Hero Node Whitepaper

Version 0.3

Hero Node Foundation

2018.4

Abstract

Hero Node utilises the Hero protocol to integrate different public blockchains and build a cross-blockchain, cross-platform development solution for DApps. Hero Node will also build a fully decentralized node network which contains multiple kinds of public chain and IPFS storage to support fully decentralized applications.

It will break the life cycle of existing applications, and become an eternal application.

Contents

Contents

Background

It is widely said that 2017 was the genesis year of blockchain technology, because this was the year where we witnessed phenomenal growth in the sector. The first generation of blockchain started with Bitcoin as a form of payment and evolved into the second generation with Ethereum's smart contracts. Blockchain technology continues to evolve and mature day after day with new chains like QTUM and NEO. We have seen the impact of blockchain technology in finance, sports, entertainment, real estate and other major industries. However, the blockchain industry remains in its infancy and one of the most important factors hindering rapid development is the technical barrier.

The diversity of development languages

BitCoin was written in C++. In order to appeal to more developers, Ethereum has more language support including Go, C++. It is essential that developers are proficient in these languages if they wish to program dApps on blockchains. However in most cases, programmers are only proficient in one language, and their choice of blockchain platform is usually based on the programming language they are familiar with, rather than the features and strengths of the blockchain itself.

The complexity of underlying blockchain technologies

Blockchain technology spans a variety of technical fields, including but not limited to contemporary cryptology, distributed systems, peer–to–peer network communication technology and various consensus algorithms. In addition, as the industry is still in its infancy and technical documentation is limited, even experienced developers struggle when they first get exposed to the blockchain technology.

Cross–platform dApps

Today, most dApps are presented in the form of webpages and some dApps even have to rely on contract calls to complete their functions. Under network product quality standards, such applications would typically be considered sub–standard. In addition, we have also seen the rise of mobile devices. According to research, 90% of users will choose to utilize a service on a mobile platform rather than a non–mobile one assuming all else is equal. Develping applications for mobile devices also remains a large barrier for blockchain developers. In addition, mobile operating systems are divided between iOS and Android.

Hero Node was started to solve the problems listed above and to contribute to the future development of the blockchain industry.

User Experience

Today's blockchain applications are extremely troublesome for consumers to use, not to mention the development work. Almost all blockchain applications require the consumers to use the contract method, and even those with slightly better experience require consumers to attach additional data in the transaction. Even like CryptoKitties, the most popular application, still requires the users to install and deal with the wallet plugin of Metamask. To popularize blockchain technology, the user experience of blockchain applications must be comparable to that of today's Internet applications for ordinary users, which means blockchain technology should be totally transparent.

Credibility

Traditional mobile application needs to be uploaded to a centralized application store such as the App Store after the development is completed. Even if the developer make it open-source, there is no guarantee that the application in the store matches the original code. Even if the application has been used for a really long time, after every upgrade, it is still hard to guarantee that it will never steal users' data and thus damage their interests. Even DApp which actually belongs to the blockchain world, will be put on these centralized stores after the development is completed, which makes it hard to guarantee its core concept of decentralization and credibility.

Future of node

It takes a long time to make the users dependent to the public nodes. Even the Bitcoin system, which focuses on the ledger transaction, has become too large for ordinary users to run. The public chain with high TPS will reach this stage even faster. In the future, the users will mainly use the mobile blockchain terminals that cannot participate in the blockchain consensus at the full–nodes level. As a result, connecting to a common node is the inevitable choice. Compared with the traditional APP development mode which focuses on cloud computing and cloud storage developing, new application developers rely on public nodes. DApp is based on blockchain nodes and IPFS nodes, but if those nodes are maintained by the same developers, it seems a little bit centralized. Blockchain operators rely on public nodes. When new chain with friendly public nodes come into being, it is easier to obtain more full nodes, and get the support of the node miners. Also, it is easier for the developers' applications to set off on the chain.

Hero Node's solution

Hero Node hopes to build a super node network containing the public chain service, IPFS storage, reliable off–chain computing, etc., by decentralization and incentive mechanism. Hero Node hopes to build a new generation of blockchain–based application platform, the DApp platform .

By its revolutionary design and strategy, Hero Node hopes to achieve all the goals above. Different from the current public chain in the blockchain world, Hero Node is not a traditional public chain, but a platform service, a solution that combines the concepts of public chain, mobile cross-platform technology, and fog computing.

