

Ontology Framework

White Paper

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Abstract

1. Ontology is an infrastructure that supports multiple trust collaboration scenarios and will continue to extend various modules and protocols based on scenarios and application scopes of applications. This Framework White Paper only describes Ontology's planning at the current stage and will be continuously updated according to the actual project process.

Through history, people have established trust from different dimensions and methods, for instances, via technology, legal system and communities etc. However, multi-source, multi-system and multi-method single-point trust collaboration will incur very high collaboration costs, hindering the depth and breadth of trust collaboration. Although internet technology changes rapidly, but the pain points of trust still exist today, such as trusted source decentralization, data fragmentation, lack of individual roles, identity verification and difficulty in identifying false information. During the collaboration process of society governance, economic collaboration, and financial service, there is a large amount of cost incurred by “trust” every day.

The decentralised and tamper-proof blockchain has built technology trust for specific scenarios from a certain mechanism. However, to integrate with more business scenarios in real world requires more integration mechanisms. How to construct a trust mechanism that combines diversified trust and integrative applications becomes the pursuit for the new “trust” infrastructure.

Ontology is committed to building a systematic, streamlined, and integrated trust ecosystem. Ontology will serve as the infrastructure and connector for trust ecosystem, providing a complete blockchain infrastructure for the effective collaboration of trust sources, the interconnection of data sources, and the distribution of various types of distributed application services.¹

This White Paper focuses on the overall framework of the Ontology project.

Table of Contents

1. Overview	1
2. Glossary	7
3. Ontology Ecosystem Overview	11
4. Ontology Governance Model	14
5. Ontology Economic Model.....	16
6. Ontology Technology Architecture	17
7. Postscript.....	18
Contact Us	19

1. Overview

Ontology is an integrated multi-chain and multi-system framework composed of different industries and regions that passes through Ontology's protocols to allow mapping between different chains and traditional information systems. For this reason, Ontology is also being referred to as “Ontology Chain Group” or “Ontology Chain Network”, that is, a connector between blockchains.

The logic architecture is as follows.

