

# E-Food Ordering and Diet Monitoring System

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## ABSTRACT

*Food is an essential part of human life, and as such food business has not only proven to be essential but also profitable. Due to the paramount need for food, an individual's wellbeing and advancements in technology, the traditional food order technique isn't sufficiently proficient for eatery or restaurants to manage the jammed circumstance. This study developed an online food ordering and diet monitoring system that can be of better use in University eateries or restaurants such as those at the University of Ilorin, Kwara State, Nigeria. This modernized and activated food ordering framework is intended to help the business routine in terms of having better administration just as simpler to deal with day by day business tasks. This system is designed for university cafeterias and can be used in other food industries. The methodology used in the study is the V-model and the programming language used is Hypertext Preprocessor (PHP) with other applications including Hypertext Markup Language (HTML5), Cascading Style Sheet (CSS), JavaScript and Bootstrap. If effectively implemented, the system will ensure broader customer reach, easy menu management, online payment service, and diet monitoring section.*

**Keywords:** *Menu, Food, Diet, Restaurant, System*

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## African Journal of Computing & ICT Reference Format:

Shakirat Oluwatosin Haroon-Sulyman and Abdulfatah Aishat Tolulope (2020), E-Food Ordering and Diet Monitoring System, Afr. J. Comp. & ICT, Vol. 13, No. 1, pp. 5 – 27.

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## I. INTRODUCTION

With the improvement of living conditions, people care about food safety and convenience, and they are so busy that the best choice for having a meal is home delivery [1]. The traditional food order technique isn't sufficiently proficient for the eatery to manage especially in case of long customer queue with a lot of order in their eatery. The traditional food order technique can be characterized into two classes which are paper-based and verbal based. For the paper-based food order method, the waiter will record down foods that clients request and pass the food order paper to the kitchen for further process. This is the usual and common method executed by most cafeterias such as those at the University of Ilorin, Kwara State. However, the traditional food order method is still considered safer and productive when it is well organized and the eateries are not crowded. Although, this method can lead to error especially in cases where the eateries are crowded with so many customers and can also lead to improper record management.

[2] emphasized that mismanagement of records can lead to insufficient or loss of needed information in any system or management. The verbal base food order method is far and away more terrible than the paper base food order technique. Since the verbal base food order technique expects workers to recollect all the clients' food orders without depending on any backup or software, after which the employees or waiters will relay the food order detail to the chef in the kitchen physically. The verbal base food order technique contains some shortcomings, for example, causing the employee unfit to memorize all the food orders when the eatery is crowded and the issues that referenced previously [3]. With the development of computer and information, cash transaction is being replaced by electronic or online transactions. In recent times, E-commerce has been seen as a convenient and safer means to keep adequate records and transact over the years [4].

According to the 2014 year-end statistics released, Nigeria had 57.7 million internet users. This figure is projected to grow to 76.2 million internet users in 2017 [5]. The most frequently used were e-mail and web. However, from 2003 to 2006, with the fast improvement of the logistics industry and credit guarantee system, E-commerce had rapidly developed [6]. Nowadays, business-to-consumer (B2C) E-commerce has become popular. The use of online ordering websites has sparingly risen in developed and some developing cities,

particularly become popular in families, schools, and companies.

[7] emphasizes that bit by bit, the virtual store has replaced the physical stores; since Information Technology excellence has driven the development of e-market. More so, the virtual store has significantly diminished the expenses and costs of moving up and down to shop, thereby customers can easily purchase without the restriction of time and place. By using the current features on the web with various media functionalities, the structure of user interface must be a critical consideration for showing the quality of the e-commerce site itself; and provide abundance information about the products as well as being responsible to customers [8].

[9] states that Internet shopping is significantly required since it is exceptionally proficient with various features and not time-consuming. The study by [9] also shows that seven factors influence consumer decisions in making online purchases. These include consumer and access limitations, desires, and constraints of the technology, product and price, flexibility, efficiency, convenience, as well as economic and social factors. The factor that has the greatest impact on consumers in the purchase of online food is the consumer and access limitations, it tends to be perceived from a various angle, namely; the unavailability of food at home, lacking the ability or skills to make their food, distance and tight schedule.

At present, implementing the IT sector in the various organizations has added to its value and made their services more comfortable. Restaurant management can be progressively productive with the assistance of new technology. Both the owner and the customer will find it easier and hence values will be added from the good impression and the efficient administration and management of the entrepreneurs. Also, with the advent of food consumption problems nowadays, such as overeating and obesity, or even the problem of food expenses; this system will answer the questions by showing the details of food of each meal like nutritional values and expenses.

Cafeterias and restaurants or eateries prefer the means of fast order placed via telephone as a speedy request conveyance instead of offering a physical rich dining customer experience. Even though, this method has some numerous disadvantages like a customer not having access to a physical copy of their order, the absence of visual affirmation that the request was put up effectively and delay or not responding to phone calls to take customers' requests.

The greatest impediment most eateries confront is the relocation from a paper-pencil framework to an automated touch-screen system. [10] emphasizes that the sudden and rapid growth and development of communication technology, the emergence of wireless technology, and android devices have created quite a stir in the business transactions.

Improvement in the food ordering techniques has extraordinarily influenced the system, by promoting hospitality and competition. To successfully run a restaurant, efficiency and cost advancements are fundamental. Proper time management can speed up order processing and increase productivity [11].

Some of the numerous goals of the system are to allow customers to place an order at their own will, track orders, and make an online payment. It also enhances food delivery service, preserves customer database, and provides various facilities for the smooth running of the restaurants to customers.

Designing an e-food ordering and diet monitoring system is very essential for individual benefits. Therefore, this study will make provision for a proficient food ordering system that will enhance and improve the existing traditional food ordering management system, like the one in existence at the University of Ilorin, Kwara State, Nigeria. The design will provide convenience, availability, and integrity to restaurants or eateries. It will also be very useful to university cafeterias by providing them with huge contributions and benefits to deal with the crowded situation during operation hours. The system is also applicable to any food delivery industry.

## II. LITERATURE REVIEW

Electronic commerce (E-commerce) means dealing with goods and services through electronic media and the Internet. E-commerce involves carrying on a business with the help of the internet and by using Information Technology like Electronic Data Interchange (EDI). E-Commerce relates to a website of the vendor on the Internet, who trades products or services directly to the customer from the portal. The portal uses a digital shopping cart or digital shopping basket system and allows payment through credit card, debit card, or Electronic Fund Transfer (EFT) payments [12].

E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among

organizations, and between organizations and individuals [12].

