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HarBest: An e-Commerce Agricultural Product Delivery Service Analyzed and Designed Using Progressive UI Framework and MySQL

Ruth G. Luciano[1], Kenn Bryan L. Agregado[2], Warren John C. Capinpin[3], Johnny C. Galvez[4], Cosme C. Planos, Jr.[5]
Nueva Ecija University of Science and Technology

ABSTRACT

This study was conducted with the aim of analyzing and designing an e-commerce platform for agricultural products delivery service. The proponents named this system application as "HarBest" which means best harvest. This application is designed to be accessible to its target clienteles anytime provided that internet connectivity is available. The researchers used progressive UI framework as the front-end while for the back-end, MySQL application was utilized. Progressive UI framework, as used in this study, includes a server-side scripting language called PHP version 5 as the front-end; CSS3 and Bootstrap 4 for styling purposes; and HTML5 for forms creation. PHP 5 was used since it is compatible to most of the servers available in the web. HarBest is consists of modules which are designed to improve the marketing strategy of the farmers which in turn will result to customers' satisfaction. It also provides a security module which has five access levels. These access levels are for the system administrator, farmers, customers, drivers and guests.

Key words: agriculture, agricultural products, e-commerce, farmers, progressive UI framework, MySQL

1. INTRODUCTION

The dissemination of accurate and timely marketing information is vital in helping farmers make good marketing decisions. Farmers who understand market trends and market opportunities will have a better chance of succeeding than those who do not. Only few farmers have adopted technologies to better connect them to the market and bypass traditional marketing channels. "We see huge opportunities for farmers, especially in metropolitan areas, to develop new system/methodology to connect directly to consumers and provide home delivery services" [1]. The Industrial Revolution 4.0 provides opportunities for many individuals to make use of the available resources and turn into productive tools to uplift the quality of human lives. Vyas (2019) explains that the fourth industrial revolution is the intelligent industry wherein they are transformed into its better version to achieve the best possible business results [2]. The fourth industrial revolution also encompasses agriculture and information technology sectors.

Brown, Ebora and Decena (2018) explain that the agriculture sector remains of crucial importance because the sector continuously contributes to the Gross Domestic Product (GDP) of the Philippines [3].

On the other hand, Arida (2010) asserts that there are many problems being faced by the farmers of today's generation; thus, there is a need to provide solutions to mitigate if not totally avoid problems in terms of high cost of input, low price of agricultural products, lack of capital, labor problem, lack of post-harvest facilities, pest and diseases and irrigation system [4].

Coskun-Setirek and Tanrikulu (2019) state that "…organizations can both reduce cost by getting rid of the cost of a live agent and save time by not spending time on the basic inquires or routine tasks. [5]"

These concerns prompted the proponents of this study to come-up with the study entitled HarBest: An e-Commerce Agricultural Product Delivery Service Analyzed and Designed using Progressive UI Framework and MySQL.

Bahafid, et al. (2019) mentioned in their research study that an e-commerce plays an important place in the user's lives and it makes their lives easier. It also allows users to find products, using search engines, which to respond to users, browse all e-commerce web pages, extract and index the information displayed on these pages [6].

When everything is polished, this application can serve as an e-commerce platform dedicated for the marketing of agricultural products of the farmers. It includes module that will display the available agricultural products from the farmers of Cabanatuan City, Province of Nueva Ecija, Philippines. Using the progressive UI framework, the proponents analyzed and designed a system which can be viewed easily in different viewing platforms such as internet browsers from desktop, tablets and mobile browsers.

At present, the system prototype displays the available number of products on hand, the price of each product and the means of delivering the product to the customers. The proponents also included a module that will allow a user/client to create and edit his/her account, view products, add products to cart and track the status of his/her orders. In 2017, whistl.co.uk published an article which explains the importance of good delivery management. The author asserts that a good delivery management is essential for customer retention and in increasing efficiency and business productivity [7].

