



SECJ2013 DATA STRUCTURE AND ALGORITHM
SECTION 7

SEMESTER 1/20242025

Mini Project Documentation

Korean Food Queue Simulation Platform Using C++

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LECTURER: DR. ZURAINI BINTI ALI SHAH

Prepared By: Group 8

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1.0 Introduction

1.1 Synopsis

The Korean food queuing simulation platform is designed to manage and simulate the customer queuing system of Korean food restaurants. The platform focuses on simulating the use of the platform by two main users, customers and staff. It uses C++ with data structures like queues and priority queues to provide an efficient and practical system.

For customers, the platform provides a convenient way to interact with the system. They can view the menu to explore all available food options, including food ID, names, and prices, helping them make informed decisions. Customers can place orders by entering their details, such as their food ID, quantity and additional information, which automatically adds them to the queue. The platform also allows customers to check their position in the queue and view all order details. If customers decide to leave, they can cancel their order and remove themselves from the queue with ease, ensuring flexibility and control over their experience.

For staff, the platform offers advanced tools for managing both the menu and the queue. Staff can view the complete menu to assist customers or verify available items. They can add new menu items to expand options for customers, ensuring the menu is responsive to customer preferences. Similarly, unavailable items can be removed to keep the menu accurate and up-to-date. In terms of queue management, staff can serve customers by processing the next individual in line, ensuring a smooth and orderly service flow. They also have the ability to view the entire order queue, including detailed customer information and their respective orders, which helps in planning and optimizing service.

