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AN ELECTRONIC SHOPPING SYSTEM WITH A RECOMMMENDATION AGENT

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.**ABSTRACT**

There is an inevitable need to improve the operation portfolio of the boutique, and erase problems like time consumption, inconsistency and a host of other problems encountered by most business enterprises.

This research study focused on the design of a web based shopping system. The reason for the development of this system is because every shopping software system is precipitated by some business need which are: the need to correct a defect in an existing application, the need to adapt a legacy system to a changing business environment, the need to extend the functions and features of an existing application or the need to create a new product, service or system.

A feasibility study was carried out through interviewing an entrepreneur (business proprietor) in order to acquire knowledge about the mode of operation of the boutique; also specialists in the field of fashion designing were interviewed to acquire knowledge that will be used by the proposed software agent to give recommendations online. The existing system was studied and deficiencies such as long queues, customer dissatisfaction and staff impatience, as well as the need for customers to get professional guidance.

The Scripting language used for developing the database is MYSQL, and the application used in developing the database for this site is an SQL application called SQLYOG and it is compactable with MYSQL Server which is either wamp, xammp or zends. The system accepts input from the user whether an administrator or a customer, processes the input i.e. (carries out the required action on the input collected as specified by the system design) and produces an output (either a completed transaction report and receipt or an outfit recommendation). Interfaces were designed using PHP on Dreamweaver platform. MySQL Query Language on SQLYOG platform was used as a database tool to

develop, organize and store all vital details about customers, suppliers, sales, product, and product categories.

The proposed system is designed in a bid to improve speed, accuracy, storage capability, customer satisfaction, job flexibility for the staff as well as shopping flexibility for the customer and consistency in the boutique; it can be used by trained personnel as well as for general public due to its simplicity.

This work elaborates on the implementation and use of software agents in global transaction i.e. people can transact from the various locations and their goods are delivered at their doorstep enabling them to save time and the stress involved in physically doing the shopping.

Keywords: Product Categories, Boutique, Web based shopping system, Software Agent, Global Transaction and Customer

INTRODUCTION.

Electronic shopping is a process whereby transactions (buying and selling) are done over the web (internet). The significance of this method of shopping is that, customers can now do their routine shopping without having to be physically present at the partner's business location i.e. over the customer's terms and convenience. Virtual e-business environment has encompassed in it so many features, which are:-

It is cashless & occurs in cyber space.

Transactions are done at the customer's time & convenience.

It can occur between customer and partner who spread across the globe and improved business efficiency.

Software agents are software's that help you carry out particular action. In this case, the recommendation agents are a replication of experts, assisting them to make recommendations. Their introduction into e-shopping entails high level of professionalism making it cheaper and easier for customers to consult professionals

Every software project is precipitated by some business need. the need to correct a defect in an existing application, the need to adapt a legacy system to a changing business environment, the need to extend the functions and features of an existing application or the need to create a new product, service or system.

In no time from now it is almost definite that major transactions between customers and their partners will be done in virtual processes (Alter, Steven, 2001). The identification process will be inexpedient as more and more people utilise e-

shopping facilities, because people who soon realise that they can buy commodities 24 hours a day, 7days a week, 52 weeks a year , and every day for the whole 365days anytime from their locations whilst been directly connected to their service provider.

Moving with this trend, it is necessary for companies to equip themselves with the necessary tools to assist them in surveying this dynamic environment. These tools range from search engines, representing Agents to help in carrying out the operation.

If online transactions would ever have to satisfy the insatiable human wants, the field of artificial intelligence has a major role to play in other to make it happen.

A Software agent is a type of expert system. The process of building an expert system is often called knowledge engineering (Ignizio, 1991). It typically involves a special form of interaction between the expert system builder called the knowledge engineer and one or more human experts in that particular problem area. The knowledge engineer extracts from the human experts, the procedures, strategies and rules of thumb for problem solving and converts their knowledge into an expert system. The product is a computer program that can solve problems in a manner similar to human experts.

i.e. Expert System = Inference Engine + Knowledge Base (Stone, P. and Velso, M. 1997)

Expert systems were borne out of the need for Artificial Intelligence (A.I) scientist to develop a program that is intelligent, provide it with a lot of high-quality specific knowledge about the problem area i.e. Each new deployment of an expert makes available valuable data that work in context of its problem area, thereby contributing to the A.I research to produce better equipped application.

Expert systems are computers built for commercial applications using programming techniques of artificial intelligence especially those developed for problem solving. In recent times, Knowledge-based application of A.I have aided in enhancing productivity And efficiency even in real time in areas such as medicine, business, engineering sciences, shopping, military e.t.c. (N. Paddy, 2000)

Artificial intelligence is simply simulating the human behaviour and cognitive processes on the computer i.e. developing software and machine that is adequately able to mimic human grade intelligence, reasoning and logical inference in performing the task, the intelligence capability of A.I software's are superior to common software under certain conditions can out-way the human knowledge capabilities e.g. with respect to time.

