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ATC Bakery Online Booking System

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Abstract

The Online Booking Bakery System for ATC Bakery is a web-based platform developed using HTML, CSS, JavaScript, and PHP, with Adobe Dreamweaver as the development environment. The proposed system overcomes the current process that has been used manually and inefficiently. The proposed system enables dynamic and interactive web pages, ensuring seamless user interactions and efficient data processing. The system's cross-platform compatibility allows access from various devices and browsers, while real-time updates and a responsive interface enhance the customer experience. E-commerce functionality facilitates secure online transactions, providing a convenient platform for browsing, ordering, and making payments for bakery products. Safe online banking transactions and a reservation date/time feature aligned with personalized and on-demand services. Leveraging web programming languages and e-commerce capabilities, the system offers enhanced user experience, secure transactions, and operational efficiency. This revolutionizes the online bakery experience, establishing a robust platform for customers and administrators.

1. Introduction

Established in the industry for 17 years, Cupcakes Bakery has evolving demands of their dedicated customer. Throughout the year, they have embarked on a transformative journey. Their goal is to provide the best services for customers with seamless and convenient interaction. This business operation domain is based on Food and Beverages (FNB) by selling desserts [1].

Till nowadays, the operational process for order taking from the customer remains traditional [2]. This can bring disadvantage for the company reputation. The process for order taking is usually from WhatsApp messages and Instagram direct messages. For orders that are less than ten customers may be handled easily. But there is a situation where for a day the administrator receives twenty to thirty orders with the same pickup day. Therefore, a systematic schedule to divide the bakery teams may need many labors worker.

Currently, the bakery faces a problem characterized by operational inefficiencies, a heightened risk of errors, and inadequate customer engagement due to its reliance on unstructured social media messaging for order processing. The lack of a formal order management system means that order details, particularly for custom cake designs and decorations, are prone to inaccuracies and delays, leading to potential customer dissatisfaction. Moreover, the current approach to capturie customer preferences details is probable to errors, further risk of not meeting customer expectations. Additionally, the absence of order tracking capabilities and a structured platform for customer interaction, such as personalized accounts or feedback channels, detracts from the overall customer experience. This issue needs a solution that streamlines the bakery's order handling process, ensures precise capture of customer orders, and enhances engagement and satisfaction through

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improved communication and order monitoring facilities. Therefore, this project developed a proposed system for the bakery to store their customer data safely [3]. Indirectly, developing this system can reduce the problem of losing important data and ensure that ordering management can be carried out smoothly.

This project aims to develop an ATC Bakery booking system that uses a web-based approach. The scope of the project involves the administrator and the customer. The system function that will be implemented in this bakery. The administrator will manage the customer information, such as personal information, ordering products, and the baker information, such as product description, by updating, creating, retrieving, and deleting any products in the bakery shop. The proposed system will have five modules to achieve the system functionalities. This project will be implemented using prototyping as a software development lifecycle (SDLC) methodology.

The developed system for the ATC Bakery booking system will be organized and efficiently operate for the bakery and customer implementing all the requirements that have been analyzed for the case study. The bakery can offer customers a seamless and convenient way to place orders and track orders. This system can enhance efficiency by automating administrative tasks, such as generating reports and managing order statuses, leading to streamlined operations. Furthermore, improving the company website can boost online visibility, customer engagement, and sales. Overall, this project offers an opportunity to modernize and optimize ATC Bakery's digital presence, enhancing customer satisfaction and business growth.

The rest of the paper is organized as follows: Section 2 discusses the literature review of the related work and existing applications. Next, the methodology used to develop the application, including the analysis and design, is described in Section 3. Section 4 will discuss the results and discussion of the project. Finally, the last section concludes the current work and highlights the future work for the next project.

2. Literature Reviews

ATC Bakery & Trading is well-known for its signature durian D24 crepe and strawberry crepe; the bakery offers a diverse range of treats, from cupcakes, cakes, mini bento cakes, cheese tart, Batik cake and pastry to popcorn and gift hampers for special occasions. An issue confronting online bakeries centered around the intricacies of order management, mainly through messaging platforms like WhatsApp.