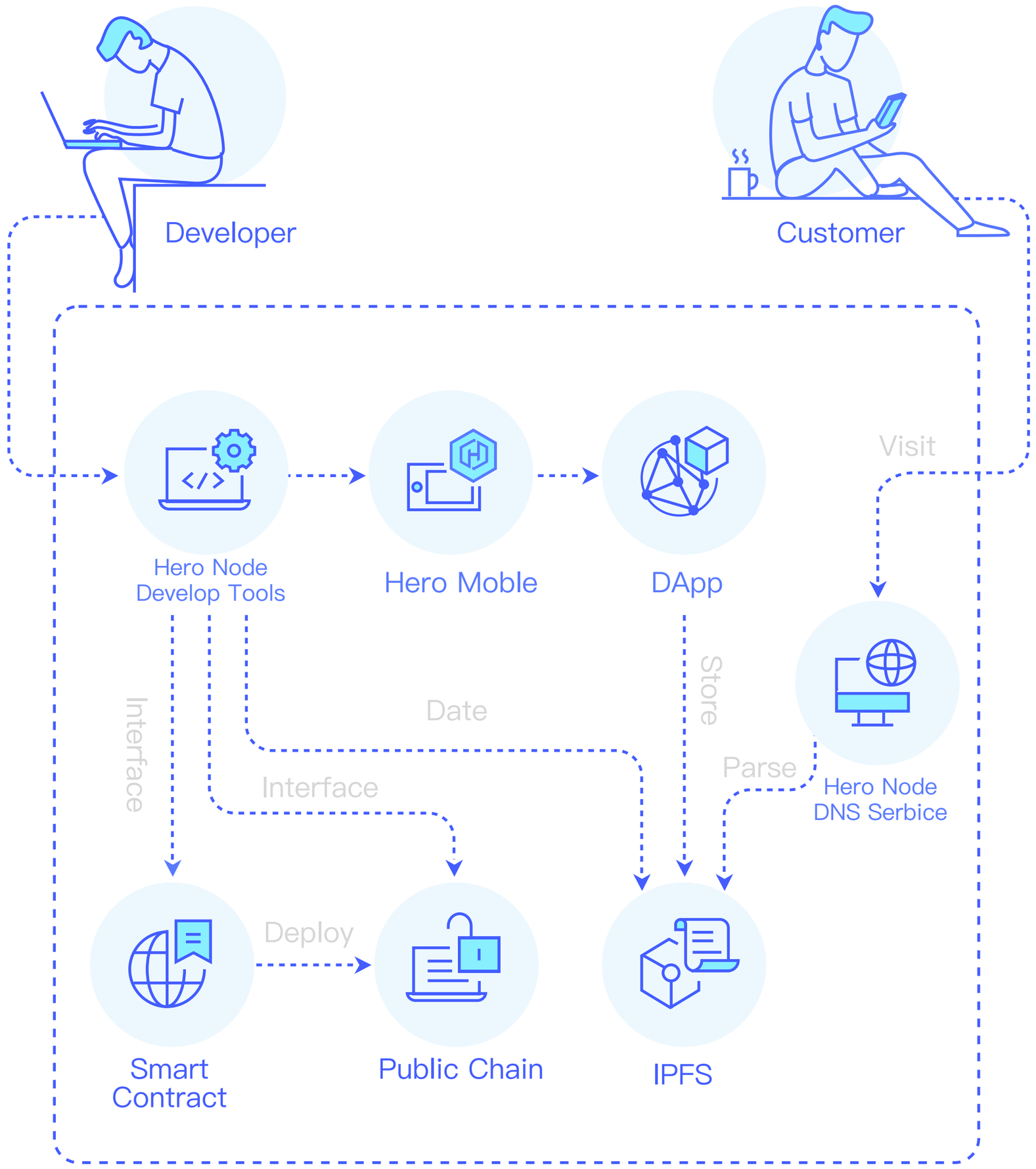
In terms of node construction, Hero Node uses a token-based incentive approach to stimulate “miners” to synchronize as many public-chain nodes as possible and provide highly available storage, bandwidth, and computing resources. Because of this kind of “proof of existence” incentive method, the nodes that contribute resources can receive considerable token income, and Hero Node can thus form a self-developing ecosystem, not just stays as a technology platform.

In terms of interface protocols, Hero Node provides a consistent interface protocol to access various public chain services. Developers can choose different public chains according to their actual needs, and can accomplish cross-chaining operation within one application. It breaks the isolation between different public chains and enables the blockchain applications to select from multiple blockchains freely according to different scenarios, which greatly improves the efficiency of developing and operating.

In terms of application experience, Hero Node integrates Hero Mobile's cross-platform technology. Developers can

easily develop native iOS and Android applications using the basic JavaScript language, and during the whole process, the blockchain technology is transparent to developers.

Hero Node also decentralizes the deployment of itself. An application is also a file in nature, and the developers of Hero Node packages it in an Hero IPFS Node, in which a unique Hash is generated. In this way, this application has also become an eternal application. Anybody can access the application through this Hash. But no one can remove it. If an application is upgraded, its Hash will change as well. If the consumer only believes a certain version of the application, he can keep using it.



【 Hero Node structure 】

Fog Computing

Fog computing was put forward as an idea in 2011 and defined in 2012. Similar to cloud computing, fog computing was aptly named. Clouds are high up in the sky and appear abstract, however fog is much closer to us. Fog computing does not have strong computational capabilities, only weak, scattered capabilities.

Fog computing used to be called grid computing or distributed computing, and was an extension of cloud computing. It mainly utilizes edge networks and its data transmission has extremely low latency. Fog computing has vast geographical distribution and has large-scale sensor networks. It supports high mobility and mobile devices would be able to communicate with each other directly without having to utilize the cloud or even the base station.

Fog computing adopts a distributed framework that is much closer to edge networks as compared to cloud computing. Fog computing concentrates data, data processing and applications in the edge networks, which is unlike cloud computing where data is stored in the cloud. Fog computing relies more on local devices than servers. As such, cloud computing can be said to be an evolution of centralized computing while fog computing is a new generation of distributed computing is more aligned with the decentralized feature of the blockchain. Cloud computing is a centralized service provided by internet service providers. The stability and security of services are wholly dependent on the service providers. In the current Internet ecosystem,

cloud computing is a mainstream service, but will surely encounter the following problems.

Security

1. Data Corruption

In 2017, there were more than 10 large internet enterprises globally that were financially impacted or bankrupted due to data corruption. Technology giant Github was among these.

2. Bankruptcy of service providers

The average lifespan of startups is <14 months. Even giants like Yahoo have struggled to maintain long-term competitiveness. As such, it is difficult to assume that any company will be able to maintain your data indefinitely.

3. Illegal usage

Cloud computing companies record your surfing habits and analyxe your behavior and interests through big data analysis. For example, when you search the terms “weight loss”, you will notice that weight loss advertisements are shown the next timie you open your browser. Similary, upon registering for a house viewing you will start receiving calls from renovation companies. The cloud is aware of your every move online.

Monopoly

The centralized framework will likely result in a monopoly on resources and traffic. In the traditional economy, we are very familiar with the concept monopoly and have many preventive measures in place. However, on the Internet, such measures appear useless.

Sustainability

With cloud computing, bandwidth worsens as more devices connect. With the advent of the mobile era and the explosive growth of connected devices, the limits of cloud computing will be constantly challenged. This problem can only get more severe as we move towards the 5G era where even more devices are connected.

Fog computing networks are not powerful servers in general. However, they are composed of weaker but more decentralized personal computers. Fog computing lies in the middle of the spectrum between cloud computing and client terminals and is a paravirtualization architecture model of computing services. This model emphasizes quantity and will work even if single computing nodes are weak. Fog computing adopts a distributed framework that is much closer to edge networks as compared to cloud computing. Fog computing concentrates data, data processing and

applications in edge networks. This is unlike cloud computing where everything is stored in the cloud. As such, storage and processing of data depend more on local devices other than servers in the fog computing model. Fog computing is a new generation of distributed computing in line with the decentralized feature of the Internet. Since Cisco proposed fog computing, big players ARM, Dell, Intel and Microsoft and Princeton University have been supportive and have set up a non-profit organization named OpenFog Consortium which aims to promote and accelerate the popularization of fog computing and promote development. Fog computing is mainly focused on personal cloud, private cloud, enterprise cloud, and other small-scale clouds.