REVIEW OF RELATED WORKS

In times past, there had been inventions in Artificial Intelligence (AI), especially in the areas of

Artificial Neural networks (ANN), Expert Systems and Fuzzy Logic. It is necessary to take a brief look into some of the previous work done in these areas.

An expert system have been found to be the most important branch of Artificial Intelligence and is almost synonymous to Decision Support System (DSS) is usually built for a variety of purposes in a specific field or discipline such as medical diagnosis, electronic fault finding, mineral prospecting etc, by storing up an expert's knowledge for decision making. The type of expert system of priority in this paper is the Decision Support System (DSS). It is any devise or system whatsoever which can aid any professional or individual in making decisions about his or her area of interest. According to M. Frize et al (2007), a Decision Support System (DSS) for medical application is any system which applies case-based reasoning and / or neural network techniques to medical databases so as to aid physicians in making decisions about the management of their patients, in various types of medical units. Also a Decision Support System could be based on Artificial Neural Network (ANN), Expert Systems, Fuzzy Logic or a combination of two of these. It has been employed over the years in virtually every facet of human endeavor such as: Education, Medicine, Nursing, Banking, Law and so on and has been found to be very effective. From the Fuzzy Logic's perspective, DSS of this system is based on variables and a continuous large range of truth values (0, 1) in place of True / False decisions and assignments. However, from the expert systems perspective are software packages developed for the Diamaltycin Medical expert system. Since Case-based reasoning is the process of predicting an outcome based upon a comparison between the present case and the cases in the case-base. Thomas Alexander, (2003) stated the fact that case-based reasoners store their knowledge of some cases by some form of abstraction of the facts of the case, the result and possibly the reasoning for reaching the result while, Aamodt et al (1994) however defined case-based reasoning as a problem fixing paradigm that utilizes the specific knowledge of previous experiences and concrete problems in order to solve new or similar situations. Case-based reasoning therefore provides concrete knowledge and abstract knowledge. Also, Artificial Neural Network logistic models for prediction of mortality in head trauma based on initial clinical data was conducted by Behzad Eftekhar et al (2005); furthermore, a research was carried out to determine how well a family physician seeks information through information technology, demographic data was gathered and analyses made was observed that the family physician found the internet useful and important as an information source and most often, information that was sought by family physician was mostly for drug reference (Nanacy L.Benett et al 2005).

PROBLEM DEFINITION

The work is aimed at designing an interactive computer aided decision support system, which is to assist physicians and other health professionals with decision making tasks.

The Decision Support system is to link health observations with health knowledge to influence health choices by clinicians for improved health care. This definition has the advantage of simplifying Clinical Decision Support to a functional concept.

The basic components of the Decision Support System include a *dynamic* (medical) knowledge base and an *inference mechanism* (usually a set of rules derived from the experts and evidence based medicine) and implementation is going to be through medical logic modules based on a language such as Visual Basic 6. It could be based on Expert Systems (Decision Support System) or Artificial Neural Networks or both (connectionist expert systems).

THE RESEARCH METHOD AND DEVELOPMENT PLATFORM

System Architecture

The proposed system adopts server-side architecture. This type of architecture is employed by many web based application developer because it provides concurrent interaction from a primary server equipped with the required software. The advantage of this architecture is that it makes easy to deploy and maintain web based application and it does not require any special software to be present at the clients end as the input and outputs are all in hyper-text mark-up language format.

The procedure involve in the server-side architecture:-

- The client makes a request through a web browser on his personal system to his ISP server
- The client server establishes a connection with the destination through the internet
- The destination server then processes the request and sends a reply back to the client

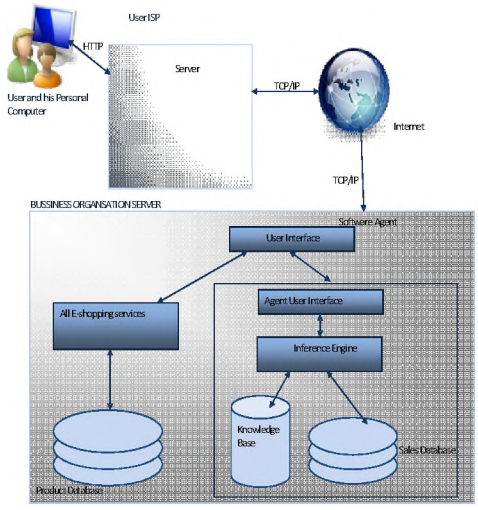


Fig 1.0 System Architecture

SYSTEM DESIGN

Systems design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. **(Wikipedia, 2009).**

Generally, system design is the specification or construction of a technical computer based solution for the business requirements identified in during system analysis.

SOLUTION PROFERRED BY THE NEW SYSTEM

The system is a design that implements the use of a website to display the Boutique's details as well as products. So, any interested customer will have had the full details about the boutique before contacting. The following solutions are provided by the new system.

