Agere Consensus: Intelligent Cryptocurrency Design Based on BEVM(λ)

Abstract

This paper conducts an in-depth analysis of the design philosophies of Bitcoin and Ethereum, pointing out that the three major technical issues proposed by Ethereum regarding blockchain (Turing incompleteness, consensus mechanism efficiency, and network scalability) are not genuine problems, but rather stem from a misunderstanding of Bitcoin's core principles. This misunderstanding has led Ethereum to violate the design principles of energy conservation and decentralization in areas such as global state management and proof-of-stake consensus, resulting in a closed system of entropy increase that is difficult to achieve sustainable development.

To this end, the Agere consensus proposes a design theory for intelligent cryptocurrencies based on the BEVM(λ) paradigm, which is grounded in Bitcoin's UTXO model, input calculations, consensus algorithms, and consensus-aware algorithms. It distills four core elements: a business closed loop of energy conservation, decentralized emergent consensus characteristics, Individual-based autonomous design, and a distributed stateless computing model. Within this framework, a dual-layer consensus architecture is designed, including the traditional parent consensus inherited from Bitcoin and the future-oriented child consensus (Agere consensus). Through the BTC staking dual-token model and an Agent-based workload resource allocation mechanism, the Agere consensus retains the security and stability of Bitcoin while achieving intelligent and diversified distributed collaboration.

This paper also discusses the current challenges faced by the Agere consensus, such as scoring decentralization, scalability, and emergence mechanisms, and proposes future optimization directions, including improving consensus quantification algorithms, strengthening individual models, and optimizing the entry calculation system. Ultimately, the Agere consensus aims to build a smart

cryptocurrency system that fully complies with the BEVM(λ) paradigm, providing a new paradigm for blockchain technology innovation and guiding the direction of industry development.

1. Introduction: The Lost Narrative of Crypto

The emergence of Ethereum in 2015 brought a new direction for blockchain technology, and its three core issues profoundly influenced the technical roadmap of the industry. However, due to a fundamental misunderstanding of Bitcoin's core principles, the views proposed by Ethereum regarding Turing completeness, consensus mechanism efficiency, and network scalability have led the development of blockchain over the past nearly ten years to deviate from the essence of Satoshi Nakamoto's design of Bitcoin.

1.1 The Three Major Issues of Ethereum Narrative

In the development of blockchain technology led by Ethereum, three core directions for technological improvement have emerged:

- **Turing incompleteness problem**: The Turing incompleteness of the Bitcoin scripting language is considered to limit the application scenarios of blockchain. Ethereum attempts to expand the functionality of smart contracts by introducing a Turing-complete virtual machine (EVM), aiming to transform blockchain from a singular value transfer system into a general-purpose computing platform.
- **Efficiency of consensus mechanisms problem**: The high energy consumption problem of the Proof of Work (PoW) mechanism has become increasingly prominent. Ethereum has proposed a transition to a Proof of Stake (PoS) mechanism, replacing computational power competition with token staking to achieve the so-called "green consensus." This change aims to reduce network operating costs and improve consensus efficiency.
- **Network scalability problem:** The transaction processing capacity (TPS) of the Bitcoin network is difficult to meet the demands of large-scale commercial applications. Ethereum plans to enhance network throughput through scaling

solutions such as sharding technology, to support a wider range of commercial scenarios and more complex application ecosystems.

1.2 The Essential Issues Behind Problem Narratives

These three directions of technological improvement actually reflect a deep misunderstanding of the essence of Bitcoin:

- **The commercial closed loop of energy conservation has been broken:** Bitcoin establishes a clear correspondence between computational power input and value output through proof of work (PoW), forming a complete energy conservation commercial closed loop. However, after projects like Ethereum shifted to a proof of stake (PoS) mechanism, the energy input of validation nodes becomes negligible, leading to a loss of correspondence between system value and external energy, ultimately resulting in a closed extraction system lacking real value support.
- **The divergence of consensus quantification algorithms from the emergence principle**: Bitcoin's PoW is a disordered entropy reduction emergence process based on computational power, reflecting true decentralization characteristics. In contrast, the new generation of public chains generally adopts deterministic voting or staking rules, losing the emergent characteristics of self-organization in the system, essentially devolving into a predetermined centralized rule execution process.
- **Violation of the Individual Decentralization Design Principle:** Bitcoin ensures the independence and autonomy of each transaction unit through the UTXO model. However, the new generation of public chains completely abandons this principle in order to support complex computations, opting instead for a centralized account model and a global state tree architecture, which undermines the decentralized foundation based on the Individual.

