Gode Chain

Technical White Paper

Gode Chain： Heterogeneous Multi-chain Framework
(Multi-chain communication, unlimited interface)

2022

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Introduction

Gode Chain： Heterogeneous Multi-chain Framework

——Multi-chain communication, unlimited interface

At present, there are many issues in the existing blockchain (high cost, high latency, cross-chain operation, etc.) ， limiting the development of blockchain. Instead, Gode Chain adopts a brand-new architecture ， applies multi-chain communication and unlimited interfaces in its ecosystem, finds a practical method of scalability and scalability; through the incentivization of untrusted public nodes, the bonded core can be scaled out. Gode Chain keeps the overall functionality to the absolute minimum of security and transport, and introduces the practical method of in-situ core scalability, thus achieving multi-chain framework successfully.

The heterogeneous nature of Gode Chain allows different types of consensus systems to interoperate in a trustless, fully decentralized "federation", allowing open and closed networks to have trust-free access to each other.

Gode chain proposes a way to provide backwards compatibility with one or more pre-existing networks (such as Ethereum). We believe that such a system can provide a useful basic component in the overall search and can find a system that can achieve global business-level scalability and at the same time, it is practical and feasible in terms of privacy.

Overview

——It is a blockchain with unlimited potential

Gode Chain is a new generation blockchain protocol that unites the entire dedicated blockchain network so that they can operate seamlessly together on a large scale. Since Gode Chain allows any type of data to be sent between any type of blockchain, it unlocks a wide range of real-world use cases.

By bringing together the best features from multiple specialized blockchains, Gode Chain paves the way to a new decentralized market, providing a fairer way to access services through various applications and providers.

Although the blockchain has shown great prospects in many fields------- Internet of Things (IoT), finance, governance, identity management, web decentralization, and asset tracking, etc.-------there are limitations in the previous system design,   which largely hindered large-scale adoption.

Compared with existing and traditional networks, the design of Gode Chain has several obvious advantages, including heterogeneous sharding, scalability, upgradeability, transparent governance and cross-chain composability.
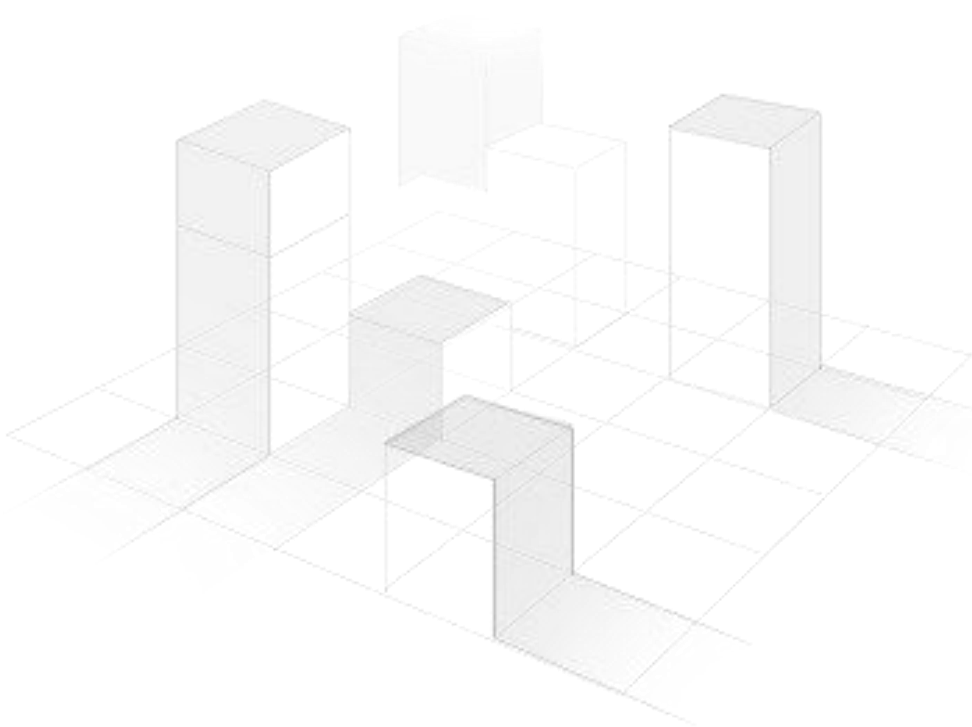
Challenges

——Technical problems that need to be solved urgently

Protocol, Implementation and Network.

Like Bitcoin and Ethereum, Gode Chain refers to both the network protocol and the primary public network that runs the protocol. Gode Chain aims to be a free and open project. The protocol of the agreement is under the Creative Commons license, and the code is under the FLOSS license. The project is developed in an open way and accepts all useful contributions. Unlike Python Enhancement Proposals, it is an RFC system that allows publicly collaborative over protocol changes and upgrades.

