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Linux 5.9 Test With page_lock_unfairness

Benchmarks by Michael Larabel testing of 14 September page_lock_unfairness patch. Kconfig and other bits same throughout kernels, PLU patches done with Linus' patches from Monday.

Automated Executive Summary

v5.8 had the most wins, coming in first place for 53% of the tests.

Based on the geometric mean of all complete results, the fastest (v5.8) was 1.228x the speed of the slowest (v5.9 Git). PLU 4 was 0.94x the speed of v5.8, PLU 5 was 0.962x the speed of PLU 4, PLU 3 was 1x the speed of PLU 5, Default PLU 1000 was 0.992x the speed of PLU 3, PLU 1 was 0.982x the speed of Default PLU 1000, PLU 2 was 0.964x the speed of PLU 1, PLU 0 was 0.981x the speed of PLU 2, v5.9 Git was 0.979x the speed of PLU 0.

The results with the greatest spread from best to worst included:

Apache Siege (Concurrent Users: 200) at 3.398x
Apache Siege (Concurrent Users: 100) at 2.617x
SQLite (Threads / Copies: 8) at 1.821x
Hackbench (Count: 4 - Type: Process) at 1.575x
Apache Siege (Concurrent Users: 50) at 1.575x
Hackbench (Count: 4 - Type: Thread) at 1.52x
Hackbench (Count: 2 - Type: Process) at 1.435x

Hackbench (Count: 2 - Type: Thread) at 1.421x
Flexible IO Tester (Type: Random Read - Engine: Linux AIO - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.416x
Flexible IO Tester (Type: Sequential Read - Engine: Linux AIO - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory) at 1.415x.

Test Systems:

v5.8

Processor: AMD Ryzen Threadripper 3960X 24-Core @ 3.80GHz (24 Cores / 48 Threads), Motherboard: MSI Creator TRX40 (MS-7C59) v1.0 (1.12N1 BIOS), Chipset: AMD Starship/Matisse, Memory: 32GB, Disk: 1000GB Sabrent Rocket 4.0 1TB, Graphics: Sapphire AMD Radeon RX 5500/5500M / Pro 5500M 4GB, Audio: AMD Navi 10 HDMI Audio, Monitor: ASUS MG28U, Network: Aquantia AQC107 NBase-T/IEEE + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.8.0-050800-generic (x86_64), Desktop: GNOME Shell 3.36.4, Display Server: X Server 1.20.8, Display Driver: modesetting 1.20.8, OpenGL: 4.6 Mesa 20.0.8 (LLVM 10.0.0), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8301025
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

v5.9 Git

Processor: AMD Ryzen Threadripper 3960X 24-Core @ 3.80GHz (24 Cores / 48 Threads), Motherboard: MSI Creator TRX40 (MS-7C59) v1.0 (1.12N1 BIOS), Chipset: AMD Starship/Matisse, Memory: 32GB, Disk: 1000GB Sabrent Rocket 4.0 1TB, Graphics: Sapphire AMD Radeon RX 5500/5500M / Pro 5500M 4GB, Audio: AMD Navi 10 HDMI Audio, Monitor: ASUS MG28U, Network: Aquantia AQC107 NBase-T/IEEE + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.9.0-rc4-pts (x86_64) 20200910, Desktop: GNOME Shell 3.36.4, Display Server: X Server 1.20.8, Display Driver: modesetting 1.20.8, OpenGL: 4.6 Mesa 20.0.8 (LLVM 10.0.0), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8301025
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Default PLU 1000

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PLU 0

PLU 1

PLU 2

PLU 3

PLU 4

PLU 5

Processor: AMD Ryzen Threadripper 3960X 24-Core @ 3.80GHz (24 Cores / 48 Threads), Motherboard: MSI Creator TRX40 (MS-7C59) v1.0 (1.12N1 BIOS), Chipset: AMD Starship/Matisse, Memory: 32GB, Disk: 1000GB Sabrent Rocket 4.0 1TB, Graphics: Sapphire AMD Radeon RX 5500/5500M / Pro 5500M 4GB, Audio: AMD Navi 10 HDMI Audio, Monitor: ASUS MG28U, Network: Aquantia AQC107 NBase-T/IEEE + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.9.0-rc5-14sep-patch (x86_64) 20200914, Desktop: GNOME Shell 3.36.4, Display Server: X Server 1.20.8, Display Driver: modesetting 1.20.8, OpenGL: 4.6 Mesa 20.0.8 (LLVM 10.0.0), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8301025
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	v5.8	v5.9 Git	Default PLU 1000	PLU 0	PLU 1	PLU 2	PLU 3	PLU 4	PLU 5
Flexible IO Tester - Seq Write - Linux AIO - Yes - No - 2MB (IOPS)	1159	1077	1107	**1183**	966	959	**841**	1102	955
Normalized	97.97%	91.04%	93.58%	100%	81.66%	81.07%	71.09%	93.15%	80.73%
Standard Deviation	8.2%	10.8%	11.7%	1%	12.4%	16.4%	28.6%	11%	13.6%
Flexible IO Tester - Seq Write - Linux AIO - Yes - No - 2MB (MB/s)	2326	2162	2222	**2372**	1939	1926	**1690**	2212	1918
Normalized	98.06%	91.15%	93.68%	100%	81.75%	81.2%	71.25%	93.25%	80.86%
Standard Deviation	8.1%	10.8%	11.7%	1%	12.3%	16.3%	28.4%	11%	13.6%
SQLite - 8 (sec)	50.581	**46.483**	47.602	47.530	47.583	79.370	**84.624**	47.67	47.725
Normalized	91.9%	100%	97.65%	97.8%	97.69%	58.56%	54.93%	97.51%	97.4%
Standard Deviation	0.2%	0.7%	0.6%	1.1%	0.6%	36%	25.1%	2.1%	0.5%

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Apache Siege - 250 (Transactions/sec)	55280	20283	67639	**20182**	40505	56914	55285	55499	**74348**
Normalized	74.35%	27.28%	90.98%	27.15%	54.48%	76.55%	74.36%	74.65%	100%
Standard Deviation	0.8%	1%	18.7%	1.4%	25.8%	2.4%	2.3%	1.2%	6.1%
Apache Siege - 200 (Transactions/sec)	47825	20175	48190	**20095**	48524	47823	47751	**68286**	47662
Normalized	70.04%	29.54%	70.57%	29.43%	71.06%	70.03%	69.93%	100%	69.8%
Standard Deviation	0.6%	1.2%	2%	0.7%	2.7%	2.1%	1.8%	10.1%	0.7%
Apache Siege - 100 (Transactions/sec)	51256	21927	42002	**21528**	37138	38087	38058	**56351**	37869
Normalized	90.96%	38.91%	74.54%	38.2%	65.91%	67.59%	67.54%	100%	67.2%
Standard Deviation	5.9%	2.8%	1%	3%	0.5%	0.6%	1.5%	6.5%	1.3%
NGINX Benchmark - S.W.P.S (Reqs/sec)	**42692**	**39040**	40275	39964	40553	40677	40576	40267	40337
Normalized	100%	91.45%	94.34%	93.61%	94.99%	95.28%	95.04%	94.32%	94.48%
Standard Deviation	0.3%	0.6%	1.2%	1.5%	0.6%	2.2%	1.3%	0.5%	1.1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - No - 4KB (IOPS)	**300000**	292000	293000	291333	288000	289667	289667	**287000**	293000
Normalized	100%	97.33%	97.67%	97.11%	96%	96.56%	96.56%	95.67%	97.67%
Standard Deviation	2.4%	1.8%	1.4%	2.7%	1.4%	2.5%	1%	2.4%	1.5%
Flexible IO Tester - Rand Write - Linux AIO - Yes - No - 4KB (MB/s)	**1173**	1141	1144	1138	1125	1131	1133	**1122**	1144
Normalized	100%	97.27%	97.53%	97.02%	95.91%	96.42%	96.59%	95.65%	97.53%
Standard Deviation	2.3%	1.7%	1.3%	2.7%	1.4%	2.5%	0.9%	2.4%	1.4%
Flexible IO Tester - Seq Read - Linux AIO - Yes - No - 2MB (IOPS)	760	837	**755**	945	**1068**	846	1067	861	1059
Normalized	71.16%	78.37%	70.69%	88.48%	100%	79.21%	99.91%	80.62%	99.16%
Standard Deviation		0.6%			0.2%	0.2%	0.5%	0.2%	0.2%
Flexible IO Tester - Seq Read - Linux AIO - Yes - No - 2MB (MB/s)	1528	1681	**1518**	1899	**2143**	1700	2142	1730	2126
Normalized	71.3%	78.44%	70.84%	88.61%	100%	79.33%	99.95%	80.73%	99.21%
Standard Deviation	0.2%	0.6%		0.4%	0.2%	0.2%	0.5%	0.2%	0.2%
Flexible IO Tester - Rand Read - Linux AIO - Yes - No - 4KB (IOPS)	15800	15867	11367	15900	15900	**11300**	**16000**	**16000**	15867
Normalized	98.75%	99.17%	71.04%	99.38%	99.38%	70.63%	100%	100%	99.17%
Standard Deviation		0.4%	0.5%				1.1%	1.1%	0.4%

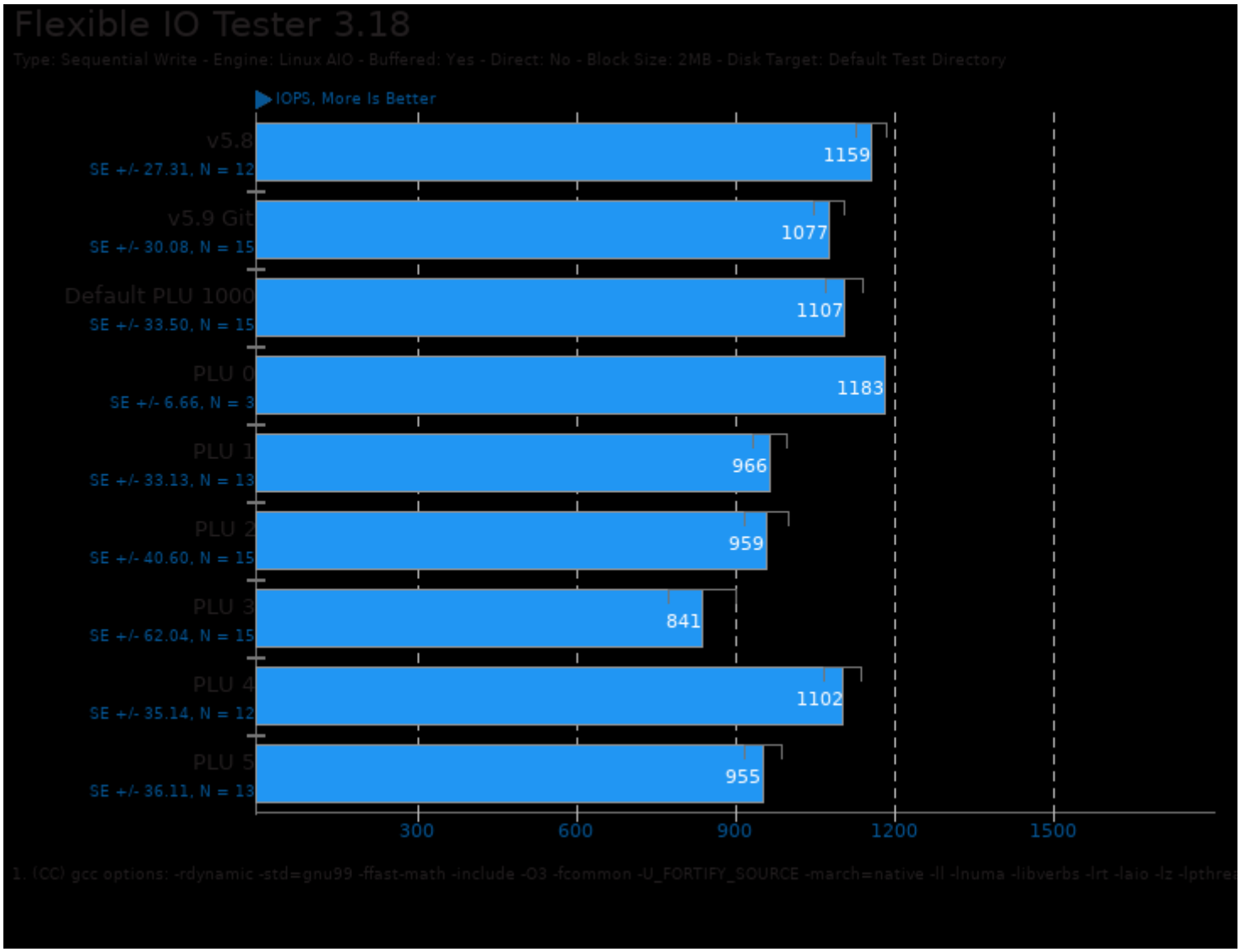
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Flexible IO Tester - Rand Read - Linux AIO - Yes - No - 4KB (MB/s)	61.8	62.1	44.4	62.1	62.2	**44.3**	**62.5**	**62.5**	62.0
Normalized	98.88%	99.36%	71.04%	99.36%	99.52%	70.88%	100%	100%	99.2%
Standard Deviation	0.1%	0.2%	0.1%	0.1%	0%	0.1%	1%	1.3%	0.6%
Redis - LPOP (Reqs/sec)	**2582975**	1523888	1540468	1576776	1535369	2088864	2130440	**1512402**	1553887
Normalized	100%	59%	59.64%	61.04%	59.44%	80.87%	82.48%	58.55%	60.16%
Standard Deviation	8.5%	1.6%	2.9%	1.7%	2.9%	20.5%	17.8%	1.7%	1.7%
Apache Siege - 50 (Transactions/sec)	39281	28241	39708	**26645**	38710	39713	**41960**	38871	41302
Normalized	93.61%	67.3%	94.63%	63.5%	92.26%	94.65%	100%	92.64%	98.43%
Standard Deviation	1.1%	2.8%	2.4%	2.8%	0.3%	2.8%	0.8%	0.5%	2.9%
Redis - SADD (Reqs/sec)	**2095660**	1962099	1974407	2013620	1965123	**1912229**	1938043	1967502	1968610
Normalized	100%	93.63%	94.21%	96.09%	93.77%	91.25%	92.48%	93.88%	93.94%
Standard Deviation	6.5%	0.5%	2.3%	1.2%	1.9%	1.2%	0.7%	1.5%	2.7%
Redis - LPUSH (Reqs/sec)	**1602868**	**1489838**	1527639	1512886	1519533	1527285	1506277	1516495	1514181
Normalized	100%	92.95%	95.31%	94.39%	94.8%	95.28%	93.97%	94.61%	94.47%
Standard Deviation	6.1%	1.6%	1.2%	2.8%	2.3%	2.4%	1.6%	2.4%	2.3%
Redis - GET (Reqs/sec)	**2656139**	**2111757**	2194355	2217842	2178990	2217654	2169198	2206395	2158857
Normalized	100%	79.5%	82.61%	83.5%	82.04%	83.49%	81.67%	83.07%	81.28%
Standard Deviation	2.7%	2%	2.9%	1.9%	1.5%	1.6%	0%	1.9%	2%
Redis - SET (Reqs/sec)	**1989099**	**1723207**	1820617	1772166	1745423	1758508	1766810	1780663	1775157
Normalized	100%	86.63%	91.53%	89.09%	87.75%	88.41%	88.82%	89.52%	89.24%
Standard Deviation	2.8%	0.7%	1.4%	1.2%	1.4%	0.3%	0.5%	1.4%	0.3%
Hackbench - 4 - Thread (sec)	**5.660**	7.106	7.144	7.167	8.580	**8.603**	7.098	7.103	8.571
Normalized	100%	79.65%	79.23%	78.97%	65.97%	65.79%	79.74%	79.68%	66.04%
Standard Deviation	1.7%	0.7%	0.5%	0.7%	0.2%	1%	0.8%	1%	0.9%
Hackbench - 4 - Process (sec)	**5.265**	6.729	6.652	6.732	8.205	8.192	6.674	6.723	**8.292**
Normalized	100%	78.24%	79.15%	78.21%	64.17%	64.27%	78.89%	78.31%	63.49%
Standard Deviation	2.9%	0.8%	1.1%	1.9%	0.8%	0.3%	1.5%	0.7%	0.6%
Hackbench - 2 - Thread (sec)	**3.788**	4.761	4.739	4.764	5.371	5.367	4.744	4.732	**5.383**
Normalized	100%	79.56%	79.93%	79.51%	70.53%	70.58%	79.85%	80.05%	70.37%
Standard Deviation	1.7%	0.3%	0.4%	0.3%	0.4%	1%	0.7%	1.1%	0.7%
Hackbench - 2 - Process (sec)	**3.642**	4.515	4.533	4.511	5.206	5.219	4.537	4.511	**5.227**
Normalized	100%	80.66%	80.34%	80.74%	69.96%	69.78%	80.27%	80.74%	69.68%
Standard Deviation	1.4%	0.4%	0.7%	1.4%	0.6%	0.3%	0.9%	1.2%	0.7%
Hackbench - 1 - Process (sec)	**2.760**	3.212	3.104	3.208	3.363	3.374	3.155	3.189	**3.397**
Normalized	100%	85.93%	88.92%	86.03%	82.07%	81.8%	87.48%	86.55%	81.25%
Standard Deviation	2.7%	0.9%	2.2%	1.2%	2.9%	2.2%	2.9%	0.9%	1.7%