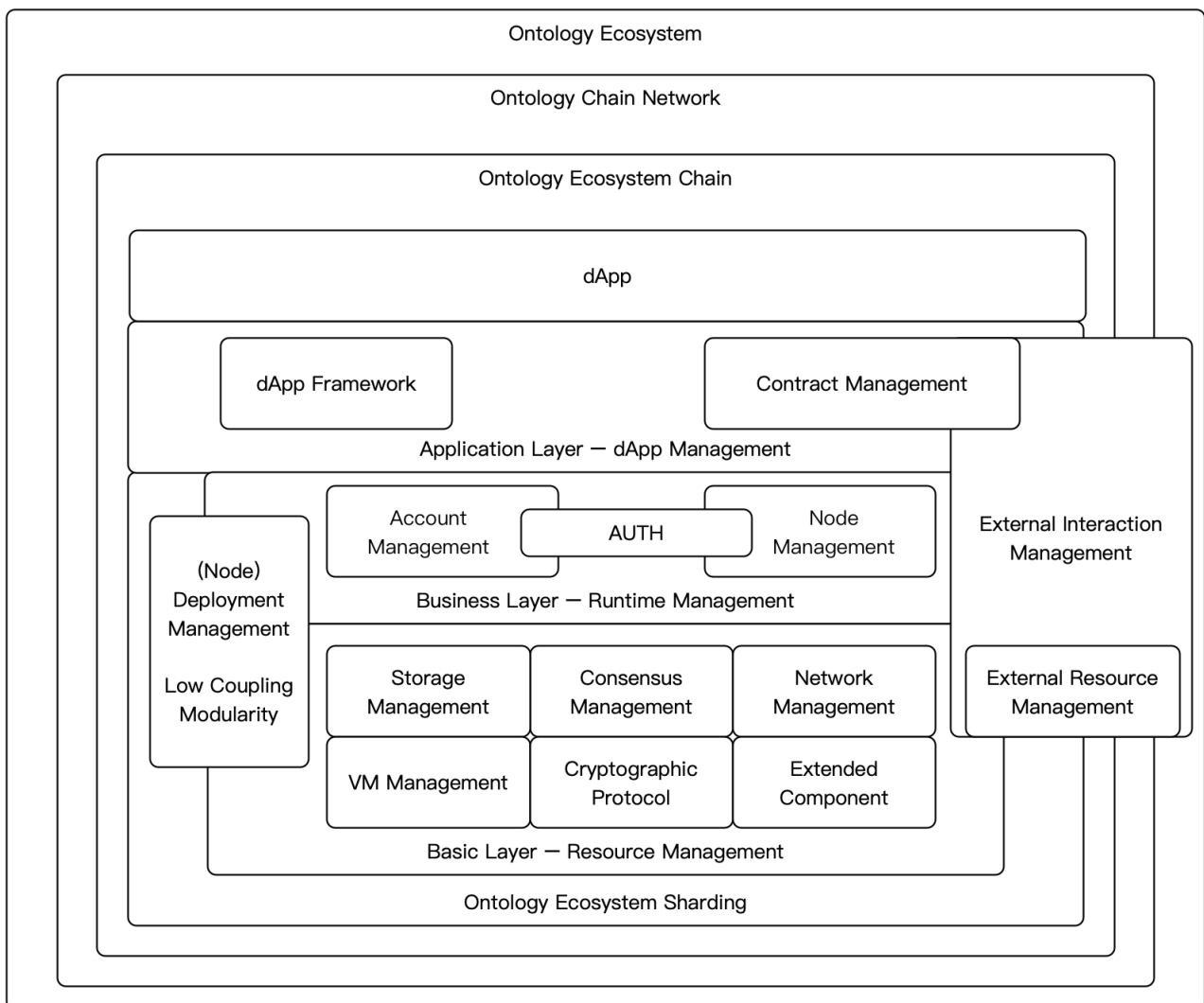


Figure: Ontology Logic Framework

- The Ontology ecosystem is based on the Ontology multi-chain network, which can integrate external resources;
- The multi-chain network is composed of Ontology ecosystem chains. Each type of governance model is only applicable to one chain. Depending on the needs of different governance models, ecosystem chain can include business chains and function chains. The Ontology ecosystem chain supports cross-chain interaction;
- The ecosystem chain supports multi-ecosystem sharding, which can provide a scaling solution. It can achieve scalability from three dimensions: state sharding, transaction sharding, and network sharding. Cross-shard communication is also supported;
- Decentralized applications are deployed on the Ontology blockchain and shards;
- The application layer of Ontology's infrastructure supports decentralized applications. The Ontology application layer framework can also manage decentralized applications. Ontology's application layer trust framework can provide trusted management for decentralized applications;
- Blockchain supports operation of businesses. The business layer of Ontology's infrastructure ensures the execution of decentralized applications;
- The Ontology underlying layer manages the resources on the Ontology ecosystem chain.
- The technology architecture is as follows.

