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EPYC Tyan Server

AMD EPYC 7543 32-Core testing with a TYAN S8036GM2NE-LE (V2.00.B21 BIOS) and ASPEED on Ubuntu 21.04 via the Phoronix Test Suite.

Automated Executive Summary

Clear Linux 34770 had the most wins, coming in first place for 31% of the tests.

Based on the geometric mean of all complete results, the fastest (Clear Linux 34770) was 1.085x the speed of the slowest (Fedora Server 34). Debian 10.10 was 0.973x the speed of Clear Linux 34770, Ubuntu 20.04.2 LTS was 0.992x the speed of Debian 10.10, Debian Bullseye was 0.982x the speed of Ubuntu 20.04.2 LTS, Ubuntu 21.04 was 0.986x the speed of Debian Bullseye, CentOS Stream was 0.986x the speed of Ubuntu 21.04, Fedora Server 34 was 0.999x the speed of CentOS Stream.

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

NAS Parallel Benchmarks (Test / Class: BT.C) at 4.349x
NAS Parallel Benchmarks (Test / Class: SP.C) at 3.369x
NAS Parallel Benchmarks (Test / Class: EP.D) at 2.947x
NAS Parallel Benchmarks (Test / Class: FT.C) at 2.727x
NAS Parallel Benchmarks (Test / Class: CG.C) at 2.348x
NAS Parallel Benchmarks (Test / Class: IS.D) at 2.273x

VP9 libvpx Encoding (Speed: Speed 5 - Input: Bosphorus 4K) at 1.89x
SVT-AV1 (Encoder Mode: Preset 8 - Input: Bosphorus 4K) at 1.608x
Timed Wasmer Compilation (Time To Compile) at 1.522x
libavif avifenc (Encoder Speed: 10) at 1.463x.

Test Systems:

Ubuntu 20.04.2 LTS

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 2-port PCIe

OS: Ubuntu 20.04, Kernel: 5.8.0-55-generic (x86_64), Desktop: GNOME Shell 3.36.4, Display Server: X Server 1.20.9, OpenGL: 4.5 Mesa 20.2.6 (LLVM 11.0.0 256 bits), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.8.5
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Fedora Server 34

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Fedora 34, Kernel: 5.12.11-300.fc34.x86_64 (x86_64), Compiler: GCC 11.1.1 20210531, File-System: xfs, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-redhat-linux --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,d,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=i686 --with-gcc-major-version-only --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.9.5
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Debian 10.10

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Debian 10, Kernel: 4.19.0-17-amd64 (x86_64), Desktop: GNOME Shell 3.30.2, Display Server: X Server, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
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
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Debian Bullseye

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 2-port PCIe

OS: Debian 11, Kernel: 5.10.0-7-amd64 (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server, Vulkan: 1.0.2, Compiler: GCC 10.2.1 20210110, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-Km9U7s/gcc-10-10.2.1/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-Km9U7s/gcc-10-10.2.1/debian/tmp-gcn/usr, hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.9.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

CentOS Stream

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: llvmpipe, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 2-port PCIe

OS: CentOS Stream 8, Kernel: 4.18.0-310.el8.x86_64 (x86_64), Desktop: GNOME Shell 3.32.2, Display Server: X Server + Wayland, OpenGL: 4.5 Mesa 21.1.1 (LLVM 11.0.0 256 bits), Compiler: GCC 8.5.0 20210514, File-System: xfs, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=x86_64-redhat-linux --disable-libmpx --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=x86-64 --with-gcc-major-version-only --with-isl --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.6.8
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Clear Linux 34770

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850

1TB, Graphics: llvmpipe, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 2-port PCIe

