

# Online Food Ordering System in Triple L Café by Scanning Quick Response (QR) Code

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**Abstract:** The Android-based Online Food Ordering System was developed for Triple L Café, which currently uses a manual food ordering system. The manual system results in errors and waste of cost and time. The system aims to increase the efficiency of daily business by providing a QR code for the customer to scan and place their order online. The methodology used to develop the system is the Prototype Model. Flutter is the system development platform, and Dart is the primary language for system development. Firebase acts as data storage. Stripe powers online payment processing in the developed system. QR is provided for customers to scan and access the system. The developed system has a user-friendly interface with full functionality. Through the User Acceptance Test (UAT) result, the administrator was very satisfied with 7 out of 8 features, while 93.33% of customer respondents agreed that the system is easy to use.

**Keywords:** Order, QR Code, Android-based

## 1. Introduction

An online food ordering system creates a food menu online, and customers make orders from restaurants online [1]. Nevertheless, each consumer may be unable to afford it due to time constraints. The online food ordering system is a system that enables a restaurant to take orders without physical communication. The online food ordering system creates an online food menu to allow customers to make orders [2]. Customers can access a restaurant's menu using their electronic devices, such as mobile phones, by scanning the QR code prepared by the restaurant.

Triple L Café is currently using a manual system where the staff needs to take customer orders using paper and pen and pass them to the kitchen. Through the online ordering system, scanning the QR code provided by the Triple L Café may solve these problems by increasing staff efficiency and reducing errors. The customer can view the menu, place order, order for delivery, and make payments. The admin of the system can update the details in the menu, add a new dish, edit the food details, delete the food, monitor service pricing, and provide an organised menu clearly for the users. Lastly, the monthly sales of the system can be displayed to the admin.

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Triple L café, which uses a manual system, has a high chance of making errors as the staff does all the work manually, where they take orders using paper and pen and pass them to the kitchen. Due to the manual method, staff negligence often occurs when there are various orders. As a result, food ordering issues such as late orders, wrong orders, unclear orders, forgotten orders, forgotten customers' special requirements, misunderstood of customers' orders, and so on may occur.

Based on the problem statement stated, there are several objectives determined. The objectives include to:

1. design an online food ordering system for Triple L café using an object-oriented approach
2. develop online food ordering system for Triple L café using Android technology
3. test the online food ordering system for the suitability of daily business for Triple L Café

This paper is organised as follows: Section 2 focuses on a literature review of the related works and existing applications related to the topic. Next, Section 3 describes the methodology used to develop the system. Lastly, the final section summarises the current work and discusses future work.

## **2. Related Works**

### **2.1 Online Food Ordering Systems**

An online food ordering system was created to allow customers to view the online menu, place their orders and make payments. The primary feature of the ordering system is that they can view the food details on the menu and add them to the cart online. The easily viewed menu enables issues such as staff misunderstanding the customer's order and placing the wrong one to be avoided. Customers can also visit the system to order food for delivery. The admin can view the monthly sales and order lists for the month.

### **2.2 Study on existing related systems**

The existing similar applications involved in this study are Mohd Chan (Chinese Muslim restaurant) [3], Yhofoodie [4] and Radiance Restaurant [5].

Mohd Chan (Chinese Muslim restaurant) is a Chinese Muslim restaurant selling "halal" fare, delectable comfort cuisine that is prepared in the traditional Cantonese manner [3]. Users can add the order they want to their cart and deliver food online using the system. The system's payment can be made using e-payment and cash. The interface design of Mohd Chan (Chinese Muslim restaurant) is straightforward and user-friendly, allowing the user to quickly understand the structure of the system and the information to be expressed.

Yhofoodie is a mobile application that combines a few local restaurants to consolidate their order-taking processes into a single platform [4]. The QR code feature added in Yhofoodie mobile applications is concentrated in this application. If a restaurant has a partnership with Yhofoodie, the restaurants offer services that employ QR codes for each table so that users may place orders through the application. Users can scan the QR code on the table to be directed to the exact page of the restaurant they were visiting on the app, where they can view the menu items provided there.

Radiance Restaurant Application is a web-based system that provides a set of core modules with functionalities that meet the requirements of most restaurants [5]. For example, in the login module, sign-up functionality is provided. The main interface of the Radiance Restaurant Application is eyes catching as many nice food pictures are placed in the main interface. The pages in Radiance Restaurant Application are simple and easy to understand. Table 1 shows the comparisons between the existing systems and the developed system.

**Table 1: Comparison between Existing Systems and Developed System**

Feature	Mohd Chan (Chinese Muslim restaurant)	Yhofoodie	Radiance Restaurant	Online Food Ordering System in Triple L café by scanning QR code
Signup account	✓	✓	✓	✓
Process order	✓	✓	✓	✓
Delivery service	✓	✓	✓	✓
Add to cart	✓	✓	✗	✓
E-payment	✓	✓	✗	✓
Uses QR code	✗	✓	✓	✓
Provide map	✓	✗	✗	✗
Can open using mobile	✓	✓	✓	✓
Provide special diets	✗	✗	✓	✗

### 3. Methodology/Framework

#### 3.1 Prototyping Model

The Prototyping Model is the model adapted to develop the online food ordering system. The prototype model is a method of creating software that is iterative and involves rapid planning, with feedback that enables the replication and refinement of software until it meets the user's requirements [6]. The Prototype Model is a Software Development Life Cycle (SDLC) model in which a prototype is constructed, evaluated, and reworked as needed until an acceptable prototype is obtained, from which the entire system or product can be developed [7]. The prototype model is an iterative procedure that begins with creating an initial version of the software, which is then tested and refined until it satisfies the user's specifications.

The prototype model starts with the planning phase. The planning phase is mainly concerned with required project planning tasks. In this phase, a proposal is produced, and a Gantt Chart is created as a guide in completing the tasks. The problem statements, project objectives, and project scope of the developed system are also analysed. The project's objectives are the goals that must be reached after this endeavour.

The analysis phase aims to investigate and evaluate the options identified in the planning phase [8]. In this phase, similar existing systems were studied. An interview is held with the owner of Triple L Café to understand their current system and their flow of ordering process to collect requirements. The restaurant's details, such as the food name, image, price, and descriptions, are obtained through the interview. After analysing the current system Triple L Café uses, the strengths, weaknesses and ways of improvement are determined. The hardware and software requirements are analysed.

