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Research Article

Computerization of the Students' Industrial Work Experience Scheme (SIWES) Registration and Payment System (SIWES-RPS) in Nigeria

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Abstract: The current registration and payment processes for the Student Industrial Work Experience Scheme is semi-automated if not completely manual. Students have to queue at the Student's Industrial Work Experience Scheme (SIWES) unit of their institutions to carry out registration. Thereafter, students still have to wait for couple weeks before he or she could have access to placement letter. At the end of the industrial training exercise, students will have to join a long queue and cluster at the bursary unit of their institutions for days waiting for the disbursement of their stipends from Industrial Training Fund (ITF). This system is drudgery, crude, time consuming, error prone and inimical to the 21st century technological innovation. The aim of this work is to design and implement a web-based SIWES registration and repayment system for students, Institutional and SiWES based supervisors. The objective is to implement a database for storing the record of students on industrial training exercise; develop software that will ease supervision, student's placement and ensure prompt payments of students and supervisors allowances to their respective accounts. This work adopted the Object Oriented Analysis & Design (OOAD) approach with the Structured System Analysis and Design Methodology (SSADM). The Top-Down Design approach was used, where the entire system was broken into several subsystems and each subsystem was further sub-divided into different modules. Hypertext Preprocessor (PHP), MYSQL, and Cascading Style Sheets (CSS) were used as development tools. PHP was used because it is a general purpose server side scripting language originally designed for web development to produce dynamic web pages. MYSQL was adopted in this study as the database engine because of its ability to run as a server providing multi user access to a number of databases. Unified Modeling Language (UML) was used as a graphical language to specify diagrams for documenting the system behavior. The system was tested using different test dat.
Keywords: ITF, SIWES, e-Payment.

INTRODUCTION

The students industrial work experience scheme (SIWES) is a skill training program that is designed by the federal government of Nigeria to expose and prepare students of tertiary institutions - universities, Polytechnics and colleges of education for industrial work site that they might likely encounter after graduation. Before the establishment of the scheme, there was a growing concern among industrialists about conditions graduates of our institutions of higher learning lacking adequate practical background skills and studies preparatory for employment in industries.

The foremost objective of the program was to bridge the gap between theories and practical by providing the opportunity for students to get themselves exposed to real jobs and actual job situations and environments. The scheme has therefore, now become an important and mandatory component of training in the accredited disciplines or courses like Computer science, Engineering, Geology, and Agricultural Sciences, etc. in Nigeria, Industrial Training Fund (ITF) is the body trusted with the responsibility of coordinating and financing the industrial work scheme.

Industrial Training Fund was introduced under the National policy by the federal government of Nigeria in the year 1971, it has operated consistently and painstakingly within the context of its enabling laws decree 47 of 1971 of the ITF ACTS as amended in

2011 and supervised by the National Board for Technical Education (NBTE) [1].

The purpose for which the fund was established has been pursued vigorously and efficiently. In the four decades of its existence, the ITF has not only raised training consciousness in the economy, but has also helped in generating a crop of skilled indigenous manpower which has been naming and managing various sector of the National economy [2].

The main driving force of ITF programme and Service is to stimulate human performance, improve productivity, and induce value-added production in industry and commerce. Through its SIWES and vocational apprentice training programmes, the fund also builds capacity for graduates and youth self employment in the context of small scale industrialization in the economy. It is a training a student undergoes in the field of his/her course of study in other to acquires more knowledge and be more practical [3].

The existing of student's registration and payment processes for the scheme is almost manual if not semi-manual. Students has to queue or clustering at the Student's Industrial Work Experience Scheme (SIWES) unit of their institutions to carry out registration after which the students will still have to wait for more than a couple weeks before he or she could have access or collect placement letter. At the end of the scheme, students will have to join a long queue and clustering at the bursary unit of their institutions waiting for the disbursement of their stipends from industrial training fund either by cash or cheque. This type of system is drudgery, crude, and inimical to the 21st century technological advancement. The reason is because, the processes of keeping accurate records of students that participates in the industrial training for a giving period of time, and sorting out or extrication of the list according to institutions and further by Departments has been posing a great challenge to the SIWES coordinators and ITF. These results in delay of payments making it almost impossible for students to access their allowances immediately after the industrial training exercise. Besides, the existing process is prone to human error and results in unnecessary delay in the payment of students and supervisor's allowances. Students' placement becomes more difficulty and also results in inadequate supervision.

The aim of this work is to design and implement a web-based SIWES registration and repayment system for students and supervisors. The objective is to design and implement a database for storing the record of students on industrial training exercise; develop software that will make students and supervisors have access to information faster and more reliable and to Enhance accurate transactions and record keeping in SIWES that will ease students placement and ensure prompt payments of students and supervisors allowances to their respective accounts.

REVIEW OF RELATED LITERATURE

The growing concern among our industrialists is that graduates of our institutions of Higher learning lacks adequate practical background studies preparatory for employment in industries, this led to the formation of students Industrial Work Experience Scheme (SIWES) by ITF in 1993/1994 [11]. ITF has as one of its key functions; to work as cooperative entity with industry and commerce where students in institutions of higher learning can undertake mid-career work experience attachment in industries which are compatible with students' area of study [4].