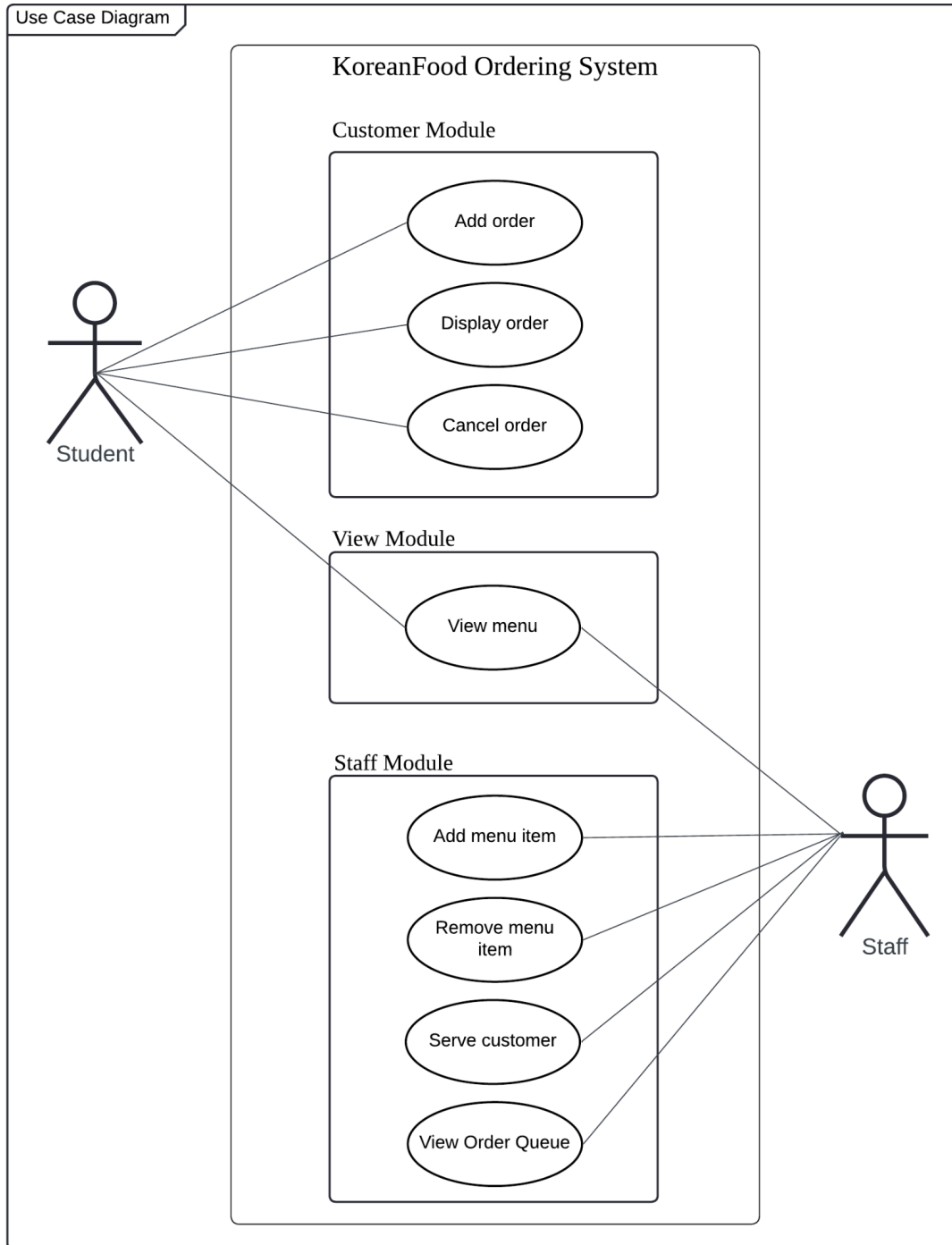
1.2 Objective

- Learned the concept and application of queues, focusing on the principle of "First In First Out" (FIFO).
- To demonstrate the practical use of queues in managing real-world operations.
- To provide a user-friendly platform for customers to view menus, place orders, and manage their queue positions.
- To enable staff to efficiently handle menu updates, order processing, and queue management.
- To integrate fundamental data structure operations such as insertion, deletion, and traversal in a functional application.
- To foster teamwork and collaboration through the design and development of a C++-based mini-project.

2.0 System Requirement, Analysis & Design

2.1 System Requirements

2.1.1 Use Case Diagram



2.1.2 Use Case Description for Korean Food Queuing Simulation Platform

The system users are staff and customers.

Actor	Task
Staff	<ul style="list-style-type: none">- View menu- Add menu item- Remove menu item- Serve customer- View Order Queue
Customer	<ul style="list-style-type: none">- View menu- Add order- Display order- Cancel order

2.1.3 Detailed Description for Each Use Case

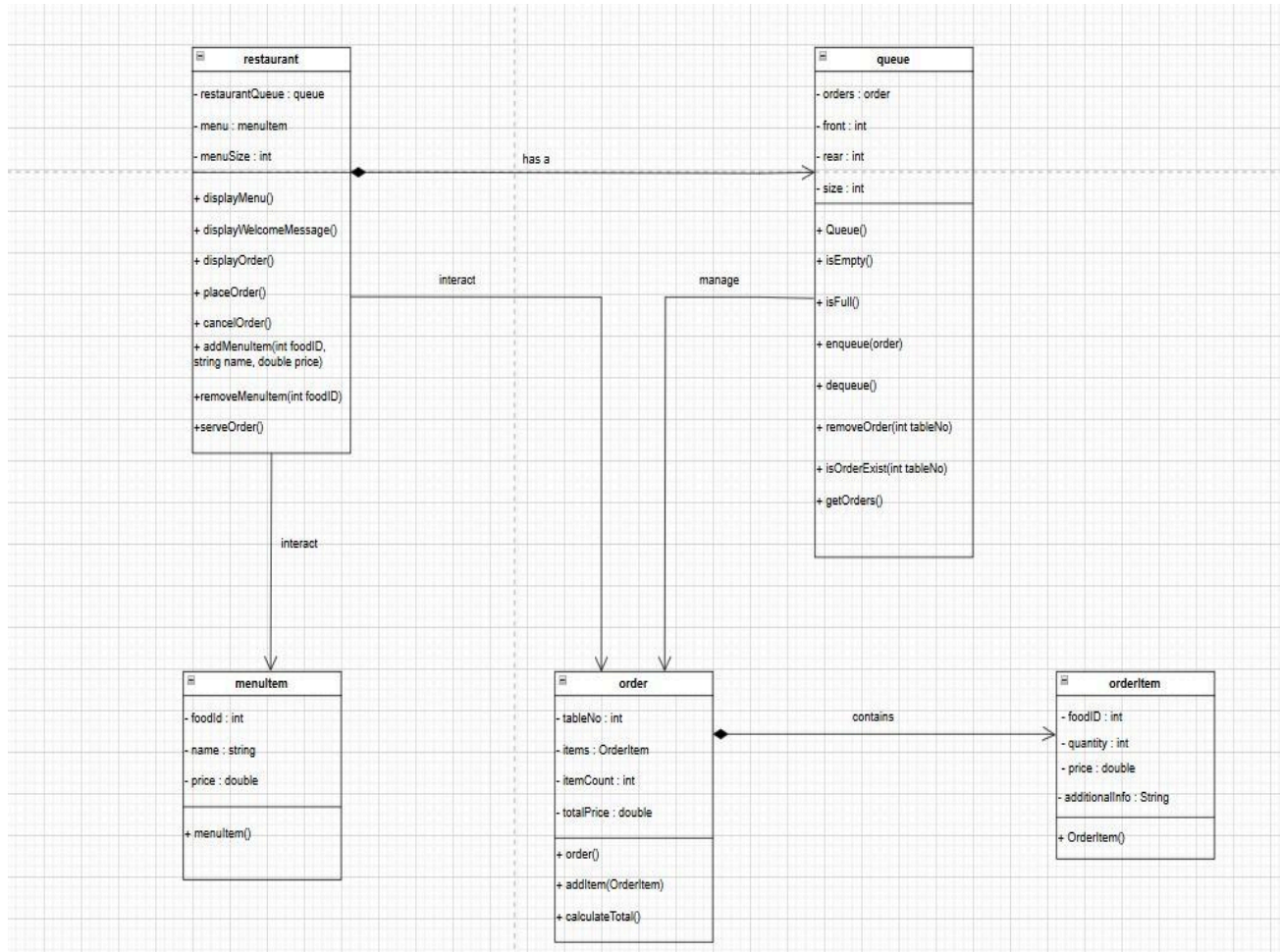
The system has 9 main use cases.

