Bonus Cloud

The next generation infrastructure driven by blockchain

# White Paper

2018 Version 1.0

# Table of contents



content

# Executive Summary

Social development goes hand in hand with that of human civilization which increasingly evolves towards trust and cooperation. Thanks to rapid development of computer technology, rules in many fields have been data-centric and digitalized, become more and more clear and easily duplicated, which increases social effectiveness.

The ecological impact and data credibility driven by Blockchain technology enhances trust and coordination to a higher standard and also aligns with social expectation towards trust and coordination.

BonusCloud aims to develop a decentralized, trustworthy global infrastructure platform combining Blockchain and cloud computing technology, which is foundation for an open-ended shared ecosystem we endeavor to build. By Connecting and utilizing each kind of resources with computing capability and converting them into digital assets value, DApp empowers entrepreneurs of Blockchain applications.

By developing a global trading platform for the computing power, BonusCloud could effectively connect such global computing resources as present cloud computing platforms, enterprise data centers, personal computers and individual CPU/GPU/bandwidth. With millions of resource contributors, platform users and developers, BonusCloud could also provide trustworthy cloud computing platform services with ultra-low price, ultra-wide range and ultra-strong computing power, which reshapes business model and resources distribution structure of traditional centralized cloud computing. As a computing power resources platform, BonusCloud is featured with distributed, low-latency and intelligent, enjoying bright prospect in such industries as network access, data storage, digital currency mining, 3D rendering, live video stream decoding, AI learning and IoT protection, AR and VR. BonusCloud is closer to device end, not only contributors to collection of data at cloud end, but also has upper hand in real- time data analysis in short cycle and intelligent processing, so as to better support timely processing and execution of local business and generate more efficient and safe computing service. On the basis of this brand-new distributed computing platform, we could develop DApp store, so as to create an application ecosystem that is based on distributed computing and peripheral computing, and to create substantial social and economic value.

Currently BonusCloud has completed 50% of coding for basic Blockchain service and completed small prototype verification of network test. Relevant functions will be released step by step. In parallel, BonusCloud began to develop computing resource framework combining container and Blockchain technology and prototype of resource scheduling.

# Introduction about Background

*1. Cloud computing platform*

According to National Institute of Standards and Technology (NIST), cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

That is to say, cloud computing offers IT infrastructure resources and capability, and decouples them with devices, thus achieving the experience of rapid delivery and application. Meanwhile, cloud computing alters the Capex model of traditional IT into OPEX model, thereby minimizing consumed cash flow for enterprises. This especially provides a friendly supply model for unexpected resource demands.

*2. Centralized Cloud Computing Platform*

Due to huge initial investment in cloud computing industry, it becomes a game among tycoon players, which caused many issues.

*Lack of industry standards*

Suppliers of cloud computing industry are mostly tycoon players in the big game. From the perspective of commercial value, each player wants to set industry standard, so each cloud computing supplier has their own set of standards and systems for user to define application standards. When users work with multiple platforms for the benefit of lower costs and higher stability, they have no choice but to adapt to multiple suppliers. Therefore, users have to bear the usage cost brought by competition among commercial products.

For upstream supply chain companies, they have to provide customized products for every tycoon to meet demands of their customers.

*Black box operating environment*

As a black-box environment offered to users, centralized cloud computing platform makes it impossible for users to keep their resources and applications in a reliable status. On the other hand, cloud computing enterprises tend to be intrusive to users' resources due to the purpose of control and management. Under such an environment, there have been multiple examples of user data loss and application malfunction caused by cloud computing service providers' own bugs (e.g. certain public cloud's security product had deleted user files).

# Introduction about background

*Excessively high cost*

Due to huge initial investments and multi-oligarch monopoly in the cloud computing industry, cloud computing vendors have strong pursuit of profitability. According to Amazon's financial statements, EBITDA (gross margin) of AWS reached almost 45% with operating margin of 25% (net profit). In terms of service model, cloud service providers could only meet resources usage and growth on a steady basis rather than temporary large-scale ones, as substantial investment cannot be rewarded timely due to uncertainty of resources usage. Therefore, current cloud computing platforms cannot meet the existing demands, causing conflict between business and technology. But the repressed demand also means a large blue sea market.

*3. Decentralized Cloud Computing Platform*

Blockchain technology and its development give everyone a new trustworthy and collaborative eco-model. And combination of Blockchain and cloud computing technology could solve issues in the centralized cloud computing platforms. Decentralized cloud computing platform is also an ideal application platform for future Blockchain DApp.

*4. What is BonusCloud*

Individual household network has witnessed an evolution from ADSL to broad band and then fiber optic, and mobile network from 2G to 4G and 5G. While with increase of computing capability for common chip at user end and popularity of dedicated chip, difference of computing power between user end and server is not far from big. It is predicted that when internet access capability and terminal computing power further improves, user terminal and IDC server in same region will not have obvious difference, and when popularity of infrastructure exceeded 20%, the industry will embrace overall booming.

BonusCloud (BonusCloud.io) aims to develop a decentralized trustworthy global cloud computing platform to serve open and shared ecosystem platform in Blockchain application. BonusCloud connects and utilizes all resources with computing capability and convert them into the value of digital assets, so as to make DApp empower Blockchain application entrepreneurs.