In the design phase, the data obtained from the previous phase is transformed into designs. The necessary task is to develop the system and database architectures. The user in the system is divided into two sites: the admin site and the user site. The system's prototype is sketched in this phase to show the system's flow. The benefit of a prototype is that it is utilised to gain information about software and the intended interface functionality. System Architecture Diagram, Use Case Diagram, Sequence Diagram and Class Diagram are constructed in this chapter. These diagrams serve as the system's guideline and assist in system development.

In the implementation phase, the system is first built as separate programmes known as units combined in the subsequent stage. The System Architecture Diagram, Use Case Diagram, Sequence Diagram and Class Diagram constructed in the design phase are used to solve issues, optimise solutions, and execute the components indicated in the requirement phase. This phase implements and completes the link between the firebase and system modules. The online food ordering system's front-end and back-end development is implemented by using Flutter and Dart. Stripe powers online payment processing in the developed system. The payment details are stored in Stripe. Besides, QR Code is implemented to allow the customer to scan and access the system. System error detection occurs throughout the implementation phase. If a system error occurs, it must be fixed before proceeding to other sections. These two essential procedures will continue until the system is fully developed.

In the testing phase, the requirements are tested against the requirements before the system is delivered to customers. The testing objective is to identify errors within the system and verify that the system operates as specified in the document created during the requirement analysis process. Each connection's integrity should be examined to ensure no broken linkages. Once an issue is detected, the developer must fix the error and attempt to run the system to ensure the error is resolved [9]. Each development phase has tasks and outputs, as shown in Table 2.

**Table 2: Workflow for Developed System Development**

Phase	Task	Output
Planning	<ol style="list-style-type: none"> <li>1. Research for a suitable project title</li> <li>2. Proposed the project</li> <li>3. Determine the problem statements, objectives, and the project scope</li> <li>4. Research several restaurants that have already implemented the concept</li> <li>5. Create a Gantt Chart</li> </ol>	<ol style="list-style-type: none"> <li>1. Project title is confirmed</li> <li>2. Gantt Chart</li> <li>3. Project proposal</li> </ol>
Analysis	<ol style="list-style-type: none"> <li>1. Analyse the similarities and differences between existing systems and developed system</li> <li>2. Interview with the owner of Triple L Café</li> <li>3. Analyse the result of the interview</li> <li>4. Analyse the hardware and software requirement</li> </ol>	<ol style="list-style-type: none"> <li>1. Functional and non-functional requirements</li> <li>2. Literature Review</li> <li>3. Comparison between 3 existing systems and the developed system</li> <li>4. Hardware and software requirements</li> </ol>
Design	<ol style="list-style-type: none"> <li>1. Design wireframe</li> <li>2. Design prototypes</li> <li>3. Design database</li> <li>4. Illustrate System Architecture Diagram, Use Case Diagram, Sequence Diagram and Class Diagram</li> </ol>	<ol style="list-style-type: none"> <li>1. Wireframe design</li> <li>2. Prototype design</li> <li>3. Database design</li> <li>4. System Architecture Diagram</li> <li>5. Use Case Diagram</li> <li>6. Sequence Diagram</li> <li>7. Class Diagram</li> </ol>
Implementation	<ol style="list-style-type: none"> <li>1. Develop system module</li> <li>2. Complete system integration</li> <li>3. Connect system with firebase</li> </ol>	<ol style="list-style-type: none"> <li>1. Developed system</li> </ol>
Testing	<ol style="list-style-type: none"> <li>1. Carry out system testing</li> <li>2. Enhance system</li> <li>3. Conduct User Acceptance Testing (UAT)</li> </ol>	<ol style="list-style-type: none"> <li>1. Errors detected and fixed</li> <li>2. Test report</li> <li>3. UAT result</li> <li>4. Final complete system</li> <li>5. Final report</li> </ol>

### 3.2 System Analysis and Design

This section discusses the system analysis and design during the development of the developed system. The functional and non-functional requirements of the developed system are described. The System Architecture Diagram, Use Case Diagram, Sequence Diagram and Class Diagram are created to comprehend the system architecture readily.

Functional requirements are a minimum level of functionality from the system. Table 3 shows the Functional Requirements of the Online Food Ordering System by QR Code.

**Table 3: Functional Requirements of the Online Food Ordering System by QR Code**

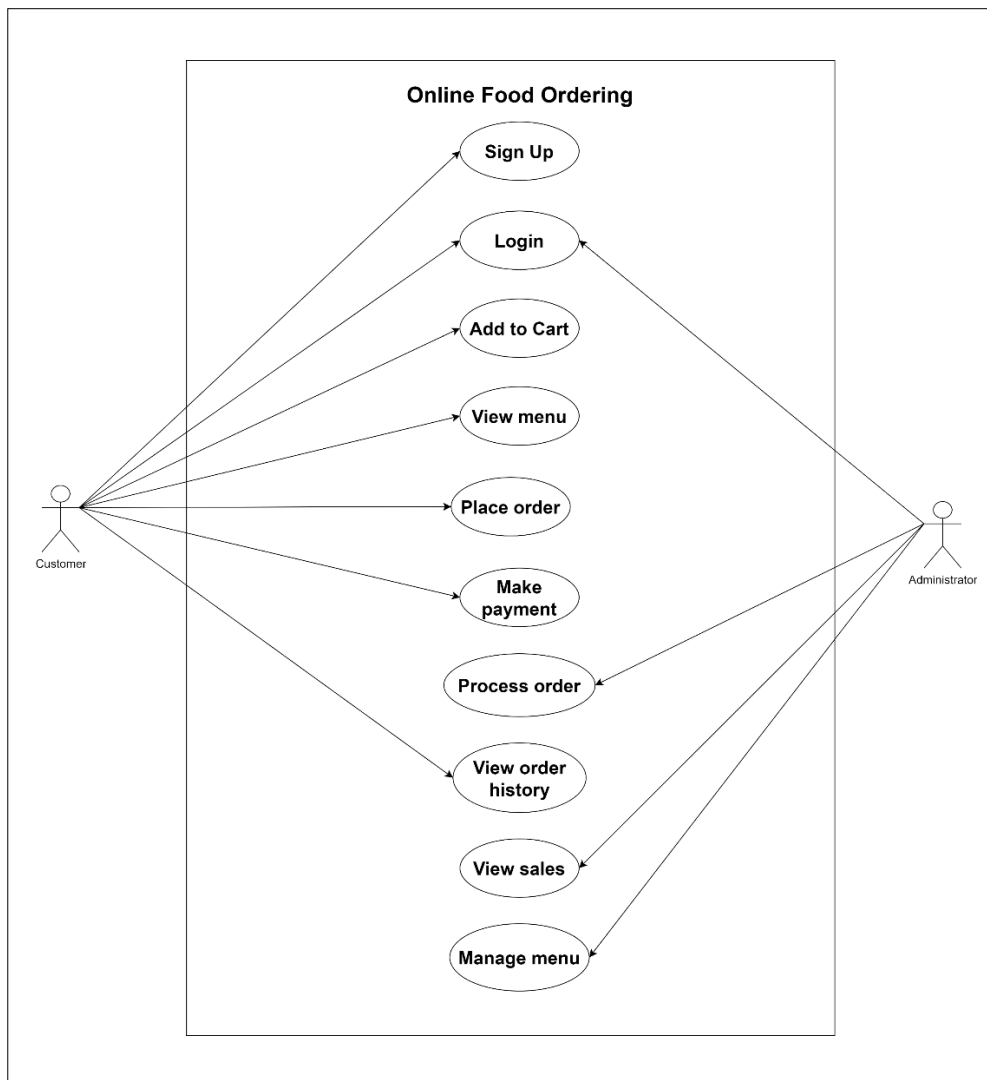
Modules	Functionalities
Menu management module	- Admin can update the information of the menu.
Delivery module	- User can order food online for delivery.
Cart management module	- User can add to cart the food they want to order.
Sales record module	- Admin can view monthly sales and the order list of the month.
Payment module	- User can view the unit price of the food they want to order, and the total amount needed to pay. - The payment process can be done by cash or card payment.
Order module	- User can view the food status of the ordered food. - User can view the order details.

