

Introduction to Besu

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Hyperledger Besu Roadmap 2023



HYPERLEDGER
BESU

Rollups & Staking Experience

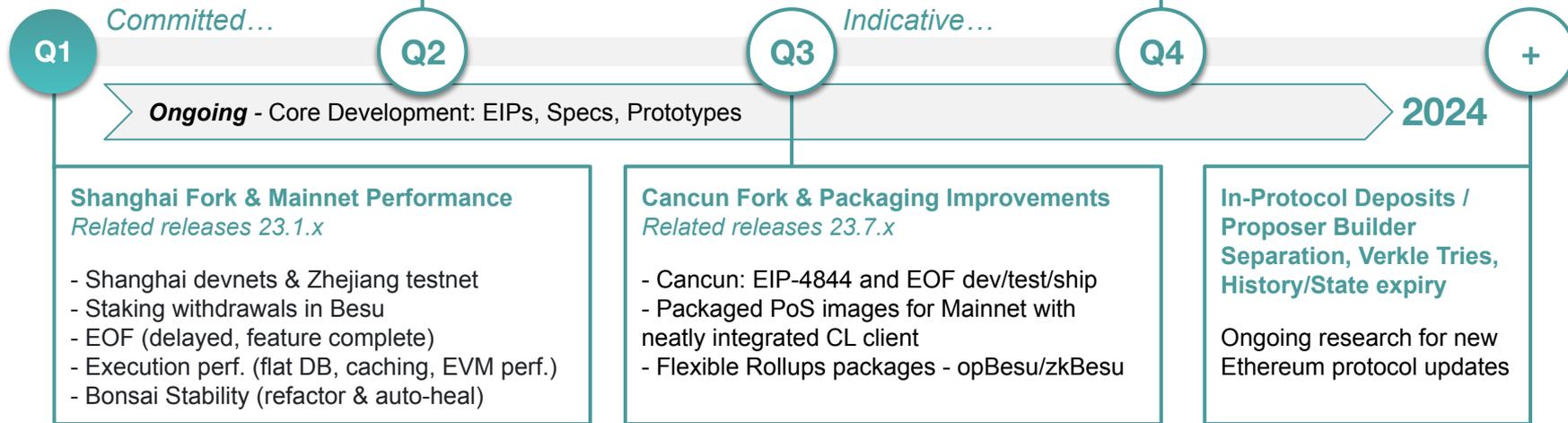
Related releases 23.4.x

- Ship Shanghai, wrap up staking UX improvements
- Besu as a rollups engine (pluggable crypto, RPC, rollup-compatible state management)
- Prepare for Cancun

Multi-Chain Besu, Flexible Infrastructure

Related releases 23.10.x

- Codebase tailored for multi-use case support (Mainnet, private nets, EVM-compatible L1/L2s)
- Tooling & features for infrastructure providers
- Besu as an Ethereum reference client in Java, bringing enterprise to public nets



Well suited to enterprises

Besu provides a **familiar license**, a **familiar programming language**, and institutional-grade features for running low-overhead nodes, **staking** Ether, and interacting with blockchain networks



Besu aims to be the **best and most flexible infrastructure** for institutions looking to participate in **blockchain networks**

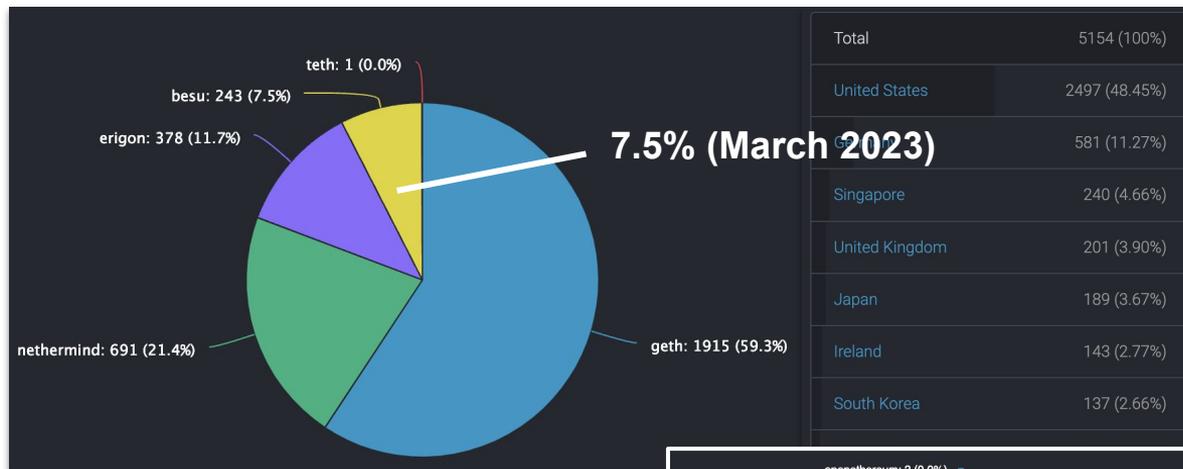
- Public networks
- Private/enterprise networks

