HitChain

Whitepaper

A Developer Autonomous Community Powered by Blockchain

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HitChain

Whitepaper

A Developer Autonomous Community on Blockchain

HitChain Community Announcement

In only 50 years, the Information Technology revolution has profoundly changed the way we work and live. Wave upon wave of productivity growth has been fueled by technological breakthroughs brought forth by the computer, software, internet, mobile internet, cloud computing, big data, IOT and now the Blockchain. We are standing on new ground, an inter-connected world never experienced by humans before. Millions of software developers and computer programmers around the world with billions of lines of source code are undoubtedly the biggest contributors to these great advancements. While the code created by these developers has benefited many, far too few developers have been able to be properly rewarded for their efforts. The initial capital investments required to build a software business have prevented many developers from being the true beneficiaries of their own work.

HitChain is a decentralized and collaborative community built to value developers' works with a transparent credit system using blockchain technology. It is a community of the developers, by the developers, for the developers. HitChain provides a platform for developers to automatically redeem the value of innovation and creativity with compensation (currency value) and privileges (currency right). The self -governed system will guarantee that each member has the responsibility and right to participate in community decisions.

HitChain community and the platform it runs on will embrace autonomy, democracy, transparency and fairness without any third-party intermediaries or centralized supervision. HitChain members will be among the first developers to recognize the full value of their efforts.

This white paper lays out a summary of the HitChain implementation plan and related algorithms. As developers who have great faith in our own kind, we invite you to join us in making this long-awaited dreamland a full-fledged reality.

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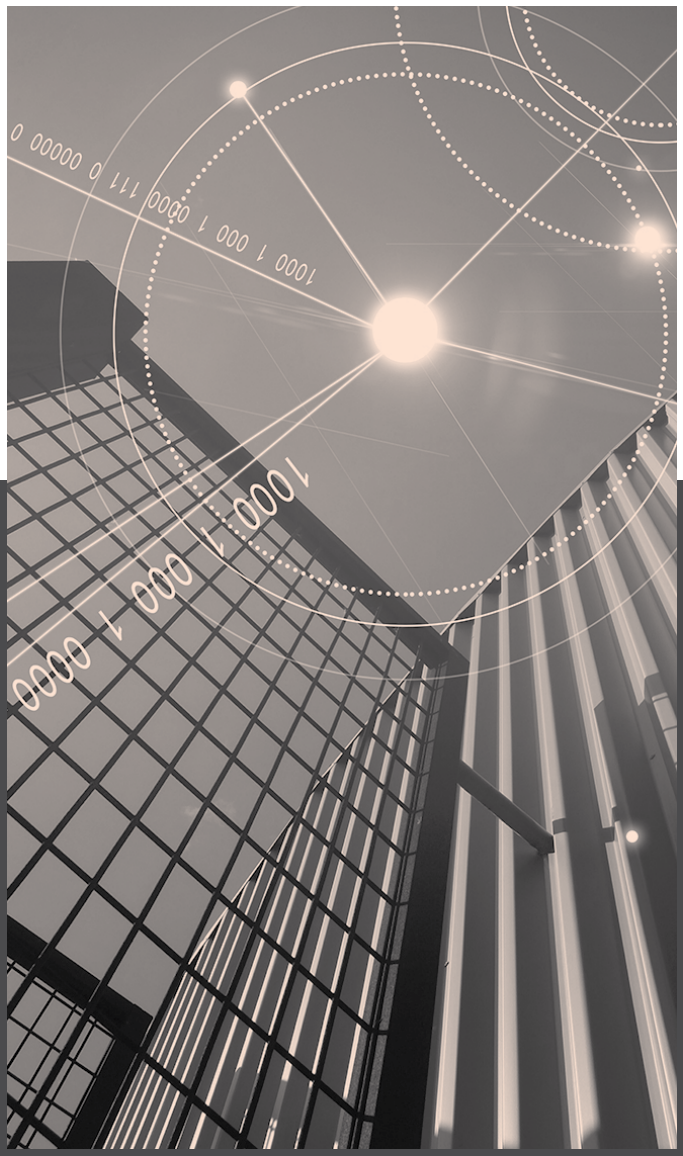
Background of HitChain



Chapter 1 Background of HitChain

1.1 Open-source Goes to Mainstream

The Open-source software movement has democratized computing and greatly increased the speed of technological innovation. The current global Open-source network has become a strategic engine promoting software development and commercial application. Open-source developers are undoubtedly the driving force behind this unstoppable movement.

GitHub, the world's largest Open-source development platform with 24 million registered developers, hosts 67 million repositories and over 5 million Open-source projects. Open-source China (OSChina), the largest Open-source development platform in China has over 2 million registered developers and hosts over 3 million repositories. 68.8 million issues were submitted, and more than 1 billion commits were made on GitHub globally in 2017. In addition to veteran Open-source contributors such as IBM and Google, more companies are adopting Open-source. Microsoft, whose CEO described Linux as 'Cancer' in 2001, is now a Platinum member of the Linux foundation. Every indication is that Open-source is revolutionizing the software industry paradigm and leveling the playing field.

1.2 Issues of Open-source Ecology

As Open-source developers strive to contribute and innovate their income has not yet been upgraded accordingly.

① Developers are still at the farthest end in the value chain of the tech industry

The Open-source business model brings the most dexterous and complex development and business practices available to date. However, an undeniable fact is that the top of the Open-source ecological value chain has been dominated by commercial and technology giants, and the vast majority of hard-working developers are unable to reap from their own contribution. This will have a fundamental negative impact on the fairness, justice, and efficiency of Open-source ecology.

② Developer's intellectual property is difficult to be effectively protected

Intellectual property protection has always been a challenge in the field of technological innovation. Many technology giants are struggling with intellectual property problems, not to mention the average individuals. Particularly the Open-source code is mainly hosted on a centralized platform like GitHub. The Git protocol can't guarantee that the version information is not tampered with. It brings tremendous risk both technically and administratively as the version information is the only evidence to prove the true owner of the software property.

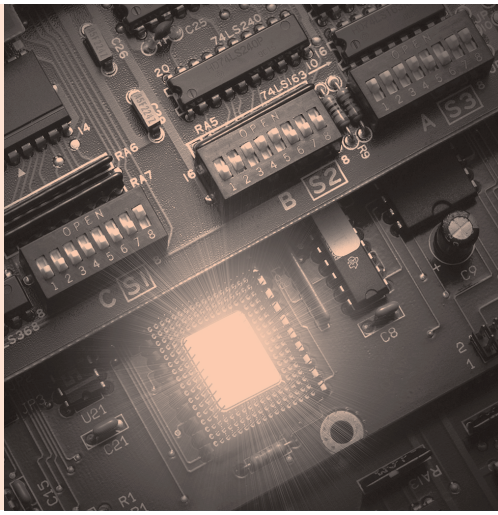
③ The current Open-source platform is centralized controlled

Current Open-source platforms such as GitHub are centralized controlled and not built on the Open-source model. Developers have neither say to or ownership of the community.

1.3 HitChain Proposal

Currently open-source communities such as GitHub are focused on facilitating developers' work by providing tools or space. These communities don't always represent the developer's interest as they are profit driven enterprises representing the interests of their investors and shareholders.

Therefore, we propose **the HitChain project, a global autonomous community that is of the developers, by the developers, for the developers. The term HitChain derives from Git and Blockchain. Git is the open source distributed revision control system authored by Linus Torvalds. Blockchain is the open distributed legder invented by Satoshi Nakamoto. With HitChain we hope to surpass GitHub as the largest Open-source platform by applying Blockchain technology for a more dynamic, democratic, and autonomous Open-source ecosystem.**



1.4 Terminology

The main terms used in this article are as follows:

Blockchain

Blockchain is a decentralized distributed ledger system. Based on the cryptographic algorithm, consensus mechanism and timing mechanism, it realizes the continuous data recording, real-time verification, hard-to-tamper, unmasking and other features of every node in the system, establishing a set of privacy, efficiency and security of shared value system.

HitChain

HitChain is a blockchain technology based 'autonomous' community of global developers, which is 'Of the developers, by the developers, for the developers.'

Hit Protocol

Hit protocol is a combination of Git protocol and blockchain technology, aiming to solve the bottleneck problem of Git protocol in developer value measurement and exchange, code warehouse decentralization management, and so on.

Merkle Tree

A tree structure that stores a set of hash values, widely used in blockchain and IPFS systems.

