



# Who We Are



**Maggie Love**

Co-Founder W3bCloud  
Director of Ecosystem &  
Partnerships

Founder SheFi

**Twitter:** [@maggielove\\_](#)



**Shane Burgett**

Co-Founder Decentralized  
Authority

**Twitter:** [@shane8burger](#)

# About W3bCloud

W3bCloud is a leading compute and storage infrastructure provider, powering Web 3. As a joint venture with ConsenSys, a leading blockchain technology company, and Advanced Micro Devices (AMD), a leader in high-performance compute semiconductor chips, we aim to enable innovative developers to build and scale disruptive new blockchain-based services.

Ethereum believes that validators will play an active part in Ethereum's future" and that they are key to a **more secure, scalable, and sustainable Ethereum.**





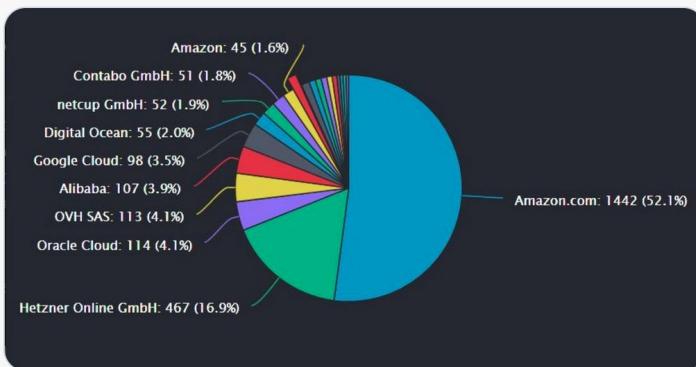
maggie love @ Devcon (⭐, ⭐) @maggielove\_ · Aug 25

...

Ethereum cannot be decentralized if the stack is not decentralized...

Where is the dialogue on this?

69% of hosted nodes on the Ethereum Mainnet, with over 50% of that coming from Amazon Web Services (AWS), over 15% from Hetzner and 4.1% from OVH.



157

408

1,235



← Thread



Péter Szilágyi (karalabe.eth)

@peter\_szilagyi

We've been saying it since Devcon IV. Either the state gets pruned, or you will end up with nobody running home nodes.

Everyone went crazy at the thought of state rent. Alexey almost got crucified for researching it. Well, now you're seeing the effect of no pruning.

↖\_(ツ)\_/↖

**POLL:** How many of you think centralization of node infrastructure is a concern for Ethereum?

**Goal:** Teach you about the importance of running your own node to contribute to the resilience and decentralization of the network and to protect yourself from penalties

# Agenda

- Why did Ethereum move to Proof of Stake
- Node Infrastructure Landscape
  - Examining Decentralization across layers
- Node Runner Options



# Quick Proof of Stake Glossary

- **Proof of Stake:** a consensus mechanism where validators put their own capital at risk to validate and secure the network
- **Consensus Mechanism:** how a network agrees on a single source of truth
- **Staking:** act of locking up or depositing crypto
- **Validator node:** a node that processes transactions, adds new blocks to the blockchain and stores data
  - Responsible for:
    - proposing blocks of transactions
    - attesting transactions in blocks are true

# Why did Ethereum move to Proof of Stake

- Reducing barriers to entry for network participants
- Reduce Ethereum's carbon footprint by 99.95%
- Reduce ETH issuance
  - Less ETH issuance is needed to incentivize participation
- 51% style attacks are more costly and difficult
- Social recovery
- **Reduce centralization risk of validator nodes**

# Validator Requirements

- To participate in the consensus of a blockchain, one must commit capital resources
- In Proof-of-Stake, one **must commit 32 ETH** to become a solo-validator on the network
- This collateral can be penalized if a validator is "lazy" or "dishonest"
  - Risk of slashing
- **Run 3 pieces of software:** an execution client, a consensus client, and a validator

# Why Solo Validate?

- Earn ETH directly from the protocol
- No middlemen taking a cut of earnings
  - Coinbase take 25% cut of earnings from stakers
- Your keys, your crypto
- Control of clients and hardware set up
- Reduce the risk of large event slashing
- Don't have to trust third-party for running node / information coming from the node is true
- ***Improve the resilience, robustness, decentralization, and security of the Ethereum protocol***

