

Enterprise AI Agent Technical Whitepaper

Financial Quant | Cross-border E-commerce | Enterprise Digital Employees | Private
Deployment

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1. Executive Summary

This whitepaper systematically presents Meichen Information Technology's enterprise AI Agent architecture and implementation solutions for three core scenarios: financial quantitative trading, cross-border e-commerce operations, and general enterprise administration. In the wave of digital transformation, Meichen is committed to helping enterprises build secure, efficient, and controllable intelligent operation systems.

Our core philosophy is "Data Sovereignty" - ensuring enterprise core data remains within the client's own infrastructure through private deployment, eliminating data leakage risks; achieving 7×24-hour uninterrupted operation through automated agents to significantly reduce labor costs; meeting financial-grade real-time requirements through low-latency execution engines.

1.1 Core Objectives

- **Data Sovereignty:** Private deployment architecture ensures market data, trading strategies, and customer information 100% retained in client infrastructure, fully controllable, meeting financial-grade security compliance requirements
- **Low-Latency Execution:** Quantitative trading achieves microsecond-level (<100μs) processing; cross-border e-commerce achieves millisecond-level response, ensuring business real-time performance
- **Automated Closed-Loop:** From signal generation and service intake to execution and response - fully unmanned 7×24-hour operation
- **Cost Reduction & Efficiency:** Digital employees replacing repetitive manual labor can save over 60% in labor costs

1.2 Target User Groups

This solution is specifically designed for enterprise decision-makers and technical leaders:

- CTOs and technical team leads at quantitative funds and securities firms
- Quantitative researchers and risk control directors at proprietary trading teams
- E-commerce operation directors and IT managers
- IT directors and CISOs at mid-to-large enterprises
- Executives at traditional enterprises seeking digital transformation

2. System Architecture Design

Meichen AI Agent adopts industry-leading layered decoupled architecture, fully considering high availability, scalability, and security requirements for enterprise applications. The system supports both standalone deployment and Kubernetes horizontal scaling.

2.1 Overall Topology Architecture

The system uses a four-layer architecture design, each layer meticulously optimized for high performance and stability.

- **Gateway Layer:** Supports RESTful API, WebSocket, FIX, gRPC, CTP/XTP native trading interfaces. Nginx + Keepalived for high-availability load balancing, supporting millions of concurrent connections
- **Agent Core Layer:** Four modules - Perception (multimodal data parsing), Inference Engine (local LLM + RAG), Planner (ReAct-based task decomposition and tool calling), Executor (standardized action output)
- **Data Storage Layer:** Time-series DB (DolphinDB/ClickHouse) for market data, Vector DB (Milvus/Faiss) for knowledge bases and conversation history, Relational DB (PostgreSQL/MySQL) for configuration and permissions
- **Infrastructure Layer:** Docker Compose standalone or Helm Chart cluster deployment. Recommended: 32GB+ RAM, 8+ core CPU, NVIDIA T4/A10 GPU (optional)

2.2 Core Technology Stack

Component	Selection	Rationale & Advantages
LLM	Qwen2.5 / Llama 3 (Quantized)	Offline capable, excellent Chinese/code capabilities, no API fees, supports private deployment
Inference	vLLM / TensorRT-LLM	High throughput, VRAM optimized, first-token latency <50ms, supports large batch token generation
Market Data	C++ High-Performance Gateway	Nanosecond parsing, zero-copy memory management, ultra-low latency
Task Orchestration	LangGraph / AutoGen	Complex state machine, supports checkpoint resume, debug-friendly
Monitoring	Prometheus + Grafana	Real-time QPS, latency, error rate, resource usage with custom alerts
Message Queue	Kafka / Redis Stream	High-throughput distribution, ensures no message loss, supports replay

2.3 High-Availability Design

To meet enterprise HA requirements, the system uses multi-layer fault tolerance:

- **Compute HA:** Stateless service design with K8s auto-scaling, single node failure doesn't affect overall service
- **Data HA:** DB master-slave replication + regular snapshots, supports Point-in-Time Recovery (PITR)
- **Network HA:** Dual NIC bonding, active-active load balancers, no single point of failure at network layer
- **DR Drills:** Complete failover playbooks, supports regular drills for quick recovery

3. Financial Quantitative Agent

For financial quantitative trading, Meichen provides complete solutions from market access, strategy execution to risk control, validated by years of live trading.

