Talk about the optimization direction of Filecoin cluster from the three stages of cluster development

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The exploration of the Filecoin (http://ipfs.cn) cluster has a long history and has never stopped.

If Filecoin mining is compared to the construction of high-rise buildings, then the cluster is like laying a foundation. The structure of the foundation, the quality of materials, and the construction plan all affect how high and wide the house can be, and how many people can be carried at most. Whether it will remain unmoved and stand firm even when natural and man-made factors such as typhoons, rainstorms, earthquakes, etc. are invaded.

If Filecoin is the underlying infrastructure of the blockchain, then the cluster architecture is the underlying infrastructure of Filecoin. Next, we will talk about the optimization direction of the Filecoin cluster from the three stages of cluster development.

01.

Distributed and clustered

What is a cluster?

Cluster refers to the deployment of the same application or service module in multiple different servers. In simple terms, cluster refers to the clustering of several servers to achieve the same business.

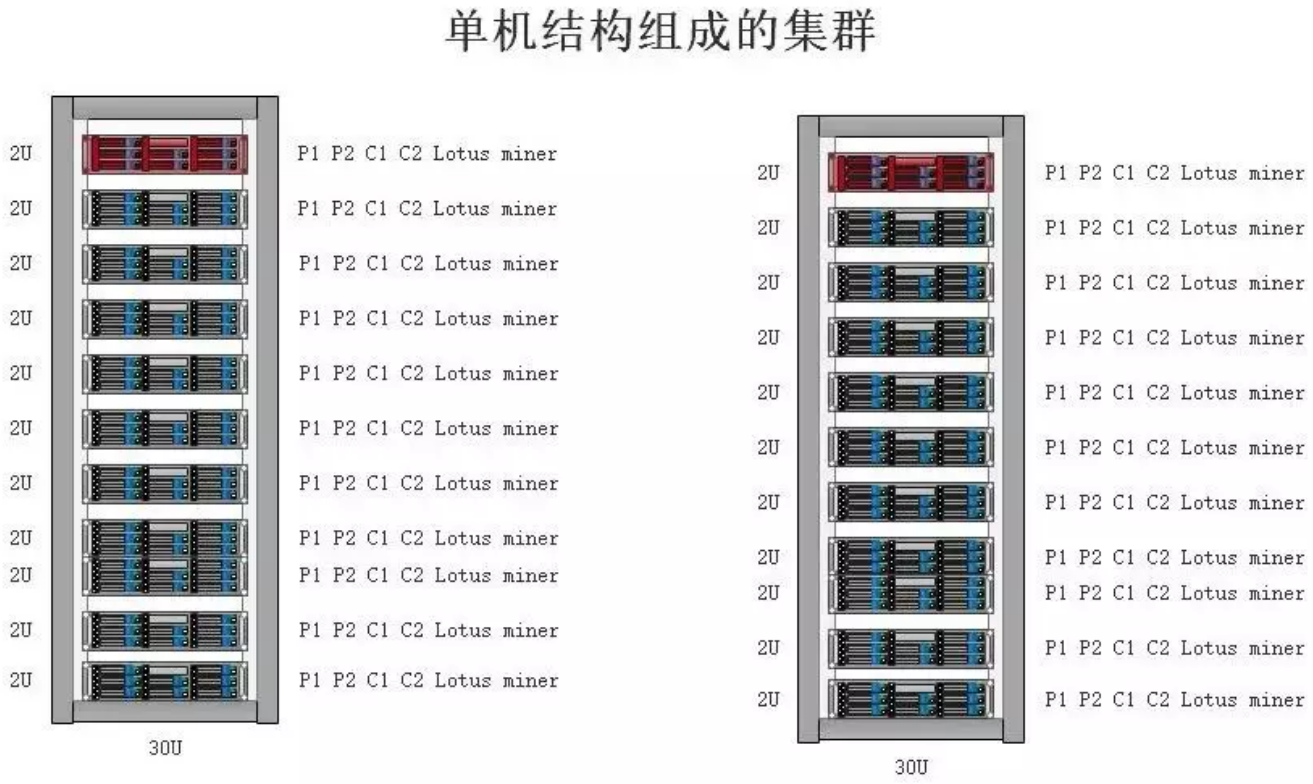
Clusters generally refer to physical centralized and unified management. In terms of form, clusters are just a physical form, but not a working method. In terms of working methods, clusters are also divided into single-machine structure clusters, cluster structure clusters, and distributed structures. Cluster.

