Filecoin SpaceRace's first-stage pit record

Filecoin mining (https://learnblockchain.cn/tags/Filecoin%20%E6%8C%96%E7%9F%BF)

The first phase of SpaceRace initiated by Filecoin has ended on September 14. Hundreds of miners around the world invested tens of thousands of machines, and actually completed 210PB of data sealing in 3 weeks. The results exceeded our predictions, and they also blinded the official eye.
We still underestimated the enthusiasm of global miners (should be Chinese miners). Miners from all walks of life worked hard, you 996, I was 007, the direct goal is the same for everyone, is to run a good result in this test.
It's just that the original intention behind everyone is all different. Some miners participate in the competition to serve sales, while some miners (such as us) are to better test the stability of their solutions and products.

In the process of testing, everyone encountered various problems, chain problems, network problems, storage problems, order success rate problems... Interestingly, the official finally released water, "the rain and dew are evenly wet", so that most of the The miners are more or less allotted some rewards.

No matter what, the game is finally over. Taking advantage of some time on the weekend, this SpaceRace will be digging (stepping) the mine (pit) and ending (recording).

> By the way: Track 1 of SpaceRace Phase2 has started on September 15th, and the time is also three weeks, mainly to encourage storage miners to continue to test and expand the network scale.
> Track 2 will be launched on September 24th and will end on October 15th. It is only applicable to storage customers and developer groups. At the same time, the official also revealed that the information of track 2 will be recorded in the main net, which means that the main net can be seamlessly connected, indicating that the overall situation of the main net is determined.

1. Hardware compatibility issues

Those who report similar instruction errors are generally because the CPU instruction architecture of the compiling machine and the running machine are different.

(1). As we all know, Lotus compiled with Intel CPU cannot play the sha256 acceleration function even if it runs on AMD machine. Sha want to start accelerating AMD machine, you need to use AMD machine to compile, and the need to add `FFI_BUILD_FROM_SOURCE=1` environment variables:

```
1   env RUSTFLAGS="-C target-cpu=native -g"   FFI_BUILD_FROM_SOURCE=1 make clean all
```

(2). Intel machines need to remove the `FFI_BUILD_FROM_SOURCE=1` environment variables (the previous version SR1 can add this variable), directly `make clean all` on the line, or else run `lotus daemon` time errors may report asm instruction.

(3). Intel CPUs with different instruction sets must be compiled separately on their own machines. For example, the Intel E5 V2, V3, V4 machines we tested are not compatible with each other. A version of the machine of the same model must be compiled separately.

AMD CPU series machines only need to compile one version to run on different machines (home machines and servers). At least several machines we tested are like this (Ryzen 3600x, 3800x, 3950/60/70x, EPYC 73xx, 74xx, 75xx, 7fxx).

2. Synchronization issues

This is a very important and often overlooked issue. Because synchronization not only involves the issue of whether your messages can be normally connected to the chain, but also may affect whether your block is stable. During SR1, due to frequent version updates, synchronization problems were endless.

Especially in the last week of the exercise, if you do not follow the official instructions to upgrade the client in time, you will almost not be able to synchronize the blocks normally. We have also been troubled by synchronization problems for several days, and in those few days our miners' computing power hardly increased. On the contrary, due to synchronization issues,

messages cannot be normally linked, resulting in negative growth for several consecutive days. Generally speaking, the direct causes of synchronization errors are as follows:

1. Bug of lotus software

2. The version of lotus client is too low and needs to be upgraded to the latest version

3. The synchronization speed of the machine is not fast enough, because each tipset (the same height) of lotus chain generally contains several blocks, so once you are more behind, you don't know who to go with, you just walk along. I lost my way,

and then I was farther away from the main force
. I was stuck at a certain bifurcation point and couldn't synchronize data.

As for why the synchronization of the machine is not fast enough, this has something to do with the network speed, CPU and hard disk. For space reasons, I will not expand it in detail here. Interested students can discuss it by email or WeChat.

3. Message (Message) on the chain problem

There are many reasons for the failure of information on the chain, and the typical ones are as follows:

1. The wallet balance is not enough to pay the Gas fee (handling fee), there is no other way except recharge.
2. The wallet balance is sufficient, but the fee is too low. In this case, you need to increase the fee. Use `lotus mpool replace` the command can modify the fee specified transaction.
3. There are too many transactions to be packaged in the blockchain, which means that the TPS of the chain is too low, resulting in too long queue time for transaction packaging. This situation is beyond human control.
4. The chain itself is not blocked, but some large miners only pack their own transactions, and even prefer to pack empty blocks without earning a fee. This is harmful to others and is despised by righteous miners. Unfortunately, no one can intervene and prevent this situation.
   We can only count on big miners not to do evil (that is impossible) or adjust the Filecoin economic model to solve it.

