

DESIGN AND IMPLEMENTATION OF A WEB-BASED STUDENT MARKETPLACE

BY

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**A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF COMPUTER
SCIENCE, FACULTY OF COMPUTING, UNIVERSITY OF BENIN, BENIN CITY**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A
BACHELOR OF SCIENCE (B.Sc.) DEGREE IN COMPUTER SCIENCE**

JANUARY, 2026

CERTIFICATION

This is to certify that this project work was carried out by OLOLOBOU EDEMATEDE GODBLESS with Matriculation Number PSC1814509 under my supervision. It is adequate and satisfactory, both in scope and content, for the award of Bachelor of Science (B.Sc) Degree in Computer Science of the University of Benin

Dr. Aziken G.O.

Project Supervisor

DATE

APPROVAL

This project work is hereby approved in partial fulfilment of the requirements for the award of Bachelor of Science (B.Sc.) Degree in Computer Science from the University of Benin

Dr (Mrs.) Rosemary A. Usiobafo

Head of Department

DATE

DEDICATION

I dedicate this work to God, for giving me the strength and guidance to properly carry out and complete the work and also for his protection throughout my time at the University of Benin.

This work is also dedicated to my parents, for making this journey as possibly easy as they could, for encouraging me, and for guiding me

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ABSTRACT

This project presents the design and implementation of a web-based student marketplace aimed at improving buying and selling activities within an academic environment. The system was developed to address challenges commonly faced by students, such as limited access to affordable goods, lack of organized trading platforms, and trust issues in informal transactions. The marketplace provides a centralized online platform where students can register, list products or services, search for items, and communicate securely with other users. The system was designed using structured system analysis and developed with modern web technologies to ensure efficiency, usability, and data security. Emphasis was placed on user-friendly interfaces and reliable database management to support smooth transactions. The implementation and testing of the system showed that it effectively enhances accessibility, promotes entrepreneurship among students, and reduces the time and effort involved in campus trading activities. The project demonstrates that a web-based student marketplace can significantly improve commerce and interaction within tertiary institutions.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

E-commerce (or electronic commerce) is the buying and selling of goods or services on the internet. Most businesses with an e-commerce model use an online store and/or a digital platform to carry out marketing, manage sales operations, and supervise logistics and fulfilment. E-commerce has a history of decades and is continuously growing; it is an online virtual store that can exist in two main technological formats: over the World Wide Web (commonly known as a web store) and via mobile applications installable on smartphones and tablets (Barner, 2018). A typical example of an e-commerce transaction includes platforms such as Amazon (merchandise purchase), eBay (auction-based sales), Ajobomarket (specialised fashion retail), Jumia, and Etsy.

With the increasing digitalisation of retail services, there has been a growing need for customised platforms tailored to specific communities such as university students. Existing mainstream marketplaces often lack context-specific relevance for academic environments, leading to difficulties in logistics, trust, and accessibility among student users (Chen & Liu, 2021). For instance, students selling textbooks, hostel accessories, gadgets, or offering services like typing, barbing, or tutorial sessions may find it inefficient or overly competitive to rely on general-purpose platforms. A university-based e-marketplace reduces these frictions by offering a trusted, location-specific, and demographically aligned platform that encourages peer-to-peer transactions within the school ecosystem (Okafor et al., 2023).

Moreover, the shift towards digital platforms has been accelerated by the rapid integration of mobile technologies and increasing internet penetration across educational institutions in Nigeria and beyond. A report by Statista (2022) shows that over 70% of Nigerian youth aged 18–25 actively use smartphones and spend significant time online, particularly on platforms that support buying, selling, and peer collaboration. This behavioural shift provides a strategic opportunity to develop web-based tools that cater specifically to their lifestyle and daily needs. A student marketplace that leverages this connectivity can help students not only meet their immediate needs but also cultivate entrepreneurial skills while saving costs associated with off-campus transactions.

Additionally, from a software development perspective, designing a web-based marketplace tailored for students aligns with contemporary software engineering practices that prioritise user experience, security, and modularity. Using a two-module system involving administrators and users ensures accountability, reduces fraud, and provides an efficient content management structure. Administrators can serve as moderators to verify listings, while students enjoy a user-friendly environment that supports real-time communication and transactions. Such systems can also be enhanced in the future with features such as review mechanisms, in-app messaging, and integrated payment gateways, providing a scalable solution for intra-campus commerce (Aliyu & Musa, 2022).

The physical marketplace is faced with different challenges on regular basis: it is more expensive, they have to have a good location for a physical store, good physical displays, lightings etc, they have to have more employees, external physical signage, they have to advertise more locally, they have smaller customer base, they have to spend on security systems and anti-theft. Also, they have to keep up with the ever-changing customer expectations because consumers

preferences will always change due to seasons and trends and other factors such as economic circumstances and competitions, which all these have significant effect on the consumers demand (Philips, 2018). The purpose of E-commerce is that it brings convenience for customers as they do not have to leave home or their current location and only need to browse the website online, especially for buying the products which are not sold in nearby shops. An online shop enables the consumers to search, find, order and pay for the product and services that they need. It helps consumers buy wider ranges of products and it saves consumers time and energy, it also gives the seller a wider range of consumers that are in need of the product they sell or the services they render.

This proposed web application is an online marketplace designed to provide a platform which will efficiently connect students who have goods to sell and services to render to fellow students within the school environment. It is a free marketplace for students that is designed strictly for students to make buying and selling easy for students within the school. Students do not have to pay any form of charges to the marketplace owner before he/she is required to sign up. It provides a wider customer base for the seller (within the school, this is to avoid a wider community of users/buyers beyond the school's environment). This system is made of two modules; Administrator and User. The administrator can upload or advertise goods or services and approve user's products or services before it can be viewed in the market. Users can sign up on the platform then to save their credentials, then login using the same credentials they used to sign up. They can both view the market and contact the seller for the goods or service they want to purchase.

1.2 STATEMENT OF THE PROBLEM

According to research, there are no efficient means for students to advertise their products and services to customers in the school, no efficient platforms to suit and improve the students' businesses (Onalaye, 2020). Currently, the only means is through writing on the school walls with chalk or writing on papers then pasting on the walls, they also place stickers on walls and classroom desks which are highly prohibited by the school authorities. Students who have goods for sale and services to render are usually confined to their whatsapp status which are only viewed by people in their contact list and people around them. Sometimes, students go to hostels, faculties, classrooms, to sell and advertise their goods which consumes a lot of time and energy.

Mr O. Adewole et al, 2012 created a secure E-commerce system for a campus hall, where shop owners can advertise their product or services on that platform, this system was created for only shop owners in the campus. Students without shops are not allowed to use the platform. Also, Anton Wolyansky 2018 created an online marketplace (Wolyansky, 2018) called jiji.ng where both sellers and buyers can buy and sell. However, due to the large community using the platform, when a user uploads in the platform he is offered to pay a listing fee which has restricted some sellers from using the platform.

1.3 AIM OF THE STUDY

The aim of this study is to design and implement an online marketplace for students, that provides an efficient means for buying, selling and advertising.

1.4 OBJECTIVE OF THE STUDY

- i. To create a platform where student can easily access goods and services.
- ii. To create an avenue for students to advertise to a large community within the school environment.
- iii. To create a free platform to connect buyers and sellers.
- iv. To create a platform to connect students to other students that have services to render within the school environment.

1.5 METHODOLOGY

The methodology adopted for this study is the Agile methodology. Agile is used for a variety of projects and it is one of the best options for eCommerce websites. It works with an objective to promote automation and fast delivery, coordination between development and operations and improving product quality using quality control testing. The research methodology that was taken in achieving the objectives outlined above:

- i. Adopting the online marketplace aim for advertising as the school management prohibits the posting of papers or stickers on the school walls and classroom desks.
- ii. Analysis of students that sell goods and render services been confined to only whatsapp status for customer reach.
- iii. Evaluation of other marketplace platforms requiring a form of monetary charge.

1.6 SCOPE OF STUDY

This project is focused on the usefulness of an online marketplace to enhance buying and selling of goods or rendering of services within the school. The online student marketplace is designed to provide a platform that connects students who have goods to sell or services to render to students who are in need of such goods or services within the school environment. This study is not made strictly for business (buying and selling), it is designed to provide a platform at which students get to connect with other students who have academic issues.

1.7 RELEVANCE OF STUDY

This project provides a free and efficient means of selling, buying and advertising goods and services. This web application is made free for students, hence, no charges would be required by the platform before signing up the page or uploading the goods and services. Compared to other marketplace platforms, the monetization method can restrict many sellers from trying the platform as they need to pay in advance without assurance that their investments will pay off. It provides a direct interaction between buyer and seller; the buyer gets the seller's contact from the marketplace page and they both agree on a specific public location for exchange within the school.

1.8 OUTLINE OF REPORT

Chapter one introduces the work, giving an overview of the web-based marketplace and its advantages, the aim and objectives of this study, methodology. It also describes the scope of the work study and the relevance of the study to students

Chapter two deals with a comprehensive literature review of the study of various types of ecommerce and their advantages and disadvantages, software method and technologies needed to

implement an online hostel management system, study of web based application with objective, characteristics and security, the related worked to this project.

Chapter three deals with the methodology adopted for the project. Object Oriented Methodology (OOM), which involves the system analysis, system design, object design and implementation of the project using entity relation diagram.

Chapter four makes up the testing and documentation of the system. It shows the various tests carried out such as, unit test, integration, system and acceptance test and the results obtained. The result obtained are represented in pictorial form.

