DEPLOYMENT OF UNIVERSITY CASHLESS (E-TUITION) PAYMENT SYSTEM: A CASE OF UNIVERSITY OF CALABAR SCHOOL CHARGES

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Abstract

University of Calabar has a large number of students who pay all the university charges through cash deposits and bank drafts to the university's accounts in designated bank branches. These methods of paying fees have not been efficient enough especially during periods of tests and examinations when most students pay fees to meet the requirements for entering examination rooms. The process fee and charges payment is characterized by long queues and waiting time. This has always resulted in students missing out on tests and/or examinations while queuing to make payments. This research therefore, is aimed at developing an Enhanced E-Payment System that enables students of the University of Calabar, as well as their sponsors to securely pay fees online using valid credit and debit cards. Object oriented Analysis and Design was employed in the design of the proposed System. The system was implemented using Apache web server, MySQL database server, Hypertext Preprocessor (PHP), and the Laravel framework. System testing and validation was also done by allowing users of the system to interact with it using several test data. The result of the system is the test result generated from the testing stage.

Keywords: E-payment, Web Technology, ICT.

1.0 Introduction

Organizations always want to make it easy and convenient for customers to pay, as such, they offer multiple choices of payment and media channels (Lwanga et al., 2017). For almost every business transaction, the simple act of collecting payments from customers is often quite complex. Tuition payments by students in University of Calabar are made through cash deposits,

bank drafts and bank tellers to the university's accounts in designated bank branches across Calabar (Unical, 2017).

A well-designed payment infrastructure contributes to the proper functioning of businesses and helps to eliminate friction in trade. If the cost of a transaction exceeds the benefits expected from the trade, services, assets and products might not even be exchanged. The availability of reliable and safe payment mechanisms for the transfer of funds is therefore a sine qua non for the majority of economic interactions (that is, "no payment, no trade"),(Kokkola, 2010).

According to Ashby et al., 2010, tuition is a sum of money charged for teaching by a College or University, Simply put, tuition payments are fees charged by education institutions for instructions, services and knowledge they offer. With that in mind, one can infer that tuition payments are meant to be made on regular intervals. University of Calabar has a very large number of students who are supposedly expected to pay all the university's tuition fees through cash deposits or bank drafts to the university's account in designated bank branches. This method of payments, has over the years, been found not to be very efficient, especially during examination periods, when majority of the students are paying fees to meet the university requirements for entering examination rooms. Typically, the process of fees payment during such periods is characterised by long waiting bank queues, and congestion at the bank where payments are made. Students queue to pay fees and those who do not reach bank counters within the banks' working hours are advised and expected to return the next day to complete payments.

Web technology is growing at an extremely fast pace. It has been estimated that there is a new web page every minute. The ease of use, efficiency and quickness, search engines and international presence of the web has been drawing millions of users towards it. By considering the trend, it is necessary that higher institutions in Nigeria that mostly depends on her student's tuition to operate provide a web-based payment platform for the students (Moertini et al., 2011). Since the University of Calabar is made-up of students from different states, and culture across the country (Nigeria), and their tuition, sometimes are paid directly by their parents and sponsors, it could be best if the payment system can be accessed through the banks wide ATM network, internet, and other cellular networks. This system of cashless transaction is commonly called e-payment or electronic payment.

Electronic payment (e-payment) is defined as a monetary transaction that occurs electronically as opposed to the physical exchange of money or checks. Tangible currency is eliminated and accounts are maintained electronically to reflect the effects of transaction. Electronic payments are categorized as stored account payments or stored value payments. Expectations are that, online transactions will continue to rise. As the number of internet transaction increases, more and more merchants are showing an interest in reaching customers through the web. There are various methods to implement electronic payment processing. However, the most popular payment method adopted is the credit card payment system (Abrazhevich, 2004). In Nigeria, as it

is in many developing countries, cash is the main mode of payment and a large percentage of the populations are unbanked (Ajayi & Ojo, 2006).

