Node Configuration

⚠ Always runop-node andop-geth in a one-to-one configuration. Don't run multipleop-geth instances behind oneop-node , or vice versa. To configure your node, you will need to do the following:

1. Configureop-node
2. to point to the correct L1,op-geth
3. , and L2 network.
4. Initializeop-geth
5. with the correct network parameters.
6. Configureop-geth
7. to properly communicate with the Rollup Node.
8. Optionally, configure Legacy Geth.

Configuring op-geth

Even though the Docker image for the Execution Engine is calledop-geth , the actual binary is still calledgeth in order to minimize differences betweenop-geth andgo-ethereum . We'll start withop-geth 's configuration because it is more complex. As mentioned before,op-geth is a minimal fork ofgo-ethereum . As a result, it stores its state in a database that requires initialization. Initialization is done one of two ways, depending on which network you're deploying:

1. With a Genesis File:
2. This is for OP Sepolia, and other testnets or deployments that are not migrated from a legacy network. In this case, you'll download thegenesis file(opens in a new tab)
3. and initialize the data directory viageth init
4. .
5. With a Data Directory:
6. This is used for networks that are migrated from a legacy network. This currentlyonly
7. includes OP Mainnet. In this case, you'll download a preconfigured data directory and extract it. No further initialization is necessary in this case, because the data directory contains the network's genesis information.

Regardless of howop-geth is initialized, you'll need to ensure that you have sufficient disk space available to store the network's data. As of this writing, the mainnet data directory is ~1TB for a full node and ~4TB for an archival node.

Instructions for each initialization method are below. If you're spinning up an OP Mainnet, use theInitialization via Data Directory path. If you're spinning up an OP Sepolia node, use theInitialization via Genesis File path.

Initialization via Genesis File

op-geth uses JSON files to encode a network's genesis information. Unlike OP Mainnet, the genesis for OP Sepolia is not currently included in theop-geth binary. For networks that are initialized in this way, you'll receive a URL to the genesis JSON. You'll need to download the genesis JSON, then run the following command to initialize the data directory:

!/bin/sh

FILE

/ DATADIR /genesis.json OP_GETH_GENESIS_URL = https://networks.optimism.io/op-sepolia/genesis.json

if [!

-s FILE]; then apk

add

curl curl OP_GETH_GENESIS_URL -o FILE geth

init

--datadir

/db FILE else echo

"Genesis file already exists. Skipping initialization." fi ⚠ CLI Flag Requirements

- op-node
- requires:--network=op-sepolia

- do not set:--rollup.historicalrpc
- orrollup.historicalrpctimeout
- op-geth
- requires:--op-network=op-sepolia

Initialization via Data Directory

To initializeop-geth with a preconfigured data directory, simply download and extract the data directory to a place of your choosing. The data directory is exported as a tar file. An example command to do this is below:

curl

-o

< path

to

data

director y

-sL

< URL

to

data

director y

tar

-xvf

< path

to

data

director y

Configuration

Onceop-geth is initialized, it can be configured via CLI flags.op-geth accepts all thestandardgo-ethereum flags(opens in a new tab) as well as a few extra flags that are specific to Optimism. These flags are:

- --rollup.historicalrpc
- : Enables the historical RPC endpoint. This endpoint is used to fetch historical execution data from Legacy Geth. This flag is only necessary for upgraded networks.
- --rollup.sequencerhttp
- : HTTP endpoint of the sequencer.op-geth
- will routeeth_sendRawTransaction
- calls to this URL. Bedrock does not currently have a public mempool, so this is required if you want your node to support transaction submission. Consult the documentation for the network you are participating in to get the correct URL.
- --rollup.disabletxpoolgossip
- : Disables transaction pool gossiping. While not required, it's useful to set this totrue
- since transaction pool gossip is currently unsupported.

To communicate withop-node and enable the Engine API, you'll also need to generate a JWT secret file and enable Geth's authenticated RPC endpoint.

To generate the JWT secret, run the following:

openssl

rand

-hex

jwt.txt Then, specify the following flags:

- --authrpc.addr
- : Sets the addressop-geth
- 's authenticated RPC should listen on.
- --authrpc.port
- : Sets the portop-geth
- 's authenticated RPC should listen on. The default value is8551
- .
- --authrpc.jwtsecret
- : Sets the path to a JWT secret file you generated above.

Optional op-geth Configuration

You may also want to specify the following flags based on your configuration:

- --authrpc.vhosts
- : Whitelists which hosts (as defined in theHost
- header) are allowed to access the authenticated RPC endpoint. This is useful if you're runningop-geth
- on containerized infrastructure. The default value islocalhost
- .
- --http.vhosts
- : Whitelists which hosts (as defined in theHost
- header) are allowed to access the unauthenticated RPC endpoint. This is useful if you're runningop-geth
- on containerized infrastructure. The default value islocalhost
- .
- --http
- ,--http.addr
- , and--http.port
- : Enables the unauthenticated RPC endpoint, configures its address, and configures its port. You'll almost certainly want to specify these, since they will enable Geth's JSON-RPC endpoint.
- --ws
- ,--ws.addr
- , and--ws.port
- : Enables the WebSocket API.
- --verbosity
- : Configures Geth's log level. This is a number between 0 and 5, with 5 being the most verbose. Defaults to 3.

Working Base Configuration

A valid command that runsop-geth and enables RPC over HTTP and WebSockets looks like:

geth \ --ws \ --ws.port=8546 \ --ws.addr=localhost \ --ws.origins= *"* \ *--http* \ *--http.port=8545* \ *--http.addr=localhost* \ *--http.vhosts= "*" \ --http.corsdomain= "" \ *--authrpc.addr=localhost* \ *--authrpc.jwtsecret=/var/secrets/jwt.txt* \ *--authrpc.port=8551* \ *--authrpc.vhosts= "*" \ --datadir=/data \ --verbosity=3 \ --rollup.disabletxpoolgossip=true \ --rollup.sequencerhttp=https://mainnet-sequencer.optimism.io/ \ --op-network=op-mainnet ConsultGeth's documentation(opens in a new tab) for more information on customizingop-geth 's behavior.