Thanks to computing power trading platform, BonusCloud could effectively connect such resources worldwide as current cloud computing, enterprise data centers, personal computers and CPU/GPU/bandwidth of user ends; it provides general computing services with ultra-cheap price, huge scope and ultra-strong computing power to a range of industries, including network access, data storage, digital currency mining, 3D rendering, live video transcoding, AI learning and IoT protection. At the same time, BonusCloud will further promote development and upgrade of infrastructure by rewarding back all the contributors from ecosystem.

# Technology Architecture

*1. Next-Generation Blockchain (BonusChain)*

In traditional cloud computing services, the matching of resource transactions and the distribution and execution of tasks are centered around the service provider in the form of centralization. However, at the beginning of its founding, the cloud computing and service was characterized by the distributed pattern. Compared with the distributed pattern of minicomputer and super computer, the traditional computing is too centralized in today's globalized Internet. But, the attendant consequence of this centralized resource service is the lack of information transparency and symmetry. The users are having difficulties in understanding the distribution and utilization patterns of resource and task in the cloud computing system. Besides various security risks, overbooking and other problems are also quite common.

The emergence of Blockchain technology, especially the Blockchain 2.0 represented by Ethereum, which extends the application scenes of through the smart contract mechanism operated by Ethereum Virtual Machine (EVM), and its characteristics of information transparency, openness and non-falsification provide a right solution to the problems facing traditional cloud computing.

BonusCloud can make further improvements based on this. On one hand, it can combine the virtualization technology of cloud computing with the Blockchain to enhance the functions of the Blockchain virtual machine to support more PaaS applications under the promise of guaranteeing its security. It can execute the smart contract as well as web application, storage application and computing application. Based on this, FaaS and Edge Computing can be developed by the virtualization technology of BonusChain. On the other hand, it stores all the transaction information and resource information into the Blockchain where the users can inquire and audit freely. Due to the differences in timeliness and data volume generated by difference information, BonusChain uses the pattern combining both the main and side chains. The main chain is in charge of the making of contracts and recording of contract information and other core contents, while one or multiple side chains are in charge of recording resource information, log information and other contents with large data volume and low timeliness. The side chain can apply technologies, such as DAG, different to the main chain according to requirements.

[More technical details will be continuously updated]

# Technology Architecture

*2. Open Hardware Platform (BonusNode)*

As an infrastructure platform for decentralized cloud computing, BonusCloud adopts software and hardware decoupling scheme to achieve rapid iteration and open-sharing. At hardware level, open-source and open hardware platform is used to adapt and verify terminal hardware, so as to maximize shared resources and develop an open platform.

BonusCloud's hardware adaption is mainly divided into three types: Lite, Normal and Super. Different hardware plans apply to different application scenarios, which equip clients with different customers different platform capabilities.

Lite client (thin client): by fulfilling light network-related assignment, thin client hardware, namely micro-controllers and household router, is mainly applied in network access and measurement, data acquisition, test of mobile APP etc. With batched processing, it emphasizes on distribution capability and access capability of terminals, has lower requirements of signal node stability. It mainly focuses on assignments with short cycle and light workload.

Normal client: general hardware, namely PC+GPU, engages in calculating assignments and are applied in calculation of HPC, deep learning and rendering. With batched processing, it emphasizes on calculating capability, assignment breakdown and deployment capability of terminals, and has average requirements of signal node stability. It addresses assignments with short-period and heavy computing.

Super: represented by Server, super terminals have wide application scenarios, as it mainly involves in network hub, fast storage access, scalable data processing and computing and enterprise applications. It tackles with enterprise service with real-time requirements, focuses on stability of terminal and rapid processing capability, and has strong demand for stability of single node. It is mainly deployed in IDC. It mainly addresses long-cycle and real-time enterprise service.

Users can choose hardware platform solutions based on their own requirements develop and deliver their services, so as to flexibly allocate resources and rationalize utilization of resources.

# Technology Architecture

*3. Distributed Network (BonusNet)*

BonusCloud endeavors to connect and utilize any qualified resources, so a safe and reliable network that connects any resource is foundation for delivering all services.

