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Ubuntu 18.10 vs. Ubuntu 19.04 vs. Clear Linux Benchmarks

Ubuntu 19.04 benchmarks for a future article on Phoronix.com.

Automated Executive Summary

9900K: Clear Linux had the most wins, coming in first place for 71% of the tests.

Based on the geometric mean of all complete results, the fastest (9900K: Clear Linux) was 2.754x the speed of the slowest (Dell XPS: Ubuntu 18.10). 9900K: Ubuntu 19.04 20190325 was 1.08x the speed of 9900K: Ubuntu 18.10, 9900K: Clear Linux was 1.146x the speed of 9900K: Ubuntu 19.04 20190325, Dell XPS: Ubuntu 18.10 was 0.363x the speed of 9900K: Clear Linux, Dell XPS: Ubuntu 19.04 20190325 was 1.069x the speed of Dell XPS: Ubuntu 18.10, Dell XPS: Clear Linux was 1.21x the speed of Dell XPS: Ubuntu 19.04 20190325.

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

NAS Parallel Benchmarks (Test / Class: SP.A) at 15.981x
NAS Parallel Benchmarks (Test / Class: EP.C) at 7.263x
ParaView (Test: Wavelet Contour - Resolution: 3840 x 2160) at 7.241x
ParaView (Test: Wavelet Contour - Resolution: 3840 x 2160) at 7.23x
Rodinia (Test: OpenMP LavaMD) at 5.874x
ParaView (Test: Wavelet Volume - Resolution: 3840 x 2160) at 5.743x
ParaView (Test: Wavelet Volume - Resolution: 3840 x 2160) at 5.742x

NAS Parallel Benchmarks (Test / Class: LU.C) at 5.681x
Tesseract (Resolution: 3840 x 2160) at 5.527x
Go Benchmarks (Test: json) at 4.768x.

Test Systems:

9900K: Ubuntu 18.10

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0802 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16384MB, Disk: Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX 64 8GB (1590/800MHz), Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel I219-V

OS: Ubuntu 18.10, Kernel: 4.18.0-16-generic (x86_64), Desktop: GNOME Shell 3.30.2, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 18.2.8 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Graphics Notes: GLAMOR
Python Notes: Python 2.7.15+ + Python 3.6.7
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW STIBP + SSB disabled via prctl and seccomp

9900K: Ubuntu 19.04 20190325

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0802 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16384MB, Disk: Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX 64 8GB (1590/800MHz), Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel I219-V

OS: Ubuntu 19.04, Kernel: 5.0.0-7-generic (x86_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: amdgpu 18.1.99, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Graphics Notes: GLAMOR
Python Notes: Python 2.7.16 + Python 3.7.2+
Security Notes: __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp

9900K: Clear Linux

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0802 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16384MB, Disk: Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX 56/64 8GB (1590/800MHz), Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel I219-V

OS: Clear Linux OS 28460, Kernel: 5.0.3-721.native (x86_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: amdgpu 19.0.0, OpenGL: 4.5 Mesa 19.1.0-devel (LLVM 7.0.1), Compiler: GCC 8.3.1 20190322 + Clang 7.0.1 + LLVM 7.0.1, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes:
CFFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl now-Wl-z-Wl relro-malign-data=abi-fno-semantic-interposition-ftree-vectorize-ftree-loop-vectorize-Wl-sort-common-Wl--enable-new-dtags
FFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-malign-data=abi-fno-semantic-interposition-ftree-vectorize-ftree-loop-vectorize-Wl--enable-new-dtags
CXXFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wformat-Wformat-security-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-fno-semantic-interposition-ffat-lto-objects-fno-signed-zeros-fno-trapping-math-fassociative-math-Wl-sort-common-Wl--enable-new-dtags-mtune=skylake-fvisibility-inlines-hidden-Wl--enable-new-dtags MESA_GLSL_CACHE_DISABLE=0
CFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wformat-Wformat-security-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-fno-semantic-interposition-ffat-lto-objects-fno-signed-zeros-fno-trapping-math-fassociative-math-Wl-sort-common-Wl--enable-new-dtags-mtune=skylake THEANO_FLAGS=floatX=float32 openmp=true gcc.cxxflags="-ftree-vectorize-mavx"
Compiler Notes: --build=x86_64-generic-linux --disable-libmpx --disable-libunwind-exceptions --disable-multiarch --disable-vtable-verify --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-clocale=gnu --enable-gnu-indirect-function --enable-languages=c,c++,fortran,go --enable-ld=default --enable-libstdcxx-pch --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --exec-prefix=/usr --includedir=/usr/include --target=x86_64-generic-linux --with-arch=westmere --with-glibc-version=2.19 --with-gnu-ld --with-isl --with-ppl=yes --with-tune=haswell
Disk Notes: MQ-DEADLINE / relatime,rw,stripe=256
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 3.7.2
Security Notes: __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp

Dell XPS: Ubuntu 18.10

Processor: Intel Core i7-8550U @ 4.00GHz (4 Cores / 8 Threads), Motherboard: Dell 0H0VG3 (1.0.2 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 8192MB, Disk: PM961 NVMe SAMSUNG 256GB, Graphics: Intel UHD 620 (1150MHz), Audio: Realtek ALC3271, Network: Qualcomm Atheros QCA6174 802.11ac

OS: Ubuntu 18.10, Kernel: 4.18.0-16-generic (x86_64), Desktop: GNOME Shell 3.30.2, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 1920x1080

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.15+ + Python 3.6.7
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW STIBP + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Dell XPS: Ubuntu 19.04 20190325

Processor: Intel Core i7-8550U @ 4.00GHz (4 Cores / 8 Threads), Motherboard: Dell 0H0VG3 (1.0.2 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 8192MB, Disk: PM961 NVMe SAMSUNG 256GB, Graphics: Intel UHD 620 (1150MHz), Audio: Realtek ALC3271, Network: Qualcomm Atheros QCA6174 802.11ac

OS: Ubuntu 19.04, Kernel: 5.0.0-7-generic (x86_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.5 Mesa 19.0.0, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.16 + Python 3.7.2+

Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Dell XPS: Clear Linux

Processor: Intel Core i7-8550U @ 4.00GHz (4 Cores / 8 Threads), Motherboard: Dell 0H0VG3 (1.0.2 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 8192MB, Disk: PM961 NVMe SAMSUNG 256GB, Graphics: Intel UHD 620 3GB (1150MHz), Audio: Realtek ALC3271, Network: Qualcomm Atheros QCA6174 802.11ac

OS: Clear Linux OS 28510, Kernel: 5.0.4-722.native (x86_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.5 Mesa 19.1.0-devel, Vulkan: 1.1.102, Compiler: GCC 8.3.1 20190326 + Clang 7.0.1 + LLVM 7.0.1, File-System: ext4, Screen Resolution: 1920x1080

Environment Notes:
CFFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl now-Wl-z-Wl relro-malign-data=abi-fno-semantic-interposition-ftree-vectorize-ftree-loop-vectorize-Wl-sort-common-Wl--enable-new-dtags
FFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-malign-data=abi-fno-semantic-interposition-ftree-vectorize-ftree-loop-vectorize-Wl--enable-new-dtags
CXXFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wformat-Wformat-security-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-fno-semantic-interposition-ffat-lto-objects-fno-signed-zeros-fno-trapping-math-fassociative-math-Wl-sort-common-Wl--enable-new-dtags-mtune=skylake-fvisibility-inlines-hidden-Wl--enable-new-dtags MESA_GLSL_CACHE_DISABLE=0
CFLAGS=-g-O3-feliminate-unused-debug-types-pipe-Wall-Wp-D_FORTIFY_SOURCE=2-fexceptions-fstack-protector--param=ssp-buffer-size=32-Wformat-Wformat-security-Wl--copy-dt-needed-entries-m64-fasynchronous-unwind-tables-Wp-D_REENTRANT-ftree-loop-distribute-patterns-Wl-z-Wl relro-fno-semantic-interposition-ffat-lto-objects-fno-signed-zeros-fno-trapping-math-fassociative-math-Wl-sort-common-Wl--enable-new-dtags-mtune=skylake THEANO_FLAGS=floatX=float32 openmp=true gcc.cxxflags="-ftree-vectorize-mavx"
Compiler Notes: --build=x86_64-generic-linux --disable-libmpx --disable-libunwind-exceptions --disable-multiarch --disable-vtable-verify --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-clocale=gnu --enable-gnu-indirect-function --enable-languages=c,c++,fortran,go --enable-ld=default --enable-libstdcxx-pch --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --exec-prefix=/usr --includedir=/usr/include --target=x86_64-generic-linux --with-arch=westmere --with-glibc-version=2.19 --with-gnu-ld --with-isl --with-ppl=yes --with-tune=haswell
Disk Notes: MQ-DEADLINE / relatime,rw,stripe=256
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 3.7.2
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline STIBP: disabled RSB filling + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

	9900K: Ubuntu 18.10	9900K: Ubuntu 19.04 20190325	9900K: Clear Linux	Dell XPS: Ubuntu 18.10	Dell XPS: Ubuntu 19.04 20190325	Dell XPS: Clear Linux
t-test1 - 2 (sec)	4.35	4.34	**4.20**	**6.87**	6.81	6.29
Normalized	96.55%	96.77%	100%	61.14%	61.67%	66.77%
Standard Deviation	0.7%	0.7%	0.2%	0.8%	0.1%	0.3%
NAS Parallel Benchmarks - EP.C (Mop/s)	405	524	**857**	**118**	155	248
Normalized	47.26%	61.14%	100%	13.77%	18.09%	28.94%
Standard Deviation	0.2%	0.2%	0.1%	1.6%	2.3%	2.8%
NAS Parallel Benchmarks - LU.C (Mop/s)	6541	6536	**11510**	2041	**2026**	6771
Normalized	56.83%	56.79%	100%	17.73%	17.6%	58.83%
Standard Deviation	0.1%	0.3%	2.4%	0%	1%	0.6%
NAS Parallel Benchmarks - SP.A (Mop/s)	586	575	**5178**	331	**324**	3040
Normalized	11.32%	11.1%	100%	6.39%	6.26%	58.71%
Standard Deviation	0%	0.1%	0.7%	0.2%	0.4%	1.1%
Parboil - OpenMP LBM (sec)	145	146	**132**	**185**	184	164

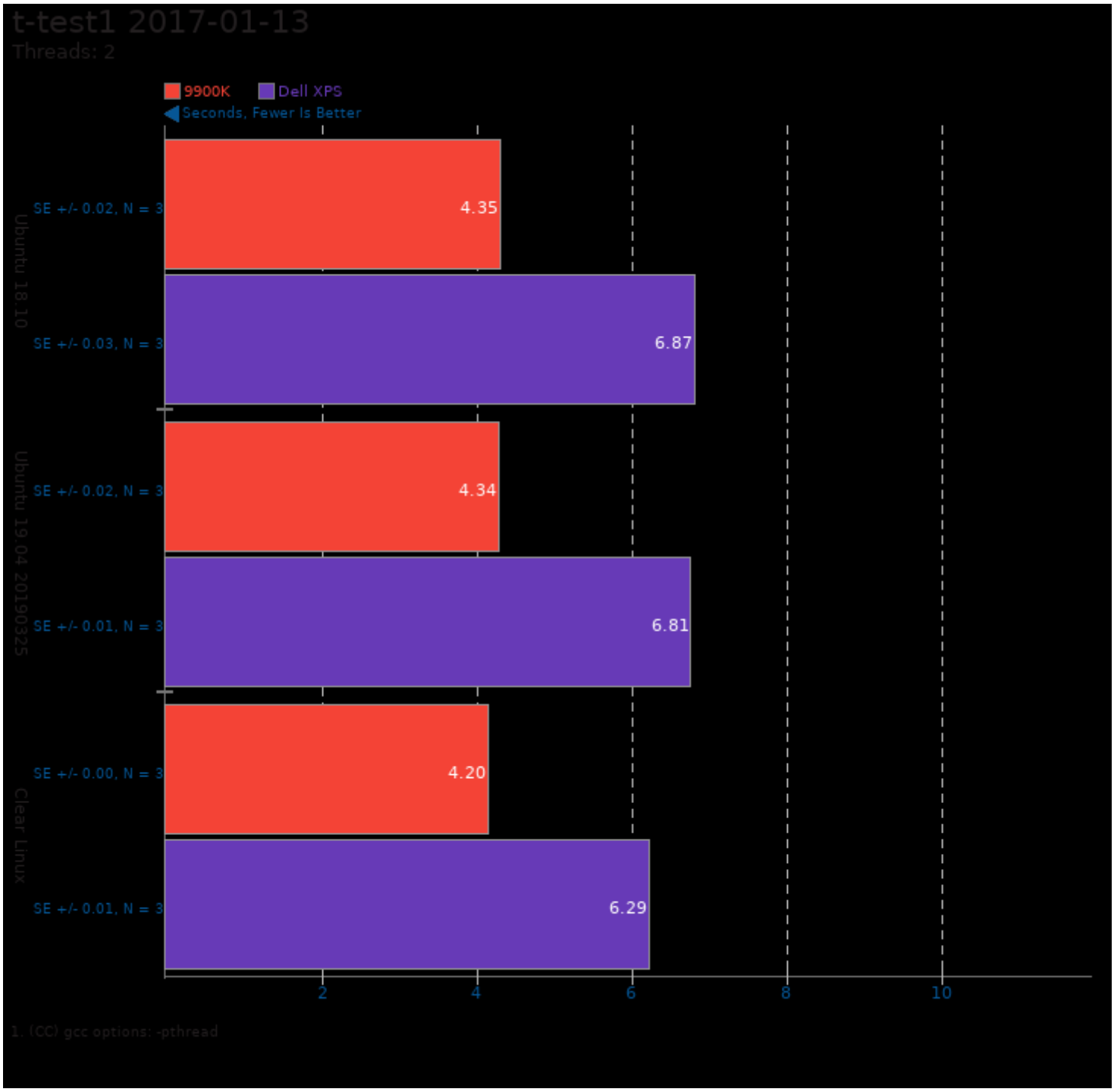
Normalized	91.03%	90.41%	100%	71.35%	71.74%	80.49%
Standard Deviation	0.2%	0.1%	0.1%	0%	0.1%	2.3%
Parboil - OpenMP CUTCP (sec)	3.50	**3.48**	3.51	10.58	10.52	**10.59**
Normalized	99.43%	100%	99.15%	32.89%	33.08%	32.86%
Standard Deviation	0.2%	0.3%	0.4%	3.3%	3.4%	3.2%
Parboil - OpenMP Stencil	18.44	**18.15**	22.83	**42.27**	41.90	32.66
Normalized	98.43%	100%	79.5%	42.94%	43.32%	55.57%
Standard Deviation	2.4%	1.8%	0.5%	2.1%	1.9%	0.2%
Parboil - O.M.G (sec)	48.93	48.31	**55.71**	44.66	**41.23**	51.79
Normalized	84.26%	85.34%	74.01%	92.32%	100%	79.61%
Standard Deviation	4.7%	3.8%	7%	6.5%	1.9%	7.8%
Rodinia - OpenMP LavaMD (sec)	44.80	29.80	**27.87**	**163.71**	106.49	103.71
Normalized	62.21%	93.52%	100%	17.02%	26.17%	26.87%
Standard Deviation	0%	0.5%	2.6%	0.5%	0.6%	0.6%
Rodinia - OpenMP CFD Solver (sec)	20.71	**20.40**	21.41	61.56	61.32	**65.56**
Normalized	98.5%	100%	95.28%	33.14%	33.27%	31.12%
Standard Deviation	0.3%	0.6%	0.6%	0.9%	0.6%	1.2%
Rodinia - O.S (sec)	17.58	17.45	**17.40**	**33.85**	33.72	33.13
Normalized	98.98%	99.71%	100%	51.4%	51.6%	52.52%
Standard Deviation	0.1%	0.1%	0.1%	0.4%	0.6%	0.5%
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	1.73291	**1.72734**	1.75786	**6.35906**	6.35519	6.32447
Normalized	99.68%	100%	98.26%	27.16%	27.18%	27.31%
Standard Deviation	0.1%	0.3%	2.7%	0%	0.3%	0.3%
Timed HMMer Search - P.D.S (sec)	5.13	4.17	**3.58**	**11.62**	9.88	6.81
Normalized	69.79%	85.85%	100%	30.81%	36.23%	52.57%
Standard Deviation	1.2%	0.3%	0.6%	2.7%	2.8%	2.9%
Go Benchmarks - http	4101	4114	**3272**	11591	**11674**	9806
Normalized	79.79%	79.53%	100%	28.23%	28.03%	33.37%
Standard Deviation	0.2%	0.2%	2.1%	3%	3%	2.9%
Go Benchmarks - json	6412608	5684003	**4692337**	**22374653**	19785205	17734907
Normalized	73.17%	82.55%	100%	20.97%	23.72%	26.46%
Standard Deviation	0.4%	0.3%	1.7%	2.3%	2.5%	2.6%
Go Benchmarks - build	10899446204	**10862857619**	14165867825	14616425791	14576954478	**17686254818**
Normalized	99.66%	100%	76.68%	74.32%	74.52%	61.42%
Standard Deviation	2.9%	2.7%	0.7%	2.8%	2.4%	1.1%
Go Benchmarks - garbage (ns/op)	1134314	1135604	**998127**	**4011772**	3999645	3693767
Normalized	87.99%	87.89%	100%	24.88%	24.96%	27.02%
Standard Deviation	0.6%	0%	0.5%	2.9%	2.9%	2.9%
LuaJIT - Composite (Mflops)	1860	**1869**	1863	**1354**	1362	1392
Normalized	99.52%	100%	99.68%	72.45%	72.87%	74.48%
Standard Deviation	0.1%	0.2%	0.1%	0.1%	0.4%	0.2%
SVT-HEVC - 1.8.b.Y.T.H.V.E (FPS)	195	195	**216**	**60.87**	61.14	63.83
Normalized	90.28%	90.28%	100%	28.18%	28.31%	29.55%
Standard Deviation	0.9%	1.3%	0.9%	4.2%	4.2%	2.9%
SVT-VP9 - 1.8.b.Y.T.V.V.E (FPS)	57.55	57.80	**64.28**	**16.39**	16.48	17.66
Normalized	89.53%	89.92%	100%	25.5%	25.64%	27.47%

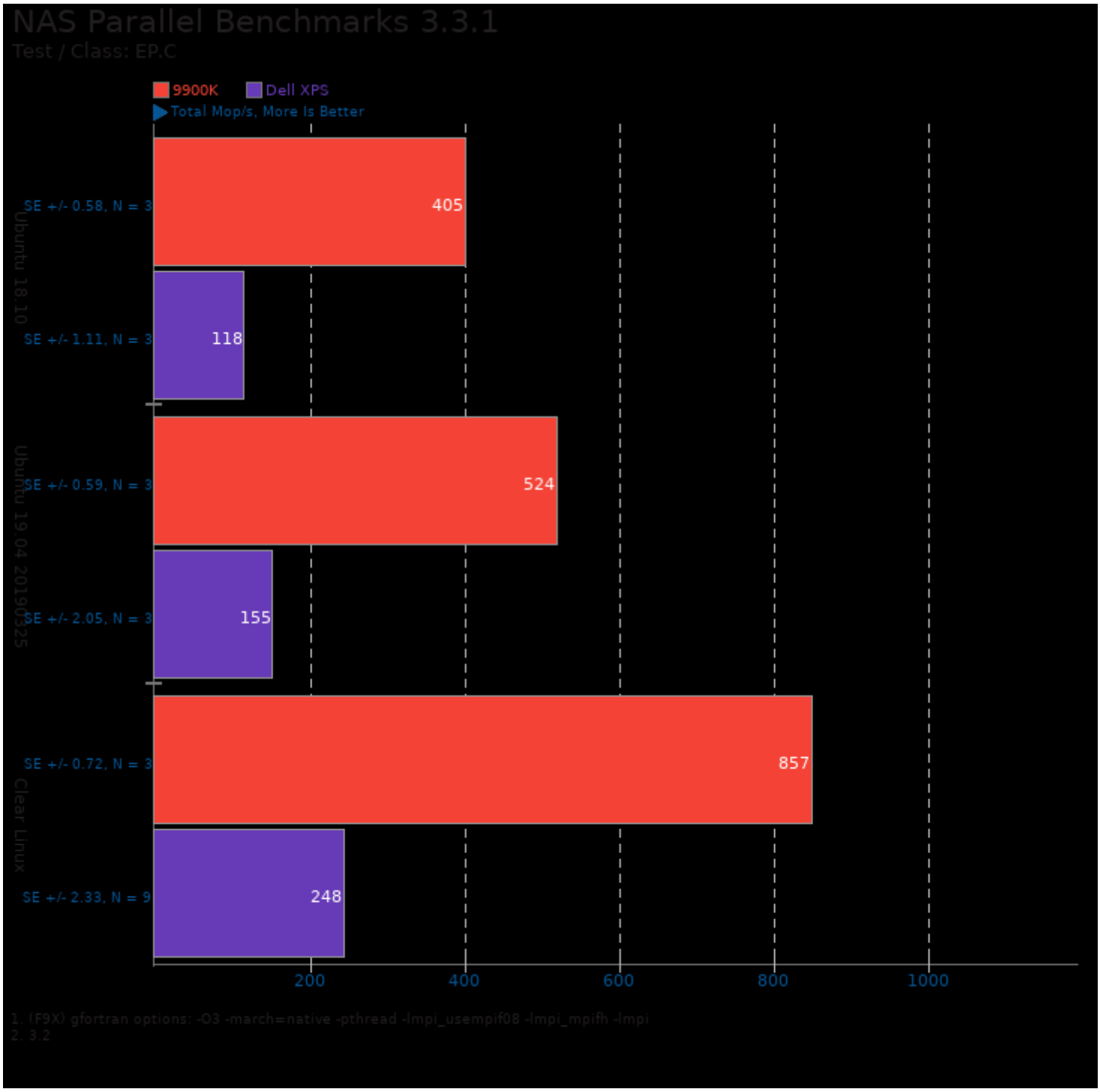
Standard Deviation	0.4%	0.2%	0.1%	0.6%	0.6%	0.4%
VP9 libvpx Encoding - v.V.1.V.E (FPS)	30.68	31.24	32.45	23.32	23.22	25.22
Normalized	94.55%	96.27%	100%	71.86%	71.56%	77.72%
Standard Deviation	0.5%	0.1%	0.5%	0.7%	0.8%	0.6%
x265 - H.2.1.V.E (FPS)	45.05	45.48	49.76	14.80	14.77	15.18
Normalized	90.53%	91.4%	100%	29.74%	29.68%	30.51%
Standard Deviation	0.8%	0.5%	0.8%	1.6%	1.7%	1.3%
Timed Linux Kernel Compilation - Time To Compile (sec)	76.78	64.04	62.06	264.82	216.48	217.08
Normalized	80.83%	96.91%	100%	23.43%	28.67%	28.59%
Standard Deviation	1.6%	2.9%	0.9%	0.8%	0.7%	0.6%
Parallel BZIP2 Compression - 2.F.C (sec)	3.70	3.72	3.65	11.89	11.93	11.71
Normalized	98.65%	98.12%	100%	30.7%	30.6%	31.17%
Standard Deviation	0.9%	1.4%	1.9%	2.9%	2.9%	2.9%
Primesieve - 1.P.N.G (sec)	24.71	24.48	23.85	88.56	87.17	87.43
Normalized	96.52%	97.43%	100%	26.93%	27.36%	27.28%
Standard Deviation	1.1%	0.7%	2.9%	0.2%	1.1%	0.9%
LZMA Compression - 2.F.C (sec)	193	192	183	322	322	247
Normalized	94.82%	95.31%	100%	56.83%	56.83%	74.09%
Standard Deviation	0.5%	0.5%	0.5%	0.2%	0.2%	0.2%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	24.43	24.12	24.76	60.22	59.78	41.95
Normalized	98.73%	100%	97.42%	40.05%	40.35%	57.5%
Standard Deviation	0.1%	0.8%	0.6%	0.4%	0.4%	0.1%
Hackbench - 16 - Thread	31.29	31.25	29.11	130.54	128.08	110.81
Normalized	93.03%	93.15%	100%	22.3%	22.73%	26.27%
Standard Deviation	2.1%	2.5%	2.7%	1.1%	4%	0.7%
Hackbench - 16 - Process (sec)	29.71	29.81	27.88	123.63	121.31	109.12
Normalized	93.84%	93.53%	100%	22.55%	22.98%	25.55%
Standard Deviation	3.1%	2.8%	1.1%	0.7%	0.4%	0.3%
Perl Benchmarks - Pod2html (sec)	0.17166014	0.09627961	0.09351156	0.21803389	0.12333322	0.12063131
Normalized	54.47%	97.12%	100%	42.89%	75.82%	77.52%
Standard Deviation	0.3%	0.7%	0.6%	0.7%	1.4%	1.2%
Perl Benchmarks - Interpreter (sec)	0.00195073	0.00074548	0.00080469	0.00110483	0.00100097	0.00105809
Normalized	38.22%	100%	92.64%	67.47%	74.48%	70.46%
Standard Deviation	59.3%	7.5%	0.8%	6.9%	0.7%	0.3%
R Benchmark (sec)	0.1595	0.1396	0.0955	0.2389	0.2124	0.1339
Normalized	59.87%	68.41%	100%	39.97%	44.96%	71.32%
Standard Deviation	1.1%	0.8%	1.2%	1%	0.1%	0.9%
OpenSSL - R.4.b.P	2698	2688	2847	822	821	816
Normalized	94.77%	94.42%	100%	28.87%	28.84%	28.66%
Standard Deviation	0.3%	0.3%	0.7%	3.7%	3.6%	2.9%
Stress-NG - Forking (Bogo Ops/s)	87171	93159	82511	29195	30770	30432
Normalized	93.57%	100%	88.57%	31.34%	33.03%	32.67%
Standard Deviation	0.7%	0.7%	1.2%	1.6%	1.1%	2.8%

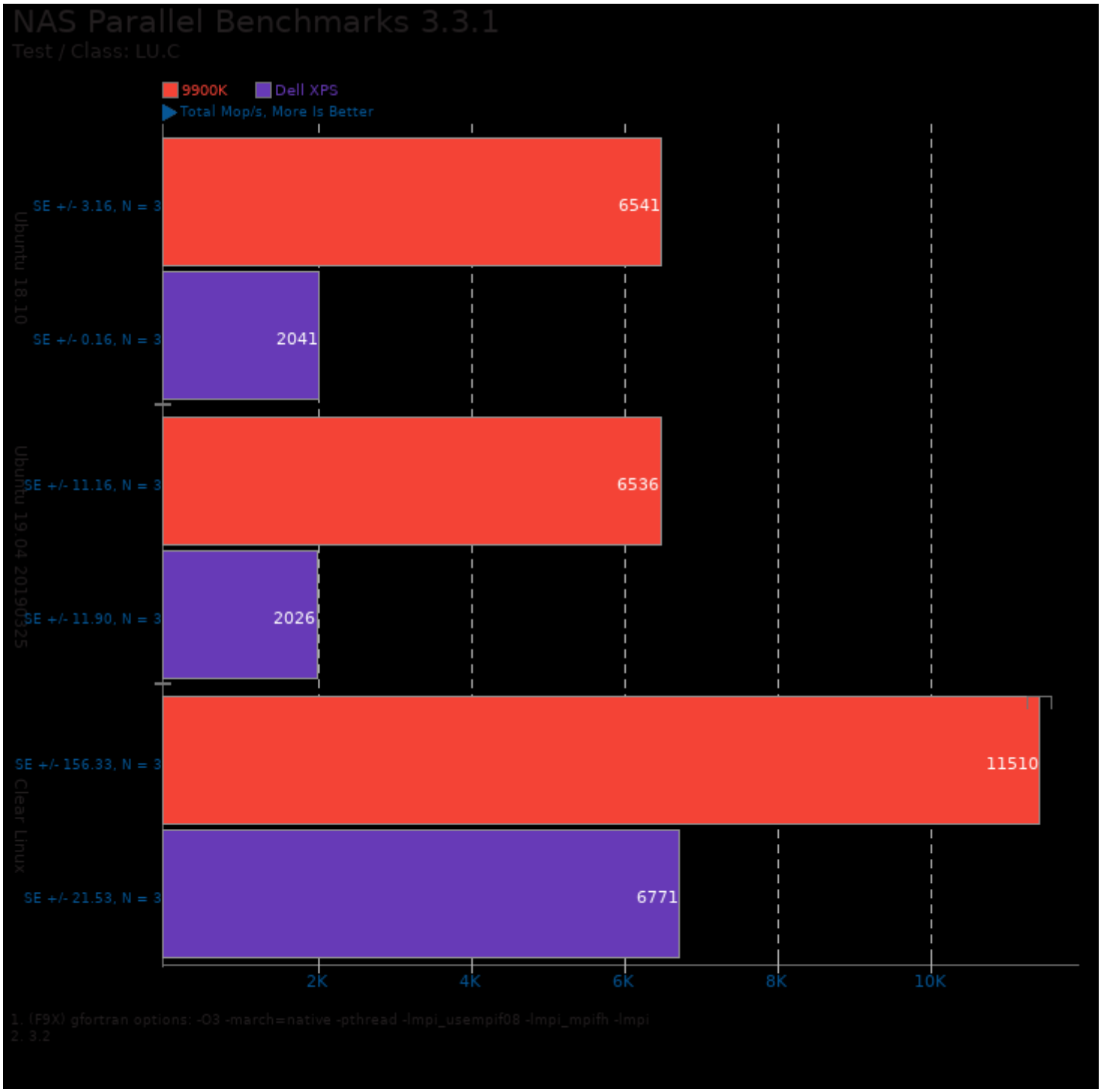
Stress-NG - Semaphores (Bogo Ops/s)	**5109302**	5069179	5030507	**3778574**	3894530	3823311
Normalized	100%	99.21%	98.46%	73.95%	76.22%	74.83%
Standard Deviation	0.7%	2.1%	2.5%	1.4%	2.8%	2.7%
Stress-NG - Socket Activity (Bogo Ops/s)	7735	**9242**	6843	**2156**	2864	3767
Normalized	83.69%	100%	74.04%	23.33%	30.99%	40.76%
Standard Deviation	12.5%	1%	1.9%	20.1%	3.4%	0.9%
Stress-NG - Context Switching (Bogo Ops/s)	5345401	5637589	**6036380**	1405383	1267361	**1266742**
Normalized	88.55%	93.39%	100%	23.28%	21%	20.99%
Standard Deviation	1.3%	4.6%	1.3%	2.2%	1%	2.1%
Stress-NG - S.V.M.P (Bogo Ops/s)	11330784	11727698	**12023439**	**4688581**	4902227	5107615
Normalized	94.24%	97.54%	100%	39%	40.77%	42.48%
Standard Deviation	0.1%	0.1%	0.1%	0.3%	1.2%	1.8%
Blender - BMW27 - CPU-Only (sec)	215	200	**193**	**779**	721	701
Normalized	89.77%	96.5%	100%	24.78%	26.77%	27.53%
PyBench - T.F.A.T.T (Milliseconds)	1150	806	**798**	**1444**	1009	1002
Normalized	69.39%	99.01%	100%	55.26%	79.09%	79.64%
Standard Deviation	0.3%	0.2%	0.2%		0.3%	0.4%
PHPBench - P.B.S (Score)	567249	818111	**987796**	**452775**	649183	787810
Normalized	57.43%	82.82%	100%	45.84%	65.72%	79.75%
Standard Deviation	0.4%	0.1%	0.1%	0.3%	0.1%	0.1%
Selenium - ARES-6 - Firefox (ms)	56.74	56.41	**52.28**	**77.50**	77.35	54.01
Normalized	92.14%	92.68%	100%	67.46%	67.59%	96.8%
Standard Deviation	2.3%	2%	1.4%	1.6%	1.1%	0.4%
Selenium - Octane - Firefox (Geometric Mean)	41550	41646	**43177**	30309	**30267**	39134
Normalized	96.23%	96.45%	100%	70.2%	70.1%	90.64%
Standard Deviation	0.5%	0.7%	0.2%	0.2%	0.4%	0.3%
Selenium - WebXPRT - Firefox (Score)	253	251	**302**	188	**187**	258
Normalized	83.77%	83.11%	100%	62.25%	61.92%	85.43%
Standard Deviation	0.4%		0.5%			
Selenium - Basemark - Firefox (Overall Score)	626	690	**814**	**364**	374	536
Normalized	76.9%	84.77%	100%	44.72%	45.95%	65.85%
Standard Deviation	3.5%	4.7%	2.3%	0.8%	4.6%	5.8%
Selenium - Jetstream - Firefox (Score)	234	233	**249**	**169**	170	219
Normalized	93.98%	93.57%	100%	67.87%	68.27%	87.95%
Standard Deviation	0.3%	0.5%	0.2%	0.3%	0.1%	0.4%
Selenium - MotionMark - Firefox (Score)	168	164	**281**	66.84	**63.86**	208.55
Normalized	59.79%	58.36%	100%	23.79%	22.73%	74.22%
Standard Deviation	20.1%	15.1%	1.9%	12.6%	14.5%	2.6%
Selenium - Speedometer - Firefox (Runs/min)	88.27	88.20	**104**	61.40	**60.43**	88.23
Normalized	84.88%	84.81%	100%	59.04%	58.11%	84.84%

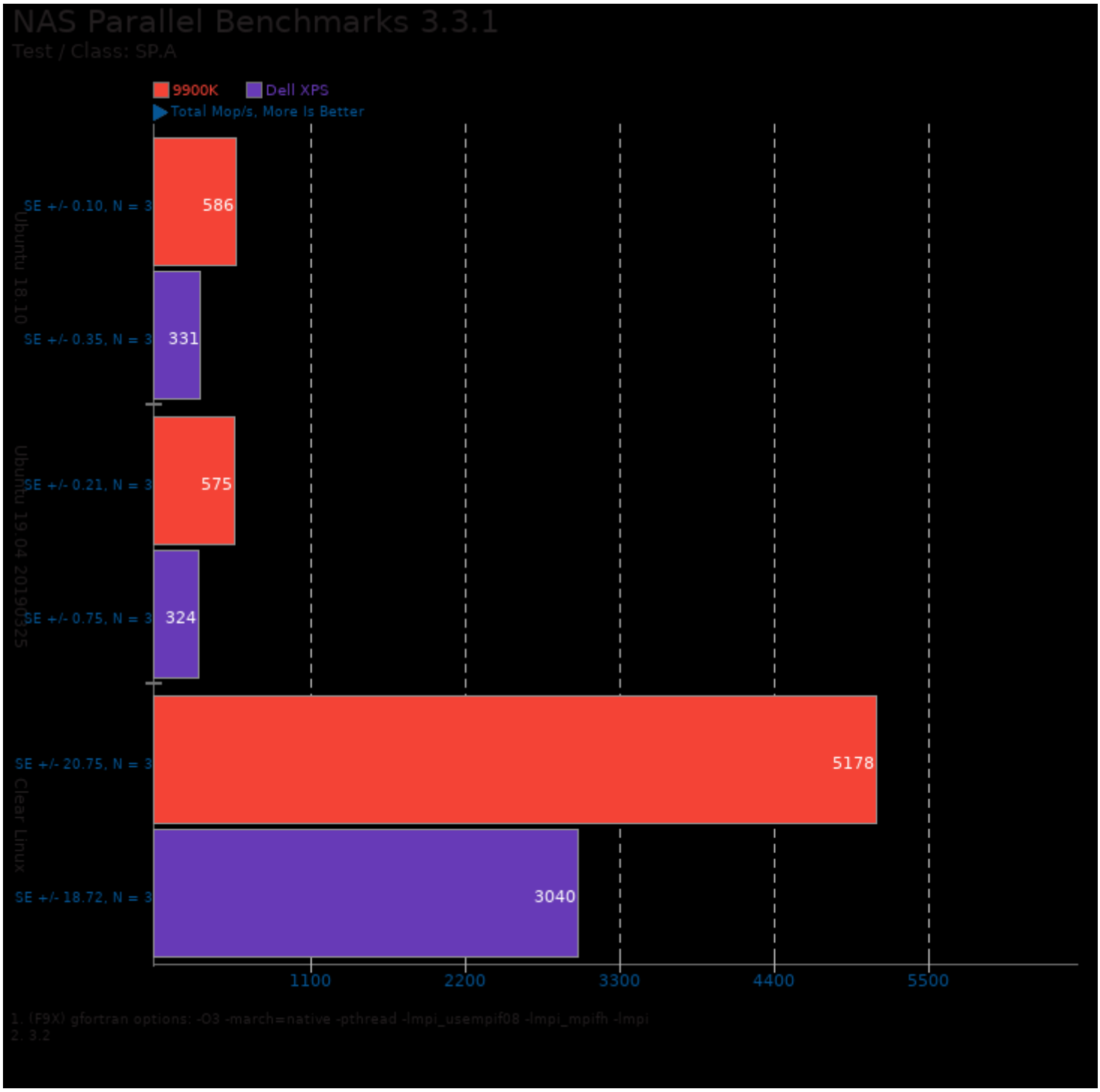
Standard Deviation	0.2%	0.6%		0.3%	0.6%	0.3%
Selenium - CanvasMark - Firefox (Score)	12953	13028	14687	9837	9988	14093
Normalized	88.19%	88.7%	100%	66.98%	68.01%	95.96%
Standard Deviation	2.5%	0.5%	0.3%	1.6%	3%	1.8%
Git - T.T.C.C.G.C (sec)	4.66	4.27	4.17	5.96	5.56	5.37
Normalized	89.48%	97.66%	100%	69.97%	75%	77.65%
Standard Deviation	0.7%	2.8%	2.9%	2.3%	2.1%	1.4%
PHP Micro Benchmarks - Zend bench (sec)	0.54	0.32	0.18	0.68	0.40	0.23
Normalized	33.33%	56.25%	100%	26.47%	45%	78.26%
Standard Deviation	1.5%	1.4%	0%	0.1%	0.9%	0.7%
PHP Micro Benchmarks - Zend micro_bench (sec)	1.73	1.64	1.28	2.19	2.06	1.61
Normalized	73.99%	78.05%	100%	58.45%	62.14%	79.5%
Standard Deviation	0.5%	2.2%	0.1%	0.2%	1%	0.2%
Tesseract - 3840 x 2160	261	232	307	55.55	59.06	58.93
Normalized	85.02%	75.57%	100%	18.09%	19.24%	19.2%
Standard Deviation	1.1%	1.3%	0.9%	2.3%	1.5%	2.6%
Xonotic - 3840 x 2160 - Ultimate (FPS)	207	217	245	60.07	63.25	63.67
Normalized	84.49%	88.57%	100%	24.52%	25.82%	25.99%
Standard Deviation	2.1%	0.5%	0.6%	0.1%	0.1%	0.2%
ParaView - Many Spheres - 3840 x 2160 (Frames / Sec)	37.44	37.39	37.43			
Normalized	100%	99.87%	99.97%			
Standard Deviation	0.3%	0.1%	0.4%			
ParaView - Many Spheres - 3840 x 2160 (MiPolys / Sec)	3753	3748	3753			
Normalized	100%	99.87%	100%			
Standard Deviation	0.3%	0.2%	0.4%			
ParaView - Wavelet Volume - 3840 x 2160 (Frames / Sec)	75.36	70.86	140.70	24.55	24.50	26.78
Normalized	53.56%	50.36%	100%	17.45%	17.41%	19.03%
Standard Deviation	7.6%	8.8%	4.6%	1.1%	1.4%	0.6%
ParaView - Wavelet Volume - 3840 x 2160 (MiVoxels / Sec)	1206	1134	2251	393	392	429
Normalized	53.58%	50.38%	100%	17.46%	17.41%	19.06%
Standard Deviation	7.6%	8.8%	4.6%	1.1%	1.4%	0.6%
ParaView - Wavelet Contour - 3840 x 2160 (Frames / Sec)	130	129	130	17.98	18.08	18.07
Normalized	100%	99.23%	100%	13.83%	13.91%	13.9%
Standard Deviation	0.8%	0.8%	0.4%	0.2%	0.3%	0.1%
ParaView - Wavelet Contour - 3840 x 2160 (MiPolys / Sec)	1354	1346	1354	187	188	188
Normalized	100%	99.41%	100%	13.81%	13.88%	13.88%
Standard Deviation	0.8%	0.8%	0.4%	0.2%	0.3%	0.1%
OSBench - Create Files (us/Event)	10.50	10.83	10.24	14.82	14.85	13.66
Normalized	97.52%	94.55%	100%	69.1%	68.96%	74.96%
Standard Deviation	0.6%	0.6%	0.4%	0.1%	0.4%	0.9%

