SYSTEM ARCHITECTURE & TECHNICAL MANUAL

Waterbiz ERP Platform Specification

Technical Reference Manual: Circular Returnable-Asset Accounting, 3-Tier Mobile Fleet Suite, Contractor Sub-Ledger Engine & UAE FTA / Corporate Tax Compliance

Central ERP Core LARAVEL
Double-entry General Ledger, Chart of Accounts, Procurement, Inventory, HR & UAE FTA VAT engine.

Van Mobile POS FLUTTER DRIVER
Doorstep 4-step checkout, Bluetooth thermal receipts, empty bottle swap audit, live dues collection.

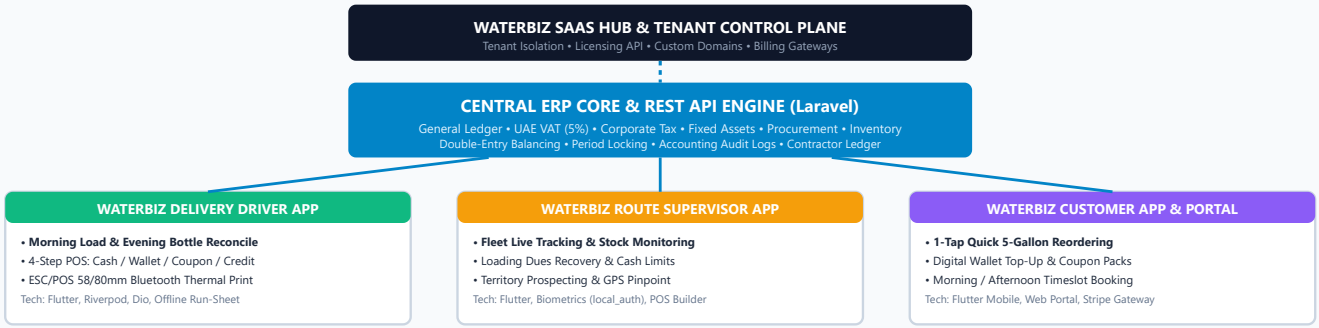
Fleet Oversight FLUTTER SUPV
Loading dues recovery, vehicle stock monitoring, market prospecting, biometric driver sign-off.

Customer Loyalty FLUTTER CLIENT
1-tap quick reorder, prepaid digital wallet, barcode coupon books, live vehicle arrival tracking.

01 System Architecture & Ecosystem Topology

Waterbiz ERP manages the high-velocity, circular physical and financial flows of bottled water delivery businesses. Rather than modeling water sales as single-direction retail transactions, the system models the multi-tier relationship between central production plants, mobile van warehouses, and distributed customer nodes.

FIGURE 1.1: WATERBIZ END-TO-END ENTERPRISE SYSTEM TOPOLOGY



02 Circular Returnable-Asset & Empty Bottle Lifecycle

The core asset in water delivery is the **returnable 5-gallon polycarbonate bottle**. Because bottles represent significant capital, Waterbiz implements a closed-loop accounting cycle that audits bottle movements from plant to customer and back.

FIGURE 2.1: CLOSED CIRCULAR BOTTLE ACCOUNTING CYCLE



Bottle Balance Equations: **Client Held Balance = Opening Balance + Full Bottles Delivered − Empty Bottles Collected**
Van Shift Bottle Reconciliation = Morning Empty Inventory + Sum(Empties Collected) − Evening Empties Deposited at Depot

5-Gallon Polycarbonate Tracking

Every delivery note requires the driver to register both delivered full and collected empty quantities. Missing bottles adjust the customer deposit liability or generate an immediate replacement charge.

Electric Dispenser Asset Registry

Hot & Cold water dispensers placed on deposit or lease are serialized in the `assets` table. Generates automated quarterly sanitization work orders and recovery vouchers when contracts terminate.

TOUCHPOINT	DATABASE TABLE	DEBIT / ASSET ACTION	CREDIT / LIABILITY ACTION	OPERATIONAL CONTROL
Depot Loading	`loadings` / `loading_items`	Debits Van Mobile Warehouse	Credits Central Plant Inventory	Driver digital sign-off prevents "short-load" claims.
Doorstep Drop	`client_stock_movements`	Debits Customer Custody	Credits Van Mobile Inventory	Mobile POS prevents order completion without empty bottle entry.
Evening Return	`un_loadings` / `un_loading_items`	Debits Plant Empty Holding Bay	Credits Van Mobile Inventory	Physical empty counts compared with app records; shortages flagged.
Account Exit	`deposit_transactions`	Debits Cash / Bank Refund	Releases Held Deposit Liability	Refunds authorized only after driver recovers bottles/dispensers.

03 Daily Van Operations, Route POS & Cash Reconciliation

Each delivery vehicle operates as a mobile point of sale. Waterbiz enforces a mathematically closed cash and inventory reconciliation equation to prevent revenue leakage.

