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Core i9 7960X Linux 5.0 Kernel Benchmarks

Linux 4.12 to Linux 5.0 kernel benchmarks on an Intel Core i9 7960X. Benchmarks by Michael Larabel.

Automated Executive Summary

Linux 4.12 had the most wins, coming in first place for 30% of the tests.

Based on the geometric mean of all complete results, the fastest (Linux 4.13) was 1.07x the speed of the slowest (Linux 4.19). Linux 4.14 was 0.991x the speed of Linux 4.13, Linux 4.12 was 0.981x the speed of Linux 4.14, Linux 5.0 Git was 0.971x the speed of Linux 4.12, Linux 4.20 was 0.998x the speed of Linux 5.0 Git, Linux 4.16 was 0.999x the speed of Linux 4.20, Linux 4.17 was 0.995x the speed of Linux 4.16, Linux 4.15 was 1x the speed of Linux 4.17, Linux 4.18 was 0.999x the speed of Linux 4.15, Linux 4.19 was 1x the speed of Linux 4.18.

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

Stress-NG (Test: Context Switching) at 8.331x
ctx_clock (Context Switch Time) at 4.29x
Systemd Total Boot Time (Test: Kernel) at 3.287x
Stress-NG (Test: System V Message Passing) at 1.875x
Sockperf (Test: Throughput) at 1.697x
OSBench (Test: Create Threads) at 1.646x
Stress-NG (Test: Socket Activity) at 1.576x

Hackbench (Count: 32 - Type: Process) at 1.469x
GNU Octave Benchmark at 1.461x
OSBench (Test: Create Processes) at 1.306x.

Test Systems:

Linux 4.12

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.12.0-041200-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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 / data=ordered,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

Linux 4.13

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.13.0-041300-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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 / data=ordered,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

Linux 4.14

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS

VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.14.0-041400-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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 / data=ordered,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

Linux 4.15

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.15.0-041500-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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 / data=ordered,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: KPTI + Full generic retpoline

Linux 4.16

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.16.0-041600-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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 / data=ordered,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: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW

Linux 4.17

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.17.0-041700-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

Linux 4.18

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.18.0-041800-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

Linux 4.19

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.19.0-041900-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Linux 4.20

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 4.20.0-042000-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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: 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

Linux 5.0 Git

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G8, Graphics: Gigabyte AMD Radeon RX 550/550X 2GB (1206/1750MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I219-V + Intel I211

OS: Ubuntu 18.10, Kernel: 5.0.0-999-generic (x86_64) 20190217, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (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: 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

	Linux 4.12	Linux 4.13	Linux 4.14	Linux 4.15	Linux 4.16	Linux 4.17	Linux 4.18	Linux 4.19	Linux 4.20	Linux 5.0 Git
BlogBench - Read (Final Score)	**1441338**	1277929	1435431	1433530	1368724	1281157	1413307	1380708	**1239923**	1335880
Normalized	100%	88.66%	99.59%	99.46%	94.96%	88.89%	98.06%	95.79%	86.03%	92.68%

Core i9 7960X Linux 5.0 Kernel Benchmarks

Standard Deviation	6.5%	10.9%	12.1%	14.9%	12.4%	12.2%	6.8%	11.7%	9.6%	12%
FS-Mark - 5.F.1.S.4.T (Files/s)	111	118	121	116	116	115	109	101	109	120
Normalized	91.74%	97.52%	100%	95.87%	95.87%	95.04%	90.08%	83.47%	90.08%	99.17%
Standard Deviation	2.5%	7.2%	8.2%	7.5%	7.5%	10.9%	10.9%	7.8%	13.3%	4.8%
BRL-CAD - V.P.M (VGR Performance Metric)	197740	195417	195636	190789	189766	191202	189662	189338	189860	191503
Normalized	100%	98.83%	98.94%	96.48%	95.97%	96.69%	95.91%	95.75%	96.01%	96.85%
FS-Mark - 4.F.3.S.D.1.S (Files/s)	68.56	68.84	68.49	68.88	70.25	66.93	68.77	66.62	68.24	67.65
Normalized	97.59%	97.99%	97.49%	98.05%	100%	95.27%	97.89%	94.83%	97.14%	96.3%
Standard Deviation	15.7%	13%	10.9%	12.3%	16.3%	5.7%	10.6%	4.7%	16%	15.5%
Compile Bench - Compile (MB/s)	934	937	937	849	844	843	855	847	854	855
Normalized	99.68%	100%	100%	90.61%	90.07%	89.97%	91.25%	90.39%	91.14%	91.25%
Standard Deviation	5.4%	2.8%	5.6%	3.7%	5%	3.2%	3.3%	3.2%	2.6%	3.8%
NAS Parallel Benchmarks - SP.A (Mop/s)	452	452	452	433	434	435	433	434	434	434
Normalized	100%	100%	100%	95.8%	96.02%	96.24%	95.8%	96.02%	96.02%	96.02%
Standard Deviation	0.1%	0.1%	0%	0.2%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%
NAS Parallel Benchmarks - LU.C (Mop/s)	11085	11108	11091	9912	10344	10669	10657	10655	10655	10654
Normalized	99.79%	100%	99.85%	89.23%	93.12%	96.05%	95.94%	95.92%	95.92%	95.91%
Standard Deviation	0.1%	0.1%	0.2%	0.5%	1.1%	0%	0.1%	0.1%	0.1%	0.3%
Blender - Barbershop - CPU-Only (sec)	577	578	578	579	578	578	578	578	578	578
Normalized	100%	99.83%	99.83%	99.65%	99.83%	99.83%	99.83%	99.83%	99.83%	99.83%
Xonotic - 3840 x 2160 - Ultimate (FPS)	66.51	66.54	66.80	64.08	64.44	64.52	64.47	64.88	64.69	64.59
Normalized	99.57%	99.61%	100%	95.93%	96.47%	96.59%	96.51%	97.13%	96.84%	96.69%
Standard Deviation	0.1%	0.3%	0.2%	0.3%	0.5%	0.2%	0.3%	0.5%	0.2%	0.4%
DaCapo Benchmark -	3103	3170	3375	3232	3270	3272	3282	3217	3222	3235
Normalized	100%	97.89%	91.94%	96.01%	94.89%	94.83%	94.55%	96.46%	96.31%	95.92%
Standard Deviation	11.1%	10.4%	16.2%	1.3%	2.1%	2.1%	1.3%	1.9%	3.1%	3.4%
DaCapo Benchmark -	2986	2852	2836	3004	3006	3040	3035	3065	3085	3068
Normalized	94.98%	99.44%	100%	94.41%	94.34%	93.29%	93.44%	92.53%	91.93%	92.44%
Standard Deviation	18.4%	1.3%	1.3%	1.2%	1.1%	1.8%	2.5%	1.2%	1.9%	0.3%
XZ Compression - C.u.1.0.3.s.i.i.C.L.9 (sec)	85.07	86.30	86.20	85.18	84.58	85.50	84.98	85.51	85.55	85.27
Normalized	99.42%	98.01%	98.12%	99.3%	100%	98.92%	99.53%	98.91%	98.87%	99.19%
Standard Deviation	0.6%	0.9%	1.6%	0.5%	0.5%	0.1%	0.8%	0.5%	0.1%	0.3%

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NAMD - ATPase Simulation - 327,506 Atoms	1.02607	1.06390	1.07717	1.06693	1.06728	1.06732	1.06739	1.06557	1.06267	1.06771
Normalized	100%	96.44%	95.26%	96.17%	96.14%	96.14%	96.13%	96.29%	96.56%	96.1%
Standard Deviation	0.3%	6.8%	7.3%	0%	0.1%	0.1%	0.2%	0.1%	0%	0.2%
Timed LLVM Compilation - Time To Compile (sec)	246	236	233	248	240	247	249	251	252	250
Normalized	94.72%	98.73%	100%	93.95%	97.08%	94.33%	93.57%	92.83%	92.46%	93.2%
Cryptsetup - PBKDF2-whirlpool (Iterations/sec)	960188	930854	936410	939024	937905	981821	984270	979372	982426	
Normalized	97.55%	94.57%	95.14%	95.4%	95.29%	99.75%	100%	99.5%	99.81%	
Standard Deviation	2.7%	6.1%	5.9%	0.1%	0.2%	0.4%	0.1%	0.3%	0.1%	
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	513316	527596	514126	483791	481499	481641	486733	484720	476537	471254
Normalized	97.29%	100%	97.45%	91.7%	91.26%	91.29%	92.25%	91.87%	90.32%	89.32%
Standard Deviation	0.5%	0.8%	0.4%	0.3%	0.7%	0.3%	0.7%	0.4%	1.6%	1.6%
Parboil - OpenMP LBM (sec)	70.80	71.31	71.37	71.08	71.10	71.05	71.06	70.83	70.78	70.74
Normalized	99.92%	99.2%	99.12%	99.52%	99.49%	99.56%	99.55%	99.87%	99.94%	100%
Standard Deviation	0.1%	1.1%	1.1%	0%	0%	0%	0%	0%	0.1%	0%
LeelaChessZero - BLAS (Nodes/s)	279	284	283	269	267	273	272	272	271	273
Normalized	98.24%	100%	99.65%	94.72%	94.01%	96.13%	95.77%	95.77%	95.42%	96.13%
Standard Deviation	0%	1.8%	0.9%	3.3%	1.1%	2%	1.8%	1%	1.4%	1%
Cryptsetup - PBKDF2-sha512 (Iterations/sec)	1609799	1581770	1578102	1587255	1593588	1679542	1686718	1668836	1681349	1677741
Normalized	95.44%	93.78%	93.56%	94.1%	94.48%	99.57%	100%	98.94%	99.68%	99.47%
Standard Deviation	4.5%	6.5%	6.4%	1%	0.3%	0.5%	0.1%	0.4%	0.6%	0.4%
Timed Linux Kernel Compilation - Time To Compile (sec)	43.41	43.95	44.17	45.05	44.66	44.83	44.94	44.91	44.80	45.27
Normalized	100%	98.77%	98.28%	96.36%	97.2%	96.83%	96.6%	96.66%	96.9%	95.89%
Standard Deviation	3.6%	3.3%	3.3%	3.3%	3%	3.2%	2.6%	3%	3.1%	3.2%
Cryptsetup - PBKDF2-whirlpool (Iterations/sec)	951646	957561	965007	938463	952595	983045	983042	984270	982426	983042
Normalized	96.69%	97.29%	98.04%	95.35%	96.78%	99.88%	99.88%	100%	99.81%	99.88%
Standard Deviation	3.3%	3.6%	3.5%	0.1%	2.8%	0.3%	0.2%	0.1%	0.1%	0.2%
IndigoBench - Bedroom (M samples/s)	2.33	2.31	2.31	2.31	2.31	2.30	2.30	2.30	2.30	2.30
Normalized	100%	99.14%	99.14%	99.14%	99.14%	98.71%	98.71%	98.71%	98.71%	98.71%
Standard Deviation	0.1%	1.3%	1.3%	0.1%	0.2%	0.2%	0.1%	0%	0%	0.1%

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IndigoBench - Supercar (M samples/s)	**5.72**	**5.45**	**5.45**	5.50	5.50	5.50	5.49	5.50	5.48	5.51
Normalized	100%	95.28%	95.28%	96.15%	96.15%	96.15%	95.98%	96.15%	95.8%	96.33%
Standard Deviation	0.4%	0.2%	0.1%	0.1%	0.2%	0.1%	0.1%	0.3%	0.3%	0.1%
Stress-NG - Socket Activity (Bogo	**16352**	15660	14206	**10375**	10957	10984	10849	10545	15252	15636
Normalized	100%	95.77%	86.88%	63.45%	67.01%	67.17%	66.35%	64.49%	93.27%	95.62%
Standard Deviation	5.4%	2.5%	3.3%	2.3%	2.3%	2.2%	2.8%	1.7%	10.3%	8%
SQLite - T.S.I (sec)	13.95	14.00	14.26	16.00	15.77	14.75	14.72	15.06	**16.61**	**12.51**
Normalized	89.68%	89.36%	87.73%	78.19%	79.33%	84.81%	84.99%	83.07%	75.32%	100%
Standard Deviation	16.2%	19.1%	11.8%	34.7%	24.2%	30.9%	37.9%	11.9%	23.5%	21.5%
Himeno Benchmark - P.P.S (MFLOPS)	2859	2869	**2822**	2943	2924	**3056**	3043	3054	3043	3041
Normalized	93.55%	93.88%	92.34%	96.3%	95.68%	100%	99.57%	99.93%	99.57%	99.51%
Standard Deviation	0.5%	1.9%	1%	0.2%	1.3%	0.1%	0.2%	0.4%	0.6%	0.4%
Schbench - 8 - 4 (usec, 99.9th Latency Percentile)	101	101	**100**	105	104	106	107	108	108	**110**
Normalized	99.01%	99.01%	100%	95.24%	96.15%	94.34%	93.46%	92.59%	92.59%	90.91%
Standard Deviation	3.3%		4%	2%	1.9%		0.5%	1.1%	1.9%	3.5%
ebizzy (Records/s)	**457858**	478703	469816	470012	489375	458116	**492589**	479383	482232	478733
Normalized	92.95%	97.18%	95.38%	95.42%	99.35%	93%	100%	97.32%	97.9%	97.19%
Standard Deviation	9%	7.3%	7.1%	5.4%	3.4%	0.7%	1.6%	2.4%	7.7%	2.3%
Sockperf - Latency Under Load (usec)	29.52	29.84	29.24	31.32	32.68	32.19	**33.94**	32.45	**26.39**	31.61
Normalized	89.4%	88.44%	90.25%	84.26%	80.75%	81.98%	77.75%	81.33%	100%	83.49%
Standard Deviation	32.3%	22.1%	27.4%	22.5%	19.4%	20.6%	5.8%	22%	40.4%	31.6%
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**672**	663	660	661	660	661	660	660	661	**658**
Normalized	100%	98.66%	98.21%	98.36%	98.21%	98.36%	98.21%	98.21%	98.36%	97.92%
Standard Deviation	4.6%	4.5%	4.5%	0.1%	0.4%	0.5%	0.7%	0.4%	0.1%	0.2%
Node.js Octane Benchmark (Score)	41724	45257	**39198**	43277	44320	45868	45929	45808	**46166**	45881
Normalized	90.38%	98.03%	84.91%	93.74%	96%	99.35%	99.49%	99.22%	100%	99.38%
Standard Deviation	9.7%	3.1%	11.5%	3.2%	0.4%	0.5%	0.5%	0.5%	0.5%	0.4%
Stress-NG - Context Switching (Bogo Ops/s)	**2313307**	15048186	9280054	13704038	13624004	15109550	15143645	15525058	19010699	**19272733**
Normalized	12%	78.08%	48.15%	71.11%	70.69%	78.4%	78.58%	80.55%	98.64%	100%
Standard Deviation	0.6%	23%	14.4%	1.8%	1.6%	0.9%	0.5%	0.8%	0.3%	0.2%
Rust Mandelbrot - T.T.C.S.P.M (sec)	46.20	46.66	**47.14**	45.84	45.74	**44.08**	44.14	44.15	44.27	44.12
Normalized	95.41%	94.47%	93.51%	96.16%	96.37%	100%	99.86%	99.84%	99.57%	99.91%
Standard Deviation	3.2%	1.3%	2.1%	0.2%	0%	0%	0.1%	0%	0.4%	0%
Hackbench - 32 - Process (sec)	33.91	**33.40**	33.55	45.78	46.37	49.06	**49.07**	48.21	48.03	47.28
Normalized	98.5%	100%	99.55%	72.96%	72.03%	68.08%	68.07%	69.28%	69.54%	70.64%
Standard Deviation	0.3%	2.7%	0.3%	0.1%	0.3%	2.4%	2.8%	0.3%	2.7%	0.1%

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Blender - BMW27 - CPU-Only (sec)	119	124	123	123	123	123	123	123	123	123
Normalized	100%	95.97%	96.75%	96.75%	96.75%	96.75%	96.75%	96.75%	96.75%	96.75%
GIMP - unsharp-mask (sec)	18.81	18.89	18.77	19.70	19.73	18.92	18.96	19.13	18.92	18.96
Normalized	99.79%	99.36%	100%	95.28%	95.13%	99.21%	99%	98.12%	99.21%	99%
Standard Deviation	3.7%	3.7%	3.8%	0.2%	0.3%	0.5%	0.2%	0.3%	0.1%	0.1%
Tesseract - 3840 x 2160 (FPS)	72.31	72.16	72.42	70.37	70.97	71.35	71.10	71.23	71.22	70.92
Normalized	99.85%	99.64%	100%	97.17%	98%	98.52%	98.18%	98.36%	98.34%	97.93%
Standard Deviation	0.3%	0.3%	0.5%	0.2%	0.3%	0.4%	0.2%	1%	1.7%	0.3%
LuaJIT - Composite (Mflops)	1568	1612	1517	1544	1529	1593	1591	1592	1592	1593
Normalized	97.27%	100%	94.11%	95.78%	94.85%	98.82%	98.7%	98.76%	98.76%	98.82%
Standard Deviation	0.8%	1.9%	1.6%	0.3%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
GNU Octave Benchmark (sec)	12.28	16.77	17.04	17.84	17.94	17.51	17.51	17.81	17.55	17.41
Normalized	100%	73.23%	72.07%	68.83%	68.45%	70.13%	70.13%	68.95%	69.97%	70.53%
Standard Deviation	5.5%	4.4%	4.4%	1%	0.4%	0.3%	0.1%	0.2%	0.5%	0.3%
Stress-NG - Semaphores (Bogo Ops/s)	3544177	3021911	3149801	3170972	3125260	3029755	3124404	3124139	2965774	3116617
Normalized	100%	85.26%	88.87%	89.47%	88.18%	85.49%	88.16%	88.15%	83.68%	87.94%
Standard Deviation	1.6%	1.9%	1.2%	0.3%	0.3%	2.4%	2.5%	1.7%	1.7%	1.8%
Stress-NG - Forking (Bogo Ops/s)	96634	103143	96693	92400	91597	91170	90244	97350	93872	92840
Normalized	93.69%	100%	93.75%	89.58%	88.81%	88.39%	87.49%	94.38%	91.01%	90.01%
Standard Deviation	0.3%	0.3%	1.5%	1%	1.2%	0.7%	1.7%	0.4%	0.5%	0.4%
Stress-NG - S.V.M.P (Bogo Ops/s)	8222695	14618292	9809250	8120291	10055836	7989215	8224598	8250516	8158439	7796583
Normalized	56.25%	100%	67.1%	55.55%	68.79%	54.65%	56.26%	56.44%	55.81%	53.33%
Standard Deviation	0.2%	0.3%	0.4%	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Tesseract OCR - T.T.O.7.I (sec)	26.89	26.73	27.42	26.75	26.77	26.35	26.37	26.34	26.31	26.59
Normalized	97.84%	98.43%	95.95%	98.36%	98.28%	99.85%	99.77%	99.89%	100%	98.95%
Standard Deviation	0.7%	3.3%	1.6%	0.3%	0.3%	0.1%	0.3%	0.3%	0.2%	1.4%
GIMP - auto-levels (sec)	14.78	14.90	14.98	15.59	15.60	15.07	15.12	15.13	15.05	15.20
Normalized	100%	99.19%	98.66%	94.8%	94.74%	98.08%	97.75%	97.69%	98.21%	97.24%
Standard Deviation	4.7%	4.7%	4.7%	0.1%	0.1%	0.1%	0.2%	0.5%	0.3%	1%
dav1d - Summer Nature 4K (sec)	21.97	21.46	21.97	21.84	21.89	21.74	21.72	21.72	21.77	21.77
Normalized	97.68%	100%	97.68%	98.26%	98.04%	98.71%	98.8%	98.8%	98.58%	98.58%
Standard Deviation	3.4%	3.4%	3.1%	0.2%	0.4%	0.6%	0.4%	0.6%	0.6%	0.6%
PHPBench - P.B.S (Score)	687767	657535	648147	668188	673483	703272	702188	705017	702192	703748
Normalized	97.55%	93.27%	91.93%	94.78%	95.53%	99.75%	99.6%	100%	99.6%	99.82%
Standard Deviation	1.7%	8.2%	7.9%	1.4%	0.4%	0.2%	0%	0.2%	0.8%	0.1%
Rodinia - OpenMP CFD Solver (sec)	12.28	12.29	12.22	12.40	12.33	12.29	12.31	12.33	12.28	12.24
Normalized	99.51%	99.43%	100%	98.55%	99.11%	99.43%	99.27%	99.11%	99.51%	99.84%
Standard Deviation	5.9%	5.7%	5.6%	0.9%	0.2%	0.3%	0.6%	0.1%	0.6%	0.4%

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PyBench - T.F.A.T.T (Milliseconds)	953	960	955	998	997	952	955	949	950	947
Normalized	99.37%	98.65%	99.16%	94.89%	94.98%	99.47%	99.16%	99.79%	99.68%	100%
Standard Deviation	0.4%	0.3%	0.4%	0.5%	0.4%	0.5%	0.3%	0.3%	0.3%	0.7%
x265 - H.2.1.V.E (FPS)	51.49	50.90	50.84	50.81	51.04	51.15	51.31	51.33	51.23	51.51
Normalized	99.96%	98.82%	98.7%	98.64%	99.09%	99.3%	99.61%	99.65%	99.46%	100%
Standard Deviation	5.5%	5.9%	5.7%	0.1%	0.5%	0.6%	0.3%	0.1%	0.2%	0.7%
Rodinia - OpenMP LavaMD (sec)	21.43	21.36	21.49	21.76	21.30	21.35	21.45	21.50	21.36	21.32
Normalized	99.39%	99.72%	99.12%	97.89%	100%	99.77%	99.3%	99.07%	99.72%	99.91%
Standard Deviation	3.1%	3.3%	3.3%	2.2%	0.2%	0.5%	0.4%	0.9%	0.2%	0.1%
GIMP - rotate (sec)	12.55	12.98	13.06	13.64	13.60	13.60	13.61	13.62	13.57	13.62
Normalized	100%	96.69%	96.09%	92.01%	92.28%	92.28%	92.21%	92.14%	92.48%	92.14%
Standard Deviation	0.2%	4.7%	5.1%	0.2%	0.3%	0.4%	0.1%	0.3%	0.2%	0.1%
OpenSSL - R.4.b.P (Signs/sec)	4597	4609	4602	4424	4417	4401	4408	4413	4419	4404
Normalized	99.74%	100%	99.85%	95.99%	95.83%	95.49%	95.64%	95.75%	95.88%	95.55%
Standard Deviation	0%	0.1%	0.1%	0%	0.3%	0.2%	0.2%	0.1%	0.2%	0.3%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	10.45	10.56	10.47	10.59	10.53	10.57	10.53	10.58	10.60	10.61
Normalized	100%	98.96%	99.81%	98.68%	99.24%	98.86%	99.24%	98.77%	98.58%	98.49%
Standard Deviation	5.8%	6.5%	5.6%	0.4%	0.6%	0.3%	0.8%	0.4%	0.5%	0.3%
GIMP - resize (sec)	9.00	9.04	9.00	9.47	9.50	9.18	9.25	9.21	9.12	9.20
Normalized	100%	99.56%	100%	95.04%	94.74%	98.04%	97.3%	97.72%	98.68%	97.83%
Standard Deviation	6.6%	6.8%	6.9%	0.7%	1.6%	1.2%	1.7%	1.1%	1.1%	2%
DaCapo Benchmark - H2	3028	2901	2946	3011	3054	3090	3008	3069	2982	3136
Normalized	95.81%	100%	98.47%	96.35%	94.99%	93.88%	96.44%	94.53%	97.28%	92.51%
Standard Deviation	11.8%	2.6%	2%	2.6%	2.9%	4.3%	1.7%	2.5%	1.6%	3.1%
dav1d - S.N.1 (sec)	7.67	7.65	7.68	7.68	7.70	7.64	7.65	7.66	7.66	7.65
Normalized	99.61%	99.87%	99.48%	99.48%	99.22%	100%	99.87%	99.74%	99.74%	99.87%
Standard Deviation	8.1%	8.2%	8.2%	1.1%	0.8%	0.9%	0.8%	1%	1.1%	0.9%
Darktable - Boat - CPU-only (sec)	8.18	7.76	8.20	8.08	8.07	8.07	8.05	8.05	8.05	8.05
Normalized	94.87%	100%	94.63%	96.04%	96.16%	96.16%	96.4%	96.4%	96.4%	96.4%
Standard Deviation	7.4%	0.1%	8.2%	0.1%	0.1%	0.2%	0.3%	0.2%	0.2%	0.1%
NAS Parallel Benchmarks - EP.C (Mop/s)	654	654	653	615	621	627	622	626	626	628
Normalized	100%	100%	99.85%	94.04%	94.95%	95.87%	95.11%	95.72%	95.72%	96.02%
Standard Deviation	0.2%	0.2%	0.1%	0.2%	0.3%	0.2%	1.4%	0.2%	0.3%	0.1%
Sockperf - Latency Ping Pong (usec)	3.60	3.38	3.51	4.23	4.03	4.01	4.21	4.16	3.88	3.96
Normalized	93.89%	100%	96.3%	79.91%	83.87%	84.29%	80.29%	81.25%	87.11%	85.35%
Standard Deviation	2.1%	2.1%	2.2%	1.5%	1.6%	1.1%	1.5%	1%	1.2%	1.3%
Sockperf - Throughput (Messages/sec)	774467	757001	789092	594603	643361	627930	614978	585818	464981	464915
Normalized	98.15%	95.93%	100%	75.35%	81.53%	79.58%	77.93%	74.24%	58.93%	58.92%
Standard Deviation	1.5%	1.8%	2.5%	1.4%	3.3%	1.9%	1.7%	2.7%	2%	2.4%

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Rust Prime Benchmark - P.N.T.T.2.0.0 (sec)	6.64	6.75	6.64	6.69	6.68	6.68	6.69	6.69	6.69	6.69
Normalized	100%	98.37%	100%	99.25%	99.4%	99.4%	99.25%	99.25%	99.25%	99.25%
Standard Deviation	7.9%	9%	7.9%	0.1%	0%	0%	0%	0.2%	0%	0.1%
Parboil - OpenMP Stencil (sec)	7.28	7.76	7.11	7.47	7.45	7.43	7.41	7.80	7.74	7.86
Normalized	97.66%	91.62%	100%	95.18%	95.44%	95.69%	95.95%	91.15%	91.86%	90.46%
Standard Deviation	1.6%	6.9%	1.6%	0.8%	0.4%	1.2%	0.9%	1.1%	2.9%	2.4%
Node.js Express HTTP Load Test (Reqs/sec)	11545	11599	11761	10657	10498	10545	10624	10443	10312	10361
Normalized	98.16%	98.62%	100%	90.61%	89.26%	89.66%	90.33%	88.79%	87.68%	88.1%
Standard Deviation	0.6%	1.1%	1.3%	1.5%	0.9%	1.3%		0.6%	0.9%	0.5%
x264 - H.2.V.E (FPS)	137	137	138	132	132	133	133	133	134	135
Normalized	99.28%	99.28%	100%	95.65%	95.65%	96.38%	96.38%	96.38%	97.1%	97.83%
Standard Deviation	4%	3.9%	3.7%	3.2%	3.4%	2.2%	1.5%	3.4%	1.1%	0.1%
DaCapo Benchmark -	3257	3435	3270	3427	3427	3451	3458	3441	3422	3449
Normalized	100%	94.82%	99.6%	95.04%	95.04%	94.38%	94.19%	94.65%	95.18%	94.43%
Standard Deviation	0.5%	13.9%	1%	0.7%	1%	1.5%	0.9%	0.9%	0.8%	0.8%
Darktable - Masskrug - CPU-only (sec)	4.14	4.13	3.93	4.11	4.11	4.03	4.02	4.03	4.01	4.03
Normalized	94.93%	95.16%	100%	95.62%	95.62%	97.52%	97.76%	97.52%	98%	97.52%
Standard Deviation	12.4%	13.1%	1%	0.2%	0.3%	0.4%	0.3%	0.7%	0.5%	1%
OSBench - Create Processes (us/Event)	22.57	23.05	23.57	28.79	28.98	29.16	29.09	29.19	29.48	29.31
Normalized	100%	97.92%	95.76%	78.4%	77.88%	77.4%	77.59%	77.32%	76.56%	77%
Standard Deviation	2.2%	2.3%	3%	1.4%	3.4%	0.8%	0.5%	3.9%	1.4%	1.7%
Timed HMMer Search - P.D.S (sec)	4.42	4.21	4.41	4.42	4.46	4.32	4.35	4.32	4.33	4.28
Normalized	95.25%	100%	95.46%	95.25%	94.39%	97.45%	96.78%	97.45%	97.23%	98.36%
Standard Deviation	11.9%	0.9%	11.9%	1.6%	1.2%	1.3%	1.1%	1.1%	1.9%	1.5%
OSBench - Create Threads (us/Event)	10.48	9.87	11.33	15.27	15.04	16.22	16.25	13.36	13.49	13.40
Normalized	94.18%	100%	87.11%	64.64%	65.63%	60.85%	60.74%	73.88%	73.17%	73.66%
Standard Deviation	9.9%	1.1%	0.7%	2.7%	0.6%	2.5%	2.6%	0.4%	0.4%	0.8%
Timed MAFFT Alignment - M.S.A (sec)	2.11	2.07	2.37	2.20	2.20	2.17	2.21	2.29	2.22	2.21
Normalized	98.1%	100%	87.34%	94.09%	94.09%	95.39%	93.67%	90.39%	93.24%	93.67%
Standard Deviation	3.5%	0.2%	22.7%	0.5%	0.8%	0.4%	3.5%	7.6%	4.4%	0.2%
OSBench - Create Files (us/Event)	10.80	10.44	10.42	12.72	12.52	12.32	12.28	12.33	12.23	12.35
Normalized	96.48%	99.81%	100%	81.92%	83.23%	84.58%	84.85%	84.51%	85.2%	84.37%
Standard Deviation	2.8%	0.7%	2.1%	0.5%	2.2%	0.4%	0.6%	0.2%	0.3%	0.8%

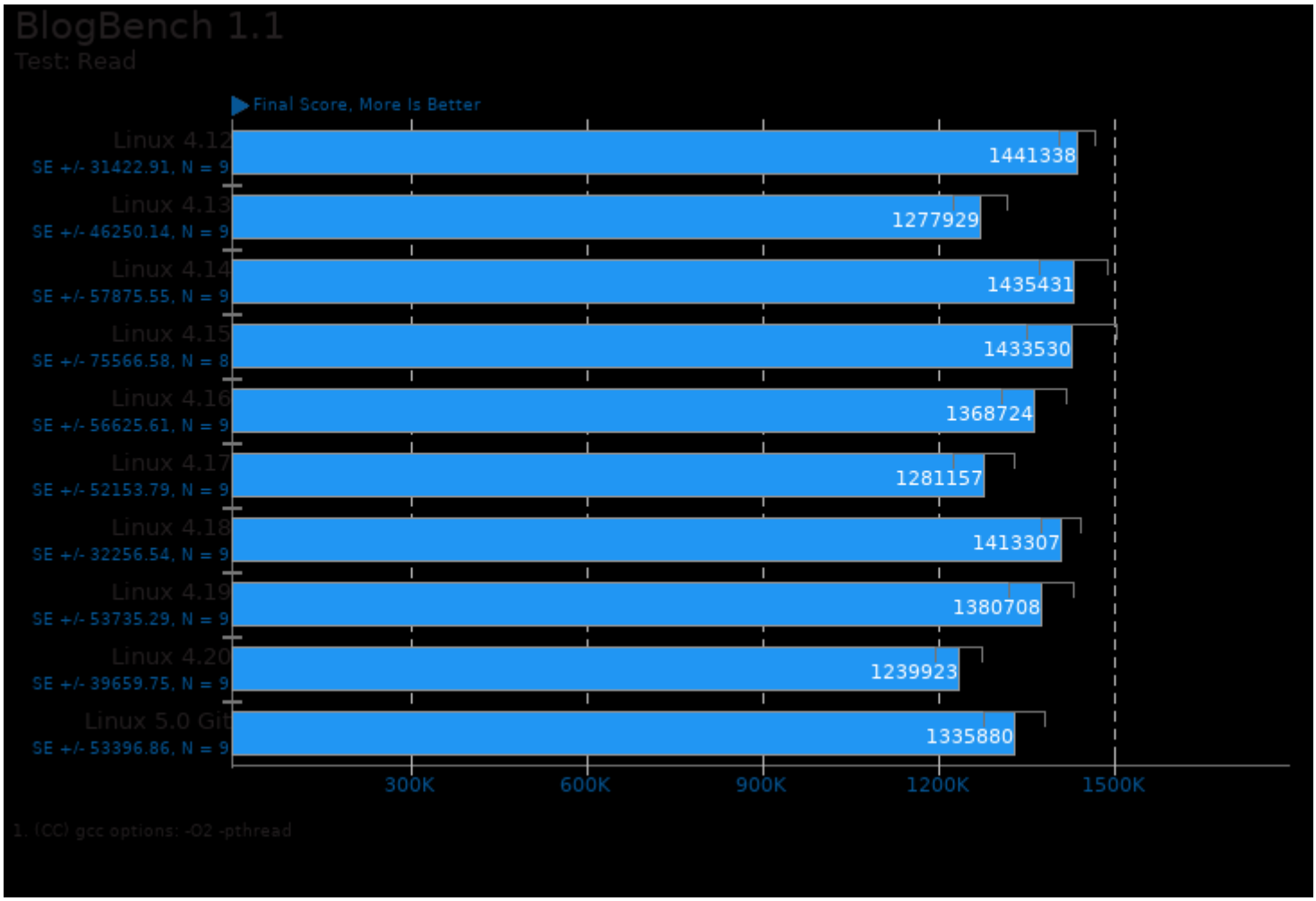
Core i9 7960X Linux 5.0 Kernel Benchmarks

OSBench - Memory Allocations (Ns/Event)	67.08	**65.82**	65.97	72.14	**72.69**	71.63	71.53	72.08	71.62	71.79
Normalized	98.12%	100%	99.77%	91.24%	90.55%	91.89%	92.02%	91.32%	91.9%	91.68%
Standard Deviation	3.4%	0.3%	0.5%	0.2%	0.5%	0.5%	0.1%	0.2%	0.1%	0.1%
OSBench - Launch Programs	29.02	**28.69**	29.65	32.57	34.30	35.23	35.48	34.26	34.96	**35.55**
Normalized	98.86%	100%	96.76%	88.09%	83.64%	81.44%	80.86%	83.74%	82.07%	80.7%
Standard Deviation	1%	0.6%	0.8%	1.9%	3.3%	0.8%	0.8%	0.7%	0.4%	0.8%
Darktable - Server Room - CPU-only (sec)	**2.73**	**2.54**	**2.54**	2.64	2.64	2.64	2.62	2.63	2.63	2.63
Normalized	93.04%	100%	100%	96.21%	96.21%	96.21%	96.95%	96.58%	96.58%	96.58%
Standard Deviation	19.3%	0.2%	0.3%	0.2%	0.2%	0.3%	0.7%	0.3%	0.5%	0.2%
SVT-VP9 - 1.8.b.Y.T.V.V.E (FPS)	**317**	**295**	313	298	299	300	297	299	299	299
Normalized	100%	93.06%	98.74%	94.01%	94.32%	94.64%	93.69%	94.32%	94.32%	94.32%
Standard Deviation	3.4%	17.4%	3.4%	3.4%	3.2%	3.3%	3.4%	3.2%	3%	3.2%
Optcarrot - O.B (FPS)	135	134	136	**129**	131	137	**138**	136	137	136
Normalized	97.83%	97.1%	98.55%	93.48%	94.93%	99.28%	100%	98.55%	99.28%	98.55%
Standard Deviation	4.4%	2.2%	0.4%	1.4%	0.4%	0.2%	0.5%	0.8%	0.9%	1.7%
SVT-HEVC - 1.8.b.Y.T.H.V.E (FPS)	299	306	**307**	296	**294**	295	296	296	295	295
Normalized	97.39%	99.67%	100%	96.42%	95.77%	96.09%	96.42%	96.42%	96.09%	96.09%
Standard Deviation	12.8%	1.9%	2.2%	1.9%	2%	1.4%	1.6%	2.1%	2.2%	1.9%
Parboil - OpenMP CUTCP (sec)	2.42	**2.39**	2.40	2.50	2.50	2.49	**2.51**	2.49	**2.51**	**2.51**
Normalized	98.76%	100%	99.58%	95.6%	95.6%	95.98%	95.22%	95.98%	95.22%	95.22%
Standard Deviation	1.2%	0.2%	0.5%	1%	0.4%	0.4%	0.3%	0.6%	0.5%	0.8%
NAS Parallel Benchmarks - FT.A (Mop/s)	**6441**	5404	5449	**5172**	5199	5311	5204	5256	5352	5181
Normalized	100%	83.9%	84.6%	80.3%	80.72%	82.46%	80.79%	81.6%	83.09%	80.44%
Standard Deviation	0%	0.7%	0.2%	0.4%	0.7%	0.3%	0.6%	0.2%	1.1%	0.2%
ctx_clock - C.S.T (Clocks)	**107**	119	115	449	**459**	418	422	422	407	403
Normalized	100%	89.92%	93.04%	23.83%	23.31%	25.6%	25.36%	25.36%	26.29%	26.55%
Standard Deviation	3.4%	3.4%	1.7%	0.3%	0.3%				0.2%	
Darktable - Server Rack - CPU-only (sec)	**0.11**	0.12	**0.11**	0.12	0.12	0.12	**0.13**	0.12	**0.13**	0.12
Normalized	100%	91.67%	100%	91.67%	91.67%	91.67%	84.62%	91.67%	84.62%	91.67%
Standard Deviation	0.5%	1%	0.5%	1.3%	0.5%	3.9%	7.1%	2%	5%	0.5%
Systemd Total Boot Time - Kernel (ms)	**7554**	5053	2711	2433	**2298**	5780	5340	5615	5330	5278
Normalized	30.42%	45.48%	84.77%	94.45%	100%	39.76%	43.03%	40.93%	43.11%	43.54%

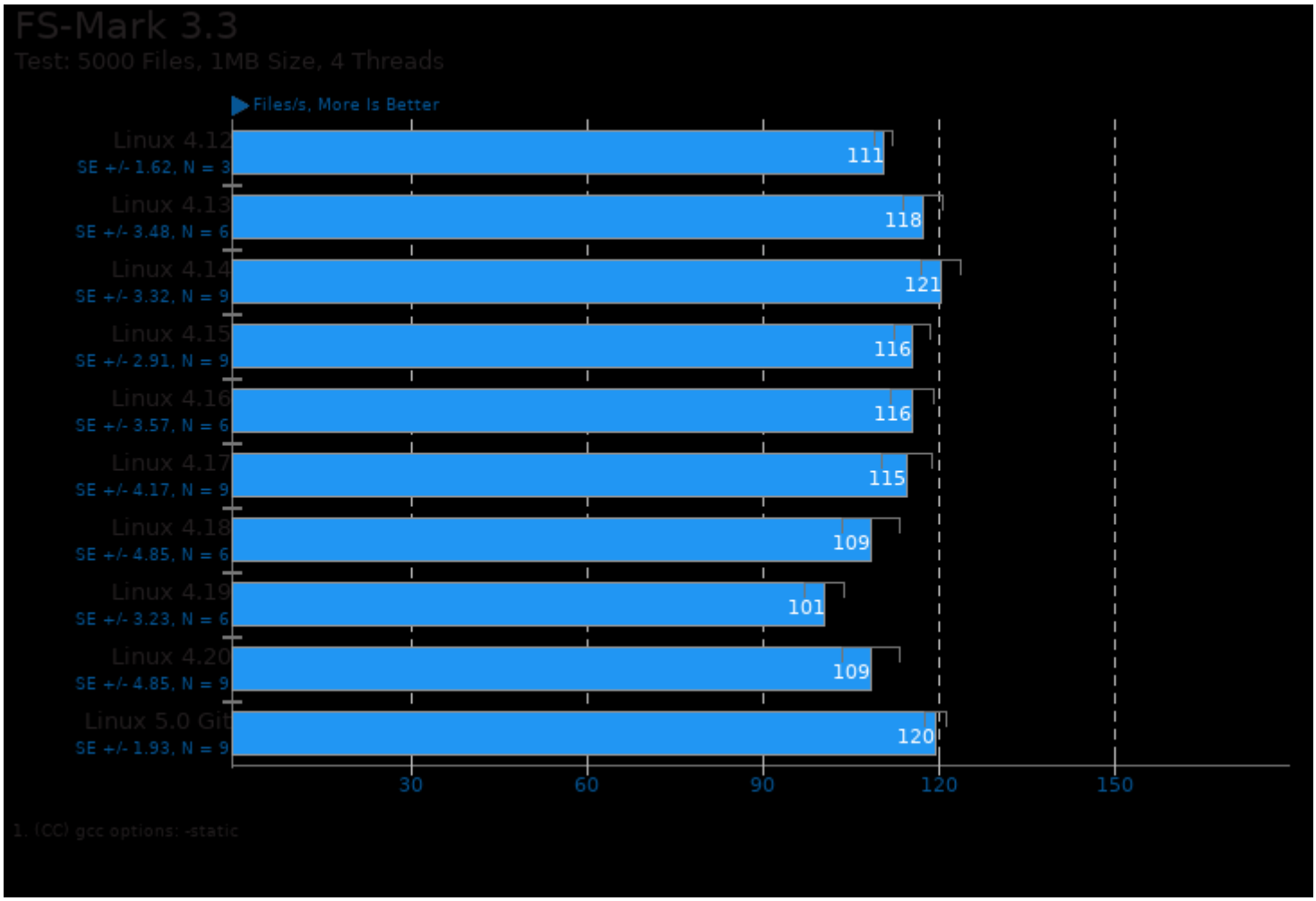
Core i9 7960X Linux 5.0 Kernel Benchmarks

Systemd Total Boot Time - Firmware (ms)	26400	26452	26416	**26636**	26383	26395	26454	26384	**26381**	26407
Normalized	99.93%	99.73%	99.87%	99.04%	99.99%	99.95%	99.72%	99.99%	100%	99.9%
Compile Bench - Initial Create (MB/s)	626	**682**	643	**518**	549	613	586	555	625	627
Normalized	91.79%	100%	94.28%	75.95%	80.5%	89.88%	85.92%	81.38%	91.64%	91.94%
Standard Deviation	9.8%	9.2%	11.2%	10.8%	8%	6.1%	6.5%	5%	2.2%	7.8%
BlogBench - Write (Final Score)	7450	**8340**	8076	7848	**7357**	7772	7614	7531	7716	7437
Normalized	89.33%	100%	96.83%	94.1%	88.21%	93.19%	91.29%	90.3%	92.52%	89.17%
Standard Deviation	3.6%	3.1%	3.8%	2.5%	2.6%	3.2%	2%	2.5%	1.6%	3.8%

Core i9 7960X Linux 5.0 Kernel Benchmarks



Core i9 7960X Linux 5.0 Kernel Benchmarks



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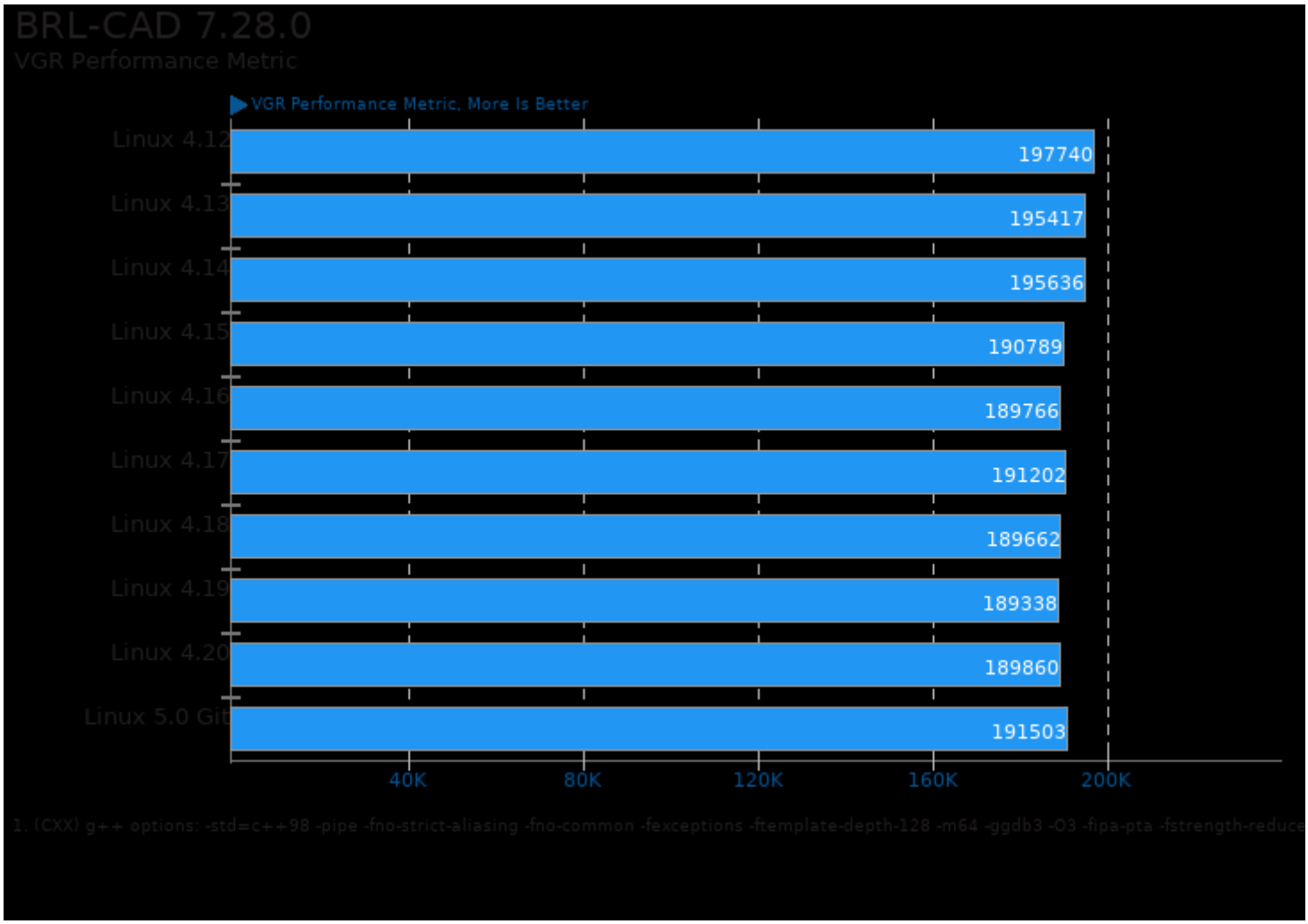

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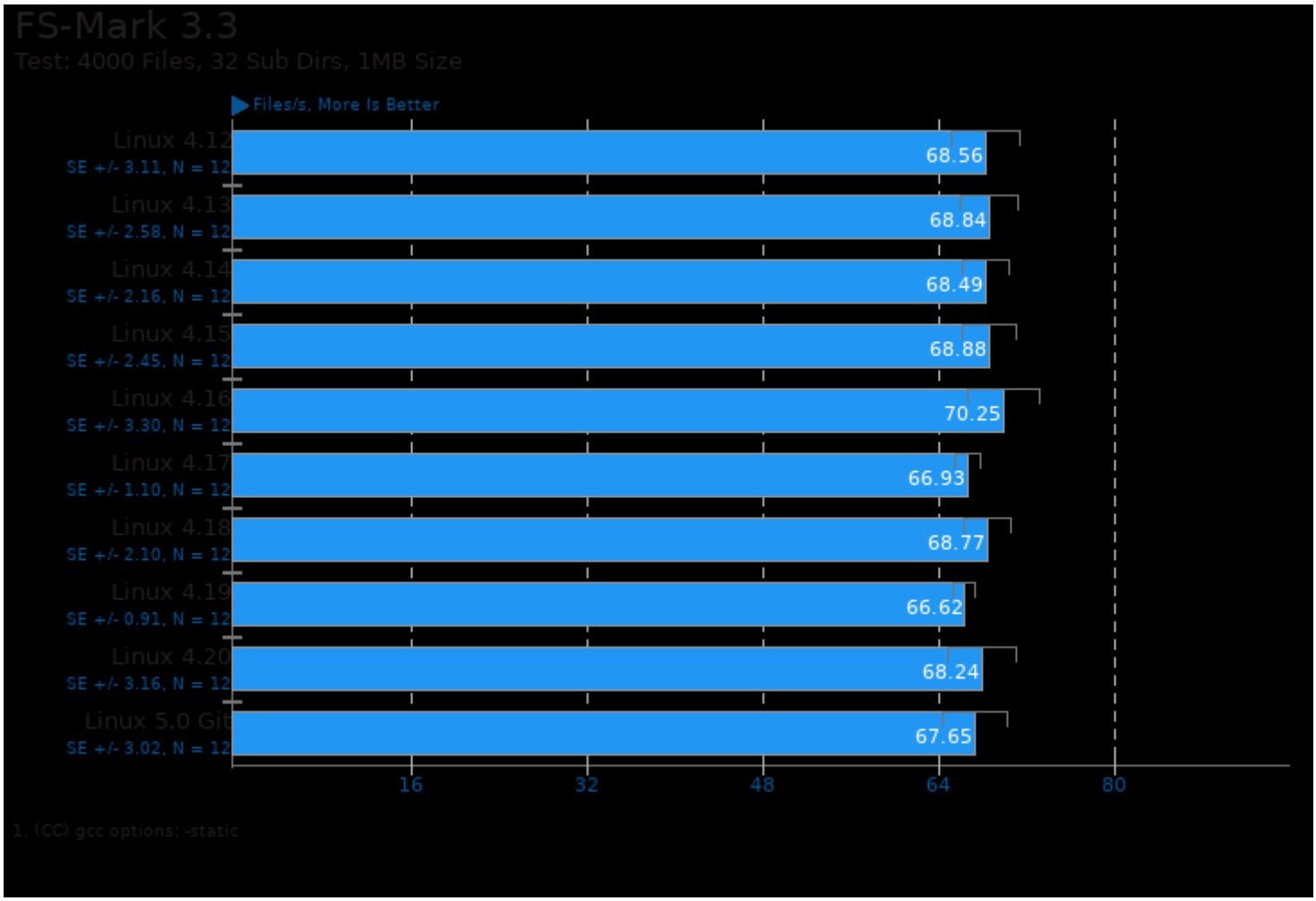

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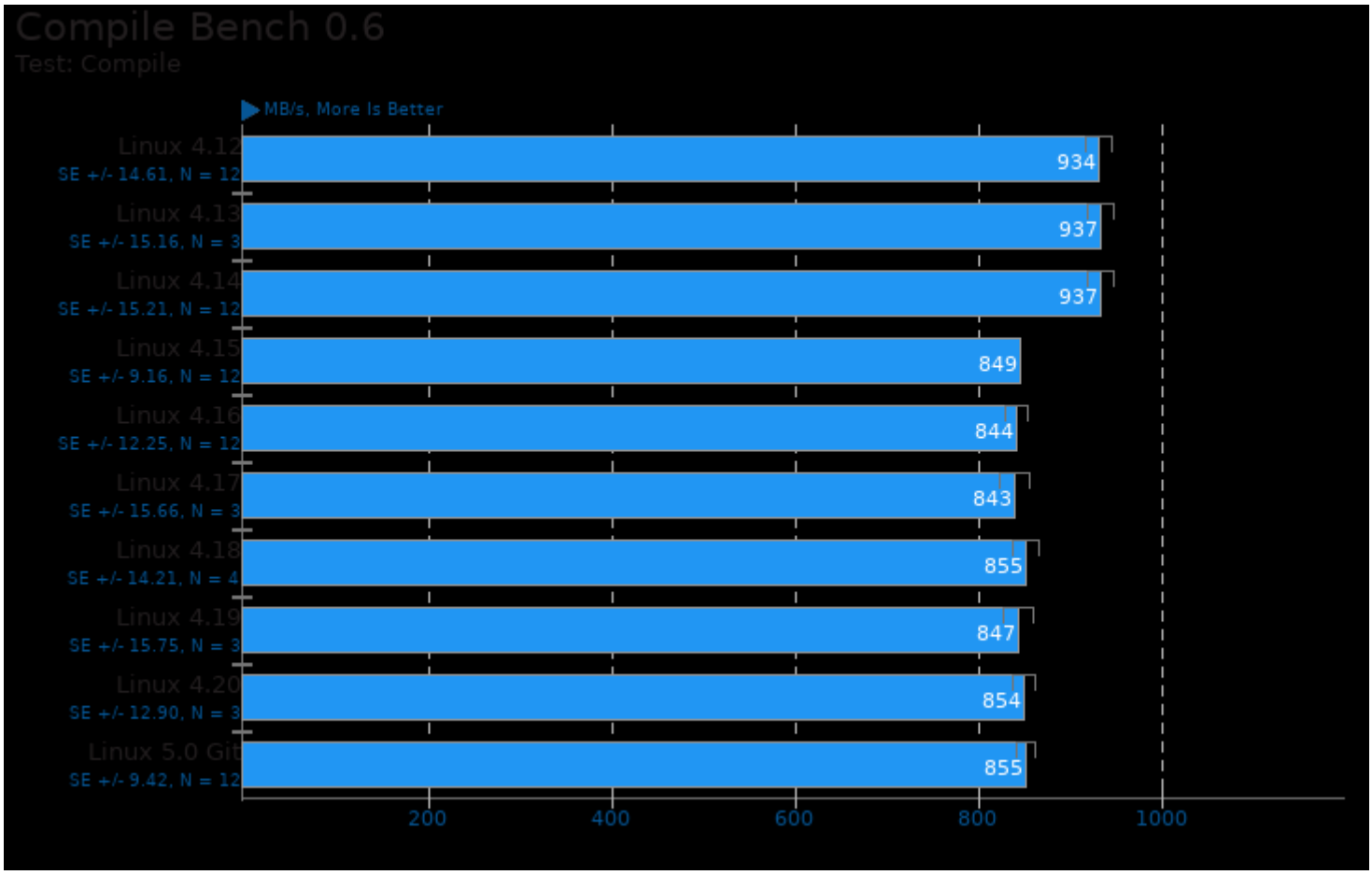

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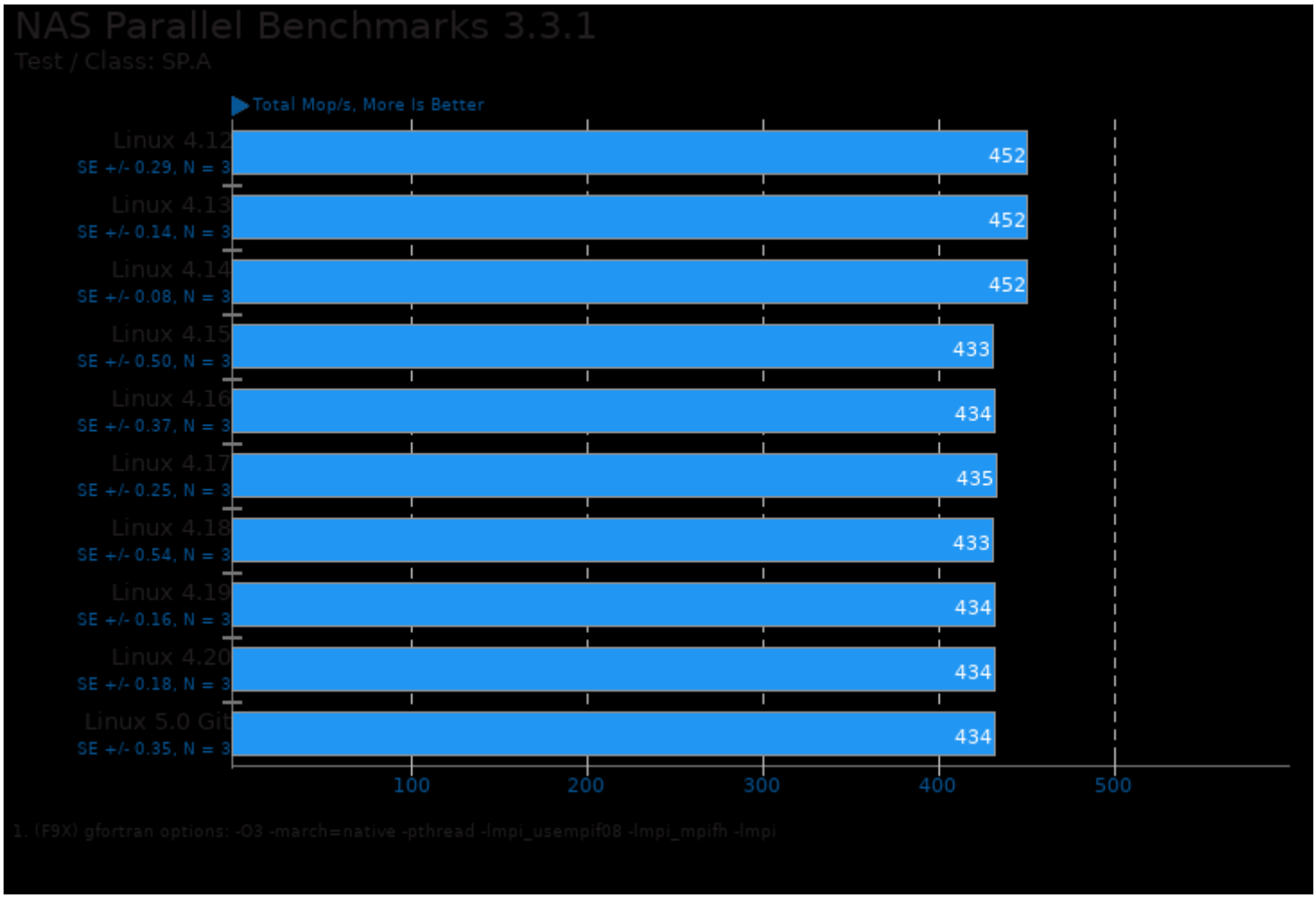

