

8.7.1-pre and 8.7.0-pre against 8.1.2
value-only workload

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Chapter 1

Manifest

We compare 8.7.0-pre (Babbage) and 8.7.1-pre (Babbage) relative to 8.1.2 (Babbage), under value-only workload.

	8.1.2	8.7.0-pre	8.7.1-pre
Analysis date	2023-09-07	2023-11-24	2023-12-04
Cluster system start date	2023-09-05	2023-11-23	2023-12-01
Cluster system start time	15:55:53	11:38:20	13:10:32
Identifier	unknown	unknown	unknown
Run batch	8.1.2	8.7.0-pre	8.7.1-pre
GHC version	8.10.7	8.10.7	8.10.7
cardano-node version	unknown	unknown	unknown
ouroboros-consensus version	unknown	unknown	unknown
ouroboros-network version	unknown	unknown	unknown
cardano-ledger-core version	unknown	unknown	unknown
plutus-core version	unknown	unknown	unknown
cardano-crypto version	unknown	unknown	unknown
cardano-prelude version	unknown	unknown	unknown
cardano-node git	d2d90b4	34d89af	7f7a93d
ouroboros-consensus git	0123456	0123456	0123456
ouroboros-network git	0123456	0123456	0123456
cardano-ledger-core git	0123456	0123456	0123456
plutus-core git	0123456	0123456	0123456
cardano-crypto git	0123456	0123456	0123456
cardano-prelude git	0123456	0123456	0123456
Era	babbage	babbage	babbage
Delegation map size	1000000	1000000	1000000
Starting UTxO set size	4000000	4000000	4000000
Extra tx payload	100	100	100
Tx inputs	2	2	2
Tx Outputs	2	2	2
TPS	12.0	12.0	12.0
Transaction count	480000	480000	480000
Plutus script	—	—	—
Machines	52	52	52
Number of filters applied	5	5	5
Log text lines emitted per host	8991146.9038	4493570.8076	3970765.2884
Log objects emitted per host	8991145.9038	4493569.8076	3970764.2884
Log objects analysed per host	1174892.0192	1005520.3653	924800.61538
Host run time, s	97240.6	54400.7	53215.5
Host log line rate, Hz	92.463	82.602	74.617
Total log objects analysed	61094385	52287059	48089632
Run time, s	97247	54406	53221
Analysed run duration, s	55218	54407	53221
Run time efficiency	0.56	1.00	1.0
Node start spread, s	12.97	8.26	9.48
Node stop spread, s	3.02	3.07	3.03
Perf analysis start spread, s	13	9	9
Perf analysis stop spread, s	0	3	3
Slots analysed	55213	54400	53215
Blocks analysed	1327	2302	2330
Blocks rejected	1578	352	301

Chapter 2

Analysis

2.1 Resource Usage

	8.1.2	8.7.0-pre	Δ	$\Delta\%$	8.7.1-pre	Δ	$\Delta\%$
Forge loop starts, #	0.99852	0.99814	-0.000	0	0.9981	-0.000	0
Process CPU usage, %	6.0036	6.4143	0.411	7	6.086	0.082	1
RTS GC CPU usage, %	0.94301	0.94614	0.003	0	0.89427	-0.049	-5
RTS Mutator CPU usage, %	5.0622	5.4643	0.402	8	5.1827	0.121	2
Major GCs, #	0.00204	0.00124	-0.001	-49	0.00126	-0.001	-49
Minor GCs, #	1.323	1.7316	0.409	31	1.6735	0.351	27
Kernel RSS, MB	4560.4	6673.9	2113.500	46	6684.1	2123.700	47
RTS live GC dataset, MB	2026.8	2806.8	780.000	38	2780.3	753.500	37
RTS heap size, MB	4514.3	6625.8	2111.500	47	6635.4	2121.100	47
RTS alloc rate, MB/s	41.493	52.242	10.749	26	50.356	8.863	21
CPU 85% spans, slots	12.877	3.9776	-8.899	-69	3.1446	-9.732	-76
Sample count	(287>)	(282>)			(276>)		

2.2 Anomaly control

	8.1.2	8.7.0-pre	Δ	$\Delta\%$	8.7.1-pre	Δ	$\Delta\%$
Blocks per host, blocks	57.788	52.596	-5.192	-9	52.134	-5.654	-10
Filtered to chained block ratio, /	0.45989	0.86786	0.408	89	0.88721	0.427	93
Chained to forged block ratio, /	0.96609	0.97069	0.005	1	0.9705	0.004	0
Height & slot battles, blocks	0.0015	0.00434	0.003	200	0.00472	0.003	200
Block size, B	86817	86783	-34	0	86791	-26	0
Sample count	(52)	(52)			(52)		

2.3 Forging

	8.1.2	8.7.0-pre	Δ	$\Delta\%$	8.7.1-pre	Δ	$\Delta\%$
Started forge loop iteration, s	0.00124	0.0008	-0.000	0	0.00085	-0.000	0
Acquired block context, s	0.01009	0.02076	0.011	109	0.02142	0.011	109
Acquired ledger state, s	0.0	0.0	0.000	nan	1e-05	0.000	nan
Acquired ledger view, s	1e-05	1e-05	0.000	0	0.0	-0.000	0
Leadership check duration, s	0.00027	0.0002	-0.000	0	0.00024	-0.000	0
Ledger ticking, s	0.01792	0.01754	-0.000	0	0.01736	-0.001	-6
Mempool snapshotting, s	0.0466	0.06258	0.016	34	0.06218	0.016	34
Leadership to forged, s	0.00119	0.00129	0.000	0	0.00109	-0.000	0
Forged to announced, s	0.00059	0.00063	0.000	0	0.00067	0.000	0
Forged to sending, s	0.00468	0.00434	-0.000	0	0.00449	-0.000	0
Forged to self-adopted, s	0.05382	0.06072	0.007	13	0.06102	0.007	13
Slot start to announced, s	0.07795	0.10385	0.026	33	0.10386	0.026	33
Sample count	(1327)	(2302)			(2330)		

2.4 Individual peer propagation

	8.1.2	8.7.0-pre	Δ	$\Delta\%$	8.7.1-pre	Δ	$\Delta\%$
First peer notice, s	0.07902	0.10479	0.026	33	0.10484	0.026	33
First peer fetch, s	0.08744	0.11231	0.025	29	0.11225	0.025	29
Notice to fetch request, s	0.00103	0.00102	-0.000	0	0.00105	0.000	0
Fetch duration, s	0.32065	0.34322	0.023	7	0.34842	0.028	9
Fetches to announced, s	-0.0	-0.0	0.000	nan	-0.0	0.000	nan
Fetches to sending, s	0.0397	0.04256	0.003	8	0.04281	0.003	8
Fetches to adopted, s	0.05809	0.06677	0.009	15	0.06493	0.007	12
Sample count	(1327)	(2302)			(2330)		

2.5 End-to-end propagation

	8.1.2	8.7.0-pre	Δ	$\Delta\%$	8.7.1-pre	Δ	$\Delta\%$
0.50 adoption, s	0.56873	0.62554	0.057	10	0.62654	0.058	10
0.80 adoption, s	0.87981	0.95891	0.079	9	0.96811	0.088	10
0.90 adoption, s	0.89237	0.97089	0.079	9	0.9808	0.088	10
0.92 adoption, s	0.89515	0.97412	0.079	9	0.98357	0.088	10
0.94 adoption, s	0.89891	0.97754	0.079	9	0.98748	0.089	10
0.96 adoption, s	0.90318	0.98174	0.079	9	0.9917	0.089	10
0.98 adoption, s	0.90845	0.98864	0.080	9	0.99723	0.089	10
1.00 adoption, s	0.93103	1.0152	0.084	9	1.0161	0.085	9
Sample count	(1327)	(2302)			(2330)		

