MULTIMEDIA UNIVERSITY OF KENYA

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

DEVELOPING A WEB APPLICATION FOR A CLOTH STORE IN NAIROBI

BY

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OJIEM NIXON OCHICH

SUPERVISOR: Mr. KIIRU

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A project submitted in partial fulfillment of the requirement for the degree in Information Technology.

DECLARATION

I hereby affirm that this Project is my original work and that it has not been submitted to any other institution of higher learning, to the best of my knowledge.

Student: ———————————————— Registration Number: ————————————————

Signature: ----------------------------- Date:--

With my agreement as the University supervisor, this project was submitted as a partial fulfillment of requirements for the Bachelor of Science in Computer Science/Information Technology at Multimedia University of Kenya.

Supervisor:_____

Signature: ----------------------------Date:---

DEDICATION

This project is dedicated to my ever-loving parents and friends, who have always supported and stood by me in all of my endeavors. In terms of both academics and finances.

Mr. Kiiru, my long-time supervisor, deserves special thanks for editing and counseling me on this endeavor.

ACKNOWLEDGEMENTS

First and foremost, I want to express my gratitude to God for His protection and the gift of life and good health thus far. All glory and honor belong to Him. Second, I am grateful for my family and friends' unending love and support in every way.

ABSTRACT

Online shopping has been growing steadily since 2007 and by today it has grown significantly because of the pandemic. This project intends to give the company a share of this online market by targeting online users. This allows users to buy items from the store without physically being in the store, thus reducing the chances of contracting covid 19 for both the customers and the employees of the store. By targeting online users, the project allows the company to increase their revenue because customers are not limited by region. For the project to be a success the methodology employed in this scenario is the waterfall model. The main reason for using it, is because it provides a list of all required resources for the project thus during development there will be minimum errors. The expected outcome for this project is to increase the revenue of the company, reduce covid 19 infection among employees and create more awareness of the store. To summarize the content stated above, this project helps the cloth store to generate more revenue by targeting more customers while still being able to reduce the risk of its employees contracting covid 19.

LIST OF ABBRIVIATION

TB-   Terabyte

POS-   Point of sale system

CRM-   Customer Relation Management

HR-   Human Resource

PC-   Personal Computer

PL- Programming Language

UPS-   Uninterrupted power supply unit

Mac- Macintosh Computer

PSA-   Professional Service Automation

ERPM- eResearch Proposal management

UML- Unified modelling language

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CHAPTER 1

1 Introduction

1.1 Background of study

E Commerce has been implemented for a while now, since 1991, then in 1995 Amazon started out as an online book, making it gain more traction, and since then it has grown steadily. In late 2019 it increased in growth significantly because of the covid 19 pandemic, which had restricted the movement of people forcing them to trade and do business in an online set up. Today, over 1.8 billion people in the world shop online, with most of the first world countries leading the way. It is expected that other countries will soon join in, Africa has 17% of the market share and is at position three, just behind Asia and Europe (74 Compelling Online Shopping Statistics: 2020/2021 Data Analysis & Market Share - Financesonline.com, 2021).

To put this in perspective to Kenya, Kenya has 2.61 million shoppers and ranks third in Africa. Kenya has a population of 49.7 million, considering the number of online shoppers in Kenya, 2.61 million, Kenya has the highest absorption rate of the three top countries in Africa proving that online shopping is a worthy investment for companies (Growth of Online Shopping in Kenya - Kenya News, 2021).

1.2 Problem statement

The East end cloth store is limited to the number of customers it can receive by geographical location. Potential buyers who are not within the geographical location of the store cannot access the store. The measures put in place by the government due to covid 19, the curfew and one-meter social distancing also limits the potential customers to access the store. This limits the number of customers at the store at any particular time. With all these facts stated it is logical that the store will not achieve its maximum profit with this kind of situation. For the store to be successful it has to reach out to as many customers as possible without restrictions.

1.2.1 Proposed solution

I intend to solve the problems stated above, with an online commercial website, commonly known as Ecommerce. With an ecommerce system the company can reach out to every potential buyer without the limit of geographical position of the store. Potential customers all over Kenya can make their orders. It is important to note that the potential online customers are over 2 million. About the restrictions of the government placed by the government like curfew and maintaining one meter apart in public spaces, the proposed system solves this problem by being available 24hrs a day for customers to make their orders and also lowering the risk of customers and employees contracting covid 19.

1.3 Aim of the study

This project will better the east end cloth store by:
1. Increasing the number of potential buyers through ecommerce.
2. Lowering the risk of employees contracting covid 19.
3. Increasing the revenue of the store.
4. Increasing the popularity of the store through advertisements online.
5. Creating a possibility of expansion to other regions depending on the statistics of online buyers.

1.4 Research objectives

The research objectives for the proposed system are actions that will be taken to make sure that the goals and aims of the project are realized. They include:
1. To Apply design skills, development skills and theory learnt in class for this project.
2. To Design and develop a working web application.
3. To Ensure the web application is secure.

1.4.1 Research questions

1. How will the principles of designing and developing an application be implemented?
2. How will I meet the user requirements?
3. How will security features in the system be implemented?

1.5 Significance and justification of the study

With the movement restrictions placed by the government, many businesses are making less profit than they expected if not losses. Some of the businesses that have online platforms like Amazon, have recorded an increase in their net profit. This solidifies the need for most businesses to go online. For a cloth store the advantages are significant because the frequently sold items online are fashion wear. This makes the success of the online cloth store even more possible because of the nature of the products that this company deals in. With the facts stated above, it is possible that the chances of success of this proposed system are very high if not a mandatory success. It is also worth noting that the proposed system will reduce the risk of employees and customers contracting covid 19 while still increasing the sales of its products (The 6 most sold products online (ideas and market analysis), 2021).

1.6 Scope of the proposed system.

This project will produce an online platform for customers to use for buying goods. The platform will accept new users and also allow current users to log in and view the goods offered. The project will produce a working user-friendly website for its customers to use. The constraints involved with this project include:

- a limit to the number of users that are online at a particular time. This is to provide a good experience to the users who are already logged in so that the functional requirements do not fail.
- Another constraint is, multiple accounts from users cannot be accepted because there is a need to provide accurate statistics of how many customers visit the platform.
- Administrators will be the only ones with access to the sensitive data.

The main primary objective of the proposed system is to produce a system with all the functional requirements and non-functional requirements met (Bernie Roseke, 2021).

List of project stakeholders include:

- Project manager
- Project planning committee
- Sample customers
- Sample employees

1.7 Assumptions and limitations (challenges and countermeasures)

Some of the assumptions involved include:

- The East end cloth store already has customers who are willing to buy the goods.
- Another assumption is that the server hosting the proposed system will not fail, otherwise the proposed system will not be efficient.
- The online market will continue to grow as analyzed
- The customers will prioritize the online platform than physical shopping

One major limitation of the system is, if a buyer is located in a remote area then it will not be possible for the store to get the customer his/her ordered goods.

CHAPTER 2

2 Literature review

2.1 Introduction

There are a lot of similar systems that have been developed similar to the proposed system, all with the aim of meeting all the functional requirements set by the stakeholders. Some organizations prefer these systems while others prefer to hire developers to make a tailored system specific to their organization. In this topic we shall discuss the benefits of both systems and look at examples and also the disadvantages of these already available systems (Best Clothing Store Inventory Software - 2021 Reviews, 2021).

2.2 Related systems

Lightspeed Retail

Lightspeed Retail is a cloud-based POS arrangement that is reasonable for retailers in ventures like attire, footwear, bicycle, adornments, pet, outdoor supplies and home style. The arrangement offers retailers devices including stock administration, retail location the executives, cash cabinet control, installment handling, buy request the board, client profile access, bookkeeping programming incorporation and coordination with POS equipment, for example, standardized tag scanner or receipt printer apparatuses. Lightspeed offers a completely coordinated, eCommerce stage that permits clients to oversee coming up and online stock, have a solitary perspective on clients and examine multi-channel deals information.

This software's cheapest plan starts at $69 per month retail POS, $119/month retail POS and lastly the most expensive being $169 per month retail POS. This software does not have a free version (Lightspeed Retail Reviews, Demo & Pricing - 2021, 2021).

NetSuite

As the main cloud ERP framework, NetSuite helps in excess of 24,000 clients acquire the perceivability, control and spryness to assemble and maintain an effective business. With an incorporated framework that incorporates ERP, financials, trade, stock administration, HR, PSA,

production network the board, CRM and that's just the beginning – NetSuite empowers quickly developing organizations across all enterprises to work all the more successfully via computerizing center cycles and giving constant bits of knowledge into functional and monetary execution. NetSuite gives a variety of bookkeeping and monetary administration arrangements like an overall record, creditor liabilities, money due, cash the board, project bookkeeping and fixed assets management.

There is no free version for this software, the starting price is $499.00 per month.

Heartland retail

Heartland Retail, previously Springboard Retail, is an online retail arrangement intended for multi-channel and multi-store retailers. Heartland's retail location framework is completely open through any advanced internet browser on any gadget. The arrangement is intended to work well on both touchscreen gadgets, similar to the iPad, or on conventional gadgets like a PC or Mac. The arrangement's client dashboard permits clients to all the more likely comprehend their clients by gathering data at the retail location. Utilizing this information, the product creates significant level insights about client inclinations and buy history. Limitless custom fields mean following and announcing can be custom-made to the different requirements of the business.

There is also no free version or trial version for this system, its starting price is 79.00 dollars per month.

Orderhive

Orderhive is a cloud-based request board framework intended for small, medium and enormous retailers, wholesalers and merchants. With Orderhive, retail merchants can follow their orders, stock and shipments across the entirety of their online deals channels just as examine group execution across capacities and find stock in the distribution center. The framework likewise furnishes clients with constant updates about their business by means of a detailing and examination. Furthermore, Orderhive permits clients to store client data for future showcasing use, construct buy orders, track stock across stockrooms, satisfy outsourcing and 3PL orders, track crude materials needed for items, make solicitations and track installments.15-day completely free preliminary (no Visa required) Add-ons are accessible for additional functionalities. Simple discount strategy, no inquiries posed. Orderhive accompanies 15 days free preliminary (no Visa

required) and loans all day client care to its clients. The starting price for this software is 44.99 dollars per month.

2.3 limitations/ weaknesses of these systems

Some of the weaknesses facing these online systems can be classified into technical and non-technical weaknesses. Technical weaknesses include:

- There can be absence of framework security, unwavering quality or guidelines inferable from helpless implementation of web-based business.
- The product advancement industry is as yet developing and continues to change quickly.
- In numerous nations, network transfer speed may cause an issue.
- Now and then, it gets hard to incorporate an internet business programming or site with existing applications or information bases.
- There could be programming/equipment similarity issues, as some internet business programming might be contrary to some working framework or some other segment.

Non-technical weakness include:

- Introductory expense − The expense of making/assembling an internet business application in-house might be high. There could be delays in dispatching a web-based business application because of errors, and absence of involvement.
- Client opposition − Users may not believe the site being an obscure nondescript merchant. Such a question makes it hard to persuade conventional clients to change from actual stores to on the web/virtual stores.
- Security/Privacy − It is hard to guarantee the security or protection on online exchanges.
- Internet business applications are advancing and evolving quickly.
- Web access is as yet not less expensive and is awkward to use for some likely clients, for instance, those living in far off towns

(E-Commerce - Disadvantages - Tutorialspoint, 2021)

2.4 how the proposed system will handle these weaknesses.