- Sidechains
- Layer 2s
- zkRollups

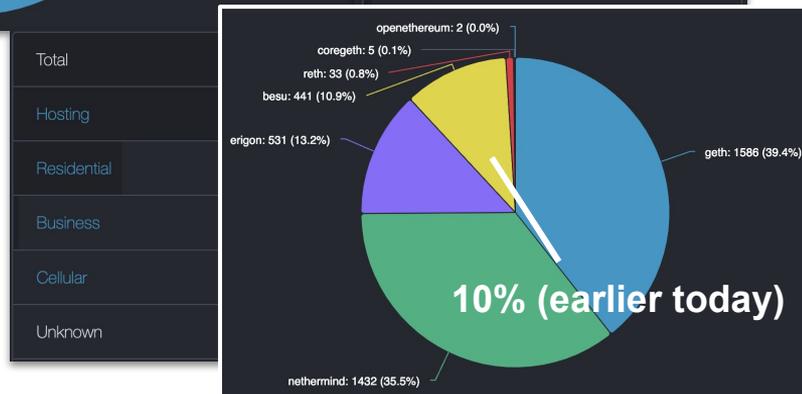
- Enterprise friendly license
- Enterprise familiar programming language
- Active OSS community

Besu is a Complete Mainnet Client

- 4 Main Clients make up the Execution Layer and have prominent voices among Ethereum Core Developers
- Besu participates in and steers network upgrades on Ethereum Mainnet
- Besu has historically been used for private networks, but has climbed from ~1% network share pre-Merge
 - Differentiated by [Bonsai](#)
- No other client has been built with the same enterprise features used in private networks and infrastructure



Source: ethernodes.org



Besu is built on standards to support Hybrid Networks

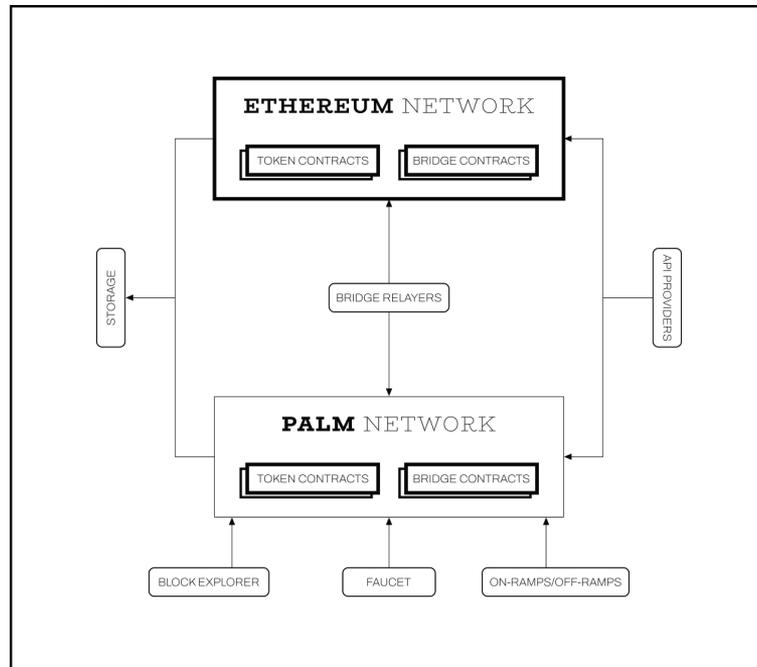
palm.network

"The Palm network uses IBFT 2.0 Proof of Authority (PoA) consensus, with network validators being run by key stakeholders. The network offers a fast transaction speed and super low minting costs... An automated bridge relay service connects payment tokens, like DAI, and NFTs on Ethereum and the Palm network, with bridging contracts deployed on both networks to manage the connection."