CHAPTER TWO

LITERATURE REVIEW

2.1 HISTORY OF ONLINE MARKET

Ecommerce was introduced about 40years ago in the earliest form by Micheal Aldrich. Late Micheal Aldrich was an English inventor, he invented online shopping to enable online transaction processing between consumers and businesses or between one business and another, a technique later known as e-commerce. Since then, electronic commerce has helped countless businesses grow with the help of new technologies, improvements in internet connectivity, added security with payments gateways, and widespread consumer and business adoption (Adewole, 2012)

2.1 REVIEW OF ECOMMERCE IN NIGERIA

Nigeria's digital landscape is flourishing. The country has one of the biggest internet economies in Africa. Nigeria presents a vast digital audience. The country has one of the best network coverages, as well as good infrastructure for mobile connectivity in Africa. Internet penetration is around 60 percent and is projected to increase steadily (Shahrad, Shadriari, & Gheiji, 2015). Mobile ownership reached almost 50 percent. In 2019, over 70 percent of internet accesses were recorded on mobile devices, whereas this share was even higher when it came to online marketplaces visits. In 2019, the B2C index value for e-commerce stood at 53.2 points, the fourth highest in Africa. The B2C E-commerce index measures an economy's preparedness to support online shopping by taking different indicators into account. Nigeria is among the African countries with the largest number of online marketplaces. The most popular marketplaces in terms of visitor numbers is by far Jumia. Jumia is based in Lagos and operates in 12 African countries. Other popular online marketplaces in Nigeria are Jiji, konga, and Cheki. Despite the

low popularity of credit cards and digital payments, ecommerce has been growing significantly in Nigeria, especially between 2018 and 2019. Online food retail and personal care rose by 50 percent, whereas the fashion and beauty sector experienced an increase of over 40 percent. The results of different surveys conducted by Statista in 2020 show that Nigerians have a very positive attitudes towards online shopping. Clothing, shoes, and consumer electronics were the most common items purchased online among Nigerian respondents. (Ward, 2020)

2.1 OVERVIEW OF ONLINE MARKETPLACE

A market is a place where two parties can gather to facilitate the exchange of goods and services. The parties involved are usually buyers and sellers. The market may be physical like a retail outlet, where people meet face-to-face, or virtual like an online market, where there is no direct physical contact between buyers and sellers. This type of market is called Ecommerce (Obayi, 2013). An online marketplace offers independent sellers the opportunity to list their products and services. It bridges the gap between sellers and buyers. An online marketplace is a digital platform with website and online/offline mobile apps versions, where several sellers and vendors offer products listings, in exchange for some marketplace fees. Online market is a fast-growing method of exchanging goods and service between buyers and sellers through the internet. The use of online shops has reduced the stress of going to the store to get what you want. There are different marketplaces today, they can be categorized according to

- i. Target audience,
- ii. Core focus and
- iii. Interaction.

2.1.1 MARKETPLACE BY THE TARGET AUDIENCE

Marketplaces by the target audience is classified into three forms which are: B2B (Business-to-Business), B2C (Business-to-Customer) and the P2P (Pee- to-Peer) (Mcfadyen, 2008).

- a. **Business-to-business marketplaces:** A B2B marketplace is a website where wholesale suppliers sell their products or services to buyers in bulk. This type of marketplace is usually operated by a third party, allowing businesses to use it on beneficial terms.
- b. **Business-to-customer marketplaces:** The B2C marketplace model involves two types of users: business and customers. In this model, businesses sell their products and services not to other businesses but directly to customers. Many B2C marketplaces are one-stop shops where customers can buy a variety of goods online. As this model is one of the most popular today, there are lots of famous B2C marketplaces. For example, Jumia is a huge online B2C marketplace that includes thousands of vendors offering products from clothes to vehicle, gadgets, etc.
- c. **Peer-to-peer marketplaces:** A peer-to-peer (P2P) or customer-to-customer (C2C) marketplace connects individuals with similar needs, tastes, and incomes to share products and services with each other. The concept of this type of marketplace is the following: peers can share products (like on Etsy) or services (like on Uber) in exchange for money or other products and services. P2P marketplaces are part of the sharing economy, helping people make optimal use of resources through renting, not buying. The most important thing about this type of marketplace is that today someone can be a consumer but tomorrow may be a service provider. The P2P model features a shorter sales cycle and average length of relationship compared to the B2B and B2C models. A

peer-to-peer marketplace is an online platform that connects people who have products for sales or services to render and people who needs the product or services. The importance of the peer-2-peer online marketplace:

- i. It is a platform created to enable sellers advertise their products and services.
- ii. It is an avenue for buyers to have direct contact with sellers and vice-versa.
- iii. It also offers a platform for buyers and sellers to play both roles, that is, a seller can also be a buyer

The benefits of peer-to-peer marketplaces for users are:

- i. Speed & convenience. A user has a wide array of options gathered in a single place. He can scroll through hundreds of choices in an hour, from almost anywhere. From a vendor's standpoint, marketplaces allow saving costs of renting a physical store and related expenses. An artist can post their goods online and wait until someone buys them
- ii. High profitability for store owners, vendors, and cost efficiency for consumers. Since marketplaces erase any middle man between vendors and the end buyers, this cuts costs on offering him a commission.
- iii. selling products. In this case, product vendors showcase their products via listings and sell them virtually. This type of peer-to-peer marketplace is among the most popular ones, as it lets you sell even the weirdest items with little effort.

2.1.2 MARKETPLACE BY THE CORE FOCUS

Marketplaces by the core focus is classified into two: vertical marketplace and horizontal marketplace.

- a. **Vertical marketplace:** As the name suggests, vertical marketplaces focus on a particular area or niche. Instead of selling everything to everyone, they offer a narrow segment of services and goods. These websites are dedicated to a specific niche which offers higher-quality products and services. An example of such marketplace is Etsy, the platform focuses on craft supplies and handmade vintage goods.
- b. **Horizontal marketplace:** A horizontal marketplace offers product and services in various industries to different customers in different regions. This type of marketplace is considered a one-stop shop, fulfilling various customer needs in one place. It can be compared to walking in a mall with lots of stores, only online. Most famous marketplace is eBay, Amazon, Jumia. They offer a large variety of goods and services.

2.1.3 MARKETPLACE BY INTERACTION

Market place by interaction: Depending on where a client gets a service (online or offline), there can be two types of marketplaces:

- a. **O2O: online to offline:** A marketplace attracts users online, but the clients get a service offline. For example, one chose a product on the Internet, but received at the shop. Another found someone online, who was willing to walk his dog, and the person in question came to his house.
- b. **Online commerce:** Everything is happening online, only the product delivery is offline, however, sometimes no delivery is needed at all. For example, with online marketplaces that are selling tickets, a session can be finished online, and the electronic ticket is received afterwards in an email.

ADVANTAGES OF ONLINE MARKETPLACES

Some of the potential benefits are summarized below:

- i. It provides an additional channel to market and sell your products
- ii. the platform offers reduced marketing costs compared to other sales channels
- iii. It allows new opportunities for overseas sales - there has been noted online marketplace growth in the categories of homeware, pets, fashion and sporting goods
- iv. They are popular with customers and offer a convenient way to compare prices and products from a single source
- v. Being part of an established online marketplace provides a level of trust between you and the buyer
- vi. Impartial reviews of your products and service may give new customers the confidence to buy
- vii. They offer opportunities to establish new trading partnerships with traders and suppliers, either within your supply chain or across supply chains
- viii. They provide greater transparency - availability, prices and stock levels are accessible in an open environment
- ix. It is possible to operate a round-the-clock - time constraints and problems with varying international trading hours are removed

2.3 DISADVANTAGES OF ONLINE MARKETPLACES

There are a number of significant benefits to selling on marketplaces however there are potential drawbacks that may need to be considered.

- i. Marketplaces can charge commission on every sale and fees can vary from site to site. Before selling your products on a marketplace, make sure you understand the marketplace's pricing structure.
- ii. The online stores may impose restrictive terms and conditions in terms of how you can communicate to customers.
- iii. There may be marketplace limitations as to how your business can brand its online presence

WEB BASED APPLICATION

A web application is a computer program that utilizes web browsers and web technology to perform tasks over the Internet. Millions of businesses use the Internet as a cost-effective communications channel. It lets them exchange information with their target market and make fast, secure transactions. However, effective engagement is only possible when the business is able to capture and store all the necessary data and have a means of need to be manually downloaded by the user onto their device. Web applications use a combination of server-side scripts (PHP and ASP) to handle the storage and retrieval of the information, and client-side scripts (JavaScript and HTML) to present information to users. This allows users to interact with the company using online forms, content management systems, shopping carts and more. In addition, the applications allow employees to create documents, share information, collaborate on projects, and work on common documents processing this information and presenting the results to the user. A web-based application is any application that uses a website as the frontend, allowing users to access the application from any device. This is in direct contrast to conventional software applications, which regardless of location or device

2.4.1 CHARACTERISTICS OF WEB BASED APPLICATION

- i. **Product features:** This is a crucial part of the web application. It is difficult to predict the usage frequency of a web application because it varies according to the user and devices used by the users etc. The user related characteristics of web application can be grouped as: Natural content, Social content and Technical content.
- ii. **Development characteristics:** The development team, the development process, the technological infrastructure, and the integration are all included.
- iii. **Characteristics of evolution:** As requirements change, the web application undergoes adjustments or upgrades. This evolution may concern all the other three characteristics viz. Product, Use and Development. Market competition or short time development may cause the changes.

2.4.2 CATEGORIES OF WEB BASED APPLICATIONS

1. Static web application

Static web application is usually developed in **HTML and CSS**. However, animated objects such as banners, GIFs, videos, etc., may also be included and shown in them. It can also be developed using jQuery and Ajax. *Examples of static web application development include professional portfolios or digital curriculums.* In addition, modifying the contents of static web apps is not easy, because one needs to download the HTML code, then modify it and finally upload it again to the server. These changes can only be made by the webmaster or by the development company that planned and designed the app in the first place.

2. Dynamic web application

Dynamic web applications are much more complex at a technical level. They use databases for loading data and their contents are updated each time the user accesses them. They generally have an administration panel called CMS (Content Management System) from where administrators can correct or modify the app's content including text and images. Many different programming languages can be used for dynamic web application development. PHP and ASP are the most common languages used for this purpose because they allow you to structure the content. In this kind of application, upgrading content is very simple and the server doesn't even have to be accessed when modifying it and it allows the implementation of more features such as forums or databases. Design – besides content – can be modified to match the administrator's preferences.

3. E-commerce

If the web application is an online store or shop, its development is likely to resemble that of m-commerce or an e-commerce site. This kind of application's development process is more complicated because it must enable electronic payments via credit cards, PayPal or other payment methods. The developer must also create a management panel for the administrator. It will be used for listing new products, updating or deleting them and managing orders and payments. Its web application fits mobile devices the same way a mobile application does, making it possible to interact with it as if it were a native app.