The sheer volume of messages and the lack of a structured system often result in missed orders, delayed responses, and confusion concerning payment and pickup details. This disrupts the customer experience and presents significant challenges for the administrative team in maintaining order accuracy and ensuring elevated levels of customer satisfaction. To address these challenges and align with the current trends in the industry, the proposed solution involves developing and implementing the ATC BAKERY online system.

Online shopping is a process whereby consumers directly buy goods, services etc. from a seller without an intermediary service over the Internet. Shoppers can visit web stores from the comfort of their house and shop as by sitting in front of the computer. Online stores are usually available 24 hours a day and many consumers have internet access both at work and at home. So, it is very convenient for them to shop Online. One of the most enticing factors about online shopping, particularly during holiday season, is, it alleviates the need to wait in long lines or search from a store for a particular item [6].

To develop the online shopping system, an information management concept is utilized. The information management system is designed to leverage technology to flawlessly process data. It helps to ensure integration with various organizational procedures. It aims to equip decision-makers with the necessary insights and data points for effective organizational decision-making [4]. Emphasizes the crucial role of information as an essential resource in the information society, highlighting the multifaceted nature of information management, which involves aspects such as change management, systems and services, technology, collection development, personnel management, finance, and planning [5].

Stated that in this study comparison of three existing systems together with the proposed system is provided. It is to ensure that the previously mentioned features can be implemented, or the proposed system can be improved. Based on **Table 1**, registration and login features are only included in Soru Station and the proposed system for the registration and login function for dessert ordering. For category and product, for the user to be able to view the detailed details of their product, it is available in all existing systems and proposed systems. While for Booking features only Soru Station is the only existing system that has provided this feature, and so does the proposed system. Payment and invoice features are only available in the proposed system. Lastly, for reporting, only the proposed system will implement the feature.

Table 1: Comparison analysis between existing system

Features/Systems	Mamasab Bakery	Soru Station	Baker's Cottage	**ATC Bakery Booking System**
Registration and Login module	X	√	X	√
Category and Product module	√	√	√	√
Booking module	X	√	X	√
Payment and invoice module	X	X	X	√
Reporting module	X	X	X	√

3. Methodology

Systems Development Life Cycle (SDLC) provides the foundation for the processes used to develop an information system. A methodology is a formalized approach to implementing the SDLC (i.e., it is a list of steps and deliverables). There are many different systems development methodologies, and they vary in terms of the progression that is followed through the phases of the SDLC [7]. The most suitable methods to be used has been analyzed and identified. Therefore, the prototyping methodology is the most suitable in developing this system.

3.1 Prototyping Model

The prototype methodology consists of the five phases in the system development life cycle methodology: requirements gathering and analysis, quick design, building a prototype, initial user evaluation, refining prototype, and implementing product and maintaining. This methodology is suitable for developing a new system, requiring user involvement from time to time to observe the progress of the prototype system development and correct any errors to meet user requirements**.** The prototype methodology involves a high level of commitment among users, system developers, and technology [8]. **Figure 1** shows the project methodology framework.