Use Case	Purpose
View menu	Staff and customers can browse the list of available food items, including their IDs, names and prices.
Add order	Customers can select food items from the menu, specify the quantity, provide additional information (optional), and confirm their order for a specific table.
Display order	Customers can view their current orders in the system, including the food details, quantity, additional information, and total price.
Cancel order	Customers can cancel their orders by providing their table number.
Add menu item	Staff can add new food items to the menu.
Remove menu item	Staff can remove existing food items from the menu.
Serve customer	Staff can serve an order, process its completion, and remove it from the queue.
View Order Queue	Staff can view all current customer orders in the queue, including table numbers, food details, quantity, additional information, and total price.

2.2 System Design

UML Diagram

Prepared by: MUHAMMAD AFIQ IKRAM BIN NORIZAN



3.0 System Prototype

The training record management system can be utilised by two target users which are Staff and Customers.

Screen1: Home Menu

Prepared by: Yap En Thong

The home page of the 'Huat Huat BBQ Restaurant' system displays a welcome message followed by a menu with three options: 1 (Customer), 2 (Staff) and 3 (Exit). Users can navigate to their respective menus or exit the program by entering an integer between 1 and 3. If an invalid input is provided, the system displays an error message, 'Invalid choice. Please try again.' and redisplay the menu for correction. This ensures a user-friendly interface with robust input validation, streamlined navigation and prevention of errors for a seamless experience.

```
*****
***** WELCOME TO HUAT HUAT BBQ RESTAURANT *****
*****

***** HOME MENU *****
*   1. Customer   *
*   2. Staff      *
*   3. Exit       *
*****
Enter your choice:
```

Screen 2: Customer Options (Choice 1 - Customer from Home Menu)

Prepared by: Yap En Thong

After selecting choice 1 - Customer from the Main Menu, the user is directed to the Customer Options menu. Users are presented with five choices: 1 (View Menu), 2 (Place Order), 3 (Cancel Order), 4 (Display Order) and 5 (Back to Home Menu). Customers must input an integer value between 1 and 5 to navigate through the options. If an invalid number is entered, the system displays the error message, 'Invalid choice. Please try again.' and redisplay the menu, ensuring smooth and user-friendly navigation with robust input validation.


```

***** CUSTOMER OPTIONS *****
*   1. View Menu                      *
*   2. Place Order                    *
*   3. Cancel Order                  *
*   4. Display Order                 *
*   5. Back to Home Menu             *
*****
Enter your choice: 6
Invalid choice. Please try again.

