Point of Sale (POS) System — Proposal & Requirements

Client: TBD

Date: 2025-09-18

Version: 1.0.0

# 1. Overview & Objectives

This document defines the scope, functional and non-functional requirements, security posture, and recommended technology stack for a new Point of Sale (POS) system.

The primary product line is footwear, with support for selling additional non-footwear items. The solution must provide two distinct interfaces: a tablet-optimized Sales interface for in-store transactions and a Back Office interface for catalog, inventory, users, and reporting.

Objectives include a fast, intuitive checkout experience, robust offline capability, accurate inventory tracking, and secure payment processing compliant with industry standards.

# 2. Scope

In scope:

* Tablet-optimized POS (Sales) interface with offline-first capability
* Web-based Back Office for product, inventory, pricing, promotions, users, and reports
* Footwear-specific product variants (size, color) and general merchandise
* Barcode scanning, receipt printing, and cash drawer support
* Payment terminal integration (e.g., Stripe Terminal) with tokenization
* Multi-store locations and registers
* Real-time and background synchronization across devices

Out of scope (Phase 1):

* Full e-commerce website (only optional future integration hooks)
* Advanced warehouse management (basic stock transfers only)
* Accounting system replacement (provide export/integration instead)

# 3. Stakeholders & User Roles

Stakeholders include Store Associates, Store Managers, Inventory Managers, Finance/Accounting, Operations, and Administrators.

At minimum, the system will support role-based access controls (RBAC) with the roles summarized below.

|  |  |  |
| --- | --- | --- |
| Role | Responsibilities | Permissions (summary) |
| Sales Associate | Process sales, returns/exchanges, customer lookup, issue receipts | Checkout, view catalog, apply allowed discounts, hold/resume |
| Store Manager | Override discounts, manage users in store, daily reconciliation | All associate permissions + overrides, end-of-day reports |
| Inventory Manager | Maintain products, variants, stock counts, transfers | Create/edit products, adjust inventory, receive stock |
| Admin | System configuration, tax rules, multi-store settings, audits | Full back-office access, security settings, audit exports |

# 4. Interfaces

Sales (Tablet POS):

* Responsive, touch-friendly UI optimized for 10–13″ tablets
* Scan/search products, build cart, apply discounts, collect payment
* Customer lookup/enrollment, receipt via print/email/SMS
* Offline-first with background synchronization

Back Office (Web Admin):

* Product, category, variant management (sizes, colors)
* Pricing, promotions, and tax rules
* Inventory, stock adjustments, transfers, and purchase orders
* User and role management, store and register configuration
* Operational and financial reporting

# 5. Functional Requirements

5.1 Sales (Tablet POS)

* Secure sign-in with role-based access
* Product scan (barcode), quick search, and variant selection (size, color)
* Cart operations: add/remove items, quantity edit, notes
* Discounts: per-line and cart-level (role/approval-gated)
* Tax calculation by store/location rules
* Payments: card (terminal), cash, gift card, split payments
* Refunds and exchanges with receipt/lookup
* Receipt printing/email/SMS; reprint on demand
* Hold/resume transactions; parked sales
* Customer profiles, simple loyalty (points/balance), and marketing opt-in
* Inventory lookup by store; low-stock warnings
* Shift management: open/close register, cash drawer operations
* Offline mode: queue transactions and sync on reconnect

5.2 Back Office (Web Admin)

* Product catalog: categories, variants (size/color), SKUs, barcodes
* Pricing and promotions: price lists, promo codes, time-bound discounts
* Tax configuration per jurisdiction; rounding rules
* Inventory: stock levels, cycle counts, adjustments, transfers
* Suppliers and purchase orders: receiving and reconciliation
* Users, roles, and permissions; audit trails
* Stores and registers configuration; receipt templates
* Reports: sales, margins, tax, inventory movement, cashier performance
* Data import/export (CSV) for products and inventory
* Multi-store management with per-store overrides

5.3 Cross-Cutting & Integrations

* Payment terminal integration (e.g., Stripe Terminal, Adyen, or Square)
* Receipt printers (ESC/POS over network) and cash drawers
* Barcode scanners (BLE/USB HID) and handheld scanners
* Background sync and conflict resolution (last-write-wins + merge rules)
* Webhooks/ETL for accounting systems (e.g., export to CSV/S3)
* Localization (currency, date/number formats); multi-currency display
* Accessibility (WCAG 2.1 AA) for back-office; large-touch targets for POS

# 6. Non-Functional Requirements & SLAs

|  |  |
| --- | --- |
| Category | Target/Expectation |
| Performance (POS UI) | Initial load ≤ 3s on modern tablets; interactions ≤ 100ms |
| Transaction time | Add item ≤ 300ms; tender to receipt ≤ 5s (online) |
| Availability | >= 99.9% monthly for cloud services |
| Offline tolerance | Operate offline ≥ 72 hours; seamless resync on reconnect |
| Data durability | >= 11x9s for production databases (managed service) |
| Scalability | Support 100+ concurrent registers across stores |
| Security | TLS 1.2+ in transit, AES-256 at rest; RBAC; audit logs |
| Usability | Optimized touch UI; ADA/WCAG 2.1 AA (back office) |
| Observability | Structured logs, metrics, traces; alerting on SLOs |
| Backup & DR | Daily snapshots; PITR ≤ 15 min; RPO ≤ 15 min; RTO ≤ 4 h |

# 7. Security & Compliance

The solution follows a defense-in-depth strategy and industry standards.