Starting with the technical issues, framework security will not be an issue because the system will be tailor made with the organizations needs in mind. Necessary frameworks that do not

compromise on security will be used. Since the technology in the internet keeps changing, the proposed software will have an update team to keep the system UpToDate with the current trends in the technology industry. If our system is deployed in a stable server with fast speed and high bandwidth, we will not face problems in network transfer speeds with customers. Integrating the proposed system with the internal organization of the system will not be a problem because the system will be made according to the structure of the individual organization.

Lastly, how the proposed system will solve the non-technical issues. Both the proposed system and the off the shelf systems have high initial cost, but the running cost of the off the shelf systems is because of the monthly payments that have to be made for the organization to run the system. Because the proposed system is tailor made for the organization, it will take great measures where hackers may exploit the system. For those clients living in far off towns that claim that the internet may be expensive, in Kenya thanks to Telkom fiber 4G, there are cheap data deals that can help these clients. There will be no or little client opposition because the clients are involved in the development of the project.

CHAPTER 3

3 Methodology

3.1 Introduction

Software development has many methods, some of them include Agile, Waterfall, rapid application development among others. For the proposed system, I will be using the waterfall model. Many believe the waterfall technique to be the most customary programming advancement strategy. The waterfall strategy is an unbending straight model that comprises successive stages (prerequisites, plan, execution, check, upkeep) zeroing in on unmistakable objectives. Each stage should be 100% finished before the following stage can begin.

The benefits of using this model include, the straight idea of the waterfall improvement strategy makes it straightforward and oversees. Activities with clear destinations and stable necessities can best utilize the waterfall strategy. Less experienced venture chiefs and task groups, just as groups whose synthesis changes oftentimes, may profit the most from utilizing the waterfall advancement methodology (Team, 2021).

3.2 Data collection methods and tools

There are many data collection techniques that are used during data collection, for this proposed system, the following methods were used to collect data.
Primary data collection methods

These are methods that get information first-hand. The methods used include
- Questionnaire- These contain a set of questions that are mailed to a recipient, employees of the company and the customers of the store.
- Interview- This method involves asking the employees and customers a set of questions that will help shape the functional and non-functional requirements. Oral or verbal responses are accepted here.
- Schedules- this is similar to a questionnaire except that the enumerations are for the purpose of filling the schedule.

(Data Collection Methods | Methods of Primary and Secondary Data, 2021)

Secondary data collection techniques

Auxiliary information is information gathered by somebody other than the real client. It implies that the data is as of now accessible, and somebody investigates it. The auxiliary information incorporates magazines, papers, books, diaries among others. There are various sources that we can obtain this information including, government publication, public records, business documents and letters.

3.3 Project resources

The project resources are the necessary prerequisites for the proposed system to be a success. It includes all the hardware and software requirements needed by the proposed system. The proposed project resources include:

Resource	quantity
server	1
RAID solid state storage 1TB	4
Monitor	1
Laptop	3
Developers	5
Internet connection	Fast (over 100mb/s)
UPS	2
Administrator	1
Server room	1
Windows enterprise server side	1

Table 3. 1

3.4 Project schedule

To ensure that nothing falls through the cracks or ends up delayed past its due date, it is compulsory to use a schedule. Without a schedule, a big project like this one might fall apart. Also, to convince the organization and stakeholders, I have put in place the project schedule that will ensure all the components of the project are met intime to ensure no delays are experienced during the implementation of the project.

A	B	C	D	E	F	G	H	I	J	K
Activity	week1			week2	week3	week4	week5	week6	week 7	week8
Requirments	3 adys									
Design		5 days								
Implementation				3weeks 6 days						
Testing								2 weeks		
Deployment										1week

Figure 3. 1

The deliverables for week one include all requirements for the project to be a success. The deliverables should be achieved within three days.by the end of week two, the design layout should already be drawn and ready for implementation. At the end of the fifth week, the implementation should already be done. Testing of the application should begin from week 6 to week 7. And lastly the deployment and maintenance of the proposed system should be done in the last week, that is week 8.

3.5 Project Budget

Resource	quantity	Cost
server	1	150,000
RAID solid state storage 1TB	4	40,000
Monitor	1	25,000
Laptop	3	80,000
Developers	4	300,000
Internet connection	Fast (over 100mb/s)	4,000
UPS	2	14,000
Administrator	1	0
Server room	1	0
Linux	1	0
TOTAL		613,000

Table 3. 2

It is important to note that the prices listed here are higher estimates of the prices of these resources. The price might actually be a little lower than this.

CHAPTER 4

4.0 Requirement gathering and documentation

4.1 Introduction

This is the first stage of the waterfall model; in this stage the requirements of the system are gathered and well documented. Requirement analysis focuses on the needs and conditions to be met by the development of the system. It measures the success or failure of the system. The requirements should be documented, measurable, and actionable. There are many methods used to collect the requirements of projects, the ones used for the proposed system include:

- Google forms
- Brainstorming
- Questionnaire
- Scheduled discussions with the project assessors.

By the end of this phase, I should have clear project requirements and be well documented. They will be used in the coming stages to ensure that every stage becomes a success.

4.2 Results of the surveys conducted

4.2.1 Google forms

These are online forms that can be shared to a wide audience through the internet. They are reliable and one can set as many questions as they desire and share them with various informed members who wish to collect their views on a certain topic.

4.2.1.1 Questions used

The question asked to the participants to ensure requirements were tactical and objective to ensure that the requirements were up to the desired high standard. The following questions were asked:

- What is the potential upside of solving this problem?

- What are the risks?
- How much will it cost me to solve this problem?
- Who are the key stakeholders and users?
- What is most important for the success of the project?
- What needs to happen to make this project/system successful?

4.2.2 Brainstorming

Brainstorming is a way of generating ideas and exchanging knowledge for the purpose of solving a specific commercial or technical challenge in which participants are encouraged to think freely. Brainstorming is a group exercise in which each person expresses their thoughts as they arise.

4.2.2.1 Questions used

Some of the question that were brought up include:
- What will this project/system do that is entirely new?
- Does the current system do things that this system will not do?
- How do these functions interact with each other?
- Are there other systems this system will interface with?

4.2.3 Questionnaire

A questionnaire is a research tool that consists of a series of questions designed to collect data from respondents. Questionnaires are similar to written interviews in that they collect information. They can be done in person, over the phone, on the computer, or through the mail.

4.2.3.1 Questions Used

Some of the questions used in the questionnaire include:
- What department/business requirements will this project/system address?
- What information do you need from this project/system that you don't have now?
- Is any of this data currently captured in any other project/system?
- Is the data and/or functionality shared by others?

4.2.4 Scheduled discussions with the project assessors.

I held meetings with my project assessor and came up with questions that can help to come up with the requirements that are supposed to guide me during the development of the proposed system.

4.2.4.1 Questions

- Application is easier to use.
- Application has a nicer front-end.
- Application has additional functionality (list).
- Application is more efficient.

4.3 Overall results of the survey.

The results of all the methods developed the requirements that the proposed system is to adhere to. They include:

4.3.1 Functional requirements

- Third-Party Integrations.

The website should integrate with other third-party web pages like email, linked in, Instagram among others.

- Mobile-Friendliness.

It's no secret that mobile responsive apps bring more traffic to the website. According to Statista, the number of customer conversions on mobile devices has also reached those on desktops worldwide.

- Product Attributes.

There should be a clear display of the product attributes so that the users can choose easily from the categories without getting confused.

- Order & Checkout Flow

This includes the order and flow in which the customers make their orders. Should they register first before ordering or they can order without registering.

- Social Sharing.

Online presence goes alongside social media presence in ecommerce. Allowing a user to share your website's content on social media leads to higher brand awareness and brings you closer to your present and potential customers.

- Integration with Mobile money banking (Mpesa)

The proposed system will be linked with a demo that supports Mpesa API.

4.3.2 Non-functional requirements

- Usability

No matter the size of your business, you want your website to be intuitive and easy-to-use. It takes o.5 seconds for users to figure out if your website is worth their time and attention.

- Security

Security is paramount while dealing with monetary transactions and sensitive data. A simple SSL certification and data privacy policy will instill trust into your website and convert the customers into your brand advocates.

- Performance

The goal is increasing your website traffic, performance should be the priority NFR in your specification document. This NFR is often found in briefs from large enterprises or websites with legacy architecture: they want their e-stores to load fast no matter the number of integrations and sales seasons

- Maintainability

It's widely known that the tricky part of planning a business budget is accounting for the operational costs of business maintenance. Striving to make the website maintainable from the initial development phase means cutting the time and cost to identify and resolve the system faults in the future.

- Scalability

The project should be capable of growing with the business, increase in size as the business increases and also decrease in size as the business decreases.

CHAPTER 5

5. System Design

Introduction

This chapter is going to give a specific hardware and system requirements like, data layers, network infrastructure, user interface and programing languages used in this project to enable the functional and non-functional requirements. This chapter gives a detailed description of my creative methods visual design and technical design, and latter justifies the literature review.

5.1 Overall System architecture

The system architecture in the proposed system is a four-stage process. The four stages are structured in such a way that allows the user to understand the web application better. The user has a better understanding of the system because there are even help function embedded in the system. The following diagram represents the system architecture.

```
┌──────────────────────────────────────────────────────────────────────────┐
│                                                                            │
│   ┌────────────────────┐                    ┌────────────────────┐         │
│   │   LANDING PAGE     │───────────────────▶│    LOGIN PAGE      │         │
│   │                    │                    │        OR          │         │
│   │                    │                    │   SIGN UP PAGE     │         │
│   │                    │                    └──────────┬─────────┘         │
│   └────────────────────┘                               │                   │
│                                                         ▼                   │
│   ┌────────────────────┐                    ┌────────────────────┐         │
│   │  CHECKOUT PAGE     │◀───────────────────│   ACTIVITY PAGE    │         │
│   │                    │                    │    (Involves the   │         │
│   │                    │                    │  display of products│        │
│   │                    │                    │       sold)        │         │
│   └────────────────────┘                    └────────────────────┘         │
│                       Page 17 of 73                                        │
└──────────────────────────────────────────────────────────────────────────┘
```
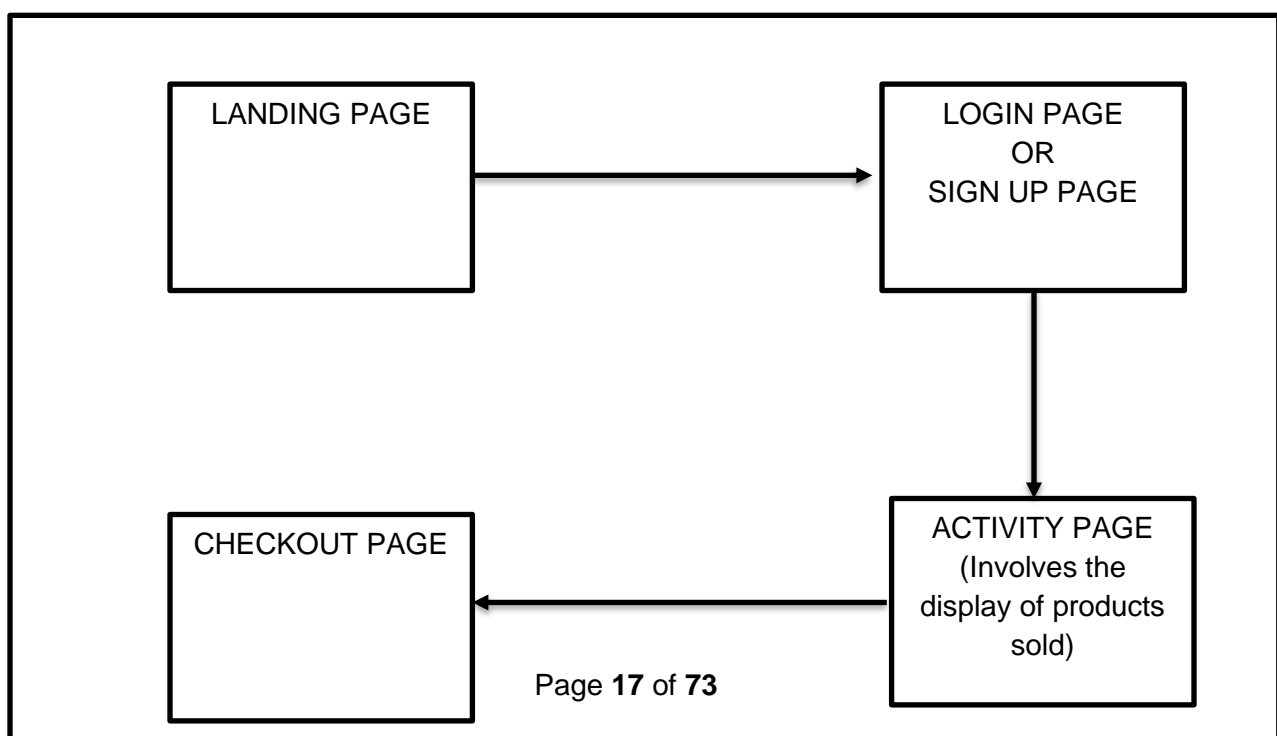
Figure 5. 1