Aside from the delivery and marketing module of the agricultural products, the system prototype also covered a good set of sorting algorithm to facilitate easy display and management of records on available agricultural products.

Generally, this study aims to provide a prototype that can be used as basis in enhancing and developing an online system/platform which will help uplift the quality of marketing the agricultural products of Cabanatuan City farmers. The said software can also help farmers sell their products with the integration of a delivery service feature that will enable the customers to purchase goods easily. It will, in effect, uplift the quality of customer-farmer relationship through a convenient way of transactions and delivery service. The system when completed and finalized will also provide ascendancy to farmers as they would not need the services of an intermediary/middleman anymore to sell their products. Thus, they can directly transact with their customers and increase their earnings.

Technical Background of the System

The Current System

From the observation and interview conducted by the researchers, the current system in purchasing agricultural product/s is done manually. Consumers need to personally visit supermarkets or wet markets to buy agricultural produce. Most of the time, farmers are selling their products to intermediaries/middlemen. The middlemen set the price and bring these products to the market for public consumption. Figure 1 shows the current system of selling the products of the farmers.

Figure 1: Current System of Marketing the Products of the Farmers

The Proposed System

The design of the system when implemented will allow consumers to purchase agricultural products without interacting personally to the farmers. The application will work for both desktop and mobile devices. Registering in a website can be done easily by filling out the form with their personal information. By registering an account, the user automatically agrees to the terms, conditions and policy of the website.

Log-in information must also be filled out by providing a preferred e-mail and password. After the registration process, the user will be redirected to the login page. The login button can be found at the top right section of the navigation bar. The user must be a member first before he/she can log-in successfully. Otherwise, an error message will be displayed on the screen. Figure 2 shows a sample interface of the system prototype.

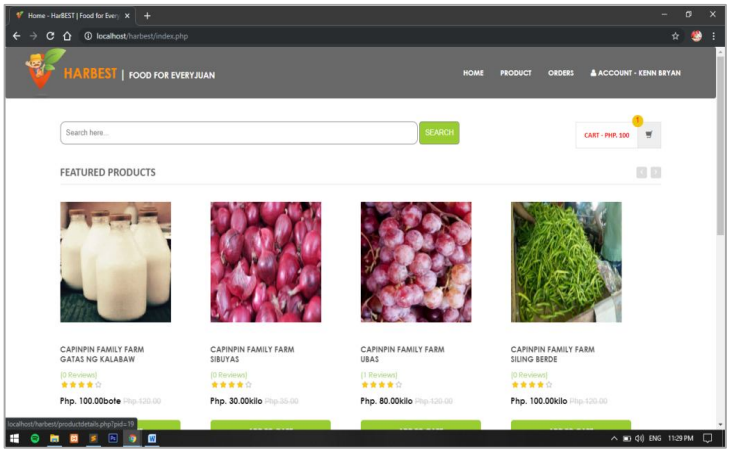

Figure 2: Sample Interface of the System Prototype

Both members and guests can browse products. The products are sorted according to their agricultural classifications.

The customer, on the other hand, can add orders to their cart. The product page will display basic contents such as the image/picture of the product, product name, store/farm name, quantity of product available, number of reviews of the product, product price and an “add to cart” button. Once the customer clicks the image or the product name he/she will be redirected to product details page which will show other photo/s and additional information about the selected product.

Ordering can be done just by first clicking the “Add to Cart” button. The system automatically adds the item to the consumer’s shopping cart. A shopping cart can be viewed at the upper right column of the page. Shopping cart contains the summary of the orders such as product image, product name, product price, quantity, total cost and a “My Cart” button that will redirect customer to cart page showing more details about his/her orders.

"My Cart" page also contains a remove column option which allows the customer to remove product/s that he/she accidentally added to the cart. It also contains a quantity column so that the customers can add more quantity of the product/s they want to purchase.

