

CtCake Ordering System

Nur Aqilah Azizah Nordin¹, Rozita Abdul Jalil^{1*}

¹ Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia (UTHM), Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author: rozita@uthm.edu.my
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Abstract

The bakery industry increasingly relies on technology to enhance customer experience and operational efficiency, particularly in managing custom orders. At Ct Cake Silaturahim, a home-based bakery in Ipoh, Perak, orders are managed manually via WhatsApp, Instagram, and agents, resulting in inefficiencies such as delayed responses, missed bookings, and limited capacity to analyze customer feedback. To address these challenges, this research focuses on developing a web-based ordering system, CtCake, to centralize and streamline order management processes. Using the Prototyping Methodology, the system was iteratively designed and developed with feedback from stakeholders to ensure it meets business needs. Core functionalities include a user-friendly interface for browsing and ordering cake, QR code payment, and tools for collecting and analyzing customer feedback. Data flow diagrams and entity relationship diagrams guided the design, while MySQL was employed to implement the database. The results demonstrate significant improvements in order accuracy, customer satisfaction, and operational efficiency. The system reduces response time, minimizes errors, and provides actionable insights through data analytics. In conclusion, the CtCake system enhances the ability to manage orders efficiently and positions the business for sustainable growth by fostering improved customer engagement and operational excellence.

1. Introduction

An ordering system in a bakery simplifies placing orders, enhancing convenience and reducing errors. For Ct Cake Silaturahim, an efficient ordering system is crucial for customer satisfaction and sales. Orders are managed manually through WhatsApp, Instagram, and agents, with booking details recorded on paper. The line between online and real environments has blurred, with companies leveraging the rise of online ordering, which is now more popular than traditional methods due to its ease, speed, accuracy, and transparency [1]. Online systems allow customers to browse items, compare options, and place orders anytime, improving customer relationships [2]. However, the manual system causes inefficiencies and errors, leading to delays and missed orders.

Ct Cake Silaturahim's manual order management process leads to delays in responding to customers, overlooked orders, and difficulties in tracking feedback from multiple platforms. These issues result in poor customer experiences and disrupt business operations. The cake shop can significantly improve its operational efficiency, enhance customer satisfaction, and expand its market reach by implementing an online ordering system. Transitioning to an online ordering system could streamline the order process, making it more efficient and accessible for both the shop and its customers [3]. Without an automated system, the business will continue to struggle with inefficiencies, limiting its growth and negatively impacting customer satisfaction.

2. Literature Review

2.1 E-commerce

E-commerce refers to buying and selling goods and services over the internet, significantly transformed how businesses and consumers interact. It includes various types, such as Business-to-Consumer (B2C), where companies sell directly to individuals, and Consumer-to-Consumer (C2C), where individuals sell to each other via platforms [4]. E-commerce has grown exponentially with technological advancements, creating vast global opportunities for companies, lowering operational costs, and increasing consumer convenience by enabling online transactions and digital services [5].

The convenience of e-commerce has led to a rapid market expansion, as businesses can now reach a wider audience without physical storefronts. Platforms like online marketplaces and social media channels have enabled businesses to engage with consumers more efficiently and in real-time. Additionally, the rise of mobile commerce (m-commerce) has empowered consumers to shop anywhere, enhancing the customer experience [6]. As a result, e-commerce is shaping the future of retail, offering personalized shopping experiences and altering traditional business operations.

2.2 Comparison with the Existing Systems

During the development of the proposed system, several existing systems were analyzed for comparison. The selected systems for this project are Yubake, Ipoh Cakes, and KetoCake. Table 1 compares these three existing systems and the proposed system

Table 1 System Comparison

Features/System	Yubake	Ipoh Cakes	KetoCake	CtCake
Log in / Register	✓	✓	✓	✓
Category / Search	✓	✓	✓	✓
Menu	✓	✓	✓	✓
Cart	✓	✓	✓	✓
Feedback	×	✓	×	✓
Menu Description	×	✓	✓	✓
Customization	×	✓	✓	✓

3. Methodology

This chapter outlines the methodology employed for the project, detailing the chosen model, its phases, and the workflow involved in system development. The selected approach for this project is the Prototyping Model.

3.1 Prototyping Model

The Prototyping Model is a development methodology where an initial working version of a system or software is created to test and validate its feasibility, functionality, and design. Prototyping converts abstract ideas into tangible configurations, allowing stakeholders to evaluate, provide feedback, and refine the system [7]. This iterative model focuses on continuous improvement through multiple cycles of development and feedback, ensuring the final product meets user expectations. This model is beneficial when project requirements are unclear or incomplete. It involves iterative stages, including gathering initial requirements, building a basic prototype, conducting evaluations with stakeholders, and refining the prototype based on feedback. The cycle continues until a satisfactory version is achieved, forming the foundation for the final system or software [8]. The iterative nature of the Prototyping Model facilitates early detection and resolution of potential issues, fostering better communication between developers and users. Ensure the system aligns with user needs and expectations, creating a more user-centric design [9]. This approach makes the development process more adaptable and responsive to changes, leading to a high-quality and effective system [10]. Figure 1 illustrates the phases of the Prototyping Model.

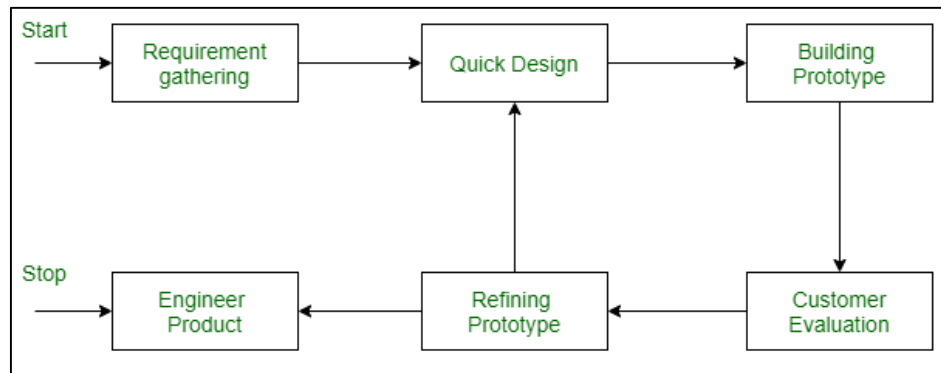


Fig. 1 Prototyping Model Phases

3.2 System Development Workflow

The prototype model has six phases. As shown in Table 2, each is designed with specific task and deliverables during the development process. Every phase focuses on producing targeted outputs that contribute to the overall progression of the project.