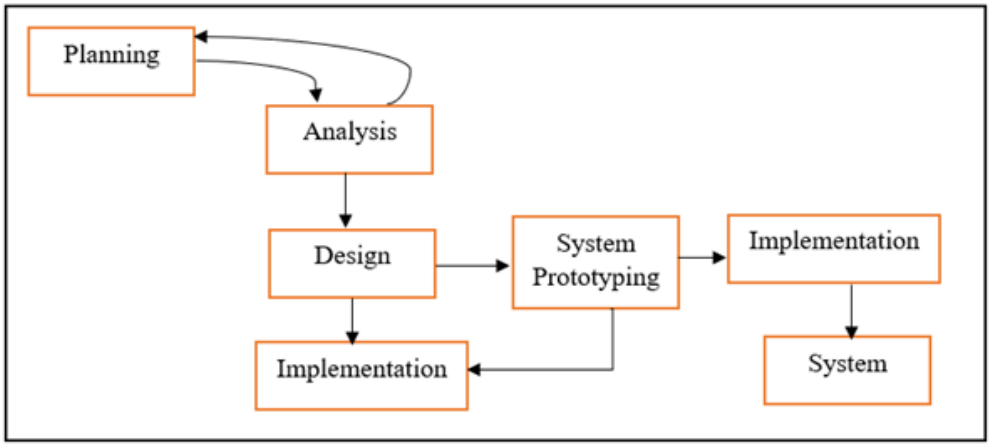

Fig 1 *Project methodology framework*

3.1.1 Planning Phase

Data and information are needed to develop the system. The process of selecting the title and supervisor for the project was crucial and was carried out. After that, a proposal was created to explain the system to be developed, namely ATC bakery booking system. Identifying the problems has been conducted to determine the system's goals, objectives, and scope.

3.1.2 Analysis Phase

This phase is essential for understanding the current problems and requirements of ATC Bakery in developing a new system. A comprehensive understanding is formed through interviews, existing system reviews, and comparative research. The goal is to design a system that automates manual processes and improves overall efficiency, with visual aids such as DFD and ERD, which may be helpful in conceptualizing the system's operations.

3.1.3 Design Phase

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System design acts as a structure during the development of the system. These designs can also help avoid careless mistakes during system development. Creating a user-friendly interface that facilitates smooth navigation through the booking system, ensuring that users can efficiently complete actions such as logging in, searching, ordering, and receiving notifications. Simultaneously, a well-structured database is designed to manage the data effectively, emphasizing the avoidance of redundancy and clarity in data handling. This organized approach aims to enhance the functionality and usability of the ATC Bakery Booking System.

3.1.4 Implementation Phase

This phase is where it will be developed according to the requirements and user interface that have been designed. It is important to ensure that the software meets its requirements and user's needs. Program code will be written in this phase. In developing the system, programming languages such as PHP, HTML, CSS, and JavaScript are used as the system's front-end and back-end. The system that is being developed will be developed based on the requirement of its functionality. Testing and debugging will be implemented after complete development of the system. This process must be executed and evaluated to ensure it is available for use and accepted by users without error. In this phase, system documentation will be done as the system also have complete.

3.1.5 Testing Phase

In the system prototype phase, the prototype system is tested before handing it over to the user. Users will examine the system to ensure whether the system meets user requirements or not. In this phase, any improvement will be implemented according to the users' needs. Improvements will be made with several versions until the system meets the user requirements.

4. Analysis and Design

This section will describe the analysis of the study and data schema. It includes Context Diagram (CD), System Architecture Data Flow Diagram (DFD), Flowcharts, and Entity Relationship Diagram (ERD).

4.1.1 Context Diagram

In **Figure 2**, the ATC Bakery Booking System context diagram illustrates its interactions with two external entities. Customer and Administrator. The system streamlines the online ordering of bakery products by defining the flow of information and system boundaries. Customers interact with the system through actions such as registration, ordering, scheduling pickups, and payment while receiving confirmations, product information, order updates, and historical data. Administrators manage product listings, order approvals, and fulfillment and generate reports on sales and performance. The diagram serves as a guide for system design and a reference for stakeholders, aiming to enhance the system's effectiveness and user experience.

