

10.6-pre against 10.5

Plutus countdown loop workload

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2025-11-17

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Chapter 1

Manifest

We compare `10.6-pre` (Conway) relative to `10.5` (Conway), under Plutus countdown loop workload.

	10.5	10.6-pre
Analysis date	2025-08-03	2025-11-16
Cluster system start date	2025-08-02	2025-11-15
Cluster system start time	13:33:43	16:19:08
Identifier	10.5.0	10.6.0
Run batch	1050mmap	1060pre
GHC version	9.6.5	9.6.6
cardano-node version	10.5.0	10.6.0
ouroboros-consensus version	0.27.0.0	0.28.0.2
ouroboros-network version	0.21.2.0	0.22.4.0
cardano-ledger-core version	1.17.0.0	1.18.0.0
plutus-core version	1.45.0.0	1.53.1.0
cardano-crypto version	1.3.0	1.3.0
cardano-prelude version	0.2.1.0	0.2.1.0
cardano-node git	8db07f6	f5ac0eb
ouroboros-consensus git	8e3afe1	d3c4b5c
ouroboros-network git	879683d	ee53402
cardano-ledger-core git	a9e78ae	faa7a9d
plutus-core git	ba16ec6	babbed7
cardano-crypto git	unknown	unknown
cardano-prelude git	68e015f	68e015f
Era	conway	conway
Delegation map size	1000000	1000000
Stuffed UTxO size	4000000	4000000
DRep count	10000	10000
Extra tx payload	100	100
Tx inputs	1	1
Tx Outputs	1	1
TPS	0.85	0.85
Transaction count	61200	61200
Plutus script	Loop	Loop
Machines	52	52
Number of filters applied	4	4
Log objects emitted per host	904540.67307	881191.53846
Log objects analysed per host	610342.63461	609602.07692
Host run time, s	71849.1	71906.5
Host log line rate, Hz	12.589	12.254
Total log objects analysed	31737817	31699308
Run time, s	71853	71913
Analysed run duration, s	56010	56041
Run time efficiency	0.77	0.77
Node start spread, s	4.8371453	5.5210645
Node stop spread, s	1.9440116	5.1150143
Slots analysed	56008	56037
Blocks analysed	2658	2651
Blocks rejected	871	842

Chapter 2

Analysis

2.1 Resource Usage

	10.5	10.6-pre	Δ	Δ%
Forge loop starts, #	0.99931	0.99864	-0.001	0
Process CPU usage, %	3.9406	4.1001	0.160	4
RTS GC CPU usage, %	0.23161	0.20602	-0.026	-11
RTS Mutator CPU usage, %	3.7045	3.8875	0.183	5
Major GCs, #	0.0011	0.00088	-0.000	0
Minor GCs, #	0.98239	0.39442	-0.588	-60
Kernel RSS, MB	6333.9	7280.6	946.700	15
RTS heap size, MB	6272.3	7217.9	945.600	15
RTS live GC dataset, MB	2476.6	3224.6	748.000	30
RTS alloc rate, MB/s	28.7	11.648	-17.052	-59
Filesystem reads, KB/s	1e-05	0.0	-0.000	0
Filesystem writes, KB/s	226.97	223.8	-3.170	-1
CPU 85% spans, slots	10.518	12.164	1.646	16
Sample count	(291>)	(291>)		

2.2 Anomaly control

	10.5	10.6-pre	Δ	Δ%
Blocks per host, blocks	69.673	68.75	-0.923	-1
Filtered to chained block ratio, /	0.75208	0.75935	0.007	1
Chained to forged block ratio, /	0.97381	0.97688	0.003	0
Height & slot battles, blocks	0.00037	0.00113	0.001	270
Block size, B	2996.0	2996.0	0.000	0
Sample count	(52)	(52)		

2.3 Forging

	10.5	10.6-pre	Δ	$\Delta\%$
Started forge loop iteration, s	0.00102	0.00128	0.000	0
Acquired block context, s	6e-05	6e-05	0.000	0
Acquired ledger state, s	9e-05	0.00012	0.000	0
Acquired ledger view, s	2e-05	3e-05	0.000	0
Leadership check duration, s	0.00042	0.00042	0.000	0
Ledger ticking, s	0.02144	0.02368	0.002	9
Mempool snapshotting, s	0.00151	0.00166	0.000	0
Leadership to forged, s	0.00016	0.00018	0.000	0
Forged to announced, s	0.00066	0.00065	-0.000	0
Forged to sending, s	0.00531	0.00541	0.000	0
Forged to self-adopted, s	0.04226	0.04661	0.004	9
Slot start to announced, s	0.02543	0.02812	0.003	12
Sample count	(2658)	(2651)		

2.4 Individual peer propagation

	10.5	10.6-pre	Δ	$\Delta\%$
First peer notice, s	0.02721	0.0299	0.003	11
First peer fetch, s	0.03222	0.03509	0.003	9
Notice to fetch request, s	0.00119	0.00131	0.000	0
Fetch duration, s	0.12281	0.12331	0.001	1
Fetched to announced, s	0.0008	0.00089	0.000	0
Fetched to sending, s	0.04294	0.04439	0.001	2
Fetched to adopted, s	0.04457	0.04728	0.003	7
Sample count	(2658)	(2651)		

2.5 End-to-end propagation

	10.5	10.6-pre	Δ	$\Delta\%$
0.50 adoption, s	0.28337	0.28889	0.006	2
0.80 adoption, s	0.44275	0.45267	0.010	2
0.90 adoption, s	0.45342	0.46576	0.012	3
0.92 adoption, s	0.45596	0.46845	0.012	3
0.94 adoption, s	0.45936	0.47134	0.012	3
0.96 adoption, s	0.46337	0.47826	0.015	3
0.98 adoption, s	0.46924	0.49362	0.024	5
1.00 adoption, s	0.48178	0.57099	0.089	18
Sample count	(2658)	(2651)		

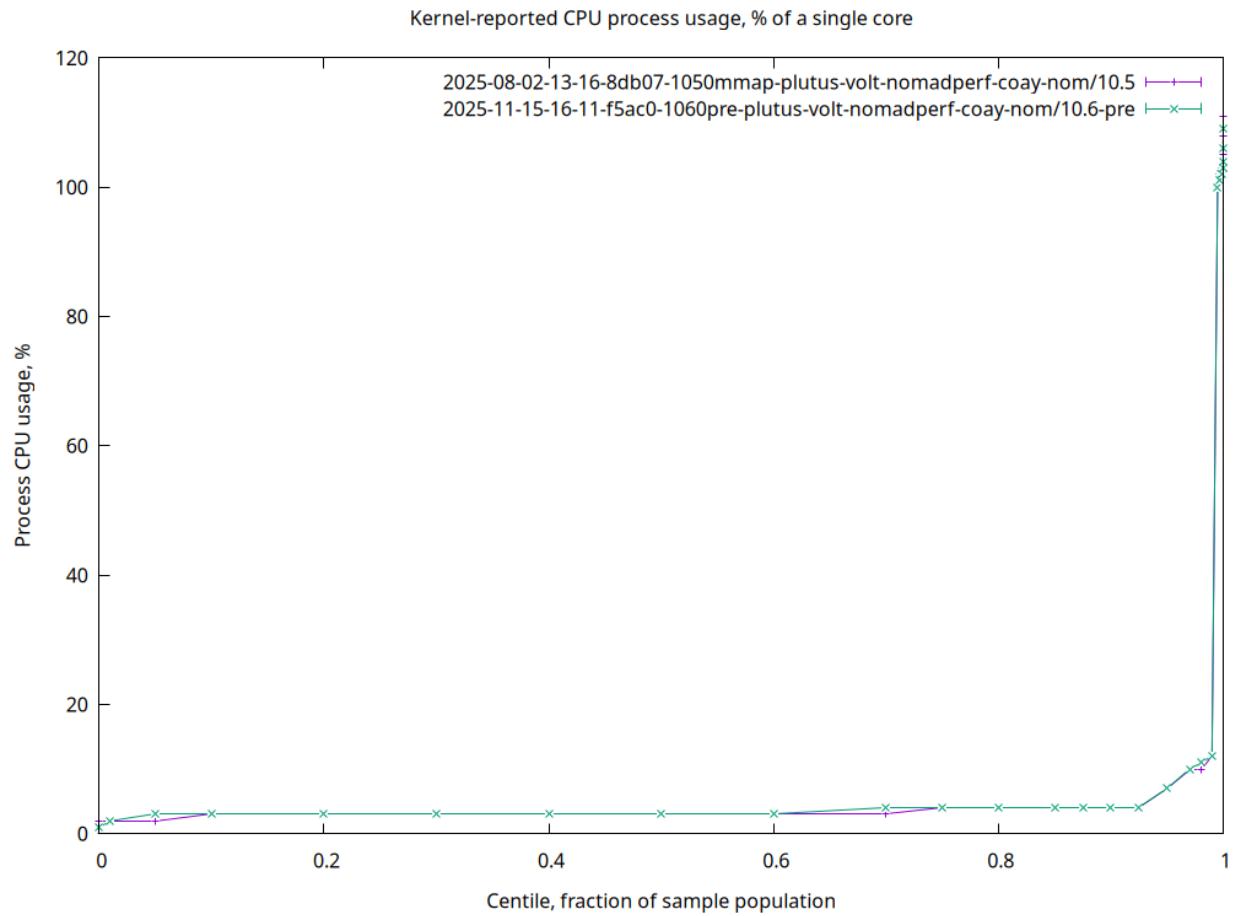
Part I

Appendix A: charts

Chapter 3

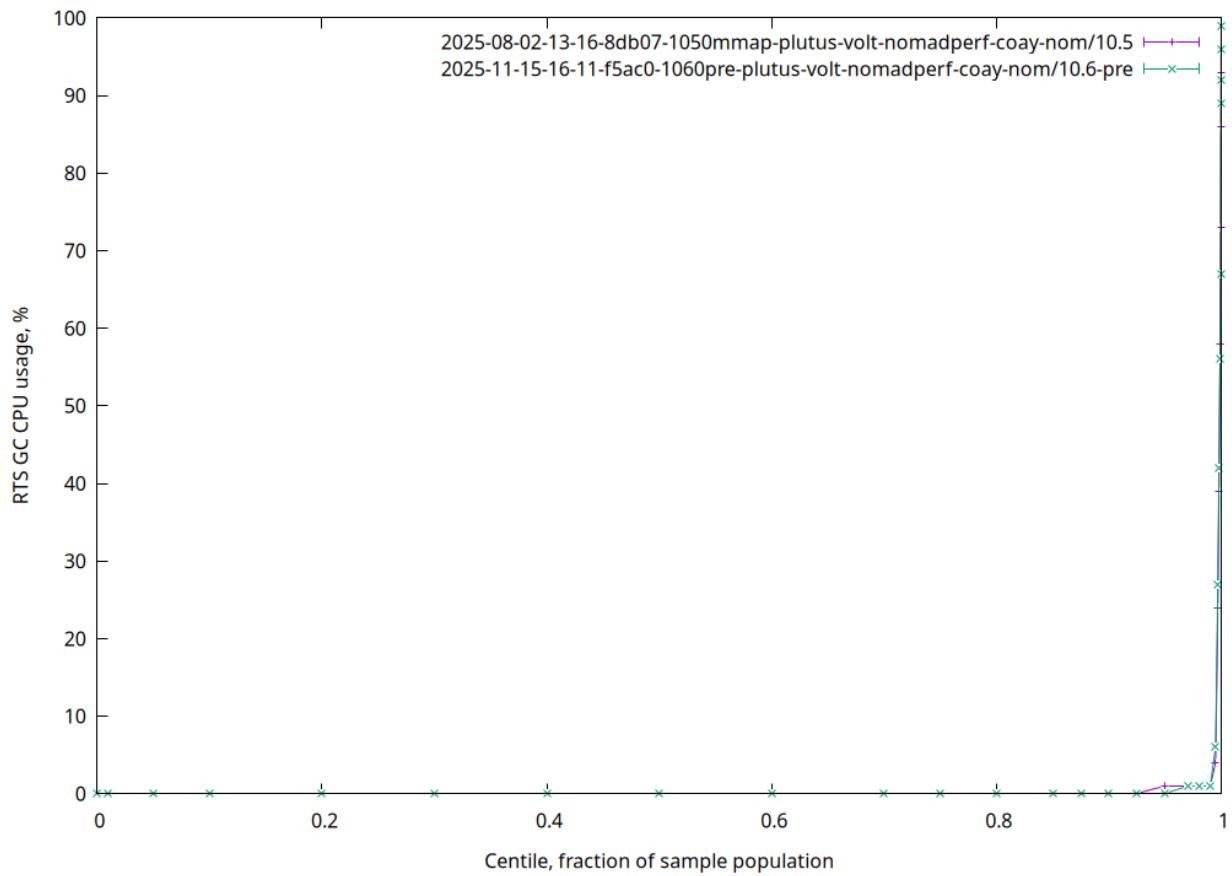
Cluster performance charts

Process CPU usage (CentiCpu) Kernel-reported CPU process usage, % of a single core