## Solo Validator Challenges

- 32 ETH = \$ 42671.58 which is not accessible to many who want to stake at home
- Cost of hardware, electricity and storage over time
- Technical know-how to develop and operate an Ethereum validator
- Secure key management
- Stable Internet reduces the risk of slashing and maximizes rewards
- Lock up and immovability / inaccessibility of staked Ethereum
  - 6 - 12 months after the Merge / Shanghai upgrade
- Solo stakers are at greater risk of Denial of Service Attack (DDos)

## Ethereum Validator Landscape Reality

- What if a person doesn't meet all requirements: 32 ETH, technical expertise, time and maintenance?
- She can stake via a service, a pool or an exchange
- These options increase participation of individuals staking
- But aren't ideal for the resilience, robustness, decentralization and security of the network
- ***What is the state of Ethereum validating today?***



## Section 2

# Ethereum Staking / Validator Landscape

# Ethereum Validator Landscape

**smart contract platform**  
(L1's)

**software infrastructure providers**  
(SSV network, Obol, Kiln.fi)

**hardware infrastructure providers**  
(W3bcloud, digitalocean)

**Solo stakers**

**Liquid staking protocols**  
(Rocketpool, Ankr & Lido)

**Staking service businesses**  
(Stakewise, Everstake)

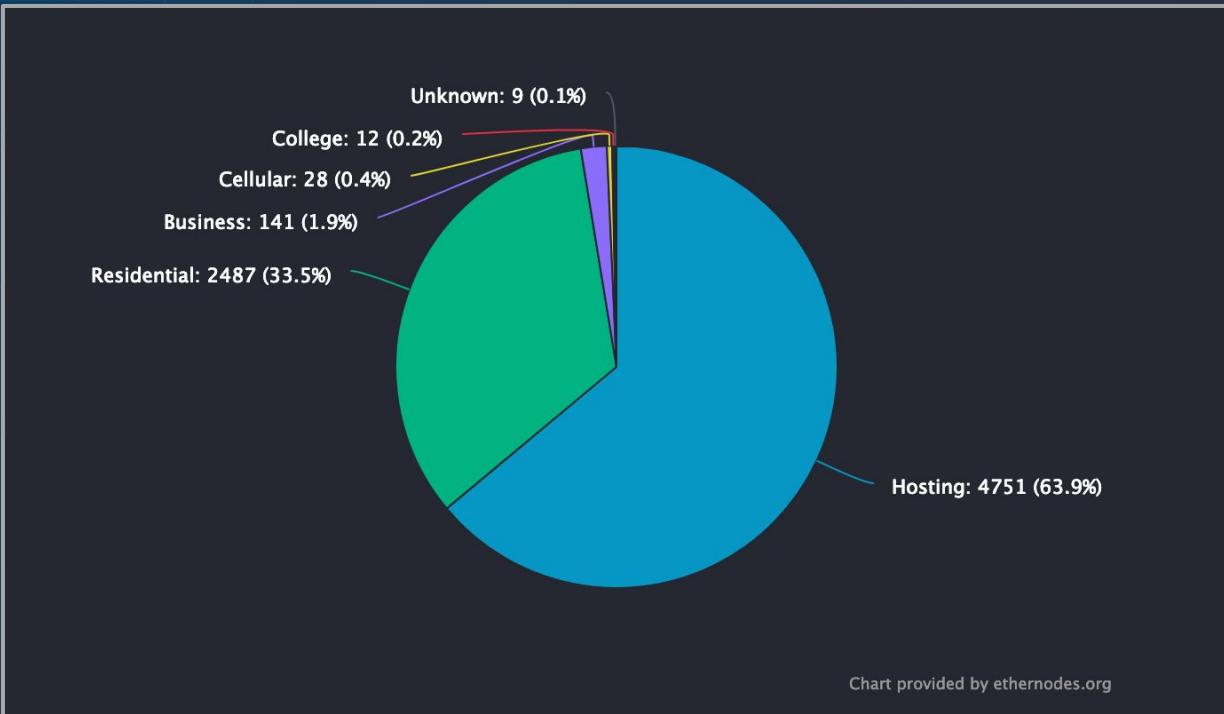
**Liquid stakers**  
(stETH, rETH, aETHc)

