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Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

POWER9 testing with a PowerNV C1P9S01 REV 1.01. Benchmarks by Michael Larabel for a future article.

Automated Executive Summary

Ubuntu 19.04 had the most wins, coming in first place for 61% of the tests.

Based on the geometric mean of all complete results, the fastest (Ubuntu 19.04) was 1.038x the speed of the slowest (Ubuntu 19.10).

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

Stress-NG (Test: Matrix Math) at 1.339x
Stress-NG (Test: Context Switching) at 1.184x
Parboil (Test: OpenMP Stencil) at 1.154x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 1.152x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 1.151x
Flexible IO Tester (Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.148x
Flexible IO Tester (Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: No - Block Size: 4KB - Disk

Target: Default Test Directory) at 1.145x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.144x
Flexible IO Tester (Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.144x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.144x.

Test Systems:

Ubuntu 19.04

Processor: POWER9 @ 3.80GHz (4 Cores / 16 Threads), Motherboard: PowerNV C1P9S01 REV 1.01, Memory: 131072MB, Disk: 1024GB SAMSUNG MZVLB1T0HALR-000L7, Graphics: ASPEED, Network: 3 x Broadcom NetXtreme BCM5719 PCIe

OS: Ubuntu 19.04, Kernel: 5.0.0-32-generic (ppc64le), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=powerpc64le-linux-gnu --disable-libphobos --disable-multilib --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-secureplt --enable-shared --enable-targets=powerpcle-linux --enable-threads=posix --host=powerpc64le-linux-gnu --program-prefix=powerpc64le-linux-gnu- --target=powerpc64le-linux-gnu --with-cpu=power8 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-long-double-128 -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: SMT (threads per core): 4
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: l1tf: Not affected + mds: Not affected + meltdown: Mitigation of RFI Flush L1D private per thread + spec_store_bypass: Mitigation of Kernel entry/exit barrier (eieio) + spectre_v1: Mitigation of __user pointer sanitization ori31 speculation barrier enabled + spectre_v2: Mitigation of Indirect branch cache disabled

Ubuntu 19.10

Processor: POWER9 @ 3.80GHz (4 Cores / 16 Threads), Motherboard: PowerNV C1P9S01 REV 1.01, Memory: 131072MB, Disk: 1024GB SAMSUNG MZVLB1T0HALR-000L7, Graphics: ASPEED, Network: 3 x Broadcom NetXtreme BCM5719 PCIe

OS: Ubuntu 19.10, Kernel: 5.3.0-19-generic (ppc64le), Compiler: GCC 9.2.1 20191008, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=powerpc64le-linux-gnu --disable-libphobos --disable-multilib --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-offload-targets=nvptx-none --enable-plugin --enable-secureplt --enable-shared --enable-targets=powerpcle-linux --enable-threads=posix --host=powerpc64le-linux-gnu --program-prefix=powerpc64le-linux-gnu- --target=powerpc64le-linux-gnu --with-cpu=power8 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-long-double-128 --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: SMT (threads per core): 4
Python Notes: Python 2.7.17rc1 + Python 3.7.5rc1
Security Notes: l1tf: Not affected + mds: Not affected + meltdown: Mitigation of RFI Flush L1D private per thread + spec_store_bypass: Mitigation of Kernel entry/exit barrier (eieio) + spectre_v1: Mitigation of __user pointer sanitization ori31 speculation barrier enabled + spectre_v2: Mitigation of Indirect branch cache disabled

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Phoronix Test Suite

	Ubuntu 19.04	Ubuntu 19.10
Stress-NG - Crypto (Bogo Ops/s)	**902.84**	**902.19**
Normalized	100%	99.93%
Standard Deviation	0.4%	0.2%
Stress-NG - Bsearch (Bogo Ops/s)	**2506**	**2585**
Normalized	96.94%	100%
Standard Deviation	1.9%	2%
Stress-NG - Forking (Bogo Ops/s)	**40666**	**37961**
Normalized	100%	93.35%
Standard Deviation	1.9%	2.2%
Stress-NG - Hsearch (Bogo Ops/s)	**17086**	**15089**
Normalized	100%	88.31%
Standard Deviation	1%	1.4%
Stress-NG - Lsearch (Bogo Ops/s)	**19.38**	**17.95**
Normalized	100%	92.62%
Standard Deviation	1.6%	1.1%
Stress-NG - Tsearch (Bogo Ops/s)	**112.84**	**118.33**
Normalized	95.36%	100%
Standard Deviation	1.8%	1%
Stress-NG - CPU Stress (Bogo Ops/s)	**1157**	**1152**
Normalized	100%	99.57%
Standard Deviation	0.3%	1.1%
Stress-NG - Semaphores (Bogo Ops/s)	**2274263**	**2061617**
Normalized	100%	90.65%
Standard Deviation	2.7%	1.9%
Stress-NG - Matrix Math (Bogo Ops/s)	**11889**	**15917**
Normalized	74.69%	100%
Standard Deviation	0.8%	1.2%
Stress-NG - Vector Math (Bogo Ops/s)	**8236**	**8585**
Normalized	95.94%	100%
Standard Deviation	0.2%	0.1%
Stress-NG - Memory Copying (Bogo Ops/s)	**5982**	**6645**
Normalized	90.02%	100%
Standard Deviation	7.1%	2.6%
Stress-NG - Socket Activity (Bogo Ops/s)	**3023**	**2713**
Normalized	100%	89.75%
Standard Deviation	0.6%	0.7%
Stress-NG - Context Switching (Bogo Ops/s)	**1340372**	**1132305**
Normalized	100%	84.48%
Standard Deviation	0.7%	1.5%
Stress-NG - G.C.S.F (Bogo Ops/s)	**116149**	**119757**
Normalized	96.99%	100%
Standard Deviation	0.4%	0.4%
Stress-NG - G.Q.D.S (Bogo Ops/s)	**23.97**	**24.33**
Normalized	98.52%	100%
Standard Deviation	0.8%	0.5%
Stress-NG - S.V.M.P (Bogo Ops/s)	**3767616**	**2532536**
Normalized	100%	67.22%
Standard Deviation	5.9%	12.4%
miniFE - Small (CG Mflops)	**4317**	**4362**
Normalized	98.96%	100%
Standard Deviation	0.1%	0.1%
libgav1 - S.N.1 (FPS)	**34.56**	**34.74**
Normalized	99.48%	100%
Standard Deviation	2.8%	2.9%

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dav1d - Chimera 1080p (FPS)	**73.75**	**77.76**
Normalized	94.84%	100%
Standard Deviation	3.3%	3%
dav1d - Summer Nature 4K (FPS)	**17.12**	**18.29**
Normalized	93.6%	100%
Standard Deviation	3.1%	2.9%
dav1d - S.N.1 (FPS)	**71.20**	**76.11**
Normalized	93.55%	100%
Standard Deviation	0.4%	0.2%
dav1d - C.1.1.b (FPS)	**30.16**	**30.28**
Normalized	99.6%	100%
Standard Deviation	2.7%	2.6%
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**153.96**	**162.69**
Normalized	94.63%	100%
Standard Deviation	6.4%	7.5%
Optcarrot - O.B (FPS)	**30.36**	**30.00**
Normalized	100%	98.81%
Standard Deviation	0%	1%
rav1e - 1.T.A.V.E (FPS)	0.13	0.13
Standard Deviation	0.3%	0.4%
VP9 libvpx Encoding - v.V.1.V.E (FPS)	**6.84**	**6.90**
Normalized	99.13%	100%
Standard Deviation	1.3%	0.9%
x264 - H.2.V.E (FPS)	**12.82**	**12.94**
Normalized	99.07%	100%
Standard Deviation	1.3%	1.6%
x265 - H.2.1.V.E (FPS)	**5.77**	**5.42**
Normalized	100%	93.93%
Standard Deviation	0.8%	1%
Flexible IO Tester - Rand Read - Linux AIO - No - No - 4KB (IOPS)	**131333**	**120667**
Normalized	100%	91.88%
Standard Deviation	2.4%	0.5%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (IOPS)	**136800**	**120667**
Normalized	100%	88.21%
Standard Deviation	2.8%	0.5%
Flexible IO Tester - Rand Read - Linux AIO - Yes - No - 4KB (IOPS)	**38667**	**34853**
Normalized	100%	90.14%
Standard Deviation	2.3%	14.9%
Flexible IO Tester - Rand Write - Linux AIO - No - No - 4KB (IOPS)	**127000**	**110667**
Normalized	100%	87.14%
Standard Deviation		0.5%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4KB (IOPS)	**51153**	**45507**
Normalized	100%	88.96%
Standard Deviation	19.5%	24.6%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (IOPS)	**125000**	**109667**
Normalized	100%	87.73%
Standard Deviation	1.4%	2.3%

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Flexible IO Tester - Rand Write - Linux AIO - Yes - No - 4KB (IOPS)	**126667**	**114333**
Normalized	100%	90.26%
Standard Deviation	0.9%	1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4KB (IOPS)	**126667**	**114000**
Normalized	100%	90%
Standard Deviation	0.5%	1.8%
Flexible IO Tester - Seq Read - Linux AIO - No - No - 4KB (IOPS)	**138000**	**120667**
Normalized	100%	87.44%
Standard Deviation		0.5%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (IOPS)	**137333**	**119333**
Normalized	100%	86.89%
Standard Deviation	0.4%	2.4%
Flexible IO Tester - Seq Read - Linux AIO - Yes - No - 4KB (IOPS)	**212067**	**174600**
Normalized	100%	82.33%
Standard Deviation	9.4%	11.1%
Flexible IO Tester - Seq Write - Linux AIO - No - No - 4KB (IOPS)	**126000**	**110000**
Normalized	100%	87.3%
Standard Deviation		1.6%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4KB (IOPS)	**210000**	**168533**
Normalized	100%	80.25%
Standard Deviation	10.3%	12.3%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (IOPS)	**125667**	**112667**
Normalized	100%	89.66%
Standard Deviation	2.6%	0.5%
Flexible IO Tester - Seq Write - Linux AIO - Yes - No - 4KB (IOPS)	**139333**	**126000**
Normalized	100%	90.43%
Standard Deviation	0.4%	
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4KB (IOPS)	**138667**	**126000**
Normalized	100%	90.87%
Standard Deviation	0.4%	
GraphicsMagick - Swirl (Iterations/min)	131	131
Standard Deviation	3.2%	2.9%
GraphicsMagick - Rotate (Iterations/min)	**721**	**712**
Normalized	100%	98.75%
Standard Deviation	1.9%	1.4%
GraphicsMagick - Sharpen (Iterations/min)	**40**	**41**
Normalized	97.56%	100%
Standard Deviation	3.4%	4.1%
GraphicsMagick - Enhanced (Iterations/min)	**53**	**54**
Normalized	98.15%	100%
Standard Deviation	1.1%	1.1%
GraphicsMagick - Resizing (Iterations/min)	**309**	**312**
Normalized	99.04%	100%
Standard Deviation	0.5%	0.8%

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GraphicsMagick - Noise-Gaussian (Iterations/min)	57	57
Standard Deviation		1%
GraphicsMagick - HWB Color Space (Iterations/min)	**457**	**465**
Normalized	98.28%	100%
Standard Deviation	0.6%	0.5%
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	**86640**	**87100**
Normalized	99.47%	100%
Standard Deviation	0.3%	0.2%
Xsbench (Lookups/s)	**1397974**	**1278742**
Normalized	100%	91.47%
Standard Deviation	0.1%	1.1%
Flexible IO Tester - Rand Read - Linux AIO - No - No - 2MB (MB/s)	**2037**	**2088**
Normalized	97.56%	100%
Standard Deviation	15.3%	14.8%
Flexible IO Tester - Rand Read - Linux AIO - No - No - 4KB (MB/s)	**513**	**472**
Normalized	100%	92.01%
Standard Deviation	2.7%	
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 2MB (MB/s)	**2007**	**2076**
Normalized	96.68%	100%
Standard Deviation	15.1%	15.2%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (MB/s)	**534**	**471**
Normalized	100%	88.2%
Standard Deviation	3%	0.2%
Flexible IO Tester - Rand Read - Linux AIO - Yes - No - 2MB (MB/s)	**1475**	**1459**
Normalized	100%	98.92%
Standard Deviation	16%	13.7%
Flexible IO Tester - Rand Read - Linux AIO - Yes - No - 4KB (MB/s)	**151**	**137**
Normalized	100%	90.73%
Standard Deviation	2.4%	15%
Flexible IO Tester - Rand Write - Linux AIO - No - No - 2MB (MB/s)	**2236**	**2238**
Normalized	99.91%	100%
Standard Deviation	0.1%	0.5%
Flexible IO Tester - Rand Write - Linux AIO - No - No - 4KB (MB/s)	**495**	**433**
Normalized	100%	87.47%
Standard Deviation	0.3%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 2MB (MB/s)	**635**	**613**
Normalized	100%	96.54%
Standard Deviation	13.2%	7.7%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4KB (MB/s)	**200**	**178**
Normalized	100%	89%
Standard Deviation	19.6%	24.7%

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Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 2MB (MB/s)	2238	2238
Standard Deviation	0.4%	0.5%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (MB/s)	**488**	**429**
Normalized	100%	87.91%
Standard Deviation	1.5%	2.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - No - 2MB (MB/s)	**1648**	**1645**
Normalized	100%	99.82%
Standard Deviation		0.4%
Flexible IO Tester - Rand Write - Linux AIO - Yes - No - 4KB (MB/s)	**493**	**447**
Normalized	100%	90.67%
Standard Deviation	0.9%	1.1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 2MB (MB/s)	**1645**	**1650**
Normalized	99.7%	100%
Standard Deviation	0.4%	0.1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4KB (MB/s)	**494**	**445**
Normalized	100%	90.08%
Standard Deviation	0.4%	1.9%
Flexible IO Tester - Seq Read - Linux AIO - No - No - 2MB (MB/s)	**1954**	**1913**
Normalized	100%	97.9%
Standard Deviation	8.3%	7.6%
Flexible IO Tester - Seq Read - Linux AIO - No - No - 4KB (MB/s)	**539**	**471**
Normalized	100%	87.38%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 2MB (MB/s)	**2020**	**2241**
Normalized	90.14%	100%
Standard Deviation	15.1%	1.9%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (MB/s)	**537**	**466**
Normalized	100%	86.78%
Standard Deviation	0.2%	2.2%
Flexible IO Tester - Seq Read - Linux AIO - Yes - No - 2MB (MB/s)	**1932**	**1850**
Normalized	100%	95.76%
Standard Deviation	11.3%	6.6%
Flexible IO Tester - Seq Read - Linux AIO - Yes - No - 4KB (MB/s)	**828**	**682**
Normalized	100%	82.37%
Standard Deviation	9.4%	11%
Flexible IO Tester - Seq Write - Linux AIO - No - No - 2MB (MB/s)	**1825**	**2256**
Normalized	80.9%	100%
Standard Deviation	12.8%	0.3%

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Flexible IO Tester - Seq Write - Linux AIO - No - No - 4KB (MB/s)	**493**	**431**
Normalized	100%	87.42%
Standard Deviation		1.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 2MB (MB/s)	**2023**	**2030**
Normalized	99.66%	100%
Standard Deviation	8.3%	9.3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4KB (MB/s)	**821**	**658**
Normalized	100%	80.15%
Standard Deviation	10.4%	12.4%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 2MB (MB/s)	**1816**	**2242**
Normalized	81%	100%
Standard Deviation	13.1%	1.4%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (MB/s)	**489**	**440**
Normalized	100%	89.98%
Standard Deviation	2.6%	0.5%
Flexible IO Tester - Seq Write - Linux AIO - Yes - No - 2MB (MB/s)	**1645**	**1647**
Normalized	99.88%	100%
Standard Deviation	0.2%	0.2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - No - 4KB (MB/s)	**545**	**491**
Normalized	100%	90.09%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 2MB (MB/s)	**1650**	**1655**
Normalized	99.7%	100%
Standard Deviation	0.1%	0.7%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4KB (MB/s)	**542**	**491**
Normalized	100%	90.59%
Standard Deviation	0.6%	
IOR - Write Test (MB/s)	**271.08**	**205.09**
Normalized	100%	75.66%
Standard Deviation	1.5%	13.5%
IOR - Read Test (MB/s)	**1328**	**738.24**
Normalized	100%	55.58%
Standard Deviation	5.5%	40.6%
libjpeg-turbo tjbench - D.T (Megapixels/sec)	**101.95**	**101.09**
Normalized	100%	99.16%
Standard Deviation	0%	0.1%
Himeno Benchmark - P.P.S (MFLOPS)	**1826**	**1820**
Normalized	100%	99.68%
Standard Deviation	1.6%	1.7%
ASKAP - tConvolve MT - Gridding (Million Grid Points/sec)	**923.43**	**922.10**
Normalized	100%	99.86%
Standard Deviation	0.2%	0.2%

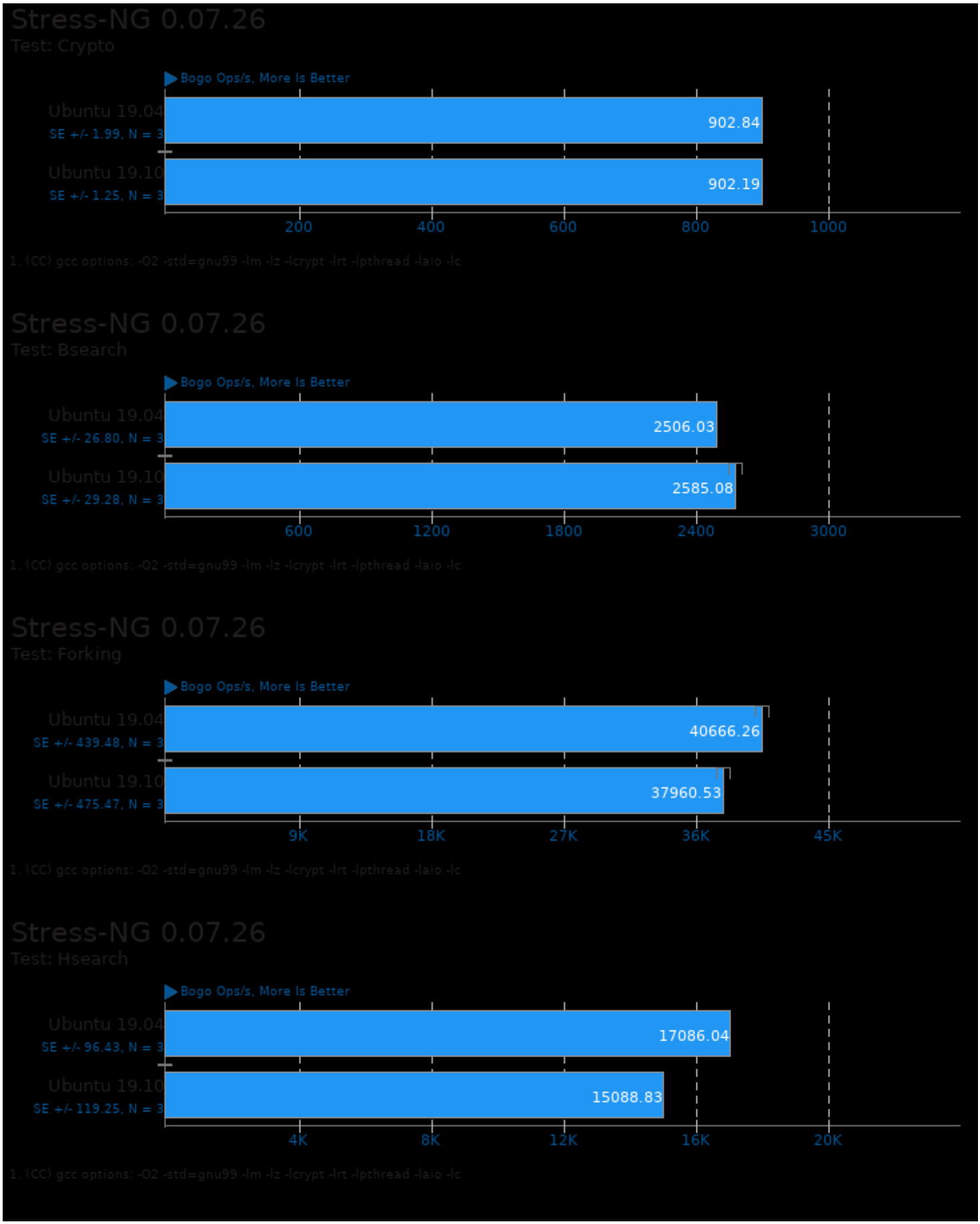
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

ASKAP - tConvolve MT - Degridding (Million Grid Points/sec)	**1060**	**1048**
Normalized	100%	98.79%
Standard Deviation	0.1%	1%
ASKAP - tConvolve MPI - Gridding (Million Grid Points/sec)	**925.04**	**918.93**
Normalized	100%	99.34%
Standard Deviation	0.1%	0.4%
ASKAP - tConvolve MPI - Degridding (Million Grid Points/sec)	**1059**	**1031**
Normalized	100%	97.29%
Standard Deviation	0.7%	0.9%
ASKAP - tConvolve OpenMP - Gridding (Million Grid Points/sec)	**910.20**	**896.25**
Normalized	100%	98.47%
Standard Deviation	4.7%	4.9%
ASKAP - tConvolve OpenMP - Degridding (Million Grid Points/sec)	**1191**	**1182**
Normalized	100%	99.27%
Standard Deviation	0.3%	1%
7-Zip Compression - C.S.T (MIPS)	**19394**	**19338**
Normalized	100%	99.71%
Standard Deviation	3.7%	3.3%
Stockfish - Total Time (Nodes/s)	**7574635**	**7530031**
Normalized	100%	99.41%
Standard Deviation	3%	0.2%
Redis - GET (Reqs/sec)	**944130**	**898769**
Normalized	100%	95.2%
Standard Deviation	5.8%	6%
Redis - SET (Reqs/sec)	**560739**	**572622**
Normalized	97.92%	100%
Standard Deviation	2.3%	3.3%
PHPBench - P.B.S (Score)	**160917**	**164421**
Normalized	97.87%	100%
Standard Deviation	0.4%	0.1%
OpenSSL - R.4.b.P (Signs/sec)	**797.13**	**825.00**
Normalized	96.62%	100%
Standard Deviation	2.7%	2.1%
PyBench - T.F.A.T.T (Milliseconds)	**4051**	**3876**
Normalized	95.68%	100%
Standard Deviation		0.2%
SQLite - 1 (sec)	**54.10**	**58.58**
Normalized	100%	92.35%
Standard Deviation	6.2%	5.8%
SQLite - 8 (sec)	**138.80**	**136.76**
Normalized	98.53%	100%
Standard Deviation	3%	1.4%
SQLite - 32 (sec)	**245.93**	**244.34**
Normalized	99.35%	100%
Standard Deviation	0.2%	0.4%
Parboil - OpenMP LBM (sec)	**115.92**	**116.32**
Normalized	100%	99.66%
Standard Deviation	0.3%	0.2%
Parboil - OpenMP CUTCP (sec)	**16.24**	**16.07**

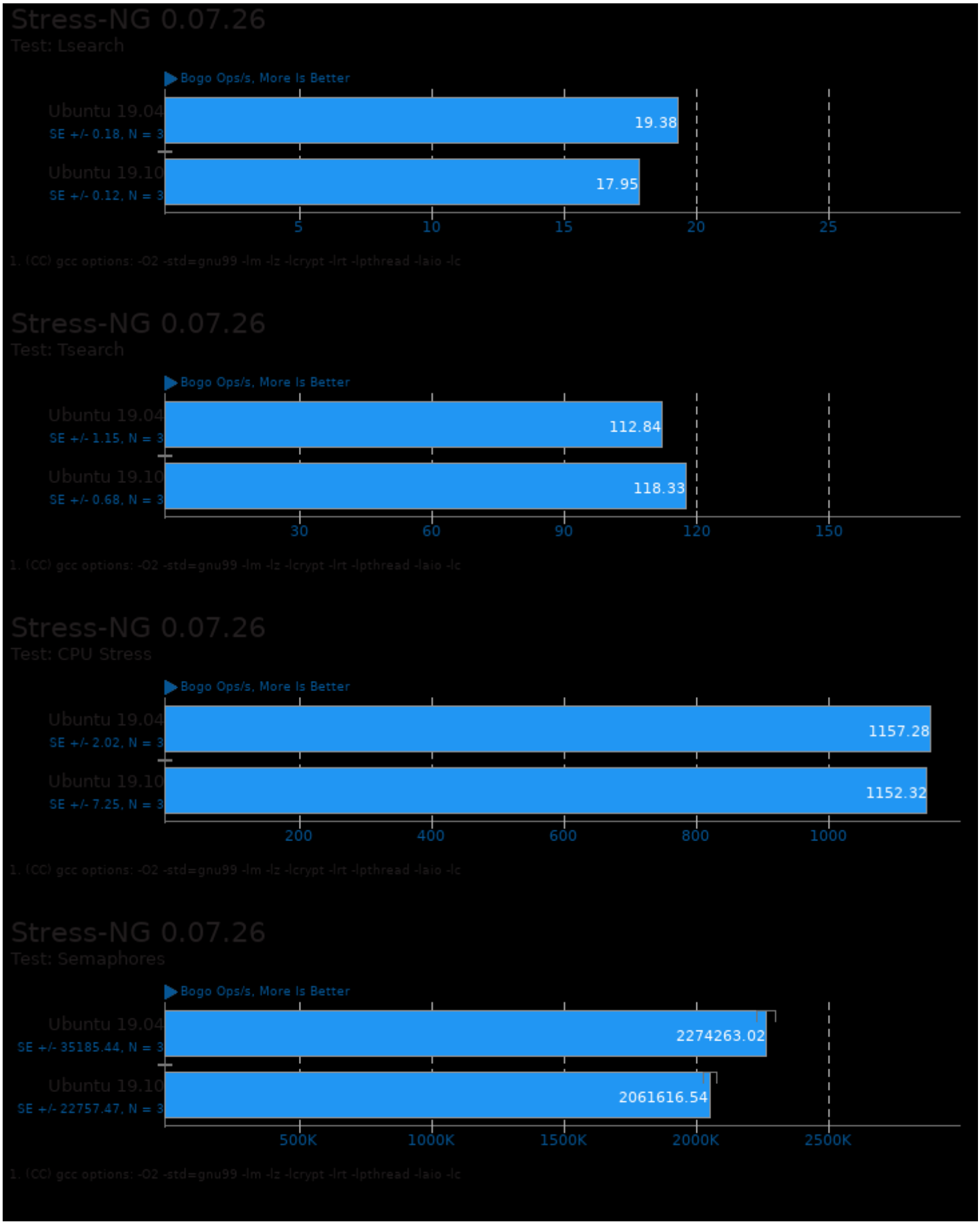
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