Configuring op-node

op-node is a standalone, statically linked binary. It stores no state, and requires no initialization. It consumes configuration parameters either via the command line or environment variables. For some networks, the Rollup Node also requires a configuration file (calledrollup.json or the "rollup config") that configures network-specific genesis parameters. For official networks like OP Sepolia and OP Mainnet, the genesis config is hardcoded in theop-node software and can be specified via a--network flag.

Following theEcotone upgrade node operators must set an L1 beacon value to retrieveblobs from a Beacon node.

⚠ Theop-node RPC should not be exposed publicly. If left exposed, it could accidentally expose admin controls to the public internet.

Working Base Configuration

A minimal valid configuration that runsop-node looks like:

op-node

--l1= < ethereum

mainnet

RPC

ur l

\ --l2= < op-geth

authenticated

RPC

ur l

\ --network=op-mainnet \ --rpc.addr=127.0.0.1 \ --rpc.port=9545 \ --l2.jwt-secret= < path

to

JWT

secre t

\ --l1.beacon= < http

endpoint

address

of

L1

Beacon-nod e

You can manually specify a path to a rollup config with the--rollup.config flag. This is used for testnets or internal deployments that are not migrated from a legacy network.

Each of the above flags can also be defined via an environment variable. Runop-node --help to see a list of all available flags and environment variables.

Configuring Peer-to-Peer Networking

Unlike the previous system, theop-node participates in a peer-to-peer network. This network is used to distribute blocks that have not been submitted to L1 yet. Theop-node will automatically discover and connect to peers using a hardcoded set of bootnodes. You can also manually specify peers to connect to via the--p2p.static flag.

For best results, runop-node with a static IP address that is accessible from the public Internet. For Kubernetes deployments, this can be achieved by configuring a dedicatedIngress with an external IP, and using the--p2p.advertise.ip flag to specify the IP address of the load balancer when advertising IP addresses to peers.

The default port for the peer-to-peer network is9003 . You will need to open this port on your firewall to receive unsubmitted blocks. For your node to be discoverable, this port must be accessible via both TCP and UDP protocols.

Legacy Geth

If you are running a node for an upgraded network like OP Mainnet (but not OP Sepolia), you will also need to run Legacy Geth in order to serve historical execution traces. Fundamentally, Legacy Geth is our oldl2geth binary running against a preconfigured data directory. To configure Legacy Geth, follow the instructions above for using a preconfigured data directory, then execute the following command:

It is imperative that you specify theUSING_OVM=true environment variable in the command below. Failing to specify this will causel2geth to return invalid execution traces, or panic at startup. USING_OVM = true \ ETH1_SYNC_SERVICE_ENABLE = false \ RPC_API = eth,rollup,net,web3,debug \ RPC_ADDR = 0.0 .0.0 \ RPC_CORS_DOMAIN = * \ RPC_ENABLE = true \ RPC_PORT = 8545 \ RPC_VHOSTS = * \ geth

--datadir

< path

to

data

director y

> This command is the minimum required to run Legacy Geth and expose a functioning RPC endpoint. As before,l2geth takes all standardgo-ethereum flags so you can customize the configuration as needed.

As mentioned above, don't forget to specify--rollup.historicalrpc onop-geth to properly route requests for historical execution to Legacy Geth.

Since Legacy Geth is read-only, it is safe to run multiple Legacy Geth nodes behind a load balancer.

Historical Execution vs. Historical Data Routing

Only requests for historical execution will be routed to Legacy Geth. Everything else will be served byop-geth directly. The termhistorical execution refers to RPC methods that need to execute transactions prior to bedrock (not just read data from the database):

- eth_call
- eth_estimateGas
- debug_traceBlockByNumber
- debug_traceBlockByHash
- debug_traceCall
- debug_traceTransaction

If you do not need these RPC methods for historical data, then you do not need to run Legacy Geth at all.

Command line options

You can configure your node using command line options (a.k.a. flags). There are also has sub-commands, which can be used to invoke functionality such as the console or blockchain import/export.

The command line help listing is reproduced below for your convenience.

op-node

op-node implements most rollup-specific functionality as Consensus-Layer, similar to a L1 beacon-node. The following options are from the--help inv1.5.1(opens in a new tab) .

GLOBAL OPTIONS

conductor.enabled

Enable the conductor service. The default value isfalse .

Syntax Example Environment Variable --conductor.enabled=

conductor.rpc

Conductor service rpc endpoint. The default value ishttp://127.0.0.1:8547 .

Syntax Example Environment Variable --conductor.rpc=

conductor.rpc-timeout value

Conductor service rpc timeout. The default value is1s .

Syntax Example Environment Variable --conductor.rpc-timeout value=

heartbeat.enabled

Enables or disables heartbeating. The default value isfalse .

Syntax Example Environment Variable --heartbeat.enabled=

heartbeat.moniker

Sets a moniker for this node.

Syntax Example Environment Variable --heartbeat.moniker=

heartbeat.url

Sets the URL to heartbeat to. The default value is"https://heartbeat.optimism.io" .

Syntax Example Environment Variable --heartbeat.url=

l1

Address of L1 User JSON-RPC endpoint to use (eth namespace required). The default value is"http://127.0.0.1:8545" .

Syntax Example Environment Variable --l1=

l1.beacon

Address of L1 Beacon-node HTTP endpoint to use.

Syntax Example Environment Variable --l1.beacon=

l1.beacon.fetch-all-sidecars

If true, all sidecars are fetched and filtered locally. Workaround for buggy Beacon nodes. The default value isfalse .

Syntax Example Environment Variable --l1.beacon.fetch-all-sidecars=

l1.beacon.ignore

When false, halts op-node startup if the healthcheck to the Beacon-node endpoint fails. The default value isfalse .

Syntax Example Environment Variable --l1.beacon.ignore=

l1.epoch-poll-interval

Poll interval for retrieving new L1 epoch updates such as safe and finalized block changes. Disabled if 0 or negative. The default value is6m24s .

