BAISS: a new standard of blockchain technology *(Beta version)*

BAISS LAB*

Abstract

Present-day blockchain technology is too simple to run any complex projects, and therefore the real practical E-commerce project such as Ebay, will never fit in any current blockchain framework. BAISS was created to solve this problem. This document introduces an original protocol that is called Dynamic Distributed Searching Storage Protocol. With the help of this protocol, BAISS is able to build a truly decentralized computing cloud which unlock all the possibility for processing real-world business project on top of it. At the end, we will also cover the multi-currencies generating mechanism of BAISS.

I. Introduction

Blockchain Artificial Intelligent Services System (hereafter, ***BAISS***) is an AI blockchain project with ambitious goal. BAISS aims to provide decentralized platform services at the new technological standard. We believe nowadays blockchain technology is too simple to run any complex projects, and therefore real practical E-commerce projects such as Ebay, will never fit in any current blockchain framework. We believe the world need a better version of blockchain technology, so here we develop BAISS.

BAISS introduces a new protocol which is called ***DDSSP*** (*Dynamic Distributed Searching Storage Protocol*), which organically combines the latest technology of blockchain with artificial intelligence. It balances the transaction per second (TPS) and the level of decentralization, while it is achieving a high TPS, also providing a highly decentralized service architecture.

Eventually, by achieving *higher dimensional saturated structure searching* with the techniques of DDSSP, BAISS network may ultimately reach ten-million of transaction per second without sacrificing a single element of decentralization. And a solid foundation for establishing a truly decentralized cloud is now provided by BAISS with the help of DDSSP.

II. Business Motivation

It should be clear by now that BAISS is trying to build a true decentralized computing cloud. However, when we already have a bunch of well-developed centralized computing cloud infrastructures, what motivate BAISS to do the same thing in a decentralized manner? At present, all internet services and tools used by companies and individuals are all supported by central servers. No matter video or music websites, games, social media platforms and various mobile applications, they all involve data transfer and interaction.

The place where these huge data are stored is a huge centralized server cluster. With the emergence of new applications, enormous new data are created, data volume grows exponentially over time, and therefore those centralized server clusters will also be expanded. Those clusters are usually controlled by a few unicorn

*https://github.com/BAISS-Network

companies, what we call *centralized infrastructure service providers* (hereafter, IaaS providers), e.g. Google, Amazon, and Azure. Since all data are stored on the server clusters which provided by IaaS companies, it will bring several outcomes:

The Snowball Effect As users continue to use their services. Data and capitals will be highly inclined to these IAAS providers. Their data volume will become larger and larger, the data services they provide will get better and better, and again more new data will be created. Under this kind of positive feedback loop, eventually all the other companies will be defeated.

Monopoly Pricing on the Data Services When all the other companies cannot provide services with at least the same quality and magnitude as the unicorns. Those unicorns will monopolize the game.

Isolated Data Island Effect In order to maintain their monopoly advantages, these IaaS providers cannot achieve complete data openness and eventually form some data islands. These data islands are what we call the technology giants.

IaaS providers have already monopolized the market. As the result, no matter user, data or capital are now all highly concentrated on these tech giants. Take Google's business in the cloud computing market as an example. In 2019, the revenue of Google's cloud business reached US $8.918 billion. Compare with the revenue of the same company in 2018 which was US $5.838 billion, it increased by 52.76% (US $3.08 billion) [Google, 2019].

During this period, the amount of user has not changed substantially, but profits have increased dramatically, which indicates that the price of the same service is rised. For startups, this not only means that they have to pay higher maintenance costs, but also means they lose the opportunity completely to compete in the game. Therefore, they can only choose to rely on those tech giants to survive, and because the prices of those infrastructure services continue to rise, the prices of their services will also rise. At the end, consumers pay the bills.

The problem now is: we know centralization is unbalance system, then why we still doing it? This is the fact about centralization. Under the monopolistic structure, economically it is impossible for us to look up a better solution. BAISS was born to break this biased structure through providing the computing cloud service in a decentralized way.

III. Technical Motivation

BAISS has only one goal, which is to make blockchain truly applicable to every single corner of the world. However, the current blockchain as a payment platform clearly cannot support the real-world business services even in the near future. According to the founder of Ethereum and Polkadot Gavin Wood, **isolatability** and **scalability** are the two main obstacles hindering the adoption of blockchain technology, and this motivated him to design Polkadot [Wood, 2016].