The My Cart page also has a "Continue Shopping" button. This is used when the customer wants to add more products to their cart. It also contains the "Proceed to Checkout" button which will redirect the customer to the shipping address page. The input fields for shipping address details are required fields. This means that customers need to fill out all the text boxes assigned for this information.

For their payment, they can choose a payment method if it is cash on delivery (COD) or debit/credit card payment transaction. As of this time, the proponents only focused on the cash on delivery (COD) payment method because most of the farmers do not have bank accounts or do not know the concept of payment through bank or internet yet.

Once the order transaction is successfully completed, their order will be stored in their order history. This document can be viewed by the customers on a separate page. They can also track their orders by simply clicking the track button in the order history page. Another way of tracking order is by simply clicking the track order hyperlink located at the navigation bar.

On the other hand, farmer's registration can be done by providing the system with farm information such as farm name, farm location and farm logo or image. After registering their farm information, their personal information will be asked such as first name, middle name, last name, email address, contact number and password. The farm/store account registration is similar to customer registration; after the registration, the farmer will be redirected to the login page.

Once the customer logged in, he/she will be redirected to pending orders page where pending orders can be processed. It will also show the navigation bar for them to go to other pages of the website. Farmers can also add product information thru this system. The product information consists of image, name, amount, discount (if there is any), product description and the quantity of available products. They can also delete and edit the product information and manage their profile and farm information.

Driver's registration can be accomplished by filling out the form with the first name, middle name, last name, contact number, and the driver's license number. The photos or scanned copy of the driver's license will also be uploaded in the system for verification and security purposes. Like other user registering account, drivers can edit their personal information and set or schedule their availability so farmers can contact them if needed.

2. METHODOLOGY

The proponents used the agile method, in designing the proposed system, particularly the scrum technique. Scrum software development, as cited by Luciano (2020), is a lightweight software development methodology that focuses on having small time-boxed sprints of new functionality that are incorporated into an integrated product baseline [8]. It places an emphasis on customer interaction, feedback and adjustments rather than prediction. With the results of the interviews as bases, the system was prototype was created. In the development of the system prototype, all the pertinent information gathered from the interviewees were closely taken into account and given utmost importance.

In designing the system, the proponents used progressive UI framework consisting of server-side scripting language called PHP version 5 as the front-end; CSS3 and Bootstrap 4 for styling purposes; while HTML5 is utilized in creating forms. PHP 5 is used since it is compatible to most of the servers available in the web.

As for the back-end, the proponents made used of MySQL as it is widely used in most of the hosting sites and it has an easy-to-use interface.

The proposed system when deployed will run in both desktop and android mobile devices. The recommended web browser for this system is Google Chrome but it will also run in different web browsers.

HarBest is consists of significant modules that will help farmers in promoting their farm produce or products. This will, on the other hand, help customers in buying fresh produce. Each of these modules is described below.

Administrator module is used by the system admin to fully monitor and maintain the website. The administrator can also view the user's login activity, add another classification for agricultural products and order transactions.

As for the farmers' module, the system will provide an area where they can view and manage customer's orders. The system also includes some modules that are viewable by the farmers only. These modules are mostly for managing orders and for product monitoring. It also allows farmers to manage driver's module which will show a list of possible drivers that they can hire when there is a need to deliver orders.

The customers' module allows individuals to purchase agricultural products, track their orders and manage account information using their own accounts and module.

In the drivers' module, drivers can set their availability and manage their own accounts and personal information.

Unlike the members, guests can only browse the website but no transaction can be done unless they will sign-in/register as system users.

3. RESULTS AND DISCUSSION

Requirements Analysis

As discussed in the previous section, selling and purchasing agricultural product/s, during the conduct of this study, are being done manually. This gives the proponents an idea to develop a new system which will help in enhancing the existing procedure. Based on the gathered data the proponents identified all the necessary requirements of the system, both functional and non-functional.

