

Paper Title: Sui 2026: An Infrastructure Architecture for Autonomous AI Agents in Decentralized Finance

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Abstract

This paper analyzes three major infrastructure upgrades introduced by the Sui blockchain in 2025—Mysticeti consensus, Walrus decentralized storage, and DeepBook V3—and evaluates their collective impact on enabling autonomous AI agents on-chain. While prior research has explored the convergence of Artificial Intelligence (AI) and blockchain, practical deployment has been constrained by latency, data availability costs, and fragmented liquidity.

We argue that Sui's recent architectural advancements address these constraints holistically, forming the foundation for an emerging paradigm termed **Agent Finance (AgentFi)**, where AI agents autonomously execute financial strategies within decentralized systems. Furthermore, this paper proposes strategic design recommendations for AI-native DeFi protocols, including standardized agent vaults, on-chain inference tooling, and verifiable AI content platforms.

Keywords: Sui Blockchain, Artificial Intelligence, Mysticeti, Walrus Protocol, DeepBook V3, Agent Finance, Decentralized Storage, CLOB

1. Introduction

The integration of Artificial Intelligence (AI) into blockchain ecosystems represents the next frontier of digital finance. In traditional finance (TradFi), high-frequency trading and automated asset management are dominated by centralized entities due to the speed limitations of decentralized networks. Legacy blockchain architectures, constrained by serial execution and limited block space, have struggled to support the high-frequency and data-intensive nature of AI operations.

However, the year 2025 marked a turning point with the Sui blockchain introducing significant infrastructure upgrades designed to resolve these bottlenecks. This paper examines how the combination of the Mysticeti consensus, Walrus storage, and DeepBook V3 transforms Sui into a foundational layer for the "Autonomous Economy" of 2026. In this new economy, financial interactions are increasingly executed by AI agents—software entities capable of autonomous decision-making—rather than human users, requiring a substrate that offers both speed and deterministic finality. This paper makes three contributions:

- (1) it provides a systematic analysis of Sui's 2025 infrastructure upgrades from the perspective of AI agent requirements;
- (2) it introduces the concept of Agent Finance (AgentFi) as a design paradigm for AI-driven decentralized markets; and
- (3) it proposes concrete architectural and tooling recommendations to accelerate the development of AI-native DeFi applications.

2. Analysis of Key Infrastructure Improvements in 2025

Three major technological advancements in 2025 have redefined the capabilities of the Sui network, moving it from a user-centric platform to an agent-centric infrastructure.

Table 1. Infrastructure Comparison for AI Agent Execution

Feature	Ethereum L2	Solana	Sui (2025)
Consensus Latency	~2–5s	~400–600ms	<400ms (Mysticeti)
Execution Model	Account-based	Account-based	Object-based (parallel)
Data Availability Cost	High	Medium	Low (Walrus)
Native CLOB	No	Limited	Yes (DeepBook V3)
AI Agent Suitability	Low–Medium	Medium	High

2.1. Mysticeti Consensus Mechanism

Mysticeti represents a paradigm shift in Byzantine Fault Tolerant (BFT) consensus. Unlike its predecessor Narwhal-Bullshark, which required multiple round-trips for certification, Mysticeti significantly reduces consensus latency by utilizing **uncertified DAGs (Directed Acyclic Graphs)**. By optimizing the DAG structure, Mysticeti allows transaction finality to be achieved in under **400 milliseconds** [1].

For AI applications, particularly those involved in algorithmic trading and real-time payments, speed is critical. Traditional blockchains with multi-second block times expose AI agents to "stale data" risks, where market conditions change before a transaction is finalized. It is noted that Mysticeti's reduction in latency enables AI agents to react to market changes with institutional-grade speed, effectively eliminating the performance gap between on-chain and off-chain systems.

2.2 Walrus Decentralized Storage Protocol

Data is the fuel for Artificial Intelligence, but storing large datasets on-chain has historically been cost-prohibitive. The introduction of **Walrus** provides a specialized solution for storing large data "blobs" efficiently. Unlike traditional storage solutions that burden the consensus layer with heavy data, Walrus operates as a separate layer utilizing advanced **erasure coding** techniques [2]. This ensures that data is dispersed across storage nodes with high redundancy but low overhead.

This is crucial for "DeAI" (Decentralized AI) as it allows the storage of large datasets, model weights, and training histories directly linked to the blockchain without incurring prohibitive gas costs. For the first time, an AI model's training data can be auditably stored and retrieved via smart contracts, enabling verifiable inference.

2.3 DeepBook V3

DeepBook V3 establishes a Central Limit Order Book (CLOB) as a public good within the Sui ecosystem. While Automated Market Makers (AMMs) spurred the initial growth of DeFi, they suffer from capital inefficiency and high slippage for large trades. DeepBook V3 offers a highly performant matching engine with low transaction fees and high throughput [3].

