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Building Agentic AI-Oriented High-Frequency Trading Architectures in C#: Low-Latency Design Patterns

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Abstract: High-frequency trading requires infrastructure that combines speed, accuracy, and responsiveness to respond in microseconds to volatile market activity. The strategy is to create smart, low-latency backend infrastructure using C# that integrates autonomous agents as their hub of executing and calibrating trades in real time. These agents facilitate responsive decision-making and continuous system calibration, providing an unparalleled edge over conventional rule-based systems. The design exploits low-overhead design patterns, efficient memory management, and .NET-native concurrency models to meet the performance and reliability requirements needed in uncertain trading environments. By combining intelligent automation with performance-aware engineering, the system provides scalable, fault-tolerant, and high-throughput execution infrastructure suitable for fast-paced financial markets.

Keywords: High-Frequency Trading, Intelligent Agents, Low-Latency Systems, C# Backend, Concurrency Models, Memory Optimization, Trade Execution