Normalized	98.95%	100%
Standard Deviation	0.1%	0.4%
Parboil - OpenMP Stencil (sec)	**19.83**	**17.18**
Normalized	86.64%	100%
Standard Deviation	1.1%	0.3%
Parboil - O.M.G (sec)	**183.18**	**182.51**
Normalized	99.63%	100%
Standard Deviation	1.8%	1.5%
Rodinia - OpenMP LavaMD (sec)	**126.94**	**125.08**
Normalized	98.53%	100%
Standard Deviation	0.2%	0.2%
Rodinia - OpenMP CFD Solver (sec)	**60.12**	**61.11**
Normalized	100%	98.38%
Standard Deviation	2%	0.5%
Rodinia - O.S (sec)	**34.37**	**33.92**
Normalized	98.69%	100%
Standard Deviation	0.7%	0.5%
Timed MrBayes Analysis - P.P.A (sec)	**492.30**	**476.96**
Normalized	96.88%	100%
Standard Deviation	0.5%	0.1%
Timed Linux Kernel Compilation - Time To Compile	**377.92**	**390.00**
Normalized	100%	96.9%
Standard Deviation	0.5%	0.3%
Timed LLVM Compilation - Time To Compile (sec)	**1066**	**1152**
Normalized	100%	92.55%
C-Ray - Total Time - 4.1.R.P.P (sec)	**213.84**	**213.54**
Normalized	99.86%	100%
Standard Deviation	0.3%	0.3%
Smallpt - G.I.R.1.S (sec)	**39.85**	**39.93**
Normalized	100%	99.8%
Standard Deviation	0.3%	0.5%
AOBench - 2048 x 2048 - Total Time (sec)	**65.23**	**66.56**
Normalized	100%	98%
Standard Deviation	1.4%	3%
XZ Compression - C.u.1.0.3.s.i.i.C.L.9 (sec)	**48.73**	**46.93**
Normalized	96.31%	100%
Standard Deviation	2%	2.4%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	**27.73**	**27.28**
Normalized	98.38%	100%
Standard Deviation	1%	0.3%
LAME MP3 Encoding - WAV To MP3 (sec)	**15.31**	**14.68**
Normalized	95.89%	100%
Standard Deviation	0.3%	3%
Sudokut - Total Time (sec)	**28.19**	**28.34**
Normalized	100%	99.47%
Standard Deviation	0%	0.2%
SQLite Speedtest - Timed Time - Size 1,000 (sec)	**162.36**	**164.87**
Normalized	100%	98.48%
Standard Deviation	0.2%	0.3%
PHP Micro Benchmarks - Zend bench (sec)	1.85	
Standard Deviation	1%	
PHP Micro Benchmarks - Zend micro_bench (sec)	9.99	
Standard Deviation	0%	
QMCPACK (Execution Time - sec)	**722.51**	**720.35**
Normalized	99.7%	100%

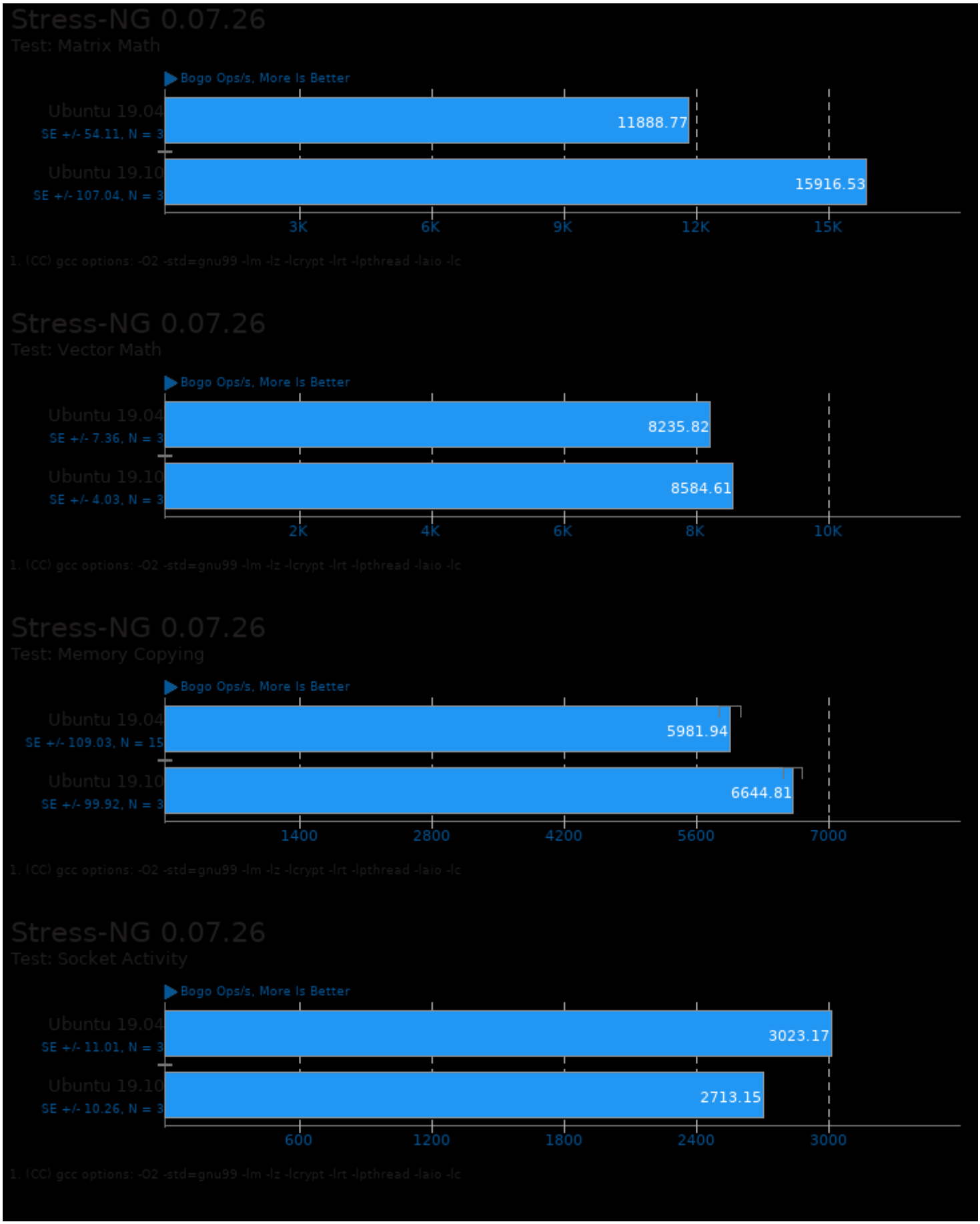
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



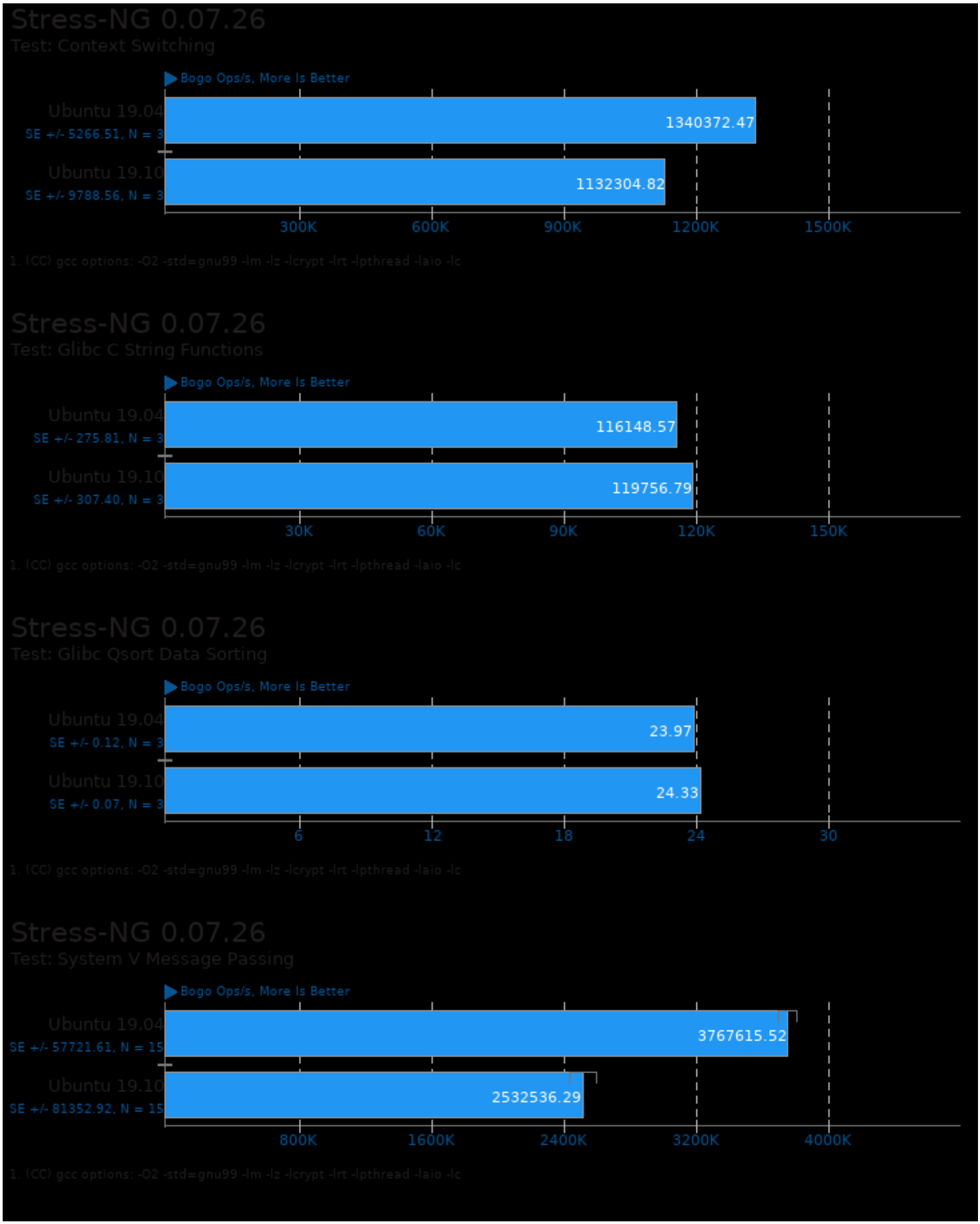
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



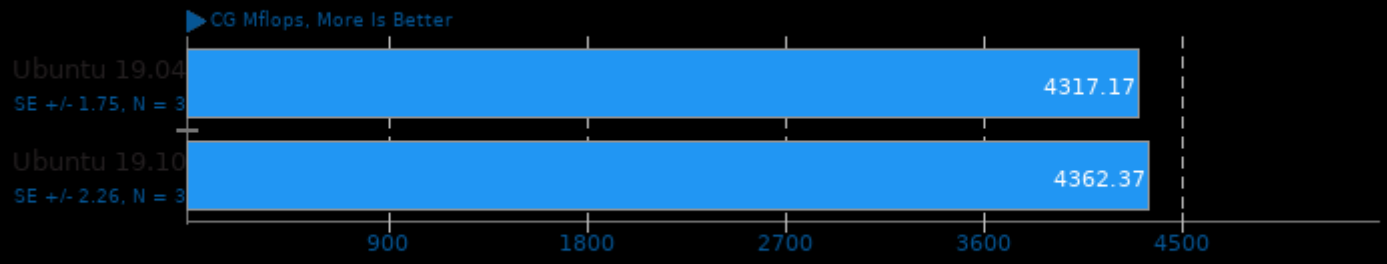
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

miniFE 2.2

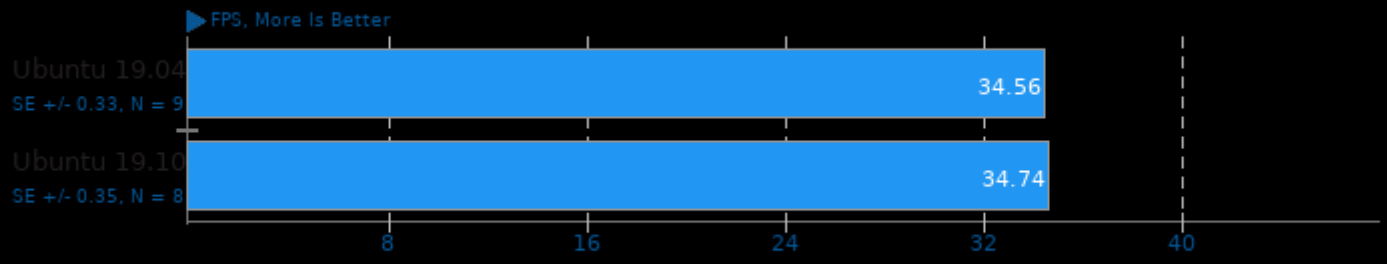
Problem Size: Small



1. (CXX) g++ options: -O3 -fopenmp -pthread -lmpi_cxx -lmpi

libgav1 2019-10-05

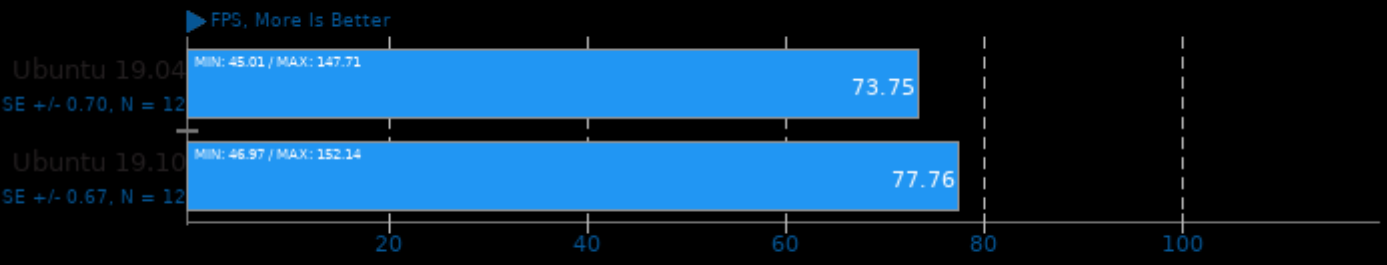
Video Input: Summer Nature 1080p



1. (CXX) g++ options: -O3 -lpthread

dav1d 0.5.0

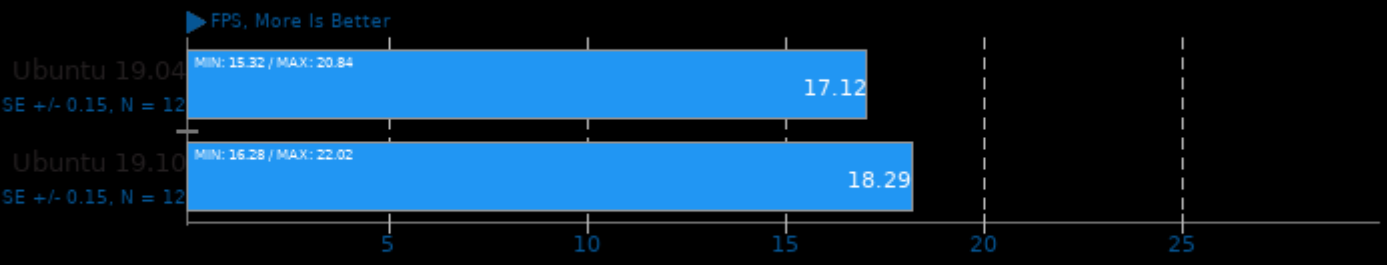
Video Input: Chimera 1080p



1. (CC) gcc options: -pthread

dav1d 0.5.0

Video Input: Summer Nature 4K

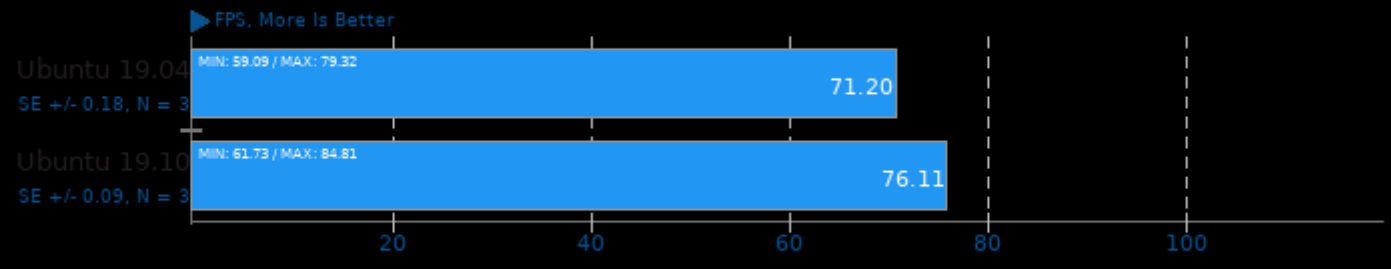


1. (CC) gcc options: -pthread

Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

dav1d 0.5.0

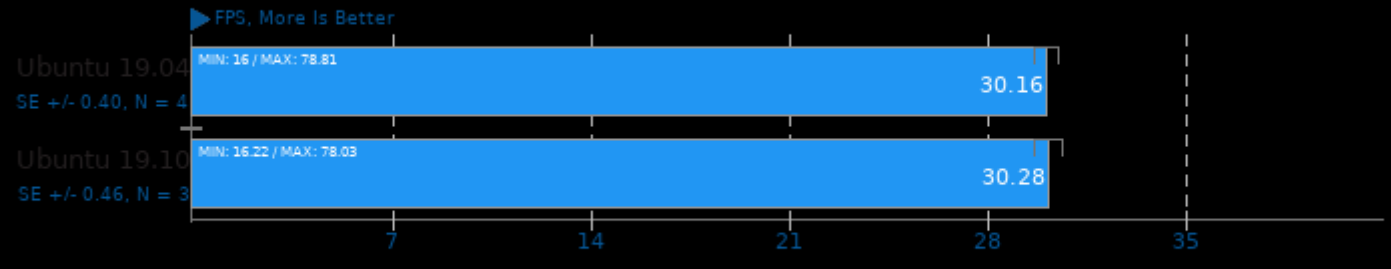
Video Input: Summer Nature 1080p



1. (CC) gcc options: -pthread

dav1d 0.5.0

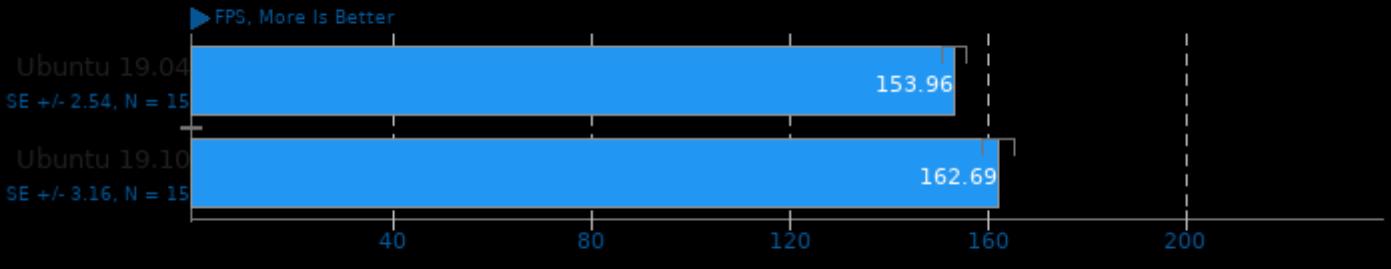
Video Input: Chimera 1080p 10-bit



1. (CC) gcc options: -pthread

TTSIOD 3D Renderer 2.3b

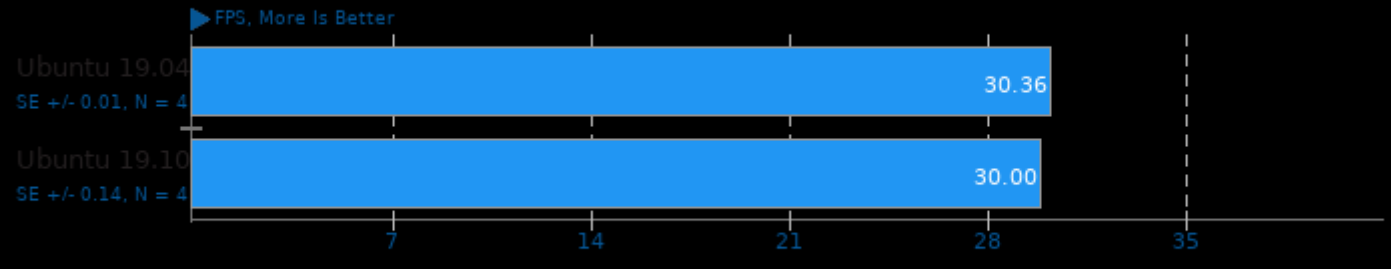
Phong Rendering With Soft-Shadow Mapping



1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -lSDL -fopenmp -fwhole-program -lstdc++

Optcarrot

Optimized Benchmark

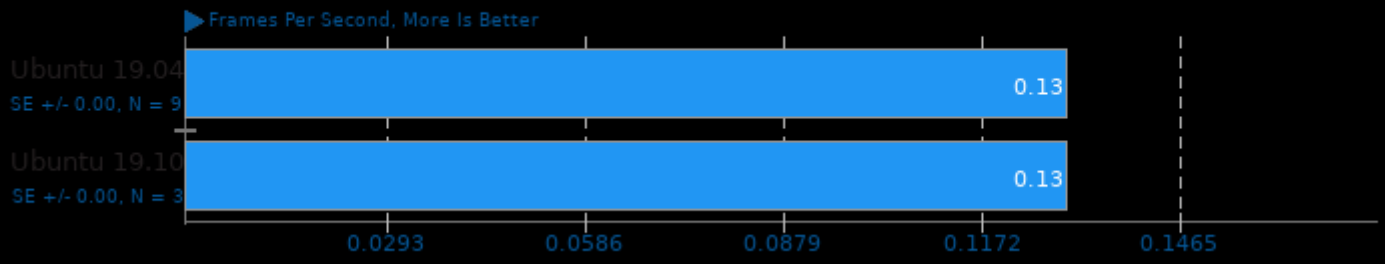


1. ruby 2.5.5p157 (2019-03-15 revision 67260) [powerpc64le-linux-gnu]

Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

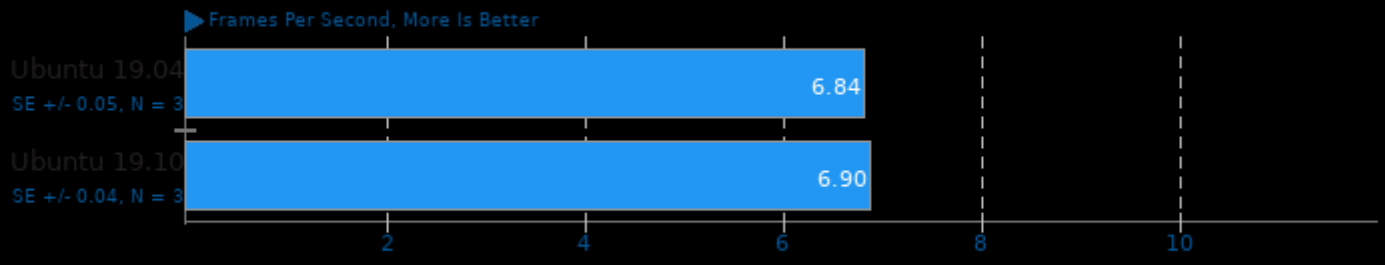
rav1e 20191023

1080p To AV1 Video Encode



VP9 libvpx Encoding 1.8.1

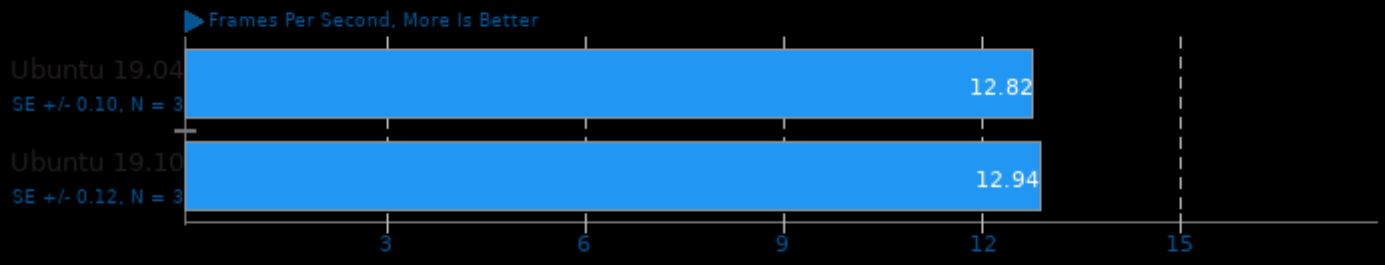
vpxenc VP9 1080p Video Encode



1. (CXX) g++ options: -lm -lpthread -O3 -fPIC -U_FORTIFY_SOURCE -std=c++11

x264 2018-09-25

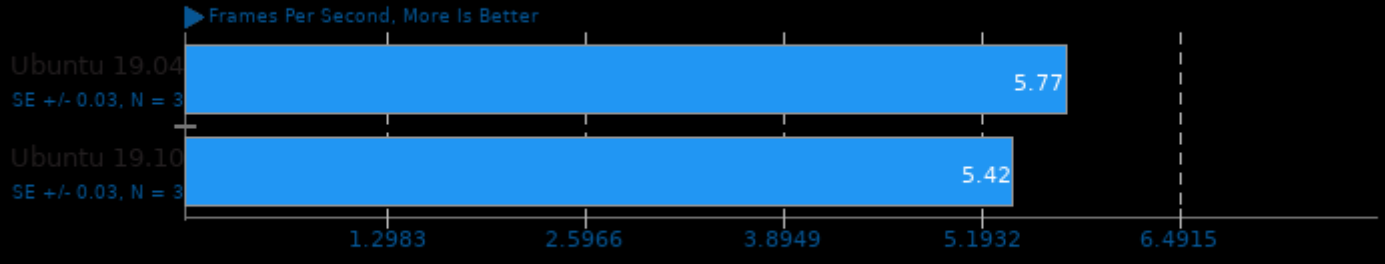
H.264 Video Encoding



1. (CC) gcc options: -ldl -lm -lpthread -O3 -ffast-math -maltivec -mabi=altivec -mvsx -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize

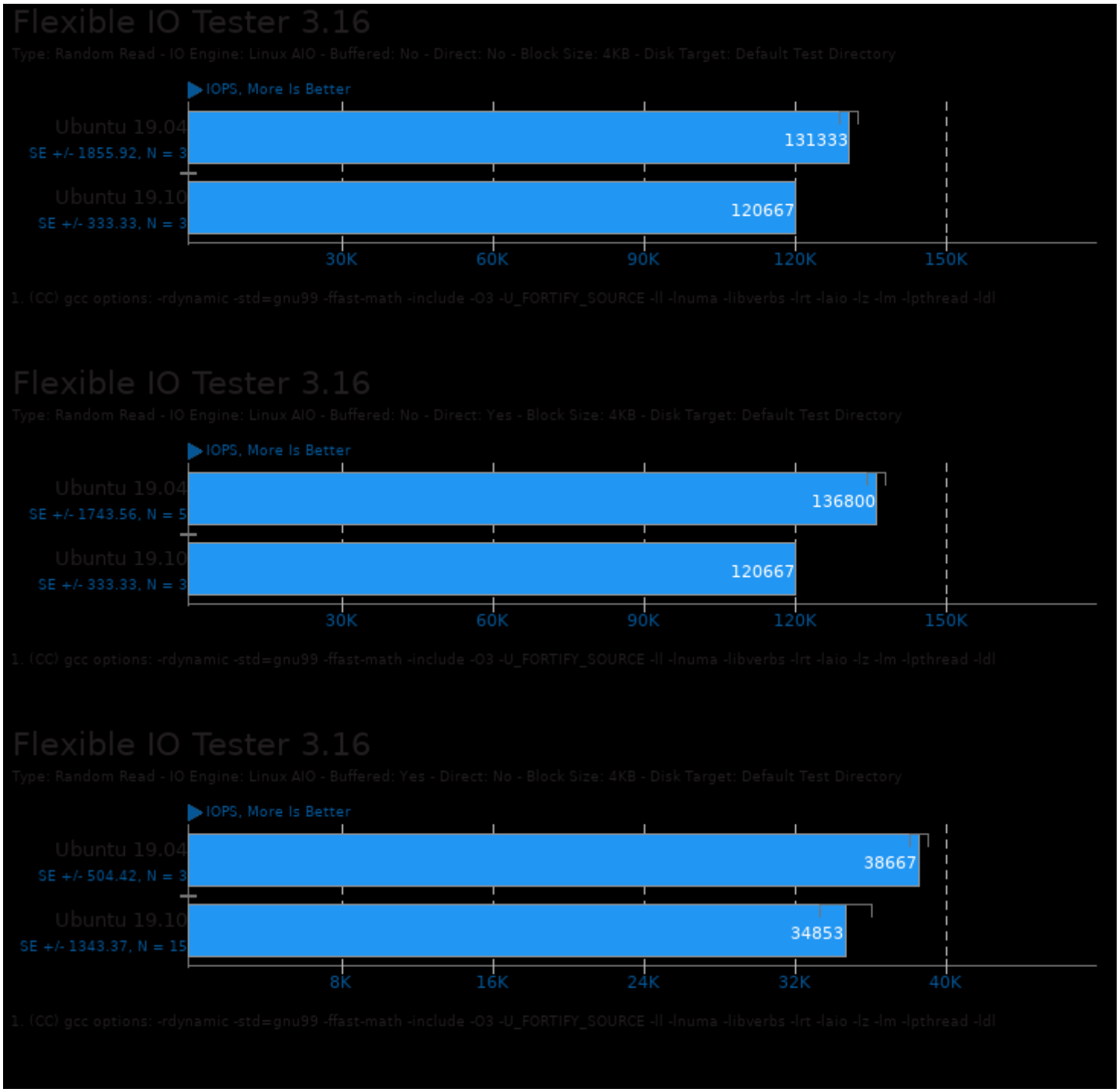
x265 3.1.2

H.265 1080p Video Encoding

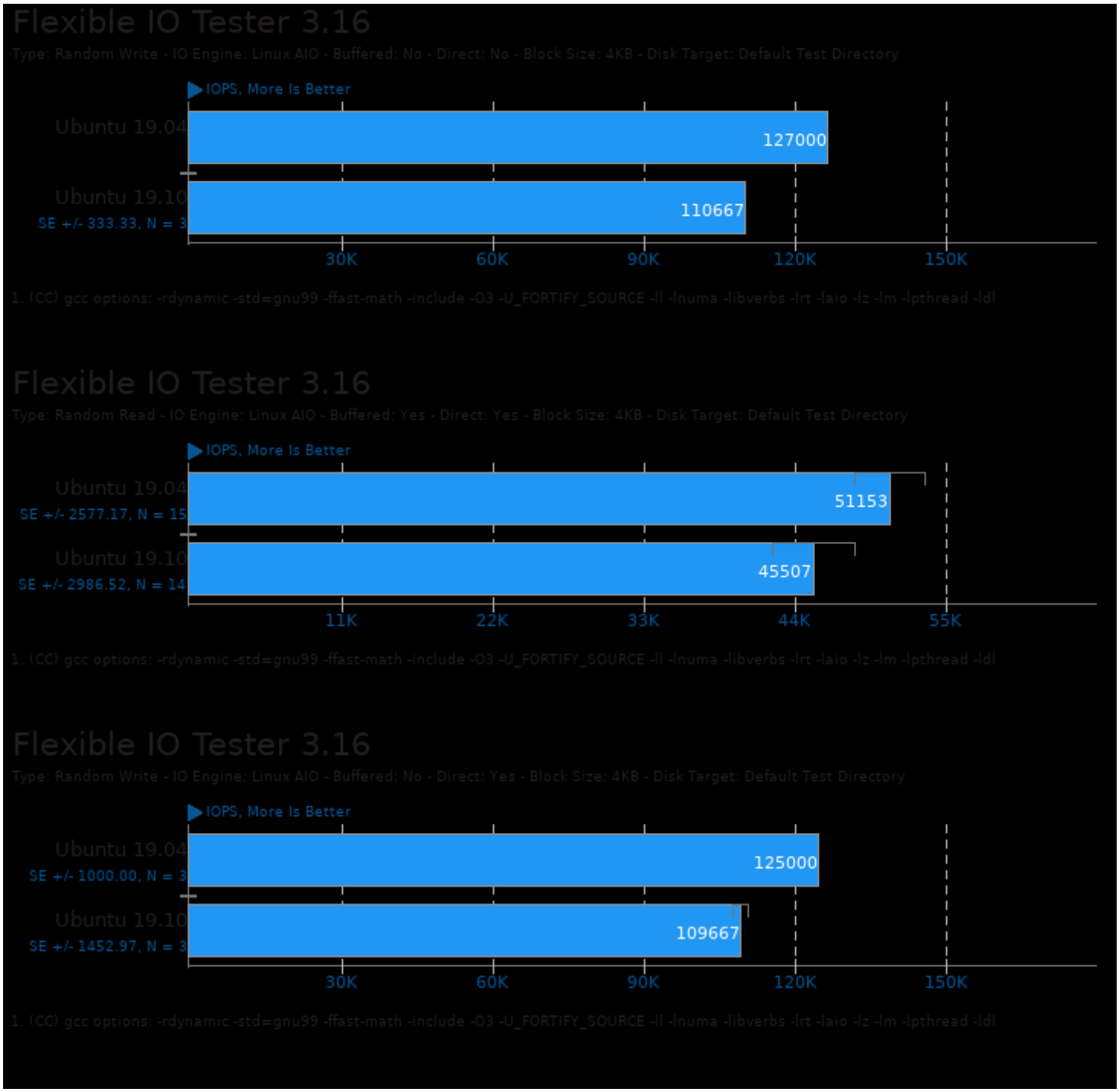


1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

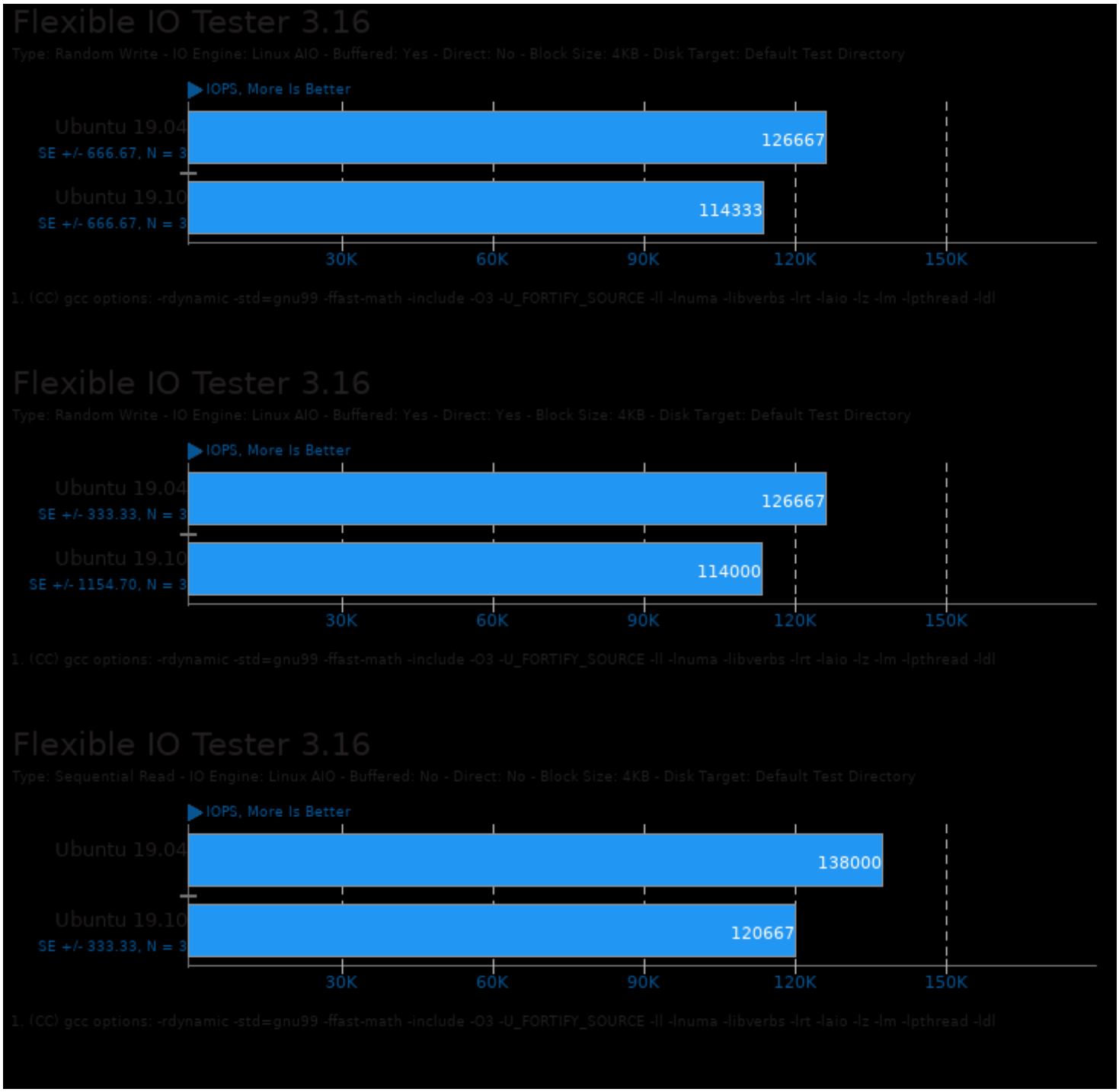
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



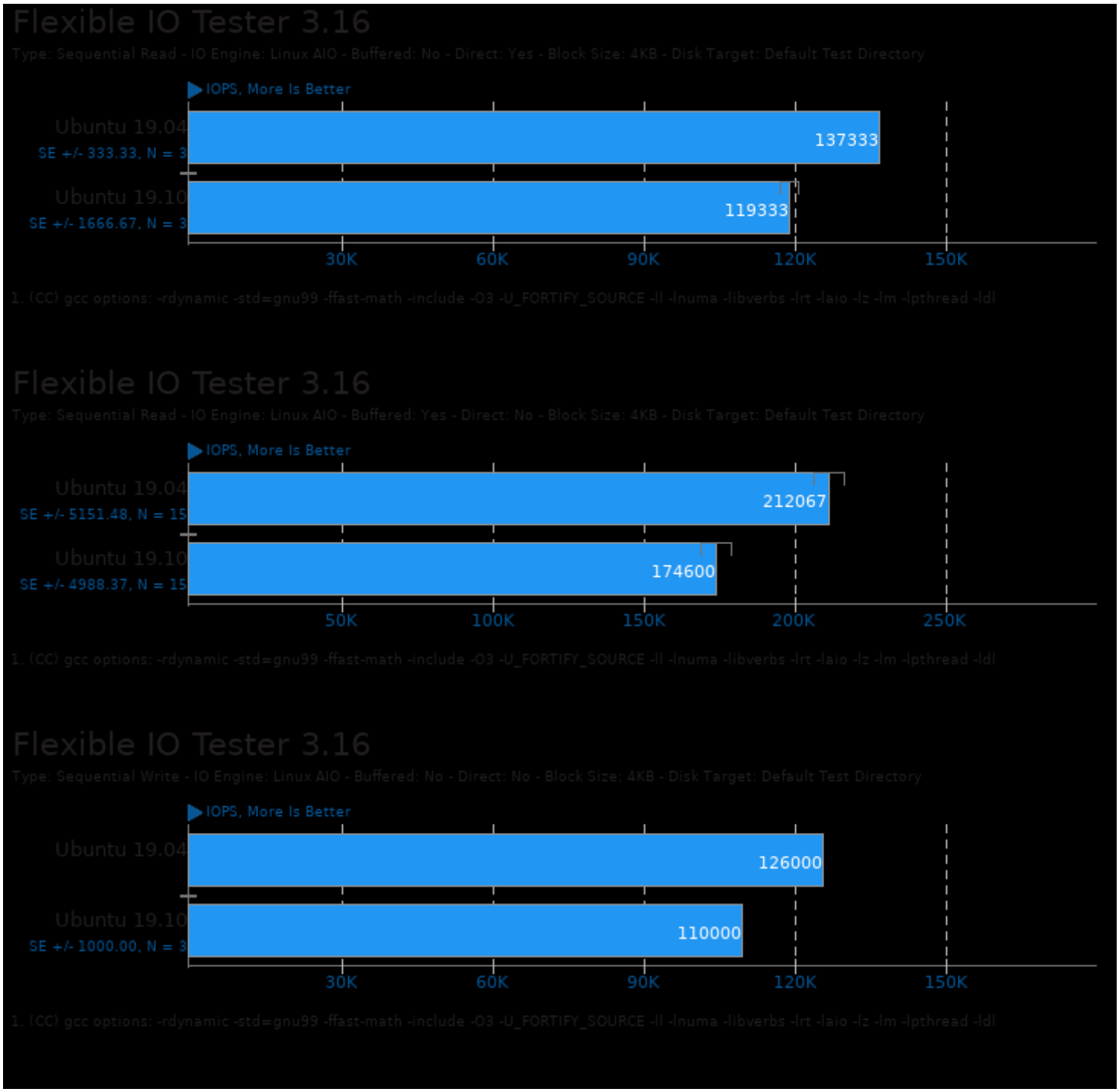
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



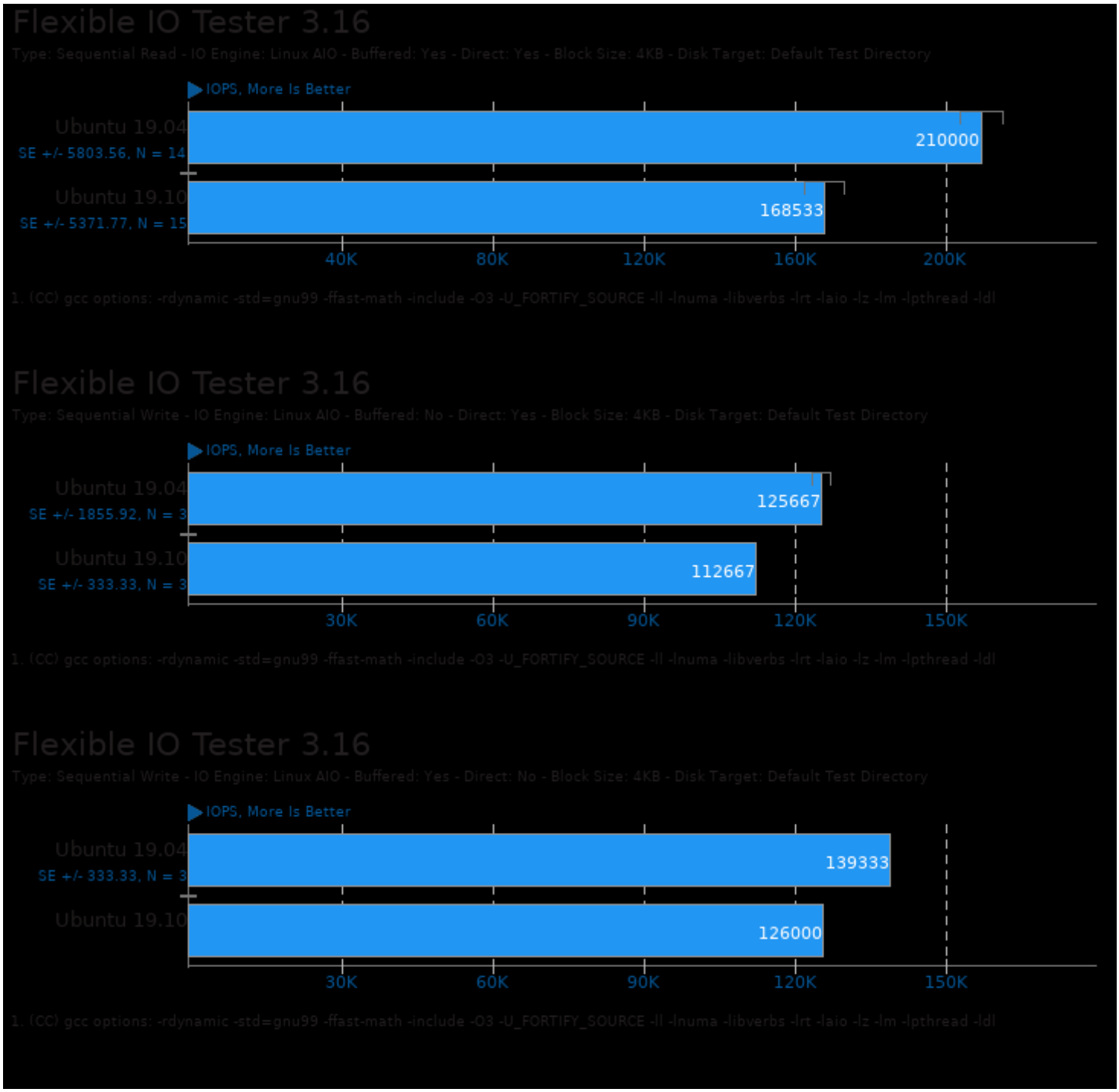
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



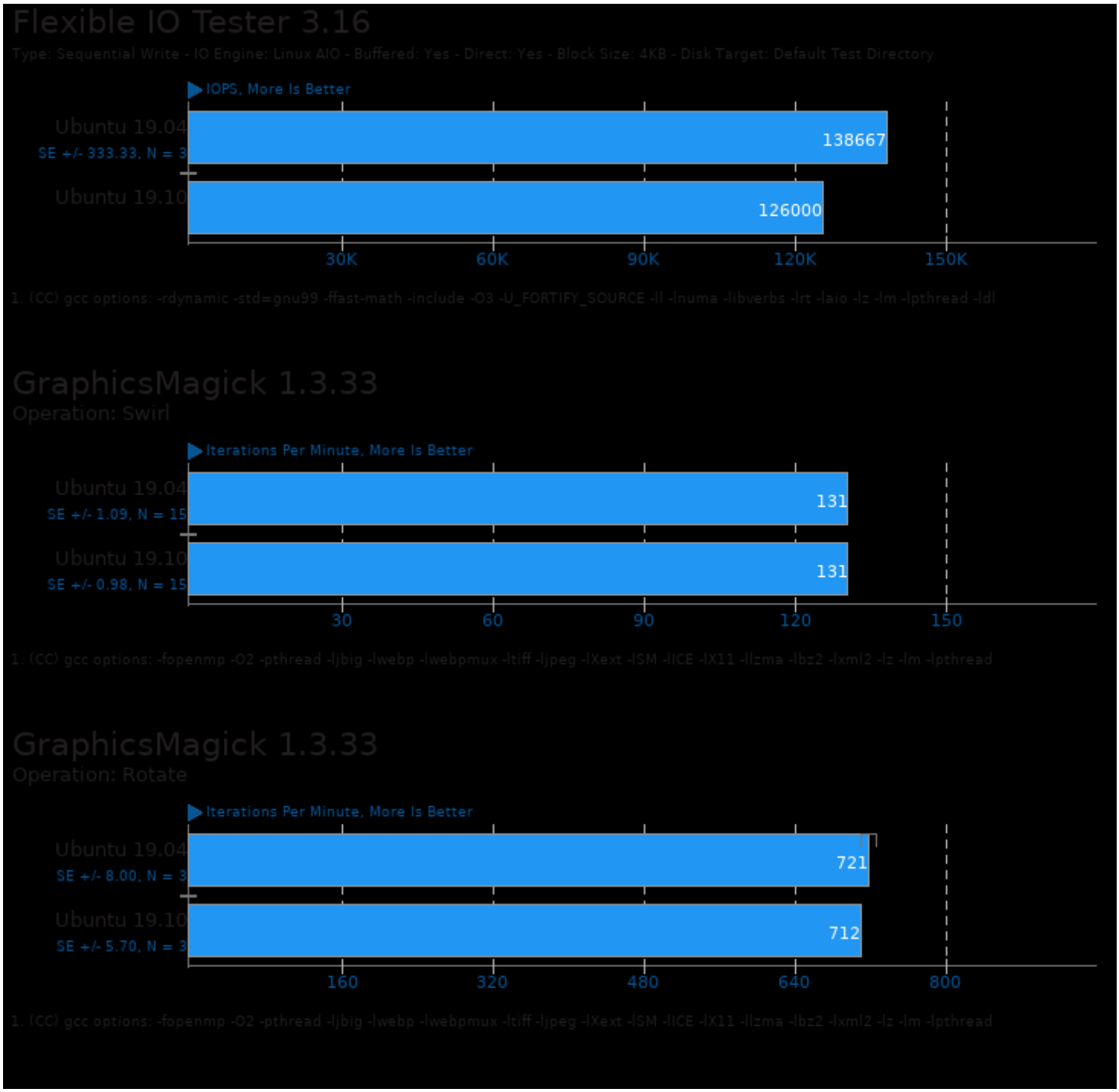
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



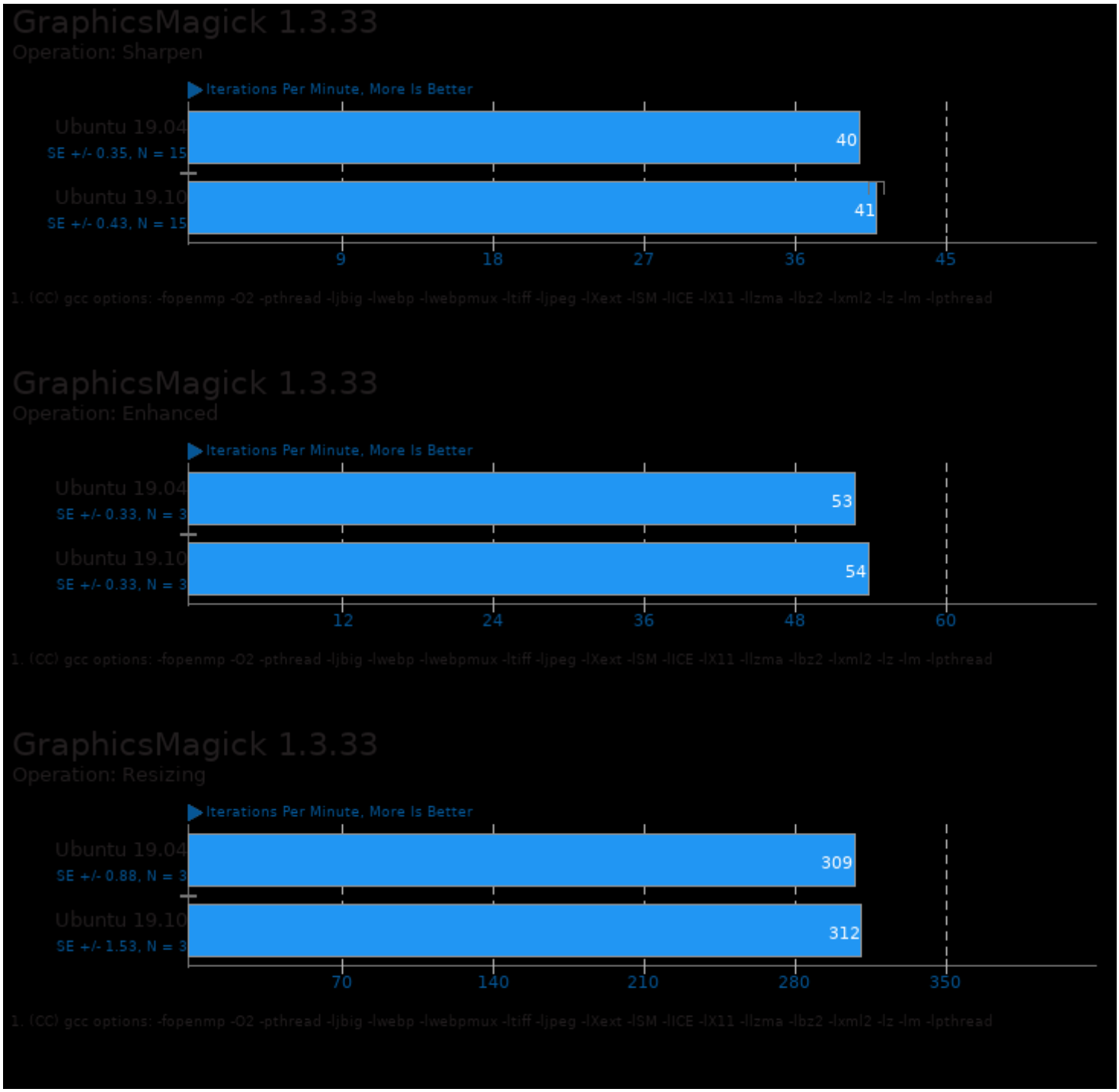
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



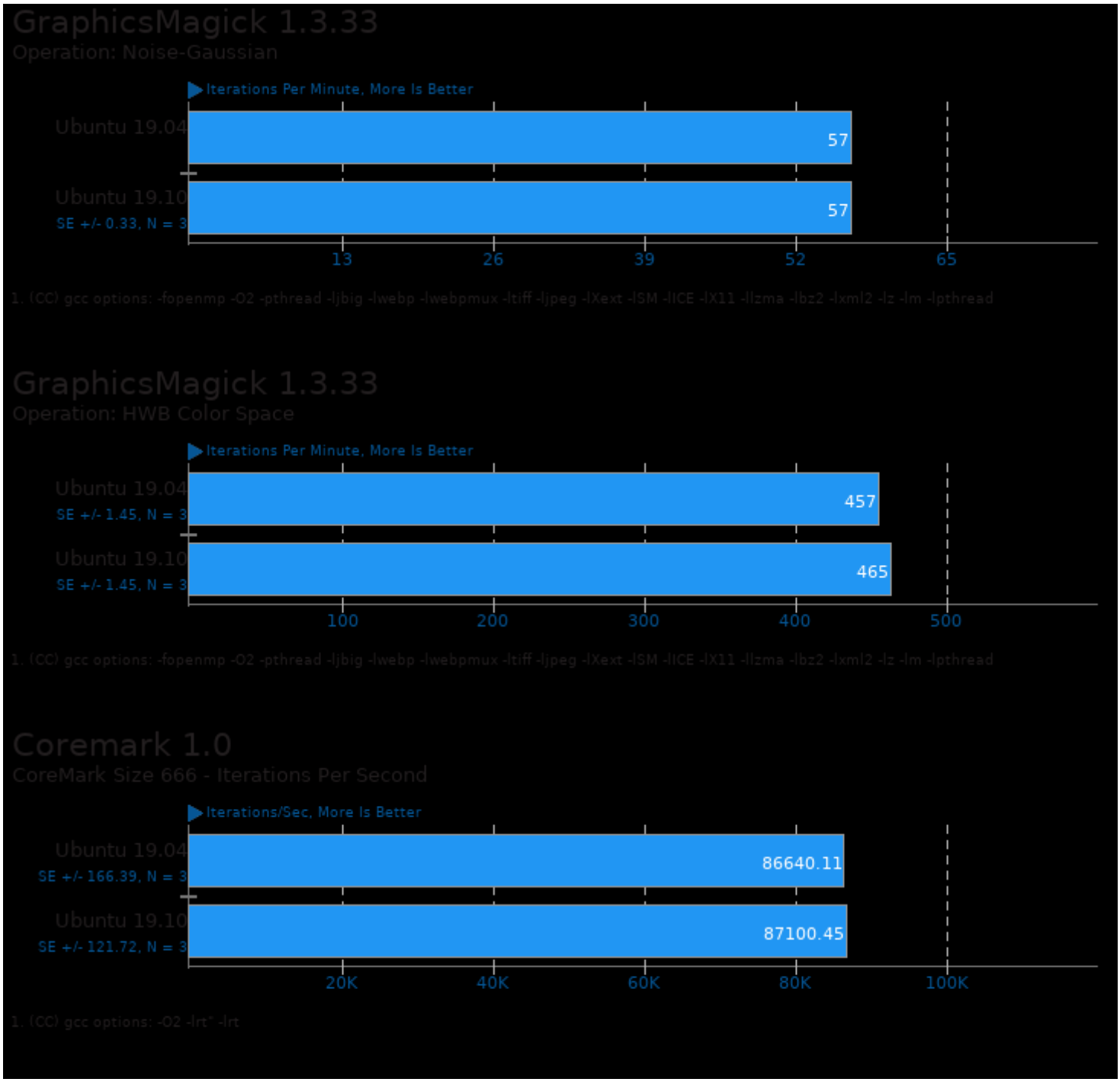
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