Isolatability measures the level to compatible with different types of demands of multiple parties and applications at a near optimal level under the same framework [Wood, 2016]. Gavin Wood's solution to improving isolatability of blockchain technology is to provide a scalable interactive test platform, which he called "scalable heterogeneous multi-chain" [Wood, 2016], to build different chains on top of Polkadot. In other words, Polkadot can be regarded as a collection of independent chains, or the so called "parachains", which according to Gavin Wood, contains Ethereum, Ethereum Classic, Namecoin and Bitcoin [Wood, 2016].

Even if we fully ignore the centralized business model (auction mechanism) of Polkadot and

focus only on its technological innovation, Polkadot still only provides micro-innovation, but not revolution. The revolution here at least implies an excellent experience which the product can deliver to the users. Based on this standard, although we have obtained quite a novel architecture from Polkadot, which is a base-chain that carries many parachains at the same time, the overall structure is still not very practical due to the unsatisfactory qualities (e.g. low TPS or low level of decentralization) of these parachains.

Different from the philosophy of Polkadot's design, we believe products that are needed in the reality are not driven by fancy technical terms but by great user experiences. The genuine challenge to blockchain is to develop decentralized solutions with at least the same quality as the best existing products. We thus need a technical framework or architecture which is specifically designed for all the real-world online business, and this is what BAISS is going to achieve.

BAISS provides users with sufficiently large storage spaces, powerful computing resources, and an highly efficient decentralized payment architecture that can preserve the real-world commercial payment experience. All the factors combined make it possible to build a decentralized version of commercial IaaS on top of BAISS. Since we now have a decentralized version of IaaS, it is not surprised that we can also build a truly decentralized version of PaaS, SaaS, and write AI-Dapp on BAISS. Clearly, BAISS is highly compatible with different types of demands of multiple parties at a near optimal level. All traditional webs or mobile applications can be directly ported to the BAISS system. In other words, BAISS fully meets the isolation requirements.

Scalability is a key factor that greatly affects the user experience of any decentralized product. In the context of the blockchain literature, it measures the ability to process transactions on the given network. If blockchain is really

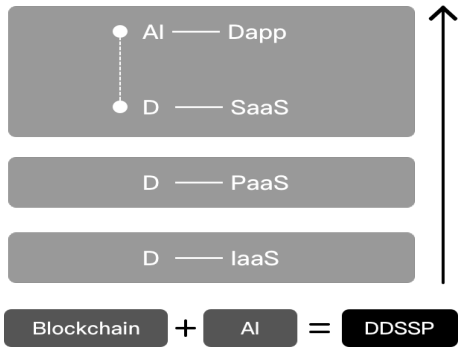

Figure 1: *Architecture of BAISS*

designed for the general public, it must be able to handle situations where there are million of users on their networks. Scaling is always the limitation of the current blockchain. For example, it is up to 7 TPS for Bitcoin [Nakamoto, 2008] and 15 TPS for Ethereum [Wood, 2014], which is inadequate for most traditional business demands that usually require payment methods to process thousand of transactions per second. By contrast, centralized payments like Visa, can provide services with an average of 1700 TPS [Visa, 2020]. It explains why they are still the first choice for the conventional business.

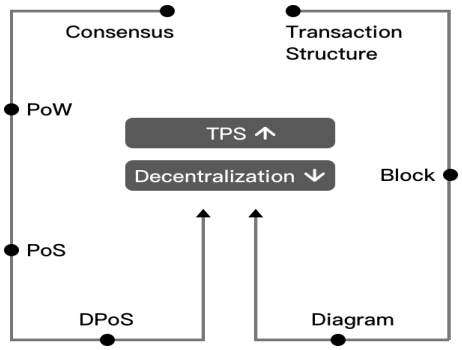

Figure 2: *Inverse Relationship*

An inverse relationship between the notions *TPS* and *Decentralization* can be deduced from the level of consensus and transaction structures (see figure 2). If some blockchain networks try to achieve a higher TPS, then it has to give up certain degree of decentralization,

and vice versa. *TPS* and *Decentralization* seem to be two concepts that are not fully compatible. However, we believe that the inverse relationship above is not necessarily vaild and therefore can be eliminated at technical level.

