PROJECT CASE STUDY

Cross-Border E-Commerce Infrastructure

Multi-Brand, Multi-Language, Multi-Currency European Expansion

COMMERCE / INFRASTRUCTURE | 2024-25

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Project Overview

Headless multi-brand e-commerce infrastructure engineered for European market expansion with 90+ speed scores and 3000+ daily transactions.

Project Overview

YEAR	CATEGORY	STATUS
2024-25	Commerce / Infrastructure	Live · 3000+ TX/Day

Executive Summary

The Cross-Border E-Commerce Infrastructure is a headless, multi-brand platform built to support aggressive European market expansion. Engineered on Next.js 16 with TypeScript and PostgreSQL, the system handles automated multi-lingual content routing, localised payment gateway integration with real-time currency conversion, and highly available DNS configuration across EU regions.

Every performance metric was optimised for the European market: First Contentful Paint (FCP), Largest Contentful Paint (LCP), and Time to Interactive (TTI) all score 90+ on Core Web Vitals. Order flows, webhooks, and reconciliation pipelines were rebuilt from the ground up to handle multi-currency transactions at scale. The result is a global storefront that feels completely local in every market it serves.

Technology Stack

Next.js 16 | TypeScript | PostgreSQL | LiasonPay | i18n | DNS

90+	3000+	Multi
SPEED SCORES	DAILY TRANSACTIONS	CURRENCY SUPPORT

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The Problem

Expanding into European markets introduces severe currency, translation, DNS, and payment complexity.

The Problem

CORE CHALLENGE

Expanding a localised storefront into European markets is not a simple matter of translation. Each market introduces distinct currency requirements, regulatory obligations, preferred payment methods, language variants, and DNS latency considerations. Without a purpose-built infrastructure, brands either compromise on user experience or delay market entry indefinitely.

Key Pain Points

1

Currency & Pricing Complexity

Eurozone markets require real-time currency conversion, local tax calculation (VAT), and price display in the shopper's native currency. Static pricing locks out non-EUR markets.

2

Language & Content Fragmentation

Product descriptions, checkout flows, legal notices, and marketing copy must exist in multiple languages. Manual translation processes do not scale across brands.

3

Payment Gateway Fragmentation

European shoppers expect local payment methods: SEPA, iDEAL, Bancontact, Klarna. A single-gateway approach results in abandoned checkouts and lost revenue.

4

Performance & DNS Latency

Serving a global storefront from a single origin creates unacceptable latency for EU shoppers. FCP and LCP metrics suffer, directly impacting conversion rates and SEO rankings.

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The Solution

Headless multi-brand infrastructure with automated i18n routing, localised payments, and resilient DNS for frictionless international commerce.

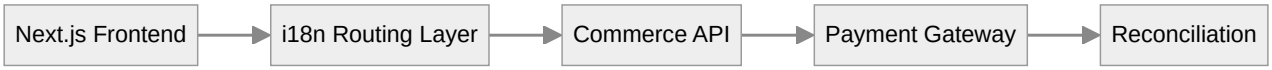
The Solution

APPROACH

Designed and built the entire cross-border infrastructure for a brand expanding into European markets. The stack handles automated multi-lingual content routing, localised payment gateway integration with currency conversion, and highly available DNS configuration. Order flows, webhooks, and reconciliation pipelines were rebuilt to handle multi-currency at scale. The result: a global storefront that feels local in every market it serves.

System Architecture

The architecture decouples the presentation layer from commerce logic, enabling independent brand storefronts to share a unified backend while serving localised experiences.



Infrastructure Components

Table 1 Infrastructure Component Breakdown

Component	Technology	Function
Frontend	Next.js 16, TypeScript	Server-side rendering, ISR for product pages, image optimisation, and edge caching. TypeScript ensures type safety across the full stack.
i18n Routing	Next.js i18n	Automated locale detection, sub-path routing (/de/, /fr/, /nl/), and language-specific SEO metadata generation for each market.
Database	PostgreSQL	Relational data store for products, orders, customers, and inventory. Handles multi-currency pricing tables and regional tax rules.

Payments	LiasonPay	Localised payment gateway supporting EUR, GBP, and regional methods. Currency conversion, VAT calculation, and PCI-compliant tokenisation.
DNS	Geo-DNS	Geo-routed DNS with EU edge nodes. Sub-50ms resolution times across European markets for optimal FCP and LCP scores.
Reconciliation	Webhooks, Custom Pipelines	Real-time webhook listeners for payment events, automated reconciliation between gateway settlements and order records.

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Key Features

Performance-optimised, compliance-ready infrastructure built for scale across European markets.

Key Features & Capabilities

1

90+ Core Web Vitals Scores

Optimised for European network conditions with edge caching, image compression, critical CSS inlining, and font subsetting. FCP under 1.2s, LCP under 2.0s across all EU test regions.

2

Automated Multi-Lingual Routing

Locale detection from browser headers and IP geolocation routes users to the correct language sub-path. Content is served from pre-rendered static pages with ISR for real-time updates.

3

Localised Payment Integration

LiasonPay gateway handles EUR, GBP, and local methods with automatic currency conversion at checkout. VAT calculation applied per destination country. PCI-DSS compliant tokenisation.

4

Multi-Brand Headless Architecture

Single backend powers multiple brand storefronts. Each brand has independent theming, catalog segmentation, and pricing rules while sharing inventory, order management, and customer data.

5

Webhook & Reconciliation Pipeline

Event-driven architecture listens for payment confirmations, refunds, and chargebacks. Automated reconciliation matches gateway settlements against order records with exception flagging.

6

Resilient Geo-DNS

Anycast DNS routes European traffic to the nearest edge node. Automatic failover between regions ensures 99.9% uptime with sub-50ms DNS resolution.

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Results & Impact

Sustained high-performance commerce across European markets with transaction volume exceeding 3000 per day.

Results & Impact

Operational Outcomes

The infrastructure has been running in production across multiple European markets, consistently processing over 3000 transactions daily while maintaining elite performance scores and operational stability.

90+
PAGESPEED SCORE

3000+
DAILY TRANSACTIONS

99.9%
UPTIME

Key Achievements

Table 2 Performance & Business Impact

Dimension	Before	After
Page Load (FCP)	3.5s+ from non-EU origin	<1.2s via EU edge nodes
Language Support	English only	Automated multi-language routing
Currency	Single currency checkout	Multi-currency with real-time conversion
Payment Methods	Credit card only	SEPA, iDEAL, Klarna, local methods
Reconciliation	Manual spreadsheet matching	Automated webhook-based reconciliation
Market Entry	Per-market custom builds	Single infrastructure, multiple brands

Conclusion

The Cross-Border E-Commerce Infrastructure demonstrates that performance, localisation, and scale are not mutually exclusive. By building a headless, i18n-native, edge-optimised platform from the ground up, the brand achieved market-ready speed scores, localised checkout

experiences, and automated operational pipelines — all while processing thousands of daily transactions across multiple European markets from a single unified backend.