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# CAFÉ MANAGEMENT SYSTEM

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## 1.1 INTRODUCTION

The University Café Management System (UCMS) is an advanced software solution designed to streamline the operations of a university café. It manages critical components such as managers, employees, students, suppliers, items, and meal cards. The system aims to simplify and enhance efficiency in inventory management, meal card transactions, and supplier coordination. By integrating these entities into a centralized platform, the UCMS provides a robust framework for monitoring and optimizing café operations.

The primary purpose of this system is to provide a seamless experience for students and staff while ensuring that the café operates efficiently. Managers can oversee all operations, employees can perform their duties effectively, and students can use their meal cards for transactions without hassle. The system also ensures that suppliers and items are adequately tracked, reducing waste and ensuring timely stock replenishment.

## System Features

### 1. User-Friendly Interface

The UCMS offers a user-friendly interface tailored for different user roles, such as managers, employees, and students. Each user has access to specific functionalities aligned with their responsibilities.

### 2. Meal Card Management

The system enables students and employees to use meal cards for purchasing food and beverages. It tracks card balances, transaction history, and recharge details. This feature reduces the need for cash transactions and ensures transparency.

### **3. Inventory Management**

Items sold in the café are linked to suppliers, ensuring real-time tracking of stock levels. The system alerts managers when stock levels are low, allowing for timely restocking and better coordination with suppliers.

### **4. Reporting and Analytics**

The UCMS generates detailed reports on meal card usage, sales, inventory, and supplier performance. This data assists managers in making informed decisions, optimizing inventory, and enhancing overall efficiency.

### **5. Role-Based Access Control**

To ensure data security, the system incorporates role-based access control. Managers, employees, and students can only access functionalities relevant to their roles, safeguarding sensitive information.

## **System Benefits**

**Efficiency:** Streamlines café operations by automating inventory and transaction processes.

**Transparency:** Provides detailed records of meal card transactions and inventory.

**Cost-Effectiveness:** Minimizes waste through better stock management.

**Convenience:** Enables seamless transactions for students and employees.

## **1.2 System Analysis**

### **System Analysis for University Cafeteria Management System**

# 1. Problem Definition

The university cafeteria faces specific challenges, such as:

- Long waiting times during peak hours.
- Difficulty in managing multiple meal plans for students, staff, and visitors.
- Manual inventory tracking leading to inefficiencies.
- Lack of integration with student and staff identification systems.
- Inability to analyze food preferences and sales trends effectively.

# 2. Objectives of the System

- The proposed cafeteria management system aims to:
- Enhance Service Efficiency: Streamline food ordering, payment, and delivery processes.
- Improve Resource Management: Automate inventory tracking and reduce waste.
- Support Meal Plans: Enable management of prepaid meal plans for students and staff.
- Facilitate Reporting: Provide detailed sales, inventory, and customer behavior analytics.
- Increase Accessibility: Provide mobile and web platforms for easy access.

# 3. System Requirements

## 3.1 Functional Requirements

### User Management:

Allow students and staff to log in using university credentials.

Manage visitor accounts for non-regular users.

### **Menu Management:**

Display daily menu items with pricing.

Allow cafeteria staff to update menus dynamically.

### **Order and Payment:**

Support pre-ordering via mobile app or website.

Accept multiple payment methods (meal plans, credit/debit cards, digital wallets).

Provide order status updates in real time.

### **Meal Plan Management:**

Enable registration and tracking of prepaid meal plans.

Allow students and staff to view their meal plan balance and transaction history.

### **Inventory Management:**

Track stock levels and usage in real time.

Generate automated restocking alerts.

### **Reporting and Analytics:**

Generate reports on popular items, peak usage times, and revenue.

Provide data for planning menus and managing inventory.

## **3.2 Non-Functional Requirements**

**Scalability:** Handle large numbers of users during peak hours.

**Performance:** Ensure low response times for transactions and order processing.

**Security:** Protect user data, including meal plan balances and payment information.

**Usability:** Ensure interfaces are intuitive and accessible to diverse user groups.

**Integration:** Seamlessly integrate with existing university systems (e.g., student portals or ID cards).

## 4. Stakeholders

### Primary Stakeholders:

- Students and staff using the cafeteria.
- Cafeteria management and staff.

### Secondary Stakeholders:

- University administration.
- IT staff managing the system.
- Vendors supplying raw materials.

## 5. Existing System Analysis

### Evaluate the current system for:

- Meal plan tracking (manual or semi-automated).
- Order placement and payment methods.
- Inventory and supplier management.
- Bottlenecks during peak hours.

