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DESIGN AND DEVELOPMENT OF A WEB-BASED EMPLOYEE INFORMATION SYSTEM FOR ABIA STATE COLLEGE OF EDUCATION (TECHNICAL) AROCHUKWU

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Abstract

Presently, Abia State College of Education (Technical) Arochukwu, maintains a manual employee information system. The manual employee information system is costly, time consuming and cumbersome compared to computerize one. Hence, the researchers present the design and development of a web-based employee information for Abia State College of Education (Technical) Arochukwu. The developmental process of the web-based system began with the examination of the existing manual system. This was followed by system analysis which culminated into both functional and non-functional requirements. The web-based architectural design followed client-server architecture with three tiers of presentation, application and database. Microsoft visual studio, XAMPP, phpMyAdmin and fireworks tools were used as development tools. The web-based system was implemented using html, PHP, CSS and Javascript web technologies. Admin using the developed web-based employee information system can add, view, update, delete and print employee records. Employee on the other hand can view and print his or her records. Visitors however can only view information about the College and contact information respectively. The developed web-based system was tested by some staff of the College using real data. Thereafter, a questionnaire designed to measure user's satisfaction with the use of the developed web-based system was administered to the staff of the College participated in the testing and evaluation exercise. The data collected were then analyzed. The result of the analysis shows that the participating staff are satisfied with the performance of the developed web-based employee information system. The participating staff then recommends the usage of the web-based employee information system in the College.

Keywords: Employee, Personnel, Employee Information System, Personnel Information System, Abia State College of Education (Technical) Arochukwu

1.0 Introduction

Most establishment (personnel) units in registry department of Nigerian Colleges of Education have a unit head and three desk officers covering academic staff, senior non-academic staff and junior non-academic staff sub-units. Staff of establishment unit carries out numerous activities that contribute immensely toward achievement of College goals and objectives. Prominent among such activities or functions include recruitment, appointment, performance appraisal, promotion, training, placement, processing and monitoring study/duty leave, transfer, secondment, maintenance of personal files of staff, discipline and grievance proceedings, resignation, retirement, pension, welfare, monitoring staff attendance to work, keeping statutory body records, and receiving as well as supplying information to other departments, schools and units (Musa, Ejura & Nwaorgu, 2015).

Certainly, the above activities require the use of some existing records as well as generation of new ones. The existing records that guide staff of personnel unit in discharging their duties are filed in different files. Similarly, the records generated during service delivery are also organized in different files. Therefore, personnel (human resource) unit maintained two broad categories of files; subject and personal files. Subjects files are those files that cover policy and procedural matters relating to, for example, recruitment, manpower planning, conditions of service, College edict (or College act), labour relations, schemes of service, training, performance management and discipline. Personal files on the other hand contain the records that document

an individual's employment history throughout his or her career in public service (United Republic of Tanzania, 2013).

Personal files are broadly categorized into master personnel and working files. Master personnel file (previously known as confidential file) is a type of personal file which contain document such as personal record card/form (including PIN- Personal Identification Number and social security number), application form(s), appointment letter(s), acceptance letter(s), medical report on appointment, Birth certificate/affidavit, unique file number, photograph, letters of confirmation, letters of promotion, letters of transfers/postings, copies of educational/professional certificates, security vetting documents, disclosure/official secrets act agreement, marital status record, medical board reports, notification of termination/resignation/retirement/death, change of name, disciplinary records, Pension certification and performance assessment forms (on sub-file) among others (International Records Management Trust, 2009). In addition, master personnel file has a checklist on its front recording the presence of all the documents inside it. Any additional document must be recorded on the checklist. This practice ensures that illegal removal of document will be detected easily. Records in master personnel files are maintained throughout the service life of an employee and some years after retirement depending on the country's policy regarding to the retention and destruction of the contents of personnel master files. Employee master personnel file is kept at central office of the employer. Master personnel files contain sensitive and confidential documents and are therefore kept in a secured place with restricted access (Registrar's office).

Working personnel file (also known as personnel open file) and is a type of employee personal file that reside in the place where employee is working. The content of working personnel file include copies of documents held in the master file, details of acting appointments, requests for job changes, transfers and so on, complaints concerning promotion, training, allowances, leave and so on, documents relating to salary and allowances, including; salary advances, salary arrears, salary slips / advice, documents relating to tax, national insurance and so on, government loan applications and details, allowance applications, repayments, refunds, expense claims, telephone call charges, documents relating to training or study leave, including: training requests / nominations, training courses / reports, academic progress report, correspondence relating to travel, other travel documents, insurance records and so on and records of annual leave, leave forms, applications and so on (International Records Management Trust, 2009). The documents inside working personnel file that become obsolete with passage of time are usually destroyed. However, in some organizations, bulky personal file are officially closed and new ones are opened.

In addition to the above records and files, establishment unit keeps correspondents files, promotion, circulars and minutes of meetings among others. Establishment unit also keeps staff nominal roll. Such nominal roll contain staff name, gender, state of origin, date of first appointment, present appointment, date of retirement, rank, grade level and step among others. All the above generated records in custody of establishment unit need to be managed effectively for effective employee service delivery and beyond. The records in custody of establishment unit form substantial part of employee information system.

Employee information system according to Kiran (2012) is a database which keeps the records of all the details pertaining to employees in an organization. Employee information system is the organizational memory where establishment (personnel) staff, management staff and other staff can access employee records and information concerning employees. The employee records and information accessed by the management facilitates and supports decision making, planning, coordinating and controlling staff activities (Dewah & Ndlovu, 2013). In other words, staff of establishment (Human Resource) unit renders service to employees using employee records and information.

