Process 1: Manage Parking Availability

Subprocess 1.1: Restaurant Owner Setup

* Data In:
  + Restaurant owner logs in to the webapp.
  + Restaurant owner inputs details like name, location, and number of parking spaces.
  + Restaurant owner defines individual parking space locations and assigns unique serial numbers corresponding to the Smart Parking Devices.
  + Restaurant owner sets pricing for each parking space or defines dynamic pricing rules.
* Data Out:
  + Restaurant owner profile created in the system database.
  + Parking space information and serial numbers stored in the database.
  + Pricing rules saved for each parking space.

Subprocess 1.2: Smart Parking Device Communication

* Data In:
  + Smart Parking Device continuously transmits ultrasonic sensor readings.
  + System identifies the device based on its unique serial number.
* Data Out:
  + System interprets sensor readings to determine car presence or absence.
  + System updates parking availability status for the corresponding space in the database.
  + If parking lot is full, system triggers an alert for the restaurant owner.

Process 2: Customer Parking Flow

Subprocess 2.1: Customer Search and Selection

* Data In:
  + Customer opens the webapp and selects "Find Parking".
  + Customer enters the restaurant location or chooses from a nearby list.
  + Customer sets parking preferences (e.g., covered, closest).
* Data Out:
  + System queries the database for available parking spaces near the chosen restaurant.
  + System prioritizes options based on customer preferences and real-time availability.
  + Webapp displays a list of available parking spaces with details like location, number, and price.

Subprocess 2.2: Booking and Confirmation

* Data In:
  + Customer selects a desired parking space from the list.
  + Customer confirms booking request.
* Data Out:
  + System verifies parking availability and reserves the selected space for the customer.
  + System sends a parking confirmation message to the customer's mobile app.
  + System sends an activation signal to the Smart Parking Device at the chosen space.

Process 3: Parking Guidance and Payment

Subprocess 3.1: Navigation and Activation

* Data In:
  + Customer opens the mobile app navigation feature.
  + System transmits turn-by-turn directions to the customer's app for reaching the parking space.
  + Smart Parking Device receives the activation signal from the system.
* Data Out:
  + Mobile app displays navigation instructions.
  + Smart Parking Device unlocks the parking barrier or activates any designated indicator for the customer.

Subprocess 3.2: Payment and Completion

* Data In:
  + Customer selects a payment method within the mobile app.
  + Customer confirms payment details.
* Data Out:
  + System processes the payment through the integrated payment gateway.
  + Payment confirmation sent to the customer and restaurant owner.
  + System extends the parking duration based on the chosen payment plan.

Note: This Level 2 DFD provides a detailed breakdown of the main processes but can be further refined based on your specific implementation details and additional features. Remember to consider factors like:

* Smart Parking Device Communication Protocol: Specify the wireless or wired connection technology used for data exchange.
* Parking Reservation System: Decide if customers can pre-book parking spaces or only book upon arrival.
* Dynamic Pricing Algorithm: Define the rules for adjusting parking prices based on real-time demand.
* Payment Gateway Integration: Choose a secure and reliable payment processing system.