The Students Industrial Work Experience Scheme (SIWES) is a skill Training programme designed to expose and prepare students of Agriculture, Engineering, Technology, Environmental, Science, Medical Sciences and pure and applied science for the Industrial work situation which they likely to meet after graduation. Duration of SIWES is four months in Polytechnics at the end of NDI, four months in College of Education at the end of NCE II and six months in the Universities at the end of 300 or 400 or 500 levels depending on the discipline [3].

Growing public demand and legislative expectations for accountability in the past two decades have made it imperative that higher education administrators and researchers pay attention to the potential impact of student work programmes on skill development, which in turn, impacts directly on national development objectives [4].

Okpor and Hassan [5] stated that 'if Vocational Technical Education is to be meaningful and successful in Nigeria, then relationships are needed between public and private sectors to partner effectively with Vocational Technical Education and skill acquisition programmes. '

SIWES is a core academic requirement carrying six credit units. This requirement must be met by all students in computer science before graduation. It is also compulsory at National Diploma (ND) level and is scheduled in the NBTE curriculum. The training program is undertaken in the third year of a four-year degree [6].

Derrick [7] points out that government has recognized the importance of SIWES through the establishment of the Industrial Training Fund (ITF). The ITF was established in 1971 and was charged with human resources development and training. Following the establishment of ITF, SIWES commenced in 1974

with the aim of making education more relevant and to bridge the yawning gap between the theory and practice of computer, engineering, technology, and science-related disciplines in tertiary institutions in Nigeria.

Electronic payment (E-payment) is a subset of an e-commerce transaction to include electronic payment for buying and selling goods or services offered through the Internet. There are many forms of e-payment ranging from cards, Internet, mobile payment, financial service kiosks, biometric payments, electronic payments networks etc. and as technology develops, the range of devices and processes to transact electronically continues to increases while the percentage of cash and cheque transactions continue to decrease. With the advancement in telecommunication, electronic payment systems are rapidly replacing the traditional modes of payment that involved personal contact between buyers and sellers. Electronic payment systems entail online financial transactions that utilize some form of a digital financial device, such as e-tokens, e-cash and checks [8].

SYSTEM DESIGN AND METHODOLOGY METHODOLOGY

Ismail [9] defined Methodology as a way of thinking about and studying social reality. Methodology is defined as strategies that lay out the means for achieving the goals of research. They all defined methods as procedures and techniques used to reach the study's goal. The inter-relationship and differences by stating: Methodologies are the blue prints; methods are the tools.

In this work, the Structured System Analysis and Design Methodology (SSADM) were used to analyze our proposed system. The Top-Down Design approach was used, where the entire system was broken into several subsystems and each subsystem was further sub-divided into different modules.

The study adopted both primary and secondary source of data collection to gather data needed for the development of the proposed system from the various stakeholders such as the ITF, institutional based SIWES coordinators, SIWES supervisors who have been in the scheme for up to six (6) years and above. This was done through interview, observations and in rare cases, questionnaires were adopted.

Choice of Programming Language and Database Engine

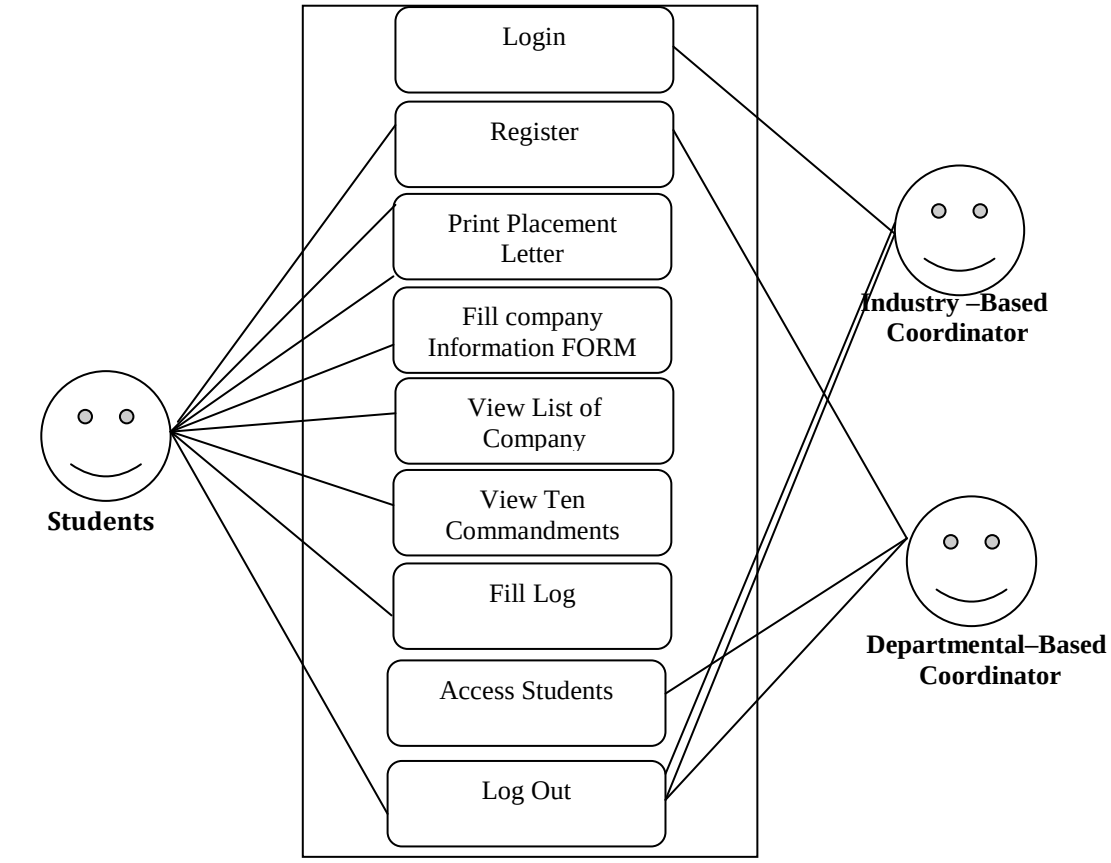
The programming languages used in the development of the proposed system are Hypertext Preprocessor (PHP), MYSQL, and Cascading Style Sheets (CSS). PHP was used because it is a general purpose server side scripting language originally designed for web development to produce dynamic web pages. It has also evolved to include a command line interface capability and can be used in stand-alone graphical applications. **MYSQL** is a relational database management system and was adopted in this study because of its ability to run as a server providing multi user access to a number of databases. The MYSOL, among other features, was used basically to create the relational database structure on the server in other to store data and automate procedures. The **CSS** technology provides fascinating features and functionalities that make it preferable to others in implementing the design of the interface of this system: it has the capability to build a more diverse website: CSS gives the opportunity to design sites that looks very different from page to page, without a lot of extensive coding.