Presently, Abia State College of Education(Technical), Arochukwu (ASCETA) maintain paper based employee information system. The system is associated with many shortcomings and limitations. This includes slowness, costly, vulnerable to document loss and alterations among others. In addition, paper based information system prevents employees, staff of establishment unit as well as management staff to access employee information outside College premise and at anytime unless they travel with hard copy of the employee records. It is with these reasons and more that the researchers set out to develop a web-based employee information system that will solve the above enumerated problems.

2.0 Problem Statement

Establishment unit in ASCETA is an entity under registry department in charge of personnel matters. It carries out numerous activities such as staff recruitment, promotion, training, placement, processing and monitoring study/duty leave, staff transfer, maintenance of personal files of staff, discipline, retirement and pension among others. Presently, these activities are carried out manually and using paper based information system. The use of manual system couple with paper based information system in establishment unit makes employee service delivery slow and costly. The use of manual system also led to the use of large space due to storage of paper documents and difficulties in updating employees' personal records. In addition, manual system is vulnerable to document damage, document misplacement, illegal replacement, removal and alteration (mutilation) of records and documents among others. Furthermore, the recent reduction in staff strength in establishment unit increases the workload of the staff in the unit.

However, the use of web-based employee information system make employee service delivery less costly, less time consuming, more efficient and protect official documents against alterations and illegal removal of document. Furthermore, both employees and administrative staff can access authorized employee information anywhere and anytime. Hence, the researchers set out to design and develop a web-based employee information system for ASCETA that will address the problems facing establishment unit.

3.0 Objectives of the Study

The objectives of the study are as follows:

1. Determine the web-based software requirements
2. Design the web-based software.
3. Develop the web-based software.
4. Test the web-based software
5. Determine user's satisfaction with the performance of the sweb-based software

4.0 Literature Review

This section presents the functions or duties of establishment (personnel) unit as well as the employee records generated and those used in the course of service delivery. The section also presents the concept of information system. The section ends with presentation of some web-based softwares developed for managing employee records and information.

Functions and Records Generated by Establishment Division

Staff of establishment unit (also known as personnel or Human Resource Department) performs a number of functions for the purpose of achievement of organizational goals and objectives. Performance of such functions lead to the generation of the following records: ***recruitment records:*** job analyses, job descriptions, personal qualifications, advertisements, interview reports, ***appointment and confirmation records***: candidates' application forms, letters of appointment, letters of acceptance, confirmation letters, security clearance, disclosure/confidentiality/official secrets act agreement***, performance appraisal records***: record of appraisal, forward job plan, annual report, personal development plan, ***education, training and staff development records***: training needs/skills assessments, records of courses attended, skills acquired and levels obtained, ***promotion and transfer records:*** promotion board reports, records of transfer negotiations, letters of promotion and transfer***, discipline proceedings records:*** warning letters; records of disciplinary proceedings and outcome, ***grievance proceedings records***: records relating to the hearing of, and decisions about, grievances, ***attendance, leave and sickness records:*** leave and sickness cards, requests, approvals, claims; medical reports, accident/incident registers, ***separation from employment records:*** assessment of pension entitlement, pension notification and other documents relating to the retirement process, full records of redundancy proceedings, negotiations and results relating to individual employees, death certificate; compensation terms (International Records Management Trust ,2009).

Employee Information System

Computer based employee information system consist of employees, administrator and database system. Database system consists of user interface, a database management system (DBMS) and one or several databases. DBMS is a set of programs that enables users to store, manage and access data. Database system can be two or three tier architecture. Three-tier architecture is a client/server configuration that includes three layers; a client layer and two server layers consisting of a database server and an application server.(Çiğdem ,2005). Figure 1 depicts typical three-tier architecture.

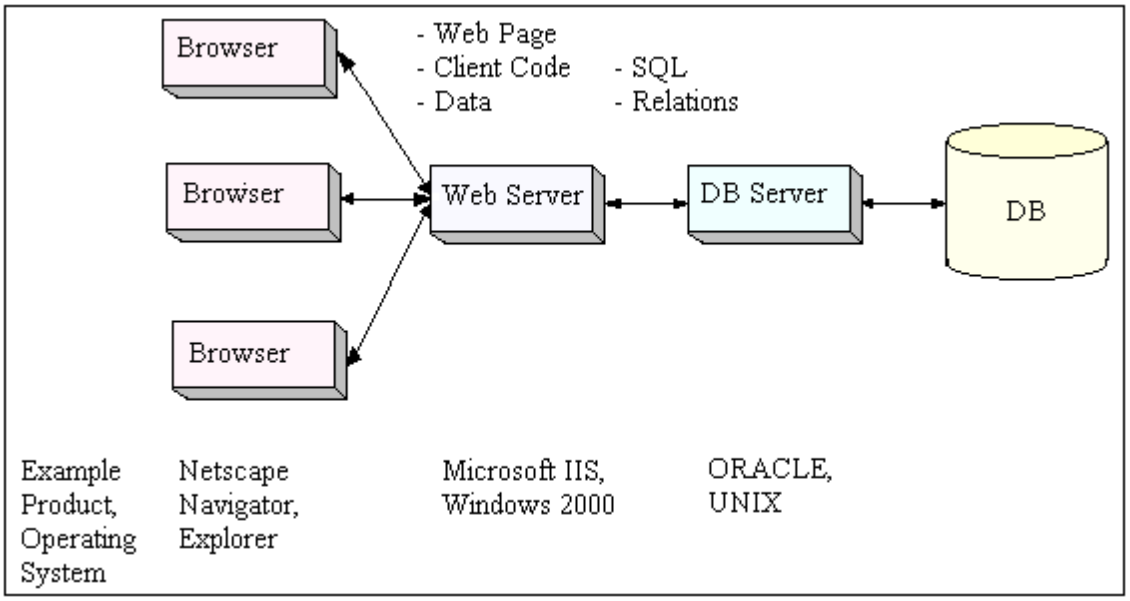


Figure 1: three tier Architecture Adapted from Kroenke (2000)

Some Developed Softwares on Employee Information Management System

Aribisala and Olusuyi (2014) developed an employee management system for National iron Ore Mining Company, Itakpe, Kogi State. The system consists of functionally related GUI (Graphical User Interface) and a database for. The application programme is between the users and the database, where the data is stored for reliability, flexibility and functionality. The programming tool includes Microsoft visual studio 2010 platform and CSharp (C#) as the language. It involves a mutual development of application program and a database. The main menu of the system comprises of record, report, decision and administration. Figure 2 shows the menu selection flow chart of the system. Record submenu comprises of the employee, appraisal, transfer, leave and retirement. Report submenu has promotion, employment, transfer, retirement, appraisal, leave and disciplinary report. Decision submenu deals with discipline. Administrator submenu on the other hand deals with user and database.