FIGURE 3.1: EXPECTED CASH CALCULATION & PAYMENT MIX BREAKDOWN



End-of-Day Shift Cash Reconciliation: **Expected Physical Cash = Delivered Stock Value − Credit Sales − Coupon Punch Value − Wallet Balance Deductions − Logged Fuel & Toll (Salik) Expenses**

1. Morning Stock Verification

Driver counts physical stock (5G, PET cartons, accessories). In-app approval locks the mobile inventory ledger before the truck departs.

2. Route Stop Sequencing

Orders are clustered by street and morning (8–12) or afternoon (1–5) timeslots, reducing vehicle fuel consumption and delivery delays.

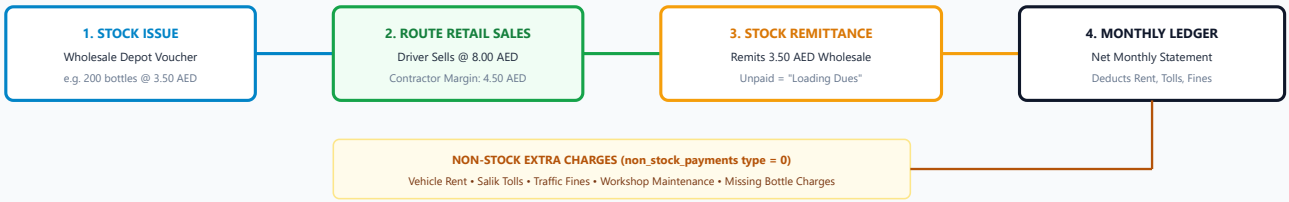
3. Evening Cash Handover

The depot cashier reviews the driver's Day-Summary. Physical cash remitted must match Expected Cash. Discrepancies generate audit incident records.

04 Commission-Based Contractor Model & Monthly Statements

In addition to company-owned fleets, Waterbiz includes a dedicated **Contractor Sub-Ledger**. Independent delivery teams purchase water at wholesale depot transfer rates, manage retail route sales, and settle monthly statements with the company.

FIGURE 4.1: CONTRACTOR WHOLESALE FINANCIAL & SETTLEMENT FLOW



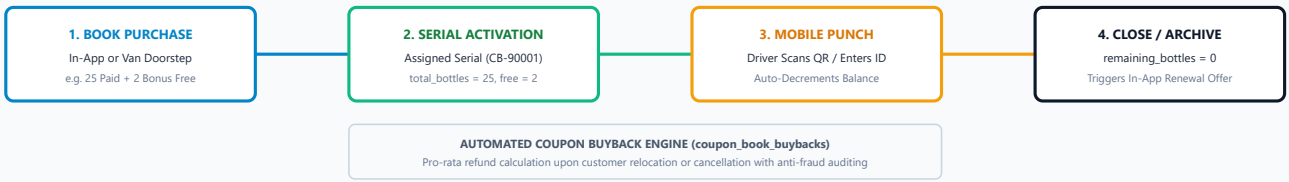
Contractor Monthly Statement Balance Equation: **Closing Balance (C/F) = Opening (B/F) + Wholesale Stock Issues + Non-Stock Debits (Rent/Fines) – Stock Payments – Charge Settlements – Stock Return Credits**

OPERATING DIMENSION	COMPANY-CONTROLLED VEHICLE	COMMISSION-BASED CONTRACTOR VEHICLE
Vehicle Capitalization	Owned by company; capitalized in `assets` table with monthly depreciation.	Contractor vehicle; contractor pays vehicle lease or maintenance fee to company.
Driver Earnings	Fixed salary + performance allowances processed via `payrolls` module.	Retains spread between retail price (8.00 AED) and wholesale issue price (3.50 AED).
Fleet Operating Costs	Company operating expense logged in `expenses` table.	Debited to contractor account via `non_stock_payments` (type 0).
Inventory Transfer	Internal depot-to-truck transfer.	Wholesale commercial sale via `contractor_invoices` (Team Issue Voucher).
Unpaid Stock Handling	Van stock discrepancy investigation.	Recorded as **Loading Dues**; blocks subsequent morning stock loading if credit limit is exceeded.

05 Prepaid Coupon Books & Customer Digital Wallet Engine

Prepaid mechanisms generate positive operational cash flow by securing payment before water is consumed. Waterbiz automates both physical serialized coupon books and mobile digital wallets.

FIGURE 5.1: PREPAID COUPON BOOK LIFECYCLE & DIGITAL VALIDATION



Digital In-App Wallet Engine

Customers pre-load credit via credit card (Stripe / UAE gateway). Enables zero-contact doorstep deliveries: drivers swap bottles and the system auto-debits the wallet with instant SMS/push notification.

Anti-Fraud Serialized Coupon Protection

Each coupon book carries a unique barcode index in `coupon_books`. Prevents driver coupon theft, duplicate redemptions, and out-of-sequence punches across different delivery zones.

