FORTUNA WHITEPAPER

Blockchain Platform for Global OTC Derivatives Market

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Contents

Summary

A Peer-to-Peer Electronic Cash System[1], published by Satoshi Nakmoto in 2008, has brought a whole new mode of thinking about decentralization. With the new mode of thinking, Fortuna, the first blockchain platform for the global OTC derivatives market, solves several core problems and introduces some new features as follows:

1. Build a trust network. Fortuna can solve the trust problem of the OTC derivatives market with consensus algorithm DPOSA, structured smart contract, decentralized quote scheme, digitalized supervision and other techniques of blockchain.

2. Improve the operational efficiency. As a specialized blockchain platform for derivatives, Fortuna can improve the operational efficiency of each step of transactions, including contract creation, price quoting, contract signature, trading and clearing.

3. Increase the liquidity. As the only medium of exchange accepted by Fortuna, FOTA can enable the platform to embrace the global liquidity pool regardless of the physical and multi-currency barriers.

4. Motivate users to trade. Fortuna supports two modes of trading: PrC and PuC. Under PrC mode, users can launch a peer to peer transaction without any cost of agency. Under PuC mode, users can create new types of derivatives and be the market makers while benefiting from the trading volume of the new derivatives created.

5. Enrich the derivatives market. Users of Fortuna can create all kinds of derivatives with different underlying assets, deal structures, durations, margin ratios and other elements of transactions. To some extent, Fortuna can be a worldwide incubator for innovative derivative tools.

6. Algorithmic regulation and self-discipline. With algorithmic regulation and self-discipline, Fortuna supports transparent, real time, and full dose data supervision. Smart contract, digitalized supervision, arbitration driven by consensus algorithm and other new technical features can inspire a new mode of regulation and self-discipline.

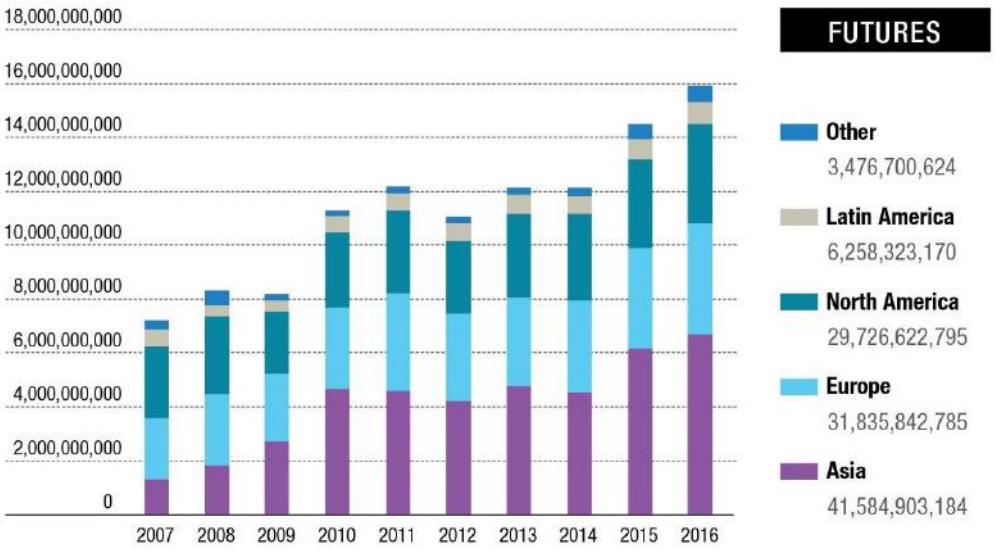
As Herbert Marshall Mcluhan said, “we shape our tools and afterwards our tools shape us.” Fortuna will inspire a new mode of thinking for the global OTC derivatives market and make the tools of hedging more available and more popular.

1. Fortuna

This chapter will analyze the current state of the derivatives market and introduce the solutions for three core problems of the OTC derivatives market. Moreover, three dimensional value-added innovations of Fortuna will be introduced and the meaning of blockchain technology for self-discipline and regulation will be analyzed. Finally, the business model and the economy design of Fortuna will be detailed in this chapter.

1.1 Current State of OTC Derivatives Market

2010 is called the first year of hedging in China because securities margin trading and stock index futures were issued in this year, which concluded the age of one-sided stock market in China. As stock index futures, securities margin trading, Treasury bond futures, commodity options and other derivatives issued, many companies began the transition from traditional private equity companies to hedge funds adopting all kinds of investment strategies including long/short, macro, event driven, CTA, relative value and others. On the other hand, the volume of Chinese futures market reached 4 billion and the balance of securities margin financing reached 900 billion RMB. All the signs show that the derivatives market of China has entered a rapid development period. Moreover, as the data provided by FIA[2] shows, Asia has become the biggest market in 2016.



In spite of the high speed of development, the Chinese derivatives market still have many problems compared with the markets in America and Europe.

1. Exchange Market: lack of derivatives varieties

As the data provided by China Futures Association[3] shows, there are only four futures exchanges and only 48 kinds of derivatives in exchange market in the first half year of 2017. The lack of derivatives varieties restrict the possibilities of more participation directly, and too many demands on derivatives are not satisfied.

Exchange	Number of Derivatives	Name of Derivatives
Shanghai Futures Exchange	14	Copper, Aluminum, Zinc, Lead, Nickel，Tin，Gold，Silver，Steel Rebar，Steel Wire Rod, Hot rolled Coils, Fuel Oil，Bitumen，Natural Rubber
Zhengzhou Commodity Exchange	17	Cotton No.1, Japonica Rice, Late Rice, Rapeseed Oil, Wheat PM, Wheat WH, Early Rice, Rapeseed Meal, Rapeseed, Flat Glass, Methanol, Ferrosilicon, Silicon Manganese, PTA, Thermal Coal, SR Call, SR Put
Dalian Commodity Exchange	17	Corn, Corn Starch, No.1 Soybean, Egg, No.2 Soybean, Soybean Meal, Soybean Oil, RBD Palm Olein, Fiberboard, Blockboard, Soybean Meal Options, LLDPE, PVC, PP, Coking Coal, Coke, Iron Ore
China Financial Futures Exchange	5	CSI 300 Index Futures, CSI 500 Index Futures, SSE50 Index Futures, 5-year Treasury Bond Futures, 10-year Treasury Bond Futures

Furthermore, the unbalanced development of exchange market is obvious. For example, in the first half year of 2017, 5 kinds of derivatives (Steal Rebar, Bitumen, Zinc, Natural Rubber and Hot Rolled Coils) occupied 81% of total volume of Shanghai Futures Exchange and the other 9 kinds of derivatives occupied only 19%. Unbalanced development of exchange market implies that under the surface of rapid development, the Chinese exchange derivatives market is still not mature.

2. OTC Market: credit risk and efficiency problem

In 2013, China Futures Association issued *Guide for Risk Management Service Carried by Subsidiaries Set up by the Futures Company*[4]. Since then, many futures company in China began to set up subsidiaries to provide OTC derivatives service to

satisfy the requirements of risk management and price management in many areas. As OTC derivatives market in China is developing rapidly, the credit risk and trust problem become the key issue of the OTC market. On the other hand, although many institutions are trying to build an inter-institution OTC derivatives market, the lack of authoritative third party institution makes the inter-institution market loose and inefficient.

3. Whole Market: unconnected with the overseas market and insufficient institutional investors

As *FIA 2016 Volume Survey*[2] shows, the derivatives exchanges of China performed well based on the volume dimension.

TOP EXCHANGES IN 2016

For more information: contact Will Acworth at wacworth@fia.org

1	CME Group		International Securities Exchange Mercury [1,4]	20	ASX
	Chicago Mercantile Exchange		Nasdaq Commodities		ASX 24
	Chicago Board of Trade		Nasdaq NLX		ASX
	New York Mercantile Exchange	8	Dalian Commodity Exchange	21	Taiwan Futures Exchange
	Commodity Exchange (COMEX)	9	BM&FBovespa	22	TMX Group
2	National Stock Exchange of India		Bolsa de Mercadorias & Futuros		Boston Options Exchange [1]
3	Intercontinental Exchange		Bolsa de Valores de Sao Paulo		Montreal Exchange
	ICE Futures Europe	10	CBOE Holdings	23	Singapore Exchange
	NYSE Arca [1]		Chicago Board Options Exchange [1]		Singapore Exchange
	ICE Futures U.S.		C2 Exchange [1]		SGX Asiaclear
	NYSE Amex [1]		CBOE Futures Exchange	24	Euronext
	ICE Futures Canada	11	Zhengzhou Commodity Exchange	25	Rosario Futures Exchange
	ICE Futures Singapore [2]	12	Korea Exchange	26	Borsa Istanbul
4	Moscow Exchange	13	BSE India	27	Thailand Futures Exchange
5	Eurex	14	JSE Securities Exchange	28	London Stock Exchange Group
6	Shanghai Futures Exchange	15	BATS Exchange [1]		Borsa Italiana
7	Nasdaq		BATS Exchange [1]		Turquoise Derivatives
	Nasdaq PHLX [1]		EDGX Options Exchange [1]		CurveGlobal [5]
	International Securities Exchange [1]	16	Hong Kong Exchanges and Clearing	29	Tel-Aviv Stock Exchange
	Nasdaq Options Market [1]		Hong Kong Exchanges and Clearing	30	Tokyo Financial Exchange
	Nasdaq Exchanges Nordic Markets		London Metal Exchange	31	Metropolitan Stock Exchange of India
	International Securities Exchange Gemini [1]	17	Japan Exchange	32	MEFF
	Nasdaq NFX [3]	18	Miami International Securities Exchange [1]		
	Nasdaq Boston [1]	19	Multi Commodity Exchange of India		

However, the derivatives market in China are not connected with the international market very well for many reasons, such as the foreign exchange control policy. Moreover, the lack of professional institutional investors is another big problem. Since the first hedge fund was built in 1949, the market size of hedge fund has jumped from 39.8 billion dollars to 3 trillion dollars. America market occupies 70%, Euro market occupies 20% and Chinese market only occupies 0.5%. The small market share shows the immature current state and the big room for growth in China.

1.2 Solutions for Three Core Problems

There are four essential symbols of a mature financial market including a large pool of underlying financial assets, abundant derivatives, global liquidity participation and efficient regulation. Accompanying with the improving market maturity, the derivatives and risk management service will be in great demand. However, there are still three core problems need to be solved:

1. How to build a trust network for OTC derivatives market.
2. How to improve the operational efficiency of OTC derivatives market.
3. How to increase the liquidity of OTC derivatives market.

1.2.1 Build a Trust Network

The trust problem and credit risk not only restrict the participation, but also limit the pool of liquidity. The difficulties to build trust within OTC derivatives market lead to three structural features of the OTC derivatives market as follows.

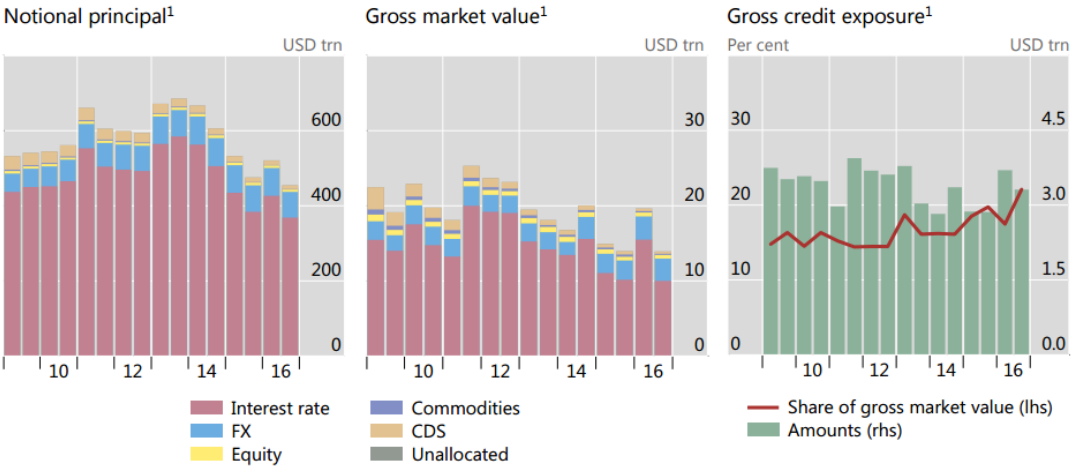
1. The majority of participants are big intuitions with good credit records. The participation of small enterprises and individuals are rare.