A cluster composed of a single machine structure

The stand-alone structure mentioned here is not a single mining machine, but a cluster composed of one mining machine. The reason why it is called a stand-alone structure is because this cluster does not have specific functional subdivisions. A mining machine Almost all functions are included.

Take Filecoin mining (https://ipfs.cn/100013/type-100046.html) as an example. Assuming that Filecoin mining has six processes (P1, P2, C1, C2, Lotus, and miner), a cluster composed of a single machine structure means that these six processes are all

placed on one mining machine. The mining machines also form a cluster at the same time, but each mining machine is an independent individual, and the system interaction among them is relatively low.

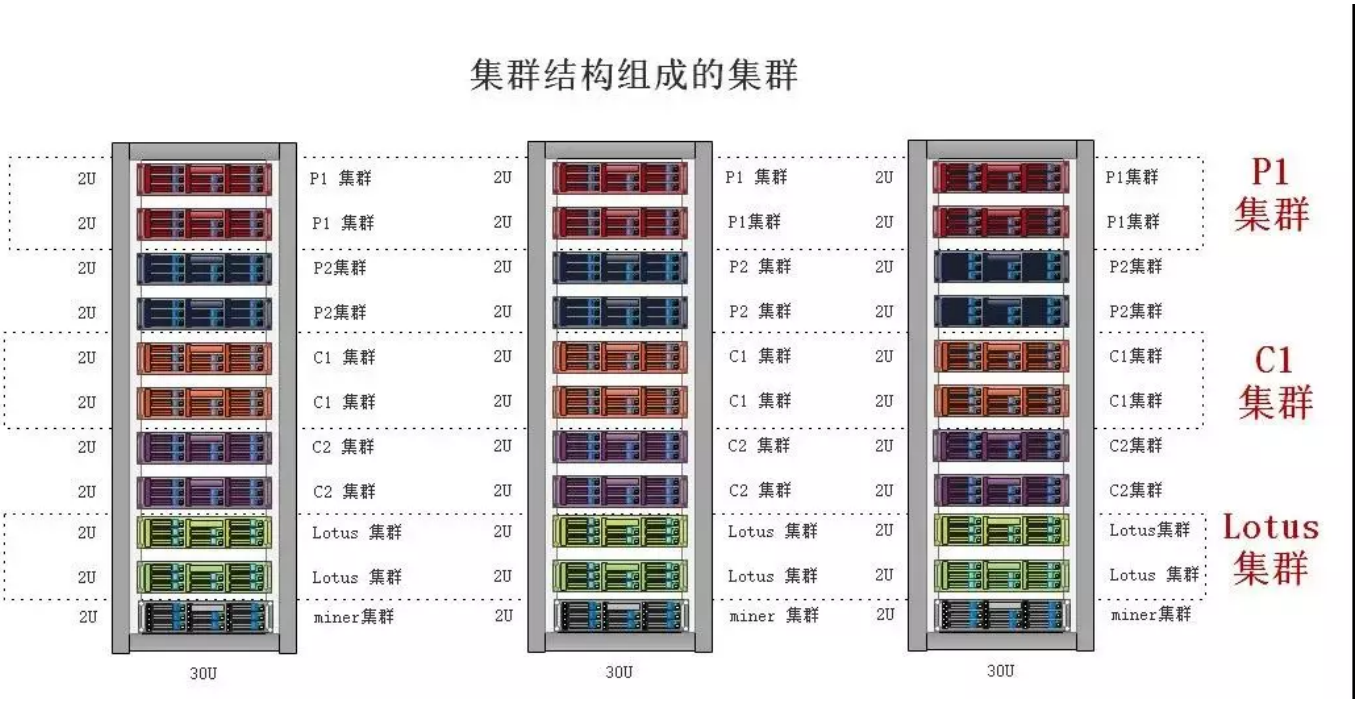


A cluster composed of a single machine structure is relatively thick, and all processes are presented on a mining machine, which will reduce processing efficiency and reduce the composability between functional modules. For Filecoin mining, this may increase the generation The time period of effective computing power.