It is worth mentioning that the official still reserves some interfaces (`lotus-miner actor control`), so that we can take some measures to maximize the success rate of our messages (with real-time empty proof messages) on the chain. I tried it and the effect is obvious.

4. Worker disconnection problem

This is a very bad problem. Filecoin is actually very advanced in the design mode of task scheduling. Through the form of scheduling window, the code is a bit rough when it is implemented, but it is understandable,
because at this stage The main official goal is to "achieve" rather than "optimize."
According to our test situation, there are several reasons that cause the worker to go offline:

1. The network connection between Miner and worker is unstable. This is mainly a hardware problem, which must be solved by network engineers.
2. For software dependencies, the version of the jsonRPC library used by Lotus is unstable. You can try to upgrade or downgrade to a stable version. But this is not necessarily effective.
3. Software design issues. At present, workers will not automatically reconnect to miners after they are offline. Those with development capabilities can add a reconnection mechanism (this is what we have adopted).

However, I believe that except for the first item above, the official later will solve it well, but they can't spare time now.

By the way, according to Why, the head of the Filecoin project, said on slack that they have optimized P1 to 2 hours. If the news is true, then this is really good news for miners.

5. Various computing power problems

I believe that in the entire SpaceRace process, the problem of miner's loss of computing power should have been a nightmare that plagued the majority of miners. One thing that the operation and maintenance personnel should wake up every morning should be: open the block browser to see the loss of computing power last night No, what is the hashrate increase in 24 hours.

The most afraid of seeing is the increase in computing power-xxxTB. Really tired! ! ! Students who are lucky can generally recover their arithmetic the next day, and those who are not lucky have to face the torture of clearing their arithmetic every morning. **It was really hard work for decades, and I went back to before liberation.**

It's an honor that we belong to the "good luck" wave of classmates. In fact, the problem of computing power is not simple to say, but it is not complicated to say that it is complicated. First of all, you need to know that there are only two direct reasons for the loss of computing power:

1. Miners find the wrong sector by themselves, and then actively report it, requesting to deduct the effective computing power of the wrong sector, which is equivalent to surrendering.
2. Miners are unable to complete the space-time proof challenge on time and put the result on the chain. This is a mandatory deduction of computing power.

Among them, the occurrence of the above two situations is caused by various reasons. For example, the reported error sector may prove to be unreadable (deleted or unreadable), it may be a path error, or even a bug in the program...

There are also many situations in which the time-space proof cannot be submitted. One is that the time-space proof fails to be generated, and the other is that the generation is successful, but the chain cannot be uploaded. The reason the chain is likely to prove unsuccessful result (Proof) has not been verified, it may be blocked chain, unable to make a `epoch`
submission before the emergence of similar `PoSt chain commitment 50938 too far in the past, must be after 51152 (RetCode=16)` errors, and so on.

So, don't panic when you encounter a loss of computing power, just follow the process step by step to investigate, **as long as your data is not deleted, there is always a way to retrieve it** .

Here, please allow me to tell the story of a well-known genius doctor Bian Que:

> Wei Wenwang once asked the famous doctor Bian Que for advice: "The three brothers in your family are all good at medical skills. Who is the best one?"
> Bian Que said, "The eldest brother is the best, and the second brother is worse. I am the best of the three. The poor one."
> Wei Wang said puzzledly: "Please give me more details."
> Bian Que explained: "The older brother treated the illness before the onset of the illness. At that time, the patient himself did not feel sick, but the older brother did. The medicine was used to eradicate the root cause of the disease, making it difficult to be recognized for his medical skills, so he is not well-known, but is highly respected in our family.
> My second brother treated his illness at the beginning of his illness, and the symptoms were not very obvious, and there were no patients. When I feel painful, my second brother can cure the disease, so that people in the village think that my second brother is only very effective in treating minor illnesses.
> I treat the illness when the patient's condition is very serious. The patient is in great pain and the patient's family is anxious. At this time, They saw me puncture the meridians, bleed blood with needles, or apply poison to the affected area to attack the poison, or perform major operations to direct the focus of the disease,
> so that the condition of the severe patient can be relieved or cured quickly, so I am famous in the world."

To be honest, the last thing we worry about during the entire SpaceRace process is the loss of computing power, because we are adopting the strategy of Bian Que.

We have developed a small tool that can detect those sectors that may not be able to complete the space-time proof challenge before doing the space-time proof, and then find a way to repair it. If it cannot be repaired, we will not let this sector participate in the space-time proof.