Table 2 Software development activities and their tasks

Phase	Task	Output
Requirement Gathering	- Identify user needs - Conduct interviews with the stakeholder - Document the system requirement	- Notes the interview - Documented requirement - Flowchart
Quick Design	- Sketch the interface - Create low-fidelity wireframes - Outline core features	- DFD & ERD - System Architecture - Database Schema & Data Dictionary - User Interface Design
Build Prototype	- Code basic functionalities - Develop prototype - Set up database	- Functional prototype - Initial coded of the system
User Evaluation	- Conduct a usability testing - Gathering user feedback - Analyze interactions	- Usability test result - Summarize user feedback
Refinement	Modify design and functionality based on the feedback	- Enhanced prototype - Updated features - Revised the system workflows
Implement and maintain	- Finalize code - Deploy system	- Functional system - Deployment documentation

3.3 System Requirements Functional and Non-Functional requirements tables

Functional requirements define the specific operations, features, and services that the system must perform to meet user needs. These include the core functionalities that ensure the system operates as intended. Table 3 shows the functional requirements of the proposed system.

Table 3 *Functional Requirements Tables*

No	Module	Description
1	User Management Module	- Allow the new users to register new account before login. - Allow the existing users to login with the id and password. - Alerts users for invalid login attempts. - Redirects users to the main menu after successful login.
2	Menu Management Module	- Allow the admin to update the daily menu details, including images, name of the menu and prices. - Ensures real-time reflection of menu changes.
3	Order Module	- The system should provide customers with cake details, including images, descriptions, and prices. - The system should enable adding items to the shopping cart. - The system should support modification of cart quantities.
4	Booking Module	- The system should enable customers to reserve cakes or desserts for specific occasions. - The system should ensure proper scheduling and management of reservations.
5	Payment	The system offers customers to make online payments through integrated payment gateways for their orders.
6	Dashboard	Admin can generate report on sales and customer feedback.

Next, the non-functional requirements focus on the system's performance characteristics, such as reliability, scalability, usability, and security. These attributes collectively guarantee that the system fulfills the operational and quality standards expected by users and stakeholders. Table 4 outlines the non-functional requirements of the developed system.

Table 4 *Non – Functional Requirements*

No	Requirement	Description
1	Performance	The system should remain responsive and usable under varying loads, always ensuring smooth operation.
2	Operational	The system should have a loading time of no more than one minute.
3	Security	The system should provide secure data handling and ensure safe transactions for users.
4	Usability	The system interface should be user-friendly and easy to navigate.
5	Scalability	The system should support the addition of new features and handle an increasing number of users over time.

3.4 System Analysis

System analysis describes the overall structure or flow of the system, including its function. In this section, the proposed system design is described. The structured approach is used to generate Data Flow Diagrams (DFD) to represent the system's processes and data flows effectively.

3.4.1 Context Diagram

Context diagrams present the overview of the interaction between the system and its user. Context diagrams also show the input and output from its user and the system. Figure 2 illustrates the Context Diagram for the CtCake Ordering System.

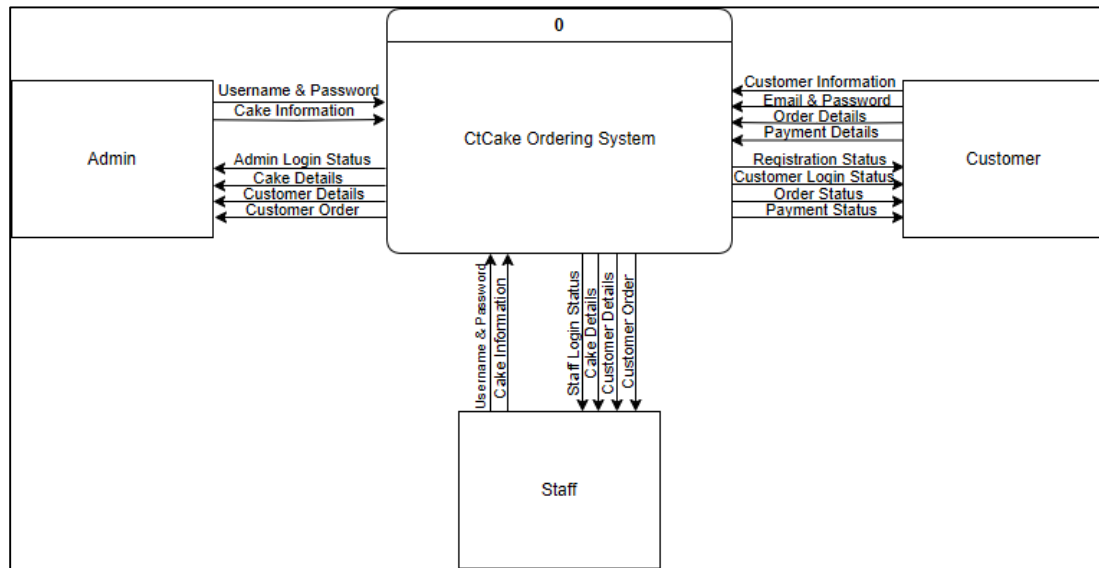


Fig. 2 Context Diagram

3.4.2 Data Flow Diagram (DFD)

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 developed system's Level 0 Data Flow Diagram (DFD 0).

