

**DATA AND APPLICATIONS
PROJECT PHASE 1
REQUIREMENTS DOCUMENT**

Team 32

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1. Introduction to the mini-world

- In this mini-world, we are developing a database for our college campus which has seven canteens: JC, Tantra, Devids, BBC, VC, CIE Canteen, Rolls canteen, each open at different times and offering different menus.
- The primary goal is to facilitate a take-away and delivery system for students and staff within the campus. The system provides menu information, opening hours, and manages orders and payments.

2. Purpose of the database

- The purpose of the database is to efficiently manage and coordinate the operations of the seven canteens, including their menus, operating hours, and orders.
- It enables students and staff to place orders, receive deliveries, and view menus and operational details of the canteens.

3. Users of the database

- a. Students: To place orders for food from any of the canteens without having to wait for the food preparation. It will enable speedy take away orders.
- b. Faculty and Staff: To order food or request bulk deliveries for meetings or events.
- c. Canteen Staff: To update menus, manage orders, and track inventory.
- d. Admins: To manage the database and resolve issues.

4. Assumptions

- Customers have unique IDs and roles (students, faculty, staff, admins).
- The campus has a defined delivery area.
- Customers can place orders for take-away or dine in.
- Menus at the canteens can change frequently.
- Opening hours and menu availability can vary by canteen.
- Each menu item must be offered by at least one canteen.
- Every canteen must offer at least one menu item.
- Every customer in the database must have placed at least one order.
- An order will contain at least one item i.e. there will be no empty orders.
- Every order must be paid for.
- An order can contain multiple menu items (each order MUST have menu item(s)).

5. Database requirements

- a. **Strong Entity types**
 - i. **Customer**

| Attribute | Key | Type | Datatype | Description |
|-----------|-----|------|----------|-------------|
|-----------|-----|------|----------|-------------|

| | | | | |
|---------------------|-------------|------------------------|-------------|--|
| customerID | primary key | simple attribute | int | |
| customerName | - | simple attribute | varchar[64] | |
| customerRole | - | simple attribute | varchar[32] | student, faculty, etc. |
| customerDateOfBirth | - | simple attribute | date | |
| phoneNum | - | multi-valued attribute | int | a person can have multiple phone numbers |
| age | - | derived attribute | int | |

ii. Canteen

| Attribute | Key | Type | Datatype | Description |
|---------------|-------------|---------------------|-------------|---|
| canteen | primary key | simple attribute | varchar[32] | |
| location | - | simple attribute | varchar[64] | |
| yearOfOpening | - | simple attribute | int | |
| openingTime | - | composite attribute | int | with sub-attributes for each day's schedule |
| closingTime | - | composite attribute | int | with sub-attributes for each day's schedule |

iii. Order

| Attribute | Key | Type | Datatype | Description |
|-----------|-------------|------------------|----------|-------------|
| orderID | primary key | simple attribute | int | |
| orderDate | - | simple attribute | date | |

| | | | | |
|---------------|-------------|------------------|-------------|---|
| totalPrice | - | simple attribute | int | |
| orderStatus | - | simple attribute | int | status of the order: received, fulfilled, etc |
| customer | foreign key | simple attribute | int | customerID |
| canteenPlaced | foreign key | simple attribute | varchar[32] | canteen |

iv. Staff

| Attribute | Key | Type | Datatype | Description |
|------------------|---------------|-------------------|-------------|---------------------------------|
| staffId | primary key | simple attribute | int | |
| aadhar | candidate key | simple attribute | int | |
| staffName | - | simple attribute | varchar[64] | |
| staffDateOfBirth | - | simple attribute | date | |
| staffAge | - | derived attribute | int | |
| staffGender | - | simple attribute | varchar[32] | |
| staffSalary | - | simple attribute | int | |
| staffPhoneNum | - | simple attribute | int | |
| canteenEmployed | foreign key | simple attribute | varchar[32] | Canteen where they are employed |

