E-Commerce in a Closed System: Development of an E-Marketspace for a University Community.

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ABSTRACT

E-commerce opens up the market to otherwise closed communities providing a market space for trade in contrast to the location dependent market place. A typical university typifies such a closed system, which is usually populated enough to benefit from a web-based application. This paper presents the design and implementation of an e-marketspace for use in a university community. The methodology used for the design is the waterfall model. The system design was represented using a data flowchart and logical diagrams and implemented using PHP, CSS, HTML, Bootstrap and MySQL for the database query.

(Key terms: closed system commerce, consumer to consumer, C2C, electronic commerce, e-commerce, e-marketspace, university, web-based system)

INTRODUCTION

In the last ten years, the internet has completely revolutionized the manner in which goods and services are exchanged, both locally and globally, leading to the terminology: electronic commerce. Electronic commerce, commonly referred to as "e-commerce", has been defined by the World Trade Organization as the sale or purchase of goods or services conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders; and even though goods or services are ordered electronically, the payment and the ultimate delivery of the goods or services do not have to be conducted online (WTO, 2013).

Leong, Pan, Newell, and Cui (2016) describe how Information and Communication Technology (ICT) transformed some remote villages in China through self-organizing ecosystems. Leong et al.

(2016, p.476), describe it as the "emergence of e-commerce villages in rural China, which epitomizes ICT enabled development driven by a community". They argue from their findings that ICT allows for reconfiguration of interdependencies and for visibility of involvement while allowing for role repositioning.

The notion of "marketspace" as distinct from "location" is described by Clark (2000) as the virtual context in which buyers and sellers discover one another, and transact business and expatiates further that "marketspace" is a working environment that arises from the complex of increasingly rich and mature telecommunications-based services and tools, and the underlying information infrastructure. The term "marketspace" was originally used by Rayport and Sviokla (1994).

Through the years, businesses have evolved from being face-to-face transactions where buyers and sellers have to converge to carry out a transaction (popularly known as traditional markets), to transactions carried out over the internet, using electronic or computer means to communicate to the buyers and sellers.

Presently, the situation is such that a buyer need not communicate with the seller in order to complete a transaction online. With the click of a button, a buyer can effectively show his/her interest in obtaining a product at a certain price and quantity. This technology of transacting businesses online has benefitted the economies of countries, businesses and individuals in many ways.

Andam (2013) mentions that to businesses, aside from reducing the cost to conduct business transactions, it acts as an equalizer, enabling start-ups and small- and medium-scale enterprises (SMEs) to reach a global market

alongside the bigger, well established companies. Businesses that adopt the use of the e-marketplace are not restricted by time and space and as such, can make their products available to customers beyond geographical borders.

According to Andam (2013), individuals, or customers as the case may be, benefit from e-commerce as it offers a faster and more open process, with customers having greater control as they are given more influence over what and how products are made and how services are delivered, thereby broadening consumer choices.

Coming down to the tertiary institution environment, where there are dozens of student and staff business owners who need a wide market for their businesses, an e-commerce site dedicated to university community businesses can prove to be very beneficial and necessary.

Although the modes of operation are basically the same, there are various types of e-commerce and also different classifications of business model types in e-commerce. This paper focuses on consumer-to-consumer (C2C) e-commerce and the advertising business model type. Clark (2000) defines C2C e-commerce as commerce between private individuals or consumers.

Abdollahi and Leimstoll (2011), describe the advertising model as that in which the e-commerce company offers advertising services and products. The company provides the services for the publication of advertisements on the websites and appears more like the broadcaster of the advertisements.

The Problem

There are two major C2C e-commerce sites in Nigeria – Jiji (www.jiji.ng) and OLX (www.olx.com.ng). Two sites known for their e-marketspace to university communities were offline at the time of the writing of this paper. One is MakeWeConnect (http://www.makeweconnect.com) which is an e-marketplace that specifically caters for students of Ibrahim Badamosi Babangida University, Lapai (IBBUL) but the site is no longer active. Another is Campus Trader (http://www.campustrader.com.ng) which has all the higher institutions in the country listed. Students from a certain university register under that university and conduct businesses in

that domain. Before going offline, only students in the Federal University of Technology (FUT), Minna had items listed for sale.

The existing manner of conducting business transactions within a university was analyzed and the major weakness observed was that moving from room to room to market goods and services wastes time that could be used for other productive things leading to a low customer base. The objectives therefore, of developing an e-marketspace for the university community is to design an e-commerce site where products and/or services can be uploaded and viewed by interested buyers. Buyers can then contact the seller of a particular product directly to facilitate purchase.