```

Screen 3: Food Menu (Choice 1 - View Menu from the Customer Options menu)

Prepared by: Yap En Thong

When a user selects option 1 (View Menu) from the Customer Options menu, the system displays the restaurant's Food Menu, showcasing a list of 20 default items. Each item is presented with its corresponding Food ID, Name, and Price, ensuring clear and detailed information for users to review.

```

Enter your choice: 1

***** FOOD MENU *****
*   Food ID   |      Name      |   Price   *
*****
*   1         | Kimchi Fried Rice | RM 8.99   *
*   2         | Bibimbap         | RM 10.49  *
*   3         | Tteokbokki       | RM 6.99   *
*   4         | Bulgogi          | RM 12.99  *
*   5         | Japchae          | RM 9.99   *
*   6         | Samgyeopsal      | RM 15.49  *
*   7         | Sundubu Jjigae   | RM 10.99  *
*   8         | Kimchi Jjigae    | RM 9.49   *
*   9         | Naengmyeon       | RM 11.99  *
*   10        | Dak Galbi        | RM 13.99  *
*   11        | Galbitang        | RM 14.49  *
*   12        | Hoddeok          | RM 5.99   *
*   13        | Patbingsu        | RM 7.49   *
*   14        | Hotteok          | RM 6.49   *
*   15        | Jjajangmyeon     | RM 8.99   *
*   16        | Gimbap           | RM 7.49   *
*   17        | Korean Fried Chicken | RM 12.99  *
*   18        | Soondae          | RM 9.99   *
*   19        | Doenjang Jjigae  | RM 10.49  *
*   20        | Pajeon           | RM 8.99   *
*****

```

Screen 4: Place Order (Choice 2 - Place Order from the Customer Options menu)

Prepared by: Yap En Thong

This option is designed for efficient and user-friendly order placement (enqueue order). After selecting choice 2 - Place Order from the Customer Options menu, users begin by entering a valid table number (1–10) and the system validates the input to ensure correctness. They then select food items from a predefined menu (IDs 1–20) with the system similarly validating the food ID. For each selected item, users provide the quantity and may include optional special instructions. Each order is added to a queue after users answer the additional information prompt. Users can choose to add more items or finalise their order. For instance, in our simulation, a user selected Table 2 and ordered two servings of ‘Tteokbokki’ (Food ID: 3) with no special instructions, followed by one serving of ‘Pajeon’ (Food ID: 20) marked as ‘extra spicy’. After completing their selections, the system redirected the user to the main customer options menu. This system ensures error-free data entry, simplifies order management, and enhances the user experience.

```
Enter your choice: 2
Enter Table Number (1-10): 1

***** FOOD MENU *****
*  Food ID  |      Name      |  Price  *
*****
*   1       | Kimchi Fried Rice | RM 8.99  *
*   2       | Bibimbap         | RM 10.49 *
*   3       | Tteokbokki       | RM 6.99  *
*   4       | Bulgogi          | RM 12.99 *
*   5       | Japchae          | RM 9.99  *
*   6       | Samgyeopsal      | RM 15.49 *
*   7       | Sundubu Jjigae   | RM 10.99 *
*   8       | Kimchi Jjigae    | RM 9.49  *
*   9       | Naengmyeon       | RM 11.99 *
*  10       | Dak Galbi        | RM 13.99 *
*  11       | Galbitang        | RM 14.49 *
*  12       | Hoddeok          | RM 5.99  *
*  13       | Patbingsu        | RM 7.49  *
*  14       | Hotteok          | RM 6.49  *
*  15       | Jjajangmyeon     | RM 8.99  *
*  16       | Gimbap           | RM 7.49  *
*  17       | Korean Fried Chicken | RM 12.99 *
*  18       | Soondae          | RM 9.99  *
*  19       | Doenjang Jjigae  | RM 10.49 *
*  20       | Pajeon           | RM 8.99  *
*****
Enter Food ID (1-20): 3
Enter Quantity: 2
Enter Additional Information (or type 'none'): none
Order for Table 1 added to the queue.
Do you want to add more items? (y/n): y
```

```

Do you want to add more items? (y/n): y

***** FOOD MENU *****
*   Food ID   |   Name   |   Price   *
*****
*   1         | Kimchi Fried Rice | RM 8.99   *
*   2         | Bibimbap         | RM 10.49  *
*   3         | Tteokbokki       | RM 6.99   *
*   4         | Bulgogi          | RM 12.99  *
*   5         | Japchae          | RM 9.99   *
*   6         | Samgyeopsal      | RM 15.49  *
*   7         | Sundubu Jjigae   | RM 10.99  *
*   8         | Kimchi Jjigae    | RM 9.49   *
*   9         | Naengmyeon       | RM 11.99  *
*  10         | Dak Galbi        | RM 13.99  *
*  11         | Galbitang        | RM 14.49  *
*  12         | Hoddeok          | RM 5.99   *
*  13         | Patbingsu        | RM 7.49   *
*  14         | Hotteok          | RM 6.49   *
*  15         | Jjajangmyeon     | RM 8.99   *
*  16         | Gimbap           | RM 7.49   *
*  17         | Korean Fried Chicken | RM 12.99  *
*  18         | Soondae          | RM 9.99   *
*  19         | Doenjang Jjigae  | RM 10.49  *
*  20         | Pajeon           | RM 8.99   *
*****
Enter Food ID (1-20): 20
Enter Quantity: 1
Enter Additional Information (or type 'none'): extra spicy
Order for Table 1 added to the queue.
Do you want to add more items? (y/n): n

***** CUSTOMER OPTIONS *****