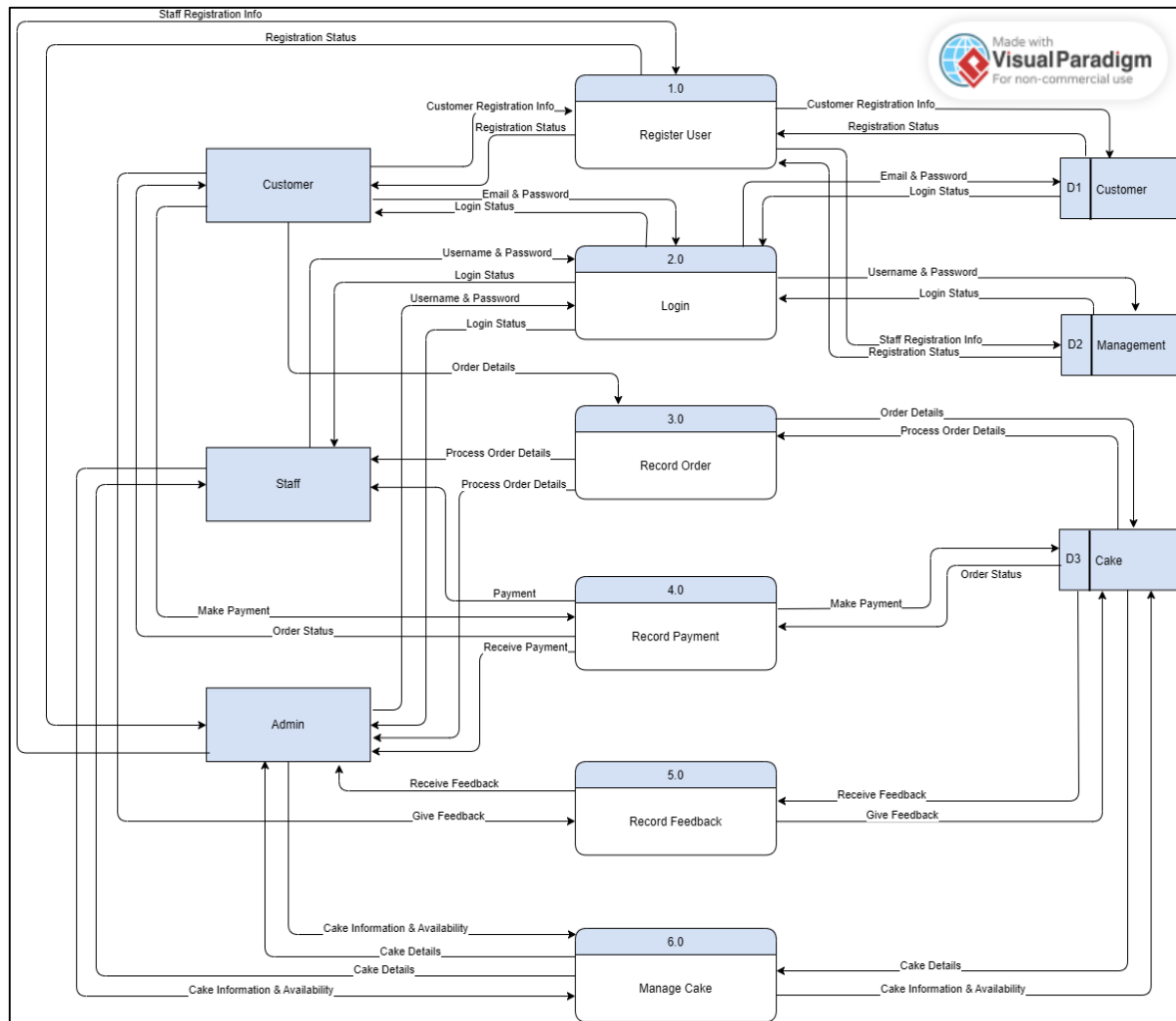


Fig. 3 Data Flow Diagram (DFD)

3.4.3 ERD

An Entity Relationship Diagram (ERD) is a visual representation of how different entities (objects or concepts) relate to each other in a system. ERDs are commonly used in database design to model the structure of a database and ensure data integrity. In this system, 6 tables have been identified, which are customer, staff, order, cake, payment and feedback. Figure 4 below illustrates the system's ERD for CtCake Ordering System.

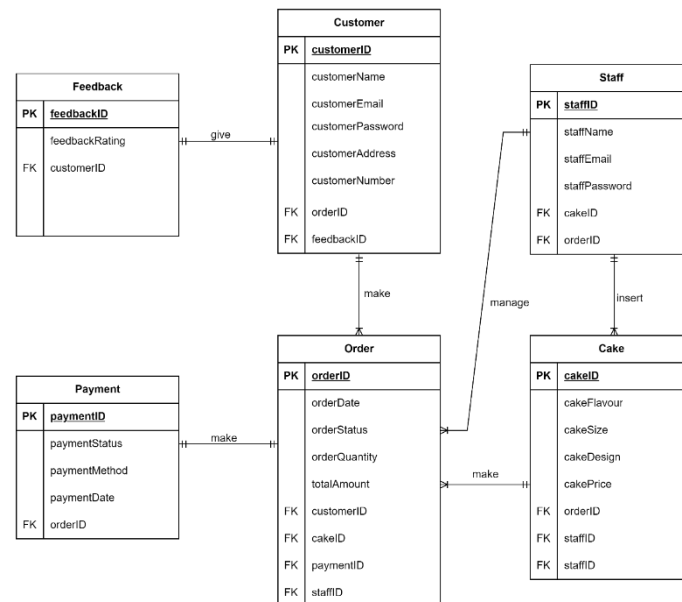


Fig. 4 Entity Relationship Diagram (ERD)

