Nuls whitepaper betaV1.0

Making Trust Simpler

A highly customizable modular blockchain infrastructure

Abstract

Nuls is a global blockchain open-source project which aims to be a highly customizable modular blockchain infrastructure; it consists of two parts (microkernel and functional modules). Nuls provides smart contracts, a multi-chain mechanism and is built on a cross-chain consensus. It aims to break the technical barriers of the blockchain, to reduce the cost of development, and to promote the usage of blockchain technology in the commercial field.

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Contents

1. Blockchain prospect

With the accelerating pace of life and the expansion of information, the need for trustless solutions is a must. The blockchain has characteristics of decentralization, tamper-proof and high transparency, and we believe it is an important technology to promote the progress of human society.

2. What's Nuls?

Nuls is a global blockchain open-source project which is a highly customizable modular blockchain infrastructure, and it aims to break the technical barriers of the blockchain, to reduce the cost of development, and also to promote the usage of blockchain technology in the commercial field. Nuls is adaptable because of the following features:

A. Module definition
The difference between other blockchain and the Nuls platform is Nuls divides the blockchain into several modules, such as network, account, ledger, storage, consensus, and smart contract. Every module will perform independently, ignoring the change of other modules. The modules of Nuls cooperate through the service bus and event bus. The microkernel manages the service bus and event bus.

B. Smart contract
Nuls provides a smart contract container (NulsVM), the application developers can define and run their logic in a decentralized environment.

C. Multi-chain mechanism
Nuls supports users to customize their own sub-chains by combining appropriate modules from the module library according to their own application requirements. The cross-chain consensus mechanism defined by Nuls will join the sub-chains to main chain to secure the network.

3. Why Nuls?

Considering the characteristics of blockchain technology, such as decentralization, tamper-proof, honesty and transparency, we believe it will be the infrastructure of various commercial applications. We find few applications or projects that are based on blockchain in the field of commercial business or everyday life. According to our analysis we believe performance limitations and technical barriers are obstacles to the promotion of blockchain technology which is how Nuls was born.

4. Goals of Nuls

A. Easy to use

In order to reduce the cost of development, an easy programming environment based on blockchain is necessary. Nuls provides a Turing-complete smart contract, and it helps developers to define their own logic without understanding the underlying technical details, such as cryptography, consensus mechanism, storage and so on.

B. Adaptable to numerous application scenarios

It is predictable that blockchain will be widely adopted as a basic technology in the future. Nuls is designed to adapt to numerous application scenarios, and Nuls can support different application scenarios at the same time, ignoring the different technology selection and hardware conditions among various applications.

C. High-performance

Commercial applications require high performance, and Nuls is committed to breaking performance limitation of blockchain by adopting multi-chain mechanism and modular architecture.

D. Balance transparency & confidentiality of data

The confidentiality and security of data is important for organizations. However, the transparency of the blockchain makes them hesitate to choose this new technology. The cross-chain consensus will supply a way to audit the data of sub-chain without breaching confidentiality.

5. Economic Model

The built-in token of Nuls, named NULS, will promote the entire Nuls Ecosystem.
NULS will be used to support Nuls-based applications, pay for application cost, exchange for asset, support Nuls development, reward miner, pay transaction fees, etc.
The minimum unit of NULS is 0.00000001.

A. Distribution Mechanism

The initial issuance of NULS is 100 million, which is divided into four parts:

NULS distribution mechanism
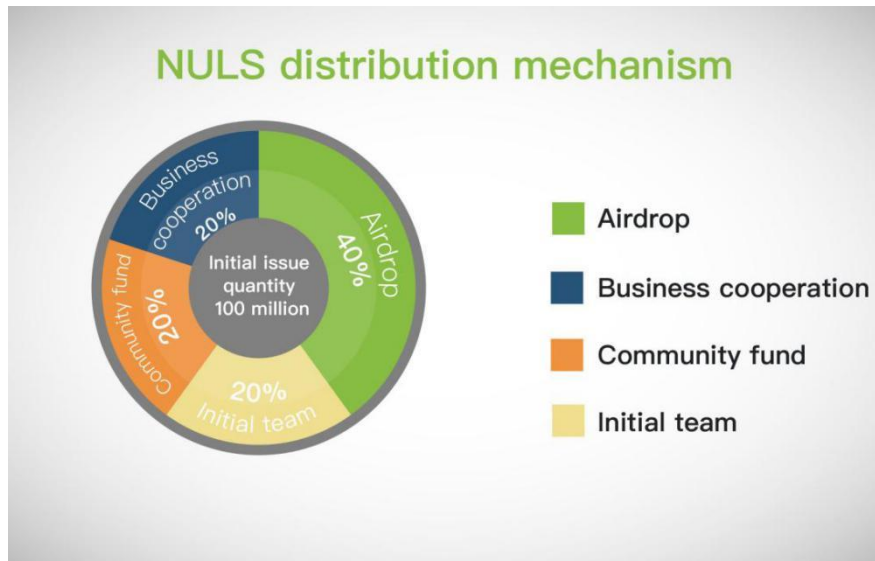
- ✓ 40%(40 million) Airdropped.
- ✓ 20%(20 million) Development funding - (NOTE: These funds cannot be accessed until the first version of Nuls is released) After the release of the first version 1 Million Nuls can be accessed by the team each month).
- ✓ 20%(20 million) Community Funding – These tokens will be used to grow the community in ways such as bounties, competitions and other various community projects. The cost mustn't be spend more than 4 million per year.
- ✓ 20%(20 million) Strategic partners that will benefit Nuls and Nuls-based applications. The cost mustn't be spend more than 4 million per year.

In the part 2, 3 and 4, all the wallet address (the detailed transaction or summary) will be transparent to the public and subject to supervision
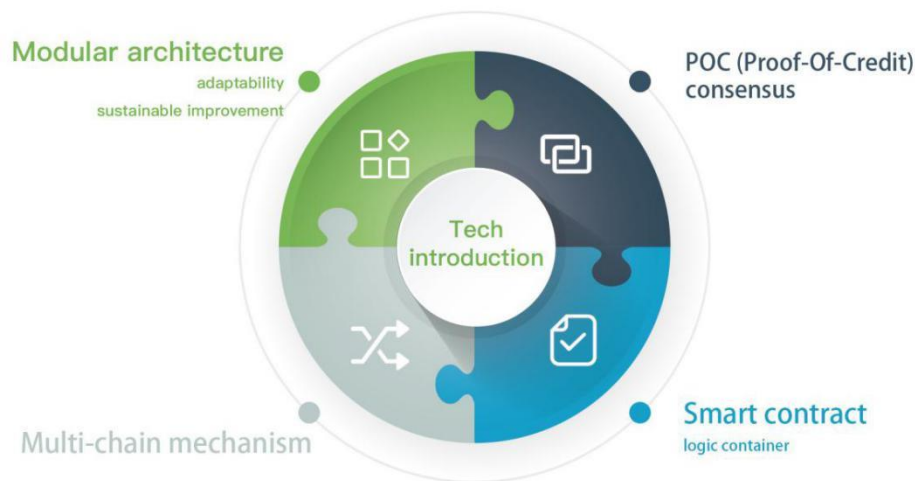
B. Network Maintenance

About 5 million NULS will be created to reward miners per year.

C. Sub-chain Network Maintenance

Registering a sub-chains requires a fee paid in NULS and the NULS obtained by this will then be rewarded to cross-chain miners.