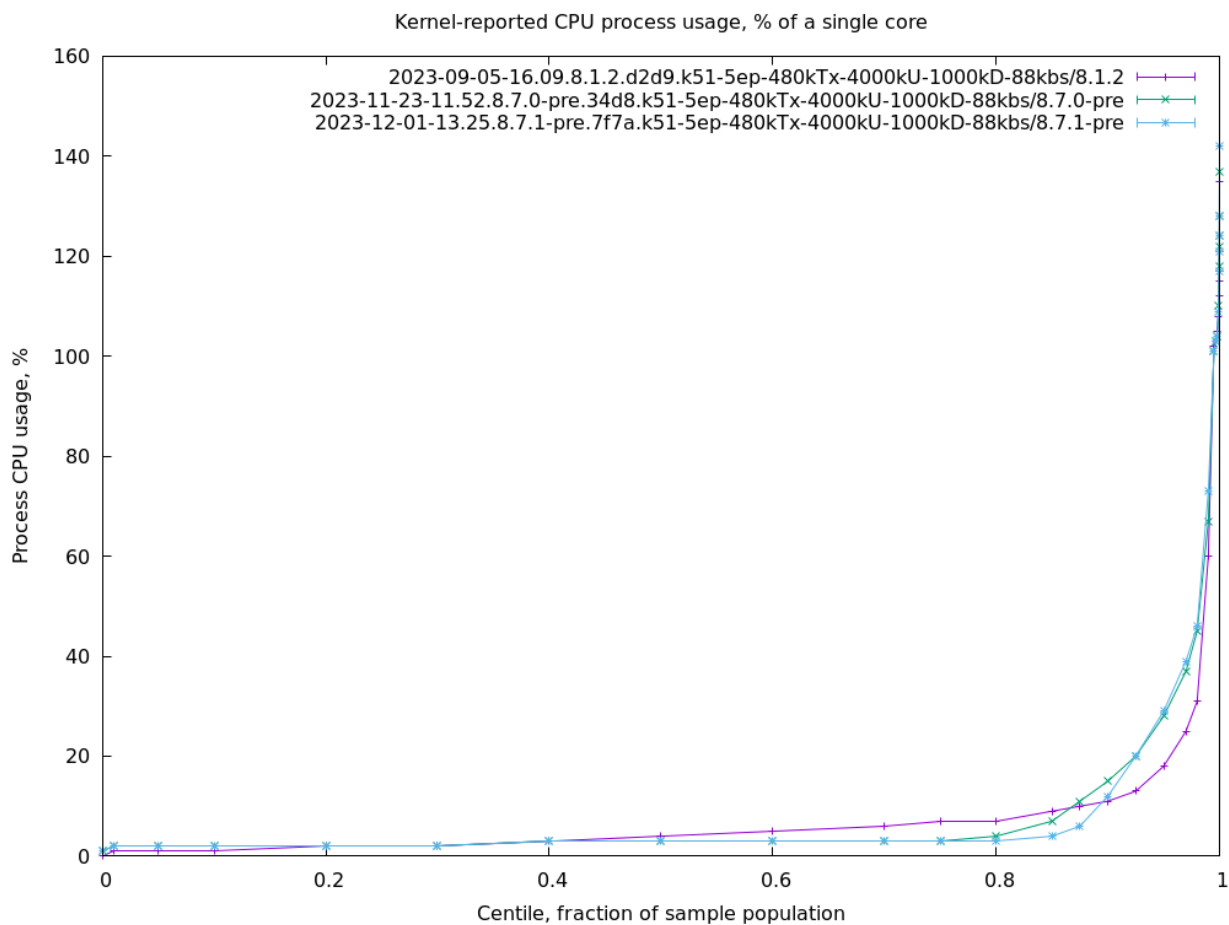
Part I

Appendix A: charts

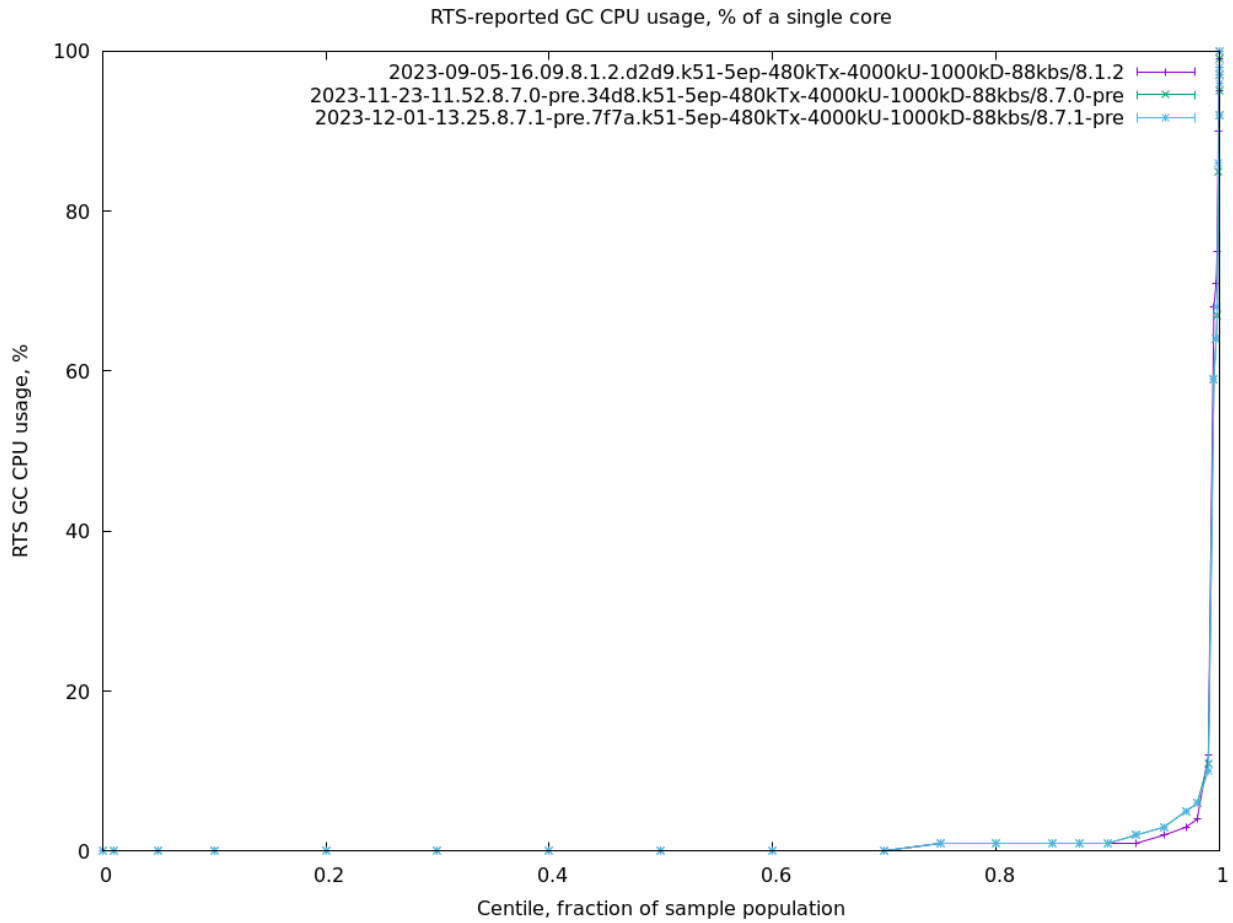
Chapter 3

Cluster performance charts

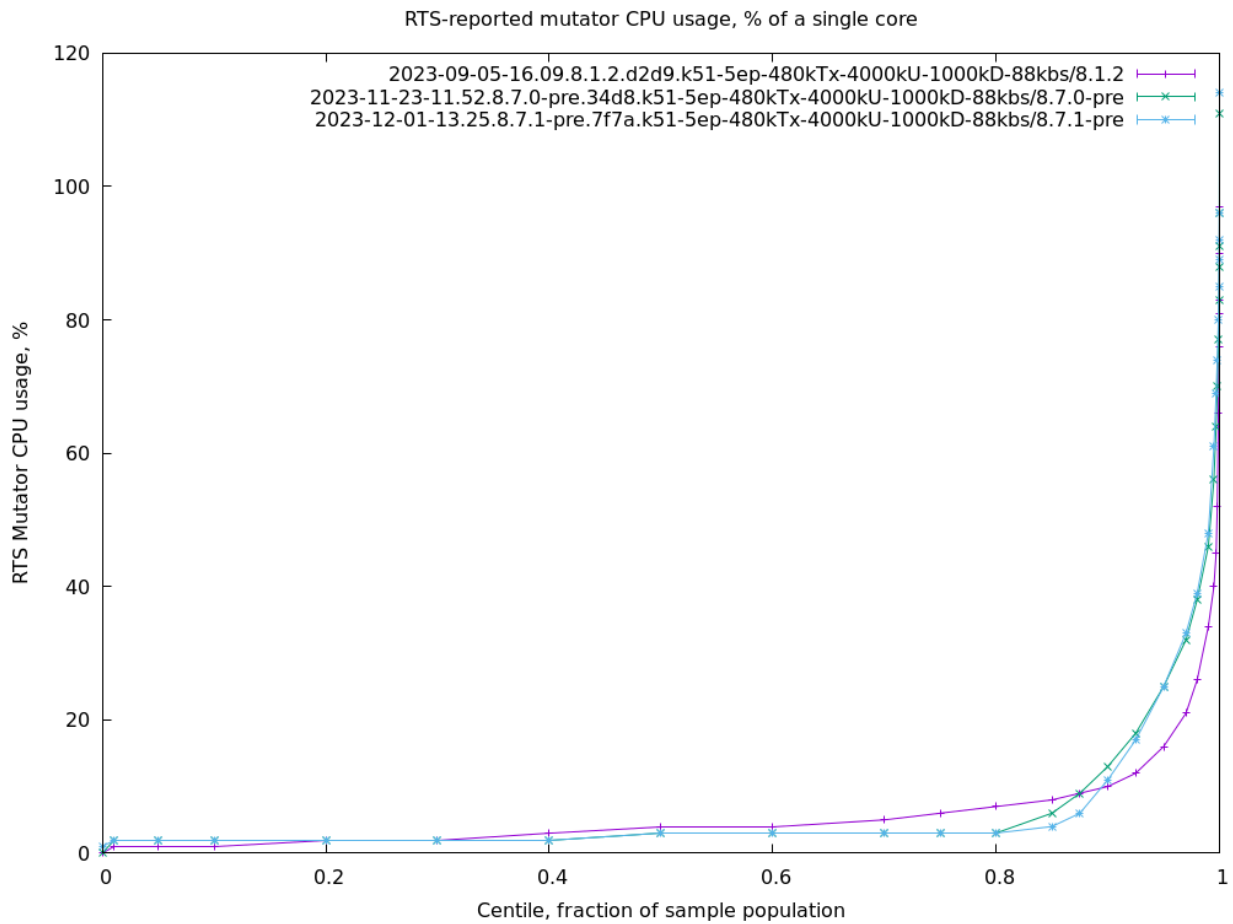
Process CPU usage (CentiCpu) Kernel-reported CPU process usage, % of a single core



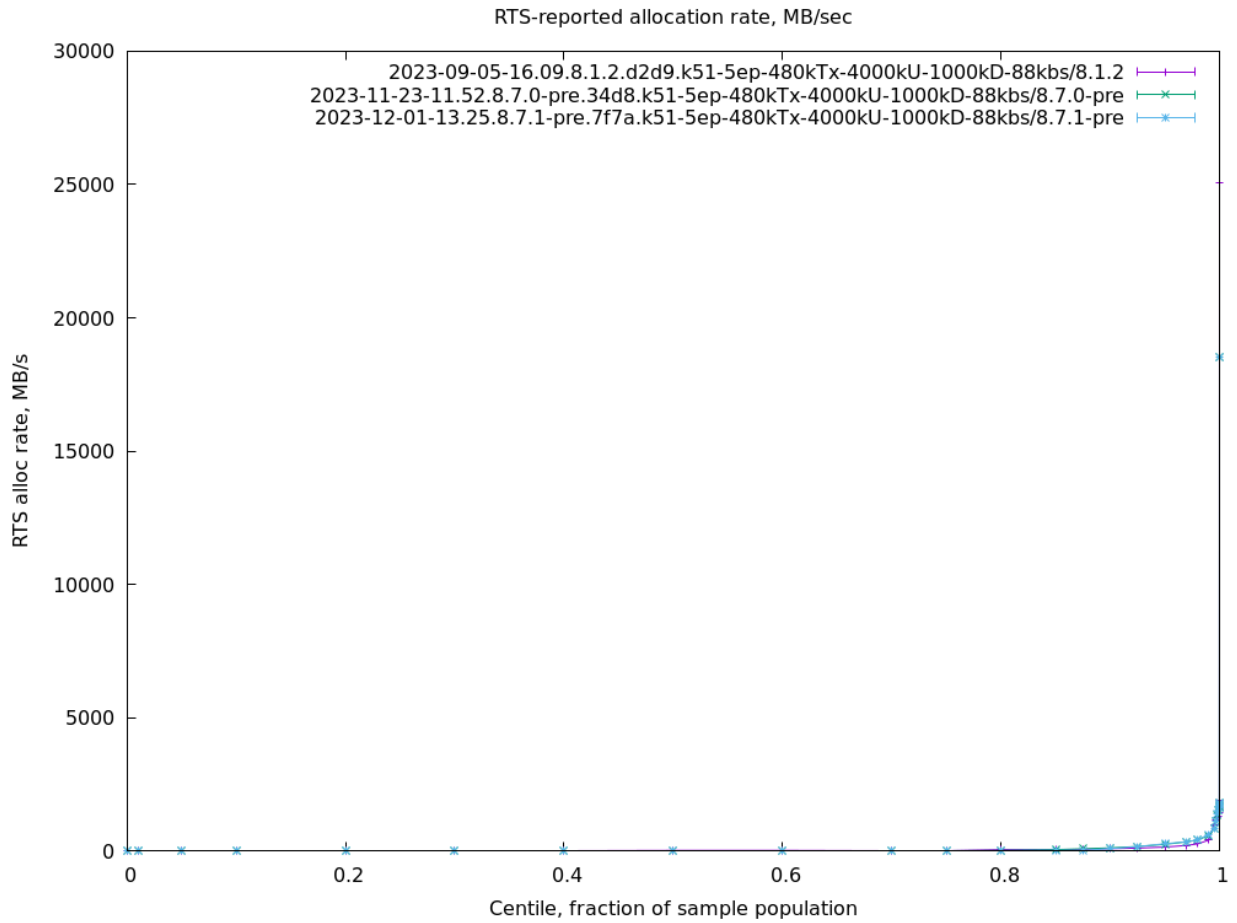
RTS GC CPU usage (CentiGC) RTS-reported GC CPU usage, % of a single core



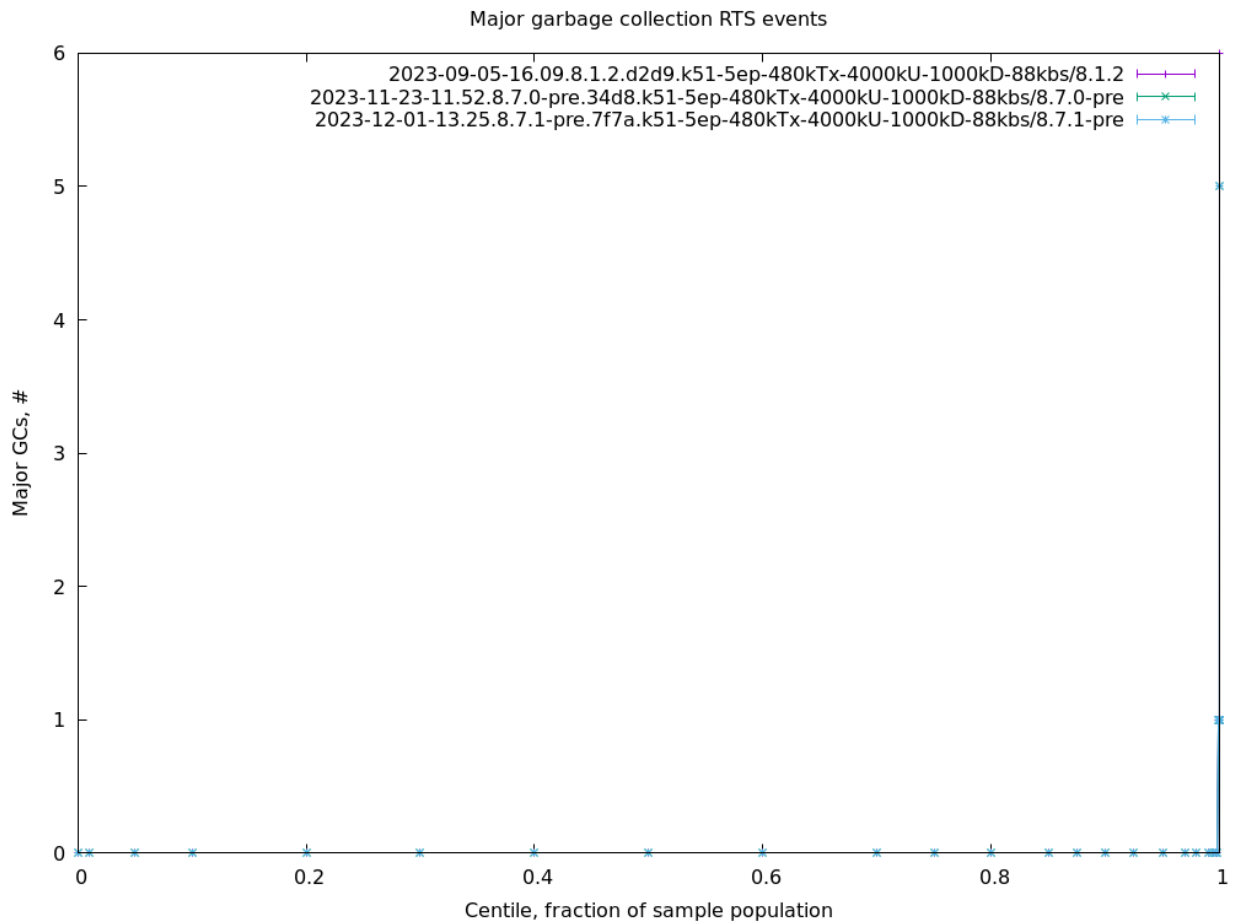
RTS Mutator CPU usage (CentiMut) RTS-reported mutator CPU usage, % of a single core



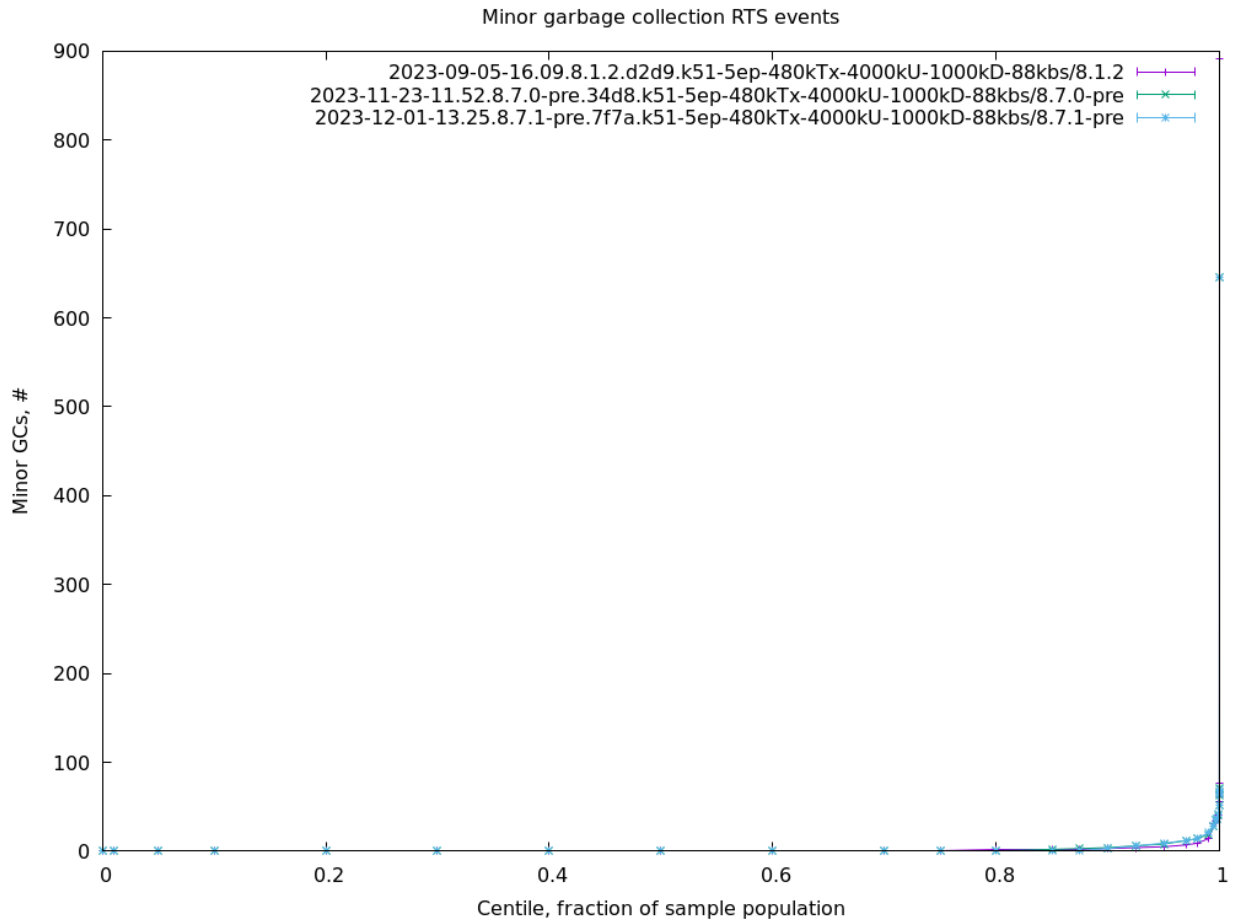
RTS alloc rate (Alloc) RTS-reported allocation rate, MB/sec