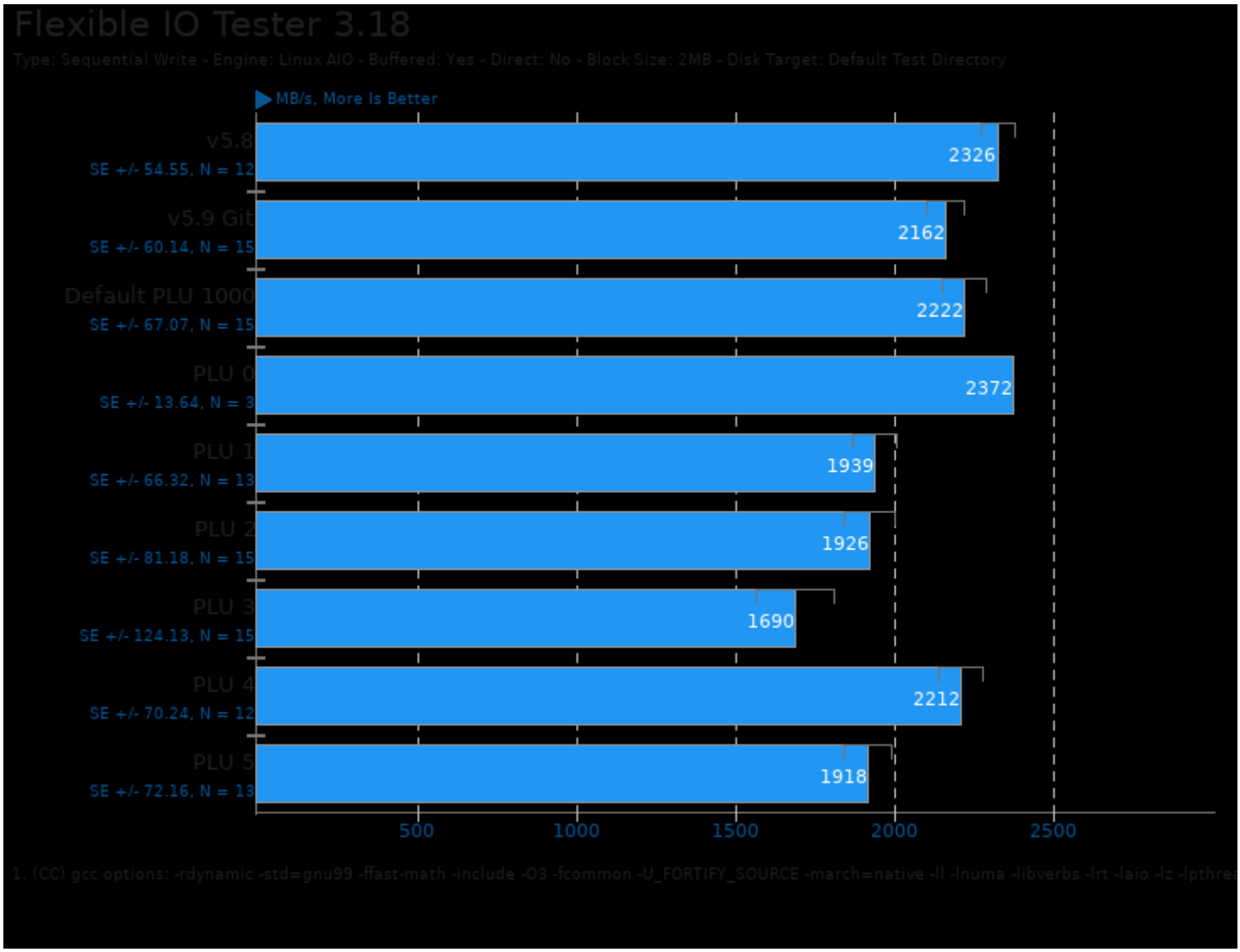
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Hackbench - 1 - Thread (sec)	**2.945**	3.366	3.324	3.409	**3.591**	3.579	3.265	3.395	3.509
Normalized	100%	87.49%	88.6%	86.39%	82.01%	82.29%	90.2%	86.75%	83.93%
Standard Deviation	2.6%	0.5%	1.2%	2.4%	1.4%	1.6%	2.1%	0.8%	2.6%
Apache Siege - 1 (Transactions/sec)	7685	**7391**	7579	**7938**	7465	7553	7476	7639	7736
Normalized	96.81%	93.11%	95.49%	100%	94.04%	95.15%	94.18%	96.23%	97.45%
Standard Deviation	3.5%	1.9%	2.7%	1.6%	2%	3.3%	2.9%	2.9%	2.7%