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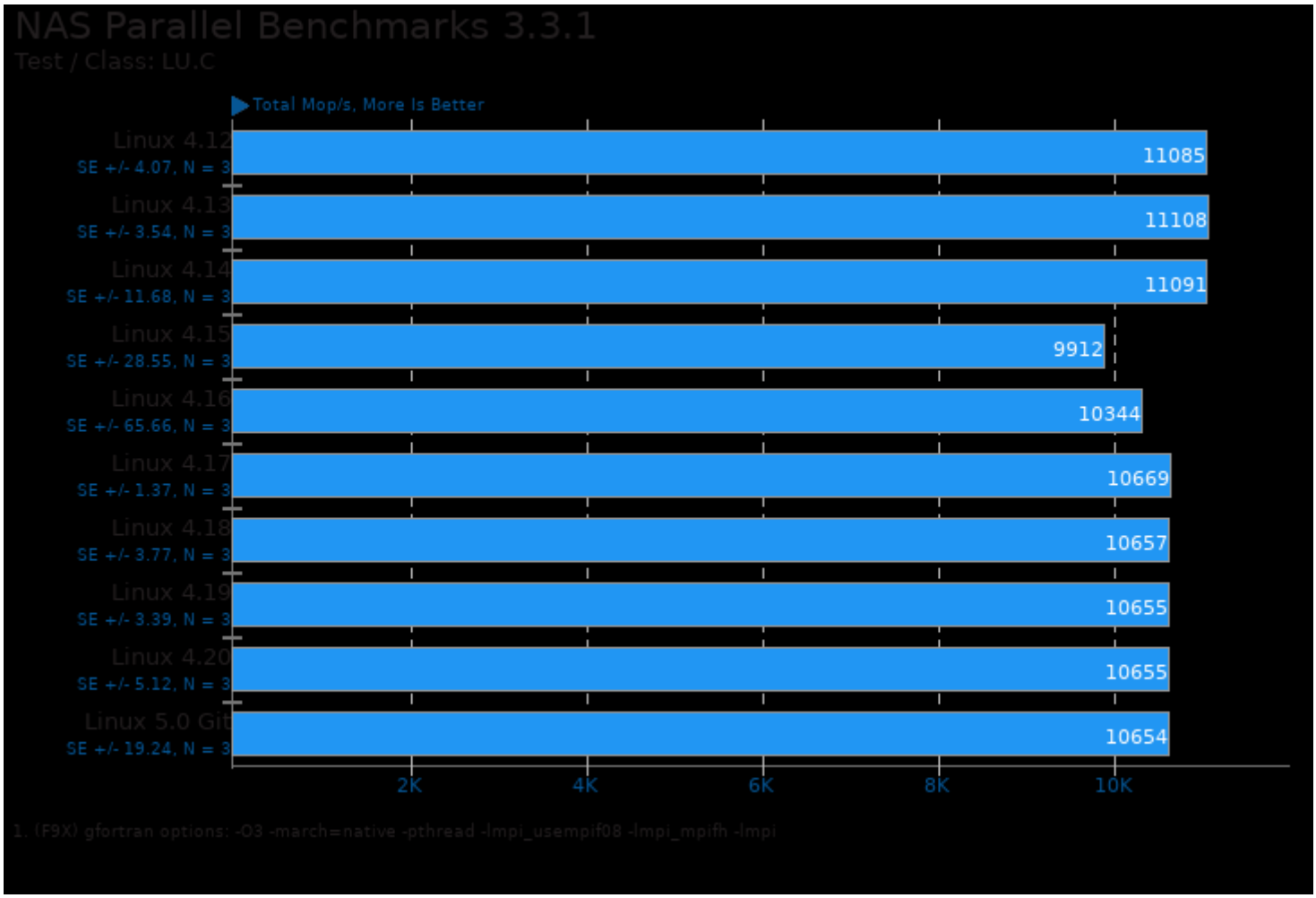

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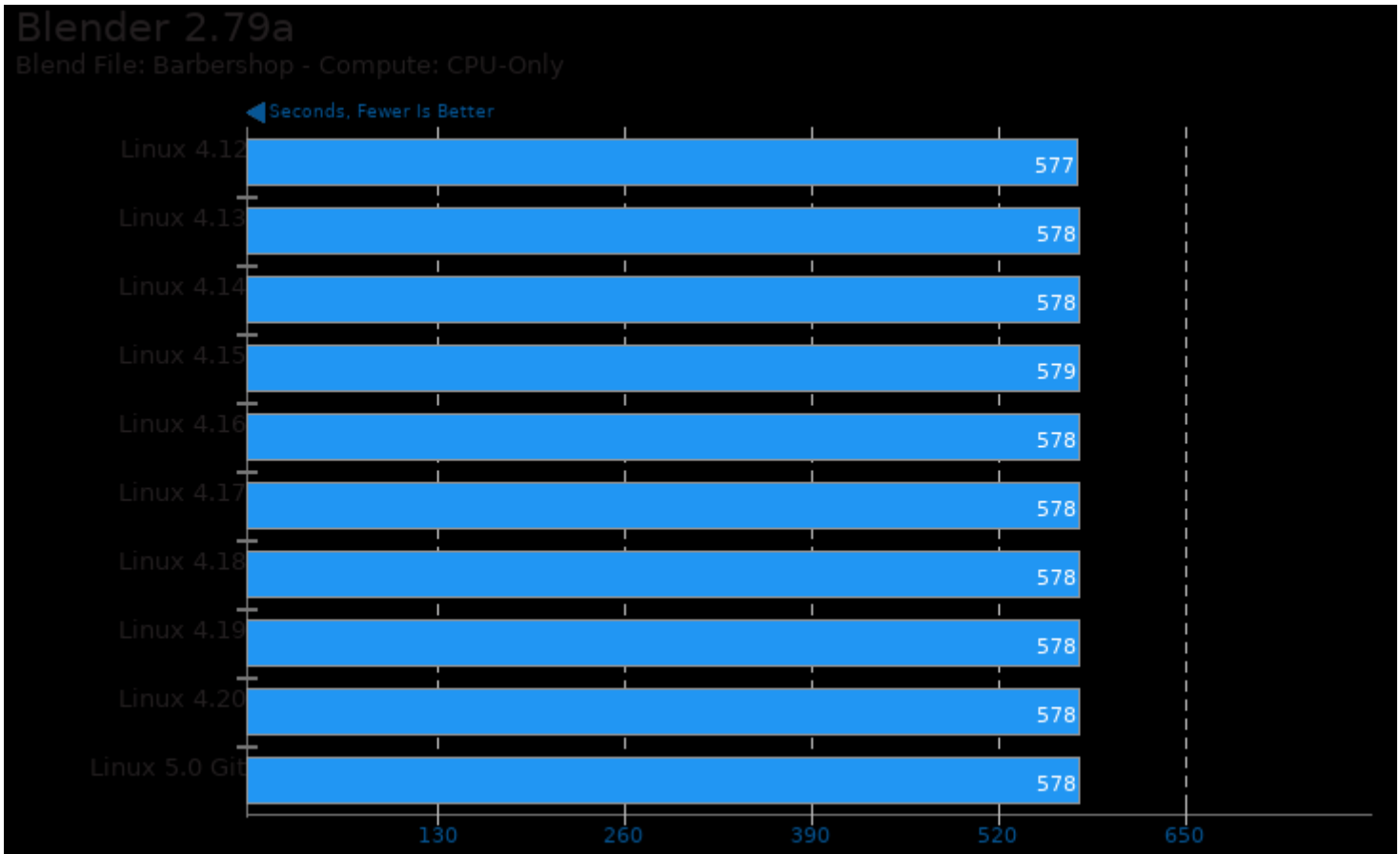

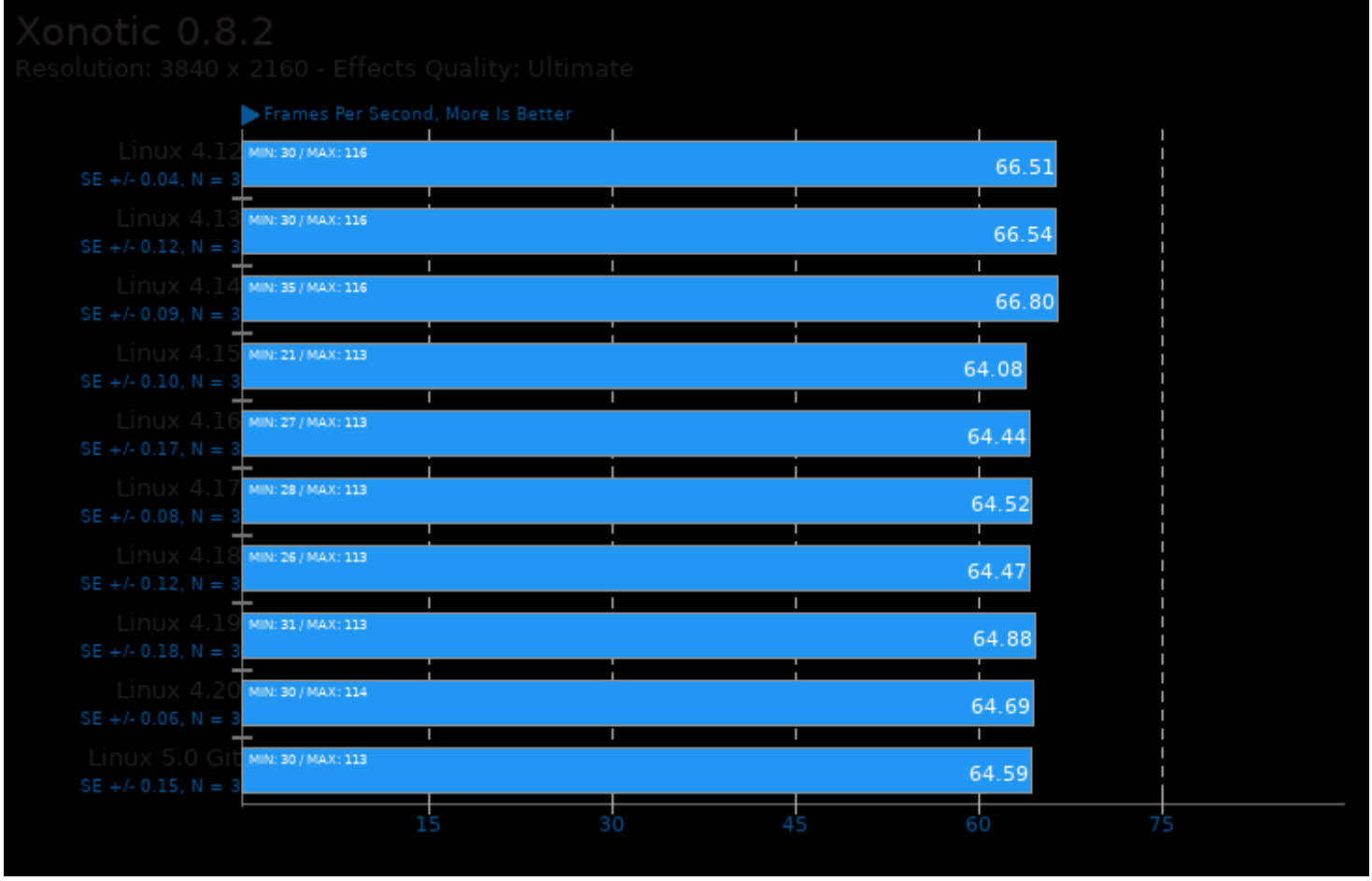

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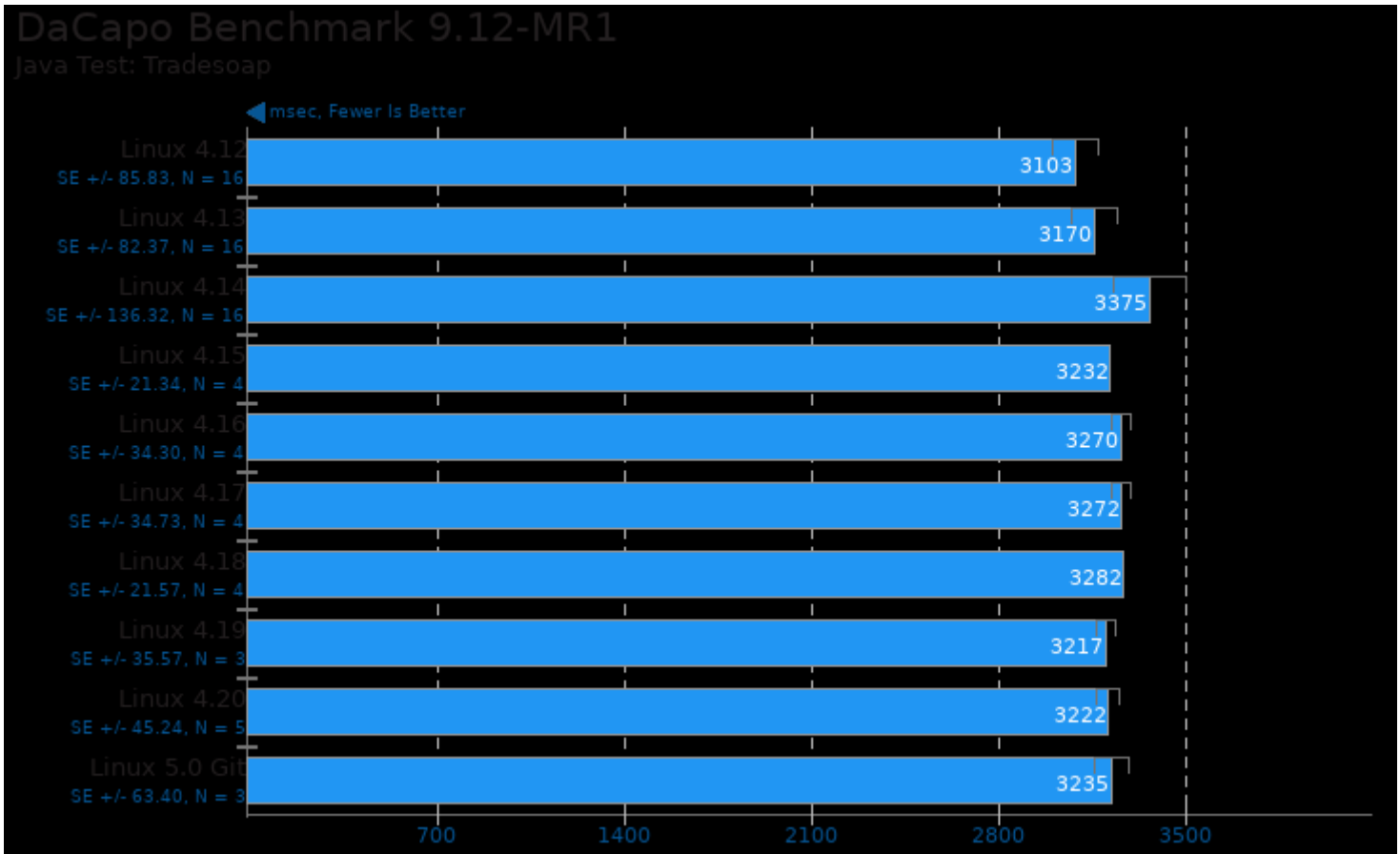

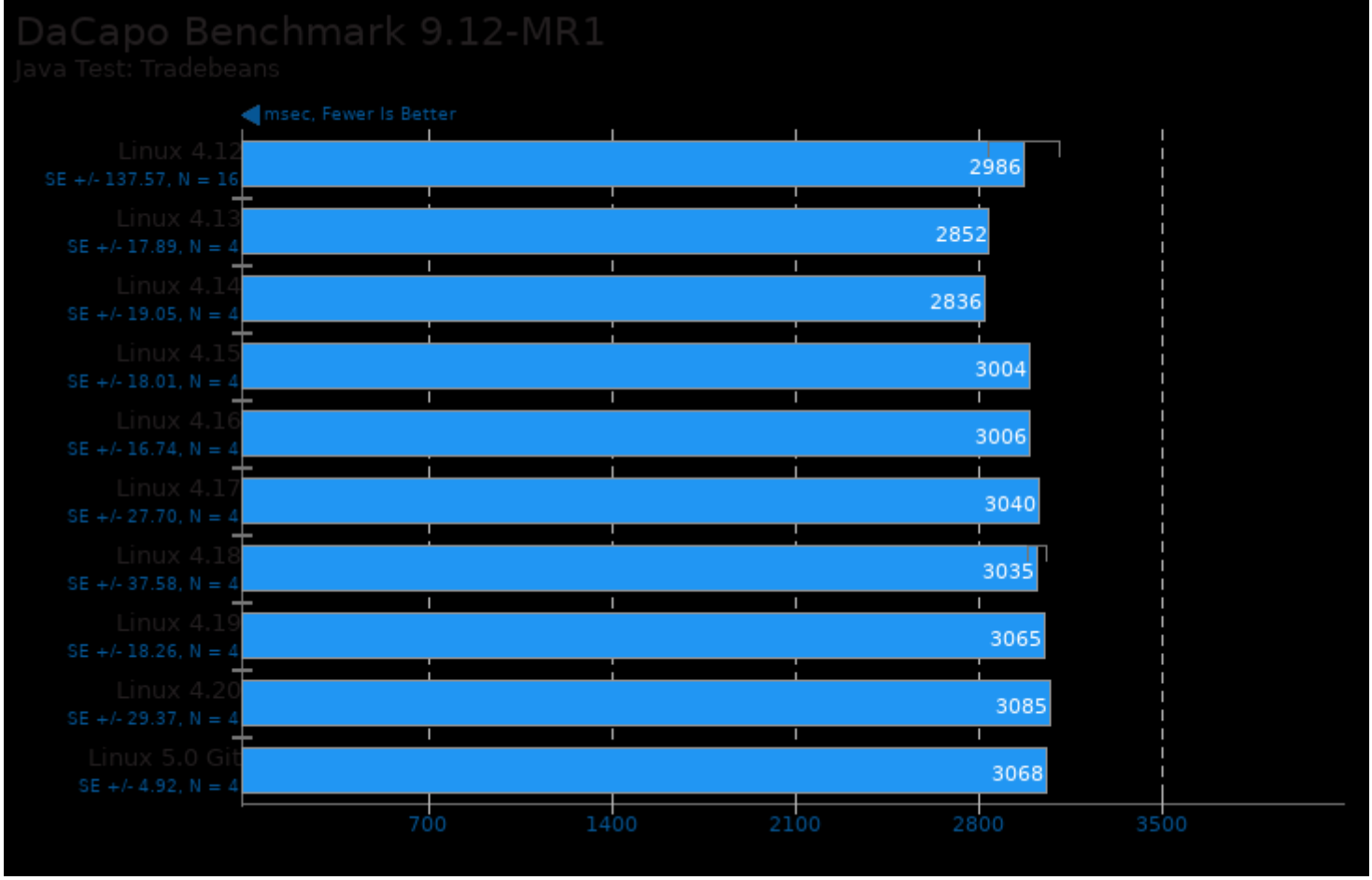

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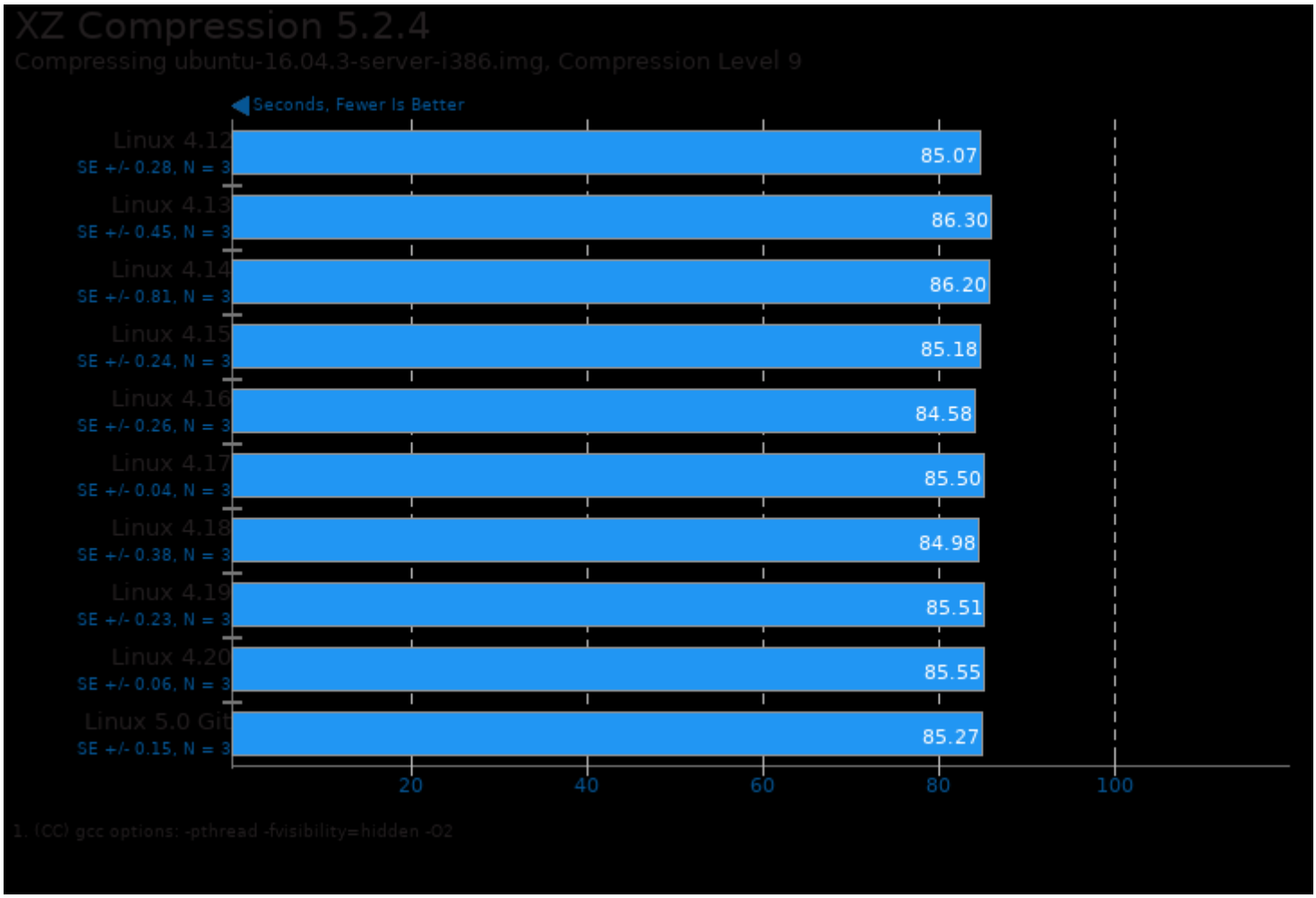

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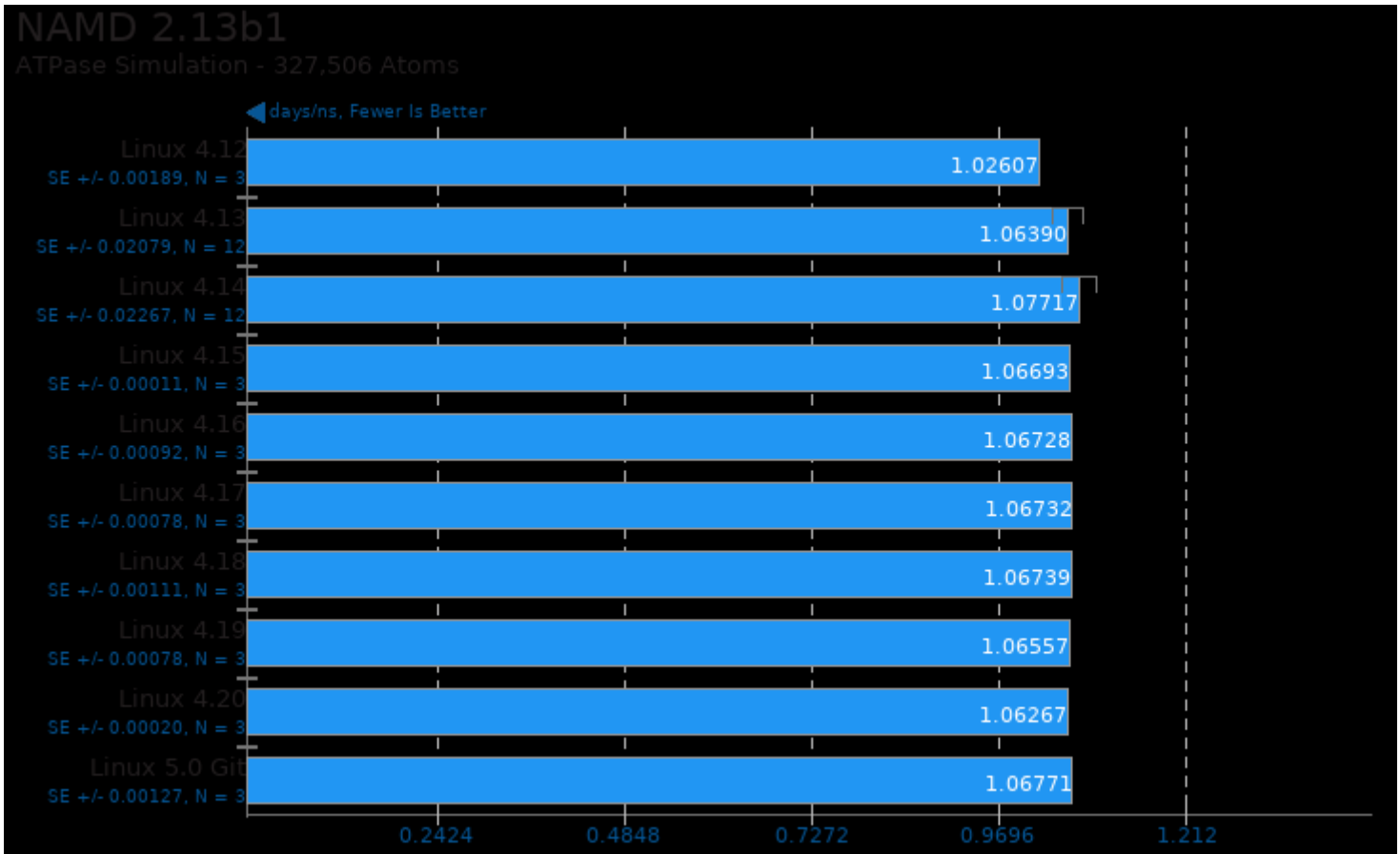

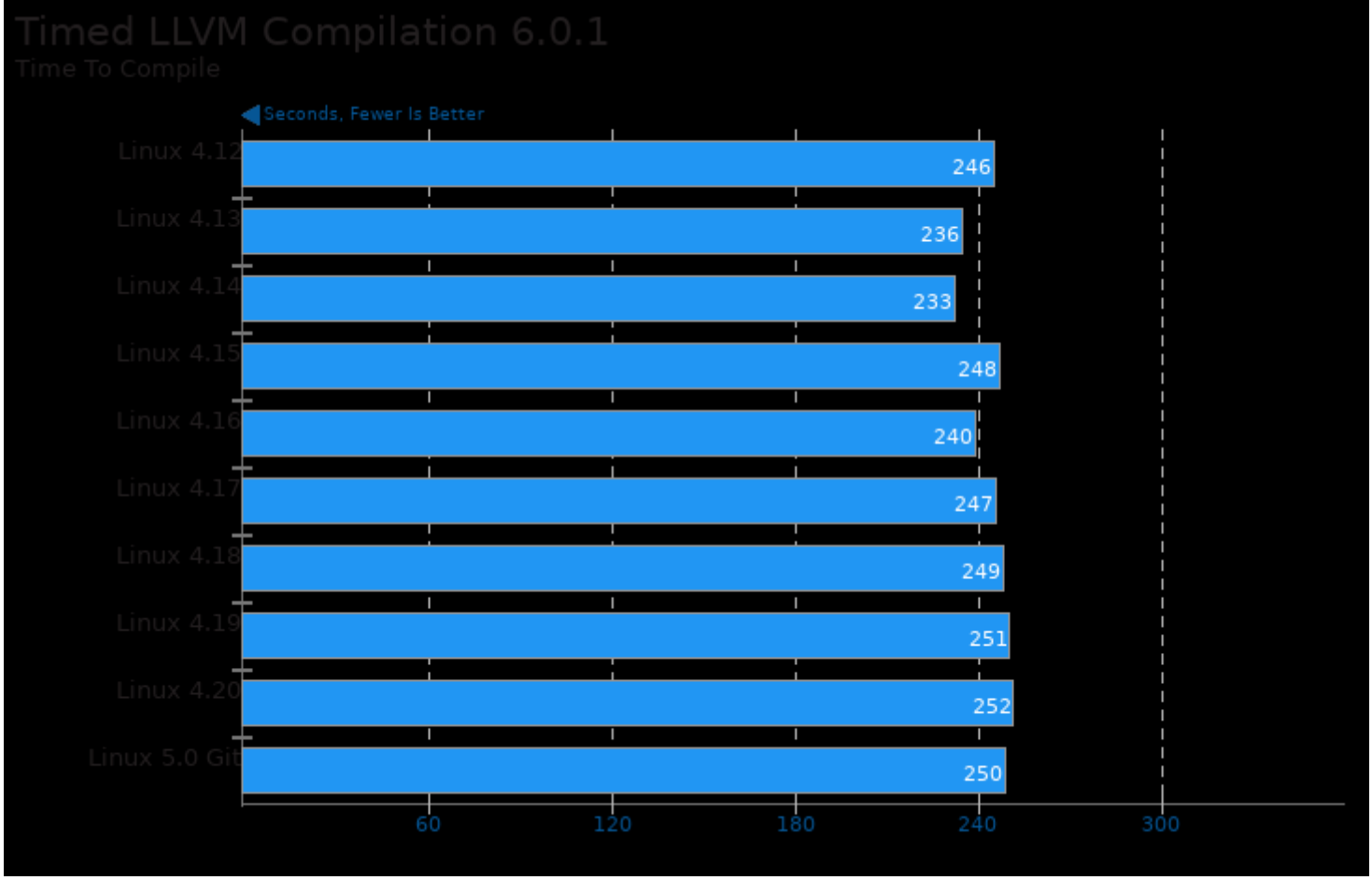

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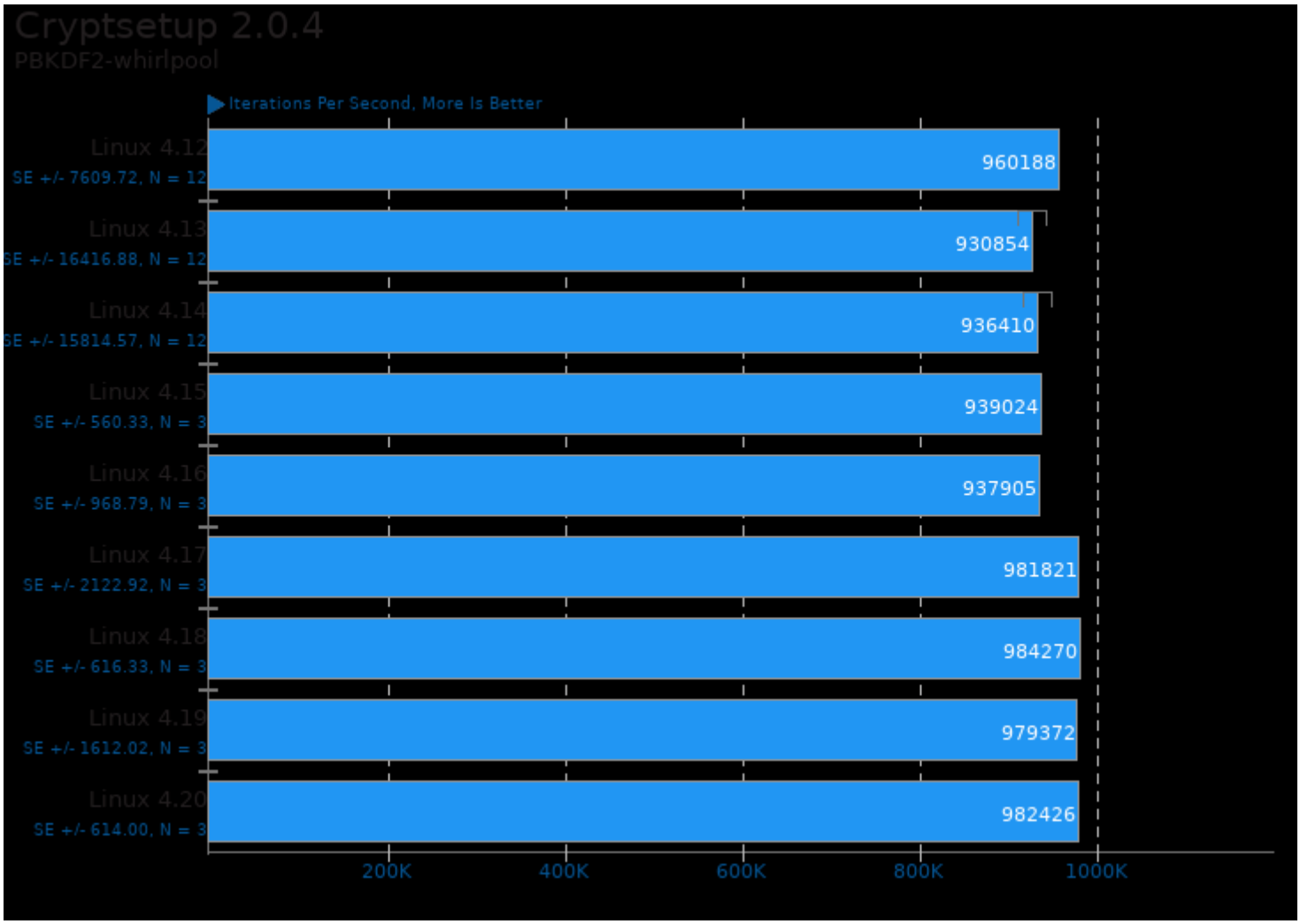

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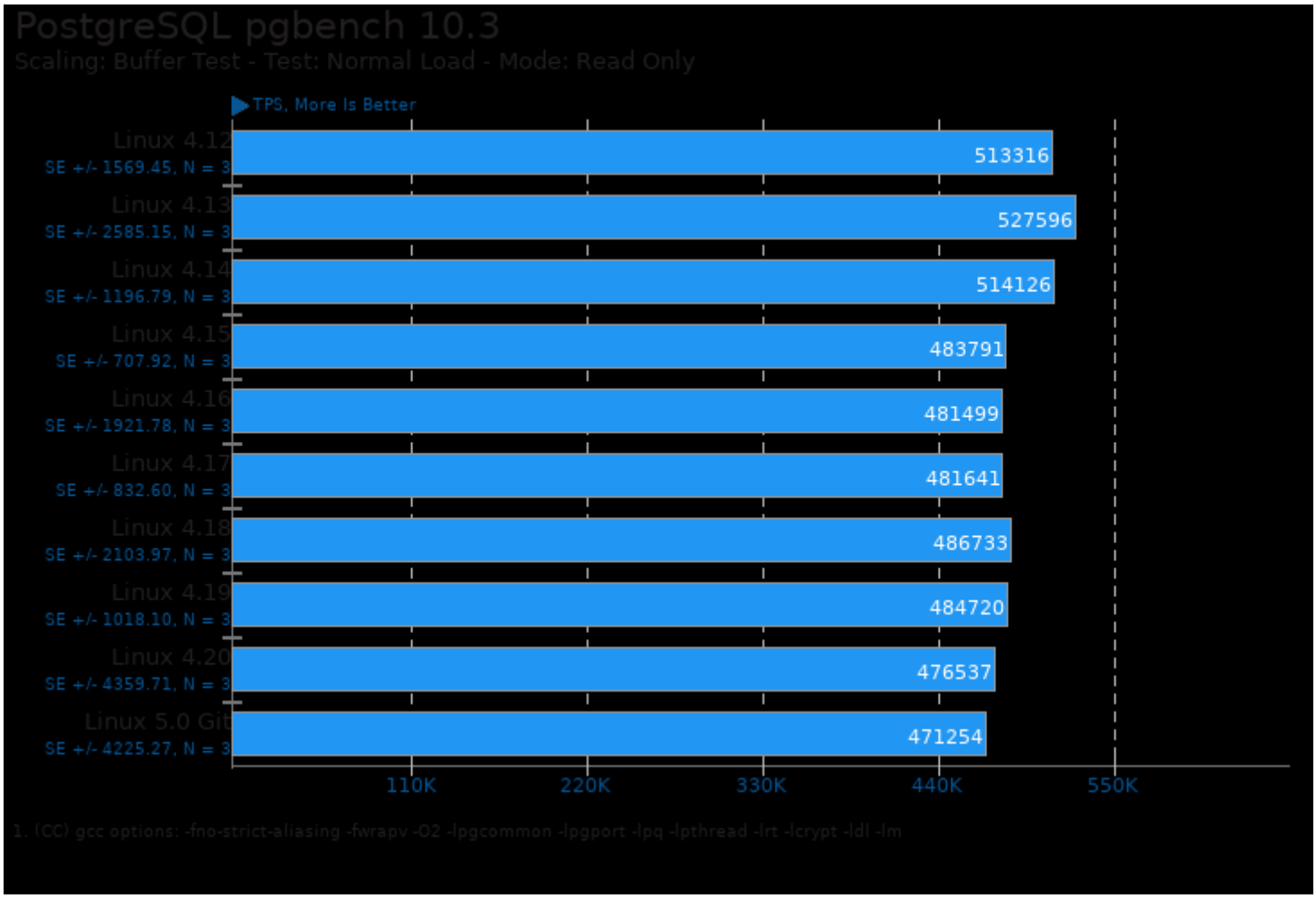

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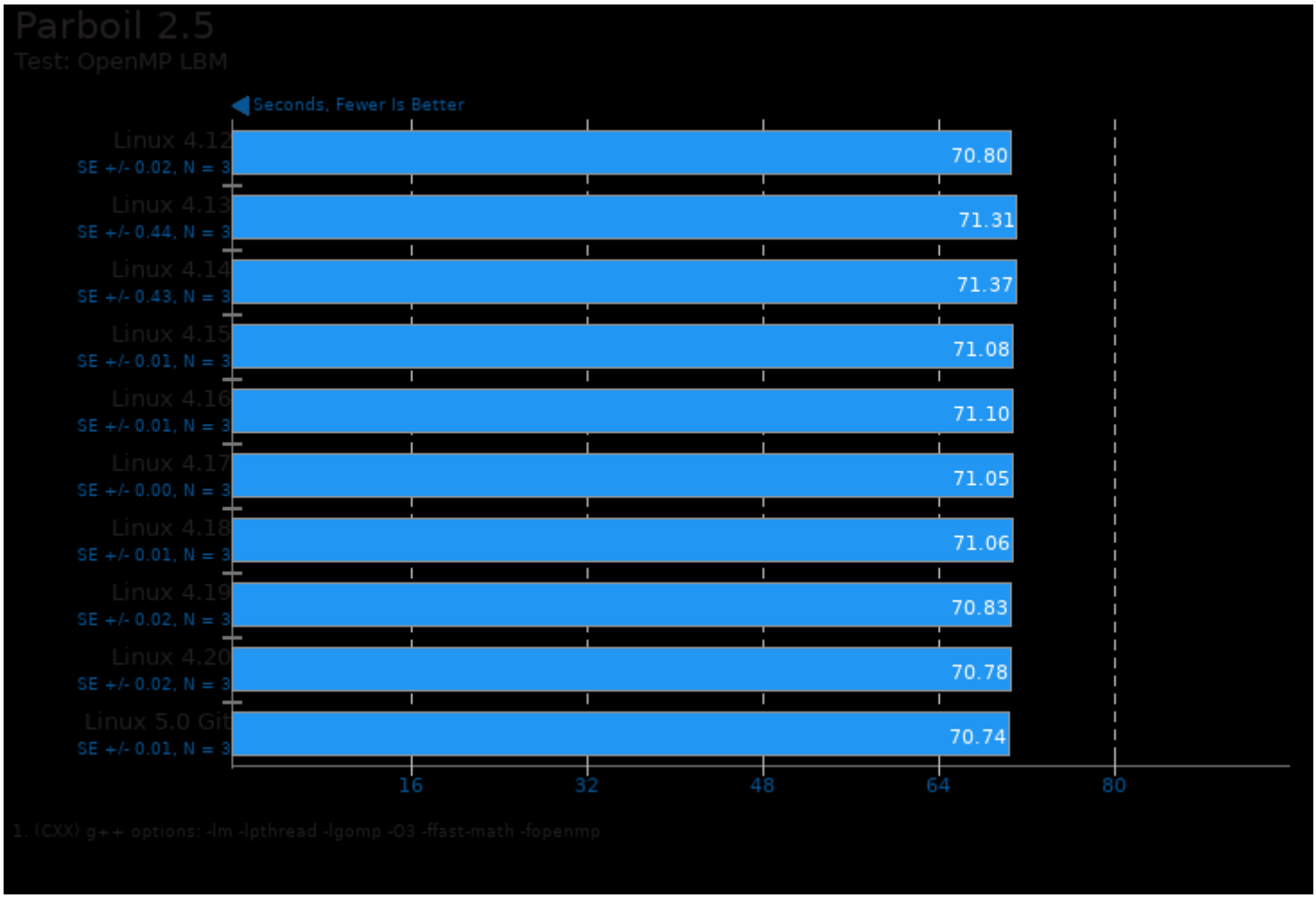

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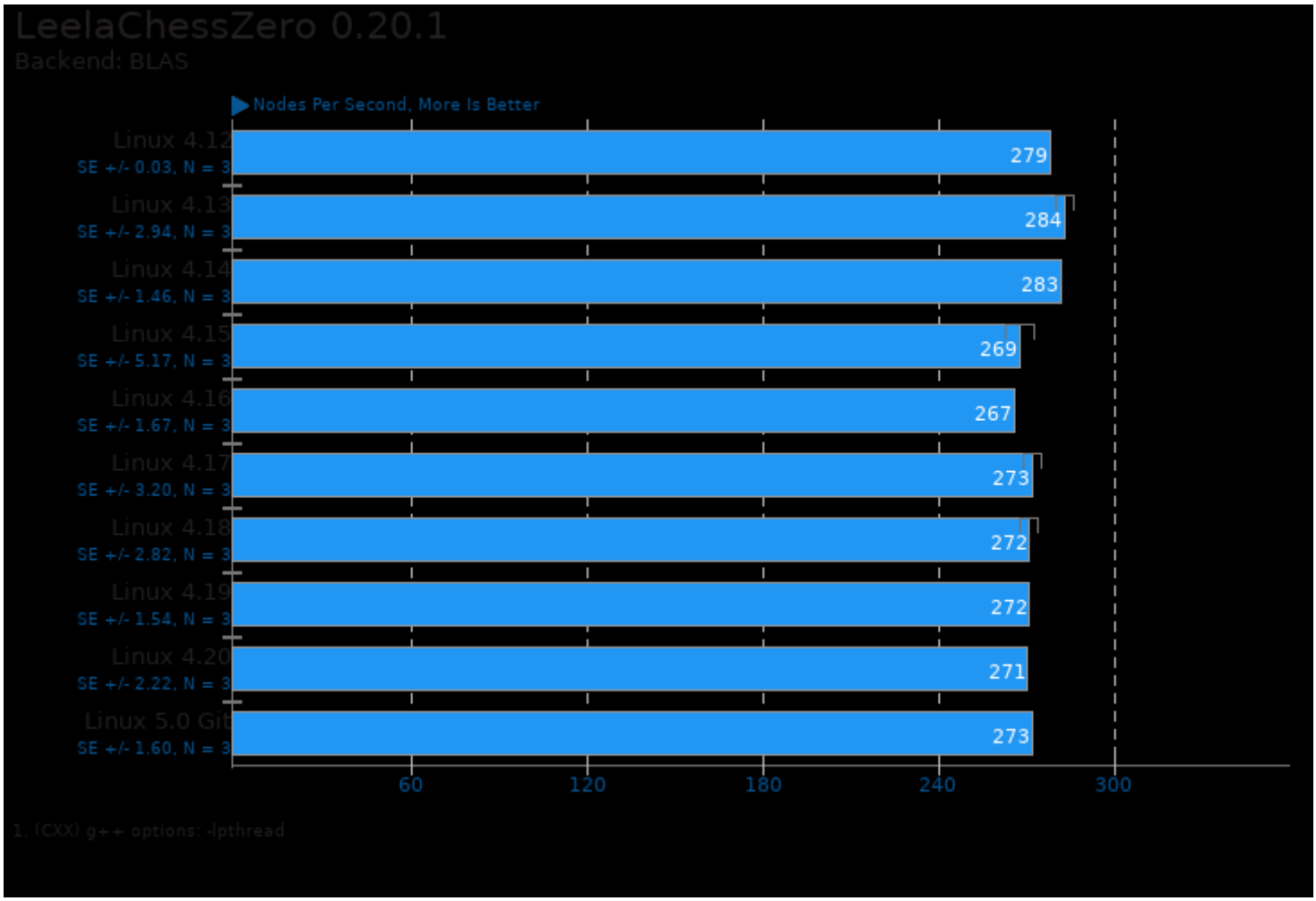

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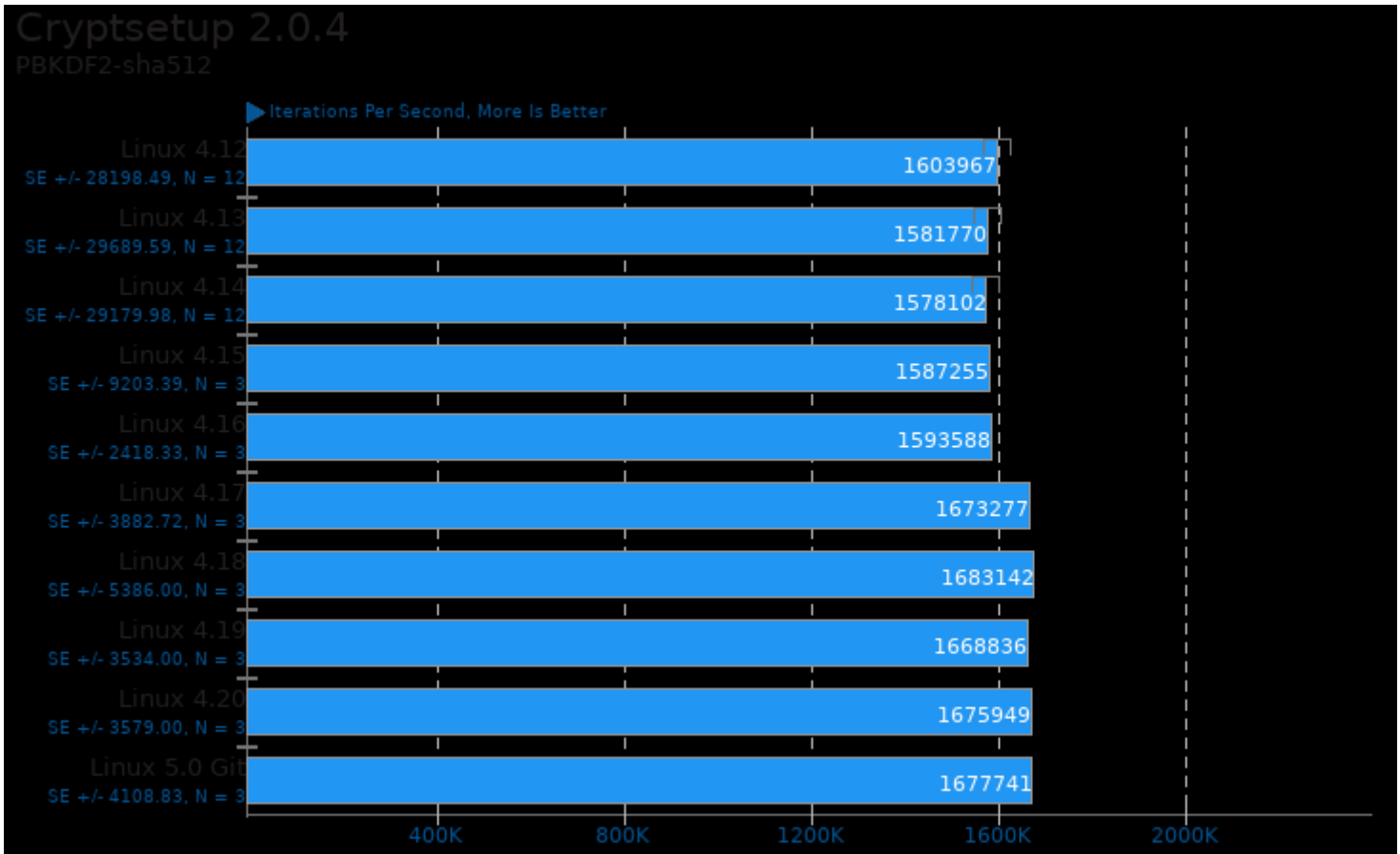

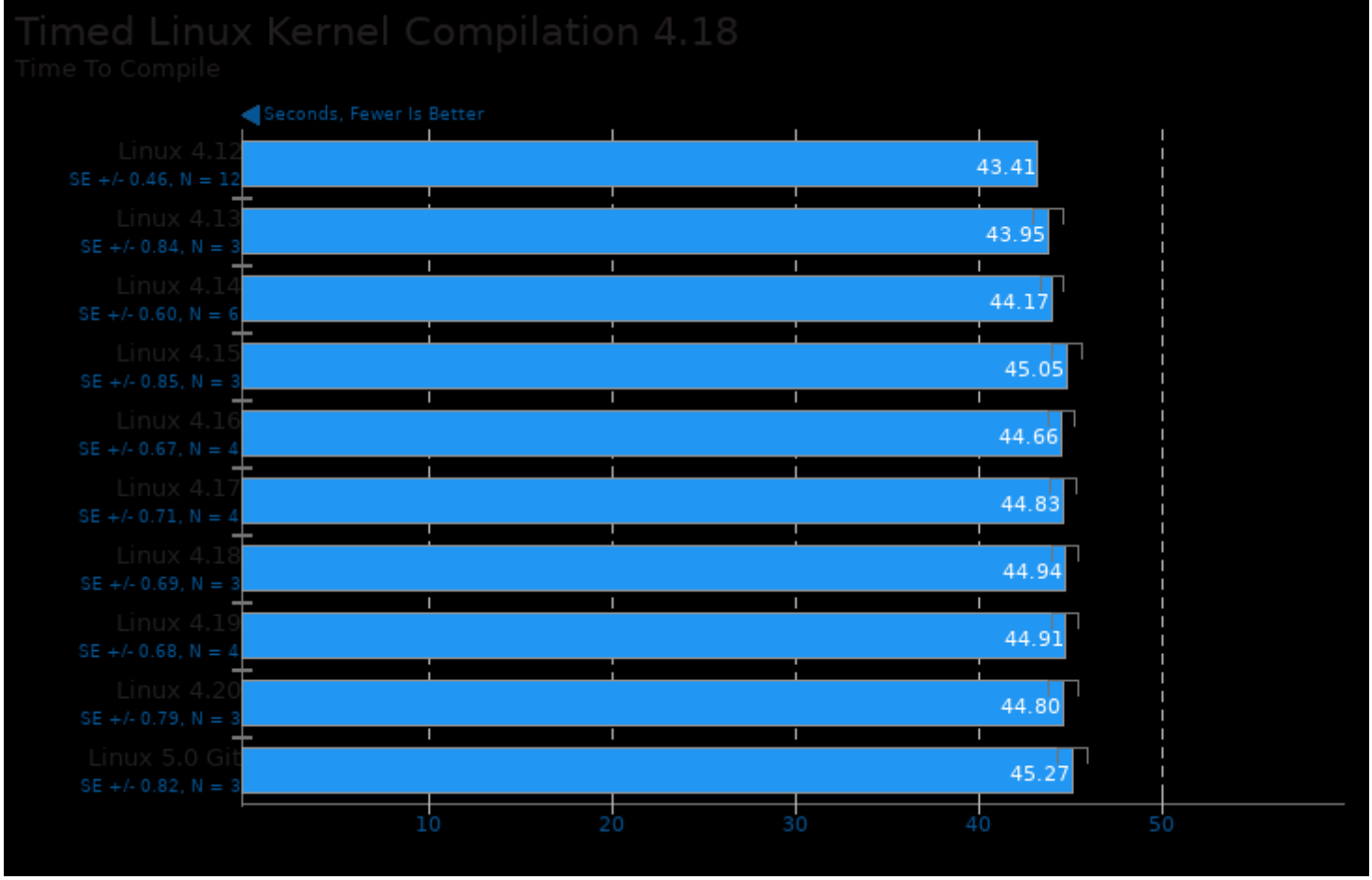

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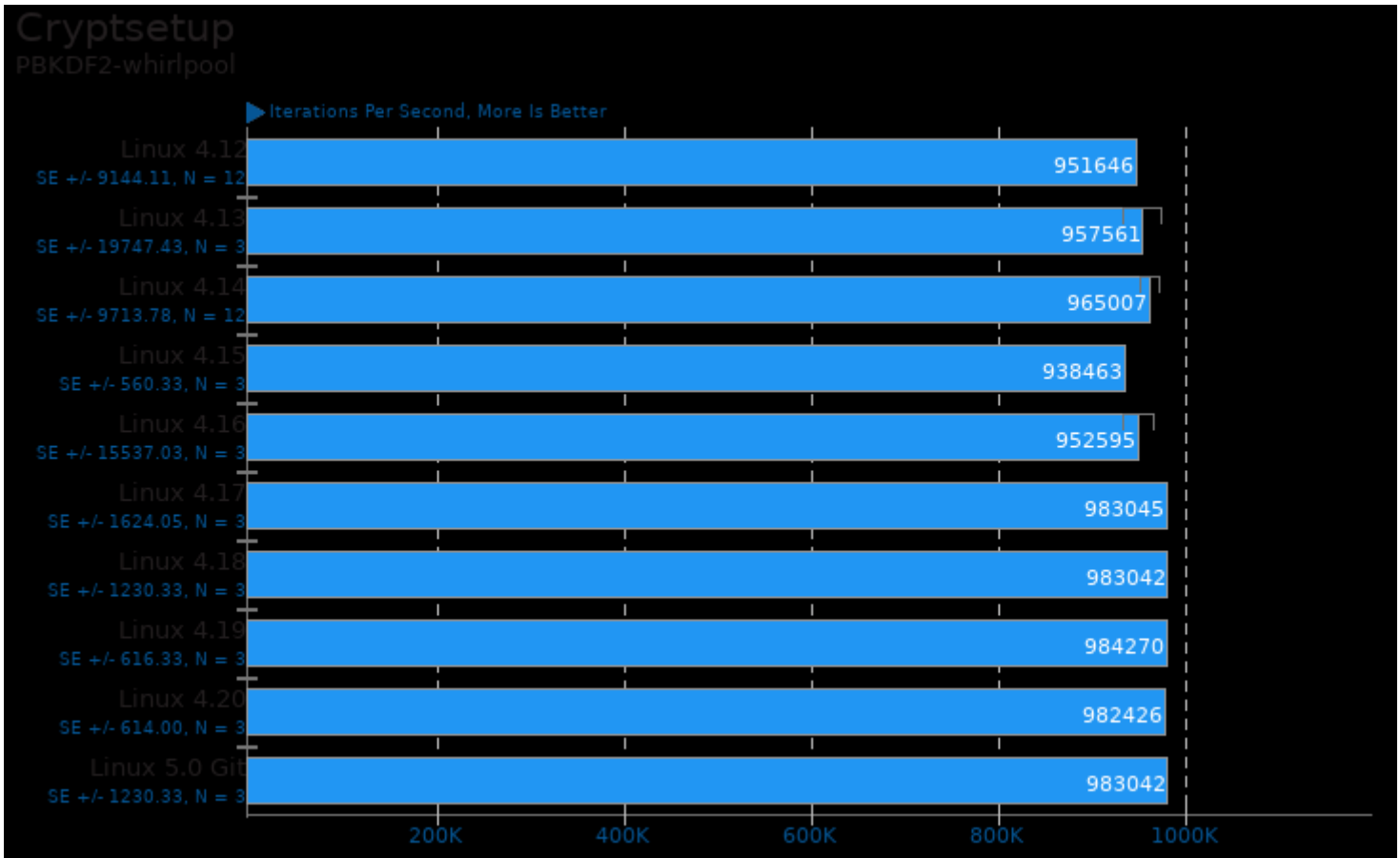