6. Tech design

A. Consensus mechanism (POC, Proof-of-Credit)

The default consensus mechanism of Nuls is POC and sub-chains can use other mechanisms by replacing the consensus module. The nodes of the consensus meeting should pack blocks by turns, and every node only pack one block per round.

a. Consensus condition

There are two necessary conditions for entering the consensus meeting:

1. Mortgage more than a fixed number of tokens. The fixed number will be voted in test phase.
2. Credit ratio is larger than 0.

b. Credit ratio

Credit ratio is calculate from capability and responsibility. Capability is calculated from the block counts packed by the account recently, and responsibility is calculated from the violations. The exact formula will be voted in the test phase.

c. Punishment

➢ Yellow card

Missing packing blocks for two consecutive rounds. The mortgaged coins will be locked for 72 hours and the credit ratio will be downgraded.

➢ Red card

Hostile attack. The mortgaged coins will be locked for 1 months and the account will be put into blacklist of consensus.

d. coinbase reward

$$coinbase = fee + 5000000 * \mathrm{rnc} * \frac{bti}{spy} * \frac{cmc * \max(0, cr)}{\sum_{1}^{rnc} cmc * \max(0, cr)}$$

*rnc : round node count*

bti : block time interval (second)

spy : seconds per year (second)

cmc : consensus mortgage coin count

cr : credit ratio

B. Modular architecture

The Nuls community recognizes the inevitability of technical upgrades and the unpredictability of business application logic. Nuls incorporates the modularity of the Linux kernel to develop the Nuls micro-kernel. The design of Nuls follows the principle of "everything is a module".
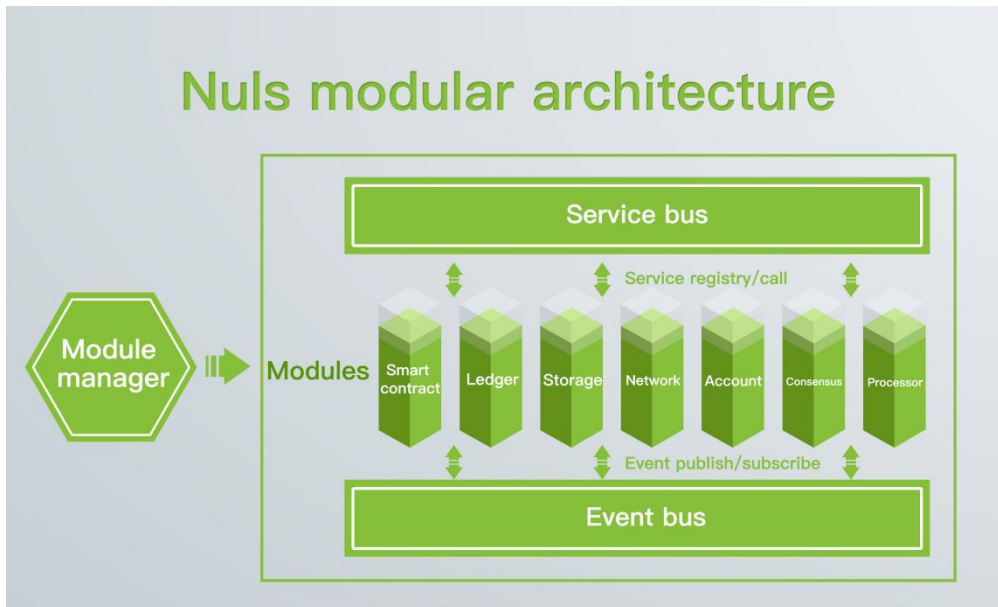
a. Nuls module & Module manager

The Nuls module provides the standard definition of "NulsModule", and all Nuls modules follow the NulsModule definition.

The Nuls module manager manages all modules; the extended modules that follow the NulsModule definition can be loaded into the Nuls node through the module manager. When a module is loaded, the module manager registers the module service, and each Nuls module can provide services and invoke other modules. The Nuls module can publish events and subscribe to events of other modules.