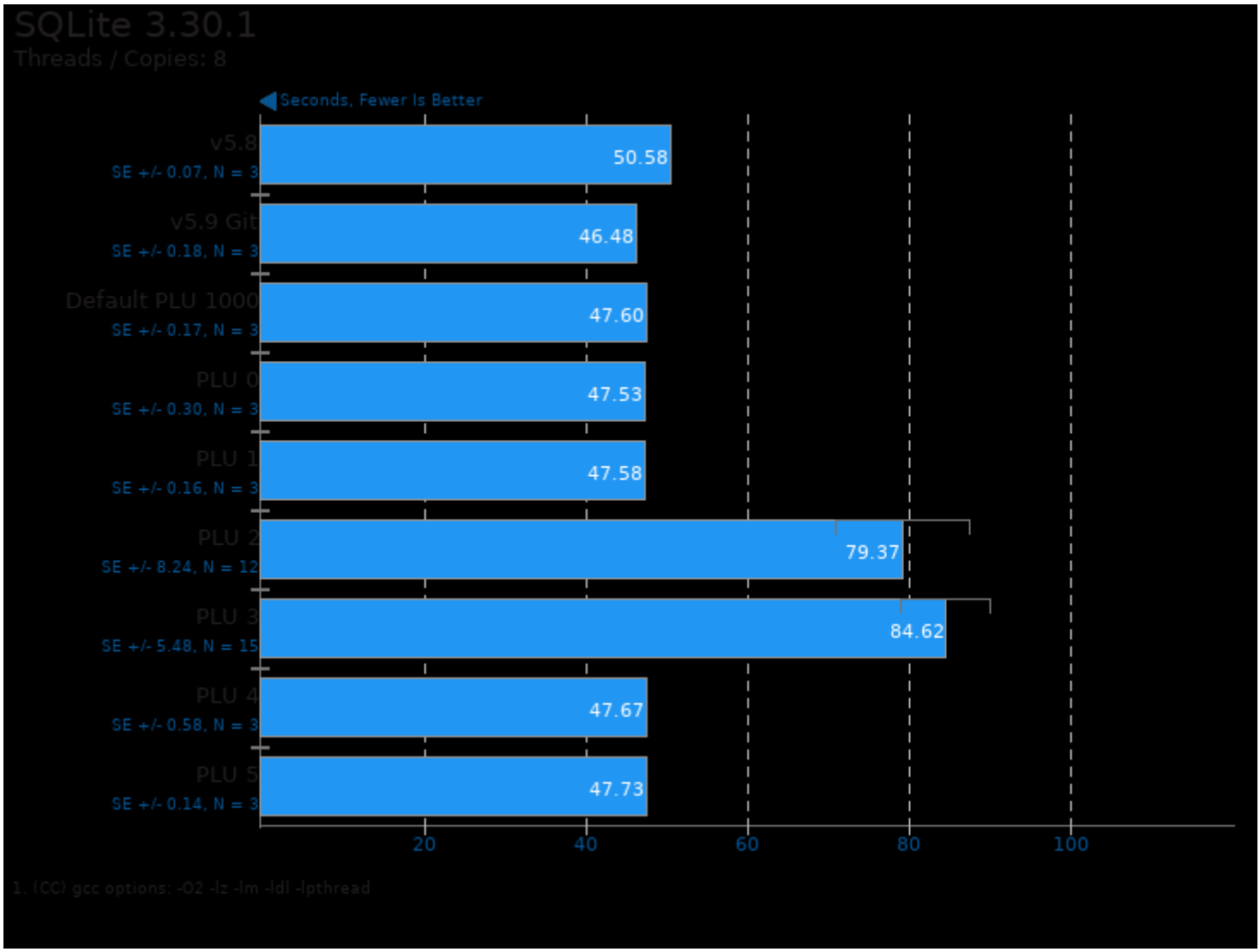
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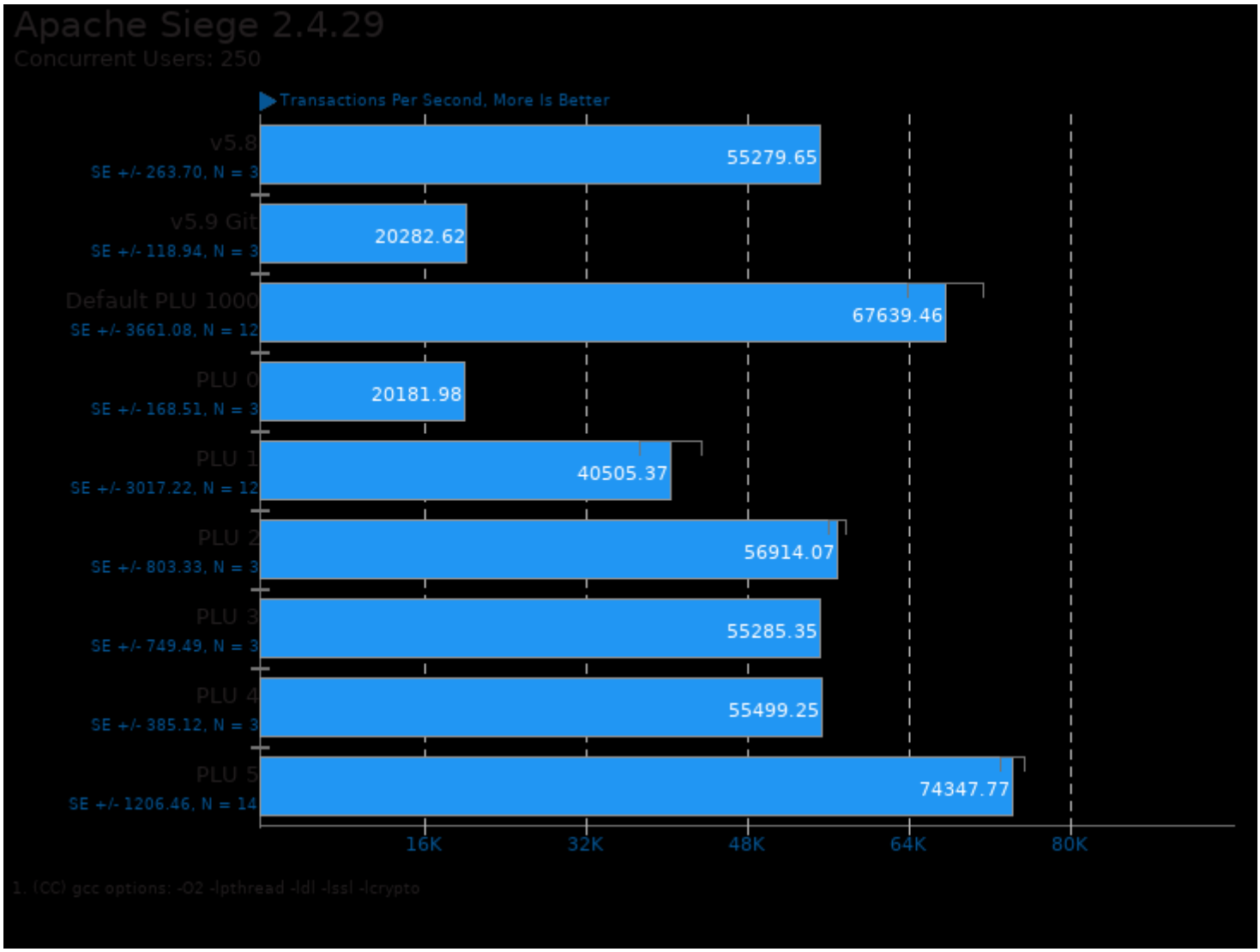
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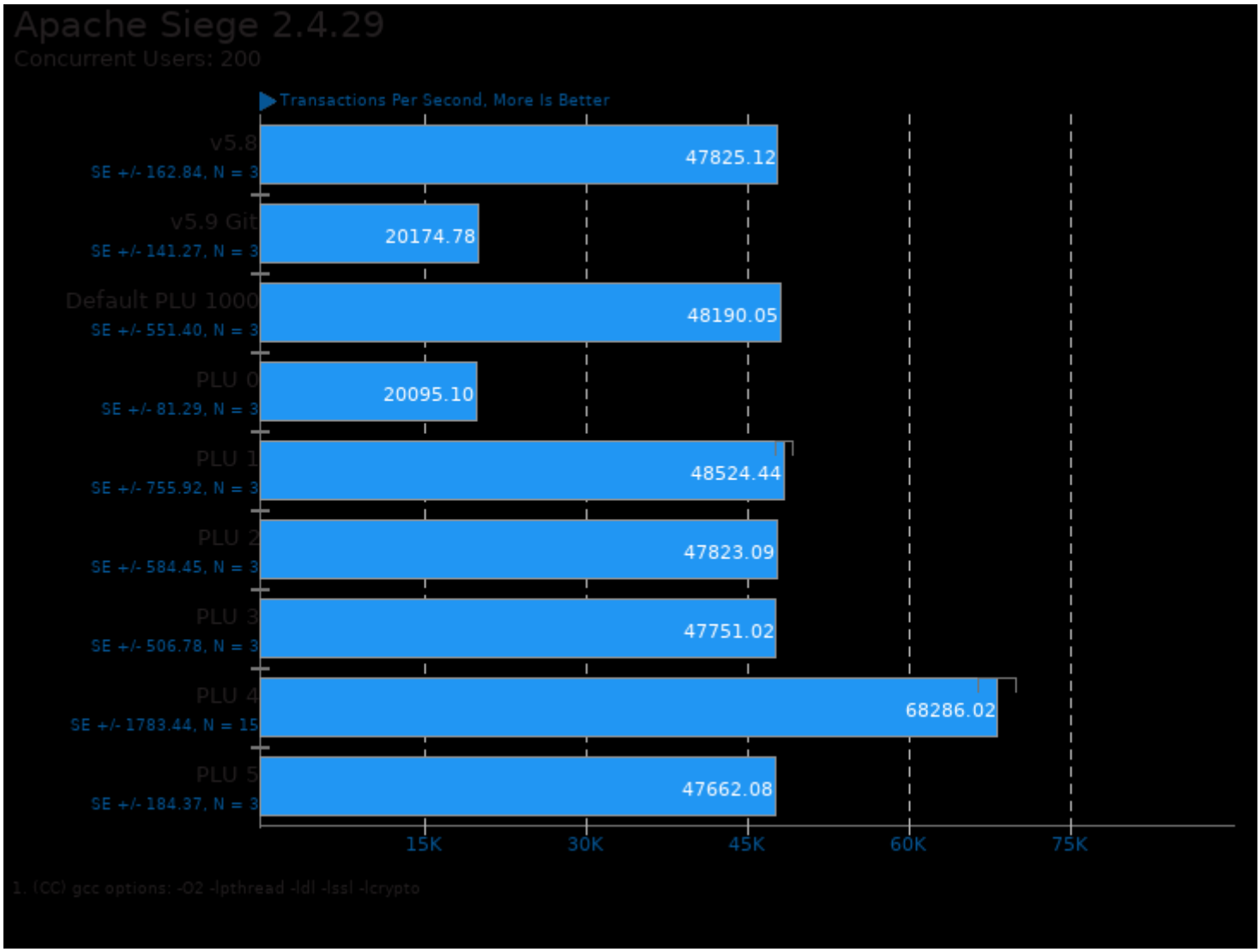
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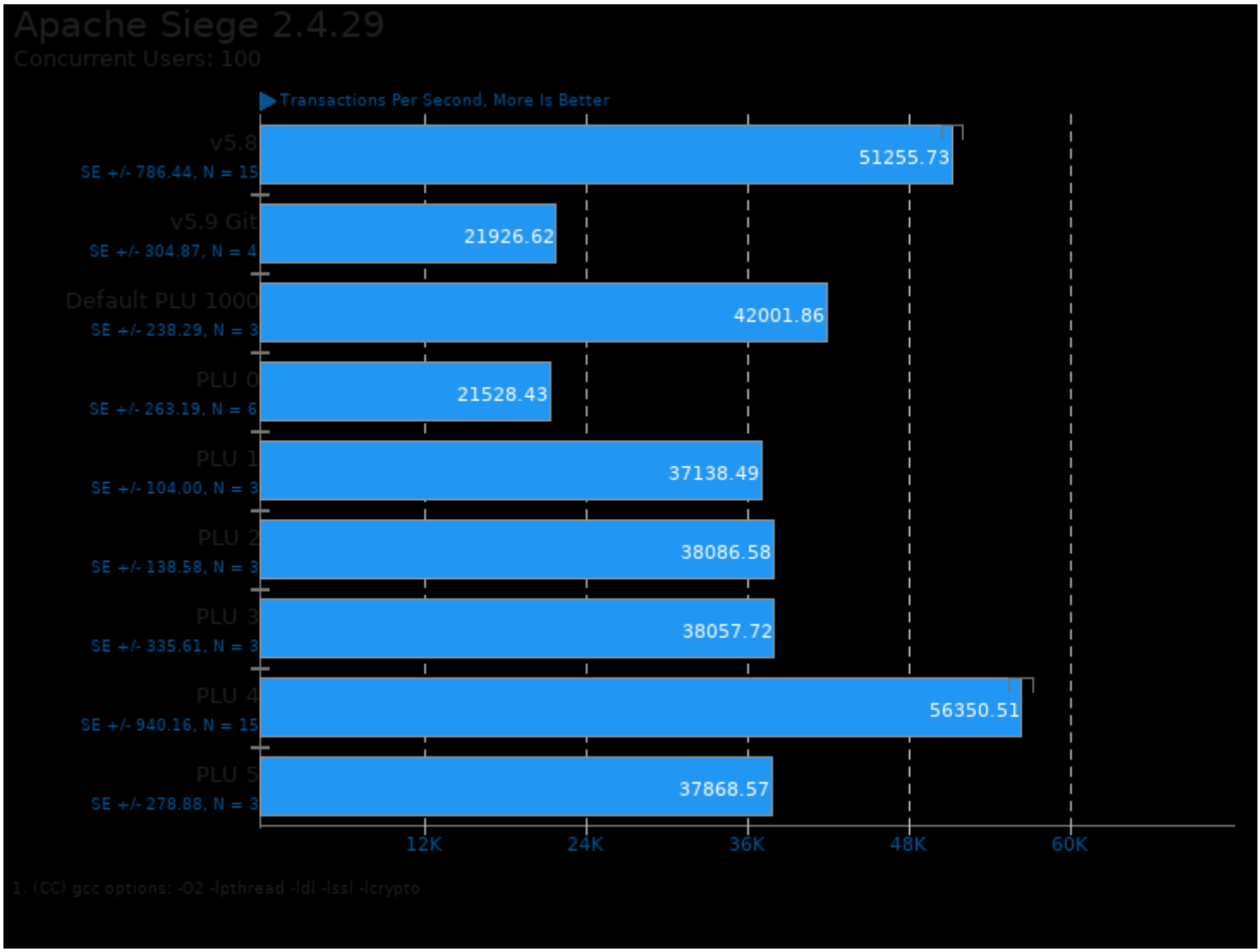
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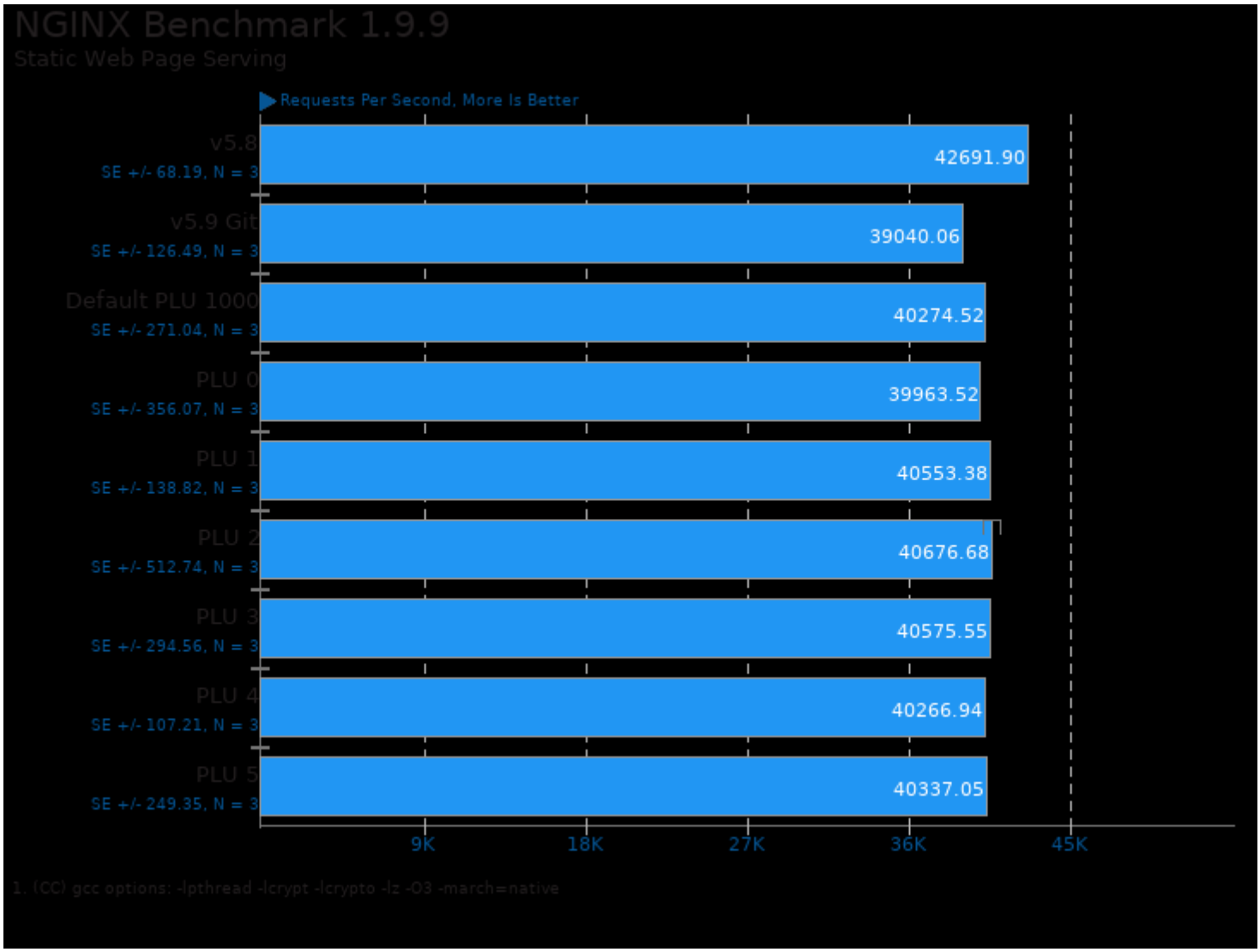
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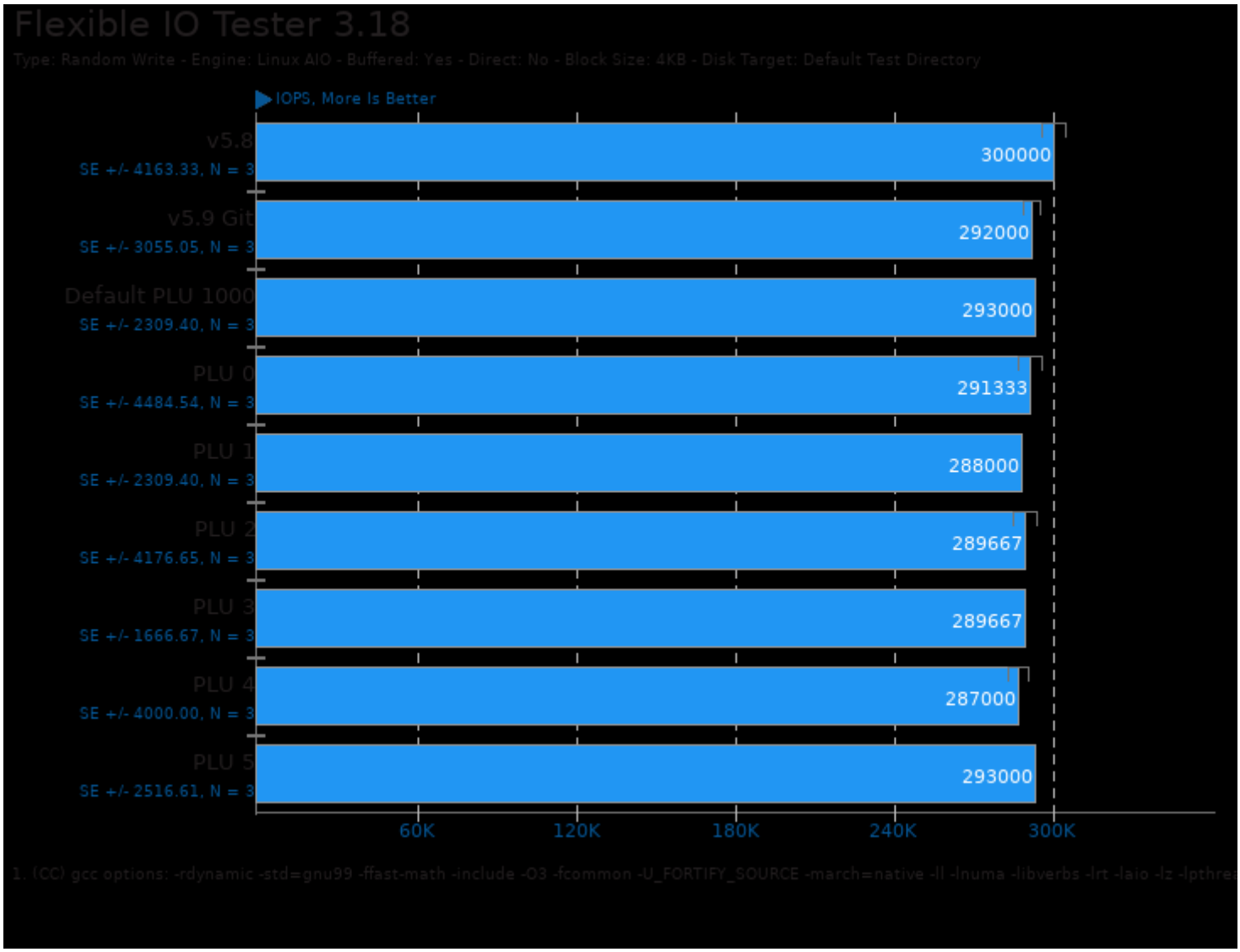
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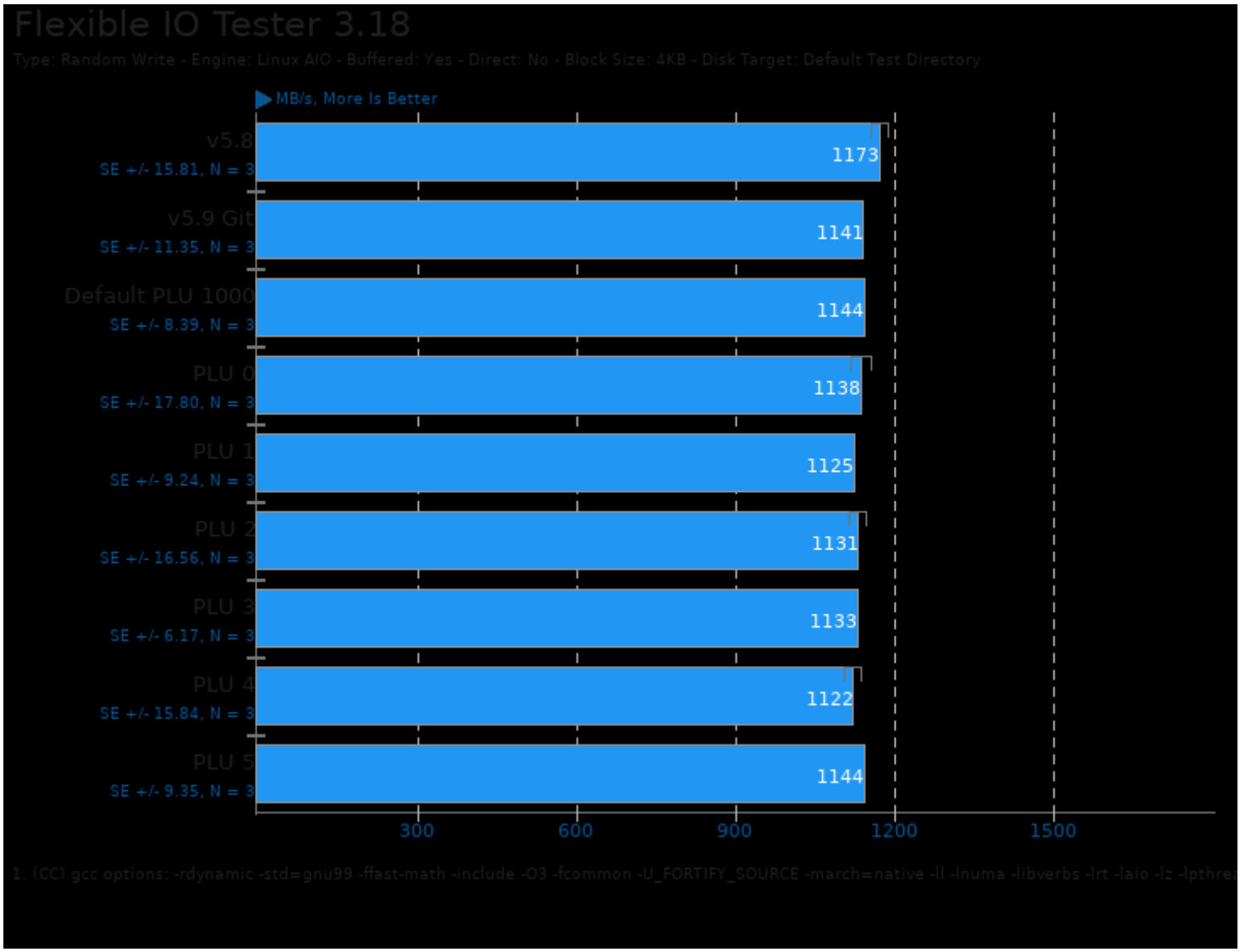
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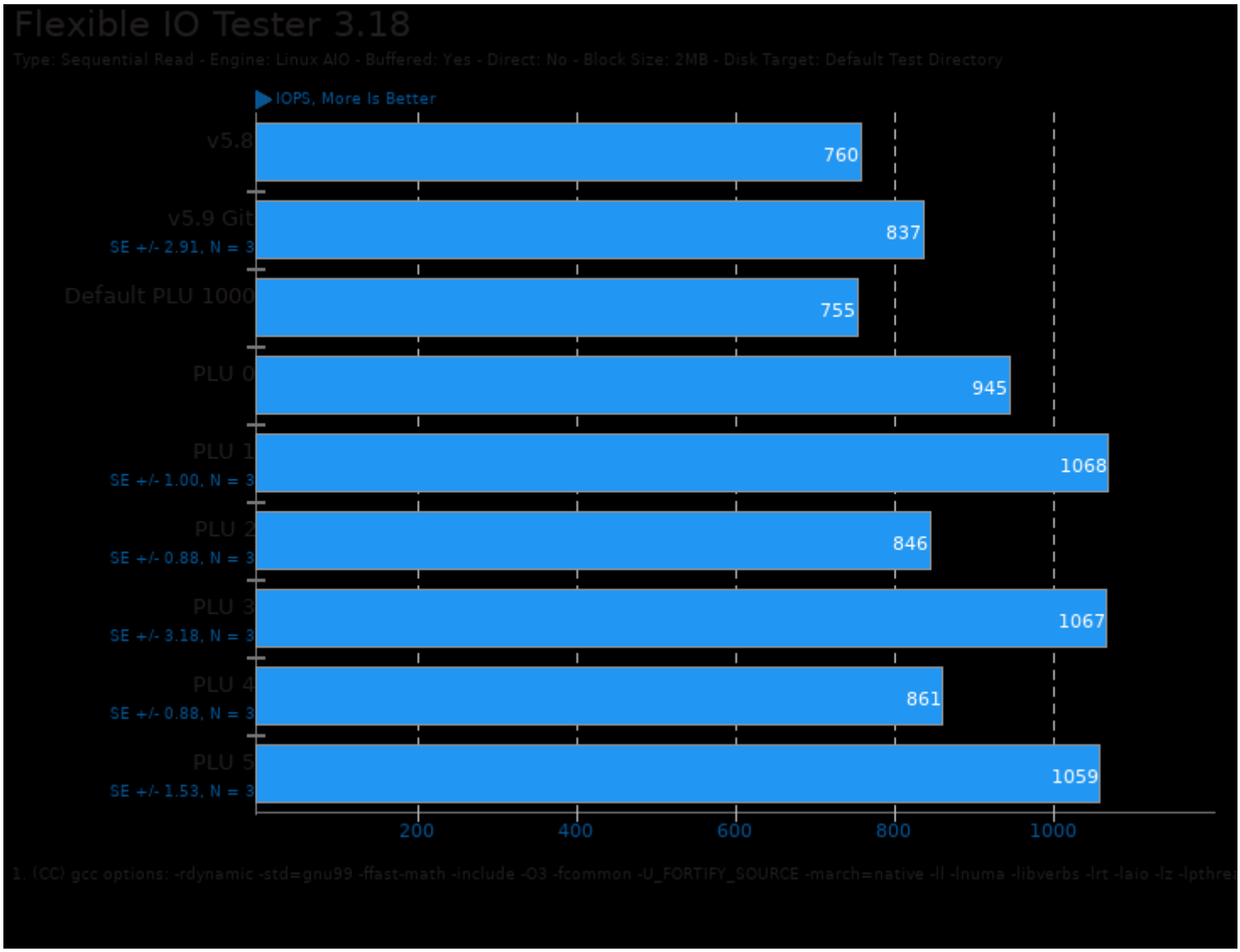
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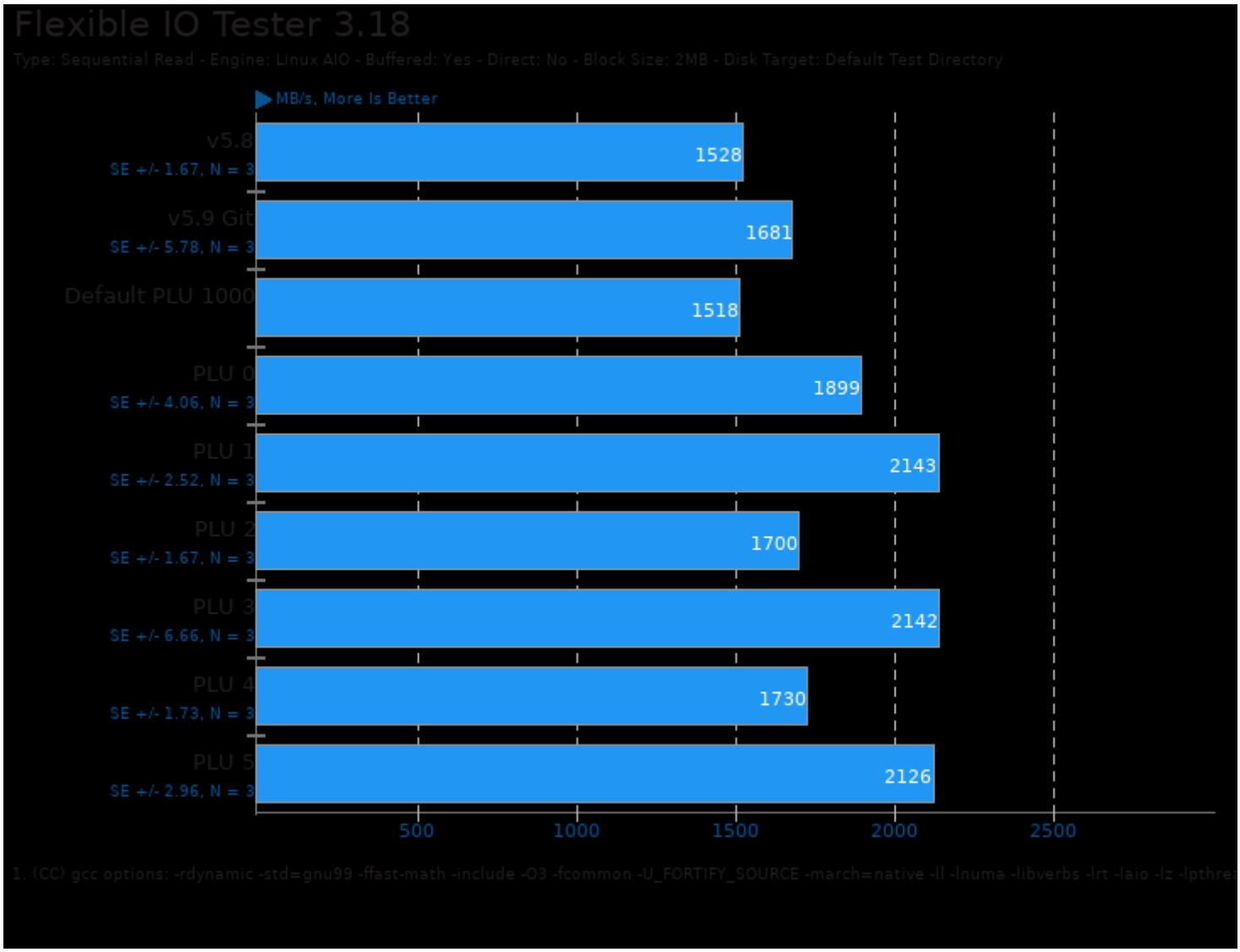
Linux 5.9 Test With page_lock_unfairness



