A Proposal on E-commerce Platform with Auction and Barter Systems for Online Shoppers and Sellers

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ABSTRACT

Having an effective system of online shopping, customers can have easy transactions without going outside. The rising trend of online shopping started when PayPal and amazon was released and made online shopping a norm. Having an e-commerce alternative with a minimalistic approach would attract people as there would be more options for them to choose. The design of the system is based on the name of the website "Minima" the short term for minimalism as most of the features that a normal online shopping website has are here as we only added a few features that other websites do not have. A barter and auction system are what separates us from the likes of Shopee and Lazada as having this system can result in having an alternative to getting products on the shop. The features that are still missing in the system is the ability to message a seller or a buyer to address customers and having a profile if you are planning to sell on the website. The advancement of technology at this time is fast as the things people hoped for to have are happening and having innovation at this time would surely be needed because it is getting too redundant to invent something that had already been invented.

Keywords

Online shopping; web application; e-commerce.

1. INTRODUCTION

1.1 Project Context

When people buy the item/s they need, it is sometimes a hassle to travel to the shop and back. Why go in line when you can go online. Amazon changed the online shopping idea by becoming the new 'norm'. People nowadays are experiencing the luxury of items being delivered straight at the comfort of their home. Anything can now be seen and bought right away as soon as you check out the items. Payment methods have been improved to provide a safer way of paying for your items. An Online Shopping System gives the benefit of not going outside and being able to use your time for something else like working, spending time with your friends or family, and getting the items you need to buy.

1.2 Purpose and Description

The aim of this research project is to create an effective system for online shopping. With the help of this system, customers can carry out smooth and easy transactions without going to stores and shopping districts. To use the system the customer would need to enter their log-in credentials which includes the registered email, password, and the customer's shipping address. Logging in ensures the security of the customer's information as well as saving their previously checked in products. It helps the customer by personalizing their storefront based on the customer's information and order history. The purpose of the site is to facilitate an e-commerce alternative like the likes of Shopee and Lazada with a focus on a more minimalistic design principle. The name of the website is "Minima" which is short for the word Minimalistic in line with the theme of the project.

1.3 Scope and Limitations

The scope of the research covers the basics of a functioning online shopping system as well as prototype views for auctioning and bartering. It features a website with a working user interface (Front-End) and a database system (Back-end). Organization of two groups were made to reduce workload and allow the team to specialize in their respective field. Entries for purchasing and selling of items are fully functional and automatically added into the database.

In order to accomplish the goals of the research in a timely manner, some features that are included in mainstream online shopping systems have not yet been included. One such feature is an online messaging system to facilitate buyer and seller communication. This can be useful to address customer feedback and complaints. Another feature that was to be added was vendor profiles. This would allow the sellers to customize their own shop complete with contact details, shipping locations, and authorized sellers. Customers could also leave reviews for their overall experience with the shop. Lastly, the barter and auction systems which, for now, are still only in the prototype and proposal stage of development. These features are avenues for improvement when it comes to the development of the application even after the research.

2. BACKGROUND AND REVIEW OF RELATED LITERATURE

Ecommerce: A website capable of handling transactions between the buyer and seller, host an auction, and give people a platform for trading items. Users should be able to pay online. Users who bought a certain product should be able to rate the product by leaving a review on the product page. Users should be able to filter the through list of products to find the item they are looking for. Users should be able to contact customer support when dealing with problems with their transactions. The website is expected to have a pleasing design. The website is expected to have no bugs that could hamper users' experience.

Back-end: a part of web development that focuses on how the website functions. It handles the functionality of the website, this includes management of the hosting environment and creating a server-side web application logic [1]. Most of the back-end development requires being proficient in languages such as PHP, Ruby on Rails, Java, JavaScript, etc. [2].

Front-end: a part of web development that creates visual and interactive elements on a website. Its goal is to create a graphical interface using data from the back end. The front-end deals with the appearance of the website. Aside from the design it is also responsible for the user's experience. A front-end developer must have an advanced knowledge in languages such as HTML, CSS, JavaScript, jQuery, etc. [3].

Database: an organized collection of structured information stored in a computer system. Database uses management systems such as Microsoft Access, MySQL, MSSQL, etc. Systems like this are often used in banks, hospitals, and websites. The basic functionality requires users to store and distribute different types of data in an efficient manner [4].

