



# NULS WHITEPAPER 2.0

Make the Blockchain Simpler

A Highly Customizable  
Blockchain Infrastructure

## Abstract

*NULS is a blockchain infrastructure that provides customizable services and is also a global open-source community blockchain project. NULS adopts micro-services to achieve a highly modular underlying architecture, using smart contracts and cross-chain technologies, combined with the ability of Chain Factory to quickly build chains, reduce development costs, and accelerate blockchain business application landing.*

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## 1. The Future of Blockchain

Since the beginning of human civilization, we have strived to survive, learn, adapt and move humanity in a direction that is sustainable for future generations. Our desire to constantly improve not only our own lives but the lives of others has brought us into the beginning of the 21st century, “the technological era”. Every generation is more fast-paced than the last and there is no sign of slowing down. The creation of blockchain technology has catapulted innovation even further and has acted as a catalyst for creative thinkers to get involved in the space. The rich incentivized environment of blockchain has created opportunities that not only interests the technological savvy individuals, but also those who simply want to be involved in the growth of a world-wide disruptive technology.

As blockchain technology continues to mature, the demand to solve real world use cases is becoming more evident. Blockchain however is still in its infancy and an impartial gap exists between itself and real-world adoption. Part of the issue is that the technology has a steep learning curve. The other issue is that many blockchains that currently exist have either a narrowed focus on the problems they selectively solve, or they are too broad to fit the needs of individuals and businesses. A new type of blockchain is required that not only can comfortably fit the needs of a wide range of businesses, but also easily handle development improvements without threatening the underlying protocol.

## 2. What is NULS?

NULS is a blockchain with a modular based architecture enabling customizable modules and cross-chain operability. Its two-part design is the micro-service and the functional modules. They have been built with the goal to maintain the well-known programming practice of high cohesion and low coupling. They also adopt the hot-pluggable principle allowing modules to be added or removed during operation.

The decentralized nature of NULS allows for a business model that bridges the gap of trust in using the technology as well allowing users to customize their side-chain to

fit with their requirements. The simplicity of implementation comes from the architectural design of NULS where complex concepts such as cryptography, consensus mechanisms and storage methods are abstracted away from the developer, so they need only to be concerned with what they want to build that is within their skillset.

The simple base of the main-chain will provide a set of modular components that can be customized to the users' needs. Users will be free to choose their preferred consensus mechanism, network, account, ledger, block management, chain management, transaction management, event bus as well as other permissions to designate to their chains. Chains are not limited to being public chains but can also be designed as private or consortium chains.

### **3. Why was NULS Created?**

Blockchain uses the chain structure which is limited in performance due to the size of the database, and difficulty lies in synchronization and the complex task of performing technical updates on a decentralized network.

A blockchain was needed that not only solves real world problems but also makes the developer's work easier. The ability to customize modules to suit the developer's needs promotes their individual innovation and does not constrain the possibilities of what can potentially be built. To solve these problems and promote the commercial use of blockchain technology, NULS was designed.

### **4. NULS Mission**

After conducting market research and analysis, we found that there are various problems that hinder the growth and development of blockchain. Talented individuals in the IT sector are already hard to come by and developers who are additionally experienced in blockchain is a rarity. This creates a higher cost for development as these individuals can charge a premium in exchange for their services due to the simple economic function of demand exceeding supply. This issue

cannot be solved in the short term and will only be solved over time as more developers learn and understand the technology.

Existing blockchains are limited in performance and cross-chain communication is still being explored. Organizations and businesses will not be interested in using a consortium or private chain that isn't completely trustworthy. NULS can provide a reliable solution to these problems.

### **A. Ease of Use**

The learning curve for developing on NULS is reduced by taking care of some of the complexity for the developer. The goal of the platform is to improve development time by offering a simple programmable environment that caters to the less experienced developer while facilitating extendibility for the more experienced individual.

### **B. Adaptable to Numerous Application Scenarios**

The application layer is where a developer can take advantage of the infrastructural support that has been designed as a part of the platform. A developer can easily perform basic tasks and make use of the modular parts such as the multi-chain system and smart contracts.

