WEB-BASED SHOPPING APPLICATION FOR SUPERMARKETS IN KAMPALA
CASE STUDY: STANDARD SUPERMARKET

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DECLARATION

We Namusisi Sylivia and Nalule Lillian do hereby declare to the best of our knowledge that this graduation project is my original work and that it has never been submitted to any other institution.

The literature and citations from other peoples' work have been dully referenced and acknowledge in text footnotes and bibliography.

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APPROVAL

This Project Report has been submitted for Examination with the approval of the following supervisor.

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God bless you all.

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List of Abbreviations

BBC	British Broadcasting Corporation
MIS	Management Information System
LAN	Local Area Network
WAP	Wireless Application Protocol
PDA	Personal Digital assistant
AJAX	Asynchronous JavaScript and XML
PHP	Hypertext Preprocessor
XML	eXtensible Markup Language
URL	Universal Resource Locator
IT	Information Technology
WML	Wireless Mark-Up Language
WSS	Web-Based Shopping System

Abstract

The number of mobile phone and Internet users in Uganda is increasing continuously, it is no doubt that online shopping market in Uganda certainly sees a rapid rise and great developing potentials with many investment opportunities. With the advent of the Internet and network technology, many organizations are now being equipped with Internet connections, either through wired connections or wireless infrastructure. Internet access provides customers an easy access to product information provided by supermarkets and ability to make online purchases using the available internet technologies. Supermarket Staff and customers therefore need a system to manage and facilitate online purchasing. There is also a need to move from time wasting, inconvenient and cumbersome manual methods of shopping especially for Uganda's busy middle class who would love to shop from wherever they are.

To fulfill these needs, we proposed a Web-Based Shopping System. The project involved developing a Web-Based Shopping System, which could solve the major problems being faced in shopping processes such as delays, inconveniences and congestion. This project describes a Web-based Shopping System that can be used by WAP- enabled cell-phones and computers which will allow users to register and create accounts with Standard Supermarket, browse available products online and carryout online shopping transactions using verifiable customer debit card details. The Supermarket Staff will be able to update the product catalogue and track customer transactions. WSS also includes a simulated Bank Application which is responsible for maintaining a database holding details of customers registered with the Bank who also happen to be Standard supermarket registered customers and their associated Debit card details.

WSS includes modules for customer Registration, Ordering, Products updating and Debit card verification designed to help customers effectively carryout online shopping. The debit card verification module is designed to help the Bank staff verify and authenticate customer debit card details .The WSS is designed to be easily deployed and provides a simple yet intuitive, user-friendly and web-based shopping interface for Standard Supermarket customers and Staff.

CHAPTER ONE

1.0 Introduction

The project seeks to explore the challenges of the increasing number of customers, management and difficulties to carry out transactions and customer's orders, since this supermarket manually runs on a cash register concept of processing transactions. It will also focus on the creation of standard supermarket backend administration databases to be used in catalog management and updates. Thus, this topic will cover all the current challenges experienced by both staff and customers in standard supermarket. It is located in Uganda at the Heart of Kampala in Central Division at Plot 67 Kampala – Jinja highway. This project is organized into three chapters, Chapter One shall in cover an overview of the project which will consist of the project background, statement of problem and possible solutions, Chapter Two shall cover Literature review and chapter Three will cover Methodology.

1.1 Background to the Study

The supermarket typically comprises meat, fresh produce, diary, and baked goods departments, along with shelf space reserved for canned and packaged goods as well as for various non- food items such as household cleaners, pharmacy products and pet supplies. Most supermarkets also sell a variety of other household products that are consumed regularly, such as alcohol (where permitted), medicine, and clothes, and some stores sell a much wider range of non-food products.

The traditional suburban supermarket occupies a large amount of floor space, usually on a single level. It is usually situated near a residential area in order to be convenient to customers. Its basic appeal is the availability of a broad selection of goods under a single roof, at relatively low prices. Other advantages include ease of packing and frequently the convenience of shopping hours that extend far into the evening or even 24 hours a day. Supermarkets usually allocate large budgets to advertising, typically through newspapers. They also present, elaborate in-store displays of products. The stores are usually part of corporate chains that own or control (sometimes by franchise) other supermarkets located nearby even traditionally thus increasing opportunities for the economies of scale.

Supermarkets are typically supplied by the distributions centers of their parent companies, usually in the largest city.

Supermarkets usually offer products at low prices by reducing their economic margins. Certain products (typically staple foods such as bread, milk and sugar) are occasionally sold as loss leaders, that is, with negative profit margins. To maintain a profit, supermarkets attempt to make up for the lower margins a higher overall value of sales, and with the sale of higher-margin items. Customers usually shop by placing their selected merchandise into shopping charts (trolleys) or baskets (self-service) and pay for the merchandise at the check-out. At present, many supermarket chains are attempting to further reduce labor costs by shifting to self-service check-out machines, where a single employee can over see a group of four or five machines at once, a system multiple customers at a time.

Uganda's middle class has increased over the last 20 years. As a result the number of shoppers using super markets has gone up. Consequently this has resulted in congestion at supermarkets and unnecessary delays while shopping.

Given the above reasons, there is a need to develop a system that can help customers to save on the time spent moving within the supermarket trying to locate the goods they need to purchase. This can be made possible by allowing customers to place their orders wherever they are so that the supermarket staff package the items for the customer and make them ready for collection by the customer on arrival at the supermarket once they present a valid order number.

This project will involve the creation of a Web-based System for customers to use on their WAP-enabled mobile phones and personal computers to browse the product catalog of Standard supermarket, make selections and order for goods online using their Web-enabled devices. The project will also focus on the creation of Standard supermarket's backend administration database to be used in catalog management and updates.

1.2 Statement of Problem

Presently, at Standard supermarket there is congestion and unnecessary delays while shopping and as a result the entire shopping process is time consuming, tiresome and inconvenient involving a huge numbers of customers. With the current shopping arrangement at Standard Super market, customers are not able to carry out their purchases conveniently at their desks, any time and with ease of payment. This has resulted from the lack of a secure E-shopping website for customer orders and transactions.

1.3 Main Objective

To develop a Web-Based Shopping System that will enable customers to carry out their purchases conveniently at their desk, any time and with ease of payment and hence improve the entire shopping process at Standard Supermarket. The study will focus on solving the current problem of too much congestion in the supermarket with the creation of an online website where different customers from wider locations can order for goods and items within turn will be delivered through local delivery service companies like DHL, Unimovers.

1.4 Specific Objectives

The specific objectives of this research project are:

(i) To investigate the causes of congestions at different hours of shopping in the supermarket.

(ii) To analyze the process that takes place when customers are shopping and paying for their merchandise.

(iii) To design and model a system that will speed up record tracking, processing and retrieval of clients information online

(iv) To develop, test and validate the new system.

1.5 Scope of the study

The case study for this research is Standard Super Market in Kampala, Uganda. The Research was focused on developing a Web-based Shopping System for Standard Supermarket to enable customers create accounts, credit their accounts, browse for available stock and make purchases using their mobile phones and web-enabled computers. In addition, Supermarket Staff will also be able to update customers' details and product catalogue, receive and process customers' orders using the System.

1.5.1 Geographical scope

The physical boundary of the scope will be Standard Supermarket which is from a rich artisan well in Uganda, Kampala Central Division.

1.5.2 Technical scope

The technical scope of the designed system will focus on the user interface, report generation, employees particulars, production and sales data and statistical business analysis for the supermarket.

1.6 Justification of the Study

The number of mobile phone and Internet users in Uganda is increasing continuously, it is no doubt that online shopping market in Uganda certainly sees a rapid rise and great developing potentials with many investment opportunities.

Web-based shopping will offer customers a convenient process of shopping through the internet. No doubt, internet plays a vast role in storing the updated information. This type of shopping ensures that all the supermarket stock is available at your fingertips that allow the customers to compare products in terms of price and features.

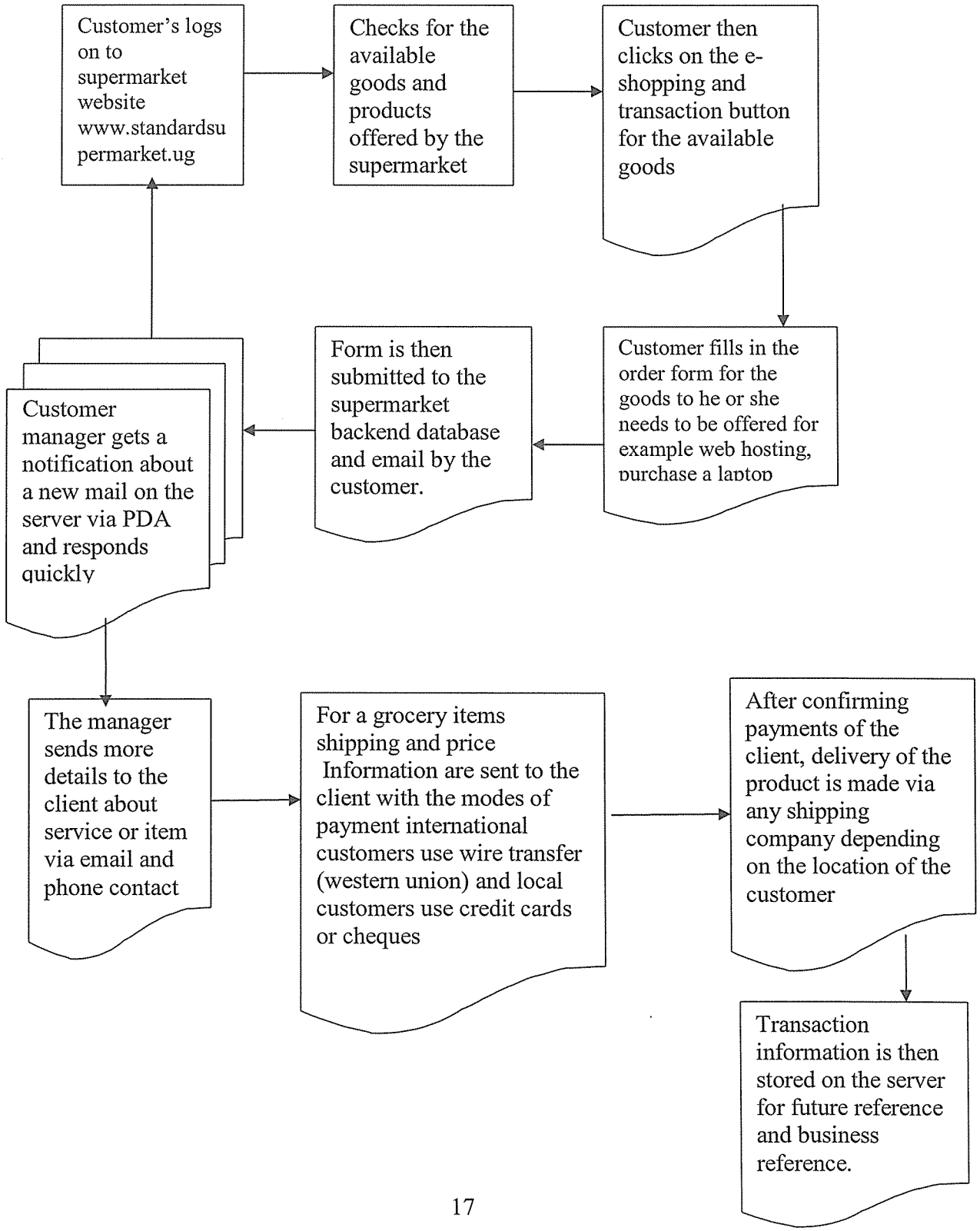
It will enhance comfort for buying goods required by customers while sitting at their homes and at any other place. Apart from the comfort, customers can take your own time to research and compare rates before deciding that which mobile phone would be right for you Kelly (2008).

