Online Registration System
(A Case of Methodist University College Ghana)

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Abstract

This paper presents the research and findings of a student registration system at Methodist University College Ghana. It was found out that students have to be physically present on their campuses to do registration for the semester, after the payment of fees. With the numerous alternatives in technological choices, this research sort to find out which alternative would help eliminate the current difficulties students go through in order to register for the semester. This paper analyzed this existing system using the waterfall model leading to a design and development of an online registration system which does not require the physical presence of students on campus but to remotely register.

Keywords: registration system, development

1 Introduction

In this technological era of education and doing business, information is considered to be an important asset for any academic institution. The availability of student data and feedback can help an educational institution to align its business processes according to the needs of its students and stakeholders. The effective management of these data can help institutions reach out directly to their students and stakeholders and also to streamline its activities.

Commitment towards the success of students of higher education can be achieved through innovations such as flexible scheduling, continuous enrolment, a university-wide academic social network, online classes, a digital library, computer simulations and online student registration as well. This innovative approach helps pioneer many of the conveniences of students - a kind of education that is research-proven to be just as effective as conventional instruction.

At Methodist University College Ghana, just like the other universities, students are enrolled to pursue a 4-year academic degree program. Some are also enrolled at either 2nd or 3rd year for a top-up leading to the award of a degree. Students must pass and obtain the minimum university admission requirements of the SSSCE/WASSCE exams in order to qualify for admission. Other admission requirements include a Post-Secondary Diploma or Professional Certifications from a recognized institution or HND.

An enrolled student is expected to register and pay either full or part of the school fees before he can take courses every semester. In most cases, enrolling and having to register every semester involves some manual processes which delay processes for both the university and more especially the students.

Student registration is done by students mostly at a registration center. Students have to move physically to campus: Dansoman, Tema or Wenchi to complete the registration process. In some cases, students move from Tema to

Dansoman campus, about 45 km apart to complete the registration process. The following are the problems inherent with the current system.

- Insufficient online utilities in handling student registration.
- Inability of students to remotely register and access documents like transcript.
- Students take too much time in processing their registration and worse, this can only be done with their physical presence on campus.

It is in this regard that this research looks at the student registration system at Methodist University College Ghana in order to design and develop an online student registration system.

2 Literature Review

2.1 Introduction

In a rapidly emerging world of technological advancement and innovations, computer has become a way of life and a driving force of modern industry and businesses (studymode.com). It has become one of the most significant tools for more productive operations and accurate results (Kramer et al, 2007).

Web development can include a web design, web content development, client liaison, client-server-side scripting, web server and network security configuration, and e-commerce development (Rajapakse, 2012). It can range from developing the simplest static single page of plain text to the most complex web-based internet applications, electronic businesses or social network services (Rajapakse, 2012). Many organizations and institutions increase their investment in web-technology and online systems. The scope of web-based applications has grown enormously and has moved to become a platform that can support all facet of organizational work (Isakowitz et al., 1998).

For this reason, engineers and IT specialists strive and are still vigilant in combining web development to the practical application of scientific investigations and research in developing systems that can support the core business processes of institutions (studymode.com).

2.2 The Role of Information Systems in an Institution

An institution without an information system will have no track record of its performance history or its present status and will be unable to forecast the future of its business. According to O'Brien & Marakas (2007), the fundamental roles of an information system are to support business processes, support decision-making by its employees and support strategies for competitive advantage. Laudon & Laudon (2007) point out that the role of information systems is to help institutions obtain operational excellence to improve the efficiency of their operations in order to achieve higher profitability. According to O'Brien & Marakas (2007), information systems are a major functional area of business that is equally as important to business success as the functions of accounting, finance and human resources management.

2.3 Background Studies of Previous Registration Systems

"The internet has opened many possibilities for the classroom instruction but it can also be a barrier to teaching as well" (Bugeja, 2006). The new innovative technologies provide opportunities to improve learning and create a more exciting and motivating environment (Connors, 2007).

According to a case study by Ralph, Buskirk, and Schmidt (2007) regarding the use of online projects, students in favor of online projects indicated that the accessibility to the professor for fast and easy feedback was a great asset. Furthermore, the study revealed that when implementing technology, students were concerned with the expense of the technology, the necessity for internet access, and the reliability of the technology. Research on student perceptions and satisfaction with online registration of courses provide insights to student reactions and satisfaction with implementation of an online registration system. Hale (2007) found that student satisfaction surveys reveal that the most important reason for taking an online registration is its convenience.

