

F&B AI Platform — Unified System Specification

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1. Executive Summary

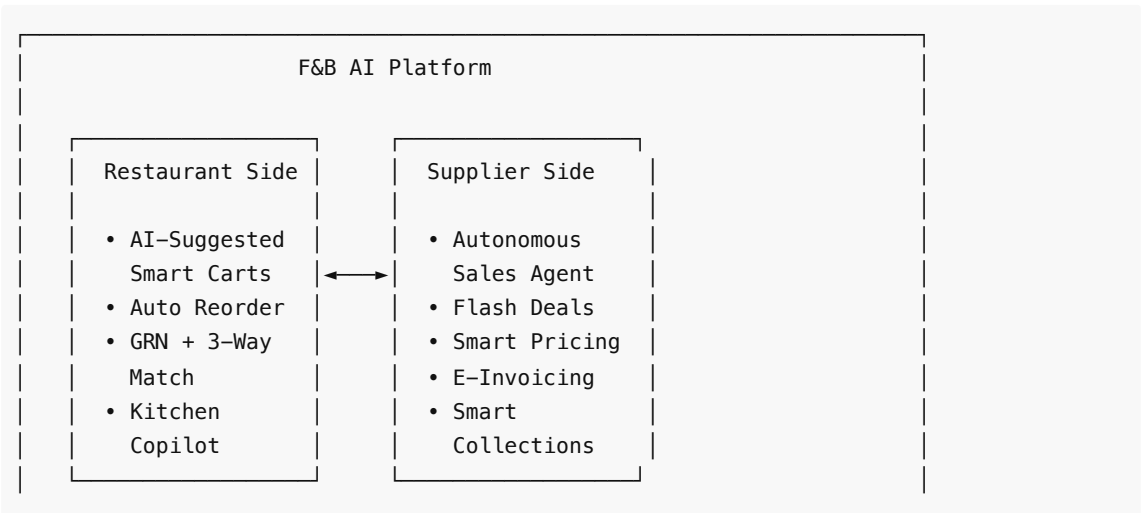
The F&B AI Platform is a **supplier-first** B2B commerce system designed for the UAE food & beverage industry. It replaces fragmented, manual procurement workflows — phone calls, WhatsApp messages, PDF invoices, spreadsheet inventory — with an AI-powered platform that makes suppliers' lives dramatically easier while giving restaurants unprecedented operational intelligence.

The Core Thesis

Make the supplier's life so easy that the platform becomes indispensable.

Traditional F&B procurement platforms treat suppliers as passive catalog holders. Our platform inverts this by giving suppliers an **autonomous AI sales agent** — a tireless digital sales rep that negotiates, closes deals, liquidates distressed inventory, and collects payments 24/7 within guardrails the supplier controls.

What We're Building



Layer	Technology	Why
Commerce Core	MedusaJS 2.0 (Node.js, TypeScript)	Open-source, headless, extensible B2B commerce

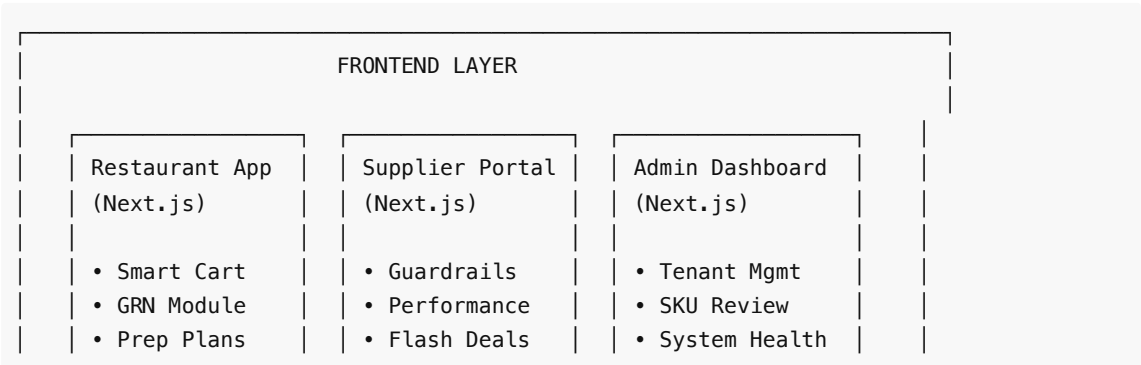
Frontend	Next.js 14+ (React, TypeScript)	SSR, App Router, mobile-responsive
Database	PostgreSQL 15+	ACID compliance, JSONB for flexible schemas
Cache & Queue	Redis + BullMQ	Real-time operations, background job processing
Vector DB	Weaviate	SKU normalization via semantic similarity
AI Orchestration	LangGraph + LangChain	Multi-agent workflows with state + human-in-the-loop
LLM	OpenAI GPT-4 (primary), Claude (fallback)	Reasoning, attribute extraction, negotiation
Embeddings	OpenAI text-embedding-ada-002	Catalog and SKU vectorization
OCR	AWS Textract / Google Document AI	Invoice and delivery note digitization
POS Integration	Foodics API, Oracle Symphony STSG2	Real-time sales and inventory data
Storage	AWS S3	Documents, images, invoice PDFs
Hosting	AWS ECS/EKS (or GCP Cloud Run)	Container orchestration, auto-scaling
CI/CD	GitHub Actions	Automated testing, staging, deployment
Monitoring	Datadog / New Relic	APM, log aggregation, alerting