Hero Node fog computing is a decentralized network system. With technological advancements, fog computing has built on the old model of grid computing and also added features of service computing, thereby making it a serious competitor to cloud computing. Hero Node has incorporated blockchain technology on top of the fog computing infrastructure to create a decentralized ecosystem.

In the past fog computing, only the information is transmitted between the small nodes. It is like A simply sends a message to B, and that is all. But the Hero Node combines fog computing with the blockchain technology,

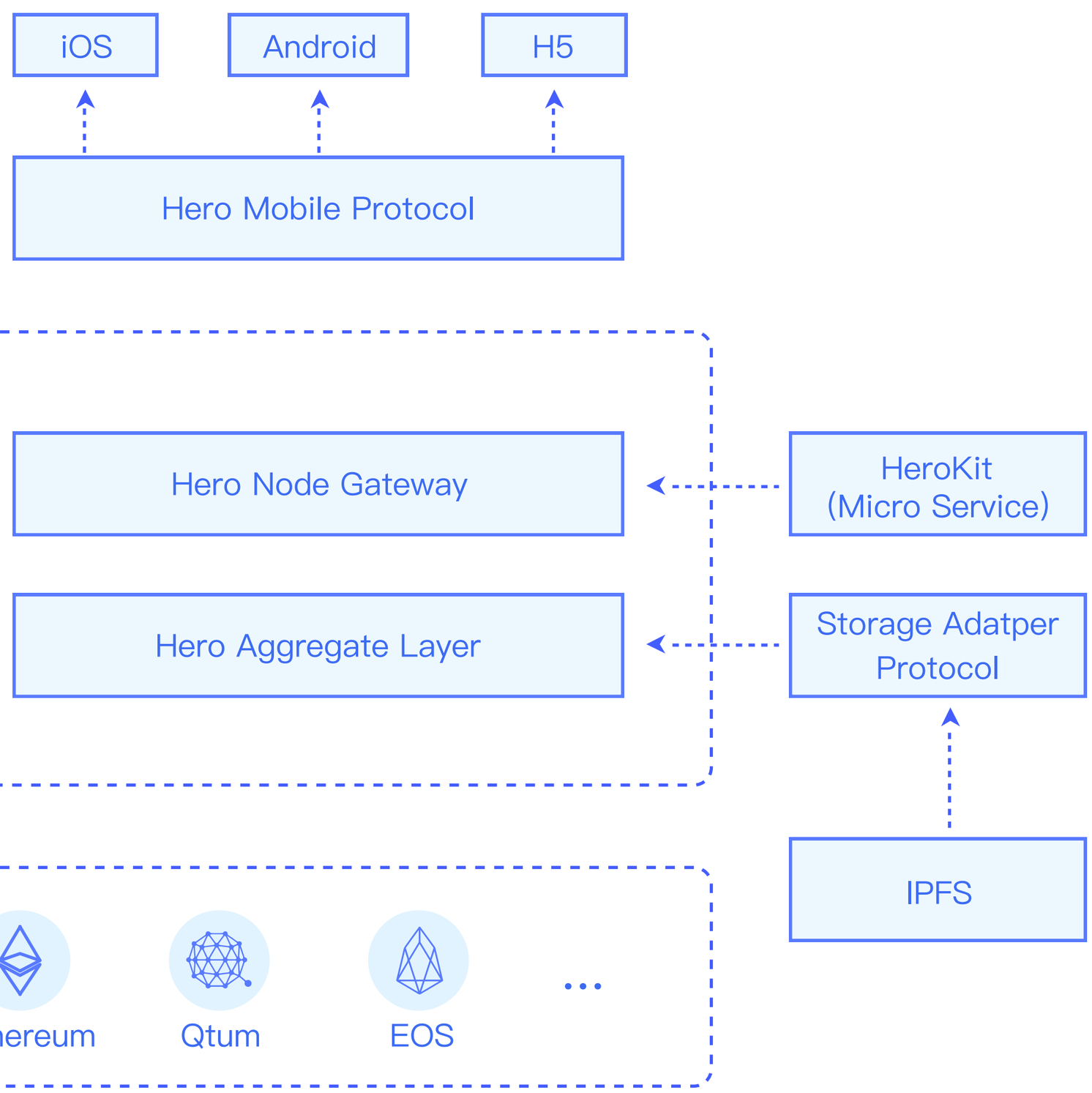
which achieves the transmission of both information and value. The information transmission is achieved by peer–to–peer communication technology. While the value transmission is achieved by the synchronized record across the entire network through the blockchain consensus mechanism.

Based on the fog computing, Hero Node fully implements the concept of FAAS (Functions as a Service). Through this micro–service framework, Hero Node provides an open protocol, by which the nodes can provide complex off–chain computing and return the results back to the chain. This can save a lot of resources, and thus improve the operating efficiency of the entire node network.

Design principles

Architecture design

Hero Node adopts a series of revolutionary designs, and constructs the system architecture according to the principles of high safety, high convenience, high availability, and user experience prioritization .



【 Hero Node Architecture 】

1. Hero Aggregate Layer

Hero Aggregate Layer is the most basic underlying structure of the Hero Node system. It directly communicates with the blockchain, deals with the compatibility and processing problem of the various public chains. It also connects to the underlying storage modules and reports the unified public chain operation API to the upper layer. Thanks to the Hero Aggregate Layer, we can develop our applications based on different blockchains without worrying about the isolation of the different underlying public chains.

2. Hero Node Gateway

Hero Node Gateway is an API gateway based on the Hero Aggregate Layer. The API of this layer is open to developers to develop DApp. Hero Node Gateway will provide network protocols like HTTP, SOCKET for developers, and will continue to improve itself to be compatible with more protocols.

Hero Node Gateway also connects to HeroKit (a micro-service architecture provided by Hero Node official and community). In HeroKit, a series of tools and approaches needed for development and common components needed for the off-chain computing are provided. It is also where the FAAS protocol is provided. Any developer can use HeroKit via the Hero Node Gateway.