4. Content Management System (CMS)

Content must be continually updated when it comes to web application development, so installing a **content management system (CMS)** is a serious option to consider. The administrator can make use of this CMS to implement changes and updates. These content managers are **intuitive and very user-friendly**.

2.4.3 OBJECTIVE OF WEB BASED APPLICATION

1. **Maintainability:** With a web-based application, customers can get the most up-to-date information immediately from their internet platform, whether it's a desktop or a mobile device. As a developer, all you have to do is release web application updates, and your users will be able to access it right away without having to download application software for each individual user.
2. **User Accessibility:** With a web-based application, an organization can give its users access to the system using a standardized interface, such as a web browser. The web application development team may handle the testing process across many web browsers, and once completed, the web application only needs to be designed for one operating system.
3. **Cross-Platform Functionality:** Web based application development process take time and it covers a lot of different platform. Traditional desktop application targets a specific operating system like windows application works for windows versions (XP, 7, 8 and10).

Web application solve this problem has it works across all platform of operating system even on mobile that has larger user.

4. **Improvements in Interoperability:** In the modern digital marketplace, it has been more important to optimize the interoperability of your various applications, to improve work flow and take advantage to digital efficiencies. For example, many organizations are looking to develop e-commerce web applications that have the capability of sharing all purchase data with a congruent accounting software, removing that step in the sales process.
5. **Potential to Handle an Increased Workload:** Web-based application is much lighter than conventional software, and as a result they have the ability to be run on less powerful devices while maintaining the same functionality. Similarly, on the server side of the organization, web-based application makes increasing processor capacity a far simpler task. This is due to the fact that web-based application capacity can be increased be running the software on several servers simultaneously.
6. **User Flexible Web Application Development Options:** There are different resources to use in development of a web-based application. Programming languages like PHP, Java, ASP. NET, or JSP can be used for the development of the application depending on the user.

2.4.4 SECURITY IN WEB BASED APPLICATION

Web application security is the practice of defending websites and online services from various security risks that take advantage of flaws in the code of the application. Content management systems are a common target for online application assaults e.g wordpress. To date no web

technology has proven itself invulnerable beyond all doubt. To improve the overall quality of web applications, developers should:

1. Maintain Web App Security During Development
2. Be on the safe side and need injection and input validation (User Input Is Not Your Friend): Input validation ensures that only properly formatted data travels through a web application's process. This prevents bad or possibly corrupted data from being processed, perhaps causing downstream components to fail.
3. Encrypt your data: Encryption is the process of encrypting data in order to keep it safe from those who aren't supposed to have access to it.
4. Applying role management, and access control: When developing a web application, implementing effective account management techniques such as strong password enforcement, secure password recovery systems, and multi-factor authentication are all important considerations to take. When users access more sensitive functions, you can even make them re-authenticate.
5. Web application firewalls (WAFs) are hardware and software solutions used for protection from application security threats. These solutions are designed to examine incoming traffic to block attack attempts, thereby compensating for any code sanitization deficiencies. By securing data from theft and manipulation. Generally, deploying a WAF doesn't require making any changes to an application, it acts as a gateway for all incoming traffic, blocking malicious requests before they have a chance to interact with an application.

METHOD THEORY

SOFTWARE DEVELOPMENT MODELS

The software development models are the various processes or methodologies that are being selected for the development of a project depending on the project's aims and goals. There are many development life cycle models that have been developed in order to achieve different required objectives, they are divided into main groups, each with its features and weaknesses. The models are; waterfall model, Agile model, V-shaped model, Spiral model, Iterative model. These models specify the various stages of the process and the order in which they are carried out. The selection of model has very high impact on the testing that is carried out. It will define the what, where and when of our planned testing, influence regression testing and largely determines which test techniques to use (Kronberg, 2019) . In this proposed project, the agile model was used.

Agile is a conceptual framework for undertaking software engineering projects. Agile is used for a variety of projects and it is the best option for eCommerce websites. It works with an objective to promote automation and fast delivery, coordination between development and operations and improving product quality using quality control testing. In the agile methodology after every development iteration, the customer is able to see the result and understand if he is satisfied with it or he is not. This is one of the advantages of the agile software development life cycle model. One of its disadvantages is that with the absence of defined requirements it is difficult to estimate the resources and development cost. Extreme programming is one of the practical uses of the agile model (Bluent.net, 2018).

2.4.1.1 BASIC STAGES OF SOFTWARE DEVELOPMENT LIFE CYCLE

Stage 1. Planning and requirement analysis

Each software development life cycle model starts with the analysis, in which the stakeholders of the process discuss the requirements for the final product. The goal of this stage is the detailed definition of the system requirements. Besides, it is needed to make sure that all the process participants have clearly understood the tasks and how every requirement is going to be implemented. Often, the discussion involves the QA specialists who can interfere the process with additions even during the development stage if it is necessary.

Stage 2. Designing project architecture

At the second phase of the software development life cycle, the developers are actually designing the architecture. All the different technical questions that may appear on this stage are discussed by all the stakeholders, including the customer. Also, here are defined the technologies used in the project, team load, limitations, time frames, and budget. The most appropriate project decisions are made according to the defined requirements.

Stage 3. Development and programming

After the requirements approved, the process goes to the next stage – actual development. Programmers start here with the source code writing while keeping in mind previously defined requirements. The system administrators adjust the software environment, front-end programmers develop the user interface of the program and the logics for its interaction with the server

Stage 4. Testing

The testing phase includes the debugging process. All the code flaws missed during the development are detected here, documented, and passed back to the developers to fix. The testing process repeats until all the critical issues are removed and software workflow is stable.

Stage 5. Deployment

When the program is finalized and has no critical issues – it is time to launch it for the end users.

After the new program version release, the tech support team joins. This department provides user feedback; consult and support users during the time of exploitation. Moreover, the update of selected components is included in this phase, to make sure, that the software is up-to-date and is invulnerable to a security breach.

ADVANTAGES

DISADVANTAGES

Corrections of functional requirements are implemented into the development process to provide the competitiveness	Difficulties with measuring the final cost because of permanent changes
Project is divided by short and transparent iterations	The team should be highly professional and client-oriented
Risks are minimized thanks to the flexible change process	New requirements may conflict with the existing architecture
Fast release of the first product version	With all the corrections and changes there is possibility that the project will exceed expected time

2.3.2 UNIFIED MODELING LANGUAGE (UML)

Unified Modeling Language is a visual language that allows you to model processes, software, and systems to express the design of system architecture. It is a standard language for designing and documenting a system in an object-oriented manner that allows technical architects to communicate with developers.

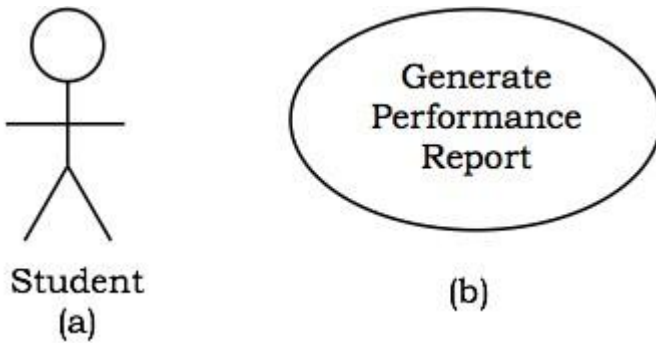
Unified Modeling Language (UML) is extensible and scalable. The objective of UML is to provide a common vocabulary of object-oriented terms and diagramming techniques that is rich enough to model any systems development project from analysis through implementation. The Unified Modelling Language is used for the following:

1. Making a business process model
2. Defining the architecture of the system
3. Displaying the structure of the application
4. Observing the behavior of the system
5. Creating a data structure model

6. Creating the system's exact specs Sketching the concepts
7. Creating the code for the program

The following lists of UML diagrams and functionality summaries enable understanding of UML applications of this study:

1. **Structure diagrams and their applications:** Structuring diagrams depict the structure of items in a system, including their classifiers, relationships, properties, and operations: class diagrams, component diagram, composite structure.
2. **Behaviour diagrams and their applications:** Behaviour diagrams are used to depict a system's behavior and are commonly used to describe the functionality of software systems: activity diagram, state machine diagram, use case diagram.



3. **Interaction diagrams and their applications:** Interaction diagrams are subset of behaviour diagrams and emphasize the flow of control and data among the things in the system being modelled: communication diagram, interaction overview diagram, sequence diagram, timing diagram

Table 2.1: Related Works

S/N	YEA	AUTHOR	TITLE	Remark	Method	REFERENCE
1	2012	O. Adewole et al	A Secure E-commerce system for a campus mall	Users cannot sale product on the website, he can only buy from it.	Business Consumers (B2C)	to https://www.academia.edu/11309185/A_Secure_E_Commerce_System_for_a_Campus_Mall_A_View_on_the_Business_to_Consumer_Relationship
				This project was built for a mall.		
				Pay before Delivery		
2	2014	Sidhartha Reddy Vatrappu <i>(Governors State University, University Park, IL 60484)</i>	Design and Implementati on of E-commerce Site for Online shopping	This project is centered on men’s wear only. And the users can only buy from it and not sell on it.	Business Business (B2B), Business Consumers (B2C)	to https://opus.govst.edu/cgi/viewcontent.cgi?article=1079&context=capstones
				Pay before Delivery		
3	2017	Effiong Micheal Pius.	Design and implementati on of online	It is only for sales of product by the owner of	Business Consumers (B2C)	to https://www.academia.edu/36893414/DESIGN_AND_IMPLEMENTA

		(uyo city shopping polytechnic) system	the Application.			<u>TION_OF_ONLINE_SHOPPING_SYSTEM.docx</u>
			Pay before Delivery			
4	1995	Pieere Omidyar	EBay	EBay is an online Auction Application where buyers would have to bid for a product and the highest bidder gets to buy the product.	Business Consumers (B2C), Peer to Peer(P2P)	to https://computer.howstuffworks.com/internet/basics/ebay1.htm https://www.ebay.com/help/selling/selling/start-selling-ebay?id=4081
			Pay before Delivery			https://en.wikipedia.org/wiki/EBay
5	2005	Robert Kalin	Etsy	Listing fee is required, Only Handmade products are sold on the site.	Business Consumers (B2C), Peer to Peer (P2P)	to cc https://www.adamenfro.com/how-to-sell-on-etsy
6	2012	Jeremy Hodara et al	Jumia	Before you can sell on jumia you must list at least 5 items before you can be	Business Business(B2B), Business	to https://sellercenter.jumia.com.ng/jumia_operating_model_guidelines

considered a Consumers (B2C) vendor. <https://blog.jumia.com.ng/want-sell-jumia-easy-sign-5mins/>