### **C. High Performance**

NULS understands the importance of performance and the limitations of current blockchains and is committed to solving these for widespread adoption. Using parallel expansion technology through Chain Factory, millions of transactions per second can be processed through NULS and other chains based on NULS.

## **5. NULS Economic Model**

The token of NULS will be used to promote the entire ecosystem. It will be used to support NULS-based applications, build the community, community governance, pay transaction fees, reward miners, pay chain-building fees and cross chain fees.

## A. The Issuance of NULS is Divided into 4 parts

### a. Airdrop

40% of the tokens are airdropped (40 million) to owners of the ERC20 placeholder token of Inchain project, which is the angel investor of NULS.

### b. Development Funding

20% of the total tokens (20 million) go towards continued development. After the main net is live, these tokens are unlocked at the rate of 5% (1 million) per month over the course of 20 months.

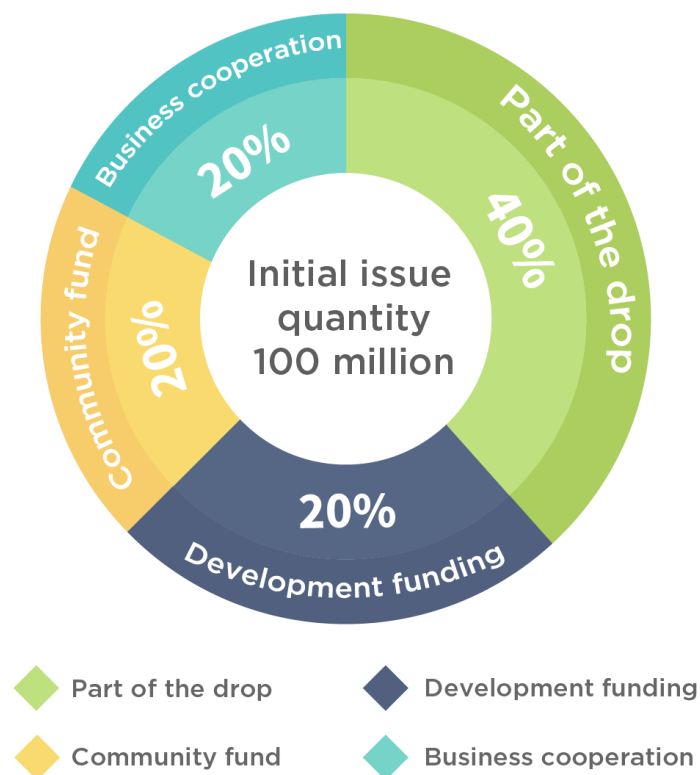
### c. Community Funding

20% of the tokens (20 million) are allocated for building the community, and no more than 4 million tokens will ever be used per year.

### d. Business Cooperation

20% of the tokens (20 million) are used for business partnerships and to support high quality NULS-based third party projects. No more than 4 million tokens will ever be used per year.

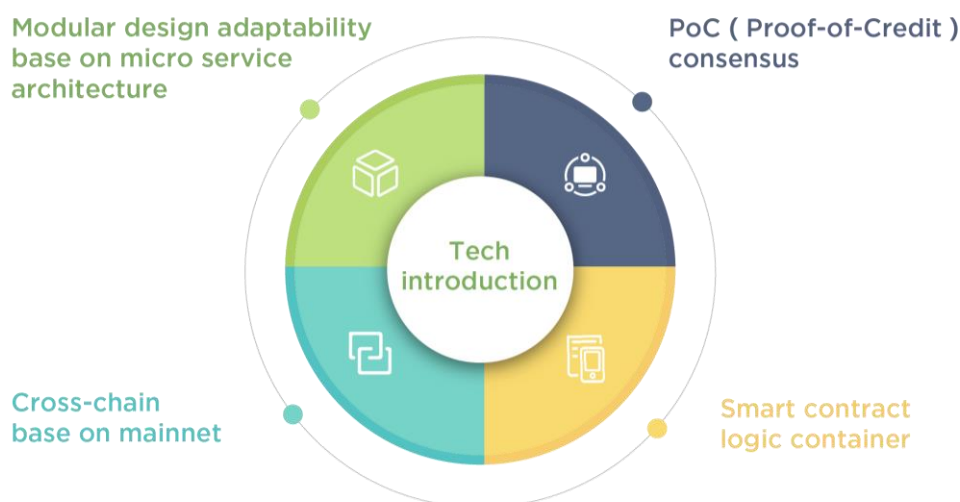
## NULS distribution mechanism



## B. Network Maintenance

5 million NULS will be created through the Proof of Credit (PoC) consensus each year to reward miners and secure the network.

