

Torah

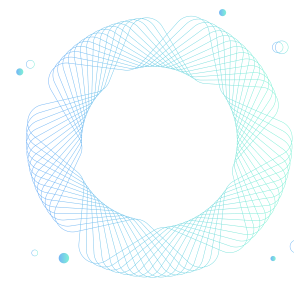


# Torah

white paper

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## Background of the project

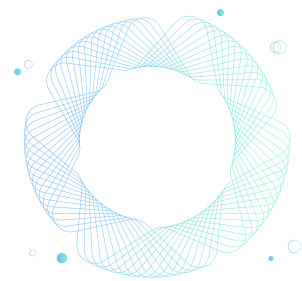
### The origin of blockchain

The concept of Bitcoin was first proposed by Satoshi Nakamoto on November 1, 2008, and was officially born on January 3, 2009.

The global financial crisis broke down in 2008. On November 1st of the same year, a person who claimed to be Satoshi Nakamoto published a Bitcoin white paper "Bitcoin: A Peer-to-Peer Electronic Cash System" on the P2P foundation website, stating his views on electronic money. A new idea-Bitcoin is here. On January 3, 2009, the Bitcoin genesis block was born.

According to Satoshi Nakamoto's ideas, the open source software is designed and released and the P2P network is constructed on it. Bitcoin is a virtual encrypted digital currency in the form of P2P. Point-to-point transmission means a decentralized payment system.

Unlike all currencies, Bitcoin does not rely on specific currency institutions to issue. It is generated through a large number of calculations based on specific algorithms. The Bitcoin economy uses a distributed database composed of many nodes in the entire P2P network to confirm and record all transaction behaviors. And use the design of cryptography to ensure the security of all aspects of currency circulation. The decentralized nature of P2P and the algorithm itself can ensure that the value of the currency cannot be manipulated through the large-scale production of Bitcoin. The design based on cryptography allows Bitcoin to be transferred or paid only by the real owner. This also ensures the anonymity of currency ownership and circulation transactions. The biggest difference between Bitcoin and other virtual currencies is that its total amount is very limited and its scarcity.



Compared with legal currency, Bitcoin does not have a centralized issuer, but is generated by the calculation of network nodes. Anyone can participate in the manufacture of Bitcoin, and it can be circulated all over the world, and it can be on any computer connected to the Internet. In trading, no matter where you are, anyone can mine, buy, sell, or collect bitcoin, and outsiders cannot identify the user's identity information during the transaction. On January 5, 2009, Bitcoin, which is not controlled by the central bank or any financial institution, was born. Bitcoin is a kind of digital currency, which is composed of a string of complex codes generated by a computer. New Bitcoins are manufactured through a preset program.

Blockchain technology, one of the underlying technologies of Bitcoin, has received increasing attention. In the process of Bitcoin formation, blocks are storage units one by one, recording all the communication information of each block node within a certain period of time. Each block is linked by random hashing (also known as a hash algorithm). The next block contains the hash value of the previous block. With the expansion of information exchange, a block and a block are successively connected. The result is called a blockchain.

Simply put, blockchain is a new application model of computer technology such as distributed data storage, point-to-point transmission, consensus mechanism, and encryption algorithm. Blockchain is an important concept of Bitcoin. It is essentially a decentralized database. At the same time, as the underlying technology of Bitcoin, it is a series of data blocks that are related to each other using cryptographic methods. The data block contains a batch of Bitcoin network transaction information, which is used to verify the validity of the information (anti-counterfeiting) and generate the next block.

From a technological perspective, blockchain involves many scientific and technological issues such as mathematics, cryptography, the Internet, and computer

programming. From an application perspective, in simple terms, the blockchain is a distributed shared ledger and database, which has the characteristics of decentralization, non-tampering, traces throughout the process, traceability, collective maintenance, and openness and transparency. These characteristics ensure the "honesty" and "transparency" of the blockchain and lay the foundation for the creation of trust in the blockchain. The rich application scenarios of the blockchain are basically based on the ability of the blockchain to solve the problem of information asymmetry and realize the cooperative trust and concerted action between multiple subjects.

Before the development of decentralized applications (DApp), blockchain storage can compete for the market from the existing centralized storage. It is very rare in blockchain applications to compete for the market with centralized applications on the basis of quality and price. For users, if blockchain storage is used as persistent storage, data reliability and service stability are more than ten thousand times higher than that of centralized storage, and it also contains very expensive disaster tolerance and anti-DDos features. The price is only a fraction of that of centralized storage without disaster tolerance and anti-DDos features. In other words, quality surpasses luxury goods and prices are lower than counterfeit goods. Blockchain storage as a persistent storage also has a disadvantage, that is, its poor performance, which is mainly reflected in the latency (Latency) index (the total system throughput index can be stacked by the number of nodes), which is due to the large network transmission Caused by the delay. Nevertheless, it does not prevent blockchain storage from having an overwhelming advantage in the field of persistent storage. This is because storage is inherently layered, and each layer serves as the next layer of cache. The higher the level, the better the performance and the higher the unit price. Expensive, the smaller the capacity, the lower the performance, the lower the unit price, and the larger the capacity.

The blockchain is the last layer of persistent storage, and there can be several layers of centralized storage as local caches (hard disk, SSD, 3DXPoint, memory, L3 cache, L2 cache, L1 cache, etc.). This kind of tiered storage system is already existing. After blockchain storage is available, it is nothing more than adding the most reliable, cheapest, largest and slowest tier, such as increasing from 7 to 8 tiers. In the field of network acceleration (CDN), blockchain storage has unparalleled performance advantages due to the large number of nodes and proximity to users, and the cost is also lower. At present, the market for centralized storage composed of enterprise-level storage represented by Dell-EMC/NetApp/HDS/IBM/HP and cloud storage represented by AWS/Google/Microsoft is more than 60 billion US dollars per year, and global data The total is doubling every 27 months (the above data is sourced from Gartner). Blockchain storage has an overwhelming advantage over existing centralized storage in both persistent storage and network acceleration. The market size of these two fields reaches tens of billions of dollars.

The Internet of Everything needs a low-cost database that can store massive amounts of data. In the past thirty years, with the development of the Internet, we have entered the digital age from the material age and the analog signal age, and informatization and digitization have become a wave sweeping everything. , Changing the productivity of every existing industry in human society, along with the process of digitization, data, as a by-product that must exist, has become an increasingly large existence.

In 2010, we created 1ZB of data, and in 2016 we created 16ZB of data. According to forecasts, in 2025, we will produce 160ZB of data. Data will play a huge role in future economic activities and will affect every enterprise, government agency and individual consumer. Large organizations are increasingly realizing that data itself is an asset of strategic value. Data is gradually forming a digital world independent of the physical world.



However, the value of data today has not been fully utilized. According to a report by the Queen of the Internet, Mary Meeker, of the data we currently generate, 7% of the data that can be stored, only 1% of the data that can be analyzed, and other data are in The situation of being discarded. The main reason is that the growth rate of centralized data storage and analysis computing power is far behind the growth rate of data itself, and the price of centralized computing power is too high.

Today, machines have replaced humans as the main source of data production. If we want to make full use of the ability of humans to generate data, we must rely on the distributed and decentralized fog computing architecture to integrate more decentralized storage and calculations. Human resources are connected to process these ever-increasing data. In the current decentralized architecture of the blockchain field, there are only a few peer-to-peer file storage systems. There is no data storage and management system. The latter is the Torah project. The first meaning. The Torah project can provide cryptocurrency incentives, reward miners who provide computing and storage capabilities, and connect numerous devices with weak computing power to form a low-cost distributed data storage and computing network. Through this structure, the Torah platform can store, calculate, and trade data with a low unit value but a huge total value. In particular, the data on the Torah platform has time series attributes, and the value of time series data generally decays with the passage of time. Therefore, the owner of the data can freely choose the storage time through smart contracts, and different storage times correspond to different prices. .

## The challenge

### **Encryption high energy consumption problem**

On January 3, 2009, the first creation block with serial number 0 was born. A few days later, a block with serial number 1 appeared on January 9, 2009, and it was connected with the genesis block with serial number 0 to form a chain, marking the birth of the blockchain.

Using a computer to perform a large number of calculations in accordance with the algorithm to "mine" Bitcoin, called the PoW incentive layer, and Bitcoin is the representative of the POW incentive layer.

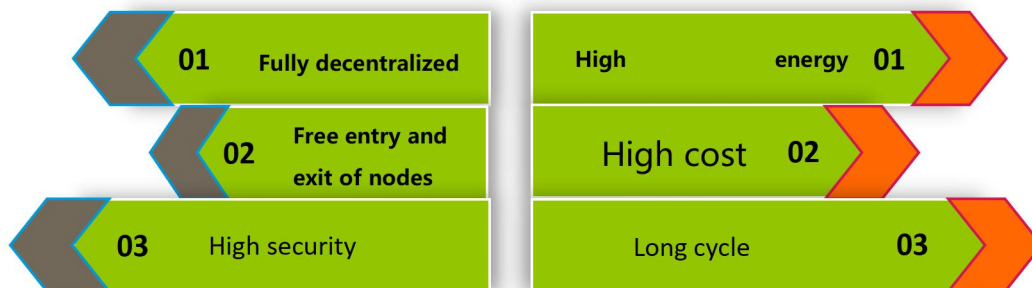
The full name of PoW is Proof of Work, which is proof of work, also known as the incentive layer. The miners use the incentive layer equipment to do a certain degree of difficulty to calculate a hash number, and the verifier can easily verify whether the result is correct. The miner who calculates this hash number will get the accounting right of the block and can get a certain amount of handling fee, that is, the miner's fee. Therefore, the PoW incentive layer continuously packs and calculates new blocks, and then continues the process of generating Block Chains. The verification process is like factorization. A number is obtained by multiplying multiple values. Given this value, let us calculate which number the value is obtained by multiplying, and the CPU must perform corresponding calculation checks to find out The corresponding calculation method has a certain degree of difficulty, and the verification is much simpler. Of course, the calculation process of pow is much more difficult than factorization.

In PoW, the accounting power of the blockchain is proportional to the computing power of the node, that is, the stronger the computing power, the greater the probability of mining. With the increase in the number of miners, the difficulty of the

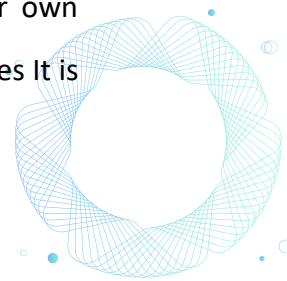


incentive layer is getting bigger and bigger. Take Bitcoin as an example. When Satoshi Nakamoto created the first creation block and received a reward of 50 Bitcoins, the number of people in the incentive layer was relatively small, and the CPU computing power of a computer accounted for the computing power of the entire network (The computing power of the entire network refers to the total computing power of all incentive layer devices in a digital currency chain). The ratio is relatively large, and the probability of mining with only one computer is relatively large. Later, the number of people in the incentive layer increased, and the computing power of the entire network continued to increase. The only way to pack a block in about ten minutes is to increase the nonce of the block. In order to increase the income of the incentive layer, the subsequent mining machines, mining pools, and mining farms, and the income of miners are also distributed according to the miners' contribution value, which guarantees the income of the incentive layer to the greatest extent.

Advantages of the PoW incentive layer: Complete decentralization, free entry and exit of nodes, as far as Bitcoin is concerned, the entire network has a strong computing power and guarantees security.



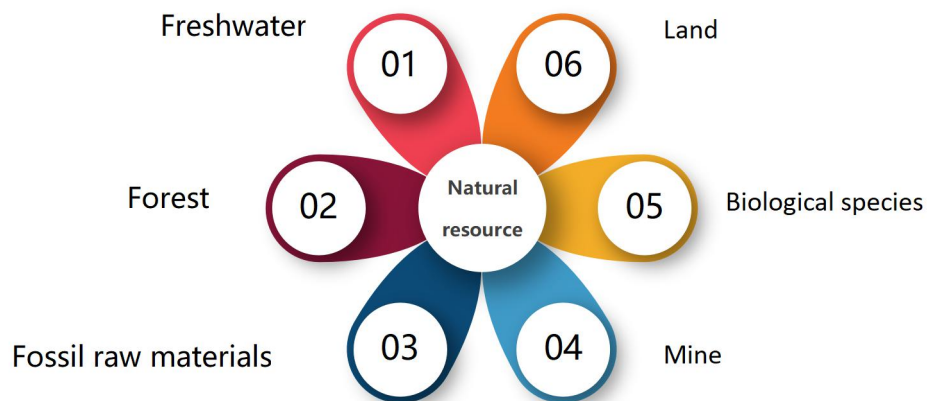
Disadvantages of the POW incentive layer: Bitcoin has attracted most of the global computing power. It is difficult for other blockchain applications that use the PoW consensus mechanism to obtain the same computing power to ensure their own security, and the high energy-consuming incentive layer creates a lot of resources It is



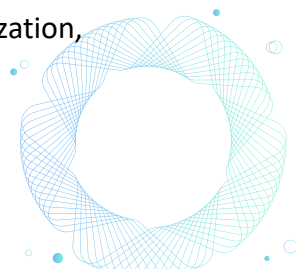
wasteful, and the consensus-reaching cycle is long, which is not suitable for commercial applications.

### **Sustainability and carbon neutrality and energy issues**

The earth provides the material materials needed by human beings for clothing, food, shelter, transportation, and medicine, which are called earth resources. There are six main types of important natural resources on land. They are: freshwater, forests, land, biological species, mines, and fossil fuels (coal, oil, and natural gas). Natural resources are divided into two categories: renewable and non-renewable. Renewable natural resources refer to substances that can continuously regenerate themselves under the action of sunlight. The most typical renewable resources are: plants, biomass energy, solar energy, wind energy, etc. The main non-renewable natural resources are: oil, coal, natural gas and all other mineral resources. They took hundreds of millions of years to form, so they are not renewable.



Since humans appeared 3 million years ago, walked out of Africa 150,000 years ago, and the Quaternary Ice Age ended 10,000 years ago, humans entered the agricultural era, with a population of about 4 million, and cities appeared accordingly, and the population finally began to grow slowly. In one year, the population was about 200 million. In 1800, human beings were already in the period of industrial civilization,



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and the population reached 1 billion. But the real big outbreak will be in the 150 years from 1900 to 2050, from one billion to 10 billion. In 2070, 50 years later, population growth will no longer be significant.

The following is the data of population growth in the past two hundred years

In 1800, the global population was 1 billion

In 1927, 2 billion

In 1959, 3 billion

In 1975, 4 billion

In 1987, 5 billion

In 1999, 6 billion

In 2011, 7 billion

In 2020, 7.8 billion

Expected:

8 billion in 2023

9 billion in 2037

10 billion in 2057

11 billion in 2100

It is estimated that in 50 years, the number of newborns worldwide will decrease, and the global population growth rate will be less than 0.1%. Although the earth can hold tens to hundreds of billions of people, the structure of human beings and the characteristics of civilization have determined that the number of humans will not increase linearly. The global population also shows the characteristics of aging, and there are two other characteristics that are increasing global migration and urbanization.

The Industrial Revolution opened the stage of rapid growth in human productivity. The increase in the level of medical care in the last century, such as the discovery of

antibiotics, ignited the flames of population explosions. From the first 150 years to the next 50 years, the population growth rate reached 1% or even 2%, but before and after, the growth rate was mostly below 1%.

At present, the global population is mainly distributed in Europe, Asia, Africa and the American continents, but the rapid population growth period in different regions is not consistent. The outbreak period in Europe and America is concentrated in 1940 to 1980, and the population outbreak period in Asia is concentrated in 1970 to 2020. In Africa and India . From 2020 to 2070, the significant population growth will be in the vast sub-Saharan region. This is due to the improvement of local medical standards. Many countries in this region will have population growth rates of more than 2% in the future.

With the industrial revolution and population growth, the current global environmental pollution and the destruction of ecological balance are particularly important.

The first point is that some environmental problems are widespread on the earth. Environmental problems in different countries and regions are universal and common in nature. Such as climate change, destruction of the ozone layer, shortage of water resources, sharp decline in biodiversity, etc.;

The second point is that although it is an environmental problem in some countries and regions, its impact and harm have transnational and trans-regional results. Such as acid rain, marine pollution, transboundary movement of toxic chemicals and hazardous waste, etc.

At present, the main environmental issues that have attracted global attention are: global climate change, acid rain pollution, ozone layer depletion, transboundary movement and proliferation of toxic and hazardous chemicals and waste, sharp

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decline in biodiversity, marine pollution, etc. There are also ecological and environmental problems that are common in developing countries. Such as water pollution and water shortage, land degradation, desertification, soil erosion, forest reduction, etc.

### **Environmental pollution and ecological destruction**

Global environmental issues, whose scope of influence has expanded to the whole world;

Some environmental pollution has transnational and trans-regional mobility: such as some international rivers, the pollution caused by upstream countries may endanger downstream countries; the acid rain caused by air pollution in some countries may drop to other countries.

Some contemporary environmental problems, such as climate warming, ozone hole, etc., have a global impact, and their consequences are also global.

Many contemporary environmental problems involve high altitudes, oceans and even outer space. The spatial scale of their impact is far from comparable to the general environmental problems that emerged in the early stages of industrialization and agricultural society. It has large-scale and global characteristics.

Before the concept of carbon neutrality was put forward, the environmental issue that people were mainly concerned about was the impact of environmental pollution on human health. The global environmental problems have far exceeded this category and involve all aspects of the human living environment and space, such as the sharp decline of forests, the degradation of grasslands, the expansion of deserts, the frequent occurrence of sand and dust storms, air pollution, species reduction, water crisis, and urbanization issues. And so on, has penetrated into all aspects of



human production and life. Therefore, to solve contemporary global environmental problems, we cannot simply consider our own problems, but we must consider a region, river basin, country, and even the world as a whole, comprehensively considering the laws of natural development, the solution of poverty problems, the sustainable development of the economy, and the resources. Reasonable development and recycling, improvement of human humanities and living conditions, and social harmony, etc. This is a complex system engineering. To solve it well, various factors need to be considered.

Secondly, people who care about environmental issues are mainly scholars in the scientific and technological circles, victims of environmental issues, and related environmental protection agencies and organizations, such as Greenpeace. However, contemporary environmental problems have affected all aspects of society and the survival and development of everyone. Therefore, contemporary environmental issues are by no means confined to the concerns of a few people and a few departments, but have become issues of common concern to the entire society.

Despite the rapid development of contemporary science and technology, there are more and more environmental problems caused by high-tech. For example, environmental problems caused by nuclear accidents, environmental problems caused by electromagnetic waves, environmental problems caused by noise, ozone layer destruction caused by supersonic aircraft, space pollution caused by space flight, etc., these environmental problems have high technical content, wide range of influence, difficult control, and consequences Serious, it has aroused widespread concern in countries all over the world. With the increasing seriousness of environmental problems and the increasing awareness of environmental protection in the whole society, various countries are also paying more and more attention to environmental protection. Therefore, contemporary environmental issues are no longer purely technical issues, but have become important issues in international politics and national politics.

Since mankind has entered the period of modern civilization and entered the post-industrialization and information era, the environmental problems generated at different stages in history still exist on the earth today and have a long-lasting impact. At the same time, modern society has produced a series of new environmental problems. . Because many environmental issues have a relatively long impact period, a complex situation has been formed in which various environmental issues are accumulating, changing, and intensively erupting on the earth over time.

Its main manifestations are:

Environmental issues have become an important content of international cooperation and international exchanges;

Environmental issues have become one of the fuse of international political struggles. For example, they often generate contradictions and cause fierce political struggles in the assumption of environmental responsibilities and obligations, and the transfer of pollution;

There have been some organizations with the purpose of environmental protection in the world, such as Greenpeace. These organizations have taken a place on the international political arena and have become a new political force.

In short, environmental issues have become a major national issue that requires the state to deal with through its fundamental laws, national planning, and comprehensive decision-making; it has become an important content for evaluating the performance of politicians and political parties; it has also become an important indicator of whether the social environment is stable and whether politics is enlightened. one.

In early 1992, the World Watch Institute released an annual report on the state of the world's environment. It uses a large amount of data to show that the world's environment is deteriorating and points out that an environmental revolution is needed to save the destiny of mankind. Later in the same year, the United Nations Environment Program published the "Report on the State of the World's Environment from 1972 to 1992", which also pointed out that human beings are encountering unprecedented environmental problems.

Since the 1992 Conference on Environment and Development, through the joint efforts of all countries in the world, certain results have been achieved, but it is still far from the goals set in (Agenda 21). The deteriorating global environment has not been reversed. All kinds of global environmental problems hinder human development. The Global Environment Outlook, edited by the United Nations Environment Programme, puts forward that the current global environmental issues present fundamental development trends in the following seven aspects:

Renewable resources have exceeded their natural regeneration capacity;

The amount of greenhouse gas emissions is still higher than the internationally agreed stable amount target proposed by the "United Nations Framework Convention on Climate Change";

The biodiversity contained in natural areas will be gradually lost due to the expansion of agricultural land and human settlements;

The increasing use of chemicals to promote economic development poses major health risks, environmental pollution and disposal issues;

On a global scale, the development of the energy sector does not comply with the principles of sustainability;

Rapid and unplanned urbanization, especially the urbanization of coastal areas, is placing a serious burden on the ecosystems of neighboring areas;

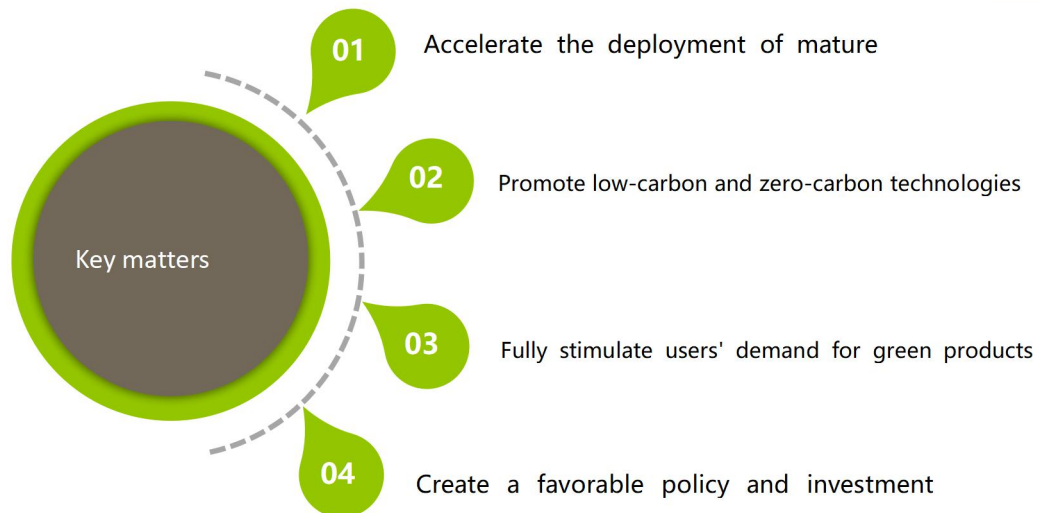
The complex and often unknown interactions of the global biochemical cycle are leading to widespread acidification, climate change, changes in the hydrological cycle, and loss of biodiversity, biomass, and biological productivity.