Syntax Example Environment Variable --l1.epoch-poll-interval=

l1.http-poll-interval

Polling interval for latest-block subscription when using an HTTP RPC provider. Ignored for other types of RPC endpoints. The default value is12s .

Syntax Example Environment Variable --l1.http-poll-interval=

l1.max-concurrency

Maximum number of concurrent RPC requests to make to the L1 RPC provider. The default value is10 .

Syntax Example Environment Variable --l1.max-concurrency=

l1.rpc-max-batch-size

Maximum number of RPC requests to bundle, e.g., during L1 blocks receipt fetching. The L1 RPC rate limit counts this as N items, but allows it to burst at once. The default value is20 .

Syntax Example Environment Variable --l1.rpc-max-batch-size=

l1.rpc-rate-limit

Optional self-imposed global rate-limit on L1 RPC requests, specified in requests / second. Disabled if set to 0. The default value is0 .

Syntax Example Environment Variable --l1.rpc-rate-limit=

l1.rpckind

The kind of RPC provider, used to inform optimal transactions receipts fetching, and thus reduce costs. Valid options: alchemy, quicknode, infura, parity, nethermind, debug_geth, erigon, basic, any, standard. The default value isstandard .

Syntax Example Environment Variable --l1.rpckind=

l1.runtime-config-reload-interval

Poll interval for reloading the runtime config, useful when config events are not being picked up. Disabled if 0 or negative. The default value is10m0s .

Syntax Example Environment Variable --l1.runtime-config-reload-interval=

l1.trustrpc

Trust the L1 RPC, sync faster at risk of malicious/buggy RPC providing bad or inconsistent L1 data. The default value isfalse .

If you're running an Erigon Ethereum execution client for your L1 provider you will need to include--l1.trustrpc . At the time of writing, Erigon doesn't support theeth_getProof that we prefer to use to load L1 data for some processing inop-node . The trustrpc flag makes it use something else that erigon supports, but theop-node can't verify for correctness.

Syntax Example Environment Variable --l1.trustrpc=

l2

Address of L2 Engine JSON-RPC endpoints to use (engine and eth namespace required).

Syntax Example Environment Variable --l2=

l2.jwt-secret

Path to JWT secret key. Keys are 32 bytes, hex encoded in a file. A new key will be generated if left empty.

Syntax Example Environment Variable --l2.jwt-secret=

log.color

Color the log output if in terminal mode. The default value isfalse .

Syntax Example Environment Variable --log.color=

log.format

Format the log output. Supported formats: 'text', 'terminal', 'logfmt', 'json', 'json-pretty'. The default value istext .

Syntax Example Environment Variable --log.format=

log.level

The lowest log level that will be output. The default value isinfo .

Syntax Example Environment Variable --log.level=

metrics.addr

Metrics listening address. The default value is"0.0.0.0" .

Syntax Example Environment Variable --metrics.addr=

metrics.enabled

Enable the metrics server. The default value isfalse .

Syntax Example Environment Variable --metrics.enabled=

metrics.port

Metrics listening port. The default value is7300 .

Syntax Example Environment Variable --metrics.port=

network

Predefined network selection. Available networks: oplabs-devnet-0-sepolia-dev-0, op-labs-chaosnet-0-goerli-dev-0, zora-mainnet, base-sepolia, pgn-sepolia, zora-sepolia, base-devnet-0-sepolia-dev-0, base-goerli, base-devnet-0-goerli-dev-0, conduit-devnet-0-goerli-dev-0, base-mainnet, pgn-mainnet, op-sepolia, lyra-mainnet, mode-mainnet, op-mainnet, op-goerli, op-labs-devnet-0-goerli-dev-0, orderly-mainnet.

Syntax Example Environment Variable --network=

override.canyon

Manually specify the Canyon fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.canyon=

override.delta

Manually specify the Delta fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.delta=

override.ecotone

Manually specify the ecotone fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.ecotone=

p2p.advertise.ip

The IP address to advertise in Discv5, put into the ENR of the node. This may also be a hostname/domain name to resolve to an IP.

Syntax Example Environment Variable --p2p.advertise.ip=

p2p.advertise.tcp

The TCP port to advertise in Discv5, put into the ENR of the node. Set to p2p.listen.tcp value if 0. The default value is0 .

Syntax Example Environment Variable --p2p.advertise.tcp=

p2p.advertise.udp

The UDP port to advertise in Discv5 as a fallback if not determined by Discv5, put into the ENR of the node. Set to p2p.listen.udp value if 0. The default value is0 .

Syntax Example Environment Variable --p2p.advertise.udp=

p2p.ban.duration

The duration that peers are banned for. The default value is1h0m0s .

Syntax Example Environment Variable --p2p.ban.duration=

p2p.ban.peers

Enables peer banning. The default value istrue .

Syntax Example Environment Variable --p2p.ban.peers=

p2p.ban.threshold

The minimum score below which peers are disconnected and banned. The default value is-100 .

Syntax Example Environment Variable --p2p.ban.threshold=

p2p.bootnodes

Comma-separated base64-format ENR list. Bootnodes to start discovering other node records from.

Syntax Example Environment Variable --p2p.bootnodes=

p2p.disable

Completely disable the P2P stack. The default value isfalse .

Syntax Example Environment Variable --p2p.disable=

p2p.discovery.path

Enables persistent storage of discovered ENRs in a database to recover from a restart without bootstrapping the discovery process again. Set to 'memory' to never persist the peerstore. The default value isopnode_discovery_db .

Syntax Example Environment Variable --p2p.discovery.path=

p2p.listen.ip

Specifies the IP to bind LibP2P and Discv5 to. The default value is0.0.0.0 .

Syntax Example Environment Variable --p2p.listen.ip=

p2p.listen.tcp

Defines the TCP port to bind LibP2P to. Any available system port if set to 0. The default value is9222 .

Syntax Example Environment Variable --p2p.listen.tcp=

p2p.listen.udp

Sets the UDP port to bind Discv5 to. It will be the same as the TCP port if left at 0. The default value is0 .

Syntax Example Environment Variable --p2p.listen.udp=

p2p.nat

Enables NAT traversal with PMP/UPNP devices to learn external IP. The default value isfalse .

