UTM UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING
UTM Johor Bahru

SECD2613-02

SECD2523-03 DATABASE

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Phase 2

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1.0 INTRODUCTION

The **Digital Cafeteria Management System (DCMS)** is developed to modernize the operations of cafeterias at Universiti Teknologi Malaysia (UTM). Traditional food ordering and payment methods often cause long queues, order mistakes, and inefficient management of menu and inventory.

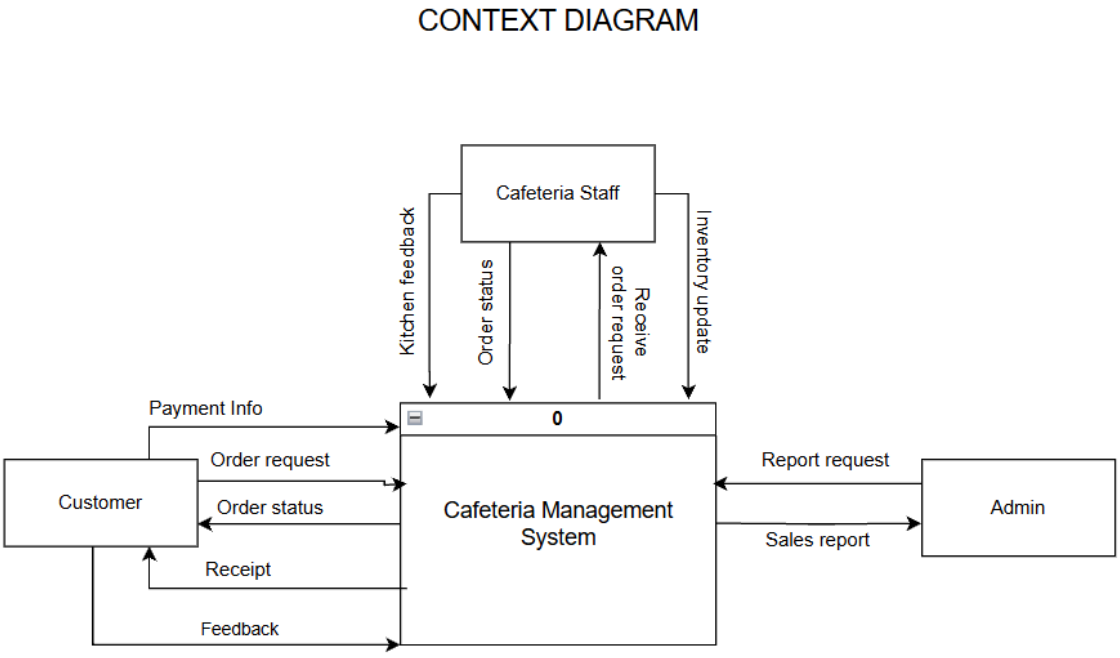
This system aims to address these issues through digitalization, enabling customers to pre-order food, make cashless payments, and receive real-time updates on order status. The system integrates **menu management**, **inventory tracking**, **order processing**, and **feedback collection** into a single platform.

By implementing the DCMS, UTM cafeterias can achieve improved service efficiency, reduced food waste, and enhanced customer satisfaction. The design of this database conceptual model forms the foundation for efficient and reliable cafeteria operations.

2.0 DATA FLOW DIAGRAM (DFD)

2.1 Context Diagram

The context diagram represents the entire system as a single process interacting with external entities.



