Chosen System: Robotized Warehouse Management System

High-Level Overview

A **Robotized Warehouse Management System** streamlines inventory handling, storage, and distribution through automation. Robots and software work together to optimize space usage, pick-and-pack operations, and dispatch items efficiently.

Functions and Use Cases:

1. **Inventory Management**:
    - Add, update, and remove products.
    - Track product quantities and locations.
2. **Order Fulfillment**:
    - Process customer orders.
    - Automate picking, packing, and dispatching operations.
3. **Robot Operations**:
    - Assign tasks to robots (e.g., picking, stocking).
    - Track robot activity and status.
4. **Location Management**:
    - Define warehouse zones and storage bins.
    - Optimize storage for fast retrieval.
5. **User Management**:
    - Enable warehouse operators and managers to interact with the system.
6. **Analytics and Reporting**:
    - Generate reports on inventory levels, robot performance, and order processing times.

Entities, Attributes, and Relationships

1. **Product**
    - `product_id` (PK): Unique identifier for the product.
    - `name`: Name of the product.
    - `description`: Description of the product.
    - `weight`: Weight of the product.
    - `dimensions`: Dimensions (length, width, height) of the product.
    - `quantity`: Current quantity in stock.
2. **Order**
    - `order_id` (PK): Unique identifier for the order.
    - `customer_id` (FK): References the `Customer` entity.
    - `order_date`: Date and time the order was placed.
    - `status`: Status of the order (e.g., pending, processing, completed).
3. **Customer**

- `customer_id` (PK): Unique identifier for the customer.
- `name`: Customer's name.
- `email`: Email address.
- `phone`: Phone number.

4. **Robot**
   - `robot_id` (PK): Unique identifier for the robot.
   - `status`: Current status of the robot (e.g., idle, active, under maintenance).
   - `current_location`: Current location in the warehouse.
5. **Task**
   - `task_id` (PK): Unique identifier for the task.
   - `robot_id` (FK): References the `Robot` entity.
   - `order_id` (FK): References the `Order` entity (if related to picking).
   - `task_type`: Type of task (e.g., picking, stocking).
   - `status`: Current status of the task (e.g., pending, in progress, completed).
6. **StorageLocation**
   - `location_id` (PK): Unique identifier for the storage location.
   - `zone`: Zone of the warehouse (e.g., A, B).
   - `coordinates`: Coordinates within the warehouse.
   - `capacity`: Maximum capacity for the location.
7. **ProductLocation**
   - `location_id` (FK): References the `StorageLocation` entity.
   - `product_id` (FK): References the `Product` entity.
   - `quantity`: Quantity of the product stored at the location.

Relationships

1. A **Customer** places multiple **Orders**.
2. An **Order** is associated with one or more **Tasks**.
3. A **Task** is executed by a **Robot**.
4. A **Product** is stored in multiple **StorageLocations** via the **ProductLocation** entity.
5. A **Task** might involve picking a **Product** from a **StorageLocation**.