



VOLKSWAGEN GROUP
DIGITAL SOLUTIONS [INDIA]

i.mobilathon 5.0

Powered By **H2S**
H A C K 2 S K I L L

Team Details

- a. Team name: **Prakhar**
- b. Team leader name: **Omkar Lolage**
- c. Problem Statement: **Predictive Parking Space Marketplace**

Brief about the idea

What if **parking felt as effortless** as booking a cab? Our app is a **predictive parking marketplace that shows you where a spot will be free at your ETA**, lets you pre-book it with confidence, and auto-handles payments - so you just drive, park, and go.

Powered by a **spatiotemporal ML engine that forecasts bay-level availability** at your ETA with calibrated confidence, **fuses live signals** (ETA, events, weather, sensors), and auto-triggers **backup swaps** when risk rises.

How it works:

- **Ingests live signals** (inventory, ETA, events, weather) into a unified feature stream.
- Uses a **spatiotemporal ML model to predict spot availability** at arrival time with confidence bands.
- **Ranks** parking offers **by distance, price, and success probability, with EV and accessibility filters** built in.
- Lets users book guaranteed or **lower-cost “smart hold” spots**; automatically reserves a **backup** if confidence is low.
- Enables **seamless entry** via QR, NFC, or license plate, with **guided navigation** for smooth last-meter access.
- Handles payments automatically, pre-auth at booking, **capture on exit with instant receipts** and invoices.

Brief about the idea

What if **parking felt as effortless** as booking a cab? Our app is a **predictive parking marketplace that shows you where a spot will be free at your ETA**, lets you pre-book it with confidence, and auto-handles payments - so you just drive, park, and go.

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Why it works:

- Moves beyond guesswork with **calibrated probabilities**, showing users a trustworthy “**chance of spot**” instead of static pins.
- **Smart backup-swap** automatically switches to the best nearby option if the first isn't ready, backed by an SLA to reduce failure anxiety.
- **Demand steering** through small time or price nudges smooths peaks, cutting cruising and improving availability.
- A continuous learning loop (arrivals, overstays, no-shows) refines predictions daily, boosting accuracy, utilization, and revenue.

Opportunities – USP and “How It Solves” the problem

Predictive Availability at ETA

A spatiotemporal **ML model** forecasts **block face availability** for your **exact arrival time** and displays a **calibrated probability with a confidence band** (e.g., “86% \pm 5%”). It fuses live signals (**ETA changes, bookings, events/weather, optional sensors**) so users see trustworthy, latest availability.

Smart Hold & Automatic Backup-Swap (Reliability)

Book with a lower-cost Smart Hold or full Guarantee. The system pre-auths payment, watches risk in transit, and **proactively activates the best nearby backup** if confidence drops - preserving price and SLA - so the journey remains reliable without over-reserving inventory.

Hardware-Lite Access & Fast Onboarding

Works day one with QR validation; plate and sensors are optional add-ons. Providers self-serve to publish locations, stalls, EV/accessible flags, pricing, and blackouts - going live in hours. Signals from devices/feeds can be ingested later to boost accuracy.

Demand Steering, EV/Accessibility & Seamless Payments

Subtle time/price nudges (e.g., arrive +10 min) raise success odds and smooth peaks; **EV and accessibility filters are first-class in every search**. Payments are pre-authorized at booking and automatically captured/refunded on exit, with instant receipts and clear status.

City-Scale Performance & Continuous Learning

Fast geospatial search (PostGIS) and hot caching keep results snappy; event-driven updates refresh availability within seconds. The **ML loop retrains from real outcomes** (arrivals, overstays, no-shows) and **hot-reloads safely**, while observability ensures stable operations as the network grows.

List of features offered by the solution

“Fast Search & Offers”

Real-time discovery

Ranked nearby options with map + list, rich cards (price, distance, rules, EV/accessible), entrance info, and quick filters for time, price cap, and amenities.

