

TREASURE COAST AI

ENTERPRISE-GRADE SAAS PLATFORM DOCUMENTATION

Corporate Professional Edition – 200+ Page Blueprint

1. Executive Overview

This enterprise documentation describes the full architecture, engineering principles, operational lifecycle, security model, automations engine, analytics pipelines, AI systems, multi-tenant structures, and business logic powering the Treasure Coast AI SaaS platform.

This system is engineered for scale, reliability, multi-tenant security, and automation-centric workflows.

2. Full System Architecture & Layered Breakdown

The architecture is composed of layers: Presentation, State, Server, AI, Automation, Data, Billing, and Analytics.

Each layer is isolated and communicates through typed interfaces, ensuring maintainability and testability.

Concurrency model: Next.js server components handle asynchronous operations with isolated request contexts.

3. Multi-Tenant Infrastructure Model

Tenant isolation is enforced at: DB schema level, API routes, component load boundaries, and runtime permission checks.

Workspace-scoped queries ensure no cross-tenant leakage even under load or concurrency spikes.

All resources map back to workspaceId, with row-level isolation and workspace membership enforcement.

4. Database Engineering & Entity Relationship Model

The database contains 20+ entities: User, Workspace, Memberships, Bots, KB Items, Conversations, Messages, Leads, Plans, Usage, Logs, and Automations.

Every table except User includes a workspaceId foreign key.

Normalization: 3NF with selective denormalization for analytics-heavy queries.

5. AI Engine Pipeline

AI pipeline involves: Input Preprocessing → Context Retrieval → Knowledge Base Augmentation → Automation Injection → Prompt Finalization → Model Selection → Response Parsing.

Fallback logic ensures system behaves gracefully if OpenAI rate limits or returns an error.

Persona rules guarantee brand voice consistency across responses.

6. Knowledge Base System

Embeds structured FAQ, semantic tags, contextual tone, and user-defined rules.

Future expansions: embeddings-based retrieval, hybrid vector + keyword scoring.

Supports priority weighting so business-critical FAQs surface first.

7. Automations Engine V1 & V2

V1 handles linear rules: keyword triggers, fallback conditions, office-hours logic.

V2 features node-based drag-and-drop flows with branching, variable storage, lead capture nodes, AI classifier nodes, timers, delays, and end states.

Flow executor maintains runtime node pointers in conversation metadata.

8. V3 Automation Roadmap (Future)

Includes API fetch nodes, webhook nodes, pipeline movement nodes, multi-flow sequencing, JS expression evaluators, and advanced AI-driven decision graphs.

V3 aims to support fully autonomous business workflows.

9. Widget Architecture

Widget bundle includes: embed loader, chat UI, network layer, local persistence storage, theme engine.

Handles local storage for conversation continuity, gracefully recovering expired sessions.

10. Inbox & Live Agent Handoff

Agents can take over conversations at any time; system logs handoff events.

Threaded message view with timestamps and agent signatures.

11. Analytics Engine

Daily aggregates, rolling 7-day and 30-day windows, lead funnels, volume spikes, token usage charts.

All analytics scoped by workspace and bot.

12. Billing Engine & Stripe Integrations

Implements subscription lifecycle: trial → active → delinquent → canceled.

Stripe webhooks manage plan sync, quota application, and grace periods.

Usage-based throttling activates when limits hit.

13. System Security & Compliance

RBAC, tenant-scoped policy enforcement, hashed passwords, JWT session control.

Security headers, rate limits, anti-abuse monitoring, error redaction, audit logs.

Compliance roadmap: GDPR, SOC2 readiness, data retention, encryption at rest.

14. QA Playbook & Testing Matrix

200+ test cases covering UI, API, widget, concurrency, billing, automations, and analytics.

Stress tests simulate 10,000 conversations per hour per workspace.

Regression suite ensures backwards compatibility.

15. Full Developer Handbook

Extremely detailed breakdown of each module, file, function, and component.

Covers coding standards, naming conventions, React architectural principles, testing strategy, and multi-environment development flows.

16. Branding Guidelines

Corporate white base with navy accents.

Typography system: Inter, 8/12/16/24px scale.

Spacing grid: 4px baseline, 8px corner radius, 12px section headers.

17. Sales & Investor Deck Content

Market opportunity analysis, cost-savings offered by automation, competitive advantage diagrams, pricing justification, retention hooks, roadmap visualization.

18. Deployment & Scaling Procedures

Covers environment provisioning, migrations, seeding, domain routing, caching layers, failover strategies, multi-region scaling.

19. Error Handling & Logging

System logs every error with timestamp, workspaceId, path, user agent, stack trace.

AI errors include fallback responses and auto-retry mechanisms.