2. The nominal amount of single OTC derivative contract is very big in general and the duration of the contract is very long in general.

3. The variety of OTC derivatives are not developed very well.

The third problem seems to be strange because one of the advantages of OTC derivatives market is the feature of supporting personalized contract. However, the credit risk and the trust problem result in the prudent participation of investors especially when the traders fall under different jurisdiction. Therefore, the participants are not willing to take extra risk with personalized derivative contracts which may have complex deal structure and new underlying asset-class. As the data provided by BIS[5] shows, the notional principal reached 48.3 trillion dollars in 2016. The market share of currency derivatives (interest rate and FX derivatives) are more than 90%.

Global OTC derivatives markets Graph A1



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[1] At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

The reasons of the trust problem within OTC derivatives market are as follows.

1. The participants of the OTC derivatives market come from different areas, such as finance, agriculture, manufacturing, etc.

2. The regulation and self-discipline mechanism is not mature and complete.

3. Traditional offline signature of contract will easily lead to disputation.

4. Lack of default management mechanism without delay and human intervention.

The reasons described above turn out to be the trust problem of the OTC derivatives market which cannot be solved easily in traditional ways. Fortuna introduces a whole new way to solve this problem based on blockchain technology as follows.

1. Consensus Algorithm. Fortuna introduces an optimized version of consensus algorithm based on DPOS, which is called DPOSA to safeguard the data's integrity and guarantee that it cannot be tampered with. As long as the malicious entities or nodes are no more than one third of the total number, there will be no fork and moral hazard.

2. Smart Contract. Fortuna replaces the traditional offline contract signature mode with programmable and automatic executable smart contract based on the blockchain to eliminate the credit risk of derivatives trading activities.

3. Digitalized Supervision. Fortuna introduces a new kind of crypto-token FOTA to unify the exchange media on the platform. All the participants from different areas and jurisdiction will trade derivatives using FOTA. The FOTA in margin account will

be supervised for 7*24 hour and no human being can intervene. The digitalized supervision mode based on crypto-token are much more efficient and transparent compared with the traditional supervision mode carried by commercial banks.

4. Decentralized Quote Scheme. Fortuna creates a decentralized scheme for price quoting while introducing a mechanism similar to corporate equity governance to motivate the quoters to fulfill their duties and eliminate the possibilities of price manipulation.

5. Arbitration Carried by Whole Network. If a trading node disagrees with the execution result of derivative contracts, it can apply for the arbitration carried by the whole network which can safeguard the equity of Fortuna.

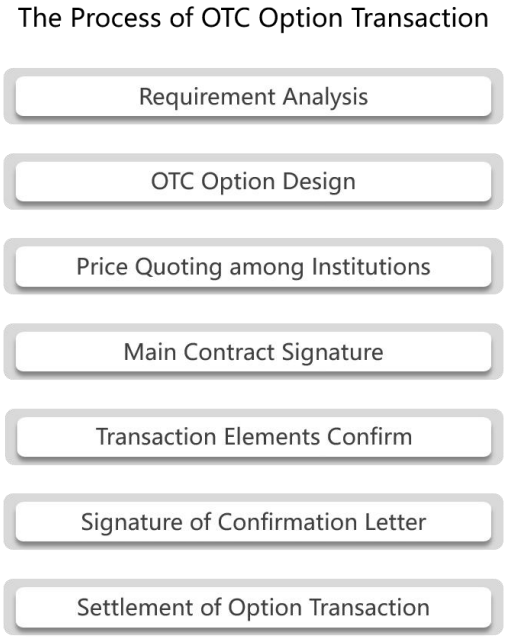
6. Lifelong Credit Record. Every node on Fortuna will have a lifelong credit record based on blockchain which can ensure the transparency, integrity and safety of the credit records.

7. Self-disciplined by Algorithm. Fortuna is an ecological decentralized platform which consists of five functional roles including CoT maker, Trader, Quoter, Marker Maker and Delegate. All the definition, motivation and restriction setting of the five roles of Fortuna are based on algorithm instead of the rules on paper which can ensure the execution and the efficiency of self-discipline of the whole network.

In conclusion, Fortuna will build a trust network for OTC derivatives market with consensus algorithm, smart contract, digitalized supervision, decentralized quote scheme, whole network arbitration, lifelong credit record, algorithmic self-discipline and other technical features.

1.2.2 Improve Operational Efficiency

Other than the credit risk and trust problem, the low operational efficiency of the OTC derivatives market is another core problem. For example, the process of OTC option transaction has 7 steps at least and requires manual operations in many steps, which turns out to be an inefficient process.



Therefore, one of the core problems of OTC derivatives market is the operational efficiency problem. Fortuna introduces a blockchain-based solution for this problem.

1. Contract Creation and Signature. Fortuna introduces structured smart contract which is optimized to meet the demand of operational efficiency. There are three layers of the smart contract: main contract, contract template and contract. Lower layer of contract will inherit all the clauses of the contract in higher layer and each layer will set up their own class of clauses. Structured smart contract will improve the efficiency of the contract creation and signature step.

2. Quote Broadcast on Blockchain. Fortuna replaces the traditional way of price quoting, which requires contact with every potential counterparty one by one through telephone or email, with broadcast on blockchain which can help to reduce the cost of communication and the response time. Moreover, the credit record of the trading node will be attached to the broadcast information which can improve the efficiency of transaction further.

3. Automatic Settlement with Smart Contract. Fortuna utilizes the technical features of smart contract to improve the efficiency of transaction settlement step. Replacing manual settlement with programmable and automatic executable smart contract will shorten the time and reduce the potential errors.

4. Data Supervision on Blockchain. Fortuna utilizes the technical features of

blockchain and decentralized network to improve the quality and efficiency of data supervision. For example, with Fortuna, there is no need for the regulator to send audit requirements to each institution while worrying about the quality, timeliness and veracity of data sent by institutions.

In conclusion, Fortuna will improve the efficiency and quality of the work such as contract creation and signature, price quoting, transaction settlement and data supervision based on the technical features of blockchain and the optimization of smart contract technology.

1.2.3 Increase the Liquidity

The third core problem of OTC derivatives market is the liquidity problem due to three factors as follows.

1. The foreign exchange control policy restricted the connection between Chinese market and international market.

2. The personalized contract is hard for secondary trading in nature.

3. The lack of trust limited the number of participants which restrict the liquidity of the whole OTC derivatives market.

Fortuna introduces a solution for this problem based on blockchain technology.

1. Unify the Exchange Media with Crypto-token FOTA. Fortuna introduces a new kind of crypto which is called FOTA to unify the exchange media on the platform. All the participants around the world should trade derivatives using FOTA on Fortuna regardless of the physical and multi-currency barriers.

2. Support PrC and PuC Trading Mode. Fortuna not only introduces a structured smart contract with three layers, but also supports two kinds of trading mode: PrC and PuC. PrC Mode will enable every trading node of Fortuna to launch a peer-to-peer derivative transaction without any cost of agency. PuC Mode offer opportunities for every node of Fortuna to be a market maker and create a new market for a new type of derivative which can bring profit for the creator related to the trading volume of the new derivative contract. PuC is similar to the standardized contracts traded in exchanges which have better liquidity. The biggest difference between PuC and the exchange-

traded contract is that the exchange-traded contract is designed and issued by exchange, but on Fortuna, every node could design and issue any kinds of derivative contract on their demand.

1.3 Three Dimensional Innovations

Other than providing solutions for the three core problems of OTC derivatives market, Fortuna can also make a difference through three dimensional innovations for OTC derivatives market as follows.

1. Support more precise and specific derivatives on a smaller granularity level.
2. Support new class of underlying assets.
3. Support more participants to utilize hedging as a scientific risk management tool.

1.3.1 Smaller Granularity Level

The majority of the derivatives are designed for the majority of the participants. However, many investors need some derivatives on smaller granularity level to manage their risk more precise and more specifically. For example, S&P 500 index futures are good for majority of the investors, but there are still a lot of demand on making S&P 500 a smaller index so that investors can take more targeted hedging strategy to manage the risk of their portfolios.

Furthermore, the factors that can affect the price of underlying assets are abundant and investors may have more precise prediction and analysis on these single factor rather than the price of the underlying asset. For example, a company occupied in international trade between China and America. The CEO of the company predicted that Trump would be the president of U.S. and he believed that the result could affect the foreign exchange rates and the international trades. However, the only way he could manage the risk in the finical market is to trade foreign exchange derivatives to hedge the risk, but there are some problems with this way.

First of all, the reaction chain is too long. Take the international trade company as an example, the result of the presidential election can determine whether Trump has the right to name a new chairman of Fed. The new chairman of Fed can affect the monetary

policy which can impact the foreign exchange rate further. The reaction chain is too long which leads to a lower precision of hedging.

Second, other than the presidential election, there are too many factors affecting the foreign exchange which means even if the CEO predicts the election result correctly, he may not benefit from the derivatives trading in the financial market.

Third, the presidential election will not only affect the foreign exchange but also the tariff policy and other policies that will affect the international trades between China and America. The CEO can trade the foreign exchange derivatives to hedge the risk for the assets accumulated in history. However, there is no vehicles in traditional market for him to hedge the risk of the whole business of international trades in the future.

As for the three problems described above, Fortuna supports new types of derivatives on a smaller granularity level which can enable investors or hedgers to trade derivatives on single factor such as the monetary policy, tariff policy, presidential election, etc. New type of derivatives on a smaller granularity level will be a new way for investors to hedge the risk more precisely.

1.3.2 New Underlying Assets

The majority of traditional underlying assets of derivatives are commodity and financial securities. However, as all kinds of areas permeated with internet and technique, there are many new classes of assets coming into being and the derivatives for the risk management will definitely be developed afterwards.

For example, thousands of crypto-tokens around the world based on blockchain technology has been popular for several years. There is a great demand on the derivatives for the crypto-tokens. Actually, the CME has just announced that it will publish the BTC futures officially.

For example, micro-amount consumer finance through the internet is developing rapidly in the last few years around the world. The derivatives for the credit assets accumulated by those internet consumer finance companies are necessary and important.

As the new technology developed, there will be more and more scenarios and cases just like the examples above. The derivatives and risk management will be on great

demand in those areas afterwards. And Fortuna will enable every node throughout the blockchain to create new types of derivatives with new types of underlying assets which will make the OTC derivatives market a whole new market in the future.

1.3.3 Higher Availability of Hedging

Traditional derivatives markets are not friendly to many investors for two reasons as follows.

First of all, high threshold of financial knowledge. The majority of investors are not familiar with the derivatives market because of the complex deal structures and professional terms. However, the demand for risk management shows everywhere for every investor even if they don't realize and being blocked by the high threshold of financial knowledge.

Second, high requirement of initial deposit. Take the stock index futures of China as an example, the initial account deposit requirement is 500,000 RMB which turns out to be a high requirement for the majority of investors in China. Although a high requirement of initial deposit is an effective way to protect the investors by blocking them out, there will be another way to protect the investors while enabling them to utilize the derivatives to hedge their risk.

As for the higher threshold of financial knowledge and initial deposit, Fortuna supports more friendly vehicles for risk management through lowering the requirement of initial deposit, simplifying the deal structure, standardizing contract clauses, introducing new asset class and other effective means. Fortuna can make more and more investors know and get used to hedging for risk management.

