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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 improvements 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 that enables customers to conveniently order meals from local restaurants or food cooperatives via web pages or applications. Similar to e-commerce platforms for consumer goods, these systems often allow users to create accounts and streamline the process of frequent orders. Customers typically search for their preferred restaurant, filter options by cuisine type, select available menu items, and choose their preferred delivery method. 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 and are widely adopted by fast-food establishments across the Western world. This

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method, facilitated by electronic payment systems, allows food to be ordered online and delivered directly to customers. 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 created 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 industries. 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; however, this method has several drawbacks, including the need for constant staffing, the need 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 the KFC Restaurant in Enugu, Nigeria, although applicable across the broader food delivery industry. The primary advantage of the system lies in its flexibility, which significantly simplifies 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 a custom-designed webpage, it is automatically saved in a database and quickly accessed by a desktop application at the end of the restaurant. This application displays all order details, including menu selection and delivery instructions, in a clear and concise format. Consequently, restaurant employees can efficiently process orders and minimize delays and errors. The flexibility and efficiency of this system represent its most significant advantages, offering a seamless and streamlined experience to all parties involved.

RELATED WORKS

Corporate franchises such as Domino's and Papa John's were among the first to introduce online food ordering services, followed closely by other pizza chains such as Pizza Hut [1]. E-commerce provides significant convenience to buyers, allowing them to visit multiple vendor websites at any time, day, or night, 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 and 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 for 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 its competitors by implementing an online self-service ordering and payment system [3]. Customers place orders via touch screens, with orders routed directly 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 waiting staff, the system streamlines operations and includes a database that tracks customer preferences, generates management reports, performs analysis, and allows 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. Additionally, tabletop touchscreen systems offer a comprehensive service by handling customer orders, fulfilling other requests, such as drink refills, summoning 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, such as text messaging, internet platforms, and kiosks [5]. These technologies are favored for their speed and convenience, reducing the risk of miscommunication, and enhancing overall customer experience. In particular, self-activated terminals are poised to become the cornerstone of ordering innovation in the future.

Shimoff (2015) developed NetWaiter, an online ordering software for restaurants that offers 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 of minimizing personal interaction [7–10]. Generally, this enhanced level of control has been associated with increased customer satisfaction and a higher likelihood of continued use or recommendations for the service [11]. However, 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 a systematic and theoretical examination of the methods employed within a specific field of study. This is the study or description of the methods [13]. This methodology encompasses the theoretical foundation of the methods and principles associated with a particular branch of knowledge. It serves as a framework for structuring, planning, and managing the development of an information system. The term often refers to a specific set of steps or procedures that guide 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 can be employed within that field [14].

Types of Methodologies

Object-Oriented Analysis and Design Methodology

Object-Oriented Analysis and Design Methodology (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).

Prototyping

Prototyping involves the creation of 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.

Expert Systems

An expert system is a knowledge-based information system designed to provide expert advice to end users by leveraging specialized knowledge in a particular complex field.

Structured Systems Analysis and Design Methodology

Structured Systems Analysis and Design Methodology (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 SSADM as its methodological approach. It was used because it involved well-defined techniques and documentation. It also engages system users in this process. SSADM uses a systematic approach to analyze and design information systems. The waterfall method provides a structured

framework for the design of an information system. The SSADM starts with a definition of the problem, followed by feasibility studies. An analysis of the proposed system was performed prior to the design of the new system. The analysis consists of an investigation of the present system, a definition of the new system, and the establishment of constraints. The methodology is completed with the deployment and maintenance of the new system. It breaks down an application development project into modules, stages, steps, and tasks, offering a structured framework for effectively managing and describing the project. 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 with a 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 step. 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 on two stages. In Stage 1, an interview was conducted between me and the restaurant to effectively introduce and endorse the research program and specify an appointment (date and time). In Stage 2, I observed existing systems and their modes of operation. Face-to-face data collection also provides 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, the possibility of miscoded responses was reduced. This data collection approach ensured both higher-quality data and an improved survey completion rate.

The techniques employed during the project include:

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 restaurants.
2. *Observatory method:* This approach involves the investigator directly observing how individuals within restaurants or organizations manage documents and adhere to various practices and procedures under different conditions.

Characteristics of Population

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

1. *The administrator:* This person is responsible for the upkeep, configuration, and reliable operation of the Online Food Ordering System website. He assigns food vendors and clients to log in to the privileges and security upgrades of the website.
2. *The food vendor:* This middlemen food retailer who patronizes the food website to sell and advertise their goods and services to customers or clients. Food vendors (restaurants) were the primary reasons for the design and implementation of the site.
3. *The clients:* These are the end consumers of the website; they patronize food vendors directly with the help of the site. They are very important, and the conception and implementation stages of the online food ordering website are being carried out.

Sampling Design and Procedure

According to Nworuh (2001), a sample is a subset of the population. The procedure for drawing samples in a population is known as sampling [15]. The sample size used was fifteen.

System Analysis Procedures

This study uses SSADM for its analysis. It was used because it involves well-defined techniques and documentation. This 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. The SSADM starts with a definition of the problem, followed by feasibility studies. An analysis of the proposed system was performed prior to the design of the new system. The analysis consists of an investigation of the present system, a definition of the new system, and the 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, thereby 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 lifecycle from a feasibility study through the creation of a physical design. It employs a waterfall approach to system development, characterized by a sequence of steps where each step leads to the subsequent one. The SSADM process methodology includes the following steps:

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

Problem Identification

This involves knowing the problems faced by the present system, such as manual records of daily sales and the inability of customers to order online.

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, wastage of time is inevitable. To this end, online sales application software will be used to handle flaws in the present system. The following types of feasibility studies were conducted:

1. *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 system. For example, if the current manual system operates at 40 percent capacity, will running computers increase the capacity? If the answer is 'No' then the project is judged not feasible and if 'Yes,' it is judged feasible. In this project, meticulous care was taken to ensure technical feasibility. The use of a key allows for rapid text and object displays. Additionally, the tools, operating systems, and programming languages utilized are compatible with existing systems and can operate across almost all operating systems.
2. *Economic feasibility:* A system is considered economically feasible if its anticipated benefits are equal to or greater than expected costs. This project is economically feasible because its benefits outweigh the costs of carrying out the project.
3. *Legal feasibility:* This involves examining contracts, liability issues, violations, and other legal aspects that may be unfamiliar to technical staff. This project is legally feasible because it meets all the legal requirements.

4. *Operational feasibility:* The question of who will operate the system arises here and is the available manpower equipped with the necessary skills 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. The key questions for evaluating operational feasibility include the following.
   i. Is there management support for the project?
   ii. Are users dissatisfied with current business practices, and will the new system significantly reduce operational time? Thus, users are more likely to embrace this change.
   iii. Have users participated in the planning and development phases of a project? Early involvement helps to minimize resistance to the new system.
   iv. Will the proposed system benefit the organization overall? Will it improve responsiveness and accessibility of information? Will this have a significant effect 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.

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 performed perfectly. This also involves the analysis of all the steps in an operation to determine how it works. To make a good design, the present system must be evaluated to determine the weaknesses to be amended to produce a viable and reliable new system. The system analyses are as follows:

1. System investigation
2. Analysis of the present system
3. Weaknesses of the present system
4. Expectations of the new system

System Investigation

A system is a combination of interrelated elements. This 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 of 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 to determine how it works. To make a good design, the present system must be evaluated to determine the weaknesses 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 method of recording data efficient without redundancy? Can customers place orders for goods and services online? The system investment is a detailed examination of the proposed system. The comprehensive study carried out on the existing system enables one to arrive at relevant facts that would be helpful in the design of the new system. The techniques employed during the project included the following:

1. *Interview method:* This method aims to obtain facts and opinions from those 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 interviews, questions regarding the type of record system used and customers' relationships with the restaurants were also asked.
2. *Observation* method*:* This involves the system investigator directly observing how individuals in restaurants or organizations manage documents and adhere to various practices and procedures under different conditions.