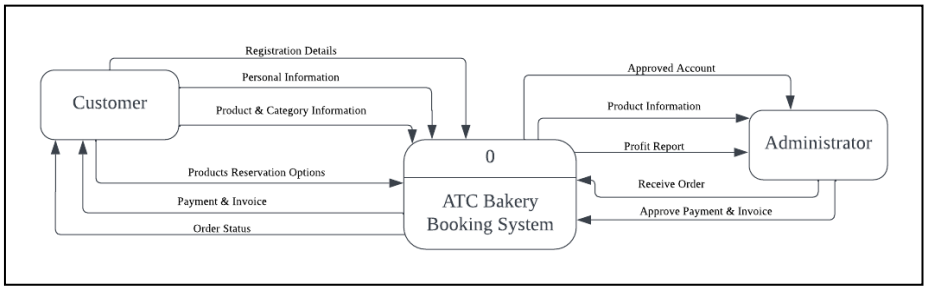

Fig 2 *Context Diagram*

4.1.2 Data Flow Diagram Level 0 (DFD 0)

Data Flow Diagram (DFD) is a graphical representation of the flow of data or input from an entity through a process, which then generates output either to another entity or stored in data storage. DFD shows each input and output for each entity and process. **Figure 3** shows the Level 0 Data Flow Diagram (DFD 0) of the developed system

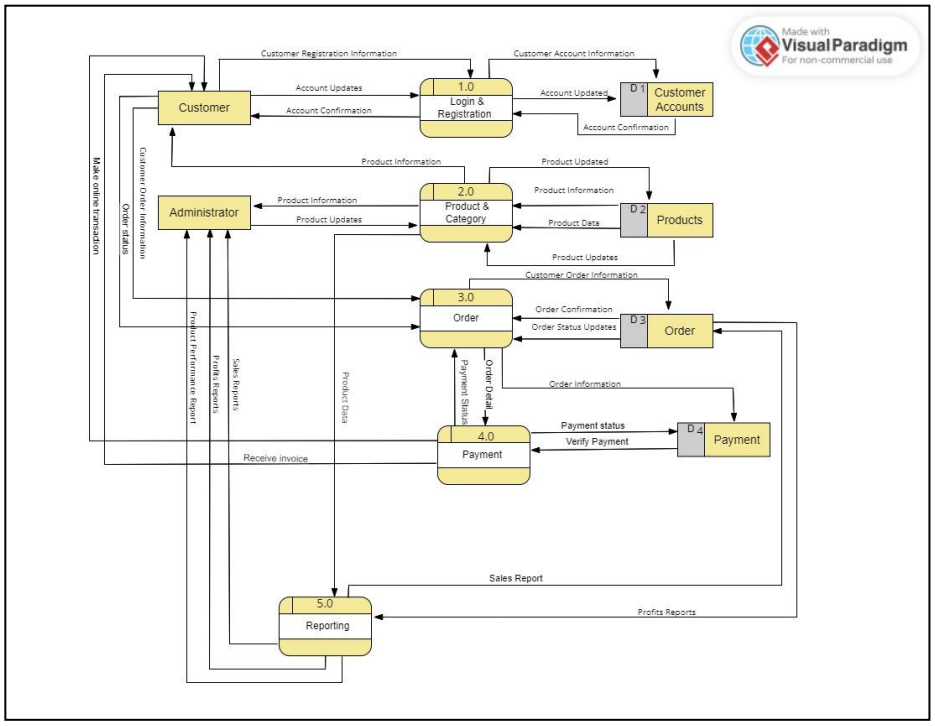

Fig 3 *Data Flow Diagram Level 0*

Figure 3 shows the first process which is the Data Flow Diagram (DFD) level 0 that represents a system with five main processes involved in handling customers, products, orders, payments, and reporting. Each process is connected to data stores and external entities.

Login and Registration is the process that handles customer interactions when they attempt to access the system. New customers can register by providing their registration information, which is then stored in the Customer Accounts data store. Existing customers can log in to the system, at which point their account information is retrieved from the Customer Accounts data store to confirm their identity and provide access to the system. This process is essential for customer authentication and maintaining up-to-date customer information.

This process Product and Catalogue involves the management of product information within the system. The Administrator external entity can provide product updates, which are reflected in the Products data store. Customers can also request product information, which will be retrieved from the Products data store and provided to them. This process ensures that the product catalog is current and that customers can access detailed product descriptions.