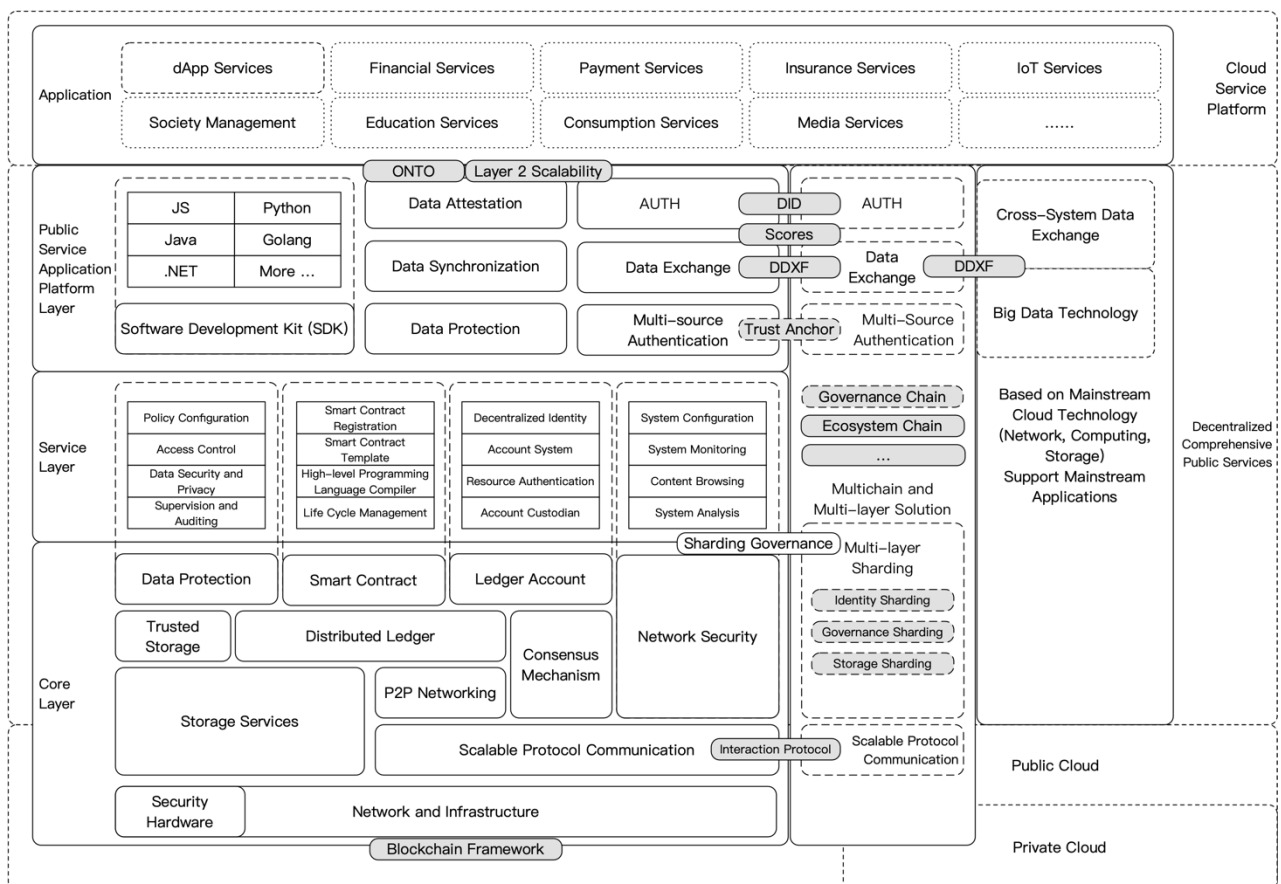


Figure: Ontology Technology Framework

In terms of technology, as a provider of blockchain infrastructure, Ontology offers a full set of solutions from blockchain construction to end user applications, including multi-chain solutions for the blockchain core layer, service layer, and application platform layer, which support cross-chain interaction and the Ontology trust ecosystem.

- **Ontology core layer.** As the infrastructure of the Ontology ecosystem, this layer provides a complete distributed ledger system, which includes core distributed ledger, smart contract system, and security system. The decentralized, jointly-maintained, and tamper-proof distributed ledger technology is the key for Ontology to achieve distributed multi-party trust. The distributed ledger includes building consensus, smart contract system, and providing consensus, storage and smart contract support for

distributed trust framework and upper layer applications. It also supports homogeneous cross-chain solution.

- Ontology service layer. Based on the Ontology core layer, Ontology provides modular service layer tools to enable scalability and flexibility of the whole architecture.
- Ontology application layer. It provides Ontology with an application platform based on identity and data asset in the upper layer; enabling a solution for information assetization and asset transaction and building Ontology's public service platform. It also supports cross-chain call. The application layer also supports cross-chain solution for heterogeneous chains.
- Ontology multi-chain and multi-layer solution. Blockchain, especially public chains, needs to take into account both the design of economic model and governance model, whereas a single chain only needs one type of governance model. To meet the requirements of governance in different businesses in different regions, Ontology provides a multi-chain solution. In the meantime, the implementation of blockchain needs to find a balance amongst scalability, performance and security, and to fulfill different businesses' requirements for performance and security. For the infrastructure needs of different businesses, Ontology provides the multi-layer sharding solution. Through the multi-chain and multi-layer solution, Ontology builds a better value ecosystem blockchain infrastructure catering for different performance and business needs.