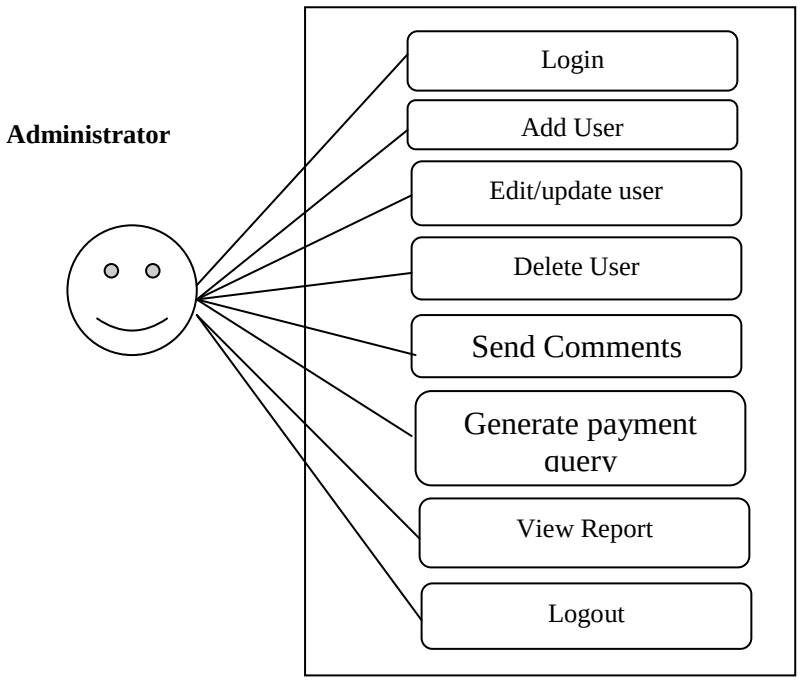
System Design

In this study, we adopted the Unified Modeling Language (UML) as a graphical language to design the system. The UML is a complex, feature-rich graphical language [10]. The UML specifies diagram for documenting the system behavior. The UML tools used are use case, activity diagram and class diagram.