Cluster structure

The cluster composed of a cluster structure is also composed of a single mining machine. The main difference from a cluster composed of a single machine structure is that a single mining machine in the cluster structure does not undertake all the processes at once, but focuses on a single process. Therefore, the subdivision and granularity of the cluster composed of the cluster structure is higher than that of the cluster composed of the stand-alone structure.

Take Filecoin mining as an example. Each process of P1, P2, C1, C2 is provided by multiple mining machines. Therefore, the processing capacity and efficiency of the cluster can be increased exponentially, which **can reduce the coupling between systems.** , Improve management efficiency and cluster efficiency.

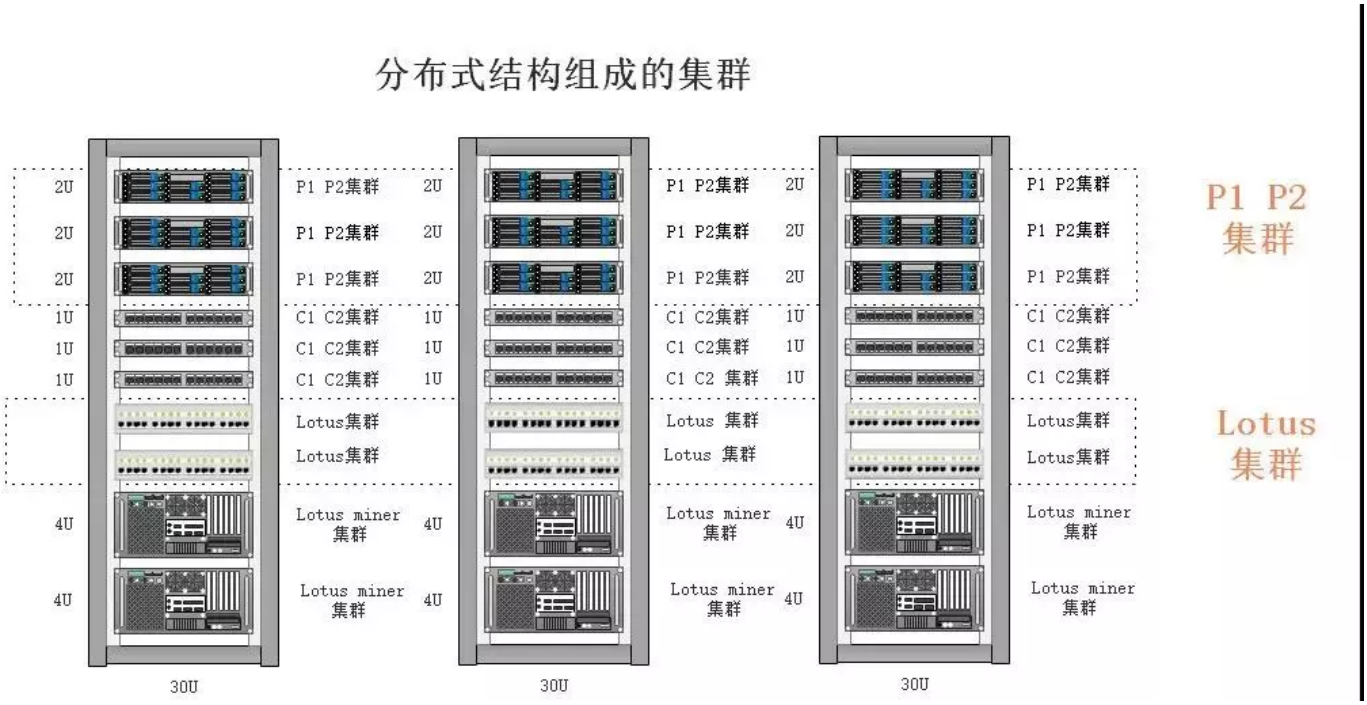


Compared with the stand-alone structure, when the company's business scale expands, the cluster structure can increase the corresponding equipment faster and more targeted to meet business needs.

