

# Hot Pot Chain

white paper



# Catalog

Catalog.....	- 1 -
Preface.....	- 2 -
Current situation of food safety.....	- 2 -
Technical characteristics of blockchain.....	- 3 -
Blockchain application.....	- 4 -
Introduction to Hot Pot Chain.....	- 6 -
Hot pot chain application.....	- 6 -
The ecological composition of Hot pot Chain.....	- 6 -
HPChain Cloud storage overview.....	- 7 -
HP Cloud storage platform system.....	- 9 -
Software definition storage system based on distributed architecture.....	- 10 -
HP Chain Cloud storage system application.....	- 13 -
HP Cloud storage system and virtualization platform.....	- 15 -
Hot Pot Chain Cloud management system.....	- 21 -
HP Cloud management system application.....	- 24 -
HPChain Cloud storage system.....	- 27 -
HPChain logistics system.....	- 28 -
Token Distribution ratio.....	- 29 -
Token allocation proportion.....	- 30 -
Foundation.....	- 32 -
Core team.....	- 33 -
Investment institution.....	- 35 -
Project mileage.....	- 36 -

## Preface

The situation of food consumption upgrading, agricultural product industry upgrading and food safety is severe. The market mainly focuses on consumers. How to start from the source of the industrial chain to ensure every link of food from planting and purchasing, trade and logistics, processing of food raw materials and feed raw materials, breeding and slaughtering, food processing, distribution and logistics, brand promotion, food sales, etc. to achieve healthy and safe food The whole process of product supply has become the world's first problem.

## Current situation of food safety

Today's food system, from farm to table, has evolved into a complex network of multiple elements. There is no doubt that today's food system provides consumers with a variety of convenient and economic food sources. At the same time, it also brings many new challenges. At present, when tracing the source of various components of the food system (such as farms, processing plants, distributors, retailers, etc.), the data records of many links are still in written form. Although some people use digital methods to solve this problem, they use the three links of agricultural production, circulation, and consumption, and the producers and consumers are too scattered and weak, so both sides cannot To achieve information symmetry, it is impossible to directly connect and determine the price. Both sides can only make rational but helpless choices: producers use all ways to reduce costs; consumers can only choose products with lower prices; distributors can only fight price wars, resulting in a vicious circle.

## Technical characteristics of blockchain

Blockchain is a new application mode of distributed data storage, point-to-point transmission, consensus mechanism, encryption algorithm and other computer technologies. Blockchain is an important concept of bitcoin. It is essentially a decentralized database. At the same time, as the underlying technology of bitcoin, it is a series of data blocks generated by using cryptography method. Each data block contains a batch of bitcoin network transaction information, which is used to verify the effectiveness (anti-counterfeiting) of its information and generate the next area Block.

From the perspective of science and technology, blockchain involves many scientific and technological issues such as mathematics, cryptography, Internet and computer programming. From the perspective of application, simply speaking, blockchain is a distributed shared ledger and database, which has the characteristics of decentralization, non tampering, whole process trace, traceability, collective maintenance, openness and transparency. These characteristics ensure the "honesty" and "transparency" of the blockchain, and lay the foundation for the creation of trust in the blockchain. The rich application scenarios of blockchain are basically based on the fact that blockchain can solve the problem of information asymmetry and achieve cooperative trust and concerted action among multiple agents.

### **Decentralization:**

Blockchain technology does not rely on additional third-party management agencies or hardware facilities, and there is no central control. In addition to the self-contained blockchain itself, each node realizes information self verification, transmission and management through distributed accounting and storage. Decentralization is the most prominent and essential feature of blockchain.

### **Openness:**

Blockchain technology is based on open source. Except that the private information of all parties to the transaction is encrypted, the data of blockchain is open to all. Anyone can query the blockchain data and develop relevant applications through the open interface, so the information of the whole system is highly transparent.

### **Independence:**

Based on the agreed specifications and Protocols (such as the hash algorithm

adopted by bitcoin and other mathematical algorithms), the whole blockchain system does not rely on other third parties, and all nodes can automatically and safely verify and exchange data in the system without any human intervention.

**Security:**

As long as we can't control 51% of all data nodes, we can't arbitrarily manipulate and modify the network data, which makes the blockchain itself relatively safe and avoids the subjective and artificial data changes.

**Anonymity:**

Unless required by laws and regulations, technically speaking, the identity information of each block node does not need to be disclosed or verified, and the information can be transmitted anonymously.

Because of the collapse of food safety problems, there are many giant enterprises. The field of food supply chain brings together farmers, warehousing, transportation companies, distributors and retail stores. In so many links, the information recording method is old and error prone. Through the use of blockchain, hanging on the steel wire, food companies can more quickly trace back to the source of food problems. This can not only help reduce consumer risk, provide security, but also reduce financial losses through targeted recall.

## **Blockchain application**

The application of blockchain technology has extended to digital finance, Internet of things, intelligent manufacturing, supply chain management, digital asset trading and other fields, showing a broad application prospect. We should follow the trend and take advantage of it, vigorously implement the innovation driven development strategic action plan led by big data intelligence, accelerate the development of blockchain technology and industry innovation, and provide strong support for high-quality economic development.

With the change of market environment, the competition among enterprises has gradually evolved into the competition among supply chains. Combining with the blockchain technology to innovate the supply chain management, aiming to ensure

the safety of meat food, this paper studies and constructs a meat food supply chain management information system based on the open-source blockchain technology, which mainly realizes the functions of credible traceability of meat food, anti-counterfeiting verification in the logistics process, etc.

People often talk about the "food supply chain". In fact, it is not a literal linear chain. Today's food system, that is, the way to get food from farm to table, has evolved into a complex network of multiple elements. There is no doubt that today's food system provides consumers with a variety of convenient and economic food sources. At the same time, it also brings many new challenges. At present, the data records of many aspects of the food system components (such as farms, processing plants, distributors, retailers, etc.) are still written, although some people use digital methods to solve them.