Hybrid infrastructure customizes and scales "off-chain" while taking advantage of the security and network effects of Ethereum Mainnet and its standards.

Evolution of Besu networks:

- Private net → Hybrid → Public infrastructure (L2, L3)



Layer 2 Solutions are Scaling Ethereum

Technology enhancements are taking place at two levels...

Layer 2 (L2):

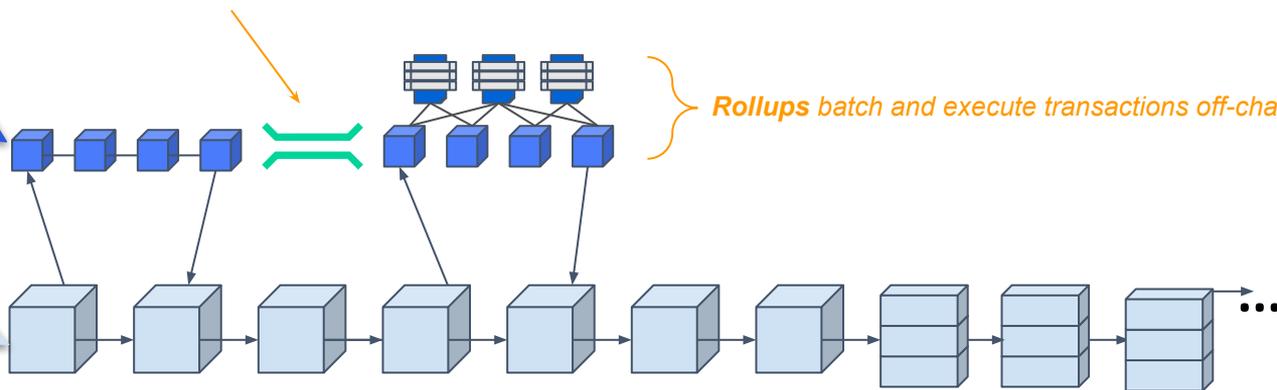
Multiple faster networks, with smaller # of nodes, leveraging Layer 1 for anchoring, interoperability, and security.

L2 bridges & frameworks interoperate assets, sidechains, & separate L1 blockchains

Rollups batch and execute transactions off-chain

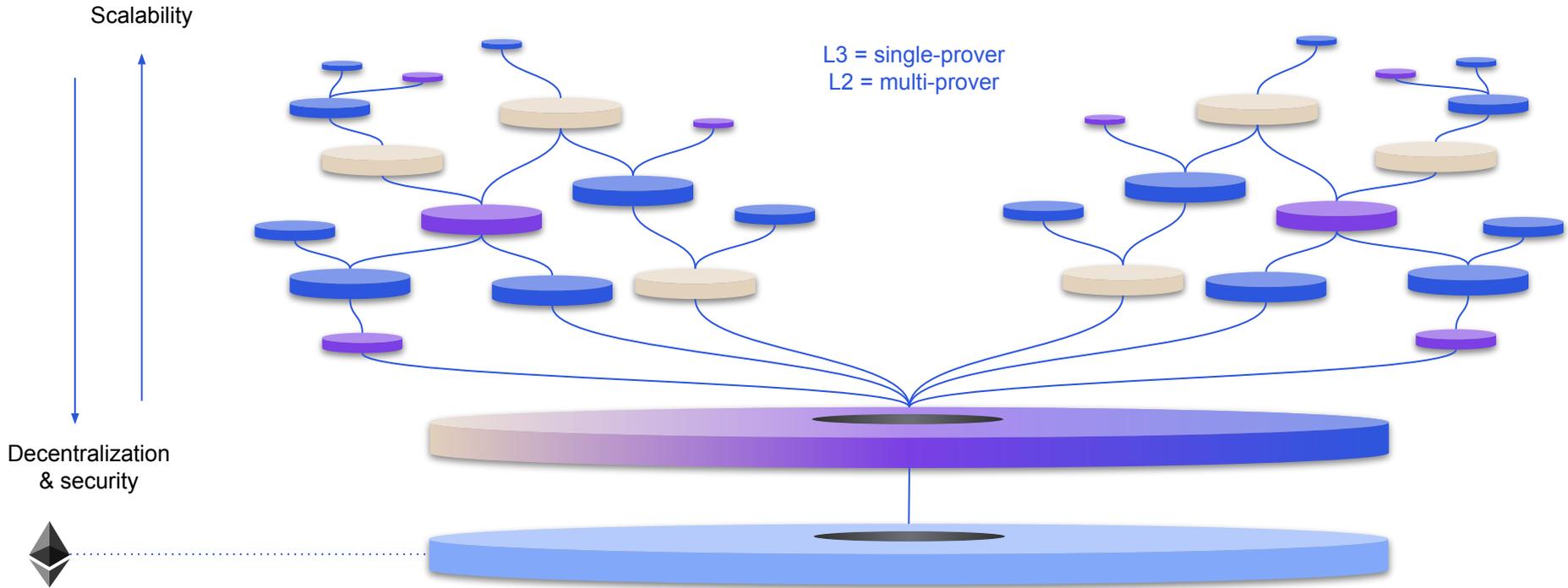
Layer 1 (L1):

