SoonChain

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ABSTRACT

SoonChain is an Optimistic Rollup-based ETH Layer 2 network, designed for efficient market transactions and AI-driven fast game development. By integrating AIGG and DCRC, SoonChain provides a low-cost, efficient, and scalable blockchain platform for game developers.

1 INTRODUCTION

As blockchain technology continues to evolve, particularly with the rise of Web3 and decentralized applications (dApps), blockchain gaming is becoming the future of digital entertainment. However, current blockchain platforms face a series of challenges in game development, including performance bottlenecks, inefficient resource scheduling, and a lack of development tools. While Optimistic Rollup technology has improved scalability for Ethereum, these issues still hinder the efficiency and cost-effectiveness of game development.

This paper introduces SoonChain, an optimistic rollup-based blockchain platform designed to address these core challenges through two key innovations:

- **AIGG:** Leveraging deep learning and automation to generate game code, smart contracts, and optimized designs, AIGG provides developers with an intelligent, low-barrier development environment, enhancing efficiency and reducing technical complexity.
- **DCRC:** DCRC optimizes the allocation of computational resources, ensuring efficient operation of Web3 applications and providing flexible scalability through cross-chain resource management.

SoonChain, built on the OP Stack and connected to the Superchain, offers an efficient, flexible development environment for game developers through smart contract automation, dynamic resource allocation, and cross-chain support. With cross-chain bridging and fast economic finality, SoonChain enables low-cost liquidity access and transaction settlement, driving the growth of the Web3 gaming ecosystem. Its open-source development process includes extensive testing on a public testnet before the SoonChain mainnet launch.

2 PRIOR WORK AND CURRENT CHALLENGES

Blockchain technology, particularly platforms like Ethereum, has improved throughput through Rollup solutions, offering greater scalability for decentralized applications(dApps). However, as the decentralized ecosystem expands, existing platforms continue to face significant challenges, especially in supporting complex applications such as blockchain-based game development.

The primary challenge lies in the inefficiency of game development. Developers are required to manually write large amounts of code for game development, which increases complexity and costs. This has led to an inability to meet the fast-paced demands of game development and difficulty in accommodating the rapid iteration and optimization required for game projects.

Additionally, insufficient resource scheduling represents another key bottleneck in current systems. While Layer 2 solutions using Rollup expand the network's throughput capacity, limitations persist in dynamic resource management and cross-chain liquidity, particularly under high-load conditions. Blockchain platforms struggle to efficiently allocate and schedule computational resources, leading to slower transaction speeds and causing resource wastage and performance bottlenecks in high-resource-demand applications like game development.

To address these challenges, SoonChain integrates the AIGG AI engine and DCRC dynamic compute resource cluster technology, proposing an Optimistic Rollup-based solution aimed at improving game development efficiency, optimizing resource scheduling, and enhancing transaction processing. By supporting cross-chain functionality, SoonChain provides stronger liquidity and more efficient development tools.

3 CORE TECHNOLOGIES AND KEY INNOVATIONS

SoonChain addresses the low development efficiency in blockchain gaming and decentralized application development through the integration of AIGG, significantly enhancing development speed and efficiency. Additionally, SoonChain optimizes resource scheduling with DCRC, effectively solving core issues related to resource allocation and deployment in games, ensuring efficient operation even under high-load conditions.

3.1 AIGG Engine

The AIGG engine is one of SoonChain's core technologies, focused on utilizing deep learning, reinforcement learning, and natural language processing (NLP) to intelligently generate game code and smart contracts. Its key features include automatically generating game frameworks based on developer input, optimizing game design, and generating and deploying smart contracts to support on-chain games. The working principle of AIGG in generating games and smart contracts is as follows:

- **Automatic Game Framework Generation:** AIGG automatically generates game frameworks by combining deep learning models with developer requirements. The system first utilizes natural language processing (NLP) technology to parse the textual input from developers, understanding the game type, mechanics, and features, while extracting the best design patterns. Based on large-scale deep neural network training, AIGG analyzes millions of game design cases, using a Transformer-based encoder-decoder structure to convert the requirements into specific game logic modules. This ensures that the generated framework is modular, scalable, and highly operable. Additionally, AIGG creates core game mechanics, including player interactions, battle systems, and task systems, through automated framework generation, while automatically adjusting core mechanisms based on game types (e.g., MMO, RPG) to meet diverse game design needs.
- **Automatic Optimization of Game Logic:** AIGG's optimization capabilities rely on reinforcement learning algorithms, aiming to continuously improve AIGG's large language model through player-generated feedback. During the development process, AIGG adjusts the generated game frameworks and logic based on player behavior and in-game experience feedback. By learning from player preferences, actions, and interactions, AIGG optimizes the design templates and adjusts the generation process, enhancing the quality and efficiency of subsequent game development. For example, AIGG continually adjusts game design parameters such as difficulty, resource allocation, and mechanics through reinforcement learning to ensure the generated game logic is balanced, innovative, and provides a better player experience. Furthermore, AIGG employs a self-feedback mechanism with deep neural networks (DNN), continuously learning from player feedback to refine the algorithms and models used in game generation, ensuring that each game generated better meets player needs.
- **From Natural Language to Game Code and Smart Contracts:** AIGG uses natural language processing (NLP) technology to convert developer requirements into specific game code and smart contracts. First, AIGG leverages NLP to understand the developer's textual descriptions, automatically identifying the core game mechanics, gameplay, and logic through semantic analysis and intent inference. Based on this understanding, AIGG generates game frameworks, smart contracts, and the code required for on-chain applications using pre-trained models. The generated smart contracts undergo automated security verification, including formal verification, vulnerability detection, and optimization suggestions to ensure their safety and reliability. Ultimately, AIGG can deploy the generated smart contracts directly to the blockchain, supporting the on-chain operation of games. AIGG's automated code generation and smart contract deployment functions enable developers to focus on game design and innovation, without needing to focus on technical implementation or contract writing, thus improving development efficiency and ensuring accuracy.

3.2 DCRC

DCRC is another core technology of SoonChain, designed to optimize computational resource allocation on the blockchain platform. As Web3 applications continue to grow, existing blockchain platforms face significant limitations in computational resource management, especially during high load and concurrency. DCRC addresses these issues through the following technological innovations:

- **Dynamic Resource Allocation and Load Balancing:** DCRC utilizes a machine learning-based resource scheduling algorithm that dynamically adjusts resource allocation by real-time analysis of network and computing resource load

conditions. The algorithm combines real-time monitoring data, historical performance data, and application demand prediction models to intelligently manage computational resources. Specifically, DCRC adjusts the resource pool size based on load forecasting, ensuring that computational capacity can rapidly scale during high-load or surge traffic scenarios.

- **Cross-chain Resource Management:** DCRC supports cross-chain resource scheduling, enabling dynamic allocation of computing resources across multiple blockchains. Through an abstraction mechanism called "resource containers," DCRC isolates resource pools and manages them via cross-chain protocols, ensuring more efficient resource flow between blockchains. Specifically, DCRC allocates computational nodes between chains to prevent resource overload on a single chain and improve the execution efficiency of cross-chain applications.
- **Elastic Scalability and Fault Tolerance:** DCRC adopts a decentralized architecture, ensuring that computational resources remain stable even in the event of node failures or anomalies. Each node is capable of independently executing tasks and can back up through redundancy mechanisms to ensure high system availability. Additionally, DCRC leverages blockchain technology to implement decentralized resource scheduling, avoiding the risk of a single point of failure that could collapse the entire system.
- **Efficient Resource Allocation Algorithm:** DCRC optimizes the allocation of computational resources using deep learning and evolutionary algorithms (such as genetic algorithms). In Web3 applications, DCRC's optimization algorithms intelligently select the most optimal resource configurations based on actual application demands and predicted load scenarios, reducing resource waste and maximizing system throughput.

4 INNOVATIVE SOLUTIONS OF SOONCHAIN

SoonChain integrates AIGG and DCRC technologies to provide an innovative solution aimed at addressing the challenges faced by blockchain game development and decentralized applications.