Ontology provides highly-efficient, trusted, and flexible infrastructure. The key is to build a trusted ecosystem. The design of Ontology's multi-chain and multi-layer hybrid application is to serve Ontology's trusted application ecosystem. Blockchain, especially the public chain service, is a decentralized "resource leasing mechanism" system which serves blockchain applications. Therefore, Ontology's infrastructure as a "trusted" cloud will continuously provide service for the Ontology ecosystem.

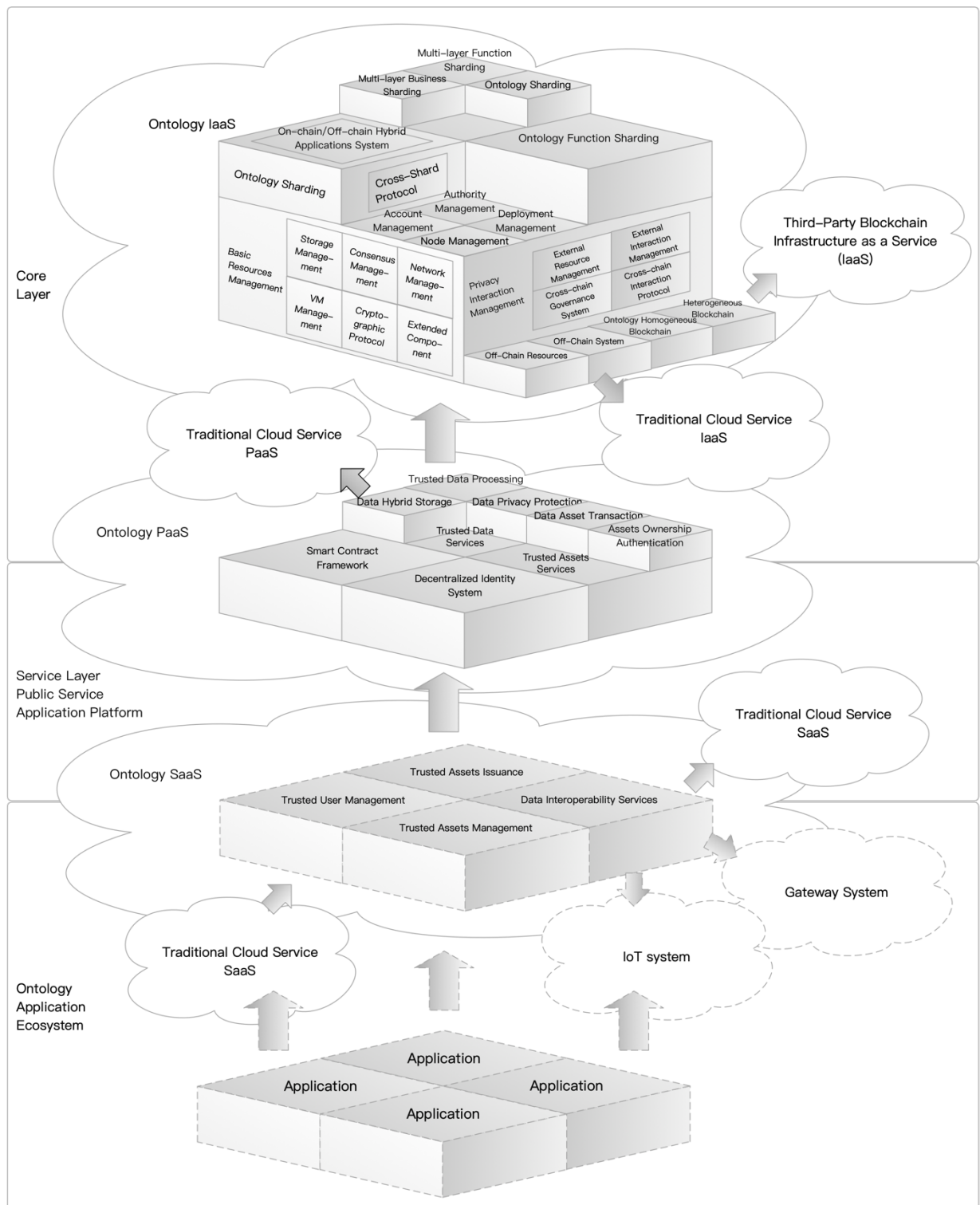


Figure: Ontology Services Framework

In the future, Ontology will also work with developer communities and business partners to add more functional modules to promote the development of the Ontology ecosystem.

