FileCoin mining tutorial (5) Lotus Miner: Setting up a high-performance miner program

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This guide describes the necessary steps to configure Lotus mining for normal operation.

Warning

You can only mine if you fully meet the minimum hardware requirements of the network in which you want to mine. Since the mining process is very demanding on the machine in many aspects and relies on precise configuration, it is strongly recommended that you start using the management experience of the Linux system.

prerequisites

Before trying to follow this guide:

- Ensure that the minimum hardware requirements are met.
- Make sure you have installed the Lotus suite according to the instructions, and make sure you have `Native Filecoin FFI` built Lotus with it. After the installation is complete, it will be installed `Lotus` , `Lotus-miner` and `Lotus-worker` .
- Make sure your Lotus Node is running, otherwise miners will not be able to communicate with it and will not work properly.
- If you are in China, you may suffer from some bandwidth issues or slow speeds when building and running Lotus. Provides some tips for Chinese users to solve some bandwidth problems or slow speeds they may suffer when building and running Lotus.

Speed up the download of certification parameters at the first startup. To

run Lotus, you need to download the certification parameters of the chain. These parameters are large files, which are hosted outside of China by default, and download in China is very slow. To solve this problem, the user is running `Lotus` , `Lotus-miner` and `Lotus-worker` when should set the following environment variables:

```
export IPFS_GATEWAY=https://proof-parameters.s3.cn-south-1.jdcloud-oss.com/ipfs/
```

Speed up the download of Go modules during the build process.

Building Lotus requires downloading some Go modules. These are usually hosted on Github, and Github's bandwidth from China is very low. To solve this problem, use the local agent by setting the following variables before running Lotus:

```
export GOPROXY=https://goproxy.cn
```

Before starting mining

Performance tuning

It is recommended to set the following environment variables in your environment so that they can be defined every time any Lotus application is started (that is, when the daemon is started).

```
# See https://github.com/filecoin-project/bellman
export BELLMAN_CPU_UTILIZATION=0.875
```

`BELLMAN_CPU_UTILIZATION` Is an optional variable used to specify part of the multi-power calculation to move it to the CPU parallel to the GPU. This is to keep all hardware in an occupied state. The interval must be a number between 0 and 1. The 0.875 value is a good starting point, but if you need the best setting, you should adjust it further. Different hardware sets the best value. Ignoring this environment variable may also be the best option.

```
# See https://github.com/filecoin-project/rust-fil-proofs/
export FIL_PROOFS_MAXIMIZE_CACHING=1 # More speed at RAM cost (1x sector-size of RAM -
 32 GB).
export FIL_PROOFS_USE_GPU_COLUMN_BUILDER=1 # precommit2 GPU acceleration
export FIL_PROOFS_USE_GPU_TREE_BUILDER=1

# The following increases speed of PreCommit1 at the cost of using a full
# CPU Core-Complex rather than a single core. Should be used with CPU affinities set!
# See https://github.com/filecoin-project/rust-fil-proofs/ and the seal workers guide.
export FIL_PROOFS_USE_MULTICORE_SDR=1
```

Run the Lotus mining program on different machine nodes

If you run Lotus mining on different machine nodes, please set as follows:

```
export FULLNODE_API_INFO=<api_token>:/ip4/<lotus_daemon_ip>/tcp/<lotus_daemon_port>/htt
p
```

And make sure that remote access (https://blog.csdn.net/weixin_46596227/article/details/114676316) `ListenAddress` is enabled . Instructions (https://blog.csdn.net/weixin_46596227/article/details/114676918?spm=1001.2014.3001.5501) on how to obtain the token (https://blog.csdn.net/weixin_46596227/article/details/114676918?spm=1001.2014.3001.5501) . (https://blog.csdn.net/weixin_46596227/article/details/114676316) (https://blog.csdn.net/weixin_46596227/article/details/114676918?spm=1001.2014.3001.5501)

Similarly, `Lotus-miner` (as a client application of the Lotus Miner daemon) can communicate with remote Miner through settings:

```
export MINER_API_INFO="TOKEN:/ip4/<IP>/tcp/<PORT>/http"
```

Add the necessary swap area (swap)

If you only have 128GiB of RAM, you need to ensure that the system provides at least an extra 256GiB of very fast swap (preferably NVMe SSD), otherwise the sector will not be encapsulated:

```
sudo fallocate -l 256G /swapfile
sudo chmod 600 /swapfile
sudo mkswap /swapfile
sudo swapon /swapfile
# show current swap spaces and take note of the current highest priority
swapon --show
# append the following line to /etc/fstab (ensure highest priority) and then reboot
# /swapfile swap swap pri=50 0 0
sudo reboot
# check a 256GB swap file is automatically mounted and has the highest priority
swapon --show
```

Create a wallet for the miner

You will need at least a BLS wallet (f3... for mainnet) for mining. We recommend using separate owner and worker addresses though. Thus, create at least two wallets (unless you have some already):

You need at least one BLS wallet (f3 for mainnet...) to mine. We recommend that although the owner and miner addresses are used separately (https://docs.filecoin.io/mine/lotus/miner-addresses/#the-owner-address) . Therefore, create at least two wallets (unless you already have some):

```
# A new BLS address to use as owner address:
lotus wallet new bls
t3...

# A new BLS address to use as worker address:
lotus wallet new bls
t3...
```

> Next, make sure to send some funds (https://docs.filecoin.io/get-started/lotus/send-and-receive-fil/#creating-a-wallet) to the address of the miner machine in order to complete the miner setup.

For more information on the different wallets that miners can use and how to configure them, please read the Miner Address Guide (https://docs.filecoin.io/mine/lotus/miner-addresses/#the-owner-address) .