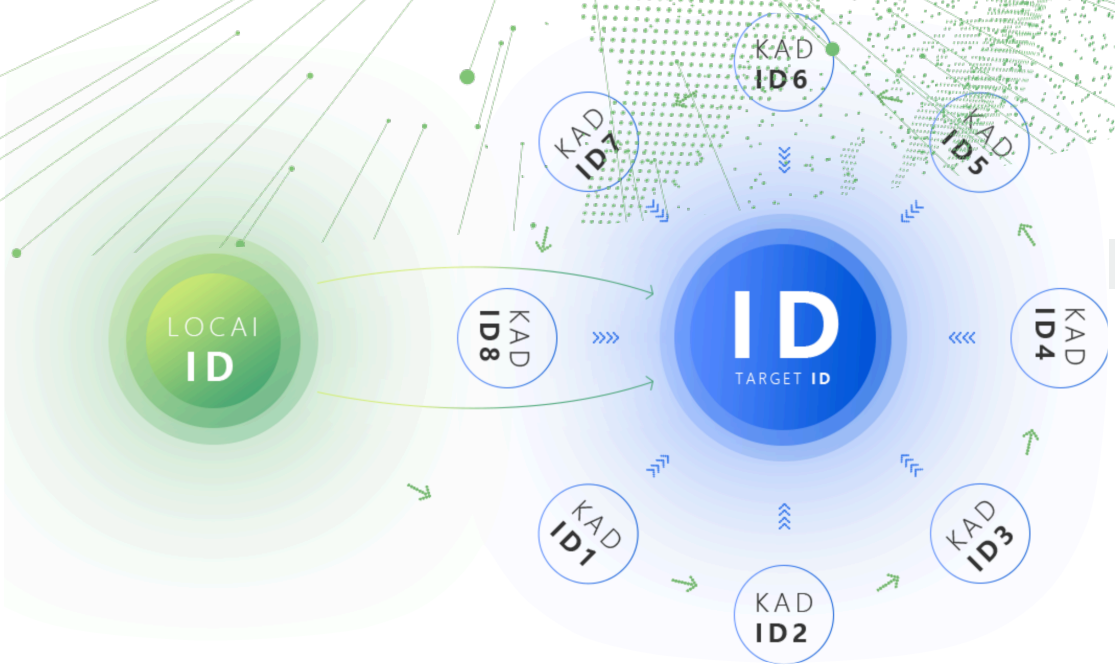
BonusNet is a new internet-based cyberspace. In its cyberspace, independent basic components as DNS and Router could be designed. BonusNet adopts L2+L3 over Internet model, in which DHT framework, similar to the Kademlia protocol is adopted on the L2 layer, and encrypted tunnel protocol is used on L3 layer. It is supplemented by new namespace addressing mode instead of DNS protocol on the Internet and provides compatible support to DNS agreement. With sufficient compatibility, a standard network space protocol, whether it is a public protocol (e.g. TCP/IP) or a user's private network protocol, can be seamlessly migrated from Internet cyberspace to BonusNet space.

Kademlia is a distributed hash table (DHT) communication protocol for decentralized peer-to-peer networks. A completely decentralized virtual or overlay network is formed by the participant nodes. Each node is identified by a number or node ID. The node ID serves not only as identification, but the Kademlia algorithm uses it to locate values (usually file hashes or keywords).

Kademlia uses an XOR metric to define distance. Two node ID's or a node ID and a key are XORed and the result is the distance between them. For each bit, the XOR function returns zero if the two bits are equal and one if the two bits are different. The Kademlia network with 2's N-th power of nudes could only use a few steps to find searched node or value under the worst scenario.

Meanwhile, upgrade of Kademlia network node is featured by maximizing existing node information and ranging by time sequence. From inspiration perspective, this means has certain logic: a node that has been online for a longer time is more trustworthy, as it has been online for several hours, it is more likely to be online for the next hour than for the node we recently visited.

# Technology Architecture



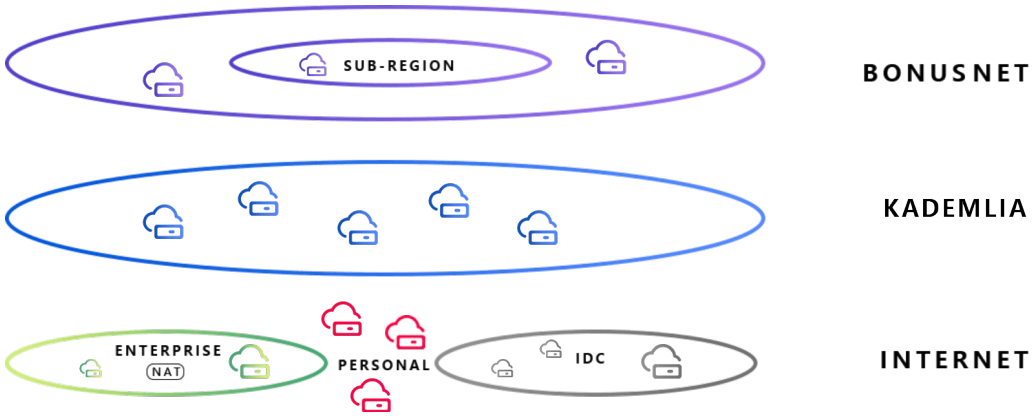

The decentralized network structure also has upper hand in being able to significantly improve anti-attack capability. Even if a whole batch of nodes in the network suffers from extensive attack, availability of network will not be affected. By bypassing these loopholes (the attacked nodes) and rewire the network, the network could restore its availability.

In Kademlia algorithm, distance of selected node has nothing to do with physical distance but XOR result, so selected nodes have higher chance of being located in different regions or even different countries. BonusNet introduced the concept of physical distance, which converges on physical distances every time we find a loop in neighboring nodes. At the same time, we could also divide and aggregate BonusNet based on features of the user's basic network, such as region, operator, etc., so as to provide more efficient and robust network access capability. In the transaction matching process, application users could raise selective requirements in certain area of network to workers, and resources with different characters could also be quoted differently.

# Technology Architecture

In traditional Kademlia network, connection between nodes is protected by private network protocols, and applications could not match and use Kademlia network without altering transmission agreement. In order to develop more compatible application and to address issues of address management, data transmission security etc., BonusCloud develops an exclusive encrypted network on the basis of Kademlia network, which adopts an IPv6 address to accommodate all nodes. All nodes are connected through an encrypted tunnel to ensure the security of transmitted data.

So nodes of BonusCloud could all be connected to build a set of seamless network system in parallel with current basic one. Even if nodes are behind a NAT or a firewall, they can also break regional restrictions of user base network
by NAT penetration technology.




As basic network platform of BonusCloud, BonusNet will act as a cornerstone for cloud platform itself as well as platform application.