The initial version of the Gode Chain protocol implementation will be the Parity Gode Chain platform, and will include the complete protocol implementation and API binding. Like other Parity blockchain implementations, PPP is designed as a general-purpose blockchain technology stack, which is neither exclusively used for public networks, nor is it operated by a private/consortium.
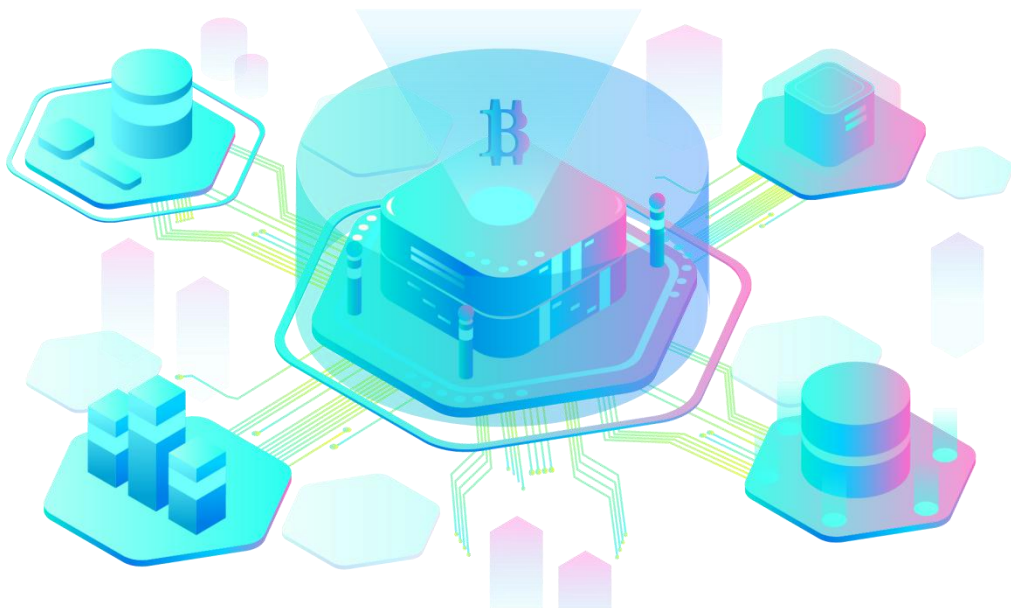
Gode blockchain ecosystem

The Gode vision is to empower, connect, share information, increase transparency, and provide a frictionless means for multi-chain blockchain ecosystem. Blockchain technology enables a decentralized and trustless network with an economic incentive layer to perpetuate its utilization now and far into the future. Gode has developed a vision that connects stakeholders within varying industries (e.g., supply chain, health care, banking, identity, insurance) into one ecosystem: Gode Chain.

Figure 1 illustrates a high-level depiction of the current vision of the Gode Multi-Chain Blockchain Ecosystem.
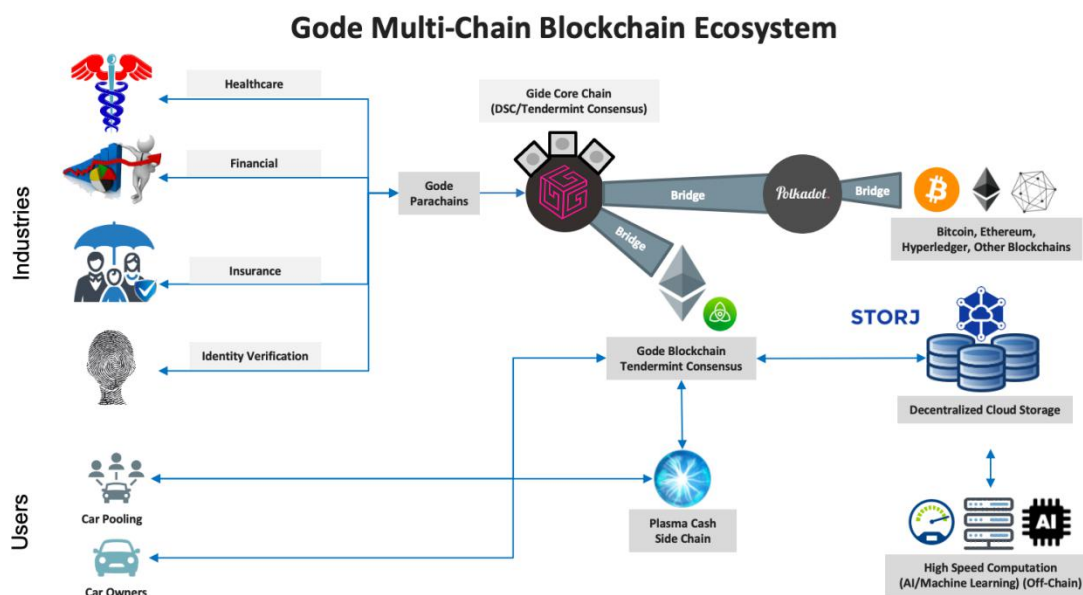

Figure 1: High-level diagram of the Gode Multi-Chain Blockchain Ecosystem

The Gode Ecosystem has blockchain technology at its core, which will enable industry stakeholders (companies and users) to connect, share, and transact in the Gode Chain-based cryptocurrency in a trustless and decentralized network.   Given that the scope of Gode's vision is expansive, a phased approach has been developed to address the needs of stakeholders of blockchain technology.