1.4 Blockchain for Supervision

A sophisticated regulation system and self-discipline mechanism is a necessary condition for mature financial market. As a new technology, blockchain could provide a whole new way for supervision.

1. Build a self-disciplined community based on blockchain. Fortuna creates an ecosystem with five functional roles including CoT Maker, Trader, Quoter, Market

Maker and Delegate. The ecosystem is balanced through role definition, interaction and motivation design which is based on FOTA as a tool for punishment and reward. Furthermore, the whole self-disciplined mechanism is programmable and automatic executable based on algorithm.

2. Data supervision. Fortuna supports transparent, real time, and full dose trading data supervision based on blockchain. Moreover, there is no need for regulation department to send audit and data requirement to each institution and worrying about the quality, timeliness and accuracy of the data provided by different institutions. Fortuna can create a new approach to improve the quality and efficiency of data supervision of OTC derivatives market.

3. Inspiration for regulation. The new features of structured smart contract, digitalized trading fund supervision, arbitration driven by consensus algorithm and other core features of Fortuna could bring a lot of inspirations for the current regulation scheme of OTC derivatives market.

4. Lifelong credit record. Based on blockchain technology, Fortuna will record every node's behavior information including price quoting, contract execution, default, arbitration, etc. The credit record will be safeguarded, lifelong and transparent to the whole blockchain.

Fortuna will utilize and optimize the core technical features of blockchain to offer tools and inspirations for the regulation and self-discipline mechanism for OTC derivatives market.

1.5 Economic Model of Fortuna

First and foremost, as an open source project based on blockchain, Fortuna is owned by every nodes of the chain. Moreover, Fortuna will not charge any nodes for any kinds of fee and all the potential fee will be charged by nodes offering different kinds of services. Fortuna will introduce a utility-based crypto token, FOTA, which will be used as the exchange media for the derivatives trading. The total amount of FOTA will be 1 billion.

For example, there is a Contract Template created by a CoT maker and the CoT set

its transaction fee standard. All the transaction fee from the concreate contracts produced by this CoT will be distributed to three type of serving nodes:

Node Type	Description
CoT Maker	CoT maker could benefit from the commission of the contract created and traded under the CoT（Contract Template）.
Quoter	Quoter on Fortuna will get FOTA based on their shares of quoter corporation providing price quoting service for trading activities.
Delegate	101 delegates elected by whole network each round based on DPOSA consensus algorithm will get a certain percentile of the commission from the contract stored in the blocks which is produced by delegates.

Moreover, there are many kinds of roles on Fortuna could make profit through the decentralized platform and this all-win mechanism design would be beneficial for the sustainable development of Fortuna.

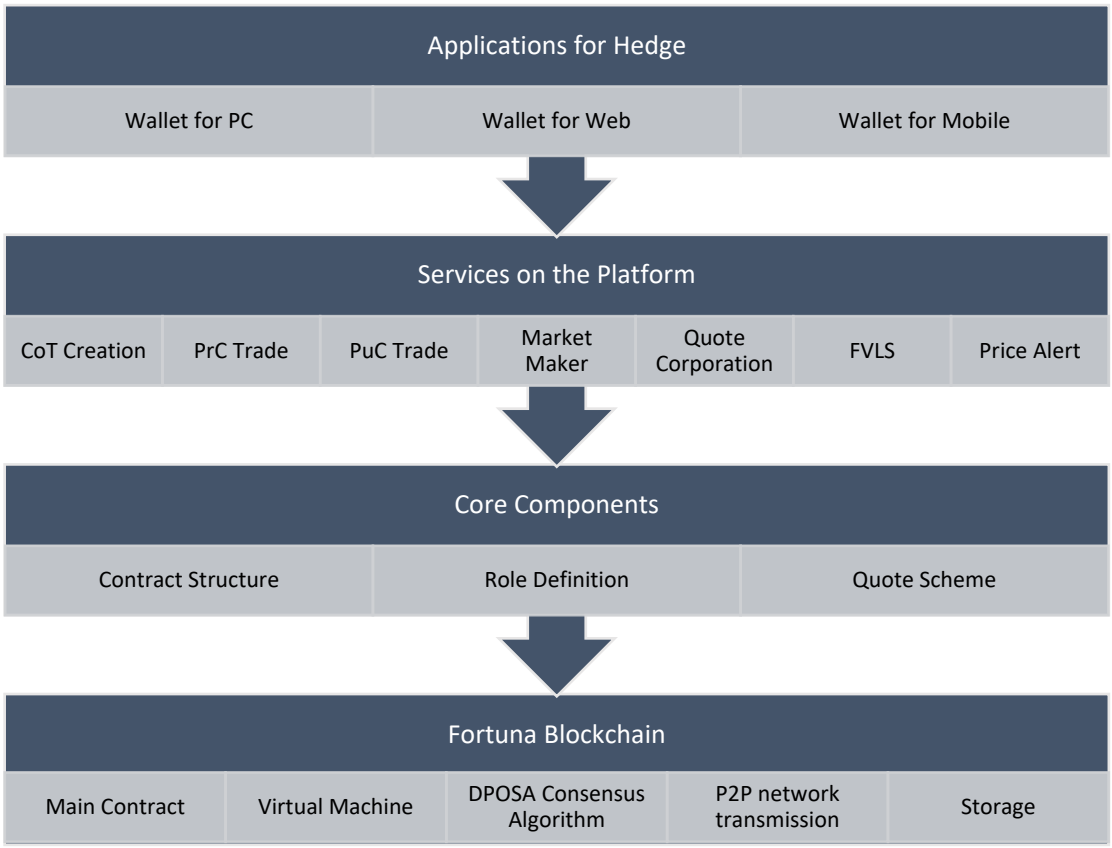
Roles	Sources of Profit
Delegate	Fortuna will newly issue 1% of whole FOTA as a reward for all the delegates producing blocks to store data.
Market Maker	Under the PuC trading mode, every node could be a market maker to earn the bid-ask spread in FOTA.
FVLS	FVLS nodes will provide FOTA value locking service for the trading nodes to ensure that the FOTA value compared with other crypto-tokens or currencies will be the same during the contract period. FVLS will be a good tool for risk management and FVLS nodes will charge for it.

2. Technology

This chapter will introduce the architecture of Fortuna and the details of four layers including bottom layer, core component layer, platform service component layer and application layer. Moreover, the structured smart contract, multi-roles definition, decentralized quote scheme and the life cycle of PrC/PuC contracts are detailed. DPOSA is discussed as an optimized version of DPOS consensus algorithm. The meaning of FVLS is analyzed and the compliance filtering scheme is given in the last part.

2.1 Fortuna Architecture

The architecture of Fortuna is as follows.



2.1.1 Bottom Layer

There are many advantages of building an application based on existing blockchain,

such as lowering the technical threshold, improving developing efficiency, automatic iteration, etc. However, Fortuna still choose to build a complete blockchain from scratch because an optimized and independent blockchain will be more appropriate for the global OTC derivatives market which needs eight core features at least as follows.

Feature	BitCoin	Ethereum	Fabric	Qtum
Application Ecosystem	●	●	●	●
Virtual Machine		●	●	●
Crypto Token	●	●		●
Quote Scheme			●	
TPS			●	●
Scalable			●	
Smart Contract Upgrade				
Search				

2.1.2 Core Component Layer

The core component layer of Fortuna consists of structured smart contract, role definition and decentralized quote scheme.

1. Structured Smart Contract

In order to meet the special requirements of OTC derivatives market, Fortuna introduces structured smart contract with three layers including main contract layer, CoT (contract template) layer and contract layer. The structured smart contract design can improve the operational efficiency for contract creation, matching, signature and clearing by reducing the repetitive work. Moreover, there are two kinds of contract at the contract layer: PrC (Private Contract) and PuC (Public Contract). PrC trading mode will enable every user of Fortuna to launch a peer-to-peer derivative contract transaction

without any transaction cost. PuC trading mode offers opportunities for every user of Fortuna to be a market maker and create a new market for a new type of derivative which can bring profit for the creator related to the trading volume of the new derivative.

2. Role Definition and Interaction Design

Fortuna builds a healthy ecosystem through the role definition and interaction design. There are five functional roles of Fortuna which are CoT maker, Trader, Quoter, Market Maker and Delegate. Based on the motivation design with FOTA and the cooperation mechanism design of the five roles, the decentralized system for OTC derivative market can develop in a healthy and sustainable way.

3. Decentralized Quote Scheme

As a decentralized network for OTC derivatives market based on blockchain technology, Fortuna needs to support price quoting service which can provide the price of underlying assets for settlement and clearing of derivatives contracts. All the nodes on Fortuna can be a quoter node after the QNS (Quote Name Service) verification. Every quoter needs to be a member of a QC (Quote Corporation) in order to provide the price quoting service of some kinds of underlying assets. Every quoter has equities of a QC and will benefit from the profit of QC based on the equities owned. Moreover, an equity redistribution mechanism is introduced for motivating all the quoter nodes to fulfill their duties and prohibiting the exit scam[8] risk.

2.1.3 Platform Service Layer

1. CoT Creation

All the nodes on Fortuna can create its own CoT (contract template) and the CoT needs to confirm the underlying asset, deal structure and other elements of transaction. A CoT creator needs to deposit some FOTA to guarantee that it will not do something that is harmful for other nodes and the whole platform, such as creating a lot of useless CoT. A CoT creator will benefit from the commission related to the trading volume of the contracts under the CoT.

2. PrC Trading

Fortuna introduces a PrC (Private Contract) trading mode which will enable every

user of Fortuna to launch a peer-to-peer derivative transaction without any cost of agency. A PrC should define the settlement time, delivery price, margin ratio, price of derivative, short or long position and other elements of transaction.

3. PuC Trading

Fortuna introduces a PuC (Public Contract) trading mode which can offer opportunities for every user of Fortuna to be a market maker and create a new market for a new type of derivative contract which can bring profit for the creator related to the trading volume of the new contract. A PuC should define the settlement time, delivery price, margin ratio, price of derivative, market maker and other elements of transaction.

4. Market Making

A PuC will choose a node to be the market maker for itself and the market maker can earn the bid-ask spread from the market making activities. On the other hand, a market maker needs to deposit some FOTA to guarantee that it can provide liquidity for the market.

5. Price Quoting

A lot of Quote Corporations will provide price quoting service of underlying assets for the settlement of derivatives transaction in OTC market and will charge for service. All the quoters of a quoter corporation will benefit from the whole profit of the corporation based on the equities owned by quoters.