OS: Clear Linux OS 34770, Kernel: 5.12.8-1045.native (x86_64), Desktop: GNOME Shell 40.2, Display Server: X Server 1.20.11, OpenGL: 4.5 Mesa 21.1.3 (LLVM 11.1.0 256 bits), Compiler: GCC 11.1.1 20210621 releases/gcc-11.1.0-335-g2348a458e1 + Clang 11.1.0 + LLVM 11.1.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
Environment Notes: FFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D_FORTIFY_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -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,--enable-new-dtags -Wa,-mbranches-within-32B-boundaries" 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 -m64 -fasynchronous-unwind-tables -Wp,-D_REENTRANT -ftree-loop-distribute-patterns -Wl,-z -Wl,now -Wl,-z -Wl,relro -fno-semantic-interposition -ffat-lto-objects -fno-trapping-math -Wl,-sort-common -Wl,--enable-new-dtags -mtune=skylake -Wa,-mbranches-within-32B-boundaries -fvisibility-inlines-hidden -Wl,--enable-new-dtags" MESA_GLSL_CACHE_DISABLE=0 FCFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D_FORTIFY_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -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" 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 -m64 -fasynchronous-unwind-tables -Wp,-D_REENTRANT -ftree-loop-distribute-patterns -Wl,-z -Wl,now -Wl,-z -Wl,relro -fno-semantic-interposition -ffat-lto-objects -fno-trapping-math -Wl,-sort-common -Wl,--enable-new-dtags -mtune=skylake -Wa,-mbranches-within-32B-boundaries" 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 --disable-werror --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-clocale=gnu --enable-default-pie --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-gcc-major-version-only --with-glibc-version=2.19 --with-gnu-ld --with-isl --with-ppl=yes --with-tune=skylake-avx512
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.9.5
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Ubuntu 21.04

Processor: AMD EPYC 7543 32-Core @ 2.80GHz (32 Cores / 64 Threads), Motherboard: TYAN S8036GM2NE-LE (V2.00.B21 BIOS), Chipset: AMD Starship/Matisse, Memory: 64GB, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 2-port PCIe

OS: Ubuntu 21.04, Kernel: 5.11.0-22-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server + Wayland, Compiler: GCC 10.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-gcn/usr, hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0xa001119
Python Notes: Python 3.9.5
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	Ubuntu 20.04.2 LTS	Fedora Server 34	Debian 10.10	Debian Bullseye	CentOS Stream	Clear Linux 34770	Ubuntu 21.04

EPYC Tyan Server

High Performance Conjugate Gradient (GFLOP/s)	12.8778	**11.7130**		11.7941	12.4586	**19.4305**	12.6926
Normalized	66.28%	60.28%		60.7%	64.12%	100%	65.32%
Standard Deviation	0.1%	17.8%		16.2%	3.6%	8.2%	19.5%
NAS Parallel Benchmarks - BT.C (Mop/s)	87955	**20508**	87888	**89193**	21314	87029	87240
Normalized	98.61%	22.99%	98.54%	100%	23.9%	97.57%	97.81%
Standard Deviation	0.4%	7.1%	0.6%	0.1%	0%	0.2%	0.2%
NAS Parallel Benchmarks - CG.C (Mop/s)	29892	13588		**30352**	**12925**	29640	28970
Normalized	98.48%	44.77%		100%	42.58%	97.65%	95.45%
Standard Deviation	1.6%	0.1%		1.4%	2.1%	1%	2.4%
NAS Parallel Benchmarks - EP.D (Mop/s)	2934	1601		**2965**	**1006**	2844	2930
Normalized	98.96%	54%		100%	33.93%	95.93%	98.8%
Standard Deviation	2.6%	6.7%		0.5%	5.5%	4.3%	2.9%
NAS Parallel Benchmarks - FT.C (Mop/s)	47060	**17996**		**49076**	18870	48460	46811
Normalized	95.89%	36.67%		100%	38.45%	98.74%	95.38%
Standard Deviation	0.2%	0.4%		0.5%	0.5%	1.1%	2.5%
NAS Parallel Benchmarks - IS.D (Mop/s)	1787	1092		1731	**958.16**	**2178**	1985
Normalized	82.05%	50.15%		79.5%	44%	100%	91.14%
Standard Deviation	0.8%	2.2%		1.1%	1.1%	7%	1.7%
NAS Parallel Benchmarks - SP.C (Mop/s)	33234	**10058**	33844	33101	10304	**33882**	32826
Normalized	98.09%	29.69%	99.89%	97.7%	30.41%	100%	96.88%
Standard Deviation	0.3%	0.8%	0.4%	0.4%	0.1%	0.3%	0.2%
miniFE - Small (CG	11203	10018	10918	**13355**	**7928**	10394	11861
Normalized	83.88%	75.01%	81.75%	100%	59.36%	77.82%	88.81%
Standard Deviation	9%	7%	8.6%	9.7%	16.7%	8.2%	4.5%
NAMD - ATPase Simulation - 327,506	0.67252	0.67355	0.67193	**0.67131**	0.67415	0.67373	**0.67638**
Normalized	99.82%	99.67%	99.91%	100%	99.58%	99.64%	99.25%
Standard Deviation	0.1%	0.1%	0%	0.1%	0.1%	0%	0.9%
Xcompact3d Incompact3d - i.i.1.C.P.D (sec)	27.8769480	**29.0366478**		27.7018650	28.6477426	**27.1634598**	28.8079955
Normalized	97.44%	93.55%		98.06%	94.82%	100%	94.29%
Standard Deviation	2.5%	0.5%		2.8%	1.1%	1.3%	1.1%
Xmrig - Monero - 1M (H/s)	**21915**		22335	**23576**			
Normalized	92.95%		94.73%	100%			
Standard Deviation	0.3%		0.4%	0.2%			
Xmrig - Wownero - 1M	23123		**23003**	**24478**			
Normalized	94.46%		93.97%	100%			
Standard Deviation	0.3%		0.6%	0.2%			
LuxCoreRender - DLSC - CPU (M samples/sec)	**5.45**	5.46	5.47	**5.45**	5.46	**5.52**	5.47
Normalized	98.73%	98.91%	99.09%	98.73%	98.91%	100%	99.09%
Standard Deviation	0.3%	1.2%	0.6%	0.5%	0.3%	0.2%	0.7%