Git / GitHub

Git is a code version control system that is widely used by Open-source developers. GitHub is a Git-based Internet code hosting platform that has grown into the world's largest Open-source development community.

IPFS

InterPlanetary File System (StarFrame), the next generation of distributed storage and sharing of network transport protocol. The current mature applications are distributed hash table, Git system, bitcoin and so on.

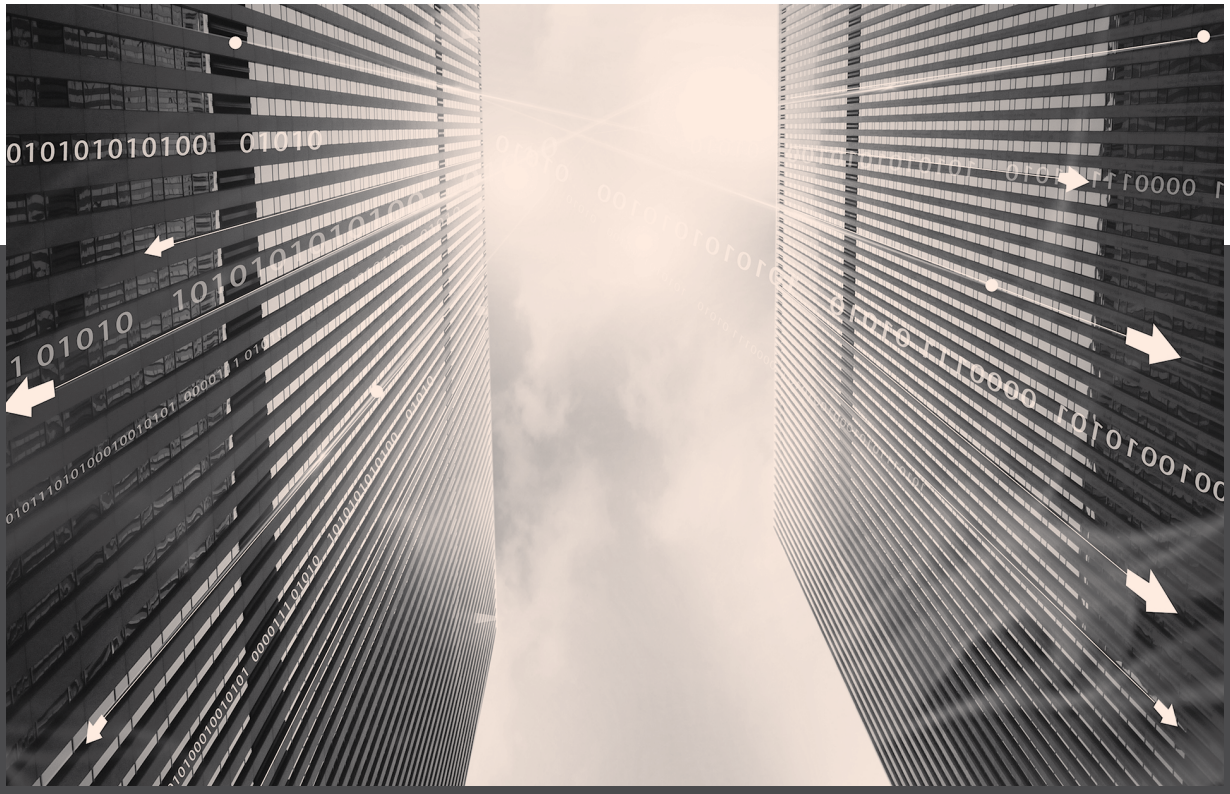
DAG

Directed Acyclic Graph, is the next-generation blockchain technology block structure

HitChain Token (HIT Token)

HitChain Token (HIT Token) is a Ethereum ERC-20 based Token circulating within the HitChain ecosystem. Once HitChain online, ERC-20 will be exchanged to HitChain Token (HIT Token) at one to one ratio.

Chapter 2
HitChain Vision and Goals



2.1 HitChain Vision

2.2 HitChain Goals

Chapter 2 HitChain Vision and Goals

2.1 HitChain Vision

HitChain is an open Distributed Autonomous Organization (DAO) of the developers, by the developers, for the developers. HitChain represents the ultimate interests of developers with better solutions to the challenges facing the current Open-source community. HitChain provides intellectual property protection, capability and credit system, equality of income distribution, and true communal ownership.

We should note that all participants or users in HitChain are regarded as developers in a generalized way. Developers include individual developers, tech consumers, as well as businesses and organizations.

HitChain strives to builds a brand new decentralized autonomous community based on Blockchain technology. HitChain is an Open-source concept framed with an original core infrastructure technology and consensus mechanism. Developers output will be saved, shared, browsed, distributed, and paid for use under HitChain hosting agreements and Hit protocols. Every product will be safeguarded with automatic copyright protection and quantified with cryptocurrency.Everyone who contribute source code and use HitChain as a development platform is a community member of HitChain, and there is no needs of holding HIT tokens to become a community member.

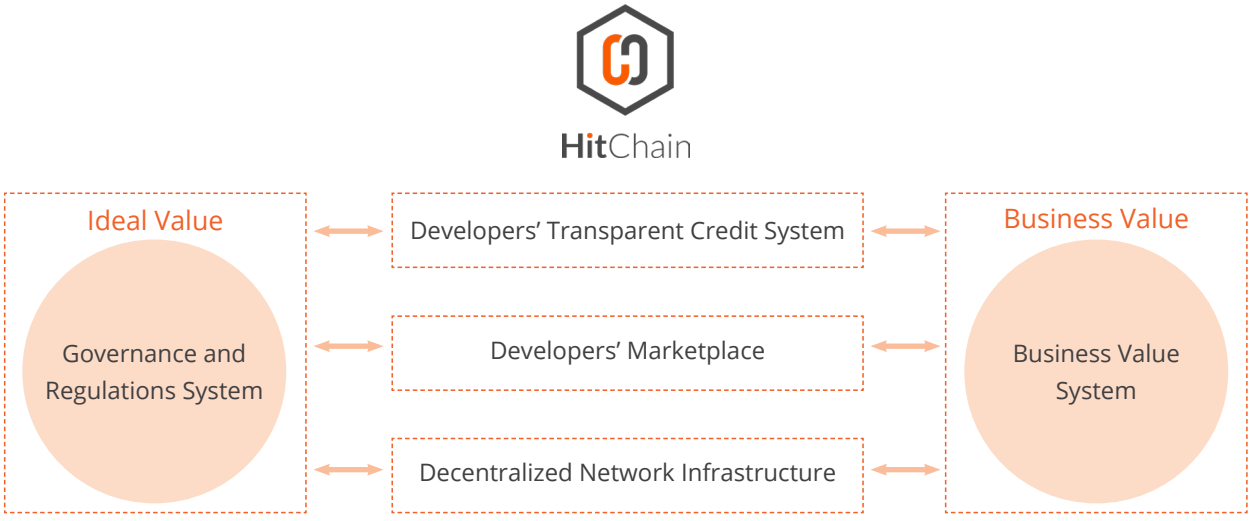


Chart 1 HitChain's Vision

HitChain founding team members are from well-known technology companies, Open-source organizations, and such as RedHat, Google, Apache Fund, Linux Fund and OSChina with strong technical and operational background.

2.2 HitChain's Goal

① The World's Largest Software Development Collaboration Platform

One of HitChain's primary goals is to benefit global software developers. HitChain is committed to addressing the most fundamental issue of fair and decentralized profit distribution. We welcome all developers to join and build HitChain regardless of country or origin, skill level and career goals.

Compared with GitHub and other Open-source platforms focusing on getting job done, HitChain will do more to formalize fair profit distribution platform to realize developers' intrinsic value.

② Products Saved in Decentralized Form

At present, all major code hosting platforms for Open-source projects around the world like GitHub, are operated by a stand-alone entity, which is subject to technical failure and with scalability issues and posting potential risk to over commercialization and monopoly.

Instead, HitChain will be a decentralized platform for software development and management to solve the above problems with security, scalability, democracy and autonomy.

③ Automatic Intellectual Property Protection

At present, the Open-source communities manage development process and the results based on version management system and issue tracking system, etc. Intellectual property rights such as developer code and documentation are also confirmed by these systems. However, these systems are not tamper resistant, and in some extreme cases the developer's originality may be maliciously deprived of.

Instead as HitChain is a decentralized and shared development and storage platform, developers' work will be safeguarded from any unauthorized direct use which can be spotted and stopped instantaneously.

