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Optimized Web-based Online Food Ordering System: Design and Implementation

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Abstract

Online food ordering systems have undergone a profound metamorphosis with the advent of digital technologies, catalyzing a pivotal shift in the operational dynamics of the gastronomic sector. This paper elucidates the conceptualization, design, and implementation of an advanced, web-based food ordering system, meticulously engineered to elevate the efficiency and sophistication of food service operations. Employing the rigorously structured Systems Analysis and Design Methodology (SSADM), this system represents a transformative departure from traditional, paper-based methodologies, integrating a robust digital architecture. The system's foundational infrastructure incorporates WAMP Server, an integrated suite comprising Apache, MySQL, and PHP, complemented by HTML, to establish an optimized, user-centric platform. This application endows both consumers and restaurant administrators with an extensive array of functionalities, including seamless online food ordering, efficient delivery management, comprehensive customer information management, dynamic menu information management, and sophisticated administrative reporting. By leveraging this innovative system, restaurants can significantly enhance operational efficiency, mitigate the limitations inherent in manual processes, and afford customers unparalleled convenience in placing orders from any geographic location. The implementation of this system is projected to result in substantial enhancements in service delivery and overall business performance. Rigorous testing within a controlled environment has substantiated the system's efficacy in achieving these objectives, underscoring its potential as a transformative instrument for contemporary food service enterprises. This study highlights the imperative for the gastronomic industry to embrace cutting-edge technological solutions to meet the evolving demands of modern food service operations.

Keywords: Online food ordering system, web based platform, user interface design, system implementation, restaurant e-commerce, SSADM.

INTRODUCTION

In the digital age, online food ordering has emerged as a vital service, enabling customers to conveniently order meals from local restaurants or food cooperatives via web pages or applications. Much like e-commerce platforms for consumer goods, these systems often allow users to create accounts, streamlining the process for frequent orders. Customers typically search for their preferred restaurant, filter options by cuisine type, select available menu items, and choose their preferred delivery methods. Payment is primarily processed through credit cards, with a portion of the transaction fees often returned to the online food ordering platform.

Online food ordering systems represent one of the most recent advancements in internet-based services, widely adopted by fast food establishments across the Western world. This method, facilitated by electronic payment systems, enables food to be ordered online and delivered

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directly to the customer. While credit card payments are standard, some systems accommodate alternative payment options, either before or after the order is placed.

The proliferation of internet usage and related technologies has opened up numerous opportunities for businesses to transition online, benefiting from the internet's inherent convenience and flexibility. Among these innovations is the online menu ordering system, which has transformed the modern restaurant and takeout industry. Many restaurants have shifted their focus from providing a rich dining experience to prioritizing rapid preparation and swift delivery of orders. Historically, most delivery orders were placed via telephone, but this method has several drawbacks, including the need for constant staffing, the necessity for trained personnel with excellent communication skills, and the potential for miscommunication or negative customer experiences due to human error.

This study presents a robust online menu ordering system, specifically designed for KFC Restaurant in Enugu, Nigeria, though applicable across the broader food delivery industry. The system's primary advantage lies in its flexibility, significantly simplifying the ordering process for both customers and restaurants. By automating the order-taking process, the system reduces the operational burden on restaurant staff. When an order is placed on the custom-designed webpage, it is automatically saved in a database and quickly accessed by a desktop application at the restaurant's end. This application displays all order details, including menu selections and delivery instructions, in a clear and concise format. Consequently, restaurant employees can efficiently process orders, minimizing delays and errors. The flexibility and efficiency of this system represent its most significant advantages, offering a seamless and streamlined experience for all parties involved.

RELATED WORKS

Corporate franchises like Domino's and Papa John's were among the first to introduce online food ordering services, followed closely by other pizza chains like Pizza Hut [1]. E-commerce provides significant convenience to buyers, allowing them to visit multiple vendor websites at any time, day or night, to compare prices and make purchases without leaving their homes or offices. The advent of net-based service ordering systems has revolutionized the food industry, where restaurants enter into contracts with online food ordering platforms that manage orders across regional or national areas [1].

Gan (2000) proposed the development of an online fast food restaurant ordering system that enables customers to place orders anytime and anywhere [2]. This system not only streamlines order management but also serves as a platform for advertising promotions. It allows kitchen staff to access order information efficiently, enables management to oversee raw material inventory, and provides tools for staff to search customer delivery and profile data. By addressing queue issues during peak hours, expediting food preparation, and accommodating larger customer volumes, this system has the potential to significantly increase market share and return on investment for fast food restaurants.

In Canterbury, England, a restaurant named Bytes successfully distinguished itself from competitors by implementing an online self-service ordering and payment system [3]. Customers place orders via touch screens, with the orders directly routed to the bar or kitchen. The system also offers games for customers post-order and plans to provide internet access in the future. By reducing the need for wait staff, the system streamlines operations and includes a database that tracks customer preferences, generates management reports, performs analyses, and allows for instant menu updates.

Bhatnagar (2006) noted that the introduction of kiosks and computerized tabletop ordering screens will drive the restaurant industry to evolve from quick service to self-service models [4]. Kiosks and internet platforms provide customers with recipe information, take orders, and process payments via credit or debit cards. This innovation minimizes order errors, reduces queues, and reallocates staff to focus on speeding up delivery orders. Additionally, tabletop touch screen systems offer a comprehensive service by handling customer orders, fulfilling other requests such as drink refills,

summoning a wait staff, and processing payments.

According to Ahmad, et al (2023), most Americans dislike waiting for their orders, leading to a preference for self-service technologies like text messaging, internet platforms, and kiosks [5]. These technologies are favored for their speed and convenience, reducing the risk of miscommunication and enhancing the overall customer experience. Self-activated terminals, in particular, are poised to become a cornerstone of ordering innovation in the future.

Jared Shimoff (2015) developed NetWaiter, an online ordering software for restaurants, offering a comprehensive suite of features, including billing, email marketing, and various integrations [6].

Effectively designed self-service ordering systems empower customers to manage the speed of their transactions while also offering the option to minimize personal interaction, should they prefer [7-10]. Generally, this enhanced level of control has been associated with increased customer satisfaction and a higher likelihood of continued use or recommendations of the service [11]. Keep in mind, however, that this level of control may not appeal to all customers, especially those who prefer personal interaction. When developing a self-service system, it is crucial to prioritize customer control, as users will likely interact with the system independently, without the assistance of an employee [12].

METHODOLOGY

Methodology refers to the systematic and theoretical examination of the methods employed within a specific field of study. It is the study or descriptions of methods [13]. Methodology encompasses the theoretical foundation of methods and principles associated with a particular branch of knowledge. It serves as a framework to structure, plan, and manage the development process of an information system. The term often refers to a specific set of steps or procedures guiding the analysis and design of a project. Methodology refers to the methods, techniques, and procedures used to collect and analyze information. It encompasses the study of the principles, rules, and assumptions applied by a discipline, as well as the systematic examination of the methods that are, can be, or have been employed within that field [14].

Types of Methodologies.

1. Object-Oriented Analysis and Design Methodology (OOADM)
2. Prototyping
3. Expert system
4. Structured system analysis and design methodology (SSADM)
    1. *Object-Oriented Analysis and Design Methodology (OOADM):* OOADM, developed from Michael Gora's work in Database Management Systems (DBMS), is a methodology used to analyze problem requirements, design a solution, and implement it through a programming language or database. Two popular types of OOADM are the Object Modeling Technique (OMT) and the Unified Modeling Language (UML).
    2. *Prototyping:* Prototyping involves creating an incomplete version of the software to be developed. The primary purpose of a prototype is to allow users to evaluate design proposals for the final product by interacting with them directly.
    3. *Expert Systems:* An expert system is a knowledge-based information system designed to provide expert advice to end users by leveraging its specialized knowledge in a particular, complex field.
    4. *Structured Systems Analysis and Design Methodology (SSADM):* SSADM is a thorough framework that directs the analysis and design of computer systems. It employs key tools such as Logical Data Modeling, Data Flow Modeling, and Entity Behavior Modeling.

Methodology Adopted

This study uses the Structured Systems Analysis and Design Methodology (SSADM) as its methodological approach. It was used because: It involves well defined techniques and documentation. It also engages system users in the process. SSADM takes a systematic approach to analyzing and

designing information systems. As a waterfall method, it provides a structured framework for developing the design of an information system. SSADM starts with a definition of problem, followed by feasibility studies. An analysis of the present system is performed before the design of the new system. The analysis consists of investigation of the present system, definition of the new system and establishment of constraints. The methodology is completed with the deployment and upkeep of the new system. It breaks down an application development project into modules, stages, steps, and tasks, offering a structured framework for managing and describing the project effectively. Its objectives are to:

1. Improve project management and control
2. Maximize the capabilities of both experienced and inexperienced development staff.
3. Develop higher-quality systems.

The methodology addresses various phases of the system life cycle, starting from the feasibility study and extending to the creation of a physical design. It follows a waterfall approach to system development, where each step sequentially leads to the next.

The process methodology of SSADM includes the following:

1. Problem identification
2. Feasibility studies
3. System analysis
4. Design phase
5. Implementation phase

Data Collection

Data collection was performed in two stages.

In stage 1, an interview was set out between me and the restaurant effectively introducing and endorsing the research program and specifying an appointment (date and time). In stage 2, I observed existing systems and their mode of operations. Face to face data collection also provided secondary benefits because:

1. Interviewers could respond to an interviewee's questions, and.
2. By contributing to a consistent understanding of the questions and answers, reduced the possibility of miscoding responses. This data collection approach ensured both higher quality data and an improved survey completion rate.

The techniques employed during the course of the project include:

1. Interview method
2. Observatory method
    1. *Interview Method:* This method seeks to collect factual information and opinions from those involved in operating the system. It entails conducting verbal interviews with people at various organizational levels and recording their responses. During these interviews, questions may include inquiries about the types of record systems used and the nature of customer interactions with the restaurants.
    2. *Observatory Method:* This approach involves the investigator directly observing how individuals within the restaurants or organization manage documents and adheres to various practices and procedures under different conditions.

Characteristics of Population

The population size is 15 and the characteristics of the population are:

The Administrator: This is the person responsible for the upkeep, configuration and reliable operation of the Online Food Ordering System website. He assigns food vendors and clients log in privileges and security upgrade of the website.

The Food Vendor: This is the middlemen food retailers who patronize the food website with the purpose of selling and advertising their goods and services to the intending customer or clients. The food vendors (restaurants) are the primary reason for the design and implementation of the site.

The Clients: These are the end consumers of the website; they patronize the food vendors directly through the help of the site. They are very important while the conception and implementation stage of the online food ordering website is being carried out.

Sampling Design and Procedure

According to Nworuh (2001), a sample is a subset of a population. The procedures for drawing samples in population are known as Sampling [15].

The sample size used was 15.

System Analysis Procedures

This study uses the Structured Systems Analysis and Design Methodology (SSADM) for its analysis. It was used because: It involves well defined techniques and documentation." It also includes user participation in the process. SSADM takes a systematic approach to analyzing and designing information systems, using a waterfall model to develop the system's design." SSADM starts with a definition of problem, followed by feasibility studies. An analysis of the present system is performed before the design of the new system. The analysis consists of investigation of the present system, definition of the new system and establishment of constraints. The implementation and maintenance of the new system complete the methodology. This approach breaks down an application development project into modules, stages, steps, and tasks, offering a framework that facilitates effective project management and description. Its objectives are to:

1. Improve project management and control.
2. Optimize the utilization of both experienced and novice development staff.
3. Enhance the quality of systems.

The methodology addresses various stages of the system life cycle, from the feasibility study through to the creation of a physical design. It employs a waterfall approach to systems development, characterized by a sequence of steps where each step leads to the subsequent one." The process methodology of SSADM includes the following:

1. Problem identification
2. Feasibility studies
3. System analysis
4. Design phase
5. Implementation phase
    1. *Problem Identification:* This involves knowing the problems the present system is facing like manual record of daily sales, inability of customers to order online etc.
    2. *Feasibility Studies:* A feasibility study assesses a proposal to determine the challenges and viability of executing a specific task. After evaluating the present system, I discovered that although they have some level of accuracy but time wastage is inevitable. To this end, the online sales application software will be used to handle some flaws of the present system. The following are types of feasibility study that were carried out:
        - *Technical Feasibility:* Technical feasibility examines the current manual systems used by hotels and restaurants, such as paper-based processes, and evaluates how well they support the proposed new system. For example, if the current manual system is operating at 40 percent capacity, then will running computers increase the capacity? If the answer is 'No' then the project is judged not feasible and if 'Yes', it is judge feasible. In this project, meticulous care has been taken to ensure technical feasibility. The use of a key allows for rapid text and object display. Additionally, the tools, operating system, and

programming language utilized are compatible with existing systems and can operate across almost all operating systems.