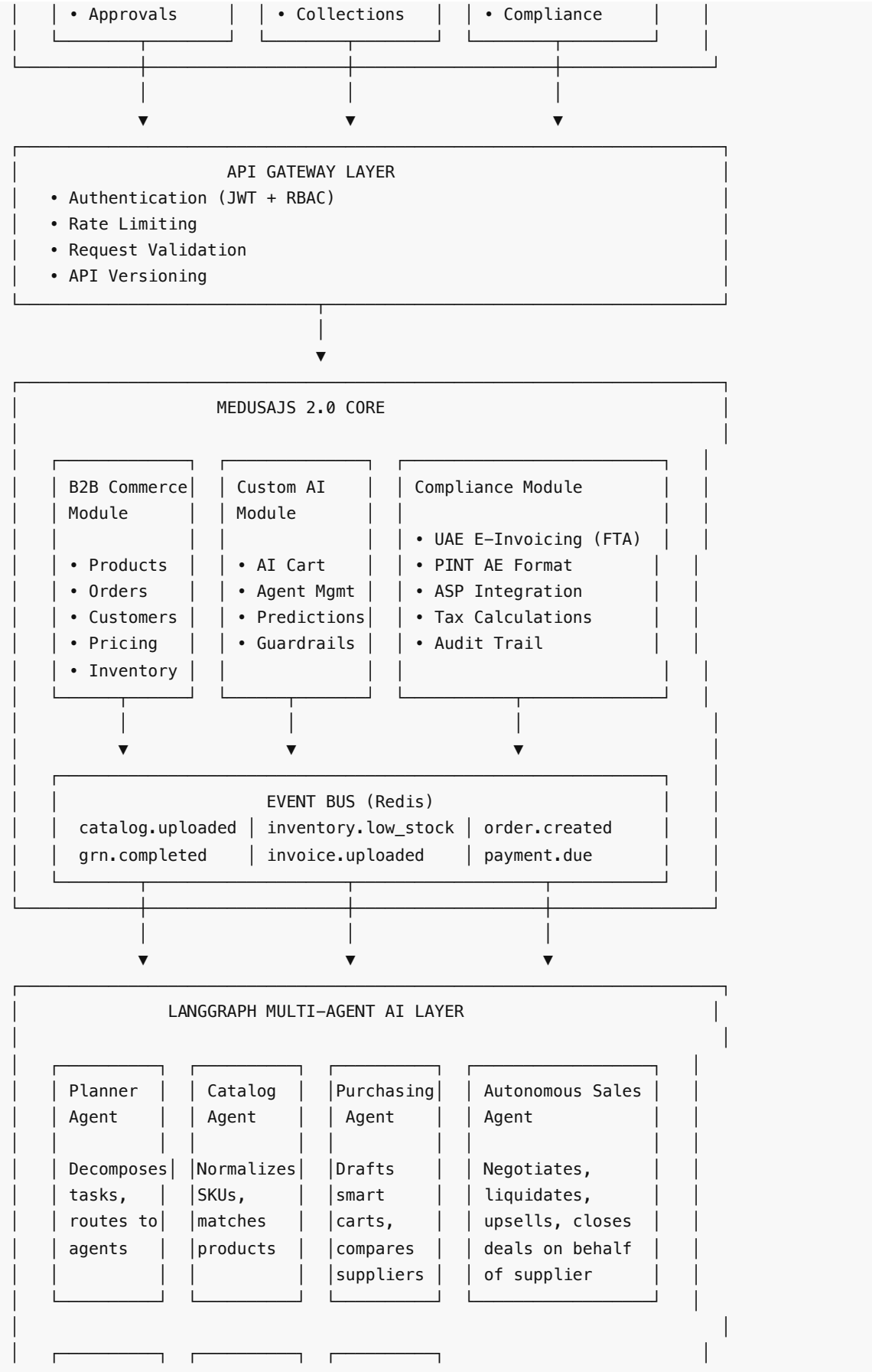
3.2 Why MedusaJS 2.0

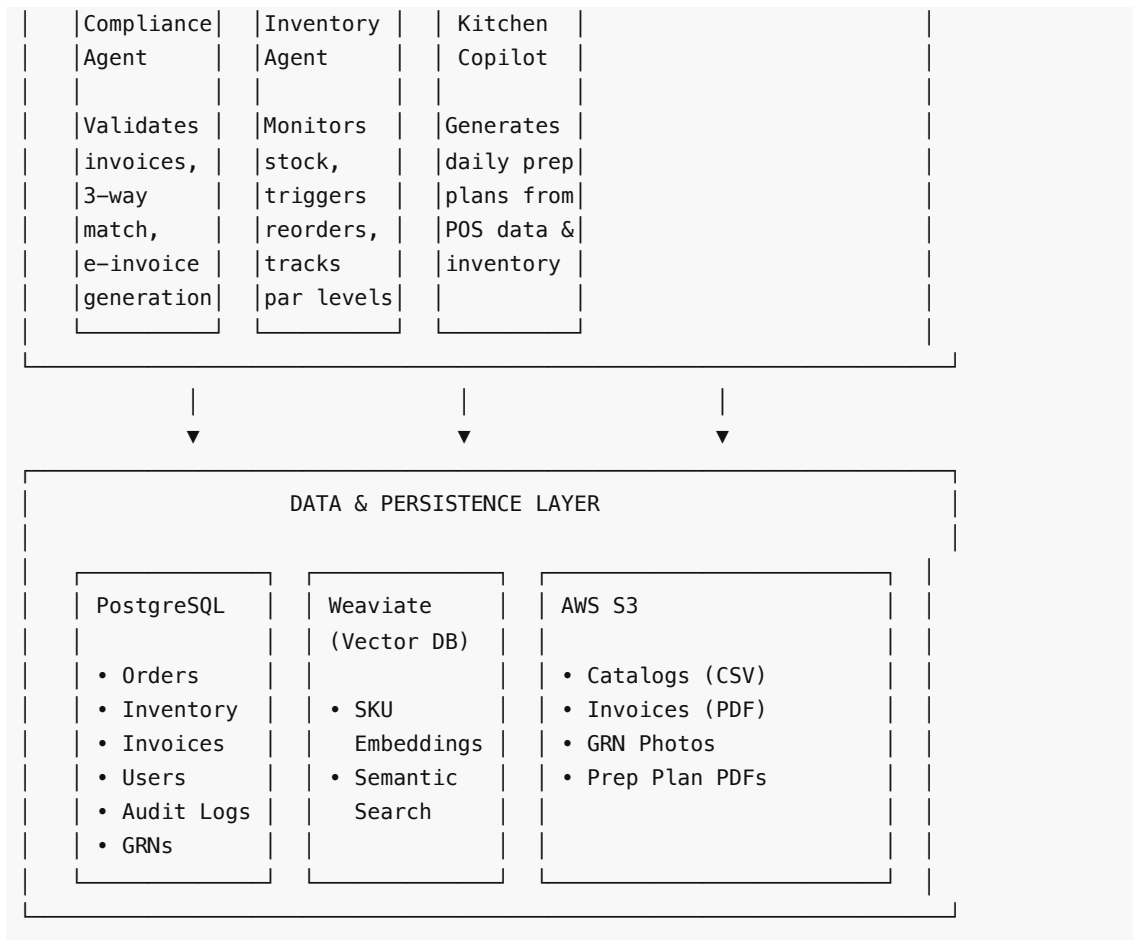
MedusaJS was chosen over alternatives (Shopify, WooCommerce, custom-built) for specific reasons:

- **Headless & Open-Source** — Full control over frontend and backend, no vendor lock-in
- **Module Architecture** — Custom modules (AI, Procurement, Compliance) plug in without forking core
- **B2B-Ready** — Native support for price lists, customer groups, custom workflows
- **Event-Driven** — Built-in event bus integrates seamlessly with LangGraph agent orchestration
- **TypeScript-First** — Type safety across the entire stack

3.3 Architecture Diagram



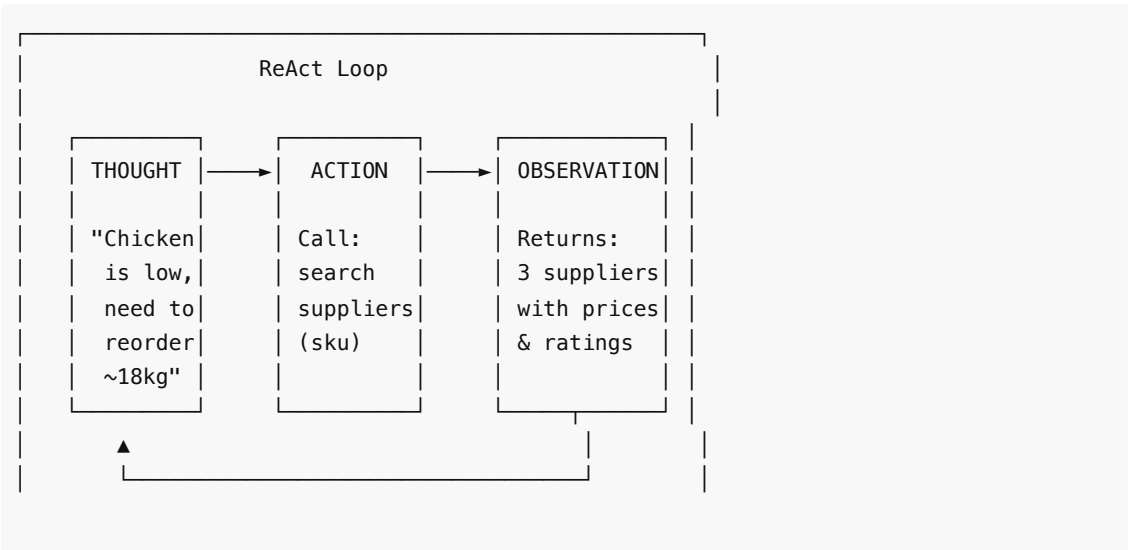


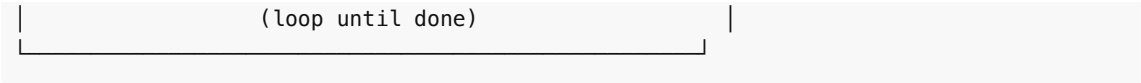


4. System Architecture

4.1 Multi-Agent Design (ReAct Pattern)

Every agent follows the **ReAct** (Reasoning + Acting) loop — a structured pattern where the AI reasons about the situation, decides on an action, executes it via a tool call, observes the result, and repeats until the task is complete.