Analysis of the Present System

In the process of examining or diagnosing the existing system of restaurants, the strengths, and weaknesses of the system in meeting customers and management requirements were identified.

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. This system cannot perform automatic sales processing. This could lead to incorrect data processing, especially when the salesperson is in haste to serve waiting customers.
2. The system does not provide quick access to information pertaining to sales transactions, particularly with regard to preparing sales reports for the day's business.
3. Excessive manual effort: Virtually all the activities of the salespersons 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 reports which at times result in error.
6. Difficulty in recording total sales for the day's business.
7. Difficulty in tracking the number of customers.
8. The system could not give access to online services.

Expectations of the New System

Having acquired a clear understanding of all the important business aspects under the current system, and all the factors that contributed to its failure, to meet the system requirements, as hotels and restaurants keep growing both in size and capacity, the need for faster, more accurate, and more reliable information systems becomes vital. Reviewing the methods and procedures with a computer system, it will be noted that the problems will be solved completely using a 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 to control production, attend to waiting customers as quickly as possible, and maintain a very fast and efficient information system for the sales division.

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. The design phase involves designing the input/output and processing steps to meet the user requirements, as identified in the system analysis. The redesign of the existing system is mainly the introduction of a computer in the sales department of a typical restaurant, which includes designing a website for restaurants that customers can access and send requests/make orders to restaurants and restaurant sales representatives, who can login to view the number of customers they have and those that have ordered online as well as record daily sales.

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 complete.
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; however, unfortunately, the manual file kept in file cabinets makes it more vulnerable to information theft by mischievous fellows or spies.
4. *Lack of backup:* There is a tally of the absence of backup storage for various employer files and other human resources files in the vent of loss to backing file outbreaks.
5. *Reliability:* Due to the lack of automation in the restaurant and considering the fatigue that sets in, when a large volume of work is involved, most data and reports from the human resources department are not reliable. This is evidenced by errors in the calculation of the overtime pay for workers.

Performance Indicator for the Proposed System

Analysis of the current company system 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. The proposed system was designed to address and resolve the issues present in the existing systems. The rationale for implementing the new system is as follows:

1. *Time:* In the existing system, 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; however, in the new system, there is fast retrieval of files and timely processing of employee information.
2. *Speed:* The time taken for report retrieval can equally reduce the speed of report production required for quick management action in the existing system. In this new system, a computer-based MIS was 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 uses a password to add some level of security to the system. The transactions were also secured.
4. *Back up:* This new system has a secure storage backup facility that protects files against fire outbreaks and accidental deletion of such files.
5. *Reliability:* Here, the online food ordering system produces accurate results in the form of output, on which managers can base their decisions and allow for quick and accurate data entry and extraction of a variety of reports.
6. *Cost:* the online food ordering system helps to cut down the 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 systems. These shortcomings are the reasons for using the proposed system. These are listed in Table 1 and Figure 1.

1. The existing system is prone to human error.
2. The existing system is slow, as 15 staff members cannot respond to more than 300 orders, such as the speed of a computer.
3. The existing system encourages the use of paper.

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

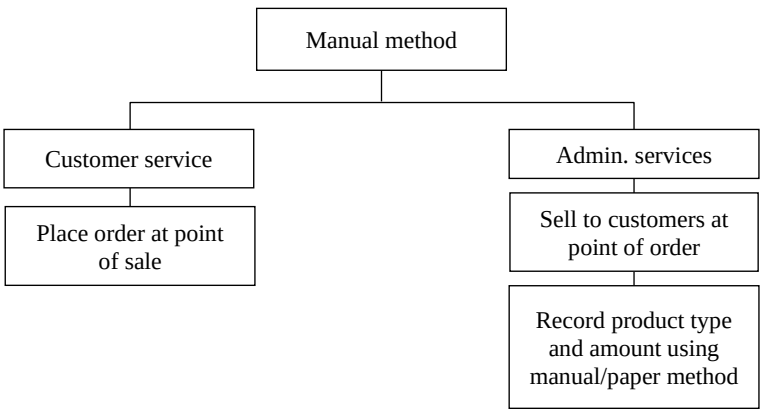

Figure 1. Model of the present system.

4. There is poor record keeping (inventory management).
5. There is no marketing or advertising plan in the current system.
6. Customer satisfaction is quite minimal in this 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 with decision-making.
4. The system will improve the fast-food 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.
8. The system encourages expansion.

System Design

A system comprises a set of interrelated or independent components that interact to form a cohesive unit that is designed to accomplish a specific task. System design involves designing the input/output and processing steps to meet the user's requirements, as identified in the system analysis. The redesign of the existing system is mainly the introduction of a computer in the sales department of a typical restaurant, which includes designing a website for restaurants that customers can access and send requests/make orders to restaurants and restaurant sales representatives, who 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 algorithms, flowcharts, 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 the program statements and coding, as shown in Figure 2.

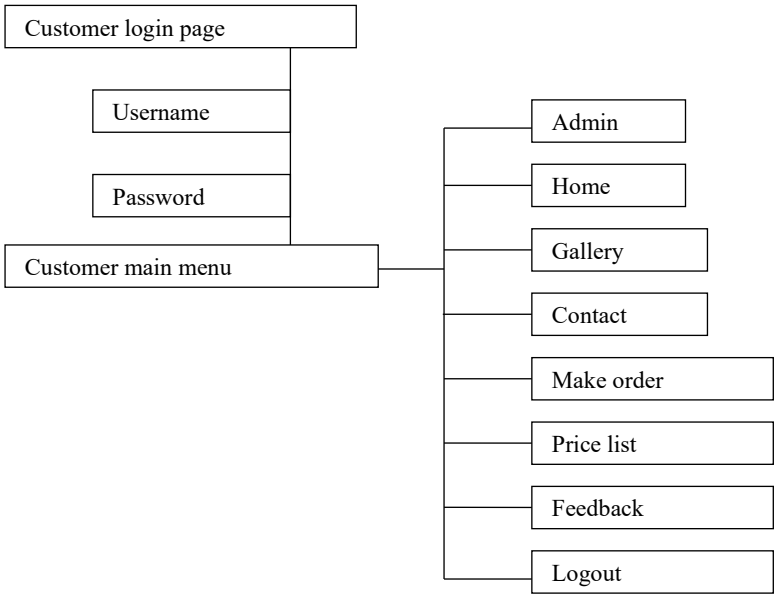

Figure 2. Structure of the online sales application software.

Database Specification

The database was designed using MySQL (My Structured Query Language), a relational database management system (RDBMS) that operates as a server, enabling multiuser access to multiple databases. In MySQL, data are organized into database objects called tables, which consist of columns and rows, to store related data entries. Databases are particularly effective in storing information in a structured and 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 in which common fields link different tables of data, as shown in Tables 2–5 and Figures 3–5.

Table 2. Admin login.

S/N	Field	Type	Description
1	ID	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 an order.

S/N	Field	Type	Description
1	ID	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 products the customer wants
9	Total amount	Int (10)	The total amount
10	Time	Timestamp	Time the order was made

Table 5. Register.

S/N	Field	Type	Description
1	RID	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	Username	Varchar (30)	Customer's username
7	Password	Varchar (30)	Customer's Password
8	Time	Timestamp	Time the customer registered

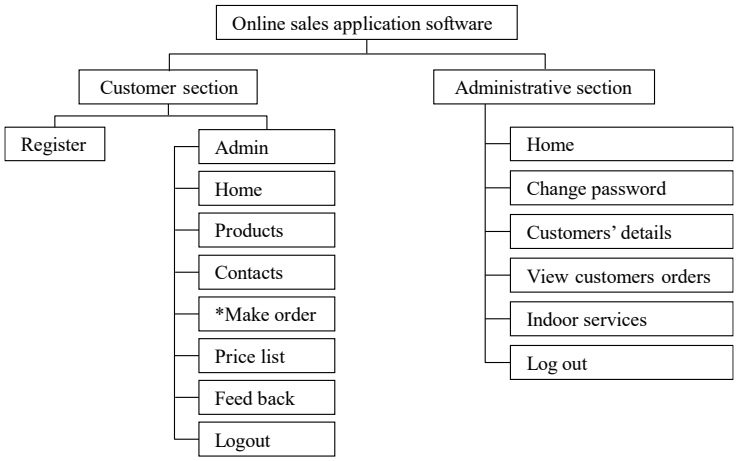

Figure 3. High-level model of the proposed system.