2.0 Literature Review

According to Singh (2009), payment systems that use electronic distribution networks constitute a frequent practice in the banking and business sector since 1960s, especially for the transfer of big amounts of money. In the four decades that have passed since their appearance, important technological developments have taken place, which on the one hand have expanded the possibilities of electronic payment systems and on the other hand, have created new business and social practice, which make the use of these systems necessary.

Arkalgud (2012), say e-payment involves trading using the latest electronic equipment and software between the sellers and the buyers. The trade in e-commerce is conducted in a slightly different way than the traditional trading. The earliest form of automation in the financial industry was done to automate the functions of clearing house in bank associations. In 1968, group of California bankers formed Special Committee on Paperless Entries (SCOPE) which led to the formation in 1972 of California Clearing House Association. This was the first regional automated Clearing House. The first form of automated payments was to disburse salaries to employees from an employer's account. Gradually, the information revolution changed the outlook of the banking sector and computerized majority of the functions.

Shon & Swatman (2001) introduced the term electronic payment system to describe any exchange of funds initiated via an electronic communication channel. (Moertini et al., 2011), defined an electronic payment as a payment services that utilize Information and Communication Technology (ICT), including cryptography and telecommunications networks. (Kalakota & Whinston, 1998), showed that an e-commerce electronic payment is a financial exchange that takes place in an online environment. (Arkalgud, 2012), stated that electronic payments are monetary transaction that occurs electronically as opposed to the physical exchange of money or checks. Tangible currency is eliminated and accounts are maintained electronically to reflect the effects of transactions.

One of the most widely used systems for electronic payment is the debit card. Debit cards combine the service of Automated Teller Machines (ATM) cards and cheques (Lwanga et al., 2017) . Another method is the credit card, which is a small plastic card issued to users as a method of payment for online or offline transactions. The service provider or the commercial bank grants a line of credit to the card user, and the card user is required to pay at least a minimum amount of purchases made every month (Harris et al., 2011).

As noted before, in Nigeria, cash is the main mode of payment and a large percentage of the populations are unbanked (Ajayi & Ojo, 2006) . This makes the country to be heavily cash-based economy. the cost of cash to Nigeria financial system is high and increasing; the cost was very

close to fifty billion naira in 2008 (CBN, 2011). Recently, it has been revealed by CBN that the direct cost of cash is estimated to reach a staggering sum of one hundred and ninety-two billion naira in 2017.

3.0 System design and methodology

3.1. **System Requirement Specification**

The major users of the system include; students, sponsors, finance officers in the university finance department, student account head, and the school bursar. Their requirements include the following:

  I. Students/Sponsors should be able to input transaction information on a user interface that accepts them
 II. Students/Sponsors should be able to complete tuition payment transaction online
III. Students/Sponsors should receive feedback that relates the process of online tuition payment
 IV. Students/Sponsors should be able to view and print or save proof of payment whenever tuition payment transactions are successful
  V. Finance officers shall provide authentication credentials to be able to use the system securely
 VI. Finance officers and Bursar should be able to view summarized reports on all payments made through the system.
VII. Student account head should be able to administer service indicators on students' accounts.

3.1.1 Functional Requirement

The functional requirements for the proposed system include:

   I. The system should accept valid input of registered student's payment details from users intending to pay fees online
  II. The system should process tuition payment transaction so that student tuition accounts are credited with the specified amount in each transaction
 III. The system should communicate tuition payment details for each transaction to the university financial information system
 IV. The system should produce a receipt as a proof of payment for every tuition payment transaction made.
  V. The system shall provide access to information about how to make payments online
 VI. The system should produce a listing of transaction information to the finance officers
VII. The system should provide feedback to the student/sponsor describing the status of the transactions
VIII. The system should be able to generate report to finance officers

3.1.2 Non-Functional Requirement

I.   The system shall be easy to maintain
II.   The system shall be compatible with different platforms
III.   The system shall be fast
IV.   The system shall always readily be available on a 24/7 basis
V.   The system should be secure and easily accessible
VI.   The system shall be easy to learn
VII.   The system shall provide easy, and user-friendly interfaces
VIII.   The system shall have a standard graphical user interface that allows for the on-line data entry, editing, and deleting of data with ease.

