



mBike

An Urban Mobility Solution

mBike addresses the need for affordable, convenient and environmentally friendly transportation solutions.



PROBLEM STATEMENT

mBike faces operational and technical challenges.

01

OPERATIONAL ISSUES

- These issues include bike malfunctioning, inadequate coordination between stations, and inefficient customer support.
- Resulted in revenue loss, customer dissatisfaction, and inefficiencies.

02

TECHNICAL ISSUES

- Existing infrastructure lacked real-time bike functionality, hindering user experience and admin management.
- Backend systems were not equipped to handle the increasing demands, leading to system failures and performance bottlenecks.

CUSTOM SOLUTION

RPI was engaged in the complete revamp of the entire enterprise system, developing an end-to-end system with effective solution architecture, strategic backend management, an integrated mobile & web app, and bike lock to server communication.

The solution includes complete operation analysis, multi-network serving, and bike opening/closing via NFC/Bluetooth lock integration.



DEVELOPMENT PROCESS

01



Product Discovery

- Pinpoint unique transportation challenges faced by mBike.
- Through research, we gain insights into user needs, operational constraints, and market trends.
- Key stakeholders within mBike are identified, including executives, operations teams, and end-users.

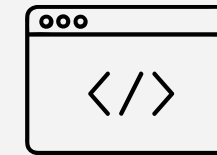
02



Product Roadmap

- We establish a robust tech development environment and architecture to support the solution's scalability and reliability.
- Working closely with mBike stakeholders, we prioritise key features such as real-time bike tracking, user-friendly interfaces, and predictive analysis capabilities.

03



Tech Development

- Adopting an Agile approach, we break down the product roadmap into iterative sprints, allowing for rapid development and frequent feedback loops.

DEVELOPMENT PROCESS

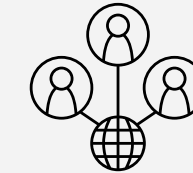
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Quality Assurance

- Based on QA findings and user feedback, we iterate on the product, refining its features and addressing any identified issues or deficiencies.
- Before deployment, the final product undergoes thorough validation in a staging environment to ensure its readiness for production.

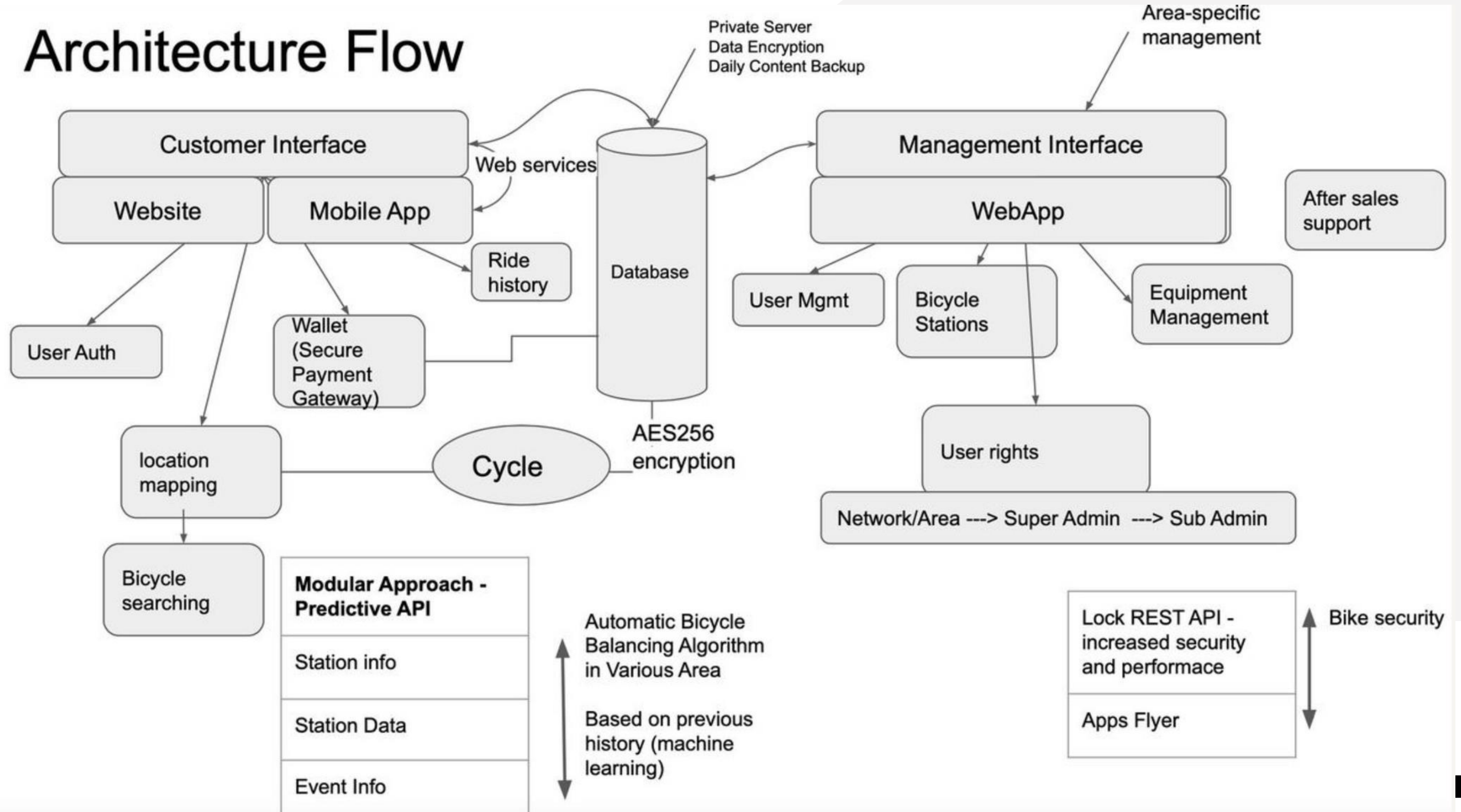
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Product Deployment