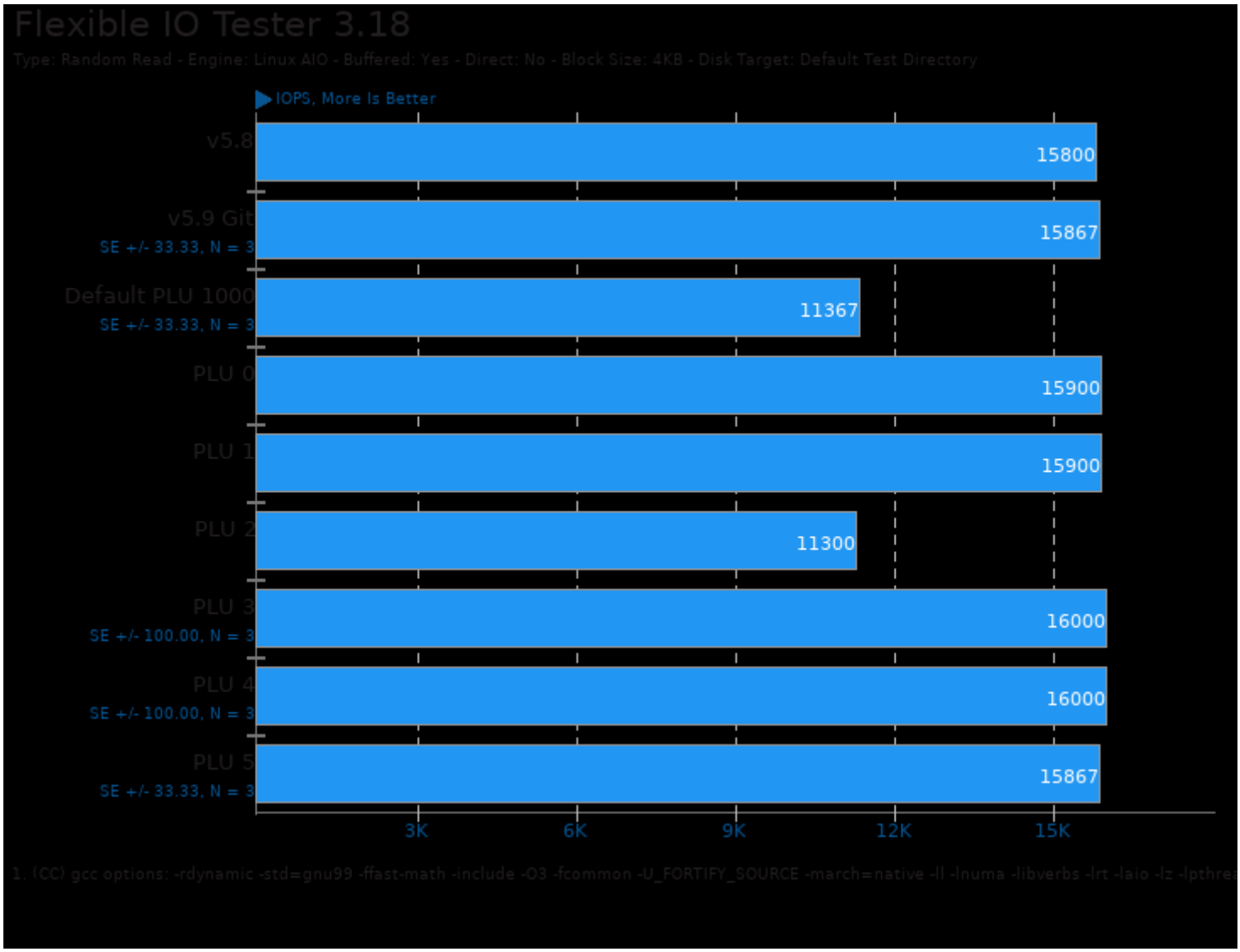
Linux 5.9 Test With page_lock_unfairness



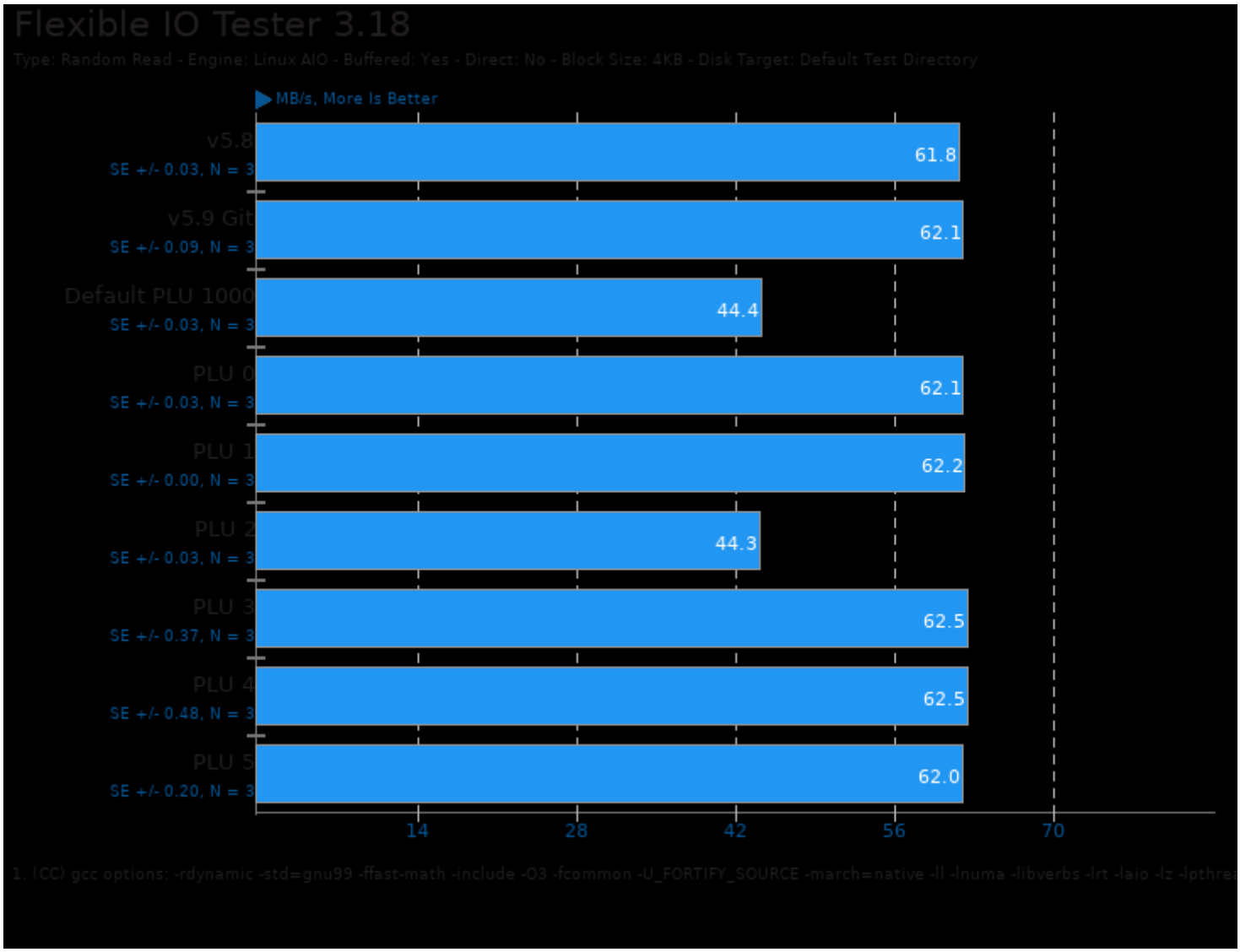
Linux 5.9 Test With page_lock_unfairness



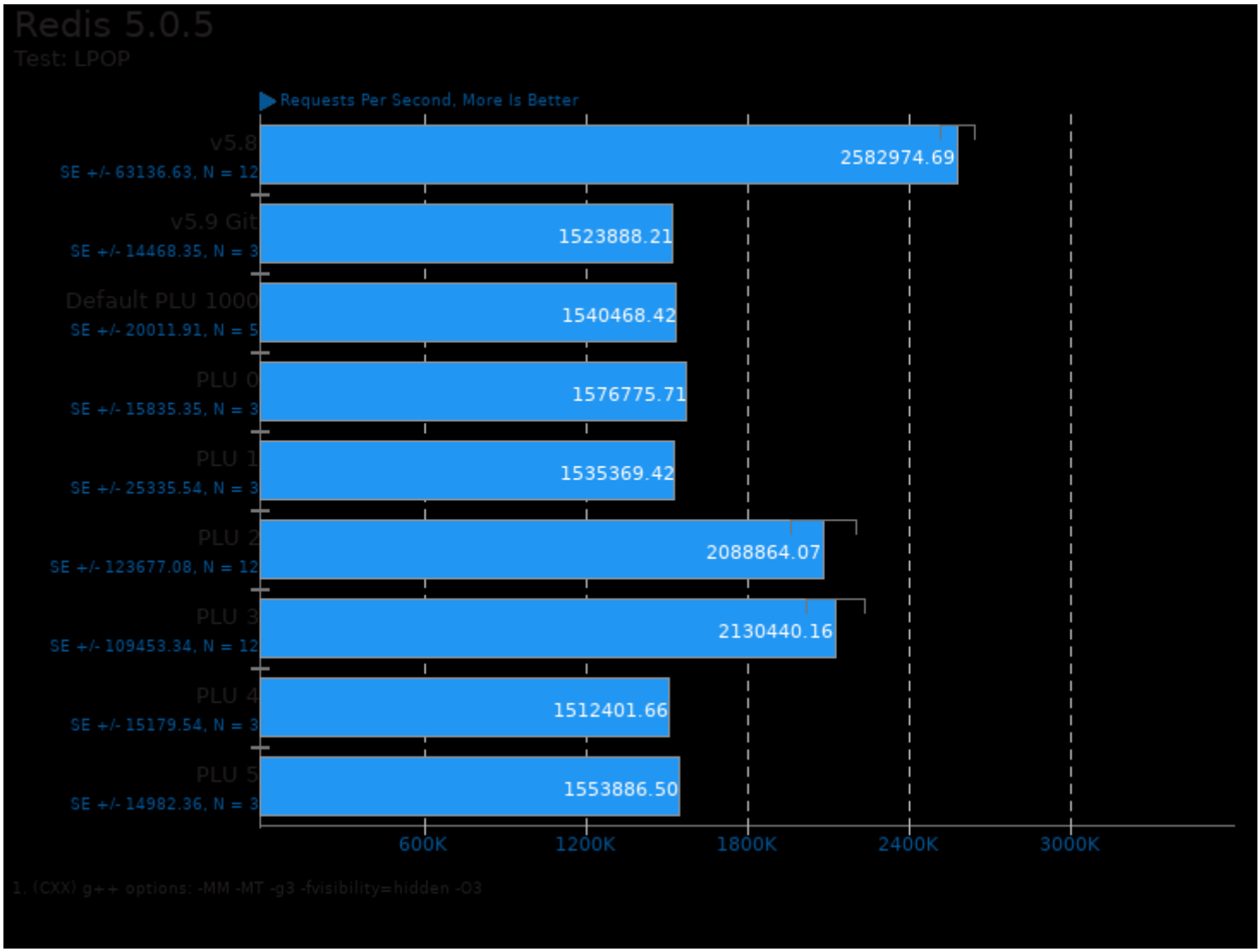
Linux 5.9 Test With page_lock_unfairness