The introduction of this system will greatly reduce the time which was previously spent by customers moving around Standard supermarket to search for the goods required.

The system will further cut down the congestion of customers in the supermarket as they will not be required to spend any extra time in the supermarket in the process of looking for their goods as it was the case previously.

The system will enable customers to make orders at any time both day and night.Stardard online stores are usually available 24 hours a day, and many Ugandan consumers now have mobile phones and internet access both at work and at home. Searching or browsing an online catalog can be faster than browsing the aisles of a physical store.

1.7 LOGICAL MODEL OF CUSTOMER SERVICE DELIVERY



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of a critical review and analysis of research work from journals, internet sources, news papers and other projects already done related to the Web-Based Shopping Systems with the aim of discovering information and ideas that may be relevant to this project ,identify contributions, weaknesses, and gaps so as to improve on the shopping experience.

2.2 Related studies

According to Chaitanya (2008),developed a web based application that enables users to search, view and select products easily and conveniently. The Application provides an interactive interface through which a user can interact with different areas of application easily and a search engine that provides an easy and convenient way to search for products specific to their needs. The search engine would list a set of products based on the search term and the user can further filter the list based on various parameters. The application further provides a "Drag and Drop" feature allowing the user to add products to or remove products from the shopping cart by dragging the products in to or out of the shopping cart. However, this application did not have a capability of allowing users to create accounts and the author suggests in his the future scope section that the system should be extended to allow users to create accounts. This is where our proposed Web-Based Shopping System comes in to provide a capability to allow customers to create account

2.3 Web-Based Shopping System

Web-based Systems are sites on the World Wide Web that act as guides for internet information and they typically provide personalized capabilities to their visitors. Web-Based Shopping Systems serve as an entry point into the internet shopping information space while providing personalized shopping capabilities to their visitors.

The role of a Web-Based Shopping System is to provide instant access to relevant information and a range of online shopping services all from your mobile phone or other internet enabled device. A typical Web-based Shopping System has a search engine and/or a subject catalogue combined with other services and interactive content. Providing the precise information in an easy-to-work framework is the primary goal of a Shopping System.

Regan (2008), suggests that a web-based shopping system allows a company's customers to shop for and complete purchases of items via their cell phones and that customers use the portal by setting up a mobile shopping account, either through their phones or on the web. Once and account is set up with a debit card number stored, users rely on a secure PIN and their mobile number to make purchases.

According to an online report Nokia News(2009), the growing retail boom, increasing internet users and brand awareness has resulted into an interest of online shopping. The tightening work schedule, massive crowds on weekends, paucity of time and convenience have also been the driving factors behind the rise of online business, thus creating more opportunities for the portal owners to expand their lines of business.

2.4 Other information related to Mobile Shopping

According to Amit (2002), the growing retail boom, increasing internet users and brand awareness has resulted in an interest in online shopping. The tightening work schedule, traffic jams, massive crowds on weekend, paucity of time and convenience have also been the driving factors behind the rise of online business, thus creating more opportunities for the portal owners to expand their lines of business. Online shopping was initially limited to sale of books and music on internet though today it has reached a wider proposition, where one can buy stuff ranging from Apparels, Accessories, Computers, Electronics, Gifts, Home Appliances, Home Furnishing, Jewellery, Office Products, Personal Care products, Toys and Games, Travel packages among other lines. This therefore suggests an opportunity for super markets to have competitive advantage if they implement Web-Based Shopping System for their customers.

Horrigan (2008), pointed out that, "American internet users have embraced online shopping because they say it is convenient and a time-saver. Two-thirds (66%) of online Americans say

they have purchased a product online, such as a book, toy, music, or clothing. Attitudes and perceptions play a key role in whether online users choose to purchase products online".

The researchers therefore believe that developing a Web-Based Shopping System for Standard Supermarket that will provide its customers with an opportunity to conveniently shop in the shortest time possible.

According to Aileen and Coughlan (2006), "Burt and Sparks (2003), suggest that we are witnessing the harnessing of the internet to enhance business efficiencies leading to the emergence of new formats within retailing and with the internet as a commercial medium, new ways of doing business have developed in almost every industry sector Anckar et al. (2009), and retailing is no exception. This recent evolution has involved a shift towards non-store formats, especially through electronic means Mulhern (1997), opening up new perspectives on shopping in the future."

Regan (2007), suggests that a Web-Based Shopping System allows a company's customers to shop for and complete purchases of items via their cell phones and that consumers use the portal by setting up a mobile shopping account, either through their phones or on the Web. Once an account is set up with a Debit card number stored, users rely on a secure PIN and their mobile number to make purchases.

2.5 Management Information system

Information system has been defined by a number of individuals differently although there is still some similarity.

Management Information Systems are systems that process data from both internal and external sources into information in order to support management decision-making.

According to Angell S (1991), Web rules defined an information system that collects process, stores and disseminates information for a specific purpose, information systems can either be formal or informal.

According to Bajgoric N, (2006), defined it as a set of organized procedures that when executed provides information for decision making, communication or control of an organization. It is a system that accepts data resources as input and processes them into information products as output.

Management information system is a system by which people apply manual and computerized information systems to process data and information needed for solving problems in an organization (Kentral, 2009). A management information system is a system or process that provides information needed to manage organizations effective

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This is a detailed description of selected methodology that was used by the researchers to achieve objectives of the proposed system. This includes the tools, instruments, approaches, processes and techniques and methods that were employed in the data collection, analysis, design and implementation of the proposed system.

3.1 Research Design

This study was both descriptive and analytical survey in nature. This study elaborated the different views on analyzing using information systems for competitive advantage of web based shopping system. A survey design was employed because the researcher got views of respondents about the study. This research design was useful because the researcher intends to find out the problems of using web based system for competitive advantage of online shopping.

3.1.1 Target Population

The study took place with the using of web based system for competitive advantage in supermarkets which is responsible for online shopping system in every community around the world. In this case, the study will be carried out on Ugandan supermarkets.

3.2 Sampling

3.2.1 Sampling Technique

Simple random sampling method was used to select a sample from the population. Non probability sampling design, where all members from a study population had equal chances of being selected as respondents. And they shop a different intervals, the sampling techniques used is simple random sampling.

3.2.2 Sample Size

The study involved a purposive sampling research data collection. The first stage involved the selected population of the study. Secondly the researcher will identify potential respondents that included shareholders, executive managers and customers. From each enterprise of the first two(shareholders and executive managers) ten were selected from each to constitute a sample size to 20 respondents and 70 from customers were selected. Therefore since the size of the customers who shop in standard supermarket is just estimated.

3.3 Requirements Instruments

In order to understand the current system, the following fact-finding techniques were used to establish the requirements of the proposed system:

- Interviews: Face to face interviews were carried out by researchers with the key stakeholders in Standard supermarket. We investigated the most essential information that is required by buyers and Standard Staff, as well as the role that Web-based technologies could play in online shopping.
- Naturalistic observation of the Standard shopping process to gain insight on how the current system operates. We used our physical eyes to critically observe the entire shopping process from the point when customers arrive at the supermarket, then follow as they move around looking for and picking up the goods they require, how they make the payments at the counter and finally get their way out.
- The researchers reviewed related documents about shopping. We referred to various data sources such as sample project reports, e-journals, newspaper excerpts and websites that are closely related to the problem area that we are dealing with.

3.4 Tools Used In System Analysis and Design

3.4.1 Data Analysis Methods

Data collected from different methods used was compared which gave the researcher a clear understanding of the problem. Data was sorted to get a clear picture of what would be the inputs and the expected outputs and reports.

This stage determines the logical requirements for the proposed system.it involves modeling, studying and analyzing the current system and business process defining requirement.

Different tools were used to analyze data for example SPSS and Microsoft excel 2007 and the results obtained were used to make our research successful.

The data collected from documentation review and interviews was analyzed using data flow diagrams to establish user as well as system requirements. User requirements were categorized into functional and non-functional requirements. Data Flow Diagrams(DFDs) and Context Diagrams were used for process modeling to show the logical flow of data and represent processes in the system. DFDs helped to give a graphical representation of the system's components, processes and the interfaces. Entity Relationship Diagram (ERD) was used as the main tool for designing the database. The ERD helped in modeling the relationships between different entities identified.

3.5 System Design and Implementation Environment

3.5.1 Entity relationship Diagrams

These are diagrams which are used on the perception of the world as consisting of a collection of basic objects (entities) and the relationship among these objects. Entity relationship diagrams represents relationships associated table in the data base of the system. The entity-relationship diagram enables to link tables and retrieve table from more than one table.

3.5.2 MYSQL

The designing tools to use are database languages called phpmyadmin because it is more enhanced database management system that made it easy to perform mysql queries side by side and it comes available to many web hosting providers that offer control panels such as plesk and control panel.

This application can also be easily integrated into the server and once it has been installed, databases can be created and managed. This tool is used because of its user friendly interface that

provides easy access or mysql connectivity with dream weaver applications which is used in developing the system. Its features such as mysql query platforms ease the work of retrieving data from specific relations or tables in the database.