2. Glossary

Ontology Chain Group

Also known as the “Ontology Chain Network”, it is formed by chains of entities based in different industries and regions, together they constitute the Ontology system. Each chain uses a separate distributed ledger and collaborates through interactive protocols.

Ontology Distributed Ledger

One or more core public service chains built by Ontology’s distributed ledger or blockchain framework, providing distributed ledger and smart contract system support to all type of services on Ontology.

Distributed Consistent Ledger

An incrementally modified data storage structure, maintained by nodes in a decentralized peer-to-peer network, featuring open data and tamper-proof historical data and providing trusted storage and smart contract support for Ontology.

Consensus

Data written into the ledger by ledger nodes according to specific protocols to ensure ledger consistency.

Smart Contract

Executable codes recorded in the ledger that is executed by the smart contract engine running on ledgers nodes. The input and output of each execution can be recorded on the ledger.

Entity

Individuals who interact with others and are identified by ONT ID on Ontology.

ONT ID

ONT ID is a decentralized distributed identification protocol for identifying people, assets, things, and affairs. It is decentralized, easy to use, and can achieve self-management and privacy protection.

Distributed Trust Framework

The core logic layers that Ontology implements distributed trust. It mainly includes distributed identity identification protocol, distributed trusted model, and distributed trust delivery system.

Trust Anchor

An entity that has been entrusted to conduct verification, acting as a source for trust delivery chains and providing basic identity authentication services.

Ontology Function Chain

Blockchains that provide certain function in the Ontology chain group, such as trusted execution environment (TEE).

Ontology Ecosystem Chain

Blockchain projects that use different governance model and participate in the Ontology ecosystem are collectively referred to as the Ontology Ecosystem Chain.

Ontology Governance Chain

The blockchain that is responsible for the overall governance, which is the Ontology main chain.

Cross-Chain

The blockchain technology that allows information and data to flow from one chain to another, and more often it's the blockchain technology that allows interaction and exchange of assets from one chain to another.

Homogeneous Blockchain

Blockchain network that runs the same blockchain protocol.

Heterogeneous Blockchain

Blockchain network that runs different blockchain protocols.

Network Node Operator

Ontology ecosystem participants who participate in the Ontology network node operation.

Synchronization Node

An Ontology ecosystem node that provides block synchronization and transaction request forwarding services in the Ontology network. Ontology synchronization nodes do not require staking.

Candidate Node

The network node operator who joins the Ontology ecosystem node by staking.

Consensus Node

The Ontology ecosystem node that is responsible for the consensus block in the Ontology network. All consensus nodes are from Ontology candidate nodes and change with the switch of Ontology consensus round.

PoS

Proof of Stake. In a blockchain network based on the PoS consensus, all nodes that become “verifiers” are able to produce (or publish) blocks, the probability of which depends on the “stake” they have.

P2P

Peer-to-Peer network, a distributed application architecture that distributes tasks and workloads among peers, is a form of

networking or network type formed by the peer-to-peer computing model at the application layer.

Sharding

Adopting the “divide and rule” approach, it divides the transaction and state of the current blockchain network, thereby enhancing the blockchain to increase the concurrency of transaction processing and verification, thus achieving blockchain scalability.

Trusted Execution Environment

An isolated, secure execution environment that guarantees the privacy and integrity of internal code and data.

Identity Authentication

The process of verifying the identity of the operator. Common authentication methods include passwords, claim certificates, and biometrics etc.

1.

3. Ontology Ecosystem Overview

The Ontology ecosystem uses the Ontology chain network as carrier.

- The Ontology function chain provides basic trusted cloud service.
- The Ontology ecosystem chain provides various on-chain business services.
- Ontology's identity solution can identify real entities like people, assets, things, and affairs, thus supporting one-stop trusted application access.
- Ontology's data assetization solution and distributed data exchange framework enable business value interaction, exchange, and sharing.

The Ontology chain network is achieved through the Ontology chain solution.