Blockchain is a kind of public and distributed ledger. Unlike centralized recording, its data source is single and data records are consistent (by recording data at all nodes at the same time), so that a clearer tracking channel can be created in all links.

By using blockchain, food companies can more quickly trace back to the source of food problems. This can not only help reduce consumer risk, provide security, but also reduce financial losses through targeted recall. At the same time, food companies can attach labels connected to the Internet of things to the goods, and each batch of goods is assigned a unique identification number. Through these identification codes, we can record the source of products, processing information, storage temperature, shelf life and other information.

On the enterprise side, at each stage of the supply chain, employees can simply "register" products (write into blocks) using their identification codes, and the blockchain will safely track products across checkpoints. Employees can also input identification codes to obtain real-time data of products and their historical records, which is a significant improvement over connecting all links and transferring files among multiple people.

Shoppers provide data traceability, and companies cooperate to register employee compensation to ensure equity and equality. To improve its financial efficiency and public opinion stability related to the supply chain.

For example, the purchase process of chemical fertilizer and pesticide should be recorded to avoid the problem of excessive heavy metals and pesticide residues from the root; the credit rating reference of growers and purchasers should be established through big data analysis; the fair trade between growers and purchasers should be guaranteed by using smart contracts. The sales process also stores sorting and processing information in distributed ledgers to ensure complete and transparent information to stakeholders.

## Introduction to Hot Pot Chain

The Hot Pot Chain is called HP for short. It integrates procurement, R & D, production, storage and transportation. Based on the block chain technology, it proposes HP consensus based on the dpos super node mechanism and integrity certification mechanism. Based on this, it establishes HP chain, establishes a service operation platform dedicated to solving catering supply chain problems, provides users with appropriate, timely and priced food materials, and enables catering operation Better, to build a global well-known catering materials supply chain operation and management platform.

## Hot pot chain application

Hot Pot Chain focuses on the use of blockchain, Internet, big data, supply chain, etc. to improve the efficiency of food supervision, accelerate the realization of the whole process trace, information traceability, so that consumers can buy safely and eat safely. Hot pot chain, as a technology with decentralization as the core, the relevant data is open and transparent among all parties of the transaction, thus effectively forming a chain of information and value sharing. As the blockchain has the characteristics of data that can not be tampered with, once the data is uploaded, it can not be changed, so it is easier to make the food source can be checked, the destination can be traced, and truly achieve food traceability.

## The ecological composition of Hot pot Chain

Hpchain traceability platform uses the characteristics of multi-center credit, safety, reliability, efficiency and low cost of blockchain to provide supply chain traceability services for manufacturing enterprises / creators, warehousing enterprises, logistics

enterprises, distributors at all levels, retailers, e-commerce and consumers, and to build a high-quality brand ecological chain: bidirectional product traceability, auxiliary anti-counterfeiting, real-time collection and supply chain key information Sharing, improving the efficiency of circulation, and realizing a win-win organic market operation system.

HPChain not only has the output capability of multilingual smart contract, pluggable consensus algorithm, multiple privacy protection, cross chain operation and other infrastructure, but also has the technical innovation advantages in improving transaction performance, data processing ability, enriching development components and so on. It can not only meet many business demands (identity, data, privacy, authority, supervision, etc.) of the industry blockchain network, but also support the public demand (decentralization, incentive mechanism, Internet of things value transfer) of public blockchain network construction.

In short, HPChain uses "blockchain" to guarantee rights and interests, improve the reliability and efficiency of value transfer, uses "digital fingerprint" to identify items, and uses "IOT" intelligent control to form a decentralized, incentive mechanism and Internet of things value transfer network system.

## HPChain Cloud storage overview

The trust cooperation mechanism provided by blockchain provides reliable technical support for solving the problems of multi-party cooperation in supply chain. The following hpchain will start from the technical characteristics of blockchain, and specifically analyze the innovation that blockchain brings to the supply chain.

### 1. Block linked data storage

Based on the traditional supply chain, hpchain emphasizes more on the deep preservation and searchability of data to ensure the traceability of required records in the past transactions. Its core is to create a source for each commodity based on other components. The unique data storage mode of hpchain enables the raw material information, component production information, each commodity transportation information and each data of finished products involved in the supply chain to be permanently stored on the chain in the form of blocks. According to all kinds of information between enterprises recorded on the chain, data traceability

can be easily carried out, and problems such as fake and inferior products can also be solved. Through this way of data storage, the framework of hpchain meets the needs of every participant in the supply chain: input and track the source of raw materials; record the telemetry data of component production; track the source of shipping goods.

## **2. Data tamper proof**

In the traditional supply chain, data is mostly recorded and stored in centralized account books by core enterprises or participating enterprises. When the information on the account book is not conducive to itself, there is a risk that the account book information will be tampered with or deleted without permission. Hpchain can guarantee that all data, including finished product production, storage, transportation, sales and subsequent matters, will not be tampered with according to the characteristics of blockchain technology that data on the chain cannot be tampered with and stamped. The data can not be tampered with, which greatly reduces the information asymmetry, and reduces the cost of credit investigation and communication between enterprises. This application helps enterprises establish trust quickly, and differentiates the risk of core enterprises. Blockchain technology ensures the lossless flow of data between the upstream and downstream of the supply chain, and effectively avoids the distortion and distortion of information.

