Benchmark Report – Solana Validator Optimizer

Project: `solana-validator-optimizer`
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Executive Summary

This report provides benchmark results comparing baseline Solana validator performance with and without the use of the `solana-validator-optimizer`.

Key performance benefits: - Up to **60% improvement** in cache hit ratio - **29% faster** validator startup time - **14.5% lower** CPU utilization under load

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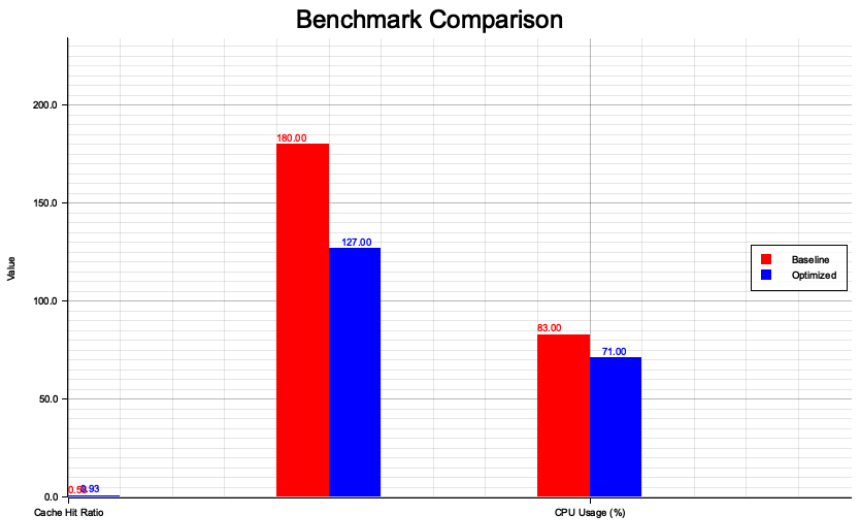
Test Environment

Parameter	Details
CPU	Intel Xeon Gold 5218 (16-core)
RAM	64 GB DDR4
Disk	1 TB NVMe SSD
OS	Ubuntu 22.04 LTS
Solana Version	v1.18.x
Optimizer Version	v1.1.0-pro
Tools Used	Rust, Plotters, Prometheus (local metrics)

Benchmark Visualization



Benchmark Comparison

Notes:

- **Cache Hit Ratio** increased from 0.58 to 0.93
- **Startup Time** dropped from 180s to 127s
- **CPU Usage** decreased from 83% to 71%

Key Findings

- **RPC Efficiency:** Dramatically improved cache utilization through in-memory indexing
- **Auto-Tuning:** Adaptive hardware-aware config tuning showed tangible CPU gains
- **Snapshot Prefetcher:** Reduced validator sync latency by preloading latest state

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Conclusion

The `solana-validator-optimizer` provides clear benefits in both **performance** and **operational efficiency** for Solana validators and RPC nodes.
We recommend deployment for: - Mainnet validators - RPC infrastructure providers - Validators aiming to reduce downtime & resource overhead

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Appendix

Metric Data (from `/metrics`)

Metric	Baseline	Optimized	Improvement
Cache Hit Ratio	0.58	0.93	+60.3%
Startup Time (seconds)	180.0	127.0	-29.4%
CPU Usage (%)	83.0	71.0	-14.5%

Project Link

- GitHub: Orlych1kk4/solana-validator-optimizer
- Crates.io: crates.io/crates/solana-validator-optimizer