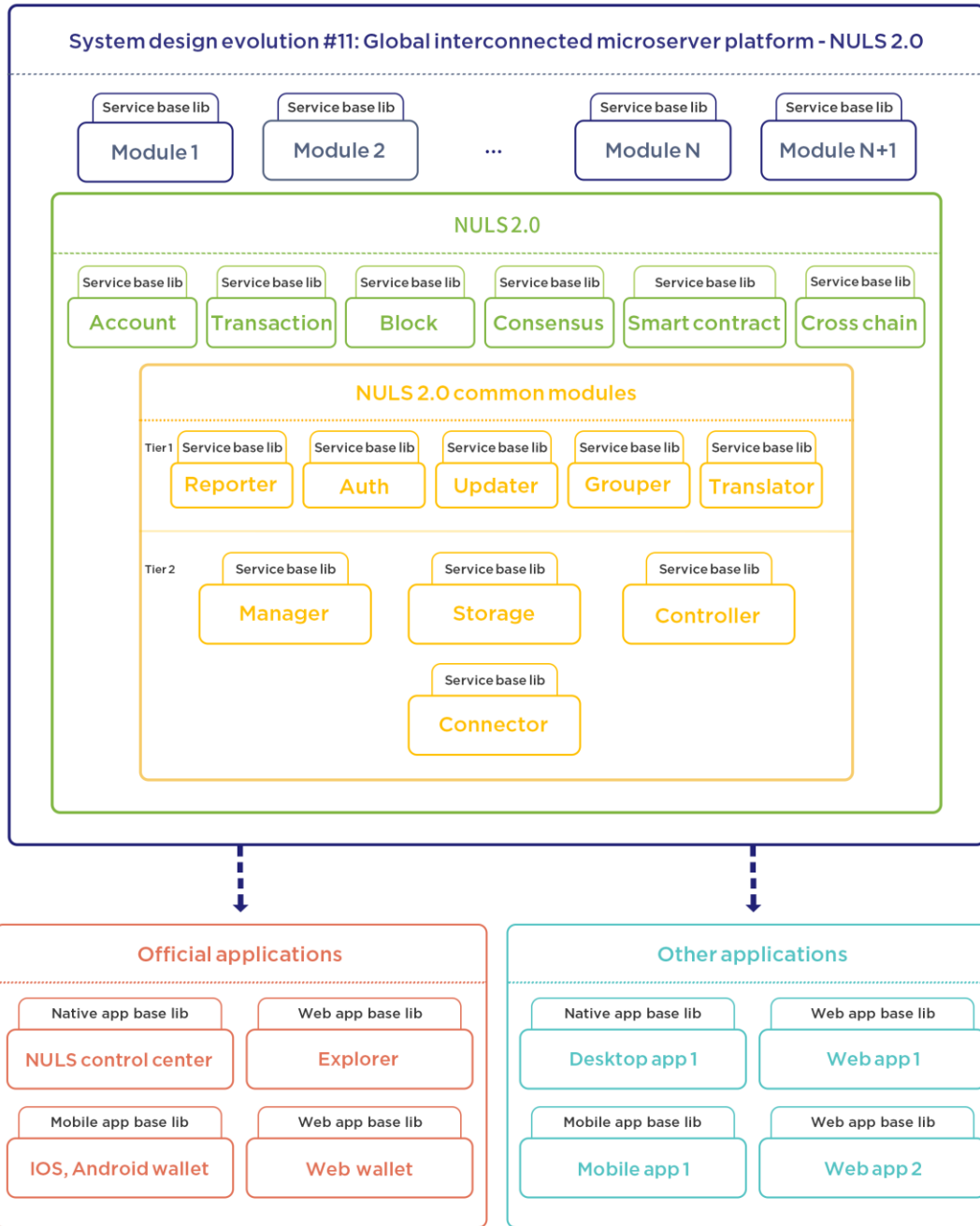
## 6. NULS Technical Design



### A. Micro-Service Infrastructure

NULS innovatively introduces the micro-service concept in the infrastructure design of blockchain, which designs software applications as service suites that can be deployed independently and introduces the most advanced ideas in this architecture into the modular design, making modules as flexible as programs that can start independently.