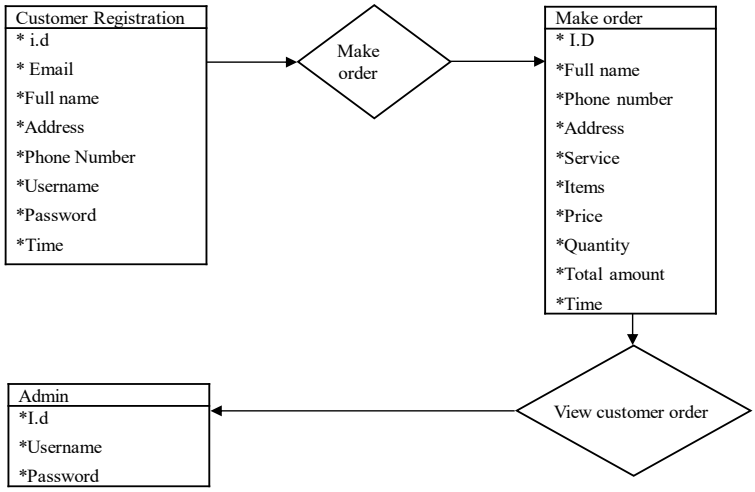

Figure 4. Entity-relationship diagram of the proposed database.

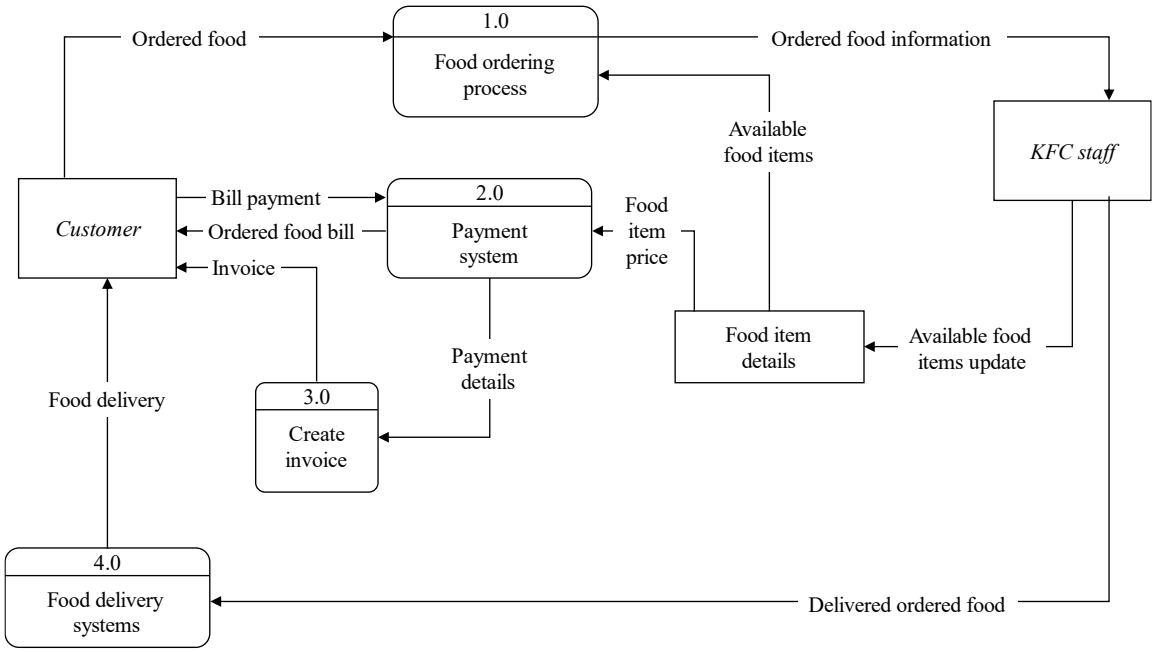

Figure 5. Data flow diagram of the proposed system.

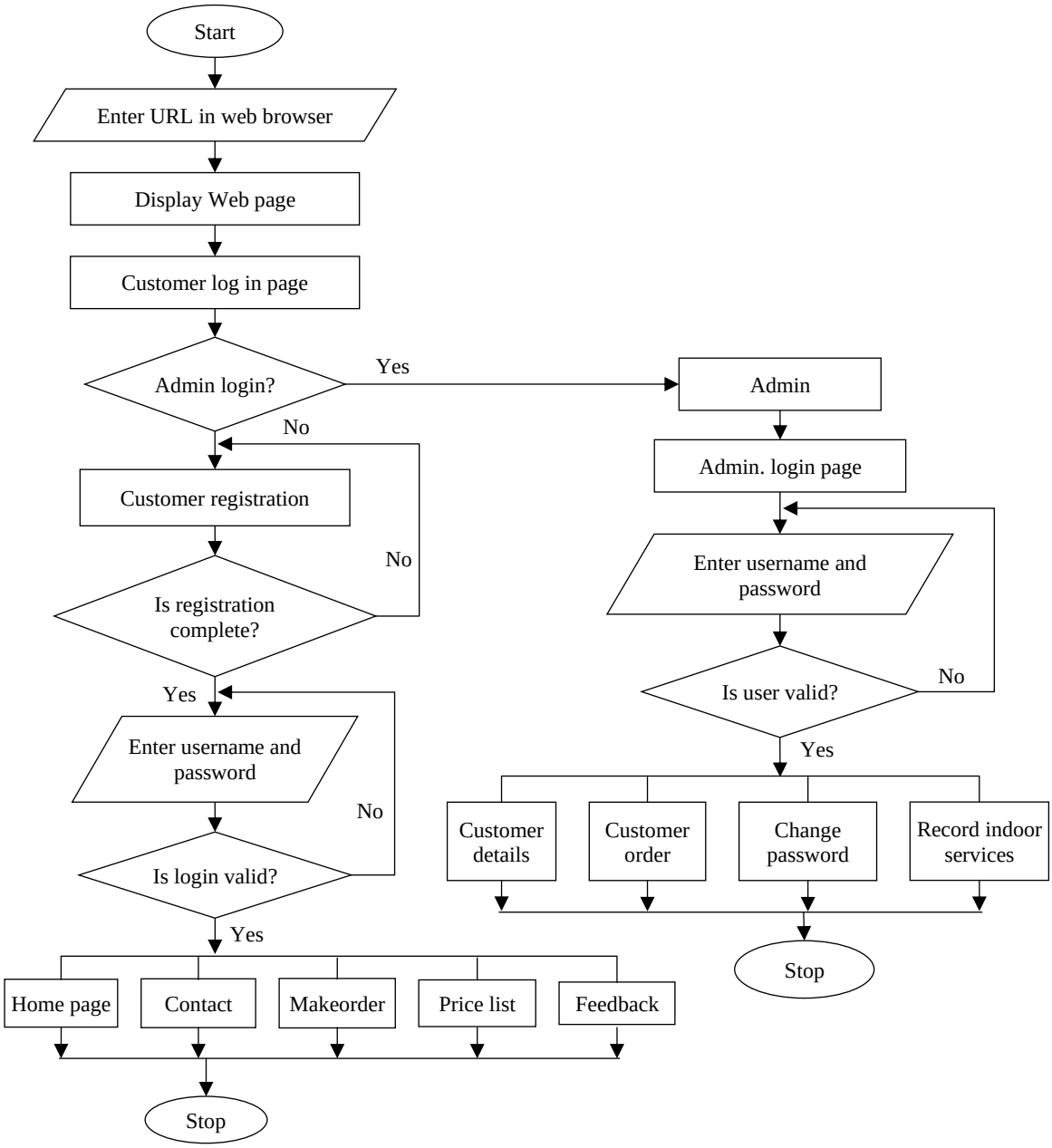

Figure 6. Flowchart of the online sales application software.