Besides, non-functional requirements are essentially the quality limitations that the system must meet. Table 4 shows the Non-Functional Requirements of the Online Food Ordering System by QR Code.

**Table 4: Non-Functional Requirements of the Online Food Ordering System by QR Code**

Modules	Functionalities
Performance	- Response time should be less than 3 seconds
Security	- Password entered by user is encrypted - User can only log in into the system with the correct email and password
Usability	- The interface is user-friendly - Instruction is easy and straightforward

A use case diagram is a dynamic or activity diagram. Use case diagrams using actors and use cases to represent the system's functioning. A use case is a collection of activities, services, and operations the system must accomplish [10]. In this sense, a 'system' is anything produced or operated, such as a website. The 'actors' are persons or objects who play specific roles inside the system. A use case diagram describes the specifics of the system's users, also known as actors, and their interactions with the system. The use case diagram of the online food ordering system is shown in Figure 1.



**Figure 1: Use Case Diagram of Online Food Ordering System by QR Code**

Besides that, The sequence diagram, an event diagram, depicts the system’s message flow. It assists in visualising a variety of dynamic settings. The sequence diagram of the signup process of the customer of the online food ordering system is shown in Figure A.1 in Appendix A. The signup() method allows the customer to register an account with their details, such as email and password.

Figure A.2 in Appendix A shows the login sequence diagram for the customer and the admin. Both users must enter their correct email and password to login into the system. The system will verify the user’s account after clicking the “Login” button. If the email or password entered are invalid, an error message will be displayed to the users.

Figure A.3 in Appendix A shows the view menu process for customers and administrator. After the customer and administrator logs into the system, the menu will be displayed. As a result, the customer and the administrator can view the menu after login into the system.

Lastly, a class diagram is design to illustrates the features and functions of a class as well as the system limitations. Besides, a class diagram demonstrates a set of classes, interfaces, relationships, collaborations, and restrictions. Class diagrams are the only diagrams that can be directly transferred to

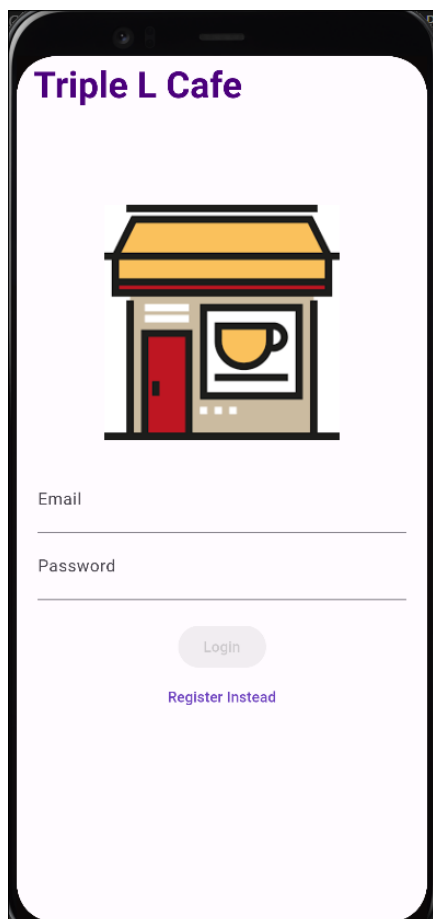
object-oriented programming languages and are thus commonly used throughout the building process. Figure A.4 in Appendix A shows the class diagram of the developed system.

#### 4. Result and Discussion

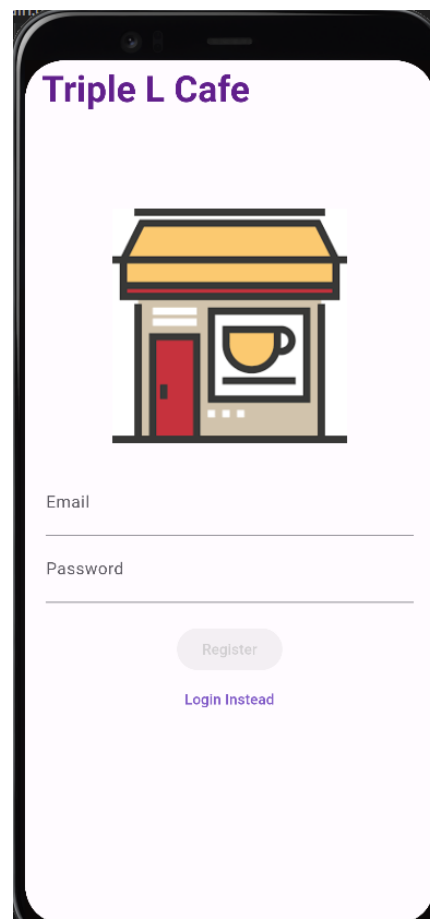
The Online Food Ordering System by QR Code is an Android-based application built with Flutter and Dart. Flutter is the system development platform, and Dart is the primary language for system development. Firebase is the backend of a system used as a database for storing data for the developed system. Triple L Café provides a QR code for customers to enter the system. QR codes are a low-cost method of improving business-to-business (B2B) and business-to-consumer (B2C) interactions. All changes made by the users and administrator will be updated in Firebase.