DESIGN OF THE E-MARKET SPACE

The conceptual framework for the e-marketspace system was designed to include the following elements:

1. A database for storing information.
2. An application system and
3. Technology platform used to deliver the services.

The overall architecture for the system is shown in Figure 1.

The following files, referred to as site assets, were proposed to develop the e-marketplace:

a) HTML files: Hypertext Markup Language (HTML) is the most widely used language on the Web to develop web pages. Hypertext refers to the way in which Web pages (HTML documents) are linked together. As the name implies, HTML is a Markup Language which means you use HTML to simply "mark-up" a text document with tags that tell a Web browser how to structure it to display.

b) CSS files: CSS is used to control the style of a web document in a simple and easy way. It is a simple design language intended to simplify the process of making web pages presentable. CSS handles the look and feel part of a web
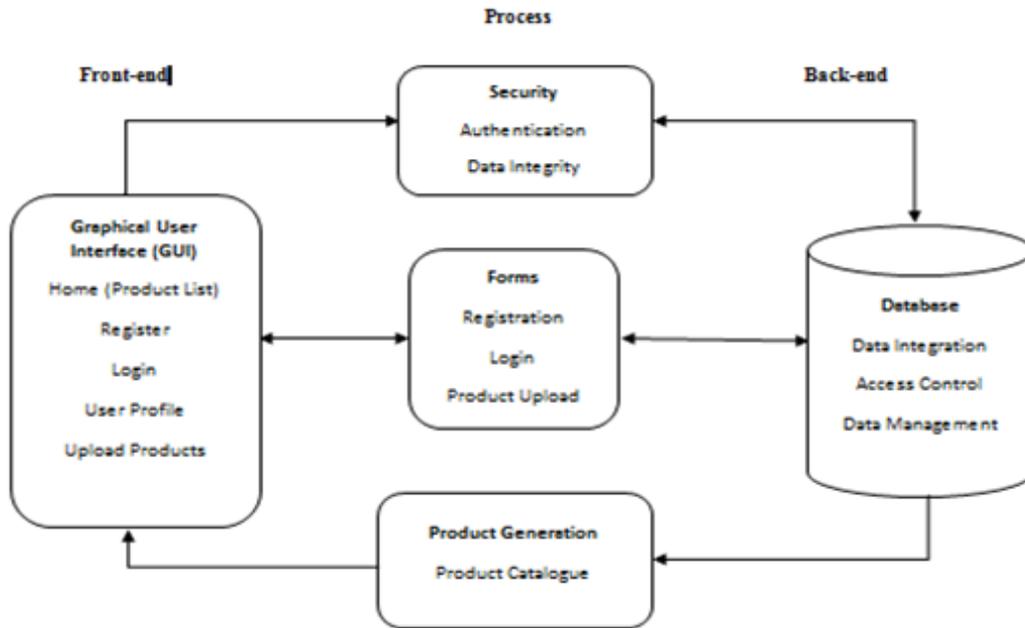
Figure 1: Architecture of the Proposed System.

page. Using CSS, one can control the color of the text, the style of fonts, the spacing between paragraphs, how columns are sized and laid out, what background images or colors are used, as well as a variety of other effects.

c) Bootstrap files: Bootstrap is a sleek, intuitive and powerful mobile first front-end framework for faster and easier web development. It is the most popular HTML, CSS and JS framework for developing responsive, mobile first projects on the web.

d) Images: These are binary files that are rendered visually by the browser. Modern web browsers typically use three image formats: JPG files (for photographs or other photorealistic images with many colours), GIF files (for computer-generated graphics that use continuous tones) and PNG files (which can display both photorealistic and continuous tone images). Both GIF and PNG files support transparent backgrounds, while JPG files do not.

e) PHP: The PHP Hypertext Preprocessor is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is used for developing web based software applications. PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server. It is available for most operating systems and web servers. PHP may be run as a separate program or compiled as a module for use with a web server.