- *Program module flowchart:* The program module flowcharts of the design are shown in Figure 6.
- *Customer registration module:* enables new customers to create accounts by providing 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:* Enhances the user experience by collecting, managing, and analyzing customer feedback efficiently (Figure 10).
- *Admin login module:* Secure and efficient portal for administrators to manage system access, monitor user activities, and configure settings (Figure 11).
- *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).

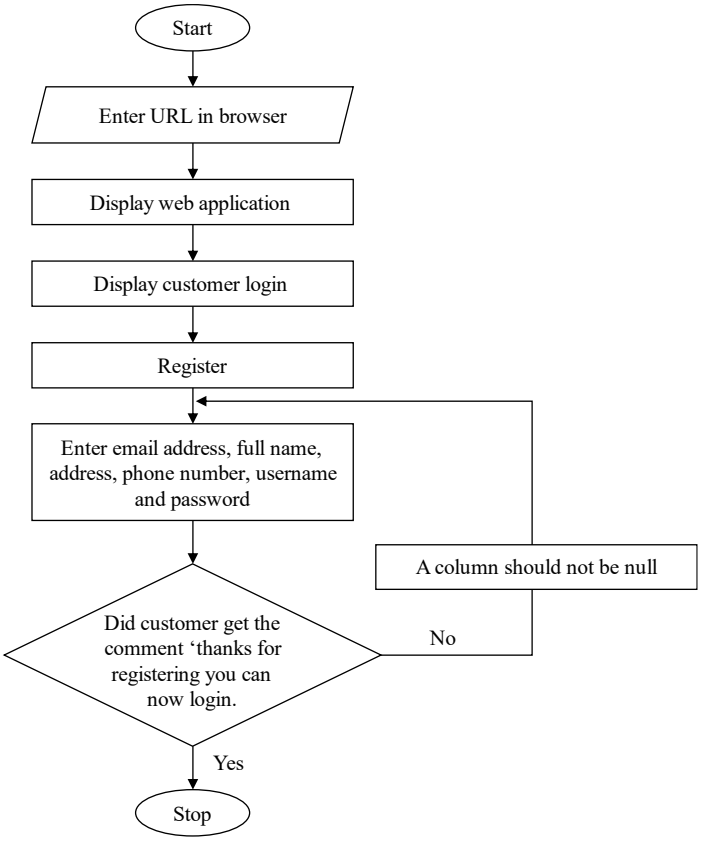

Figure 7. Flowchart of customer registration.

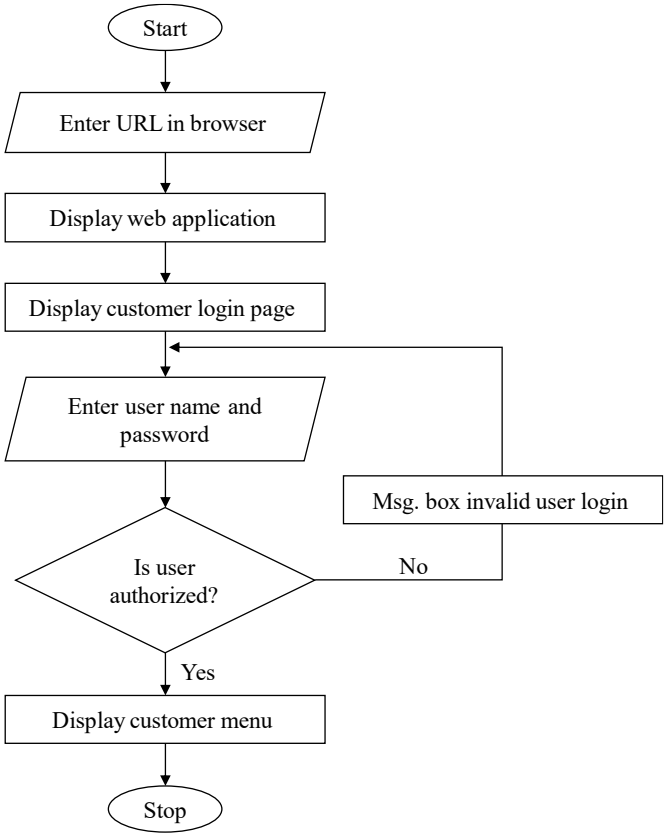

Figure 8. Flowchart of customer login.

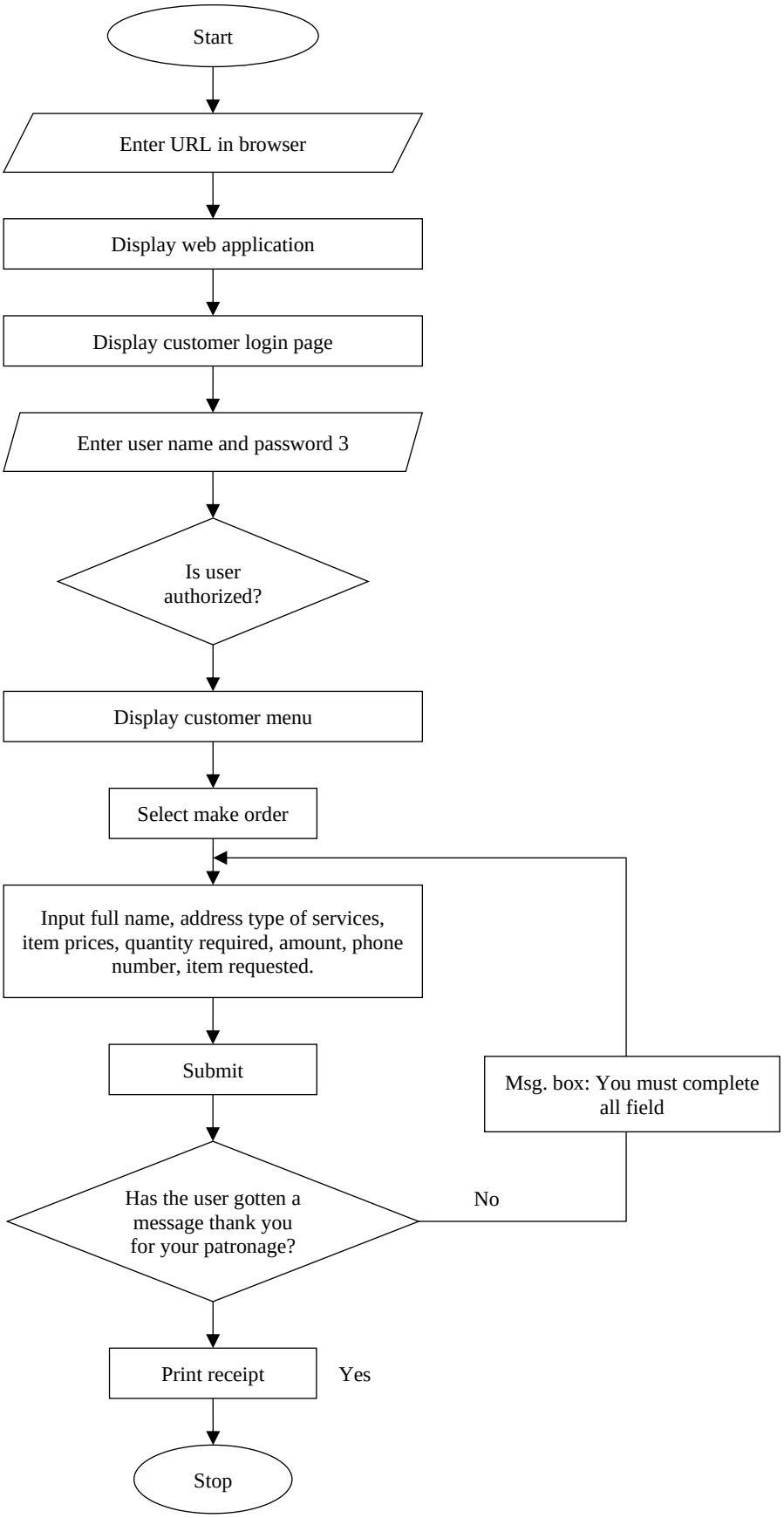

Figure 9. Flowchart of making the order by customer.