The delivery time of product is usually between a week after ordering. https://www.jumia.com.ng/sp-about_us/

7 2014 Agiri Ibrahim Ajobomarket Only men's wear is being sold on the website. Business Consumers (B2C) to <https://ajebomarket.com/about-us>

8 2018 Anton Wolyansky Jiji.ng Before you can advertise a product on jiji.ng you will be required to pay listing charges. Business Consumers (B2C), Peer to Peer(P2P) to <https://jiji.ng/about.html> <https://jiji.ng/add-free-ad.html#>

CHAPTER THREE

METHODOLOGY

This project made use of the agile software model for building software. The agile method is best used due to its Flexibility for making changes to the software. The agile method allows for modification throughout the development process. The modifiable nature of this model allows customers to test new ideas for their products, it allows direct communication with the customer. The customers feedback and involvement, issues can be tackled early on, The agile model requires less time spent on documenting and thus allows developer to spend more time designing and implementing projects. The figure shows the different stages of the model

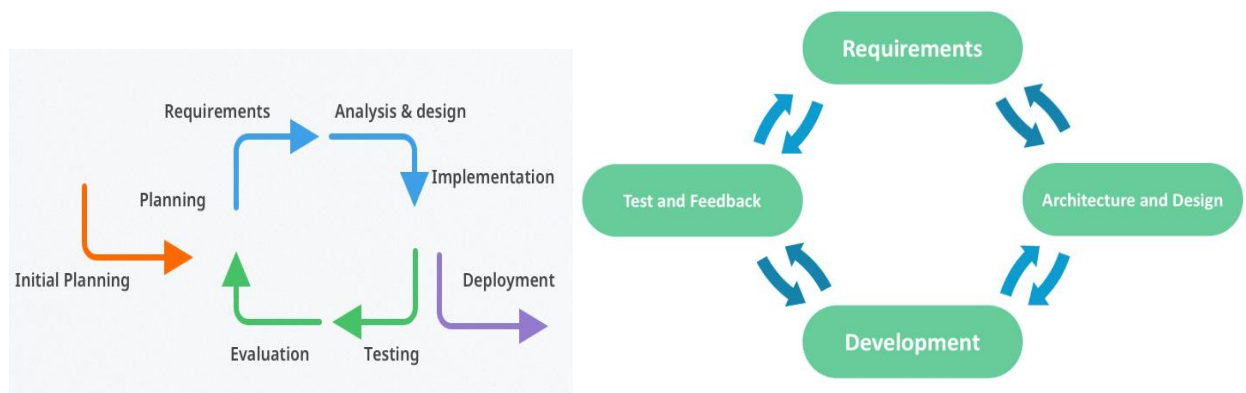


Figure 3.1 Agile Model Diagram

1. Requirement Analysis and Specification.
2. System Analysis and Design.
3. System Implementation and Validation

3.1. SYSTEM FUNCTIONAL REQUIREMENTS:

This include describing the app's features and utilizing a design tool to create the user interface. The success of the project hinges on this stage. Expectations must be fleshed out and meticulously documented. Stakeholders, end-users, and the project team frequently communicate

during the requirement analysis process. The findings of the research were utilized to define both the functional and non-functional needs for the system after a thorough evaluation of the material acquired. The software project was modelled using user stories and a use-case diagram with applicable specification.

3.1.1 USER STORY

The user story is a high-level explanation of an application requirement that provides just enough information for a developer to estimate how long it will take to execute a task. It describes how a customer or user will interact with the application.

1. users should be able to login/signup
2. The system and administrator should be able to verify users and administrator.
3. Users and administrator should be able to edit their account
4. Users and administrator should be able to upload their images and images of their product or services to sell on the platform.
5. Users should be able to access the market and access the seller.
6. Administrator should be able to register and login.
7. Administrator should be able to edit and delete records made by users in the marketplace.

3.1.3 USE CASE DIAGRAM

The Use case diagrams show how a system works from the perspective of an outside observer. A use case diagram depicts the relationship between actors and use cases. Users and actors, which are both components of a use case diagram, are the two most crucial factors.

An actor is a person who performs a specific role by exchanging Information with the system. An actor might be a real person or another external system. Actors define the different types of roles that users can take when utilizing the system. The actors in the web-based student

marketplace platform are as follows: Administrator who is in charge of uploading and delete of products in the platform and the users which are in this case the sellers and buyers

3.1.4 USE CASE DESCRIPTION:

As seen in the use case diagram above, anyone can sign up or login into the shopping website at any time as long as there is an active internet connection on their computer, the login and sign up system will require the user to include personal information like username and passwords.

The user also has the ability to add items to market, remove items from market, and view items in the market and logout of the website.

The second actor which is the Administrator (Admin) has all the privileges of the user and can perform all the user's actions, but the administrator also has additional privileges of adding an item to the market, managing the item and also removing items from the marketplace.

3.1.2 SYSTEM NON-FUNCTIONAL REQUIREMENTS

The Non-Functional Requirement (NFR) is the requirement that specifies criteria rather than specific behaviors that can be used to judge the operation of a system. It ensures the system's usability and effectiveness. Failure to meet any one of these can result in systems that do not meet internal business, user, or market needs or meet regulatory or standards agency criteria. The non-functional requirements of the system are as follows: The system should be simple, testable, available, reliable, scalable and easy to maintain.

3.2 SYSTEM ANALYSIS AND DESIGN OF THE STUDY

This entails identifying things and entities, finding relationships, and modelling these notions. The web-based system, which is hosted on the internet, is a reliable system that connects students, users, and administrators. This procedure resulted in components that were created to

meet the system's functional needs. Additionally, these components were merged using platform information to determine the system's architecture and interface design. This technique included the use of context diagrams, Class diagrams, and Sequence diagrams to describe structural (static) and behavioral (dynamic) aspects of the system.

The system also includes a comprehensive database for storing information in all locations where student data is required.

3.2.1 CHARACTERISTICS OF THE SYSTEM DESIGN

- i. **Scalability:** this is the ability to scale your market to accommodate the need of your online businesses' growth, this includes the money actualize from the monetization method of the website.
- ii. **Responsiveness:** the website which can adapt well to desktop, mobile, and tablets views. It can be viewed with any browser and should have an interactive interface.
- iii. **Easy and simplified registration:** Sign up process should be easy Nobody likes to fill out lengthy forms to sign-up on an online portal. At the same time, users don't want to give out much of their personal information in the process. So, the entire journey from sign-up to check out should be straightforward.
- iv. **Search Functionality:** This is necessary if your store has an abundance of products and services to offer. Users cannot skim through all of the listings in a short span of time. They should be able to search for the desired item by applying relevant filters
- v. **Ratings and Reviews:** Marketplaces involve numerous third-party service providers who are not connected to the site owner in any way. So, verified testimonials are the only way to judge the authenticity of the services or products.

3.2.2 ADVANTAGES OF THIS SYSTEM DESIGN

- i. The platform is made free for users thereby making more traffic on the web-app.
- ii. The use of database will help in easy retrieval of information and control data concurrency.
- iii. Passwords will be used to maintain and secure the security and integrity of data.
- iv. The new system is cost-effective and it saves energy since information can be accessed via web browsers rather than going to physical stores thereby saving money for physical services.

3.3 SYSTEM ARCHITECTURE DESIGN

The system architecture is the conceptual model that defines the structure, behaviour and views of a system. An architecture diagram is a system diagram that abstracts the overall structure of a software system as well as the interactions, constraints, and boundaries between its components. It's a crucial tool since it gives you a bird's-eye perspective of the software system's physical deployment as well as its evolution path.

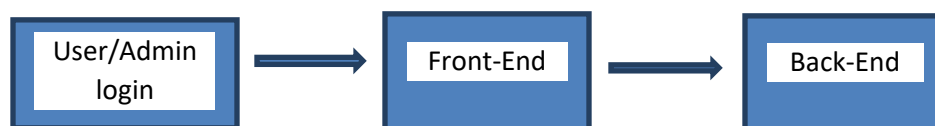


Figure 3.3 Block diagram

3.3.1 SEQUENCE DIAGRAM

Sequence Diagrams in the Unified Modelling Language (UML) are primarily used to model interactions between the actors and the objects in a system and the interactions between the

objects themselves. The following sequence diagrams shows the interactions that go on within the authentication system of the system of the platform;