**Investors**  
(private equity, Lido, RPL)

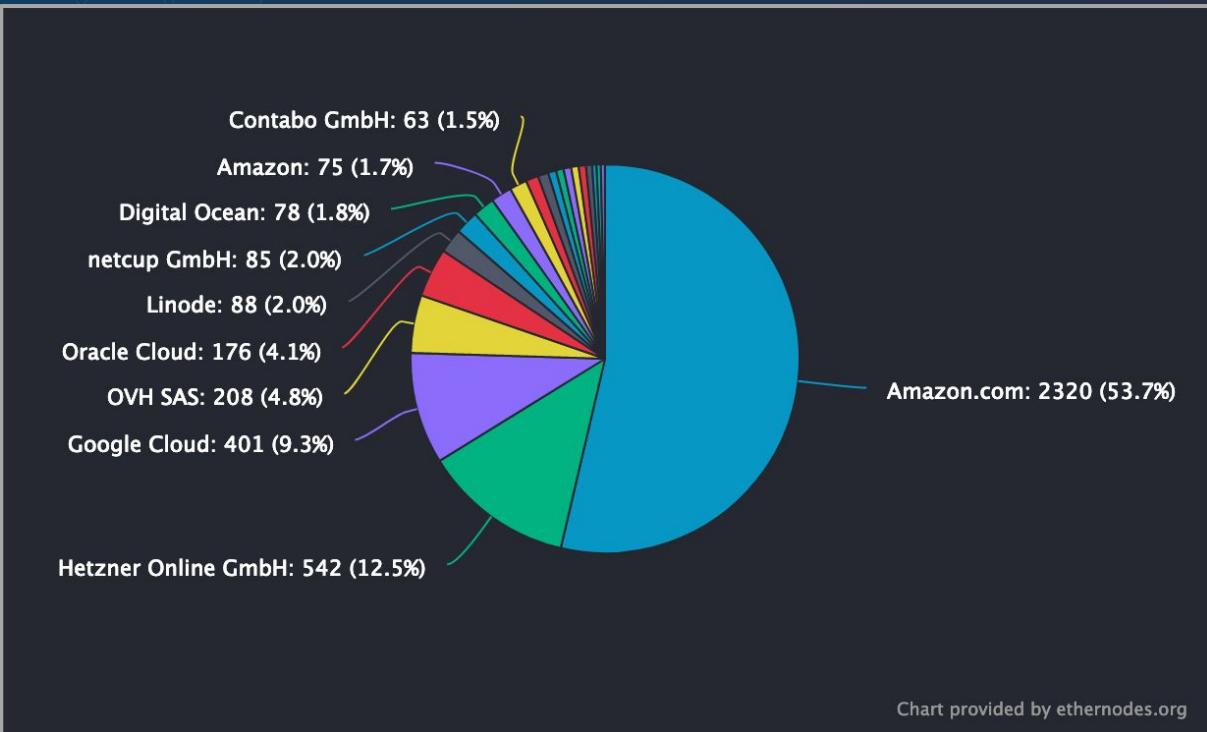
# Different Layers of Decentralization

- **Hosting provider** (60%+ of Ethereum Nodes Are Hosted on Centralized Services)
- **Pool distribution** - (lido, coinbase, kraken, binance, staked.us, rocketpool)
- **Node Client** (Prysm, Lighthouse, Teku, Nimbus, Geth, Nethermind, Erigon)
- **Geographic node distribution**
- **Coin ownership distribution**