The approach considers the trajectory of blockchain technology as well as distributed ledger technology (DLT) current shortcomings: scalability, speed, and providing a mechanism to move value and data across blockchains.

Gode blockchain ecosystem

Bitcoin1, the first peer-to-peer (P2P) digital currency network developed by Satoshi Nakamoto and released in 2009, enabled an immutable DLT that was cryptographically secure and included built-in economic incentives, enabling a self-sustainable network.Due to the success of Bitcoin, another network was developed called Ethereum2 that is like Bitcoin but has a Turing complete3 programing language for smart contracts (programs that are executed by all the nodes on the Ethereum blockchain).

Ethereum has been widely adopted by the development community, and tools have been created for Ethereum that will enable Gode to launch a blockchain with advanced features faster than if Gode developed its own custom blockchain solution. Gode has chosen to utilize an instance of Ethereum for its primary blockchain in phase 1 of the Gode Ecosystem.

Ethereum will serve as the initial backbone of Gode, for both payments and smart contract functionality. Ethereum is enabled with the capability to create smart contracts to permit custom developer targeted functionality. In Gode's vision, this will provide the backbone for utilization by multiple stakeholders in the automobile ecosystem to leverage the network and to enable frictionless and trustless computation of data and payments. The Gode token will be the fuel for the network to produce new blocks as well as fees for computation for sending payments and executing smart contracts.

In blockchains, the consensus engine provides the capability for multiple parties to agree on the order of transactions and which transactions to include in a block to the blockchain. Bitcoin and Ethereum both leverage an algorithm called Proof of Work3 (PoW). PoW for consensus works well, however there are drawbacks that include risks to decentralization and environmental impacts.

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1 https://bitcoin.org/bitcoin.pdf

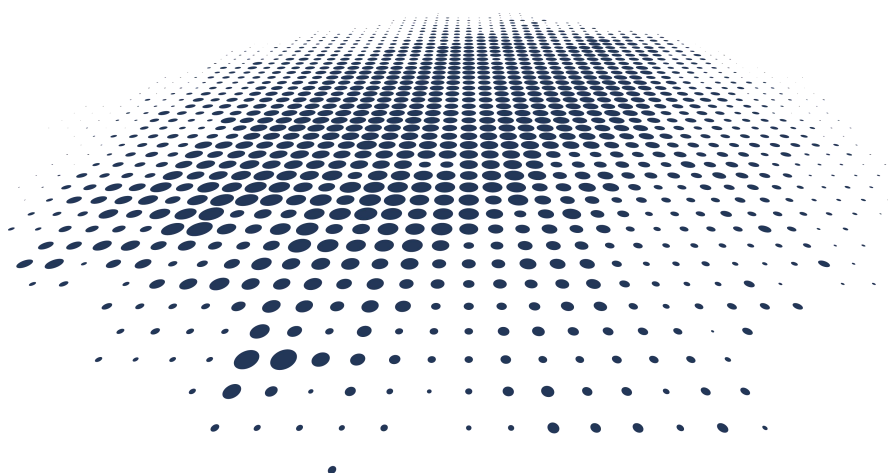2 https://github.com/ethereum/wiki/wiki/White-Paper

3 https://www.cs.virginia.edu/~robins/Turing_Paper_1936.pdf

PoW algorithms have been known to be susceptible to specifically designed computers called ASICs4 (Application Specific Integrated Circuits).

ASICs are utilized only for running a specific PoW algorithm very fast (e.g., SHA-2565, equihash6). Additionally, due to the growth of Bitcoin's network, electricity utilized for Bitcoin mining has been growing globally, which has environmental impacts7. Bitcoin's hash power also has become less decentralized over time8, with many observers suggesting ASICs could be the culprit.

Gode has chosen to utilize Proof of Stake9, 10 (PoS) algorithms for its consensus mechanisms, which is not susceptible to ASICs and environmentally friendly. For the Gode Ethereum instance, Tendermint11, 12 will be utilized as the primary consensus engine. Tendermint is a secure consensus algorithm that provides reliable replication of transactions in all Validators participating in consensus. Validators are nodes in the ecosystem responsible for committing blocks to a blockchain. Tendermint is Byzantine Fault Tolerant13 (BFT), which enables Tendermint to provide consensus even if 1/3 of the Validators fail, achieving instant finality14.