## **3. Consensus based transparency and credibility**

The consensus mechanism of hpchain cloud storage system solves the problem of mutual trust between nodes under the thought of decentralization, so that many nodes can reach a relatively balanced state in the chain. Thus, the problem of transmitting trusted information and value transfer on untrusted channel is solved, and the consensus mechanism of hpchain solves the problem of how to achieve consistency in the distributed scenario of supply chain. Under the "HP consensus mechanism", the operation between enterprises follows a set of process determined through negotiation, rather than relying on the scheduling and coordination of core enterprises. Because the information is transparent enough and trust each other enough, the operation efficiency is improved while meeting the interests of alliance enterprises.

## HP Cloud storage platform system

The core of HP cloud storage system is to manage storage resources uniformly, provide diversified data services for cloud platform. HP cloud storage system decouples applications from underlying storage and does not rely on the binding of traditional devices and application manufacturers. In the process of data center transformation in the future and cloud as a whole, realize the linkage of storage, computing and network resources, and comply with the data value chain to service transfer.

HP cloud storage system is mainly composed of software defined storage system based on distributed architecture and lightweight heterogeneous storage unified management components.

Based on the distributed architecture, the software defined storage runs on the standard server. Using the virtualization technology, the storage resources in the cluster are virtualized into storage pools, and block devices, files and object storage services are provided to the top. At the same time, software definition storage has high performance, which can easily meet the requirements of various types of high load management, including business critical applications and core business systems; multi copy and strong consistency technology applications provide high availability; strong horizontal expansion ability provides great flexibility and convenience for management and maintenance brought by business expansion.

The unified management component of lightweight heterogeneous storage realizes the unified and automatic management of distributed storage and centralized storage. The distributed software defined storage realizes the monitoring and operation of the storage system by opening the control interface of the storage system for the unified management component of storage. Through the open interface, the heterogeneous storage unified management component can realize the resource division and service arrangement of the distributed storage system, and the centralized storage device division based on the virtual volume of different QoS policies serves the cloud platform, realizing the linkage with the computing and network.

## Software definition storage system based on distributed architecture

1. Software definition storage technology based on distributed architecture provides a variety of storage services, including objects, blocks, and files. It has the advantages of high reliability, simple management, and flexible scalability, and can provide PB to EB level storage capacity.
2. The software defined storage technology based on distributed architecture virtualizes the hard disk of all servers into several resource pools, provides the creation / deletion and snapshot of virtual volume, and provides the storage service in the form of North virtual volume.

Software defined storage system is divided into hardware device layer, engine driver layer, feature function layer, service interface layer and monitoring management layer.

### 1. Hardware equipment layer

The software definition storage system based on the distributed architecture uses the x86 server based on the standard, with different disk media, including the traditional mechanical disk HDD, sata-hpd and pcie-hpd, to provide different levels of IOPs and bandwidth and other service performance. At the same time, the wide application of 10GE network card also makes the system have a faster speed in the transmission and reconstruction process.

### 2. Drive engine layer

The software defined storage system based on distributed architecture adopts distributed algorithm (such as crush, DHT, etc.) to distribute data in all disks in the cluster randomly, avoiding the generation of data storage hotspot. Data storage provides high availability through multiple copies, each copy is distributed on different servers, and can follow strong consistency according to business

requirements. The failure of a single hard disk or node does not affect the business continuity. Once the failure occurs, the system will automatically rebuild.

### **3. Feature function layer**

The software defined storage system based on distributed architecture can realize thin configuration, that is to say, it supports to divide the size of storage volume in advance, but when adding and distributing, it automatically grows according to the scale of data writing, saving available storage space. At the volume level, real-time QoS can be realized, and the restriction attributes attached to the volume can be adjusted. At the same time, for the needs of business, the system also supports online capacity expansion and reduction, so as to ensure that other volumes can get enough space. In addition, there are snapshot, disaster recovery, backup and other functions.

### **4. Service interface layer**

The distributed software defined storage system can provide diversified storage services, support SCSI device output based on open Linux platform, support iSCSI interface protocol, support FC interface protocol and FC based hardware.

### **5. Operation and maintenance management**

The software definition storage system based on the distributed architecture can complete the functions of automatic configuration, online upgrade, alarm, monitoring and log by providing users with a visual interface. Including system log and operation log. The system log records important system events, and the operation log records the operator's behavior, which is convenient for troubleshooting, auditing and tracking.

## Lightweight heterogeneous storage unified management component

Lightweight heterogeneous storage unified management component based on openshpk cinder component realizes the unified management of back-end storage resources to provide business driven and automated data services. The lightweight heterogeneous storage unified management component decouples the application from the underlying storage, unbinds the device manufacturers, breaks the barriers between heterogeneous storage devices, applies the storage functions, and supports file, block, object and other types of storage resource allocation services.

In the cloud computing application scenario, from the perspective of tenants, the storage of different architectures is encapsulated, and both the traditional centralized storage and the distributed storage are managed and provided with services.

Lightweight heterogeneous storage unified management component can gather storage resources of the same capacity in each device for unified management. This function is based on the cinder component of openshpk, through the cinder driver provided by different storage manufacturers for openshpk to obtain basic information of different storage devices, including disk type, space size, service ability, etc. After obtaining different storage device information, the storage devices with similar performance and service are arranged and grouped for subsequent use.

Lightweight heterogeneous storage unified management component can realize the automation of business deployment and intelligent operation and maintenance monitoring. Among them, business deployment automation refers to supporting the operation and maintenance personnel to edit and save service templates in order to simplify the process of creating and invoking storage. In the process of applying for storage resources, you only need to input the storage capacity and the number of volumes to complete the application of resources. The unified management component will automatically call different modules to complete the specific work according to the pre arranged template. At the same time, the component also supports the intelligent operation and maintenance monitoring, that is, for different storage pools and different virtual volumes, it can monitor the performance and failure in real time, and monitor and manage the effectiveness, space, data availability and other aspects of the storage volume; it supports the console to alert the administrator when the software and hardware at all levels of the storage system

fail; it supports the volume level QoS arrangement, Ensure the service quality between different tenants.