- *Economic Feasibility:* A system is considered economically feasible if its anticipated benefits are equal to or greater than its expected costs. This project is economically feasible because the benefits outweigh the cost of carrying out the project.
- *Legal Feasibility:* This involves examining contracts, liability issues, violations, and other legal aspects that may be unfamiliar to the technical staff. This project is legally feasible because it has met all the legal requirements.
- *Operational Feasibility:* The question of who will operate the system arises here and is the available manpower equipped with the necessary skill to use the new system. Operational feasibility examines whether the system will be used after development and implementation and considers how user resistance might affect the application's potential benefits. Key questions for evaluating operational feasibility include:
  1. Is there management support for the project?
  2. Are users dissatisfied with current business practices, and will the new system significantly reduce operational time? If so, users are more likely to embrace the change.
  3. Have users participated in the planning and development phases of the project? Early involvement helps minimize resistance to the new system.
  4. Will the proposed system benefit the organization overall? Will it improve the responsiveness and accessibility of information? Will it have a significant impact on customers?

This project is operationally feasible because the staff will undergo training on how to use the new system and users will welcome the new system.

3. *System Analysis:* Analyzing the complete description of the manual or existing system, along with the objectives of the proposed system, typically results in a comprehensive specification of the standard requirements. Requirement determination is the first step in developing a reliable system if carried out perfectly. This also involves the analysis of all the steps in an operation in other to decide how or find out how it works. To be able to make a good design, the present system must be evaluated to find out what weaknesses are to be amended to produce a viable and reliable new system. Below are the system analyses, which include:
   i. System investigation
   ii. Analysis of the present system
   iii. Weakness of the present system
   iv. Expectations of the new system
   i. *System Investigation:* A system is a combination of inter-related elements. It is a collection of interconnected components or elements that collaborate to achieve a shared goal or objective. The system investigation is concerned with the study and understanding the underlying principles of the existing system and noting the basic information requirements of the present system.

      This involves the analysis of all the steps in an operation in order to decide how to find out how it works. To be able to make a good design, the present system must be evaluated to find out what weaknesses are to be amended to produce a viable and reliable new system. To discover all the weaknesses, some questions would have to be asked: Are there bottlenecks that could be removed or improved upon, what does the data flow look like? Is the organization's way of recording data efficient; without redundancy? Can customers place orders for goods and services online? System investment is the detailed examination of the present system. The comprehensive study carried out on the existing system is to enable one arrive at relevant facts that would be helpful in the design of the new system. The techniques employed during the course of the project include:

1. Interview method
2. Observation method
    1. *Interview Method:* This aims at obtaining facts and opinions from those who are concerned with the operation of the system. It involves conducting verbal interviews with individuals at different levels of the organization and documenting their responses. During the course of interviews, questions regarding the type of record system used, and the customers' relationships with the restaurants were also asked.
    2. *Observation Method:* This involves the system investigator directly observing how individuals in the restaurants or organization manage documents and adheres to various practices and procedures under different conditions.

ii. *Analysis of the Present System:* In the process of examining or diagnosing the existing system of the restaurants, the strength and weaknesses of the system in meeting the customers and management requirements were identified.

iii. *Weaknesses of the Present System:* The analysis of the interview questions by the system analyst revealed that the existing system posed many problems to the organization. The problems include:
1. The system could not do automatic sales processing. This could lead to wrong data processing especially when the sales person is in a haste to serve waiting customers.
2. The system does not give quick access to information pertaining to sales transaction, especially as regards to preparing the sales report for the day's business.
3. Excessive manual effort: Virtually all the activities of the sales persons during and after the day's activities are usually done manually.
4. Delay in sales data processing in the sales department.
5. Manual preparation of sales report which at times result in error.
6. Difficulty in recording total sales for the day's business.
7. Difficulty in tracking number of customers.
8. The system could not give access to online services.

iv: *Expectations of the New System:* Having acquired a clear understanding of all the important business aspect under the current system, and all the factors that contributed to its failure, to meet the system requirements as the hotels and restaurants keep growing both in size and capacity, the need for faster, more accurate and more reliable information system becomes vital. Reviewing the methods and procedure with a computer system, it will be noted that the problems will be solved totally with the computer based information system. Hence, the online sales application software or sales automating software system will be used to help alleviate the problems facing the management and the sales department in the bid to track down sales activities in order to control production, attend to waiting customers as fast as possible and to maintain a very fast and efficient information system for the sales division.

4. *Design Phase:* A system consists of a set of interrelated or independent components that work together to form a cohesive entity, aimed at accomplishing a particular objective.

Design phase involves the process of designing the input/output and processing steps to meet the user's requirements; identified in the system analysis. The redesign of the existing system is mainly the introduction of computer in the sales department of a typical restaurants which includes designing of a website for the restaurants that customers can access and send request/make order to the restaurants, and the restaurants sales representative on the other hand can login to view the number of customers they have and those that have ordered online as well as record daily sales.

4. Implementation Phase: This phase is centered on the system's operation and maintenance.

Performance Indicator for Existing System:

1. *Time:* The time taken to search and locate files contained in the file cabinet and retrieve records needed to generate reports is usually lengthy and takes hours, to accomplish.

2. *Speed:* The time taken for report retrieval can equally reduce the speed of report production required for quick management action.
3. *File security:* This should be the major, objective of the existing system but unfortunately, the manual file kept in file cabinets make it more vulnerable to information theft by mischievous fellow or spy.
4. *Lack of back up:* There is tally the absence of backup storage for the various employer file and other human resources files in the vent of loss to backing of file outbreaks.
5. *Reliability:* Due to the lack of automation in the restaurant and considering the fatigue which sets in, when large volume of work is involved most data and reports from Human Resources department are not reliable. This is evidenced by error in calculation of overtime pay for workers.

Performance Indicator for the Proposed System

The analysis of the current company system clearly indicates that the introduction of a new automated system is essential for achieving an efficient, effective, and well-structured Management Information System (MIS) within the company. This proposed system is designed to address and resolve the issues present in the existing system. The rationale for implementing the new system includes the following:

1. *Time:* In the existing system, the time taken to search and locate files contained in file cabinet and retrieve records needed to generate reports is usually lengthy and take hours, to accomplish but in the new system, there is fast retrieval of files and also It provides with timely processing of employee's information.
2. *Speed:* The time taken in taken in report retrieval can equally reduce the speed of report production required for quick management action in the existing system. Whereas in this new system, the computer base MIS has been developed with features that support the preparation of schedule reports for Management decision making with an increased speed.
3. *File Security:* In this new system, the online ordering System will make use of a password to add some level of security to the system. Transactions are also secured.
4. *Back up:* In this new system, there is a secured storage back up facility that protects the file against fire outbreak and accidental deletion of such files.
5. *Reliability:* Here, the online food ordering system produces accurate result in form of output on which mangers can base their decisions and also to allow for quick and accurate data entry and extraction of a variety of report.
6. *Cost:* the online food ordering system helps to cut down purchase of paper in circulation within the restaurant.

Data Presentation and System Analysis

Challenges in the Current System

Several deficiencies have been identified in the existing system. The shortcomings are the reasons for the proposed system. And they are listed below in Table 1 and Figure 1.

1. The existing system is prone to human error.
2. The existing system is slow as 15 staffs cannot respond to over 300 orders like the speed of a computer.
3. The existing system encourages the use of papers.
4. There is poor record keeping (inventory management).
5. There is no marketing or advertisement plan in the current system.
6. Customer satisfaction is quite minimal in this system.

Table 1. Showing manual method of recording daily sales in the present system.

S/N	Type of product/services	Amount
1	A plate of rice	₦1000
2	A bottle of soft drink	₦200
3	A plate of spaghetti	₦700
4	Pizza	₦2500

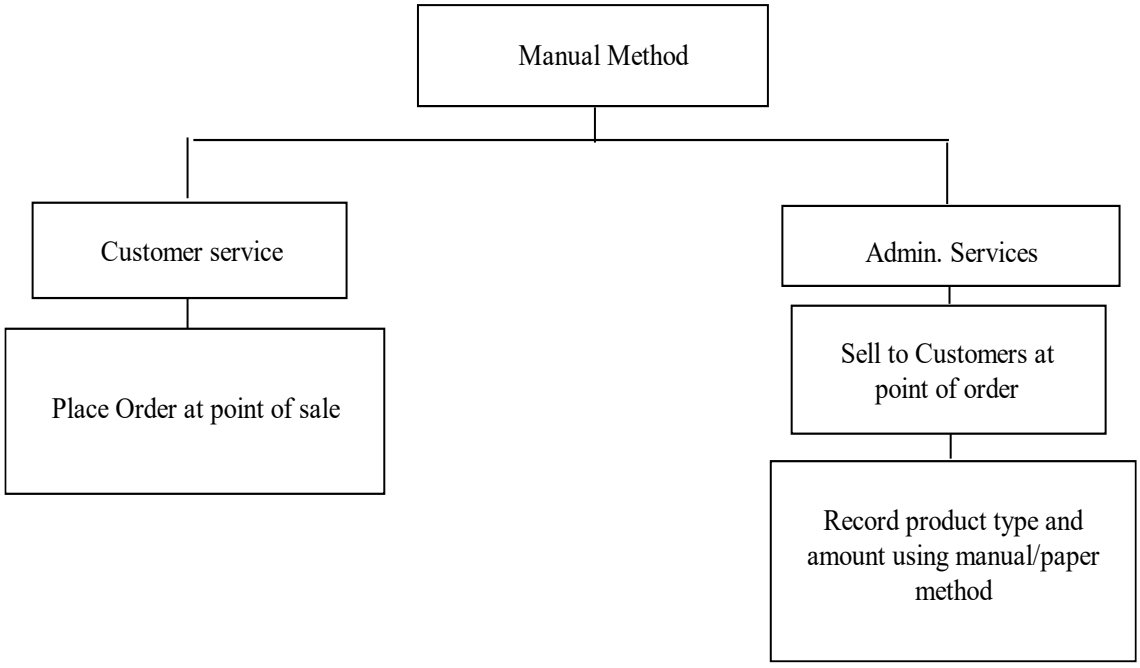

Figure 1. Model of the Present System.

Advantages of the Proposed System

The proposed system provides the following advantages:

1. Error elimination, as the system is fully automated.
2. The proposed system will provide proper inventory management.
3. The system will generate reports for management that will help in decision making.
4. The system will improve the fast foods market as search engine optimization will be fully implemented.
5. The system will help in securing customers' loyalty as it boasts of quality website design and a secure payment system.
6. The system will alleviate the need to visit a physical store for food.
7. The system will help improve the market as it can service many people from different geographical zones and.
8. The system encourages expansion.

System Design

A system comprises a set of interrelated or independent components that interact to form a cohesive unit, designed to accomplish a specific task.

System design involves the process of designing the input/output and processing steps to meet the user's requirements; identified in the system analysis. The redesign of the existing system is mainly the introduction of computer in the sales department of a typical restaurants which includes designing of a website for the restaurants that customers can access and send request/make order to the restaurants, and the restaurants sales representative on the other hand can login to view the number of customers they have and those that have ordered online as well as record daily sales.

Logical System Design

This is the employment of an algorithms, flowchart, Data flow diagrams, high level models, Use case diagrams and database definitions in the approach for the development of a solution to a problem, producing tested programs to meet given specifications. The logical system design identifies all software modules, defines their interrelationships, and outlines program statements and coding as shown in Figure 2.