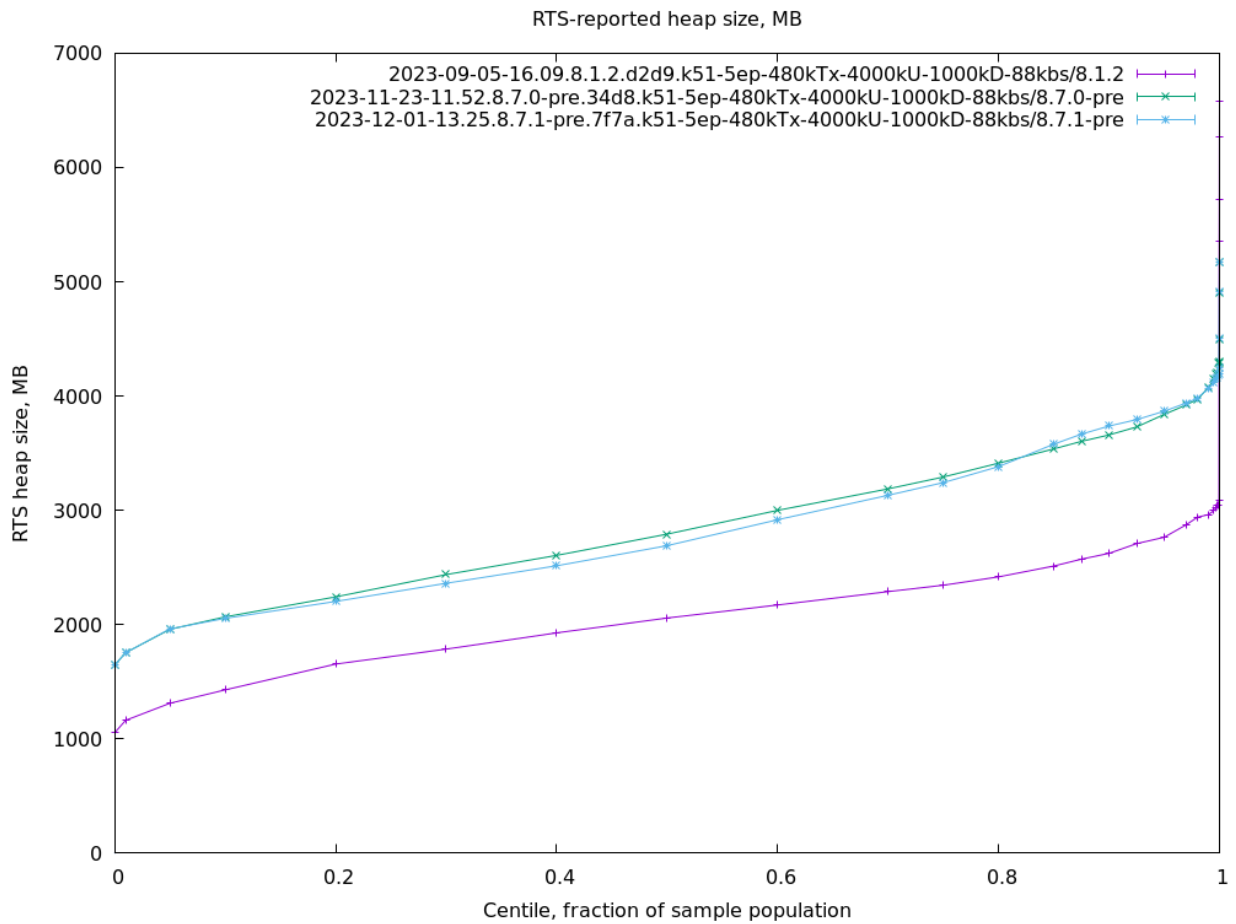
Major GCs (GcsMajor) Major garbage collection RTS events



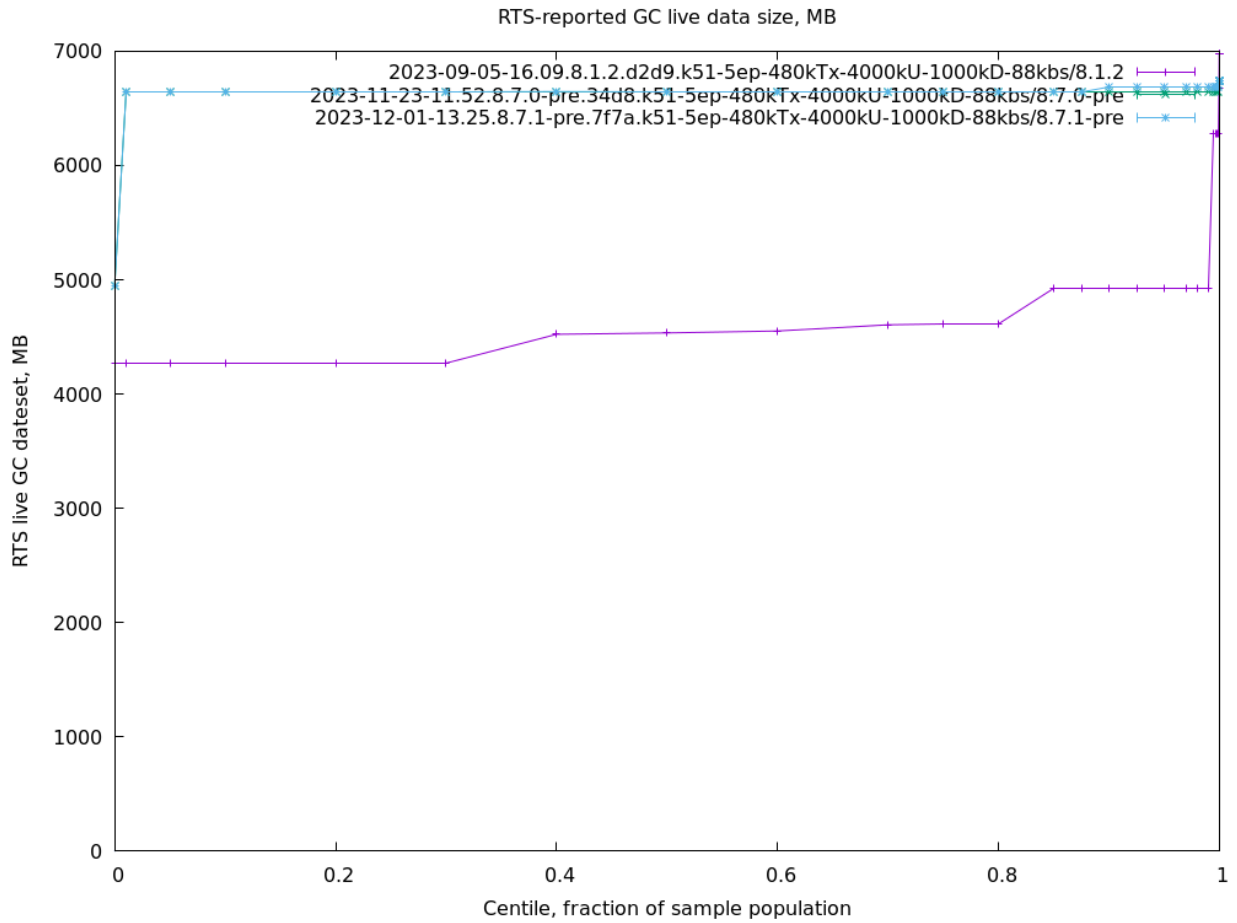
Minor GCs (GcsMinor) Minor garbage collection RTS events



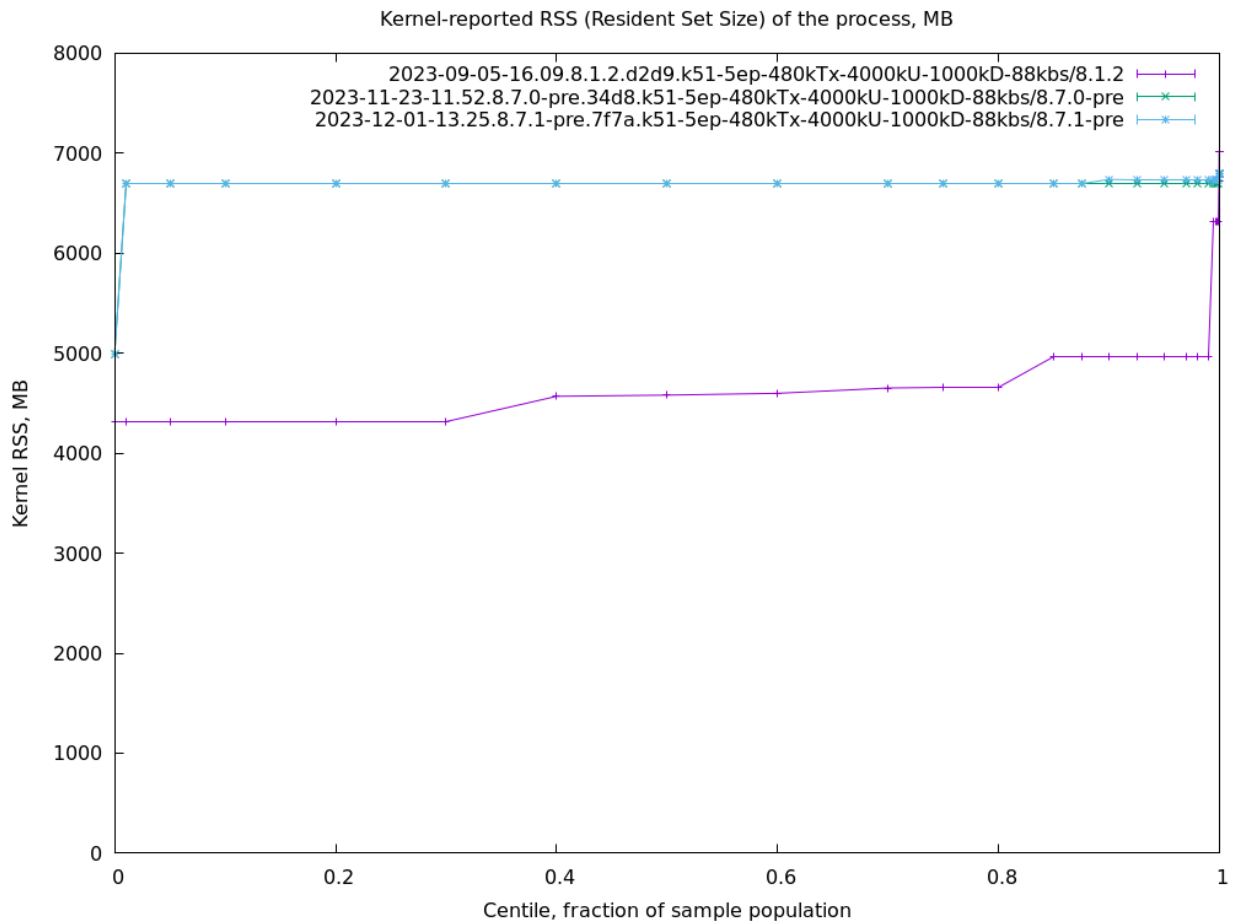
RTS heap size (Heap) RTS-reported heap size, MB



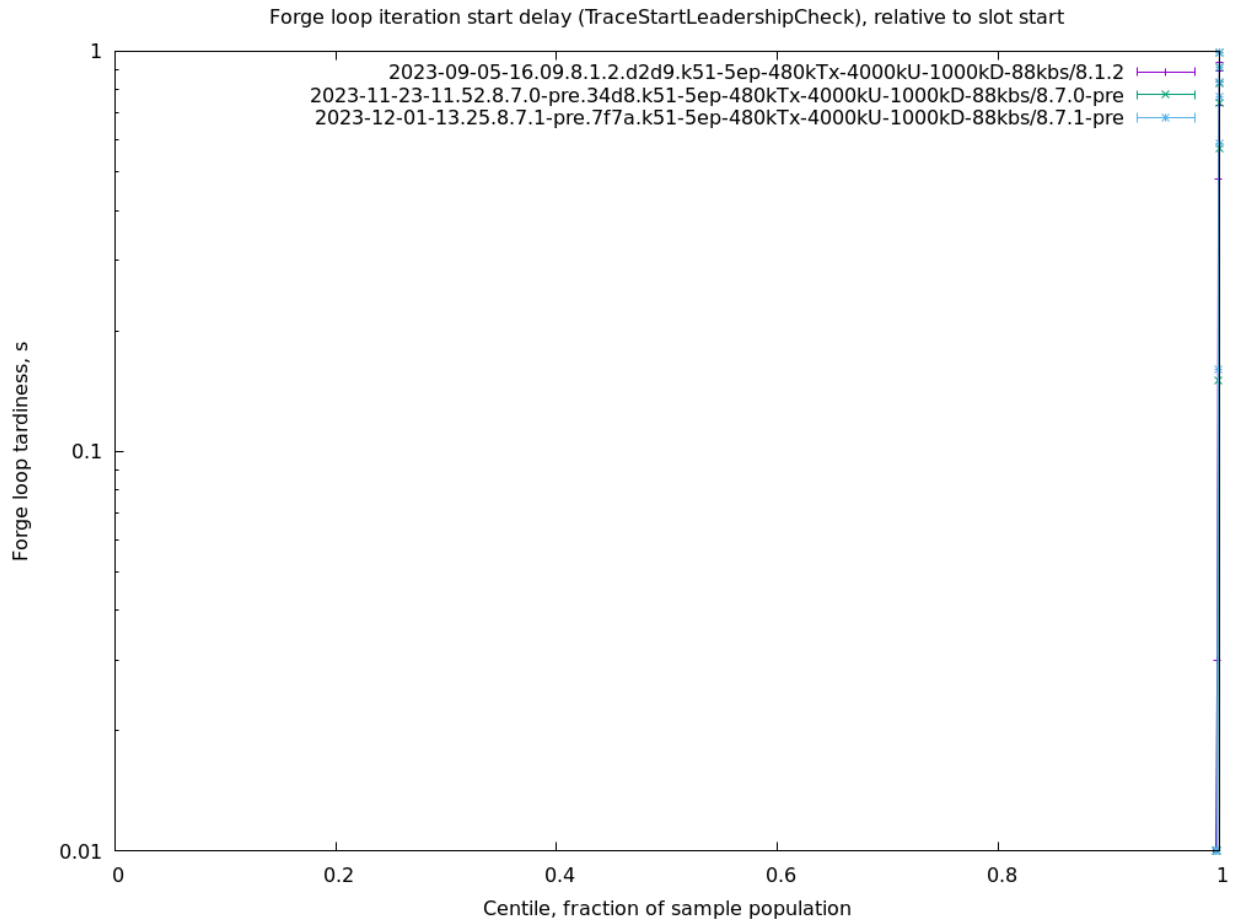
RTS live GC dataset (Live) RTS-reported GC live data size, MB



