Building a Node from Source

Docker images are the easiest way to run an OP Mainnet node, but you can always build your own node from source code. You might want to do this if you want to run a node on a specific architecture or if you want to inspect the source code of the node you're running. This guide will walk you through the full process of building a node from source.

What You're Going to Build

Rollup Node

The Rollup Node is responsible for deriving L2 block payloads from L1 data and passing those payloads to the Execution Client. The Rollup Node can also optionally participate in a peer-to-peer network to receive blocks directly from the Sequencer before those blocks are submitted to L1. The Rollup Node is largely analogous to a consensus client(opens in a new tab) in Ethereum.

In this tutorial you will build the op-node implementation of the Rollup Node as found in the Optimism Monorepo(opens in a new tab) .

Execution Client

The Execution Client is responsible for executing the block payloads it receives from the Rollup Node over JSON-RPC via the standard Ethereum Engine API(opens in a new tab) . The Execution Client exposes the standard JSON-RPC API that Ethereum developers are familiar with, and can be used to query blockchain data and submit transactions to the network. The Execution Client is largely analogous to an execution client(opens in a new tab) in Ethereum.

In this tutorial you will build the op-geth implementation of the Execution Client as found in the op-geth repository(opens in a new tab) .

Legacy Geth (Optional)

Legacy Geth is an optional component for OP Mainnet archive nodes. Legacy Geth allows you to execute stateful queries like eth_call against blocks and transactions that occurred before the OP Mainnet Bedrock Upgrade(opens in a new tab) . Legacy Geth is only relevant to OP Mainnet archive nodes and is not required for full nodes or OP Sepolia nodes.

Currently, l2Geth is the only available implementation of Legacy Geth. In this tutorial you will build the l2geth implementation of Legacy Geth as found in the optimism-legacy repository(opens in a new tab) .

Software Dependencies

Dependency	Version	Version Check Command
git(opens in a new tab)	^2	git --version
go(opens in a new tab)	^1.21	go version
node(opens in a new tab)	^20	node --version
pnpm(opens in a new tab)	^8	pnpm --version
foundry(opens in a new tab)	^0.2.0	forge --version
make(opens in a new tab)	^4	make --version

Build the Rollup Node

First you're going to build the op-node implementation of the Rollup Node as found in the Optimism Monorepo(opens in a new tab) .

Clone the Optimism Monorepo

The Optimism Monorepo contains the source code for the op-node .

git

clone

https://github.com/ethereum-optimism/optimism.git cd

optimism

Check out the required release branch

Release branches are created when new versions of the op-node are created. Read through the Releases page(opens in a new tab) to determine the correct branch to check out.

git

checkout

< name

of

release

branc h

Make sure to read the Releases page carefully to determine the correct branch to check out. Some releases may only be required for the OP Sepolia testnet.

Install Node.js dependencies

Install the Node.js dependencies for the Optimism Monorepo.

pnpm

install

Build Node.js packages

Build the Node.js packages for the Optimism Monorepo.

pnpm

build

Build op-node

Build theop-node implementation of the Rollup Node.

make

op-node

Build the Execution Client

Next you're going to build theop-geth implementation of the Execution Client as found in theop-geth repository(opens in a new tab) .

Clone op-geth

Theop-geth repository(opens in a new tab) contains the source code for theop-geth implementation of the Execution Client.

git

clone

https://github.com/ethereum-optimism/op-geth.git cd

op-geth

Check out the required release branch

Release branches are created when new versions of theop-geth are created. Read through theReleases page(opens in a new tab) to determine the correct branch to check out.

git

checkout

< name

of

release

branc h

Make sure to read the Releases page carefully to determine the correct branch to check out. Some releases may only be required for the OP Sepolia testnet.

Build op-geth

Build theop-geth implementation of the Execution Client.

make

geth

Build Legacy Geth (Optional)

Legacy Geth is an optional component for OP Mainnet archive nodes. Legacy Geth allows you to execute stateful queries likeeth_call against blocks and transactions that occurred before the OP MainnetBedrock Upgrade(opens in a new tab) . Legacy Geth is only relevant to OP Mainnet archive nodes and is not required for full nodes or OP Sepolia nodes.

Clone the OP Legacy Repository

The OP Legacy repository contains the source code for thel2geth implementation of Legacy Geth.

git

clone

https://github.com/ethereum-optimism/optimism-legacy.git cd

optimism-legacy

Build l2geth

cd

l2geth make

Next Steps

- Click here toRun an OP Mainnet Node from Source Code
- Click here toRun an OP Sepolia Node from Source Code
- If you run into any problems, please visit theNode Troubleshooting Guide
- for help.

Running a Node With Docker Running OP Mainnet from Source