Here is our famous gadgets detected lotus github `sanity check failed` error.

```
 1   2020-09-13T22:53:06.162+0800    ^[[34mINFO^[[0m miner    miner/miner.go:358      Time delta between
 2   2020-09-13T22:53:13.797+0800    ^[[31mERROR^[[0m          storageminer     storage/wdpost_run.go:65
 3   3226625    github.com/filecoin-project/lotus/storage.(*WindowPoStScheduler).runPost
 4   3226626        /golang/src/lotus/storage/wdpost_run.go:415
 5   3226627    - sanity check failed
 6   3226628    github.com/filecoin-project/filecoin-ffi.GenerateWindowPoSt
 7   3226629        /golang/src/lotus/extern/filecoin-ffi/proofs.go:580
 8   3226630    github.com/filecoin-project/lotus/extern/sector-storage/ffiwrapper.(*Sealer).GenerateW
 9   3226631        /golang/src/lotus/extern/sector-storage/ffiwrapper/verifier_cgo.go:43
10   3226632    github.com/filecoin-project/lotus/storage.(*WindowPoStScheduler).runPost
11   3226633        /golang/src/lotus/storage/wdpost_run.go:413
12   3226634    github.com/filecoin-project/lotus/storage.(*WindowPoStScheduler).doPost.func1
13   3226635        /golang/src/lotus/storage/wdpost_run.go:54
14   3226636    runtime.goexit
15   3226637        /usr/lib/go-1.14/src/runtime/asm_amd64.s:1373
```

6. Various Sector Task Failed Issues

This is a regular problem. There are always some sectors that fail to be sealed for some reason. Just check the log to see what errors are reported, and then take the corresponding measures.

The question that many people asked me the most during the test was: "You see how many failed sectors I have, what's going on, what should I do?" Then my general answer is: "Don't panic, there is no big problem." You should treat these errors with equanimity, and don't be impatient when seeing so many sector errors.

What I want to remind here is: **if it is some error that you can't handle, then you'd better not toss about it anymore and just remove the sector directly.**

A typical example is that when the daemon is restarted automatically or manually during the process of winding up the chain `PreCommitFailed`, a `CommitFailed` similar error will occur .

The reason given is usually something like: `sectorNumber is allocated, but PreCommit info wasn't found on chain` .

7. The problem of order success rate

This problem is generally only encountered in the mainland computer room. We know that during the space test, the robot has been officially arranged to send orders to the miners. However, due to some force majeure factors, the order transmission to the

mainland computer room is very slow. If the transmission timeout, it will be serious. Affect the success rate of your order.

This problem is relatively simple to deal with. You only need to buy a cloud host in Hong Kong or abroad, and then put the IP of your cloud host on the chain, and finally you do data routing and forwarding on the cloud host, and all the data packets of the corresponding port are forwarded to The Miner machine in your computer room is just fine.

The corresponding operation is as follows, if the IP of the cloud host you purchased is 123.456.789.110:

First modify your miner configuration (config.toml)

```
1    [Libp2p]
2      ListenAddresses = ["/ip4/0.0.0.0/tcp/6666"]
3      AnnounceAddresses = ["/ip4/xxx.xxx.xxx.xxx/tcp/6666"]
4    #  NoAnnounceAddresses = []
5    #  ConnMgrLow = 150
6    #  ConnMgrHigh = 180
7    #  ConnMgrGrace = "20s"
8    #
```

Here `xxx.xxx.xxx.xxx` is what you room public network IP.

Then chain the address of your outbound order:

```
1    lotus-miner actor set-addrs /ip4/123.456.789.110/tcp/6666
```

In this way, the order will be sent to your cloud host, and then you can transfer all the data packets of your cloud host's port 6666 to the port corresponding to your computer room IP.

8. Sector life cycle lighting problem

A bitter lesson is that we have to light up the life cycle of the sector (upgrade sector) as early as possible. The sectors we upgraded in the last week seem to have failed. The specific reason is unknown, maybe it is a problem with the chain, or a problem with the detection tool.

This leads to a conclusion that is: do something immediately when you have the conditions, because you never know who will come first tomorrow and accidentally, just as you don't know when the chain will start to block.

By the way, post a command to upgrade sectors to novice miners:

```
1    lotus-miner sectors mark-for-upgrade {SectorID}
```

{SectorID} indicates the mountain ID you want to mark for upgrade

9. A good operation and maintenance tool may be the key to your victory

The complexity of Filecoin mining is much higher than that of block-connected projects such as BTC and ETH. Instead of preparing the hardware, the software can be turned on and wait for the currency to be collected. This is just the first step, and the maintenance of the latter cluster is more time-consuming and labor-intensive.
Including the abnormal launch of the cluster node program, as well as the problems of the various Workers mentioned above, all need to be maintained by operation and maintenance personnel. Especially in this SpaceRace a few days ago, it almost maintained the iterative speed of 1 to 2 small versions per day, which made people feel a little bit helpless.
Especially for large clusters of hundreds or even thousands of machines, each upgrade can make you feel exhausted.