6. FVLS

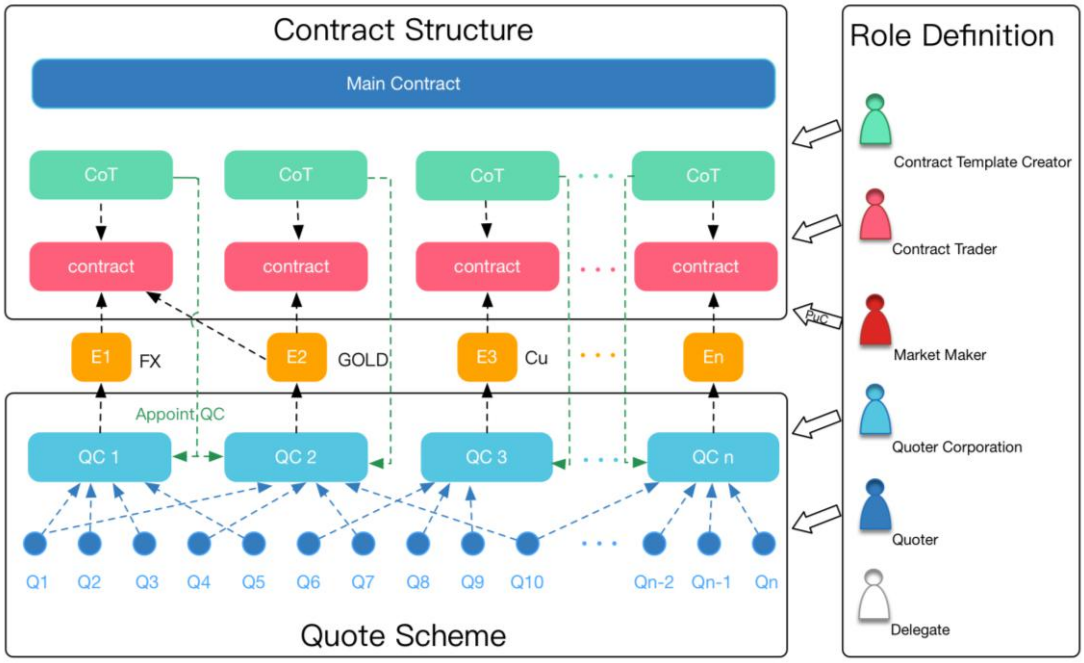
As a decentralized platform for hedging, the most important meaning of Fortuna is help investors to manage the risk of their portfolio. FOTA, as the only exchange medium of Fortuna, can help Fortuna to embrace the international liquidity regardless of physical and multi-currency barriers. However, the fluctuation of the value of FOTA will post a negative influence on the efficiency of risk management which will damage the meaning of hedging. Therefore, Fortuna introduces a kind of service which is called FVLS (FOTA value locking service). FVLS can help users to trade derivatives without the influence of the fluctuation of FOTA value and Fortuna will charge for FLVS at a reasonable level.

2.1.4 Application Layer

In order to provide great user experience, Fortuna will publish different versions of wallet and platform for PC, web and mobile phones to satisfy users' requirements about security, efficiency and availability. In addition, a light application allows users only need to download the head of the block instead of the whole block while supporting secure block access for user to create a CoT/PrC/PuC and trade the derivatives on Fortuna.

2.2 Fortuna Ecosystem

The whole ecosystem of Fortuna is as follows.



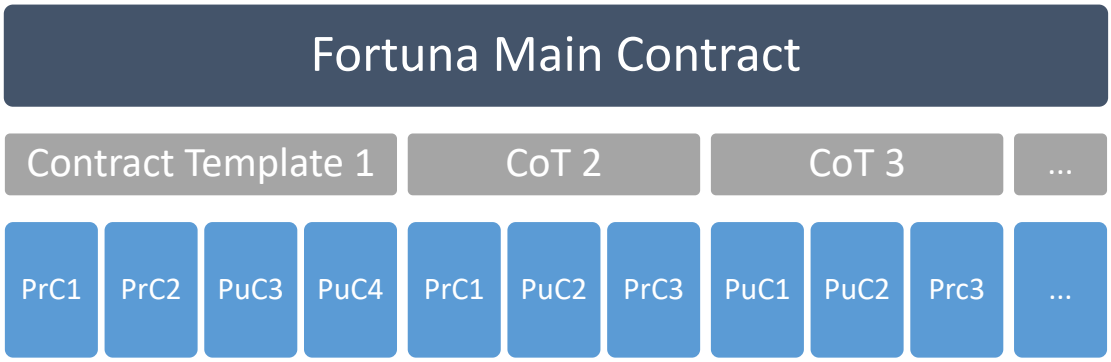
The whole ecosystem of Fortuna is built on Fortuna blockchain and three core components including structured smart contract, decentralized quote scheme, role definition and interaction design.

A CoT Maker can create all kinds of contract templates under the unified main contract. The CoT created will define the underlying asset, the deal structure and the chosen Quote Corporation. A Contract Trader can create a PrC and search for the counterparty to trade. Alternatively, a Contract Trader can create a PuC under a CoT to launch long or short trading activities with other nodes. A Quoter of a Quote Corporation

can provide price quoting service for one kind of underlying asset and the quoted price would be the basis for settlement of transactions. A Market Maker will provide liquidity for the PuC and the delegates elected by DPOSA consensus algorithm will produce blocks for storing data. Fortuna will develop in a healthy and sustainable way through the cooperation of all the roles and the motivation design based on FOTA as the punishment or reward.

2.3 Structured Smart Contract

The structured smart contract of Fortuna is as follows.



1. Fortuna Main Contract

The Fortuna Main Contract is the only main contract accepted by Fortuna and the clauses are similar to the main contract of NAFMII, SAC and other self-regulatory organization for OTC derivatives. Every trader on Fortuna will sign the main contract before they start trading activities and will come to an agreement about the constitution of contracts, efficacy level of contracts, duty of payment and delivery, definition of default, default management, definition of termination, interest, compensation, expense, arbitration and other non-transactional elements.

2. Contract Template

A Contract Template is called CoT and all the users of Fortuna can create their own CoT with different underlying assets (commodities, currencies, bonds, stocks, credit assets, crypto-tokens, events, etc.), deal structures (forwards, swaptions, American Options, European Options, LMSR[9], etc.), restrictive clauses and other core elements of transactions. Every CoT can produce a lot of contracts.

3. PrC

A Private Contract is called PrC and a PrC is a kind of derivative contract which is appropriate for peer to peer trading mode. PrC will inherit all the clauses of the corresponding CoT and will define the settlement time, delivery price, margin ratio, contract price, short/long direction and other elements of transaction. PrC has disadvantages of liquidity and matching efficiency, but it has the advantages of peer to peer trading and lower cost of agencies.

4. PuC

A Public Contract is called PuC and a PuC is a kind of derivative contract which is appropriate for N to N trading mode requiring the participation of market makers. The creator of the corresponding CoT is the market maker in default unless the creator choose another node to be the market maker for the PuC under the CoT. PuC will inherit all the clauses of the corresponding CoT and will define the settlement time, delivery price, margin ratio, contract price and other elements of transactions. PuC is very similar to the contracts traded in the derivatives exchange. However, the biggest difference between them is that the standardized contracts traded in exchange is designed and published by exchanges and no users can make changes. On the contrary, PuC are designed and created by users of Fortuna. Another big difference is that the commission of the standardized contracts traded in exchange is all for the exchanges while the commission of PuC will all belong to the CoT Creators. Therefore, although the PuC has the feature of great liquidity with market making, the PuC is a new type of derivative contract compared with the contracts traded at exchanges.

2.4 Role Definition

Five kinds of roles of Fortuna are as follows.

1. CoT Maker

- All the users could create their own CoT while defining the deal structure and underlying assets at liberty.
- A CoT Maker needs to assign a quote corporation to provide the price quoting service of the chosen underlying asset.

- A CoT Maker will benefit from the trading volume of the contracts under the CoT. This kind of mechanism will motivate CoT Maker nodes to create reasonable and popular CoT to gain more profits.
- A CoT Maker needs to deposit a certain amount of FOTA to guarantee that it will not damage the ecosystem of Fortuna, such as creating a lot of useless CoT.

2. Contract Trader

- All the users with FOTA can trade all kinds of derivatives on Fortuna to manage the risk of portfolio.
- All the users can choose a CoT and create a corresponding PrC or PuC to define all kinds of elements of transaction.
- All the users can trade with other users at a trust network based on blockchain technology.
- All the contract traders should deposit a certain amount of FOTA according to the margin ratio required by contracts.

3. Price Quoter

- All the users can apply to be a Quoter.
- A node can be a quoter only if it can pass the QNS verification (Quote Name Service, verify the efficiency of the interface provided by the quoter node for price quoting).
- A quoter node must attend at least one Quote Corporation to start providing price quoting services and pay a certain amount of FOTA for the equities of Quote Corporation.
- All the contracts will invoke a price quoting service provided by a Quote Corporation and a Quote Corporation will produce a Quote Matrix to calculate the final result through the SVD consensus algorithm.
- A Quoter will gain its proportion of profits of the corresponding Quote Corporation based on the equities owned.
- The equities of a Quote Corporation will redistribute based on the behaviors of the quoters of this Quote Corporation.

- A Quoter can sell its equities back to the corresponding Quote Corporation for FOTA when the quoter quit.

4. Market Maker

- Provides market making service for a PuC and needs to deposit a certain amount of FOTA as a margin.
- Market Maker makes profits through the bid-ask spread of market making.
- The creator of the corresponding CoT will be market maker in default.

5. Delegate

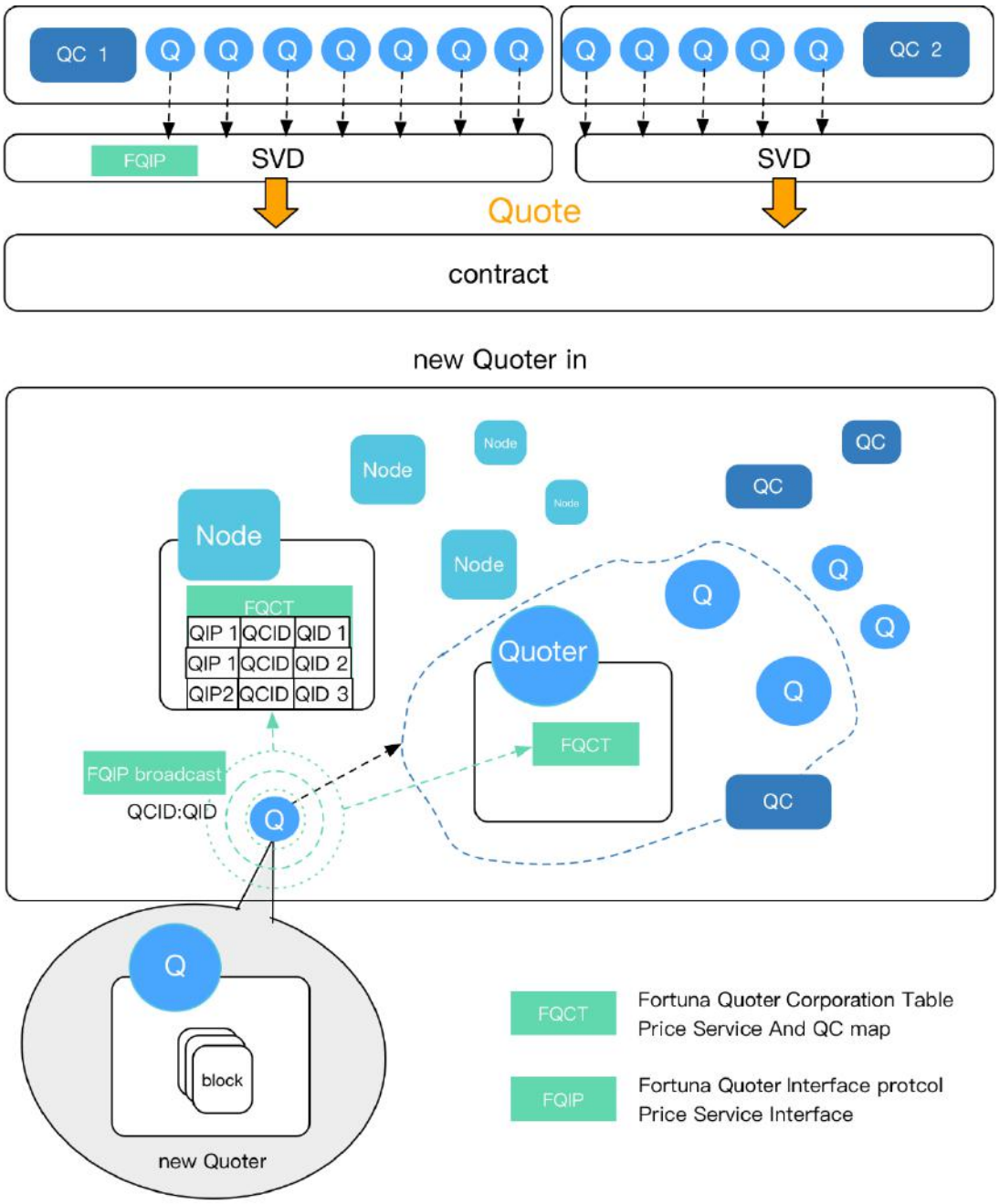
- A delegate can produce blocks as well as keep trading records. For each block produced, the delegate will be rewarded with a certain amount of FOTA.
- There are a total of 101 delegates in the whole network, which are elected based on the DPOSA algorithm.
- Until the contracts and quotes are written into the block, a delegate cannot view their contents.