In December 2015, the "Paris Climate Agreement" was formally signed. Its core goal is to control the global temperature rise to within 2 degrees Celsius, which is much lower than the level before the industrial revolution, and strive to control it within 1.5 degrees Celsius. To achieve this goal, global greenhouse gas emissions need to be halved by 2030 and reach net zero emissions around 2050, that is, carbon neutral. To this end, many countries, cities and large international companies have made carbon neutral commitments and launched actions, and the global response to climate change has made positive progress.

### **preventive solution**

At present, 28 of the 224 countries and regions in the world have established the goal of achieving carbon neutrality around the middle of this century. From the perspective of the carbon neutrality strategy deployment of major European countries, there are several common key issues:





First, accelerate the deployment of mature zero-carbon solutions. Including the implementation of the coal phase-out plan, the gradual reduction of natural gas heating, the construction of a large number of zero-carbon power generation installations, the promotion of low-carbon power generation, and the improvement of industry energy efficiency. The "availability, affordability and environmental friendliness" of energy has become the main driving force for the transformation of European countries and multinational oil companies. In July 2020, at the International Energy Agency's (IEA) Clean Energy Transition Summit, the ministers of 40 advanced and emerging economies, representing 80% of global energy consumption and carbon emissions, emphasized that clean energy technologies should be used to promote economic recovery. important parts of. The IEA predicts that by 2035, renewable energy power generation (including hydropower) will account for half of the global power generation growth. The improvement of energy efficiency will be mainly concentrated in the fields of transportation, construction and manufacturing, which provides opportunities for technological innovation in smart homes and smart buildings.

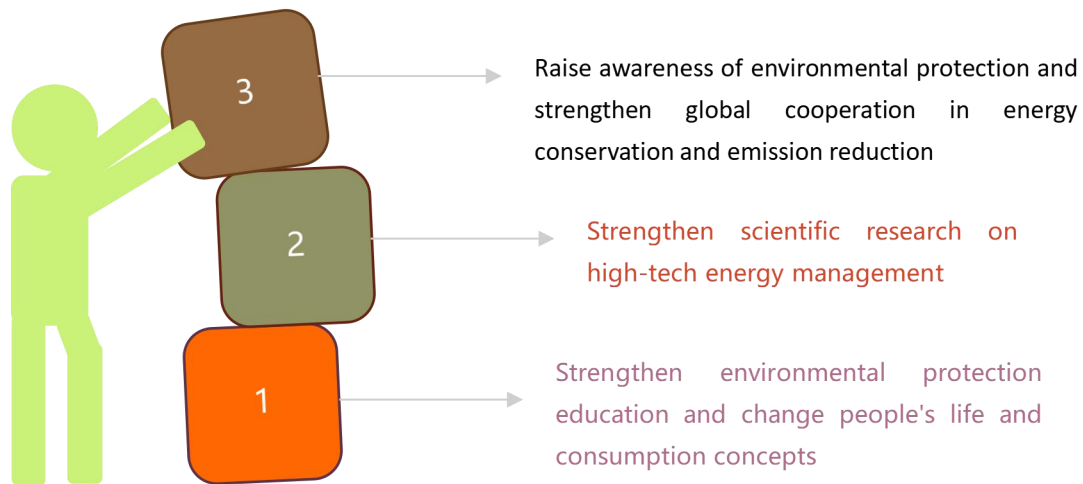
Promote low-carbon and zero-carbon technologies. This includes guiding the public and private sectors to increase their research and development efforts in key



technologies, such as energy storage, sustainable fuels, hydrogen energy, and carbon capture, utilization or absorption technologies. In recent years, the clean energy industry has undergone significant technological changes and has been in a favorable position to compete with the fossil fuel industry. Some large technology companies continue to increase investment in renewable energy, energy storage, and fuel cells. In the next ten years, lithium-ion battery technology may dominate the electric vehicle market. After 2030, more potential technologies will exceed the performance limit of lithium-ion battery technology. In addition, a wide range of cutting-edge technologies including advanced nuclear reactors and electric aircraft have also attracted the attention of venture investors. The development of hydrogen energy will also accelerate. Japan released its basic hydrogen energy strategy as early as 2017. In June 2020, Germany released its national hydrogen energy strategy, confirming the priority of "green hydrogen". Subsequently, the European Union announced the long-awaited "EU Hydrogen Energy Strategy", which will invest 575 billion euros in the hydrogen energy industry in the next ten years.

Third, fully stimulate users' demand for green products and services. Including providing tax incentives to encourage people to eliminate old gasoline vehicles, building green communities, implementing a zero-emission vehicle strategy, increasing afforestation efforts, sorting and recycling garbage, increasing subsidies for rooftop solar energy, and abolishing related electricity taxes Fees etc.

Create a favorable policy and investment environment. Including cancellation of fossil fuel subsidies, enacting climate legislation, formulating carbon pricing policies, introducing new clean fuel standards, investing in clean technologies, increasing green procurement, etc.; and providing additional incentives for decarbonization when price drivers are insufficient , Encourage responsible investment by financial institutions, etc.



### **Strengthen global energy conservation and emission reduction cooperation**

Raise awareness of environmental protection and strengthen global cooperation in energy conservation and emission reduction

At present, the earth is facing difficult environmental problems such as climate warming and destruction of the ozone layer. Although these problems have attracted the attention of all countries in the world, the international community has also made some efforts to try to solve them, but unfortunately we have not seen a major improvement in the situation, and in some aspects there is a trend of further deterioration. . This shows that mankind's understanding of the environment is not enough, mainly in:

1. Some governments and regions have insufficient awareness of environmental issues

The performance of governments at all levels in various countries is mainly reflected in economic indicators. This has caused governments at all levels to put the pursuit of regional economic goals and GDP growth in the first place, while ignoring

environmental issues. For example, countries near the equator are aggressively exploiting tropical rain forests, and a large number of treasured animal and plant resources have been destroyed. However, since their own economic development is prioritized, it is impossible to pay attention to the persuasion of other countries.

## 2. The public is not sufficiently aware of global environmental issues

The main body of society is the people, and government actions alone cannot solve environmental problems. If the public's awareness cannot be improved, the environmental problems cannot be fundamentally resolved. At present, people in developed countries have a preliminary understanding of environmental issues, but people in developing countries, which account for the vast majority of the world, have insufficient awareness of environmental issues.

With regard to the problem of the deteriorating environment, it has caused in-depth thinking by people of insight all over the world. From a global perspective, environmental problems are already global problems. For example, climate warming, ocean pollution, river pollution, etc., are not an organization or a country. A problem that can be solved, or in other words, it is very difficult to solve it within each country alone. It requires the united efforts of all countries in the world to solve it. To solve this problem, breakthroughs must be made in two aspects: one is that all countries in the world fully realize that environmental issues are closely related to the future development and survival of mankind, and are willing to take action to improve the global environment; the other is to formulate reasonable rules and mechanisms in order to equitably distribute the responsibilities and obligations of developed and developing countries, and at the same time, for the losses suffered by developing countries in their economic development due to the protection of the global environment, developed countries can help them through trade preferences, compensation assistance, etc., so as to ensure the enthusiasm of developing countries.

### 3. Transform the economic development model

To change the economic development model, in essence, is to shift from a black development model to a green development model. It contains four interrelated and complementary aspects:

One is to build a resource-saving society;

The second is to establish an environment-friendly society;

The third is to vigorously promote a circular economy;

The fourth is to actively develop a low-carbon economy.

Especially the latter is not only a new thing, but also a new way of development.

The concept of low-carbon was originally proposed from developed countries' concerns about energy security and climate change. Low-carbon economy has been regarded by all countries as the only way to meet the challenges of energy, environment and climate change and the road to sustainable development. For a long time to come, whether rich countries (developed countries) or poor (developing countries), large or small countries, low-carbon economy will be the common direction for economic transformation and sustainable development.

Two basic points of low-carbon economy:

The economic activities of the whole process of social reproduction, including production, exchange, distribution, and consumption, are low-carbon, and carbon dioxide emissions are reduced to the minimum or even zero emissions, and the greatest ecological and economic benefits are obtained;



Ecologicalization of energy consumption in the whole process of social reproduction including production, exchange, distribution and consumption, forming a low-carbon energy and carbon-free energy economy system for the common people, ensuring the clean development, green development and sustainable development of the ecological economy and society as a whole .

### **Strengthen scientific research on high-tech energy management**

It mainly includes two aspects: one is the research of environmental problems, which refers to the research on the causes of environmental problems, the degree of damage to the natural environment, and countermeasures; it is the research on environmental technologies, such as clean energy, new materials, and Energy saving and emission reduction technology and other aspects. Scientific research on environmental issues and environmental technology faces three difficulties: one is funding; the second is personnel; the third is technology transfer and information sharing.

### **Strengthen environmental protection education and change people's life and consumption concepts**

The international community generally believes that poverty and excessive consumption have led to the unrestrained development and destruction of natural resources by mankind, which is the chief culprit in causing environmental degradation. The wealthy people pursue high consumption and aggravate environmental pollution; while the poor people endure the worst environment, they have to over-exploit the limited resources of the earth to improve their basic living conditions. People first need to meet their own survival and development needs, so they consume the earth's ecological environment resources. This is indisputable. Before industrial civilization, human consumption and the self-recovery of the earth can maintain a basic balance: after entering industrial civilization, this balance was



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broken first because of the increasing population, and secondly, human beings were not satisfied with their basic survival needs. In pursuit of a higher level of enjoyment and even a luxurious life, the supply balance between mankind and the earth has been broken, and the world environment has begun to continue to be destroyed.

For the Bitcoin incentive layer to achieve carbon neutrality:

1. The energy source must be renewable;
2. These renewable energy sources cannot benefit other consumers who currently use fossil fuels;
3. Incentive layer equipment and other indirect costs will not cause carbon dioxide emissions.

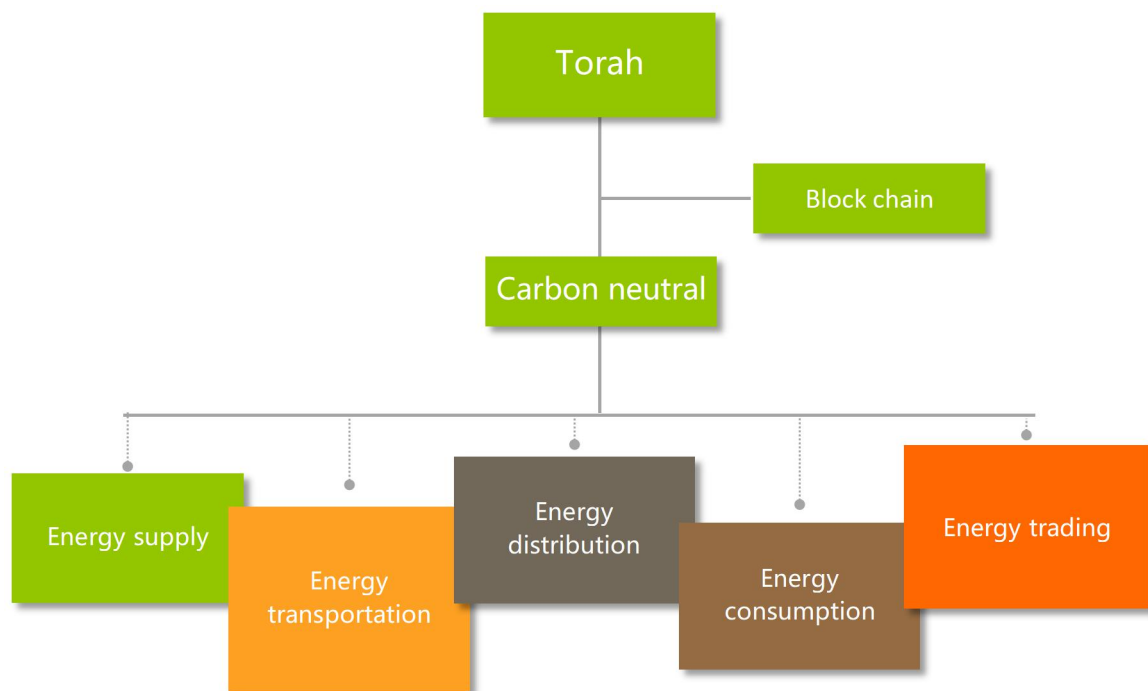
How to quickly optimize the industrial structure and energy structure, use wind energy, solar energy, nuclear energy, bioenergy, geothermal energy and other clean power or idle resource incentives, and promote the development of emission reduction technology, so that the encryption industry no longer high consumption, this is Torah has always wanted made.

## **Application prospects of blockchain in energy management**

The essence of a low-carbon economy is the efficient use of energy, the development of clean energy, and the pursuit of green GDP. The core is the innovation of energy technology and emission reduction technology, the innovation of industrial structure

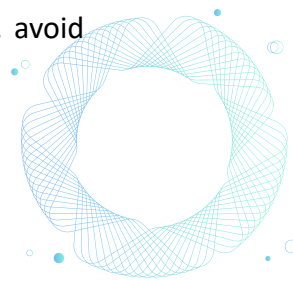
and systems, and the fundamental transformation of the concept of human survival and development. Carbon emissions to deal with a series of environmental problems caused by global warming. In a deeper sense, it is an inevitable choice made by the economy to reverse the environmental crisis, energy crisis, and economic crisis brought about by over-reliance on fossil fuels.

The Torah team embraces carbon neutrality and accelerates the exploration and establishment of an energy management guarantee system that adapts to the blockchain technology mechanism.



Blockchain technology not only has great potential in the distributed energy sharing and intelligent regulation mentioned above, but also has broad prospects in energy supply, transmission, distribution, consumption, and transactions.

In the field of energy supply, real-time updates based on blockchain technology help to realize real-time information sharing between centralized and distributed, avoid



the repeated construction of multiple energy sources, and reduce the waste of energy supply systems.

In the field of energy transmission, the trust mechanism of blockchain technology can realize the compulsory trust between multiple roles and the transparency of transactions between roles, can realize the coordination and optimization of transmission between multiple energy sources, and improve the transmission efficiency of the energy system .

In the field of energy distribution, the widespread access of distributed energy has changed the traditional structure of the energy distribution system. Automatic execution and extensive sharing based on blockchain technology will significantly improve the rationality of energy distribution.

In the field of energy consumption, the application of blockchain technology based on distributed ledgers and smart contracts will greatly improve the transparency of the energy consumption side and the energy supply side, thereby changing the energy demand curve of regional energy and realizing a variety of Reasonable use of energy.

In the field of energy transactions, the blockchain is very suitable for both parties' transactions. Compared with the time-consuming shortcomings of manual writing and signing contracts one by one in traditional transactions, the blockchain is digitally processed in a traceable and secure way, which can significantly improve Energy transaction efficiency.

## Proof of Capacity (PoC)

PoC is the abbreviation of Proof of Capacity, translated into Chinese is the proof of capacity. As the name implies, it is the algorithm that determines the block generation right by the amount of storage capacity. PoC is not a new concept, the first cryptocurrency to apply the PoC algorithm is. It was released as early as August 2014, and it has survived to this day. The earliest PoC algorithm was proposed and implemented. It's just that in the bear market in 2014, it didn't get enough attention.

The enthusiasm in 2017 has been concealed by a bunch of PoW advocated by mining machine manufacturers, and it has been unknown.

To be precise, PoC should be a general term for a class of algorithms, just like PoW algorithms have X16R, X11, Ethash, etc.

Currently, there are not many PoC algorithms, only two cryptocurrencies are in use, and only one algorithm is implemented, that is, the PoC algorithm.

### **Pros of Proof of Capacity**

The traditional PoW algorithm binds the generation of blocks to the physical law that the chip needs to consume power. No one can surpass this law and successfully solve the security problem of the blockchain.

But PoW also has many disadvantages:

Consuming a lot of energy puts high demands on mining equipment. From the initial CPU and GPU, slowly evolving to ASIC, the above shortcomings that require

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specialized production and purchase inevitably caused the threshold for PoW mining to gradually increase.

Mining farms and mining machine manufacturers with cheap power gradually monopolized the mining market, and mining tyrants began to appear and caused many problems.

During mining disasters, a large number of ASIC equipment was abandoned because they could only mine for other purposes, wasting resources and polluting the environment.

The designers of Torah took decentralization as the first goal and strived for everyone to participate. In the end, they successfully proposed a PoC algorithm. This is really low-key, and I didn't give a name to the PoC algorithm I implemented. In order not to cause confusion, we call the PoC implementation -PoC algorithm.

The PoC algorithm has the following characteristics:

The storage is hardened, and all storage space used for mining is forcibly occupied. This means that the most effective and only feasible way to improve mining efficiency is to increase the storage capacity used for mining.

I/O is not sensitive and does not require high read and write speeds of storage devices. This means that there is no need for more expensive and special storage devices such as RAID, SSD, or even memory, and the threshold for mining is greatly reduced.

The network bandwidth is not sensitive. The mining search process itself is offline, and the network is only needed to receive and broadcast transactions and blocks. This means that there is no need to use a large amount of network bandwidth, a highly centralized resource.

Computing resources are not sensitive. Once the data required for mining is



generated, there is almost no need for computing resources to participate in the actual mining process. This means that mining no longer requires powerful CPUs, GPUs, and consumes a lot of energy.

Combining these characteristics, the mechanical hard disk of every computer has become the best choice for mining, which is almost everyone can achieve, greatly reducing the threshold of mining, even some large-capacity mobile phones, tablets, etc. Equipment can also participate in mining to avoid centralization of mining. The mining equipment is a hard disk. Even if it encounters a mining disaster, it will no longer be like an ASIC. It cannot be used for any other purpose. It can only become electronic waste, pollute the environment and waste resources. The energy consumption of hard drives is much lower than other computing hardware, which is conducive to energy saving.

The core of the PoC algorithm is to bind the generation of blocks to the physical law that the storage density of storage devices cannot be increased indefinitely, thereby limiting the generation of blocks, ensuring the security of the blockchain, and ultimately enabling the entire blockchain to reach a consensus.

### **Principle of PoC algorithm**

In computer science, some frequently used data and intermediate results will be saved. This is the cache.

Caching is a very common practice, let us give an example, if we do the following calculation:

$45 \times 5545 \times 55 + 93445 \times 55 + 72345 \times 55 + 98$  If all calculations are performed normally, 4 multiplications and 3 additions are required.

Smart, you must have discovered that  $45 \times 55$  has appeared four times. Why do you have to recalculate each time, only once, and then record the result. Next time you encounter it, you will directly use the result without recalculating.

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Therefore, to complete the same work, we only need 1 multiplication and 3 additions.

However, saving calculations is not without cost. The cost is that we need a piece of space to store this intermediate result.

This approach is called space for time. The more complex the calculation, the more performance the cache can improve.

In order to ensure fairness, the PoW algorithm, when competing for each block, the puzzles to be solved are brand new, and there is no intermediate result that can be reused.

-PoC also designed an algorithm that consumes computing resources, but unlike PoW, the most complex part of the calculation process can be cached, which results in the consumption of storage space for caching. Advantage.

As we mentioned before, the more complex the calculation, the greater the advantage that can be obtained by consuming storage space for caching, and it can also ensure that miners choose larger storage space instead of stronger computing power to compete.

However, the computational complexity cannot be increased indefinitely, because when a non-miner user checks the PoC result of a block, he needs to recalculate the result for this result. We cannot require a user who does not mine to also be equipped with a large number of Storage resources are cached.

Excessive computational complexity will cause ordinary users to check blocks very slowly. Therefore, the level of computational complexity needs to be balanced. It cannot be too complicated to cause verification difficulties, nor too simple to cause insufficient cache advantages, thereby degenerating into PoW.

With sufficiently high computational complexity, the huge advantage of artificially creating space for time is the principle of the PoC algorithm.

## **Implementation of POC algorithm**

**The core of the POC algorithm is a hash function: Shabal.**

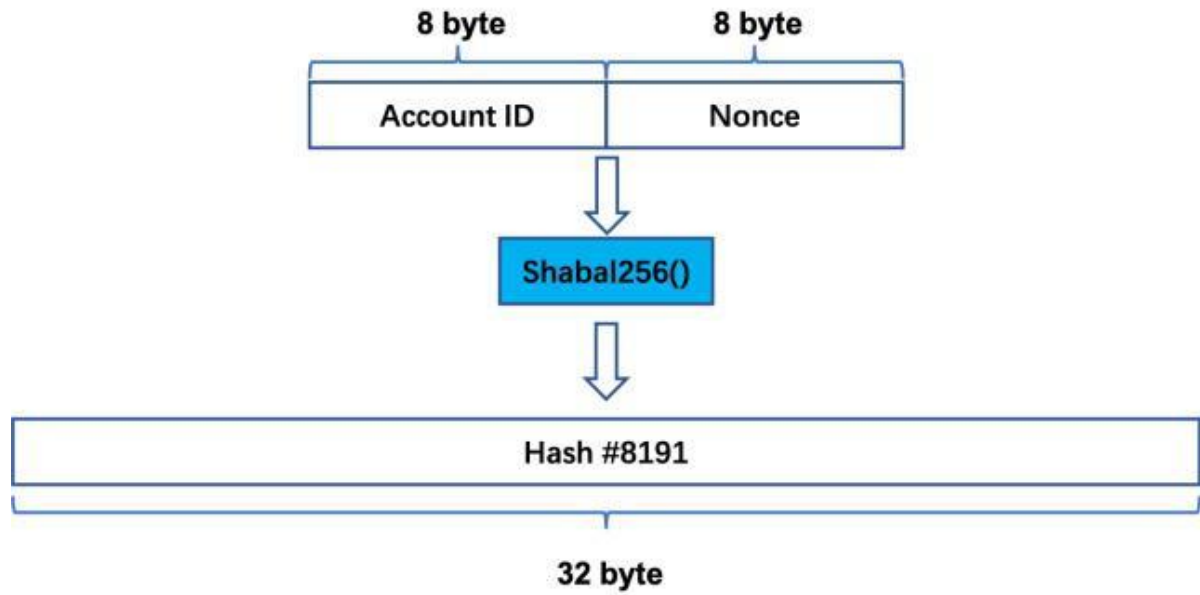
The National Institute of Standards and Technology (NIST) held a competition in 2007. Shabal is a candidate for the development of the next-generation hash function standard solicitation plan. This plan passed the first round of screening, unfortunately, it did not pass the second round and missed the final. However, Shabal is still a good hash algorithm, and no obvious security weaknesses have been found so far.