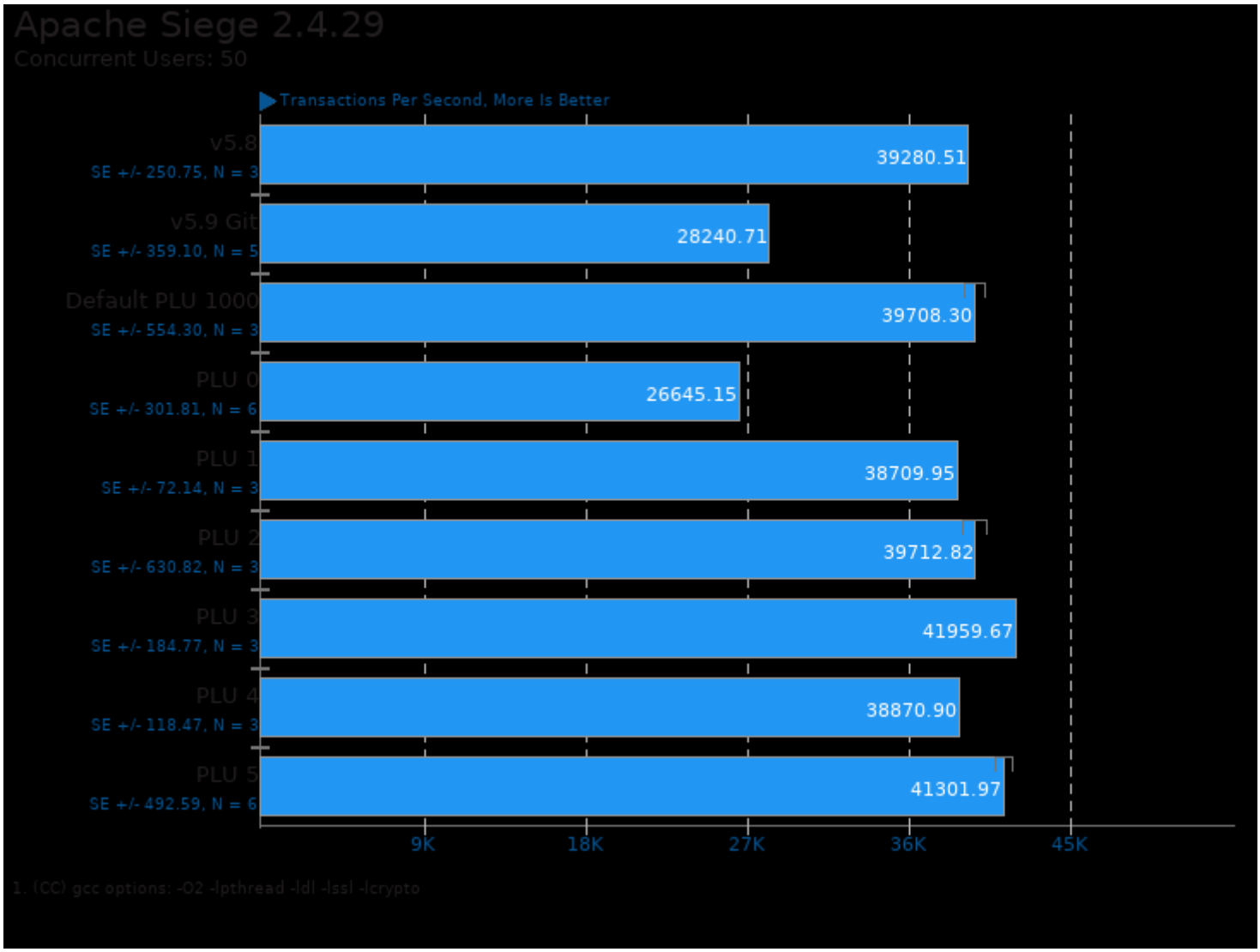
Linux 5.9 Test With page_lock_unfairness



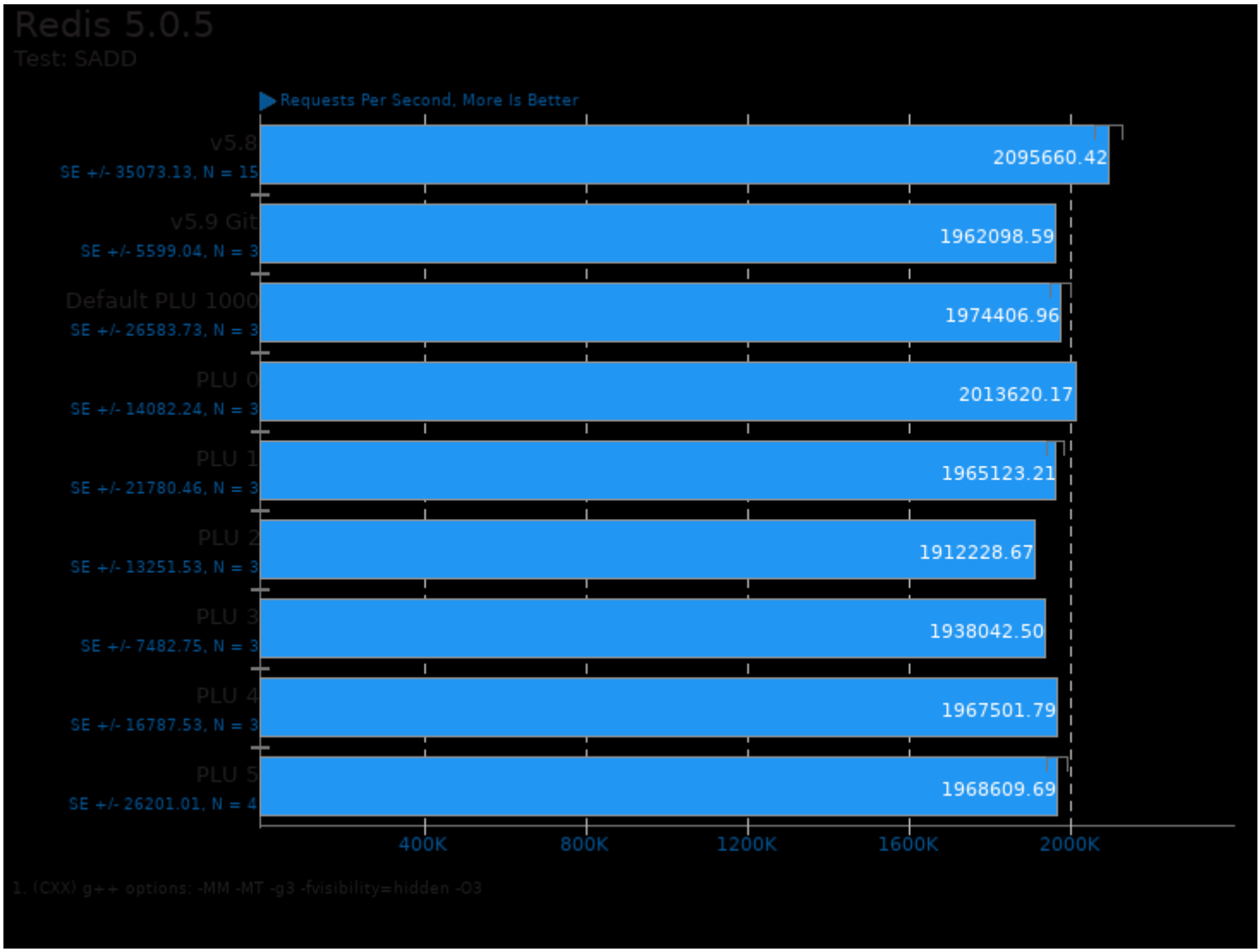
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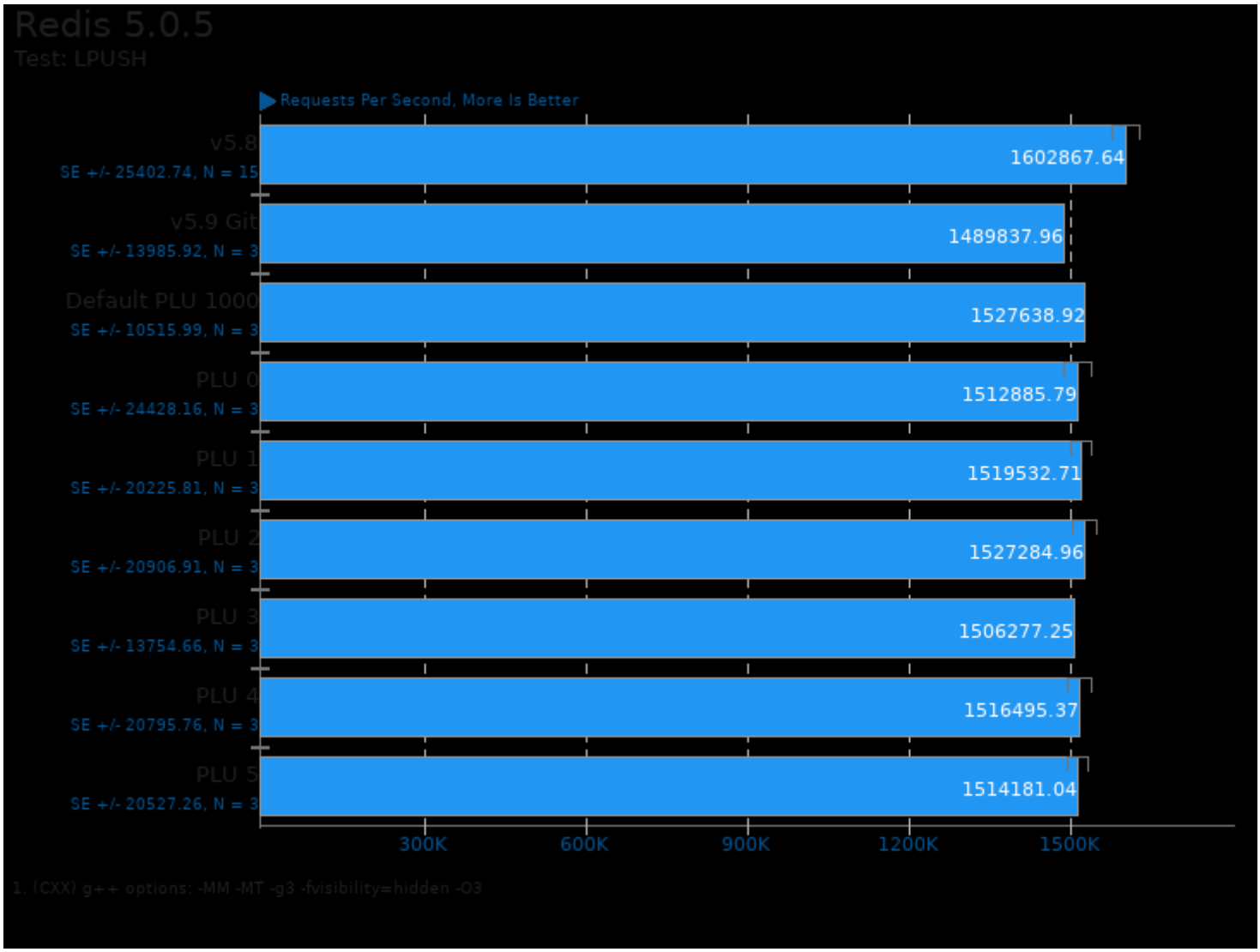
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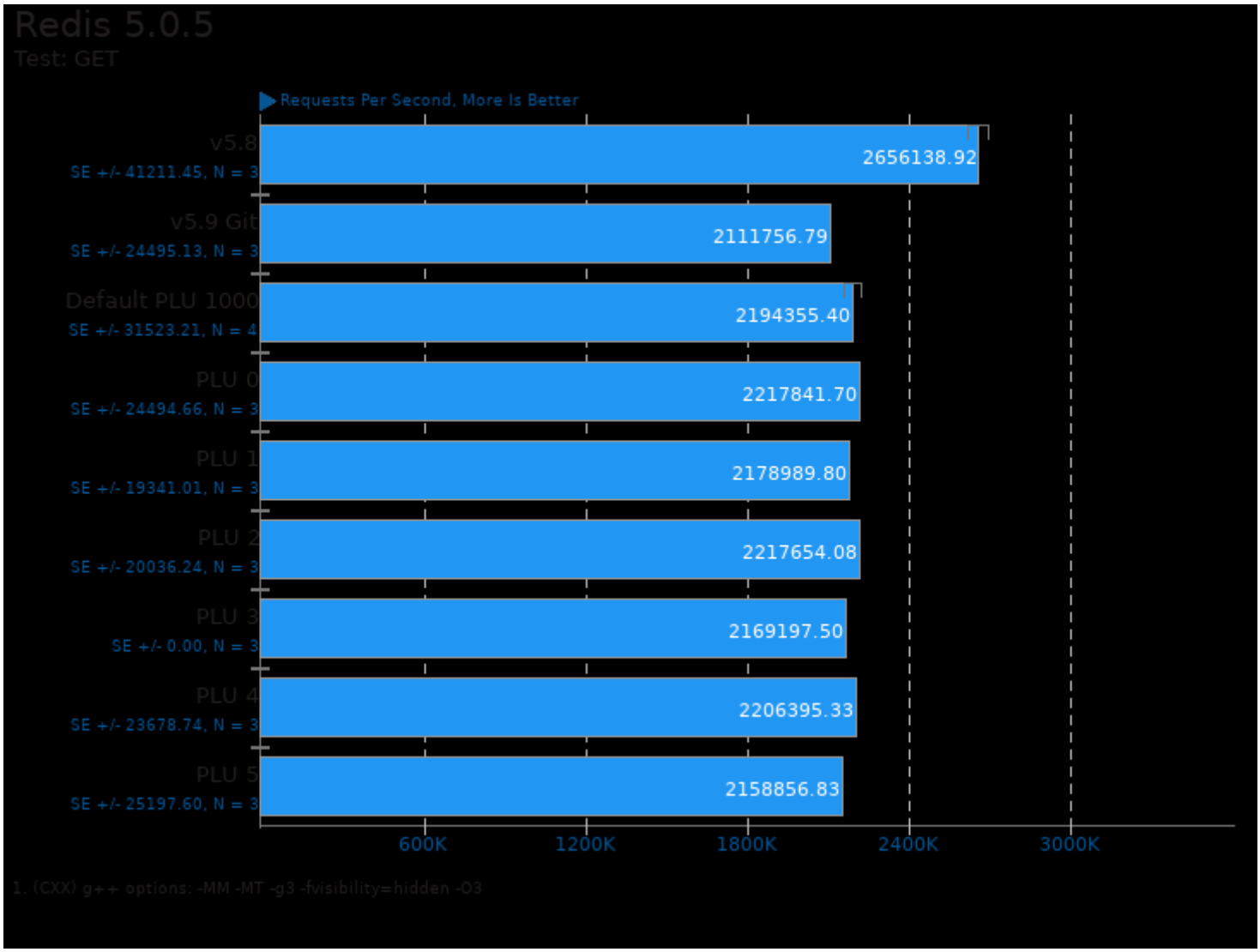
Linux 5.9 Test With page_lock_unfairness



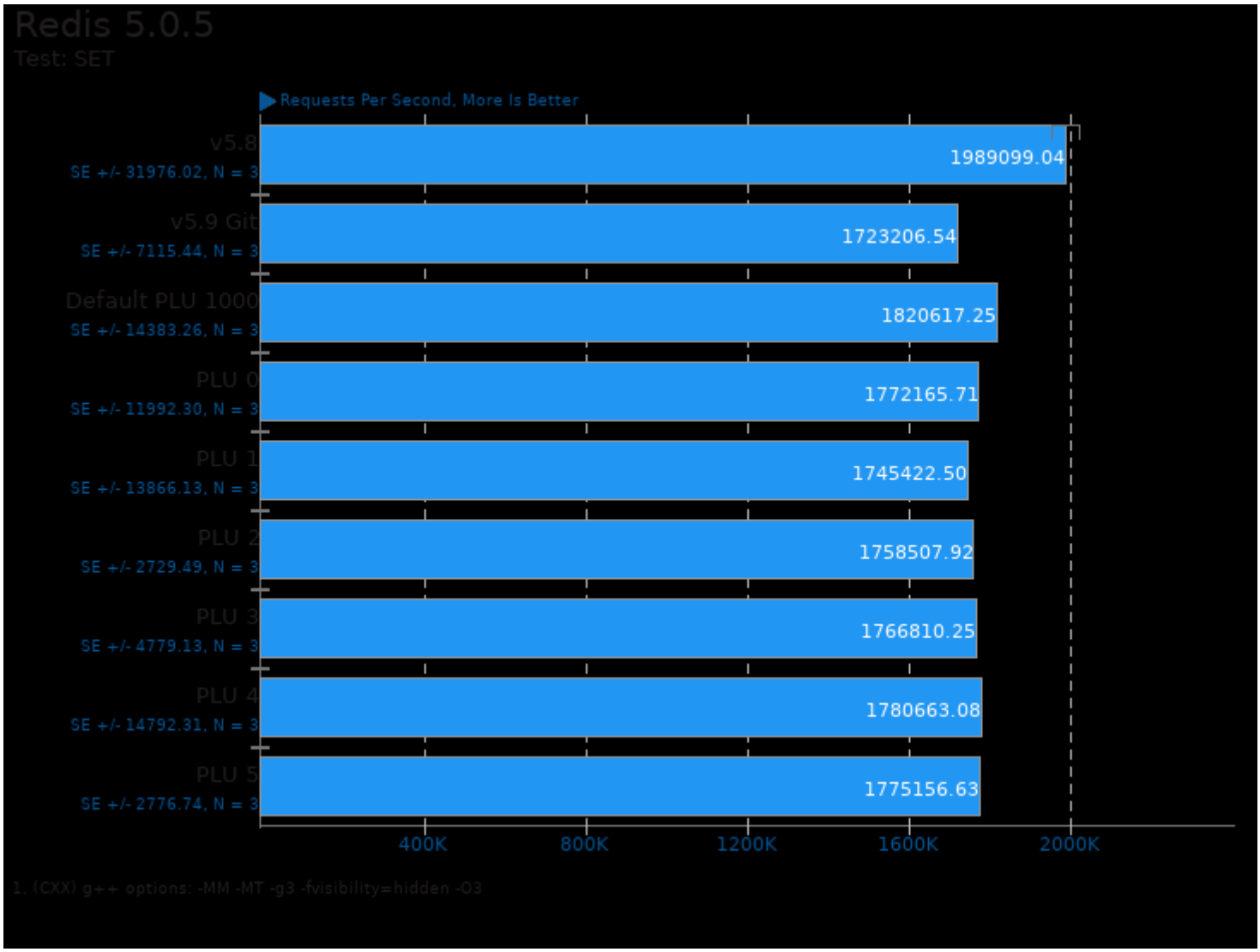
Linux 5.9 Test With page_lock_unfairness



