

Team Name : Neuratech

Problem Statement - 1 : Rapid Compliance Checker for Cross-Border Shipments

Solution Video Link : https://youtu.be/XKUbo_D2D4g?si=SQf8YLLU7gQURJ_j



Content

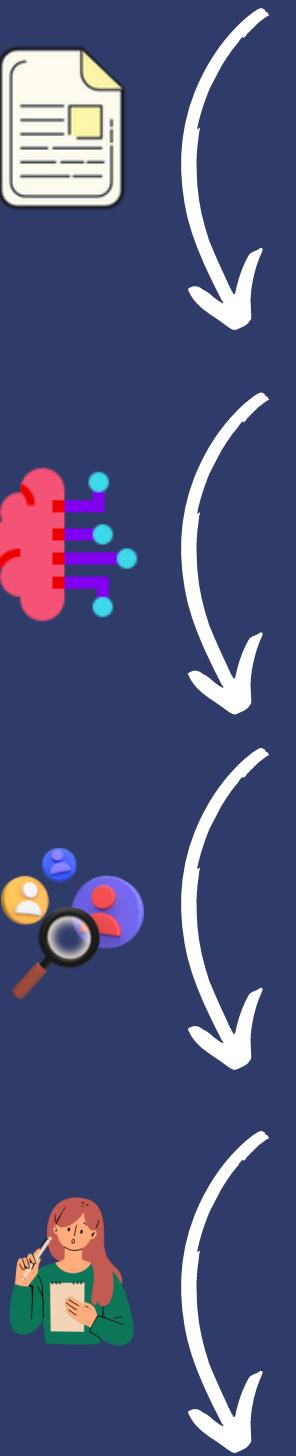
1. Introduction
2. Team Neuratech's Solution
3. Workflow
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7. AI/ML for Smart Compliance
8. Wireframe
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Solution

Team Neuratech's Solution

Softlink Global empowers global trade with intelligent logistics solutions - our Rapid Compliance Checker simplifies it. We provide a **Real-time, AI-powered solution** to ensure every parcel meets **international regulations, reducing errors, delays, and penalties**.

- ✓ **Real-Time Compliance Validation** – Instantly checks shipments against international regulations to prevent errors.
- ✓ **Automated Compliance Reports** – Generates detailed reports for easy record-keeping and audit readiness.
- ✓ **AI-Powered Risk Detection** – Identifies unusual patterns and predicts potential compliance issues using machine learning.
- ✓ **Seamless Integration** – Easily integrates with Softlink's logistics platforms, enhancing compliance workflows.
- ✓ **Scalable & Adaptive** – Designed to scale with Softlink's global operations while adapting to evolving trade regulations.



Data Input

User enter shipment details or upload CSV.
Validate fields (item, value, destination).

Compliance Validation

Apply rule-based checks in real-time.
Identify restricted items or destinations.

AI Risk Analysis

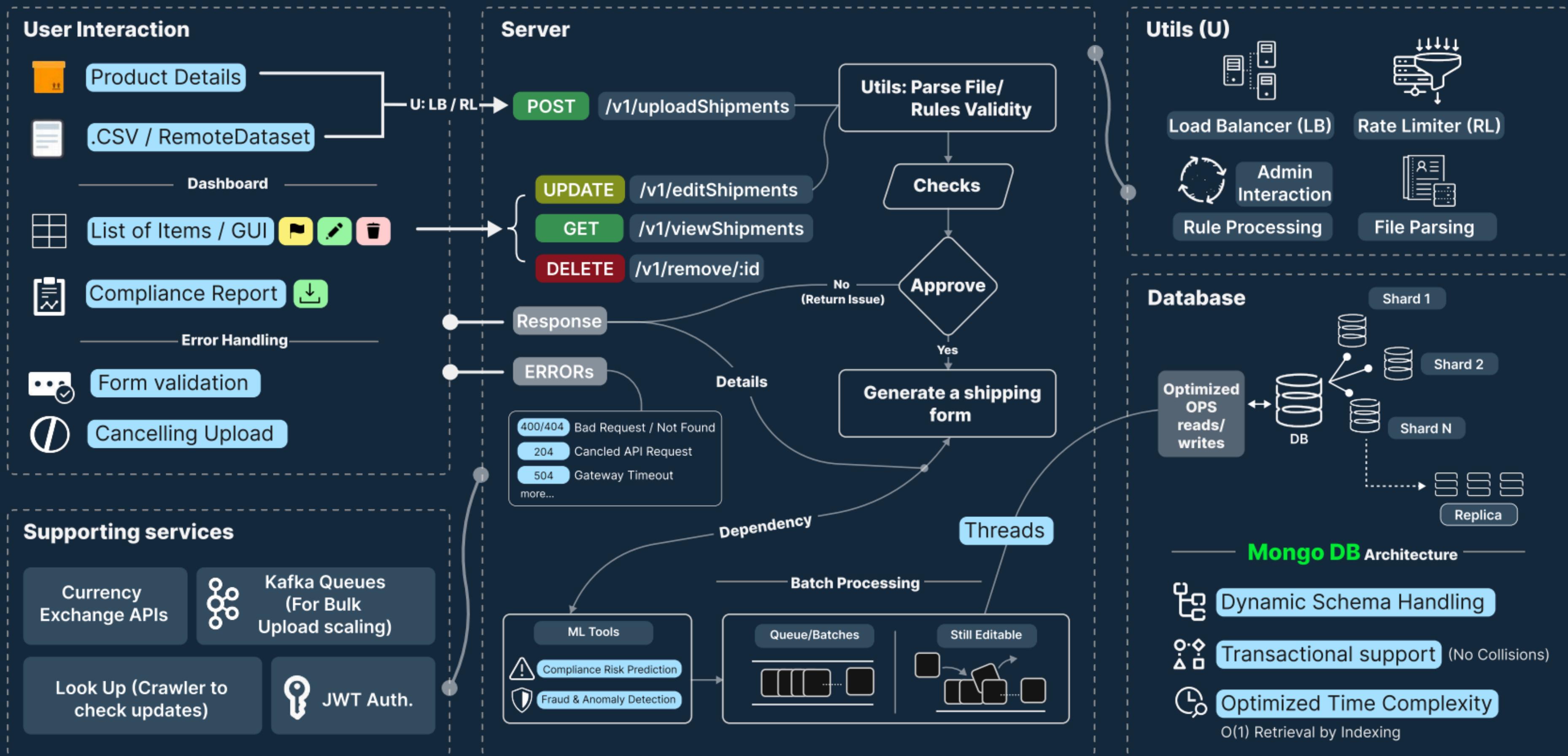
Detect anomalies using ML models.
Predict potential compliance violations.