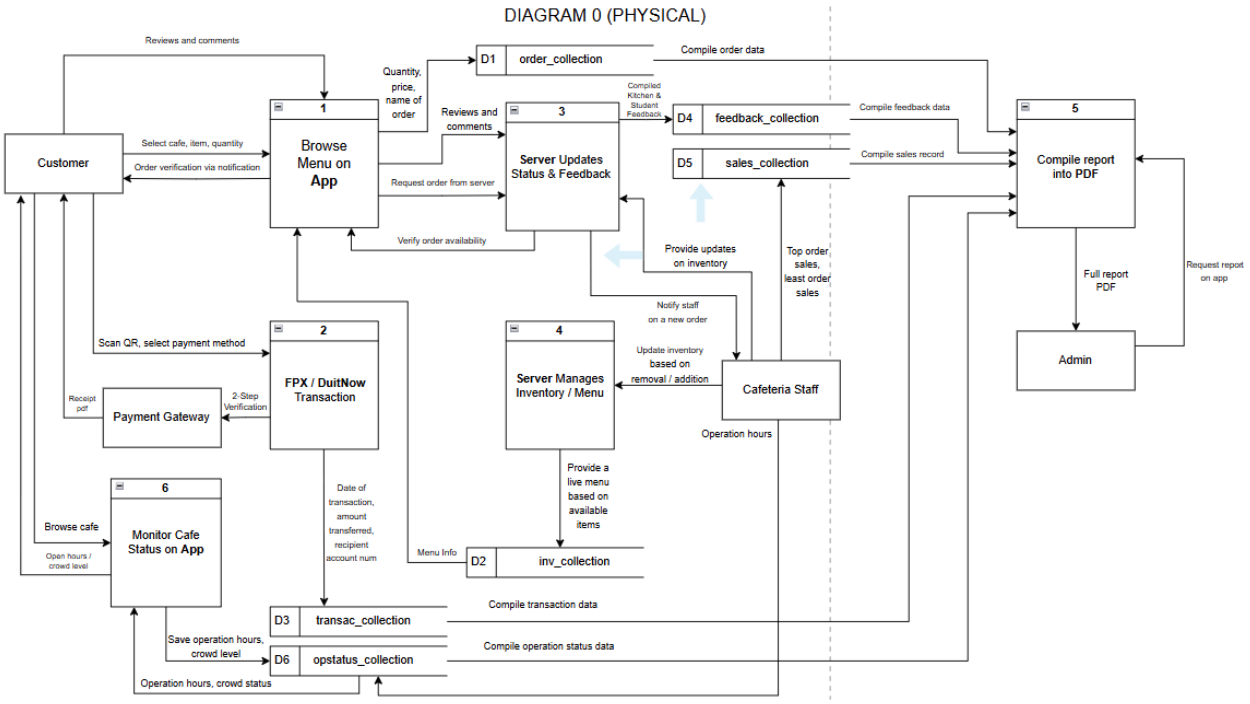
External Entities:

- Customer
- Cafeteria Staff
- Administrator

Data Flows:

- Customers send food orders, payments, and feedback to the system.
- Staff receive order details and update order status.
- The administrator reviews reports and manages staff accounts.

2.2 Parent Diagram (Level 0)



At this level, the DCMS is divided into key processes:

1. Manage Customer Orders
2. Manage Menu and Inventory
3. Manage Feedback and Reporting

Data Stores:

- Customer Data
- Menu Data
- Order Data
- Feedback Data
- Inventory Data

2.3 Child Diagram (Level 1)

2.3.1 Process 1.0 <Customer Order Management>

- The customer views the live menu and places an order with payment.
- The order is recorded in the system and sent to cafeteria staff.
- Staff confirm and prepare the order, updating its status to “Ready”.

2.3.2 Process 2.0 <Menu and Inventory Management>

- Cafeteria staff add or update menu items.
- When orders are completed, inventory quantity automatically decreases.
- Admins can view inventory reports and low-stock alerts.

2.3.3 Process 3.0 <Feedback and Report Generation>

- Customers provide feedback after order completion.
- Feedback data is stored and analyzed.
- Admins can generate performance reports using collected feedback and sales data.

3.0 DATA & TRANSACTION REQUIREMENT

3.1 Proposed Business Rule

Customer:

- Must register an account before placing any order.
- Can make one or more food orders.
- Can submit optional feedback after order completion.