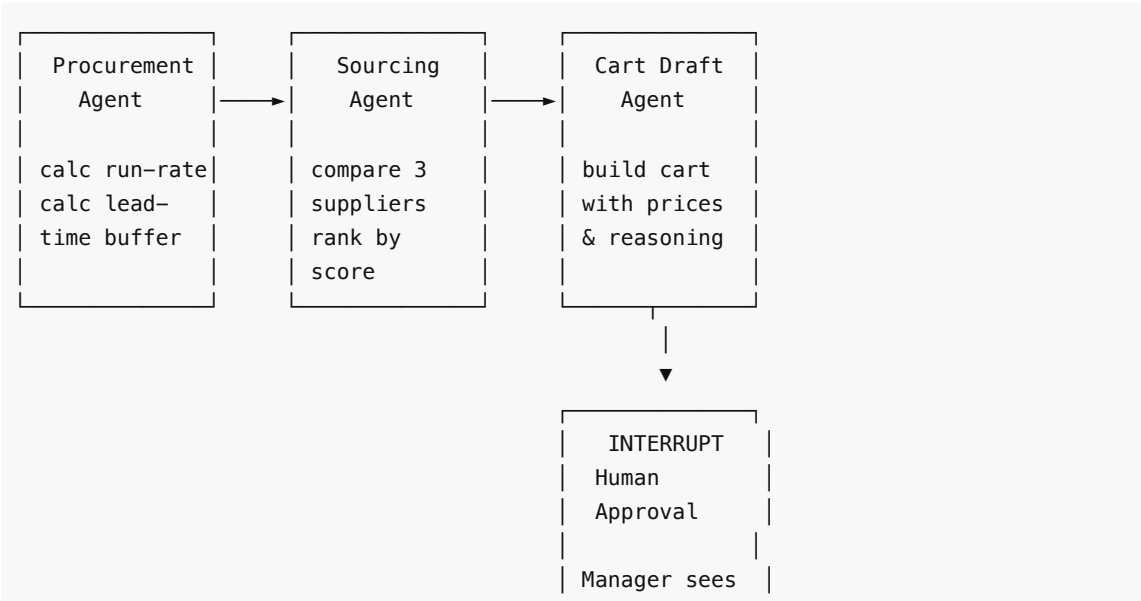


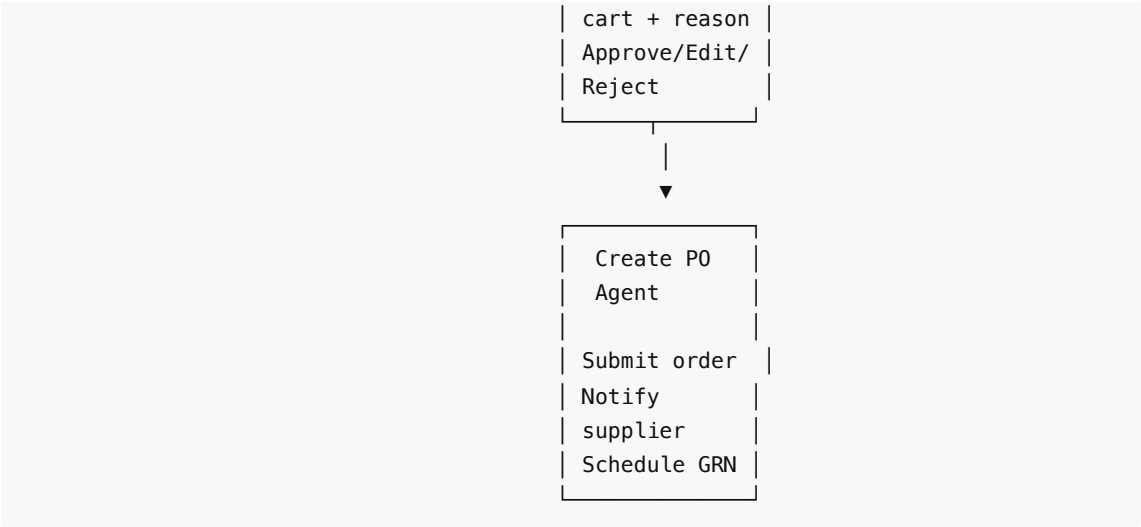
4.2 Agent Roles

Agent	Purpose	Key Tools
Planner	Decomposes user requests, routes to specialized agents	classify_intent(), route_to_agent()
Catalog / Normalization	Normalizes supplier SKUs across vendors via embeddings	generate_embedding(), similarity_search(), extract_attributes()
Sourcing / Comparison	Finds best supplier for each SKU by price, lead time, rating	search_suppliers(), compare_prices(), check_reliability()
Purchasing	Drafts smart carts, creates POs, handles approvals	create_cart_line(), validate_cart(), create_po()
Compliance	Validates invoices, performs 3-way matching, generates e-invoices	parse_invoice(), three_way_match(), generate_e_invoice()
Inventory / POS	Monitors stock levels, depletes on sales, triggers reorders	fetch_inventory(), deplete_stock(), check_par_levels()
Kitchen Copilot	Generates daily prep plans from forecasted demand	fetch_sales_history(), expand_bom(), generate_prep_plan()
Autonomous Sales	Negotiates, closes deals, liquidates inventory for suppliers	check_guardrails(), calculate_margin(), draft_offer()

4.3 LangGraph State Machine

All agent workflows are implemented as **LangGraph state graphs** — each node is a function or agent, edges define transitions, and the state is persisted in PostgreSQL for durability and human-in-the-loop interrupts.





4.4 Guardrails & Safety

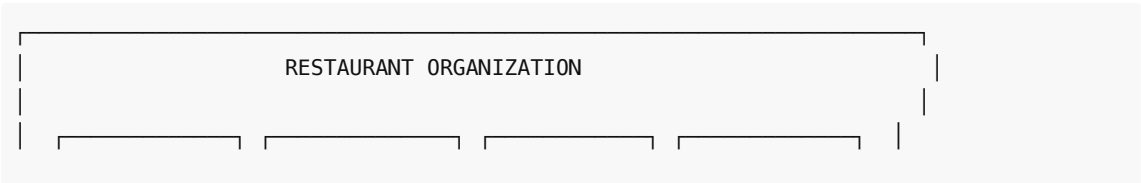
Every AI action is bound by guardrails — pre-configured rules that prevent the system from making harmful decisions:

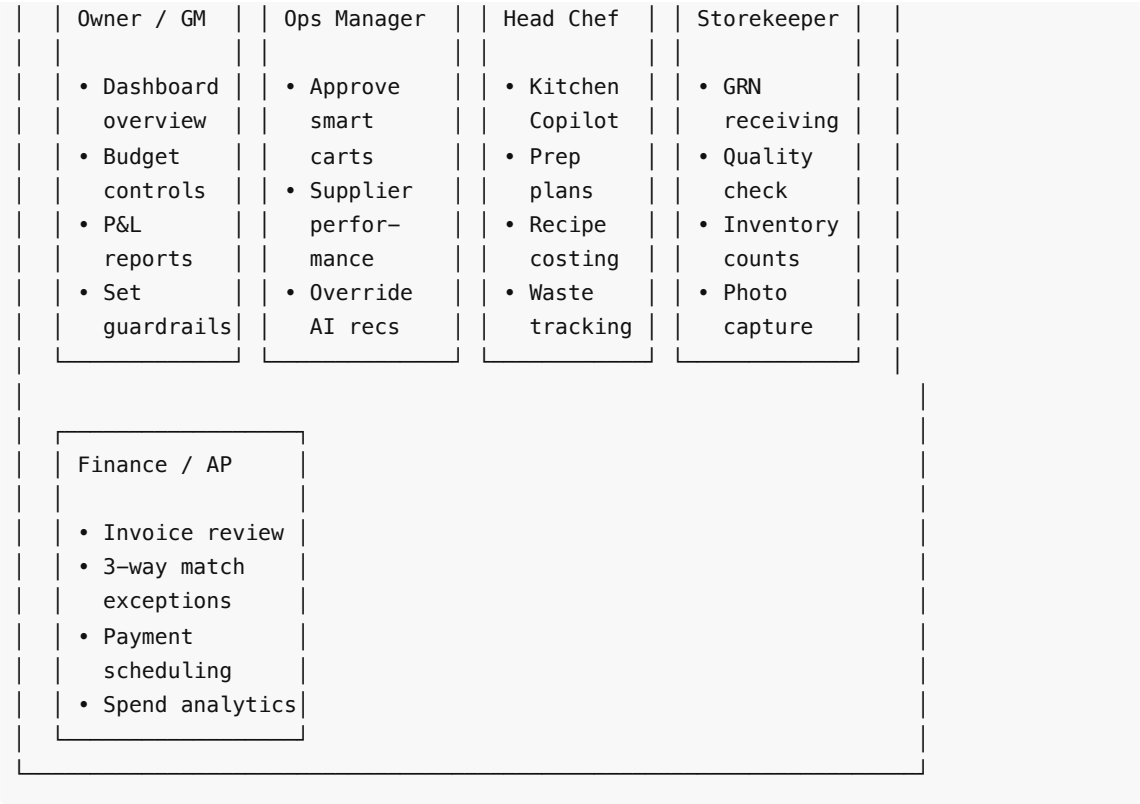
Guardrail	Rule	Enforcement
Max Order Value	No single PO exceeds tenant-defined limit	Hard block + escalation
Price Deviation	Flag if price deviates >5% from 30-day average	Warning to manager
Supplier Lock	Prevent switching from preferred supplier without approval	Human-in-the-loop
Budget Cap	Weekly/monthly spend limits per category	Hard block when reached
Margin Floor	Supplier sets minimum margin per SKU or basket	Agent cannot go below
Discount Ceiling	Maximum discount the agent can authorize	Escalation above limit
Credit Exposure	Maximum outstanding receivables per buyer	Block new orders when exceeded

5. User Persona Integration

The platform serves **four distinct user groups**, each with purpose-built interfaces and capabilities.