User Feedback

Flag issues with clear error messages.
Suggest solutions for quick correction.

Report Generation

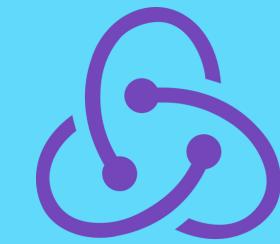
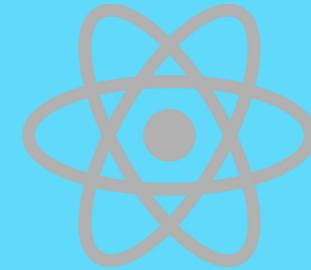
Create compliance reports (PDF/HTML).
Store records for audit and tracking.



Technologies to be used in the solution

Frontend & Visualization

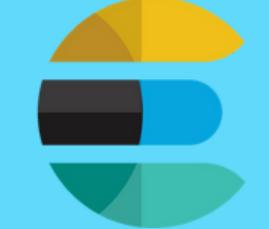
React (Vite), Redux, Chartjs, react-dropzone



Provides an interactive dashboard for shipment status, CSV uploads, and compliance report generation. Uses Chart.js for visualizing flagged issues and shipment trends.

Database & API

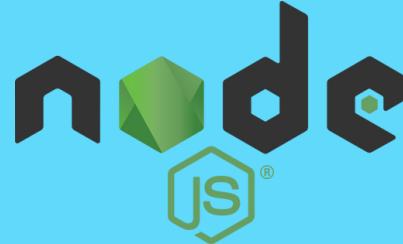
MongoDB, Redis, Elasticsearch, Open Exchange Rates & Country Compliance APIs



MongoDB stores shipment data, Redis caches frequently accessed data, and Elasticsearch enables fast search for shipments and violations. APIs handle real-time currency conversion and restriction checks.

Backend & Server

Node.js, Express, Zod, pdfkit, fast-csv



Manages shipment data processing, applies compliance rules, and generates alerts. Supports CSV parsing, validation, and PDF report creation through REST APIs.