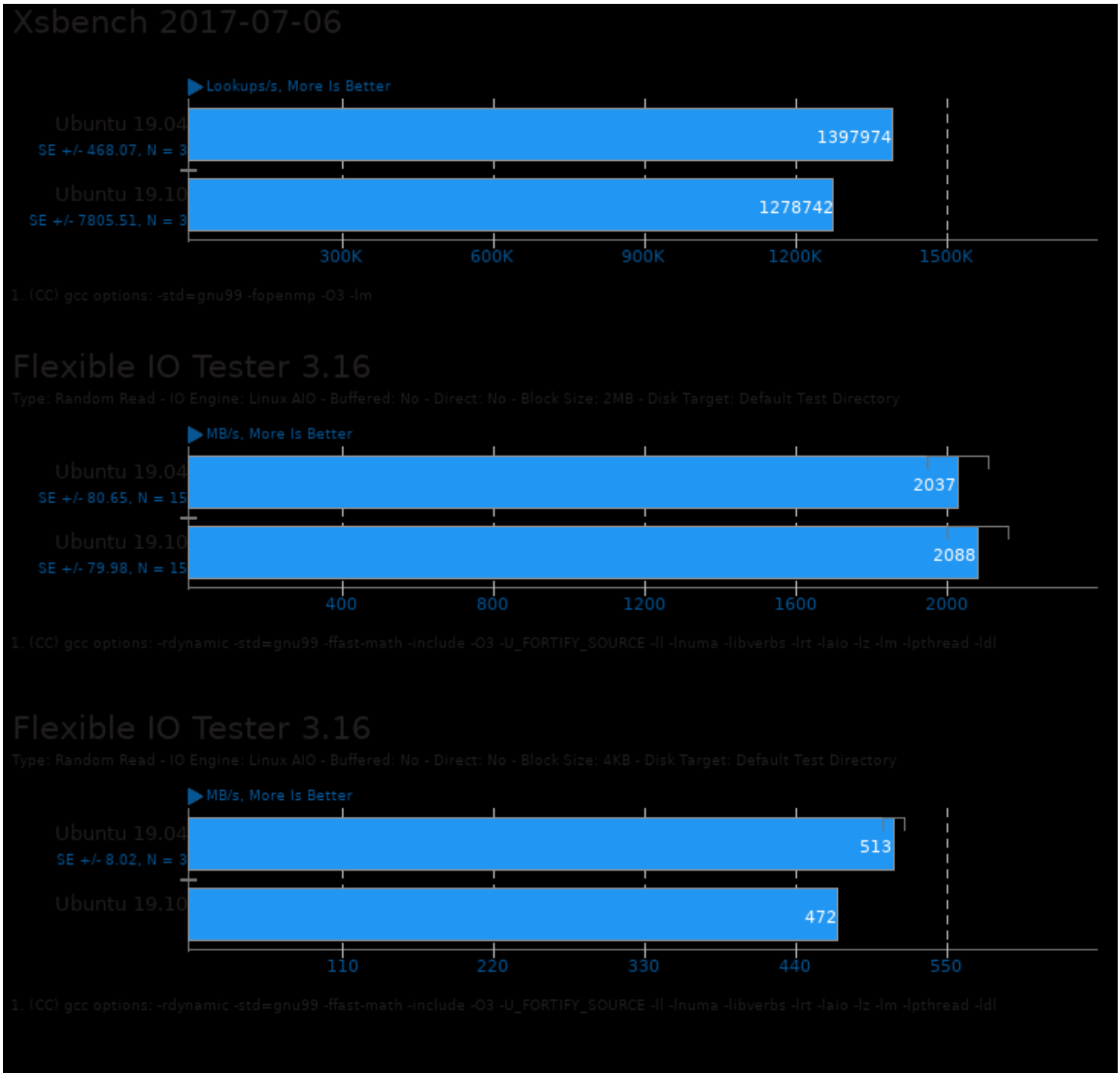
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



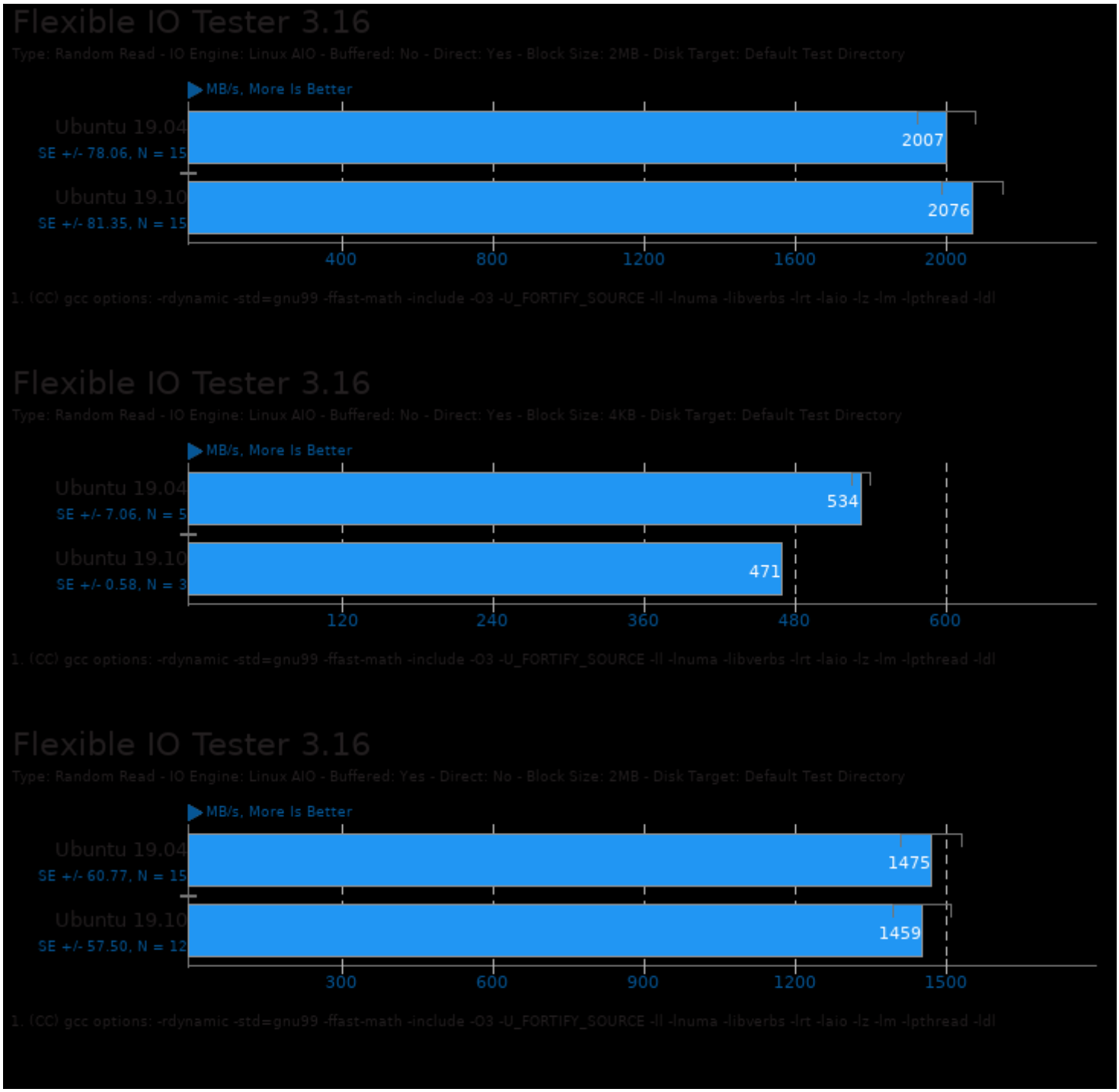
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



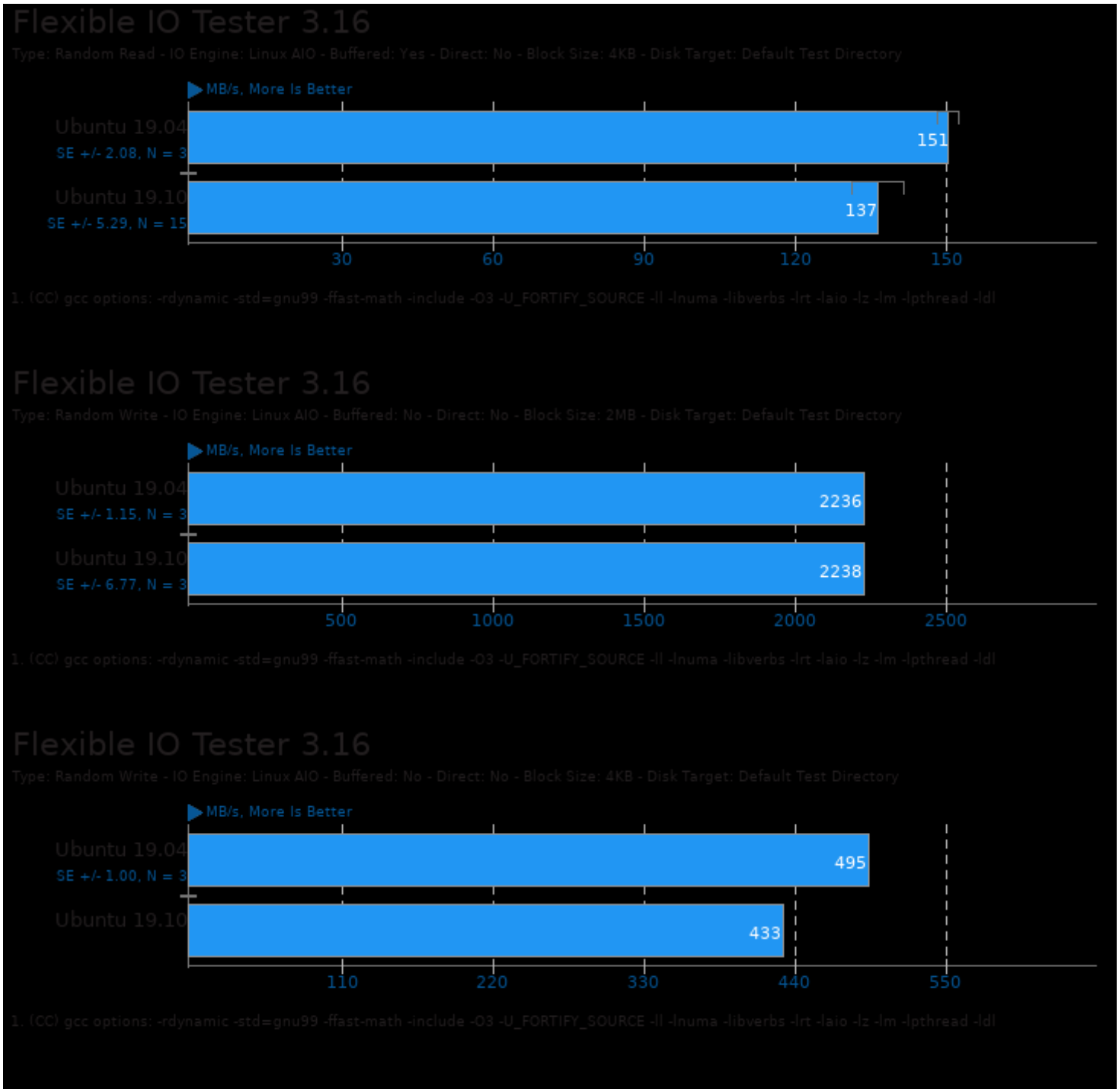
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



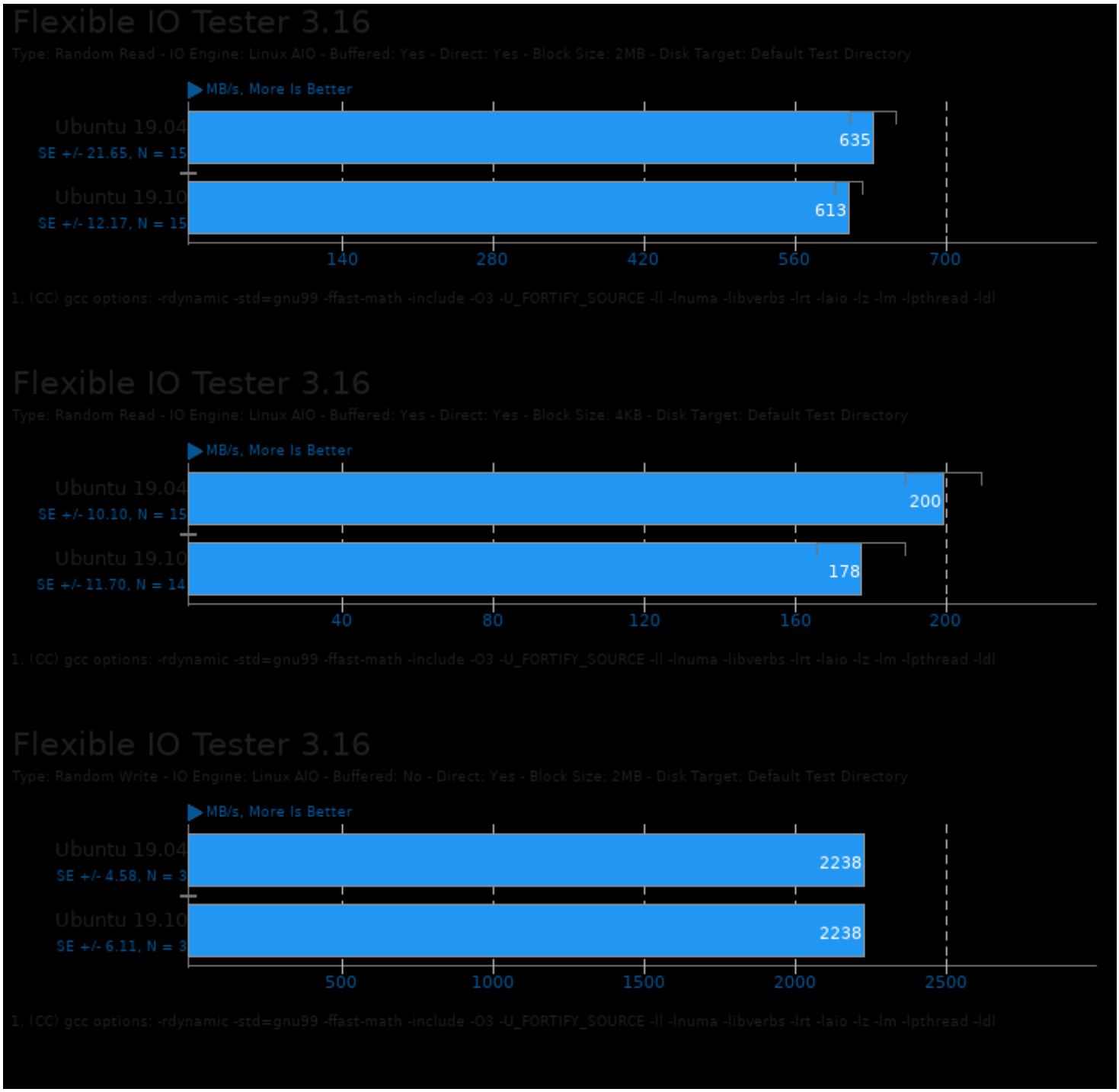
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



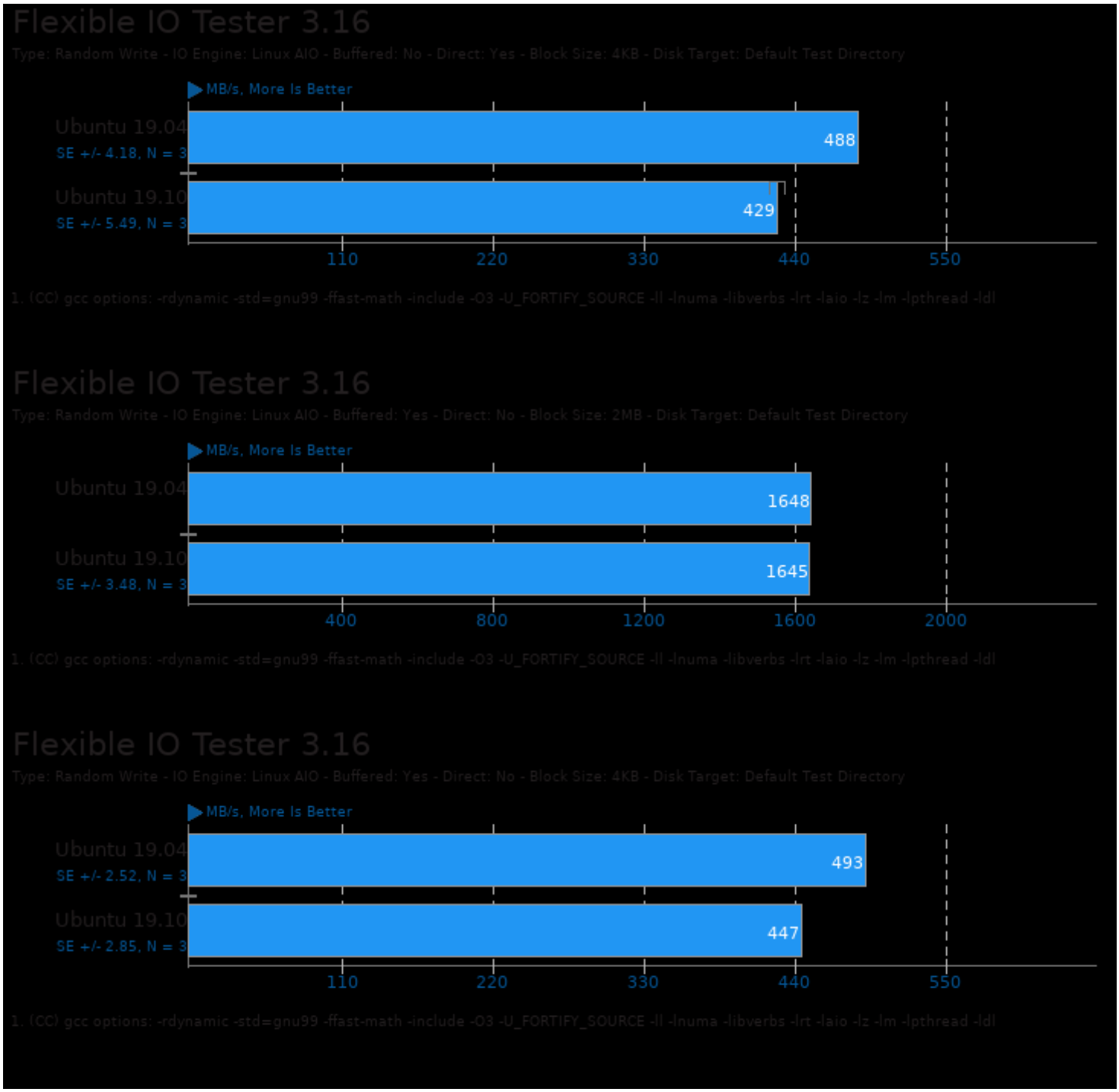
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



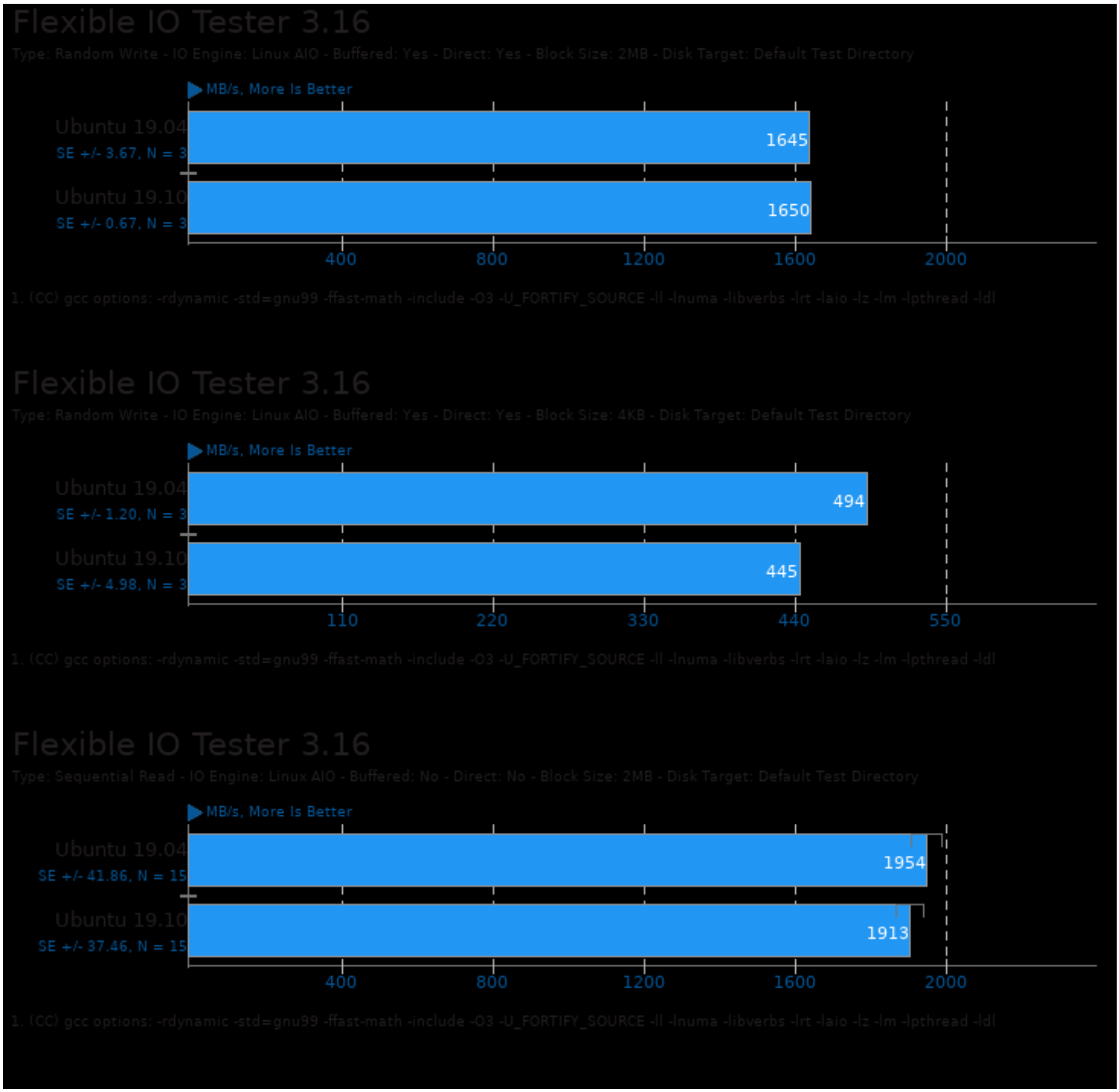
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



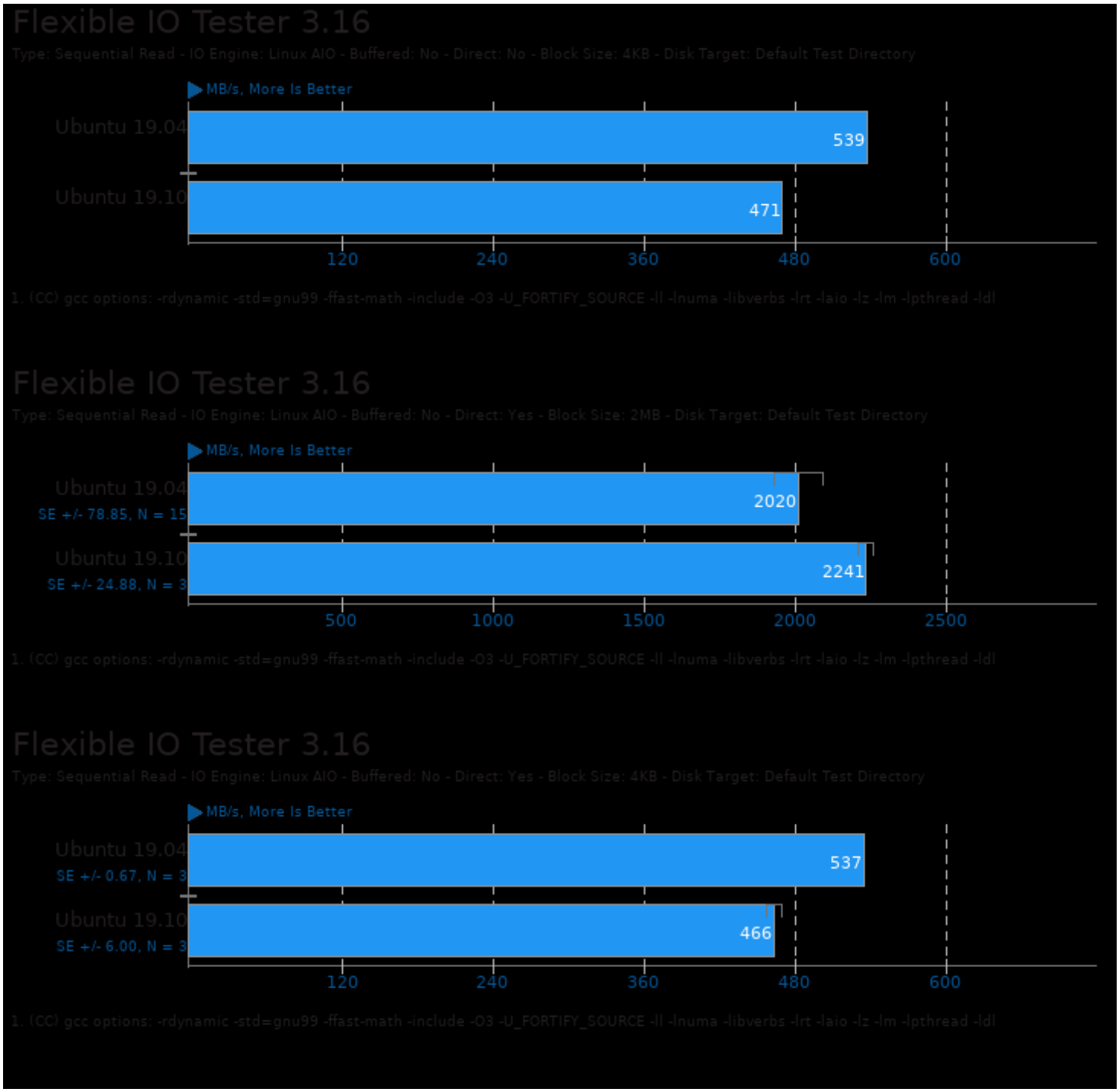
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