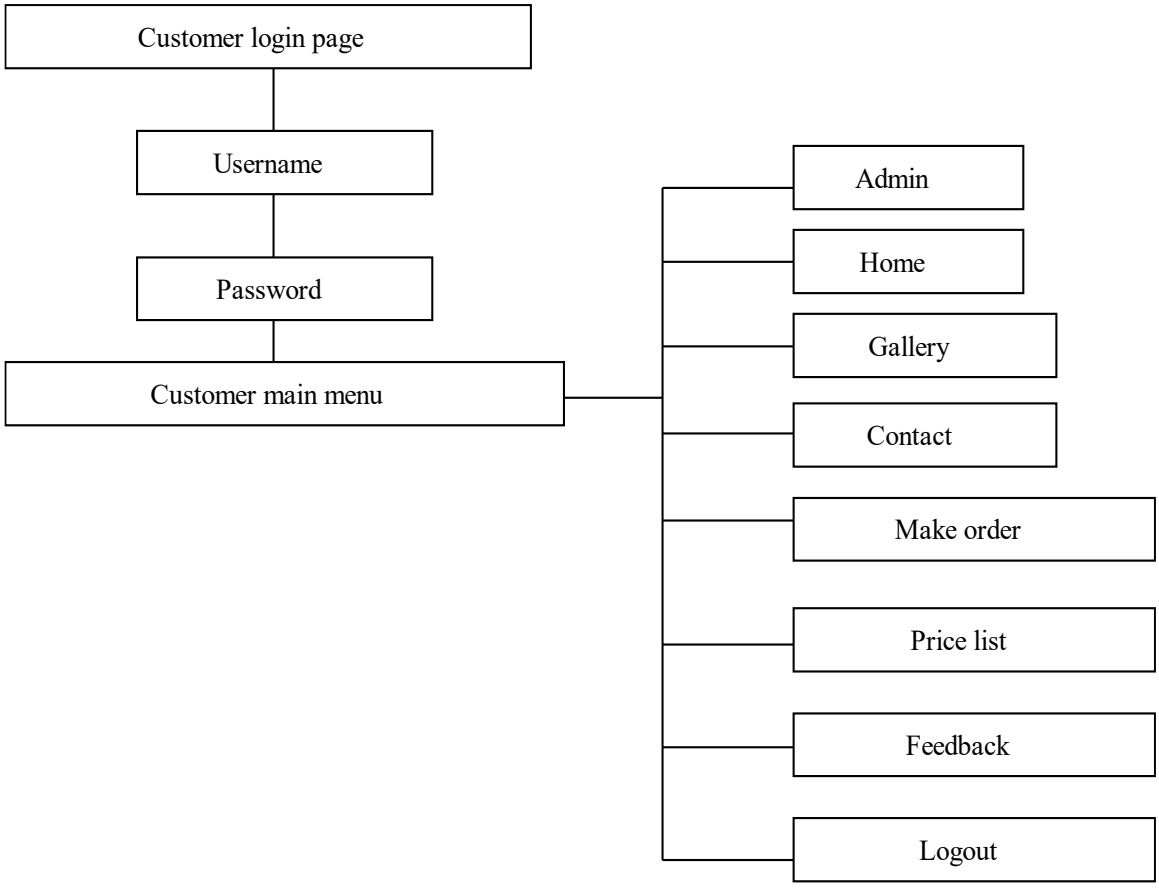

Figure 2. Structure of the Online Sales Application Software.

Database Specification

The database was designed using MySQL (My Structured Query Language), a relational database management system (RDBMS) that operates as a server, enabling multi-user access to multiple databases. In MySQL, data is organized into database objects called tables, which consist of columns and rows to store related data entries. Databases are particularly effective for storing information in a structured, categorical manner, often containing one or more tables. Each table is designated by a unique name (e.g., "customers" or "orders") and contains records (rows) with relevant data. The database organizes and manages information to generate the necessary reports to support the web application, utilizing a relational structure where common fields link different tables of data as shown in Table (2,3,4,5) and Figures (3,4,5).

Table 2. Admin login.

S/N	Field	Type	Description
1	I.D	Int (5)	Primary key for admin identification
2	Username	Varchar (20)	Username of the administrator
3	Password	Varchar (20)	Password of the administrator

Table 3. Feedback.

S/N	Field	Type	Description
1	FID	Int (11)	Primary key for feedback identification
2	Full name	Varchar (30)	Full name of the customer
3	Email	Varchar (50)	Email address of the customer
4	Comment	Text	Customer’s comment

Table 4. Make Order.

S/N	Field	Type	Description
1	I.D	Int (5)	Primary key for customer identification
2	Full name	Varchar (50)	Full name of the customer
3	Phone	Varchar (50)	Phone number of the customer
4	Address	Varchar (200)	Address of the customer
5	Service	Varchar (50)	service type whether indoor/outdoor
6	Items	Varchar (300)	Products type the customers want
7	Price	Int (10)	The amount of the product
8	Quantity	Int (10)	The number of the product the customer want
9	Total amount	Int (10)	The total amount
10	Time	Time stamp	Time the order was made

Table 5. Register.

S/N	Field	Type	Description
1	R.I.D	Int (11)	Primary key for admin identification
2	Email	Varchar (50)	Email address of the customer
3	Full name	Varchar (30)	Full name of the customer
4	Address	Varchar (50)	Address of the customer
5	Phone number	Varchar (30)	Customer's phone number
6	User name	Varchar (30)	Customer's username
7	Password	Varchar (30)	Customer's Password
8	Time	Time stamp	Time the customer registered

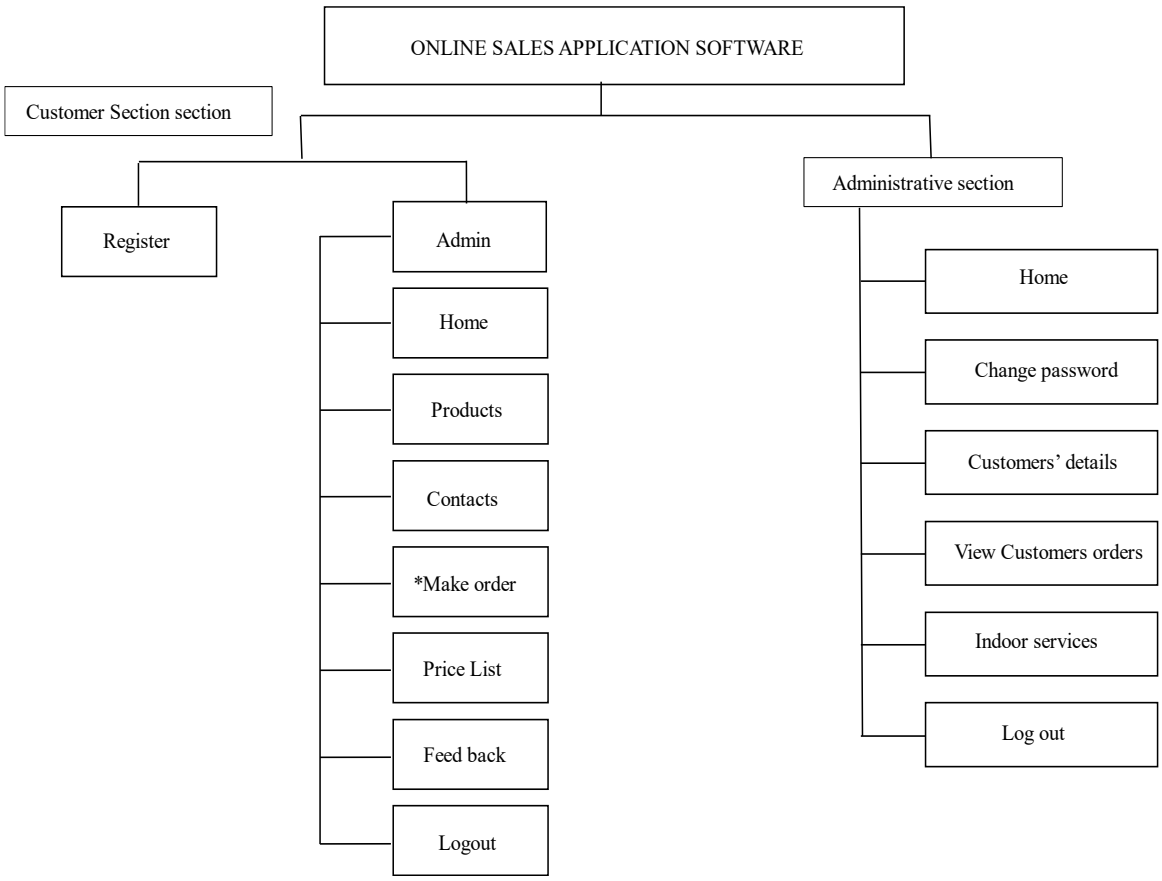

Figure 3. High Level Model of the proposed system.

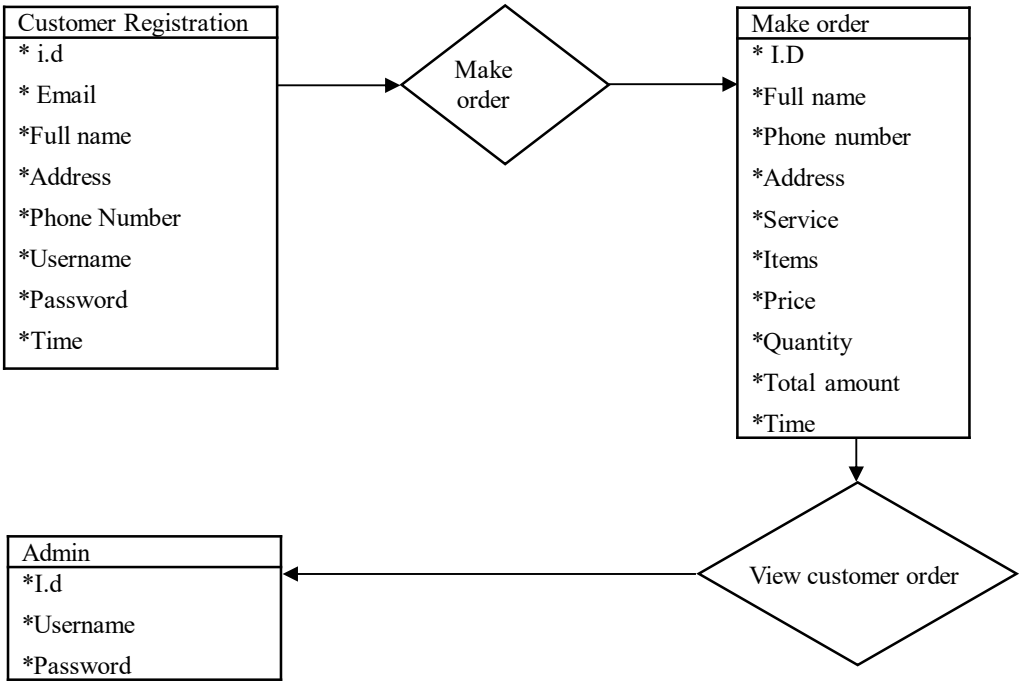

Figure 4. Entity-Relationship Diagram of the Proposed Database.

