Consensus clients

Ethereum's long-awaited shift from proof-of-work (PoW) to proof-of-stake (PoS) known as The Merge happened on September 15, 2022, and came with fundamental changes to the network. The most notable change is the addition of the consensus layer (aka Beacon Chain) which replaced the PoW mining. It is coordinating and pseudorandomly selecting block producers from the pool of stakers/validators in a way that makes it extremely difficult for validators to coordinate attacks on the network. The Merge changed how operators run nodes on the Ethereum blockchain. A node now needs two clients that work together as a pair. In addition to theexecution client (e.g., Nethermind), you need aconsensus client that connects to the consensus layer and runs the PoS algorithm. This guide shows how to run an Ethereum node with Nethermind and a consensus client of your choice.

tip An easy way to run both consensus and execution clients is withSedge . Sedge is a setup tool for PoS validators and nodes that runs on Linux and macOS.

Choosing a consensus client

On the consensus layer, there are 5 client implementations to choose from. Though all consensus clients are great, check them out yourself to find the one best suited to your needs.

- Lighthouse
- Lodestar
- Nimbus
- Prysm
- Teku

Important We urge you to takeclient diversity into consideration when choosing your consensus client and avoid the majority clients.

Configuring JSON-RPC interface

Execution and consensus clients communicate via an authenticated endpoint specified in Engine JSON-RPC API. In order to connect to a consensus client, the execution client must generate aJWT secret at a known path. Although the secret is generated automatically by Nethermind on startup atkeystore/jwt-secret path in its root directory, in some cases, you might need to do it yourself. You can generate one usingOpenSSL :

openssl rand -hex

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> path/to/jwt.hex note Since the JWT secret is simply a 64-character hex value, there are many other ways of generating it, including online resources. However, for security reasons, we recommend using OpenSSL. The generated JWT secret can be specified with the--JsonRpc.JwtSecretFile path/to/jwt.hex command line option. For more configuration options, seeEngine API .

Running the consensus client

This step assumes that you have alreadyinstalled Nethermind, theconsensus client of your choice, and, optionally, created theJWT secret .

info As syncing from the scratch can take a very long time on some networks (up to several days), the commands below optionally usecheckpoint sync to speed up the process.

Lighthouse

lighthouse bn \ --network mainnet \ --execution-endpoint http://localhost:8551 \ --execution-jwt path/to/jwt.hex \ --checkpoint-sync-url https://mainnet.checkpoint.sigp.io \ --http The command above runs Lighthouse on Mainnet. For other networks, set the--network and--checkpoint-sync-url options accordingly. See theLighthouse documentation andpublic checkpoint sync endpoints .

Lodestar

lodestar beacon \ --network mainnet \ --jwt-secret path/to/jwt.hex \ --checkpointSyncUrl https://beaconstate-mainnet.chainsafe.io The command above runs Lodestar on Mainnet. For other networks, set the--network and--checkpointSyncUrl options accordingly. See theLodestar documentation andpublic checkpoint sync endpoints .

Nimbus

./run-mainnet-beacon-node.sh \ --web3-url = http://127.0.0.1:8551 \ --jwt-secret = path/to/jwt.hex The command above runs Numbus on Mainnet without checkpoint sync. For checkpoint sync, seeSync from a trusted node . For other networks, see theNimbus documentation .

Prysm

./prysm.sh beacon-chain \ --mainnet

\ --execution-endpoint = http://localhost:8551 \ --jwt-secret = path/to/jwt.hex \ --checkpoint-sync-url = https://beaconstate.ethstaker.cc \ --genesis-beacon-api-url = https://beaconstate.ethstaker.cc The command above runs Prysm on Mainnet. For other networks, replace the--mainnet and set--checkpoint-sync-url and--genesis-beacon-api-url options accordingly. See thePrysm documentation andpublic checkpoint sync endpoints .

Teku

teku \ --network = mainnet \ --ee-endpoint = http://localhost:8551 \ --ee-jwt-secret-file = path/to/jwt.hex \ --metrics-enabled = true \ --rest-api-enabled = true \ --initial-state = https://beaconstate.ethstaker.cc The command above runs Teku on Mainnet. For other networks, set the--network and--initial-state options accordingly. See theTeku documentation andpublic checkpoint sync endpoints .

Running Nethermind

Important The consensus client must be running before you start Nethermind. nethermind \ -c mainnet \ --JsonRpc.JwtSecretFile path/to/jwt.hex The command above runs Nethermind on Mainnet. For other networks, set the-c option accordingly. For more info, seeRunning Nethermind . Edit this page Last updatedonFeb 17, 2024 Previous Installing Nethermind Next Migrating from Geth