5.2 Technical design

What is the definition of technical design? It's now time to create a technical plan that will serve as a roadmap for implementation. It's being agnostic and understanding that not every problem resembles a hammer. It incorporates scaling into the roadmap from the start, but not to the point of over-engineering. It is the skillful use of experience, knowledge, and due diligence to the planning and execution of software development, and it encompasses much more than just creating an architecture.

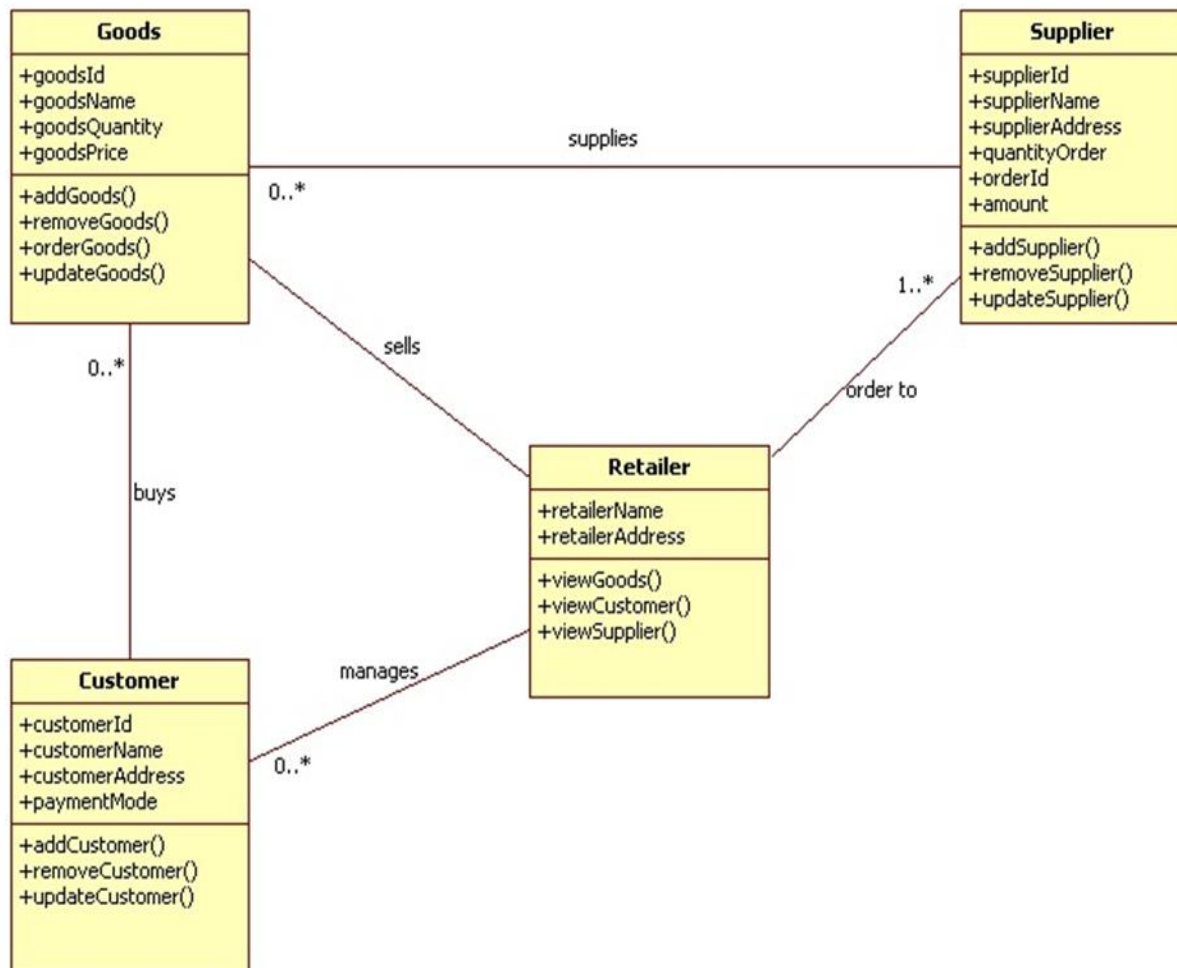## 5.2.1 Entity Relationship Diagram Design

Figure 5. 2

(Entity Relationship Diagram)

An ERD diagram shows the relationship that is within the database and states how the architecture of the database should look like. It gives an overview of how the integrated tables and systems involved in the project should work.
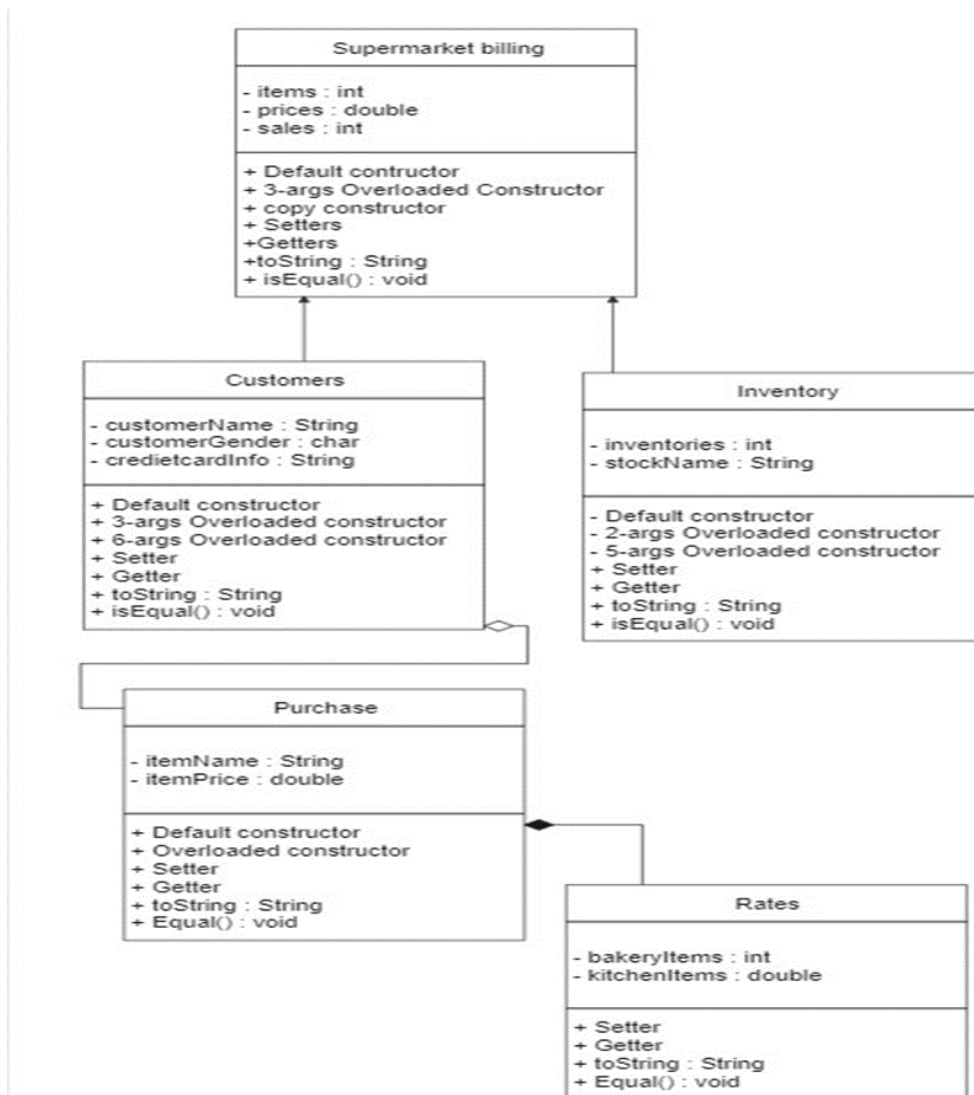
5.2.2 Unified Model Diagram

Supermarket billing

- items : int
- prices : double
- sales : int

+ Default contructor
+ 3-args Overloaded Constructor
+ copy constructor
+ Setters
+Getters
+toString : String
+ isEqual() : void

Customers

- customerName : String
- customerGender : char
- credietcardInfo : String

+ Default constructor
+ 3-args Overloaded constructor
+ 6-args Overloaded constructor
+ Setter
+ Getter
+ toString : String
+ isEqual() : void

Inventory

- inventories : int
- stockName : String

- Default constructor
- 2-args Overloaded constructor
- 5-args Overloaded constructor
+ Setter
+ Getter
+ toString : String
+ isEqual() : void

Purchase

- itemName : String
- itemPrice : double

+ Default constructor
+ Overloaded constructor
+ Setter
+ Getter
+ toString : String
+ Equal() : void