Version Control: System where it allows users to lock and track changes to files. Most of the popular systems used by developers are Git, Helix Core, Grunt, etc. It is usually used by team developers who work on a project. It is an essential when working in teams, it aids developers to have a continuous flow of work while avoiding accidents [5].

Project Management Tools: Software where aids the user individually or by the team to organize projects and works. It can be easily customizable to the needs of users. Project management tools assist users to work in an environment where collaboration, documentation, and evaluation are essential. Some of the popular systems are Basecamp, Jira, Redmine, Teamwork, etc. [6].

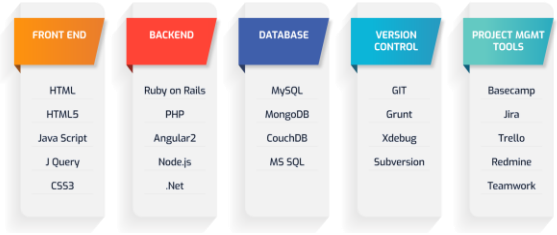

Fig. 1: Technologies used in Full Stack Development

2.1 Foreign studies

The use of the web as a shopping and purchasing medium made a tremendous impact in the global market. Electronic market platforms provided opportunities for small and big companies to run their businesses efficiently. The use of the World Wide Web enables merchants and consumers to explore new markets that are beyond their reach [7]. An Ecommerce is a market system where traders, merchants, distributors can sell and trade various products. Customers can purchase electronically by using the website. The system is structured in a way that it can be implemented at any nearby shop [8].

Online shopping is one of the commonly used mediums for shopping and purchasing that allows the user to browse and shop from the comfort of their own home. The demand for products such as clothes, electronics and services are increasing gradually. Various websites are opening every day to cater to the increasing demand [9]. It is convenient and time saving because it does not require shoppers to travel and wait in lines. The system runs and is accessible anytime of the day. It can offer a wide variety of products and allows shoppers to search, evaluate and acquire certain products that are not available in local stores [10].

2.2 Foreign Literature

In 2014. Retail e-commerce has grown to nearly US$840 billion surpassing the sales of US$695 billion in 2013. It is predicted to see an increase of up to US$1506 billion in 2018. Enormous Market Potential can be seen from this continuous sales increase from e-commerce.[11]

A major channel of product and service delivery is the Internet, and as an influx of netizens continue to arrive, they have become a key target for major retailers, the online shopping experience has taken on significant importance. In fact, experience is considered "the key battleground for today's global competition" [12].

Online shopping intermediaries are different from traditional retailers in that they host third-party sellers, freedom to choose sale prices are given to them, and then a percentage of the final price is charged as a referral fee [13].

Retail e-commerce sales will experience double digit growth through 2020, increasing to $4.058 trillion and making up 14.6 per cent of total retail spending by 2020. There has been more discussion about the emotional and psychological value of online shopping as online shopping has become more active [14].

2.3 Local Studies

Online shopping in the Philippines is still a relatively new industry. Its adoption into the Philippine market is increased both by the availability of smartphones and the aggressive advertisements on local TV stations. This is especially relevant when it comes to mobile commerce as the youth have agreed m-commerce has a positive effect on the young consumers in the country. However, there is still a slight caution towards the risks involved when purchasing online [15]. According to Bringula (2016), online consumer behavior in the Philippines has largely been about the ease of purchase, the quality, and the price of the products. As these qualities improve, people are more likely to use online shopping as their avenue of consumerism [16].

Contrary to popular belief, it is shown that millennials are not prone to impulse buying which may influence the sales of online shopping platforms. This is in part to the security vulnerabilities and the abundance of options in the traditional retail channels [17]. It is also the case with the average Filipino consumer where only 10% are susceptible to impulse buying. A way to increase spending of consumers is to focus on improving the design of an e-commerce site. This includes factors such as simplicity, consistency, branding, and ease of access [18].

2.4 Local Literature

Retail industries in the Philippines continue to grow every passing year. A study form We Are Social Hootsuite indicates that about 71 percent of the total population are Internet users and 70 percent of which are shopping online. Filipino consumers gravitate towards E Commerce since it can provide cheaper products and the convenience of not visiting a physical store [19].