v. Payment

| Attribute | Key | Type | Datatype | Description |
|-------------|-------------|------------------|-------------|-----------------|
| paymentID | primary key | simple attribute | int | |
| method | - | simple attribute | varchar[32] | cash, UPI, etc. |
| amount | - | simple attribute | int | |
| date | - | simple attribute | date | |
| canteenPaid | foreign key | simple attribute | varchar[32] | |

| | | | | |
|------------|-------------|------------------|-----|------------|
| userPaying | foreign key | simple attribute | int | customerID |
| orderPaid | foreign key | simple attribute | int | orderID |

b. Weak entity type

i. Menu Item

| Attribute | Key | Type | Datatype | Description |
|----------------------------|-------------|-----------------------|-------------|------------------------|
| Item Name | partial key | simple attribute | varchar[64] | |
| Quantity of the pack/thing | partial key | simple attribute | varchar[32] | MI, 5 pieces, gm |
| Price | - | simple attribute | int | Rs 5 |
| Ingredients | - | Multivalued attribute | varchar[64] | |
| Units Sold | - | simple attribute | int | Sold 5 mini green lays |
| CanteenID | foreign key | simple attribute | varchar[32] | |

ii. Feedback

| Attribute | Key | Type | Datatype | Description |
|---------------|-------------|------------------|-------------|--|
| Canteen ID | foreign key | simple attribute | varchar[64] | |
| Serial Number | Partial key | simple attribute | int | Feedback 234 (Serial number) of Canteen 2 (Canteen ID) |
| Rating | - | simple attribute | float | 5/10 |
| Comments | - | Simple attribute | varchar[64] | Mud Pie in vc was spectacular! |

c. Relationship types

i. Customer MAKES Payment

- Min,Max: (1,N) Customer MAKES Payment (1,1)
- Cardinality: Customer : Payment = 1 : N
- Participation Constraints: Total for Customer, Total for Payment

ii. Order CONTAINS Menu Items

- Min,Max: (1,N) Order CONTAINS Menu Items (1,N)
- Cardinality: Order : Menu Items = M : N
- Participation Constraints: Total for Order, Partial for Menu Item

iii. Canteen SERVES Order TO Customer

- A canteen can handle multiple orders from different customers, and each order is associated with only one canteen and one customer.
- Min,Max: (0,N) Canteen SERVES Orders (1,1) TO customers (1,N)
- Cardinality: Canteen : Order:Customer = M : N : P
- Participation Constraints: Partial for Canteen, Total for Order, Total for Customer

iv. Customer PROVIDES Feedback ABOUT Canteen

- Min,Max: (0,N) Customer PROVIDES Feedback (1,1) ABOUT Canteen (0,N)
- Cardinality: Customer : Feedback:Canteen = M : N : P
- Participation Constraints: Partial for Customer, Total for Feedback, Partial for Menu Item

v. Canteen OFFERS Menu Item

- Identifying Relationship
- Min,Max: (1,N) Canteen OFFERS Menu Item (1,1)
- Cardinality: Canteen : Menu Item = 1 : N
- Participation Constraints: Total for Canteen, Total for Menu Item

vi. Canteen EMPLOYS Staff

- Min, Max: (1,N) Canteen MANAGES Staff (1,1)
- Cardinality: Canteen : Staff = 1 : N
- Participation Constraints: Total for Canteen, Total for Staff

vii. Staff SUPERVISES Staff

- Min, Max: (0,N) Staff SUPERVISES Staff (0,1)
- Cardinality: Staff (supervisor) : Staff (subordinate) = 1 : N
- Participation Constraints: Partial for Staff (Supervisor), Partial for Staff (Subordinate)

6. Functional requirements

a. RETRIEVALS

i. Selection

- Select the 10 most purchased menu items.
- Select all menu items at a given price.
- Select all canteens that open before 10 A.M. on Sunday.

ii. Projection

- Return the names of all the menu items that have a price more than Rs 50.
- Return the names of customers who are older than 18.

iii. Aggregate (SUM, MAX, MIN, AVG)

- The **MIN** salary paid to the staff in a canteen.
- The **MAX** price of any menu item in a canteen.
- The **AVG** cost of all menu items in a canteen.
- The **SUM** of orders to a canteen.

iv. Search

- **Menu Item Search**- Customers can search for a particular menu item. Example- Searching for "bur" to find "burger".