These fundamental issues indicate that the technological improvements of the Ethereum era have actually deviated from the core design principles of Crypto commerce, namely, distributed closed-loop commerce based on energy conservation, decentralization of the Individual, and emergent consensus mechanisms. The cognitive deviation of Ethereum not only fails to address the original problems but also leads to deeper systemic challenges.

2. BEVM(λ): Bitcoin Paradigm Equation

We analyzed the fundamental issues in the development of blockchain during the Ethereum era. The existence of these issues prompted us to re-examine the Bitcoin system. Through an in-depth analysis of Satoshi Nakamoto's design philosophy, we proposed the BEVM(λ) paradigm equation to reveal the essential reasons for Bitcoin's success.

2.1 Composition of the BEVM(λ) Paradigm

The system consists of four core components: the Individual model, the calculation, the consensus algorithm, and the consensus perception algorithm. In the Bitcoin system, the specific implementations of these components are:

- **Individual Model**: The Coin based on UTXO constitutes the basic individual unit of the Bitcoin system. Each UTXO is an independent value carrier that does not rely on the global state, thereby achieving true individual sovereignty.
- **Input Calculation**: The BTC transfer operation based on the UTXO data structure constitutes the input calculation system of Bitcoin. Distributed computation between Individuals is achieved through the function f(compute)= TX(Input(Individual), Output(Individual)), ensuring the statelessness and independence of transactions.
- **Consensus Algorithm**: The Byzantine fault tolerance problem is addressed through the function f(consensus) = Consensus(hash, difficulty). Bitcoin's consensus algorithm quantifies hash calculations, with nonce as the individual, achieving emergent distributed consensus computation, reflecting true decentralization characteristics.
- **Consensus Perception Algorithm**: f(Consensus Mechanism, External Energy Input, Energy Conversion Mechanism) = Value Output. This function integrates the transaction function and the consensus function to achieve a distributed business system that conserves energy, mapping the electrical energy behind hash power to the commercial value of BTC.

2.2 Comparative Analysis of Bitcoin and Ethereum Based on BEVM(λ)

Through the four components of the BEVM(λ) paradigm, we can systematically analyze the design differences between Bitcoin and Ethereum:

1. **Individual Model**
    - Bitcoin: A distributed individual model based on UTXO, where each transaction output is an independently autonomous unit of value
    - Ethereum: Adopts a centralized state tree based on accounts, where all account states rely on global storage
2. **λ Calculus**
    - Bitcoin: The UTXO-based stateless functional transaction model ensures the distributed nature of computation
    - Ethereum: Turing-complete computation based on EVM, introducing global state, undermining the independence of computation
3. **Consensus Algorithm Design**
    - Bitcoin: In the POW mechanism, each miner performs independent hash calculations by adjusting the nonce value, and the system consensus naturally emerges from this decentralized computational competition
    - Ethereum: Centralized voting consensus using POS mechanism, losing emergent characteristics
4. **Consensus Perception Quantification Mechanism**
    - Bitcoin: Established a complete mapping relationship from computational power input to BTC value output
    - Ethereum: The energy input of verification nodes is negligible, lacking a value system of energy conservation

From the perspective of BEVM(λ), Bitcoin strictly adheres to the Individual distributed design principles across all four components. In contrast, Ethereum deviates from this core principle in each component in order to achieve a Turing-complete smart contract platform. Particularly in the consensus-aware quantification mechanism, the lack of necessary external energy input results in the system becoming a closed entropy-increasing system, which is the fundamental reason why projects like Ethereum have failed to achieve a sustainable business model.