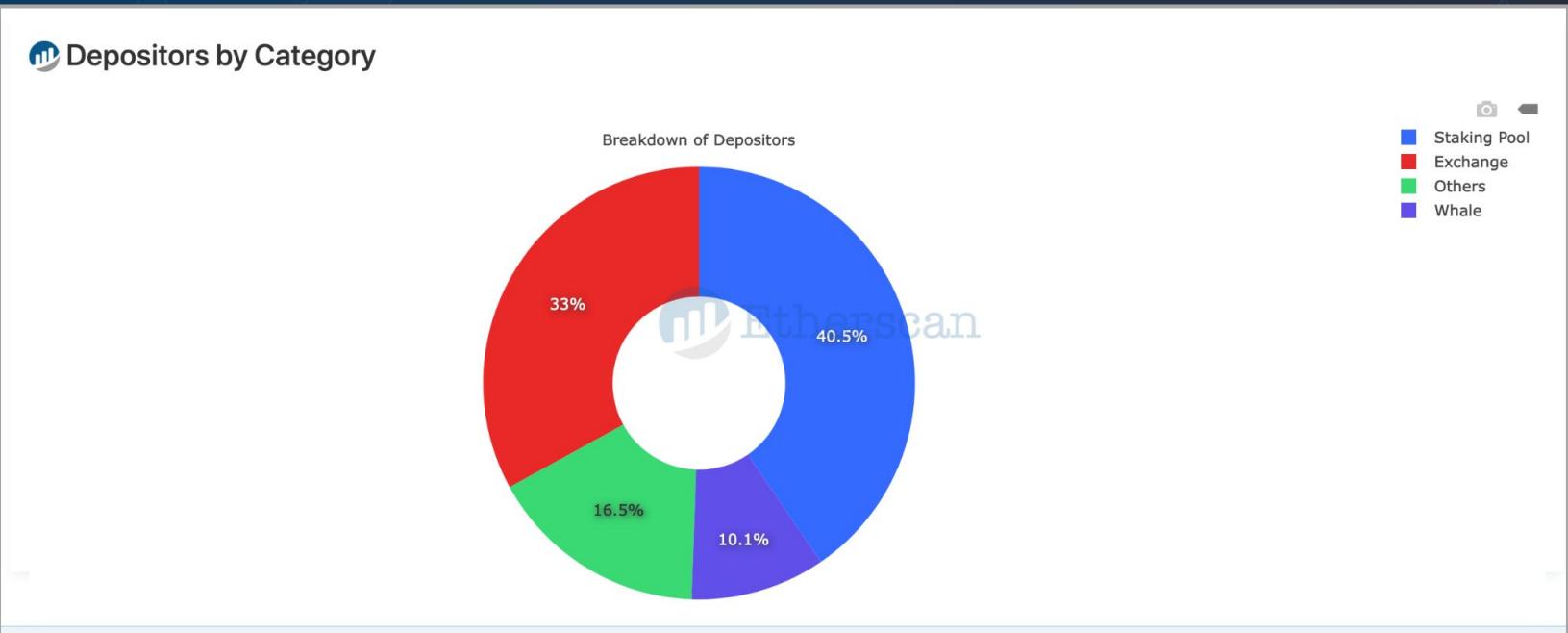
# Node Distribution



# Hosting Distribution



# Depositor Distribution



# Coinbase, LIDO Dominate Pool Market

- In September, 13.5 million ETH (worth \$22.3 billion at the time) staked
- **More than 60%** of that ETH sitting with Lido Finance, Coinbase, Kraken, and Binance
- Much higher likelihood of being assigned producing blocks of transactions
- **Concerns:**
  - rewards
  - censoring transaction on the network
  - define rules on block formation and what types of blocks get created
  - staking entities will be penalized if they don't follow rules

# Coinbase, LIDO w/ Pool Dominance

 **Martin Köppelmann**   
@koeppeleman

Out of the last 1000 blocks, 420 have been built by just Lido and Coinbase.

That's fine 24.6%

This needs to change 75.4%

15,885 votes · Final results

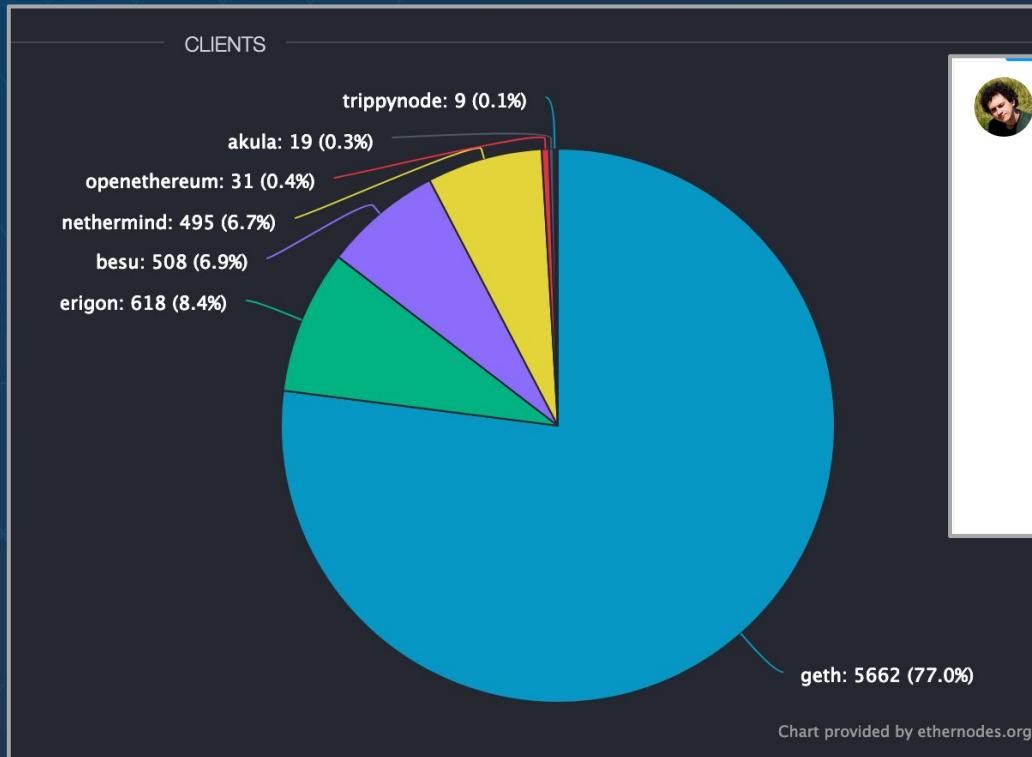
10:38 AM · Sep 15, 2022 · Twitter Web App