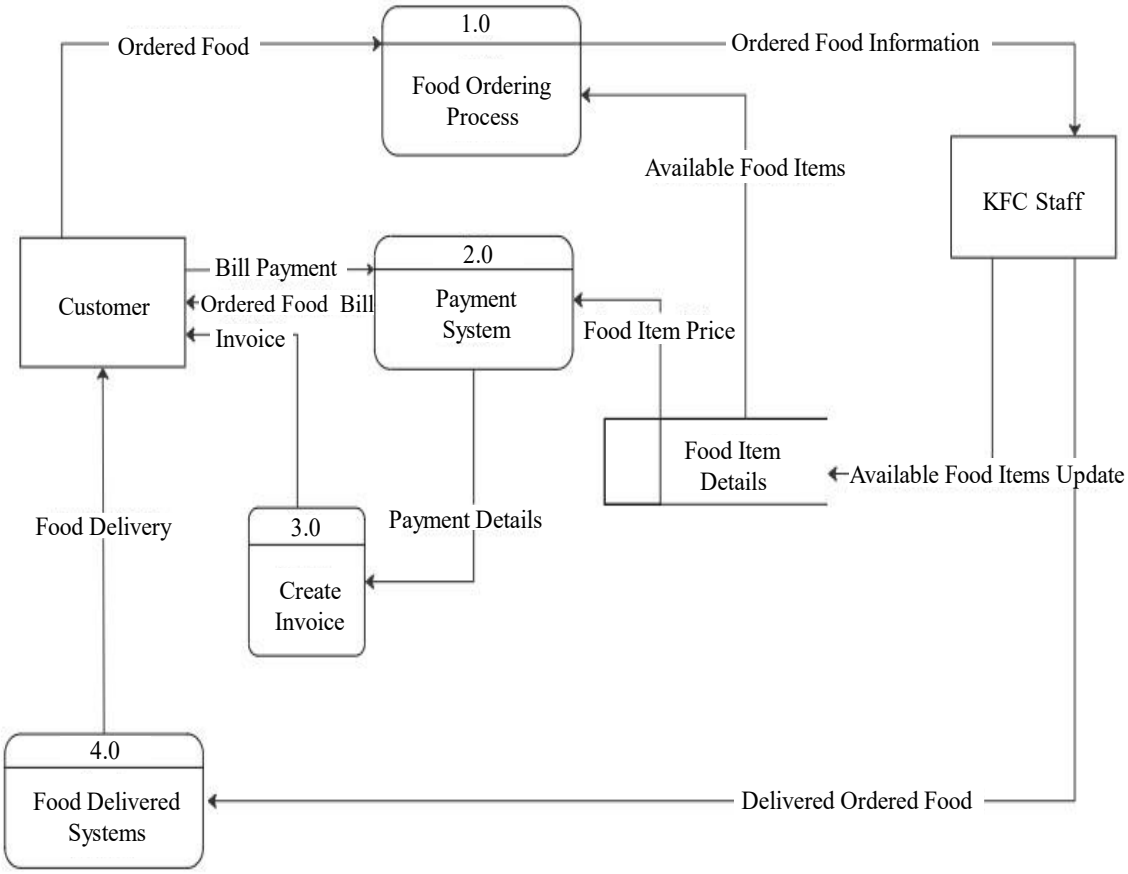

Figure 5. Data flow diagram of the proposed system.

Program Module Flowchart: The program module flowcharts of the design are listed below in Figure 6:

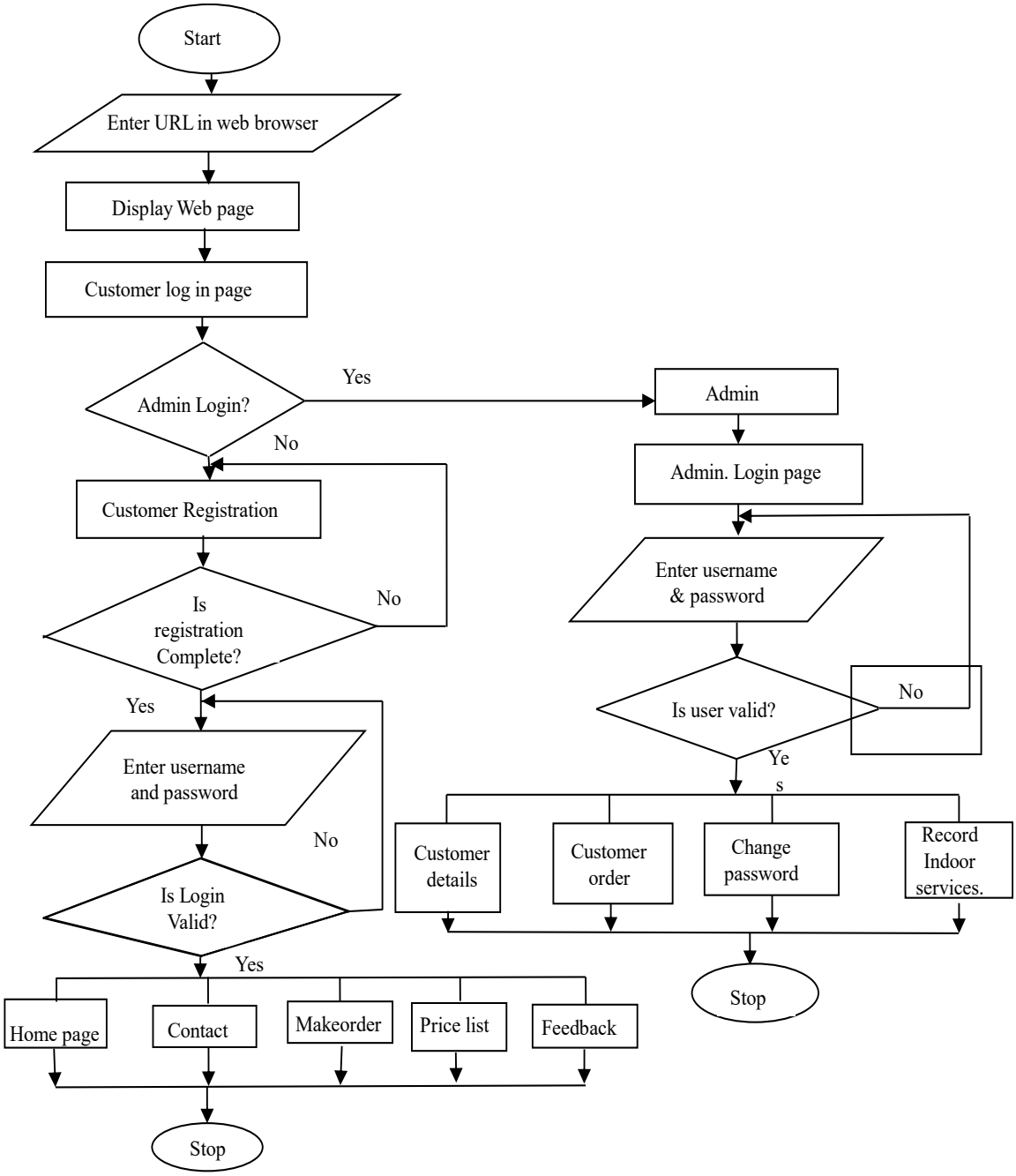

Figure 6. Flowchart of the online sales application software.

Customer Registration Module: Enables new customers to create accounts by providing their details for streamlined access to services and features as shown in Figure 7.

Customer Login Module: Secure and personalized access for customers to manage accounts and track orders (Figure 8).

Make Order by Customer Module: Facilitates seamless order creation and management within the Customer Module for an enhanced shopping experience (Figure 9).

Customer Feedback Module: Enhance user experience by collecting, managing, and analyzing customer feedback efficiently (Figure 10).

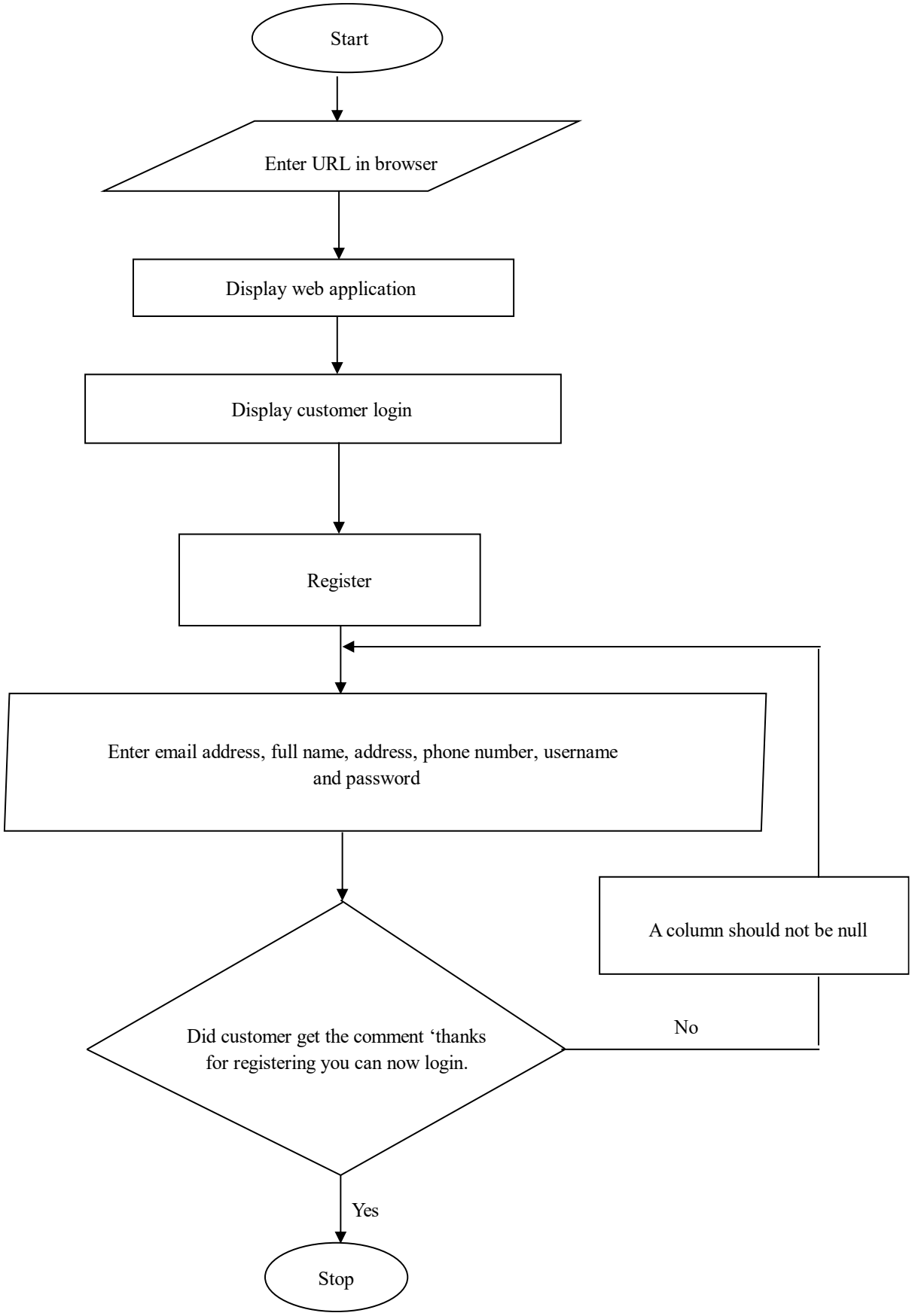

Figure 7. Flowchart of Customer Registration.

