ThemisChain Whitepaper

Next Generation Event Forecasting Ecosystem

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Abstract

Based on the token economy and platform ecosystem, this article applies the blockchain technology to the traditional forecasting industry in order to solve existing problems, such as non-transparency of information, insecurity of information and funds, and high amounts of commission paid, thereby providing global participants a forecasting and verification ecosystem that is fair, equitable, anonymous, secure, and allows for easy payment methods.

Themis Chain proposes a brand new and realizable event prediction market ecological chain. The whole ecosystem is centered on smart contracts and a self-owned chain—the Themis Chain, creating a distributed platform for users, platforms, partners and developers to participate in. Through a sound operating and incentive system, Themis Chain connects both upstream and downstream to create a closed-loop forecasting ecosystem. The forecasting ecosystem adopts a dual-Token design to promote value flow, and transmit and stimulates the value among different business modules. When users forecast any target event on the Themis Chain platform, they use Tokens to purchase shares in the outcome of an event. If the forecasting is correct, they can get the corresponding Tokens as a reward.

Themis Chain has built its own voting-based decentralized oracle and multi-data source-based oracle in order to overcome limitations and restrictions of third party oracle services. It reduces the operating costs of the platform and allows for multisource, comprehensive, rich, real-time and accurate data, as well as improves the decentralized ecological infrastructure. Themis Chain mainly uses the improved LMSR model to make real-time pricing based on market transactions, bringing market operators a lower yield and greater return without compromising liquidity.

The Themis Chain Token ecosystem circulation system is composed of a decentralized forecasting platform, OTC markets, a user wallet, a decentralized standard forecasting agreement, and platform partners. Themis Chain saves the costs of numerous credit verification, decreases the operating cost of event forecasting and ensure the profits of users and platform participants, while protecting the users' fund security through distributed forecasting account books and intelligent contracts. The Themis Chain Decentralized & Standardized

Forecasting Protocol provides consensus-based rules and an open source interface, which ensures compatibility with various forecasting products, thereby providing users a reliable and high standard forecasting experience.

All Themis Chain team members come from the top 3 technology companies in the Chinese internet industry. They have many years of experience in blockchain, big data, artificial intelligence, and games, and take the leading position in artificial intelligence, deep learning, and blockchain technology development and application. In the process of promoting globalized forecasting + blockchain, the team has invited top talents from all over the world who have rich experience in technology, operations, risk control, law, and investments, in order to promote the globalization of the Themis Chain together.

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Chapter 1 Background

1.1 Background on Prediction Markets

Since ancient times, human beings have been very interested in the forecasting of future events. In the 15th century, people forecasted the Pope's successor. In the 19th century, Wall Street began to forecast the US presidential election results. In the beginning of the mid-20th century, economists began elaborating on the economic principles behind prediction markets in their dissertations.

In the 21st century, people continue not only to forecast of future events, but moreover, have begun to forecast various types of events. Such as how is the weather tomorrow? Which team will win 2018 World Cup? Will Apple's share price fall below $ 100 on January 1, 2019? People talk about similar questions and make their own forecasts every day. In the meantime, many fields have begun to introduce scientific forecasting methods, and some forecasting platforms have been launched gradually, attracting more and more companies to enter the prediction market business.

A prediction market is a platform for people to forecast future events with a definitive result. People can forecast the promising outcomes in their own thoughts and get rewards from the results. As a new forecasting tool, the accuracy of prediction markets has been proven in many fields of application.

There are three recognized advantages of prediction markets: efficient collection of diverse and discrete information; transparent and effective incentives to provide true and relevant information; and real-time updates of information to minimize the possibility of manipulation of event outcomes. These three major advantages enable prediction markets to translate the knowledge and experience contributed by the participants into effective tools for decision making. Experience has proven that the accuracy of prediction markets is often much higher than traditional forecasting tools, and has the advantages of high efficiency, measurability, continuous real-time information gathering, active participation, and information transparency.

Although prediction markets are relatively accurate, they faces some challenges as their predictions are a reflection of the participants' preferences and confidence in the event, and the participants' preferences are affected by many

factors. For example, people only care about things related to their own interests. The forecasting of general events, such as political incidents in remote areas, will not attract many participants, resulting in insufficient sample collection. Furthermore, the centralized internet products cannot truly earn the people's trust due to the lack of transparency and openness of information.

With the development of blockchain technology, the public blockchain has become a fair and decentralized trust intermediary. Information transparency, tamper-resistance and other characteristics make blockchain a perfect operating platform for prediction markets. The inherent fairness of blockchain technology enable prediction markets to operate at nearly zero-cost. The use of smart contracts gives blockchain the ability to calculate results through programmable dynamic decision-making.

It is under this backdrop that Themis Chain, a decentralized forecasting platform, comes into being. Themis Chain will establish a credible, autonomous and scalable decentralized prediction market that will bring the prediction market to the whole world and improve the effectiveness of people's decision-making.

1.2 Problems of Centralized Event Forecasting

As mentioned above, there are many problems in the current centralized event forecasting platforms, which are summarized as follows:

1.2.1 Information lacks openness and transparency

Among the main problems of centralized event forecasting platforms are lack of openness and transparency of information, technical bugs in their centralized event forecasting system, and systemic susceptibility to black-box operations on the platform, fraud, and information leakages. At the same time, owing to their nature, centralized event forecasting platforms cannot prove their innocence, thus making it difficult to establish credit and reputation mechanisms with their users.

1.2.2 Information and fund security not guaranteed

On the technical level, most client applications of internet forecasting platforms encounter the problems of misuse of encryption algorithm, and incorrect or incomplete encryption of contracts. Moreover, their ability to adequately protect users' transactional information, safeguard users' funds, prevent transactions from being tampered with, and guard against identity theft,

is questionable, thus leaving many vulnerabilities for hackers to attack and exploit their system.

As for security, given the centralized nature of traditional event forecasting platforms, funds of the participants are deposited centrally by the platform. If a platform absconds with the funds, such is seriously damaging not only to its participants, but also to the development of the event forecasting industry as a whole.

1.2.3 Centralization limits payment methods and impedes platform intelligentization

In terms of payment methods, centralized platforms often charge high commission fees due to the lack of a globally-acceptable forecasting contract or smart contract. In spite of globalization, different countries have different regulations imposing restrictions on payment, which, when compounded with systemic, political and institutional problems, severely restrict the available means of payment. Meanwhile, banks are often reluctant to accept transactions from forecasting enterprises, and classify these projects are high-risk payment and charge commissions as high as 2% - 8%, on transactions such as sports forecasting and financial forecasting.

Likewise, most centralized platforms unilaterally set all the rules and stipulations in advance; thus, users often are left with no option but to adhere to them and are at a disadvantageous position at the very onset, which retards the formation of communities around them, thereby hampering the growth and development of said platforms.

For their future development, as centralized platforms lack openness, the funds used to further enhance their functions and technologies are limited to the investments made by their technical team and technical funds they get once the platform has been established and continuously operate. In the pursuit of a high profit platform model, the investment is very limited, which results in centralized platforms not having the unlimited development potential for updates and iterations, such as API interface and data analysis, which are provided by blockchain technology.

Most of these problems are difficult to avoid or address through simple policies or algorithms, thereby requiring the application of blockchain technology in order to enhance and empower them.

1.3 Objective and Mission

1.3.1 Objective

Themis Chain's core objective is to create a decentralized forecasting platform by employing blockchain technology to provide more credible, accurate forecasts and more immediate validation of future event outcomes.

1.3.2 Mission

Themis Chain's mission is to "Link the World with Blockchain, Touch the Future with Forecasting." We will bring together many partners and develop the community strength to create the world's largest decentralized forecasting ecosystem. Themis Chain links the blockchain with the real world, allows users to express their judgment and forecasting of future events through the community, and provides decentralized and credible result verification services to users through its own oracle machine.

- **Reshape trust**

Blockchain is a distributed, decentralized public account that is irreversible and tamper resistant. Themis Chain adopts smart contracts and consensus mechanism to save the contract and data in the nodes, and builds a trustworthy, secure, neutral and autonomous decentralized forecasting platform through algorithm self-restraint.

- **Reshape forecasting ecosystem**

Themis Chain reshapes the vibrant forecasting ecosystem by integrating upstream and downstream markets and third parties in the prediction market.

- **Improve the infrastructure**

Through its own oracle services, Themis Chain consolidates multiparty, multisource data to deliver a solid, proven infrastructure service for a wide range of decentralized applications.

1.4 Themis Chain Advantages

Themis Chain builds the next generation event forecasting ecosystem. Its similarities and differences from the existing distributed prediction market are as follows.

Characteristics	Themis	Delphy	Gnosis	Augur
Complete forecasting ecological closure	√	×	×	×
Self-owned distributed oracle machine service	√	×	×	×
Multiple pricing models	√	×	×	×
Dual-token mode	√	×	√	×
Embedded forecasting services	√	×	×	×
Mobile apps are blockchain nodes	√	√	×	×
Instant clearing	√	√	√	×
Expandability	√	√	√	×
Applied ecosystem	√	√	√	×
Cross-platform compatibility standard	√	√	√	×
Market mechanism based on preference	√	√	×	×
Event filter	√	√	×	×

Advantages of the Themis Chain:

(1) Complete forecasting ecological closure

Themis Chain offers an improved operating and incentive system by connecting the upstream and downstream of the forecasting ecosystem, thereby building a complete and closed-loop forecasting ecological closure.

A complete operating system. Themis Chain links upstream data service providers and forecasting algorithm providers to capture all forecasting-related data and forecasting algorithms. At the same time, it opens ports to all the developers interested in the forecasting ecosystem from the downstream, allowing them to settle on the platform. In addition, Themis Chain will feed back to the entire ecosystem through objective data analysis and forecasting results based on the user community's wisdom.

A complete incentive system. Themis Chain has different incentives for platform forecasting participants. For platform applications developers, the Themis Labs incubation platform and Themis Future eco-fund provide content and financial support for their growth. Themis Chain will give Token incentives to

data providers, forecasting algorithm providers and users. (See 3.3 Themis Chain Forecasting Ecosystem below.)

(2) Self-owned distributed oracle machine service

Themis Chain platform built its own voting-based decentralized oracle and multisource based oracle without the need for third party access, thereby avoiding the limitations of third party oracle services.