300 Retweets 174 Quote Tweets 941 Likes

[View thread in Reader](#)

# Node Client Diversity Distribution



Péter Szilágyi (karalabe.eth) @peter\_szilagyi · Sep 29

Can you guys please just make that better client than Geth already and everyone switch over to it? You've been saying it for 8 years now... I just want to retire and it's annoying that everyone keeps promising me that I can but nobody delivers the salvation client already.



brock @brockjelmore · Sep 28

luke warm take (iykyk): geth needs to adapt or die

akula and erigon are an order of magnitude better (or more) on multiple axes and geth will hold back and slow down improvements to L1s and L2s

hats off for what it's done for the eco but now it's 661k lines of tech debt 🤦‍♂️ [twitter.com/brockjelmore/s...](https://twitter.com/brockjelmore/status/104444444444444444)

57

15

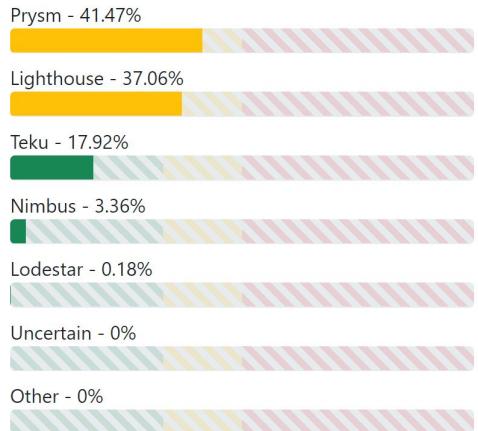
323

↑

# Client Distribution

## Consensus Clients

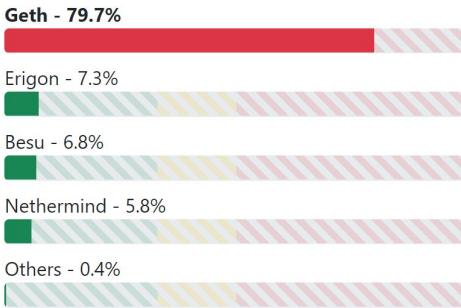
❗ The consensus client diversity has improved!



Data provided by [Sigma Prime's Blockprint](#) — updated daily.  
Data may not be 100% accurate. ([Read more](#))

## Execution Clients

❗ Switch from Geth to a minority client!



Data provided by [Ethernodes](#) — updated daily.  
Data may not be 100% accurate. ([Read more](#))

# Risks of Centralization and Slashing Across Layers

- Risks of infrastructure, hosting, pool and client centralization
- If more than 1/3rd of validators run into an issue, the network will start slashing that group
- Why? Consensus needs 2/3rds of validator agreement
- If you're in a group that's more than 1/3rd of the nodes running into issues, that group gets slashed until the amount of ETH inside of that group is below 1/3rd of the total stake

# Risks of Centralization and Slashing Across Layers

- Let's say Amazon has an outage, issue or decides to censor they have 53% of the hosting nodes
- Those nodes will all start getting slashed until the value is less than 1/3rd
  - Going from 53% go down below 33% before the slashing would end
- You as an individual don't have that control because you are part of that potential slashing group
  - Potentially you have no idea as you are staking with a service hosting on AWS