Rates

- bakeryItems : int
- kitchenItems : double

+ Setter
+ Getter
+ toString : String
+ Equal() : void

Figure 5. 3
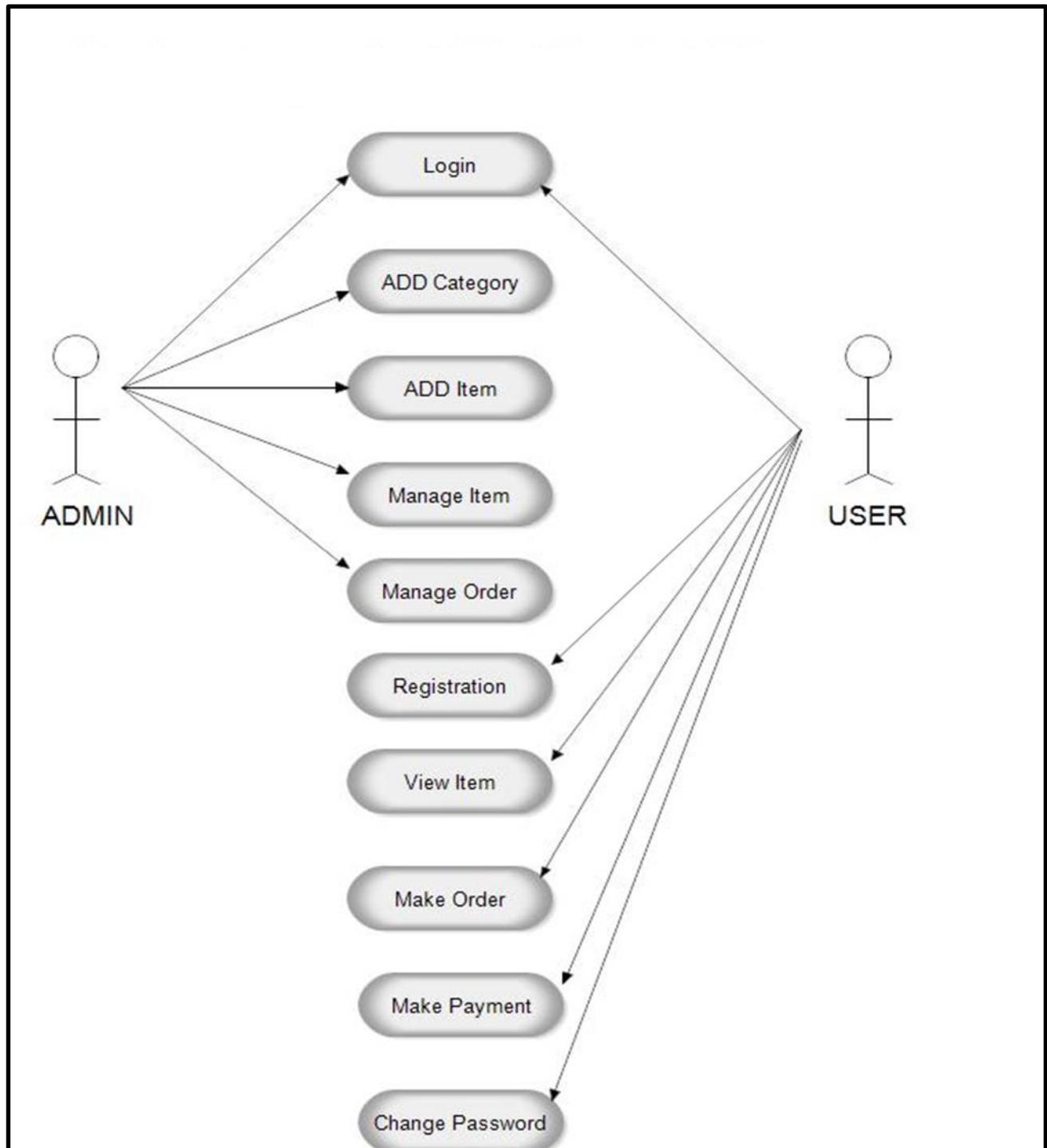
5.2.3 Use case diagram

Figure 5. 4

This diagram describes the relationship between the user, administrator and functional methods of the system. The administrator is in charge of setting credentials right and managing the system resources while the user is supposed to be capable of doing the actions in the above diagram.
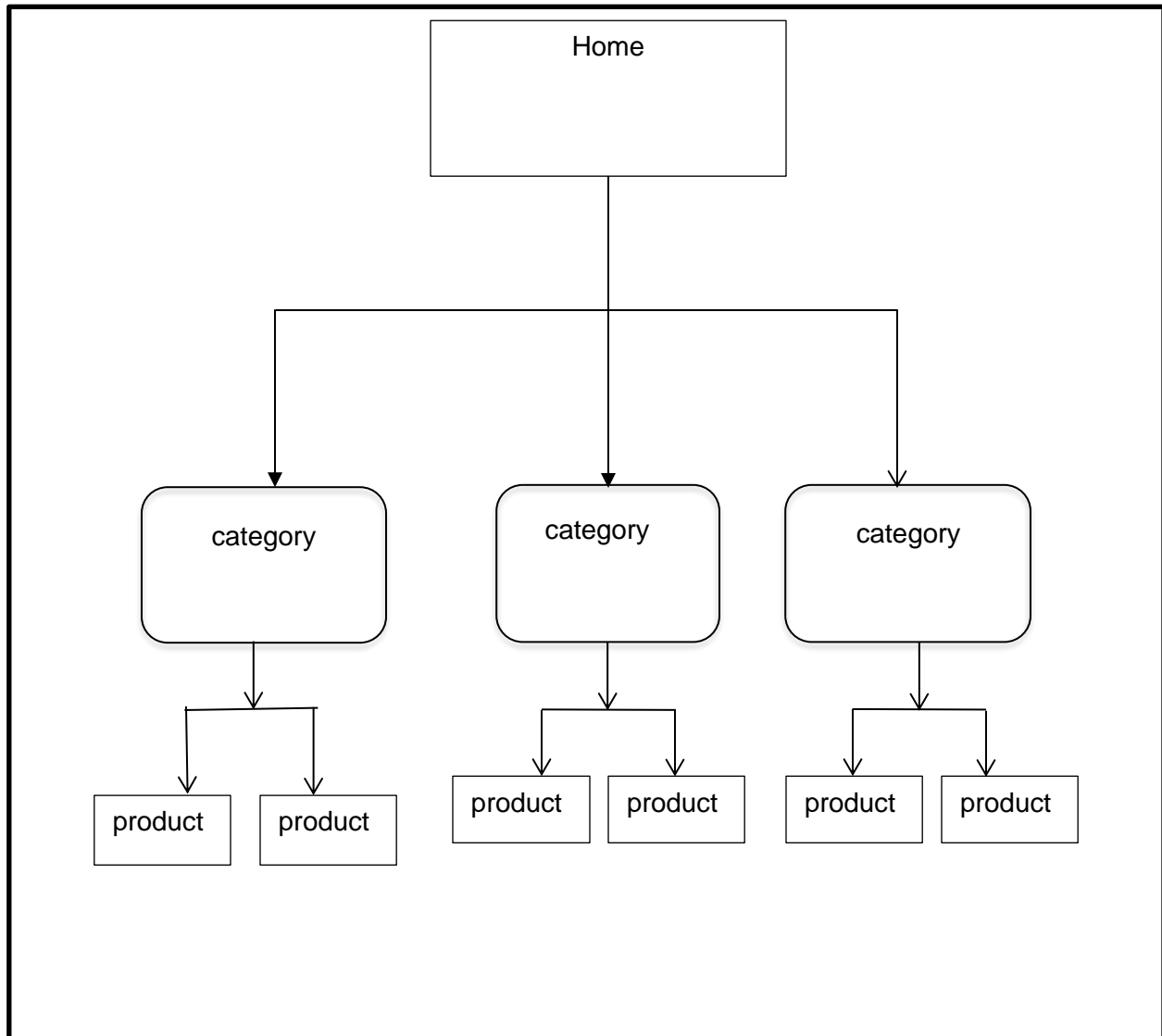
5.2.4 Hierarchical structure

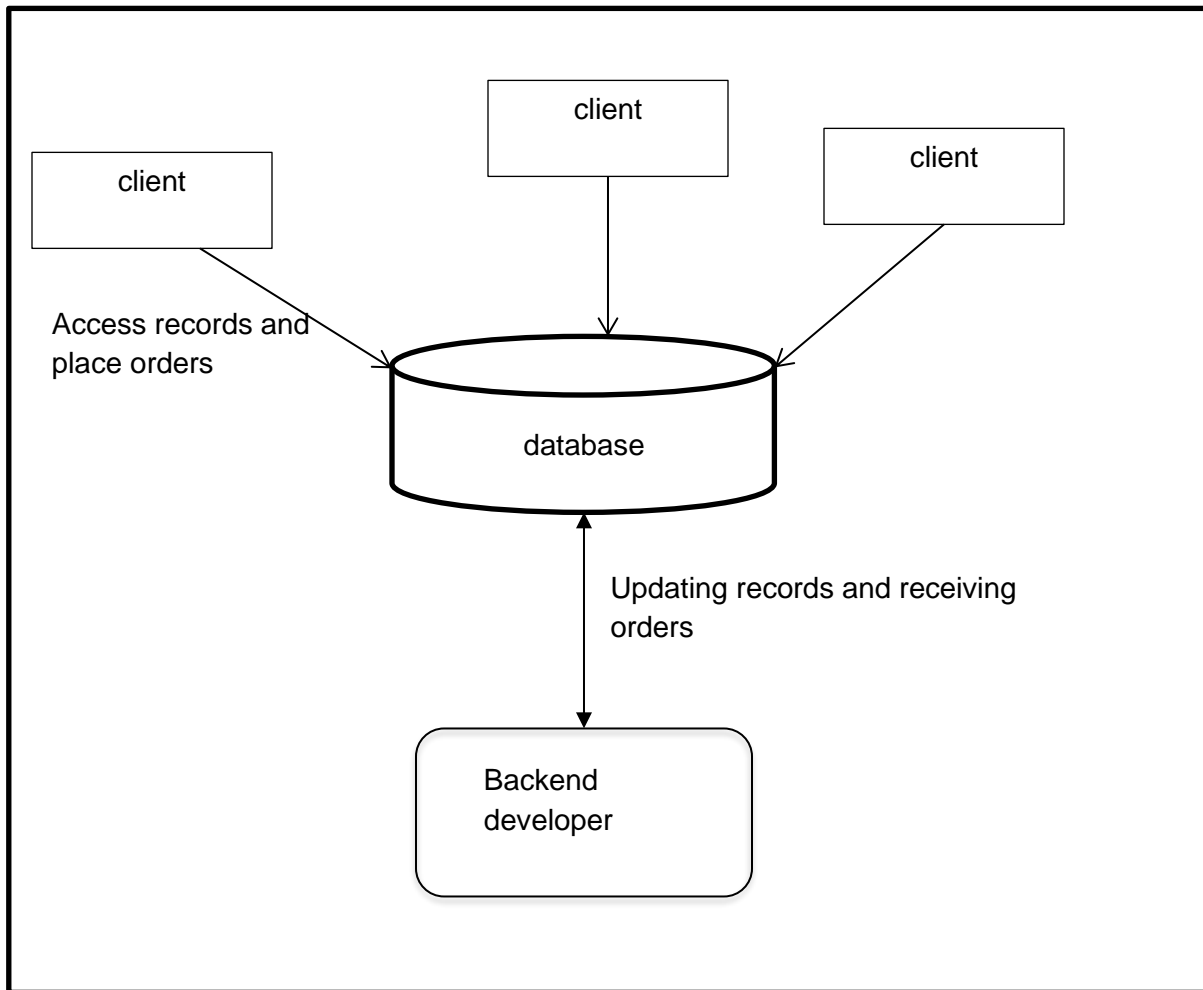Figure 5. 5

5.2.5 Database architecture

Figure 5. 6

5.3 User testing of these

There are systems already developed that are based n these design principles and function well enough to achieve the objectives set out to achieve. Systems discussed earlier in the literature review use some of these design principles. Examples of these systems include:

- Lightspeed Retail
- NetSuite
- Heartland retail

Due to the success of these systems, while using these design methods, it is only logical that the proposed system will also be a success using similar design principles.