Requirements Documentation

The proponents used the following techniques in gathering data:

Interview

Figure 3 below depicts the interview session done by one of the researchers during the data gathering stage.

Figure 3: Interview with the Respondents

An interview involves an interviewer, who coordinates the process of the conversation and asks questions to the interviewee. The proponents decided to use this method to collect in-depth information on people's opinion, thoughts, experiences and feelings. In order to do this, the proponents first identify the people who can serve as the respondents. These persons were interviewed to get the richest data and information that the proponents needed in designing and developing the system prototype. After the interview, the proponents summarized and analyzed the gathered information and came up the list of specific features and requirements of the system to be developed.

Observation

Observation is a systematic data collection approach. It includes direct access to research phenomena; high levels flexibility in terms of application; and generating a permanent record of phenomena that will be used as bases for development [9].

Proponents observed the current situation of agriculture sector in the province of Nueva Ecija. They specifically focused on the strategies used by the local farmers in marketing their products. This helped them address specific needs of the system beneficiaries.

Article Review

An article review is based on others' published articles. It does not report original research. Review articles generally summarize the existing literature on a topic in an attempt to explain the current state of understanding on the topic [10]. It is used to identify recent and significant advances and discoveries in a particular field of study; in this case, it is about marketing agricultural products.

In this study, the proponents summarized the main ideas, arguments and findings found in the articles they have reviewed. It gives them information on the strengths and weaknesses of the previous researches related to software development for farm products marketing. They tried to address the gaps identified in the previous studies conducted. This information helps them analyzing and designing the proposed system.

Internet Research

Internet research includes any activity where a topic is identified, and an effort is made to actively gather information for the purpose of furthering understanding [11]. By searching the internet, hundreds or thousands of pages related to this study were provided.

The proponents of this research also do intensive internet researches to gather more data and topics that are related to the present study. These gave them additional ideas on how they are going to analyze and design the proposed system.

Design of Software/Systems

This section discusses the design of the HarBest application prototype. It includes a discussion on the major issues and problems encountered by the researchers and the corresponding solutions and alternatives they have employed.