## 6. System Design Considerations

### 6.1 Inputs

- User details (name, role, and meal plan).
- Order details (menu items, quantity).
- Payment information (meal plan balance or other methods).
- Inventory data (stock levels, purchases).

## 6.2 Outputs

- Digital receipts for orders.
- Real-time order status updates.
- usage and restocking reports.
- Sales and customer preference analytics.

## 6.3 Processes

### Customer Processes:

- Browse menu, place order, and make payments.
- Monitor meal plan balances.

### Cafeteria Staff Processes:

- Prepare orders and update inventory.
- Update menu and pricing dynamically.

### Administrative Processes:

- Monitor sales trends and food preferences.
- Manage staff accounts and permissions.

## **6.4 Interfaces**

**Customer Interface:** Mobile app and web portal for menu browsing, ordering, and payments.

**Staff Interface:** POS systems for order processing and kitchen management.

**Administrator Interface:** Dashboard for inventory, sales, and system analytics.

## **7. Feasibility Study**

### **7.1 Technical Feasibility:**

Ensure compatibility with existing university systems (e.g., student portals, ID systems).

### **7.2 Economic Feasibility:**

Estimate development, deployment, and maintenance costs.

### **7.3 Operational Feasibility:**

Ensure alignment with cafeteria staff and university policies.

## **8. Constraints and Risks**

- Budget limitations.
- Resistance to adoption by staff or customers.
- Downtime during system transition.
- Privacy and security risks for user data.

## **9. Implementation Plan**

### **Phase 1: Planning and Requirement Gathering**

Conduct surveys with students, staff, and management

### **Phase 2: System Design**

Create wireframes, prototypes, and database schemas.

### **Phase 3: Development and Testing**

Develop modules (user login, menu display, ordering, payments).

Test system performance during peak times.

### **Phase 4: Deployment**

Implement a phased rollout (pilot testing, full deployment).

### **Phase 5: Training and Support**

Train cafeteria staff and IT administrators.

Provide customer support for system-related issues.

## **10. Proposed System**

A proposed system in a cafeteria management system is a conceptual or planned solution aimed at addressing existing challenges, streamlining operations, and enhancing the overall efficiency of cafeteria operations. Here's what a proposed cafeteria management system typically involves:

## **Key Features of the Proposed System**

### **Order Management**

Digital Menus: Interactive digital menus accessible on kiosks, mobile devices, or tablets.

Self-Ordering System: Customers can place orders via kiosks or a mobile app, reducing wait times.

Queue Management: Real-time display of order queues and estimated waiting times.

### **Billing and Payment System**

Automated Billing: Quick generation of bills with tax and discounts applied automatically.

Multiple Payment Options: Support for cash, credit/debit cards, mobile wallets, and QR code payments.

## **Objectives of the Proposed System**

Operational Efficiency: Minimize manual tasks and reduce errors in order processing, billing, and inventory tracking.

Customer Convenience: Provide faster service and modern features like self-ordering and mobile payments.

Cost Savings: Optimize inventory usage and reduce food wastage.

Scalability: Enable the cafeteria to handle a larger customer base without additional strain.

## **Benefits of the Proposed System**

Faster Service: Reduced waiting time for customers.

Enhanced Customer Experience: Improved service quality through personalization and convenience.

Data-Driven Decisions: Analytics for better decision-making and operational insights.

Reduced Costs: Improved inventory management and operational efficiency.

## 1.3 Entities and Attributes

**Definition of an Entity:**

An entity is a distinct object, person, place, event, or concept that is relevant to a system and needs to be tracked or managed. It represents a real-world object or idea in a database or system.

**Definition of an Attribute:**

An attribute is a characteristic or property that describes an entity. Attributes hold the data that defines or gives more detail about the entity.

The entities and attribute of café management system are core components of a database. These are

### 1. Students:(Entities)

**Attributes:**

- Student ID (primary key)
- Name
- Email
- Phone number
- Student type (e.g., resident, day scholar)
- Balance (for prepaid accounts)

## 2. Staff:(Entities)

Attributes:

- Staff ID (primary key)
- Name
- Role (e.g., cashier, chef, manager)
- Email
- Phone number
- Shift timings

## 3. Men:(Entities)

Attributes:

- Menu ID (primary key)
- Item name Category (e.g., drinks, snacks, meals)
- Price
- Availability status
- Ingredients (linked to the inventory)

#### **4. Orders:(Entities)**

Attributes:

- Order ID (primary key)
- Order date and time
- Student ID (foreign key)
- Staff ID (foreign key, for order processing)
- Total amount
- Payment status (e.g., paid, unpaid)