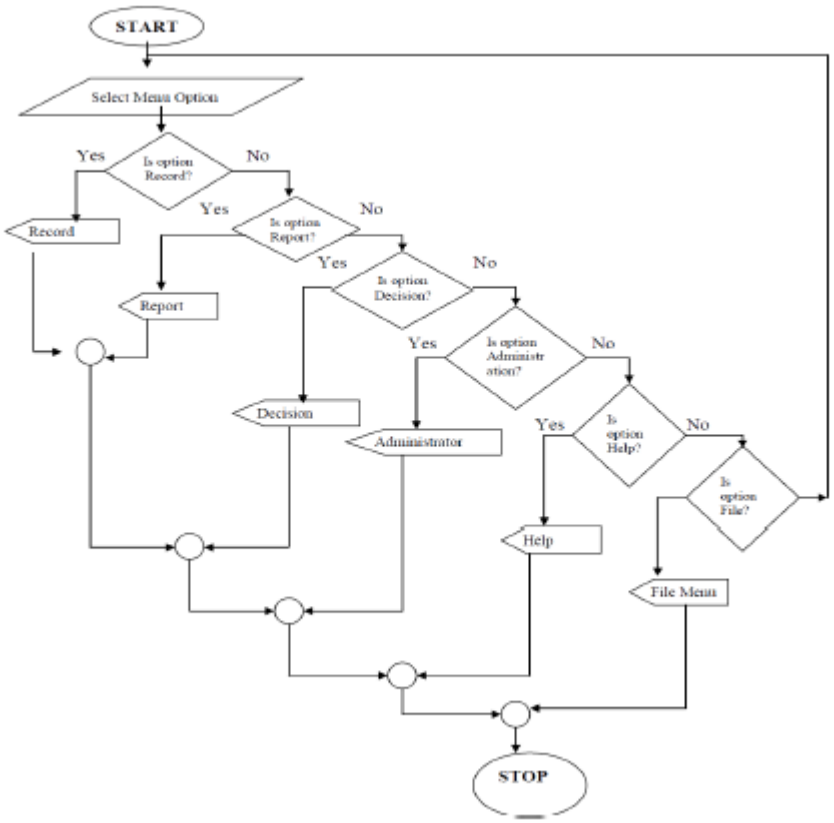


Figure 2: Menu selection flow Chart

The software was tested and found effective for the company. It is recommended for large organizations and establishments.

Abikoye, Oyelakun, Aro and Obisesan (2019) developed university personnel record management system using K-Way Merge Sort Algorithm for sorting and merging of the data in the database to produce the required information in a requested format, which before normally waste time, with a lot of inadequacy in the report. The system was designed by creating a relational database with MYSQL to accept personnel record effectively and, designing a web-based solution using PHP, JavaScript and HTML at the front-end. The MYSQL was placed at the back-end of the database in order to be able to give the record section of the University a more secured and effective personnel record management system. The developed system introduced k-way merge sort algorithm to query the database in order to generate required report, sorting and collating of different related fields as enquired, merging them to form a single output, and keeping the updated records in the archive for future references.

Ifeanyi, Obinna, Jidere, Nwabueze and Omenka (2016) developed a software tool based model that keeps track of the existing structure of a paper-based university administration and personnel management system; also, the design and implementation of the new system and the technologies used in the development of the Virtual system. A database with SQL using MySQL server PHPMYADMIN for the administration was developed. The university personnel management system was implemented using Hypertext Markup Language version 5, Cascading Style Sheet version 3, Hypertext Pre-Processor (PHP) version 5, Asynchronous Hypertext and Extensible Markup Language (AJAX) programming language, which was based on traditional three-tier architecture such as presentation, logic and data layer. It also utilizes the concept of JavaScript, Java Query and MYSQL relational database server for communication.

Kiran (2012) developed a employee information system. The system consists of employee and program modules. The employee module consists of department, designation, role, employee details and

termination modules. The program module comprise of program details and program management module. Figure 3 shows the snapshot of the system home page.