Provision of individual account numbers and account name for any payment on internet. When any product is purchased the cost will be automatically deducted from the customer's account and receipt is immediately issued. Provision of the different wears for sale including their prices respectively on the internet.

Provision of an avenue to customers to order for products and have them delivered to at the customer's convenience. With the provision of online receipt, the purchased wears will be delivered to customer contact address.

e. Provision of an online software agent that gives the customer recommendation upon request,

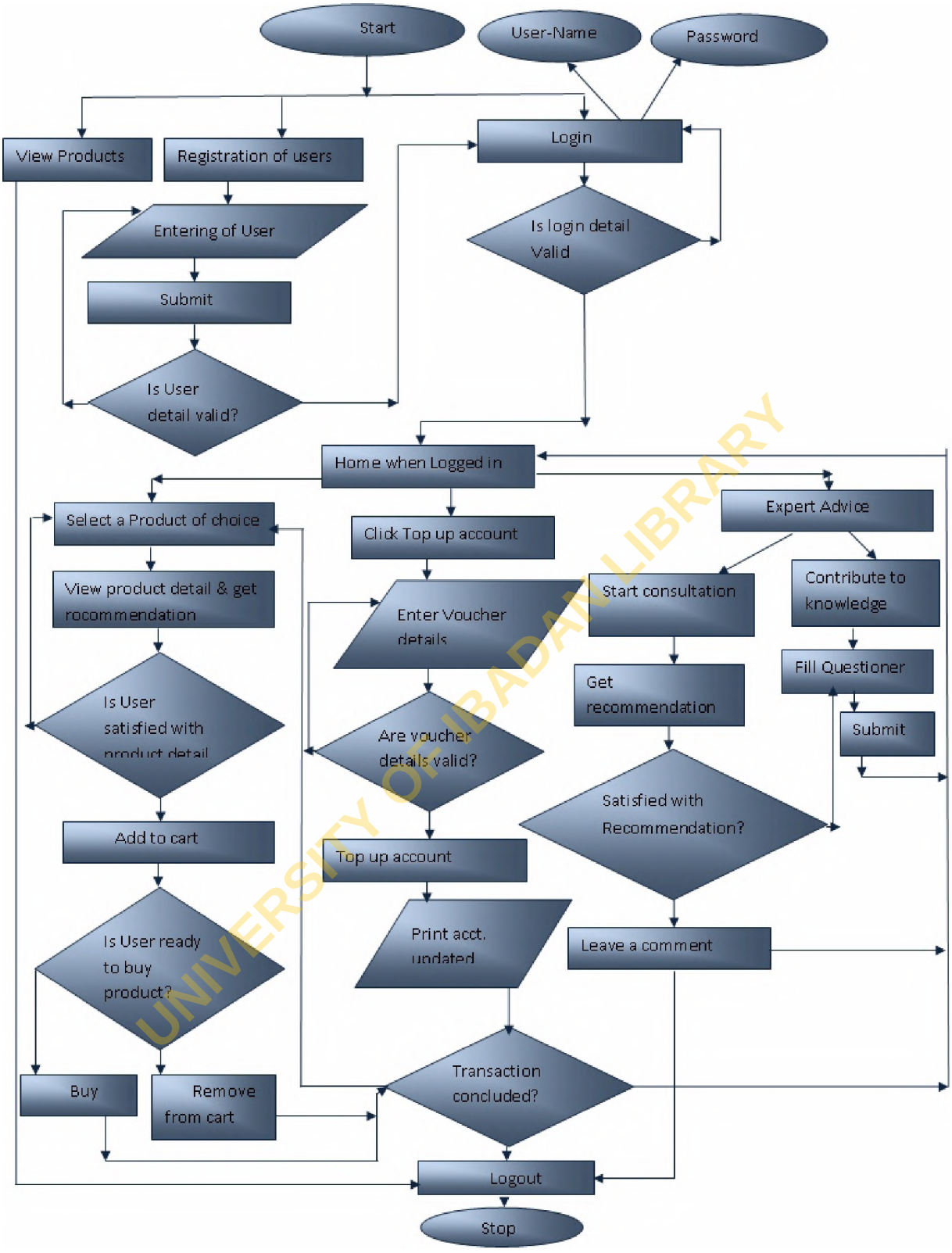


Fig 1.1 E.R flow chart of the Proposed System

OF THE PROPOSED SYSTEM

The objective of the project is to provide a powerful and efficient system which will have the following capabilities:

i. Visual access to data and simple, direct ways to view and work with information data coded in a standardized form.
ii. Allow immediate organization and rearrangement of data.
iii. Store information of customers and suppliers
iv. Enable customers to get real time sufficient and professional assistance when they require it.
v. Group each product into categories and register each product.
vi. Generate report of transactions on a day to day activity.
vii. Keep stock of sales, supply and order.

FEATURES OF THE SYSTEM

This system has two-level architecture. It comprises the front-end, which will is the actual program and a back-end, the underlying database, the inference engine.