##### 4.1 System Implementation

The customers and administrator are allowed to log in to the online food ordering system by entering their correct email address and password. Figure 2 shows the login interface of the developed system. If the customer does not have an account, they can register a new account by clicking on the “Register Instead” and the customer will be directed to the signup page as shown in Figure 3. Email and password validation are performed while registering a new account. The email address must be in the valid email format, and the password must contain more than six characters with at least one uppercase character, lowercase character and one number.



**Figure 2: Login interface**



**Figure 3: Signup interface**

Figure 4 shows the homepage of the system which shows the menu of Triple L Café. The food image, food name and food price are displayed. When the customer clicks on the food card, the customer will be directed to the food details page as shown in Figure 5. The food details are displayed in the

details page as shown in Figure 5. The customer can read the details and add to cart the food by clicking on the “Add to Cart” button.

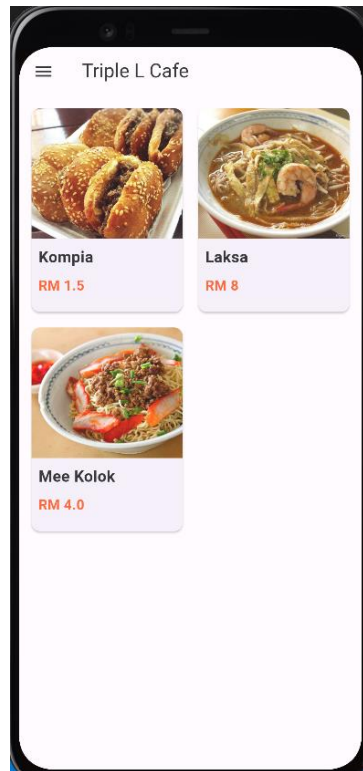


Figure 4: Homepage interface

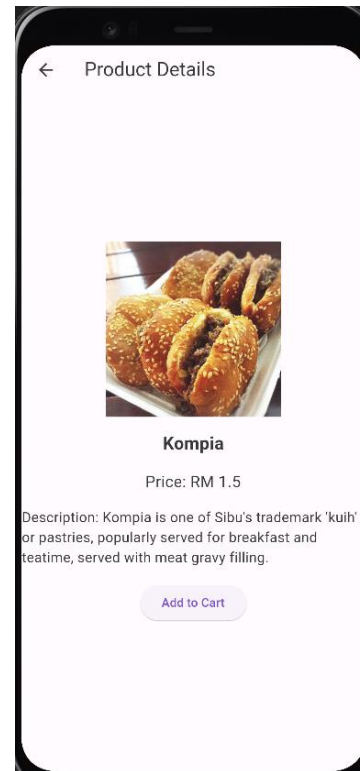
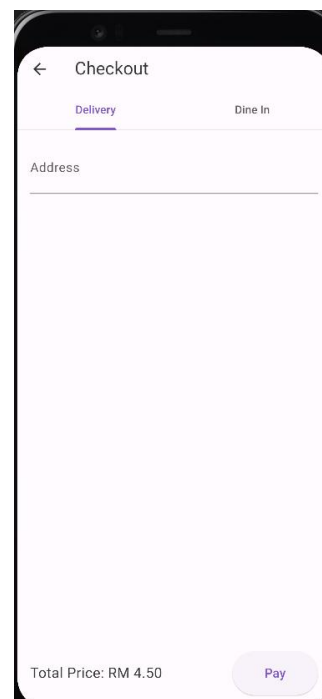


Figure 5: Product Details page

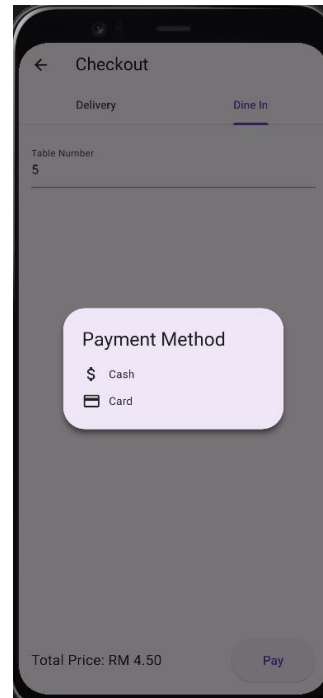
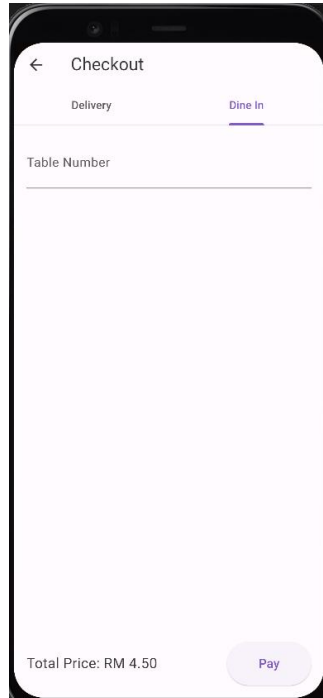
The food will then be added to cart and the cart page is shown in Figure 6. The quantity of food will be shown and can be adjusted on this page. The total price will be displayed and the customer can proceed to the payment by clicking on the “Checkout” button. After clicking on the “Checkout” button, the customer can choose the delivery option or dine-in option. If the customer chooses the delivery option, the customer needs to fill in the address to deliver as shown in Figure 7.