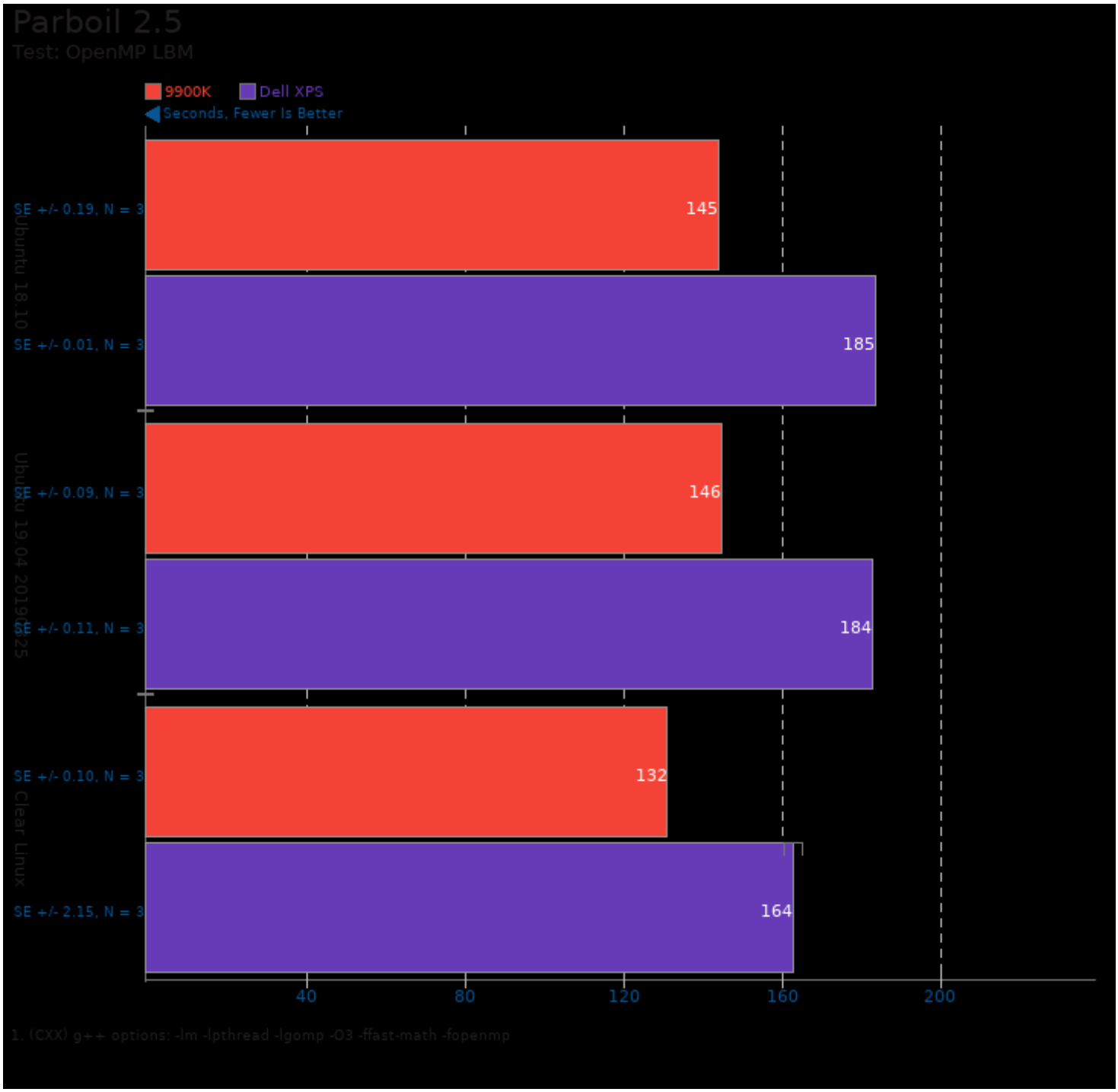
OSBench - Create Threads (us/Event)	9.24	**8.23**	8.44	**13.63**	11.63	10.93
Normalized	89.07%	100%	97.51%	60.38%	70.77%	75.3%
Standard Deviation	1.1%	1.5%	1.3%	2.9%	3.4%	1.4%
OSBench - Launch Programs (us/Event)	**21.41**	21.69	24.12	45.89	**51.08**	50.13
Normalized	100%	98.71%	88.76%	46.66%	41.91%	42.71%
Standard Deviation	0.3%	0.4%	0.7%	1.2%	0.1%	0.1%
OSBench - Memory Allocations (Ns/Event)	65.89	57.32	**44.51**	**110.15**	97.72	61.79
Normalized	67.55%	77.65%	100%	40.41%	45.55%	72.03%
Standard Deviation	0.2%	0.7%	0%	0.5%	0.2%	0%

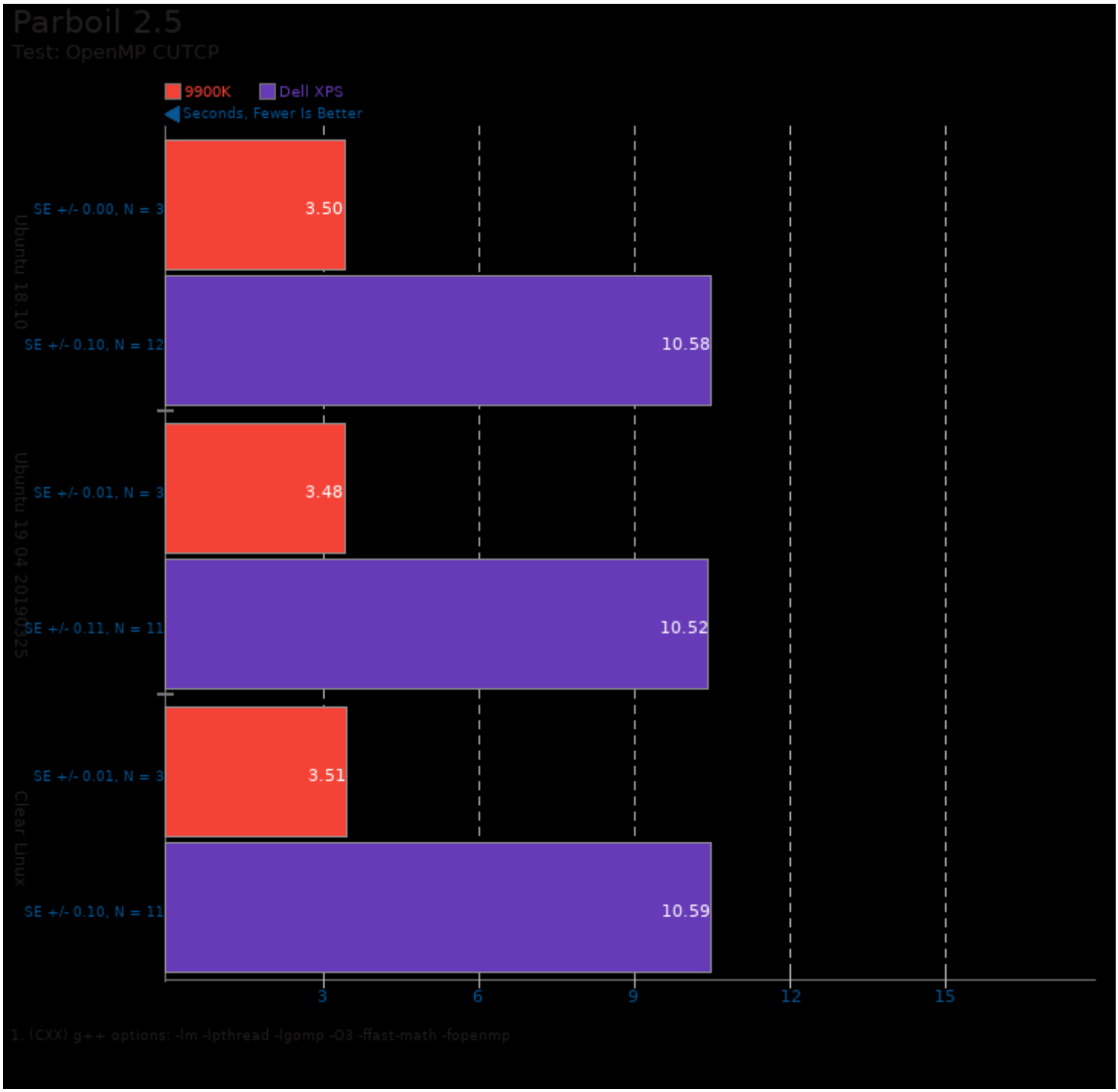

t-test1 2017-01-13
Threads: 2
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.02, N = 3
4.35
SE +/- 0.03, N = 3
6.87
Ubuntu 19.04 20190325
SE +/- 0.02, N = 3
4.34
SE +/- 0.01, N = 3
6.81
Clear Linux
SE +/- 0.00, N = 3
4.20
SE +/- 0.01, N = 3
6.29
2
4
6
8
10
1. (CC) gcc options: -pthread

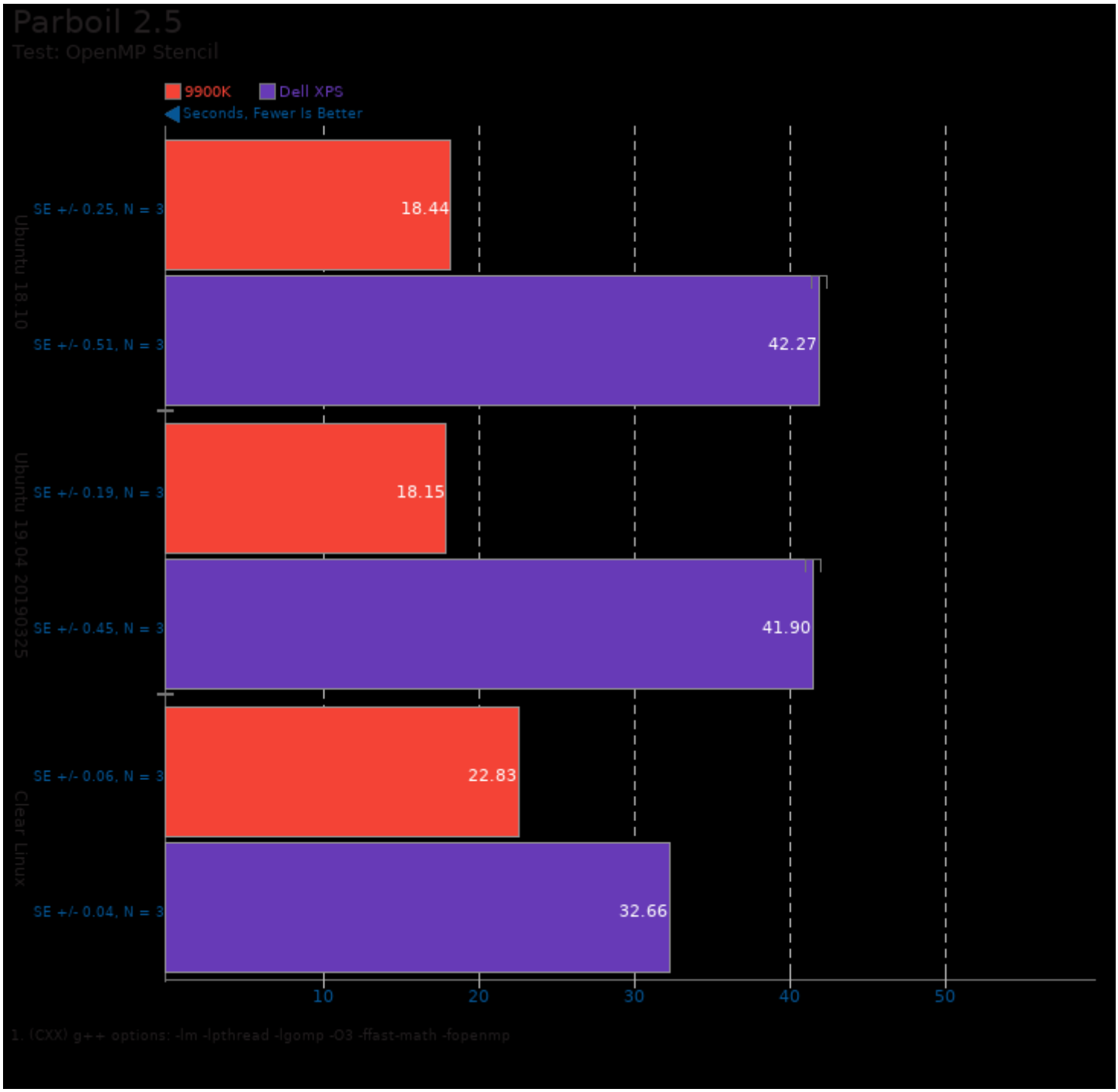

NAS Parallel Benchmarks 3.3.1
Test / Class: EP.C
9900K
Dell XPS
Total Mop/s, More Is Better
Ubuntu 18.10
SE +/- 0.58, N = 3
405
SE +/- 1.11, N = 3
118
Ubuntu 19.04 20190325
SE +/- 0.59, N = 3
524
SE +/- 2.05, N = 3
155
Clear Linux
SE +/- 0.72, N = 3
857
SE +/- 2.33, N = 9
248
200
400
600
800
1000
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 3.2

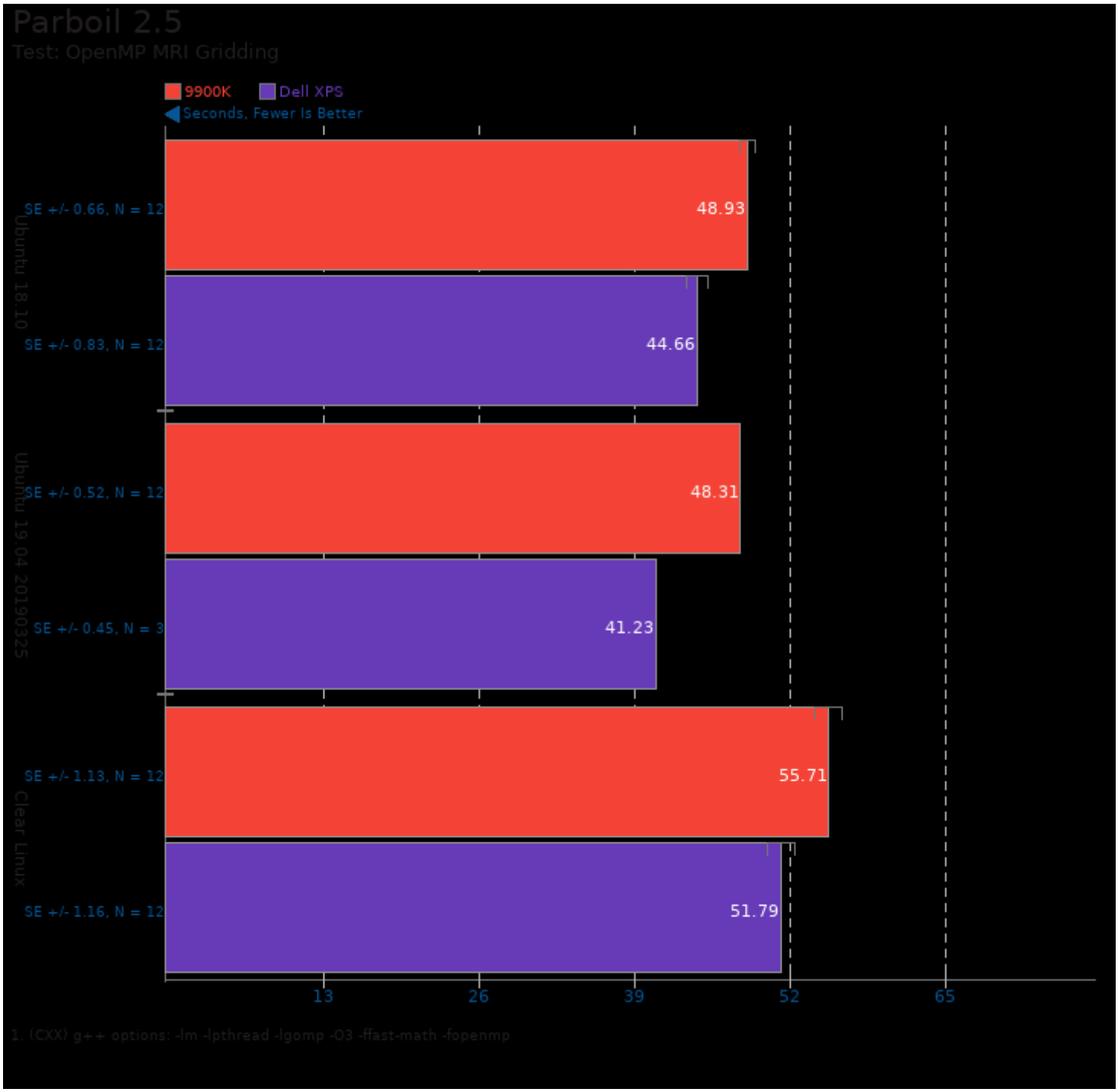

NAS Parallel Benchmarks 3.3.1
Test / Class: LU.C
9900K
Dell XPS
Total Mop/s, More Is Better
SE +/- 3.16, N = 3
6541
Ubuntu 18.10
SE +/- 0.16, N = 3
2041
SE +/- 11.16, N = 3
6536
Ubuntu 19.04 20190325
SE +/- 11.90, N = 3
2026
SE +/- 156.33, N = 3
11510
Clear Linux
SE +/- 21.53, N = 3
6771
2K
4K
6K
8K
10K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 3.2

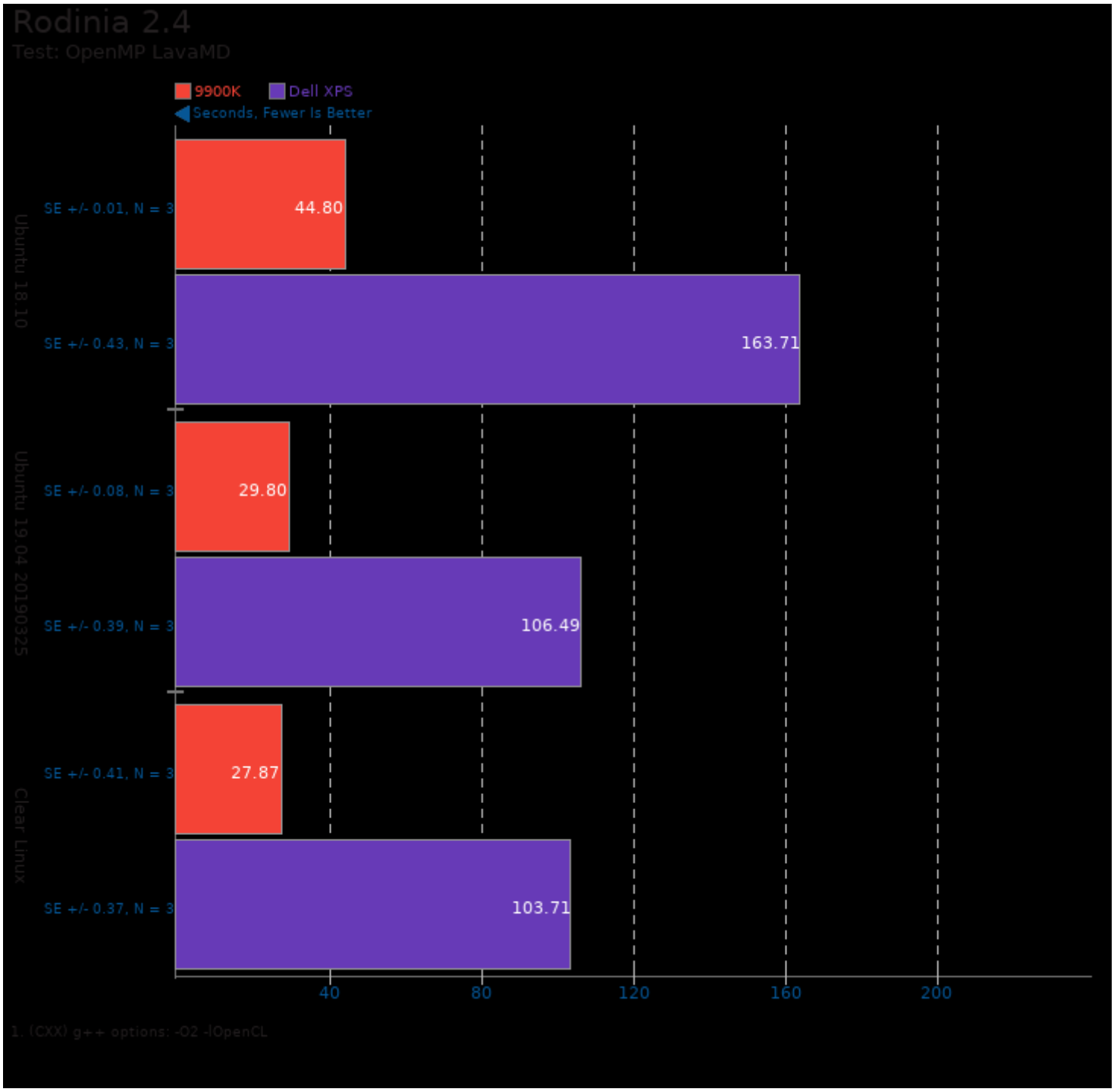

NAS Parallel Benchmarks 3.3.1
Test / Class: SP.A
9900K
Dell XPS
Total Mop/s, More Is Better
Ubuntu 18.10
SE +/- 0.10, N = 3
586
SE +/- 0.35, N = 3
331
Ubuntu 19.04 20190325
SE +/- 0.21, N = 3
575
SE +/- 0.75, N = 3
324
Clear Linux
SE +/- 20.75, N = 3
5178
SE +/- 18.72, N = 3
3040
1100
2200
3300
4400
5500
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 3.2

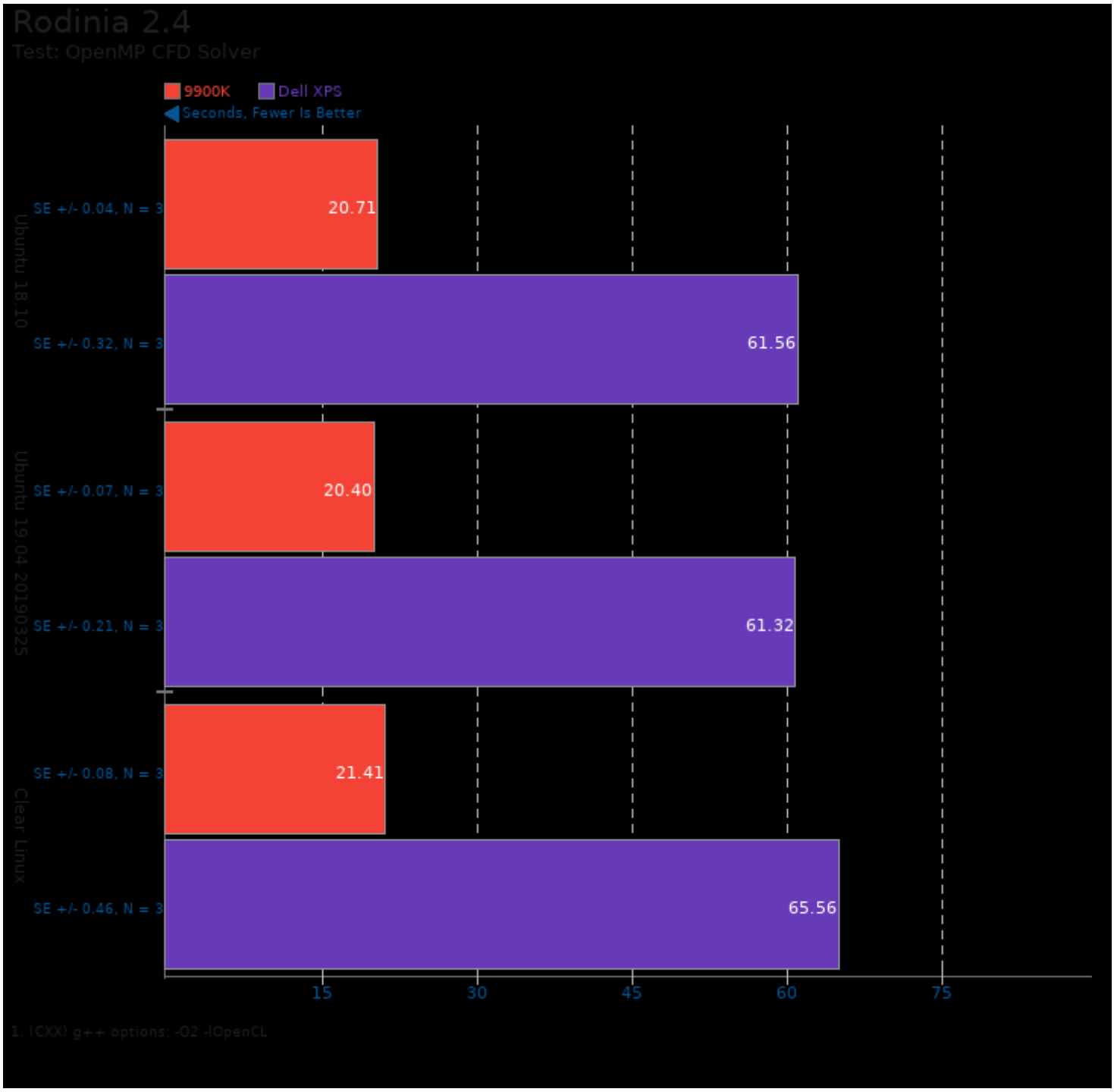

Parboil 2.5
Test: OpenMP LBM
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.19, N = 3
145
SE +/- 0.01, N = 3
185
Ubuntu 19.04 20190425
SE +/- 0.09, N = 3
146
SE +/- 0.11, N = 3
184
Clear Linux
SE +/- 0.10, N = 3
132
SE +/- 2.15, N = 3
164
40
80
120
160
200
1. (CXX) g++ options: -lm -lpthread -lgomp -O3 -ffast-math -fopenmp

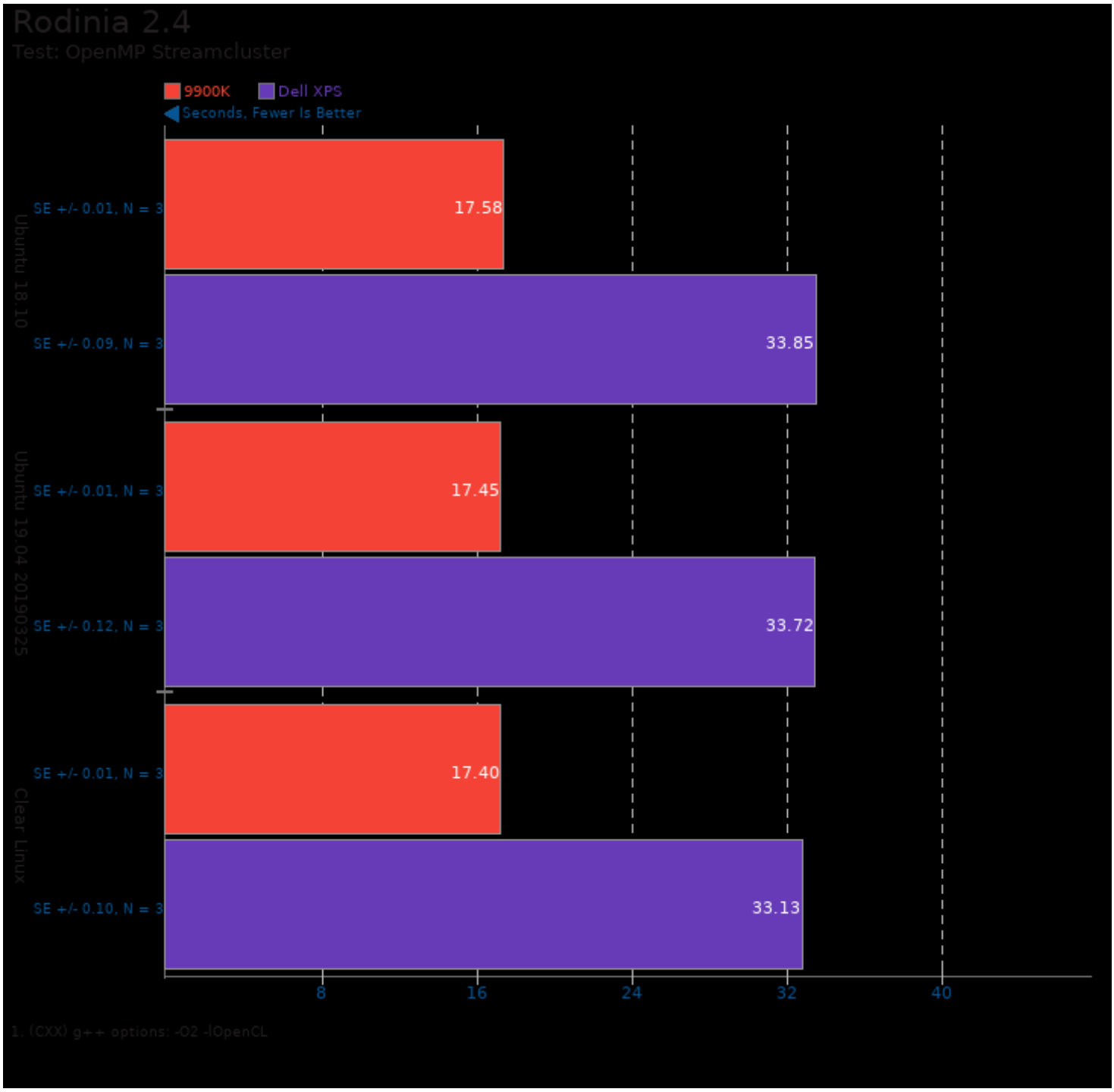

Parboil 2.5
Test: OpenMP CUTCP
9900K
Dell XPS
Seconds, Fewer Is Better
SE +/- 0.00, N = 3
3.50
SE +/- 0.10, N = 12
10.58
SE +/- 0.01, N = 3
3.48
SE +/- 0.11, N = 11
10.52
SE +/- 0.01, N = 3
3.51
SE +/- 0.10, N = 11
10.59
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
3
6
9
12
15
1. (CXX) g++ options: -lm -lpthread -lgomp -O3 -ffast-math -fopenmp

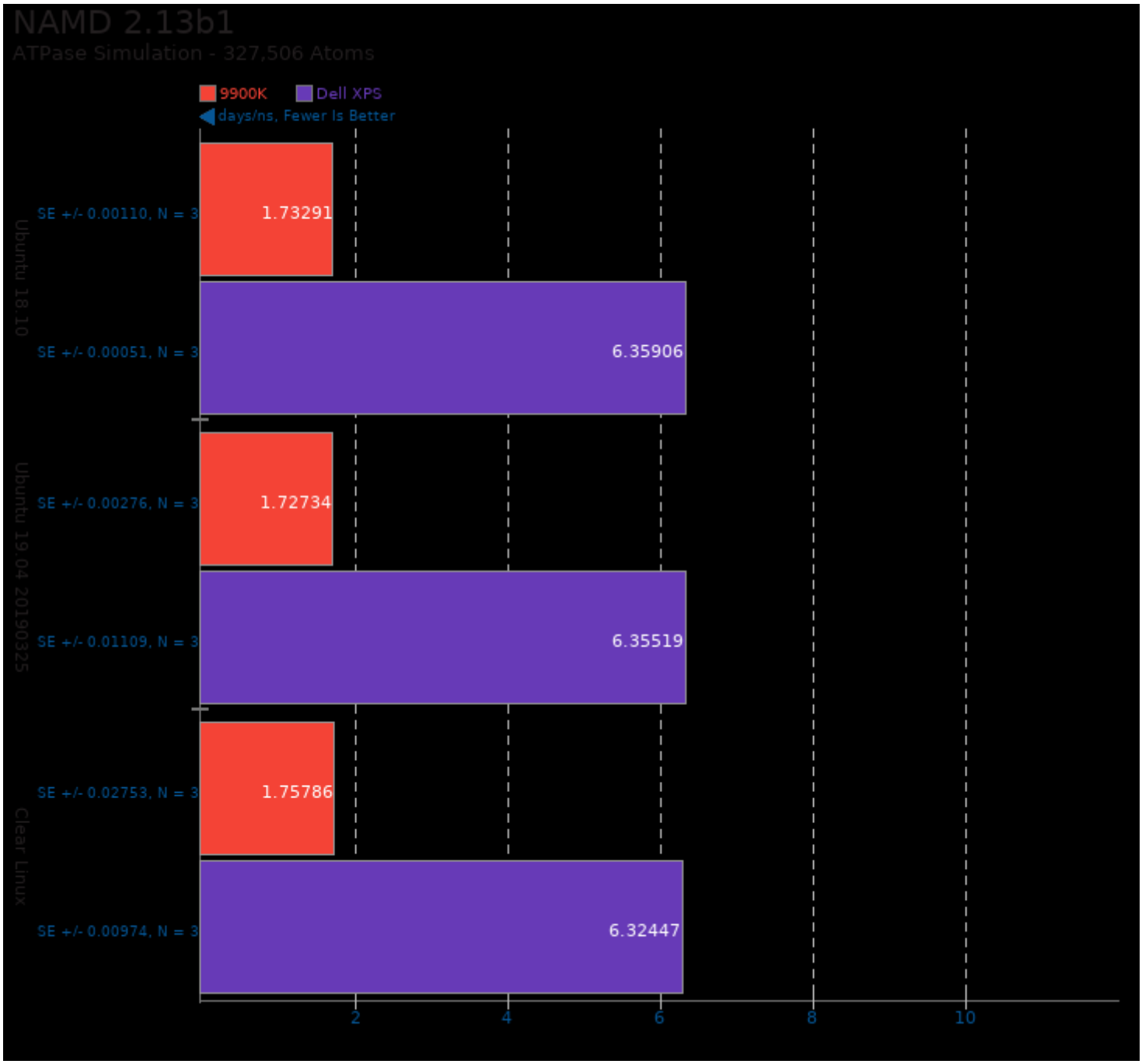

Parboil 2.5
Test: OpenMP Stencil
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.25, N = 3
18.44
SE +/- 0.51, N = 3
42.27
Ubuntu 19.04 20190325
SE +/- 0.19, N = 3
18.15
SE +/- 0.45, N = 3
41.90
Clear Linux
SE +/- 0.06, N = 3
22.83
SE +/- 0.04, N = 3
32.66
10
20
30
40
50
1. (CXX) g++ options: -lm -lpthread -lgomp -O3 -ffast-math -fopenmp

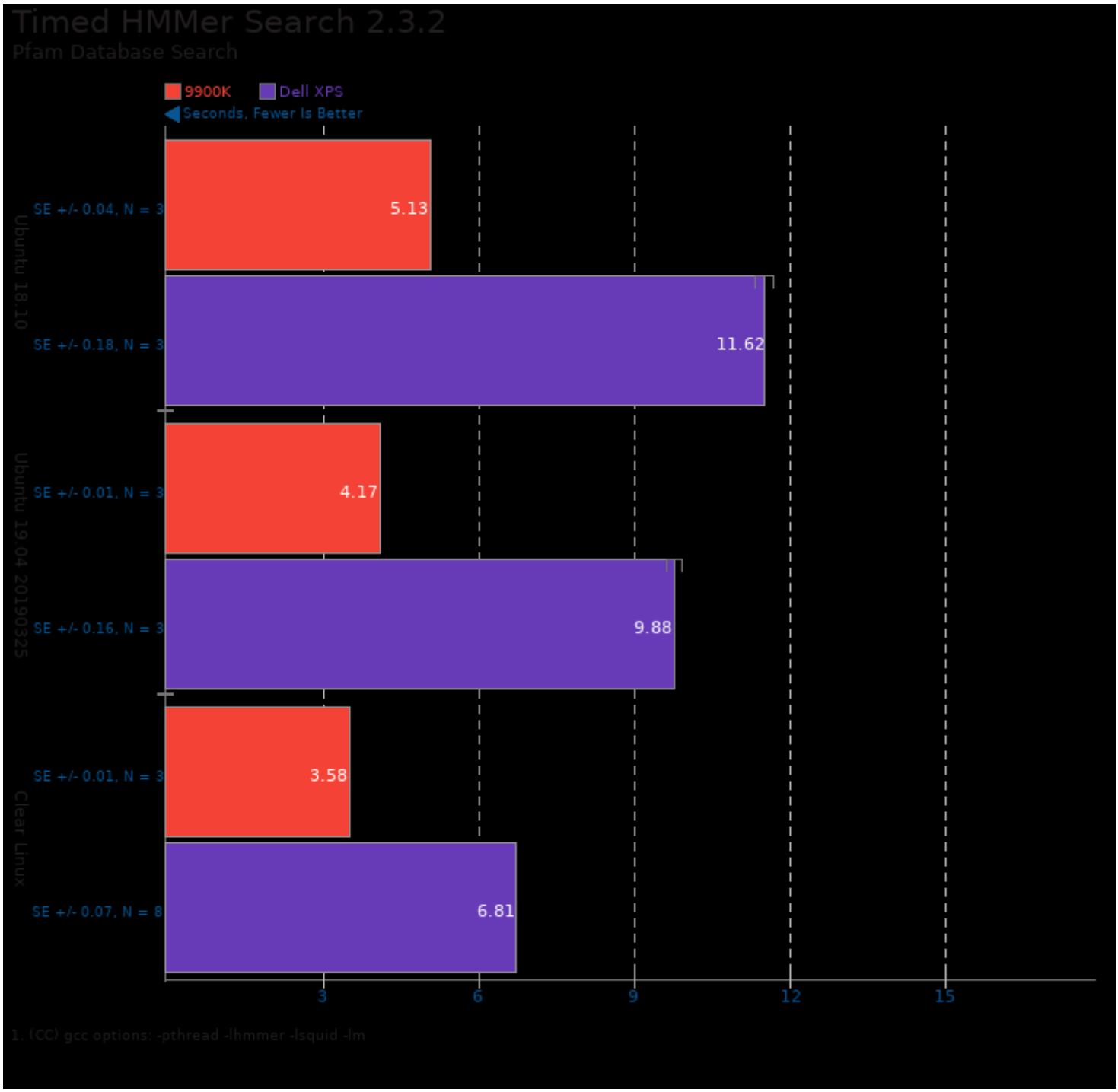

Parboil 2.5
Test: OpenMP MRI Gridding
9900K
Dell XPS
Seconds, Fewer Is Better
SE +/- 0.66, N = 12
48.93
Ubuntu 18.10
SE +/- 0.83, N = 12
44.66
SE +/- 0.52, N = 12
48.31
Ubuntu 19.04 20190325
SE +/- 0.45, N = 3
41.23
SE +/- 1.13, N = 12
55.71
Clear Linux
SE +/- 1.16, N = 12
51.79
13
26
39
52
65
1. (CXX) g++ options: -lm -lpthread -lgomp -O3 -ffast-math -fopenmp

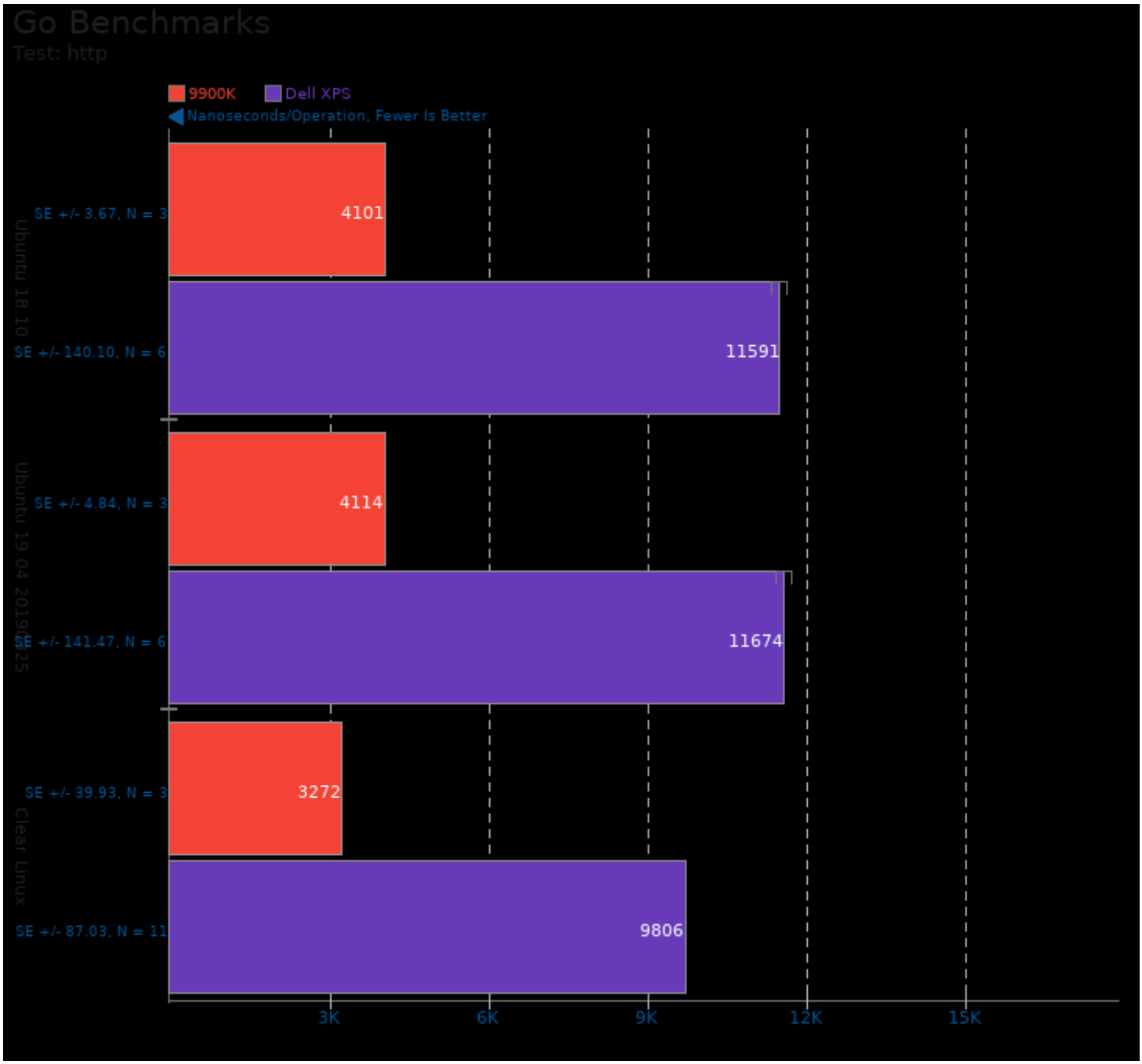

Rodinia 2.4
Test: OpenMP LavaMD
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.01, N = 3
44.80
SE +/- 0.43, N = 3
163.71
Ubuntu 19.04 20190325
SE +/- 0.08, N = 3
29.80
SE +/- 0.39, N = 3
106.49
Clear Linux
SE +/- 0.41, N = 3
27.87
SE +/- 0.37, N = 3
103.71
40
80
120
160
200
1. (CXX) g++ options: -O2 -lOpenCL