Distributed cluster

The cluster composed of the cluster architecture takes the "refined" route, which separates all functions, which helps to maximize efficiency, but there is also a certain degree of waste of resources.

We all know that not all processes of Filecoin mining are completely independent, and many of them even interact with each other. For example, the work of P1 and P2 is related to data encapsulation, and the work of C1 and C2 is related to zkSNARK. Then, These related processes can be put together to increase the utilization rate of mining machines, **improve the reusability of services** , and reduce costs while ensuring maximum efficiency .



Although each type of cluster has its own advantages, they all correspond to different scenarios. But generally speaking, compared to a single-machine cluster, a distributed cluster has the effect of reducing costs and increasing efficiency. Compared with a cluster composed of a cluster architecture, it can reduce resource waste and improve service reusability.

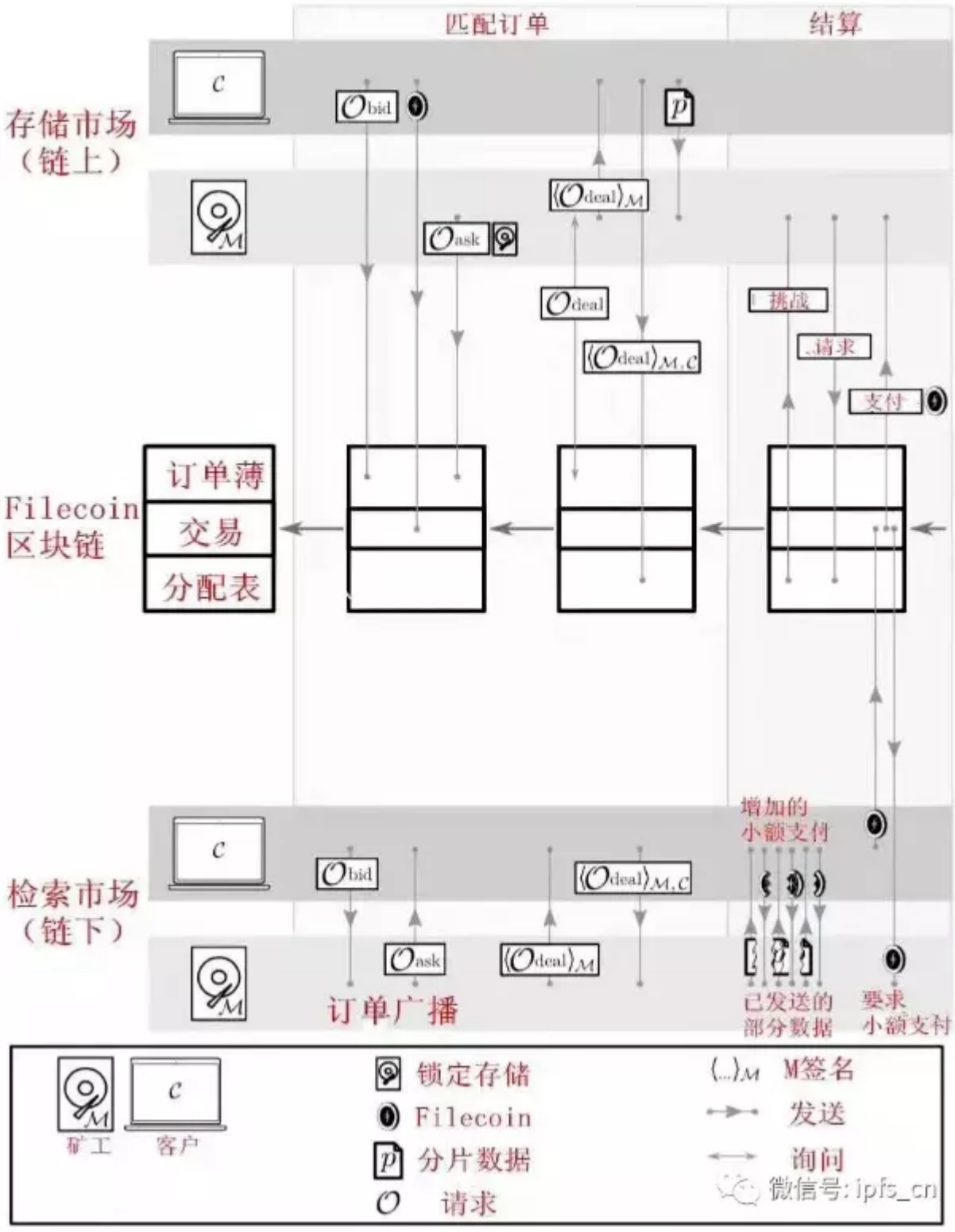
In fact, the times are changing with each passing day, and the cluster architecture is also constantly developing and progressing. Distributed and clustering must be combined for a long time and must be divided for **a** long time. **A truly excellent cluster manager and builder will inevitably be able to choose the cluster model that best suits the company's current situation. In accordance with business conditions for personalized deployment.**