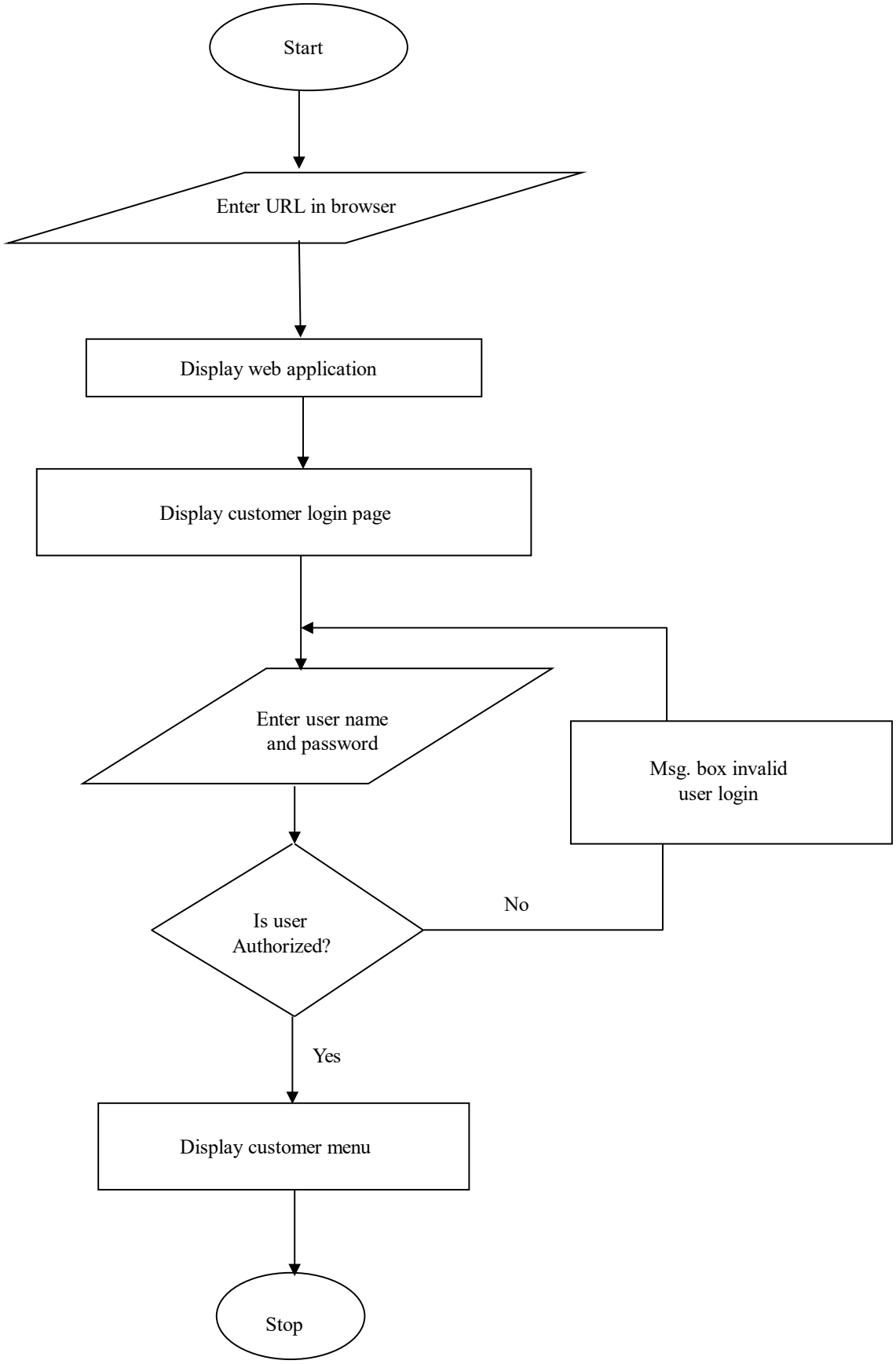

Figure 8. Flowchart of Customer login.

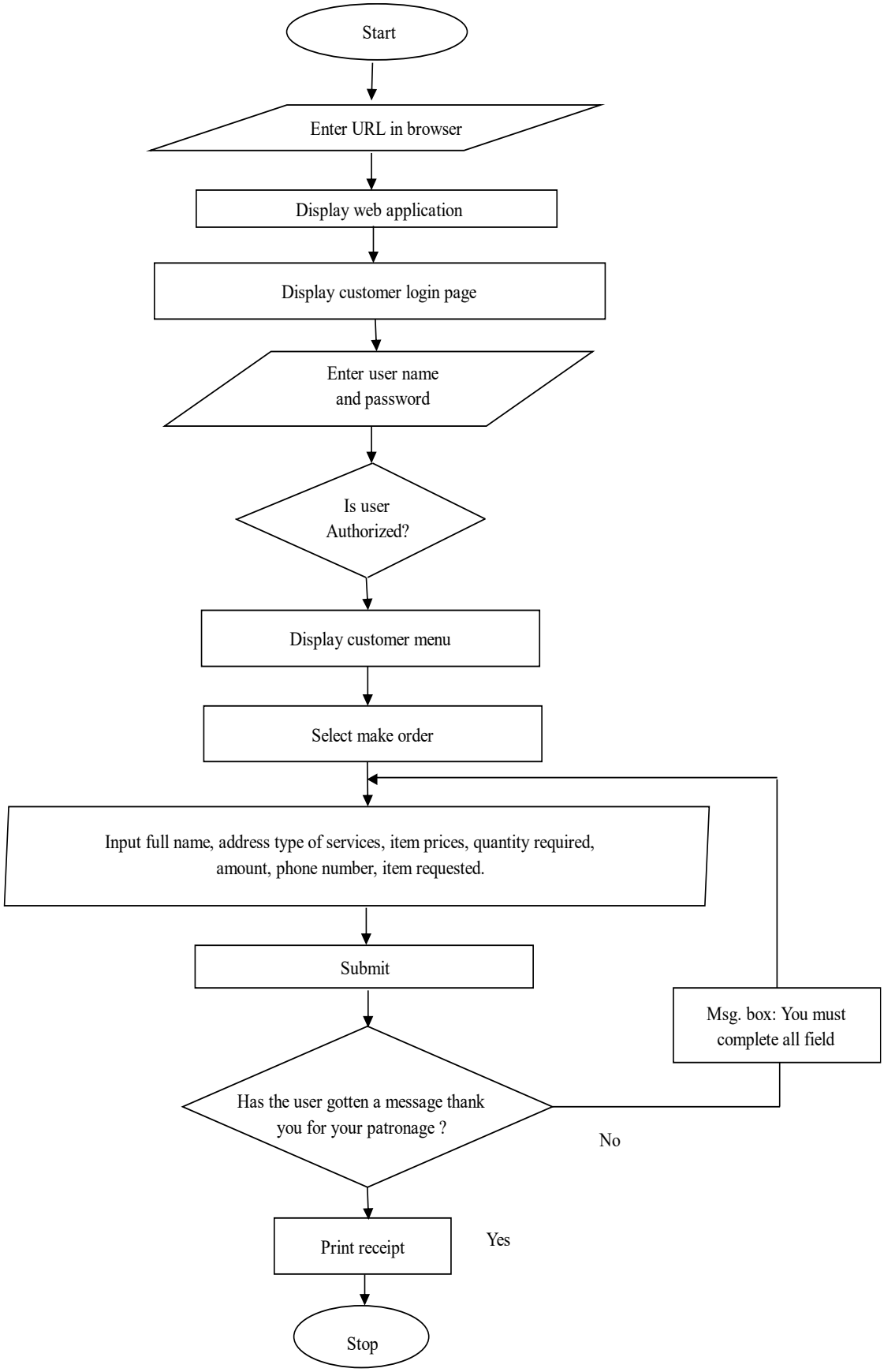

Figure 9. Flowchart of make order by Customer.

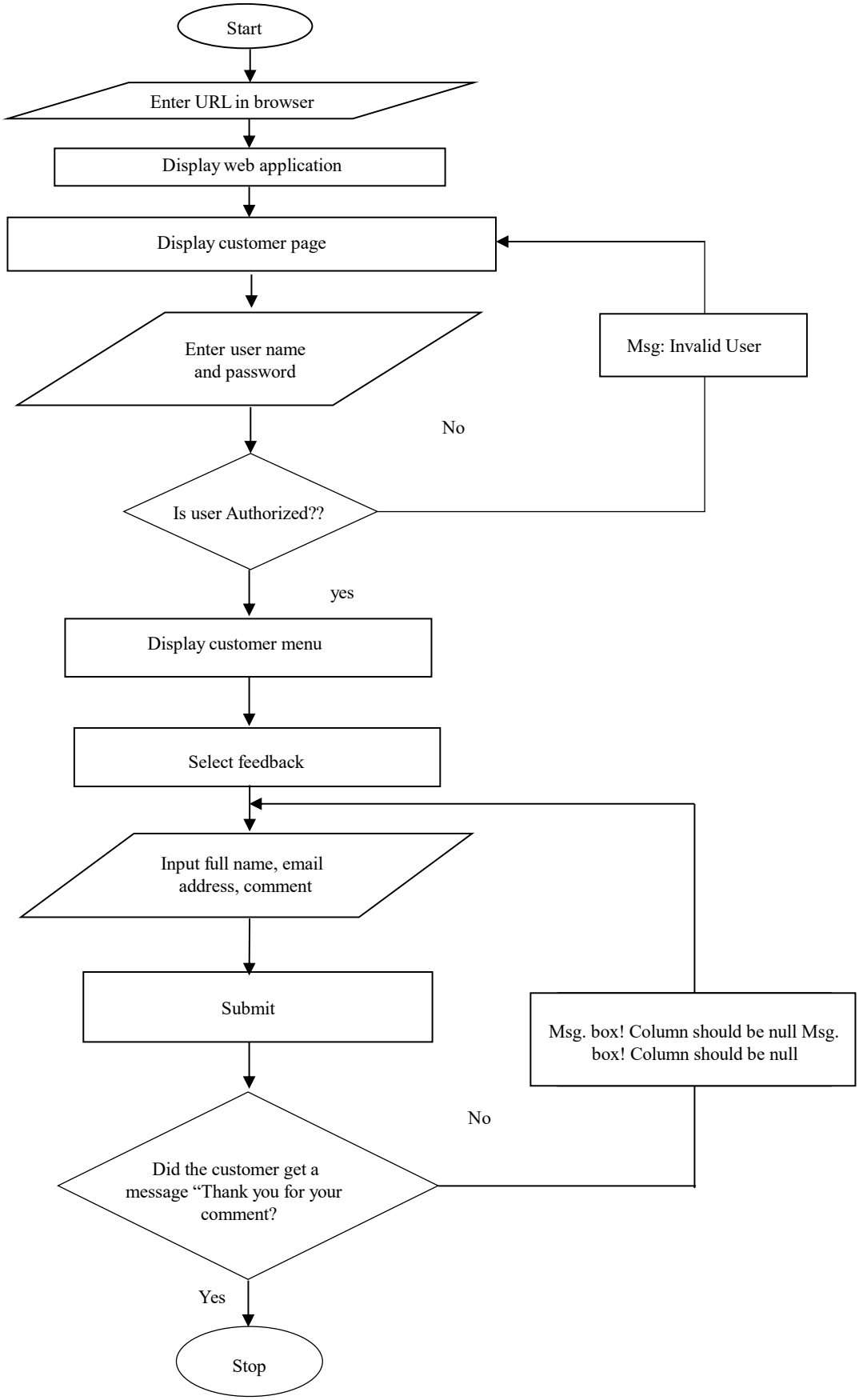

Figure 10. Flowchart of Customer Feedback.

Admin Login Module: Secure and efficient portal for administrators to manage system access, monitor user activities, and configure settings (Figure 11).

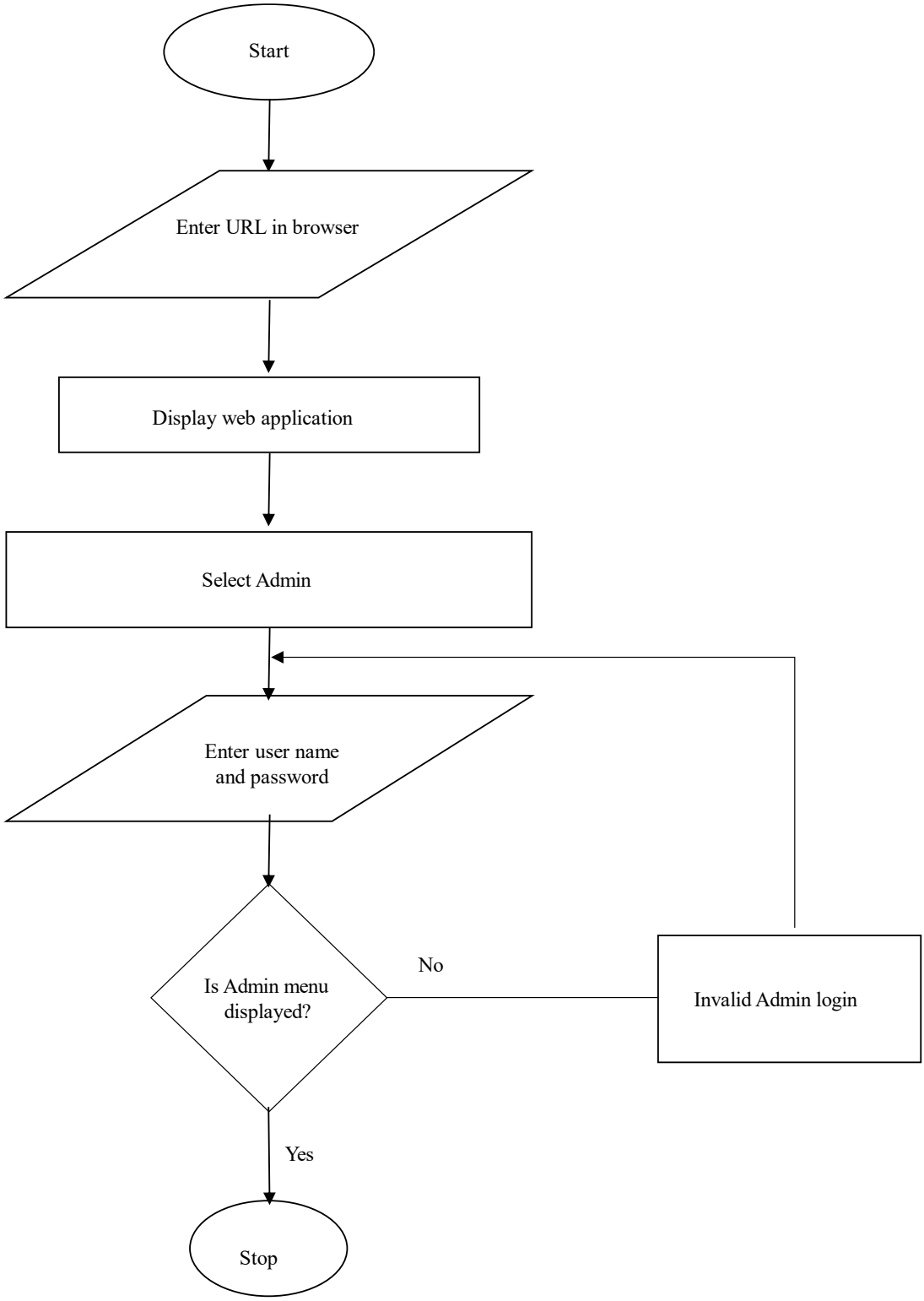

Figure 11. Flowchart of Administrator Login.