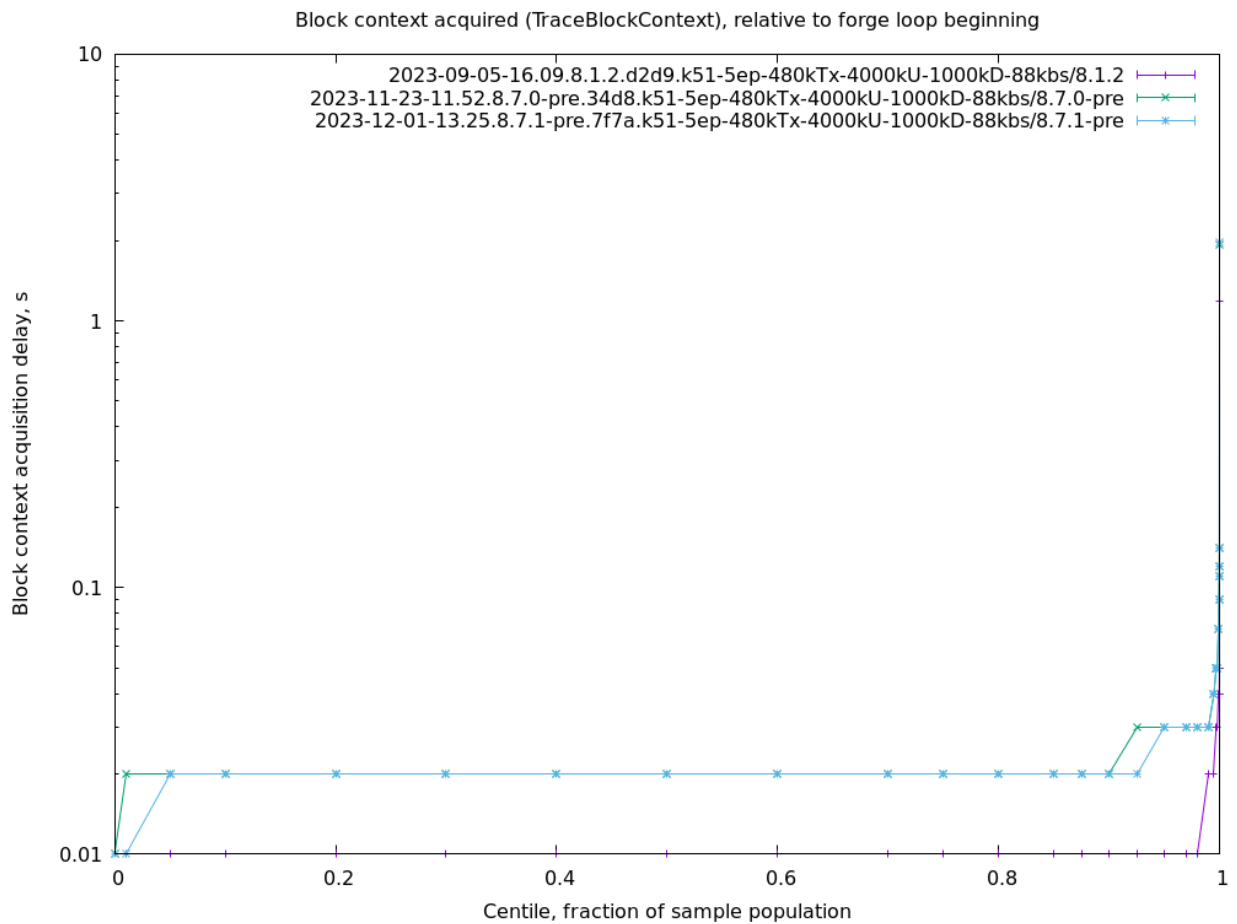
Kernel RSS (RSS) Kernel-reported RSS (Resident Set Size) of the process, MB



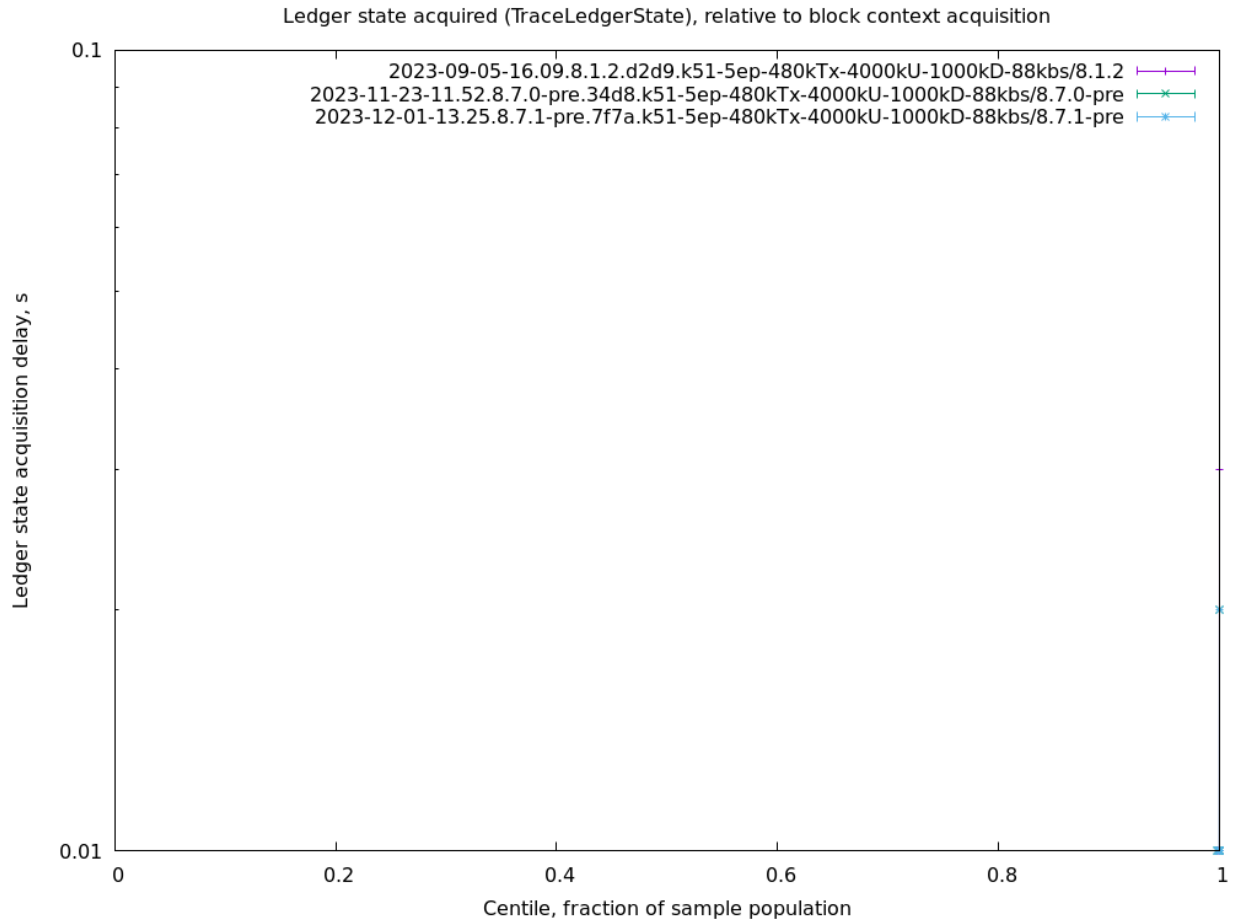
Forge loop tardiness (cdfStarted) Forge loop iteration start delay (TraceStartLeadershipCheck), relative to slot start



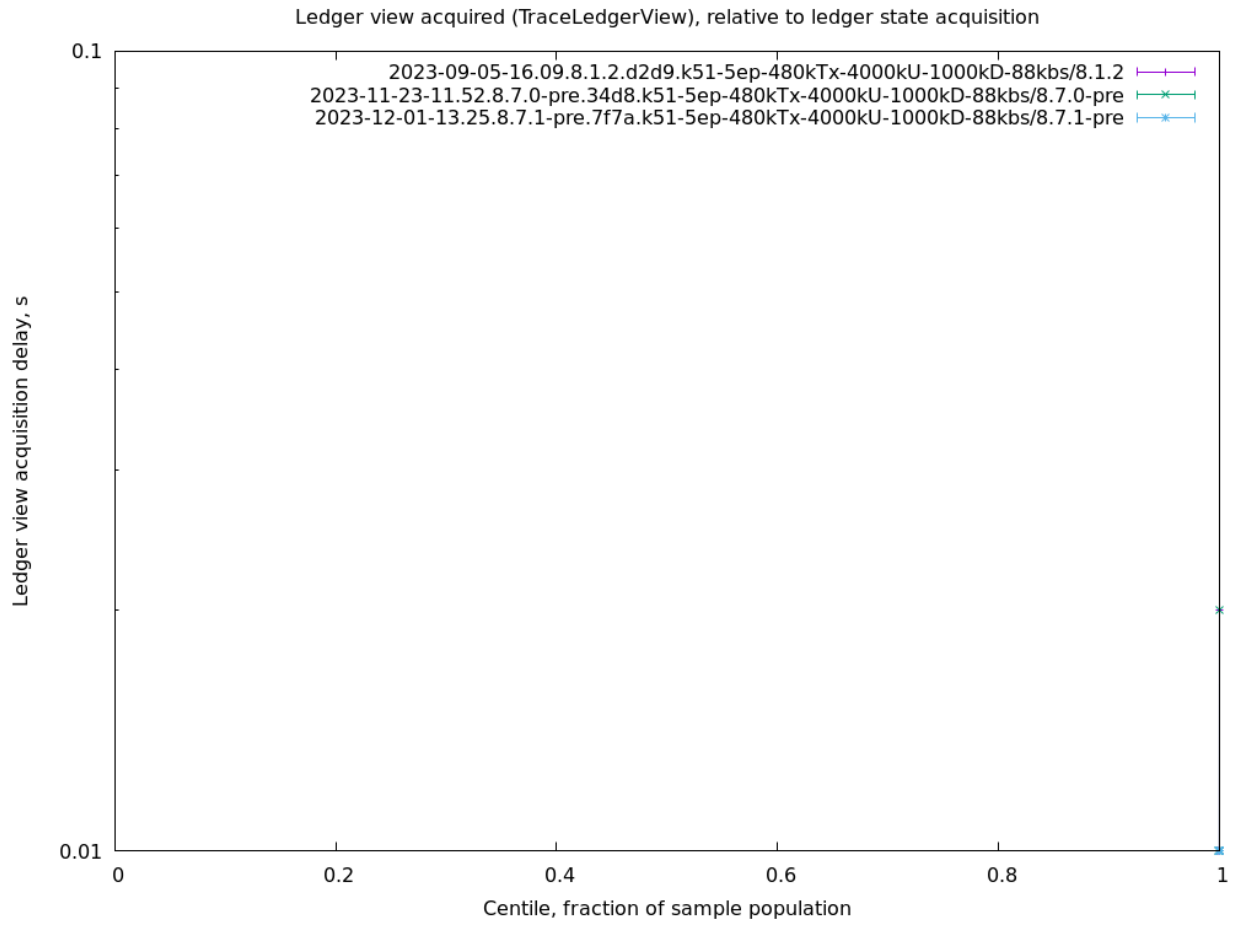
Block context acquisition delay (cdfBlkCtx) Block context acquired (TraceBlockContext), relative to forge loop beginning



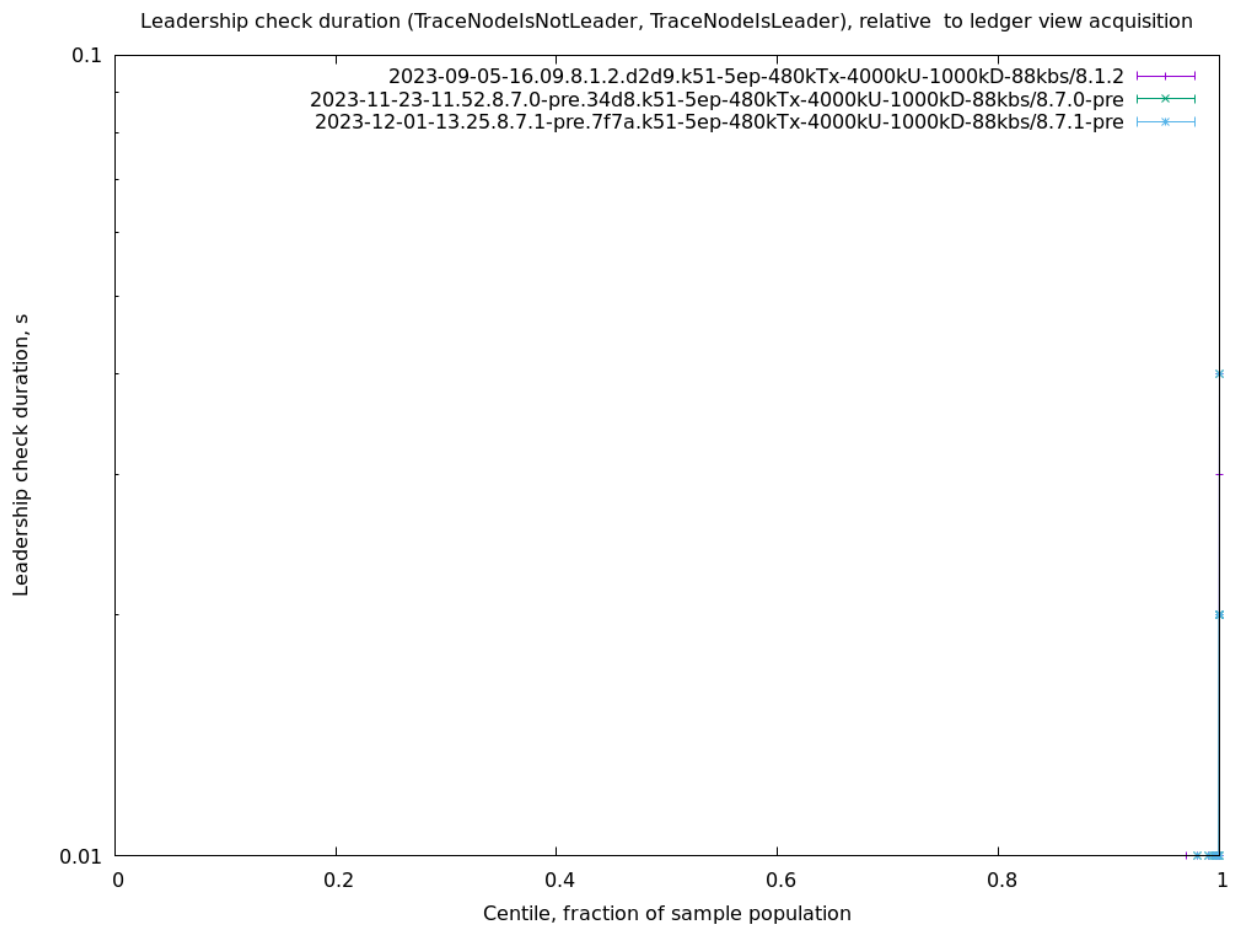
Ledger state acquisition delay (cdfLgrState) Ledger state acquired (TraceLedgerState), relative to block context acquisition