5.1 Restaurant-Side Personas

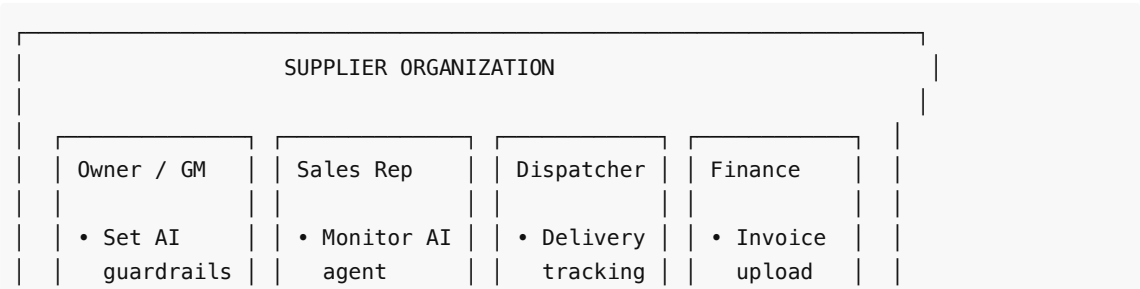




Key Interactions by Persona

Persona	Primary Workflow	AI Touchpoint
Owner / GM	Set budgets and guardrails, review P&L impact	Dashboard shows AI savings vs manual
Ops Manager	Approve/reject AI-suggested carts, manage suppliers	Reviews AI reasoning before approval
Head Chef	Receive daily prep plans, manage recipes	Kitchen Copilot generates prep from POS data
Storekeeper	Receive deliveries, complete GRN, count inventory	Mobile GRN app triggers 3-way match automatically
Finance / AP	Review invoice match exceptions, schedule payments	AI handles clean matches; humans handle exceptions

5.2 Supplier-Side Personas

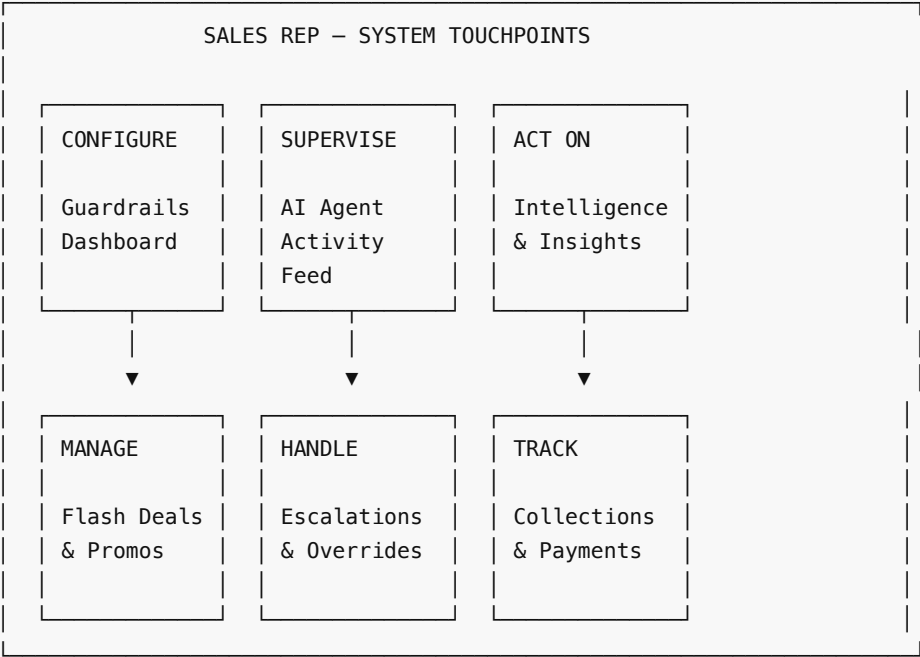


• Margin policies	performance	• Route planning	• Payment tracking
• Flash Deal budgets	• Handle escalations	• GRN sign-off	• Credit memo
• Revenue dashboards	• Market intelligence		handling

Critical Insight: This is a **supplier-first** platform. The Sales Rep's role transforms from "person who calls restaurants and takes orders" into **"manager of an AI agent that sells for them."** Every platform capability is designed to amplify the supplier Sales Rep, not replace them.

5.2.1 Sales Rep ↔ System Integration (Deep Dive)

Because we are a supplier-first platform, the Sales Rep persona is the most deeply integrated user in the system. They touch every major subsystem — from guardrails configuration to agent supervision to receivables collection. This section details exactly how.



A. Guardrails Configuration — The Sales Rep as "AI Trainer"

The Sales Rep doesn't just "use" the AI — they **train** it by setting the commercial rules it operates within:

Guardrail	What the Sales Rep Configures	System Effect
Floor Price per SKU	Minimum acceptable price per product	Agent cannot offer below this in negotiations
Volume Discount Tiers	Break-points (e.g., 5+ cases = -5%)	Agent auto-applies correct tier during negotiation

Basket Margin Floor	Minimum acceptable margin for entire cart	Agent uses cross-sell to protect overall margin
Credit Limit per Buyer	Maximum outstanding receivables per restaurant	Agent blocks new orders if limit exceeded
Discount Budget	Weekly/monthly discount allocation	Agent tracks spend against budget in real-time
Account Priority	Flag VIP accounts, set custom rules	Agent applies preferential pricing / priority fulfillment

The Sales Rep sets these once and refines over time. The AI operates within these boundaries 24/7 — effectively giving the Sales Rep "24/7 coverage" of all accounts.

B. AI Agent Supervision — Real-Time Activity Feed

The Sales Rep's primary daily interface is the **Agent Activity Feed** — a live view of everything the AI is doing on their behalf:

SALES REP – AGENT ACTIVITY FEED

09:14

✔

Auto-closed: Al Baik Kitchen – AED 4,200

Basket: Chicken 50kg, Oil 20L, Spices assorted

Margin: 21% (above 15% floor) – No discount applied

09:22

🔄

Negotiation in progress: Zafran Restaurant

Buyer requested 10% off on Lamb Rack

Agent counter-offered: 6% off + free delivery

Awaiting buyer response...

09:31

⚠

ESCALATION: Marina Grill – Price below floor

Buyer insists on AED 38/kg for Tenderloin

Floor price: AED 42/kg | Buyer is VIP (18 months)

[APPROVE EXCEPTION] [COUNTER-OFFER] [DECLINE]

09:45

📦

Flash Deal sent: Salmon 200kg (3-day expiry)