06 Flutter Mobile Application Suite Architecture

Waterbiz provides three dedicated Flutter mobile applications designed for drivers, supervisors, and end customers, ensuring real-time operational integration across the enterprise.

Delivery Driver App — PRODUCTION

Package: `Delivery VAN App`
Framework: Flutter, Riverpod, Dio, GoRouter
Core Screens: Morning Stock Audit, Clustered Run-Sheet, 4-Step POS, Empty Bottle Ledger, Van Expense Logger.
Hardware: Bluetooth ESC/POS 58/80mm thermal receipt printing; offline order caching.

Route Supervisor App — PRODUCTION

Package: `Noor Supervisor app`
Framework: Flutter, Riverpod, local_auth
Core Screens: Live Fleet Tracker, Loading Dues Recovery Hub, Charges Manager, Market Development CRM.
Security: Biometric login (Fingerprint / Face ID) for field supervisor payment sign-offs.

Customer Reorder App — PRODUCTION

Package: `Noor Customer app`
Framework: Flutter Mobile & Web Portal
Core Screens: 1-Tap Quick Reorder, Digital Wallet Topup, Coupon Package Purchase, Real-Time Delivery Tracking.
Payment: In-app credit card gateway with bilingual Arabic/English interface.

FIGURE 6.1: MOBILE EDGE POS & HARDWARE PERIPHERALS INTEGRATION



07 UAE Federal Tax Authority (FTA) Compliance & E-Invoicing

Waterbiz integrates complete compliance with UAE Federal Tax Authority (FTA) mandates: Value Added Tax (VAT 5%), Corporate Tax (9%), and upcoming Peppol E-Invoicing standards.

FIGURE 7.1: UAE FTA REGULATORY ARCHITECTURE



Double-Entry General Ledger Enforcement

In `JournalEntry.php`, the core accounting engine executes `isBalanced()` on every write. Total Debits must equal Total Credits before posting to assets, liabilities, equity, revenues, or expenses.

Accounting Period Locking Mechanism

In `AccountingPeriod.php`, month-end periods are locked (`locked_at`, `locked_by`). Once locked, no driver, supervisor, or accountant can back-date transactions or alter historical tax filings.

08 Enterprise Back-Office Modules & Subsystems Catalog

Waterbiz integrates all back-office operational requirements into unified controllers, services, and database relationships.

MODULE	DATABASE ENTITIES	KEY CONTROLLERS & SERVICES	OPERATIONAL & FINANCIAL PURPOSE
Fleet & Van POS	`delivery_teams`, `delivery_zones`, `orders`, `delivery_notes`	`DeliveryApiController`, `DeliveryTeamController`	Morning stock issuance, route sequencing, doorstep POS, Bluetooth receipts, evening settlement.
Returnable Bottles	`client_stock_movements`, `deposit_transactions`	`DepositController`, `DeliveryApiController`	Continuous held-bottle liability ledger, security deposit collections, dispenser sanitization.
Prepaid Coupons	`coupon_packages`, `coupon_books`, `coupon_book_redemptions`	`CouponController`, `CouponRedemptionController`	Serial number tracking, paid vs bonus bottles, mobile QR redemption, buyback accounting.
Customer Wallets	`wallets`, `wallet_transactions`, `client_wallet_topup_intents`	`CustomerPanelController`, `DeliveryApiController`	Prepaid digital customer balance, contactless auto-deduction at delivery, instant top-up receipts.
Contractor Ledger	`contractor_invoices`, `stock_payments`, `non_stock_payments`	`ContractorController`, `ContractorStatementService`	Wholesale depot transfer billing, loading dues recovery, vehicle rent/fine debits, monthly statements.
Expenses & Costs	`expenses`, `expense_categories`, `expense_sub_categories`	`ExpenseController`, `ExpenseService`	Cost center allocation (van vs plant HQ), input VAT logging, clean reference deduplication.
HR, Visa & Payroll	`employees`, `departments`, `payrolls`, `loans`, `loan_payments`	`EmployeeController`, `PayrollController`, `LoanController`	Expat visa expiry tracking, passport registry, salary increment logs, automatic loan deductions.
Procurement & AP	`suppliers`, `purchases`, `purchase_products`, `purchase_returns`	`SupplierController`, `PurchaseController`	Raw material sourcing (preforms, caps, minerals), supplier TRN invoices, debit note returns.
General Ledger	`gl_accounts`, `journal_entries`, `journal_lines`, `accounting_periods`	`ChartOfAccountsController`, `JournalEntryController`	Double-entry accounting, balance sheet, P&L statement, locked historical period protection.
SaaS Hub & Multi-Tenant	`saas_companies`, `saas_plans`, `saas_subscriptions`, `saas_super_admins`	`SuperAdminController`, `SaasPortalController`	Multi-tenant company onboarding, custom domains, whitelabel APK build distribution.

System Architecture Summary: Waterbiz ERP provides an integrated operational and financial platform designed for the commercial and regulatory demands of the bottled water distribution sector.