Syntax Example Environment Variable --p2p.nat=

p2p.netrestrict

Specifies a comma-separated list of CIDR masks. P2P will only try to connect on these networks.

Syntax Example Environment Variable --p2p.netrestrict=

p2p.no-discovery

Disables Discv5 (node discovery). The default value isfalse .

Syntax Example Environment Variable --p2p.no-discovery=

p2p.peers.grace

Determines the grace period to keep a newly connected peer around, if it is not misbehaving. The default value is30s .

Syntax Example Environment Variable --p2p.peers.grace=

p2p.peers.hi

Sets the high-tide peer count. The node starts pruning peer connections slowly after reaching this number. The default value is30 .

Syntax Example Environment Variable --p2p.peers.hi=

p2p.peers.lo

Determines the low-tide peer count. The node actively searches for new peer connections if below this amount. The default value is20 .

Syntax Example Environment Variable --p2p.peers.lo=

p2p.peerstore.path

Specifies the Peerstore database location. Persisted peerstores help recover peers after restarts. Set to 'memory' to never persist the peerstore. Warning: a copy of the priv network key of the local peer will be persisted here. The default value is"opnode_peerstore_db" .

Syntax Example Environment Variable --p2p.peerstore.path=

p2p.priv.path

Defines the file path for reading the hex-encoded 32-byte private key for the peer ID. Created if not already exists. Important for maintaining the same network identity after restarting. The default value is"opnode_p2p_priv.txt" .

Syntax Example Environment Variable --p2p.priv.path=

p2p.scoring

Sets the peer scoring strategy for the P2P stack. Options include 'none' or 'light'. The default value is"light" .

Syntax Example Environment Variable --p2p.scoring=

p2p.sequencer.key

Hex-encoded private key for signing off on p2p application messages as sequencer.

Syntax Example Environment Variable --p2p.sequencer.key=

p2p.static

Comma-separated multiaddr-format peer list. Static connections to make and maintain, these peers will be regarded as trusted. Addresses of the local peer are ignored. Duplicate/Alternative addresses for the same peer all apply, but only a single connection per peer is maintained.

Syntax Example Environment Variable --p2p.static=

p2p.sync.req-resp

Enables P2P req-resp alternative sync method, on both server and client side. Default istrue .

Syntax Example Environment Variable --p2p.sync.req-resp=[true|false]

pprof.addr

pprof listening address. Default is"0.0.0.0" .

Syntax Example Environment Variable --pprof.addr=

pprof.enabled

Enable the pprof server. Default isfalse .

Syntax Example Environment Variable --pprof.enabled=[true|false]

pprof.path

pprof file path. If it is a directory, the path is {dir}/{profileType}.prof

Syntax Example Environment Variable --pprof.path=

pprof.port

pprof listening port. Default is6060 .

Syntax Example Environment Variable --pprof.port=

pprof.type

pprof profile type. One of cpu, heap, goroutine, threadcreate, block, mutex, allocs

Syntax Example Environment Variable --pprof.type=

rollup.config

Rollup chain parameters.

Syntax Example Environment Variable --rollup.config=

rollup.halt

Opt-in option to halt on incompatible protocol version requirements of the given level (major/minor/patch/none), as signaled onchain in L1.

Syntax Example Environment Variable --rollup.halt=

rollup.load-protocol-versions

Load protocol versions from the superchain L1 ProtocolVersions contract (if available), and report in logs and metrics. Default isfalse .

Syntax Example Environment Variable --rollup.load-protocol-versions=[true|false]

rpc.addr

RPC listening address. Default is"127.0.0.1" .

Syntax Example Environment Variable --rpc.addr=

rpc.admin-state

File path used to persist state changes made via the admin API so they persist across restarts. Disabled if not set.

Syntax Example Environment Variable --rpc.admin-state=

rpc.enable-admin

Enable the admin API (experimental). Default isfalse .

Syntax Example Environment Variable --rpc.enable-admin=[true|false]

rpc.port

RPC listening port. Default is9545 .

Syntax Example Environment Variable --rpc.port=

sequencer.enabled

Enable sequencing of new L2 blocks. A separate batch submitter has to be deployed to publish the data for verifiers. Default isfalse .

Syntax Example Environment Variable --sequencer.enabled=[true|false]

sequencer.l1-confs

Number of L1 blocks to keep distance from the L1 head as a sequencer for picking an L1 origin. Default is4 .

Syntax Example Environment Variable --sequencer.l1-confs=

sequencer.max-safe-lag

Maximum number of L2 blocks for restricting the distance between L2 safe and unsafe. Disabled if 0. Default is0 .

Syntax Example Environment Variable --sequencer.max-safe-lag=

sequencer.stopped

Initialize the sequencer in a stopped state. The sequencer can be started using the admin_startSequencer RPC. Default isfalse .

Syntax Example Environment Variable --sequencer.stopped=[true|false]

snapshotlog.file

Path to the snapshot log file.

Syntax Example Environment Variable --snapshotlog.file=

verifier.l1-confs

Number of L1 blocks to keep distance from the L1 head before deriving L2 data from. Reorgs are supported, but may be slow to perform. Default is0 .

Syntax Example Environment Variable --verifier.l1-confs=

MISC

--help, -h

Show help. The default value isfalse .

Syntax Example --help OR-h

--version, -v

Nodes built from source do not output the correct version numbers that are reported on the GitHub release page. Print the version. The default value isfalse .

Syntax Example --version OR-v

op-geth

op-geth implements the Execution-Layer, with minimal changes for a secure Ethereum-equivalent application environment. The following are options fromv1.101308.0(opens in a new tab)

Please note that the executable is still namedgeth to maintain aminimal diff(opens in a new tab) .

GLOBAL OPTIONS

ACCOUNT

allow-insecure-unlock

Allows insecure account unlocking when account-related RPCs are exposed by HTTP. The default value isfalse .

Syntax Example Environment Variable --allow-insecure-unlock

keystore

Directory for the keystore. The default is inside the data directory.