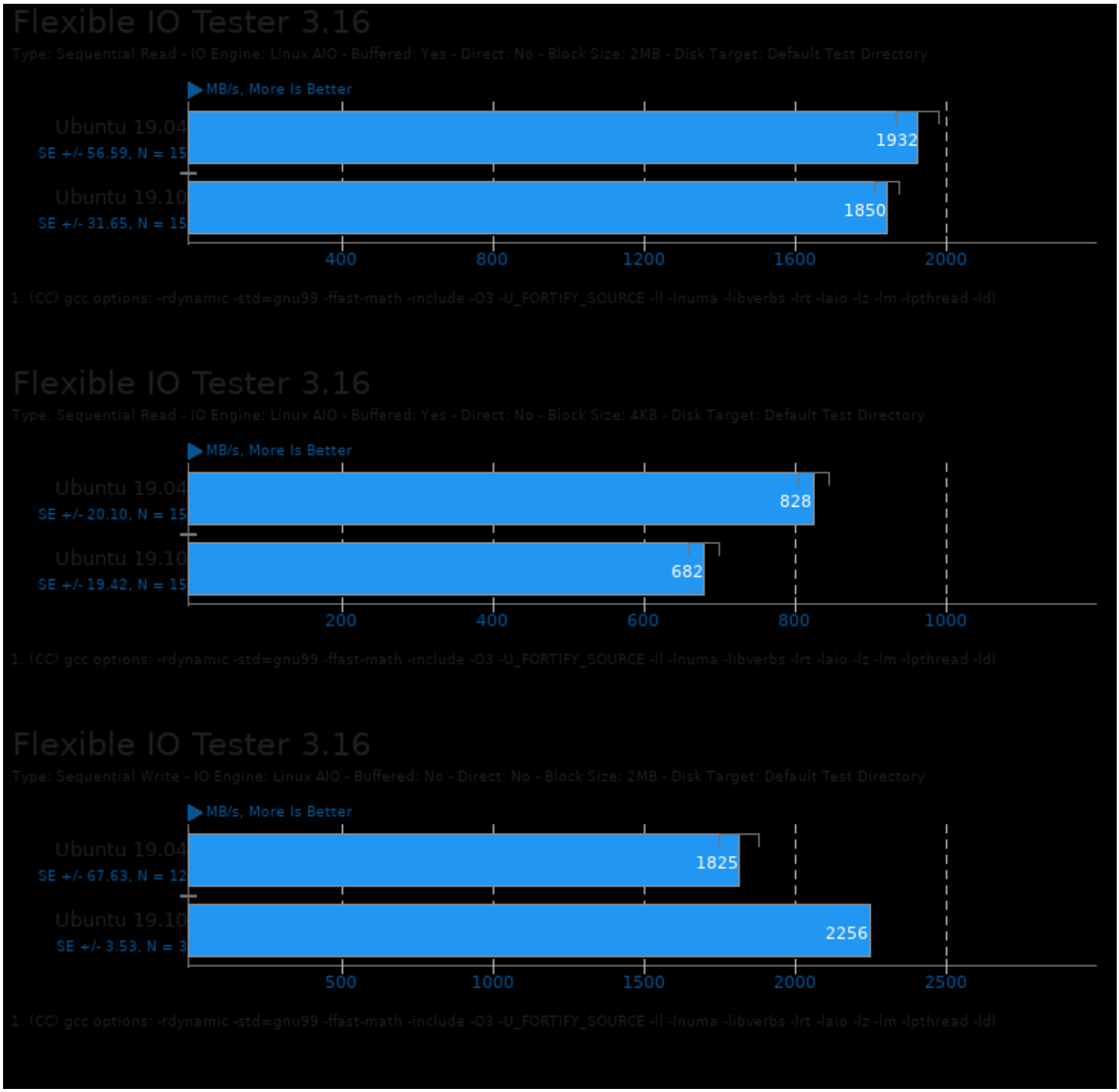
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



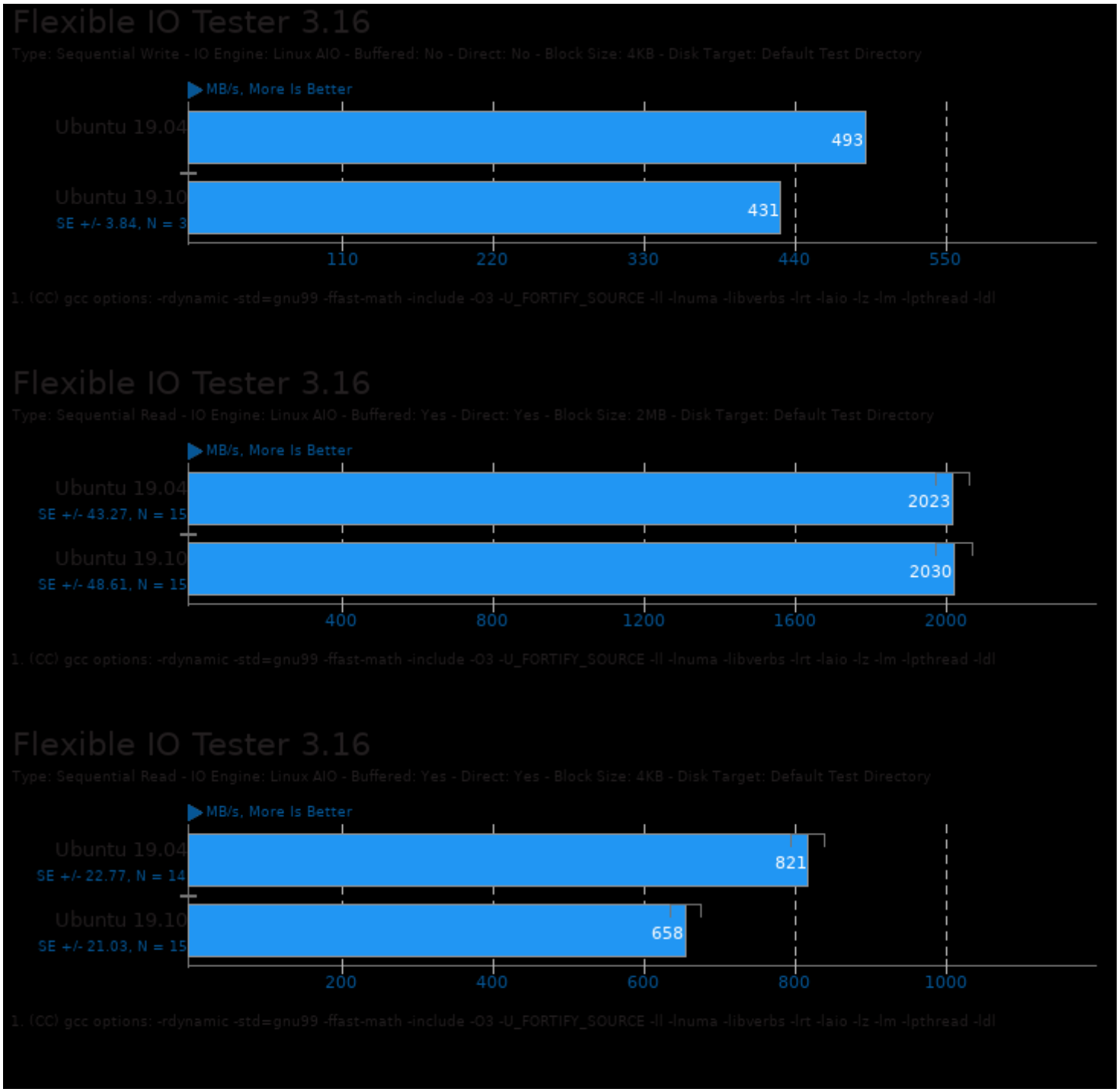
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



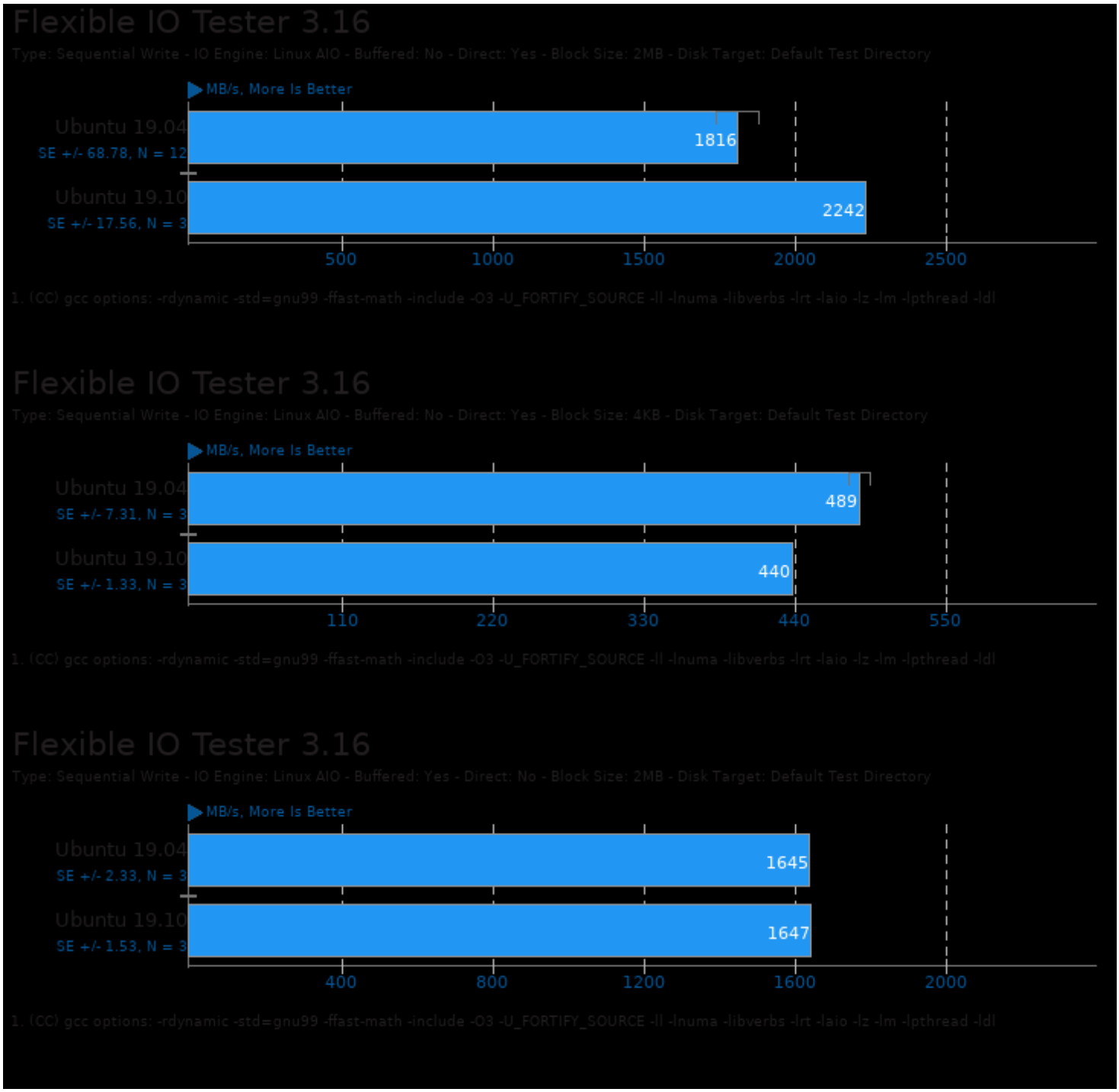
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



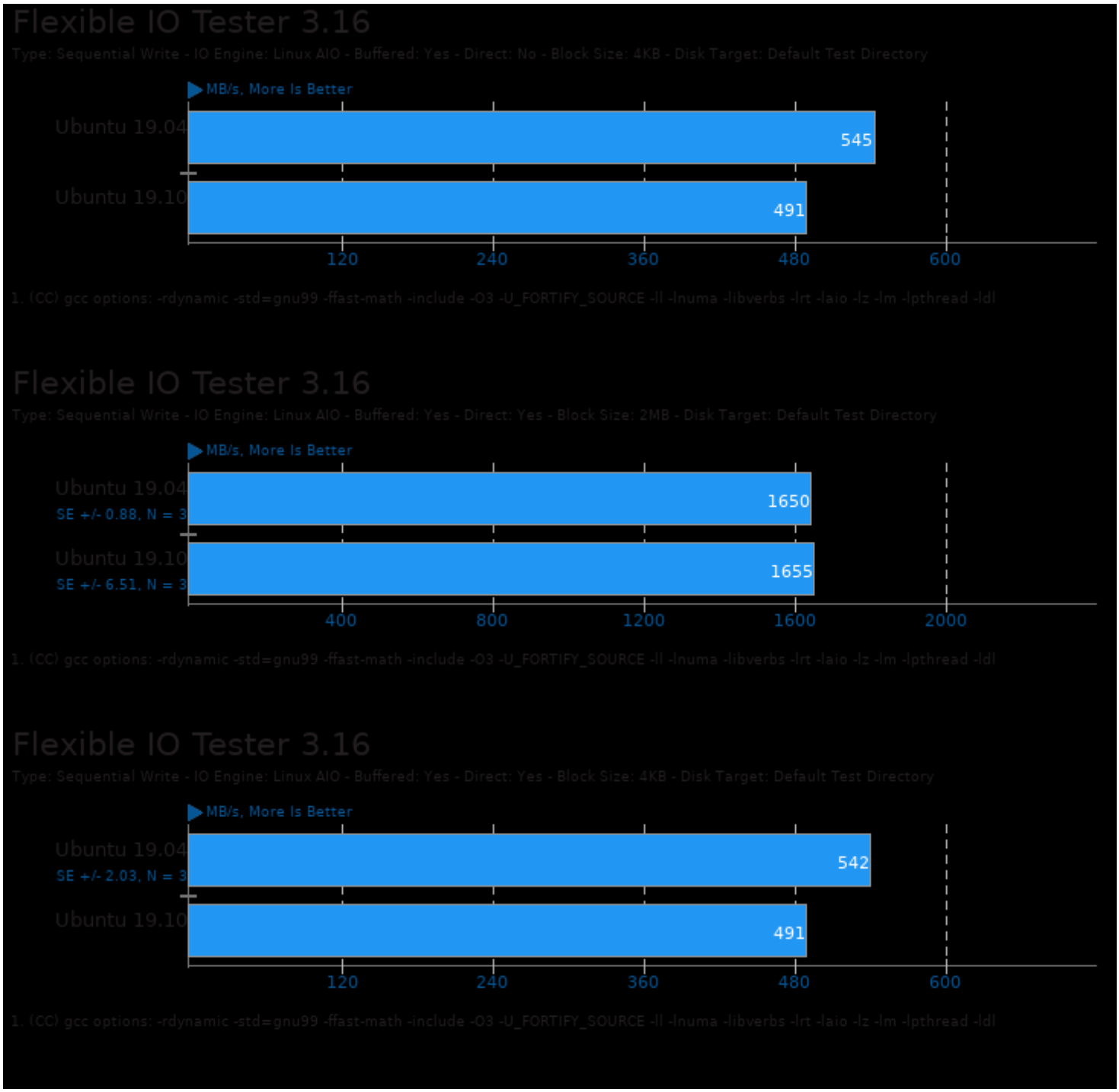
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

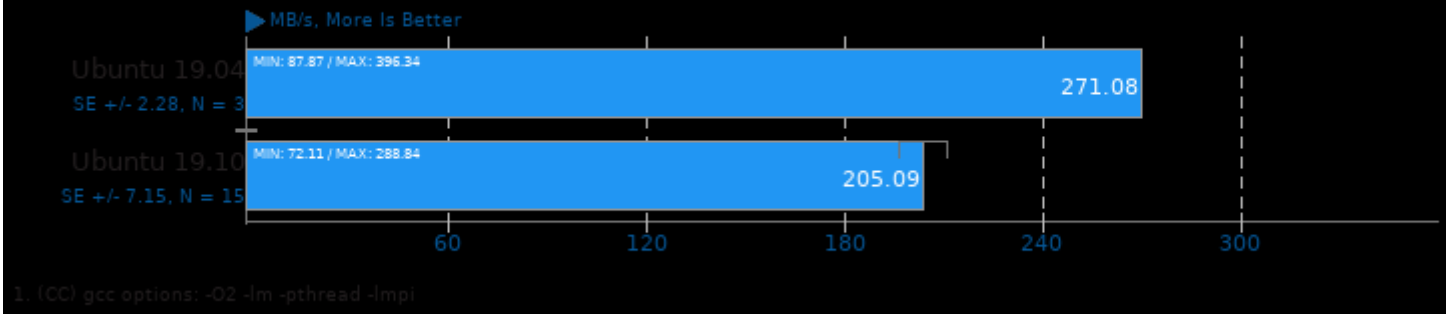


Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



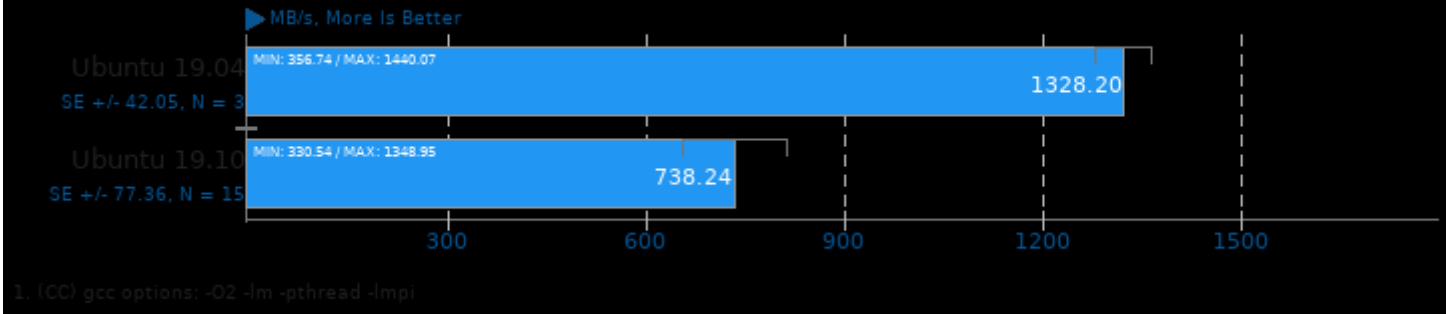
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

IOR 3.2.1
Write Test



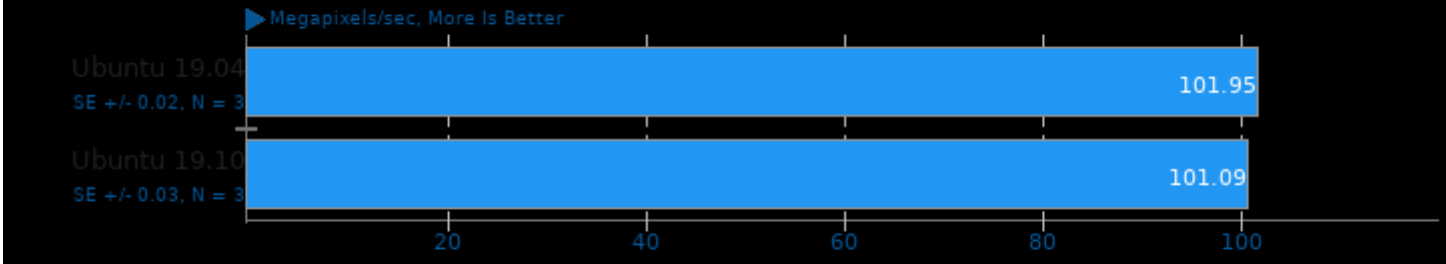
1. (CC) gcc options: -O2 -lm -pthread -lmpi

IOR 3.2.1
Read Test



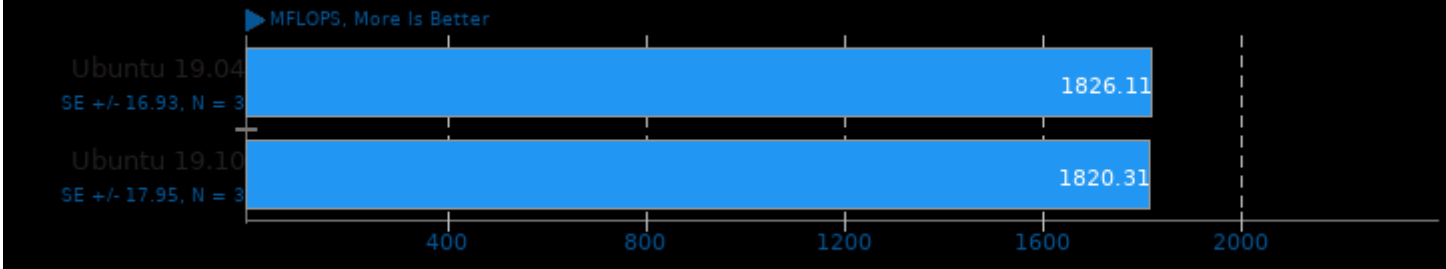
1. (CC) gcc options: -O2 -lm -pthread -lmpi

libjpeg-turbo tjbench 2.0.2
Test: Decompression Throughput



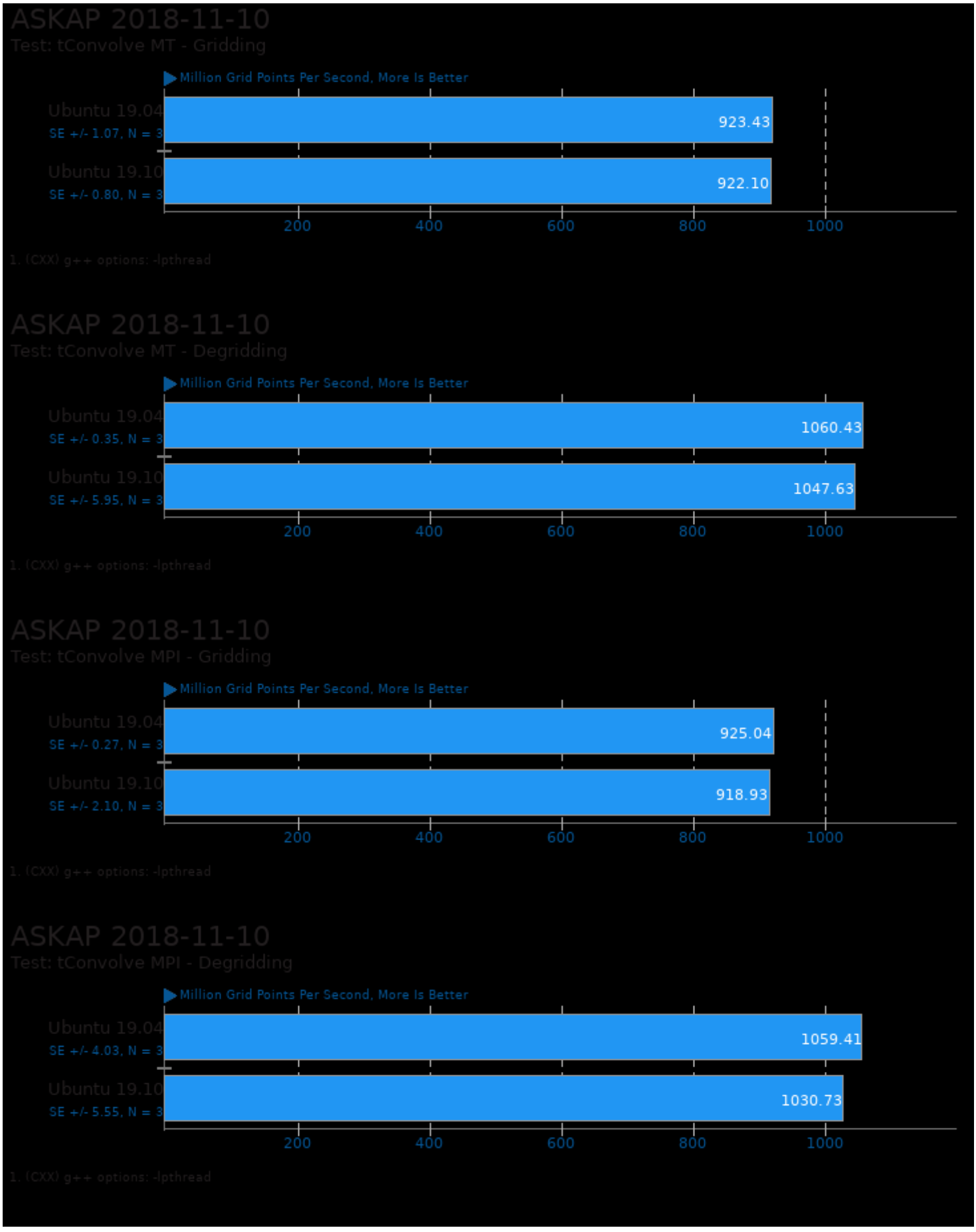
1. (CC) gcc options: -O3 -rdynamic -lm

Himeno Benchmark 3.0
Poisson Pressure Solver



1. (CC) gcc options: -O3

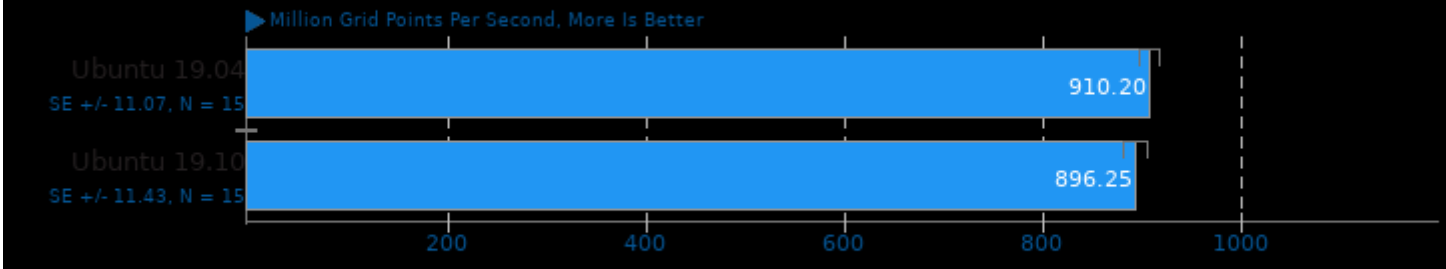
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

