**Emergency Service Platform Technical Overview Backend Canister**

The system is a decentralized emergency response platform built on the Internet Computer Protocol (ICP) with three core modules and a main core file. Here how each component works together to deliver secure, real-time emergency services:

**1. Payment Processing Module (SquarePayment)**

This module handles all financial transactions using Square API integration. Key features:

Secure Payment Processing: Simulates credit card transactions with 95% success rate for testing

Payment Tracking: Maintains complete records of all transactions with status updates (completed/failed/refunded)

User Payment History: Stores and retrieves payment records per user for auditing

Automatic Retries: Built-in failure recovery for payment attempts (5% simulated failure rate)

**2. Mapping & Navigation Module (MappingService)**

The geospatial engine powers location-based services:

Dynamic Map Creation: Stores custom maps with layers for different emergency types

Route Optimization: Uses Haversine formula for accurate distance calculation between coordinates

3D Mapping Support: Architecture ready for future 3D map integration

Asset Management: Securely stores floor plans, blueprints, and custom map data on-chain

**3. Notification System (NotificationService)**

Real-time alert system with:

Multi-Channel Alerts: Supports emergency notifications, service updates, and payment confirmations

Priority Routing: High/Medium/Low priority system for critical alerts

Delivery Tracking: Monitors notification status from sent→delivered→read

Retry Mechanism: Automatic retries for failed notifications with exponential backoff

**4. Core Emergency System (Main Module)**

The central code integrates all modules to provide:

**A. User Management**

Tiered membership system (Free to Enterprise)

Secure profile storage with principal-based authentication

Payment method management with tokenization

**B. Emergency Workflow**

Call Initiation: Users trigger emergencies via mobile app

Auto-Payment: Immediate transaction processing upon call

Provider Matching:

Finds nearest available service providers

Considers response time and ratings

Automatic retries every 5 seconds (max 5 attempts)

Real-Time Updates:

Push notifications to users and providers

Live tracking through mapping integration

Provider rating system based on performance

**C. Administrative Features**

Provider registration and availability management

System monitoring dashboard

Emergency call history tracking

Map data version control