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(Deemed to be University under section 3 of UGC Act, 1956)

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Registration Number : 22BCE3327

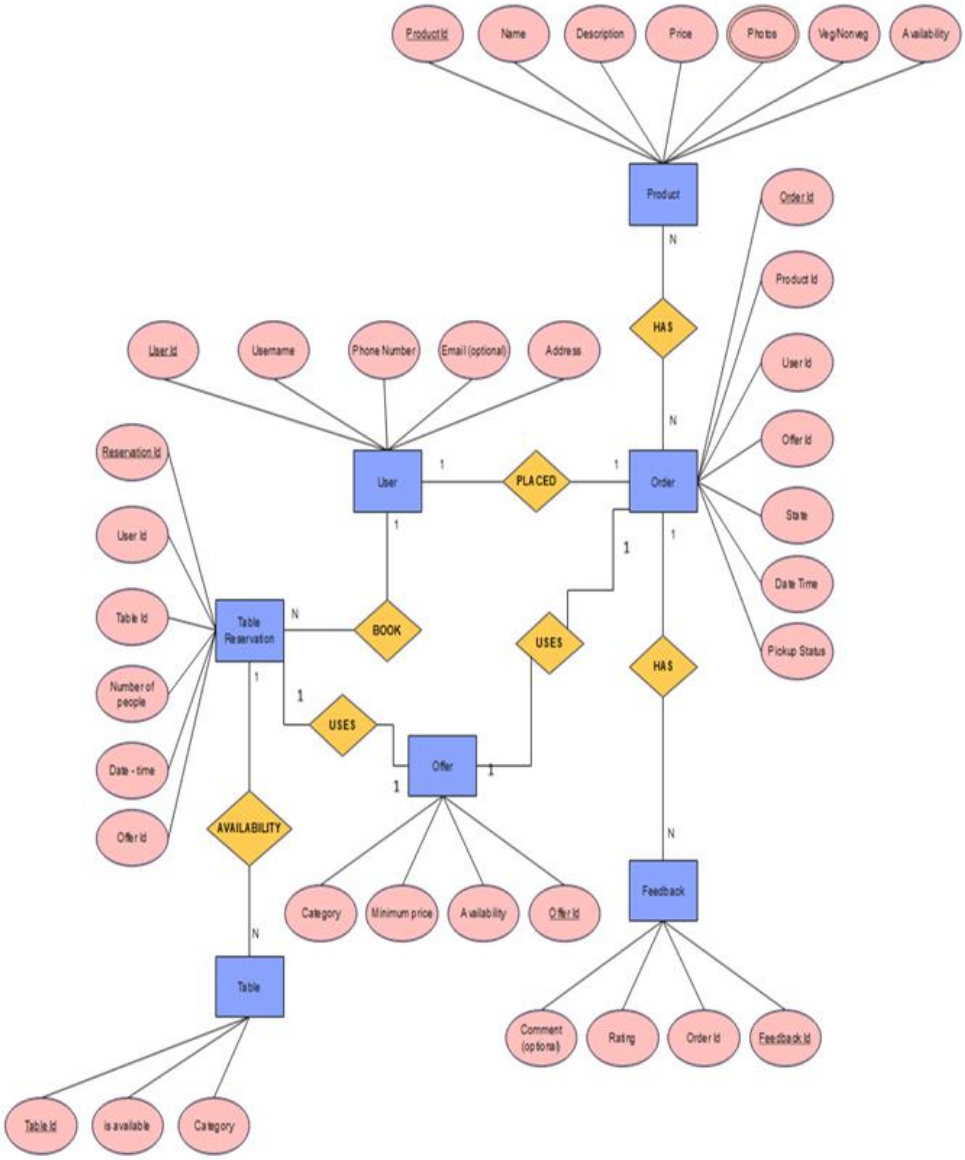
Course Code : BCSE301P

Subject Title : Software Engineering Lab

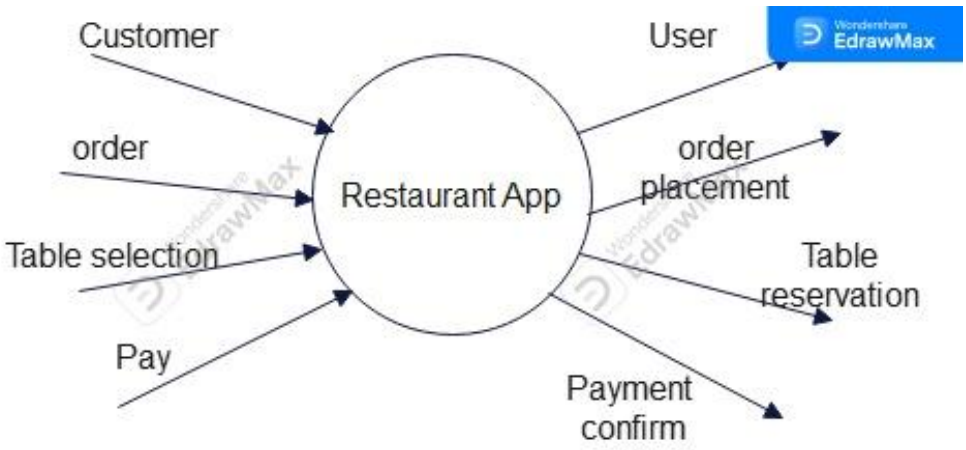
Lab Slot : L15+L16