```

System Validation:

```

Enter Table Number (1-10): 11
Invalid Table Number! Please enter a table number between 1 and 10.
Enter Table Number (1-10): 2

```

```

Enter Food ID (1-20): 21
Invalid Food ID! Please enter a food ID between 1 and 20.
Enter Food ID (1-20):

```

Screen 5: Cancel Order (Choice 3 - Cancel Order from the Customer Options menu)

Prepared by: Yap En Thong

This option allows users to cancel(dequeue) orders for a specific table. By selecting option 3 - Cancel Order from the Customer Options menu, users can input the corresponding table number and all orders associated with that table are removed from the queue. A confirmation message, such as 'Order for Table 2 has been removed from the queue.' is displayed to inform users of the

successful cancellation. This feature ensures flexibility and allows users to modify their orders efficiently.

```
***** CUSTOMER OPTIONS *****
* 1. View Menu *
* 2. Place Order *
* 3. Cancel Order *
* 4. Display Order *
* 5. Back to Home Menu *
*****
Enter your choice: 3
Enter Table Number to cancel order: 2
Order for Table 2 has been removed from the queue.
```

Screen 5: Display Order (Choice 4 - Display Order from the Customer Options menu) Prepared by: Yap En Thong

This screen displays the order queue, accessed by selecting option 4 - Display Order from the customer options menu. For example, it shows the food order for Table 2, listing each item's Food ID, Quantity, Price and Additional Info (e.g., 'none' or 'extra spicy'). The total price calculated at the bottom, is displayed as RM 22.97. The layout is neatly formatted with asterisks for clarity and formality.

```
Enter your choice: 4

***** ORDER QUEUE *****

***** FOOD ORDER *****
Order for Table 2:
*****
* Food ID | Quantity | Price | Additional Info *
*****
* 3       | 2       | RM 6.99 | none           *
* 20      | 1       | RM 8.99 | extra spicy    *
*****
* Total Price: RM 22.97 *
*****
```

Screen 6: Return to Main Menu (Choice 5 - Back to Main Menu from the Customer Options menu) Prepared by: Yap En Thong

By selecting option 5, 'Back to Home Menu', users are redirected to the Home Menu. This allows them to navigate back to the main interface to access other functionalities seamlessly.

```

***** CUSTOMER OPTIONS *****
*   1. View Menu                      *
*   2. Place Order                    *
*   3. Cancel Order                  *
*   4. Display Order                 *
*   5. Back to Home Menu             *
*****
Enter your choice: 5

***** HOME MENU *****
*   1. Customer                      *

```

Screen 7: Staff Options (Choice 2 - Staff from Home Menu)

Prepared by: Harith Haikal

When Choice 2 - Staff is selected from the Home Menu, the system enters into the Staff Operations menu. On this screen, the Staff will have six choices which are View Food Menu, Add Menu Item, Remove Menu Item, Serve Customer, View Order Queue and Back to Home Menu. Staff will need to make selections that correspond with a valid integer(1-6) for their intended operation. In the case of invalid input, it will present the user with a message, 'Invalid choice. Please try again.' and redraw the menu. The Staff Operations menu is designed to be efficient, allowing staff to control the restaurant's menu, manage customer orders and ensure that operations run smoothly. It is also easy to go back to the Home Menu, thus offering flexibility in navigating through different functionalities.

```

***** STAFF OPERATIONS *****
*   1. View Food Menu                *
*   2. Add Menu Item                 *
*   3. Remove Menu item              *
*   4. Serve Customer                *
*   5. View Order Queue              *
*   6. Back to Home Menu             *
*****
Enter your choice: 7
Invalid choice. Please try again.