In this SpaceRace competition, I maintain 6 mining clusters from 5 customers at the same time. There are hundreds of medium and large clusters and dozens of small clusters. However, I did not collapse. On the contrary, I felt that the operation and maintenance work was relatively easy.

For the reason, readers who have been following my blog may know that because we have Gamma, an operation and maintenance software customized for Filecoin mining, it is not too easy to operate and maintain clusters with it. There are screenshots of customer feedback as proof:

Using Gamma with our optimized Filecoin mining software, the efficiency is directly doubled, and the computing power growth rate is very stable.

I think if you compare Filecoin mining to an exam, then if you want to get a good score, you have two ways:

1. You can make most of the problems that you can't. Corresponding to Filecoin mining is that you can optimize the algorithm of P1, P2, C2, making your sealing speed far faster than other miners in the industry. To be honest, this is more difficult.
   And as we said above, this advantage will be levelled by the official sooner or later, because the official team is also starting to optimize the algorithm, and it is expected that P1 can be completed within two hours.

2. The second winning plan is what the teacher often told us before the high school entrance examination: **don't spend too much time studying difficult problems, get all the points you deserve, and you can get good results in the exam.** This is especially important for Filecoin, that is, you have to **run**

steadily .

Otherwise, if you keep losing your computing power, you will be punished for nothing. In this SpaceRace, those miners with stable computing power growth have achieved relatively good results in the end. Take one of our small miners. Although the computing power is only 11.5 TB, the computing power growth rate is stable, the

order success rate and retrieval success rate are very high, so in the end, he actually got 1800 FIL rewards.

10. The problem of storage is still the last

Although Filecoin is a decentralized storage network, specific to each miner node, centralized storage must be used. In fact, for large miners, they are most worried about storage landing issues, rather than packaging speed, network or other issues.

Storage mainly needs to solve two problems: one is storage dynamic expansion, and the second is storage stability and data recovery. I think there are several storage solutions currently used in miners:

1. RAID disk arrays, this is estimated to be used by almost every miner. Small miners generally use RAID5 or RAID6 as Miner storage and finally land. Miners also need to use multiple disk groups RAID0 on the Worker machine to solve the high concurrency caused by P1. Disk IO.

2. Stand-alone file systems, such as LVM, ZFS and other file systems, are the Miner storage solutions used by small and medium-sized miners. The advantage is that it is simple to build and has low requirements on the network. The disadvantage is that it is a one-click solution and the capacity for expansion is very limited.

3. Distributed file system, such as Ceph, Google's GFS, etc. This kind of storage landing solution is generally used by medium and large miners. I think in this test, everyone uses Ceph more. After all, the advantages of Ceph are there.
   But the team needs to have a more powerful operation and maintenance team, because although Ceph is easier to get started, there are many pitfalls. Generally, if you want to easily control the PB-level Ceph storage cluster, you need a dedicated team to study Ceph, or a very senior operation and maintenance engineer to maintain it.
   Otherwise, once the cluster crashes (although Ceph has its own recovery tool, it has not been tested online), you will be too late to cry. In this test, I know that several medium-sized miners had to run again because of data loss due to a Ceph crash.

4. The storage cabinet has fast storage speed, good stability, and fast data reconstruction speed. Don't think about this kind of small miner. First, the price is

too expensive, enough to discourage you; second, your computing power is far less than when you use the storage cabinet.

Finally: Mining is risky, and investment needs to be cautious. The results of the space race can tell something, but the results don't mean anything. For example, those teams that can brush dozens of PB of computing power must have the ability to manage large mining clusters. From the side, it can also show that their operation and maintenance technology is very solid.

But you can't see the manpower, material resources, and financial resources invested by others behind the "glamorous achievements". And your investment is mainly based on input and output, so you cannot use the ranking of the results of the space race as the basis for investment decisions.

Filecoin is a long-term project, because storage is a long-term stable demand, so don't expect Filecoin to become the next hundred times currency. Compared with many short-lived so-called "block-linked storage projects", Filecoin is definitely the industry's authentic.
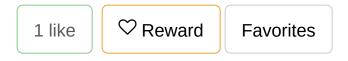
Even if its current performance is not satisfactory, most people, including us, are still optimistic about Filecoin. After all, it really did a lot of attempts.

> The last and last: We are hiring a small advertisement.
> Here is the recruitment information: blockchain operation and maintenance engineer (https://www.lagou.com/jobs/7750195.html) . In addition, we also recruit front-end developers and blockchain engineers. Interested students can email (yangjian102621@gmail.com) or WeChat private chat.

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