In fact, many algorithms in this competition, although they did not win in the end, were selected by cryptocurrency because of their excellent characteristics. Many of the 11 hash algorithms in POW algorithm X11 are candidates from this competition.

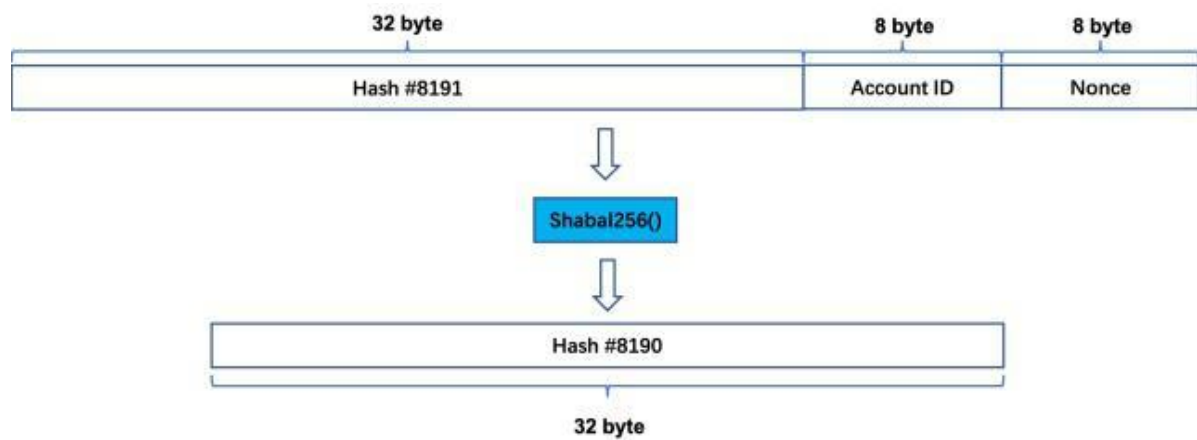
Let's take a look at how the POC algorithm is implemented.

**POC needs to generate a large amount of cache data, these caches are called Plot files.**

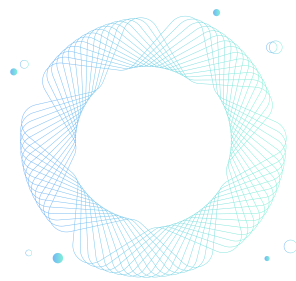
Step 1: Choose an 8-byte random number Nonce, add your AVPoint ID and perform Shabal256 calculation together to get a Hash result. This AVPoint ID is deduced from your private key and can be used to identify your identity. The reason for adding the AVPoint ID in the calculation is to prevent several people from sharing the same set of cached data to cheat and increase the search space. Range. The hash result is called Hash #8191. This is not an error. The reason for the name will be explained below.



Then, add the Hash #8191 obtained in the first step to the front of AVPount ID and Nonce, and perform another Shabal256 calculation to obtain Hash #8190.



In subsequent calculations, the obtained Hash value is added to the front of the data each time. When the length of the data exceeds 4096 bytes, only the latest 4096 bytes of data is hashed each time.

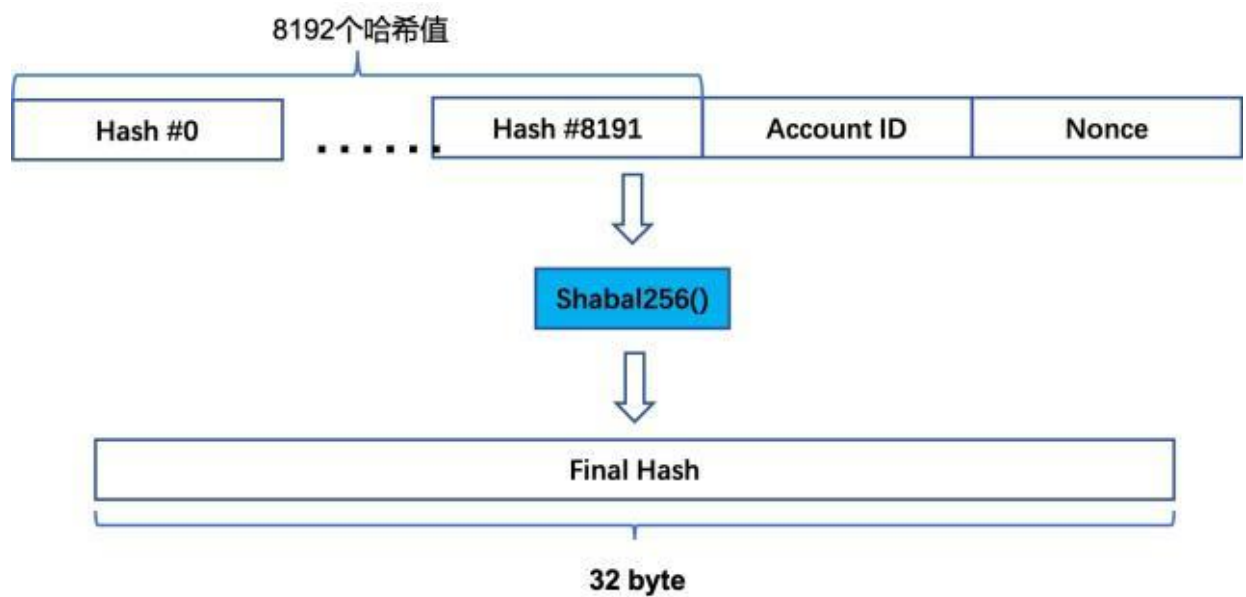




For example, when calculating Hash #7000, only the 128 hash values of Hash #7001-7128 are used for calculation.

Because the length of each hash value is 32 bytes, 128 is exactly 4096 bytes.

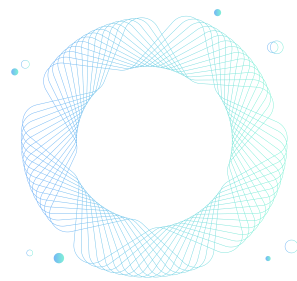
When 8192 cycles are completed, you will get 8192 hash values, and the data used to calculate the hash value will also become like this:

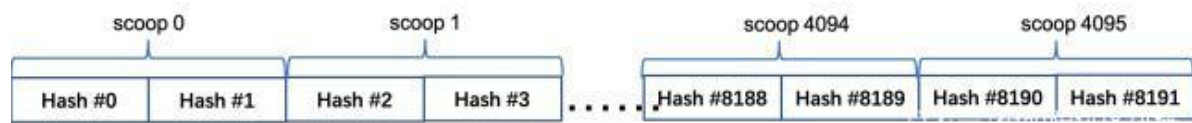


You need to perform another Shabal256 calculation on all these data to get a Final Hash.

Finally, the previous 8192 hash values are XORed with Final Hash one by one, and the 8192 XORed hash values obtained are saved. These data are the range that needs to be searched for future mining.

These 8192 hash values will be set in pairs, called a Scoop, a Scoop is the smallest data unit used in mining, and a Scoop is 64 bytes.





Now you can answer the previous question. In fact, the Hash number is reversed, which is why the result of the first Hash operation is called Hash #8191 instead of Hash #0.

For each miner, the AVPount ID is fixed. The 8192 hash values generated above are actually only related to Nonce. Nonce is 8 bytes and the value range is 0-18446744073709551615, which is a very large number.

The amount of data corresponding to a nonce is 32 bytes\*8192 = 256KB.

If you want to store all the data corresponding to Nonce, you need 256KB x 18446744073709551615 = 4096ZB of space, and all the current human data added up is said to be no more than 40ZB. In fact, it is impossible to store all the Nonce data in advance.

Miners will only cache as many Nonces and the corresponding 4096 Scoops as possible to improve the probability of finding a solution by themselves.

## Storage optimization

Remember what we said before?

PoC also has a design requirement, that is, the I/O requirements should be as low as possible.

There are two ways to reduce I/O requirements:

Reduce the amount of data to be read, optimize the data layout, and reduce the number of I/Os-the PoC algorithm uses the first method.

In fact, when -PoC searches, it will only search for the Scoop with a certain fixed number.

Suppose a miner caches the following data:

Scoop Nonce	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

This table is not complete. It is just to illustrate the problem. Many Scoops are omitted, and only 5 Nonces are drawn. The real miners cache much more data than this.

When mining a certain block, Scoop2 is selected for scanning, so the miner only needs to scan one of the 4096 Scoops, which greatly reduces the amount of data that needs to be read.

Don't worry about the miners deleting other Scoops, because different blocks will choose the Scoops that need to be used almost randomly. If you don't store a certain Scoop, it means that he will not be able to participate in the mining of the block that needs this Scoop, proportionally Reduce mining efficiency. If he does not

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store enough Nonce, the range he can search will be reduced, which will also affect his mining efficiency proportionally.

The 14T hard disk can actually use about 12.7T, even if the cache is full of data, you only need to scan  $12.7T \times 1 / 4096 = 3100.5859MB$  of data.

The block time for reconstruction is 4 minutes, as long as the hard disk can be scanned within 4 minutes.

$3100.5859MB / 240s = 12.91910792MB/s$ , as long as the read and write speed of the hard disk exceeds this value, the read and write speed of general mechanical hard disks exceed 150MB/s.

PoC helps miners reduce the amount of data that needs to be scanned for each block. Miners are also very smart. They use the second method to reduce the number of I/Os and further optimize.

Imagine you go to the supermarket to buy something, coke and beer are on the same shelf, you only need to take a trip to get them.

Conversely, diapers and beer may be so far apart that you will have to go twice.

The supermarket found that many people bought beer and diapers at the same time, so they put them on the same shelf. Everyone can get two things in just one run. This is the optimization of the supermarket's merchandise arrangement.

Very similar to the supermarket example, for mechanical hard drives, data is stored in different locations on the disc. If the data storage locations are very close, it can be read in one I/O.

Let's look at an example:

When the plot file was just generated, it was stored by Nonce, and Scoops with different numbers of the same Nonce were stored together.

The same color means storage in close locations, and different colors means storage locations are far apart.



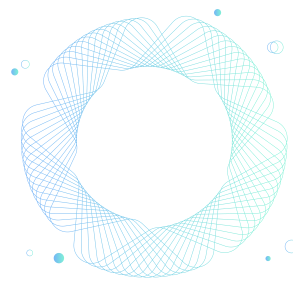
Scoop Nonce	0	1	2	3	4	5
0			I/01			
1			I/02			
2			I/03			
3			I/04			
4			I/05			
5			I/06			

However, when mining, it is scanned by Scoop. If it is arranged like this, we need 6 I/Os to scan Scoop2 of 0-5 six Nonces.

This will greatly affect the efficiency of scanning and also affect the life of the hard disk.

Therefore, the smart miners rearrange the data after the Plot file is generated, as follows:

Scoop Nonce	0	1	2	3	4	5
0			I/01			
1						
2						
3						
4						
5						



Disassemble Nonce and put the same Scoop together. In this case, accessing a Scoop only requires one I/O. Isn't it smart? The heads on the platters are very happy.

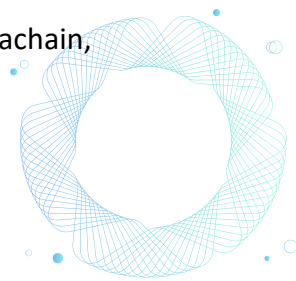
In fact, under the effect of these two optimizations, most hard disks can scan all data in less than 30 seconds, which will hardly affect the normal use of the computer, and it can truly achieve both mining and normal use. Don't delay. You can dig mines while playing games, beautiful.

## Current status of mainstream storage projects

Chia will die in January when it goes online mining. Chia mining requires no mortgage, no lock-up, and no gas fee. The initial investment cost is much lower than FIL mining. A series of simplified operations make Chia more "people-friendly", but The violent increase in computing power and prices are out of proportion to the output, leading to the indefinite return of investment in Chia mining, and the collapse of the currency price, resulting in the later participating miners becoming receivers.

BZZ went online on the exchange and died within one day. After the BZZ exchange went online, the bubble was a bubble after all, and the title of pro-son was also abandoned by the official official. Before the BZZ exchange went live, from the forecasted price of several thousand dollars, to the private equity market tens to hundreds of dollars to raise the price of each other, and then to the actual performance of the BZZ exchange at 8-9 dollars, the currency price was far lower. In anticipation of the market, the miners running into the market were severely cut by the market. Judging from the current price performance of BZZ, it is difficult for the top mine to return to its original cost. How can we talk about the future? It only takes 1 day to go from madness to criticism.

Phala (PHA) repeats the same mistakes? Phala Network is a privacy computing parachain on Polkadot. Based on a POW-like economic incentive model, Phala releases countless CPU privacy computing power and applies it to Polkadot parachain,



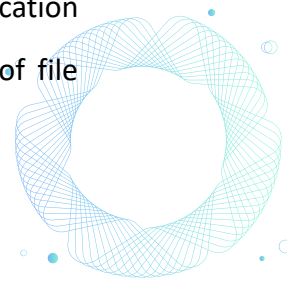
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and then serves other applications such as Defi and data services on Polkadot. His function is to protect user privacy and data. PHA mining also needs to mortgage a certain amount of PHA. According to the current mainnet economic model, the mortgage data is calculated based on the number of CPU cores. One core needs to be mortgaged 1620 PHA (the number of mortgages may change after the online preview is online). It is expected to be launched on the mainnet for excavation in July .

The relationship between Phala and Polkadot is similar to that of Swarm derived from Ethereum, and its mining mechanism is similar to the pledge mechanism of Filecoin mining. Previously, Chia's popularity with Filecoin died in January. Later, BZZ's Ethereum hotspot went online and died on the 1st. Another Phala (PHA) hotspot and Filecoin related hotspots will be launched soon. Reasons to doubt this project and participating miners Whether to repeat the same mistakes!

FILECOIN is just a mining currency?

The data on the Filecoin chain is only garbage, and no one has landed anything. That is, miners use a lot of storage devices to store a lot of useless data, just mining. The bottom layer of IPFS does not provide a data security mechanism. Anyone can access the file at will as long as they know the hash of the file. This design method is more suitable for storing public information such as web pages, but not for storing personal data and corporate data, because both personal data and corporate data want to be stored in a safer way, rather than being made public. In fact, the iconic "replace HTTP" slogan of IPFS also reflects this frustration, that is, IPFS is designed to store public data such as web pages, rather than personal and corporate data. IPFS recommends that some data security issues be solved through file encryption at the application layer, but this is not the fundamental way to solve data security issues. Data security is highly professional, it is difficult to do a good job at the application layer, and file encryption at the application layer cannot solve the problem of file

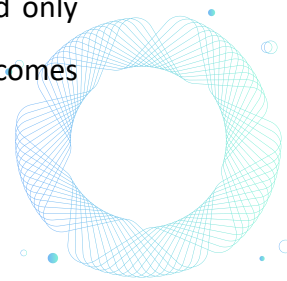


deduplication, which affects the efficiency and cost of the entire system.

IPFS is designed as a replacement for the HTTP protocol, storing static files in a decentralized manner, but most of the Internet websites currently use dynamic web technology. In the absence of computing power, the IPFS protocol cannot be used for website access. It can only be used as the underlying file storage protocol of a dynamic website, but this is not consistent with the original intention of the IPFS protocol. If the browser uses the IPFS protocol as the entry way to access the website, IPFS needs to support the processing mechanism of dynamic web pages at the bottom, which must have computing power as the support of IPFS. Because the data is not encrypted, for ethical issues, IPFS is designed for each storage node. Only active ping can obtain a copy of the file (so that violent pornography violates religious beliefs and other files that the storage node owner is unwilling to accept enter the node), that is to say, after a file is uploaded, if no other nodes ping, the entire network is still only a copy is easy to lose. This mechanism can ensure that many copies of hot files (such as popular music) will not be lost, but unpopular files may be lost, thus losing the possibility of persistent storage.

IPFS/FileCoin motivates all nodes indiscriminately according to a unified incentive algorithm, resulting in a large number of individual nodes that cannot guarantee stable services, which will drag down the service quality of the entire FileCoin system. In order to cope with these problems, FileCoin adopts a mortgage penalty mechanism, and other nodes can reconstruct the lost data when the node is offline, but this will inevitably affect the quality of FileCoin's commercial delivery.

Both zero-knowledge data encryption and data deduplication play a decisive role in blockchain storage. However, there is a "common knowledge" in the industry: data cannot be deduplicated after encryption. That is to say, zero-knowledge data encryption and data deduplication cannot be achieved at the same time, and only one can be selected at most. Some people think this is because the data becomes



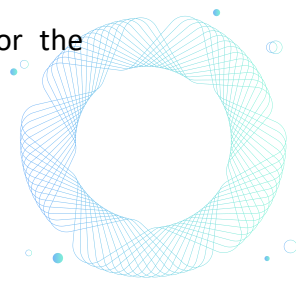


garbled after encryption, and data duplication cannot be identified. In fact, this is not the key to the problem. It is possible to save the hash value of the plaintext of the data, and to identify duplicate data by comparing the hash value, which does not pose any risk to data security. The core problem of deduplication after encryption is data authorization. That is, the data stored by A, when B also needs to store the same data, how to authorize the data of A to B without affecting the security of A's data. Usually this problem is considered unsolvable, so there is only one choice between zero-knowledge data encryption and data deduplication. In this case, IPFS chose data deduplication and sacrificed data security. This is the real reason why IPFS is designed to store public data such as web pages. IPFS proposes to encrypt data at the application layer, in fact it is to let the application bear the consequences of the data cannot be deduplicated. There are also some blockchain storage projects that choose data encryption and sacrifice data deduplication. Although data security is guaranteed, storage costs have risen sharply, and an extremely effective incentive model has been sacrificed.

## The Torah project is born

At present, when decentralized blockchain applications choose to store data for, the available decentralized options are: store all content in the blockchain itself.

Today, there are about hundreds of decentralized applications running on Ethereum. As a result, the size of today's Ethereum ledger has reached more than 100 GB, which requires such a large storage space on each node. Over time, thousands of applications may be created, so the ledger required for each machine will become larger and larger. In the future, with the withdrawal of users with insufficient disk storage space, Ethereum will gradually become centralized. Moreover, the transaction speed of Ethereum is only 15 transactions per second. In the transaction scenario, waiting for money for one minute is acceptable, but waiting for the



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webpage to open for one minute is unbearable.

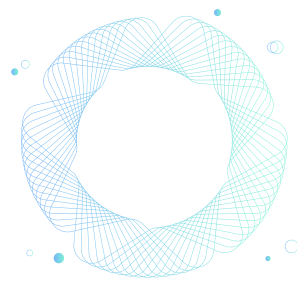
Point-to-point file system, such as InterPlanetary file system.

IPFS allows files to be shared on client computers and integrated into the global file system.

IPFS technology is based on the BitTorrent protocol. When sharing a file, you must first put the file on your computer so that someone can download it when needed. The hash of the file contains the IP of the downloader or publisher. Due to the BitTorrent protocol, the more people download popular files and the more bandwidth provided, the faster the download speed. However, IPFS also has some disadvantages. First, if you want to share your files, you must stay online, at least until the first interested person downloads it successfully. The point is that IPFS only provides static files and cannot be modified or deleted after uploading. And it does not support searching for these files by the actual contained content. AKASHA, a decentralized social application implemented through IPFS, needs to wait for the other party to receive it before downloading after sending a message.

Distributed cloud file storage, such as Storj, Sia, Ethereum Swarm, etc.

Distributed cloud file storage can lift some of the limitations of IPFS. From the user's point of view, these storages are more like cloud storage such as Dropbox. The difference is that the content is stored on a personal computer that rents out its own hard drive space, rather than in a data center. There are many such projects such as Sia, Storj, Ethereum Swarm. Users do not need to stay online to share files, just upload files to the cloud. These storages are highly reliable, download fast, and have abundant storage space. However, it still only provides static files, and cannot support content search, nor can it be accessed directly through programs.



There are tens of millions of users or even hundreds of millions of users around the world. Amazon's similar e-commerce platform provides services to tens of millions of customers during peak periods. This application requires tens of thousands of servers located in many data centers around the world. High availability and low latency of end services.

In a centralized system architecture, this high availability is accumulated with expensive hardware, such as Oracle's ExaData system. Today, the blockchain is booming, and the concept of decentralized Internet is deeply rooted in the hearts of the people. With the continuous development of decentralized applications, the requirements for the availability of back-end database systems will inevitably be higher and higher. This requires continuous growth of supporting data in a cloud, and a highly scalable database system on the platform. For future decentralized applications, high availability is one of the most important requirements, because even the slightest downtime can cause significant economic losses and affect customer trust. But there are only cheap PCs and mobile computing power and IoT devices in a decentralized network. We need to build a 100% highly available data infrastructure system on these unreliable devices.

1. In today's Internet of Everything, IOT needs a low-cost database that can store massive amounts of data.

In the past thirty years, with the development of the Internet, we have entered the digital age from the material age and the analog signal age. Informatization and digitization have become a wave sweeping everything, changing the productivity of every existing industry in human society. With the process of digitization, data, as a by-product that must exist, has become an increasingly large existence. In 2010, we created 1ZB of data, and in 2016 we created 16ZB of data. According to forecasts, in 2025, we will produce 160ZB of data. Data will play a huge role in future economic activities and will affect every enterprise, government agency and individual

consumer. Large organizations are increasingly realizing that data itself is an asset of strategic value. Data is gradually forming a digital world independent of the physical world.

However, the value of data today has not been fully utilized. According to a report by the Queen of the Internet, Mary Meeker, of the data we currently generate, 7% of the data that can be stored, only 1% of the data that can be analyzed, and other data are in The situation of being discarded. The main reason is that the growth rate of centralized data storage and analysis computing power is far behind the growth rate of data itself, and the price of centralized computing power is too high. Today, machines have replaced humans as the main source of data production. If we want to make full use of the ability of humans to generate data, we must rely on the distributed and decentralized fog computing architecture to integrate more decentralized storage and calculations. Human resources are connected to process these ever-increasing data. In the current decentralized architecture of the blockchain field, there are only a few peer-to-peer file storage systems, and no data storage and management systems.