The flow of the system, from its input, processing and output is illustrated in Figure 2 using a flow chart, while the context diagram is shown in Figure 3.
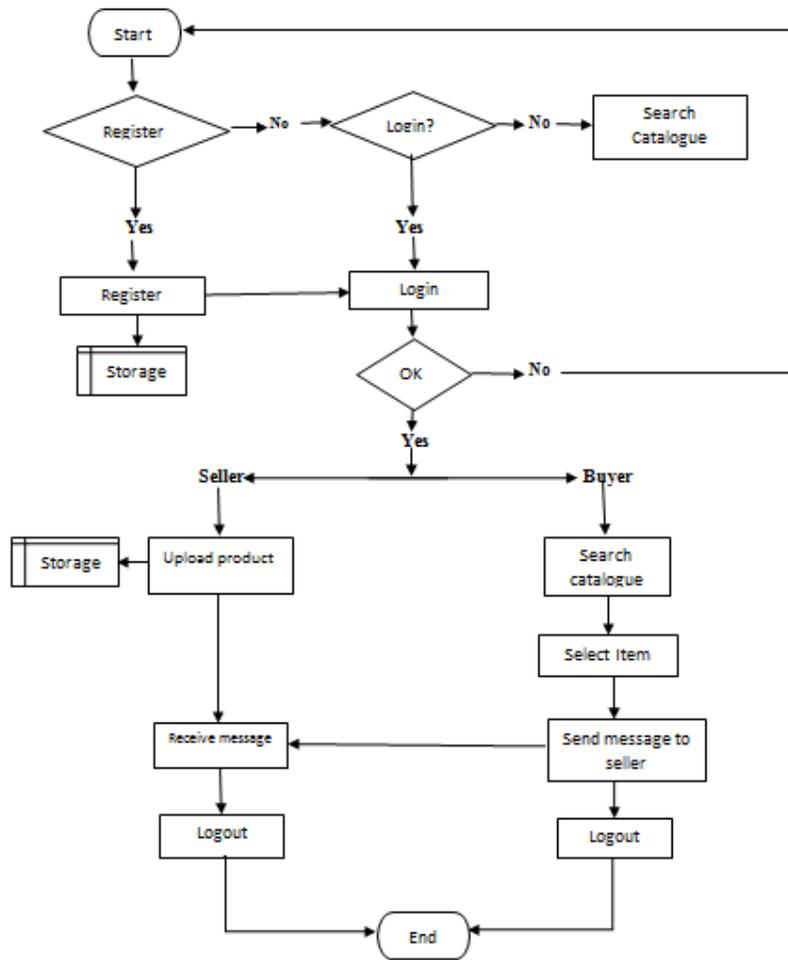
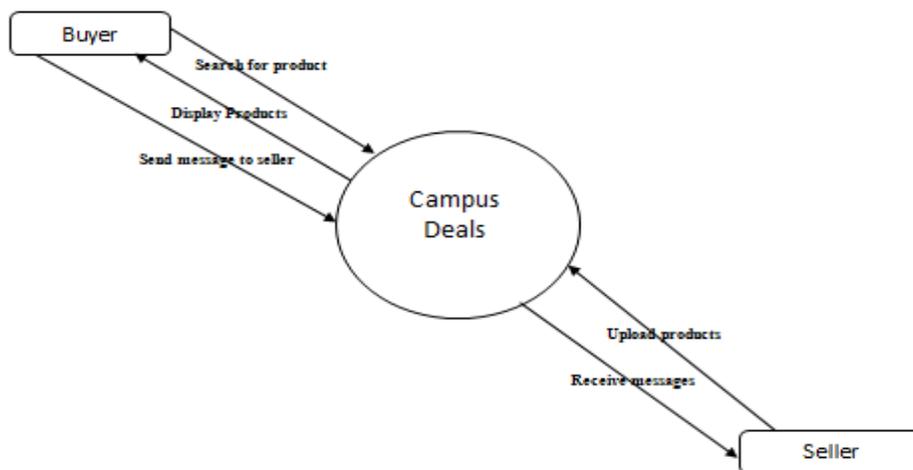**Figure 2:** Flowchart of the Proposed System.

Figure 3: Context Diagram of the Proposed System.

Database tables were created to capture details of users and details of uploaded products, including pictures of the product. This was to enable product listing on the homepage and viewing by buyers. This also enables product grouping by categories.

IMPLEMENTATION

The system design was implemented using the following technologies:

a) XAMPP (Cross platform, Apache, MySQL, PHP, Perl) server was used to facilitate the development of the e-marketplace.
b) The Windows operating system was the operating system used to design the system.
c) PhpMyAdmin is a free and open source tool written in PHP intended to handle the administration of MySQL or MariaDB with the use of a web browser. It can perform various tasks such as creating, modifying or deleting databases, tables, fields or rows; executing SQL statements; or managing users and permissions.
d) The web pages were created using HTML, CSS, and Bootstrap. All pages were saved with a .php extension.