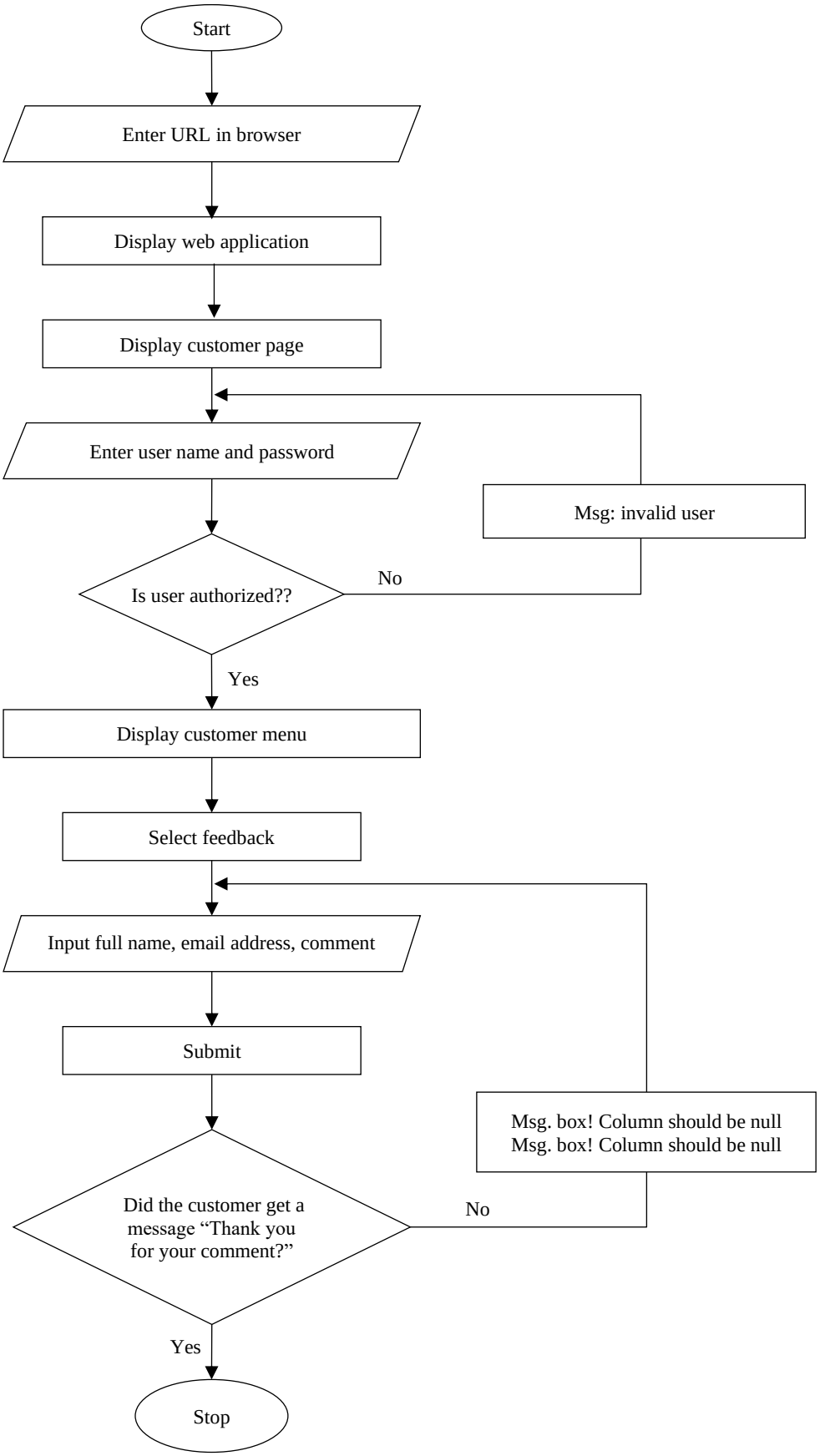

Figure 10. Flowchart of customer feedback.

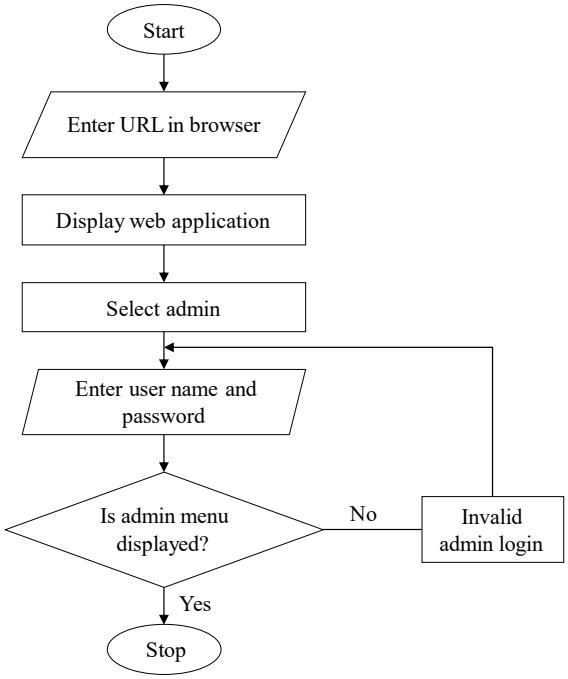

Figure 11. Flowchart of administrator login.

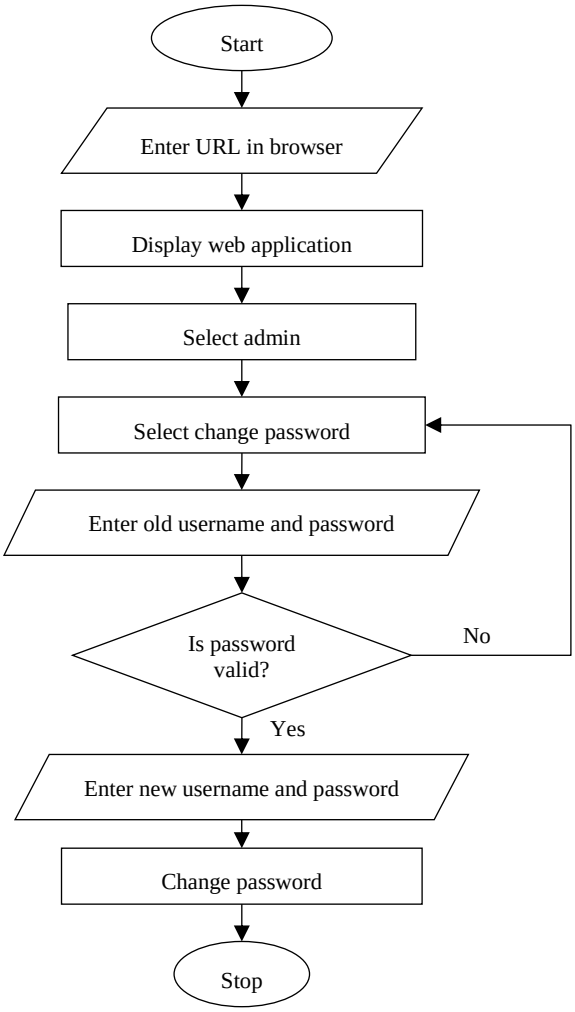

Figure 12. Flowchart for changing password by admin.

System Requirements

This section describes the basic requirements necessary for the 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, this application can be implemented on a standalone computer. 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.
    i. A secure link to the server or web host.
    ii. Pentium III is equivalent or higher.
    iii. 256MB main memory (RAM).
    iv. 20GB free hard disk space.
    v. Reliable removable drive for backup.