3. Hero Mobile

Hero Mobile is the layer that is closest to the application layer of Hero Node. It is actually a mobile cross-platform tool. The developer can just write JavaScript code for once and then it can automatically run on iOS, Android, and H5 platforms. It can greatly save the development costs of DApp. Hero Mobile is directly connected to the Hero Node Gateway, which greatly facilitates the communication between the mobile apps and the blockchain world.

Data design

1. Data security

Hero Node adopts decentralized IPFS technology to store application data and increases the alignment of data indexing technology on IPFS to ensure that the data distribution density is safe and efficient. The concept is similar to torrent files – as long as the torrent is successfully uploaded, the data will be stored in the Internet. The Hero Node system also has an additional mechanism to ensure the torrent density remains safe and efficient. Since nodes are not associated with corporations, even if the developer using Hero Node stops providing support, the published application will still run normally. Even if the Hero Node Foundation ceased to exist, all applications on the Hero Nodes which are fully compatible with IPFS will still exist in other IPFS nodes of the world,

although the access rate will be significantly reduced. Applications and data on Hero Node are locked in a “black box”. In additioin, developers can also use the public key of the blockchain to encrypt their data to ensure absolute security of their data.

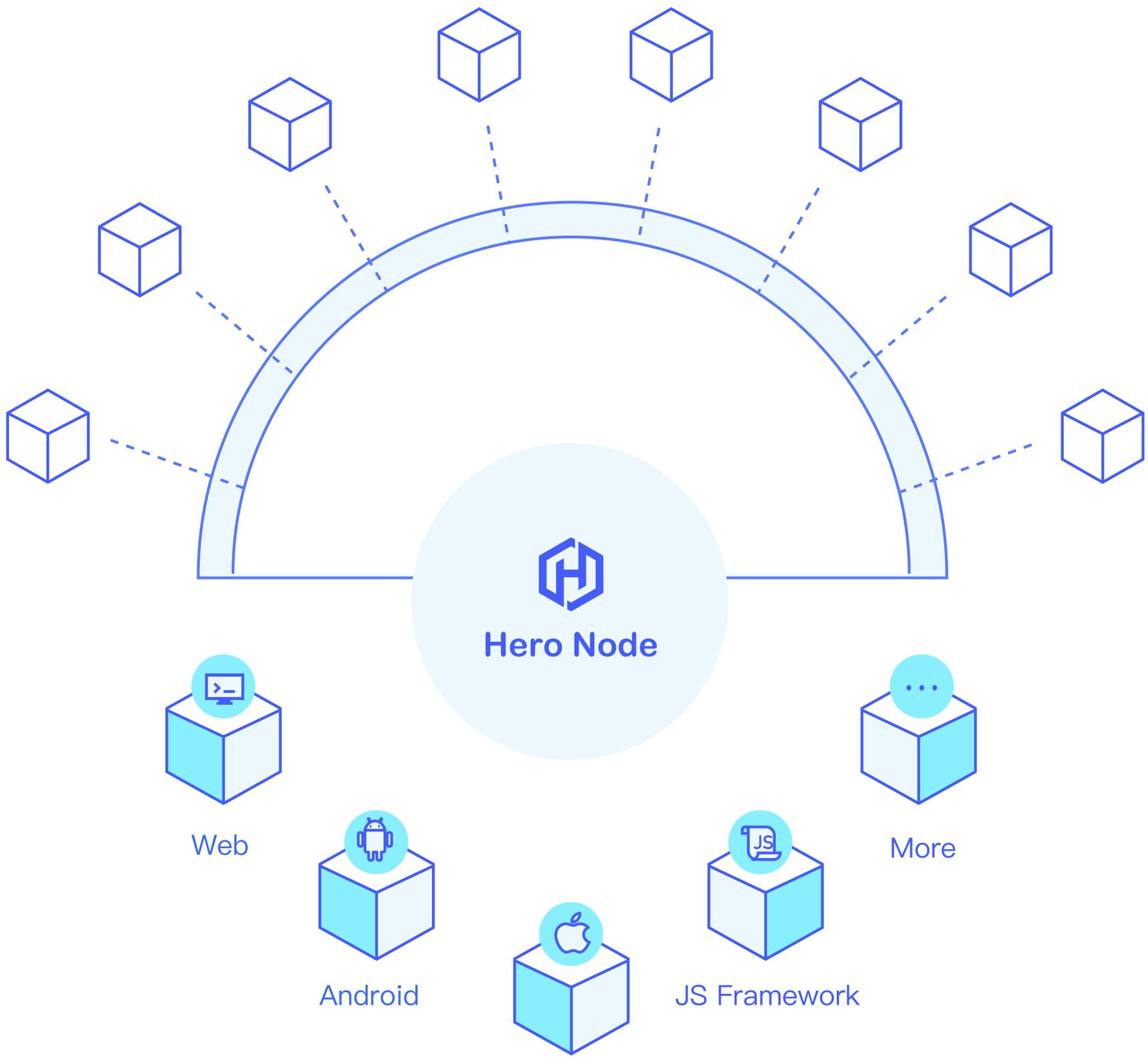
2. Data ownership

A decentralized network has a large number of participants and is a natural deterrent for monopolies. Users also retain absolute ownership of their data. Hero Node adopts blockchain technology to form the core for fog computing. Fog computing can be thought of as a bridge which eventually needs to land on a platform and decentralized blockchain technology is a natural fit. The blockchain is the only technology that solves the data consistency issue on a decentralized platform (this is also called the Byzantine Generals Problem). Smart contracts in Ethereum provides the infrastruture for dealing with service logic on the chain.

Node Design

Hero Node is a network of fully-aggregated nodes. The nodes can be synchronized with all public blockchains, such that all public chains can run on a node and blockchains can be accessed via the API provided by Hero Node. Developers will be able to develop dApps just by

interacting with the Hero Node interface. Hero Node aims to support main public blockchains like BitCoin, Ethereum and QTUM. Nodes are the core of Hero Node. Each node is independent and able to provide external communication services.