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LuxCoreRender - Danish Mood - CPU (M samples/sec)	4.32	4.39	4.36	4.42	4.40	**4.47**	**4.30**
Normalized	96.64%	98.21%	97.54%	98.88%	98.43%	100%	96.2%
Standard Deviation	0.7%	1.6%	1%	0.3%	1.7%	0.3%	0.3%
LuxCoreRender - Orange Juice - CPU (M samples/sec)	8.29	8.29	8.33	**8.39**	**8.25**	8.36	8.30
Normalized	98.81%	98.81%	99.28%	100%	98.33%	99.64%	98.93%
Standard Deviation	0.1%	0.3%	0.2%	0.5%	0.5%	0.1%	0.2%
LuxCoreRender - LuxCore Benchmark - CPU (M samples/sec)	4.73	4.68	4.74	4.79	4.74	**4.80**	**4.66**
Normalized	98.54%	97.5%	98.75%	99.79%	98.75%	100%	97.08%
Standard Deviation	0.2%	0.3%	0.7%	0.6%	0.5%	0.3%	1%
LuxCoreRender - R.C.a.P - CPU (M samples/sec)	16.38	**16.11**	17.14	16.75	17.01	**17.48**	16.29
Normalized	93.71%	92.16%	98.05%	95.82%	97.31%	100%	93.19%
Standard Deviation	4.4%	1.1%	6.9%	5.9%	6.6%	6.9%	4.3%
OSPray - San Miguel - Path Tracer (FPS)	3.72	**3.70**	3.73	**3.78**	3.74	3.76	**3.70**
Normalized	98.41%	97.88%	98.68%	100%	98.94%	99.47%	97.88%
Standard Deviation	0%	0.6%	0%	0.2%	1.2%	0.2%	0%
OSPray - NASA Streamlines - Path Tracer (FPS)	**12.35**	**12.35**	12.5	**12.66**	12.5	12.5	**12.35**
Normalized	97.55%	97.55%	98.74%	100%	98.74%	98.74%	97.55%
Standard Deviation	0%	0%	0%	0%	0%	0%	0%
OSPray - M.R - Path Tracer (FPS)	**500**	**500**	444.44	**422.22**	**500**	**500**	**500**
Normalized	100%	100%	88.89%	84.44%	100%	100%	100%
Standard Deviation			18.3%	20.4%		0%	
Embree - Pathtracer ISPC - Crown (FPS)	33.3187	33.3893	**32.5872**	**33.5204**	33.2960	33.4857	33.2569
Normalized	99.4%	99.61%	97.22%	100%	99.33%	99.9%	99.21%
Standard Deviation	0.1%	0.3%	0.6%	0.4%	0.4%	0.2%	0.2%
Embree - Pathtracer ISPC - Asian Dragon (FPS)	37.1865	**37.3838**	**32.4410**	37.3153	37.2281	37.3454	37.0053
Normalized	99.47%	100%	86.78%	99.82%	99.58%	99.9%	98.99%
Standard Deviation	1.2%	0.7%	7.6%	1%	0.5%	1.2%	1.1%
SVT-AV1 - Preset 4 - Bosphorus 4K (FPS)	1.931	1.913	1.852	**1.707**	1.959	**2.071**	1.875
Normalized	93.24%	92.37%	89.43%	82.42%	94.59%	100%	90.54%
Standard Deviation	0.1%	0.3%	0.3%	0.5%	0.7%	0.4%	0.4%
SVT-AV1 - Preset 8 - Bosphorus 4K (FPS)	20.851	18.345	20.716	**14.875**	22.402	**23.919**	17.809
Normalized	87.17%	76.7%	86.61%	62.19%	93.66%	100%	74.46%
Standard Deviation	1%	1%	0.9%	1.4%	0.6%	0.5%	0.6%
SVT-HEVC - 1 - Bosphorus 1080p (FPS)	**24.65**	24.71	**25.19**	24.96	24.76	25.15	24.69
Normalized	97.86%	98.09%	100%	99.09%	98.29%	99.84%	98.02%
Standard Deviation	0.6%	0.7%	0.3%	0.6%	0.4%	0.2%	0.4%