Software Requirements

Once the portal is successfully hosted on a web server, it can be called up from any recent web browser on the operating system. Because of the programming tools used in its development, the web-based portal can be hosted on any of the major operating systems: Windows (XP and above), Macintosh, and UNIX.

Operating system minimum requirements:

1. Microsoft Windows XP Home and Professional Edition (Service Pack 2 or 3) or any newer version of Microsoft Windows
2. PHP
3. MySQL
4. WampServer

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

1. Preparation of physica1 site
2. Preparation of documentation
3. Preparation of test plan
iv. Training of appropriate personnel

Programming Language Choice Chosen

The Hypertext Preprocessor (PHP) is a popular general-purpose scripting language used primarily for web development and can be embedded directly into HTML. It is particularly effective in 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 the PHP code to produce webpages as output. PHP is compatible with nearly all servers and platforms and is available for free.

As a versatile programming language, the PHP code is executed by an interpreter in command-line mode, performing tasks required by the operating system and generating output to the standard output channel. Additionally, a 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 the input, output, and database physical designs. Here, we present screen-shot layouts and prints of the input, output, and database design.

Input and Output Design

Data storage is 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 the data to a computer in a form that can be easily converted into its electronic format. This is accomplished 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 specifications shown in Figures 13–21.

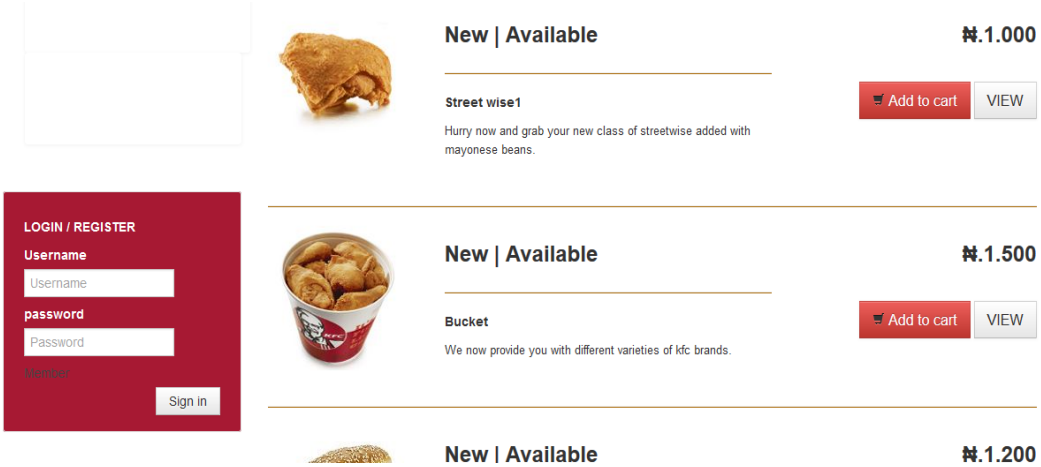

Figure 13. Customer login page.

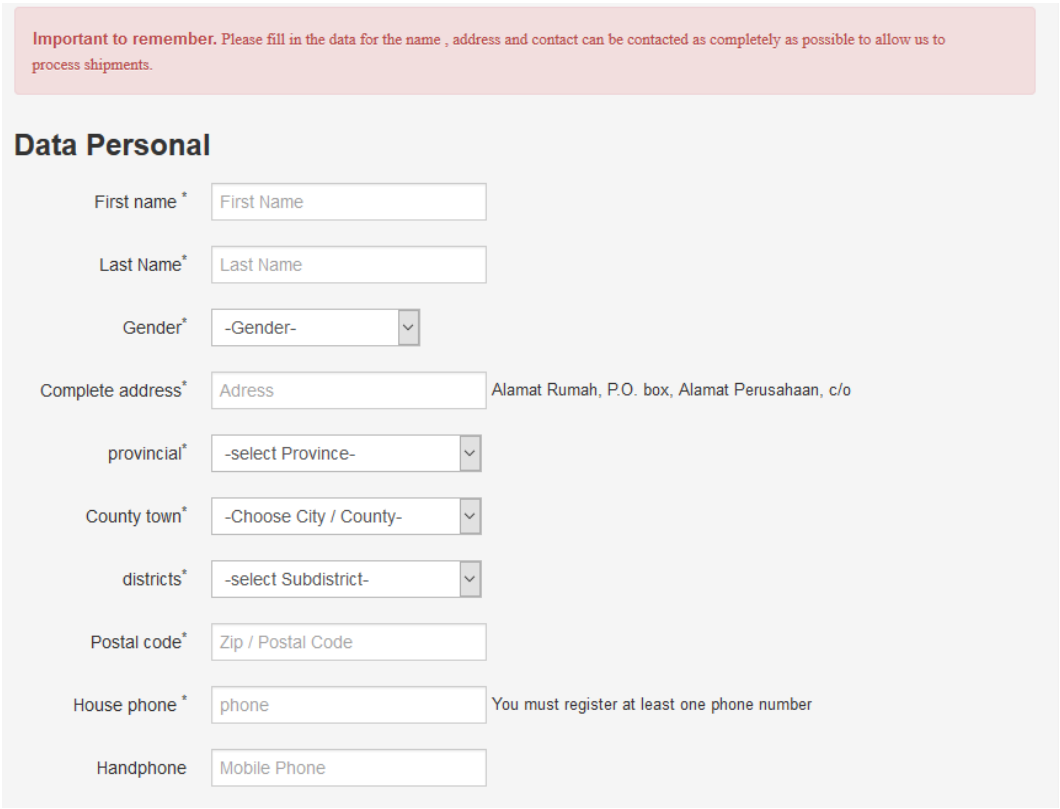

Figure 14. Customer registration page.

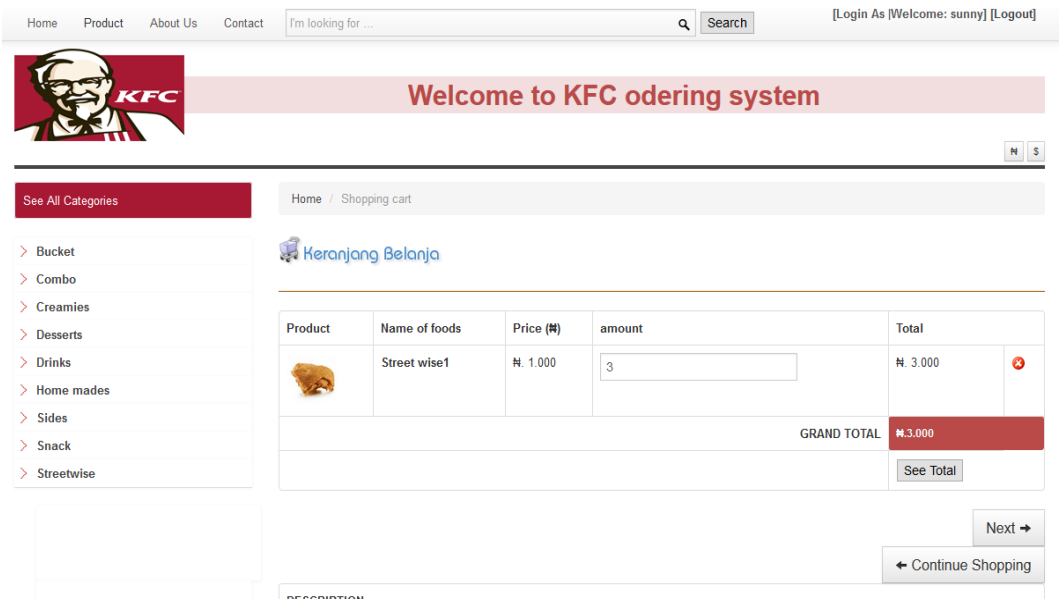

Figure 15. Customer make order page.