3.4.4 Flowchart

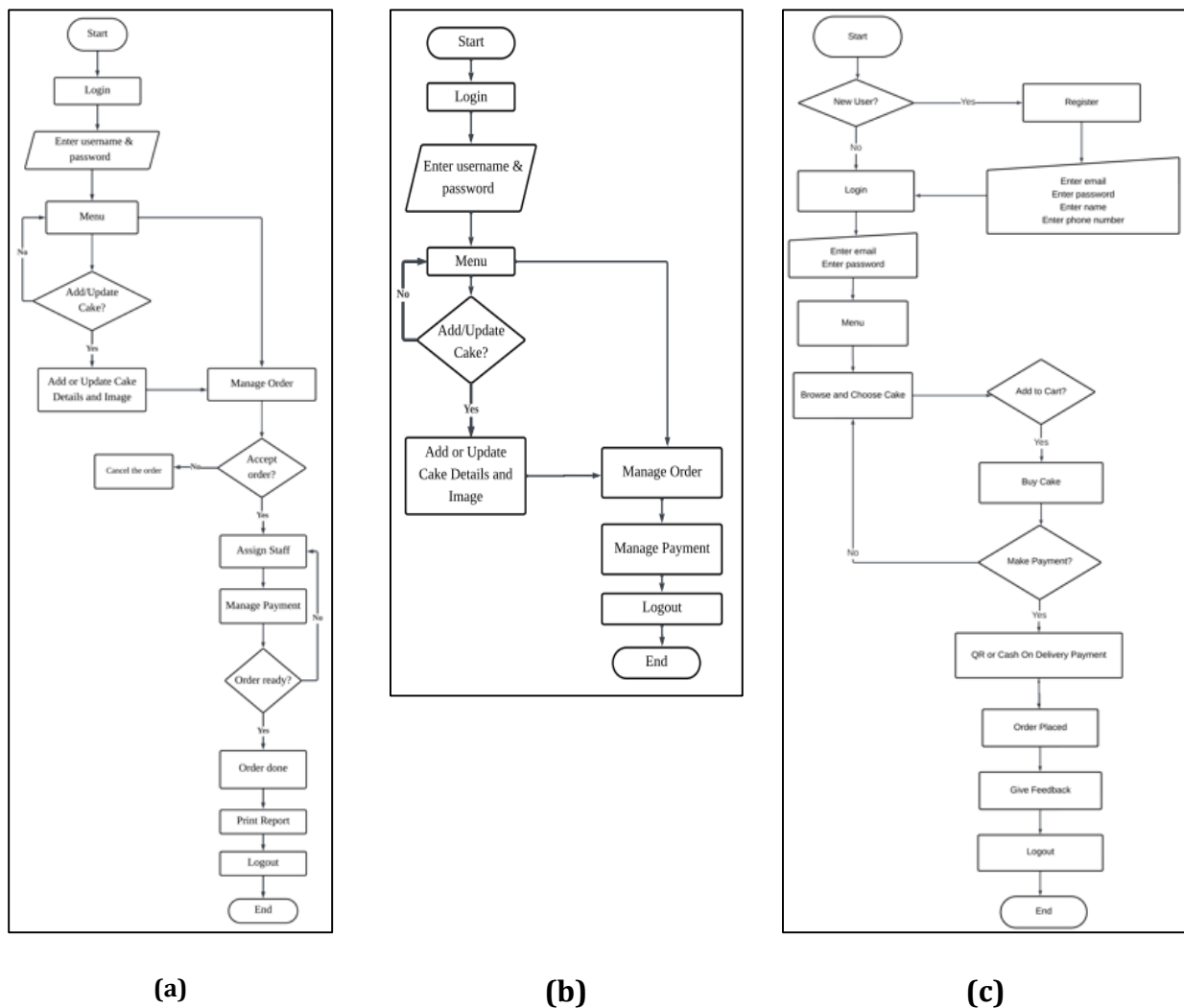


Fig. 5 Flowchart for (a) Admin; (b) Staff and (c) Customer

3.5 Interface Design

Designing the system interface is an important part of any system development process. It helps visualize how the system will look and function. A well-designed interface also plays a key role in meeting the system's requirements and ensuring a smooth user experience. The following sections present the interfaces for each module of the system.

3.5.1 UI Design

The user interface design, showing the flow of the application, is presented in Figures 8 to 15, using simple visualizations created with tools such as Figma.