【 Node Schematic 】

Consensus mechanism

The consensus mechanism is a very important part of the blockchain world. It works like the law of a country and it maintains the order of the blockchain world. Currently, the common consensus algorithms are as follows:

1. Proof of Work – PoW

PoW should be the consensus algorithm that we are most familiar with. Both Bitcoin and the early Ethereum adopted this consensus algorithm. The essence of this algorithm is that it requires a lot of computing power to guess the numbers, and the miner who gets the correct number in the shortest time can get the bookkeeping right.

2. Proof of Stake – PoS

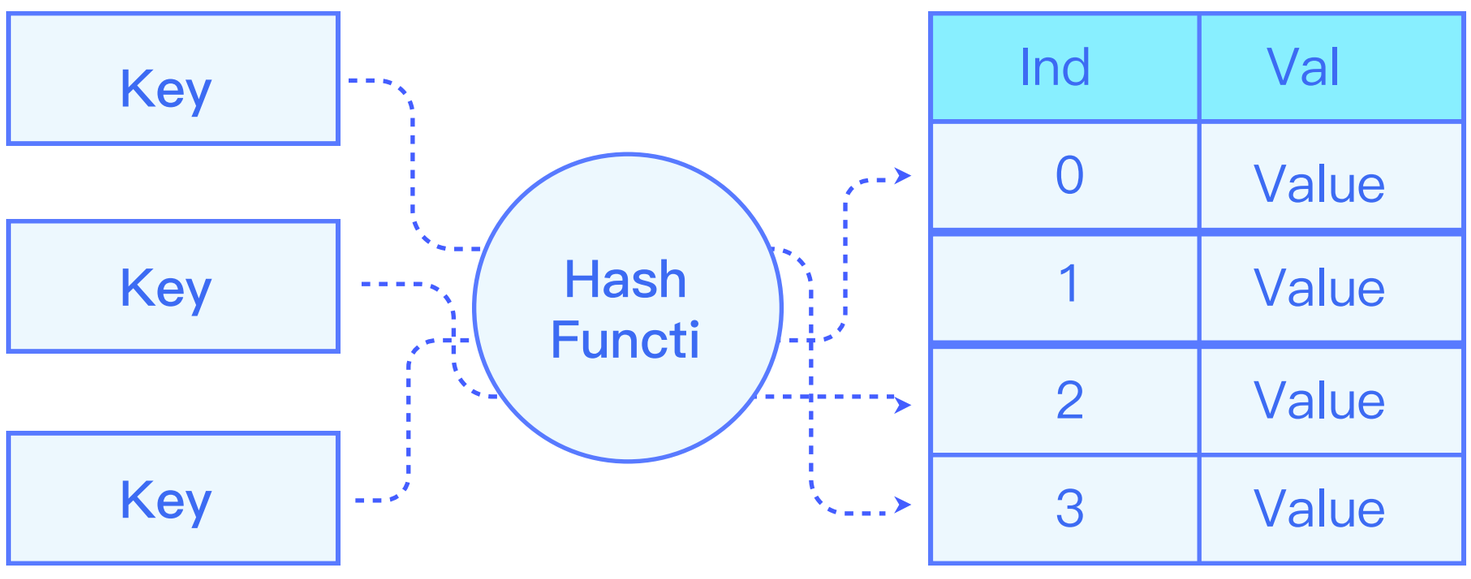
PoS is very similar to the equity certificate, and the miners who have a larger number of tokens and longer time will have a high probability of getting the bookkeeping rights. In the fourth stage of Ethereum, the PoS mechanism will be fully adopted.

3. Delegated Proof of Stake – DPoS

DPoS deploys a witness mechanism to solve the centralization problem. These witnesses are voted by the block and they can sign the block. DPoS achieves high performance in exchange of partial centralization.

However, the Hero Node itself is based on these public

chains, and the computational performance of the application is also based on these chains. Therefore, there is no need to worry about the speed of the consensus mechanism of Hero Node, but pay more attention to how the miners can fairly find mines in the nodes. Hero Node adopts a consensus mechanism which combines the proof of work (PoW) and proof of existence. The miners contribute their own storage, and the users generate a Hash list by slicing his or her own files. Each miner saves all the Hash lists and the corresponding Hash files.



Genesis Hash is born with the launch of the project. The birth of each block will throw out a Hash, which is mainly generated by the miners' addresses and file Hash according to a certain algorithm.

There is a degree of complexity of this consensus mechanism, which determines whether the difference between the Hash thrown by the previous block and the file Hash can be successfully mined. This complexity degree is automatically adjusted according to the block generating

rate. If the blocks are not generated for a long time, all miners will unanimously decide to reduce the complexity. If the block generation speed is very fast during a period of time, the miners will increase the complexity. The miners who have dug out the mine will write their address and the file Hash together into a new block and connect it to the main chain for external broadcasting. The other miners receive it, then verify it. After it is verified, the miners will continue another mining according to the Hash thrown out by the new block.

Besides mining storage part, Hero Node also takes the synchronization of the public chain and the computing into consideration.So the public chains will issue a quest in turn. For example, the quest starts when the newest block appears, and the miner will search for a file piece Hash that is within the range of the block's deviation. The moment he founds it, he broadcasts, and writes it into the main chain.

Implementation

Establishing connection

The Hero Node network supports peer–to–peer block and information transmission between full nodes and SPV nodes. When a new Hero Node is activated, it has to

connect to at least one other Hero Node. Hero Node adopts a TCP or UDP protocol to connect with a known Hero Node by using the 9083 port number.

Node discovery

Node discovery in Hero Node is similar to other blockchains. When a Hero Node is activated for the first time, it discovers other peer nodes in the network through the seed node by default. However, it can also use the –connect=<ip> parameter to connect to a Hero node that is already running. When a node is activated and successfully connected to the Hero Node network, it records peer nodes that it successfully connected with recently and will give priority to selecting these peer nodes for communicating when it restarts. If these peer nodes do not respond, the node will then restart through the seed node.

Seed nodes are not necessary for the Hero Node network. As a decentralized network, Hero Node does not have to rely on seed nodes to once the network grows in size. Peer nodes connect to the seed node and also other peer nodes to form a flat network structure rather than a traditional tree structure of delivery, and thus forms a “ All for one and one for all” peer–to–peer service model.