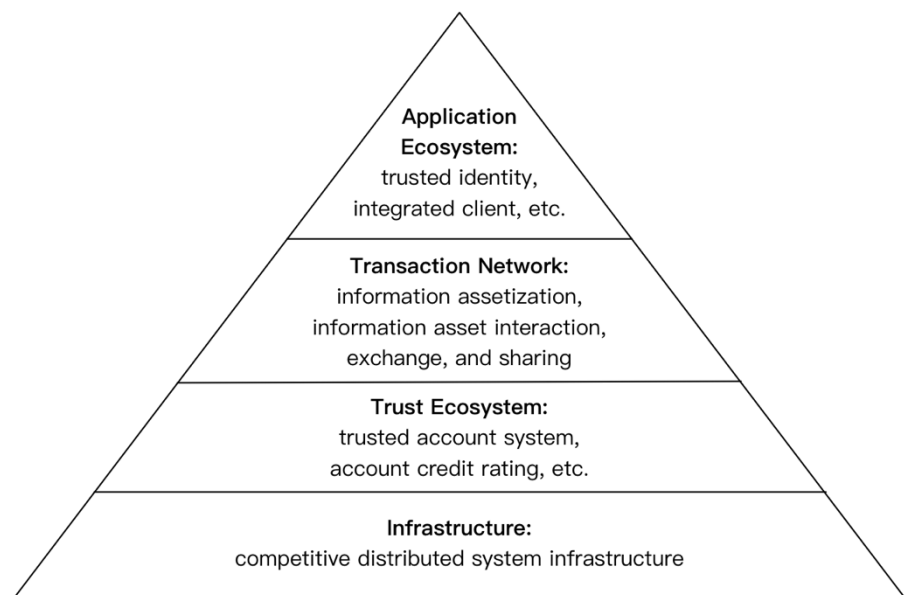


Figure: Ontology Ecosystem Structure

- Underlying layer: The Ontology infrastructure. It provides the decentralized infrastructure under blockchain technology framework;
- Trust layer: The Ontology trust ecosystem middleware. Based on identity system, it provides trusted account system and covers account credit ratings and other modules, providing infrastructure for upper layer application;
- Transaction layer: The Ontology value network middleware. Based on the trust layer, it provides high value business service function modules, including information assetization and information asset exchange, sharing, as well as complex interaction services;
- Application layer: a trusted internet of value application ecosystem. Based on transaction layer function modules, it can provide various on-chain businesses, including trusted search services, integrated clients and other upper layer application tools;
- Ecosystem interaction. It uses cross-chain technology to further achieve the interaction amongst infrastructure, trust, transaction, and application layers in the Ontology ecosystem.

The Ontology ecosystem is an open ecosystem. Ontology's chain network structure supports the participation of different ecosystem chains. That's why the Ontology chain solution needs to take account of both the governance model and economic model, and select consensus based on the ecosystem chain's group network. In other words, the design of different ecosystem chains needs to meet the requirements of the governance model and take into account the economic model at the same time. In this way, the chain can provide revenue for every ecosystem service provider, which ensures the healthy development of the Ontology ecosystem.

The Ontology chain ecosystem has the following features:

- Comprehensive infrastructure support. This includes chain network architecture, a consensus that works with the governance

model, information assetization solution and cross-chain information exchange solution;

- Support complex business ecosystem, including the following services:
 - Performance optimization based on business characteristics and customizable consensus;
 - Scalable basic function chains, for example, storage service function chain;
 - Business-based ecosystem chain, which uses related blockchain service to build business applications.

4. Ontology Governance Model

Ontology's governance focuses on creating an open governance framework, on which the governance of the ecosystem chains and function chains relies. Ontology's governance model also evolves based on this framework.

Ontology's ecosystem governance includes the governance between chains and the governance of Ontology's in-chain shards, which is supported by the governance of the ecosystem chains.

The governance decision making process between chains in the ecosystem is also a consensus process. It can reuse the in-chain governance framework or use traditional consensus tool to achieve goals. This White Paper mainly introduces Ontology's in-chain governance framework.