“One-Tap Booking & Payments”

Hold → confirm

Choose Guaranteed or Smart Hold, see clear price breakdown and policy, confirm with saved payment; pre-auth status shown inline with friendly error recovery.

“Provider Console & Ops”

Self-serve supply and insights

Onboard locations/stalls, set pricing/blackouts, monitor live sessions and bookings, and view utilization/revenue basics; changes reflect quickly in customer search.

“Session Control & Exit”

Manage your stay

Live timer, extend stay, cost estimator, gentle overstay/grace alerts; end session to auto capture/refund and receive an itemized receipt instantly.

“Guided Arrival & Access”

Navigate and validate

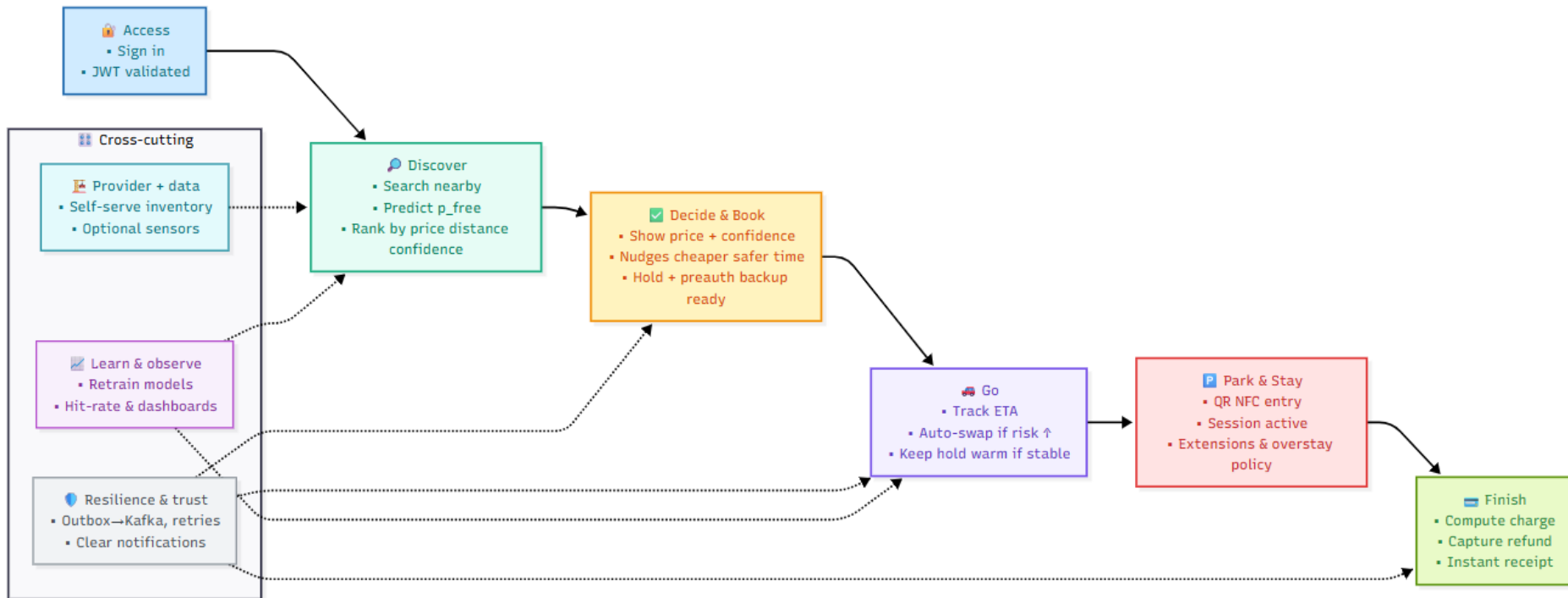
Turn-by-turn to the correct entrance, arrival checklist, and hardware-lite access via QR/NFC (plate entry fallback); bay/level guidance on success.