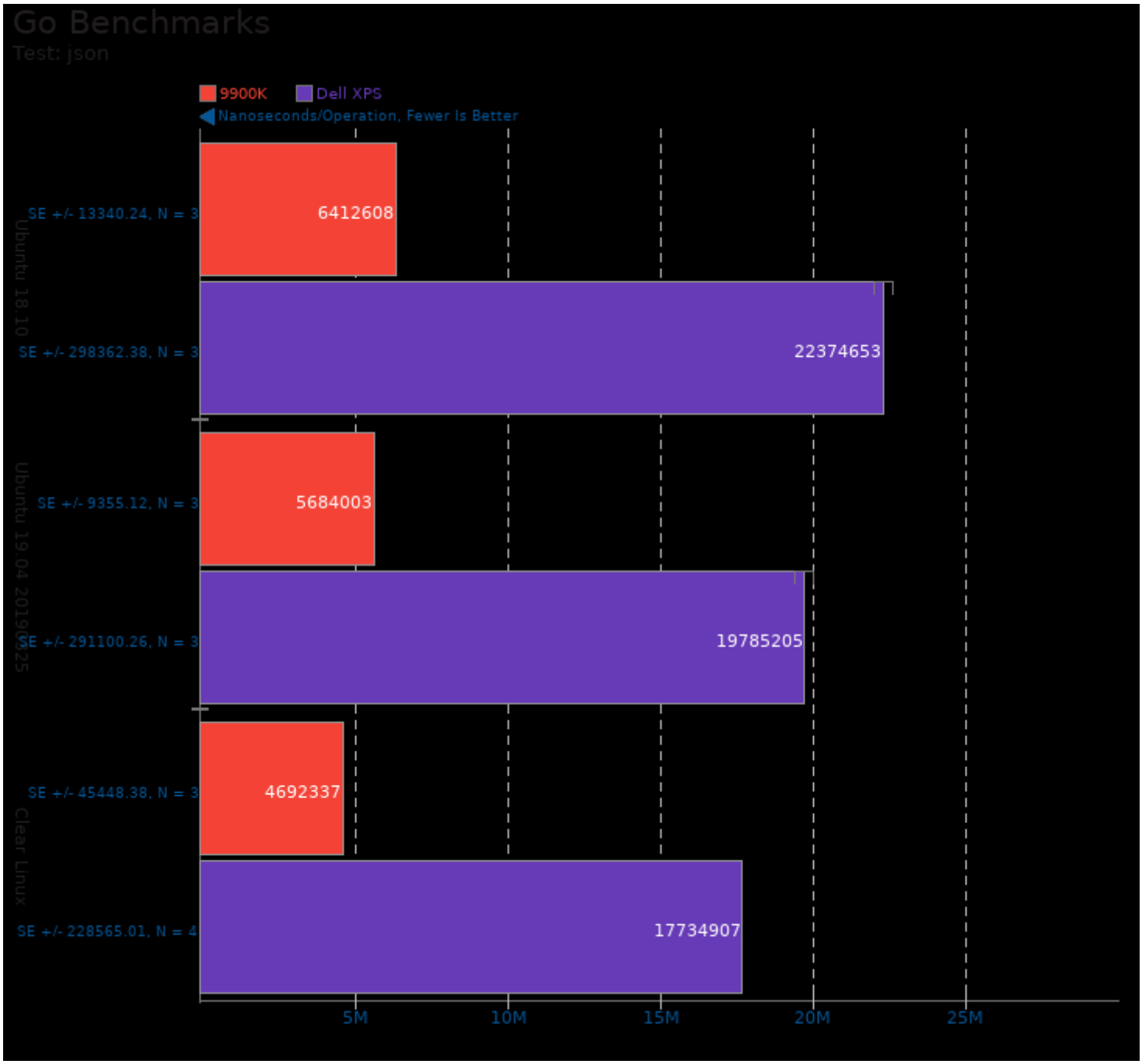

Rodinia 2.4
Test: OpenMP CFD Solver
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.04, N = 3
20.71
SE +/- 0.32, N = 3
61.56
Ubuntu 19.04 20190325
SE +/- 0.07, N = 3
20.40
SE +/- 0.21, N = 3
61.32
Clear Linux
SE +/- 0.08, N = 3
21.41
SE +/- 0.46, N = 3
65.56
15
30
45
60
75
1. (CXX) g++ options: -O2 -lOpenCL

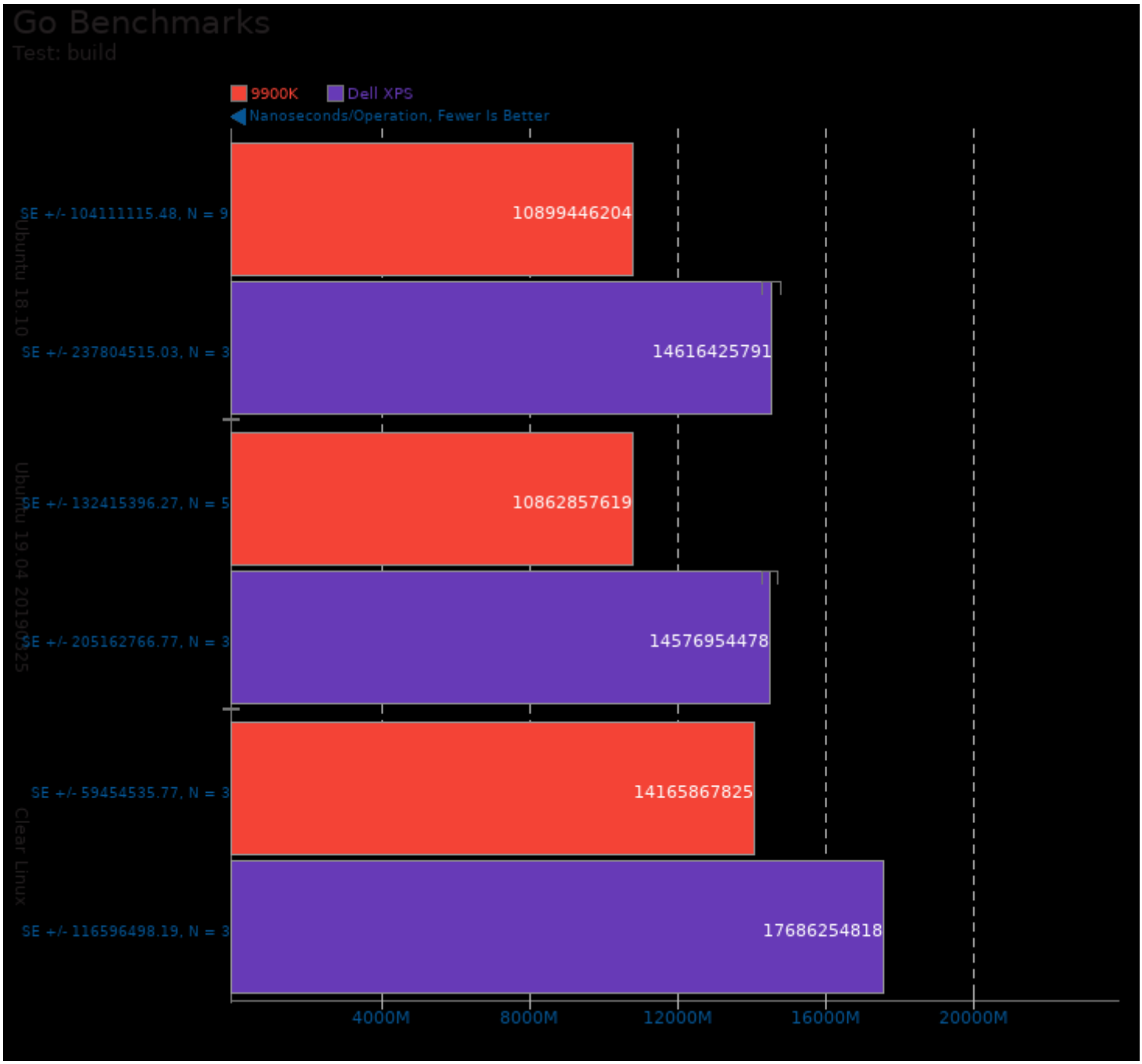

Rodinia 2.4
Test: OpenMP Streamcluster
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.01, N = 3
17.58
SE +/- 0.09, N = 3
33.85
Ubuntu 19.04 20190325
SE +/- 0.01, N = 3
17.45
SE +/- 0.12, N = 3
33.72
Clear Linux
SE +/- 0.01, N = 3
17.40
SE +/- 0.10, N = 3
33.13
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL

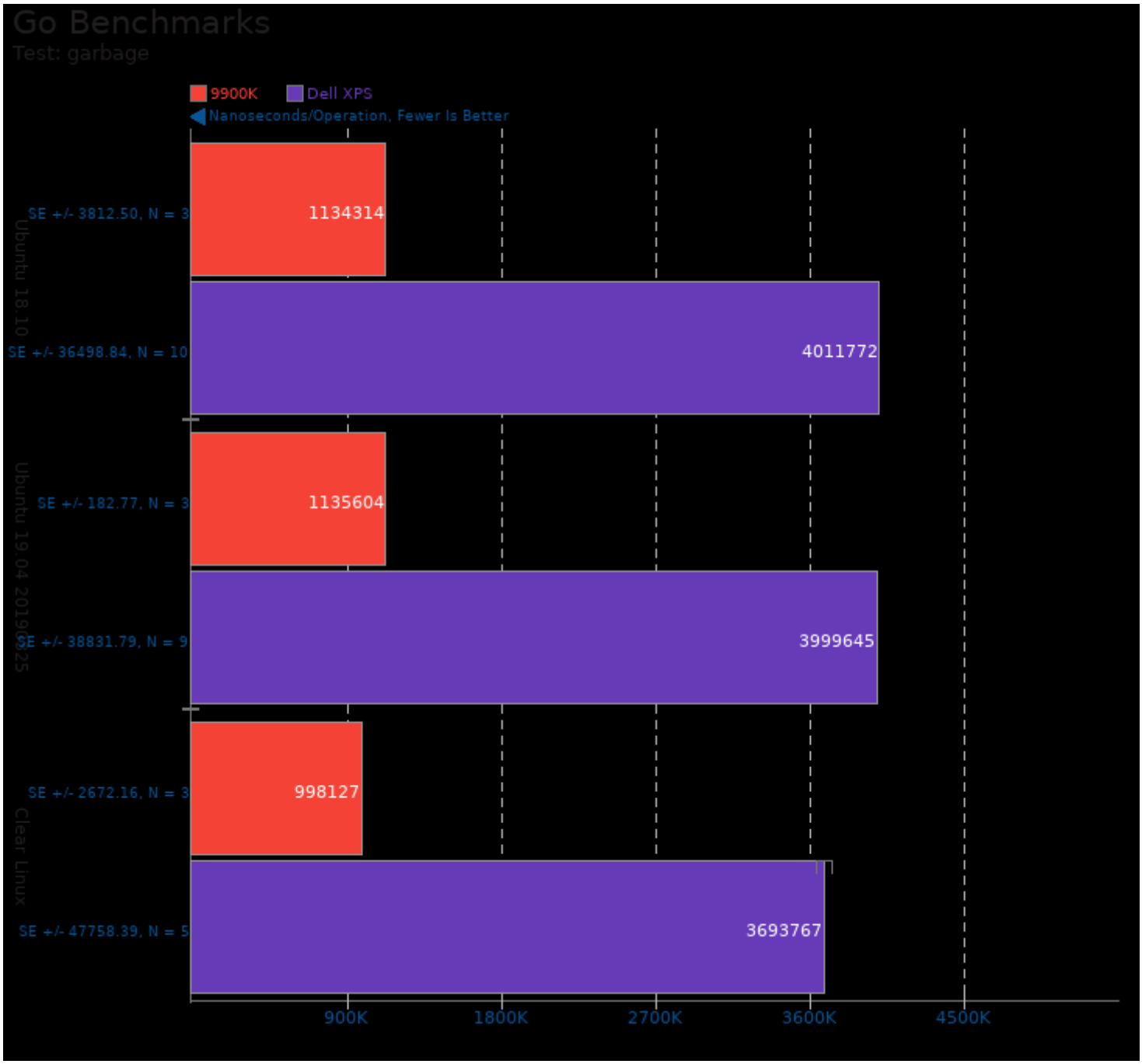

NAMD 2.13b1
ATPase Simulation - 327,506 Atoms
9900K
Dell XPS
days/ns, Fewer Is Better
Ubuntu 18.10
SE +/- 0.00110, N = 3
1.73291
SE +/- 0.00051, N = 3
6.35906
Ubuntu 19.04 20190325
SE +/- 0.00276, N = 3
1.72734
SE +/- 0.01109, N = 3
6.35519
Clear Linux
SE +/- 0.02753, N = 3
1.75786
SE +/- 0.00974, N = 3
6.32447
2
4
6
8
10

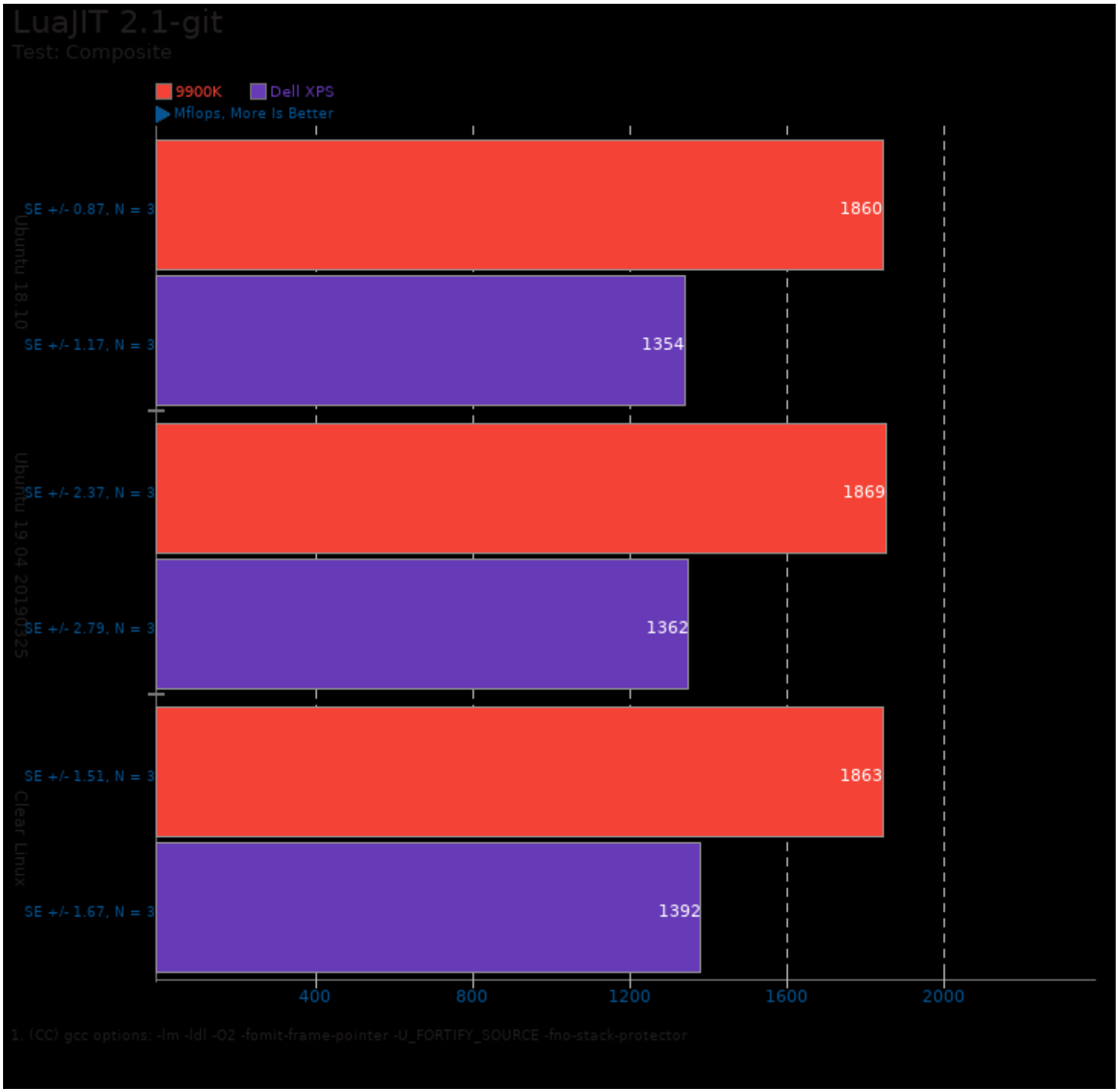

Timed HMMer Search 2.3.2
Pfam Database Search
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.04, N = 3
5.13
SE +/- 0.18, N = 3
11.62
Ubuntu 19.04 20190325
SE +/- 0.01, N = 3
4.17
SE +/- 0.16, N = 3
9.88
Clear Linux
SE +/- 0.01, N = 3
3.58
SE +/- 0.07, N = 8
6.81
3
6
9
12
15
1. (CC) gcc options: -pthread -lhmmer -lsquid -lm

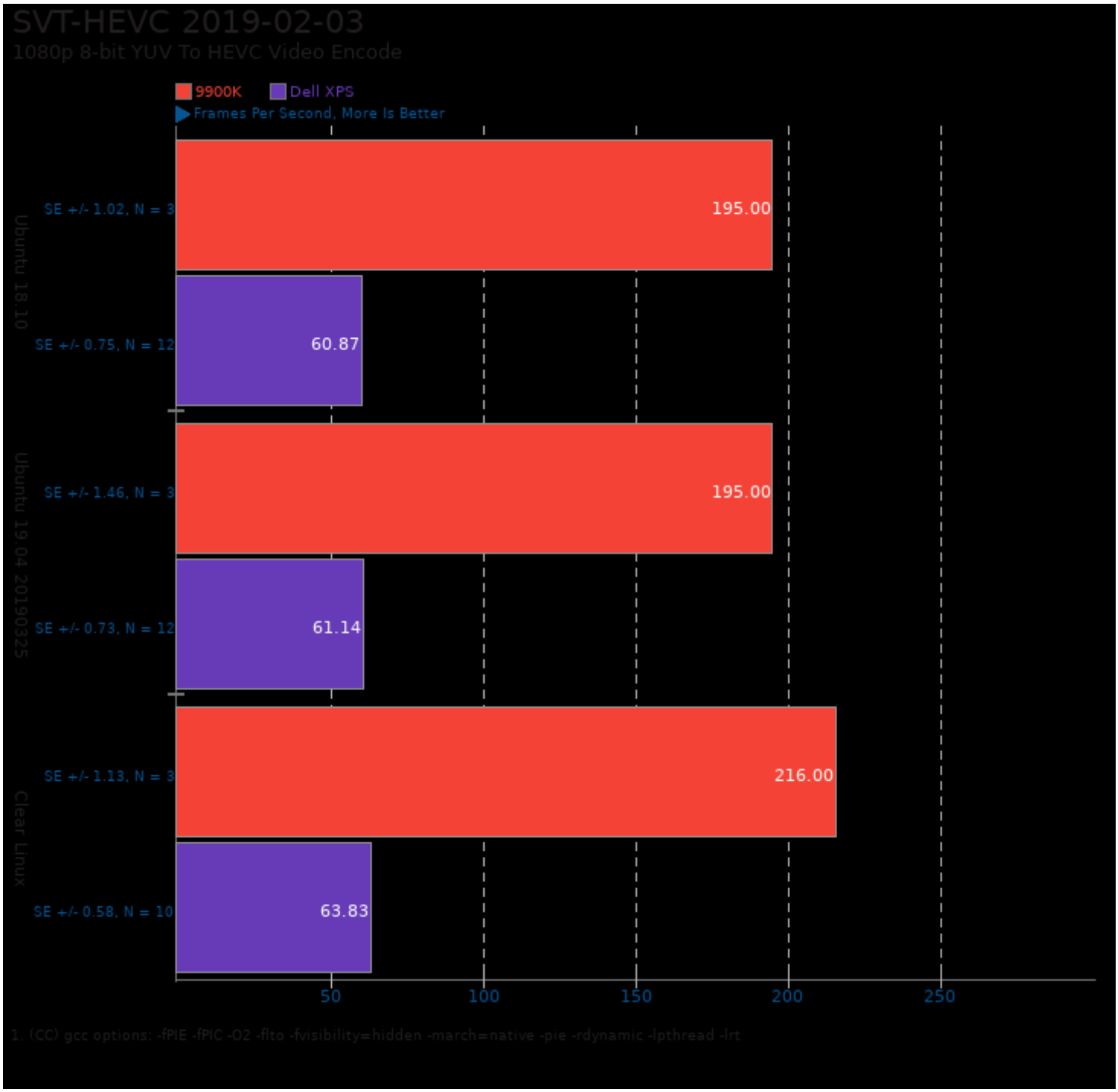

Go Benchmarks
Test: http
9900K
Dell XPS
Nanoseconds/Operation, Fewer Is Better
SE +/- 3.67, N = 3
4101
Ubuntu 18.10
SE +/- 140.10, N = 6
11591
SE +/- 4.84, N = 3
4114
Ubuntu 19.04 20190425
SE +/- 141.47, N = 6
11674
SE +/- 39.93, N = 3
3272
Clear Linux
SE +/- 87.03, N = 11
9806
3K
6K
9K
12K
15K

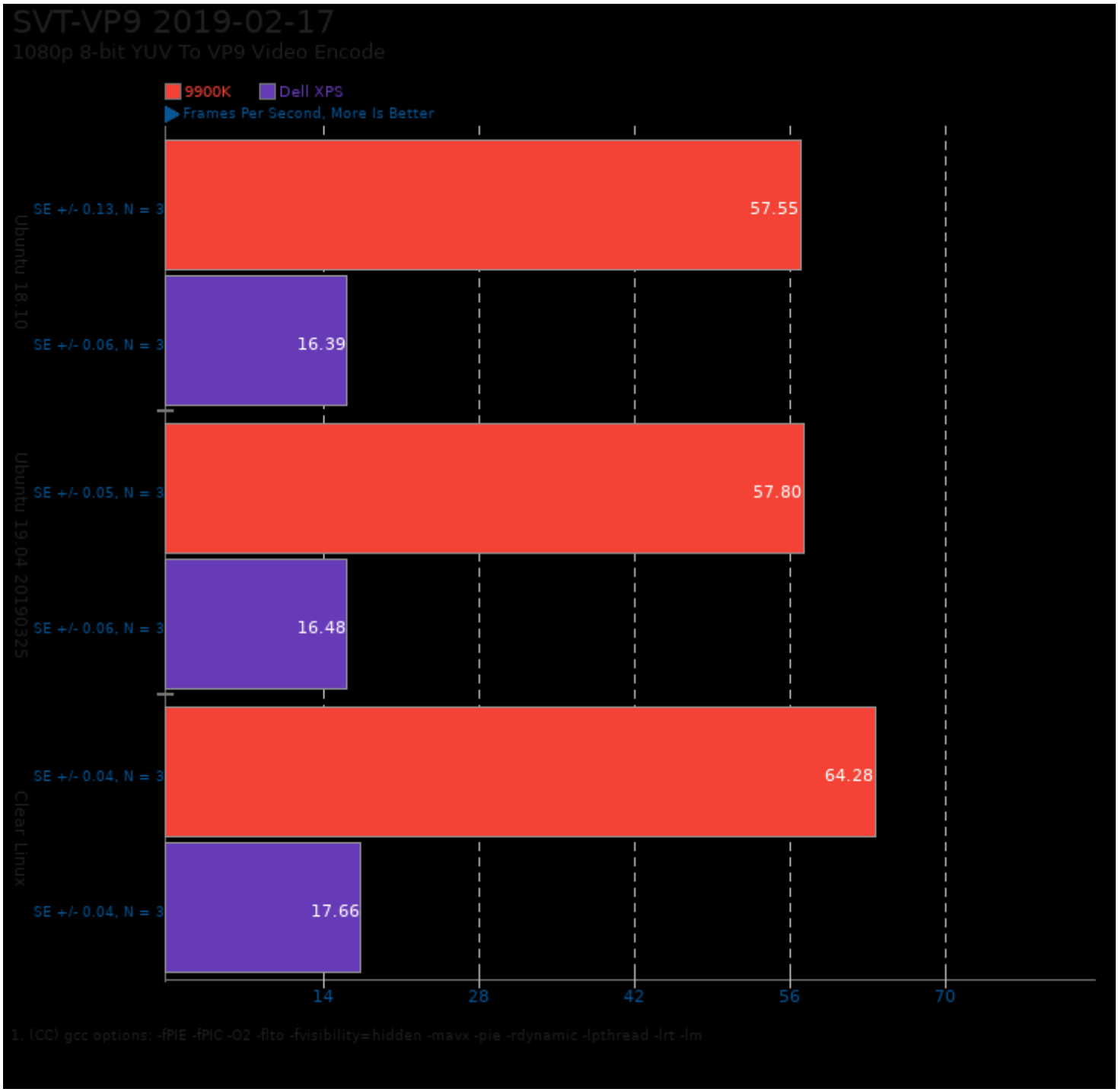

Go Benchmarks
Test: json
9900K
Dell XPS
Nanoseconds/Operation, Fewer Is Better
SE +/- 13340.24, N = 3
6412608
Ubuntu 18.10
SE +/- 298362.38, N = 3
22374653
SE +/- 9355.12, N = 3
5684003
Ubuntu 19.04 20190425
SE +/- 291100.26, N = 3
19785205
SE +/- 45448.38, N = 3
4692337
Clear Linux
SE +/- 228565.01, N = 4
17734907
5M
10M
15M
20M
25M

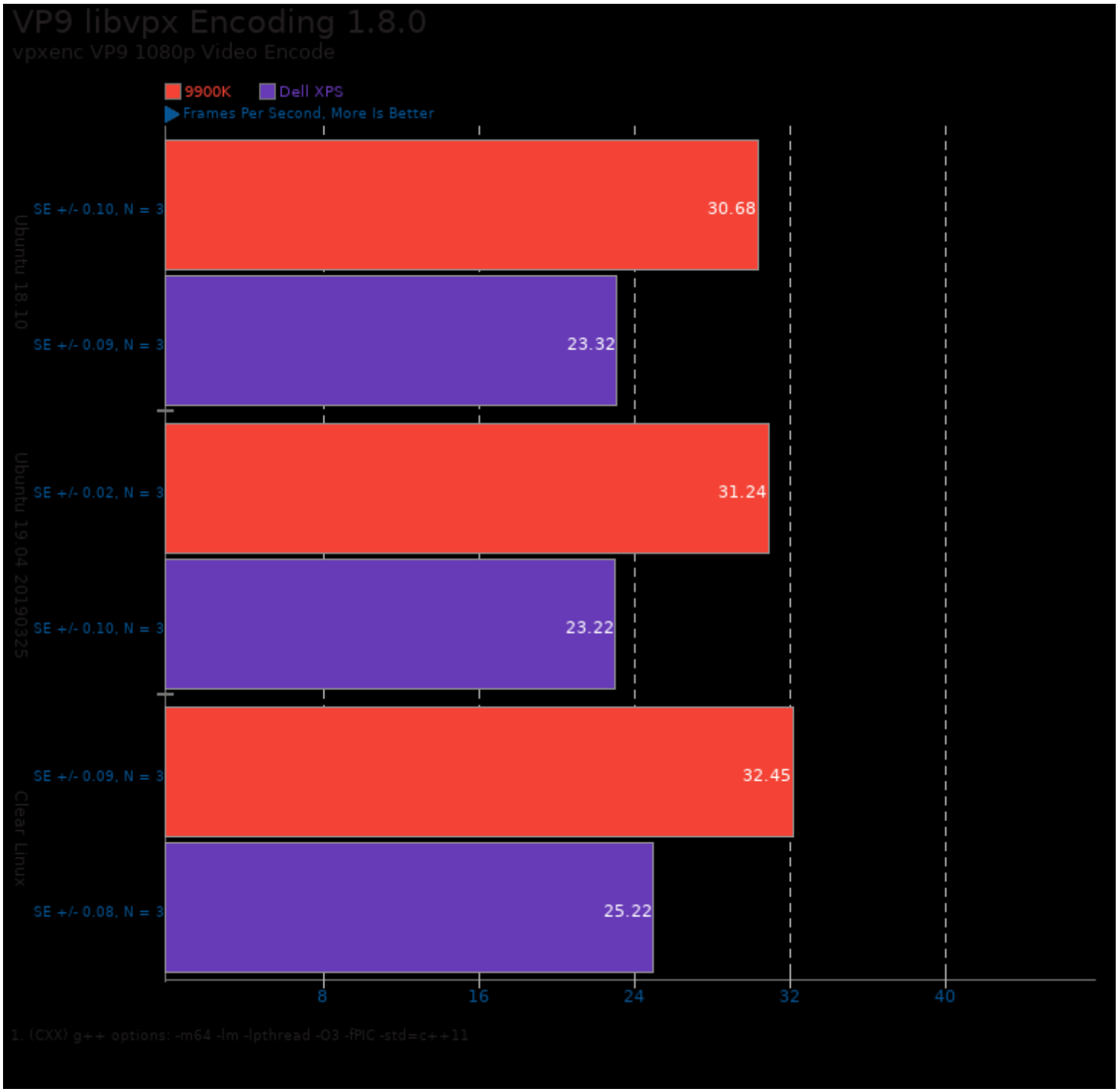

Go Benchmarks
Test: build
9900K
Dell XPS
Nanoseconds/Operation, Fewer Is Better
SE +/- 104111115.48, N = 9
10899446204
Ubuntu 18.10
SE +/- 237804515.03, N = 3
14616425791
SE +/- 132415396.27, N = 5
10862857619
Ubuntu 19.04 20190525
SE +/- 205162766.77, N = 3
14576954478
SE +/- 59454535.77, N = 3
14165867825
Clear Linux
SE +/- 116596498.19, N = 3
17686254818
4000M
8000M
12000M
16000M
20000M

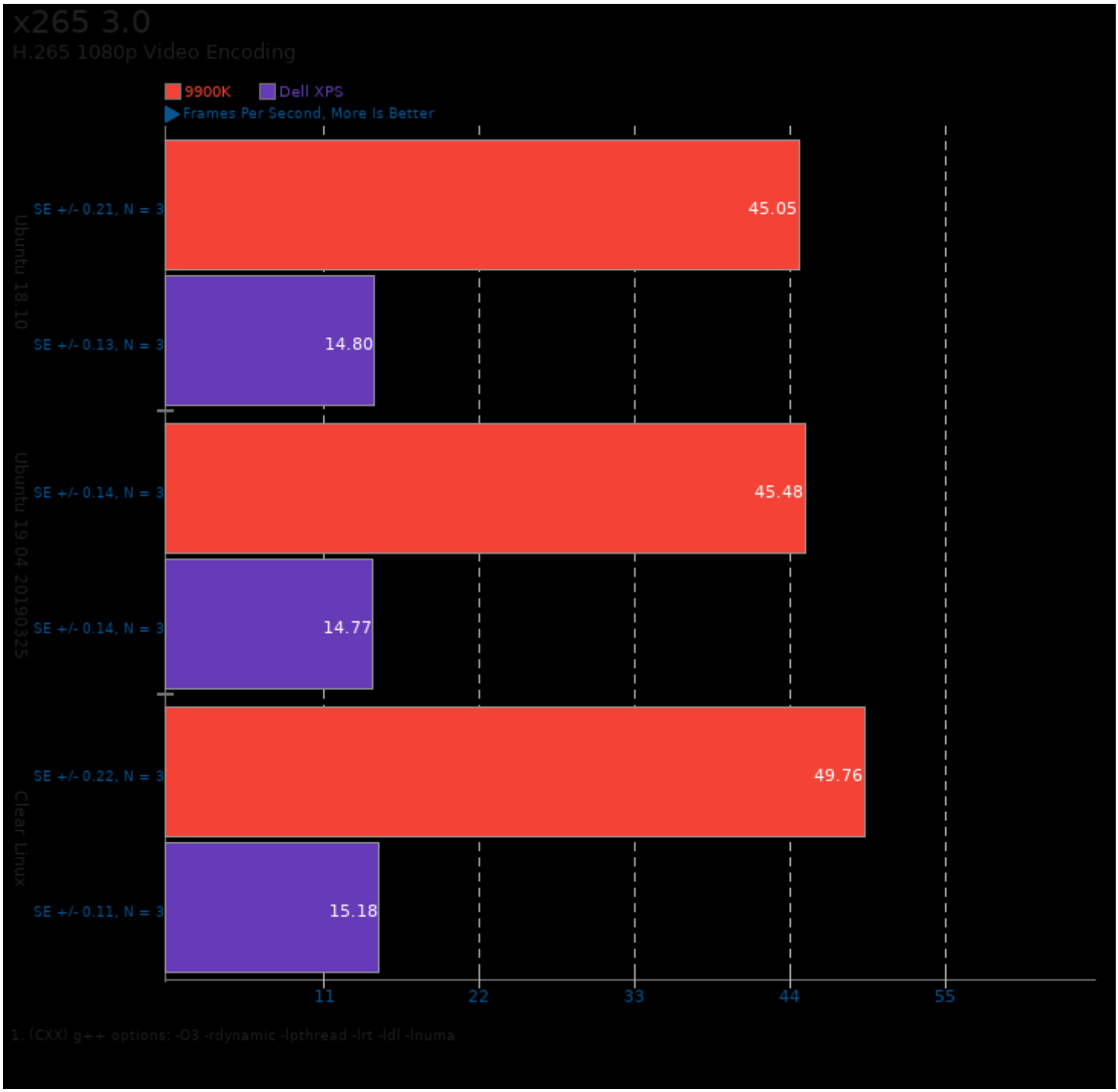

Go Benchmarks
Test: garbage
9900K
Dell XPS
Nanoseconds/Operation, Fewer Is Better
SE +/- 3812.50, N = 3
1134314
Ubuntu 18.10
SE +/- 36498.84, N = 10
4011772
SE +/- 182.77, N = 3
1135604
Ubuntu 19.04 20190425
SE +/- 38831.79, N = 9
3999645
SE +/- 2672.16, N = 3
998127
Clear Linux
SE +/- 47758.39, N = 5
3693767
900K
1800K
2700K
3600K
4500K

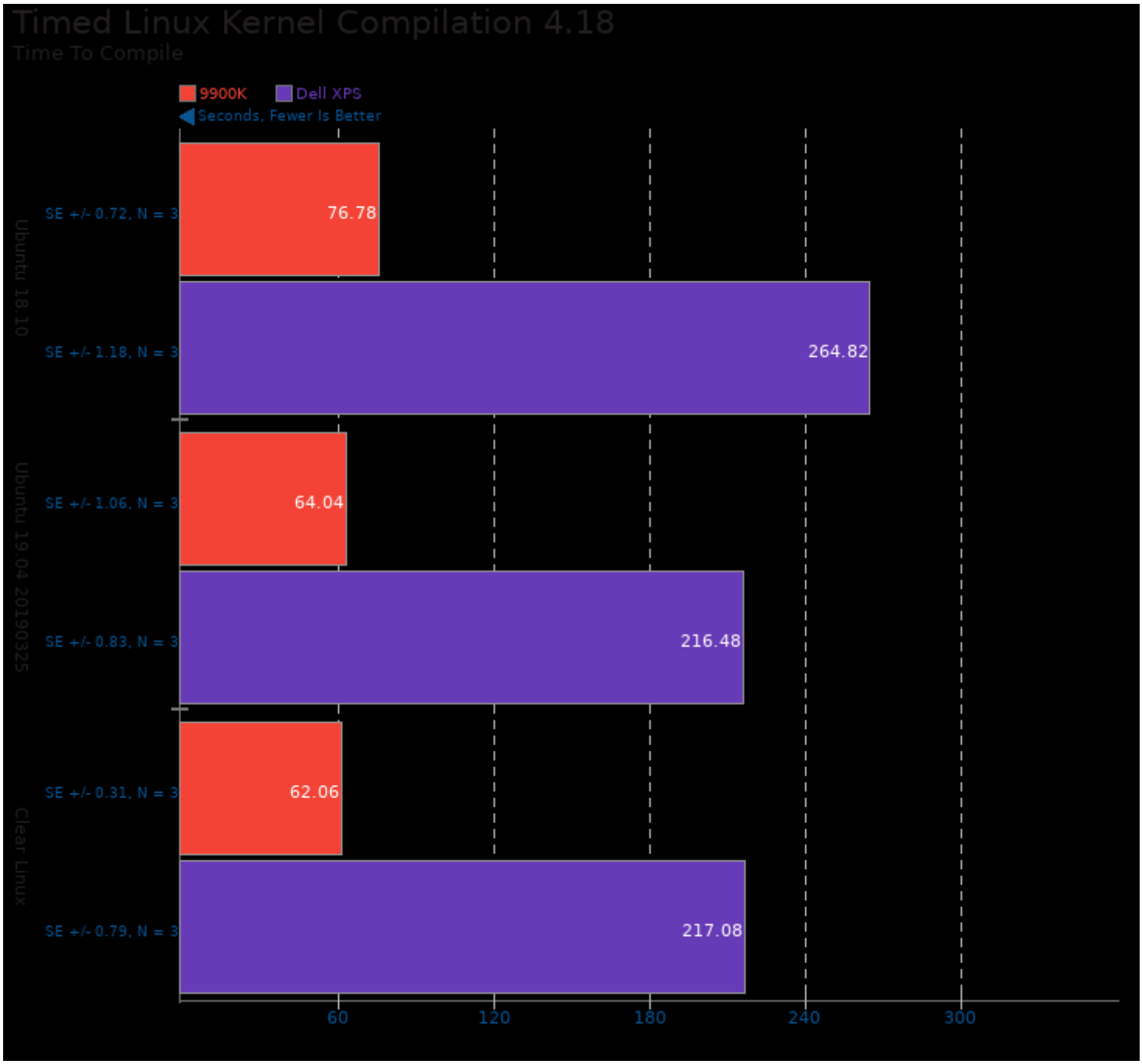

LuaJIT 2.1-git
Test: Composite
9900K
Dell XPS
Mflops, More Is Better
Ubuntu 18.10
SE +/- 0.87, N = 3
1860
SE +/- 1.17, N = 3
1354
Ubuntu 19.04 20190325
SE +/- 2.37, N = 3
1869
SE +/- 2.79, N = 3
1362
Clear Linux
SE +/- 1.51, N = 3
1863
SE +/- 1.67, N = 3
1392
400
800
1200
1600
2000
1. (CC) gcc options: -lm -ldl -O2 -fomit-frame-pointer -U_FORTIFY_SOURCE -fno-stack-protector

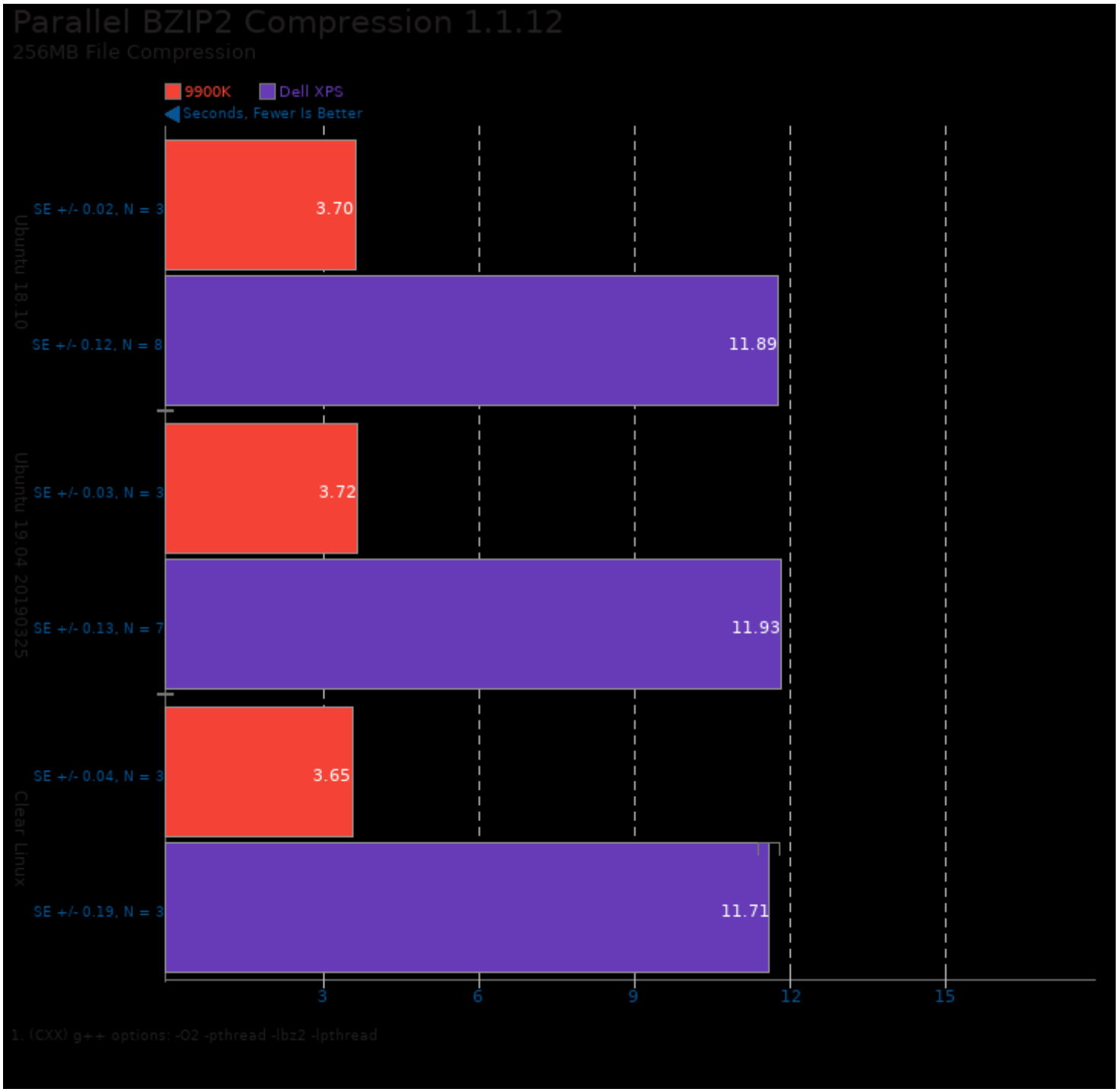

SVT-HEVC 2019-02-03
1080p 8-bit YUV To HEVC Video Encode
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
SE +/- 1.02, N = 3
195.00
SE +/- 0.75, N = 12
60.87
Ubuntu 19.04 20190325
SE +/- 1.46, N = 3
195.00
SE +/- 0.73, N = 12
61.14
Clear Linux
SE +/- 1.13, N = 3
216.00
SE +/- 0.58, N = 10
63.83
50
100
150
200
250
1. (CC) gcc options: -fPIE -fPIC -O2 -flto -fvisibility=hidden -march=native -pie -rdynamic -lpthread -lrt