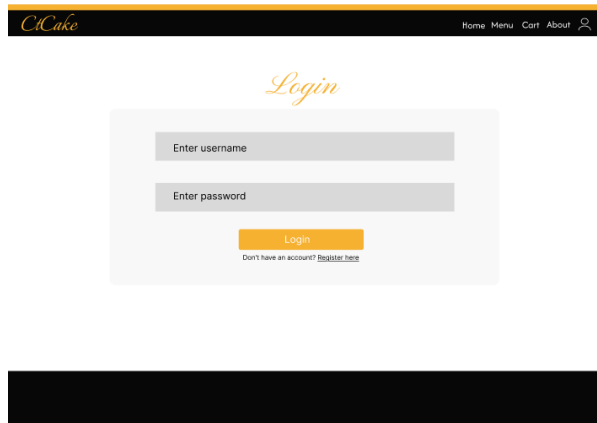


Fig. 8 Login Interface

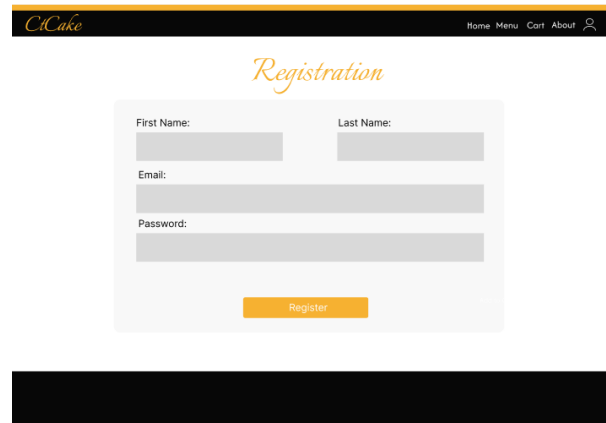


Fig. 9 Registration Interface

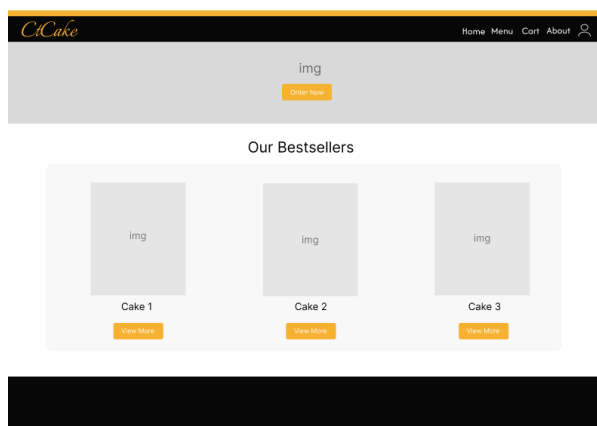


Fig. 10 Home Interface

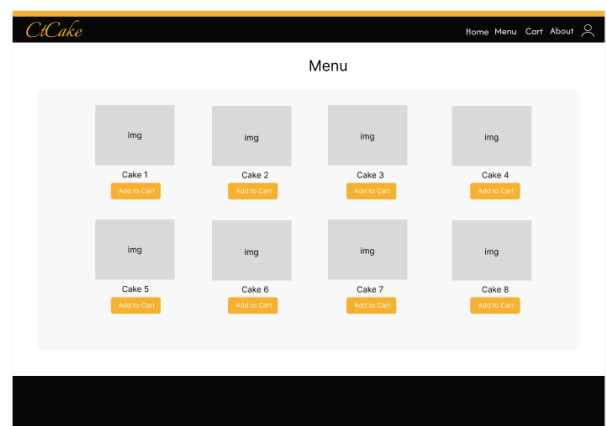


Fig. 11 Menu Interface

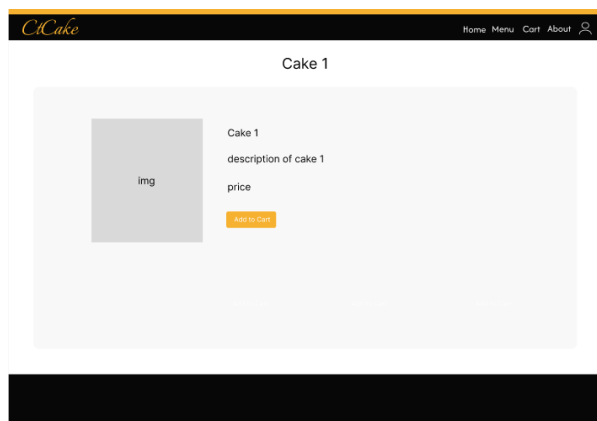


Fig. 12 Cake Description Interface

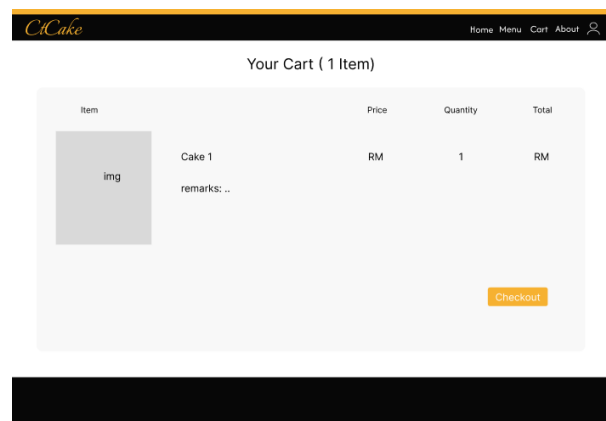


Fig. 13 Cart Interface

The image shows a web interface for 'CtCake' with a navigation bar (Home, Menu, Cart, About) and a user profile icon. The main section is titled 'Payment Details' and contains a form with the following fields: Cardholder Name, Card Number, Expiry Date, and CVV. A 'Pay Now' button is located below the CVV field. The background is a solid black color.

Fig. 14 Payment Interface

4. Result and Discussion

This section focuses on implementing and testing of the CtCake Online Ordering System. It includes the development of key features such as user login and registration, managing, adding and editing menu items, placing orders, uploading payment proofs, and handling order statuses. In addition, this section explains the functional testing that was carried out to ensure each part of the system works smoothly and meets the intended requirements.

4.1 Implementation

This section describes the development of functional modules in CtCake and provides program code to support clarification.

4.1.1 Login and Registration Interface

The image shows a web interface for 'CtCake' with a navigation bar (Contact Us) and a user profile icon. The main section is titled 'Login' and contains a form with the following fields: Enter Email, Enter Password, and a Login button. A link 'Don't have an account? Register here' is located below the Login button. The background is a solid black color.

Fig. 15 Login Interface

```

<html lang="en">
<head>
<style>
</style>
</head>
<body>
<!-- Navbar -->
<div class="navbar">
<div class="brand">CtCake</div>
<div class="menu">
<a href="contact.html">Contact Us</a>
</div>
</div>

<!-- Login Section -->
<div class="login-section">
<form class="login-form" action="login_process.php" method="POST">
<h3>Login</h3>
<input type="text" name="email" placeholder="Enter Email" required>
<input type="password" name="password" placeholder="Enter Password" required>
<button type="submit">Login</button>
</form>
</div>

<!-- Footer -->
<div class="footer">
<p>© 2024 CtCake. All rights reserved.</p>
</div>
</body>
</html>

```

Fig. 16 Login Source Code

The image shows a web interface for 'CtCake' with a navigation bar (Contact Us) and a user profile icon. The main section is titled 'Registration' and contains a form with the following fields: Full Name, Address, Phone Number, Email, Password, and Confirm Password. A Register button is located below the Confirm Password field. The background is a solid black color.

Fig. 17 Registration Interface

```

<html lang="en">
<body>

<!-- Registration Section -->
<div class="registration-section">
<form class="registration-form" action="register_process.php" method="POST">
<h3>Registration</h3>
<input type="text" name="name" placeholder="Full Name" required>
<input type="text" name="address" placeholder="Address" required>
<input type="tel" name="phone" placeholder="Phone Number" required>
<input type="email" name="email" placeholder="Email" required>
<input type="password" name="password" placeholder="Password" required>
<input type="password" name="confirm_password" placeholder="Confirm Password" required>
<button type="submit">Register</button>
</form>
</div>

<script>
const urlParams = new URLSearchParams(window.location.search);
const status = urlParams.get('status');

if (status === 'success') {
  alert('Registration successful! You can now log in.');

```

Fig. 18 Registration Source Code

Figure 15 shows the user interface for the Login page. Figure 16 display the source code used for the login function, which includes user verification. This process uses SQL queries to connect to database and check if the entered credentials match an existing user. If the login is successful, the user will be redirected to the home page. If the login fails, the system will return to the login page and display an error message. Figure 17 shows the Registration page, while Figure 18 display the source code used to handle user registration. New user can create an account and their information will be inserted into the database.