# Technology Architecture

*4. Distributed Computing Platform (BonusComputing)*

By means of evolving and executing decentralization of centralized cloud platform software, BonusCloud relies on BonusNode to provide community with three different kinds of computing environments, which are BonusContainer, BonusAppEngine, and BonusServerless, so as to meet the requirements of different developers. Users could build DApps on their own or purchase DApps provided by application developers. BonusCloud is in charge of packaging DApp operating environment into Docker files, distributing them to the leased resource nodes securely and reliably based on directives of demand side, to activate and operate.
BonusVM, the virtual machine of BonusChain, is in charge of the lifecycle management and task allocation, so as to set up safe connections in BonusNet.

Although containers have fundamentally change means of development, package and application deployment, security remains one of the key issues in the usage of containers in public resource scheduling platforms. How applications programs access system resources in traditional Linux containers is exactly the same as that of regular (non-contained) applications, which is directly deploying host kernel. The kernel runs in a privileged mode, allowing it to interact with the necessary hardware and returning results to the application. The kernel imposes some restrictions on the resources that an application can access by using Linux control groups (cgroup) and namespaces, but not all resources can be controlled through this mechanism. In addition, even with such limitations, the kernel still faces big exposure of being attacked, which can be directly attacked by malware.

To improve container isolation, it could make each container operate within its own virtual machine, being completely isolated from the host. Even there is loophole in guest system, programs in virtual machines could still isolate itself from host and other programs/ containers on it. Container technology of BonusCloud allows the one with virtual isolation technology to have isolation and security features at virtual machine level as well as maintain flexibility and performance at container level.

Image registry is used to store and distribute Docker images uploaded by users, which is not essentially a centralized repository, but only provides interfaces for uploading and downloading. In such a distributed computing environment as BonusCloud, centralized image storage and distribution couldn't meet system requirements. Therefore, the image registry relies on the distributed storage service provided by BonusCloud, and combines technologies such as intelligent compression, intelligent flow control, and P2P distribution to achieve low-latency accelerated distribution of images.

# Technology Architecture

*BonusContainer*

BonusContainer provides container resource services, mainly meeting requirements of resource usage from users. Users can apply for designated case of CPU, memory, and storage specifications. The platform selects the most suitable computing node to run the container through scheduling. With BonusContainer, users will firstly upload Docker image to BonusRegistry, and then select the image name and label from BonusRegistry to create registry. Users can choose certain scheduling policy, such as geographic location, affinity, resource requirements, etc. BonusController will select the most suitable node to create resources based on user's scheduling requirements.

Advantage of BonusContainer:

| | |
|---|---|
| Security | Runs in an exclusive kernel, and provides isolation of CPU, memory, network, and IO. Strong hardware isolation can be achieved by using virtualized VT extensions. |
| Compatibility | Supports OCI container format, industry standards of Kubernetes CRI interface, as well as traditional virtualization technologies. |
| Simplicity | No need to embed an operating container in a completely virtual machine, usage way is similar to Docker. |
| Performance | Performance is aligned with that of Linux container. |

# Technology Architecture

*BonusAppEngine*

BonusContainer is applicable for users with certain container usage background. It requires users to create a container image in a certain format and determines means of utilizing resources. It is the most flexible computing environment with certain technical threshold. In order to make it easier for application developers to use the platform, BonusCloud also provides BonusAppEngine function, which is a DApp application runtime sandbox. Users can use the SDKs in different languages provided by BonusCloud and upload the coded program to platform.

BonusAppEngine has the following characteristics:

I. It supports mainstream programming languages: it could run Java, Node.js, Ruby, Go, Python, PHP to code your application.

II. Easy to use: thanks to BonusAppEngine, developers could only focus on coding, rather than infrastructure. BonusAppEngine could fully manage traffic change of application, balanced loading, monitoring of system running, failure recovery and automatic updates of the infrastructure.

III. Control of version and A/B Test. Different versions can be released on grayscale to complete A/B test.

*BonusServerless*

In comparison with BonusAppEngine, BonusServerless has more advanced features, which could provide operation environment for functional-level programs, support business logic and forward network requests to user-defined functions by means of network requests.

Advantages of BonusServerless:

I. No need to manage servers, as it can achieve flexible scale-up, highly automated expansion of capacity and recovery of failure.

II. More granular billing, better control of cost, and no need to pay for idle time of AppEngine in comparison with BonusAppEngine.

III. Provide third-party tools and open source project ecosystems to simplify the buildup, test and deployment of development and production process.

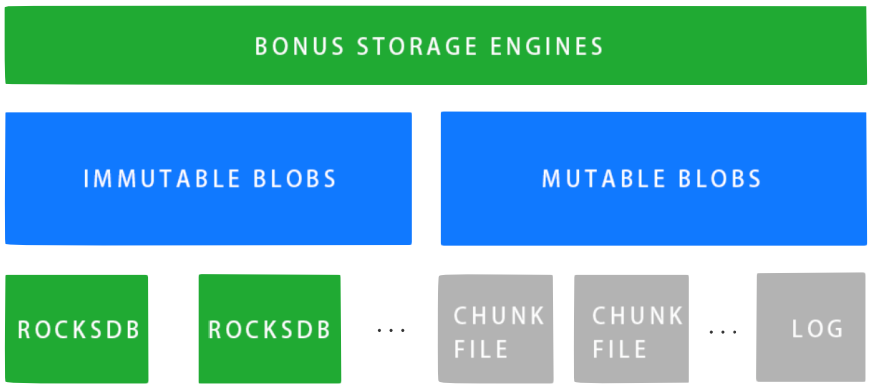
# Technology Architecture

*5. Distributed Storage (BonusStorage)*

For the convenience of app developers and community users, BonusCloud provides distributed node-based BOS (BonusObjectStorage) and will launch BonusBlockStorage (BBS) services in the following plan. With regards to platform design, BOS focuses on scale of data storage, while BBS focuses on latency of data processing, both of which have certain difference in design and utilization of bottom-level resources. There would be certain difference between the two in designs and resources utilization at underlying layer.