Cafeteria Staff:

- Receive and process orders placed by customers.
- Update order status from *Pending → Preparing → Ready → Completed*.
- Manage menu availability and update inventory quantities.

Admin:

- Manages staff accounts and system configuration.
- Generates analytical reports on sales, menu performance, and feedback.
- Deletes outdated or inactive records to maintain system efficiency.

Payment Gateway

- Sends a 2-step verification to the Customer
- Manages the payment between the cafe and the Customer
- Prints receipt for the Customer

3.2 Proposed Data & Transactional

3.2.1 Proposed Data Requirement

Customer
Stores data such as CustID, CustName, CustContact, CustPassword, and Address. CustID is defined as the primary key. Address and CustContact are composite attributes, consisting of faculty and area, CustEmail and CustPhone respectively.

Cafeteria Staff
Stores StaffID, StaffName, Role, StaffContact and StaffPassword. StaffID is defined as the primary key.

Admin
Stores AdminID, AdminName, AdminEmail, and AdminPassword. Admin ID is defined as the primary key.

Payment Gateway
Stores PaymentID, CustID, OrderID, CustName. PaymentID is defined as the primary key. CustomerID is defined as foreign key.

MenuItem
Stores MenuID, ItemName, Category, Price, Availability, and InvID. MenuID is defined as the primary key. InvID is defined as the foreign key.

Inventory
Stores ItemID, ItemName, ItemQty, and LastUpdated. InventID is defined as the primary key. InventID is also defined as foreign key.

Order
Stores OrderID, OrderDetails, Status, CustID. OrderID is defined as the primary key. CustID is defined as the foreign key. OrderDetails is a composite attribute, consisting of OrderCode, OrderName, OrderPrice, OrderQty.

Feedback
Stores FeedbackID, Rating, Comment, Date, CustID, and OrderID. FeedbackID is defined as the primary key. CustID and OrderID are defined as foreign keys.

3.2.2 Proposed Transactional Requirement

Data Entry

1. Enter the details of Customer for registration
2. Enter the details of order (cafe, item, quantity)
3. Enter the details of cafe (to check operating status)
4. Enter the payment details according to the Customer's order
5. Enter review and feedback according to the Customer's order
6. Enter order details into order_collection database
7. Enter sales details into sales_collection database
8. Enter feedback details into feedback_collection database
9. Enter inventory details into inv_collection database
10. Enter transaction details into transac_collection database
11. Enter cafe status details into opstatus_collection database
12. Enter request for report