Targeted: 12 restaurants with salmon menu items

Accepted so far: 4 restaurants, 85kg claimed

10:02

💰

Payment reminder sent: Golden Spoon – AED 12,400

Invoice #INV-2849, due 3 days ago

Auto-scheduled follow-up in 48h if unpaid

C. Flash Deal Management

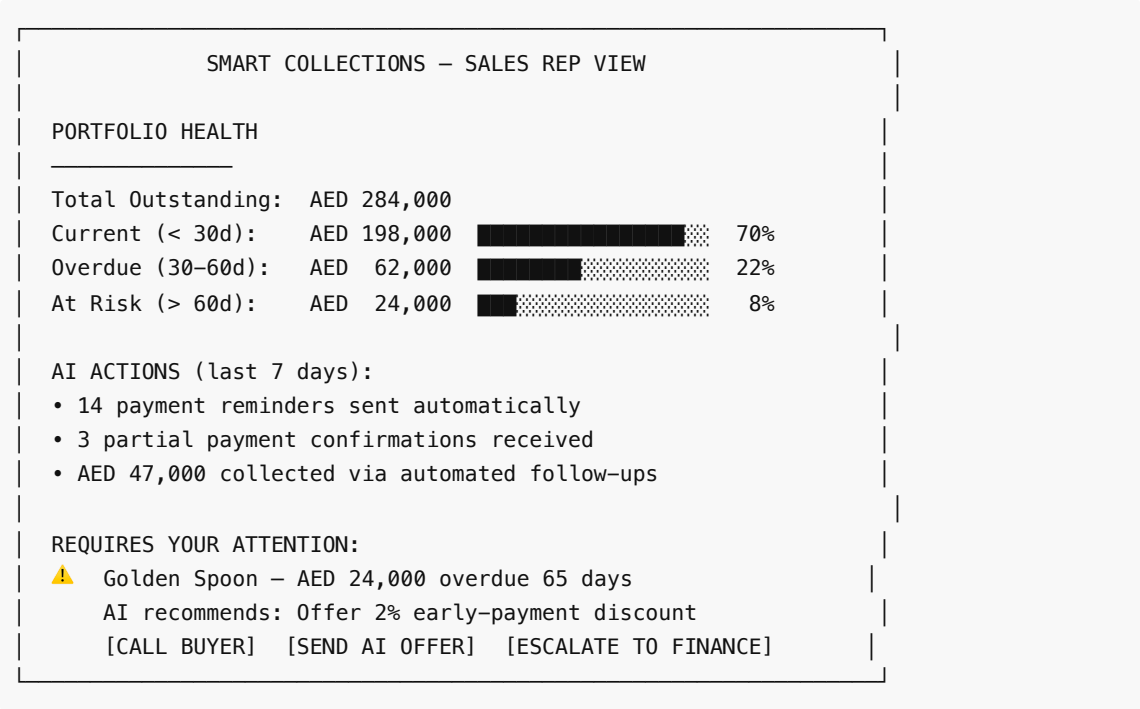
The Sales Rep manages distressed inventory liquidation through Flash Deals — an AI-powered system that matches near-expiry stock with restaurants whose menus use those items:

Step	Sales Rep Action	System Action
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Flag inventory	Marks items as distressed (or system auto-detects via shelf-life rules)	Calculates optimal discount based on remaining shelf life & margin floor
Set deal parameters	Approves discount depth, quantity caps, and target radius	AI identifies matching restaurants via POS menu data
Monitor uptake	Watches real-time acceptance dashboard	AI sends targeted notifications, tracks remaining stock
Close deal	One-tap close or auto-close when stock depleted	Generates POs, schedules delivery, creates e-invoices

D. Smart Collections — AI-Powered Receivables

The Sales Rep tracks payment health across their portfolio. The AI handles routine collection activities while the Sales Rep handles relationship-sensitive cases:



E. Buyer Intelligence Dashboard

The Sales Rep gains deep visibility into every account's behavior, powered by POS and ordering data:

Intelligence	Source	Sales Rep Benefit
Purchase Frequency	Order history	Detect declining accounts before they churn
Menu Composition	POS menu data feed	Identify upsell opportunities by product category
Price Sensitivity	Negotiation history	Know exactly how far to discount per account
Seasonal Patterns	Historical order data	Pre-position inventory for demand spikes

Competitor Risk	Order gaps + declining volumes	Trigger retention offers proactively
Basket Expansion	Cross-reference menu vs orders	Suggest products the buyer needs but orders elsewhere

F. Escalation Handling — When the Human Steps In

The AI escalates to the Sales Rep in precisely defined scenarios:

ESCALATION MATRIX		
Trigger	Agent Action	Rep Action
Price below floor	Pause negotiation Present context	Approve / Counter / Decline
Credit limit exceeded	Block new order Notify rep	Review account health
Discount budget exhausted	Switch to list price only	Replenish budget or approve one-off
New VIP account request	Flag for review	Configure custom guardrails
Buyer complaint / dispute	Pause + preserve context	Personal outreach

G. A Day in the Life — Sales Rep on the Platform

Time	Activity	System Involvement
8:00 AM	Review overnight activity feed	AI processed 12 orders, closed 9, escalated 3
8:30 AM	Handle escalations	Review 3 requests, approve 2 exceptions, counter 1
9:00 AM	Check Flash Deal performance	Yesterday's salmon deal cleared 180/200kg
9:30 AM	Review buyer intelligence alerts	2 accounts showing declining order frequency

10:00 AM	Adjust guardrails for Q2 pricing	Update volume tiers for 8 high-demand SKUs
11:00 AM	Strategic outreach to at-risk accounts	AI pre-prepared context: order history, margin, preferences
2:00 PM	Review collections dashboard	AI collected AED 47k this week; 1 account needs personal follow-up
3:00 PM	Set up new Flash Deal	150kg of shrimp nearing shelf-life threshold
4:00 PM	Review daily performance summary	AI closed AED 85k in orders today, 21% avg margin, 2 new accounts activated

Key Metric: A Sales Rep who manually managed 30-50 accounts can now effectively manage **200+ accounts** — the AI handles routine interactions while the rep focuses on relationship-building, escalations, and strategic decisions.

5.2.2 Supplier Owner / GM

Responsibility	System Feature	How It Works
Set financial guardrails	Guardrails Dashboard	Define floor prices, margin floors, discount budgets for all reps
Approve Flash Deal budgets	Flash Deal Management	Set max discount depth and weekly deal budget per category
Revenue oversight	Revenue Analytics Dashboard	Real-time revenue, margin, and AI agent ROI tracking
Sales team performance	Team Performance View	Compare AI-assisted vs manual rep performance

5.2.3 Dispatcher

Responsibility	System Feature	How It Works
Delivery tracking	Dispatch Module	View confirmed POs, plan routes, update delivery status
Route optimization	AI-suggested routes	System suggests optimal delivery sequences
GRN coordination	Mobile GRN App	Mark deliveries as completed, capture buyer signatures

5.2.4 Supplier Finance

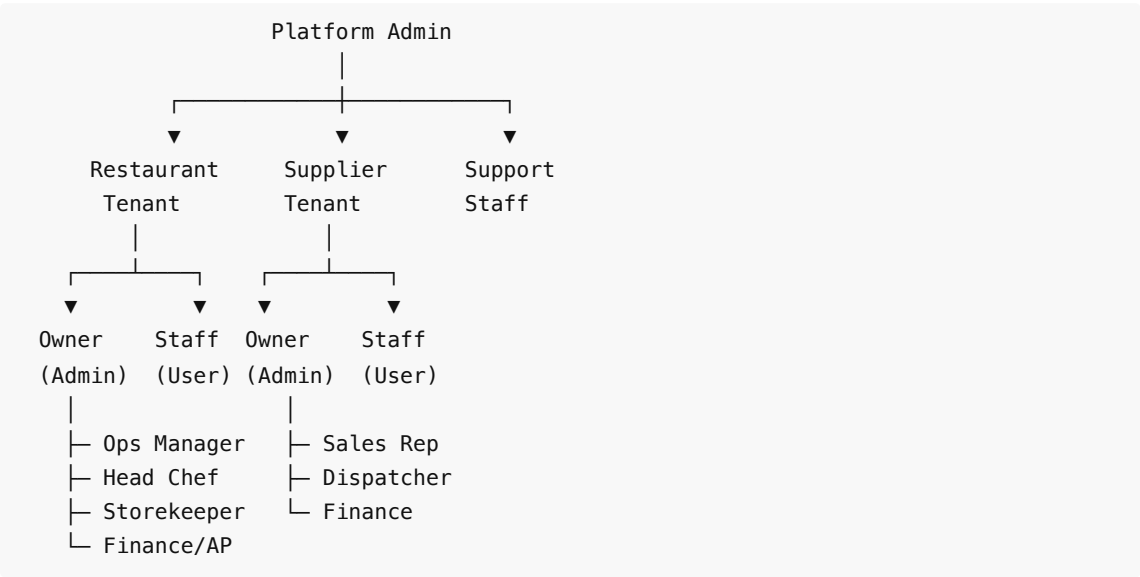
Responsibility	System Feature	How It Works
Invoice management	Auto E-Invoicing	AI generates compliant invoices on order close
Payment tracking	Collections Dashboard	Real-time aging report, AI-managed reminders

Credit memo handling	3-Way Match Engine	Auto-generates credit notes on GRN discrepancies
Compliance reporting	FTA Submission Logs	Audit trail of all e-invoice submissions

5.3 Platform / Internal Personas

Persona	Responsibilities
Admin & Support	Tenant onboarding, SKU review/merge, system monitoring, dispute arbitration