CHAPTER 6

6.0 Implementation of the system

Introduction

In this phase of development, I had to implement the designs discussed in the previous chapter, there were some challenges and I had to improvise and adapt to ensure all the functional requirements are met. In this stage I had to develop the system in units in order to tackle each functionality independently. This is an advantage of waterfall model, because it ensures that each problem is tackled independently thus making sure that by the end of the development process the objective and goals of the system are met.

6.1 Signup page

This is the first functionality I tackled, I had to make sure that user data is captured and stored successfully in the database. I also had to consider the different screen sizes, that is, desktop size screen, mobile screen and tablet screens. I had to make sure that all the different users using different screens all get the same information and the same user experience. Here is the final design that I came up with.
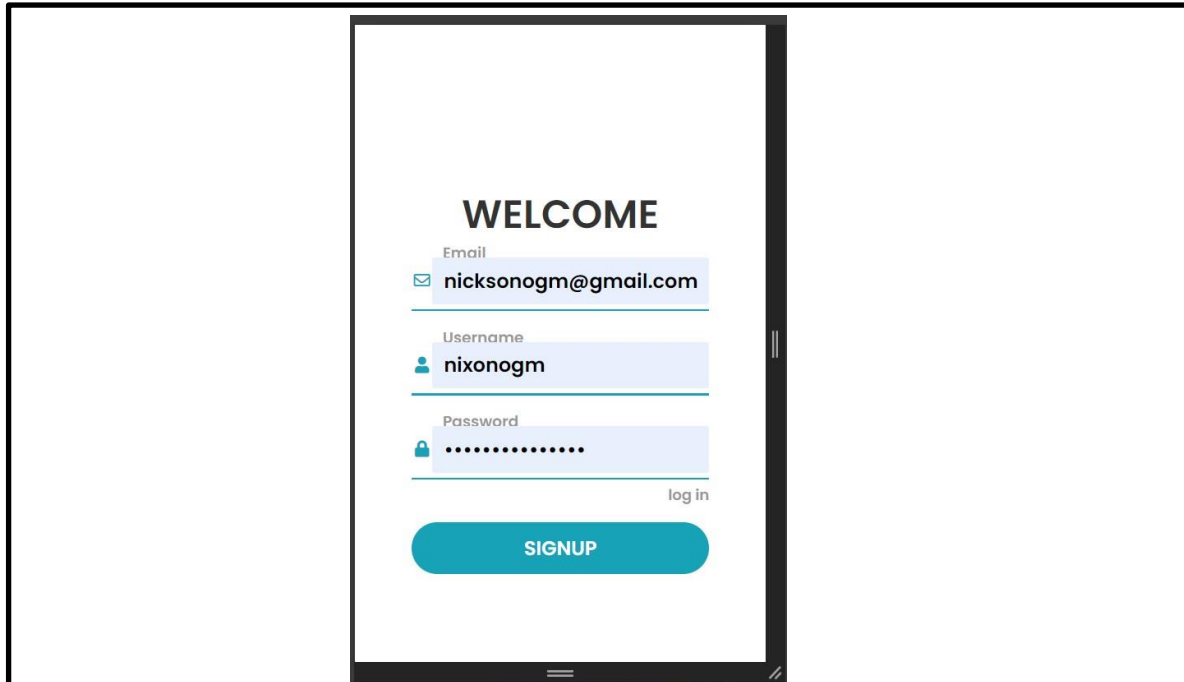
figure 6. 1

This is the mobile view of the sign-up page. This will be displayed in devices with less than 720 pixels of width. It captures the passwords, username and email of the user to the database, and stores them in the table named "users". The desktop version of the sign-up page is shown in the figure below.
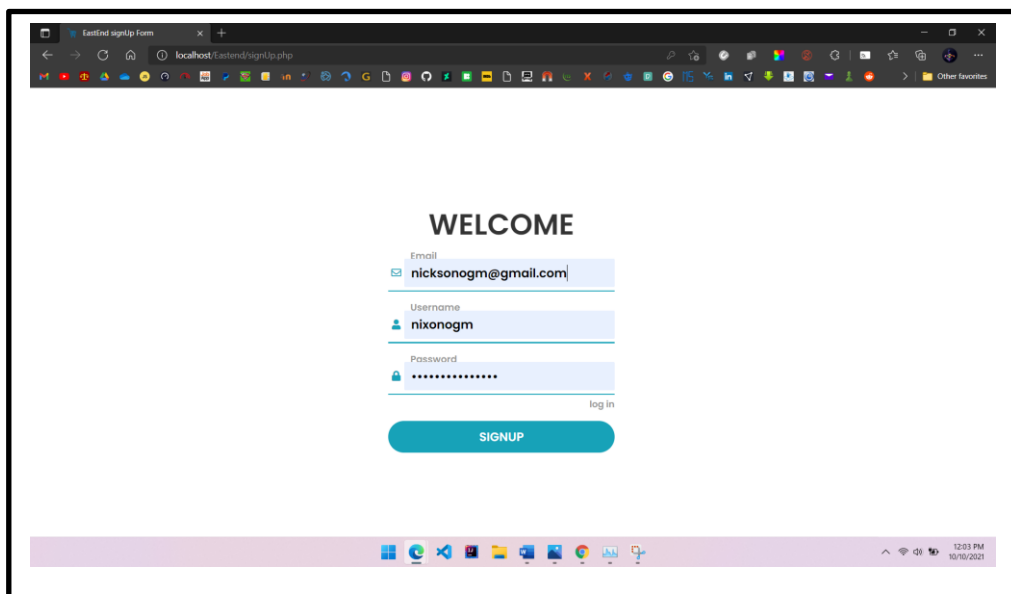

figure 6. 2

This is the view of the desktop version of the sign-up page. It offers the same functionality as the mobile version of the sign-up page.

6..2 Sign-in page

The design of the sign-up page is similar to that of the sign-up pages to offer a sense of flow and continuity. The figure below shows the sing-in page
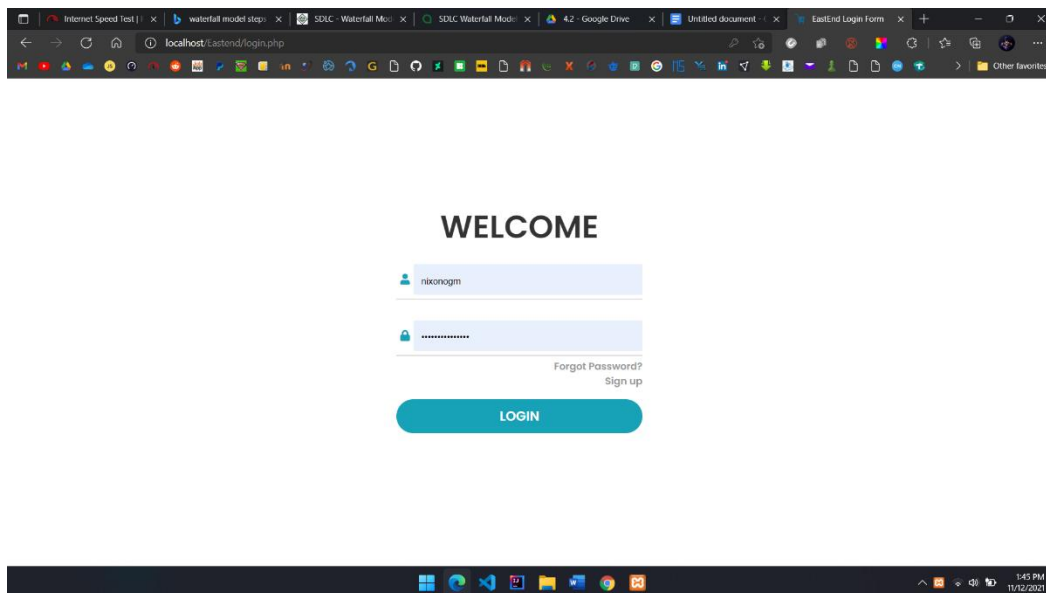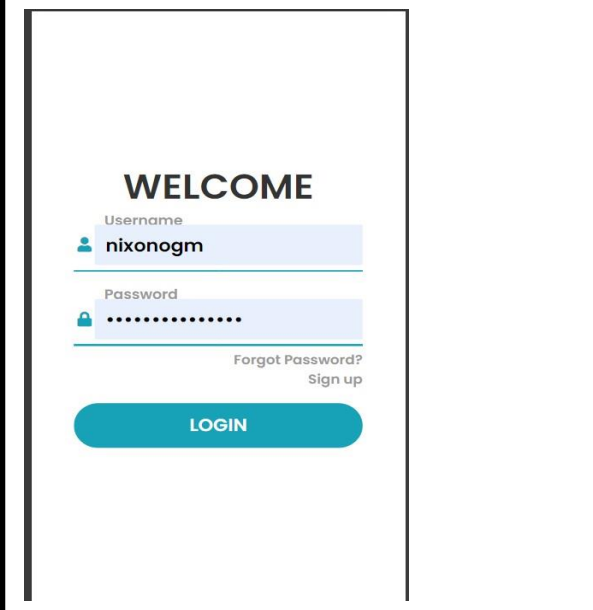
figure 6. 3

The sign-in page cross checks the sign-in details entered with the sign-up details in the tables then verifies the details if they match. If the details match, then the user is granted access to the

figure 6. 4

next page. Here is a mobile version of the sing-in page.

6.3 Activity page

This page contains all the Items that are sold in the store. It clearly shows all the description of the products, that is price, picture, quantity, name and the rating. This page gives the users a clear view of the product they wish to purchase.
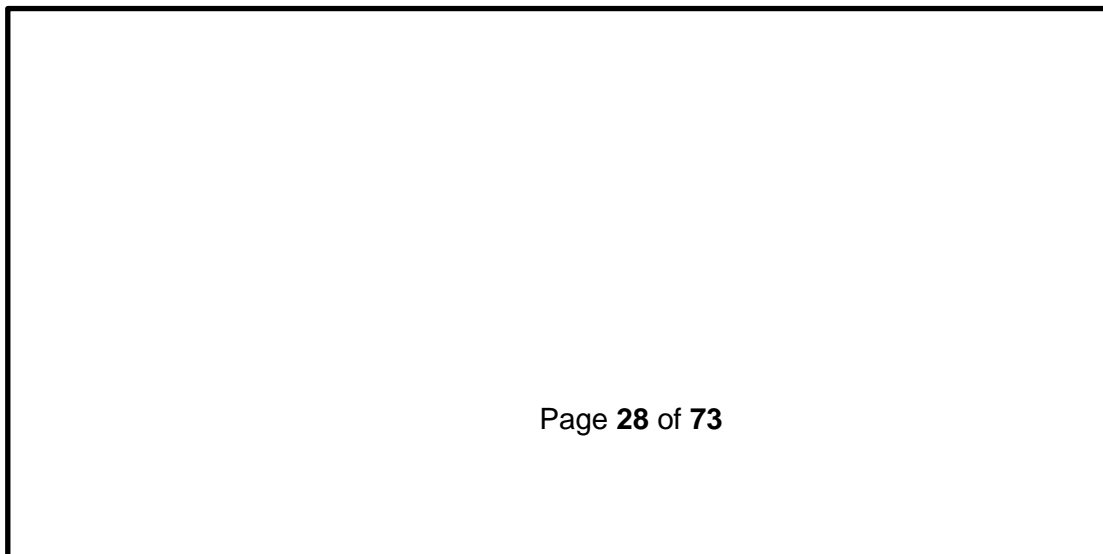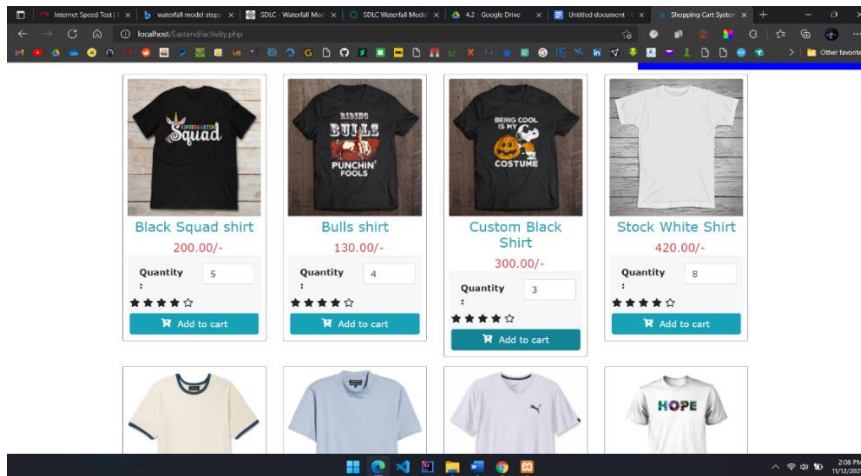
figure 6. 5