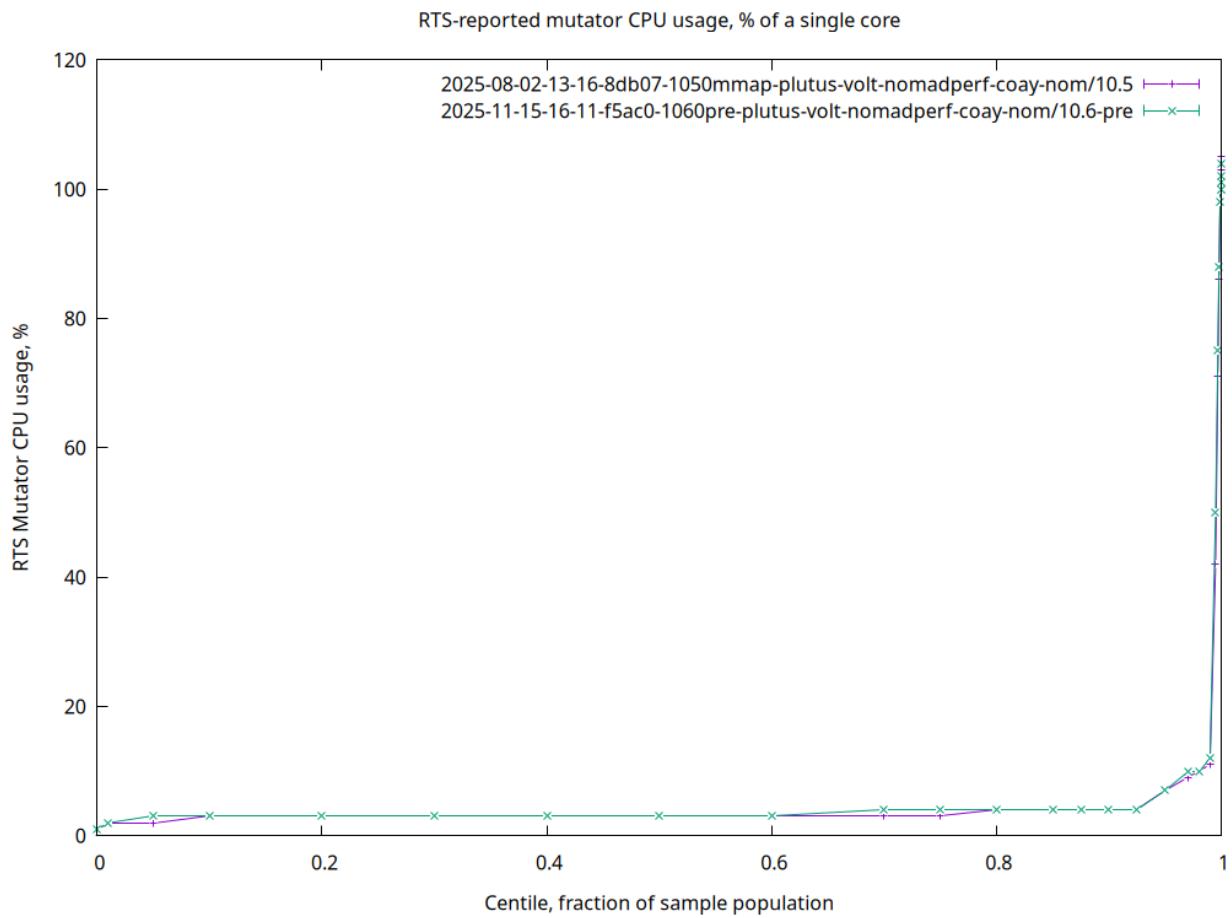


RTS GC CPU usage (CentiGC) RTS-reported GC CPU usage, % of a single core

RTS-reported GC CPU usage, % of a single core

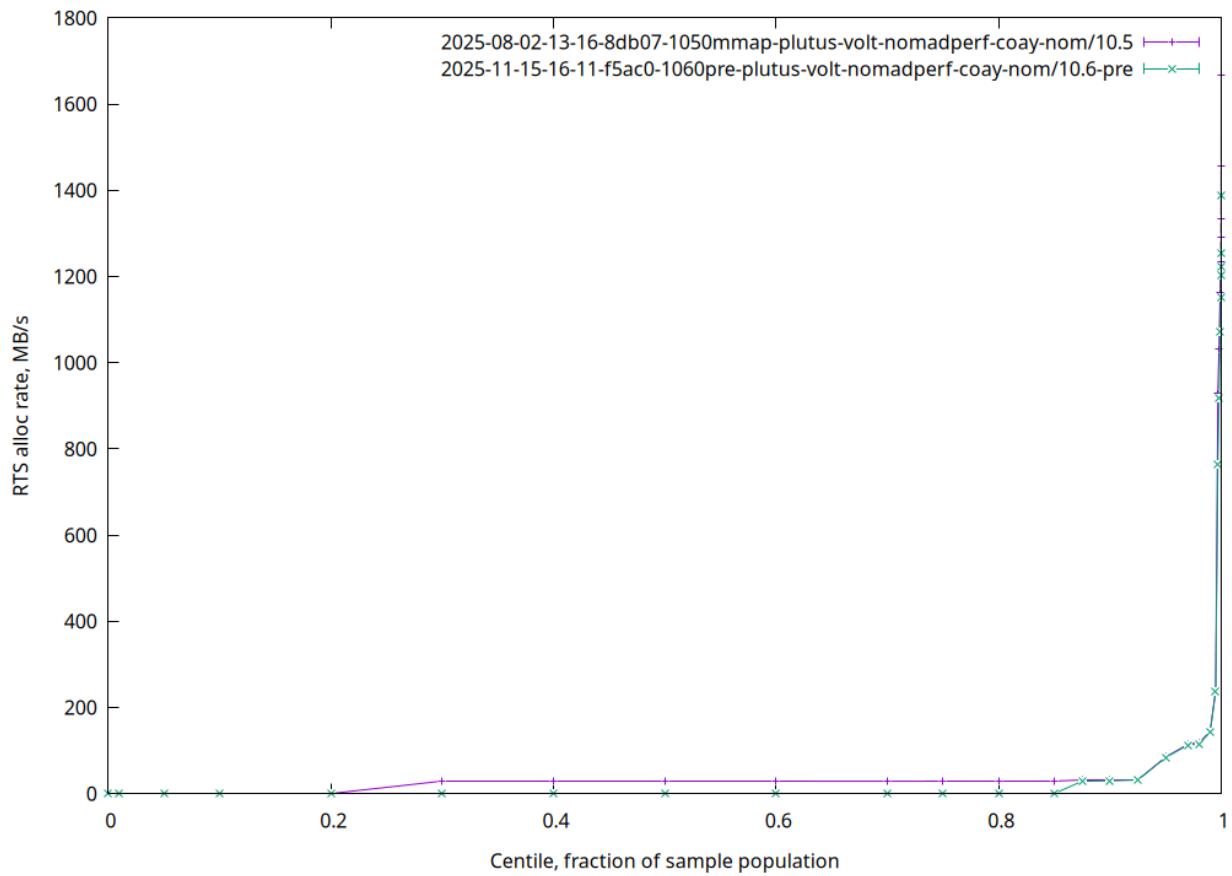


RTS Mutator CPU usage (CentiMut) RTS-reported mutator CPU usage, % of a single core



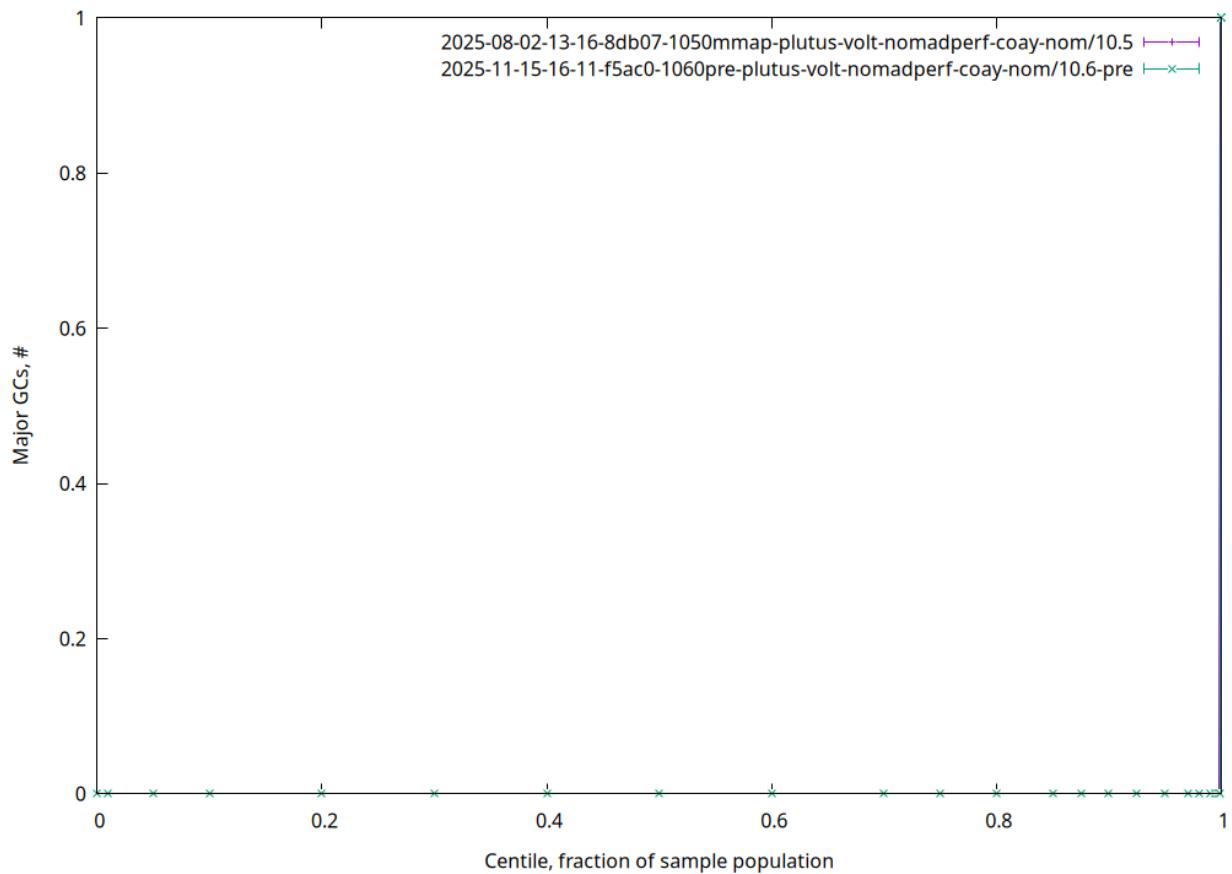
RTS alloc rate (Alloc) RTS-reported allocation rate, MB/sec

RTS-reported allocation rate, MB/sec



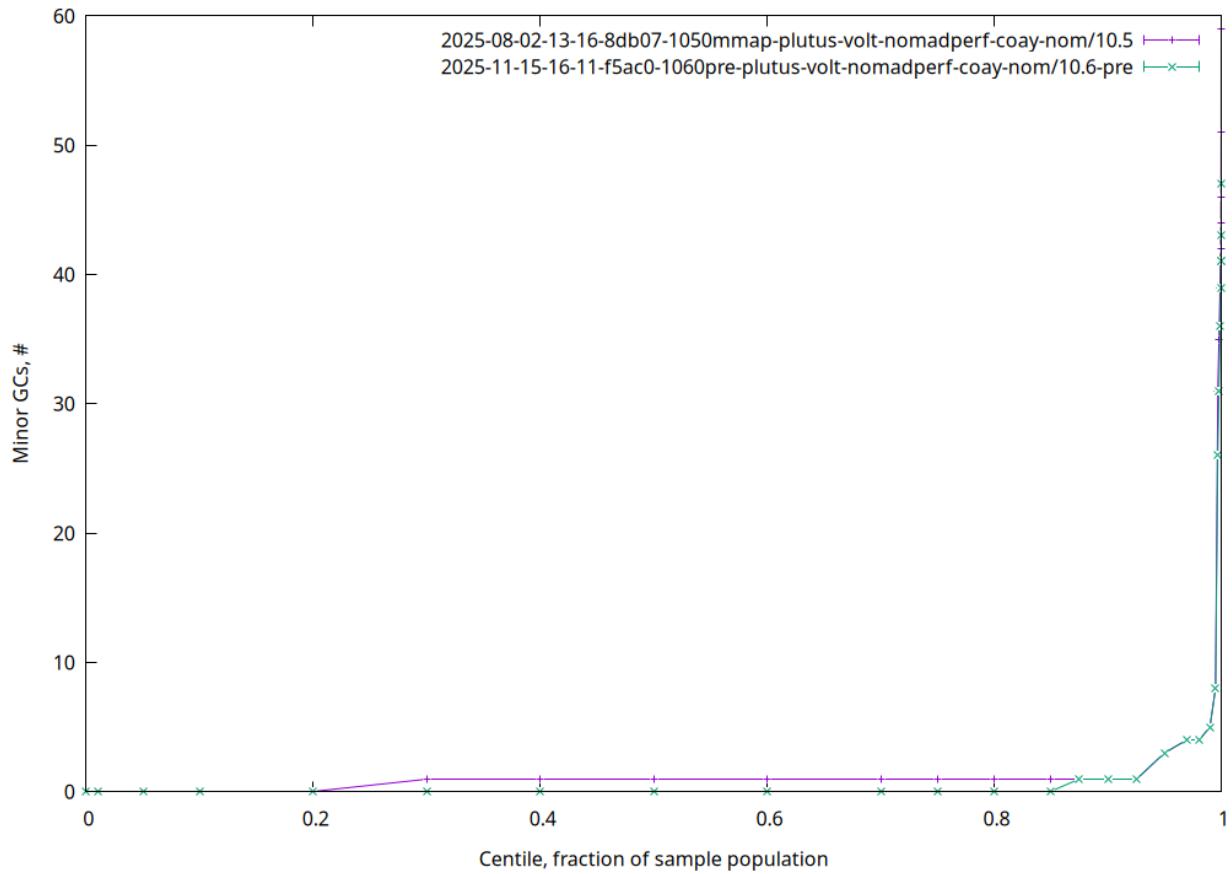
Major GCs (GcsMajor) Major garbage collection RTS events