The "widespread availability of computers and the Internet provide considerable enrichment in terms of variety of material and formats for presentation over what was possible with the old correspondence courses" (Walker and Kelly, 2007). The Chronicle for Higher Education (2007) reported that a university stated that they use electronic education to add on to their curriculum, not as the main basis. This lends to the implementation of an online service such as a student registration system to register for courses, take lessons via distant learning and under an exam.

3 Methodology

The data collection instruments used were, Interviews: this was used to solicit information from students, the faculty officers and staff of the programming unit of MUCG and also, some of the university's registration records were examined. DFD, Use Case Diagrams and Sequence diagrams where used to model the existing and proposed system. PHP and MySQL were the tools used to develop the system.

3.1 Analysis of the Current System

According to Temple (2006), the registration process involves step-by-step interdependent actions that work together to produce outcomes.

3.1.1 Context Diagram of the Current System
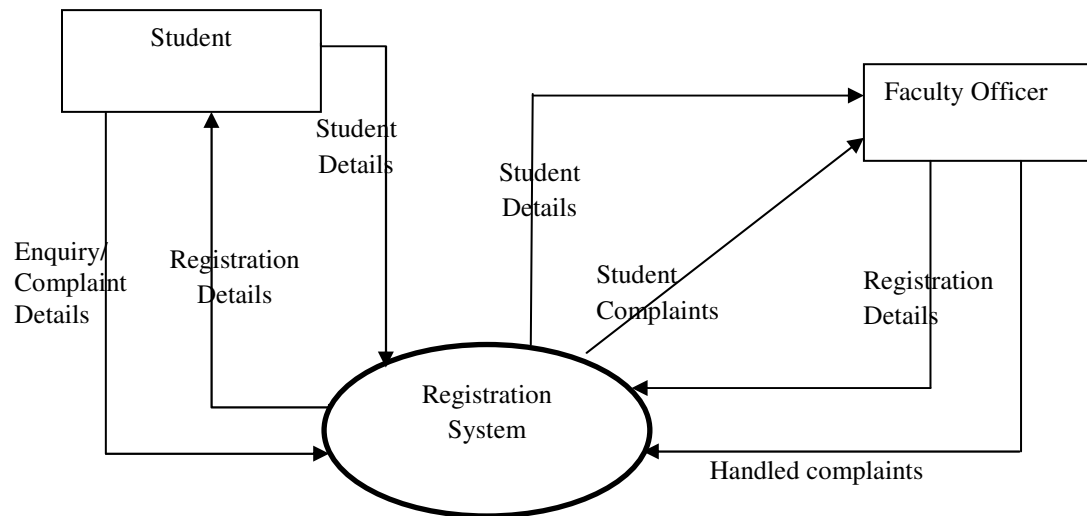
Fig. 1: Context Diagram of the Current System

In the current system, a student having to register must first come to the school to go through the processes. Students are expected to deposit cheques or bankers draft at the cash office before a slip is printed out to take to the Faculty Officer. At the bank, students queue for long hours as well as at the registration centers (faculties). During the registration, each student is asked to provide some basic personal information such as his/her index number to begin the registration process. The student's personal information obtained is fed into the registration system, the Faculty/Registration Officer then checks to see if details given by the student are correct and then there is selection of courses. The student is then handed the registration printout and made to append his signature in a book to confirm his registration. The printout shows the date and time of registration, courses registered with the number of credit hours allocated for each course. The student must check the courses registered to be sure those are the ones he has to offer for the semester.

This is done in the first two weeks of reopening, as a registration center is opened. After that period, students have to go to the office of the Faculty Officer to be registered. A Student who does not meet the deadline attracts a penalty depending on the number of days after the deadline, especially continuing students. For the fresh students, there is a time frame after which you are not allowed to register.