> Tip: backup your wallet safely (https://docs.filecoin.io/get-started/lotus/send-and-receive-fil/#exporting-and-importing-addresses)

Download parameters

Starting from the miner machine, it needs to read and verify FileCoin's proof parameters. These can be downloaded in advance (recommended), or the calibration process. The verification parameter consists of multiple files, in the case of a 32GiB sector, a total of more than 100GiB.

We recommend setting a customer local storage parameter to ensure that the first level cache can be created when it is first run:

```
export FIL_PROOFS_PARAMETER_CACHE=/path/to/folder/in/fast/disk
export FIL_PROOFS_PARENT_CACHE=/path/to/folder/in/fast/disk2
```

Every time it restarts, it will start to read the parameters, so using a disk with very fast access, such as an NVME drive, will speed up the startup speed of the miner's machine. When the above variables are not set, by default, the machine will stop running to /var/tmp/ by default, which usually lacks enough space.

To download the parameters:

```
# Use sectors supported by the Filecoin network that the miner will join and use.
# lotus-miner fetch-params <sector-size>
lotus-miner fetch-params 32GiB
lotus-miner fetch-params 64GiB
```

You can verify the sector size of the network in the network dashboard (https://network.filecoin.io/) .

`FIL_PROOFS _ * _ CACHE` Variables should remain defined not only when downloading, but also when starting Lotus Miner (or working program).

Checklist before startup

To sum up all the above, please make sure: the

miner address has some funds so that the miner can be initialized.

The following environment variables are defined, which can be used in any Lotus Miner operation:

```
export LOTUS_MINER_PATH=/path/to/miner/config/storage
export LOTUS_PATH=/path/to/lotus/node/folder # When using a local node.
export BELLMAN_CPU_UTILIZATION=0.875 # Optimal value depends on your exact hardware.
export FIL_PROOFS_MAXIMIZE_CACHING=1
export FIL_PROOFS_USE_GPU_COLUMN_BUILDER=1 # When having GPU.
export FIL_PROOFS_USE_GPU_TREE_BUILDER=1   # When having GPU.
export FIL_PROOFS_PARAMETER_CACHE=/fast/disk/folder # > 100GiB!
export FIL_PROOFS_PARENT_CACHE=/fast/disk/folder2   # > 50GiB!
export TMPDIR=/fast/disk/folder3                    # Used when sealing.
```

The parameters have been prefetched to the cache folder specified above. The system has enough swap area (swap) and is active

Miner initialization

Before running the miner for the first time, please perform the following operations:

```
lotus-miner init --owner=<address>  --worker=<address> --no-local-storage
```

- Use `--no-local-storage` flags so that later we can configure the specific location of the storage (https://docs.filecoin.io/mine/lotus/custom-storage-layout/) . This is optional, but recommended.
- The Lotus Miner configuration folder is created in `~/.lotusminer/` or `$LOTUS_MINER_PATH` (if set).
- The difference between owner and worker addresses is explained in the miner address guide (https://docs.filecoin.io/mine/lotus/miner-addresses/) . As mentioned above, we recommend using two separate addresses. If no `--Worker` flag is provided , the owner address will be used. The control address can be added later after the miner is running.

Connection with miners

Before starting the miner, it is very important to configure it so that it can be accessed from any peer in the Filecoin network. For this, you will need a stable public IP and edit it as follows `~/.lotusminer/config.toml` :

```
...
[Libp2p]
  ListenAddresses = ["/ip4/0.0.0.0/tcp/24001"] # choose a fixed port
  AnnounceAddresses = ["/ip4/<YOUR_PUBLIC_IP_ADDRESS>/tcp/24001"] # important!
...
```

Once the miner is started, make sure you can connect to its public IP/port (https://docs.filecoin.io/mine/lotus/connectivity/#finding-your-public-ip-address) .

Start miner

Now you can start the Lotus mining machine:

```
lotus-miner run
```

Or, if you are using systemd service files:

```
systemctl start lotus-miner
```

> Warning: You can (https://docs.filecoin.io/mine/lotus/connectivity/) proceed from the previous steps until you (https://docs.filecoin.io/mine/lotus/connectivity/) confirm that the miner is not only running but also accessible (https://docs.filecoin.io/mine/lotus/connectivity/) on its public IP address (https://docs.filecoin.io/mine/lotus/connectivity/)

Publish miner address

Once the miner machine is up and running, publish your miner machine address (that you configured above) on the chain so that other nodes can directly talk to it and conduct transactions:

```
lotus-miner actor set-addrs /ip4/<YOUR_PUBLIC_IP_ADDRESS>/tcp/24001
```

Next step

Now, your miner should be initially set up and running, but there are some suggested tasks that can be prepared in prime time:

Set up your custom storage layout (https://docs.filecoin.io/mine/lotus/custom-storage-layout/) (`--no-local-storage` required if used).
Edit the miner configuration settings (https://docs.filecoin.io/mine/lotus/miner-configuration/) to meet your requirements.
Know what is the right time to shut down/restart the miner. (https://docs.filecoin.io/mine/lotus/miner-lifecycle/)
Use the time when the miner encapsulates a sector to update `ExpectedSealDuration` : find it by running a benchmark (https://docs.filecoin.io/mine/lotus/benchmarks/) or confirming a sector (https://docs.filecoin.io/mine/lotus/sector-pledging/) and writing down the time.
Configure other sealing working machines (https://docs.filecoin.io/mine/lotus/seal-workers/) to improve the ability of the miner's sealing department. Configure a separate address for WindowPost messages (https://docs.filecoin.io/mine/lotus/miner-addresses/)