**Figure 6: Cart page**

**Figure 7: Delivery page**

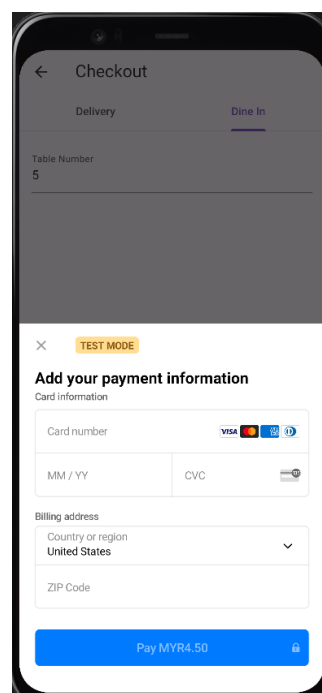
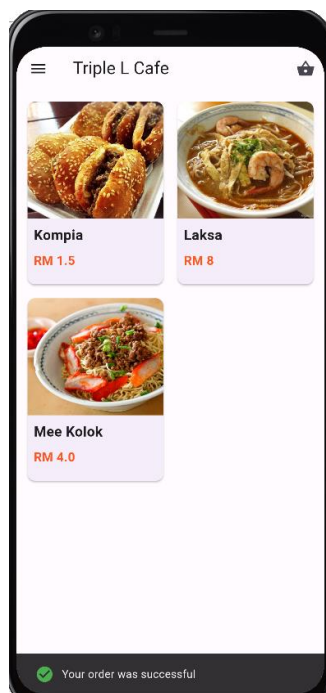
If the customer chooses the dine-in option, the customer needs to enter their table number as shown in Figure 8. After the customer clicks on the “Pay” button, the customer is required to choose a payment method between the choices provided by Triple L Café. The payment method provided are cash and card payment as shown in Figure 9.



**Figure 8: Dine in page**

**Figure 9: Payment Method page**

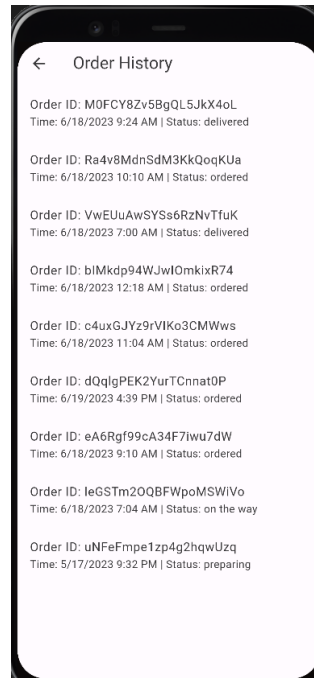
If the customer chooses the cash payment option, a success message will be displayed as shown in Figure 10. If the customer chooses the card payment option, the customer is required to fill in their payment information to complete the payment process as shown in Figure 11. After they have done the payment the card payment option, a success message as shown in Figure 10 will be displayed.



**Figure 10: Order Success page**

**Figure 11: Card Payment page**

After the customer has done their order, they can view their order history by clicking on the “My Orders” as shown in Figure 12. The order history shows the order ID, the time the order is placed and the status of the order. The details of the order can be seen by clicking on the order.



**Figure 12: Order History page**

For admin, the homepage of the admin is the same as the customer as shown in Figure 4. The admin can edit the food details after clicking on the food card. The admin can edit the food name, food description and food price as shown in Figure 13. Then, the admin can press on the saved icon and an update success message will be displayed. Besides that, the admin can view the order done history as shown in Figure 14.

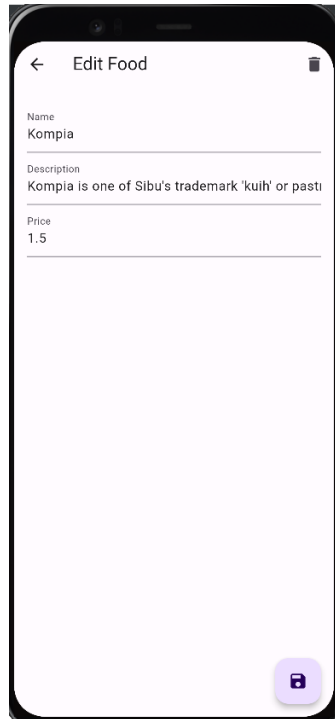


Figure 13: Edit Food page

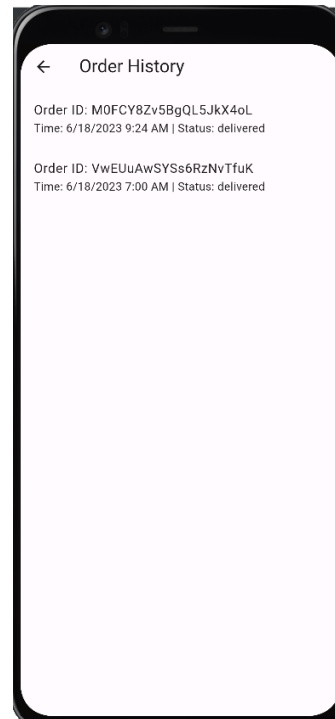


Figure 14: Order Done History page

The order history with the status “delivered” will be shown on this page. The admin can view the order details after clicking on the order as shown in Figure 15. The admin can also view the monthly sales of the month as shown in Figure 16. The monthly sales show the amount of each order and also the total sales and number of orders in the current month. Order details can also be viewed by clicking on the order.

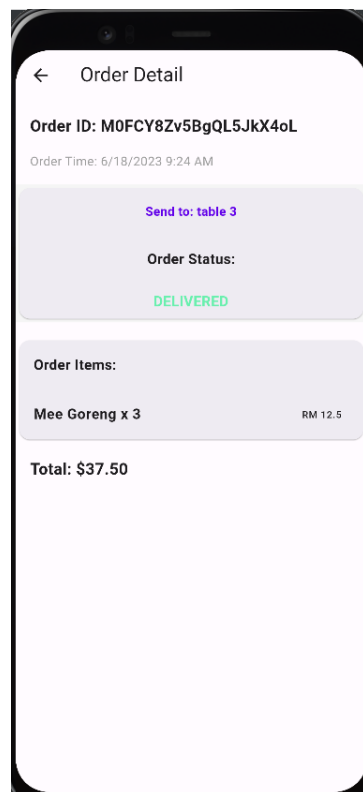


Figure 15: Order Done Details page

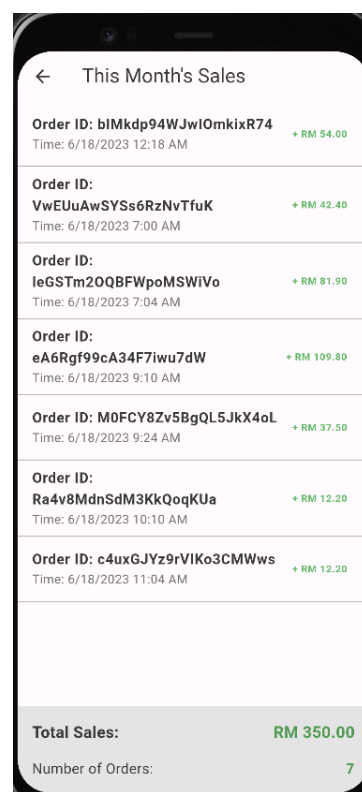


Figure 16: Monthly Sales page

## 4.2 System Testing

The system testing procedure attempts to identify as many issues and defects as possible before releasing the ultimate system. It ensures that the developed system has accomplished its primary objective and function and meets interface specifications.