The current system requires the physical presence of the student on campus. The student goes to the registration center to continue the registration process after payment of the required fees. Fresh students go to the programming unit to have their bio data checked and passport photographs taken before they can go to their respective faculty offices to be registered after two weeks.
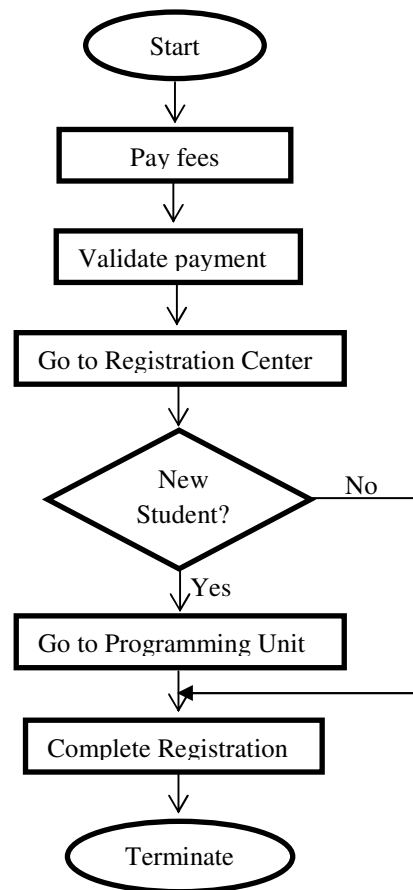
3.1.2 Flowchart of the Current System

```
                    ┌──────────┐
                   (   Start   )
                    └────┬─────┘
                         │
                         ▼
                  ┌──────────────┐
                  │   Pay fees   │
                  └──────┬───────┘
                         │
                         ▼
                 ┌────────────────┐
                 │ Validate payment│
                 └───────┬────────┘
                         │
                         ▼
              ┌──────────────────────┐
              │ Go to Registration Center │
              └──────────┬───────────┘
                         │
                         ▼
                      ╱╲
                    ╱    ╲
                  ╱  New   ╲        No
                 ╱ Student? ╲──────────┐
                  ╲        ╱           │
                    ╲    ╱             │
                      ╲╱               │
                       │ Yes           │
                       ▼               │
              ┌──────────────────────┐ │
              │ Go to Programming Unit │ │
              └──────────┬───────────┘ │
                         │◄────────────┘
                         ▼
                ┌──────────────────────┐
                │ Complete Registration │
                └──────────┬───────────┘
                           │
                           ▼
                    ┌──────────┐
                   ( Terminate  )
                    └──────────┘