3. The theoretical guidance of BEVM(λ) and the evolution of the Agere consensus

3.1 BEVM(λ): A Design Guide for Intelligent Cryptocurrencies

Based on the analysis of existing issues in Crypto narratives and the proposed BEVM(λ) design theory, we focus our current research on addressing the "intelligence" problem of Crypto systems. The core of intelligence lies in autonomy and emergence, rather than the mechanical execution and traces of human manipulation that characterize intelligent systems, making it difficult to achieve true decentralization.

Taking Bitcoin as an example, its intelligence stems from the entropy-increasing process of unlimited disordered computational power competition in the proof of work (PoW), where the dynamic adjustment of `nonce` gives rise to the system consensus and the entropy-reducing process of valuing BTC, completing the transition from non-intelligence to intelligence.

On this basis, the Agere consensus proposes the design of intelligent tokens BEVM based on the BEVM(λ) paradigm, which not only inherits the energy conservation business model of Bitcoin but also achieves future-oriented intelligent development through an innovative dual-layer consensus architecture.

3.2 The Historical Evolution of BEVM and the Dual-Layer Consensus Architecture

The Origin of BEVM

The development of BEVM has undergone a deep reflection on the core design concepts of Bitcoin and Ethereum, and has gradually formed the current paradigm through multiple technical explorations.

1. **BTC Layer 2 Exploration Stage**

- **Objective**: To address the issue of insufficient scalability in the Bitcoin network and attempt to enhance transaction efficiency through Layer 2 solutions.
- **Experience**: Although the technical implementation is feasible, this approach lacks the practical demand support for ecological applications and has not truly changed the status quo of Bitcoin.

2. **Taproot Consensus Phase**
    - **Innovation**: Combining Bitcoin SPV state channels with Taproot technology to attempt decentralized custody of Bitcoin and expand its smart contract capabilities.
    - **Reflection**: BTC has been widely used as a currency in centralized exchanges and mining pools, and its demand for decentralized expansion is relatively limited. What truly needs to be expanded is the consensus mechanism of Bitcoin, not just the function of BTC as a currency.
3. **SuperBitcoin Phase**
    - **Direction**: Introduce the security advantages of Bitcoin consensus into the design, proposing a new cryptocurrency system that shares the security of Bitcoin consensus.
    - **Limitations**: Although it has improved the security of system consensus, it has failed to address the "dream disconnection" of VM systems like Ethereum in dealing with external real-world issues—able to operate only in an endogenous liquidity environment, it cannot perceive the real data and state of the external world.
4. **BitAgere Stage**
    - **Issue**: The mechanical consensus of Bitcoin and the abstract capabilities of AI agents share commonalities, leading to the design of BitAgere.
    - **Innovation**: Based on SuperBitcoin, the focus is on addressing the perception problem of mechanical consensus, abstracting the input perception capability of AI Agents and integrating it on-chain, enabling the Crypto system to possess external perception capabilities, thereby achieving deep integration between Crypto and AI Agents.

5. BEVM(λ) Stage
   - **Discovery**: By introspecting on the design philosophy of Bitcoin, we propose the BEVM(λ) paradigm. This paradigm deeply analyzes the essence of Bitcoin's success, covering four core elements: the Individual model, λ calculus, consensus algorithms, and consensus perception algorithms, providing systematic theoretical guidance for designing intelligent Crypto systems.
   - Direction: The BEVM(λ) not only inherits the core concepts of energy conservation and decentralized emergence from Bitcoin but also further expands the system's autonomy and intelligent capabilities. Through this paradigm, combined with the Agere subsystem, we explore diverse future application scenarios supported by distributed stateless computing and consensus-aware algorithms, achieving the comprehensive design and implementation of intelligent cryptocurrencies.

Establishment of the Dual Consensus Framework

In the technological accumulation and reflection of the aforementioned stages, we established the dual-layer consensus architecture of BEVM

1. **Mother Consensus: Linking the Past**

   The mother consensus inherits the core design of the Bitcoin network, including its highly decentralized consensus mechanism and energy conservation model, providing a secure and stable foundation for the BEVM system.