The actual program has a Graphical User Interface (GUI) that aims to achieve the elements listed in User Interface Design via ease of use, clarity and appeal to the User. It is a well known fact that the less appeal a program offers will retard its progress despite having all the functionality therein.

The Database will store details about the customer, details about the supplier, product detail, user registration, account details as well as user history login information; will also be stored in the database ensuring access control.

DESCRIPTION OF THE PROPOSED SYSTEM

The proposed system is a web based shopping system that is focused on a boutique. It is an out-of-the-box application that even a layman can relate with comfortably and it also possesses various user friendly interface or modules that interact together to ensure the effectiveness and efficiency of the system. The system has four broad sections which are:-

- Backend
- Frontend
- User interfaces
- Database

THE FRONT END

The front end can be defined as the user section, upon login this is the section the user gains access to and from here he is able to view product, buy products, new users can register, select items and place in the cart, manage his user detail, as well as get fashion recommendation.

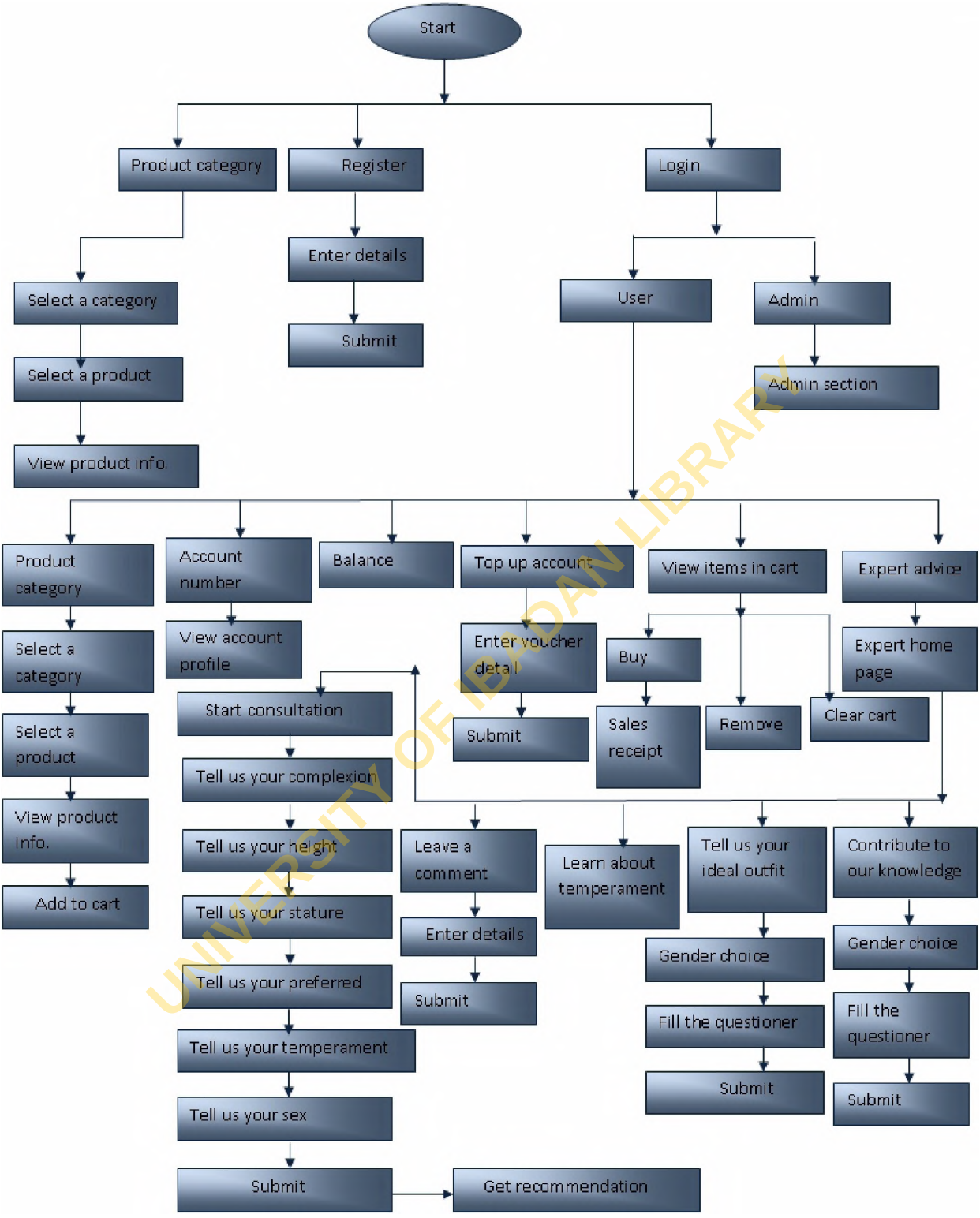
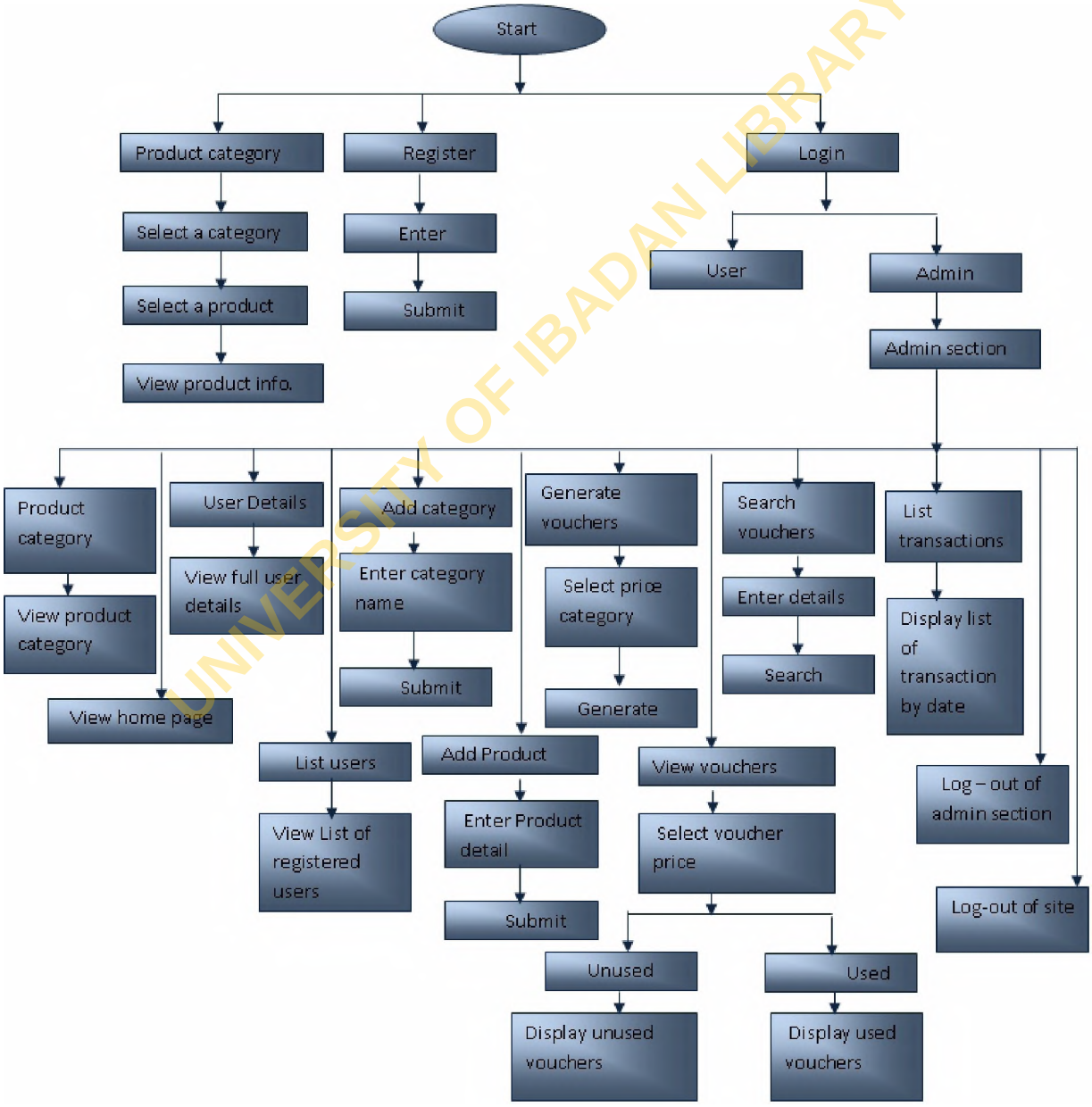