ASKAP 2018-11-10

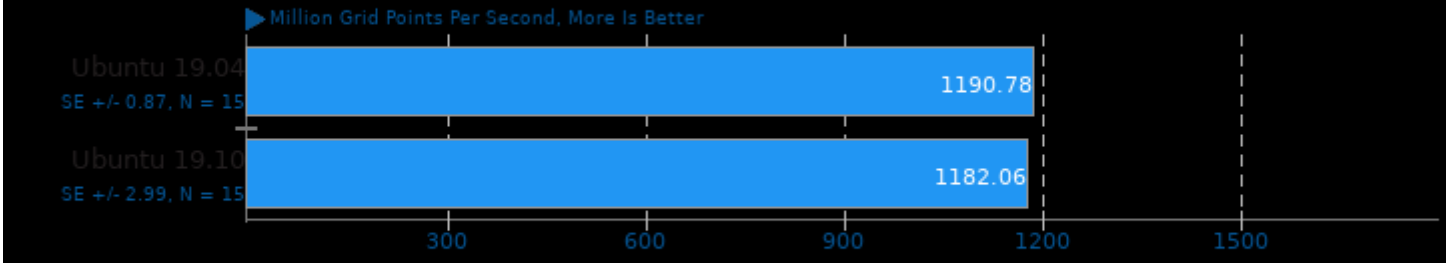
Test: tConvolve OpenMP - Gridding



1. (CXX) g++ options: -lpthread

ASKAP 2018-11-10

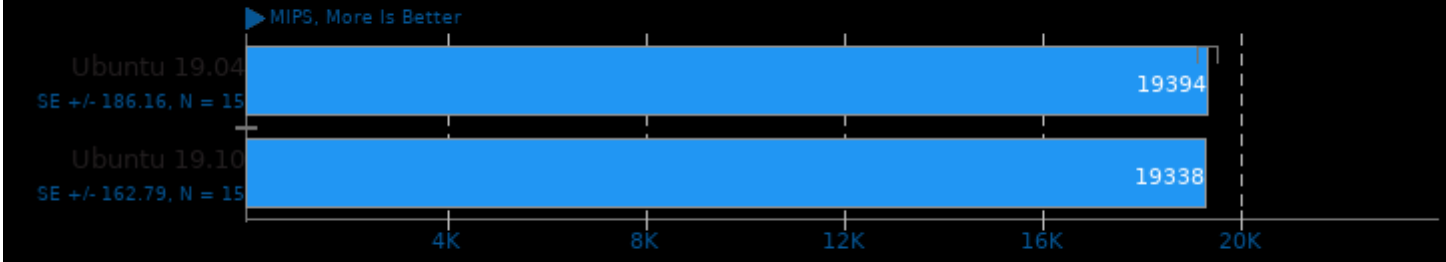
Test: tConvolve OpenMP - Degridding



1. (CXX) g++ options: -lpthread

7-Zip Compression 16.02

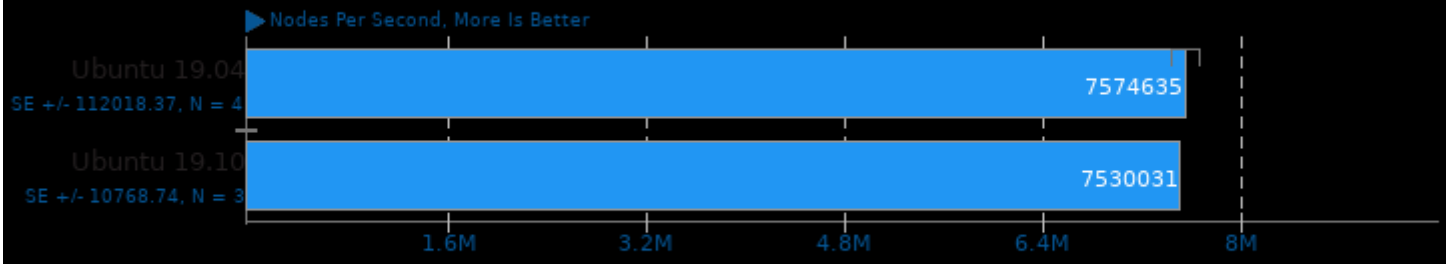
Compress Speed Test



1. (CXX) g++ options: -pipe -lpthread

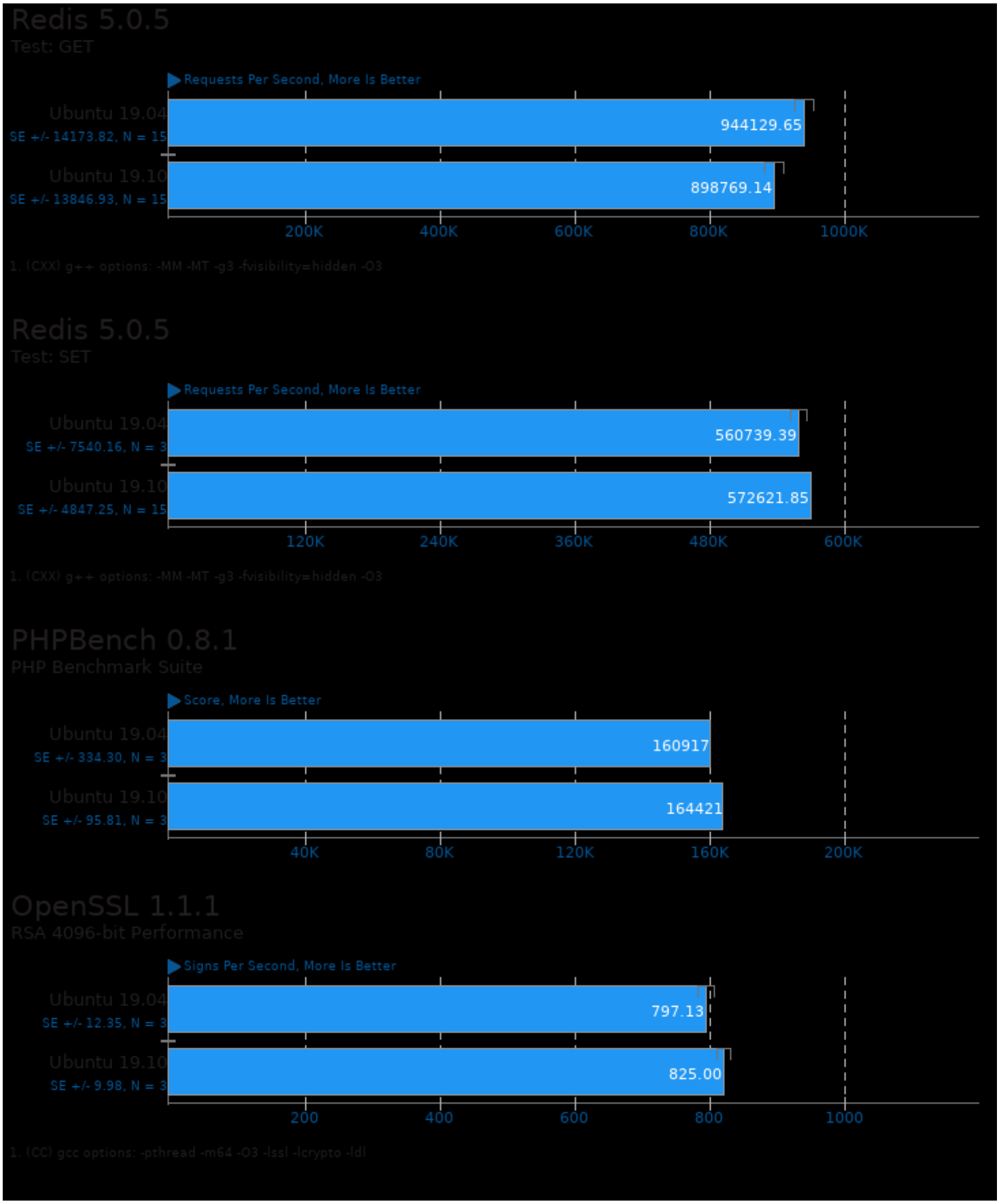
Stockfish 9

Total Time

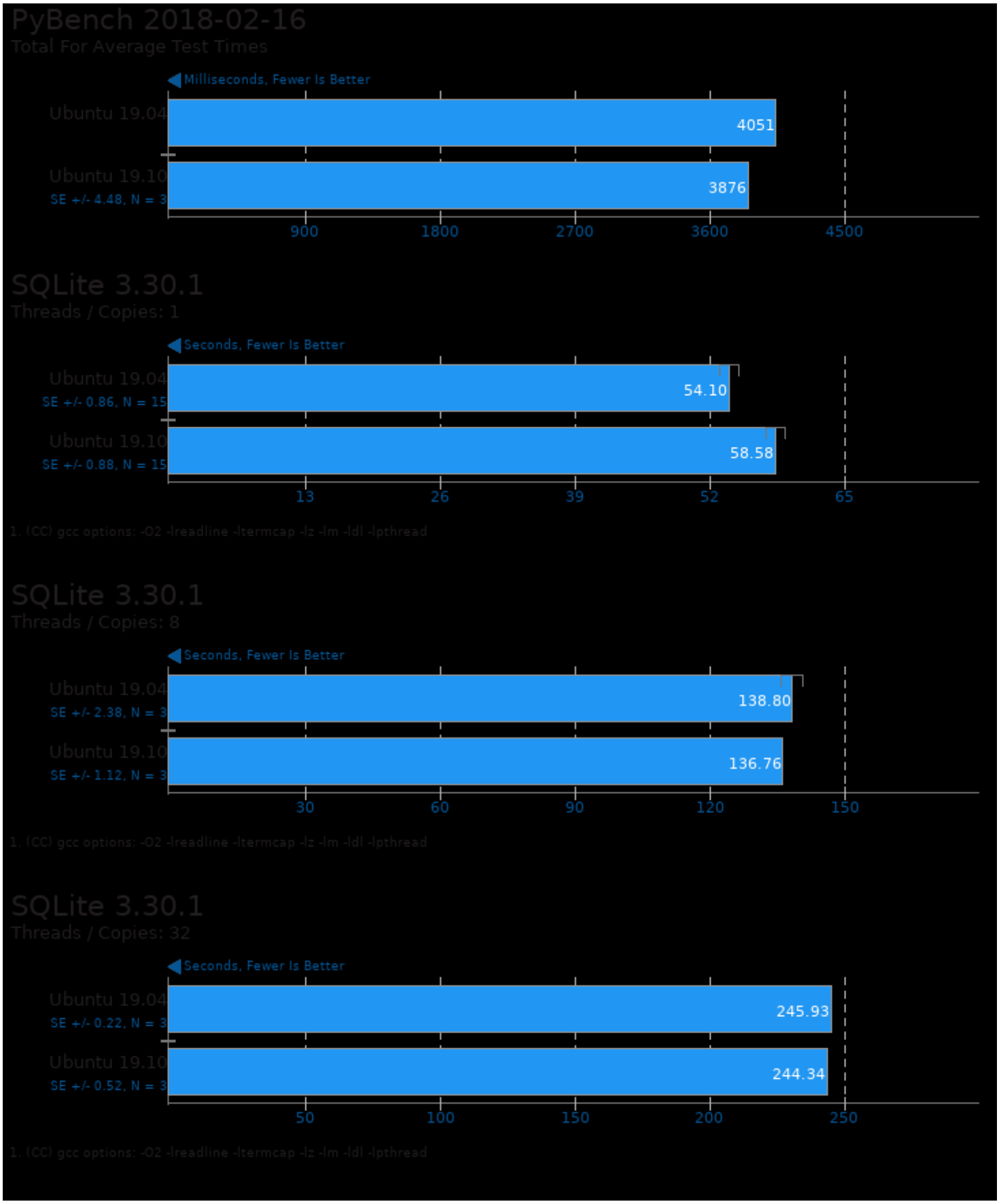


1. (CXX) g++ options: -m64 -lpthread -fno-exceptions -std=c++11 -pedantic -O3 -flto

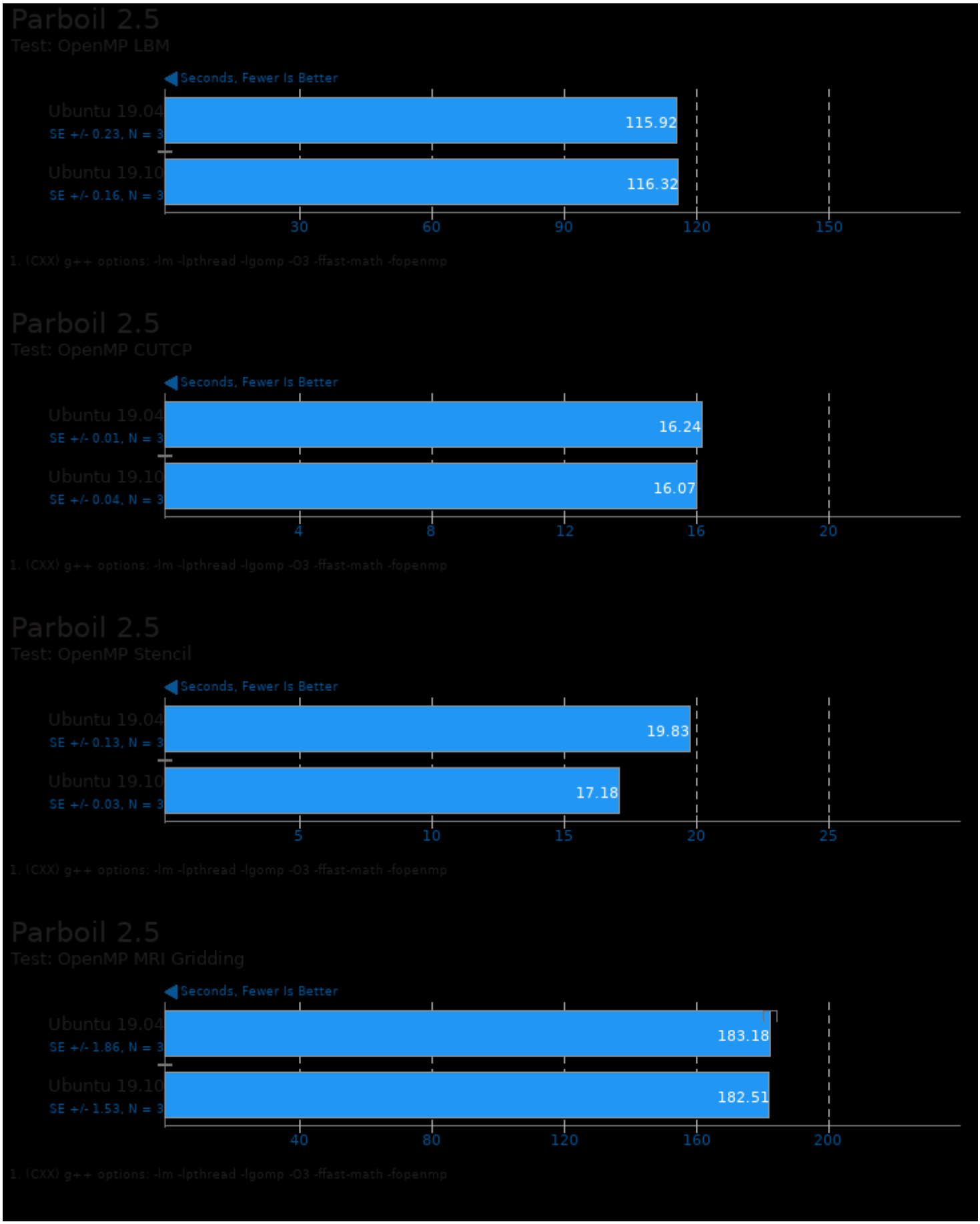
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



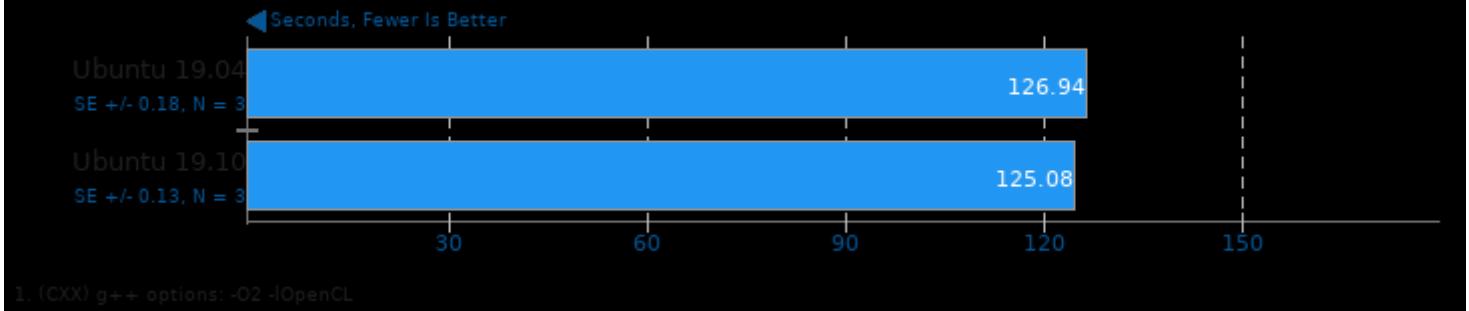
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

Rodinia 2.4

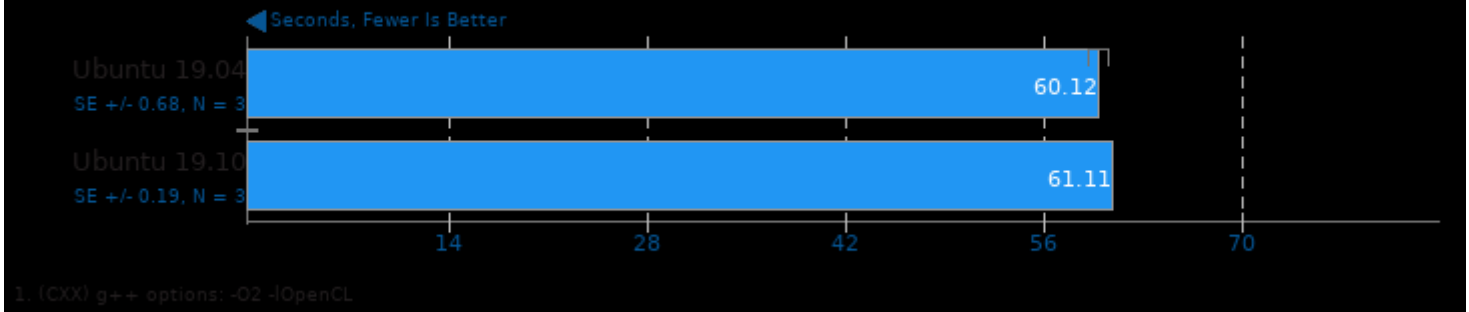
Test: OpenMP LavaMD



1. (CXX) g++ options: -O2 -lOpenCL

Rodinia 2.4

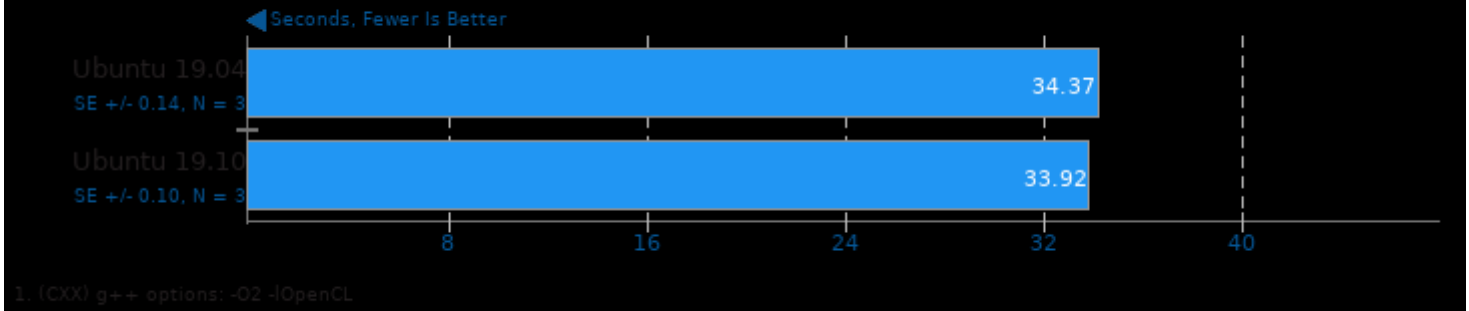
Test: OpenMP CFD Solver



1. (CXX) g++ options: -O2 -lOpenCL

Rodinia 2.4

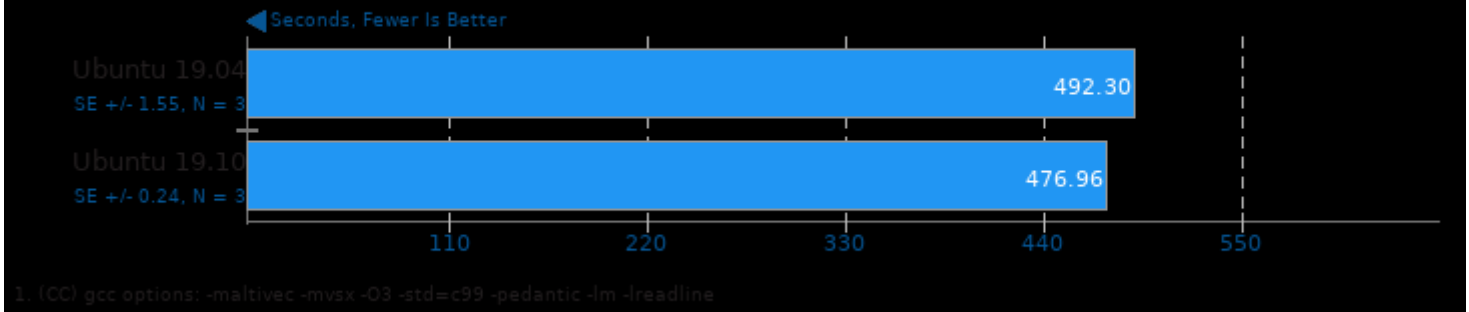
Test: OpenMP Streamcluster



1. (CXX) g++ options: -O2 -lOpenCL

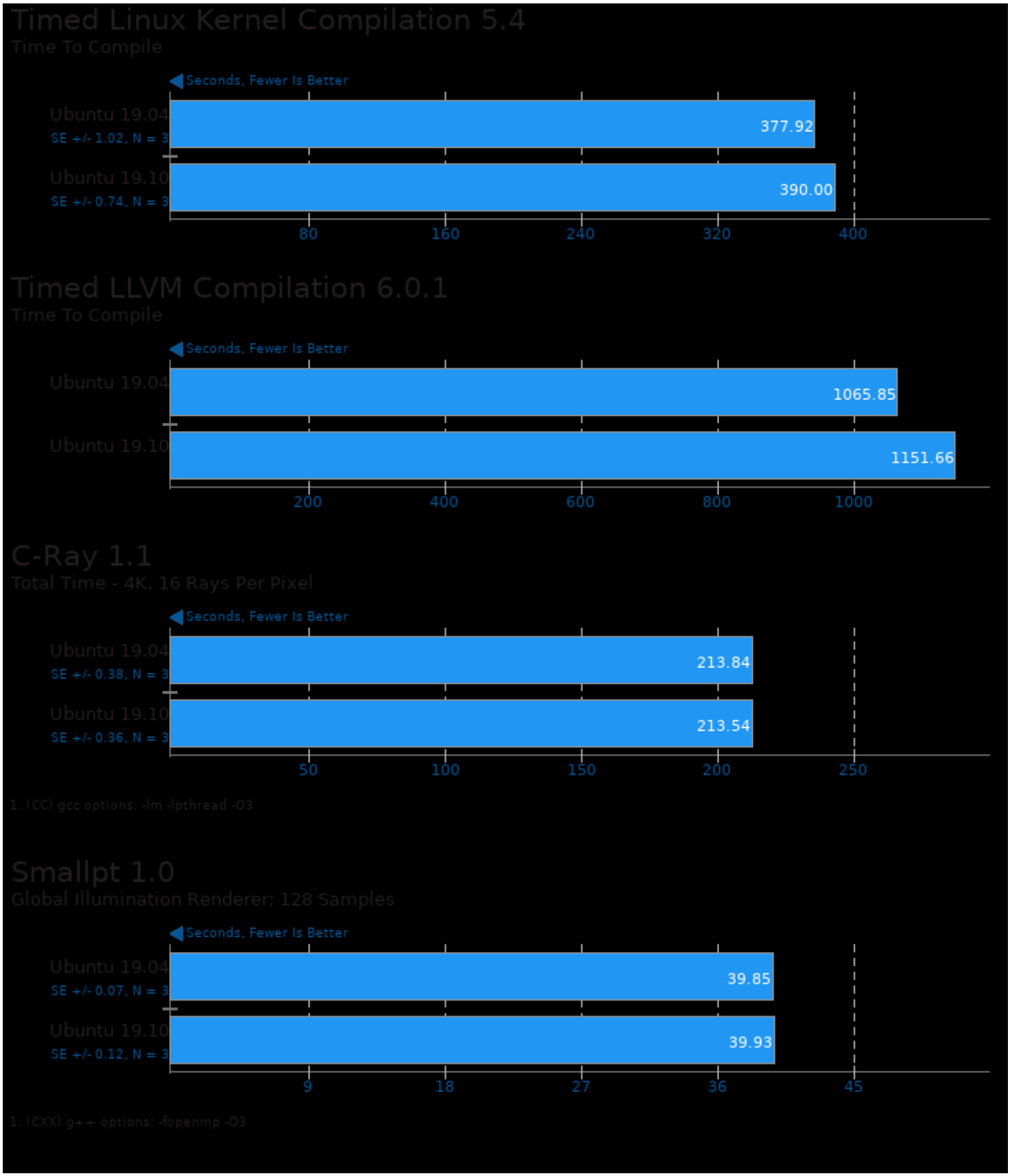
Timed MrBayes Analysis 3.2.7

Primate Phylogeny Analysis



1. (CC) gcc options: -maltivec -mvsx -O3 -std=c99 -pedantic -lm -lreadline

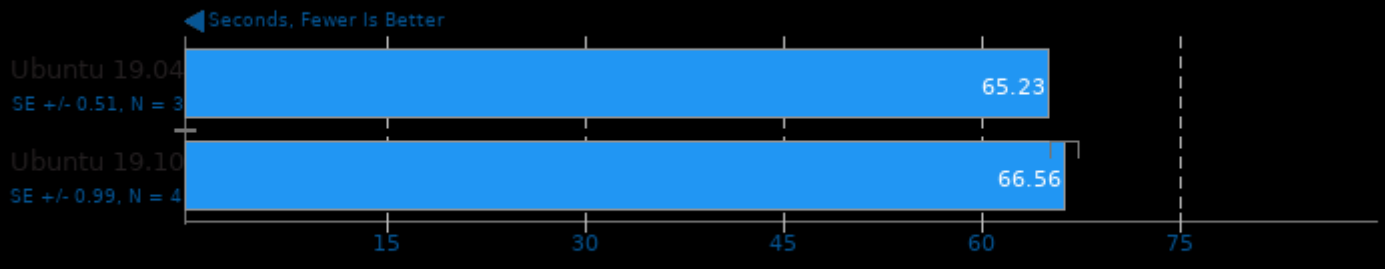
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

AOBench

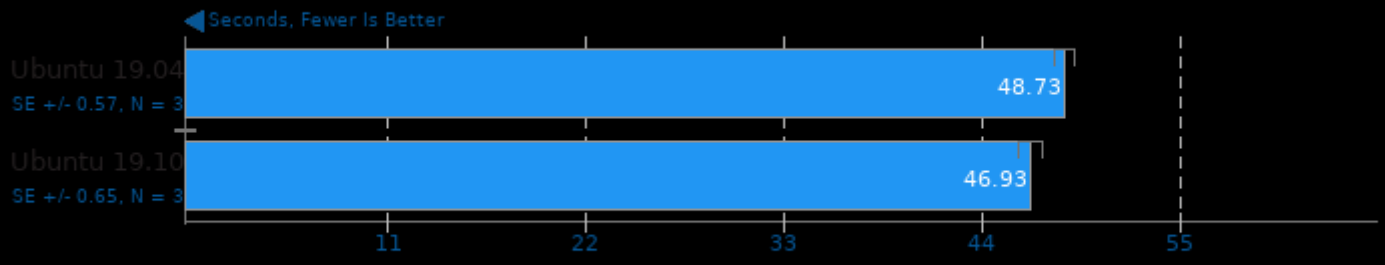
Size: 2048 x 2048 - Total Time



1. (CC) gcc options: -lm -O3

XZ Compression 5.2.4

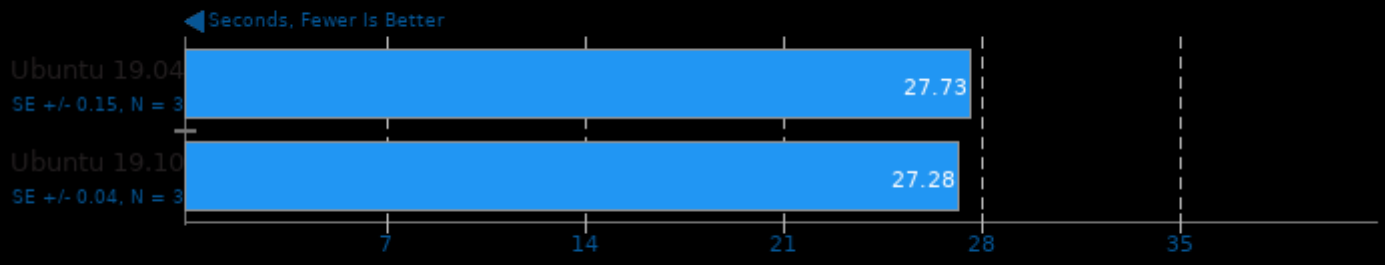
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 9