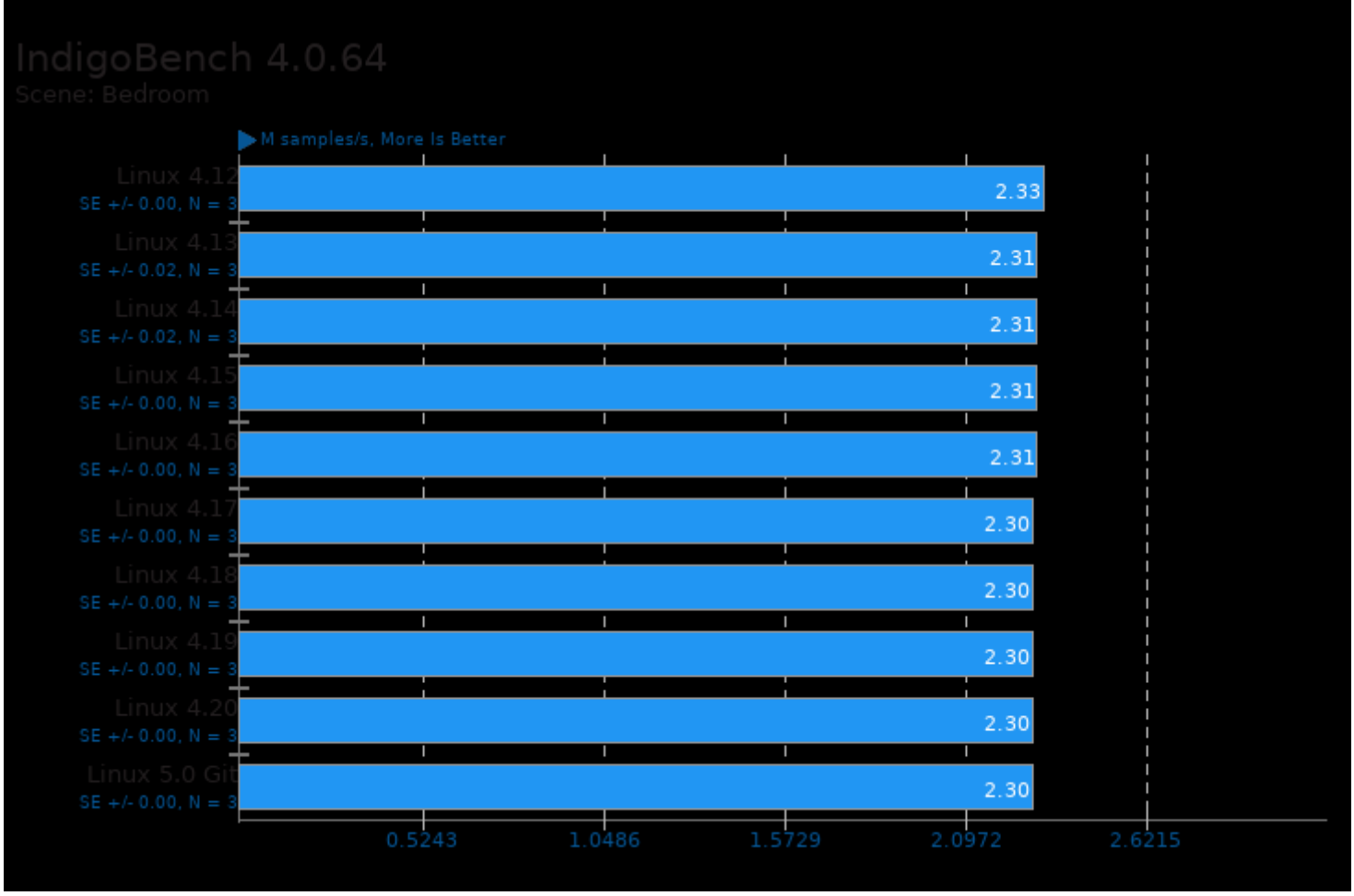

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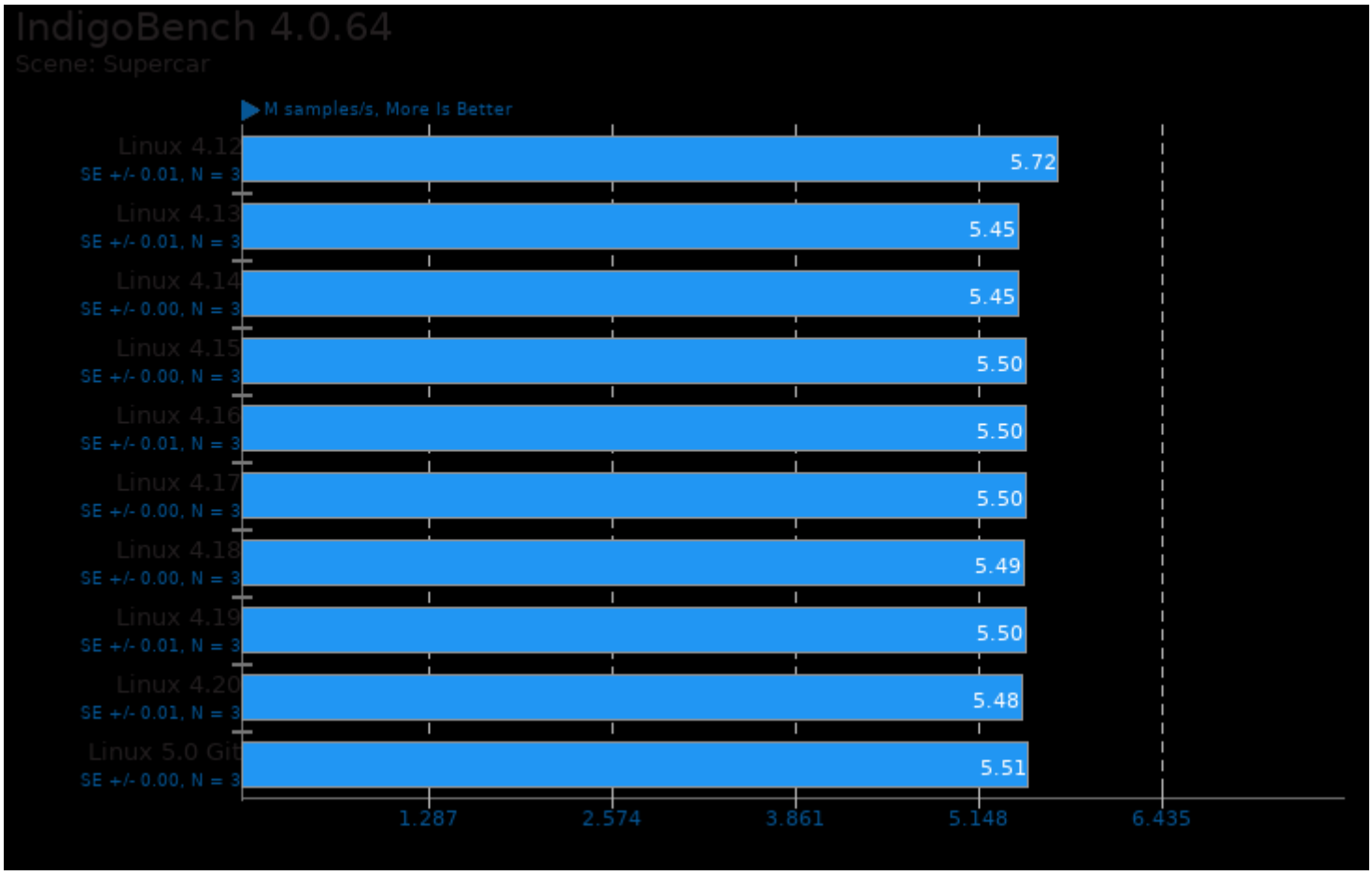

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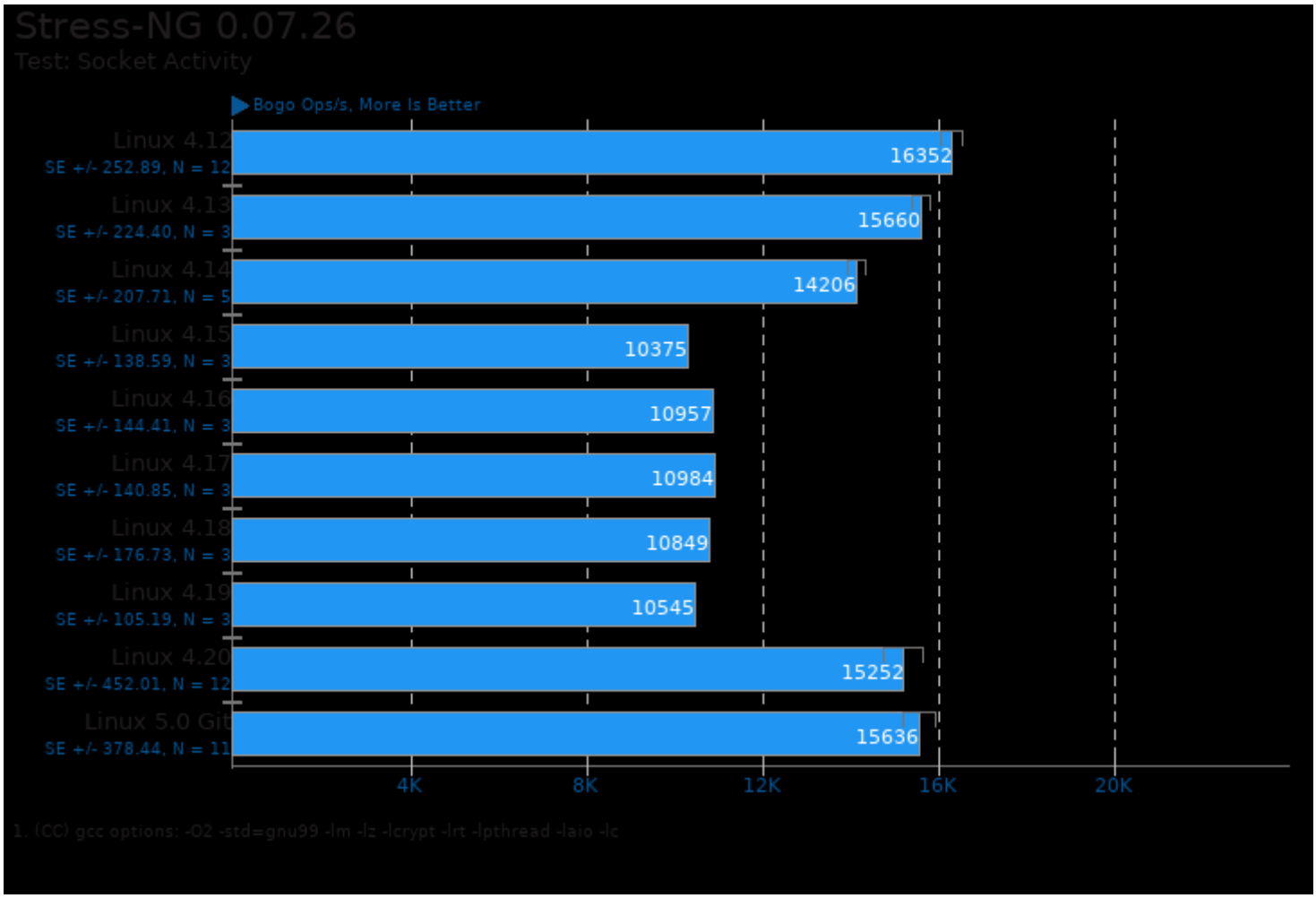

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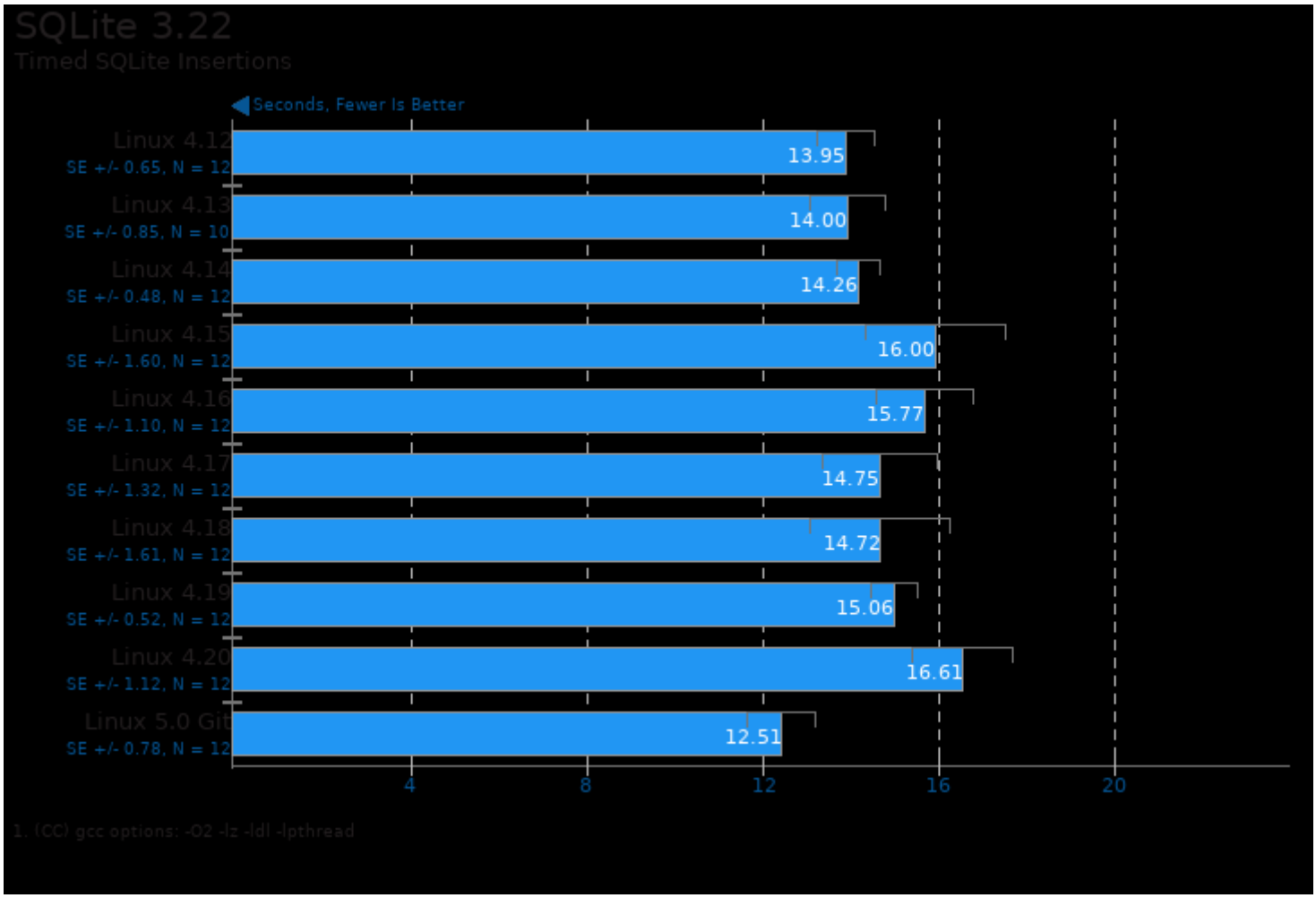

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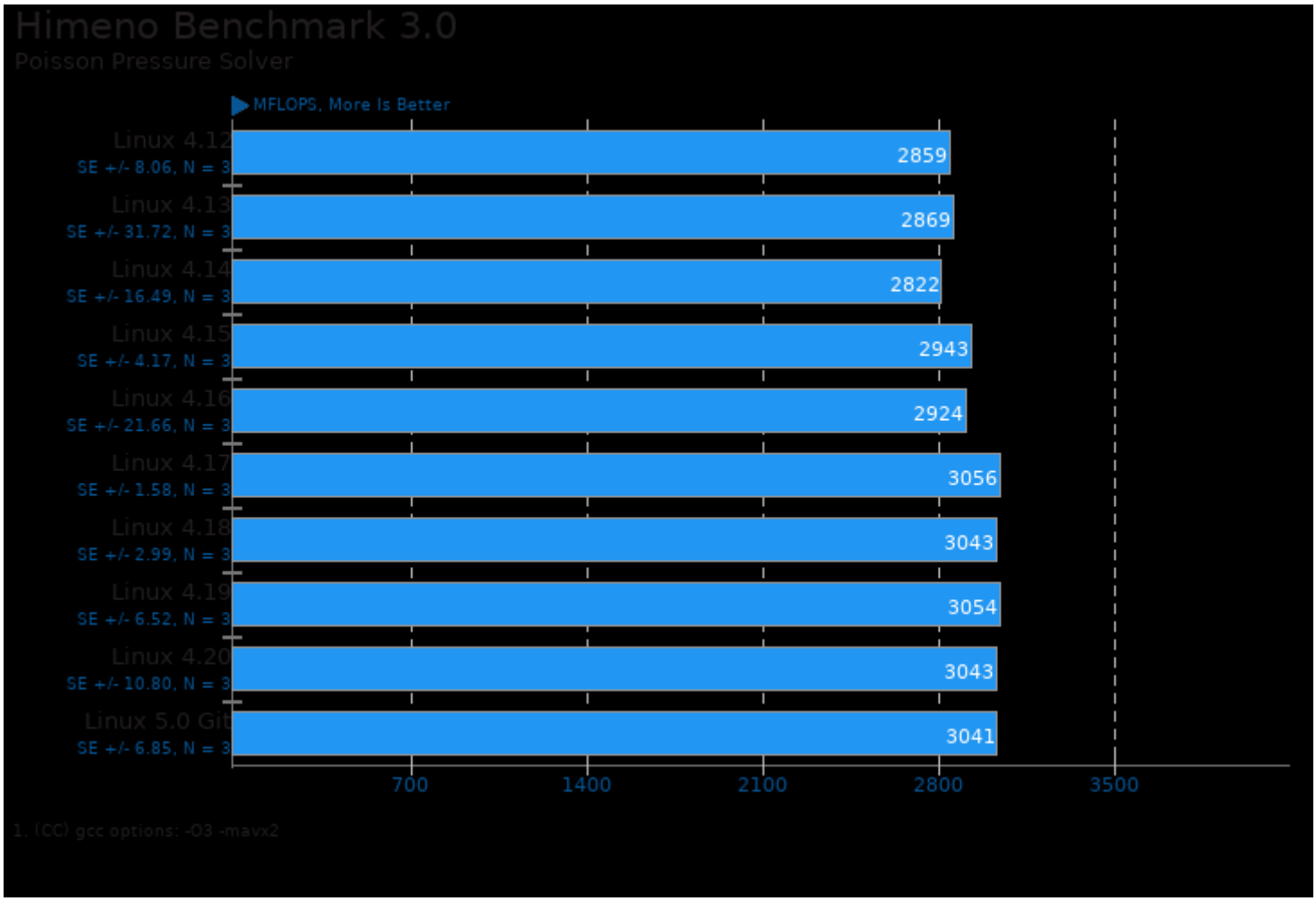

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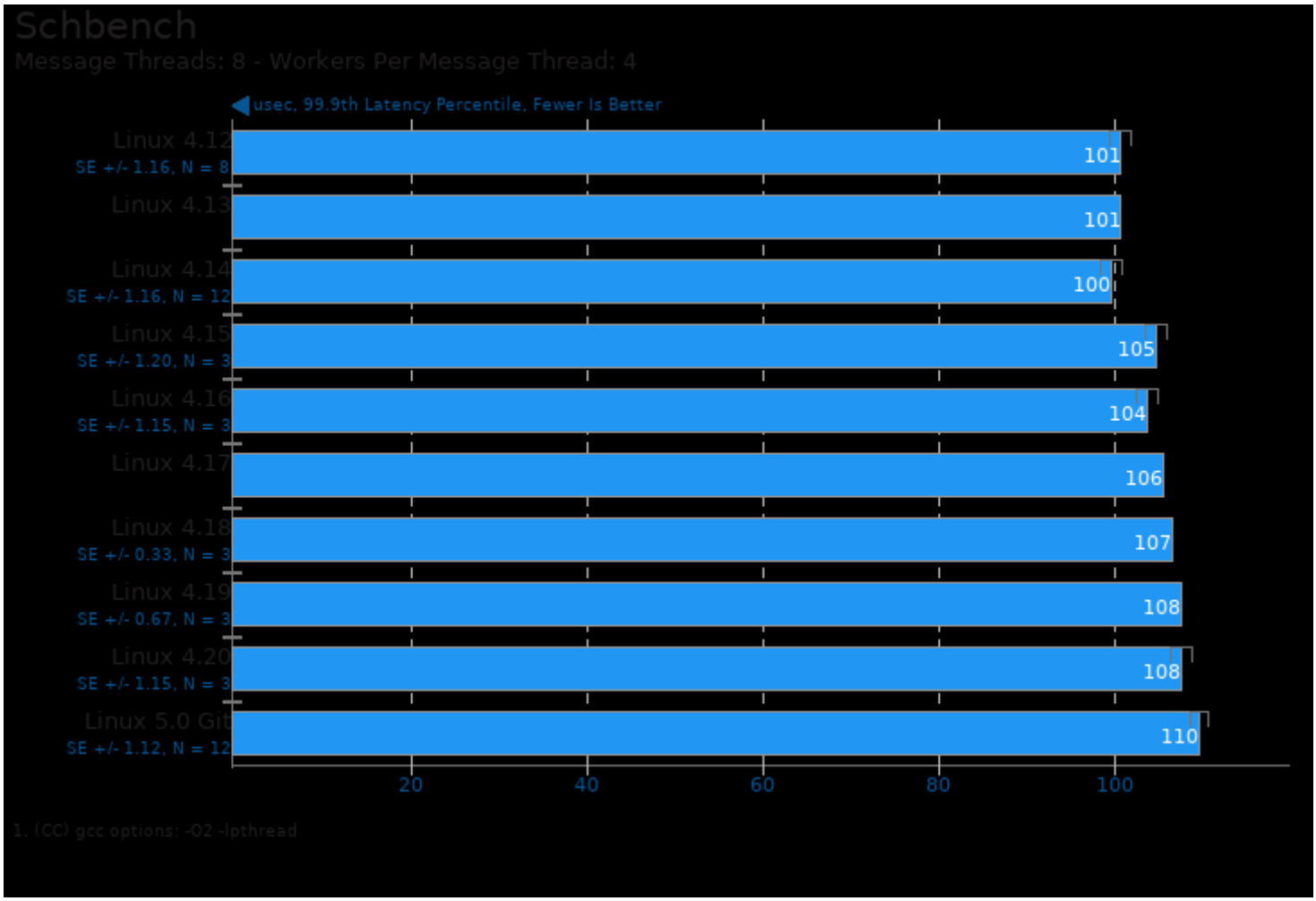

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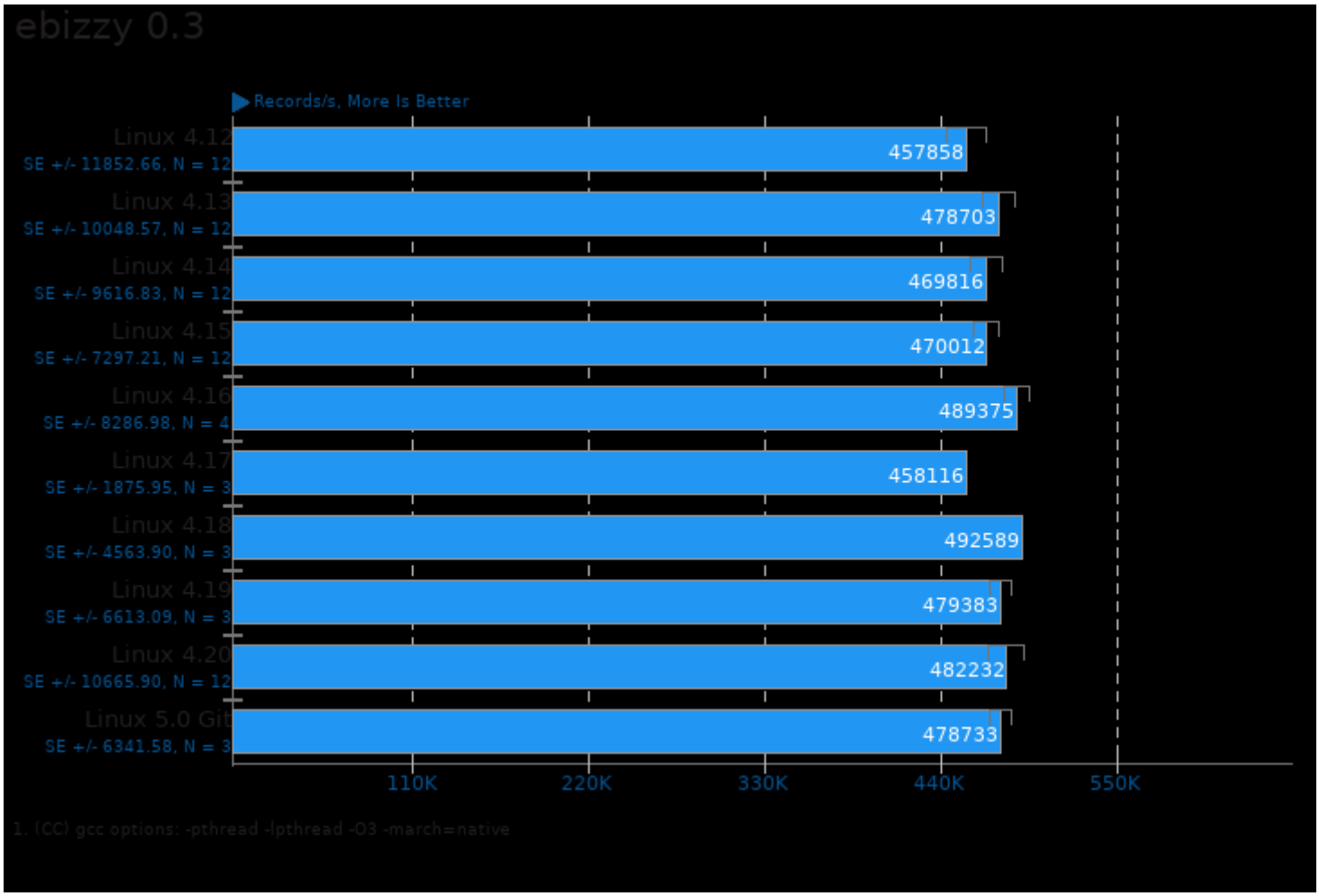
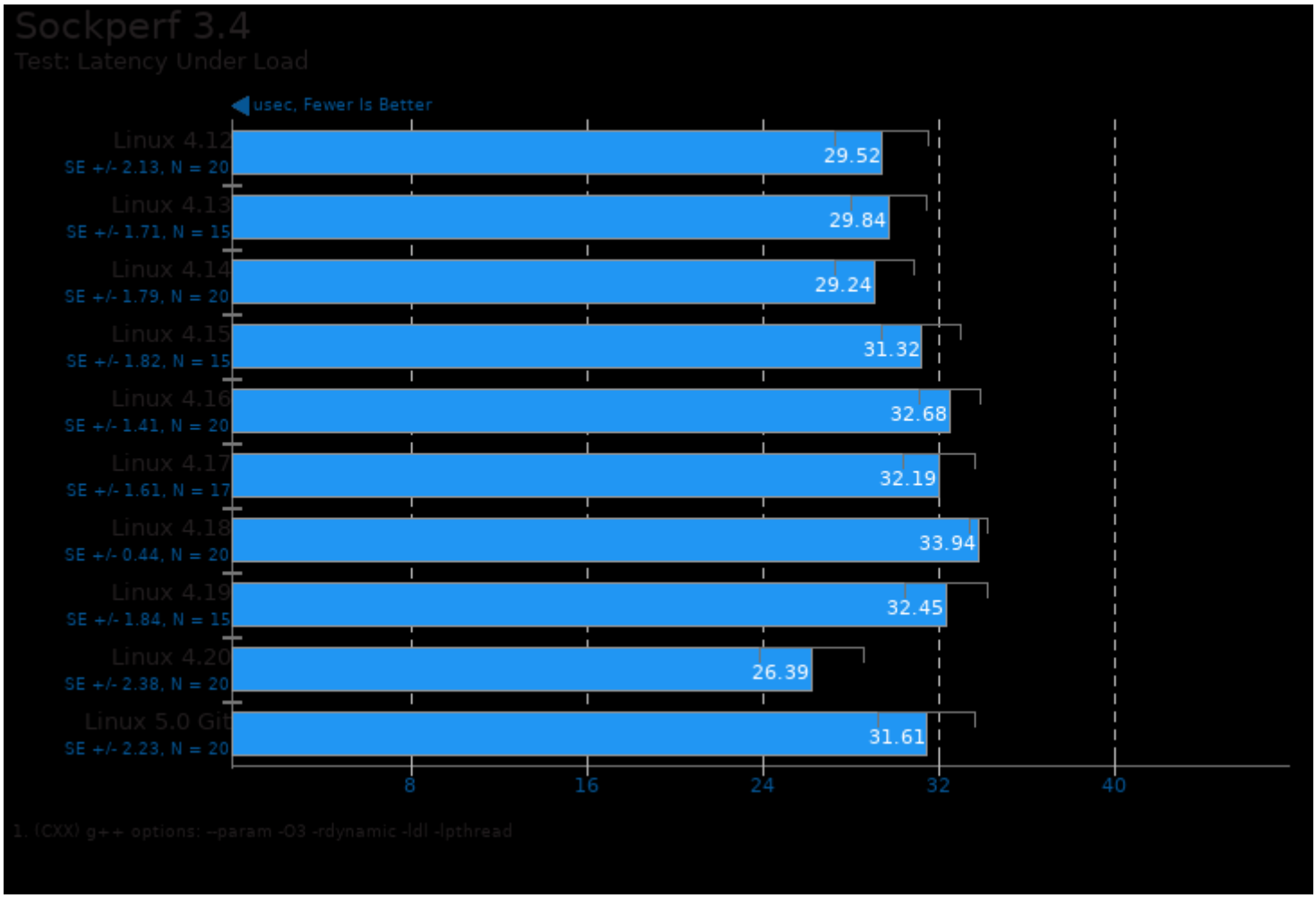
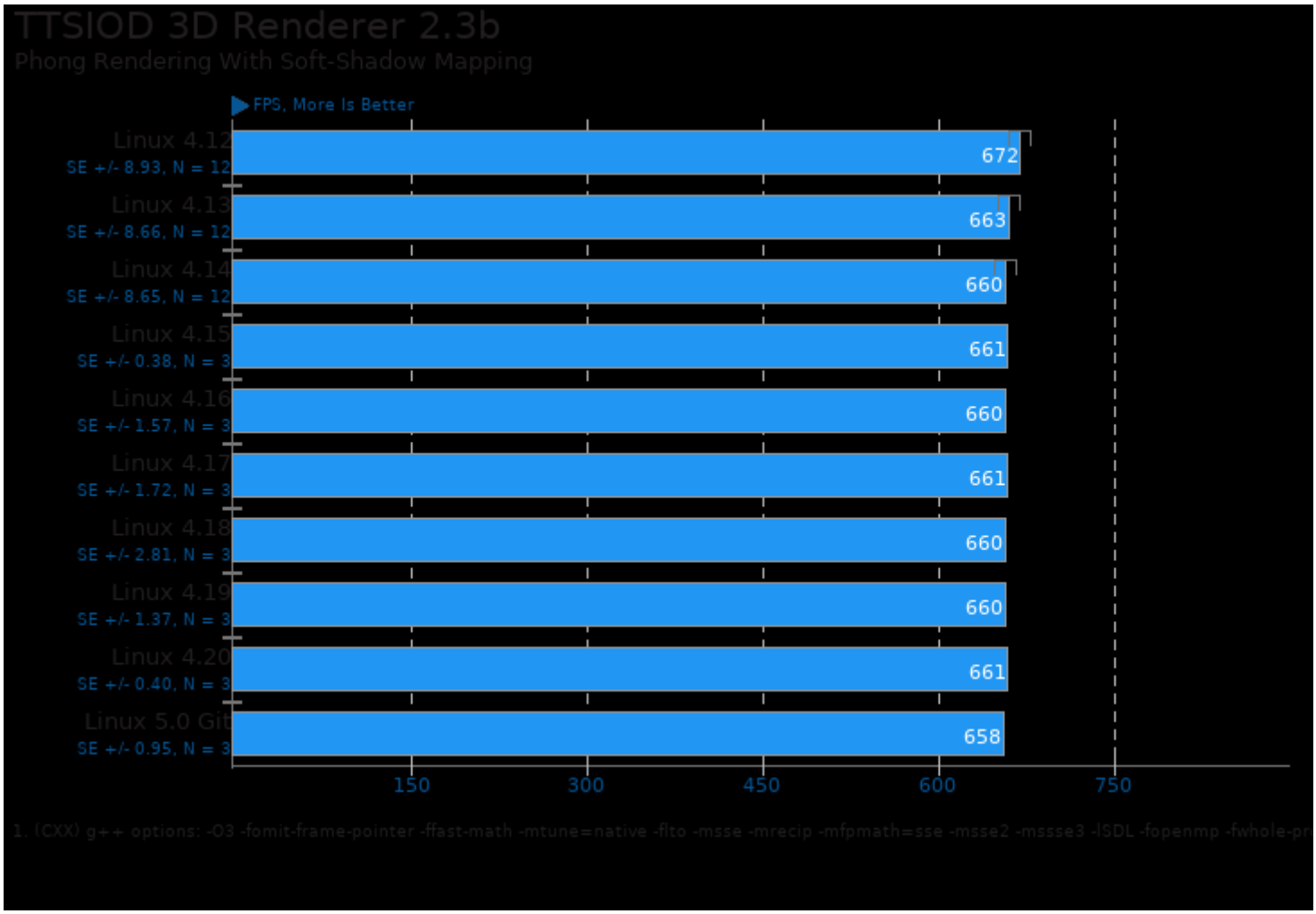


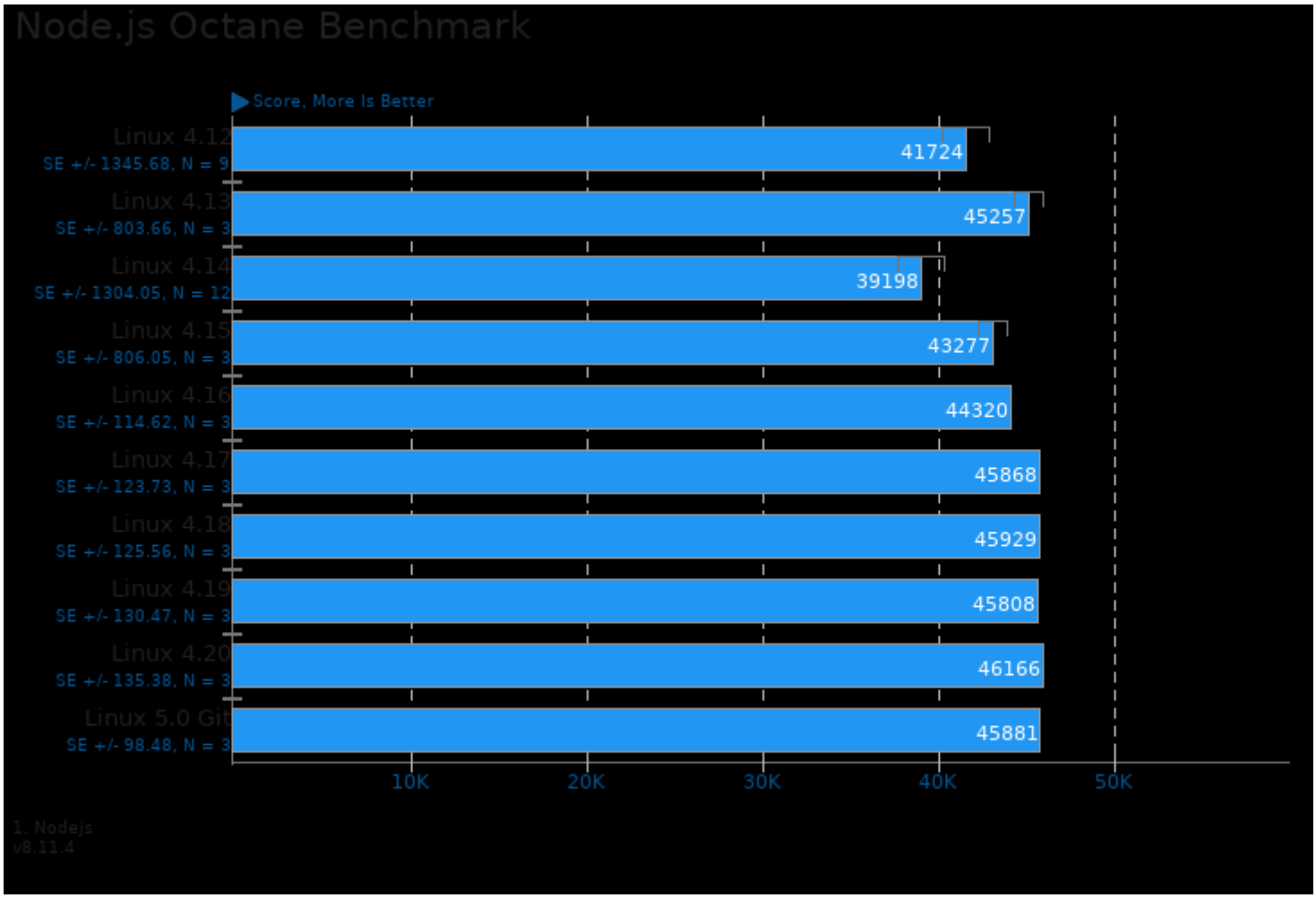
Core i9 7960X Linux 5.0 Kernel Benchmarks



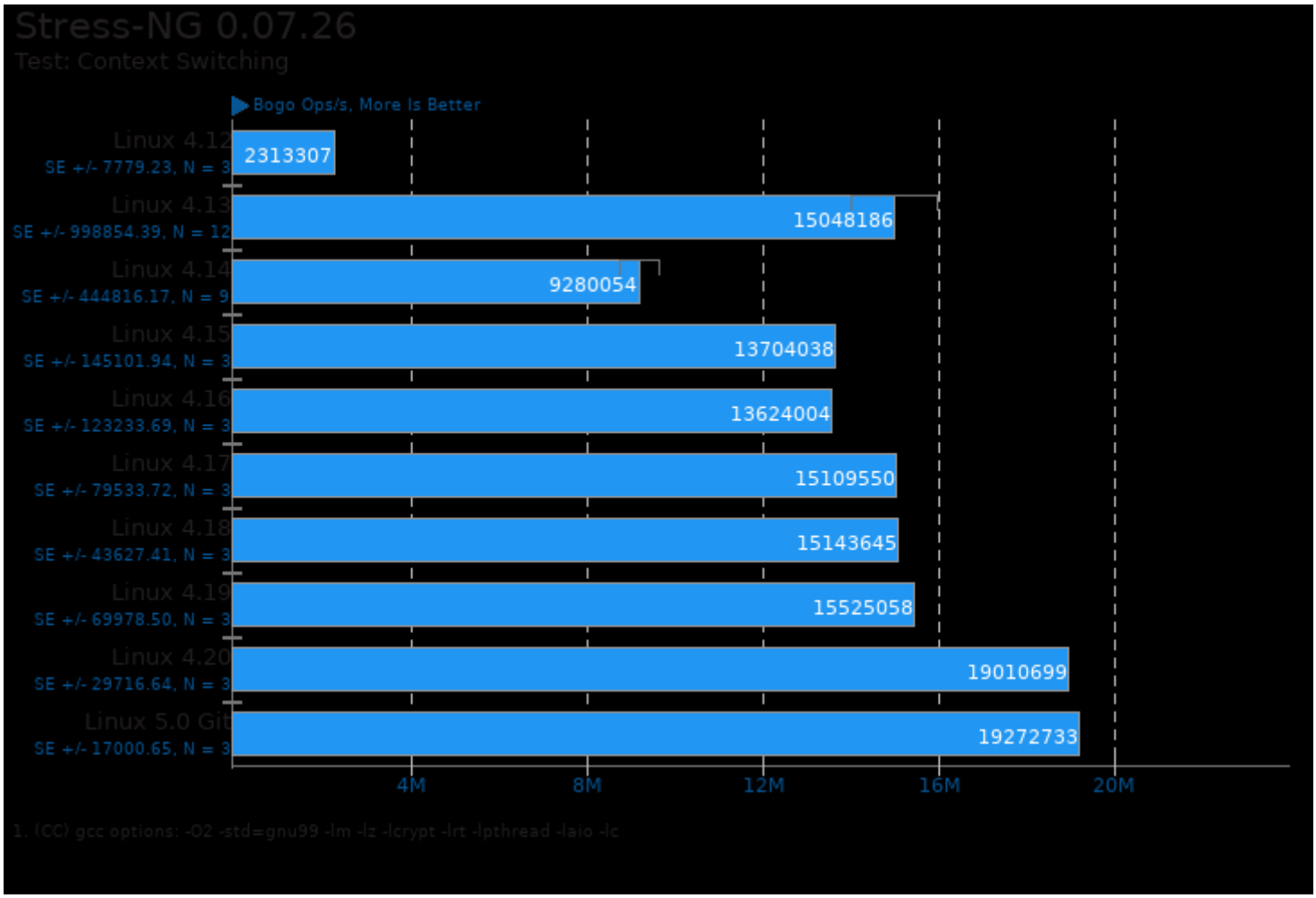
Core i9 7960X Linux 5.0 Kernel Benchmarks



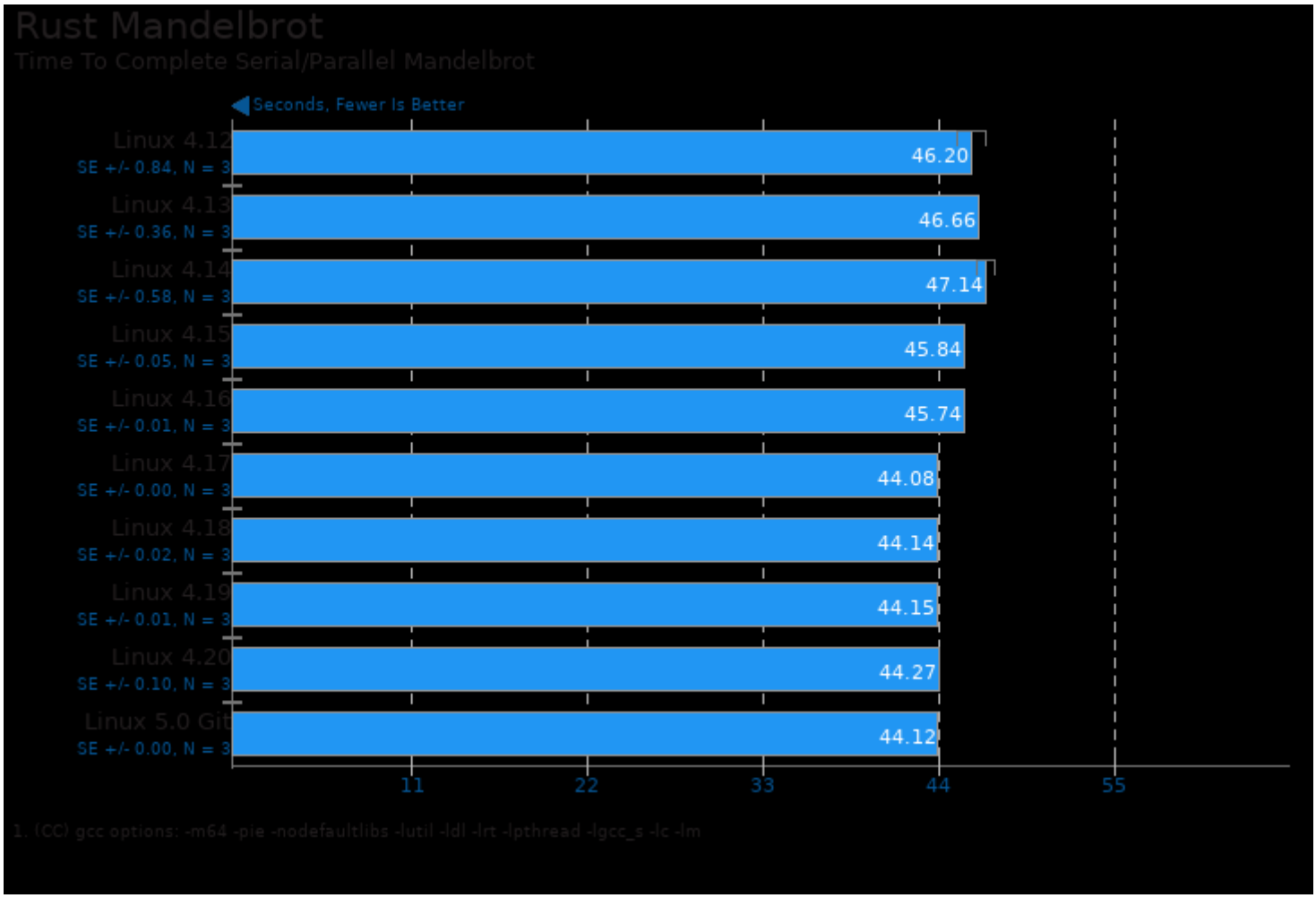
Core i9 7960X Linux 5.0 Kernel Benchmarks



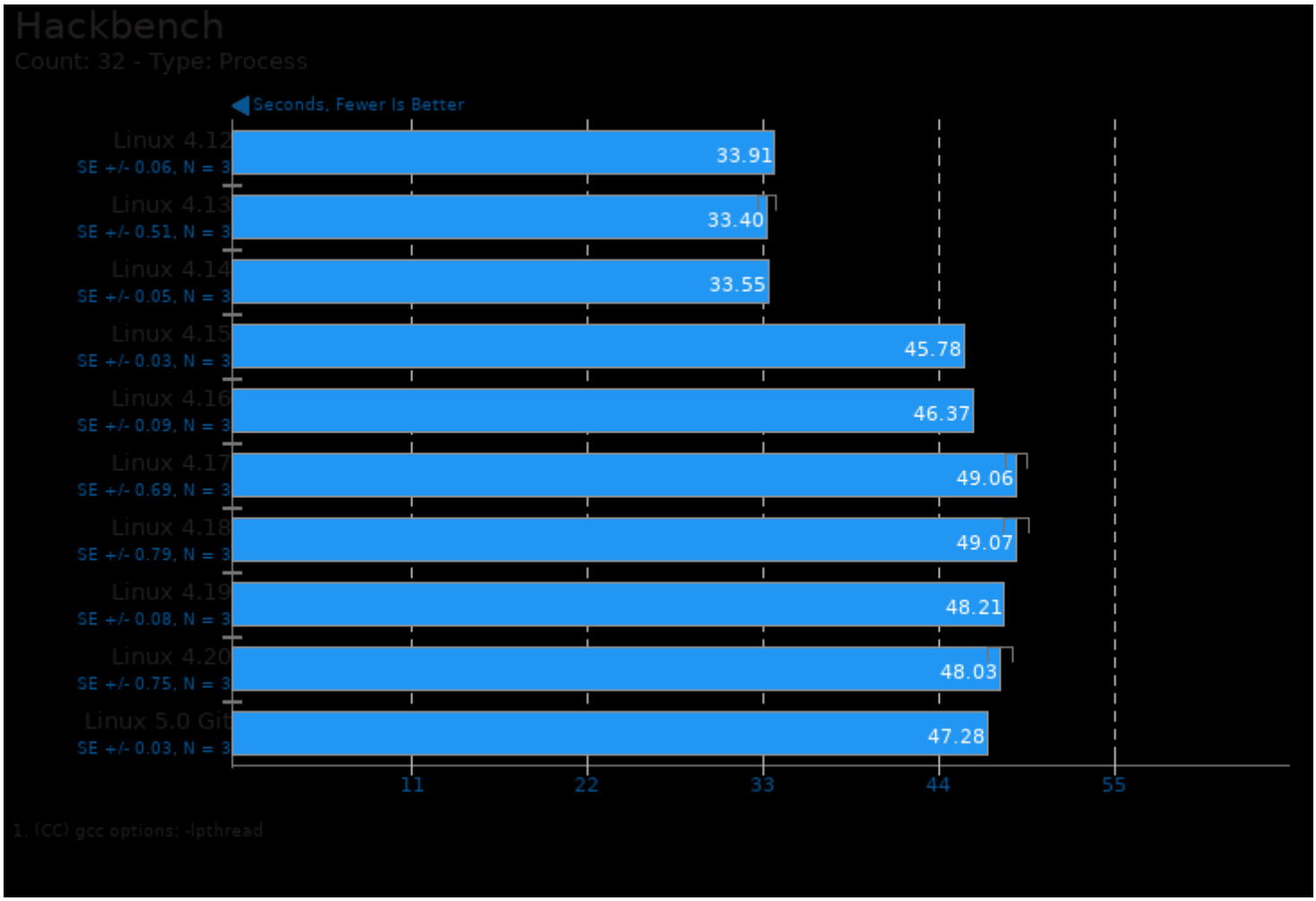
Core i9 7960X Linux 5.0 Kernel Benchmarks



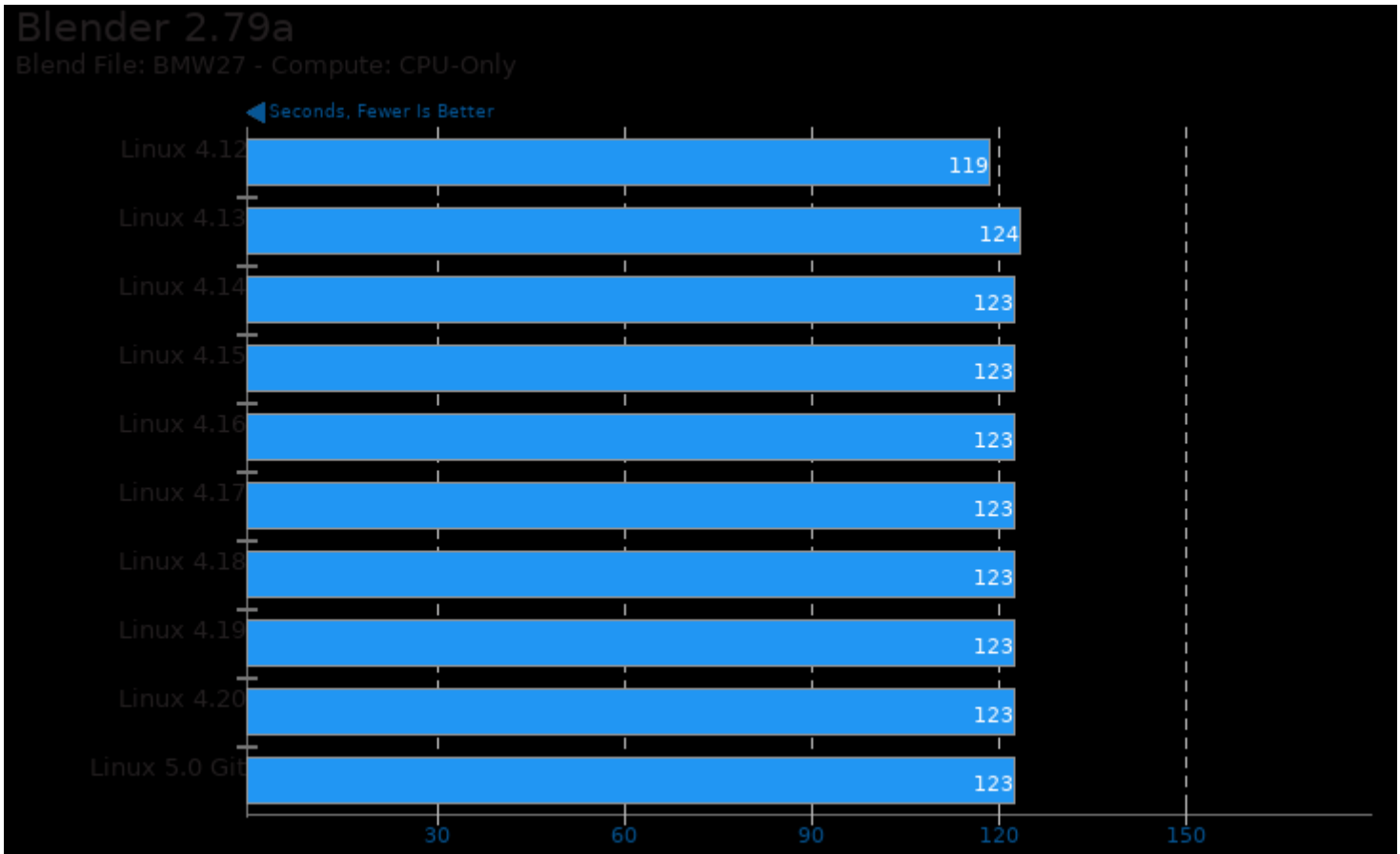
Core i9 7960X Linux 5.0 Kernel Benchmarks