3.5.3 PHP

Hypertext Preprocessor (PHP) is a scripting language to be used for designing user interface. It is selected and preferred because it is also user friendly and object oriented.

Dream weaver is used in the system because of its built Java script and html codes embedded. Dream weaver also has various languages embedded in it such as html, php, visual basic and many others. Most of the system forms and interfaces are php based. Dream weaver provides a friendly user interface where the content entered in the page is seen and supports adding of the text, images and other objects which can be edited simultaneously.

Html codes can also be created and edited directly and also supports the creating of multimedia links that eases the building process of the system. A lot of linking of pages containing details of all activities can be performed.

3.5.4 HTML

The Hyper Text Markup Language is a system language for marking up, or tagging a document is generally transmitted between the nodes in the network. It is preferred because it is simple and yet powerful, it has a mechanism for frames, style sheets, scripting, and embedded objects, it is easy for both developers and naïve and end-users to learn.

3.5.5 AJAX (Asynchronous JavaScript and XML)

AJAX (Asynchronous JavaScript and XML) which is a group of interrelated web development techniques which were used to create interactive rich web/internet applications. With AJAX, web applications can retrieve data from the server asynchronously in the background without interfering with the display and behavior of the existing page and it's easier to incorporate with PHP, JavaScript.PHP was used as a server-side scripting language together with MYSQL DBMS and Apache web server to host the web pages. MYSQL(My Server Query language) was used as the Database Management System (DBMS).Apache 2.0X Web server to host web pages and execute web scripts.

WML, a markup language based on XML was used to create web pages that can be displayed on a WAP browser. WMLScript scripting language was used in WML pages.WML pages contain

references to script URLs.JavaScript, a client-side scripting language was embedded in HTML pages in order to create dynamic web pages and validate input data. Open wave Emulator was employed as a mobile phone simulator to provide a mobile browser to view WML pages on the mobile phones and for Mobile web page testing.

3.5.6 Java Script

A client side scripting language to be embedded in HTML pages to create dynamic web pages and validate input data.

3.6 Testing and Validation

The researchers intend to use test data that will be fed into the proposed system in order to verify that actually the system meets the specified objectives and actually is working to meet user needs. The system shall be tested against a range of known results for a given inputs to the system.

It is our intention that the users will have the ability to see and test the system while having access to current identical product listings on the shopping portal.

CHAPTER FOUR

4.0 System Design and Implementation

4.1 Introduction

This chapter comprises of system study, analysis, design and implementation that broadly describe the tools, instruments, approaches, processes, techniques and methods that were employed as stated in the methodology. A detailed study of weaknesses of the existing system, the processes, requirements, design and implementation of the new system is described.

4.1.1 System Study and Investigation

In the current system the customers view, select, access and collect goods by manual method. Customers visit Standard supermarket, study the direction guide charts hanged at specific points in the supermarket, move around within the supermarket while looking for and picking the goods they intend to buy. They finally take their selections to the counter for payment. The cashier at the counter sums the total amount to be paid by the customer and the customer pays in advance. The supermarket has its security personnel who keep watch of the customers' activities in the supermarket and report any suspicious acts of theft to the security guards.

This current system is slow, leads to a congested environment in the supermarket, is more prone to attempts of theft and causes inconvenience to most of the customers who have job schedules which cannot permit them to visit the supermarket during the working hours.

4.1.2 Work Flow Process in the Current System

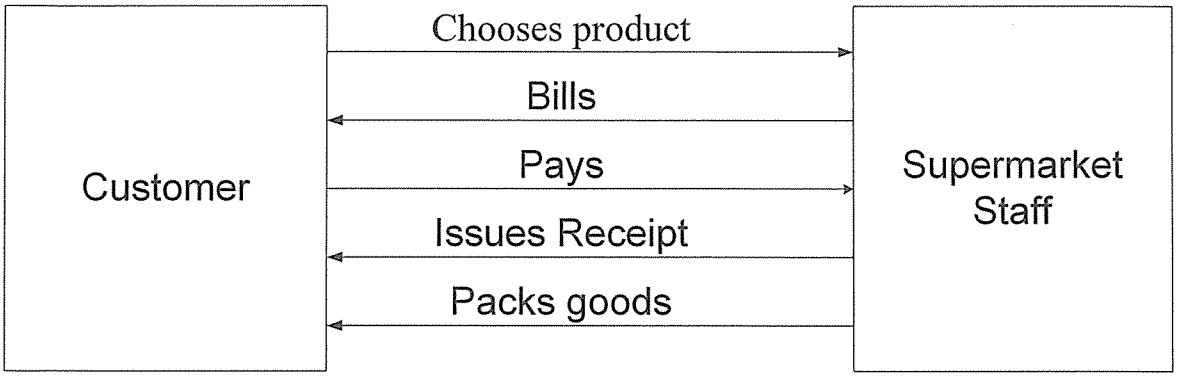


Fig 4.1 Work Flow Process in the Current System

4.1.3 Existing System Weaknesses

i. The supermarket must be open for any customer transaction to take place.
ii. The customer must move with cash money to the supermarket which is insecure.
iii. The system does not capture the number of transactions a customer has made with the supermarket.
iv. The system is much prone to theft since every body is free to enter the supermarket and move around.
v. Customers who are not well versed with the setting of the supermarket may not locate their products of preference easily.
vi. The current system does not provide an online catalogue to allow customers browse for available goods.

4.2 The Proposed System

4.2.1 System Analysis

4.2.2 Introduction

In order to document all the end user requirements for the proposed system, data collected was analyzed using structured analysis approach to rigorously specify the processes. This section includes the requirements of the new system characterized into user requirements, functional and non-functional requirements.

4.2.3 User Requirements

These include the functionalities under the different constraints that the proposed system should provide, according to the demands of all affected stakeholders.

From the system study the system stakeholders were identified. These are systems managers, systems administrator, staff, stock manager and customers.

i) Managers.

- Collecting and analyzing all the information collected from the daily operational systems.
- Making strategic decisions of the supermarket based on the information analyzed from the system.

ii) Supermarket System Administrators

- Setting access permissions to the users of the system
- Fixing the faults in case of system failure.

iii) Staff

- To manage customer accounts
- To take and process customer orders
- To register new customers
- To create accounts for each customer
- Pack purchased goods

iv) Stock manager

- To manage the flow of the stock in the supermarket.
- To update the catalogue for new products

v) Customers

- To fill their details in the registration interface and submit
- To log into the system using their pins and user names.
- To select the goods they intend to buy and submit the order.
- To credit their accounts.

vi) Sales Staff

- To manage customer orders
- To manage sales

vii) Finance Staff

- To manage payments

4.2.4 Functional Requirements

These include the services that the proposed system has to provide to the entire system users. The system will perform the following functionalities:

- Store the customers' details.
- Randomly generate account numbers for customers
- Provide customers with a view of the available products in the supermarket catalogue.
- Update the customer accounts once credited.
- Provide user login authentication.
- Calculate and deduct money from customers' accounts once goods have been ordered.
- Keep details of supermarket staff
- Verify customers' debit card details.

4.2.5 Non-Functional Requirements

These are constraints that should be imposed on the services provided by the proposed system. The system was designed to fulfill the following non-functional requirements.

- System should be complete and consistent that is, able to deal with all the possible outcomes during its operation.
- System should be robust that is, able to run on the specified platforms with no predictable failure.
- System should be able to sustain the heavy load offered to it due to network requests (provide high performance in all situations).
- System should operate efficiently under the TCP/IP protocol suite.
- All its operations should be correct, that is, should produce expected results when supplied with the right inputs.
- System should be reliable, up and running every time its operations are needed.
- System should verify/validate all user input and users must be notified in case of errors.
- The system should only allow system administrators to delete records.
- The system should be extensible.
- Allow customers to view products from using any web-enabled device.
- Allow customers to make purchases from their mobile phones and computers.
- Customers are able to make payments using their debit cards.
- Product descriptions must be easily maintained and updated by supermarket staff.
- Fast, accurate and inexpensive product distribution of product descriptions to customers of what Standard supermarket has to offer.
- Fast customer ordering system that is as simple and secure as possible

4.2.6 System Requirements

In order for the system to perform as expected, the following system specification for hardware and software, security and operations are required.

a) Hardware Requirements

Hardware	System Requirement (Minimum)
Processor	Intel Pentium IV
Memory	512 MB RAM (1024 MB Recommended).
Disk space	30GB
USB Port	Version 2.0

Table 4. 1 Hardware Requirements

b) Software Requirements

Software	System Requirement
Operating System	Microsoft Windows 7 or higher
Programs	Macromedia Dream weaver 8.0
Database	PhpMysql

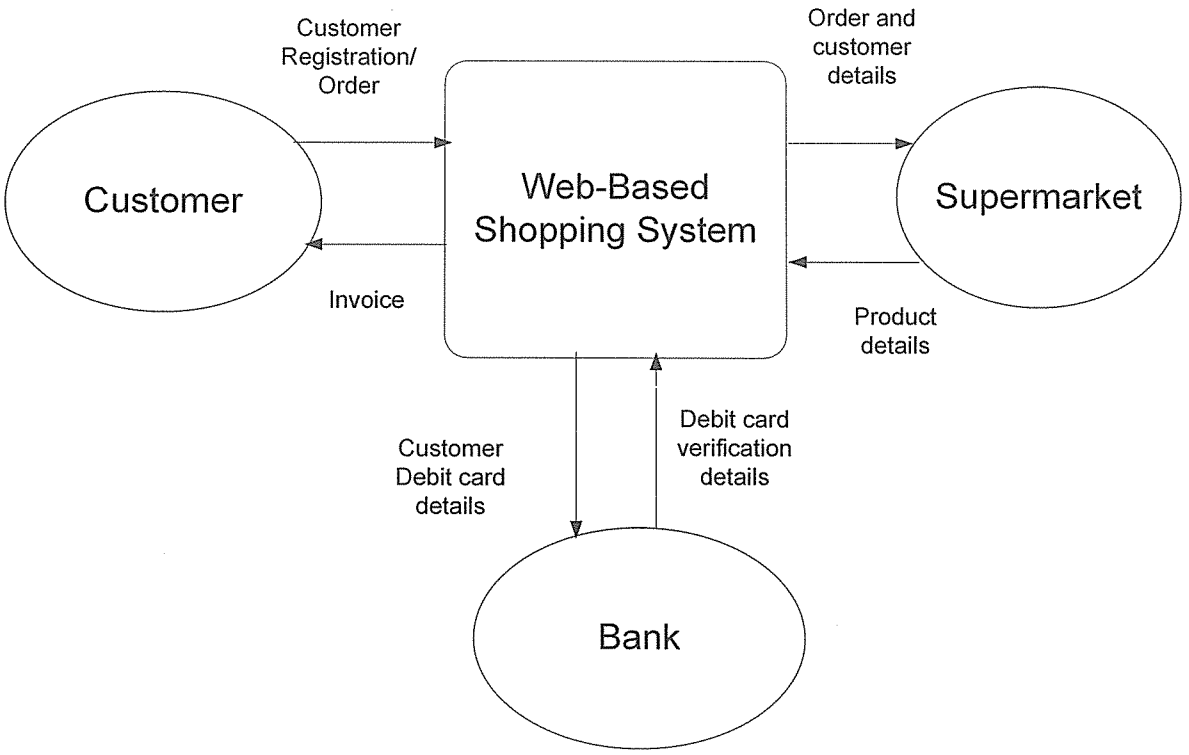
Table 4. 2 Software Requirements

4.3 System Design

4.3.1 Introduction

The new system includes a database driven website with a search tool/ engine for faster information retrieval. This section describes the system design that includes the context diagram, Level One DFD, system architecture and database design.