Fig. 1.2 Front end hierarchical flow

THE BACK END:-

Unlike what used to be few years from now where web applications were static and as well needed professional assistance from time to time, the proposed system has what can be referred to as the back end. The back end of any web application is a section of the application that is only made available to the company administrator alone. From here the administrator is able to manipulate (update, delete, edit) the users section, manage user response, user information, the delivery status of orders that have been paid for, automated voucher generation, and in cases of errors in the voucher pin he is able to check and fix the problem



For a customer to be able to buy or place an order, he is to purchase a voucher from any of the banks specified on the home page or any voucher distributor as would be specified on the about us page.

To be able to get to the site the user would type in the web address www.trendz.com in the web browser which will bring him to the home page. And in cases of the administrator he can either follow the same process or he can run the application from his local server.

DYNAMISM OF THE PROPOSED SYSTEM

The dynamism of the application (site) is attributed to the use of databases to store information, in an organized and easily retrievable format, such that as the forms are filled and the submit buttons are clicked it submits into the database and the site is immediately updated automatically.

DATABASE DESIGN

A database is essentially an electronic means of storing data in an organized manner. **(Denise G, et al, 2001)**

A database is a structured collection of records or data that is stored in a computer system. The structure is achieved by organizing the data according to a database model. We have three types of model, they are: Relational model, Hierarchical model and Network model. The model used for this research work is the relational model

The scripting language used for developing the database is MYSQL, and the application used in developing the database for this site is an SQL application called SQLYOG, but irrespective of this it is compactable with MYSQL server whether it is wamp, xammp or zend. It is also worthy of note that this database can also be created using any of the above mentioned SQL servers. To foster understanding of the processing, and method of organisation of the data collected by the online application some tables will be discussed.

The knowledge base table is a database that was used to store the knowledge acquired during the interview of the fashion experts. It is by the software agent to make recommendation for the customers outfit for certain occasions after a series of consultation and questioning.

DEVELOPMENTAL REQUIREMENT

Operating System. Operating system is the most important software in a computer. The strength and the weakness of OS are the merit and pitfall of the system.

HTTP-SERVER: Apache is the most widely used web-server in the Internet. The server is available for both Linux and Windows platforms. It provides support for many scripting languages through *modules*. Modules are dynamically loaded into the server as needed andprovide a more robust and

Table 1.6: knowledge table

ields	*Example*	*Data type*
d	1	Int
emperament	Sanguine	Varchar(50)
referred_look	Bright	Varchar(50)
tature	Slim	Varchar(50)
leight	Average	Varchar(50)
omplexion	Fair	Varchar(50)
own_color	Green	Varchar(50)
ength	3_quater	Varchar(50)
own_design	Plain	Varchar(50)
own_pattern	alter_neck	Varchar(50)
iletto_color	Gold	Varchar(50)
ewellery	gold&silver	Varchar(50)
urse	Gold	Varchar(50)
awl_color	Green	Varchar(50)
awl_pattern	Plain	Varchar(50)

efficient solution than CGI approach.

DBMS: MySQL was chosen for the system DBMS. MySQL is the most popular Open Source SQL-based relational database. It has two types: MySQL and MySQL MAX. MySQL MAX support transaction and is used for more critical systems, but is a little slower than MySQL. Both types are available for a variety of platforms, including Linux and Windows.

Scripting Language: PHP is an HTML-embedded scripting language, which recently has attracted a lot of attention. PHP stands for PHP: Hypertext Pre-processor. Its syntax is similar to C and support object-orientation, as well. There are PHP interpreters available for major platforms, and Apache provides a php-module for better handling of PHP requests. Because of its popularity, currently, there are many useful utilities, libraries, database connection routines and plug-in available for PHP, which makes the development process fast and easy.

WAMP: The meaning of the acronym WAMP simply means Windows Apache MySQL Php. This is a simulated server that acts like a real server, it enables web pages to be uploaded and tested. As the name states it is the combination of a DBMS (MySQL), HTTP SERVER (Apache) and a SCRIPTING LANGUAGE (php). This is used to simulate the proposed web based system.

IMPLEMENTATION, EVALUATION AND DOCUMENTATION

Implementation in this context is a stage in a

system's lifecycle which entails the hardware provision, programming and staff training. **(French C., 1996).**

There are four methods for implementation of a newly developed system, they are:-

i. Pilot implementation

ii. Direct implementation

iii. Phased implementation

iv. Parallel implementation

The option that will be adopted for the proposed systems is to perform "a parallel run". parallel implementation which entails using both the old and the new methods until the new system is clearly working smoothly.

This option is an alternative that is commonly embraced. This is because parallel run is more advantageous than all other options. It is of more benefit, in that it ensures that nothing is lost (except time and some money) if the new system develops implementation problem. If implementation develops problem or crops up, the old method or system can be used.

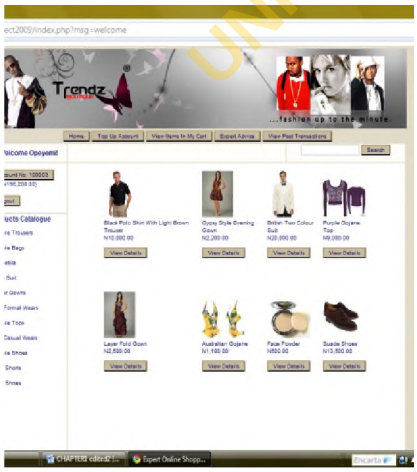


Fig1.0. home page of the e-shopping system

USER INTERFACES

Home page:- :

When the address to this site is typed in the browser this is the page that the user first of all sees, it can also be called the welcome page. Home page serves as the access point to every other aspect of the package. It has some major menu options for the users at both the horizontal and vertical sides. They are home, register, sign in, product category that enables the user view the available product category before he even decicdes to register or not, and a search form.

The home page is the first page the user sees upon entering the web address.

1.2 Registration page:-

If a new user stumbles upon the site, he is able to browse through a few pages but with restriction. In cases where he wants to buy a product it is necessary for him to register. The reason why it is inexpedient for him to register is because of the type of payment system adopted by this project. The use of vouchers. If it were possible for them to pay using credit cards then new users would have been able to buy products without registering.