4.1.2 Manage Menu Interface

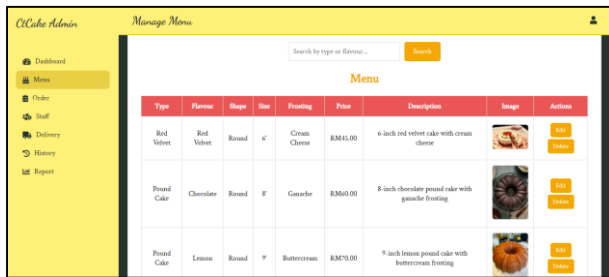


Fig. 19 Manage Menu Interface

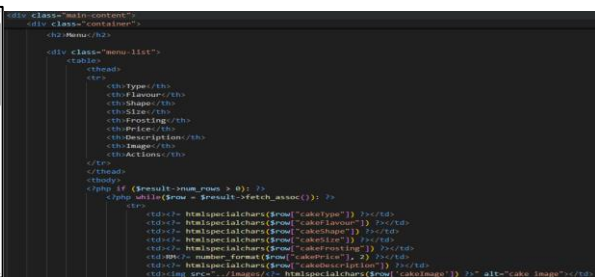


Fig. 20 Menu Source Code

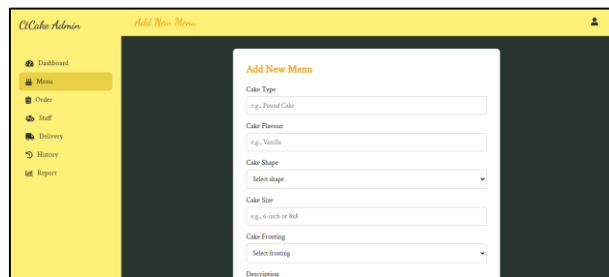


Fig. 21 Add New Menu Interface

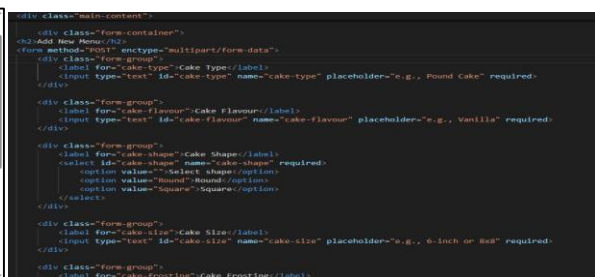


Fig. 22 Add Menu Source Code

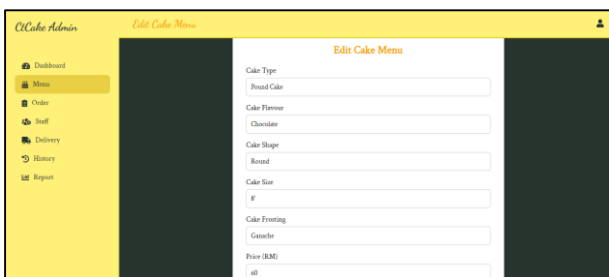


Fig. 23 Edit Menu Interface

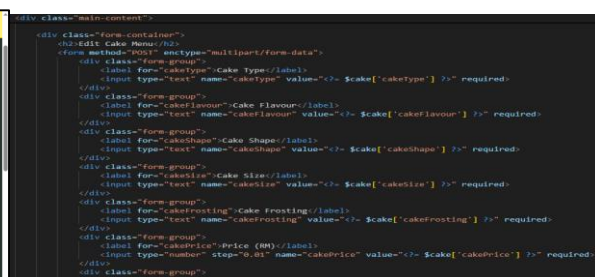


Fig. 24 Edit Menu Source Code

Figure 19 shows the Manage Menu Interface, where admin and staff can view a list of all available cakes. This interface displays cake type, flavour, price, and image. They can also choose to edit or delete existing cakes. Figure 20 displays the source code used to display and manage the menu data. The code retrieves item details from the database using SQL queries and displays them in a structured table format. Figure 21 shows the Add New Menu Interface, where admin and staff can input new cake details including the size, shape, flavour, and price. Figure 22 displays the source code for this function. Figure 23 displays the Edit Menu Interface, which allows admin and staff to update the details of existing menu items. Figure 24 shows the source code responsible for handling these updates.

4.1.3 Manage Order Interface

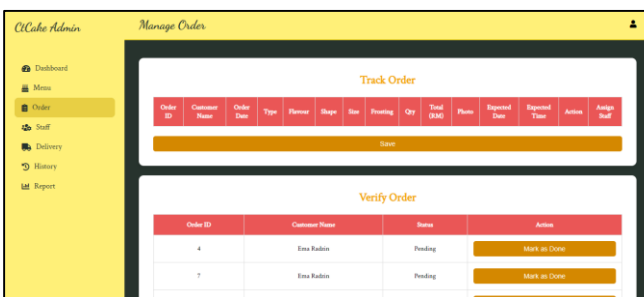


Fig. 25 Manage Order Interface

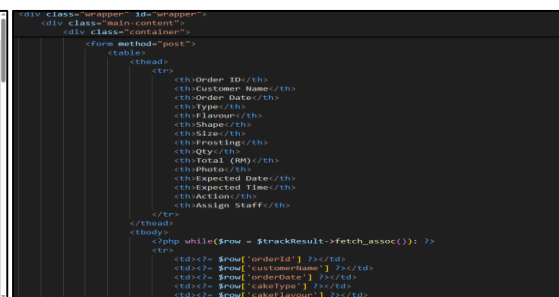


Fig. 26 Manage Order Source Code

Figure 25 shows the Manage Order Interface, which is divided into two main sections: Track Order and Verify Order. The Track Order section displays detailed information such as Order ID, Customer Name, Cake Type, Flavour, Size, Price, Quantity, and Order Status. Admins and staff can monitor and manage orders efficiently using this view. The Verify Order section allows staff to review newly submitted orders and take action by approving or marking them as completed. The interface is designed to help users quickly identify each order's progress and ensure that all orders are processed accurately and on time. On the right, Figure 26 displays the source code used to build this order management table.