The mobile view of this page still offers the same thing as the desktop version of the page. Here is the mobile version of the page.
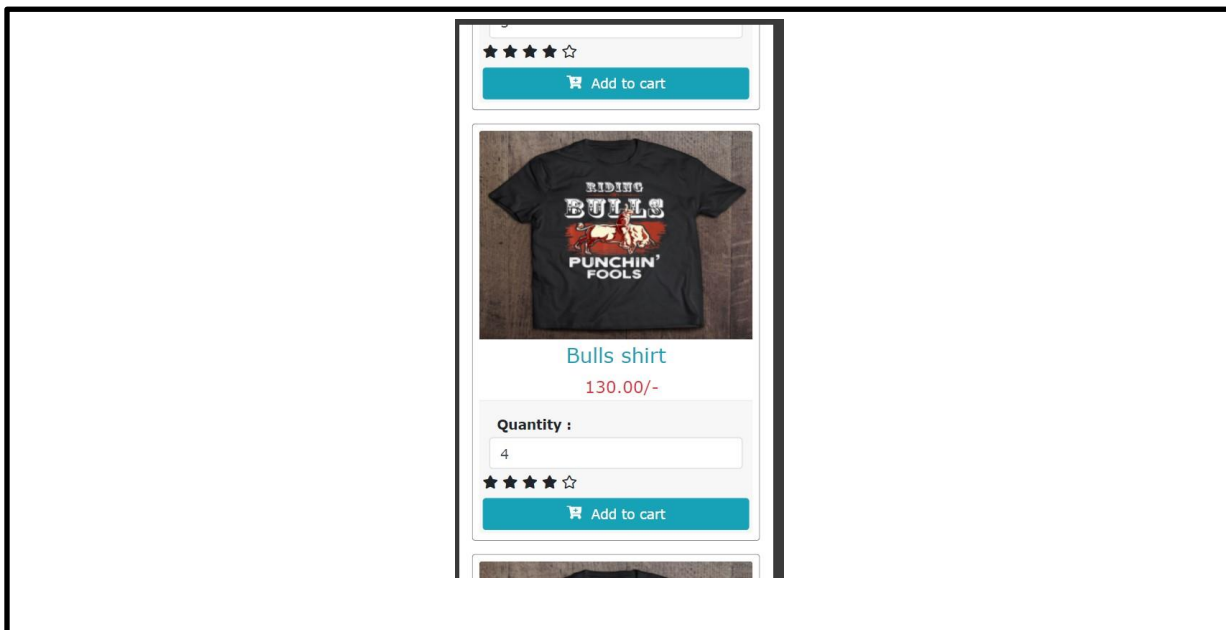
6.4 Checkout page
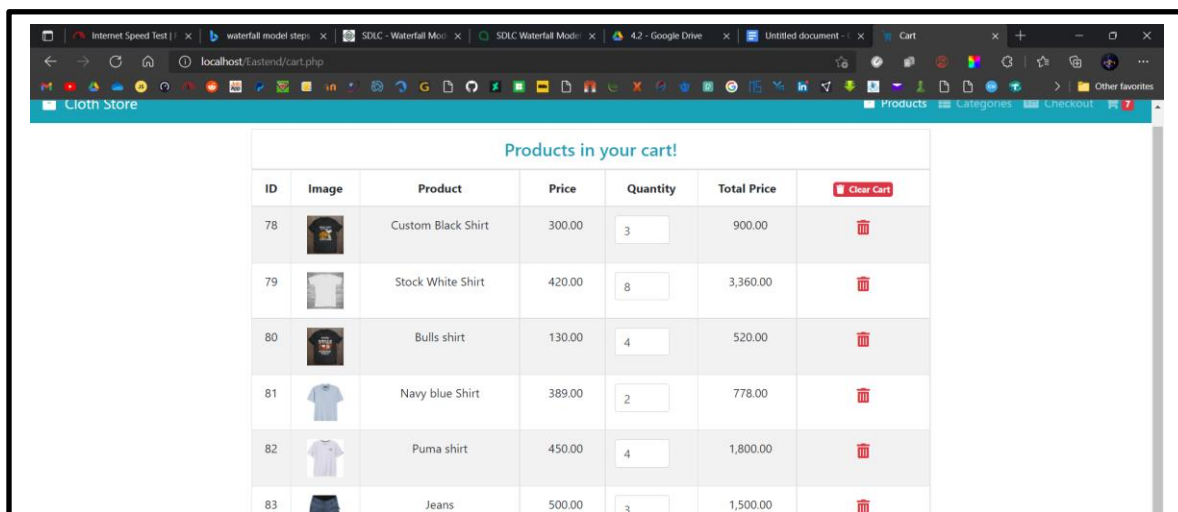
figure 6. 7

figure 6. 8

The green checkout is for payment through mobile money, that is, Mpesa.

6.5 Changes made

Some of the design features expected to work had to be changed due to the following reasons:

- Inadequate time to complete the design intended.
- Complexity of implementing the design.
- Incompatibility of the designs.

Some of the design that were not involve include the following:

- Entity relationship model

- Restriction on Double registration with one email.

6.6 Advanced coding adapted

The advanced or impressive coding adapted in the project is creating an Mpesa API that works. It involves creating a sand box with Safaricom and adapting some of these technology into your application. This gives the users more option on payment of products available in the store. Prerequisite to run this feature include:

- Composer
- PHP
- Mpesa API

Secondly, the responsive web application is impressive, it enables users to view the web page with different devices with different screen resolution and still get the same result without losing any information. This gives the users a good experience while using the web application Example of code used to enable Mpesa API.

```php
$url = 'https://sandbox.safaricom.co.ke/mpesa/stkpush/v1/processrequest';
$curl_post_data = [
    'BusinessShortCode' =>174379,
    'Password' => lipaNaMpesaPassword(),
    'Timestamp' => Carbon::rawParse('now')->format('YmdHms'),
    'TransactionType' => 'CustomerPayBillOnline',
    'Amount' => $amount,
    'PartyA' => "254797599985",
    'PartyB' => 174379,
    'PhoneNumber' => "254797599985",
    'CallBackURL' => 'https://32d0-2c0f-fe38-2323-c5eb-383c-980b-413e-1aa5.ngrok.io/callback',
    'AccountReference' => "Simon's Tech School Payment",
    'TransactionDesc' => "lipa Na M-PESA"
];


$data_string = json_encode($curl_post_data);


$curl = curl_init();
curl_setopt($curl, CURLOPT_URL, $url);
curl_setopt($curl, CURLOPT_HTTPHEADER, array('Content-Type:application/json','Authorization:Bearer '.newAccessToken()));
curl_setopt($curl, CURLOPT_RETURNTRANSFER, true);
curl_setopt($curl, CURLOPT_POST, true);
curl_setopt($curl, CURLOPT_POSTFIELDS, $data_string);
$curl_response = curl_exec($curl);
print_r($curl_response);
```

figure 6. 9

```php
if (isset($_GET['amount'])) {
    stkPush($_GET['amount']);
}
function lipaNaMpesaPassword()
{
    //timestamp
    $timestamp = Carbon::rawParse('now')->format('YmdHms');
    //passkey
    $passKey ="bfb279f9aa9bdbcf158e97dd71a467cd2e0c893059b10f78e6b72ada1ed2c919";
    $businessShortCOde =174379;
    //generate password
    $mpesaPassword = base64_encode($businessShortCOde.$passKey.$timestamp);

    return $mpesaPassword;
}


function newAccessToken()
{
    $consumer_key="k8evqzf1CKiMSMLzofGARESuKLBYrLup";
    $consumer_secret="86pX2Zv93zA5KUCM";
    $credentials = base64_encode($consumer_key.":".$consumer_secret);
    $url = "https://sandbox.safaricom.co.ke/oauth/v1/generate?grant_type=client_credentials";


    $curl = curl_init();
    curl_setopt($curl, CURLOPT_URL, $url);
    curl_setopt($curl, CURLOPT_HTTPHEADER, array("Authorization: Basic ".$credentials,"Content-Type:application/json"));
    curl_setopt($curl, CURLOPT_HEADER, false);
    curl_setopt($curl, CURLOPT_SSL_VERIFYPEER, false);
    curl_setopt($curl, CURLOPT_RETURNTRANSFER, true);
    $curl_response = curl_exec($curl);
    $access_token=json_decode($curl_response);
    curl_close($curl);
```

figure 6. 10

6.7 Technology Adopted

6.7.1 PHP (hypertext preprocessor)

PHP is a server-side scripting language that was created with the web in mind. The language's purpose is to make it possible for web developers to write dynamically can connect to a variety of database systems that use the open database connection standard (ODBC), such as.

MySQL, Oracle, Microsoft products, and others are just a few examples. Low cost and availability are also advantages is a cross-platform programming language that was developed as an open-source project.

6.7.2 MySQL (My Structured Query Language)

MySQL is an open-source relational database management system (RDBMS) that employs SQL, the most widely used language for adding, reading, and processing data in databases. MySQL is known for its speed, dependability, and versatility. It's a relational database management system that's quick, dependable, and scalable. My SQL is a multi-threaded SQL (structured programming language) database server that supports many users.

6.7.3 Bootstrap

Bootstrap is a framework that makes it easier and faster to create systems. It features typography-based HTML and CSS design templates that were utilized in the creation of forms, buttons, tables, navigation, modals, and images. It also allows you to use JavaScript plug-ins.

CHAPTER 7

7.0 System integration and Testing

Introduction

In this Phase, I had to develop a testing plan to test all the units available in the project and also to do a post integration testing to ensure that the web application works as intended. I implemented the testing of the units in two ways, first I did the unit test of the individual units and later when all the units have been tested and integrated, the testing for the whole application.

7.1 Unit testing

As stated earlier, unit testing is testing of individual units or components of the software to validate each components correctness and efficiency. In this project, I have a total of 5 units that had to be tested in order to make sure that the software developed is accurate and up to the desired performance.