# Risks of Centralization and Slashing Across Layers

- 80% of the Ethereum network uses the **geth client**
- If something happens to the geth client, they make a mistake of the client, **80% of the network would be slashed**
- **Why?** The network cannot finalize
- The penalties are much more severe for those using geth because of the inactivity leak
- Their stake is burned until the Beacon chain can finalize again
- **The ethereum network has 3 major attack vectors within the clients — prysm, lighthouse or geth, that whole group starts getting slashes**

# To What Degree does Decentralization Matter?

- **Ethereum Network Goal:**
  - To be a credibly, resilient, scalable and neutral global settlement layer
- **Ethereum Validator Goal:**
  - To be a performant validator and avoid penalties
- The Ethereum Network encourages decentralization:
  - Less penalties for running own validator node
- Keep addressing points of centralization in Proof of Stake:
  - Node infrastructure
  - Pools
  - Client diversity
  - Geographic distribution
  - Block construction
  - Coin distribution





# Node Runners Landscape

- **Advanced Users (the world is their oyster)**
  - Skills required:
    - Linux administration
    - Networking
    - Scripting
    - Docker
  - Numerous resources for learning
  - No limitations on location and clients choice
  - Custom tooling
- **Entry-level Users**
  - 3 GUI based software options
  - Limited locations options (likely run from home)
  - Limited client choice
  - Minimal skills required (mostly copy and paste)



# Entry-level: Stereum

## Type

Remote Server Controller

## Skill Level

Novice

## Time

1 Hour or less

## Notable Features

- Complete GUI UX
- Location freedom
- Extensive client options



# Entry-level: Avado

Type  
Hardware Platform

Skill Level  
Novice

Time  
1 Hour or more

## Notable Features

- No OS configuration
- Impressive App store

The image shows the Avado software interface. On the left, there's a sidebar with options like Home, DappStore, My DApps (which is selected), Connect (VPN), Support, and System. Below this is a form for generating staking keys, asking for a Staking key password and the amount of keys to generate. The main area has a heading "How does this work?" with explanatory text and a cartoon illustration of a blue dragon holding a Ethereum coin. To the right is a detailed dashboard titled "Prysm Web". It shows a "Gains & Losses" section with a purple background featuring a stylized figure. Below it is a "By the Numbers" section with metrics: Total ETH Balance (34.8261ETH), Recent Epoch Gains (0.00002ETH), Correctly Voted Head Percent (100.00%), and Validating Keys (1). Further down are sections for Beacon Node Status (with provider beaconchain.eth.cloud.avado:4000) and Global Validator Participation (99.72%). At the bottom, there's a "Latest Software Updates" section.

AVADO

# Entry-level: DAppNode



**Type**  
Server Platform

**Skill Level**  
Moderate

**Time**  
2 Hours or more

## Notable Features

- Modular approach
- Simplified OS installer
- Impressive app store
- Advanced user friendly

The screenshot shows the DAppNode interface. On the left, a sidebar titled "DAppNode" lists "ADMIN UI" options: Dashboard, Wi-Fi, VPN, DAppStore, Packages (which is selected and highlighted in blue), System, Community, Sdk, and Support. Below this, "SUPPORTED BY" icons for Docker, Kubernetes, and OpenShift are shown. The main area is titled "Packages" and contains two tabs: "My packages" (selected) and "System packages". Under "My packages", there is a table with one row for "Dappnode Exporter", showing it is RUNNING. The "Status" column has a green "RUNNING" button with an upward arrow icon. The "Name" column shows "Dappnode Exporter". The "System packages" tab is currently inactive. To the right of the table, there are several monitoring dashboards. One dashboard for "prism dashboards / DAppNode ETH2 Prism" shows metrics like Total Validator Balance (ETH), Total Earnings (ETH), Total Return, Peer Count, Participation Rate, Network Liveness, and Epochs. Another dashboard shows "Local Validators" with charts for Hourly Earnings, Daily Earnings, Weekly Earnings, Monthly Earnings, Hourly Return, Annualized, Daily Return, Annualized, Weekly Return, Annualized, and Monthly Return, Annualized. A third dashboard shows "Network Validators" with charts for Validator Counts, Validators, Validator Queues, and Queue Lengths. Other visible dashboards include "Client Status" (Beacon Uptime, Beacon Logs, Validator Uptime, Validator Logs) and "Server" (Peers, Network Traffic, Disk Usage).