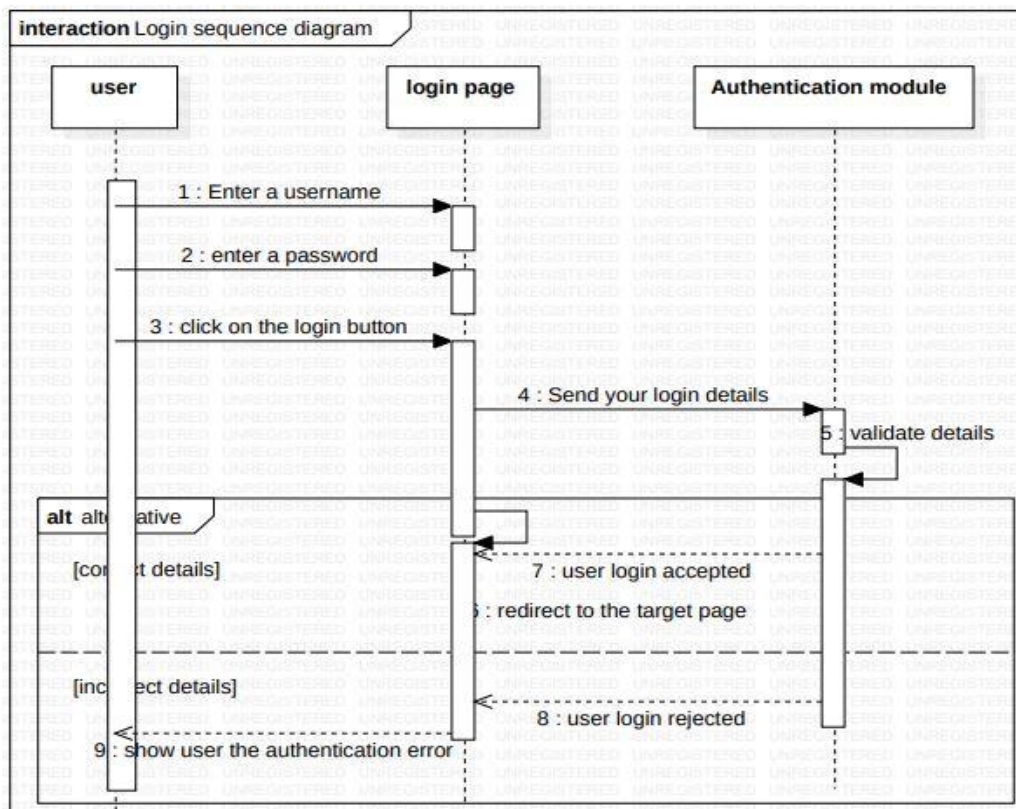
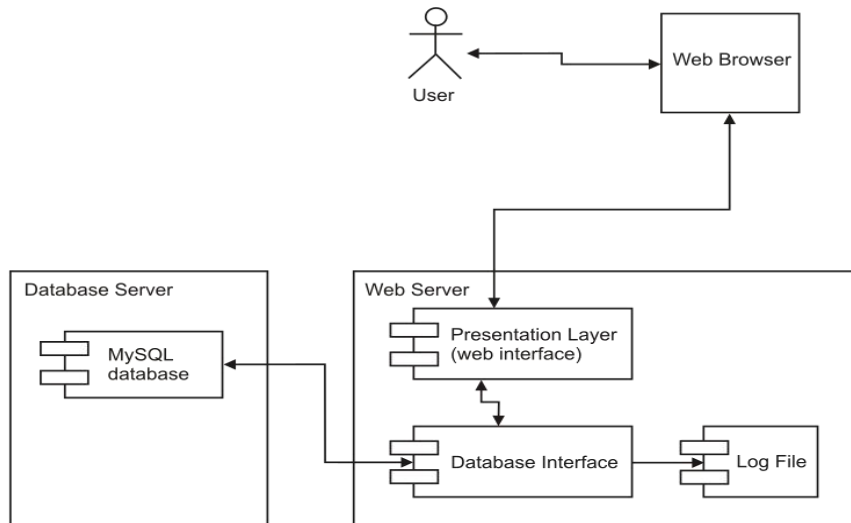


Figure 3.3 Login Sequence diagram

3.3.2 DATAFLOW DIAGRAM

A data flow diagram models objects, associations and activities by describing how data flow between and around various objects.

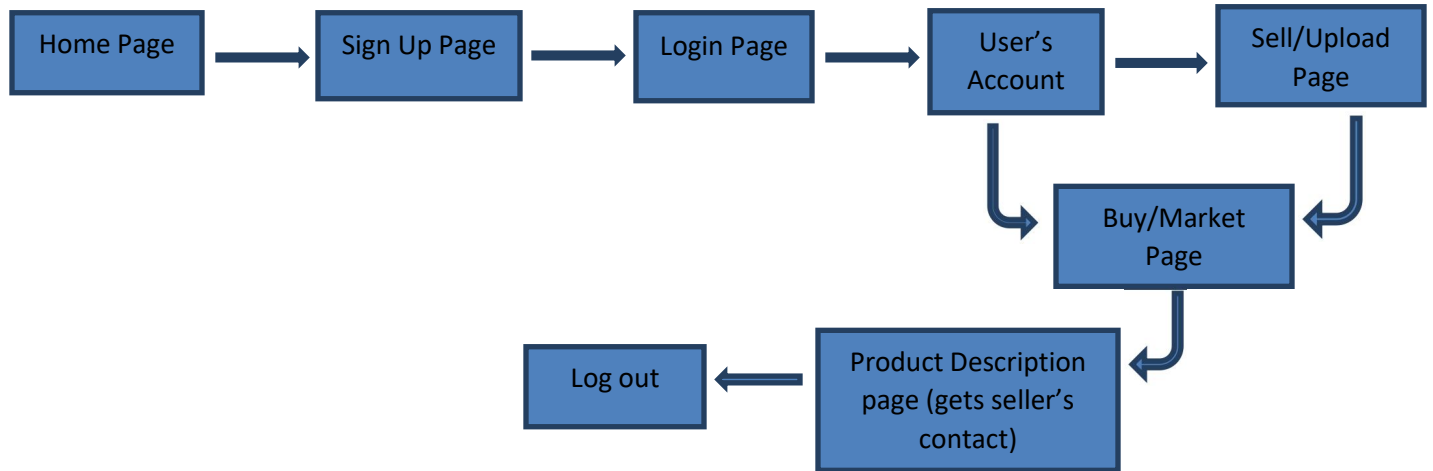


Fig 3.3 Data flow diagram

3.3.3 ACTIVITY DIAGRAM

The activity diagram is used to depict the system's dynamic behaviour. It was used to depict the transition from one action to the next. It was used to define the system's operation, which included parallel, branching, and concurrent flow.

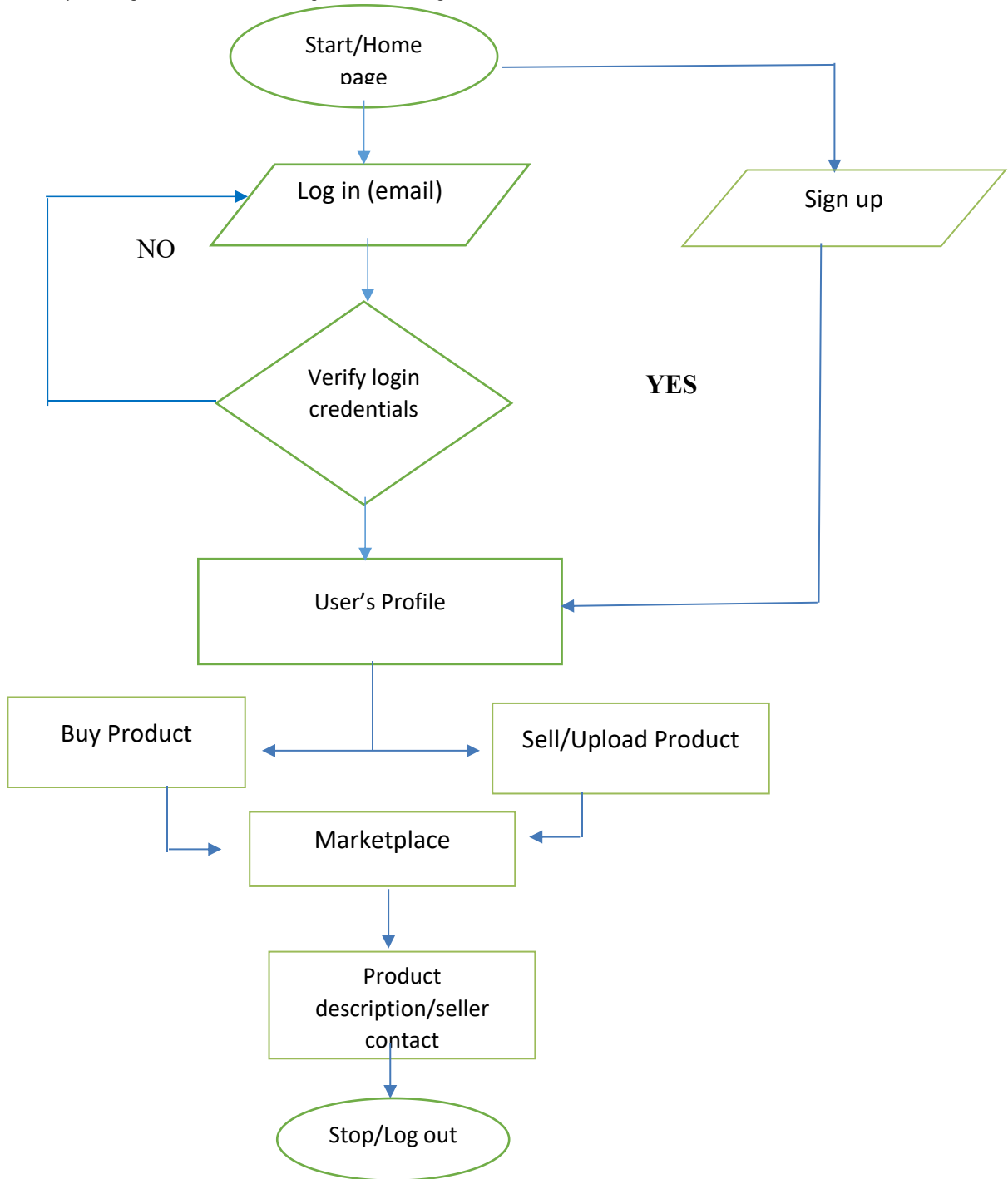


Figure 3.5: Flow Chart

3.4 SYSTEM IMPLEMENTATION

3.4.1 TECHNOLOGIES USED

3.4.1.1 FRONT-END CLIENT APPLICATION

This comprises the web application Graphical User Interface (GUI) built using **HTML** (HyperText Markup Language) the most basic building block of the Web. It defines the meaning and structure of web content, **CSS** (Cascading Style Sheet): is a style sheet language used for describing the presentation of a document written in HTML, enable the separation of presentation and content, including layouts, colors, and fonts.

3.4.1.2 BACK-END

The languages used in programming the back-end and managing the dynamic content, databases, session tracking are PHP. The framework used was Laravel. PHP is a popular general-purpose scripting language that is especially suited to web development. It is fast, flexible and pragmatic. It is integrated with a number of popular databases, including MySQL. MySQL is a free and open source Relational Database Management System (RDBMS) that employs Structured Query Language (SQL). SQL is the most widely used language for adding, accessing, and managing data in a database. It is particularly notable for its rapid processing, proven dependability, ease of usage, and flexibility of application. MySQL is an essential component of nearly every open source PHP programme.

3.3.4 LANGUAGES USED

- HTML.
- CSS.
- JQuery.
- PHP

- SQL.