Guided by : DEEPIKA J

1. Draw Entity Relationship Diagram

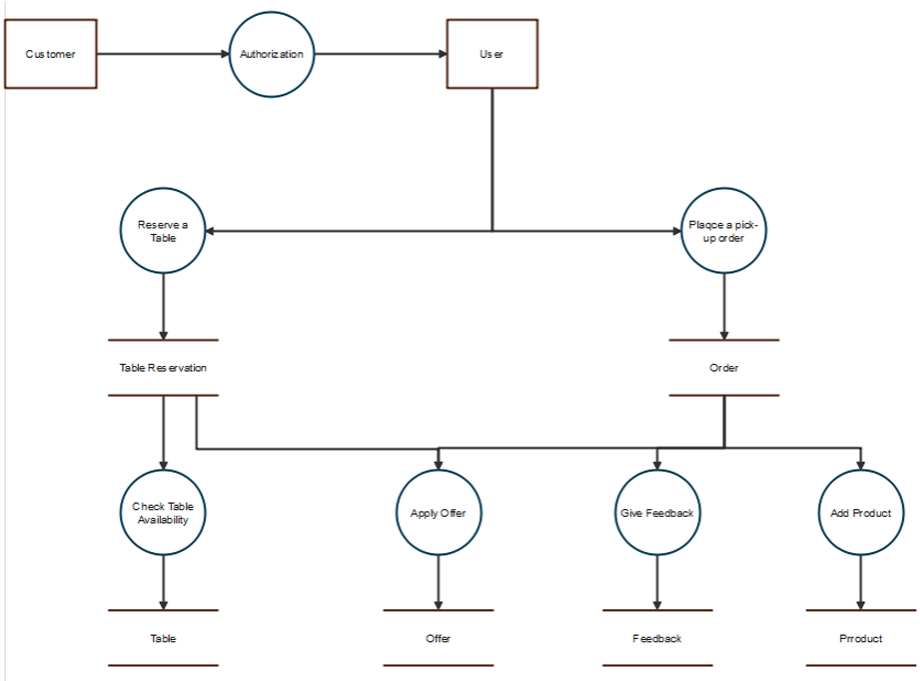


2. Draw Context flow diagram (level 0 DFD)

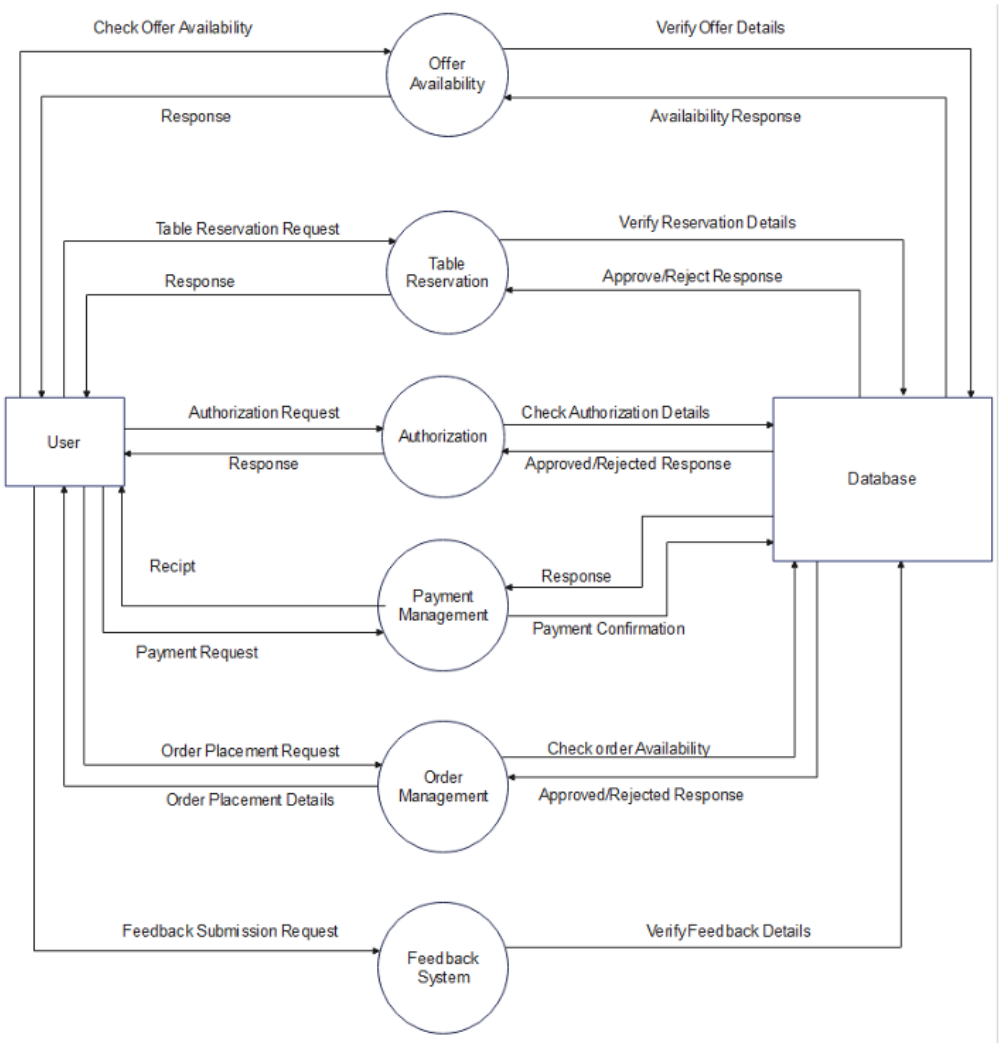


3. Draw DFD (Both level 1 and level 2)

Level-1



Level-2



4. State Transition Diagram (For any 1 user story) (Use: State Chart diagram)