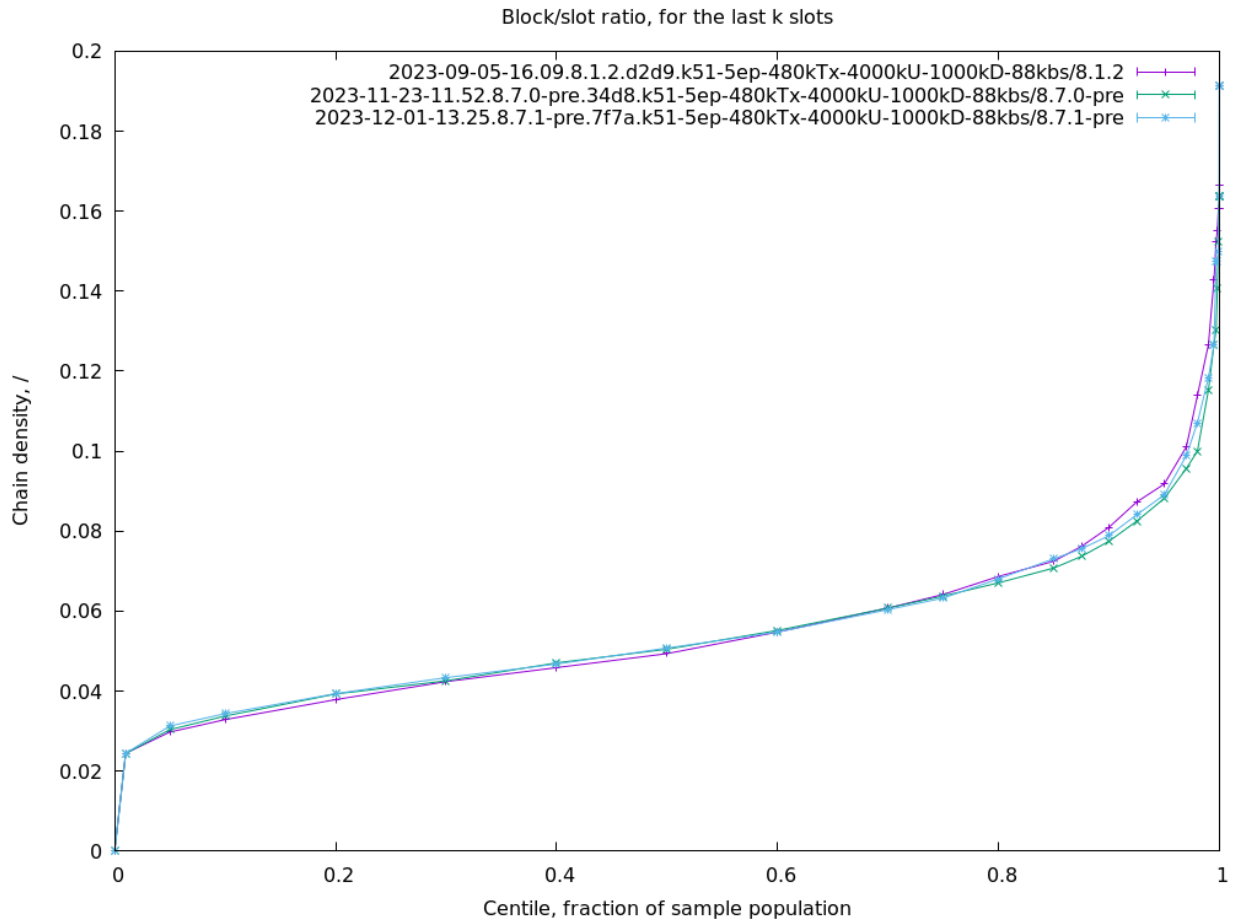
Ledger view acquisition delay (cdfLgrView) Ledger view acquired (TraceLedgerView), relative to ledger state acquisition



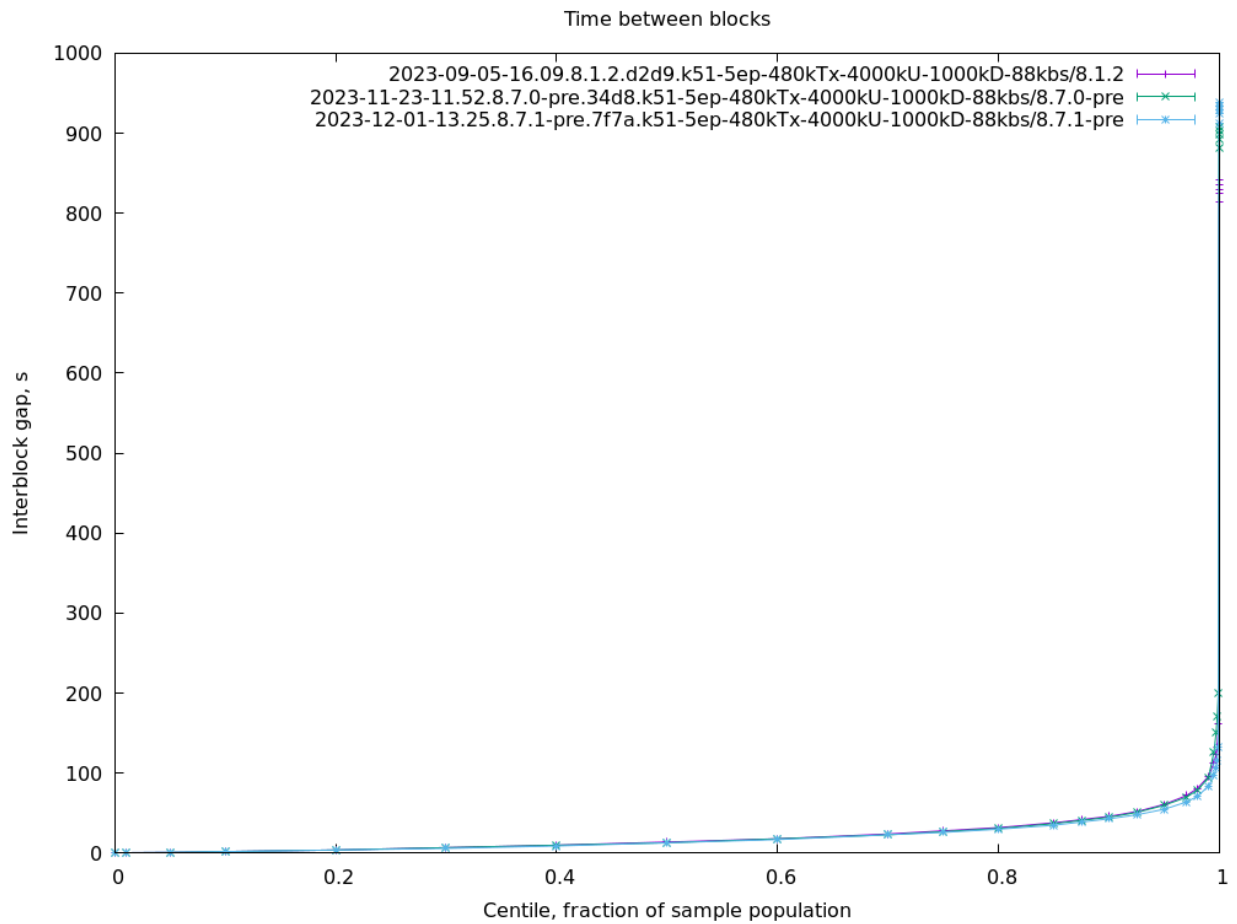
Leadership check duration (cdfLeading) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition



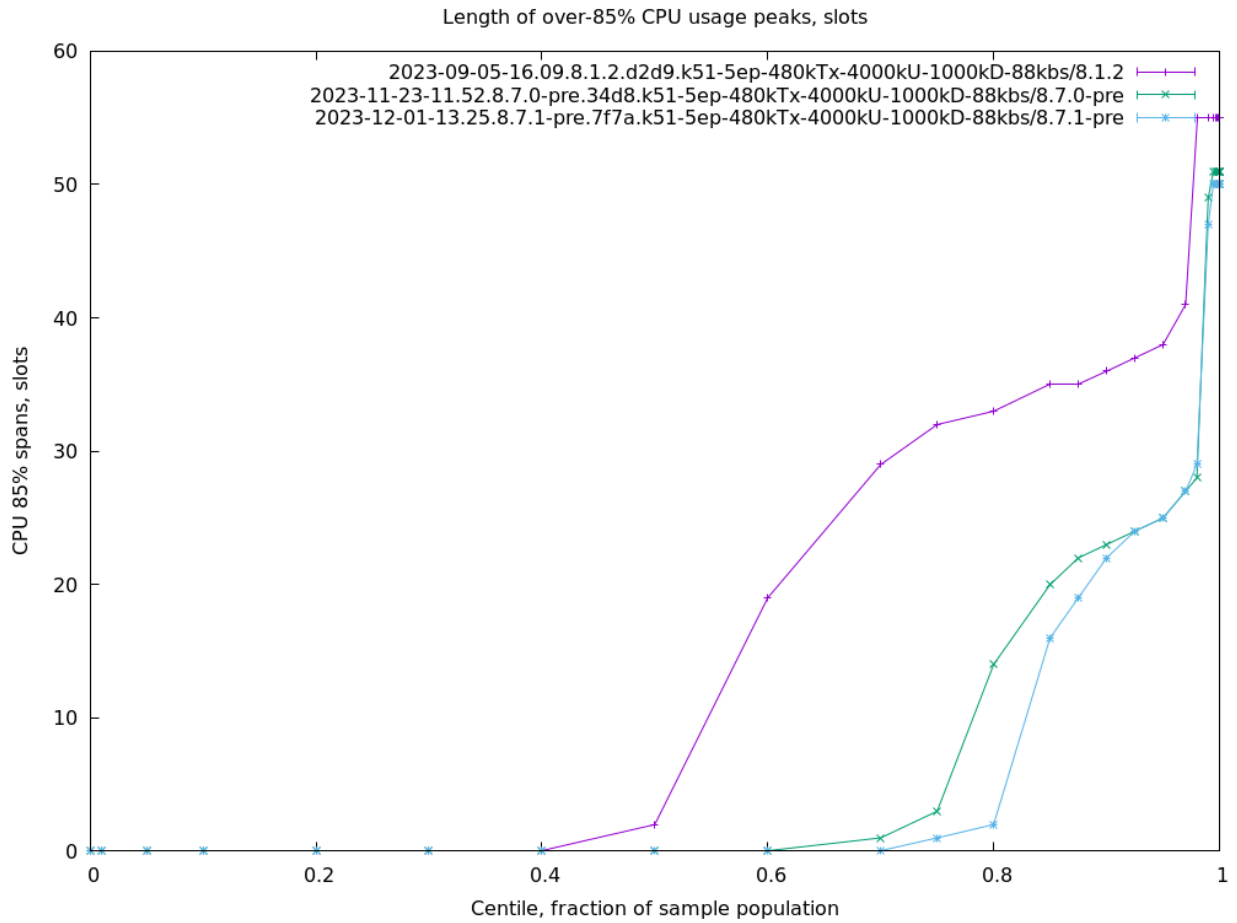
Chain density (cdfDensity) Block/slot ratio, for the last 'k' slots



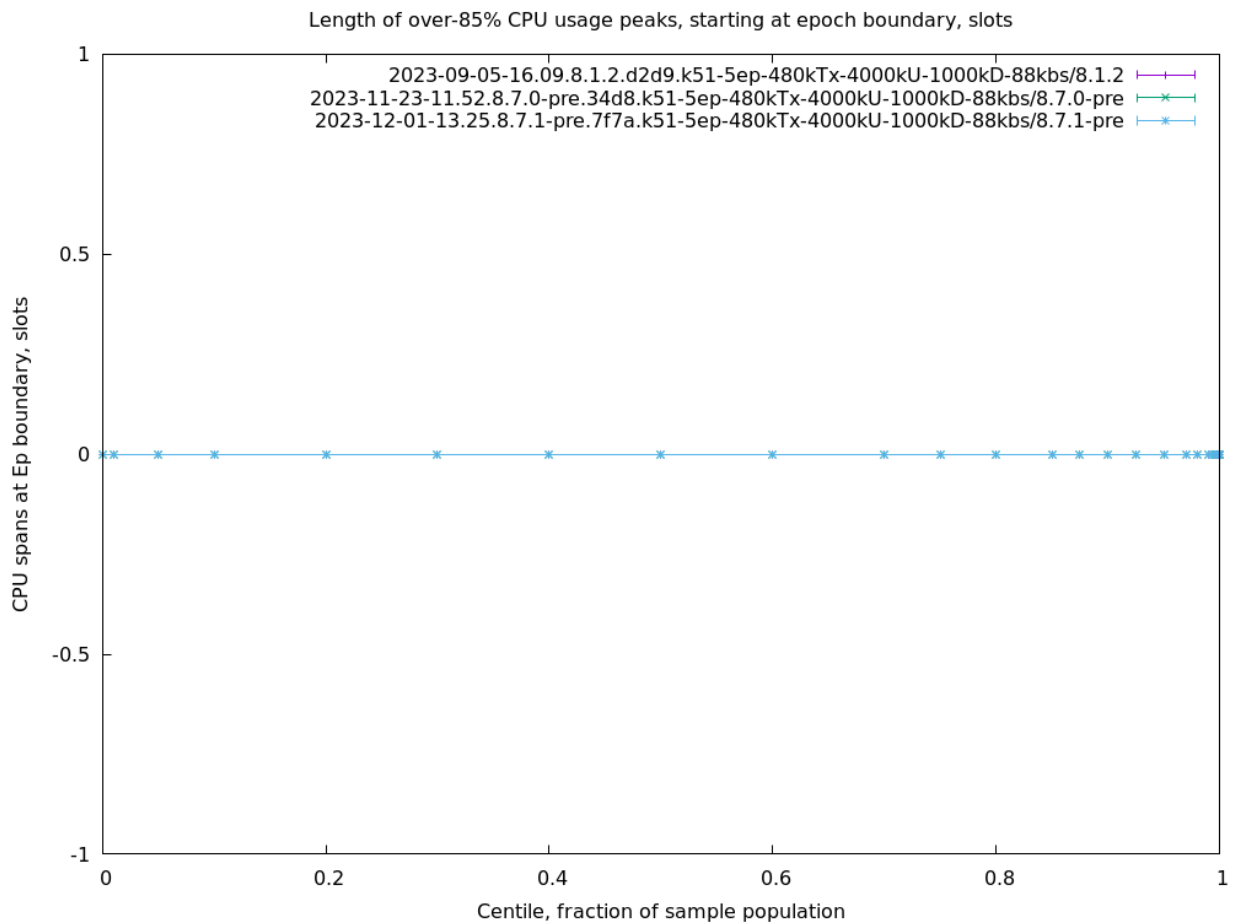
Interblock gap (cdfBlockGap) Time between blocks