Compared to third party oracle services, the self-owned oracle offers cheaper prices, and, moreover, can better guarantee that data is multi-source, comprehensive, rich, real-time and accurate. Themis Chain is a platform that can also provide oracle machine services to third party decentralized applications.

The oracle provides three forecasting observation results, namely: community crowdsourced forecasting, third party provided projection, and combinations of crowdsourced and third party forecasts.

This model reduces the operating costs of the platform while keeping the forecasting decentralized, thereby ensuring the effect and object of the forecasting result and the good experience of participants. (See 2.3 Themis Chain Oracle Machine below.)

(3) Multiple pricing models

In addition to the improved LMSR model designed by Abraham Othman and David M. Pennock, Themis Chain also encourages communities to offer multiple pricing models. (See 2.4 Themis Chain Pricing Principle below)

(4) Dual token mode

Themis Chain is one of the few platforms on the market that uses a dual token model.

The first is the THM Token, which is mainly used for circulation on the exchange. It is also used to reward partners who support the Themis Chain eco-platform. The second is the THC Token, which is mainly used to participate in the abundant events forecasting on the platform and is anchored on legal currency.

With THM Tokens, users can exchange THC Tokens within the platform or get THC Tokens through the OTC market. Such a model not only promotes the development of the platform ecosystem, but also ensures the stability of the user access channel as well as the currency prices, giving users the best forecasting experience and encourages the community to actively participate and develop. (See 3.1 Themis Chain Dual Token Model below)

(5) Embedded forecasting services

Themis Chain offers embedded forecasting services, which provide forecasting content to instant messaging tools and other blockchain applications, which help increase Themis Chain's user base.

(6) Covers the mobile platform

With blockchain nodes based on the mobile scene, iOS & Android mobile applications will be launched simultaneously with the Themis Chain platform to meet the needs of mobile users to the maximum.

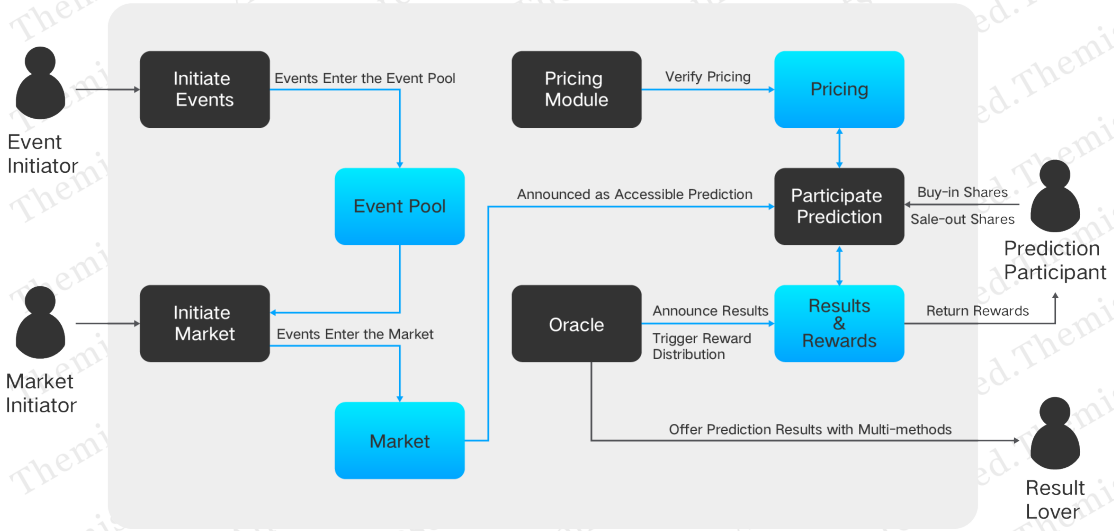
Chapter 2 Themis Chain Mechanism

2.1 Introduction

In essence, Themis Chain is a decentralized forecasting platform that uses crowdsourced wisdom to produce forecasts that are closer to the resulting future outcomes. At the same time, Themis Chain is a platform that can provide oracle machine services for third party decentralized applications. Through its own oracle machine, data off the chain can be uploaded to ensure immediate result verification.

2.2 Themis Chain Platform Event Flow

The figure below illustrates the crowdsourced forecasting event flow of the Themis Chain platform:



- Event and market initiation

On the Themis Chain platform, forecasting initiators can create forecastings of future events based on their interests, and set the oracle that issues the results of the events. Initiated events are placed into the Event Pool for forecasting initiators and others to further initiate a market.

Event initiators and people who are interested in initiating a market can pick from the event pool an event that they are interested in or otherwise consider to be profitable. Then they enter a maximum security deposit Token (the maximum stop-loss amount) to initiate a market. The security deposit Token will be locked

until the oracle outputs and delivers the event results.

- Pricing and Trading

Themis Chain mainly adopts the improved LMSR model (for details, see 2.4 Themis Chain Pricing Theory) and real-time prices based on market transactions. As forecasting events are bought and sold, the price of the event will be changed by the pricing model immediately.

In this improved LMSR model:

a) pricing is the result of crowdsourced forecasting (equal in price and probability); and

b) the maximum loss of the event initiator will not exceed the deposit for initiating the event.

Themis Chain supports not only an improved LMSR model, but also other community-published pricing models for users to choose from.

- Results and rewards

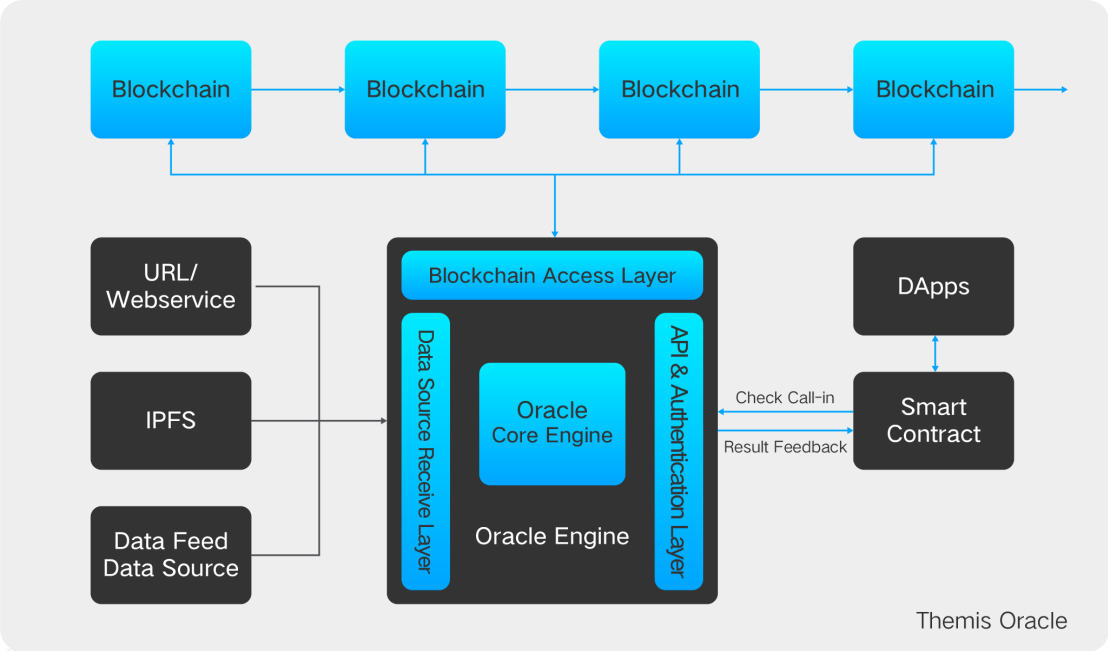
Themis Chain uses a self-built oracle service for the announcement of event results and the distribution of Tokens. When the result of a given event has been determined by the oracle, the oracle service announces the result of the event on the Themis Chain and triggers the delivery of the Token to the correct forecasters.

- Observation of forecasting results

Those who are interested in forecasting results can view them in two ways: (1) view the forecasting results through the Themis Chain product interface; or (2) use smart contracts to obtain results from the Themis Oracle Machine.

2.3 Themis Chain Oracle Machine

The Themis Oracle Machine is an important part of the Themis Chain. The infrastructure diagram is as follows:



The Themis Oracle has four levels of architecture: (1) the *API and authentication access layer*, responsible for interfacing with applications based on smart contracts in the blockchain; (2) the *blockchain access layer*, which monitors the Themis manifest data on the chain and is responsible for writing Themis query results in the chain; (3) the *data source receiving layer*, responsible for docking a variety of data sources and receiving various data feed; and (4) the *oracle core engine*, responsible for triggering the efficient operation of said three levels.

The Themis Oracle Forecasting Machine serves two main functions: (1) provide the true result of the events that have occurred, and drive Themis Chain smart contracts to distribute Tokens to the correct forecasters; and (2) provide users with forecasting analysis for future events from multiple data sources by introducing more forecastings by data partners.

The Themis Oracle can output three kinds of forecasting results:

1) Community crowdsourced forecasting

The probability that the improved LMSR algorithm forecasts the pricing is the propensity forecasting of community crowdsourcing. To a certain extent, this analysis represents the possibility of the forecasting results and has strong reference value.

2) Third party data source forecasting

The Themis Chain platform collaborates with data partners to help write their data to the oracle, allowing users to get more references on future results by viewing the forecasting results from third party data sources. Currently, the Themis

Chain platform has forged a strategic cooperation with a well-known sports big data analysis company. The Themis Oracle Forecasting Machine will provide the company's sports big data forecasting results, and, in the future, users can view the data forecasting and pay Tokens on the Themis Chain platform.

3) The combination of the above two forecastings

Themis Oracle also integrates community forecasting and third party data source forecasting results through intelligent algorithms to synthesize analyses and opinions for the users' reference.

2.4 Themis Chain Pricing Theory

Most prediction markets use the LMSR (Logarithmic Market Scoring Rule) to price every result on the market in real-time based on market transactions. LMSR is an excellent automated market maker model, which belongs to the sequential trading model. LMSR has been used by many companies, such as Microsoft and Yahoo, to predict the market. However, in the LMSR model, the size of liquidity is a priori parameter, the value of which is very difficult to set. Too little liquidity causes prices to fluctuate violently after each transaction, while excessive liquidity can make prices difficult to change. Themis Chain recommends an improved LMSR model designed by Abraham Othman and David M. Pennock. In contrast to the LMSR model, the improved LMSR model used by Themis Chain allows market operators to pay less without compromising liquidity. At the same time, Themis Chain platform also encourages communities to provide other pricing models for users to choose from.