4.1 Improved Resource Scheduling and Performance

SoonChain enhances the performance of blockchain games and decentralized applications through Rollup architecture and dynamic resource scheduling. Its core technological innovations are as follows:

- **Automated Smart Contracts and Resource Scheduling:** Through AIGG's smart contract generation and DCRC's resource scheduling, SoonChain automatically optimizes game performance and resource allocation, reducing manual configuration work for developers and ensuring efficient operation across multi-chain environments.
- **Low Latency and High Throughput:** Leveraging the advantages of optimistic validation and Layer 2 computation, combined with Rollup technology and DCRC's dynamic scaling capabilities, SoonChain significantly reduces transaction confirmation latency and increases throughput, ensuring smooth operation in high-concurrency games and applications.

4.2 Decentralization and Cross-chain Support

SoonChain solves the bottlenecks of current blockchain platforms in cross-chain liquidity, resource scheduling, and security through decentralization and cross-chain technology.

- **Decentralized Node Validation:** Through a decentralized validation network, SoonChain ensures the security and reliability of the system, preventing risks associated with single-node failures.
- **Cross-chain Resource Scheduling and Liquidity:** SoonChain solves cross-chain liquidity and resource management issues through innovative cross-chain bridging technology, enabling developers to efficiently allocate resources across multiple chains and driving the growth of the Web3 ecosystem.

5 NETWORK AND ECOSYSTEM ARCHITECTURE

SoonChain is built on the OP Stack, providing an efficient, flexible, and scalable blockchain platform designed specifically for Web3 applications and blockchain games. The architecture of SoonChain focuses on efficient resource scheduling,

low-latency transaction confirmations, and cross-chain liquidity, aiming to offer developers an environment capable of supporting large-scale applications.

5.1 Decentralized Validation Network

To ensure transaction security and platform reliability, SoonChain employs a decentralized validation network. Multiple independent nodes participate in transaction validation, eliminating the risk of single-node failure. Each validation node verifies transactions and reaches consensus, ensuring data accuracy and immutability.

5.2 Cross-chain Resource Scheduling and Liquidity Support

SoonChain's cross-chain bridging technology enables efficient resource flow across different blockchains. Through cross-chain protocols, SoonChain connects the computational resources and data of different blockchain platforms, providing liquidity support for decentralized applications. Whether it's synchronizing transaction data or scheduling cross-chain resources, SoonChain maintains high interoperability and low latency across chains.

5.3 Developer Support and Tools

SoonChain provides comprehensive tools and services to ensure efficient application development and deployment. These include robust SDKs, APIs, and smart contract templates, allowing developers to easily integrate SoonChain's core functionalities and quickly build decentralized applications.

- **SDKs and APIs:** SoonChain offers various development tools to help developers quickly implement decentralized applications, from game development to smart contract deployment and resource management. The SDK supports functionalities such as on-chain data interaction, cross-chain bridging, and resource management, greatly simplifying development tasks.
- **Developer Community:** SoonChain promotes the development of an open-source codebase and an active developer community, where developers can share experiences, ask questions, and publish applications, further driving the growth of the Web3 ecosystem.

5.4 Platform Scalability

SoonChain's architecture is designed to support stable performance during large-scale traffic, leveraging Rollup architecture and DCRC dynamic computing resource clusters to ensure efficient resource allocation and quick responses under high concurrency.

6 POTENTIAL FUTURE WORK

AIGG modules cover most of the game development lifecycle, but improvements are still needed. SoonChain aims to fully realize the AIGC vision, revolutionizing game development.

- **AIGG Engine Optimization:** Adding intelligent modules to enhance content creation, design optimization, and user experience.
- **DCRC Scaling and Compute Power Enhancement:** Expanding DCRC's resources and supporting cloud deployment in more regions to ensure efficient global performance.

7 CONCLUSION

SoonChain addresses key challenges in blockchain gaming and decentralized application development, particularly resource scheduling and cross-chain liquidity. By integrating AIGG and DCRC technologies, SoonChain provides an efficient, low-cost platform for developers, driving the rapid growth of the Web3 ecosystem.