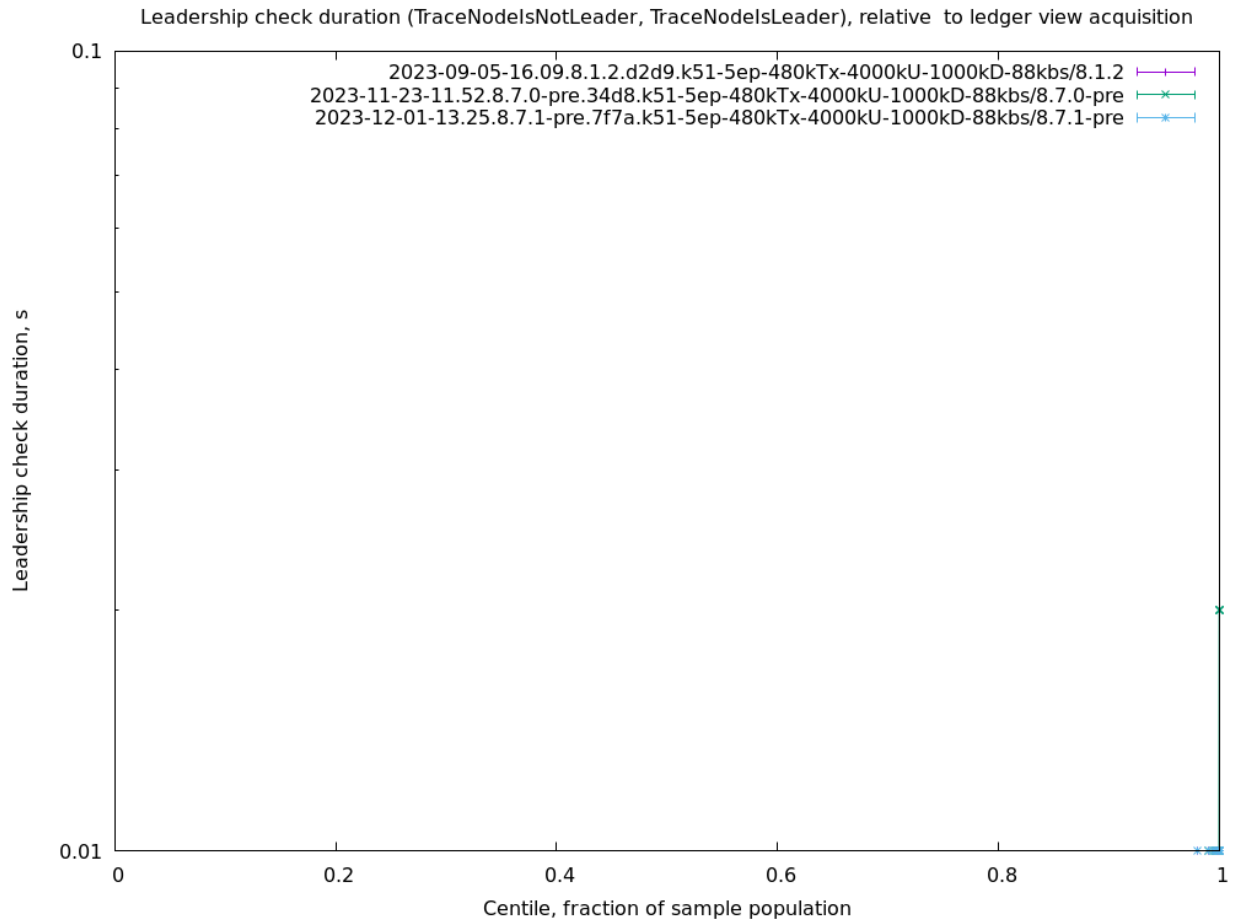
CPU 85% spans (cdfSpanLensCpu) Length of over-85% CPU usage peaks, slots



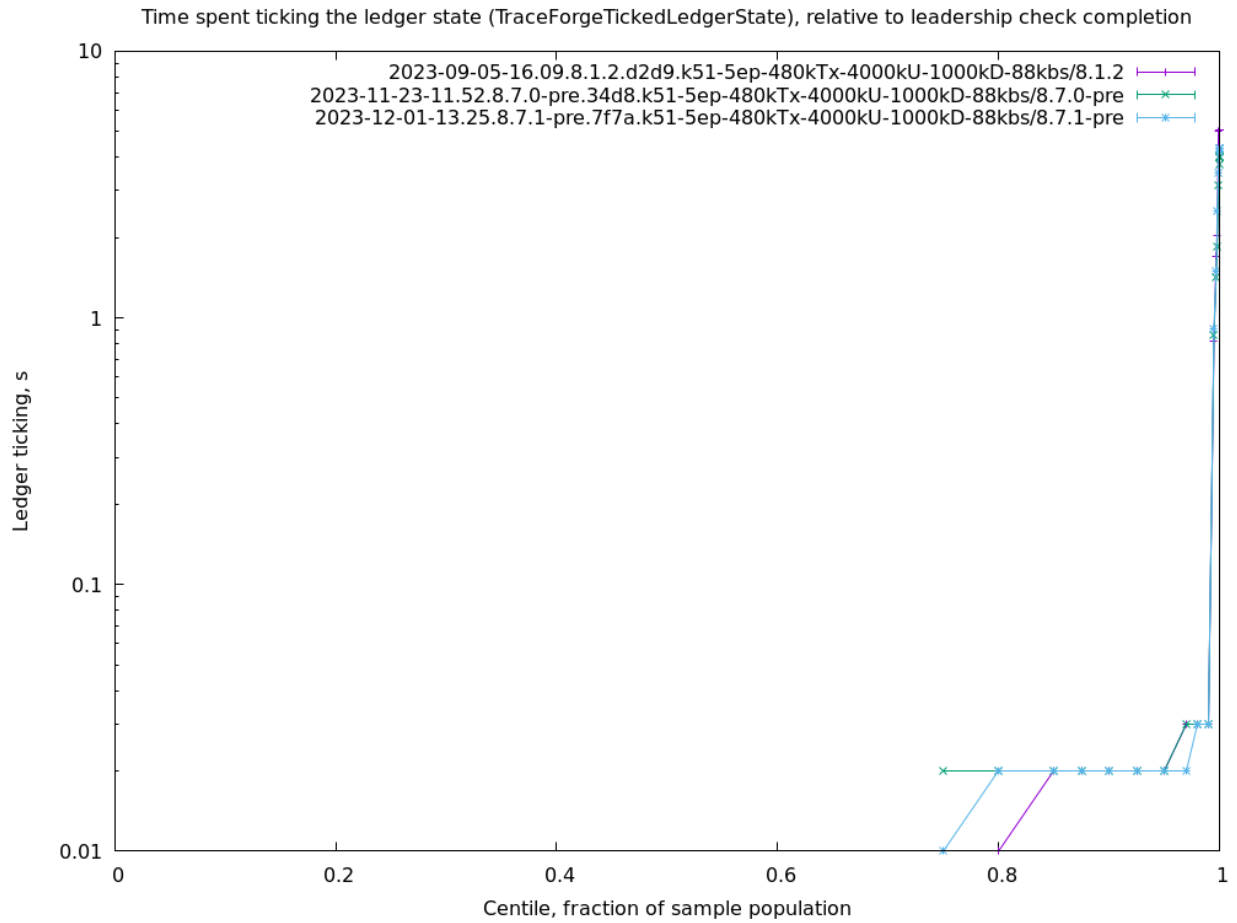
CPU spans at Ep boundary (cdfSpanLensCpuEpoch) Length of over-85% CPU usage peaks, starting at epoch boundary, slots



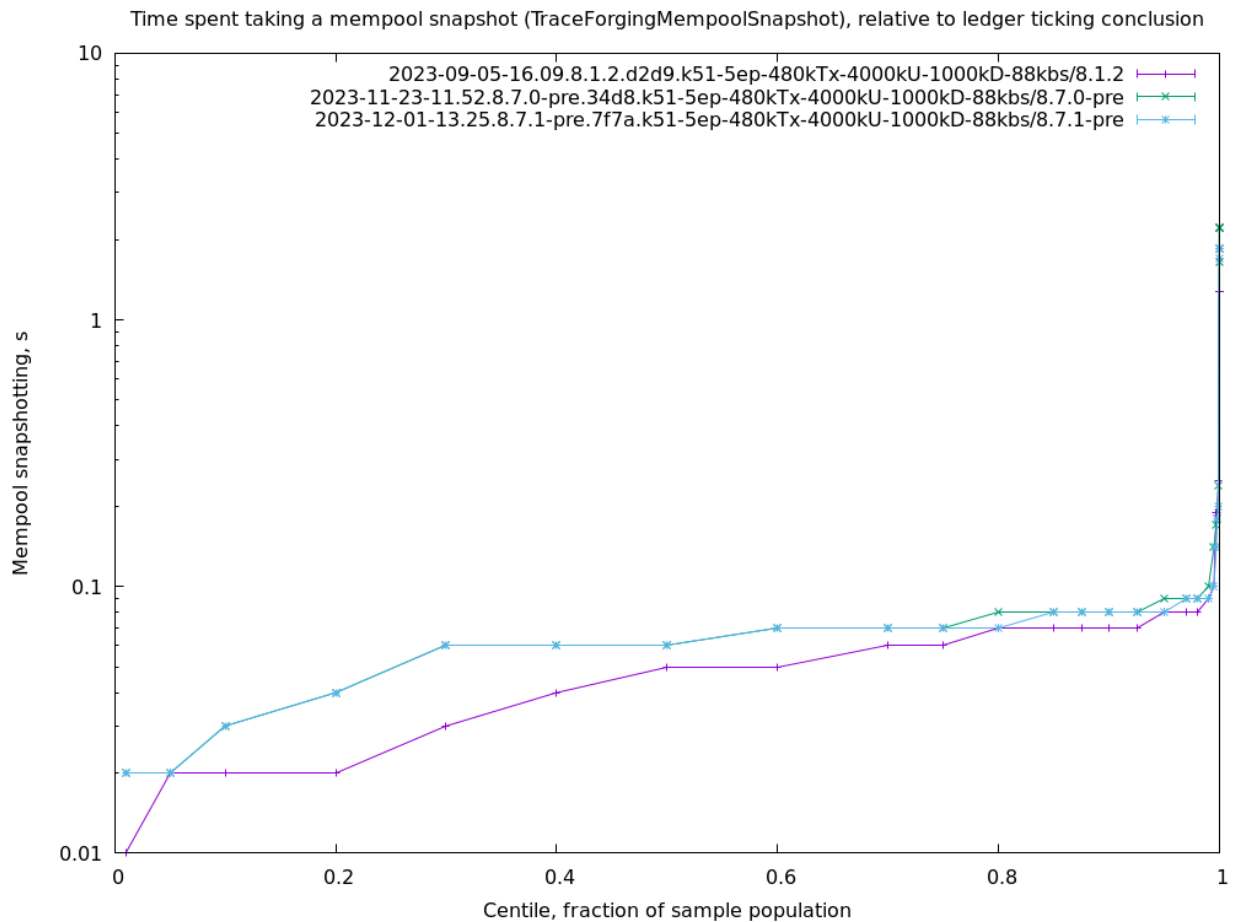
Leadership check duration (cdfForgerLead) Leadership check duration (TraceNodeIsNotLeader, TraceNodeIsLeader), relative to ledger view acquisition



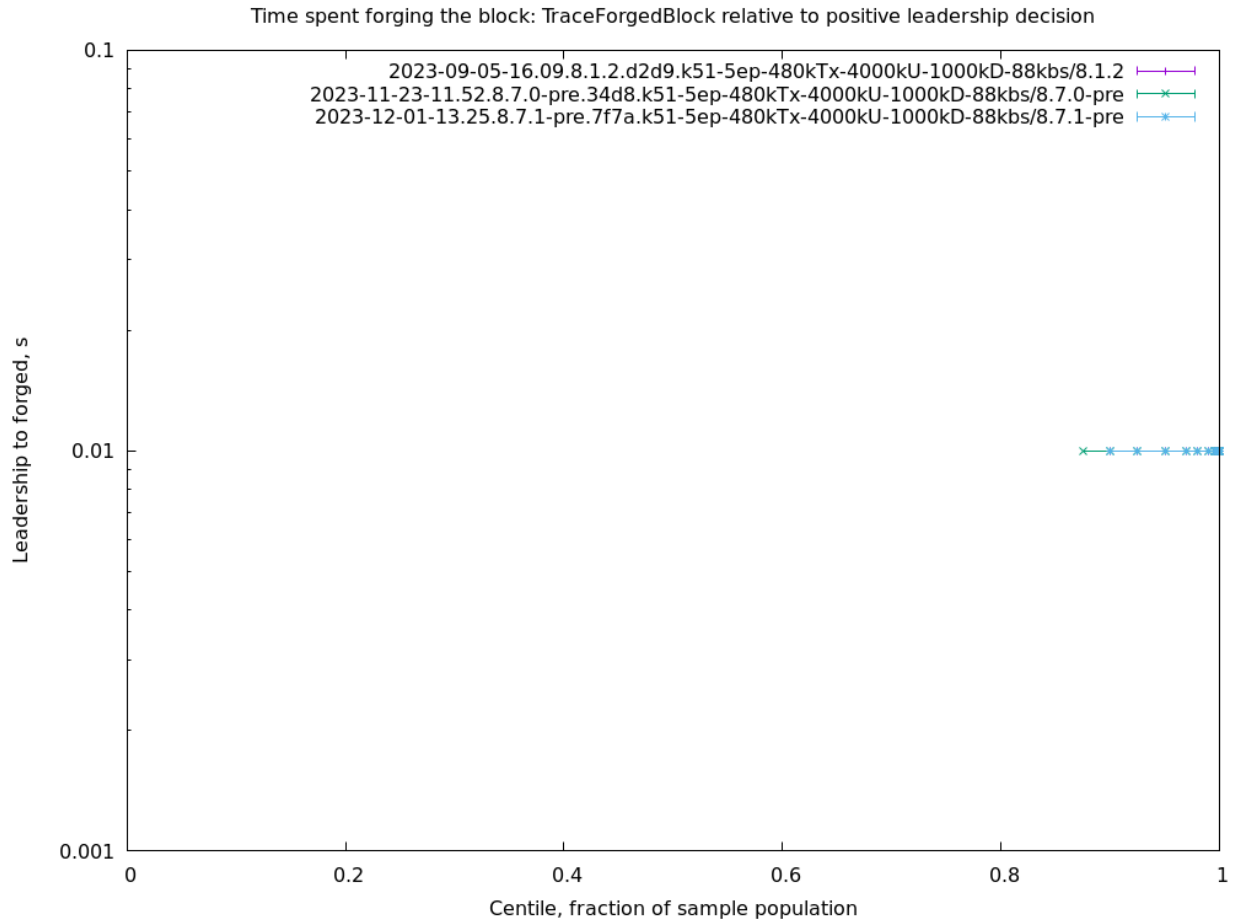
Ledger ticking (cdfForgerTicked) Time spent ticking the ledger state (TraceForgeTickedLedgerState), relative to leadership check completion