### 4.2.1 Test Plan

A test plan, which includes the expected output and actual test case results, is used as a checklist to ensure that all test cases occur during the testing process. Table 5 shows the test category of the Online Food Ordering System by QR Code, whereas Table 6 shows the test plan of the Online Food Ordering System by QR Code.

**Table 5: Test Category of the Online Food Ordering System by QR Code**

Test Category	Description
1	Test the functionality of the developed system by role of administrator
2	Test the functionality of the developed system by role of customer

**Table 6: Test plan of the Online Food Ordering System by QR Code**

Module	Test Category	Description	Expected Result	Actual Result
User management module	1, 2	Login to the system: i. Insert email ii. Insert password Click login	i. The system logs the admin and the customer in the system if the input is valid, else the system should not log the administrator and the customer in.	Pass
	1, 2	Logout from the system: i. Click logout	i. The system logs the admin and the customer out from the system if the administrator and the customer click the logout button	Pass
	1, 2	View menu Customer can view the menu in the system	i. Menu is displayed	Pass
	1	Create, view, update and delete menu	i. The menu is displayed ii. Successful message appears after success add, update, and delete.	Pass
	2	Sign up for a new account	i. The system creates a new customer account	Pass
Delivery module	2	Can order for delivery	i. The system log customer in ii. Customer can choose for delivery option	Pass

Add to cart module	2	Add the desired food to order into the cart	i. The system adds the food into the customer's cart	Pass
Payment module	2	View the total amount of the order	ii. The system displayed the total amount of order	Pass
	2	Select payment method for their order	ii. The system provides two payment methods for customer to pay their order	Pass
Order module	1, 2	View the status of the ordered food	i. The system displayed the food status	Pass
		View the order details	ii. The system displayed the order details	
	1	Update the food status	i. The food status is updated	Pass

#### 4.2.2 User Acceptance Test

User Acceptance Testing (UAT) determines if the software meets consumers' acceptance criteria [11]. Before the tested software is disseminated to its intended market, UAT is typically the final phase of the software testing procedure. Table 7 and Table 8 show the user acceptance results for the administrator and customer, respectively.

**Table 7: User Acceptance Test Result for Administrator**

No	Features	Ranking				
		1	2	3	4	5
1.	Login module					1
2.	Logout module					1
3.	Menu management					1
4.	View the list of menu					1
5.	Order management				1	
6.	View the list of order					1
7.	View the order details					1
8.	Easy to use					1

Through the user accepting test for administrator, it gives a result that the administrator is satisfied with the feature of order management and very satisfied with all of the other features provided in the system, which includes login logout module, menu management, view list of menu, order management, view list of orders and order details and lastly easy to use.

**Table 8: User Acceptance Test Result for Customer**

No	Features	Ranking				
		1	2	3	4	5
1.	Login module				4	11
2.	Logout module				4	11
3.	Signup module				5	10
4.	View menu				1	14
5.	Add to cart				5	10
6.	Payment via cash or card				4	11
7.	View order details				6	9
8.	View order status				6	9
9.	Order for delivery				5	10
10.	View order history				4	11
11.	Easy to use				1	14

Through the user accepting test for customers, it shows that 60% of the respondent is very satisfied with the view order details and views order status features, 66.67% of the respondent is very satisfied with the signup, add to cart, and delivery order features, 73.33% of respondent very satisfied with the login and logout module, payment via cash or card and view order history features, and 93.33% of respondents is very satisfied with the view menu features and also 93.33% of respondents agree that the system is easy to use.

## 5. Conclusion

The Online Food Ordering System by QR Code has effectively computerised the conventional paper record. The system reduces the staff's workload in processing the customers' orders because they no longer need to take the customers' orders individually as customers can order themselves through the system. Besides, the staff can view the order list and order details of the customer and update the customer's order status. Furthermore, customers can also order themselves and view the food details on the online menu.

In addition, this system also takes security into account. When a new customer creates an account, the password is hashed and preserved in Firebase. Email and password validation are performed while registering a new account to prevent customers from creating unsecured accounts. The email address must be in the valid email format, and the password must contain more than six characters with at least one uppercase character, lowercase character and one number.

There are some modifications and enhancements that can be made in the future. The developed system does not have a "Forgot Password" feature where the customers are unable to verify and change their password when they have forgotten it. Hence, the "Forgot Password" must be implemented in the Online Food Ordering System by QR Code for customers. Besides that, the rate and review functions are also should be included in the system to let customers rate and review the food they ordered. Rate and review are essential as they attract customers to order food with high ratings and good reviews.