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SVT-HEVC - 7 - Bosphorus 1080p (FPS)	282.38	281.37	296.57	**273.70**	285.20	**299.80**	284.09
Normalized	94.19%	93.85%	98.92%	91.29%	95.13%	100%	94.76%
Standard Deviation	2.4%	1.4%	2%	2.2%	1.2%	2.3%	2.5%
SVT-HEVC - 10 - Bosphorus 1080p (FPS)	458.18	434.07	**537.01**	**429.71**	467.20	463.76	470.53
Normalized	85.32%	80.83%	100%	80.02%	87%	86.36%	87.62%
Standard Deviation	10.3%	5.5%	2.3%	7.4%	9%	6.5%	8%
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS)	**349.16**	291.76	344.93	256.35	303.33	298.74	**251.54**
Normalized	100%	83.56%	98.79%	73.42%	86.87%	85.56%	72.04%
Standard Deviation	4.2%	1.1%	2.9%	1.4%	4.4%	2.2%	5.1%
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS)	**353.98**	305.14	353.73	259.56	303.00	302.64	**257.98**
Normalized	100%	86.2%	99.93%	73.33%	85.6%	85.5%	72.88%
Standard Deviation	1.1%	2.8%	0.7%	0.2%	1.4%	2.3%	12.6%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	264.89	272.55	**297.41**	**236.32**	274.02	273.38	241.51
Normalized	89.07%	91.64%	100%	79.46%	92.14%	91.92%	81.2%
Standard Deviation	1.5%	1.4%	1.7%	2.5%	1.3%	1.7%	0.7%
VP9 libvpx Encoding - Speed 0 - Bosphorus 4K (FPS)	6.16	6.89	**6.05**	6.52	6.48	**7.25**	6.23
Normalized	84.97%	95.03%	83.45%	89.93%	89.38%	100%	85.93%
Standard Deviation	0.2%	0.9%	0.3%	1.4%	0.9%	0.3%	0.4%
VP9 libvpx Encoding - Speed 5 - Bosphorus 4K (FPS)	13.63	16.23	13.03	**9.31**	14.89	**17.60**	14.60
Normalized	77.44%	92.22%	74.03%	52.9%	84.6%	100%	82.95%
Standard Deviation	0.9%	1.4%	0.7%	0.8%	2.5%	1.1%	1.1%
Intel Open Image Denoise - RT.hdr_alb_nrm.3840x216	0.90	0.96	**0.87**	0.89	0.94	**0.97**	0.89
Normalized	92.78%	98.97%	89.69%	91.75%	96.91%	100%	91.75%
Standard Deviation	0.6%	0.4%	1%	2.2%	0.8%	0.4%	1.3%
Intel Open Image Denoise - RT.ldr_alb_nrm.3840x216	0.90	0.96	**0.87**	0.94	0.95	**0.97**	0.89
Normalized	92.78%	98.97%	89.69%	96.91%	97.94%	100%	91.75%
Standard Deviation	0.7%	0.2%	0.4%	2.5%	0.8%	0.5%	0.2%
Intel Open Image Denoise - RTLightmap.hdr.4096x409	0.45	**0.48**	**0.44**	0.46	0.47	**0.48**	0.45
Normalized	93.75%	100%	91.67%	95.83%	97.92%	100%	93.75%
Standard Deviation	1.2%	0.1%	1.3%	0.5%	1%	2%	0.4%
OpenVKL - vklBenchmark (Items / Sec)	297	296	**282**	287	293	292	**319**
Normalized	93.1%	92.79%	88.4%	89.97%	91.85%	91.54%	100%
Standard Deviation	4.1%	0.8%	1.4%	2.1%	4.4%	2.4%	2%
libavif avifenc - 10 (sec)	**3.817**	3.620	2.785	2.873	2.817	**2.609**	3.785
Normalized	68.35%	72.07%	93.68%	90.81%	92.62%	100%	68.93%
Standard Deviation	0.8%	2.5%	2.3%	2.8%	3.2%	2.3%	2.3%