Syntax Example Environment Variable --keystore

lightkdf

Reduce key-derivation RAM & CPU usage at some expense of KDF strength. The default value isfalse .

Syntax Example Environment Variable --lightkdf

password

Password file to use for non-interactive password input.

Syntax Example Environment Variable --password

pcscdpath

Path to the smartcard daemon (pcscd) socket file. The default value is"/run/pcscd/pcscd.comm" .

Syntax Example Environment Variable --pcscdpath

signer

External signer (url or path to ipc file).

Syntax Example Environment Variable --signer

unlock

Comma separated list of accounts to unlock.

Syntax Example Environment Variable --unlock

usb

Enable monitoring and management of USB hardware wallets. The default value isfalse .

Syntax Example Environment Variable --usb

API AND CONSOLE

authrpc.addr

Listening address for authenticated APIs. The default value is"localhost" .

Syntax Example Environment Variable --authrpc.addr

authrpc.jwtsecret

Path to a JWT secret to use for authenticated RPC endpoints.

Syntax Example Environment Variable --authrpc.jwtsecret

authrpc.port

Listening port for authenticated APIs. The default value is8551 .

Syntax Example Environment Variable --authrpc.port

authrpc.vhosts

Comma separated list of virtual hostnames from which to accept requests (server enforced). The default value is"localhost" . Accepts '*' wildcard.

Syntax Example Environment Variable --authrpc.vhosts

exec

Execute JavaScript statement.

Syntax Example Environment Variable --exec

graphql

Enable GraphQL on the HTTP-RPC server. Note that GraphQL can only be started if an HTTP server is started as well. The default value isfalse .

Syntax Example Environment Variable --graphql

graphql.corsdomain

Comma separated list of domains from which to accept cross origin requests (browser enforced).

Syntax Example Environment Variable --graphql.corsdomain

graphql.vhosts

Comma separated list of virtual hostnames from which to accept requests (server enforced). The default value is"localhost" . Accepts '*' wildcard.

Syntax Example Environment Variable --graphql.vhosts

header

Pass custom headers to the RPC server when using--remotedb or the geth attach console. This flag can be given multiple times.

Syntax Example Environment Variable --header ,-H

http

Enable the HTTP-RPC server. The default value isfalse .

Syntax Example Environment Variable --http

http.addr

HTTP-RPC server listening interface. The default value is"localhost" .

Syntax Example Environment Variable --http.addr

http.api

API's offered over the HTTP-RPC interface.

Syntax Example Environment Variable --http.api

http.corsdomain

Comma separated list of domains from which to accept cross origin requests (browser enforced).

Syntax Example Environment Variable --http.corsdomain

http.port

HTTP-RPC server listening port. The default value is8545 .

Syntax Example Environment Variable --http.port

http.rpcprefix`[](https://docs.optimism.io/builders/node-operators/management/configuration#httprpcprefix)

HTTP path prefix on which JSON-RPC is served. Use '/' to serve on all paths.

Syntax Example Environment Variable --http.rpcprefix

http.vhosts

Comma separated list of virtual hostnames from which to accept requests (server enforced). The default value is"localhost" . Accepts '*' wildcard.

Syntax Example Environment Variable --http.vhosts

ipcdisable

Disable the IPC-RPC server. The default value isfalse .

Syntax Example Environment Variable --ipcdisable

ipcpath

Filename for IPC socket/pipe within the datadir (explicit paths escape it).

Syntax Example Environment Variable --ipcpath

jspath

JavaScript root path forloadScript . The default value is. (current directory).

Syntax Example Environment Variable --jspath

preload

Comma separated list of JavaScript files to preload into the console.

Syntax Example Environment Variable --preload

rpc.allow-unprotected-txs

Allow for unprotected (non EIP155 signed) transactions to be submitted via RPC. The default value isfalse .

Syntax Example Environment Variable --rpc.allow-unprotected-txs

rpc.batch-request-limit

Maximum number of requests in a batch. The default value is1000 .

Syntax Example Environment Variable --rpc.batch-request-limit=

rpc.batch-response-max-size

Maximum number of bytes returned from a batched call. The default value is25000000 .

Syntax Example Environment Variable --rpc.batch-response-max-size=

rpc.enabledeprecatedpersonal

Enables the (deprecated) personal namespace. The default value isfalse .

Syntax Example Environment Variable --rpc.enabledeprecatedpersonal

rpc.evmtimeout

Sets a timeout used for eth_call (0=infinite). The default value is5s .

Syntax Example Environment Variable --rpc.evmtimeout

rpc.gascap

Sets a cap on gas that can be used in eth_call/estimateGas (0=infinite). The default value is50000000 .

Syntax Example Environment Variable --rpc.gascap=

rpc.txfeecap

Sets a cap on transaction fee (in ether) that can be sent via the RPC APIs (0 = no cap). The default value is1 .

Syntax Example Environment Variable --rpc.txfeecap=

ws

Enable the WS-RPC server. The default value isfalse .

Syntax Example Environment Variable --ws

ws.addr

WS-RPC server listening interface. The default value is"localhost" .

Syntax Example Environment Variable --ws.addr=

ws.api

API's offered over the WS-RPC interface.

Syntax Example Environment Variable --ws.api=

ws.origins

Origins from which to accept websockets requests.

Syntax Example Environment Variable --ws.origins=

ws.port

WS-RPC server listening port. The default value is8546 .

Syntax Example Environment Variable --ws.port=

ws.rpcprefix

HTTP path prefix on which JSON-RPC is served over WS. Use '/' to serve on all paths.

Syntax Example Environment Variable --ws.rpcprefix=

DEVELOPER CHAIN

dev

Ephemeral proof-of-authority network with a pre-funded developer account, mining enabled. The default value isfalse .

Syntax Example Environment Variable --dev

dev.gaslimit

Initial block gas limit. The default value is11500000 .

Syntax Example Environment Variable --dev.gaslimit=

dev.period

Block period to use in developer mode (0 = mine only if transaction pending). The default value is0 .

Syntax Example Environment Variable --dev.period=

ETHEREUM

bloomfilter.size

Megabytes of memory allocated to bloom-filter for pruning. The default value is2048 .