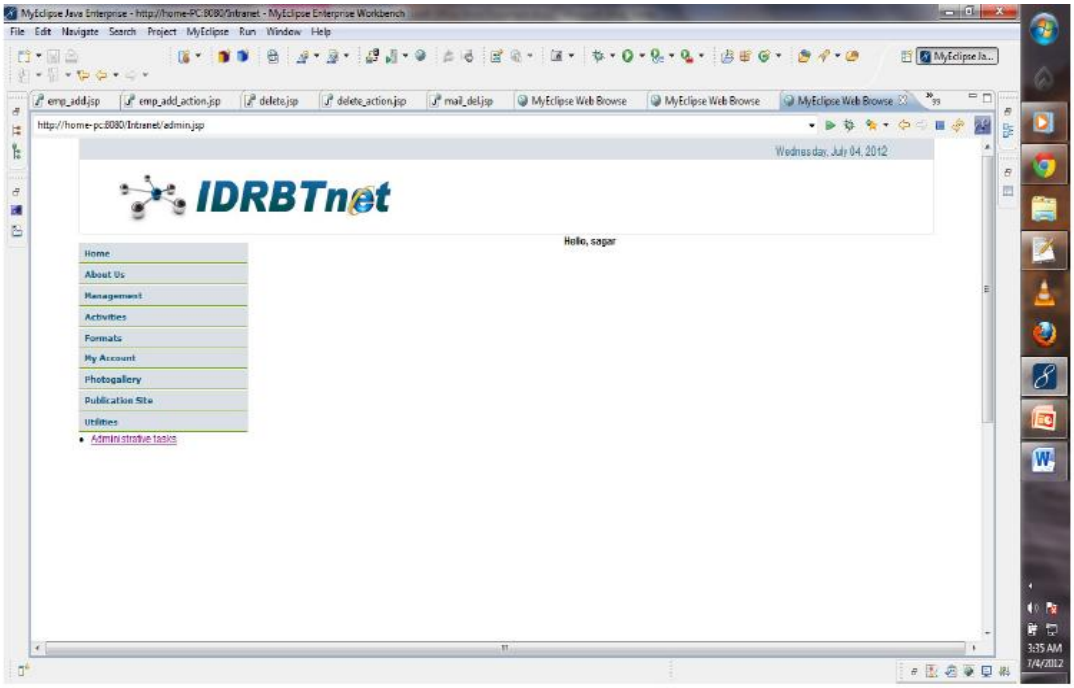


Figure 3 Systems Home page

5.0 Methodology

This project adopted System Development Life Cycle (SDLC). SDLC according to Olumoye (2013) is a framework that describes the activities performed at each stage of a software development project. It starts with system analysis, design and implementation, and continues through the maintenance and disposal of the system.

.5.1 Software Requirement Specifications

The following are the software requirement specification for the web-based employee system.

5.1.1 Hardware Requirements

(a) RAM: 1 GB or above
(b) Hard disk: 4 GB or above
(c) Processor: 2.4GHZ or above

5.1.2 Software Requirements

The following specification are needed

(a) Window 10
(b) MySql
(c) Microsoft visual studio
(d) XAMPP
(e) phpMyAdmin

5.1.3 System Users

1. Admin
2. Employee
3. Visitors

5.1.4 Functional Requirement Specifications

Admin

1. Login and logout

2. Add username and password
3. View, add, delete, update and print employee records

Employee

1. Login and logout.
2. View and print record

Visitors

1. View information about the College
2. View College contact information

5.1.5 Non-Functional Requirement Specifications

1. Provide data security
2. Be efficient during operations
3. Be portable
4. Be reliable
5. Accommodates more than 10,000 records
6. Be Scalable
7. Be robust
8. Maintainable

5.2 Design

5.2.1 System Architecture

The project adopted client-server architecture with three layers; the presentation, application and the database. The presentation layer consists of the browser. The application layer is the, Graphical User Interface (GUI) while the database layer serves as the database system (MySQL). The system architecture is shown in figure 4.

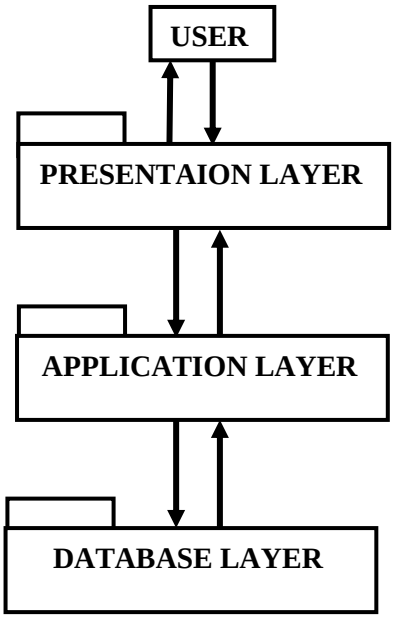


Figure 4: Three Layer Architecture

5.2.2 Use Case

The Use case diagram that shows the major functions of the users using UML (Unified Modelling Language) is shown in figure 5.

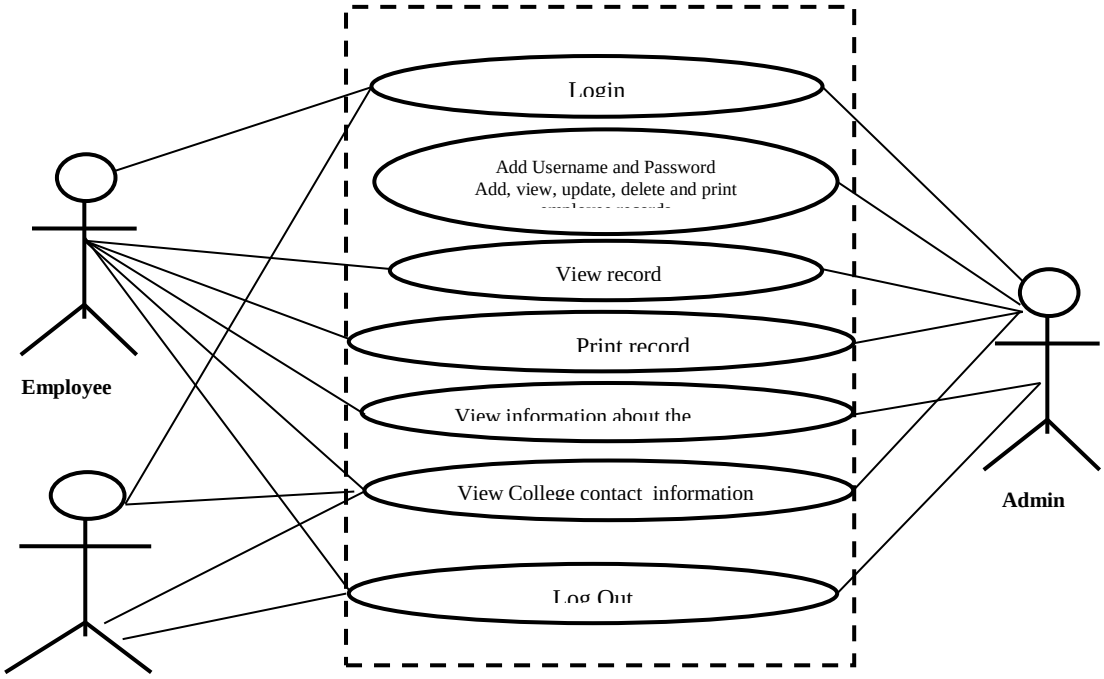


Figure 5: Use case

5.2.3 Home Page

The home page consists of four navigation buttons, namely, About Us, Contact Us, View Records and Admin respectively. The page also contains the picture of the College library to depict the nature of the College. Finally, the page contains a footer that contain names of the developers and the copy right information as shown in figure 6.