- APIs are set up to facilitate real-time communication and data exchange, enabling the solution to interface with external systems such as payment gateways and bike tracking devices.
- Post-deployment, we establish monitoring and update mechanisms to ensure the ongoing performance and reliability of the solution.

Architecture Flow



CUSTOMER INTERFACE

Viewing Geolocation of Station & Bike Availability Statistics

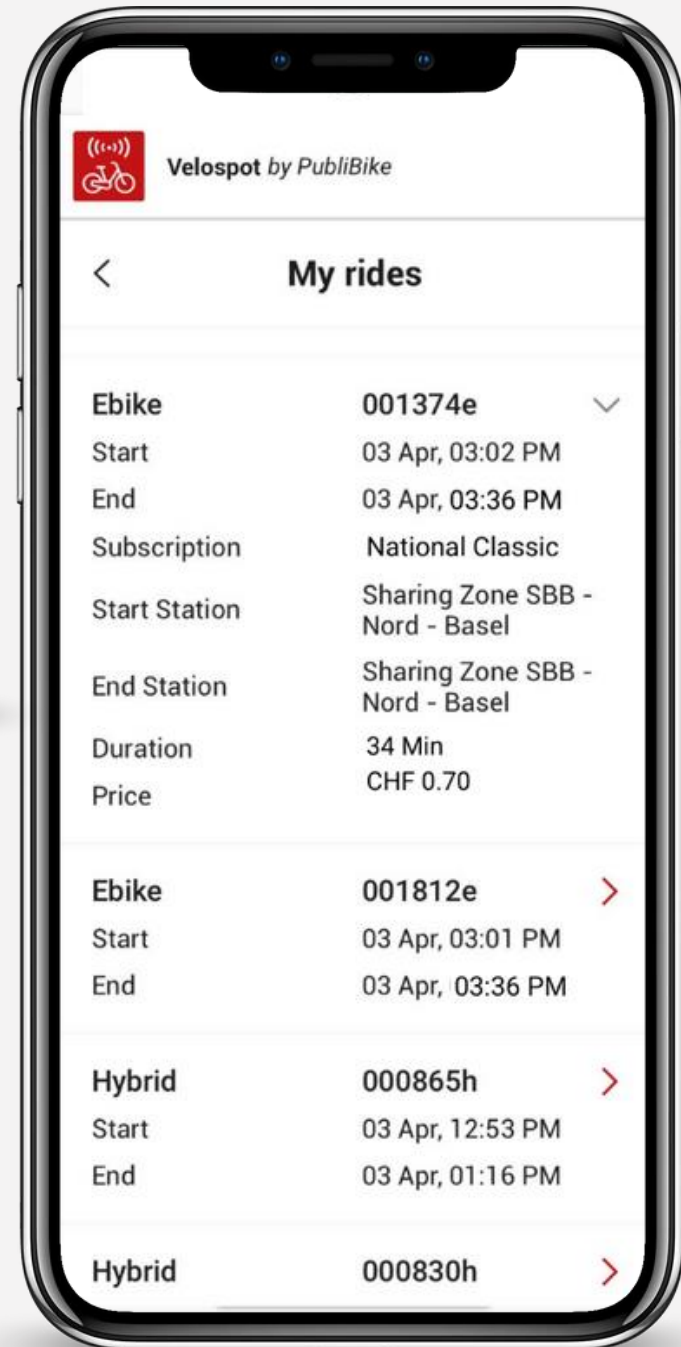
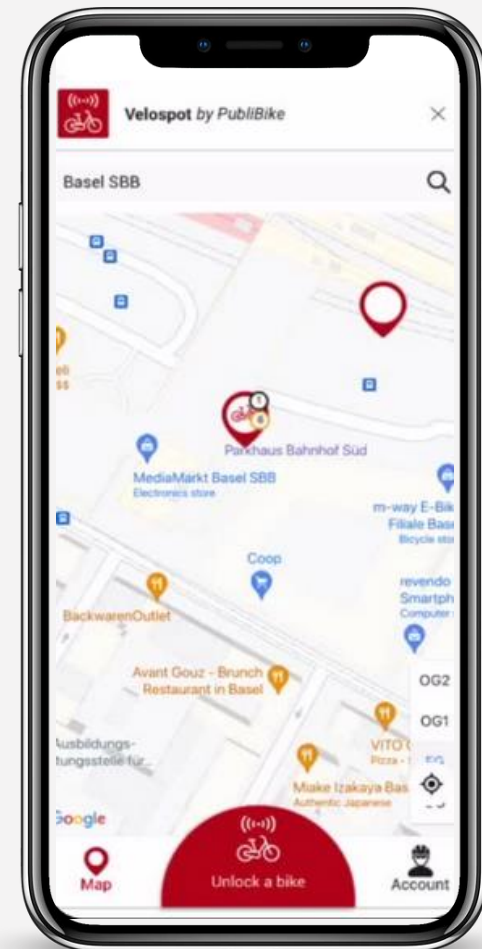
- Customers can locate bikes through searching for bike stations, and checking availability via the mobile app.

Flexible Purchase Options

- To use a bike, customers can choose between purchasing monthly subscriptions or a one time pick up & drop off ride.

Advanced Bike Locking & Tracking Mechanism

- Bluetooth/NFC/Code based bike opening & tracking for proactive maintenance and optimal deployment.
- NFC-enabled locking systems communicates with the server for tamper-proof security.
- Real-time telemetry data is processed for fleet management efficiency and predictive maintenance scheduling.