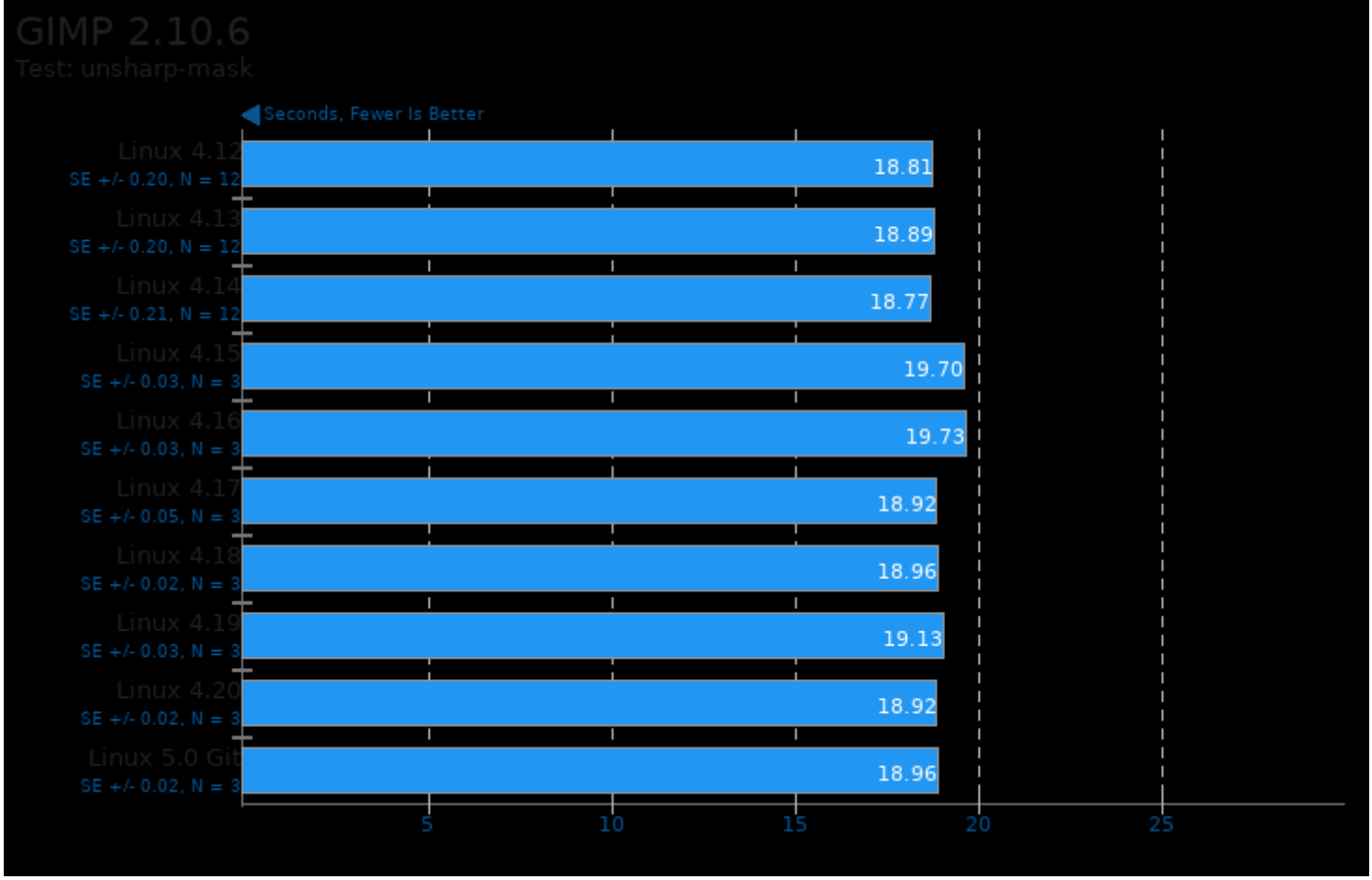


Core i9 7960X Linux 5.0 Kernel Benchmarks

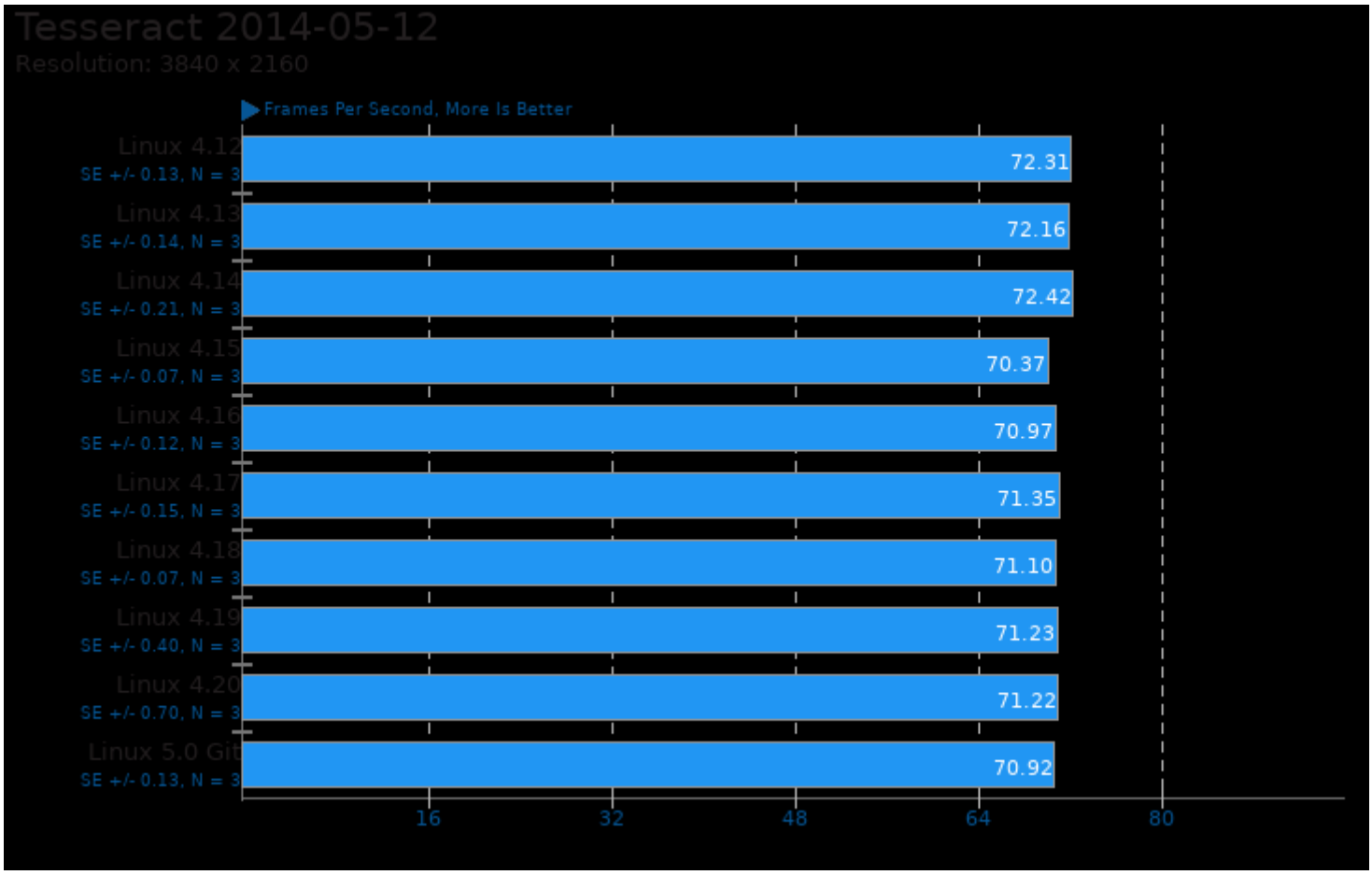


Core i9 7960X Linux 5.0 Kernel Benchmarks

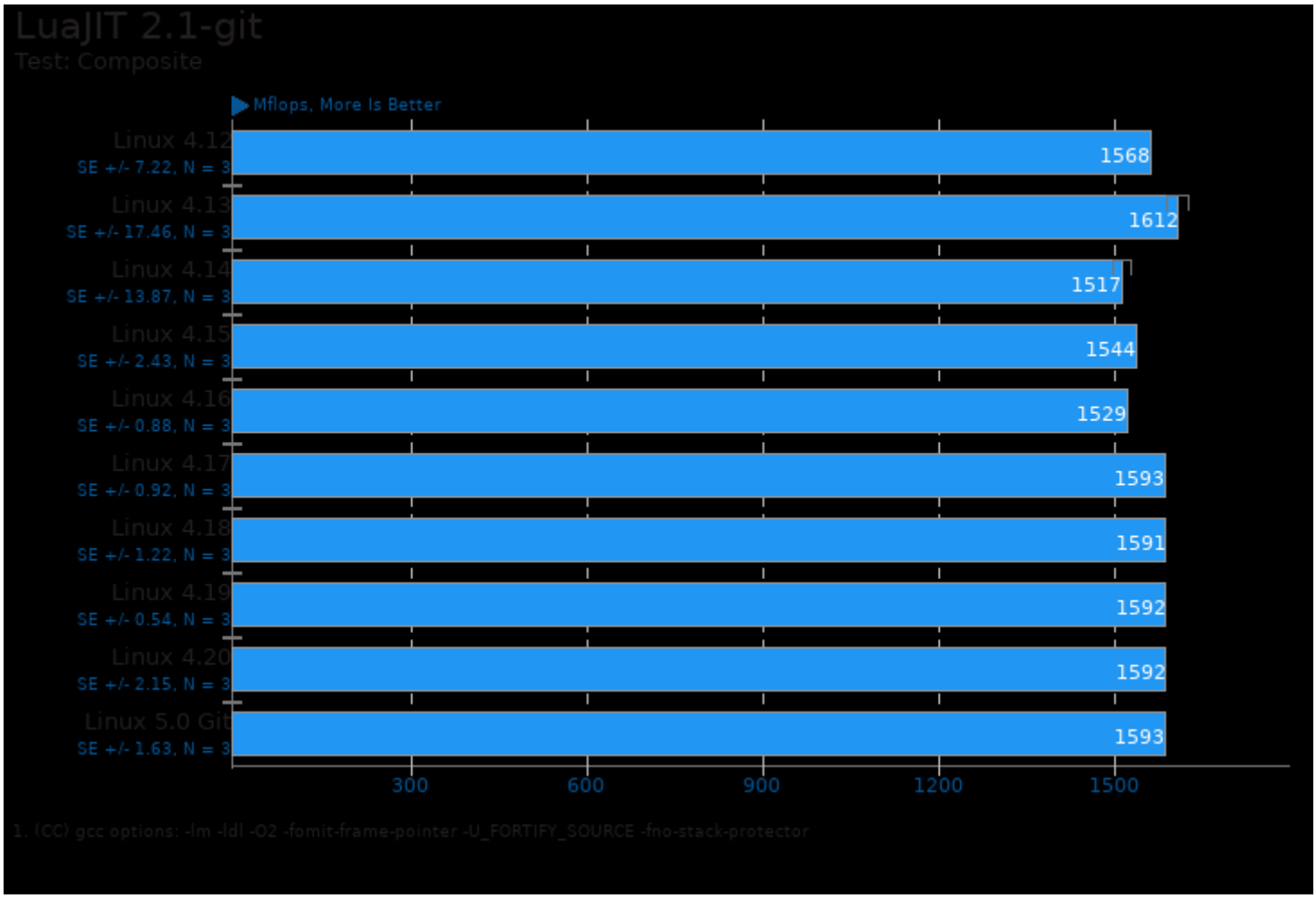


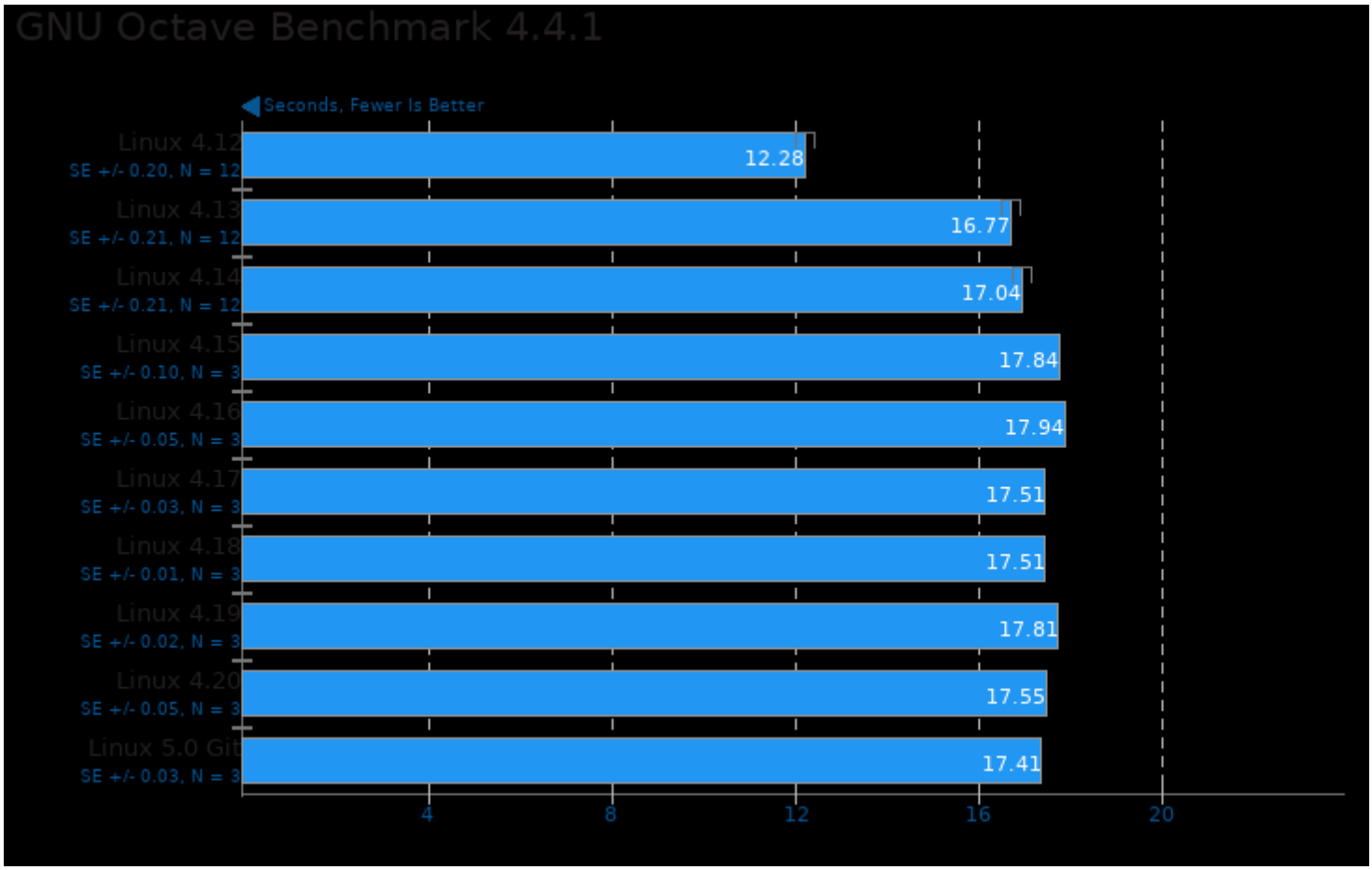


Core i9 7960X Linux 5.0 Kernel Benchmarks

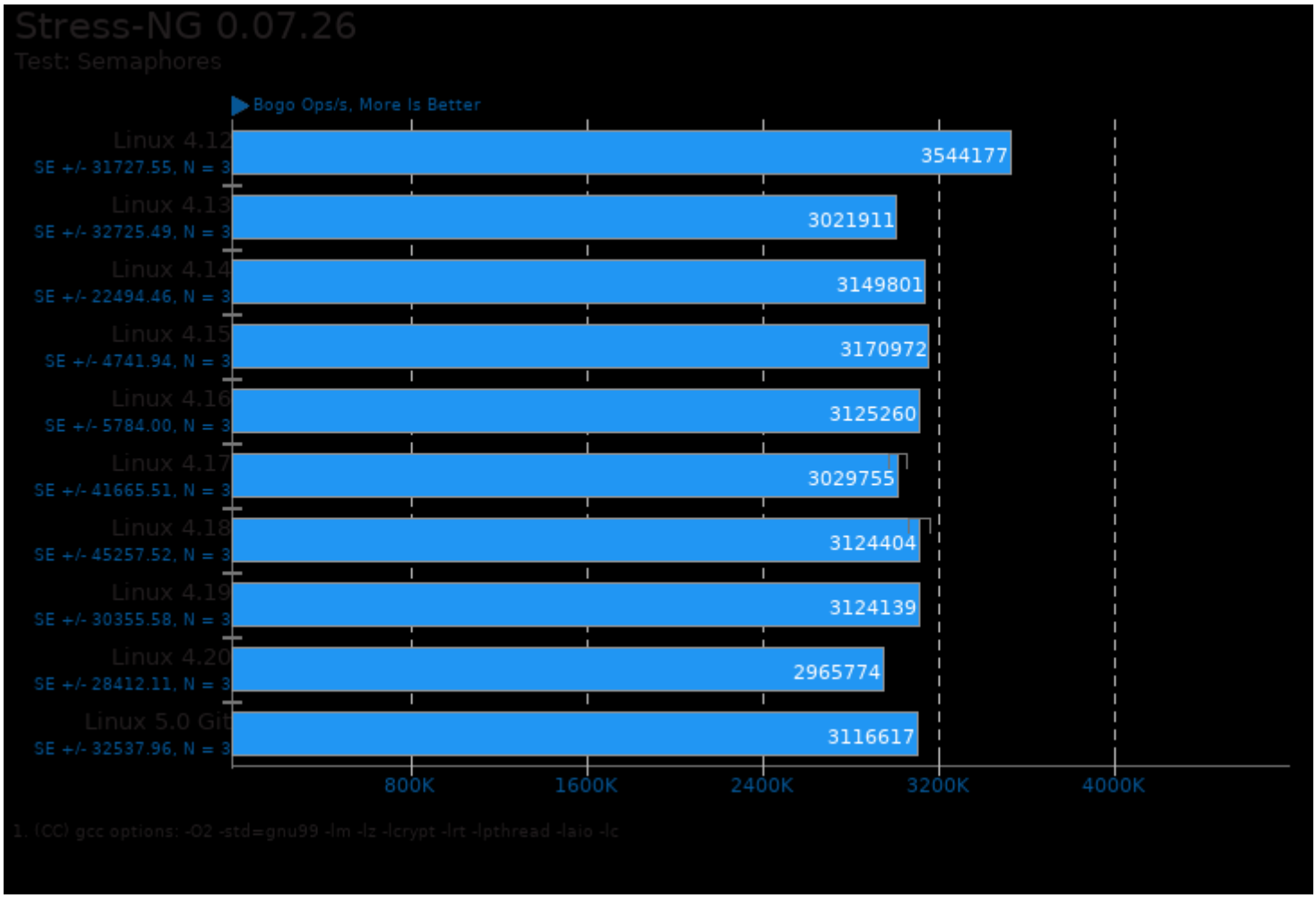


Core i9 7960X Linux 5.0 Kernel Benchmarks

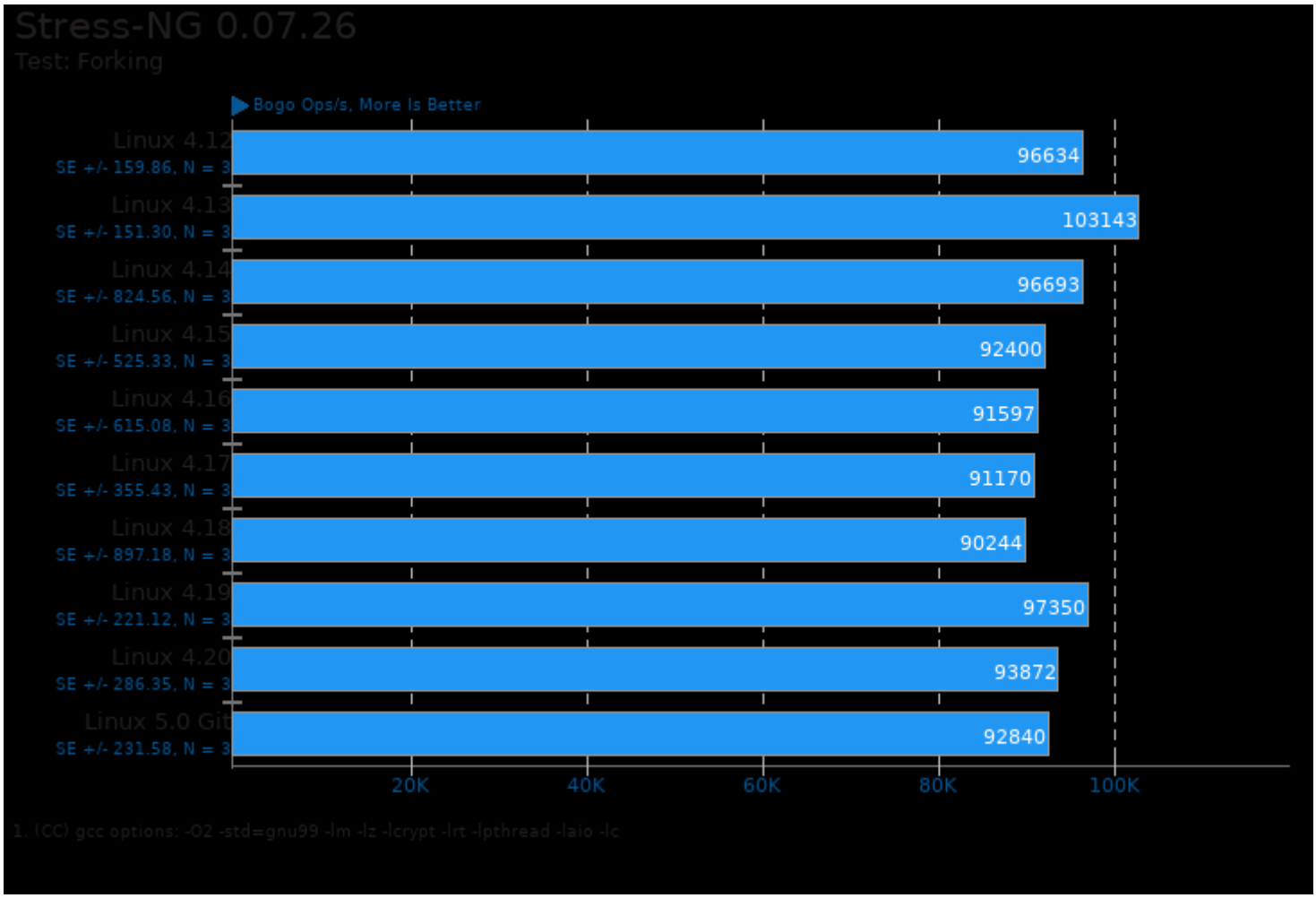



GNU Octave Benchmark 4.4.1
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.20, N = 12
12.28
Linux 4.13
SE +/- 0.21, N = 12
16.77
Linux 4.14
SE +/- 0.21, N = 12
17.04
Linux 4.15
SE +/- 0.10, N = 3
17.84
Linux 4.16
SE +/- 0.05, N = 3
17.94
Linux 4.17
SE +/- 0.03, N = 3
17.51
Linux 4.18
SE +/- 0.01, N = 3
17.51
Linux 4.19
SE +/- 0.02, N = 3
17.81
Linux 4.20
SE +/- 0.05, N = 3
17.55
Linux 5.0 Git
SE +/- 0.03, N = 3
17.41
4
8
12
16
20

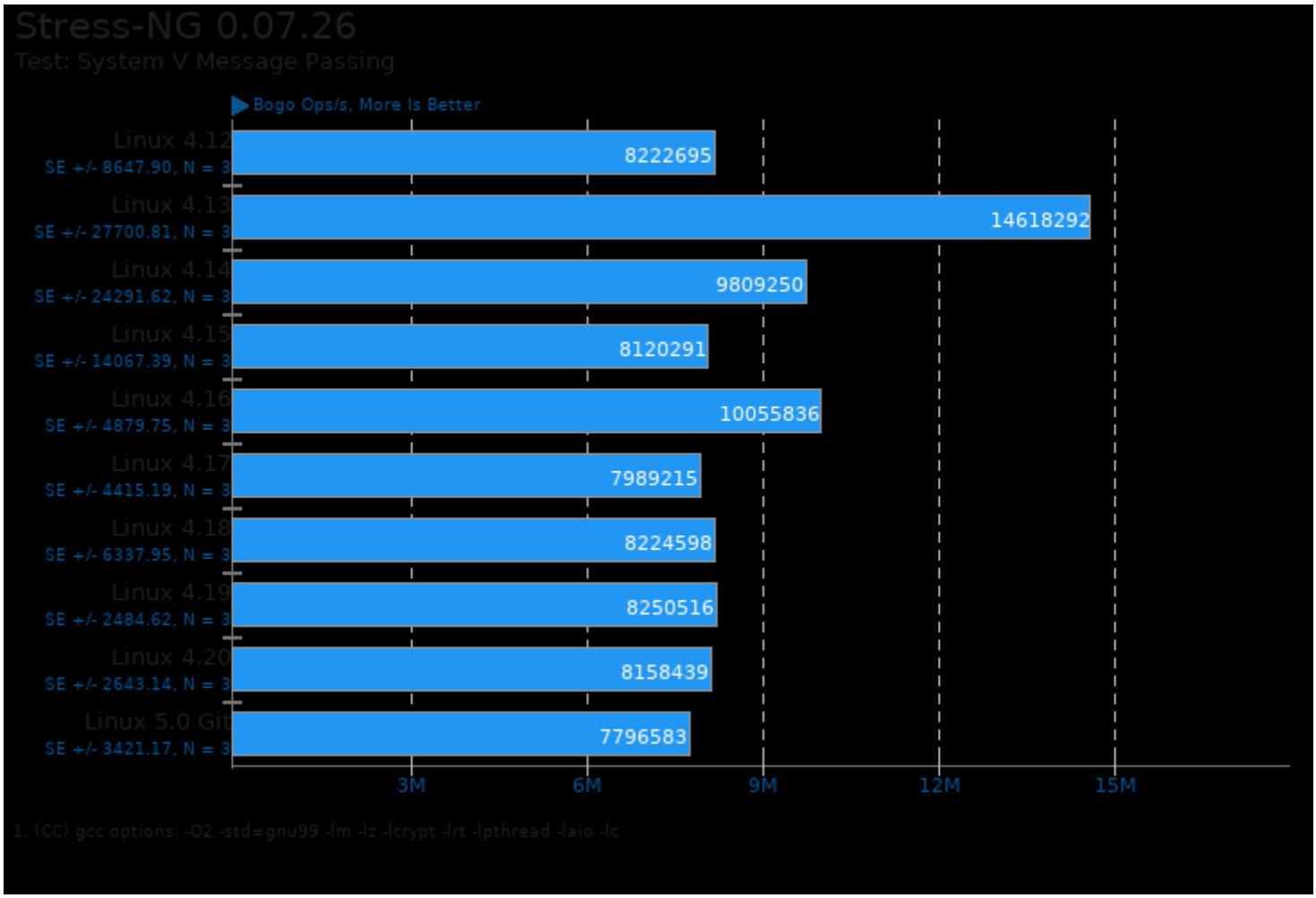
Core i9 7960X Linux 5.0 Kernel Benchmarks



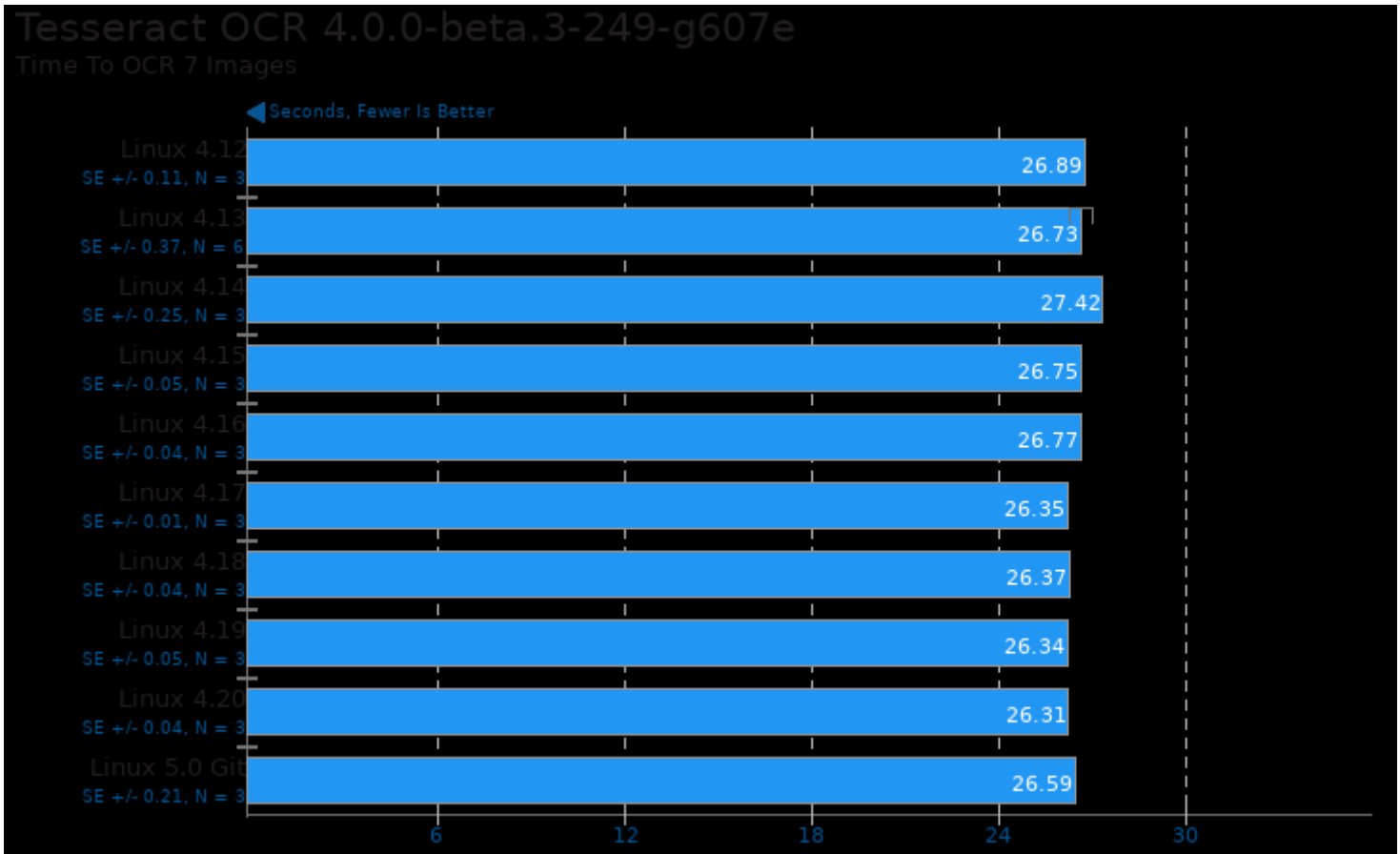
Core i9 7960X Linux 5.0 Kernel Benchmarks

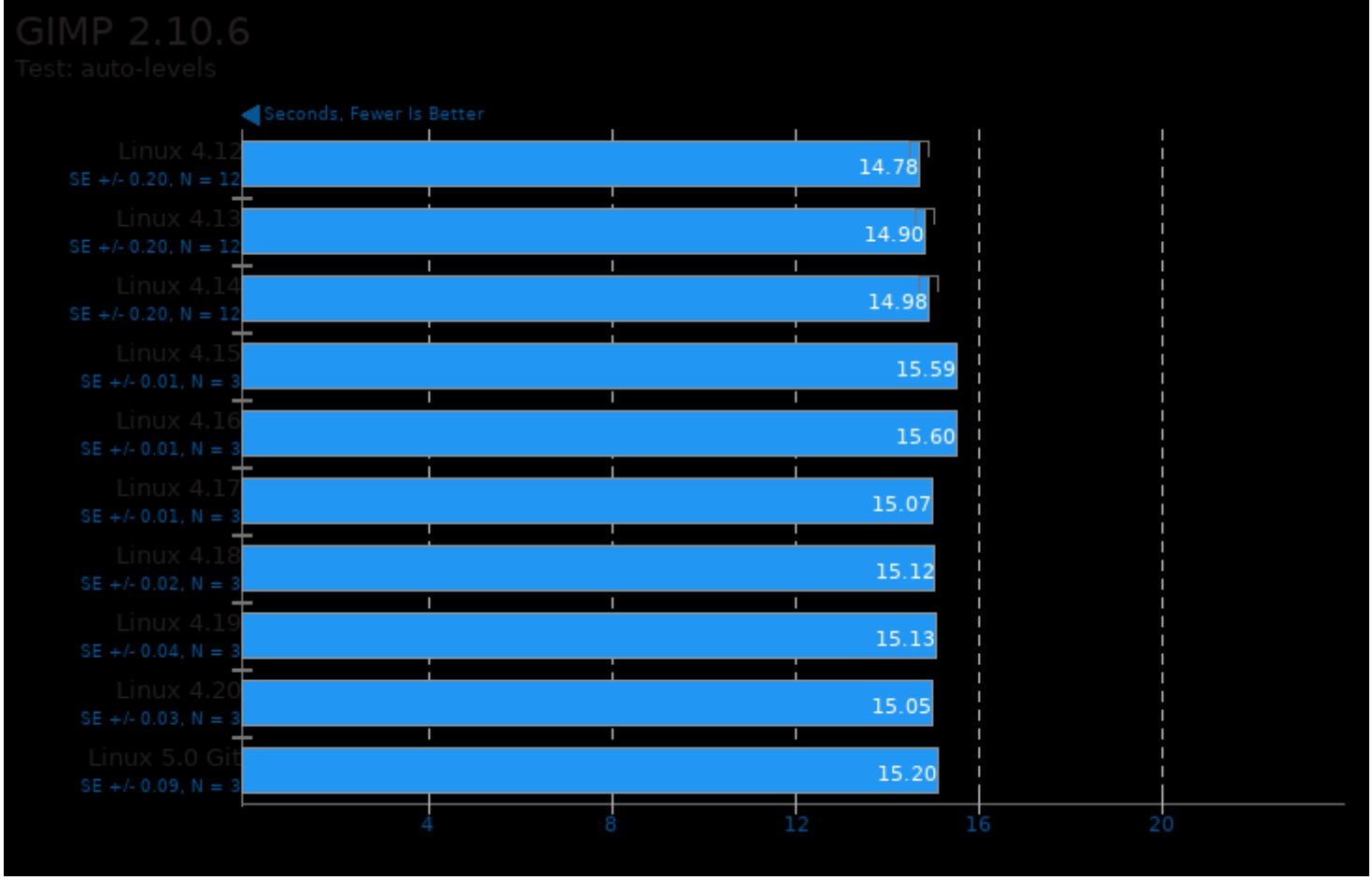


Core i9 7960X Linux 5.0 Kernel Benchmarks

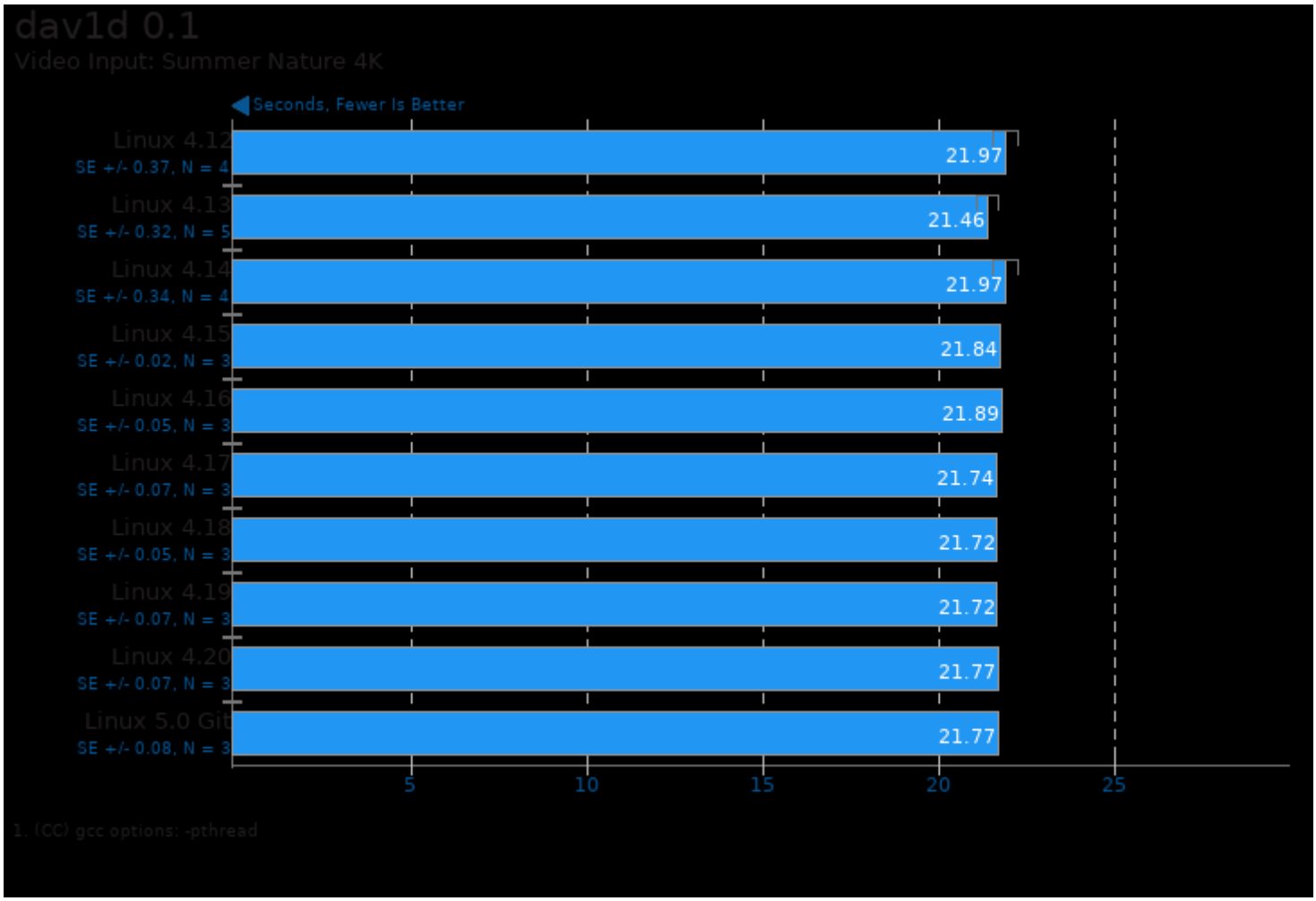


Core i9 7960X Linux 5.0 Kernel Benchmarks

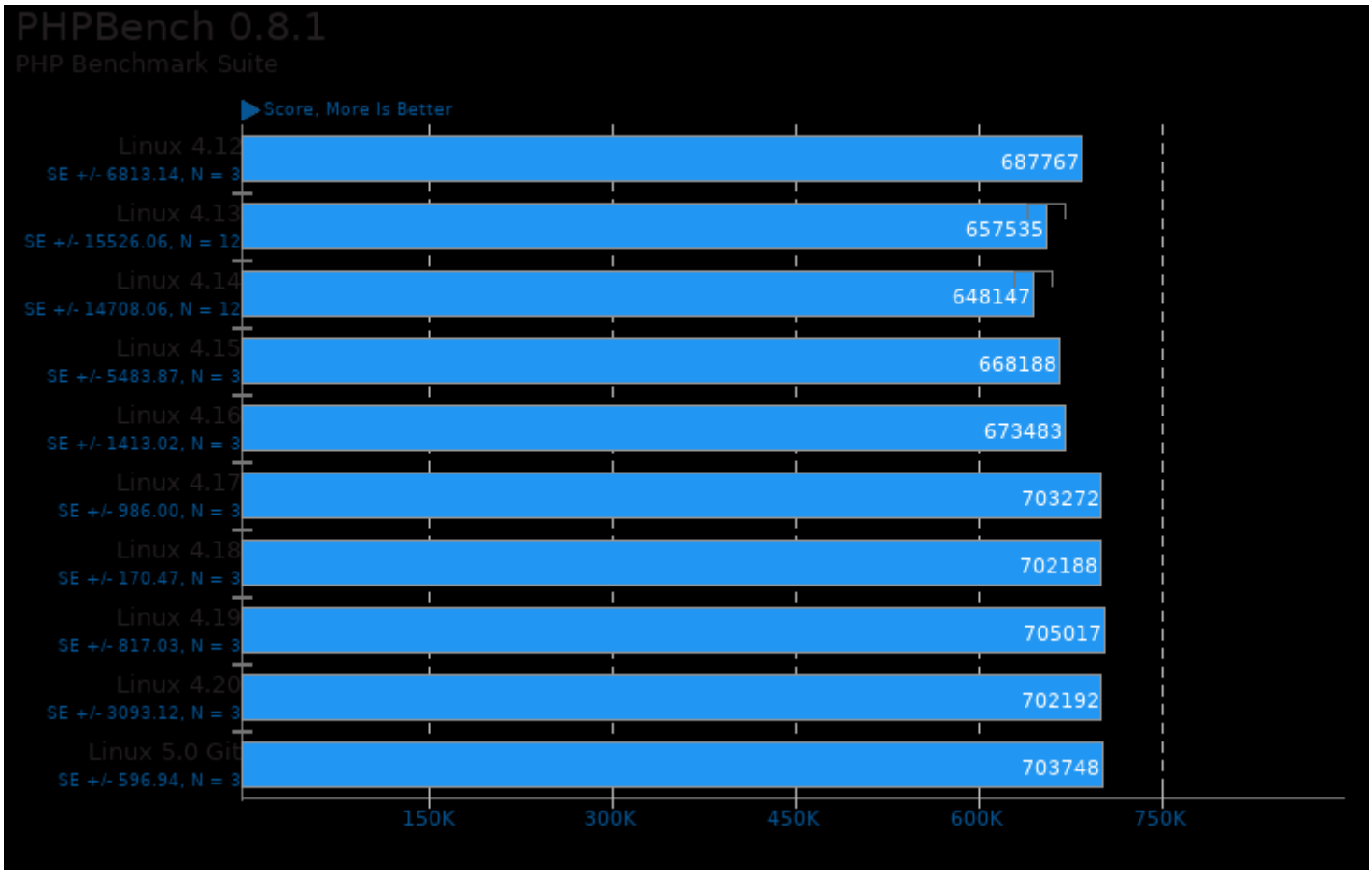




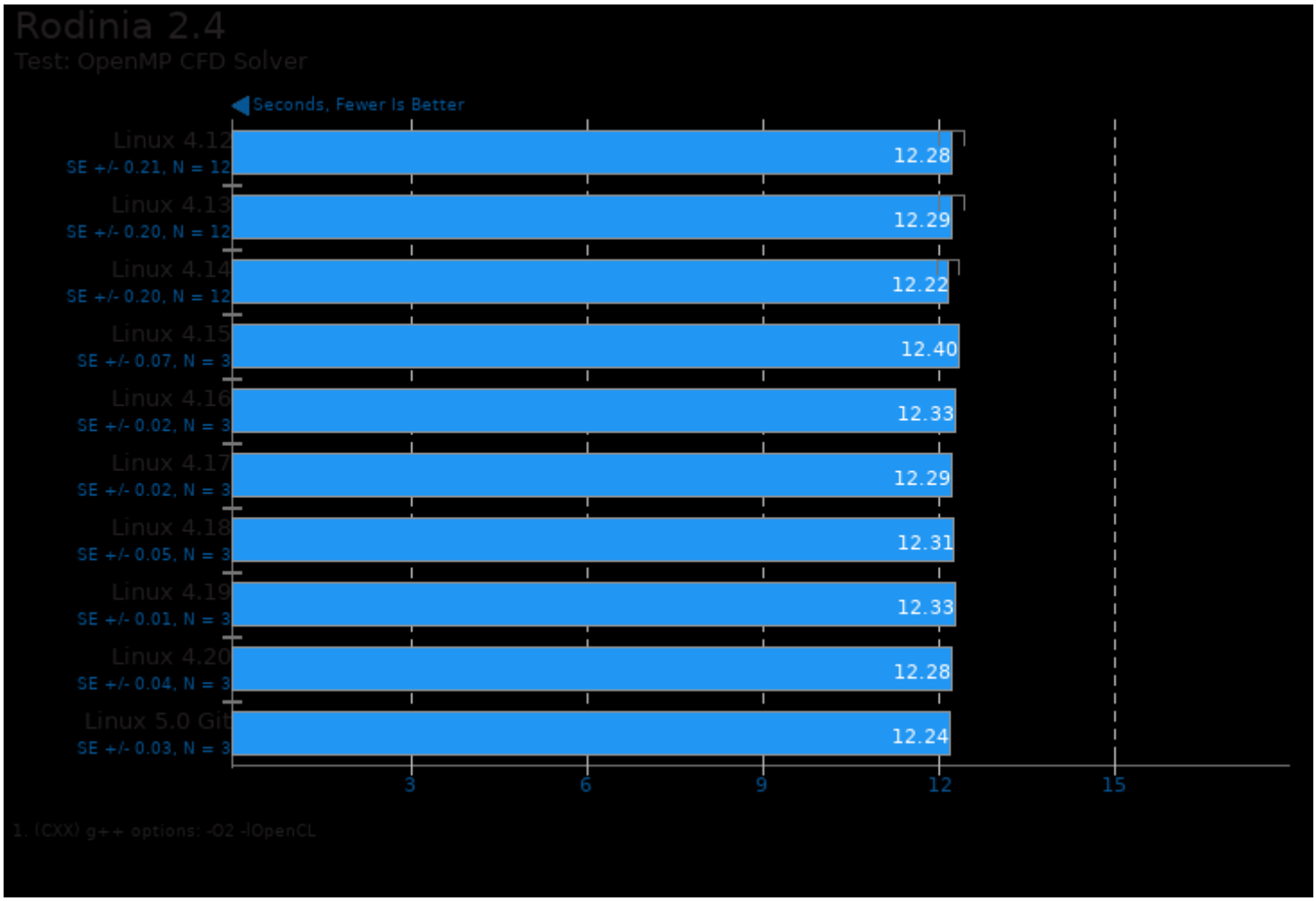
Core i9 7960X Linux 5.0 Kernel Benchmarks



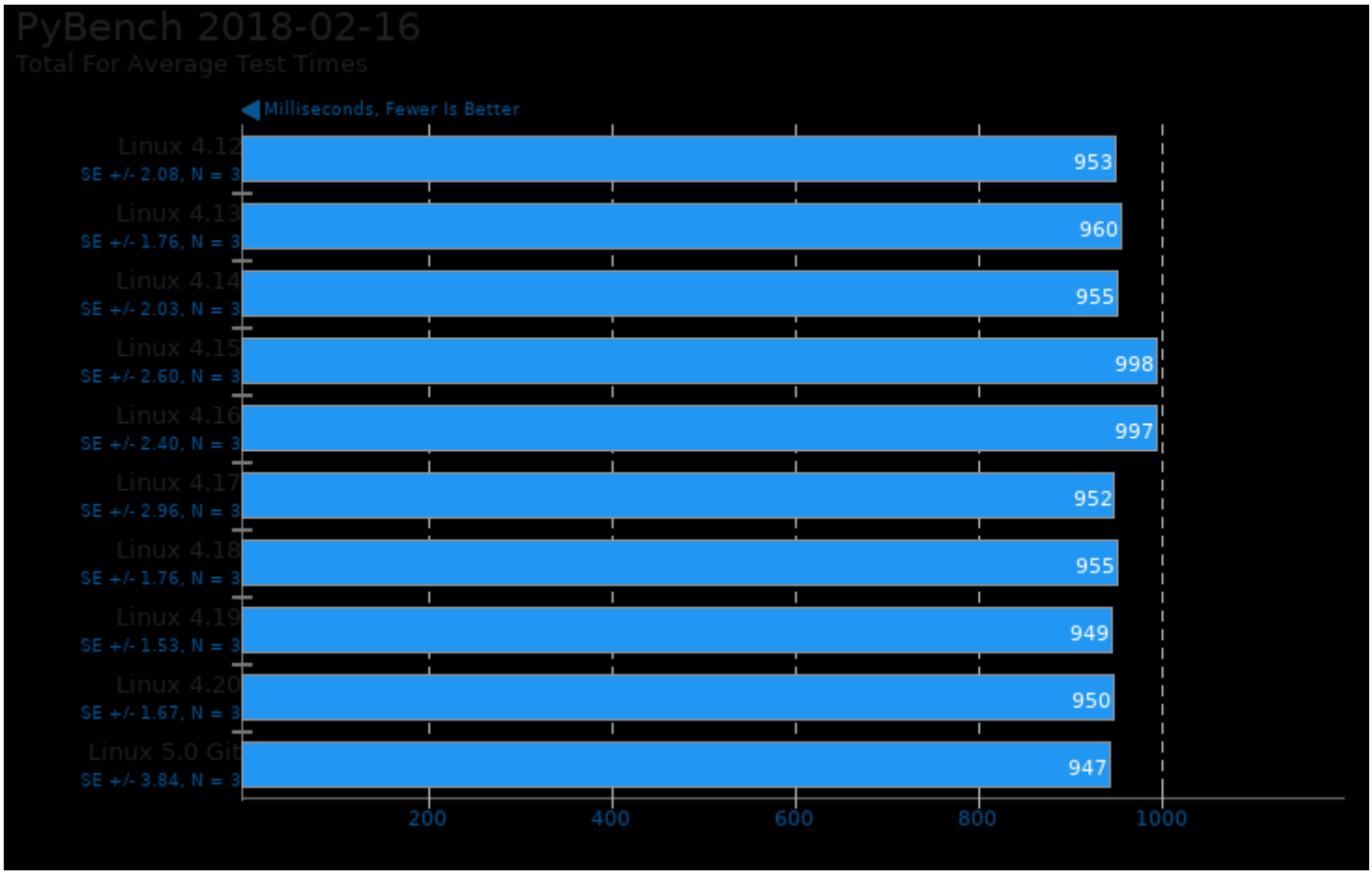
Core i9 7960X Linux 5.0 Kernel Benchmarks



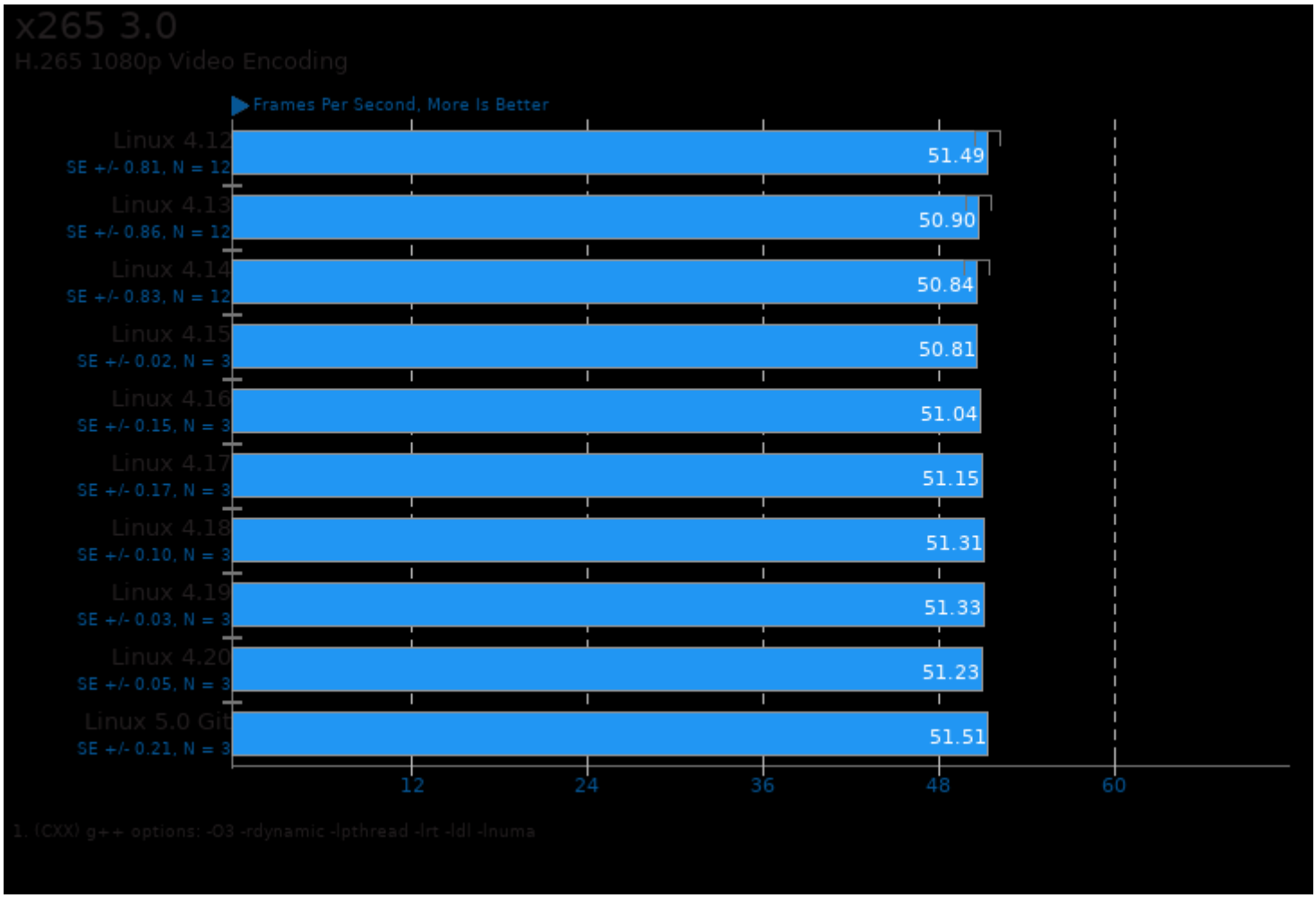
Core i9 7960X Linux 5.0 Kernel Benchmarks



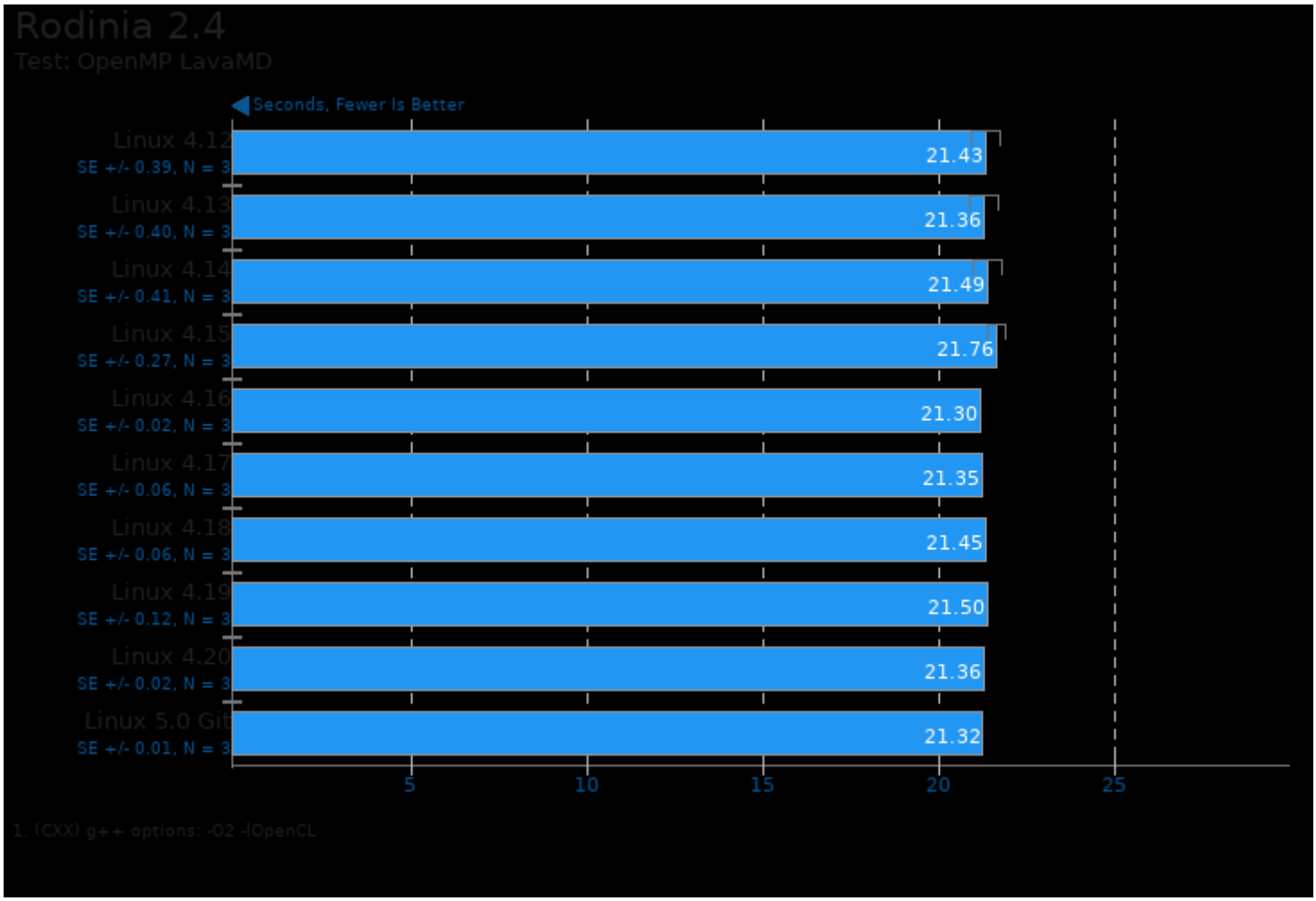
Core i9 7960X Linux 5.0 Kernel Benchmarks

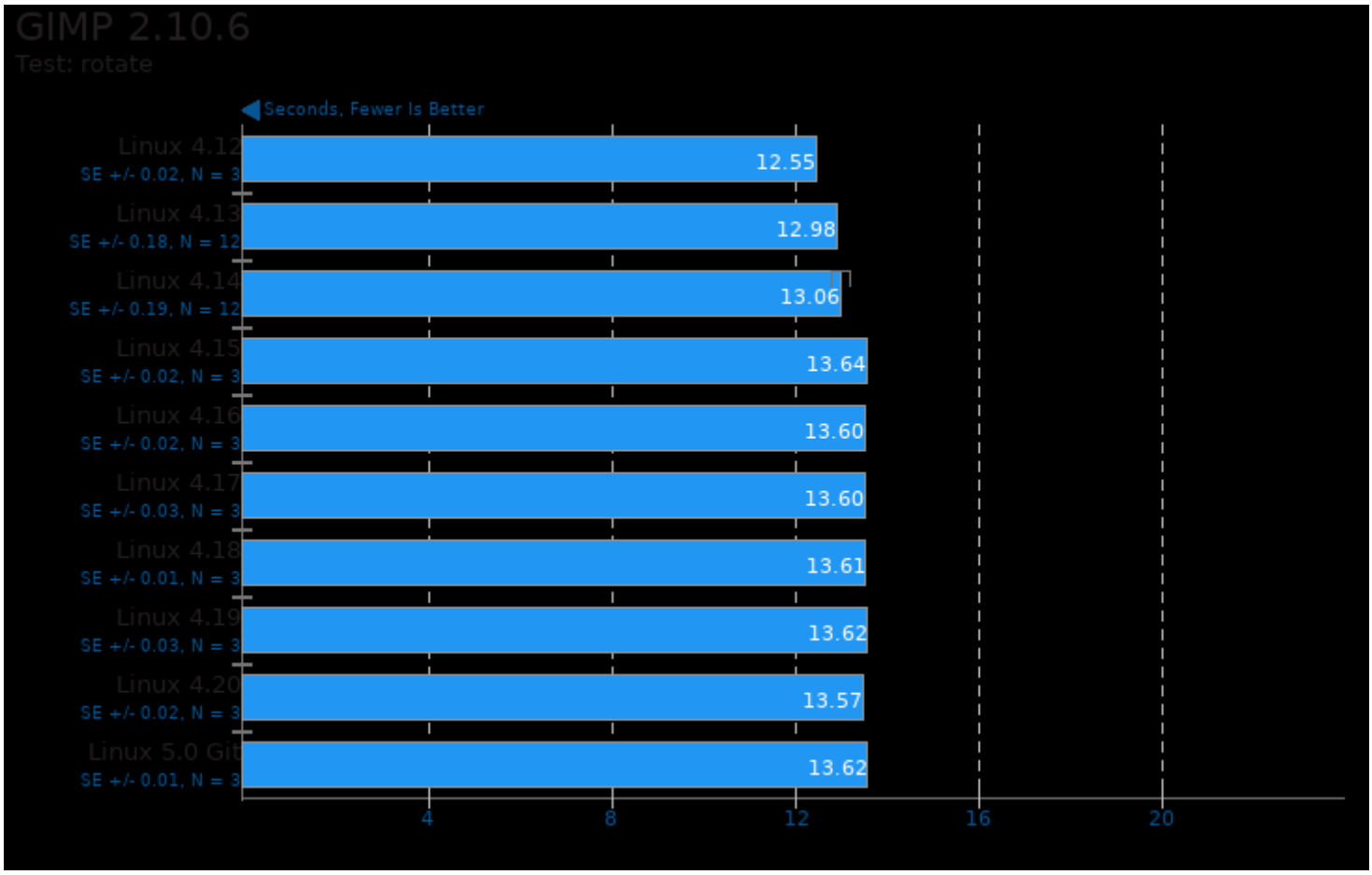


Core i9 7960X Linux 5.0 Kernel Benchmarks

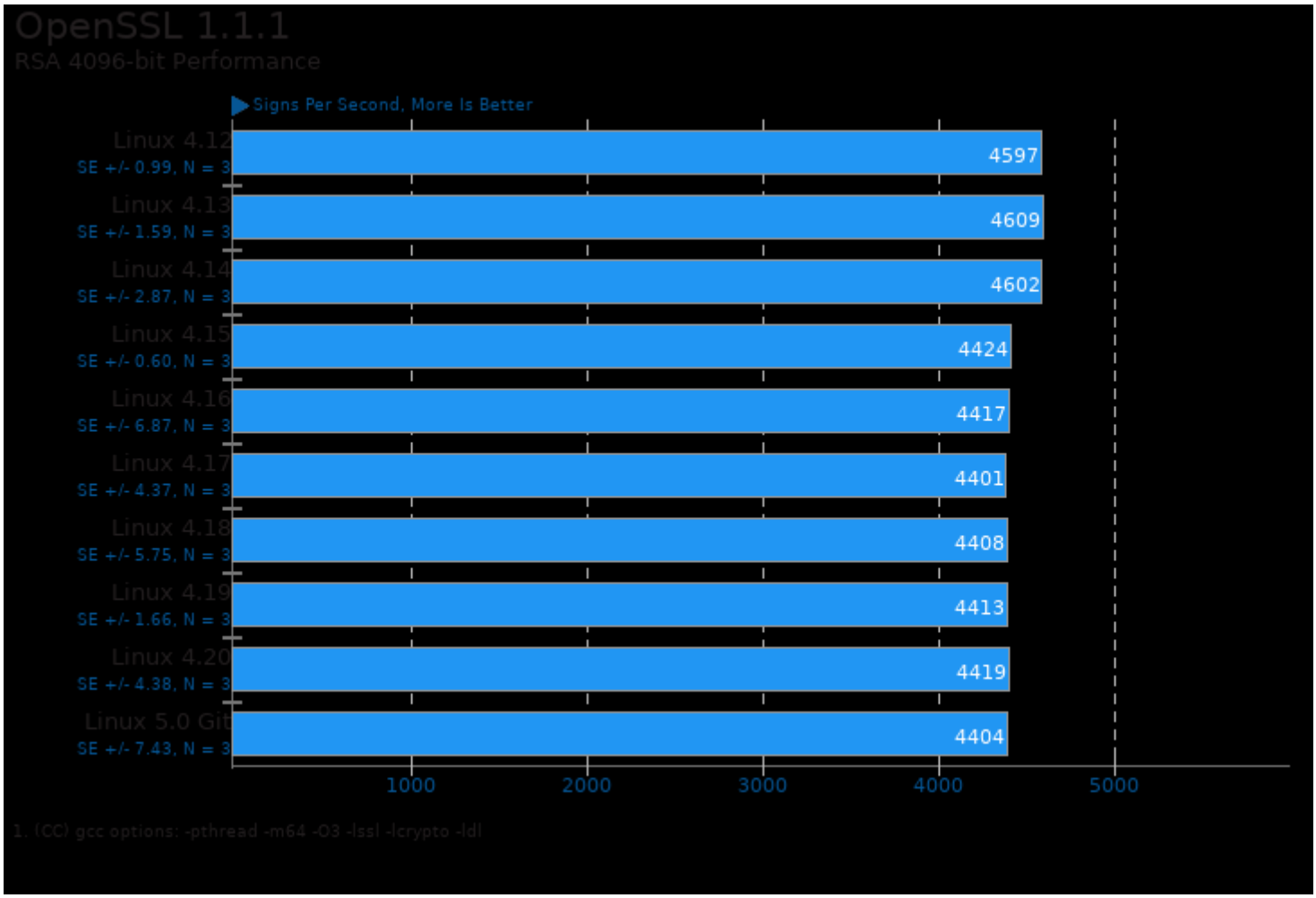


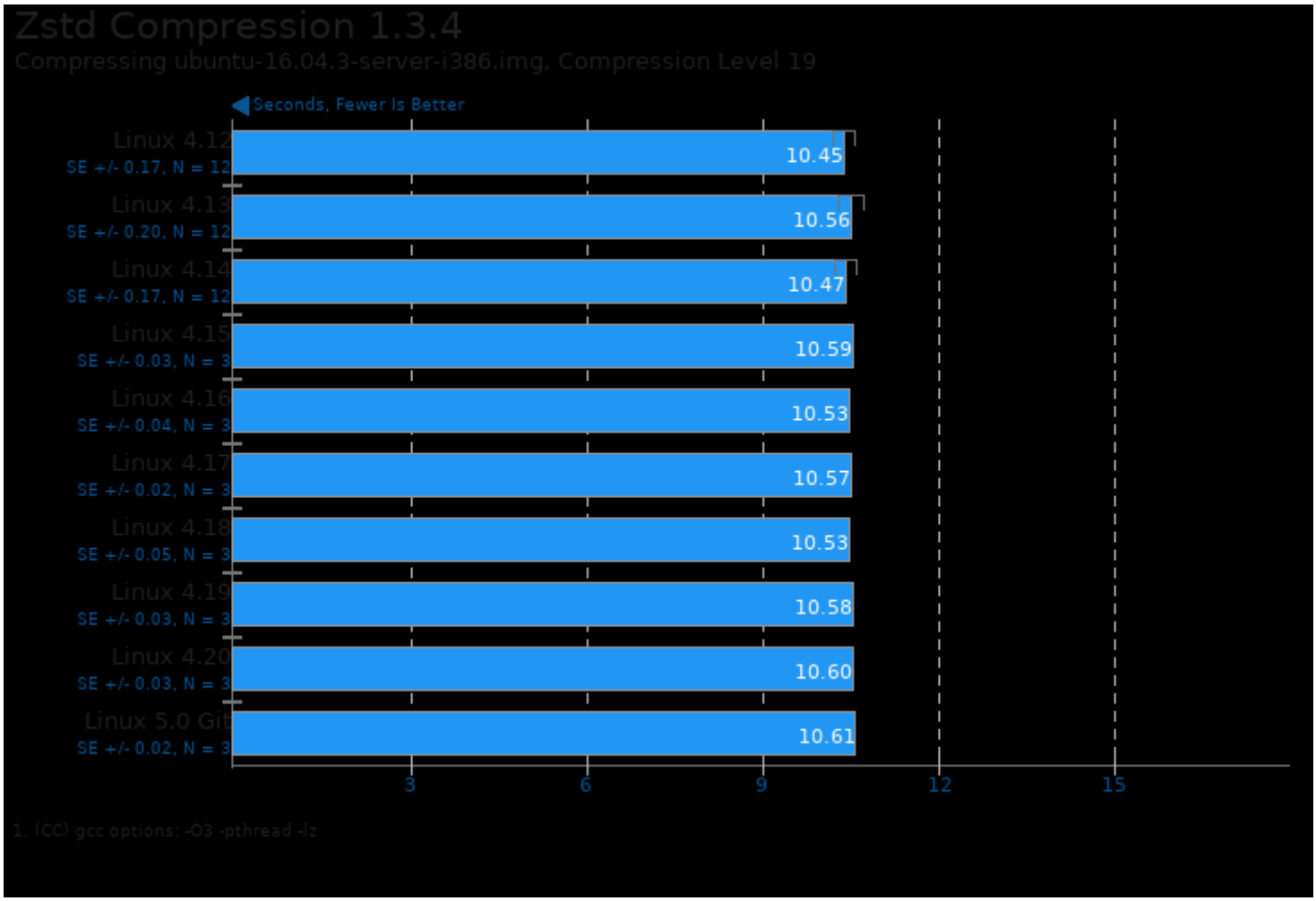
Core i9 7960X Linux 5.0 Kernel Benchmarks