3.2 System Design

3.2.1 Use Case Design

A use case diagram is a representation of a user interaction with the system that shows the relationship between the user and the different use cases in which the user is involved (Ele, et al, 2017). The use case is representation of this system is shown below.
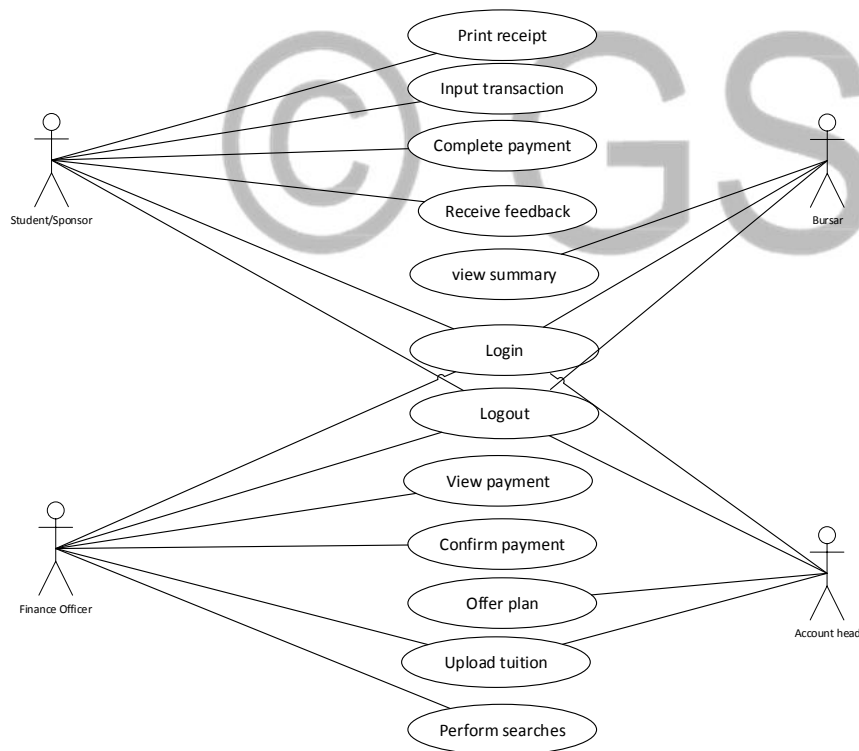

