

Scenario Description: A system for a courier service to manage shipments, package tracking, and delivery routes. It records package statuses and driver assignments.

Business Requirements:

- Shipments are created with sender, recipient, origin, destination, and initial status.
- Shipments progress through statuses (pending, in_transit, delivered, returned).
- Packages belong to shipments and include weight and content descriptions.
- Status logs record shipment location updates with timestamps and agents.
- Drivers register with license numbers and contact details.
- Drivers are assigned shipments with assignment and estimated delivery times.
- A driver cannot handle more than a set number of active shipments simultaneously.
- Locations can be organized hierarchically (e.g., hubs, sub-hubs).
- Delivery performance metrics (on-time vs. delayed) are tracked.
- Delayed shipments (beyond estimated delivery) must be flagged automatically.

Frequent Queries:

1. Retrieve current status and location log for a shipment.
2. List all pending shipments assigned to a driver.
3. Find average delivery time per route hub.
4. Show shipments delayed beyond estimated delivery.

5. Generate daily shipment volume by origin

Deliverables:

- An **E-R diagram** meeting the above requirements
- A **brief justification** of your design choices (normalization level, indexing, etc.)