Use Case Diagram

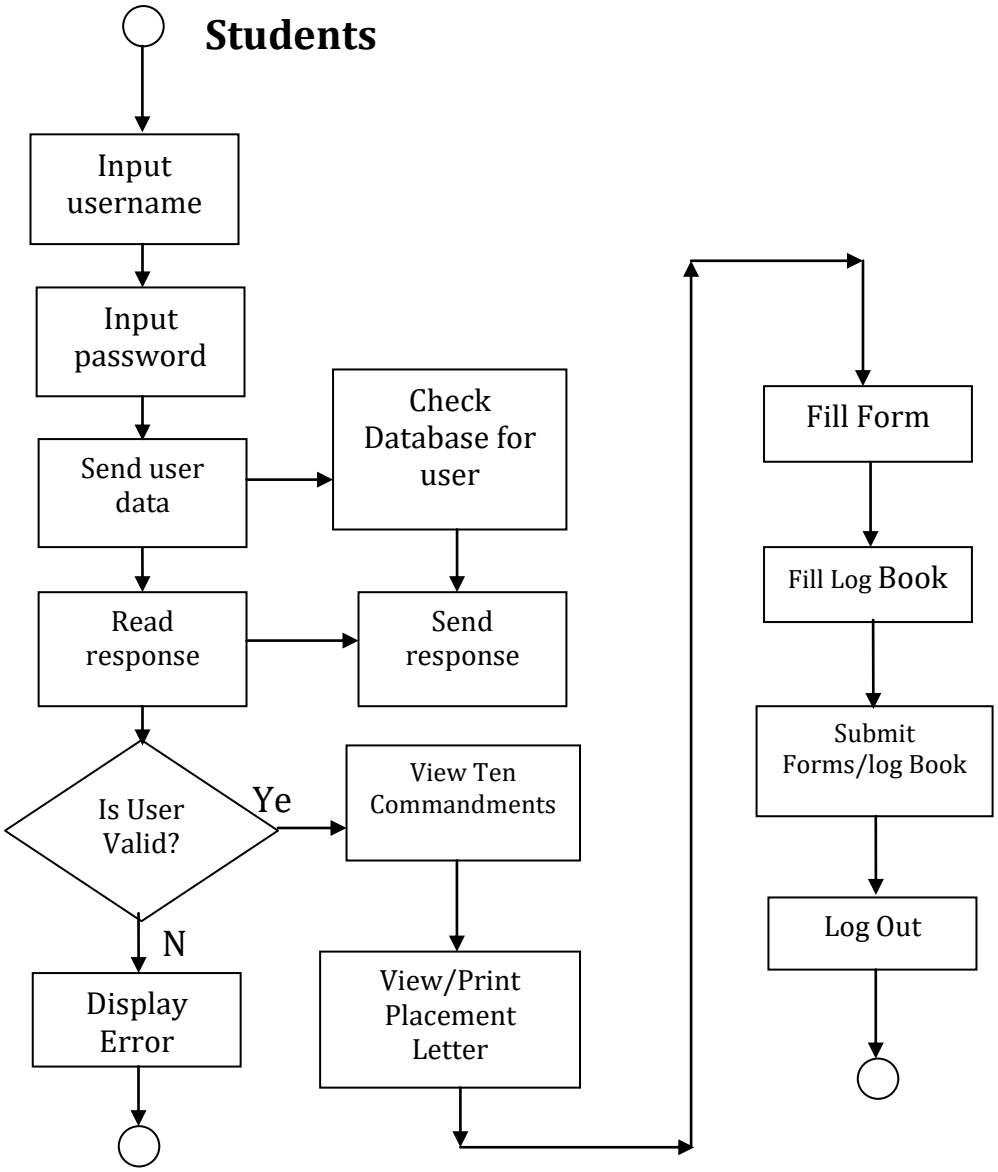
Here we present the different way the SIWES-RPS can be used by the users. Use Case corresponds to the high-level functional requirements. The use case models for the SIWE-RPS are shown below.