4.3.2 Context Diagram



4.3.3 Level 1 Data Flow Diagram

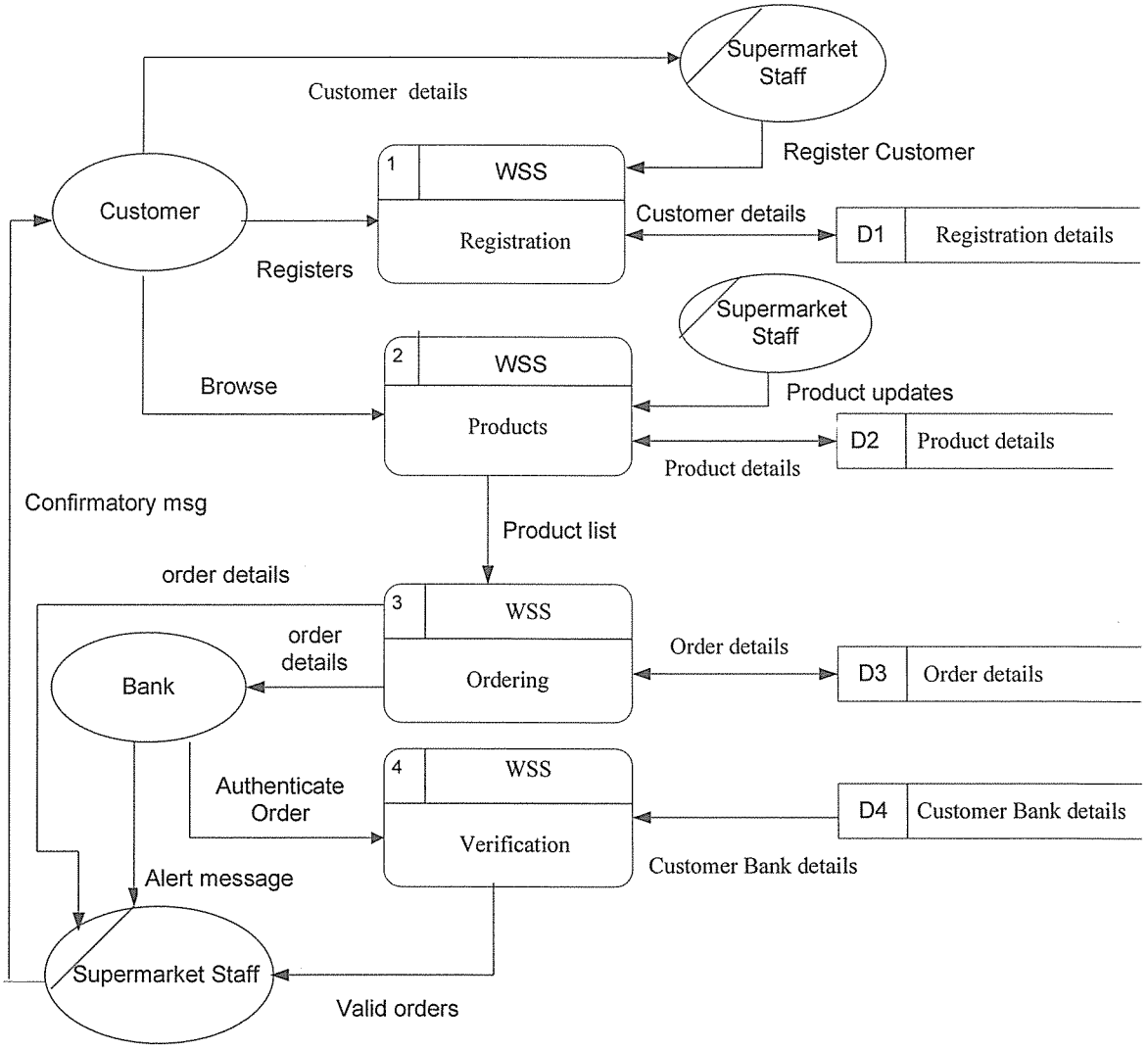


Fig 4.3.3 Level One Data Flow Diagram

4.4 System Architecture

This gives a high level view of the new system with the main components of the system and the services they provide and how they communicate. The system is implemented using a three-tier architecture that comprises of user interface, process management and DBMS as illustrated below. This structure ensures that users' interaction with the system is independent of storage consideration.

4.4.1 Architectural Design of WSS

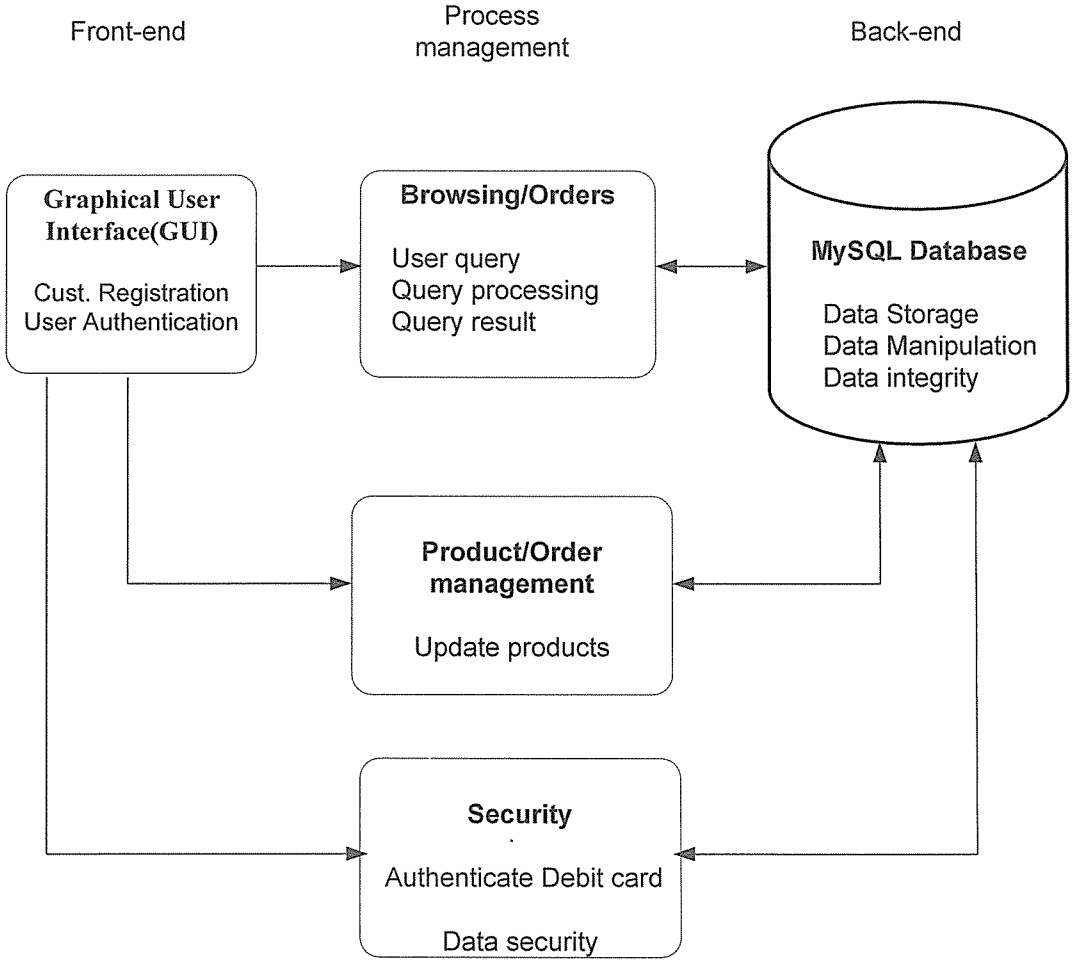


Fig 4.5 Architectural Design

4.5 System Database Design

4.5.1 Introduction

The DBMS used was Php and My SQL and this section includes details of the database design. The conceptual and physical database design and the data dictionary are described below.