Machine Learning & Deployment

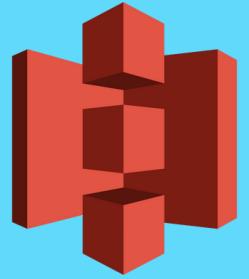
XGBoost, Docker, AWS



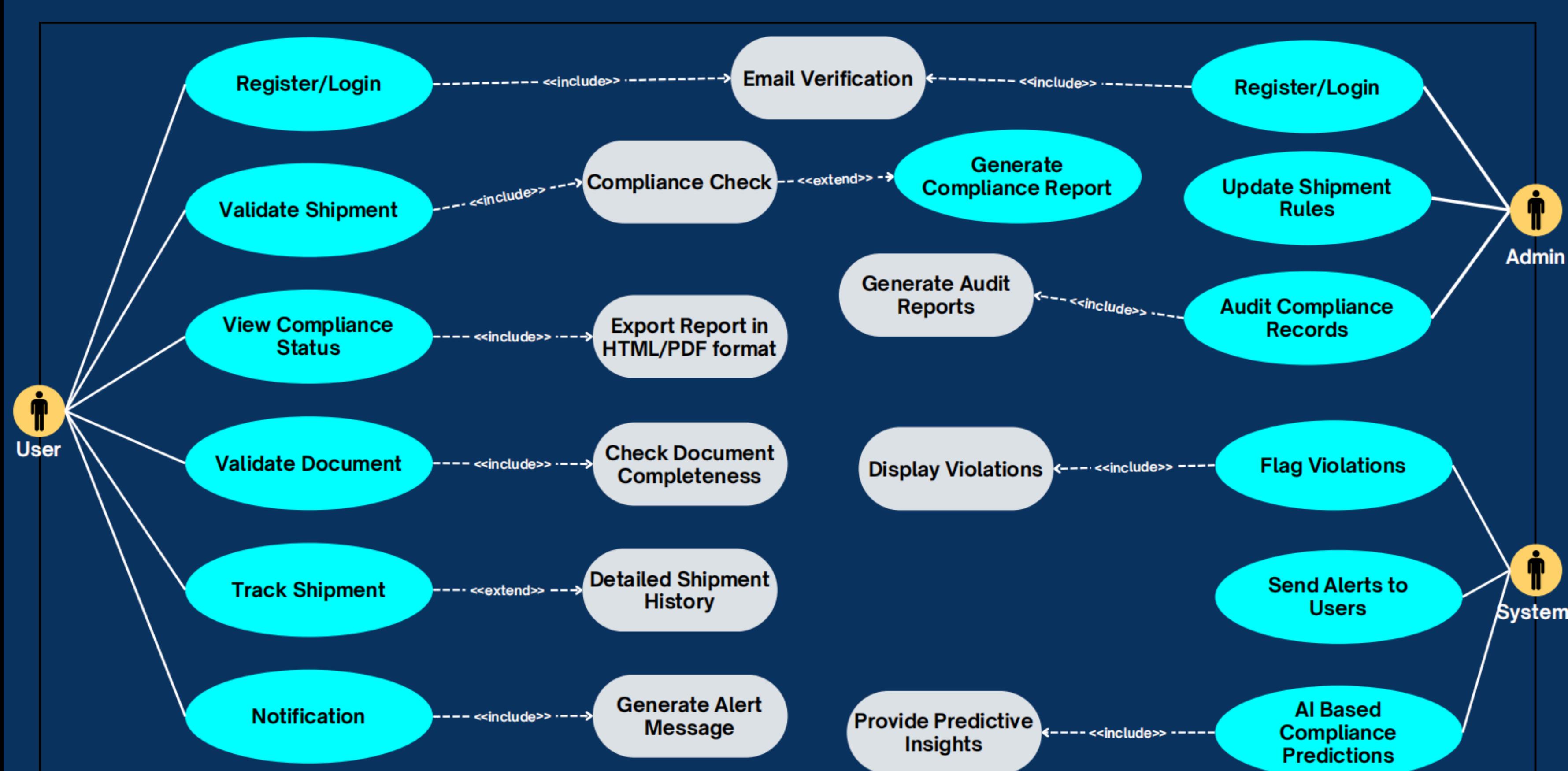
Uses Machine Learning to predict potential compliance issues based on historical data. Containerized with Docker and deployable on cloud services like AWS.

Scalability

Kubernetes, AWS S3, Load Balancer



High availability and fault tolerance by with Docker and orchestrating them using Kubernetes. AWS S3 securely stores compliance reports for easy access and retention. A load balancer distributes incoming traffic across multiple instances, ensuring optimal performance.



Automated Compliance Checks

AI validates shipment data in real-time, ensuring it meets international rules (e.g., item restrictions, value limits).



Anomaly Detection

AI detects unusual shipments (e.g., abnormal value or weight) using XGBoost.



Continuous Learning

AI improves over time by learning from flagged cases and adapting to new rules.



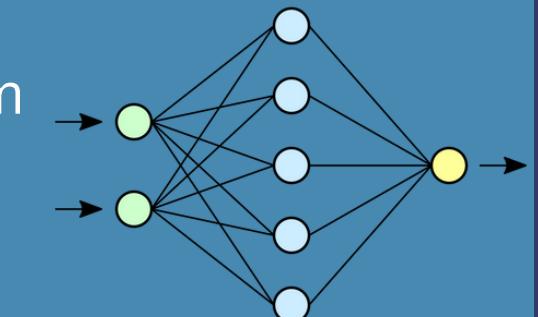
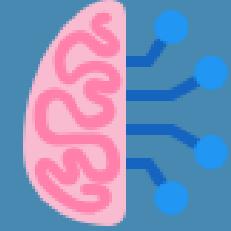
Fast Decision Support

Provides instant alerts and insights, reducing manual checks and speeding up validation.



Why Use AI for Compliance Checking?