[13] developed a mobile-based monitoring system for obesity management which provides an automated food image recognition that also tracks the dietary and physical activities of users. The system was able to provide real-time feedback to customers and recommendations about the food to prevent customers against obesity. This is quite similar to the present system in terms of being a real-time feedback platform and encourages user wellbeing in terms of diet monitoring. Though, it provides automated food image recognition, which makes it differ from the present system.

An interactive food recognition web-based smartphone application was designed for users to monitor their calorie intake to ensure they are eating and living healthy [14]. This system encourages the wellbeing of users; the present system will do more to improve on this by making provision for the user height and weight to appropriately monitor their diet.

[15] points out that the online food ordering system is usually an online application that makes provision for necessary feedback, recommendations, convenient payment, and delivery options for customers or users. More importantly, it saves customers the stress of queuing for long at the restaurant.

[16] designed a similar system that emphasized more on the advantages of online ordering system, some of which includes; reduction of labor cost and employees service required at the restaurant, errors will reduce since the machine is involved and restaurants can easily accommodate more customers since long waiting queue has been eliminated and the whole process is automated.

### Commerce Facilitators:

#### (1) Internet:

The Internet has turned into a vital apparatus for shopping, picking up, conveying, and notwithstanding getting services from a plumber, craftsmen, specialists, and so on. Massive Internet penetration has increased the development of E-commerce. Internet and smartphones are becoming an integral part of every life. Digital platforms ensure an easy and better connection with the customers, such that it supports green organizations [17].

In recent years, the revolution to Information Communication Technology (ICT) has extraordinarily resulted in worldwide improvement. With a massive advancement in innovation, the internet and its administrations have prompted the making of new markets [17].

**(2) Payment Gateways:**

A payment gateway is an e-commerce application service provider that authorizes credit card payments for e-businesses, online retailers, bricks and clicks, or traditional brick and mortar. The existence of online business is the payment routes which comprise credit card, debit card, online banking payments, and electronic funds transfer. The world is moving digital and as such, there is a need for payment gateways to ensure sustainable future e-commerce [18].

**(3) Analytics:**

Analytics causes organizations to accumulate, arrange, examine, and provide details regarding everything their clients do. The huge increment in the volume of information has constrained the organizations to concentrate on examination to comprehend the conduct of the client. Analytics is the logical procedure of changing information into proper understanding for settling on better choices [18].

**(4) Social Media**

Social media refers to websites and computer programs that enable individuals to impart and share data on the web utilizing a Personal Computer (PC) or cell phone. It provides a platform for brand building, advertisements, developing a community of trusted users, spreading word of mouth, and so on [18]. Online networking has assumed an incredible job in brand building and marketing various offers to clients. It also helps in getting feedback about the product or service. Organizations are progressively making utilization of social media to showcase their products and enterprises [18].

**(5) Autonomous Vehicles**

An autonomous vehicle is a motor vehicle that uses Artificial Intelligence, sensors, and a global positioning system coordinates to drive itself without the active intervention of a human operator. The age of the independent vehicle is rapidly evolving. Buyers of self-ruling vehicles will have more opportunities to look through messages, surf the web, and purchase new items. With self-ruling autos, immense advanced advertising knowledge will introduce itself. These purchases and search patterns can be tracked to help companies tailor their marketing campaign to capture this new segment. The scope of big data just got much bigger but will become so tailored and predictive in the years to come that we may never have to manually adjust anything again [18].

**III. METHODOLOGY**

In this study, the V-model from the Software Development Life Cycle (SDLC) was used to produce an online food ordering system. It is used by system developers to produce or alter information systems or software. It divides the development process into several stages or processes. After the completion of one stage, it will logically move to another stage. V Model is a software development process that includes testing at every phase to provide quality work. It is also known as the Verification and Validation model.

The V-model was used because it is easy to manage a system due to the rigidity of the model. Each phase of V-Model has specific deliverables and a review process. V-model does not contain ambiguous or undefined requirements, therefore it is suitable where requirements are clearly defined and fixed. It also helps to track project defects at an early stage of development. V-model has numerous merits which include pre-testing that occurs long before coding to save a great deal of time. Subsequently, this model is straightforward, simple, and easy to use, the deformity is noticed at an early stage and necessary measures are effectively comprehended and taken.

**Analysis of the Existing System**

The existing procedure for food ordering in University restaurants/cafeterias are in two ways. The first method is by visiting the cafeteria and making the order. Each time the client visits the cafeteria, he/she chooses his/her menu from the accessible menu on a paper menu card/list. The waiter notes down the request of the client in his notebook. Then the customer might decide to take away the food or occupy the table.

In the second method, orders are placed via telephone, the restaurant employee then deliver the food to the customer's destination. Yet there are numerous disadvantages to this style, including the customer not having a physical copy of the menu to verify the order, absence of a visual affirmation that the request was put effectively, and the need or delay from the restaurant representative in picking up the telephone and taking requests.

**Problems Associated with the Existing System**

Some of the demerits associated with the existing method include:

- The occurrence of error when taking customers order: In the traditional method of the food ordering process, which involve waiters and writing materials such as; pen and paper, every

food order transaction is noted down on a piece of paper and the waiters transfer the food order ticket to the kitchen for further processing. While the food order tickets have been transferred or during that process, the sequence of the food order ticket might be interchanged with other tickets which can cause dissatisfaction to customers.

- Lack of visual affirmation when orders are placed through telephone: when a customer places an order via telephone he/she won't be sure if the call receiver heard him/her right which can lead to the customer getting the wrong order request.
- Difficulties in updating menu card information: The information printed in the menu card is very important because it will enable the consumer to make as many request orders as possible. When a change made to the menu card isn't properly updated, it may lead to consumer dissatisfaction, and conflict during payment.
- Time-consuming and costly to produce sales reports: In the traditional method of food ordering processes that involve waiters and their writing materials, the receipt is always handwritten. Each time the management needs to generate a report; all receipts need to be compiled.
- The manual system is dependent on staff and therefore becomes mandatory that the restaurant management gives their staff the required training to keep them accustomed to the system rules and procedures.

#### Advantages of the Developed System

- More extensive customer reach: The customer can put in their orders anytime conveniently. Online food ordering systems enable the customers to submit their requests without any influence in their everyday meal timetable.
- Providing the administrator with enabling access to alter some data like the meal price, as well as tool menu to manage user and promotion records
- Permitting customers to make online payment through payment cards or MasterCard.
- Enable clients to place orders, view orders, and make necessary changes before submitting their orders.
- Enable a structured communication platform: It was discovered that on various

occasions the requests made via phone get mixed up due to a communication gap or some other reasons. With the online ordering system, order requests will be placed in a more structured and easy way.