Seed nodes use heartbeat communication to detect the pulse of a peer node after the initial connection. This pulse contains information on the current status of the peer node and also information on the connection quality between the node and neighboring nodes as well as the seed node. On this basis, when a new node joins or there are changes in network circumstances, the list of available service nodes can be updated in a timely fashion. This update is dynamic and will be based on statistics such as the stability of time online and connection quality so as to ensure that the network operates without issues in real-time.

Node authentication

An authentication process takes place when a node first connects to a Hero Node. The authentication message body includes the following primary fields:

```
message Verification {
    string HN_ID; // Node ID, Randomly generated using sha-1 Hash Algorithm, Length 160bit
    string HN_VERSION; //Hero Node Version No., E.g. hn-1.0.0-stable
    Subversion HN_SUBVERSION; //Hero Node-supported public chain version number, For
example {"HN_BTC": "/Satoshi:0.9.2.1/", "HN_ETH": "1.7.3-stable", "HN_QTUM": "2.0"}
    string HN_SERVICE;   // services supported by the node, current version supports
HN_BTC, HN_ETH, HN_QTUM
    int32 HN_TIME;       // current timestamp
    string HN_THIS_ADDR; // own IP address
    PBlock HN_BLOCK_HEIGHT; // public blockchain height, For example {"HN_BTC": 7000562,
"HN_QTUM": 321029}
}
```

Subversion is the type of public blockchain version number supported by Hero Node. Fields that are included will be extended according to public blockchains supported by Hero Node. The sample message body is defined as follows:

```
message Subversion {
    string HN_BTC_VERSION; // BTC Version
    HN_ETH_VERSION; // ETH Version
    HN_QTUM_VERSION; // QTUM Version
}
```

PBlock is the height of the public blockchain. Information contained in PBlock fields will be extended in a similar fashion to that in Subversion. The sample message body is defined as follows:

```
message PBlock {
    int64 HN_BTC_HEIGHT; // BTC Block Height
    int64 HN_ETH_HEIGHT; // ETH Block Height
    int64 HN_QTUM_HEIGHT; // QTUM Block Height
}
```

The message body is a tentative structure. Please see GitHub for a specific field description.

The Hero Node network will authenticate new nodes joining the network to prevent mining fraud. The authentication process is as follows:

1. The new node will perform rlp on the authentication message

2. Perform SHA256 hash twice on rlp and convert to a 256–bit binary

3. New node to use its own private keys to perform a secp256k1 signature on the above binary

4. Send the message body, signature and public key together to peer nodes

5. Peer nodes use the public key to decrypt signature and verify the authenticity of the node

Storage

As Hero Node's storage system is based on IPFS distributed file storage systems, after a file or content is stored and published to IPFS or IPNS, a fixed hash address will be generated. Using the distributed hash table algorithms based on Kademlia, the items are stored on different nodes in key–value form. The closer the ID is to the key in the Hero Node network, the greater the number of saved copies of the item. As such, the process of searching for the item becomes a search for nodes. In future token weighting rules will be added so that token holders will be able to obtain more node connections. All item objects form the data structure for a Directed Acyclic Graph.

However, the speed of the current IPFS is far behind the required efficiency for commercial use. Therefore, the Hero Node connects all the nodes together, scatters the files to different places through the DHT algorithm, and places the documents that are most likely to be read in the all nodes

that can be collectively called to usage. So that users can get what they want in the shortest time.

Service Optimization

Measures to optimize service are as follows:

1) Distribution networks generally have stronger long-tails and need to dynamically regulate the cost of resource storage and distribution according to the scarcity of the resource and the difficulty of obtaining it. This guarantees resources are used rationally and the usability of resources at the tail-end of the long tail in these networks. This incentivizes and controls all nodes in the network as seed nodes are unable to influence change, thereby ensuring fairness and preventing malicious nodes from becoming seed nodes and obtaining incentives. This is a key advantage in decentralized services.

2) For resources with long tails, it is possible to ensure that resources are obtained in an efficient manner by optimizing service routing. This optimization improves the overall quality of network services without contravening the previous optimization principle.

3) When community structures are formed, resources can be used more efficiently with less cost as existing resources may be found within communities. Connections within

communities would also be of higher quality than those of the external communities. Community discovery can rely on access features as indiicators in the event IPFS storage content is encrypted.

Applications

Hero Node supports public blockchains from the underlying protocol level and theoretically all dApps can be developed using Hero Node. This is particularly so for mobile as developers can easily build dApps for mobile. Mobile users can also enjoy applications and games based on blockchain technology.

Using the popular game “CryptoKitties”as an example — while the game was a trendsetter, the number of people who actually played the game were a small fraction of people in the crypto world. This was because in order to own a kitty, you had to log onto the official website, install the wallet plugin of Metamask and then activate the smart contracts through the Metamask wallet. As an amateur to the blockchain, the process is tedious enough to lose interest to even try out the game. It will be easy to develop similar types of games on mobile using Hero Node and the user experience would be similar to that of other mobile applications.

Developers can develop a wide variety of blockchain applications through the rich APIs provided by the Hero Node platform. For example, you can quickly retrieve transaction data through the Hero Node Ethereum interface using Hero Node eth, or quickly generate your own ERC-20 token wallet using specific templates. You would also be able to generate your own predictive smart contracts using the Oracle predictive model of Hero Node.

Blockchain remains a clunky technology and the application layer is imperfect currently but we expect developers to be able to develop sufficient number of interesting applications using Hero Node to enrich the ecosystem.

Hero Mobile

Hero Mobile is the development tool in the Hero Node package which one can use to quickly develop cross–platform applications. The open source framework of Hero Mobile has been in existence for many years and there are a large number of applications that are utilizing the Hero framework on iOS, Android and HTML5.

The Hero Node Framework

Hero Mobile defines standard HTML files through JS Page. The Hero framework extracts two items – the UI and Hero respectively. When plugged into different platforms UI will have the same effect, while Hero would send the data one–way to the UI element after processing data.