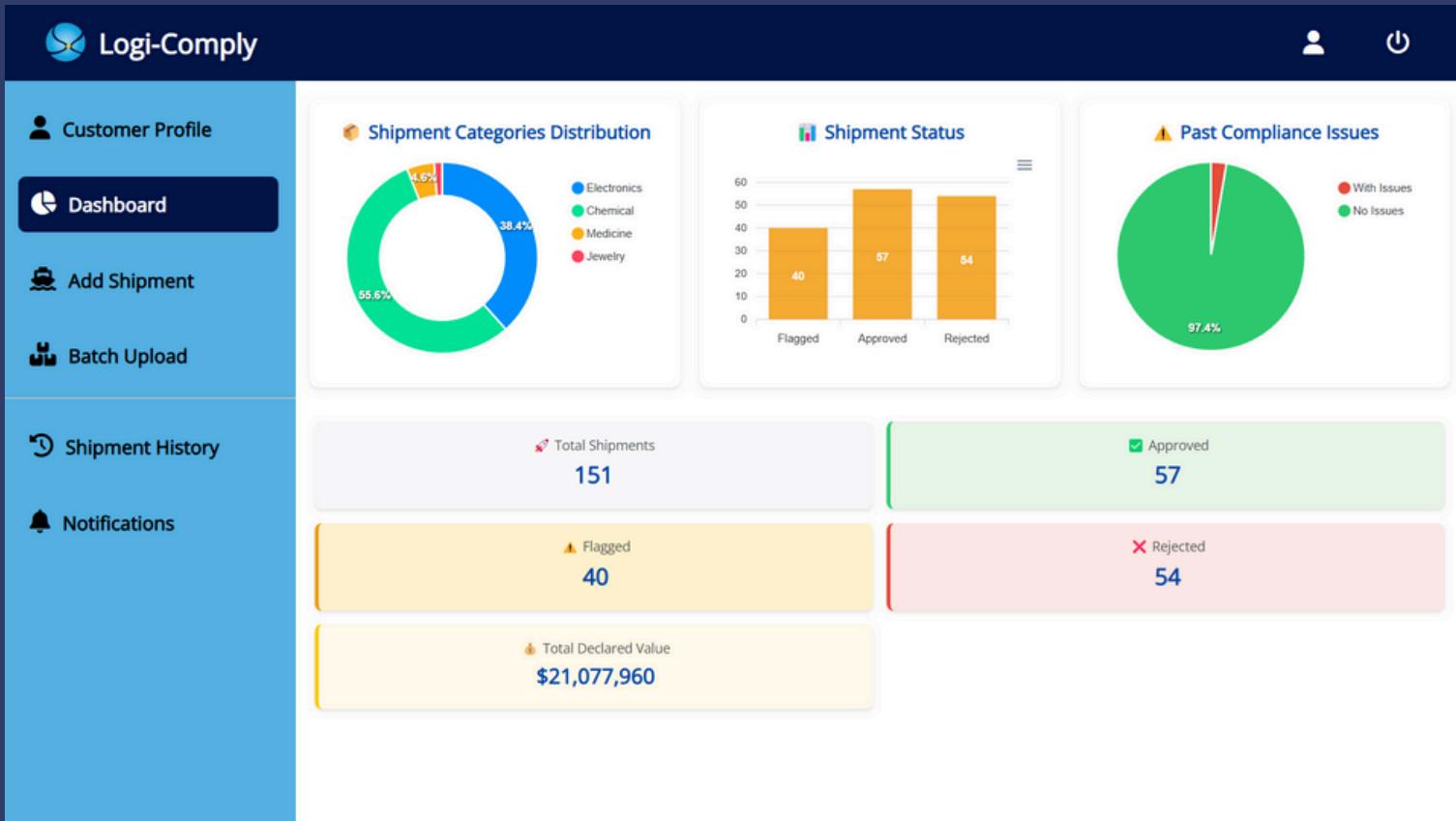
- **Flags high-risk shipments** by learning from past compliance violations.
- Enhances **accuracy and speed** by automating complex rule validations.
- **Detects Risks** Identifies fraud, suspicious shipments, or high-risk items before problems occur.



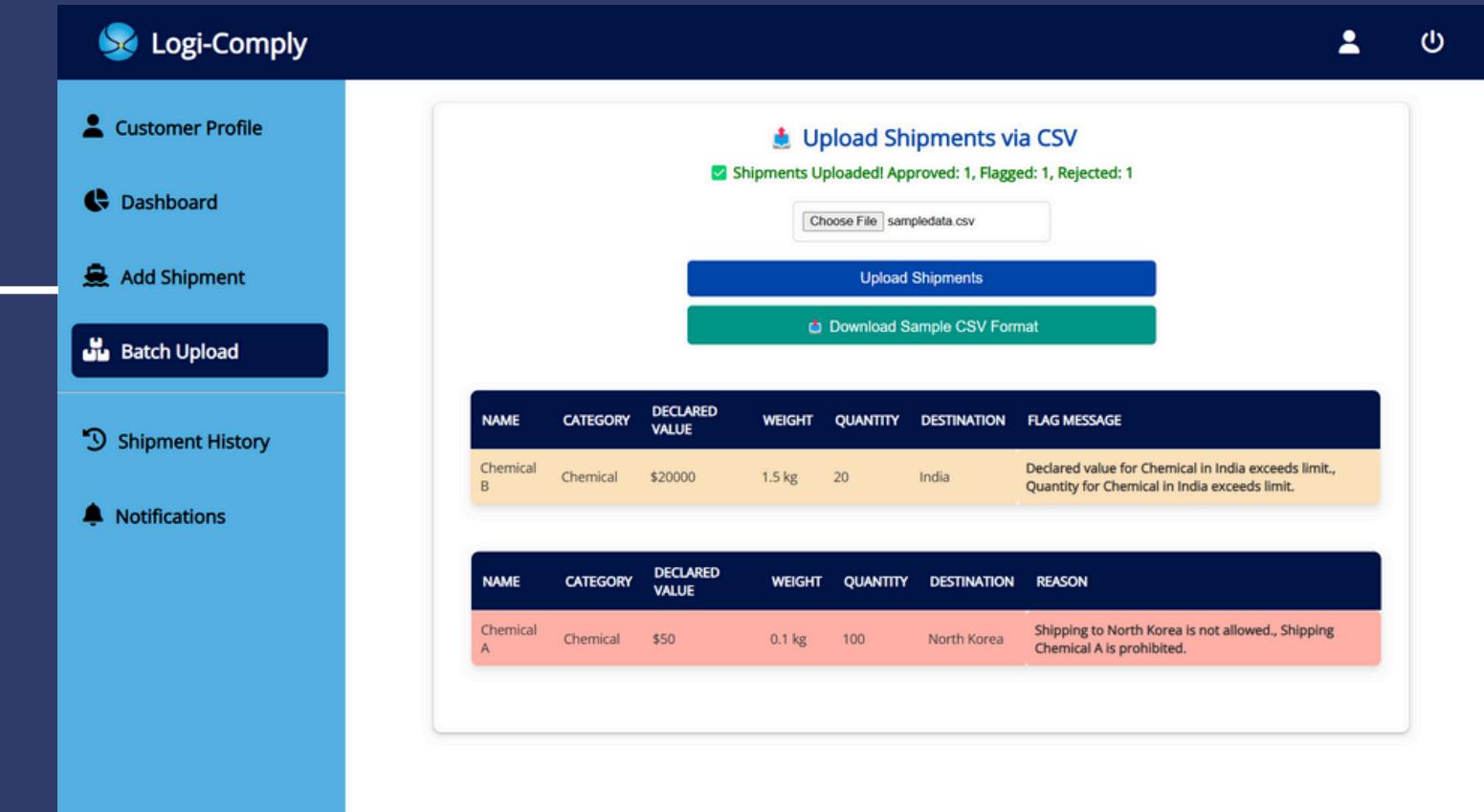
How AI Works in Our System?