2. Data trust. Both individual consumers and corporate consumers need to have a trusted data cloud storage.

In the past ten years, the cloud computing business has flourished, and SaaS has become a strong driving force for the development of the US economy. However, many public cloud services have been transformed into privatized deployment and internal use. The main concern of enterprise customers is to worry about SaaS. The back-end of the enterprise will leak data. In the consumer field, with the development of precision advertising technology, tagging individual customers has become a major means of precision marketing, and information comes more from underground market transactions. Individual consumers' express delivery data, e-commerce data and even social data have been monetized by various



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manufacturers in various ways, but as the owner of the data, individual consumers have not benefited from the development of society and technology, and even become Victims of harassment.

Distributed applications can easily complete data generation, calculation, transmission, storage, and retrieval. Through attribute encryption and proxy encryption technology, we provide protection for data privacy. Not only that, the Torah project also has the characteristics of flexible data structure, powerful programming interface, and efficient backup.

With the development of Internet globalization, there will be more and more service capabilities, such as distributed cache, distributed shared memory computing based on non-volatile memory, distributed relational database, distributed MapReduce and other projects, as parallel The sub-chain joins the network and provides infrastructure services together through Torah. Finally, a self-organizing and self-managing data management system covering tens of millions of nodes in the cloud will be formed. All decentralized applications can conveniently use this cloud database to store and query data through APIs. In particular, since there is no need to bear the huge organizational costs of the expensive centralized IAAS, this decentralized cloud database must have extremely high cost-effective advantages, as well as inherent capabilities for remote disaster recovery and cross-continental data sharing. This has initially formed a decentralized IAAS, with three basic IAAS capabilities of storage, computing, and network bandwidth, plus the value exchange system provided by the blockchain network.

Today, Internet applications have penetrated into everyone's life, and ordinary users rarely perceive the computer science behind the Internet. However, the Internet has relied on the development of computer technology from the beginning, especially several key technologies, such as HTTP protocol, Web server and database software.

In 1989, Tim Berners-Lee developed the HTTP protocol, Web server and browser in the particle laboratory established by the European Nuclear Research Society (CERN), and the curtain on the Internet has been opened since then. With the passage of time, the population of Internet users has been expanding, and technology has been advancing to every corner of the world. However, no matter how the technology changes, the development of Internet applications always requires a database system to store data.

### 3. Decentralized applications on the blockchain require decentralized data storage solutions

Today, with the development of blockchain technology, the concept of decentralization is deeply rooted in the hearts of the people. However, when decentralized applications are developing and running software, they can only store data on a centralized IDC. In essence, this is still a centralized system. Traditional database management systems are often managed and maintained by a single organization, which has the highest authority over the entire database. This model is not suitable for the mutual management of data between institutions that are not fully trustworthy. This problem is particularly prominent in the Internet application environment. As a new type of distributed data management technology that is decentralized, non-tamperable, traceable, and jointly maintained by multiple parties, blockchain is suitable for effective data management in this non-mutual trust scenario. Due to the significant differences between the new and old data management architectures, the existing database management technology cannot be copied, and innovations in the blockchain data management technology must be made.

Except for Swarm, which can provide storage for the current four mainstream projects, the rest of the projects basically have no landing. The Swarm's up and down speed is worrying. Max 200kb/s. The economic model is also sad, the

Torah

consumer/merchant model. That is, only when the consumer spends the Swarm to store the uploaded data, the node that provides the storage is likely to obtain the Swarm spent by the consumer. If users do not consume, then the storage node will not be able to get any benefits, then the entire ecology is a dead ecology. Torah will surpass the above four items.

Maintain network storage space. The Torah Vortex Protocol will adjust the output according to the amount of storage, which is similar to the adjustment of Bitcoin and Ethereum's computing power.

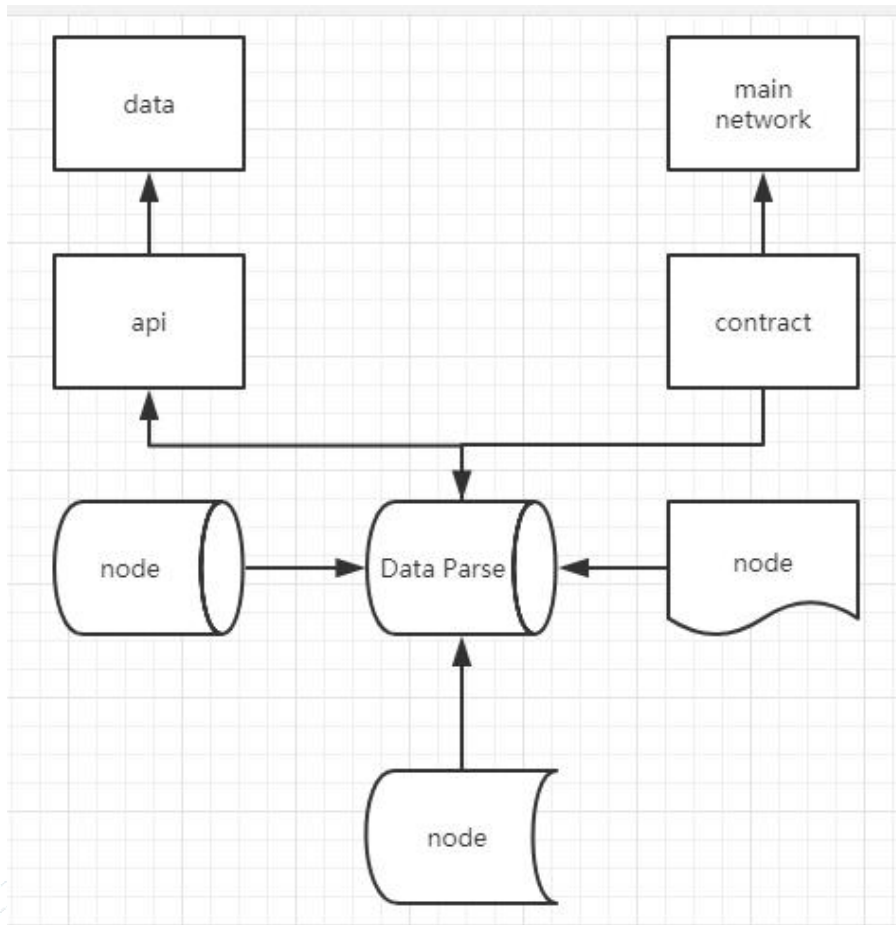
That is

$F(Q)=\{P,GP,C\}$  P: pledge amount. GP: The amount of pledge of the whole network. C: The storage capacity of the entire network.

$C(G)=\sum c * K$ . The storage capacity of the entire network is the sum of each effective node multiplied by the mining output coefficient.

Mining revenue is directly related to the pledge of the entire network and the amount of storage on the entire network.

The vortex protocol will analyze the discrete data in the container in advance, and the downstream speed can reach a bandwidth of 10M.





## Torah logo



The Torah, the name of the project, is derived from the first five books of the Old Testament, the Five Books of Moses, which include Genesis, Exodus, Leviticus, Numbers and Deuteronomy. It is said that It was written by Moses in the light of God. The main ideas of the Torah are: God's creation, Human dignity and fall, God's redemption, God's election, God's covenant, God's law.

The Torah broadly refers to god's revelation to teach and guide mankind. The Torah occupies a central position in the Old Testament as the most sacred and important part of the Bible. Many people today believe that the Torah contains a secret message from God.

It is the source of the most famous of the ten plagues in exodus.

Three thousand years ago, in the heyday of Egypt, the Pharaoh enslaved the Israelites and built cities and monuments for them. As the Population of Israel grew, the Pharaoh became worried and ordered the firstborn son of the Israelites to be executed. The mother could not bear to see her son executed.



He had secretly prepared for them a deliverer to lead them out of their plight. That Deliverer was Moses.

The theme of the ten plagues god sent to the Egyptians in order to bring the Israelites out of Egypt. With every disaster God showed the Egyptians how great and awesome he was over the earth, because he could easily defeat the "gods made with hands."

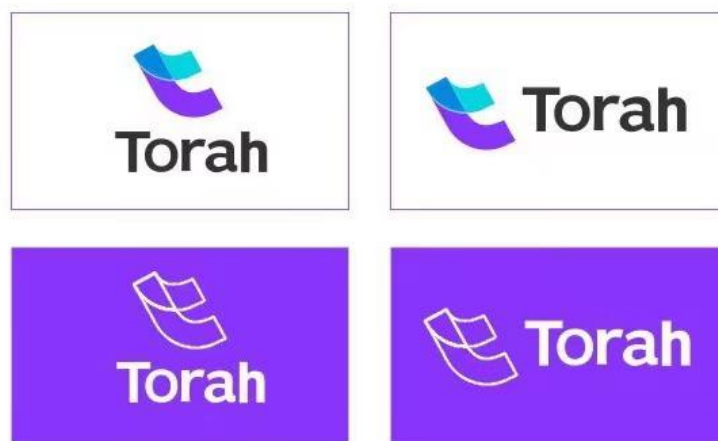
Back to Moses, the baby was later rescued by Pharaoh's daughter and raised in the Egyptian royal family. Moses went on the run one day after killing the slave's overseer to save one of his slaves. Years later, while walking alone in the desert, he witnessed something amazing. A bush was burning, but it was not destroyed. God's voice came out of the bush, and God ordered Moses to go to Pharaoh and free all the slaves. Moses travels alone through the desert to challenge the most powerful man in the world. Moses asks Pharaoh to release his people. Pharaoh refuses, so God sends massive disasters and diseases upon the Egyptians, and the Ten Plagues begin to happen in Egypt.

According to the Bible, there were ten disasters in ancient Egypt. Scientific research later found that it was true. But the root causes are global warming and volcanic eruptions. Therefore, in the face of disasters, human beings are really very small, disasters do not happen for no reason, everything has a cause and effect. The earth is our home, god or no God. We should be good to the earth, good to the home, then the earth will be good to us.

## LOGO Design Ideas



- It starts with a "T"
- Open internationalization
- Data is stored
- Collaborative links



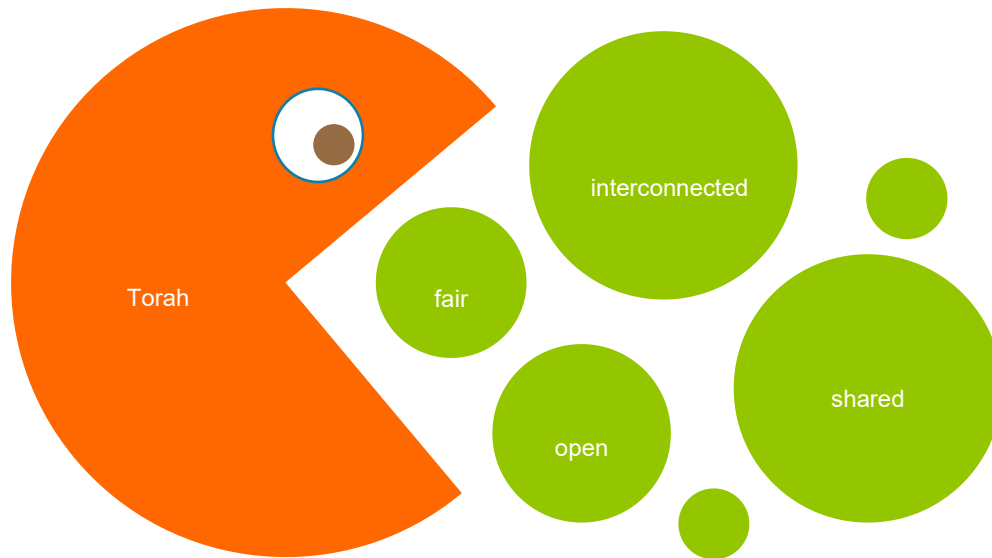
It is a combination of publishing data storage and point-to-point transmission of block chain with the first letter T. The link between the graphics, make LOGO easy to identify, easy to read, easy to remember, enhance brand recognition. Reflect the industry characteristics transparent, open, sharing collaboration links.

Mass-tone attune is purple, have gentle, composed, grave meaning. The addition of blue highlights the clever logo. Gray is mainly used in the text part, so that the logo has a classic calm visual effect. It reflects the sharing and reliability of the TORAH platform.

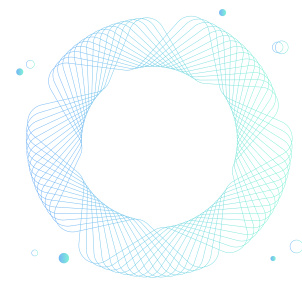
## Torah overview

Torah empowers distributed energy sharing and combines distributed and intelligent contract system functions to establish distributed energy transactions, data management, information security and other scenarios, providing strong technical guarantees for distributed energy sharing, achieving encrypted carbon neutrality, Energy saving and emission reduction, and promotion of global energy management. Breaking through many limitations of poc, not only provides powerful incentive schemes for miners, but also provides end-to-end seamless high-quality low-cost persistent storage and network acceleration solutions for users of original centralized storage, and also develops blockchain storage Protocol BSP, build an open platform for blockchain storage, provide reliable, cheap, large-capacity, high-performance decentralized storage for DAPP, provide core capabilities for other blockchain storage systems and share the de-duplication effect.

## Torah design goals



Blockchain technology is an emerging decentralized architecture and distributed computing paradigm. Its decentralized, open, transparent, and non-tamperable technical characteristics are consistent with the open, fair, interconnected and sharing concepts of energy management. Scenarios such as energy trading, carbon emission rights certification and green certificate trading, data management and information security have broad application prospects. Torahchain will become a key technology to solve the bottleneck problem in the energy management process, enhance the overall ecological value, and add global carbon neutrality. The construction determines the vent of the new era of encryption. At the same time, Torah's innovative economic mechanism helps the overall layout of the construction of ecological civilization, the sustainable development of society and the construction of a community with a shared future for mankind.





## Torah system architecture

### Consensus mechanism

Torah's persistent storage service uniformly uses redundant coding, and any data is automatically coded into  $N$  (for example, 100, the specific number will be determined by the community governance committee in the future) fragments, of which any  $M$  (for example, 70) fragments can be recovered Data, and then store these  $N$  fragments in  $N$  storage nodes, each node saves an 18/77 redefinition blockchain to store 19/77 fragments, so as long as they are not at the same time, there are  $N-M+1$  (in this example) In 31) the failure of a node can ensure that the data is intact and not lost. When any node fails, the system will immediately select another node to rebuild the data of the failed node. In this example, as long as the reconstruction of the first failed node is completed, the data is not lost. There will be another 30 nodes failing one after another, which can ensure that the data will never be lost. Each node will monitor and verify each other. Once any node fails, it can be quickly found. When the data of a failed node is rebuilt, it will be divided into Many nodes are rebuilt at the same time to speed up the reconstruction. For example, one fragment of 10,000 files is stored on a failed node. It takes an average of 0.5 seconds to rebuild a fragment (mainly the network transmission takes time). If 100 nodes are selected to participate in the reconstruction, each node only needs to rebuild 100 fragments. All reconstruction work is completed in an average of 50 seconds. As long as no other 30 nodes of the same file fail at the same time within 50 seconds, the file data will not be lost. Due to the good redundancy and geographical dispersion, there is no need to worry about the damage of the hard disk and the operation and maintenance errors of individual nodes (2018 In August 2008, it was exposed that Tencent Cloud lost user data due to operation and maintenance errors), lightning weather (in September 2018, Microsoft's Azure services in some areas were down for more than 20 hours due to lightning strikes), power outages, fiber cuts, earthquakes and fires. Data failure, due to scattered nodes and good redundancy, it



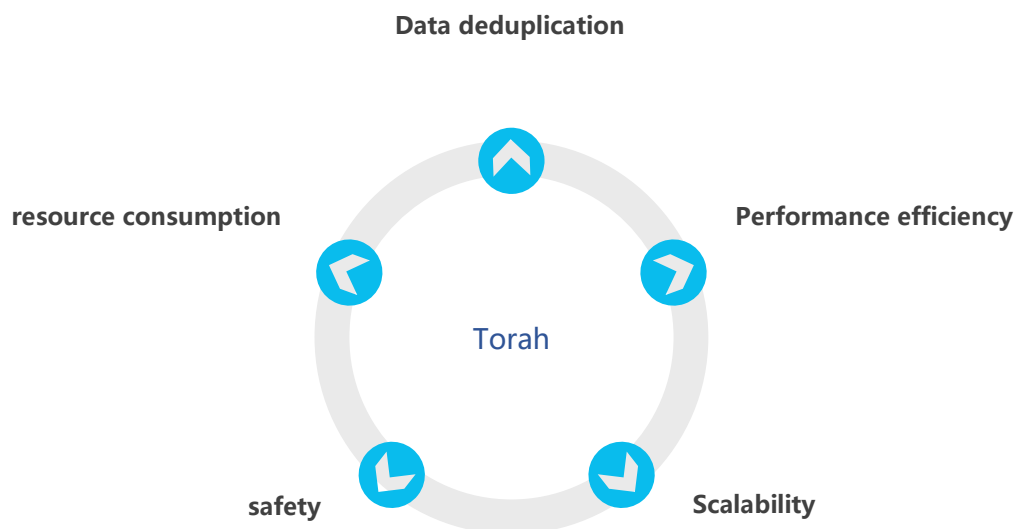
Torah

is not afraid of DDOS attacks.

As a data structure that stores data in chronological order, the blockchain can support different consensus mechanisms. The consensus mechanism is an important component of blockchain technology. The goal of the blockchain consensus mechanism is to enable all honest nodes to maintain a consistent view of the blockchain while satisfying two properties:

**Consistency:** The prefix part of the blockchain saved by all honest nodes is exactly the same;

**Validity:** The information published by an honest node will eventually be recorded in its own blockchain by all other honest nodes.



1. **Security:** Is it possible to prevent attacks such as secondary payments and selfish incentive layers, and whether it has good fault tolerance. In the process of achieving consistency in a blockchain system driven by financial transactions, the most important security issue is how to prevent and detect secondary payment behavior. The selfish incentive layer uses appropriate strategies to publish its own generated

blocks to obtain higher relative benefits. It is a theoretical attack method that threatens the security and fairness of the Bitcoin system. In addition, the Eclipse attack controls the network communication of the target object, forms a network partition, and blocks the spread of transactions. The Sybil attack affects system security by producing a large number of meaningless nodes.

2. Scalability: whether to support network node expansion. Scalability is one of the key factors to be considered in blockchain design. According to different objects, scalability is divided into two parts: the increase in the number of system members and the increase in the number of transactions to be confirmed. Scalability mainly considers when the number of system members and the number of transactions to be confirmed increases, the changes in system load and network traffic that will follow are usually measured by network throughput.

3. Performance efficiency: that is, the time delay from when a transaction reaches a consensus and is recorded in the blockchain to when it is finally confirmed. It can also be understood as the number of transactions that the system can process and confirm per second. Unlike traditional third-party supported trading platforms, blockchain technology reaches consensus through a consensus mechanism, so its performance efficiency has always been the focus of research. The Bitcoin system can process up to 7 transactions per second, which is far from being able to support the existing business volume.

4. Resource consumption: that is, the amount of computing resources that the system will consume in the process of reaching a consensus, including CPU, memory, etc. The consensus mechanism on the blockchain uses computing resources or network communication resources to reach a consensus. Taking the Bitcoin system as an example, the consensus based on the proof-of-work mechanism needs to consume a lot of computing resources for mining to provide a proof of trust to complete the consensus.

5. Data deduplication: If multiple people have the same data, they do not store it repeatedly but merge and share the same space, which is called deduplication (that is, to remove duplicate data), also known as deduplication (that is, data deduplication). Data deduplication and redundant storage are concepts at different levels. Even if only one copy of data is stored after deduplication, this data must be divided into many fragments with redundant coding and stored on multiple different nodes. Even if some of the node data is lost, the integrity of the data will not be affected. The fragments stored on so many nodes are collectively called a piece of data. The reason why these two concepts are sometimes misleading or confusing is that one of the simplest redundancy algorithms is multi-copy storage, such as IPFS. In this case, the same data owned by multiple users will be deduplicated and only one copy will be saved, but this one has multiple copies. The data repetition rate is positively correlated with the number of users and the amount of data: if the number of users is larger, the amount of data is larger, and the repetition rate is higher. According to a reference data, the average data repetition rate of 360 cloud disk is 5 times. 360 cloud disk is only a single application, and is not the largest application, so the data repetition rate of the entire blockchain storage will far exceed this multiple. The higher the data repetition rate, the lower the average storage cost. If the average data repetition rate is 10 times, then 1GB of space can store 10GB of data on average, and the average storage cost is reduced by 10 times, which constitutes the strong competitiveness of blockchain storage. In addition to greatly reducing costs, blockchain storage can also use data deduplication to build a powerful incentive model. Assume that a person with 100GB of storage space can only store 100GB if used to store their own data, but if the storage resources are used for mining and then use the mined digital currency to purchase storage space, they will be able to store 200GB of storage space. Data, and a lot of digital currency surplus. This method can store more data and get a lot of additional digital currency, which can effectively incentivize storage resource owners to join the system for mining. The whole process does not require subsidies, and the system can even

collect taxes, which is long-term sustainable. The secret of this "magic effect" is that 100GB of space can store 500GB or more of data on average.

## Time and Space Proof

Proof-of-spacetime (post). The proof-of-spacetime (post) proposes the data structure of the proof chain. The proof chain is formed by linking challenge and proof. A time period is added to the proof chain. This is the proof of the data stored by the miners for a period of time, which is the Proof of Spacetime (PoSt).

It allows the verifier to check whether the storage miner has stored his/her outsourced data for a period of time. The spatio-temporal proof (post) scheme enables the prover to convince a verifier that the storage miner has been storing the data for a period of time. Space-time proof can be understood as a continuous copy proof. The miner must continuously generate the proof and submit the proof within a submission cycle. The challenger repeats  $N$  rounds in the POREP cycle, and enters a random challenge parameter  $C$ , for example,  $C$  equals 10, challenge The parameters will be calculated recursively in a chain, that is, the previous output will be used as the next input. Until  $T$  time, the last result will be used as the proof of the space-time proof. Reverse verification is accepted. If it is not within the submission period, the proof will be submitted continuously in time. , Some tokens will be deducted by the system.

PoSt can prove that miners have stored specific data during this period of time, and anchor these proof chains with timestamps, so that even if the verifier is not online, it can be verified in the future that the miner has generated a proof during this period of time Chain, PoSt will be submitted to the chain to generate a new Block.



**Several core advantages of Time-Space Proof:**

- Accurate
- Fast
- Economy
- Permanence
- Unbreakable

Aims to provide decentralized distributed storage. Miners obtain payment from customers through the storage and retrieval process, and obtain block rewards through the time-space proof algorithm. Since the entire network is a P2P network without centralized nodes, a certain mechanism is needed to ensure the integrity and recoverability of the data stored by users. Therefore, some related algorithms in this field have been born.