## Acknowledgement

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Appendix A

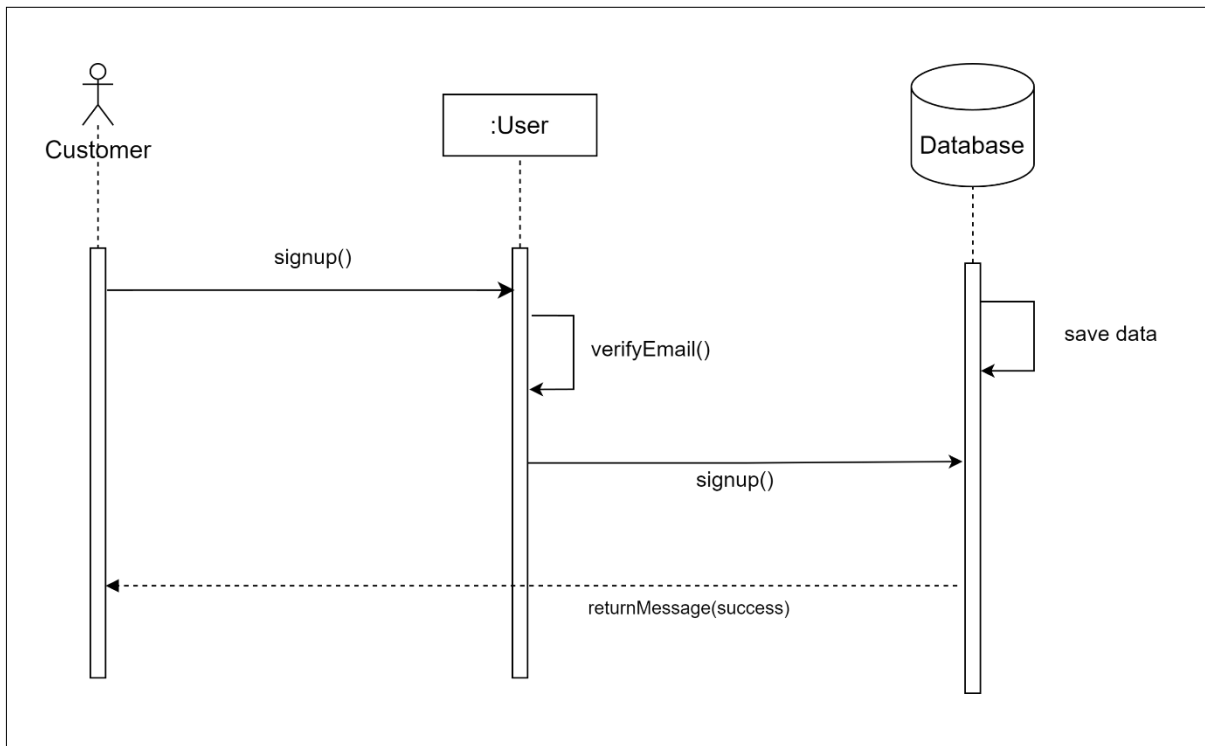


Figure A.1: Sequence Diagram of Sign Up for customer

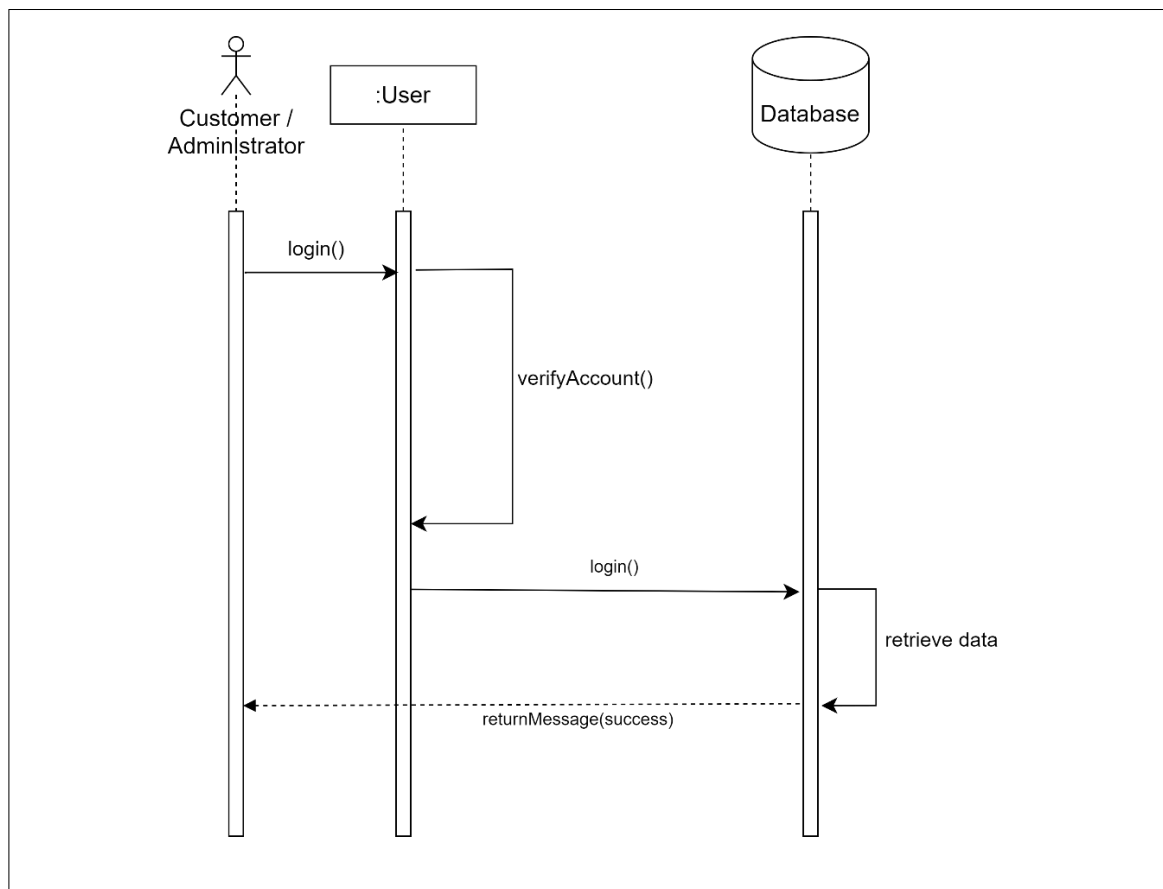


Figure A.2: Sequence Diagram of Login for customer and administrator