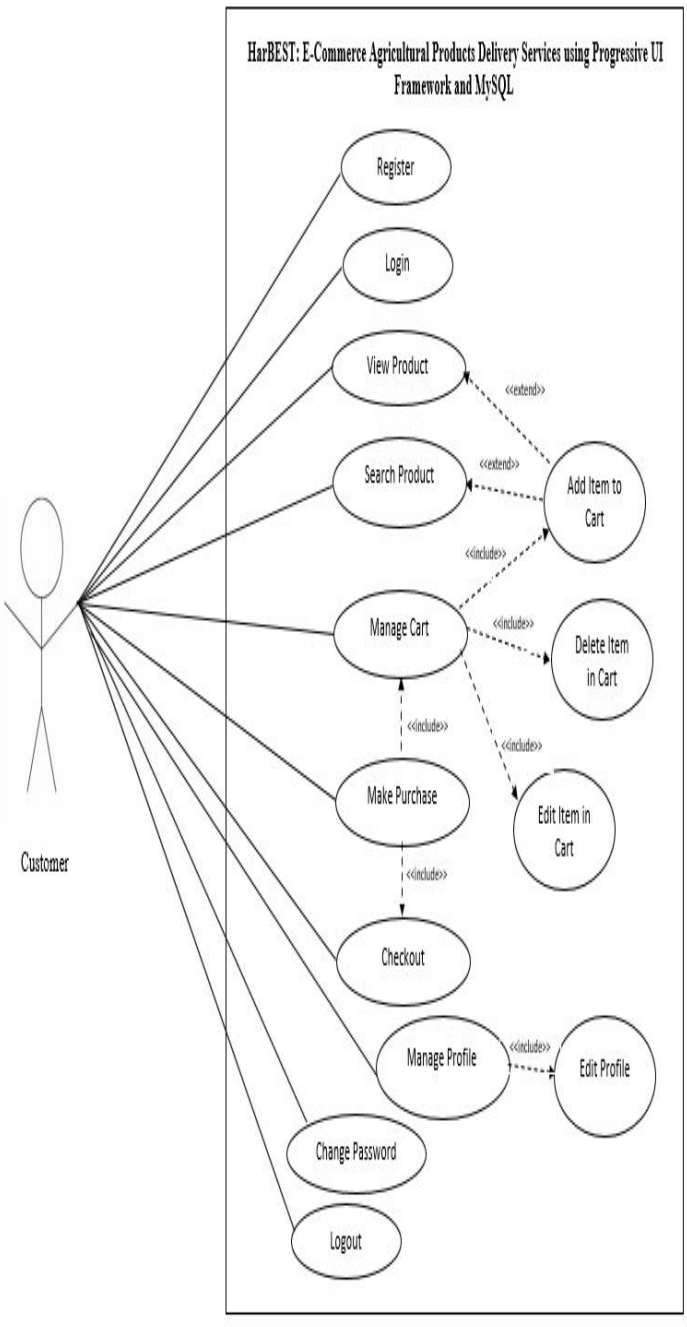

Figure 4: The System's Use Case Diagram for the Customers

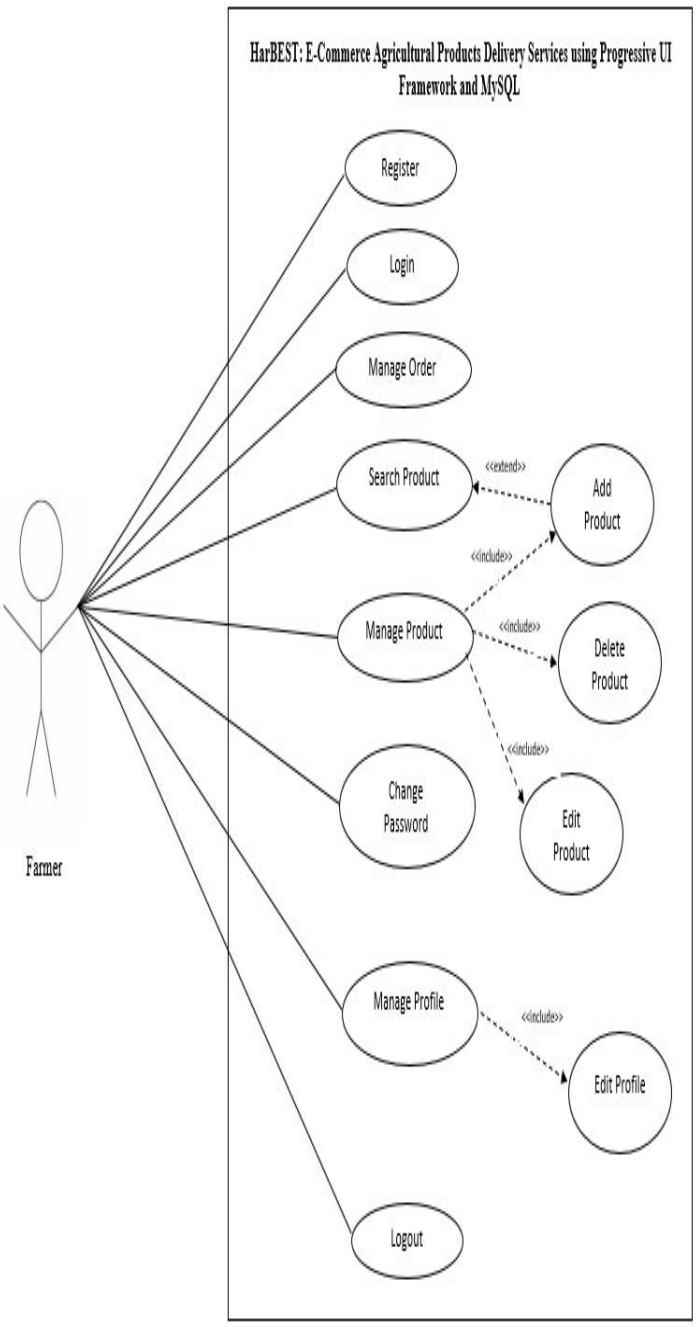

Figure 5: The System's Use Case Diagram for the Farmer

On the other hand, figure 4 above illustrates an elaborated system flow for the customers. The customers can login, view product, search product, manage cart, make purchase/s, checkout order/s and manage their profile. They can also change password and logout from the system.