Time and space proof PoST, which allows the verifier to check whether the storage provider has stored his/her outsourced data for a period of time. The immediate requirements for this provider are:

Generate sequential storage proofs as a way to determine time

Compose recursive execution to generate simple proofs

In fact, the PoST algorithm is an improvement to POR. The core of the POR algorithm is to store files in fragments, and to challenge and prove regularly based on the tag information of the fragments. However, the operation of the POR defined by the academic circles generally depends on a centralized third-party node, and each operation must be pre-processed. In contrast, SpaceTime (PoST) generates a POR sequence within a certain period of time to prove the retention time of useful storage.



In recent years, cloud computing has been widely popularized and applied. Its core concepts are resource leasing, application hosting, and service outsourcing. It uses virtualization technology to form a shared virtualized pool of distributed computing nodes to provide users with services. However, when users choose to deploy a large number of applications and data to the cloud computing platform, the cloud computing system also becomes a cloud storage system. However, the highly concentrated computing resources make cloud storage face severe security challenges, which is also centralized Weaknesses inherent in the service.

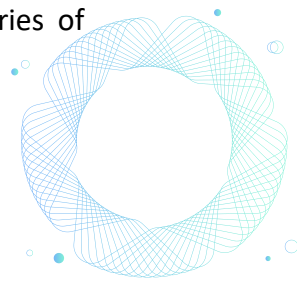


Torah is using time-space proof to reduce cloud storage costs, improve economic efficiency, and solve problems such as centralized operation management, opaque structure, system trust, and data security.

## Vortex Protocol

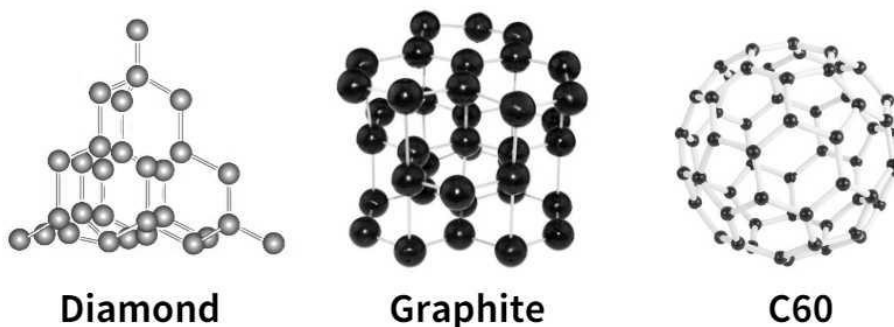
One, carbon molecule has its uniqueness

Carbon is a non-metal element. Carbon element has been recognized and used for a long time. Most of the molecules in organisms contain carbon element. As the most basic element of chemical elements, carbon has very rich properties. A series of



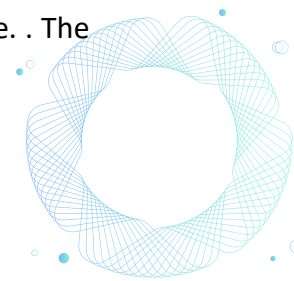
carbon compounds-organic matter is the foundation of life. Carbon is indispensable to all living systems currently known. Without it, life cannot exist.

There are three main types of pure, elementary carbon, which are diamond, graphite, and C60. They are three allotropes of carbon.



Diamond is a simple crystal composed of carbon element formed under high pressure and high temperature conditions in the deep parts of the earth. Diamond is a colorless octahedral crystal. Its composition is pure carbon, which is linked by carbon atoms with four-valent bonds. It is the hardest substance known to exist naturally. Because the C-C bond in diamond is very strong, all valence electrons participate in the formation of covalent bonds, and there are no free electrons, so diamond is very hard and is the hardest ore in nature. The melting point is 6900 degrees Fahrenheit, the ignition point of diamond is 720~800°C in pure oxygen and 850~1000°C in air, and it is not conductive.

Graphite is a transition type crystal between atomic crystals, metal crystals and molecular crystals. It is the softest ore in the world. In the crystal, the carbon atoms in the same layer are sp<sup>2</sup> hybridized to form a covalent bond. Each carbon atom is connected to three other carbon atoms, and the six carbon atoms form a regular hexagonal ring on the same plane, which stretches to form a lamellar structure. . The



Torah

carbon atoms in the same plane also have a p-orbital each, which overlap each other to form a delocalized  $\pi$ -bond electron that can move freely in the lattice and can be excited, so graphite has metallic luster, can conduct electricity and transfer heat. Due to the large distance between the layers and the small bonding force (Van der Waals force), each layer can slide, so the density of graphite is smaller than that of diamond, soft and smooth.

C60 is a cluster of carbon atoms, labeled by 14C. It consists of 60 carbon atoms to form a 32-sided body like a football, including 20 hexagons and 12 pentagons. When these 60 C atoms are arranged in space, they form a spatial arrangement position with the most stable chemical bond, which is exactly the same as the arrangement of the football surface grid.

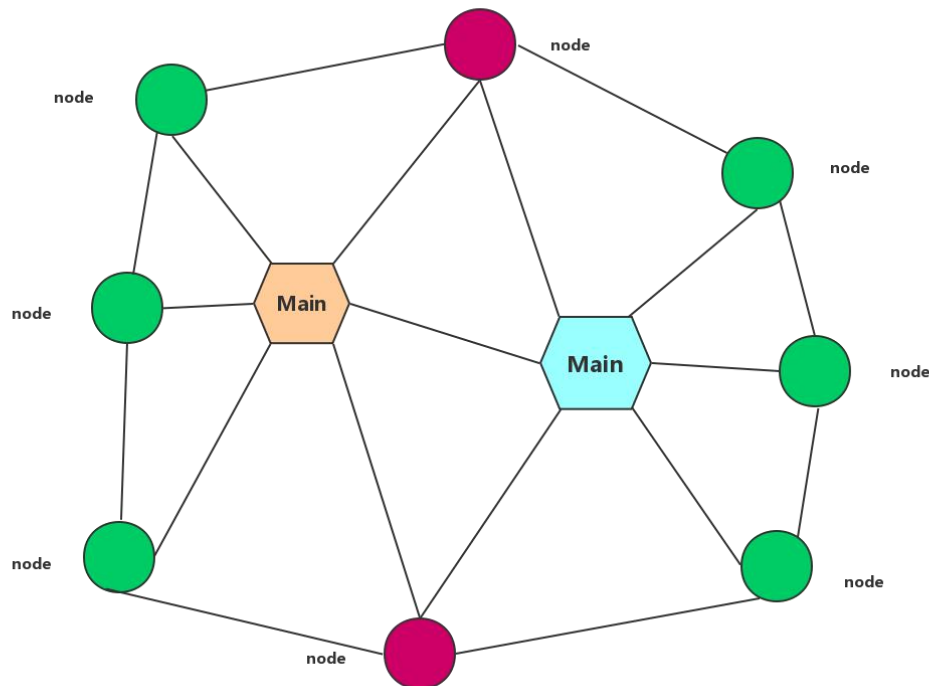
Since the discovery of C60 for more than ten years, it has extensively affected the fields of physics, chemistry, materials science, electronics, biology, and medicine. It has greatly enriched scientific theories and has also shown great Potential application prospects.

## **Two, storage technology**

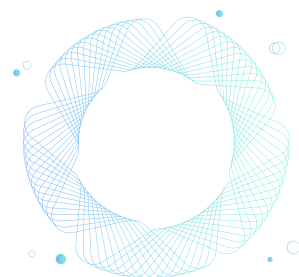
The molecular structure diversity of carbon can better interpret the Vortex Protocol. For example, the structure of graphite is arranged in honeycomb-like multiple hexagons. We can predict that each hexagonal point is our full storage node. At present, common poc storage has the following modes:

1. Perform full data storage, read data from any node when you need data, although the speed is very fast. But this is an extreme waste of storage equipment.
2. Sub-node storage. Although the sub-node storage can save space, the data must be reorganized and restored through multiple nodes. If some of the data is stored in

a node with poor equipment (such as low channel bandwidth). Then the entire download data time will increase. We discussed that carbon saving is not only natural carbon, storage space, people's time is also a way of carbon expression, this kind of waste should be avoided as much as possible.

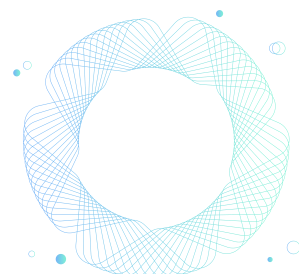
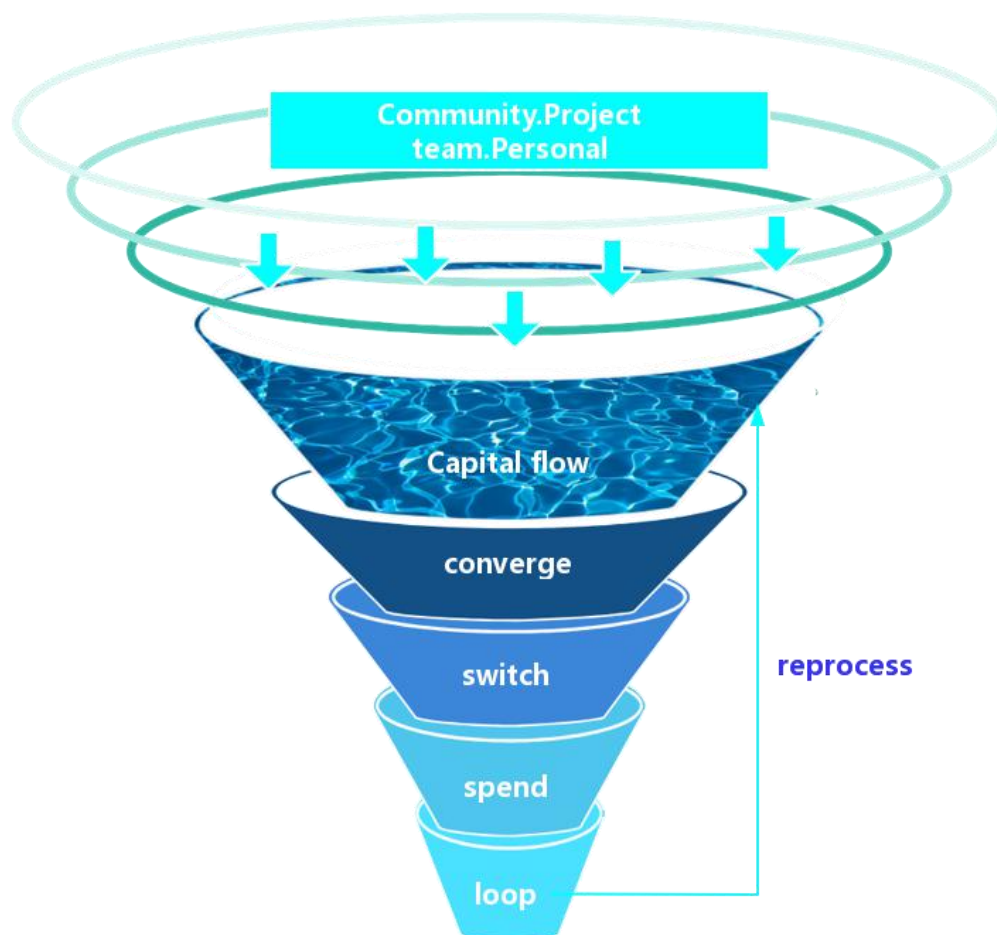


The vortex protocol will iterate on this storage method. The first generation protocol uses partial storage for the whole according to the basic structure of C60 to form a complete closed loop. When data is requested, the node with the most complete resources is selected from the nearest node, and the data is sent to the requesting node. , Like a vortex, when it reaches the exit, it will accelerate to form a convergence. When uploading data, the protocol will select the node with the best resource (node duration, bandwidth, storage medium) when accessing the data. The second-generation protocol improves the three-dimensional performance according to the diamond structure, increases the depth of data interaction, and achieves the goal of optimal access to decentralized data.



### Three, economic model

The economic model has always been a major issue in POC storage projects. The Torah team has been inspired by the molecular structure of carbon, the vortex in the sea, and the top vortex—the universe. The cost of generating storage resources is not affordable for individuals at the initial stage. It should be provided by multiple communities and foundations. In this way, many small funds can be concentrated to generate huge energy like sea water rushing into a whirlpool. Promote a virtuous ecological cycle.





To put it simply, when various elements are gathered, an energy vortex will be generated in the surrounding space, which will generate a kind of accumulation, integration, accretion, and accumulation of various social resources in the entire project ecology. For economic effects such as divergence and radiation, the energy and magnitude of the vortex depends on the utilization efficiency of each economic factor, the associated configuration efficiency and its development level, and the level of economic aggregate.

The project builds its own ecosystem around these resources, combining practice and theory to achieve its own competitive advantage.

First, combined with dark energy to promote the phenomenon of vortex motion in the universe, a prerequisite for the formation of a vortex is to have a huge gravitational field. This gravitational field can be regarded as the gravitational field of economic benefits. Just like the "singularity" in the vortex of a natural phenomenon, there is a huge energy-based focus fulcrum, which has a huge magnet-like gravitational force and has the function of accretion. Another condition is that the derivative attached to it is a carrier of information, making waves with it, and dying. The structural difference between "singularity" and "derivative" does not mean that they are systems that exist independently of each other. On the contrary, they exist as interconnected and mutually conditional poles, forming a unified and dynamic system. Economic system.

Second, there are countless small vortices in the social economy. Small vortices are then formed into middle vortices. The middle vortices form large vortices, just like the movement of celestial bodies in the universe. The stronger the central force, the greater the energy produced. The more small vortex organizations are attracted; on the contrary, the central force is destroyed, and the gathering energy of society also disappears. Of course, the new center begins to form again, and it goes round and round.

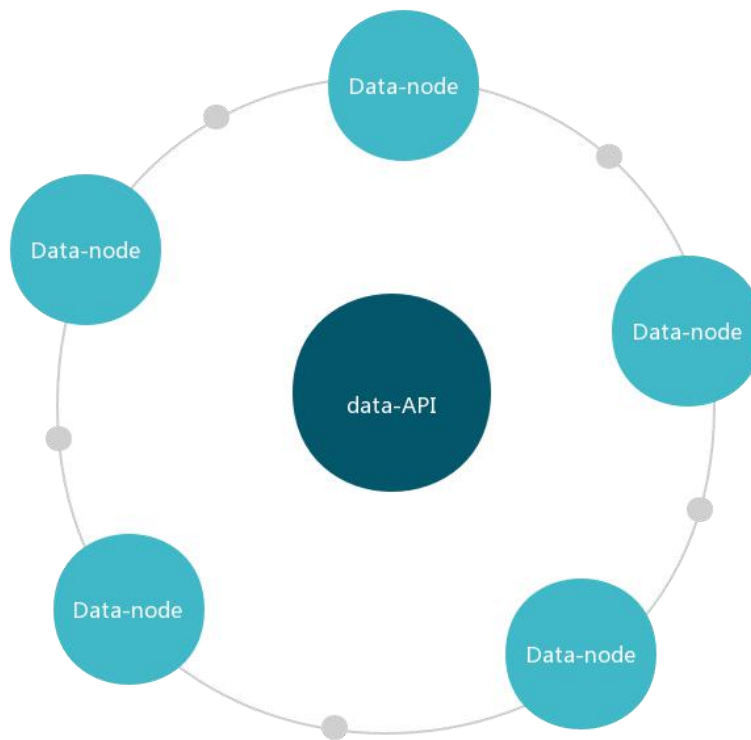
At present, the global social and economic movement is driven by interest. The energy of interest exists in the form of a vortex. The energy of interest is involved in all the carriers of information resources. Within the scope of the movement of interest energy, it will form a unity. A huge economic vortex field, just like the vortex phenomena that exist in tornadoes, galaxies, quasars, black holes, etc., enables information carriers of element resources to generate a mutual attraction through the interaction of engines around the field. An economic internal rotation centripetal force will be formed. This internal rotation economic centripetal force will become tighter and tighter, and the more rotation will produce economic cohesion. Due to its strong internal rotation centripetal force, the element resources will become more and more important. More and more, the competitiveness is getting stronger and stronger, the economic benefits are getting bigger and bigger, the area of the economic vortex is getting bigger and bigger, the energy of the economy will be bigger and bigger, and the core competitiveness will be stronger and stronger.

Centripetal force will also produce a kind of "centrifugal force." When resource elements are combined with low, loose, and inefficient resource elements and economies, they are getting farther and farther away from the center of their economic vortex, and they are gradually marginalized or even thrown away. At the same time, the centrifugal force enables the economic development of the survival of the fittest to maintain the endurance of its core competitiveness and the guarantee of innovation, which gradually spreads its economic influence outward and benefits the peripheral economy.

Torah mainly uses the vortex protocol and his storage mechanism is as follows:

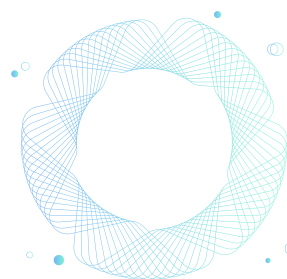
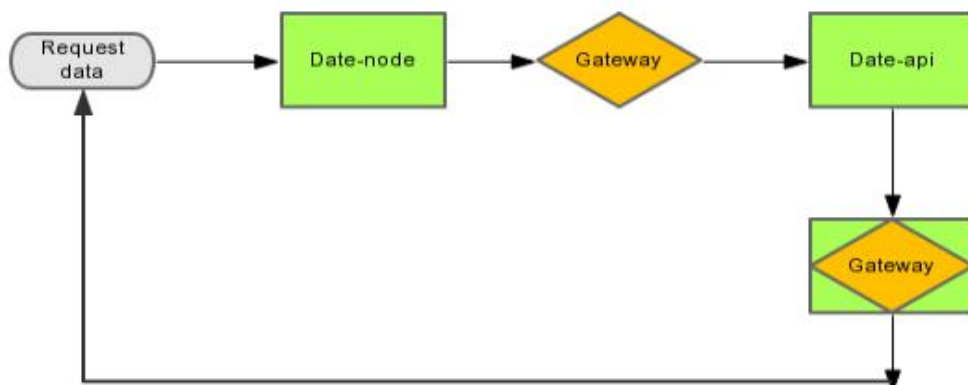
Most of the current blockchain projects are just distributed storage. Application extension is very poor. Take bzz as an example. Its downward speed is very low. Moreover, storing the same data on each node is a great waste, and it is not conducive to the storage and use of the project.

Most of the current poc storage mechanisms.



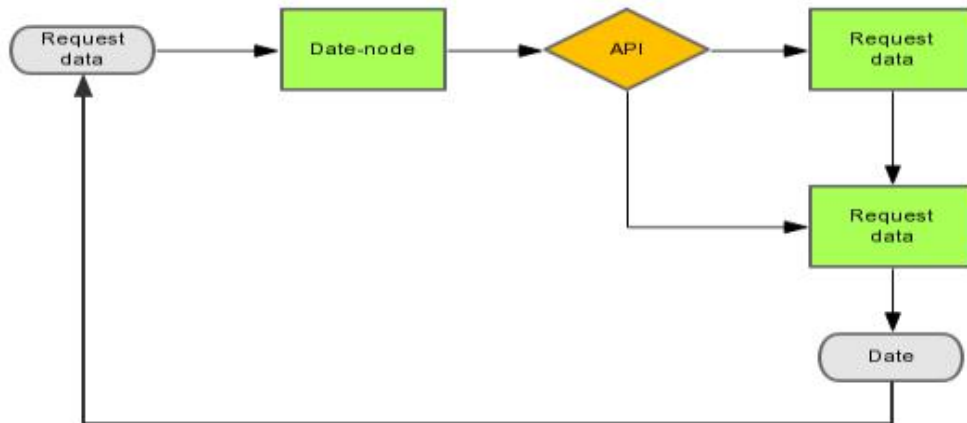
The only advantage of this mechanism is that it is fault-tolerant. But there are too many problems for poc storage.

Downward speed is too slow. Each time the data is converted, it is written to the local. The downstream bandwidth will be affected by the gateway bandwidth. As follows.



However, if the speed of one gateway in the entire link is restricted, the storage will be severely affected. Inefficient access can lead to the entire project

The Vortex Protocol will be modified here as follows.



Bypass a large number of gateways that restrict access. Reach the peak value of data upstream and downstream.

**Waste too much storage space, waste resources.**

At present, most of the storage is full-node. This will eventually lead to more and more data on the entire main network. This will seriously waste storage space and resources. Space and resources are precious. Wasted is not conducive to environmental protection. The vortex protocol cuts most of the file data. There is no full-node for each node, and the vortex protocol will guarantee a fixed value to stably store the content. Ensure the fault tolerance of stored content.