There are two mainstream means of data distribution in distributed storage system, which are hash distribution, such as Kademlia DHT, Amazon Dynamo, etc., and central node-based distribution, such as google GFS, Hadoop HDFS. At implementation level, object storage and KV storage generally adopt hash distribution ratio, while block storage and distributed database often use central node distribution. BonusStorage could support two data distribution strategies, as well as negotiate during resource request at the same time. Supported by BonusStorageEngines, BonusCloud provides different types of storage to serve BOS and BSS.

BonusStorageEngines supports two types of blob: immutable blob for BOS and mutable blob for BBS.




Object storage could be realized by one write and multiple read, so underlying level uses immutable blob, whose specific execution is to maintain a set of rocksdb on the local disk with key of blob's hash value.

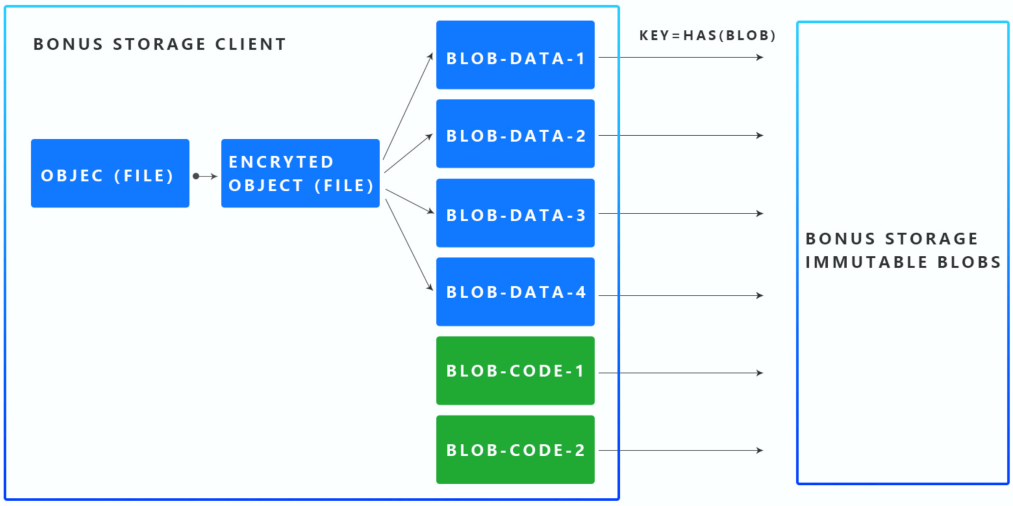
# Technology Architecture

Block storage is required to support random read and write, so underlying level uses mutable blob, supported by a set of chunk files and logs. Each chunk file matches with certain chunk content of a volume, and is required to maintain current version. Once each request is written, it has to be updated, and log is used to record request with focus on data check and recovery.

*BonusCloud Object Storage (BOS)*

BOS Storage Model

BOS provides decentralized and encrypted object storage services. On the client terminal of BonusStorage, if an object (file) is to be stored, the terminal will first be encrypted on the client, and then split into multiple immutable blob-data. The check block blob-code of the erasure code will be calculated according to the blob-data, and then the data blob and the check blob will be stored in the BonusStorage with the hash value of the blob as the key. This set of blobs will be stored in a combination of multiple instances and erasure codes in the BonusStorage. Specific strategies will be negotiated at the time of creation.

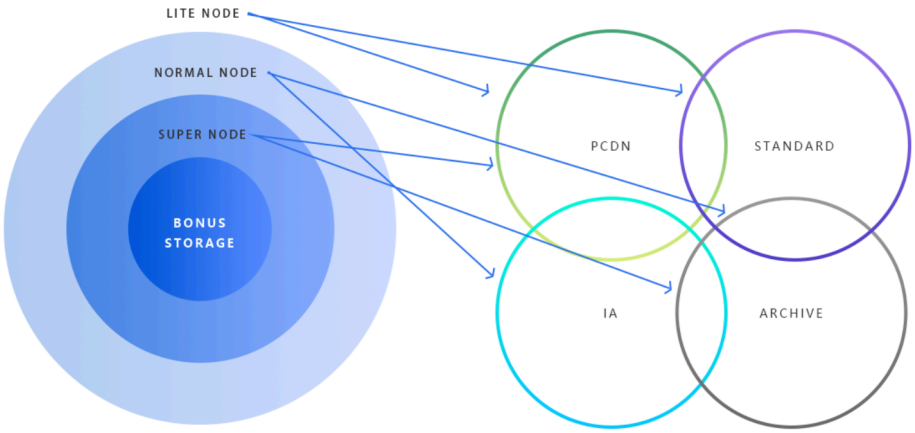


# Technology Architecture

*BOS Data Distribution*

Business scenarios of BOS cover PCDN distribution, standard types, low frequency types and archived types, which combines traditional CDN and cloud object storage capability, and support flexible conversion.