Figure 1: Use Case Diagram of the E-Tuition System

3.2.1   Class Diagram

A class diagram is used to show the relationships between the entities involved in the system together with their attributes and indicate the number of occurrences an entity can exist for a single occurrence of a related entity (Ele, at al, 2017). The class diagram of the system is shown below.
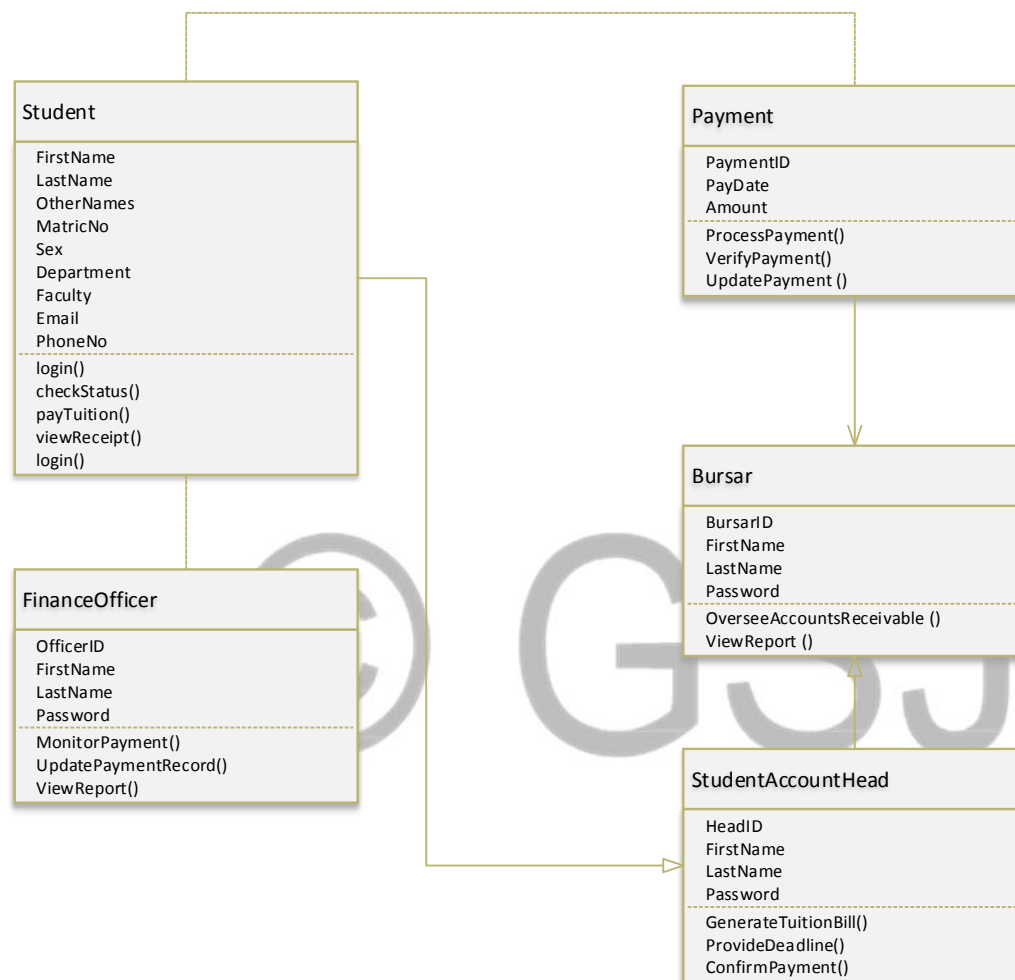

Figure 2: The Class Diagram of the E-Tuition System

3.2.2   Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system. They are graphical representation of workflows of stepwise activities and actions with support for choice, iteration and concurrency. Activity diagrams are intended to model both computational and organizational processes (workflows) (Ele, et al, 2016). The activity diagram showing the control flow of the e-tuition system is represented in the figure below.
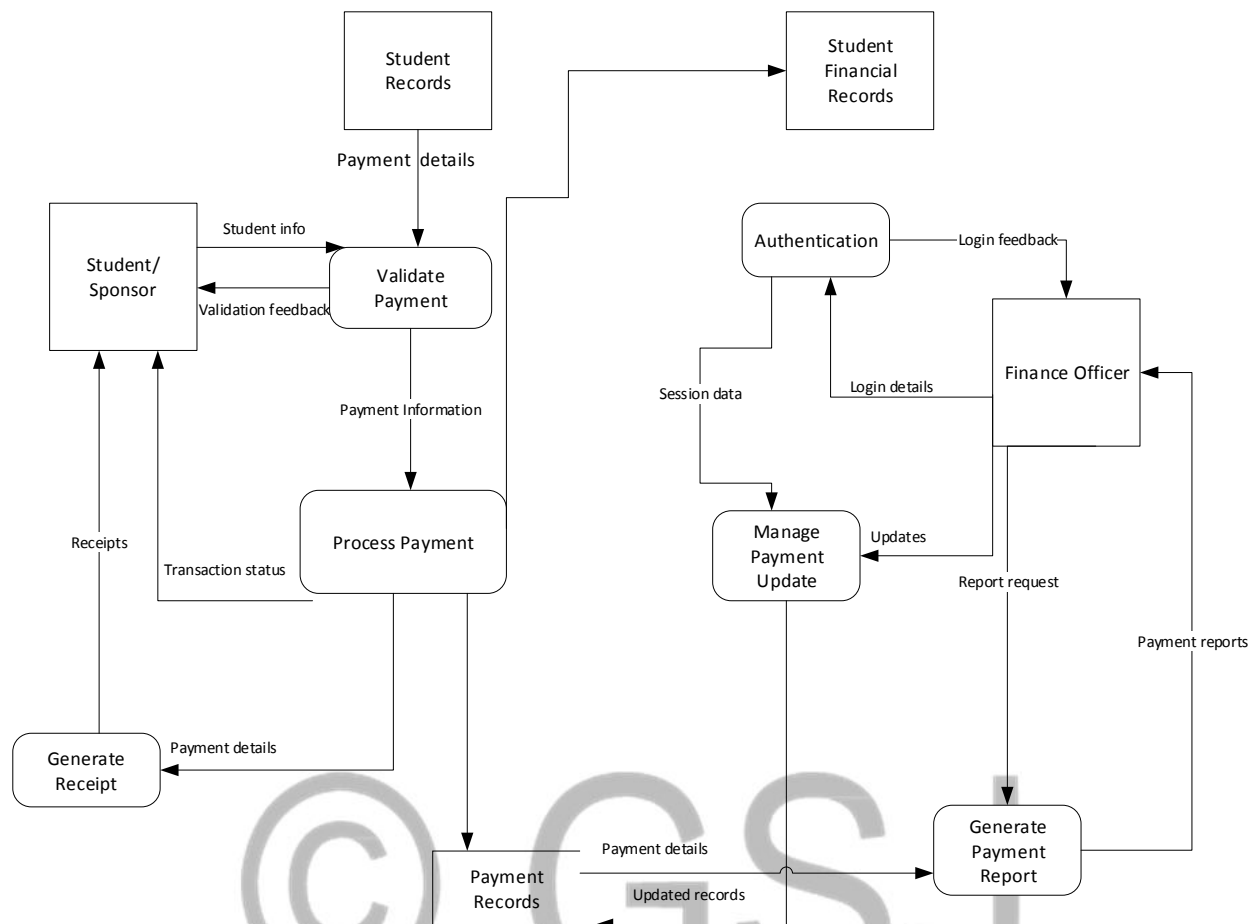
Figure 3: Activity Diagram of the E-Tuition System