Syntax Example Environment Variable --bloomfilter.size=

config

TOML configuration file.

Syntax Example Environment Variable --config=

datadir

Data directory for the databases and keystore. The default value is/home/.ethereum .

Syntax Example Environment Variable --datadir=

datadir.ancient

Root directory for ancient data (default = inside chaindata).

Syntax Example Environment Variable --datadir.ancient=

datadir.minfreedisk

Minimum free disk space in MB, once reached triggers auto shut down (default = --cache.gc converted to MB, 0 = disabled).

Syntax Example Environment Variable --datadir.minfreedisk=

db.engine

Backing database implementation to use ('pebble' or 'leveldb').

Syntax Example Environment Variable --db.engine=

eth.requiredblocks

Comma separated block number-to-hash mappings to require for peering (=).

Syntax Example Environment Variable --eth.requiredblocks=

exitwhensynced

Exits after block synchronization completes. The default value isfalse .

Syntax Example Environment Variable --exitwhensynced

goerli

Görli network: pre-configured proof-of-authority test network. The default value isfalse .

Syntax Example Environment Variable --goerli

holesky

Holesky network: pre-configured proof-of-stake test network. The default value isfalse .

Syntax Example Environment Variable --holesky

mainnet

Ethereum mainnet. The default value isfalse .

Syntax Example Environment Variable --mainnet

networkid

Explicitly set network id (integer). The default value is1 . For testnets: use --goerli, --sepolia, --holesky instead.

Syntax Example Environment Variable --networkid

op-network, beta.op-network

Select a pre-configured OP-Stack network (warning: op-mainnet and op-goerli require special sync, datadir is recommended), options: base-devnet-0-goerli-dev-0, base-devnet-0-sepolia-dev-0, base-goerli, base-mainnet, base-sepolia, conduit-devnet-0-goerli-dev-0, lyra-mainnet, mode-mainnet, op-goerli, op-labs-chaosnet-0-goerli-dev-0, op-labs-devnet-0-goerli-dev-0, op-mainnet, op-sepolia, oplabs-devnet-0-sepolia-dev-0, orderly-mainnet, pgn-mainnet, pgn-sepolia, zora-mainnet, zora-sepolia

Syntax Example Environment Variable --op-network=

override.cancun

Manually specify the Cancun fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.cancun=

override.canyon

Manually specify the Optimism Canyon fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.canyon=

override.ecotone

Manually specify the Optimism Ecotone fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.ecotone=

override.interop

Manually specify the Optimism Interop feature-set fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.interop=

override.verkle

Manually specify the Verkle fork timestamp, overriding the bundled setting. The default value is0 .

Syntax Example Environment Variable --override.verkle=

sepolia

Sepolia network: pre-configured proof-of-work test network. The default value isfalse .

Syntax Example Environment Variable --sepolia

snapshot

Enables snapshot-database mode. The default value istrue .

Syntax Example Environment Variable --snapshot

GAS PRICE ORACLE

gpo.blocks

Number of recent blocks to check for gas prices. The default value is20 .

Syntax Example Environment Variable --gpo.blocks=

gpo.ignoreprice

Gas price below which GPO will ignore transactions. The default value is2 .

Syntax Example --gpo.ignoreprice=

gpo.maxprice

Maximum transaction priority fee (or gasprice before London fork) to be recommended by GPO. The default value is500000000000 .

Syntax Example --gpo.maxprice=

gpo.minsuggestedpriorityfee

Minimum transaction priority fee to suggest. Used on OP chains when blocks are not full. The default value is1000000 .

Syntax Example --gpo.minsuggestedpriorityfee=

gpo.percentile

Suggested gas price is the given percentile of a set of recent transaction gas prices. The default value is60 .

Syntax Example Environment Variable --gpo.percentile=

LIGHT CLIENT

light.egress

Outgoing bandwidth limit for serving light clients (deprecated). The default value is0 .

Syntax Example Environment Variable --light.egress=

light.ingress

Incoming bandwidth limit for serving light clients (deprecated). The default value is0 .

Syntax Example Environment Variable --light.ingress=

light.maxpeers

Maximum number of light clients to serve, or light servers to attach to (deprecated). The default value is100 .

Syntax Example Environment Variable --light.maxpeers=

light.nopruning

Disable ancient light chain data pruning (deprecated). The default value isfalse .

Syntax Example Environment Variable --light.nopruning

light.nosyncserve

Enables serving light clients before syncing (deprecated) The default value isfalse .

Syntax Example Environment Variable --light.nosyncserve

light.serve

Maximum percentage of time allowed for serving LES requests (deprecated). The default value is0 .

Syntax Example Environment Variable --light.serv=

LOGGING AND DEBUGGING

log.compress

Compress the log files. The default value isfalse .

Syntax Example Environment Variable --log.compress

log.file

Write logs to a file.

Syntax Example Environment Variable --log.file=

log.format

Log format to use (json|logfmt|terminal).

Syntax Example Environment Variable --log.format=

log.maxage

Maximum number of days to retain a log file. The default value is30 .

Syntax Example Environment Variable --log.maxage=

log.maxbackups

Maximum number of log files to retain. The default value is10 .

Syntax Example Environment Variable --log.maxbackups=

log.maxsize

Maximum size in MBs of a single log file. The default value is100 .

Syntax Example Environment Variable --log.maxsize=

log.rotate

Enables log file rotation. The default value isfalse .

Syntax Example Environment Variable --log.rotate

log.vmodule

Per-module verbosity: comma-separated list of= (e.g. eth/*=5,p2p=4).

Syntax Example Environment Variable --log.vmodule=

nocompaction

Disables database compaction after import. The default value isfalse .

Syntax Example Environment Variable --nocompaction

pprof

Enable the pprof HTTP server. The default value isfalse .

Syntax Example Environment Variable --pprof

pprof.addr

pprof HTTP server listening interface. The default value is"127.0.0.1" .

Syntax Example Environment Variable --pprof.addr=

pprof.blockprofilerate

Turn on block profiling with the given rate. The default value is0 .