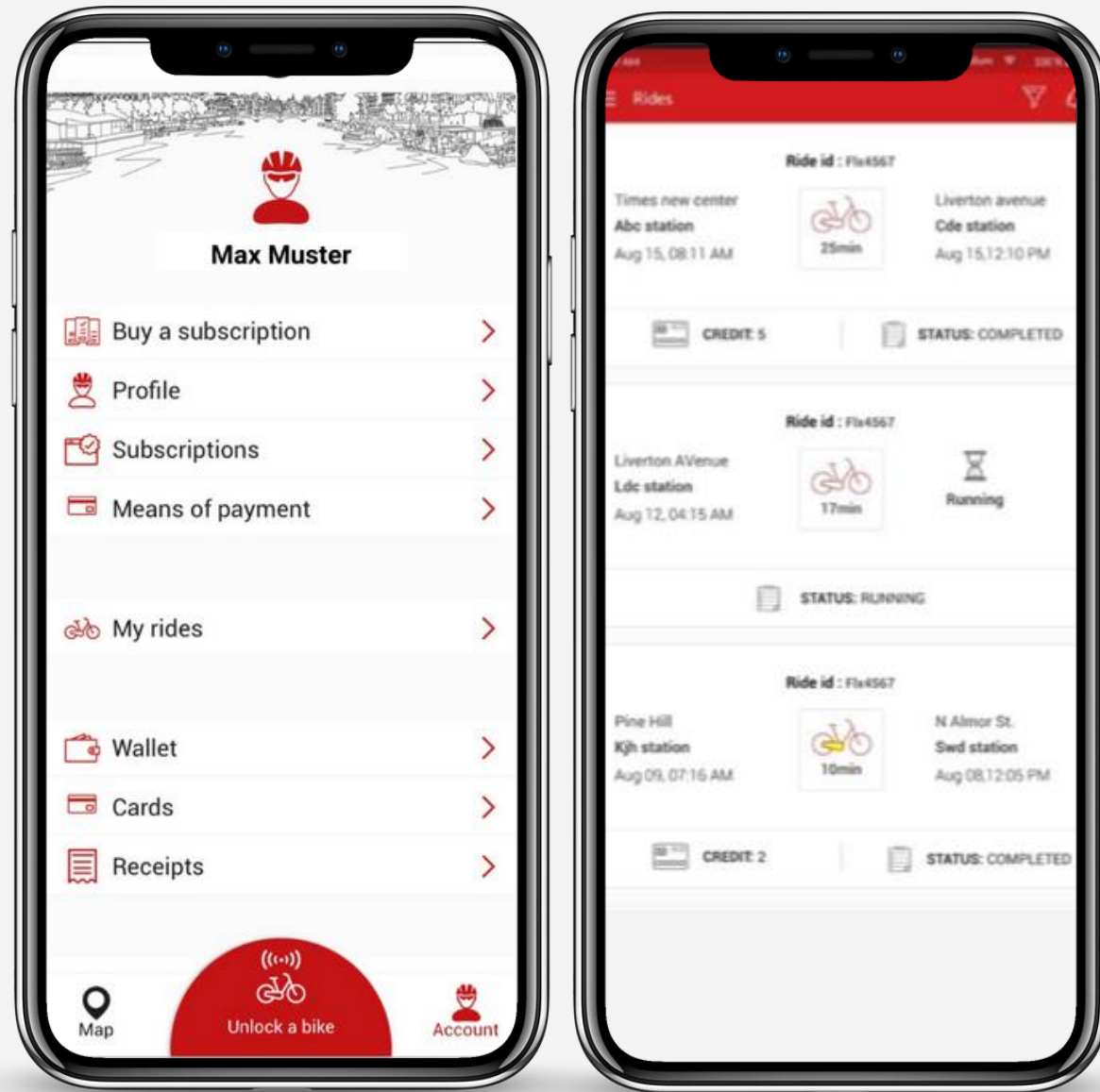
CUSTOMER INTERFACE

Enhanced Payment Integration

- Highly secure and PCI-DSS compliant Braintree payment gateway.
- GDPR compliant for user data privacy.

Service Pass Card Integration

- for seamless travel on all mode of transportation.



ID	Name	Network Number	City	Country	Station Status	Last Updated	Status	Action
25	BNB demo station	1	La Verriere	France	🚲	13-04-2023	✓	👁️ 📄 🗑️
15	test 10th Oct	75777	Rome	Italy	🚲	10-04-2023	✓	👁️ 📄 🗑️
1	Network 1 (en)	23456	Hougang	Singapore	🚲	10-04-2023	✓	👁️ 📄 🗑️
12	Paris Network	654321	Rome	Italy	🚲	10-04-2023	✓	👁️ 📄 🗑️
19	howrah net	467	Kolkata	India	🚲	22-06-2022	✓	👁️ 📄 🗑️
18	Network Kol	909081	Kolkata	India	🚲	22-11-2021	✓	👁️ 📄 🗑️
23	Test Unpublished	653433	Kolkata	India	🚲	07-09-2021	✓	👁️ 📄 🗑️
24	test network un other	234234	Berlin	Germany	🚲	20-08-2021	✓	👁️ 📄 🗑️
2	Network 2 (en)	547567	Paris	France	🚲	10-06-2020	✓	👁️ 📄 🗑️
22	singapore new network	5534	Hougang	Singapore	🚲	24-05-2019	✓	👁️ 📄 🗑️