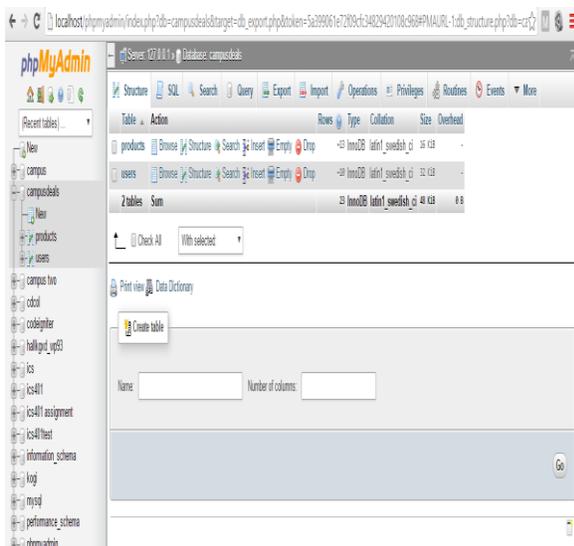The database tables created with PhpMyAdmin are shown in Figure 4 below.

Figure 4: Database containing PRODUCTS and USERS tables.

The database was populated with dummy data about users and products. The data were collected via HTML forms shown in Figures 5 and 6.
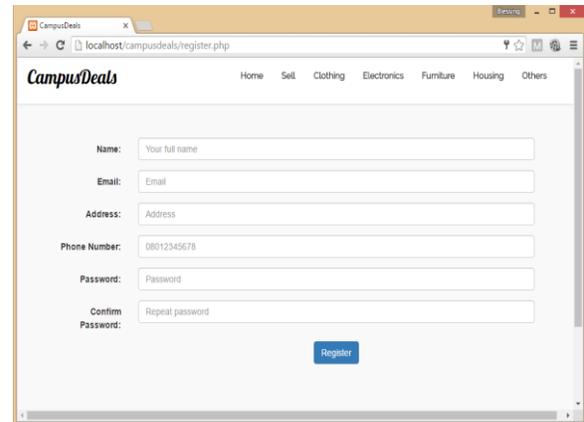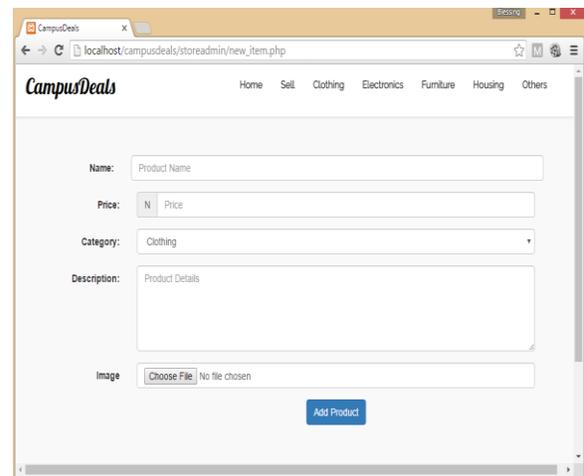

Figure 5: User Registration Form.

Figure 6: Product Upload Form.

SYSTEM TESTING

The developed system, christened *CampusDeals*, was hosted on a XAMPP local server and the various components tested for coherence and functionality. Typing the address of the index.php file, the Home page shown in Figure 7 was launched.
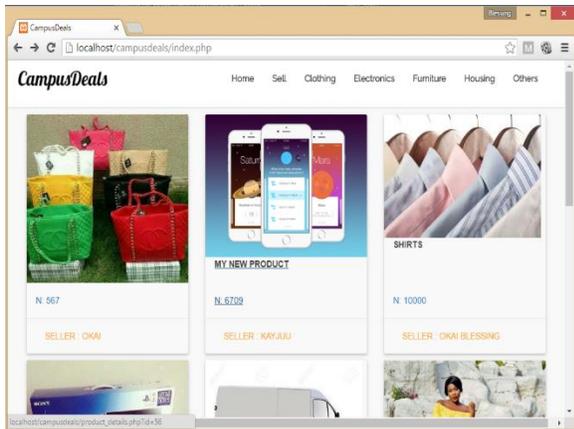
Figure 7: Home Page of the Application.