This modular architecture combined with micro-services, without any programming language limitations, is called NULS 2.0. Modules in this architecture are less coupled to each other. Multi-language development greatly improves the contribution of code and the convenience of users. This also allows NULS to support distributed deployment and hot module replacement. At the same time, Chain Factory and Cross-Chain Modules are being developed in coordination with this architecture.



NULS micro-service infrastructure design is divided into a three-layer system architecture design:

- The first layer is the micro-service infrastructure layer
- The second layer is the basic service layer of the blockchain
- The third layer is the DAPP application layer

This architecture allows NULS to develop more advanced applications on the second layer such as the distributed system of exchanges, the data service system, including



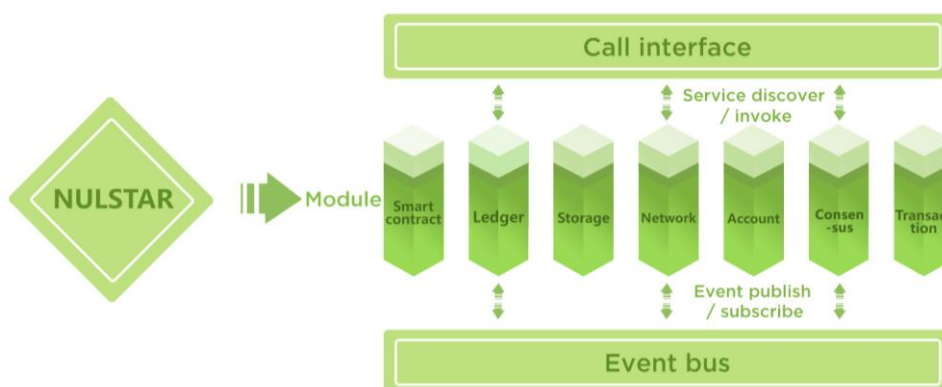
systems similar to DiDi. Many things can be built on the NULS system, not only multiple chains and multiple DAPPs, but also other large and medium-sized non-blockchain commercial systems.

This design allows NULS to be more than just the underlying infrastructure of the blockchain, but also a distributed system infrastructure that seamlessly integrates with the blockchain system. NULS is a platform for seamless communication between different systems (blockchain and other systems), which will enable businesses built around NULS to flourish more quickly while greatly reducing development costs. This overall optimization gives the NULS a significant competitive advantage.

## B. Modular Architecture

The design structure of NULS was born out of the understanding that technology is going to continue to advance at a rapid rate and static technologies will be left behind. NULS incorporated the modularity of the Linux kernel to give the flexibility of a dynamic blockchain. Since everything is a module, technical upgrades can easily be made to add the latest improvements to the blockchain.

### NULS modular architecture



The module manager is where all modules can be managed, loaded and unloaded from the chain. Once a module is loaded, it is able to communicate with other modules and allow for various actions to be performed. From a standard technical

point of view, NULS is like a program that has been designed with the open-closed principle in mind. Open for extension but closed for modification.

### **C. Consensus Mechanism - Proof of Credit (POC)**

The modular architectural design of NULS supports the insertion of new functional modules as well as the replacement of the core functional modules in the consensus mechanism. The user can set the rules for their chains and customize them to their needs.

The main-chain will use the Proof of Credit (POC) protocol that is the first of its kind designed by the NULS team. It works like Proof of Stake where a certain number of tokens will need to be locked before the user can run a node on the network. The number of tokens required to set up a node is 20k NULS, however the community is allowed to vote to change this in the future. When a user wants to stop running a node, they wait 72 hours to unlock their tokens, whereas staked tokens are unlocked immediately.

- **Yellow Card Alert**

When a node fails to generate a block during an internet disconnection, computer crash or when experiencing network issues, this will not be considered as a violation in the network's rules. However, because this will affect the entire system, a warning will be given with the credit ratio downgraded.