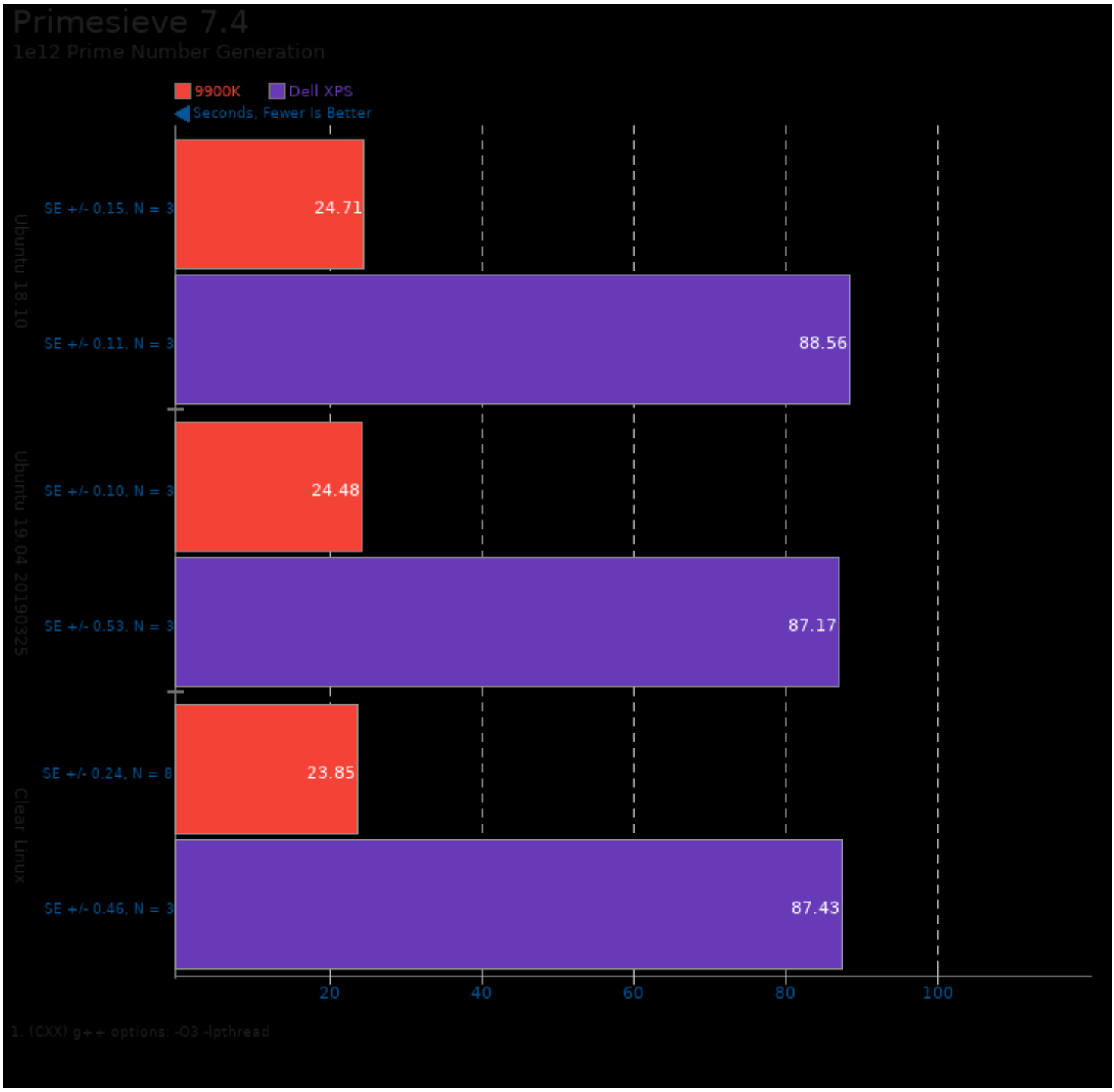

SVT-VP9 2019-02-17
1080p 8-bit YUV To VP9 Video Encode
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
SE +/- 0.13, N = 3
57.55
SE +/- 0.06, N = 3
16.39
Ubuntu 19.04 20190325
SE +/- 0.05, N = 3
57.80
SE +/- 0.06, N = 3
16.48
Clear Linux
SE +/- 0.04, N = 3
64.28
SE +/- 0.04, N = 3
17.66
14
28
42
56
70
1. (CC) gcc options: -fPIE -fPIC -O2 -flto -fvisibility=hidden -mavx -pie -rdynamic -lpthread -lrt -lm

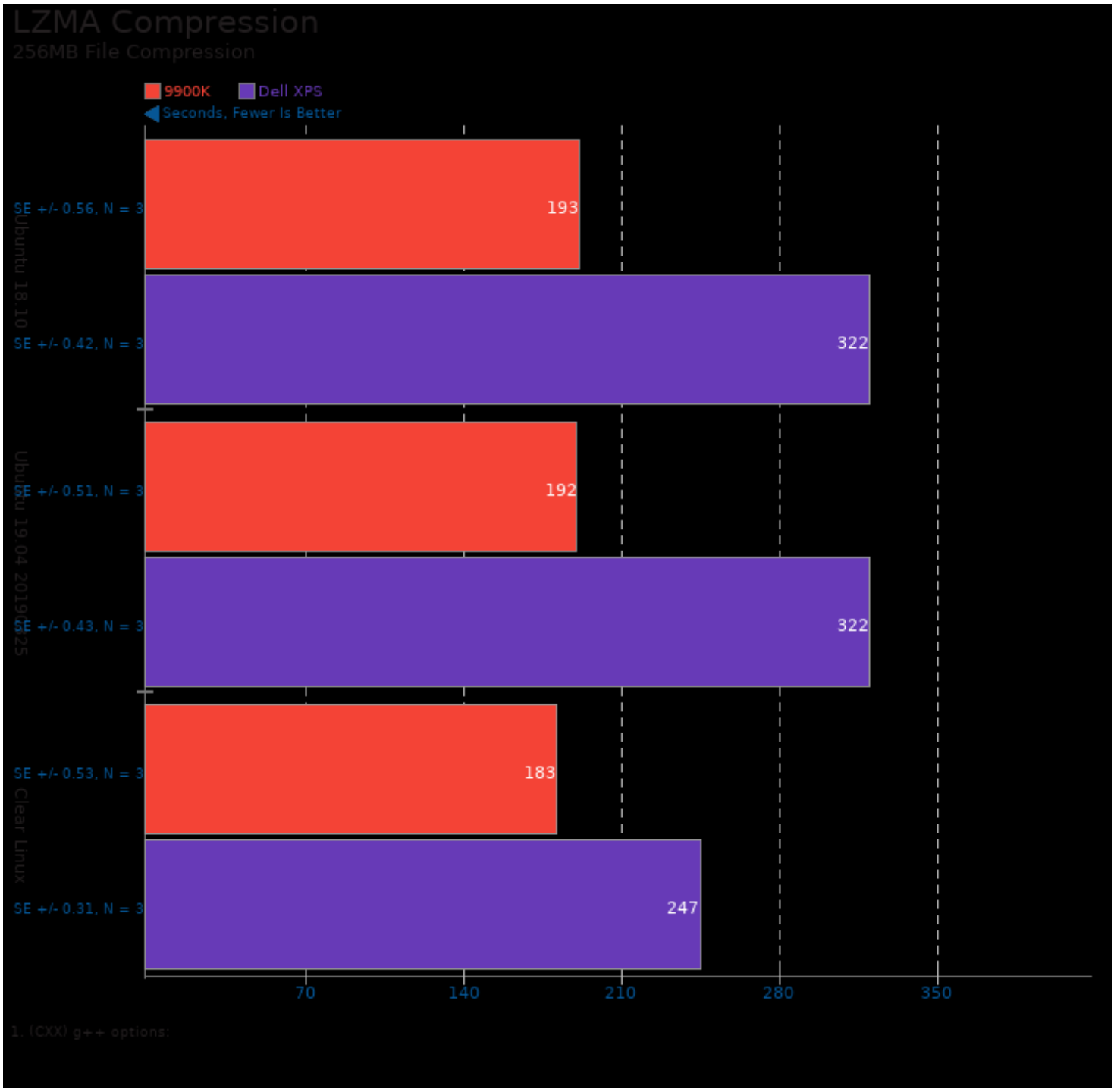

VP9 libvpx Encoding 1.8.0
vpxenc VP9 1080p Video Encode
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
SE +/- 0.10, N = 3
30.68
SE +/- 0.09, N = 3
23.32
Ubuntu 19.04 20190325
SE +/- 0.02, N = 3
31.24
SE +/- 0.10, N = 3
23.22
Clear Linux
SE +/- 0.09, N = 3
32.45
SE +/- 0.08, N = 3
25.22
8
16
24
32
40
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -std=c++11

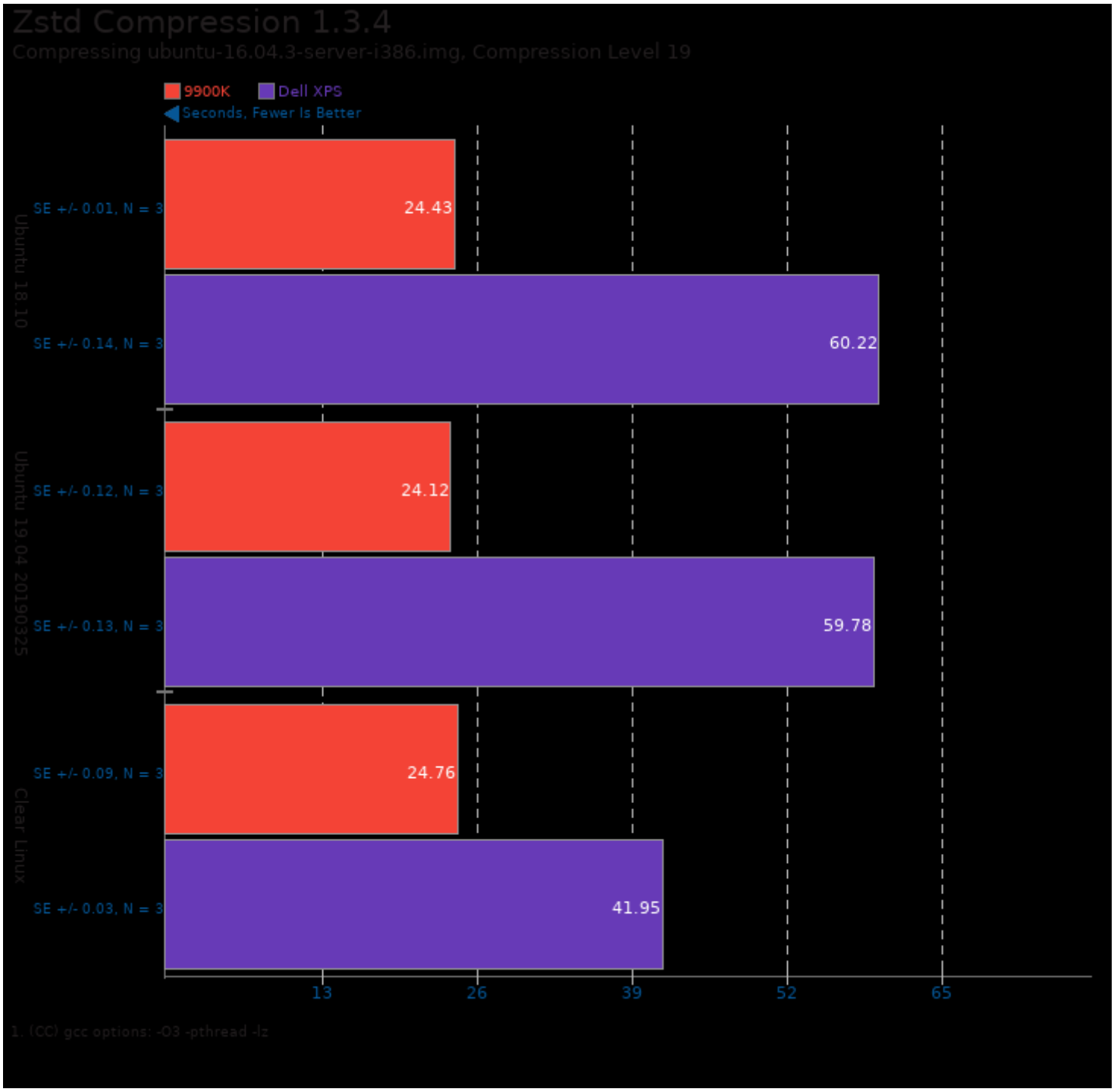

x265 3.0
H.265 1080p Video Encoding
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
SE +/- 0.21, N = 3
45.05
SE +/- 0.13, N = 3
14.80
Ubuntu 19.04 20190325
SE +/- 0.14, N = 3
45.48
SE +/- 0.14, N = 3
14.77
Clear Linux
SE +/- 0.22, N = 3
49.76
SE +/- 0.11, N = 3
15.18
11
22
33
44
55
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

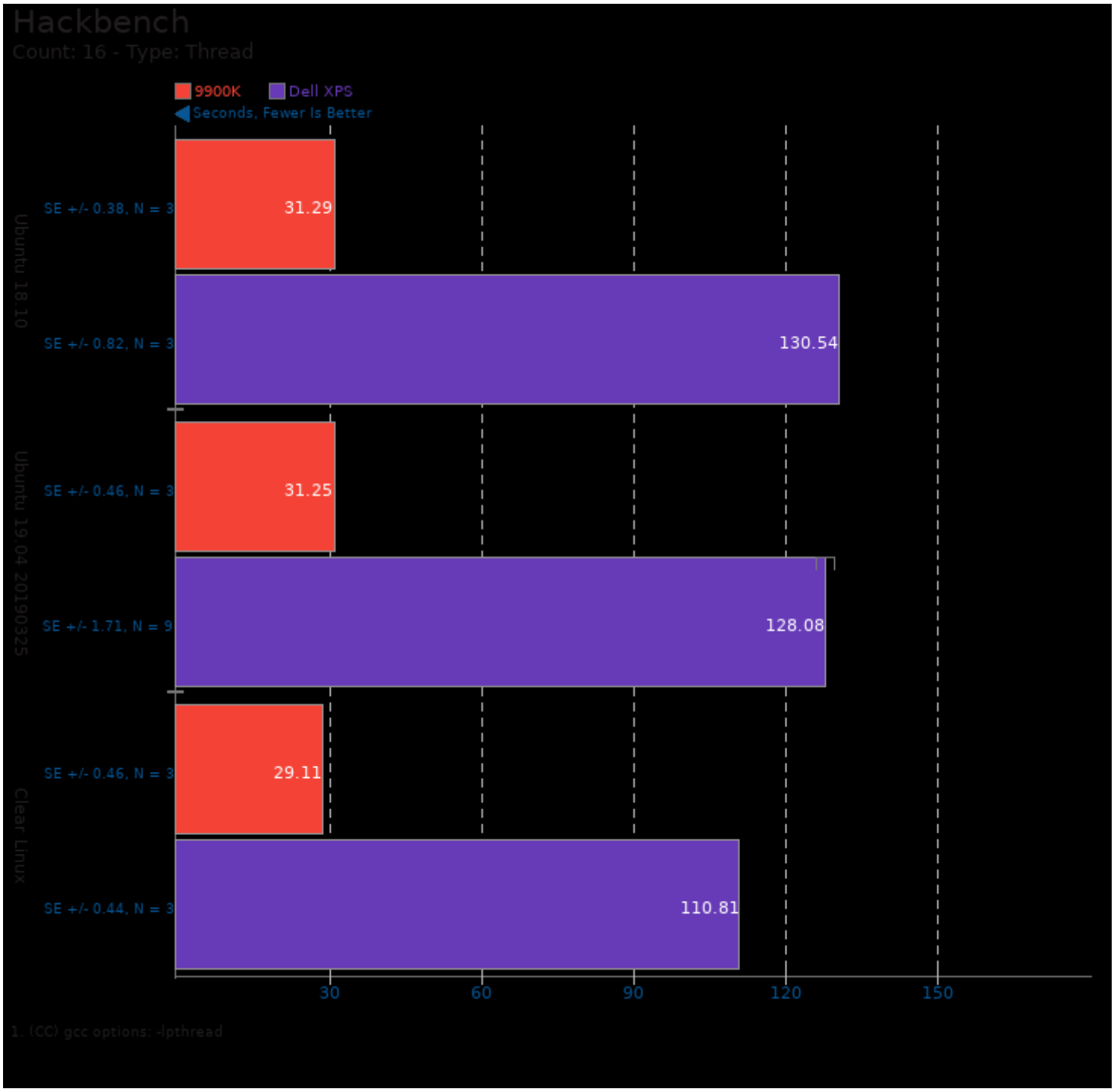

Timed Linux Kernel Compilation 4.18
Time To Compile
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.72, N = 3
76.78
SE +/- 1.18, N = 3
264.82
Ubuntu 19.04 20190325
SE +/- 1.06, N = 3
64.04
SE +/- 0.83, N = 3
216.48
Clear Linux
SE +/- 0.31, N = 3
62.06
SE +/- 0.79, N = 3
217.08
60
120
180
240
300

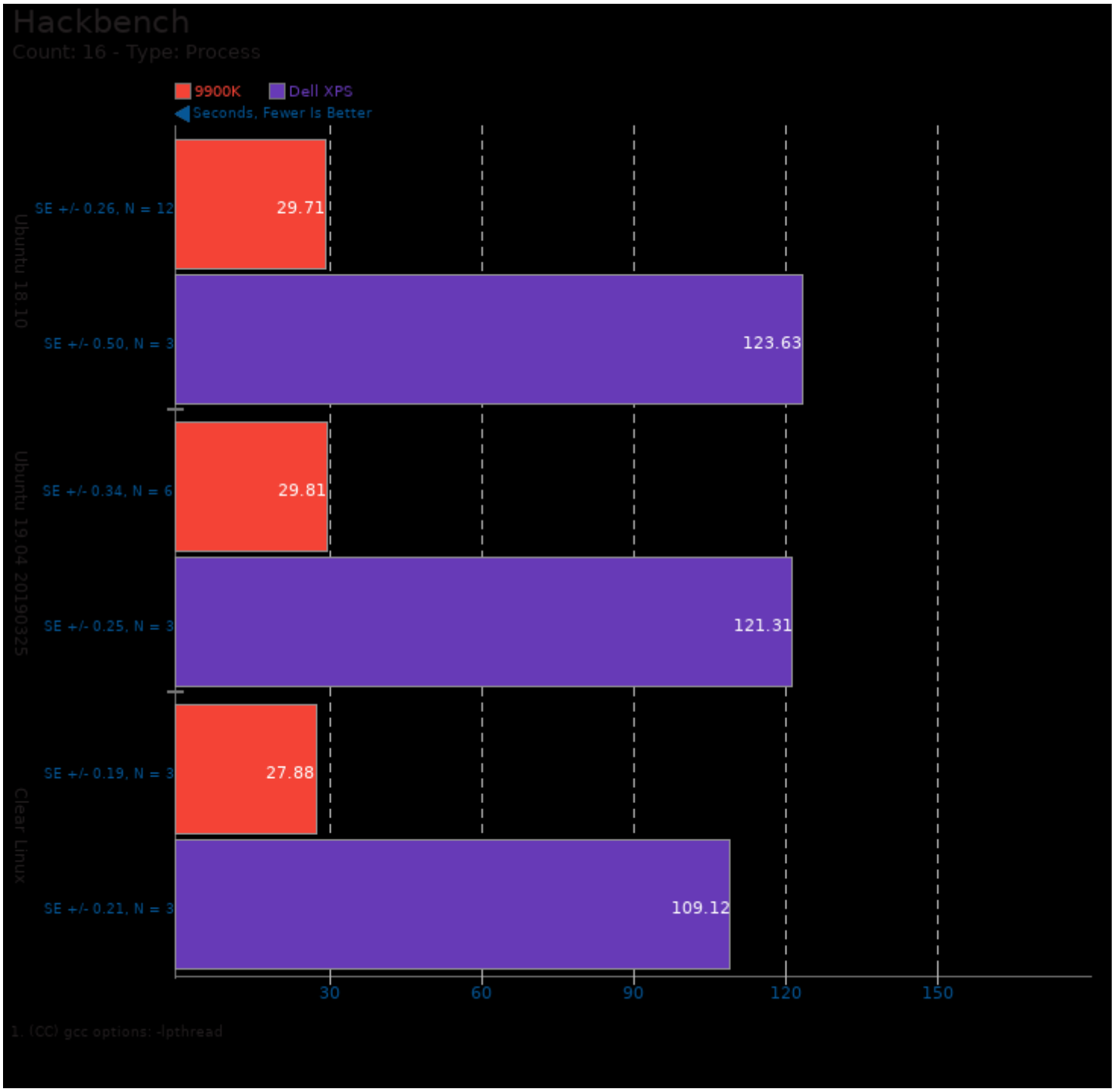

Parallel BZIP2 Compression 1.1.12
256MB File Compression
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.02, N = 3
3.70
SE +/- 0.12, N = 8
11.89
Ubuntu 19.04 20190325
SE +/- 0.03, N = 3
3.72
SE +/- 0.13, N = 7
11.93
Clear Linux
SE +/- 0.04, N = 3
3.65
SE +/- 0.19, N = 3
11.71
3
6
9
12
15
1. (CXX) g++ options: -O2 -pthread -lbz2 -lpthread

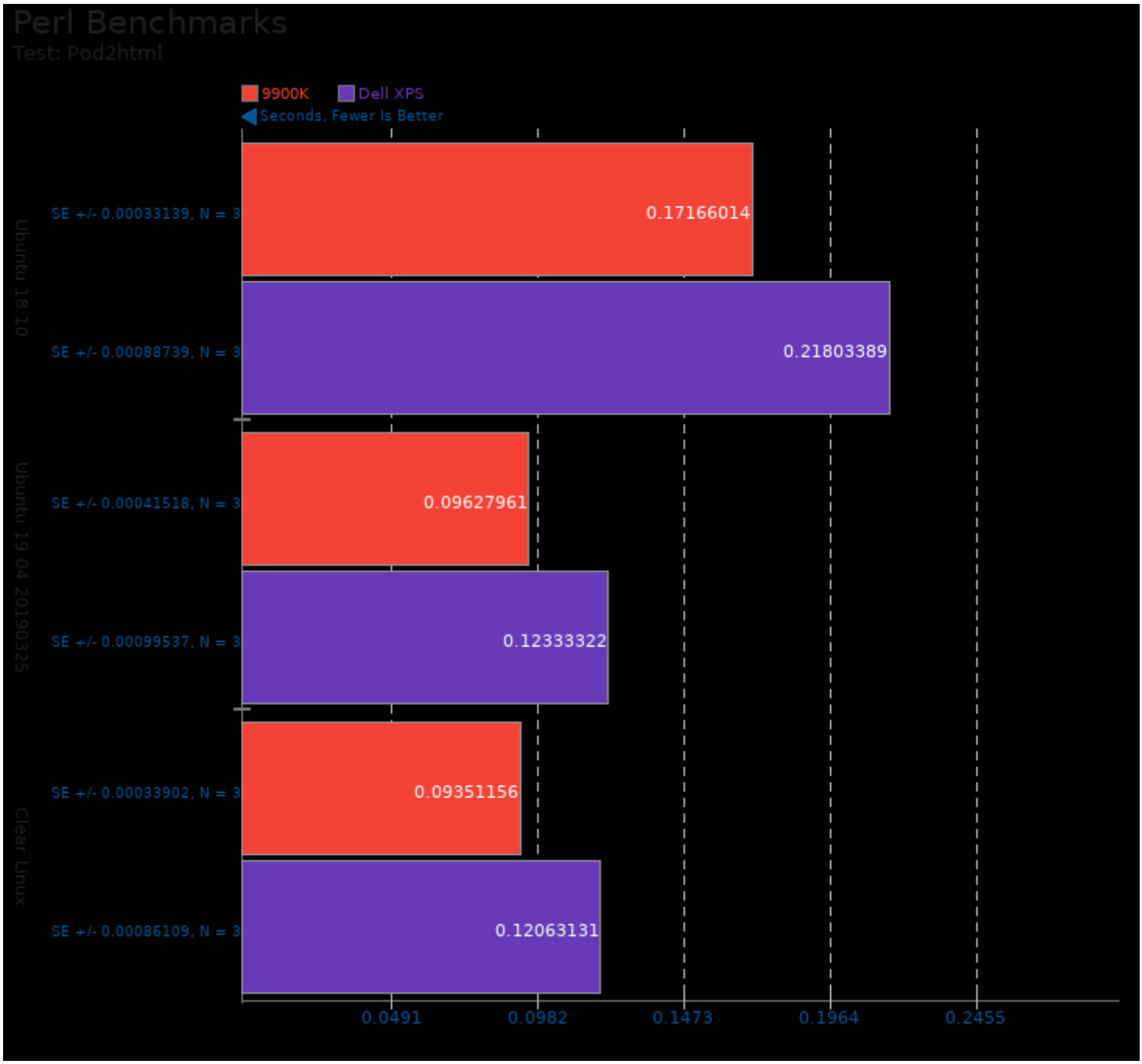

Primesieve 7.4
1e12 Prime Number Generation
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.15, N = 3
24.71
SE +/- 0.11, N = 3
88.56
Ubuntu 19.04 20190325
SE +/- 0.10, N = 3
24.48
SE +/- 0.53, N = 3
87.17
Clear Linux
SE +/- 0.24, N = 8
23.85
SE +/- 0.46, N = 3
87.43
20
40
60
80
100
1. (CXX) g++ options: -O3 -lpthread

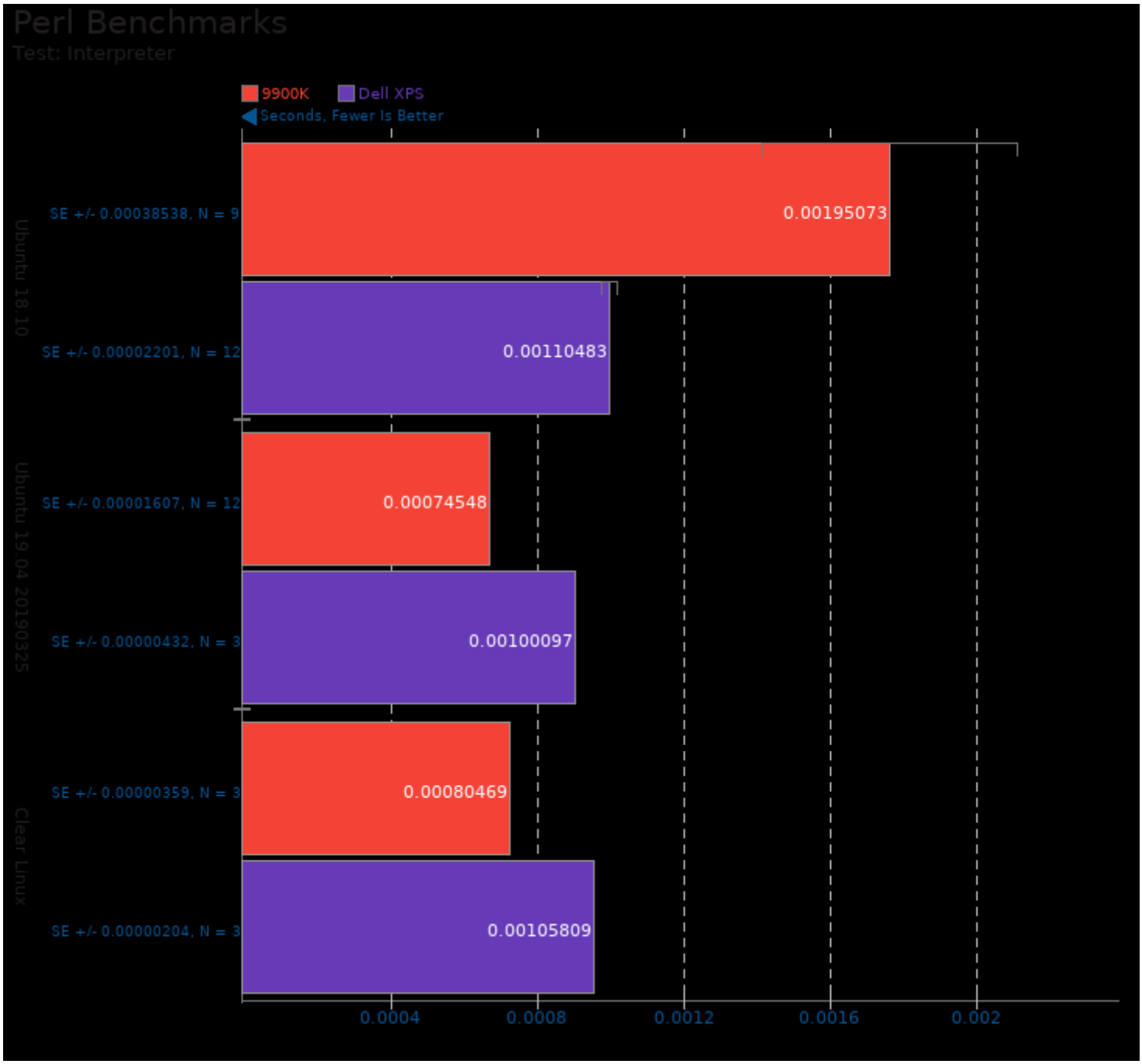

LZMA Compression
256MB File Compression
9900K
Dell XPS
Seconds, Fewer Is Better
SE +/- 0.56, N = 3
193
Ubuntu 18.10
SE +/- 0.42, N = 3
322
SE +/- 0.51, N = 3
192
Ubuntu 19.04 20190425
SE +/- 0.43, N = 3
322
SE +/- 0.53, N = 3
183
Clear Linux
SE +/- 0.31, N = 3
247
70
140
210
280
350
1. (CXX) g++ options:

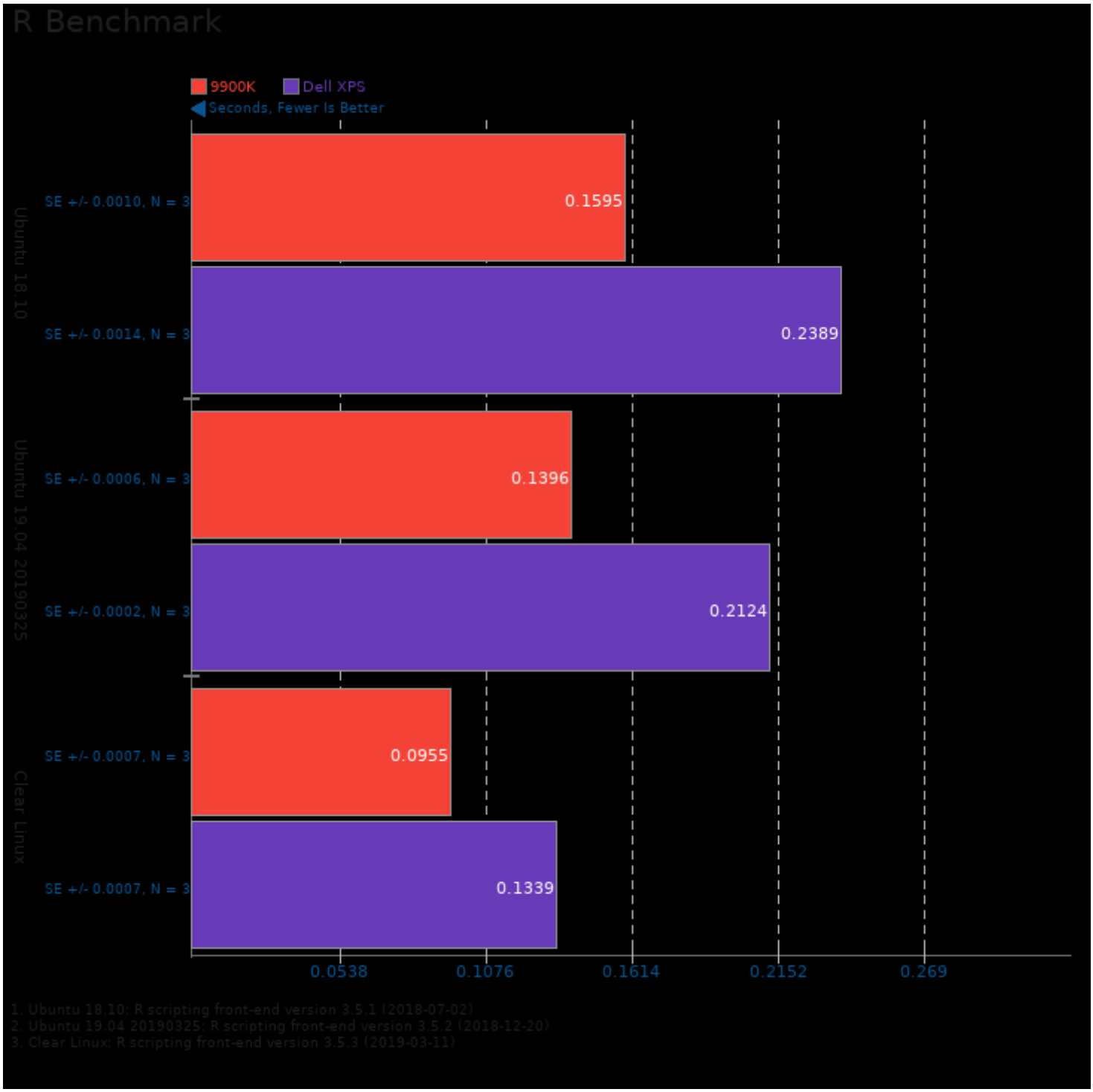

Zstd Compression 1.3.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.01, N = 3
24.43
SE +/- 0.14, N = 3
60.22
Ubuntu 19.04 20190325
SE +/- 0.12, N = 3
24.12
SE +/- 0.13, N = 3
59.78
Clear Linux
SE +/- 0.09, N = 3
24.76
SE +/- 0.03, N = 3
41.95
13
26
39
52
65
1. (CC) gcc options: -O3 -pthread -lz

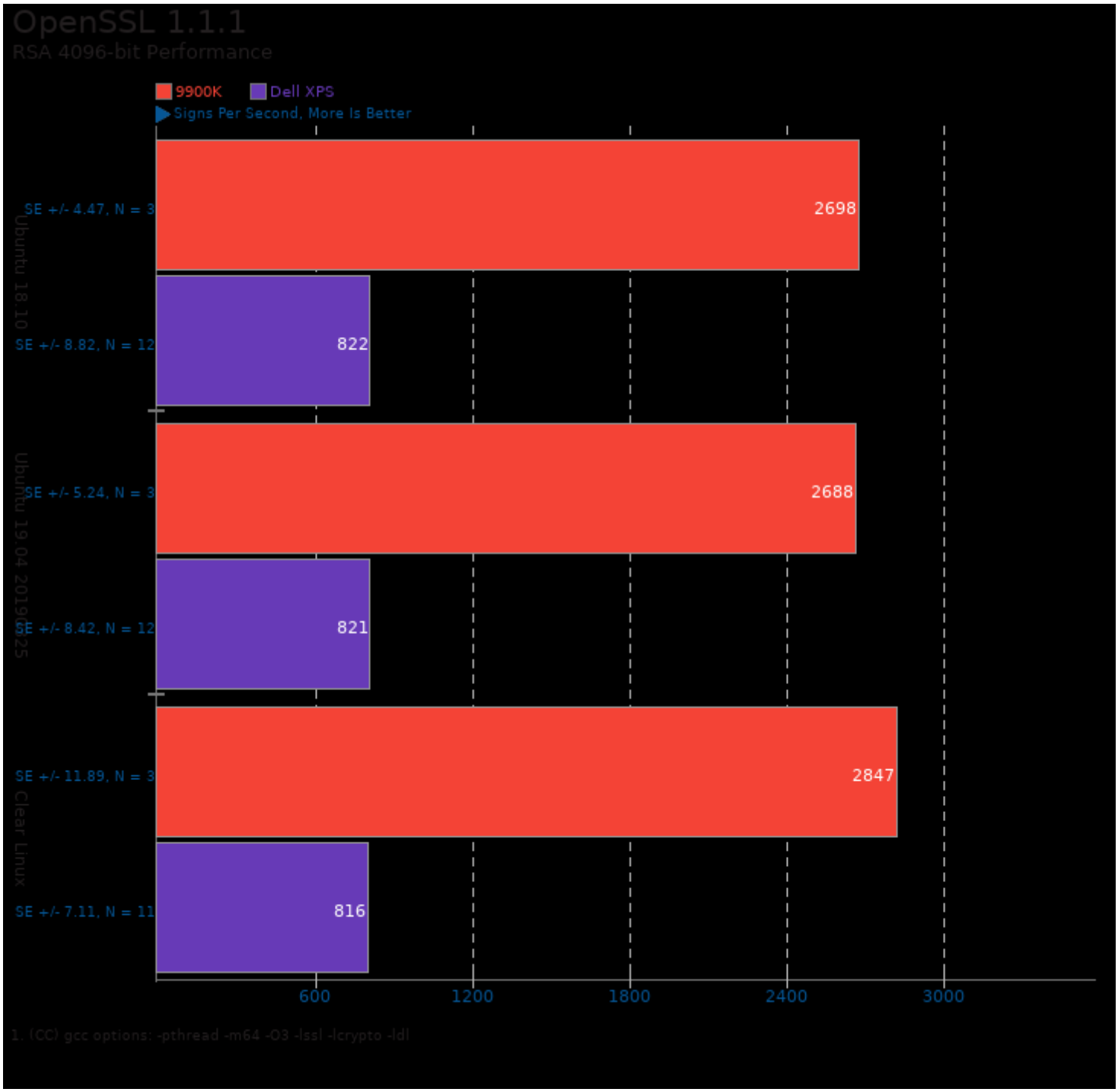

Hackbench
Count: 16 - Type: Thread
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.38, N = 3
31.29
SE +/- 0.82, N = 3
130.54
Ubuntu 19.04 20190325
SE +/- 0.46, N = 3
31.25
SE +/- 1.71, N = 9
128.08
Clear Linux
SE +/- 0.46, N = 3
29.11
SE +/- 0.44, N = 3
110.81
30
60
90
120
150
1. (CC) gcc options: -lpthread

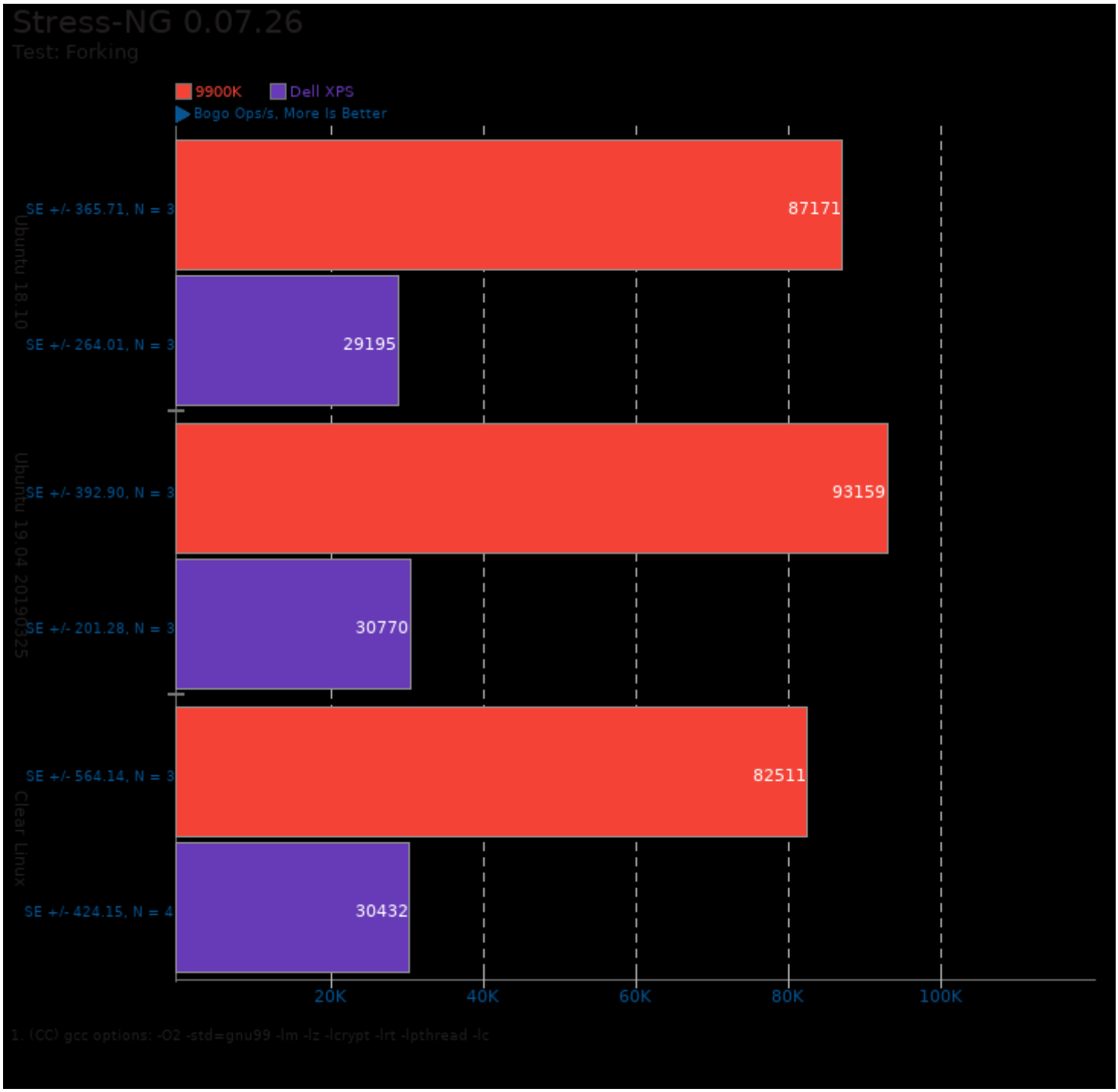

Hackbench
Count: 16 - Type: Process
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.26, N = 12
29.71
SE +/- 0.50, N = 3
123.63
Ubuntu 19.04 20190325
SE +/- 0.34, N = 6
29.81
SE +/- 0.25, N = 3
121.31
Clear Linux
SE +/- 0.19, N = 3
27.88
SE +/- 0.21, N = 3
109.12
30
60
90
120
150
1. (CC) gcc options: -lpthread