Each module of Nuls can be upgraded or replaced according to the technical upgrading and application requirements. From a technical point of view, Nuls is an operating system software with a long life cycle and high adaptability.

b. Multi-chain mechanism & cross-chain consensus

Nuls supports sub-chain creation. The main chain and sub-chain verify blocks and transactions using our cross-chain consensus.
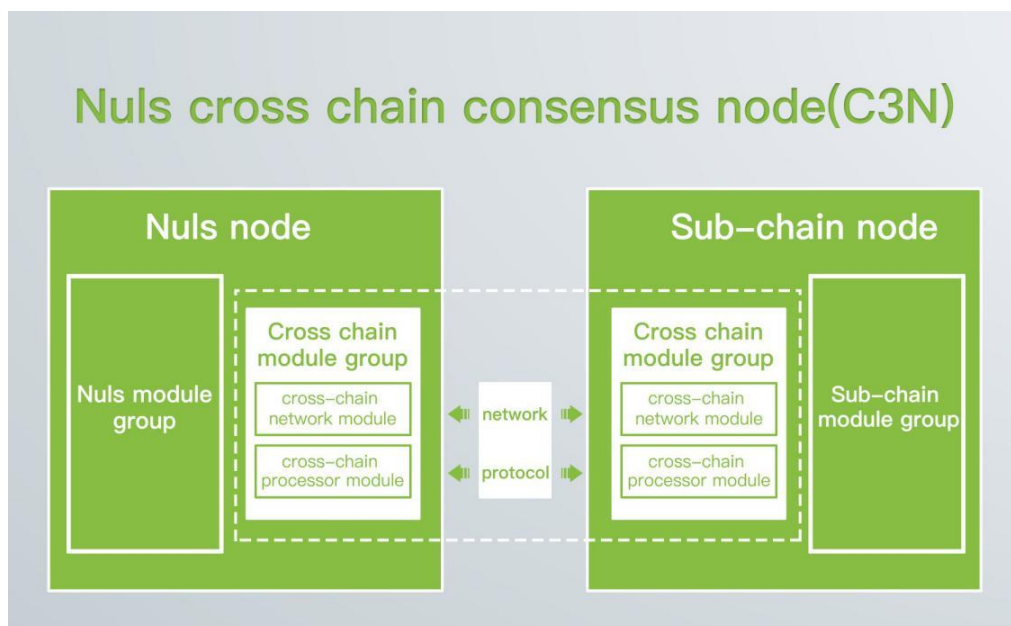
c. Cross-chain consensus domain (C3D)

Partial nodes of the main chain and partial nodes of the sub-chain are composed of a cross-chain consensus domain (C3D). The nodes in C3D agree on cross-chain transactions and blocks, and then share cross-chain data to other nodes in their own chain.
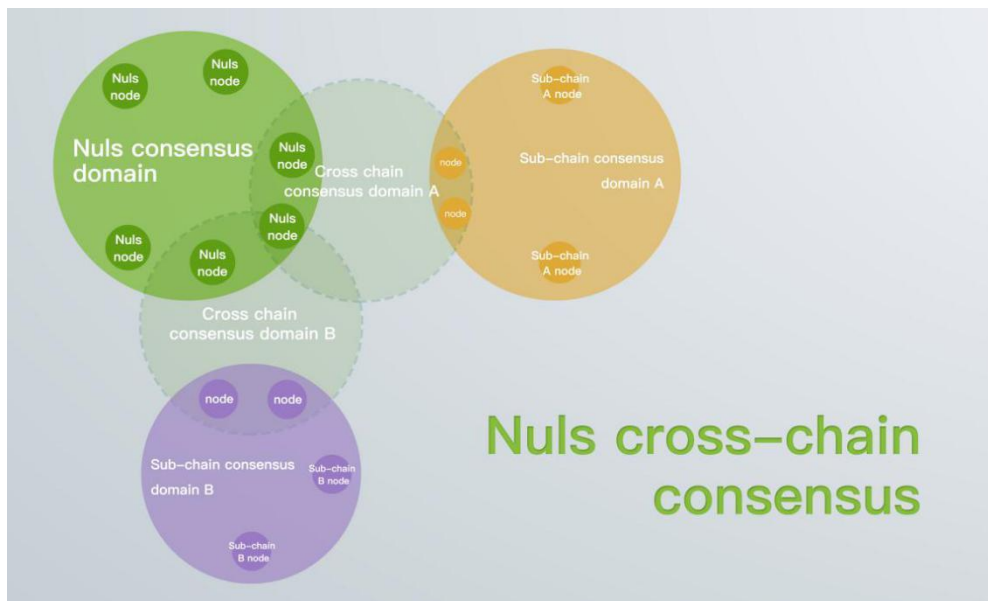
d. Cross-chain consensus node (C3N)