- **Feature Extraction:** Analyzes shipment details (e.g., item type, value, destination).
- **Risk Prediction Models:**
 - **XGBoost:** Identifies shipments likely to violate regulations.
 - **Isolation Forest:** Detects anomalous shipments
- **Real-Time Alerts:** Instantly flags non-compliant parcels for user review.

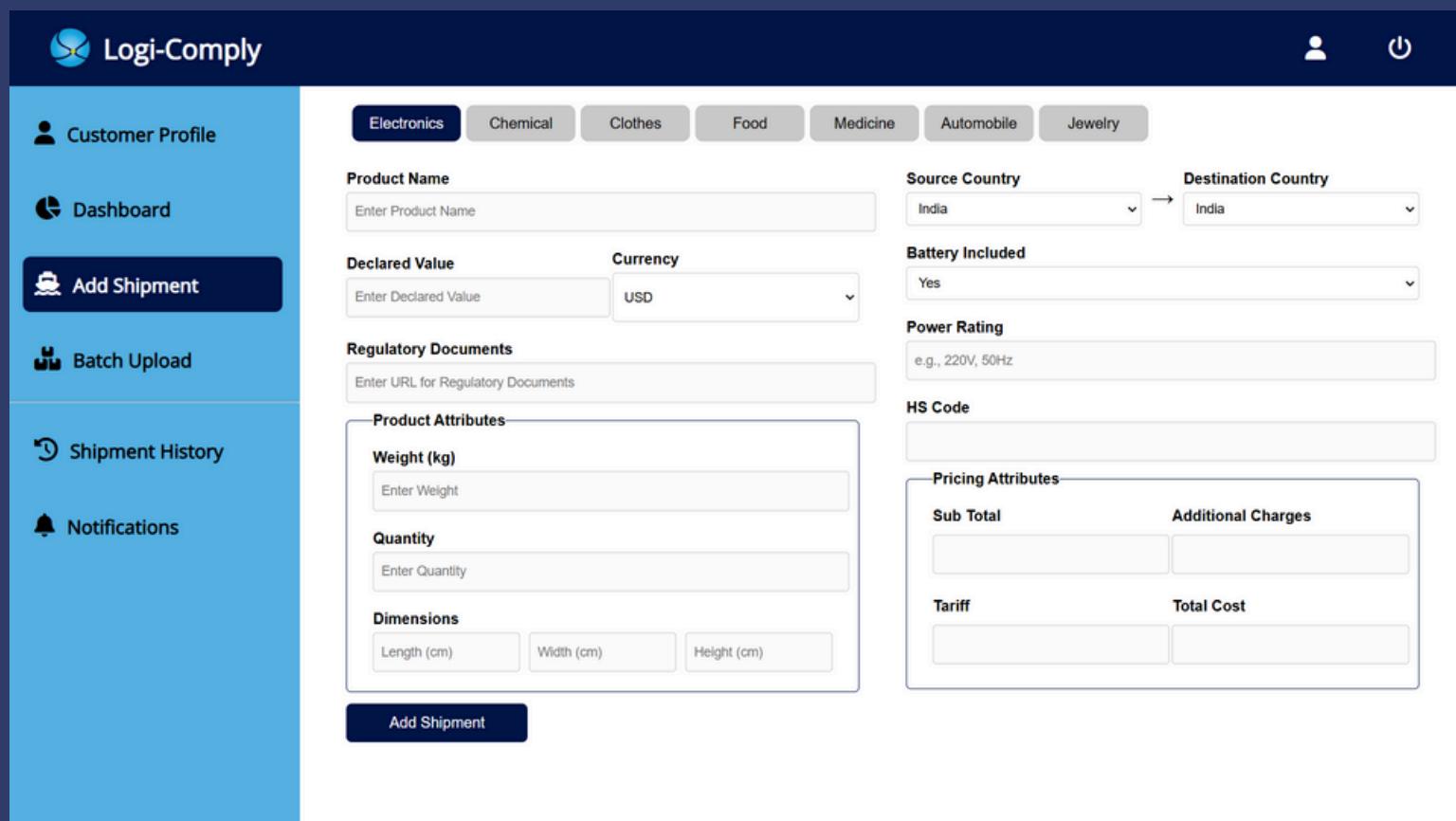




Bulk Product Upload - CSV



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User Dashboard



Add Shipment

Customer Profile

Product Name: Electronics

Source Country: India → **Destination Country**: India

Declared Value: Enter Declared Value → **Currency**: USD

Regulatory Documents: Enter URL for Regulatory Documents

Product Attributes

- Weight (kg)**: Enter Weight
- Quantity**: Enter Quantity
- Dimensions**: Length (cm), Width (cm), Height (cm)