2.5 Decentralized Quoting Scheme

The Quoting mechanism, a mechanism providing the current market price of underlying assets, needs to minimize risks from malicious entities and provide adequate incentives for quoters to post high-quality quotes at the same time. Fortuna is equipped with an SVD-based decentralized quoting mechanism that can prevent market manipulation from a small number of malicious entities in an effective way. In the meantime, it introduces “Quote Corporation”, which uses an incentive scheme that is analogous to corporate governance and equity redistribution, motivating quoters to provide high-quality quotes continuously. The detail mechanism is described below:

2.5.1 The Overall Scheme

The overall scheme of Fortuna’s decentralized quoting mechanism is as follows:



1. Joining a Quote Corporation

Every node in the network can become a quoter once certified by QNS (Quote Name Service). A quoter needs to join one or more Quote Corporation (QC) before it can post any quotes. A quoter can query the FQCT catalogue to find and join QCs that match the category of quoting services it provides. If no such QC exists, a QC of the new category will be automatically created.

2. Quote Corporation provide quoting services

In a certain cycle, when multiple smart contracts that using the same QC's quoting

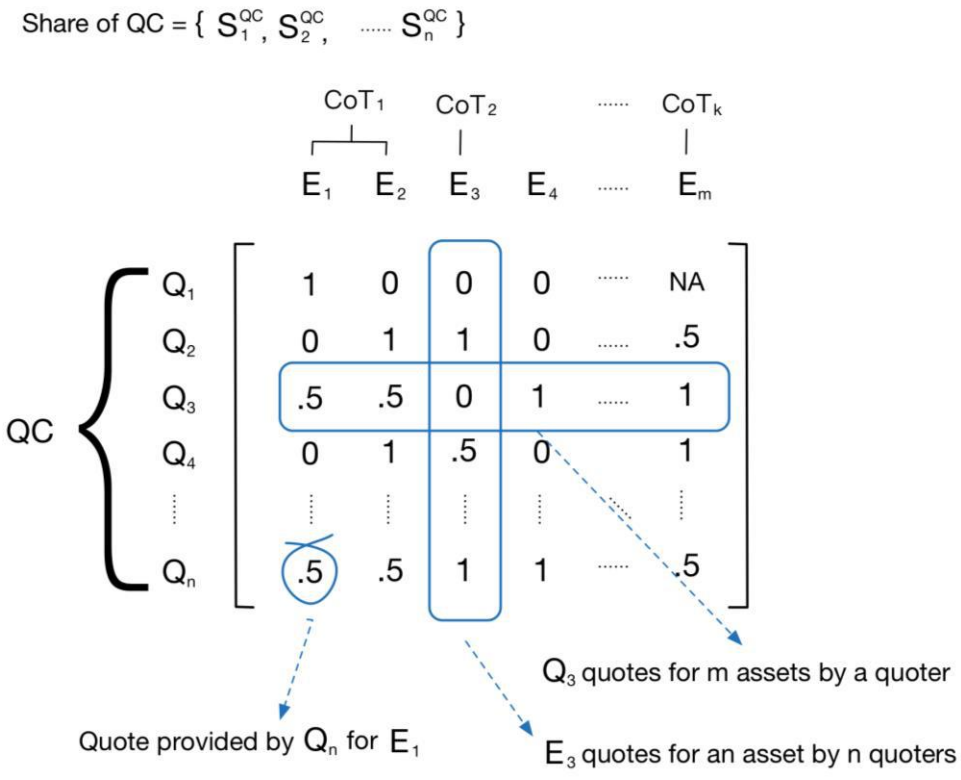
service matures, the quoters in this QC will provide independent quotes. The QC will compile a quote matrix using all the quotes provided for each underlying asset by all the quoters and obtain a consensus price using the SVD consensus algorithm. This consensus price will be used for contract fulfillment. The details of the SVD consensus algorithm will be described in later sections.

3. Dynamic redistribution of Quote Corporation equity

After each cycle, the consensus algorithm will determine the consensus quote as well as every quoter's impact weight in this cycle, which is used as an indicator of the quality of its quotes. Then the QC will set aside a certain amount of equity as to redistribute among all quoters according to their impact weights, motivating them to provide high-quality quotes actively. This equity redistribution mechanism will be detailed in later sections.

2.5.2 SVD-Based Consensus Algorithm

In each cycle, for a quote corporation that has n quoters and m underlying assets, a n by m quote matrix will be constructed by collecting all the quotes posted by every quoter for every underlying asset. The quote matrix is illustrated below.



QC：a Quote Corporation

Q_x：the quotes provided by the x-th quoter

E_y：the quotes received by the y-th underlying asset

S_x^{QC}：the equity share possessed by the x-th quoter

CoT_k：the k-th contract template

In the quote matrix above, each row corresponds to the quotes provided by a quoter to the m underlying assets and each column corresponds to the quotes received by the n quoters for an underlying asset. An SVD algorithm is applied on the quote matrix $Q_{\mathrm{n}\times m}$ to determine the consensus quotes and the impact weight of each quoter as follows.

Assume that there are k eigenvalues of $Q_{\mathrm{n}\times m}$，λ_{k} represents the k-th eigenvalues, x_k represents the k-th column of $Q_{\mathrm{n}\times m}$:

$$Q_{\mathrm{n}\times m}x_1 = \lambda_1 x_1$$

$$Q_{\mathrm{n}\times m}x_2 = \lambda_2 x_2$$

$$Q_{\mathrm{n}\times m}x_3 = \lambda_3 x_3$$

...

$$Q_{\mathrm{n}\times m}x_k = \lambda_k x_k$$

Then we can have:

$$U = [x_1, x_2\ x_3, \ldots\ x_k]$$

$$\Lambda = \begin{matrix} \lambda_1 & \ldots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \ldots & \lambda_k \end{matrix}$$

$$Q_{n\times m} \cdot U = U \cdot \Lambda$$

Then we can calculate the eigen decomposition of $Q_{\mathrm{n}\times m}$:

$$Q_{\mathrm{n}\times m} = U \cdot \Lambda \cdot U^{-1} = U \cdot \Lambda \cdot U^T$$

Assume there is a group of orthogonal basis $\{v_1, v_2, v_3 \ldots v_n\}$:

$$Q_{\mathrm{n}\times m}v_i \cdot Q_{\mathrm{n}\times m}v_j = (Q_{\mathrm{n}\times m}v_i)^T \cdot Q_{\mathrm{n}\times m}v_j = {v_i}^T {Q_{\mathrm{n}\times m}}^T \cdot Q_{\mathrm{n}\times m}v_j = 0$$

Which means $v_i{}^T \cdot v_j = v_i \cdot v_j = 0$

Then

$$u_i = \frac{v_i}{|Av_i|}$$

So we can have

$$Q_{\mathrm{n}\times m}[v_1\ v_2\ v_3 \ldots\ v_k|v_{k+1} \ldots v_n]\ =\ [u_1\ u_2\ u \ldots\ u_k|u \ldots u_n]$$

Finally

$$Q_{n\times m} = U\Sigma V^t$$

As

$$SVD(Q_{n\times m}) = U_{m\times m} \times \Sigma_{m\times n} \times V^*_{n\times n}$$

We can have

$d_{m\times 1} = U_{,1}$ we take the first row of U

Centralize $Q_{n\times m}$ which means calculate the mean value of each column of $Q_{n\times m}$

$$\mu_{n\times m} = J_{n\times 1} \cdot mean_{1\times m}(Q_{n\times m})$$

$$V^{norm}_{n\times m} = Q_{n\times m}\ -\ \mu_{n\times m}$$

$$c_{n\times 1} = V^{norm}_{n\times m} \times d_{m\times 1}$$

After normalization, each item of $c_{n\times 1}$ is positive and the weighed sum equals 1.

$$N_\chi = \frac{|\chi|}{\sum|\chi|}$$

Finally we can get N_χ which is the weight of the current result of Q_χ.

Based on this, we can get the consensus quotes of a Quote Matrix $Q_{\mathrm{n}\times m}$ for the settlement of transactions.

2.5.3 QC Equity Governance and Redistribution

QC equity can be bought by a quoter upon joining a QC. Correspondingly, it can also be sold upon exiting a QC. However, in order to ensure its integrity of an incentive for providing high-quality quotes, no QC equity is allowed to be traded between quoters. The only channel for it to flow between quoters is through the dynamic redistribution

after each cycle, which is based on the quality and frequency of the quotes provided by each quoter – a quoter with better performance will be rewarded with more equity. Below are the detailed rules for the redistribution:

Quote Corporation Updated Status for E_X

$$N^{QC\prime} = N^{QC} + 1$$

$$C^{QC\prime} = C^{QC} + M$$

$$S_X^{QC} = \frac{1}{N^{QC\prime}}$$

$$S_1^{QC\prime} = S_1^{QC} \times (100\% - S_X^{QC})$$

$$S_2^{QC\prime} = S_2^{QC} \times (100\% - S_X^{QC})$$

……

$$S_n^{QC\prime} = S_n^{QC} \times (100\% - S_n^{QC})$$

Quote Corporation Updated Status for C_Z

$$N^{QC\prime} = N^{QC}$$

$$C^{QC\prime} = C^{QC}$$

$$S_1^{QC\prime} = S_1^{QC} \times (100\% - \Phi) + W_1^Z \times \Phi$$

$$S_2^{QC\prime} = S_2^{QC} \times (100\% - \Phi) + W_2^Z \times \Phi$$

……

$$S_n^{QC\prime} = S_n^{QC} \times (100\% - \Phi) + W_n^Z \times \Phi$$

Quote Corporation Updated Status for O_Y

$$N^{QC\prime} = N^{QC} - 1$$

$$C^{QC\prime} = C^{QC} \times \left(100\% - S_Y^{QC}\right)$$

$$S_Y^{QC\prime} = 0$$

$$S_1^{QC\prime} = S_1^{QC} \div (100\% - S_Y^{QC})$$

$$S_2^{QC\prime} = S_2^{QC} \div (100\% - S_Y^{QC})$$

……

$$S_n^{QC\prime} = S_n^{QC} \div (100\% - S_n^{QC})$$

QC : a quote corporation

E_X : quoter X joins the QC

O_Y : quoter Y exits the QC

C_Z : the Z-th cycle of the consensus algorithm

M : the amount FOTA that needs to be paid to join the QC

N^{QC} : the number of quoters in the QC before the update

$N^{QC'}$: the number of quoters in the QC after the update

C^{QC} : the total amount of funds in the QC before the update

$C^{QC'}$: the total amount of funds in the QC after the update

S_X^{QC} : the fraction of equity shares possessed by quoter X before the update

$S_X^{QC'}$: the fraction of equity shares possessed by quoter X after the update

Φ : the fraction of equity shares used for redistribution after each cycle

W_X^Z : the impact weight of quoter X after the Z-th cycle

Below is a case example to help illustrate the rules described above:

Suppose $M = 1000FOT$ and $\Phi = 20\%$

1. Quoter A paid 1000 FOTA to set up a new QC for a certain category of underlying assets. And it owns 100% of the QC's equity shares.