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Fig. 2: Flowchart of Current System

3.1.3 The Current Payment System

The current system accepts payment in cheques and bankers draft from all banks in the country. However this may take one or two forms reflecting the category of students who are admitted into the school. The school admits two categories of students: Foreign and Ghanaian students. The major services charged at the University include: Admission Fees, Registration Fees, Library Services, Computer User Fees and SRC dues, etc.

3.2 The Proposed System

To obtain information about the student registration system, it was necessary to interview students, the responsible staff like the Faculty Officers and staff of the Programming Unit. Getting to know how the University conducts its registration helped flag any apparently unusual aspects. Understanding the concerns of students helped to incorporate them in the development of the proposed system.

With the gathered data, a use case diagram was developed to incorporate the actors of the system. Students and faculty officers play a critical role as actors. It is conceivable that other actors may be added in subsequent iterations. Fig. 3 shows the use case diagram of the proposed system.
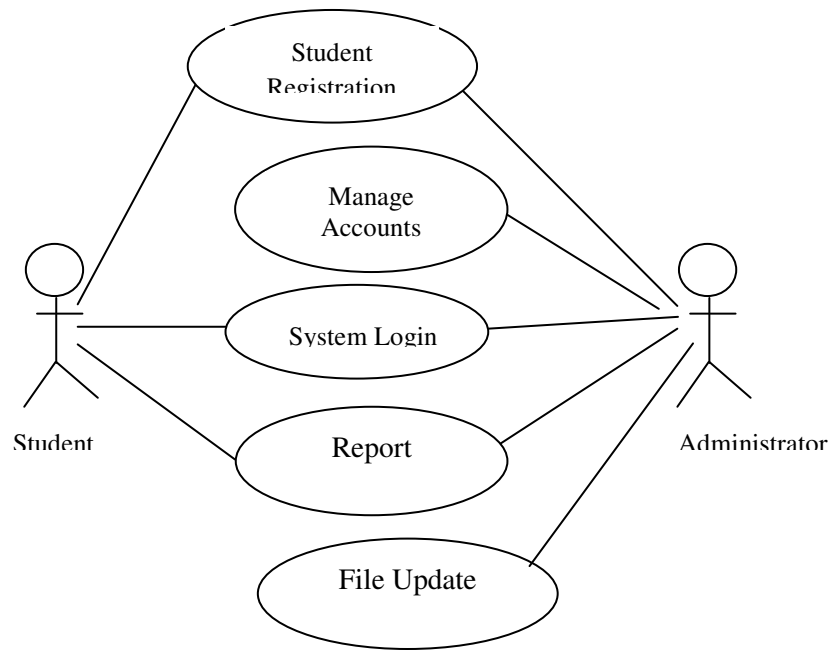
Fig. 3: Use Case Diagram of Proposed System.

At the start of each registration day, each front-end system is connected by a TCP. One process for each connected front-end is created on the system; this process is responsible for interpreting the messages from the front-end and translating them into corresponding operations on the registration database. In order to balance the load on these systems, each user is asked to connect to a client system. If that system is unavailable, then the user is asked to try a particular backup system from among other machines.