4 https://books.google.com/books/about/Application_Specific_Integrated_Circuits.html?id=3hxTAAAAMAAJ

5 https://csrc.nist.gov/CSRC/media/Publications/fips/180/2/archive/2002-08-01/documents/fips180-2withchangenotice.pdf

6 http://wp.internetsociety.org/ndss/wp-content/uploads/sites/25/2017/09/equihash-asymmetric-proof-of-work-based-generalized-birthday-problem.pdf

7 https://link.springer.com/chapter/10.1007/978-3-642-39498-0_7

8 https://dl.acm.org/citation.cfm?id=3212998

9 https://github.com/ethereum/wiki/wiki/Proof-of-Stake-FAQs#what-is-proof-of-stake

10 https://peercoin.net/assets/paper/peercoin-paper.pdf

11 https://cdn.relayto.com/media/files/LPgoWO18TCeMIggJVakt_tendermint.pdf

12 https://tendermint.com/docs/

13 https://dl.acm.org/citation.cfm?doid=357172.357176

14 https://blog.ethereum.org/2016/05/09/on-settlement-finality/

Tendermint Consensus Exhibit

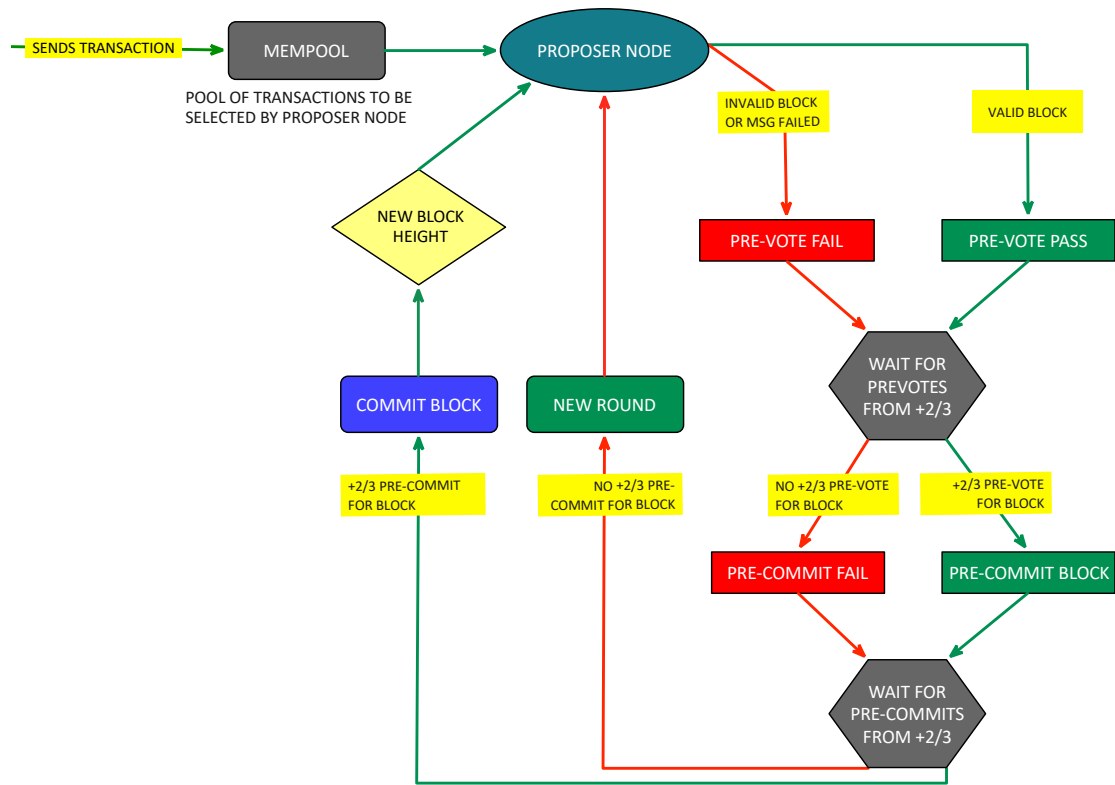Figure 2 illustrates how blocks are proposed, voted on, and committed to a blockchain using Tendermint.

Figure 2: Based on illustration from Tendermint.org15

Validators take turns in proposing a block and voting on them, which then gets committed to the chain of blocks at a new block height. If a block fails to be committed, the protocol moves to the next round and a different Validator gets to propose a block for the next block height. If 2/3 of validators that pre-vote and pre-commit a block (two rounds required) in the same round, a new block gets committed to the blockchain.

Tendermint assumes that 1/3 of validators are byzantine, meaning Tendermint guarantees safety and will not commit two blocks at the same block height. Block height refers to the number of blocks in the chain between the current block and the first block in the blockchain (called the genesis block) which has a height of 0.

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15 http://tendermint.readthedocs.io/en/master/introduction.html

Tendermint is a PoS protocol, and thus validators need to bond a stake of tokens (Gode) to participate in the consensus of blocks. The stake of tokens from the Validator is utilized as the weight of the voting power for the Validator. If a Validator is found to be byzantine, part of the Validator's stake will be taken away (slashed16).

Ethereum with the Tendermint Consensus engine speeds up transaction throughput while also leveraging an environmentally friendly consensus algorithm17. The Gode blockchain will enable Gode to create an ecosystem for the auto industry with technology available today. The utilization of Ethereum will also enable developers in the automotive community to develop applications for their own respective applications for vehicular data, such as telematics data or P2P auto sharing data, and in the future autonomous car-to-car data sharing. The Gode blockchain can connect the fragmented auto industry through smart contract enabled blockchain technology that provides censorship resistance, reduction of fraud, increased transparency, and one trusted platform for automobiles.

Five key failures of present technology stacks:

1. Scalability:

On a global scale, how much resources does the system need on processing, bandwidth and storage to process a single transaction, and how many transactions can be reasonably processed under peak conditions?