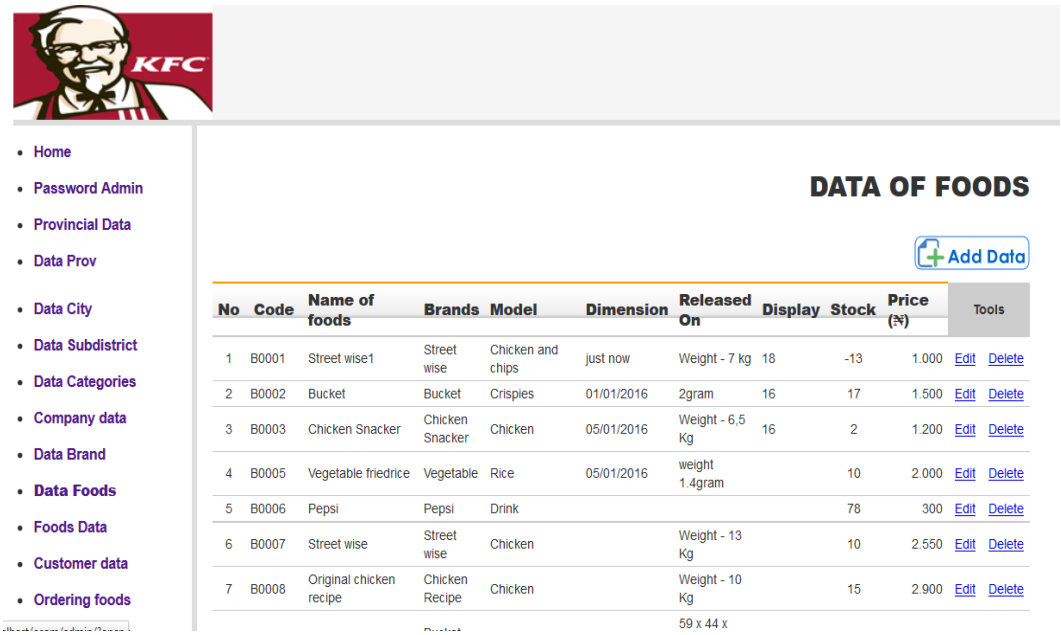

Figure 16. Admin add food page.

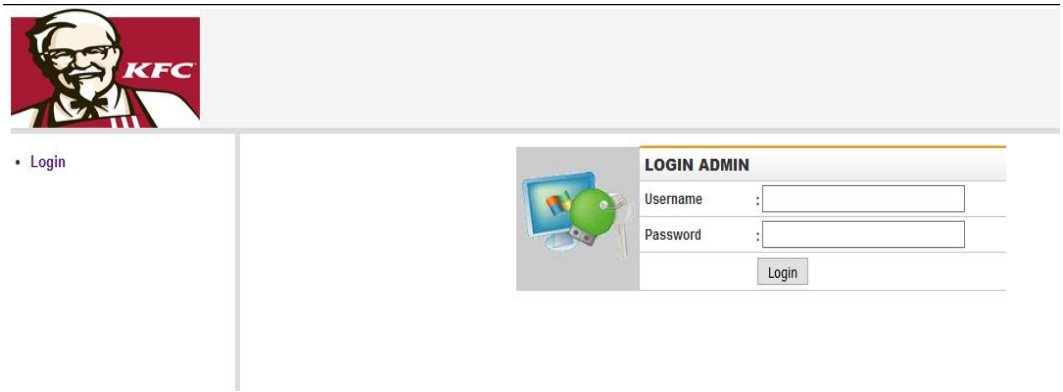

Figure 17. Admin login page.

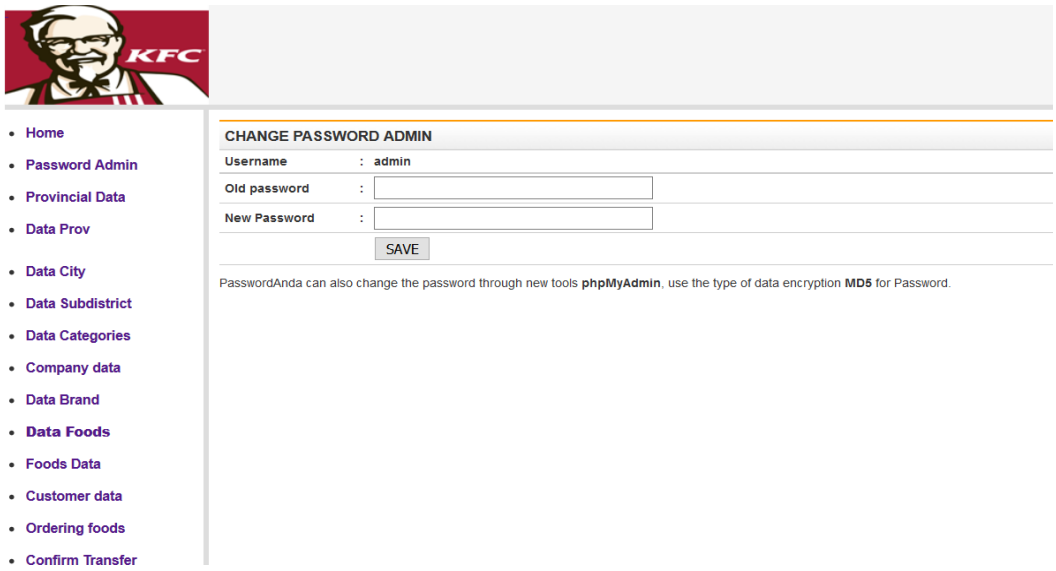

Figure 18. Change password by admin page.

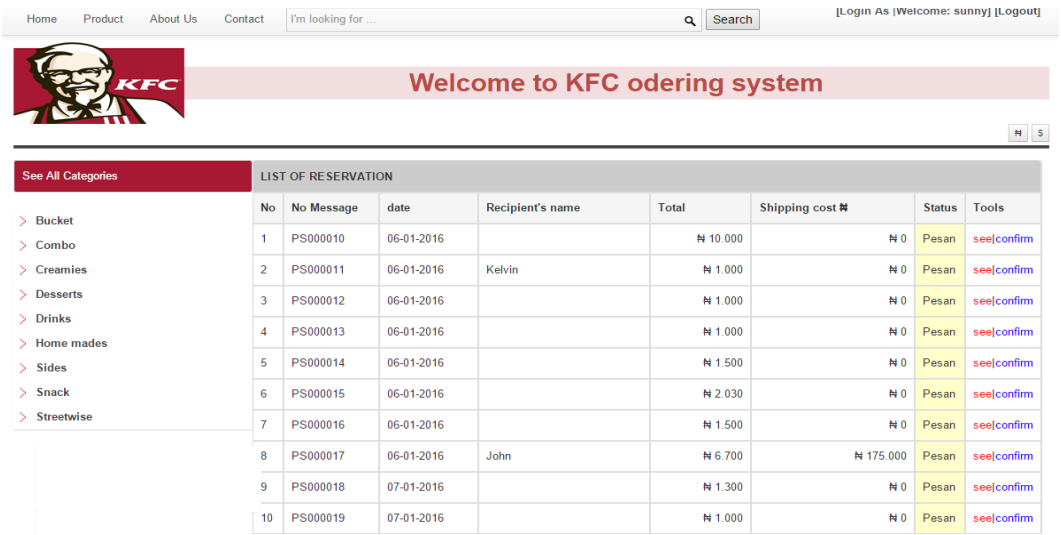

Figure 19. View orders.