4.5.2 Conceptual Database Design

After system investigation and analysis, the concept of the new system was designed and all the relevant entities involved in the system were identified. The following entities were chosen to capture this information.

i. Customers
ii. Products
iii. SupermarketStaff
iv. Orders
v. BankStaff
vi. Cards

4.5.4 Entity Relationship Diagram (ERD)

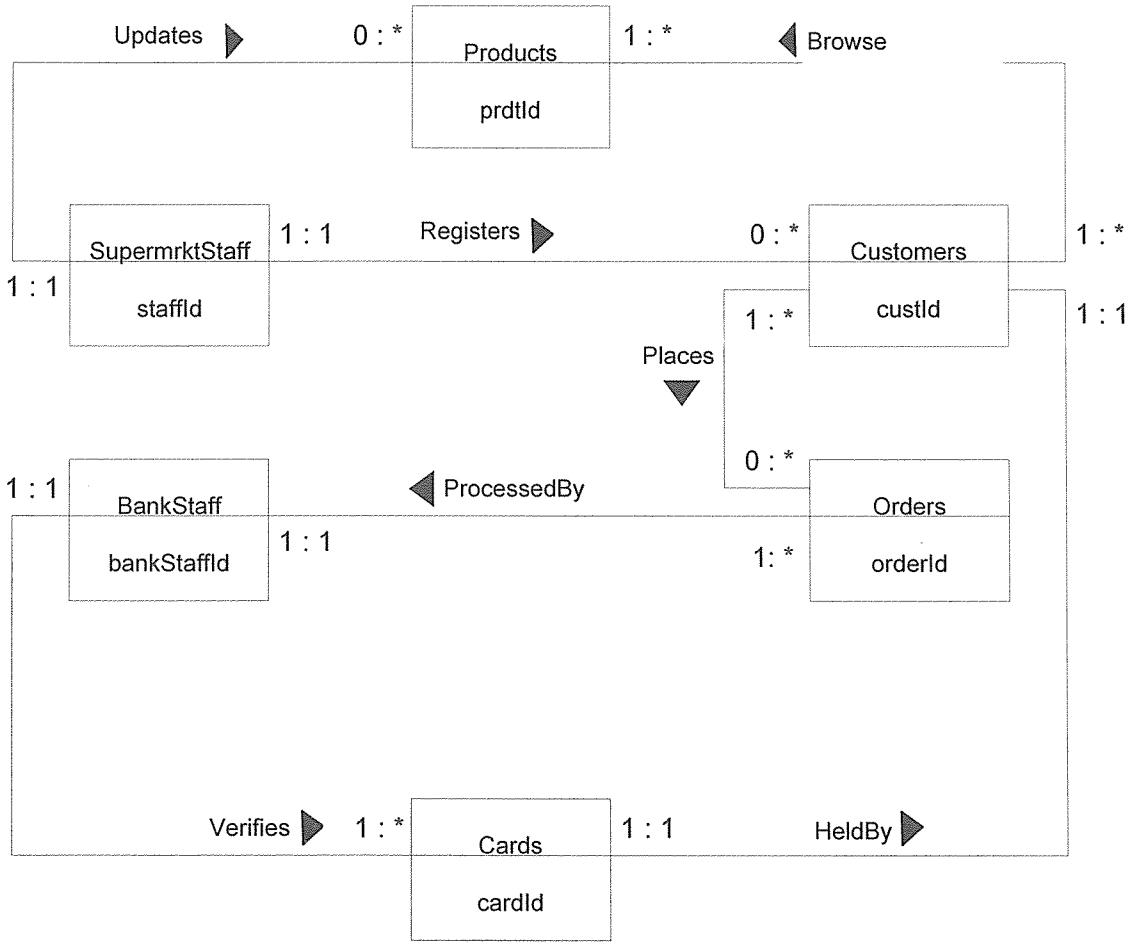


Fig 4.6 Entity Relationship Diagram

4.5.5 Mapping the ERD to Database Relational Schema

a) Mapping Strong Entities

Customer (acc_Id, acc_no, pin, cash, phone_no, fname, lname, DOB, email, residence)

Bankstaff (name, uname, psword, role)

Cards (id, card_type, card_no, security_code, billing_address, expiry_date, balance, phone_no)

Orders (id, acc_no, tot_amount, order_time, status)

Products(id,date_added,name,category,units,quantity,price,discount,photofile,added_by)

SupermarketStaff (name, uname, psword, role)

b) Mapping Weak Entities

No weak entities were identified.

c) Mapping One-to-Many Relationships

Customer (acc_Id, acc_no, pin, cash, phone_no, fname, lname, DOB, email, residence)

SupermarketStaff (name, uname, psword, role)

Products(id,date_added,name,category,units,quantity,price,discount,photofile,added_by)

BankStaff (name, uname, psword, role)

Cards (id, card_type, card_no, security_code, billing_address, expiry_date, balance, phone_no)

Orders (id, acc_no, tot_amount, order_time, status)

d) Mapping One-to-One Relationships

Customer (acc_Id, acc_no, pin, cash, phone_no, fname, lname, DOB, email, residence)

Cards (id, card_type, card_no, security_code, billing_address, expiry_date, balance, phone_no)

e) Mapping Ternary(many-to-many) Relationships

Customer (acc_Id, acc_no, pin, cash, phone_no, fname, lname, DOB, email, residence)

Products(id,date_added,name,category,units,quantity,price,discount,photofile,added_by)

The final relations for the system database design are:

Customer (acc_Id, acc_no, pin, cash, phone_no, fname, lname, DOB, email, residence)

BankStaff (name, uname, psword, role)

Cards (id, card_type, card_no, security_code, billing_address, expiry_date, balance, phone_no)

Orders (id, acc_no, tot_amount, order_time, status)

Products(id,date_added,name,category,units,quantity,price,discount,photofile,added_by)

SupermarketStaff (name, uname, psword, role)

4.5.6 Physical Database Design

This shows the Data Dictionary describing the relations, the attributes, data type and size. This will be used together with SQL statements to create the tables.

4.5.7 Data Dictionary

Relation	Attribute	Type and Size	Key	Description
Customers	acc_id	mediumint(9)	Primary Key	
	acc_no	varchar(18)		
	pin	varchar(50)		
	cash	int(11)		
	phone_no	varchar(30)		
	fname	char(30)		
	lname	char(30)		
	dob	varchar(30)		
	email	varchar(70)		
	residence	varchar(40)		
SuperMarketStaff	name	varchar(40)		
	username	varchar(40)	Primary Key	
	psword	varchar(40)		
	role	varchar(15)		

BankStaff	name	varchar(4)		
	username	varchar(20)	Primary Key	
	Psword	varchar(20)		
	role	int		
Orders	id	int(11)	Primary Key	
	acc_no	varchar(8)		
	tot_amount	int(11)		
	order_time	varchar(30)		
	status	varchar(20)		
	rec_by	varchar(40)		
Products	id	int(11)	Primary Key	
	date_added	Date time		
	name	varchar(40)		
	category	varchar(40)		
	units	varchar(20)		
	quantity	int(11)		
	price	int(11)		
	discount	float		
	photofile	varchar(50)		
	added_by	varchar(40)		
Users	name			
	username		Primary Key	
	psword			
	role			
Cards	Id	int(11)	Primary Key	
	card_type	varchar(20)		
	card_no	varchar(16)		
	security_code	int(4)		
	billing_address	text		
	expiry_date	varchar(30)		
	Balance	int(11)		
	phone_no	varchar(15)		

Table 4.3 Data Dictionary

4.6 Application Architecture of WSS

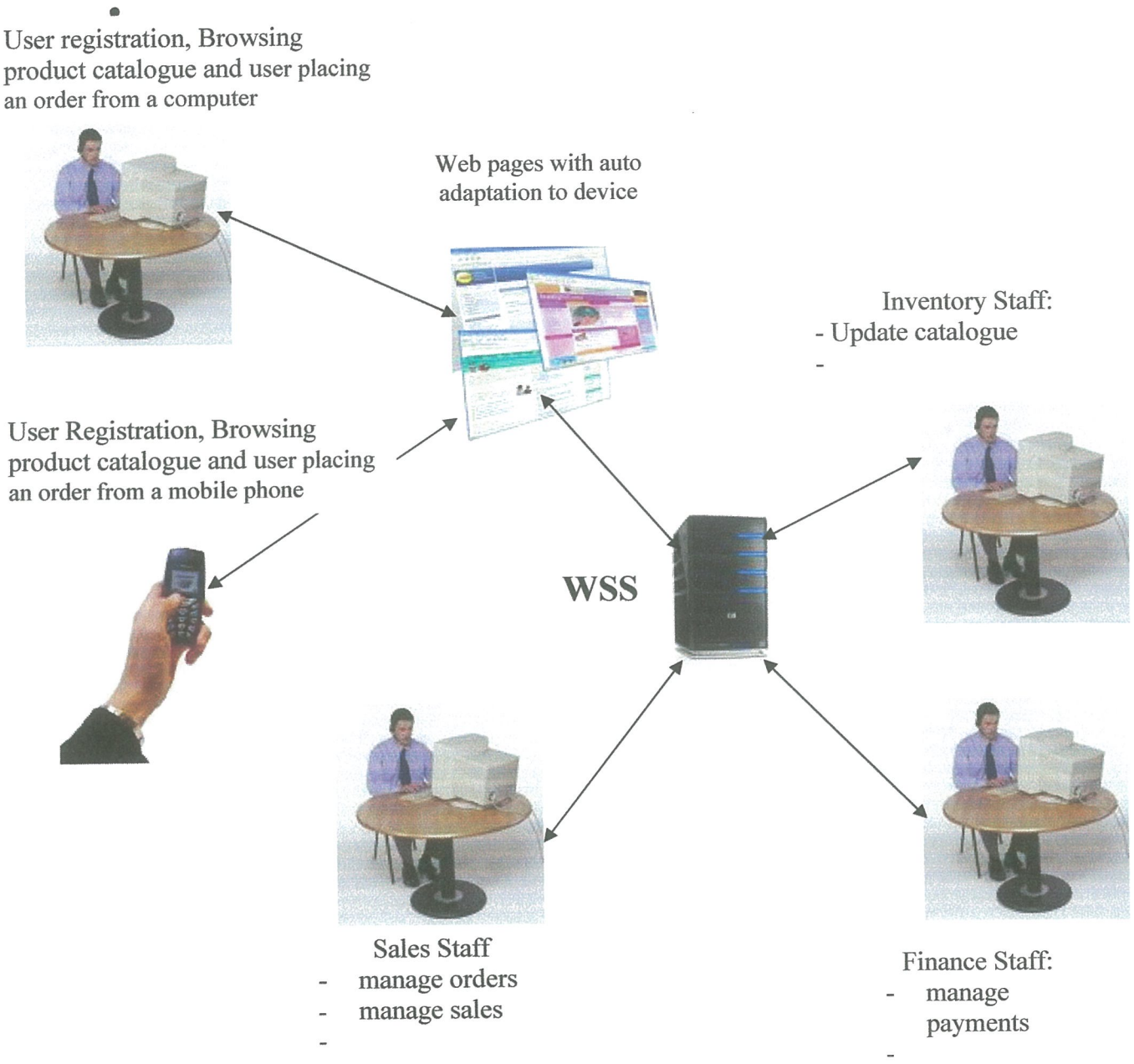


Fig 4.6 Application Architecture

4.7 System Implementation

4.7.1 Introduction

The implementation environment used to support the WSS was Microsoft windows 7 and the main scripting languages used were PHP/JavaScript. WMLScript was also used. This section introduces the developed application with emphasis on how it was developed. This section further shows the samples of the implemented WSS interfaces in use as well as the methodologies used in testing the application. Sample interfaces in use and source code is included in Appendix B and E respectively.