5.2.4 Input Forms Design

The system consists of four input forms, namely, employee record management form, employee record view form, login form and username and password form.

The Employee Record Management Form

The employee record management form consists of text boxes, labels and buttons as shown in figure 7. The text boxes enable the admin to input employee data while the buttons enable the data transfer and data manipulations.

5.2.4.1 The Employee Record View Form

The employee record view form as shown in figure 8 consists of a text box where an employee can enter his or her employee number while the search button enable display of an individual employee record when clicked. The print button is for printing of the record displayed in html table while the reset button is for resetting text box data.

5.2.4.2 The Login Form

The login form contains two textfields; username and password and two buttons, the login and reset. The username and the password field enable admin to input his or her username and password. The login button enables admin to login into the employee record management form. The reset button on the other hand let admin to clear input fields as shown in figure 9.

5.2.4.3 The Username and Password Form

Username and Password form is designed to enable admin to enter username and password. It simply consists of fields and buttons as shown in figure 10.

5.2.5 Database Design

. This project made use of MySQL database to store all the information required by the system to function. The database named employee_db contain two tables. Figure 11 shows the two tables. The database and its tables were created using *phpMyAdmin* . Figures 12 and 13 shows two tables containing testing data.

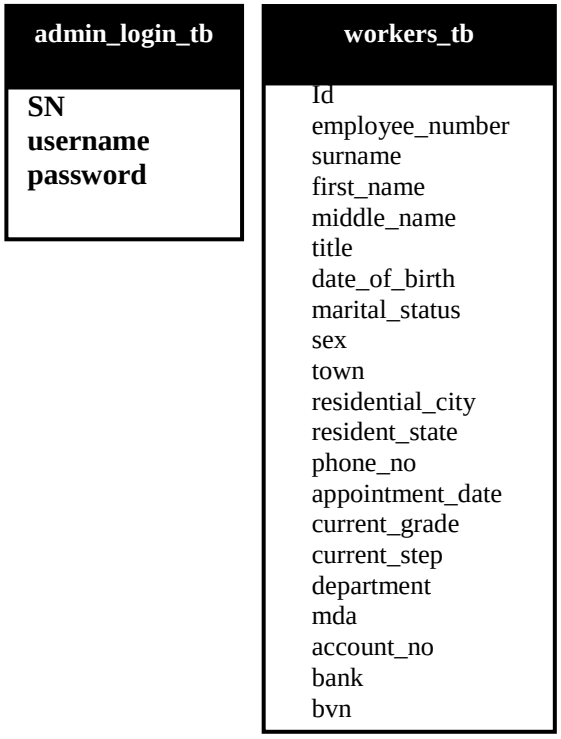


Figure 11: Database tables

5.3 Implementation

5.3.1 Writing Program Code

The project was implemented using PHP and javasript programming languages. The database and its tables were constructed using *phpMyAdmin* The codes were written under Microsoft visual studio.

6.0 Sample Outputs

The following are a sample of the outputs of the system when running.