IV. DDSSP

DDSSP is the cornerstone of the entire BAISS system. DDSSP enhances the capabilities of the entire network and enables each node in the network to fast connect with its target node at an astonishing level. At the end, an highly efficient decentralized payment architecture that can preserve the real-world commercial payment experience is present.

The current mainstream blockchains are using a gossip-like structured protocol whereby all state modifications to the ledger are broadcasting to all participants. The global consensus is spreading to every single nodes in the whole state through the gossip protocol. The problem here is how can we maintain the efficiency of every node reaching a global consensus when we are managing a broad distributed network with billion of peer nodes. If every node in the network must know all the other unrelated transactions that occurs globally, then it may severely affect the overall performance of the network.

We agree that the gossip model may be the fastest communication model for information transmission, at least this is what the textbook says. However, this story does not apply when we attach the model to a wide distributed network. Although the gossip model is usually fast enough to spread information among stranger nodes, but *this does not mean we must treat every node as a stranger node forever*. This new angle provides us some crucial ideas about how to process different types of connection between nodes and super nodes.

In fact, we understand the blockchain family is actually an abstract architecture composed of a bunch of layers. Each layers represent different blockchain with different level of *robustness* and *efficiency*. At the basic layer, all the information are spread through the gossip model, and the corresponding blockchains are all completely objective, which are based on the most stringent version of proof-of-work. And they are trying to reach the most universal consensus among different parties who totally do not know each other but still need to conduct transactions.

However, when we think about the business transactions, assuming two user of the networks already have been working very well as partner in the last twenty years, then why do they need to treat themselves as a totally strangers in transaction mechanism (like all the current blockchain networks do)?

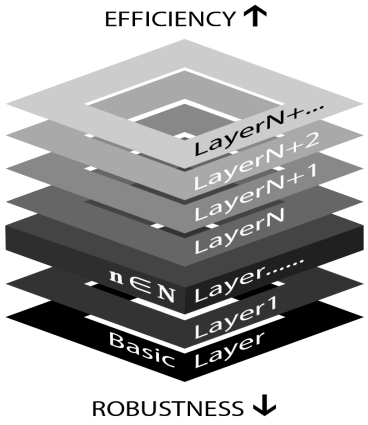

Figure 3: *The Hierarchy of Blockchain Universe*

As we "jump" above each layer, the layer gradually becomes less robustness, but more efficiency. The trade-off here comes from our **history of trust**. If users have had business cooperations and they trust each other well enough, then they do not necessarily have to use the most universal robust layer. We can build a higher layer which will sacrifice some robustness to exchange efficiency for them.

The gossip model can be described as efficient only when it deals with information spread-

ing between group of people with no previous history of trust. However, once we obtain the trust history of certain nodes indicating that the connection between these nodes is legitimate (we describe this situation as *the related saturation degree is slightly higher than zero*), then we no longer need to apply the gossip model. In other word, the gossip model is not the most efficient method anymore in this situation.

1. **Node** is a set of peer nodes make up a distributed system. Each node contributes to the system through providing storage and computing resource. All data stored into the system are distributed among the nodes.
2. **Saturation Degree** measures the distance complexity of node transactions. Higher distance complexity means we have lower saturation degree, and vice versa. Higher saturation degree means that the system can identify and communicate with the related structures in a faster way.
3. **History of Trust** is a special type of well-defined data about nodes, and these data are stored and shared in the BAISS system.
4. **HDSS** stands for *higher dimensional saturated structure*, which is an abstract structure that capture the process of jumping between nodes through layers.
5. **Sweat-gland** stores a bunch of HDSS and provide a dynamic mechanism to manage the jumping process in related HDSS by calculating the saturation of each node.
6. **Super Node** is a peer class that participates in the node discovery system. It stores sweat-gland for all the other nodes in the newwork, and gets paid for providing big amount of storage and computational resources.

The word *dynamic* in the name of the DDSSP represents (a) the dynamic transaction data flow in the BAISS system; and (b) the dynamic process occurs in the sweat-gland.

The component (a) is relatively easy to understand. Since BAISS is a blockchain system that allows users to build real business applications on top of it, thus the system will contain a bunch of **well-defined** transaction data. Then the history of trust can be easily extracted from these records by our **HDSS-algorithms** to build the relevant HDSS.