Syntax Example Environment Variable --pprof.blockprofilerate=

pprof.cpuprofile

Write CPU profile to the given file.

Syntax Example --pprof.cpuprofile=

pprof.memprofilerate

Turn on memory profiling with the given rate. The default value is524288 .

Syntax Example Environment Variable --pprof.memprofilerate=

pprof.port

pprof HTTP server listening port. The default value is6060 .

Syntax Example Environment Variable --pprof.port=

remotedb

URL for remote database.

Syntax Example Environment Variable --remotedb=

trace

Write execution trace to the given file.

Syntax Example Environment Variable --trace=

verbosity

Logging verbosity: 0=silent, 1=error, 2=warn, 3=info, 4=debug, 5=detail. The default value is3 .

Syntax Example Environment Variable --verbosity=

METRICS AND STATS

ethstats

Reporting URL of an ethstats service (nodename:secret@host:port).

Syntax Example Environment Variable --ethstats=

metrics

Enable metrics collection and reporting. The default value isfalse .

Syntax Example Environment Variable --metrics

metrics.addr

Enable stand-alone metrics HTTP server listening interface.

Syntax Example Environment Variable --metrics.addr=

metrics.expensive

Enable expensive metrics collection and reporting. The default value isfalse .

Syntax Example Environment Variable --metrics.expensive

metrics.influxdb

Enable metrics export/push to an external InfluxDB database. The default value isfalse .

Syntax Example Environment Variable --metrics.influxdb

metrics.influxdb.bucket

InfluxDB bucket name to push reported metrics to (v2 only). The default value is"geth" .

Syntax Example Environment Variable --metrics.influxdb.bucket=

metrics.influxdb.database

InfluxDB database name to push reported metrics to. The default value is"geth" .

Syntax Example Environment Variable --metrics.influxdb.database=

metrics.influxdb.endpoint

InfluxDB API endpoint to report metrics to. The default value is"http://localhost:8086" .

Syntax Example Environment Variable --metrics.influxdb.endpoint=

metrics.influxdb.organization

InfluxDB organization name (v2 only). The default value is"geth" .

Syntax Example Environment Variable --metrics.influxdb.organization=

metrics.influxdb.password

Password to authorize access to the database. The default value is"test" .

Syntax Example Environment Variable --metrics.influxdb.password=

metrics.influxdb.tags

Comma-separated InfluxDB tags (key/values) attached to all measurements. The default value is"host=localhost" .

Syntax Example Environment Variable --metrics.influxdb.tags=

metrics.influxdb.token

Token to authorize access to the database (v2 only). The default value is"test" .

Syntax Example Environment Variable --metrics.influxdb.token=

metrics.influxdb.username

Username to authorize access to the database. The default value is"test" .

Syntax Example Environment Variable --metrics.influxdb.username=

metrics.influxdbv2

Enable metrics export/push to an external InfluxDB v2 database. The default value isfalse .

Syntax Example Environment Variable --metrics.influxdbv2

metrics.port

Metrics HTTP server listening port. The default value is6060 . Please note that--metrics.addr must be set to start the server.

Syntax Example Environment Variable --metrics.port=

MINER

mine

Enable mining. The default value isfalse .

Syntax Example Environment Variable --mine

miner.etherbase

0x prefixed public address for block mining rewards.

Syntax Example Environment Variable --miner.etherbase=

miner.extradata

Block extra data set by the miner (default = client version).

Syntax Example Environment Variable --miner.extradata=

miner.gaslimit

Target gas ceiling for mined blocks. The default value is30000000 .

Syntax Example Environment Variable --miner.gaslimit=

miner.gasprice

Minimum gas price for mining a transaction. The default value is0 .

Syntax Example Environment Variable --miner.gasprice=

miner.newpayload-timeout

Specify the maximum time allowance for creating a new payload. The default value is2s .

Syntax Example Environment Variable --miner.newpayload-timeout=

miner.recommit

Time interval to recreate the block being mined. The default value is2s .

Syntax Example Environment Variable --miner.recommit=

MISC

help

Show help. This is typically used to display command-line options and usage information.

Syntax Example --help or-h

synctarget

Hash of the block to full sync to (dev testing feature).

Syntax Example Environment Variable --synctarget=

version

Nodes built from source do not output the correct version numbers that are reported on the GitHub release page. Print the version. This option is typically used to display the version of the software.

Syntax Example --version or-v

NETWORKING

bootnodes

Comma separated enode URLs for P2P discovery bootstrap.

Syntax Example Environment Variable --bootnodes=

discovery.dns

Sets DNS discovery entry points (use "" to disable DNS).

Syntax Example Environment Variable --discovery.dns=

discovery.port

Use a custom UDP port for P2P discovery. The default value is30303 .

Syntax Example Environment Variable --discovery.port=

discovery.v4

Enables the V4 discovery mechanism. The default value istrue .

Syntax Example Environment Variable --discovery.v4 or--discv4

discovery.v5

Enables the experimental RLPx V5 (Topic Discovery) mechanism. The default value isfalse .

Syntax Example Environment Variable --discovery.v5 or--discv5

identity

Custom node name.

Syntax Example Environment Variable --identity=

maxpeers

Maximum number of network peers (network disabled if set to 0). The default value is50 .

Syntax Example Environment Variable --maxpeers=

maxpendpeers

Maximum number of pending connection attempts (defaults used if set to 0). The default value is0 .

Syntax Example Environment Variable --maxpendpeers=

nat

NAT port mapping mechanism (any|none|upnp|pmp|pmp:|extip:). The default value is"any" .

Syntax Example Environment Variable --nat=

netrestrict

Restricts network communication to the given IP networks (CIDR masks).

Syntax Example Environment Variable --netrestrict=

nodekey

P2P node key file.

Syntax Example Environment Variable --nodekey=

nodekeyhex

P2P node key as hex (for testing).

Syntax Example Environment Variable --nodekeyhex=

nodiscover

Disables the peer discovery mechanism (manual peer addition). The default value isfalse .

Syntax Example Environment Variable --nodiscover

port

Network listening port. The default value is30303 .