Major garbage collection RTS events

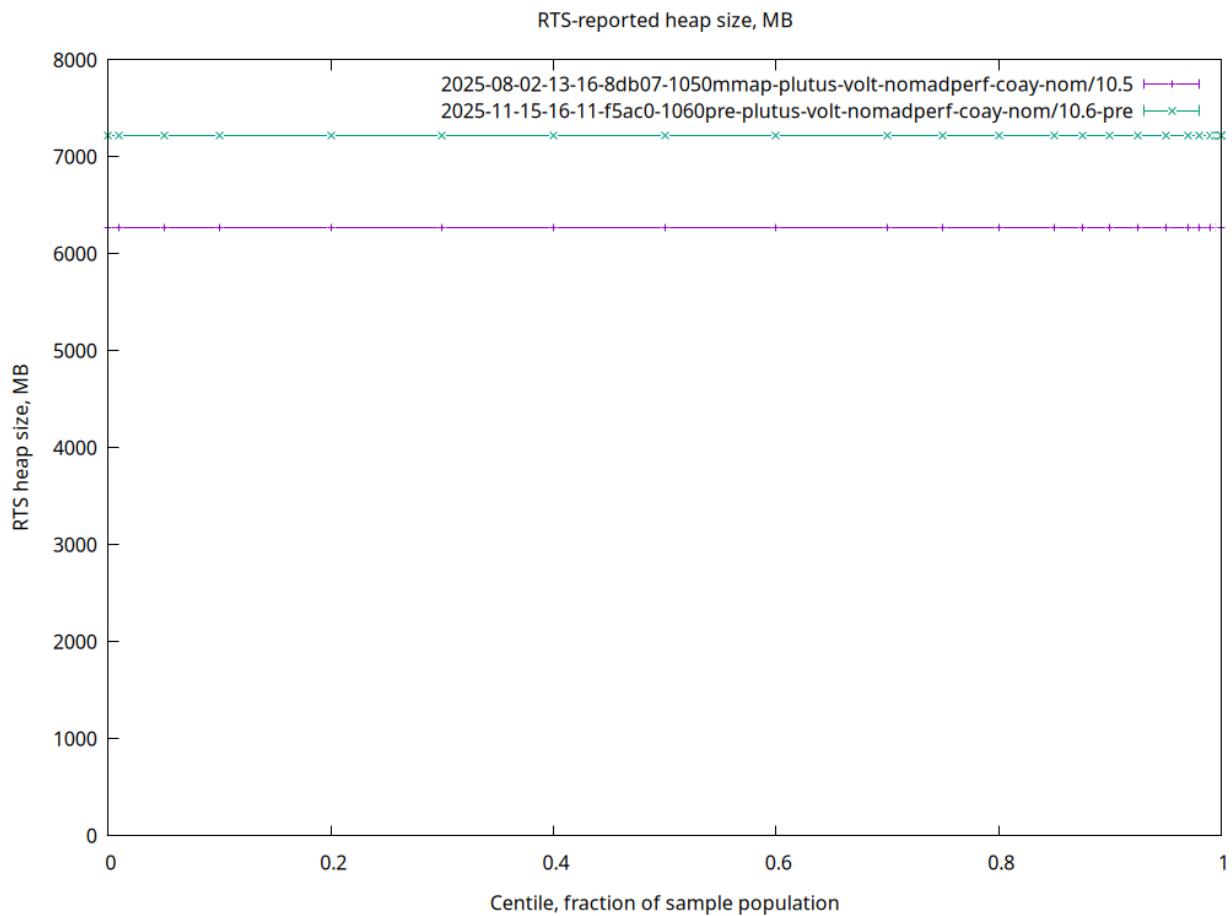


Minor GCs (GcsMinor) Minor garbage collection RTS events

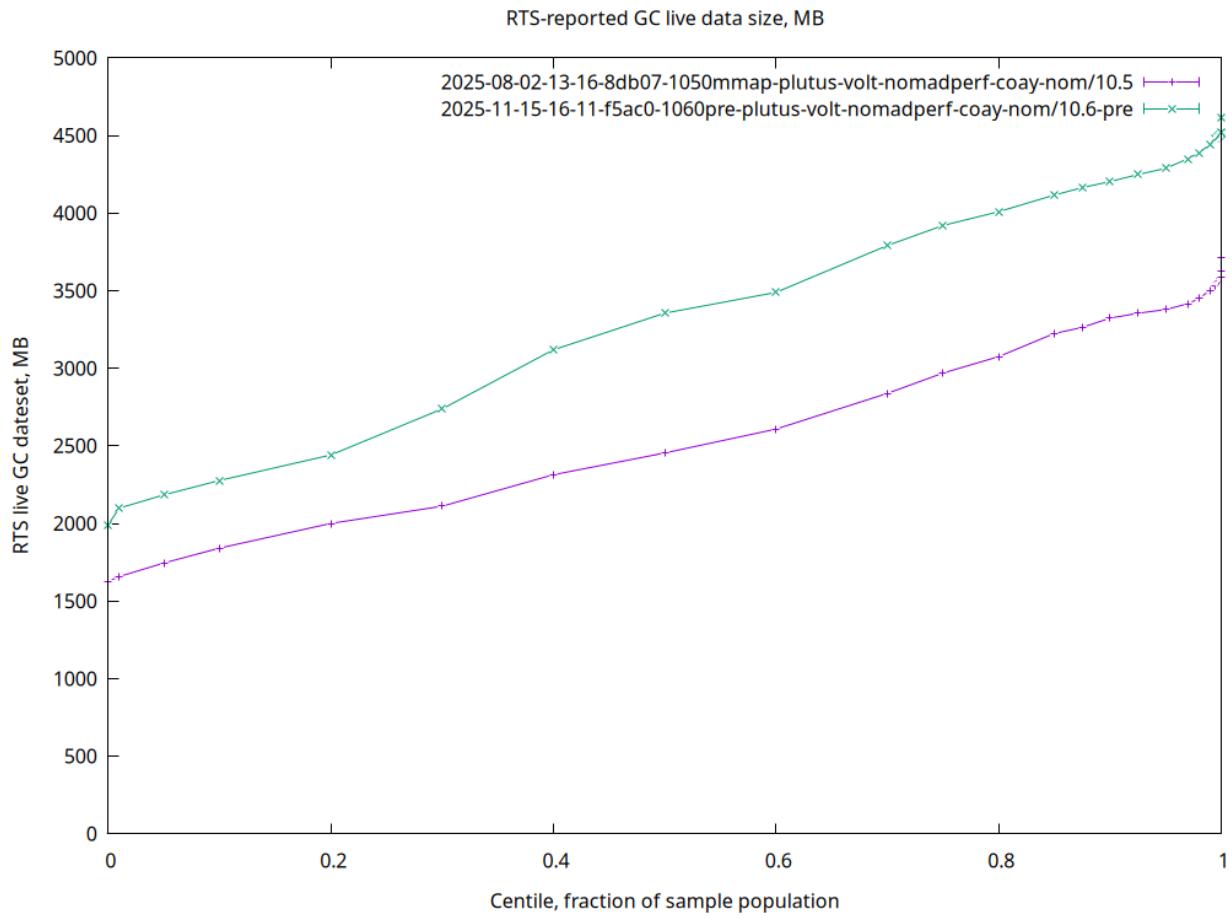
Minor garbage collection RTS events



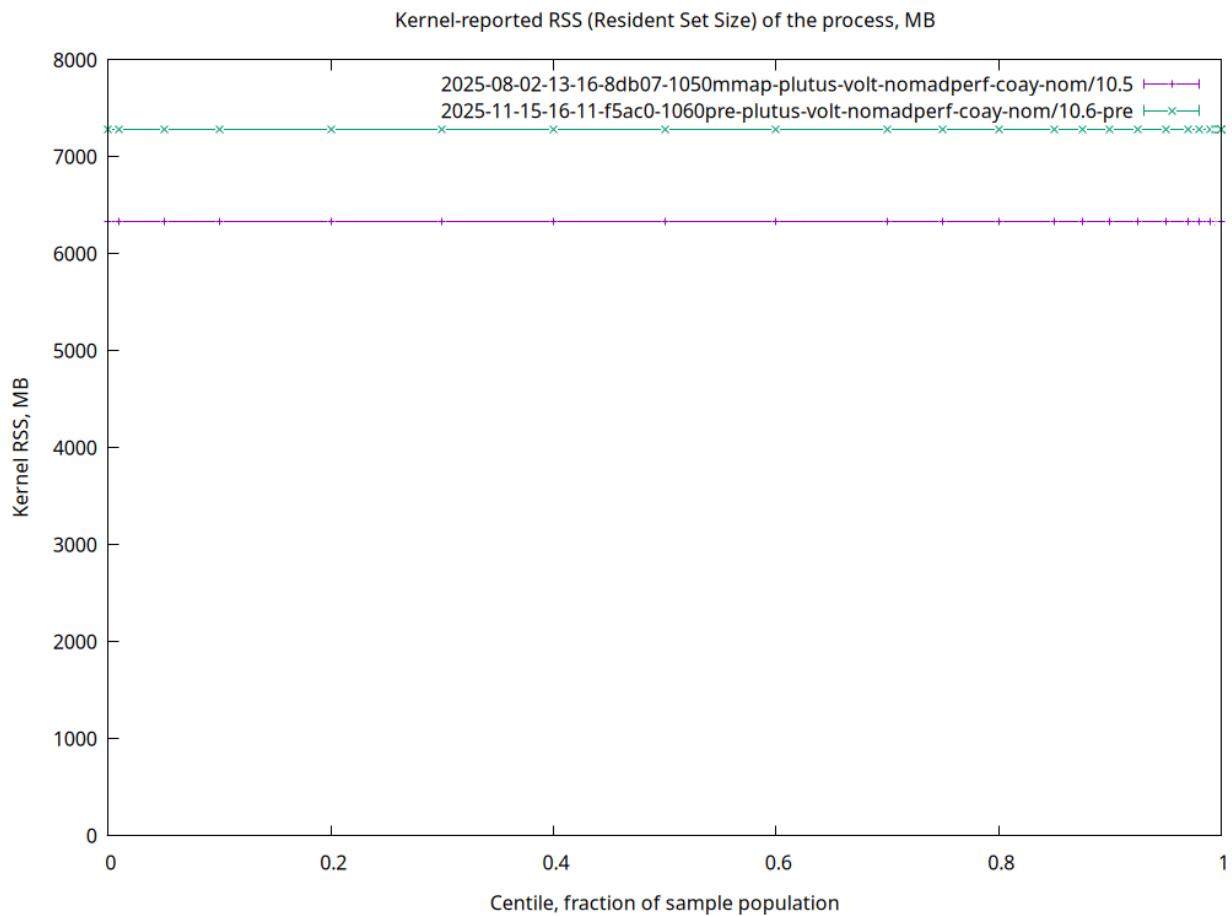
RTS heap size (Heap) RTS-reported heap size, MB



RTS live GC dataset (Live) RTS-reported GC live data size, MB

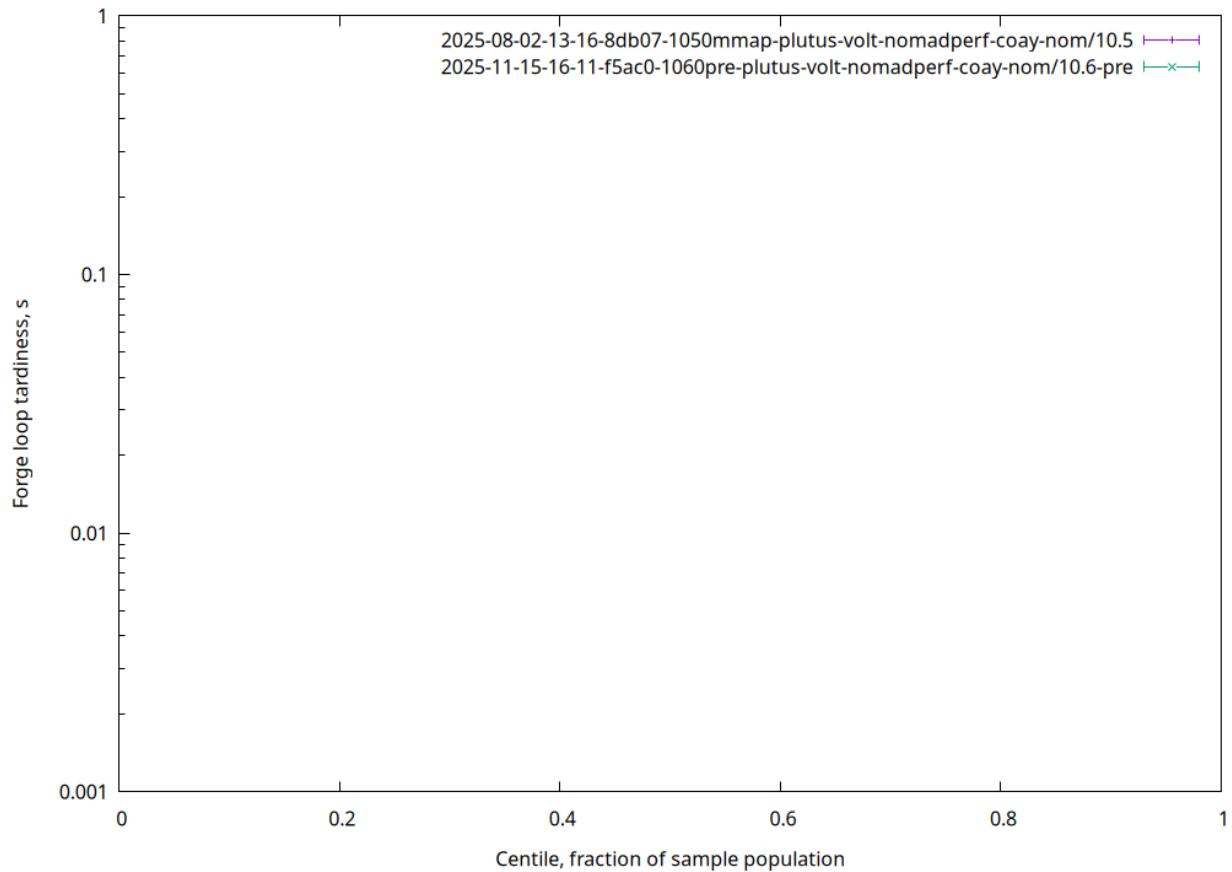


Kernel RSS (RSS) Kernel-reported RSS (Resident Set Size) of the process, MB

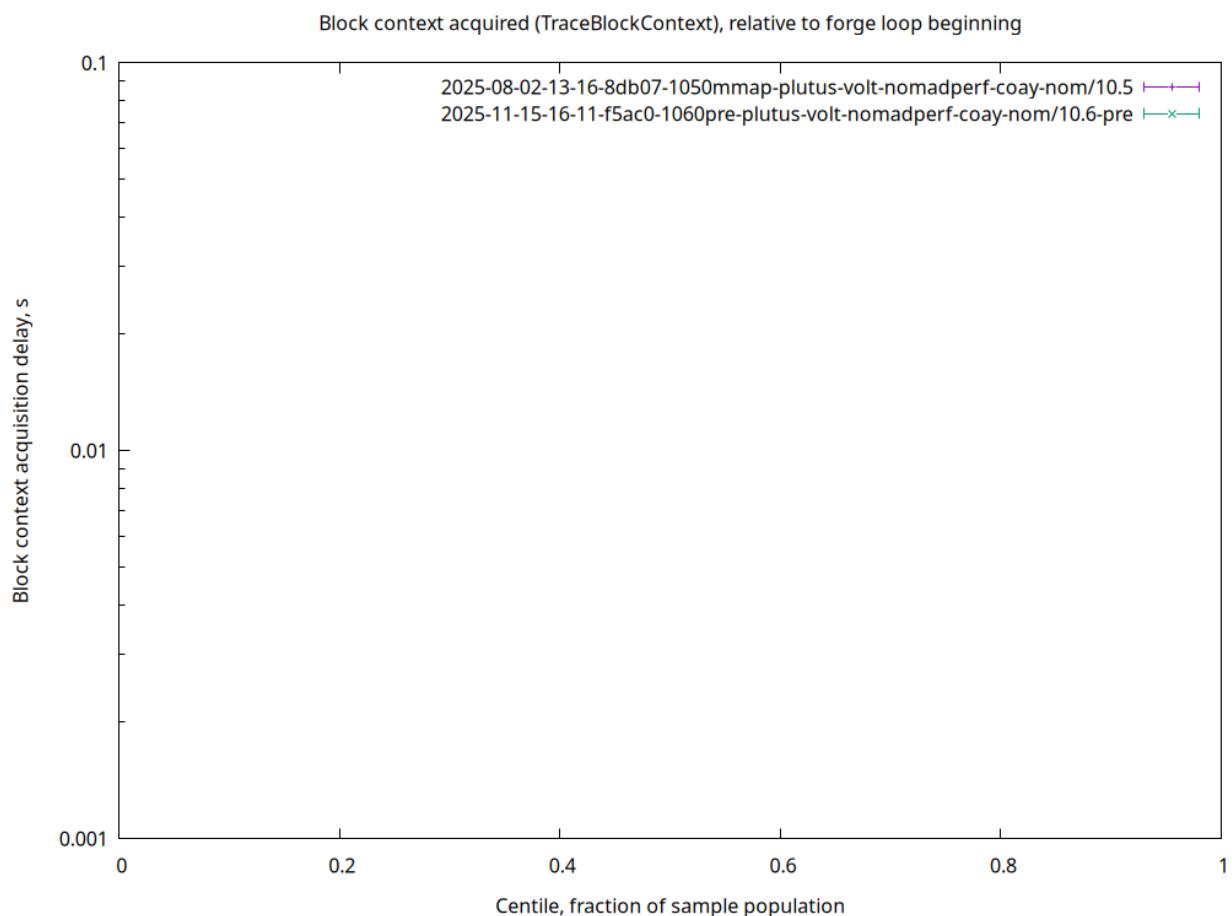


Forge loop tardiness (cdfStarted) Forge loop iteration start delay (TraceStartLeadershipCheck), relative to slot start