The component (b) is related to the *hierarchy of the blockchain universe* (see figure 3). The history of trust from BAISS system provides us a reliable source to reduce *distance complexity*, which it minimizes all those non-legit paths (what we called *path update*) in the whole network. As mentioned earlier, between different layers of the blockchain hierarchy, we are exchanging the robustness of the structure with the overall efficiency of the entire system. But how to ensure that exchange will not bring us serious systemic risks? From the perspective of model updating, we can see that *the loss of robustness is actually replaced by the credibility of reliable historical records*.

Since that the distance complexity can be used to compare different combinations of node connections, and model updating is a way for us to reduce the distance complexity. So structures with higher distance complexity (not be supported by enough history of trust) should be placed into the lower layer of the hierarchy. For extreme case, when the saturation degree equals **zero**, the structure model will collapses into the classical blockchain structure. In other words, *the most universal robust layer (**the Basic Layer**) for the most unreliable entities*.

By selecting relevant HDSS (which are stored and *managed* by sweat-glands in BAISS), we can directly connect states *through other layers*. In our terms, when the related saturation degree is increasing and more than zero, the data

traversal will jump some shortcuts in higher-dimensional structures (*layer-jump*). Since the services provided by BAISS will keep growing, and therefore the history of trust will also continue growing. Under the model updating framework, *the entire BAISS will become larger over time, but the node connection system will surprisingly become high level of compact*, eventually transaction can be done in a very high speed.

V. Dpow and Super Node

Nodes play a major role in supporting the whole BAISS system and therefore nodes will get decent compensation after their work. For example, nodes can be rewarded by reliably storage files, or providing computational resources. Besides the ordinary nodes, BAISS also have super nodes, which are responsible for carrying a big amount of transaction data, history of trust and the saturation rate. Node holds header file and **AI algorithms** and they will communicate with super nodes when transaction is triggered, and the super nodes will then provide the **node verification** for deciding whether the layer-jump is involved in the current situation.

In mining ecosystem, super node will provide many services to nodes. First, super node stores functions, transaction data and account information as service. The storage system will calculate and reward to miners according to the storage size they provided. BAISS will never delete transaction data, therefore the data set will grow to a huge size and titanic space is again needed for the storage.

Second, super node will get reward when node discovery performs action and result. Node discovery system will **search** and **calculate** the saturation degree for nodes.

Third, super node will be rewarded when every node's transaction going through it. Transaction process in BAISS involves a search activity for saturation degree in sweat-gland as first step, therefore every transaction have to use super node's resources. Meanwhile node transaction will be split a share to the super node serves nodes.

BAISS adopts a version of Delegated Proof-Of-Work (DPOW) as the consensus without sacrificing the level of decentralization. The key here is BAISS has to establish nodes and corresponding super nodes on a global scale in order to maintain good user experience. Unlike those DPOS chains, such as EOS, which have only a limited amount of super nodes [EOS, 2018], BAISS dramatically increases the numbers of super node, and therefore the problem of centralization will no longer exist.

VI. BIGO token

Multi-currencies generating mechanism is supported on our BAISS chain. Based on the **BAISS-20 protocol**, BAISS will issue its own token which is called ***BIGO***. BIGO can be further divided into two tokens: BIGO_α and BIGO_β.

.1 BIGO alpha

BIGO_α is the type of BAISS token that miners will get when they provide the specific storage functions and computational resources for maintaining BAISS system. The total amount of BIGO_α is around 2 billion, all produced by processing token mining.

For the miners of BAISS, the token generating process of BIGO_α is to (a) provide storage resources; or (b) provide AI computational resources. Therefore, from the perspective of the entire BAISS economic system, BIGO_α is an incentive mechanism used to motivate all the nodes in the network to maintain the whole BAISS ecosystem.

In order to maintain the dynamics of BAISS system operation, BIGO_α must satisfies the price volatility property, which means when we design BIGO_α we allow its price to change (even dramatically change) over time.

.2 BIGO beta

$BIGO_\beta$ is the type of BAISS token that is needed when the users experience the services on BAISS system. Contrary to $BIGO_\alpha$, because the $BIGO_\beta$ is used to pay for business services on BAISS, we generally do not want big price fluctuations involved. Therefore the key feature of $BIGO_\beta$ is to resist the token price fluctuations. Since $BIGO_\beta$ has this unique property that against inflation and volatility. therefor, business clients will worry-free about payments stability instead facing token price change frequently.