- An easy way to back up or duplicate data is enabled in case of data loss.
- It encourages better record storage and a faster retrieval system with a well-structured database by enabling restaurants to easily store and retrieve their sales record easily.

#### IV. SYSTEM DESIGN

This is done to provide sufficient data and information about the system and its elements to make the implementation consistent with architectural entities as defined in models and views of the system architecture.

The system is in two platforms. The first is the platform developed to allow the user to view the restaurant menu card information and allow the user to place an order. The second platform will be used by staff to update and make changes to their food and beverage menu information, view the orders placed, as well as allow staff generates as they wish, such as monthly sales reports. The programming language used is Hypertext Preprocessor (PHP) with other applications including Hypertext Markup Language (HTML5), Cascading Style Sheet (CSS), JavaScript, and Bootstrap. For the front-end; HTML, CSS, Bootstrap, JavaScript. And back-end; MySQL, Xamp Server. The programming language used was PHP and SQL.

##### System architecture

This is a conceptual model that describes the view, structure, and behavior of a system. It consists of the components that make up the overall system

##### System Implementation

###### Welcome Screen

This is the first interface presented to a user (customer) when he or she visits the website. A customer can choose from the various provided options depending on what he or she wants to do.

###### Login and Registration page

Figure 3 is the registration and login page. This is where customers can sign in and sign up. A login will be displayed when the user wants to perform some action required to authorize and authenticated. The registration form comes along to make registration easy for a user that doesn't have an account

**Customer Account page**

This page gives information about the customer order history. It contains the list of ordered food and a reserved table. It is the account created for users after registering.

**Main menu page**

This interface will show up after the customer clicks on the food zone section. It displays food available in the restaurant and allows users to place an order from the order list and lastly submit their order to the server.

**Food Category**

This interface displays all food categories that are stored in the system. It allows users to select the food category and food will display according to the selected food category. Figure 6 shows food in the salad category.

**Shopping Cart Page**

This contains the items the customer chose from the food menu. Customers can remove a food item, empty the entire cart, or check out the items for payment.

**Delivery Address Form**

This is the form that collects information from the customer about where the meal will be delivered too.

**Online Payment Interface**

This is the payment interface that displays all the order details and the number of details with the billing. The payment gateway used is the pay stack test page

This is the page that contains customer transaction information such as the delivery address, food item, amount paid, date, and reference number. The customer can print this page and present it as evidence of payment.

**Email Interface**

This page displays a sample of an email the payment gateway will send to the restaurant after each customer make payment.

**Setting**

This interface allows managers to change their passwords.

**Diet Monitoring Section****Body Mass Indicator Calculation Interface**

This page helps to calculate customer BMI. Customers are required to enter their height and weight in meter and kilogram respectively.

*Customer Body Mass Indicator (BMI) status*

This page displays customer Status it indicates if the customer is underweight, overweight, normal or obese

**Meal Table Interface**

This displays a list of recommended food for customers based on the previously calculated BMI. For instance, it suggests foods with low calories for an obese person. Customers can save the page as pdf.

**Restaurant Side****Staff and manager login interface**

This interface is the home page where staff and manager can sign in to access the dashboard; the manager also can change the password from the settings option.

**Add and delete food items**

This interface allows the manager to add new food for the particular food category. Manager is required to fill in all the relevant information. The manager can also delete food items.

**View order details**

This display details about the order placed. The manager verifies order to ensure no error is made and in case of any error or exceptional issue, the staff will clarify it with the customer

**V. CONCLUSION**

This study is about a web-based system to automate restaurant management. An online food ordering and diet monitoring system has been created to help reduce and replace the human manpower task, monitor and track the human diet, automate transactions, and generate a report for further management purposes. The methodology utilized was the V-model which focuses on developing software with numerous advantages. The system is faster and smarter with more advantages than the manual or traditional method. This E-food ordering and diet monitoring system is thereby recommended to cafeterias or restaurants; situated in the University of Ilorin and other University environments, to create an easier and prompt transaction process between the students or staff of a particular institution with the restaurant management, as well as, assist in monitoring their diet system. It is also recommended for use by other restaurants located especially in busy environs.

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Table 1: Comparison of Developed System to Existing Systems

	Paper menu card	KIOSK Technology	QORDER system	Electronic-Based menu card	Proposed system
Wireless network	No	No	Yes	Yes	Yes
Dependenc y on the waiter	High	Less	High	Less	Less
Customized order	No	Yes	No	Yes	Yes
Order processing time	High	High	High	Less	Less
Chance of human error	High	Less	High	Less	Less
Online Ordering	No	No	No	No	Yes
Mobility	No	No	No	No	Yes

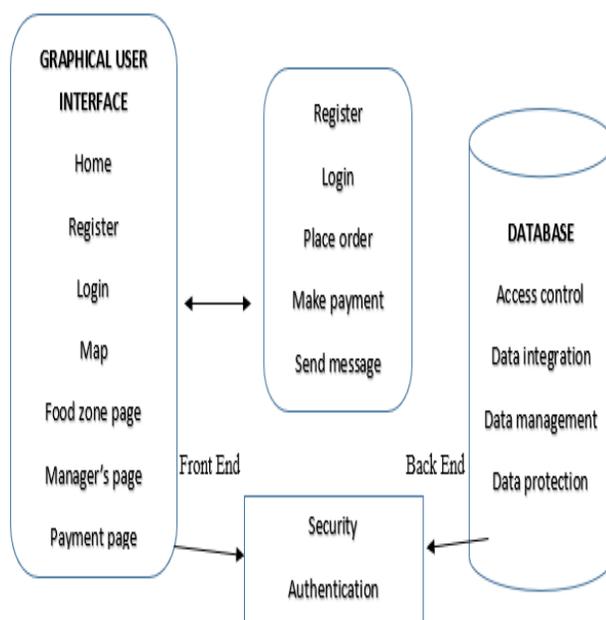


Figure 1: Conceptual model of the system

Table 2: Use-case glossary

Use case name	Use case description	Actor(s)
View food menu	This use case describes the event of a customer either potential or not checking the available food menu	Customer
Place order	This use case describes the event of a potential customer submitting an order for the desired food. Before this can be done, the customer must have an account registered with the system	Customer
Make payment	This use case describes the event of a customer paying for the food he/she has ordered for. This can be done online or on delivery	Customer
View order	This use case describes the event of a restaurant staff checking the orders available	Staff
Validate order	This use case describes the event of a restaurant staff checking-out the available orders	Staff
Print receipt	This use case describes the event of a staff printing out customers receipt	Staff
Generate sales report	This use case describes the event of getting the sales details within a specified period	Manager
Update staff information	This use case describes the event of the manager adding, removing or changing staff details	Manager
Update food menu information	This use case describes the event of the manager adding, removing or changing food menu details	Manager