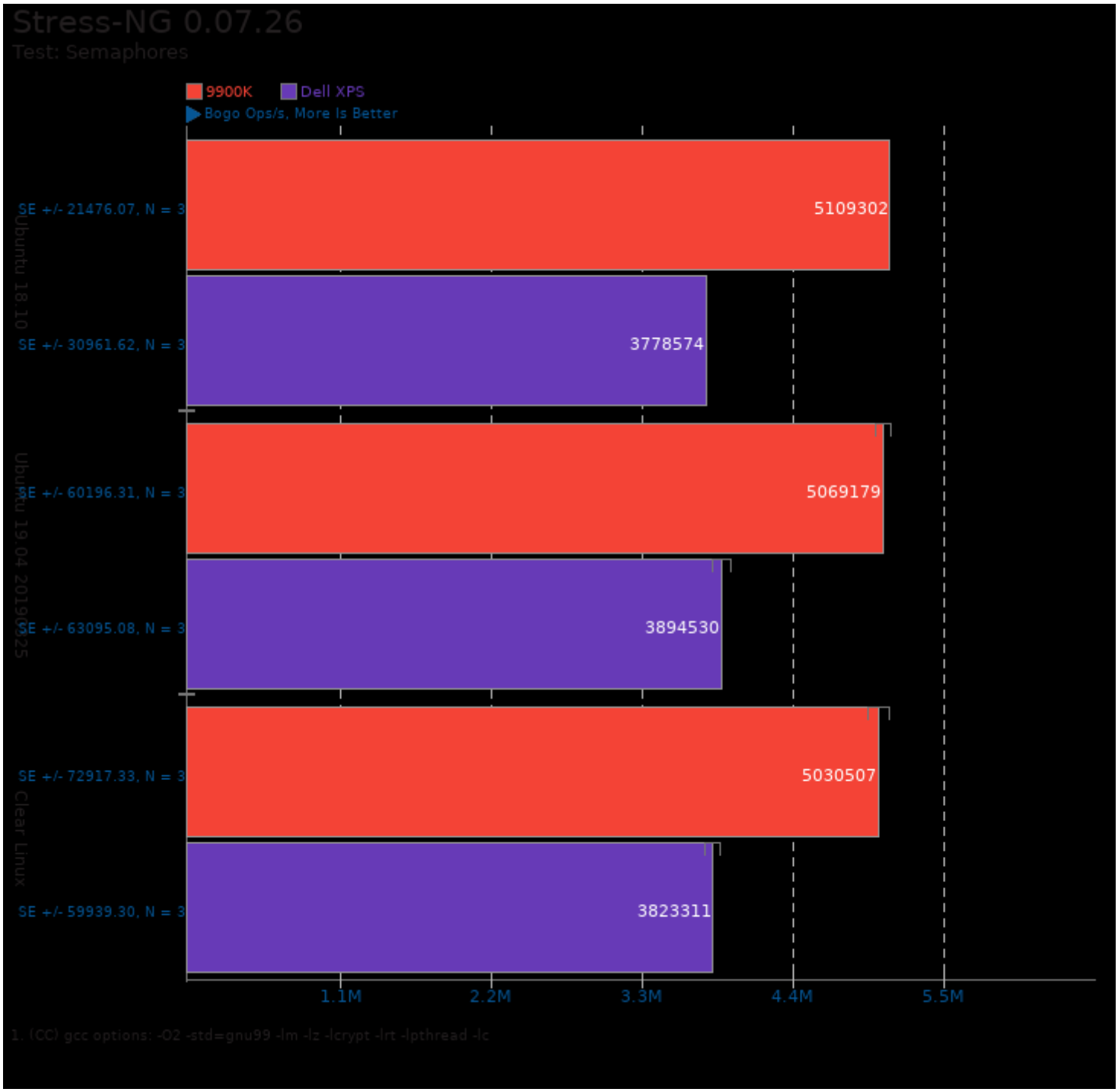

Perl Benchmarks
Test: Pod2html
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
SE +/- 0.00033139, N = 3
0.17166014
SE +/- 0.00088739, N = 3
0.21803389
SE +/- 0.00041518, N = 3
0.09627961
SE +/- 0.00099537, N = 3
0.12333322
SE +/- 0.00033902, N = 3
0.09351156
SE +/- 0.00086109, N = 3
0.12063131
0.0491
0.0982
0.1473
0.1964
0.2455

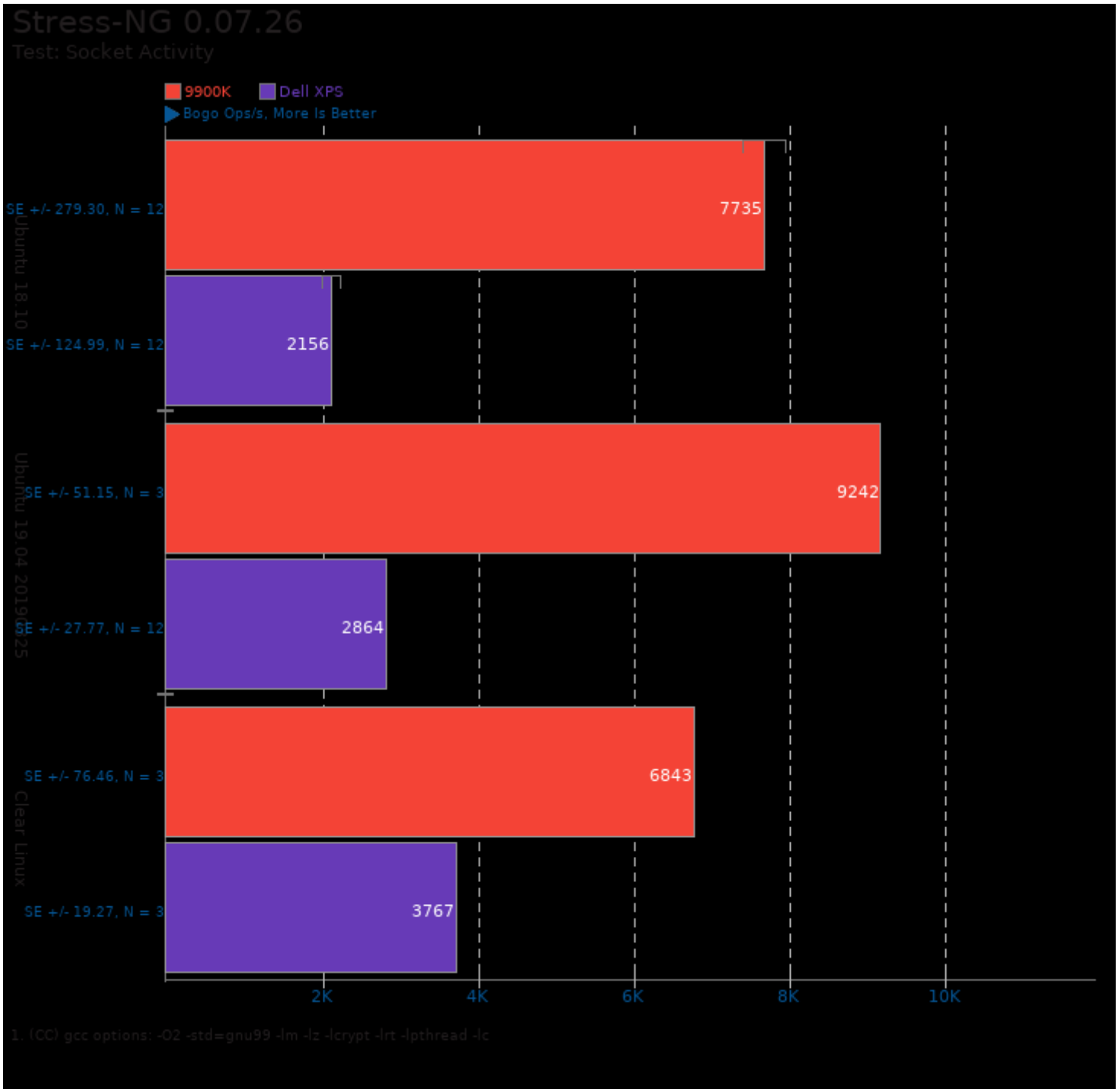

Perl Benchmarks
Test: Interpreter
9900K
Dell XPS
Seconds, Fewer Is Better
SE +/- 0.00038538, N = 9
0.00195073
SE +/- 0.00002201, N = 12
0.00110483
SE +/- 0.00001607, N = 12
0.00074548
SE +/- 0.00000432, N = 3
0.00100097
SE +/- 0.00000359, N = 3
0.00080469
SE +/- 0.00000204, N = 3
0.00105809
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
0.0004
0.0008
0.0012
0.0016
0.002

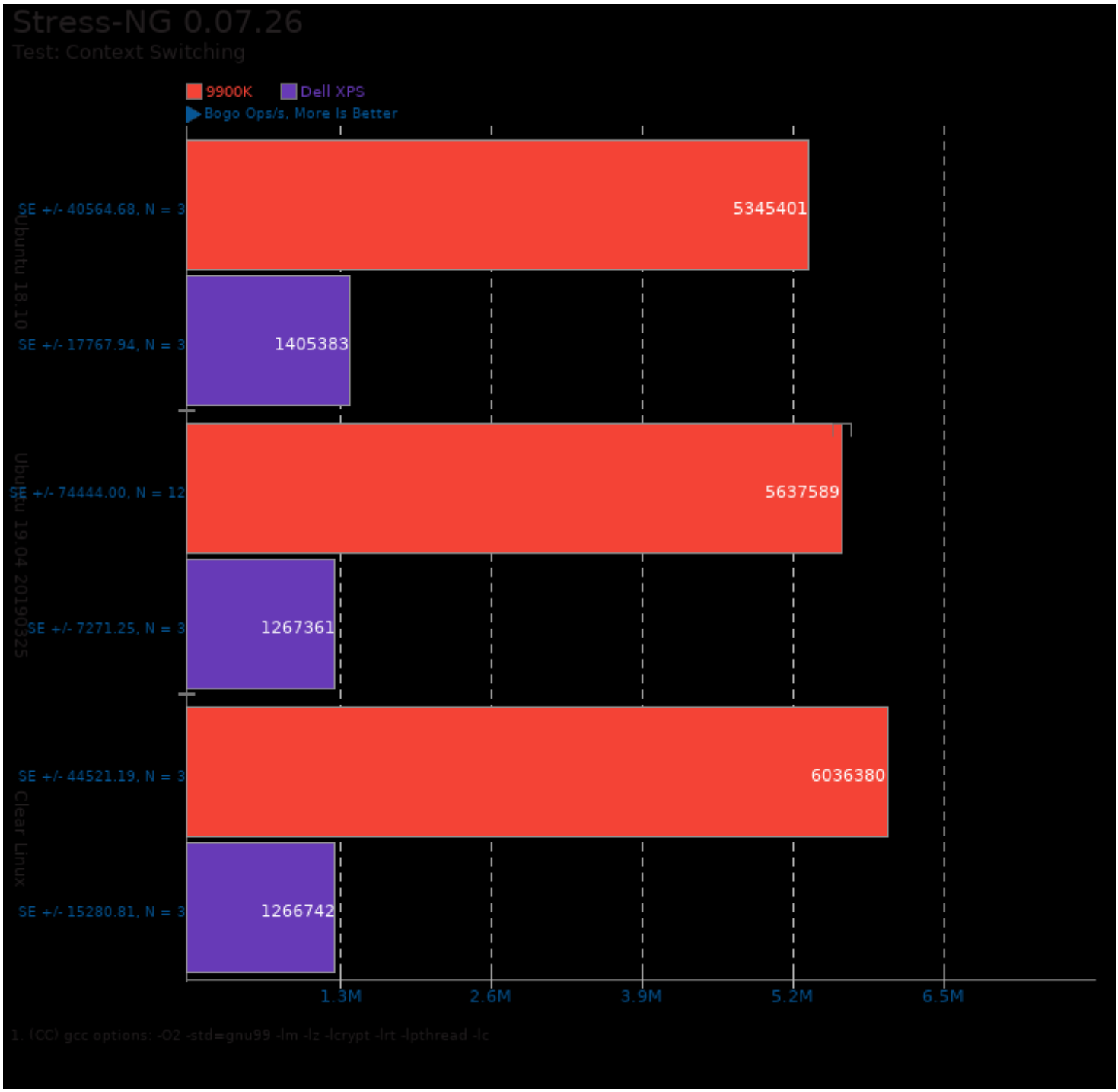

R Benchmark
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
SE +/- 0.0010, N = 3
0.1595
SE +/- 0.0014, N = 3
0.2389
SE +/- 0.0006, N = 3
0.1396
SE +/- 0.0002, N = 3
0.2124
SE +/- 0.0007, N = 3
0.0955
SE +/- 0.0007, N = 3
0.1339
0.0538
0.1076
0.1614
0.2152
0.269
1. Ubuntu 18.10: R scripting front-end version 3.5.1 (2018-07-02)
2. Ubuntu 19.04 20190325: R scripting front-end version 3.5.2 (2018-12-20)
3. Clear Linux: R scripting front-end version 3.5.3 (2019-03-11)

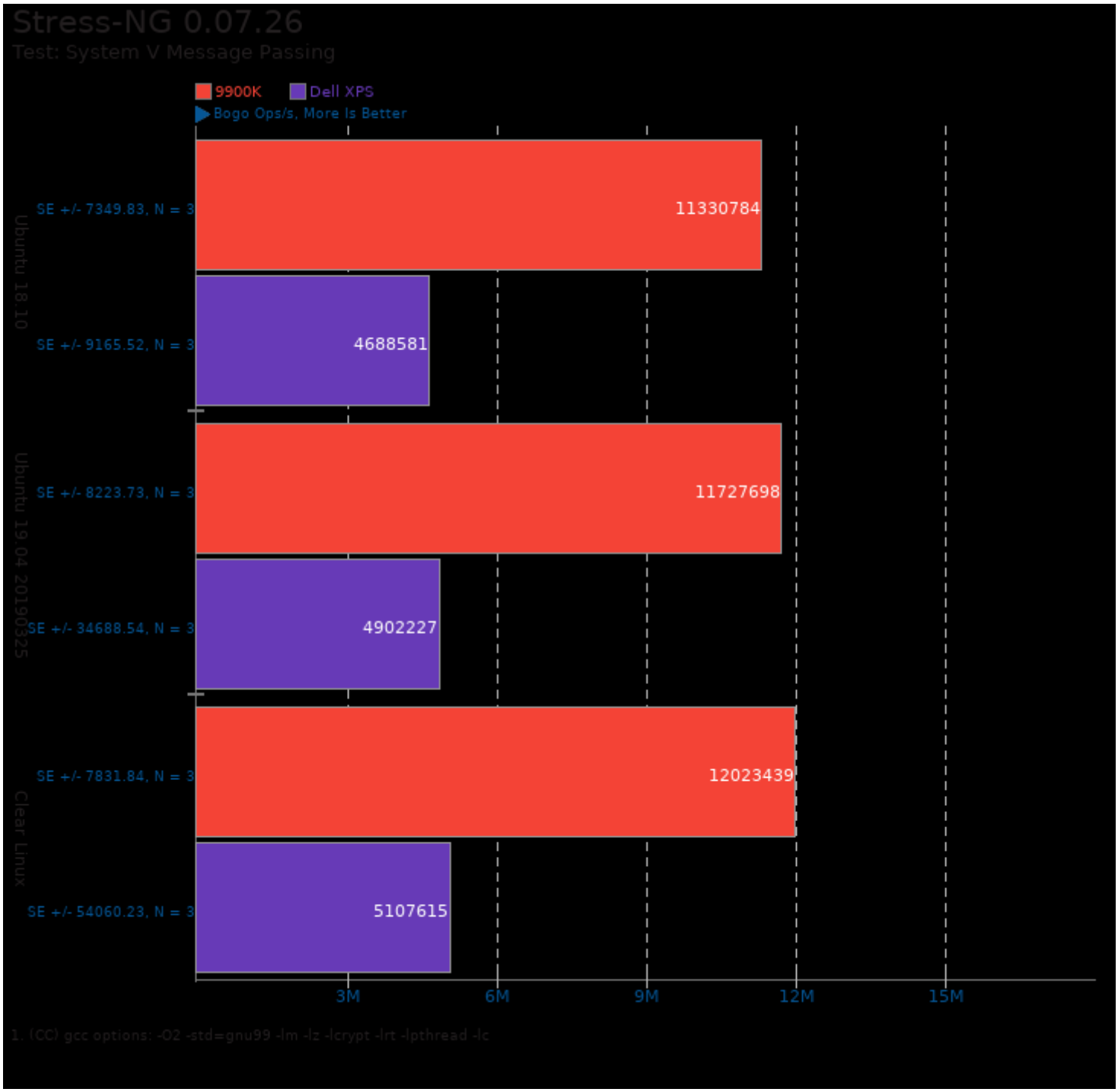

OpenSSL 1.1.1
RSA 4096-bit Performance
9900K
Dell XPS
Signs Per Second, More Is Better
SE +/- 4.47, N = 3
2698
Ubuntu 18.10
SE +/- 8.82, N = 12
822
SE +/- 5.24, N = 3
2688
Ubuntu 19.04 20190425
SE +/- 8.42, N = 12
821
SE +/- 11.89, N = 3
2847
Clear Linux
SE +/- 7.11, N = 11
816
600
1200
1800
2400
3000
1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl

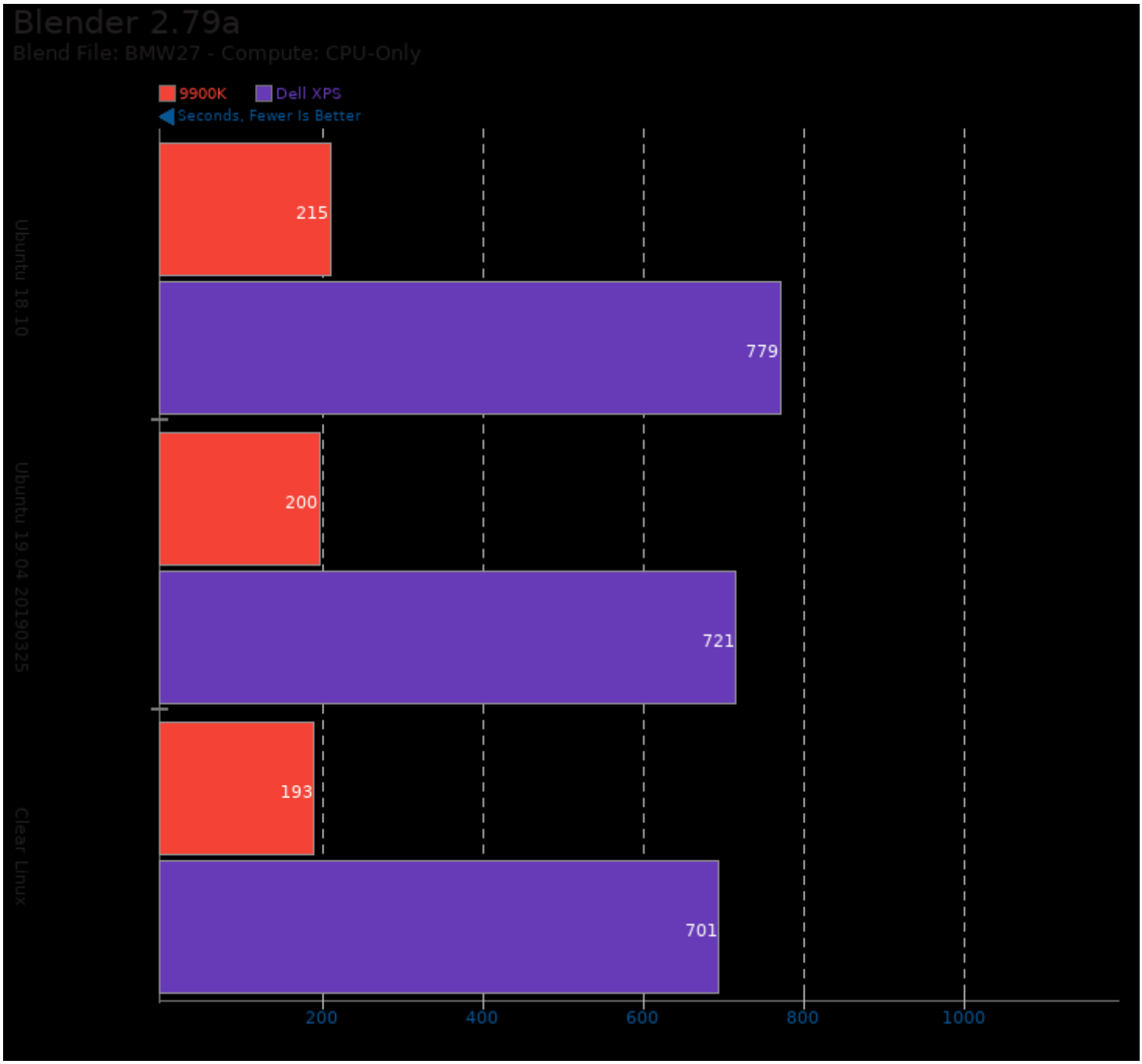

Stress-NG 0.07.26
Test: Forking
9900K
Dell XPS
Bogo Ops/s, More Is Better
Ubuntu 18.10
SE +/- 365.71, N = 3
87171
SE +/- 264.01, N = 3
29195
Ubuntu 19.04 20190325
SE +/- 392.90, N = 3
93159
SE +/- 201.28, N = 3
30770
Clear Linux
SE +/- 564.14, N = 3
82511
SE +/- 424.15, N = 4
30432
20K
40K
60K
80K
100K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -lc

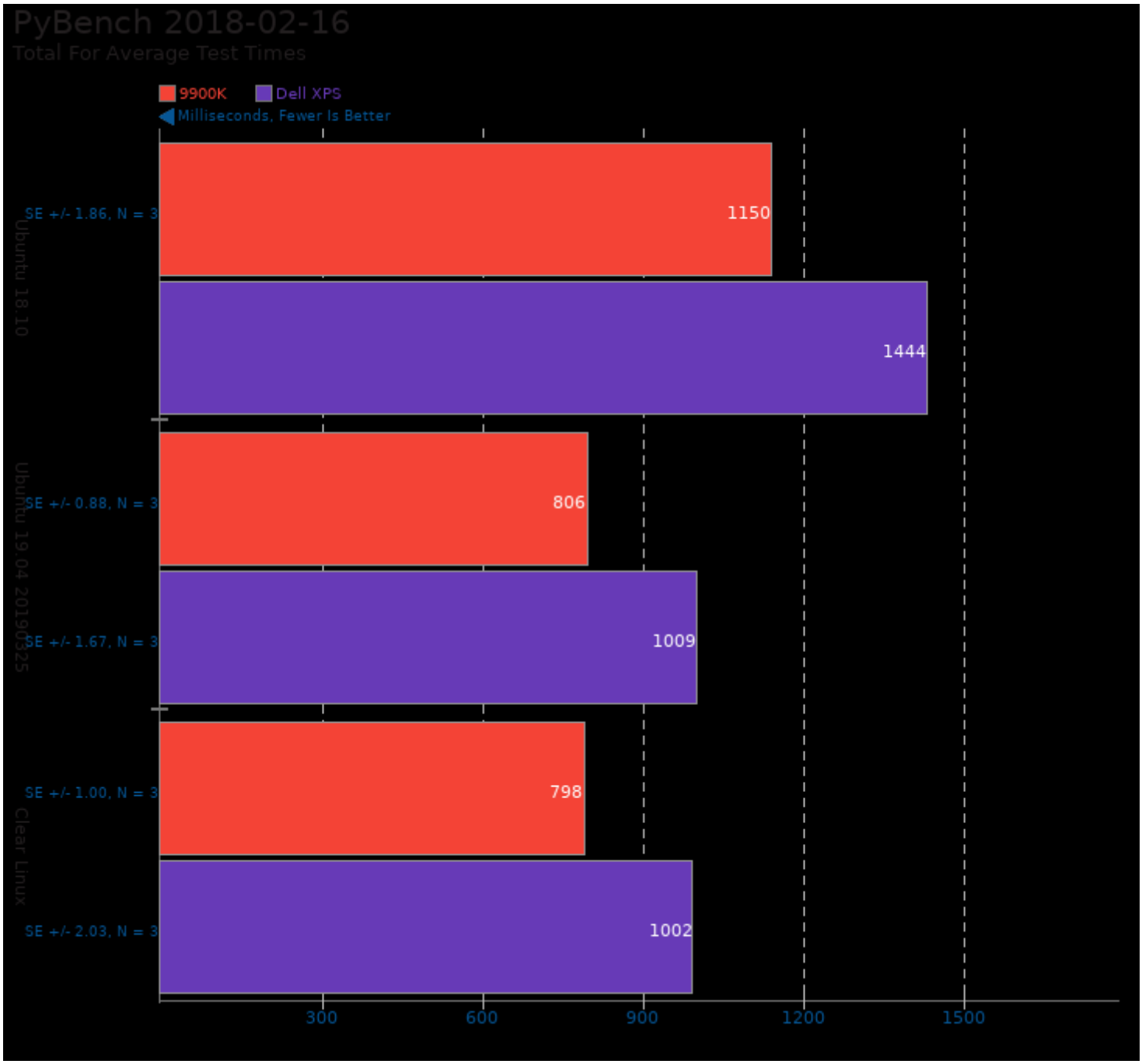

Stress-NG 0.07.26
Test: Semaphores
9900K
Dell XPS
Bogo Ops/s, More Is Better
SE +/- 21476.07, N = 3
5109302
SE +/- 30961.62, N = 3
3778574
SE +/- 60196.31, N = 3
5069179
SE +/- 63095.08, N = 3
3894530
SE +/- 72917.33, N = 3
5030507
SE +/- 59939.30, N = 3
3823311
Ubuntu 18.10
Ubuntu 19.04 20190425
Clear Linux
1.1M
2.2M
3.3M
4.4M
5.5M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -lc

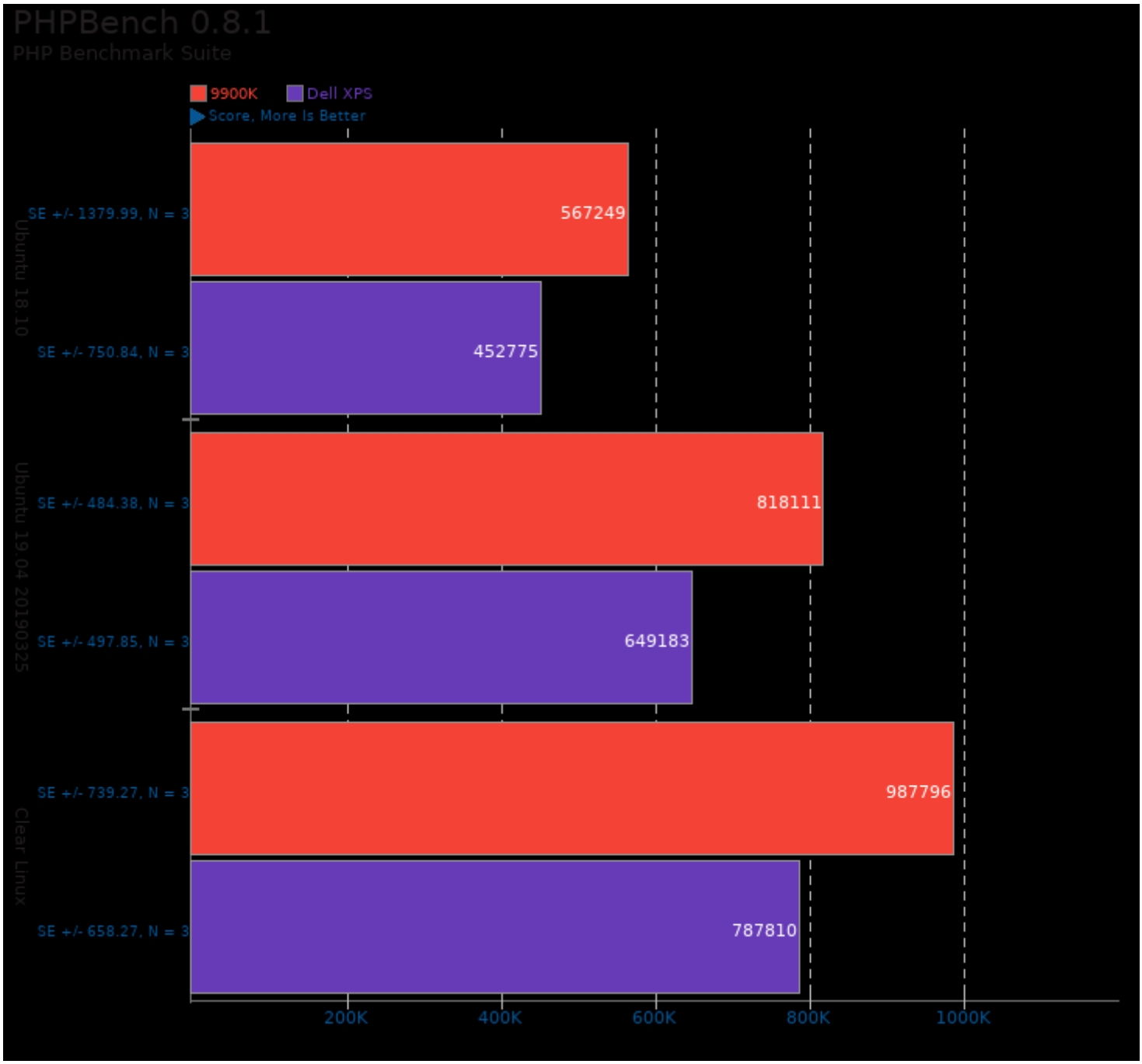

Stress-NG 0.07.26
Test: Socket Activity
9900K
Dell XPS
Bogo Ops/s, More Is Better
Ubuntu 18.10
SE +/- 279.30, N = 12
7735
SE +/- 124.99, N = 12
2156
Ubuntu 19.04 20190425
SE +/- 51.15, N = 3
9242
SE +/- 27.77, N = 12
2864
Clear Linux
SE +/- 76.46, N = 3
6843
SE +/- 19.27, N = 3
3767
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -lc

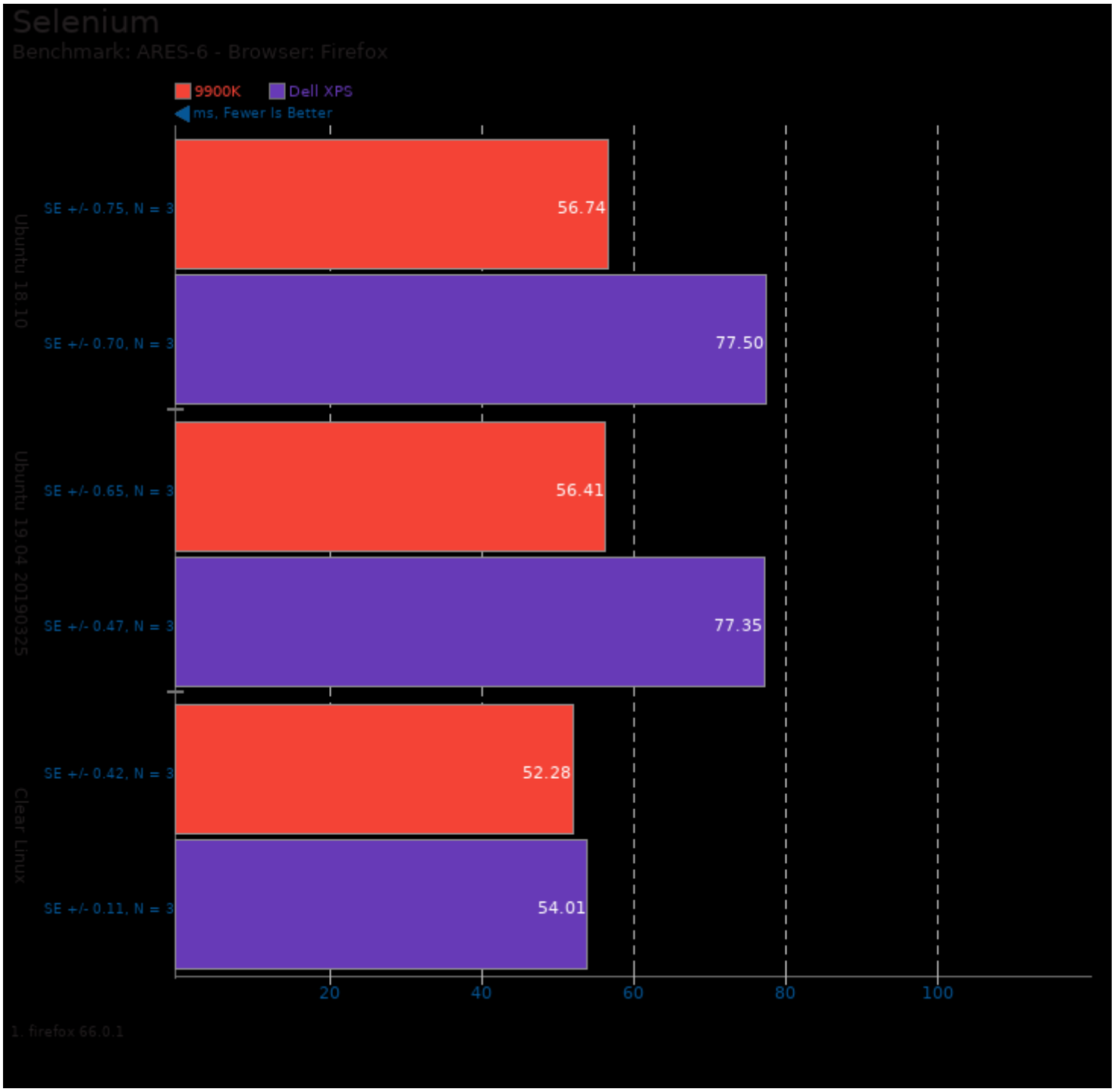

Stress-NG 0.07.26
Test: Context Switching
9900K
Dell XPS
Bogo Ops/s, More Is Better
SE +/- 40564.68, N = 3
5345401
Ubuntu 18.10
SE +/- 17767.94, N = 3
1405383
SE +/- 74444.00, N = 12
5637589
Ubuntu 19.04 20190325
SE +/- 7271.25, N = 3
1267361
SE +/- 44521.19, N = 3
6036380
Clear Linux
SE +/- 15280.81, N = 3
1266742
1.3M
2.6M
3.9M
5.2M
6.5M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -lc

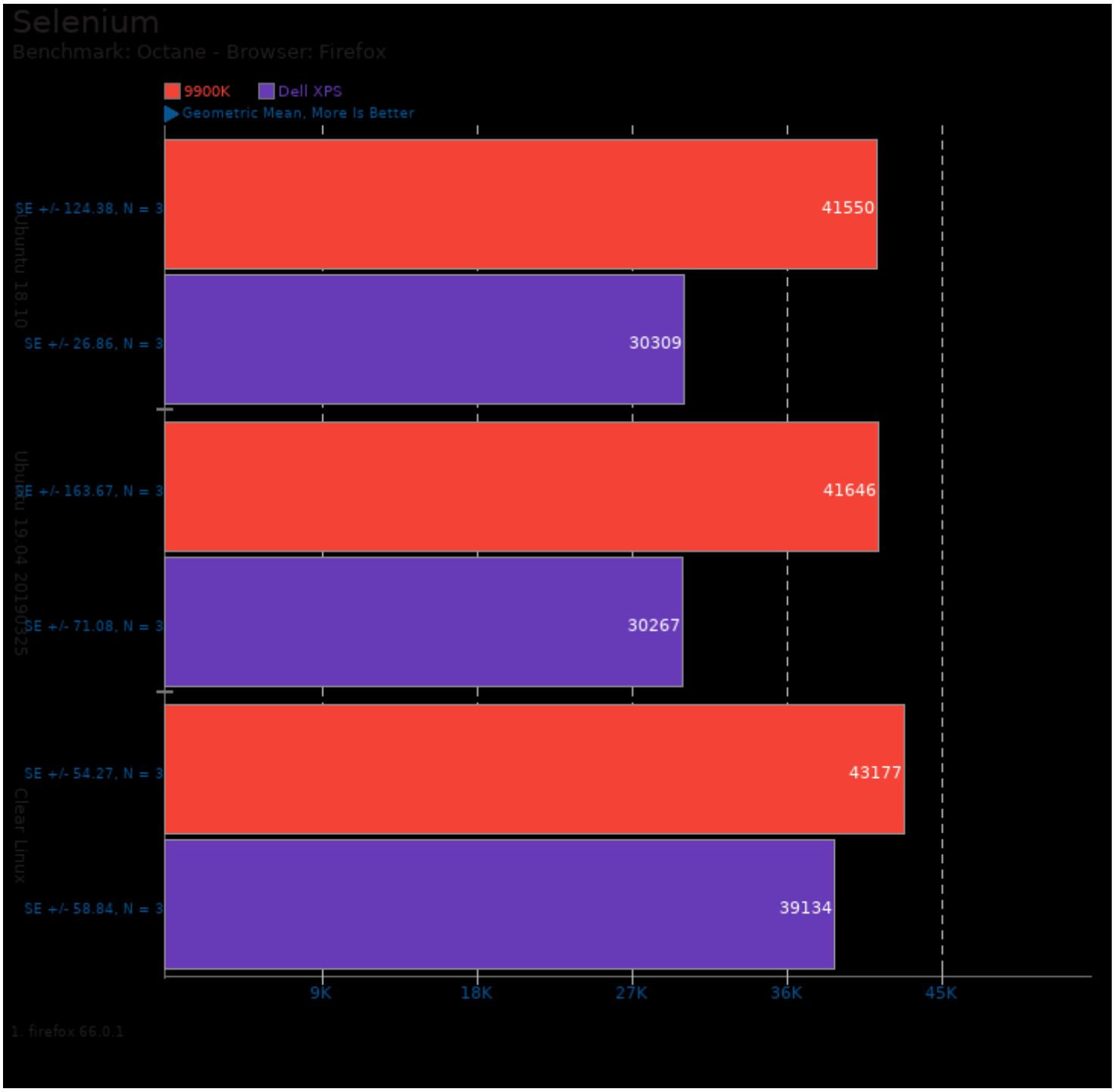

Stress-NG 0.07.26
Test: System V Message Passing
9900K
Dell XPS
Bogo Ops/s, More Is Better
Ubuntu 18.10
SE +/- 7349.83, N = 3
11330784
SE +/- 9165.52, N = 3
4688581
Ubuntu 19.04 20190325
SE +/- 8223.73, N = 3
11727698
SE +/- 34688.54, N = 3
4902227
Clear Linux
SE +/- 7831.84, N = 3
12023439
SE +/- 54060.23, N = 3
5107615
3M
6M
9M
12M
15M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -lc

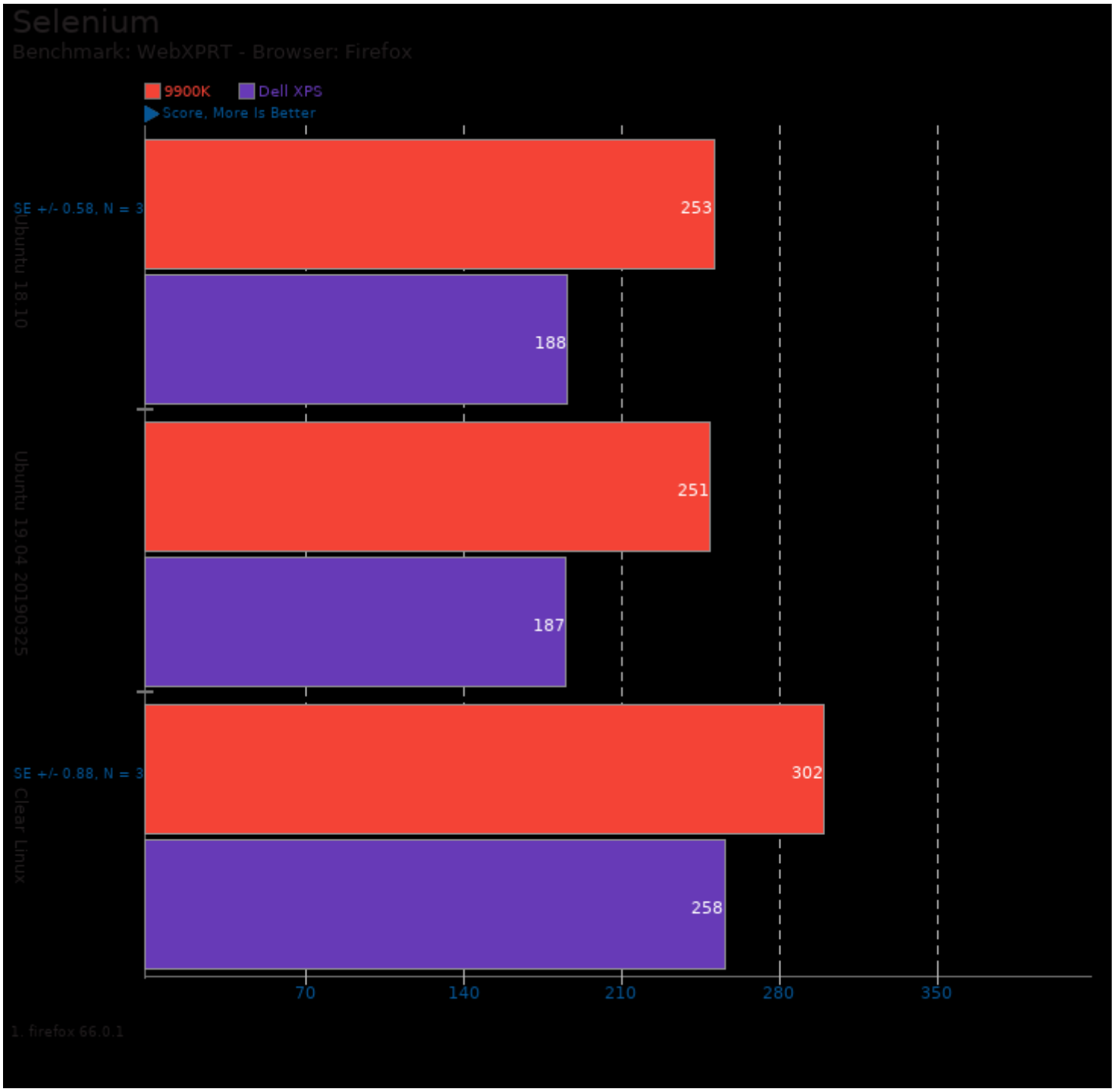

Blender 2.79a
Blend File: BMW27 - Compute: CPU-Only
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
215
779
200
721
193
701
200
400
600
800
1000