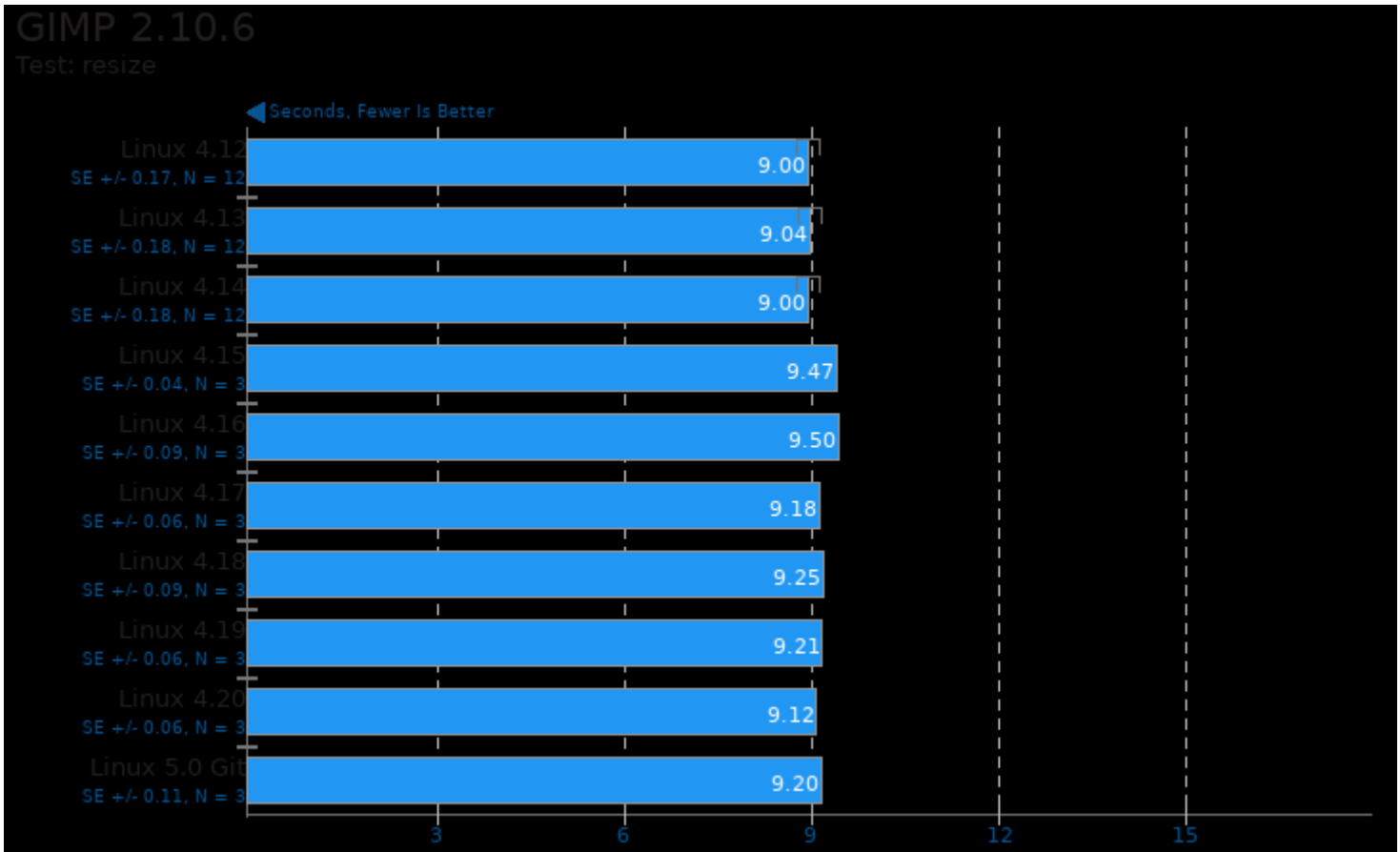

GIMP 2.10.6
Test: rotate
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.02, N = 3
12.55
Linux 4.13
SE +/- 0.18, N = 12
12.98
Linux 4.14
SE +/- 0.19, N = 12
13.06
Linux 4.15
SE +/- 0.02, N = 3
13.64
Linux 4.16
SE +/- 0.02, N = 3
13.60
Linux 4.17
SE +/- 0.03, N = 3
13.60
Linux 4.18
SE +/- 0.01, N = 3
13.61
Linux 4.19
SE +/- 0.03, N = 3
13.62
Linux 4.20
SE +/- 0.02, N = 3
13.57
Linux 5.0 Git
SE +/- 0.01, N = 3
13.62
4
8
12
16
20

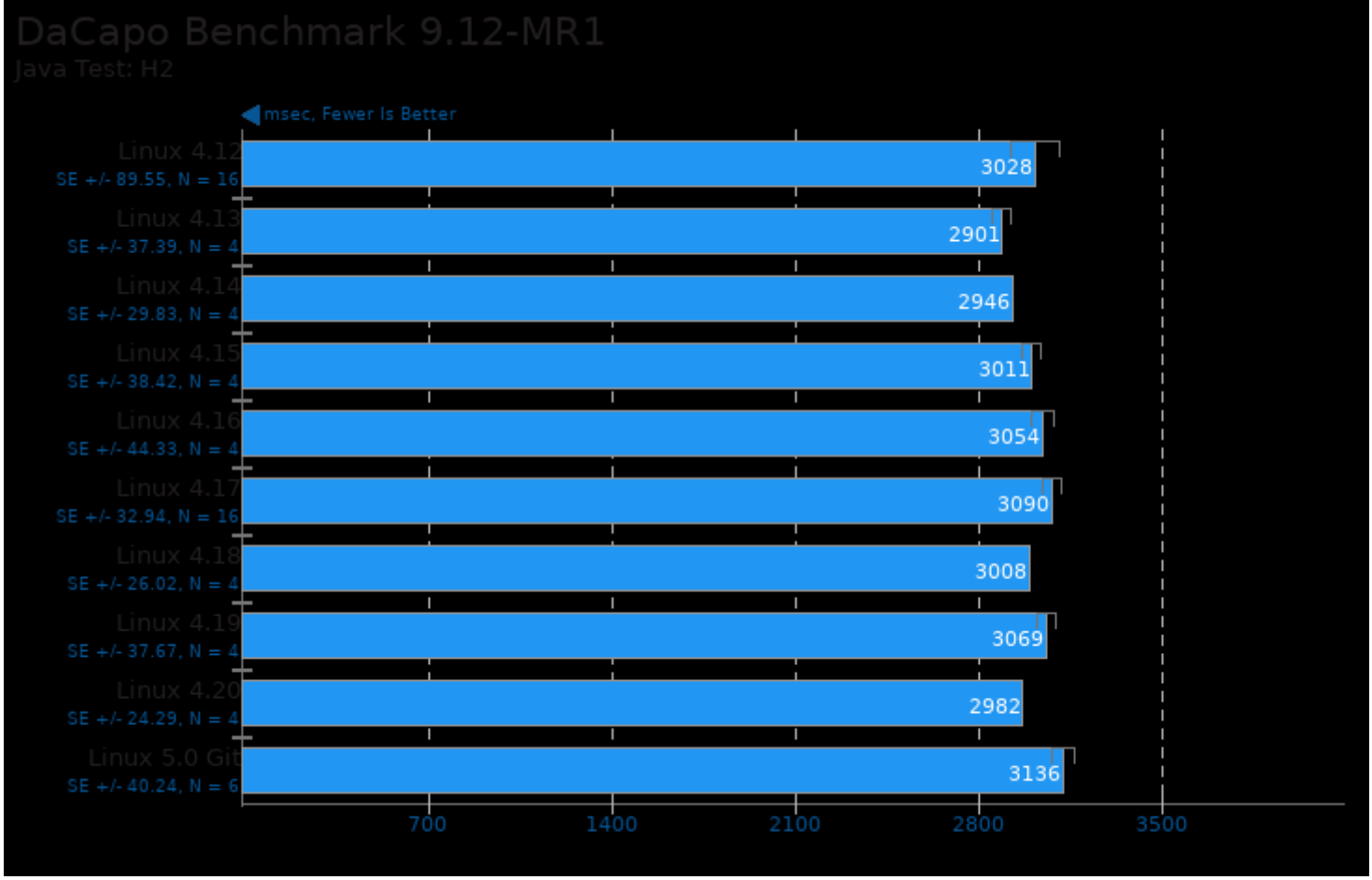
Core i9 7960X Linux 5.0 Kernel Benchmarks



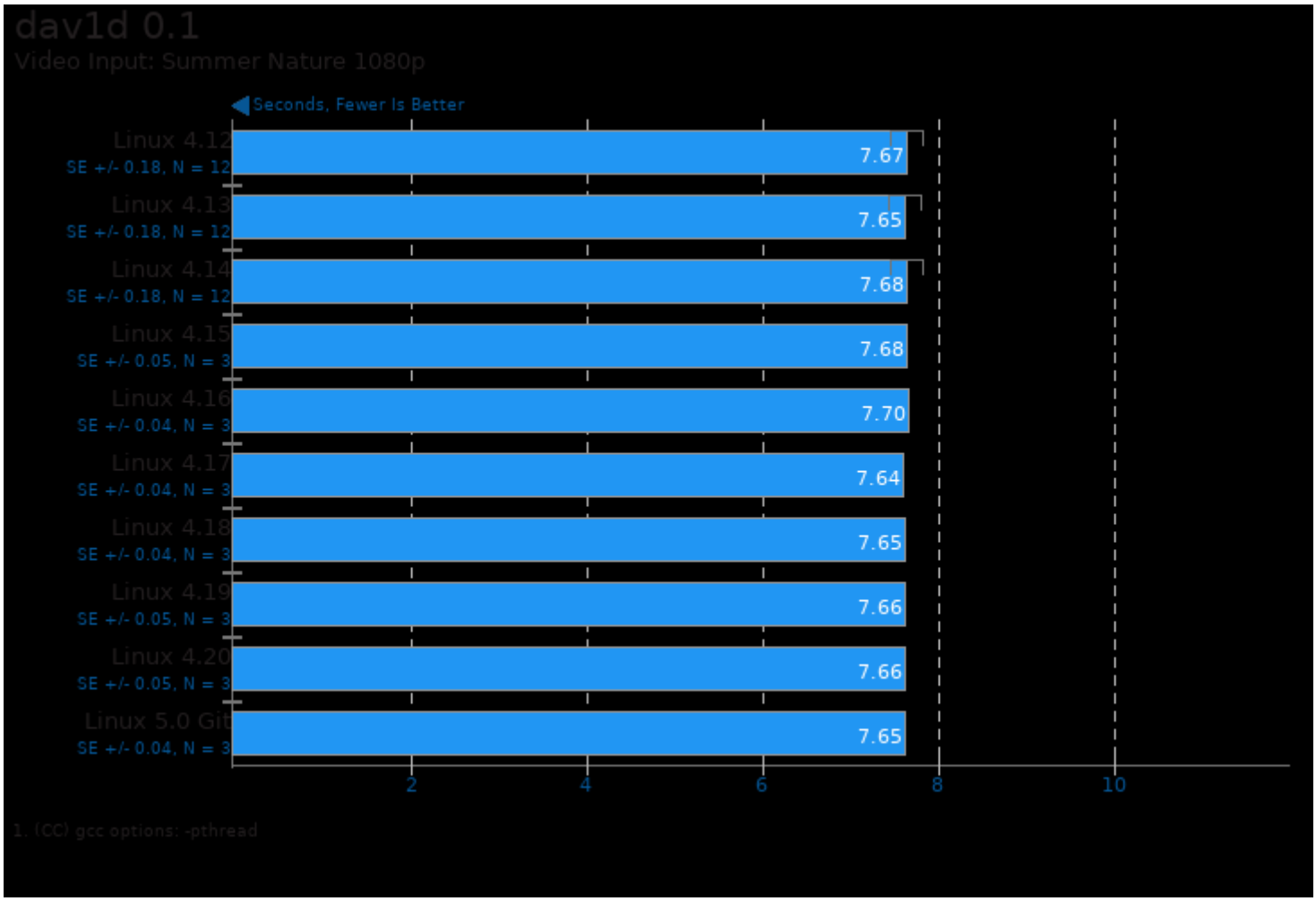

Zstd Compression 1.3.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.17, N = 12
10.45
Linux 4.13
SE +/- 0.20, N = 12
10.56
Linux 4.14
SE +/- 0.17, N = 12
10.47
Linux 4.15
SE +/- 0.03, N = 3
10.59
Linux 4.16
SE +/- 0.04, N = 3
10.53
Linux 4.17
SE +/- 0.02, N = 3
10.57
Linux 4.18
SE +/- 0.05, N = 3
10.53
Linux 4.19
SE +/- 0.03, N = 3
10.58
Linux 4.20
SE +/- 0.03, N = 3
10.60
Linux 5.0 Git
SE +/- 0.02, N = 3
10.61
3
6
9
12
15
1. (CC) gcc options: -O3 -pthread -lz

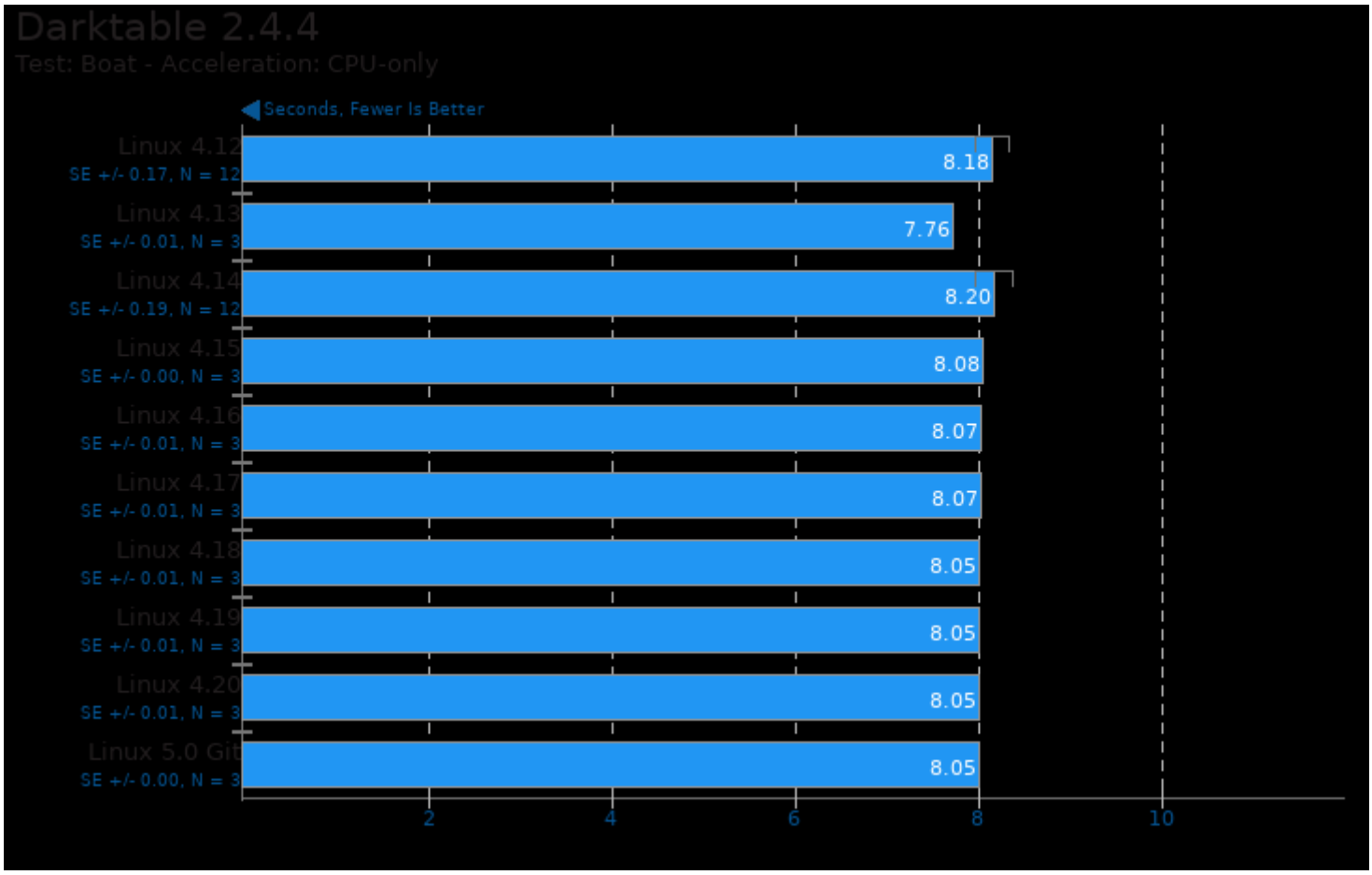
Core i9 7960X Linux 5.0 Kernel Benchmarks



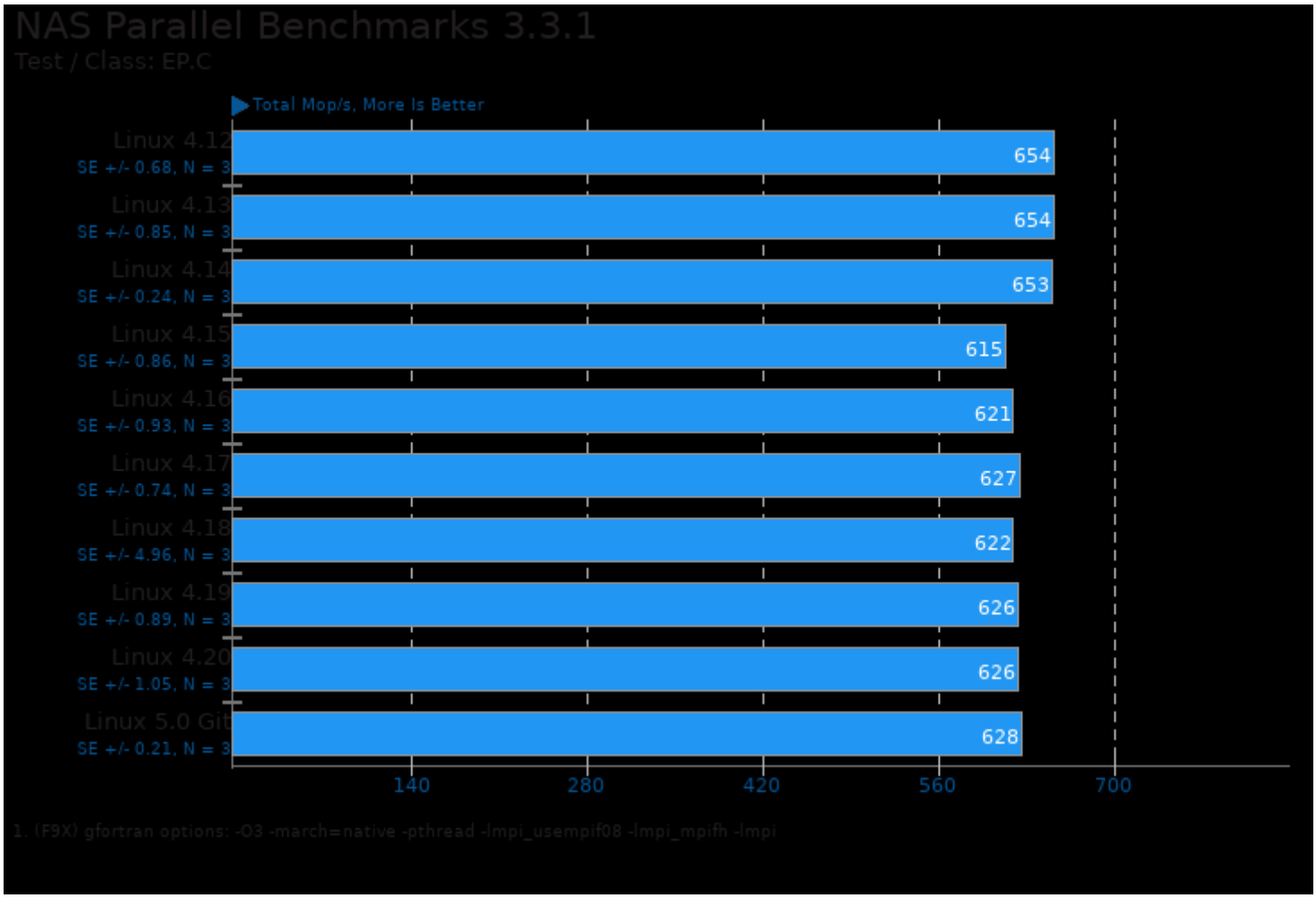


Core i9 7960X Linux 5.0 Kernel Benchmarks

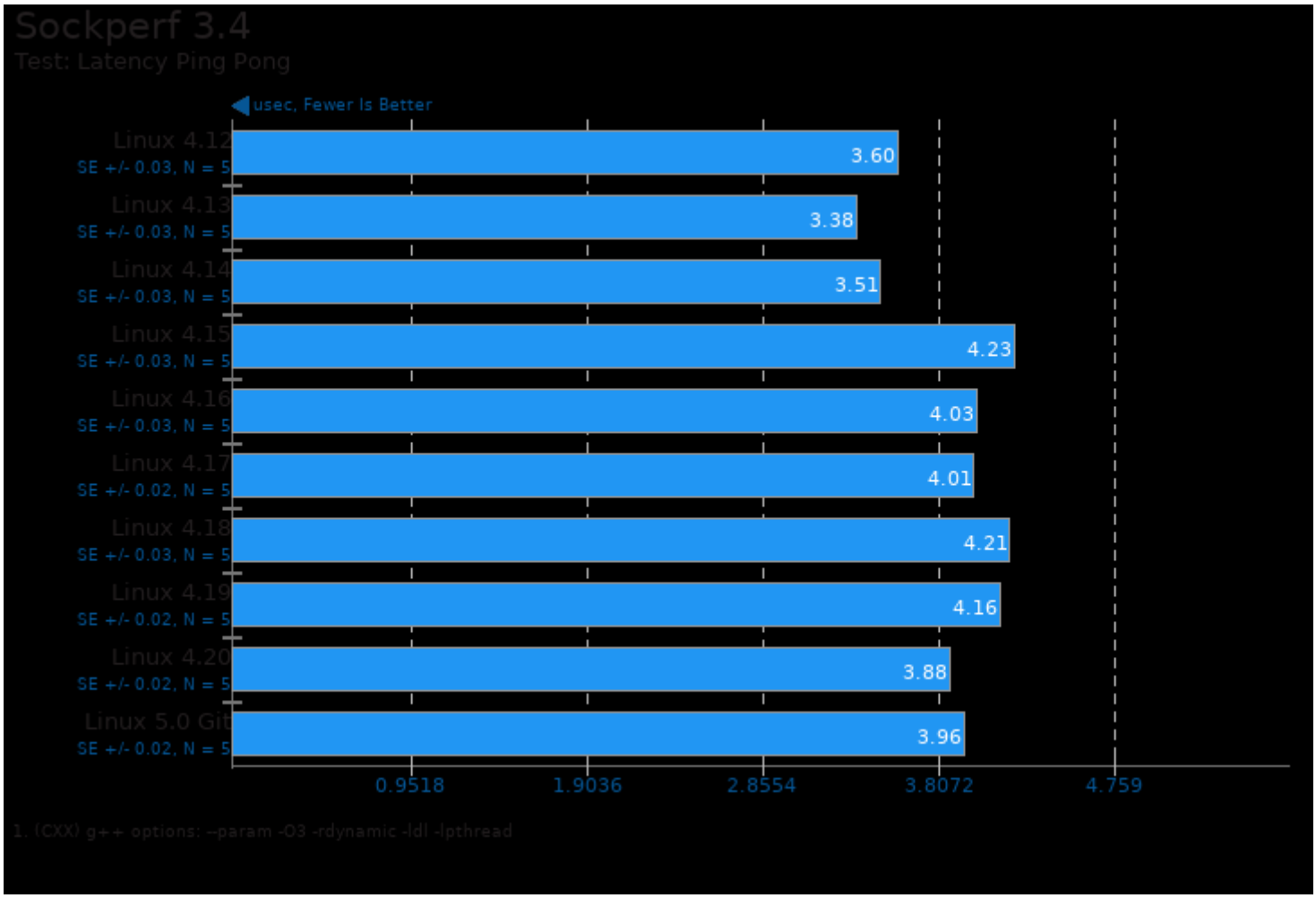


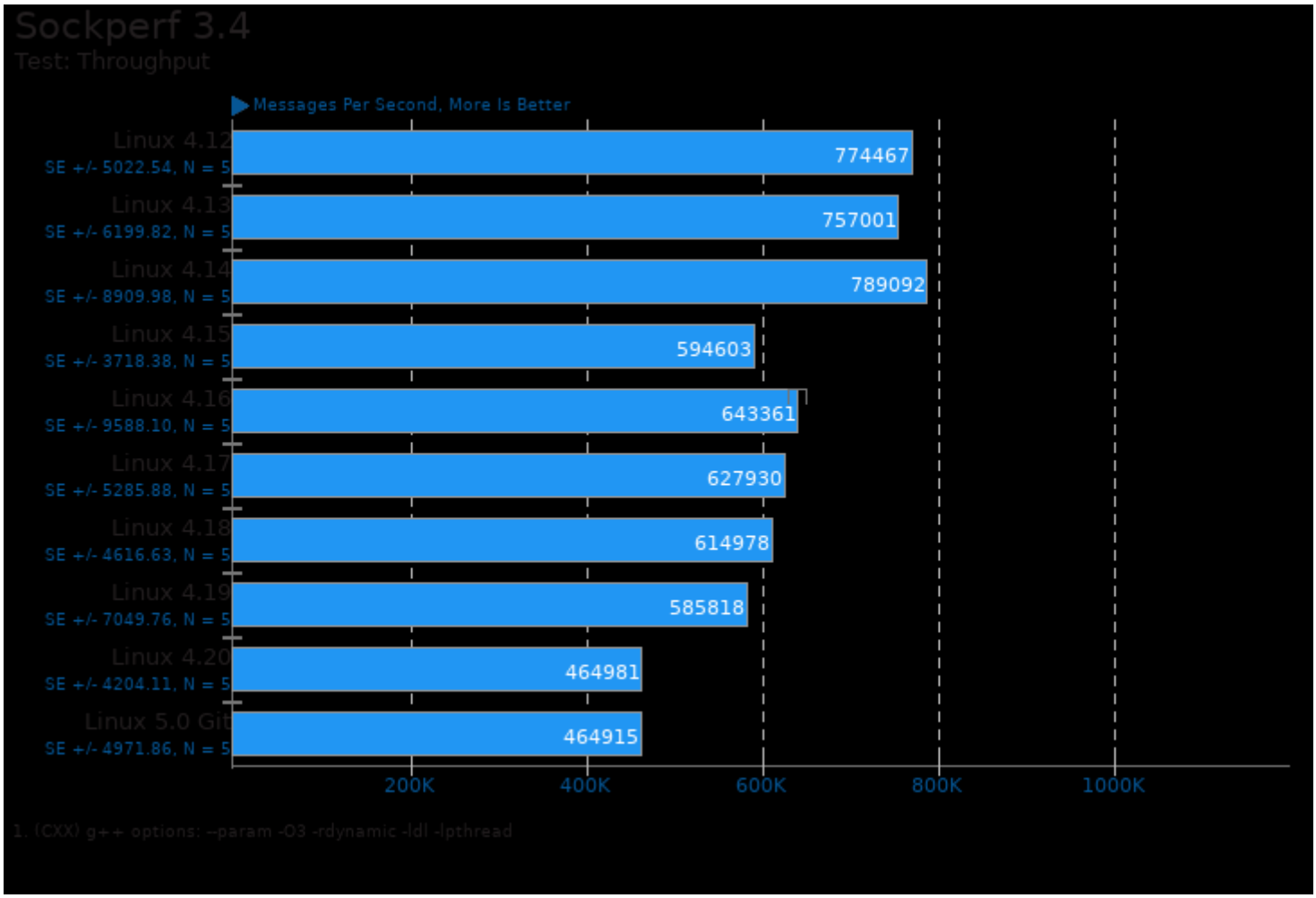

Darktable 2.4.4
Test: Boat - Acceleration: CPU-only
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.17, N = 12
8.18
Linux 4.13
SE +/- 0.01, N = 3
7.76
Linux 4.14
SE +/- 0.19, N = 12
8.20
Linux 4.15
SE +/- 0.00, N = 3
8.08
Linux 4.16
SE +/- 0.01, N = 3
8.07
Linux 4.17
SE +/- 0.01, N = 3
8.07
Linux 4.18
SE +/- 0.01, N = 3
8.05
Linux 4.19
SE +/- 0.01, N = 3
8.05
Linux 4.20
SE +/- 0.01, N = 3
8.05
Linux 5.0 Git
SE +/- 0.00, N = 3
8.05
2
4
6
8
10

Core i9 7960X Linux 5.0 Kernel Benchmarks

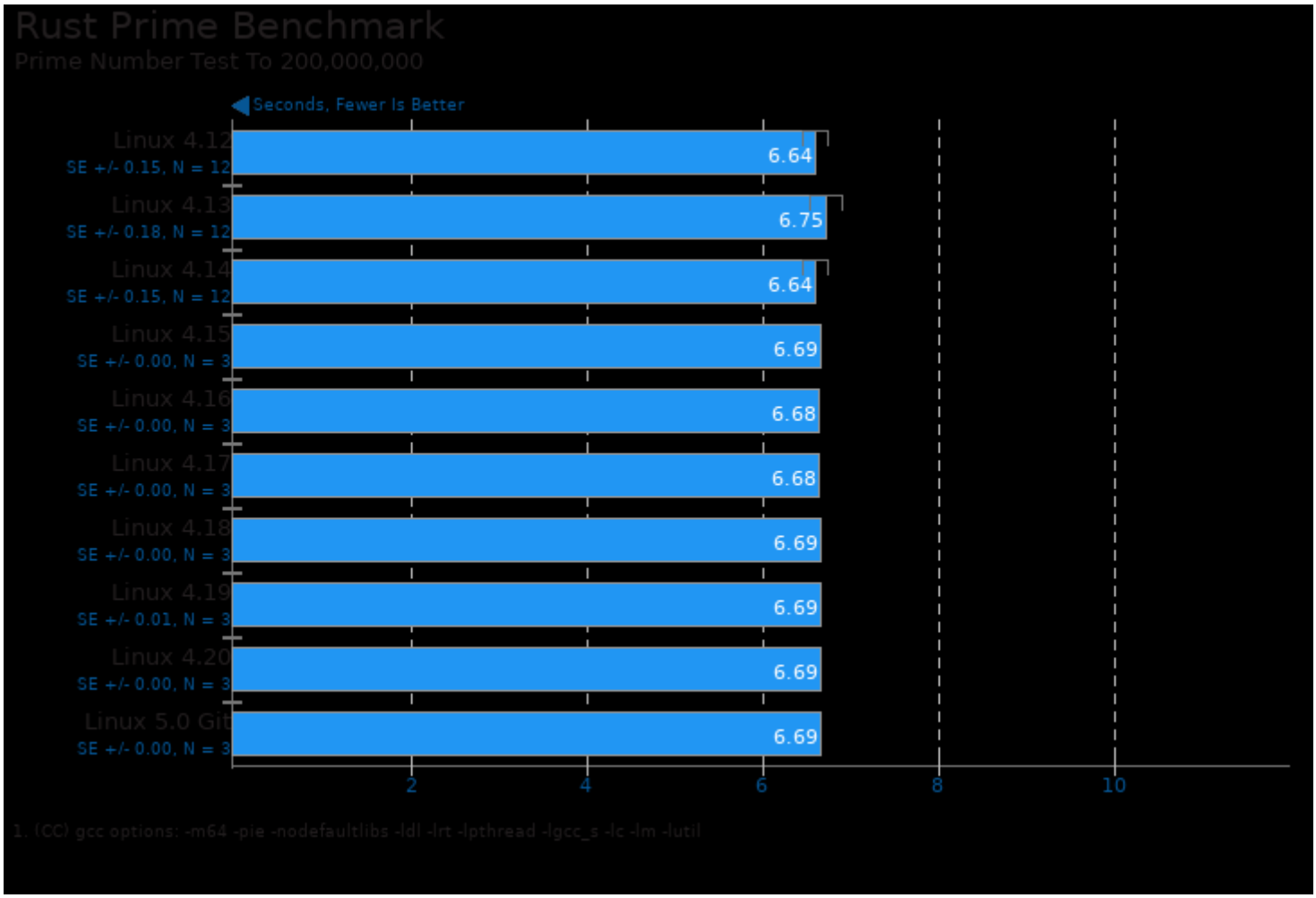


Core i9 7960X Linux 5.0 Kernel Benchmarks

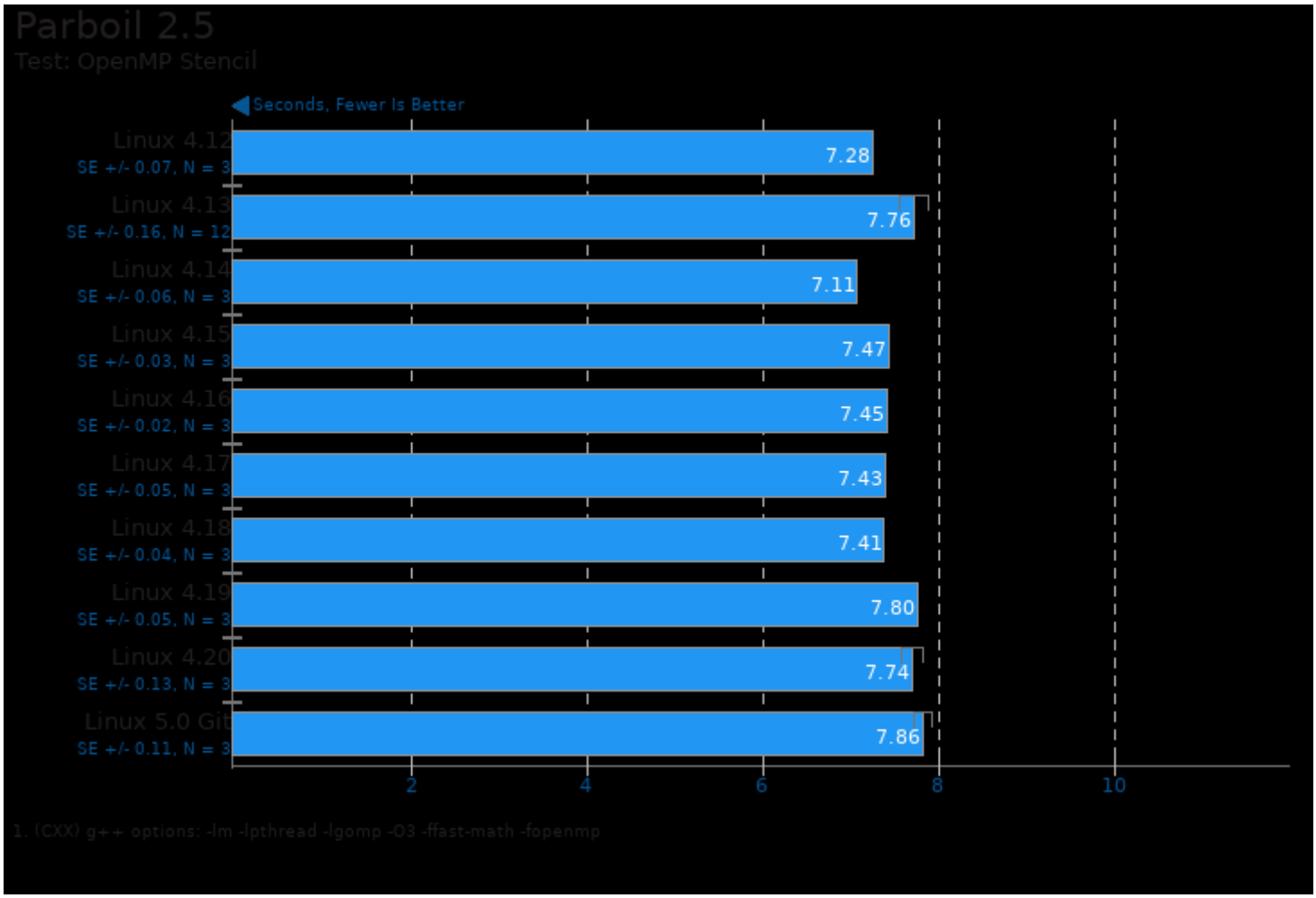


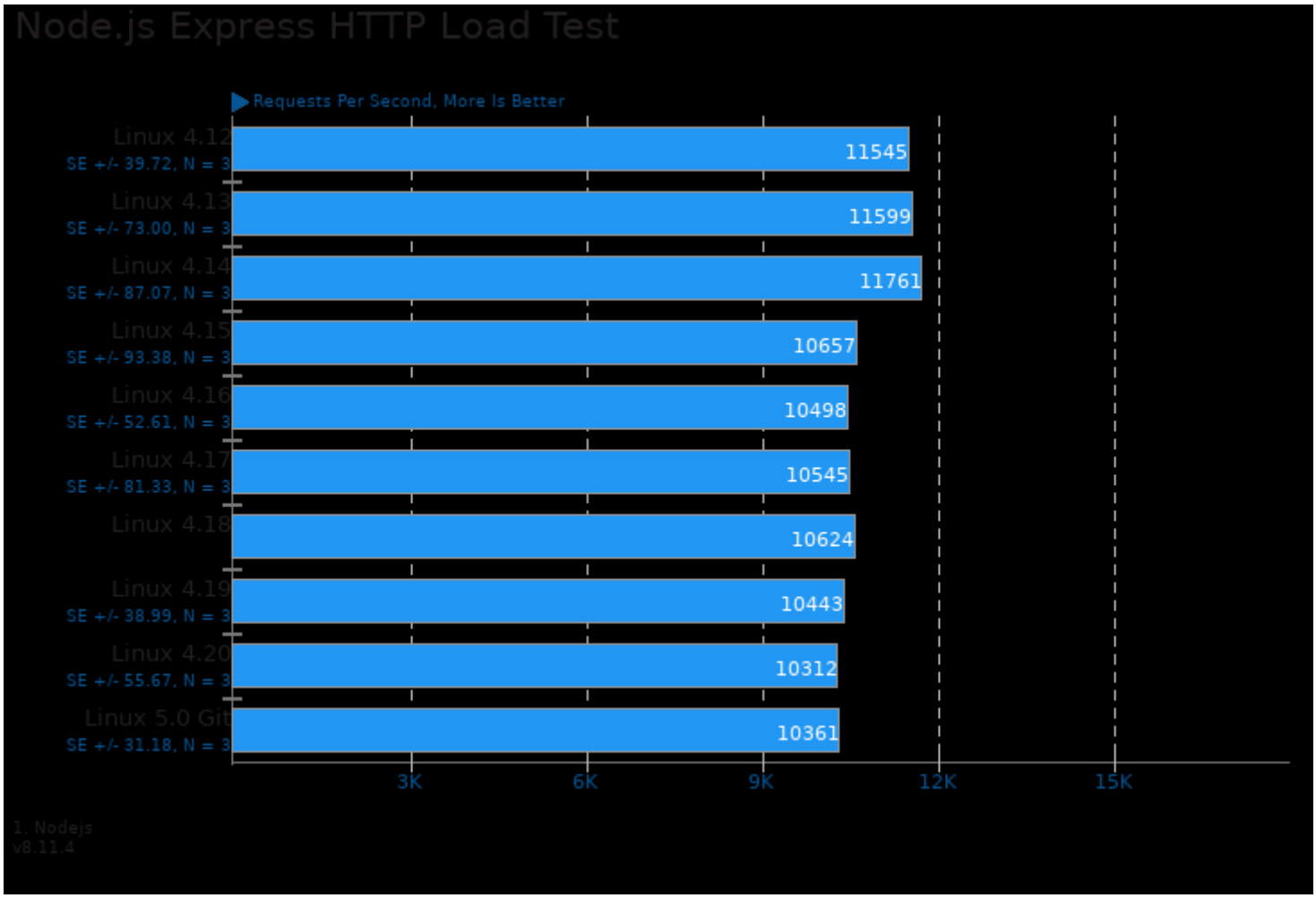

Sockperf 3.4
Test: Throughput
Messages Per Second, More Is Better
Linux 4.12
SE +/- 5022.54, N = 5
774467
Linux 4.13
SE +/- 6199.82, N = 5
757001
Linux 4.14
SE +/- 8909.98, N = 5
789092
Linux 4.15
SE +/- 3718.38, N = 5
594603
Linux 4.16
SE +/- 9588.10, N = 5
643361
Linux 4.17
SE +/- 5285.88, N = 5
627930
Linux 4.18
SE +/- 4616.63, N = 5
614978
Linux 4.19
SE +/- 7049.76, N = 5
585818
Linux 4.20
SE +/- 4204.11, N = 5
464981
Linux 5.0 Git
SE +/- 4971.86, N = 5
464915
200K
400K
600K
800K
1000K
1. (CXX) g++ options: -param -O3 -rdynamic -ldl -lpthread

Core i9 7960X Linux 5.0 Kernel Benchmarks

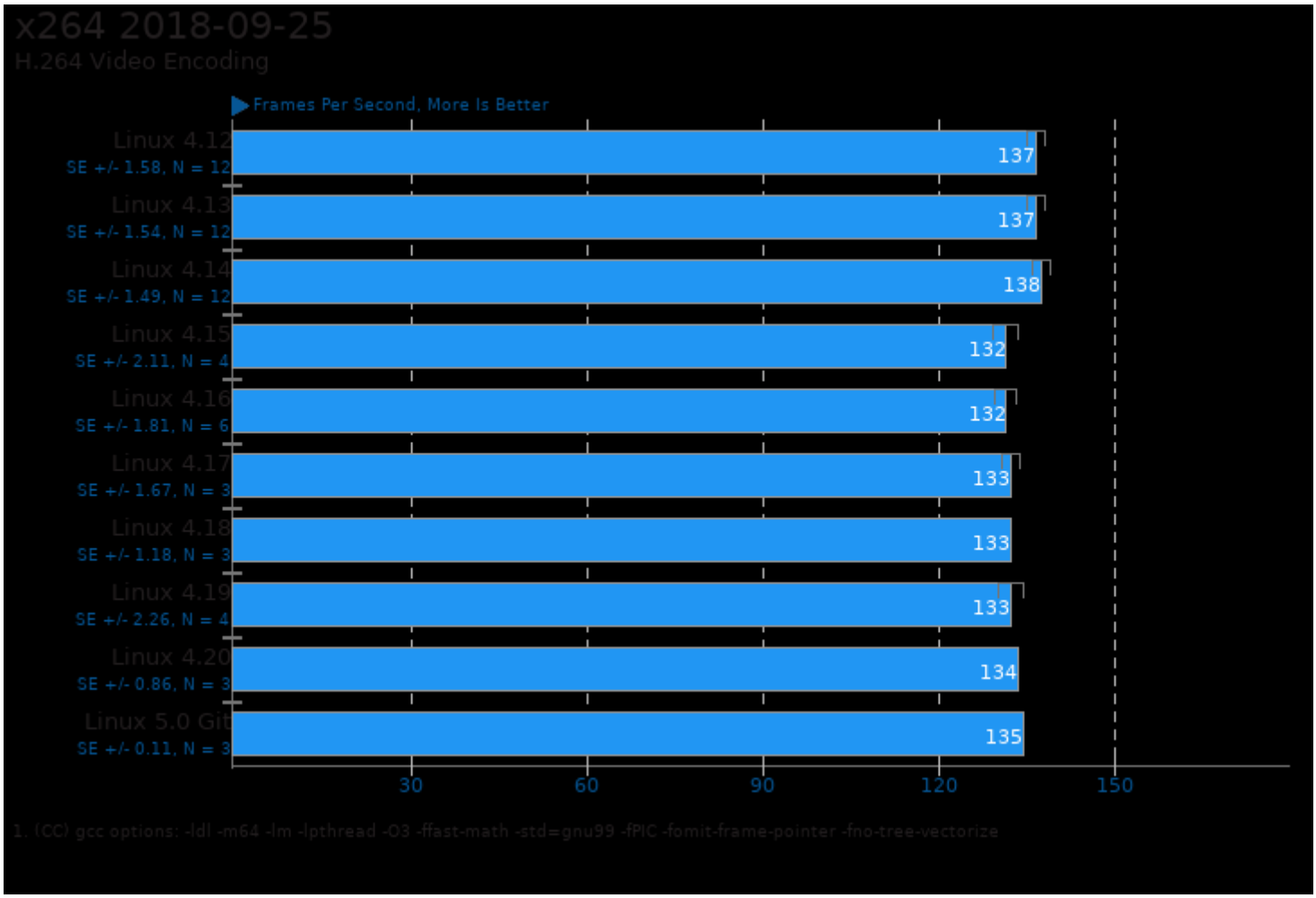


Core i9 7960X Linux 5.0 Kernel Benchmarks

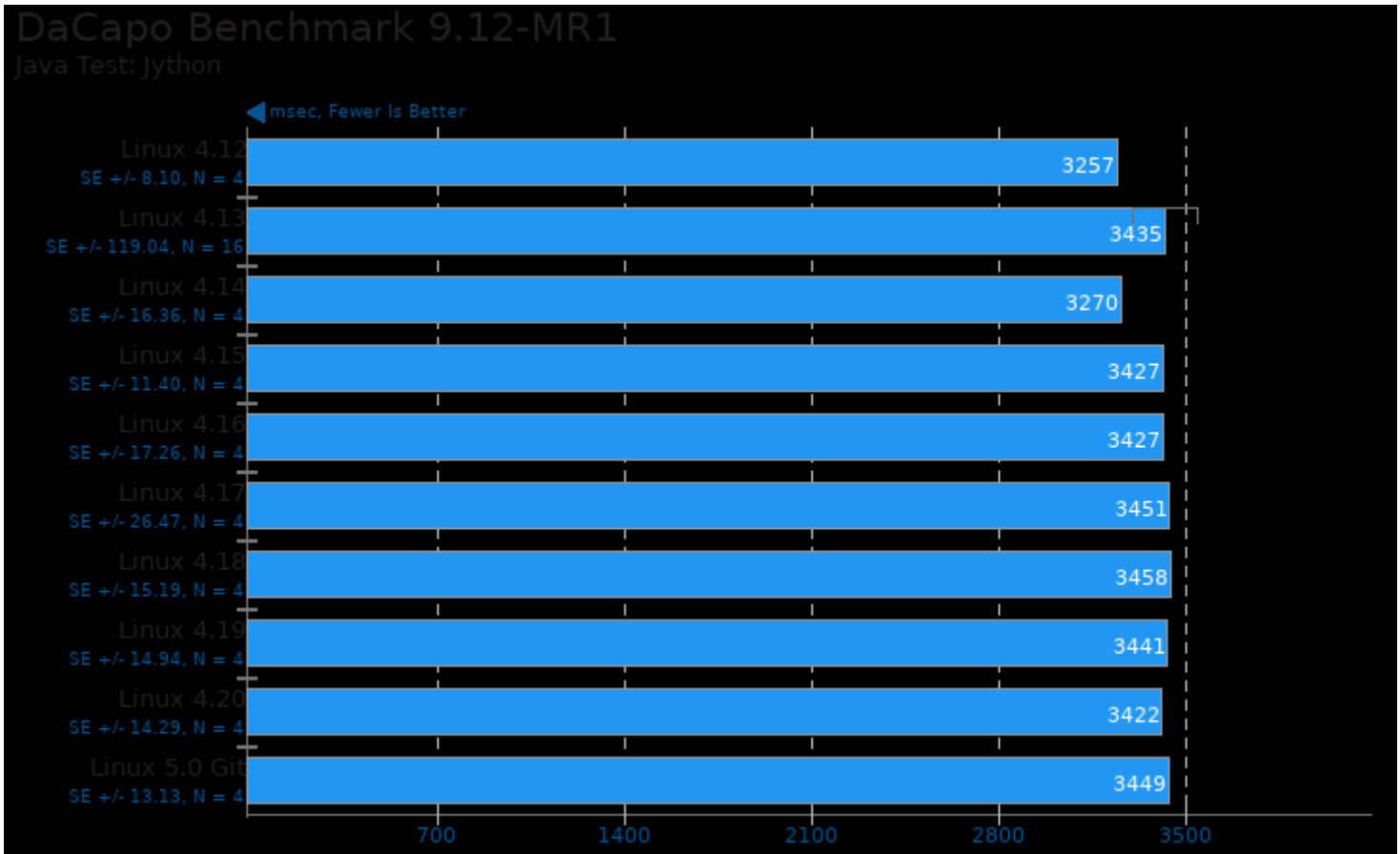


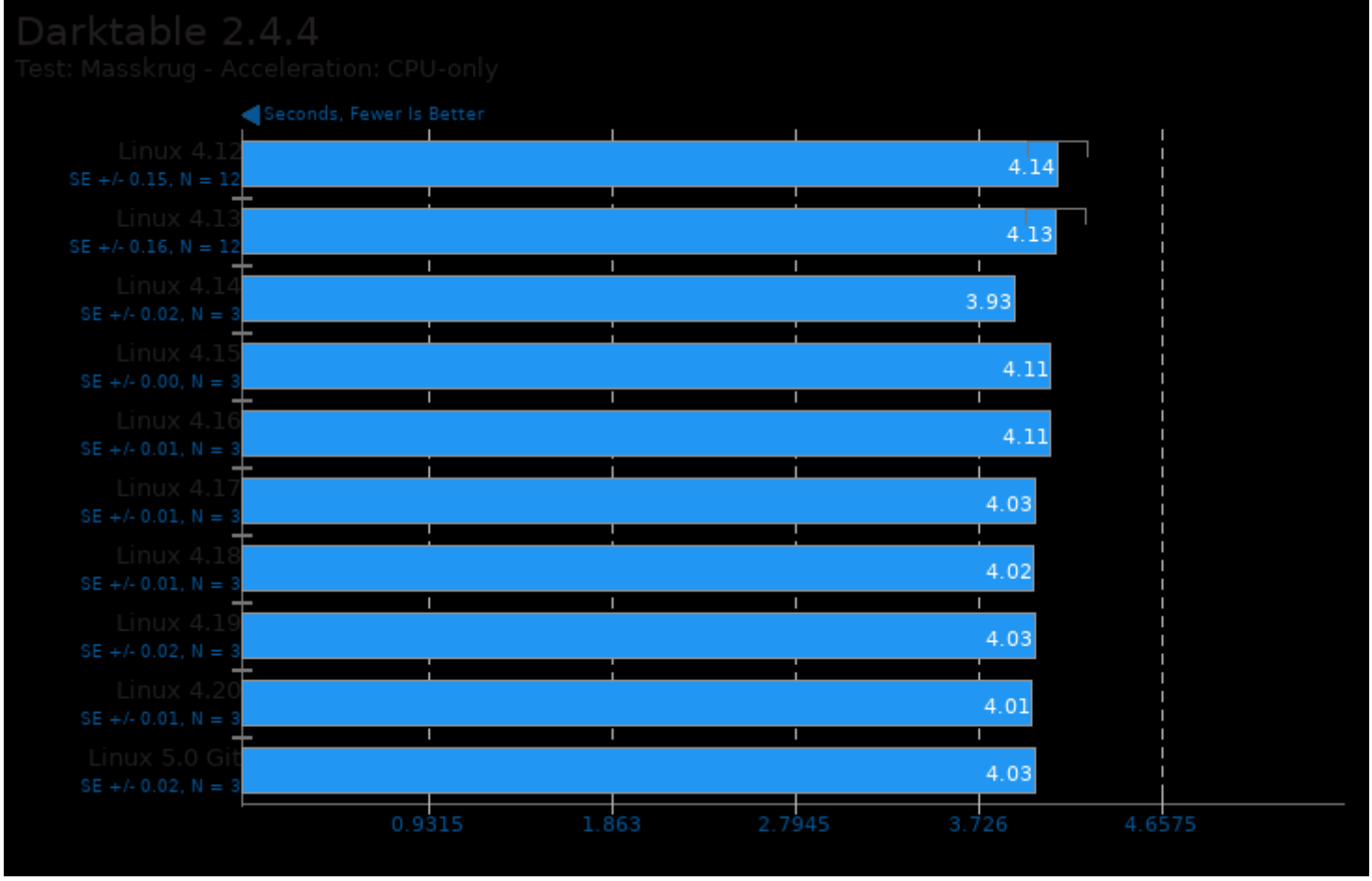

Node.js Express HTTP Load Test
Requests Per Second, More Is Better
Linux 4.12
SE +/- 39.72, N = 3
11545
Linux 4.13
SE +/- 73.00, N = 3
11599
Linux 4.14
SE +/- 87.07, N = 3
11761
Linux 4.15
SE +/- 93.38, N = 3
10657
Linux 4.16
SE +/- 52.61, N = 3
10498
Linux 4.17
SE +/- 81.33, N = 3
10545
Linux 4.18
10624
Linux 4.19
SE +/- 38.99, N = 3
10443
Linux 4.20
SE +/- 55.67, N = 3
10312
Linux 5.0 Git
SE +/- 31.18, N = 3
10361
3K
6K
9K
12K
15K
1. Nodejs
v8.11.4

Core i9 7960X Linux 5.0 Kernel Benchmarks

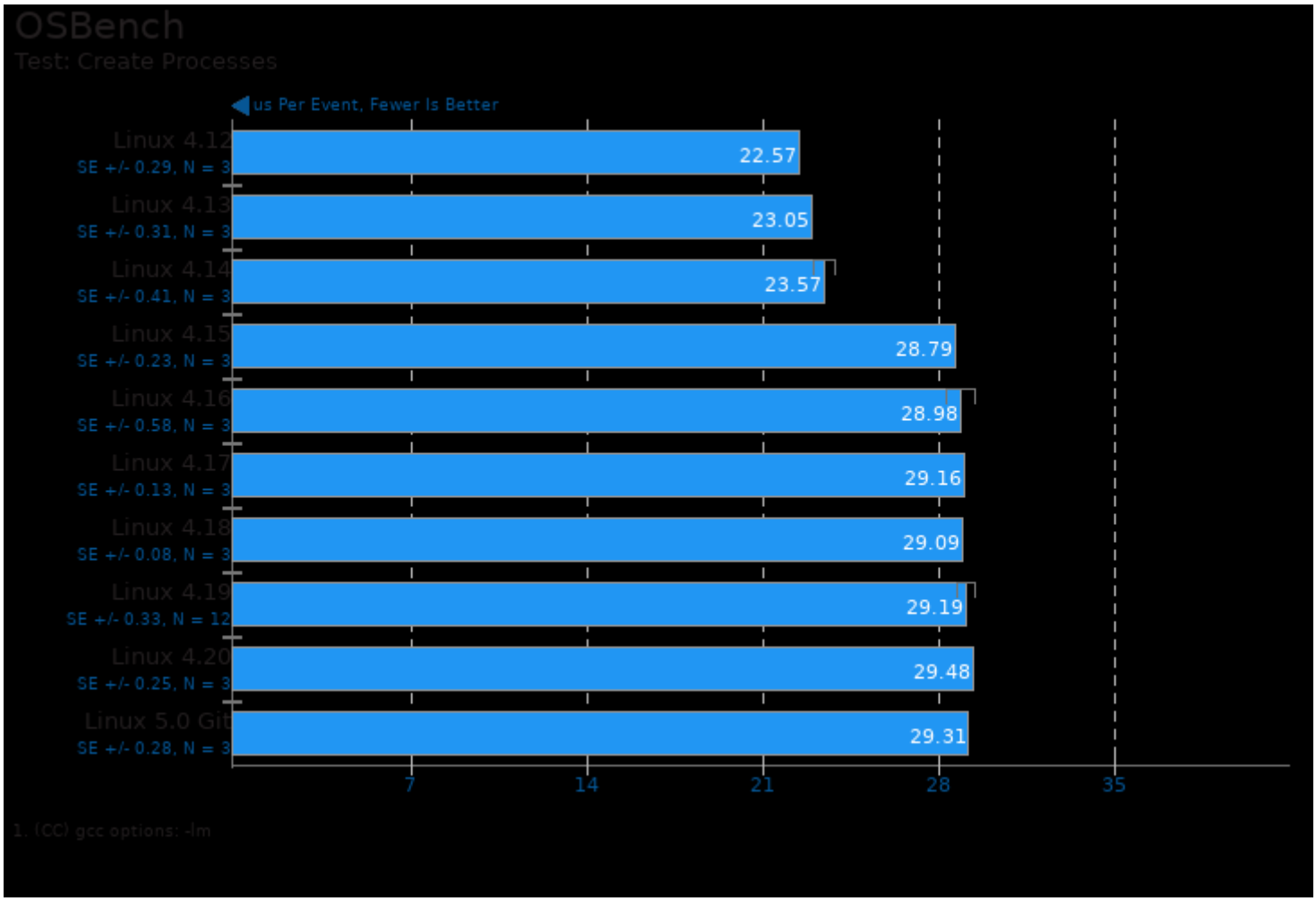


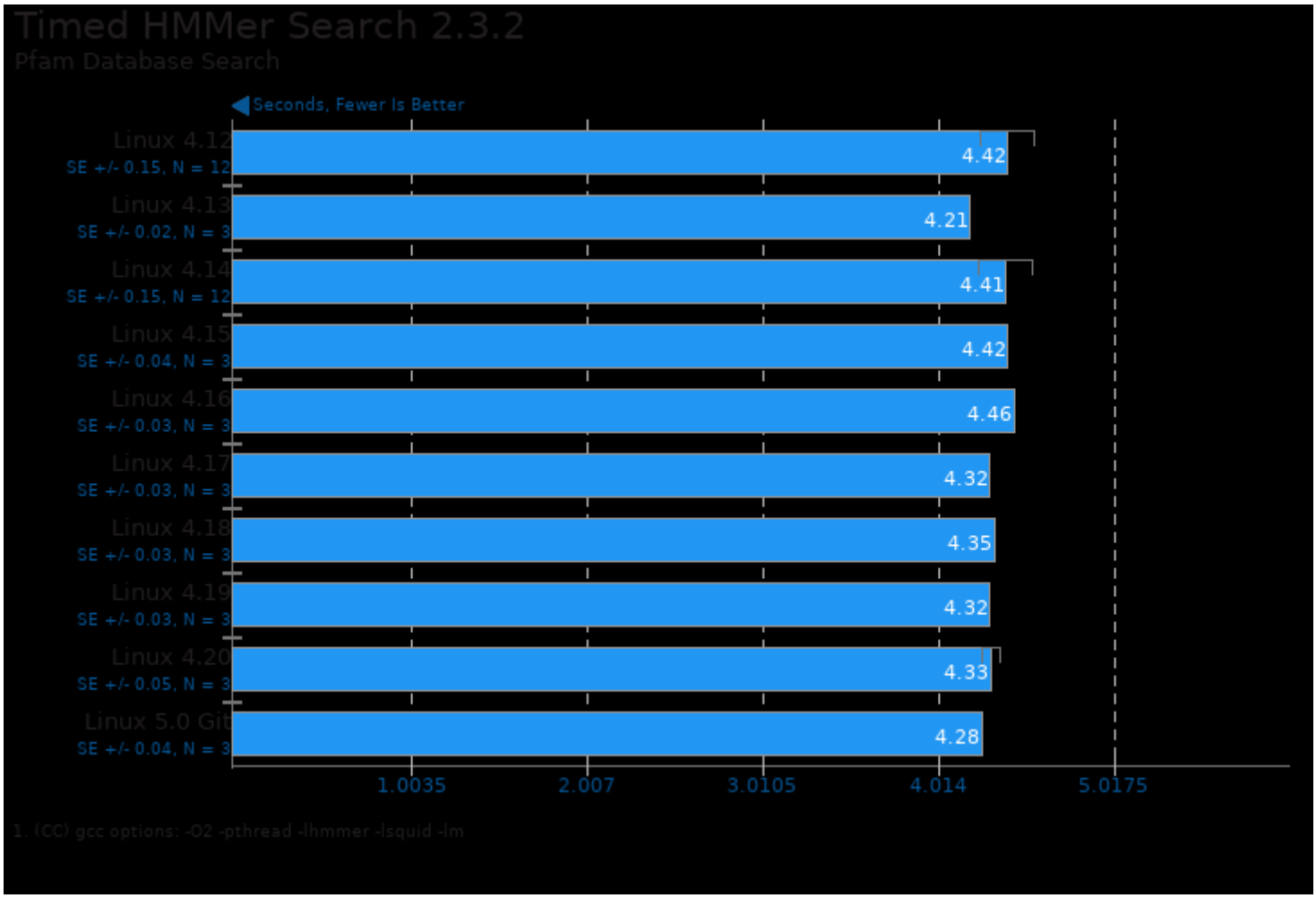
Core i9 7960X Linux 5.0 Kernel Benchmarks