HS Code: [Field]

Pricing Attributes

Sub Total	Additional Charges
[Field]	[Field]
Tariff	Total Cost
[Field]	[Field]

Add Shipment

→ Add Product Details

Logi-Comply

- Customer Profile
- Dashboard
- Add Shipment
- Batch Upload
- Shipment History**
- Notifications

Shipment History

TRACKING ID	DESTINATION	CATEGORY	NAME	DECLARED VALUE	WEIGHT	QUANTITY	STATUS
TRACK789	France	Electronics	Smartphone	\$500	0.3 kg	5	APPROVED
TRACK456	India	Chemical	Chemical B	\$20000	1.5 kg	20	FLAGGED
TRACK123	North Korea	Chemical	Chemical A	\$50	0.1 kg	100	REJECTED
TRACK7251	North Korea	Electronics	newProd	\$20000	20 kg	22222	REJECTED
TRACK789	France	Electronics	Smartphone	\$500	0.3 kg	5	APPROVED
TRACK456	India	Chemical	Chemical B	\$20000	1.5 kg	20	FLAGGED

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Shipment Details

Logi-Comply

- Customer Profile
- Dashboard
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Shipment Details

⚠ Flagged: Declared value for Chemical in India exceeds limit., Quantity for Chemical in India exceeds limit.

Tracking ID: TRACK456	Dimensions
Category: Chemical	30 cm × 18 cm × 30 cm
Name: Chemical B	Compliance Info
Declared Value: \$20000	HS Code: 3214.50
Weight: 1.5 kg	Past Compliance Issues: No
Quantity: 20	Restricted Item: No
Source Country: China	Cost Breakdown
Destination Country: India	Sub Total: \$4000
Status: PENDING	Tariff: \$500
	Additional Charges: \$100
	Total Cost: \$4600

Edit Shipment **Close**

Shipment History

Compliance Report

Shipment 1
 Tracking ID: TRACK123
 Customer ID: 65d9c1f8b9a1f2c8a6e7d9c1
 Category: Chemical
 Status: Rejected
 Flag Message: Shipping to North Korea is not allowed., Shipping Chemical A is prohibited.

Shipment Details

Field	Value
Name	Chemical A
Declared Value	50
Weight	0.1 kg
Quantity	100
HS Code	123.12.xx
Tariff	200
Additional Charges	50
Total Cost	5250
Source Country	India
Destination Country	North Korea

Shipment 2
 Tracking ID: TRACK456
 Customer ID: 65d9c1f8b9a1f2c8a6e7d9c1
 Category: Chemical
 Status: Pending
 Flag Message: Declared value for Chemical in India exceeds limit., Quantity for Chemical in India exceeds limit.