④ Developer's Comprehensive Technical Credit System

In HitChain, blockchain technology will be applied to establish an authoritative, recognized and transparent competency appraisal and credit system by collecting and managing developers' data. Such appraisal system will greatly reduce the collaboration and transaction cost.

⑤ Monetization of Developers' Works

Till today developers' income is not matching to their contribution as they are kept at the farthest end of the centralized value chain. Also, at the default of a widely accepted appraisal and credit system, developers' tech capability can't be measured quantitatively and bring matching monetary value.

HitChain's solution is the cryptocurrency protocol. Cryptocurrency will be rewarded to developers based on designated algorithm. Developers' workload and quality of work can be directly assessed and converted into corresponding cryptocurrencies by the pre-defined triggers from either development stages or milestone (such as PR being accepted, Project maturity, etc.), or public's attention (such as praise, fork, reuse, subscriptions, etc.). Therefore, a transparent, open competency appraisal and credit system will be established in HitChain and developer's capability is measured precisely and will be converted to monetary value.

Quite the opposite to existing highly centralized income distribution controlled by certain entity, HitChain ensures fairness, accountability, autonomy, and justice by letting developers transact and earn in algorithmic market freely.

⑥ Transaction History is Transparent and Independent

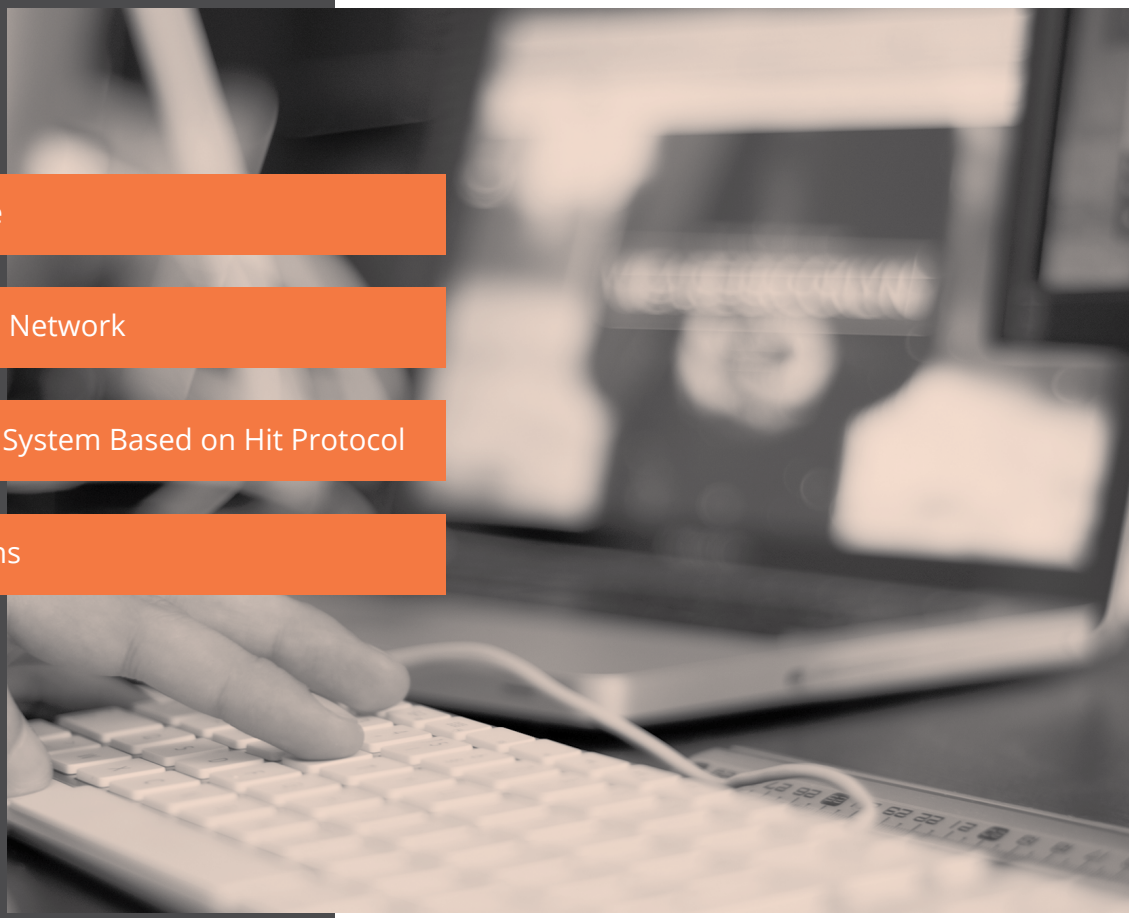
In HitChain, supply and demand information is symmetrical. The price and transactions are open and transparent. Dispute if any can be traced back and reconciled. HitChain's transaction settlement system is based on Blockchain technology jointly built by all participators.

Taking Open-source development activities as an example, each Open-source project can recruit developers for support. Such transactions can be easily settled with HitChain cryptocurrency system without any third-party involvement with transparent pricing.

⑦ Autonomous Community

HitChain is a platform maintained and updated by the all developers. All decisions needed for community operation, such as development tool to provide, operation regulation, reward system and transaction system will be made by members through public voting supervised by committee. Each member's voting power is different based on his competency appraisal and credit grade calculated by underlining algorithm.

Chapter 3
HitChain Technical Solutions



3.1 System Architecture

3.2 HitChain Blockchain Network

3.3 Distributed Hosting System Based on Hit Protocol

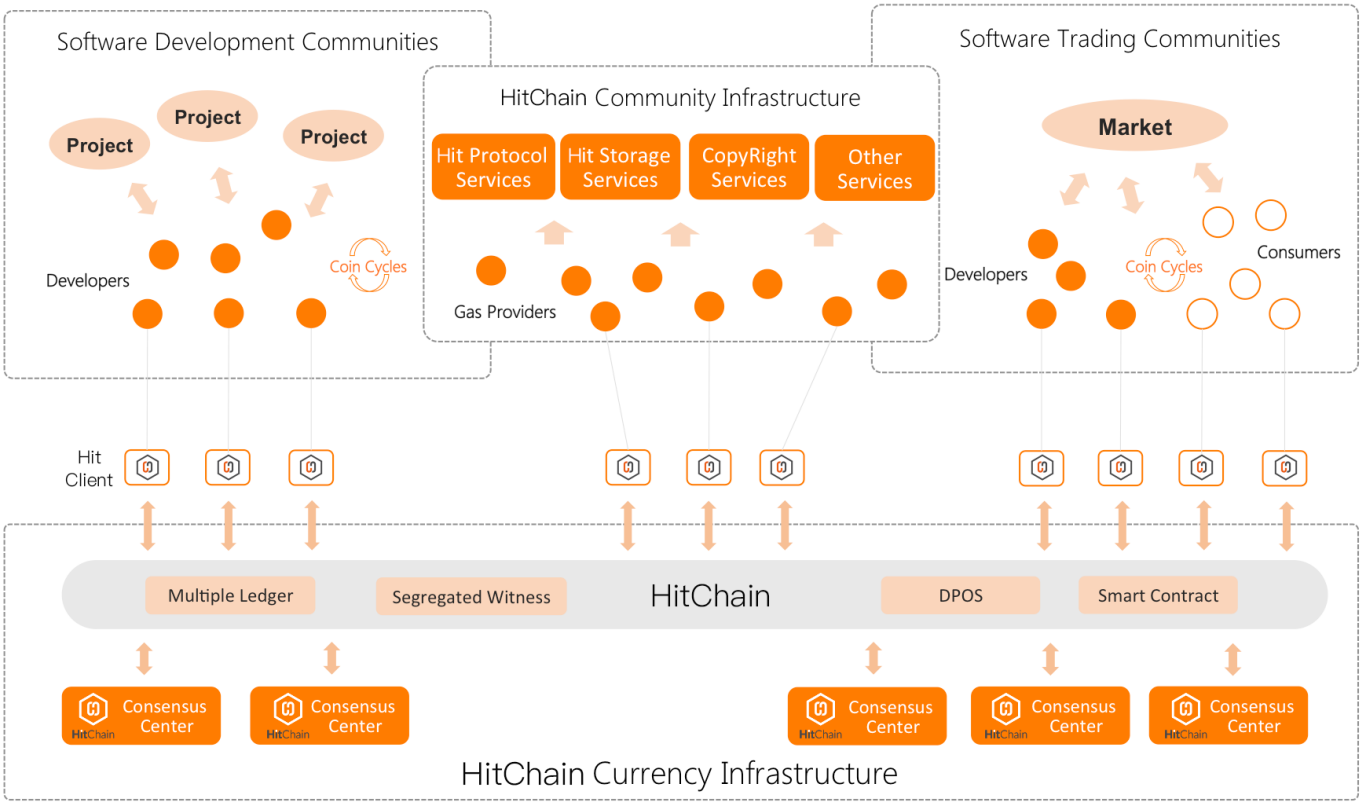
3.4 HitChain Applications

Chapter 3 HitChain Technical Solutions

3.1 System Architecture

In order to establish a true community of the developers, by the developers, for the developers, there are several key issues that need to be addressed; free and efficient code development, automation and security of intellectual property, code distribution protection, and fair and transparent trading of developers' works.