The impact of COVID-19 shifted the consumers attitude towards shopping. The pandemic increased the number of Filipino consumers that are using e commerce. This forced thousands of businesses to shift to E-commerce platforms such as Lazada and Shopee. It is expected to have a significant amount of need and usage in ecommerce platforms for both merchants and consumers. According to Yu there are now 500,000 active sellers in Shopee [20]. Ecommerce platforms support Filipinos with the rising unemployment caused by the pandemic. Platforms such as Shopee provide opportunities to the unemployed through online selling as a source of income. LGUs and government institutions partnered with Shopee to have a various support system for the sellers [21].

Statista disclosed that Filipinos spent a total of $840 million on online shopping alone in 2018. The growth of e-commerce can be attributed to tech-savvy shoppers who seek convenience. Government presumes e-commerce to contribute up to 25% to the gross domestic product. Ecommerce improved and became the major contributor to the success in the retail sector [22].

3. Methodology

The software application for this research paper focuses on the feasibility of building and maintaining an online shopping site for the Philippine market. As such, the methodology most fit for the task was chosen to be Incremental Development, Integration and Configuration, and Agile Development. The project needed to be flexible to changes and updates to accommodate the learning curve posed by the development process.

Incremental development is the chosen approach as it allows the team to begin with a small working system which can be improved and expanded step by step over a period. Each phase such as functional specification, implementation, design, and testing are evaluated repeatedly. This is greatly beneficial for both back-end and front-end as it allows the team to constantly re-evaluate the website and its database to ensure its functionality.

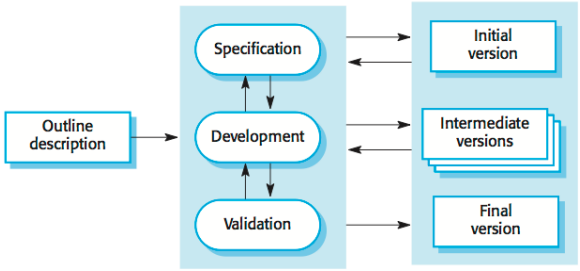

Fig. 2: Incremental Development Process

For the integration and configuration of the project development. The team used Spree, an open-source e-commerce platform, an already existing component to aid them with the creation of the website through its flexible changeable layouts and database related features such as login, address and adding products which can be further configured to fit the team's criteria.

Agile software development refers to software development methodologies based on the concept of iterative development, where specifications and solutions grow by cooperation between self-organizing cross-functional teams. This method of development was present using GitHub, a version control and file management software, that allowed both teams in the front and back-end of development to simultaneously organize and allow each team member to work on their designated criteria.

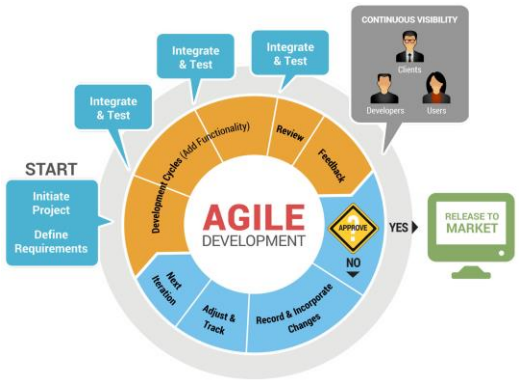

Fig. 3: Agile Development Process

3.1 Requirements Specification and Features

The software has two types of users: the buyers that will buy, bid, and barter for products and the seller that would list, approve, and ship products to be sold.

The products posted by sellers must have their price, description, image, shipping location, stocks, estimated arrival, payment method, and distribution on display.

The software has a feature for auctions where customers would compete for an item against other customers where the customer with the highest bid would get the item.

The auctions would have starting bid, current bid, auction timer, minimum bid, and an option to buy the product at maximum price. The software has a barter feature where users can trade items with other users.

A feature for users to register as a buyer is present in the software, users of this type would need to indicate their full name, address, contact information, email, and civil status. A feature for users to register as a seller is present in the software, users who intend to be a seller must indicate their shop name, authorized sellers, products sold, contact information, and email.

The software has a search feature where users could type in a search box to quickly identify if the item, they are looking for is present in the inventory. The search function would show the product's name, price range, shipment fee, and current discounts.

The software has requirement validation features where the validity, consistency, completeness, realism, and verifiability of the users and products would be checked.