“Proactive Alerts & Support”

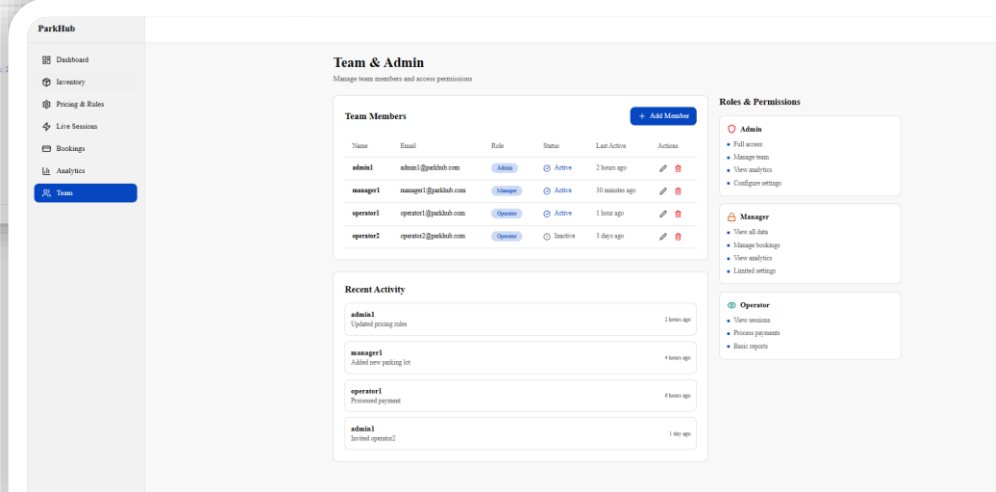
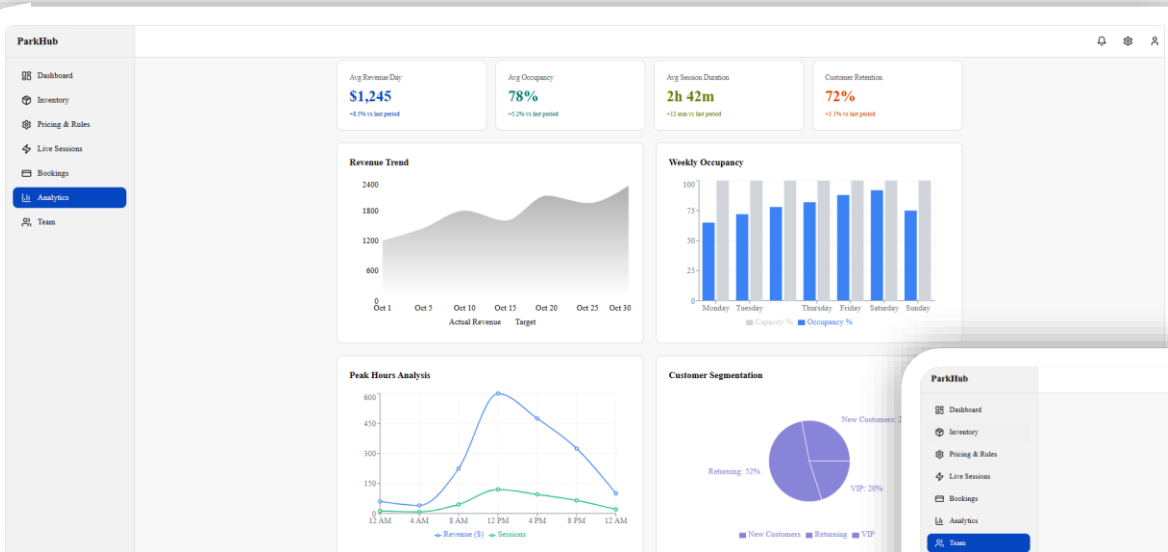
Stay informed end-to-end

Clear notifications for confirmations, swap notices, reminders, and extension prompts; instant receipts and quick help.