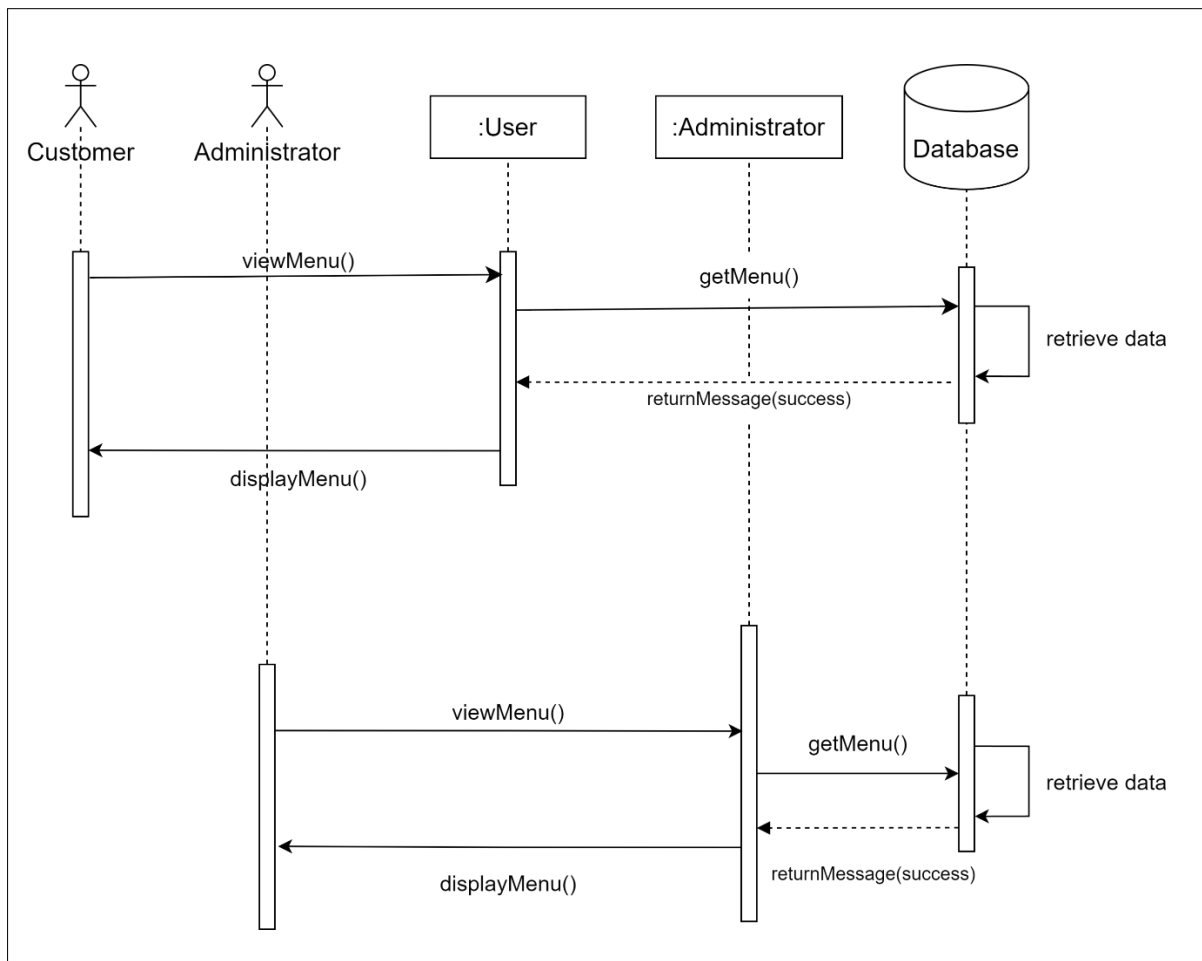


Figure A.3: Sequence Diagram of View Menu for customer and administrator

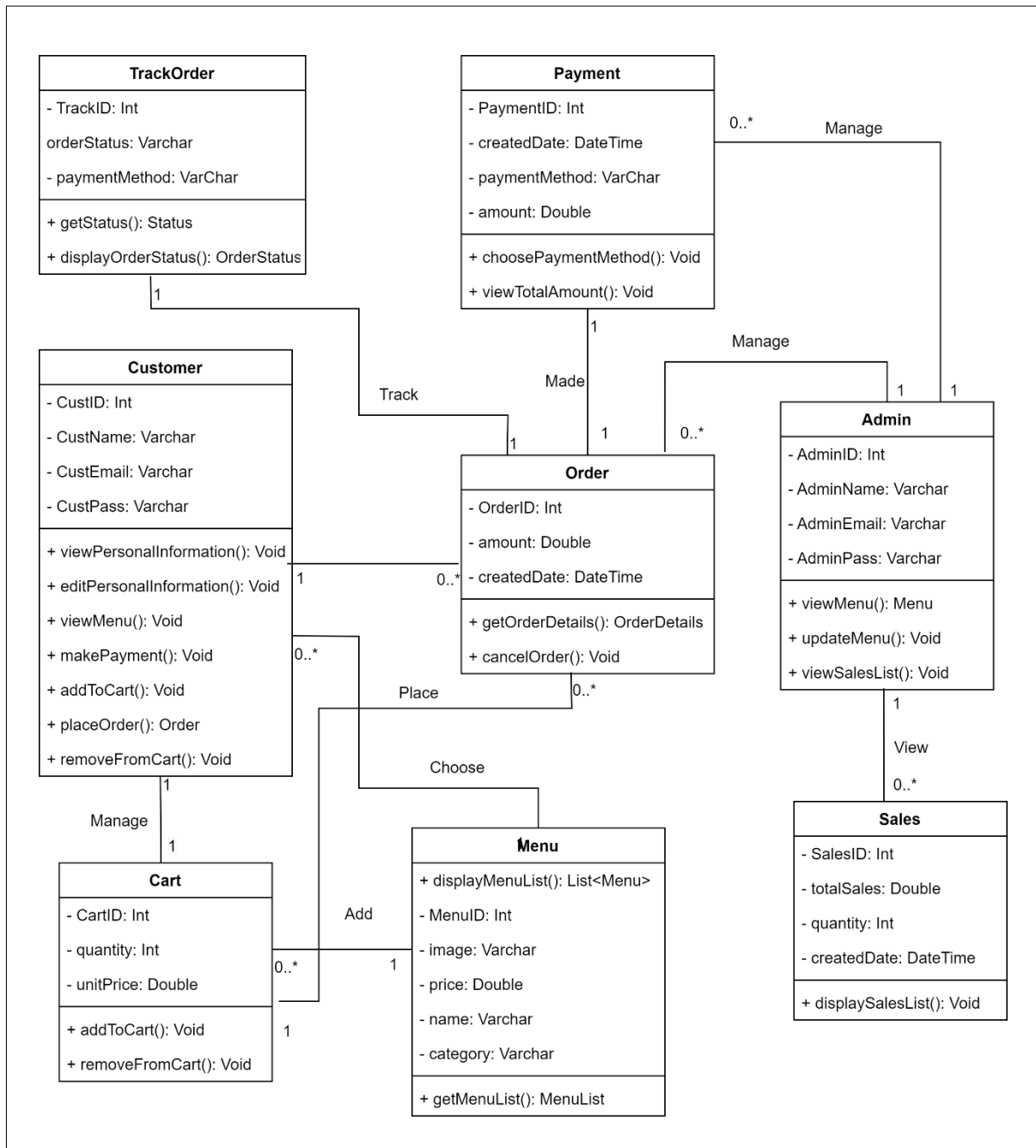


Figure A.4: Use Case Diagram of Online Food Ordering System by QR Code

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