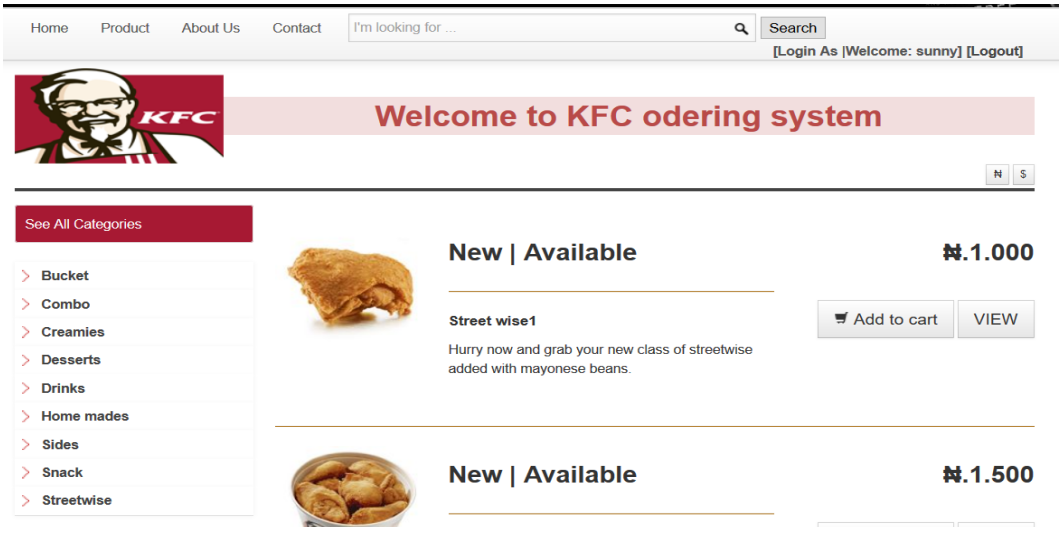

Figure 20. View food page.

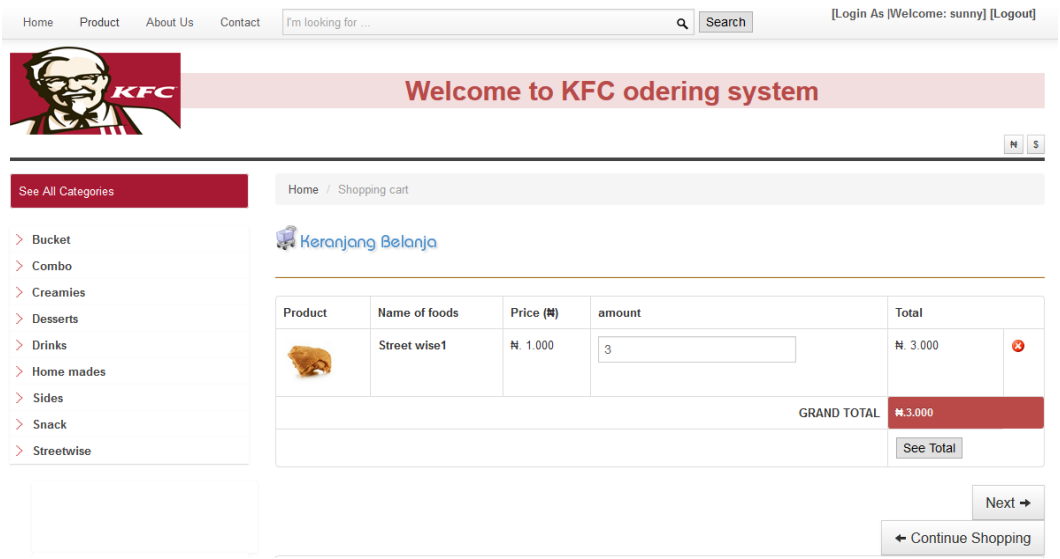

Figure 21. View cart page.

System Implementation and Testing

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

Installation of the Program

As previously stated, the program should be installed on a 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) onto the desktop of the computer system.
4. Open the Wamp software that has been installed and click on exploration. 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; if everything goes fine, the program is up and running. An alternative way to install the program is to choose a hosting company and host the application program.

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

WAMP Server

The WAMP Server is a free and open-source web server package that operates across platforms, consisting mainly of the Apache HTTP Server, the 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 the data in a structured manner. PHP is a server-side scripting language used to manipulate database information and generate webpages dynamically whenever content is requested from a web browser. The package may also include additional tools, such as phpMyAdmin, which provides a graphical interface for managing MySQL databases, as well as other scripting languages. ASP.net. Only users with administrative rights can install a 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 hotel and

restaurant operations. This transition was designed to minimize losses and improve customer satisfaction. Implementation encompasses the activities required to migrate from the old system to the new system, 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. The 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 shifting 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 remain unchanged, and this continues until the new system works satisfactorily.
3. Pilot changeovers involve running the old and new systems side by side, but the new system is designed to handle a representative subset of the procedures already processed with the old system. Thus, comparison information is available, but changeover is less costly than parallel running.
4. *Phased changeover:* Here the changeover starts as in parallel running, but with only a portion of the current data processed by the new system. In the following weeks, additional data are transferred to the new system, with the old system running in parallel for a single cycle. This phased approach allows for a 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. This is less costly than running in parallel.

The changeover recommendation method is a 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. Two 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 much training; however, 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 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 functionality. Although software testing can be costly, it is crucial to avoid potentially much higher costs associated with launching untested software, particularly in systems where human safety is a concern.

While testing the online sales application software system using the Windows Vista operating system, some test data were fed into it. Several errors and potential sources of error have been discovered and corrected. The tests were continued until the desired results were obtained. Further trials were conducted to ensure that there were no additional bugs. Testing software may involve any of the following tests.

Unit Test

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

Integration Test

Because software modules work together, the module must be tested as a whole to determine if they are working together. The goal of unit testing is to ensure that each module is implemented correctly. However, unit testing alone does not ensure that the interfaces between the modules function properly.

Therefore, it is necessary to conduct integration testing. Integration testing specifically focuses on the interfaces between modules, ensuring that the parameters match in terms of type, allowable range, meaning, and usage on both sides.

System Test

System testing is similar to integration testing, in which 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, whereas system testing involves integrating programs into a complete system. In system testing, they not only tested the modules and program alone but also tested the functionality between the interfaces.

Stub Test

A stub is two (2) or three (3) lines of code written by the programmer. During testing, the coordinating module is called a stub instead of an actual subordinate module. The stub takes control, performs minimal data manipulation or verification, and then returns the 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 a process that is used when software is developed for a particular customer. It involves a series of tests that allow the customer to confirm that all the 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 using a select group of potential customers within a controlled environment. This typically begins when formal testing is nearly complete.
- *Beta testing* is conducted by customers or end users on their sites. In contrast to alpha testing, beta testing occurs in a real-world environment in which the developer cannot oversee, and the developer is not present during this phase.

RESULT DISCUSSIONS

The 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

This served as a reference point. It is an orderly process of defining and describing the goals of a project, its functions, development, operations, and reports generated in the entire process of software development. Proper documentation is essential for efficient operation and maintenance of a system. Accurate documentation helps a programmer carry out a future program change and makes maintenance easier, faster, and less expensive. This software was designed using an object-oriented approach, which involves breaking down the entire program into different classes of objects. The object that constitutes an application is.

1. Administrator
2. Food vendor
3. Customers

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

Training

No system can be successfully implemented without proper training. The entire system development effort can depend on whether people understand the system and know how to use it effectively. The first step is to identify those who need training and their specific training requirements. The department is also one of the main criteria for knowing how the system will affect academic activities and who will

be involved or affected. The main choices of training are either vendors, outside training firms, or IT staff and in-house resources.

Maintenance

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 that 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 for the smooth operation of the new system. This 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.

1. Backup the files on the server hard disk to external storage devices so that, in the case of any hard disk malfunction, most of the data (if not all) can be recovered.
2. Regular scanning of the hard disk for viruses to prevent damage can result in this system.

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

1. Servicing computer hardware parts and peripherals to prevent unforeseen breakdowns.
2. *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 by 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 the KFC Restaurant, Enugu, which revealed 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 focuses on specifying the system components in a manner that best addresses the organization's business requirements. Throughout this phase, rigorous adherence to software engineering principles and practices was maintained. The design will be implemented using a computer program developed and tested in a phpMyAdmin environment.

Future Work

Future work on online food ordering systems 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 such as social media and CRM tools, and exploring sustainability practices, such as optimizing delivery routes and eco-friendly packaging, are crucial. Enhancing the 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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