The Hero Mobile Core

Any function element has only one interface to exchange data with the external environment. Each element is independent and their performance and actions on the interface are only related to the JSON (javascriptobject notation) data received. Hero Mobile adopts the most basic language syntax and tools and as a result, is developer–

Problems solved by Hero Mobile

Hero Mobile was made for mobile and designed to be compatible with Hero Node. Hero Mobile aims to solve the following problems:

1. The need for more terminal platforms for developers

In order to cater to a wider audience, the developers need to at least simultaneously develop for iOS, Android and the Web. Using Hero Node Mobile can complete multiple terminal operations through editing a single code.

2. The time taken for dApp development

Due to the application store restrictions of each platform, there is a longer waitinig time before each new version is officially released online. When adopting the deployment features of Hero Mobile, users can quickly use the latest–available versions without updating the dApp.

3. Recruitment

As blockchain is an emerging industry, there are very few developers in the market. However, if Hero Node is used to access the Hero Mobile framework, an amaeteur NodeJS developer can quickly be able to develop applications on the blockchain, thereby reducing labor costs.

4. Lack of cross–platform solutions

It is difficult to maintain uniformity in applications across different platforms. Using Hero Mobile will guarantee that the presentation and interaction of cross–platform development is as uniform as possible.

Advantages of Hero Mobile

Using Hero Mobile can greatly facilitate blockchain development. This being able to quickly develop dApps and public blockhain interfacing (enquiries, transfers, transaction retrieval, etc.). Hero Mobile provides the following advantages:

1. Cross-platform interface that supports differnet underlying blockchain protocols

Currently, mainstream dApps use webpage display. By using Hero Mobile, it would be possible to dApp functionality into native applications (such as iOS or Android), which greatly increases users' experience.

2. Speeding up development

After developing on Hero Mobile, the application can work on any platform quickly.

3. Completely Native Experience

The fundamental elements in Hero Mobile correspond 1:1 with the native fundamental elements in existing platforms. These elements will run natively in the system, providing a smooth and uniform experience.

4. Higher Operability

Hero Mobile supports fast deployment, which will make it easier for operators to update contents quickly.

5. Data integrity

Any interface, data, and operations can be saved through the Hero Mobile routing pipes which means that authenticity of the user’s operations and actions are guaranteed.

Hero Node Token

What is unique about Hero Node is that Hero Node is not just an ordinary blockchain application, but a blockchain development platform, a super node, and a DApp ecosystem in which the Hero Node token is of vital importance.

Token Acquisition

The token will be issued in the form of ERC-20 and will circulate as a Ethereum-based token in the short term. Before the launch of the Hero Node Mining Incentive Program, the token can be obtained through private and public sales channels. We strictly abide by all the laws of different countries in the world, but still also a strict KYC supervision is required to open up the white list.

Mining

Nodes are crucial to Hero Node. In Hero Node, a node needs to synchronize at least one public chain and provide corresponding storage and network bandwidth. After Hero Node net is built, the mining can get started.

For the total amount and price of the tokens, please refer to the project website at https://heronode.io. We have set aside a 30% allocation for community mining. Anyone will be able to run nodes to provide services for the Hero application, there by obtaining tokens. The token pool is fixed and the emission curve will reduce over time.

Tokens obtained through mining will be rebalanced and allocated every day based on the of the amount of work that the miners contributed on that day. Tokens are allocated based on the weight of miner's work as a proportion of total work done on that day. The amount of work is calculated based on the hardware capability of miners, bandwidth and storage size. The calculation formula of miner scores is as follows.

$$Score = Score_h * \sigma_h + Score_b * \sigma_b + Score_s * \sigma_s$$

Of which, $Scoreh$, $Scoreb$, $Scores$are hardware capability score, bandwidth score and storage score respectively. σh, σb and σs are the weight functions of the three scores listed.

The amount of tokens obtained on a single day by a miner can be obtained by looking at the amount of work done by the miner in relation to the entire network's amount of work and the total amount of tokens allocated on the day. The formula for the number of obtained coins for Miner i on a specific day is as follows.

$$Coin_i = \frac{Coin_{total} * Score_i}{\sum_{j=1}^{N} Score_j}$$

Of which $Cointotal$ indicates the total distribution of tokens on that day and $Scorei$ indicates the score value of the Miner i's amount of work.

Token Utility

In the Hero Node ecosystem, the consumers and producers of token form a cycle. Approaches include:

1. When linking to Hero Node, the value of tokens held would determine the weight of links. A newly-added node would tend to be linked to high-value nodes and provide data storage and bandwidth for high-value nodes. In the ecosystem, applications which have obtained the most users and have the largest flow capacity will always need to purchase and stock up on token in order to support better performance for their applications. The mining process provides them with computing, storage and bandwidth for applications.

2. Hero Node is a completely decentralized ecosystem and applications often cannot be separated from payments. Token will become a virtual payment tool in the application ecosystem of Hero Node, which is similar to the IAP in the App Store or the Q-coins used in Tencent. However, the difference is that the value of token is entirely determined by the market.

The more resources a developer has, the more resources he can obtain; the more nodes he can access, the more he can mine. So the value of the Hero Node token will improve with the perfection of the Hero Node ecosystem.

Tokenized economic model

In the ecosystem of the Hero Node, the token functions as the permission for the application to use the node network, but this permission is not precisely quantified but probabilistic. The DApps made by any developers can join the Hero Node network freely. The applications are fully available, but they can not be widely spread.They only exists on a minor of nodes. If the developer locks a partial Hero Node token to the smart contract, the system will automatically distribute this application to a wider node network.