Process flow diagram or Use-case diagram



Mock – UI for Provider Web Application



ParkHub

- Dashboard
- Inventory
- Pricing & Rules
- Live Sessions
- Bookings
- Analytics
- Team

Downtown Lot A

123 Main St

Total Capacity

100

Occupied

78

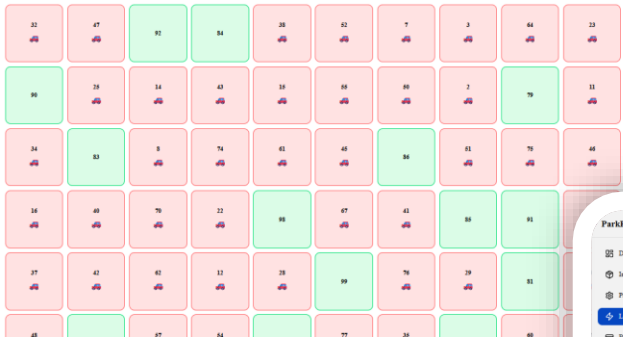
Available

22

Occupancy Rate

78%

Parking Spots



Mock – UI for Provider Web Application

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Live Sessions

Monitor active parking sessions in real time

List View

Map View

Active Sessions

342

Avg Duration

2h 34m

Current Revenue

\$4,275

Warnings

5

Customer	Location	Duration	Est. Cost	Status	Actions
user1 Blue Sedan Model 1	Lot A - A-42	2h 17m	\$15.25	Active	
user2 Red Hatchback	Lot B - B-15	1h 10m	\$10.00	Active	
user3 Black SUV Model X	Lot A - A-18	4h 45m	\$15.75	Expiring	
user4 White Audi A4	Lot C - C-33	1h 10m	\$7.50	Active	
user5 Grey Toyota Camry	Lot B - B-45	1h 17m	\$14.25	Expiring	

Find Parking

Where would you like to park?

city mall

14:00

Filters

EV Charging ☐Accessibility ☐

Max Price (₹/hour)

No limit

Search Parking

Quick Actions



My Vehicles



View Booking

Available Parking

Arrive +10m → +8% success, -₹10

Metro Station Parking

₹100

0.5 km away

per hour

92% (±3%)

Confidence

Accessible

Guaranteed

Tech Park Underground

₹180

0.8 km away

per hour

64% (±8%)

Confidence

EV

Accessible

Smart Hold

Arrive -15m → +12% success, -₹20

City Mall Parking

₹120

1.2 km away

per hour

78% (±6%)

Confidence

EV

Accessible

Smart Hold

Mock – UI of Users(car-owners) Mobile App

Parking Details

City Mall Parking ₹120

56 Commerce Street
1.2 km away

Predicted Availability Based on patterns

78% (±6%)

Confidence based on time/day trends and live signals

Features

EV Charging

Accessibility

Covered

24/7 Security

Operating Hours

8:00 AM - 10:00 PM

Book Smart Hold (with Backup)

Confidence Decreased

Switching to nearby guaranteed spot.
Price and SLA preserved.Central Plaza → Metro Station
Parking+2
min