3.3.5 SOFTWARE TOOLS:

- Operating System :- 64-bit windows 8 operating system
- Web Server:- Xampp[8.0.2].
- Web Browser:- Google Chrome, Mozilla Firefox etc.
- Database Connector:- Laravel.
- PHP:- Version 7.4.

3.3.6 HARDWARE TOOLS:

Personal computer with the following requirements;

- 1.8GHz Intel Pentium processor.
- 4GB RAM.
- 240GB HDD.

3.3.7 DEVELOPMENT TOOLS:

- Visual studio code (IDE).
- Github.
- Git.
- Github actions.

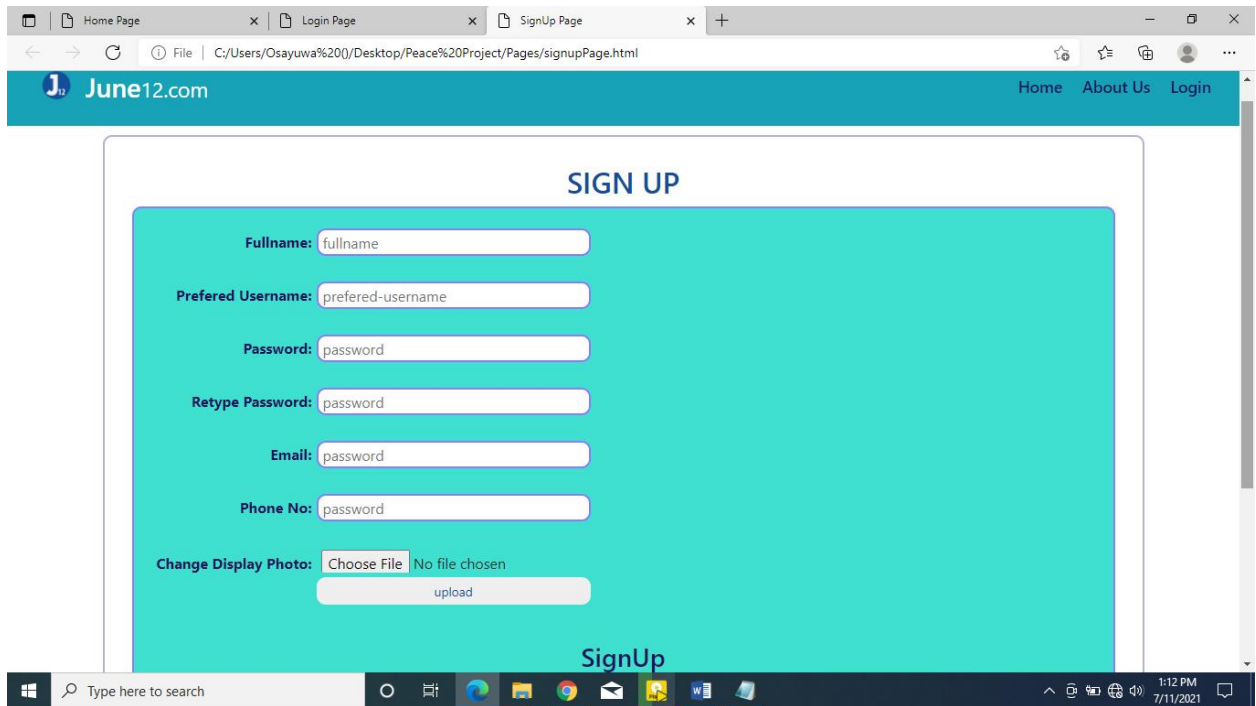
CHAPTER FOUR

SYSTEM IMPLEMENTATION

4.1 TESTING

4.1.1 USERS REGISTRATION (SIGN UP)

The system testing phase is for verification and to show the functionality of each feature. It verifies that the system works properly and meets all the requirements defined in the analysis phase. Before gaining access to the website's shopping area, the user must first register. On this screen, the user enters information such as username, email, full name, phone number, and password to create an existing account on the database.



The screenshot shows a web browser window with three tabs: Home Page, Login Page, and SignUp Page. The address bar shows the file path: C:/Users/Osayuwa%20/Desktop/Peace%20Project/Pages/signupPage.html. The website header is teal with the logo 'June12.com' and navigation links 'Home', 'About Us', and 'Login'. The main content area is a light blue box titled 'SIGN UP' with the following fields:

- Fullname:
- Preferred Username:
- Password:
- Retype Password:
- Email:
- Phone No:
- Change Display Photo: No file chosen

The Windows taskbar at the bottom shows the search bar, task view, and various application icons. The system clock shows 1:12 PM on 7/11/2021.

Figure 4.1 Sign up Page.

4.1.2 USERS AUTHENTICATION (LOGIN)

After a user has successfully registered on the platform, they will be directed to a login page where they can authenticate into the system. The information provided by the user is compared to information previously stored in the database.

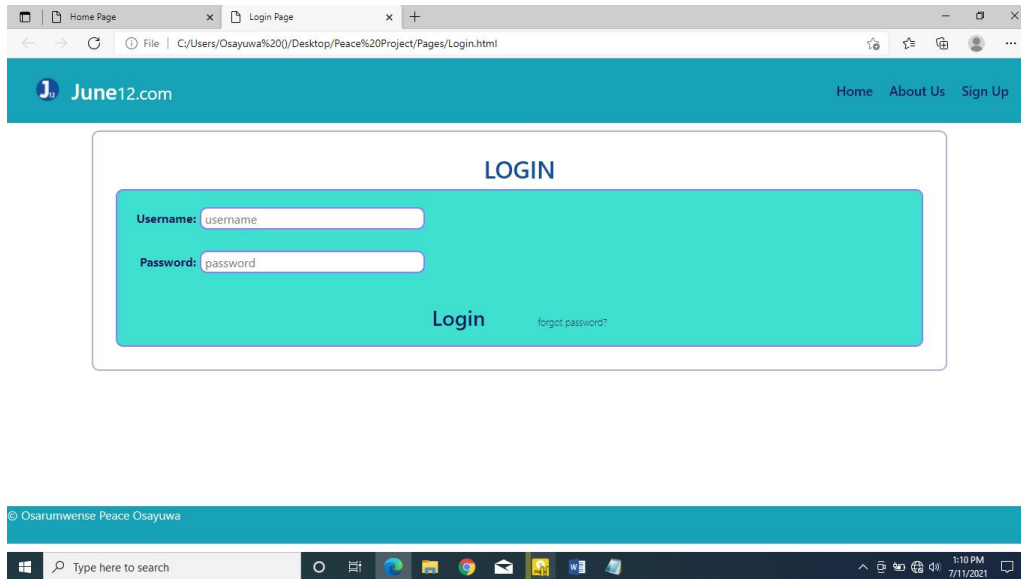


Figure 4.2 Login page

4.1.3 USER PROFILE PAGE:

After a successful verification of the user's details, the user is routed to the user's profile. An account is created for the user. The page displays the user's personal details, it shows user's name, email, the user can decide to change his or display photo. On this page the user can either decide to buy product/employ a service or sell a product, that is the user can go to the market page from clicking on the buy item/employ services. The user clicks on the sell item/advertise service when the user wants to sell a product or advertise a service.

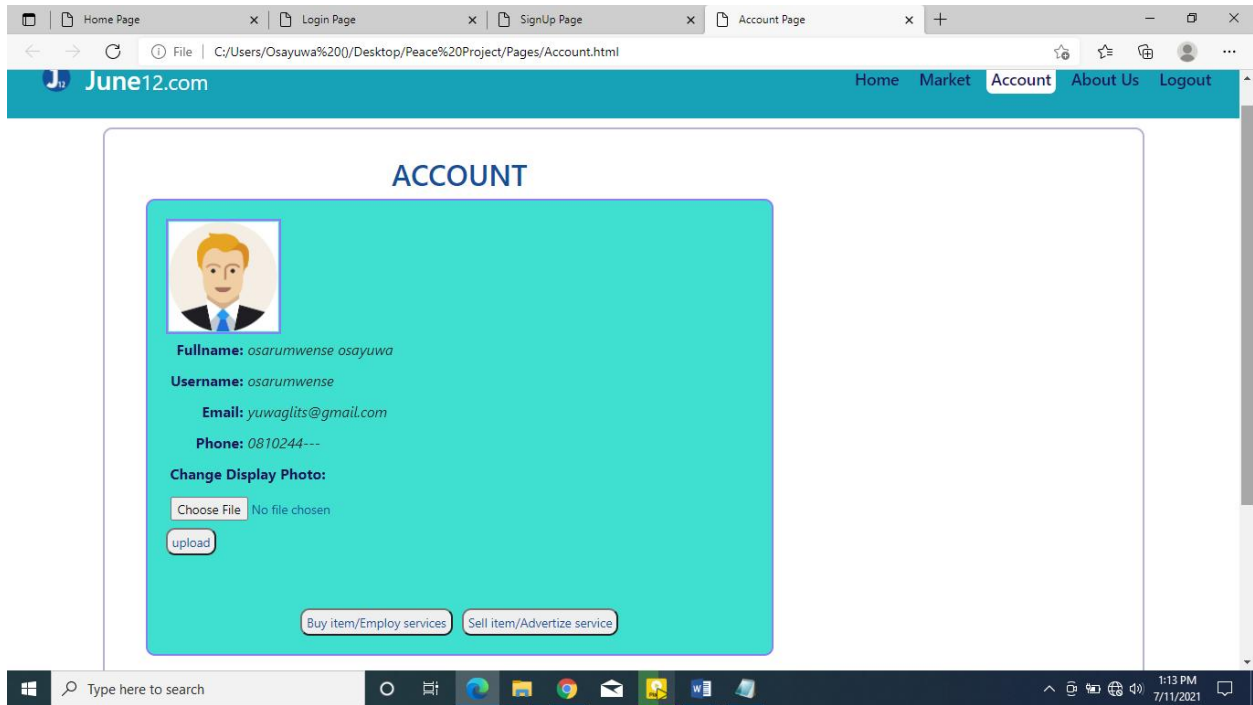
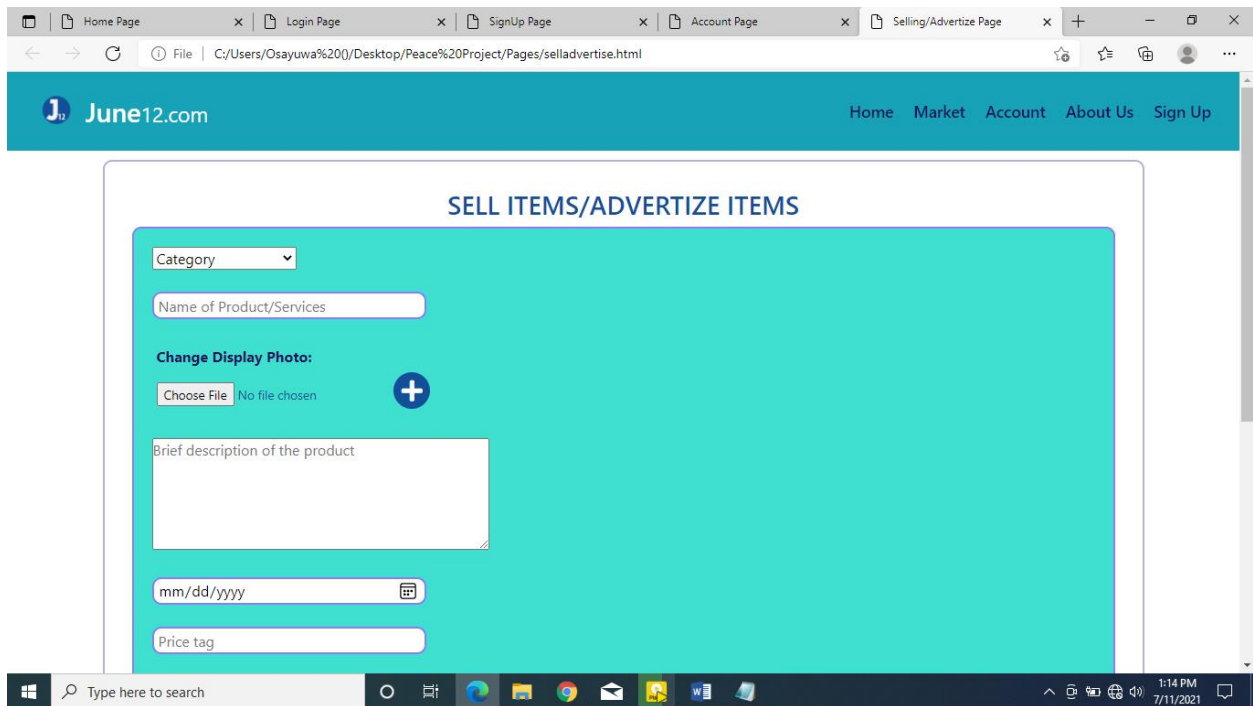