Fig 1.2 Registration page of the e-shopping system

Fig 1.2 Registration page of the e-shopping system

After registration, the user is redirected to the home page where he is required to sign in. Upon sign in he is still able to browse the pages he was browsing initially but additional privileges are made available to him, such as an account is created for him, he can manage his user information, a cart is assigned him and a whole lot of privileges. During the process of login, a user level is specified and this determine the privileges made available to the user, there are two user level, the admin and the customer and this is differentiates by a user level id that is assigned upon registration.

Top up account

Since it is required for the user to be able to buy without physically having money, the user is expected to have purchased a voucher from any of the banks that the management would go into partnership with and would display their logo on the home page. If he has purchased the voucher, this is the page where he is expected to enter the voucher details and his account status is automatically upd

Fig.1.*3 Product selection and addition to cart page of the e-shopping system*

Items in the cart:-

On this page the user can view the items in his cart, and decide whether he wants to buy them immediately, he also has the privilege to delete so

Fig.1.*4 view items in the cart page of the e-shopping system*

List of past transactions:-

This page displays the list of transactions that the user has been involved in, this display is done in and organized manner by date. Also on this page the transaction receipt number is displayed, this receipt number makes it possible for the user to

Fig *1.5. Lists past transaction cart page of the e-shopping system*

Expert advice home page:-

The expert system home page is referred to as a home page because it is the first page a user sees if he wants to take recommendation from the proposed system. On this page, he is able to learn a little about himself, if he is an expert in the fashion profession, he is provided the privilege to contribute to the existing knowledge of the enterprise's system. Also provisions are made for a process of consultation after which recommendation is given to the user. He can the leave a comment or if he is not satisfied tell the agent what he thinks is ideal for him.

Fig *1.6 software agent home page of the e-shopping system*

Page viewing full user details.

On this page the administrator is able to view full user detail, all information about the user inclusive as long as they were entered during registration.

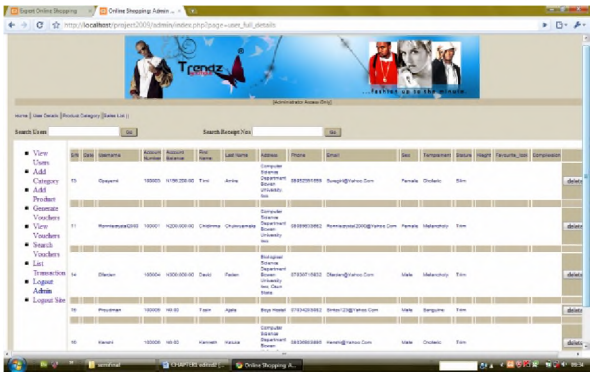


Fig 1.7. View full user detail page of the e-shopping system

This page displays a list of all registered users, new products added the e-shopping ,their account numbers, and their account information.

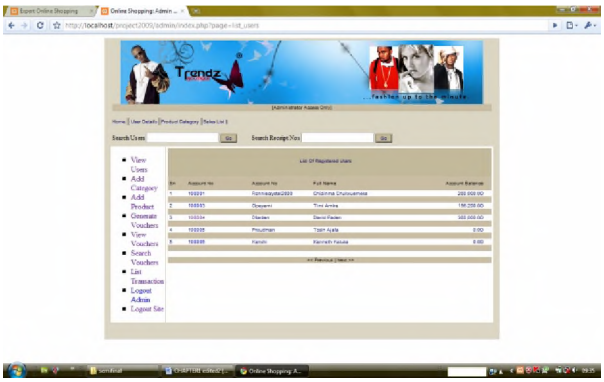


Fig *1.9. List registered user*

Fig 1.10. Add product form of the e-shopping system

List of transactions

This page lists all transactions by their date whilst

Fig 1.11. List of past transactions of the e-shopping system

View unused vouchers

Page viewing the list of generated vouchers that haven't been unused. I.e. The valid vouchers.

Fig1.12. View unused vouchers of the e-shopping system

Search Vouchers

Form to validate vouchers (search vouchers).

This is a form that can be used to verify if a voucher is valid or not in cases where a customer calls complaining of problems relating to the vouchers.

Fig .13. Search vouchers of the e-shopping

Consultation process.

This is an example of the interface during the consultation (dialog with the system). A series of questions are asked and the user is guided by the system through this process of questioning.

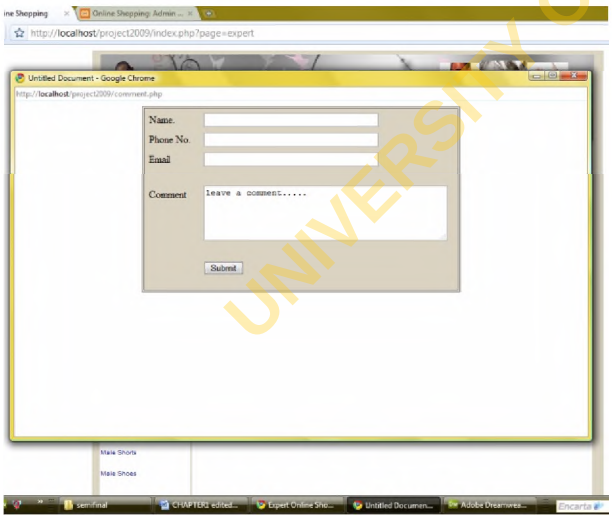


Fig 1.14 The consultation process

Fig 4.16. Leave a comment page

Form to contribute to knowledge

On the expert home page there is also provision for the user, if he/she is a professional to contribute to the existing knowledge of the software agent. A for is provided, which the professional can fill as many times as possible teaching the agent or sharing their own professional idea.

