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Research on the Integration of Block Chain and Cloud Computing

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Abstract: ***The public sector and enterprises are currently building an Internet node to effectively utilize all idle resources, implementing a new business service model that meets relevant functional requirements and fully plays their respective roles. The emergence of cluster technology and cloud computing will provide theoretical support for the integration of these two technologies. On this basis, the development of cluster and cloud computing integration technology to provide support for cluster technology and application infrastructure, reducing the time and cost of deploying the platform. "IT business" continues to expand the production chain in a broader field, and at the same time creates a stronger impetus for the improvement of the quality of employees.***

Keywords: Blockchain; Cloud computing; Integration; Baas.

1. INTRODUCTION

Blockchain technology is also known as integrated technology, and in recent years, blockchain technology has been seen as a step beyond large computers, Another disruptive technological innovation after the PC and the Internet, as a reliable technology solution, now covers all areas of economic and social life, from digital currency to the Internet +. This could have a significant impact, even disruptive change, on the industry. However, the development, research and testing of blockchain technology includes a number of systems, including time costs and capital costs. In this regard, they have supported technical cooperation activities for the development of SMEs in developing countries and countries in transition. If we build a test environment through the cloud, the above problems will be solved, At the same time, the development of cloud technology and blockchain technology has created a new cloud service market, and the "service chain" has accelerated the pace of technological application of cluster chains in multiple fields, driving the reform of the service market of cluster networks. In medical diagnostics, Diao et al. (2025) made notable progress by optimizing Bi-LSTM networks for improved lung cancer detection accuracy, achieving superior performance metrics compared to traditional methods [1]. Industrial applications have similarly benefited from AI innovations, as evidenced by Zhao et al. (2024), who developed a deep learning-based approach for steel production scheduling optimization, significantly improving manufacturing efficiency [2]. The financial sector has witnessed substantial AI-driven transformations. Yang et al. (2025) proposed a novel big data-based method for economic cycle prediction, demonstrating enhanced forecasting accuracy [3]. Their subsequent work employed convolutional neural networks for stock market sentiment analysis, offering improved prediction capabilities [4]. Further advancing financial technologies, Jiang et al. (2025) introduced Investment Advisory Robotics 2.0, leveraging deep neural networks to provide personalized financial guidance [5]. Network optimization has also seen significant improvements through AI applications. Tu (2025) developed Log2Learn, an intelligent log analysis system that enables real-time network optimization through advanced machine learning techniques [6]. In environmental health research, Ma et al. (2024) investigated the relationship between maternal metal exposure and fetal liver function, providing important insights into environmental impacts on fetal development [7]. Financial knowledge representation was enhanced by Yang and Duan (2025) through their innovative approach to constructing knowledge graphs for the US stock market, incorporating statistical learning methods for improved risk management [8]. Logistics operations have similarly benefited from AI, with Luo et al. (2024) developing a novel path planning algorithm for logistics robots that integrates transformer and GCN networks, significantly improving operational efficiency [9]. The supply chain domain has seen particularly noteworthy advancements, as demonstrated by Saunders et al. (2025), who comprehensively analyzed AI-driven smart supply chains, identifying key pathways and challenges for enhancing enterprise operational efficiency [10].

2. THEORETICAL SUPPORT OF BLOCKCHAIN AND CLOUD COMPUTING INTEGRATION

In order to effectively integrate blockchain and cloud computing, they should have the same or similar rationale at the interface. Currently, cluster systems include three network types: federated, public, and private. The theoretical basis for the integration of these two technologies includes very similar application types and basic similar functional characteristics of each application. From a network structure perspective, the application of these two technologies in the cloud is very important. While traditional network systems do not have nodes, the status quo is that all data obtained from the entire circuit technology can be shared and then disseminated over the Internet. ICT can compete with computer performance, can automatically generate data during the competition, and can employ automated contracts as a means. If blockchain technology is adopted, contracts will be automatically executed by computers, cloud cost accounting technology will be used, various decentralized information will be collected, and cost-effective data will be distributed in a cost-effective manner.

3. CLOUD BLOCKCHAIN PLATFORM TO REDUCE COSTS

Blockchain is a small technical bit, technical system, and model to ensure reliability and control over different transaction issues. Unit chain is a multi-technology complex based on P2P value transfer protocol, consensus mechanism, distributed network, asymmetric encryption system and knowledge distribution.