Base settlement layer, most decentralized and resilient network with the largest # of nodes.



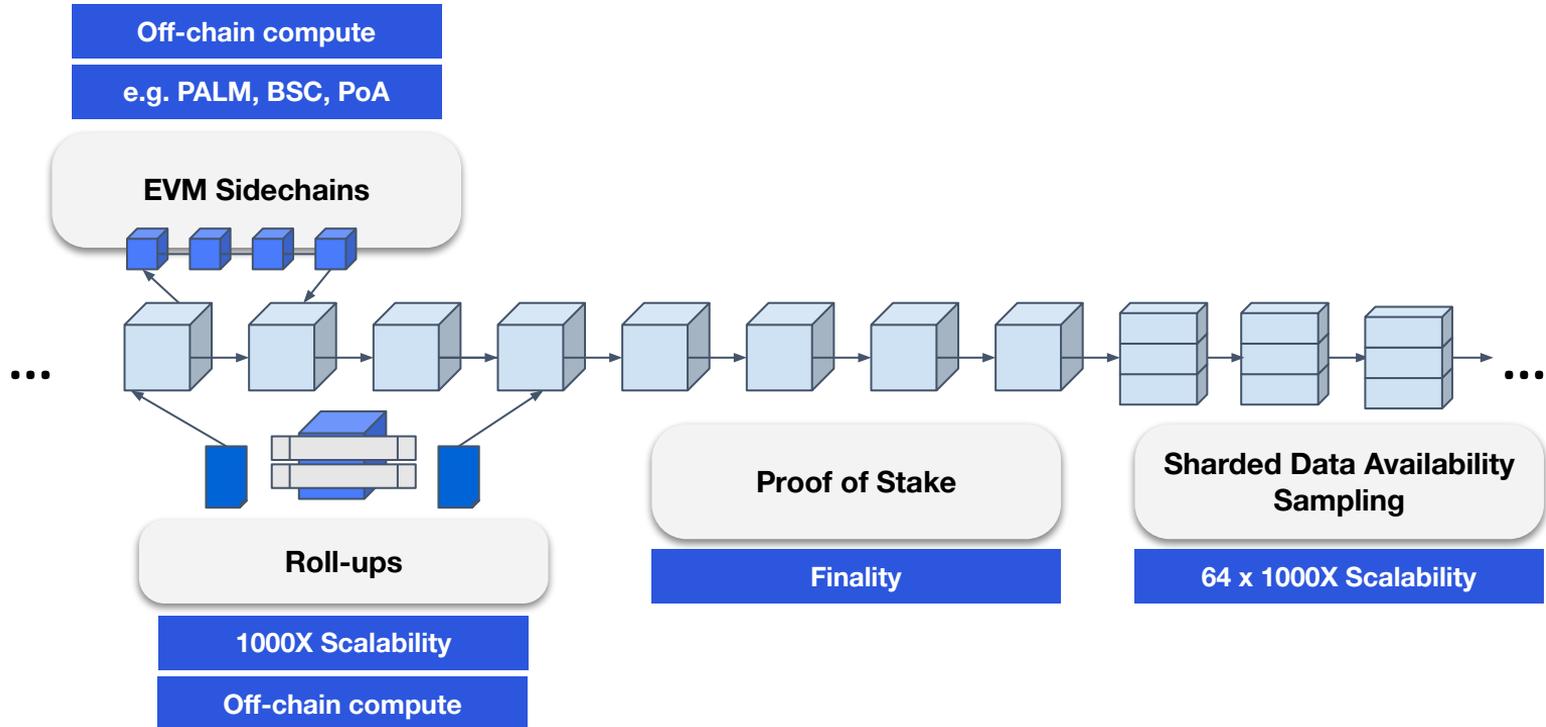
Note: Layer 1 may include "shards" in 2023, which are interconnected sub-networks that are still considered to be part of Layer 1.