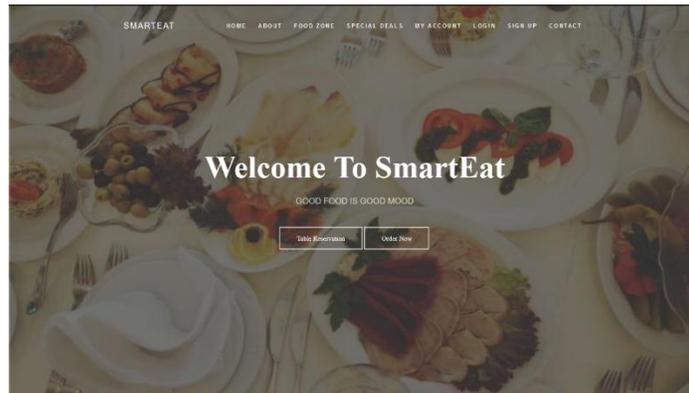


Figure 2: Welcome Page

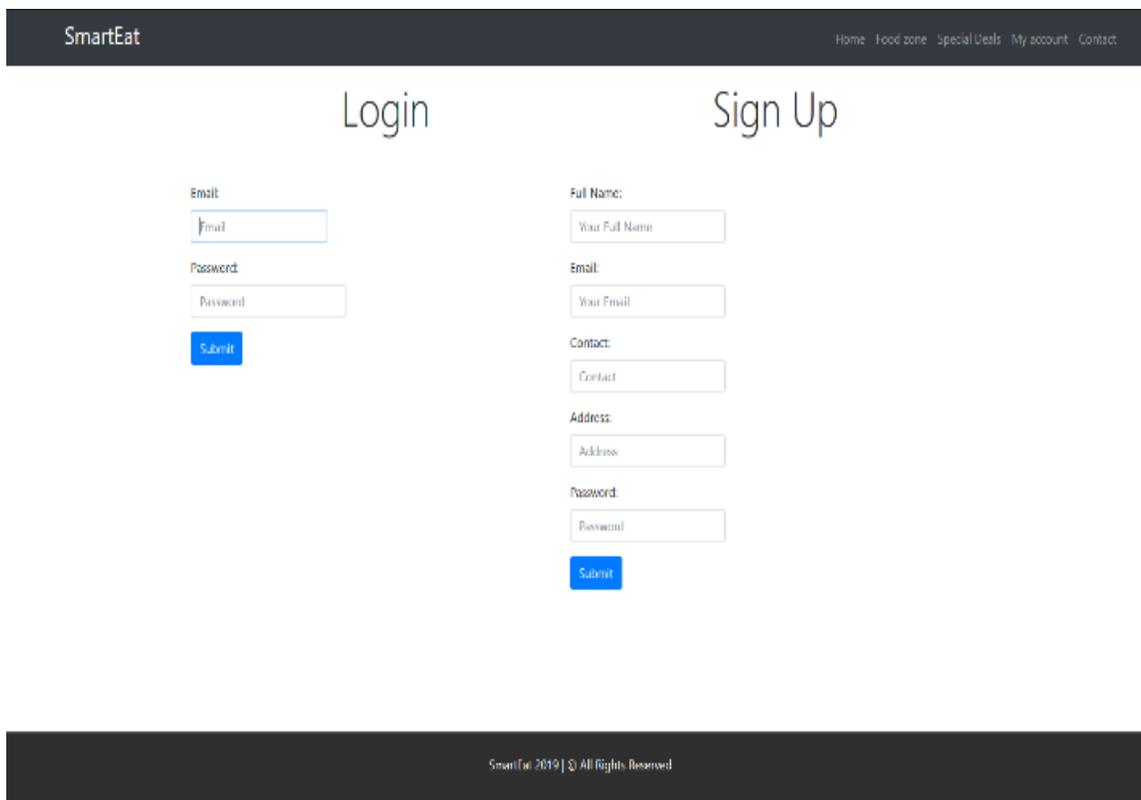


Figure 3: Registration and Login Page

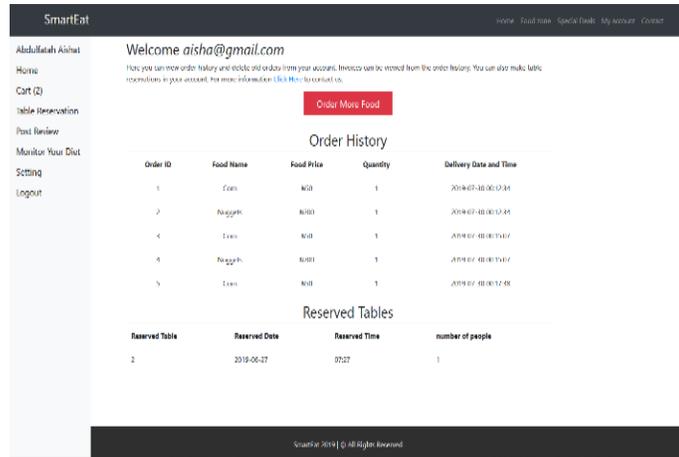


Figure 4: User Account Interface

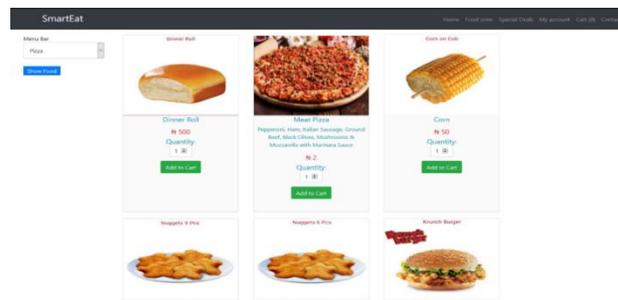


Figure 5: Main Menu Page

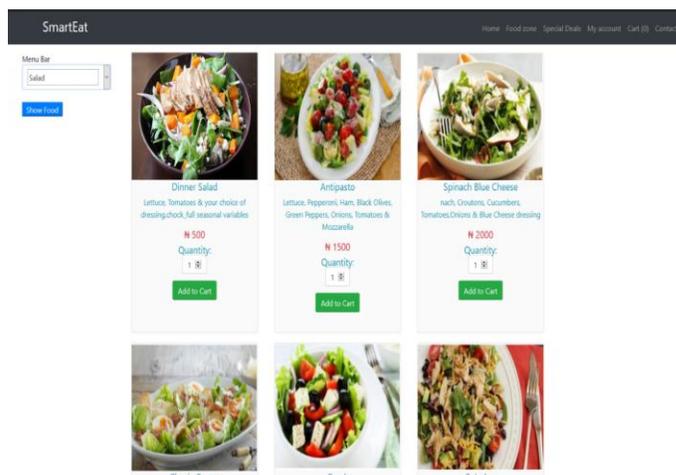


Figure 6: Food Category Interface

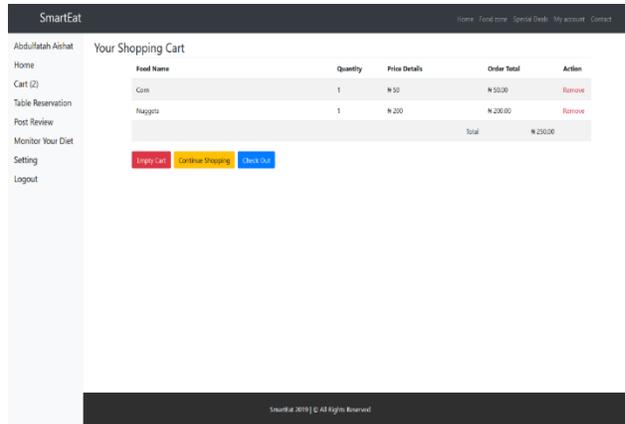


Figure 7: Cart page

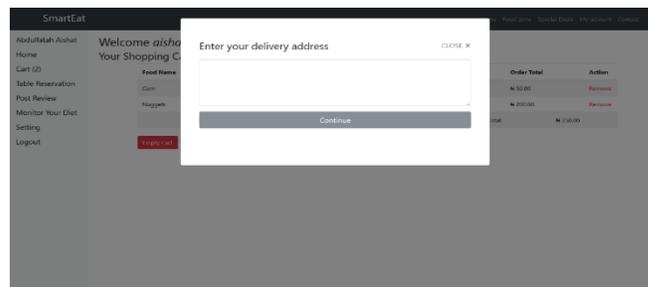


Figure 8: Delivery Address Form

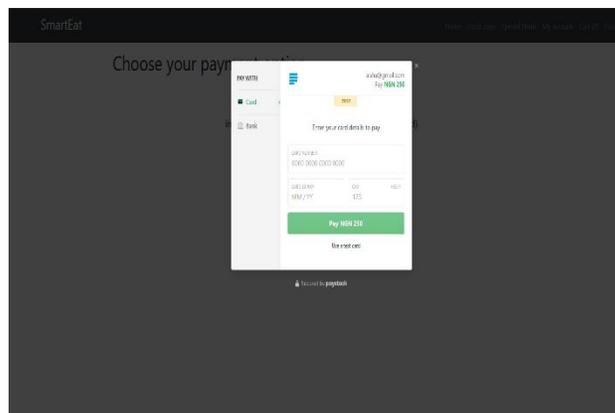


Figure 9: Payment page for debit card

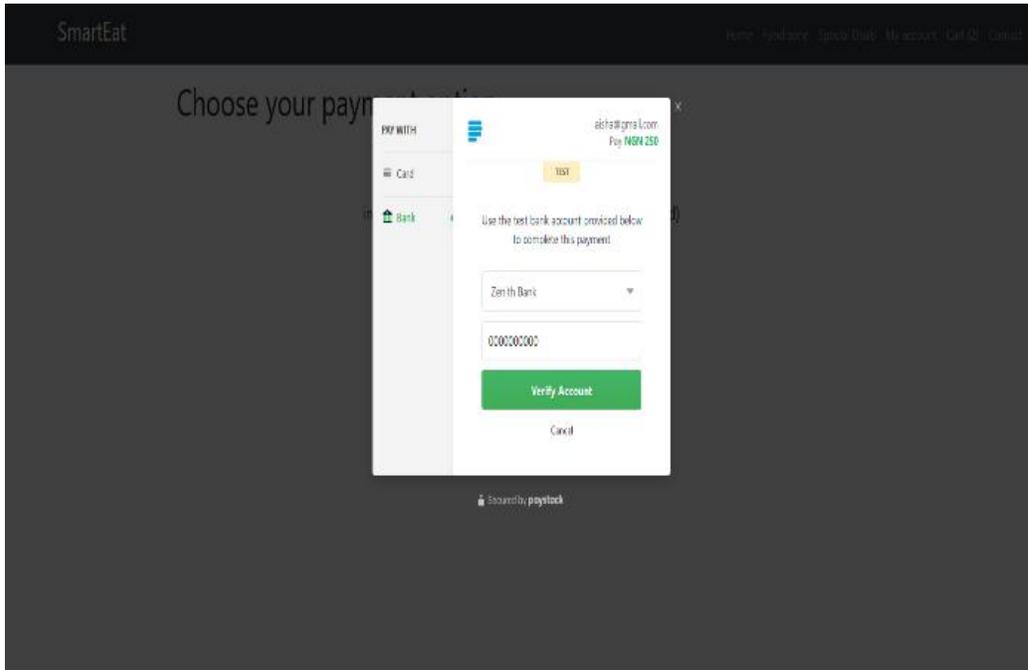


Figure 10: Payment page for bank transfer

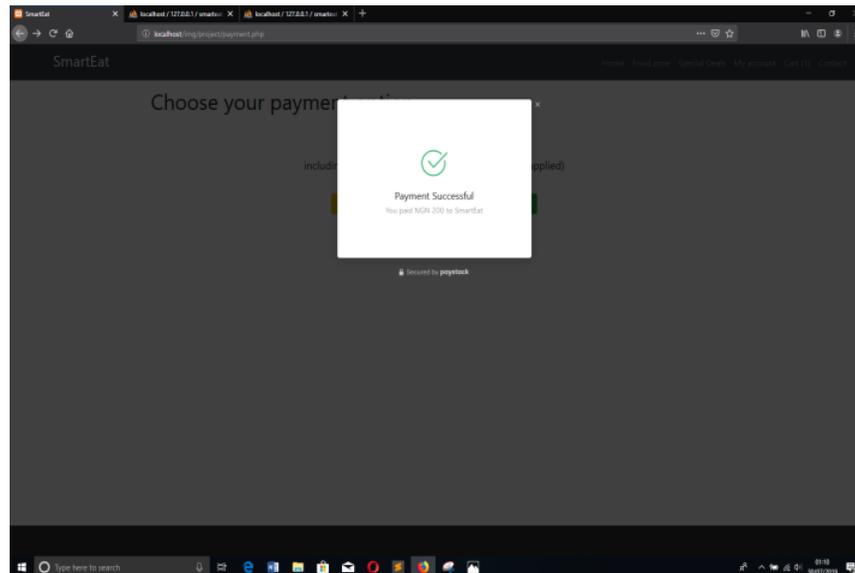


Figure 11: Payment verified

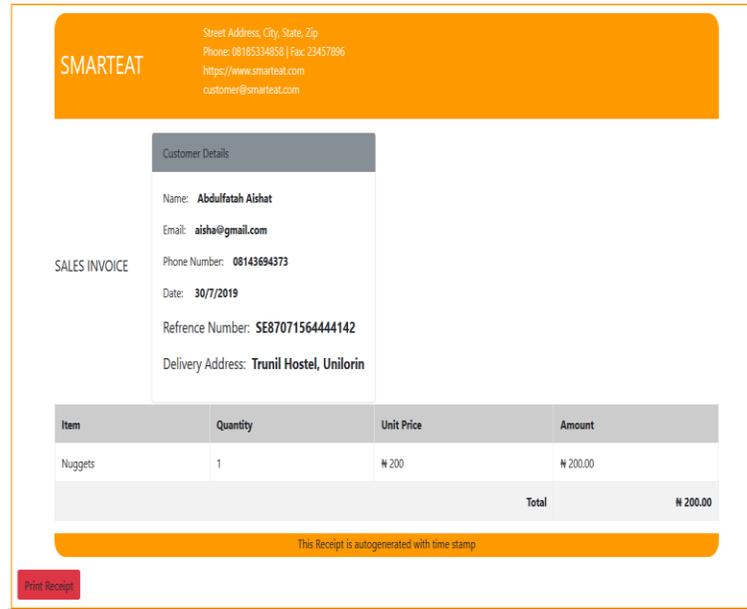


Figure 12: Customer Receipt

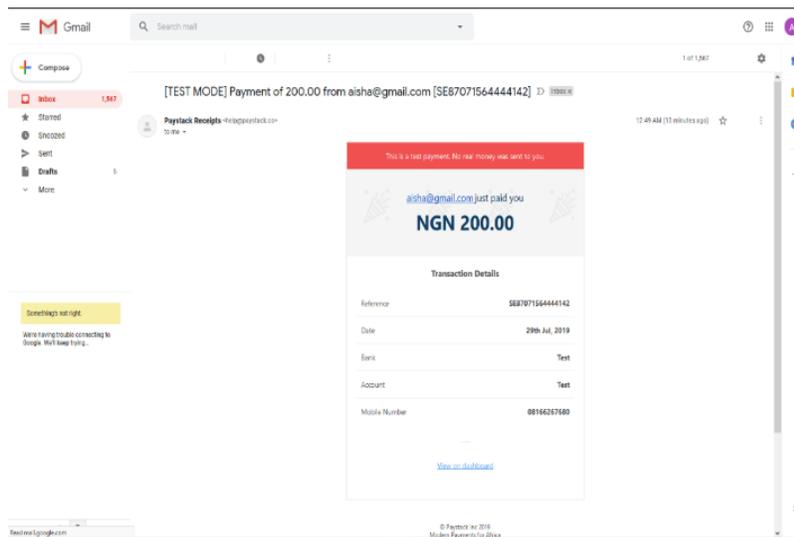


Figure 13: Email Receipt copy

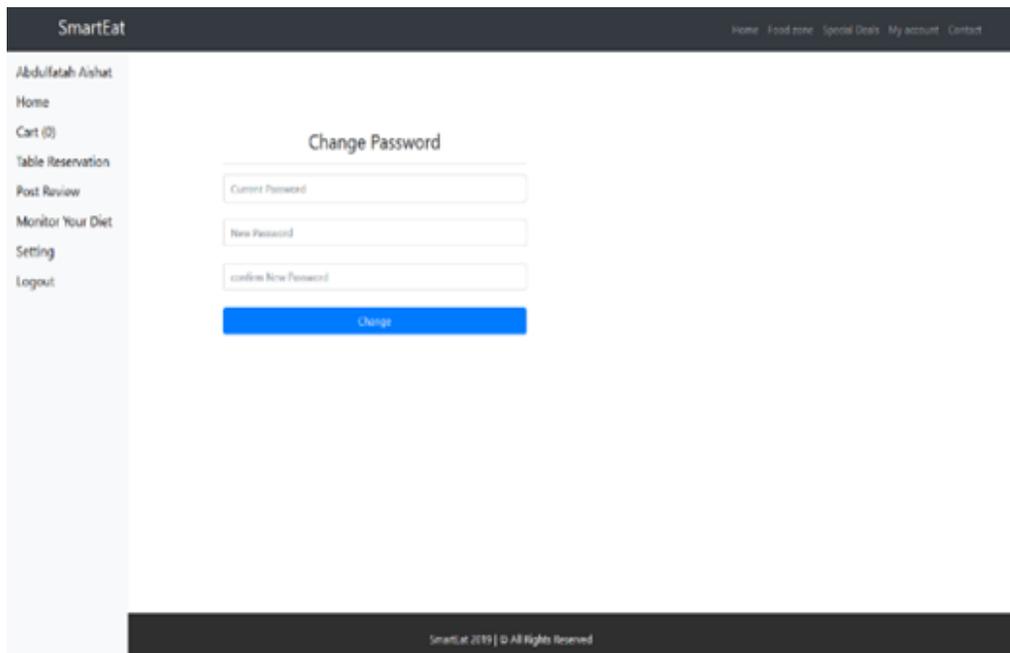


Figure 14: Setting

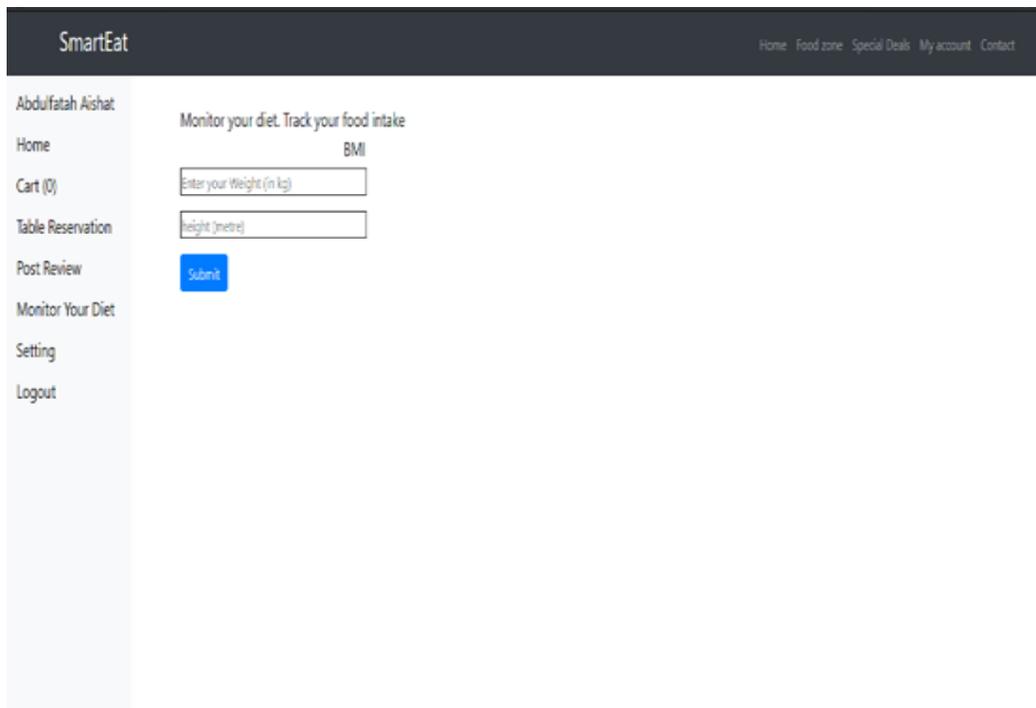