1. (CC) gcc options: -pthread -fvisibility=hidden -O2

Zstd Compression 1.3.4

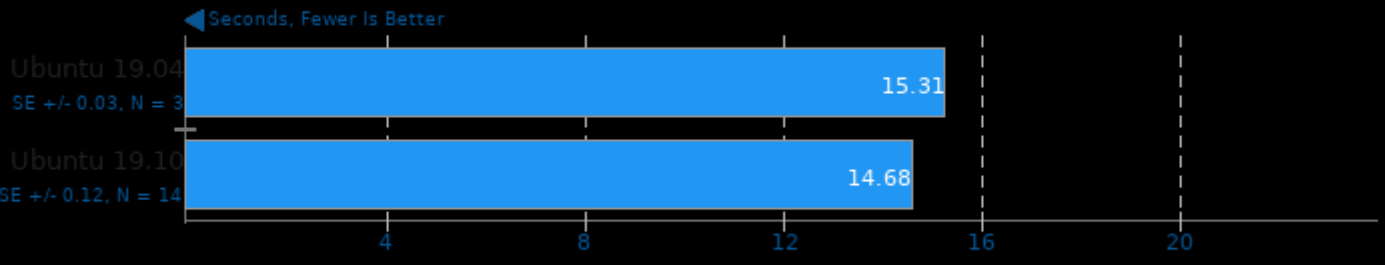
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19



1. (CC) gcc options: -O3 -pthread -lz -llzma

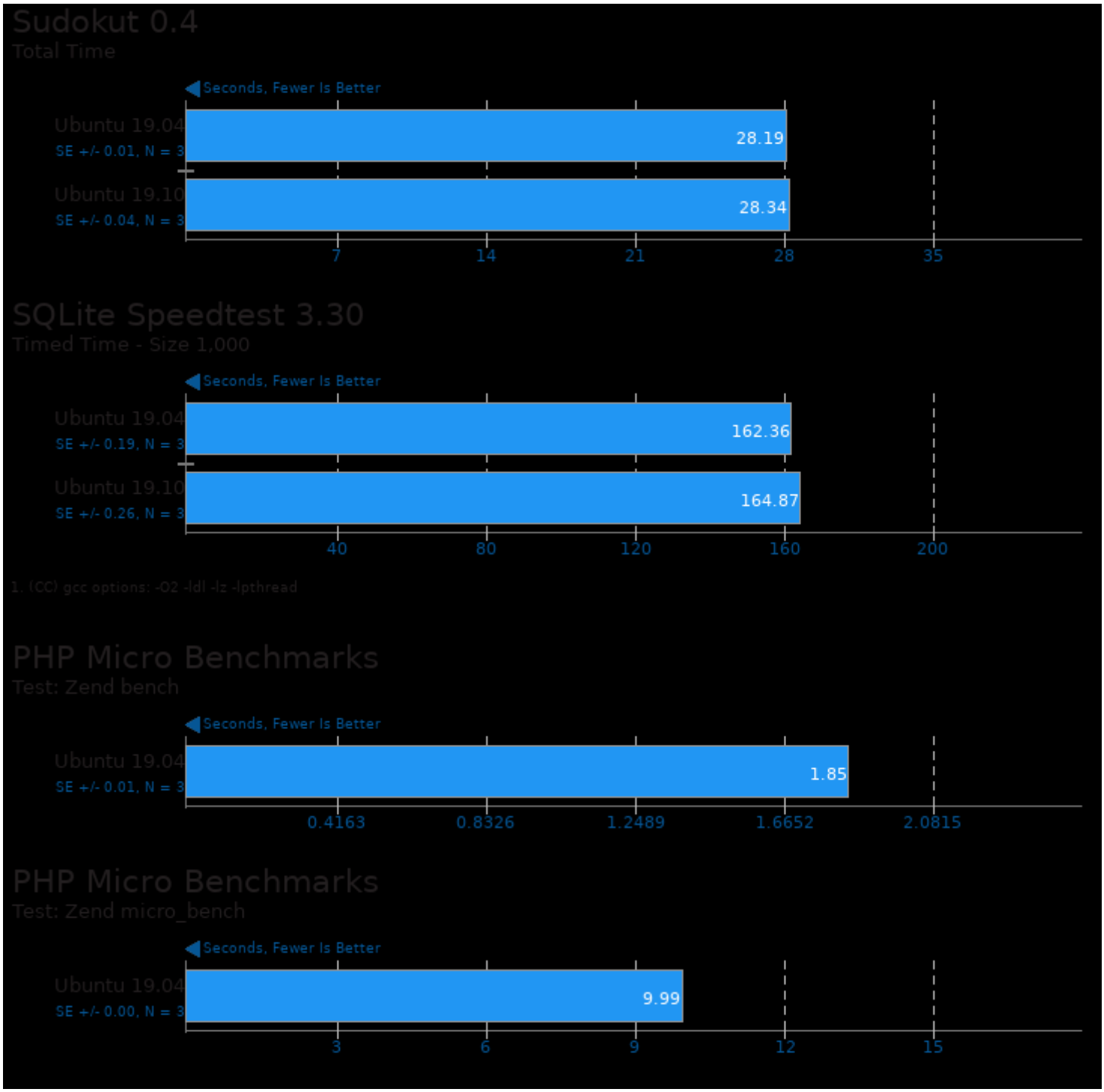
LAME MP3 Encoding 3.100

WAV To MP3

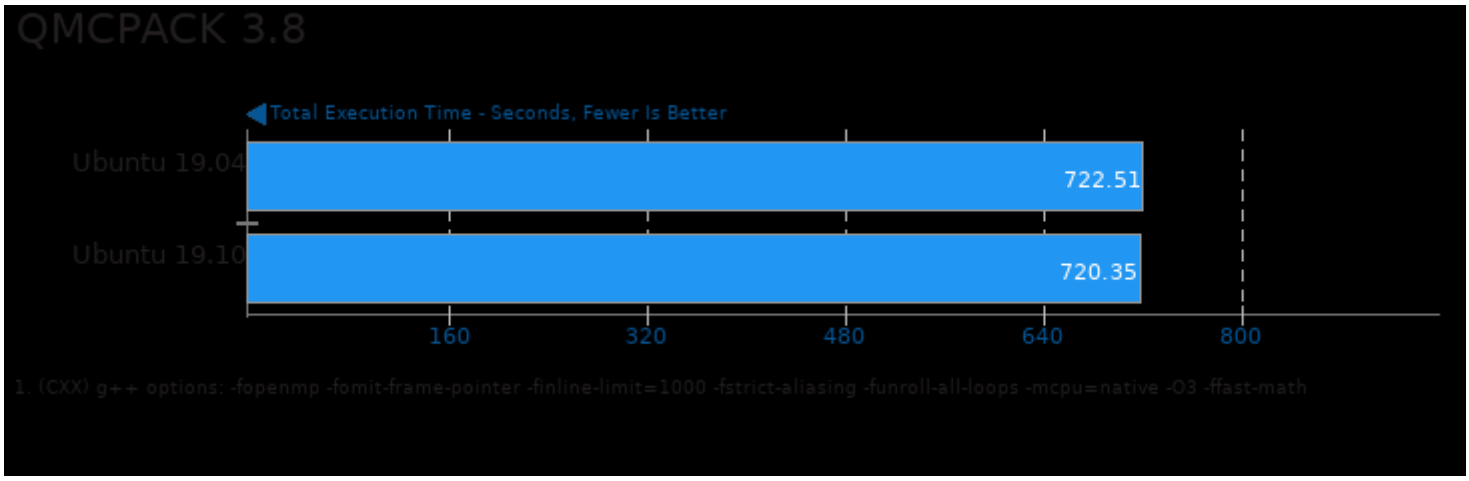


1. (CC) gcc options: -O3 -ffast-math -funroll-loops -fschedule-insns2 -fbranch-count-reg -fforce-addr -pipe -lncurses -lm

Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

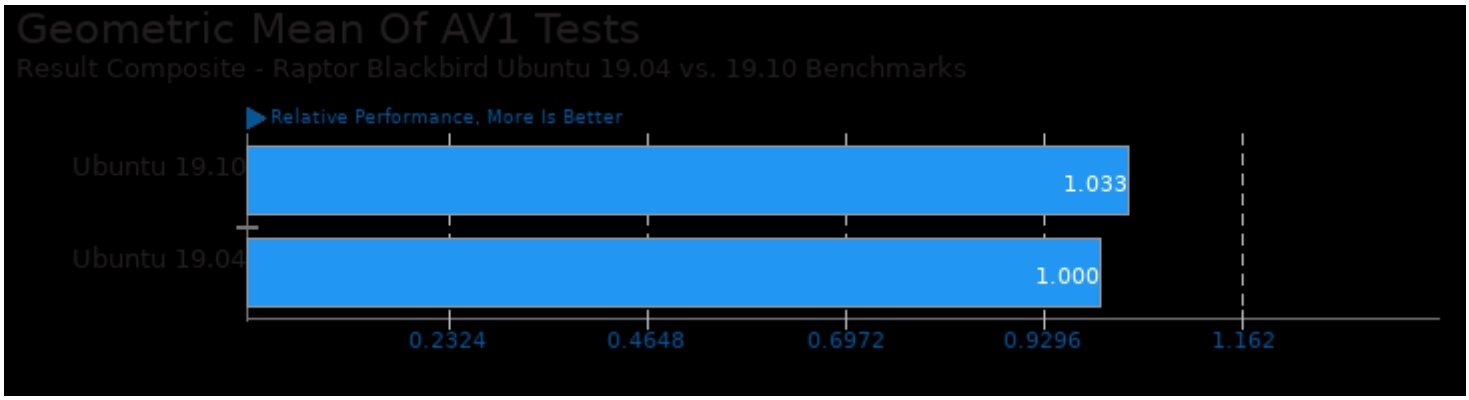


Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

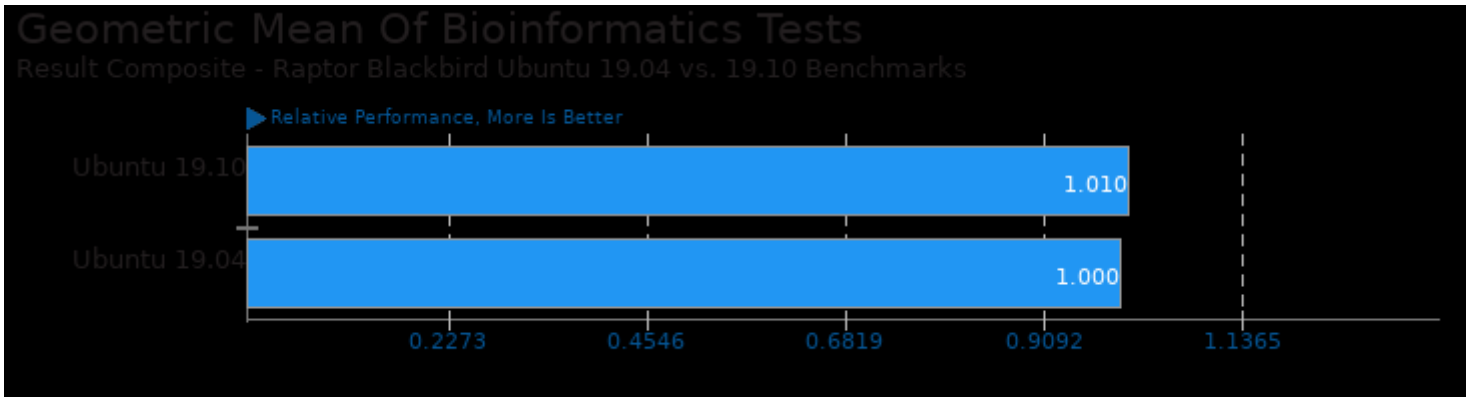


Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

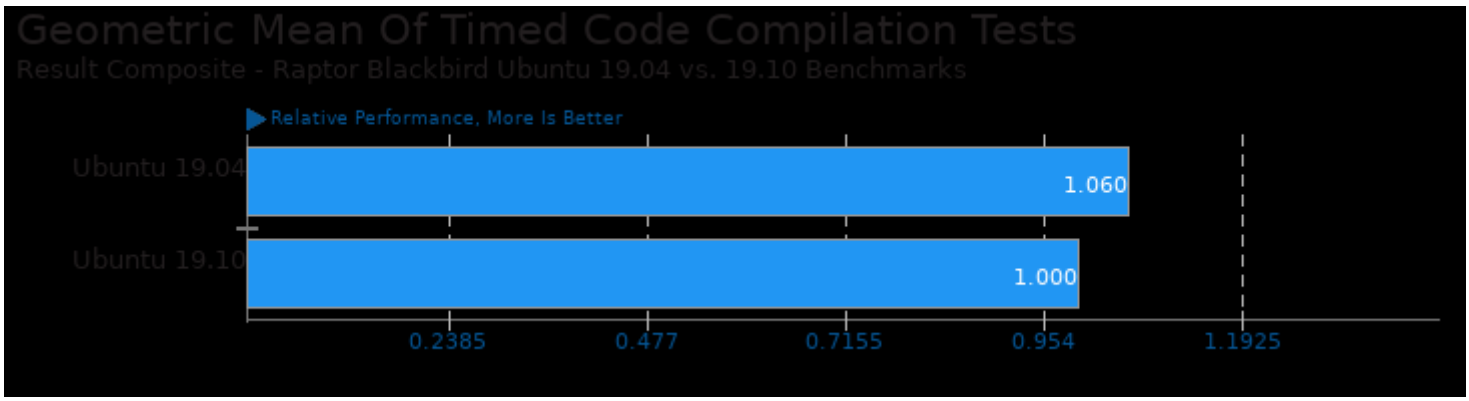
These geometric means are based upon test groupings / test suites for this result file.



Geometric mean based upon tests: pts/dav1d, pts/libgav1 and pts/rav1e

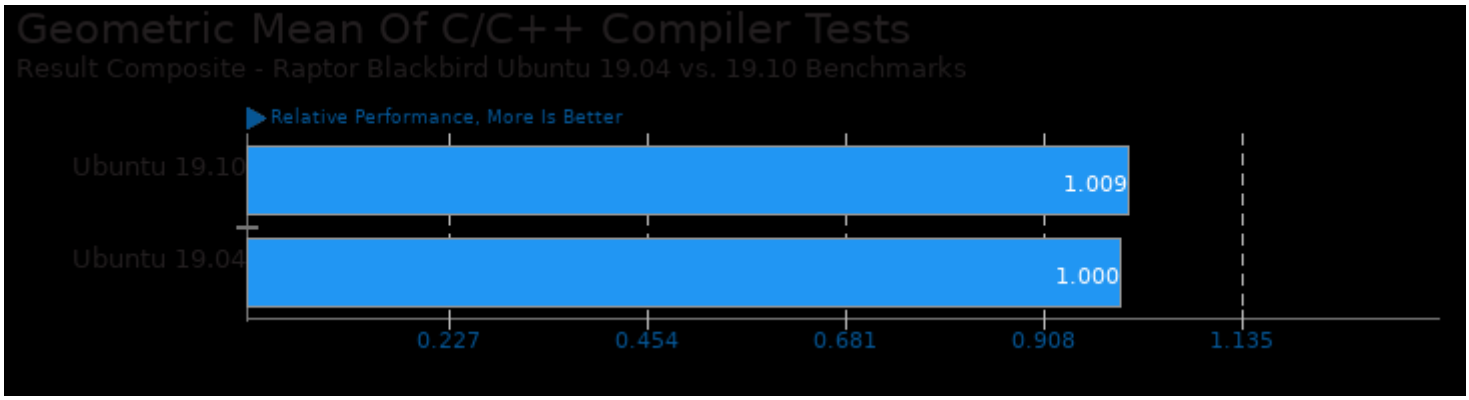


Geometric mean based upon tests: pts/himeno, pts/mrbayes and pts/qmcpack



Geometric mean based upon tests: pts/build-linux-kernel and pts/build-llvm

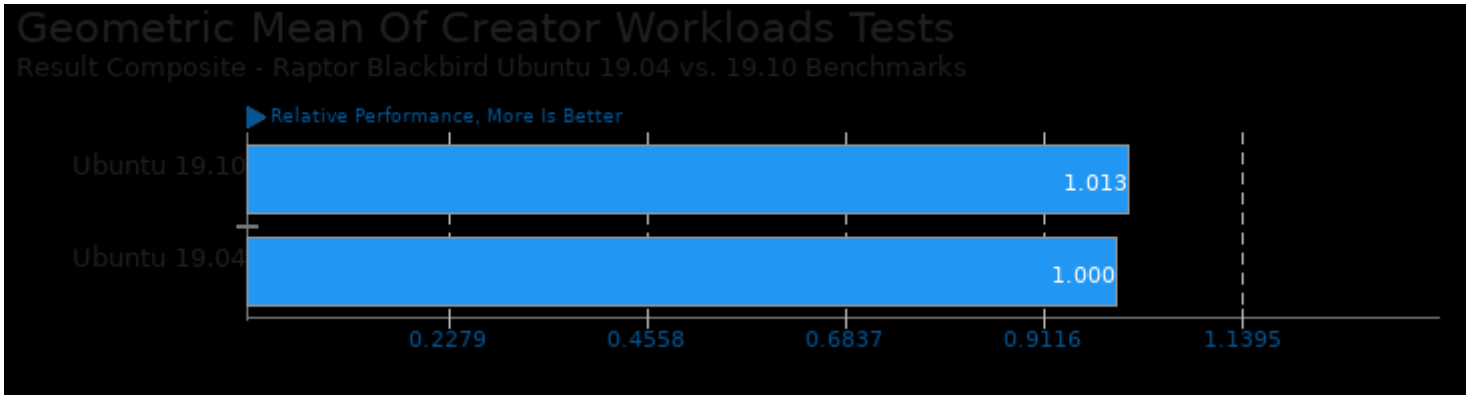
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



Geometric mean based upon tests: pts/aobench, pts/vpxenc, pts/graphics-magick, pts/himeno, pts/stockfish, pts/build-llvm, pts/c-ray, pts/compress-7zip, pts/encode-mp3, pts/sqlite-speedtest, pts/mrbayes, pts/libgav1, pts/dav1d, pts/x264, pts/x265, pts/compress-xz, pts/compress-zstd and pts/openssl

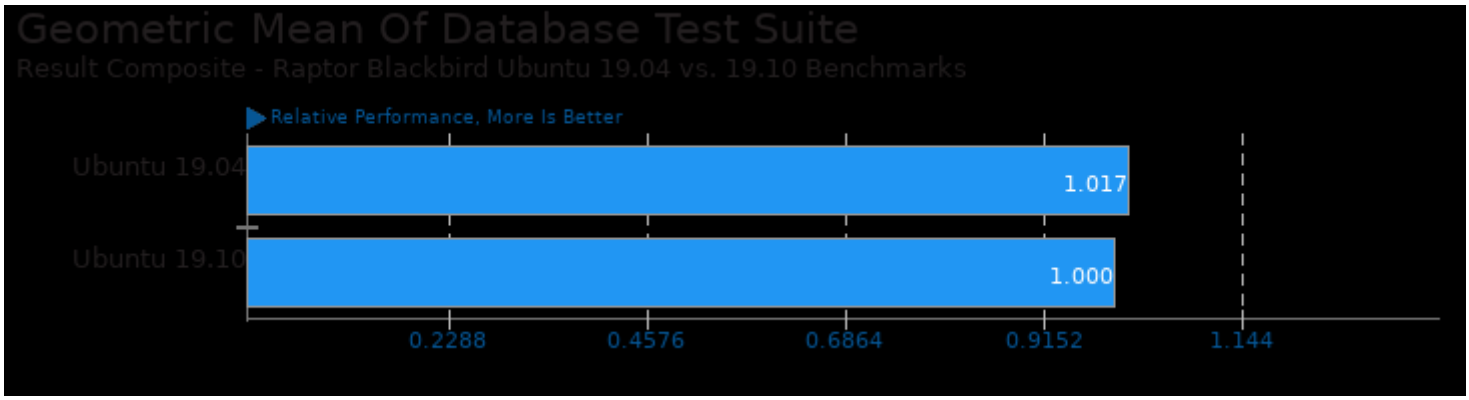


Geometric mean based upon tests: pts/compress-7zip, pts/compress-zstd and pts/compress-xz

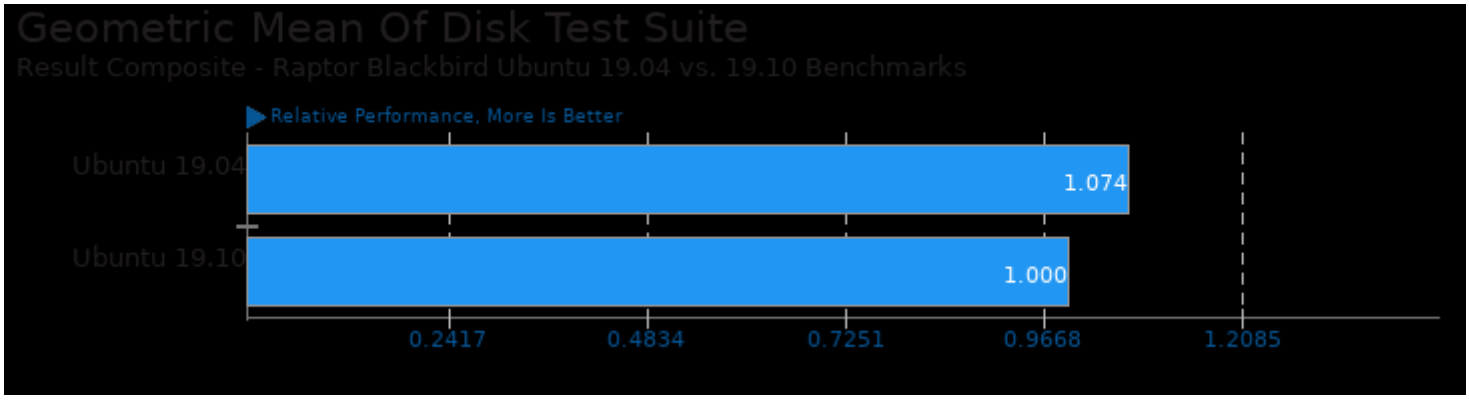


Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/smallpt, pts/ttsiod-renderer, pts/x264, pts/x265, pts/vpxenc, pts/dav1d, pts/libgav1, pts/rav1e, pts/encode-mp3, pts/graphics-magick and pts/tjbench

Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



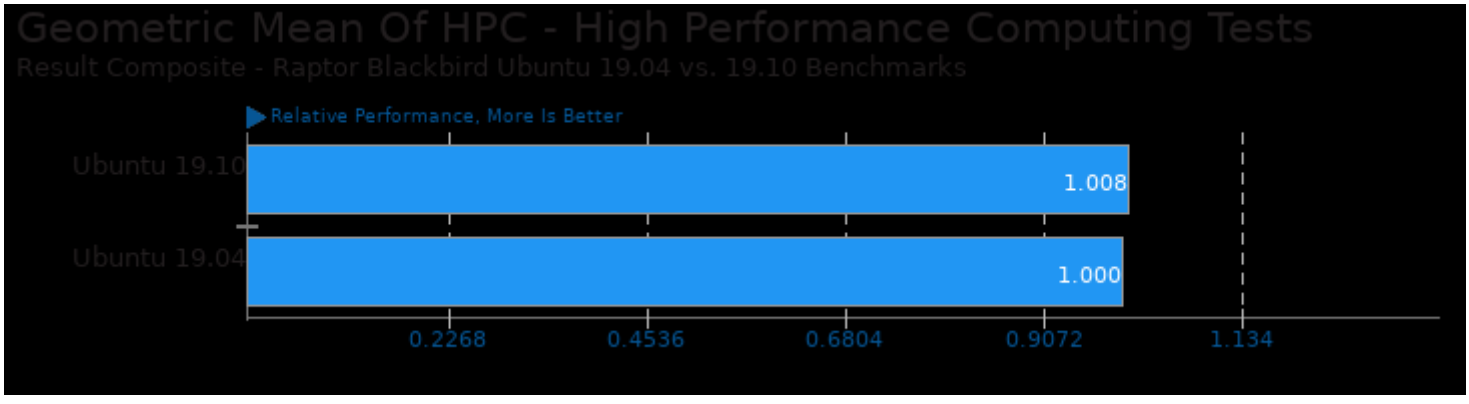
Geometric mean based upon tests: pts/sqlite, pts/sqlite-speedtest and pts/redis



Geometric mean based upon tests: pts/sqlite and pts/fio

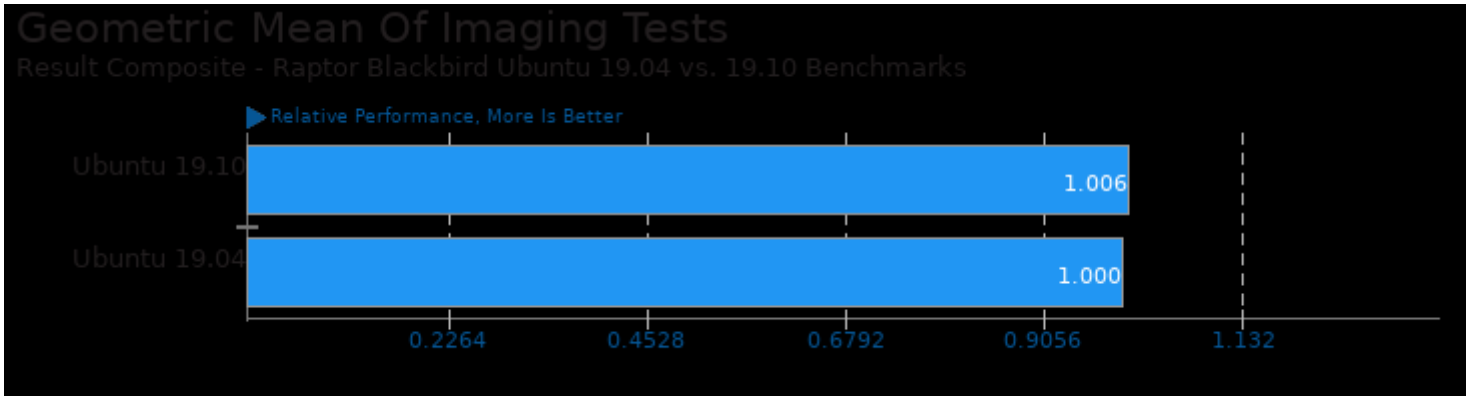


Geometric mean based upon tests: pts/encode-mp3, pts/x264, pts/x265, pts/vpxenc, pts/dav1d, pts/libgav1 and pts/rav1e