Figure 5 above illustrates an elaborated system flow for the farmers. The farmers can login, logout, manage order, search product, manage order, manage product, search product, change password and manage or edit their profile.

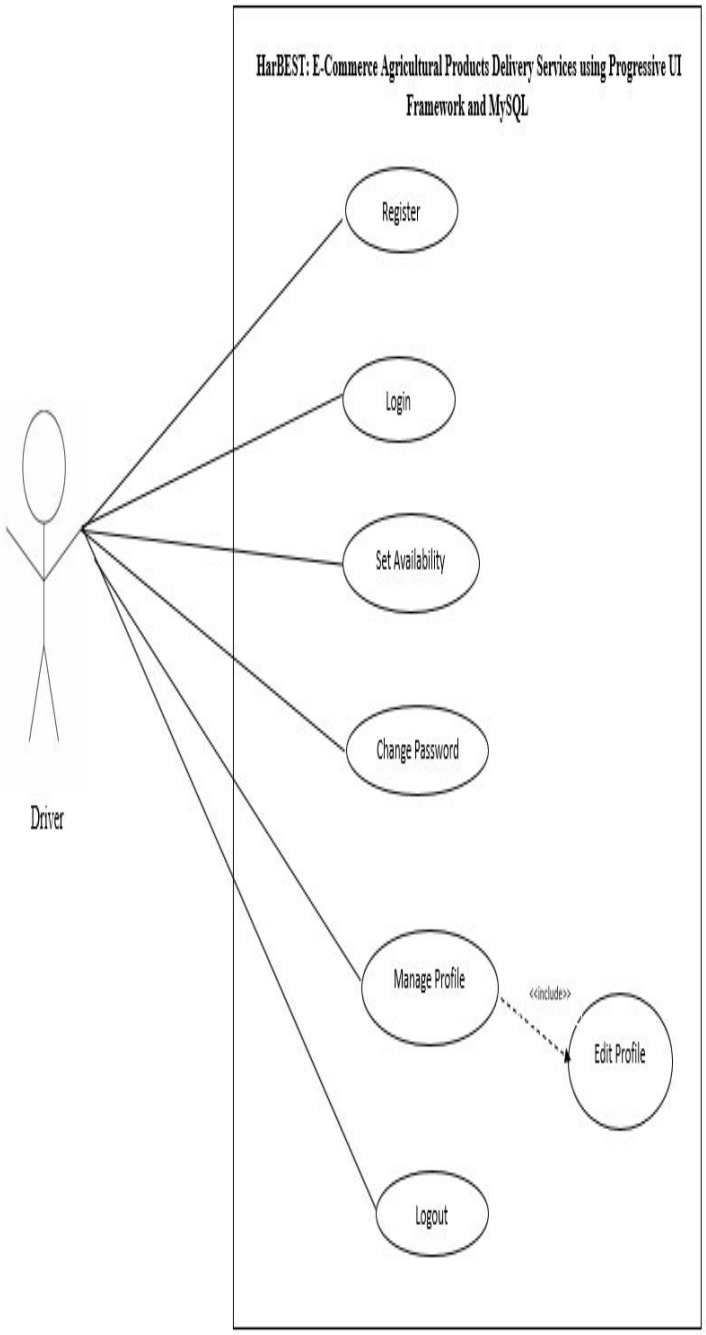

Figure 6: The System's Use Case Diagram for the Driver

Figure 6 above illustrates an elaborated system flow for the drivers. The drivers can login, logout, set their availability, change password and manage their profile.