Walk through a user story of how the system should behave in different situations. This will help

clarify the transitions, actions, and guards.

For example: User inserts enough coins, presses the coffee button, and the machine dispenses

coffee.

User Story:

"As a customer, I want to place a takeaway order so that I can pick it up when it's ready."

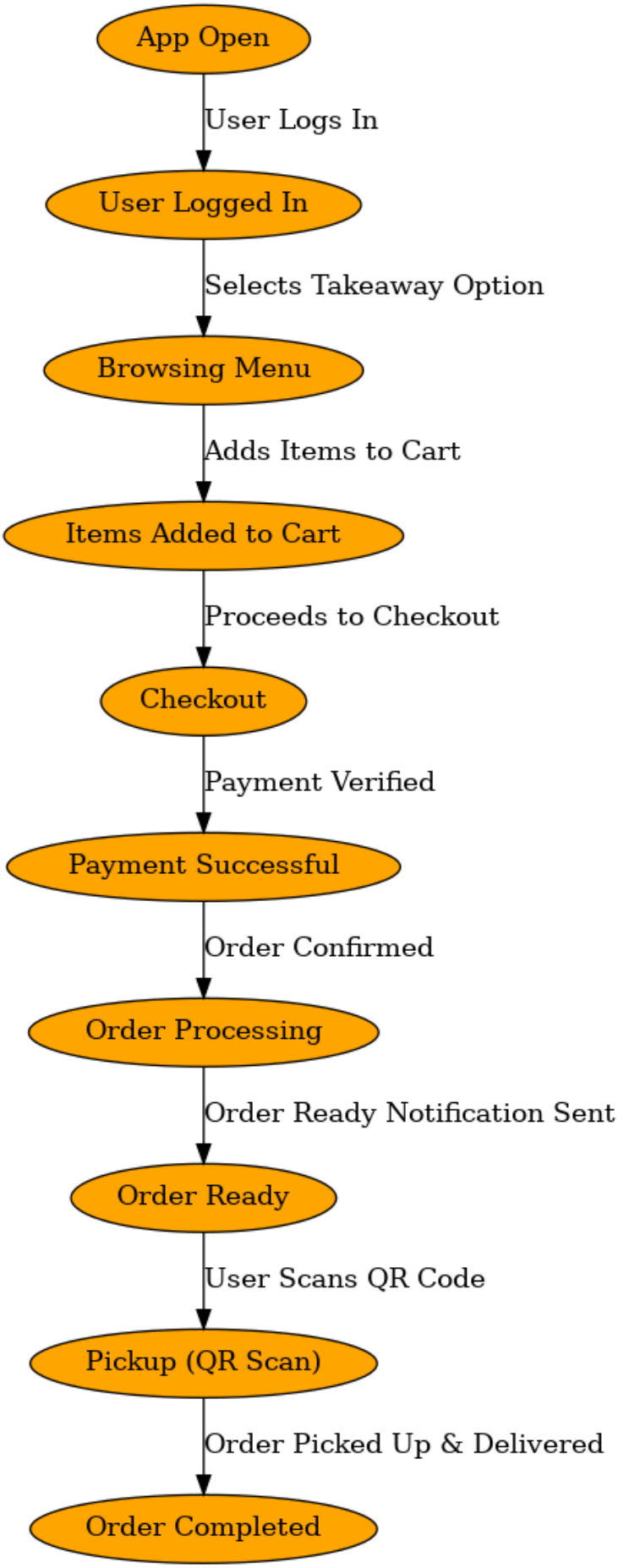
State Chart Walkthrough:

1. **User Opens App** → The user launches the restaurant application.
2. **User Logs In** → The user enters valid credentials and gains access to the home page.
3. **User Navigates to Takeaway Menu** → The user selects the "Takeaway" option.
4. **User Adds Items to Cart** → The user selects menu items and adds them to the cart.
5. **User Proceeds to Checkout** → The user verifies the cart and clicks on "Proceed to Payment."
6. **User Makes Payment** → The user selects a payment method and completes the transaction.
7. **Order is Confirmed** → The system processes the order and sends a confirmation notification.
8. **Order is Being Prepared** → The restaurant staff starts preparing the order.
9. **Order is Ready** → The system updates the order status and notifies the user.
10. **User Scans QR Code for Pickup** → The user arrives at the restaurant, scans the QR code, and collects the order.
11. **Order is Completed** → The system marks the order as completed.

State Transition Diagram (State Chart Diagram)

States & Transitions:

1. **Idle State** → App is waiting for user input.
2. **Logged In State** → User successfully logs in.
3. **Browsing State** → User navigates and selects menu items.
4. **Cart State** → User reviews selected items.
5. **Checkout State** → User proceeds to payment.
6. **Payment Successful State** → Payment is verified, and order is confirmed.
7. **Order Processing State** → The restaurant starts preparing the order.
8. **Order Ready State** → Order is completed, and the user is notified.
9. **Pickup State** → User scans QR code and collects the order.
10. **Completed State** → Order is successfully delivered.


App Open
User Logs In
User Logged In
Selects Takeaway Option
Browsing Menu
Adds Items to Cart
Items Added to Cart
Proceeds to Checkout
Checkout
Payment Verified
Payment Successful
Order Confirmed
Order Processing
Order Ready Notification Sent
Order Ready
User Scans QR Code
Pickup (QR Scan)
Order Picked Up & Delivered
Order Completed

1. Describe the System/Project:

What is the project about?

What are the main functionalities?

The project is a **Restaurant Management Mobile Application** designed to facilitate **dine-in reservations** and **takeaway orders** for users. It provides a seamless experience for customers to browse menus, place orders, make reservations, and complete payments digitally. The app also includes **real-time notifications** and **QR-based order pickup** to enhance convenience for both customers and restaurant staff.

The key functionalities of the system include:

1. **User Authentication & Profile Management**
    - Sign up/login via email or phone number.
    - Profile management (update user details).
2. **Menu Browsing & Selection**
    - View restaurant menu categorized by food type (meals, beverages, desserts).
    - Search and filter menu items.
3. **Dine-in Reservation System**
    - Select meal type and preferred time.
    - Choose a table and confirm the reservation.
    - Make a **partial prepayment** for booking confirmation.
4. **Takeaway Order System**
    - Add items to the cart.
    - Modify item quantity and apply discounts.
    - Complete order payment.
5. **Payment Processing**
    - Supports multiple payment options (UPI, card, wallet).
    - Generates **payment receipts** for tracking.
6. **Order Tracking & Notifications**
    - Notifies users about order status (processing, ready for pickup).
    - Provides real-time updates on reservation confirmation.
7. **QR Code-Based Order Pickup**
    - Generates QR codes for takeaway orders.
    - Users scan the QR code at the restaurant for a smooth pickup process.