Data Update/Delete

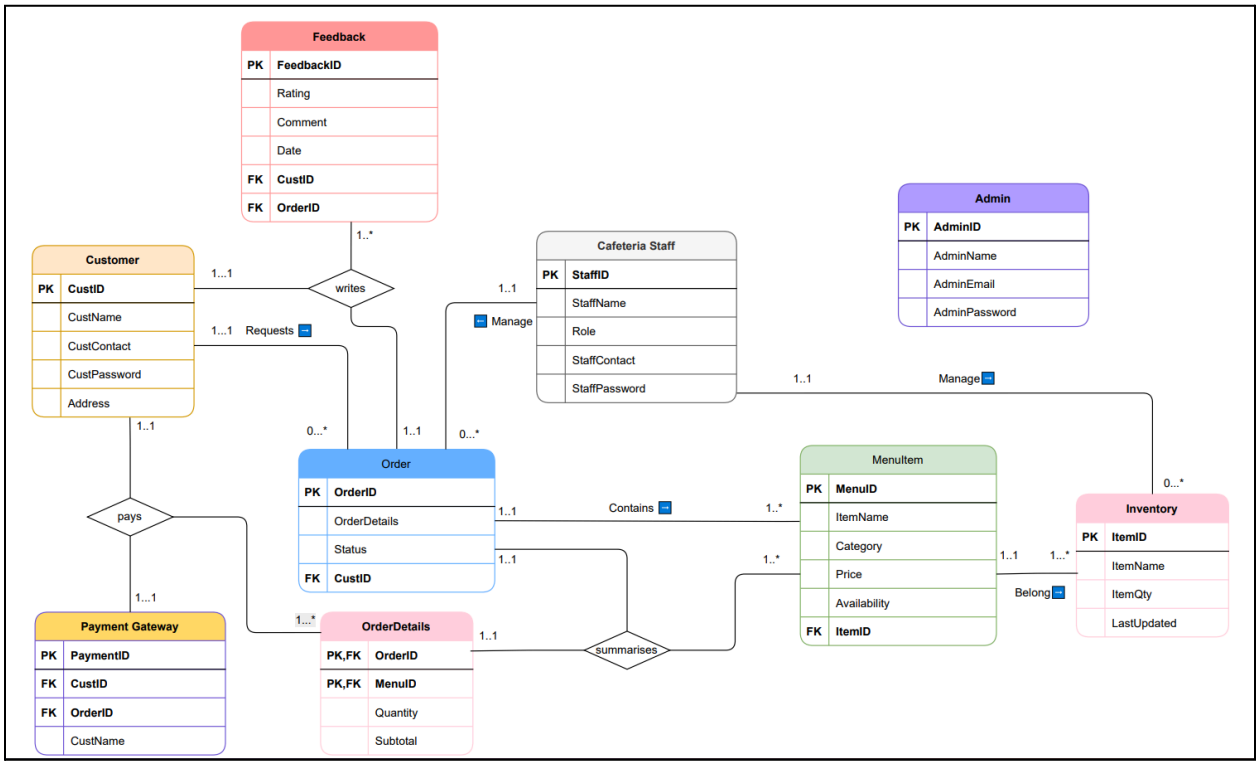
1. Update/Delete review and comments
2. Update/Delete menu items (in / out of stock)
3. Update/Delete order status (open / closed)
4. Update/Delete inventory (in / out of stock)
5. Update/Delete review and comments
6. Update/Delete order details from order_collection database
7. Update/Delete sales details from sales_collection database
8. Update/Delete feedback details from feedback_collection database
9. Update/Delete inventory details from inv_collection database
10. Update/Delete transaction details from transac_collection database
11. Update/Delete cafe status details from opstatus_collection database
12. Update/Delete new menu items and inventory records
13. Update/Delete new orders into the order database
14. Update/Delete transactions into transaction database
15. Update/Delete staff and admin account details
16. Update/Delete customer feedback after order completion

Data Queries

1. Display live / dynamic list of menu items
2. Display item price
3. Display items availability
4. Display order status
5. Display cafeteria status
6. Display customer feedback records
7. Display inventory status and low-stock alerts
8. Display receipt
9. Display report for admin