L3 brings Web2 to Web3



Scalability Increasing

Layer 1 & 2 Scalability Solutions Increasing Throughput by x10,000



Institutions & DeFi Need More than Layer 1

- **Throughput** on mainnet Ethereum is becoming a bottleneck as institutions and users struggle with queues, fees, and long finality times
- While auditability is key to Ethereum's security and success, institutions and users require transaction **privacy** for certain use-cases on-chain
- Utility tokens and stablecoins require privacy and scalability to power revolutionary use-cases for CeFi like CBDCs or high throughput use-cases like micro-transactions
- Compatibility with Layer 1 smart contracts and composable platforms are key to ecosystem success but have key technical challenges for adoption by businesses and new users
- Layer 1 token transfers are too expensive and non-private (and lack compatibility with ecosystem)

Modular Besu & Post-Merge Architecture

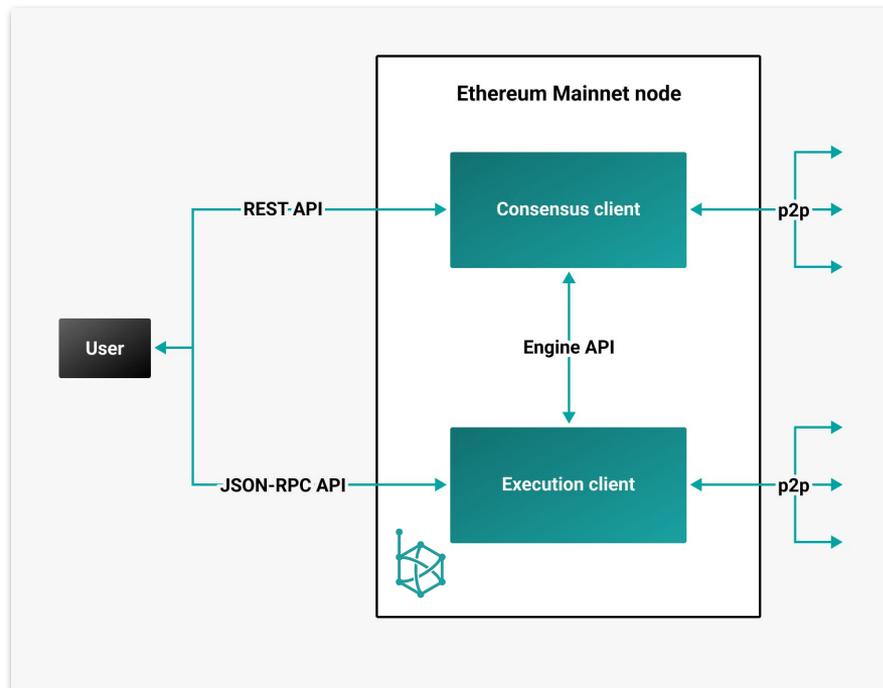
Besu as an Execution Client

From our documentation:

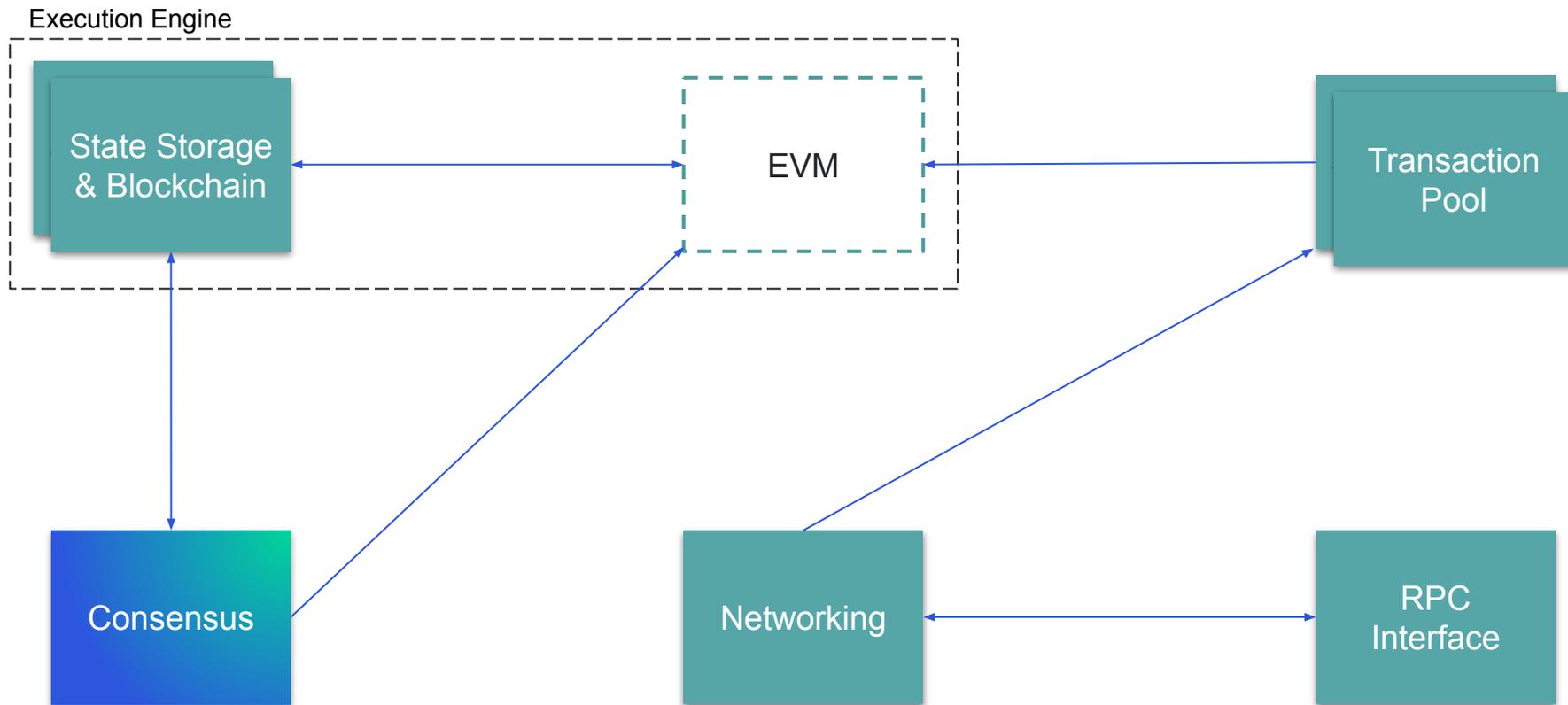
Execution clients, such as Besu, manage the execution layer, including executing transactions and updating the world state. Execution clients serve JSON-RPC API requests and communicate with each other in a peer-to-peer network.

Engine API:

Novel set of APIs to enable maximum re-use of technology for proof of stake and to keep consensus operations quick (via a lightweight consensus client) as Ethereum scales