We propose a new code management protocol and code intellectual property identification system combining Git protocol and Blockchain technology to build a complete set of solutions for decentralized code hosting, intellectual property protection, value measurement, service delivery and so on.



HitChain Ecosystem Structure Chart

The overall architecture of HitChain includes four core components: HitChain Currency Infrastructure, HitChain Community infrastructure, HitChain Development and Trading Community, and HitChain Applications:

① Hitchain Cryptocurrency Infrastructure

Mainly based on blockchain technology, HitChain currency Infrastructure provides basic technical support for the operation including ledgers, isolation testimonials, consensus mechanisms and smart contracts.

② Hitchain Infrastructure

HitChain Community Infrastructure is to provide key services including the Hit code management Protocol, distributed code hosting services, and code authentication services, etc.

③ Hitchain Development and Trading Community

HitChain Development Community is mainly for software development based while HitChain Trading Community for software transactions. Software development community is mainly composed of Open-source developers while code trading community is composed of code developers and code consumers.

④ Hitchain Applications

HitChain Applications provides comprehensive applications to facilitate code development, deployment and transaction.

3.2 HitChain Blockchain Network

HitChain is a blockchain for software code development, hosting, and transactional activities providing runtime support for the HitChain community. The main components and services involved include hybrid shards, ledgers, consensus mechanisms, isolation witness, and smart contracts.

3.2.1 Hybrid Chains Infrastructure

The blockchain architecture represented by Bitcoin and Ethereum is facing scalability issues and slow response problems. HitChain will build on top of the blockchain public chain with a high frequency of concurrent, zero-latency responses complemented with Hit distributed hosting system to avoid such problems.

HitChain uses hybrid sharding chain technology, organically combining the public chain and shard chain (logical sub-chain) to form a hybrid chain infrastructure. HitChain will keep a small amount of the core content of transaction records on the public chain, major information such as the history of a witness, consensus records, business transactions and other transaction details will be stored in an independent space.

By a standardized cross-chain communication protocol, HitChain will seamlessly exchange data between the public chain and fragmented chains. Hash indexing technology can effectively guarantee the mapping and unique authority of data.

3.2.2 DAG High Concurrency Asynchronous Execution

HitChain's double-chain parallelism technology can not only verify the integrity of the main chain, but also maintain flexibility in the sharding chain. The main chain is the traditional chained structure, while the shard chain is the DAG data structure.

DAG is the Directed Acyclic Graph data structure. It consists of a set of vertices and directed edges. Each edge connects different vertices so that there is no possibility of loopback between the vertices. Through the witness mechanism, DAG can quickly find the relevant shortest path to improve transaction validation efficiency and concurrency performance. As long as one transaction in the shard chain meets the definition of the main chain rules, it can be quickly considered as a valid transaction.

In addition to a decentralized tamper-resistant distributed ledger, DAG blockchain technology supports high concurrency and prevents the “double spending” problem when combined with double consensus mechanism and workload proof consensus algorithm.

3.2.3 Classified Dynamic Ledger Technology

Distributed ledgers are a core component of the blockchain and play a key role in the integrity and transparency of all types of information and transactions. To support the process of code development and activities such as software coding, hosting, distribution, sharing and trading HitChain will include a transaction ledger, storage cluster management ledger, and code management ledger.

Transaction Ledger

Transaction ledge is mainly used to record code and storage transaction details which is tamper-resistant.

Storage Cluster Management Ledger

Storage cluster management ledger is used to record storage sharing information, cluster node distribution information, storage space size information related to storage cluster changes, etc.

Code Management Ledger

Code management ledger, combined with the Hit protocol, is used to record version changes, code submission, code download, comments and other information.

3.2.4 Double Consensus Parallelism Mechanism

In order to ensure the consistency of distributed ledgers, there are five major types of consensus mechanisms in current blockchain applications: POW, POS, DPOS, POOL, PBFT. Among them, the most representative methods are POW (Proof of Work) and POS (Proof of Stake), which are also applied by Bitcoin and Ethereum respectively. However, the limitations of these methods are inherent. For example, POW needs to consume a large number of computing resources to reach a consensus to form a new block, and these computing tasks rely on solving complex problems of cryptography, thus it is difficult to form an effective computing power.

HitChain's hybrid chain applies a dual consensus mechanism in the public chain and the shard (dual consensus of PBFT and DPOS).

In the public chain, we use the Practical Byzantine Fault Tolerance (PBFT) algorithm to maintain the legitimacy of underlying transactions. The PBFT Consensus provides (N-1) / 3 fault tolerance on the premise of ensuring flexibility and security. It uses encryption to prevent spoofing and replay attacks and to detect corrupted messages. Each message contains a post-quantum public key signature

(RSA256 algorithm), message authentication code (MAC), collision-free hash function generated message digest (Message sage) and so on.

The DPOS Consensus Mechanism will be used in the shard chain to validate the management in the Hit code hosting business layer. DPOS completes the transaction confirmation by voting at the super node in the election, which can significantly increase the transaction concurrency and confirmation speed. With the certificate signed by a trusted accountant, DPOS eliminates the transaction verification time and enables HitChain users to quickly submit business requests with less transaction costs.

3.2.5 Isolation Witness and Smart Contract

In order to ensure the efficiency and security, HitChain will use a lightweight isolated data structure as the bottom layer, which will store and transmit different data based on demand. This structure will include recording trading status, legal trading witness status, and other specific status information in HitChain for the purpose of extending blockchain functionality. In the delivery process, users of different roles can selectively operate on the selected data. Therefore, isolation mode greatly reduces the load pressure on storage and communication relative to a full block design structure.

Based on the segregation of data structures, HitChain's business scenario will use smart contracts to support various types of user-defined business activities such as project crowdsourcing, code copyright transactions, and community public events such as policy referendums and brainstorming. The organic combination of smart contracts and isolation models ensures that every piece of information or data is exchanged on demand and on a per-authorization basis so as to increase the efficiency and credibility of HitChain operation.

3.3 Distributed Hosting System Based on Hit Protocol

3.3.1 IPFS Decentralized Storage Structure

Traditional centralized storage has bottlenecks in access performance and issues of reliability and security. HitChain will build a decentralized distributed storage system based on blockchain technology. Users earn by providing and sharing storage to others and are motivated to provide more. The protocol weaves these amassed resources into a self-healing network to host software code in a more efficient, secure and inexpensive way.

Sharing and Trading of Storage

By installing the HitChain application, users are free to share storage on PCs, mobile phones, and other storage-enabled devices in the HitChain distributed storage network as a storage node on the network. HitChain records the storage-related information including a share timestamp, a storage node identifier, a storage size, etc. in a storage management ledger.

When this storage space is used by other users, the shared storage will be priced according to the evaluation rules and consensus algorithms, and HitChain Token incentive will be given to the provider accordingly.

IPFS InterPlanetary File System

Decentralized storage networks feature large redundant storage spaces. IPSF technology is applied to store data in different nodes for file cutting, mapping, and dealing with redundant storage.

As a next-generation file network transmission system, IPFS nodes in the IPFS network form a distributed file system through content-addressable peer-to-peer hypermedia distribution protocol, which makes the network faster, safer and more open. All IPFS objects form an encrypted authentication data structure called the Merkle DAG.

An IPFS object is a data structure that contains two fields:
- Data - Unstructured binary data, less than 256kB
- Links - An array of Link data structures. IPFS objects link

IPFS has the following features: searching based on content rather than the domain name; providing a file version of the historical version of the controller, allowing multiple nodes to save different versions of the same file. IPFS running on the blockchain can store the hash of the Hit file Table. Cryptocurrency becomes an important system to coordinate resource sharers and users.