In this process, customers place orders for products. The system captures the order details and stores them in the Order data store. Simultaneously, the system provides confirmation of the order to the customer. The Administrator can also update the order status, which the system then communicates back to the customer. This process is critical for processing customer orders and communicating order status.

The final process in the DFD is responsible for generating reports. It takes in product data and produces sales and profit reports. These reports are likely used by the Administrator to make informed decisions about the business, such as marketing strategies, and financial analysis. This process is essential for the ongoing management and strategic planning of the business.

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4.1.3 System Architecture

The architecture of the proposed system is structured to provide a smooth and secure transaction process for customers while offering comprehensive management capabilities to administrators. The database design process underpins this by ensuring data is structured in a way that supports these functions effectively.

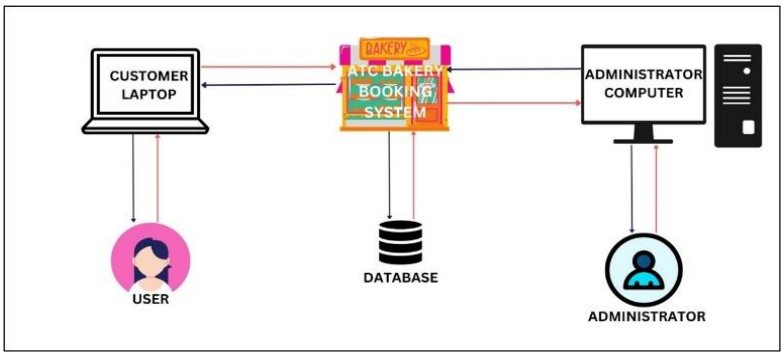

Fig 4 System Architecture

Figure 4 separates customer-facing functionalities like browsing and purchasing from admin-specific tasks like managing products and orders. This segregation ensures a streamlined user experience for both customers and bakery staff, contributing to the smooth operation of the ATC Bakery Booking System. The system interacts with a computer, presumably a web server, which facilitates communication with the database containing product information and order details. Once customers choose their desired items and proceed to checkout, the system directs them to an external payment gateway for secure online transactions. Upon successful payment, the order is confirmed, and the customer receives a notification.

4.1.4 Flowchart

A flowchart is a graphical representation of a series of steps. It is usually used to present the flow of an algorithm, workflow, or process because it shows the steps sequentially. Flowcharts often depict processes as a variety of boxes, with arrows connecting them in the correct order. The flow chart also shows all the work processes that involve all the processes in the system. **Figure 5** shows the flowchart for customer processes and **Figure 6** shows the flowchart for administrator processes.

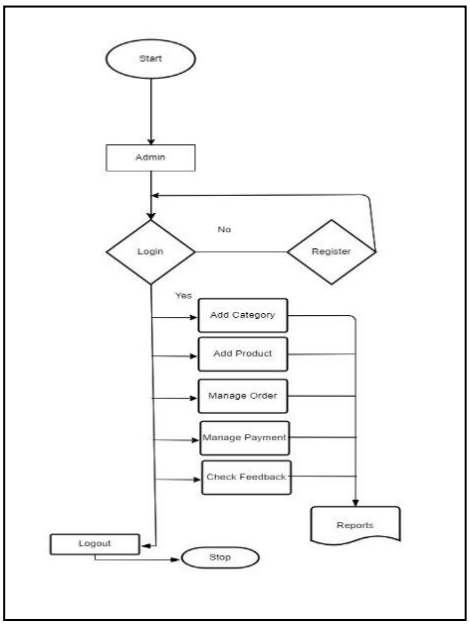

Fig 5 Flowchart for Customer process

Figure 5 shows the flowchart for the Customer process. Once logged in, browsing of bakery products and item additions to the cart are facilitated. Upon completion of shopping, the cart is displayed for quantity update. When satisfied, the customer proceeds to checkout. When ready to purchase, they proceed to payment, where they can choose between uploading a bank transaction receipt for online payment or opting for cash payment at the store. Upon completing the payment process, their order is placed, and they can safely log out.