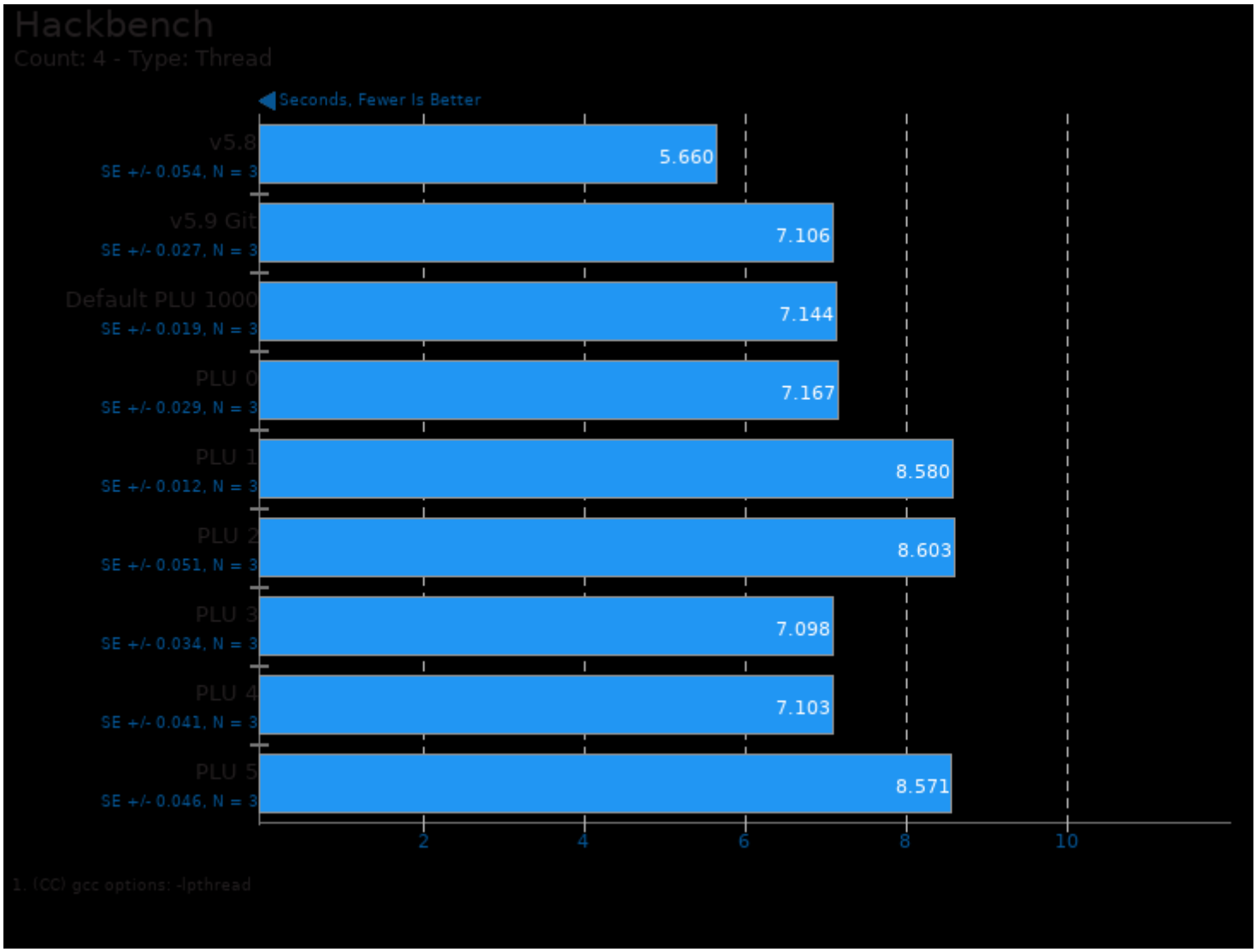
Linux 5.9 Test With page_lock_unfairness



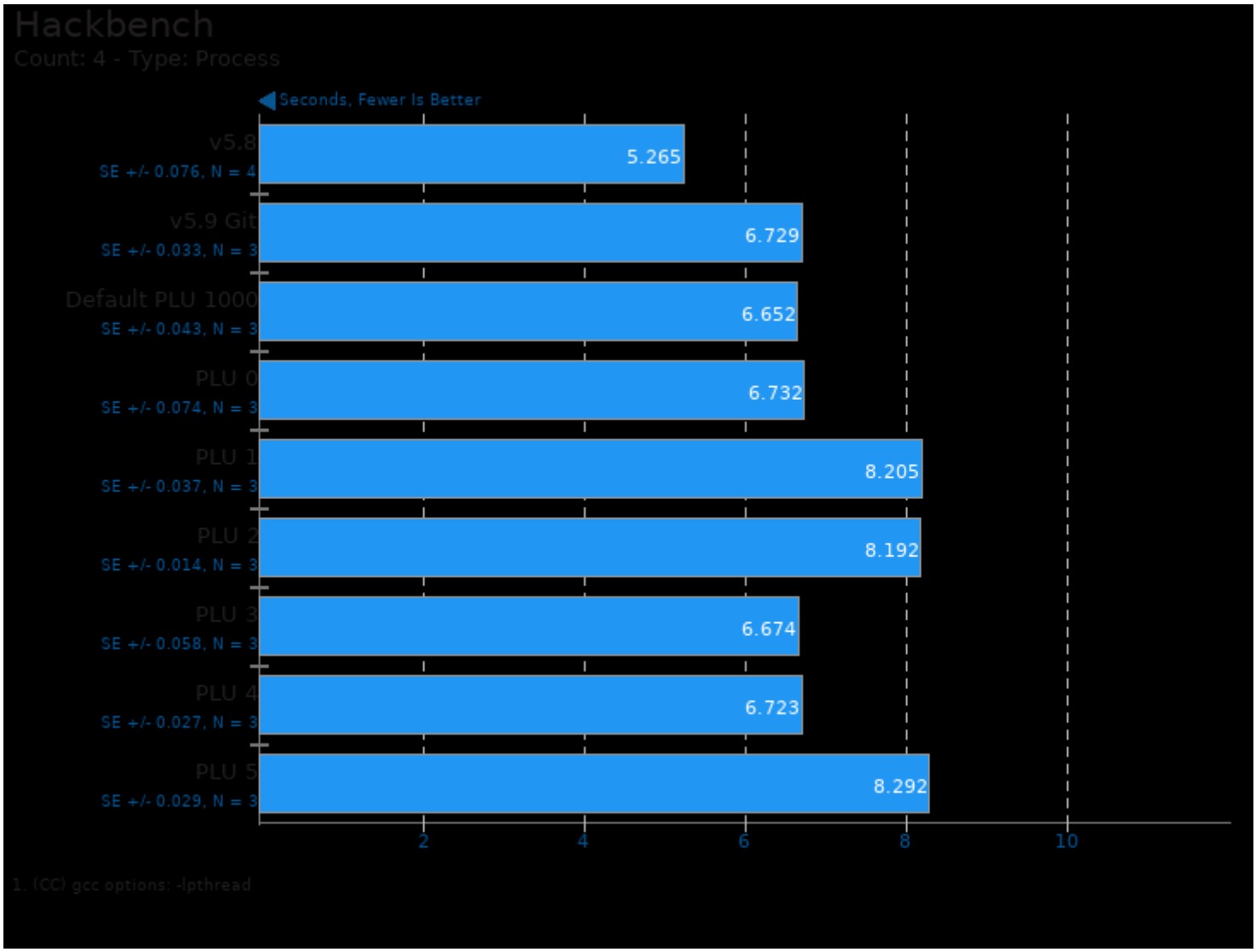
Linux 5.9 Test With page_lock_unfairness



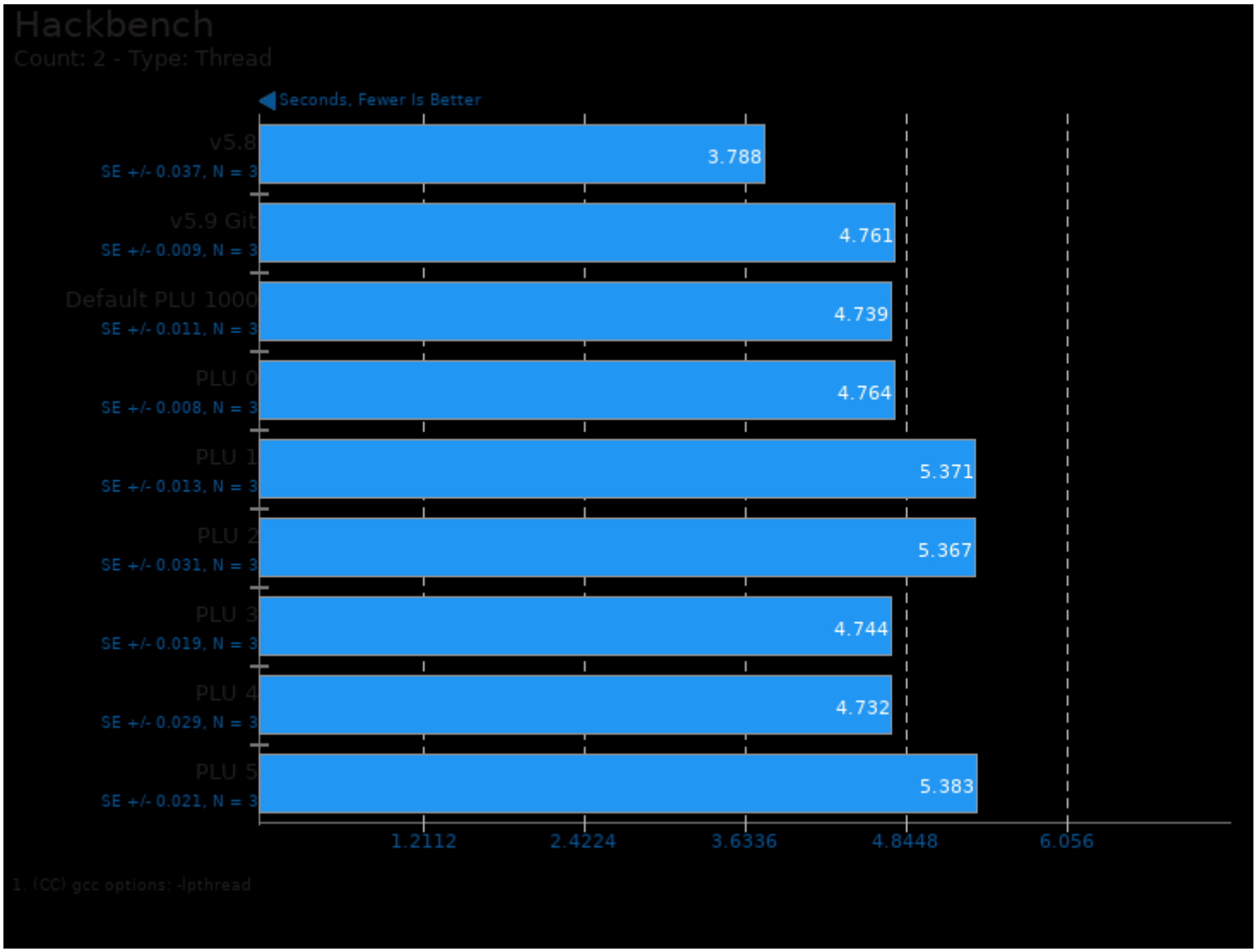
Linux 5.9 Test With page_lock_unfairness



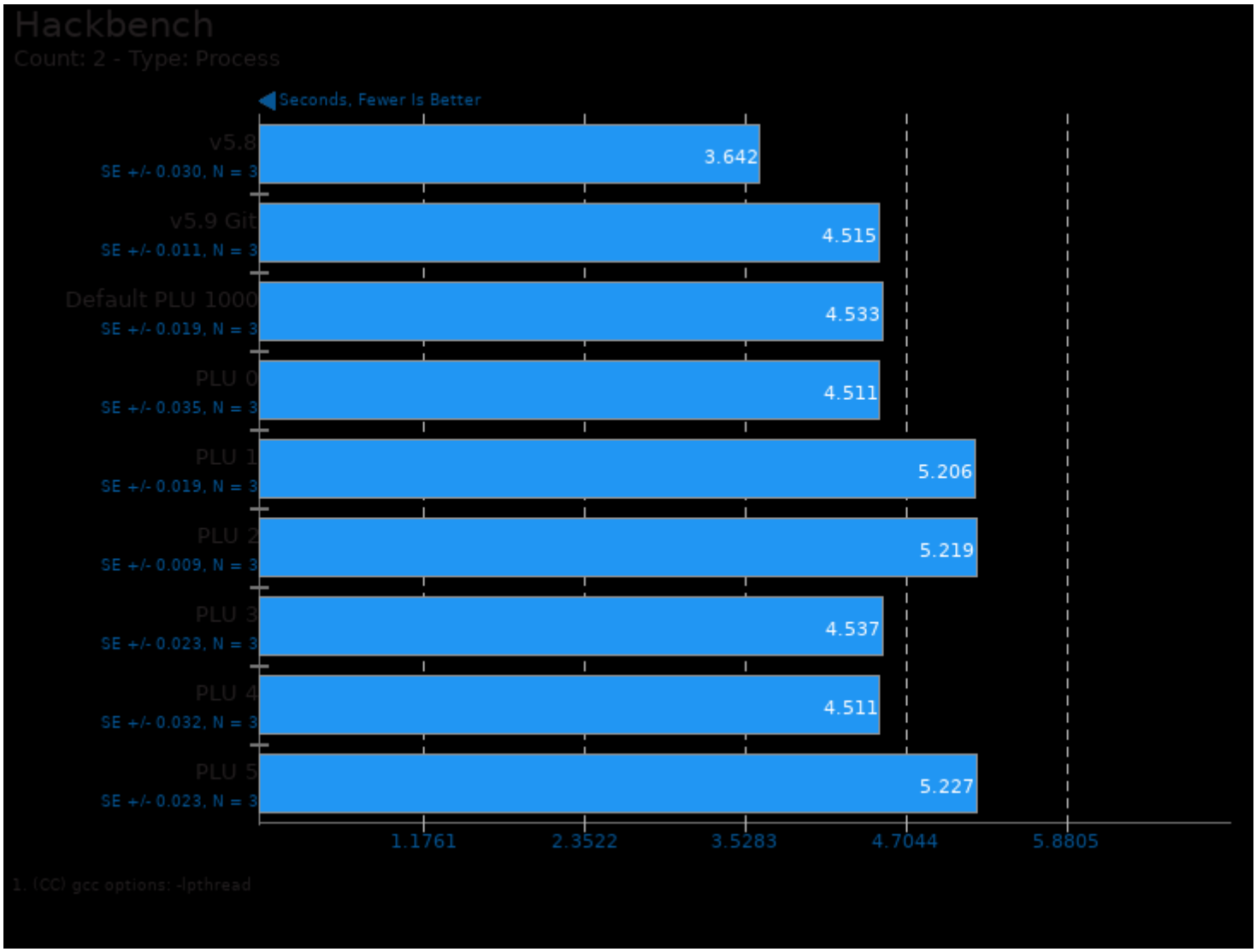
Linux 5.9 Test With page_lock_unfairness