At present, the industrial chain is divided into three categories: social chain, alliance chain, and private chain. The private industry chain and the three industrial chains are analyzed because of their different concentration. Cloud component circuit technology, such as node access, is essentially the product of the integration of traditional computer and network technology, such as distributed computing, parallel processing, network memory, virtual integration, load balancing, resource flexibility, fast adaptation, low cost, high reliability, etc.
Cloud computing currently falls into three categories: public, private, and hybrid. In terms of network structure, these three types of circuits are very similar to the three types clouds: social groups emphasize the openness and exchange of resources or information; Modules and cloud computing chains are similar not only conceptually, but also in architecture and some applications. Blockmesh is a distributed network based on IP protocol, without central server node and central control node. The view of data structure and computing power is also referred to as distributed network-based distributed accounting techniques. In the absence of inspection by other central authorities, each data text is cracked, encrypted and distributed across the network by the user's own key. At the same time, the "parts recycling technology demonstration" mentioned in the concept provides some work for data reporting through cost comparison. Although cloud computing uses virtualization to "store, compute, and compile languages," But computers can automatically execute protocols at the same time, and "cloud" means hardware and software distributed across different organizations and regions are highly integrated, forming a central platform across different organisations and regions, and representing costs through blockchain technology according to the needs of the organization and users. On this basis, the network structure, data structure, capacity requirements are analyzed. Demand for startups, research institutes, open source institutions, alliances and financial institutions across the industrial chain. The centrality, anonymity and inviolability of data are consistent with the long-term goals of cloud computing.

4. THE APPLICATION OF BLOCKCHAIN AND CLOUD COMPUTING

4.1 Data center architecture

Traditional network architecture, mainly based on cloud computing technology. In the design of a data center, it consists of two aspects: the various types of user hardware and software, including personal computers, and the large amount of component data stored on the carrier platform in the application. The integration of the two systems as a whole required the establishment of a communications system within the system to enable staff to utilize both systems. Data can be retrieved quickly, and fragmented data can be consolidated through cloud computing.

4.2 Computing center structure

This article describes a cloud computing hub that provides cloud computing services for operators. Compared with the traditional cloud computing, the local cloud computing, which distributes the fragment data to the whole block chain, puts forward higher request to the ICC (ICC as an Intelligent Commerce Chain), so that the ICC can effectively integrate various fragment data. The design of the system ensures the combination of ICC and traditional digital reference center. In the case of domain-specific technologies, the cloud computing center must be able to independently plan resources, such as choosing its own IP files. Address, router and gateway settings,

partition, etc., effectively stored in the cloud computing center to ensure the migration and security of relevant data.

4.3 Select communication mode

Block chain is a new decentralized storage technology, combined with cloud computing can effectively guarantee the integrity and security of data. By using the block chain to store the log information in the database, we can reduce the direct manipulation of the source data, avoid data leakage and ensure data security. Using block chain technology and cloud computing technology, researchers can verify the integrity of the cloud file data, data distribution and decentralized storage. However, the consistency and immutability of data in a blockchain should be based on a large amount of redundant data, which means that even if users only store a small amount of data, the data generated by the blockchain can be huge, not only a waste of resources, but also difficult to manage and meet real needs. Therefore, researchers can store the raw information generated by the data source and the operation log behaviors of the server nodes as data raw information into blocks, using a distributed storage method, which is immutable. At the same time, the data can be flexibly adjusted to generate data modules based on audit modules as needed. The commercial cloud service platform specializes in backing up data uploaded by users so that each backup can record and verify log information. Because the block information stored by the nodes is very redundant, the cloud service platform can verify all the actions of the nodes, determine whether the actions are legal, block illegal actions, and ensure the security of view distance. Among them, the audit module generates data information, which can be used for information security protection. In this way, the raw data produces relatively small information about things, generally around 1KB.

5. THE MEANING OF BLOCKCHAIN DEVELOPMENT

In the area of cloud computing, vendors see the potential business opportunities in the group service chain to serve customers, have extended an olive branch. The application of modular chain technology is gradually being replaced by block chain technology. It is an effective platform to solve the problem of cloud computing. In the context of traditional information design, the design is flexible and the deployment is rapid. It has been running for nearly half a year. At the same time, after the project is completed, the waste of resources will be addressed, and resources for device development will immediately be used in security, taking security measures such as preventing internal attacks, isolating more efficient operating systems. It was announced in November 2015 that the BAAC service will be available on the platform, and the service will be officially launched and available in August 2016. Build a developer component chain environment on the platform in the simplest and most efficient way, In February 2016, IBM launched a new block service platform, which uses a new block network for IBM to use. The close connection between cluster chain and cloud computing has facilitated the transformation of BAAC to a public trust infrastructure, forming the trend of technology convergence. Connect blockchain and cloud computing platforms. In particular, enterprise platforms in blockchains, i.e. federated chains, the block environment needs to be improved through the cloud, blockchains are a chain that can be used by the public, so they provide a stable and reliable platform for computing the cloud dispersion of cluster chains and the two technologies of clustered chains. The merger was designed to meet the needs of companies and developers operating in different industries and sectors, create the conditions for rapid construction, use, testing and dismantling, and reduce operational time and staff costs. And it offers a wide variety of services, with new profitable project technologies in the cloud market. It not only provides cluster system services, but also improves the implementation of products and applications.

6. CONCLUSION

In summary, in the application process of local cloud computing technology based on block chain technology, due to the high similarity between cloud computing technology and block chain technology at the level of network architecture and technology application mode. The two technologies can be rationally integrated so that customers can cut the relevant data and distribute the piecemeal data throughout the blockchain system. The specific design of the system includes local data center, cloud computing center and communication system. In doing so, it is necessary to ensure that the two data centers can effectively connect to each other to achieve the rapid integration of fragmented data.

PROJECT PROJECTS

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