```

Screen 8: View Food Menu (Choice 1 - View Food Menu from the Staff Operations menu)
Prepared by: Harith Haikal

Once the option View Food Menu is selected from the menu, Staff Operations opens up the present list of menu items. Each item is represented by its Food ID, Name and Price for easy review by the staff. This screen will make sure that the staff has the latest information on the food the restaurant has to offer. This will help them in the process of guiding customers in ordering their food.

```
Enter your choice: 1
```

***** FOOD MENU *****			
* Food ID	Name	Price	*

* 1	Kimchi Fried Rice	RM 8.99	*
* 2	Bibimbap	RM 10.49	*
* 3	Tteokbokki	RM 6.99	*
* 4	Bulgogi	RM 12.99	*
* 5	Japchae	RM 9.99	*
* 6	Samgyeopsal	RM 15.49	*
* 7	Sundubu Jjigae	RM 10.99	*
* 8	Kimchi Jjigae	RM 9.49	*
* 9	Naengmyeon	RM 11.99	*
* 10	Dak Galbi	RM 13.99	*
* 11	Galbitang	RM 14.49	*
* 12	Hoddeok	RM 5.99	*
* 13	Patbingsu	RM 7.49	*
* 14	Hotteok	RM 6.49	*
* 15	Jjajangmyeon	RM 8.99	*
* 16	Gimbap	RM 7.49	*
* 17	Korean Fried Chicken	RM 12.99	*
* 18	Soondae	RM 9.99	*
* 19	Doenjang Jjigae	RM 10.49	*
* 20	Pajeon	RM 8.99	*

Screen 9: Add Menu Item (Choice 2 - Add Menu Item from the Staff Operations menu)

Prepared by: Harith Haikal

The Add Menu Item feature allows staff to expand the menu by adding new items. After selecting this option, the system asks the staff for details like food ID, name of dish and price. It does the necessary validation of the input to be added into the system so that only valid and complete information gets included in the database. When a new item is added successfully, the system confirms the action by showing a message like 'Menu item added!'. In case the menu is full and cannot hold any more items, the system should notify the user with an appropriate error message. This feature is very important to keep restaurant offerings current and also for customer preferences.

```
Enter your choice: 2
Enter Food ID: 21
Enter Name: Bingsu
Enter Price: RM7.99
Menu item added!
```

Screen 10: Remove Menu Item (Choice 3 - Remove Menu Item from the Staff Operations menu)

Prepared by: Harith Haikal

When option 3 is selected, the system removes a food item from the menu, including its Food ID, Name, and Price. This feature helps keep the menu accurate by removing items that are no longer available. . When an item is removed successfully, the system confirms the action by showing a message like 'Menu item removed!'. In case the food ID is not found in the menu, the system should notify the user with an appropriate error message “Food ID not found in the menu.”.

```
Enter your choice: 3
Enter Food ID: 21
Menu item removed!
```

```
***** STAFF OPERATIONS *****
* 1. View Food Menu *
* 2. Add Menu Item *
* 3. Remove Menu item *
* 4. Serve Customer *
* 5. View Order Queue *
* 6. Back to Home Menu *
*****
Enter your choice: 3
Enter Food ID: 22
Food ID not found in the menu.
```

Screen 11 : Serve Customer (Choice 4 - Serve Customer from the Staff Operations menu) Prepared by: Harith Haikal

The selected option to Serve Customer allows a staff member to process the next order in the queue. It gets and displays the order details, including table number and items list along with Food ID, Quantity, Price, and Additional Info provided. The total amount of the Order is calculated and displayed. When the order has been served, it is removed from the queue and displays a confirmation message, for example, 'Order for Table 1 has been served and removed from the queue.' This makes the service effective and accurate in tracking customer orders.

```
Enter your choice: 4

***** SERVING ORDER *****
Serving Order for Table 1:
*****
* Food ID | Quantity | Price | Additional Info *
*****
* 3       | 2       | RM 6.99 | none           *
* 20      | 1       | RM 8.99 | extra spicy    *
*****
* Total Price: RM 22.97 *
*****
Order for Table 1 has been served and removed from the queue.
```

Screen 12 : View Order Queue (Choice 5 - View Order Queue from the Staff Operations menu) Prepared by: Harith Haikal

