

# ParkPro

Smart Parking Management System

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**Product Overview & Technical Specification**  
Generated for Internal Review

# 1. Executive Summary

ParkPro is a cutting-edge, full-stack parking management solution designed to modernize the parking experience. It combines a premium, responsive user interface with a robust backend to streamline vehicle booking, manage layouts, and provide real-time analytics for administrators.

# 2. Payment Architecture (RinggitPay)

ParkPro integrates with RinggitPay for a secure checkout, using robust checksum validation and auto-reconciliation.

Step	Feature	Description
1	Checkout	Seamless RinggitPay integration for secure payments.
2	Security	Uses <b>Checksum (SHA256)</b> to validate all transaction data.
3	Redirect	User sent to secure Gateway (Credit Card, FPX, E-Wallet).
4	Callback	Server-to-Server webhook confirms payment instantly.
5	Retry	Users can easily <b>retry</b> payments if the transaction fails.
6	Auto-Update	System checks status <b>every 5 mins</b> (Auto-Reconciliation).
7	Refund	Automated and manual refund support for cancellations.

**Highlights:** Secure Checksum, Retry Capabilities, Auto Background Updates, and Full Refund Support.

### 3. Customer Portal Features

#### ***Real-Time Interactive Booking***

- **Visual Parking Map:** View available spots (Green), booked (Red), and maintenance (Striped).
- **Multilevel Support:** Seamlessly switch between different parking floors.
- **Spot Types:** Standard, EV (Electric), or VIP spots with pricing differentiators.

#### ***Seamless User Experience***

- **Vehicle Management:** Save and manage multiple vehicles (Make, Model, Plate).
- **Smart Pricing:** Automatic calculation based on duration and spot multipliers.

#### ***Notifications & History***

- **Premium Emails:** HTML confirmations, alerts, and receipts.
- **PDF Receipts:** Instant generation of transaction records.

### 4. Administration & Management

#### ***Dashboard & Analytics***

- **Live Occupancy:** Real-time visual tracking of lot usage.
- **Revenue Intelligence:** 7-day revenue trends and occupancy heatmaps.

#### ***Operational Control***

- **Grid Editor:** Click-to-edit interface for changing spot types.
- **Maintenance Mode:** Block specific spots instantly for repairs.
- **Overstay Management:** Identify violators and calculate exit fees.

## 5. Technology Stack

ParkPro is built on a high-performance modern stack ensuring scalability and security.

Component	Technology	Details
Frontend	React (Vite)	TypeScript, Glassmorphism UI
Styling	Tailwind CSS	Responsive Design System
Backend	FastAPI	Python High Performance Async
Database	MySQL	SQLAlchemy ORM
Security	JWT + OAuth2	Secure Session Management
Payments	RinggitPay	External Gateway Integration