8. **Customer Support**
    - In-app customer care for queries and complaints.
    - Direct messaging and support ticket system.
9. **Feedback & Reviews**
    - Users can submit ratings and comments after an order.
    - Feedback is stored for restaurant improvement.

2. Define the States:

List the distinct states the object/system can be in

Explain what each state represents.

State transitions for the restaurant mobile application involve capturing the different states that the system or its components can go through and the events that trigger these transitions.

Not Authenticated → Authenticated

Menu Browsing → Viewing 3-Meals Menu / Viewing Top Items / Viewing Offers/Schemes

[Depending on Food Type Selected] → Selecting Food Type → Table Reservation → Payment → Reservation Confirmed

Choosing Food, Beverages, Dessert → Adding to Cart → Adjusting Cart → Placing Order → Order Ready

Order Ready Notification → Displaying QR Code → Order Received

Assumptions

Assumption	Description
User authentication	Users will enter accurate and valid email addresses or phone numbers during the authentication process. The accuracy of user-provided information is crucial for effective communication and order processing.
Menu and offers	Menu items, 3-meals menu, top items, and offers/schemes are regularly updated and maintained by the restaurant staff. Providing users with accurate and up-to-date information is essential for a positive user experience.
Dine-in reservation	The availability of tables for reservation is managed by the restaurant staff in real-time. Real-time table availability ensures that users can make accurate reservations based on the current capacity.
Take-away order	The restaurant staff will prepare and notify users when take-away orders are ready in a timely manner. Timely order preparation and notification contribute to customer satisfaction in the take-away process.
Payment processing	The payment processing system is secure and complies with industry standards. Ensuring the security of user payment information is crucial for building trust and meeting regulatory requirements.
Notification	Users have enabled notifications on their devices to receive timely updates. Effective communication relies on users receiving and promptly responding to notifications.
QR code	Users will present the QR code promptly upon receiving the order notification. A smooth order pickup process relies on users actively participating and presenting the QR code when required.
User feedback	Users will provide accurate and constructive feedback when prompted. Gathering meaningful feedback is essential for continuous improvement and enhancing the user experience.
App performance	Users have access to a stable internet connection for optimal app performance. A stable connection is necessary for seamless interactions, especially when placing orders or receiving notifications.

3. Identify the Events:

What triggers transitions between states?

Transitions between states in the restaurant management app are triggered by various user interactions and system processes. Some key events include:

- **User Login:** Entering valid credentials triggers a transition from the login state to the home screen.
- **Selecting Dine-in/Takeaway:** Clicking on "Dine-in" or "Takeaway" moves the user to the respective state.
- **Placing an Order:** Selecting menu items and confirming payment transitions the system to the "Order Processing" state.
- **Reservation Confirmation:** Entering reservation details and paying triggers a transition to the "Table Reserved" state.
- **Order Completion:** When the kitchen marks an order as "Ready," the system transitions to the "Order Ready" state.
- **QR Code Scanning:** Scanning the QR code at the restaurant transitions the system to the "Order Picked Up" state.

4. Specify the Actions:

What actions does the system perform in each state or during a transition?

The system performs the following actions in different states and transitions:

- **Login State:**
    - Verifies user credentials.
    - Redirects to the home page upon successful authentication.
- **Home Page:**
    - Displays menu items.
    - Provides options to navigate to dine-in or takeaway pages.
- **Dine-in State:**
    - Allows the user to select table and meal preferences.
    - Confirms table reservations.
- **Takeaway State:**
    - Displays menu and allows item selection.
    - Adds items to cart and proceeds to payment.
- **Order Processing State:**

    - Sends order details to the kitchen.
    - Sends real-time notifications to the user.
- **Order Ready State:**
    - Notifies the user when the order is ready.
    - Generates a QR code for order pickup.
- **Order Picked-Up State:**
    - Confirms order pickup after QR code verification.

5. Define the Guards (Conditions):

Are there conditions that must be met for a transition to occur? Explain.

Yes, several conditions (guards) must be met for transitions to occur:

- **Login Successful:** Only valid credentials allow a transition from the login state to the home page.
- **Menu Selection:** The user must select at least one item before proceeding to checkout.
- **Reservation Constraints:** The user must select an available table and provide valid reservation details to confirm a booking.
- **Payment Completion:** Orders and reservations are confirmed only after successful payment processing.
- **Order Readiness:** The system transitions an order to "Ready" only when the kitchen marks it as complete.
- **QR Code Verification:** The user can pick up an order only after scanning the correct QR code.