When IPFS stores data files, it divides large files into small blocks, maps their contents, and stores the corresponding hash values in multiple backup nodes to multiple storage nodes. The relationship between the sub-block and its storage location is recorded in the storage management ledger. When the data file is downloaded, the file splitting and storage location information are searched on the ledger. Then small blocks are retrieved from multiple servers in parallel, and finally the whole file is aggregated and reconstructed.

Storage Location Selection Strategy

File block storage needs to determine the number of each block backup and storage location in order to achieve the best storage and access efficiency.

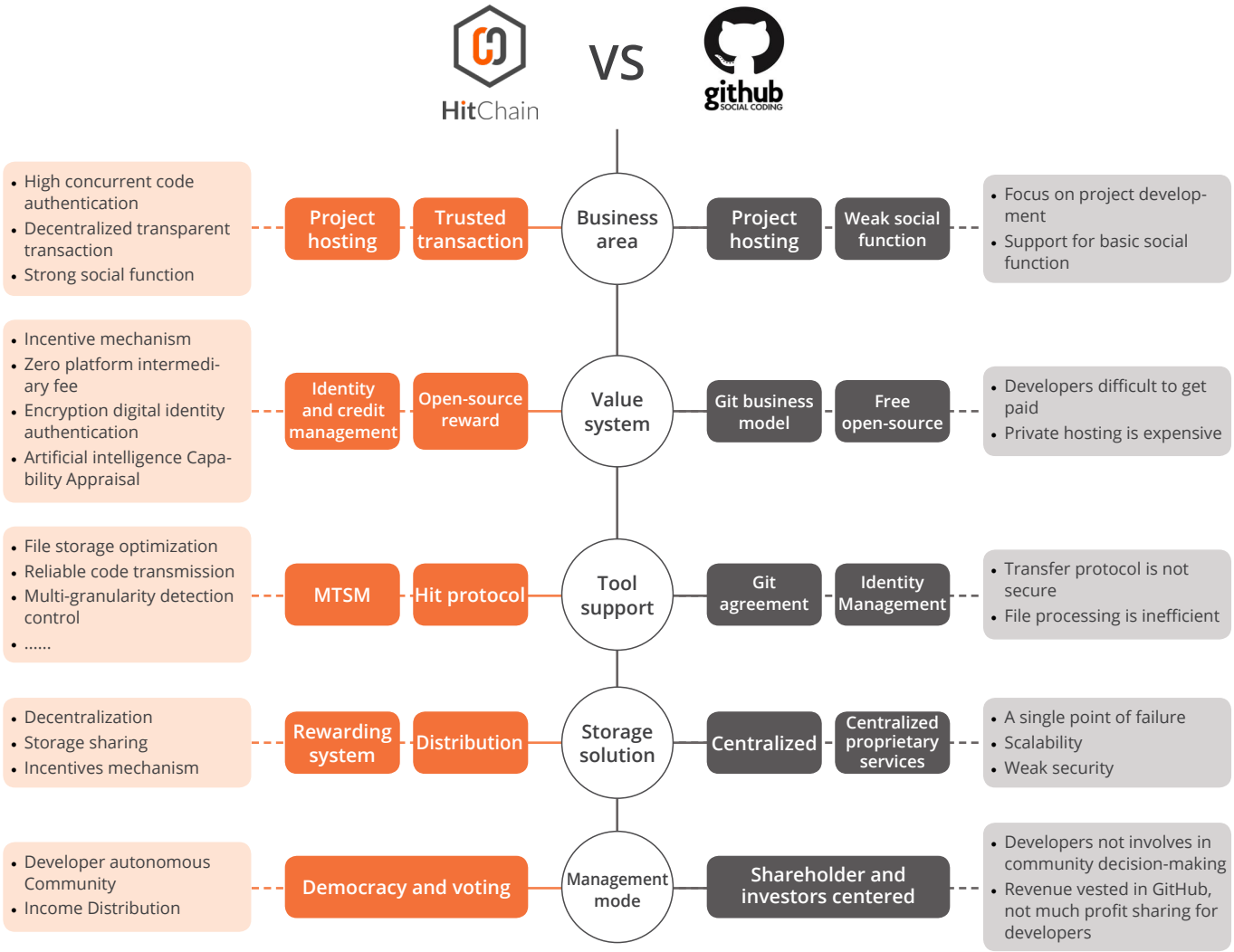
The basic strategy of data files storage is the optimal storage in the global view. A multi-iteration storage scheme with multiple backups is designed around storage request initiator node and subsequent file storage block nodes. In the initial block storage, we use the principle of the fastest arrival to ensure the rapid storage of the initial data. In the process of transmission and storage in the follow-up backup block, we use the principle of the furthest distance to ensure that follow-up file download can achieve fastest download speed in the global perspective.

3.3.2 Hit Distributed Hosting Protocol

Git is currently the most widely used code management protocol for software development. Major development communities like GitHub, GitLab and OSChina are all based on Git protocol. But, it has inherent weaknesses such as large file support and slow access to large-scale small files.

HitChain's goal is to overcome the limitation of Git protocol by upgrading to a new Hit protocol which combines Blockchain technology for more efficient large-scale, distributed software management and service worldwide.

Merkel Tree File Processing is an effective fragmentation file management solution. Before the Hit protocol is downloaded, the Merkle root of the file is obtained from a trusted source, and the Merkle Tree can be obtained from untrusted sources. Once the root has been obtained. HitChain will check the received Merkle Tree with a trusted tree root. If the Merkle Tree is corrupted or fake, HitChain will get another Merkle Tree from another source until a Merkle Tree that matches the trusted root is received.



Comparison between HitChain and GitHub

File Storage Optimization

Software development files consist of large binary files including Jar package, design resource base, SDKs and a large number of small code files. It requires a protocol to effectively store and clean up large files as well as to read large number of small files instantaneously.

The Hit protocol will build a code management ledger based on blockchain technology and address the above requirements on a distributed storage platform. A file segmentation algorithm will be adopted to efficiently split large files into a suitable size then submit them to the distributed storage platform.

For the optimization of reading a large number of small files, the redundancy of the distributed file block will improve the efficiency of querying and downloading via parallel downloads.

Multi-Granularity Detection Control

The Git protection mechanism is mainly used for a specific version of an entire repository. It is difficult to adjust the access to different files based on different access rules.

Hit protocol reconstructs files from different authorization levels based on files' relationship to achieve multiple granularity access with a single file as the minimum checkout unit. When submitting to storage, Hit will record the relationship of files and file permission information in the code management ledger. During the check-out, the file storage location and the relationship of the files are obtained, and then each file that meets the permission requirements is downloaded and the folder hierarchy is reconstructed according to the multiple granularity permission rules.

Reliable Transmission of Code Files

As a distributed storage platform, HitChain can store and manage the code data and split and store the data files to enable reliable data transmission including the resuming from breaking point.

After resuming from interruptions during the code file download and transmission, the entire data file does not need to be downloaded again and only the incomplete part will be downloaded in blocks.

The specific process is as follows: First, the files are opened and downloaded after splitting into blocks. The hash values of the file contents mapping is performed to determine whether the file has been completely downloaded. If the hash value is exactly the same as the pre-stored hash value, it indicates that the block has been completely downloaded successfully. Otherwise, it indicates that the sub-block is not completely downloaded, in that case, the sub-block is cleared and new downloading begins. After all the partitions have been downloaded, Hit will reconstruct blocks into the original data file.

3.3.3 Cross-Chain Authentication Mechanism

HitChain's cross-chain authentication mechanism includes user identity management and copyright identification in order to achieve continuous and effective code copyright protection.

User Identity Management

Each developer in the HitChain community corresponds to a unique identifier that tracks the developer's activities in the community, such as community discussions, transactions, code creation, and more. The developer identity information is also an important basis for protecting the originality of developers' works for proof against infringement.

In the HitChain community, developers can also form small groups of common interests or goals. When creating a group, the developers negotiate the group management model with rights and interests settings. Details include whether new members need to join via invitation, whether the members of the community can share resources freely, etc.

Copyright Identification

HitChain generates an ECC (Encrypt Copyright Certificate) for original code submitted by the developer as its unique markup. ECC will be used to effectively support code authentication, authorization, rights protection, and other services.