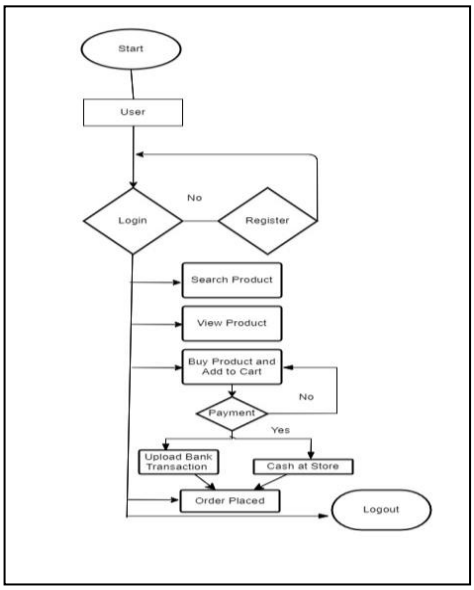

Fig 6 *Flowchart for Administrator process*

The flowchart process for the Administrator is shown in Figure 6. The login is then presented to the admin with various management options. The admin can add or manage product categories and individual products to fulfill orders by checking payment status and processing them. Payment management involves reviewing and approving payments. Additionally, the admin can analyze performance through sales reports and customer feedback. Finally, the admin can log out.

4.1.5 Entity Relationship Diagram

Entity Relationship describes the relation of each entity that is connected. Customers can place multiple orders. The system is designed to facilitate the management of a bakery's offerings and orders, along with a transparent payment system ensuring a smooth operation and customer satisfaction. **Figure 7** shows the details of the ATC Bakery Booking System Entity Relationship Diagram.

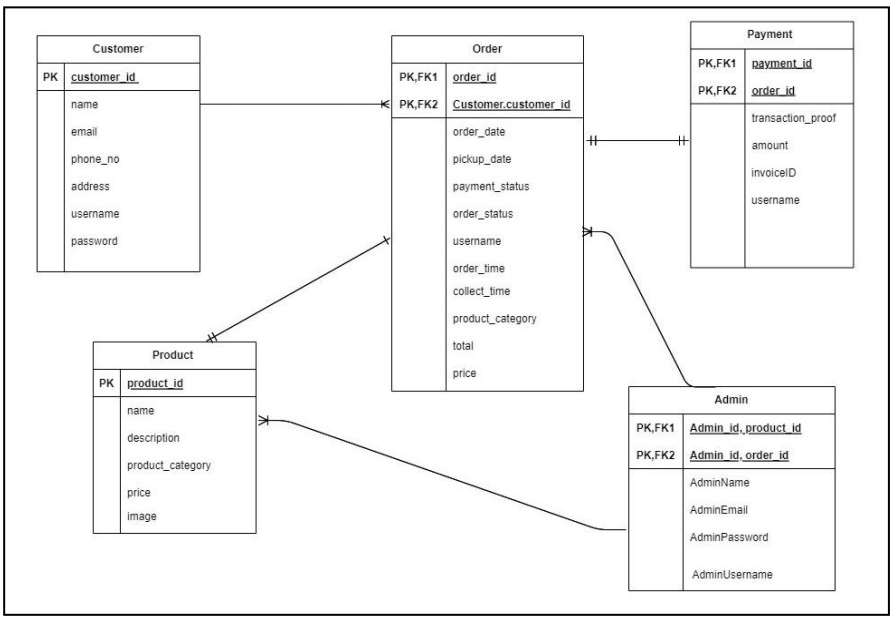

Fig 7 *Entity Relationship Diagram*

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5. Result and Discussion

Table 2 shows the test case for the Account Registration and Login module. There is a total of 3 test cases for this module. This test aims to verify whether the administrator is allowed to register for an account and log in into the system and whether the system will restrict login if an incorrect credential is entered. Table 2 shows that all three (3) tests passed.