libavif avifenc - 6, Lossless (sec)	30.222	27.881	27.237	27.395	27.000	**26.150**	**30.515**
Normalized	86.53%	93.79%	96.01%	95.46%	96.85%	100%	85.7%
Standard Deviation	1.2%	0.1%	2%	0.6%	0.7%	0.3%	1.3%
libavif avifenc - 10, Lossless (sec)	6.287	6.185	5.323	5.298	5.188	**4.915**	**6.302**
Normalized	78.18%	79.47%	92.34%	92.77%	94.74%	100%	77.99%
Standard Deviation	2.4%	0.2%	5.7%	0.5%	2.1%	1%	2.5%
Timed Godot Game Engine Compilation - Time To Compile (sec)	57.907	54.948	**63.293**	**53.426**			54.630
Normalized	92.26%	97.23%	84.41%	100%			97.8%
Standard Deviation	0.8%	0.3%	1%	0.6%			2%
Timed Linux Kernel Compilation - Time To Compile (sec)	**35.137**	34.019	**29.492**	32.031	31.134	31.165	31.450
Normalized	83.93%	86.69%	100%	92.07%	94.73%	94.63%	93.77%
Standard Deviation	2.3%	2.4%	2.4%	2.5%	2.4%	2.4%	2.2%
Timed LLVM Compilation - Ninja (sec)	**232.758**	209.690	**185.201**	202.013	192.197		209.931
Normalized	79.57%	88.32%	100%	91.68%	96.36%		88.22%
Standard Deviation	0.6%	0.6%	0.1%	0.1%	0.6%		0.8%
Timed LLVM Compilation - Unix Makefiles (sec)	**286.375**	257.168	**223.264**	250.573	227.741		250.224
Normalized	77.96%	86.82%	100%	89.1%	98.03%		89.23%
Standard Deviation	0.9%	1.2%	2.5%	1.6%	0.7%		0.4%
Timed Node.js Compilation - Time To	**151.647**	137.588	**123.139**	134.407	127.498		140.352
Normalized	81.2%	89.5%	100%	91.62%	96.58%		87.74%
Standard Deviation	0.1%	0.3%	0.2%	0.2%	0.2%		0.6%
Timed Wasmer Compilation - Time To	**61.241**	41.498		60.641	45.007		**40.231**
Normalized	65.69%	96.95%		66.34%	89.39%		100%
Standard Deviation	1%	0.8%		1.6%	2.4%		1%
GROMACS - MPI CPU - water_GMX50_bare (Ns/Day)	3.639	3.640		3.756	**3.801**	3.777	**3.581**
Normalized	95.74%	95.76%		98.82%	100%	99.37%	94.21%
Standard Deviation	0.5%	0.4%		0.2%	0.1%	0.2%	0.3%
TensorFlow Lite - SqueezeNet (us)	69193	70454	69846	**69107**	**87581**	72316	83601
Normalized	99.88%	98.09%	98.94%	100%	78.91%	95.56%	82.66%
Standard Deviation	0.5%	1.3%	0.9%	0.7%	9.3%	1.9%	9.7%
TensorFlow Lite - Inception V4 (us)	936694	941892	942408	**932251**	944105	940126	**1052955**
Normalized	99.53%	98.98%	98.92%	100%	98.74%	99.16%	88.54%
Standard Deviation	0.4%	1.1%	0.8%	0.3%	0.9%	0.9%	2.8%
TensorFlow Lite - Mobilenet Float (us)	**43688**	43886	44223	43712	45933	43841	**50144**
Normalized	100%	99.55%	98.79%	99.95%	95.11%	99.65%	87.13%
Standard Deviation	0.6%	0.4%	0.4%	0.4%	7%	0.4%	5.3%