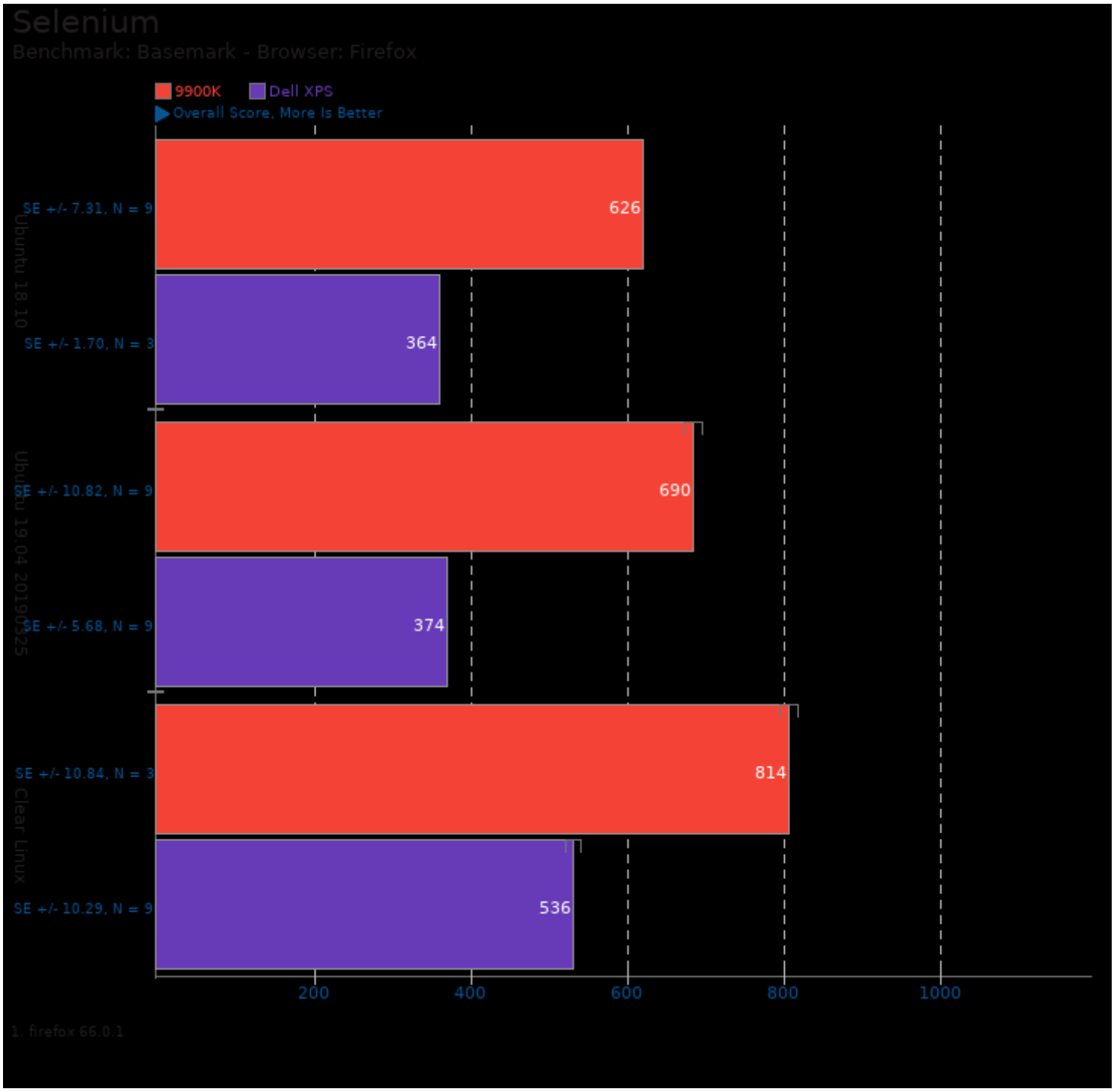

PyBench 2018-02-16
Total For Average Test Times
9900K
Dell XPS
Milliseconds, Fewer Is Better
Ubuntu 18.10
SE +/- 1.86, N = 3
1150
1444
Ubuntu 19.04 20190325
SE +/- 0.88, N = 3
806
SE +/- 1.67, N = 3
1009
Clear Linux
SE +/- 1.00, N = 3
798
SE +/- 2.03, N = 3
1002
300
600
900
1200
1500

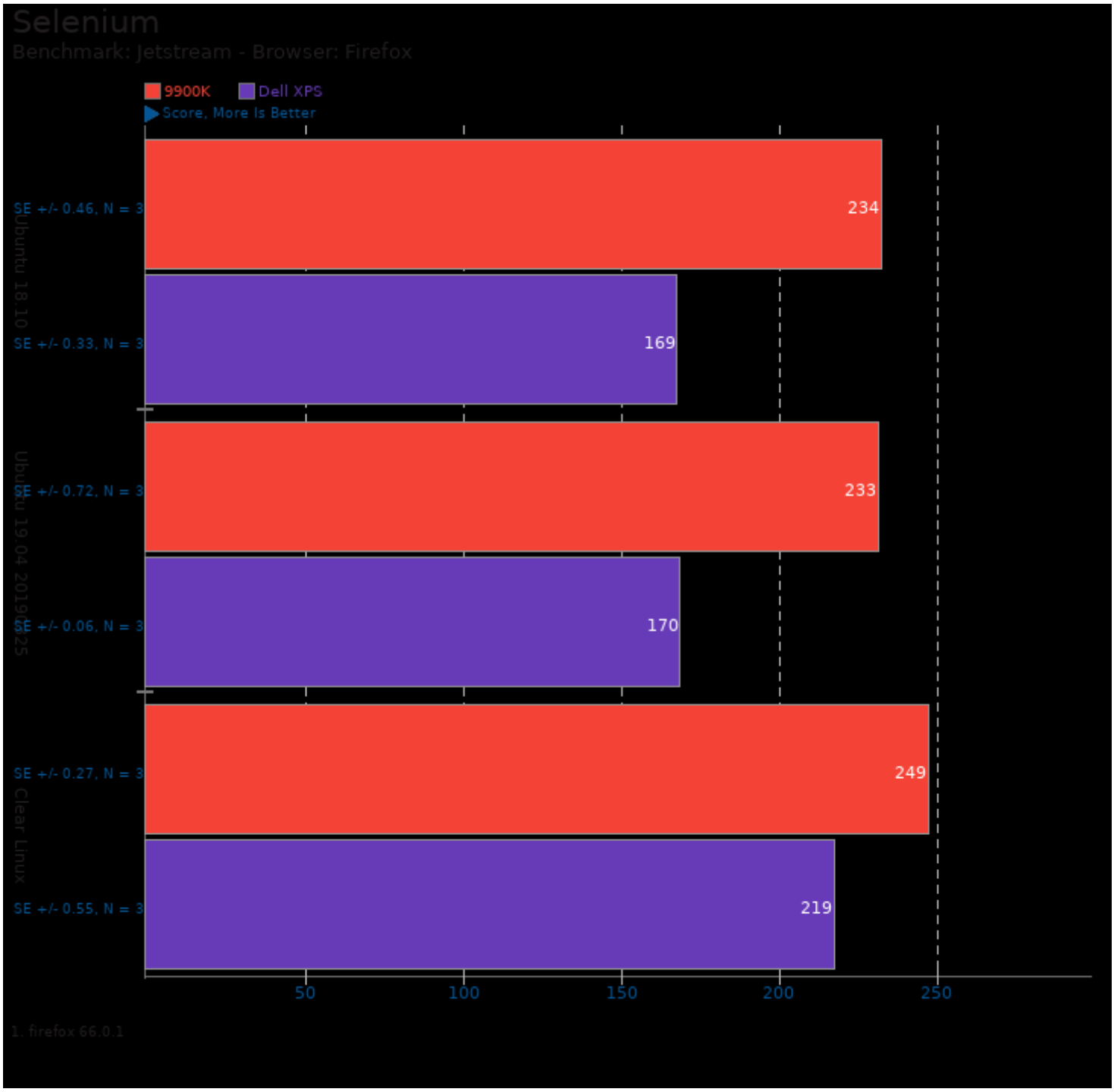

PHPBench 0.8.1
PHP Benchmark Suite
9900K
Dell XPS
Score, More Is Better
Ubuntu 18.10
SE +/- 1379.99, N = 3
567249
SE +/- 750.84, N = 3
452775
Ubuntu 19.04 20190325
SE +/- 484.38, N = 3
818111
SE +/- 497.85, N = 3
649183
Clear Linux
SE +/- 739.27, N = 3
987796
SE +/- 658.27, N = 3
787810
200K
400K
600K
800K
1000K

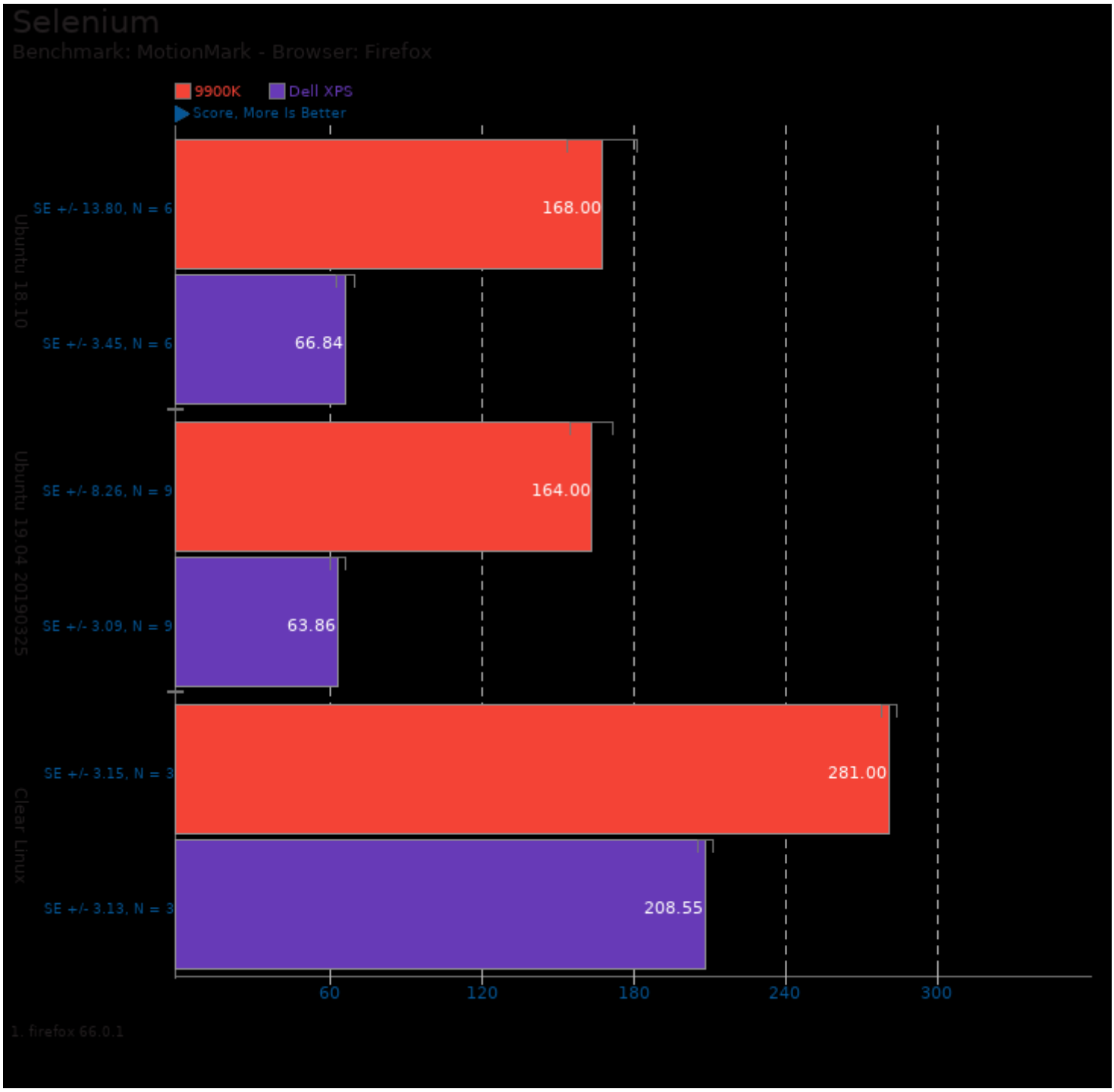

Selenium
Benchmark: ARES-6 - Browser: Firefox
9900K
Dell XPS
ms, Fewer Is Better
Ubuntu 18.10
SE +/- 0.75, N = 3
56.74
SE +/- 0.70, N = 3
77.50
Ubuntu 19.04 20190325
SE +/- 0.65, N = 3
56.41
SE +/- 0.47, N = 3
77.35
Clear Linux
SE +/- 0.42, N = 3
52.28
SE +/- 0.11, N = 3
54.01
20
40
60
80
100
1. firefox 66.0.1

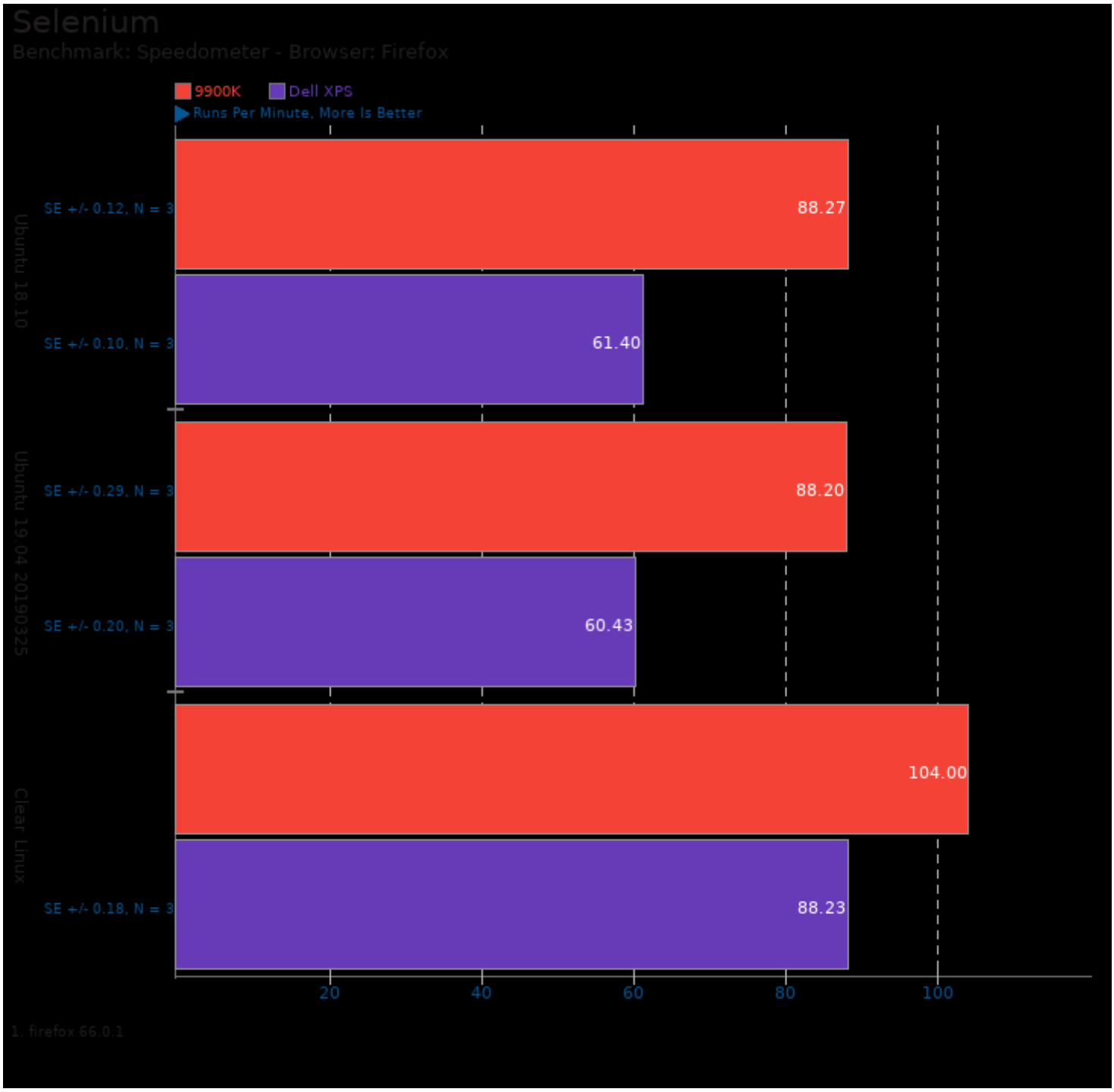

Selenium
Benchmark: Octane - Browser: Firefox
9900K
Dell XPS
Geometric Mean, More Is Better
Ubuntu 18.10
SE +/- 124.38, N = 3
41550
SE +/- 26.86, N = 3
30309
Ubuntu 19.04 20190325
SE +/- 163.67, N = 3
41646
SE +/- 71.08, N = 3
30267
Clear Linux
SE +/- 54.27, N = 3
43177
SE +/- 58.84, N = 3
39134
9K
18K
27K
36K
45K
1. firefox 66.0.1

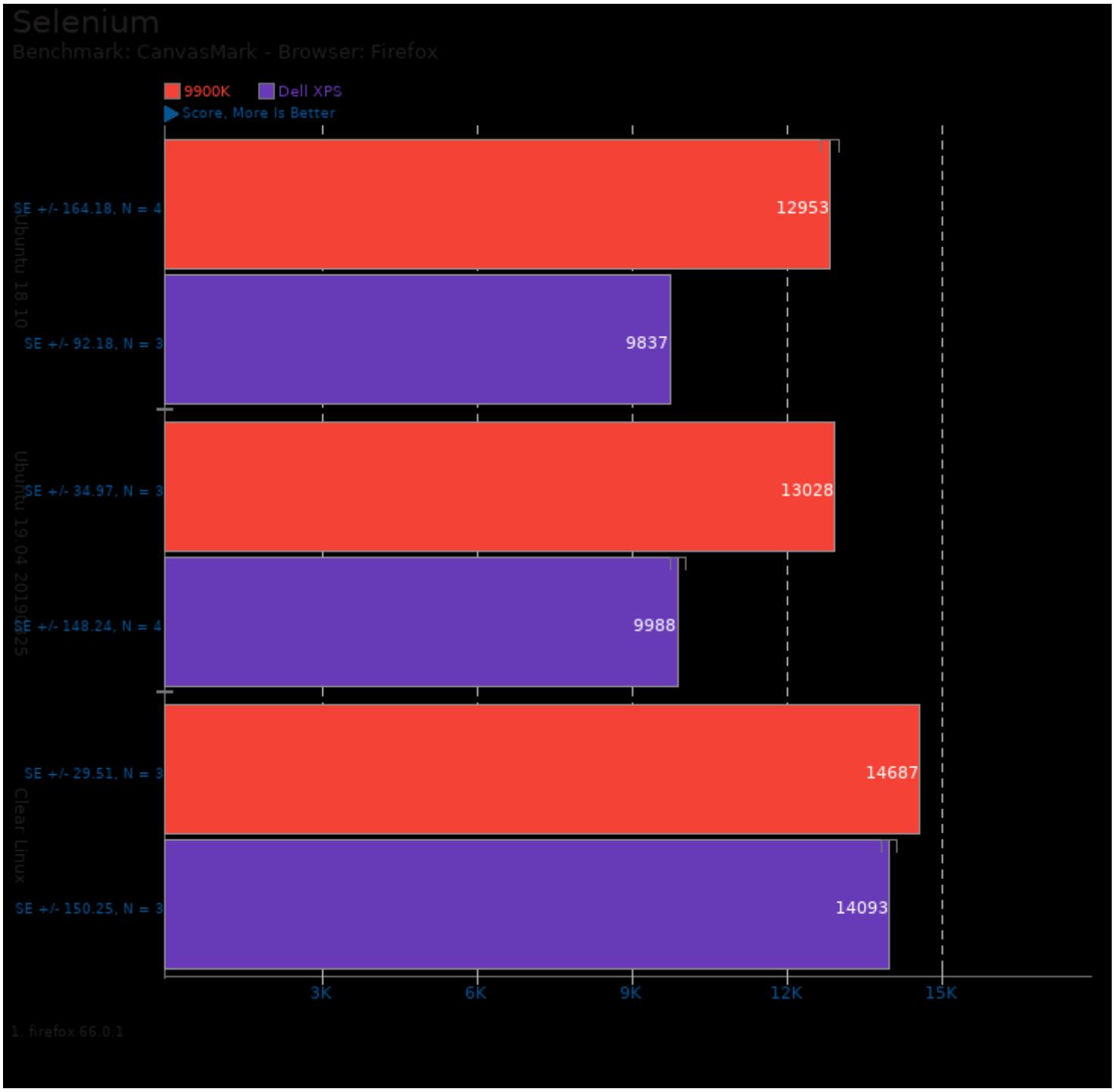

Selenium
Benchmark: WebXPRT - Browser: Firefox
9900K
Dell XPS
Score, More Is Better
SE +/- 0.58, N = 3
Ubuntu 18.10
253
188
Ubuntu 19.04 20190325
251
187
SE +/- 0.88, N = 3
Clear Linux
302
258
70
140
210
280
350
1. firefox 66.0.1

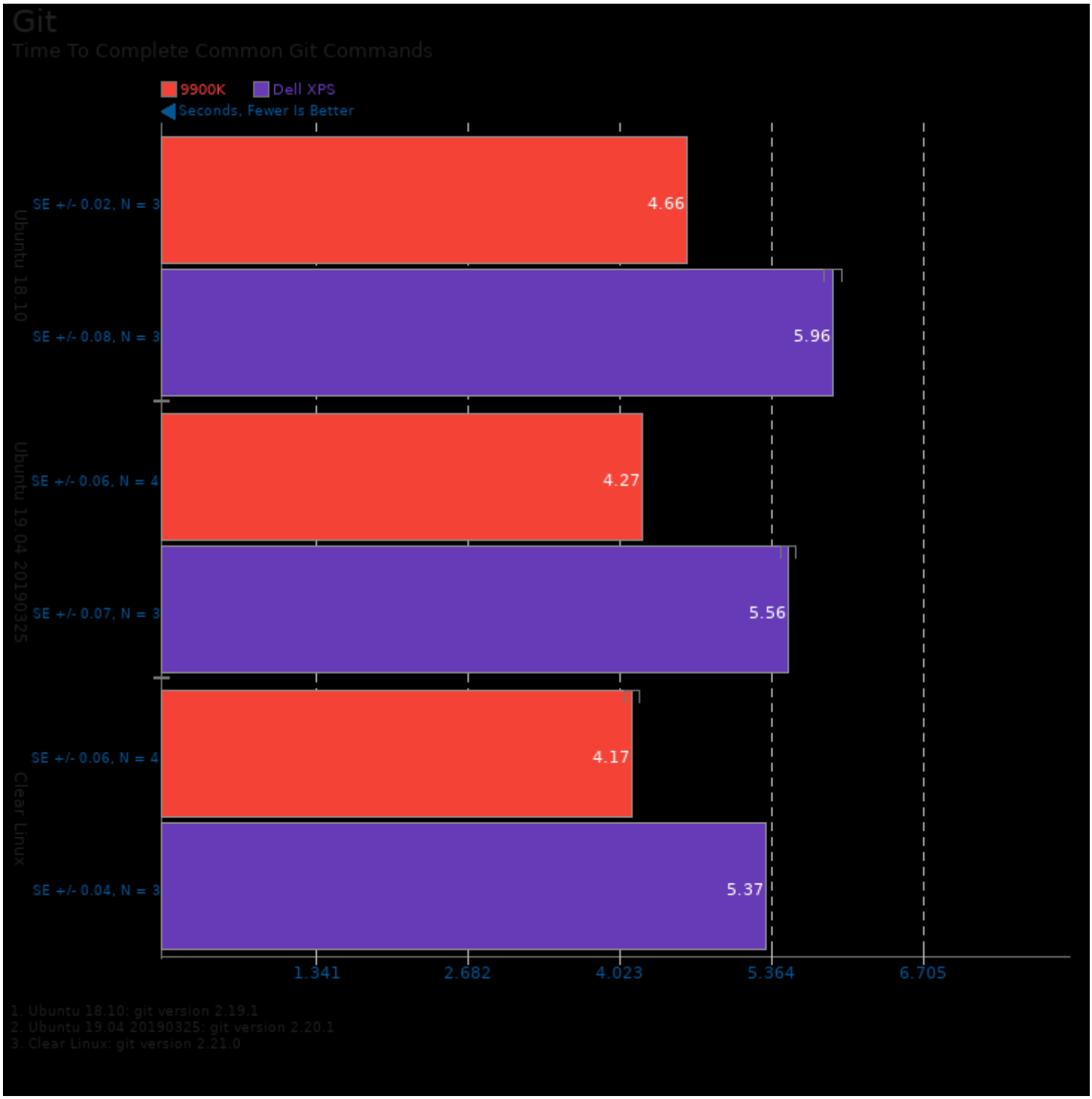

Selenium
Benchmark: Basemark - Browser: Firefox
9900K
Dell XPS
Overall Score, More Is Better
SE +/- 7.31, N = 9
626
Ubuntu 18.10
SE +/- 1.70, N = 3
364
SE +/- 10.82, N = 9
690
Ubuntu 19.04 20190325
SE +/- 5.68, N = 9
374
SE +/- 10.84, N = 3
814
Clear Linux
SE +/- 10.29, N = 9
536
200
400
600
800
1000
1. firefox 66.0.1

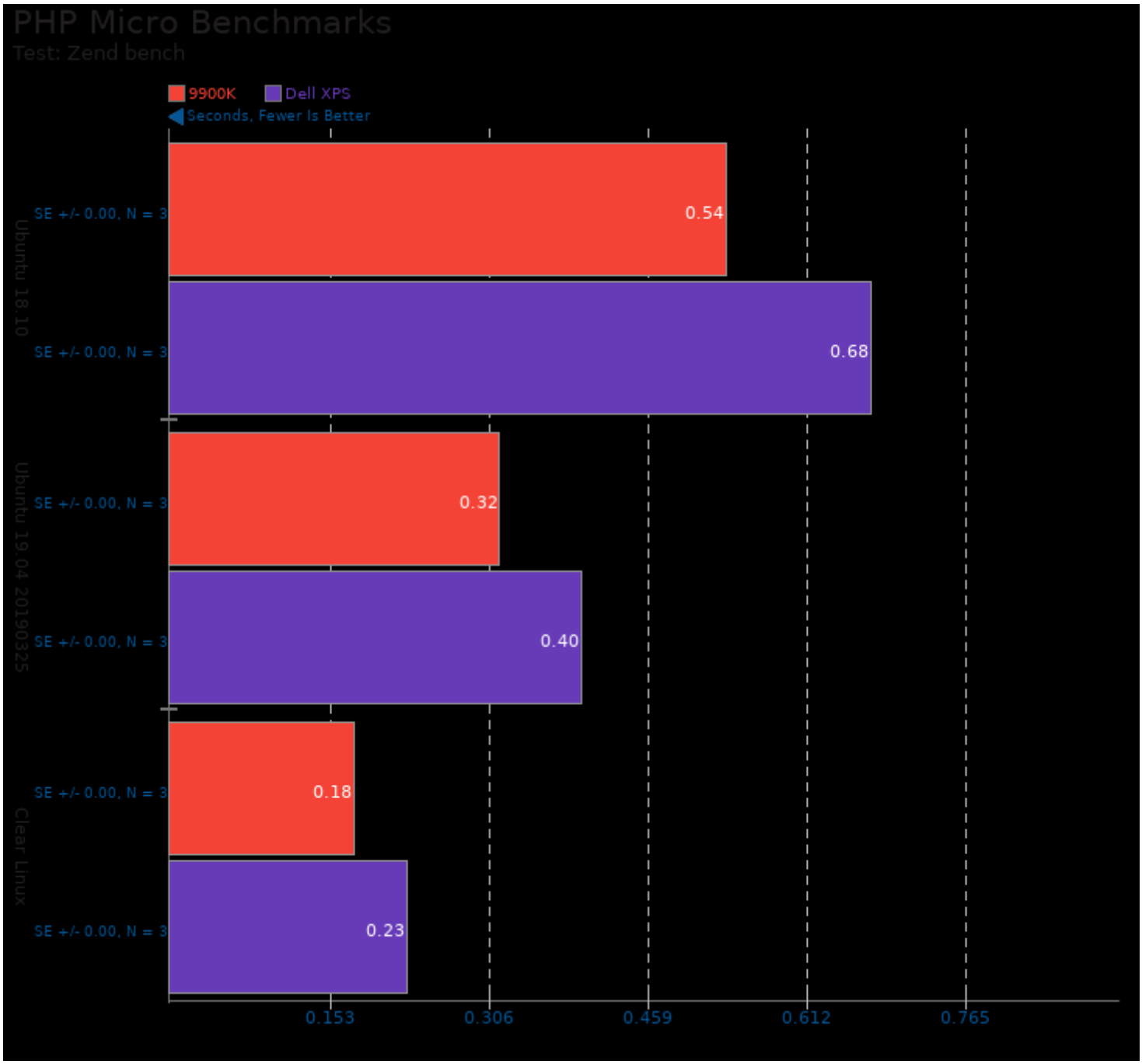

Selenium
Benchmark: Jetstream - Browser: Firefox
9900K
Dell XPS
Score, More Is Better
SE +/- 0.46, N = 3
234
Ubuntu 18.10
SE +/- 0.33, N = 3
169
SE +/- 0.72, N = 3
233
Ubuntu 19.04 20190425
SE +/- 0.06, N = 3
170
SE +/- 0.27, N = 3
249
Clear Linux
SE +/- 0.55, N = 3
219
50
100
150
200
250
1. firefox 66.0.1

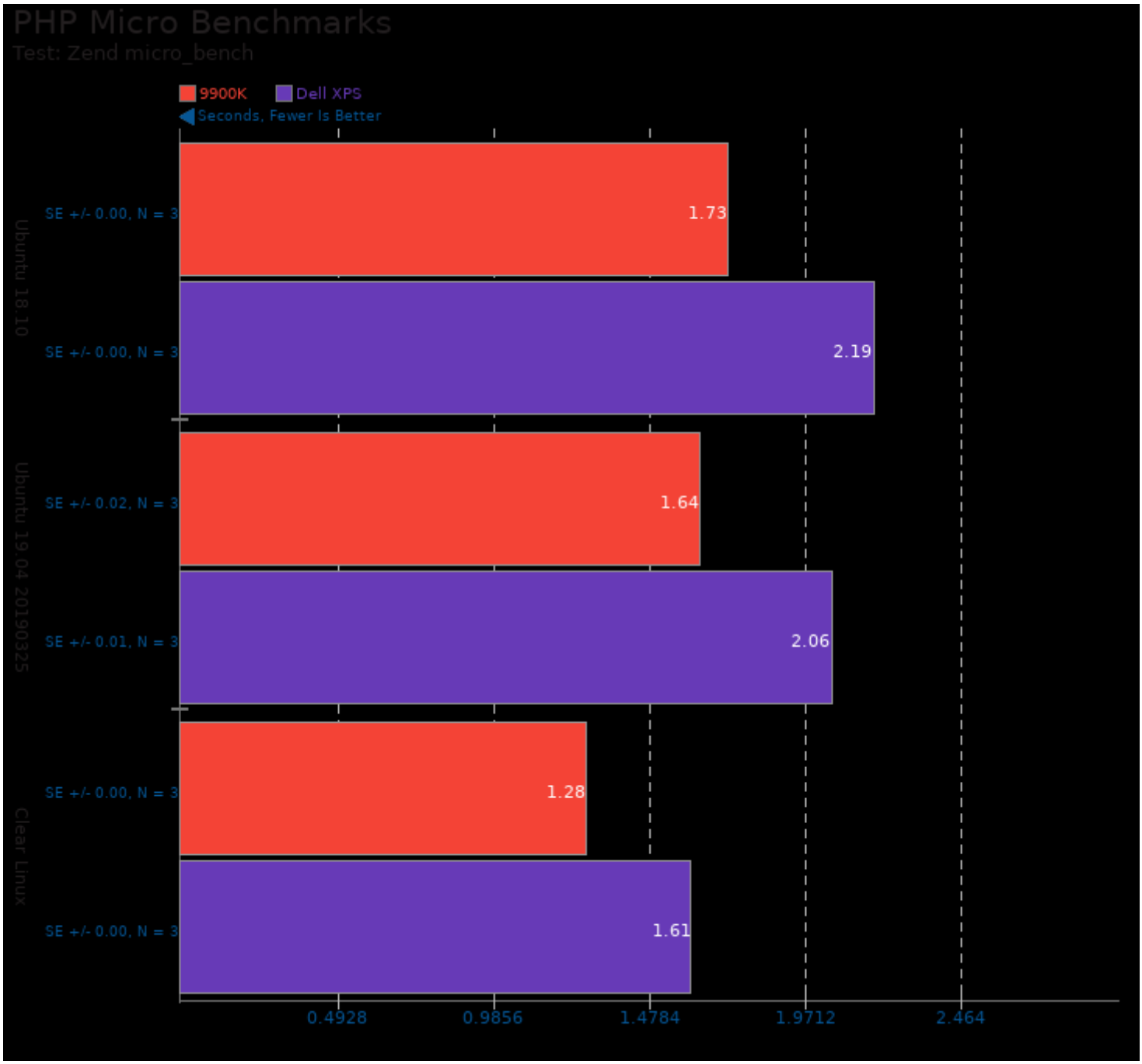

Selenium
Benchmark: MotionMark - Browser: Firefox
9900K
Dell XPS
Score, More Is Better
SE +/- 13.80, N = 6
168.00
SE +/- 3.45, N = 6
66.84
SE +/- 8.26, N = 9
164.00
SE +/- 3.09, N = 9
63.86
SE +/- 3.15, N = 3
281.00
SE +/- 3.13, N = 3
208.55
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
60
120
180
240
300
1. firefox 66.0.1

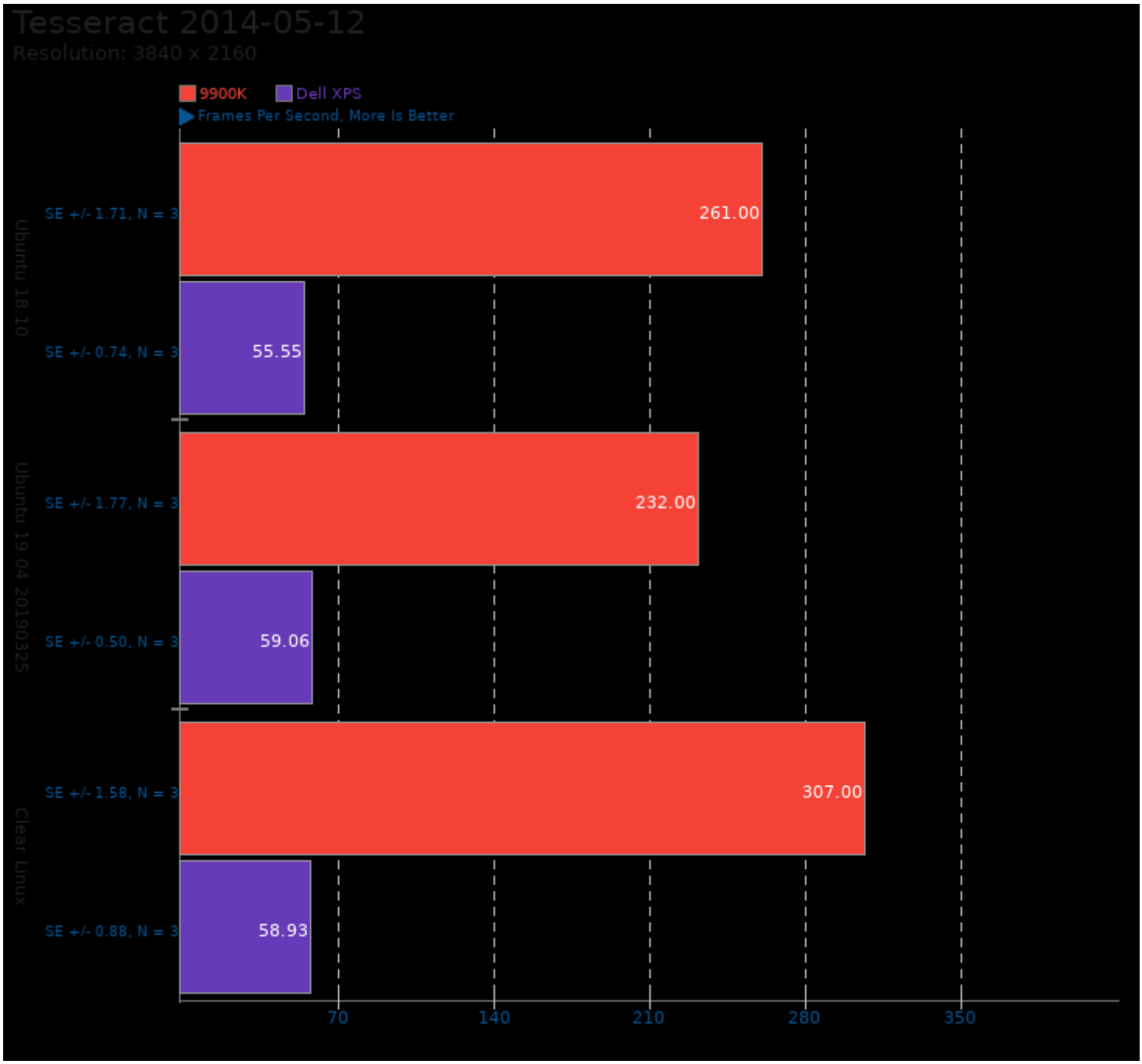

Selenium
Benchmark: Speedometer - Browser: Firefox
9900K
Dell XPS
Runs Per Minute, More Is Better
Ubuntu 18.10
SE +/- 0.12, N = 3
88.27
SE +/- 0.10, N = 3
61.40
Ubuntu 19.04 20190325
SE +/- 0.29, N = 3
88.20
SE +/- 0.20, N = 3
60.43
Clear Linux
104.00
SE +/- 0.18, N = 3
88.23
20
40
60
80
100
1. firefox 66.0.1

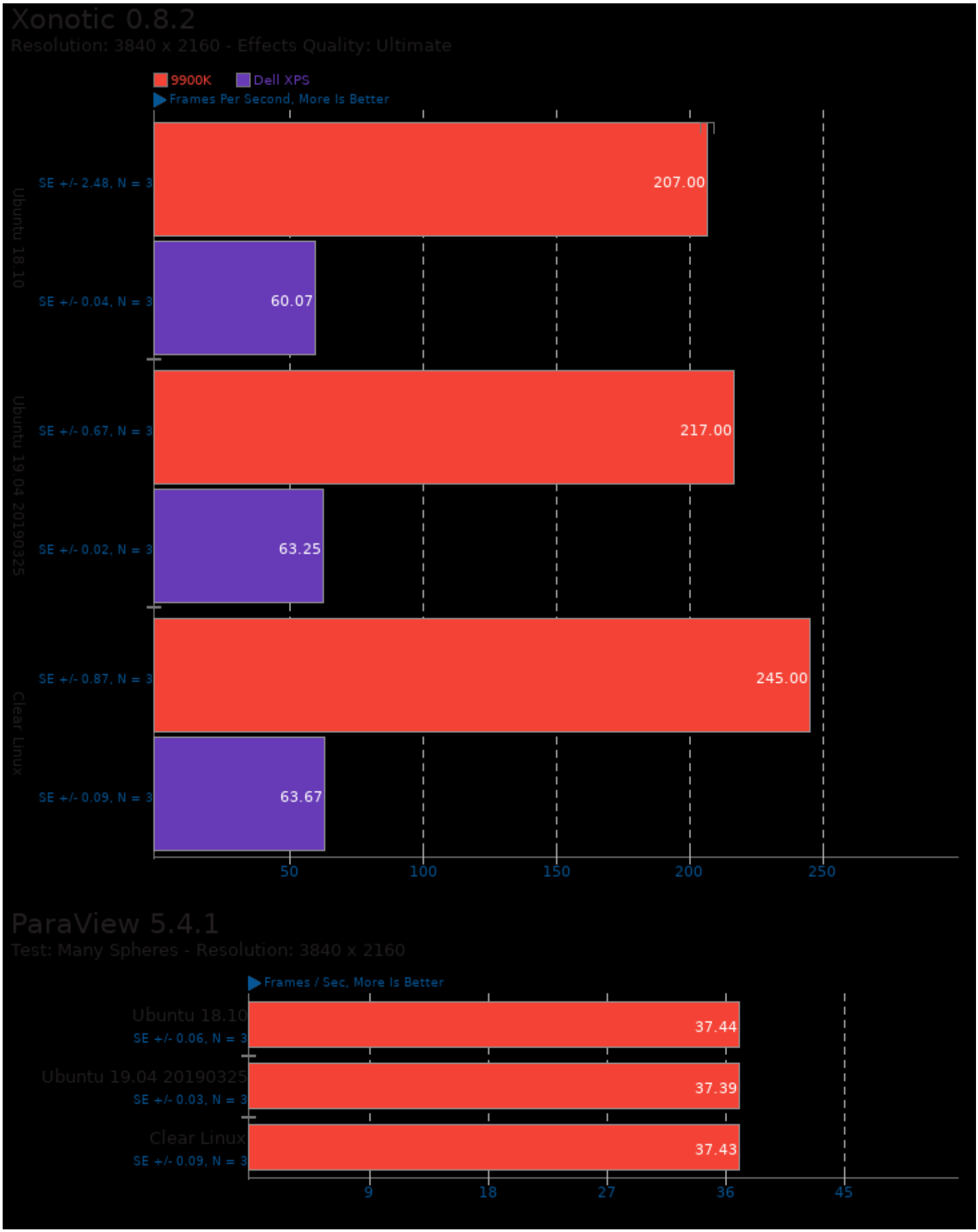

Selenium
Benchmark: CanvasMark - Browser: Firefox
9900K
Dell XPS
Score, More Is Better
Ubuntu 18.10
SE +/- 164.18, N = 4
12953
SE +/- 92.18, N = 3
9837
Ubuntu 19.04 20190425
SE +/- 34.97, N = 3
13028
SE +/- 148.24, N = 4
9988
Clear Linux
SE +/- 29.51, N = 3
14687
SE +/- 150.25, N = 3
14093
3K
6K
9K
12K
15K
1. firefox 66.0.1

