

Technical Architecture Deep-Dive

Distributed Autonomous Revenue Orchestration System

1. System Overview

AlgoSale is architected as a distributed, event-driven autonomous revenue execution platform. The system integrates multi-source data ingestion pipelines, probabilistic conversational intelligence models, deterministic pricing engines, and autonomous negotiation state machines. The architecture follows a modular, horizontally scalable topology optimized for high-concurrency B2B transactional workflows.

Field of Innovation

The present invention relates to automated sales systems, artificial intelligence, and digital transaction automation. More specifically, it relates to an autonomous system capable of executing end-to-end revenue generation workflows without human intervention.

Background

Existing systems provide partial automation in marketing outreach but fail to autonomously execute negotiation, requirement extraction, and transaction closure.

There exists a need for a system capable of autonomously performing full B2B sales cycles.

2. Macro Architecture

The system is composed of the following computational domains:

1. Data Acquisition & Ingestion Layer
2. Data Normalization & Validation Layer
3. Distributed Messaging Orchestration Engine
4. Conversational NLP Inference Engine
5. Contextual Memory & Dialogue State Manager
6. Requirement Structuring Engine
7. Pricing Computation & Decision Engine
8. Negotiation Finite-State Machine

9. Transaction Closure Orchestrator

10. Analytics & Telemetry Pipeline

All components communicate via asynchronous message queues using event-driven architecture to ensure non-blocking execution.

3. Data Acquisition & Ingestion Engine

3.1 Multi-Source Scraping Framework

Implements:

- DOM traversal algorithms
- Heuristic-based pattern extraction
- Regular expression pipelines
- Structured document parsing
- Spreadsheet schema inference

Extraction engine applies probabilistic confidence scoring to determine data validity.

3.2 Data Deduplication & Validation

Uses:

- Hash-based fingerprinting
- Levenshtein distance similarity scoring
- Bloom filter probabilistic duplicate detection
- Weighted validation heuristics

Validated entities are committed into a normalized relational schema.

4. Distributed Messaging Orchestration Layer

Implements:

- Asynchronous task queues
- Rate-limiting governors
- Concurrency throttling
- Exponential backoff retry mechanisms
- Channel escalation logic

Message dispatch scheduling uses temporal optimization algorithms to maximize response probability.

5. NLP Conversational Intelligence Engine

The conversational core operates on a transformer-based inference architecture augmented with deterministic intent routing.

5.1 Core NLP Components

- Tokenization pipeline
- Contextual embedding generation
- Multi-head attention modeling
- Intent classification layers
- Named entity recognition (NER)
- Semantic similarity scoring

5.2 Dialogue State Tracking

Maintains persistent conversational memory using:

- Vectorized state embeddings
- Context windows
- Stateful dialogue progression graphs

5.3 Response Generation Strategy

Hybrid model:

- Generative language modeling
- Rule-constrained response bounding
- Business-logic-safe output filtering

This prevents hallucinated pricing or unauthorized commitments.

6. Requirement Structuring Engine

Transforms unstructured conversational input into structured transactional parameters.

Implements:

- Slot-filling models
- Context-weighted entity extraction
- Constraint satisfaction logic
- Parameter validation matrix

Outputs structured JSON-based requirement objects.

7. Pricing Computation Engine

Implements deterministic and probabilistic pricing strategies:

- Rule-based pricing trees
- Dynamic pricing multipliers
- Margin optimization algorithms
- Elasticity-aware discount computation
- Conditional offer branching

Pricing output is mathematically constrained to maintain profitability thresholds.

8. Negotiation Finite-State Machine

Negotiation modeled as:

- Directed acyclic decision graph
- Multi-stage conditional branching
- Probabilistic concession modeling
- Objection classification mapping

System computes expected value (EV) per negotiation state to determine optimal concession strategy.

9. Autonomous Deal Closure Orchestrator

Once acceptance probability threshold is achieved, system:

- Confirms terms
- Generates structured contract summary
- Triggers next-stage workflow
- Logs transaction metadata

All transactions are cryptographically hashed for audit integrity.

10. Scalability Architecture

Implements:

- Horizontal containerized deployment
- Load-balanced API gateways
- Distributed inference clusters

- Database sharding strategies
- Event-stream processing

System designed for:

- Thousands of concurrent conversational threads
 - Real-time pricing computation
 - Sub-second inference response latency
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11. Security Architecture

Includes:

- End-to-end encryption
 - Role-based access control
 - Audit trail logging
 - Data anonymization protocols
 - Intrusion detection heuristics
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12. Performance Optimization

Uses:

- Lazy evaluation pipelines
- Caching layers
- Precomputed pricing matrices
- Vector similarity indexing

System designed for high-throughput B2B engagement workloads.