TensorFlow Lite - Mobilenet Quant (us)	46473	46558	46650	46350	47417	**46346**	**52962**
Normalized	99.73%	99.54%	99.35%	99.99%	97.74%	100%	87.51%
Standard Deviation	0.3%	0.6%	0.4%	0.1%	1.7%	0%	3.8%
TensorFlow Lite - I.R.V	835539	837065	834724	**834703**	843780	837254	**943408**
Normalized	99.9%	99.72%	100%	100%	98.92%	99.7%	88.48%
Standard Deviation	0.3%	0.4%	0%	0.3%	0.6%	0.4%	6.8%
ASTC Encoder - Exhaustive (sec)	23.6779	23.5167		**23.4605**	**23.9299**	23.5118	23.5801
Normalized	99.08%	99.76%		100%	98.04%	99.78%	99.49%
Standard Deviation	0.1%	0%		0.1%	0.1%	0%	0.1%
Mobile Neural Network - mobilenetV3 (ms)	2.572	2.535	**2.906**	2.616	2.584	**2.264**	2.496
Normalized	88.02%	89.31%	77.91%	86.54%	87.62%	100%	90.71%
Standard Deviation	2.3%	4.4%	6.5%	4.9%	1.2%	3%	1.7%
Mobile Neural Network - squeezenetv1.1 (ms)	4.144	**4.042**	**4.720**	4.676	4.355	4.409	4.377
Normalized	97.54%	100%	85.64%	86.44%	92.81%	91.68%	92.35%
Standard Deviation	2%	3.4%	3.4%	2.4%	3.3%	4%	1.1%
Mobile Neural Network - resnet-v2-50 (ms)	21.954	**18.933**	**23.736**	22.520	22.034	22.347	21.663
Normalized	86.24%	100%	79.76%	84.07%	85.93%	84.72%	87.4%
Standard Deviation	0.9%	5.7%	4.1%	6.6%	3.4%	4.6%	2%
Mobile Neural Network - SqueezeNetV1.0 (ms)	6.094	**5.767**	6.326	6.204	6.776	6.539	**6.900**
Normalized	94.63%	100%	91.16%	92.96%	85.11%	88.19%	83.58%
Standard Deviation	3.5%	3.3%	5.4%	5.8%	2.2%	6.9%	0.7%
Mobile Neural Network - MobileNetV2_224 (ms)	**3.947**	3.975	4.242	4.034	**4.275**	4.026	3.955
Normalized	100%	99.3%	93.05%	97.84%	92.33%	98.04%	99.8%
Standard Deviation	5.4%	4.3%	5.9%	10.3%	2.1%	7.5%	1.1%
Mobile Neural Network - mobilenet-v1-1.0 (ms)	2.849	2.894	3.482	**3.796**	2.932	2.981	**2.734**
Normalized	95.96%	94.47%	78.52%	72.02%	93.25%	91.71%	100%
Standard Deviation	6%	7.7%	8.5%	8.5%	11.5%	10.6%	0.8%
Mobile Neural Network - inception-v3 (ms)	24.361	**22.603**	26.471	**27.651**	27.519	23.754	24.418
Normalized	92.78%	100%	85.39%	81.74%	82.14%	95.15%	92.57%
Standard Deviation	2%	2.4%	3.1%	1.4%	2.1%	3.9%	1.3%
TNN - CPU - DenseNet (ms)	2907	3043	**2822**	3098	2957	2895	**3183**
Normalized	97.08%	92.75%	100%	91.09%	95.45%	97.48%	88.68%
Standard Deviation	0%	1.2%	0.2%	0.5%	0.2%	0.2%	5.5%
TNN - CPU - MobileNet v2 (ms)	290.337	296.547	**286.254**	307.534	301.637	289.527	**316.885**
Normalized	98.59%	96.53%	100%	93.08%	94.9%	98.87%	90.33%
Standard Deviation	0.4%	1.5%	1.7%	2.3%	0.3%	0.1%	2.4%
TNN - CPU - SqueezeNet v2 (ms)	62.597	64.811	62.217	**62.165**	62.620	65.828	**66.292**
Normalized	99.31%	95.92%	99.92%	100%	99.27%	94.44%	93.77%
Standard Deviation	0.9%	0.2%	2.4%	1.3%	0.5%	2.4%	0.3%