The lightweight heterogeneous storage unified management component is compatible with the virtualization platform or container cloud platform through the rest interface in the north direction to realize the unified distribution of storage resource services. Different components of

openspk, such as cinder and Nova, and heterogeneous storage management components, complete volume division and mounting, and realize the allocation of cloud disk or the creation of virtual machine instances in cloud disk; the persist volume storage system in kubernetes realizes the state saving of applications and services through the plug-ins provided by cinder.

## HP Chain Cloud storage system application

Hpchain combines the application of big data, Internet of things, blockchain, AI, cloud computing and other technologies;

### Internet of things

At present, the main factors restricting the large-scale extension of Agricultural Internet of things are high application cost and maintenance cost, and poor performance. Moreover, the Internet of things is centralized management. With the rapid increase of Internet of things equipment, the cost of infrastructure investment and maintenance of data center is difficult to estimate. The combination of the Internet of things and blockchain will enable these devices to achieve self-management and maintenance, which will save the high maintenance cost centered on cloud control, reduce the later maintenance cost of Internet devices, and help to improve the intelligent and large-scale level of the Agricultural Internet of things.

## **big data**

The three achievements of traditional database, relational model, transaction processing and query optimization, have been till the rise of NoSQL database after the popularity of Internet. Database technology is constantly developing and changing. In the future, with the further promotion of the project of information entering the villages and households, the further deepening of government information, the establishment of agricultural big data collection system, how to solve the authenticity and effectiveness of data in a large-scale way, this will be an urgent problem facing the whole society. And these technologies represented by blockchain, which are effective, unforgettable and tamperable to the data, are definitely a new starting point and a new requirement compared with the current database.

## **Quality and safety traceability**

In the process of agricultural industrialization, the distance between production area and consumption area has been widened. Consumers have no idea about the information of pesticides and chemical fertilizers used by producers and additives used in the process of transportation and processing. Consumers' trust in production has been reduced. The agricultural product traceability system based on the blockchain technology, once all data is recorded in the blockchain account book, it cannot be changed. Relying on the advanced technology of asymmetric encryption and mathematical algorithm, the human factor is fundamentally eliminated, making the information more transparent.

## **Supply chain**

Products from production to sales, from raw materials to finished products to finally reach the hands of customers in the whole process of all the links involved, all belong to the scope of the supply chain. At present, the supply chain may involve hundreds of processing links, dozens of different locations, the number is so large, which brings great difficulties to the tracking management of the supply chain.

Blockchain technology can record all the information related to the product in the supply chain process in different ledgers, including the involved responsible enterprise, price, date, address, quality, and product status. The transaction will be recorded permanently and decentralised, which reduces the time delay, cost and human error.

## HP Cloud storage system and virtualization platform

Openstack provides a standard API interface to manage the entire underlying architecture resources. Cinder, the component that openstack provides block device storage services, is essentially a resource management component. It encapsulates different back-end storage devices and provides a unified API to the outside. In essence, it is not a storage system, but a plug-in method, combining different back-end storage drivers to provide storage services. The core is various operations and management of volumes. It includes providing cloud disk for virtual machine through virtual volume, or it can be used to store and start virtual machine instance. In each life cycle of virtual machine, the following operations can be realized:

1. When creating a virtual machine, you need to create and mount the volume;
2. When using virtual machine, the volume needs to be expanded and backed up;
3. When deleting a virtual machine, you need to detach and delete the volume.

With cinder components, users can easily and efficiently manage virtual machine data. The following figure shows a schematic diagram of cinder components using back-end storage. The communication between computing virtualization component Nova and storage management component cinder is via rabbitmq message queue.

The specific call process is as follows:

1. The user sends storage management request through page or command line, and sends it through cinder API;
2. Cinder API adds this message to cinder scheduler through rabbitmq message queue, and schedules it in turn;
3. Cinder scheduler communicates with cinder volume through rabbitmq message queue to deliver volume management requests such as creation and mount;

4. After receiving the storage resource request, cinder volume communicates with the back-end HP cloud storage system to operate and execute the request.

Since then, a storage resource management operation request of the user has been completed Application of HP cloud storage system in openshpk.

## HP cloud storage system and container cloud platform

Container virtualization technology has become a widely recognized way of server resource sharing. Container technology can provide great flexibility for system administrators in the process of building container technology operating system instances on demand. Container technology provides an isolated running space for applications. Each container contains an exclusive and complete user environment space, and changes in one container will not affect the running environment of other containers.

HP cloud storage system receives the actual storage operation requests such as creating, deleting, loading, unloading and migrating data volumes from the north through the container engine volume plug-in or scheduling API, and transfers them to the underlying data plane for implementation. Kubernetes, as a cluster management tool, based on its plug-in design, stores stateful data in a persistent volume (PV) based storage system.

### Distributed hash table (DHT)

Distributed hash table (DHT) is widely used to coordinate and maintain metadata about peer-to-peer systems. For example, mainlinedht is a decentralized hash table that can trace and find all peers.

## KADEMLIA DHT

### **kademlia is a popular DHT offering:**

Efficient query through a large number of networks: query the average contact of  $(\log_2 n)$  nodes. (for example, a network with 20 hops of 100000 nodes)

Low coordination cost: optimize the number of control messages sent to other nodes.

Resist all kinds of attacks and like long-lived nodes.

It is widely used in peer-to-peer applications, including Gnutella and BitTorrent, forming a network of more than 20 million nodes.

## **CORAL DSHT**

Although some peer-to-peer file systems store data blocks directly in DHT, this kind of "data storage in unnecessary nodes will waste storage and bandwidth". Coral dsht extends kademlia's three particularly important ways:

Kademlia stores values in key nodes whose IDS is "recent" (using XOR distance). This ignores the locality of application data, ignores "far" nodes that may already have data, and forces the "nearest" section of HP super storage to store it, whether they need it or not. This wastes a lot of storage and bandwidth. In contrast, coral stores the address, and the peer node of the address can provide the corresponding data block.