BonusCloud supports three hardware solutions. Different workers will be allocated to support different scenarios matched according to their different storage and bandwidth capabilities.



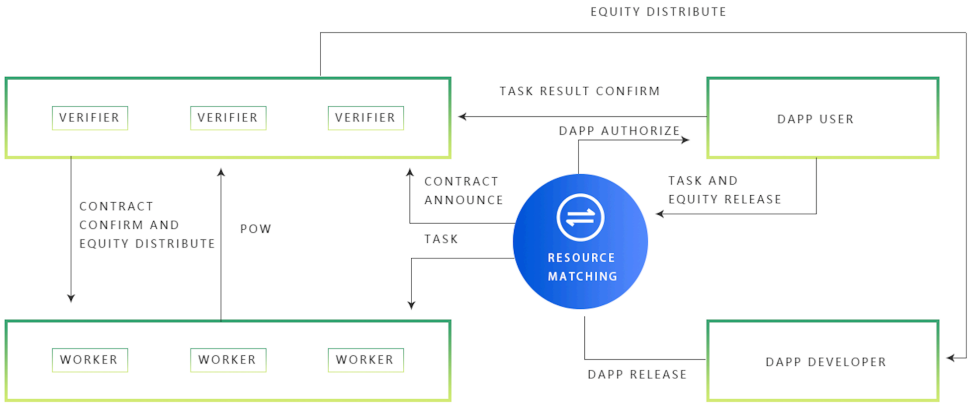

When BonusStorage client uploads an object, it could designate storage type and change it later during the process of converting object storage type.

# Technology Architecture

## 6. *Ecosystem Model*

As a distributed general computing platform to exchange and distribute general computing, BonusCloud provides customers with an open and trustworthy environment to conduct valuable exchange of computing capability.

BonusCloud will develop a bilateral (multi-lateral) ecosystem, which is composed by workers, bookkeepers, application developers, application users, and resource trading platforms. Bilateral market will lead to "bilateral network effect" which is cross-side network effect: the value captured by users at one side of market will depend on number of users on the other side. Take the example of Uber's business model, user value of passengers depends on number of drivers (the more drivers they attract, the shorter time of idling driving, hence the higher income they will generate). The two sides promote each other to amplify network effect. Therefore, in future's ecosystem, first of all, we will focus on supply increase, such as increase of the number of workers as resources supplier and their online time, incentivizing bookkeepers and application developers to provide more sound, transparent and diversified products and services. Secondly, efforts will be made to stimulate user demand by means of marketing and penetration in global market, so as to mutually promote supply and demand, develop effect of scale during competition and form competitive barriers. The whole ecosystem of BonusCloud is an economic system. Founders of BonusCloud, set its objective of increasing GDP in its overall economic system.



# Technology Architecture

There are several roles in ecosystem of BonusCloud:

*Workers*

Workers are contributors of basic resources of BonusCloud with specific computing capability, storage, network and other resources. After tasks are released on trade matching platform, workers whose current idle resources can meet conditions of application users will compete for the tasks.

Workers are paid by executing DApp to complete tasks. Newly joined workers and veteran workers will have different income algorithms. Workers' income will be deducted, if nodes are interrupted abnormally. They will be fined by deducting heir income or lower their probability of getting new assignments.

Based on different levels of resources (lite, normal and super), workers can receive different types of tasks and get different benefits depending on the level of resources they provide (lite client, normal client, and hyper client).
In addition to having the income paid by application users, workers could play the role as bookkeeper to get paid.

*Bookkeepers*

Bookkeepers are responsible for identifying rights of application developers and accountable for each transaction. Bookkeepers communicate block content and hash value with other bookkeepers who will verify before putting into the chain.
After workers are assigned with tasks, bookkeepers are responsible for registering task information in the chain and opening service IP and port to application users. After the task is completed, workers provide proof of work to the bookkeeper to prove their workload. Then bookkeepers notify application users to check the work proof record provided by the workers and confirm the completion of the application.

After workers have completed the task, bookkeepers account for the income of the worker, for the payment of the application users, and assign the corresponding income to application developers and account for the corresponding income based on the service contribution and the quality of service provided by the worker and the smart contract. Bookkeepers will also be rewarded correspondingly.

# Technology Architecture

*Application Developers*

As important participants in BonusCloud, application developers develop DApp with various functions based on resources and services provided by BonusCloud, package DApp into a Docker image to complete all preparations before distribution. DApp usage profit is determined by system algorithm and is written into a smart contract when the DApp is used. Once application users are authorized to use, the token will be transferred from user account to developer account. Quality and usage of DApp represent contribution of DApp to the community, which will affect calculation results of DApp's usage profit.

*Application Users*

Once application users are authorized by application developers to use, they can release resources and computing assignments according to the actual needs, including requirements of resource allocation for assignments and price. Application users submit container image that contains assignment requirement to resource platform and corresponding amount of stakes.

*Resource Trading*

BonusCloud is responsible for matching transactions between application users and workers. The workers or application users publish the resources they are about to rent or lease and the corresponding BxC quotations for the collection / payment on the resource trading platform, and BonusCloud helps both the buyers and the sellers to complete the match quickly. Once the transaction is approved by both parties, the smart contract will be triggered automatically to ensure fairness in the transaction. Depends on the different application types, the factors that affect the quotation include but is not limited to the floating-point operand, the occupied storage space, memory space usage in a unit of time and traffic flow usage in a unit of time, etc. User factors and random factors will also be introduced in the transaction matching to ensure a certain randomness and distribution, so that the task assignment is not too centralized.
In each transaction match, the resource trading platform will charge 1% of the transaction amount as the technological service fee.