5.4 RBAC Model

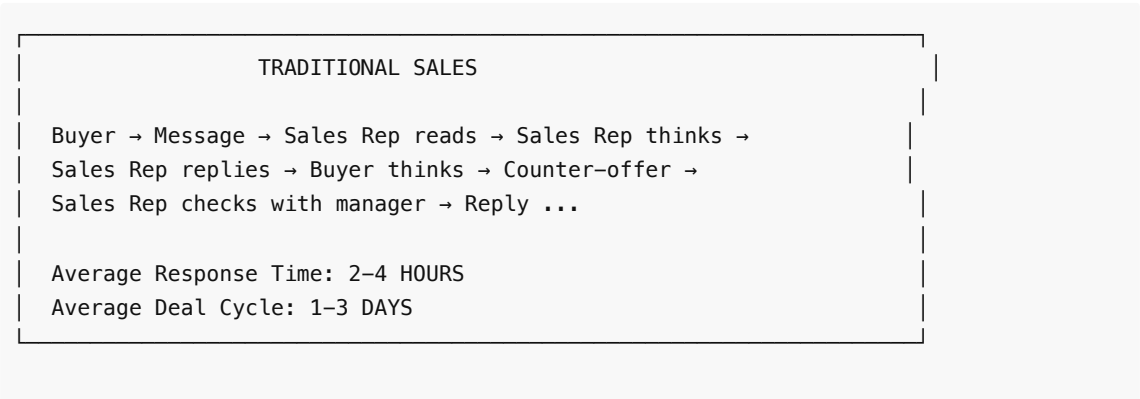


Each role maps to specific API permissions and UI views, enforced at the API Gateway layer via JWT claims.

6. Autonomous Sales Agent

6.1 The Innovation: "Permission, Not Process"

Traditional B2B sales follows a slow loop: Inquiry → Quote → Negotiate → Approve → Close. Our Autonomous Sales Agent collapses this into **instant-close authority** — the AI has pre-approved financial guardrails and can negotiate and close deals without human intervention.



vs.

AUTONOMOUS SALES AGENT

Buyer adds to cart → Agent checks guardrails → Agent offers optimized price → Buyer accepts → Order created → Invoice sent

Average Response Time: < 3 SECONDS

Average Deal Cycle: INSTANT CLOSE

6.2 Pricing Authority Stack

The supplier pre-configures a **guardrails hierarchy** that gives the AI financial decision-making authority:

PRICING AUTHORITY STACK

Level 4: CATALOG PRICE (public list price)

| ▲ Agent starts here



Level 3: VOLUME DISCOUNT (bulk tiers)

| 5+ cases: -5% | 20+ cases: -8% | 50+ cases: -12%



Level 2: BASKET OPTIMIZER (total cart margin)

| Cross-sell upsell: give discount on X if buying Y



Level 1: FLOOR PRICE (absolute minimum)

| Agent CANNOT go below this



Level 0: ESCALATE TO HUMAN

| Buyer demands price below floor → human sales rep

6.3 Capability Modules

Module 1: Basket-Aware Negotiator

Unlike simple per-item discounting, this module optimizes **total cart margin**. It can give a deeper discount on one item if the overall basket still meets the supplier's target margin.

Example:

Buyer adds "Chicken Breast 20kg" to cart.

Agent analyzes the cart: total margin is 22%.

Agent offers: "Add 5 cases of cooking oil and I'll knock 8% off the chicken — your total saves AED 180."

Basket margin stays at 19% (above supplier's 15% floor).

Result: *Larger order, protected margin, happy buyer.*

Module 2: Distressed Inventory Liquidator

When supplier inventory is approaching expiry, shelf-life thresholds, or overstock, the AI sends **targeted Flash Deals** to restaurants whose menus use those exact items.



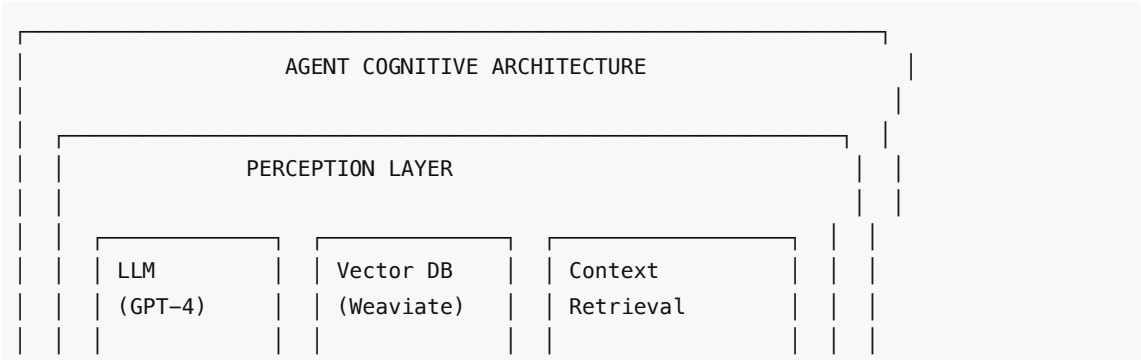
Module 3: Smart-Draft (Retention Engine)

The AI learns purchasing patterns and proactively creates draft orders before the restaurant even realizes they need to reorder. If a regular item is missing from a buyer's usual order, the agent auto-suggests it.

How it works:

- 1. Analyze 90 days of order history for each buyer
- 2. Detect weekly/bi-weekly patterns (e.g., "Always orders chicken on Monday")
- 3. On expected order day, pre-draft a cart based on historical patterns
- 4. Send notification: *"Your usual Tuesday order is ready — Chicken 20kg, Lettuce 5kg, Tomatoes 8kg. One tap to confirm."*
- 5. If an item is missing: *"Noticed you didn't add Cooking Oil this week — you usually order 5L every 2 weeks. Need it?"*

6.4 Agent Cognitive Architecture





6.5 Performance Dashboard

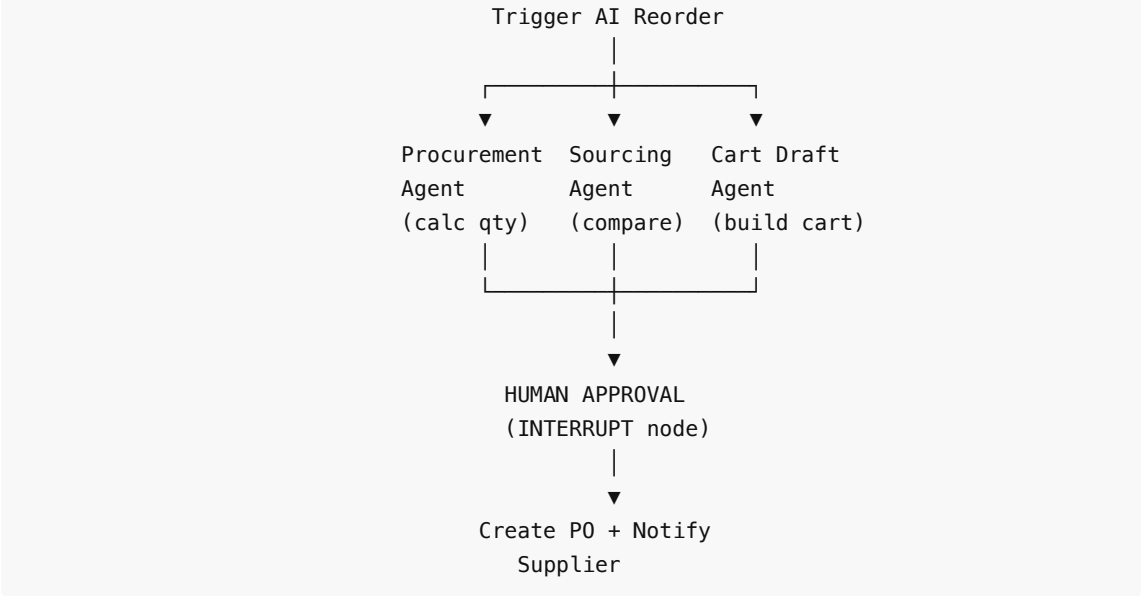
The AI agent's performance is tracked against human benchmarks:

Metric	Human Baseline	AI Target
Response Time	2-4 hours	< 3 seconds
Win Rate (quotes → orders)	30-40%	60%+
Revenue from Liquidation	Near zero	15%+ of distressed inventory recovered
Upsell Conversion	5-10%	20%+
Order Accuracy	92%	99%+
Operating Hours	8h/day, 5d/week	24/7/365