Prior to the start of the registration, the database is pre-loaded with data pertaining to existing students. Under some circumstances, it is expected that a small number of new student records would have to be created during the registration process.

3.2.1 Network Architecture the Proposed System

Figure 3.6 depicts the design of the network architecture of the proposed system. This design serves as a communication between the various components of the system network and how it is implemented. It is a framework for the specification of the network's physical components and their functional organization and configuration, its operational principles and procedures.
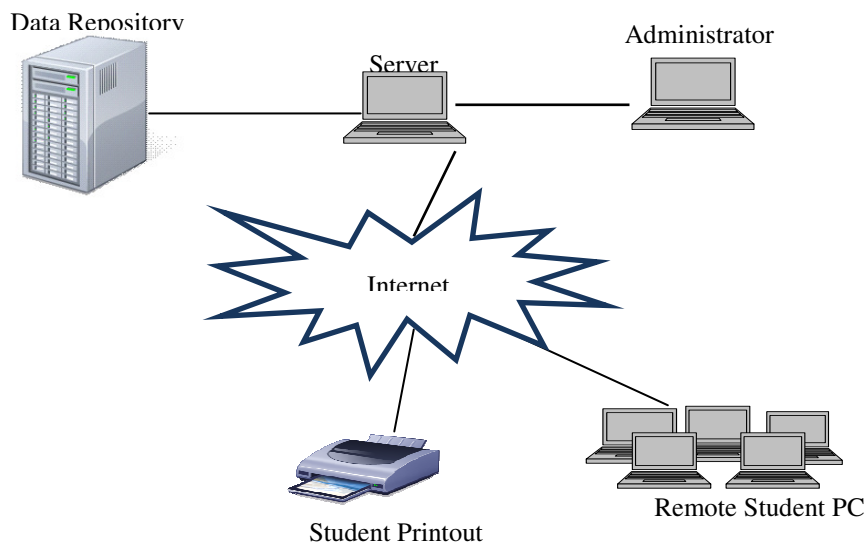
Fig. 4: Network Architecture of the Proposed System

4 Design of the Proposed System

There is no more need for opening a registration center to do the registration. A student can remotely register from any location.

Context Diagram of the Proposed System
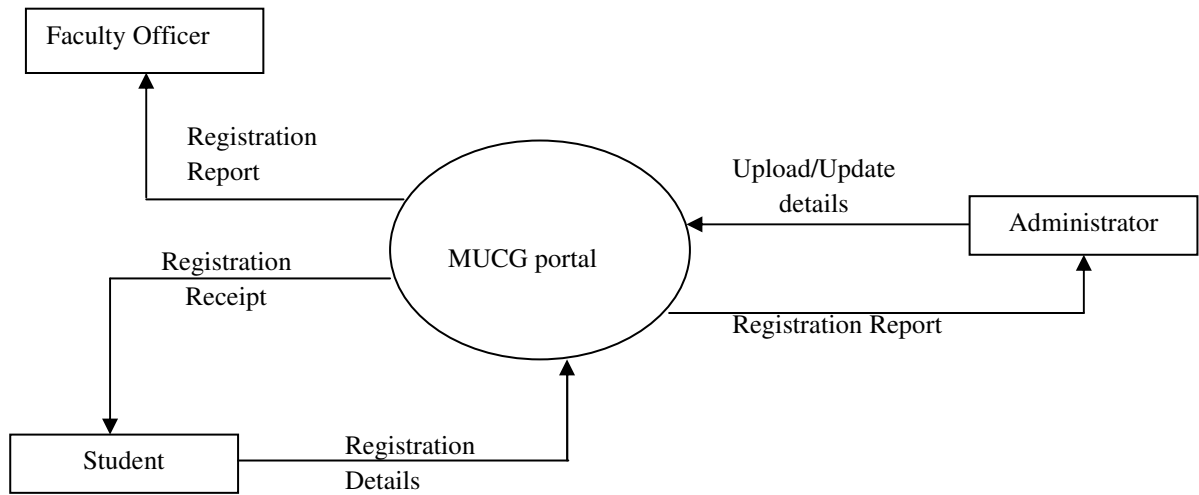
Fig. 5: Context Diagram of the Proposed System
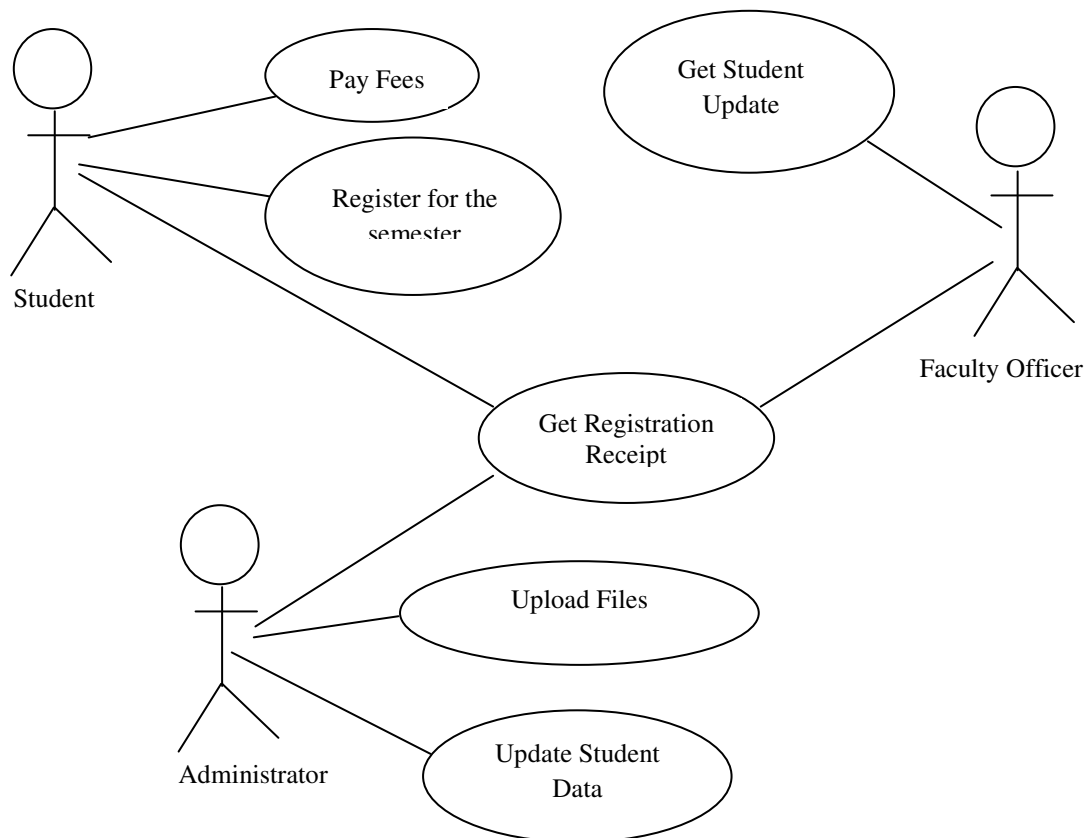
Fig. 6: Exploded Use Case Diagram of the Proposed System

4.1 Registration Subsystem

This is the main and the most important subsystem of the web portal. The system can manage the registration activities in real time thereby solving the registration problems inherent with the current system.

A student after making payment of fees at the bank is given a receipt with a code. He needs this code when doing the registration to validate his payment. Students are able to register on their own anywhere and not having to come to campus if this new system is implemented. This eliminates the long queues and pressures of the old system.

The registration process is a vital component of the system, and must be transparent to the end users. The student gets two reports as feedback; a confirmation of registration and a confirmation of payment.
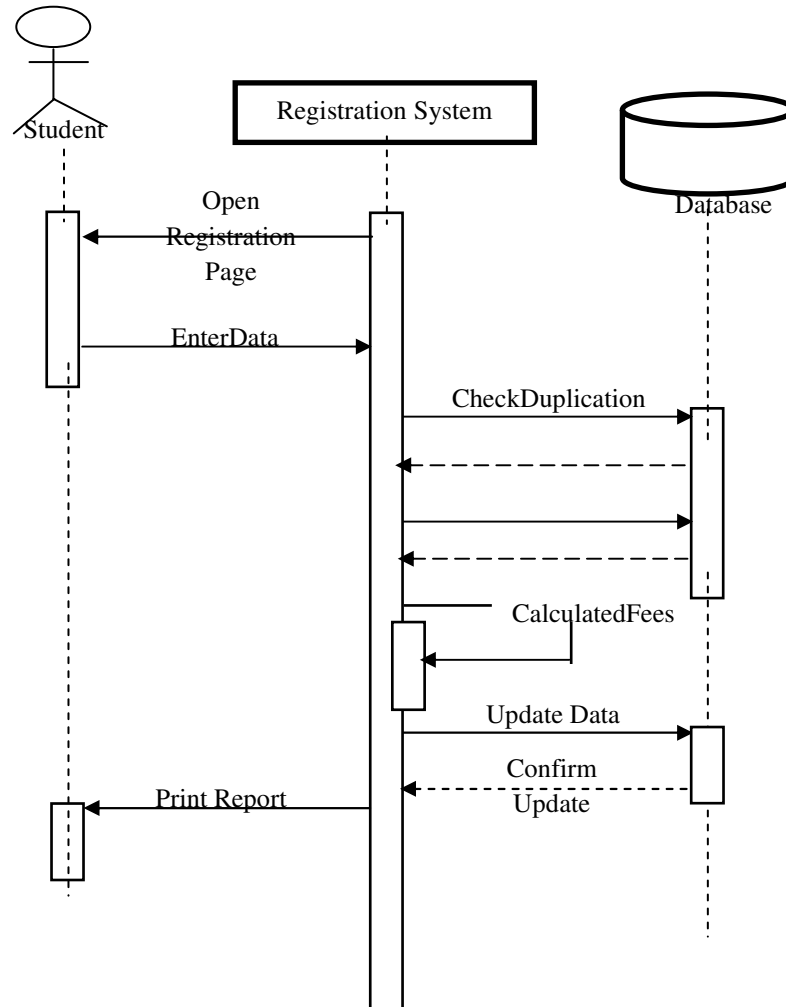
Fig. 7: Student Registration's Sequence Diagram