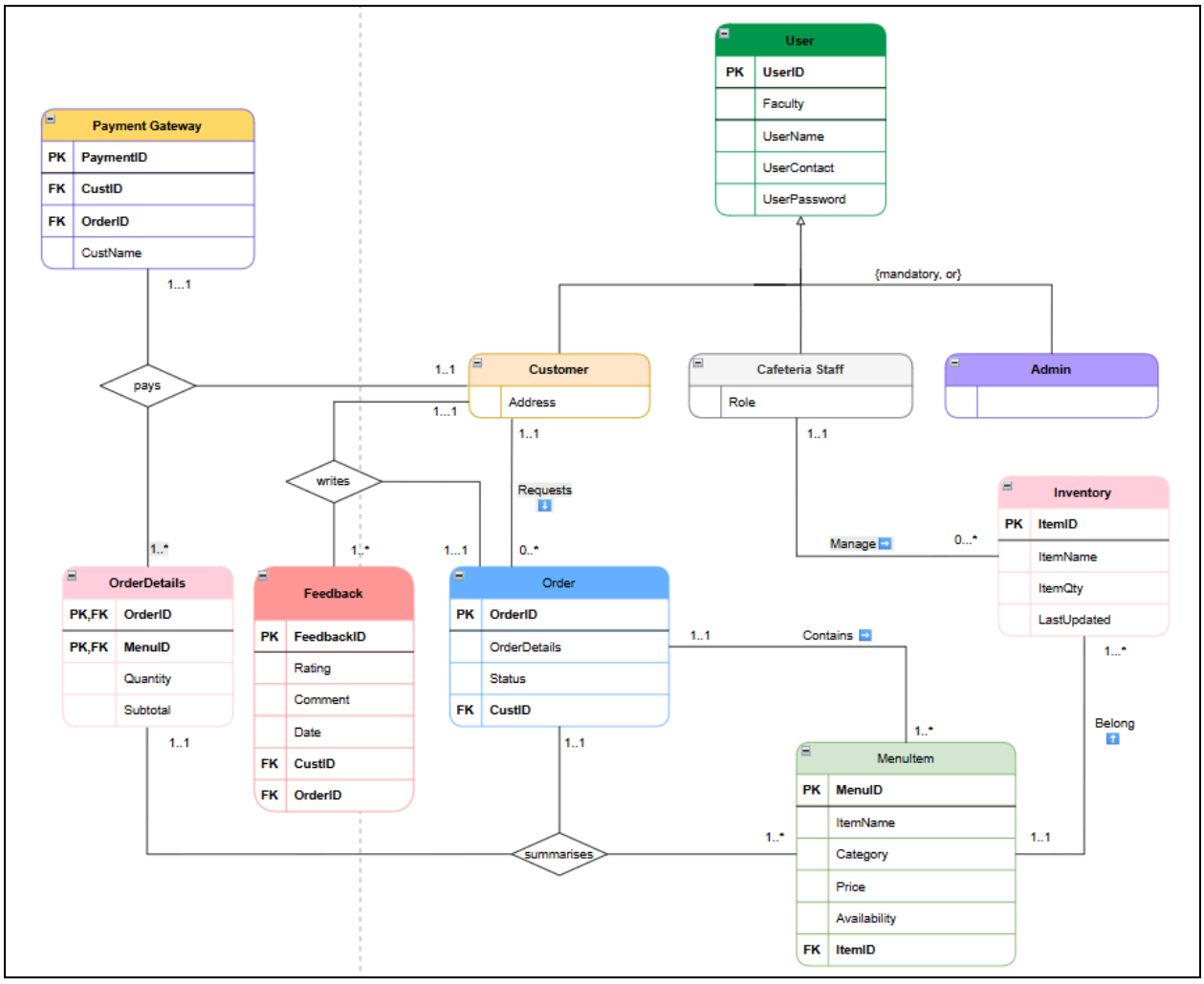
4.0 DATABASE CONCEPTUAL DESIGN

4.1 Conceptual ERD



[Database P2 ERD.drawio]

4.2 Enhanced ERD (EERD)



5.0 DATA DICTIONARY

5.1 Description of Entity

Entity	Description	Occurence
Customer	Customer's information	Customers register for an account, browse the menu, place orders, make payments, and submit feedback.
Cafeteria Staff	Cafeteria staff's information	Cafeteria staff manage menu items and inventory, receive incoming orders, and update the order status.
Admin	Admin's information	Admins generate reports on sales and feedback.
Order	Customer's order request	Orders are created by customers, processed by staff (from pending to ready), and generate a receipt upon payment.
OrderDetails	Associative entity between **Order** and **MenuItem**	Order details list the specific items and quantities for a single order and link the order to the menu items.
Feedback	Customer's feedback	Feedback is submitted by customers after order completion.
MenuItem	Food item information	Menu items are browsed by customers for ordering and managed by staff to reflect price and availability.
Inventory	Inventory's information	Inventory records are updated by staff when stock is added or automatically decreased when menu items are sold.