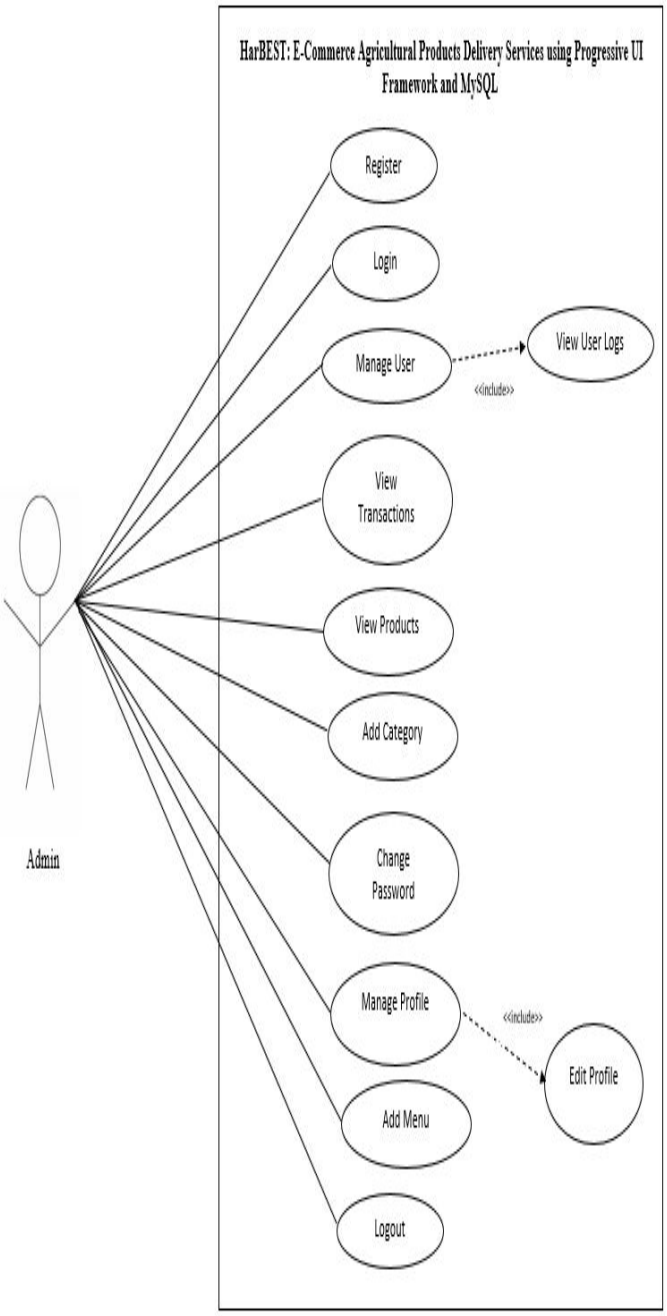

Figure 7: The System's Use Case Diagram for the Admin

Figure 7 above illustrates an elaborated system flow for the system administrator. The administrator can login, logout, manage users, search or view transactions, view products, add category/classification, change password and manage his own profile.