- **Red Card Alert**

In the case of hostile attacks, double spend attacks, attempts at forking the system or deliberately trying to attack the network, NULS will be able to detect and protect itself from vulnerabilities and exploits. Any hostile nodes will have their coins frozen for a longer period (e.g. 60 days) and their credit ratio will be set to the minimum, meaning they are no longer able to meet the minimum amount to participate in the network.

- **Credit Rating**

The crediting system is the coefficient that is used to determine a user's integrity and trustworthiness in the network. Credit ratings are between -1 and 1 and are

automatically calculated based on the behavior of the node using the credit rating algorithm.

Credit Evaluation Formula:

Credit Cardinality = Coefficient of Capacity + Coefficient of Duty

Coefficient of Capacity: Calculated based on the number of blocks generated in the past.

Coefficient of Duty: Calculated based on violation cases and accuracy of blocks generated.

- **Consensus Reward**

To ensure the balance and fairness of the entire NULS system, the consensus reward is computed based on the amount of staked coins and the node credit submitted by all consensus nodes.

- **Consensus Mechanism**

NULS provides the underlying infrastructure for all chains and allows applications to be built on top of their own chain. NULS gives the user the building blocks required to easily customize their own chain with their own token and own rules, in relation to consensus e.g. (POW, DPOS, POS, PBFT, POOL) so that users can decide how their chain will operate.

## **D. NULS Smart Contract**

NULS has a built-in smart contract virtual machine (NVM) that is structurally between the external service module (e.g. RPC module) and the underlying infrastructure module (e.g. network module, storage module or account module).

The smart contracts are used by the higher-level applications, interpreted by the interpreter, stored by the storage module and computed by the NVM module. It will support various higher-level programming languages to cater towards developers in their desired language and compiles the program through the interpreter so that the NVM can understand and read the application.

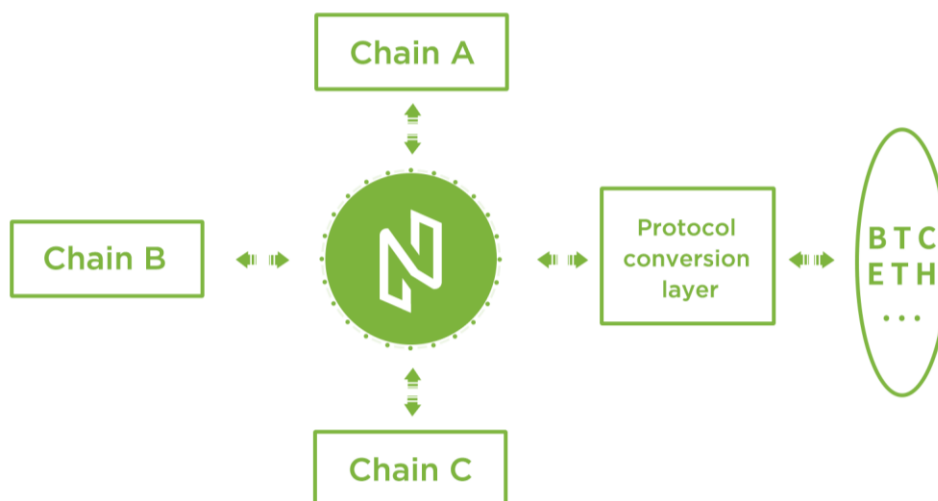
### E. Cross-Chain

Implementation based on the NULS module repository, means that blockchains (within the ecosystem) can add the cross-chain module to communicate with NULS at the base layer.

For public blockchains such as Ethereum and Bitcoin which are not affected by NULS, it is necessary to implement the protocol conversion through a special mechanism, and adapt the public blockchain protocol to the NULS cross-chain protocol to achieve the purpose of communication under a unified protocol.

Blockchains directly communicate only with the NULS main-net. The verification of the transaction is performed by the NULS main-net, and each parallel blockchain will trust the verification result of the NULS main-net.

Assets on a certain blockchain can be transferred to any chain that accepts the cross-chain protocols in the NULS ecosystem. It is also possible to achieve business interoperability between any two blockchains at a small cost based on mutually acceptable protocols.