The significance of DeepBook V3 lies in its "API-first" design. AI agents, unlike humans, do not need visual interfaces; they require efficient APIs to execute complex financial strategies such as market making or arbitrage. DeepBook serves as a universal liquidity layer that any dApp or Agent can tap into, providing the deep liquidity required for autonomous financial operations.

3. Strategic Evaluation: The Convergence of AI and DeFi

The combined impact of these three improvements enables a strategic pivot towards an AI-integrated financial ecosystem in 2026.

3.1. The Rise of Agent Finance (AgentFi)

The synergy between Mysticeti and DeepBook V3 creates an ideal environment for "AgentFi." In this model, users delegate financial tasks to autonomous AI agents. These agents utilize DeepBook's liquidity to execute trades and Mysticeti's speed to capitalize on arbitrage opportunities or rebalance portfolios in real-time. Without sub-second transaction finality, on-chain AI agents are vulnerable to front-running and Miner Extractable Value (MEV) attacks, which disproportionately impact latency-sensitive trading strategies. Prior studies have shown that delayed transaction confirmation enables systematic exploitation through transaction reordering and arbitrage [6].

3.2. Case Study: The "Sui-Rebalancer" Agent

To illustrate the practical application of AgentFi, we propose the "Sui-Rebalancer," an autonomous agent designed to maintain a 50/50 portfolio allocation between SUI and USDC. The agent operates through a three-step autonomous loop:

1. Monitoring & Data Retrieval: The agent continuously monitors real-time price feeds. Crucially, its historical decision-making logic and backtesting data are stored on Walrus. This allows the agent to access gigabytes of historical market scenarios without incurring high on-chain storage costs, ensuring its strategies are data-driven.
2. Execution via DeepBook: When market volatility causes the portfolio allocation to drift by more than 5% (e.g., SUI price drops), the agent automatically triggers a rebalancing event. Unlike AMMs with high slippage, the agent utilizes DeepBook V3's CLOB to execute precise limit orders, minimizing execution costs.
3. Settlement Speed: The trade relies on Mysticeti to achieve finality in under 400ms. This sub-second speed is vital; on slower chains, a 5% price gap might close before the transaction is finalized, causing the rebalancing strategy to fail.

This case study demonstrates how the convergence of cheap storage (Walrus), deep liquidity (DeepBook), and low latency (Mysticeti) creates a viable environment for institutional-grade AI finance.