The nodes that join the cross-chain consensus domain need to load the modules required for the cross-chain consensus, such as cross-chain network module, cross-chain protocol processor module.

e. Safety

Cross-chain consensus protocol has two methods to guarantee safety:

➢ Minimum node requirements prevent centralization of the cross-chain consensus domain.
➢ Dynamic adjustment (Rotating) of cross-chain nodes to prevent a single cross-chain node to broadcast cross-chain information continuously.

C. Smart contract

Nuls provides a Turing-complete smart contract virtual machine NulsVM, which will support JAVA as the first language and will expand during development. NulsVM is the key of lightweight customization within the coding layer.

7. Open-source community

Nuls is a global open-source project driven by the blockchain community, and the ecosystem a source of vitality of open-source. The Community will provide comprehensive development documentation and fully developed tools for easy use. We will hold an assortment of various development competitions, giving support to superior applications and reward contributors for projects to expand the Nuls ecosystem. We have set up the Nuls Community Foundation with 20 million Nuls from the team to promote and support the project. The Nuls Community Foundation is short for NULS FOUNDATION PTE. LTD. (201729333G). The main objective of this fund is to maintain a community driven developer side of the Nuls open-source project and maintain upgrades and innovation within the project, this also keeps the safety, harmony and development aspects intact. The main objective of this fund is to maintain a community driven developer side of the Nuls open-source project and maintain upgrades and innovation within the project, this also keeps the safety, harmony and development aspects intact. At Nuls our main goal is to promote community-driven development to ensure a sustainable growth in development from the community.

8. Nuls Roadmap

We have 3 major milestones within the project which can be seen below.

1. Upgrade: Ice (To be completed within the next 1-2 years)

Technology Upgrades
- Launch of the Nuls Main Chain.
- Improve the technical design documentation.
- Complete the basic module code development.
- Continuously improve initial functions, such as smart contracts, multi-chain parallels, and cross-chain consensus.
- Improve the main-chain's overall ecosystem, including a blockchain browser, e-wallet, mobile wallet, smart contract virtual machine compiler, development tools, and multilingual adapters.

a. Ecosystem Upgrades

Establish and expand an open-source development community. Start and promote more applications to be accessed within the NULS ecosystem.

2. Evolution: water (the next 3-5 years)
a. Technology Upgrades
- Complete more consensus module implantation.
- Grasp self-evolution of network and storage modules (support Exabyte of data volume storage).
- Form a standard technical solution system to be used in various industries. Establish a new ecosystem which is composed of blockchain and other fields such as big data and artificial intelligence.
b. Ecosystem Upgrades

Form a mature open-source community, large-scale set up application sub-chain.

3. Final Step: steam (the next 5 years)
c. Technology Upgrades
- Providing a complete solution to solve production and management in both industry and agriculture. Consisting of a complete technology platform for the integration of blockchain, big data and artificial intelligence all in one eco-system.
a. Ecosystem Upgrades

Forming an open-source community integrated within the blockchain, big data and artificial intelligence sectors and providing comprehensive value docking and collaboration platforms.

4. Conclusion

Nuls adheres to the mission of "Making Trust Simpler," and commit to becoming a Value-Fusion Operating System that could change human life following the desktop operating system and smart phone operating system, promoting the development of human economy and human society.

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