4.8 System Testing

This involved execution of the WSS in order to determine whether it matches its specification and executes as per the design. The following testing strategies were employed to carry out application testing of the WSS:

a) User Testing

A number of users were randomly selected to test the system interfaces and to comment on the usability of the system.

c) Unit Testing

Each executable component of the system was tested for the desired functionality.

d) Module Testing

Each executable unit was integrated and tested as a module.

d) Functionality or System Testing

WSS modules were integrated and tested as whole. The different modules were integrated to come up with one functional system which was then be tested as a whole to make sure that it meets the general objectives of the project.

CHAPTER FIVE

Discussions, Conclusions, and Recommendations

5.1 Discussion of Results

The project was successful in implementing the objectives stipulated in earlier chapters. The WSS offers a number of benefits to the intended users. The Customers are able to conveniently and easily carryout their shopping online using either their WAP enabled computers in the shortest time possible and the Standard Supermarket System Administrators are able to effectively manage the entire shopping process online.

Some of the graphical results generated from the system are discussed below:

5.2 User-Interfaces

a) Mobile Phone Login Interface

This interface is meant for the Administrator (or any other authorized individual) to gain access to the application. He/she has to enter a unique username and the password, which are validated and authenticated. Access is denied if the username and password don't match otherwise permission is granted. [See Appendix B.1.1]

b) Computer Supermarket Account Registration Interface

Provide users with interface to carryout online registration with the supermarket.

[See Appendix B.2.2]

c) WSS's Main Interface

This provides links to all the other interfaces and is also used to execute the following functionalities:

- Provide links for customers to access the Supermarket product services such as customer registration, add funds to supermarket account, and make orders for goods.

[See Appendix B.2.1]

5.2 Limitations

The Researchers faced a number of limitations in the course of this project development as enumerated below:

The timeline imposed for the project duration limited the extent to which we could carryout the necessary research as we also have to divide the available time with other course units in the course of the semester.

The fluctuating internet connection limited the amount of Research information that the Researchers would access to help with the Research Project.

Some of the software and tools required to successfully execute our project were not inaccessible in the computer laboratories.

The Researchers also experienced difficulties eliciting the System requirements from the various stakeholders of Standard supermarket as some of them were not readily available on the scheduled interview times.

5.3 Recommendations

Standard Supermarket does not have an application in place that can enable their customers to register with the supermarket and make purchases using mobile phones despite the ever-increasing need for organizations to provide mobile shopping services through the Internet. Adopting WSS will help in effectively managing and facilitate the online shopping process. Other Supermarkets or shopping malls can also adopt the application to enhance their shopping.

Further research is recommended to widen the scope of this application to include the following:

- The system should be extended to allow supermarket customers to pay for transportation or shipping costs so that goods can be delivered to the customer premises.
- The Portal should be extended to permit customers who hold Debit cards from various Banks to transact with the supermarket as opposed to a single Bank used in WSS.
- Incorporate provision to search products by category, keywords and by name.

5.4 Conclusion

Computers and Mobile phones are becoming prevalent in today's modern Societies. In addition, recent developments in the Internet, Computing and Telecommunication Industries has revolutionized and consequently brought about a paradigm shift in the way activities are accomplished. Consequently the Shopping processes need to embrace these new technologies. In this report, we have presented a simple, convenient, cost-effective, but efficient WSS with a user-friendly, intuitive web interface. It is cost effective as less time is spent by customers effecting their shopping transactions and offers customers a chance to shop from wherever they are provided they have a WAP-enabled mobile phone or they are connected to the internet using some other device.

The WSS was successfully implemented and its objectives were attained. The main advantage of the WSS is its ability to be accessed by both supermarket customers and staff from wherever they are provided they have an internet enabled device. The WSS can provide the customers with an opportunity to carryout their shopping more conveniently and in such a way as to save on time spent during the shopping process. This is particularly true for the busy customer. Successful tests the researchers conducted show that the WSS functions in accordance to the design specifications.

The system hardware, Software and technical requirements.

Technical requirements.

- ✓ Good knowledge of Advanced web designing.
- ✓ Good knowledge of system application tools and database tools

Software requirements.

- ✓ Any operating system installed. Windows 7 of 32 bit can be used, since it was to design and test the prototype.
- ✓ Tools or program installed.
- ✓ MySQL server should be available, since it's applied in the new system as a backend data source to store client's information.
- ✓ Dream weaver .version.8, should be installed.

  This software was used as a programming tool to design the front – end interface and act as the systems user interface.

Hardware requirements

- ✓ A Dual Core processor of at least 2.9 GHZ, 1.7 GHZ of speed.

  This speed rate is to allow processing of clients details within the shortest possible time.
- ✓ A 17 inch LCD monitor.
- ✓ At least 320 GB of hard disk capacity.

This is because the system uses a program that should have the capacity to store a huge amount of clients records.

- ✓ At least 2GB of RAM (memory)

This makes it possible to run several programs concurrently at the same time.

This is to support the appearance of all the design interface, since it was designed on the given monitor specification.

- ✓ An HP Laser Jet D1650 printer networked to the computer system.
- ✓ This is necessary to for printing of the customers and data source records.

  Network facilities, such as switches, cables.

  This is to connect the different computers to other offices at the institution.
- ✓ An interruptible power supply (UPS)

  This is not a basic requirement, but for efficiency reasons it can be provided.

5.5 OFFICIAL BUDGET FOR GRADUATION PROJECT 2012

REQUIREMENTS	COSTS
COMPUTER SETS(2 LAPTOPS)	2,800,000/=
INTERNET COST(Orange Provider)	95000/=
TRANSPORT	300,000/=
PENS	1500/=
PAPERS(Ream)	12000/=
FLASH DISK(2GB)	50,000/=
TOTAL	3,258,500/=


Kawempe
Kisasi area
Kisota Zone
Kigowa
Kazo
Kalerwe
Kyebando
Bukoto
Ntinda
Kyambogo University
Kyambogo
Jamaica Mulago
Kamwokya
Mulago
Mulago Hospital
Katalima
Nakawa
Rudam well
Clean washing bay
Kasubi
Namungoona
Kiwunya
Makerere University
Kitante
Kololo
Uganda Golf Club
Katali
Mubs
Mbuya
SDV Transami Inland container depot
Nakulabye
Bulenga
Masiro Rd
Lusaze
Standard Supermarket
Golf Course
Munaku
Bulange
Market
Central
Industrial Area
Spring Rd
Kampala
Eigth St
Electricity Substation
Bugolobi
Oluzzi water hole
Busega
Lungujja
Rubaga
Goods Loading/ Storage Centre
Locomotive Sheds
mt. carmel polling station
Social Center Village
Kiwuliriza
Bulwa Zone
Nsambya
Kabalagala
Kabaka's Lake
Lubiri
A 109
Natete
Nakulongo Railway Workshop
Masaka Road
Kibuye
Nakivubo
Kyeitabya
Kansanga
Kabowa
Mutundwe
Kiwempe Zone
Wankulukuku
2 km
1 mi
Satellite
Photos
Map data ©2011 Google, TradeMarkAfrica
Edit in Google Map Maker

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Appendices

Appendix A

A.1 Interview Script

The primary purpose of this interview is to obtain a profile of the stakeholders who use the Standard Supermarket shopping system, how the shopping is done, to assess stakeholder satisfaction with the current system or aspects of the current system, and to find out how Standard Supermarket customers carryout shopping and generally how the Supermarket Manages the entire shopping process. The Researchers will then be able to identify any possible problems with the current shopping system in place and thereafter devise a solution to improve the customer's shopping experience.

1. Who are the various stakeholders of Standard Supermarket and their respective roles?

   .....

   .....

2. How is shopping done in the Supermarket?

   .....

   .....

3. Do you have an I.T Department?

   i)☐ Yes ii)☐ No

4. What is the role of the I.T Department with regards to supporting customer shopping?

   .....

   .....

5. What kinds of activities are involved in for a typical customer shopping in the supermarket?

   .....

   .....

6. How do customers pay for the goods purchased?

   i) Western Union ☐ ii) Credit Card ☐ iii) Cash ☐ iv) Mobile Money ☐

7. Is it possible for a customer to place an order online say using a mobile phone or using a computer connected to internet?

   i) ☐ Yes ii) ☐ No

8. Do you experience any congestion in the supermarket?

   i) ☐ No ii) ☐ Yes

9. Have you automated any aspects of the shopping system in place? If so, to what extent?

   .....

   .....

10. Do you keep track of your customers shopping process?

    i) ☐ Yes ii) No ☐

11. Do you have any arrangements in place for busy customers who may wish to shop with you but have not enough time to physically come to the supermarket?

    .....

12. Do you do any packing of goods for customers?

    i) ☐ Yes ii) ☐ No

13. Are there any aspects of the current shopping system that you would particularly think need to be addressed in order to make the entire shopping experience convenient and time saving on the part of the customer and also help make the work of Standard supermarket Management much easier?

    .....

    .....

14. Do you sometimes receive any complaints from Standard Supermarket customers expressing any dissatisfaction with the current shopping system?

    i) ☐ Yes ii) ☐ No

15. Do you think a system that would help customers browse an online catalogue, place orders from wherever they are would make things better for Standard stakeholders as a whole in terms of convenience, time saved while shopping, increased revenue and also help track the customer details and purchases and generally improve the entire shopping experience /management?

    .....

    .....

16. Do have any form of registration for customers who shop with Standard Supermarket?

    i) ☐ Yes ii) ☐ No

17. Could you please suggest any desired improvements, if any, to the current system?

    .....

    .....