7.1.2 White box testing

This type of test is done by checking the code written line by line and identifying errors. This is mostly done during the writing of the code itself, because you have to compile the code after every update you put. This did not take much of my time because I just had to delete part of the code that I did not use in order to make my code presentable and easy to understand and comprehend by other programmers

Techniques used

I employed two techniques in this test, branch coverage and path overage. Branch coverage validates whether each branch is validated at least once. This helps to reduce the redundant code and helps to delete blocks of code that I did not need in the program.

Path coverage method test all paths covered by the program. It validates whether the paths are necessary for the proper functioning of the application. This helps in the load times of the web

page thus making the web application more usable. Deleting the paths that are not used is the first step in reducing the complexity of the program and decreasing the loading time.

7.1.3 Black box testing

In black box testing a tester does not information about the internal working of the software system. Black box testing is a high level of testing that focuses on the behavior of the software. It involves testing from an external or end-user perspective. Black box testing can be applied to virtually every level of software testing: unit, integration, system, and acceptance. It is mostly concerned with data driven and functionality test. Some of the functionalities I tested include:

- Accurate capture of information during the sign-up process.
- Accurate capture of orders during the checkout.
- Accurate login validation.
- Accurate representation of the products in the activity page
- Quick loading time.

7.2 integration Testing

Integration testing is concerned with merging all my tested units together and then making sure that they work in harmony to achieve a single goal. It is concerned with functionality, reliability and performance. All my five units were integrated successfully and work well together. Here are some of the tests done.

7.2.1 Accessibility test.

This is concerned with making sure that the disabled community can still use the web site as efficiently as the rest of the community. Here is a code snippet that;

```
<div id="vec2"> <img src="img/vect2.png" alt="Vector image of our partners apperas here" height="300px" width="600px" id="pic2"> </div>
```
 Figure 7. 1

The "alt" is what will be read out loud to the blind because they cannot see the picture, also if the web page fails to load then that text will be displayed.

7.2.2 loading time

This is concerned with the loading time of the web page and how much time the user has to wait on average. Using browserStack I was able to detect a loading time of under one second consistently. This is usable and within the recommended threshold.

7.2.3 System validation

Validation of the system was critical as one of the study's specific objectives.

The system was validated by comparing it to the system's predetermined goals.

The majority of their responses matched what the system can perform.

To validate user input and the corresponding input, JavaScript was employed.

The system, for example, does not permit blank fields and distinguishes between numerical and non-numerical characters.

CHAPTER 8

8.0 Critical appraisal

Introduction

Critical appraisal is an important aspect of evidence-based practice since it entails methodically examining evidence to see if it is valid, accurate, and relevant. It's crucial to assess evidence rigorously to guarantee its quality and clinical relevance for the application you're planning. Critical evaluation can also help you save time by allowing you to concentrate on the research that matters to you. Is this system worth pursuing? In this project, the critics include:

- The system must be online

The system developed must be online in order to be accessed by the users. Without internet connection, the system cannot be accessed by the users. This limits the system, in locations where there is no internet or poor internet connection.

- The system has adapted other API

Other API such as Mpesa have been integrated into the application, this increases the Complexity of the system thus making it hard to ensure security of the individual components without compromising on the security and functionalities of the system.

- The cost of the system

The starting cost of the project is high, because of the resources required such As server, computers, domain name among others. On the other hand, the running cost of the project is cheap because the domain name is renewed once a year and there are a lot of discounts on the domain names once you have started using a consistent internet service provider.

- Reduced paper work

The system will reduce the amount of printing of official documents and transactions. This is because the online system will not require printing of other documents but only receipts issued for transaction.

- Usability of the system

The term usability is mainly concerned with how easy or quick it is for a user to make a successful. It refers to both design and functionality of the system, to work together to accomplish one task. The system developed is usable because it has a help section that the users can ask questions and

get answers to. With this feature and the quick loading time of the web application, it is safe to say that the system is usable. There is also support for the disabled users as discussed in the earlier chapter.

- Is there a reliable way to measure results?

There is no way to measure the results of the system before it is implemented. The system has to be installed and then the result of the output measured and compared to the previous system in order to determine if the system is reliable or not.

8.1 Advantages of the system

- Increase in market of the potential of the organization.
- Reduce the amount of paper work, that is, less printing therefore reduces cost.
- Make sales at any point of the day.
- Increase in the quality of services that the user receives.
- Can act as a marketing tool for some of the other services that they offer.

8.2 Disadvantages of the system

- The employees would require some learning curve to adapt to the system.
- If the servers fail at any time, then the services will not be rendered to the customers.
- It is expensive to adapt the system, initial cost is high.
- Users who cannot use or access the internet are disadvantaged.

CHAPTER 9

9.0 Conclusion and recommendation

9.1 Conclusion

Some of the project functionalities, for example search, in the activity page were not implemented due to time constraints. In the future it would be implemented. During my time developing this project I acquired the following knowledge:

- Design skills.
- Problem solving skills.
- Gained more knowledge in programming especially PHP and JavaScript.
- I learnt integration testing and unit testing
- Frontend and backend web development.
- Integrating web application with Mpesa API.

To conclude this project was very important for my degree program, it made me learn new skills listed above. I have learnt a lot during my time developing this project, it has given me an insight on the process of application development.

9.2 Recommendation

During my time developing this project, I encounter some problems that affected my project, and would like the university to take them into consideration. First, I would like the university to allocate more time for the students so that they have ample time developing the projects to a completion. Secondly, the university curriculum should include PHP as one of the languages taught. Most students do PHP based applications. Lastly the university should give a clear detailed calendar showing when the presentations will be done. This is to give the students a clear perspective of the time frame of the project.

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APPENDIX A: Snippets of Code.

A connection to the database code

```php
<?php
$servernam = "localhost";
$usernam = "root";
$passwor = "";
$databas = "eastend";

// Create connection
$conn = mysqli_connect($servernam, $usernam, $passwor, $databas);

// Check connection
if (!$conn) {
    die("Connection failed: " . mysqli_connect_error());
}
?>
```

Figure 10. 1

Code to process the cart items

```javascript
$(document).ready(function() {

  // Change the item quantity
  $(".itemQty").on('change', function() {
    var $el = $(this).closest('tr');

    var pid = $el.find(".pid").val();
    var pprice = $el.find(".pprice").val();
    var qty = $el.find(".itemQty").val();
    location.reload(true);
    $.ajax({
      url: 'action.php',
      method: 'post',
      cache: false,
      data: {
        qty: qty,
        pid: pid,
        pprice: pprice
      },
      success: function(response) {
        console.log(response);
      }
    });
  });

  // Load total no.of items added in the cart and display in the navbar
  load_cart_item_number();

  function load_cart_item_number() {
    $.ajax({
      url: 'action.php',
      method: 'get',
      data: {
        cartItem: "cart_item"
      },
      success: function(response) {
        $("#cart-item").html(response);
```

Figure 10. 2

APPENDIX B: Sample Questionnaire

Background Experience

Age --- Gender -----------------------

Which device do you prefer?

Phone --- Computer ---------------------

Do you prefer online shopping or Traditional shopping?

Traditional ------------------------------------ Online -----------------------

Have you bought products online?

Yes --- No -----------------------

Did you like the experience?

Yes --- No -----------------------

APPENDIX C: Project Proposal

MULTIMEDIA UNIVERSITY OF KENYA

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

DEVELOPING A WEB APPLICATION FOR A CLOTH STORE IN NAIROBI

BY

CIT-221-051-2017

OJIEM NIXON OCHICH

SUPERVISOR: Mr. KIIRU

NOVEMBER 15th, 2021

Declaration

I hereby affirm that this Project is my original work and that it has not been submitted to any other institution of higher learning, to the best of my knowledge.

Student: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ Registration Number: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Signature: ------------------------- Date:---

With my agreement as the University supervisor, this project was submitted as a partial fulfillment of requirements for the Bachelor of Science in Computer Science/Information Technology at Multimedia University of Kenya.

Supervisor:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Signature: ----------------------------Date:--

Dedication

This project is dedicated to my ever-loving parents and friends, who have always supported and stood by me in all of my endeavors. In terms of both academics and finances.

Mr. Kiiru, my long-time supervisor, deserves special thanks for editing and counseling me on this endeavor.

Acknowledgment

First and foremost, I want to express my gratitude to God for His protection and the gift of life and good health thus far. All glory and honor belong to Him. Second, I am grateful for my family and friends' unending love and support in every way.

Abstract

Online shopping has been growing steadily since 2007 and by today it has grown significantly because of the pandemic. This project intends to give the company a share of this online market by targeting online users. This allows users to buy items from the store without physically being in the store, thus reducing the chances of contracting covid 19 for both the customers and the employees of the store. By targeting online users, the project allows the company to increase their revenue because customers are not limited by region. For the project to be a success the methodology employed in this scenario is the waterfall model. The main reason for using it, is because it provides a list of all required resources for the project thus during development there will be minimum errors. The expected outcome for this project is to increase the revenue of the company, reduce covid 19 infection among employees and create more awareness of the store. To summarize the content stated above, this project helps the cloth store to generate more revenue by targeting more customers while still being able to reduce the risk of its employees contracting covid 19.

List of abbreviation

TB-   Terabyte

POS-   Point of sale system

CRM- Customer Relation Management

HR-   Human Resource

PC-   Personal Computer

PL- Programming Language

UPS-   Uninterrupted power supply unit

Mac- Macintosh Computer

PSA-   Professional Service Automation

ERPM- eResearch Proposal management

UML- Unified modelling language

CHAPTER 1

1 Introduction

1.1 Background of study

E Commerce has been implemented for a while now, since 1991, then in 1995 Amazon started out as an online book, making it gain more traction, and since then it has grown steadily. In late 2019 it increased in growth significantly because of the covid 19 pandemic, which had restricted the movement of people forcing them to trade and do business in an online set up. Today, over 1.8 billion people in the world shop online, with most of the first world countries leading the way. It is expected that other countries will soon join in, Africa has 17% of the market share and is at position three, just behind Asia and Europe (74 Compelling Online Shopping Statistics: 2020/2021 Data Analysis & Market Share - Financesonline.com, 2021).

To put this in perspective to Kenya, Kenya has 2.61 million shoppers and ranks third in Africa. Kenya has a population of 49.7 million, considering the number of online shoppers in Kenya, 2.61 million, Kenya has the highest absorption rate of the three top countries in Africa proving that online shopping is a worthy investment for companies (Growth of Online Shopping in Kenya - Kenya News, 2021).

1.2 Problem statement

The East end cloth store is limited to the number of customers it can receive by geographical location. Potential buyers who are not within the geographical location of the store cannot access the store. The measures put in place by the government due to covid 19, the curfew and one-meter social distancing also limits the potential customers to access the store. This limits the number of customers at the store at any particular time. With all these facts stated it is logical that the store will not achieve its maximum profit with this kind of situation. For the store to be successful it has to reach out to as many customers as possible without restrictions.

1.2.1 Proposed solution

I intend to solve the problems stated above, with an online commercial website, commonly known as Ecommerce. With an ecommerce system the company can reach out to every potential buyer

without the limit of geographical position of the store. Potential customers all over Kenya can make their orders. It is important to note that the potential online customers are over 2 million. About the restrictions of the government placed by the government like curfew and maintaining one meter apart in public spaces, the proposed system solves this problem by being available 24hrs a day for customers to make their orders and also lowering the risk of customers and employees contracting covid 19.

1.3 Aim of the study

This project will better the east end cloth store by:

- Increasing the number of potential buyers through ecommerce.
- Lowering the risk of employees contracting covid 19.
- Increasing the revenue of the store.
- Increasing the popularity of the store through advertisements online.
- Creating a possibility of expansion to other regions depending on the statistics of online buyers.