Shipment Details

Field	Value
Name	Chemical B

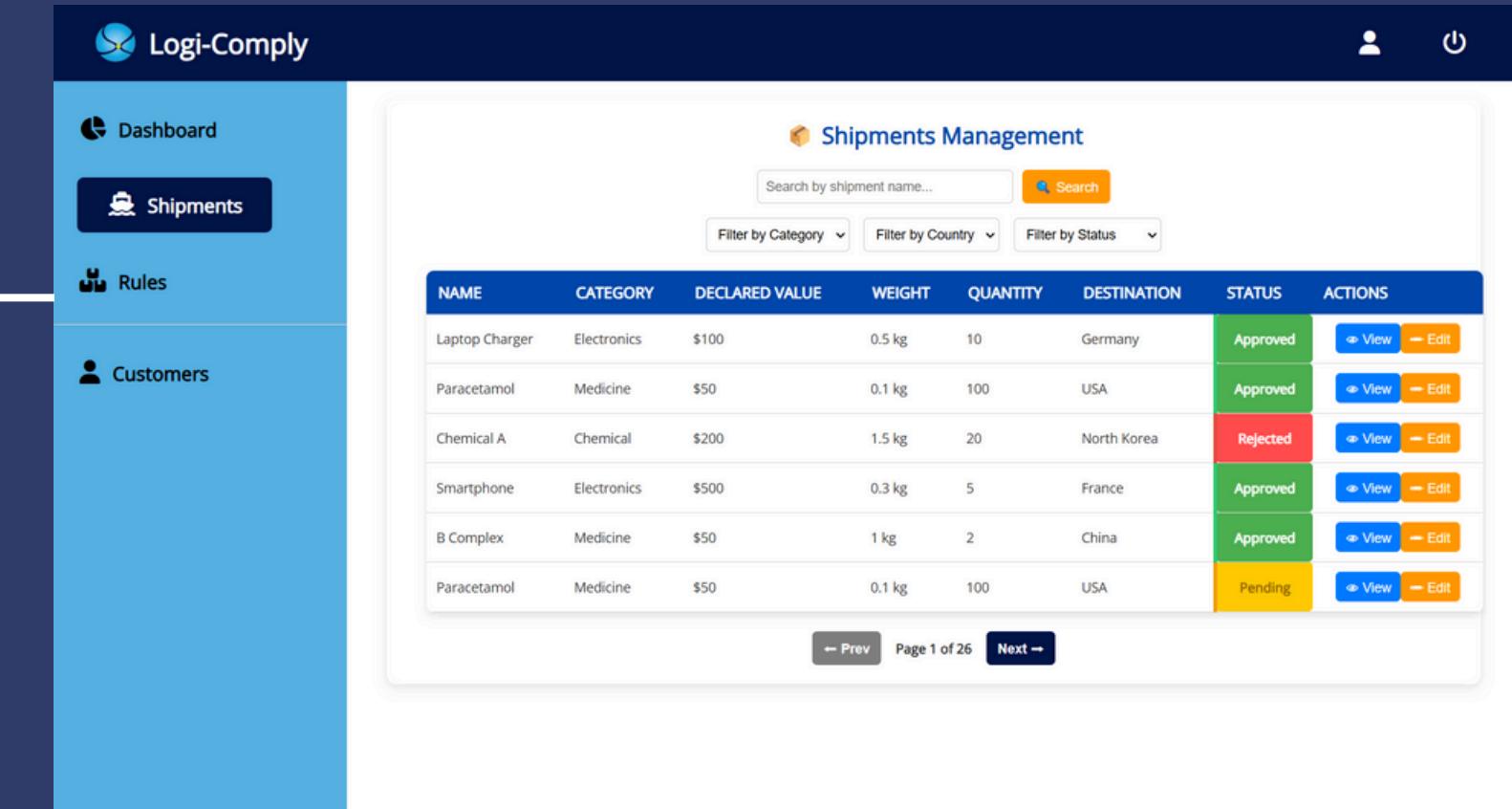
Admin Dashboard

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Prototype



Admin Shipment Management

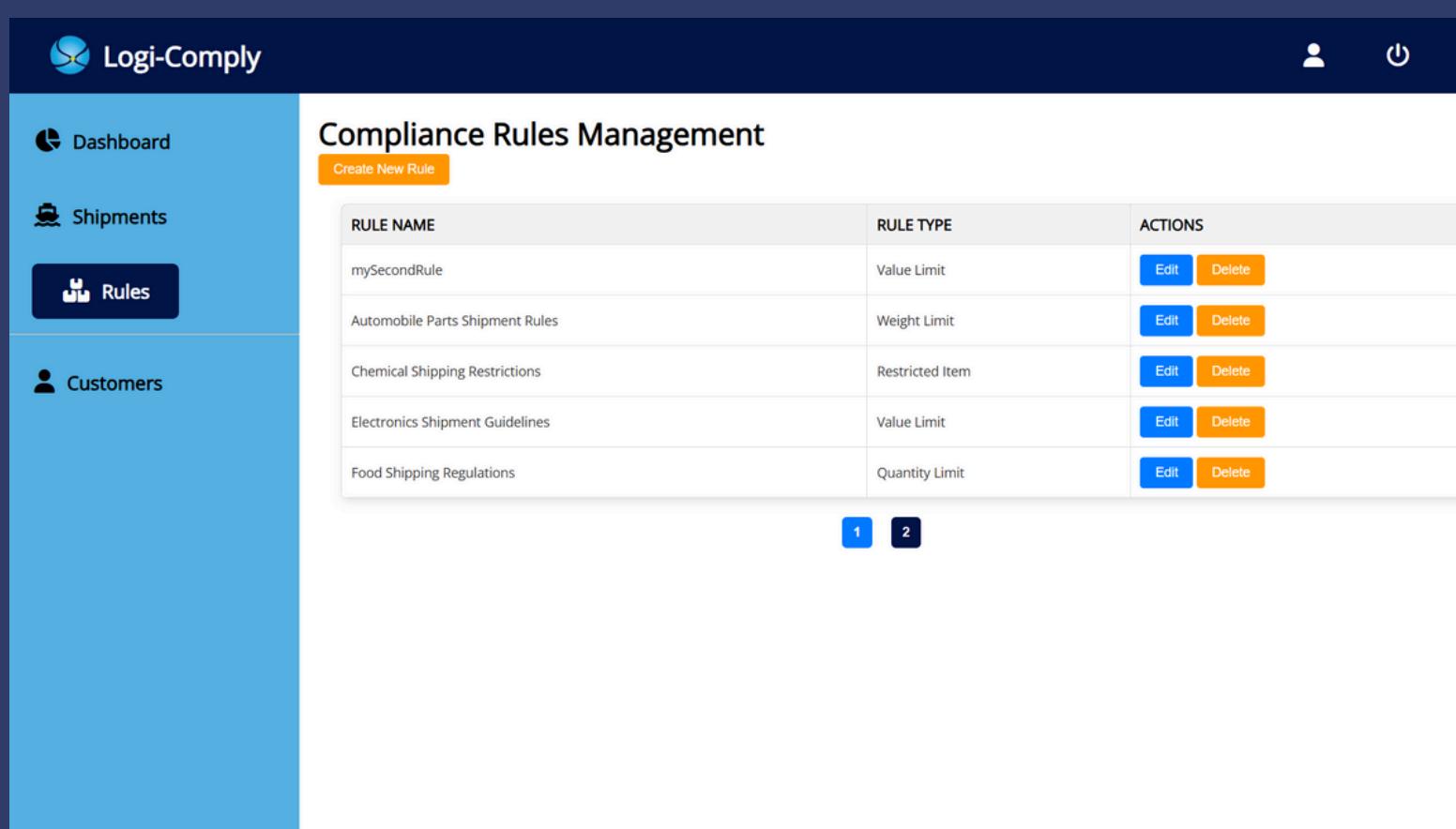


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Shipments Management

Name	Category	Declared Value	Weight	Quantity	Destination	Status	Action
Laptop Charger	Electronics	\$100	0.5 kg	10	Germany	Approved	View Edit
Paracetamol	Medicine	\$50	0.1 kg	100	USA	Approved	View Edit
Chemical A	Chemical	\$200	1.5 kg	20	North Korea	Rejected	View Edit
Smartphone	Electronics	\$500	0.3 kg	5	France	Approved	View Edit
B Complex	Medicine	\$50	1 kg	2	China	Approved	View Edit
Paracetamol	Medicine	\$50	0.1 kg	100	USA	Pending	View Edit