2.4.1 LMSR pricing model

The cost function used by LMSR is:

$$C(q) = b \log \sum_i e^{q_i/b}$$

Here b is a constant and the pricing mechanism is:

$$p_i(q) = \frac{e^{q_i/b}}{\sum_j e^{q_i/b}}$$

LMSR is the pricing mechanism that is widely used in market forecasting currently; however, it still has the potential to cause large losses to users and bring high costs to forecasting initiators.

2.4.2 Improved algorithm cost function based on LMSR

Themis Chain has been optimized based on LMSR in terms of liquidity, cost,

etc., and uses the optimized LMSR-based Themis Chain prediction market pricing mechanism.

With q_i representing the amount of money (i.e. platform security deposit) that the forecasting initiator must pay under the outcome i, the improved cost function based on the classical LMSR algorithm can be expressed as:

$$C(\mathbf{q}) = b(\mathbf{q})\ log \sum_i e^{q_i/b(\mathbf{q})}$$

In the above formula, $b(q) = b$ is a fixed coefficient set according to the model of the classical LMSR algorithm. Our model changes it to a variable that changes with the event cluster and is expressed as:

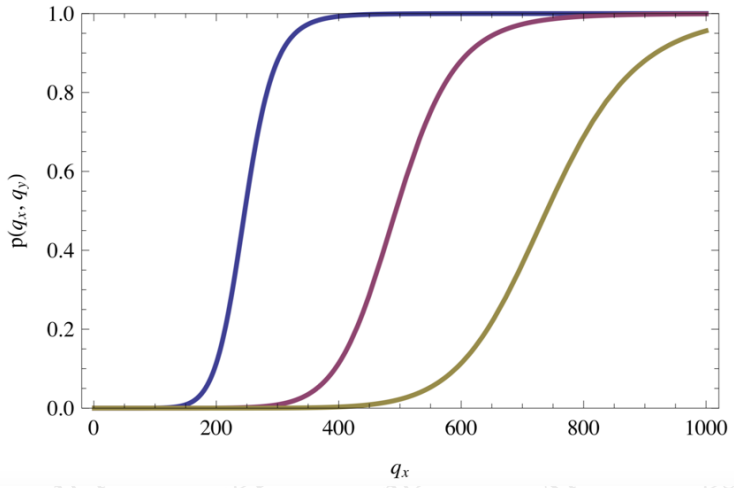
$$b(\mathbf{q}) = \alpha \sum_i q_i$$

where $\alpha > 0$ is a constant, and the effective area of q_i is the n-dimensional vector set of all non-negative vectors, except the origin.

2.4.3 LMSR-based improved algorithm price formula

In the process of platform pricing, the price corresponding to the state i is produced by the partial derivative of the cost function. In the function $b(q)$, the price formula becomes:

$$p_i(\mathrm{q}) = \alpha \log(\sum_j e^{q_j/b(\mathrm{q})}) + \frac{\sum_j q_j e^{q_i/b(\mathrm{q})} - \sum_j q_j e^{q_j/b(\mathrm{q})}}{\sum_j q_j \sum_j e^{q_j/b(\mathrm{q})}}$$



The graph shows the sensitivity of these prices to liquidity in two complementary events. As the number of complementary event shares increases, the market's sensitivity to fixed-size investment declines. Among them, the corresponding data is $\alpha = 0.05$, the three curves respectively illustrate the relationship between q_x and p_x where $q_y = 250, 500, 750$. Where q_y is increasing, the

sensitivity of platform pricing to liquidity decreases obviously.

2.4.4 Limited losses in improved LMSR-based algorithm

All pricing rules have as a concern whether a forecast initiator's loss is finite. In fact, in the worst case, there exists the possibility of loss in any pricing rule; however, some pricing rules may have the possibility incurring "infinite loss", which forecasting initiators do not want. However, the mathematical conditions for limiting the amount of loss in pricing rules to a finite amount are more stringent than exclusion and monotony.

Here we define the initial state of the market as $\mathbf{q^0}$, while $\mathbf{q}$ represents any state of the market. $C(\cdot)$ is a cost function, and q_i is the amount that must be paid ultimately after a platform event i occurs. The improved algorithm based on LMSR allows for a finite amount of loss, and the upper limit of loss $C(\mathbf{q^0})$ is proved as follows:

The loss of forecasting initiator occurs in line with the incident i. The loss is

$$C(\mathbf{q})-q_i-C(\mathbf{q^0})$$

of which $q_i-C(\mathbf{q})$ is non-positive, and where q_i increases, its limit is zero.

$$q_i=b(\mathbf{q})\ log(e^{q_i/b(\mathbf{q})})\le b(\mathbf{q})\ log\sum_i e^{q_i/b(\mathbf{q})}=C(\mathbf{q})$$

Therefore, the forecasting initiator has a limited loss because $C(\mathbf{q^0})$ is limited. Now, in the event of any enlargement in q_i, with no loss of generality, change from $(1,1,1\cdots)$, and set:

$$b(q_i)\equiv b(q_i;1-q_i)=\alpha(q_i+n-1)$$

Then,

$$\begin{aligned}
&\lim_{q_i\to\infty} q_i-C(q_i;1-q_i)\\
&=\lim_{q_i\to\infty} q_i-b(q_i)\log(e^{\frac{q_i}{b(q_i)}}+\sum_{i\neq q_i} e^{\frac{q_i}{b(q_i)}})\\
&=\lim_{q_i\to\infty} q_i-\alpha(q_i+n-1)\log(e^{\frac{q_i}{b(q_i)}}+\sum_{i\neq q_i} e^{\frac{q_i}{b(q_i)}})\\
&=q_i-\alpha q_i\log(e^{\frac{1}{\alpha}})\\
&=0
\end{aligned}$$

Therefore, the worst-case loss of the forecasting initiator is equal to the initial cost amount $C(\mathbf{q^0})$.

And, precisely because

$$\lim_{q\to 0} b(\mathbf{q})=0$$

sets the initial market capitalization close to zero, such results in a very small loss

in the worst case scenario; however, reducing the initial vector too much is costly because

$$\lim_{q\to 0} b(\mathbf{q}) = 0$$

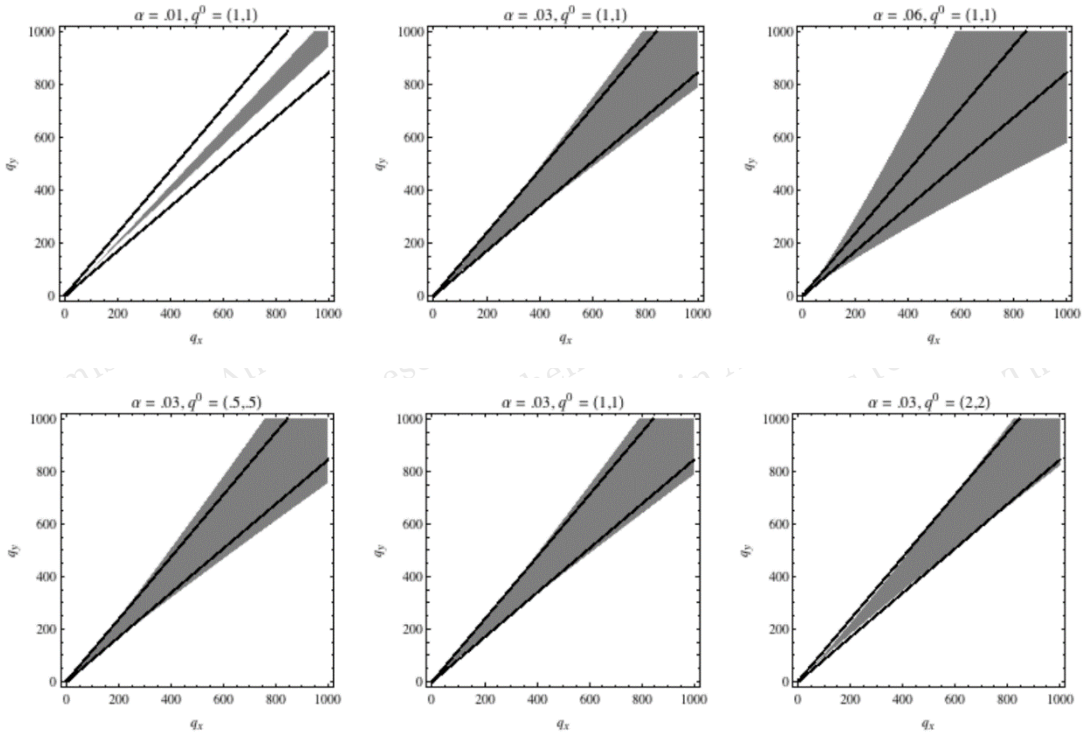
will make small votes become very sensitive and unstable in the early market.

2.4.5 LMSR-based algorithm for calculating the maximum loss of platform pricing

The initial state of the market is defined as $\mathbf{q}^0$, and $\mathbf{q}$ is any state of the market. The definition $C(\cdot)$ is a cost function, and q_i is the amount that must be paid ultimately after a platform event i occurs. The maximum forecasting initiator loss is calculated as follows:

$$\Re(\mathbf{q}) \equiv C(\mathbf{q}) - \max_i q_i - C(\mathbf{q}^0)$$

To achieve profitability, the goal of a forecasting initiator is to make $\Re(q) > 0$. The following figures show a set of various market states, with changing α values and initial vectors. While it may seem as if forecasting initiators will lose money most of the time, but, actually, there is a highly nonlinear relationship between price and quantity, and even at its worst case, a forecasting initiator can still easily make a profit.



2.4.6 Advantages of the improved LMSR-based algorithms

In summary, the improved LMSR-based algorithm has the following advantages over the classical LMSR algorithm:

- Better sensitivity to liquidity

In the classical LMSR algorithm, in order to obtain a loss close to 0 for small votes, b must be set to a coefficient close to 0, which makes the investment behavior very sensitive to small votes throughout the market. However, the improved LMSR-based algorithm is only sensitive to the initial stage, and the stability gradually increases as the investment scale increases.

- Better platform profitability

Compared with the classical LMSR algorithm, the improved LMSR-based algorithm has better control over volatility and has a smaller risk coefficient under similar benefits. As shown in the profit model graphs, i the improved LMSR-based algorithm can obtain large gains stably when the event correlation is not strong.