7. Core Data Flows

7.1 Flow Summary

The platform handles **five major data flows**, each implemented as a LangGraph state machine:



7.4 3-Way Match (PO ↔ GRN ↔ Invoice)

The compliance engine performs automated invoice reconciliation:

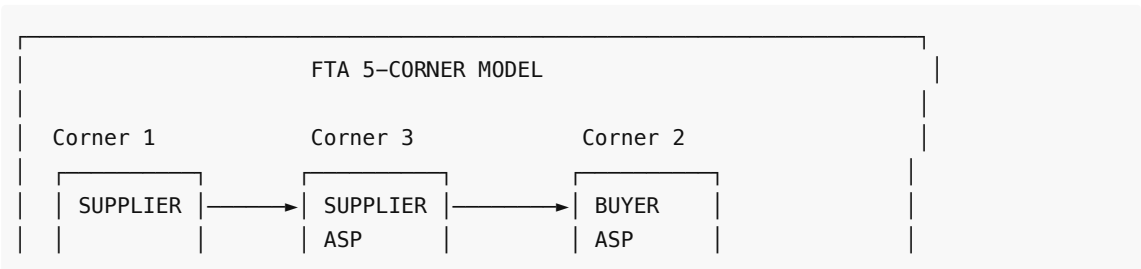
Check	Compare	Tolerance	Action
2-Way Match	PO qty × price vs Invoice total	Exact match	Auto-approve
3-Way Match	PO vs GRN vs Invoice quantities	±2% or ±0.5kg	Auto-approve within tolerance
Exception	GRN qty ≠ Invoice qty	Above tolerance	Flag for finance review
Price Mismatch	PO price ≠ Invoice price	> 1% deviation	Flag + suggest adjustment

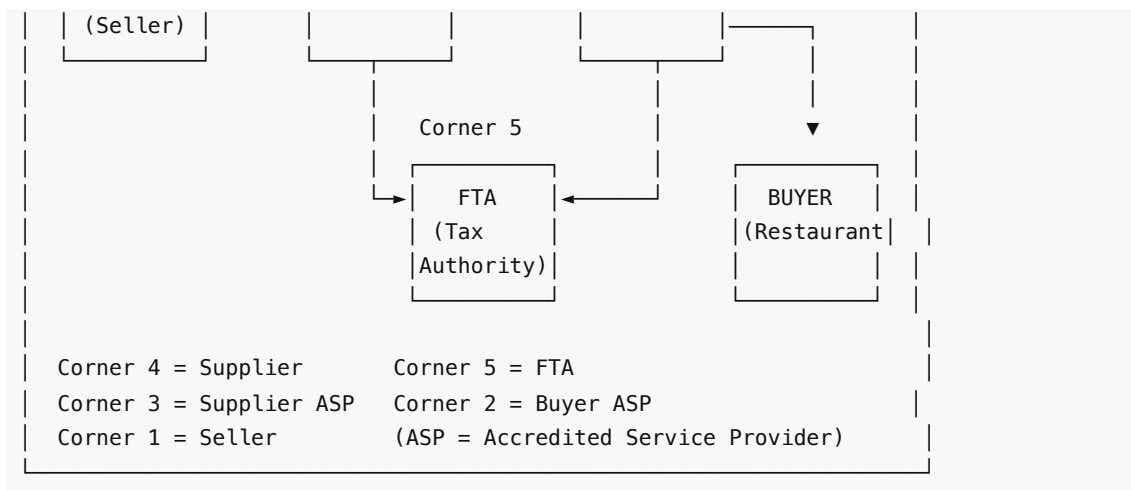
8. UAE E-Invoicing Compliance

8.1 Regulatory Context

The UAE's Federal Tax Authority (FTA) is mandating electronic invoicing via a **Decentralized Continuous Transaction Control & Exchange (DCTCE)** model using a **5-Corner architecture**. All B2B transactions must use structured, machine-readable invoices exchanged through Accredited Service Providers (ASPs).

8.2 The 5-Corner Model



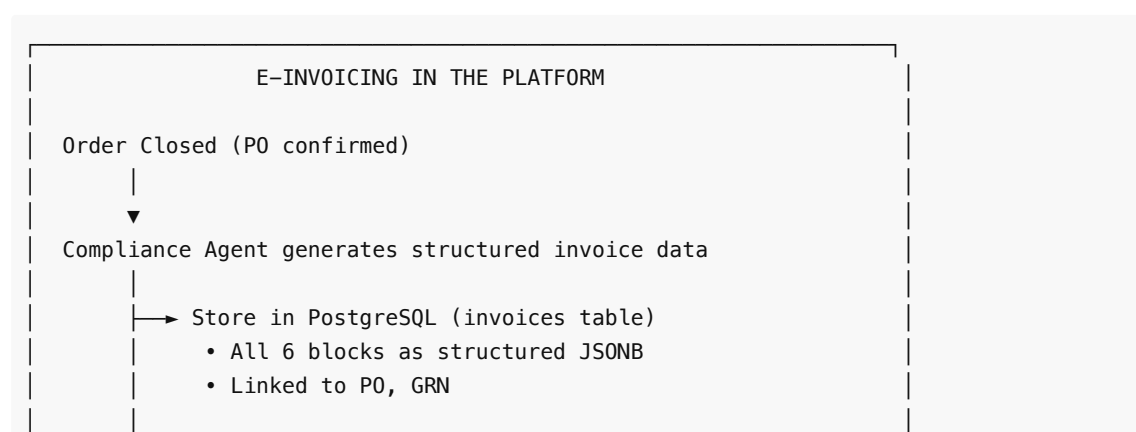


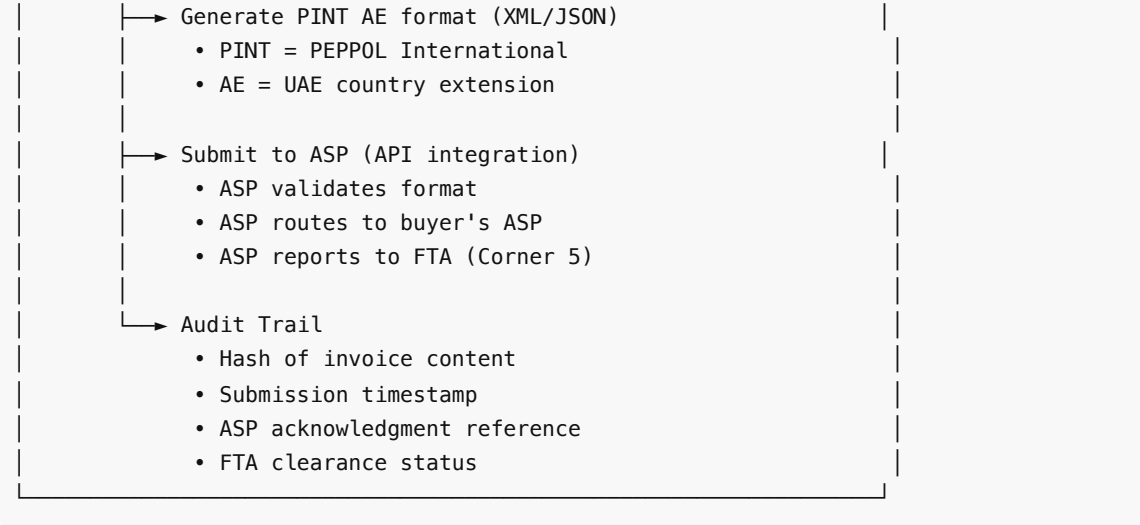
8.3 Mandatory Invoice Fields (6 Blocks)

The FTA requires ~50 fields organized into 6 blocks for every compliant e-invoice:

Block	Name	Key Fields
Block 1	Invoice Identity & Control	Invoice number, issue date, type code (380/381/386), currency (AED), reference to original invoice (for credit/debit notes)
Block 2	Seller Details	Legal name, TRN (VAT registration number), address, city, emirate, country code (AE)
Block 3	Buyer Details	Legal name, TRN, delivery address, contact
Block 4	Invoice Totals	Line extension amount, allowances, charges, tax-exclusive total, VAT total, payable amount
Block 5	Tax Breakdown	Per-rate VAT breakdown (5% standard, 0% zero-rated), taxable amount, tax amount
Block 6	Invoice Line Items	Per-line: description, quantity, unit price, net amount, VAT rate, VAT amount, item classification (UNSPSC)