3.3 Database Design

3.3.1   Logical Database

The logical schema for the enhanced tuition e-payment system showing the derived relations is given below:

Student (id, matricNumber, firstName, lastName)
PK: id
Payment (id, paymentReference, created_at, amount, matricNumber)
PK: paymentReference
FK: id references student
FinanceOfficer (id, firstName, lastName, password, department)
PK: id
Bursar (id, firstName, lastName, Password)
PK: id
StudentAccountHead (id, firstName, lastName, Password)
PK: id

3.3.2 Physical Database (Table) Design

The physical database design for the enhanced tuition e-payment system is illustrated below:

Table 3.1: Students table

Field Name	Field Type	Null	Key	Description
id	int(10)	No	Primary	Unique auto-generated identifier
firstName	Varchar(255)	No		Student first name
lastName	Varchar(255)	No		Student last name
otherNames	Varchar(255)	No		Student other names
sex	Varchar(255)	No		Student sex
matricNumber	Varchar(255)	No		Student matric number
department	Varchar(255)	No		Student department
faculty	Varchar(255)	No		Student faculty
phoneNo	Varchar(255)	No		Student phone number
session	Varchar(255)	No		Student admission session
email	Varchar(255)	No		Students email address
password	Varchar(255)	No		Student login password

Table 3.2: Payments table

Field Name	Field Type	Null	Key	Description
id	int(10)	No	Primary	Unique auto-generated identifier
amount	Varchar(255)	No		Amount to be paid
cardNo	Varchar(255)	No		The students debit card number
cardVerificationNo	Varchar(255)	No		The student secret card pin
cardCompany	Varchar(255)	No		The issuing card company
paymentReference	Varchar(255)	No		Unique auto-generated identifier for each successful payment made
paymentType	Varchar(255)	No		The type of payment the student made (school fees, departmental dues, faculty dues)
student_id	int(10)	No	Foreign	Reference to the student
Created_at	timestamp	Yes		The date the payment was made