# Node Software Is The Best Way To Decentralize

## **Node software can...**

- Encourage anyone to run Validators from home
- Ensure updates and best practices are being applied (better nodes better network)
- Simplify client adoption

## **What are some challenge to developing node software?**

- Requires full stack development skills (backend to frontend)
- Deep understanding of node running and UX
- Minimal node tooling is available

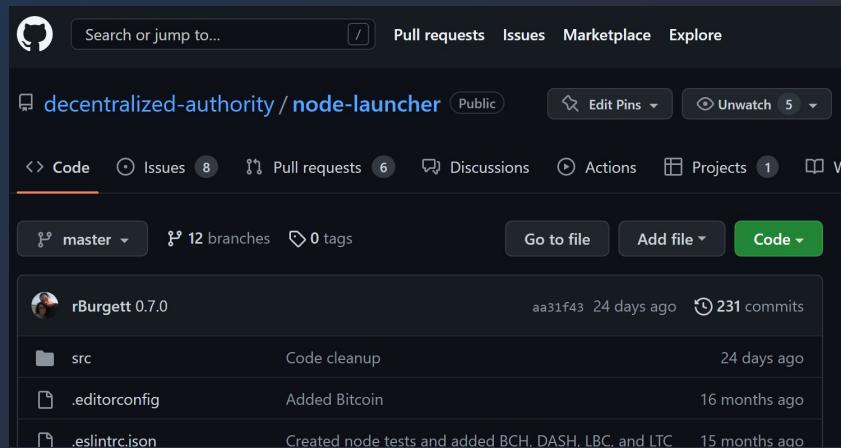


# Node Launcher - A TypeScript Deployment Engine

Node Launcher is an open-source, node deployment engine written in TypeScript that enables the easy creation of node deployment applications.

## Features

- Nodes can be deployed and controlled through standard APIs
- Programmatically deploy nodes and upgrade them to validators
- Seamless client updates
- Client test suite



# Node Launcher Sample API

```
6  const configDir = '/home/np/geth2/config';
7  const walletDir = '/home/np/geth2/keystore';
8  const dataDir = '/home/np/geth2/data'
9  const network = 'GOERLI';
10 const client = 'GETH';
11 const id = 'eth2';
12 const role = 'VALIDATOR';
13 const password = 'P@ssword1!(IJOMK';
14
15 const ethereumValidator = new nr.ETH({
16   'network': network,
17   'configDir': configDir,
18   'walletDir': walletDir,
19   'client': client,
20   'id': id,
21   'role': role,
22   'mnemonic': mnemonic,
23   'dataDir': dataDir});
24
25   ethereumValidator
26   .on(nr.constants.NodeEvent.OUTPUT, console.log)
27   .on(nr.constants.NodeEvent.ERROR, console.error)
28   .on(nr.constants.NodeEvent.CLOSE, code => console.log(`Exited with code ${code}`));
29
30 console.log(ethereumValidator.generateConfig());
31
32 ethereumValidator.encryptMnemonic('boss rural month arm exit elegant eight grain palace biology pistol control outside album slab top boil absorb tree mean street giggle head froz
33
34 ethereumValidator.start(password);
35
36 setTimeout(() => {
37   console.log("STAKING")
38   ethereumValidator.stakeValidator(password, numVals=3, validatorStartIndex=0, eth1AccountIndex=2)
39   .then(value => console.log(value))
40   .catch(console.error);
41 }, 20000);
```