Accept & Update Route

Central Plaza Garage Smart Hold

123 Main St, Downtown

Your Booking #BK12345

Expected Arrival 2:08 PM

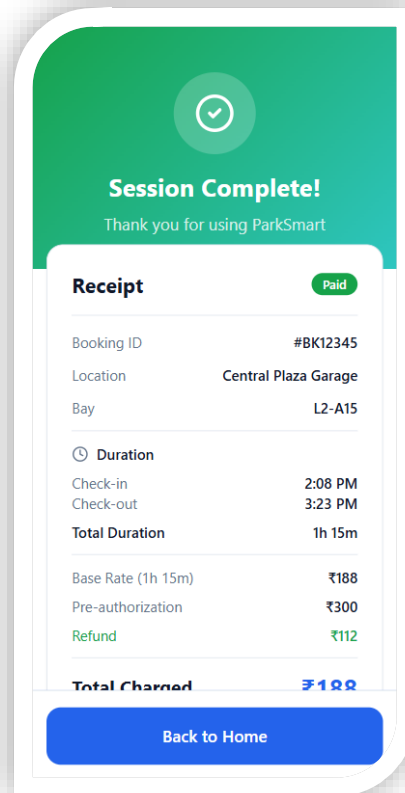
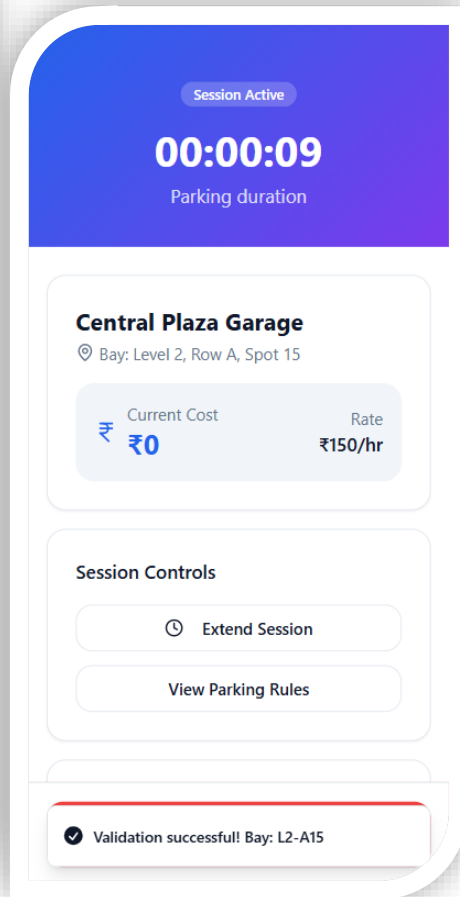
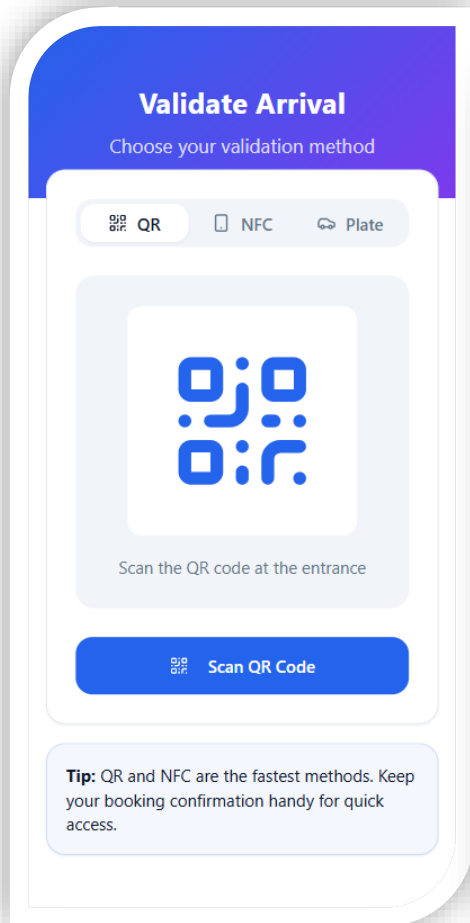
Rate ₹150/hour

Backup Active: We're monitoring availability. If needed, we'll switch you to a guaranteed spot automatically.