2. Isolatability:

Can the system solve the different needs of multiple parties and applications in the same framework and to a near-optimal degree?

3. Developability:

How effective are these tools? Do the APIs meet the needs of developers? Are there educational materials available? Is there a correct integration?

4. Governance:

Can the network remain flexible and adaptable over time? Can decision-making be sufficiently inclusive, legal and transparent to effectively lead the decentralized system?

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16 https://medium.com/@VitalikButerin/minimal-slashing-conditions-20f0b500fc6c

17 https://tendermint.com/docs/tendermint.pdf

5. Applicability:

Can the technology address the urgent need independently? Do you need other "middleware" to bridge the gap with actual applications?

At present, our main goal is to solve the first two problems listed above: scalability and isolatability. We believe that the special framework of Gode Chain can provide meaningful improvements to these two problems.

Summary

Gode Chain is a scalable heterogeneous multi-chain. This means that unlike previous blockchain implementations (focusing on a single chain with varying degrees of generality over potential applications), Gode Chain itself is designed to provide no inherent application functions. Rather, Gode Chain provides the cornerstone "polycore-chain", which a large number of verifiable, globally-coherent dynamic data structures can be hosted side by side. We refer to these data structures as "parallelised" chains or parachains, although they do not necessarily need to be blockchains in nature.

In other words, in addition to the following two very important points, Gode Chain can be considered as a set of independent chains (e.g. a set that includes Ethereum, Ethereum Classic, Namecoin, and Bitcoin):

- Pooled security;

- Trust-free interchain transactability

These are the reasons why we think Gode Chain is "scalable". In principle, the problems to be deployed on the Gode Chain may be massively parallelized (scaled out) on a large number of parallel chains. Since all aspects of each parachain can be conducted in parallel by a different segment of the Gode Chain network, the system will have certain scalability. Gode Chain provides a fairly simple middleware level. This is a conscious decision that can reduce development risks, enable the necessary software to be developed in a short time, and ensure its safety and stability.

Gode Chain Heterogeneous Sharding

——Many Chains, One Network

In order to support the specific features and use cases, all blockchains will make different trade-offs. Moreover, as chain specialization increases, the demand for transactions between them will only increase over time.

Gode Chain is a sharded blockchain, that is, it can connect multiple chains in the same network, allowing them to process transactions in paralle, and exchange data between chains with security guarantees.

Because of Gode Chain's unique heterogeneous sharding model, each chain in the network can be optimized for a specific situation, rather than being forced to adapt to a one-size-fits-all model.

Will there be one blockchain to dominate the market in the future? We don't think so. More chains and more specialization mean more possibilities for innovation.

Scalability

—— Blockchains that grow

One single blockchain is not enough to support the prosperous future of decentralized applications. In early blockchains, limited throughput and lack of runtime specialization made their expansion in many practical use cases impractical.

By bridging multiple specialized chains to a shared network, Gode Chain allows the parallel processing of multiple transactions. This system eliminates the bottleneck of processing transactions one by one on the early network.

In the future, Gode Chain plans to further expand the functionality of Nested Polycore Chains, which can increase the number of shards that can be added to the network.

Upgradeability

——Future-proof your blockchain with forkless upgrades

Early computer games were shipped on Cartridge printed circuit boards. Since the code needs to be etched onto the chip, the manufacturing of these circuit boards is time-consuming and expensive.

Today, we are used to our apps, games, and browsers updating frequently and even automatically. Developers will fix the bugs that cause the problem and add new features as better solutions become available.

Like all software, the blockchain needs to be upgraded to remain relevant. However, it is much more difficult to upgrade the blockchain than apps, games, and browsers. Upgrading a conventional blockchain requires forking the network, which usually takes months of work. A particularly contentious hard fork may also lead to the break of the community.

Gode Chain has completely changed this process, it can upgrade itself without forking the chain. These fork-free upgrades are achieved through Gode Chain's transparent on-chain governance system.

With this feature, Gode Chain can keep the project agile, adaptable, and continue to evolve with the pace of technology. It also significantly reduces the risks associated with controversial hard forks-----a serious obstacle for many organizations.

Transparent Governance

——Community powered

The early blockchains had no formal governance procedures. Individual stakeholders are nearly impossible to propose or veto protocol Unless they know the right people.

Gode Chain is different. It is governed by all members in a fair and transparent manner.

All token holders can propose changes to the protocol or vote on existing proposals. They can also help elect board members, who will represent passive stakeholders in the Gode Chain governance system.

Cross-Chain Composability

——Collaborative by design

The early blockchain is like a walled garden isolated from other networks. However, as the number of chains in given use cases continues to increase, the demand for cross-chain communication and interoperability is also increasing.

Gode Chain's cross-chain composability and message transmission allows shards to communicate, exchange value, and sharing functionalities, opening the door to a new wave of innovation.