The Home page of the e-marketspace is the first page that loads when the site URL is entered. The Home page displays a catalogue of the available products in the store including their images, name, prices and seller. From the Home page, a potential buyer can click on a product that redirects to the product page shown in Figure 8, or the potential buyer can click on a product category shown at the top navigation bar of the header to list all products related to a specified category as shown in Figure 9.
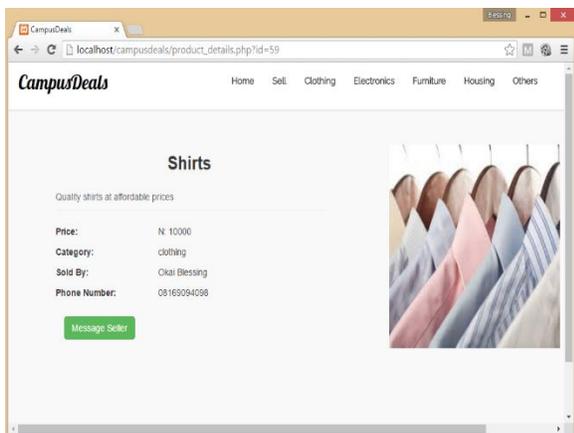

Figure 8: Product details page.

Once a buyer clicks on a desired product, he is redirected to the product details page. A full description of the product as inputted by the seller when uploading is available for viewing.

Other information provided by this page includes the product name, price, category, product image, seller name, seller phone number, and seller email.
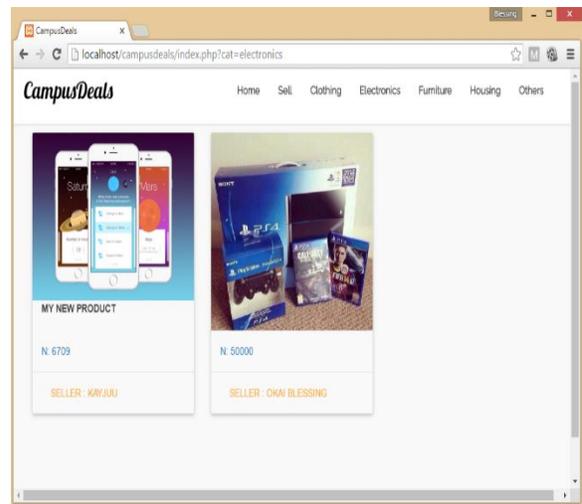

Figure 9: Product Category Page.

Clicking on the "Message Seller" button, takes the buyer to the mailing application to send an email to the seller.

Once a seller has registered and uploaded a product to his/her store, the seller can edit a particular product's details (Figure 10) or delete a product entirely from his store (Figure 11).
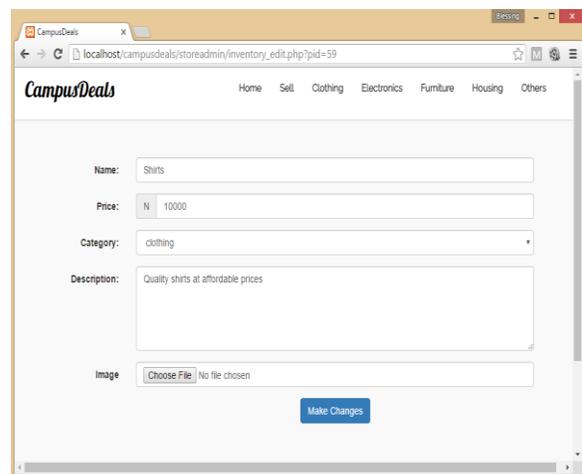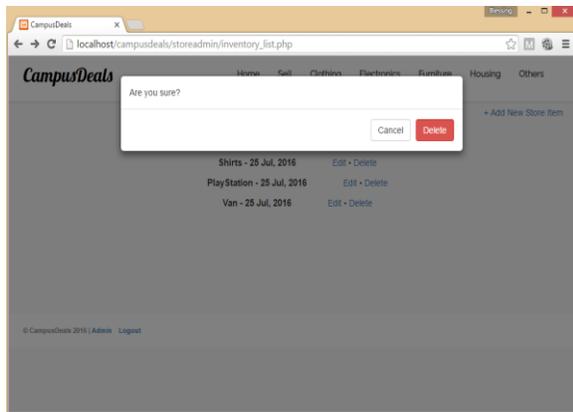

Figure 10: Product Edit Page.

Figure 11: Delete Confirmation Notification.

CONCLUSION AND RECOMMENDATIONS

This paper has outlined the development of an e-marketspace for a university community. The purpose was to build a platform for members of the university community to expand their customer-base, either by advertising business goods or services or providing a channel for individuals who need to sell new or used products or advertise personal services to do so. The verdict of the handful of evaluators is that the developed system meets these purposes. We, therefore, recommend that any university that wishes to adopt CampusDeals should have it hosted on the university's website.

The system was designed to deliberately cater for a face-to-face exchange of goods and money mainly because of security and to avoid scams. This could be a limitation and it is recommended that future enhancements to the system could include a business-to-consumer (B2C) module with an option for online payment.

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