Chapter 3 Themis Chain Platform Ecological Structure

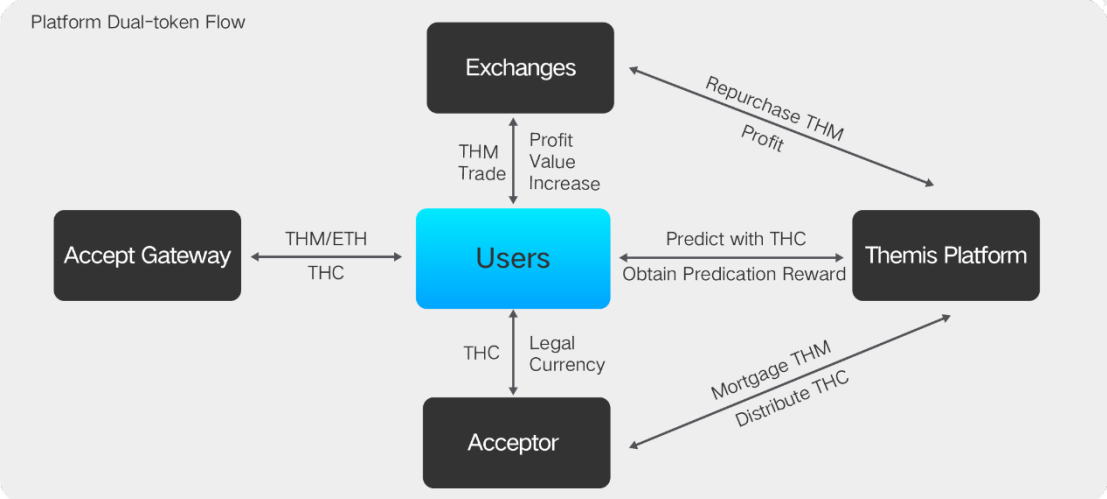
3.1 Themis Chain Dual-Token Model

3.1.1 Description and purpose

Themis Chain team issues two Tokens:

The first are THM Tokens, which are mainly used to circulate on the exchange. Holders can enjoy the financial value of their circulation on the exchange. THM Tokens are also used to reward partners who provide support for Themis Chain eco-platform, such as oracle data providers.

The second are THC Tokens, the forecasting sub-coins, which are based on Ethereum ERC20 and issued by Themis Chain. THC Tokens are mainly for participating in events forecasting on the platform. The Token is anchored on legal currency in order to ensure that the exchange rate between THC Tokens and legal currency stays constant. The Themis Chain platform launches a variety of promotions for THC Token users from time to time. Users can exchange THC Tokens with THM Tokens on the platform or get THC Tokens through OTC



markets.

The dual-Token design by Themis Chain serves as a flow medium in forecasting value ecosystem and creates a value network of forecasting rewards, Token conversion, Fiat to Token and eco-construction across business modules. This Dual-Token design not only promotes the development of the platform ecosystem, but also provides a guarantee the stability of the users' fund access

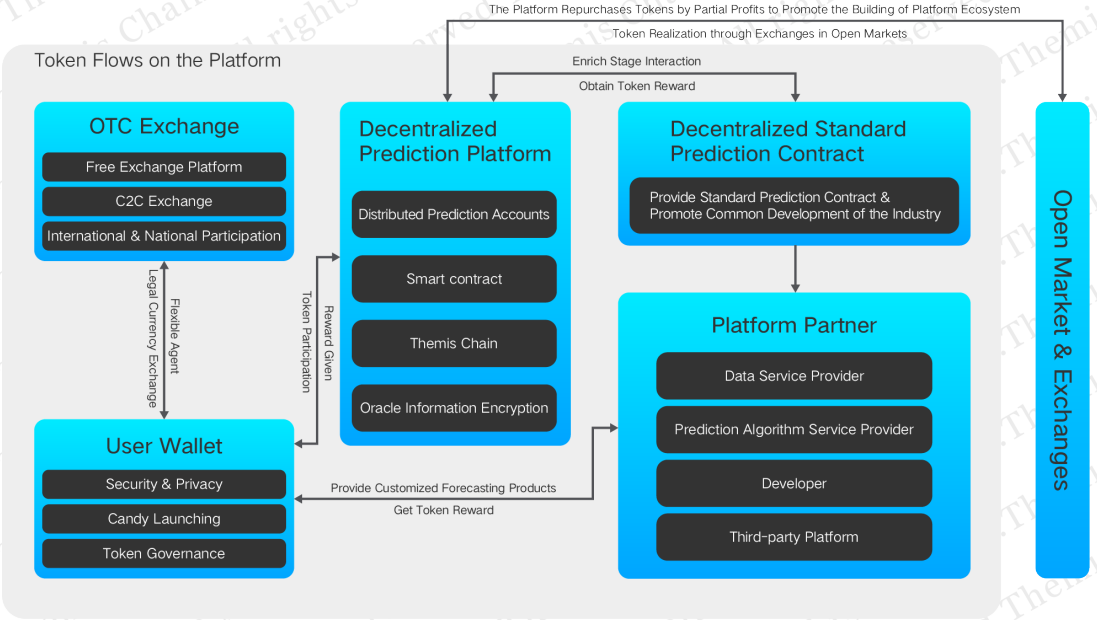
channel, thereby offering users the best forecasting experience.

3.1.2 Themis Chain Token ecosystem circulation model

Themis Chain has created a smart contract-driven, decentralized forecasting ecosystem platform that provides participants from over the world a forecasting application that is fair, equitable, anonymous, secure, and allows for easy payments.

The Themis Chain Token ecosystem circulation model consists of modules, such as a decentralized forecasting platform, OTC markets, a user wallet, a decentralized standard forecasting contract, and platform partners. The whole model is centered on smart contracts and the Themis Chain, creating a forecasting value ecosystem of users, platforms, OTC partners and forecasting industry partners.

As a completely equitable, transparent and immutable distributed system, the decentralized forecasting application built on the Themis Chain platform has solved many gaps in the current industry and has greatly enhanced efficiency and profitability.



3.1.3 Importance of the core module in the circulation system

3.1.3.1 Decentralized forecasting platform

The decentralized forecasting platform based on smart contracts and Themis Chain inherits the features and advantages of blockchain technology. The

distributed forecasting account is built on P2P network and the underlying technology of blockchain. No one can tamper with the forecast records. All forecasting results are determined through blockchain technology in order to ensure fairness and transparency. At the same time, there is no longer a need for traditional credit endorsements from centralized institutions, which saves a large amount of credit verification costs.

The withdrawal and deposit of funds in connection with forecasting activities are executed automatically by smart contracts in accordance with the defined rules, and the accounts are locked before the forecasting ends. Information of external events is collected and encrypted by the oracle from reliable data sources, and then linked to the smart contracts. Cryptocurrency and blockchain technologies make the forecasting industry more liquid and transparent, and make up for the lack of platforms and tools in the current market, and serves to guarantee the platform' s operations worldwide.

3.1.3.2 OTC market

OTC markets are an important fund channel to the platform. Through OTC markets, THC Tokens and legal currency can be exchanged either way, effectively shortening the exchange path between the legal currency and THC Tokens. Meanwhile, the OTC markets invite acceptors from the outside to facilitate the exchange between THC Token and other currencies. The acceptor needs to apply to the Themis Chain platform for a pre-qualifier, and thereafter has to mortgage a certain number of THM Tokens to the platform to obtain THC Tokens. The acceptor may earn commissions by facilitating the exchange of legal currency and THC Tokens.

3.1.3.3 User wallet

The users center provides a wallet that securely stores THM Tokens and THC Tokens, and allows users to switch between accounts and participate in forecasting using different wallet addresses. During holidays or when new prediction markets go online, the platform will also take out some profit and distribute THM candies to reward users for their support.

3.1.3.4 Decentralized standard forecasting contract

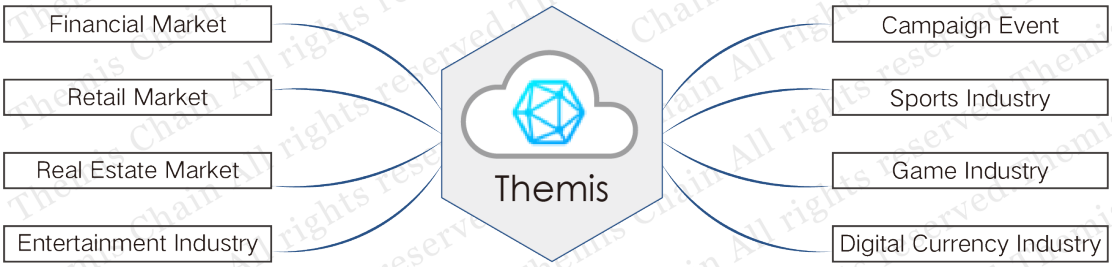
The Themis Chain Decentralized & Standardized Forecast Protocol was

designed by the Themis Chain Team based on the blockchain technology to provide consensus basis and open interfaces for forecasting behaviors and forecasting products through a variety of smart contracts, which, with its ability to support diverse forecasting products that rely on traceable real forecasting data, ensures users and developers' reasonable returns.

3.2 Themis Chain Event Forecasting Scenarios and Partners

3.2.1 Themis Chain event forecasting scenarios

Themis Chain aims to create a common event forecasting platform and forecast objective, subjective, and objective + subjective events through crowdsourced wisdom and mass data analysis. Through sophisticated pricing, storage, and result entry mechanisms, it is able to support various forecasting products. The team will also pave the way for a diverse range of forecasting products and demand-driven participants through a decentralized standard forecasting contract.