Figure 4.3 User's profile page

4.1.4 SELL ITEM PAGE/ADD PRODUCT OR SERVICES:

This is where the seller uploads the image and gives the description of the item he wants to sell.



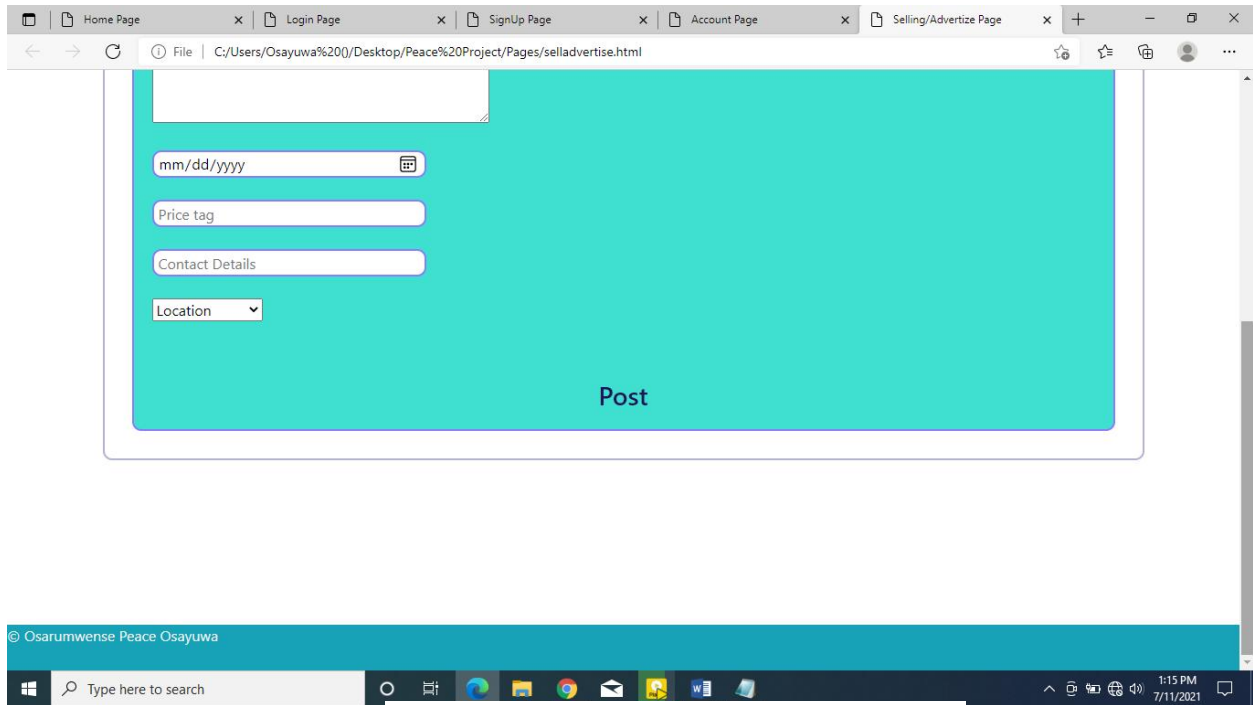
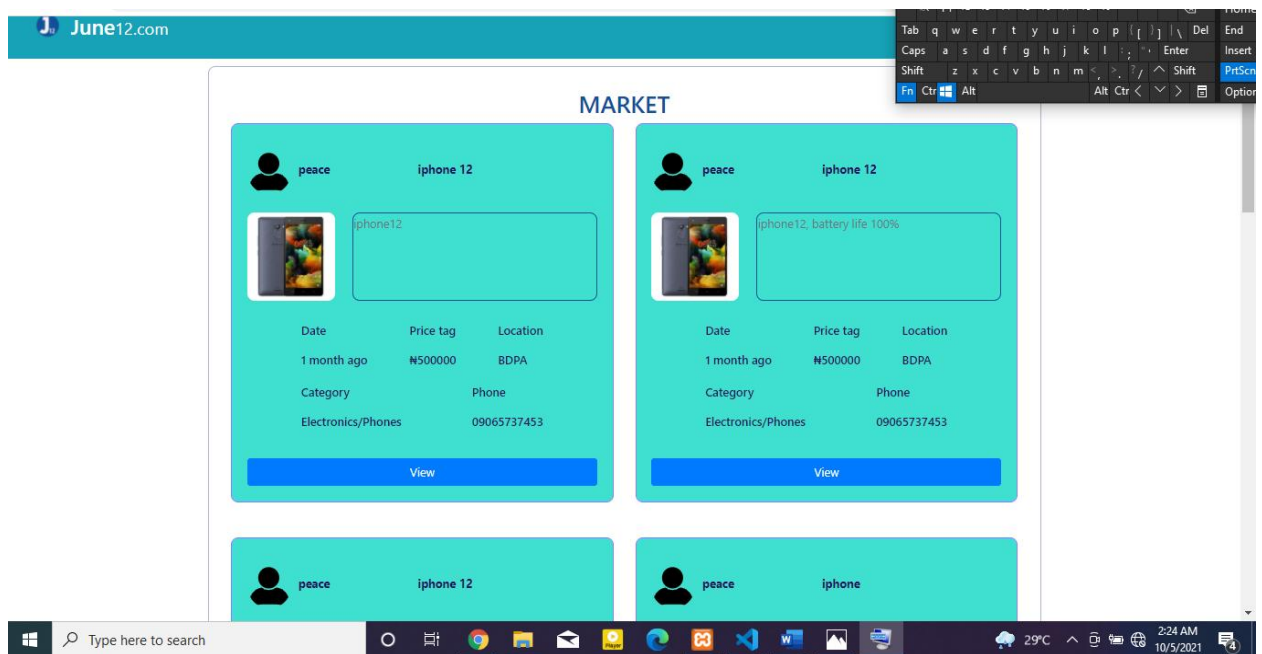


Figure 4.4 sell item page

4.1.5 MARKET PLACE PAGE

This page shows the various products and services that were posted by seller, this is where buyers can browse through and click on their desired item for purchase.



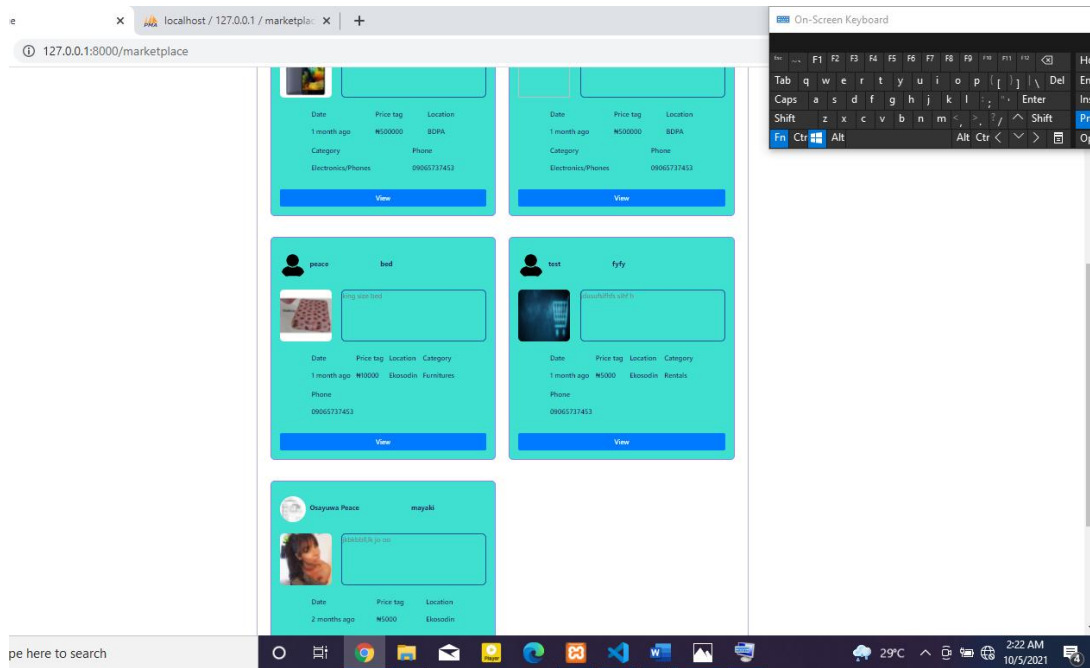


figure 4.5 Market page

4.2 DATABASE DASHBOARD

This is the interface where the administrator can add or remove categories from the web application. The administration dashboard provides a basic overview or analytics of the actions that are taking place between platform users and products, including information on the number of registered users, the number of users, goods and services and already purchased goods.