Figure 15: BMI Calculation Interface

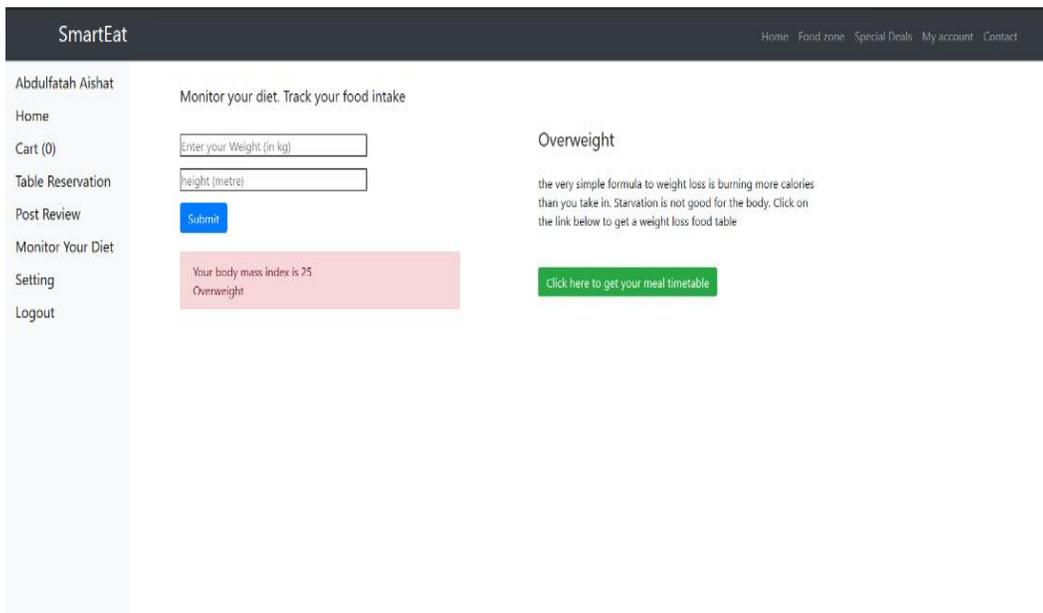


Figure 16: Customer BMI status

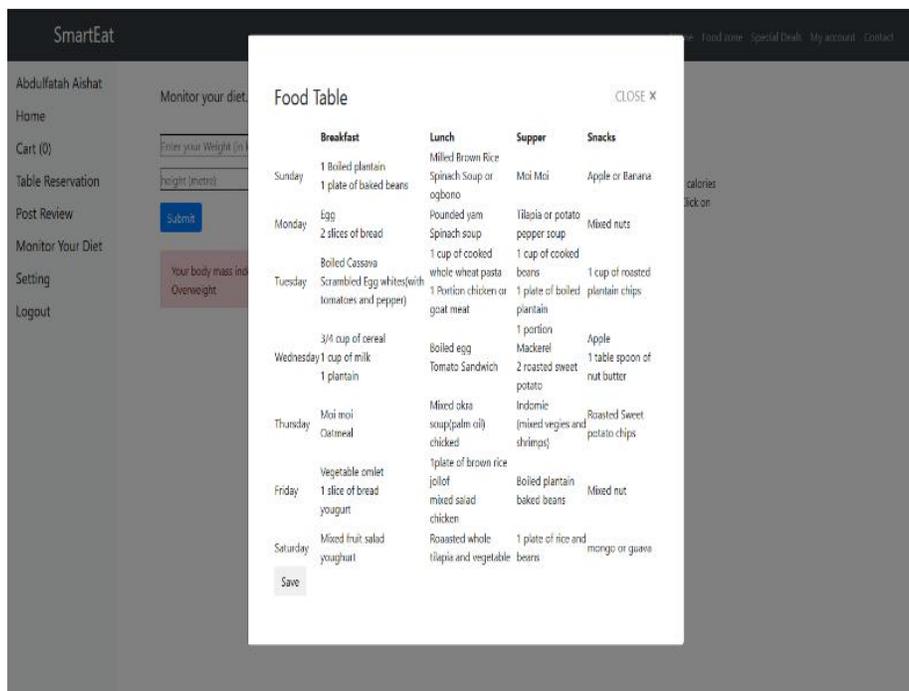


Figure 17: Meal Table Interface

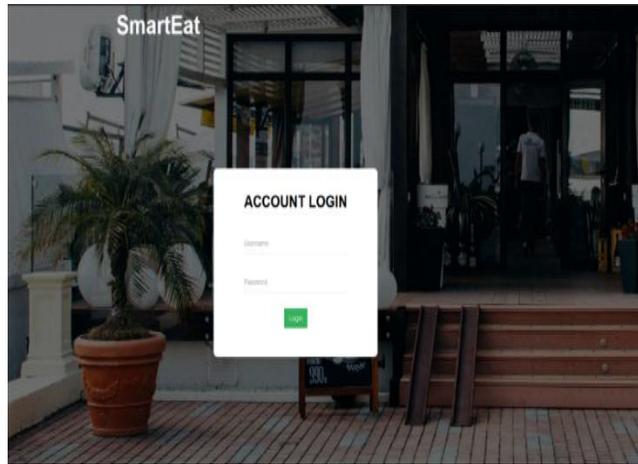


Figure 18: Staff and Manager Login Interface

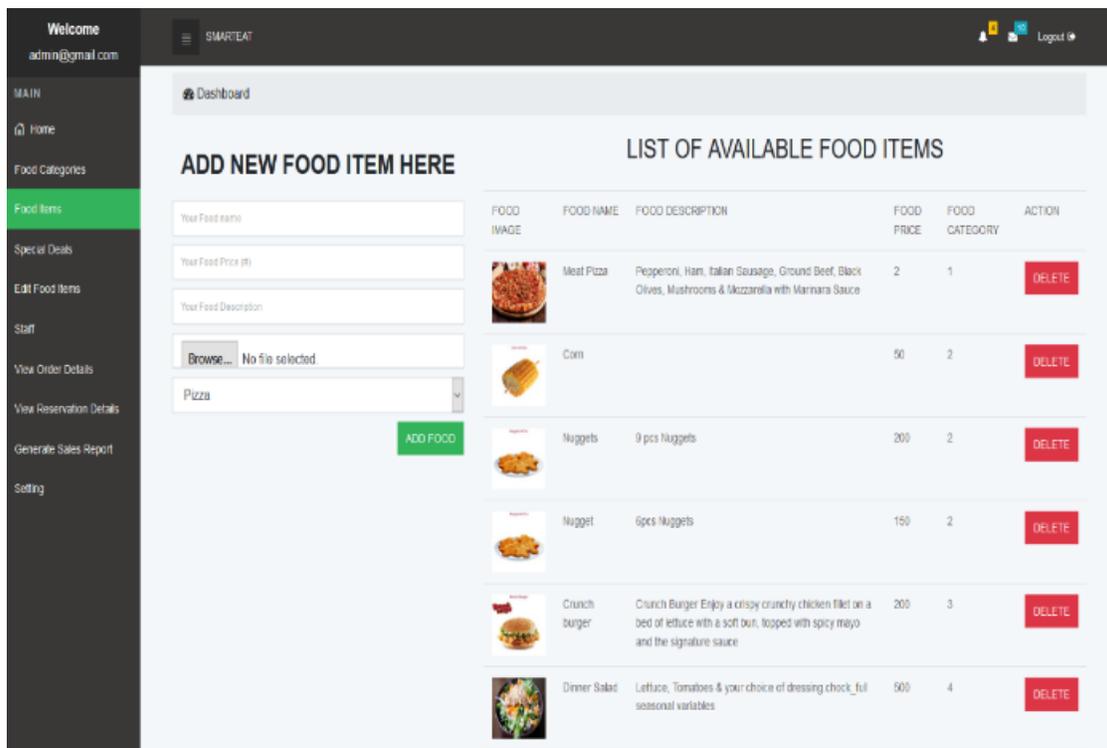


Figure 19: Add and delete food item

The screenshot displays a web interface for a food ordering system. On the left is a dark sidebar with a 'Welcome' message and a user email 'admin@gmail.com'. Below this is a 'MAIN' menu with options: Home, Food Categories, Food Items, Special Deals, Edit Food Items, Staff, View Order Details (highlighted in green), View Reservation Details, Generate Sales Report, and Setting. The main content area is titled 'List of food order' and includes a 'Dashboard' link. It features a table with the following data:

ID	FOOD NAME	FOOD PRICE	FOOD QUANTITY	ORDER DATE AND TIME	
1	Com	50	1	2019-07-30 00:12:34	<a href="#">Verify</a>