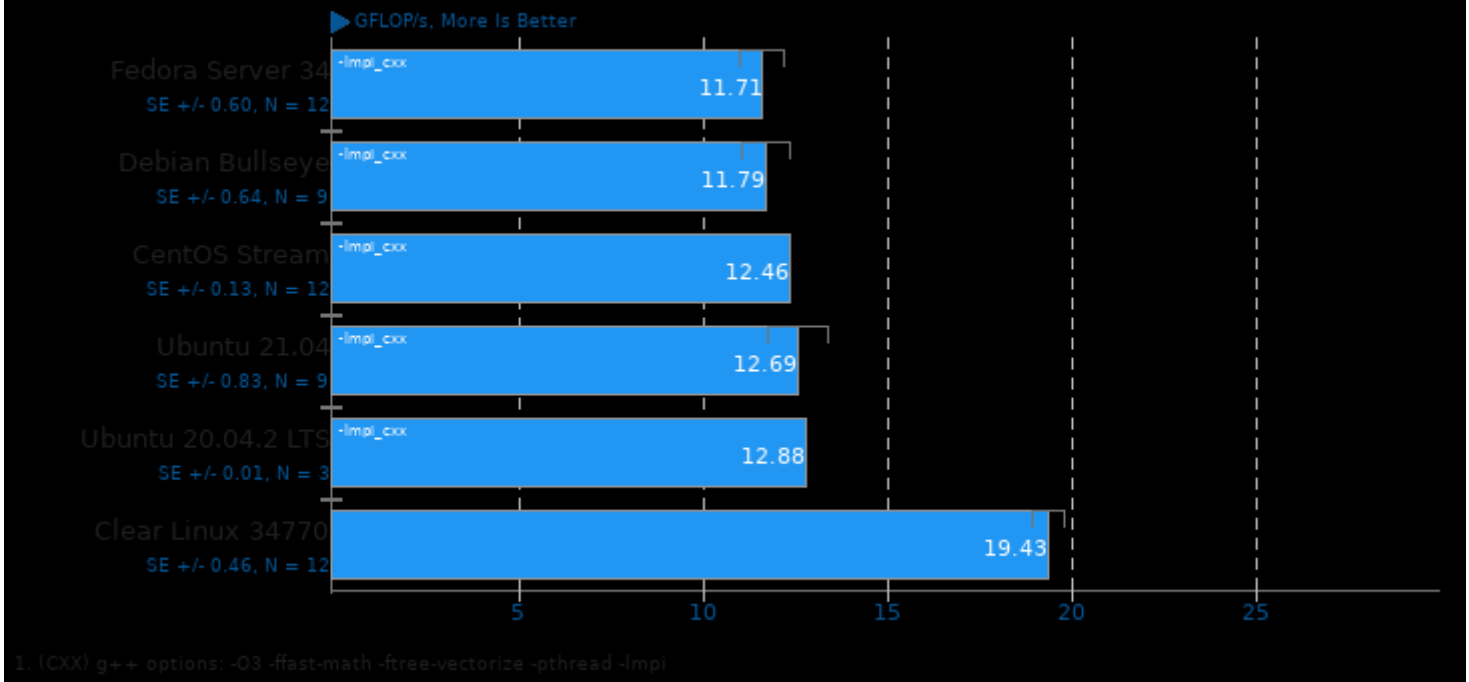
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TNN - CPU - SqueezeNet v1.1 (ms)	269.182	271.391	**268.003**	269.358	269.467	270.350	**277.579**
Normalized	99.56%	98.75%	100%	99.5%	99.46%	99.13%	96.55%
Standard Deviation	0.1%	0.1%	0.2%	0.4%	0.1%	0.1%	0%
PlaidML - No - Inference - VGG16 - CPU (FPS)	**26.73**	26.96	33.54	33.87	33.59	**34.20**	27.43
Normalized	78.16%	78.83%	98.07%	99.04%	98.22%	100%	80.2%
Standard Deviation	1.5%	1.2%	1.3%	2.4%	1.4%	1.2%	0.7%
PlaidML - No - Inference - VGG19 - CPU (FPS)	22.49	**22.13**	27.95	27.67	27.92	**28.34**	22.86
Normalized	79.36%	78.09%	98.62%	97.64%	98.52%	100%	80.66%
Standard Deviation	1.4%	2.4%	2%	1.5%	1.6%	1.6%	1.1%
PlaidML - No - Inference - ResNet 50 - CPU (FPS)	9.04	8.59	9.60	**9.61**	**7.59**	7.74	9.38
Normalized	94.07%	89.39%	99.9%	100%	78.98%	80.54%	97.61%
Standard Deviation	0.5%	0.5%	1.9%	0.4%	0.4%	1%	2.1%
Blender - BMW27 - CPU-Only (sec)	52.85	53.13	52.44	52.55	**52.25**	**52.25**	**53.59**
Normalized	98.86%	98.34%	99.64%	99.43%	100%	100%	97.5%
Standard Deviation	0.2%	0.3%	0.2%	0.2%	0.2%	0.1%	0.3%
Blender - Classroom - CPU-Only (sec)	146.51	146.65	146.09	**145.38**	146.29	145.82	**147.55**
Normalized	99.23%	99.13%	99.51%	100%	99.38%	99.7%	98.53%
Standard Deviation	0.2%	0.1%	0.3%	0.2%	0.2%	0.4%	0.1%
Blender - Barbershop - CPU-Only (sec)	195.79	196.64	192.55	**189.90**	190.76	190.95	**197.52**
Normalized	96.99%	96.57%	98.62%	100%	99.55%	99.45%	96.14%
Standard Deviation	0%	0.3%	0.9%	0.3%	0.1%	0.1%	0.2%