What goes inside is a set of operations depicted in Fig. 7, showing a Sequence Diagram of the Registration Process. The Sequence Diagram shows system objects and how they interact with each other and the order in which these interactions occur (IBM, UML's Sequence Diagram, 2014).

4.2 Repository Subsystem

Looking at the System's sequence diagram, it's clear that there are three means of communication between system users and the registration system. The first communication method is by using the reporting subsystem which issues different types of reports as demanded. Another method is by updates done by system's administrator, and viewed by Faculty Officers. The last method is by using the System Repository. It is a tool that enables students to

download files necessary for managing their school activities. Such files include the payment history, bills for next semester, course registration confirmation and program of study.

Users of the system may link to the latest regulations and news issued by MUCG authorities and can also download various files. Files are uploaded by a user with administrator privileges having different formats: PDF and DOC.

4.3 System Features

The system utilizes codeigniter framework which makes it necessary to build system components and objects. This system was developed using PHP as the webpage design tool in combination with HTML as the technology that provides the necessary coding behind the web pages. The application connects to MySQL Server database, which plays the role of the RDBMS associated with the application. Users of the system can run the application through their internet browsers, such as IE v6 or higher.

4.4 Database Design

The proposed system is a 3-Tier web-based system meaning a Client/Server Architecture in which the user interface, functional process logic (business rules), computer data storage, and data access are developed and maintained as independent modules, most often in different platforms. Fig. 8 shows a 3-Tier Architecture design.