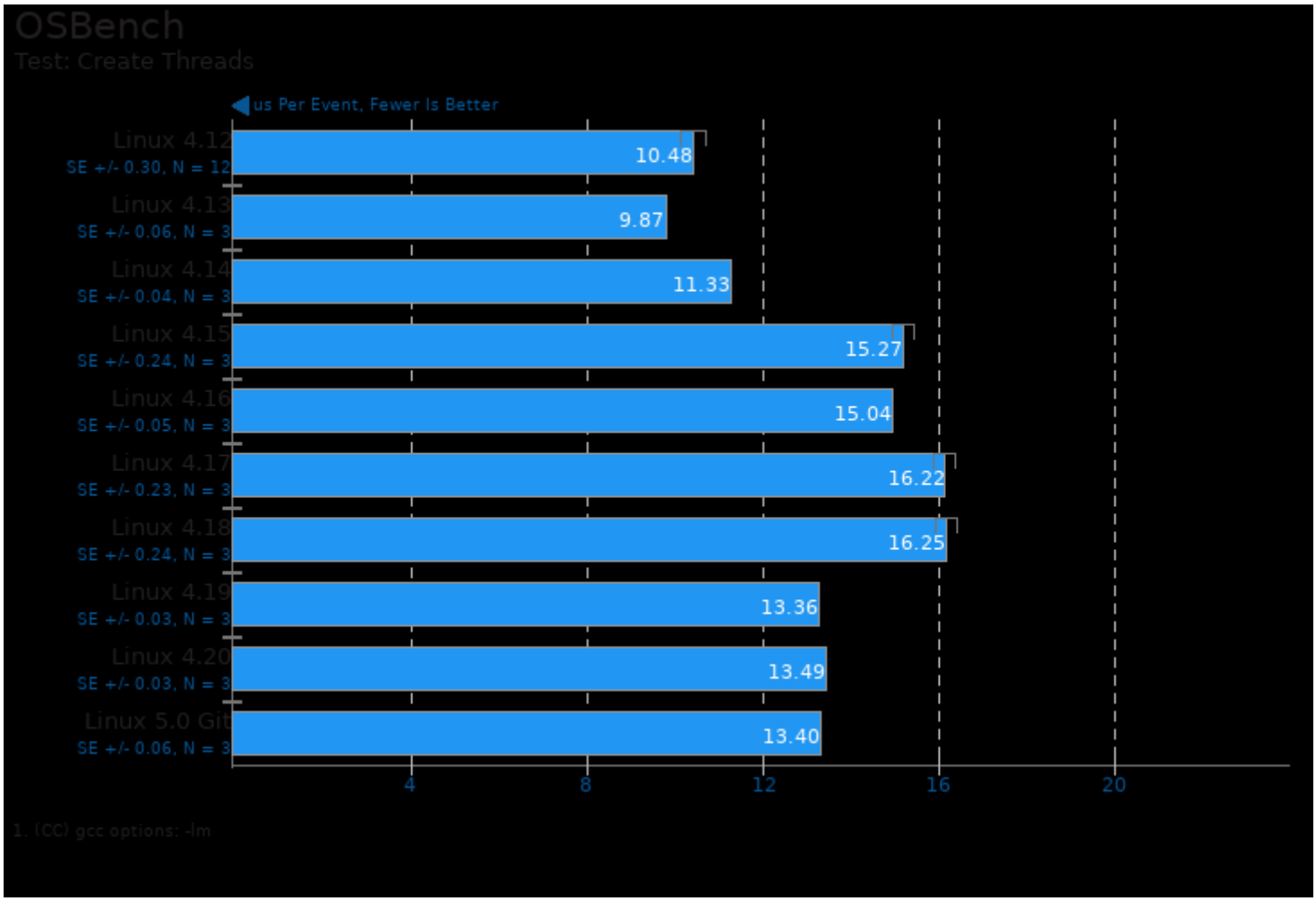


Core i9 7960X Linux 5.0 Kernel Benchmarks

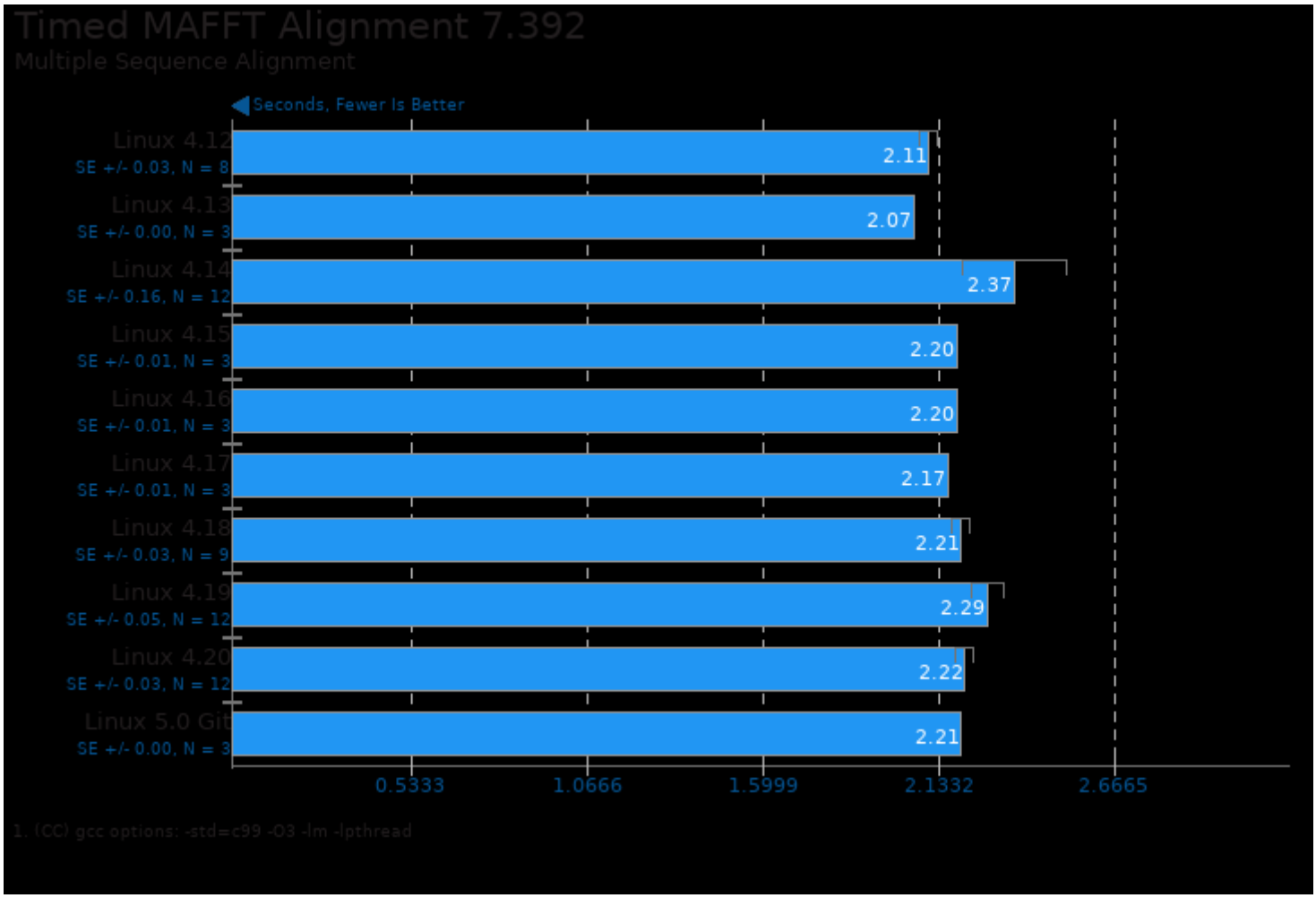



Timed HMMer Search 2.3.2
Pfam Database Search
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.15, N = 12
4.42
Linux 4.13
SE +/- 0.02, N = 3
4.21
Linux 4.14
SE +/- 0.15, N = 12
4.41
Linux 4.15
SE +/- 0.04, N = 3
4.42
Linux 4.16
SE +/- 0.03, N = 3
4.46
Linux 4.17
SE +/- 0.03, N = 3
4.32
Linux 4.18
SE +/- 0.03, N = 3
4.35
Linux 4.19
SE +/- 0.03, N = 3
4.32
Linux 4.20
SE +/- 0.05, N = 3
4.33
Linux 5.0 Git
SE +/- 0.04, N = 3
4.28
1.0035
2.007
3.0105
4.014
5.0175
1. (CC) gcc options: -O2 -pthread -lhmmer -lsquid -lm

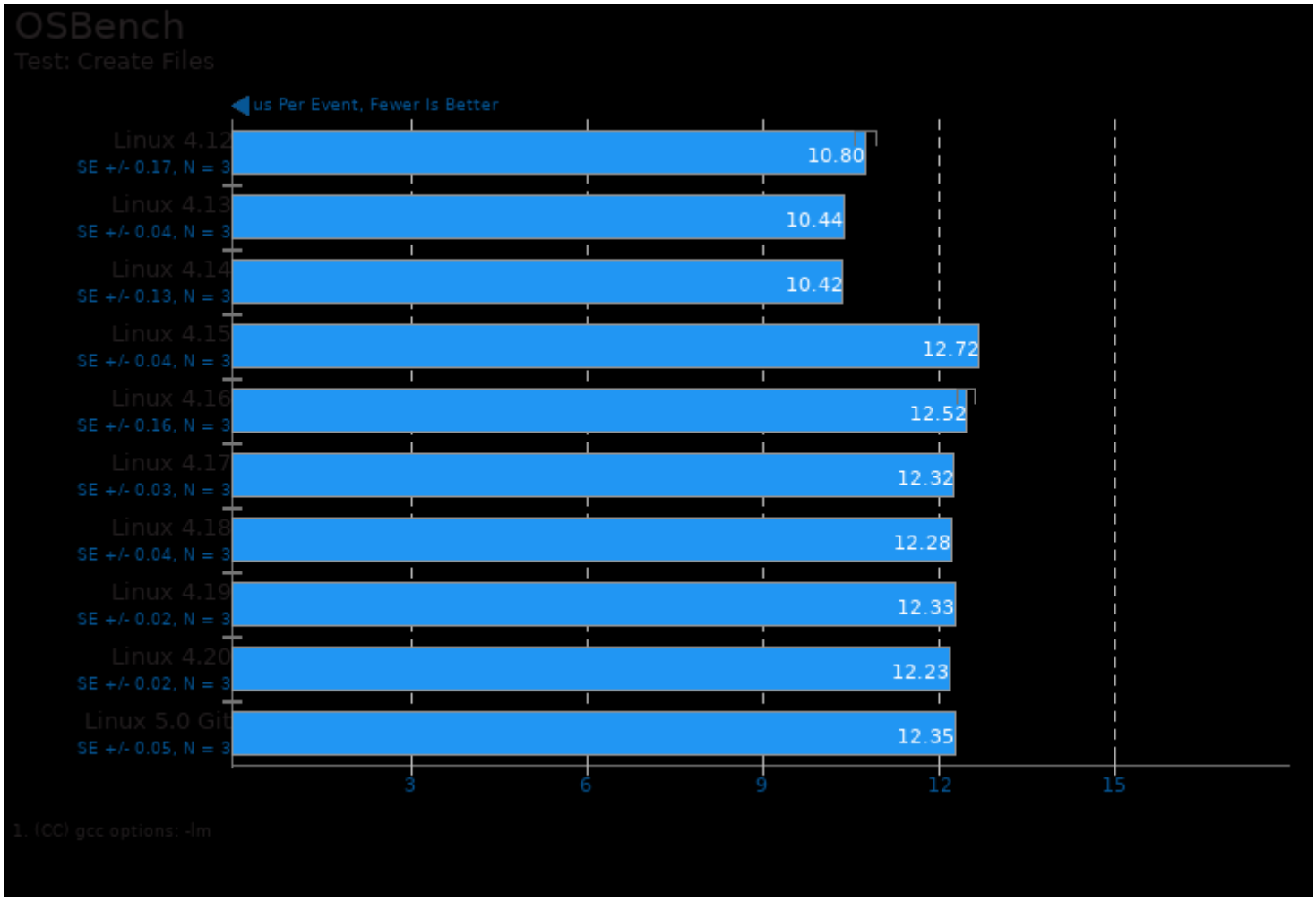
Core i9 7960X Linux 5.0 Kernel Benchmarks



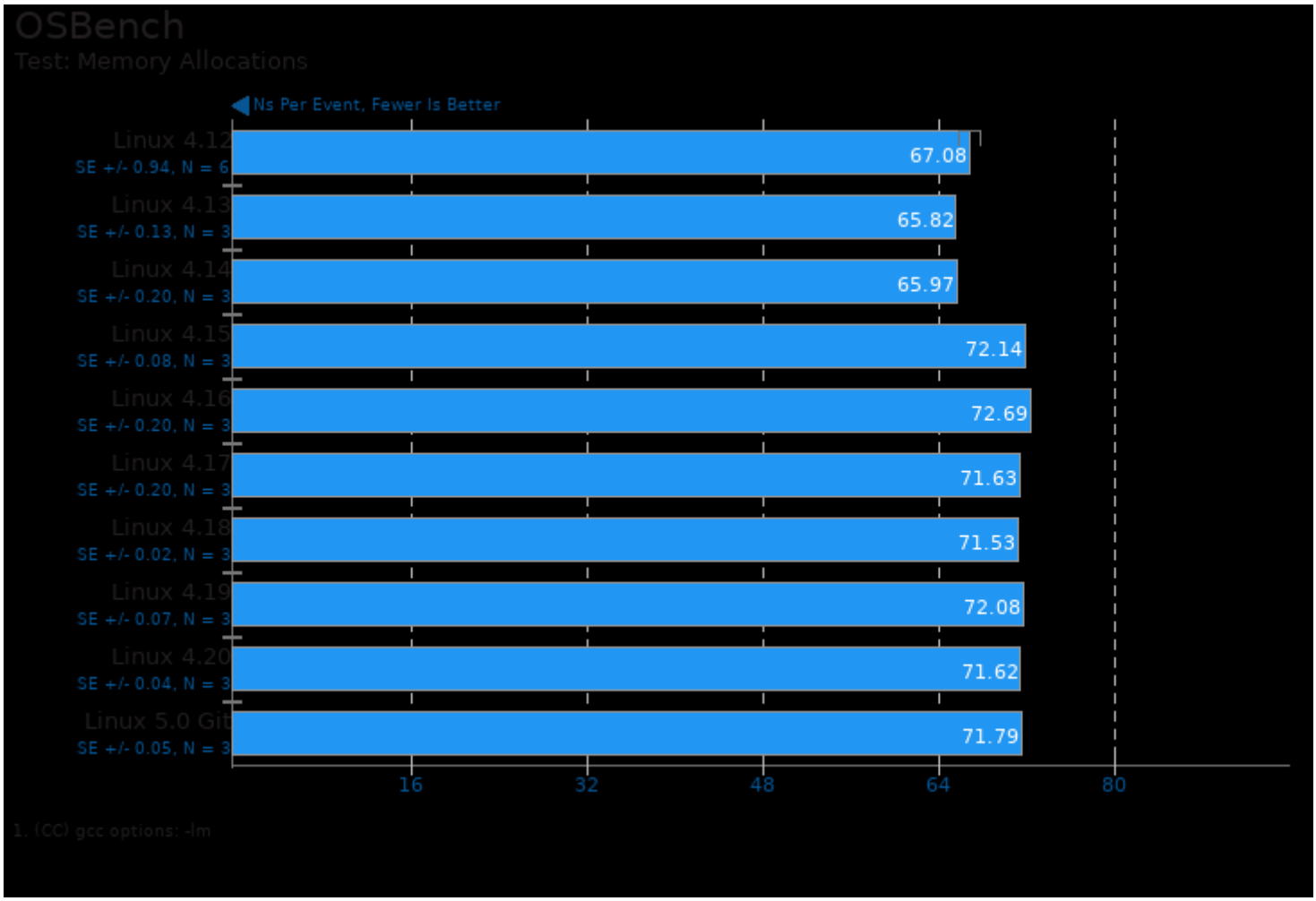
Core i9 7960X Linux 5.0 Kernel Benchmarks



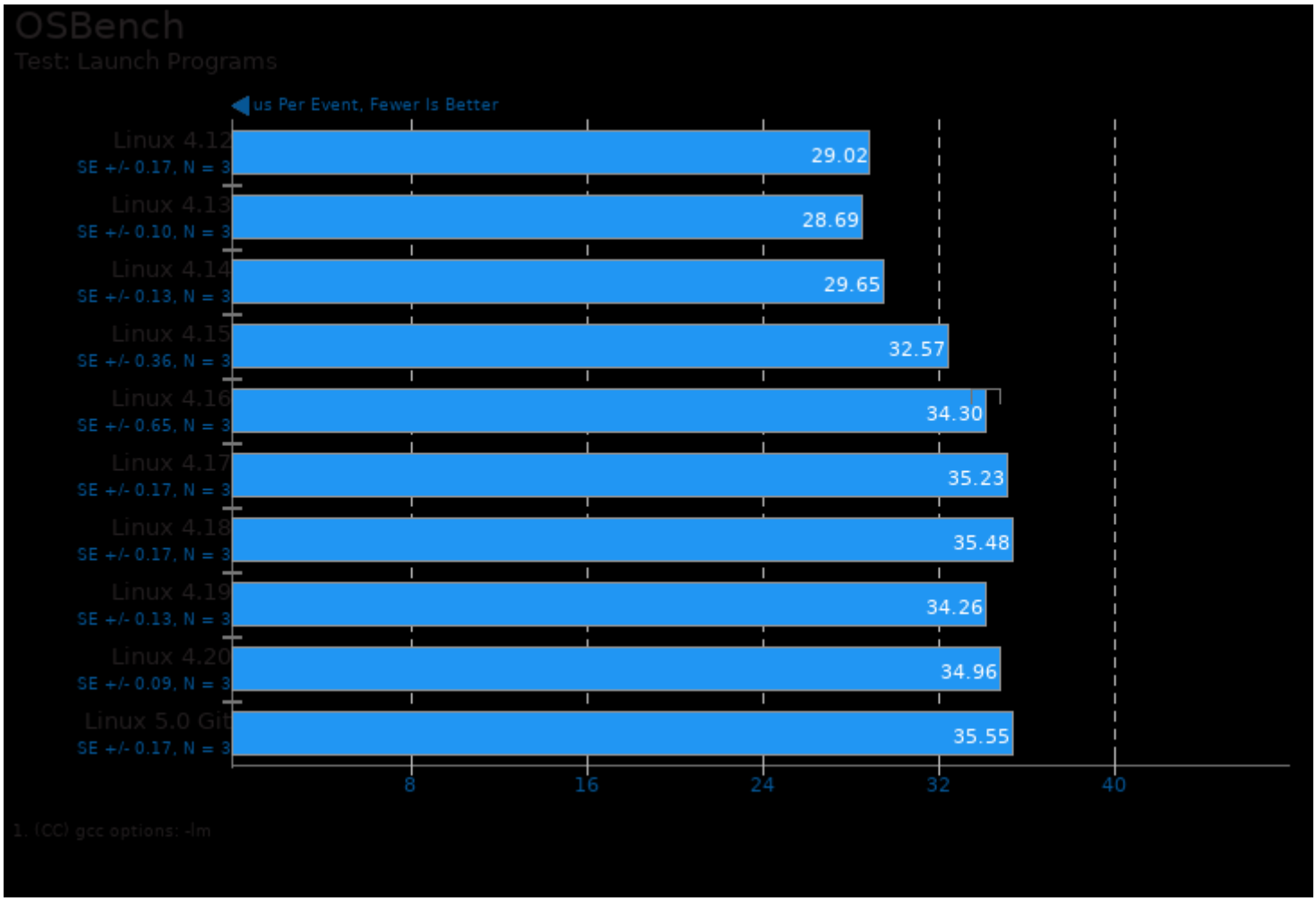
Core i9 7960X Linux 5.0 Kernel Benchmarks

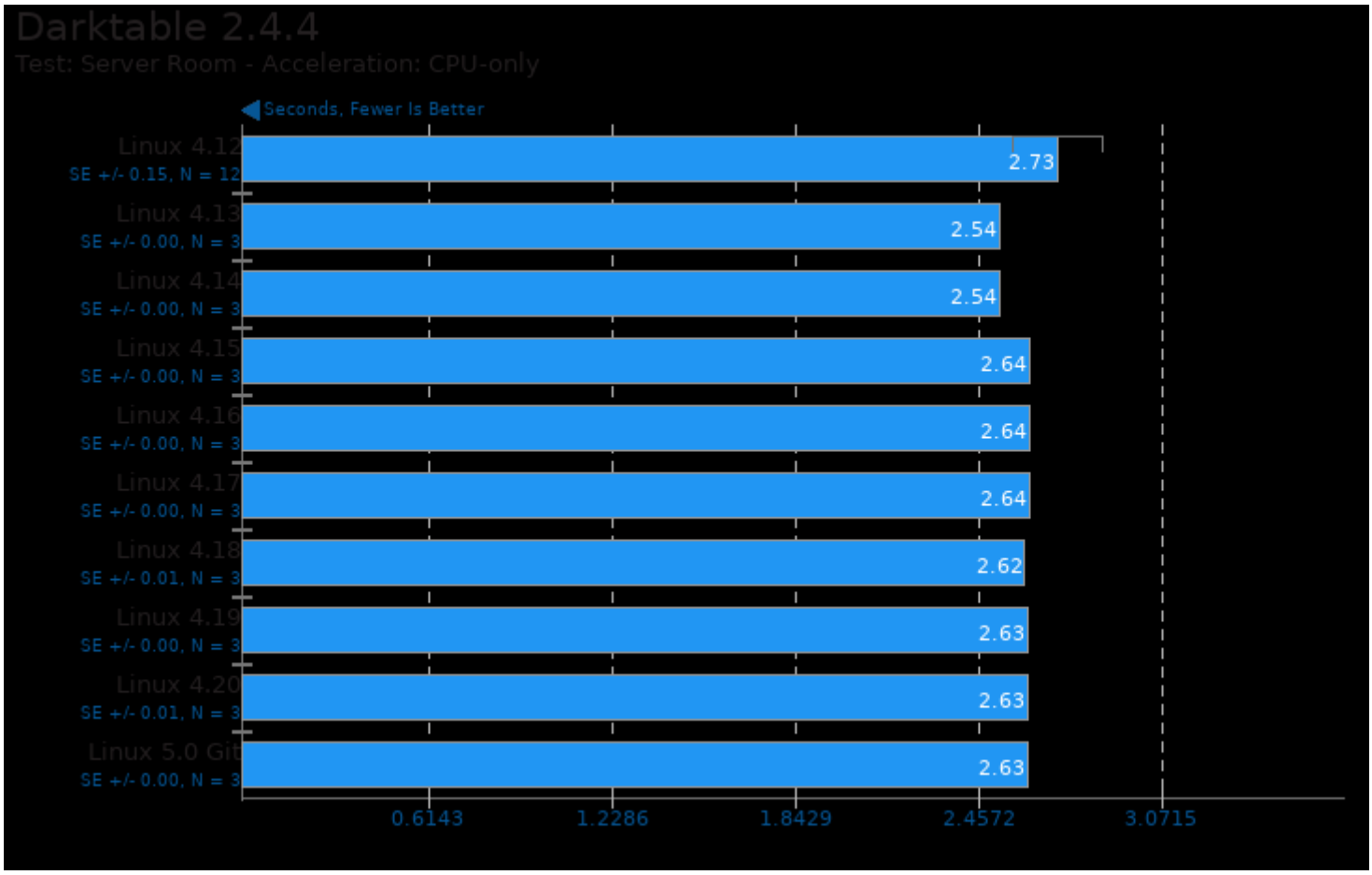


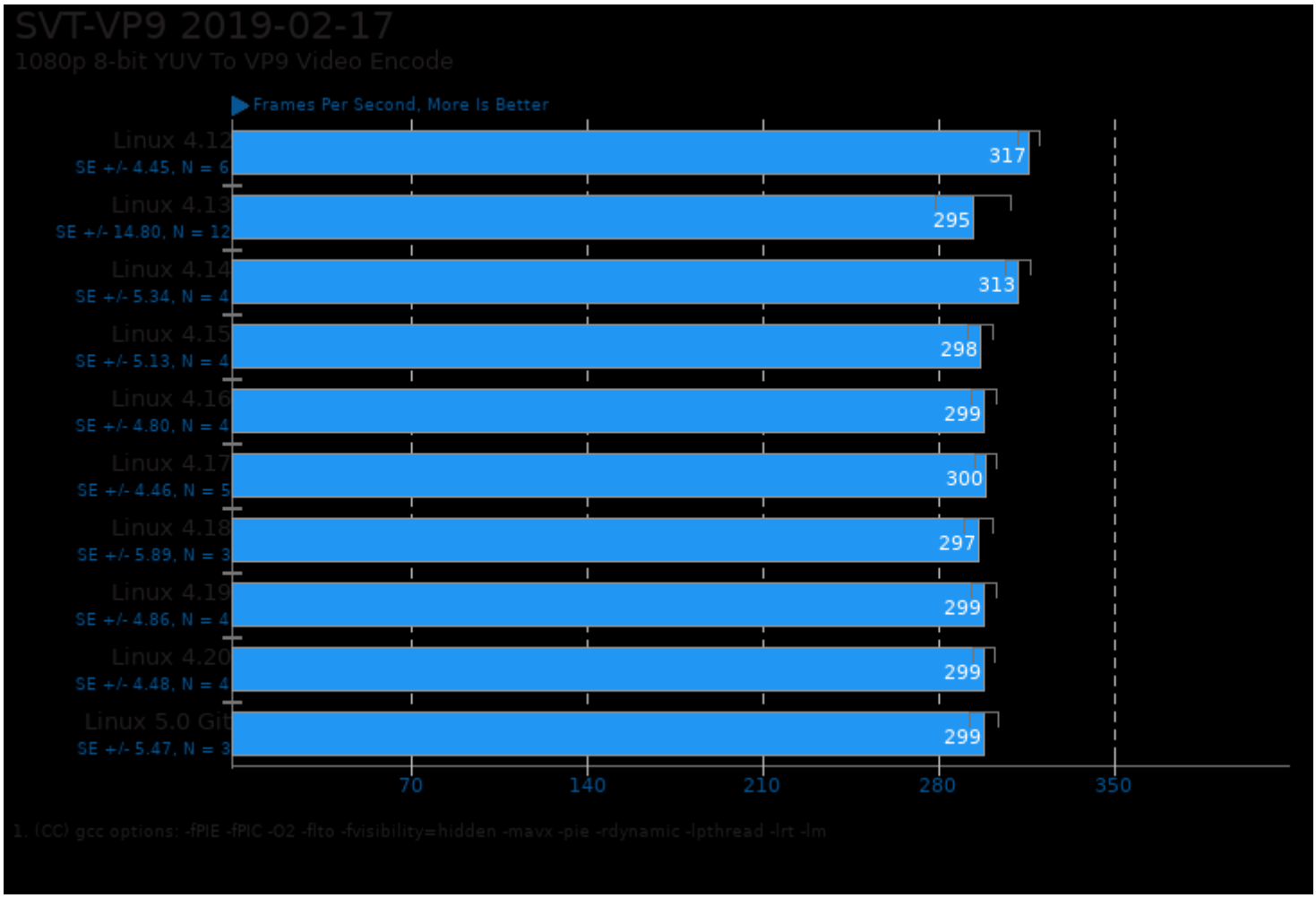
Core i9 7960X Linux 5.0 Kernel Benchmarks



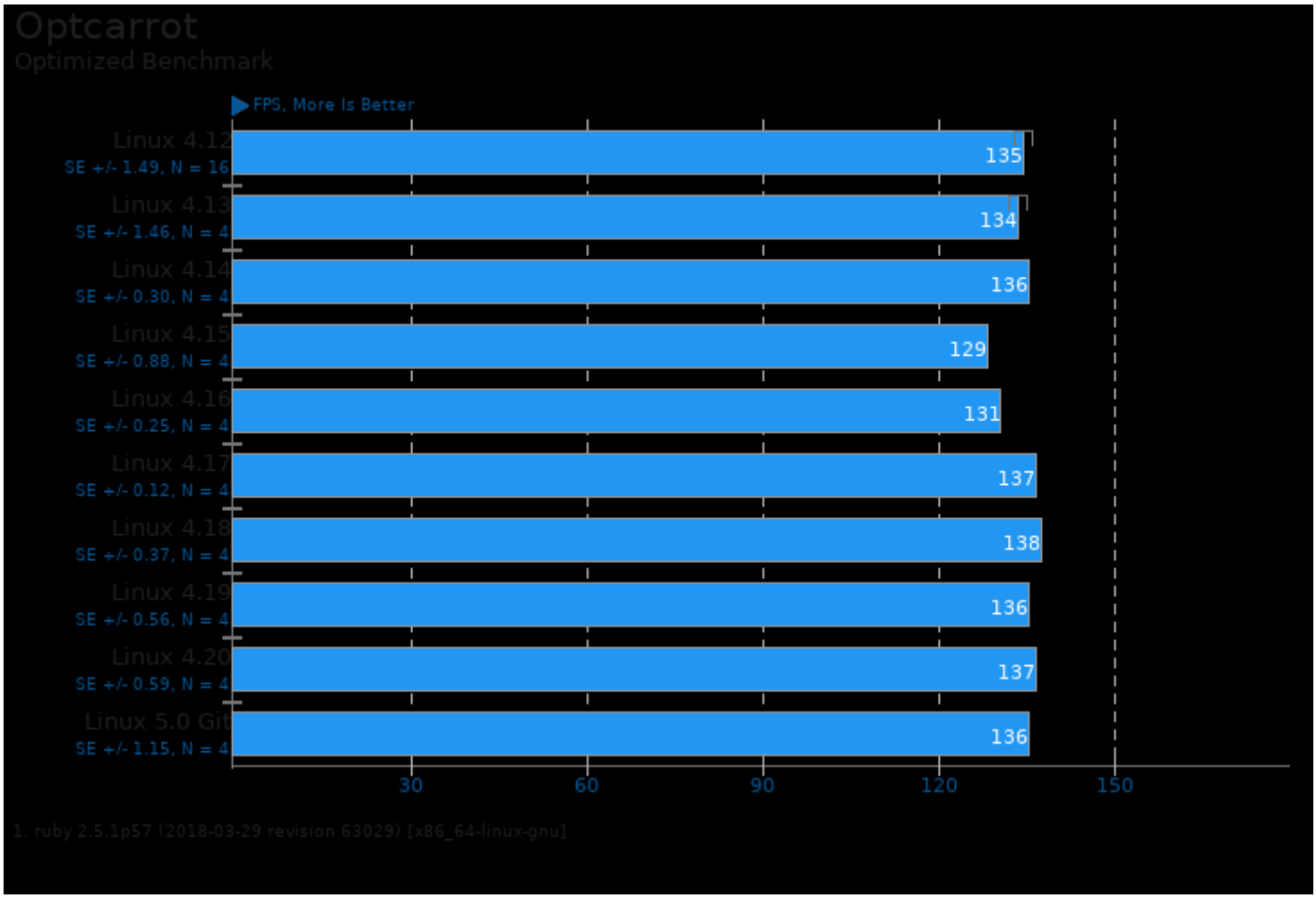
Core i9 7960X Linux 5.0 Kernel Benchmarks

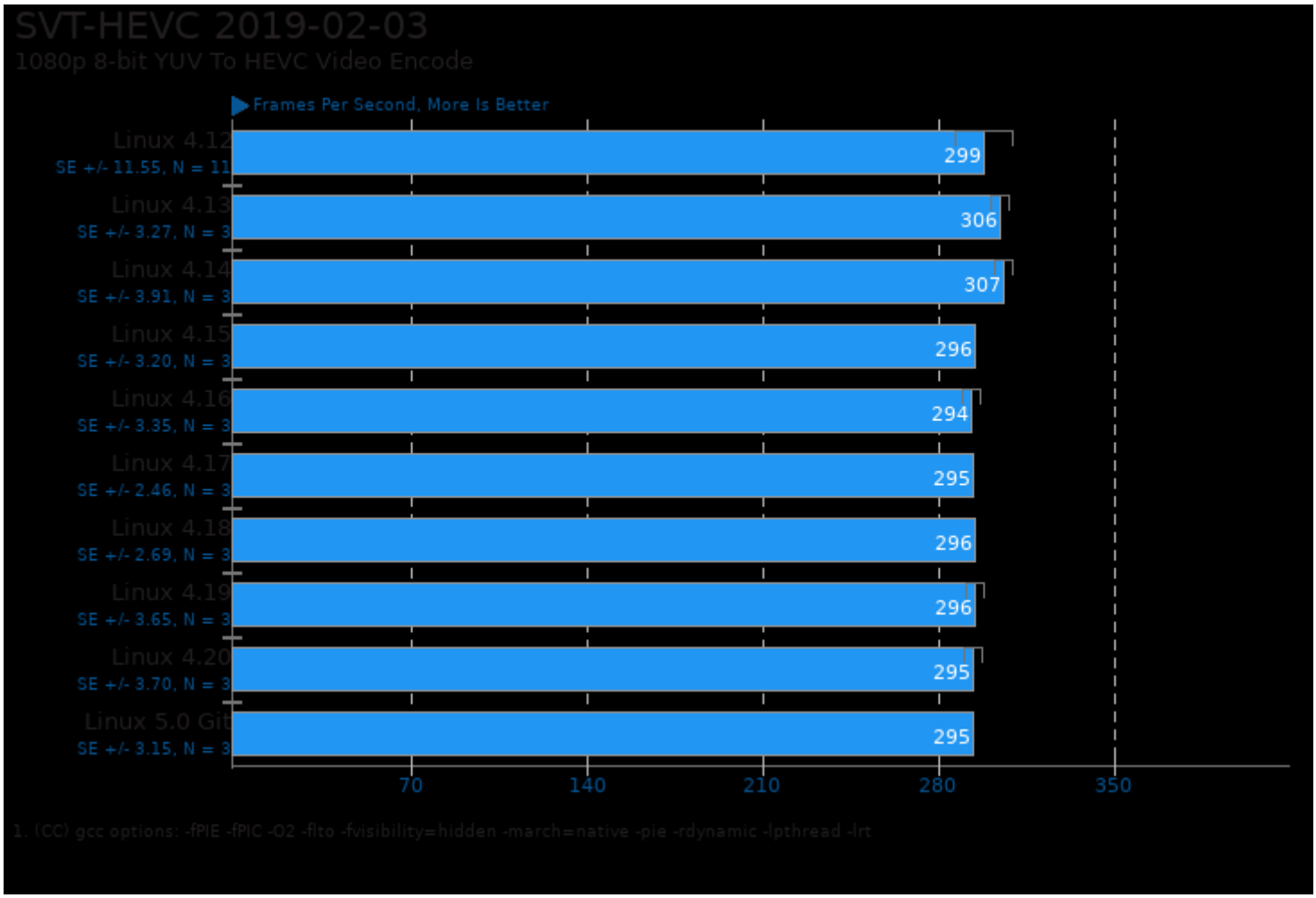



Darktable 2.4.4
Test: Server Room - Acceleration: CPU-only
Seconds, Fewer Is Better
Linux 4.12
SE +/- 0.15, N = 12
2.73
Linux 4.13
SE +/- 0.00, N = 3
2.54
Linux 4.14
SE +/- 0.00, N = 3
2.54
Linux 4.15
SE +/- 0.00, N = 3
2.64
Linux 4.16
SE +/- 0.00, N = 3
2.64
Linux 4.17
SE +/- 0.00, N = 3
2.64
Linux 4.18
SE +/- 0.01, N = 3
2.62
Linux 4.19
SE +/- 0.00, N = 3
2.63
Linux 4.20
SE +/- 0.01, N = 3
2.63
Linux 5.0 Git
SE +/- 0.00, N = 3
2.63
0.6143
1.2286
1.8429
2.4572
3.0715

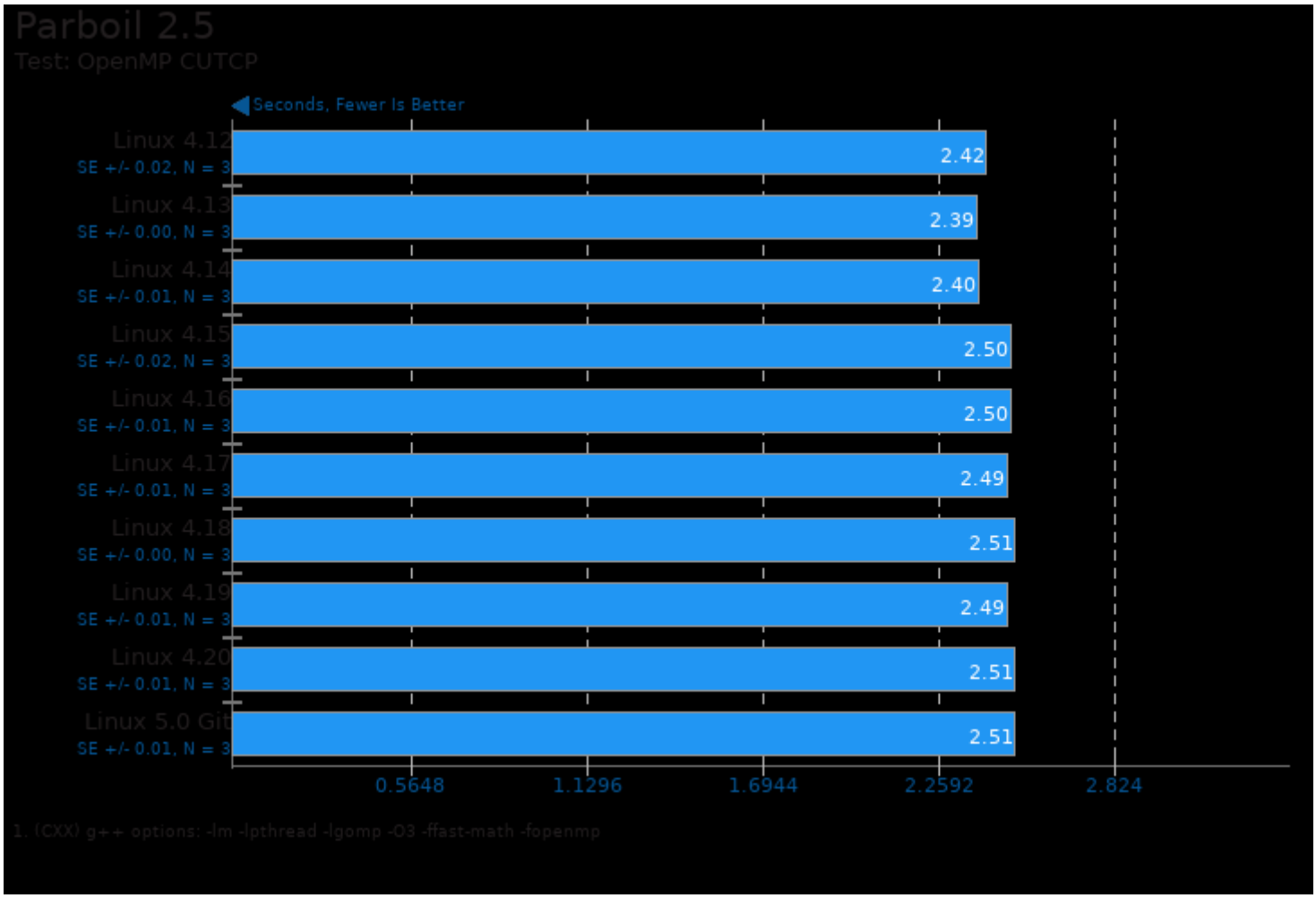

SVT-VP9 2019-02-17
1080p 8-bit YUV To VP9 Video Encode
Frames Per Second, More Is Better
Linux 4.12
SE +/- 4.45, N = 6
317
Linux 4.13
SE +/- 14.80, N = 12
295
Linux 4.14
SE +/- 5.34, N = 4
313
Linux 4.15
SE +/- 5.13, N = 4
298
Linux 4.16
SE +/- 4.80, N = 4
299
Linux 4.17
SE +/- 4.46, N = 5
300
Linux 4.18
SE +/- 5.89, N = 3
297
Linux 4.19
SE +/- 4.86, N = 4
299
Linux 4.20
SE +/- 4.48, N = 4
299
Linux 5.0 Git
SE +/- 5.47, N = 3
299
70
140
210
280
350
1. (CC) gcc options: -fPIE -fPIC -O2 -flto -fvisibility=hidden -mavx -pie -rdynamic -lpthread -lrt -lm

Core i9 7960X Linux 5.0 Kernel Benchmarks

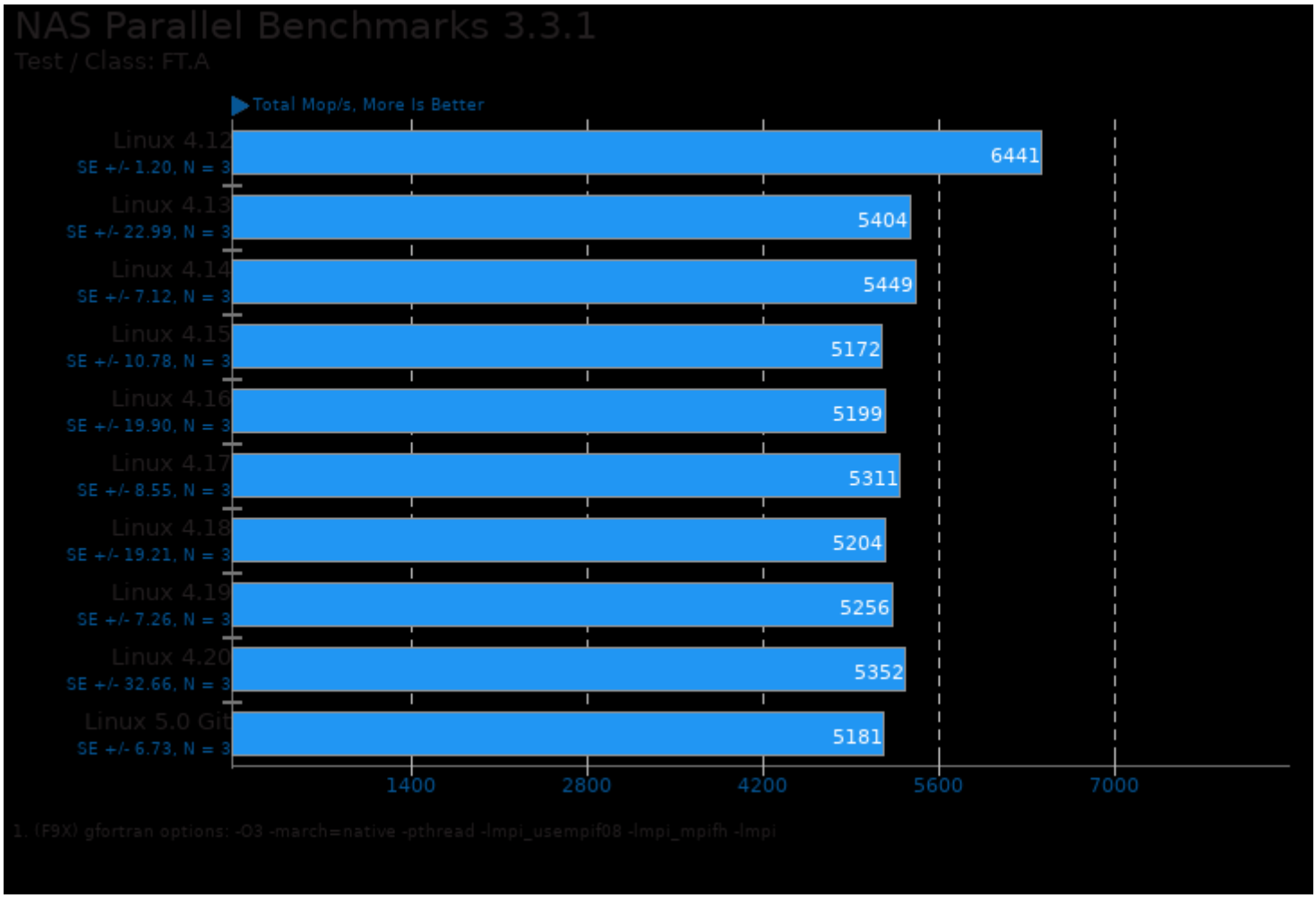



SVT-HEVC 2019-02-03
1080p 8-bit YUV To HEVC Video Encode
Frames Per Second, More Is Better
Linux 4.12
SE +/- 11.55, N = 11
299
Linux 4.13
SE +/- 3.27, N = 3
306
Linux 4.14
SE +/- 3.91, N = 3
307
Linux 4.15
SE +/- 3.20, N = 3
296
Linux 4.16
SE +/- 3.35, N = 3
294
Linux 4.17
SE +/- 2.46, N = 3
295
Linux 4.18
SE +/- 2.69, N = 3
296
Linux 4.19
SE +/- 3.65, N = 3
296
Linux 4.20
SE +/- 3.70, N = 3
295
Linux 5.0 Git
SE +/- 3.15, N = 3
295
70
140
210
280
350
1. (CC) gcc options: -fPIE -fPIC -O2 -flto -fvisibility=hidden -march=native -pie -rdynamic -lpthread -lrt

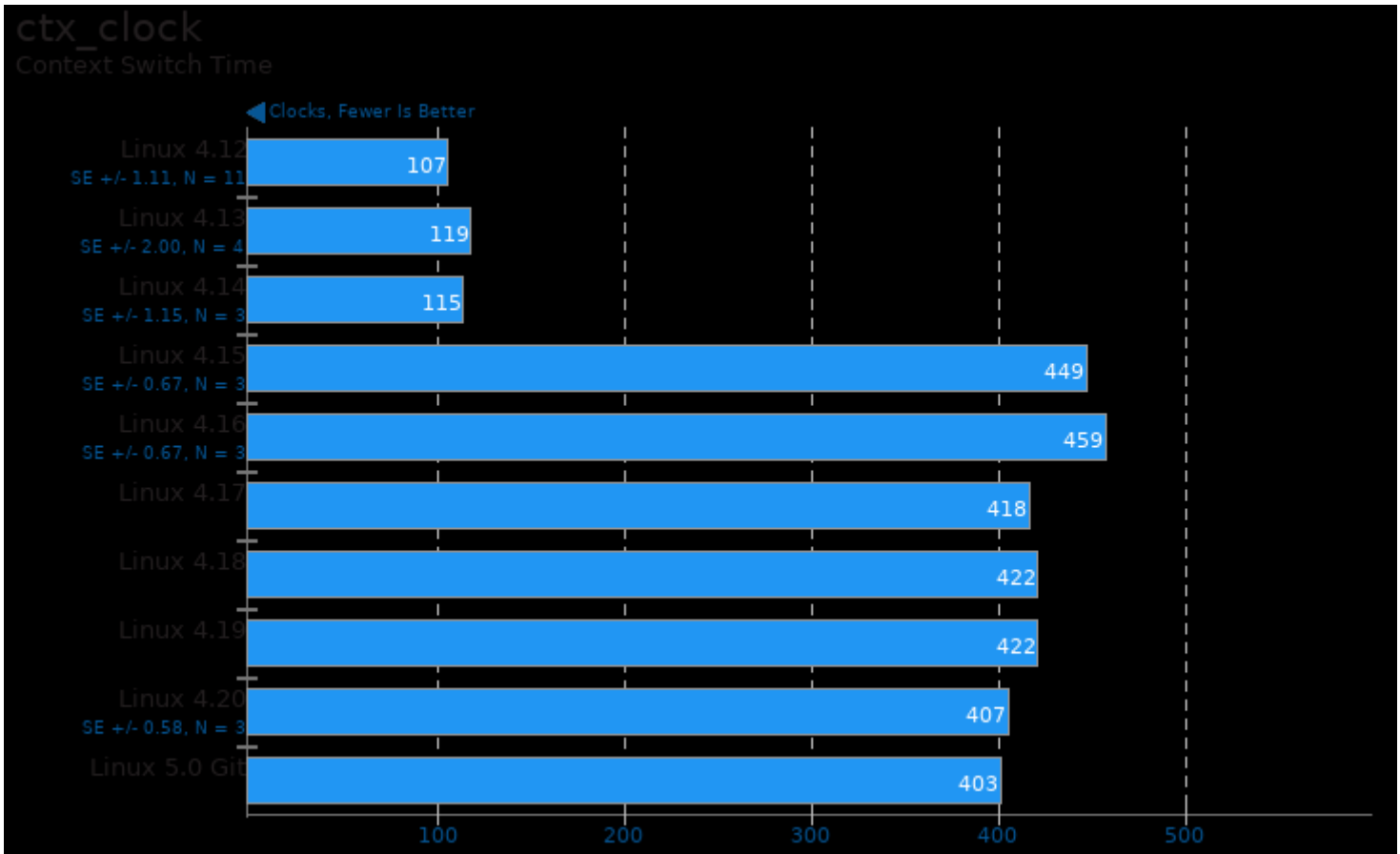
Core i9 7960X Linux 5.0 Kernel Benchmarks

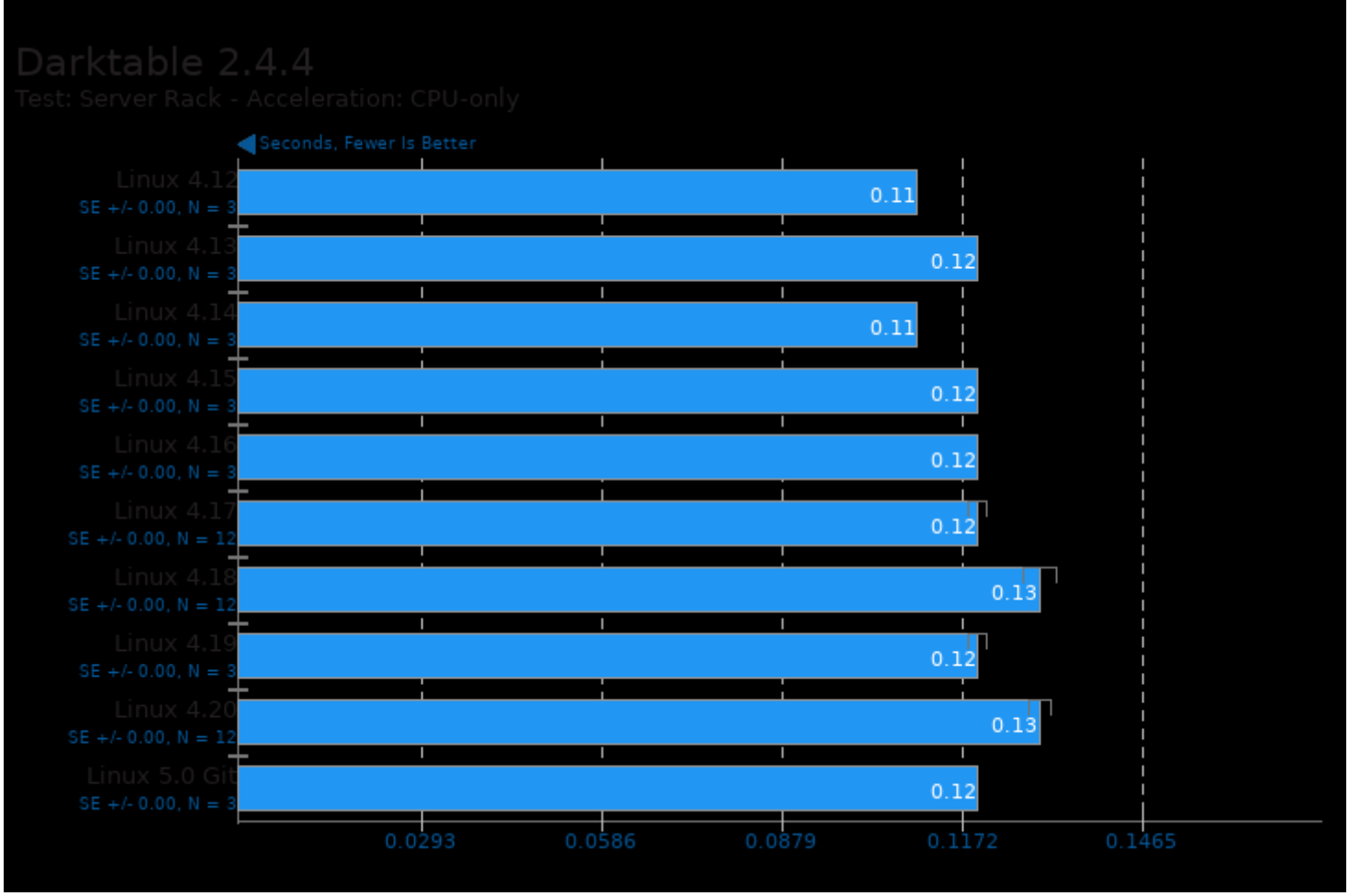


Core i9 7960X Linux 5.0 Kernel Benchmarks

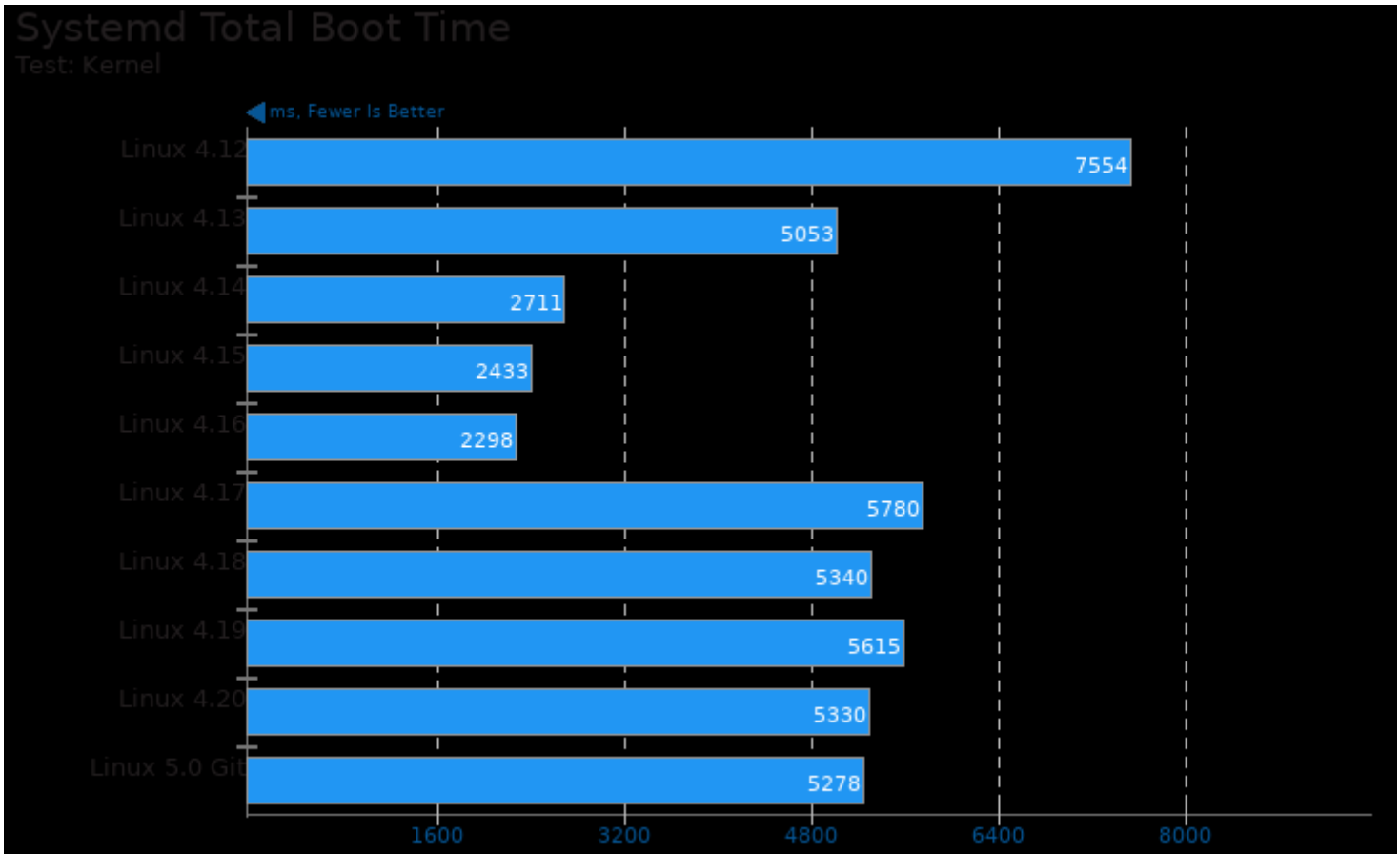


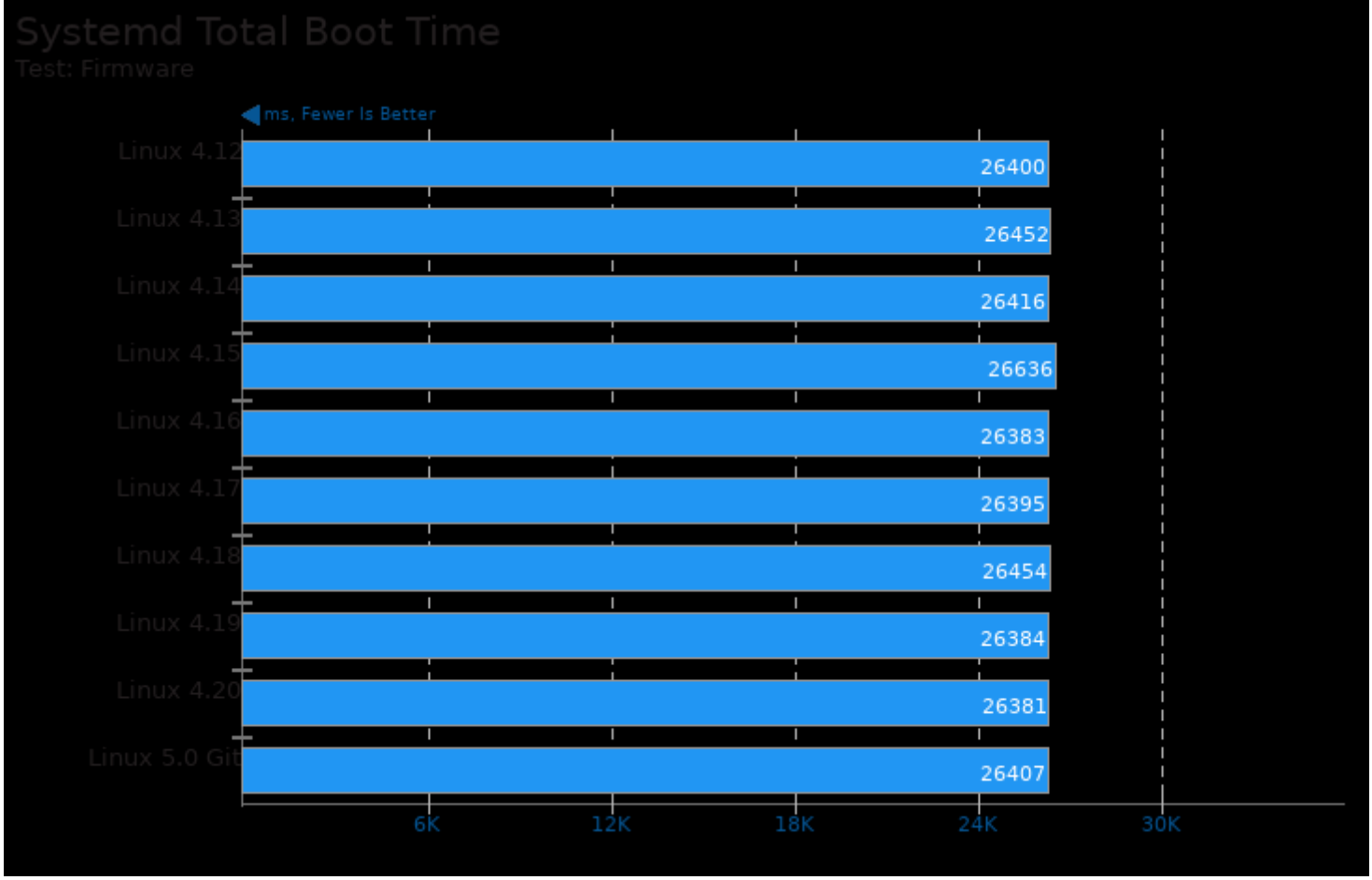
Core i9 7960X Linux 5.0 Kernel Benchmarks