8.4 Platform Implementation





8.5 Compliance Automation Benefits

Manual Process	Platform Automation
Accountant manually creates invoices in accounting software	AI auto-generates compliant invoices on order close
Manually exports and uploads to FTA portal	API integration with ASP for real-time submission
Risk of missing fields or format errors	Schema validation ensures 100% field compliance
No link between PO, delivery, and invoice	3-way match automatically links PO ↔ GRN ↔ Invoice
Credit notes created manually	Auto-generated when 3-way match detects discrepancy

9. Strategic Value Propositions

9.1 For the Procurement Manager (Restaurant Side)

The platform transforms procurement from a reactive, manual task into a proactive, data-driven function:

Pain Point	Platform Solution	Impact
Hours on phone/WhatsApp placing orders	AI suggests smart carts; one-tap approve	Save 15+ hours/week
No price benchmarking across suppliers	Real-time price comparison per normalized SKU	8-12% cost reduction
Over-ordering leads to waste	POS-based demand forecasting drives precise quantities	Reduce waste 20-30%

Invoice disputes take days	Automated 3-way match catches discrepancies instantly	95% faster resolution
Supplier reliability unknown	Historical delivery data + quality scores per supplier	Informed switching decisions
Stockouts cause menu blackouts	Par-level monitoring + lead-time-aware reordering	Near-zero stockouts

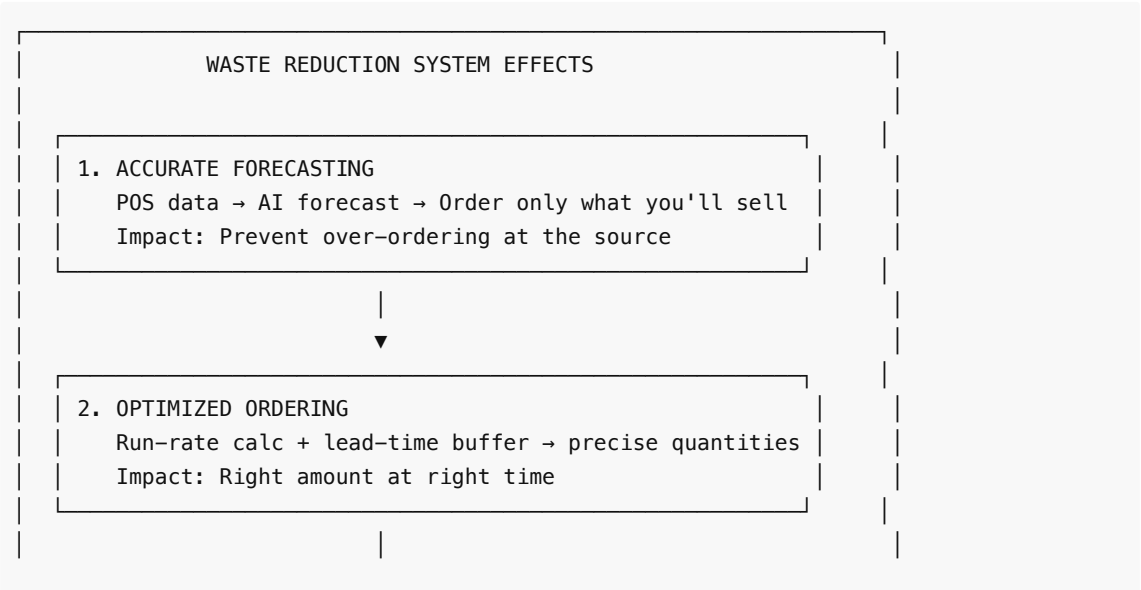
9.2 For the Sales Manager (Supplier Side)

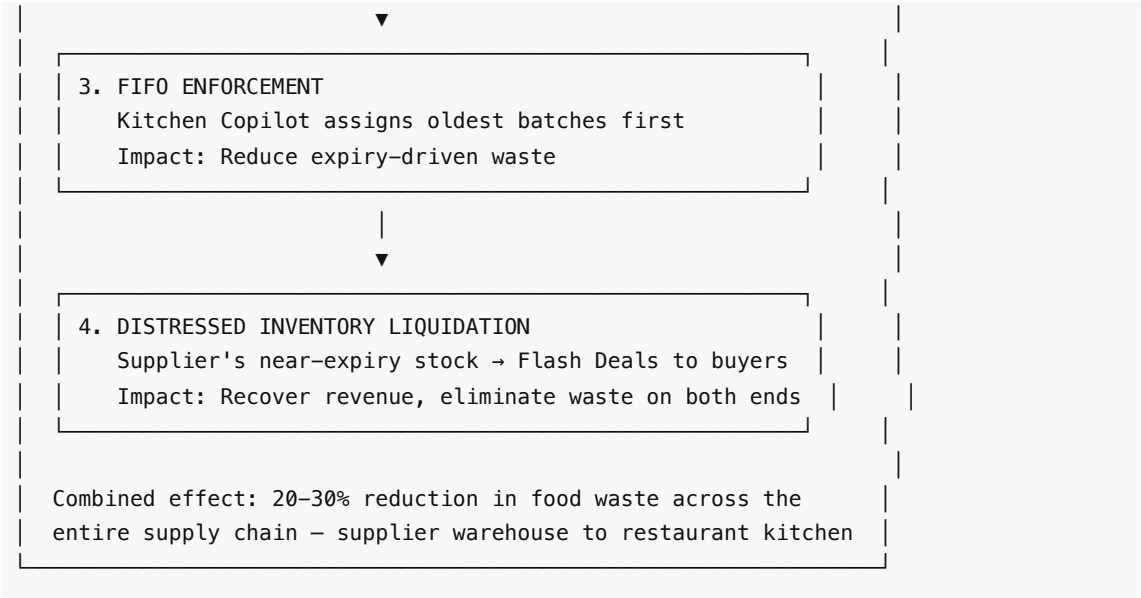
The platform's autonomous sales agent is a force multiplier for supplier sales teams:

Pain Point	Platform Solution	Impact
Sales reps maxed out at 30-50 accounts	AI agent handles unlimited accounts 24/7	10x account coverage
Slow response loses deals to competitors	< 3-second response with instant-close authority	2x win rate
Price war erodes margins	Basket-aware negotiation optimizes total margin	Margin protected
Food waste from expiring inventory	Targeted Flash Deals to restaurants who need those items	Recover 15%+ of at-risk inventory
Collections are awkward and slow	Smart Collections: AI sends payment reminders, tracks aging	Reduce DSO by 30%
No visibility into buyer needs	POS data reveals real-time consumption patterns	Predictive selling

9.3 Waste Management as a System-Level Feature

Food waste isn't a standalone feature — it's an **emergent property** of the system working correctly:





Appendix A: Data Model Summary

Core Entities



qty_on_hand	entity_id
par_level	performed_by
reorder_point	ai_reasoning
unit	guardrails_
batch_id	checked
expiry_date	timestamp

Key State Transitions

Purchase Order: DRAFT → PENDING_APPROVAL → CONFIRMED → SHIPPED → DELIVERED → COMPLETED

Invoice Match: PENDING → 2WAY_MATCHED → 3WAY_MATCHED → EXCEPTION → APPROVED → PAID

Appendix B: Key Architectural Decisions

Decision	Choice	Rationale
Commerce engine	MedusaJS 2.0	Open-source, modular, B2B-ready, event-driven
AI orchestration	LangGraph	Stateful workflows, human-in-the-loop, persistence
Vector database	Weaviate	OSS, GraphQL API, hybrid search capabilities
SKU matching strategy	Embedding similarity	Handles messy supplier data without rigid schemas
POS integration	Webhook-based	Real-time, event-driven, decoupled
E-invoice format	PINT AE (PEPPOL)	UAE FTA mandated standard
Agent authority model	Permission-based guardrails	Enables instant-close while maintaining control
Invoice reconciliation	3-way match	Industry standard: PO ↔ GRN ↔ Invoice
Deployment	Containerized (ECS/EKS)	Scalable, reproducible, CI/CD friendly

This document synthesizes specifications from: *architecture-and-flows.md*, *autonomous_sales_agent.md*, *medusajs-architecture.md*, *agentic-architecture.md*, *data-model.md*, *detailed-flows.md*, and *UAE E-Invoicing requirements*.