# Technology Architecture

*Developer Incentive Protocol*

BonusCloud provides developer incentive protocol (DIP) to DApp developers. DApp that reached certain contribution in the recent cycle (including number of usage, number of users etc.) was elected between certain number of blocks, so as to reward its developers. Newly released DApp and existing DApp will have different incentive strategy to reach different results. With the help of DIP's incentive mechanism, more developers will be continuously encouraged to create DApp with more value, so as to develop forward feedback facing developer community.

*Consensus Algorithm*

BonusCloud adopts a hybrid consensus algorithm of DPoS+PBFT. Bookkeepers are regularly elected by workers according to their contribution value. Contribution value is calculated based on a series of factors (such as computing capability, network bandwidth capacity, transferred data amount size, data storage capacity, data storage time and node health, etc.). When they become bookkeepers, the value of some factors will be cleared to encourage them to keep providing services for application users in the next period. Bookkeepers will turn over a certain amount of stakes as a margin which will be returned once they are no longer a verifier. But if they are proved to have committed any malicious conducts, the margin will be taken to give back to the community. When the bookkeeper election is completed, the list of current bookkeepers will be randomly sorted (to ensure that the order of each round of bookkeepers is different, and that the next round cannot be predicted), and then each bookkeeper will create a block successively. If the bookkeeper has the right to account for this round but is not online, the right to account will be handed over to the next bookkeeper in sequence. This will not deduct the margin, but will be recorded as a related factor for the next election.

# Technology Architecture

Based on the analysis above, system consensus protocol workflow is as below:

I. Verifier Registration

To register, verifiers are required to provide margin, Vb. The margin must be greater than the minimum margin parameter set by the system, B_Min. At any time, the party who register may exit from the registration, but the margin will have a waiting period, which is normally set as one month. The contribution value of verifier who runs for election is Vc.

II. Equity Holders Vote to Elect Verifier

Equity holders can vote on verifiers. If the weight generated by the voters is St, the ranking weight of the verifier would be Wc= St*Vc. If the verifier does not get any vote, its weight is Wc=0.

III. Campaign of Qualified Verifier

The verification nodes for registration are kept in a table that lists n higher ranked Bookkeepers sorted by weight. They are the qualified bookkeepers and the ones who can participate in the competition of generating blocks. For those who are qualified as Bookkeepers, there will be an eligible deduction of their contribution value, Vc.

IV. Qualified Bookkeepers Package Deal

With the parent block header hash value Hp, the current transaction Merkle root Hm and the timestamp T, a nonce generates the candidate block header hash, Hn, and then broadcasts a proposed transaction. Each qualified verifier can only send one proposed transaction per round, anybody who sends proposed transactions repeatedly in the same round will be considered to be a malicious node. If reported, the margin will be confiscated. Only if the system has not reached a consensus within a certain period of time (the system's consensus timeout parameters), can the qualified verifier change the nonce to regenerate the hash value of a new block and initiate the proposed transaction.

# Technology Architecture

V. Confirmation of Transaction Information

After every qualified verifier has received the proposed transaction, other Bookkeepers will first verify the node that initiates the proposed transaction and the transaction in the block. After verification, the verifier will calculate a voting weight value, Vw, vote on the proposed transaction that corresponds to the highest current Vw, and initiate the Vote Block message. The original proposer will initiate the Commit Request message after receiving the Vote Block message from more than 2/3 of the Bookkeepers. Each verification node will verify whether the Vote Block message corresponding to the Commit Request message exceeds 2/3. If it does, the commitment of the Commit Request message will be carried out and broadcast. Each qualified verification node will broadcast the New Height transaction after receiving more than 2/3 commit transactions. Each node will confirm the transaction and update the respective local Blockchain after receiving the New Height transaction. The New Height transaction also allows the new block to be confirmed and not to be forked before the block.

VI. Contribution of node:

Letter P represents device contribution, P includes online contribution of $P_O$ and contribution of device assignment $P_T$ , in which $P_T$ is the sum of on-grid contribution of assignment $P_W$ and completion contribution of assignment $P_B$ , weight of online contribution is $W_O$ and weight of assignment contribution is $W_T$ . As for designated user X, total contribution of user X is $P^X = W_O P_O + W_T P_T = W_O P_O + W_T (P_W + P_B)$ . Continuously online device could accumulate online contribution $P_O$ without interruption and will be benefited by the same amount of share generated by new block at this stage, based on $P_O$ 's current percentage in the overall network after phased block is generated. Meanwhile, Power value is used to express difference of different hardware cost, energy consumption and computing capability. So with different power at different types of node, accumulated speed of $P_O$ will be different too.

# Technology Architecture

T is a function of CPU's usage (C), memory usage (M), bandwidth usage (B), storage space usage (D), so current contribution of this transaction is $P_W = P(C, M, B, D)$

Take the block generation time as the unit time, we could set its starting time as $t_0^S$, current time is $t^S$, if certain device serves several applications at the same time, contribution of overall device at the moment of t is sum of contribution from all assignments which is $P^x(t) = \Sigma P^x(t^S, t_0^S)$ .

