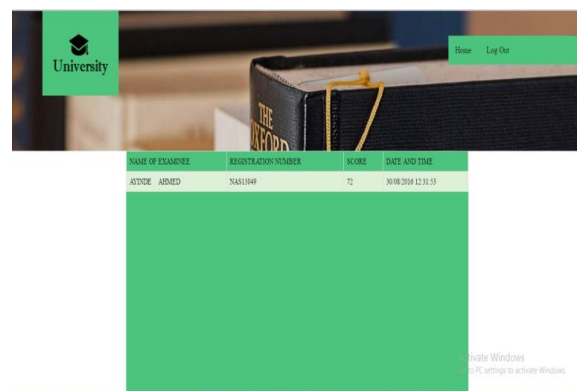
Fig. 9 indicates the page examination is conducted. The examination questions are randomly arranged via the question table system and can be viewed by the candidates. However, the candidates can select a radio button that concurs with the appropriate answers. The result can be viewed by the candidates at end of the examination.



**Figure 9:** Question Page

### 5.6 The Result Page

Fig. 10 describes examination results page after completion of the examination. The page also highlights ID numbers, examination date, course code and marks obtained by the candidates.



**Figure 10:** Result Page

## 6. Conclusion

The application was devised with the use of PHP, HTML, CAS, MySQL and Javascript as the backend database. The system ensures uniform accessibility to the web browser and makes the system to run on varied operating models. It is very robust and cheap. The system can be improved utilizing integrated biometric applications including face recognition and fingerprint for its security and effectiveness.

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