Table 2: Test Case for Account Registration and Login Module

Module: Account Registration and Login				
Test Case ID	**Description**	**Expected Result**	**Actual**	**Result**
M1-1	To check whether user can login account	The user should be able to create for an account	The user has successfully created for an account	Pass
M1-2	To check whether an administrator can login into the system	The user should be able to login into the system	The user has successfully logged into the system	Pass
M1-3	To check whether the system will restrict login whenever a wrong credential is entered	The system should restrict login when an incorrect credentials has been entered	The system restricted the login when an incorrect or no credentials has been entered	Pass

Table 3 shows the test cases for the administrator's Products and Order Status module. There are a total of 7 test cases for this module. This test aims to verify the functionality of displaying products, searching, pagination, and error handling for the customer user. **Table 3** shows that all seven (7) tests had passed.

Table 3: Test Case for Administrator

Module: Administrator Products and Orders Status				
Test Case ID	**Description**	**Expected Result**	**Actual**	**Result**
AO1	View order details for a specific order ID.	Display all relevant information about the selected order, including products, customer details, and total amount.	All relevant order information was displayed correctly.	Pass
AO2	Search for orders by customer name or order ID.	Retrieve orders matching the entered customer name or order ID.	Orders were retrieved correctly based on customer name or order ID.	Pass
AO3	Update order status.	Change the status of an order (e.g., from pending to processing or completed).	Order status was updated correctly.	Pass
AP1	Add a new product.	Successfully add the new product to the database.	New product was added successfully to the database.	Pass
AP2	Edit existing product details.	Update the product information (e.g., name, price, description, image).	Product details were updated correctly.	Pass
AP3	Delete a product.	Remove the selected product from the database.	Product was removed successfully from the database.	Pass
AP4	View product details.	Display all relevant information about the selected product, including name, price, description, and image.	Product details were displayed correctly.	Pass

Table 4 shows the test cases for the Shop and Products module for users. There are a total of 7 test cases for this module. This test aims to verify the functionality of displaying products, searching, pagination, and error handling for the customer user. **Table 4** shows that all seven (7) tests had passed the test.

Table 4: Test Case for User

Module: Shop and Products				
Test Case ID	**Description**	**Expected Result**	**Actual**	**Result**
CU1	Verify successful display of products without any search parameters.	All products should be displayed on the shop page.	All products were displayed correctly on the shop page.	Pass
CU2	Validate the functionality of searching products by category and price range.	Products matching the selected category and price range should be displayed on the shop page.	Products matching the search criteria were displayed correctly.	Pass
CU3	Ensure proper pagination functionality.	Pagination links should allow users to navigate between pages of products.	Pagination links worked correctly, allowing navigation between pages.	Pass
CU4	Validate the display of products per page.	Only the specified number of products per page should be displayed.	Correct number of products displayed per page.	Pass
CU5	Verify the redirection to the single product page upon clicking the "Buy Now" button or product image.	Users should be redirected to the single product page upon clicking the "Buy Now" button or product image.	Users were correctly redirected to the single product page.	Pass
CU6	Validate the behaviors of pagination controls when navigating to the first and last pages.	Users should be able to navigate to the first and last pages using the pagination controls.	Pagination controls worked correctly, allowing navigation to the first and last pages.	Pass
CU7	Ensure proper handling of database connection issues.	Users should be presented with an error message if there are any database connection issues during product retrieval.	Error messages were displayed correctly during database connection issues.	Pass

Table 5 shows the test cases for the Reporting Dashboard module. There are a total of 3 test cases for this module. This test aims to verify the administrator's ability to view and generate reports effectively. **Table 5** shows that all three (3) tests had passed the test.