# Application Scenarios

*Performance Monitor and Pressure Test*

Enterprise-level clients are provided with application performance monitor, network performance monitor and APP and Web (with IP node on independent public network) pressure test capability, via large-scale monitoring and testing network composed by agent application distributed on periphery computing nodes.

*P2P Computing and Cloud Storage*

On-demand and elastic content/storage/application distributed architecture is called as CDN-aaS. Users who voluntarily connect to periphery computing node devices provide services for media content sharing and distributed encrypted file storage and obtain quantifiable revenue by means of sharing idle computing capability and providing storage resources and network bandwidth.

*VPN Periphery Access*

Users run a heterogeneous-platform-compatible client application on the edge node of the voluntary connection, which is connected to the cloud and is encrypted in communication. The edge nodes are used as CPE devices that make up the SD-WAN. Users with high bandwidth can cluster as a super node by sharing bandwidth.

# Application Scenarios

*IoT Data Aggregation Analysis*

Traditional cloud computing modes can send out computing directive, and then centralized back-office will operate and respond to the results, which can meet most of the application scenarios rather than applications that requires real-time response within millisecond. With current cloud computing mode, data will be passed on to the cloud over thousands of kilometers away through the delayed and jittering network within an uncontrollable distance, and results will be passed back after computation is completed. This obviously cannot meet the needs of real-time computing applications. But if the network, computing, storage, application and data that are close to device end can be combined, the results would be responded in real time.

Peripheral computing application adopts processing power of IoT devices to filter, pre-process, aggregate or score IoT data, and leverages strong computing power and flexibility of cloud services to run complex analytics on those data.

*Public Chain Carrying*

Public chains of Blockchains need to be deployed in decentralized distributed platforms, such as BTC and ETH, which is also the initial form of Blockchain. But so far there is not a decentralized platform to support deployment and operation of public chains. From current market situation, many public chain enterprises and teams are faced with this problem, and some of them tried to solve the problem by self-distributing devices. However, this deployment mode undoubtedly increases the cost of investment and operation of public chains. But decentralized cloud computing platform is well positioned to address the issues of distributed deployment and operation in public chains. DApp now and in the future will also face the same problems as public chains.

With booming of Blockchain industry, it is necessary to put a decentralized cloud computing platform into place to provide solid support, so as to equip DApp with rapid deployment, test and release capability.

# Foundation and Team

*Governance Mechanism*

The BonusCloud Foundation is established by PE investors, project executive committee, lawyers and treasurers, who shall coordinate with each other to manage raised assets and token assets through multiple key signatures of Blockchain. They shall jointly and transparently use assets, regularly declare to relevant regulatory bodies and disclose details to the public. Virtual tests and small-scaled tests at local level shall be conducted before project is released. The project could not be truly rolled out and executed without being proved successfully. A certain percentage of tokens shall be locked and distributed to community and market by stages.

The BonusCloud team shall set up BonusCloud Foundation overseas, acting as main body to govern BonusCloud, so as to fully responsible for implementing major resolutions, standardizing management of BonusCloud technology development and application development.

*BonusCloud Founders*

Psymon Li - CEO

Former CEO of Meituan Cloud, former director of Network Department of Alibaba, former chairman of Baidu System Technology Committee.

Grace Gao - COO

Former General manager of CISCO XaaS and Cloud Partner Greater China, former chief director of global technology strategy cooperation of Alibaba.

Sid Wong - CTO

Former CTO of Meituan Cloud, former director of network product research and development of Ali Cloud and Alipay.

# Foundation and Team

*BonusCloud Team*

Sean Ley - System Operation Lead

Former head of SRE and Devops of Meituan Cloud, Meituan technical expert , former senior system engineer of Baidu.

Will Wong - Network R&D Lead

Former Meituan network and security technical expert,  former senior network and security engineer of Sangfor.

Felix Ying - Blockchain R&D Lead

Former head of Storage team of Meituan Cloud. Meituan technical expert. Abundant experience in distributed systems and high concurrency systems.

Geiger Gao - Hardware R&D Lead

A senior IT industry expert with more than 15 years of experience in Information Communications Technology. He was responsible for planning and designing multiple carrier-level products.

Candice Chen  Front-End Developer Lead

Former Meituan senior front-end developer, lecturer of Meituan Internet+ College, former senior front-end developer of iQIYI.

# Foundation and Team

*BonusCloud Team*

Shawn Wong - Brand Lead

Senior brand public relations expert and public opinion big data expert, has many years of experience in the field of Internet marketing and new media communication.For SMG, Youku and dozens of first-line stars, many years of marketing public relations and public opinion big data services.

Di Lee - Marketing Lead

Senior media and digital currency mine construction expert, has many years of experience in media marketing, distribution and publicity, And has many years of mine construction, node deployment experience.

Yuqing Chen  HRD

Former Meituan HRBP, worked in Baidu and Russell Reynolds Associates, expert in recruiting, compensation and benefit.

Sinan Wong  Growth Lead

Former Meituan product operation expert, senior business analyst of Meituan Cloud.

# Foundation and Team

*BonusCloud Advisor*

Binsheng Wang, Consultant of Blockchain Development Organization, professor at Graduate School of Chinese Academy of Social Sciences.

Coly Li, Linux Kernel Maintainer, former founder of Taobao kernel team.


The next generation infrastructure
driven by blockchain

https://bonuscloud.io