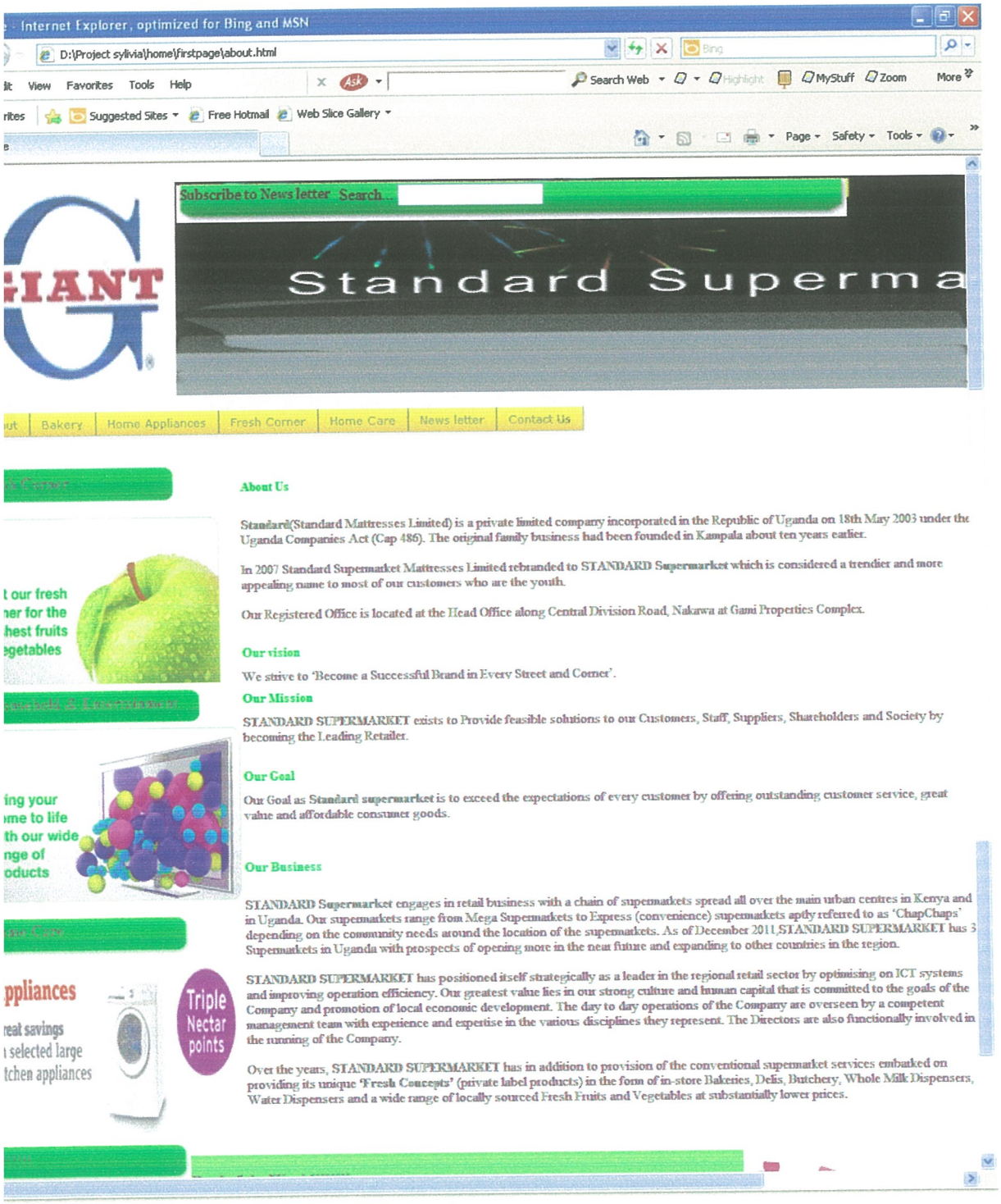
    .....

Answers to these questions, especially when combined with other techniques described in this report provided very useful information for our research project