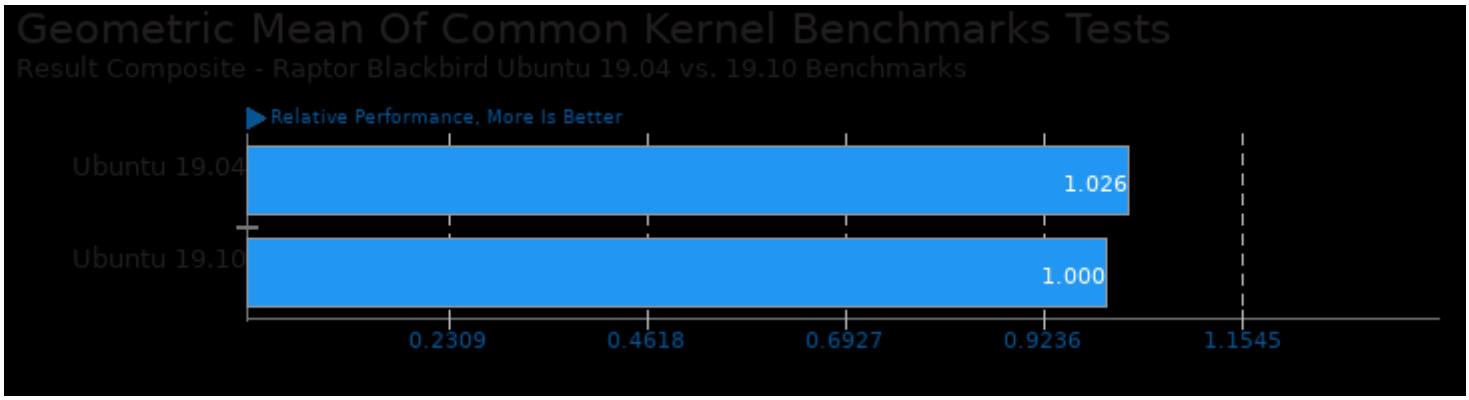


Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks

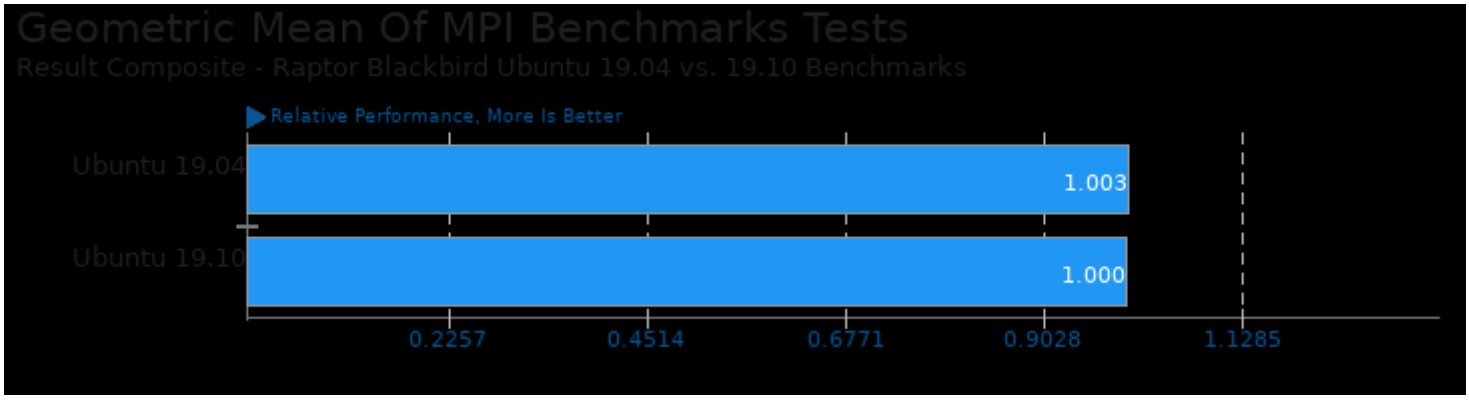
Geometric mean based upon tests: pts/rodinia, pts/parboil, pts/askap, pts/minife, pts/himeno, pts/mrbayes and pts/qmcpack



Geometric mean based upon tests: pts/graphics-magick and pts/tjbench

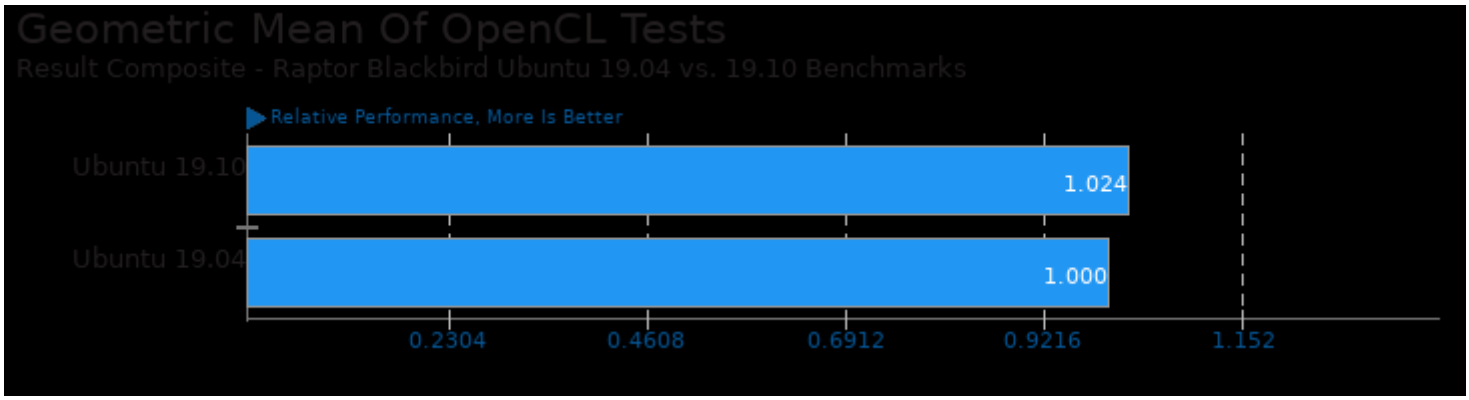


Geometric mean based upon tests: pts/sqlite-speedtest, pts/openssl and pts/stress-ng

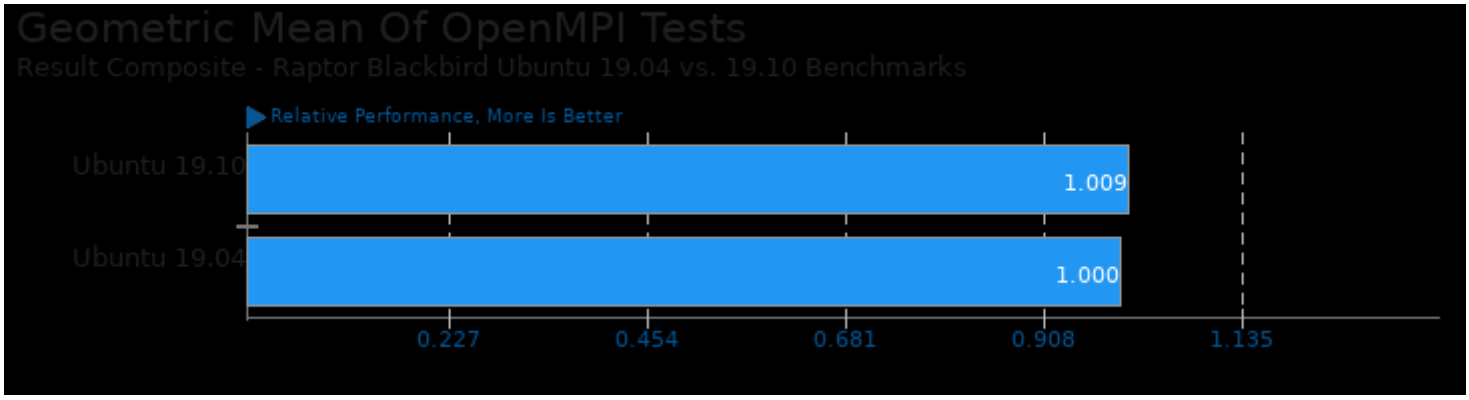


Geometric mean based upon tests: pts/askap, pts/qmcpack, pts/mrbayes and pts/minife

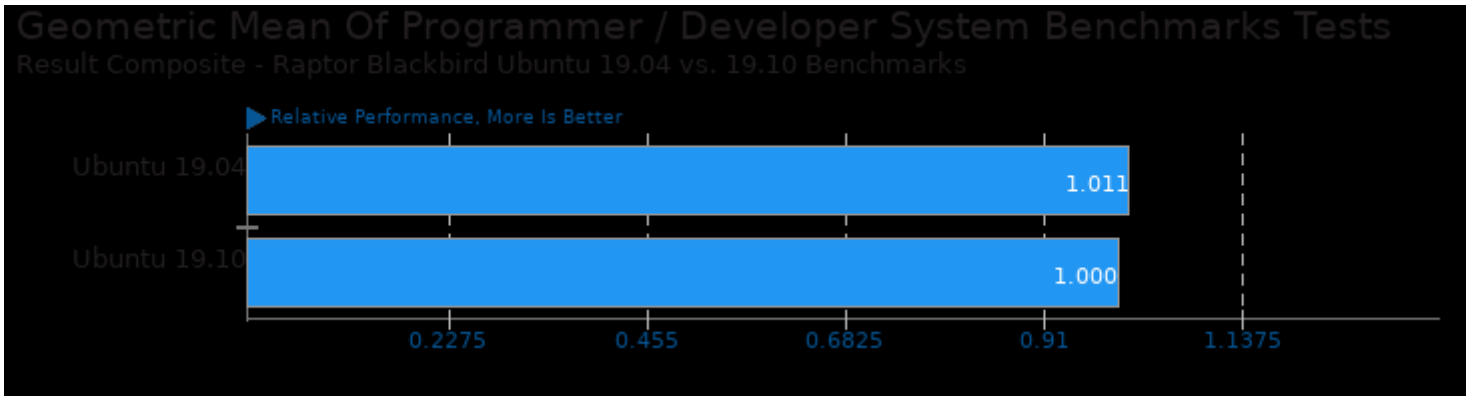
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



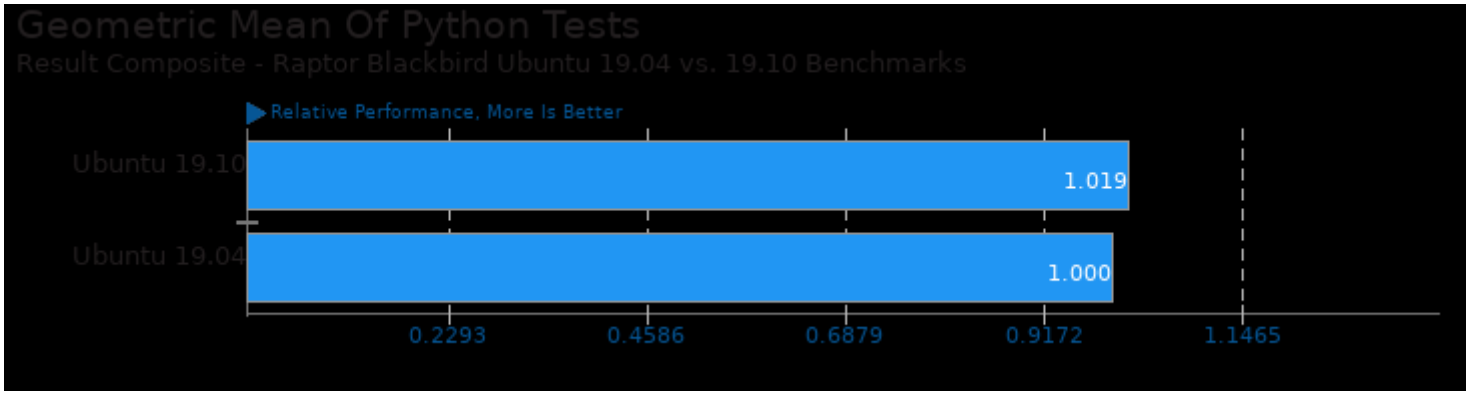
Geometric mean based upon tests: pts/rodinia and pts/parboil



Geometric mean based upon tests: pts/minife, pts/askap, pts/parboil, pts/rodinia, pts/mrbayes and pts/qmcpack

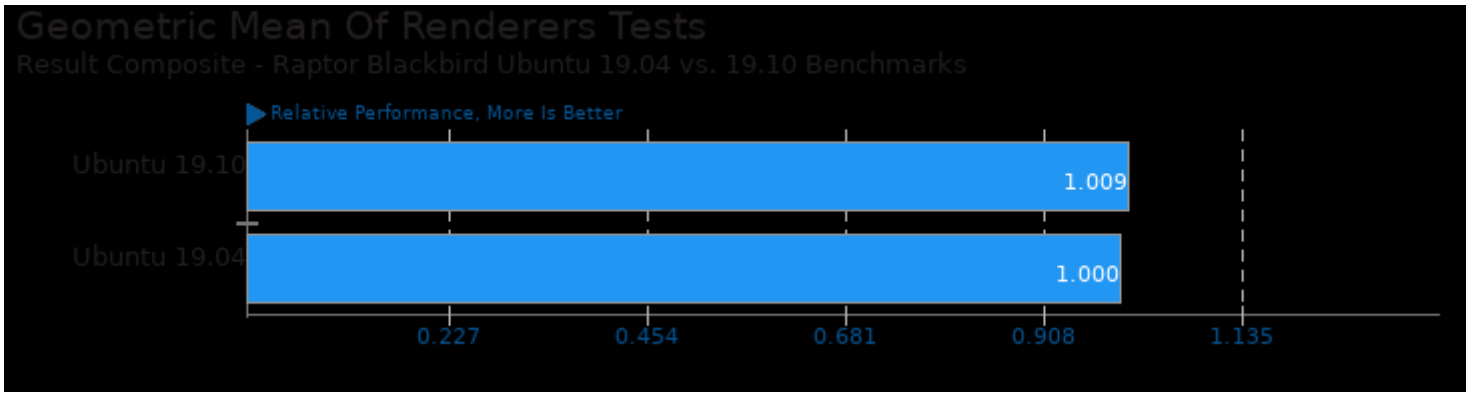


Geometric mean based upon tests: pts/sqlite-speedtest, pts/compress-zstd, pts/pybench, pts/build-linux-kernel and pts/build-llvm

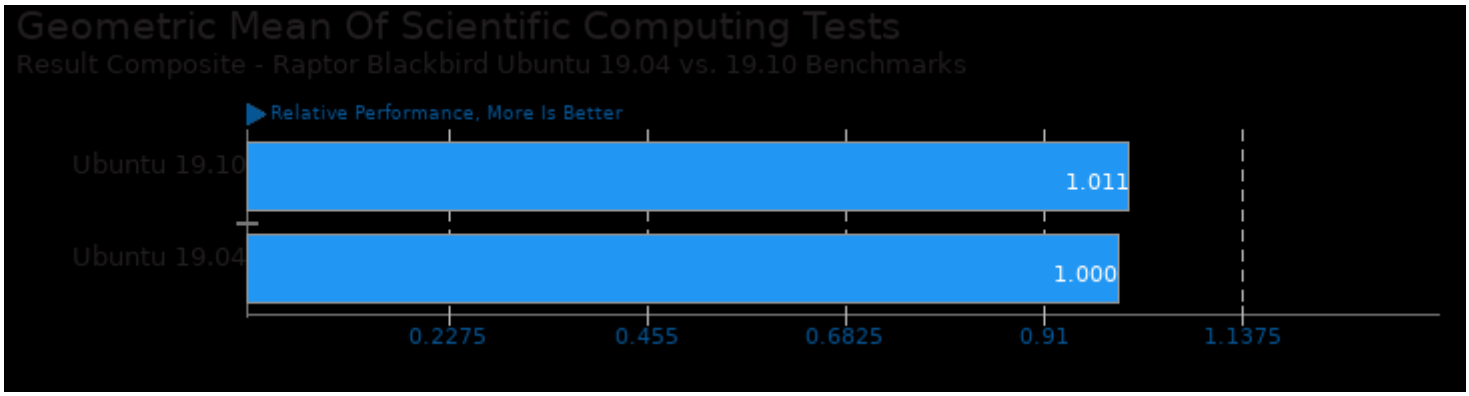


Geometric mean based upon tests: pts/pybench, pts/parboil and pts/build-llvm

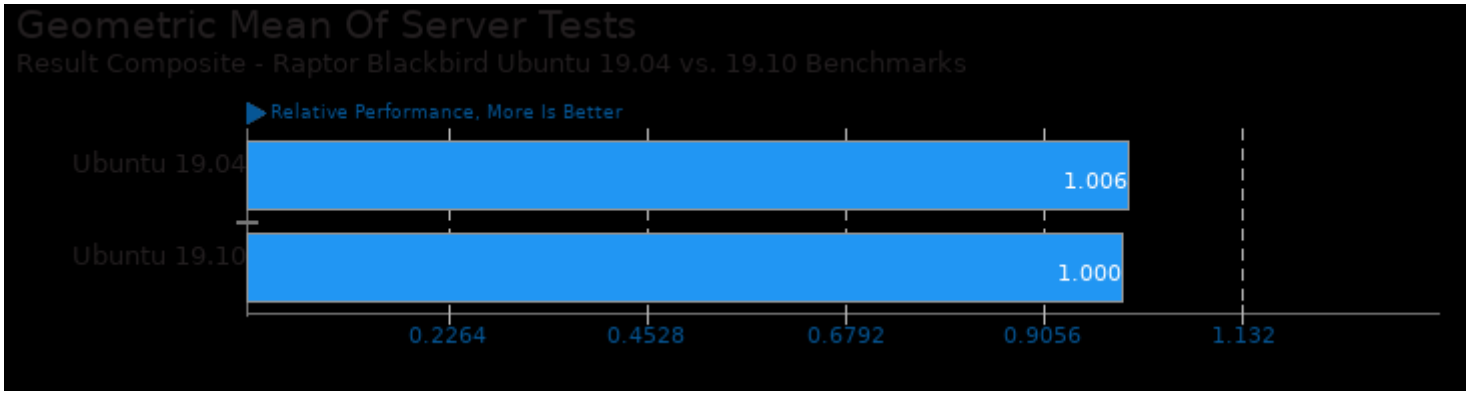
Raptor Blackbird Ubuntu 19.04 vs. 19.10 Benchmarks



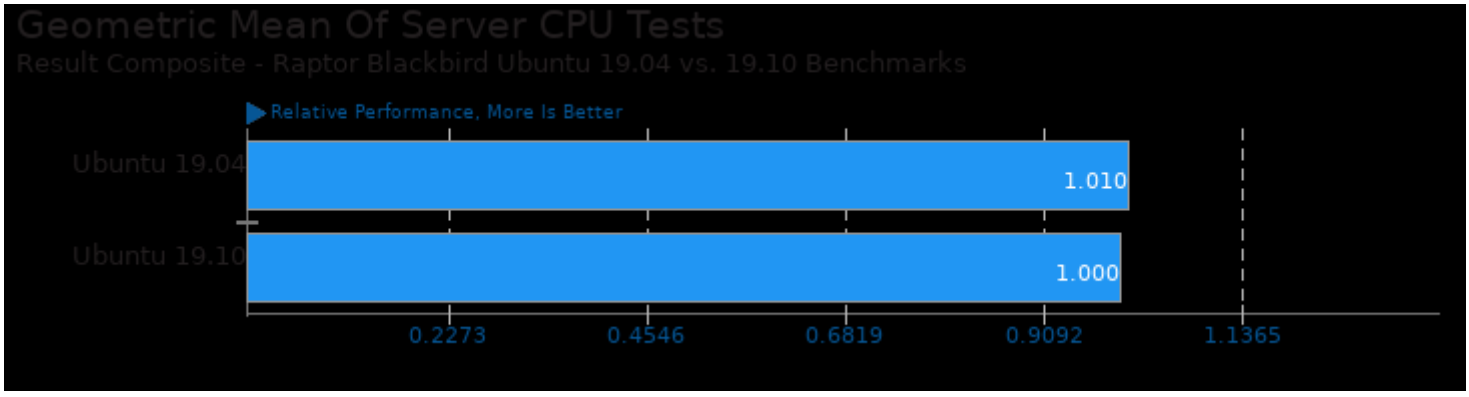
Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/smallpt and pts/ttsiod-renderer



Geometric mean based upon tests: pts/minife, pts/himeno, pts/mrbayes and pts/qmcpack

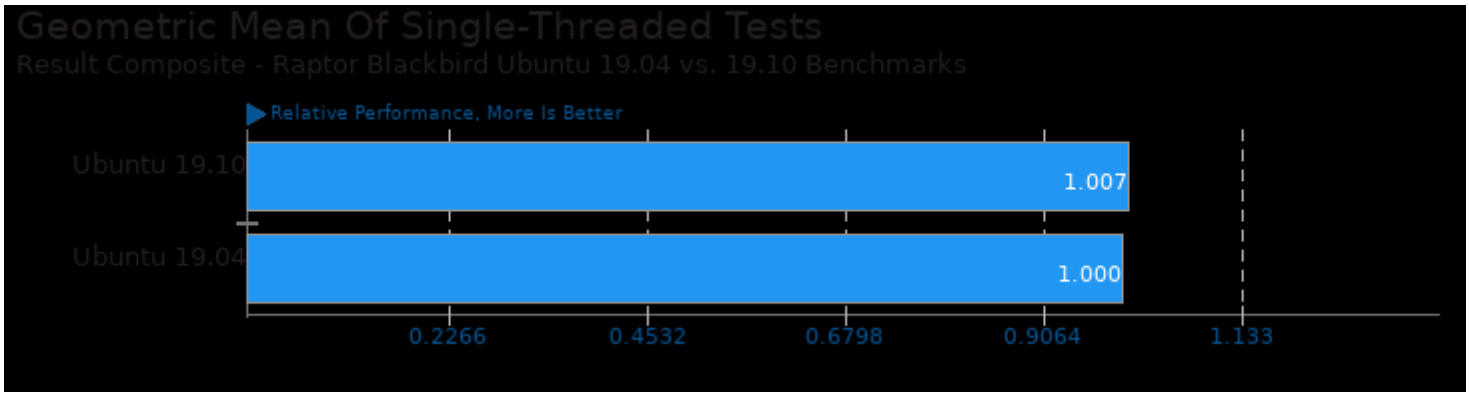


Geometric mean based upon tests: pts/redis, pts/php, pts/phpbench, pts/openssl, pts/sqlite and pts/sqlite-speedtest

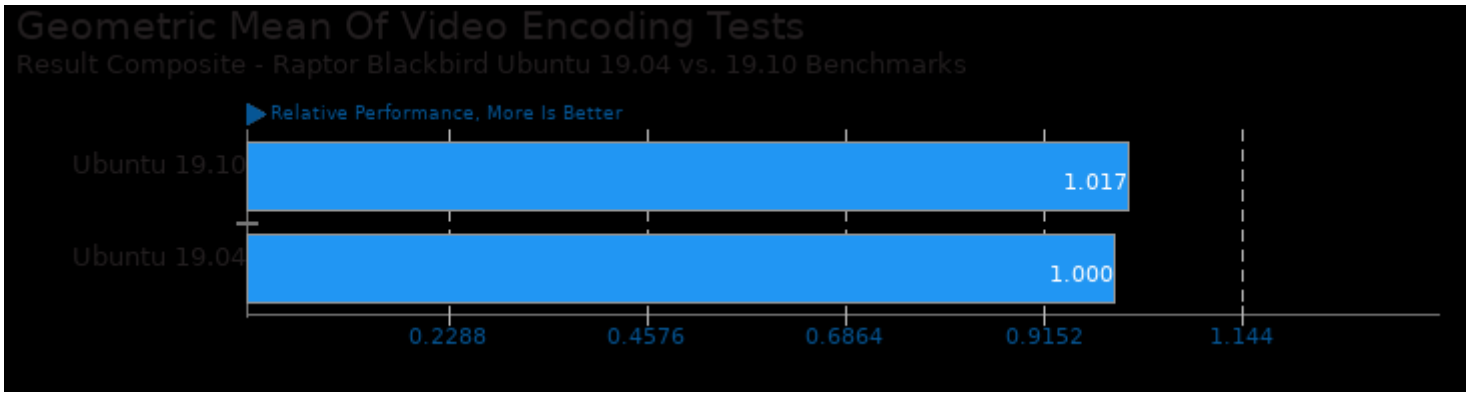


Geometric mean based upon tests: pts/rodinia, pts/x264, pts/x265, pts/dav1d, pts/himeno, pts/compress-7zip, pts/stockfish, pts/build-linux-kernel, pts/build-llvm, pts/c-ray, pts/compress-zstd, pts/openssl, pts/tjbench, pts/redis,

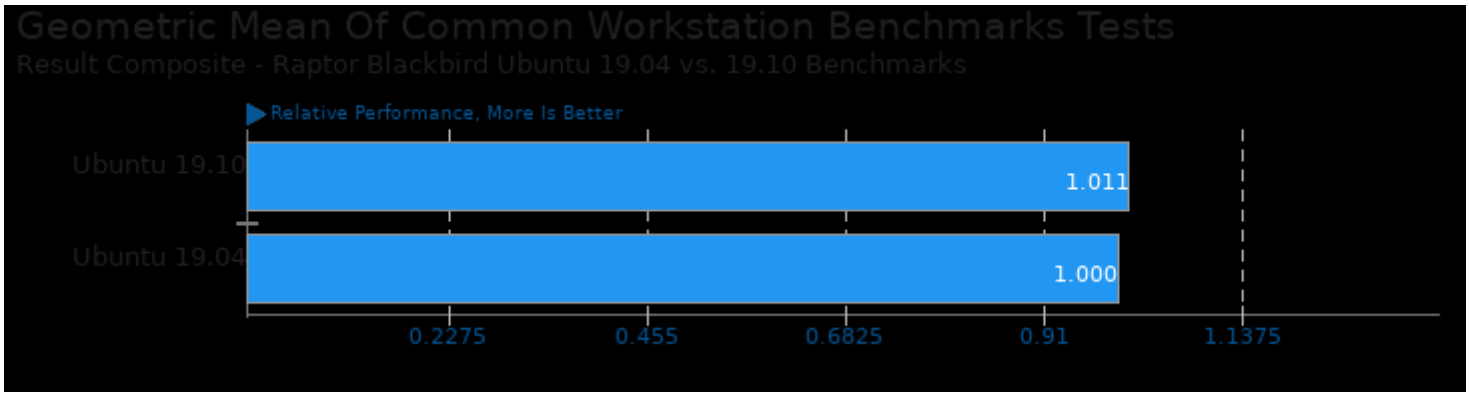
pts/stress-ng, pts/pybench and pts/phpbench



Geometric mean based upon tests: pts/encode-mp3, pts/sudokut, pts/tjbench, pts/redis, pts/optcarrot, pts/pybench and pts/phpbench



Geometric mean based upon tests: pts/x264, pts/x265, pts/vpxenc, pts/dav1d, pts/libgav1 and pts/rav1e



Geometric mean based upon tests: pts/rodinia, pts/parboil, pts/himeno and pts/x265

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 10:35.