Because of Gode Chain's ability to bridge blockchains, Gode Chain's shards can also interact with popular decentralized financial protocols and cryptoassets on external networks such as Ethereum.
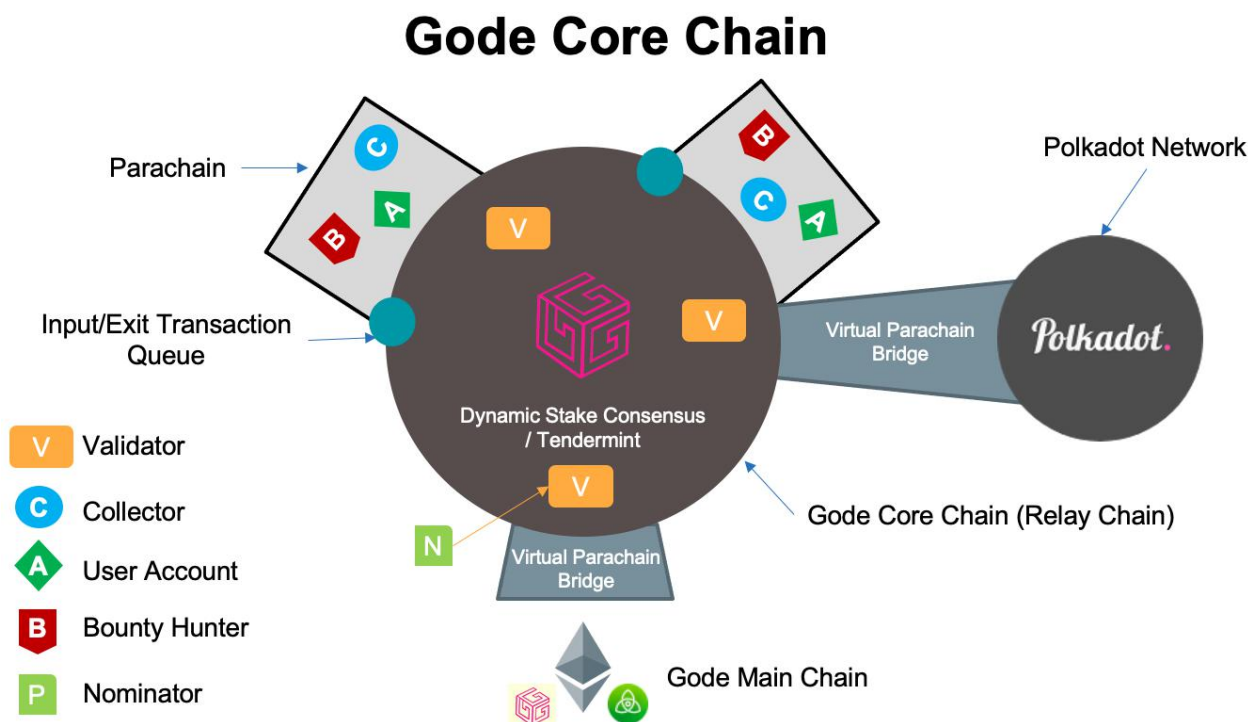
Gode Chain

Gode Chain Architecture

——Connecting all dots

Gode Chain unites a heterogeneous blockchain sharding network called parachains. These chains are connected to and protected by the Gode Chain Polycore chain. They can also be connected to external networks through bridges.

Polycore Chain

The core of Gode Chain, responsible for network security, consensus and cross-chain interoperability.

The polycore chain will be a chain similar to Ethereum because it is state-based with the mapping address to account information, mainly balances and (to prevent relays) transaction counters. Placing accounts here achieves one purpose: to provide accounting information for the amount of stake an identity owns in the system.

Parachains

Sovereign blockchains can have their own tokens and optimize functionalities for specific use cases. To connect to the polycore chain, the parachain can pay on demand or lease a slot for continuous connection.

Each parachain is defined in the registry. It is a relatively simple, database-like structure, and holds static and dynamic information on each chain. The static information includes the chain index (a simple integer), and the validation protocol identity, which is a way to distinguish different classes of parachains so that the verifier can run the correct verification algorithm to propose valid candidates.

The initial proof of concept will focus on putting a new verification algorithm into the clients themselves, and each time an additional chain class is added, the protocol will be hard-forked by requirement. However, it is ultimately possible to specify the verification algorithm in a rigorous and efficient way so that clents can effectively use the new parachain without a hard fork. One possible way is to use a complete, natively compiled, platform-neutral language (such as WebAssembly) to specify the parachain verification algorithm.

Bridges

Special blockchains that allows Gode Chain shards to connect to and communicate with external networks such as Ethereum and Bitcoin.

Although the choice of a BFT consensus mechanism with validators comes from a set of stakehoders, we can still get a security consensus with a controllable number of validators that does not change frequently.

In a system with a total of 144 validators, with a block time of 4 seconds and 900 blocks (reporting, penalizing and repairing malicious behaviors like double votes), the validity of a block can be verified by only 97 signatures (Two-thirds of 144 plus 1), and a following 60-minute verification session without challenges deposited.