2. Quoter B paid 1000 FOTA to join the QC. Quoters A and B now each owns 50% of total equity shares.

3. Quoter C paid 1000 FOTA to join and quoters A, B and C each owns one third of the total shares.

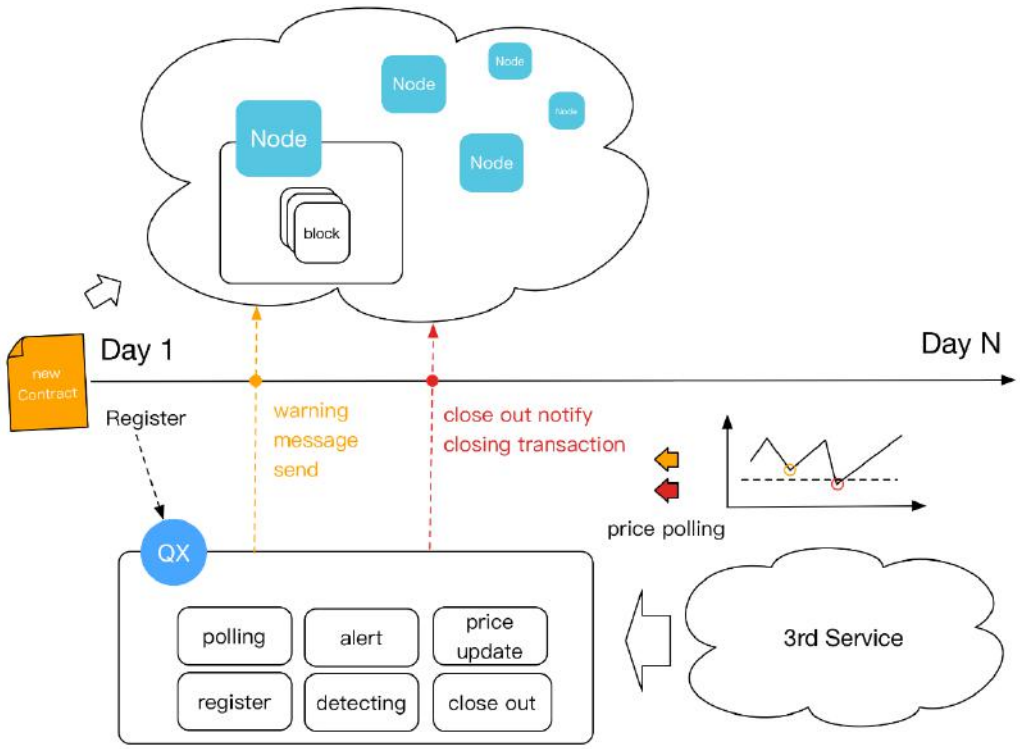
4. Quoter D also paid 1000 FOTA to join. Now A, B, C and D each owns 25% of the total shares.

5. Suppose at the end of cycle, quoters A, B, C and D ended up with impact weights of 40%, 30%, 20% and 10%, respectively. After the redistribution, their equity share percentages became 25%×(1-20%)+20%×40%=28%, 25%×(1-20%)+20%×30%=26%, 25%×(1-20%)+20%×20%=24% and 25%×(1-20%)+20%×10%=22%.

6. Quoter A exits the QC. Upon the exit, all of its equity shares would be bought back by the QC. Because the QC had a total fund of 4000 FOTA (paid by A, B, C and D upon their entry), the shares of A would be sold for 4000×28% = 1120 FOTA. These shares would be released to quoters B, C and D proportionally. In the end, the fraction of equity shares owned by B, C and D would be 36%, 33% and 31%.

2.5.4 Continuous Quoting and Close Out Alert

There are two types of quotes that a quoter can provide in terms of the contract trading structure: discrete and continuous. Under certain trading structure, the trading contract requires continuous quoting service in order to monitor the deposit accounts of both parties in real time and issue alert when they need close out. Therefore, Fortuna will rigorously scrutinize quoters who provide continuous quoting services to make sure they can provide robust and continuous services continuously. See the details in the figure below:



A quoter who provides continuous quoting/close out/alert services needs to closely monitor if there is any active contract that requires alert/close out. Let us call such a quoter QX. Below is how QX functions:

1. QX provides various types of continuous real-time services including registration, notification, real-time inquiry, close out check, etc;

2. QX will check if the current block contains deals that need to be alerted for close out and write them into the local contract list;

3. QX node will inquire third-party prices in real-time and compare with the alerted close out prices in the local contracts. If the alert/close out condition applies, the alert/close out will be executed immediately;

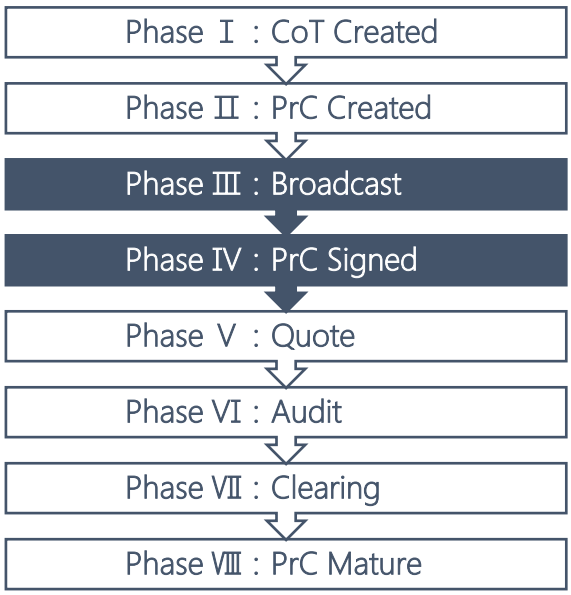
4. The deposit requirement can dramatically increase the cost of malicious activities and potentially minimize them.

2.6 Contract Life Cycle

Depending on their types, contracts have different life cycles. This section will describe the life cycles of PrC and PuC in detail.

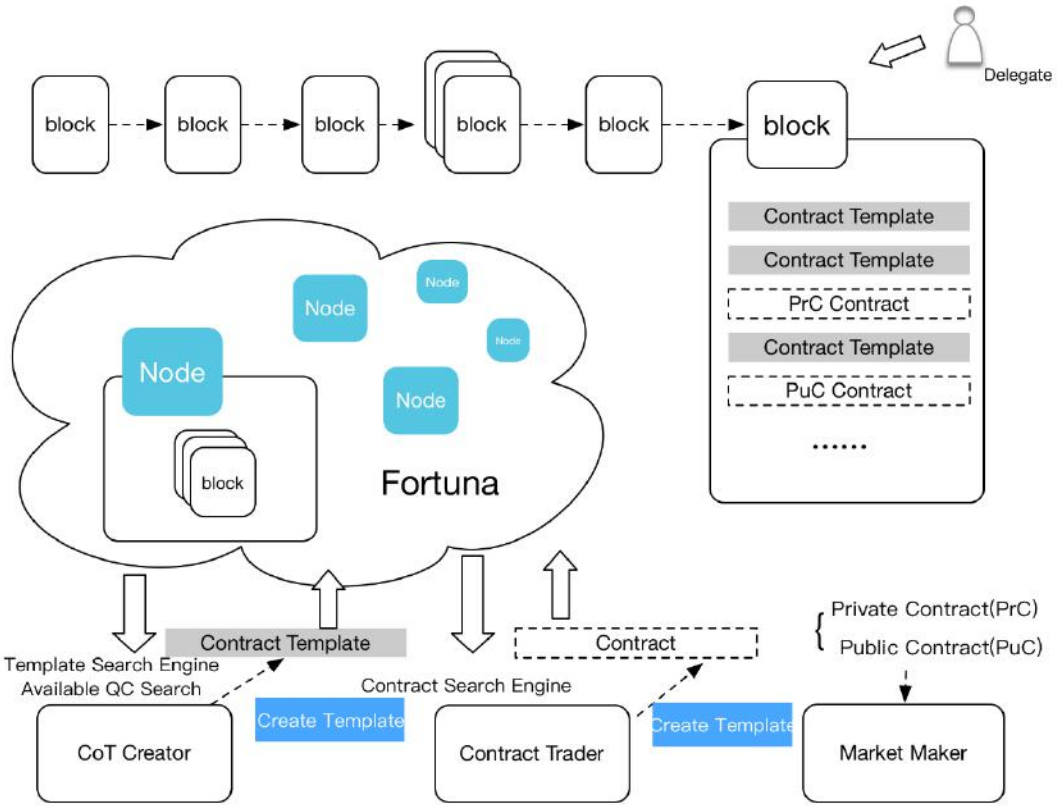
2.6.1 Life Cycle of PrC

PrC is useful for 1 to 1 or 1 to N customized contracts, its life cycle is shown in the picture below:



1. CoT Created: A contract template is created by the CoT maker, specifying the anchored underlying assets, deal structure and quote corporation. The template is submitted and will be written into a block. Until then, the template is be invisible.

2. PrC Created: Based on the template, a trader will create a concrete PrC, which defines various key elements of the deal such as the delivery time, deal price, unit, deposit percentage, contract price, trading direction, etc. The contract is submitted and written into a block. Until then, the contract is invisible, which is similar to creating a PrC contract template. Please see the figure below for illustration.



3. Broadcast: Inquiry and quoting are done by broadcasting over the whole network. Parties who are interested in the contract will respond to the broadcast. Inquiry will be broadcasted if the trading direction is specified as “buy-in” and quoting will be broadcasted if the trading direction is specified as “sell-out”.

4. PrC Signed: A party responds to the broadcast and signs the contract with its creator. Then both parties pay a certain amount of contract fee as well as deposits, which enacts the contract effectively.

5. Quote: Upon the delivery date specified in the PrC contract, the contract will utilize the quote corporation specified in its template and inquires the price for the corresponding underlying assets. The quote corporation will determine a consensus result based on the SVD algorithm and provide it for the contract fulfillment.

6. Audit: Both parties of the deal needs to confirm and agree on the contract fulfillment conditions. If either party refuses the conditions, it can request for an audit by all the nodes in the network. In this case, price inquiry will be done by all the nodes instead of the QC. Note that, the party who requested the audit will pay a certain amount of audit fee. However, if the audit is successful, the audit fee will be covered by the QC.

7. Clearing: After both parties confirmed the contract fulfillment conditions, they will clear the deal by paying off their balances. The deposits will be refunded to them after that.

8. PrC Mature: Upon the clearing, the contract finishes its life cycle. In the meantime, Fortuna will keep a record of the behaviors of all relevant entities of this contract, which can be used to construct a credit database.

2.6.2 Life Cycle of PuC

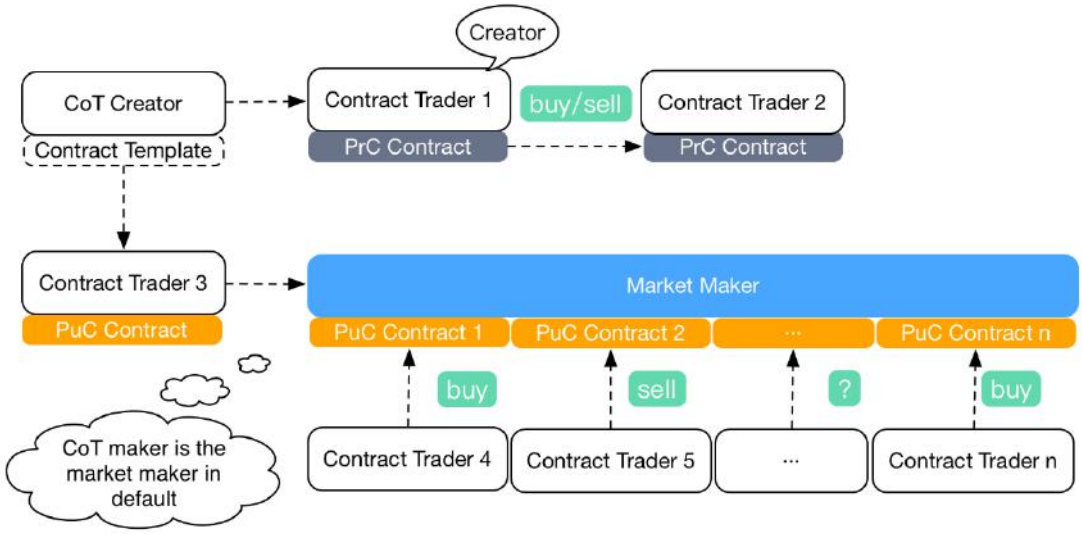
PuC contracts are useful for N to N risk hedging deals and require market makers in the deal. Their life cycles are very similar to those of PrC contracts, with some differences in the 3rd and 4th phases. The 3rd and 4th phases of a PrC are broadcasting of inquiry/quoting and contract signing which are suitable for direct signing the 1 to 1 or 1 to N customized contracts. However, the 3rd and 4th phases of a PuC provide initial liquidity of market makers and open the floor for whole network trading, which is essentially an N to N market maker trading mode.