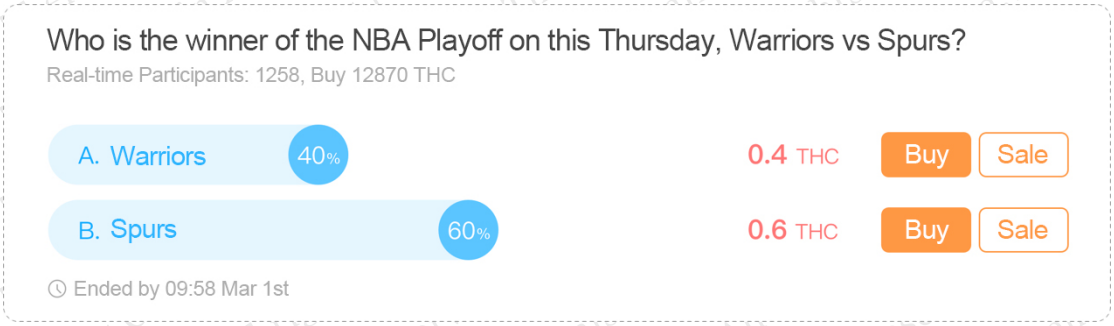
The number of participants and their subjective standpoints will largely influence the outcome of crowdsourced forecastings. When the number of participants is too small, the results are likely to skewed. Forecasting results are also inaccurate when participants' subjective standpoints affect their judgment of events. For example, in a sporting event, a team's diehard fans often make irrational forecastings based on their strong bias for their home team regardless of objective facts, thus affecting the accuracy of the final event forecasting.

Themis Chain will work with a number of data service providers and forecasting algorithm providers in forecasting scenarios where historical data can reveal reality to some degree, such as the sports industry, and scenarios based on objective events, such as the weather. Themis Chain will produce a summarized analysis of the data and provide participants with a programmatic analysis based

on historical data. It aims to help participants make their own judgment based on a more comprehensive and timely understanding of historical and practical conditions, such as in the examples that follow.

- Sports industry

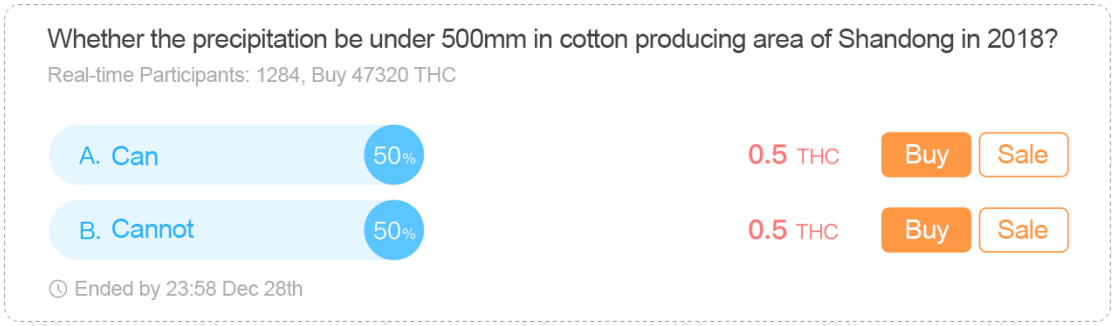
The Themis Chain prediction market has broken the black box of the traditional sports industry by providing users with more transparent and higher yield forecasting services. Compared to the traditional sports forecasting industry, the decentralized sports prediction market has the advantages of offering a lower threshold for initiation and participation, use of smart contracts, data is open to the public, and security of participants' funds. In prediction markets, sports enthusiasts can also create their favorite sporting event forecastings to meet their individual needs and increase their sense of participation.



- Insurance and hedging

Prediction markets with high liquidity are relatively more accurate in assessing the likelihood of future events. As a result, in the insurance context, Themis Chain can be used to estimate the probability of occurrence of an insured event and can be used as a model input or even replace some traditional actuarial models. For example, the World Association of Weather Risk Management believes that 20%-30% of the current global economy is directly exposed to weather risks. In this context, the weather index insurance has become the biggest hot spot in recent years. Since 2000, the annual growth rate of trade amount of weather index insurance in Japan has been above 20%. The Chicago weather derivatives have also been trading for 20 years.

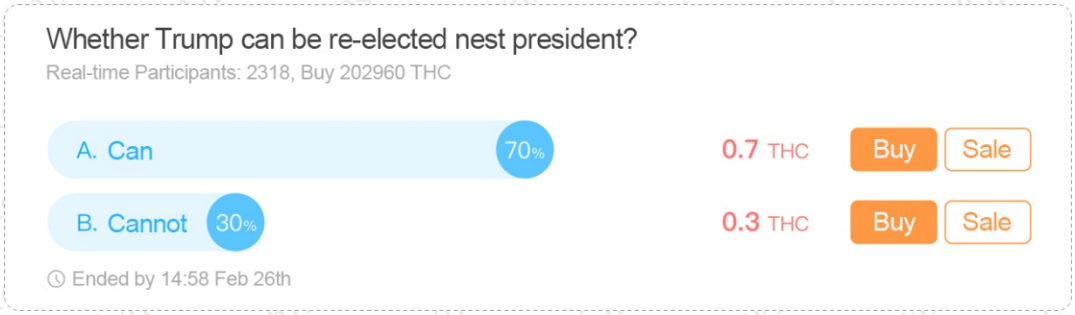
The Themis Chain prediction market is quite useful in this area. For example, for agricultural practitioners, participating in prediction markets can help them hedge against possible disaster risks and reduce economic losses.



However, the actual results of subjective event-based scenarios, such as elections, and financial and entertainment industries, are less affected by historical data. Thus, Themis Chain not only provides forecasting results from crowdsourced wisdom, but also present participants with relevant multidimensional data to enable them to make rational judgments in these scenarios. For example:

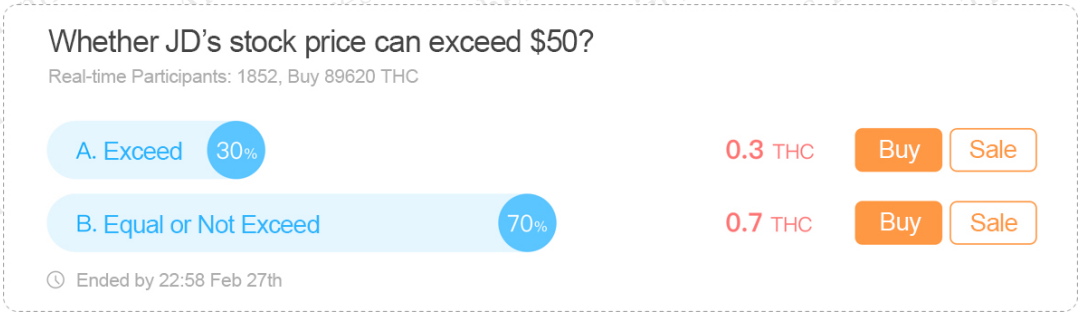
- Campaign events

The Themis Chain prediction market is widely useful in campaign events, as the popular tendencies of such events can be evaluated through forecasting. Commercial firms can use the trends of forecasts made by the public as a factor in formulating future strategies. Ordinary individuals can also adjust the ratio of their foreign exchange assets according to the result. The possibilities are endless.



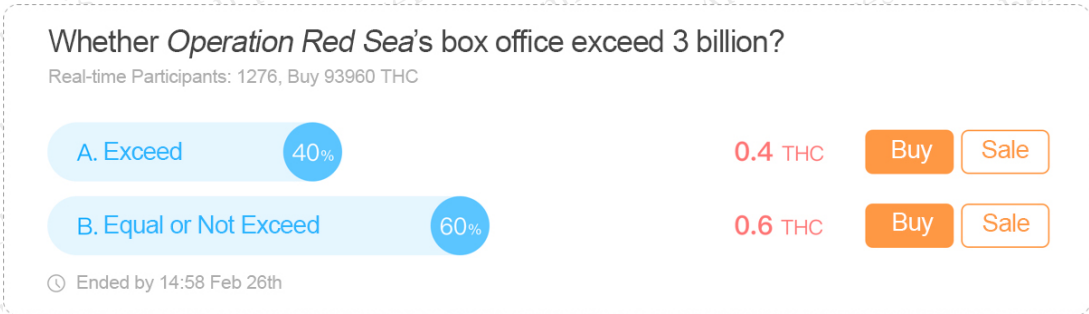
- Financial market

Themis Chain prediction markets can forecast events in traditional financial markets, enabling people to make wiser decisions through forecasting results and to obtain higher gains.



- Entertainment industry

The Themis Chain prediction market will play a wide range of roles in the entertainment industry, making it possible to forecast the ratings of major TV shows and movie box office results.



3.2.2 Themis Chain forecasting partners

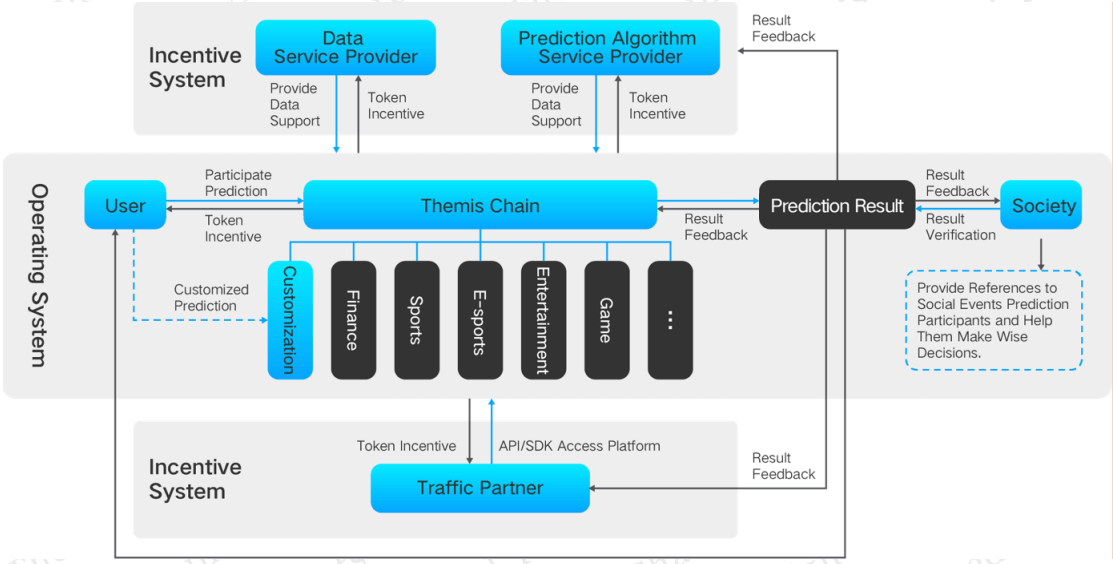
Themis Chain welcomes partners from all industries to join Themis Chain's forecasting ecosystem. The Themis Chain Ecosystem will be the gateway to the real world. The ecosystem includes diverse finance, real estate, leisure and entertainment, sports, games, digital currencies and many other forecasting scenarios.