4.5 The Database Layer

The proposed system's database is developed using MySQL Server. This layer provides high connectivity and availability. It provides system developers with the ability to manage and administer databases easily, especially using the Graphical User Interface (GUI) of its Management Studio. In addition, it enables developers to either create their own stored procedures or use built-in ones.

Using MySQL Server as a RDBMS gives the user the ability to create server-side cursors to iterate programmatically through different table records and manipulate them row by row. At development time, developers may need to process resulting records at the server without the need to use another programming language, i.e. by means of the built-in functionality of the RDBMS.

4.6 The Application Layer

As shown in Fig. 8, the Application Layer contains the User Interface (UI), Business Rules, and the Data-Access Components. In this system, PHP is used to provide data access to the MySQL Server 2008. All the accessing data codes and business rules implementation were developed using PHP framework codeigniter; the code was written in files, each contains a class or more to handle the operations of web forms. Internet Information Services (IIS) v5 or later must run on the Application Server.

4.7 The Client Layer

The simplest client must have a PC, preferably running Windows XP with Internet Explorer (IE) installed to enable the client to browse the website over the Internet. As a web-based application, all processing is done on behalf of the users' computers on the server hosting the system. So, other operating systems such as Linux, UNIX, MacOS, etc. would be acceptable on client machines.
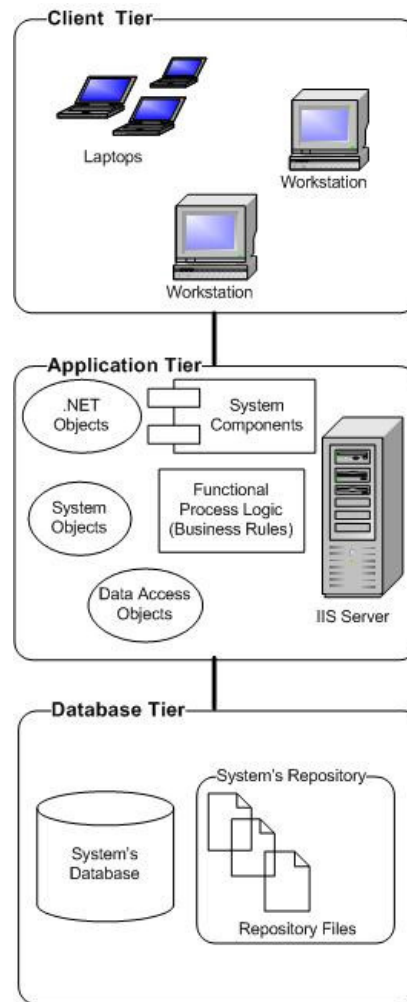
Fig. 8: 3-Tier Architecture design

5 System Development

The system was developed successfully resulting in the following below; a brief of the entire solution.