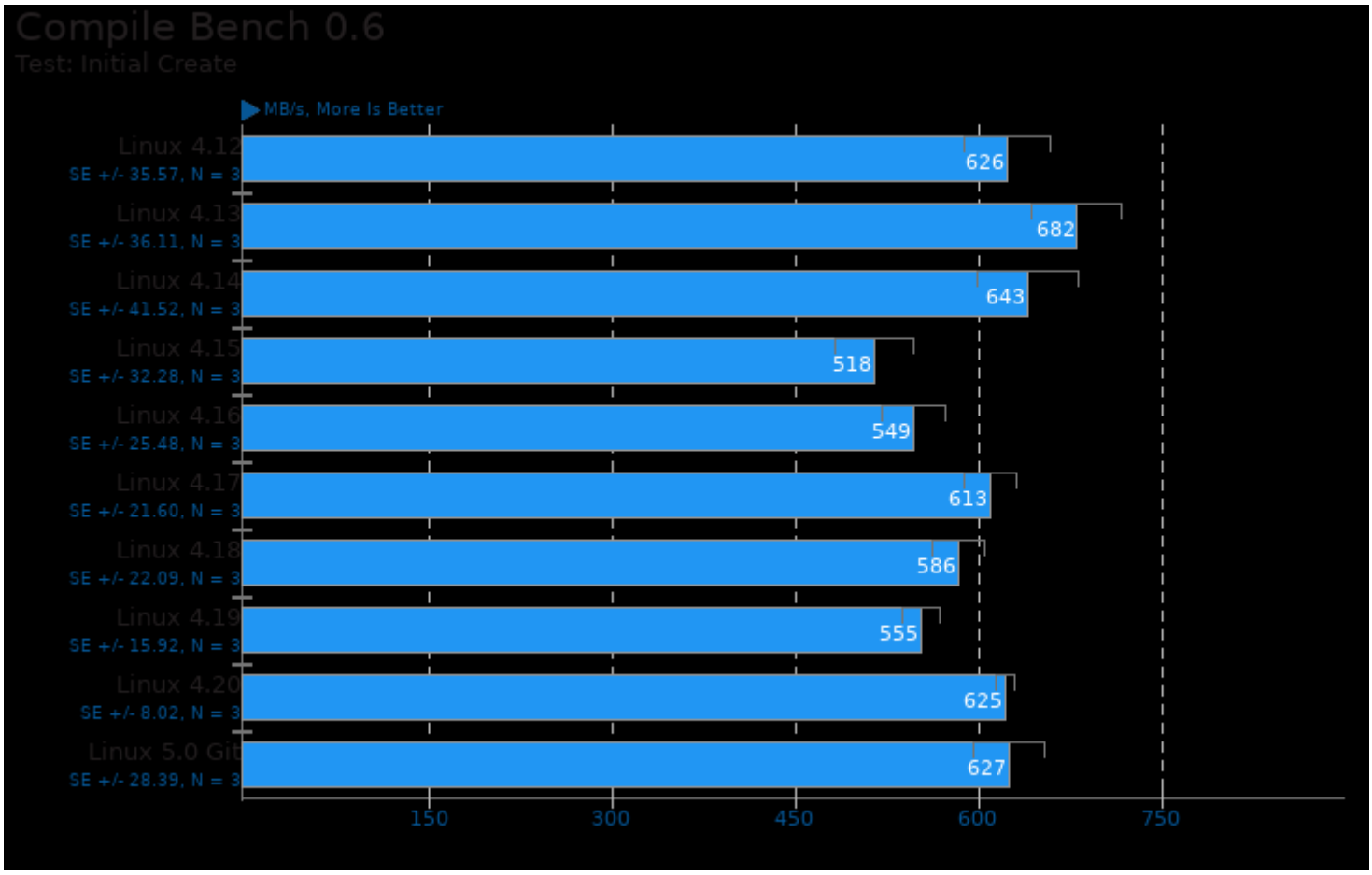


Core i9 7960X Linux 5.0 Kernel Benchmarks

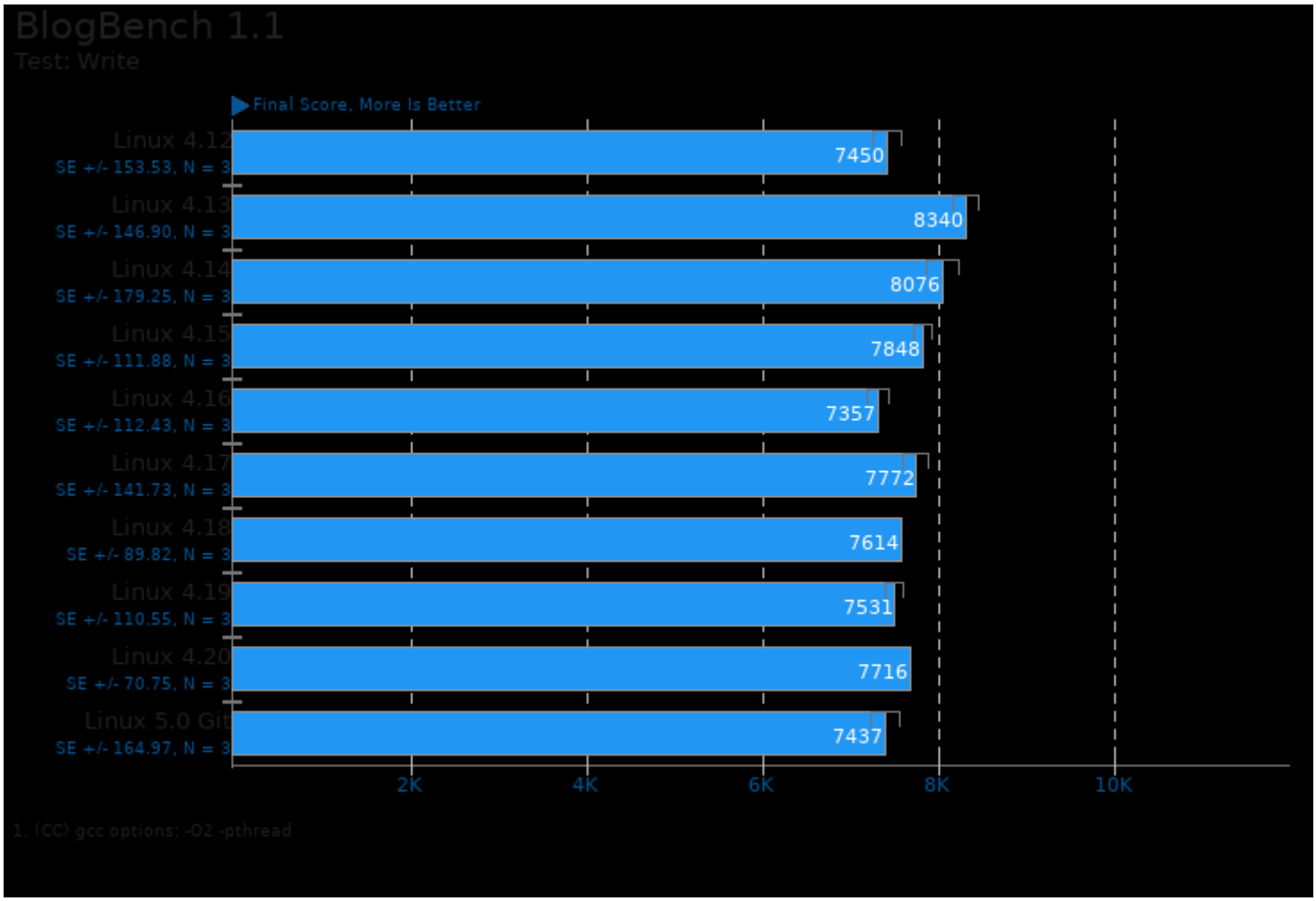




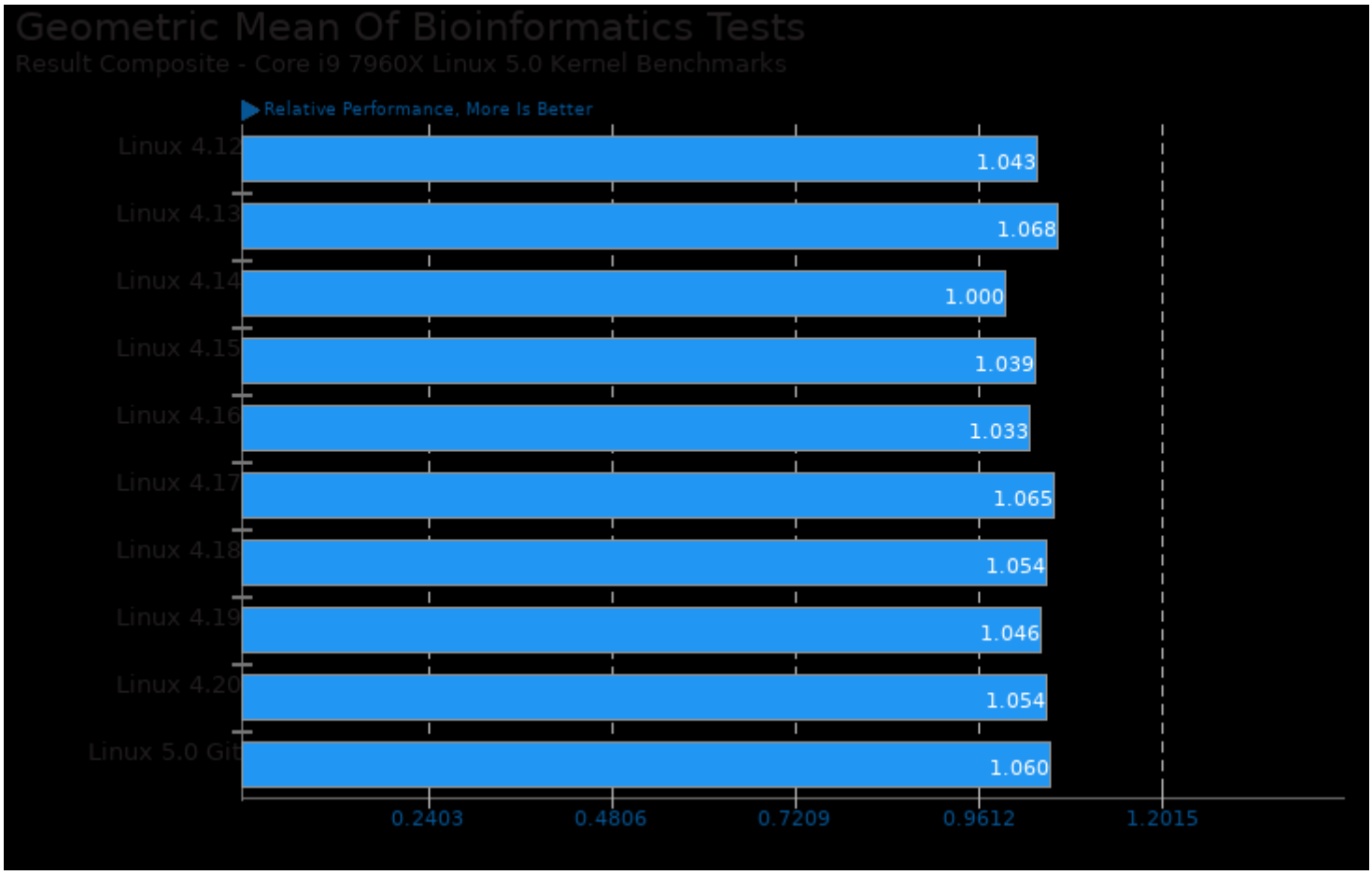
Core i9 7960X Linux 5.0 Kernel Benchmarks



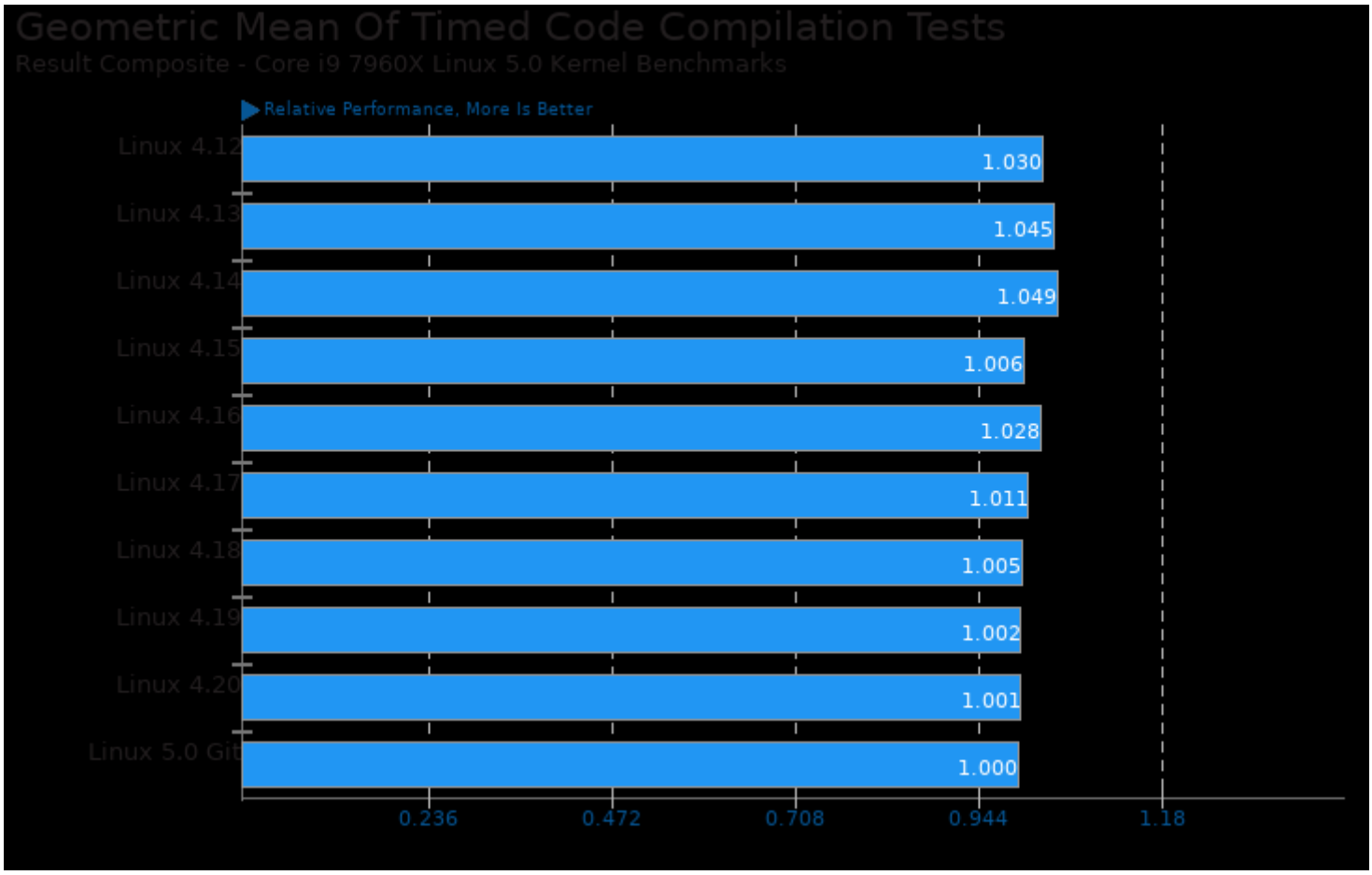
Core i9 7960X Linux 5.0 Kernel Benchmarks



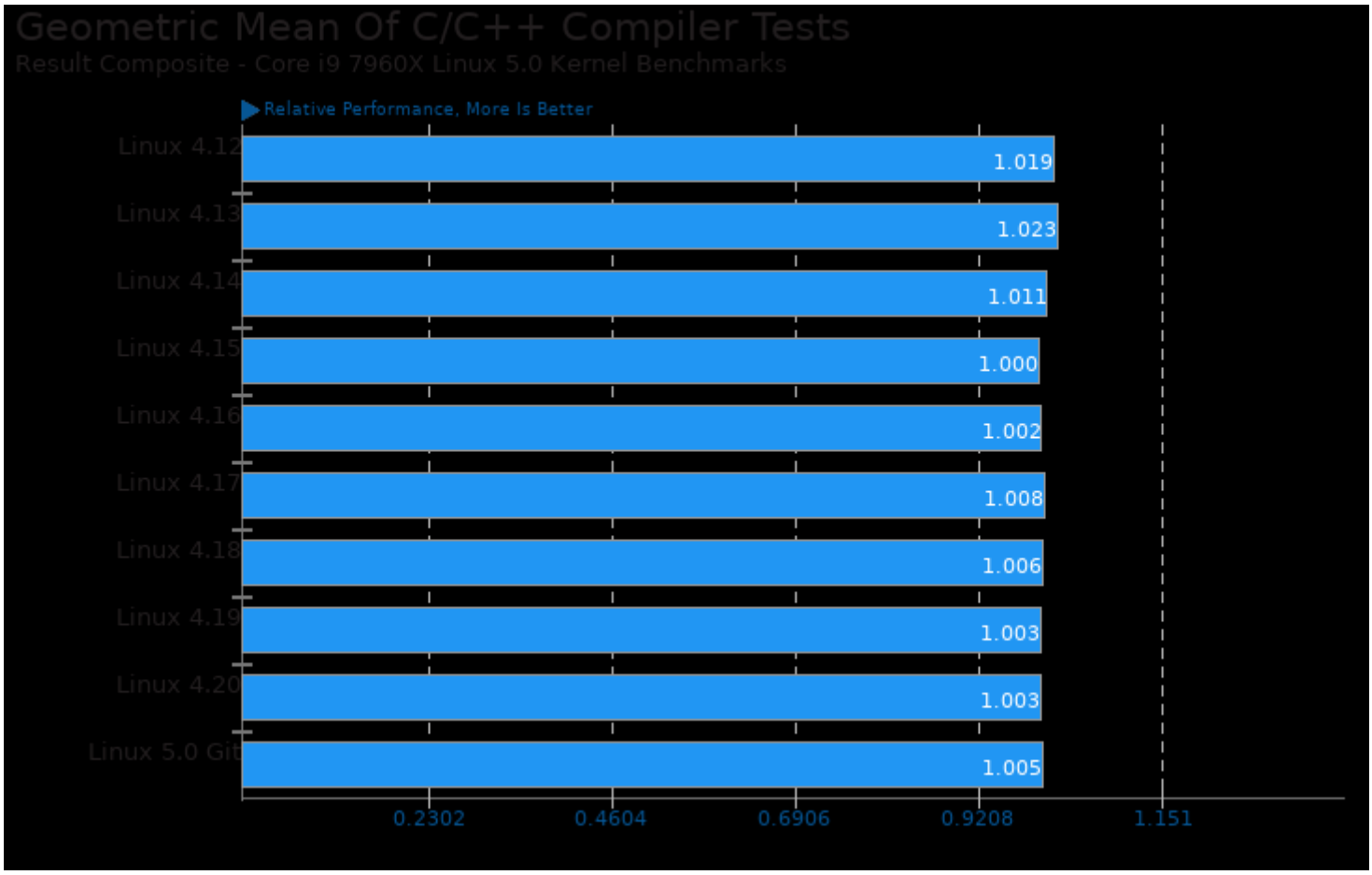
These geometric means are based upon test groupings / test suites for this result file.



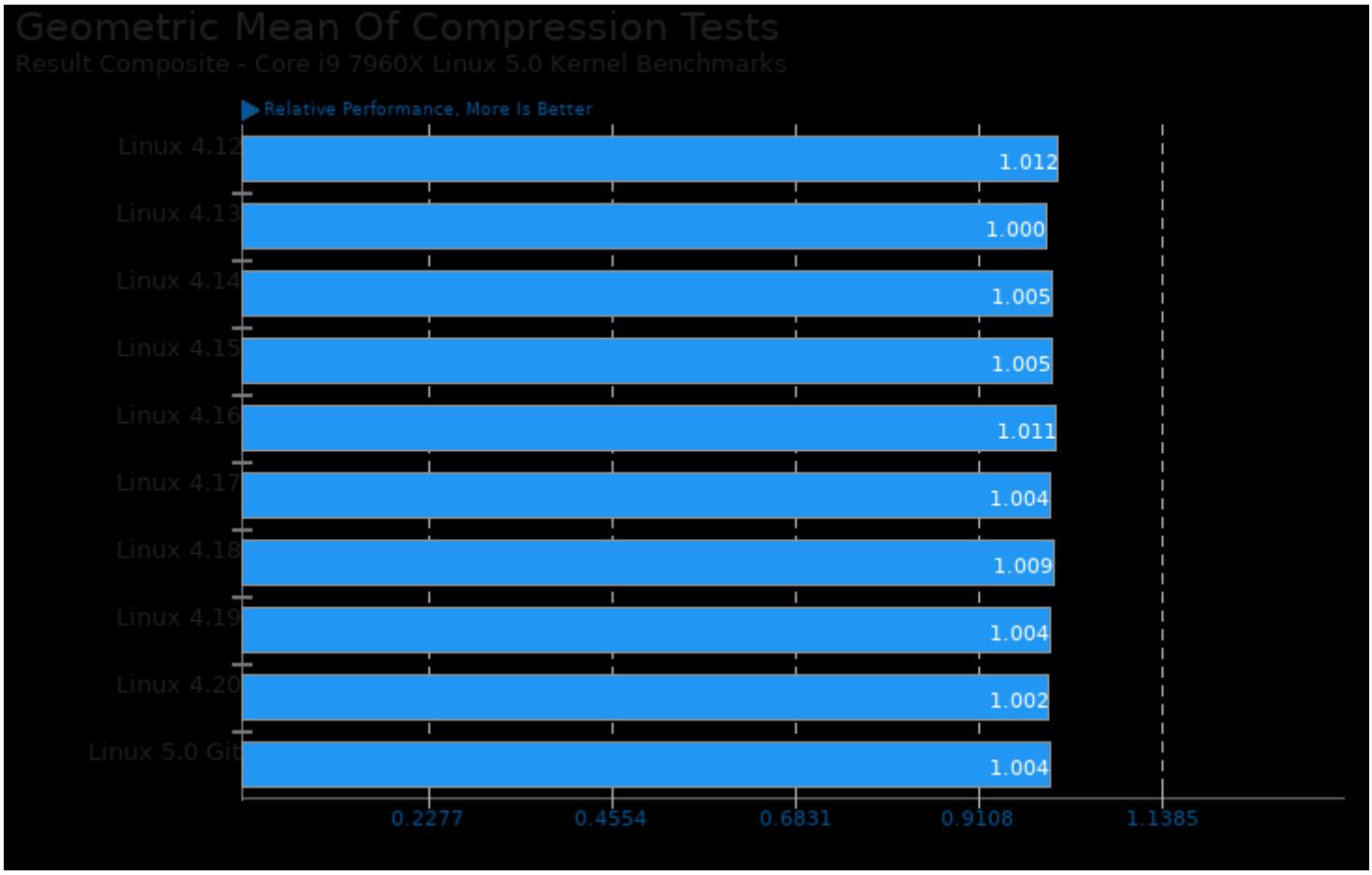
Geometric mean based upon tests: pts/himeno, pts/hmmer and pts/mafft



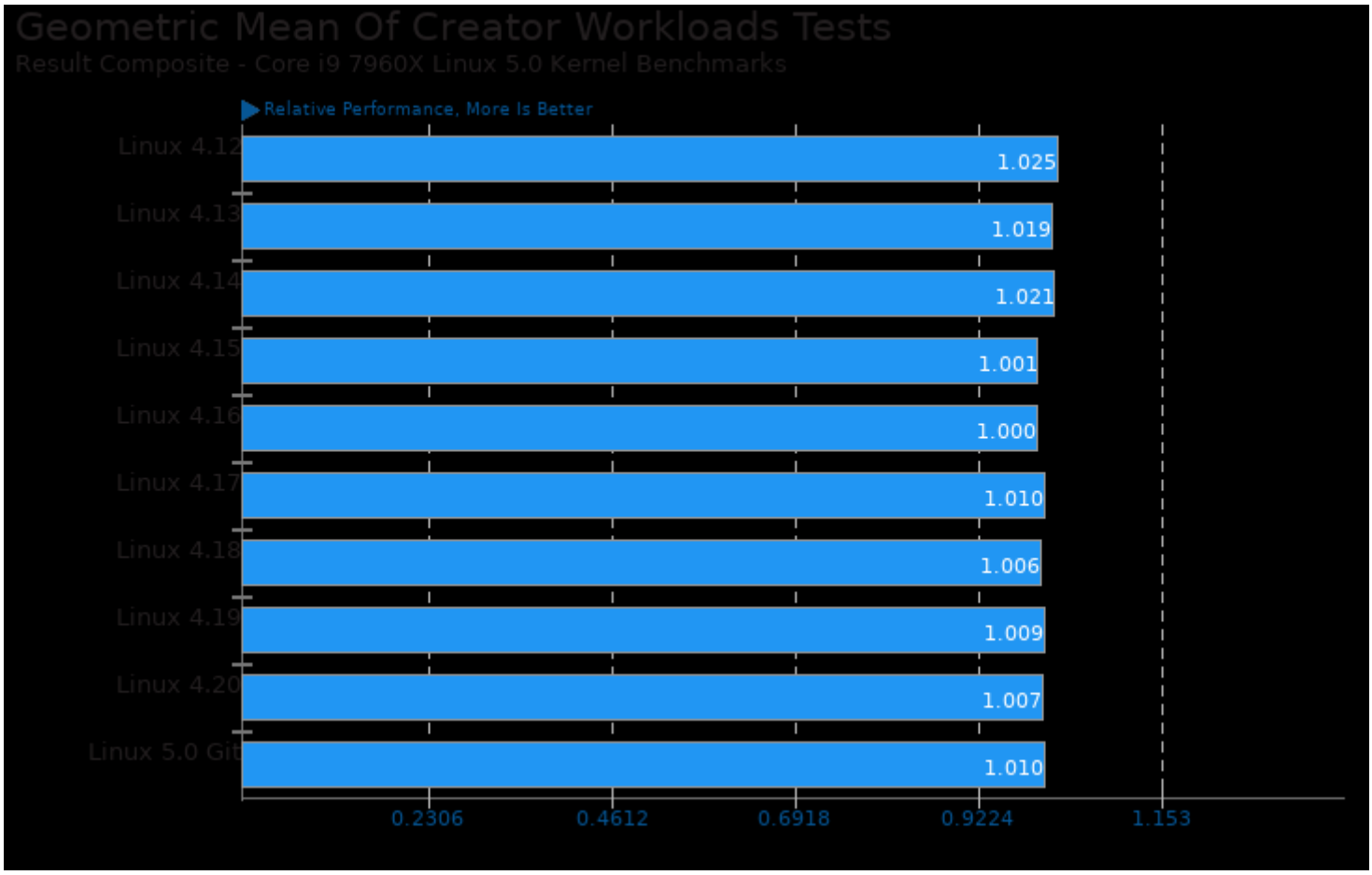
Geometric mean based upon tests: pts/build-linux-kernel and pts/build-llvm



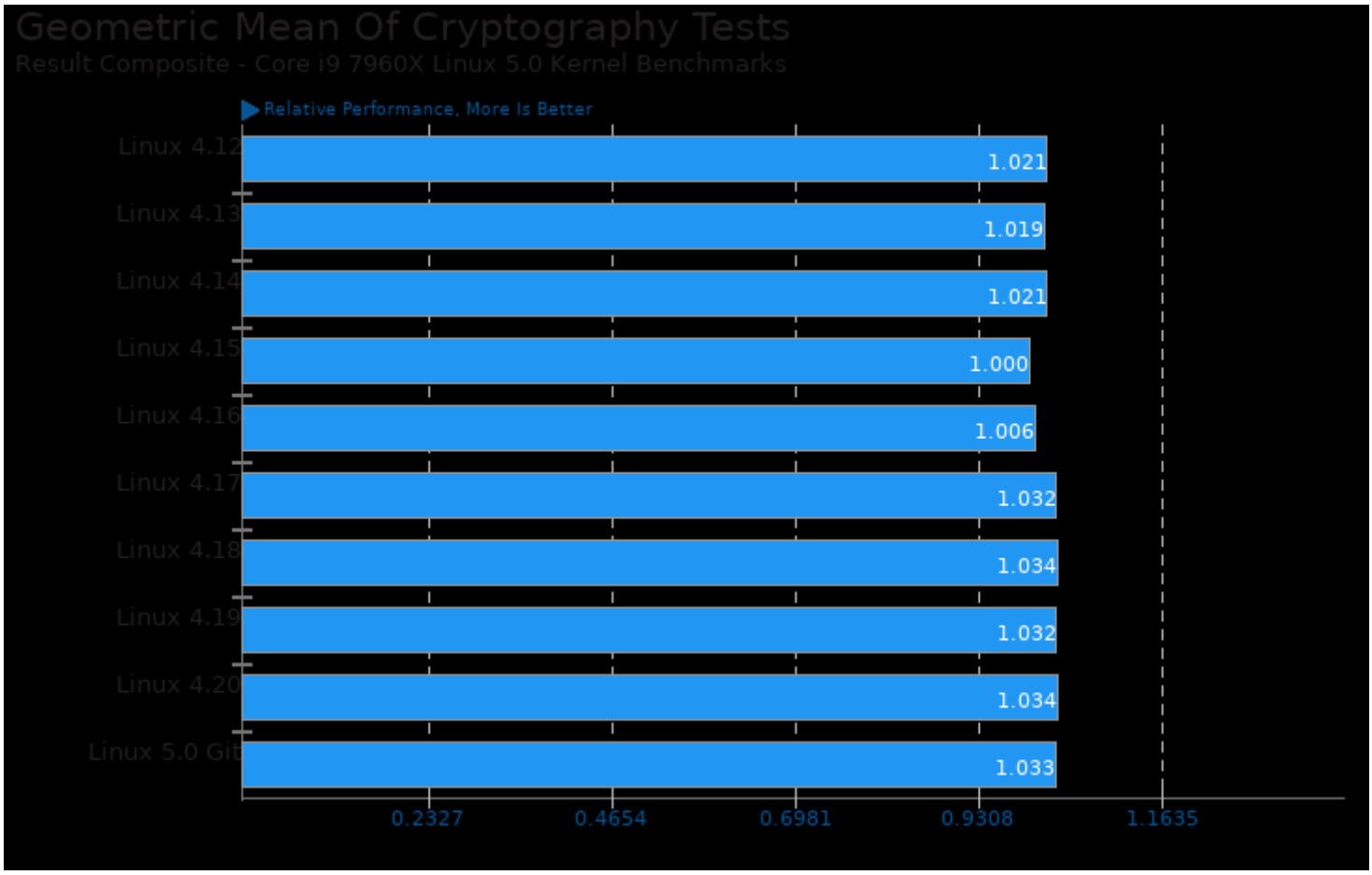
Geometric mean based upon tests: pts/mafft, pts/himeno, pts/hmmer, pts/build-llvm, pts/pgbench, pts/dav1d, pts/x264, pts/x265, pts/compress-xz, pts/compress-zstd, pts/openssl and pts/svt-vp9



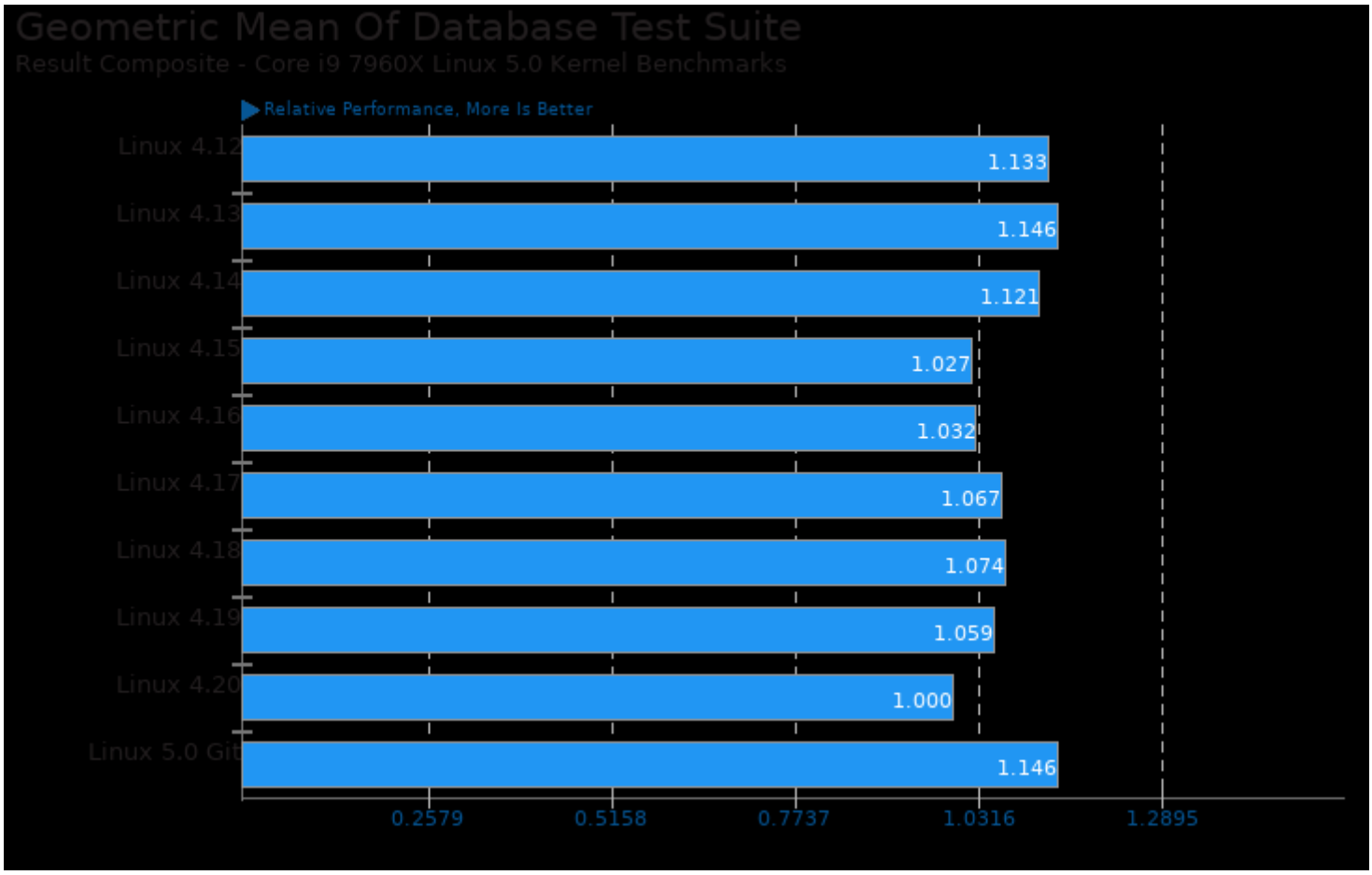
Geometric mean based upon tests: pts/compress-zstd and pts/compress-xz



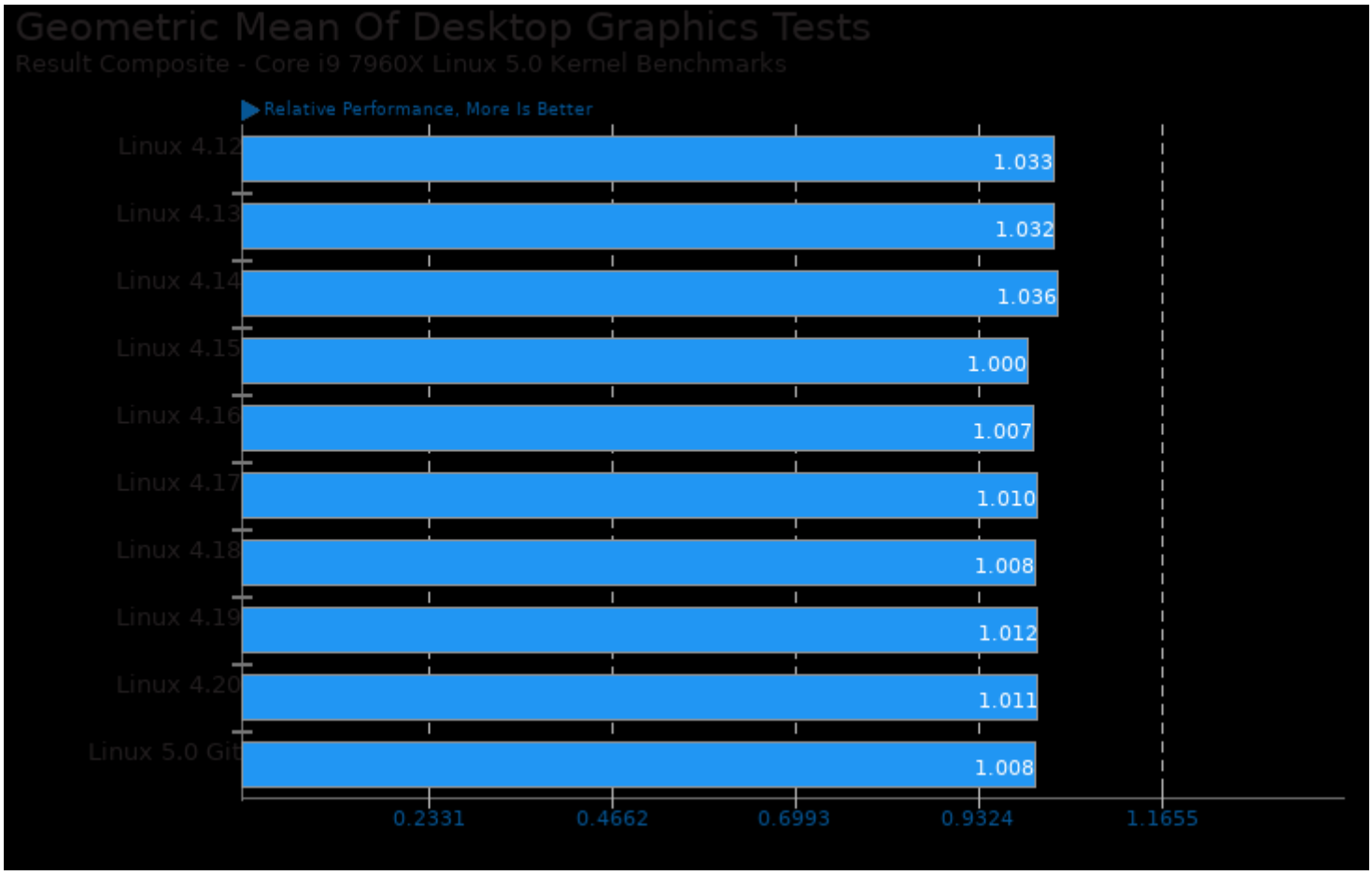
Geometric mean based upon tests: pts/blender, pts/ttsiod-renderer, pts/indigobench, system/tesseract-ocr, pts/svt-vp9, pts/svt-hevc, pts/x264, pts/x265, pts/dav1d, system/gimp, system/darktable, pts/luajit and pts/brl-cad



Geometric mean based upon tests: pts/openssl and system/cryptsetup

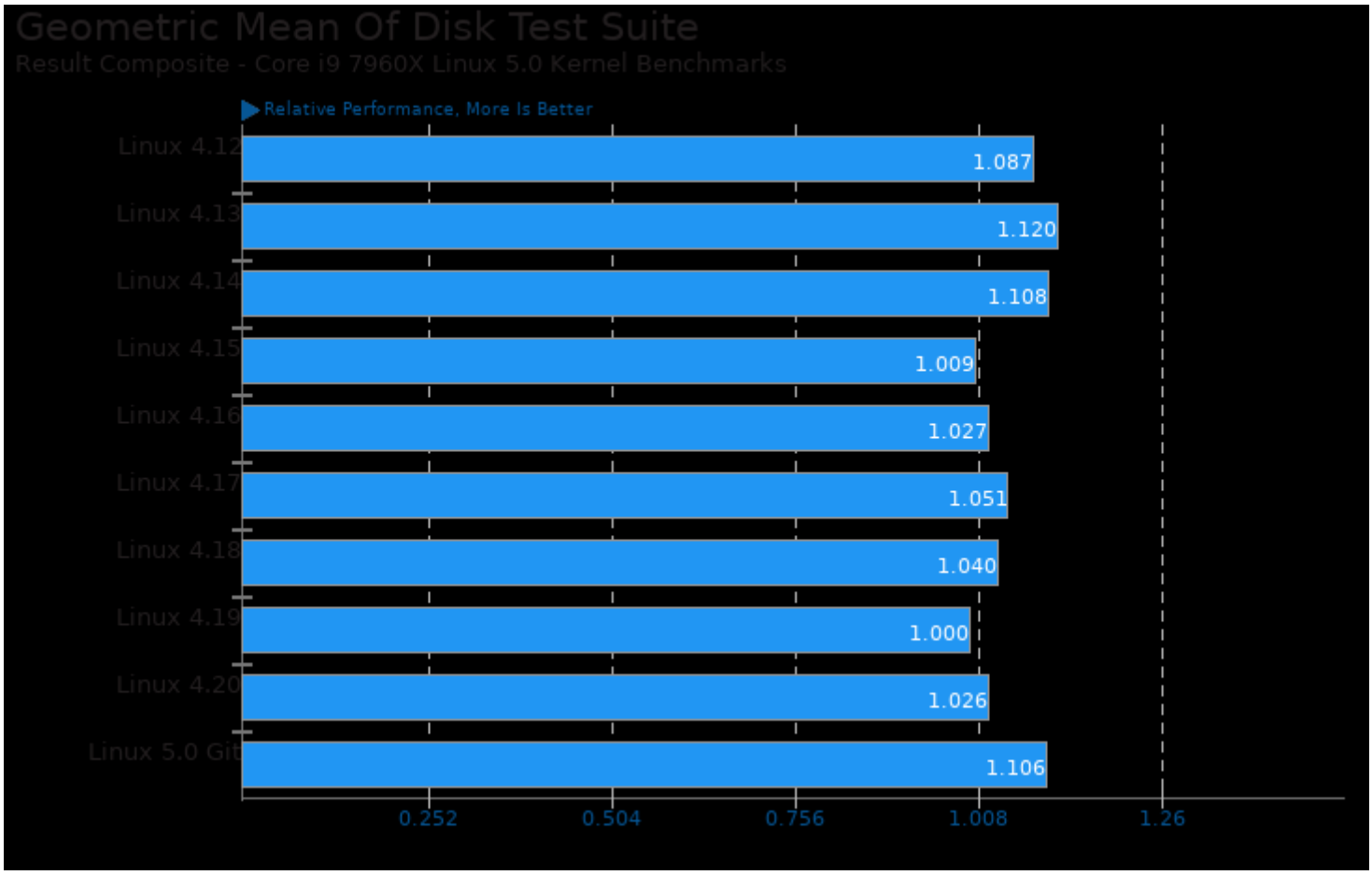


Geometric mean based upon tests: pts/sqlite and pts/pgbench

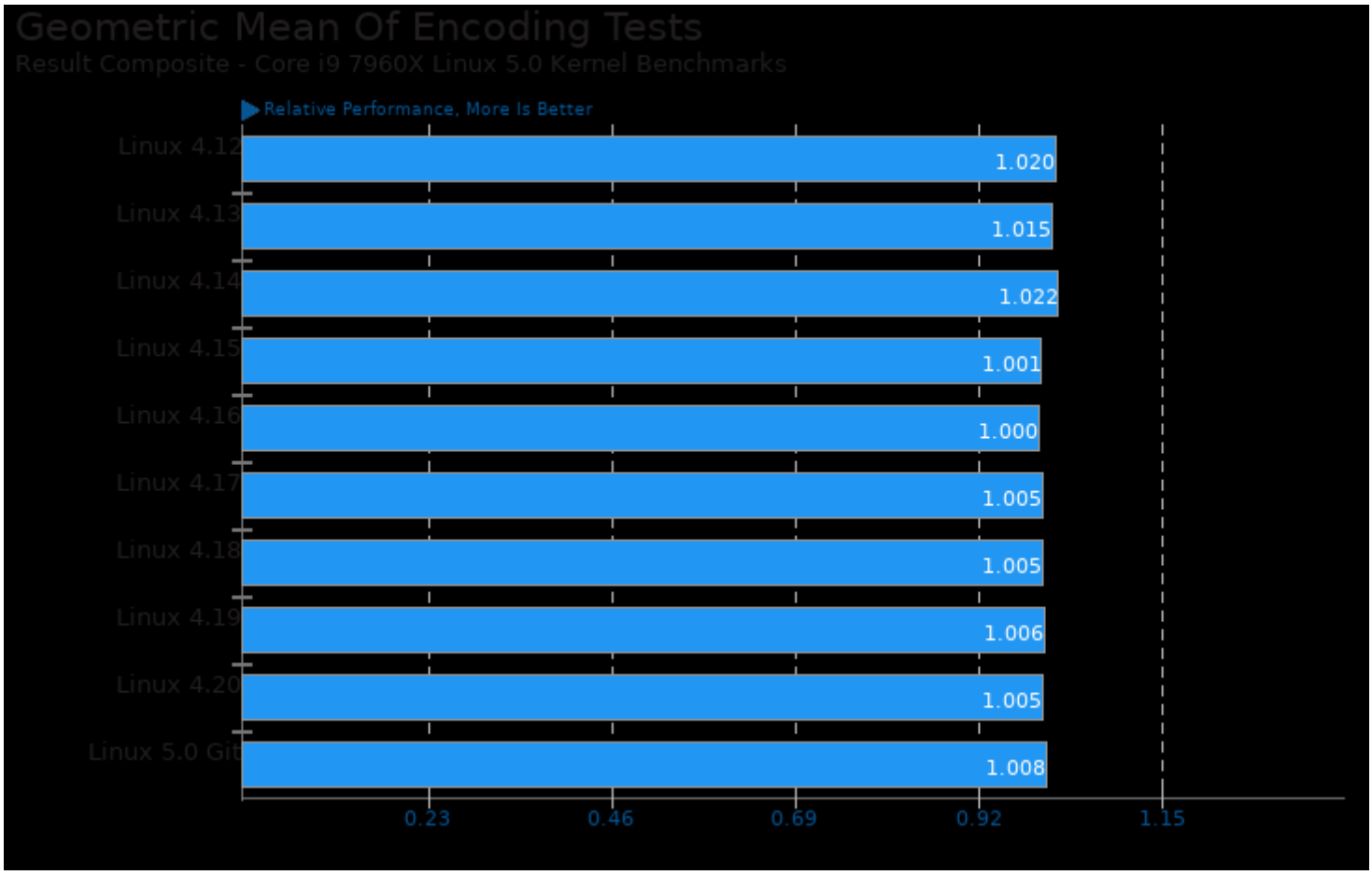


Geometric mean based upon tests: pts/xonotic and pts/tesseract

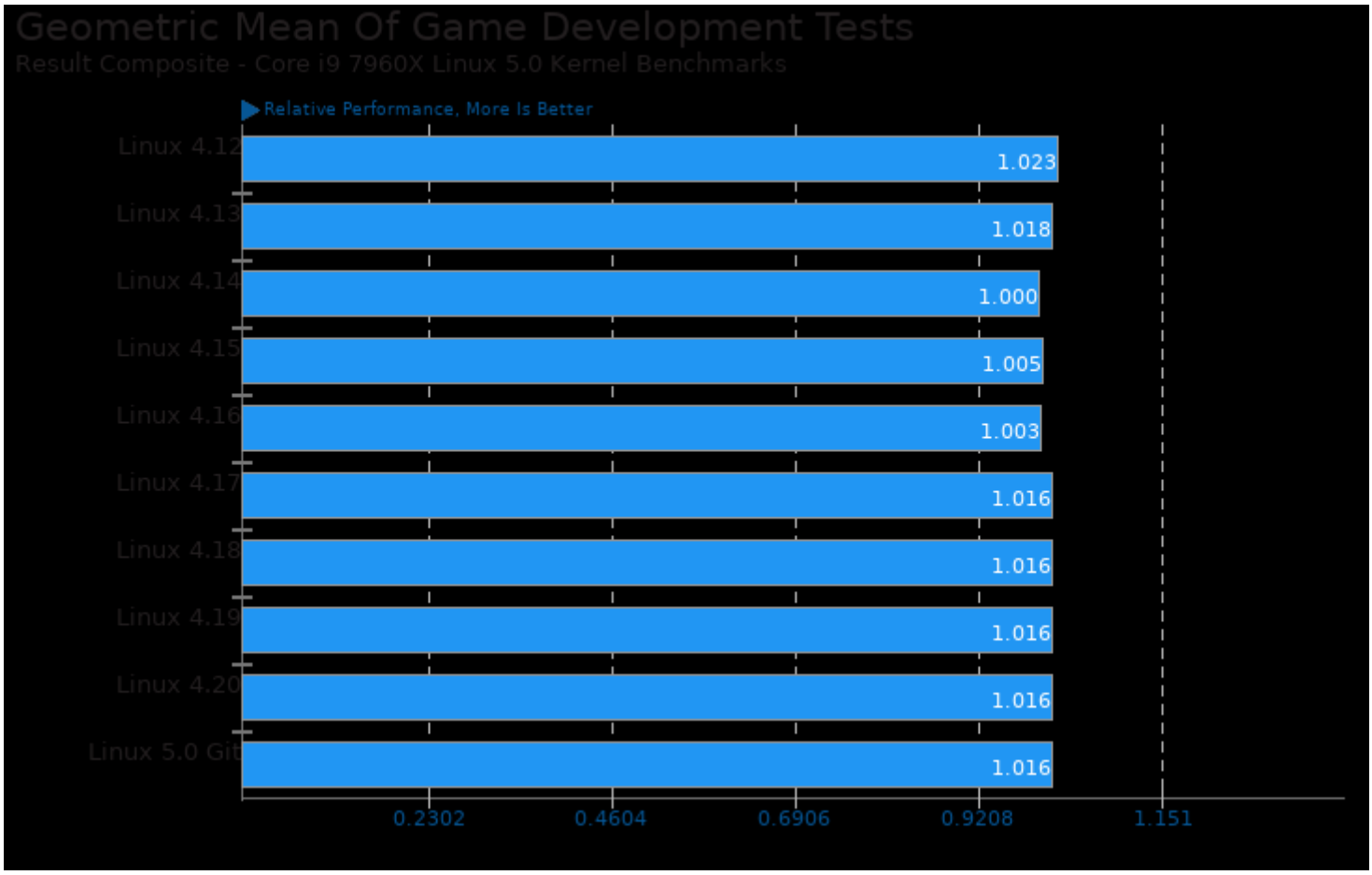
Core i9 7960X Linux 5.0 Kernel Benchmarks



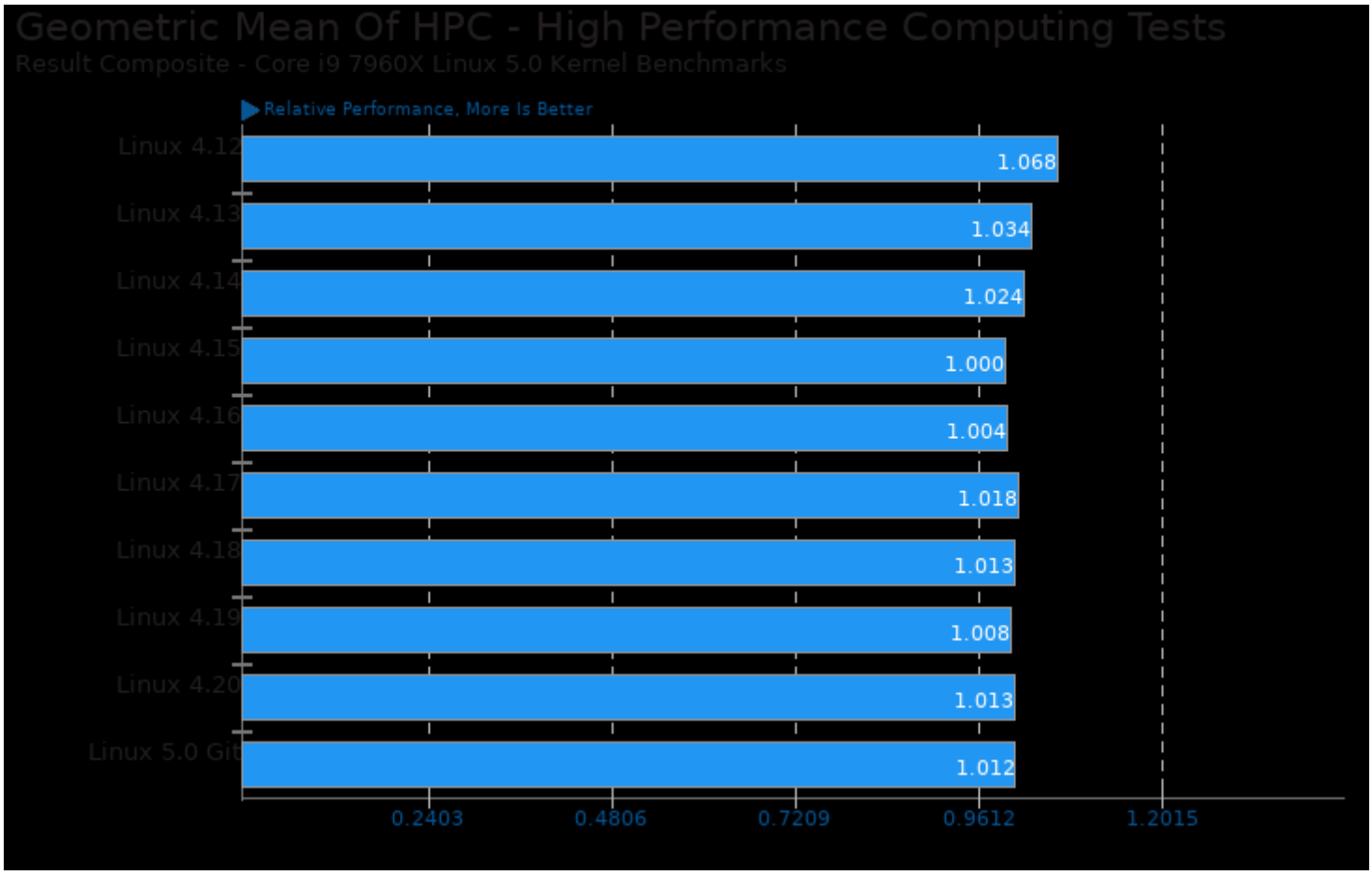
Geometric mean based upon tests: pts/sqlite, pts/fs-mark and pts/compilebench