Fig.1.17. Contribute to knowledge page

SYSTEM REQUIREMENTS

System requirements refer to the accessories required by a computer system so as to enable it implement the system. The requirements for this system are both hardware and software.

HARDWARE REQUIREMENTS

The minimum hardware specifications required to operate the system includes:

i. Pentium IV or higher processor

ii. 512MB of RAM or higher

iii. At least 40GB of Hard Disk space

iv. 15”inch monitor or LCD

SOFTWARE REQUIREMENTS

Software requirement is the term used to describe

program support which help computer systems meet the needs of users in their performance. The following software's are required by the Web based shopping system for proper functioning are:

i. Operating Systems The system is compatible with both Windows XP service pack 2 and Window Vista or higher versions.

ii. Application software's

a. Antivirus software to prevent the system against viruses,

b. MySQL database server

c. XAMP application server

d. Apache 2.2 Web server

iii. Web browser This is needed to run the application software e.g.

a. Internet explorer,

b. Opera,

c. Mozilla Firefox

d. Google chrome ore/and Safari.

One of the other requirements which we often overlook is that of a conducive environment for the computer system. These include: A dust free computer room with effective power supply, stabilizers, uninterrupted power supply (UPS), and Air conditioners to help keep the temperature at the barest minimum. (Onaolapo S., 2008).

INSTALLATION GUIDE

The Web based software can be installed into systems using the following steps:

Start up the system to install the software.

Install the XAMP application server

Start the service for MySQL Database server if not already started

Create the boutique's database and manipulate the necessary data

Start the service for Apache web server if not already started

Select My Computer on the Menu bar, or on the desktop.

Select the local disk

In the local disk copy the development folder from the CD provided and place in the htdocs folder in the Apache web server root folder

Open your web browser or install if not already installed

Type in the site address mentioned above

Login as an administrator

Collect the latest data and make them available in the database by filling out the form provided on the admin section.

SYSTEM TESTING

System testing is a view of finding out whether the proposed system works according to expectation. (Akinniyi J., & Abe T., 1988).

The newly designed system was tested with a view of finding out whether it works according to expectation. This was done by preparing simple data that covers all the possible situations that might

arise and running it through the system. The correctness of the output information obtained from the test run is verified by processing the data manually. The result of the test-run and that of the manual method are then compared. The results from the two ends are the same it means that the new system is adequate. If on the other hand, there is disagreement between the two results, it means there are errors in the system.

MAINTENANCE OF THE SYSTEM

The system requires maintenance frequently which can be carried out in either of the forms: Corrective and Preventive maintenance methods. It may occur in the forms of Trouble-shooting and debugging, the former working as detecting, locating and correcting any malfunction occurring in the system and the latter has to do with the process of running, locating and removing/correcting any bugs (errors) for desired results to be obtained.

CONCLUSION AND CONTRIBUTION TO KNOWLEDGE

At the end of this research, it's highly clarified that online shopping is faster, cheaper, easier and better to get potential customers on the internet. Since information technology is widely accepted in the world today, it immensely necessary that e-shopping is adopted into all aspect of business to consumer transactions especially businesses that involve the consumers day to day need. Through the application of computers and information technology infrastructures in the boutique's services, there would be speedy recovery or retrieval of information. The boutique's staffs can access customers and suppliers records, sales and stock from anywhere around the globe and business is still transacted fine. It is necessary to note that computer science and information technology is dynamic and plays a vital role in all disciplines and so should be regarded as a partner in progress. The implementation of the web-based shopping system will greatly enhance the system of buying things because it will move transactions from the market space to the cyber space and would immensely improve the efficiency of many business entities.

This work would contribute to the existing knowledge by proving alternative means of carrying out their transaction ensuring flexibility, customer satisfaction and ease of business for the management of the business. Also one important contribution is the recommendation system that the is contained in the proposed system, it makes it possible for the business and the customer to interact on professional basis with being physically presented or being at a stable location.

BENEFITS OF THE PROPOSED SYSTEM

The benefits of the proposed system are itemized below:

i. The improved customer service with a decrease

in time customers spend in the boutique when purchasing items.

ii. System flexibility as the boutique staffs do not have to be physically present before transaction can be

carried out.

iii. The effective management and proper job scheduling

iv. Reduction in the amount of stationery used in running a manual system.

v. Significantly improved return on investment.

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