Login Screen

Fig. 9 shows the login screen. Depending on your user rights (i.e. Continuing or Fresh Student), one must enter a login ID and password. A fresh student must key in his application code and pin (which is given after payment of fees) in order to continue with the registration process. This is shown in Fig. 10.
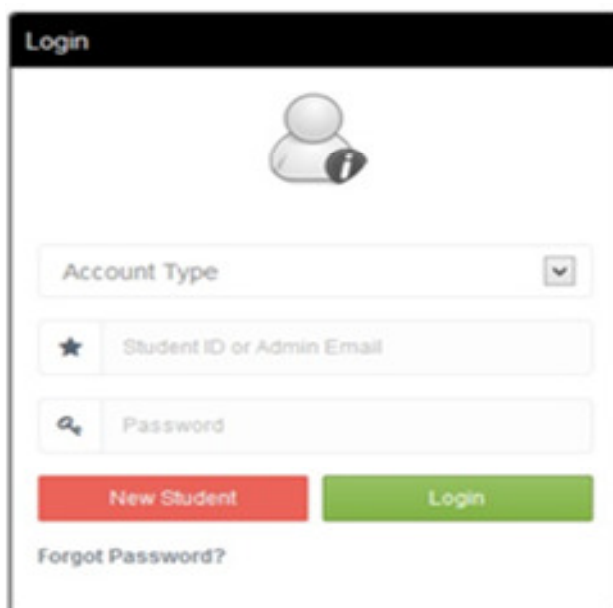
Fig. 9: Login Screen

Fig. 10: New Student Admission

The Main Menu

Once a student is granted access, he is able to go to the menu items depicted in Fig. 11 below.
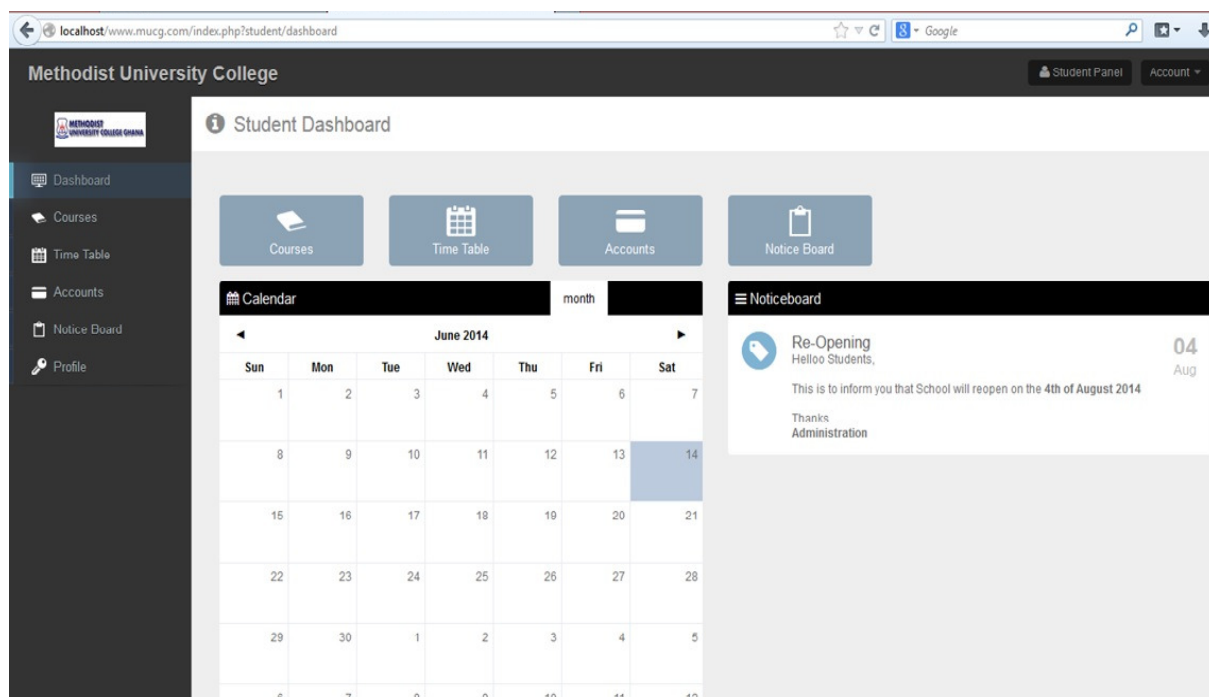
Fig. 11: Main Menu

Online Registration Subsystem

Fig. 12 shows the interface that lets a student register for his/her semester's courses after payment of required school fees for that particular semester. In this case a continuing student must key in a pin and a code which is given after payment of his fees.
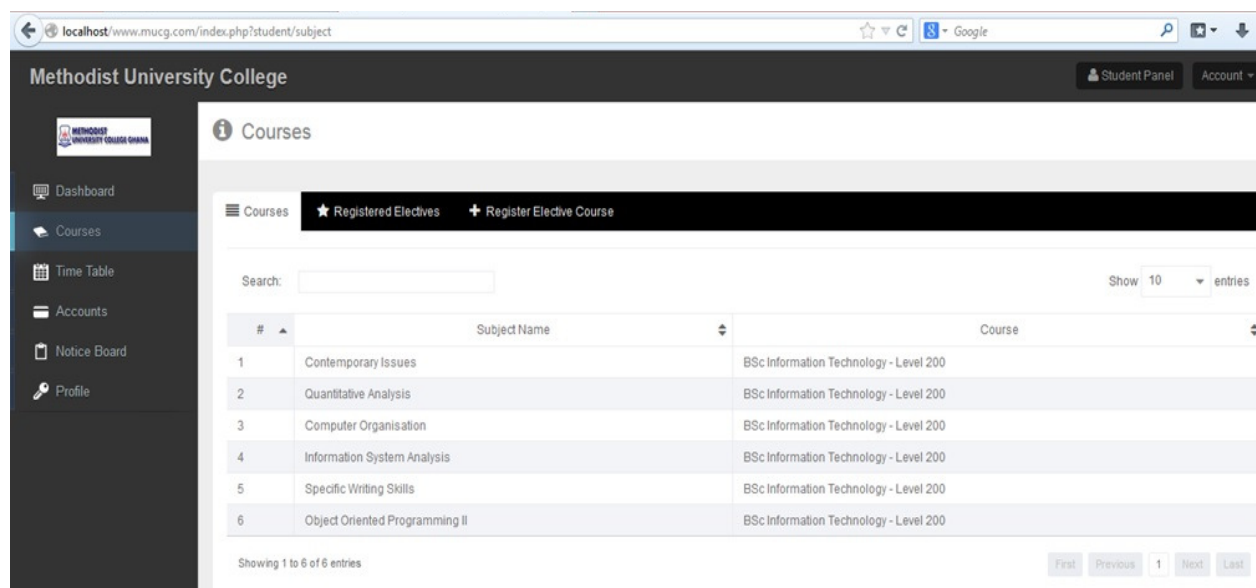

Fig. 12: Course Registration Details

The student can view his or her personal details.

Fig. 13: Student Personal details

Students can also view his/ her payments made. Fig. 14 shows a payment receipt of a student.

Fig. 14: Student Payment Receipt

6 Conclusion

According to Smith (2002), technology, organization and people must cooperate and support one another to optimize the performance of the entire system. Integrating the role of information systems in the registration process of students helps to identify, correct defects, problems, and inefficiencies. In this way, an institution can monitor as well as address its students' complaints and develop quality improvement solutions that will increase client satisfaction. This proposed system if implemented will allow students to register remotely without having to be physically present on campus. This would be a huge improvement in service to students as well as cutting off cost for the University.

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