**Use the incentive effect of blockchain**

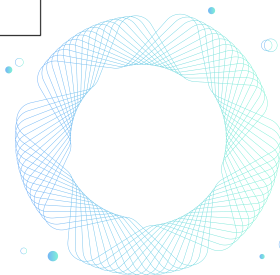
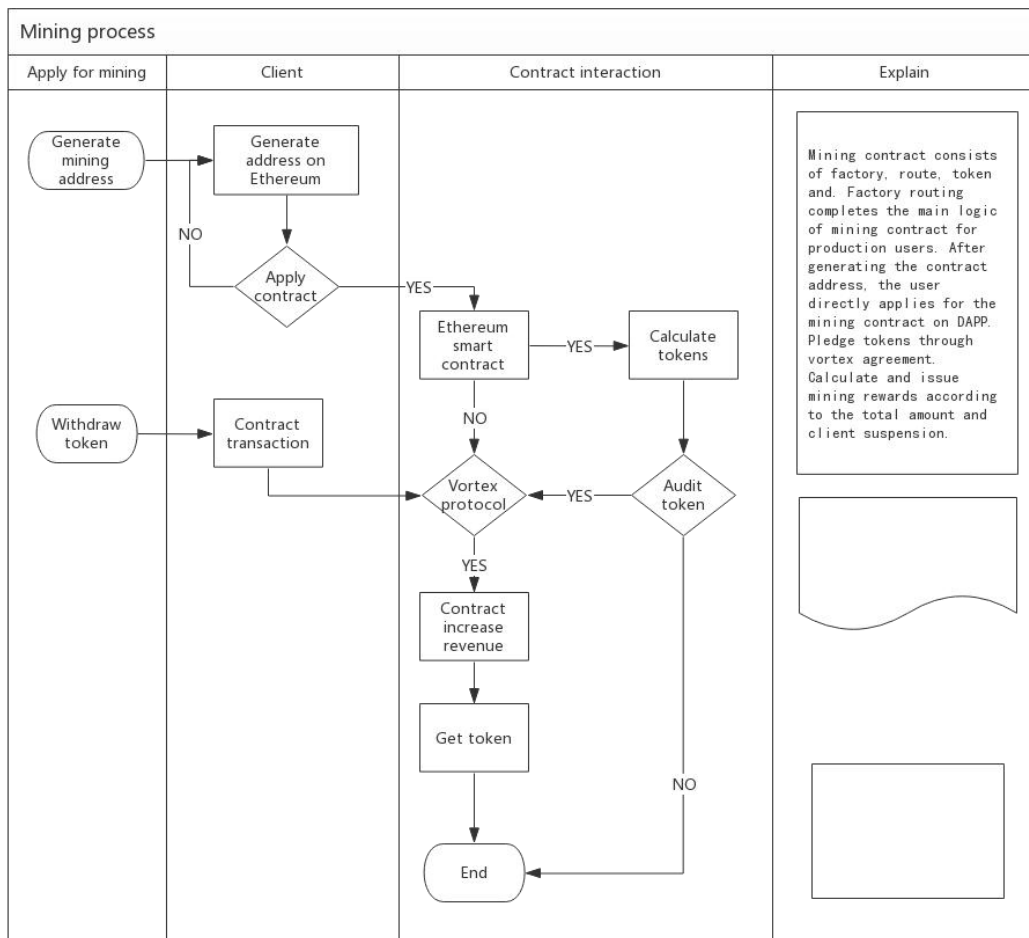
It is possible to quickly recruit many miner nodes around the world to join the blockchain storage system without huge investment and attract a large number of users to use it. It will quickly form a scale with a large number of nodes,

geographically dispersed, close to end users, many users, and many data , Thereby improving the quality of storage, increasing storage space, and reducing costs. On the other hand, due to the needs and characteristics of storage itself, the value of the blockchain can be more prominently reflected. Therefore, blockchain storage not only has actual application scenarios, rigid market demand and huge market space (nearly 100 billion US dollars per year), but it is also the best application scenario for blockchain.

## Mining mode

### POC and Ethereum smart contract binding mode

Flow chart





## Smart contract

A smart contract is a computer agreement designed to spread, verify or execute a contract in an information-based way. The promise controls the digital assets and includes the rights and obligations agreed upon by the contract participants, and is automatically executed by the computer system. The smart contract program is not just a computer program that can be executed automatically. It is a system participant in itself, which responds to the received information, can receive and store value, and it can send information and value out. This program is like a person who can be trusted, can temporarily keep assets, and always perform operations in accordance with the rules in advance.

Smart contracts can also be used to operate various open and fair automatic service organizations (DAO, Decentralized Autonomous Organization). Through smart contracts that operate on various nodes around the world, all operations and decisions are open and transparent, reducing the uncertainty of transactions.

The smart contract proposed after Blockchain 2.0 makes the application of Blockchain more convenient and expandable.

Features of smart contracts in the blockchain field:

The rules are open and transparent, and the rules and data in the contract are visible to the outside;

All transactions are publicly visible, and there will be no false or hidden transactions.

Main advantages:

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The contract is written into the blockchain in a digital form. Due to the characteristics of the blockchain, the data cannot be deleted or modified, but can only be added. The entire process is transparent and traceable, ensuring the traceability of history;

Because the behavior will be permanently recorded, it can greatly avoid the interference of malicious behavior to the normal execution of the contract;

Decentralization avoids the influence of centralization factors and improves the cost efficiency advantages of smart contracts;

When the content of the contract is satisfied, the code of the smart contract will be automatically activated, which not only avoids the manual process, but also ensures that the issuer cannot breach the contract;

A state machine system is constructed by the consensus algorithm that comes with the blockchain to enable smart contracts to run efficiently.

### **Proof of document existence**

The PoI (Proof of Importance) importance proof consensus algorithm introduces the concept of "account importance" and uses the account importance score to allocate the probability of accounting rights. By distinguishing the importance of accounts and obtaining accounting rights from accounts that are considered important, it is natural to achieve the goal of low energy consumption and speed, which is used to prove that the storage provider completely stores the data agreed by the smart contract.

POI is mainly constructed based on a hash tree to form an authentication tree and submit it to the verification node. We divide the data submitted by the customer into small data blocks and calculate the hash values of the data blocks respectively. Then

the two adjacent hashes are merged into a string, and the hash of this string is calculated, and each two hashes are combined to obtain a sub-hash. Calculating the hash value in this way will eventually form an upside-down tree. At this position of the root of the tree, there is only one root hash left in this generation. The hash tree corresponding to the user data is stored in the smart contract.

Data integrity verification refers to the verification method that verifies whether the received data is completely consistent with the original data becomes integrity verification. Integrity verification is also divided into general integrity verification and remote integrity verification. General integrity verification refers to whether the data read from the server is consistent with the previously written data. The verification method is based on user access. In the initial general integrity verification, it is necessary to download data from the server to the local, and then use the Hash algorithm to verify whether the value of the Hash result is the same as the previously pre-existing local source Hash. Although this verification method is simple, the shortcomings are obvious, and the integrity needs to be verified. Download all the data from the server. When the amount of data is large, the consumption and requirements of network traffic will be very large, and the gain is not worth the loss. The integrity verification of cloud data is particularly special, because no matter how large file data is stored in the cloud in the form of a block, then it is okay to block these one by one, then the set of blocks is a set of objects, so we can The archive file is regarded as a structured object set  $S$ . The general integrity verification problem of cloud data is also the member verification problem of the object set  $S$ , that is, verifying whether the file block retrieved by the user is a member of the object set  $S$ . The membership verification problem of the object collection can be verified through the integrity verification of the authentication data structure (authentication dictionary).

The authentication dictionary, which can also be called an authentication data structure, is a structure that combines a query data structure with cryptographic

technology, so that the data in it can be authenticated. The following introduces several general integrity verification algorithms based on the authentication dictionary.

### **Data integrity verification based on MHT**

Merkel Hash Tree is a tree-type data structure, its leaf nodes are independently verifiable data blocks (or indirect data) Hash, any internal node is calculated after the data of its child nodes are connected hash value. It is suitable for quickly verifying the integrity of a data block or a small number of data blocks. Compared with the traditional integrity check, the time complexity of the Merkel hash tree is greatly reduced, from  $O(n)$  to  $O(\log n)$ .

### **Data Integrity Verification Based on Jump Table**

Jump list is a kind of data structure extended from binary tree, it is an ordered multi-level linked list.

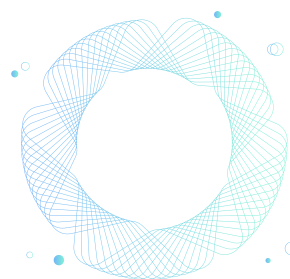
The calculation method of tag value  $f(v)$  is as follows: Define  $w = \text{right}(v)$ ,  $u = \text{down}(v)$ , when  $\text{right}(v) = \text{null}$ , define  $f(v) = 0$ . So:

When  $u = \text{null}$ , that is,  $v$  is on So:

- (A) When  $w$  is a high tower node,  $f(v) = h(\text{elem}(v), \text{elem}(w))$ ;
- (b) When  $w$  stops at the node,  $f(v) = h(\text{elem}(v), f(w))$ .

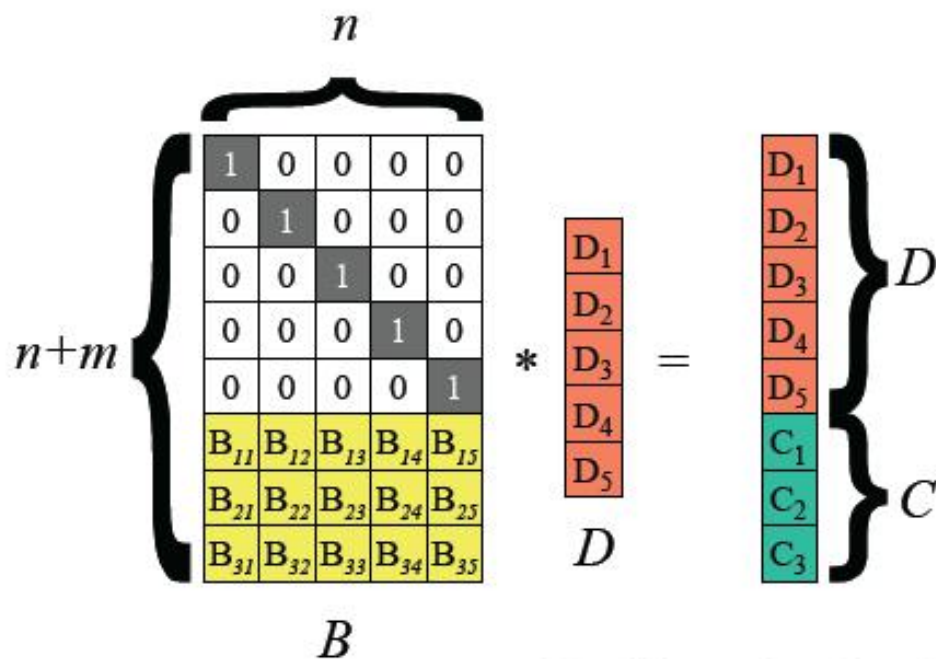
When  $u$  is not equal to null:

- (A) When  $w$  is a high tower node,  $f(v) = f(u)$ ;
- (B) When  $w$  is a stagnant node,  $f(v) = h(f(u), f(w))$

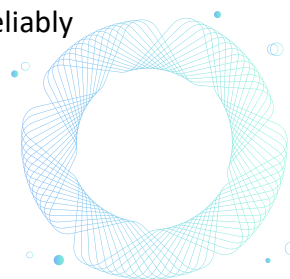


## Erasure coding technology

Due to the unreliability of idle equipment, equipment drops and other phenomena occur from time to time. In order to prevent user data from being unable to be obtained normally due to device disconnection, the stored data must be stored redundantly. However, if only the data is processed in multiple backups, the distributed system needs to continue to provide services even after hardware failures and other failures occur. As far as data is concerned, HDFS uses 3 copies of each data to ensure that some data can still be used after loss. In addition to copying, there is another way of data fault tolerance, which is to calculate the missing data. The advantage of erasure codes is to save storage space.



Each of the file fragments obtained through the fragmentation mechanism is composed of data blocks and check blocks of different parts of the file. The file information in the fragments is scattered, that is, a single file fragment will not leak user data information. It is guaranteed that even if a third party, including storage node providers, illegally obtains the shards stored on a single node, they cannot obtain user file content, and the privacy of data in cloud storage is reliably





guaranteed. At the same time, from the nature of the Vandermonde matrix, in  $n = k + m$  slices, as long as there are  $k$  slices that can be used normally, the system can completely restore the user's original file. This means that even if some fragments are maliciously deleted, or when single or multiple storage nodes in the system fail, user data will not be lost. This feature improves the fault tolerance and redundancy of the cloud storage system, and provides a guarantee for the reliability and integrity of the data. In addition, when using RS erasure codes to restore user files, at least  $k$  download nodes need to be connected. The fewer download nodes connected, the faster the download speed, and the shorter the download delay. The advantage of applying this algorithm is that when network packet loss or error occurs, the download node does not need to use the retransmission mechanism, and only needs to re-select other nodes to complete the download task.

## TorahChain application

How to achieve seamless connection of each step of Internet information circulation, chaining, storage, exchange, and calculation?

How to achieve openness, fairness, interconnection and sharing of energy management?

Different from existing cloud storage solutions, Torah is a decentralized shared storage platform where nodes in the Torah network rent storage space to each other. Because the storage space in each node is idle space, the marginal cost can be considered as close to zero, and it can be achieved in a true sense; carbon neutrality, carbon emission reduction, and organization of zero-carbon solutions.

The cost of sharing storage through Torah is much lower than ordinary cloud storage. The storage lease is based on the smart contract on TorahChain. By forming a smart contract, storage providers (nodes that provide storage) agree to store customer data

and regularly prove that they can continue to provide storage services until the contract expires. The storage provider can be rewarded by submitting the completeness proof, but the failure of the proof will be punished accordingly. TorahChain guarantees the fairness and accuracy of smart contracts. Customers do not need to verify the contract. They only need to upload data and leave the rest to TorahChain.

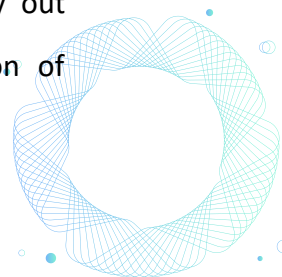
The Torah project is committed to providing a data storage infrastructure for blockchain and decentralized applications. On top of this infrastructure platform, it provides decentralized cloud database storage and access capabilities. Moreover, Torah is based on horizontal scalability and distribution. Chip technology provides high-speed transaction capabilities; through relay chain technology and cross-chain transaction verification, it provides cross-chain transactions and data access and verification capabilities in the system. Through the support of the BCP protocol, it provides cross-chain systems with other chain systems. Chain communication capability. By providing infinitely expandable block storage, file storage, object storage, KV storage and table storage, and a series of basic capabilities services including rapid network transmission (rsync), Torah enables distributed applications to easily complete data generation and calculation , Transmission, storage, and retrieval. Through attribute encryption and proxy encryption technology, we provide protection for data privacy. Not only that, the Torah project also has the characteristics of flexible data structure, powerful programming interface, and efficient backup. With the development of the Torah project, there will be more and more service capabilities, such as distributed cache, distributed shared memory computing based on non-volatile memory, distributed relational database, distributed MapReduce and other projects, as parallel sub-projects The chain joins the network and provides infrastructure services together through Torah. Finally, a self-organizing and self-managing data management system covering tens of millions of nodes in the cloud will be formed. All decentralized applications can conveniently use this cloud database to store and query data through APIs. In particular, since

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there is no need to bear the huge organizational costs of the expensive centralized IAAS, this decentralized cloud database must have extremely high cost-effective advantages, as well as inherent capabilities for remote disaster recovery and cross-continental data sharing. This has initially formed a decentralized IAAS, with three basic IAAS capabilities of storage, computing, and network bandwidth. Coupled with the value exchange system provided by the blockchain network, Torah will be a global infrastructure with unlimited imagination. The internet.

As a decentralized blockchain data infrastructure, Torah does not benchmark the performance indicators of a centralized database. Moreover, considering the characteristics of a distributed network of peer nodes, there must be usage scenarios for the Torah cloud database at the current time. limit. Torah' s advantages are open source, community governance, economic models and trust mechanisms that can be verified. For today' s technical staff, Torah can be used as a cloud-based KV database (such as redis), document database (mongodb), and time series database (druid). ) To use, you can start using backup and archive scenarios to store immutable data. In terms of business scenarios, Torah is more suitable for scenarios where the transaction speed is frequent, the amount of data inflow and outflow is high, but the amount of change is small. Torah can be used to store IoT and AI data. In addition, it can also be used to store KV data, log data, Mertrics and Event data, IoT and AI data, feed stream data, etc., so it is similar to decentralized lottery, Low-frequency gambling, video websites, feed streaming applications, blogs, forums and other decentralized services can all use Torah cloud database as the back-end storage of data.

At present, most public chain projects in the world have only one public chain, such as Ethereum or EOS, including Polkadot, etc. The infrastructure that provides facilities is also provided around the chain, such as providing decentralized domain names. Analysis, network disk, files, etc. What Torah wants to do is not only carry out technological innovation in the field of blockchain, but also a combination of



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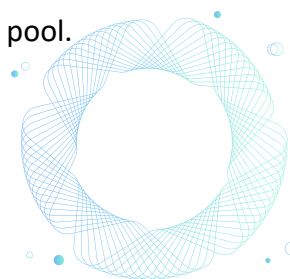
business model innovation and economic system, energy management, and social effects. If the Bitcoin system does not introduce economic models and does not follow the trend of the times, then the blockchain ecology will stagnate. Therefore, if you only look at the realization of Torah from a technical point of view, then this issue will always be controversial. Torah is not just going to be a pure technology studio or a technology company, we are more hopeful that technology will change our lives and work with all mankind towards a better future.

## Torah Cloud Mine Pool

### Torah design principle

At present, the incentive layer generally refers to the digital token that adopts the proof-of-work mechanism. Take Bitcoin as an example. Bitcoin uses the POW mechanism in the block generation process. A Block Hash that meets the requirements is composed of N leading zeros, and the number of zeros depends on the difficulty value of the network. To get a reasonable Block Hash requires a lot of trial calculations, and the calculation time depends on the hash operation speed of the machine. When a node provides a reasonable Block Hash value, it indicates that the node has indeed undergone a lot of trial calculations. Of course, the absolute value of the number of calculations cannot be obtained, because finding a reasonable hash is a probabilistic event. When a node has n% of the computing power of the entire network, the node has a probability of n/100 to find BlockHash. The mining pool increases the probability of obtaining digital tokens by gathering a large amount of computing power, and then distributes revenue according to the percentage of computing power contribution.

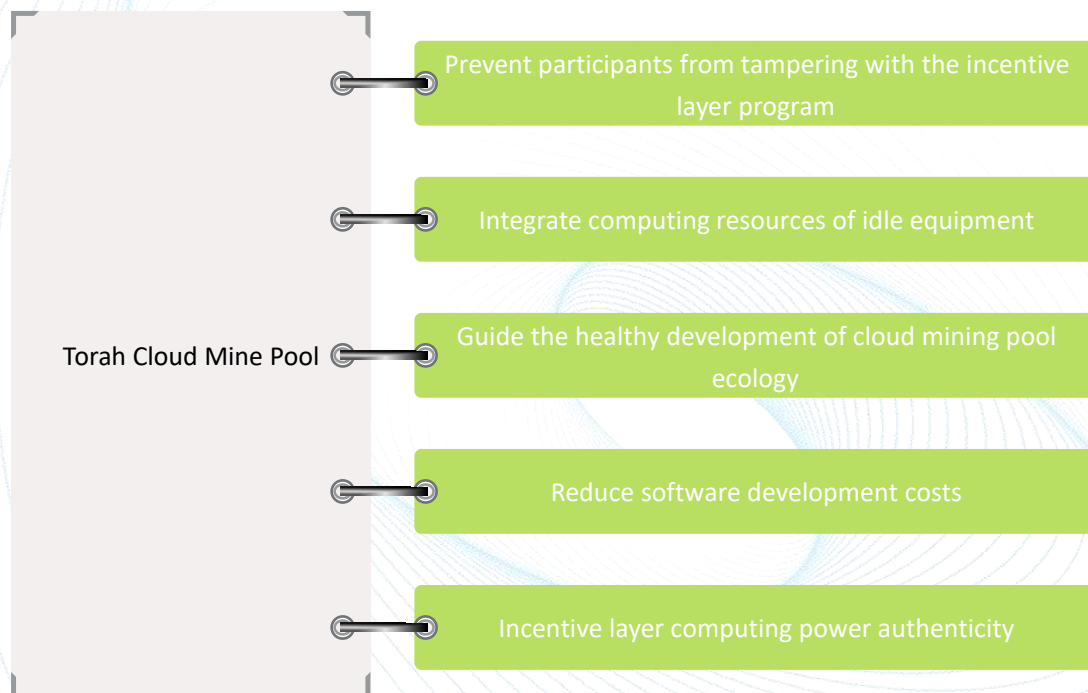
Torah cloud mining pool is a typical distributed computing. Based on MapReduce, combined with Torah cloud storage architecture Torah cloud mining pool.



MapReduce is a computing model, framework, and platform for parallel processing of big data. It implies the following three meanings:

A cluster-based high-performance parallel computing platform (Cluster Infrastructure). It allows common commercial servers on the market to form a distributed and parallel computing cluster containing tens, hundreds to thousands of nodes.

A parallel computing and running software framework (Software Framework). It provides a large but well-designed parallel computing software framework that can automatically complete the parallel processing of computing tasks, automatically divide computing data and computing tasks, automatically allocate and execute tasks on cluster nodes, collect computing results, and distribute data for storage. Many complex details at the bottom of the system involved in parallel computing such as data communication, fault-tolerant processing, etc., are handled by the system, which greatly reduces the burden on software developers.





A parallel programming model and method (Programming Model & Methodology). It provides a simple parallel programming method with the help of the design idea of the functional programming language Lisp. It uses Map and Reduce functions to program basic parallel computing tasks, and provides abstract operations and parallel programming interfaces. Simple and convenient to complete the programming and calculation processing of large-scale data. Based on MapReduce, we parallelize the workload proof functions involved in the incentive layer and decompose them into TorahCloud to run. With the help of the huge computing power in the network, the Torah cloud mining pool is more competitive than other mining pools.

At the same time, because the Torah cloud mining pool distributes the incentive layer revenue in proportion to the computing power, in order to prevent participants from falsifying computing power, we conduct regular integrity verification of the incentive layer program implanted in the terminal device. The integrity proof algorithm uses a similar algorithm to Torah cloud storage. Proof of integrity prevents participants from tampering with the incentive layer program and falsifying the computing power of the incentive layer.

Torah cloud mining pool highlights: Torah cloud mining pool integrates the computing resources of idle equipment through MapReduce technology. With the help of MapReduce's powerful function mapping simplification ability, it can deal with all the incentive layer businesses on the market. Through the introduction of completeness proofs, it can avoid computing power fraud and guide the healthy development of Torah cloud mining pool ecology.

Torah's persistent storage service uniformly uses redundant coding, and any data is automatically coded into  $N$  (for example, 100, the specific number will be determined by the community governance committee in the future) fragments, of which any  $M$  (for example, 70) fragments can be recovered Data, and then store these  $N$  fragments in  $N$  storage nodes, each node saves an  $18/77$  redefinition blockchain to store  $19/77$  fragments, so as long as they are not at the same time,

there are  $N-M+1$  (in this example) In 11) node failure can ensure data integrity and no loss. When any node fails, the system will immediately select another node to rebuild the data of the failed node. In this example, it will not be possible until the first failed node is rebuilt. There are 11 other nodes that have also failed successively, which can ensure that data will never be lost. Each node will monitor and verify each other. Once any node fails, it can be quickly discovered and reconstructed. When the data of a failed node is rebuilt, it will be divided into many nodes. Rebuild at the same time to speed up the reconstruction. For example, one fragment of 10,000 files is stored on a failed node, and it takes 0.5 seconds to rebuild a fragment on average (mainly the network transmission takes time). 100 nodes are selected to participate in the reconstruction, and each node only needs to rebuild 100 fragments. All reconstruction work is completed in an average of 50 seconds. As long as no other 11 nodes of the same file fail at the same time within 50 seconds, the file data will not be lost. Due to the good redundancy and geographical location, there is no need to worry about the damage of the hard disk and the operation and maintenance errors of individual nodes (2018 In August 2008, it was exposed that Tencent Cloud lost user data due to operation and maintenance errors), lightning weather (in September 2018, Microsoft's Azure services in some areas were down for more than 20 hours due to lightning strikes), power outages, fiber cuts, earthquakes and fires. Data failure is not afraid of DDOS attacks due to scattered nodes and good redundancy.

