Simplified Smart Inventory Palette System Architecture

Delivery Driver

Data Flow:
1. Weight change detected → NFC card tapped
2. ESP32 processes transaction locally
3. Data sent to cloud via Wi-Fi
4. Inventory updated in real-time
5. Alerts/reports generated automatically

Edge Features:
• Real-time weight monitoring (±10g)
• Offline capability with local storage
• Multi-vehicle NFC support
• Self-diagnostics & OTA updates

Card Tap
(Vehicle ID)

Smart Palette (Edge Device)
«#E8F4FD»

- 20kg Load Cell + HX711 ADC
- RC522 NFC Reader + Vehicle Cards
- OLED Display + Status LEDs + Buzzer
- MicroSD Card (Local Storage)
- Power Management (12V Input)

ESP32 (Main Controller)

Key Functions:
• Weight monitoring
• NFC authentication
• Local data logging
• Wi-Fi communication
• Real-time processing

Wi-Fi
(HTTPS/JSON)

Network Infrastructure
«#FBF2CC»

- Warehouse Wi-Fi (WPA3)
- Router/Firewall + VPN
- Internet (Fiber/4G Backup)

Security & Compliance
«#FFEBEE»

- Encryption (AES-256)
- Identity Provider (Auth/OAuth)
- SSL Certificates (Auto-renewal)
- Audit Logs (ELK Stack)

Cloud Features:
• Multi-tenant SAAS architecture
• Auto-scaling & 99.9% uptime
• Real-time inventory sync
• Advanced analytics & ML
• Role-based access control

Security Events

Warehouse Manager

System Admin

Management Console

System Monitoring

Cloud SAAS Platform
«#E1F5FE»

- Web Dashboard (Management)
- Mobile App (Monitoring)

TLS 1.3
(REST API)

API Gateway + Load Balancer

Microservices
- Inventory Processing
- Device Management
- Vehicle Management
- Analytics & Reporting

Reporting Engine

Message Broker (Kafka/RabbitMQ)

Data Storage
- PostgreSQL (Primary DB)
- InfluxDB (Time-Series)
- Redis (Cache)

JWT Validation

Certificate Management

Data Encryption