区块链技术近年来发展迅速，相关应用如雨后春笋般蓬勃发展。区块链应用生态圈逐渐形成，绝大多数的应用通过接入区块链公共服务机构如以太坊(Ethereum)、超级账本(HyperLedger)等加入区块链网络。应用的接入依赖于单一的节点导致了整个应用的流量压力全部集中到一个Geth客户端上，使得基于以太坊的区块链应用的并发性能较低。同时，由于区块链技术多应用于数字信息交易领域，对数据安全要求较高，因此单Geth客户端的架构在容灾和可靠性方面亦存在不足。

As block chain technology has developed rapidly in recent years, related applications have mushroomed as well. The blockchain application ecosystem is gradually forming, and most applications join the blockchain network by accessing blockchain public service agencies such as Ethereum and HyperLedger. The access of these applications relies on a single node, which causes the traffic pressure of the entire application to be concentrated on a Geth client, making the Ethereum-based blockchain application's concurrent performance poor. At the same time, because blockchain technology is mostly used in the field of digital information transactions, and requires high data security, the architecture of a single Geth client also has shortcomings in disaster tolerance and reliability.

针对上述问题，结合区块链与相关业务场景的特点，设计和实现高性能以太坊服务系统极为必要。因此，本文结合微服务思想设计了以太坊后台服务架构，基于Docker构建了多Geth客户端的以太坊服务平台，基于Geth客户端在Docker容器中的运行状态设计了反馈负载均衡策略，并最终实现了面向私募股权交易的区块链应用平台。本文主要工作如下：

In view of the above problems, it is extremely necessary to design and implement a high-performance Ethereum service system based on the characteristics of the blockchain and related business scenarios. Therefore, this research designs the Ethereum back-end service architecture based on the idea of the microservices, builds an Ethereum service platform with multiple Geth clients based on Docker, designs a feedback load balancing strategy based on the running state of the Geth client in the Docker container, and finally implements A blockchain application platform for private equity transactions. The main work of this research is as follows:

1. 提出一种基于微服务思想的面向私募股权的区块链服务平台设计方案。根据业务特点和技术特点设计灵活的应用架构，可以在资源耗费最小的情况下满足业务要求，同时在需要的时刻快速进行系统延展。

1. Propose a design scheme of a private equity-oriented blockchain service platform based on the idea of microservices. Design a flexible application architecture based on business features and technical traits, which can meet business requirements with minimal resource consumption, and quickly expand the system at the moment of need.

2. 基于以太坊(Ethereum)自身特点提出了一种状态反馈负载均衡策略，该策略考虑区块链节点运行状态建立状态空间，对状态空间中的节点进行负载分配实现系统的可靠性和高性能。主语??并将该负载均衡策略应用于基于容器化技术思想构建了一种灵活的底层区块链服务平台。该平台将以太坊客户端运行于容器中作为单一节点，结合负载均衡策略实现可靠性和高性能。

2. Based on the characteristics of Ethereum, a state feedback load balancing strategy is proposed. This strategy considers the operating status of the blockchain nodes to establish a state space, and performs load distribution on nodes in the state space to achieve system reliability and high performance. This load balancing strategy is applied to build a flexible underlying blockchain service platform based on the idea of ​​containerization technology. The platform will run the Ethereum client in the container as a single node, and combine the load balancing strategy to achieve reliability and high performance.

3. 实现了面向私募股权的区块链服务系统，包括账户管理、转账管理和合约发布等业务功能，以及状态监控、网关管理等后台模块功能。结合区块链的智能合约等技术特点实现了私募股权交易自动化结算与科学管理功能。

3. Implemented a private equity-oriented blockchain service system, including business functions such as account management, transfer management, and contract issuance, as well as background module functions such as status monitoring and gateway management. Combined with the technical characteristics of the smart contracts of blockchain, it has realized the functions of automatic settlement and scientific management of private equity transactions.

**关键字**：以太坊、高并发、微服务、负载均衡、私募股权

**Keywords:** Ethereum, high concurrency, microservices, load balancing, private equity