Experience Running Besu with Enterprises

Matthew Whitehead
mwhitehead@kaleido.io

www.kaleido.io

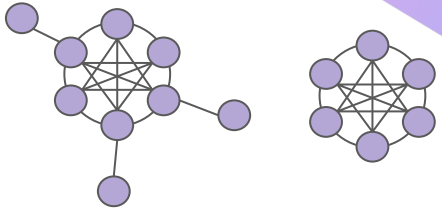
kaleido

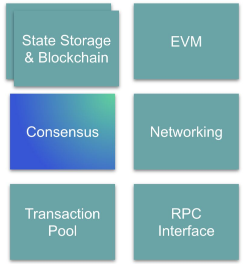
Agenda

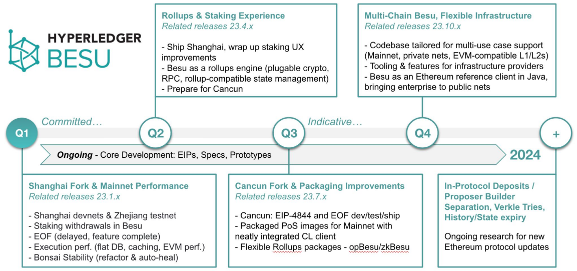
- Besu for Enterprise
- Consensus choices
- Priorities for enterprises
- Enterprise roadmap

Besu is the ideal solution for enterprise chains

- Flexible configuration allowing wide range of topologies
- Support for public, hybrid, and private chains
- Pluggable (and becoming more so)
- Regular release cycle (bug fixes, security fixes, hard forks)
- Growing to support rollups and layer 2
- Enterprise familiar license & programming language







HYPERLEDGER BESU

Rollups & Staking Experience
Related releases 23.4.x

- Ship Shanghai, wrap up staking UX improvements
- Besu as a rollups engine (plugable 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

Committed… Q1 Q2 Q3 *Indicative…* Q4 +

Ongoing - Core Development: EIPs, Specs, Prototypes

2024

Shanghai Fork & Mainnet Performance
Related releases 23.1.x

- Shanghai devnets & Zhejiang testnet
- Staking withdrawals in Besu
- EOF (delayed, feature complete)
- Execution perf. (flat DB, caching, EVM perf.)
- Bonsai Stability (refactor & auto-heal)

Cancun Fork & Packaging Improvements
Related releases 23.7.x

- Cancun: EIP-4844 and EOF dev/test/ship
- Packaged PoS images for Mainnet with neatly integrated CL client
- Flexible Rollups packages - opBesu/zkBesu

In-Protocol Deposits / Proposer Builder Separation, Verkle Tries, History/State expiry

Ongoing research for new Ethereum protocol updates

Choice of consensus algorithms for enterprise

- QBFT, IBFT2, IBFT, Clique/POA
    - QBFT is the the recommended protocol for enterprise blockchains
    - Improves fork resiliency over IBFT
    - Reduces message complexity for voting round changes
    - Standard clarifies aspects of the IBFT2 specification
    - Most enterprises using QBFT for new chains

- PoW/PoS both supported for public chains (ETH, ETC)

Priorities for Enterprises

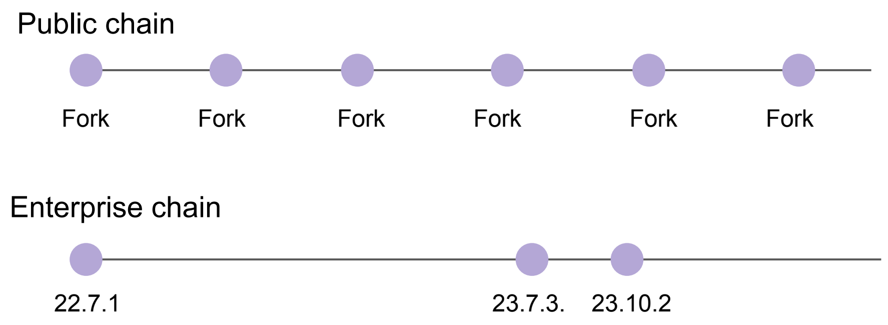
- Some are similar to mainnet users
  - Performance
  - Security
  - Stability
- However, our experience shows enterprises have some distinct requirements
  - Clear and stable peering behaviour. How many are there, are any missing, why?
  - Expectation for administrative control points
  - Desire to have granular control of TX pool, TX replacement, peering etc.

Priorities for Enterprises

- Enterprises need to understand behaviour in detail
  - Monitoring tools need to be configured to avoid giving false-positive alerts
  - Network traffic between peers likely be monitored and matched up to expected blockchain activity
  - Non-determinism of peer connectivity isn’t well suited to enterprise deployments
    - “If I do X, Y should happen” not “If I do X I hope sometimes Y will happen”
  - Transaction pool management not blockchain-wide, but node-wide
    - If a node drops a transaction, other nodes might not
    - Pending transaction lists expected to be the same everywhere. Not always the case.

Besu release process

- Enterprises expect to know if their installed version:
  - Is current
  - Is stable
  - Has security vulnerabilities
  - Needs upgrading
- They also need to know:
  - When they need to plan for an upgrade
  - How long their current version is “supported” for, and what support means for OSS
  - Whether an upgrade will have breaking changes (CLI arguments, behaviour changes)
  - What the process is if they find a bug in their current version



Besu has embraced enterprise use-cases

- Technical
  - Ability to prioritize specific senders in free-gas networks
  - Ability to replace transactions in free-gas networks
  - Control over transaction pool size by memory allocation
  - Options to configure peering more deterministically
- Process
  - Welcomes maintainers from vendors and enterprises to help shape priorities
  - Permissioned chains acknowledged as an increasing priority for release planning
  - Per-release testing window for 3rd parties to exercise candidate releases
  - New enterprise-focused discord channel

WIP Enterprise Roadmap

HYPERLEDGER BESU

Q2

- Clarification around release candidate test window
- New enterprise-focused discord channel

Q3

- Improvements in transaction replacement (tx-pool-price-bump=0 behaviour)

2023

Q4

- Zero-transaction block period for QBFT
- More control over TX mining order (option for more FIFO-like ordering)

Q1

- Bonsai archiving for Bonsai DBs
- BFT/permissioned chain-oriented TX pool?
- Ongoing modularity improvements to distinguish public vs permissioned changes in each release
- Pluggable consensus?

2024

+

- Enterprise-specific releases?
- Use-case specific releases?
- Guidance for support orgs & enterprise vendors