Change Password by an Administrator Module: Change Password by an Administrator Module allows admins to securely update user passwords directly within the system (Figure 12).

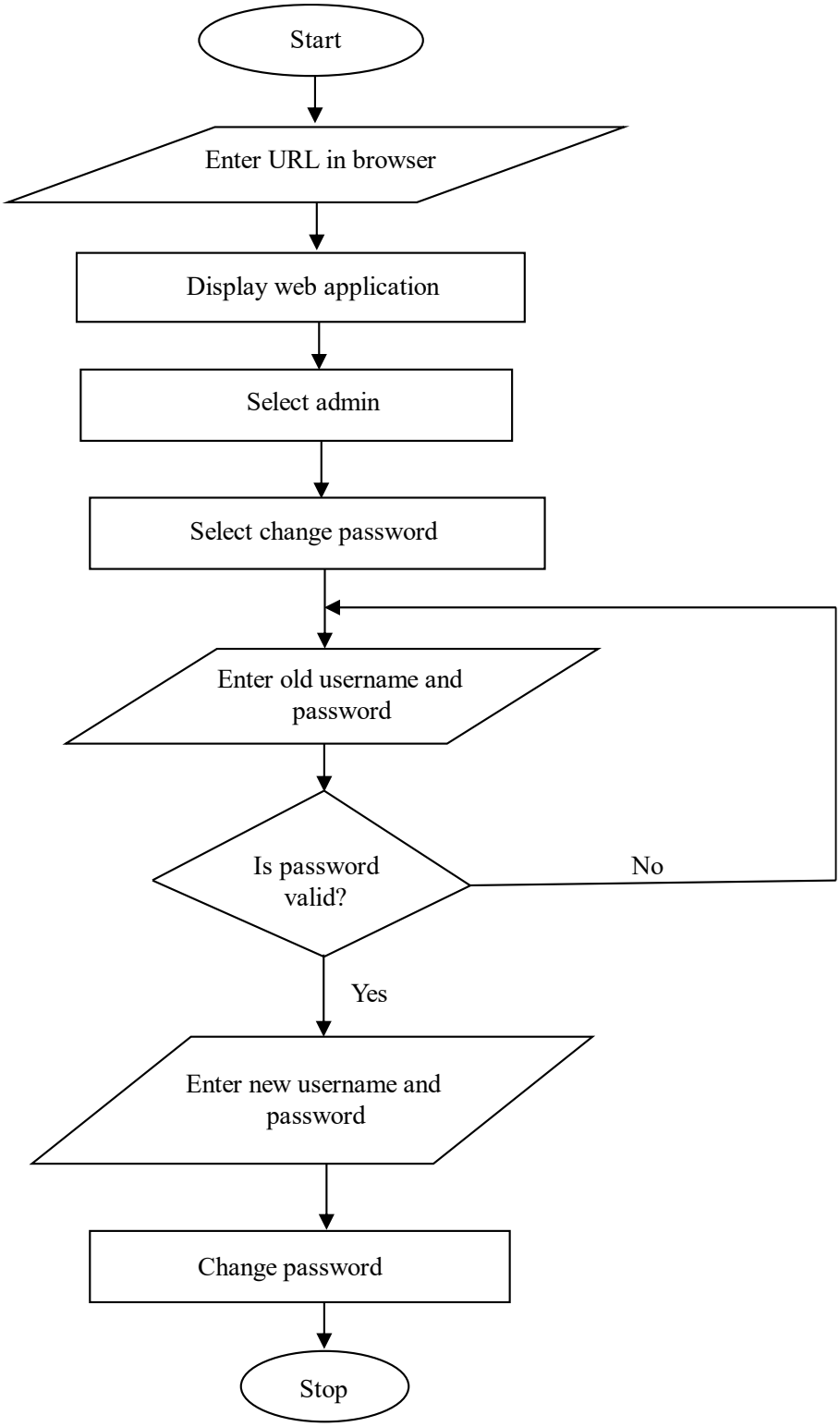

Figure 12. Flowchart for change password by admin.

System Requirements

This describes the basic requirements necessary for complete installation and effective use of the system. An internet connection with good data transfer speed is required for the best use of the system. However, the application can be implemented on a standalone computer. The other requirements can be subdivided into hardware and software requirements.

Requirements of the Operating System

Choose from the following operating systems:

1. Windows XP version
2. Microsoft Windows XP (IIS configured) Home and Professional service pack 2 and 3
3. Windows 7
4. Windows 8 and above
5. Microsoft Windows 2000 Professional version (Service Pack 4)

Hardware Requirements

The following hardware requirements are necessary for the effective use of the portal.

1. A web host or local server with high capacity (at least IGB storage space)
2. A computer system for the administrator with the following.
   - A secure link to the server or web host
   - Pentium III, its equivalent or higher
   - 256MB main memory (RAM)
   - 20GB free hard disk space
   - Reliable removable drive for backup

Software Requirements

Once the portal is successfully hosted on a web server, it can call up from any recent web browser on the operating system. Due to the programming tools used in its development, the web-based portal can be hosted on any of the major operating system; Window (xp and above), Macintosh, UNIX, etc.

Operating System Minimum Requirements:

i. Microsoft Windows XP Home and Professional Edition (Service Pack 2 or 3) or any newer version of Microsoft Windows
ii. PHP
iii. MySQL
iv. WampServer

Tasks to be completed before the full implementation of the program include:

i. Preparation of physica1 site
ii. Preparation of documentation
iii. Preparation of test plan
iv. Training of appropriate personnel

Programming Language Choice Chosen

PHP (Hypertext Preprocessor) is a popular, general-purpose scripting language used primarily for web development and can be embedded directly into HTML. It is particularly effective for generating dynamic web pages and is primarily used for server-side scripting. PHP can also be executed from the command line or used as a standalone application. Typically, it operates on a web server, processing PHP code to produce web pages as output. PHP is compatible with nearly all servers and platforms and is available for free.

As a versatile programming language, PHP code is executed by an interpreter in command-line mode, carrying out tasks required by the operating system and generating output to the standard output channel. Additionally, PHP can function as a graphical application and is supported by most modern web servers and computing platforms as both a server-side processor and a standalone interpreter.

RESULTS AND DISCUSSION

This comprises of the input, output and database physical designs. Here we present the screen-shot layouts and prints of the input, output and database designs.

Input and Output Design

Data and storage are central to information processing. Computers cannot directly interpret data in human-readable formats, such as speech or handwritten documents. Therefore, it is essential to present data to the computer in a form that can be easily converted into its electronic format. This is accomplished by using input devices, such as keyboards, which transform data into a machine-readable format, and output devices, such as monitors and printers, which produce human-readable results.

The following are the input/output design specification shows in Figures 13–21:

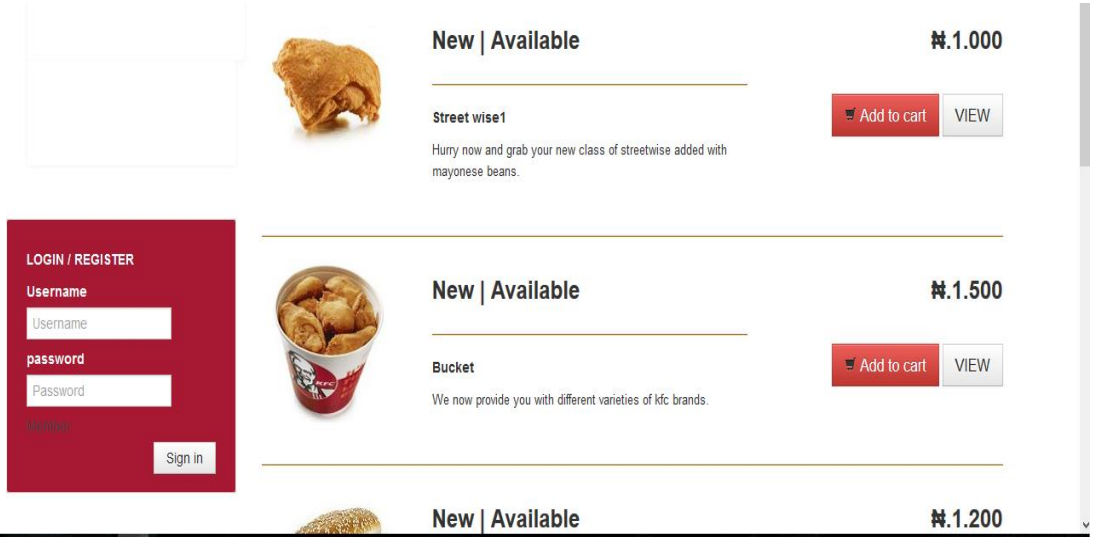

Figure 13. Customer login page.

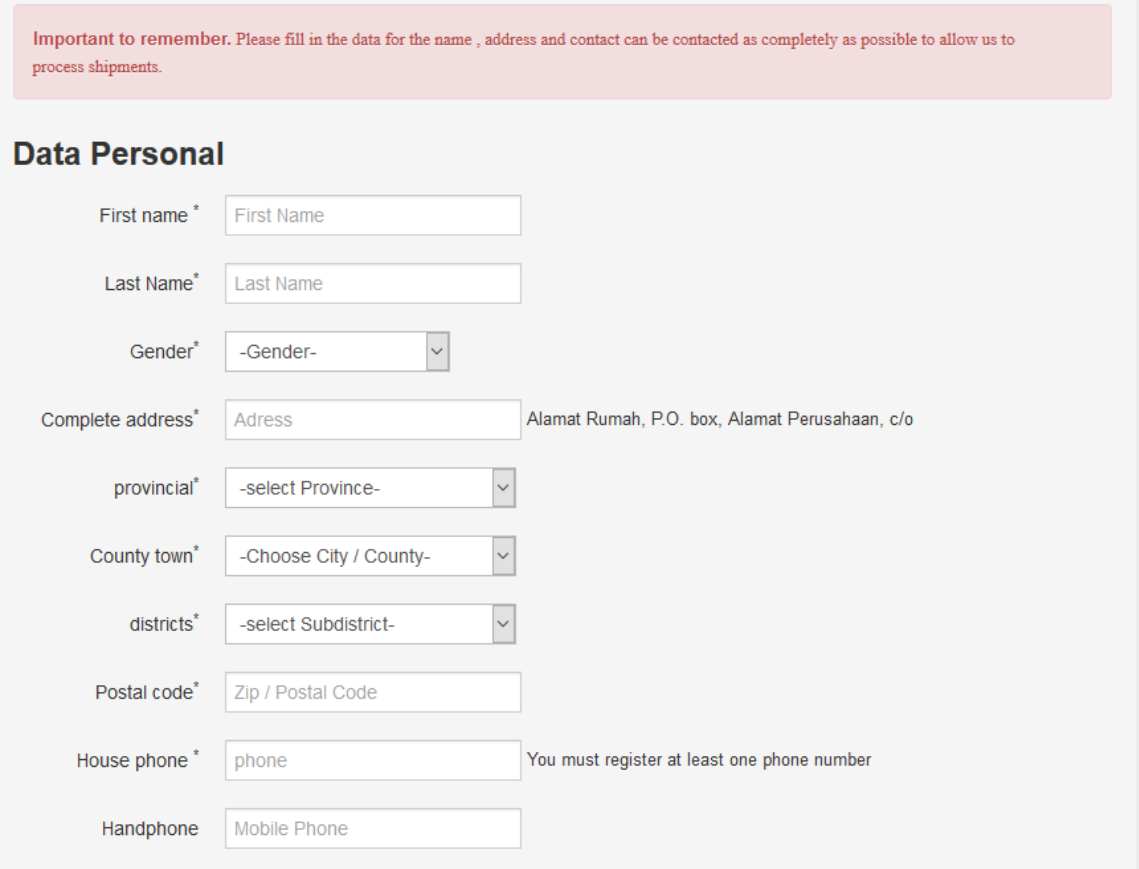

Figure 14. Customer registration page.