2. **Sub-consensus: Looking to the Future**

   The sub-consensus is centered around Agere consensus, exploring new models of distributed economy by strictly adhering to the BEVM(λ) paradigm. Agere consensus particularly focuses on energy conservation and emergent properties, laying a theoretical foundation for the sustainable development of intelligent cryptocurrencies.

Through a dual-layer consensus architecture, BEVM can maintain a deep connection with Bitcoin while achieving a new intelligent development path through Agere consensus. BEVM focuses on the issues that have been perceived in the present and continues to address them.

4. Design and Implementation of Dual Consensus: The Foundation of Bitcoin and the Agere Extension

4.1 Mother Consensus: A Dual-Token Consensus Model Based on Bitcoin

4.1.1 Bitcoin Staking Dual Token Model

Based on the initial value accumulation, the mother consensus introduces a dual-token model based on Bitcoin staking, which ensures the continuity of the Bitcoin network's security and provides participating nodes with a flexible proof-of-stake incentive mechanism

1. **Non-custodial staking of Bitcoin:**

   Nodes can lock a certain amount of BTC into the network through the Lightning Network's layer two protocol, without the need to entrust it to a centralized institution. This ensures the security of the assets and decentralization.

2. **Time Pledge and Energy Conservation:**

   The generation process of BEVM tokens follows the law of conservation of energy:

   - The PoW computing power of Bitcoin generates BTC through mining, a process that consumes external energy.
   - The BTC locked into the network is converted into BEVM tokens through time staking, further extending the value transfer relationship of energy.

   The generation of BEVM tokens is directly proportional to the amount of BTC staked (b_i) and the staking duration (t_i), as expressed in the following formula:

   $$BEVM_i = k \cdot b_i \cdot t_i$$

   Among them, k is the reward coefficient set by the system, used to reflect the ratio of BTC staking to BEVM token generation.

3. **Dual-token coordination mechanism:**
    - BTC Token: Reflects the actual contributions of nodes in the Bitcoin network, such as BTC holdings, staking scale, and active duration.
    - BEVM Token: Used for participating in staking and consensus at the PoS layer, determining the consensus weight of nodes and reward distribution.
4. **Randomness and Threshold Mechanism:**

- The node must meet the minimum staking threshold to ensure it has a basic economic binding.
- In the nodes that meet the conditions, the system randomly selects validators based on BTC staking weight, avoiding the problem of wealth concentration while enhancing the decentralization of the network.

4.1.2 Consensus Algorithm: BFT PoS Mechanism Based on Aura + GRANDPA

The BEVM system employs a BFT PoS consensus algorithm based on the Substrate framework within the mother consensus architecture, combining the efficient features of Aura and GRANDPA. Aura serves as the block production mechanism, rapidly generating new blocks through a rotating leader model, ensuring high throughput and low latency for the system. GRANDPA acts as the finality mechanism, quickly confirming the blockchain state through a Byzantine fault-tolerant full network voting process, enhancing the chain's security and irreversibility. The two work in synergy to achieve high performance, high security, and strong consistency in blockchain consensus, providing a solid foundation for BEVM's distributed economic model.

4.2 Sub-consensus: Agere Consensus

The Agere consensus mechanism starts from the core issue of optimizing the consensus quantification function, aiming to achieve a quantitative assessment of individual contributions and reasonable incentive distribution in intelligent multi-agent systems. From its inception, the Agere consensus strictly adheres to the principle of energy conservation in business closed-loop systems: by quantifying the workload of agents, it directly maps this to the output of equity tokens (BEVM), realizing a closed-loop structure of value flow.

Agere consensus adopts a hierarchical allocation mechanism, decomposing the complex agent collaboration problem into two parts for optimization: intra-system and inter-system. This design balances subjective scoring with objective measurement, allowing the system to capture the diversity of complex behaviors while maintaining overall fairness and consistency.

