AED Fall24’ Final Project Proposal

Project Proposal: Food Supply Logistics System for Restaurants

1. Problem Statement

The food industry faces challenges in maintaining efficient supply chains, especially for perishable items. Restaurants often struggle with inconsistent supplier performance, lack of inventory transparency, and inefficient logistics. Furthermore, surplus food at the end of the day often goes to waste, despite its potential for donation to needy communities. A centralized system is needed to streamline supplier-restaurant interactions, optimize inventory and logistics management, and create a sustainable solution for managing surplus food.

Managing inventory, maintaining supplier coordination, and handling customer interactions are common operational challenges in the restaurant industry. Ineffective management can lead to food spoilage, disruptions in supply chains, and unsatisfactory customer experiences. A comprehensive solution that integrates inventory tracking, supplier management, and customer order processing can address these inefficiencies and improve overall restaurant operations.

2. Solution

The proposed Food Supply Logistics System acts as an intermediary platform between restaurants and suppliers, providing real-time visibility into supplier inventory, logistics tracking, and performance analytics. The system will include:

- **Supplier Portal** for inventory updates, ratings, and analytics.
- **Restaurant Portal** for order placement and supplier comparisons.
- **Logistics Management** for delivery optimization.
- **Donation Management Extension** for tracking surplus food nearing expiration and creating a network for donations to charities or food banks.

This Java Swing-based application will integrate multiple modules, including inventory management, analytics, and a scalable donation system as an extension, ensuring seamless functionality across the supply chain.

3. High-Level UML Diagram Outline

Central Hub (City Node)

- **City Management**
  - Methods: `addCity()`, `removeCity()`, `manageCityWorkArea()`

Supplier System

- **Supplier**
  - Attributes: `supplierID`, `name`, `inventory`, `rating`
  - Methods: `updateInventory()`, `viewRatings()`, `analyzePerformance()`
- **Inventory**
  - Attributes: `itemID`, `quantity`, `expiryDate`
  - Methods: `updateItem()`, `checkAvailability()`, `notifyRestock()`
- **Rating**
  - Attributes: `ratingID`, `supplierID`, `score`, `review`
  - Methods: `addRating()`, `viewRatings()`, `calculateAverageScore()`

Restaurant System

- **Restaurant**
  - Attributes: `restaurantID`, `name`, `orderHistory`, `inventory`
  - Methods: `placeOrder()`, `trackInventory()`, `viewSupplierComparisons()`
- **Order**
  - Attributes: `orderID`, `restaurantID`, `supplierID`, `items`, `status`

    - Methods: `createOrder()`, `updateOrder()`, `cancelOrder()`

Logistics System

- **LogisticsManager**
    - Attributes: `logisticsID`, `deliverySchedule`, `routeOptimization`
    - Methods: `optimizeRoutes()`, `trackDeliveries()`, `updateSchedule()`
- **Delivery**
    - Attributes: `deliveryID`, `orderID`, `status`, `ETA`
    - Methods: `updateStatus()`, `trackLocation()`, `confirmDelivery()`

Donation Management Extension

- **DonationCoordinator**
    - Attributes: `coordinatorID`, `network`, `schedule`
    - Methods: `identifySurplus()`, `notifyCharities()`, `schedulePickup()`
- **SurplusFood**
    - Attributes: `foodID`, `quantity`, `expiryDate`
    - Methods: `trackExpiry()`, `allocateSurplus()`, `notifyCoordinator()`

Use Cases:

1. **Supplier**
    - Manage inventory
    - Update performance ratings
    - View analytics
2. **Restaurant**
    - Place orders
    - Compare supplier ratings
    - Track inventory
    - Manage surplus food for donations
3. **Logistics Manager**

    - Optimize delivery routes
    - Track order status
    - Update delivery schedule
4. **Donation Coordinator**
    - Identify expiring surplus food
    - Notify charities
    - Schedule pickups

5. Ecosystem Hierarchy

Networks:

- Supplier Network: Connects suppliers for inventory and delivery.
- Logistics Network: Interfaces with delivery and routing systems.
- Donation Network: Links restaurants with food banks and charities for surplus food donations.

Organizations:

- Supplier Organizations: Provide goods and manage inventory.
- Restaurant Organizations: Procure goods and manage end-user services.
- Donation Organizations: Accept surplus food for redistribution.

Roles:

- Supplier: Updates inventory and fulfills orders.
- Restaurant: Places orders, track stock, and identifies surplus food.
- Logistics Manager: Optimizes delivery.
- Donation Coordinator: Ensures food is safely redistributed.
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