## Torah contribution mechanism

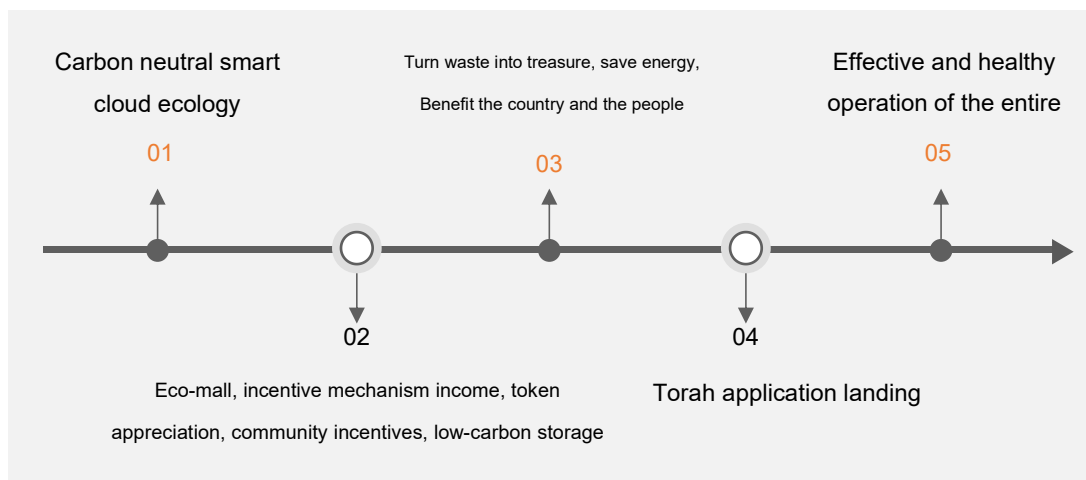
The smart contract concluded between the customer and the storage provider is maintained by the CDN node.

The work of the CDN node to maintain the smart contract includes: obtaining the POI periodically submitted by the Torah terminal, judging the validity of the POI, no processing is performed if the POI is valid, if the POI is invalid, a counter is started to determine the number of POI failures; once the POI failure exceeds the threshold,

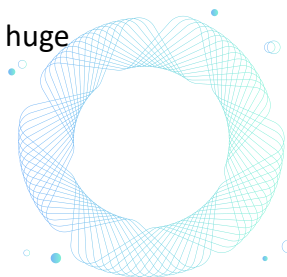
the CDN node Look for a new Torah terminal to back up the storage content and create a new smart contract; after the smart contract ends, valid POIs will be rewarded with VP, and invalid POIs will be punished with VP.

## Torah economic model market circulation

Since the emergence of life on earth, natural resources such as oil, coal, metals, natural gas, forests, land, water, combustible ice, animals, plants, etc. have been continuously consumed from the beginning to the end of life.



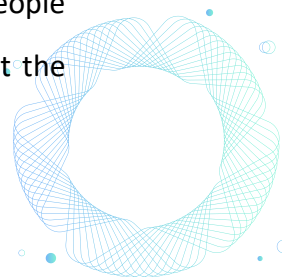
Like the current 7.4 billion humans on the planet, they consume natural resources every day for food, clothing, shelter and transportation. Shopping malls and supermarkets are the main places for commodity circulation and consumption. The circulation of commodities will generate value/currency circulation. Currency circulation refers to the form of currency movement caused by commodity circulation, which has two functions: circulation means and payment means. Torah's carbon-neutral and smart cloud ecosystem closed-loop to create a new consumption model, allowing consumers to use the pass to obtain shopping, but also easily turn the holding of the pass into an investment, while taking into account low-carbon consumption, through the use of Torah By producing and acquiring tokens, this consumption model will gradually form a "closed-loop circulation system", and everyone participating in the closed-loop circulation system will enjoy the huge



profits generated by the closed-loop circulation model. For example: if you are a Torah pass holder, you can enjoy the entire Torah ecological use pass purchase qualification; if the user obtains the pass through carbon neutral "behavior" contributions, you can increase revenue based on ecological circulation; for example, ecological Integration of shopping malls, incentive layer revenue, token value-added, community incentives, and low-carbon storage. In the end, the Torah economic model is to turn idle resources into investment, waste into treasure, save energy, and benefit the country and the people. With the implementation of the Torah application, as the only pass in the early stage of the pass system, Torah will be responsible for the effective and healthy operation of the entire ecology.

Torah issues a token for resources, called a resource token. For example, one type of resource token for hard disk storage resources. Never over-issue. The corresponding relationship between the issuance of resource certificates and the number of resources used for mining is fixed. For resource users, resource tokens can be used to purchase corresponding resources. Due to the factor of data deduplication, the amount of resources available to users is many times the resources contributed by miners, which greatly reduces the cost of users purchasing and using resources, and constitutes an economic model for everyone to profit.

The following uses hard disk storage as an example to illustrate Torah's resource token mechanism. Assuming that the token for the hard disk storage resource is TOR (the specific name is finalized by the community governance committee when the token is created), a miner can obtain 1 TOR for 1GB of data a year, if the data deduplication factor is not considered, then 1GB of data It takes 1 TOR to save for 1 year. But after adding the data deduplication factor, a very special model will be produced. According to our research, the average data repetition rate of a medium-scale cloud disk application is about 3 times, and the average data repetition rate of a large cloud disk application is about 5 times. The more people who use it, the greater the data repetition rate. High, so we can estimate that the



average repetition rate of Torah is about 7-10 times. Which is 28/77

Redefining blockchain storage 29/77 It is said that if the entire system stores 1EB of data, the actual physical storage space occupied is approximately between 100P-200P. Considering that data storage also requires redundant coding, we take an example of 5 times the average repetition rate (this is the number after offsetting the data redundancy rate brought by redundant coding). In the case of 5 times the average repetition rate, 1GB of data requires only 0.2GB of space on average. Even with transaction fees, it only takes about 0.25TOR to buy 1GB of data for 1 year of storage space. This creates a magical incentive effect: a user has 1GB of hard disk space, if it is used for personal use, only 1GB of data can be stored, but if it is used for mining, this part of the hard disk space will be contributed to help others to save for a year. Time data, this can be exchanged for 1TOR resource tokens, and then 0.5TOR can be used to purchase 1 year storage service of 2GB data, and there is 0.5TOR remaining. This not only helps others, but also benefits from it.

This model is long-term sustainable. The system operator not only does not subsidize, but can also collect transaction fees from it for long-term ecological construction, which fully reflects the superiority of the blockchain model. After a miner has contributed resources to mine to obtain TOR, he can process these TORs in the following ways:

Use these TORs to buy more storage space and store personal data

Exchange TOR into other resource tokens (using TOR as an intermediary) to purchase other types of resources (such as CPU resources)

Converted into TOR, and then converted into legal currency

Converting into TOR, holding TOR, participating in Torah community governance



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through voting or campaigning The above is an example of TOR. No matter what kind of resource token, its value is directly related to the corresponding resource. It is guaranteed that the corresponding resource can be purchased. Never worry about the price returning to zero, but it will not appear.

Redefining blockchain storage 30/ 77 Ten times and one hundred times the value-added in the short term. It is a long-term and stable value-added token, and its purchasing power will become stronger and stronger over time.

## Basic ideas for achieving Torah carbon neutrality

1. The implementation of carbon neutrality will contribute to the realization of Torah's global ecological strategic goals;

Torah actively promotes the high-quality development of blockchain ecology, and builds global economic, environmental and social benefits brought about by a modern information energy system. Torah uses 5G technology, big data, Internet of Things, supply chain, artificial intelligence, new infrastructure, distributed data storage, smart contract system functions and other blockchain technologies to effectively combine energy circulation, value circulation and data circulation to provide energy Value regeneration and sharing provide powerful technical support to achieve a new balance between man and nature, and to achieve a harmonious symbiosis between man and nature. Currently, Torah is exploring the construction of a modern energy system, combining carbon neutrality, energy saving and emission reduction, and promoting global energy management. At the same time, it is also accelerating the development of the digital economy and society, ensuring the efficiency and application value of data storage and dissemination, meeting the energy structure requirements of the new era in accordance with the global environmental policy orientation and development path, strengthening the low-carbon and energy-saving development model, and adjusting the district on this

basis. The block chain industry structure, and in accordance with the current international social policies, is moving towards the direction of promoting low-carbon development of the industry and promoting the construction of a modern new energy system.

2. Demonstrate Torah's social responsibility and fulfill its responsibilities and obligations to the whole society;

Driven by the strategy of global economic development, rapid economic development has continuously put forward new demands on energy requirements, and energy reform is imminent; Torah further accelerates energy reform, optimizes the industrial structure and energy structure (distributed storage), and helps the global economy and society. The development of green and environmental protection. Torah is always fulfilling his social rights and interests to the whole society, and innovatively proposes to realize a reasonable layout of data collection, conversion, transaction, storage, and consumption based on the modern international energy development plan. Through Torahchian, all low-carbon behaviors are digitized, interconnected, interconnected, co-constructed, and shared to make full use of them, making them more digital, informatized, intelligent, and efficient, breaking industry barriers, and making important contributions to achieving global carbon neutral development.

3. Promote global energy saving and emission reduction, and become a pioneer in carbon neutral projects;

Torah adheres to the concept of green development, empowers smart low-carbon energy development in the digital age, promotes global energy conservation and emission reduction, and becomes a pioneer in carbon neutral projects; Torah combines blockchain, the Internet, big data, and artificial intelligence with the real economy , To create a sustainable Internet wisdom ecology. In the process of Torah's

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carbon neutral ecological global layout, to promote the realization of Torah's energy-saving and emission reduction technology, Torah will also actively participate in global environmental protection in cooperation with the community.

4. Meet the needs of global users to reduce their carbon footprint;

The development of Torah will promote the technological innovation and development of 5G, privacy computing, knowledge graph, Internet of Things, big data technology, blockchain technology, big AI technology and distributed storage in the energy field, while using high technology and market The driving force encourages users to improve their daily rational energy use habits, enhance their awareness of energy conservation and environmental protection, promote natural ecological balance, achieve better proximity to users, serve users in demand around the world, and further promote the great progress of social civilization.

5. Meet the relevant requirements of contemporary countries in low-carbon regulations and carbon tax policies.

In the 1950s and 1960s, when environmental pollution and ecological destruction became more and more serious, many environmental problems such as global warming, ozone layer destruction, acid rain, ocean pollution, arbitrary exploitation of energy, reduction of forest area, The destruction of the natural environment is becoming more and more globalized and internationalized. The natural environment and natural resources have been unable to withstand the tremendous pressure of rapid industrialization, rapid population growth and urbanization, and the world's natural disasters have increased significantly.

The United Kingdom, one of the representatives of the Industrial Revolution, paid attention to economic development while taking into account environmental protection. In 1876, it promulgated the River Pollution Prevention and Control Act,



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the Coal Mining Act in 1957, the Agricultural Land Act in 1953, and the 1974 , The United Kingdom promulgated the "Pollution Control Act", which brought the British environmental protection and environmental legislation into a new stage. After the 1980s, the United Kingdom continued to strengthen environmental legislation. The Criminal Law promulgated in 1982 added provisions for criminal sanctions for crimes that endanger the environment.

Australia is also one of the first countries in the world to promulgate environmental protection laws. The government has continued to improve from four aspects: environmental planning and pollution control, protection of natural and cultural heritage, development and management of natural resources, and determination of environmental protection content in relevant laws and regulations. The construction of the environmental protection legal system has established a very complete ecological environmental protection and construction of a legal and regulatory system. Such as "Environmental Protection and Biodiversity Protection Law", "National Environmental Protection Committee Law", "National Parks and Wildlife Protection Law", "Resource Evaluation Committee Law" and "National Appropriation Law", "Endangered Species Protection Law" and "Ozone Layer Protection Law" The Marine Petroleum Pollution Act, the Continental Shelf Act, and the Great Barrier Reef Marine Park Act; Australia's Environmental Protection and Biodiversity Conservation Act (1999) is the core environmental protection law of the Australian government, which took effect in July 2000. There are more than one hundred local environmental protection regulations in various states. For example, Victoria and New South Wales, which have 70% of the manufacturing industry in the country, have enacted the Environmental Protection Act and the Environmental Crime and Punishment Act, which have effectively controlled environmental pollution .

As the world's most developed country, the United States also paid attention to environmental issues early and formulated a series of laws and regulations on environmental protection and pollution prevention.

The first law on pollution prevention and control promulgated in 1899 was the 1899 River and Port Law (also known as the Garbage Law). Subsequently, the "Federal Pesticide Act" (1910), the "Prevention of River Oil Pollution Act" (1924), and the "Federal Food, Drug and Cosmetic Act" (1938) were promulgated.

Around the 1950s, due to the increase in environmental pollution incidents, the United States began to attach importance to federal pollution prevention and control legislation, and successively promulgated the "Federal Water Pollution Control Act" (1948), the "Federal Pesticide, Fungicide, and Rodenticide Act" (1947), "Atomic Energy Act" (1954), "Federal Air Pollution Control Act" (1955), "Federal Hazardous Substances Act" (1960), "Fish and Wildlife Coordination Act" (1965), "Air Quality Act" (1967), "Nature and Scenic Rivers Act" (1968), etc. In addition, the "Water Pollution Prevention and Control Law" and the "Air Pollution Prevention and Control Law" have been amended many times.

By 1969, the United States had promulgated the National Environmental Policy Act, marking that its environmental policies and legislation had entered a new stage, from focusing on governance to focusing on prevention, and from preventing pollution to protecting the entire ecological environment. Subsequently, the "Environmental Quality Improvement Act" (1970), the "American Environmental Education Act" (1970), the "Coastal Zone Management Act" (1972), the "Marine Mammal Protection Act" (1972), and the "Environmental Quality Improvement Act" (1970) were promulgated. Marine Conservation Research and Prohibited Fishing Zone Act (1972), Federal Environmental Pesticide Control Act (1972), Noise Control Act (1972), Safe Drinking Water Act (1974), Endangered Species Act (1973), Federal Land Policy and Management Act (1976), Toxic Substance Transportation Act (1975), Resource Conservation and Recycling Act (1976) and Toxic Substances Control Act (1976).

After entering the 1980s, the United States further strengthened the legislation on



acid, energy, resources, and waste disposal, enacted the "Acid Rain Act" (1980), the "Motor Vehicle Fuel Efficiency Act" (1980), "Biomass and Alcohol" Fuel Law (1980), Solid Waste Disposal Law (1980), Super Fund Law (1980) and Nuclear Waste Policy Law (1982). At present, the U.S. federal government has enacted dozens of environmental laws and thousands of environmental protection regulations, and has formed a complex and complete environmental law system. The United States is a federal country, and each state has its own environmental laws, which are important effect. And in accordance with the National Environmental Policy Act (NEPA) of the United States, the United States Environmental Quality Committee established the United States Environmental Quality Advisory Agency.

In June 1972, the first Human Environment and Development Conference was held in Stockholm, the capital of Sweden, and the Declaration on the Human Environment was issued. This is the first environmental conference jointly held by the international community, marking the awareness and concern of mankind on global environmental issues and their impact on human development.

On December 15, 1972, the United Nations General Assembly made a resolution to establish the UNEP. In January 1973, the United Nations Environment Programme (UNEP) was formally established as the United Nations organization that coordinates the world's environmental protection work.

In 1997, the European Union signed the "Amsterdam Treaty" which laid the foundation for its eastward expansion. The treaty made sustainable development the fundamental goal of the European Union, thus greatly expanding and strengthening the scope and functions of the European Union's environmental policies.

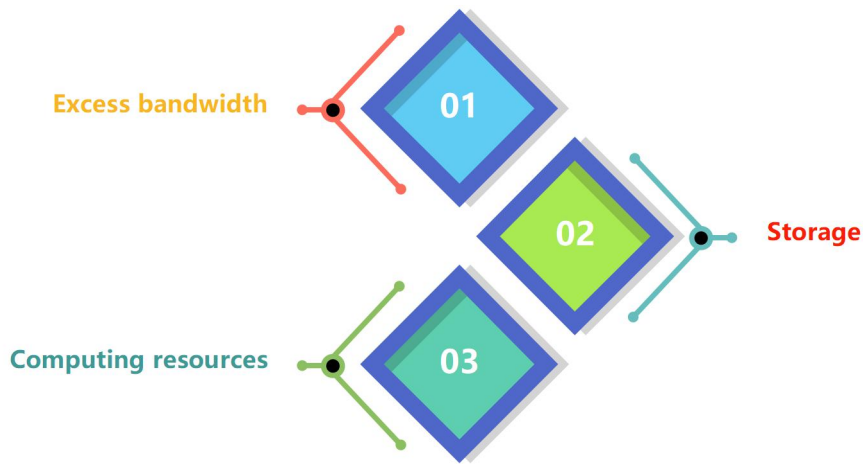
In 2005, the European Union passed the "Energy-using Products Eco-Design Framework Directive." The directive greatly exceeds the polluter pays principle, and aims to ensure that the environmental impact of the entire life cycle of the product is

minimized by setting requirements on the design of certain energy-using products.

This shows that more and more countries are urgently pursuing the ecological environment, infrastructure, industrial upgrading, green services, energy conservation and environmental protection, clean production, and clean energy. The global energy pattern, governance system, energy management, and low-carbon development are the general trend. The awareness of energy conservation and emission reduction, and the concept of green environmental protection have been deeply rooted in the hearts of the people. All countries are actively creating higher quality, lower energy consumption, smarter, greener and healthier energy management systems. . Torah conforms to the trend of the times, “carbon neutrality” empowers energy encryption in the digital age, and promotes the integration of blockchain, the Internet, big data, and artificial intelligence with entities to create sustainable energy development and a comprehensive smart energy ecology.

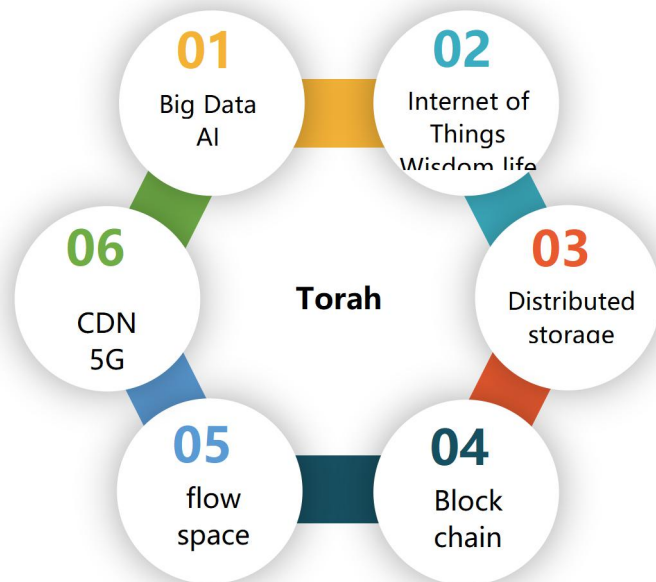
## **Idle broadband and hardware resource reuse**

Globalized economic growth, rapid development of science and technology, the trend of interconnection of all things intensified, the new energy structure, the subject and mode of energy transactions are diversified, and the transaction frequency is higher. Therefore, higher requirements are put forward for network communication and data interaction. How to make full use of idle resources has great application value in the energy field.

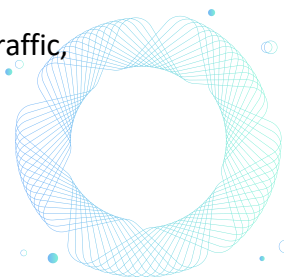


According to related reports, the value of home broadband, computers and smart devices worldwide is only a few hours per day.

At the beginning of Torah's design, one of the aspects was to record and trace carbon consumption, so as to improve the efficiency and application value of storing and disseminating data, and to provide a new solution to meet the energy structure and energy management of the new era.



Torah encourages users to share excess bandwidth, computing resources, storage space, etc. through blockchain technology, and will integrate and utilize CDN, traffic,



space, storage and other resources to make contributions to society. At the same time, Torah uses the underlying blockchain technology as the architecture and storage as the bottom layer, integrating big data, Internet of Things, smart life, artificial intelligence, distributed data storage, smart contract system functions and other blockchain technologies to integrate energy circulation, value circulation and data. The combination of circulation provides a powerful technical guarantee for the regeneration and sharing of energy value.

## Torah physical resource advantage

### **High performance and scalability**

Common hardware devices in daily life are: calculators, TV set-top boxes, mobile phones, digital TVs, multimedia players, cars, microwave ovens, digital cameras, home automation systems, elevators, air conditioners, security systems, vending machines, consumer electronics equipment , Industrial automation instruments and

medical instruments, etc., most of which require computing speed and storage capacity.

High performance is mainly manifested in high-speed computing power, long-term reliable operation, and powerful external data throughput capabilities.

Processor, hard disk, memory, system bus, etc., but physical hardware equipment processing capacity, stability, reliability, security, scalability, manageability, maintainability, mean time between failures, performance price, cost, and volume There are big differences in comprehensive aspects such as power consumption. But the larger the memory capacity, the larger the program that the machine can run, and the stronger the processing power.



Torah

Torah is well aware of the importance of high-performance computing in various industries, such as cryptography, large-scale scientific problems, meteorology, biopharmaceuticals, geological prospecting, data mining, image processing, gene sequencing, AI, new material manufacturing, efficient trading, Internet finance. For applications in various fields such as energy management, Torah parallelizes the corresponding applications in the industry, optimizes performance, reduces workload, and optimizes solutions.

Torah mainly involves three aspects: high-performance storage devices, high-performance network layer, high-performance, low-carbon and energy-saving.

For example, high-performance CPUs, such as AMD and Intel's high-performance server CPUs. For example, in a general high-performance server, the machine performance is high, and the power consumption is naturally large. In general, a very small number of PUEs can achieve less than 1.1 heat dissipation. With the increasing demand for high-performance computing by artificial intelligence, AI technology is based on data interaction and data storage. Therefore, the importance of high-performance computing is gradually manifesting, and high-performance storage devices are also developing rapidly.