1. CoT Created: A contract template is created by the CoT maker, specifying the anchored underlying assets, deal structure and quote corporation. The template is submitted and will be written into a block. Until then, the template will be invisible.

2. PuC Created: Based on the template, a trader will create a concrete PuC, which defines various key elements of the deal such as the delivery time, deal price, unit, deposit percentage, contract price, trading direction, etc. This contract will also specify its market maker (it will be the creator of the contract by default).The contract is submitted and written into a block. Until then, the contract is invisible.

3. Market Making: The market maker designated by the PuC pays the liquidity deposit and provide market making service for the deals specified in the PuC. The market maker needs to refill the deposit account once its balance is too low. The market maker can earn profit through the ask-bid spread of market making activities.

4. Trading: Any user with FOTA on the platform can participate in the trading specified by the PuC. To participate, a user needs to pay certain amount of deposit and transaction fee. The main difference between the life cycles of PuC and PrC contracts lies in the market making and trading phases. The former follows the market maker trading mode, in which all users can participate in the trading with market makers; the latter uses whole network broadcasting for quoting and inquiry. Once two parties are matched during the broadcasting, a 1-to-1 customized contract will be signed between them. This difference is illustrated in the figure below:



5. Quote: Upon the delivery date specified in the PuC contract, the contract will utilize the quote corporation specified in its template and inquires the price for the corresponding underlying assets. The quote corporation will determine a consensus result based on the SVD algorithm and provide it for the contract fulfillment.

6. Audit: Both parties of the deal needs to confirm and agree on the contract fulfillment conditions. If either party refuses the conditions, it can request for an audit by all the nodes in the network. In this case, price inquiry will be done by all the nodes instead of the QC. Note that, the party who requested the audit will pay a certain amount of audit fee. However, if the audit is successful, the audit fee will be covered by the QC.

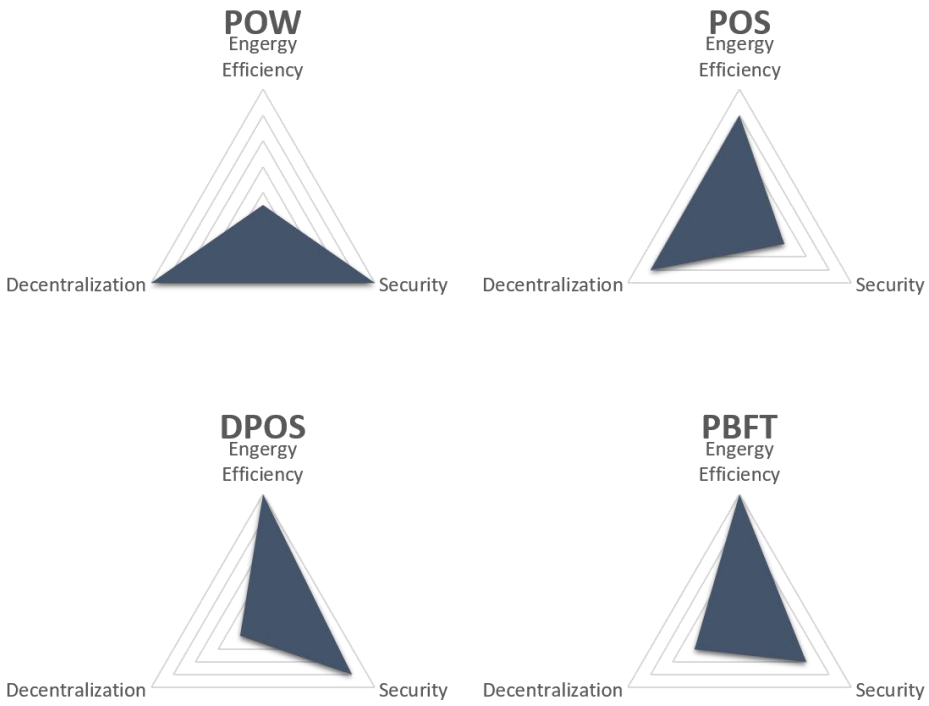
7. Clearing: After both parties confirmed the contract fulfillment conditions, they will clear the deal by paying off their balances. The deposits will be refunded to them after that.

8. PuC Mature: Upon the clearing, the contract finishes its life cycle. In the meantime, Fortuna will keep a record of the behaviors of all relevant entities of this contract, which can be used to construct a credit database.

2.7 DPOSA Consensus Algorithm

To ensure the security and orderliness of the whole block chain, a block can only be generated upon certain consensus. The consensus algorithm is one of the key elements of a block chain. In terms of the choice of the consensus algorithms, block chains face the same challenge of all distributed systems - the *CAP*[10] principle, i.e., only two of the three following properties can be achieved at the same time: Consistency, Availability and Partition-Tolerance.

Correspondingly, all block chains can only excel two of the following three aspects: energy efficiency, decentralization and security. The commonly used consensus algorithms are POW, POS, DPOS and PBFT. Their performances in terms of these three aspects are shown below:



- **POW:** Proof of Work, generate a new block through massive hash computations which result in an appropriate random number. This is most secure mechanism. But it also comes with the highest energy cost.
- **POS:** Proof of Stake, reduces the difficulty for block generation according to the amount and time of tokens possessed, which also greatly reduces the energy cost of POW. However, its security is sacrificed and is susceptible to bifurcation.
- **DPOS:** Delegate Proof of Stake. A certain number of delegates are elected by voting. These delegates will generate blocks in a certain sequence, which greatly reduced the number of verification nodes that are needed. In this mechanism, deal verification is greatly accelerated with no sacrifice of security. However, the system becomes more centralized.
- **PBFT:** Practical Byzantine Fault Tolerance. No token is required in this mechanism, making it suitable for alliance chains.

After weighing all the pros and cons, Fortuna decides to use an improved hybrid DPOS algorithm for consensus determination, establishing a secure and efficiency consensus mechanism. Besides increased centralization, DPOS has another obvious problem: the voting rights are controlled by users with more FOTA, which marginalized the roles of other users with less FOTA. To overcome this issue, Fortuna introduced an

active index, to reflect how active a user is on the platform. This purpose of this active index is to 1) encourage the active participation of users; 2) balance their financial contribution and activeness contribution. The active index is calculated as follows.

$$UL = TL + AL$$

$$TL = N^{CoT} + N^{PrC} + N^{PuC} + N^{MM}$$

$$AL = N^{SA} - N^{FA}$$

UL：user activeness；

TL：trading activeness；

AL：arbitrage activeness；

N^{CoT}：number of CoT created，the CoT has to be used for at least one deal；

N^{PrC}：number of deals cleared under PrC contracts；

N^{PuC}：number of deals cleared under PuC contracts；

N^{MM}：number of times serving as a market maker；

N^{SA}：number of times that the consensus result agrees with the arbitrage result；

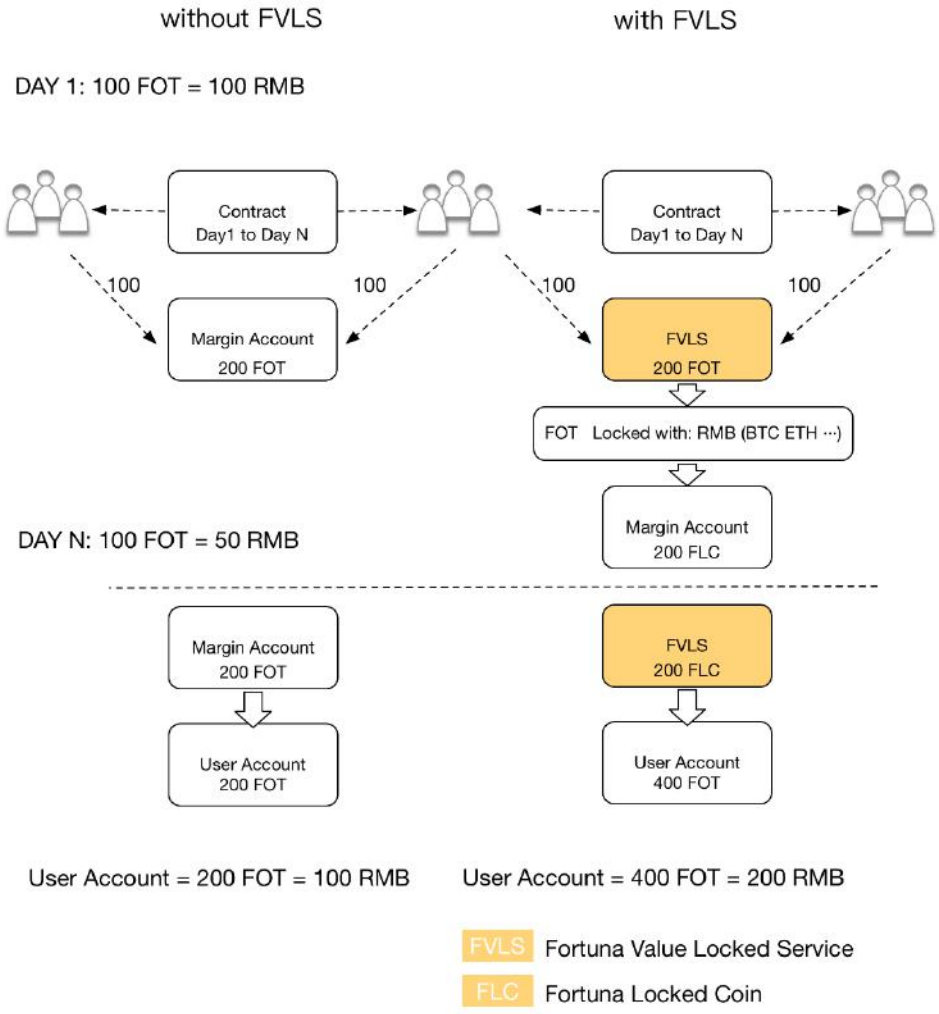
N^{FA}：number of times that the consensus result differs from the arbitrage result.

The 101 delegates elected according to the DPOSA in each round will reach an agreement on the block generation sequence (2 / 3 of the nodes need to reach agreement) before the blocks are generated. Unless more than 1 /3 of the delegates collaborate to sabotage the system, no bifurcation will occur.

2.8 FOTA Value Locking Service

As a distributed risk hedging block chain platform, the purpose of Fortuna is to achieve rational risk management through decentralization. However, as the only medium used on the Fortuna platform, FOTA is actively traded on the secondary market as a digital asset. It will cause devastating damage to the risk hedging trades if its value is unstable. Therefore, Fortuna introduces the FOTA Value Locking Service (FVLS) to

make sure risk hedging trades can be completed under the stable FOTA value. We use the exchange rate between FOTA and RMB as an example to illustrate FVLS. Suppose user A and B signed a simple risk hedging contract: each of them pays 100 FOTA as deposit. A will earn 100 FOTA if its expectation is right, it will lose 100 FOTA otherwise. The trading modes with and without FVLS are as follows.



1. Hedging without FVLS

In this case, upon the maturity of the contract, if A's judgement is correct, it will earn 100 FOTA. A receives 200 FOTA (profit and deposit). But because FOTA devalued 50% against RMB, the 200 FOTA still worth the same as the 100 FOTA that was paid before the deal. Effectively, user A did not profit nor lose.