3.2 Software and Technologies

The online platform uses Ruby as the primary programming language and Rails as the framework. These two were chosen in combination to allow for fast prototyping and development. Rails is a mature framework for creating web-applications and is well documented in the field. It follows an MVC (Model-View-Controller) approach and is a full stack framework out of the box. Rails provides a database engine in the form of SQLite and makes creating and managing tables easy with its built-in migrations. The framework is also used by well established companies such as Airbnb, GitHub, Twitch, and Bloomberg.

In conjunction with Rails, the project also uses Spree and Devise engines. Spree is an open-source e-commerce platform. It has the benefit of being focused primarily on online shopping. It creates a template for a database along with its corresponding relationships and a functional user interface for the website. Languages such as Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and JavaScript will also be essential in the making of the website design alongside with the most popular library Bootstrap. Devise is a flexible authentication and solution built for Rails built on Warden. The purpose of this engine is to provide a way for users to register and log-in to the site. It has a built-in hashing function for password generation and is the most regarded authentication engine for Rails.

For version control and file management, the team used GitHub to monitor changes made both in the front-end and back-end branches of the webapp. GitHub is a provider of web hosting for software creation and version control using Git. It provides Git's distributed version control and source code management capabilities, plus its own features.

3.3 ALGORITHMIC DESIGN CHOICE

3.3.1 Binary Search

Search a sorted array by repeatedly dividing the search interval in half. Begin with an interval covering the whole array. If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half. Otherwise narrow it to the upper half. Repeatedly check until the value is found, or the interval is empty [23].

The purpose of Binary Search is it allows you to quickly search a record by its key, presumably the keys are already sorted. This is true if the number of keys is large. 32 key reads would be enough to find any single unique key within a collection of two billion sorted keys. Binary search works this way because every search attempt cuts the number of records to search in half.

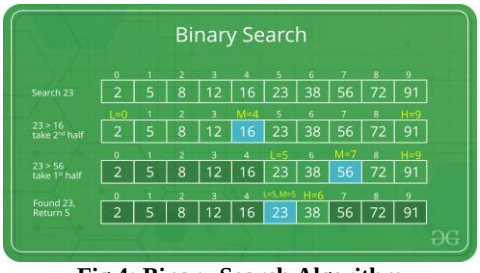

Fig 4: Binary Search Algorithm

3.3.2 Merge Sort

Merge Sort is one of the most popular and used sorting algorithms that is based on the idea of Divide and Conquer Algorithm. Merge sort first divides the array into equal halves and then combines them in a sorted arrangement. The idea of keeping on dividing the list into equal halves until it can no more be divided is what made Merge sort the most

used sorting algorithm. If it is only one element in the list, it is sorted. Then, merge sort combines the smaller sorted lists keeping the new list sorted too [24].

The purpose of Merge Sort is it divides lists to be able to sort it out once it merges back together. This can be used in arranging price ranges as having an option to see the highest pricing product to the lowest or vice versa would result in having more options to see when it comes to shopping on the website.

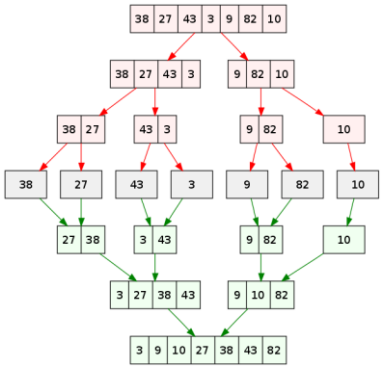

Fig. 5: Merge Sort Algorithm

3.3.3 Dijkstra's Shortest Path Algorithm

Dijkstra's algorithm is finding the shortest path from a starting node to a target node in a weighted graph. The algorithm creates a tree of shortest paths from the starting vertex, the source, to all other points in the graph [25].

The purpose of using Dijkstra's Shortest Path Algorithm is to determine whether a country is close to the shipping country, it results in having cheaper shipping fees compared to other countries where they are further away as it can result in having more expensive shipping fees.

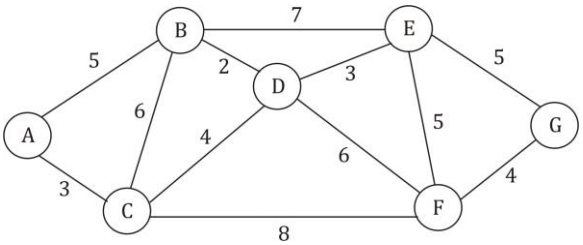

Fig. 6: Example of Dijkstra's Algorithm

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