Table 5.4: Test Case for Reporting Dashboard Module

Module: Reporting for Administrator				
Test Case ID	**Description**	**Expected Result**	**Actual**	**Result**
AR1	View Total Orders per Day	Produce detailed reports with graphs and charts illustrating orders	The reporting interface displayed visualization information such as pie charts and bar charts correctly.	Pass
AR2	Product Categories Distribution	Produce detailed bar chart for total products by categories	The source code provided for reporting functions executed without errors and produced the expected output.	Pass
AR3	Monitor product performance.	Display real time payment, revenues, number of products and number of users	All reports related to orders and products that need to be processed were generated accurately.	Pass

6. Conclusion

The need for a structured approach tin helping the ordering management system for the ATC Bakery is crucial. The current manual system highlights the challenges faced by the bakery due to its reliance on unstructured social media messaging for order processing. The lack of a formal order management system leads to operational inefficiencies, errors, and inadequate customer engagement. The proposed solution involves the development and implementation of the ATC Bakery online system, aiming to streamline the bakery's order handling process, ensure precise capture of customer orders, and enhance engagement and satisfaction through improved communication and order monitoring facilities. From this proposed system it can provide customers a seamless and convenient way to place orders, track orders, and enhance efficiency by automating tasks for administrators. Furthermore, offering an opportunity to modernize and optimize ATC Bakery's digital presence, enhancing customer satisfaction and business growth. Lastly from the analysis and observation with the existing system in the market have given ideas to encourage the continuation of the current research, indicating the need for further development and refinement of the ATC Bakery online system to meet evolving customer needs and industry trends.

Acknowledgement

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References

This guide contains examples of common types of APA Style references. Section numbers indicate where to find the examples in the Publication Manual of the American Psychological Association (7th ed.).

[1] Zebua, S., Anathasya, G., & Puspitasari, Y. (2022). Understanding how consumer’s FNB engage with Digital Storefront. JMBI UNSRAT (Jurnal Ilmiah Manajemen Bisnis Dan Inovasi Universitas Sam Ratulangi)., 9(3), 1017–1034. https://doi.org/10.35794/jmbi.v9i3.43958

[2] Raside, A. N., & Ramli, A. A. . (2021). Development of Online Bakery Shop Web Application (e-Bakery). *Applied Information Technology And Computer Science*, *2*(2), 1846–1859. Retrieved from https://publisher.uthm.edu.my/periodicals/index.php/aitcs/article/view/3913

[3] Muhammad Syahir Ramadhan Mohd Badrol, & Mohd Azahari Mohd Yusof. (2023). Secure Food Ordering System For DHaratmas Restaurant. *Applied Information Technology And Computer Science*, *4*(2), 120–138. Retrieved from https://publisher.uthm.edu.my/periodicals/index.php/aitcs/article/view/12068

[4] Neziraj, E., & Shaqiri, A. B. (2018). The impact of information technology in decision making process of companies in Kosovo. Informatologia, 51(1–2), 13–23. https://doi.org/10.32914/i.51.1-2.2

[5] Ravichandra, I. (1998). *Information Management : An Overview*. https://ir.inflibnet.ac.in/bitstream/1944/2223/1/Information%20Management%20

[6] C.K.Sunitha, & Gnanadhas, E. (2014). Online shopping - an overview. *ResearchGate*. https://www.researchgate.net/publication/264556861_Online_Shopping_-_An_Overview#:~:text=Online%20shopping%20is%20a%20platform,services%

[7] ALAN DENNIS, BARBARA HALEY WIXOM, ROBERTA M. ROTH. (2012). SYSTEM ANALYSIS AND DESIGN Fifth Edition. John Wiley & Sons, Inc. https://www.uoitc.edu.iq/images/documents/informatics-institute/Competitive_exam/Systemanalysisanddesign.pdf

[8] Nacheva, R. (2017, June 28). *PROTOTYPING APPROACH IN USER INTERFACE DEVELOPMENT*. ResearchGate. https://www.researchgate.net/publication/317414969_PROTOTYPING_APPROACH_IN_USER_INTERFACE_DEVELOPMENT