Super interface

Due to the limited interface load capacity of a single polycore chain, the super interface can connect multiple polycore chains thus achieve in-chain operation.
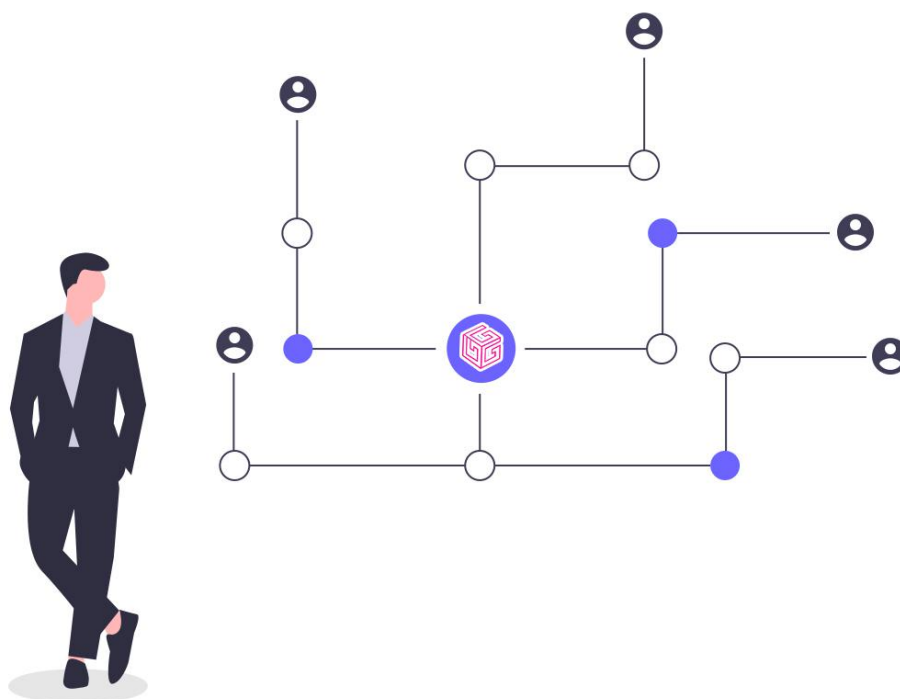
Gode Chain

Gode Chain Consensus Roles

Validators

Secure Polychain by staking tokens, validating proofs from managers, and participating in consensus with other validators.

Validators charge the highest fees, which help seal new blocks on the Gode Chain network. Although we allow secured parties to nominate one or more validators to act on their behalf, the role of the validator depends on whether a sufficiently high bond is deposited, so some portion of the validator bond may not necessarily belong to the validator All themselves, but rather these nominees.

Validators must run Polynuclear clients with high availability and bandwidth. In each block, nodes must be ready to accept the role of approving new blocks on the designated parachain.

This process involves receiving, validating and republishing candidate blocks.

Certifier

Secure Polychain by choosing trusted validators and staking tokens.

The prover is the stakeholder who contributes to the validator's security deposit. They have no role other than placing venture capital, so it can be shown that they trust validators to act responsibly in maintaining the network. They increase or decrease deposits proportionally according to the growth of the bonds they contribute.

Provers, like collators, are in a sense similar to miners of today's PoW networks.

Packers

Shards are maintained by collecting shard transactions from users and generating proofs for validators.

Transaction packers (referred to as packers) are the parties that assist validators in generating valid parachain blocks. They maintain a "full node" for the parachain; that means, they keep all the necessary information to be able to author new blocks and execute transactions as miners do on current PoW blockchains. Under normal circumstances, they would collate and execute transactions to create an unsealed block and provide it, along with a zero-knowledge proof, to one/or more validators currently responsible for proposing parachain blocks.

inspector

Monitor the network and report bad behavior to the validation period. Arrangers and any parachain full node can act as auditors.

Unlike the other two active parties, the auditor has no direct relationship with the block creation process. Instead, they are independent "bounty hunters" motivated by large one-time rewards. It is because of the presence of auditors that we expect incidents of misconduct to be rare, and if they do, it will only be due to the binding party's carelessness with the security key, not malicious intent.

Gode Chain

Gode Chain Governance Roles

Council Members

Representing passive stakeholders in two main governance roles:

1. Propose a referenda.

2. Vetoing dangerous or malicious referenda.

Technical Committee

It is composed of a team that actively building Gode Chain. Can propose emergency referenda and act with the council for fast tracking of voting and implementation.

The GODE Token

Gode Chain tokens serve three different purposes: network governance, staking, and binding.

Governance

Gode Chain token holders have complete control over the protocol. All the privileges miners on other platforms will be granted to the participants (holders of GODE), including special events management such as protocol upgrades and repairs.

Staking

Game theory will incentivize token holders to act in an honest manner. Good actors can get rewards through this mechanism, and bad members will lose their stake in the network. This ensures that the network remains secure.

Gode Chain

Binding

New parachains are added by binding tokens. By removing the bound tokens, outdated or useless parachains can be removed. This is a form of proof of stake.

Gode Foundation

The foundation is created to nurture and manage technologies and applications in the field of decentralized network software protocols, especially those that use modern cryptographic methods to protect decentralized technologies and applications to benefit the Gode ecosystem and ensure its stability. Gode Chain is the flagship agreement of the Gode Foundation.