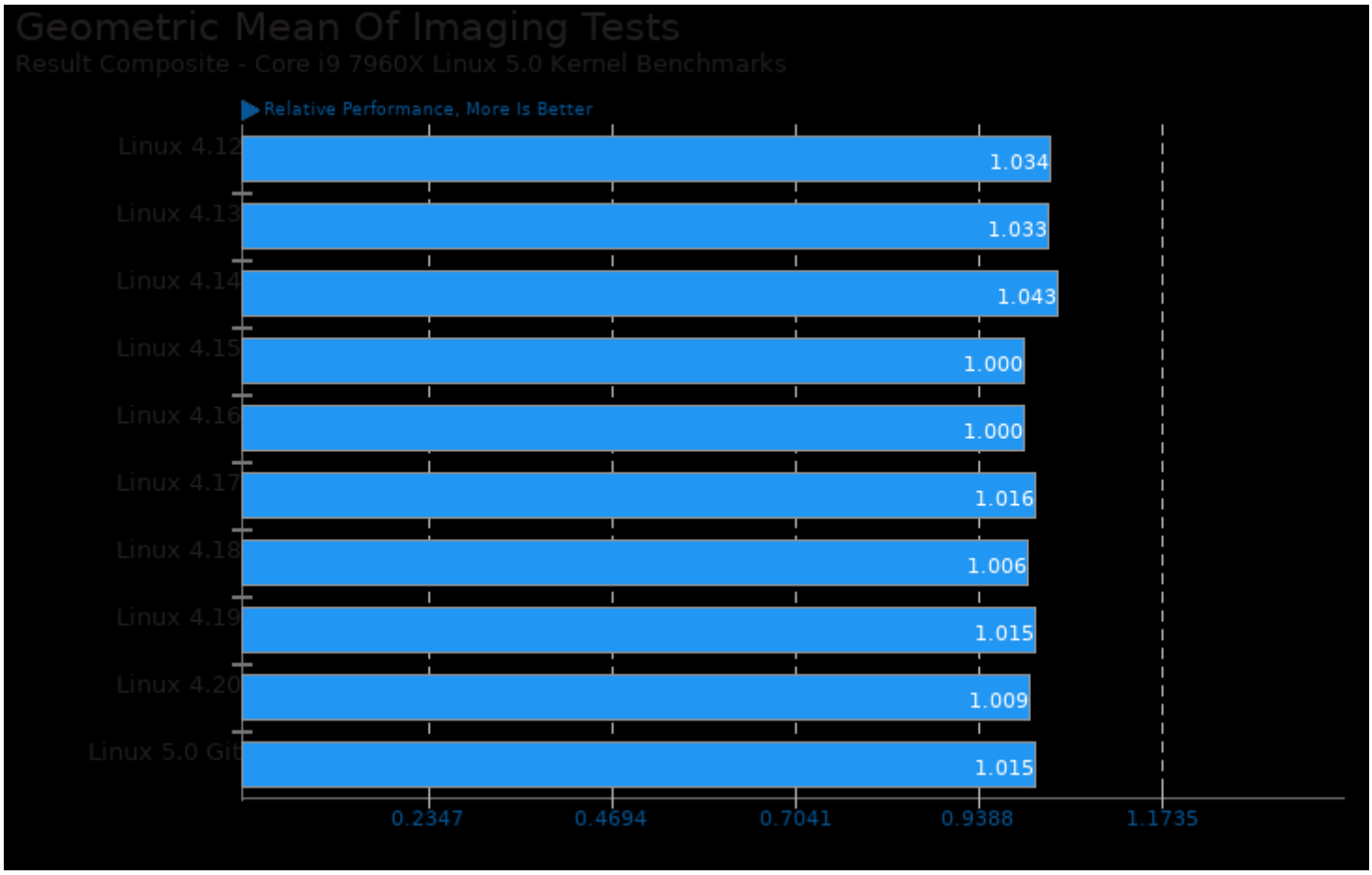
Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x264, pts/x265 and pts/dav1d



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

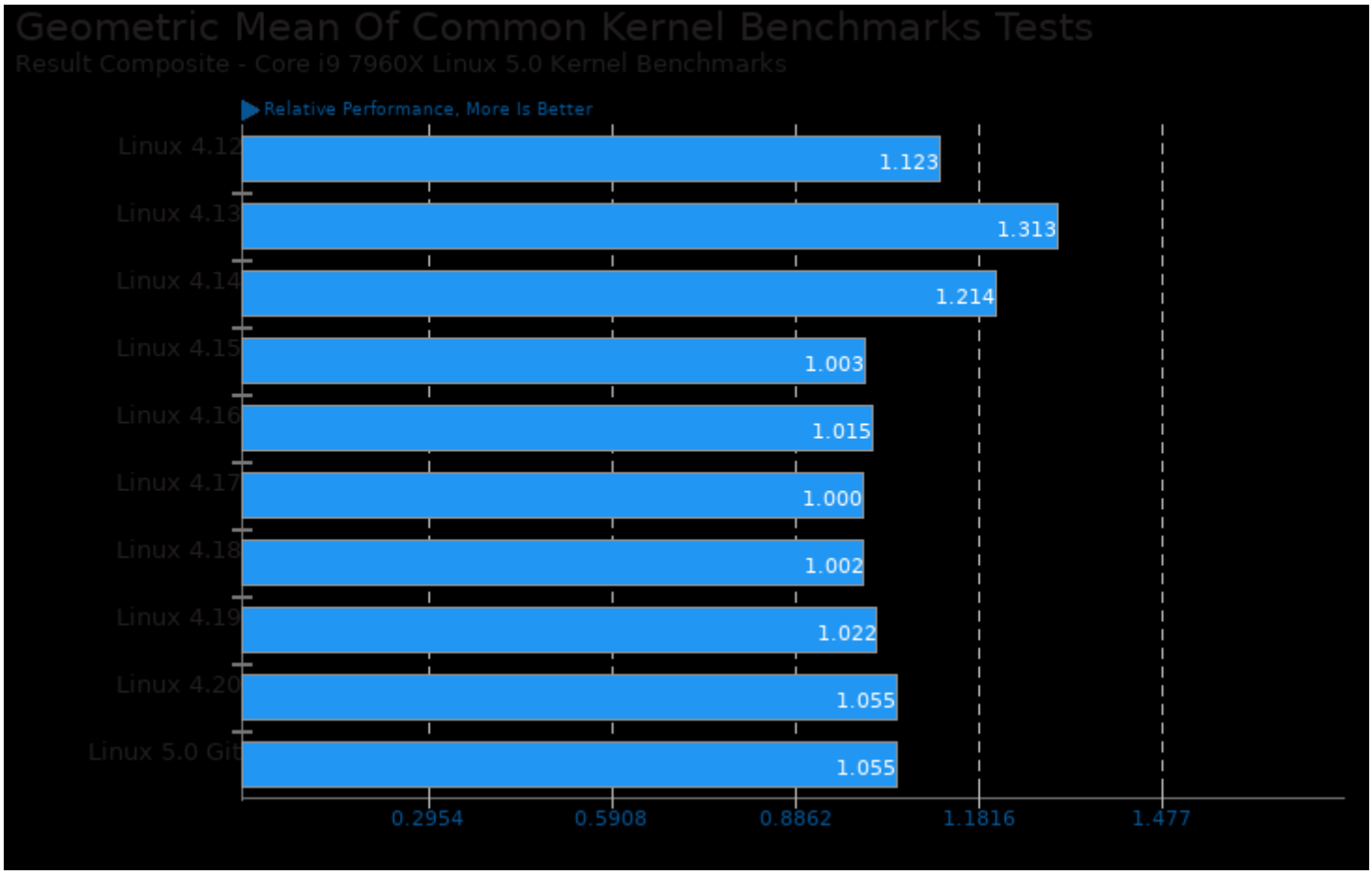


Geometric mean based upon tests: pts/npb, pts/rodinia, pts/parboil, system/octave-benchmark, pts/namd, pts/himeno, pts/hmmer, pts/mafft and pts/lczero

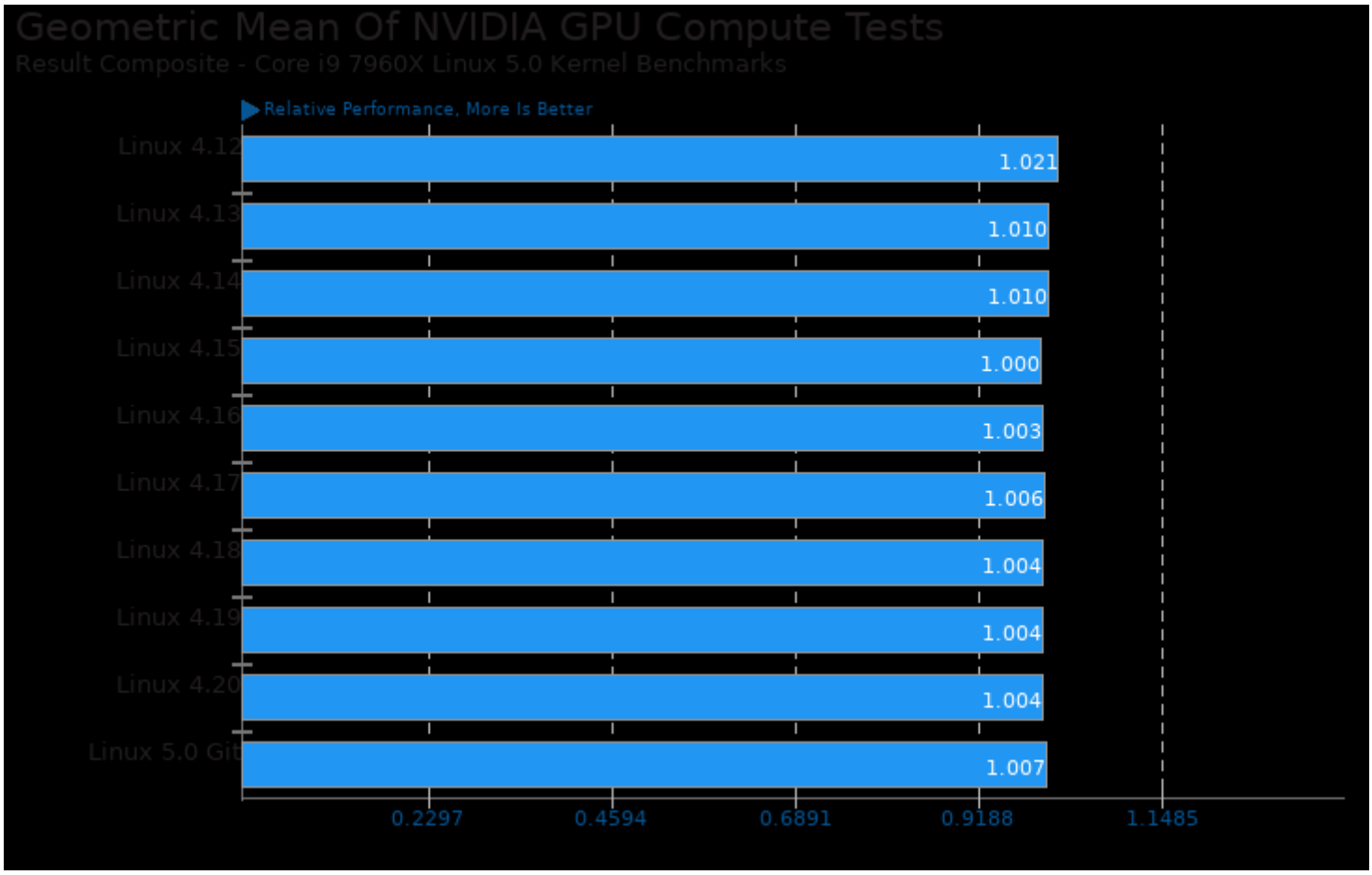


Geometric mean based upon tests: system/gimp and system/darktable

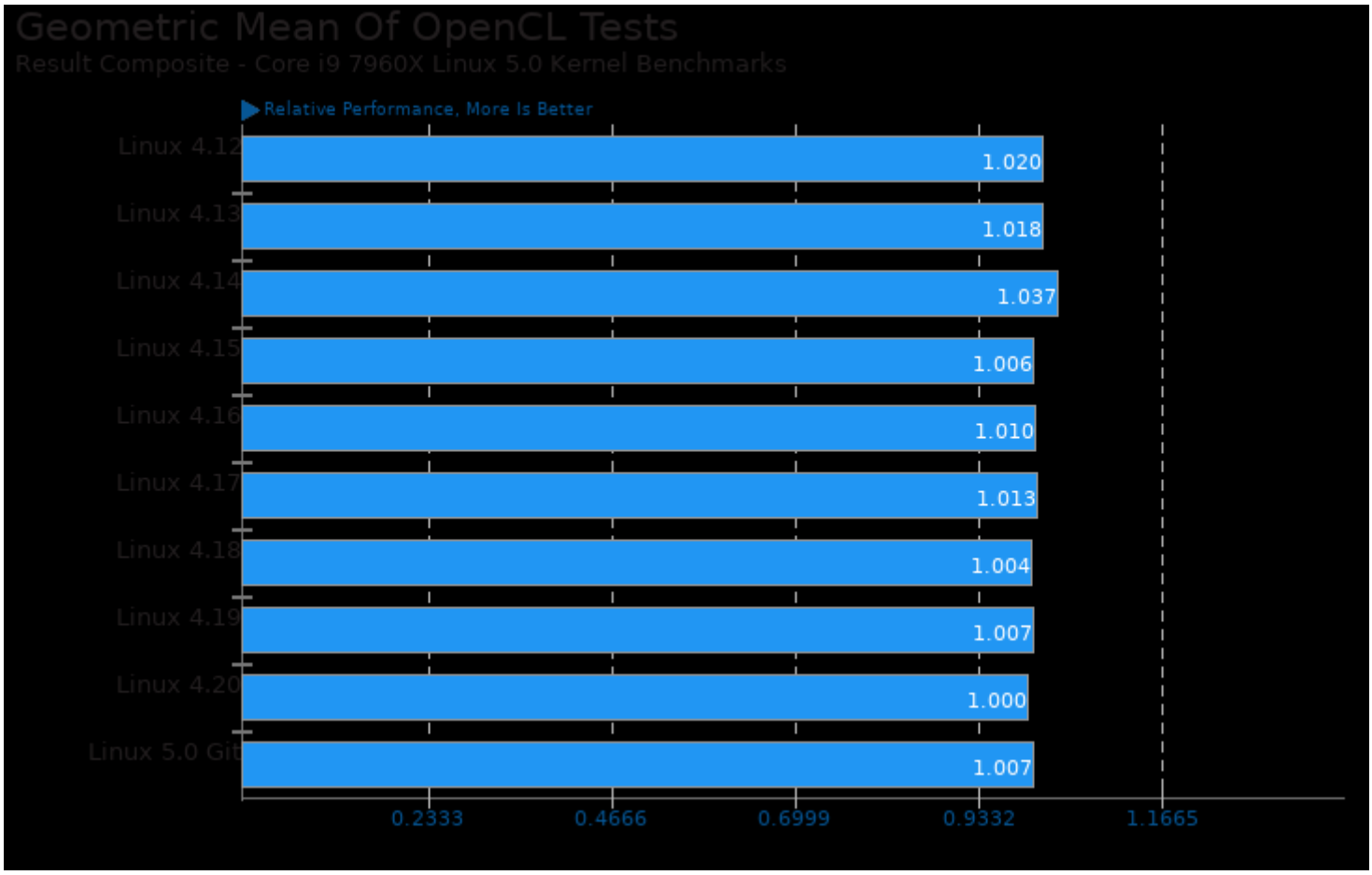
Core i9 7960X Linux 5.0 Kernel Benchmarks



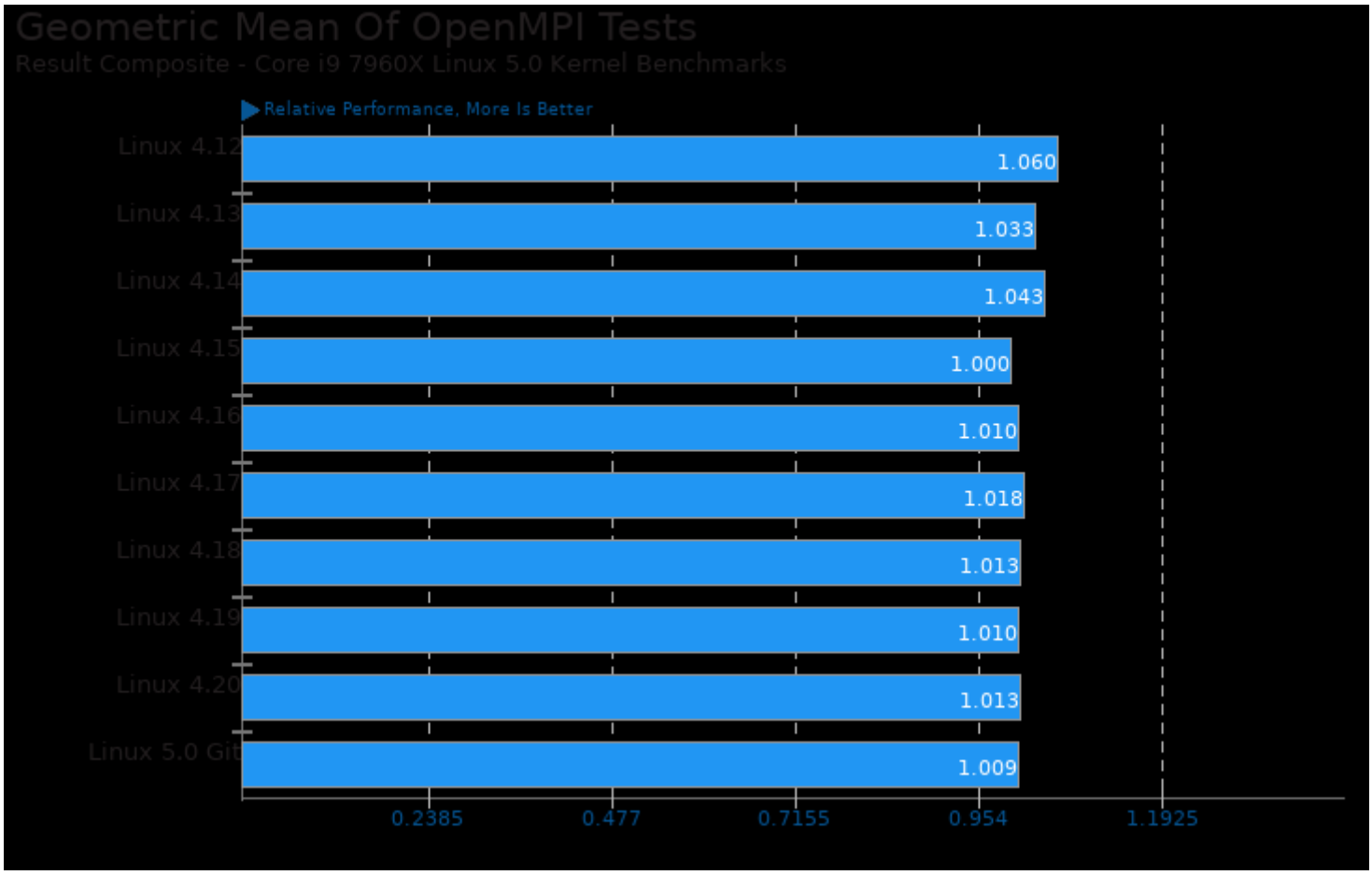
Geometric mean based upon tests: pts/pgbench, pts/openssl, pts/ctx-clock, pts/hackbench, pts/schbench, pts/stress-ng and pts/osbench



Geometric mean based upon tests: pts/rodinia, pts/lczero, pts/indigobench and pts/blender

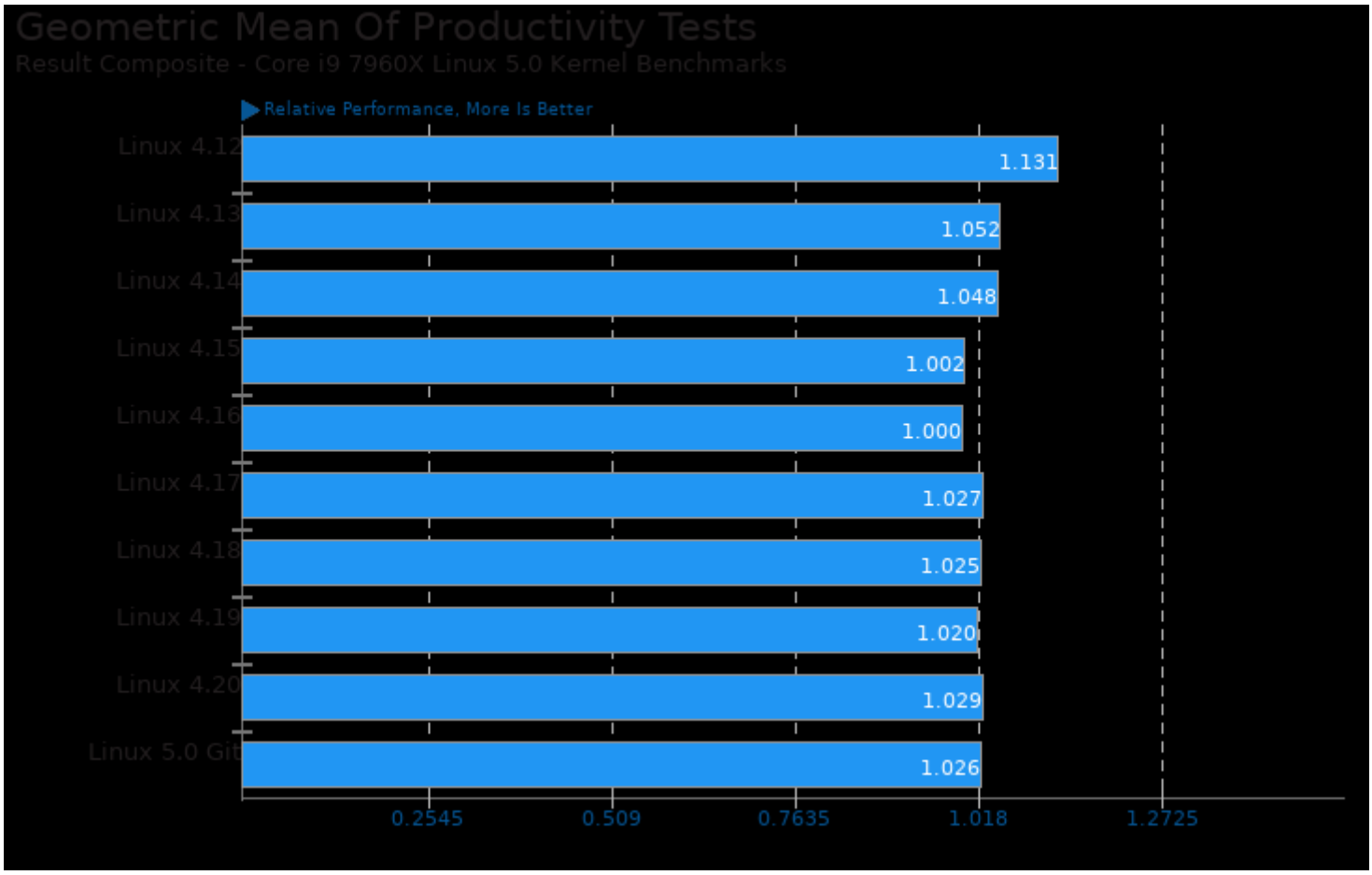


Geometric mean based upon tests: pts/rodinia, pts/parboil and system/darktable

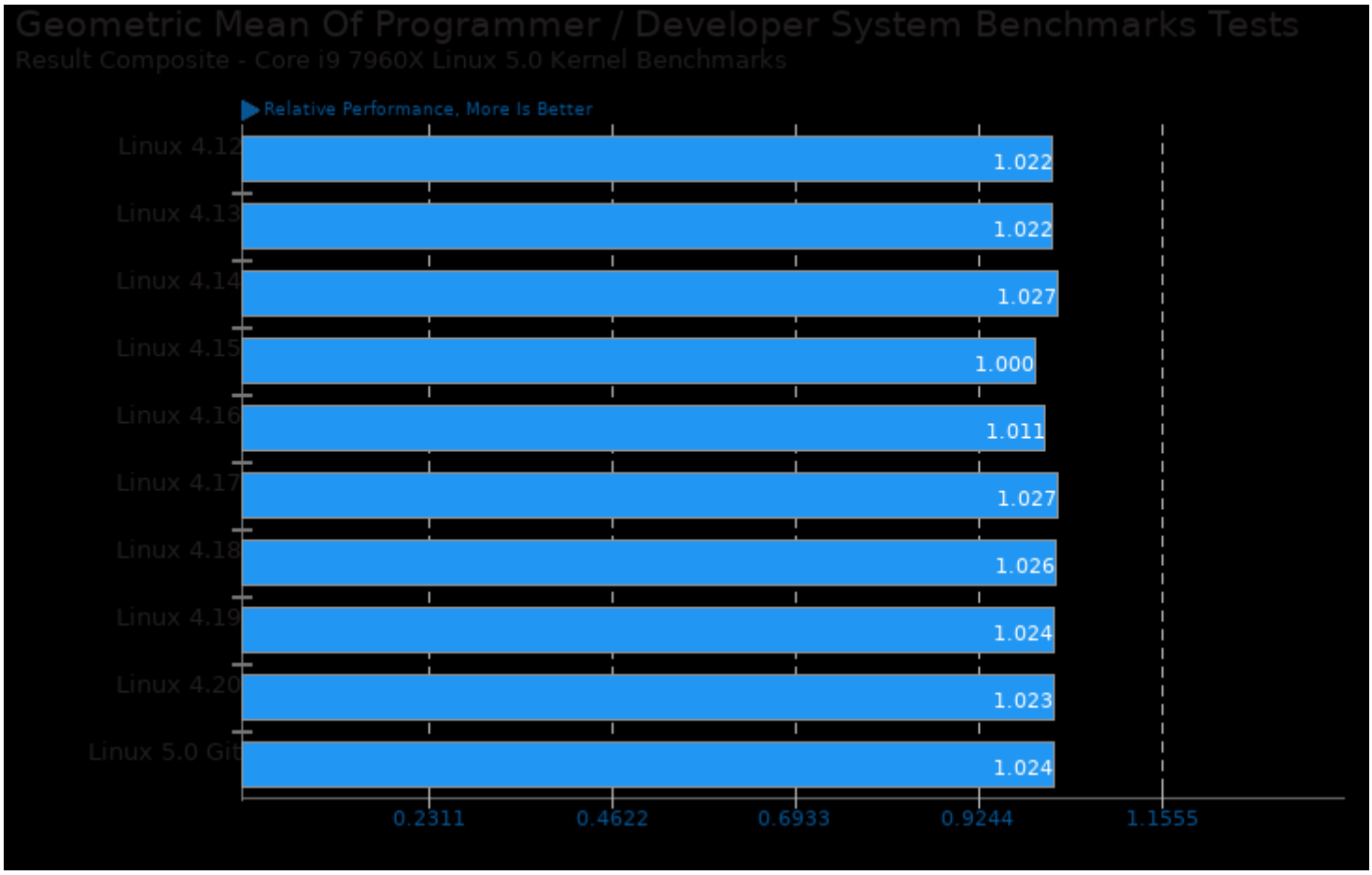


Geometric mean based upon tests: pts/npb, pts/parboil and pts/rodinia

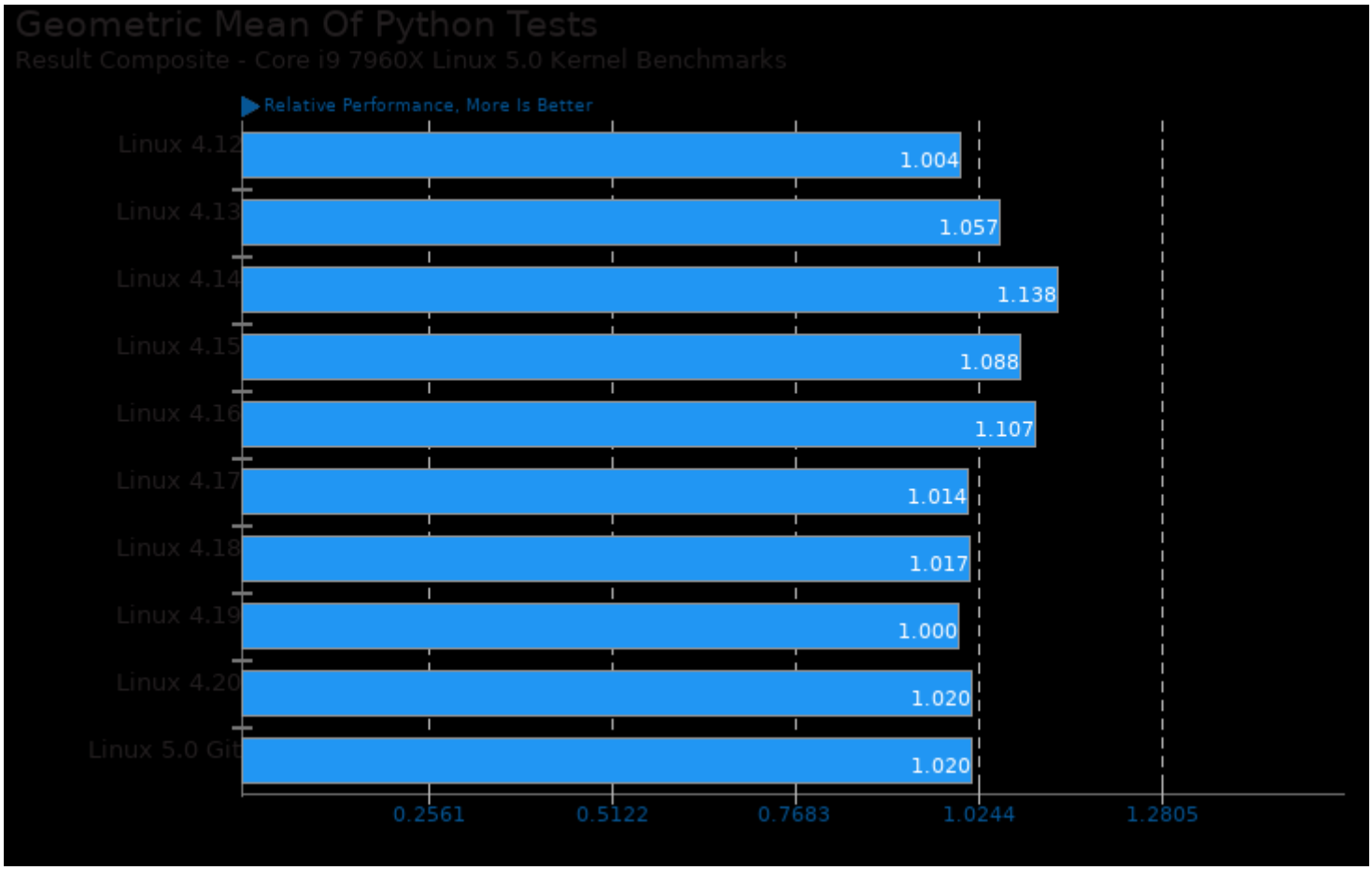
Core i9 7960X Linux 5.0 Kernel Benchmarks



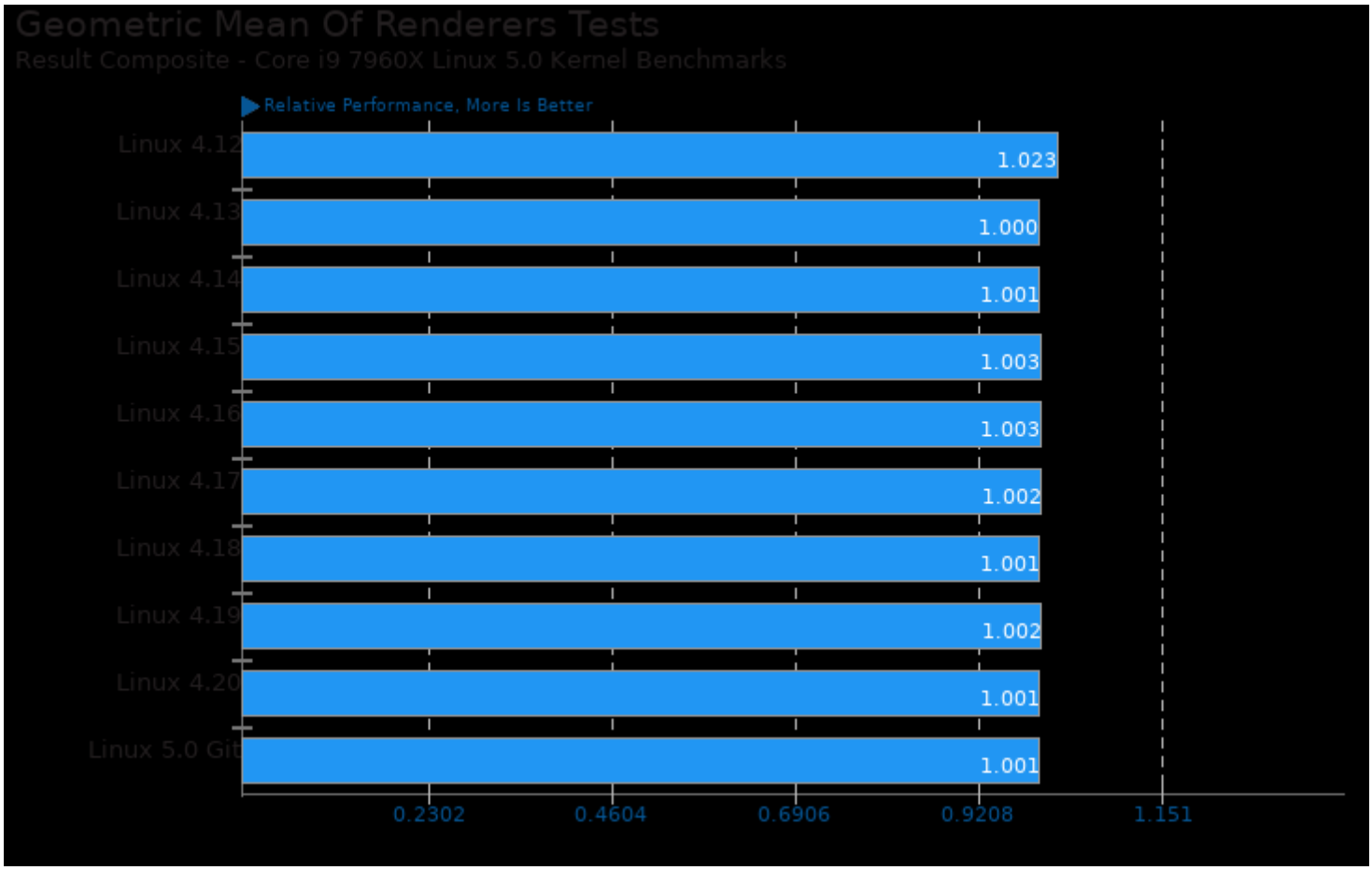
Geometric mean based upon tests: system/octave-benchmark and system/gimp



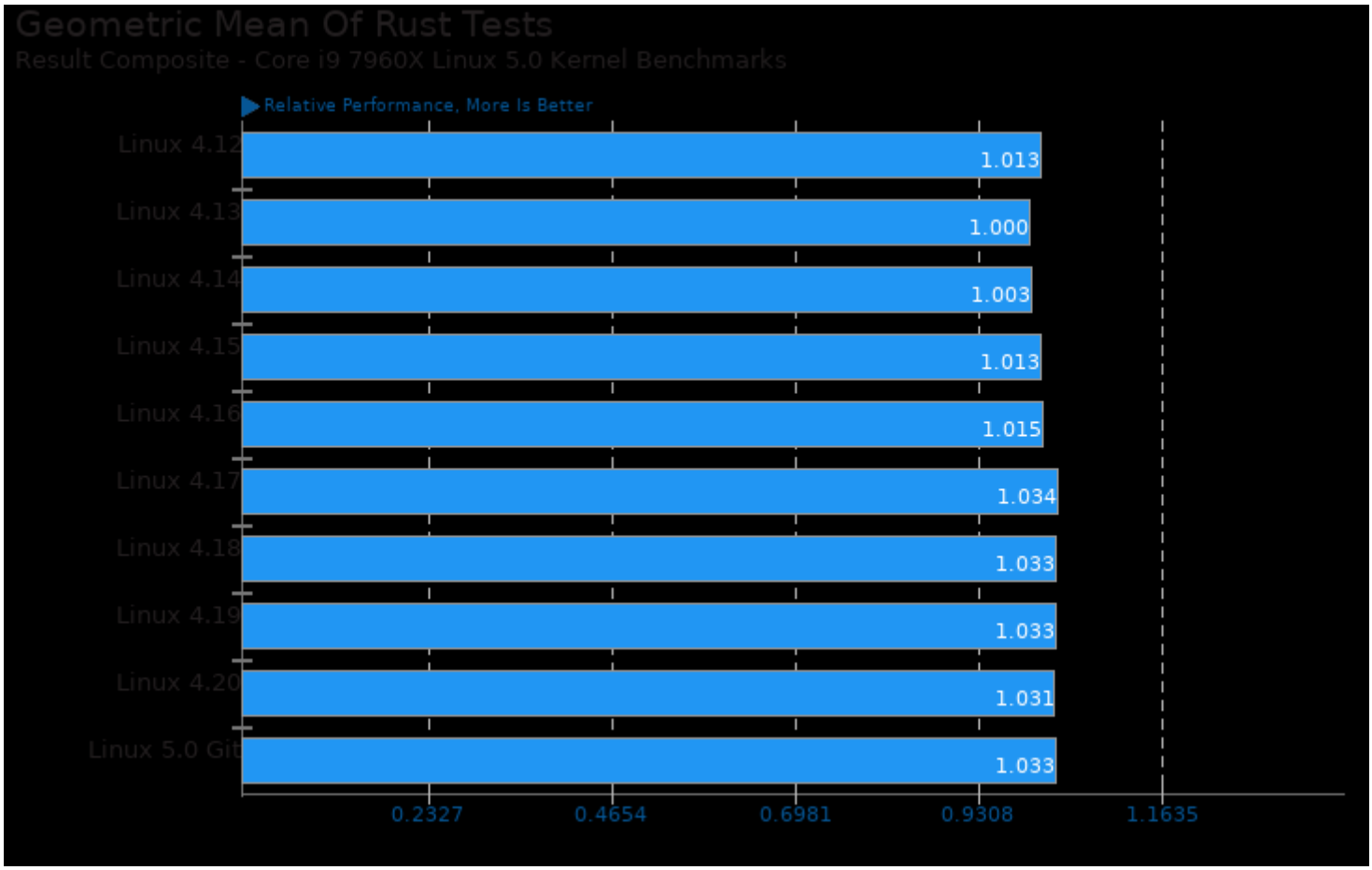
Geometric mean based upon tests: pts/compress-zstd, pts/pybench, system/cryptsetup, pts/build-linux-kernel and pts/build-llvm



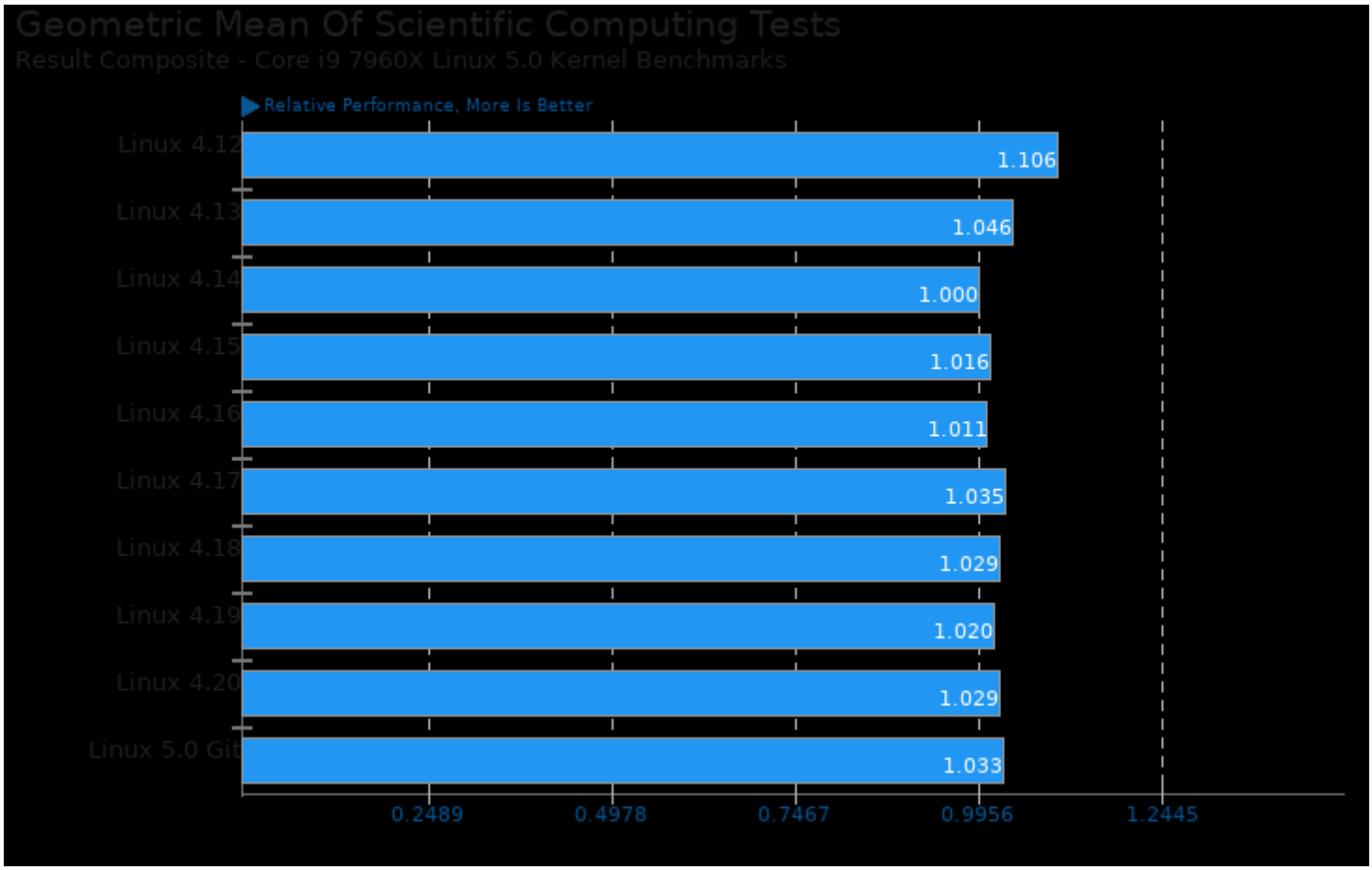
Geometric mean based upon tests: pts/compilebench, pts/build-llvm, pts/parboil, pts/pybench and pts/systemd-boot-total



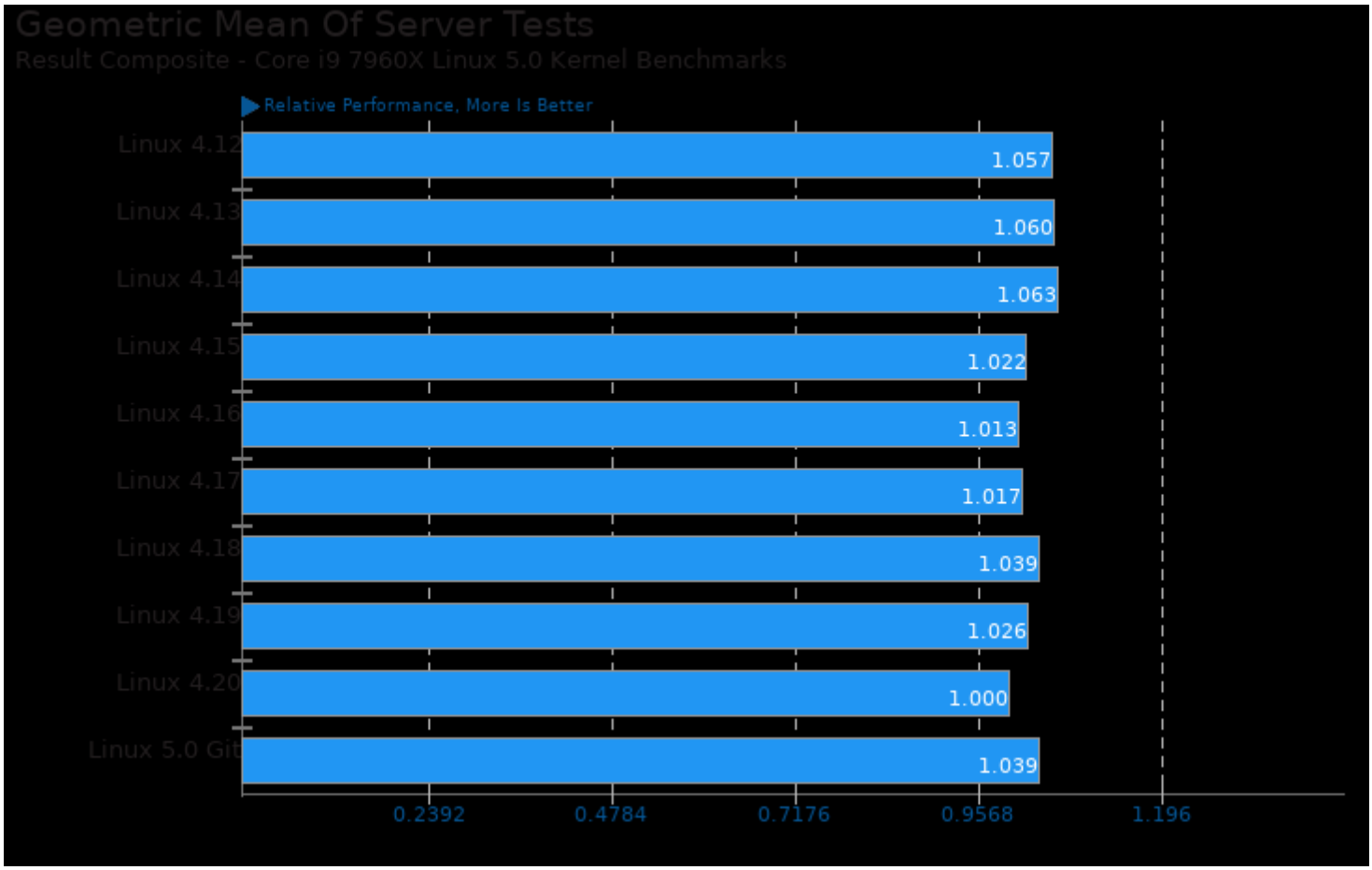
Geometric mean based upon tests: pts/blender, pts/ttsiod-renderer and pts/indigobench



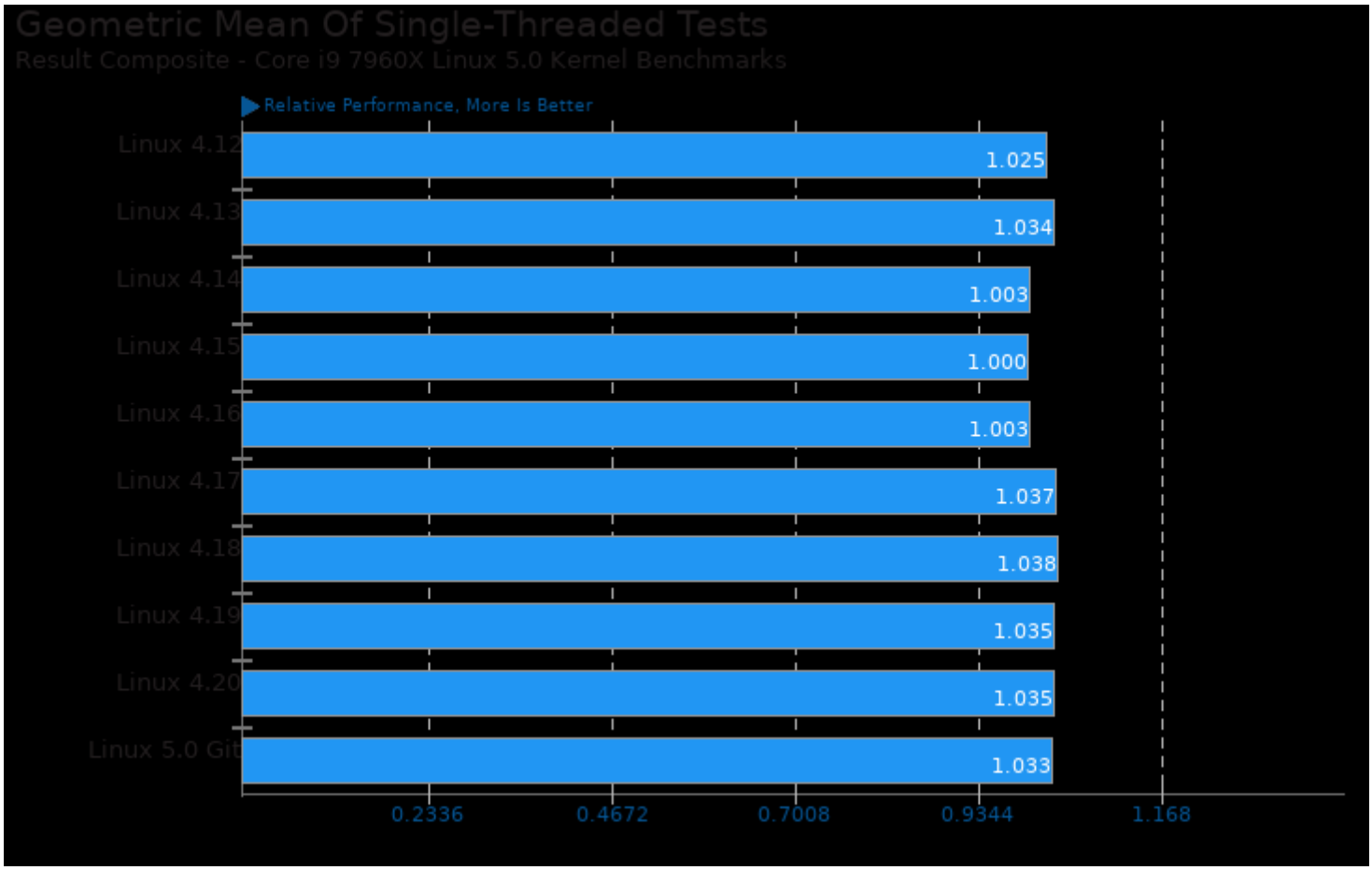
Geometric mean based upon tests: pts/rust-mandel and pts/rust-prime



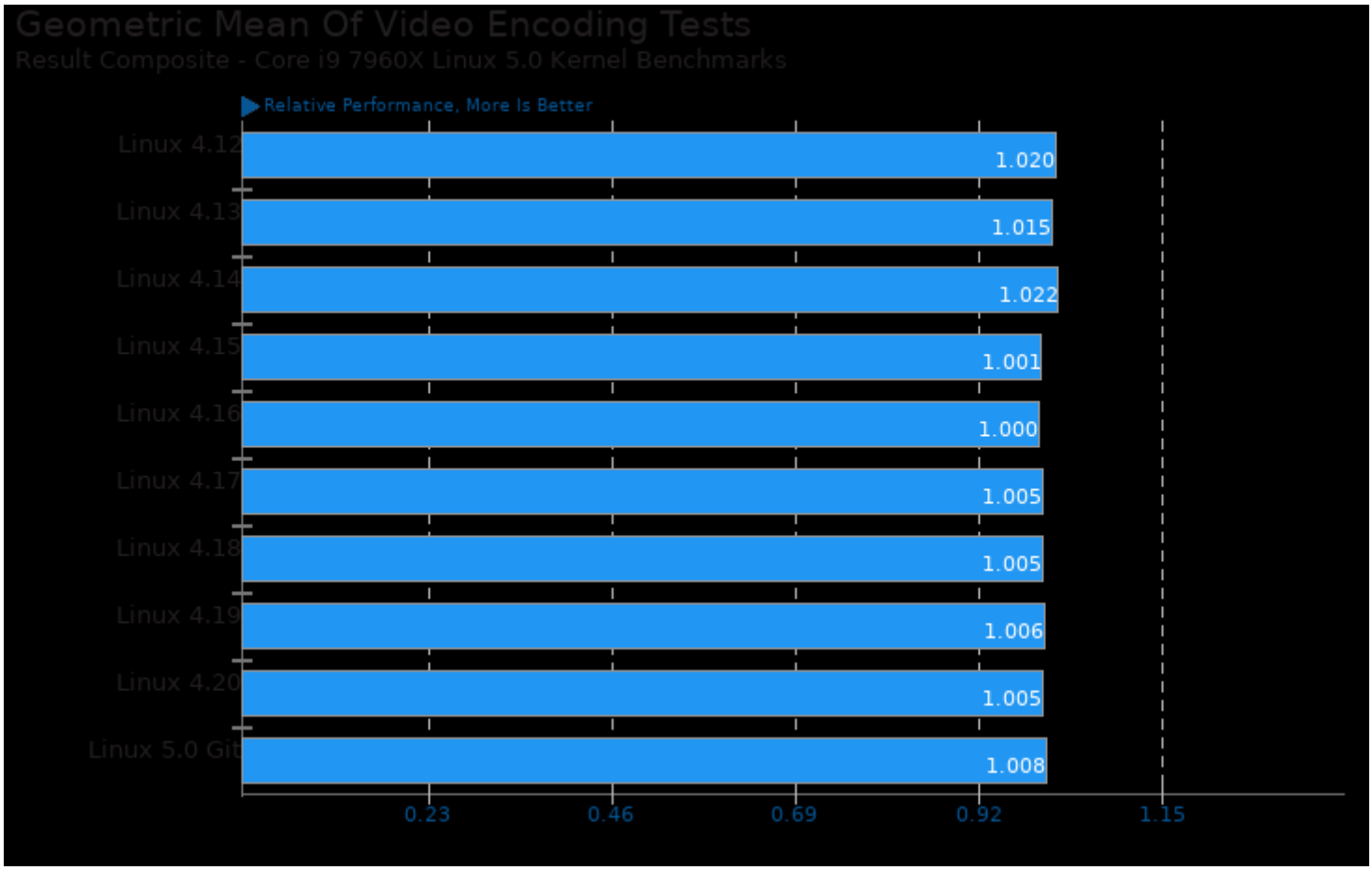
Geometric mean based upon tests: system/octave-benchmark, pts/namd, pts/himeno, pts/hmmer and pts/mafft



Geometric mean based upon tests: pts/blogbench, pts/ebizzy, pts/pgbench, pts/phpbench, pts/node-express-loadtest, pts/openssl and pts/sqlite

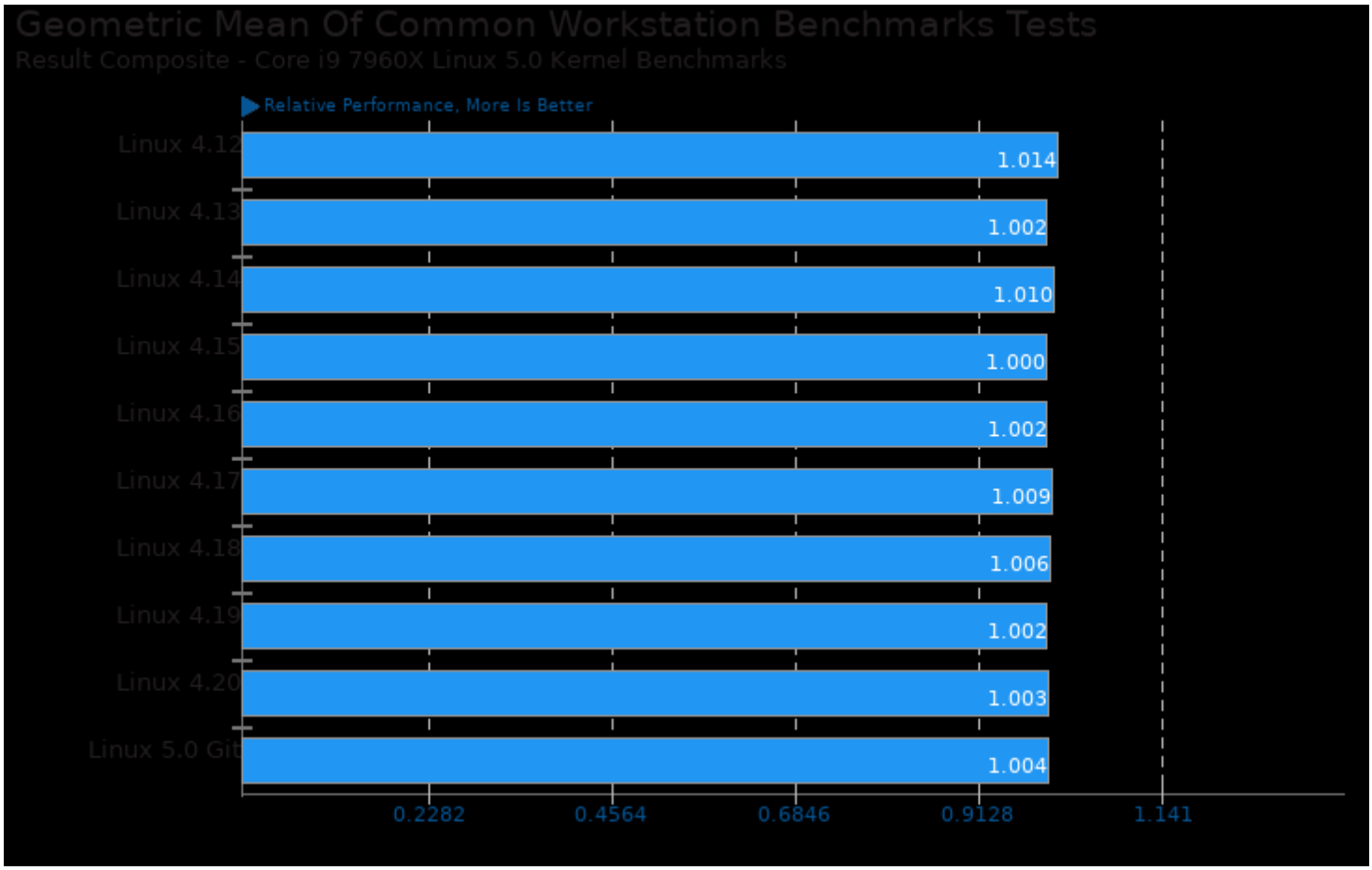


Geometric mean based upon tests: pts/luajit, pts/node-express-loadtest, pts/node-octane, pts/optcarrot, pts/pybench, pts/phpbench and system/tesseract-ocr



Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x264, pts/x265 and pts/dav1d

Core i9 7960X Linux 5.0 Kernel Benchmarks



Geometric mean based upon tests: pts/blender, pts/rodinia, pts/parboil, pts/himeno, pts/brl-cad and pts/x265

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