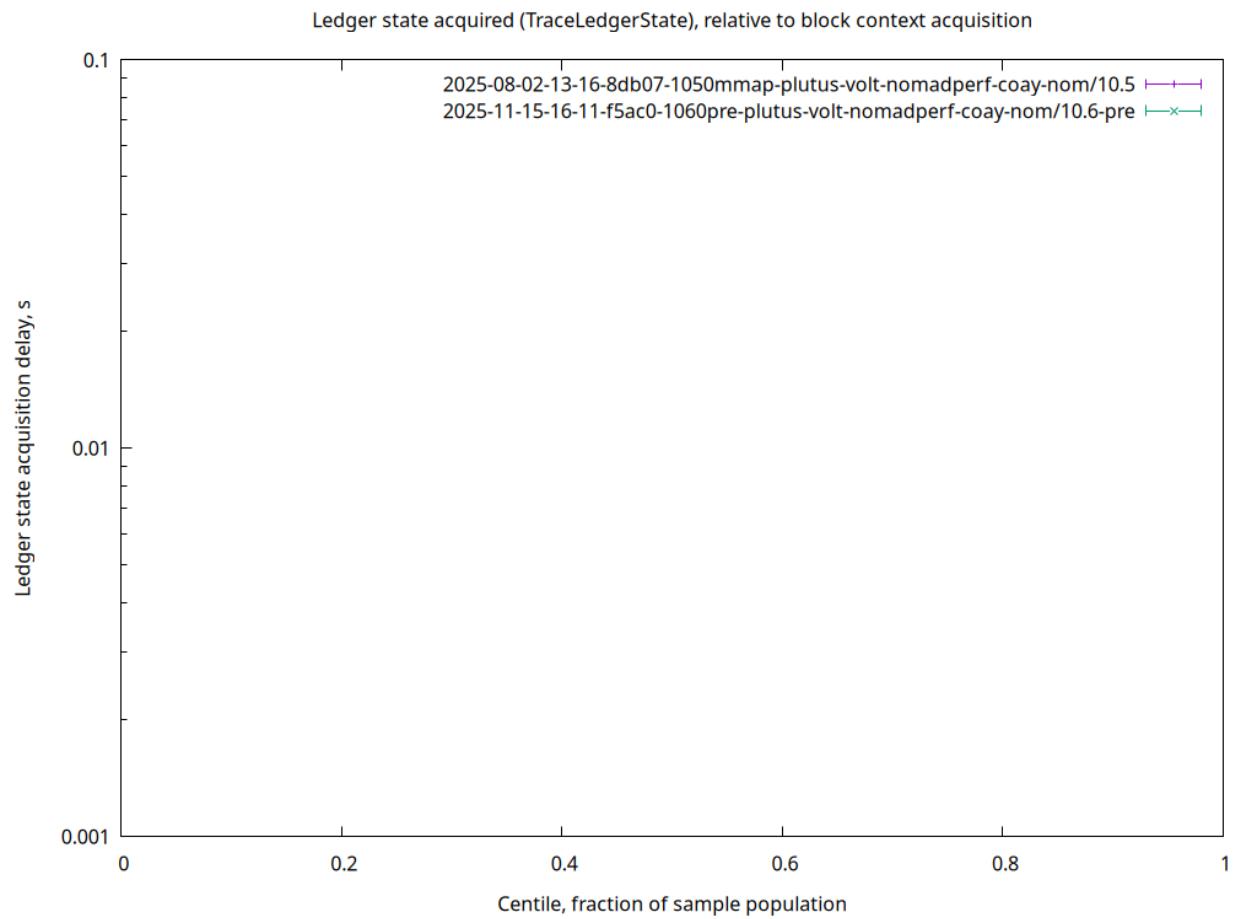
Forge loop iteration start delay (TraceStartLeadershipCheck), relative to slot start



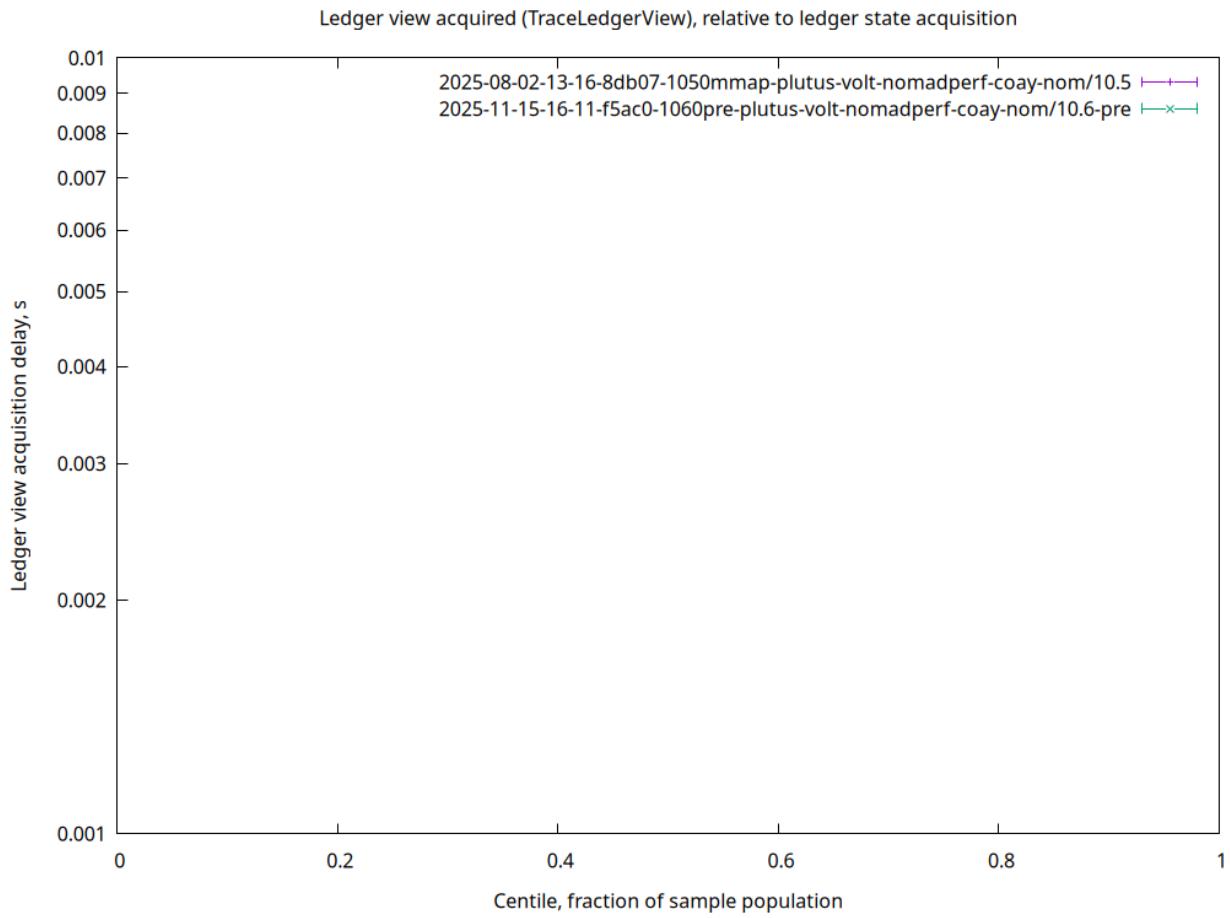
Block context acquisition delay (cdfBlkCtx) Block context acquired (TraceBlockContext), relative to forge loop beginning



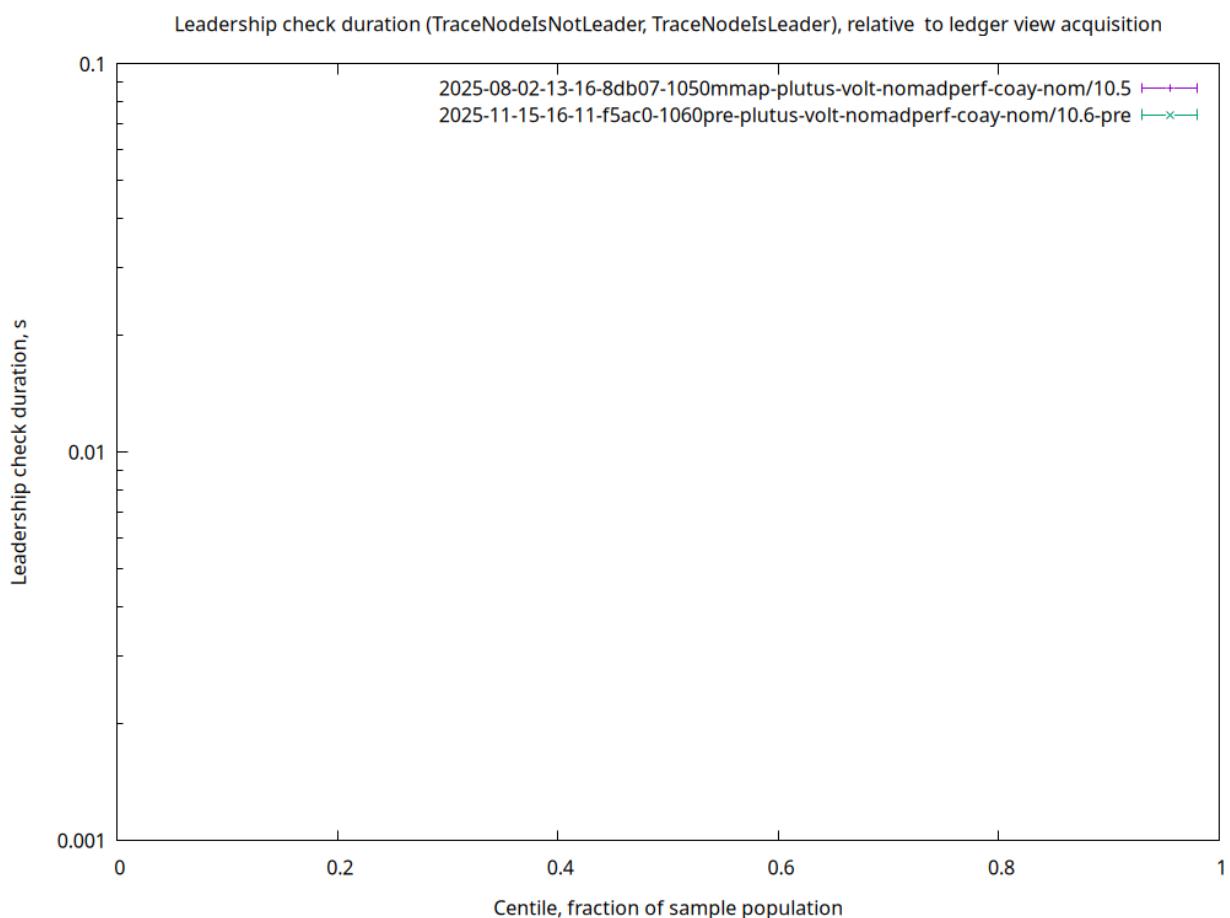
Ledger state acquisition delay (cdfLgrState) Ledger state acquired (TraceLedgerState), relative to block context acquisition



Ledger view acquisition delay (cdfLgrView) Ledger view acquired (TraceLedgerView), relative to ledger state acquisition

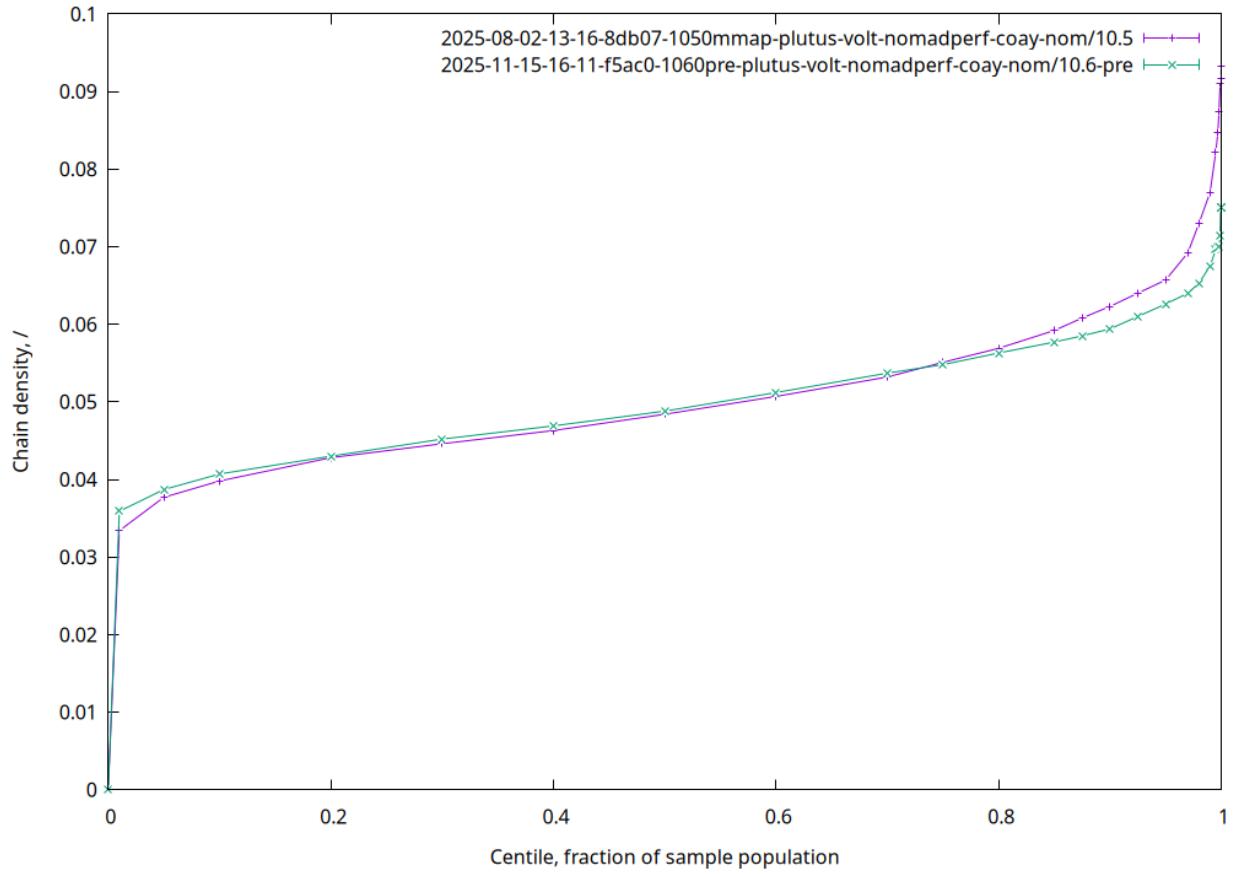


Leadership check duration (cdfLeading) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition

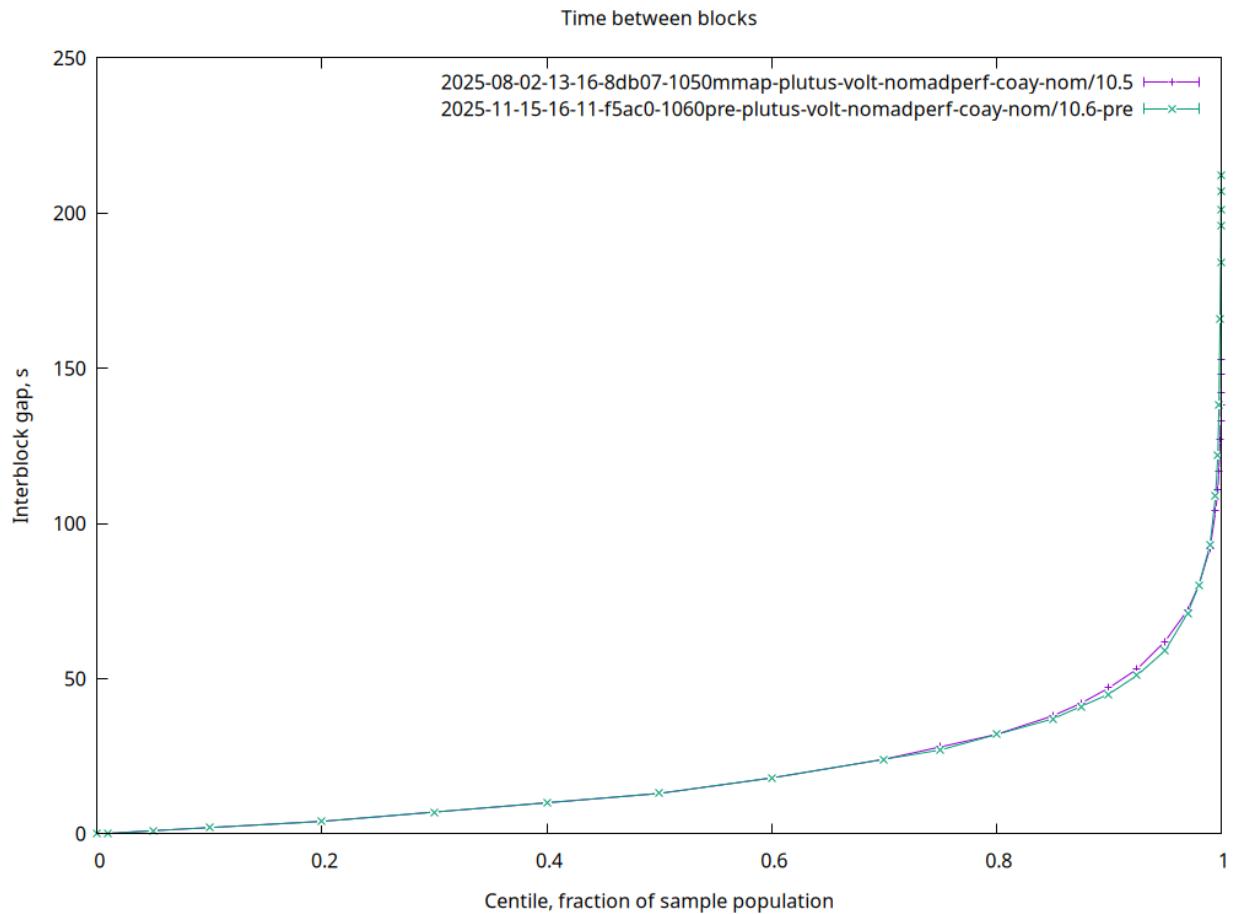


Chain density (cdfDensity) Block/slot ratio, for the last 'k' slots

Block/slot ratio, for the last k slots

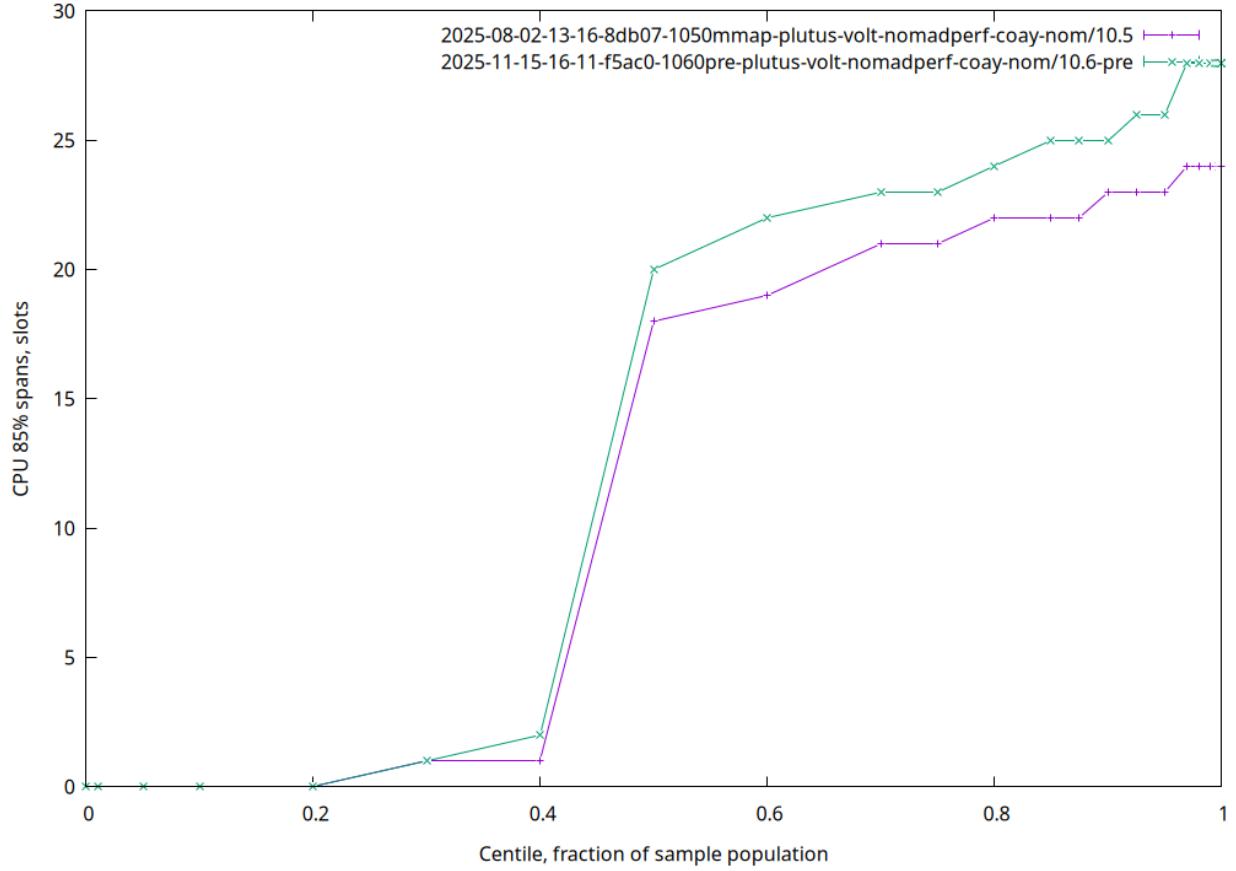


Interblock gap (cdfBlockGap) Time between blocks

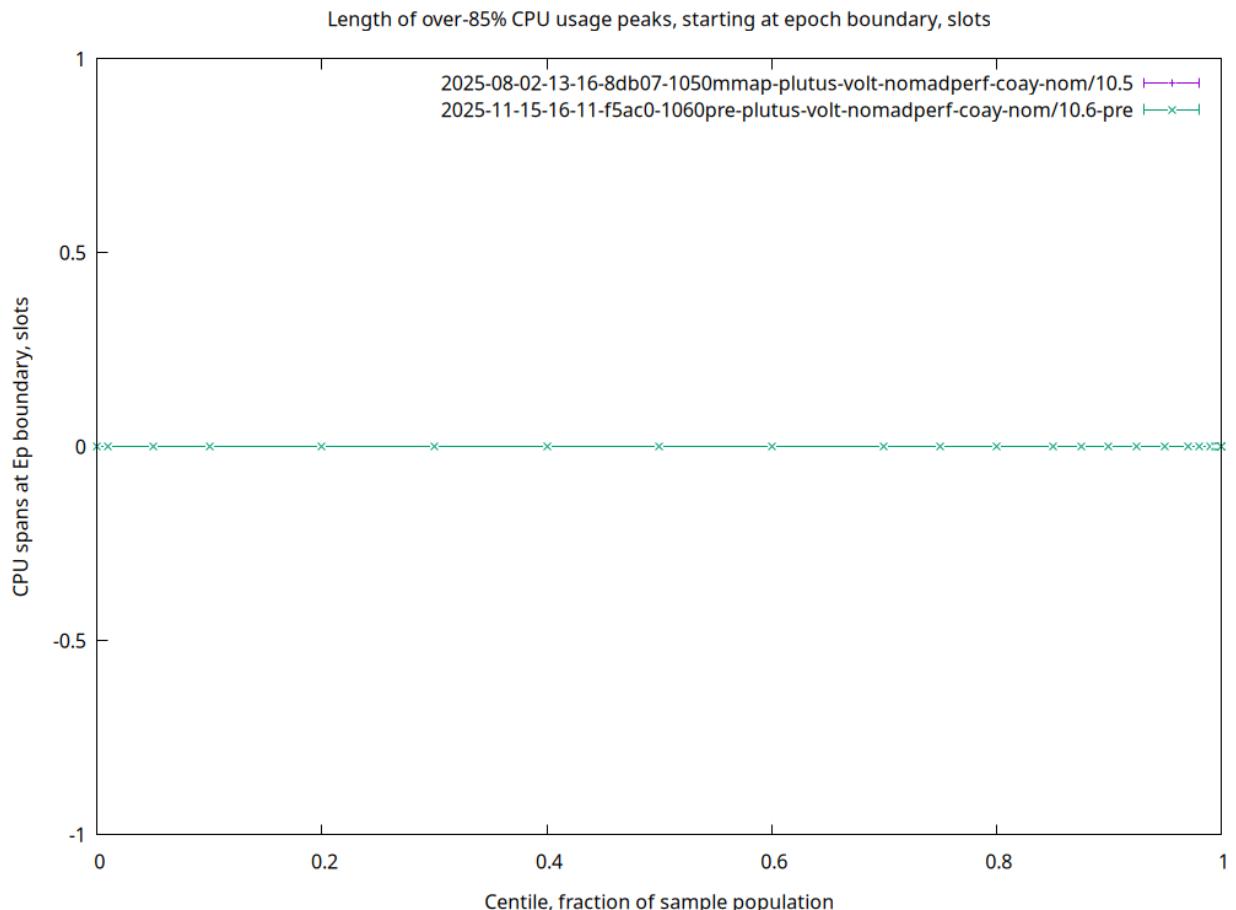


CPU 85% spans (cdfSpanLensCpu) Length of over-85% CPU usage peaks, slots

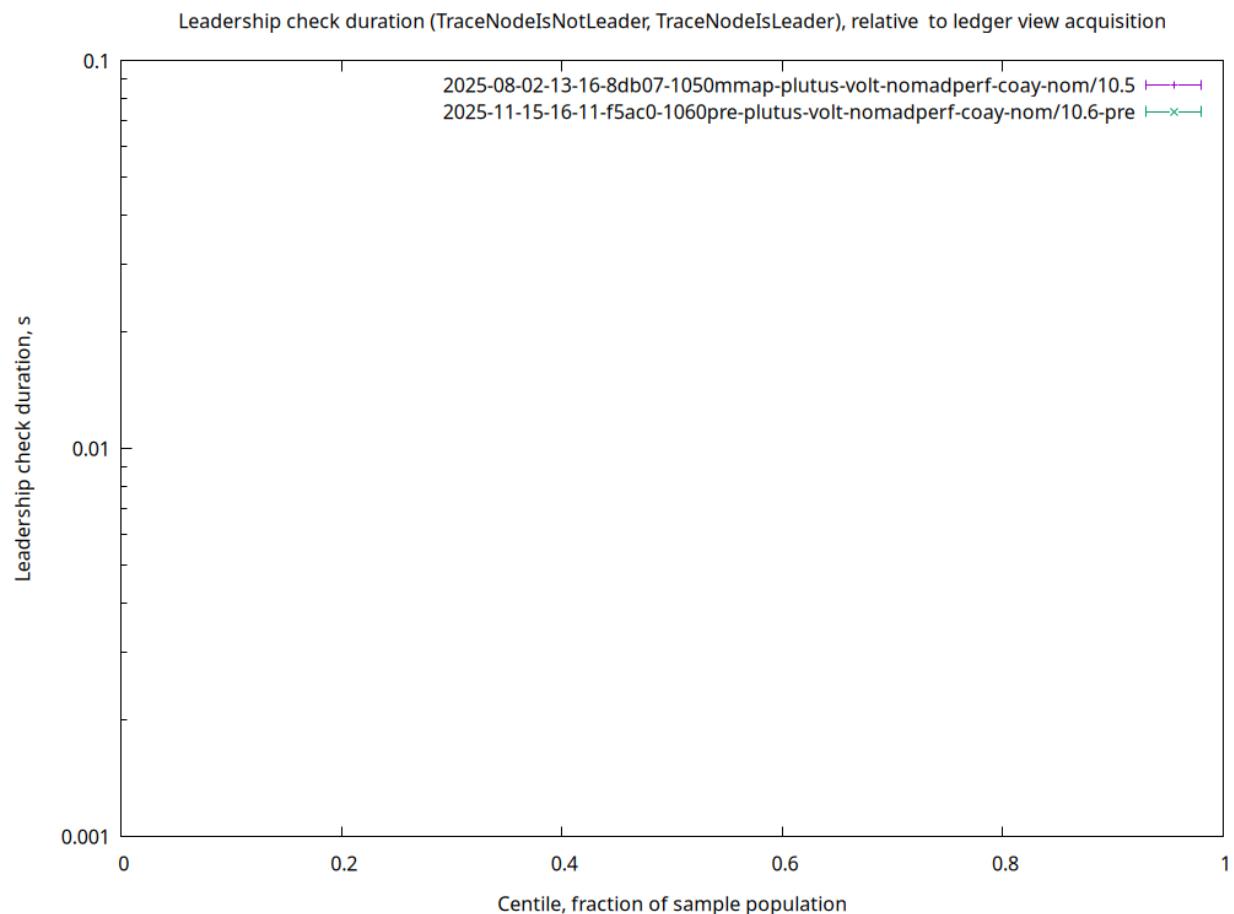
Length of over-85% CPU usage peaks, slots



CPU spans at Ep boundary (cdfSpanLensCpuEpoch) Length of over-85% CPU usage peaks, starting at epoch boundary, slots