Table 3. 3: Admin table

Field Name	Field Type	Null	Key	Description
id	Int(10)	No	Primary	Unique auto-generated identifier
title	Varchar(255)	No		Career portfolio of the various admins
firstName	Varchar(255)	No		The admins first name
lastName	Varchar(255)	No		The admins last name
email	Varchar(255)	No		The admins email
password	Varchar(255)	No		The admin login password
role	Varchar(255)	No		The admins role (Bursar, Account Head, Finance Officers)
department	Varchar(255)	Yes		The various department each admins belong

Table3. 4: Generate Fees table

Field Name	Field Type	Null	Key	Description
id	Int(10)	No	Primary	Unique auto-generated identifier
amount	Varchar(255)	No		The stipulated amount to be paid for the session
faculty	Varchar(255)	No		The faculty for which the stipulated amount generated for
session	Varchar(255)	No		The session for which the stipulated amount is generated

4.0 Result

The results of the implementation of the prototype of the proposed E-Tuition System are presented in the figures below. All inscriptions and entity/object names used in this system are strictly used for demonstration purposes and does not represent the actual entity to which the name is being used.
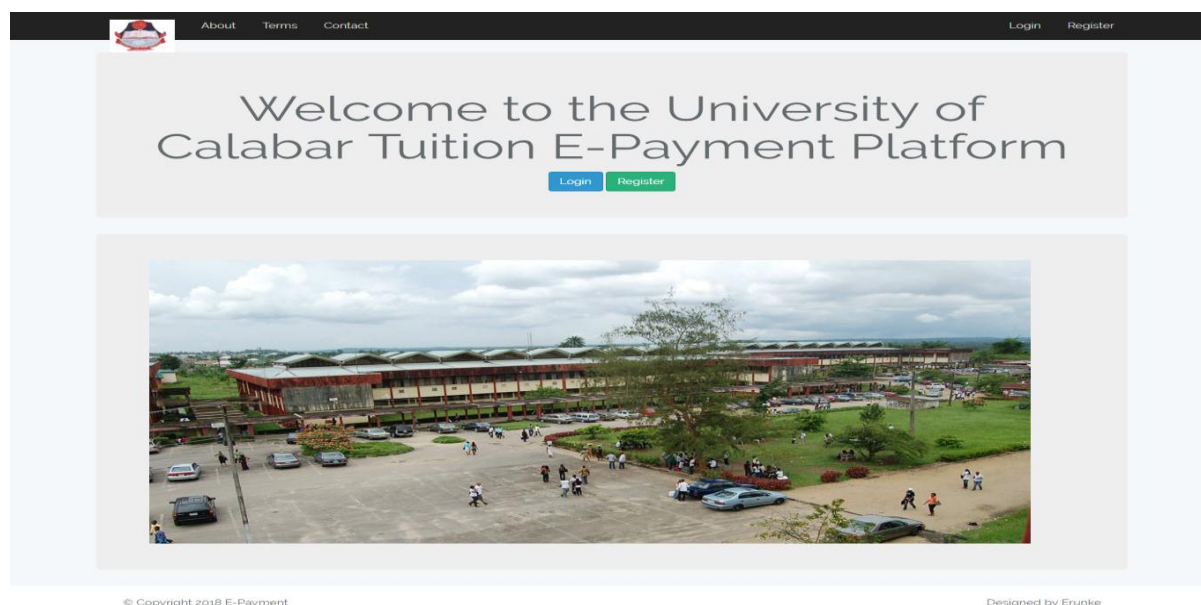
Figure 4: Screen shot of e-payment system Home Page

Figure 4: e-payment system StudentLogin page

Figure 5: e-Payment system Registration page

Figure 6: School Fees Payment page

Figure 7: Faculty Dues Payment page

Figure 7: Faculty Dues payment receipt

5.0 Conclusion

The paper develop a prototype of an e-tuition payment system that can address the difficulties encountered by students, parents and university management regarding tuition payments and collections using University of Calabar as a case study. The Enhanced E-Tuition Payment system was developed to automate the fee payment process to improve situation regarding tuition payments in the University.

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