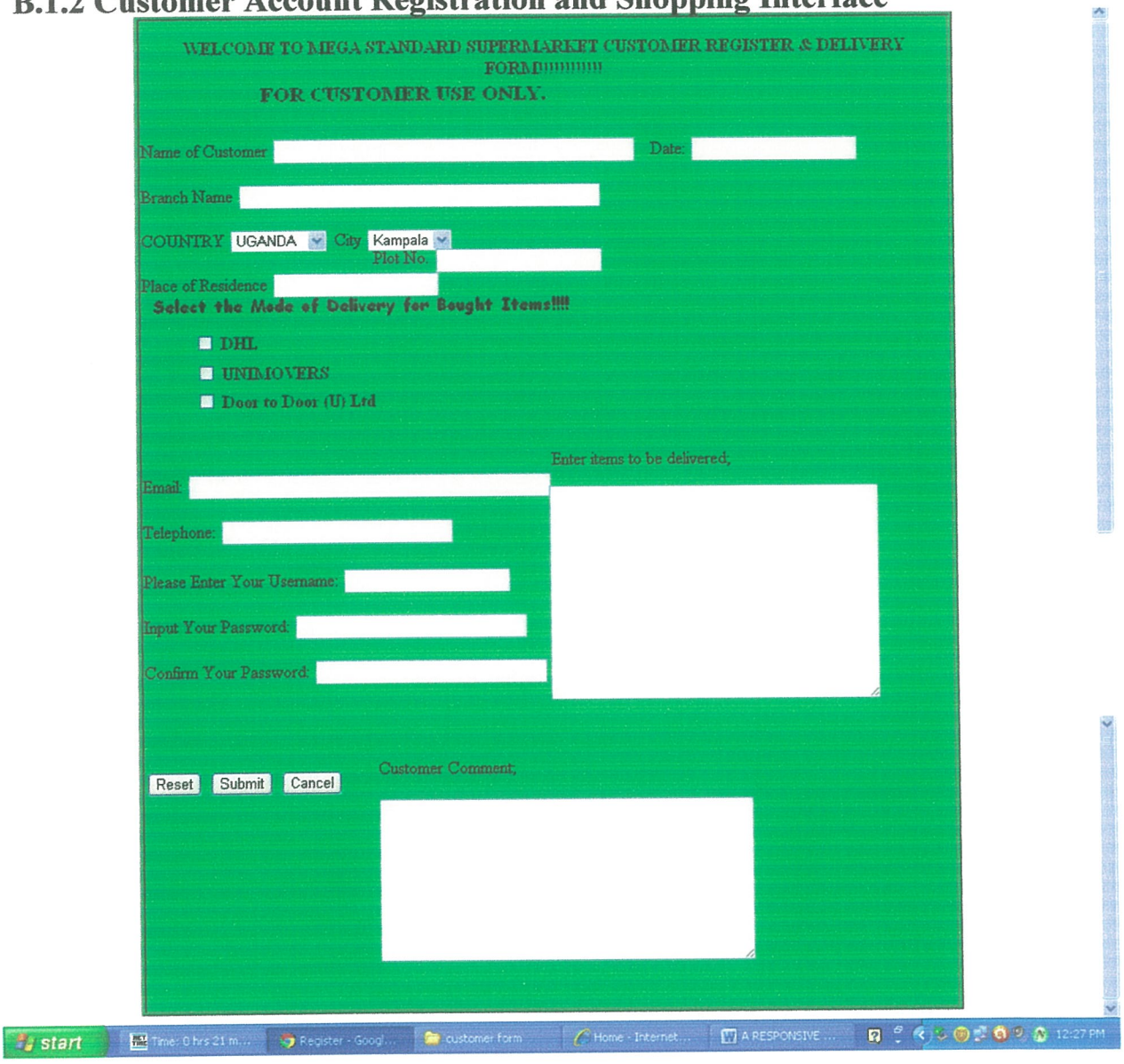
Appendix B

Sample User Interfaces

B.1.1 WSS About Page interface on Computer

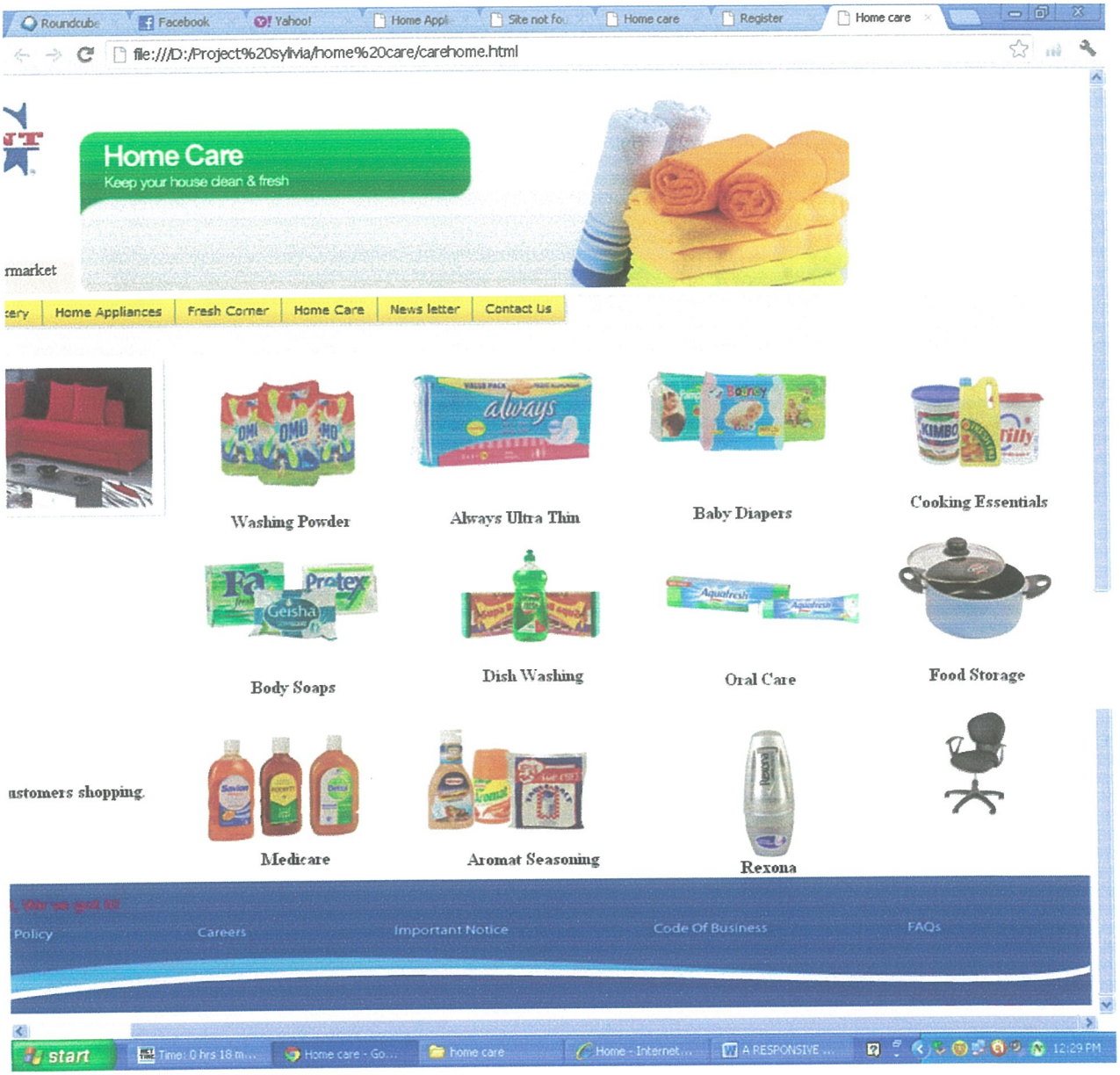


B.1.2 Customer Account Registration and Shopping Interface

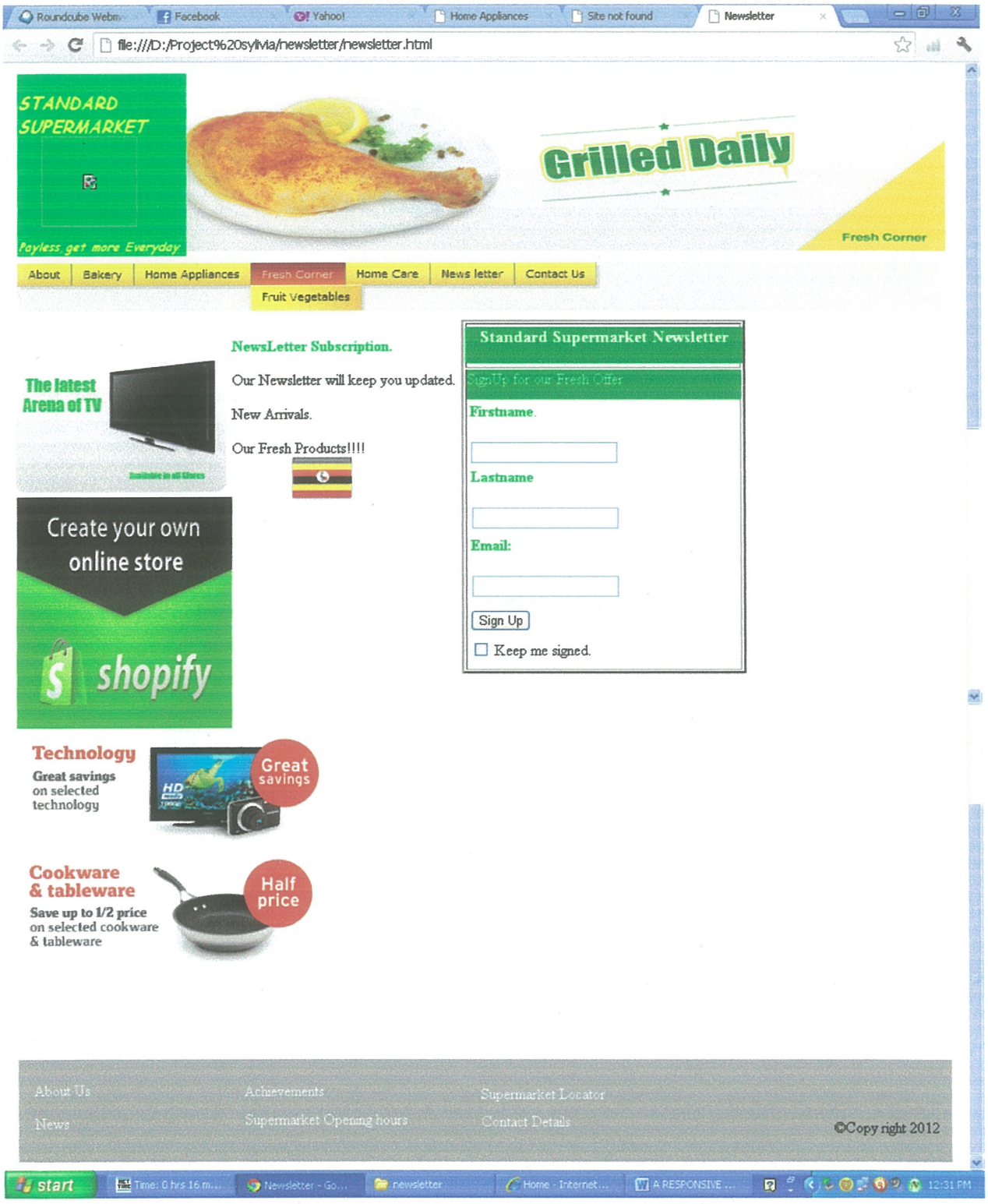


B.1.3 Home Appliance interface

B.1.4 Home Care interface



B.1.5 Mega Standard weekly newsletter interface



APPENDIX C

SAMPLE SOURCE CODE (ONLINE SHOPPING CART AND REGISTRATION FORM)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Register</title>
<style type="text/css">
<!--
#Layer1 {
        position:absolute;
        left:41px;
        top:266px;
        width:532px;
        height:20px;
        z-index:1;
}
#Layer2 {
        position:absolute;
        left:42px;
        top:296px;
        width:179px;
        height:95px;
        z-index:2;
}
#Layer3 {
        position:absolute;
        left:44px;
        top:299px;
        width:167px;
        height:25px;
        z-index:3;
}
#Layer4 {
        position:absolute;
        left:44px;
        top:326px;
        width:172px;
        height:23px;
        z-index:4;
}
#Layer5 {
        position:absolute;
        left:45px;
        top:353px;
        width:172px;
        height:34px;
        z-index:5;
}
#Layer6 {
        position:absolute;
        left:307px;
        top:790px;
        width:0px;
```

```
        height:1px;
        z-index:6;
}
#Layer7 {
        position:absolute;
        left:44px;
        top:411px;
        width:96px;
        height:20px;
        z-index:7;
}
#Layer8 {
        position:absolute;
        left:138px;
        top:659px;
        width:275px;
        height:22px;
        z-index:8;
}
#Layer9 {
        position:absolute;
        left:42px;
        top:458px;
        width:94px;
        height:22px;
        z-index:9;
}
#Layer10 {
        position:absolute;
        left:38px;
        top:27px;
        width:676px;
        height:107px;
        z-index:10;
}
.style1 {color: #000000}
.style2 {
        font-family: "Comic Sans MS";
        font-weight: bold;
}
#Layer11 {
        position:absolute;
        left:97px;
        top:57px;
        width:552px;
        height:28px;
        z-index:7;
}
.style3 {
        font-size: larger;
        font-weight: bold;
}
#Layer12 {
        position:absolute;
        left:430px;
        top:409px;
        width:263px;
        height:26px;
```

```
        z-index:8;
}
#Layer13 {
        position:absolute;
        left:428px;
        top:445px;
        width:257px;
        height:199px;
        z-index:9;
}
-->
</style>
</head>

<body>
<div id="Layer1">
  <div align="center" class="style2">Select the Mode of Delivery for Bought
Items!!!! </div>
</div>
<div id="Layer2"></div>
<div id="Layer3">
  <form id="form3" name="form3" method="post" action="">
    <label>
      <input type="checkbox" name="checkbox2" value="checkbox" />
      <strong>      DHL</strong></label>
  </form>
</div>
<div id="Layer4">
  <form id="form4" name="form4" method="post" action="">
    <label>
      <input type="checkbox" name="checkbox3" value="checkbox" />
      <strong>UNIMOVERS</strong></label>
  </form>
</div>
<div id="Layer5">
  <form id="form5" name="form5" method="post" action="">
    <label>
      <strong>
      <input type="checkbox" name="checkbox4" value="checkbox" />
      Door to Door (U) Ltd</strong></label>
  </form>
</div>
<div id="Layer6"></div>
<div id="Layer11">
  <div align="center" class="style3">FOR CUSTOMER USE ONLY. </div>
</div>
<div id="Layer12">Customer Comment: </div>
<div id="Layer13">
  <form id="form2" name="form2" method="post" action="">
    <label>
      <textarea name="textarea" rows="10"></textarea>
    </label>
  </form>
</div>
<table width="693" height="776" border="1" align="center" cellpadding="1"
bgcolor="#00FF66">
```

```
  <tr>
    <td width="687" height="688"><form action="" method="post" name="form1"
class="style1" id="form1">
      <p align="center"><strong>WELCOME TO STANDARD SUPERMARKET CUSTOMER
REGISTER!!!!!!!!!!!! </strong></p>
      <p> </p>
      <p>
        <label> Name of Customer
          <input name="textfield" type="text" size="50" />
      </label> 
      <label>Date:
      <input type="text" name="textfield9" />
      </label>
      </p>
      <p>
        <label>Branch Name
        <input name="textfield2" type="text" size="50" />
        </label>
      </p>
      <p>
        <label>COUNTRY
        <select name="select">
          <option selected="selected">UGANDA</option>
          <option>KENYA</option>
          <option>TANZANIA</option>
          <option>RWANDA</option>
        </select>
        </label>
        <label> City
        <select name="select2">
          <option>Kampala</option>
          <option>Masaka</option>
          <option>Jinja</option>
          <option>Nairobi</option>
          <option>Entebbe</option>
        </select>
        </label>
      </p>
      <p>
        <label>Place of Residence
        <input type="text" name="textfield3" />
        </label>
      </p>
      <p> </p>
      <p> </p>
      <p> </p>
      <p> </p>
      <p>
        <label>Email:
        <input name="textfield4" type="text" size="50" />
        </label>
      </p>
      <p>
        <label>Telephone:
        <input name="textfield5" type="text" size="30" />
        <br />
        <br />
        Please Enter Your Username:
```

```
        <input type="text" name="textfield6" />
        </label>
      </p>
      <p>
        <label>Input Your Password:
        <input name="textfield7" type="password" size="30" />
        </label>
      </p>
      <p>
        <label>Confirm Your Password:
        <input name="textfield8" type="password" size="30" />
        </label>
      </p>
      <p> </p>
      <p>
        <input type="reset" name="Submit2" value="Reset" />
        <input type="submit" name="Submit" value="Submit" />
        <input type="button" name="Submit3" value="Cancel" />
</p>
      <p>
        <label></label>
        <label></label>
      </p>
      <p> </p>
      <p> </p>
      <p> </p>
      <p> </p>
      <p> </p>
      </form>    </td>
  </tr>
</table>
</body>
</html>
```