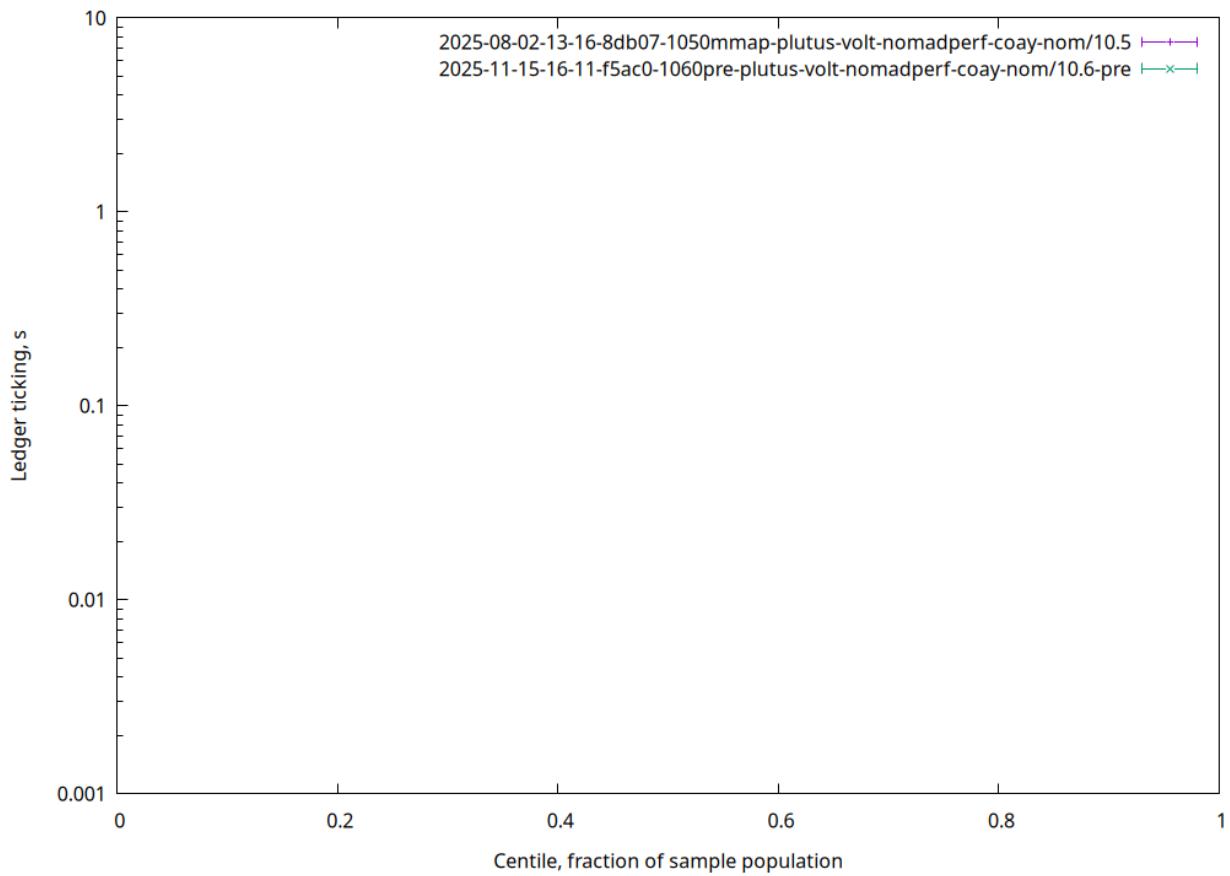


Leadership check duration (cdfForgerLead) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition

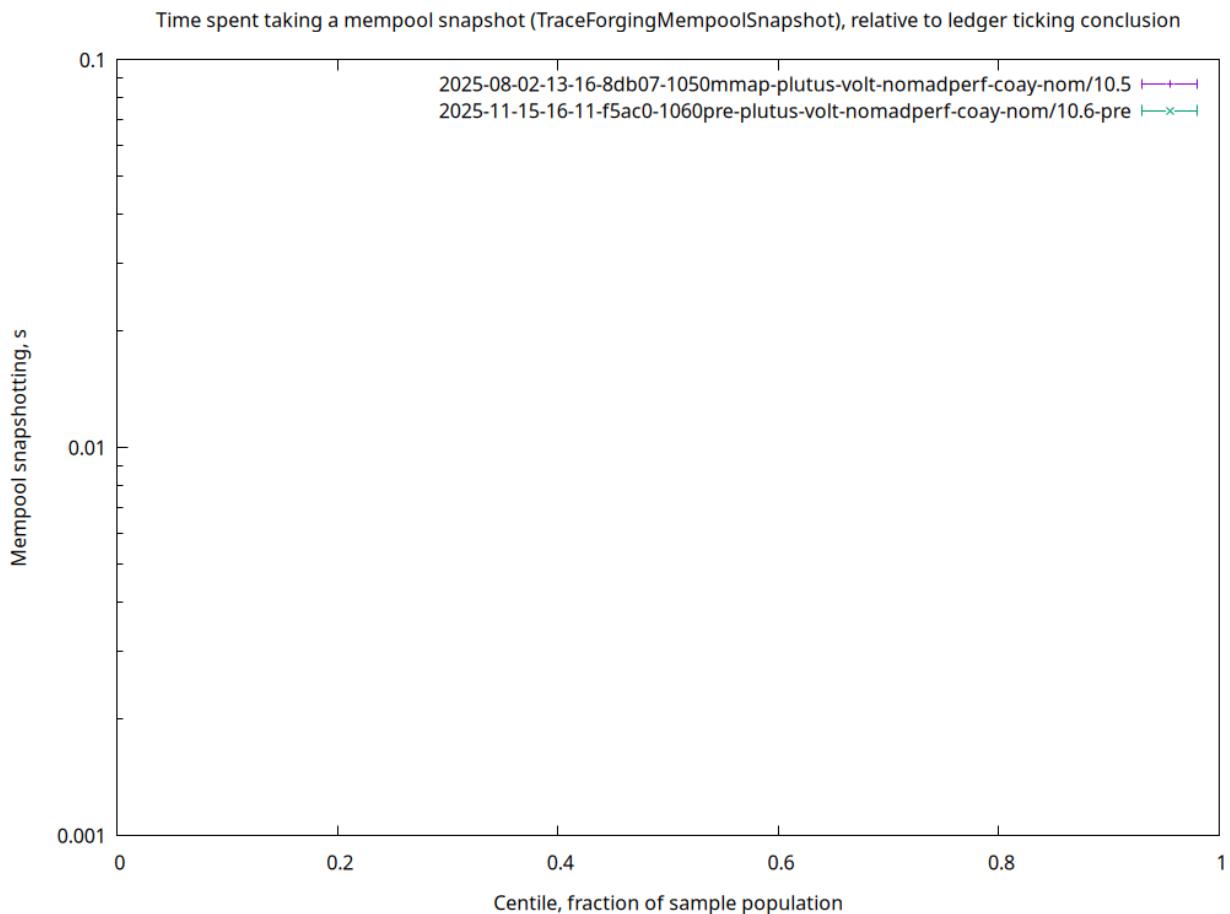


Ledger ticking (cdfForgerTicked) Time spent ticking the ledger state (TraceForgeTickedLedgerState), relative to leadership check completion

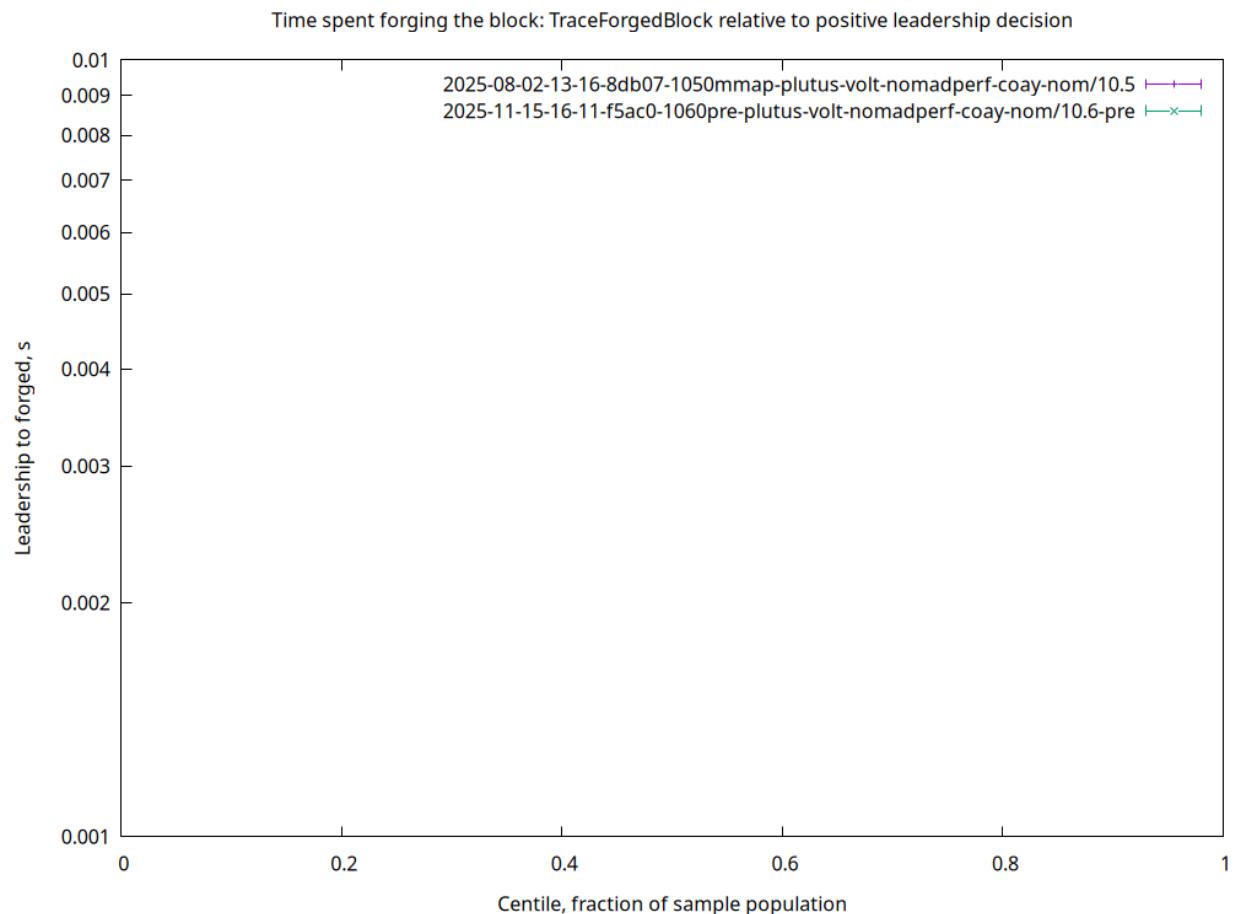
Time spent ticking the ledger state (TraceForgeTickedLedgerState), relative to leadership check completion



Mempool snapshotting (cdfForgerMemSnap) Time spent taking a mempool snapshot (TraceForgingMempoolSnapshot), relative to ledger ticking conclusion

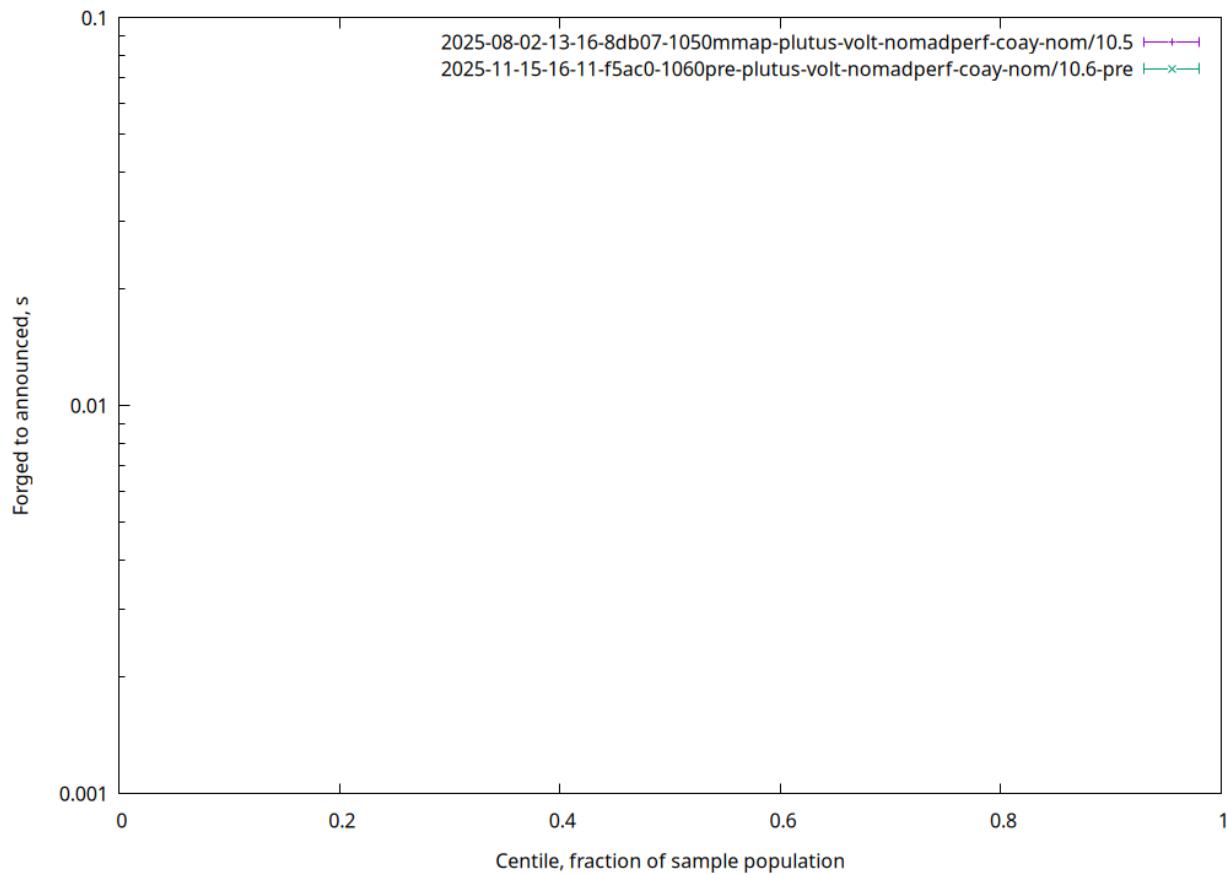


Leadership to forged (cdfForgerForge) Time spent forging the block: TraceForgedBlock relative to positive leadership decision

