Got it! Here are a few **detailed, scenario-based questions with solutions** related to Use Case Diagrams:

**Scenario 1: E-commerce Website**

**Scenario:** A customer visits an e-commerce website to purchase items. The system allows the customer to browse products, add them to a shopping cart, view the cart, apply discount coupons, make payment, and track delivery status. The administrator of the system can add or remove products, update prices, and view sales reports.

**Questions:**

1. Identify all the actors in the system.
2. Design a use case diagram for this scenario, showing all major use cases and relationships (e.g., include, extend).
3. Explain how the "extend" relationship would apply for applying discount coupons.
4. Highlight the boundary of the system and how actors communicate with it.

**Solution:**

1. **Actors:**
   * Customer: Browses, adds to cart, purchases, and tracks delivery.
   * Administrator: Manages products and views reports.
   * Payment Gateway: Handles payments.
2. **Use Case Diagram:**
   * Major Use Cases: Browse Products, Add to Cart, View Cart, Apply Coupons, Make Payment, Track Delivery.
   * Relationships:
     + "Include" relationship between "Make Payment" and "Confirm Order".
     + "Extend" relationship from "Apply Coupons" to "View Cart".
     + Boundary shows the system as the central entity connecting actors.
3. **Extend Relationship:**
   * Applying coupons is optional. The "Apply Coupons" use case extends the "View Cart" use case.

**Scenario 2: University Management System**

**Scenario:** A university management system enables students to register for courses, view grades, and pay tuition fees. Professors can upload course materials, mark attendance, and assign grades. The system administrator manages the overall setup of the system, including course creation and user management.

**Questions:**

1. Determine the actors involved in this scenario.
2. Create a use case diagram incorporating the actors and their roles.
3. Describe how generalization might be used for student types (e.g., undergraduate vs. postgraduate).
4. Identify a use case where an "include" relationship might be relevant.

**Solution:**

1. **Actors:**
   * Student: Registers for courses, views grades, pays tuition.
   * Professor: Uploads materials, marks attendance, assigns grades.
   * Administrator: Manages system setup.
2. **Use Case Diagram:**
   * Major Use Cases: Register for Courses, View Grades, Pay Fees, Upload Materials, Mark Attendance, Assign Grades.
   * Relationships:
     + Generalization: Undergraduate and Postgraduate students derive from "Student".
     + "Include" between "Pay Fees" and "Generate Payment Receipt".
3. **Generalization:**
   * Undergraduate and Postgraduate are types of students who share similar attributes but differ in course requirements.

**Scenario 3: Hospital Management System**

**Scenario:** A hospital management system supports patient admission, treatment scheduling, prescription tracking, and payment processing. Doctors can update patient prescriptions and view medical histories. Administrators manage schedules and generate reports.

**Questions:**

1. Identify the primary and secondary actors in this system.
2. Develop a use case diagram showing interactions between actors and the system.
3. Explain the use of "include" and "extend" relationships in treatment scheduling.
4. Define the scope of the boundary rectangle in this diagram.

**Solution:**

1. **Actors:**
   * Primary: Patient, Doctor, Administrator.
   * Secondary: Pharmacy, Payment Processor.
2. **Use Case Diagram:**
   * Major Use Cases: Schedule Treatment, Update Prescription, View Medical History, Process Payment.
   * Relationships:
     + "Include" between "Process Payment" and "Generate Invoice".
     + "Extend" from "Update Prescription" to "Schedule Follow-up Appointment".
3. **Boundary Rectangle:**
   * Encompasses the hospital management system. Communication lines connect external actors to internal functionality.

These scenarios are rich, detailed, and designed to test your understanding of Use Case Diagrams, focusing on real-world applications. Let me know if you'd like more examples or additional clarification!