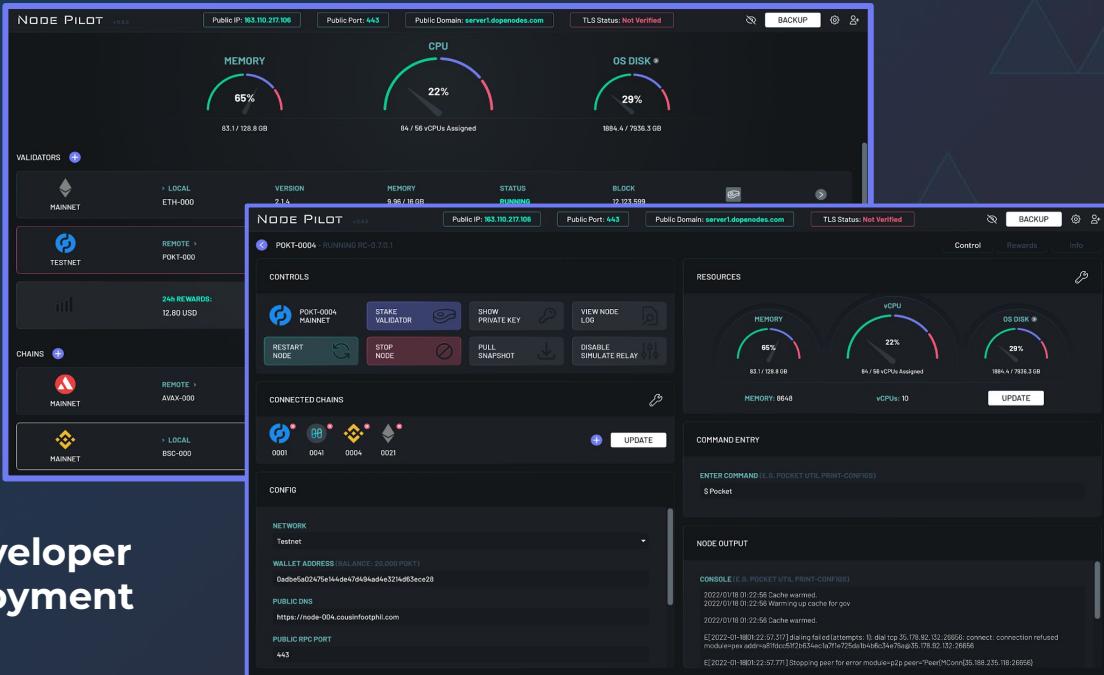
# Node Launcher In Use

Node Launcher has been battle tested through Node Pilot.

1000s of nodes and validators deployed

Node Pilot is:  
62% CSS  
25% SCCC  
13% JavaScript

**With Node Launcher, any developer can start creating node deployment applications like Node Pilot.**



# Node Launcher Is Being Tested With Ethereum

- Node Launcher successfully launched a testnet Ethereum validator last week
- Multiple Ethereum clients are expected to be ready by the end of the year
- Development progress can be followed in the Node Launcher Github:

[github.com/decentralized-authority/node-launcher](https://github.com/decentralized-authority/node-launcher)

We hope to see developers use a tool like Node Launcher to create the next generation of node software.

The screenshot shows a transaction details page from Etherscan for a Goerli Testnet transaction. The transaction hash is 0x48db281140f3bc71a8d0ddb56e1f8d7e95ebfff58a964dd5b27d08f58f3735e7. It was successful, occurring in block 7725123, which has 41586 block confirmations. The transaction took 7 days 5 hrs ago (Oct-07-2022 01:41:12 AM +UTC). The transaction originated from address 0xc366452fdd1ebf67fc34ea9e8a8fd17c2ad74de and was sent to a contract at address 0xff50ed3d0ec03ac01d4c79aad74928bff48a7b2b. The value transferred was 32 Ether (\$0.00), and the transaction fee was 0.000003085960501974 Ether (\$0.00).

Overview	Internal Txns	Logs (1)	State
[ This is a Goerli Testnet transaction only ]			
② Transaction Hash:	0x48db281140f3bc71a8d0ddb56e1f8d7e95ebfff58a964dd5b27d08f58f3735e7		
② Status:	Success		
② Block:	7725123	41586 Block Confirmations	
② Timestamp:	7 days 5 hrs ago (Oct-07-2022 01:41:12 AM +UTC)		
② From:	0xc366452fdd1ebf67fc34ea9e8a8fd17c2ad74de		
② To:	Contract 0xff50ed3d0ec03ac01d4c79aad74928bff48a7b2b		
② Value:	32 Ether (\$0.00)		
② Transaction Fee:	0.000003085960501974 Ether (\$0.00)		

# Conclusion

- Ethereum is designed for optimal decentralization
- Validator can protect themselves from potentially large losses by avoiding:
  - Over saturated cloud providers
  - Using clients with less utilization
- There are great options for entry-level users to participate in Ethereum Validation
- The future is bright for node software and decentralization.





# Thank you!

## Maggie Love

Co-Founder W3bCloud  
Director of Ecosystem &  
Partnerships



@maggielove\_

Founder SheFi

## Shane Burgett

Co-Founder Decentralized  
Authority



@shane8burger

Noir offers simple syntax with optimized functionality

## Simple Circuit Syntax

- Noir aims to be Rust-like in its syntax while abstracting away low-level concepts
- Complex cryptographic functionality can be supplied by the proving system through the stdlib rather than through new Noir libraries
- All smaller data types translate to a Field type
  - Can constrain on any of the data types Noir supports