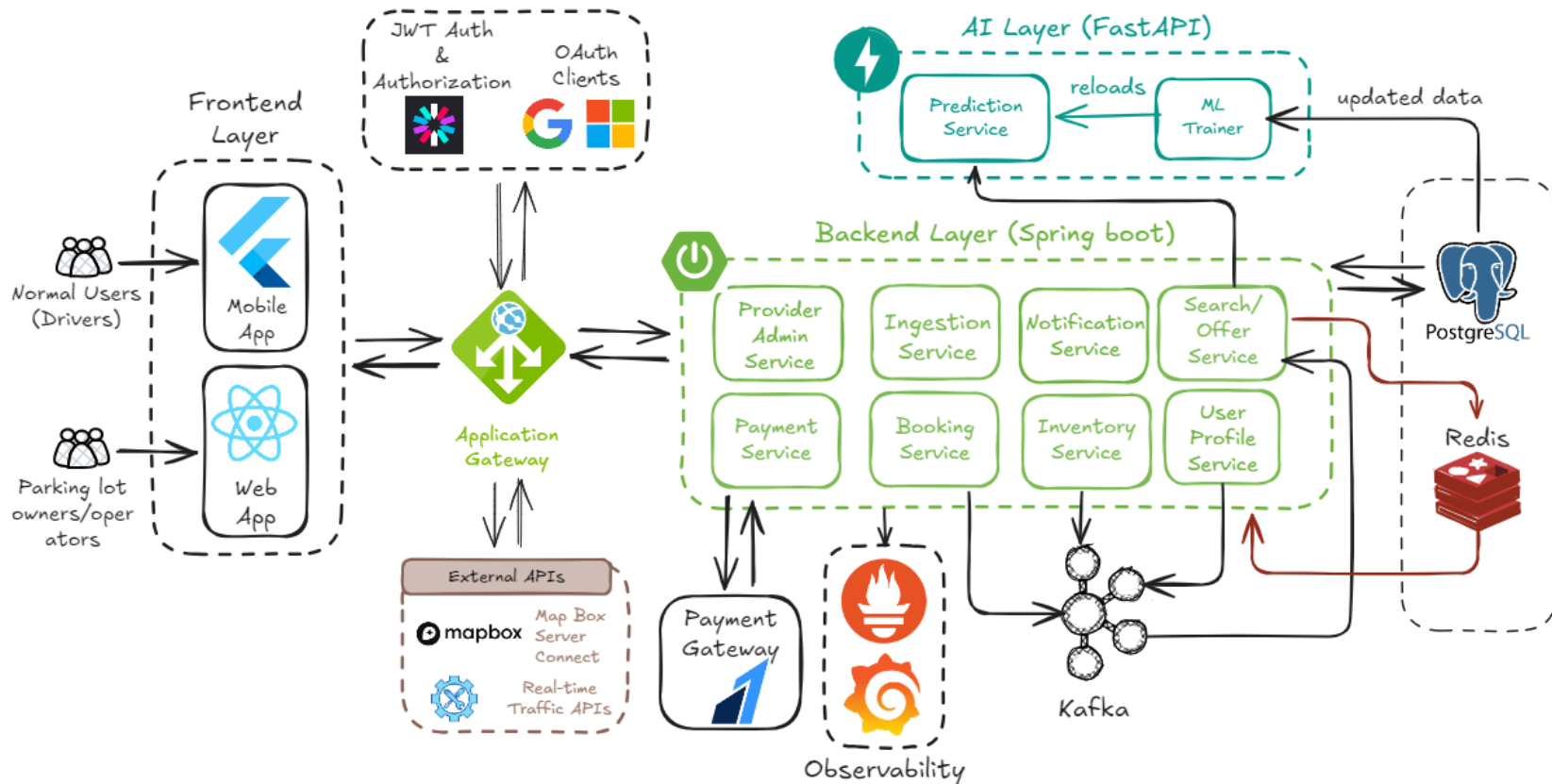
I've Arrived

Cancel Booking

Mock – UI of Users(car-owners) Mobile App



Architecture diagram of the proposed solution



Technologies to be used in the solution



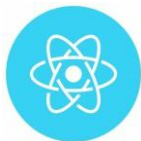
Flutter:

Cross-platform driver app for search, booking, validation, and receipts.



PostgreSQL/MySQL:

System of record with geospatial queries for nearby inventory.



React.js:

Lightweight and interactive for provider web portal for onboarding, pricing, and live operations.



Redis

Hot cache for availability, short-lived holds, sessions, and rate limits.



Spring boot:

Stateless microservices with secure API routing and rate limiting.



FastAPI (Python) + PyTorch/XGBoost

Real-time prediction API with offline training and hot-reload.



JWT/OAuth:

entralized authentication/authorization with roles and token issuance.



kafka

Kafka

Event backbone for bookings, payments, inventory updates, and telemetry.



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THANK YOU