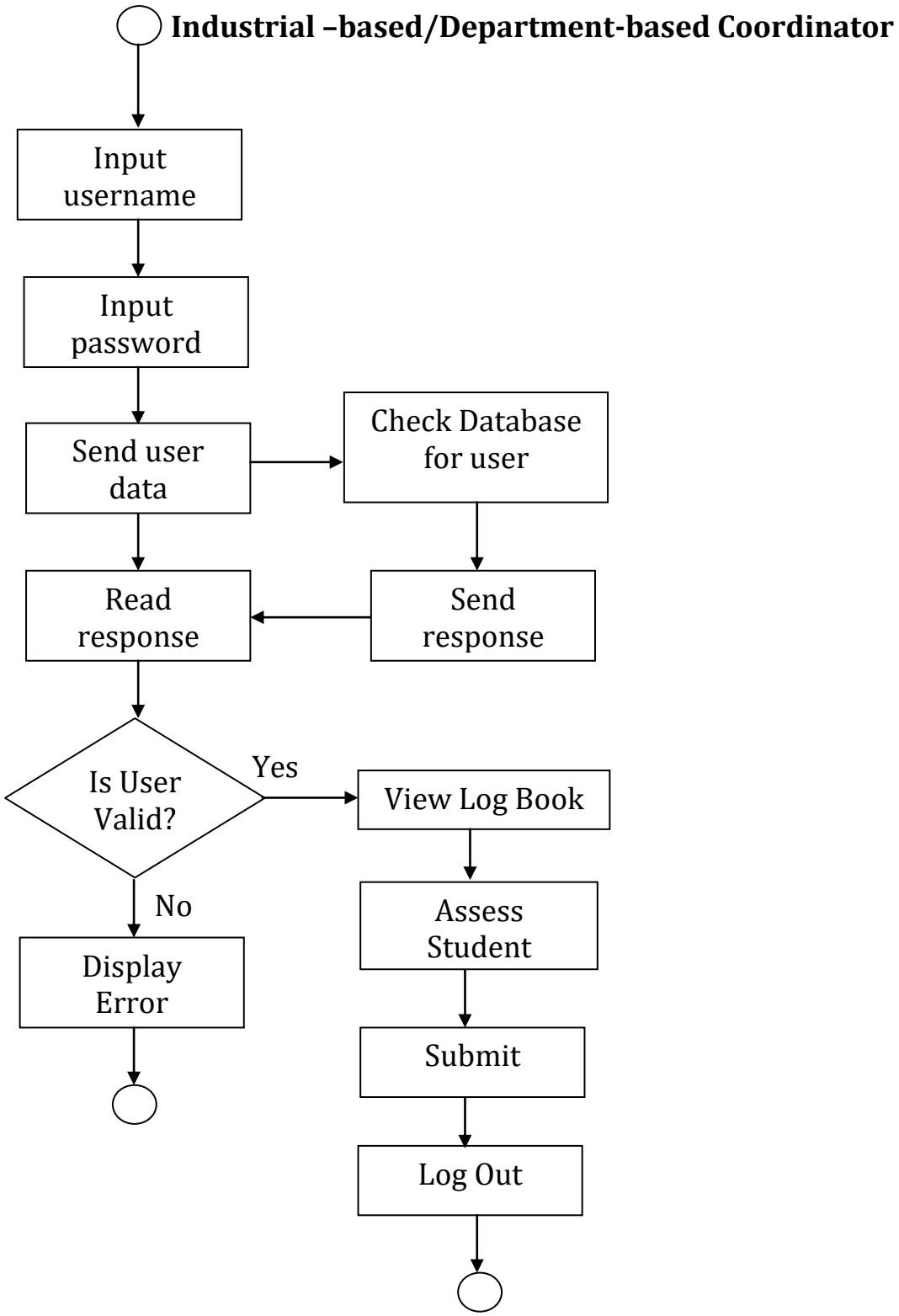


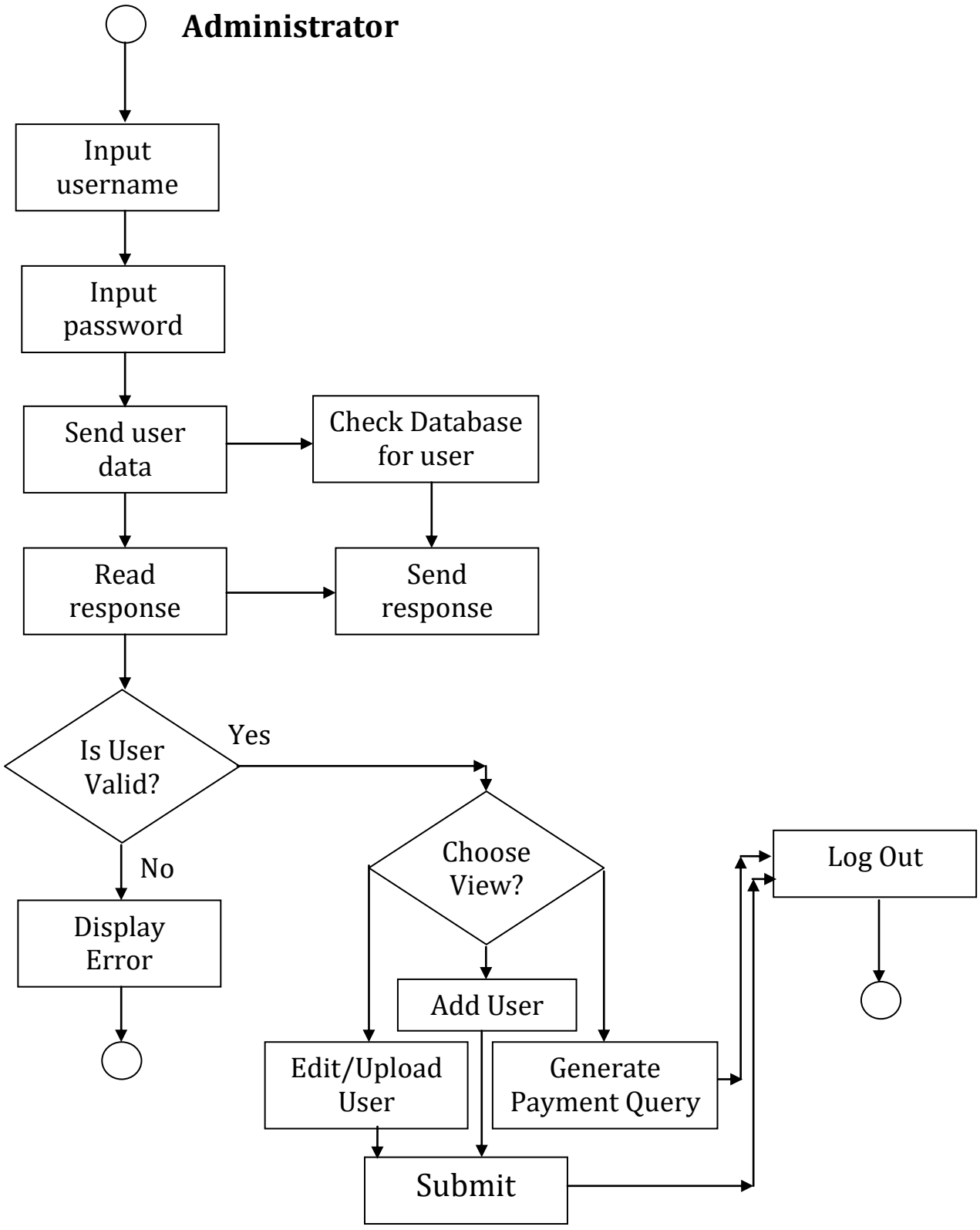


Activity Diagram

Activity diagrams are graphical representations of work flow of stepwise activities and actions with supports for choice, interaction and concurrency. In the unified modeling language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control. In this study, we have a separate activities diagrams for the student, industrial/Departmental based coordinator and Administrator are presented in the figures below:


Students
Input username
Input password
Send user data
Check Database for user
Read response
Send response
Is User Valid?
Ye
N
View Ten Commandments
Display Error
View/Print Placement Letter
Fill Form
Fill Log Book
Submit Forms/log Book
Log Out


Industrial –based/Department-based Coordinator
Input username
Input password
Send user data
Check Database for user
Read response
Send response
Is User Valid?
Yes
No
View Log Book
Assess Student
Submit
Log Out
Display Error


Administrator
Input username
Input password
Send user data
Check Database for user
Read response
Send response
Is User Valid?
Yes
No
Display Error
Choose View?
Add User
Edit/Upload User
Generate Payment Query
Log Out
Submit

Database Design

The database consists of four tables, which are:

1. **Users Table:** This table holds login information of the users of the system such as their usernames and passwords.