1. **BEVM Production Mechanism Based on Agent Workload**

   The primary goal of the Agere consensus is to directly map the completion of tasks by agents to the output of equity tokens through the quantification of workload, specifically including:

   - **Task Contribution Measurement**: Agents provide value to the network by completing tasks such as AI question answering, content generation, and data annotation. The completion of tasks is assessed through multiple indicators, such as accuracy, completion rate, and timeliness. These indicators are normalized into a contribution score, reflecting the Agent's actual performance in the tasks.
   - **Equity token mapping rules:** The output of contribution and equity tokens (BEVM) is directly mapped, maintaining a business closed loop that conserves energy.

2. **Compromise Quantification Scheme for Subjective Scoring**

   In the quantification of task contributions, some non-explicit factors (such as creativity and collaboration) are difficult to comprehensively measure through objective indicators. To address this issue, the Agere consensus introduces a subjective scoring mechanism, allowing agents to achieve a comprehensive quantification of contributions through mutual evaluation.

   Based on this, we propose two core elements: scoring (w) and equity pledge (s)

   1. **The score (w)** allows the Agent to express its contribution to the system's objectives through subjective judgment, capturing non-explicit factors in complex scenarios.
   2. **Equity pledges (s)** introduce credibility screening for this subjectivity through economic constraints, incentivizing the Agent to provide more reliable evaluations.

This design balances subjective expression and objective constraints, allowing for the quantification of the Agent's contribution to the goal through constrained subjective evaluations within the system, while also measuring the importance of different systems through cross-system weighted scoring. Based on these two core elements, we have designed a top-down hierarchical allocation process: first, a preliminary division of resources is conducted between systems, followed by further refinement of allocations within each system. This hierarchical approach ensures the rationality of overall resource distribution while maintaining the autonomy of local systems.

1. **Cross-system resource allocation:** The Agere consensus first addresses the allocation issue between systems. Agents are evaluated based on their contribution metrics to the Agere systeM(including multi-dimensional indicators such as system performance, resource utilization, value creation, etc.), forming an inter-system scoring matrix W, where w_{ij} represents the score of Agent i for the Agere system *j*. By combining this scoring matrix W with the staking rights *s* of each Agent, the consensus mapping function calculates the number of equity tokens each Agere system should receive.
2. **Resource Allocation within the System**: After the system resource quotas are determined, the Agere consensus mechanism shifts to internal allocation. Within a single Agere system, Agents are evaluated based on performance indicators such as their computational contributions to other Agents, collaborative efficiency, and goal achievement, forming a scoring matrix W, where w_{ij} represents the comprehensive evaluation of Agent i towards Agent *j*. This scoring matrix *W*, along with the staking rights s of the Agents within the system, determines the final resource allocation ratio for each Agent through a consensus mapping function.
3. **Consensus Mapping Function**: The consensus mapping function implements the mapping from subjective scores to the emission allocation function. Whether the allocation is between systems or within a system, the same three-step mapping mechanism is used to convert the score matrix W and the staked equity *s* into the final allocation E:
    a. **The consensus scoring generation mechanism** forms a consensus score $\bar{w}_j$ for each evaluated subject *j* (which may be a system or

Agent) from all scores. This is achieved through a staked-weighted median mechanism:

$$w_j \ = \ \max\left\{ w \ \middle| \ \sum_i \left[s_i \cdot \mathbf{I}(w_{ij} \geq w) \right] \ \geq \ \kappa \cdot \sum_i s_i \right\}$$

This formula implements the process of "pledge-weighted voting":

- s_i: The pledged amount of Agent i
- κ: Consensus threshold (usually 0.5)
- $I(w_{ij} \geq w)$ is an indicator function, which equals 1 when the score is greater than or equal to , and 0 otherwise
- $s_i \cdot I(w_{ij} \geq w)$ indicates the total amount of staking that supports a rating of at least
- $\kappa \cdot \Sigma s_i$ set the minimum staking ratio threshold required to form a consensus
- Ultimately, $\bar{w}_j$ selects the maximum possible score that meets the threshold requirements

b. **Scoring correction mechanism:** In order to balance the autonomy of individual scoring and the stability of the system, the original scores are corrected:

$$w_{ij} \ = \ (1 - \beta)\, w_{ij} \ + \ \beta\, \bar{w}_j$$

This linear combination implements soft constraints:

