

Project Title: Courier Delivery Management System

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Subject: Full Stack Development

Project Overview

A website application for courier services where customers can book pickups, delivery staff can manage deliveries, and administrators can oversee everything. The system helps find the best delivery routes and provides live tracking of packages.

System Requirements

What the System Does

- Schedule package pickups from customer locations
- Live tracking of packages during delivery
- Find the fastest routes for delivery
- Admin dashboard to monitor everything
- Send automatic updates to users

System Performance

- Quick page loading (under 2 seconds)
 - High system availability (works 99.5% of the time)
 - Secure user authentication
 - Real-time package location updates
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High-Level Design

Three-layer structure:

1. Frontend (User Interface): Built with React
2. Backend (Business Logic): Built with Spring Boot
3. Database (Data Storage): PostgreSQL

Additional components:

- WebSocket for live updates
 - Redis for temporary fast storage
 - Microservices architecture for easy maintenance
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Low-Level Design

Database Structure

Main tables for storing:

- User information
- Pickup requests
- Delivery assignments
- Location tracking points
- Payment records

System Services

- Authentication Service (login/security)
- Delivery Management Service
- Route Optimization Service
- Payment Processing Service
- Notification Service
- Analytics Service

External Connections

- Map services for navigation

- Payment services for transactions
 - SMS/Email services for notifications
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Frontend Modules (Website Sections)

1. Customer Portal

- Create and track pickup requests
- Live map tracking of deliveries
- View order history and receipts
- Manage account and payment methods

2. Delivery Agent Dashboard

- View and accept delivery jobs
- Get optimized delivery routes
- Scan packages using QR codes
- Track earnings and performance

3. Admin Management Panel

- Monitor all ongoing deliveries
 - Manage user accounts
 - View system analytics
 - Configure system settings
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Backend Modules (Server Functions)

4. User & Security Management

- User authentication and login
- Permission management based on user roles
- Profile updates and management

5. Pickup Request Processing

- Handle new pickup requests

- Validate package information
- Assign deliveries to available agents

6. Delivery Routing Engine

- Calculate best delivery routes
- Consider real-time traffic conditions
- Group multiple deliveries efficiently

7. Real-time Tracking System

- Process live location updates
- Send status change notifications
- Calculate estimated delivery times

8. Analytics & Reporting

- Generate delivery performance reports
- Create financial summaries
- Predict future delivery demands