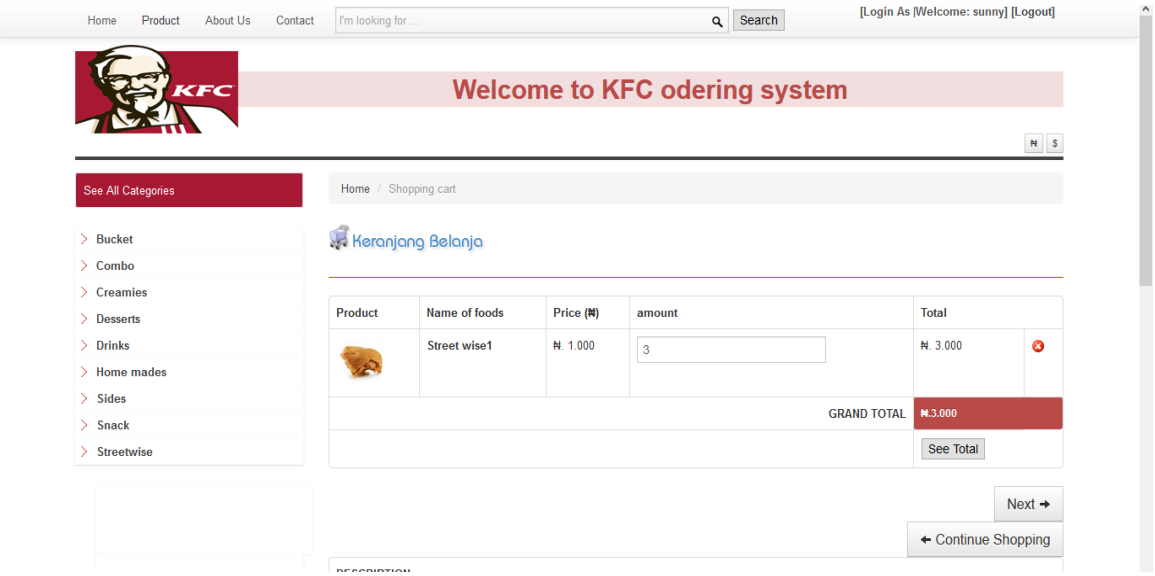

Figure 15. Customer make order page.

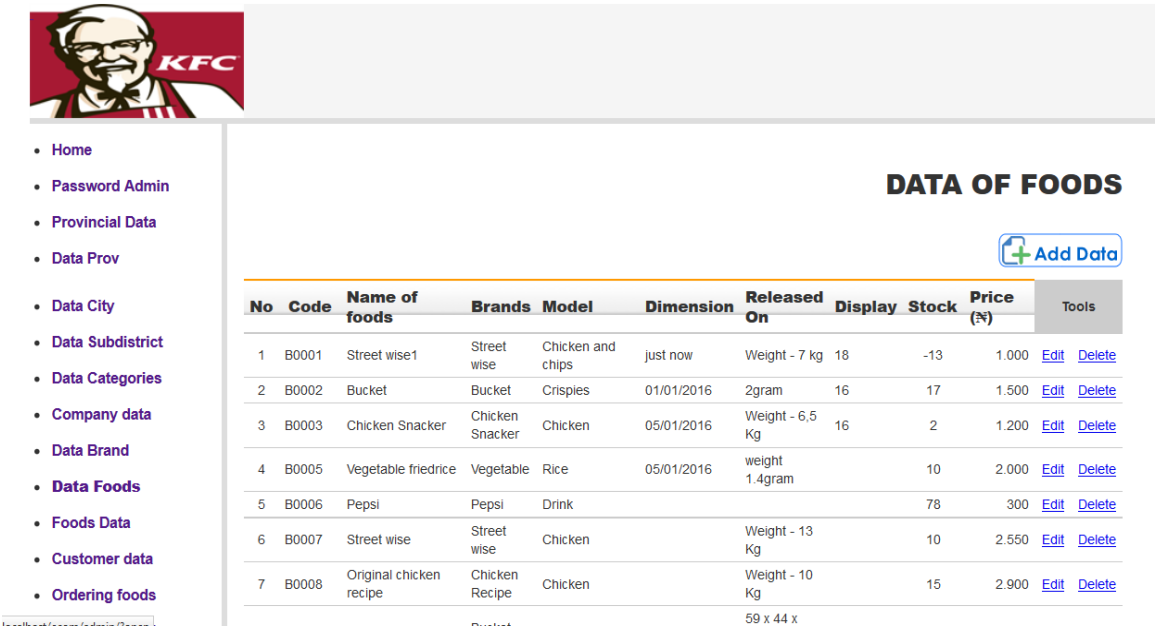

Figure 16. Admin add food page.

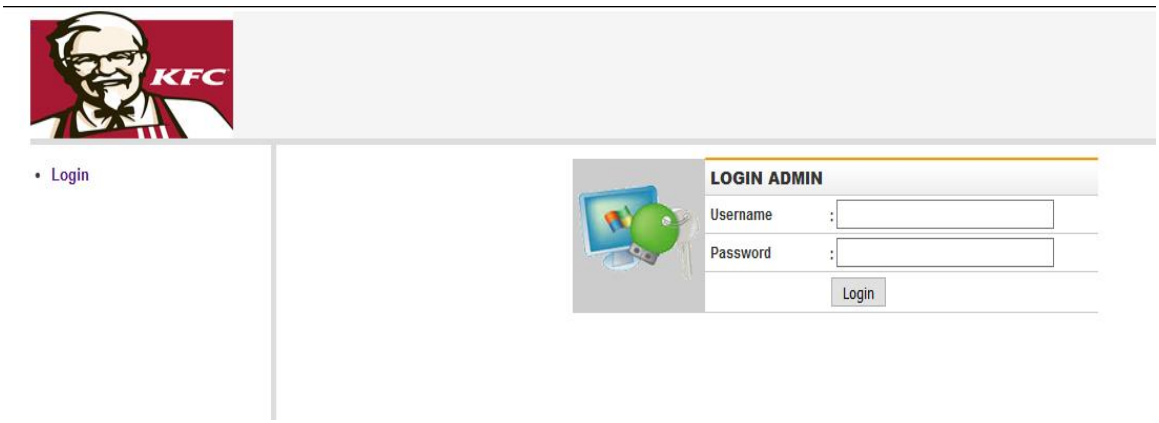

Figure 17. Admin login page.

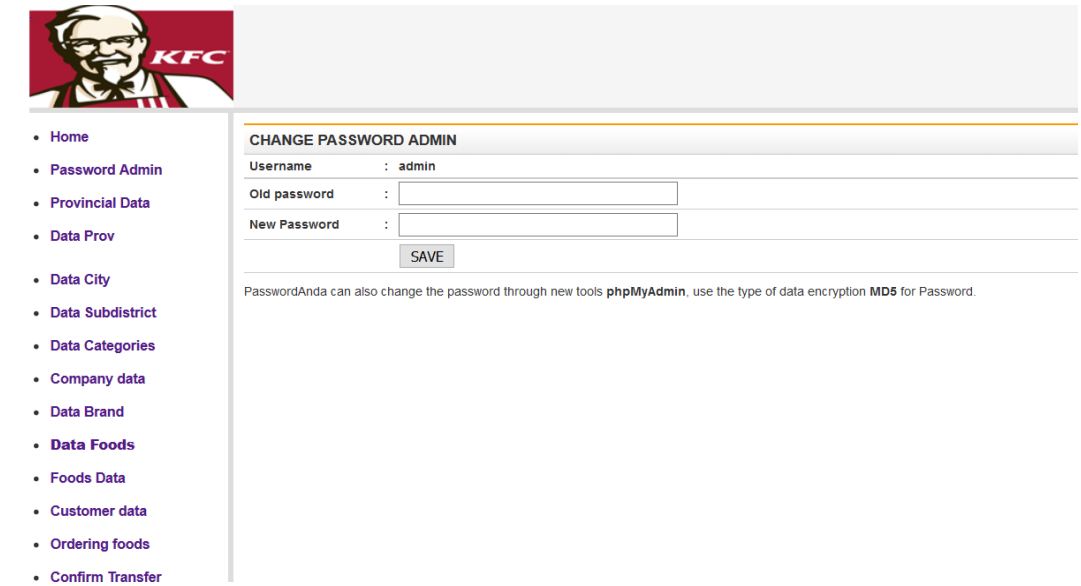

Figure 18. Change Password by admin page.

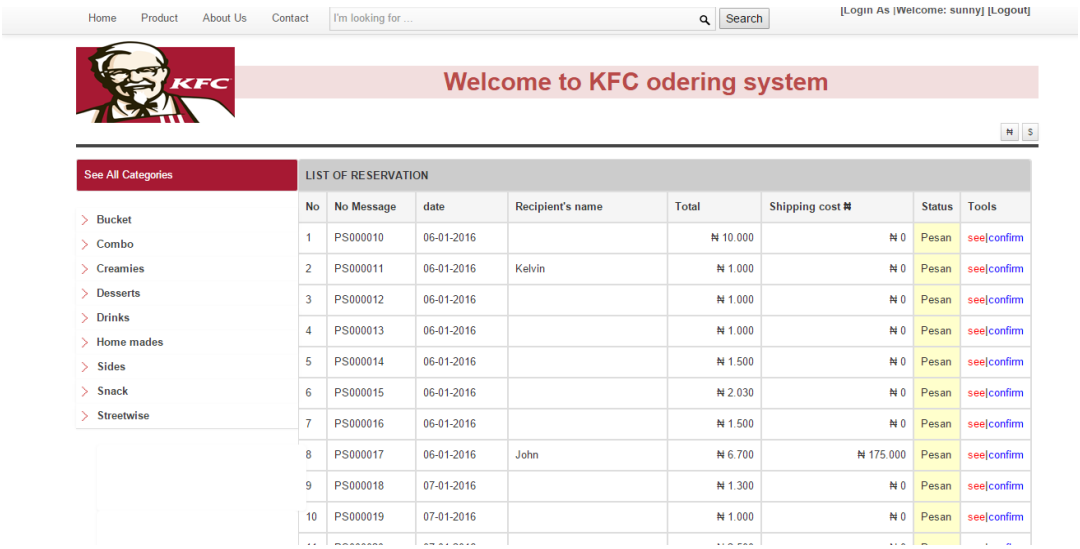

Figure 19. View orders.