#### **5. Order Items:(Entities)**

Attributes:(Entities)

- Order Item ID (primary key)
- Order ID (foreign key)
- Menu ID (foreign key)
- Quantity
- Subtotal (calculated as Quantity × Price)

#### **6. Inventory:(Entities)**

Attributes:

Inventory ID (primary key)

Item name

Quantity in stock

Reorder level

Supplier ID (foreign key)

## **7. Suppliers:(Entities)**

**Attributes:**

- Supplier ID (primary key)
- Supplier name
- Contact information
- Address
- List of supplied items (linked to inventory)

## **8. Payments:(Entities)**

**Attributes:**

- Payment ID (primary key)
- Order ID (foreign key)
- Payment method (e.g., cash, card, mobile payment)
- Payment date and time
- Amount paid

## **9. Promotions:(Entities)**

**Attributes:**

- Promotion ID (primary key)
- Title
- Discount percentage
- Start date
- End date
- Applicable items (linked to the menu)

## 10. Cafeteria Settings:(Entities)

Attributes:

- Setting ID (primary key)
- Opening hours
- Closing hours
- Location (e.g., main cafeteria, satellite kiosk)

## 1.4 Relationships

Below are the relationships between the entities in your university cafeteria management system:

1. Students ↔ Orders

Relationship: One-to-Many

Description: A student can place multiple orders, but each order belongs to one student.

Keys: Student ID (foreign key in Orders).

2. Staff ↔ Orders

Relationship: One-to-Many

Description: A staff member processes multiple orders, but each order is processed by one staff member.

Keys: Staff ID (foreign key in Orders).

### 3. Orders ↔ Order Items

Relationship: One-to-Many

Description: Each order can contain multiple order items, but an order item is linked to only one order.

Keys: Order ID (foreign key in Order Items).

### 4. Order Items ↔ Menu

Relationship: Many-to-One

Description: Each order item corresponds to one menu item, but a menu item can appear in multiple order items.

Keys: Menu ID (foreign key in Order Items).

### 5. Menu ↔ Inventory

Relationship: Many-to-Many

Description: Each menu item is made up of multiple inventory items (ingredients), and an inventory item can be used in multiple menu items.

Keys: Use a linking table with Menu ID and Inventory ID.

### 6. Inventory ↔ Suppliers

Relationship: Many-to-One

Description: Each inventory item is supplied by one supplier, but a supplier can provide multiple inventory items.

Keys: Supplier ID (foreign key in Inventory).

## 7. Orders $\leftrightarrow$ Payments

Relationship: One-to-One

Description: Each order has one corresponding payment, and a payment belongs to one order.

Keys: Order ID (foreign key in Payments).

## 8. Menu $\leftrightarrow$ Promotions

Relationship: Many-to-Many

Description: Each promotion can apply to multiple menu items, and a menu item can be part of multiple promotions.

Keys: Use a linking table with Promotion ID and Menu ID.

## 9. Cafeteria Settings $\leftrightarrow$ Staff

Relationship: One-to-Many

Description: A cafeteria has multiple staff members, but each staff member belongs to one cafeteria location.

Keys: Setting ID (foreign key in Staff).

Entity-Relationship Diagram (ERD) Suggestions:

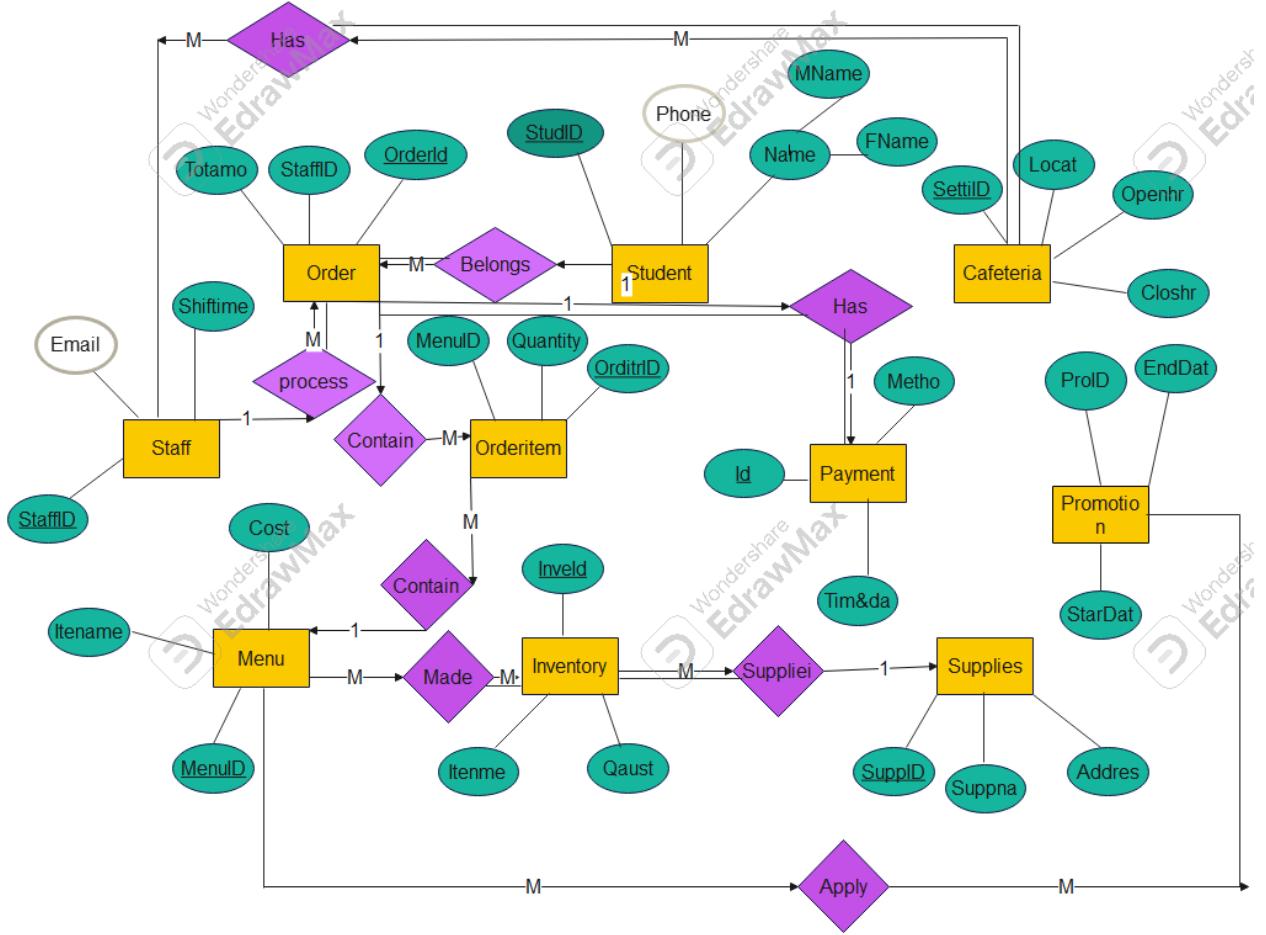
Rectangles for entities like Students, Staff, Menu, etc.

Diamonds for relationships such as "Places," "Processes," or "Includes."

Lines between entities with cardinality (e.g., 1-to-Many, Many-to-Many).

Linking tables for Many-to-Many relationships (e.g., Menu  $\leftrightarrow$  Inventory, Menu  $\leftrightarrow$  Promotions)

# 1.5 ER Diagram



# **1.6 Automated summary for the University Cafeteria Management System:**

## **Core Entities and Relationships**

### **1. Students**

Manages personal details, account balance, and links to orders and feedback.

### **2. Staff**

Tracks staff details, roles, and their association with processed orders.

### **3. Menu**

Contains items, categories, prices, and availability, linked to order items, inventory, and promotions.

### **4. Orders**

Captures student orders, staff handling, order items, and payment status.

### **5. Order Items**

Details the menu items in each order with quantity and cost calculations.

### **6. Inventory**

Tracks ingredient stock levels and links to menu items and suppliers.

### **7. Suppliers**

Maintains supplier details and their supplied inventory.

### **8. Payments**

Records payment details for each order, including method and status.

## **9. Promotions**

Manages discounts and applicable menu items.

## **10. Cafeteria Settings**

Defines operating hours, locations, and links to staff.

## **Key Relationships (Automated Summary)**

Students ↔ Orders: A student can place multiple orders.

Staff ↔ Orders: A staff member processes multiple orders.

Orders ↔ Payments: Each order has one payment.

Orders ↔ Order Items: Orders contain multiple menu items.

Menu ↔ Inventory: Menu items use ingredients from the inventory.

Inventory ↔ Suppliers: Suppliers provide ingredients for the inventory.

Menu ↔ Promotions: Promotions apply to multiple menu items.

Cafeteria Settings ↔ Staff: Staff members are linked to specific cafeteria locations

This summary simplifies the system's structure and relationships for streamlined