Admin Dashboard



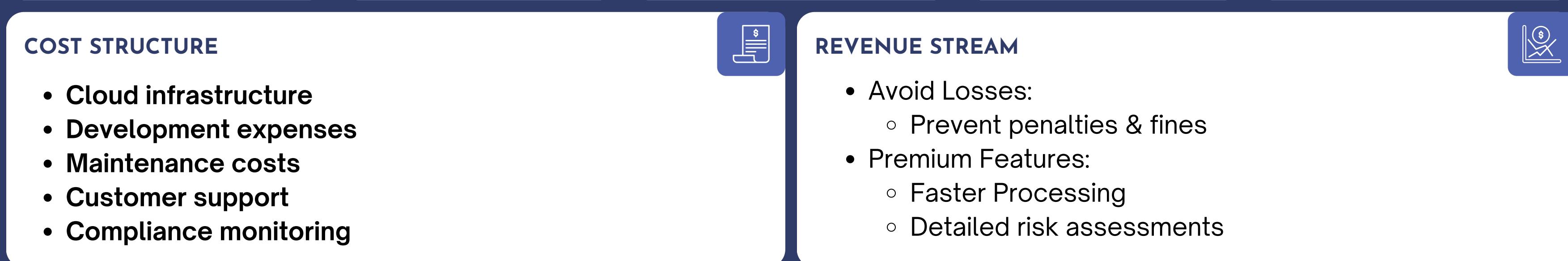
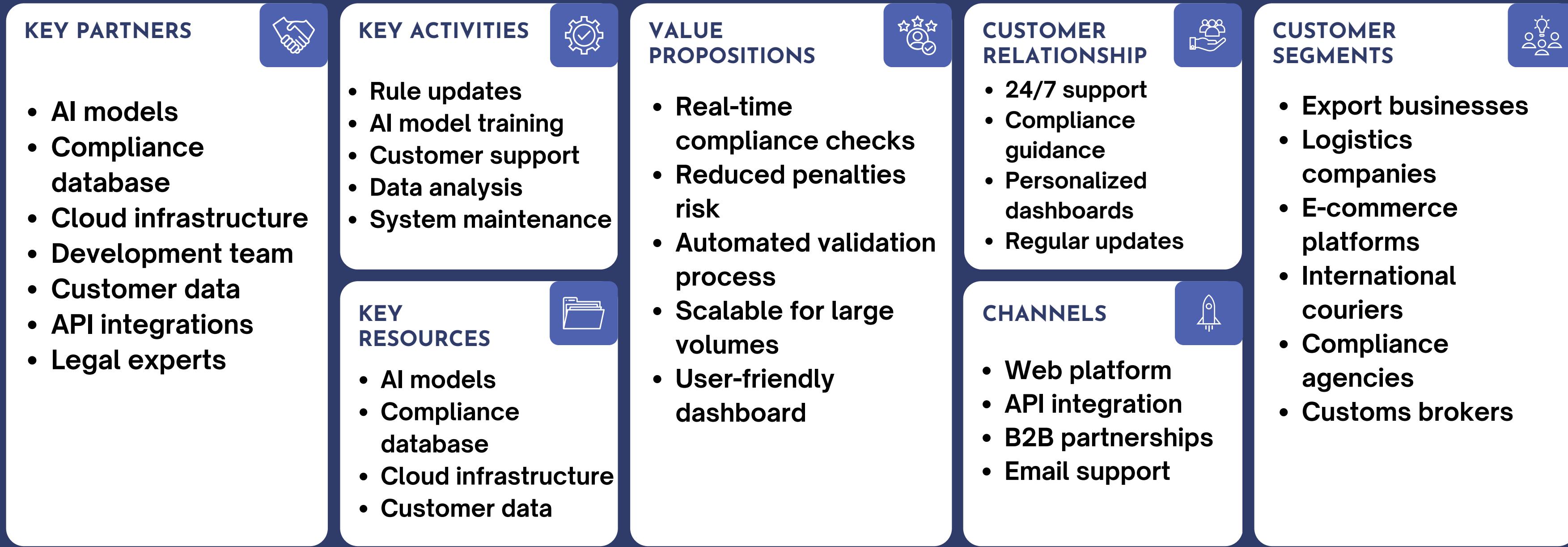
Logi-Comply

Compliance Rules Management

Create New Rule

Rule Name	Rule Type	Action
mySecondRule	Value Limit	Edit Delete
Automobile Parts Shipment Rules	Weight Limit	Edit Delete
Chemical Shipping Restrictions	Restricted Item	Edit Delete
Electronics Shipment Guidelines	Value Limit	Edit Delete
Food Shipping Regulations	Quantity Limit	Edit Delete

Rules



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