The ECC certificate contains the following information:

Code Summary *A fixed-length hash of each piece of code as a code summary. Hash functions are input-sensitive, which ensures that different pieces of code are hard to map to the same code summary value.*

Code Author *User account information in the HitChain community is used to mark the author of the code, and if the code has been used in another developers' code, the ECC of the code being used is also included.*

Creation Time *A UTC timestamp ensures the authenticity and reliability of the copyright registration time. Developers who first make the code and apply obtain the copyright for the code.*

Code Authorization *The owner specifies how other developers can use original code, including authorization policies and specific implementations. Both parties automatically fulfill the license agreement under smart contract, and the effect of the agreement fulfillment is accepted and guaranteed by the community.*

ECCs are stored in the blockchain to guarantee openness, integrity, and traceability. Any developer can view code copyrights in the HitChain community at any time, but the content cannot be tampered with. Depending on the code authorization record it contains, developers can also restore a complete code usage (authorization) path.

Before generating the ECC, submitted code is analyzed and modeled by natural language processing and an abstract syntax tree. This analysis extracts the functional code (such as file read and database access) and business logic code. HitChain performs a multi-dimension al comparison with the registered copyright code and determines whether there is infringement of the submitted code.

3.3.4 MTSM(Multi-Task State Machine)

MTSM (Multi-Task State Machine) is HitChain's multitasking parallel state machine technology, its core mission is to safeguard the code security of the Open-source management code system, authentication services, Hit network security, etc.

MTSM runs in parallel with the HitChain system to monitor HitChain system security in real time and ensures the legitimacy of Hit network data input and output while providing source code authentication services.

The MTSM performs the following three tasks.

① Code Security Management

The MTSM uses a malicious code detection mechanism based on a positive selection classification algorithm to monitor the Hit fragmented code base in real time in the background. After the code is input, the MTSM converts the sample file into a hexadecimal format, extracts all the n-grams of the sample file, calculates N n-gram terms with the maximum information gain, and then normalizes them. The algorithm optimizes the classifier training process, which is better than naive Bayes and Bayesian network algorithms, supporting vector machine and decision tree algorithms.

② Code Authentication Service

MTSM scans the chain of code base in real-time, using backpropagation to feed an Artificial Neural Network (ANN) looking for code similarities on the chain. By using the submitted code as an input vector the neural network can identify similarities in the code using non-linear mapping between input and output to give code authentication advice or decisions.

③ Security Sandbox Monitoring

MTSM can effectively analyze the active characteristics of the nodes and the legitimacy of the transaction records by detecting the transaction records such as the time-lapse chain accounts and the nodes in the chain. When a transaction records an illegal or malicious node, the MTSM state machine will use an event-driven mechanism to notify the consensus node to promptly remove the illegal ledger (except the ledger that cannot be tampered with) and remove the malicious spoofing node from the network.

3.4 HitChain Applications

HitChain offers a range of client applications so that developers can quickly and easily participate in community activities.

Online Community Platform

HitChain's online community platform supports three types of activities: community operations, asset management, and user interaction. The specific content of each is as follows:

Community Operations

An open and transparent community is important for HitChain to grow as an autonomous autonomous community. All community matters will be governed by Community Committees. The community affairs are published, and developers' opinions and suggestions are collected through an online platform.

Asset Management

Developers can manage their personal assets and trade with other developers online. Developers need personal authentication before using asset services to ensure the authenticity and security of their asset accounts. Safe and reliable asset service protects the legitimate rights and interests of developers.

User Interaction

With the online platform, developers can engage in a series of interactive activities such as providing solutions to novel and complex tasks in the form of crowdfunding and bounties. A rich user interaction channel is an effective method to utilize a developer's talent in a collaborative way.

Resource Sharing Management System

HitChain stores the developer's source code in a distributed manner throughout the network. Willing developers contribute their local computing resources to the Resource Sharing management system. The system provides graphical and command-line management tools to assist developers with configuring shared space and shared bandwidth.

Hit Client

Developers will use the Hit client to complete code submission, synchronization, and other operations. Hit, based on Git development, is a major improvement and upgrade to the Git protocol designed to be a Git user-friendly protocol compatible with most of the commands of the Git protocol and allowing Git users to adopt Hit without requiring additional training.

Chapter 4 HitChain Economic Model

4.1 Cryptocurrency System

4.2 Value Verification and Distribution

4.3 Contribution Incentive Mechanism

4.4 Developer Value Model

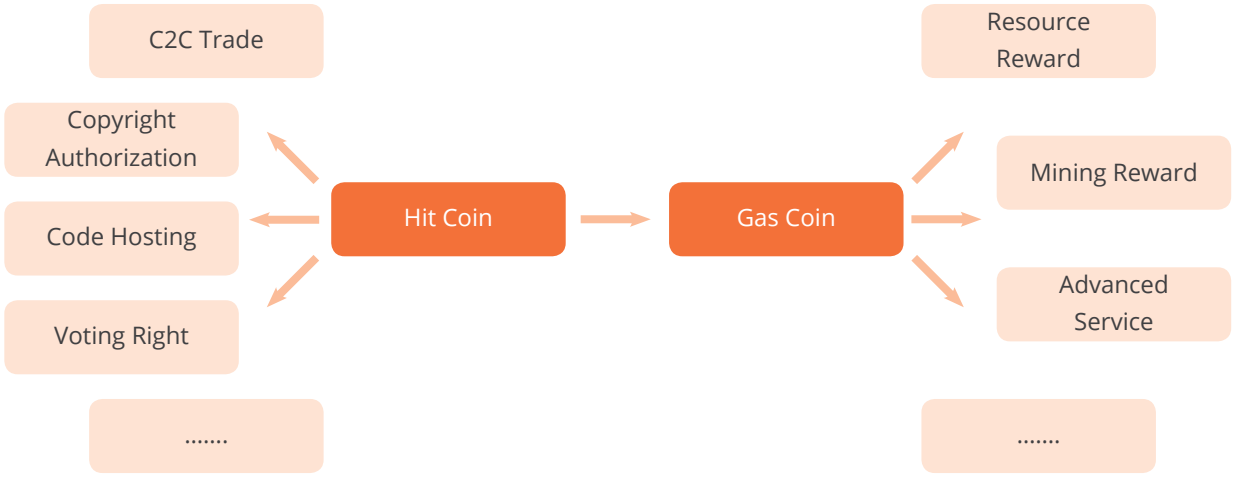
Chapter 4 HitChain Economic Model

HitChain is a global ecosystem of Open-source applications based on an Open-source philosophy and Blockchain technology, which is of the developers, by the developers, for the developers.

HitChain's economic model includes three major value transfer scenarios: reward for sharing of idle computing resources, public reward for community contributions, and transactions involving developers' works. The first two are the main approach to obtain cryptocurrency, and the last one is the main marketplace of cryptocurrency circulation.

4.1 Cryptocurrency System

In HitChain, participants or users are defined as developers generally. They actually are software developers, miners, Open-source software users, Open-source application services agencies, certification authorities, third-party component developers, education and research institutions, business partners and more. In the HitChain system, all community participants are decentralized co-hosts and co-governors who work together for code hosting, copyright management, crowdfunding, paid use, basic network construction, resource sharing and so on as per HitChain's framework.



Hitchain's Monetary System and Circulation Scenarios

The cryptocurrency is the core coordination mechanism. HitChain uses a dual token system: basic token and fuel token.

The base token is used in the following scenarios:

C2C Trade to pay for HitChain operating expenses including code hosting, copyright management, crowdfunding rewards, paid use and so on.

Copyright Authorization To fund the transfer of copyrights and intellectual property.

Voting Right Weighted Voting Rights.

Code Hosting When fuel tokens are not enough to pay, basic tokens are automatically converted into fuel tokens to ensure the deal is completed.

> **Fuel tokens are used in the following scenarios**:
>
> ***Mining Reward*** Miners provide the basic network infrastructure and the cost of the transaction ledger
>
> ***Resource Reward*** Fees charged by P2P resource sharers.
>
> ***Advanced Service*** Fees for advanced service

It is important to note that before the launch of HitChain, the ERC-20 token - HIT based on Ethereum will be used for rewards and operations. Once HitChain is online, ERC-20 will be exchanged for HitChain Token (HIT) at a one to one ratio.

