

# Combine DV private key shares

danger Reconstituting Distributed Validator private key shares into a standard validator private key is a security risk, and can potentially cause your validator to be slashed.

Only combine private keys as a last resort and do so with extreme caution. Combine distributed validator private key shares into an Ethereum validator private key.

## Pre-requisites

- Ensure you have the charon
- directories of at least a threshold of the cluster's node operators.
- Ensure you have [docker](#)
- installed.
- Make sure docker
- is running before executing the commands below.

## Step 1. Set up the key combination directory tree

Rename each cluster node operator.charon directory in a different way to avoid folder name conflicts.

We suggest naming them clearly and distinctly, to avoid confusion.

At the end of this process, you should have a tree like this:

```
tree ./cluster
```

```
cluster/ |—— node0 | |—— charon-enr-private-key | |—— cluster-lock.json | |—— deposit-data.json |
|—— validator_keys | |—— keystore-0.json | |—— keystore-0.txt | |—— keystore-1.json | |—— keystore-
1.txt |—— node1 | |—— charon-enr-private-key | |—— cluster-lock.json | |—— deposit-data.json | |——
validator_keys | |—— keystore-0.json | |—— keystore-0.txt | |—— keystore-1.json | |—— keystore-1.txt
|—— node2 | |—— charon-enr-private-key | |—— cluster-lock.json | |—— deposit-data.json | |——
validator_keys | |—— keystore-0.json | |—— keystore-0.txt | |—— keystore-1.json | |—— keystore-1.txt ..
|—— node* |—— charon-enr-private-key |—— cluster-lock.json |—— deposit-data.json |—— validator_keys |——
keystore-0.json |—— keystore-0.txt |—— keystore-1.json |—— keystore-1.txt caution Make sure to never mix the
various.charon directories with one another.
```

Doing so can potentially cause the combination process to fail.

## Step 2. Combine the key shares

Run the following command:

## Combine a clusters private keys

```
docker run --rm -v "$(pwd):/opt/charon" obolnetwork/charon:v0.19.1 combine --cluster-dir /opt/charon/cluster --output-dir
/opt/charon/combined This command will store the combined keys in the output-dir , in this case a folder named combined .
```

```
tree combined combined |—— keystore-0.json |—— keystore-0.txt |—— keystore-1.json |—— keystore-1.txt We can
verify that the directory names are correct by looking at the lock file:
```

```
jq .distributed_validators [ ] .distributed_public_key cluster/node0/cluster-lock.json
"0x822c5310674f4fc4ec595642d0eab73d01c62b588f467da6f98564f292a975a0ac4c3a10f1b3a00ccc166a28093c2dcd"
"0x8929b4c8af2d2eb22d377cac2aa7be950e71d2b247507d19b5fdec838f0fb045ea8910075f191fd468da4be29690106"
info The generated private keys are in the standard EIP-2335 format, and can be imported in any Ethereum validator client
that supports it.
```

Ensure your distributed validator cluster is completely shut down before starting a replacement validator or you are likely to be slashed. [Edit this page](#) [Previous](#) [Advanced Docker Configs](#) [Next](#) [Introduction](#)