

Optical Store & ERP - Solution Architecture

Version: 0.1 (Draft)

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1. Vision & Goals

- Unified B2C optical storefront with integrated ERP: catalog, prescriptions, inventory, orders, warehouse, procurement, lab, CRM, analytics.
- Objectives: reduce stockouts, faster fulfillment, higher conversion, accurate Rx, operational visibility.

2. Personas

- Customer; Store associate; Optician/Lab; Warehouse; Buyer/Planner; Admin/Ops.

3. Scope Overview

- Storefront: Catalog, search, PDP + lens builder, cart, checkout, payments, accounts.
- ERP: Inventory, pricing/promos, orders, fulfillment, procurement, suppliers, warehouse, lab, CRM, reporting.
- Integrations: Payments, tax, shipping, address, supplier EDI, messaging, analytics.

4. Architecture

- Start as modular monolith; evolve into services for catalog, orders, inventory, pricing, lab, integrations.
- REST APIs; internal async events via message bus.
- Data: PostgreSQL (OLTP), Redis (cache/queues), Object Storage (assets).
- Search: OpenSearch/Elasticsearch.

5. Tech Stack

- Backend: Node.js (NestJS) or Python (FastAPI).
- Frontend: Next.js (React).
- Data: PostgreSQL, Prisma/SQLAlchemy; Redis; OpenSearch.
- Infra: Docker, Terraform, CI/CD (GitHub Actions).
- Observability: OpenTelemetry, Prometheus/Grafana, Sentry.

6. Domain Model (High-Level)

- Catalog: Products, frames, lenses, variants, attributes, media.
- Pricing: Price lists, promotions, coupons, tax classes.
- Customers: Profiles, addresses, Rx docs, PD/seg height.
- Orders: Cart, payments, shipments, returns, adjustments, status history.
- Inventory: Locations, stock, reservations, movements.
- Procurement: Suppliers, POs, receipts, lead times.
- Warehouse: Bins, pick/pack/ship, labels, carriers.
- Lab: Rx validation, lens selection, edging, QA, remakes.

7. Security & Compliance

- PII/Rx data protection; encryption in transit/at rest.
- AuthN/Z: OIDC, MFA, RBAC/ABAC; least privilege.
- Audit trails, data retention; GDPR/CCPA readiness.

8. MVP Scope

- Storefront: Auth, catalog, PDP basic lenses, cart/checkout, order tracking.
- ERP: Single-warehouse inventory, pricing, basic promos, order-to-ship, simple returns.
- Integrations: One payment, one tax, two carriers, email.

9. Phased Roadmap

- Phase 1: MVP + manual lab handoff.
- Phase 2: Advanced pricing, multi-warehouse, procurement, RMA.
- Phase 3: Lab automation, supplier EDI, analytics + CRM.
- Phase 4: i18n, POS/omnichannel, B2B, service extraction.

10. Environments & DevOps

- Dev, Staging, Prod; isolated secrets/DBs; blue-green/rolling deploys.
- IaC: Terraform modules; migrations and rollback strategy.

11. Testing & Quality

- Unit/integration per domain; Playwright E2E for key flows.
- Security testing: authz, input validation, SSRF/CSRF/XSS.

12. Analytics & Reporting

- KPIs: Conversion, AOV, abandonment, lead time, stockouts, return rate.
- Dashboards: Sales, inventory, lab throughput, supplier performance.

13. Integrations

- Payments: Stripe/Adyen; Tax: Avalara/TaxJar; Shipping: Shippo/EasyPost.

14. Risks & Mitigations

- Lens complexity: start constrained; expand post-MVP.
- Data quality: strict validation; reference data; Rx parsing.
- Scope creep: MVP guardrails; phase gates; value slices.

15. Open Decisions

- Regions/currencies; tenant model; cloud; lab at MVP or later; providers.