2	Nuggets	200	1	2019-07-30 00:12:34	<a href="#">Verify</a>
3	Com	50	1	2019-07-30 00:15:07	<a href="#">Verify</a>
4	Nuggets	200	1	2019-07-30 00:15:07	<a href="#">Verify</a>
5	Com	50	1	2019-07-30 00:17:35	<a href="#">Verify</a>

Figure 20: View Order Details

APPENDIX**Database Design**

The system was designed using MYSQL. The tables with the appropriate field size are under listed:

## Customer Table

Table 3.1 stores personal details about any customer that fills in the registration form for an account

**Table 3.1: Schema of registration Table**

FIELD	DATA TYPE	LENGTH
Customer_id	Int	11
Email	Varchar	30
Full_name	Varchar	30
Password	Varchar	30
Contact	Varchar	30
Address	Varchar	50

## Food category Table

Table 3.2 stores the categories of food available in the restaurant

Table 3.2: Schema of the food category table

FIELD	DATA TYPE	LENGTH
Category_id	Int	11
Category_name	Varchar	50

## Food description Table

Table 3.3 stores information about the foods available in the restaurant like the price, the category it belongs to, and what it is made of.

**Table 3.3: Schema of food description table**

FIELD	DATATYPE	LENGTH
Food_id	Int	11
Food_name	Varchar	30
Food_price	Varchar	30
Food_description	Varchar	200
Food_image	Varchar	100
Food_category	Varchar	300

## Food order details table

Table 3.4 stores information about any order placed such as the food name, quantity, delivery location, date, and time the order was placed as well as the customer that placed the order.

**Table 3.4: Schema for order details**

FIELD	DATATYPE	LENGTH
Order_id	Int	11
Food_id	Int	11
Customer_email	Varchar	30
Food_name	Varchar	30
Food_price	Varchar	30
Food_quantity	Int	30
Order_date and time	Datetime	
Order_status	Int	30
Delivery_address	Varchar	200

## Staff Table

This stores information about staffs of the restaurant including their login details

**Table 3.5: Schema for Staff table**

FIELD	DATATYPE	LENGTH
Staff_id	Int	11
Fullname	Varchar	50
Email	varchar	50
Contact	Varchar	11
Address	Varchar	255
Password	Varchar	10
Level	Int	11

#### Message Table

Table 3.6 stores message sent by the customers or staffs to the restaurant

**Table 3.6: Schema for the message table**

FIELD	DATATYPE	LENGTH
Message_id	Int	15
Message_from	Varchar	225
Message_date	Date	
Message_time	Time	
Message_subject	Text	
Message_text	Text	

#### Table reservation details

This stores information sent by the customers on their table reservation

**Table 3.7: Schema for Table reservation**

FIELD	DATATYPE	LENGTH
Member_id	Int	11
First_name	Varchar	255
Last_name	Varchar	255
Number_of_people	Varchar	255
Phone	Varchar	255
Date	Varchar	255
Time	Varchar	255
Message	Varchar	255

Customer Body Mass Indicator (BMI) table

This table stores information about the height and weight of the customer to get the BMI

**Table 3.8: Schema for Customer BMI**

FIELD	DATATYPE	LENGTH
Id	Int	11
Customer_id	Int	11
Customer_weight	Int	11
Customer_height	Int	11
Customer_bmi	Int	11