5.2 Description of Relationship

Entity	Multiplicity	Relationship	Multiplicity	Entity
Customer	1..1	writes	1..*	Feedback
	1..1	writes	1..1	Order
	1..1	request	0..*	Order
	1..1	pays	1..1	Payment Gateway
	1..1	pays	1..*	OrderDetails
Cafeteria Staff	1..1	manage	0..*	Inventory
	1..1	manage	0..*	Order
Order	1..1	contains	1..*	MenuItem
	1..1	summarises	1..1	OrderDetails
	1..1	summarises	1..*	MenuItem
MenuItem	1..1	belong	1..*	Inventory

5.3 Description of Attributes

Table Name	Field Name	Data Type	Description
Customer	CustomerID (PK)	VARCHAR(20)	Unique identifier for each customer.
	Name	VARCHAR(100)	Customer full name.
	Email	VARCHAR(100)	Customer email for login.
	Phone	VARCHAR(15)	Contact number.
	Password	VARCHAR(50)	Encrypted password for login.
Staff	StaffID (PK)	VARCHAR(20)	Unique identifier for each staff member.
	Name	VARCHAR(100)	Staff name.

	Role	VARCHAR(50)	Staff position (Cashier, Cook, etc.).
	Contact	VARCHAR(15)	Staff contact number.
Admin	AdminID (PK)	VARCHAR(20)	Unique identifier for each admin.
	Name	VARCHAR(100)	Admin full name.
	Email	VARCHAR(100)	Admin email address.
	Password	VARCHAR(50)	Admin login password.
MenuItem	MenuID (PK)	VARCHAR(20)	Unique identifier for menu item.
	ItemName	VARCHAR(100)	Name of the dish or drink.
	Category	VARCHAR(50)	Food, Beverage, etc.
	Price	DECIMAL(6,2)	Selling price per item.
	Availability	BOOLEAN	Whether item is available or sold out.
	InventoryID (FK)	VARCHAR(20)	Linked to related inventory record.
Inventory	InventoryID (PK)	VARCHAR(20)	Unique identifier for stock item.
	ItemName	VARCHAR(100)	Ingredient name.
	Quantity	INT	Available stock quantity.
	LastUpdated	DATE	Date of last stock update.
Order	OrderID (PK)	VARCHAR(20)	Unique order number.
	OrderDate	DATE	Date order was placed.
	TotalAmount	DECIMAL(8,2)	Total calculated cost.
	Status	VARCHAR(20)	Order progress (Pending, Ready, Completed).
	CustomerID (FK)	VARCHAR(20)	Linked to customer placing order.
	StaffID (FK)	VARCHAR(20)	Linked to staff handling order.

OrderDetails	OrderID (FK, PK)	VARCHAR(20)	Order reference.
	MenuID (FK, PK)	VARCHAR(20)	Menu item reference.
	Quantity	INT	Number of items ordered.
	Subtotal	DECIMAL(8,2)	Total price for this menu item.
Feedback	FeedbackID (PK)	VARCHAR(20)	Unique feedback entry.
	Rating	INT	Rating from 1 to 5.
	Comment	VARCHAR(255)	Customer’s written feedback.
	Date	DATE	Date feedback submitted.
	CustomerID (FK)	VARCHAR(20)	Linked to customer giving feedback.
	OrderID (FK)	VARCHAR(20)	Linked to the related order.

6.0 SUMMARY

In this phase, our group developed the **conceptual database design** for the **Digital Cafeteria Management System (DCMS)**. We designed the **Data Flow Diagrams**, established **business rules**, and outlined the **data and transactional requirements** based on the proposed cafeteria operations.

The **Conceptual ERD** and **Enhanced ERD** were designed to ensure proper representation of relationships, constraints, and participation levels. The **Data Dictionary** was created to define entities, attributes, and relationships, ensuring a consistent and logical database structure.

Through this phase, we gained a deeper understanding of the database design process and its importance in supporting system functionality. The work completed in this phase provides a strong foundation for **Phase 3 (Logical and Physical Design)**, where the DCMS database will be implemented to support real-world cafeteria operations effectively.