1.4 Research objectives

The research objectives for the proposed system are actions that will be taken to make sure that the goals and aims of the project are realized. They include:

- To Apply design skills, development skills and theory learnt in class for this project.
- To Design and develop a working web application.
- To Ensure the web application is secure.

1.4.1 Research questions

4. How will the principles of designing and developing an application be implemented?
5. How will I meet the user requirements?
6. How will security features in the system be implemented?

1.5 Significance and justification of the study

With the movement restrictions placed by the government, many businesses are making less profit than they expected if not losses. Some of the businesses that have online platforms like Amazon, have recorded an increase in their net profit. This solidifies the need for most businesses to go online. For a cloth store the advantages are significant because the frequently sold items online are fashion wear. This makes the success of the online cloth store even more possible because of the nature of the products that this company deals in. With the facts stated above, it is possible that the chances of success of this proposed system are very high if not a mandatory success. It is also worth noting that the proposed system will reduce the risk of employees and customers contracting covid 19 while still increasing the sales of its products (The 6 most sold products online (ideas and market analysis), 2021).

1.6 Scope of the proposed system.

This project will produce an online platform for customers to use for buying goods. The platform will accept new users and also allow current users to log in and view the goods offered. The project will produce a working user-friendly website for its customers to use. The constraints involved with this project include:

- a limit to the number of users that are online at a particular time. This is to provide a good experience to the users who are already logged in so that the functional requirements do not fail.
- Another constraint is, multiple accounts from users cannot be accepted because there is a need to provide accurate statistics of how many customers visit the platform.
- Administrators will be the only ones with access to the sensitive data.

The main primary objective of the proposed system is to produce a system with all the functional requirements and non-functional requirements met (Bernie Roseke, 2021).

List of project stakeholders include:

- Project manager
- Project planning committee
- Sample customers
- Sample employees

1.7 Assumptions and limitations (challenges and countermeasures)

Some of the assumptions involved include:

- The East end cloth store already has customers who are willing to buy the goods.
- Another assumption is that the server hosting the proposed system will not fail, otherwise the proposed system will not be efficient.
- The online market will continue to grow as analyzed
- The customers will prioritize the online platform than physical shopping

One major limitation of the system is, if a buyer is located in a remote area then it will not be possible for the store to get the customer his/her ordered goods.

CHAPTER 2

2 Literature review

2.1 Introduction

There are a lot of similar systems that have been developed similar to the proposed system, all with the aim of meeting all the functional requirements set by the stakeholders. Some organizations prefer these systems while others prefer to hire developers to make a tailored system specific to their organization. In this topic we shall discuss the benefits of both systems and look at examples and also the disadvantages of these already available systems (Best Clothing Store Inventory Software - 2021 Reviews, 2021).

2.2 Related systems

Lightspeed Retail

Lightspeed Retail is a cloud-based POS arrangement that is reasonable for retailers in ventures like attire, footwear, bicycle, adornments, pet, outdoor supplies and home style. The arrangement offers retailers devices including stock administration, retail location the executives, cash cabinet control, installment handling, buy request the board, client profile access, bookkeeping programming incorporation and coordination with POS equipment, for example, standardized tag scanner or receipt printer apparatuses. Lightspeed offers a completely coordinated, eCommerce stage that permits clients to oversee coming up and online stock, have a solitary perspective on clients and examine multi-channel deals information.

This software's cheapest plan starts at $69 per month retail POS, $119/month retail POS and lastly the most expensive being $169 per month retail POS. This software does not have a free version (Lightspeed Retail Reviews, Demo & Pricing - 2021, 2021).

NetSuite

As the main cloud ERP framework, NetSuite helps in excess of 24,000 clients acquire the perceivability, control and spryness to assemble and maintain an effective business. With an incorporated framework that incorporates ERP, financials, trade, stock administration, HR, PSA, production network the board, CRM and that's just the beginning – NetSuite empowers quickly

developing organizations across all enterprises to work all the more successfully via computerizing center cycles and giving constant bits of knowledge into functional and monetary execution. NetSuite gives a variety of bookkeeping and monetary administration arrangements like an overall record, creditor liabilities, money due, cash the board, project bookkeeping and fixed assets management.

There is no free version for this software, the starting price is $499.00 per month.

Heartland retail

Heartland Retail, previously Springboard Retail, is an online retail arrangement intended for multi-channel and multi-store retailers. Heartland's retail location framework is completely open through any advanced internet browser on any gadget. The arrangement is intended to work well on both touchscreen gadgets, similar to the iPad, or on conventional gadgets like a PC or Mac. The arrangement's client dashboard permits clients to all the more likely comprehend their clients by gathering data at the retail location. Utilizing this information, the product creates significant level insights about client inclinations and buy history. Limitless custom fields mean following and announcing can be custom-made to the different requirements of the business.

There is also no free version or trial version for this system, its starting price is 79.00 dollars per month.

Orderhive

Orderhive is a cloud-based request board framework intended for small, medium and enormous retailers, wholesalers and merchants. With Orderhive, retail merchants can follow their orders, stock and shipments across the entirety of their online deals channels just as examine group execution across capacities and find stock in the distribution center. The framework likewise furnishes clients with constant updates about their business by means of a detailing and examination. Furthermore, Orderhive permits clients to store client data for future showcasing use, construct buy orders, track stock across stockrooms, satisfy outsourcing and 3PL orders, track crude materials needed for items, make solicitations and track installments.15-day completely free preliminary (no Visa required) Add-ons are accessible for additional functionalities. Simple discount strategy, no inquiries posed. Orderhive accompanies 15 days free preliminary (no Visa

required) and loans all day client care to its clients. The starting price for this software is 44.99 dollars per month.

2.3 limitations/ weaknesses of these systems

Some of the weaknesses facing these online systems can be classified into technical and non-technical weaknesses. Technical weaknesses include:

- There can be absence of framework security, unwavering quality or guidelines inferable from helpless implementation of web-based business.
- The product advancement industry is as yet developing and continues to change quickly.
- In numerous nations, network transfer speed may cause an issue.
- Now and then, it gets hard to incorporate an internet business programming or site with existing applications or information bases.
- There could be programming/equipment similarity issues, as some internet business programming might be contrary to some working framework or some other segment.

Non-technical weakness include:

- Introductory expense − The expense of making/assembling an internet business application in-house might be high. There could be delays in dispatching a web-based business application because of errors, and absence of involvement.
- Client opposition − Users may not believe the site being an obscure nondescript merchant. Such a question makes it hard to persuade conventional clients to change from actual stores to on the web/virtual stores.
- Security/Privacy − It is hard to guarantee the security or protection on online exchanges.
- Internet business applications are advancing and evolving quickly.
- Web access is as yet not less expensive and is awkward to use for some likely clients, for instance, those living in far off towns

(E-Commerce - Disadvantages - Tutorialspoint, 2021)

2.4 how the proposed system will handle these weaknesses.

Starting with the technical issues, framework security will not be an issue because the system will be tailor made with the organizations needs in mind. Necessary frameworks that do not

compromise on security will be used. Since the technology in the internet keeps changing, the proposed software will have an update team to keep the system UpToDate with the current trends in the technology industry. If our system is deployed in a stable server with fast speed and high bandwidth, we will not face problems in network transfer speeds with customers. Integrating the proposed system with the internal organization of the system will not be a problem because the system will be made according to the structure of the individual organization.

Lastly, how the proposed system will solve the non-technical issues. Both the proposed system and the off the shelf systems have high initial cost, but the running cost of the off the shelf systems is because of the monthly payments that have to be made for the organization to run the system. Because the proposed system is tailor made for the organization, it will take great measures where hackers may exploit the system. For those clients living in far off towns that claim that the internet may be expensive, in Kenya thanks to Telkom fiber 4G, there are cheap data deals that can help these clients. There will be no or little client opposition because the clients are involved in the development of the project.

CHAPTER 3

3 Methodology

3.1 Introduction

Software development has many methods, some of them include Agile, Waterfall, rapid application development among others. For the proposed system, I will be using the waterfall model. Many believe the waterfall technique to be the most customary programming advancement strategy. The waterfall strategy is an unbending straight model that comprises successive stages (prerequisites, plan, execution, check, upkeep) zeroing in on unmistakable objectives. Each stage should be 100% finished before the following stage can begin.

The benefits of using this model include, the straight idea of the waterfall improvement strategy makes it straightforward and oversees. Activities with clear destinations and stable necessities can best utilize the waterfall strategy. Less experienced venture chiefs and task groups, just as groups whose synthesis changes oftentimes, may profit the most from utilizing the waterfall advancement methodology (Team, 2021).

3.2 Data collection methods and tools

There are many data collection techniques that are used during data collection, for this proposed system, the following methods were used to collect data.

Primary data collection methods

These are methods that get information first-hand. The methods used include

- Questionnaire- These contain a set of questions that are mailed to a recipient, employees of the company and the customers of the store.
- Interview- This method involves asking the employees and customers a set of questions that will help shape the functional and non-functional requirements. Oral or verbal responses are accepted here.
- Schedules- this is similar to a questionnaire except that the enumerations are for the purpose of filling the schedule.

(Data Collection Methods | Methods of Primary and Secondary Data, 2021)

Secondary data collection techniques

Auxiliary information is information gathered by somebody other than the real client. It implies that the data is as of now accessible, and somebody investigates it. The auxiliary information incorporates magazines, papers, books, diaries among others. There are various sources that we can obtain this information including; government publication, public records, business documents and letters.

3.3 Project resources

The project resources are the necessary prerequisites for the proposed system to be a success. It includes all the hardware and software requirements needed by the proposed system. The proposed project resources include:

Resource	quantity
server	1
RAID solid state storage 1TB	4
Monitor	1
Laptop	3
Developers	5
Internet connection	Fast (over 100mb/s)
UPS	2
Administrator	1
Server room	1
Windows enterprise server side	1

Table 3. 3

3.4 Project schedule

To ensure that nothing falls through the cracks or ends up delayed past its due date, it is compulsory to use a schedule. Without a schedule, a big project like this one might fall apart. Also, to convince the organization and stakeholders, I have put in place the project schedule that will ensure all the components of the project are met intime to ensure no delays are experienced during the implementation of the project.

A	B	C	D	E	F	G	H	I	J	K
Activity	week1			week2	week3	week4	week5	week6	week 7	week8
Requirments	3 adys									
Design		5 days								
Implementation				3weeks 6 days						
Testing								2 weeks		
Deployment										1week

Figure 3. 2

The deliverables for week one include all requirements for the project to be a success. The deliverables should be achieved within three days.by the end of week two, the design layout should already be drawn and ready for implementation. At the end of the fifth week, the implementation should already be done. Testing of the application should begin from week 6 to week 7. And lastly the deployment and maintenance of the proposed system should be done in the last week, that is week 8.

3.5 Project Budget

Resource	quantity	Cost
server	1	150,000
RAID solid state storage 1TB	4	40,000
Monitor	1	25,000
Laptop	3	80,000
Developers	4	300,000
Internet connection	Fast (over 100mb/s)	4,000
UPS	2	14,000
Administrator	1	0
Server room	1	0
Linux	1	0
TOTAL		613,000

Table 3. 4

It is important to note that the prices listed here are higher estimates of the prices of these resources.
The price might actually be a little lower than this.

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