Coral changed the DHT API from `get_value (key)` to `get_any values (key)` (sloppy in dsht). This is still because coral users only need one (working) peer, not a complete list. In return, coral can allocate only a subset to "nearest" nodes, avoiding hot spots (overloading all nearest nodes when keys become popular).

In addition, coral organizes a separate dsht hierarchy called clusters based on region and size. This makes the node first query the peers in its region, "find the nearby data without querying the remote node" and greatly reduces the search delay.

HP protocol is divided into a group of sub protocols responsible for different functions:

1. Identity - manage node identity generation and authentication.
2. Network - Manage Connections with other peers, using various underlying network protocols.
3. Routing - maintains information to locate specific peers and objects. Respond to local and remote queries.
4. Switch - a new block switch protocol (bitswap) supporting effective block allocation. Simulate the market and weaken data replication. Trade strategy can be replaced.
5. Object - Merkle DAG with linked content addressing non changeable objects. Used to represent any data structure, such as file hierarchy and communication system.
6. File - git inspired versioning file system hierarchy.
7. Naming self certified variable name system.

These subsystems are not independent; they are integrated and take advantage of each other's attributes. However, it is useful to describe them separately, building the protocol stack from the bottom up. Symbols: the following data structures and functions are specified in the go language.

### **Identity**

The node is identified by nodeid, which is a static encryption problem using S / kademia, and the password hash of the public key created. Section HP super storage stores its public and private keys (encrypted with a password). Users are free to set up a "new" node identity each time they start, although this will lose the accumulated network benefits. The excitation nodes remain unchanged.

### **Network**

HP nodes communicate regularly with hundreds of other nodes in the network, which may span the wide area network. HP network stack features:

transport layer: HP can use any transport protocol and is best suited for webrtc dahphannels (for browser connections) or uttp (ledbat).

reliability: if the underlying network does not provide reliability, HP can use UTP or SCTP to provide reliability.

Connectivity: HP can also use ice NAT through wall drilling technology.

Integrity: hash checksums can be used to check the integrity of messages.

verifiability: HMAC can be used to check the authenticity of the message using the sender's public key.

Peer node addressing considerations:

HP can use any network; however, it does not assume the acquisition of IP and does not directly depend on the IP layer. This allows HP to be used in overlay networks.

HP stores the address as a multi-layer address, which is composed of byte strings for the use of the underlying network. Multi layer address provides a way to express the address and its protocol, which can be encapsulated into a well parsed format.

## Route

HP nodes need a routing system that can be used to find:

- (a) the network address of other partners,
- (b) peer nodes dedicated to serving specific objects.

HP uses dsht based on S / kademia and coral, which is described in Section 2.1. In terms of object size and usage mode, HP is similar to coral [5] and mainline [16], so HP DHT distinguishes stored values based on their size. Small values (equal to or less than 1KB) are stored directly on DHT. For larger values, DHT only stores the value index, which is the nodeid of a peer node. The peer node can provide specific services for this type of value.

## **Block switch bitswap protocol**

Inspired by BitTorrent, bitswap protocol in HP distributes data by exchanging data blocks between peers. Like BT, each peer keeps uploading downloaded data to other peers while downloading. Unlike BT protocol, bitswap is not limited to data blocks in a torrent file. There is a permanent market in bitswap protocol. This market includes all the block data that each node wants to acquire. Regardless of which blocks are part of a. Torrent file. These fast data may come from completely unrelated files in the file system. This market is made up of all nodes.

While the concept of barter systems means that virtual currencies can be created, this will require a global ledger to track the ownership and transfer of currencies. This can be implemented as a bitswap strategy and will be discussed in future papers.

In the basic case, bitswap nodes must provide direct values to each other in the form of blocks. This works well only when the distribution of blocks across nodes is complementary and each takes what it needs. This is not usually the case, and in some cases nodes must work for their own blocks. When a node does not have what its peer needs (or does not have at all), it will have a lower priority to find the block that the peer wants. This motivates the node to cache and propagate rare clips, even if the node is not interested in them.

## **Bitswap credit**

This protocol must have incentive mechanism to motivate nodes to seed the blocks needed by other nodes, which are not needed by them. Therefore, bitswap's nodes are very active in sending blocks to the peer nodes, expecting to be paid. However, leech attack must be prevented (empty load nodes never share blocks). A simple credit like system solves these problems:

Peers track their balance (via byte authentication).

As the debt increases and the probability decreases, the peer probability sends the block to the debtor.

Note that if the node decides not to send to the peer, the node then ignores the peer's ignore & cooldown timeout. This prevents the sender from trying to send multiple times (flood attack) (bitswap default is 10 seconds).

## Hot Pot Chain Cloud management system

Hot Pot Chain helps improve the efficiency of supply chain management. The production is recorded, the flow direction can be traced, the quality can be traced, the responsibility can be defined, and the violator can be investigated. Because the data is open and transparent among all parties of the transaction, a complete and smooth information flow is formed in the whole supply chain, which can ensure that all parties involved can discover the problems existing in the operation of the supply chain system in time, and find the solutions to the problems in a targeted way, and then put forward Improve the overall efficiency of supply chain management.

Hot pot chain can avoid supply chain disputes. The characteristics of data non tamperability and existence proof of time stamp can be well used to solve the disputes among the participants in the supply chain system, so as to realize easy proof and accountability. Blockchain technology can be used for product anti-counterfeiting. The combination of the two characteristics of data tamperability and transaction traceability can eliminate the problem of counterfeit products in the process of product circulation in the supply chain.