ADMIN INTERFACE

Scalable Station and Network Management

- Manage networks and stations across multiple cities or office spaces.
- Ensure seamless expansion with centralised control over diverse geographic regions.
- Oversee and optimise deployment and maintenance of bike stations and networks.

Real-Time Bike Status Monitoring

- Track real-time status, including lock type, ID details, operational health, electricity of each bike.
- Facilitate proactive maintenance and quick resolution of issues.

Integrated Kiosk System

- Kiosk system synchronizes in real-time with the user mobile app and the Admin Dashboard.
- Supports data flow, enhancing user experience and operational oversight.

ID	Network Name	Vehicle Number	Vehicle Type	Station Group	End Location [Station]	Battery Voltage	Minimum Battery Voltage	Last Updated	Blocked	Status	Action
38	Network Kol	121212	caption.cargo	Group 2			12.00	01-08-2022	No	✓	👁️ 📄 🗑️
25	Network Kol	12345678	Ebike	Group 2	[test 9th]	40.61 ↑	1.10	03-06-2021	No	✓	👁️ 📄 🗑️
35	Network Kol	V123V12375	Ebike	NKOL Group1	[NKOL2 Matrix]	7.00 ↑	5.00	15-07-2020	No	✓	👁️ 📄 🗑️
24	Network Kol	87564	Mechanical	Group 2		40.61 ↑	1.60	02-06-2020	No	✓	👁️ 📄 🗑️
23	Network 1 (en)	987000	Ebike	Group m 1	[Station 5 (en)]		2.00	23-04-2020	No	✓	👁️ 📄 🗑️
29	Network 1 (en)	V9898	Hybrid	Group m 1	[Station 5 (en)]	7.00 ↑	0.00	16-12-2019	No	✓	👁️ 📄 🗑️

Invoices

Search [] Invoice From [] Invoice To [] Select Platform []

Select City [] Select Network [] Select Shop []

ID	Invoice Number	Transaction Id	Invoice Date	Payment Mode	Customer Name	Network	Purchase Type	Product Quantity	Cost / Bond Amount	Discount	Paid Amount	Status	Platform
807	00000807	8sqwa99p	13-07-2023	Credit Card	Kaushik Mondal	Network 1 (en)	Subscription (O)	1	1.00 chf		0.00 chf	Blocked	Web
806	00000806	qs5aj7kj	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
805	00000805	qtm87a4v	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	200.00 chf		200.00 chf	Paid	Web
804	00000804	bbe4zwcx	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	12.00 chf		12.00 chf	Paid	Web
803	00000803	p0s0hc6x	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	12.00 chf		12.00 chf	Paid	Web
802	00000802	aewbkc3e	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
801	00000801	a72726xh	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
800	00000800	1wpjbdvp	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
799	00000799	fhh3yth0	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
798	00000798	7bmv0hdy	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web
797	00000797	ebrwyx15	10-04-2023	Credit Card	Peter	Network 1 (en)	Subscription (R)	1	10.00 chf		10.00 chf	Paid	Web

ADMIN INTERFACE

Comprehensive Customer Data Management

- Maintain and update detailed user profiles, ride histories, and reported issues.
- Access and review all customer inquiries and support emails through a centralised email management platform.

Financial Transaction Oversight

- Monitor all financial transactions for accuracy and auditing purposes.

Gift Code Utilization Tracking

- Manage and verify customer card purchases.
- Track redemption and usage of gift codes by customers in real-time.
- Analyse marketing campaigns and assess their effectiveness.