The Development Prospects of the Foundation

The foundation is seeking funding or otherwise assisting in the development and deployment of projects consistent with the following missions:

- Innovative blockchain technology, cryptographic messaging protocol.
- Data publication system (such as IPFS).
- NFT meta-universe chain gaming application system.

- Peer-to-peer network infrastructure (such as libp2p and devp2p)

- Blockchain sharing economy model (allowing more groups to benefit from the blockchain technology).

- Provide technology training services (to better assist traditional enterprise with blockchain technological advantages, and integrate blockchain technology with traditional enterprises rapidly and seamlessly)

- Crypto economic mechanism (such as DEFI/ DAC/DAO software)
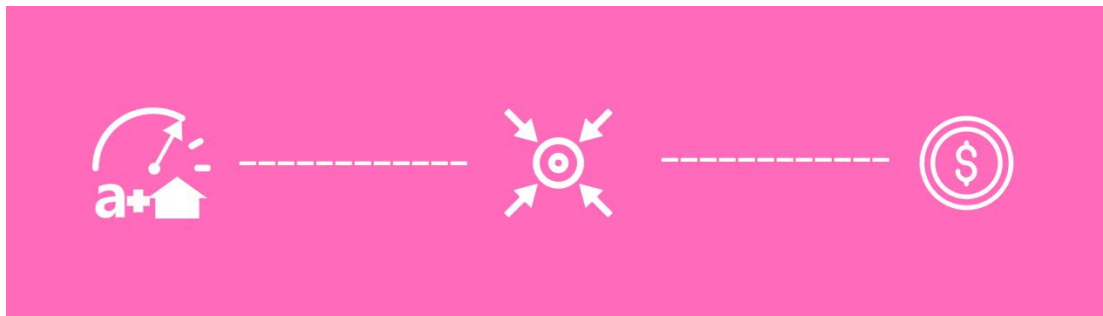
About us

——————development team

The Gode Foundation has commissioned a technology development team led by Dr.Peiper and Adam.Luciano to build Gode Chain.

Adam

Adam has a Bachelor of Business Administration from Babson College-Oli Business School and a Bachelor of Finance and Investment from Baruch College. He is a former market research analyst with 13 years of business evaluation, product and project management experience.

Peiper

Peiper has a Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign.

He is currently an Adjunct Professor at Drexel University. He was also an Adjunct Professor of Network Security at the University of Maryland. Prior to that he was a member of the former US Department of Defense Global Command and Control System Joint, Integrated Imaging and Intelligence Architecture Group. Lastly, he was also a Senior Application Architect.

The GODE team comes from a team of PhDs from Stanford, Yale, and MIT, and the core members have worked for Facebook, Google, Oracle, and other companies. 65% of the team members have master's degrees or PhDs, and there are many technical staffs with more than ten years of development experience or even designed Ether as early developers.

GODE will fundamentally reshape the blockchain industry: the team has highly absorbed the technical advantages of public chains such as ethereum, Polkadot, salana, and so on to innovate the cross-chain and cross-protocol technical architecture, Gode Chain multi-chain connection will be the core technical development direction of the next-generation blockchain.

GODE Token Issuance

Gode chain will issue 10 billion GODE tokens for the normal operation of the eco system：

- 30% is allocated by the f foundation to technical, community, and operations teams;

- 20% for private equity, early consens participants.

- 50% for stake and rewards of mining pools, miners and nodes.

Collaborations

——Friends of Gode Chain

Gode Chain is designed to be work with public, private and enterprise chains. We are excited to work closely with the following partners to develop more use cases, and look forward to working with other blockchain projects seeking to adopt this technology:

Contacts

——Dive deeper, stay connected and get building!

- Learn more on the Gode Chain website and Wiki
- Subscribe to Gode Chain Newsletter
- Participate in and join the Gode Chain Community Program
- Attend or host a Gode Chain meetup in your area
- Chat with the Gode Chain team on Telegram
- Additional resources

Gode Disclaimer

As a new investment model-digital asset investment

There are various risks, and potential investors need to assess the investment risks and their risk tolerance carefully.

Market Risks

The market environment after the issuance of Gode Token is inseparable from the digital asset

market situation.

If the global market is generally depressed or there are other uncontrollable market factors, the price of Gode Token may remain undervalued for a long time even if the project has a good prospect.

Policy Risk

At present, digital assets have become the main regulatory object of each major country in the world, while the policies of some countries on digital assets are still unclear, if the regulatory body exerts influence, the application, promotion, and development of Gode may be restricted, hindered or even directly terminated.

Competition Risk

With the development of information technology and mobile internet, all kinds of decentralized applications continue to emerge, and the competition in the industry becomes increasingly fierce. As other projects emerge and continue to expand, the community will face continuous operational pressure and certain market competition risks.

White paper disclaimer

This document is for informational purposes only and does not constitute an opinion on the purchase or sale of Gode Token. Price offers or solicitations will be made on trustworthy terms and permitted by applicable law. The above information or analysis does not constitute an investment decision or specific recommendation.

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