The hot pot chain is a credible and transparent food safety traceability system to strengthen the supervision efficiency of the food industry chain, improve the level of food safety, and ensure the health of the national diet. However, the current food traceability system mainly faces problems such as non-standard information collection, unsafe data storage, vulnerability of the central system and the lack of privacy in the process of information exchange between enterprises. Blockchain technology has the characteristics of distributed fault tolerance, non tampering and privacy protection, which can solve the current problems in food traceability system. Based on the analysis of the technical framework of the food safety traceability system based on the blockchain, this paper puts forward the scheme of properly embedding the blockchain into the food traceability system, that is, the blockchain technology is applied to the database layer and the communication layer of the system, analyzes the operation mechanism of the food traceability system after the scheme is adopted, and demonstrates the effectiveness of the design scheme combining with the specific application scenarios and actual cases.

Traditional enterprises are increasingly aware of the importance of using information management technology or system to optimize the information collaboration process of supply chain, mining the economic value of massive information, and reducing cost and increasing revenue for supply chain. However, the traditional supply chain

information collaboration system generally has some problems such as centralized management and control, lack of intelligent collaboration ability and so on, which leads to the formation of information island among enterprises, weak cross-border collaboration ability, increased vulnerability of supply chain, and no obvious synergy benefit.

Therefore, hot pot chain takes the collaborative optimization of supply chain information as the fundamental starting point, and tries to establish a decentralized, intelligent and transparent information collaborative system, optimize the traditional supply chain information collaborative process, and improve the information collaborative efficiency of supply chain by virtue of blockchain, a new information management technology. In view of the lack of traditional supply chain information collaboration, this paper proposes a solution to build a supply chain information collaboration system based on blockchain, and optimizes it by using blockchain.

Taking the cooperation of purchase, inventory and logistics information as the main content, through analysis and verification, the advantages of blockchain in supply chain information collaboration are compared and demonstrated, and further proves the supply chain information collaboration based on blockchain. The synergy benefit is better than the traditional supply chain. By using the technology characteristics of blockchain decentralization, smart contract, P2P and so on, the process optimization of blockchain is carried out to verify the applicability and advancement of blockchain in optimizing the information collaboration process of supply chain and realizing the information collaboration benefit of supply chain.

For example, the cold chain logistics supply chain in food industry is still plagued by three major problems due to the existence of information barriers. The concept of supply chain collaborative management should start with the management of alliance enterprises, strengthen the consistency of consensus, value and mode, and improve the dependence and loyalty of enterprises on the supply chain. In terms of information technology, blockchain uses its decentralized, distributed data, traceability and non tampering features to ensure the openness, transparency and authenticity of data. This paper discusses the problem-solving strategies under the concept of supply chain collaborative management, and analyzes the node, chain selection, alliance chain architecture and information platform deployment from the perspective of blockchain. Thus, in the management concept and information technology, to ensure that the cold chain logistics supply chain information barriers.

In the traditional food supply chain information system, the phenomenon of information island is widespread, which makes the timeliness and authenticity of information interaction difficult to guarantee. Blockchain technology is a decentralized high trust distributed database ledger technology, which has the characteristics of traceability, information can not be tampered with, and can effectively solve the problem of supply chain information system. To establish the

supply chain information with blockchain technology as the core. The information platform can effectively connect the supply chain alliance, financial institutions and government supervision departments, promote the integration of business flow, logistics, capital flow and information flow in the supply chain, so as to build a supply chain ecosystem of mutual trust and win-win situation. This paper discusses the application of blockchain smart contract in the supply chain, and puts forward a consensus mechanism of Random Dynamic Equity proof (dpos) which is suitable for the supply chain alliance, and supplies it with automobiles. As an application scenario, the applicability and superiority of blockchain technology in supply chain information system are analyzed, which provides a new idea for the application of blockchain technology in supply chain and other fields.

At present, the mainstream fake identification mechanism uses RFID or QR code and other scannable tags that can be forged, and the transaction data stored in its centralized database is easy to be tampered with, which leads to the problem of fake goods in supply chain transactions difficult to contain. In the guarantee transaction between supply chains, the transaction funds are mostly guaranteed by the third party transaction platform, but its guarantee behavior is lack of strong constraints and can not fully guarantee the reliability of funds. Decentralized blockchain technology can be used to solve the above problems. However, after the introduction of blockchain in the supply chain transaction, the private key used by users in the transaction lacks a reliable backup method. Although the private key can be recovered from the key seed in the key wallet, it does not solve the problem of key seed backup. Based on the blockchain technology, HP has realized the decentralized and traceable supply chain transaction system, and designed the following mechanisms to solve the above problems in three aspects of supply chain transaction: fake identification, guarantee transaction and key backup:

(1) Transaction data in supply chain transactions are easy to be tampered with. HP designed a commodity chain transaction structure based on the blockchain to store commodity transaction data, and performed fake identification by tracing the transaction data of commodity manufacturers and owners. At the same time, it improves the query efficiency of fake identification.

(2) It is difficult to guarantee the security of the guaranteed funds for the secured transactions centered on the third-party transaction platform. HP has designed a decentralized guarantee mechanism, which uses smart contracts to write transaction arbitration and settlement rules into the blockchain, so as to realize the immutability of the fund transfer process and guarantee the fund security.

(3) There is still the possibility of losing the key seed used to recover the private key in the key wallet. HP designed a cross backup model to select the backup location of the key seed.

From the perspective of HP's whole life cycle, this paper combs the existing problems of project information management on the basis of existing research. Combined with the blockchain technology, the project supply chain information platform is optimized, and integrated with the project management function information integration and project information collection system to build the project information integration management platform based on the intelligent construction.