4.2.1 INTERFACE TO DELETE PRODUCT FROM THE DATABASE

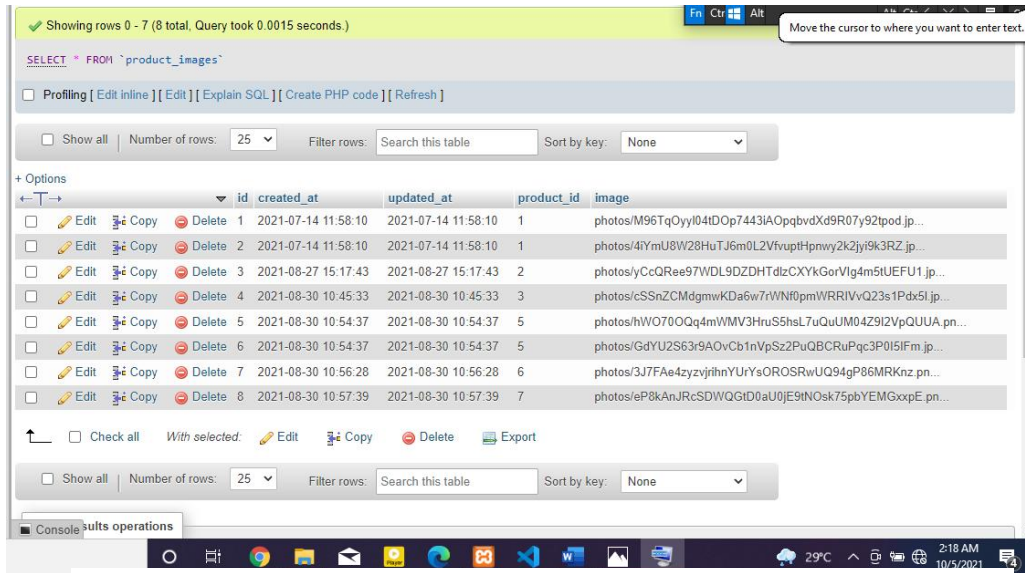


figure 4.6 This interface shows how the user deletes products that has been purchased by a buyer from the database

4.2.2 INTERFACE OF PENDING PRODUCT/SERVICE TO BE APPROVED

This interface explains how users or sellers who wants to upload their goods or services are approved by the administrator. The administrator logs into the database, approves pending products and deletes products or services that cannot be sold or advertised in the platform.

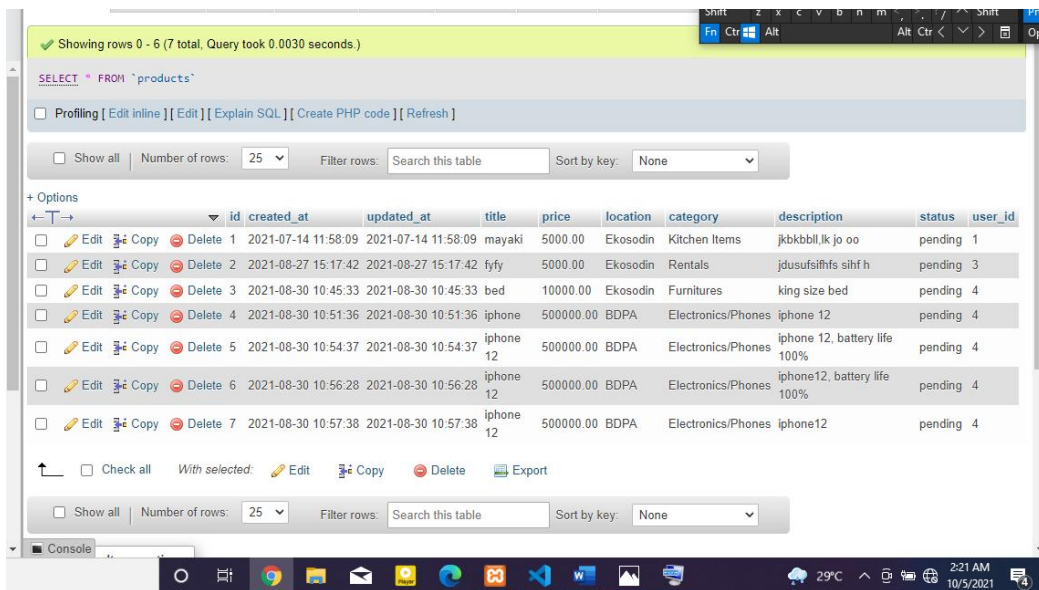


figure 4.7 This interface shows the necessary details about the pending goods or service to be approved by the administrator in the database

4.2.3 INTERFACE OF USERS SAVED IN THE DATABASE

The interface below shows the various users signed up to the web application saved in the database. It shows the name of the user, their email, passwords. The administrator which has access to the database can delete users imposters using the web application and such users can easily be traced by the administrator.

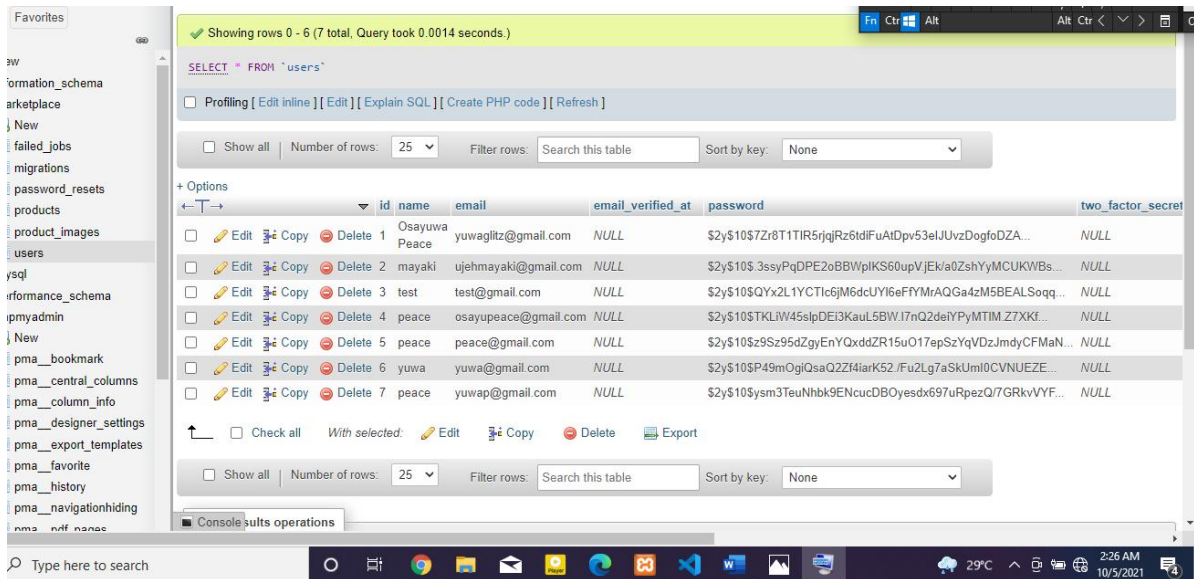


figure 4.8 this interface in the database shows the details of all users saved in the web application

4.3 BILL OF ENGINEERING MANAGEMENT AND EVALUATION.

Table 4.1 Bill of Engineering Management and Evaluation (BEME).

S/N	COMPONENT	QUANTITY	UNIT PRICE	TOTAL PRICE
1.	Web Hosting	1 month	Pay as you go	N30000
2.	SSL Certificate	1	N2000	N2000
3	Template Cost	1	N20000	N20000
	Grand Total			N52,000

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

In conclusion, the online sales web-app comprising of the login, signup, other features including the data base was designed and implemented. The web-app online marketplace was built for students to tackle the challenges students face when they want to sell or advertise their product or services.

The completion of the project resulted in the following benefits:

1. An efficient means for students to buy, sell and advertise products and services with ease of accessibility in viewing products.
2. A functional administrative panel where students or users can upload, delete and manage their products on the platform.
3. Wider range of buyers and sellers within the school environment which will make it easy for student in accessing goods or services within the school environment.
4. Accuracy
5. Easy system to connect with students in the school.

S/N	TEST	OBSERVATION	REMARK
1	Access Login Page	Users successfully logged into the system	Successful
2	Access Registration page	User was successfully added to the database	Successful
3	Access User's account	Users can successfully access their account created showing their details	Successful
5	Add Product/Services	Users can successfully add product or services to their market page	Successful

4	Access Market page	Users can successfully access the market page and successfully browse the list of products and services	Successful
6	Access product description page	Users can successfully access the market page and browse through the description and functionality of that product or service	Successful
7	Access Database	Users can successfully access the database for saved details.	Successful
8	Delete products/services	Users can successfully delete products after which it is purchased or out of stock.	successful

5.2 RECOMMENDATIONS

Considering the results obtained, the online market system which presents as an efficient, fast, accurate, reliable and well secured database should be encouraged and be given maximum attention, the system can easily be adapted in the school. Therefore, it is recommended that the school management should encourage e-commerce system in the school and should try as much as possible to effect the process of increasing power supply and relevant equipment for accessing internet around the school areas for growth and optimum efficiency of such web-based platform.

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