Table-1: User Table

Field	Data Type	Width	Description
Username	Varchar	50	The User name
Password	Varchar	40	The User's Password

Table-2: SIWES Form Table

Field	Data Type	Width	Description
Id	Int	10	Unique identifier of table
Surname	Varchar	50	Students surname
First name	Varchar	50	First name of student
Other name	Varchar	50	Student's other name
Matric_no	Int	10	Matriculation number
Master_list no	Int	10	Master list Number
Course of study	Varchar	30	Course of study
Year_of_study	Int	10	Year or level
From year: to year:	Year	10	Year of entry and exit
Sex: male/female	Char	10	Gender
Date_of_birth Student_address	Date Varchar	110	Date of birth of student Student's address
Bank_name	Varchar	60	Students bank name
Acct_no	Int	60	Students account number
Email_add	Varchar	11	Student's e-mail address
Phone_no	Int	60	Student's phone number
Employer_add	Varchar	11	Company's address
Employer_email	Varchar	60	Company's email address
Employer_phone_no	Int	60	Company's telephone number
Login_id	Varchar	60	Login id of student
Nationality	Varchar	11	Nationality of student
Password	Varchar	60	Student's password

Table-3: Form SPE 1 Table

Field	Data Type	Width	Description
Id	Int	10	Unique identifier of table
Employer_design	Varchar	40	Employer's Designation
Itf_area_off	Varchar	20	Name of ITF Area Office
Name_of_org	Varchar	60	Where attachment was done
Location_add	varchar	50	Address of Organization
Serial_no	Int	70	Serial number of student
Name_of_stud	Varchar	90	Student's name
Matric_no	Int	10	Student's matric. number
Course_of_study	Varchar	40	Student's course
Year_or_level	Int	30	Level of study
Name_of_inst	Varchar	10	Name of Student's institution
Period_in_month	Int	60	Duration of IT
Date_of_comm	Varchar	20	Date attachment began
Date_of_comp	Varchar	30	Date attachment will end
Remarks	Text	30	remarks
Date_sign	Date	150	Date form was filled
Sign_of_employer	Varchar	40	Employer's signature

Table-4: Log Book _able

FIELD	DATA TYPE	WIDTH	DESCRIPTION
Nameostud	Varchar	60	Name of Student
Reg_no	INT	30	Registration Number of Student
Unit	Varchar	40	Unit/Course of Study of Student
Yearostud	INT	20	Year of Study
Nameadd	Varchar	60	Name and address of Company
Comsup	Varchar	60	Name of Company Supervisor
Depsup	Varchar	40	Name of Departmental Supervisor
Itcoord	Varchar	40	Name of IT Coordinator
Namehod	Varchar	40	Name of Head of Department
Wmon	Text	50	What was learnt on Monday
Wtue	Text	70	What was learnt on Tuesday
Wwed	Text	80	What was learnt on Wednesday
Wthur	Text	80	What was learnt on Thursday
Wfri	Text	80	What was learnt on Friday
Wsat	Text	80	What was learnt on Saturday
Image	Varchar	60	Attach Diagram, sketches, graphs
Student_sign	Varchar	40	Student's signature
Comcoord	Text		Comments by Supervisor
coordnam	Varchar	60	Name of coordinator

SYSTEM IMPLEMENTATION

The prototype of the proposed SIWES-RPS was developed using PHP and CSS with MYSQL as the database engine. The proposed system maintained a two level security:

Server based security: The administrator's password is required to view the total number of SEWIS participating students, dissemination of information informing students of their placement and upload other relevant information about the system.

Student Based Security: This level of security implemented here includes; Registration number will be needed to confirm the student's registration, and Student must have bank account.

System Testing

This involves the testing and debugging of the programs. A primary purpose of testing is to detect software failures so that defects may be discovered and corrected. The testing approaches explored in this research are unit and integration testing. During the unit testing, we tested some of the smallest pieces of codes some of which are represented in the table below.