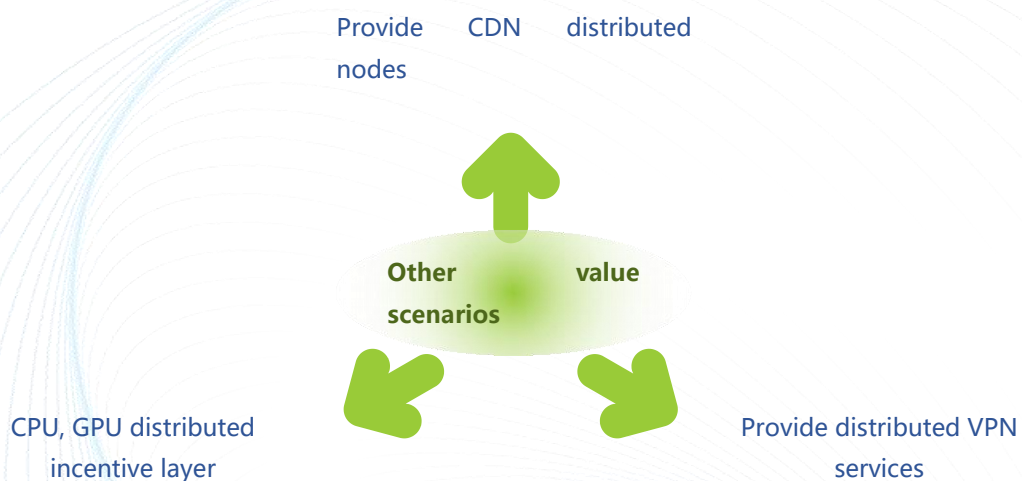
The current social energy problem is becoming increasingly prominent, and the contradiction between server power utilization and low efficiency and a new round of growth in IT architecture has intensified. Like a large and medium-sized data center with thousands of servers, the larger the programs that can run in it, the larger the memory capacity, the stronger the processing power, and the greater the energy consumption.

The energy saving of the server in the computer room is carried out on the premise of not reducing the running performance of the server, and the problem is found from the source. For example, the server is mainly composed of CPU, memory, disk,



network card, and motherboard components. Among them, CPU is the most energy-intensive consumer, followed by memory, followed by disk energy consumption. If we can reduce the energy consumption of these components, it is equivalent to reducing the energy consumption of the entire server, so as to achieve the purpose of server energy saving. Torahchian uses 5G, privacy computing, artificial intelligence, cloud computing, Internet of Things, big data technology, blockchain and other technologies by recording and tracing carbon consumption to improve the efficiency and application value of data storage and dissemination, and meet the energy structure of the new era. Energy management, reduce carbon emissions, and accelerate the realization of carbon neutrality.

### Introduction to other physical scenes



CPU, GPU distributed incentive layer

Torah integrates the computing power of distributed CPUs and GPUs, gathers large computing power, performs encryption and incentive layer tasks, and obtains token revenue.

Provide distributed VPN services

The remote data needed to be accessed through the Torah system is encrypted, and the user pays for the use of VPN according to time and traffic.

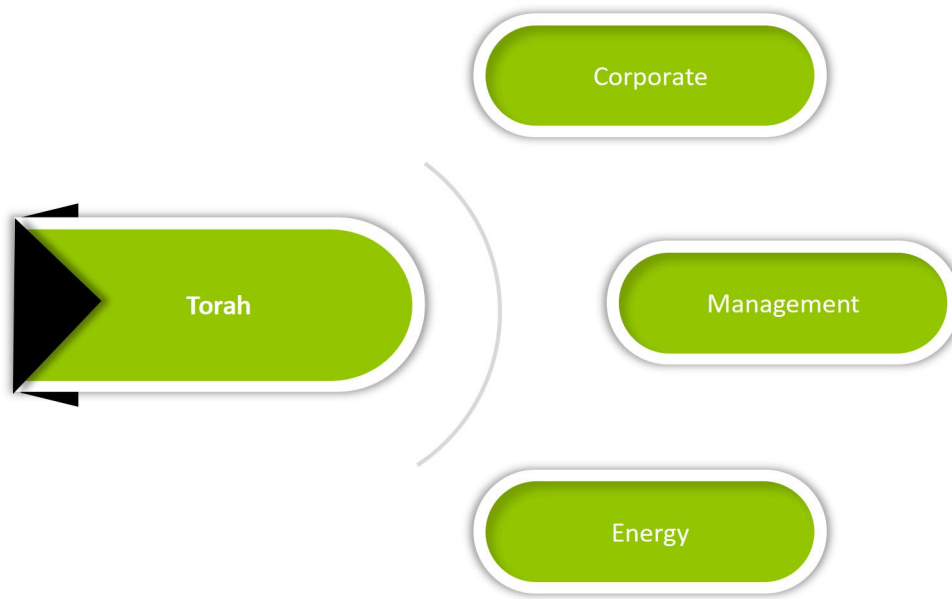
Provide CDN distributed nodes

Torah is committed to a one-stop solution combining cloud computing, big data and CDN, providing one-stop services for storage applications, integrating data collection, upload acceleration, storage, CDN distribution and storage and other functional services. Not only through the CDN service itself, but also open the entire cloud service, through its sharing to create value and profit.

## Other applications in the Torah ecosystem

1. Through energy management, use clean energy, save energy, reduce emissions, and improve energy efficiency;
2. Through green supply chain management, actively participate in the participation of major suppliers in carbon emission reduction actions, and reduce carbon emissions in the upstream of Torah from the source;
3. By improving the product design process, reducing material consumption, scientific waste treatment, scientific discharge and environmental pollution from the technical level;
4. By mobilizing all members of society to actively participate, improve personal behavior, inspire everyone, care for the environment, Everyone is responsible to reduce unnecessary carbon emissions.

Torah on jointly promoting green development and industrial upgrading



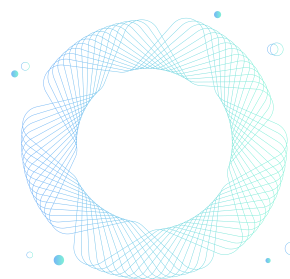
### **1. Enterprise:**

Features of blockchain technology; natural advantages such as data transparency, no tampering, traceability, supply chain management, etc., can effectively improve the overall output efficiency and resource utilization of all links in the industrial chain, and activate low-carbon and zero-carbon related suppliers and related The market value and competitiveness of the process;

### **2. Management:**

Establish carbon accounting standards based on blockchain technology and smart contract implementation to achieve unified management, automatic sorting, and carbon emission early warning, rewards and punishments, incentives, etc. with clear rights and responsibilities for the entire industry;

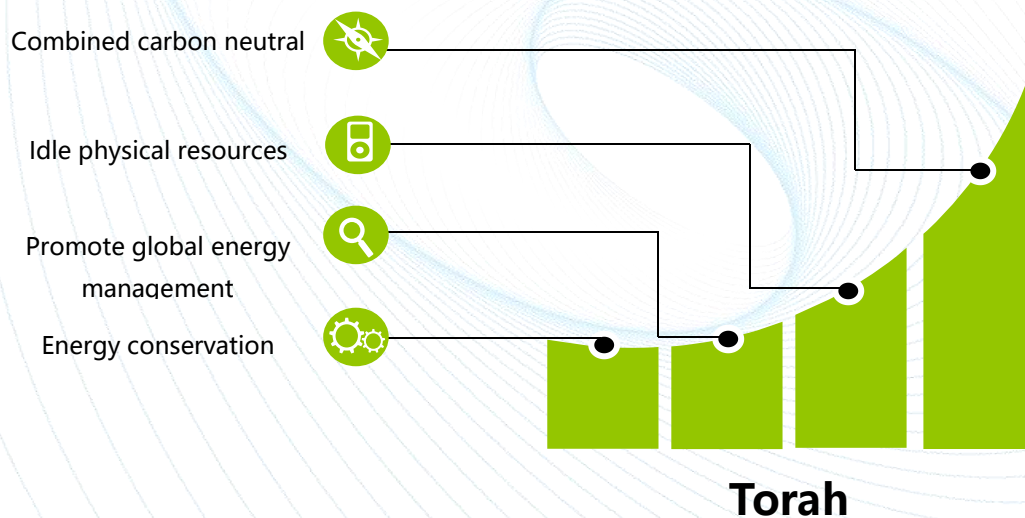
### **3. In terms of energy:**



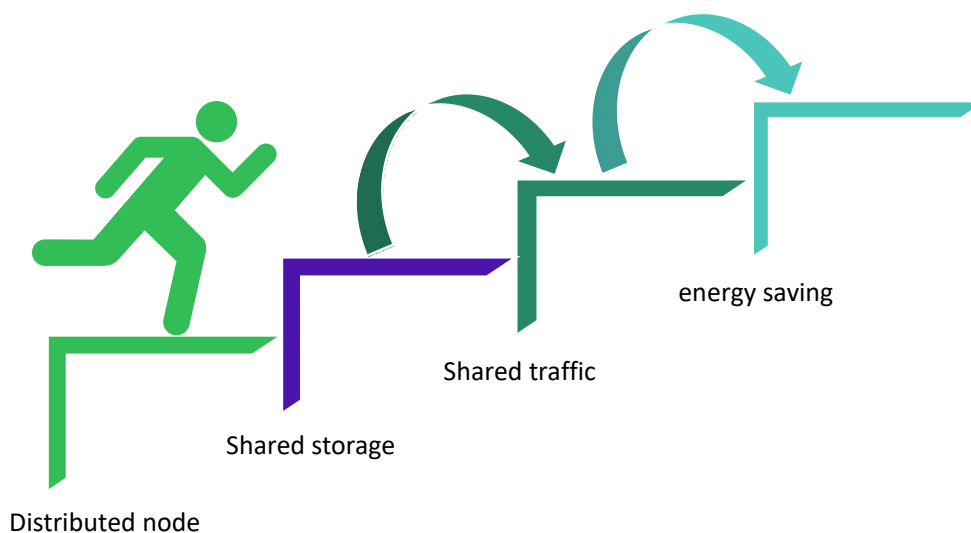
Let blockchain technology deeply participate in energy transportation, distribution, trading, recycling and other links, such as focusing on energy distribution in low-carbon industries, promoting the transformation of the energy market from centralized to decentralized, reducing energy waste, etc., and objectively stimulating the vitality of the renewable energy market.

## Torah Eco-Business Closed Loop

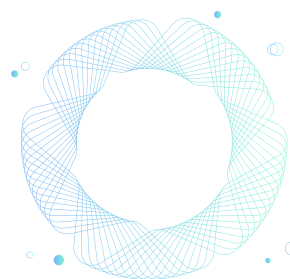
Torah's closed-loop business model is a business model that revolves around a series of related carbon-neutral consumption needs of users, and provides corresponding products one by one to satisfy them. To put it simply, the closed-loop model is a "one-stop" service. There is a big difference between the whole industry chain model and the closed loop model; the whole industry chain model is based on the product as the core, and it integrates upstream, midstream and downstream, which is vertical; its advantage is to improve operating efficiency and control product quality throughout the process.



The closed-loop model takes users as the core, and solves a series of closely related carbon-neutral consumer demands in one-stop manner. It is horizontal; its advantage is to enhance user demand experience and deeply bind users. For example, each demand has a corresponding solution; Torah will focus on combining carbon neutrality, energy saving and emission reduction, and promoting global energy management, using idle physical resources (CDN, broadband, CPU/GPU, ICD computer room, routing...), Create an innovative low-carbon smart life with distributed nodes, shared storage, shared traffic, environmental protection and energy saving.



At the same time, Torah is based on the incentive layer of the blockchain technology ecological incentive mechanism, and is committed to using physical equipment "one-stop low-carbon, environmental protection, and energy-saving" services to create a distributed intelligent cloud ecological closed loop. VP is the only token of the Torah system. The primary circulation of VP will revolve around a series of related carbon neutral needs of users. Users can enjoy Torah's "one-stop carbon neutral" experience.





## Torah Creation Team



### **Dan Edmunds**

Dan Edmunds is a software engineer and entrepreneur. He began his career in technology at Google after graduated from University of Illinois at Urbana-Champagn. He has led a few Greenwich initiatives across Silicon Valle. His passion is worth with companies that are creating a positive impact on environment, and that is why he is excited about the Torah project.

Dan Edmunds will applies his experience in Torah' s carbon neutrality initiative.



### **Jack Travinski**

Jack Travinski is an expert in business strategy. He graduated from the University of Chicago with a degree in economics and continued on to get my MBA from Northwestern. He is always passionate about furthering solid business solution with strong societal motivations and Torah seemed like a natural fit for him. Jack' s experience in business strategy will help Torah Network' s development.



**John Sol**

A pioneer in Silicon Valley Internet and streaming media technology, he has patents in the field of high-performance servers and remote monitoring. Experts in the fields of robotics, sensors, network communications, control equipment, visualization systems, VR technology, etc., have been in business for more than 30 years. Committed to integrating various high-tech technologies with the encryption world. Proficient in C language, C++ language, Kernel, device drivers, TCP/IP and network protocols, routing technology, video editing and compression, image processing and light and shadow technology, and many other scientific technologies.



**KK**

"Karthik Krishna:He has published to an international audience on energy, safety and sustainability issues, and his pioneering work has been recognized by global business, government and defense industry leaders. He has participated in leading the investigation of 100 Torah emerging national defense topics by the Institute of Social Technology, including information superiority and network superiority, raising social awareness of network diseases, and the need for foreign interference in domestic political affairs. Participated in the development and risk analysis of the best power transaction model for the US\$254 million renewable power purchase agreement between Michigan and New York energy entities. He once joined the U.S. Power Grid Modernization Elite Working Group and laid a preliminary foundation for the development of pricing agreements for the entire retail market segment, which accounts for 40% of the US\$350 billion power industry in the United States."



**Tyler Beaudin**

Tyler Beaudin: an investment analyst focused on technology. After graduating from the Kelly School of business at Indiana University, he spent the first few years of his career as an analyst at Goldman Sachs. Since, it has been transformed into venture capital, focusing on early technology start-ups. Investing in technology companies with a positive mission is where passion lies and where you are excited about the Torah project.



**Jay K**

Jayanth Kumar: A pioneer in the digital field, he led the community operation of the early Bitcoin company Bitinstant in 2011, has nearly 10 years of market and community experience, and has led the community promotion of the universe energy chain and the construction of the Dapp ecosystem.



### **Lindsay Lochlin**

Lindsay Lochlin has been working in the startup marketing for over half a decade. She joined her first startup in SF. She is still deeply connected to the tech startup marketing community SF and have found a home in the blockchain industry. She is excited play a role in bringing Torah ' s next-age data storage solution to the world. With her connection inthe marketing community, Torah will have a strong marketing strategy.

## Torah token overview

For the needs of good ecological operation and commercial applications, VP is the only official designated circulation pass of Torah, with a total global issuance of 102,400,000, and will never be issued; VP has an indispensable position in the Torah ecosystem, As the carrier of Torah's ecological value transfer, in addition to the circulation of Torah's entire ecological value, it also serves as a proof of interest for users to participate in Torah's equity, community incentives, and Torah POOL's ownership. It can be used in ecology, developers, enterprises, service organizations, Circulation among users makes the entire ecology develop in the direction of lower carbon and energy saving, more environmentally friendly and healthy, and more valuable potential.

### **VP allocation ratio**

2,400,000 tokens will set for the Timetravel Approval Competition, details will be announced by official.

#### 1. Founding team: 3%

10 years of linear release, 10% of the quota is released every year as a linear reward for the start-up team;

#### 2. Development Fund: 3%

Community vote is required, and no more than 20% of the quota per year is used to discover more high-quality innovative products under the Torah ecosystem, and use blockchain technology to assume more social responsibilities, promote the combination of carbon neutrality, energy saving and emission reduction, and promote the global Energy management development;



3. Investment institutions: 1%

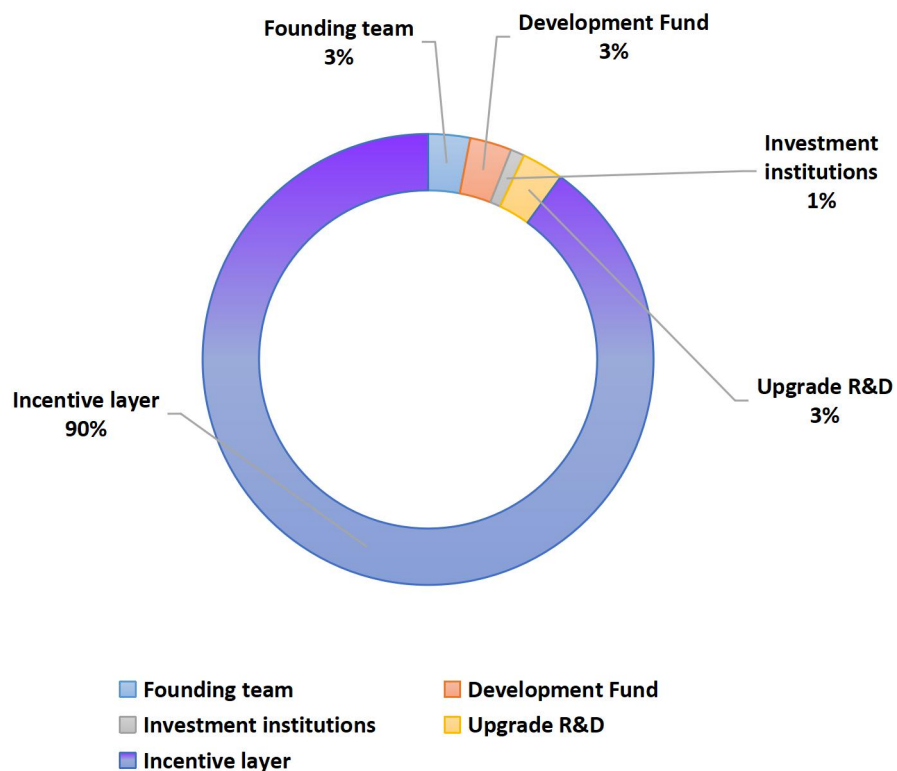
It will be released linearly in 5 years, and 20% of the quota will be released every year;

4. Upgrade R&D: 3%

Released according to the schedule, no more than 10% of the quota per year, used for the follow-up technology research and development, supporting software development, product hardware expansion and upgrade in the Torah ecosystem;

5. Incentive layer: 90%

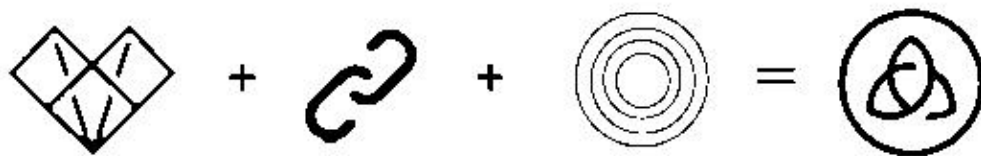
Obtaining the corresponding income through computing power reflects the scarcity of Torah's value, because 90% of it is generated through the hardware incentive layer.



## Vortex Protocol LOGO



### Conceptual design



Element:

1. Carbon + crystal
2. Chain, technology, sharing, blockchain, interconnection
3. Beating vortex lines

Represents the value attribute of Vortex Protocol

1. VP is the abbreviation of Vortex Protocol, the world's first public chain for distributed energy management decentralized storage ecological applications. Because the original Vortex protocol is used technically, creative graphic design can be developed from this. The jewel + chain (technology, sharing) + pulsating whirlpool

Torah

thinking that represents the attributes of the industry is the design prototype, which is combined into the "VP" LOGO graphics by extracting and continuously simplifying graphics.

In terms of color, blue is the main color. Blue is a broad color. When it comes to blue, people often think of the sky and the sea. Blue is the symbol of eternity, it is the coldest color, showing an image of rationality and cleanliness, technology, and efficiency. Similar colors are supplemented by green, and the overall simplicity is atmospheric.



## 2. LOGO design structure

Vortex Protocol LOGO adopts the standard geometric drawing principle, so that the LOGO is coordinated, proportioned, symmetrical, balanced, diverse and unified, making the LOGO more scientific and more standardized.

## Torah time mileage

November 2019: Launched the blockchain-enabled energy management concept, technical demonstration and research, and in-depth research on the technical framework of each public chain and protocol layer of the blockchain

December 2019: Torah project preparation, demonstration of the combination of business model and Token economy

February 2020: Application layer technology demonstration, determination of technical routes and technical solutions

June 2020: Torah public chain bottom development, bottom data block storage system

January 2021: Performance evaluation test, code modification

May 2021: Torah technology verification, cloud mining pool construction

June 2021: Web development is used to synchronize the blockchain ledger and store data synchronization, the development and verification of built-in contracts, API interface, RPC interface, command line, peripheral tool development

August 2021: Test network deployment, build a large-scale test network based on the community, and conduct a full range of tests

September 2021: Encourage early community enthusiasts to develop application examples based on Torah, and conduct security and business vulnerability reward



Torah

testing and corrections on application examples based on the test network.

November 2021: The mainnet test version is launched, other data service capabilities expansion and data transactions

December 2021: Torah global community ecology is initially completed

February 2022: The technology application layer is gradually opened

June 2022: Combine carbon neutrality, energy saving and emission reduction, and promote global energy management

September 2022: Continuous improvement of Torah's core concept of global carbon neutrality; low-carbon incentive layer, low-carbon manufacturing, and low-carbon community

May 2023: Continuous development of new applications and large-scale promotion of existing applications



## Excerpt

1. "Blockchain: Blueprint for a New Economy" Melanie Swan
2. "The Internet of Money" Andreas M. Antonopoulos
3. "Blockchain: The Road to Asset Digitization" Andreas M. Antonopoulos
4. "The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology" William Mougayar
5. "Blockchain Revolution" Don Tapscott
6. "Wikinomics: How Mass Collaboration Changes Everything" Don Tapscott and Anthony D. Williams
7. "Bitcoin Governance Network" Alex Tapscott
8. "Blockchain and Digital Financial Revolution: A Complete Guide to Encrypted Currency" Pedro Franco
9. "The Master Algorithm" Pedro Domingos
10. "(Descartes) Theory of Aether Vortex" René Descartes
11. "Cellular Internet of Things: From massive deployments to critical 5g applications" Olof Liberg, M & Rten Sundberg, Johan Bergman
12. "Internet of Things Penetration Testing" Aaron Guzman
13. "Principles of Economics" N. Gregory Mankiw
14. "Database Internals: A deep dive into how distributed data systems work" Alex Petrov
15. "IOT and edge computing for architects" Perry Lea
16. "Computer Organization and Architecture: Themes and Variations" Alan Clements
17. "Designing Data-Intensive Applications" Martin Kleppmann
18. "Cloud Computing: Theory and Practice" Dan C. Marinescu
19. "Hadoop: The Definitive Guide" Tom White
20. "Understanding Compression" Colt McAnlis, Aleks Haecky



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white paper