3.1 Multi-Market Access

Direct exchange gateways, no middleman, ensuring real-time and accurate data:

- **Domestic Futures/Securities:** CTP (SHFE, CFFEX, DCE, CZCE), XTP (Zhongtai Securities), OES (Hundsun)
- **Cryptocurrency:** Binance, OKX, Bybit, WebSocket full-duplex push, latency <10ms
- **Forex/CFD:** FIX Protocol 4.2/4.4, MT5 bridge, 50+ currency pairs
- **Data Granularity:** Tick-level snapshots, Order Book Level 2/3 depth data for HFT

3.2 Strategy Execution Engine

Function	Spec	Description
Conditional Orders	<100μs latency	TA-Lib 150+ indicators, custom Python/C++ callbacks
Algo Trading	>15% slippage optimization	TWAP, VWAP, Iceberg, Sniper strategies, dynamic order splitting
Arbitrage	10ms scan	Cross-exchange/inter-temporal/spot-future basis monitoring
Backtesting	1 year <30s	Event-driven, includes fees, slippage, market impact simulation
Paper Trading	Supported	Historical replay for strategy validation before live trading

3.3 Risk Control Mechanism

C++ modules enforce risk rules at architecture level, cannot be bypassed by upper-layer strategies.

- **Position Limits:** Per-instrument max position, total account leverage, industry concentration - forced rejection on violation
- **Capital Risk:** Auto-liquidation at 5% daily loss, trading authority locked until admin unlock
- **Anomaly Detection:** Auto-pause after 3 consecutive API errors; stop opening after 500ms latency; protective stop-loss at 5% price gap
- **Response Time:** Full risk control pipeline executes in <1ms

3.4 Post-Market Analysis

- **Logging:** Nanosecond timestamps for all Order/Trade/Fill, tick-level performance analysis
- **Factor Analysis:** Auto-calculate Alpha/Beta contribution, separate strategy return from market luck
- **Sentiment Analysis:** Local NLP scans financial news/social media, outputs -1.0 to 1.0 sentiment score
- **Event Annotation:** Auto-annotate extreme market dates for strategy review

4. Cross-border E-commerce Agent

For cross-border e-commerce operations, Meichen provides complete solutions from multi-platform integration, automation to competitor monitoring.

4.1 Multi-Platform Integration

Official APIs (SP-API, GraphQL) aggregate data, eliminating information silos:

- **Platforms:** Amazon, Shopify, TikTok Shop, eBay, Walmart
- **Data Sync:** Orders, inventory, ads sync every 5 minutes, custom frequency supported
- **Message Aggregation:** All platform messages in unified inbox with auto-translation

- **Data Cleaning:** Auto-standardize formats across platforms

4.2 Core Automation Modules

Scenario	Logic	Expected Results
Customer Service	RAG knowledge base + Intent recognition → Auto multi-language response	>85% block rate, <30s response time
Listing Optimization	Competitor top-10 reviews → NLP pain points → Generate bullet points	Conversion +10-20%
Ads Optimization	Hourly keyword reports → Smart negative keywords → Dynamic Bid adjustment	ACOS -15-25%, CTR +30%
Dynamic Pricing	Real-time competitor BuyBox → Auto reprice per rules	BuyBox >90%
Inventory Warning	Sales forecast + In-transit → Smart reorder calculation	Reduce stockout/overstock 20%+

4.3 Competitor Monitoring

- **Price Tracking:** Every 30 min, trigger reprice strategy, price trend visualization
- **Inventory Estimation:** BSR rank changes → estimate competitor stock, stockout warning
- **Review Mining:** Daily review capture, NLP clustering, product improvement reports
- **New Product Alerts:** Monitor competitor new listings, market trends

5. Enterprise Digital Employees

Based on unified Agent framework, Meichen builds customizable "Digital Employee" matrices. They can perceive, decide, and execute - 7x24 integration with OA, ERP, CRM, and IM systems.