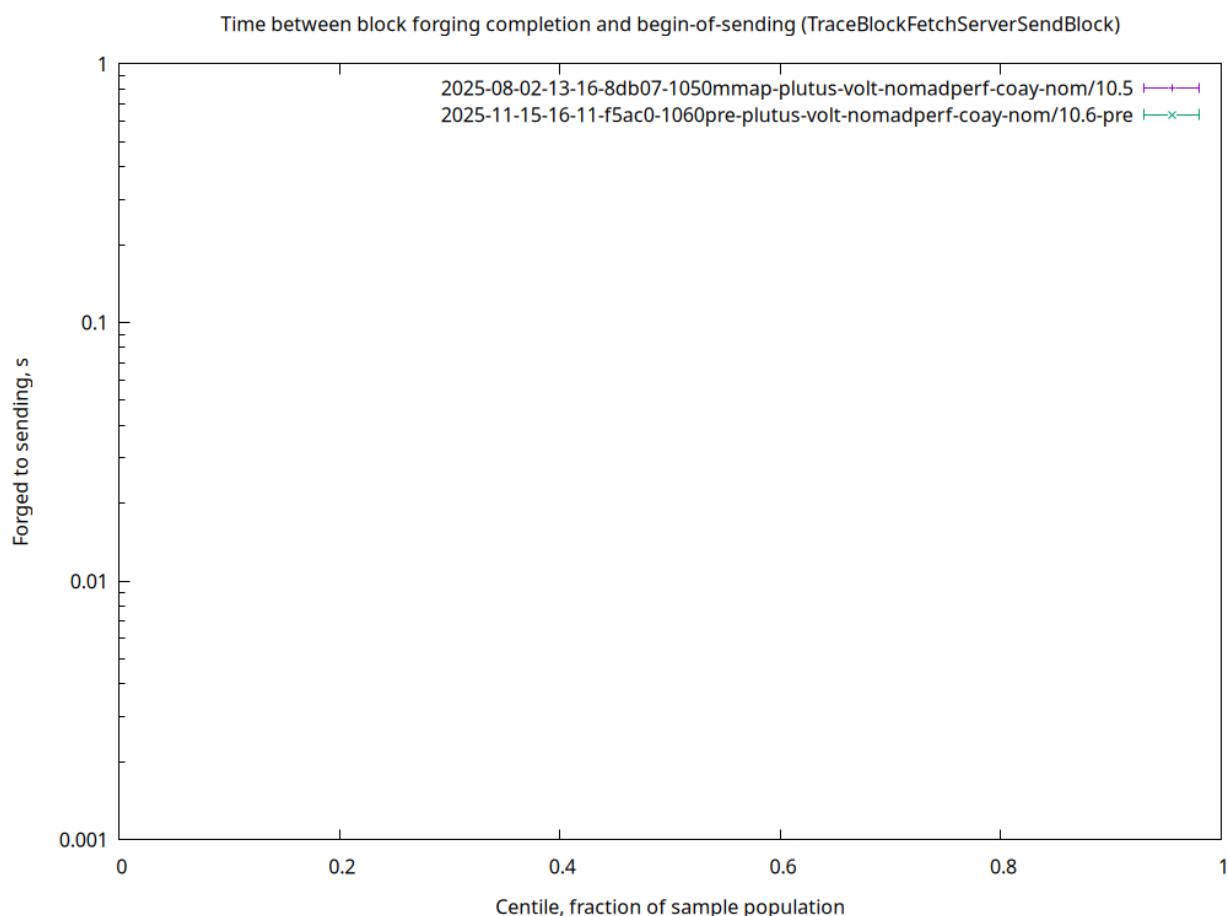


Forged to announced (cdfForgerAnnounce) Time between block forging completion and header announcement
(ChainSyncServerEvent.TraceChainSyncServerRead.AddBlock)

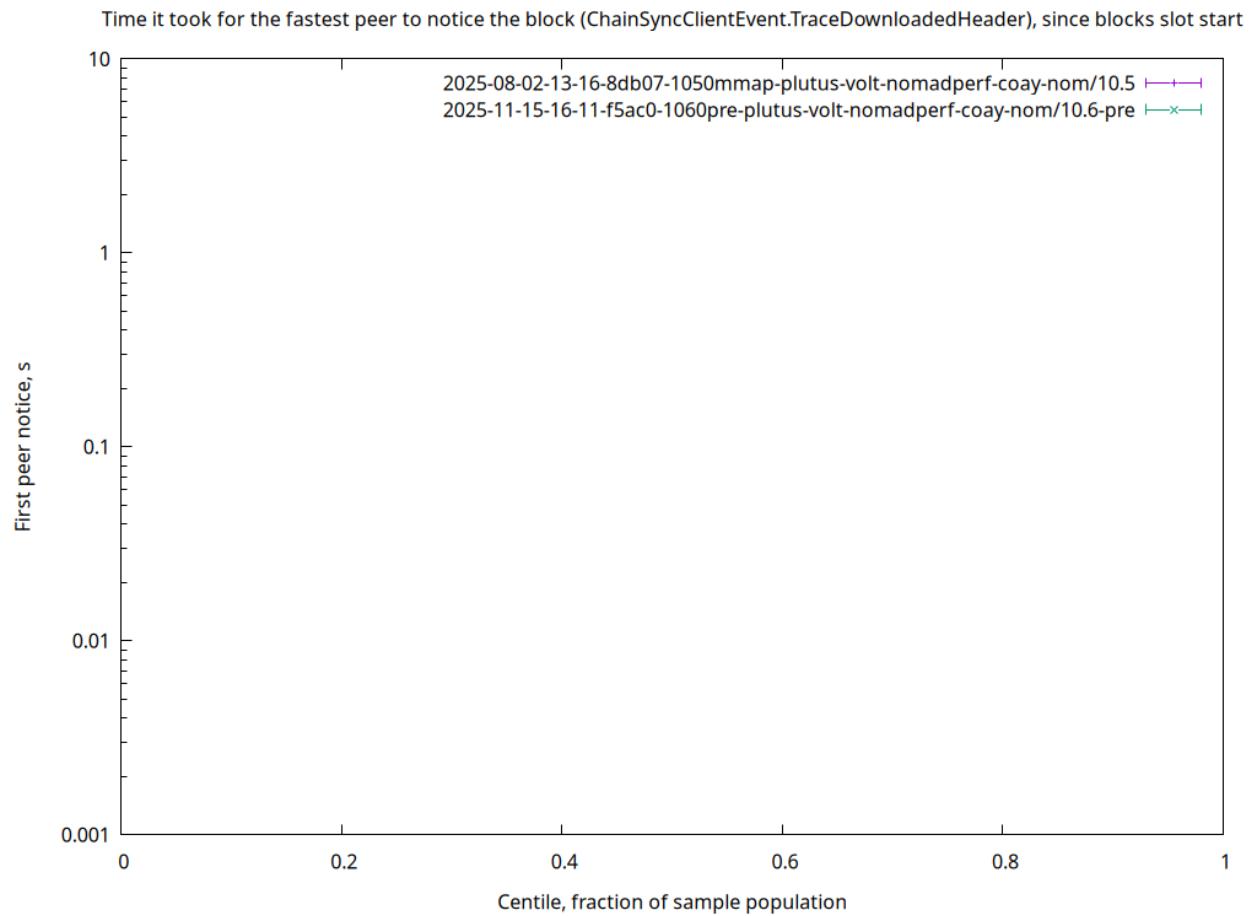
Time between block forging completion and header announcement (ChainSyncServerEvent.TraceChainSyncServerRead.AddBloc



Forged to sending (cdfForgerSend) Time between block forging completion and begin-of-sending (TraceBlockFetchServerSendBlock)

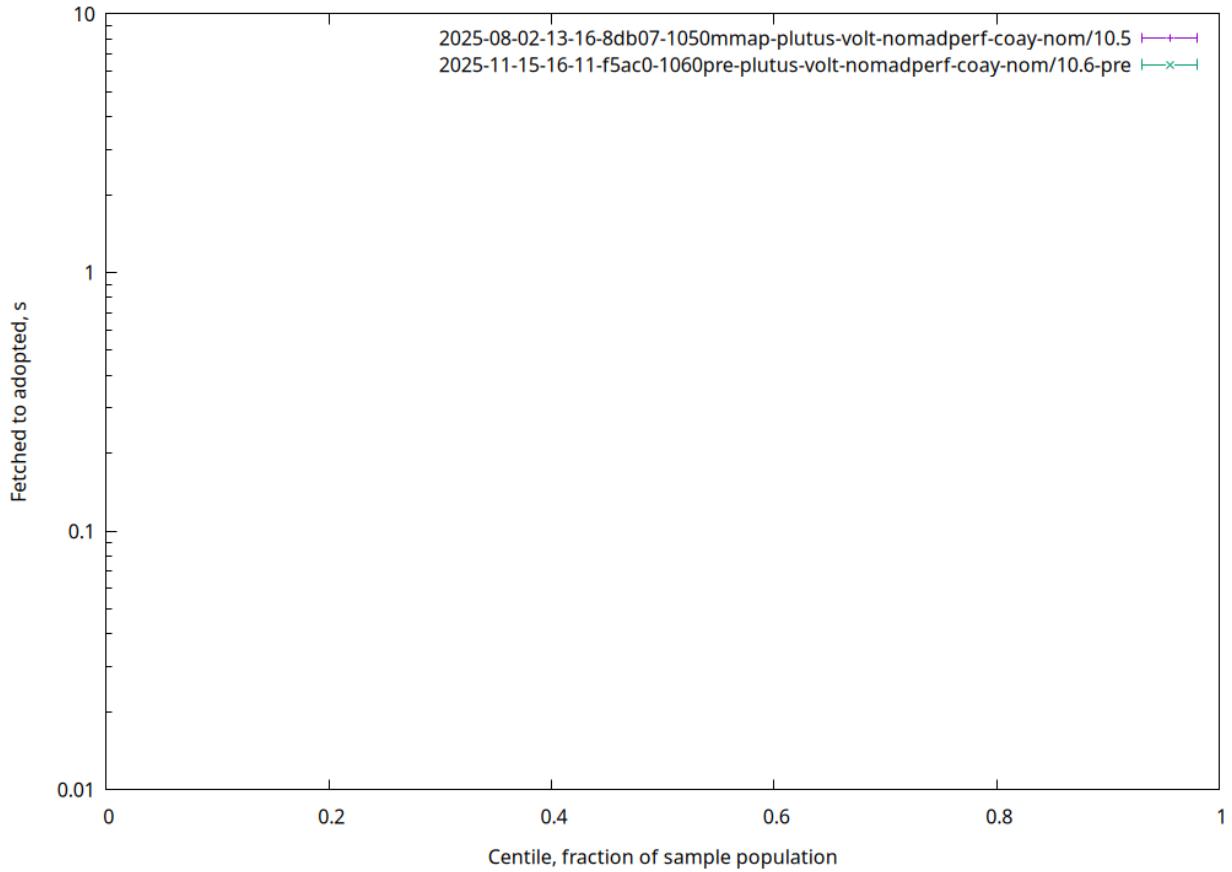


First peer notice (cdfPeerNoticeFirst) Time it took for the fastest peer to notice the block (ChainSyncClientEvent.TraceDownloadedHeader), since block's slot start

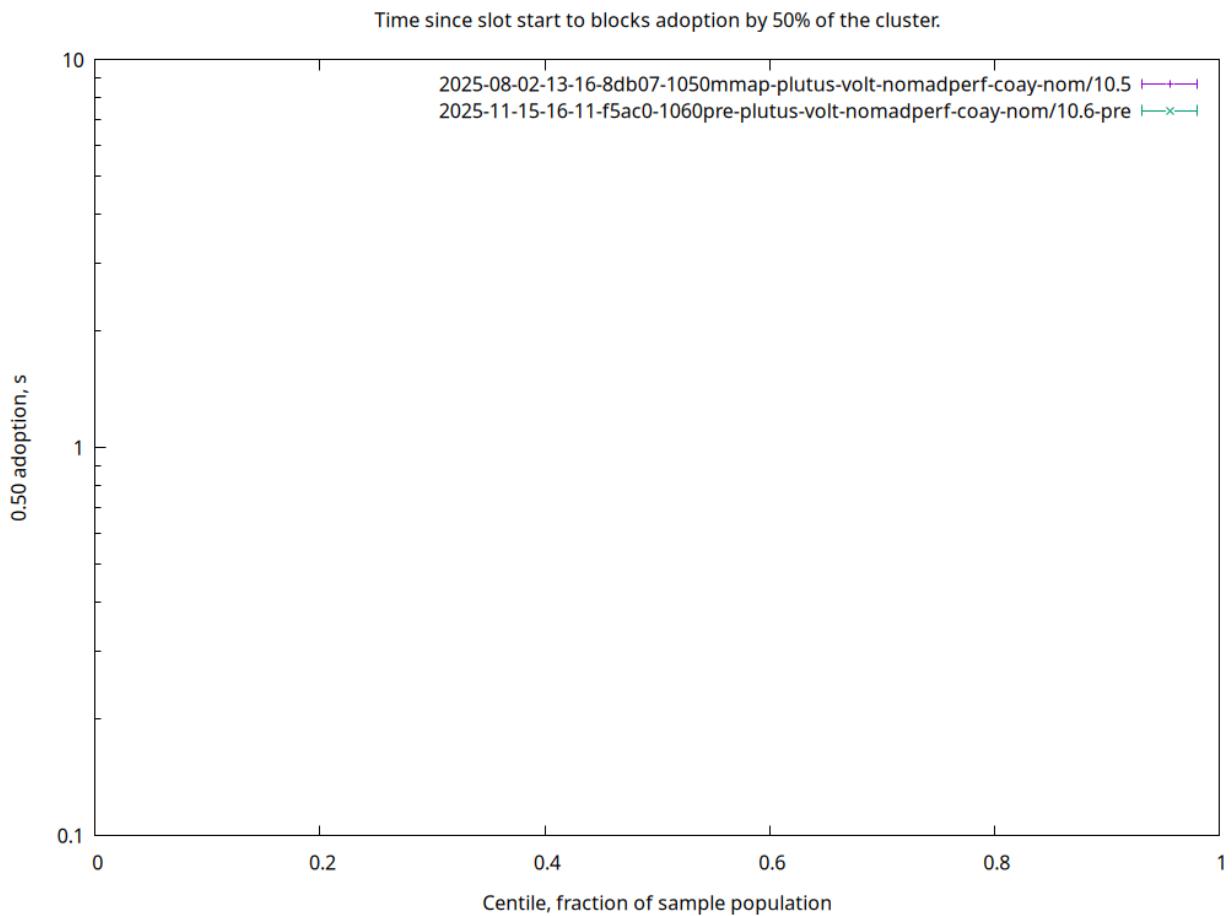


Fetched to adopted (cdfPeerAdoption) Time until the peer adopts the block (TraceAddBlockEvent.AddedToCurrentChain), since it was fetched

Time until the peer adopts the block (TraceAddBlockEvent.AddedToCurrentChain), since it was fetched

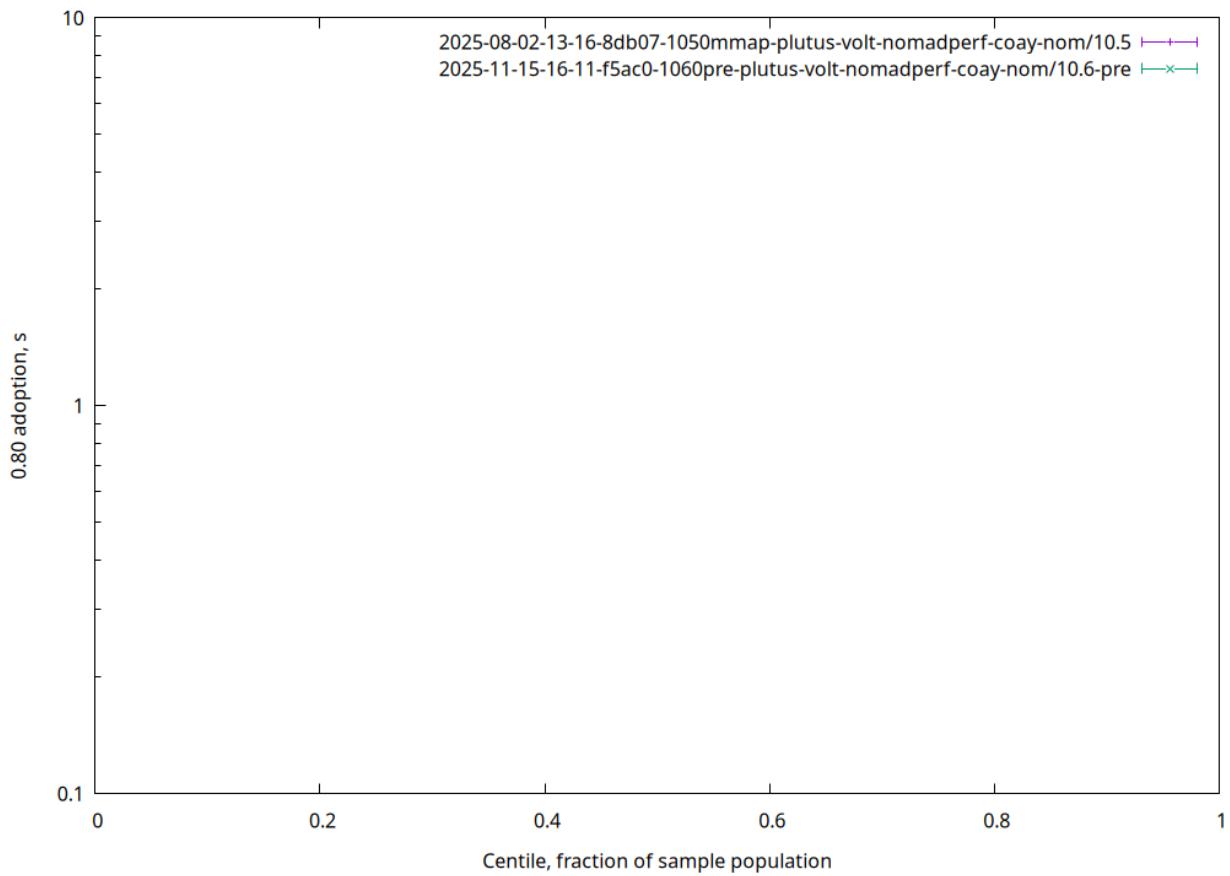


0.50 adoption (cdf0.50) Time since slot start to block's adoption by 50% of the cluster.