4.1.4 Booking Interface

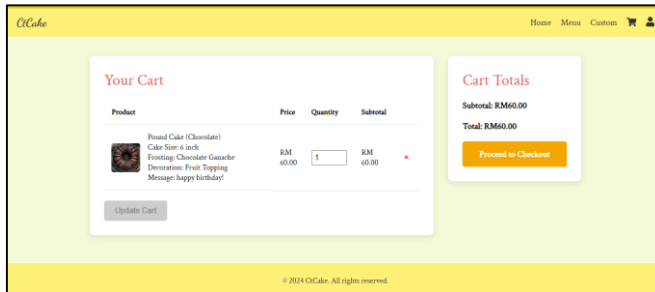


Fig. 27 Cart Interface



Fig. 28 Cart Source Code

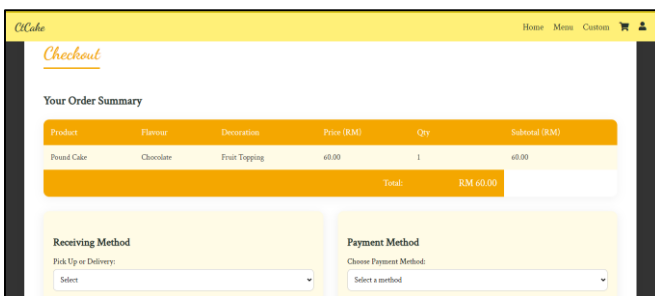


Fig. 29 Checkout Interface

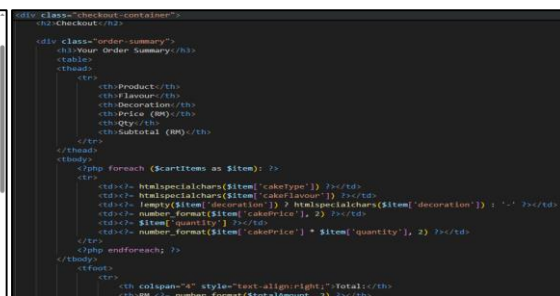


Fig. 30 Cart Source Code

Figure 27 shows the Cart Interface, where users can view, update, or remove items before proceeding to checkout. It also displays the total amount of the selected items. Figure 28 shows the source code, which retrieves cart data. Figure 29 presents the Checkout Interface, where users review their order summary, choose a delivery method, expected date, and payment option. Figure 30 shows the source code that handles displaying the order details and processing user input for final submission.

4.1.5 Payment Interface

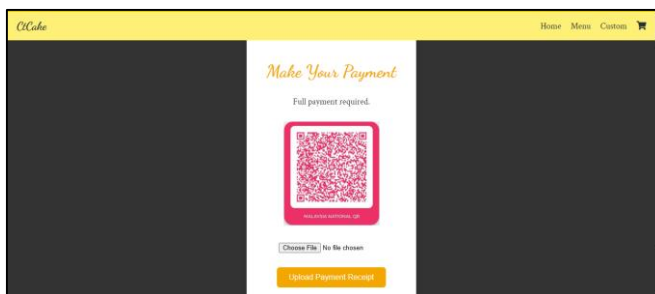


Fig. 31 Payment Interface

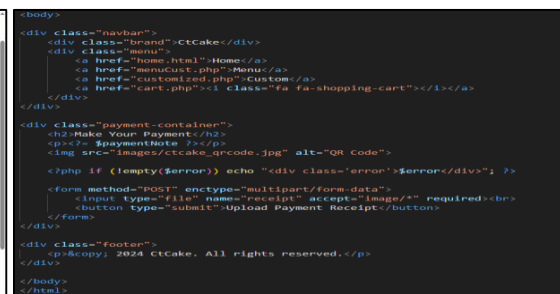


Fig. 32 Payment Source Code

Figure 31 shows the Payment Interface, where users are required to upload proof of payment after scanning the provided QR code. This step is necessary to complete the order process. Figure 32 presents the source code used for the payment page. It includes a form that allows users to upload their payment receipt using the POST method. The code also displays an error message if the upload fails.

4.2 Functional Testing Result

Table 5 *Testing Result*

Module	Description	Expected Result	Actual Result	Pass/Fail
User Management	To test whether users can register, log in, and are restricted when entering incorrect credentials.	Users can register, log in, and are blocked when credentials are invalid.	Users successfully registered, logged in, and were restricted when inputs were wrong.	Pass
Menu Management	To test whether menu items can be added, edited, and removed.	Items can be added to the menu, updated, or removed as needed.	Menu items were added, updated, and removed successfully from the system.	Pass
Order	To test whether orders can be saved and order statuses can be updated by admin or staff.	Orders are stored and status (e.g., Pending, Done) can be updated.	Orders were saved in the system and statuses were updated correctly.	Pass
Booking	To test whether customer can add items to the cart, proceed to checkout, and complete bookings.	Cart items are displayed, passed to checkout, and bookings submitted with details.	Cart and checkout functioned correctly; bookings were successfully submitted	Pass
Payment	To test whether customers can upload proof of payment and select a payment method.	Payment file is uploaded and method is recorded in the system.	Receipt was uploaded and payment method was saved successfully.	Pass

