**Proof of Concept: Ultra-Low Latency Market Microstructure Modeling for High-Frequency Trading**

**Problem:** Current market microstructure models lack the speed for real-time decision-making in HFT, leading to inefficiencies and lost opportunities. [1]

**Target Audience:** High-Frequency Trading Firms, Market Makers, Proprietary Trading Desks

**User Group Need:** HFT entities need ultra-low latency models to maximize profits and minimize risks, identified through industry research.

**Resources Needed:**

* **Hardware:** High-performance servers, GPUs (if necessary), FPGAs (if necessary)
* **Software:** Python, JavaScript, HTML, CSS, React
* **Human Expertise:** Data Scientists, Quantitative Analysts, Software Engineers, Infrastructure Specialists [2]

**Success Criteria/KPIs:**

* **Latency:** Process and respond within microseconds to milliseconds
* **Scalability:** Handle millions of messages per second
* **Profitability:** Positive Sharpe ratio in profit
* **System Uptime:** At least 99.9% during testing [3]

**Timeline:**

* **Phase 1 (Aug 19- Aug 22, 2024):** Data Preparation and Algorithm Development
* **Phase 2 (Aug 22 - Aug 25, 2024):** Simulated Trading Environment Setup and Performance Testing

**Resources:**

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| [1] | J. &. S. G. (. Hasbrouck, "Low-Latency Trading," *Journal of Financial Market,* p. 1, 2013. |
| [2] | W. &. M. Zhang, "FPGA Acceleration for High-Frequency Trading," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems,* p. 2, 2019. |
| [3] | G. A. A. &. G. J. A. (. Laughlin, ""Information Transmission between Financial Markets in Chicago and New York," *Financial Review, 49(2), 283-312,* 2014. |