Figure 6: Home Page

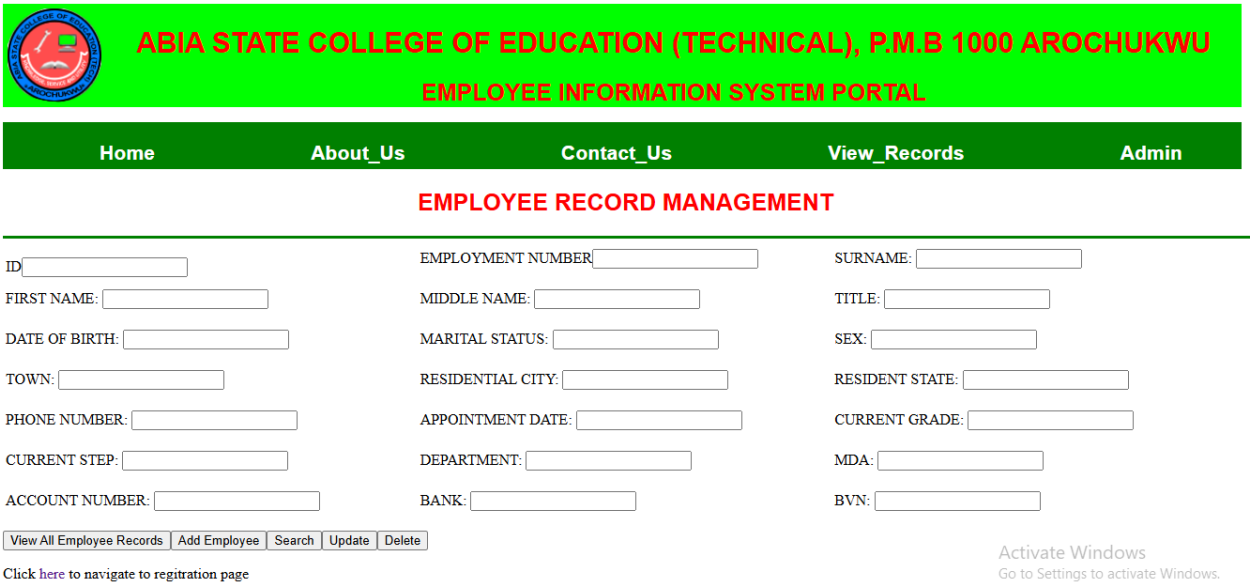


Figure 7: Employee Record Manipulation

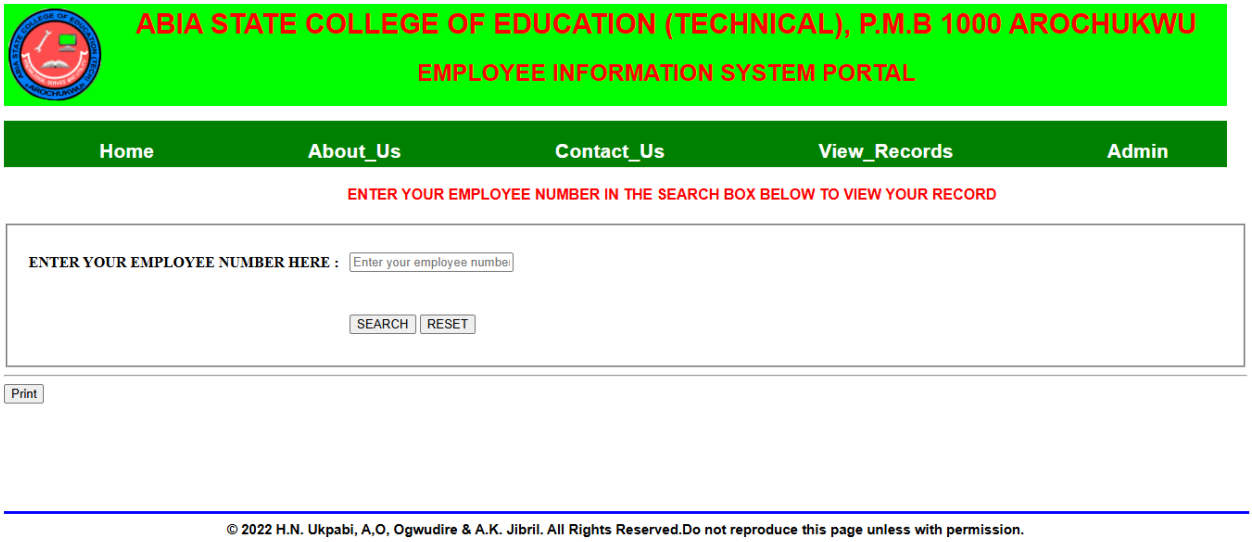


Figure 8: Employee Record View form