* Authentication & Authorization: OAuth 2.0/OIDC for back-office; secure session for POS; RBAC with least privilege
* Password policy and MFA for administrative roles
* Data Protection: TLS 1.2+ (pref. TLS 1.3); AES-256 at rest; field-level encryption for sensitive PII
* Secret management via cloud KMS/Parameter Store; no secrets in code
* PCI DSS alignment: no cardholder data stored/processed by our servers; use P2PE terminals and tokenization
* Privacy (GDPR/CCPA): consent tracking, data subject requests, retention policies
* Secure coding (OWASP ASVS/Top 10), code scanning, SCA, dependency pinning
* Audit logging for authentication, configuration changes, overrides, refunds
* Device hardening guidance for store tablets; MDM support optional

# 8. Technology Stack Recommendation

The POS will primarily run on tablets. We recommend a Progressive Web App (PWA) built with React and TypeScript for the Sales interface, leveraging offline storage and background sync. For the Back Office, a responsive React web app shares components and design system.

* Frontend: React + TypeScript (PWA), service worker, IndexedDB (Dexie), state via Redux Toolkit or Zustand; UI via MUI or Tailwind
* Hardware access: WebHID/WebUSB/WebBluetooth where supported; optional Capacitor build for broader device support
* Backend: Node.js 20 + NestJS; PostgreSQL 15; Prisma ORM; Redis for caching/queues
* Realtime/sync: WebSockets; background job processing
* Payments: Stripe Terminal (recommended) with tokenization; pluggable provider interface
* Cloud: AWS (ALB + ECS/EKS or Fargate), RDS Postgres, S3, CloudFront, Secrets Manager, CloudWatch
* CI/CD: GitHub Actions; IaC via Terraform; containerized with Docker

# 9. High-Level Data Model (Selected Entities)

|  |  |
| --- | --- |
| Entity | Purpose |
| Store | Physical location with configuration and tax context |
| Register | Checkout terminal instance at a store |
| User | System user with role assignments and permissions |
| Customer | Customer profile, contact details, loyalty data |
| Product | Base product with brand, category |
| Variant | Size, color variants; links to SKU |
| SKU | Sellable unit with barcode and price |
| Inventory | Stock levels by store/SKU; adjustments and movements |
| Order | Sales transaction header |
| OrderLine | Line items referencing SKUs and quantities |
| Payment | Tender details and tokenized references |
| Promotion | Discount rules and eligibility |
| TaxRule | Tax rates and application rules by jurisdiction |
| Supplier | Vendor information for purchasing |
| PurchaseOrder | Stock receiving and reconciliation |

# 10. Hardware & Peripheral Support

* Barcode scanners: Bluetooth LE and USB HID
* Receipt printers: ESC/POS network printers (Ethernet/Wi‑Fi); supported models list to be finalized
* Cash drawers: via printer kick port
* Payment terminals: Stripe Terminal (WisePad 3/BBPOS), Adyen, or Square (pluggable)
* Tablet OS: Recent iPadOS and Android versions; Chrome/Safari browsers

# 11. Reporting & Analytics

* Daily sales summary and Z-reports
* Product/category performance and sell-through
* Cashier performance and overrides/discounts report
* Inventory valuation and movement
* Tax liability reports
* Exports (CSV) and scheduled email delivery

# 12. Environments, Deployment & Observability

* Environments: Dev, Staging, Production with separate resources
* CI/CD: automated build/test/lint, vulnerability scans, infrastructure as code
* Observability: structured logs, metrics (latency, error rates), tracing; alerts on SLO breaches
* Backups: daily snapshots; PITR; tested restore procedures

# 13. Acceptance Criteria (Sample)

1. As a Sales Associate, I can scan a shoe SKU, select size, and complete a payment with a printed receipt in under 60 seconds.
2. When the internet is unavailable, I can complete cash sales and the system syncs automatically when connectivity returns without data loss.
3. Managers can configure a time-bound promotion in Back Office that is applied at POS within 60 seconds of publish.
4. Inventory received in Back Office updates on-hand counts and is visible at POS within 60 seconds.
5. All sensitive traffic is encrypted in transit and at rest; administrator actions appear in audit logs within 1 minute.

# 14. Project Plan & Milestones (Indicative)

* Discovery & Design (2–3 weeks): user flows, hardware validation, visual design
* MVP Build (6–8 weeks): core POS, catalog, inventory, payments, basic reports
* Pilot (2 weeks): limited stores, feedback, bug fixes
* Hardening & Training (1–2 weeks): performance tuning, documentation, staff training
* General Availability (GA): phased rollout, monitoring, support SLAs

# 15. Assumptions & Risks

Assumptions:

* Payment provider (e.g., Stripe) account and approved hardware are available
* Printer and scanner models selected from a supported list
* Tax rules and pricing policies are provided and maintained by client

Risks & Mitigations:

* Hardware variability: validate early; maintain compatibility matrix
* Offline conflicts: implement clear conflict resolution and operator guidance
* Network constraints in-store: support resilient sync and compressed payloads