- β: Adjustment parameter, with values between [0,1]
- Retained the original score w_{ij} at a ratio of (1-β), maintaining the diversity of scores
- Introduce a consensus score $\bar{w}_j$ of β proportion, constraining the anomaly score
- The β parameter can be adjusted according to system requirements, and a larger value will make the ratings more

consistent

c. **Emission allocation calculation**: Finally, the system calculates the emission allocation based on the revised scores and the amount pledged

$$E_j = \frac{\sum_i \left(s_i \cdot \tilde{w}_{ij}\right)}{\sum_k \sum_i \left(s_i \cdot \tilde{w}_{ik}\right)}$$

This allocation mechanism ensures:

- The molecule $\Sigma_i (s_i \cdot \tilde{w}_{ij})$ represents the total score weighted by the stake obtained by Agent j
- Normalization of the weighted scores summed over all agents in the denominator
- The staked amount s_i plays a key role in the scoring weight
- The final allocation E_j reflects the combined effects of scoring and staking

Through this layered allocation mechanism, the Agere consensus not only achieves a rational allocation of resources between systems but also ensures the distribution of incentives within the system, ultimately allocating equity tokens precisely to each Agent.

4.3 Economic Models and Block Incentives

To ensure the fairness and sustainability of BEVM, the consensus layer designed a self-evolving economic model at the beginning of the system's launch. This model, while ensuring decentralization and security, enables the network to possess high vitality in its early stages through no pre-mining, deflationary issuance, and diversified incentive distribution, thereby laying a solid foundation for subsequent long-term development.

1. **Total amount 2.1 billion, no pre-mining and halving issuance**
   - Total Supply Cap: The total supply of BEVM tokens is set at 2.1 billion, achieving a balance between mathematical models and deflationary expectations;

- No pre-mining, starting from 0: During the genesis block, no pre-mining is conducted; all tokens are gradually released through the block generation process, ensuring fair competition under the same rules for early participants and later newcomers
- Halving every 4 years: Drawing on Bitcoin's method of inflation control, the block reward is halved approximately every 4 years (or at specified block intervals) until the tokens are fully issued, with the inflation rate gradually approaching 0. This mechanism not only provides sufficient incentives for the network in its early stages but also maintains the scarcity of token value during the later stages of inflation convergence.

2. **Three-way Distribution of Block Rewards**

   The issuance amount of each new block in BEVM adopts the "parent consensus + child consensus + treasury " three-dimensional distribution model, achieving multi-party incentives and ecological win-win

   - **Mother Consensus Incentives**(50%): Allocated to PoS validation nodes and BTC stakers, aimed at ensuring the underlying security of the network and its basic block production capability;
   - **Sub-consensus Incentives** (40%): Specifically used to incentivize multi-agent intelligent collaboration under Agere consensus, through a comprehensive assessment of "workload + subjective scoring + equity staking," accurately rewarding nodes or service providers that make actual contributions to the ecosystem;
   - **Treasury Injection** (10%): Treasury injection contracts, used for community incentives and risk reserves, among other purposes. This portion is managed and allocated by a decentralized governance process.

3. **Decentralized Governance and Fund Utilization**

   - **Treasury Governance**: The use of the treasury requires a publicly proposed initiative on the chain and must be executed following a voting process. The scope of proposals includes funding for new technology modules, support for community activities, or the allocation of funds for emergency events, among others;

- **Dynamic Adjustment:** When there are significant changes in network scale or demand, the community can initiate proposals to revise the treasury ratio, halve the cycle, or even the overall allocation plan, in order to rebalance safety, inflation, and community vitality
- **Transparency and Traceability**: All fund flows and voting processes are publicly recorded on the blockchain, allowing for auditing and tracing by any node, ensuring the fairness and transparency of decision-making.