Syntax Example Environment Variable --port=

PERFORMANCE TUNING

cache

Megabytes of memory allocated to internal caching. The default is4096 MB for mainnet full node and128 MB for light mode.

Syntax Example Environment Variable --cache=

cache.blocklogs

Size (in number of blocks) of the log cache for filtering. The default value is32 .

Syntax Example Environment Variable --cache.blocklogs=

cache.database

Percentage of cache memory allowance to use for database I/O. The default value is50 .

Syntax Example Environment Variable --cache.database=

cache.gc

Percentage of cache memory allowance to use for trie pruning. The default is25% for full mode and0% for archive mode.

Syntax Example Environment Variable --cache.gc=

cache.noprefetch

Disable heuristic state prefetch during block import (less CPU and disk IO, more time waiting for data). The default value isfalse .

Syntax Example Environment Variable --cache.noprefetch

cache.preimages

Enable recording the SHA3/keccak preimages of trie keys. The default value isfalse .

Syntax Example Environment Variable --cache.preimages

cache.snapshot

Percentage of cache memory allowance to use for snapshot caching. The default is10% for full mode and20% for archive mode.

Syntax Example Environment Variable --cache.snapshot=

cache.trie

Percentage of cache memory allowance to use for trie caching. The default is15% for full mode and30% for archive mode.

Syntax Example Environment Variable --cache.trie=

crypto.kzg

KZG library implementation to use; gokzg (recommended) or ckzg. The default value is"gokzg" .

Syntax Example Environment Variable --crypto.kzg=

fdlimit

Raise the open file descriptor resource limit. The default is the system fd limit.

Syntax Example Environment Variable --fdlimit=

ROLLUP NODE

rollup.computependingblock

By default, the pending block equals the latest block to save resources and not leak transactions from the tx-pool. This flag enables computing of the pending block from the tx-pool instead. The default value isfalse .

Syntax Example Environment Variable --rollup.computependingblock

rollup.disabletxpoolgossip

Disable transaction pool gossip. The default value isfalse .

Syntax Example Environment Variable --rollup.disabletxpoolgossip

rollup.halt

Opt-in option to halt on incompatible protocol version requirements of the given level (major/minor/patch/none), as signaled through the Engine API by the rollup node.

Syntax Example Environment Variable --rollup.halt=

rollup.historicalrpc

RPC endpoint for historical data.

Syntax Example Environment Variable --rollup.historicalrpc

rollup.historicalrpctimeout

Timeout for historical RPC requests. The default value is5s .

Syntax Example Environment Variable --rollup.historicalrpctimeout=

rollup.sequencerhttp

HTTP endpoint for the sequencer mempool.

Syntax Example Environment Variable --rollup.sequencerhttp=

rollup.superchain-upgrades

Apply superchain-registry config changes to the local chain-configuration. The default value istrue .

Syntax Example Environment Variable --rollup.superchain-upgrades or--beta.rollup.superchain-upgrades

STATE HISTORY MANAGEMENT

gcmode

Blockchain garbage collection mode, only relevant instate.scheme=hash . Options are "full" and "archive". The default value is"full" .

Syntax Example Environment Variable --gcmode=

history.state

Number of recent blocks to retain state history for. The default is90000 blocks, with0 representing the entire chain.

Syntax Example Environment Variable --history.state=

history.transactions

Number of recent blocks to maintain transactions index for. The default is about one year (2350000 blocks), with0 representing the entire chain.

Syntax Example Environment Variable --history.transactions=

state.scheme

Scheme to use for storing Ethereum state. Options are 'hash' or 'path'.

Syntax Example Environment Variable --state.scheme=

syncmode

Blockchain sync mode. Options are "snap", or "full". The default value is"snap" .

Syntax Example Environment Variable --syncmode=

TRANSACTION POOL (BLOB)

blobpool.datacap

Disk space to allocate for pending blob transactions (soft limit). The default value is10737418240 .

Syntax Example Environment Variable --blobpool.datacap=

blobpool.pricebump

Price bump percentage to replace an already existing blob transaction. The default value is100 .

Syntax Example Environment Variable --blobpool.pricebump=

TRANSACTION POOL (EVM)

txpool.accountqueue

Maximum number of non-executable transaction slots permitted per account. The default value is64 .

Syntax Example Environment Variable --txpool.accountqueue=

txpool.accountslots

Minimum number of executable transaction slots guaranteed per account. The default value is16 .

Syntax Example Environment Variable --txpool.accountslots=

txpool.globalqueue

Maximum number of non-executable transaction slots for all accounts. The default value is1024 .

Syntax Example Environment Variable --txpool.globalqueue=

txpool.globalslots

Maximum number of executable transaction slots for all accounts. The default value is5120 .

Syntax Example Environment Variable --txpool.globalslots=

txpool.journal

Disk journal for local transactions to survive node restarts. The default value is"transactions.rlp" .

Syntax Example Environment Variable --txpool.journal=

txpool.journalremotes

Includes remote transactions in the journal. The default value isfalse .

Syntax Example Environment Variable --txpool.journalremotes

txpool.lifetime

Maximum amount of time non-executable transactions are queued. The default value is3h0m0s .

Syntax Example Environment Variable --txpool.lifetime=

txpool.locals

Comma-separated accounts to treat as locals (no flush, priority inclusion).

Syntax Example Environment Variable --txpool.locals=

txpool.nolocals

Disables price exemptions for locally submitted transactions. The default value isfalse .

Syntax Example Environment Variable --txpool.nolocals

txpool.pricebump

Price bump percentage to replace an already existing transaction. The default value is10 .

Syntax Example Environment Variable --txpool.pricebump=

txpool.pricelimit

Minimum gas price tip to enforce for acceptance into the pool. The default value is1 .

Syntax Example Environment Variable --txpool.pricelimit=

txpool.rejournal

Time interval to regenerate the local transaction journal. The default value is1h0m0s .

Syntax Example Environment Variable --txpool.rejournal=

VIRTUAL MACHINE

vmdebug

Record information useful for VM and contract debugging. The default value isfalse .

Syntax Example Environment Variable --vmdebug

Snapshot Downloads Using Blobs