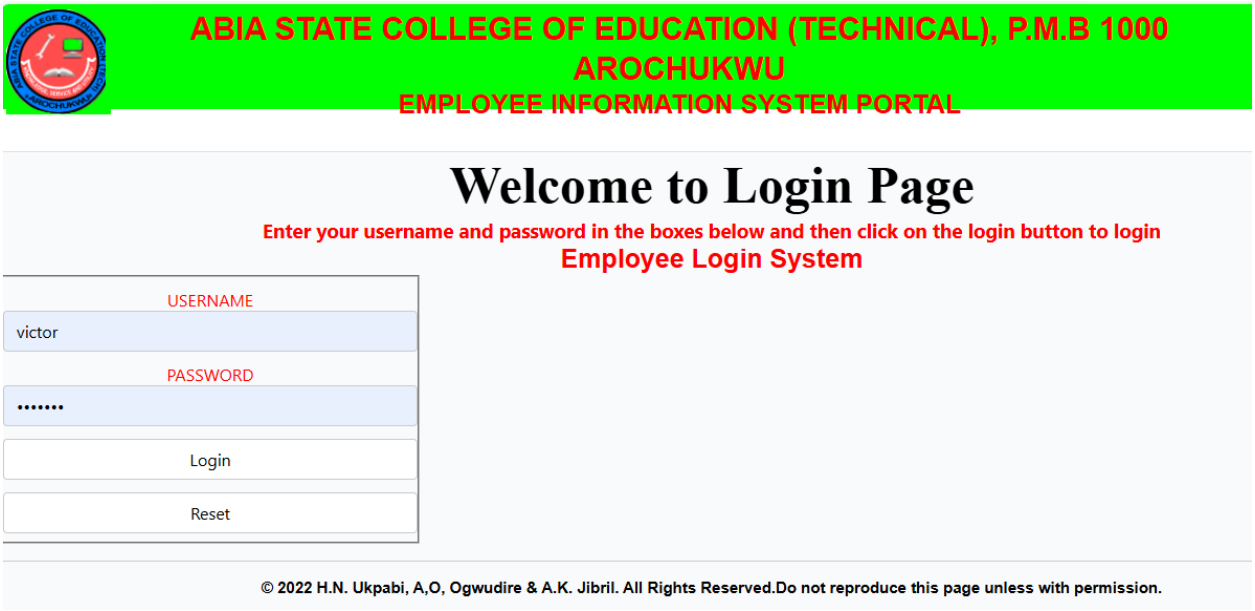


Figure 9: Login form

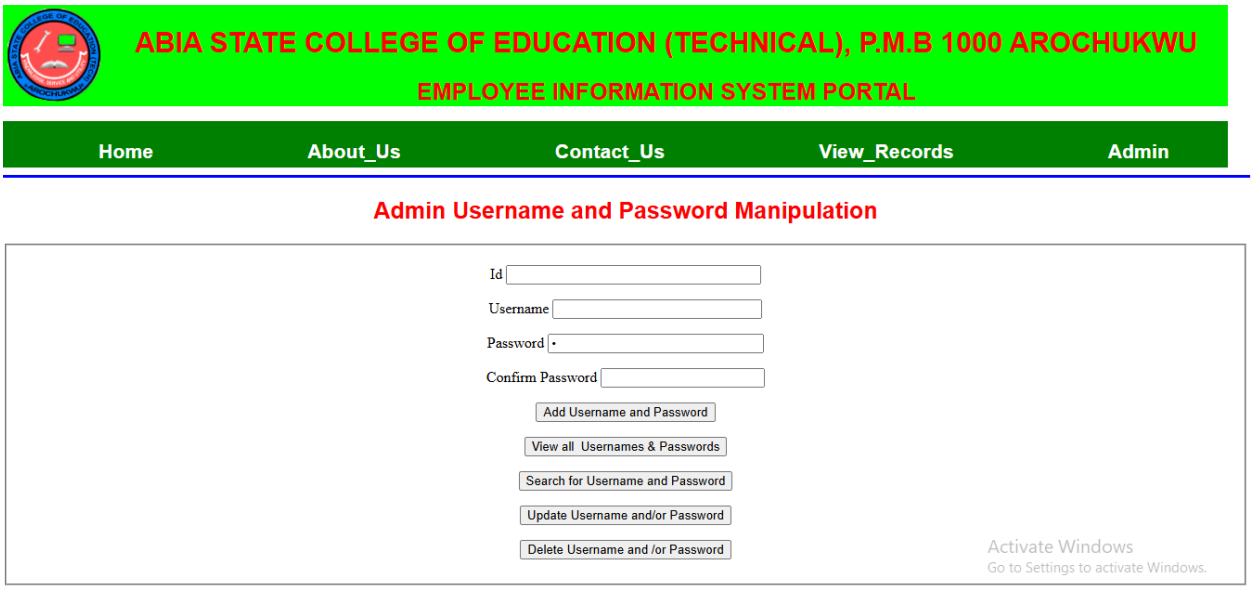
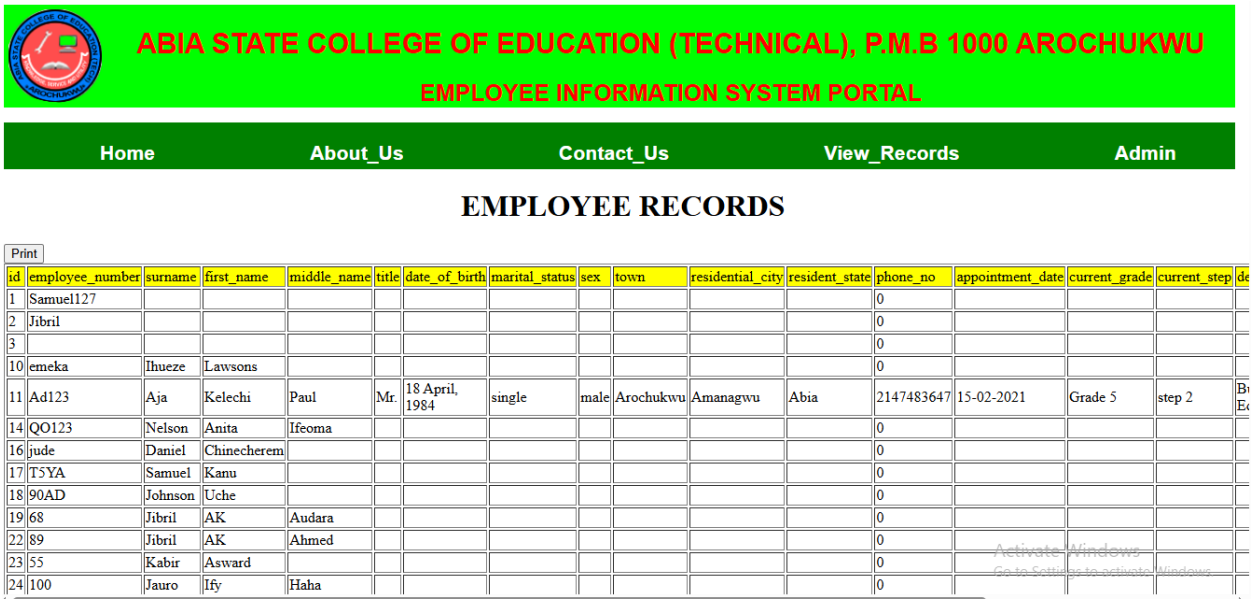
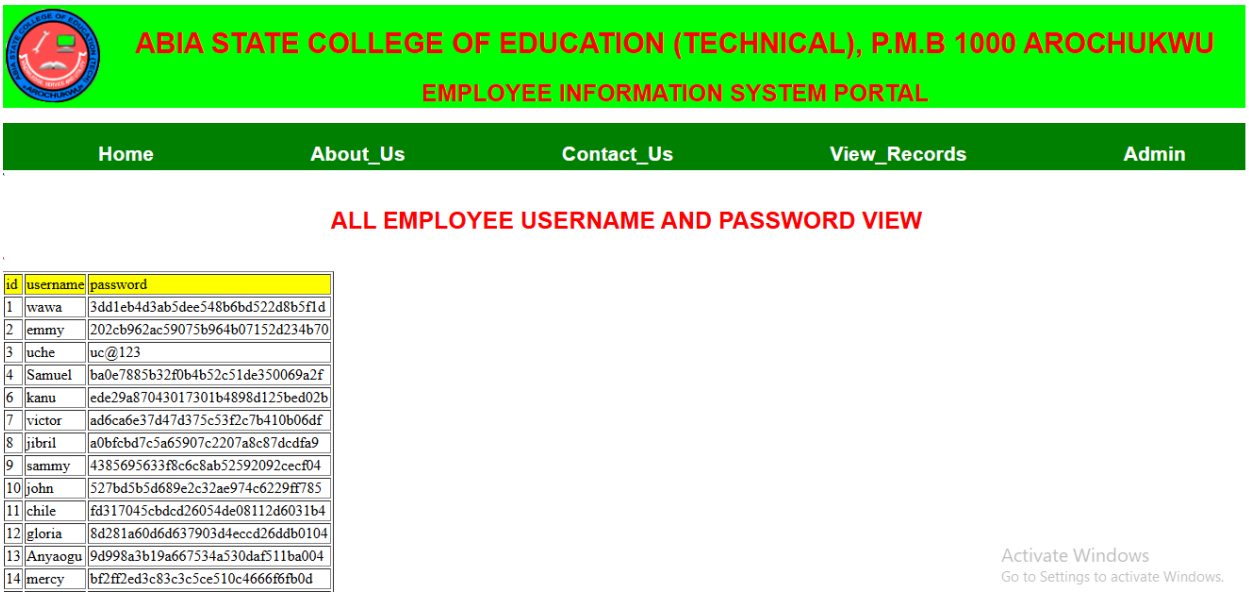