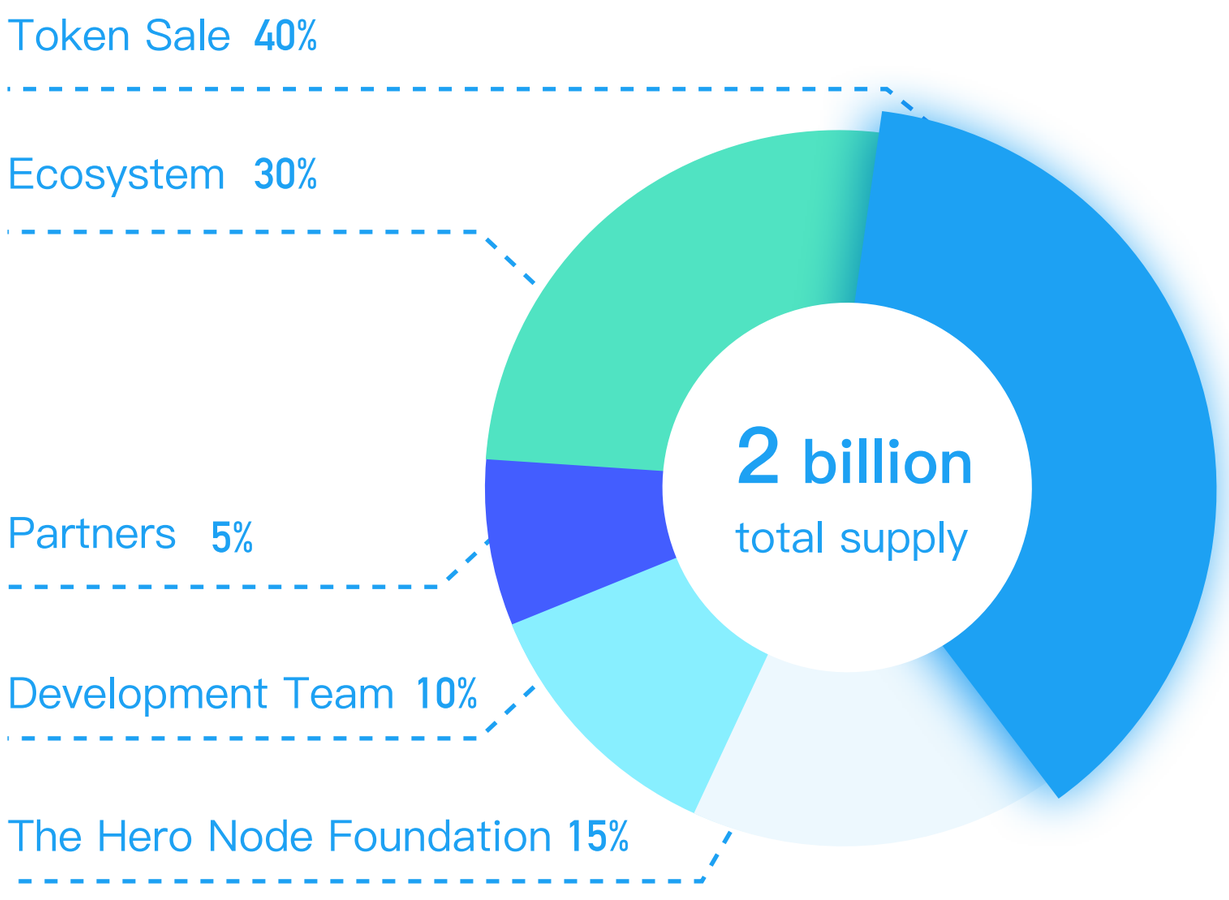
Generally speaking, the more successful a commercial application is, the more tokens it needs to possess more network resources. However, this possession is actually probabilistic and not exclusively. All commercial applications have a life cycle. When an application is no longer popular, its developer can unlock some of the tokens and transfer them to other applications with better market potential.

The mining of Hero Node is a completely free market, but when the node resources are insufficient, the value of the

token will increase, and the more miners will be willing to participate in the mining of Hero Node, providing more resources to meet the market demand. And vice versa.

Token Distribution

The total supply of tokens is 2 billion and the allocation are as follows:



- **Development Team of Hero Node 10%**

The development team includes our core contributors. A large portion of the budget will be dedicated to optimizing performance and further function development of Hero Node.

- **The Hero Node Foundation 15%**

The foundation will manage funds raised through the sale in the early days of the project.

- **Ecosystem 30%**

Hero Node requires a large number of nodes to join. This pool is reserved for mining so as to incentivize people to participate in the ecosystem.

- **Partners 5%**

This part of tokens will be allocated to partners who have contributed to the project.

- **Token Sale 40%**

Used to expand the user base of the project.

Development Plan

Stage One Implementation

By the end of April, 2018

the production node will be implemented, including basic functions such as Ethereum, IPFS, etc.

By the end of June, 2018

the Hero Node official DApp will be launched, and more nodes will be deployed.

By the end of August 2018

more unofficial DApps will be launched and the nodes will support more public chains.

By the end of December 2018

the DApp development environment SDK and other tools will be completed and mature.

Stage Two Incentives

By the end of January 2019

the Hero Node node will allow anyone to run it and get incentive

tokens. The tokens will be issued at a relatively fixed amount automatically in a semi-centralized way.

To the community

By the end of December 2019

We already have consensus algorithms based on POWs and POCs in research and development. After we confirm that it has been mature enough, we will make it possible to obtain the incentive tokens by consensus algorithms automatically. The bookkeeping of token will be achieved by its own public chain.

Team

The technical team of Hero Node is largely from Dianrong.

Guoping Liu

Founder, co-author of the Hero cross-platform development framework, serial entrepreneur

Lilian Lin

CMO, Masters Degree from Illinois Institute of Technology in America, also served as branding director at Volkswagen, PPDF and Wheat Financial

John Patrick

Overseas Director of Business Strategy, LinkedIn FinTech Influencer, APAC Regional Director FinTech Connector and former research analyst at Guotai Junan Securities

Bella Yang

Data scientist, worked at FaceBook, Airbnb and other unicorn companies in Silicon Valley

Daniel Li

Experts of Distributed Database, senior developer of Blockchain

Carl Zhu

Co-author of the Hero crossplatform development framework, experienced blockchain developer

Mason Zhang

Experienced blockchain developer

Jacob Yu

Self-proclaimed geek, entrepreneur, experienced developer, full stack engineer

Risks and Disclaimer

This whitepaper is only used to describe the basic information of the project and does not constitute legal, financial or investment advice or a contract or commitment in any form. The Hero Node Team does not guarantee any return on investment, nor does the team take responsibility for any investment losses as a result of purchasing HER tokens both directly or indirectly. Users or investors should have a clear understanding of the risks of digital currencies and once they have undertaken the investment, understand and accept the risk that tokens may lose all value. Although the Hero Node team will strive to advance the project, due to the many uncertainties surrounding digital currencies including but not limited to policy and regulatory attitudes towards digital currencies, the Hero Node team cannot guarantee that the project will succeed. We request that users and investors participate only after fully understanding the risks involved.