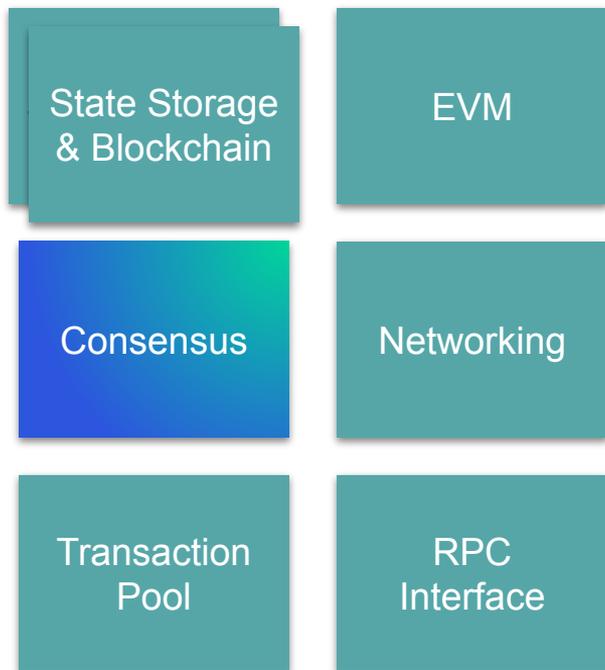


Componentization & Modularity

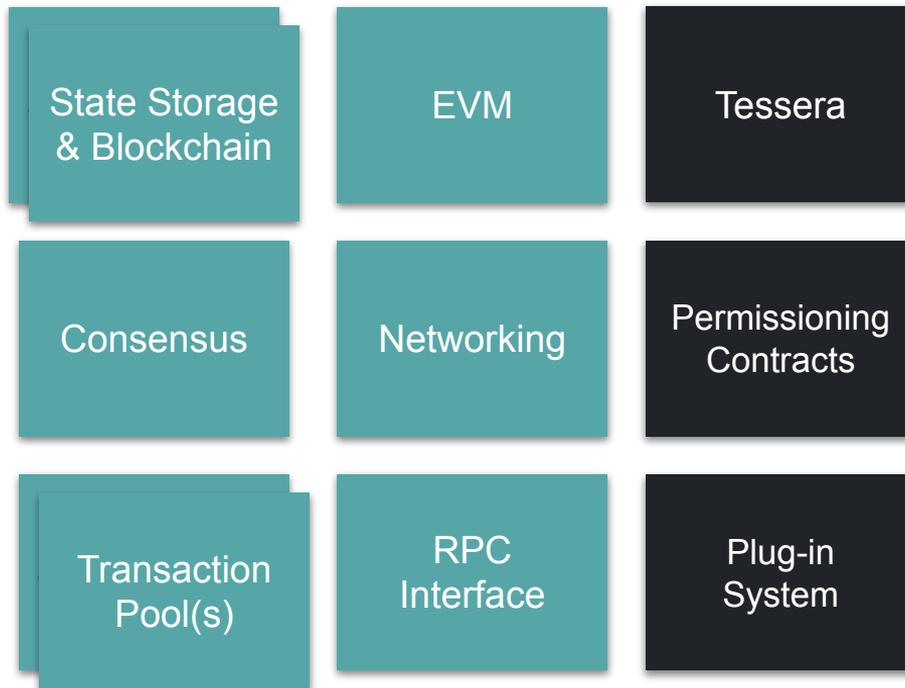


Reusable Building Blocks

Mainnet & PoS Chains

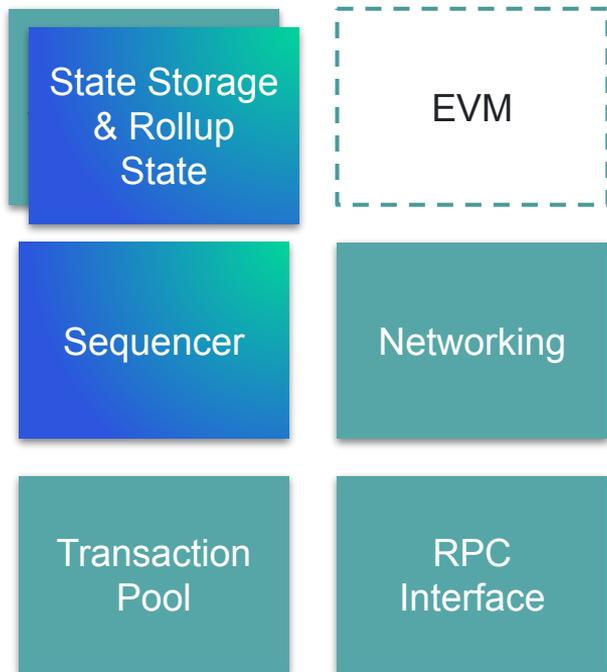


Private Net

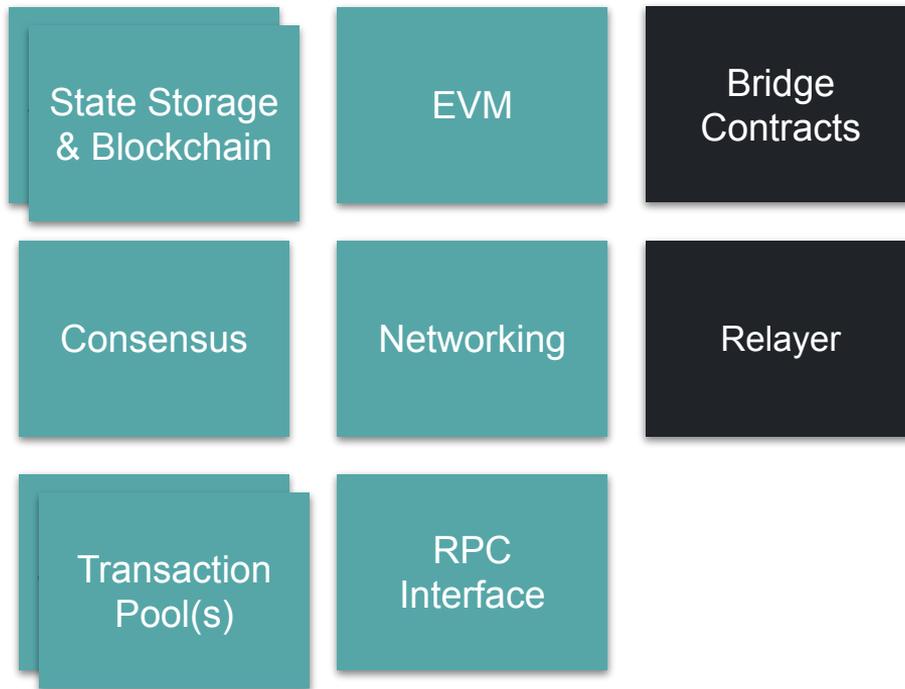


Reusable Building Blocks

Rollup



Hybrid Net



Steering & Contributing to Besu & Core Development

Existing Process

Besu is primarily maintained by contributors from Consensys, Swirlds Labs, ETC Co-op, Splunk, Kaleido, and Web3Labs

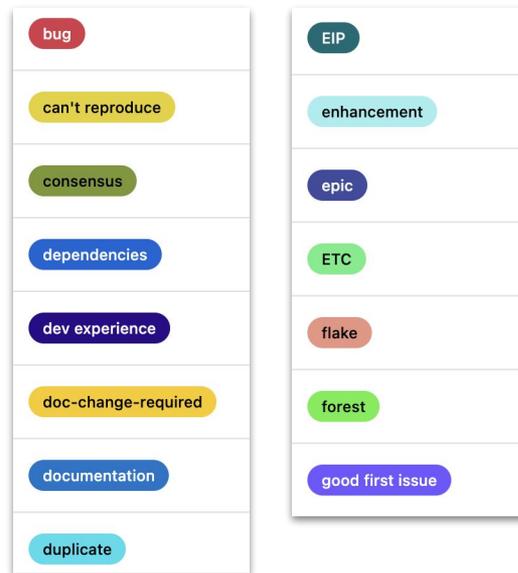
- Some contributors are primarily focused on Public networks
- Kaleido & Web3Labs contributors focusing on private network feature maintenance, bug fixes, etc.

Contributing to Besu has [existing guidelines](#)

- Bi-weekly Contributor Calls - Open Forum, multiple Time-zones
- Roadmap routinely updated [here](#)
- [Public Zenhub board](#) to see issues, epics, and priorities of contributors (mainly Consensys)

Code Contributions...

- Labels
- Contributor calls
- More



Some relevant labels...

Why does Core Development matter?

- Getting involved in Core Development reduces platform risk as more activity moves onto public networks
- More voices in Core Development deepens collaboration and opens the door for progressive decentralization
- Brings an understanding of business and regulatory requirements back to Core Devs
- Web2 → Web3 migration requires collaboration
- Core Development and protocol updates are constantly in the news...

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Technology

Ethereum's Shanghai Upgrade to Enable Withdrawals Set for April

- Software upgrade will let users 'withdraw staked' Ether
- Ether stakers may have to wait in line to withdraw tokens

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What's Possible...

Open-governance...

- Any of the existing process can be changed with consensus among contributors
- Maintainer status is for pull requests into the Main repo, but non-maintainers can propose project changes
- Discord → [#besu-contributors](#) for governance discussions (discord.gg/hyperledger)

Some current proposals

- Quarterly or Bi-annual Roadmap Review, open to the public
 - Steer-co?
- Quarterly or Bi-annual Core Development Review to align on Ethereum Improvement Proposals and standards
 - Consenys currently host Core Devs reviews and can make these public if there is appetite
- Public Issue Triage calls
- **Enterprise roadmap**
 - **Focus areas specific to enterprise-oriented architectures & topologies**