## **HP Cloud management system application**

### **Supplier evaluation and Application**

According to the enterprise supplier selection rules, select the suppliers that meet the relevant standards, and create new suppliers for warehousing, and enter the basic information, relevant qualification, financial information, product information, etc

### **Supplier information management**

Details of supplier selection, entry, product catalog, inquiry, price comparison, cooperation implementation, rating feedback, elimination and exit, supplier collection and payment, and contract record. The supplier resources are continuously optimized and layered through evaluation, classification and other management functions.

### **Detailed product and price base**

"Maintain and record product type, specification, number, cost and other information at any time. Each product can track the number of past purchases, quotations, purchase prices, and associated orders and contracts. You can customize query criteria to find related product information.

### **Reasonable and compliant purchase request**

For enterprises strongly associated with business and purchase, the system supports the automatic generation of purchase requirements from business contracts so that each purchase can be relied on; meanwhile, the purchase budget can be associated with the project budget and control system to effectively control the purchase cost; the corresponding approval process can be set for each purchase.

### **Real time supplier collection and payment status view**

From a single supplier or project, you can view the real-time payment status, make real-time statistics on the progress status of each link in the purchase process, feed back the execution status documents of each purchase order in real time, and automatically collect the purchase cost and invoiced quantity.

### **Purchase contract ranking**

Suppliers, product items, contract amounts and other dimensions are used to rank purchases, provide data support for enterprise purchase and supplier management, and support user-defined data report kanban

Generally speaking, the purpose of using the supplier management system is to manage the supplier information better, to reduce the human cost and optimize the whole process, and to improve the profits of the enterprise.

## Hot Pot Chain Application scenario framework

### **All categories and multiple standards:**

Fruits, vegetables, eggs, spices, aquatic products, meat, kitchen supplies, grain and oil

Supplier management

1. Remove gray
2. Quality assurance
3. Service Capacity Guarantee
4. Supplier's anti risk ability and the best choice of the top suppliers in the industry
5. The first entry premise of food safety

### **purchasing management**

1. Inquiry pricing process
2. Bidding mechanism
3. Hpchain system support

### **Information record**

Blockchain records and encrypts all key information of commodities from production to consumption to prevent data forgery, and authorized users can query and verify.

### **Data traceability**

The commodity code can map the blockchain account address, share the account book, connect the commodity ownership and transfer relationship, automatically identify the commodity code through smart phones, sensor equipment, etc., and the data can be extracted and verified in real time.

### **Multipartite**

Blockchain multi center network trust, enterprises can not only master the upstream and downstream enterprises, track the transaction status, understand the indirect links until the end consumer information; at the same time, provide the interface for regulators to intervene, which is conducive to government / market supervision.

# HPChain Cloud storage system

## 1. Effectively improve storage utilization efficiency

The development of the cold chain intelligent warehouse management system for agricultural products aims at the standardized storage of agricultural products: how to make better and efficient use of the warehouse, reduce the loss of agricultural products in the warehouse circulation, reasonably control the inventory, and realize the time sequence control of warehouse out and warehousing; the remote control end of the warehouse management can monitor and adjust the temperature and humidity of the warehouse, and count the circulation of different types of agricultural products And analyze its circulation cycle, predict the supply capacity of the existing inventory, make ordering decision in time; guide the handling personnel to choose a reasonable path and appropriate bin through the prompt of the operation screen when entering and leaving the warehouse.

## 2. Optimize warehouse location and cargo area

In order to realize the time separation and space separation of the agricultural products in and out of the warehouse, we should optimize the location and the layout of the cargo area and choose a reasonable path. Intelligent control of temperature and humidity in cold chain warehouse of agricultural products. Reasonable configuration of temperature and humidity sensors in different cargo areas, real-time monitoring of temperature and humidity information in the cargo area, feedback to the system, with the help of information stored in the system database, automatic and intelligent adjustment of temperature and humidity in the cargo area.

## 3. Research and development of cold chain intelligent warehouse management system

The modular decomposition of the system, the design of the module logic and the realization of the module function, the integration of the modules, debugging and improving the system. It can realize the intelligent management of such links as the warehouse in and warehouse out operation of agricultural products, the automatic control of temperature and humidity in the inventory area, the forecast of future demand for agricultural products, the critical inventory early warning, the real-time update of inventory information and the record of cold storage operation log.

## HPChain Value of warehouse management system

1. The whole life cycle inventory traceability, through a single bar code monitoring to achieve the monitoring from the raw and auxiliary materials link to the production link;
2. Effectively use resources, enrich the categories of agricultural products, and better meet the needs of customers;
3. Reduce the inventory level of raw and auxiliary materials and effectively control the inventory cost;
4. Realize the analysis of raw and auxiliary material consumption cost and actual finished product output based on product season and product batch;
5. Effectively reduce the pressure of warehouse management, reduce the cost of management, labor, time, etc.

## HPChain logistics system

### **1. Rely on HP's complete functions**

We have established a reliable cooperation relationship with domestic and foreign trade partners, which is based on the platform's credibility, specialization and brand benefits to meet the diversified needs of customers, and help customers optimize trade business processes, control operational risks, reduce comprehensive costs and maximize trade value. Strive to create more and better value for customers.

### **2. Smooth and reliable public communication channels**

Keep a smooth communication with the public sector, which can timely consult, answer and solve the related problems in the process of trading business for customers, and provide effective support and help.

### **3. Fast and safe technical support means**

Based on the HP cloud platform, the enterprise has its own information management system, automatic settlement center and efficient and safe technical service support for customers.

For enterprises, users and consumers, HP cloud platform can effectively track the trace of each product based on data analysis of uploaded data (crop details, contracts, invoices, packing lists, bills of lading, certificate of origin, health certificate, filling certificate, nutrition composition table, etc.) between merchants and merchants, merchants and farmers, so as to make the data traceable and ensure the safety of consumers To protect the legitimate rights and interests of all parties.