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

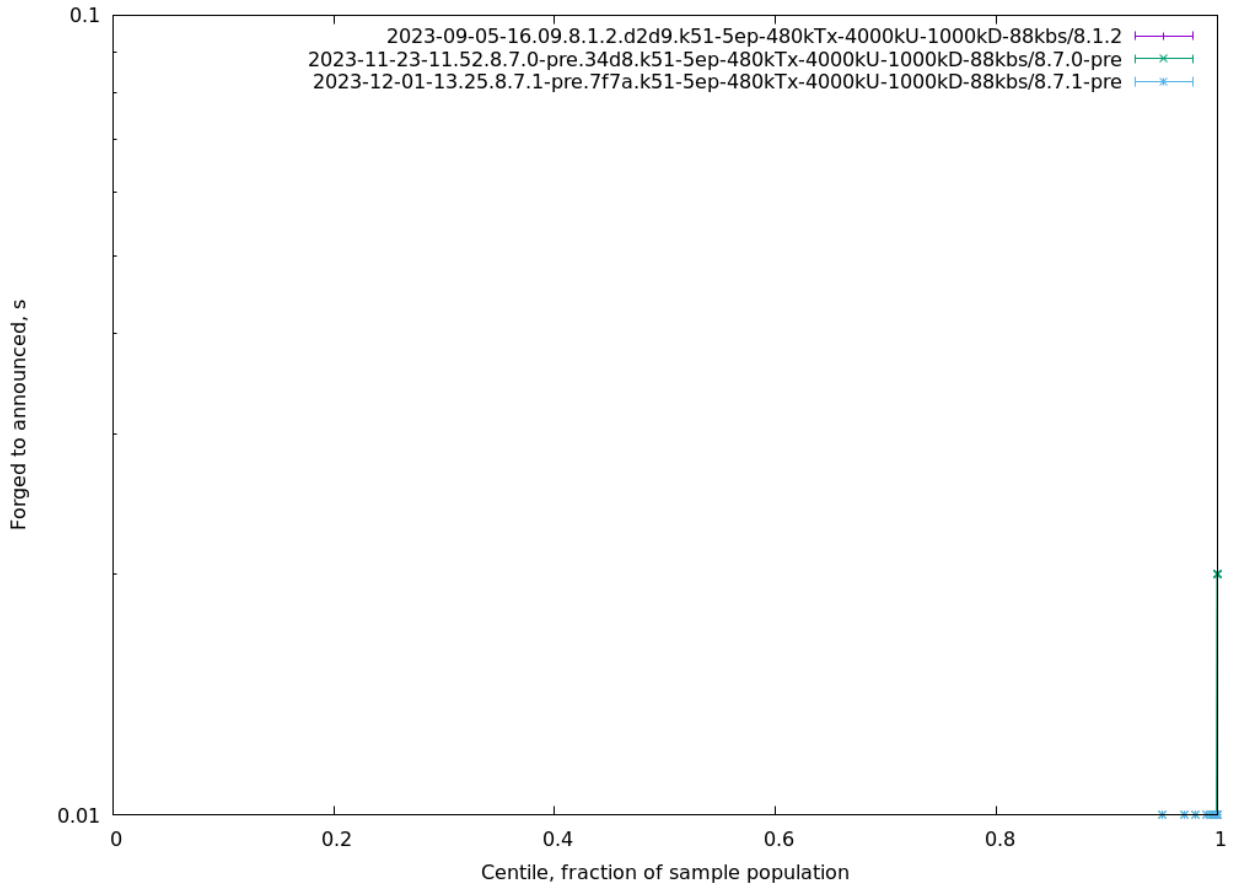


Leadership to forged (cdfForgerForge) Time spent forging the block: TraceForgedBlock relative to positive leadership decision



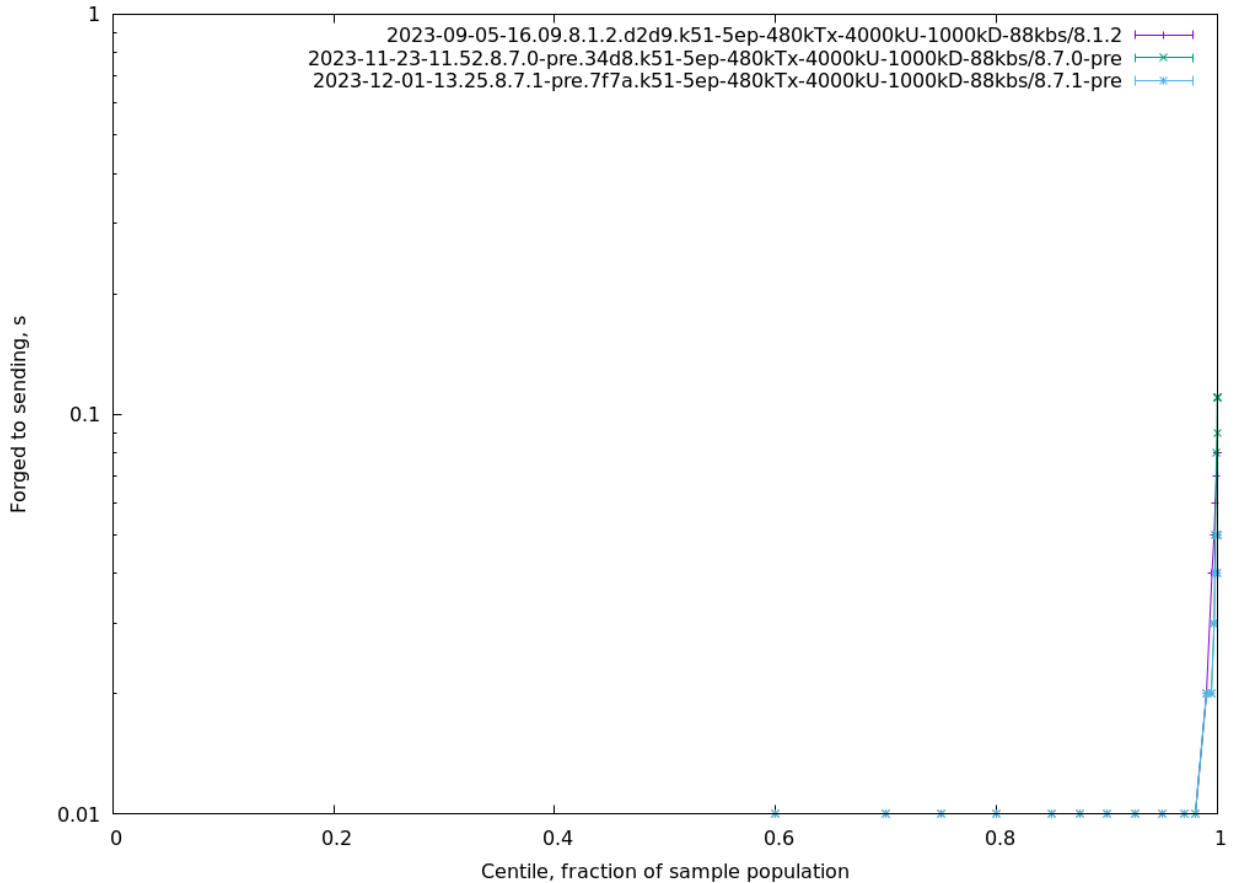
Forged to announced (cdfForgerAnnounce) Time between block forging completion and header announcement (ChainSyncServerEvent.TraceChainSyncServerRead.AddBlock)

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

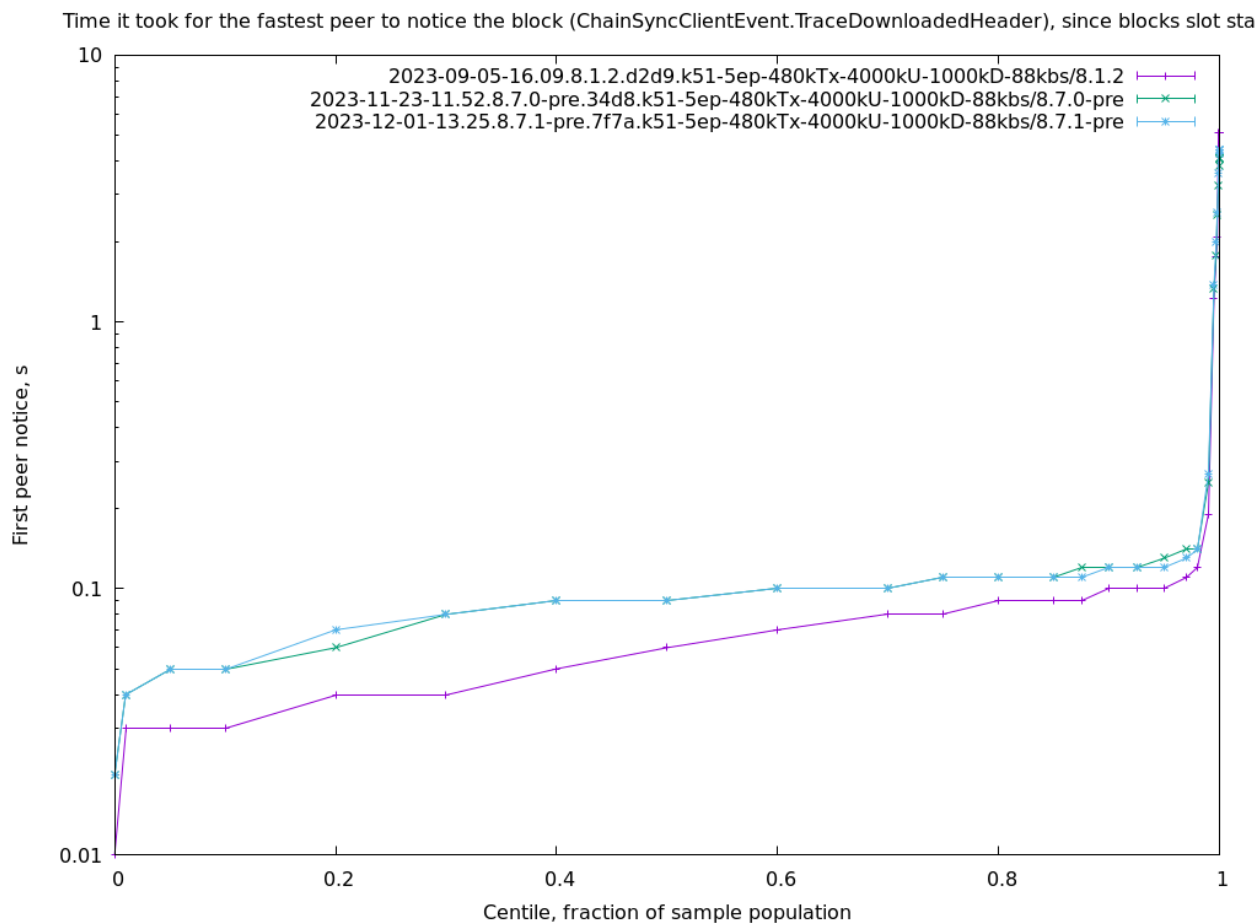


Forged to sending (cdfForgerSend) Time between block forging completion and begin-of-sending (TraceBlockFetchServerSendBlock)

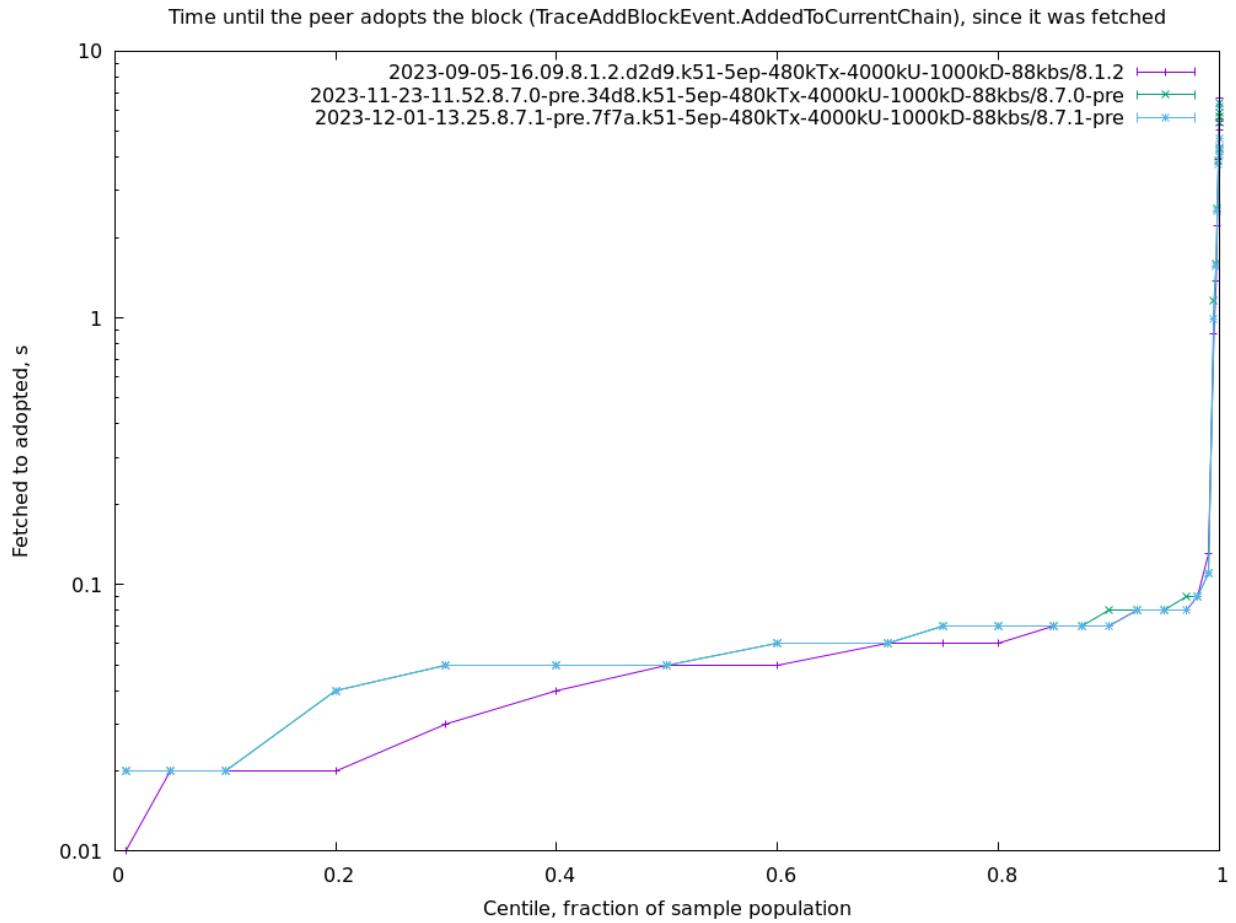
Time between block forging completion and begin-of-sending (TraceBlockFetchServerSendBlock)