Themis Chain recruits partners from all over the world, and has now established a strategic partnership with a well-known sports event analytics company that has extensive forecasting experience. Said company gathers top international talents in the fields of technology, operations and marketing, and continuously operates a variety of forecasting products with tens of millions of users. The company will launch forecastings on the Themis Chain platform to create a forecasting ecosystem together.

The platform also welcomes all developers interested in the Themis Chain forecasting ecosystem to create a global forecasting ecosystem.

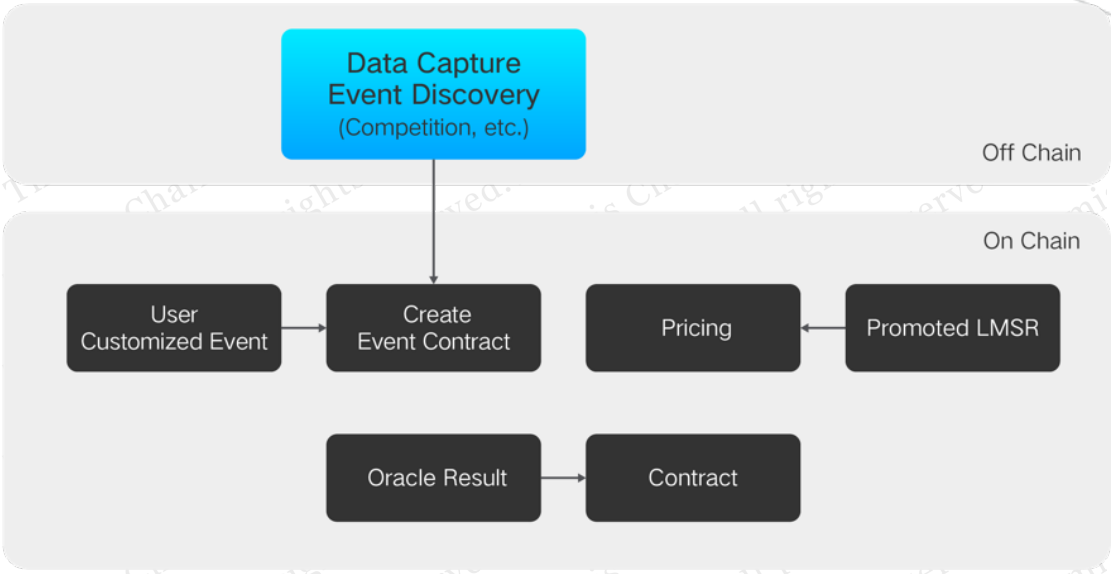
3.3 Themis Chain Forecasting Ecosystem

Themis Chain links users, data service providers, forecasting algorithm providers and application developers. It connects the upstream and downstream of the forecasting ecosystem through a complete operating and incentive system, forming a forecasting ecological closure. More diverse types of events, more accurate forecasts, and more immediate results validation allow a virtuous circle throughout the forecasting ecosystem, while Themis Chain's forecasting results also provide references for participants in social events forecasts to help them make wiser decisions.



3.3.1 Platform ecological operation system

Themis Chain links upstream data service providers and forecasting algorithm providers to capture all forecasting-related data and algorithms, and it open ports to all downstream developers who are interested in the forecasting ecosystem, allowing them to enter the platform. Themis Chain makes forecasting results by objective data analysis and user' s crowdsourced wisdom and feedback them to the entire ecosystem, perfectly creating a forecasting ecological closure.



The operation process of Themis Chain consists of three parts, namely event creation, pricing collaboration and result verification.

- Event creation

The forecasting initiators can create events on the Themis Chain platform. Through the event filter, other participants can participate in the forecasting of these events.

- Multiple pricing models

Themis Chain recommends using the improved LMSR crowdsourced forecasting algorithm to solve forecasting pricing problems. It also encourages the community to provide other pricing models for users to choose from, allowing the community to make the entire pricing process open and transparent.

- Oracle machine results validation

Themis Chain uses its own oracle machine and SWARM/IPFS to solve external trusted data entry and community-recognized issues, prompting third party applications to easily access the platform.

Taking a sports competition forecasting as an example, Themis Chain's eco-data partners will upload results to smart contracts via capture or manual entry method with the oracle. The contract automatically triggers pre-issued rules and algorithms to distribute profits, and Tokens are automatically distributed to user accounts, which users can withdraw at any time.

If users have any doubt on the oracle's results, they can, after validating the data from SWARM/IPFS, submit their feedback and complaints, and they can also modify the oracle data results peer-to-peer via the community. The distributed

community endows each user with rights, and users can exercise community rights through the nodes, and any fraudulent, illegal or malicious acts can be promptly detected and blocked. The perfect information input mechanism of the platform lays the foundation for expanding more scenarios.

3.3.2 Platform ecological incentive system

Themis Foundation will use part of its profits to continuously support the Themis Chain eco-building, offering different incentives for data providers, application developers and users. With a complete set of data entry, pricing mechanism and standardization contracts, it provides various forecasting applications to create a complete international forecasting ecosystem and continuously bring in traffic and users to the platform.

3.3.2.1 Data provider

Themis Chain will issue certain Tokens from the Token pool to stimulate data providers, which include data service providers and forecasting algorithm service providers.

- Data service providers

The platform’ s self-owned oracle service will accept the data provided by data service providers. Data service providers can provide data in a variety of ways, such as through crawling and crowdsourcing. The data is stored on the SWARM/IPFS for community supervision. If the data is accurate and not of complained by communities, data service providers can get the corresponding THM Token incentives, which will greatly increase the value of the circulation of THM.

- Forecasting algorithm service providers

The Themis Chain platform will provide improved LMSR forecasting algorithms. At the same time, users can also choose the forecasting algorithm provided by the platform's forecasting algorithm provider and pay the corresponding tokens.

3.3.2.2 Application developers

Themis Chain provides incentives for application developers through its Themis Labs Incubation Platform and Themis Future Eco-Fund. Support, in both content and financing, will be given to excellent endogenous and exogenous

projects to complement them and help them grow from 0 to 100.

- Themis Labs Incubation Platform

Themis Labs will provide standard API interfaces and SDK kits to allow traffic partners to easily access forecasting scenarios within the partner system simply by embedding. Themis Labs also supports emerging forecasting products through capital and traffic resources, providing partners and developers with a fully-customizable forecasting scenario experiment platform. In the meantime, Themis Labs Incubation Platform will incubate promising forecasting projects in three ways. First, the incubation platform provides APIs/SDKs to traffic partners, helping them add forecasting content and context to link the Themis Chain ecosystem at one click. Second, the incubator platform will find potential ideas from 0 to 1 and support idea growth from scratch. Third, the platform also pays attention to the replicating the idea at the multi-regional level to rapidly globalize the forecasting projects and achieve the establishment of a global ecological system from 1 to 100.

- Themis Future Eco-Fund

Themis Future Eco-Fund invests in projects, which include, but are not limited to, those of the Themis Labs. It supports the development of excellence endogenous and exogenous projects financially, thereby creating a diversified forecasting ecosystem.

3.3.2.3 Users

As for user incentives, the Themis Chain platform will reward users who make correct forecasts.

Rich ecological incentives and reliable underlying technologies, combined with Themis Chain's extensive risk control and traffic operations experience, will inject strong growth momentum into the entire platform ecosystem.

Chapter 4 Technology Realization of Themis Chain Platform

4.1 Themis Chain Technology Framework

4.1.1 Technology realization goals

Themis Chain is an event forecasting ecosystem based on blockchain technology. Through the technology of blockchain, event forecasting becomes a generalized, highly credible and huge-scale economic model and an important part of future social and economic operation.

Themis Chain will provide scientifically credible pricing solutions for the financial, insurance, retail, real estate, entertainment, gaming and sports industries as well as more risk hedging mechanisms and new modes of economic participation.

Themis Chain offers event forecasting participants a common event forecasting environment that provides references of common events forecasts and opportunities to participate in forecasting. With its unique consensus mechanism design, smart contract design, oracle machine, and event forecasting platform development based on Themis Chain, it ensures the participants' basic rights such as information security and fund security, and guarantees that the event forecasting platform can provide a reasonable and scientific reference for the events. It also provides participants with a wealth of risk hedging channels and brings all kinds of common events with information circulation mechanism based on value transfer, so that event forecasting can be separated from the originally simple position of entertainment forecasting.

4.1.2 Technology design principles

In order to build a new and common event-forecasting ecosystem, the technology framework of the platform is designed under the principles of blockchaining the core data, universalizing and expanding contracts, rational pricing result, and true and reliable data, from generation to confirmation.

- Blockchained core data.

All information, such as users accounts, events, funds, and dynamic odds, are preserved in encrypted or public form on the chains. Key information, like pricing

and outcome verifications, are generated and recorded with data validation technology, which is composed of the oracle and consensus mechanisms. Blockchaining all the core data of event forecastings ensures the truthfulness, openness, and credibility of the forecasting process, and the optimization of the participants' profits.

- Expanded and universalized contracts

Themis Chain provides industry standard, and foundation modules, for common decentralized event forecasting by standardizing the core components of forecasting activities. Third party platforms, as well as other types of event forecasting applications, can access Themis Chain through a contract interface, providing a broader space for Themis Chain's business growth, and blockchain-based technology for current and prospective prediction markets.

- Rational pricing results

To enable the Themis Chain event forecasting ecosystem provide an effective risk hedging method and a rational pricing reference for the existing real economy, Themis Chain created an event-pricing technology based on consensus mechanism to provide a rational pricing reference for the event forecasting process.

- Reliable data, from generation to verification

In order to ensure the participants' privacy and data security, Themis Chain has set up the mechanism for encrypting and storing internal and external accounts separately. Internal and external accounts are separately stored on the chain or SWARM/IPFS using encryption algorithm. Such ensures the traceability of information, while providing maximum security to users' information.

4.1.3 Technical characteristics

4.1.3.1 Rational pricing based on smart contracts for general events

The Themis Chain platform aims to realize a completely new ecological model of event forecasting. The Themis team designed a smart contract and event forecasting contract based on blockchain to provide a general and expanded underlying technology framework for various scenarios, and a rational pricing mechanism, to build the cornerstone of a blockchain technology-based forecasting ecosystem.