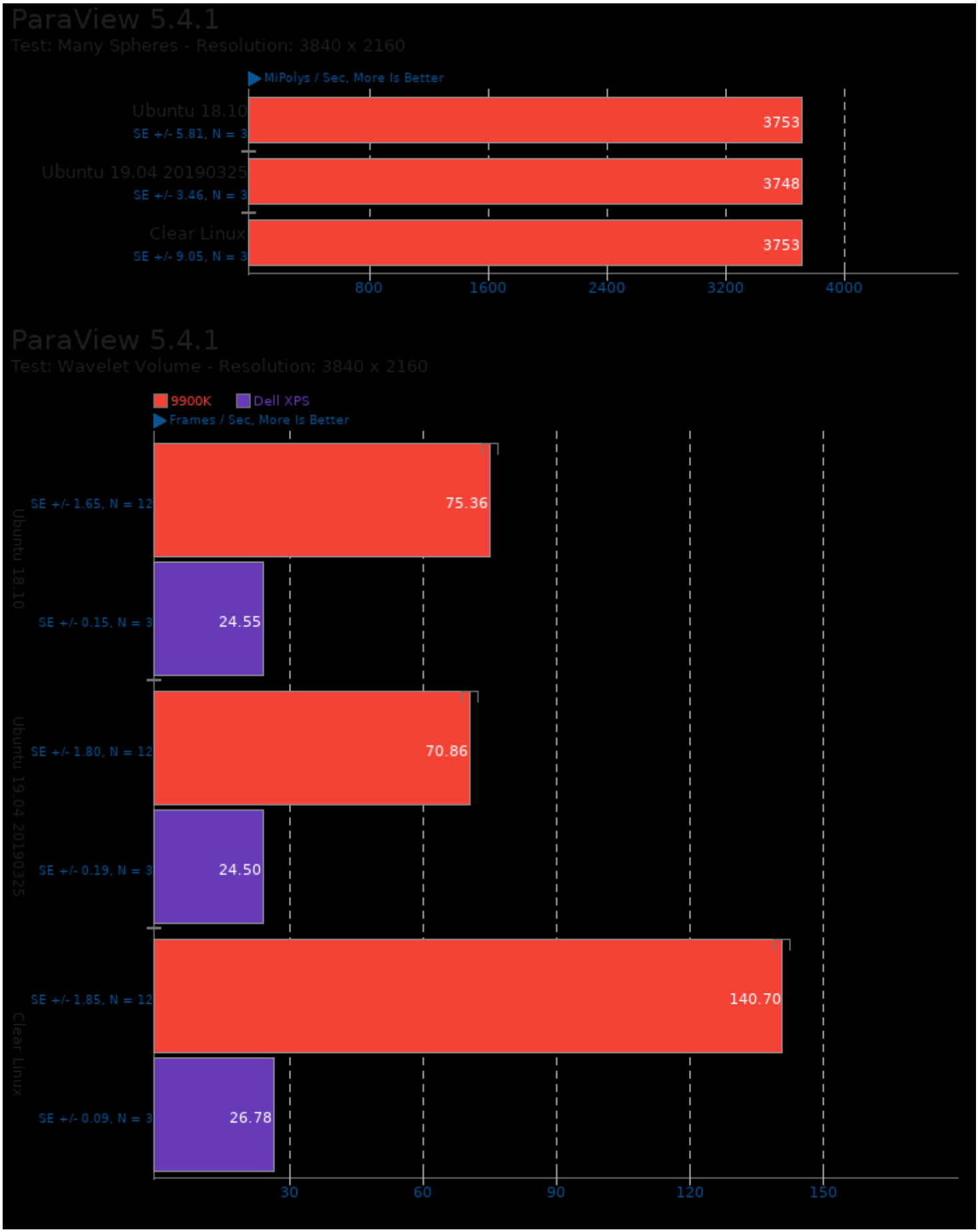

Git
Time To Complete Common Git Commands
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
SE +/- 0.02, N = 3
4.66
SE +/- 0.08, N = 3
5.96
Ubuntu 19.04 20190325
SE +/- 0.06, N = 4
4.27
SE +/- 0.07, N = 3
5.56
Clear Linux
SE +/- 0.06, N = 4
4.17
SE +/- 0.04, N = 3
5.37
1.341
2.682
4.023
5.364
6.705
1. Ubuntu 18.10: git version 2.19.1
2. Ubuntu 19.04 20190325: git version 2.20.1
3. Clear Linux: git version 2.21.0

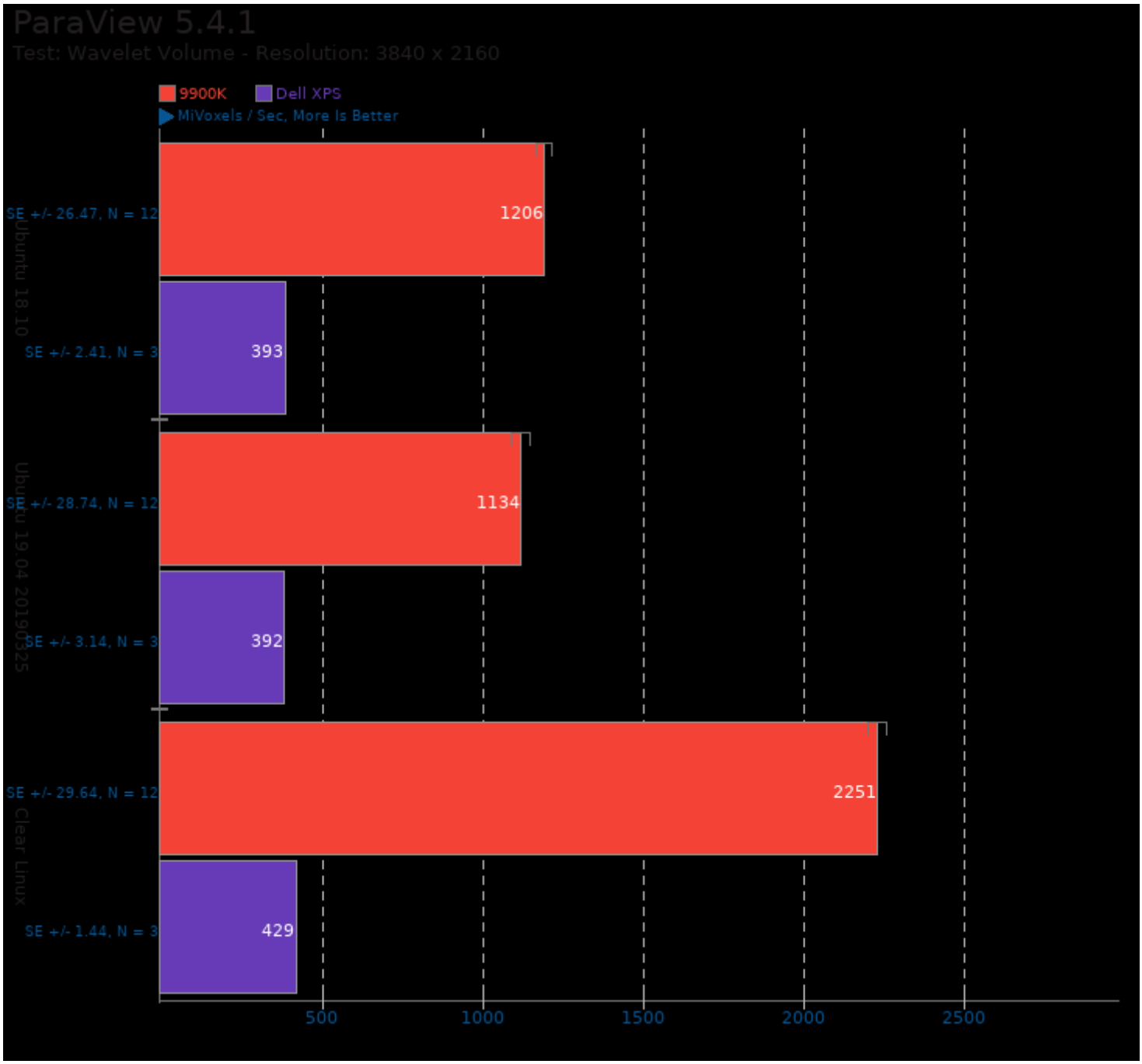

PHP Micro Benchmarks
Test: Zend bench
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
SE +/- 0.00, N = 3
0.54
0.68
0.32
0.40
0.18
0.23
0.153
0.306
0.459
0.612
0.765

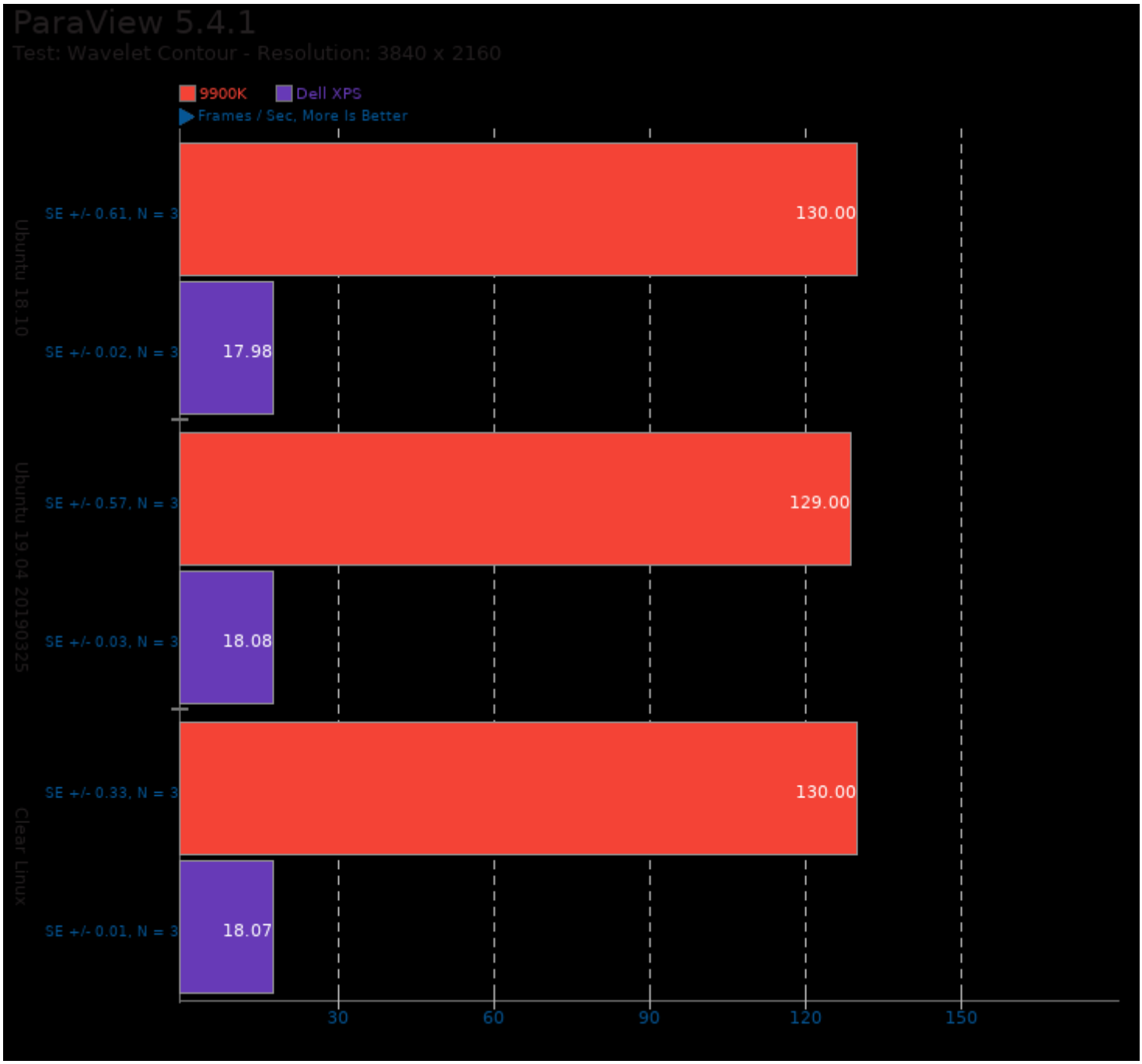

PHP Micro Benchmarks
Test: Zend micro_bench
9900K
Dell XPS
Seconds, Fewer Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
SE +/- 0.00, N = 3
1.73
SE +/- 0.00, N = 3
2.19
SE +/- 0.02, N = 3
1.64
SE +/- 0.01, N = 3
2.06
SE +/- 0.00, N = 3
1.28
SE +/- 0.00, N = 3
1.61
0.4928
0.9856
1.4784
1.9712
2.464

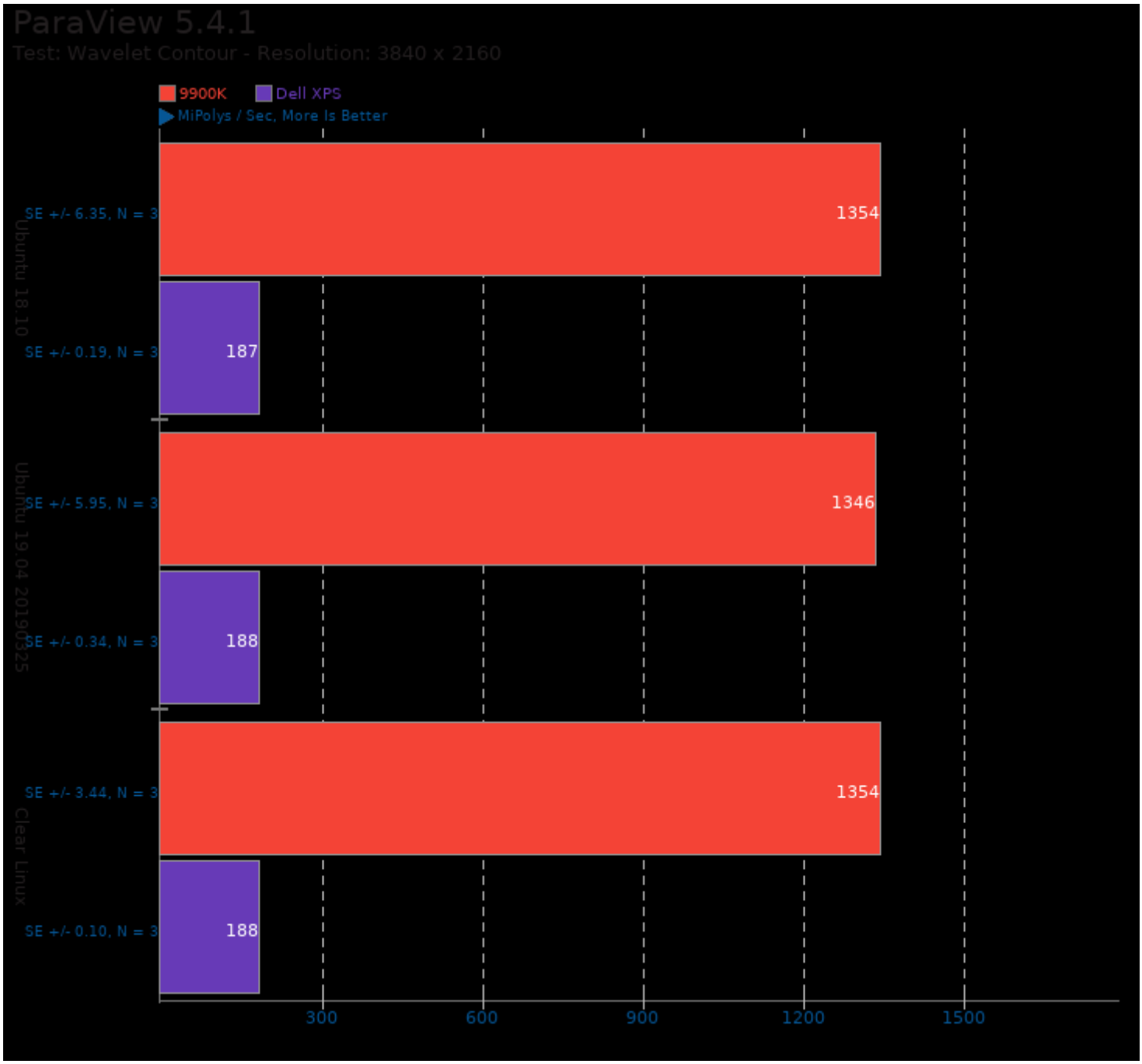

Tesseract 2014-05-12
Resolution: 3840 x 2160
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
Ubuntu 19.04 20190325
Clear Linux
SE +/- 1.71, N = 3
261.00
SE +/- 0.74, N = 3
55.55
SE +/- 1.77, N = 3
232.00
SE +/- 0.50, N = 3
59.06
SE +/- 1.58, N = 3
307.00
SE +/- 0.88, N = 3
58.93
70
140
210
280
350

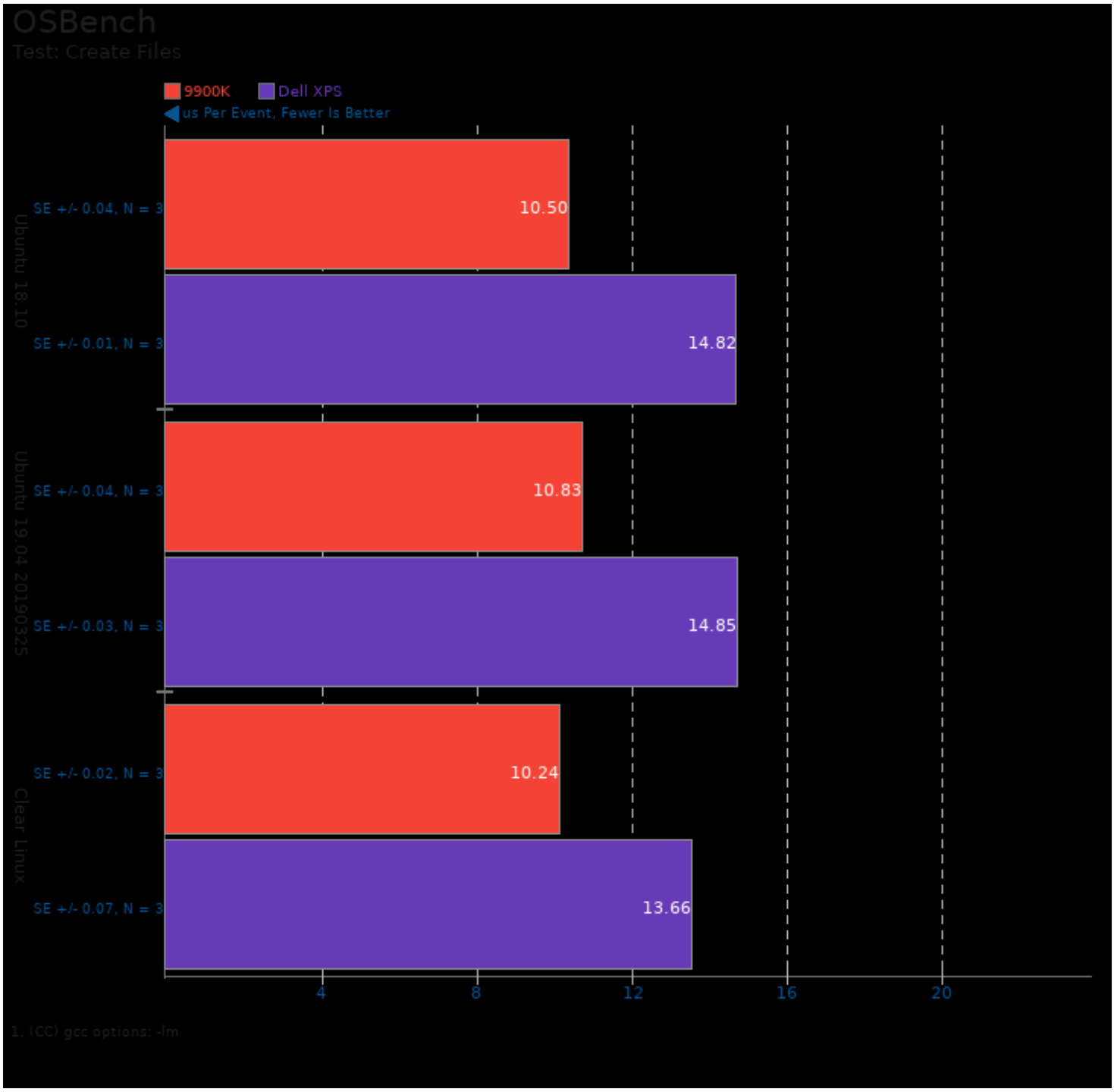

Xonotic 0.8.2
Resolution: 3840 x 2160 - Effects Quality: Ultimate
9900K
Dell XPS
Frames Per Second, More Is Better
Ubuntu 18.10
SE +/- 2.48, N = 3
207.00
SE +/- 0.04, N = 3
60.07
Ubuntu 19.04 20190325
SE +/- 0.67, N = 3
217.00
SE +/- 0.02, N = 3
63.25
Clear Linux
SE +/- 0.87, N = 3
245.00
SE +/- 0.09, N = 3
63.67
50
100
150
200
250
ParaView 5.4.1
Test: Many Spheres - Resolution: 3840 x 2160
Frames / Sec, More Is Better
Ubuntu 18.10
SE +/- 0.06, N = 3
37.44
Ubuntu 19.04 20190325
SE +/- 0.03, N = 3
37.39
Clear Linux
SE +/- 0.09, N = 3
37.43
9
18
27
36
45

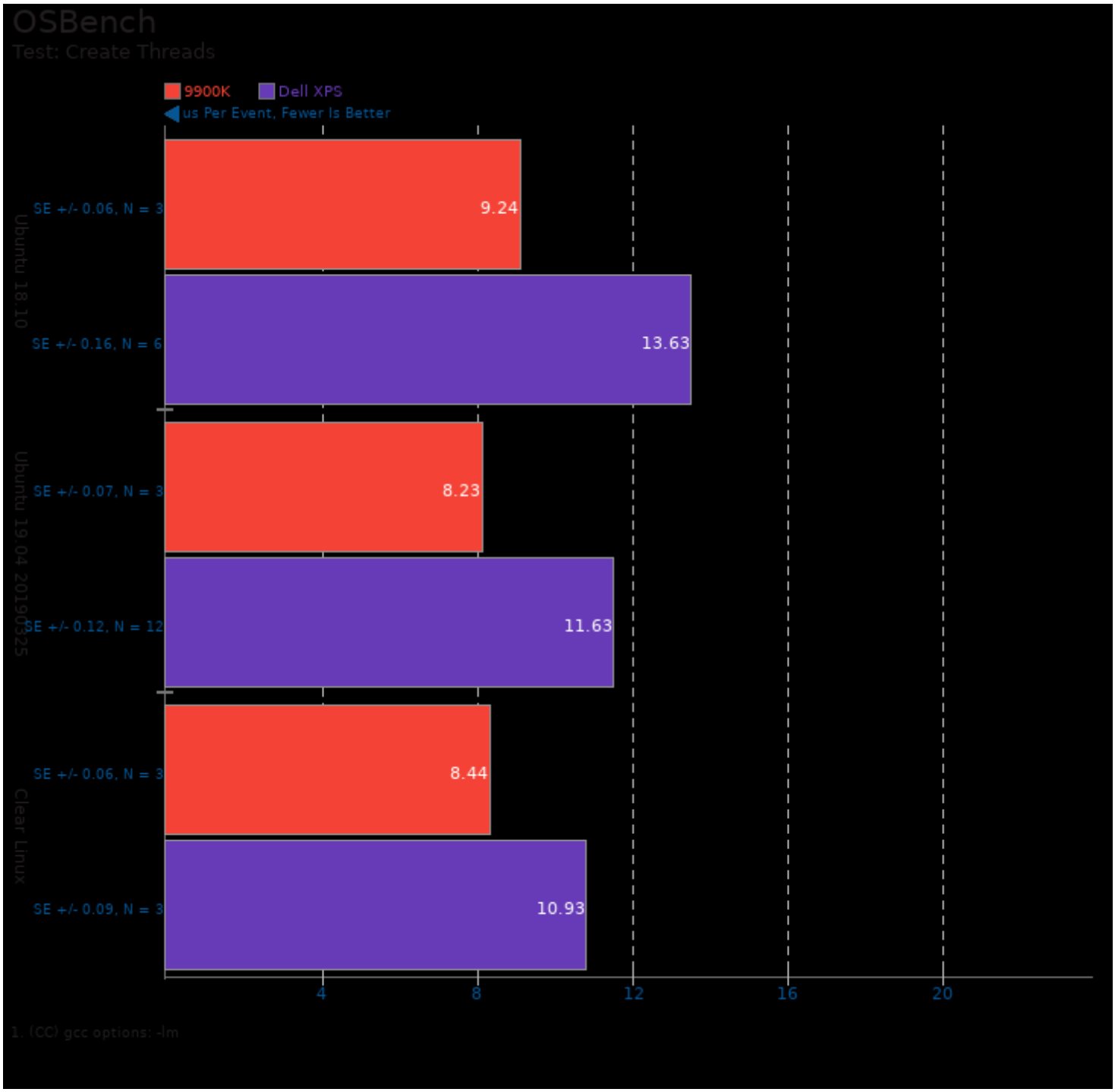

ParaView 5.4.1
Test: Many Spheres - Resolution: 3840 x 2160
MiPolys / Sec, More Is Better
Ubuntu 18.10
SE +/- 5.81, N = 3
3753
Ubuntu 19.04 20190325
SE +/- 3.46, N = 3
3748
Clear Linux
SE +/- 9.05, N = 3
3753
800
1600
2400
3200
4000
ParaView 5.4.1
Test: Wavelet Volume - Resolution: 3840 x 2160
9900K
Dell XPS
Frames / Sec, More Is Better
Ubuntu 18.10
SE +/- 1.65, N = 12
75.36
SE +/- 0.15, N = 3
24.55
Ubuntu 19.04 20190325
SE +/- 1.80, N = 12
70.86
SE +/- 0.19, N = 3
24.50
Clear Linux
SE +/- 1.85, N = 12
140.70
SE +/- 0.09, N = 3
26.78
30
60
90
120
150

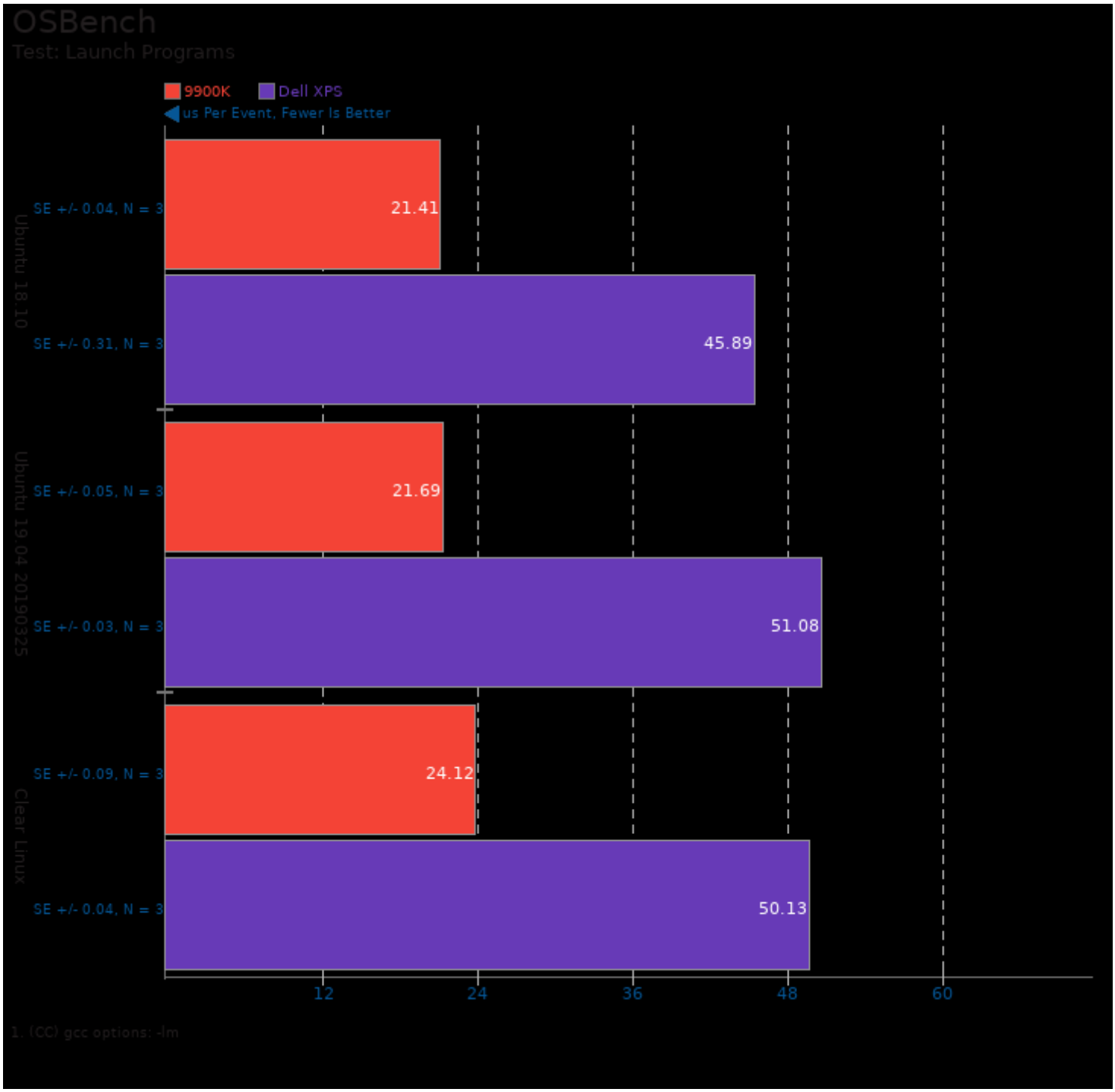

ParaView 5.4.1
Test: Wavelet Volume - Resolution: 3840 x 2160
9900K
Dell XPS
MiVoxels / Sec, More Is Better
SE +/- 26.47, N = 12
1206
Ubuntu 18.10
SE +/- 2.41, N = 3
393
SE +/- 28.74, N = 12
1134
Ubuntu 19.04 20190325
SE +/- 3.14, N = 3
392
SE +/- 29.64, N = 12
2251
Clear Linux
SE +/- 1.44, N = 3
429
500
1000
1500
2000
2500

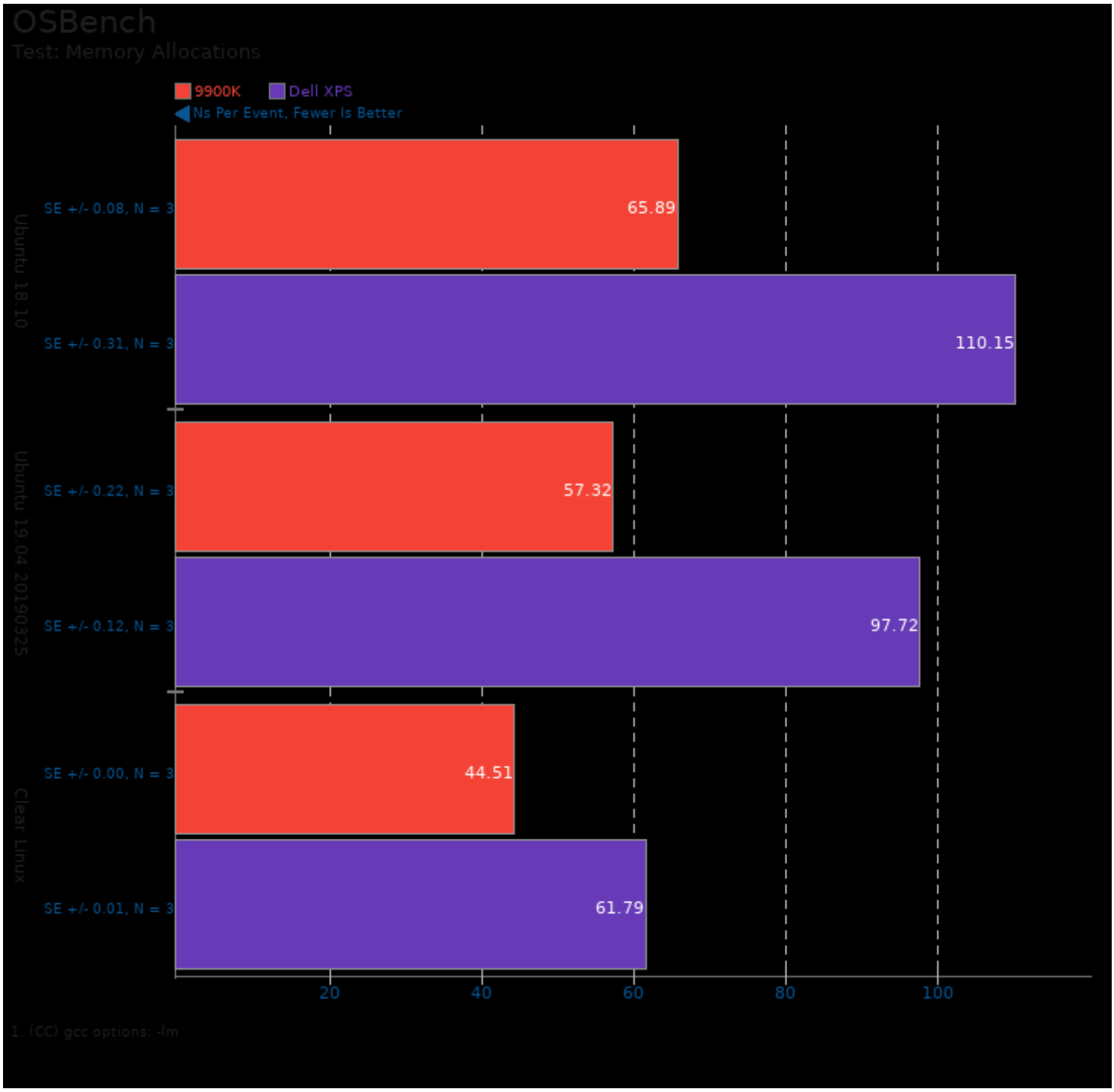

ParaView 5.4.1
Test: Wavelet Contour - Resolution: 3840 x 2160
9900K
Dell XPS
Frames / Sec, More Is Better
Ubuntu 18.10
SE +/- 0.61, N = 3
130.00
SE +/- 0.02, N = 3
17.98
Ubuntu 19.04 20190325
SE +/- 0.57, N = 3
129.00
SE +/- 0.03, N = 3
18.08
Clear Linux
SE +/- 0.33, N = 3
130.00
SE +/- 0.01, N = 3
18.07
30
60
90
120
150


ParaView 5.4.1
Test: Wavelet Contour - Resolution: 3840 x 2160
9900K
Dell XPS
MiPolys / Sec, More Is Better
Ubuntu 18.10
SE +/- 6.35, N = 3
1354
SE +/- 0.19, N = 3
187
Ubuntu 19.04 20190325
SE +/- 5.95, N = 3
1346
SE +/- 0.34, N = 3
188
Clear Linux
SE +/- 3.44, N = 3
1354
SE +/- 0.10, N = 3
188
300
600
900
1200
1500

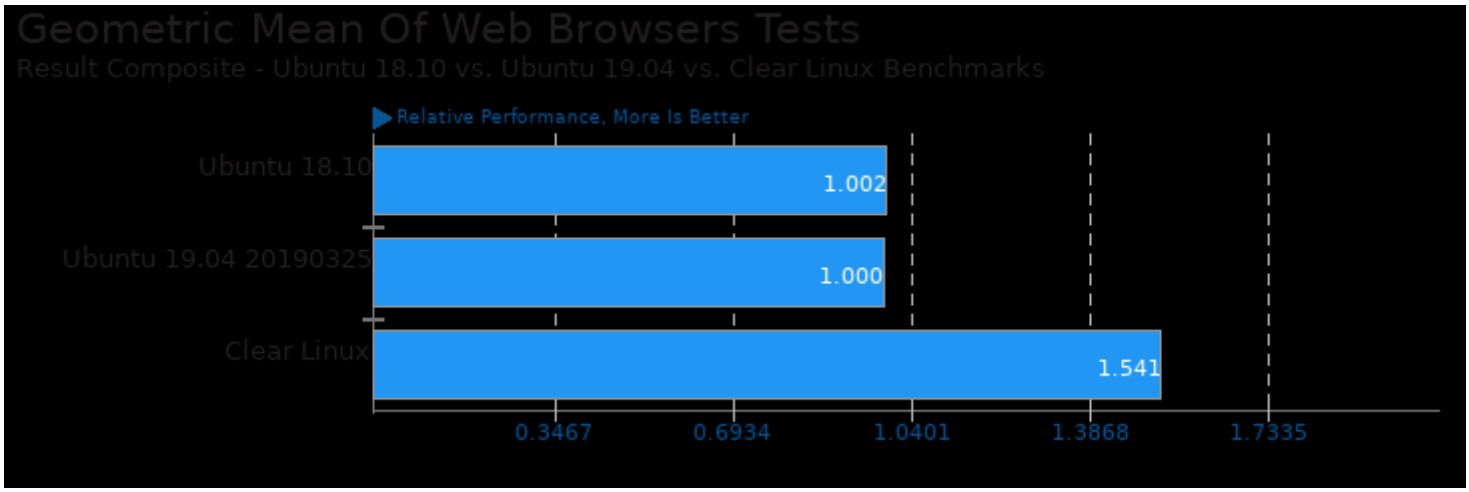

OSBench
Test: Create Files
9900K
Dell XPS
us Per Event, Fewer Is Better
Ubuntu 18.10
SE +/- 0.04, N = 3
10.50
SE +/- 0.01, N = 3
14.82
Ubuntu 19.04 20190325
SE +/- 0.04, N = 3
10.83
SE +/- 0.03, N = 3
14.85
Clear Linux
SE +/- 0.02, N = 3
10.24
SE +/- 0.07, N = 3
13.66
4
8
12
16
20
1. (CC) gcc options: -lm


OSBench
Test: Create Threads
9900K
Dell XPS
us Per Event, Fewer Is Better
Ubuntu 18.10
SE +/- 0.06, N = 3
9.24
SE +/- 0.16, N = 6
13.63
Ubuntu 19.04 20190325
SE +/- 0.07, N = 3
8.23
SE +/- 0.12, N = 12
11.63
Clear Linux
SE +/- 0.06, N = 3
8.44
SE +/- 0.09, N = 3
10.93
4
8
12
16
20
1. (CC) gcc options: -lm

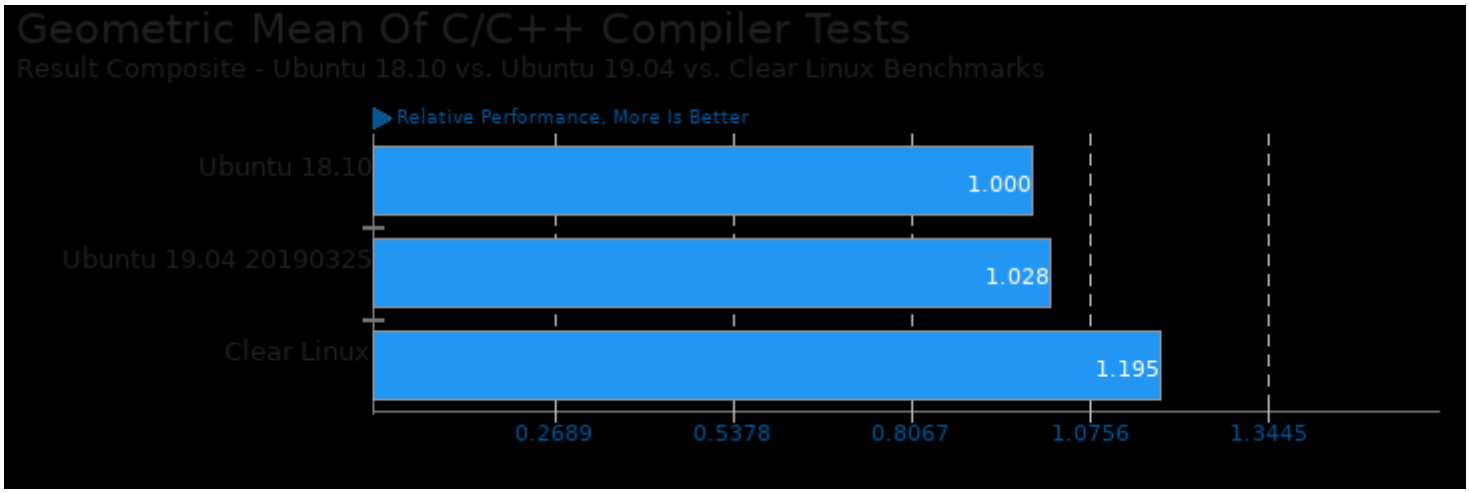

OSBench
Test: Launch Programs
9900K
Dell XPS
us Per Event, Fewer Is Better
Ubuntu 18.10
SE +/- 0.04, N = 3
21.41
SE +/- 0.31, N = 3
45.89
Ubuntu 19.04 20190325
SE +/- 0.05, N = 3
21.69
SE +/- 0.03, N = 3
51.08
Clear Linux
SE +/- 0.09, N = 3
24.12
SE +/- 0.04, N = 3
50.13
12
24
36
48
60
1. (CC) gcc options: -lm


OSBench
Test: Memory Allocations
9900K
Dell XPS
Ns Per Event, Fewer Is Better
Ubuntu 18.10
SE +/- 0.08, N = 3
65.89
SE +/- 0.31, N = 3
110.15
Ubuntu 19.04 20190325
SE +/- 0.22, N = 3
57.32
SE +/- 0.12, N = 3
97.72
Clear Linux
SE +/- 0.00, N = 3
44.51
SE +/- 0.01, N = 3
61.79
20
40
60
80
100
1. (CC) gcc options: -lm

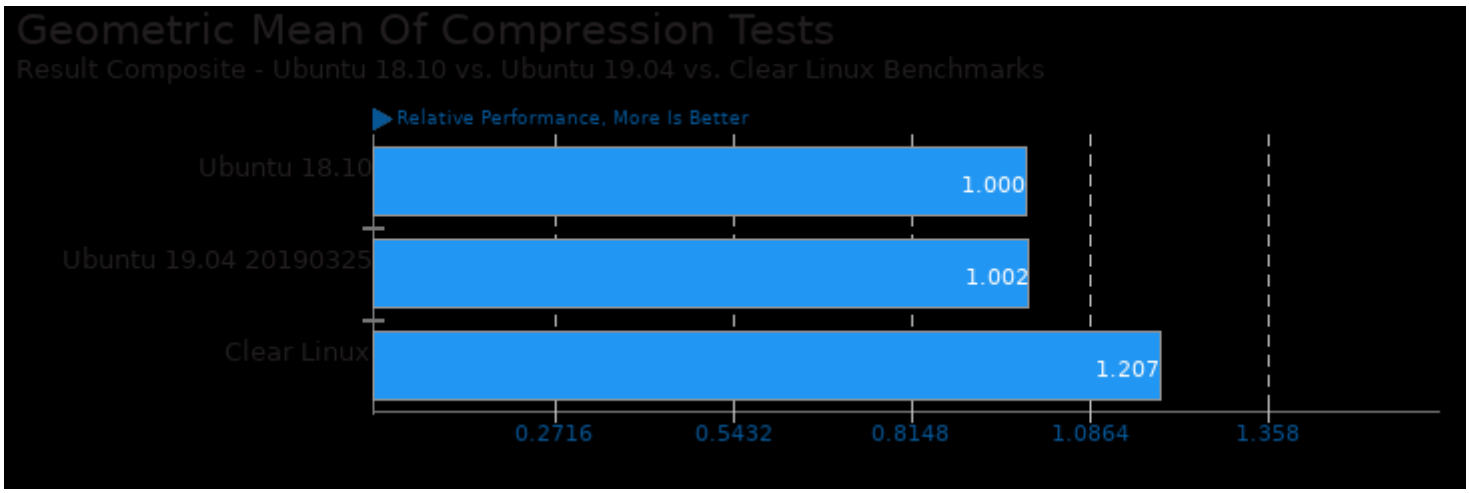
These geometric means are based upon test groupings / test suites for this result file.