4.2 Value Verification and Distribution

HitChain adopts a decentralized approach to distributed computing therefore encourages users to share storage space like CPU or GPU computing resources and network bandwidth to build a robust network infrastructure. The community will reward resource contributors on the rule of "contributing early returns early and more contributions provide more returns". For certain amounts of computing resources, the earlier contributor will get more returns than the late comer. Similarly, in terms of contribution value, the higher the scarcity of contribution resources and the greater the number of resources, the higher rewards. Specifically, the reward formula for a certain resource r (such as 300M storage space) contributed by a certain contributor at time t (as of January 1, 2018, 12:00) is as follows:

$$\mathrm{Award_{rt}} = Award_{stand} \times \lambda_{\mathrm{t}} \cdot \frac{T_{init}}{T_{con}} \times \lambda_{\mathrm{r}} \cdot \frac{R_{con}}{R_{total}} \cdot I_r$$

Among them, λ_t and λ_r are the revenue reconciliation factors, which are used to weigh the proportion between the time dimension and the value dimension. $\frac{T_{init}}{T_{con}}$ indicates that the community is open to the ratio of time (T_{init}) to resource contribution time (T_{con}), which are used to ensure that the earlier participants share the resource, the higher the reward is. $\frac{R_{con}}{R_{total}}$ represents the ratio of resource contribution R_{con} to the total amount of community idle resources R_{total}, used to ensure the larger the participation of resource sharing is, the higher the reward is. I_r is the coefficient of the importance of such resource r in the calculation of the current overall community behavior. For example, for a programmer who needs to submit a specific behavior of uploading 100 lines of code, let's assume that we need 1M storage and 10kb / s of bandwidth, and the current 100M of free space in the community and 1kb / s of upstream bandwidth. Then for this scenario, the urgency of storage space is much less than bandwidth so the contributors of the bandwidth will earn more than contributors of storage space. I_r coefficients are calculated from a global perspective based on the results of monitoring and analysis of all transactions in a particular phase of the community and are subject to change as the community evolves.

4.3 Contribution Incentive Mechanism

HitChain aims at creating a autonomous community of the developers, by the developers, for the developers. The community will reward members who make contributions by bringing promising software projects and valuable ideas to the community.

4.3.1 Content Incentive

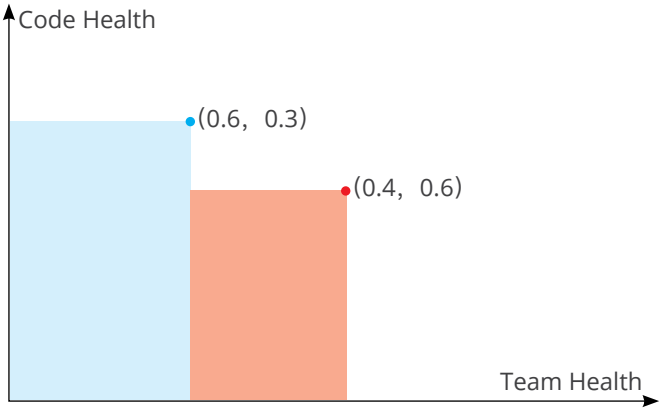
Good software projects are the cornerstone of an Open-source community. After decades of roaring development, tens of thousands of software products are on the market with varying levels of quality. In order to attract premium software projects to HitChain, rewards will be given to based on the a five-dimension assessment: popularity, project maturity, code health, development team, and project development trend. The five dimensions are as shown in the following table.

Measurement dimension	Metrics	Metrics description
Popularity	Total download	The number of software downloads in major hosting communities
	Reuse numbers	The number of other projects that rely on this specific software
	User trending	User trending of software in major knowledge sharing communities, related technical introduction, and training materials.
Project maturity	Maintenance period	Years of maintenance from inception to migration
	Attention received	Number of fork star watch
Code health	Debug speed	The average debug time
	Bug fix rate	Bug fix rate
	Static code quality	Analysis metrics for static code quality checking tools that cover vulnerability risk, complexity, code style, annotation rate, etc.
Team health	Team size	Numbers of contributors
	Personnel growth	The Percentage of new contributors in the current period
	Continuous contribution	The percentage of contributors who contributed to the current time period from the previous time period
Project development trend	Commits activity	Increase of commits
	Task increase	Increase of project tasks
	Attention trend	Numbers of new follows

Based on the above five dimensions of quantitative assessment, we can measure the quality of the migrated items through the subspace below the 5-space surface after normalization. The corresponding reward calculation method is as follows, where $f(x_p)$ is the surface function of the project P to be migrated, $x_p \in X$ is a concrete measure for each dimension.

$$\text{Award(P)} = Award_{stand} \times \iint \mathrm{f}(\mathrm{x_p})\, dS,\ x_p \in X$$

Since it is difficult to clearly illustrate the above ideas in high-dimensional space, we briefly describe the basic idea of this method with two dimensions, namely code health and team health. Suppose we have two projects P1 and P2 to be migrated, where P1 has a code health of 0.6, a team health of 0.3, a project P2 code health of 0.4, and a team health of 0.6. In two-dimensional space, P1 can be expressed as coordinates (0.6,0.3), P2 coordinates (0.4,0.6), after drawing that P1 surface function can be expressed as a blue plane, P2 red plane. Therefore, the quality of P1 is the value corresponding to the blue plane area. The quality of the P2 project is the value corresponding to the red plane area, that is, the quality of the two projects is quantified. Similarly, in high-dimensional space, the quality of the project can correspond to the volume under the surface, and the specific quantitative values can be obtained by double integral.



Software Project Evaluation Model

4.3.2 Community Building Incentive

HitChain encourages members to express their opinions as to how to build a democratic and open community. In return the community will reward members with the digital currency. The community will conduct multiple rounds of screening of the opinions collected by all members and evaluate each for feasibility and effectiveness. Finally, HitChain will reward the best opinions based on the actual effect. The calculation for reward is as follows:

$$\text{Award(T)} = \mathrm{E}\ (1 - e^{-T}) \quad \mathrm{T} = 1,2,3, \ldots \ldots$$

Where T is the observation window of the practical application of the opinion, for example, the community may stipulate that its effect is observed in a period of one month or three months. E is the value of the observed observations during the T-th observation window. For example, communities have improved their platform services to appeal to users due to the opinion of developers. If the community designates a unit of token for the comment provider for every new user added, the number of new users added during an observation period is the total benefit that the opinion has achieved during the observation period. The program will enable those whose opinions produce long-term benefit to receive more reward.

4.4 Developer Value Model

Developers can conduct C2C transactions in HitChain. Common trading scenarios are as follows:

Code Transaction

When a developer wants to use someone else's original code, they need to accept the license agreement and pay for it. There are two alternative strategies for code authorization: (a) Pay Then Use (PTU), which allows the buyer to pay the HIT required by the owner once. After the payment is completed, the buyer ceases to have any obligation to the owner for use of the code. (B) Earn Then Pay (ETP), the buyer only pays HIT to the owner after the buyer makes profit from the code purchased.

Mission Reward

When developers encounter difficulty, they can post mission rewards. The bounty hunter who provides the solution will receive an appropriate reward based on two rules. First, one winner either handpicked by the task publisher or determined by the platform as the best solution through multi-dimensional assessment will take all the reward. Second, the reward will be shared by all users who provide the right solution. Each winner will get a bonus share of M / 2n, where M is the total bonus amount, n is the number of winners, the sooner the correct solution is provided, the more rewards will be earned.

Consultation Service

Developers can also consult with experts and pay the price set by the expert. Because each developer's capabilities and charges are open and transparent, users can make the most economical choices based on actual need.

Social Interaction

In HitChain, developers can conduct a series of social interactions. For example, when a developer broadcasts the code on the platform directly, the viewer can offer reward freely.

Information Subscription

To keep up to the latest developments in related fields, developers can subscribe to the updates from interested developers and get notifications regarding online and offline tech lectures or meetings.

Creative Crowdfunding

Interested users can invest money or technology through crowdfunding on HitChain. These inputs are recorded in the blockchain transparently to protect investors' interest.

Project Collaboration

HitChain provides a decentralized collaborative project solution that makes it easy for Open-source projects. Any community user who reaches a certain level of reputation can become a project sponsor and call on community developers to join and give incentives to them.

Chapter 5
HitChain Strategic Planning

5.1 Community Governance Structure

5.2 HitChain Roadmap

Chapter 5 HitChain Strategic Planning

5.1 Community Governance Structure

HitChain will set up Community Governance Committees to ensure the community's sustainable development. The committees are elected by all community members and act on behalf of all community members.

5.1.1 Committee Organization

As shown in the figure below, there is a decision-making committee and various affiliated functional committees. The decision-making committee oversees the community at large while the functional committees are in charge of specified fields.