2. Hedging with FVLS

In this case, the exchange rate between FOTA and RMB will be locked by Fortuna until the delivery date of the contract. In the above scenario, when A receives the 200

FOTA, Fortuna will offer 200 extra FOTA to user A in order to offset the loss due to change of exchange rate between FOTA and RMB. The FLVS makes sure users can hedge without being affected by the fluctuation of FOTA value.

When providing FVLS, Fortuna will execute trades at the opposite position in the secondary market to achieve dynamic risk hedging and control the overall risk in the platform. A certain amount of fee needs to be paid by the user for this service.

2.9 Compliance Filter

For the purpose of compliance and sustainable development, Fortuna will set up a compliance filter. Its details are as below:

1. Types of filter rules: the categories of compliance filters includes ID type (filter based on the ID of a certain contract template), asset type (filter by the type of underlying assets), deal attribute type (filter by a certain attribute of the deal, for example, the lower limit of the deposit fraction), entity type (filter by the entities in the deals, i.e. blocking any deal with a certain entity)

2. Enactment/Invalidation of filter rules: a compliance filter rule needs the agreement by the whole network to enact. Certain rules may be invalided under certain circumstances, such as setting up error, reopening.

Upon the enactment of the compliance filter rules:

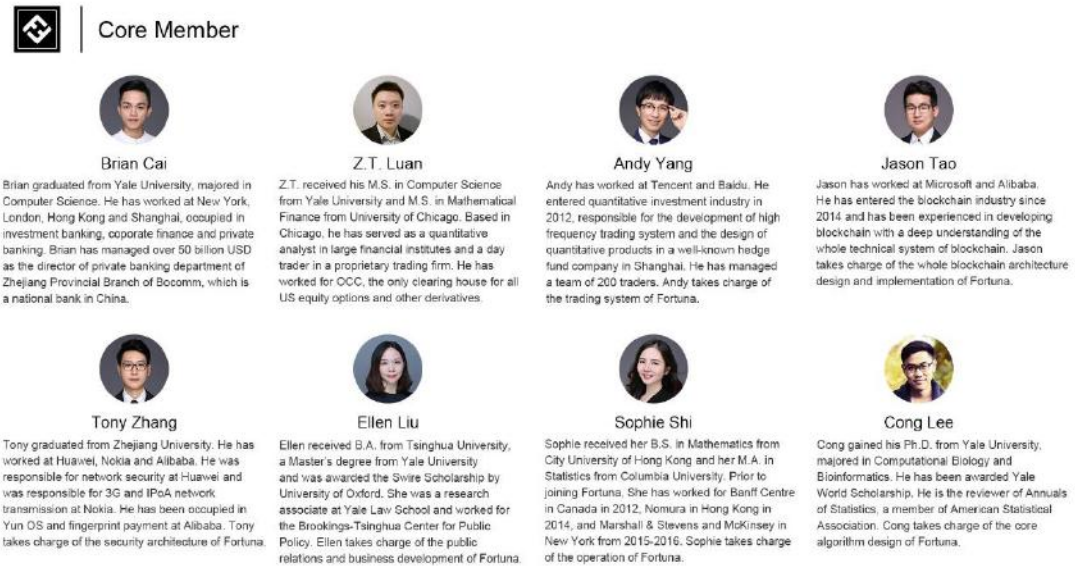
1) The rules will be added into the blocks. Before a new template is created, the platform will query these rules. If any rule is matched, the contract template cannot be created.

2) After each iteration of the compliance filter rules, the platform will scan all existing contract templates. Any template that are not compliant will be removed.

We think that a comprehensive compliance filter system is the foundation for the sustainable development of Fortuna. Therefore, as our business grows, we will update this system in a timely manner, keeping the platform thrive on a healthy, lawful and compliant track.

3. Project

3.1 Core Member



Core Member: Brian Cai

Brian graduated from Yale University, majored in Computer Science. He has worked at New York, London, Hong Kong and Shanghai, occupied in investment banking, corporate finance and private banking. Before launching Fortuna, he was managing over 50 billion USD as the director of private banking department of Zhejiang Provincial Branch of Bocomm, which is a national bank in China. Brian takes charge of the strategy design and implementation of Fortuna.

Core member: Z.T. Luan

Z.T. received his M.S. in Computer Science from Yale University and M.S. in Mathematical Finance from University of Chicago. Based in Chicago, he has served as a quantitative analyst in large financial institutes and a day trader in a proprietary trading firm. He has worked for OCC, the only clearing house for all U.S. equity options and other derivatives. Z.T. takes charge of the functional optimization of Fortuna.

Core member: Andy Yang

Andy has worked at Tencent and Baidu. He entered quantitative investment industry in 2012, responsible for the development of high-frequency trading system and the design of quantitative products in a well-known hedge fund company in Shanghai. He has managed a team of 200 traders. Andy takes charge of the trading system design of Fortuna.

Core Member: Jason Tao

Jason has worked at Microsoft Research Asia, Alibaba Cloud, Taobao and other famous enterprise. He was responsible for developing the Yun Operating System during the working period of Alibaba Cloud and responsible for developing IVR technology and CRM platform during the working period of Taobao. Jason has entered blockchain industry since 2014 and has a lot of experience of developing blockchain with a deep understanding of the whole technical system of blockchain. Jason takes charge of the whole architecture design and implementation of Fortuna.

Core Member：Tony Zhang

Tony gained his Master degree from Zhejiang University. He has worked at Huawei, Nokia, Alibaba Cloud, Alipay and Taobao. He was responsible for the network security including the hardware firewall and UTM during the working period of Huawei and was responsible for 3G and IPoA network transmission during the working period of Nokia. He has been occupied in the development of Yun Operating System at Alibaba Cloud and took charge of the implementation of fingerprint payment of Alipay. With a lot of experience on network security, Tony takes charge of the security mechanism design and implementation of Fortuna.

Core Member: Ellen Liu

Ellen received her B.A. from the School of Journalism and Communication, Tsinghua University. She held a Master's degree from Yale University and was awarded the Swire Scholarship by St Antony's College, the University of Oxford. She was a research associate at the Paul Tsai China Center of Yale Law School and worked for the Brookings-Tsinghua Center for Public Policy. Ellen takes charge of the public relations and business development at Fortuna.

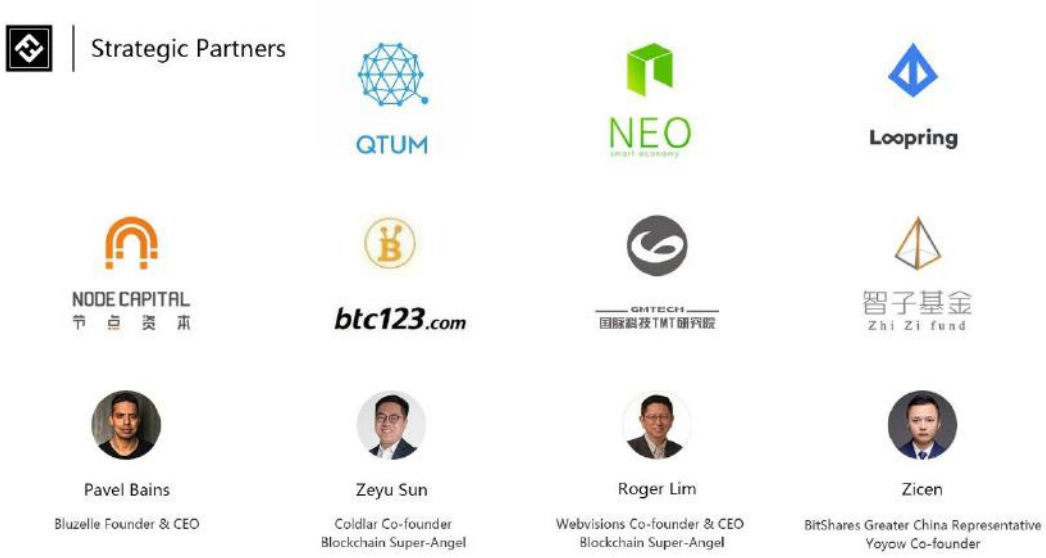
Core Member: Sophie Shi

Sophie received her M.A. in Statistics from Columbia University. Prior to joining Fortuna, she has worked for Banff Centre in Canada in 2012, Nomura in Hong Kong in 2014, and Marshall & Stevens and McKinsey in New York from 2015-2016. Sophie takes charge of the operation of Fortuna.

Core Member: Cong Lee

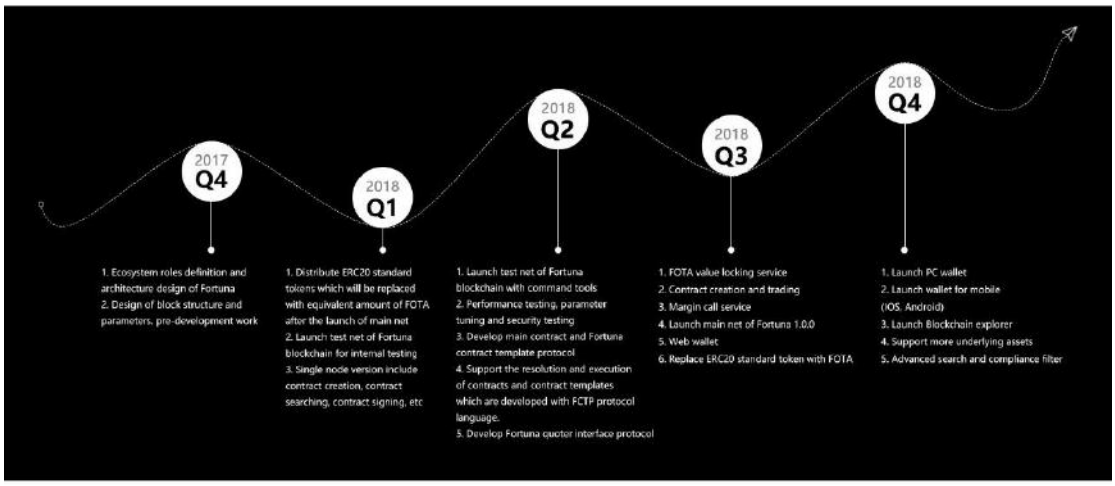
Cong gained his Ph.D. from Yale University, majored in Computational Biology and Bioinformatics. He has been awarded Yale World Scholarship and Yale Graduate Student Travel Award. He is the reviewer of Annals of Statistics, a member of American Statistical Association, a member of international biometric society. With a profound algorithm and statistics basis, Cong takes charge of the core algorithm design of Fortuna.

3.2 Strategic Partners



3.3 Roadmap

Roadmap



3.4 FOTA Allocation Plan

FOTA ALLOCATION PLAN

FOTA ALLOCATION PLAN		
Proportion	Plan	Detail
40%	Token Generation Event	400 million FOTA will be distributed through the whole token generation event. The BTC/ETH/QTUM/NEO raised through TGE will be used for research, development, operation and promotion of Fortuna. If 400 million can't be distributed completely, the rest of those FOTA will be distributed proportionally to the community members who attend the TGE, according to the FOTA they have.
30%	Foundation	300 million FOTA will be stored in the community foundation which is founded in Singapore. 20% will be unlocked immediately after the release of Fortuna platform. After that, circulation-restricted FOTA will be unlocked by 20% every year for the following 4 years. Here the capital is mainly used for: 1. Upgrade and improvement of Fortuna. 2. Business development. 3. Promotion of Fortuna. 4. FOTA Value Locking Service for clients. 5. Investment, merger, acquisition of projects or companies for Fortuna-based ecosystem.
15%	Team Rewards	150 million FOTA will be the rewards to team and will be unlocked by 50 million FOTA every year for the following three years.
15%	Marketing	150 million will be mainly used for general marketing, general partnership development, general public relations works, market value management for FOTA, etc.

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