## Token Distribution ratio

In order to meet the needs of good ecological operation and commercial application, HP is issued as the token of hot pot chain, with a total amount of 100 million, which will never be issued again. HP plays an indispensable role in HP ecology and is the carrier of value transmission. It flows among platforms, developers, enterprises, service institutions and consumers, making the whole ecology healthier and more dynamic for development.

The technology team is billion yuan, which is the reward for the start-up technology development team. Lock up, starting from one month after the online transaction of HP general pass, will be released by% month by month.

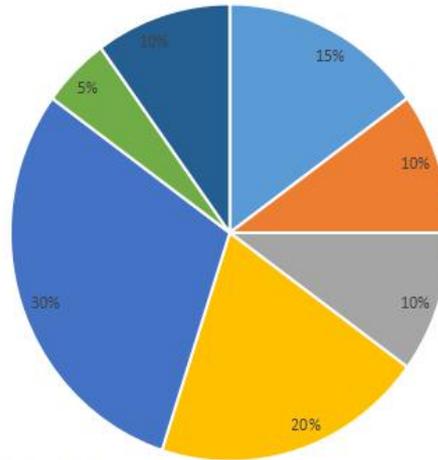
The market circulation is billion yuan, which is distributed and circulated to investors in all countries recognized by the global law of HP ecology.

As the reserve fund of the foundation, billion is used to explore more high-quality innovative products under HP ecology, and use blockchain technology to undertake more social responsibilities and promote the development of public welfare crowdfunding projects. (lock up, the use of this part of funds needs to be decided by the foundation and publicized in advance).

Upgrade R & D is billion yuan, which is used for subsequent technology R & D, supporting software development and product hardware development and upgrading in HP ecosystem.

## Token allocation proportion

Proportion



- Team ownership Rewards for start-up technology development teams 15 million
- Community operation Issued and circulated to investors in all countries recognized by global law for AAT ecology 10 million
- Foundation As the reserve fund of the foundation, it is used to explore more high-quality innovative products under HP ecology, and use blockchain technology to undertake more social responsibilities and promote the development of public welfare crowdfunding projects 10 million
- technological development HP's subsequent technology research and development, supporting software development, product hardware development and upgrading 20 million
- Ecological development Follow up ecological supporting development and upgrading in HP ecology 30 million
- Meeting An activity of information exchange or meeting or discussion 5 million
- Market value management And maintain the relative dynamic balance between the related parties by maintaining accurate and timely information exchange and transmission with the capital market. 10 million

Allocation plan	Explain	Amount	Proportion
Team ownership	Rewards for start-up technology development teams	15 million	15%
Community operation	Issued and circulated to investors in all countries recognized by global law for AAT ecology	10 million	10%
Foundation	As the reserve fund of the foundation, it is used to explore more high-quality innovative products under HP ecology, and use blockchain technology to undertake more social responsibilities and promote the development of public welfare crowdfunding projects	10 million	10%
technological development	HP's subsequent technology research and development, supporting software development, product hardware development and upgrading	20 million	20%
Ecological development	Follow up ecological supporting development and upgrading in HP ecology	30 million	30%
Meeting	An activity of information exchange or meeting or discussion	5 million	5%
Market value management	And maintain the relative dynamic balance between the related parties by maintaining accurate and timely information exchange and transmission with the capital market.	10 million	10%

## Foundation

In order to promote the development and construction of HP and the transparent governance mechanism, the smooth progress and development of HP chain, and the safe and harmonious development of the open-source ecological society, the foundation, through the block chain data structure, realizes the blockchain process of commodity raw material collection, production, warehousing, outbound, distribution logistics, door store, stock taking, sales, user purchase, user evaluation, after-sales service, etc To realize the win-win interests of users, stores, partners, third parties, governments and other interested parties, ensure the effectiveness, sustainability and safety of project management, establish a service operation platform dedicated to solving the catering supply chain problems, provide users with appropriate, timely and priced food materials, make the catering operation better, and build a global well-known catering supply chain operation management Management platform.

## Core team



Jack Washton, CEO, Ph.D. in economics, Yale University, former head of Investment Management Department of Morgan Stanley, has senior financial expertise to help the company's long-term and stable development. He has participated in Morgan Stanley's overseas listing services for Ping An insurance, China Unicom, Sinopec and China Telecom.



Jim Green, Senior Software Engineer, Princeton engineering doctor, former Apple Senior Software Engineer, is now a senior engineer of Google, proficient in C++, Objective-C and Java programming technology, with more than ten years of experience in game creation and development.



Dave Brice, Senior Software Engineer, PhD, computer science, Washington University, St. Louis

A former technical consultant of SpaceX, he has been engaged in software development for more than ten years. At present, he has participated in wallet development of multiple international trading platforms, and has in-depth research in algorithmic trading, blockchain, trading engine, mining pool and app.



Adam Bain, senior engineer, PhD, computer science, Oxford University, formerly worked in GitHub Technology Department, participated in the improvement of existing services and migration to mobile platforms, as well as the development of open source code base and version control system.

## Investment institution



## Project mileage

March 2017: founding team launches HP

May 2017: white paper 1.0 release

July 2017: demonstrate HP blockchain attribute closed loop

November 2017: technology framework development

February 2018: officially launch the continuous development of public chain bottom layer

June 2018: Technology Application landing

September 2018: continue to develop new applications for HP's ecological attributes

October 2018: formal development of ecological DAPP

March 2019: DAPP internal test

April 2019: DAPP bug repair, improvement and optimization

November 2019: online exchange

November 2019: DAPP starts marketing

May 2020: plan to accumulate more than 100 million people around the world to participate in HP ecological construction

August 2020: main network internal test

September 2020: public test of main network

January 2021: Launch HP super node campaign

Future time after 2021: continuous construction of HP ecology