5. Looking to the Future: The Optimization Path of BEVM

In order to build an intelligent cryptocurrency system that fully complies with the BEVM(λ) paradigm, we need to further address the following three key issues based on the current Agere consensus. The resolution of these issues involves not only breakthroughs at the technical level but also a deeper understanding of system design theory, to achieve comprehensive optimization of the cryptocurrency system in terms of energy conservation, decentralization, and emergent properties.

5.1 Improvement of Consensus Quantification Algorithms and Exploration of Emergence Mechanisms

Current limitations

The existing consensus quantification algorithms face the following issues in practical applications:

- The subjective scoring mechanism is difficult to fully decentralize and may be subject to manipulation by a few nodes
- As the system scale expands, there are bottlenecks in the computational complexity and scalability of the scoring system
- The lack of objective contribution measurement standards makes it difficult to achieve fair and scientific resource allocation.

Optimization Direction

Future research will focus on the following directions:

1. **Quantitative mechanism based on the principle of emergence**: Develop quantitative algorithms that can reflect the self-organizing characteristics of the system, thereby enhancing the system's robustness and dynamic adaptability.
2. **Design a self-organizing evaluation system**: establish a decentralized evaluation mechanism to enable efficient and fair contribution assessment in a distributed environment.
3. **Establish a scientific contribution measurement model**: Develop a mixed quantitative method that combines subjective and objective factors to ensure the rationality and fairness of resource allocation.

5.2 Design and Optimization of the Individual Model

Current limitations

The existing system still follows the account model of Ethereum, which leads to the following issues:

- State management relies on global storage in its implementation, exhibiting centralized characteristics
- The system lacks a truly Individual-based autonomous design, making it difficult to meet the principles of decentralization
- Each trading unit's failure to achieve independence increases the complexity of the global state.

Optimization Direction

To address the above issues, future work will focus on:

1. **Design new distributed data structures**: Develop an Individual-based distributed storage model to ensure data autonomy and separation.
2. **Decentralized State Management**: Implement decentralized management of state within the system architecture to reduce reliance on global state.

3. **Strengthen the independence of trading units**: Ensure that each trading unit has the ability for independent self-governance, fundamentally enhancing the degree of decentralization of the system.

5.3 Construction and Optimization of the λ Calculus System

Current limitations

The existing design of smart contracts has the following issues:

- The lack of computational models adapted to distributed scenarios results in low execution efficiency;
- There is a contradiction between Turing completeness and decentralization characteristics, making it difficult to satisfy both requirements simultaneously
- Lack of programming design paradigms specifically aimed at optimizing decentralized environments.

Optimization Direction

In response to these challenges, future work will focus on:

1. **Design a new smart contract language**: Based on the theory of input-output calculus, develop a smart contract language with decentralized characteristics to enhance the execution efficiency of the system.
2. **Balancing Turing Completeness and Distributed Characteristics**: By designing specific language constraints and optimization models, ensure the efficiency and scalability of distributed computing while maintaining Turing completeness.
3. **Achieving a decentralized computing architecture**: In a distributed environment, develop a stateless computing model to ensure system scalability and decentralization.

6. Summary

This paper conducts an in-depth examination of the three major issues of Turing incompleteness, consensus mechanism efficiency, and network scalability proposed by Ethereum, revealing that these technical improvements actually deviate from the core design principles of cryptocurrency. Based on this understanding, we propose the BEVM(λ) paradigm, which consists of four core components: the Individual model, λ calculus, consensus algorithms, and consensus-aware algorithms.

The elements not only reveal the essence of Bitcoin's success but also provide a theoretical foundation for the design of intelligent cryptocurrencies. Based on this, we have designed an innovative dual-layer consensus architecture: the parent consensus based on Bitcoin ensures the security and stability of the system, while the child consensus centered on Agere consensus opens up a future-oriented path for intelligent development.

In order to ultimately achieve true intelligent cryptocurrency, our team will continue to explore improvements in consensus quantification algorithms, reinforcement of individual models, and optimization of the λ calculus system.

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