4.3 User Acceptance Testing

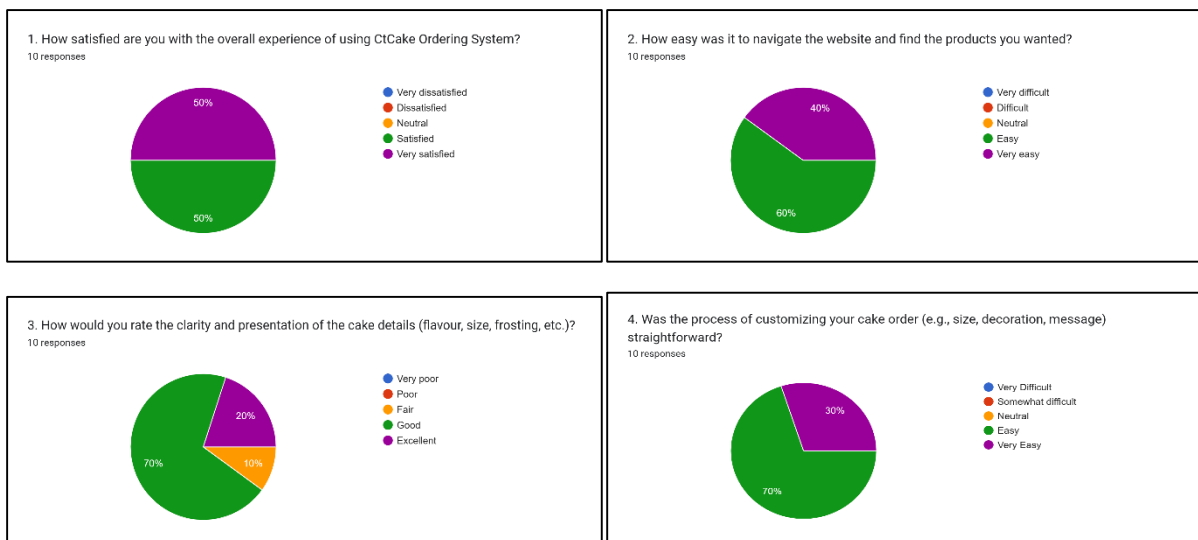


Fig. 33 *Pie Chart of Testing Result for System Functionality*

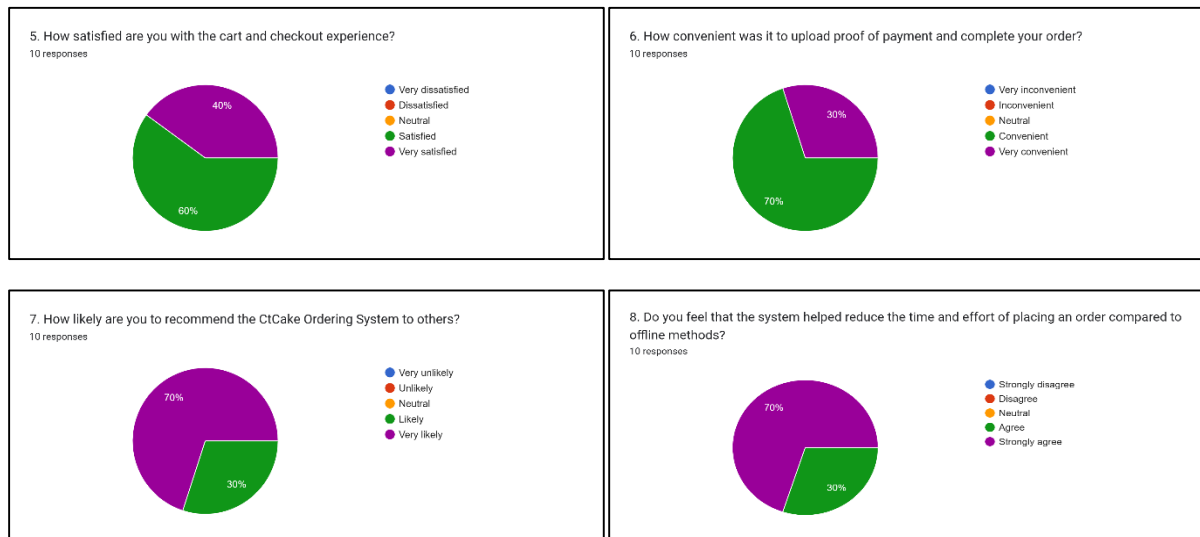


Fig. 34 Pie Chart of Testing Result for System Functionality

Figure 33 and Figure 34 show the user acceptance testing results for the CtCake Ordering System. 10 respondents were involved in testing feedback, and the results were overall very positive across various system functionality and usability aspects. For overall satisfaction, 50% of users selected “Very satisfied”, and the other 50% chose “Satisfied”, showing that all participants were happy with their experience. In terms of navigation, 60% of users found it easy to browse the system, while 40% said it was very easy, indicating that the interface is intuitive and accessible. When rating the simplicity of cake details such as flavour, size, and frosting, 70% gave a “Good” rating, and 20% marked it as “Excellent”, showing users found the product information well presented. The customization process (like adding decoration or a message) was also praised, with 70% rating it “Easy” and 30% saying it was “Very easy”. The cart and checkout experience was rated positively, with 60% saying they were “Satisfied” and 40% “Very Satisfied”.

Regarding the payment process, 70% of users found it convenient, and 30% found it very convenient, suggesting that uploading payment receipts was smooth for most users. Additionally, 70% of participants said they are “Very likely” to recommend the system to others, while 30% said “Likely”, showing strong user confidence. Most users (70%) also strongly agreed that the system saves time and effort compared to offline methods, while 30% agreed. Overall, the responses indicate that users are highly satisfied with the system’s design, ease of use, and functionality.

5. Conclusion and Future Work

The development of the CtCake Ordering System has successfully fulfilled its main goal of helping customers and bakery staff manage cake orders more efficiently. Moving the ordering process online, makes it easier for customers to browse products, customize their orders, and complete their bookings in one place. It also helps admin and staff keep track of orders, update cake menus, and handle payments more smoothly. Future work adding automatic notifications and an integrated payment gateway would make the system even more user-friendly. Plus, the layout optimization for mobile devices will improve the experience for users on phones or tablets. In the future, adding these features can make CtCake more complete and professional.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Nur Aqilah Azizah Nordin, Rozita Abdul Jalil; **data collection:** Nur Aqilah Azizah Nordin; **analysis and interpretation of results:** Nur Aqilah Azizah Nordin, Rozita Abdul Jalil; **draft manuscript preparation:** Nur Aqilah Azizah Nordin, Rozita Abdul Jalil. All authors reviewed the results and approved the final version of the manuscript.

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