Development of the System Prototype

The proponents used the following platforms in designing and coding the system prototype:

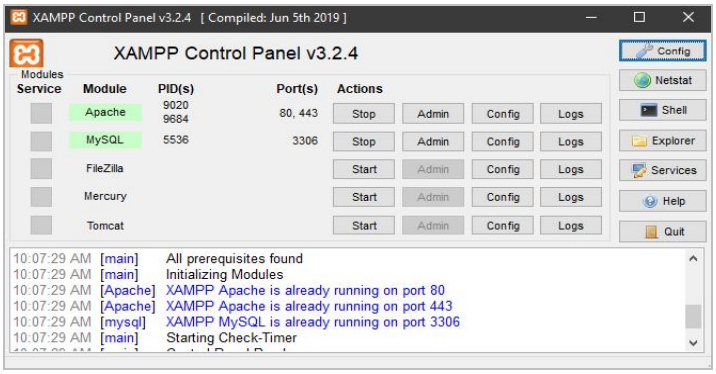

Figure 8: XAMPP Control Panel

As shown in figure 8 above, the researchers made used of Apache Server and MySQL to establish the connection in the database.

On the other hand, figure 9 below shows the application used by the researchers to setup the database of the system prototype.

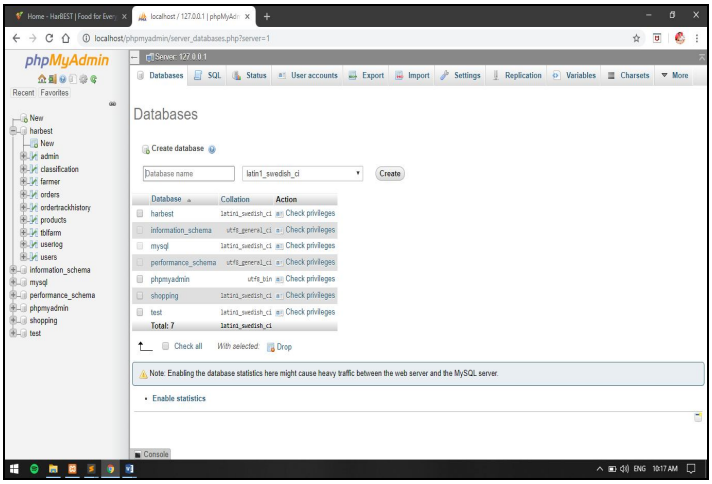

Figure 9: Screenshot of phpMyAdmin used in creating the database

Initial Testing of the System Prototype

Prototype was created by the proponents to help them picture out the possible outcome of the project to be done. It also gave them ideas on how to further enhance the features of the system based on the results of the prototype testing conducted. The proponents have added the navigation bar, search bar and cart button in the webpage. They also added products images in the webpage as shown in Figure 10.

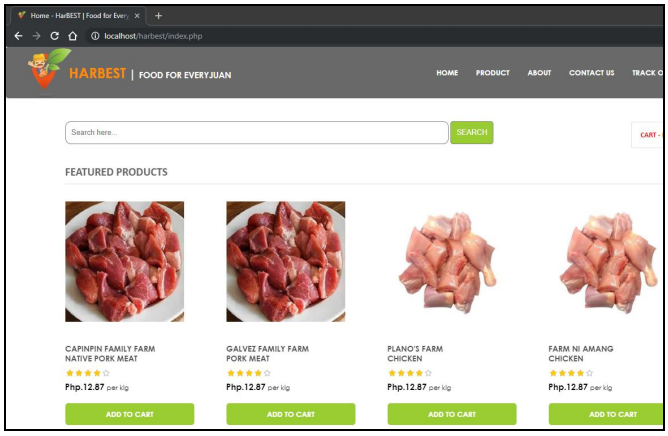

Figure 10: Display images are included in the webpage

4. RECOMMENDATIONS

The most essential ingredient in building a significant project for the farmers and consumers is being very much aware on their actual needs and the available technology and resources that they can use in marketing their products. The enhancement of the system prototype should be made using the results of the prototype testing conducted by the researchers.

Finally, the proponents would like to suggest that the following improvements be done to make the HarBest application more useful and efficient: (1) incorporate a total sales tracker where the farmers can trace their weekly, monthly and annual sales; (2) add a record trail system showing the users' activity logs. This can help enhance the security feature of the system; and (3) set quantity requirement and order limit, if needed.

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