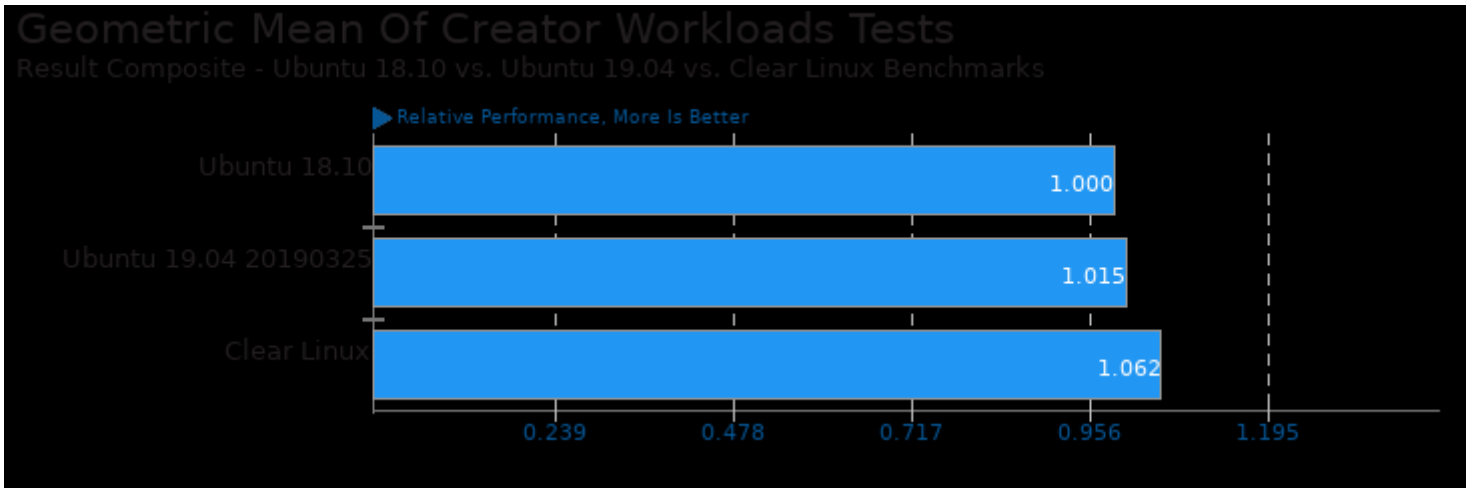
Geometric mean based upon tests: system/selenium



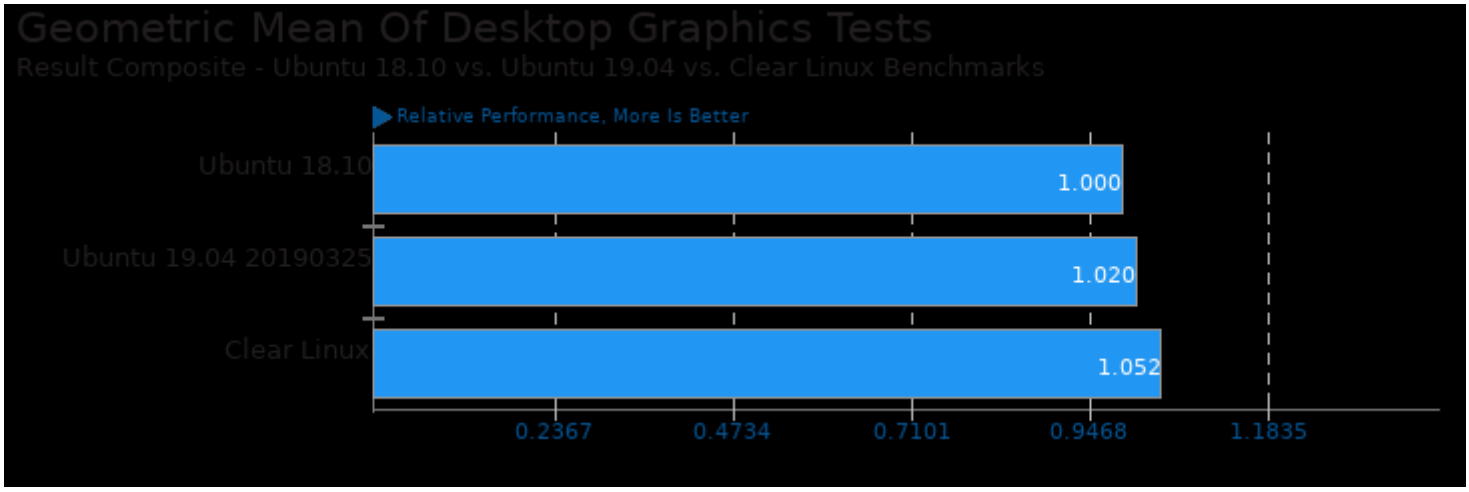
Geometric mean based upon tests: pts/vpxenc, pts/hmmer, pts/x265, pts/compress-zstd, pts/openssl and pts/svt-vp9



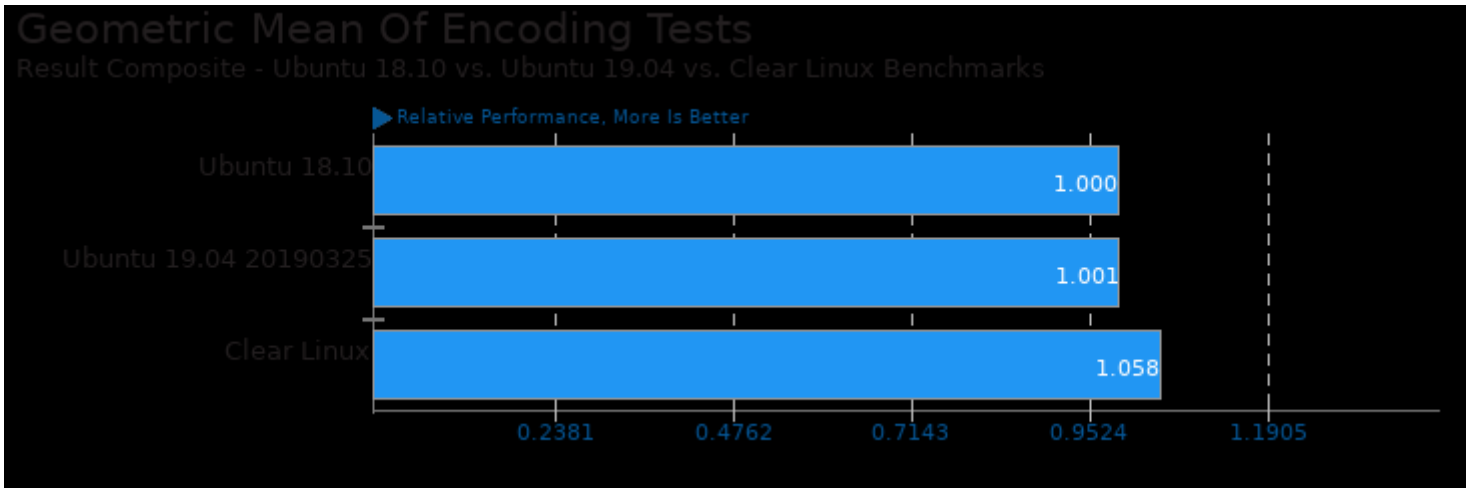
Geometric mean based upon tests: pts/compress-pbzip2 and pts/compress-zstd



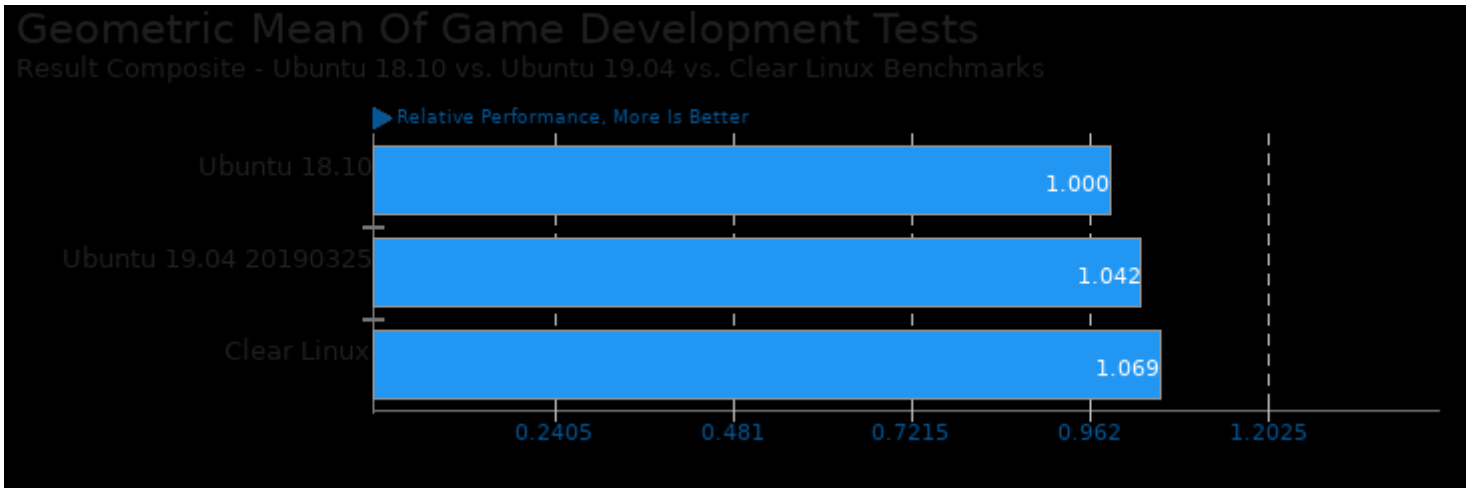
Geometric mean based upon tests: pts/blender, pts/svt-vp9, pts/svt-hevc, pts/x265, pts/vpxenc and pts/luajit



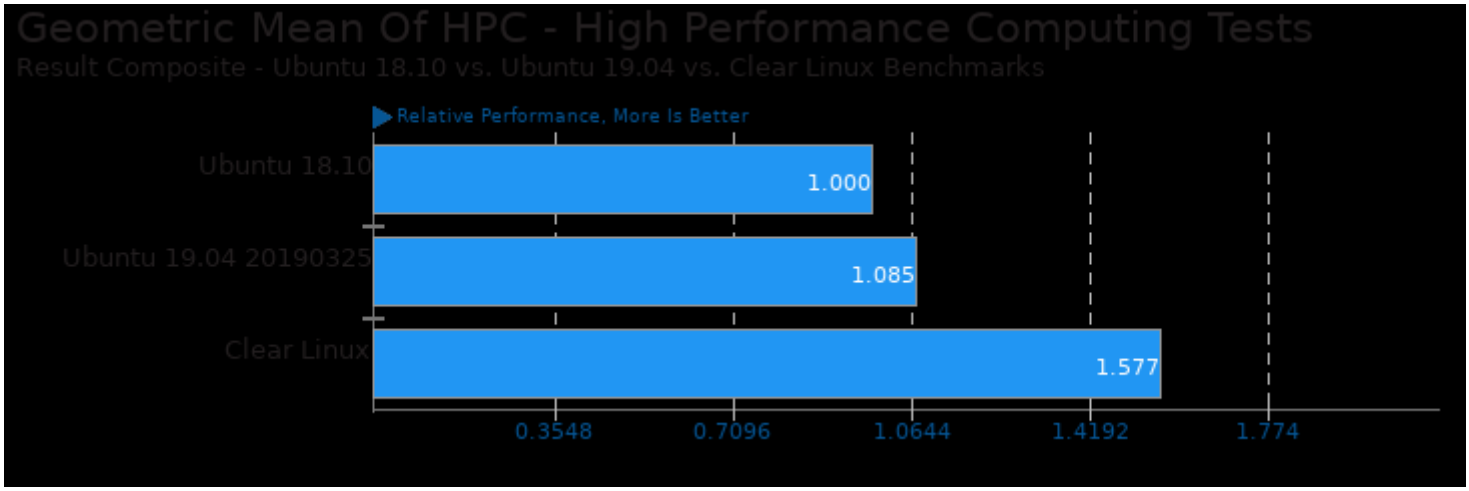
Geometric mean based upon tests: pts/xonotic, pts/tesseract and pts/paraview



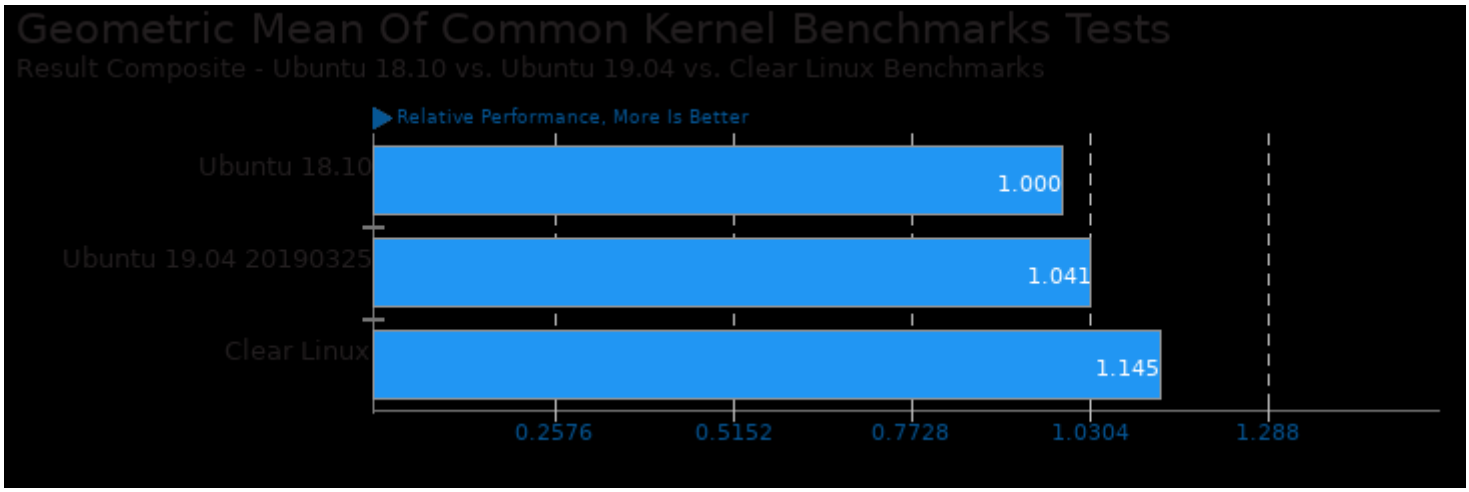
Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x265 and pts/vpxenc



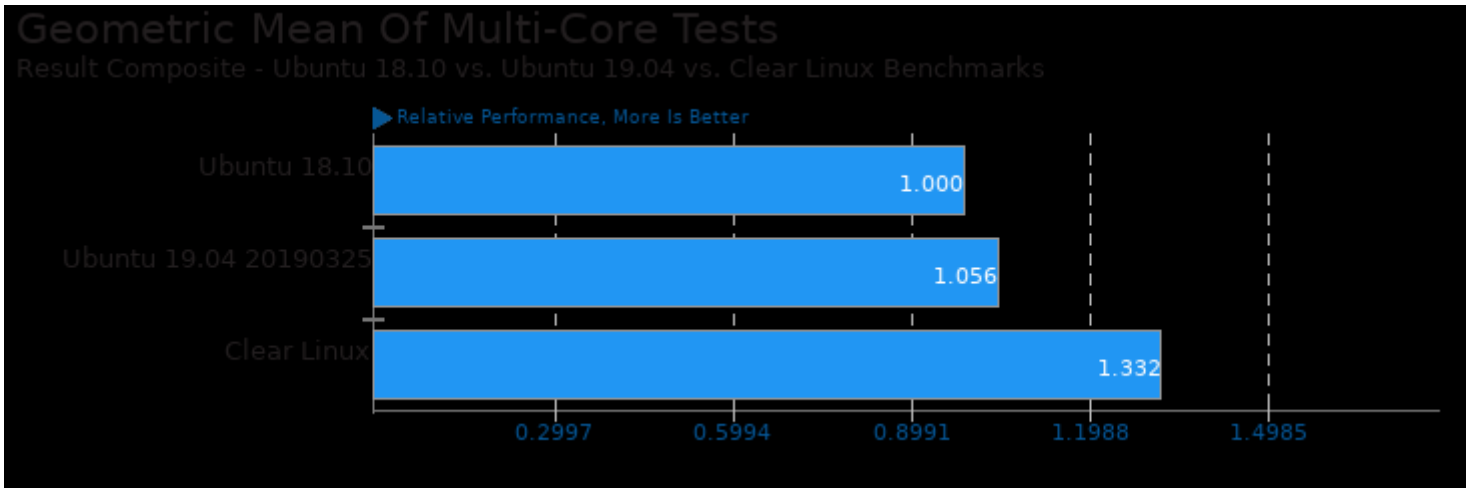
Geometric mean based upon tests: pts/luajit and pts/blender



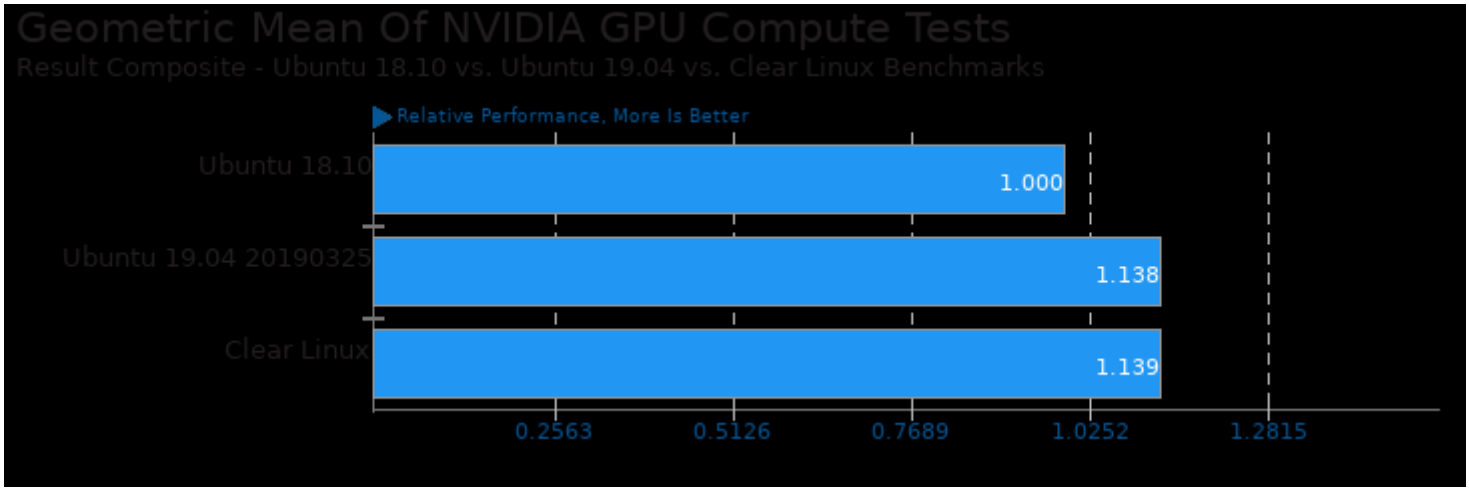
Geometric mean based upon tests: pts/npb, pts/rodinia, pts/parboil, pts/namd, pts/hmmer and pts/rbenchmark



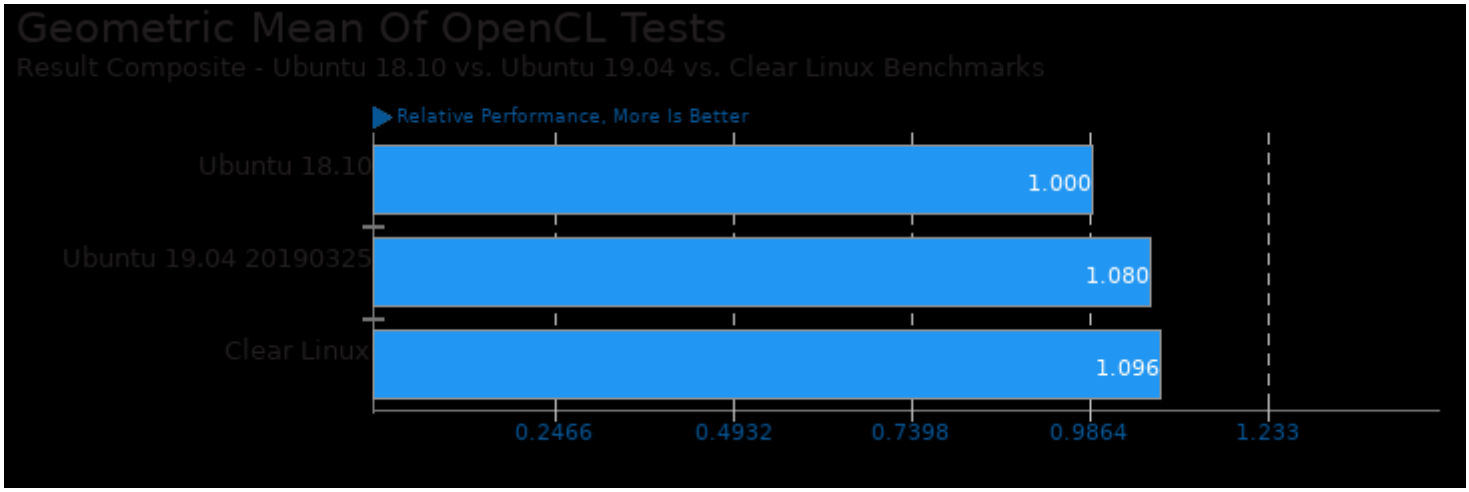
Geometric mean based upon tests: pts/t-test1, pts/openssl, pts/hackbench, pts/stress-ng and pts/osbench



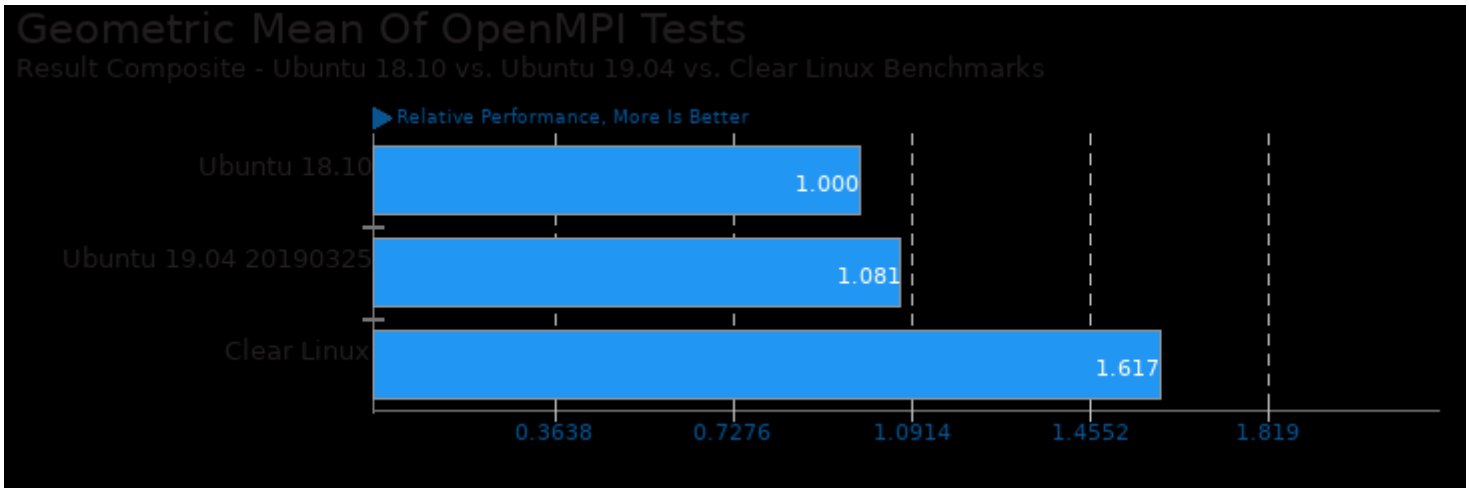
Geometric mean based upon tests: pts/blender, pts/svt-vp9, pts/svt-hevc, pts/x265, pts/vpxenc, pts/primesieve, pts/rodinia, pts/parboil, pts/npb, pts/namd, pts/compress-pbzip2, pts/compress-zstd and pts/build-linux-kernel



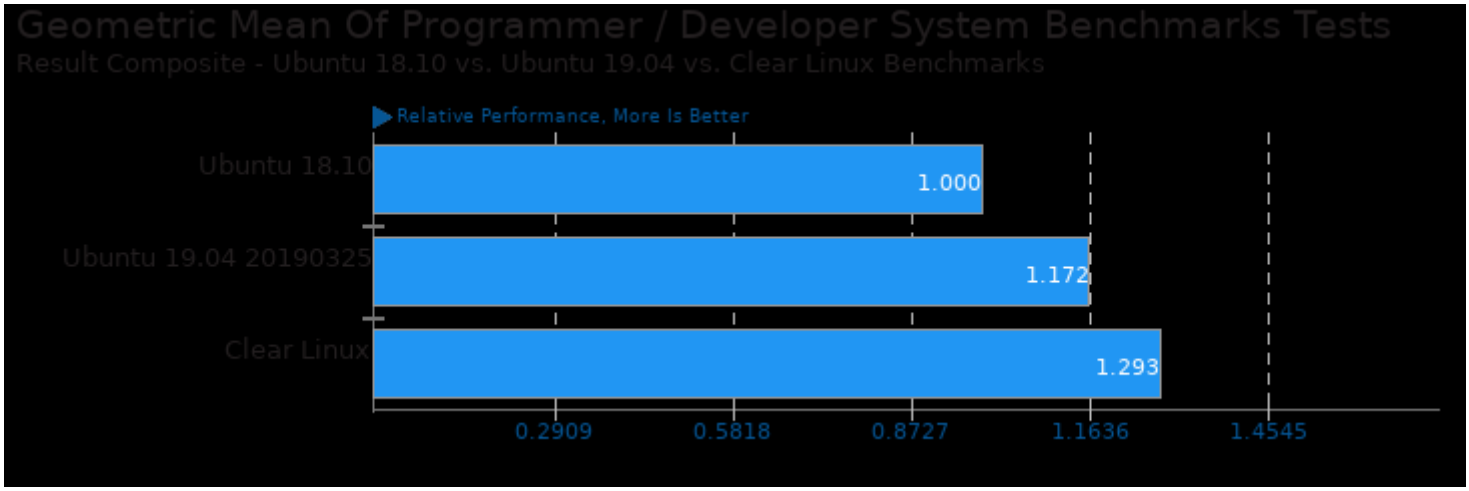
Geometric mean based upon tests: pts/rodinia and pts/blender



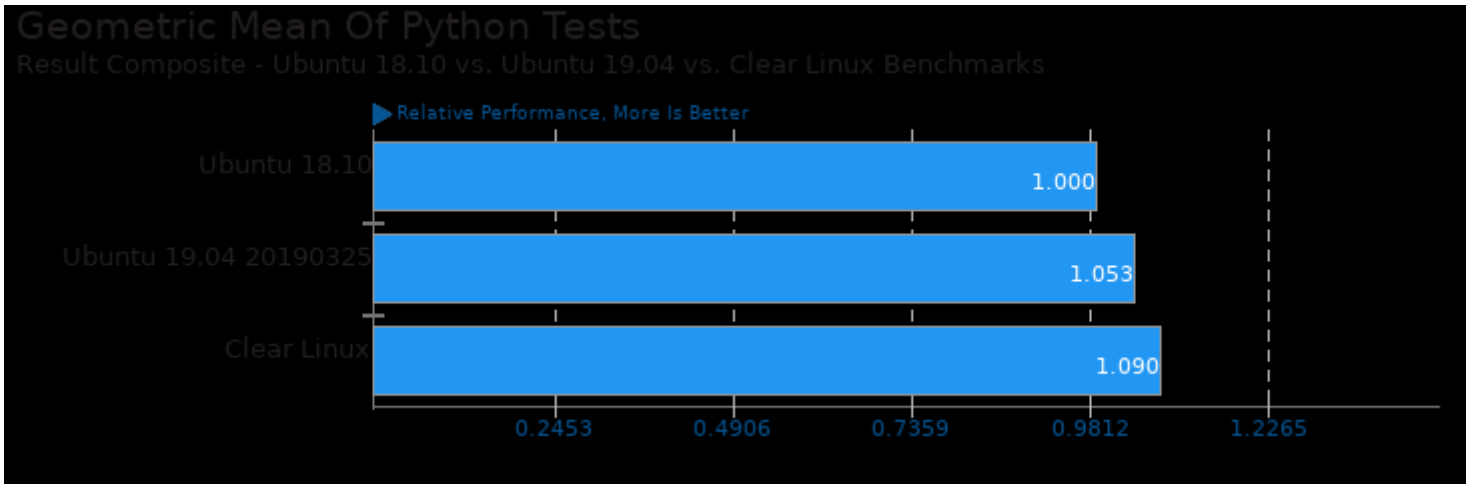
Geometric mean based upon tests: pts/rodinia and pts/parboil



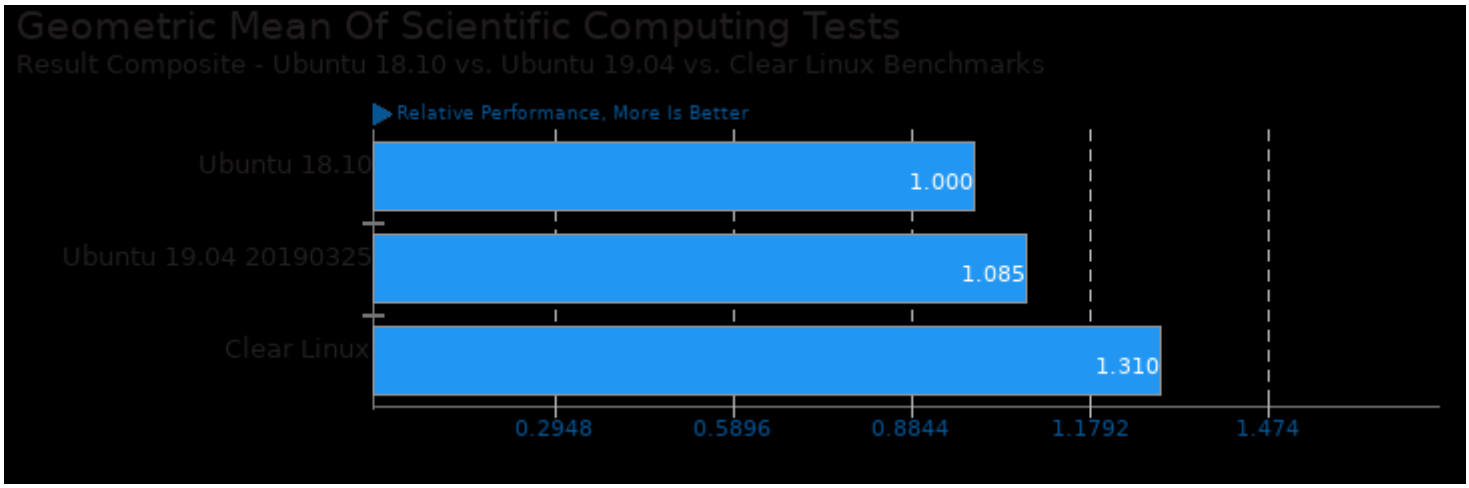
Geometric mean based upon tests: pts/npb, pts/parboil and pts/rodinia



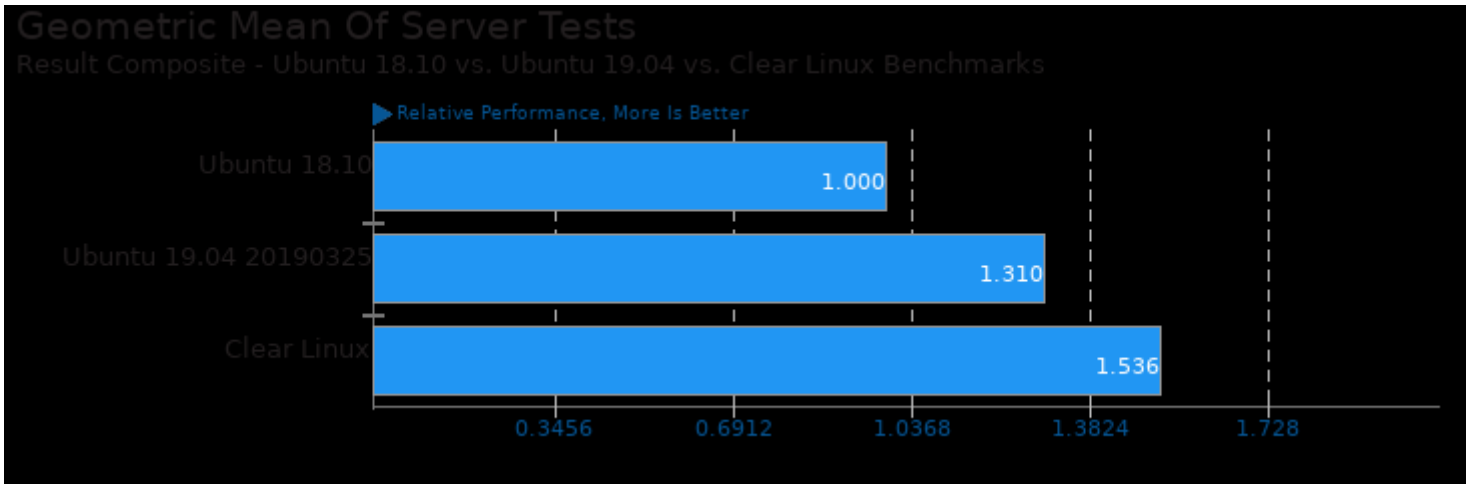
Geometric mean based upon tests: pts/git, pts/compress-zstd, pts/pybench and pts/build-linux-kernel



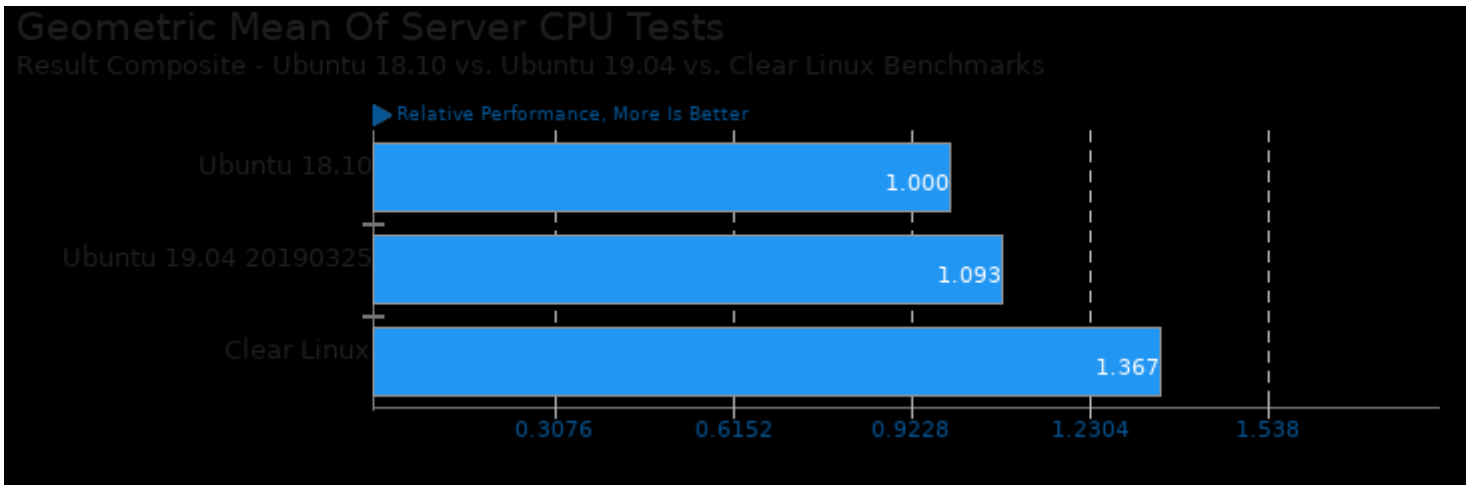
Geometric mean based upon tests: pts/parboil, pts/pybench and pts/paraview



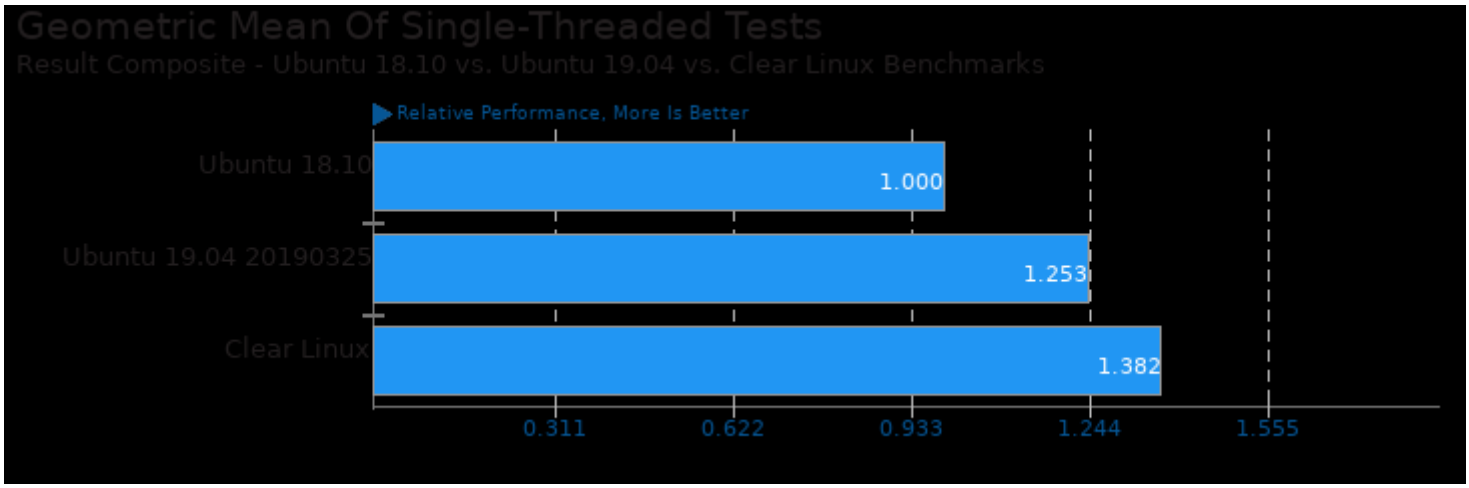
Geometric mean based upon tests: pts/namd and pts/hmmer



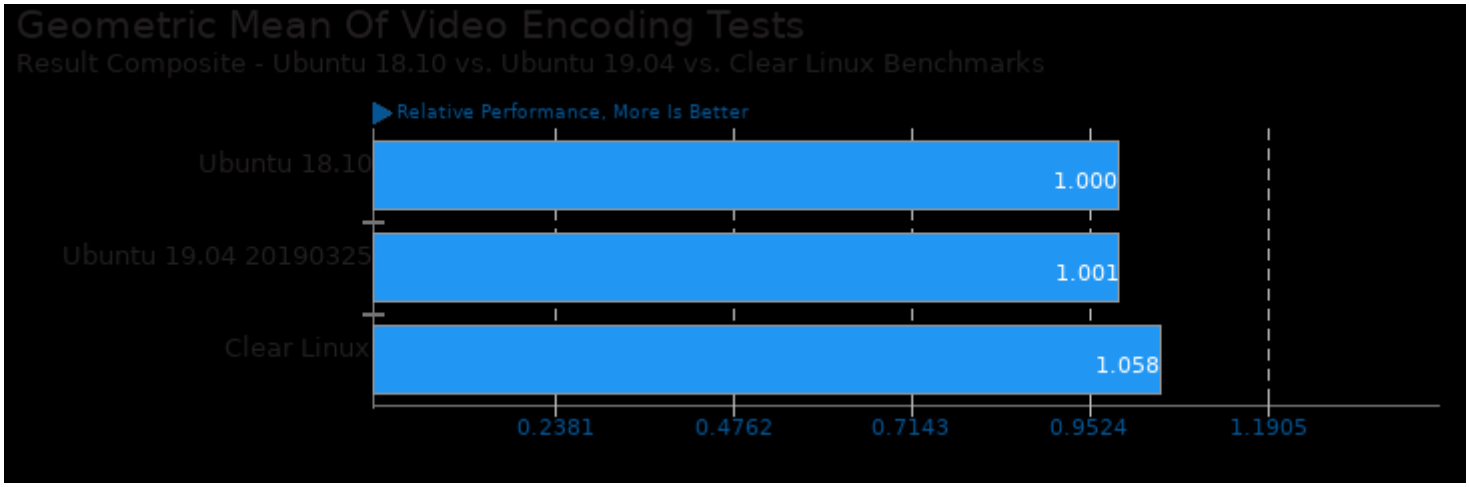
Geometric mean based upon tests: pts/php, pts/phpbench, pts/openssl and pts/perl-benchmark



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/namd, pts/svt-hevc, pts/svt-vp9, pts/x265, pts/build-linux-kernel, pts/compress-zstd, pts/hackbench, pts/openssl, pts/stress-ng, pts/blender, pts/pybench and pts/phpbench



Geometric mean based upon tests: pts/luajit, pts/perl-benchmark, pts/rbenchmark, pts/pybench, pts/phpbench and pts/git



Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x265 and pts/vpxenc



Geometric mean based upon tests: pts/blender, pts/rodinia, pts/parboil, pts/x265, pts/paraview and pts/git

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 07:03.