4.1.3.2 Trusted data architecture based on self-developed oracle and consensus mechanisms

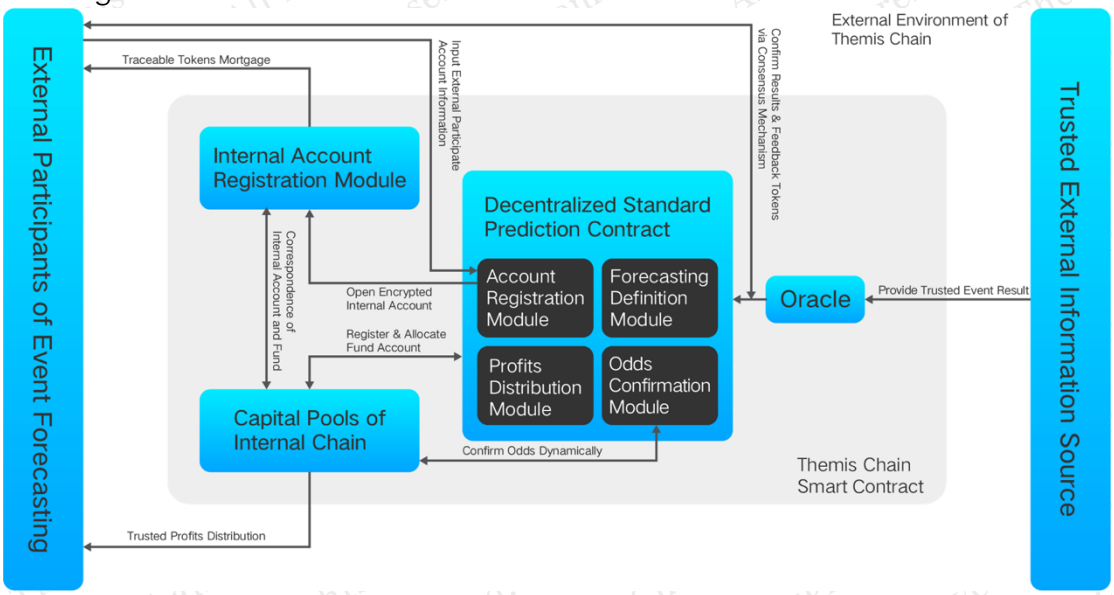
An event forecasting ecosystem requires highly-trusted event result data. The Themis team uses an oracle to hold highly reliable event result data on the chain, and validates the results for participants through the RDPoS consensus mechanism, to provide proven and reliable outcome data for forecasting events.

4.1.4 Framework structure

The core technical framework of Themis Chain consists of two parts: external environment and intelligent contracts. The external environment includes external participants and reliable external sources of information; while smart contracts are made up of decentralized standard forecasting contracts, the internal account registration module, Token wallets, and the oracle unit, among others.

4.1.4.1 Event forecasting participants

Event forecasting participants are registered users of the Themis Chain platform and partners platforms, who participate in event forecastings on the Themis Chain platform. The participants by providing money and information through smart contracts, can participate in forecasting activities, and earn profits or hedge risks.



4.1.4.2 Reliable external information source and event forecasting verification mechanisms

Reliable external sources are information providers who bring credible

external information for forecasting scenarios. The trusted information can be imported into the smart contracts by the oracle, after which the event results are confirmed through consensus mechanism, providing uncontested basis for determining forecasting results.

4.1.4.3 Event forecasting realization based on smart contracts

Decentralized standard forecasting contracts provide an industry standard, and foundation module, for common decentralized forecasting by standardizing the core contracts of the event forecasting activity. The contracts also perform the basic functions of event definition, pricing confirmation, account registration, and profit distribution, in order to ensure the operation of forecasting activities. Third party platforms and other types of event forecasting applications can access Themis Chain via a contract interface, providing a broader space for Themis Chain's business growth.

The account registration module provides a unified operation unit for the divided management of internal and external accounts, ensuring the accuracy of account information, traceability of profit distribution, and user privacy.

Users' Tokens for forecasting are temporarily deposited in the capital pools of the chain to ensure the safety and fairness of the fund depository. The Token wallet can only be controlled through standardized forecasting contracts, and thus is open and fair in the depositing of funds and in the distribution of profits.

4.2 Themis Chain Core Technology

4.2.1 Smart contracts

Themis Chain will create a fair, safe and universal forecasting economic ecosystem in the area of event forecasting. All participants will get THC Token rewards automatically distributed by smart contracts through the participation of standard forecasting contracts, the development of dynamic pricing and the confirmation of event results. The smart contract is essentially a Turing-complete state machine that completes data reception, transaction processing, and preservation. The decentralized application of the Themis Chain platform accomplishes asset distribution and data logging on the chain through smart contracts.

4.2.2 Rational LMSR pricing

Themis Chain uses an improved model of LMSR and also offers other pricing models to the community. (See 2.4 Themis Chain Pricing Principle)

4.2.3 Data validation techniques based on oracle and consensus mechanisms

The core of event forecasting, that is, confirmation of event results, will be conducted in two ways. First of all, the platform will encrypt the results released by trusted data providers, then inject them into contracts, and transmits the data to the platform's encrypted database for storage. After the participant receives the result, the outcome of the event will be further confirmed through the consensus mechanism. Event-confirmation participants will receive Token rewards to motivate users' contribution to the authenticity of the event outcome. In addition, the event result validation unit will reserve extensible interfaces to provide space for richer types of event forecasting.

4.2.4 Decentralized standard forecasting protocol

Forecasting participants directly enter into the event forecasting agreement through smart contracts. The corresponding shares and criteria of each are clearly stated in the contract, and the contract likewise clearly defines the rules for profit distribution, determines the price dynamically through the pricing model technology, and finally determines the result through the consensus mechanism. The contract will deliver the awarded THC Tokens to participants on schedule. Participants can check prices and shares in real time through smart contracts to ensure that event forecastings are done transparently. A Token, once injected into the smart contract, cannot be changed or transferred, thus eliminating the of possibility of absconding or embezzlement of funds, thereby protecting users' interests to a great extent.

4.3 Technical route and public chain design of Themis Chain

The technology route of the Themis Chain platform will follow three stages. The first phase is Themis Chain based on Ethereum, which provides basic event forecasting function and small-scale verification. The second phase is the public

chain design of Themis Chain based on Graphene technology, which will provide the underlying technological support for high-frequency event forecasting. Finally, after the technologies of the first two phases have stabilized, the Themis team will develop the public chain of the Themis Chain based on Graphene technology and RDPoS consensus mechanism to improve the problem in the existing consensus mechanism whereby a large amount of capital or heavy workload may hijack the forecast result.

4.3.1 Themis Chain realization based on Ethereum

In the first phase of product development, THM Tokens and THC Tokens will be designed and developed based on Ethereum ERC20 and will be used in the Token economy of the platform to fulfill the basic forecasting functions in the fields of finance, insurance, real estate, entertainment, sports and games. Because Ethereum cannot meet the high-frequency request of massive users, the early Themis Chain based on Ethereum uses the core data up-chain method to implement the forecasting function. For the purpose of ensuring user experience, the core concept of decentralized event is initially realized, ensuring the smooth realization of platform functions.

Themis Chain based on Ethereum will implement a series of performance optimization and acceleration solutions to enable basic event forecasting.

- Isolation verification: As blockchain technology has such problems as small block capacity, high network latency and low throughput, we will use the isolation verification mechanism to reduce the pressure on client data storage. The mechanism extracts the signature part of the transaction, separates witness from trading data, suppresses the plasticity and reduces the size of the trade, in order to pack more deals in a limited block. The load of witness authentication information requires verifying full node of data, and most users only need to run Light-Wallet to conduct transactions, providing fast and convenient services for mobile users.
- Upload core data to the chain: Considering the limited size of the block and low efficiency of network transmission, we upload the core data to the chain and store basic information such as digests, vouchers and data certificates of forecasting events on the chain or in SWARM/IPFS, in order to compress the blockchain data size as small as possible and reduce the

system risk of real data obtained after the attack explosion.

- Trigger off-chain data: The existing smart contracts of blockchain systems are closed. They are triggered only by the data on the chain, thus lacking interactions with the real world and dissatisfying the interactional need of multiparty data in quantitative transactions. Therefore, we will develop a smart contract model that receives data feed trigger, and use the data off the chain as one of the trigger conditions, to achieve healthy interactions between on-chain and off-chain.

4.3.2 Public chain design based on Graphene technology

Graphene technology is a blockchain tool group technology with high concurrency capability. The public blockchain based on Graphene technology is characterized by high concurrency ability, which is very suitable for high frequency and high concurrency event forecasting. During the second phase of Themis Chain's development, the Themis team will design the public Themis Chain, which will offer high scalability, high concurrency, and high throughput based on Graphene technology to meet a variety of forecasting scenarios.

4.3.3 Public chain improvement based on RDPoS consensus mechanism

In the third stage of product development, with the foundation of the second stage and the RDPoS consensus mechanism, Themis Chain will develop the public Themis Chain aimed at special value forecasting scenarios. Such will enable Themis Chain to completely process the key data on the chain, such as event definition, user account information, asset information, transaction information, event result data, and pricing data, and thus will become the public chain industry standard for value definition in the field of event forecasting.

4.3.3.1 Existing consensus mechanism review

Consensus mechanism is the cornerstone of the blockchain system to achieve cooperation among nodes and ensures data uniqueness and traceability. With the development of public chains, such as Bitcoin, Ethereum, EOS, and NEO, many consensus mechanisms have emerged. The current consensus algorithms that are used the most are PoW (Proof of Work), PoS (Proof of Stake), DPoS (Delegated Proof of Stake), PoI (Proof of Importance), PBFT (Practical Byzantine Fault

Tolerance), and dBFT (delegated BFT). Each consensus algorithm has its own advantages and disadvantages. Thus, the choice of consensus algorithm will depend on the application scenarios, user needs, and data features. The Themis Chain forecasting platform has set very high requirements for the chain's security, stability, reliability, and data throughput; and as a public chain, Themis Chain, does not want to meet the above requirements with high computational costs. The choice of consensus mechanism is therefore an issue that is fundamental issue to Themis Chain.