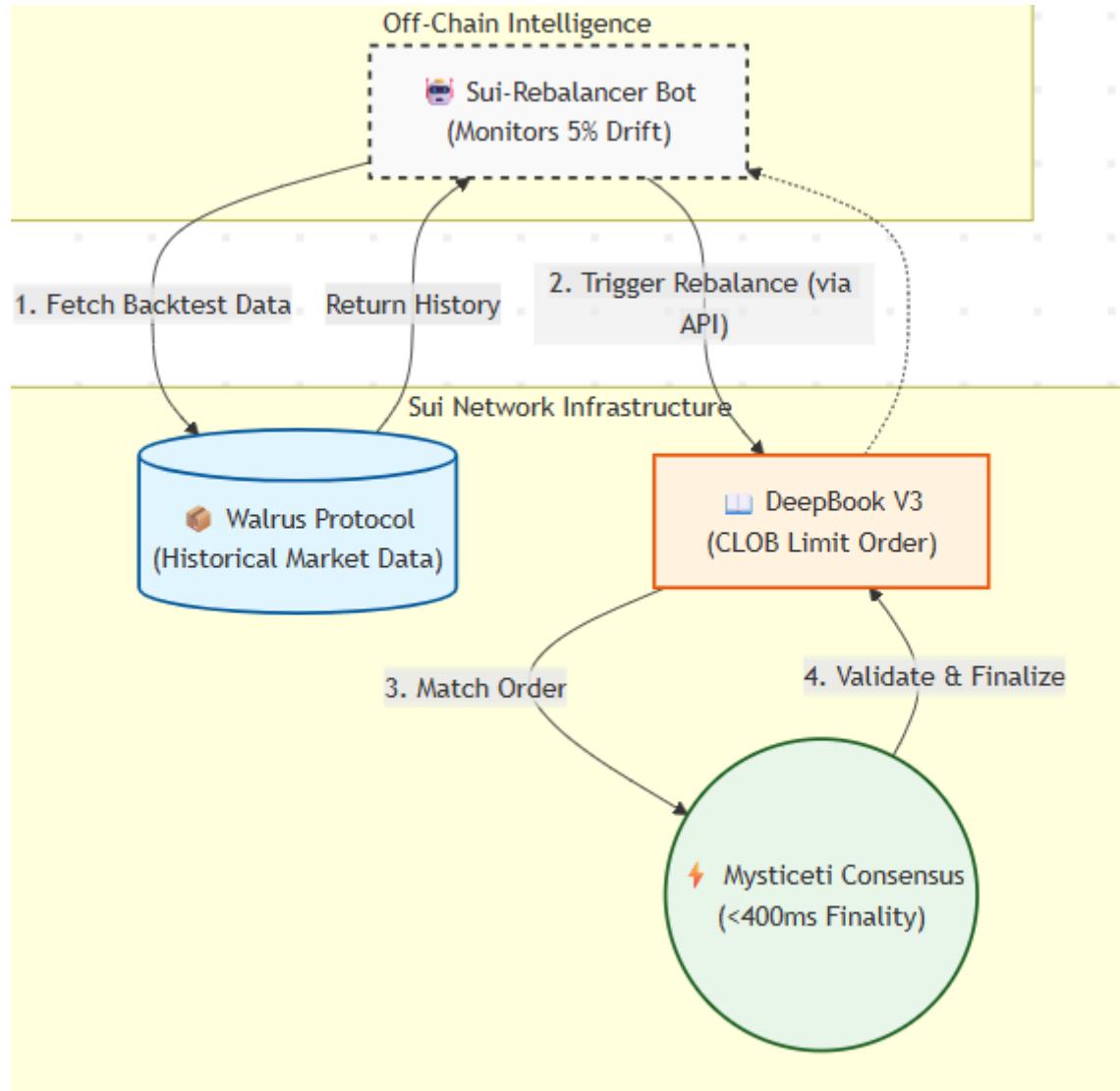


Figure 1. Execution Architecture of the "Sui-Rebalancer" Agent. The diagram illustrates the autonomous workflow where the agent retrieves historical data from Walrus, detects a 5% portfolio drift, and executes a rebalancing order via DeepBook with Mysticeti's sub-second finality.

3.3. Verifiable Intelligence via Walrus

Trust is a major challenge in AI adoption. "Black box" AI models are difficult to audit. By utilizing Walrus, the provenance of data used to train AI models can be cryptographically verified. It allows developers to store the "reasoning" or audit trails of AI agents on-chain. This transparency is essential for the integration of AI with Real-World Assets (RWAs) and payments, where auditability is a regulatory requirement.

4. Strategic Recommendations

Based on the analysis, the following recommendations are proposed to accelerate the adoption of Sui's AI economy.

4.1. Finance: Standardizing Agent Vaults

It is recommended that DeFi protocols on Sui develop standardized "Agent Vaults." These smart contracts should define specific permissions for AI agents, allowing them to trade or manage assets within strict risk parameters set by the user (e.g., "stop-loss at 5%"). This bridges the gap between non-technical users and sophisticated AI trading strategies, effectively democratizing access to high-frequency trading.

4.2. Tooling: On-Chain Inference SDKs

To attract AI developers, the Sui ecosystem needs robust Software Development Kits (SDKs) that facilitate on-chain inference. Tools should be built to allow Move smart contracts to query AI models directly or verify **Zero-Knowledge Machine Learning (zkML)** proofs, enabling trustless validation of AI inference without revealing model parameters or sensitive data. Recent research has demonstrated the feasibility of zkML for verifiable inference in adversarial environments [5]. This would enable use cases such as decentralized credit scoring for lending protocols based on wallet history analyzed by AI.

4.3. Consumer: AI-Verified Content Platforms

Leveraging Walrus and Sui's object model, consumer applications should focus on content authenticity. A platform could be developed where digital content created by AI is instantly minted as an NFT with its metadata (prompt, model version) stored on Walrus. This creates a verifiable "chain of custody" for digital media, addressing the growing concern over deepfakes in the generative AI era.

4.4. Limitations and Open Challenges

Despite its advantages, the proposed AgentFi paradigm on Sui faces several challenges. First, on-chain inference remains computationally expensive, requiring further optimization or off-chain execution with cryptographic verification. Second, autonomous AI agents introduce new security risks, including emergent behaviors and adversarial manipulation. Finally, regulatory uncertainty surrounding AI-driven financial decision-making may limit near-term adoption. These challenges represent important directions for future research.

5. Conclusion

The infrastructure upgrades of 2025 have positioned Sui not merely as a high-performance blockchain, but as the operating system for the intelligent economy. By solving the trilemma of speed (Mysticeti), storage (Walrus), and liquidity (DeepBook), Sui effectively lowers the barriers for AI to enter the decentralized financial space. The execution of the 2026 strategy will depend on how effectively builders leverage these tools to create user-centric, autonomous applications that can operate at the speed of thought.

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