- **Staff search-** Canteen staff can also implement a search operation to find canteen staff by their names. Example- Searching for “kul” to find “Kuljeet”.

b. Analysis

i. Analysis 1 : To find the most popular menu items offered by each Canteen

- Join the “Menu Item” and “Canteen” tables using the “CanteenID” attribute.
- Group the results by canteen and menu item, and count the number of units Sold for each menu item.
- **Output:** A list of most popular menu items will be generated which can help canteen staff understand which items are in *high demand* and optimize their inventory and menu offering accordingly.

ii. Analysis 2 : Customer Feedback Analysis for each Canteen

- Join the “Canteen” and “Feedback” tables using the “CanteenID” attribute.
- Calculate the average rating for each canteen based on customer Feedback.
- **Output:** A list of average ratings will be generated which will help in analyzing Customer feedback and rating for different canteens.

c. MODIFICATIONS

i. Insertion

- **Customer:** When an order is placed and the customer is not in the database.
- **Order:** When an order is placed
- **Payment:** When a payment is made

ii. Update

- **Staff:** When an employee’s salary changes
- **Canteen:** When opening or closing hours are updated
- **Order:** The status of the order, when it is fulfilled or failed.

iii. Delete

- **Staff:** When an employee leaves the canteen.
- **Menu Item:** When a particular menu item has been removed from the menu of a canteen.

7. Requirements satisfied

- We have at least five strong entity types (Customer, Canteen, Order, Staff, Payment)
- We have at least one weak entity with two key attributes (Menu item with partial keys: Item name and quantity)
- We have at least two weak-entity types (Feedback , Menu Item)
- We have at least five relationship types
 - Customer MAKES Payment
 - Order CONTAINS Menu Items
 - Canteen SERVES Order TO Customer
 - Customer PROVIDES Feedback ABOUT Canteen
 - Canteen OFFERS Menu Item
 - Canteen EMPLOYS Staff

- Staff SUPERVISES Staff
- Canteen GETS Feedback
- We have at least one ($n > 2$) degree relationship type:
 - Canteen SERVES Order TO customer
 - Customer PROVIDES feedback ABOUT canteen
- We have a few composite, multi-valued, derived attributes
 - Customer (Multivalued Attribute: Phone Number, Derived attribute: Age)
 - Canteen (Composite Attribute: Opening time (with sub-attributes for each day's schedule), Composite Attribute: Closing time (with sub-attributes for each day's schedule))
 - Staff (Derived Attribute: staffAge)
 - Menu Item (Multivalued attribute: Ingredients)
- We have a BONUS Relationship type with the same participating entity type in distinct roles:
 - Staff SUPERVISES Staff
- We have BONUS mentions of improvements upon an already existing database in the real world.

8. Improvements compared to real world scenarios

- **Campus-Specific Focus:** Our database is tailored to the specific needs of the IIIT college campus. This allows for a more precise management and customization of canteen operations. This campus-centric approach ensures that the system is optimized for the unique dynamics of a closed campus environment.
- **Canteen Management:** The database facilitates detailed canteen management, allowing staff to efficiently control their menus, hours of operation, and inventory. In contrast, large food delivery apps may not provide such granular control to individual canteens.
- **Customer Profiling:** With this database, we can also maintain detailed customer profiles, making it easier to provide personalized services to students, faculty, and staff. General food delivery apps are not campus-specific and may not contain as much information about the specific preferences and roles of customers.