Table-5: Different test cases, test data and expected results

Test Case	Test Data	Expected Result	Remarks
Login to the system.	Enter valid user ID and password	Display successful message and display homepage	Success
Fail to login to the system	Enter invalid user ID and password	Display invalid login message	Success
Fill the various forms (e.g. SIWES form)	Enter valid data and click submit button	Display successful message	Success
Logout from the system	Click logout button on the menu.	Logout from the system and display welcome page	Success
View company's list	Click view company list link	Display company list	Success
View and print placement letter	Click Placement link	Display/print Placement letter	Success
Fill log book	Click on fill log book link	Display the log book page	Success

RESULTS
(**Sample Output**)

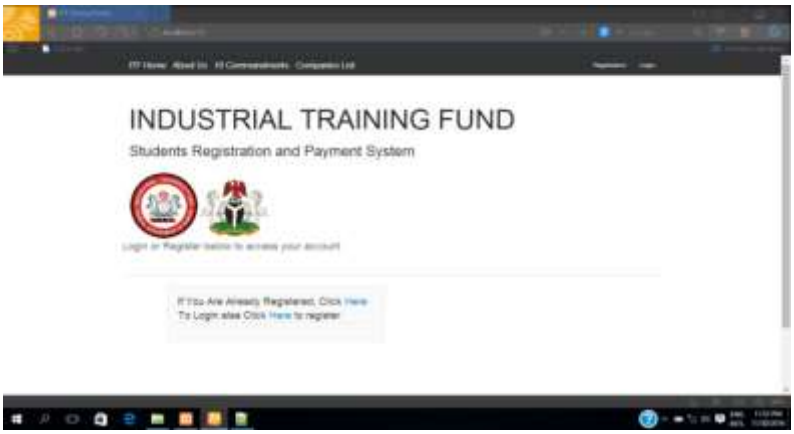


Fig-4.1: SIWES-RPS Home page Screen shot

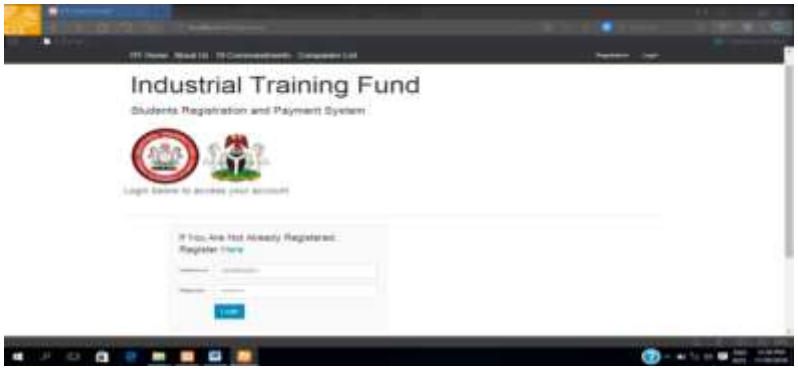


Fig-4.2: SIWES-RPS Login page Screen shot

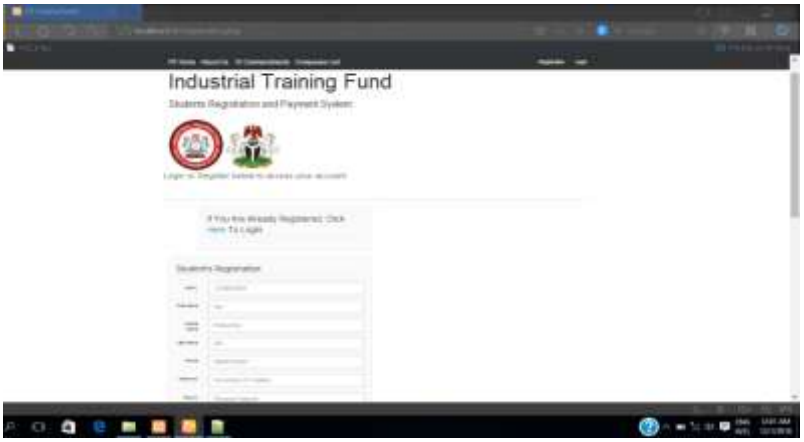


Fig-4.3: SIWES-RPS Students Registration page Screen shot

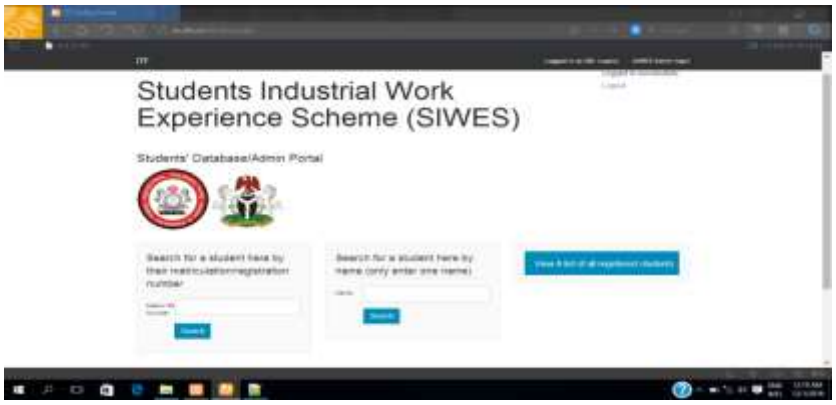


Fig-4.4: SIWES-RPS Student portal Screen shot

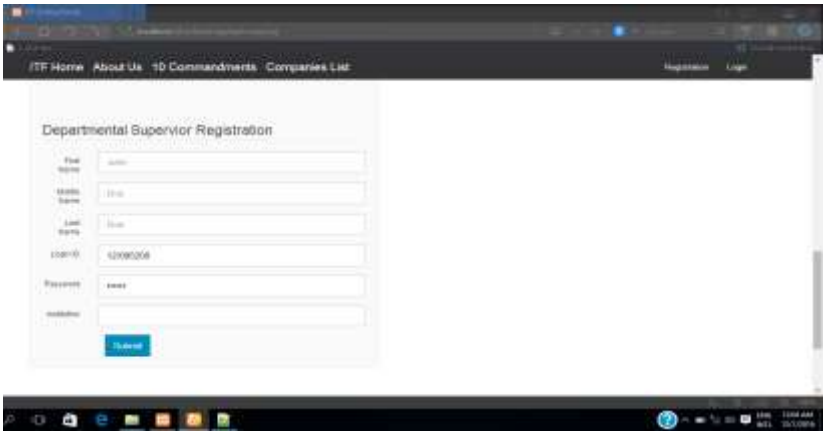


Fig-4.5: SIWES-RPS Departmental Supervisors' form page Screen shot