Figure 10: Username and Password form



id	employee_number	surname	first_name	middle_name	title	date_of_birth	marital_status	sex	town	residential_city	resident_state	phone_no	appointment_date	current_grade	current_step	de
1	Samuel127											0				
2	Jibril											0				
3												0				
10	emeka	Ihueze	Lawsons									0				
11	Ad123	Aja	Kelechi	Paul	Mr.	18 April, 1984	single	male	Arochukwu	Amanagwu	Abia	2147483647	15-02-2021	Grade 5	step 2	Bu Ed
14	QO123	Nelson	Anita	Ifeoma								0				
16	jude	Daniel	Chinecherem									0				
17	T5YA	Samuel	Kanu									0				
18	90AD	Johnson	Uche									0				
19	68	Jibril	AK	Audara								0				
22	89	Jibril	AK	Ahmed								0				
23	55	Kabir	Asward									0				
24	100	Jauro	Ify	Haha								0				

Figure 12: A Table containing tested data



id	username	password
1	wawa	3dd1eb4d3ab5dee548b6bd522d8b5f1d
2	emmy	202cb962ac59075b964b07152d234b70
3	uche	uc@123
4	Samuel	ba0e7885b32f0b4b52c51de350069a2f
6	kanu	ede29a87043017301b4898d125bed02b
7	victor	ad6ca6e37d47d375c53f2c7b410b06df
8	jibril	a0bfcbd7c5a65907c2207a8c87dcdfa9
9	sammy	4385695633f8c6c8ab52592092cecf04
10	john	527bd5b5d689e2c32ae974c6229ff785
11	chile	fd317045cbdcd26054de08112d6031b4
12	gloria	8d281a60d6d637903d4eccd26ddb0104
13	Anyaogu	9d998a3b19a667534a530daf511ba004
14	mercy	bf2ff2ed3c83c3c5ce510c4666f6fb0d

Figure 13:A view of username and password table containing username and password hashed

7.0 Training/ Performance Evaluation

The potential users of the developed web-based software were first trained on how to use th web-based software. Thereafter, one of the researcher issued copies of questionnaire to them. The questionnaire was designed to measure their satisfaction with the performance of the questionnaire. The data collected from the questionnaire were then analyzed, The resul of the analysis is shown in table 1.

Table 1; Evaluation of Developed Web-based Software

S/N	Item	$\overline{X}$	SD	Remark
	Functional Software Requirements			Agree
	Admin			
1	The software enables admin to add username and password	3.58	0.52	Agree
2	The software enables admin to login	3.92	0.29	Agree
3	The software enables admin to logout	3.75	0.45	Agree
4	The software enables admin to add employee record	3.67	0.49	Agree
5	The software enables admin to view the records of all employees	3.67	0.49	Agree
6	The software enables admin to update the record of an employee	3.75	0.45	Agree
7	The software enables admin to delete the record of an employee	3.42	0.29	Agree
8	The software enables admin to print employee records	3.83	0.39	Agree
	Employee			Agree
9	The software enables an employee to view his or her records	3.58	0.53	Agree
10	The software enables an employee to print his or her records	3.58	0.52	Agree
	Visitor			
11	The software enables a visitor to view information about the College	3.10	0.29	Agree
12	The software enables a visitor to view the Colleges contact information	3.17	0.72	Agree
	Non-Functional Software Requirements			
13	The software is well organized	3.50	0.67	Agree
14	The Software window environments are attractive	3.50	0.52	Agree
15	The software buttons are responding to mouse click quickly	3.33	0.49	Agree
16	The feedback massages provided by the software are self- explanatory	3.17	0.39	Agree
17	The software has data security	3.25	0.62	Agree
18	I felt comfortable when using the software	3.50	0.25	Agree
19	It is easy to navigate to different parts of the software	3.25	0.62	Agree
	Recommendation			
20	The developed software can be used for employee information system in the College	3.67	0.49	Agree

N=Number of respondent SD=Standard Deviation $\overline{X}$ ***=Mean***

The data from table 1 shows that all the items had mean values greater than 2.50 which is the cut-off point. This implies that the developed web-based software satisfies its functional requirements. In addition, the table shows that the values of the standard deviations (SD) are small, implying that the respondents' opinions on the items were very close. Finally, the mean value of item 20 (3.67) indicated that the potential users agreed that the developed web-based software can be used as employee information system for the College.

8.0 Conclusion/Recommendation

Abia State College of education (Technical) Arochukwu maintains a manual employee information system. The system is expensive, require large space for storage of papers and documents. Documents are vulnerable to damage and misplacement. In order to reduce the cost of the College employee information system as well as making the system more effective and efficient. the researchers designed and developed a computerized employee information system. The system can store employee information and admin can update and delete employee information. Employees on the other hand can view their records as well as printing them. Performance evaluation of the system shows that it is effective and efficient. Based on this attributes, the evaluators recommended its usage in the College.

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