Advanced Account and Access Management

- Role-based access control (RBAC) for account management.

Customers

Search [] All Registration Type [] Select Network [] Active []

Select Action []

ID	Name	Email	Gender	Preferred Network	Registration Type	Source	Total Credits	Generate Password	Last Updated	Status	Action
294	testKaushik	kaushikfortest@yopmail.com		Network 1 (en)	GEN	Web(1)	0.00	🔍	12-04-2023	✓	👁️ 📄 🗑️
253	Peter	test@test.com	Male	Network 1 (en)	GEN	Web(1)	188.00	🔍	10-04-2023	✓	👁️ 📄 🗑️
254	Kaushik Mondal	kaushikfortest@gmail.com	Male	Network 1 (en)	GEN	Web(1)	3.00	🔍	10-04-2023	✓	👁️ 📄 🗑️
282	sant	samt@yopmail.com	Male	Network Kol	GEN	App(Gen)	12.00	🔍	06-04-2023	✓	👁️ 📄 🗑️
278	Santanu	samt@yopmail.com	Male	Network 1 (en)	GEN	App(Gen)	0.00	🔍	06-04-2023	✓	👁️ 📄 🗑️
256	kk	kk@yopmail.com		Network 1 (en)	GEN	Web(1)	0.00	🔍	05-04-2023	✓	👁️ 📄 🗑️
252	st_customer_20000003	st_customer_20000003@yopmail.com	Male	Network Kol	GEN	Admin	200.00	🔍	11-11-2022	✓	👁️ 📄 🗑️
251	st_customer_20000002	st_customer_20000002@yopmail.com	Male	Network Kol	GEN	Admin	0.00	🔍	11-11-2022	✓	👁️ 📄 🗑️

PREDICTIVE ANALYSIS

for smart bike allocation and distribution

API GATEWAY

RPI created an API gateway to pull real-time data from the client system and other data sources including weather and traffic conditions.

PRODUCE FORECAST

The data is processed, and we evaluate the predictive power of different AI/machine learning models on our specialized AI server. The forecasts are then pushed back to the admin console.



Real-time hour by hour demand forecasts for every bike station.



Ensure that utilization of bikes at every station is between 85%-95% at any point of time through notifications to admin.



Reduce the likelihood of “stock-out” – maximizing revenue for the company and reducing customer complaints

PREDICTIVE ANALYSIS



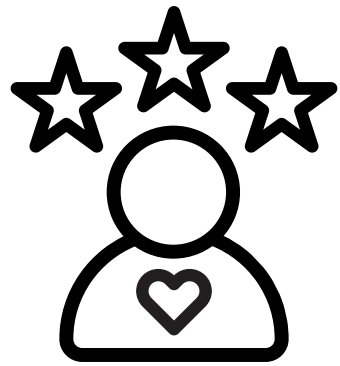
Admin Console to provide overview of forecast and actual demand in each station.



System detects demand and supply mismatches in real-time and triggers admin alert to re-allocate bicycles at each station

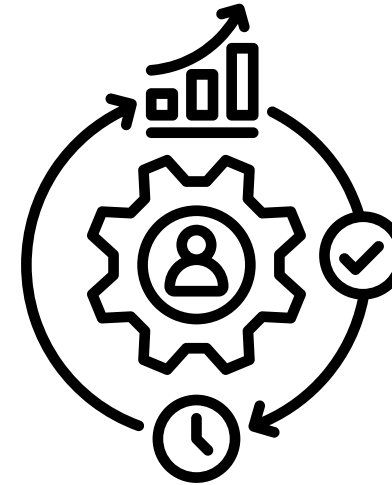


RESULTS & IMPACTS



IMPROVED USER EXPERIENCE

- Enhanced the accuracy of bike availability forecasts, ensuring users find bikes where and when they need them.
- **Reduced technical errors** in bike locking and unlocking, leading to fewer service disruptions and improved user trust.



OPERATIONAL EFFICIENCY

- **Improved operational efficiency** by streamlining maintenance processes and ensuring optimal bike distribution, minimizing downtime and maximizing availability.