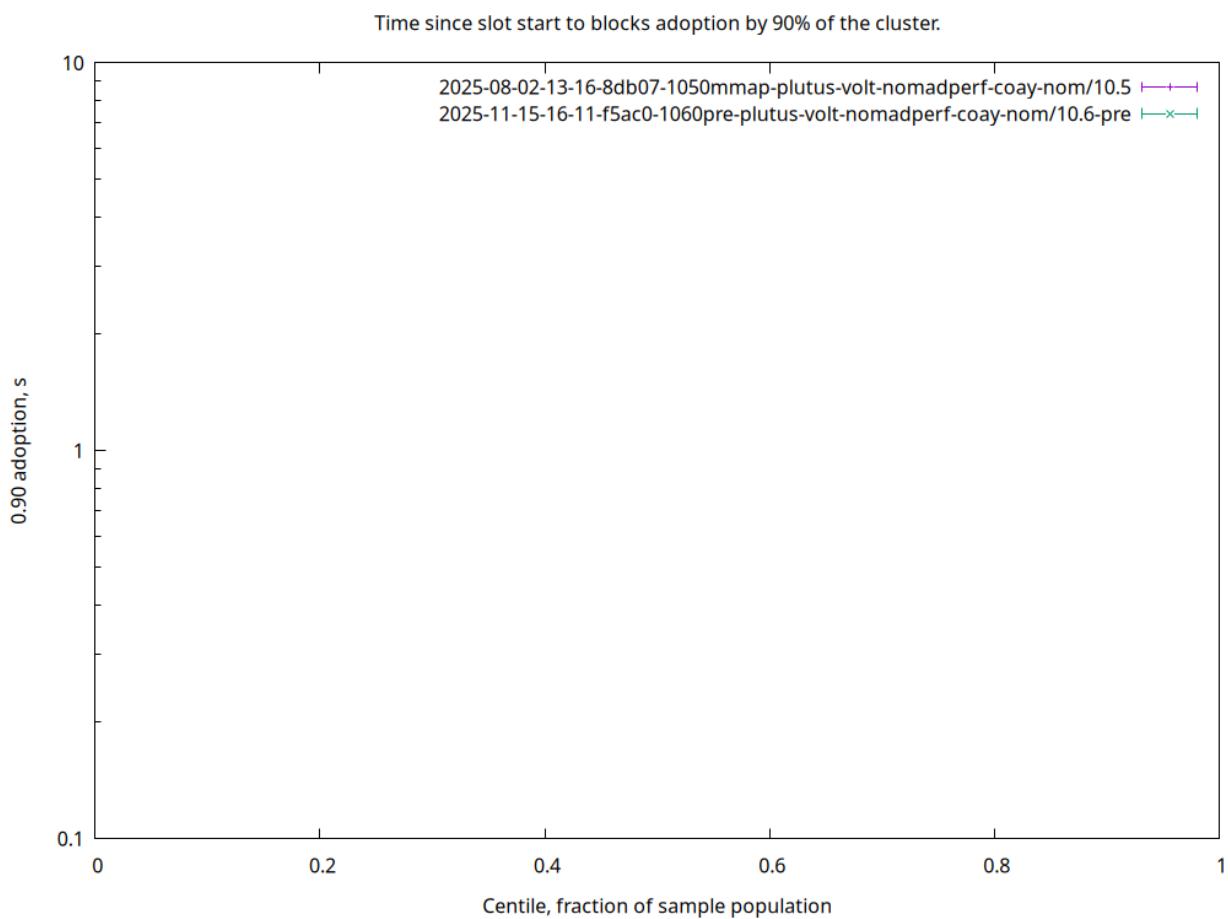


0.80 adoption (cdf0.80) Time since slot start to block's adoption by 80% of the cluster.

Time since slot start to blocks adoption by 80% of the cluster.

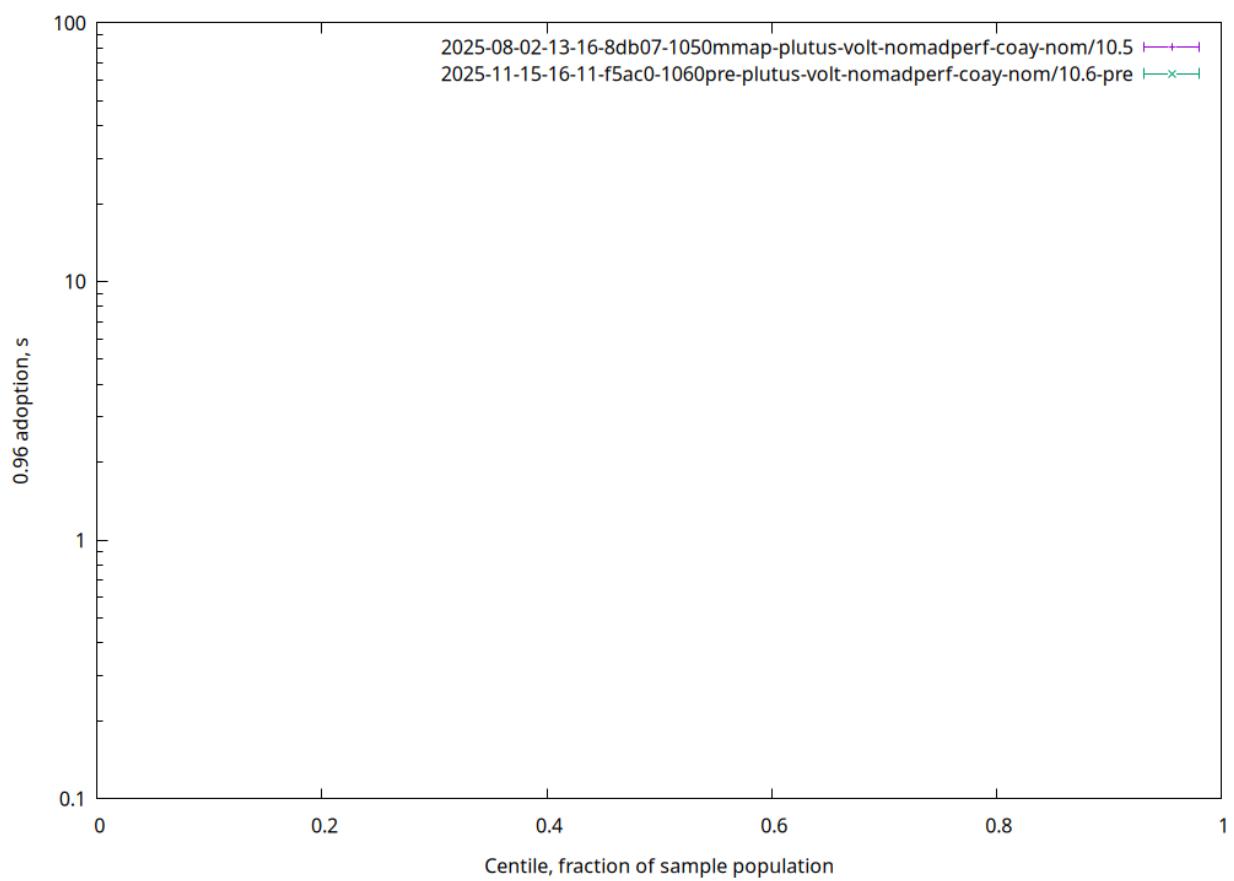


0.90 adoption (cdf0.90) Time since slot start to block's adoption by 90% of the cluster.



0.96 adoption (cdf0.96) Time since slot start to block's adoption by 96% of the cluster.

Time since slot start to blocks adoption by 96% of the cluster.



Part II

Appendix B: data dictionary

Chapter 4

Block propagation metrics

0.50 adoption (cdf0.50) Time since slot start to block's adoption by 50% of the cluster.

0.80 adoption (cdf0.80) Time since slot start to block's adoption by 80% of the cluster.

0.90 adoption (cdf0.90) Time since slot start to block's adoption by 90% of the cluster.

0.92 adoption (cdf0.92) Time since slot start to block's adoption by 92% of the cluster.

0.94 adoption (cdf0.94) Time since slot start to block's adoption by 94% of the cluster.

0.96 adoption (cdf0.96) Time since slot start to block's adoption by 96% of the cluster.

0.98 adoption (cdf0.98) Time since slot start to block's adoption by 98% of the cluster.

1.00 adoption (cdf1.00) Time since slot start to block's adoption by 100% of the cluster.

Height & slot battles (cdfBlockBattle) For a given block, number of all abandoned blocks at its block height. Sum of height and slot battles

Block size (cdfBlockSize) Block size, in bytes

Chained to forged block ratio (cdfBlocksChainedRatio) For each host, ratio of blocks that made into chain / all forged

Filtered to chained block ratio (cdfBlocksFilteredRatio) For each host, ratio of blocks that passed filtering / all on chain

Blocks per host (cdfBlocksPerHost) For each host, number of blocks made during the entire observation period

Forged to self-adopted (cdfForgerAdoption) Time between block forging completion and adoption (TraceAdoptedBlock)

Forged to announced (cdfForgerAnnounce) Time between block forging completion and header announcement (ChainSyncServerEvent.TraceChainSyncServerRead.AddBlock)

Slot start to announced (cdfForgerAnnounceCum) Time since slot start until header announcement (ChainSyncServerEvent.TraceChainSyncServerRead.AddBlock)

Acquired block context (cdfForgerBlkCtx) Block context acquired (TraceBlockContext), relative to forge loop beginning

Leadership to forged (cdfForgerForge) Time spent forging the block: TraceForgedBlock relative to positive leadership decision

Leadership check duration (cdfForgerLead) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition

Acquired ledger state (cdfForgerLgrState) Ledger state acquired (TraceLedgerState), relative to block context acquisition

Acquired ledger view (cdfForgerLgrView) Ledger view acquired (TraceLedgerView), relative to ledger state acquisition

Mempool snapshotting (cdfForgerMemSnap) Time spent taking a mempool snapshot (TraceForgingMempoolSnapshot), relative to ledger ticking conclusion

Forged to sending (cdfForgerSend) Time between block forging completion and begin-of-sending (TraceBlockFetchServerSendBlock)

Started forge loop iteration (cdfForgerStart) Forge loop iteration delay (TraceStartLeadershipCheck), relative to slot start

Ledger ticking (cdfForgerTicked) Time spent ticking the ledger state (TraceForgeTickedLedgerState), relative to leadership check completion

Fetched to adopted (cdfPeerAdoption) Time until the peer adopts the block (TraceAddBlockEvent.AddedToCurrentChain), since it was fetched

Fetched to announced (cdfPeerAnnounce) Time it took a peer to announce the block (ChainSyncServerEvent.TraceChainSyncEvent), since it was fetched

Fetch duration (cdfPeerFetch) Time it took the peer to complete fetching the block (BlockFetchClient.CompletedBlockFetch), after having requested it

First peer fetch (cdfPeerFetchFirst) Time it took for the fastest peer to fetch the block (BlockFetchClient.CompletedBlockFetch), since block's slot start

First peer notice (cdfPeerNoticeFirst) Time it took for the fastest peer to notice the block (ChainSyncClientEvent.TraceDownloadedHeader), since block's slot start

Notice to fetch request (cdfPeerRequest) Time it took the peer to request the block body (BlockFetchClient.SendFetchRequest), after it have seen its header

Fetched to sending (cdfPeerSend) Time until the peer started sending the block (BlockFetchServer.SendBlock), since it was fetched

Chapter 5

Cluster performance metrics

RTS alloc rate (Alloc) RTS-reported allocation rate, MB/sec

Process CPU usage (CentiCpu) Kernel-reported CPU process usage, % of a single core

RTS GC CPU usage (CentiGC) RTS-reported GC CPU usage, % of a single core

RTS Mutator CPU usage (CentiMut) RTS-reported mutator CPU usage, % of a single core

Filesystem reads (FsRd) Number of bytes which this process really did cause to be fetched from the storage layer, per second

Filesystem writes (FsWr) Number of bytes which this process caused to be sent to the storage layer, modulo truncate(), per second

Major GCs (GcsMajor) Major garbage collection RTS events

Minor GCs (GcsMinor) Minor garbage collection RTS events

RTS heap size (Heap) RTS-reported heap size, MB

RTS live GC dataset (Live) RTS-reported GC live data size, MB

Network reads (NetRd) Network reads, kB/sec

Network writes (NetWr) Network writes, kB/sec

Kernel RSS (RSS) Kernel-reported RSS (Resident Set Size) of the process, MB

Block context acquisition delay (cdfBlkCtx) Block context acquired (TraceBlockContext), relative to forge loop beginning

Interblock gap (cdfBlockGap) Time between blocks

Chain density (cdfDensity) Block/slot ratio, for the last 'k' slots

Leadership check duration (cdfLeading) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition

Ledger state acquisition delay (cdfLgrState) Ledger state acquired (TraceLedgerState), relative to block context acquisition

Ledger view acquisition delay (cdfLgrView) Ledger view acquired (TraceLedgerView), relative to ledger state acquisition

CPU 85% spans (cdfSpanLensCpu) Length of over-85% CPU usage peaks, slots

CPU spans at Ep boundary (cdfSpanLensCpuEpoch) Length of over-85% CPU usage peaks, starting at epoch boundary, slots

Forge loop tardiness (cdfStarted) Forge loop iteration start delay (TraceStartLeadershipCheck), relative to slot start

Forge loop starts (cdfStarts) For any given slot, how many forging loop starts were registered