PoW. The Proof of Work consensus algorithm uses competitive asymmetric and encrypted calculations to determine witnesses. Computing (mining) nodes consume a large amount of computational effort and power in competitive computing. It consumes high computational costs and are limited in speed. Transaction security on the chain is guaranteed by nodes. With the emergence of emerging blockchain projects, the new blockchain system cannot obtain enough computational power to participate, resulting in the increased possibility that malicious computations can hijack the network, thereby exposing the network to great security risks if use of PoW is continued. In terms of computational speed and economic cost, the PoW mechanism is not suitable for long-term development of forecasting applications.

PoS. Proof of Stake shared consensus algorithm uses the proportion of the token assets of nodes to reduce the difficulty of mining. The probability of assignment of witnessing rights is determined based on the node’ s age or deposit shares. Peercoin and Casper of Ethereum contracts both adopt the PoS algorithm at this stage. PoS solves the problem of high computing power consumption, shortens the election time of witnesses, and increases the speed of mining blocks. However, it is easy to form a monopoly of the big capital to control the ecosystem discourse of the blockchain and may undermine the decentralization of the pubic chain. Besides, event forecasting activities are prone to the monopoly of large capital, so the PoS mechanism is not suitable for forecasting applications.

DPoS. Delegated Proof of Stake consensus algorithm is based on PoS. Token users vote for the block node, and the Top N nodes that get the largest number of votes become the witnesses. This significantly reduces the participation verification and witness nodes, reaching the second level of consensus verification. Currently, EOS that uses DPoS algorithms and parallel chain architecture can reach

millions of transactions per second. As it is based on the same principle behind PoS, there is still the possibility of capital monopoly in DPoS mechanism.

PoI. Proof of Importance consensus algorithm introduces the concept of account importance. It adopts the probability of account importance score distributed witnessing rights to solve the high energy consumption problem of PoW and ease the capital monopoly crisis of PoS. However, merely relying on the importance of node will decrease the cost of block reversal for attackers, bringing danger to the "irreversibility" of system.

4.3.3.2 RDPoS consensus mechanism algorithm

Themis Chain is committed to creating a decentralized event forecasting ecosystem. Fairness and irreversibility are among our most important goals in designing consensus algorithms. Because the existing consensus algorithms do not provide the best support for forecasting applications, we propose a novel RDPoS (Randomized Delegated Proof of Stake) algorithm that is based on the improved DPoS and combined with the contributions of user investment. RDPoS combines the DPoS that represents user voice with the random assignment of asymmetric encryption. It empowers users with the right to choose a block-out node and injects a random weight of witnessing right into the choice, so that the probability of hijacking a block by a huge capital is reduced. This mechanism ensures fairness, security and irreversibility of the data chain through the randomness of the random forecasting and the random asymmetric problem allocation mechanism included in the smart contracts.

PoW consensus algorithm uses competitive calculated asymmetry and encryption problem to determine the witnesses. Similarly, RDPoS will assign a random PoW problem to users with a larger weight of votes in DPoS so that the process of determining witnessing rights is less susceptible to the hijacking of huge calculation pools and big capital. Besides the delegates elected by the RDPoS mechanism, it also needs to calculate the asymmetric and encryption problems that are random and at different levels of difficulty, thereby giving the elected witnesses a certain random degree of witnessing rights and creating new blocks. RDPoS algorithm can greatly reduce the competition time of witness nodes, enhance the block speed up to 10 thousands of transactions per second, in order to meet the needs of the event forecasting platform.

4.3.4 Technical interface

The development of the Themis Chain platform is divided into two phases, namely, the Token system based on Ethereum ERC20, and the later independently developed Themis Chain Token system. As for exchanging old tokens with new tokens, the Themis Chain Team promises to automatically exchange THM Tokens and THC Tokens with Themis Public Chain Tokens through the acceptance gateway once the Themis Chain Public Chain has been launched.

Chapter 5 Core Advantages and Investors

5.1 Core Advantages

- **Past performance**

Themis Chain team has developed and operated many top-tier products in multiple business areas such as blockchain, big data, artificial intelligence, games and forecasting, and has obtained over a dozen intellectual properties and patents. This includes a forecasting product with tens of millions of users.

- **Qualifications**

The team has years of professional experience in control of the industrial chain, as well as multinational resources to minimize the difficulty of the project entering the country. They not only can obtain support from the upstream and downstream partners on the global industry chain in the perspectives of policy and industry barriers, but also use scientific methods to analyze the project's operational status to make healthy promotion. At the same time, all the core team members have worked in the industry for many years. They have made in depth studies on international policies and can conduct dynamic monitoring and early warning of international risk situations. In addition, many overseas countries or regions have provided a stable and open industrial policy, which effectively ensures that the industrial chain operates reasonably and legally.

- **Technology**

Themis Chain has a very mature and strong technical team with extensive industry and technical experience in various fields such as blockchain, forecasting, big data, games and artificial intelligence. It takes the industry-leading position in the development of blockchain technologies such as building public chain with Graphene and distributed IT architecture systems.

- **Industry Resources**

Themis Chain Team is a perfect combination of veterans who have years of operational experience and deep insights in forecasting, big data, artificial intelligence, forecasting and games.

- **Fund Management**

The fund management of Themis Chain will strictly abide by the principles of fairness, just and openness, with the primary purpose of Themis Chain's development. Themis Chain has set up Themis Chain Foundation to keep Themis

Chain Development Fund and ensure the safety and sustainability of funds. The use of all funds will be regularly disclosed to all investors in order to ensure the openness of the use of funds.

5.2 Investors

INBlockchain

HandSome Foundation

Token OWN

Lomostar

S-Labs

Astar Fund

Chapter 6 Roadmap

Dec, 2017	Project start
Jun, 2018	Release the first forecasting product
Jun, 2018	Release the World Cup operation activity
Oct, 2018	Construct the Themis Public Chain
Q1 Of 2019	Complete development and testing of Themis Public Chain
Q2 Of 2019	Complete migration of Themis Public Chain

Chapter 7 Tokens Issuance Plan

7.1 Tokens Issuance Plan

The platform will issue "Themis" tokens, or "THM" for short, based on the ERC20 standard, with an initial cast of a total of 3,000,000,000 pieces, or 3 billion THM Tokens. No further issuance of THM Tokens will be made beyond the initial cast of 3 billion tokens.

PE	30%	900 million	Private equity stage financing
Foundation	25%	750 million	For the management and subsequent development
Team	15%	450 million	For internal distribution
Market Operation	20%	600 million	For expansion of business, such as entering exchanges, connecting global platforms, brand promotion, and user promotion
Community Reward	10%	300 million	For rewarding active users and long-term holders

The platform will issue "Themis Coins" tokens, "THC" for short, based on the ERC20 standard. Themis Coins' initial cast consists of a total of 300,000,000 pieces, or 300 million THC Tokens. The total amount of tokens cast may increase based on business conditions. THC Tokens will not circulate on exchanges, but will mainly circulate within OTCs and platforms, and will remain anchored on legal currency.

7.2 Themis Foundation

The Themis Chain team firmly believes that "the vitality of decentralized organizations, which is the ultimate form of human society, is far greater than the centrally controlled ones." Therefore, on the first day of its birth, THM Tokens and THC Tokens belong to the whole community, and are not tools for profit of centrally controlled organizations. As a result, the Themis Chain team will establish the Themis Foundation in Singapore with the main mission of operating the Themis Chain openly, fairly, and transparently for no profit, as well as supporting the team.

7.2.1 Establishment

The Themis Foundation will be approved by the Singapore Accounting and Corporate Regulatory Authority (ACRA) and will be governed by Singapore corporate law. The Foundation will be managed independently by a board of trustees or a management committee composed of qualified members and administered independently of the government. As Singapore is known for its stable and sound legal and financial environment, the Themis Foundation will be established in Singapore as a non-profit organization that will support or participate in activities that benefit public interest without any commercial interest. The "profits" earned by the Foundation are called surpluses, which will be retained as funds for its activities, rather than being distributed among its members.

7.2.2 Management

Themis Chain team has commissioned a credible third party organization to jointly operate the Themis Foundation set up in Singapore. Said third party organization will take charge of day to day operations, token use, information disclosure and risk management. In the meantime, the Foundation will work with key members of the Themis event forecasting community, and early platform developers and contributors, in making major decisions.

Chapter 8 Risks

Potential investors are hereby advised of the following risks connected with the project:

- Systemic risks

Systemic risks refer to possible changes in earnings due to the factors that commonly affect all profits in the same way. Among such risks are: *regulatory risks* – as some countries and regions presently do not have a clear regulatory policy on blockchain projects and its public financing methods, there exists the possibility of participants incurring losses due to governmental policy changes; *market risks* – if the overall value of the digital asset market is overvalued/overestimated, such will further increase the risk that participants may fail to realize the high expectations they have on the growth of these projects; and *systemic risks* – which also includes force majeure events such as, but not limited to, natural disasters, widespread worldwide breakdown of computer networks, and political instability.

- Technical risks

Firstly, as the project is based on cryptographic algorithms, the rapid development of quantum computing will inevitably bring about the risk of the project' s algorithms getting cracked. Secondly, while the team will utilize blockchain technology such as the use of a distributed ledger, and blockchain decentralization, and immutability, to promote its core business, however, there can be no complete guarantee that the technical aims of the project can be fully achieved. Thirdly, in the course of updating or modifying the system, certain bugs or vulnerabilities found in the system will be fixed by releasing patched, but it cannot guarantee the extent of impact caused by the vulnerability. Meanwhile, in terms of safety, although the amount of money of individual supporters is small, but their total population is large, which also places high demands on the safety and security of the project. In addition, tokens trading and treasury management are hosted on the exchange, which may expose the exchange to the risk of theft.

- Other unknown risks

With the continuous development of blockchain technology and the entire industry, Themis Chain may face some unforeseen risks. Before making decisions, participants should comprehensively understand the team' s background and the overall framework of and thoughts on the project, so as to reasonably adjust

their expectations and rationally participate in the development of digital currency.

Chapter 9 Disclaimer

This document is provided only for informational purposes and does not constitute an advice on the purchase or sale of THM Tokens and THC Tokens. All information and analysis provided here are for reference purposes only. This document does not constitute any investment proposal, investment intention or instigation investment.

This document does not constitute or cannot be regarded as an offer for the purchase or sale of tokens in any form, nor any form of contract or commitment. Prospective users must clearly understanding all the risks connected with the Themis Chain project, and all investors must comprehend and accept all risks connected with said project before they make any investment.

Chapter 10 References

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