**Key points in cross-chain design:**

- a. The NULS main-net adopts the Proof-of-Credit consensus mechanism and the Byzantine Fault-Tolerant mechanism to realize confirmation and packaging of cross-chain transactions, so as to achieve decentralization, high performance &

security.

- b.** Each node on the NULS main-net connects to multiple nodes in multiple blockchains. Because the protocol is the NULS cross-chain protocol, which is uniformly defined, it is possible for a single node to connect to multiple nodes in different blockchains simultaneously.
- c.** The NULS main-net provides the chain management mechanism to manage all equal-level blockchains registered on the NULS main-net. The contents of the registration include chain information, asset information, cross-chain deposit, etc.
- d.** When assets from other chains are received in a blockchain, corresponding assets need to be generated in this chain. Tokens on different blockchains are stored in other chains in the form of assets.
- e.** The details of the assets in a blockchain transferred from other chains will be stored in the NULS main-net. When the asset is transferred out of the blockchain, it will be verified, and illegal assets will not be allowed to be generated from the blockchain. Malicious blockchains are handled through community mechanisms such as suspending cross-chain, stopping cross-chain, forfeiting deposits, etc.
- f.** The NULS main-net will provide the API manual. Developers can develop their own wallet, explorer, web wallet and other tools according to the manual.
- g.** NULS main-net provides protocols for applications to extend, which can be used to develop DApps and optimize cross-chain protocols.

## **7. Open-source Community**

NULS is an open-source project that is driven by the blockchain community. The open-source nature of the project offers transparency and trust for developers which is vital in building a strong community. The community will provide comprehensive development documentation and fully developed tools to assist and support developers.

In order to fast-track the development of NULS technology, the NULS technical community has established the CCC (Code Craft Council) organization, which is responsible for the frontier exploration of blockchain technology and the technology construction of community ecology. At present, it is composed of 8 community developers from 7 different countries.

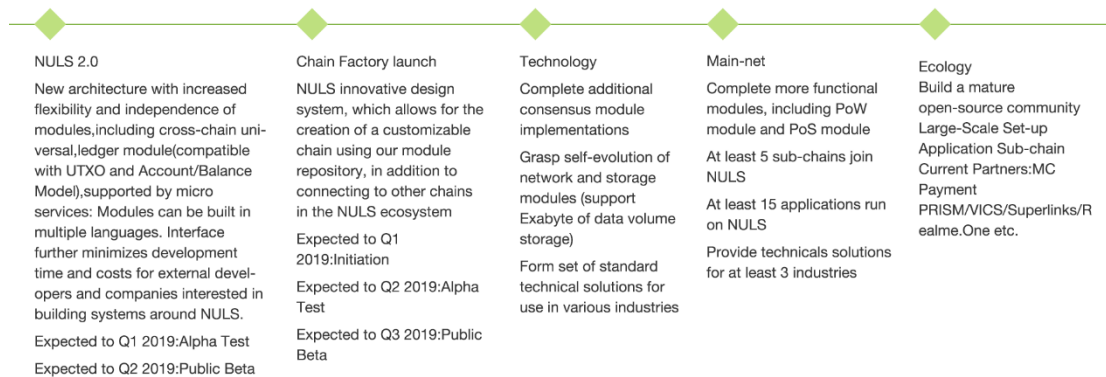
NULS has set up the Community Foundation with 20 million NULS that will be used to support excellent projects and reward contributors in the NULS ecosystem. The NULS Community Foundation is registered in Singapore (NULS FOUNDATION PTE. LTD. 201729333G). The main goal of NULS is to promote a community-driven development platform that incentivizes innovative projects to be developed, and offers the tools to simplify and fast track the work of developers.

## 8. NULS Development Roadmap

### Roadmap-ICE



### Roadmap-WATER



### Roadmap-STEAM



## 9. Conclusion

The NULS team is aware of the current issues in the Blockchain space. NULS’ mission statement of “Making Blockchain Simpler” makes them a value-driven blockchain that fortifies its network with the plan to bridge the gap between businesses and blockchain adoption. The lack of talented blockchain developers is a barrier that will continue to exist and hinders the growth of the industry. NULS will become the solution to this problem with the goal to build an ecosystem that benefits developers, businesses and supporters of the project.