Shadow Network Simulations

EPF Cohort 5

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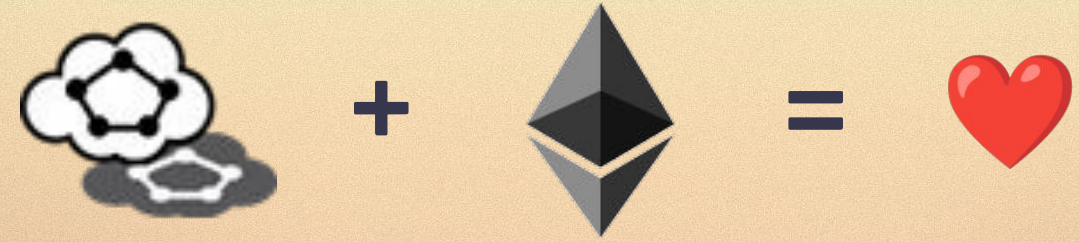
Introduction

Network Simulations are awesome!

- We can test changes quickly without rolling out devnets
- With Shadow, we can run huge simulations - **with actual clients**



Project phases

Phase 1

Prepare a tool to easily setup Shadow simulations with Ethereum clients

Phase 2

Run experiments on PeerDAS and IDONTWANT

Phase 3

Polish the tool for public use - **Ethshadow** is born!

PeerDAS

PeerDAS

- Upcoming update to scale blobs .oO
- Split blobs into parts called columns, with every node taking custody for some column
- Heavy network changes required!
- Currently, 128 additional subnets in Gossipsub

- Run simulations to help the R&D effort!
- All results represent the state of PeerDAS 2-3 months ago

Simulation setup

- 1000 nodes
- Reth, Lighthouse, and Lighthouse VC on each
- 4000 validators
- 45 minutes simulated time

- For fast simulations, we run on large servers
- 1TB memory **minimum**
- Experimented with different AWS and Azure instance types to keep costs low
- Settled on r6i.32xlarge instances: 128 cores, 1TB memory
- With Spot instance pricing and ~4h of simulation time, cost per simulation run is **~$10**

PeerDAS problems

- Simulated networks quickly fall apart as nodes lose sync, and can’t sync again
- Similar to what was seen on the devnets at the time

- Score: how long can >66% of the network stay in sync
- The unmodified client with default configuration scored **0**
- A simulation where all nodes were supernodes stayed stable until the end 🤔

- Problem is that nodes could not send all data columns, causing some columns to get lost forever, causing nodes custodying those columns to lose sync

Attempted solutions

- We need our peers to cover all subnets so that we can get all columns out

- Increase number of peers
- Base Spec: 100
- 150 scored **10**
- 200 scored **56**
- 300 survived the whole simulation

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- Increase number of supernodes (covering all columns)
- Increase to 10: scored **0**
- Increase to 25: scored **2**
- Increase to 75: scored **2**

State of Ethshadow

State of Ethshadow

- Source available on Github: **https://github.com/ethereum/ethshadow ->**
- Supports Geth and Lighthouse
- Experimental support for Reth and Teku

- Some documentation left to be written
- Usability improvements
- Shadow needs a lot of work for all clients to work

Thank you!

My mentors:
Adrian Manning, Sigma Prime
Pop, Ethereum Foundation

Support from:
João Oliveira, Sigma Prime
Jimmy Chen, Sigma Prime
Anton Nashatyrev, Consensys

EPF Organization:
Mario Havel
Josh Davis

The Ethereum Foundation

and all fellows!

Thank you!

Tomorrow's talk, an introduction to Ethshadow itself:

"Simulating an Ethereum network at scale" - on Stage 1 at 1:10 PM - together with Pop

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