The View Order Queue option allows staff to review all pending orders. After selecting this option, the system shows a detailed list of all orders currently in the queue. For each order, the system provides the table number, ordered items breakdown with Food ID, Quantity, Price, Additional Info and the total price. The information is well-presented and laid out clearly, so that the staff can monitor the orders and their priorities with ease, hence contributing to smooth restaurant operations and timely service delivery.


```

Enter your choice: 5

***** ORDER QUEUE *****
Queue Size: 2, Front: 1, Rear: 3

***** FOOD ORDER *****
Order for Table 2:
*****
* Food ID | Quantity | Price | Additional Info *
*****
* 3       | 2       | RM 6.99 | none          *
*****
* Total Price: RM 13.98                                     *
*****

***** FOOD ORDER *****
Order for Table 3:
*****
* Food ID | Quantity | Price | Additional Info *
*****
* 1       | 1       | RM 8.99 | none          *
*****
* Total Price: RM 8.99                                     *
*****

```

Screen 13: Return to Home Menu (Choice 6 - Back to Main Menu from the Staff Operations menu)

Prepared by: Harith Haikal

By selecting option 6, 'Back to Home Menu', staff are redirected to the Home Menu. This allows them to navigate back to the main interface to access other functionalities seamlessly.

```

***** STAFF OPERATIONS *****
* 1. View Food Menu *
* 2. Add Menu Item *
* 3. Remove Menu item *
* 4. Serve Customer *
* 5. View Order Queue *
* 6. Back to Home Menu *
*****
Enter your choice: 6

```

Screen 14 :Exit (Choice 3 - Exit from Home Menu)

Prepared by: Harith Haikal

If the user has chosen Choice 3 - Exit from the Home Menu, the system will terminate the session by displaying a polite message, 'Exiting the program. THANK YOU & WELCOME BACK!'. This will make the termination of the program smooth and friendly for the user.

```
***** HOME MENU *****
* 1. Customer *
* 2. Staff *
* 3. Exit *
*****
Enter your choice: 3

Exiting the program. THANK YOU & WELCOME BACK!

-----
Process exited after 464.2 seconds with return value 0
Press any key to continue . . .
```

4.0 Development Activities & Task Distribution

Meeting Date	Agenda	Members Participate in the meeting	The task for each member	Task Achieved (Yes/No)
31/12/2024	1. Select the case study for the Mini Project	Muhammad Afiq Ikram Bin Norizan	<ul style="list-style-type: none"> - View menu - Add menu item 	Yes
	2. Discuss the system functionalities to be included in the Mini Project	Yap En Thong	<ul style="list-style-type: none"> - Remove menu item - Serve customer 	Yes
	3. Discuss the task distribution for the coding of our Mini Project(Functionalities)	Muhammad Harith Haikal Bin Mohd Said	<ul style="list-style-type: none"> - View Order Queue - View menu - Add order 	Yes
		Ong Ya Sian	<ul style="list-style-type: none"> - Display order - Cancel order 	Yes
7/1/2025	1. Discuss the task distribution to complete the report for the Mini Project	Ong Ya Sian	<ul style="list-style-type: none"> - Synopsis - Objective - Use Case Diagram 	Yes
	2. Revise and update the coding	Muhammad Afiq Ikram Bin Norizan	<ul style="list-style-type: none"> - Use Case Description - System Design 	Yes
		Muhammad Harith Haikal Bin Mohd Said	<ul style="list-style-type: none"> - Detailed Descriptions for Each Use Case - System Prototype 	Yes
		Yap En Thong	<ul style="list-style-type: none"> - System Prototype - Appendix 	Yes
11/1/2025	1. Discuss the task distribution for the Mini Project(Presentation)	Muhammad Afiq Ikram Bin Norizan	<ul style="list-style-type: none"> - Slides 	Yes
		Yap En Thong	<ul style="list-style-type: none"> - Slides 	Yes
	2. Revise the report completed	Muhammad Harith Haikal Bin Mohd Said	<ul style="list-style-type: none"> - Slides 	Yes
		Ong Ya Sian	<ul style="list-style-type: none"> - Slides 	Yes

5.0 Appendix

List of Data Files:

7

1, 3, 2, 'none',y

20, 1, 'Extra Spicy',

2, 3, 2, 'none',n

3, 1, 1, 'none',n

2, 21, 'Bingsu', 7.99

Presentation Slide Link:

https://www.canva.com/design/DAGb8n23WO8/r0McmrMeMs88jhqpWXC5eg/edit?utm_content=DAGb8n23WO8&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

System Demonstration Video Link:

 Demo Video.mp4