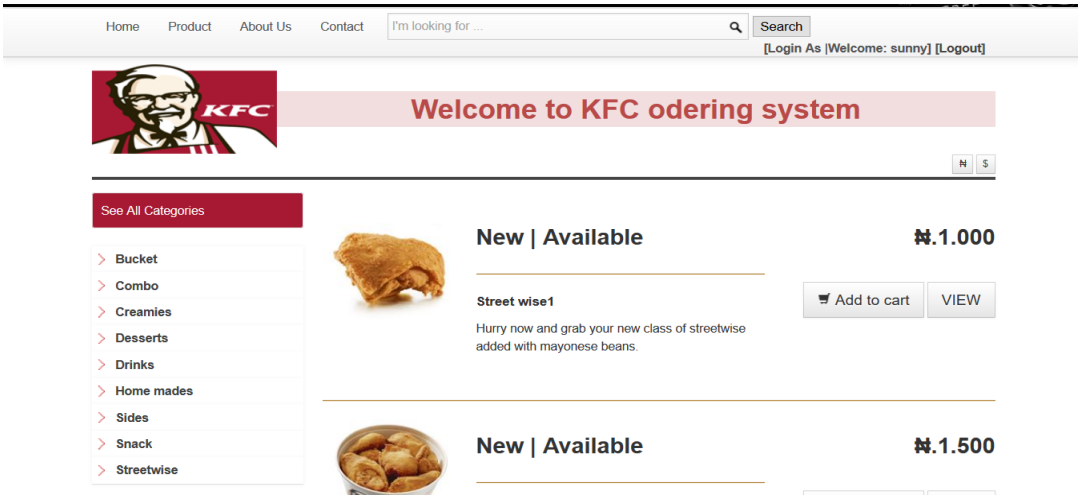

Figure 20. View Food Page.

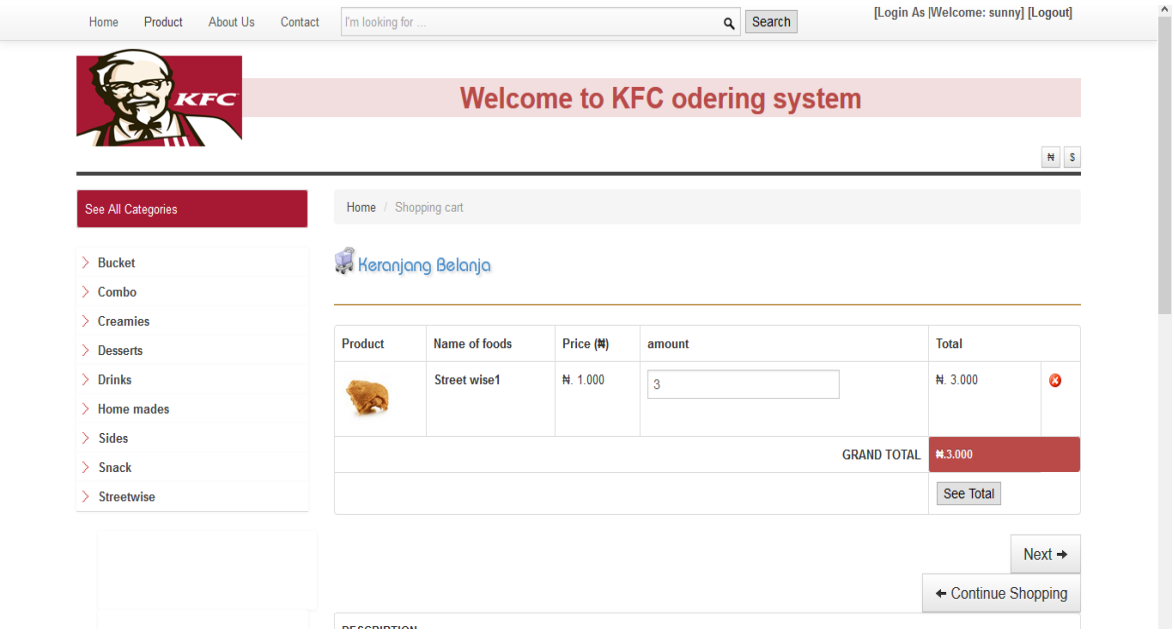

Figure 21. View cart Page.

System Implementation and Testing

This emphasizes the implementation of the system an online sales application software with the design laid out in the previous chapter. The requirements for the installation and the operation of the online sales application software will be covered in this chapter.

Installation of the Program

As stated earlier, the program should be installed on the web host server computer.

To run the web-based application, one needs to:

1. Install WampServer on a computer system running Windows XP or later versions.
2. Install a web browser (preferably Mozilla Firefox).
3. Copy the folder of the project work (Onlinefastfood.com) on the desktop of the computer system.
4. Open the Wamp software that has been installed, click on explore. A page will be displayed with different folders, open the folder "htdocs" and paste onlinefastfood.com into the folder.
5. Launch the web browser and type “http://localhost/ecom/Welcome To KFC Ordering System" in the address bar and if everything goes fine, the program is up and running. An alternative way to install the program is by choosing a hosting company and actually hosting the application program.

After which the application can be called up from any web browser on the network by typing the correct URL (Universal Resource Locator) into the address bar.

WAMP Server

WAMP Server is a free and open-source web server package that operates across platforms, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for PHP and Perl scripts. Apache functions as a web server, enabling users with web browsers such as Internet Explorer or Firefox to access and view information on a computer in the form of web pages. MySQL is a database management system that organizes data in a structured manner. PHP is a server-side scripting language used to manipulate database information and generate web pages dynamically whenever content is requested from a web browser. The package may also include additional tools like phpMyAdmin, which provides a graphical interface for managing MySQL databases, as well as other scripting languages. ASP.net. Only a user with administrative rights can install the WAMP package.

Implementation Detailed Plans

The full implementation of this project aims to replace the outdated manual system with a comprehensive web-based system, enhancing the overall effectiveness and efficiency of hotels and restaurant operations. This transition is designed to minimize losses and improve customer satisfaction. Implementation encompasses the activities required to migrate from the old system to the new one, which may involve either introducing a completely new system or upgrading an existing one. In both scenarios, careful implementation is crucial to ensure a reliable system that meets organizational needs. System implementation details how various components of the system interact to provide a viable software solution.

Procedures in Changeover

This pertains to the procedures and processes involved in moving from one system to another.

Types of Changeovers are

1. *Direct Changeover:* Here operations under the old system are stopped and operations under the new system are commenced.
2. *Parallel Changeover:* Involve the operation of the new procedure while the existing ones continue unchanged, and this goes on until the new system is working satisfactorily.
3. Pilot changeovers involve the running of the old and new systems side by side, but the new system is made to handle a representative subset of the procedures already processed with the old system. Thus, comparison information is available, but the changeover is less costly than parallel running.
4. *Phased Changeover:* Here changeover starts as in parallel running but with only a portion of current data processed by the new system. In the following weeks, additional data will be transferred to the new system, with the old system running in parallel for a single cycle. This phased approach allows for the gradual transition from the old system to the new system, ensuring that the new system is fully operational before the old one is completely phased out. It is less costly than parallel running.

The changeover recommended method here is the parallel changeover. This method allows the old system to be run side by side so that the strengths and weaknesses of the new system can be identified. A couple of weeks are required for this conversion after which the new system operates fully, eliminating the old one.

User Training

The use of the online sales application software system does not require so much training; however, the probable user(s) must be educated on some of the basic things they need to know. Users of the system should be made to know that their login details, especially their passwords, should be really kept secret and that they should properly log out from the application after each use.

Running System Test

Testing involves executing a program to identify errors and ensure its functionality. Although software testing can be costly, it is crucial to avoid potentially much higher costs associated with launching untested software, especially in systems where human safety is a concern.

While testing the online sales application software system using windows vista operating system, some test data were fed into it. A number of errors and potential sources of errors were discovered and corrected. The tests were continued until desirable results were obtained. Further trials were used to ensure that there were no more bugs.

Testing software may involve any of the following tests.

1. Unit test
2. Integration test

3. System test
4. Stub test
5. Acceptance test

Unit Test

Unit testing, which is also known as module is testing, is the process of testing each module singly to know if they are functioning as required.

Integration Test

Due to the fact that software modules work together, the module has to be tested as a whole to see if they are working together.

The goal of unit testing is to ensure that each individual module is correctly implemented. However, unit testing alone does not ensure that the interfaces between modules are functioning properly. Therefore, integration testing is necessary. Integration testing specifically focuses on the interfaces between modules, ensuring that parameters match in terms of type, allowable ranges, meaning, and usage on both sides.

System Test

System testing is like integration testing whereby modules are tested together. The distinction between integration testing and system testing lies in their scope: integration testing focuses on integrating individual modules within a program, while system testing involves integrating programs into a complete system. In system testing, they don't only test the modules and program alone but also test the functionality between the interfaces.

Stub Test

Stub is a two (2) or three (3) line of code written by the programmer. During testing, the coordinating module calls a stub instead of the actual subordinate module. The stub takes control, performs minimal data manipulation or verification, and then returns control to the coordinating module. A stub, or dummy subprogram, mimics the subordinate module's interface but generally performs only basic functions and returns promptly.

Acceptance Testing

Acceptance testing is the process used when software is developed for a particular customer. It involves a series of tests that allow the customer to confirm that all requirements have been met. These tests are performed by the end user or customer and can range from ad hoc checks to well-planned, systematic testing procedures.

For software developed for general consumers, alpha and beta testing are utilized:

- *Alpha Testing* is conducted at the developer's site by a select group of potential customers within a controlled environment. It typically begins when formal testing is nearing completion.
- *Beta Testing* is conducted by customers or end users at their own sites. In contrast to alpha testing, beta testing takes place in a real-world environment that the developer cannot oversee, and the developer is not present during this phase.

RESULT DISCUSSIONS

Results discussion involves information written to help those who want to make use of the system to feel at ease while using it and for future purposes in case of any eventuality.

Program Documentation

It serves as a point of reference. It is an orderly process of defining and describing the goals of the project, its functions, development, operations and reports generated in the whole process of software development.

Proper documentation is essential for the efficient operation and upkeep of a system. Accurate documentation helps a programmer who needs to carry out a future program change and makes maintenance easier, faster and less expensive.

This software was designed using an object-oriented approach; this implies breaking down the whole program into different classes of objects. The object that makes up this application is.

i. Administrator
ii. Food Vendor
iii. Customers

These classes of object are categorized by assigning a particular action to make the program easier and its goals easily met.

Training

No system can be successful without proper training. The entire system development effort can depend on whether or not people understand the system and know how to use it effectively. The first step is to identify who needs training and pinpoint their specific training requirements. The department is also one of the main criteria, knowing how the system will affect the academic activities and who will be involved or affected. The main choices of training are either from vendors, outside training firms, or they use IT staff and in-house resources.

Maintenance

The maintenance of the new system should commence once the system becomes operational to prevent any problems that may arise. The system should be monitored regularly to ensure it consistently delivers the expected results. Unless the need for an upgrade arises, no external expertise is required to update the online sales application software system.

System maintenance is essential to the smooth running of the new system. It should be given due attention once the system is accepted by the management to prevent system operational delays which may be in the form of hardware breakdowns or software corruption. The following precautions should always be taken.

i. Backup the files on the server hard disk to external storage devices so that in the case of any hard disk mal function, most of the data (if not all) can be recovered.
ii. Regular scanning of the hard disk for viruses to prevent damage they can cause to the system.

It is important to control the access to the system hardware and software, and to supervise closely any maintenance work that is carried out. The installation manager must authorize in advance all maintenance and repair visits and approve of any proposed repair, replacement or renewal of equipment before it is carried out. Some software problems can also arise as a result of viruses introduced into the system. The following practices are considered necessary for maintaining the new system:

i. Servicing of computer hardware parts and peripherals as at when due to prevent unforeseen breakdown.
ii. *Proper System Use:* This involves correctly starting and shutting down the system.

CONCLUSION

The development of the online food ordering system involved several phases, employing a top-down approach that began with identifying the overall objectives, followed by determining the methodology, and then addressing successive levels of detail.

The initial phase involved a comprehensive study of the ordering process at KFC Restaurant, Enugu, revealing numerous issues that impeded the effectiveness of the existing manual system. These identified problems, along with information needs and activities, were documented and served as the foundation for the subsequent system design phase. This design phase focused on specifying the system components in a way that best addressed the organization's business requirements.

Throughout this phase, rigorous adherence to software engineering principles and practices was maintained. The design will be implemented through a computer program developed and tested in a phpMyAdmin environment.

FUTURE WORK

Future work on the online food ordering system could focus on integrating advanced analytics and AI for personalized recommendations, developing a mobile application for enhanced accessibility, and expanding the system to support multiple restaurants on a single platform. Additionally, improving security measures, integrating with external systems like social media and CRM tools, and exploring sustainability practices such as optimizing delivery routes and eco-friendly packaging are crucial. Enhancing user experience through continuous interface improvements, incorporating alternative payment methods, developing real-time order tracking, and evaluating system performance and scalability under various conditions are also important areas for future research and development.

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