02.

Filecoin cluster architecture optimization direction

Combining the knowledge mentioned above, let's think about the following two issues together, and then have a deeper understanding of the optimization direction of the Filecoin cluster.

Filecoin builds a decentralized storage trading market for cloud storage based on the IPFS protocol, which mainly includes two markets: storage and retrieval. At present, miners are mainly rewarded for mining in the storage market.



The four stages of Filecoin mining (software)

Filecoin mining (miners get block rewards) generally goes through the four stages of "P1, P2, C1, C2":

- The P1 stage is mainly to break and fragment the file, and calculate the merkle tree of the original data. This stage mainly consumes CPU, which takes about 4 hours;
- The P2 stage needs to generate Replica and calculate Column Hash. At this stage, the gas demand is relatively large. At this stage, the GPU is mainly working, which takes about 20 minutes;
- The C1 stage is not on the chain, and probably only takes a few seconds;
- The C2 stage is mainly the circuit processing of zero-knowledge proof and the process of generating zero-knowledge proof, which takes about 40 minutes.

It takes 4 hours for P1. This is indispensable. It is not difficult to explain why the fastest time for miner nodes to qualify is also four hours later when Filecoin's first phase test, second phase test, and the space race start. , That is, users can only see the data at noon.

Question 1: "How can a miner encapsulate the most data in the shortest time?"

For example, P1 takes 4 hours. Is it to run P2, C1, C2 after running P1, or consider a combination of 1 P1 and 3 P2 to run, what kind of combination is needed to make your effective computing power encapsulate the speed? Fastest?

The composition of the Filecoin mining machine (hardware configuration)

A computer cluster refers to the close connection of integrated hardware and software, layered architecture, and mutual coordination to complete a certain task together. Therefore, we must not only think about the problem of software combination, but also about the problem of hardware matching and how to match software and hardware.

We all know that the hardware part of the Filecoin mining machine is mainly composed of three parts: Worker, Miner and Storage. Worker is responsible for writing data and needs a high-performance AMD processor; Miner is responsible for sending and receiving data, and its main job is Post, which means that a graphics card and GPU are needed; Storage is responsible for storing data, which is equivalent to setting up data. At this time, high-quality hard drives are needed.

Question 2: "How do we match each component so that we can develop, deploy, and investigate independently, but also match each other, reduce coupling, and make the system more scalable and flexible, so that cluster performance can be brought into play To the largest"?

Seeing this, I believe you have understood that if you are smart, the first **problem is to start with the principle of Filecoin mining, and the software optimization is carried out. The main purpose is to encapsulate the most effective data in the shortest time; the second problem is mainly Starting from the Filecoin hardware configuration, its main purpose is to reasonably match the various components of the Filecoin mining machine, so that resources are not wasted, the process is not complicated, and the "granularity" of hardware management is improved, thereby improving performance.**

A truly excellent cluster manager and architect can not only achieve the unilateral optimal solution, but also balance the contradiction between software and hardware, so that the cluster can store the most with the lowest unit cost and the fastest speed. data.

After all, in the Filecoin network, the more data sealed per unit time, the faster the growth rate of effective stock, the more effective computing power, and the more block rewards you get.

Investors who want to learn more about IPFS and Filecoin can follow the official website of the IPFS China Community: http://ipfs.cn (http://ipfs.cn)

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