We now know that $BIGO_\beta$ is a kind of stable coin which can be used in BAISS. So how do we ensure the stability of $BIGO_\beta$? Here, $BIGO_\beta$ does not intend to choose a fiat-backed approach like Tether, which allows users to make direct trades between fiat currency and tokens that are equally valuable to that fiat currency. Similarly, $BIGO_\beta$ will not choose the crypto-backed stablecoin approach like Dai, which requires users to create Dai by depositing another token. Both of these systems involve the process of creating new tokens by locking up other valuable things (fiat USD or other mainstream tokens) in exchange for newly created tokens.

The problem is that we have to find a way so we can maintain the stability of $BIGO_\beta$'s price without holding certain fiat-currencies or tokens to guarantee the value of $BIGO_\beta$. BAISS provides a solution for this problem. In the quantity theory of money, we have two central principles for controlling the price of money:

- **Money Supply Expansion**: if prices are going up, then expand the money supply to bring them back down.
- **Money Supply Contraction**: if prices are going down, then contract the money supply to bring them back up.

Inspired by these two classical principles, BAISS proposed **$BIGO_\beta$-GEN System**. According to the **$BIGO_\beta$-GEN Protocol** which defines a target price for $BIGO_\beta$ in the pegged asset, we now have 1 India Rupee (INR) for 1 $BIGO_\beta$.

It is easy to deal with the case of token supply expansion. However, we still have to further explain how to deal with the case of token supply contraction. There are two types of assets in the $BIGO_\beta$-GEN System. The first type is the $BIGO_\beta$, which is a stable currency that is pegged to the India Rupee price. On the other sides, $BIGO_\beta$-GEN Protocol defines a subsidy asset called $BIGO_\beta$-bond. When the price of $BIGO_\beta$ is less than 1 INR, $BIGO_\beta$-bond will be issued by the $BIGO_\beta$-GEN System for repurchase $BIGO_\beta$. When $BIGO_\beta$ returns to 1 INR, $BIGO_\beta$-bond will be redeemed for 1 INR.

VII. Putting It All Together: Ecosystem on BAISS

$BIGO_\alpha$ can be used for exchange the $BIGO_\beta$ at certain ratio. With the growth of the BAISS ecosystem, the services in BAISS become thrillingly complete, also it attracts more users participate in the system. Therefore, the demand of $BIGO_\beta$ will continually grow, push up the price of $BIGO_\alpha$, which it all creates a decent return for the $BIGO_\alpha$ holders.

One amazing fact is, due to the positive feedback loop between $BIGO_\alpha$ and $BIGO_\beta$, BAISS completely eliminate the monopoly pricing by provide services on BAISS with **zero fee**.

VIII. Conclusion

We are in the world which all the centralized technology giants are bullying us by raising their service fees, but we have no other choice.

In this white paper, we introduced BAISS, a truly decentralized computing cloud system, which is blockchain based cutting edge tech-

nology. We believe that freedom is the most essential key of human's society, therefor any formalities of monopoly structure system will be obstacle to human freedom of choice. In fact, blockchain technology is definitely not a toy for few geeks. BAISS hopes that innovative blockchain technology breakthroughs can be a whole product to compete with any tech giants' centralized systems, period.

IX. Roadmap

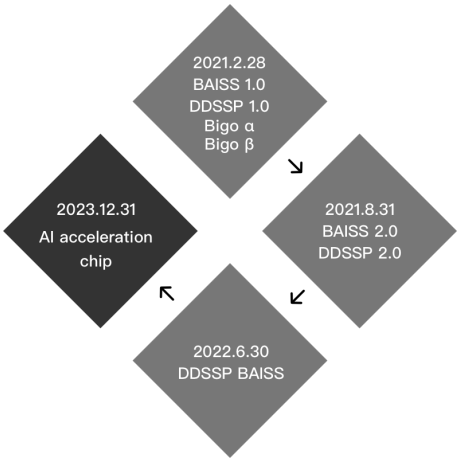

Figure 4: *Roadmap of BAISS Development*

BAISS Lab decides to release 63 millions BIGO_{α} to the tech communities and potential investors for economical purpose and network development.

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