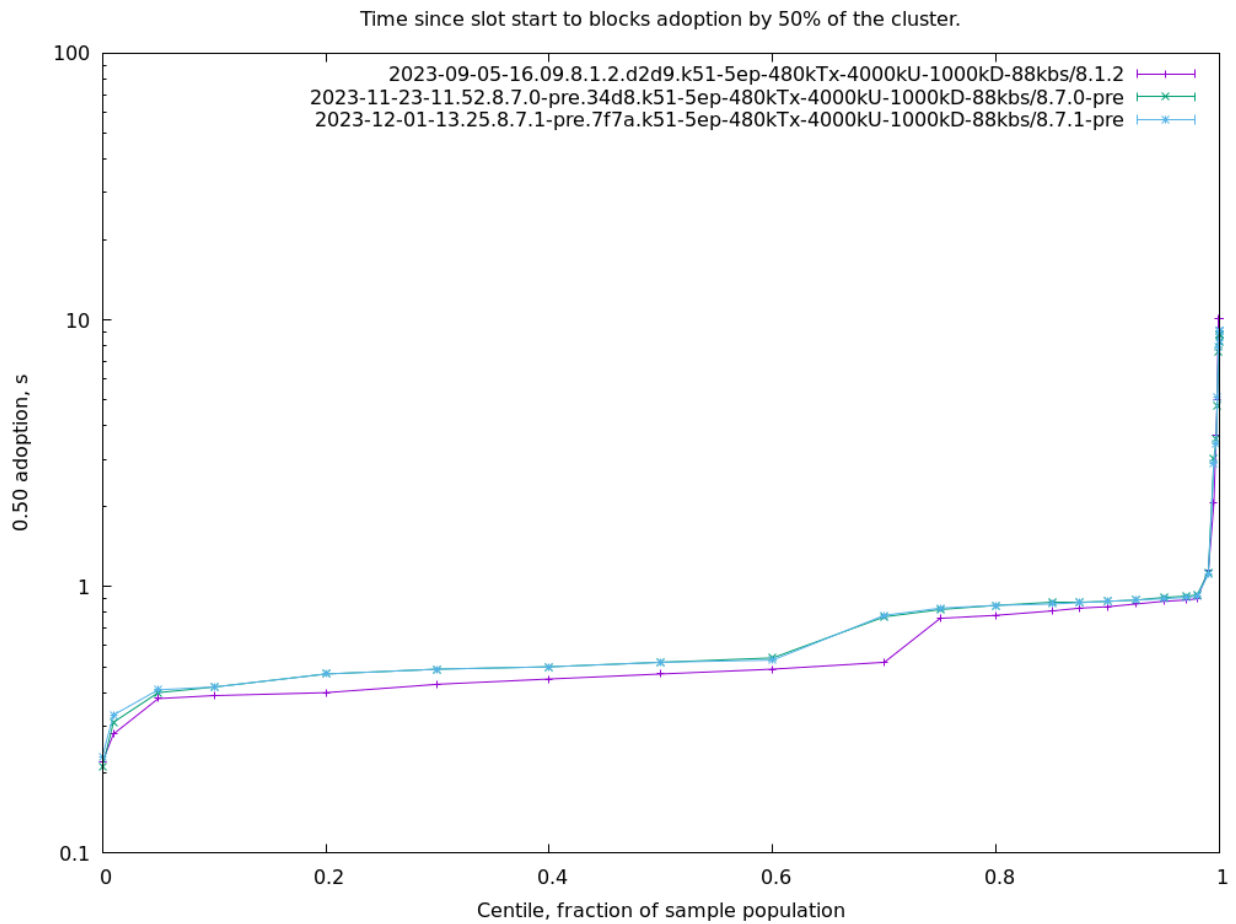
First peer notice (cdfPeerNoticeFirst) Time it took for the fastest peer to notice the block (ChainSyncClientEvent.TraceDownloadedHeader), since block's slot start



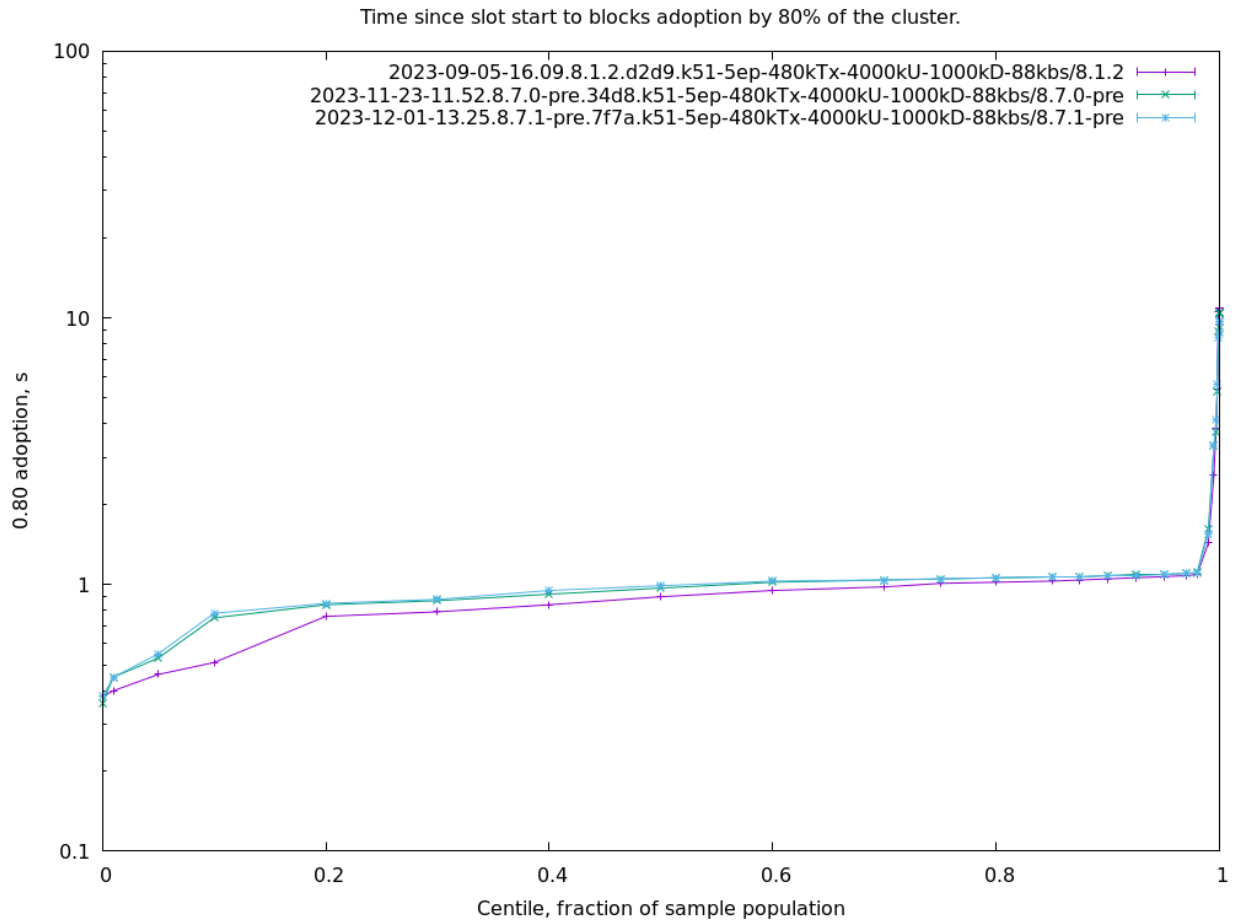
Fetches to adopted (cdfPeerAdoption) Time until the peer adopts the block (TraceAddBlockEvent.AddedToCurrentChain), since it was fetched



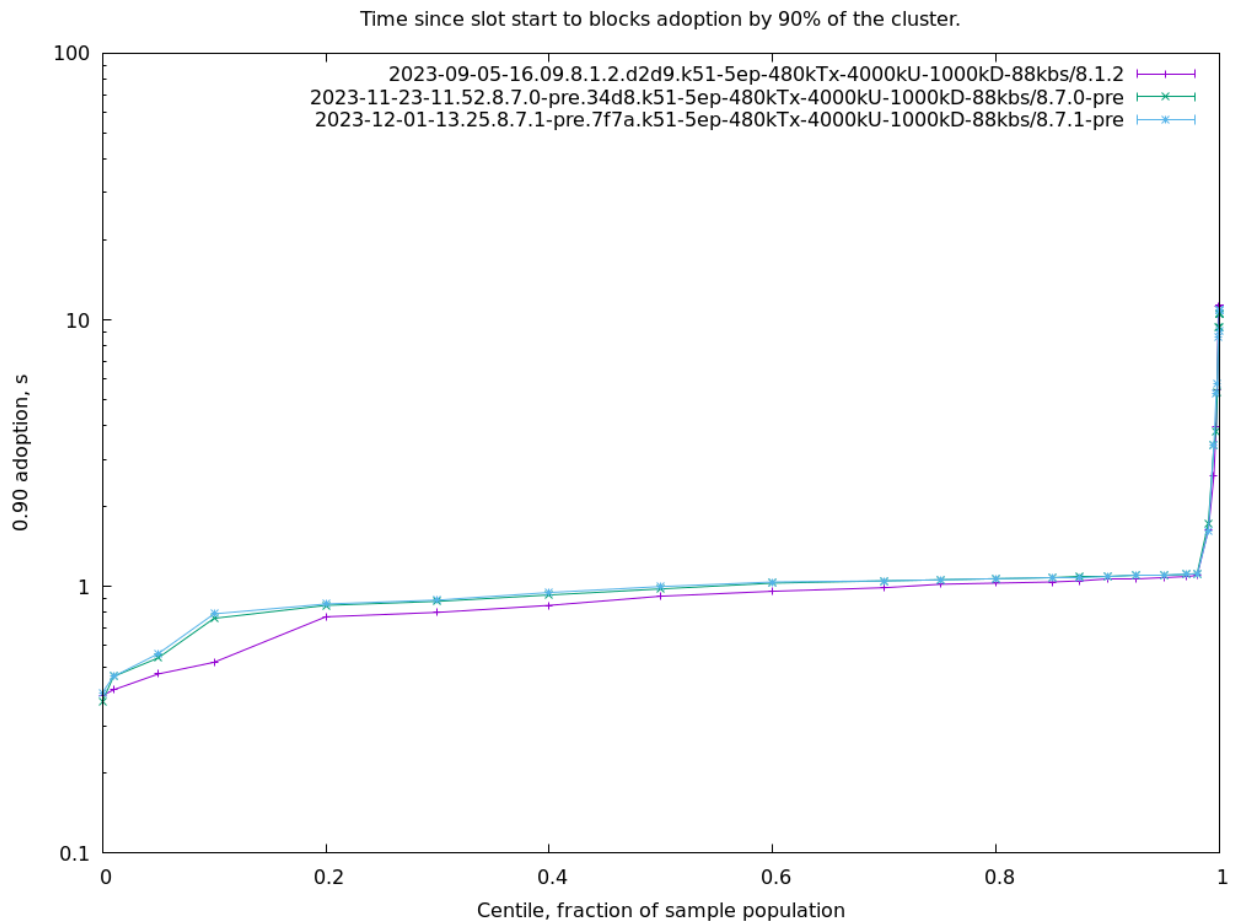
0.50 adoption (cdf0.50) Time since slot start to block's adoption by 50% of the cluster.



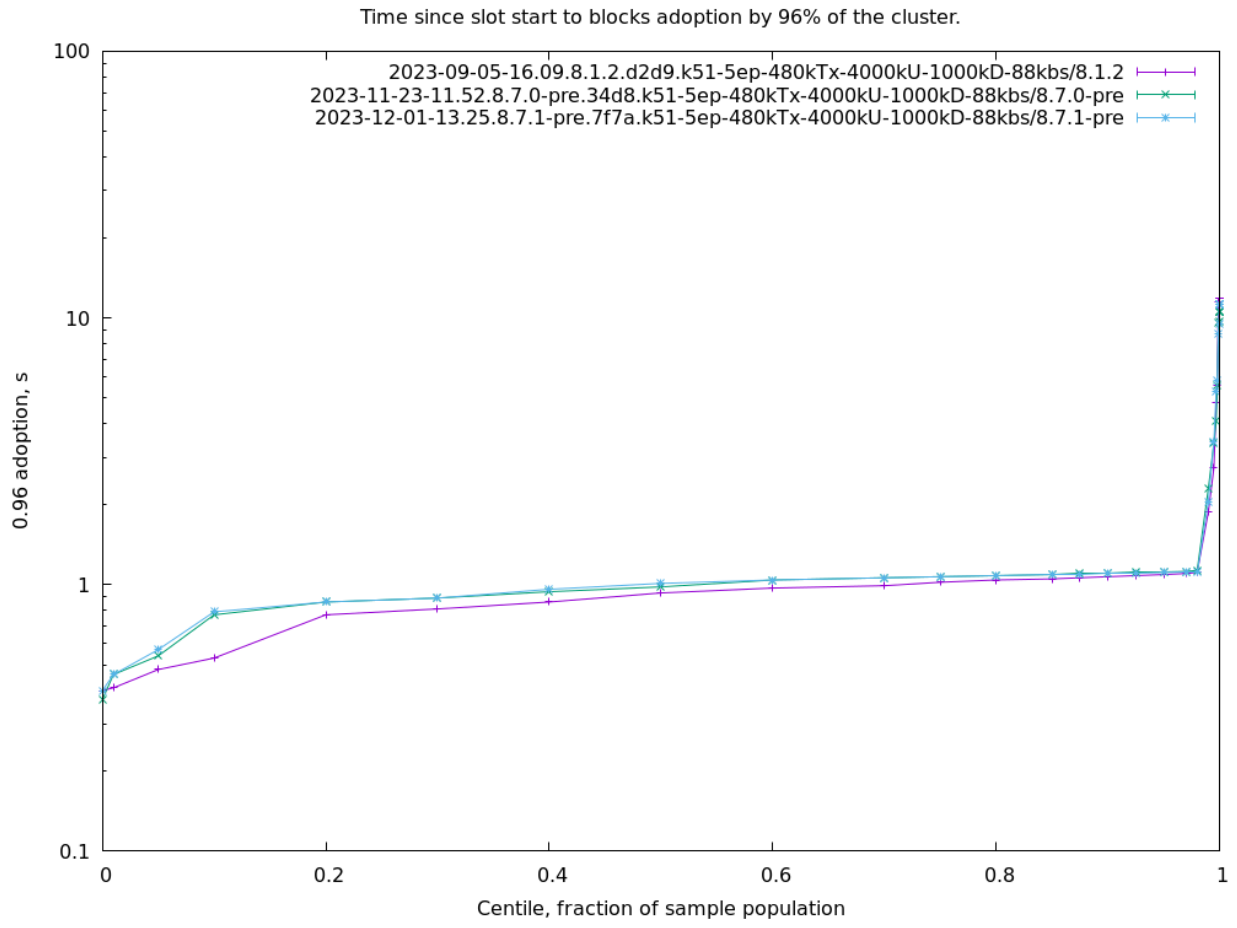
0.80 adoption (cdf0.80) Time since slot start to block's adoption by 80% of the cluster.



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.



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

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

Fetches to announced (cdfPeerAnnounce) Time it took a peer to announce the block (ChainSyncServerEvent.TraceChainSync), 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

Fetches 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