HitChain Commitee Governance Structure

5.1.2 Committee Regulations

HitChain sets the rules for community committees to ensure that they truly serve the community. Community committees will serve more as organizers than policymakers and use fair and transparent mechanisms to safeguard the community's autonomy.

Personnel Appointments and Dismissals

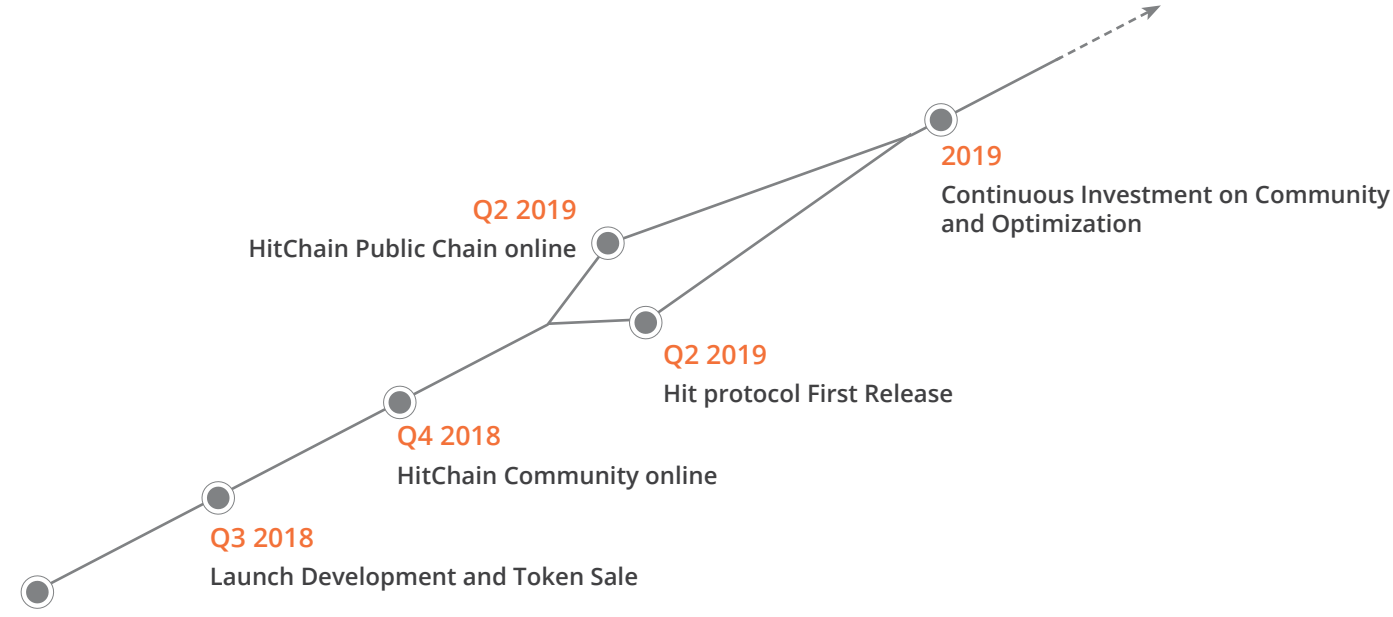
The first committee consists of the founding team of HitChain, Open-source and blockchain experts, key investors, and consultants. Follow-up bids will be made every two years for a new term. Members of the next committee will be elected by the community through voting. The members of the committee are eligible for re-election. The members of the previous committee have the right to nominate candidates for the next committee. During the non-commission election period, vacancies will be replaced by users nominated by the committee and voted by the community.

If a member of the committee commits any illegal activities during the tenure, they will be dismissed on the spot and permanently banned from re-entry at any level. If members of the committee fail to fulfill their duties or make serious mistakes during their term, they may be dismissed upon the proposal of other committee members and a vote by the community. Dismissed committee member retain their right to re-enter the committee through voting for future terms.

Voting System

All members of the HitChain community have voting rights. Polls initiated by community committees and any proposals require at least half of valid votes at pass. Each member's voting power is different based on his competency appraisal and credit grade calculated by underlining algorithm.

5.2 HitChain Roadmap



Strategic development roadmap

Chapter 6
HitChain Founding Team and Advisor Team

6.1 HitChain Founding Team

6.2 HitChain Advisor Team

Chapter 6 HitChain Founding Team and Advisor Team

6.1 HitChain Founding Team

Jiang Li (Australia)

Chairman and director of Hitchain Foundation; CTO of Microsoft China. He has held the post of global senior technology management for a long-term. He has a deep insight and extensive network of contacts in the international IT industry. He has profound accumulation in field of Blockchain, Cloud Computing and Open-source Ecology and deep understanding of blockchain application and its value. He is responsible for the overall operation and strategy of HitChain, and for promoting Hitchain Community and Hit Protocol, attracting global developers to build a developer autonomous community which can surpass Github.

Khee Joo Tan (Singapore)

Director of Hitchain Foundation, farmer TIBCO CTO in APAC. He served as technology executives in lots of transnational soft corporations. He has over 30 years of working experience in APAC software industry. He is responsible for international promotion and business development in the HitChain team.

Thomas Tan(U.S.)

Data scientist; Ph.D. of Computer Science – Software Engineering at University of Southern California. Currently he serves as a distribute storage expert in branch of IBM in L.A. He will be responsible for the development of IPFS-based code distributed storage protocol in the HitChain team.

Leon Li (Hong Kong)

Director of Hitchain Foundation, open-source expert at Intel, first RHCA Certified Architect in Greater China Area. He served on technical positions in many global soft companies. He will be leading the construction of open-source system in the HitChain team.

Nick Ma(Japan)

Core contributor and maintainer at OpenStack Foundation; Chief Cloud Architect at Telexistence Inc (Japan). He is responsible for the framework, key module research, and development in the HitChain team.

Jerry Li (China)

Git Protocol Expert; Former CDO of Gitee of OSChina. He has over 10 years of experience in research, development and management of products. He is responsible for the development and management of Git Protocol and framework and design of code hosting platform and he will engage in promotion and operation of community.

David Mei (China)

Expert and early developer of blockchain technology. He has deep study and rich experience in design and development of blockchain technology. He is responsible for the design and development of the underlying basic public chain in the HitChain team.

6.2 HitChain Advisor Team

Jia Tian

Chief Scientist of cortexlabs.ai, early adopter and long-time supporter of bitcoin since 2011. He majors in distributed systems and acquired BS/MS degree from dept. CS&T, Tsinghua University. Tian served as Chief Scientist in the first bitcoin fund in China, bitfund and was an early supporter of Zerocoin upon its incarnation since 2013, which later became Zcash and Tian joined the Zcash voting committee. He also invested in Bitfinex as a shareholder. Tian is also a serial entrepreneur. As an system architect, he joined multiple startups which became or was sold to giants later in their field such as Shenma Inc.

Zhongyang Chen

Professor and doctor tutor of the school of finance at Renmin University of China; Senior researcher at the Chongyang Institute of Finance; Fulbright scholar at the United States State Department; Famous expert in the field of finance and risk management and a policy researching specialist.

Zhongxing Xu

Chief Scientist at 360 Code Guardian. Doctor of Engineering at Chinese Academy of Sciences. He is one of the first people in China to participate in the research and development of the world's top open-source basic software projects. Famous developer in international open-source field.

David Wu

Currently the managing partner in the financial services consulting department and the performance improvement in financial services at Ernst & Young Greater China. He has more than 25 years of working experience in investment, financial management consulting and IT implementation services.

Haobo Ma

Founder of Aelf, expert of blockchain industry, early practitioner in field of digital asset. He served as CTO at Gempay and CTO at AllCoin. He is the current member of Blockchain Experts Committee of the Chinese Institute of Electronics and Blockchain Experts Committee of China Computer Federation.

Binsheng Wang

Distinguished professor of graduate school at Chinese Academy Social Sciences; Doctor of economic; Consultant of Organization of Blockchain Associations for Development; Early investor of digital asset; Disseminator of idea of blockchain.

Chapter 7 Conclusion

HitChain will offer a global decentralized, transparent and autonomous collaboration platform based on blockchain technology. This is a natural evolution of the Open-source philosophy and an upgrade to existing tools and protocols. By overthrowing the long-standing centralized and hierarchal structures of software production and distribution developers will be empowered to own more of their own work and efforts. HitChain is only a platform catalyst, the real value will come from the thousands of incredible software projects built, managed, sold, and traded on the HitChain.

HitChain