5.1 Core Capabilities

- **System Connectors:** Pre-built adapters for DingTalk, WeCom, Feishu, SAP, Oracle, Salesforce, Jira, GitLab - 50+ enterprise systems
- **Task Planning:** CoT (Chain of Thought) decomposes natural language into executable SOPs
- **Human-Machine Collaboration:** Critical operations (transfer, delete, contract sign) require manual confirmation
- **Memory & Context:** Long-term memory of employee habits and company policies for personalized service

5.2 Role Library

Role	Department	Function (SOP)	Efficiency
IT Ops Assistant	Tech	Alert→Match solution→Execute script→Generate report→Notify	MTRR -60%
HR Recruiter	HR	Resume fetch→JD match→Interview invite→ATS input→Follow-up	10x efficiency
Finance Assistant	Finance	OCR→Tax verification→Standard check→Generate voucher→Alert	3 days → 2 hours
Sales Analyst	Sales	CRM data→Report→Analysis→Push to chat→Auto weekly/monthly	4 hours → 5 min
Legal Reviewer	Legal	Clause comparison→Risk identification→Suggestion→Archive→Reminder	5x efficiency
CS Manager	Customer Service	Follow-up→Satisfaction→Churn risk→Retention trigger→Report	Churn -25%

5.3 Security Framework

- **Least Privilege:** Each digital employee has minimum API permissions, fine-grained control supported

- **Audit Trail:** All operations logged for traceability and compliance
- **Data Masking:** Auto-mask sensitive data (salary, PII, bank cards)
- **Manual Circuit Breaker:** Admin can one-click pause all digital employee activities

5.4 ROI Model

ROI = (Saved Hours × Hourly Cost) + Error Avoidance + Business Speedup Benefits

Case Study: A manufacturing company deployed "IT Ops" + "Finance Assistant", saving ~\$60K/year, 300% efficiency improvement, 4.5-month payback.

6. Security & Compliance

Security is the foundation of digital transformation. Meichen ensures security from architecture to code to operations.

6.1 Private Deployment Standards

- **Network Isolation:** Pure intranet operation, only whitelisted APIs for market/external platforms
- **Data Encryption:** AES-256 at rest, TLS 1.3 in transit, keys managed by client
- **Delivery Security:** SHA-256 verified Docker images/binaries
- **Quick Deployment:** One-click deploy script, production setup in 30 minutes

6.2 Access Control & Audit

- **RBAC:** Fine-grained role-based control (e.g., traders can view market data but not modify risk rules)
- **Audit Logs:** Tamper-proof logs, 3-year retention, exportable for audit
- **Compliance:** Grade Protection 2.0 Level 3, supports third-party code audit
- **Security Response:** 7×24 security team, critical patches within 24 hours

6.3 Data Compliance

- **Data Localization:** Supports data staying within domain, meets local regulations
- **Data Deletion:** Complete deletion functionality, supports GDPR "right to be forgotten"
- **Data Lineage:** Full lifecycle tracking, supports provenance and impact analysis

7. Service & Support

Meichen provides end-to-end service from pre-sales to post-ops.

7.1 Standard Delivery Process

1. **Environment Survey (1-2 days):** Evaluate resources, network, APIs, deliver technical proposal
2. **Deployment & Debug (3-5 days):** Container deployment, connectivity test, stress testing
3. **Rule Migration (5-10 days):** Convert Excel/legacy logic to Agent rules
4. **Parallel Run (10-20 days):** Small capital/traffic pilot, compare differences
5. **Production Switch (1 day):** Full go-live, handover documentation, training

7.2 SLA Commitments

- **Response:** P0 (trading halt/data loss) - 2hr response, 4hr recovery; P1 - 4hr response
- **API Changes:** Exchange/platform API changes patched within 24 hours
- **Upgrades:** Core modules free lifetime upgrades
- **Dedicated Support:** Each client gets dedicated Customer Success Manager

7.3 Training & Knowledge Transfer

- **Technical Training:** System management, performance tuning, security config
- **Business Training:** Train internal Agent ops teams
- **Documentation:** Complete technical docs, API manual, ops guides

8. Contact Us

Hotline: 0632-3815000

Email: info@0632999.com

Website: www.0632999.com

Address: No.11 Donghai Road, Development Zone, Zaozhuang, Shandong, China