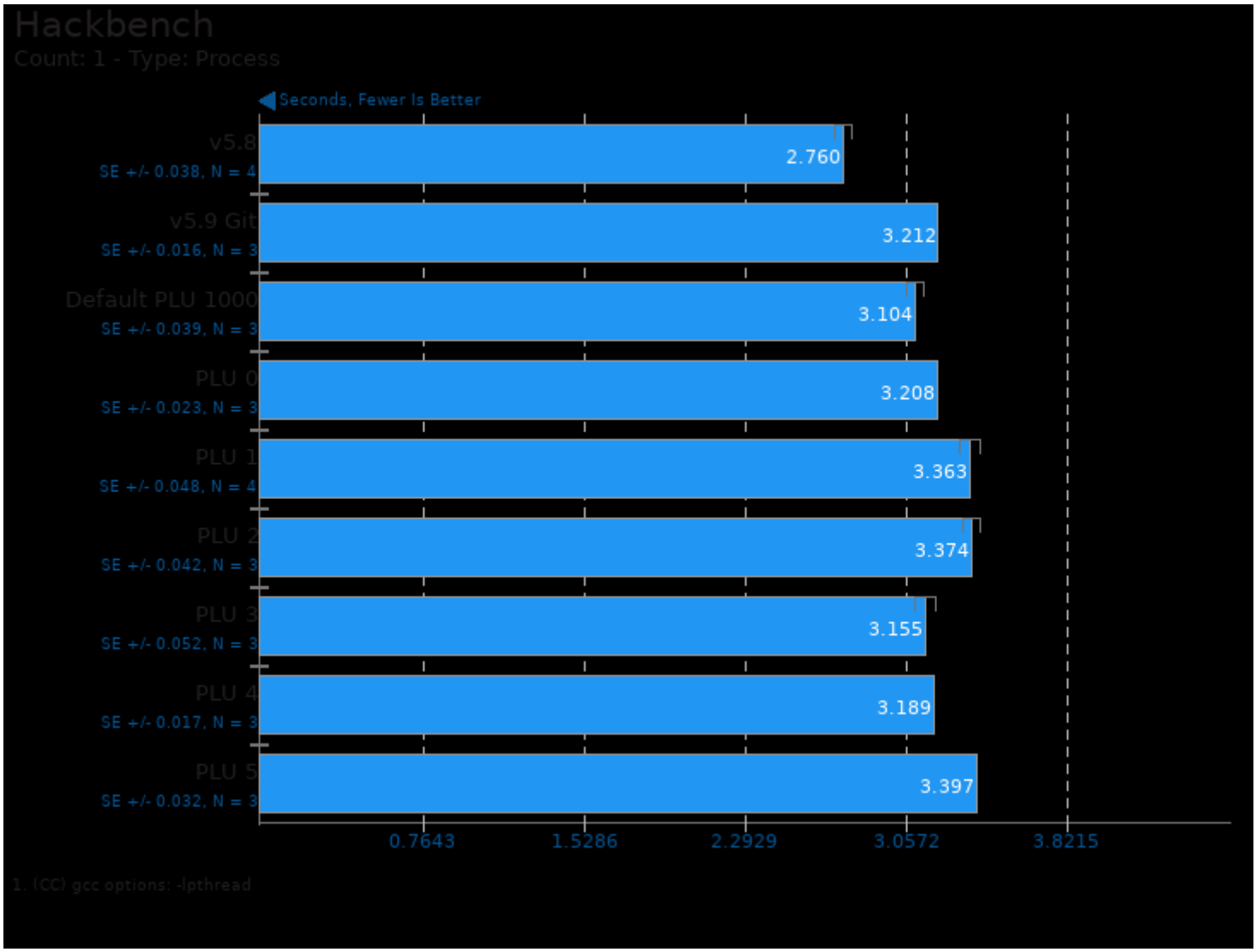
Linux 5.9 Test With page_lock_unfairness



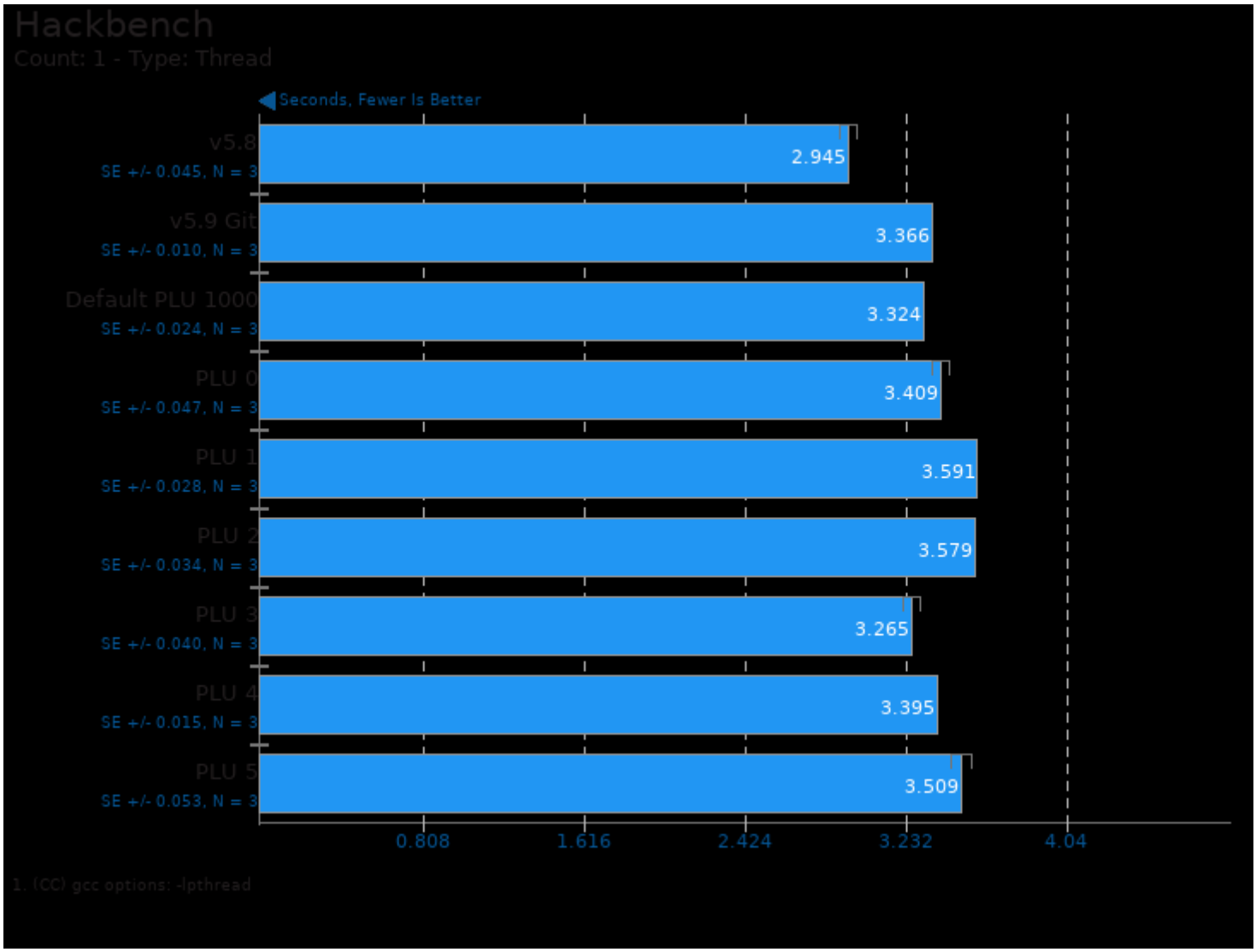
Linux 5.9 Test With page_lock_unfairness



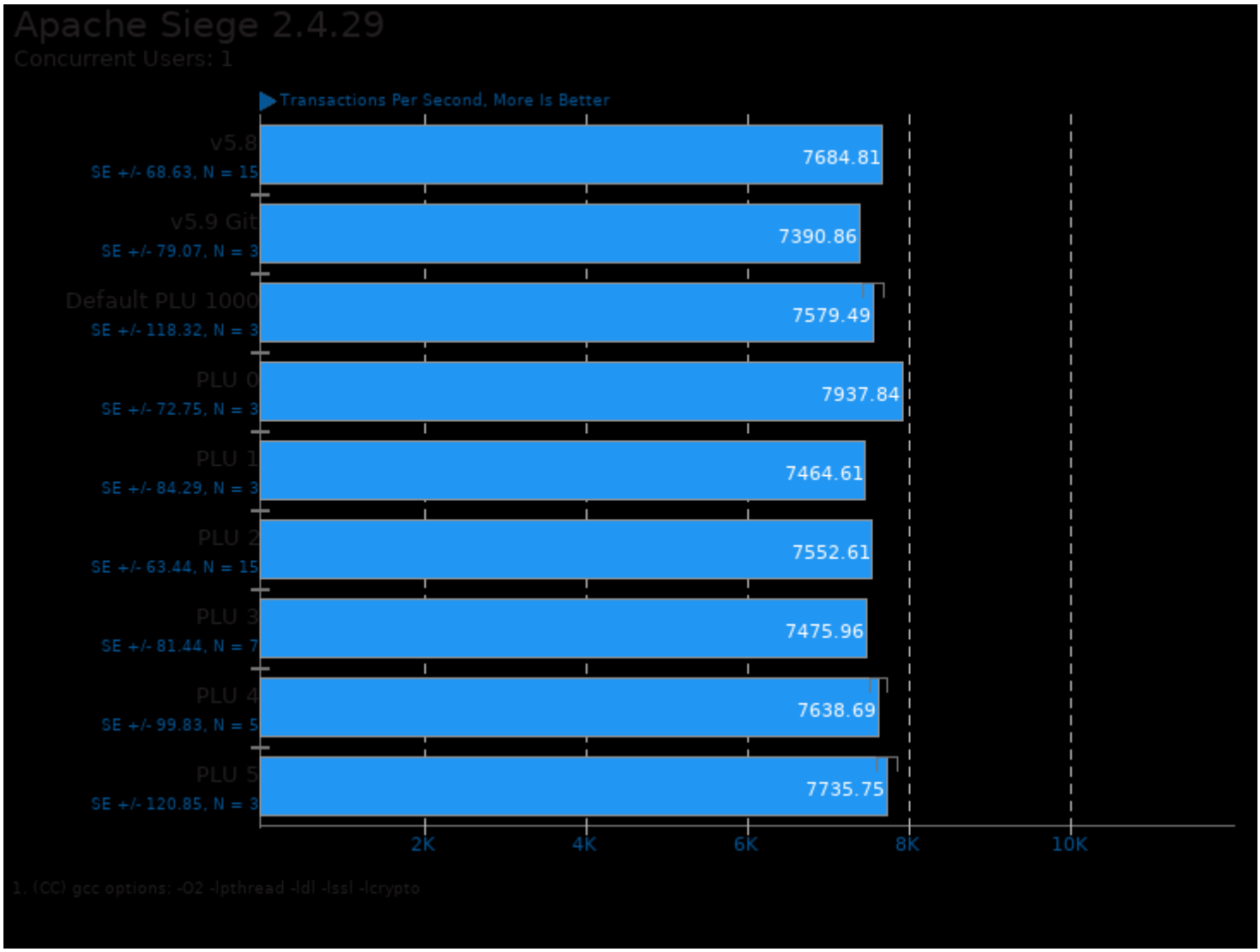
Linux 5.9 Test With page_lock_unfairness



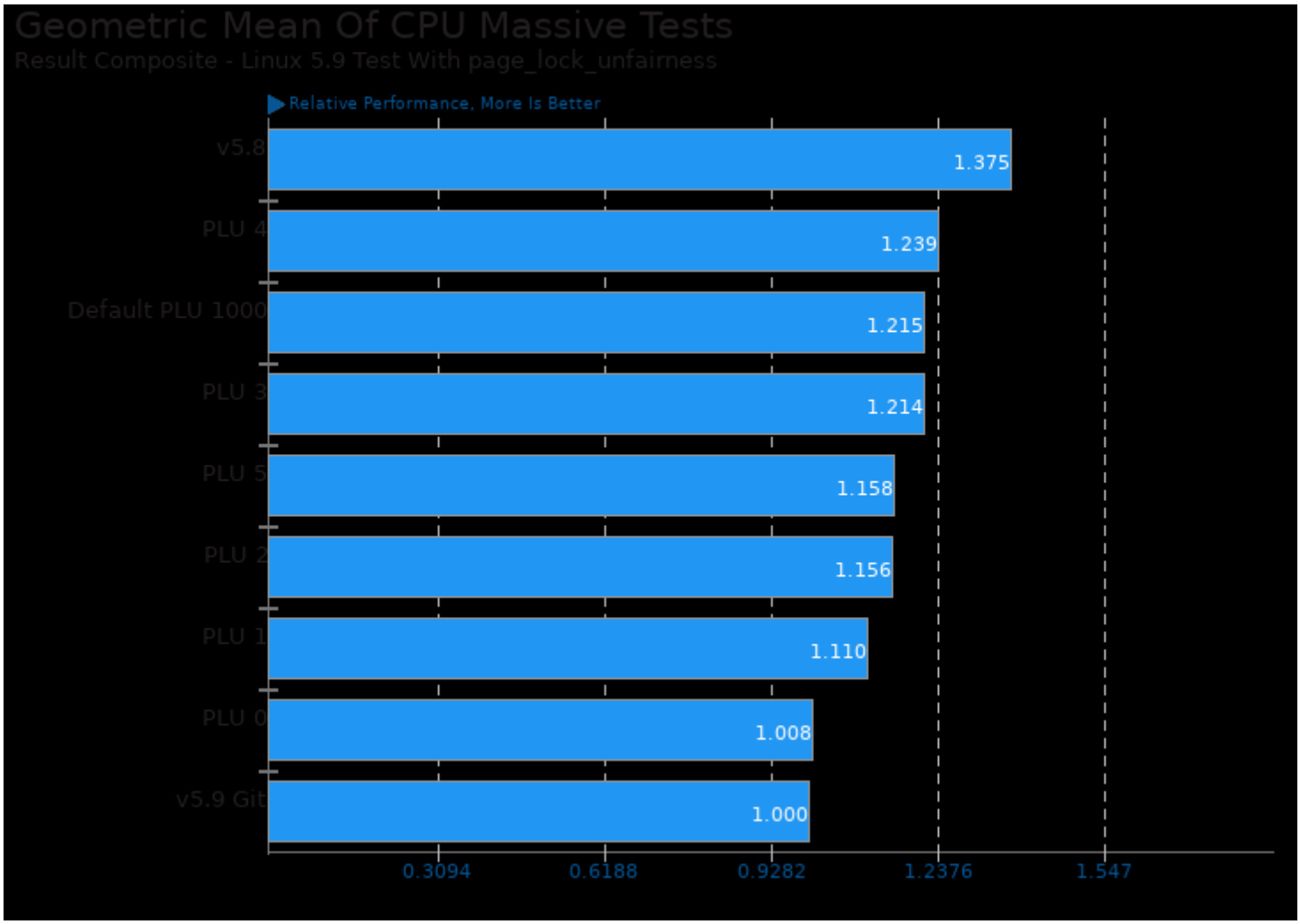
Linux 5.9 Test With page_lock_unfairness



Linux 5.9 Test With page_lock_unfairness

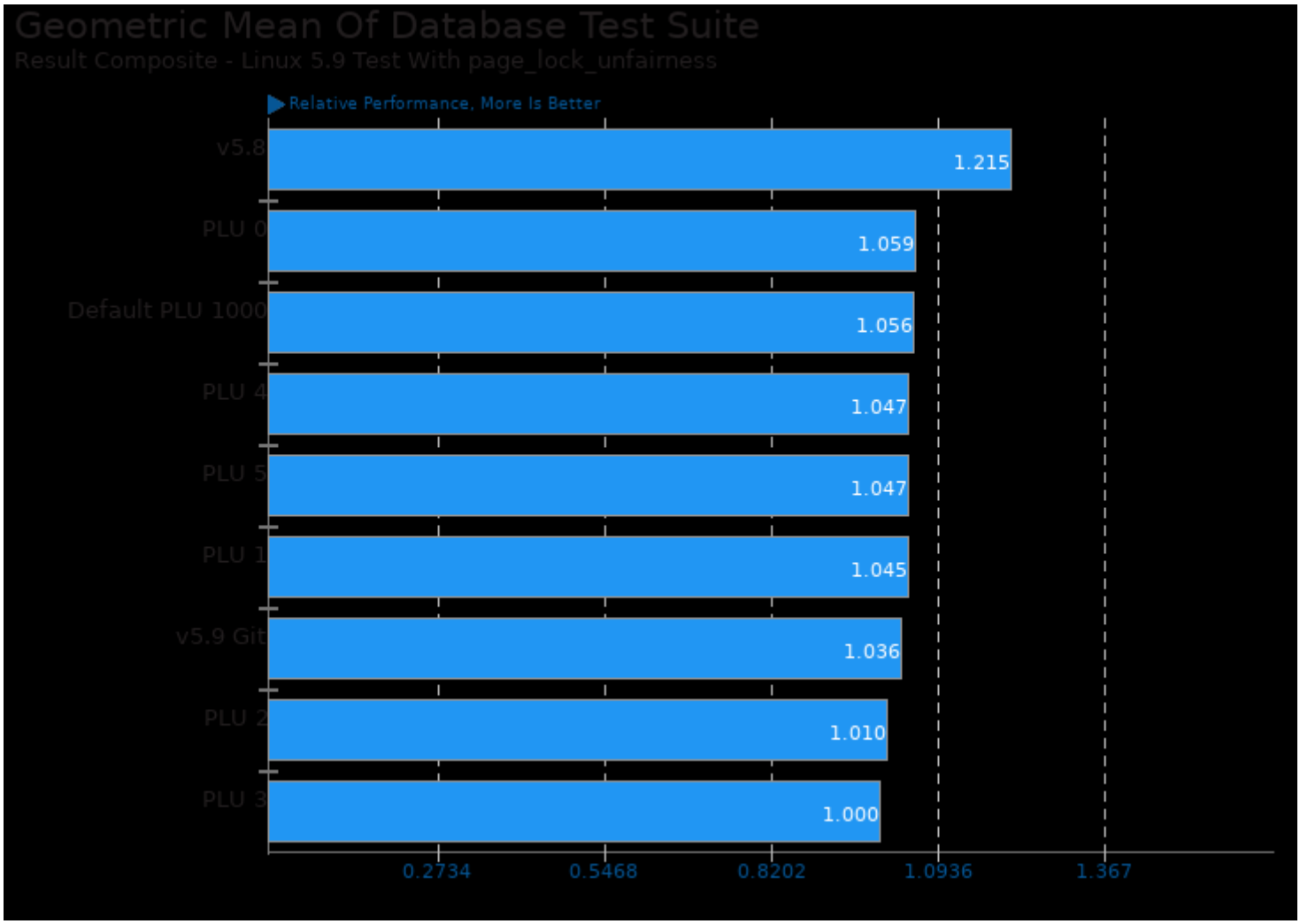


These geometric means are based upon test groupings / test suites for this result file.