Fig-4.6: SIWES base Supervisor Registration page Screen shot

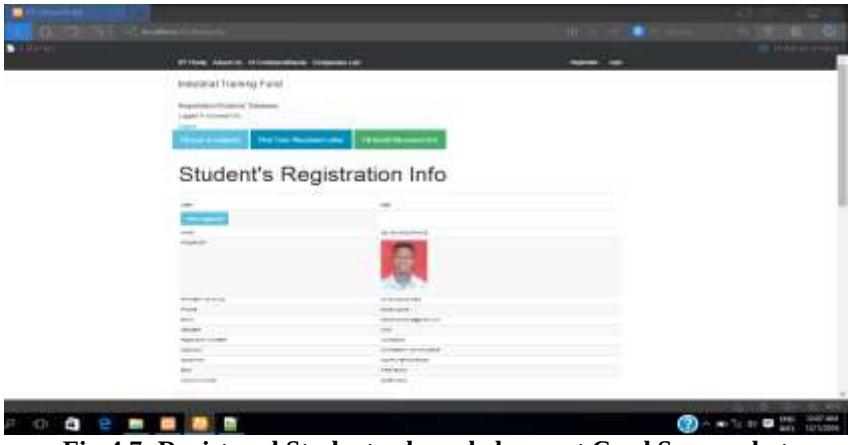


Fig-4.7: Registered Student acknowledgement Card Screen shot

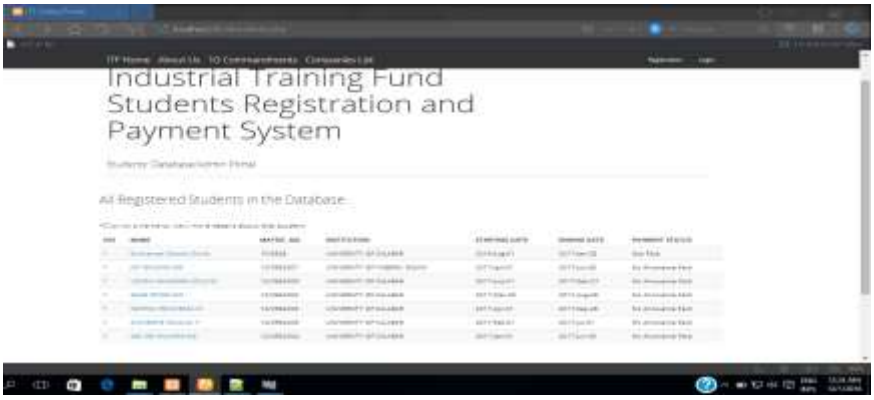


Fig-4.8: SIWES Report page Screen shot

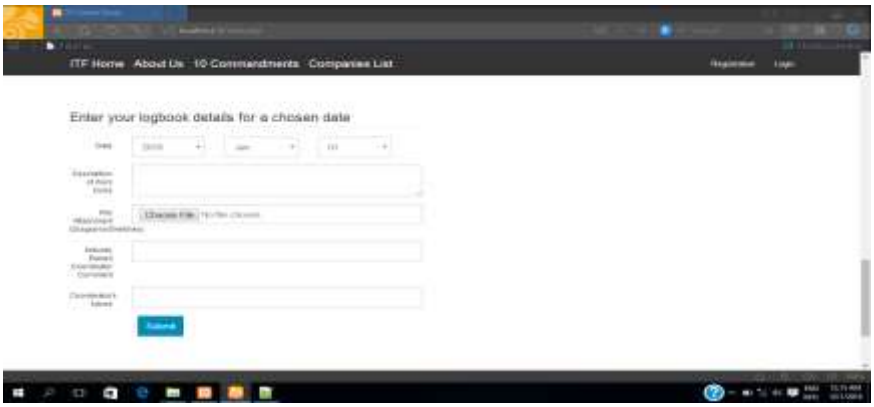


Fig-4.9: Student Online Logbook Page Screen shot

Fig-4.10: Sample automatic Generated Student's Placement Letter Screen shot

CONCLUSION

The industrial training fund student's registration and payment system was developed to automate the functions of SIWES unit to help transform it from its manual state to an automated state. This system was developed as a result of the fact that registration could only done 24/7, and also the unit can be able to manage the large amount of data inflow that comes in during the exercise. The system was developed to ensure the effectiveness and efficiency of the scheme and also make it easy for supervisors to know what the students are being taught by viewing their online logbooks which must be regularly updated by the participating students. The system was also developed to automate the participating students' and supervisors' payment processes payment.

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