The core of governance falls on governance regulation making and execution. The Ontology governance framework includes three roles, two processes and one assumption:

- One assumption: Most of the operators of the Ontology chain's network nodes are rational (within consensus algorithm fault-tolerance), these operators' goal is economic gains;
- Three roles: Regulation making, execution and supervision. Regulation makers formulate the regulations, executors enforce the regulations, and supervisors oversee the process of regulation making and execution;
- Two processes: Regulation making and execution process:
 - Governance regulation making will be improved gradually. Regulation makers first draft the regulations, then supervisors review and vote to approve them;
 - The execution process on the blockchain is carried out by executors and overseen by supervisors. Economic incentives should be provided during the execution process. For any mistakes found in the execution process,

supervisors should provide proof and impose economic punishment according to the regulations. During the execution process,

- Supervisors form a supervision network. Supervisors receive few economic incentives as their cost is low;
- Executors form an execution network. Executors receive more economic incentives as their costs are high;
- There will be a channel for promoting a supervisor to an executor. If a supervisor makes enough contribution, then they can join in the execution network. The scale of the execution network is decided by regulations. Executors who lost in the cost competition will be downgraded to the supervision network. There is a competing, symbiotic relationship between executors and supervisors.

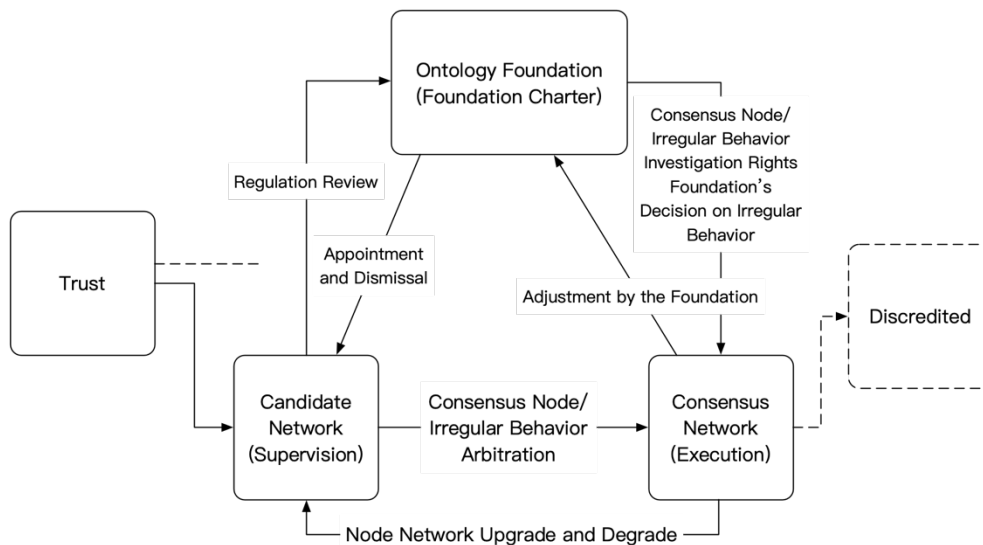


Figure: Ontology Governance Model

Within the Ontology chain network system, one node operator can operate nodes on different chains. A node operator in a single ecosystem chain can only operate one node.

5. Ontology Economic Model

The Ontology ecosystem allows different ecosystem chains to have different economic models. It supports various economic models. Services on the ecosystem chains are divided into on-chain businesses and blockchain basic services.

Ontology adopts a dual-token design to accommodate the governance framework of the chain network. Chain network basic services use an uniform token. Each ecosystem chain can have their own upper layer governance token. For ecosystem chains that adopt PoS consensus algorithm, they can also have a PoS-based staking token design. Ontology's dual-token design can meet the needs of a multi-chain ecosystem.

6. Ontology Technology Architecture

The Ontology ecosystem is supported by the Ontology infrastructure, which is achieved through the Ontology technology framework.

The Ontology technology framework fulfills the needs of the ecosystem governance and economic model. It can be customized according to the needs of different ecosystem chains' group network and provide trusted application development framework on-chain.

The Ontology technology framework is based on Ontology's multi-chain and multi-layer technology framework and provides trust for applications. The framework provides a data assetization solution to the generation, processing, and transmission of valuable information. Ontology's technical solution enables traceability, ownership authentication, and exchange of valuable information. In a word, the Ontology technology framework provides a path to realize the Internet of value.

7. Postscript

This White Paper provides framework support for the Ontology project. Ontology is committed to building an open, collaborative, and innovative ecosystem. Welcome to the Ontology family and let us make Ontology better.

Contact Us

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