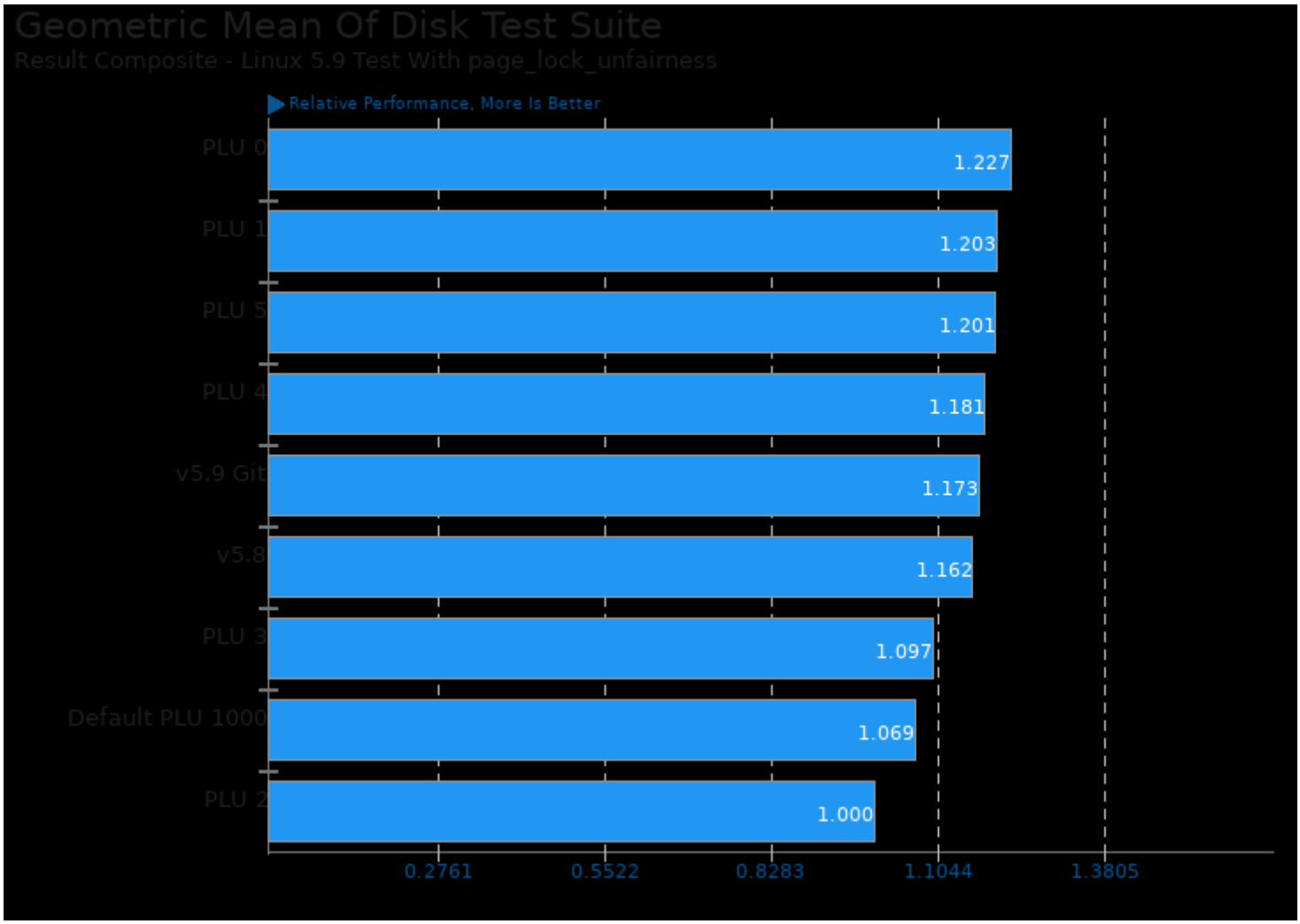
Geometric mean based upon tests: pts/apache-siege, pts/hackbench, pts/nginx and pts/redis

Linux 5.9 Test With page_lock_unfairness



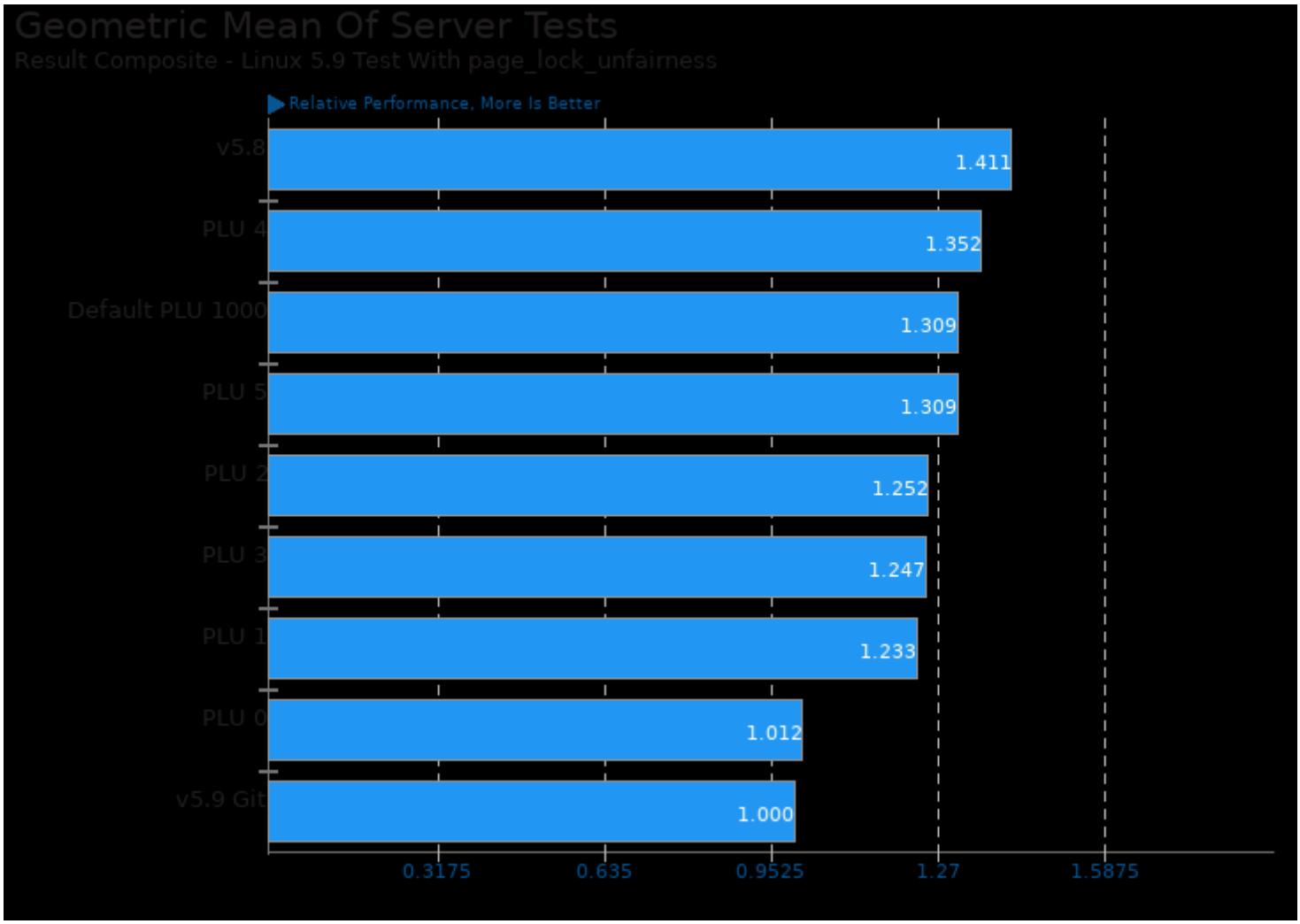
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Linux 5.9 Test With page_lock_unfairness



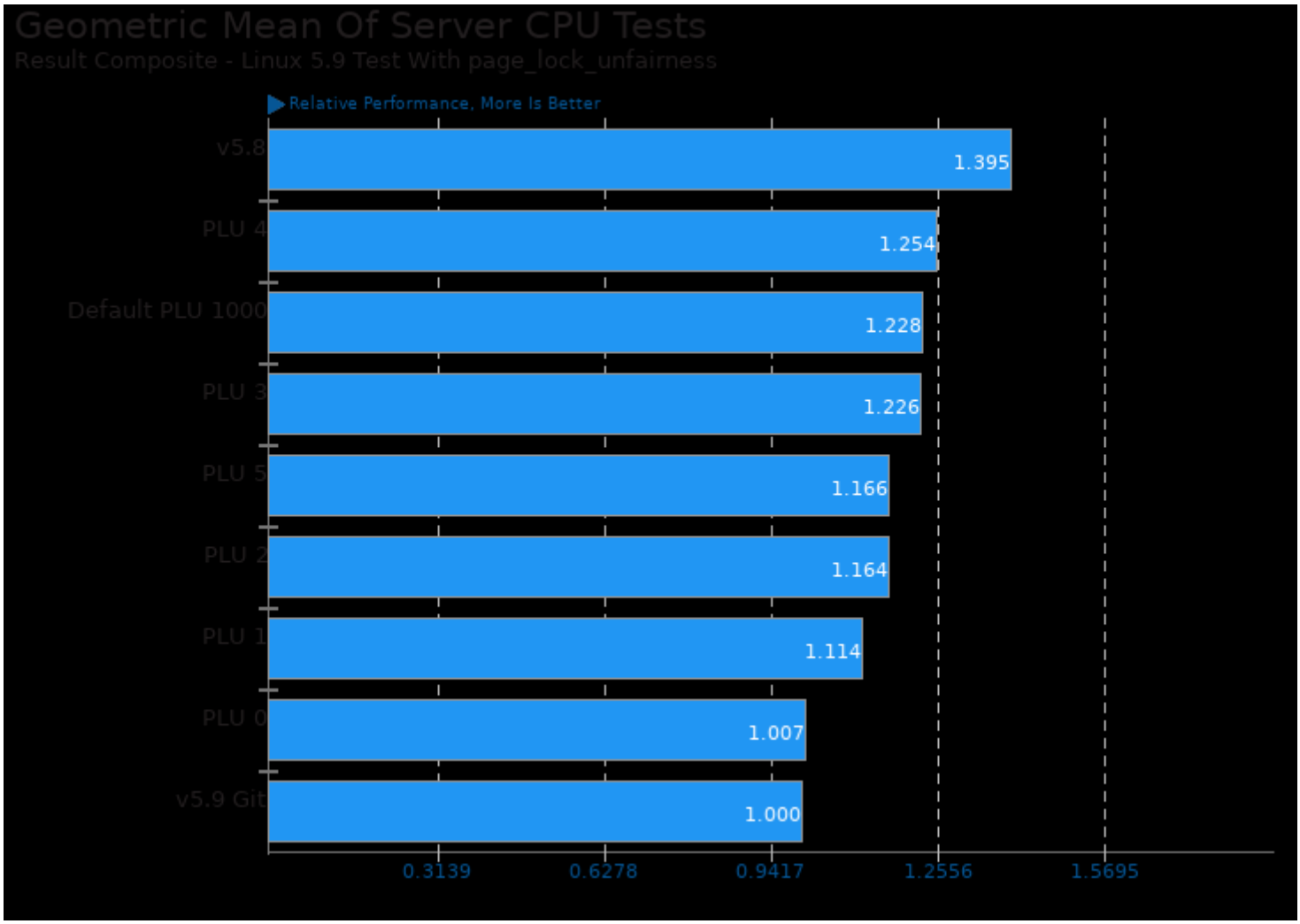
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Linux 5.9 Test With page_lock_unfairness



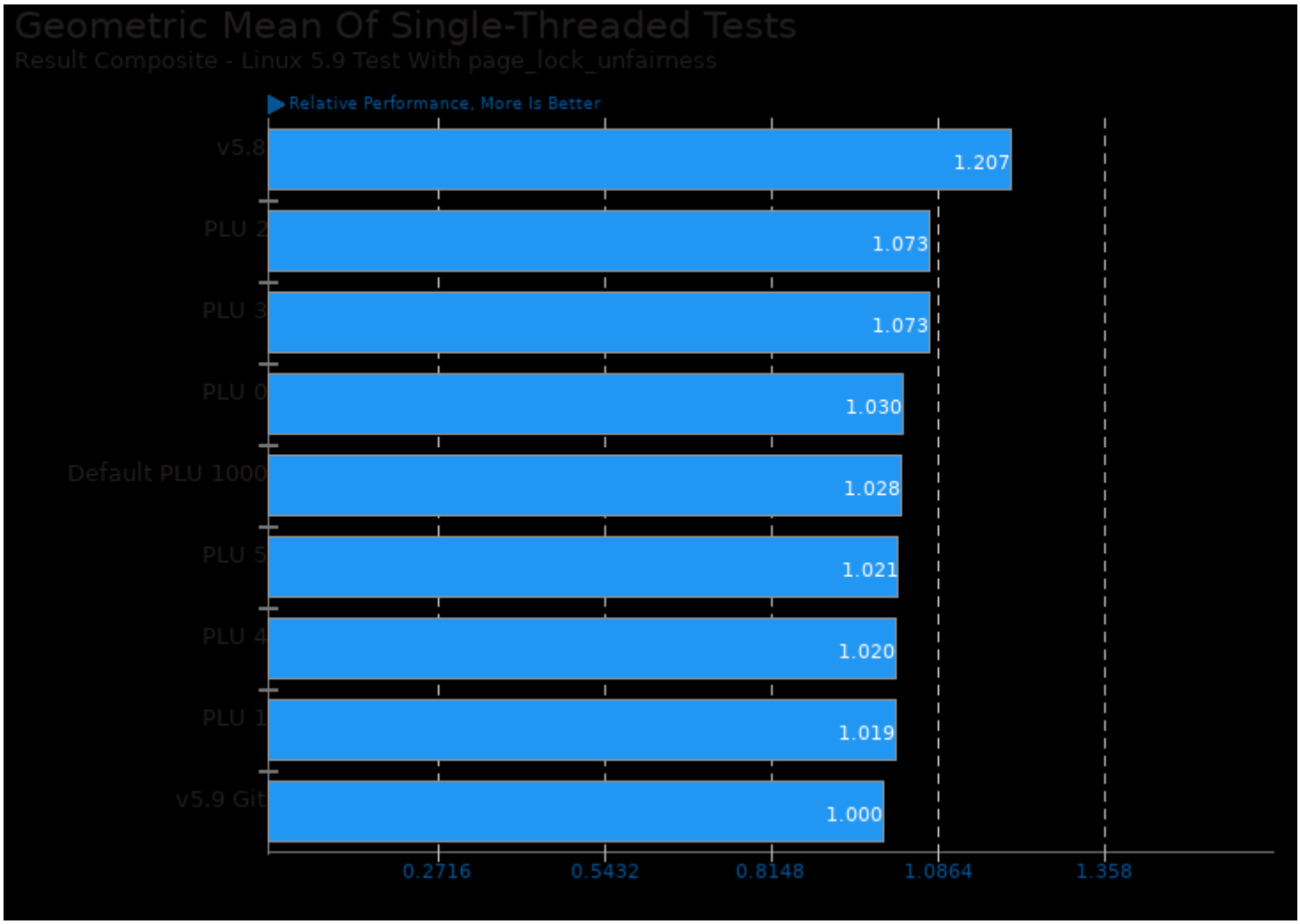
Geometric mean based upon tests: pts/nginx, pts/apache-siege, pts/redis and pts/sqlite

Linux 5.9 Test With page_lock_unfairness



Geometric mean based upon tests: pts/hackbench, pts/redis and pts/apache-siege

Linux 5.9 Test With page_lock_unfairness



Geometric mean based upon tests: pts/redis and pts/nginx

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