ONNX Runtime - yolov4 - OpenMP CPU (Inferences/min)	**291**	277	**233**	282	242		257
Normalized	100%	95.19%	80.07%	96.91%	83.16%		88.32%
Standard Deviation	5.2%	1.2%	6.9%	5.1%	3.9%		5.9%
ONNX Runtime - bertsquad-10 - OpenMP CPU (Inferences/min)	**445**	440	432	424	427		**395**
Normalized	100%	98.88%	97.08%	95.28%	95.96%		88.76%
Standard Deviation	2.9%	3.3%	5.1%	3.5%	2%		4%
ONNX Runtime - fcn-resnet101-11 - OpenMP CPU	**93**	84	75	**73**	74		90
Normalized	100%	90.32%	80.65%	78.49%	79.57%		96.77%
Standard Deviation	13.3%	14%	8.9%	13.9%	10.6%		14.3%
ONNX Runtime - shufflenet-v2-10 - OpenMP CPU	10866	10911	11064	**11283**	**9699**		10193
Normalized	96.3%	96.7%	98.06%	100%	85.96%		90.34%
Standard Deviation	0.8%	1.3%	1.7%	0.8%	2.3%		0.7%

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ONNX Runtime - super-resolution-10 - OpenMP CPU (Inferences/min)	4775	4884	**5018**	4597	**4475**		4684
Normalized	95.16%	97.33%	100%	91.61%	89.18%		93.34%
Standard Deviation	1.3%	0.9%	6.6%	0.9%	4.3%		1%
Numenta Anomaly Benchmark - Windowed Gaussian (sec)	**6.805**		6.671		6.293	**5.938**	
Normalized	87.26%		89.01%		94.36%	100%	
Standard Deviation	1.8%		0.9%		1.9%	1.9%	
Kripke (Throughput FoM)	78658979	78470519	78433118	78112133	77631927	**90502153**	**73584941**
Normalized	86.91%	86.71%	86.66%	86.31%	85.78%	100%	81.31%
Standard Deviation	9.5%	11.1%	12.5%	5.9%	5.9%	1.1%	9.8%
BRL-CAD - V.P.M (VGR Performance Metric)	**422481**	417781	409125	420156	**406823**		419835
Normalized	100%	98.89%	96.84%	99.45%	96.29%		99.37%

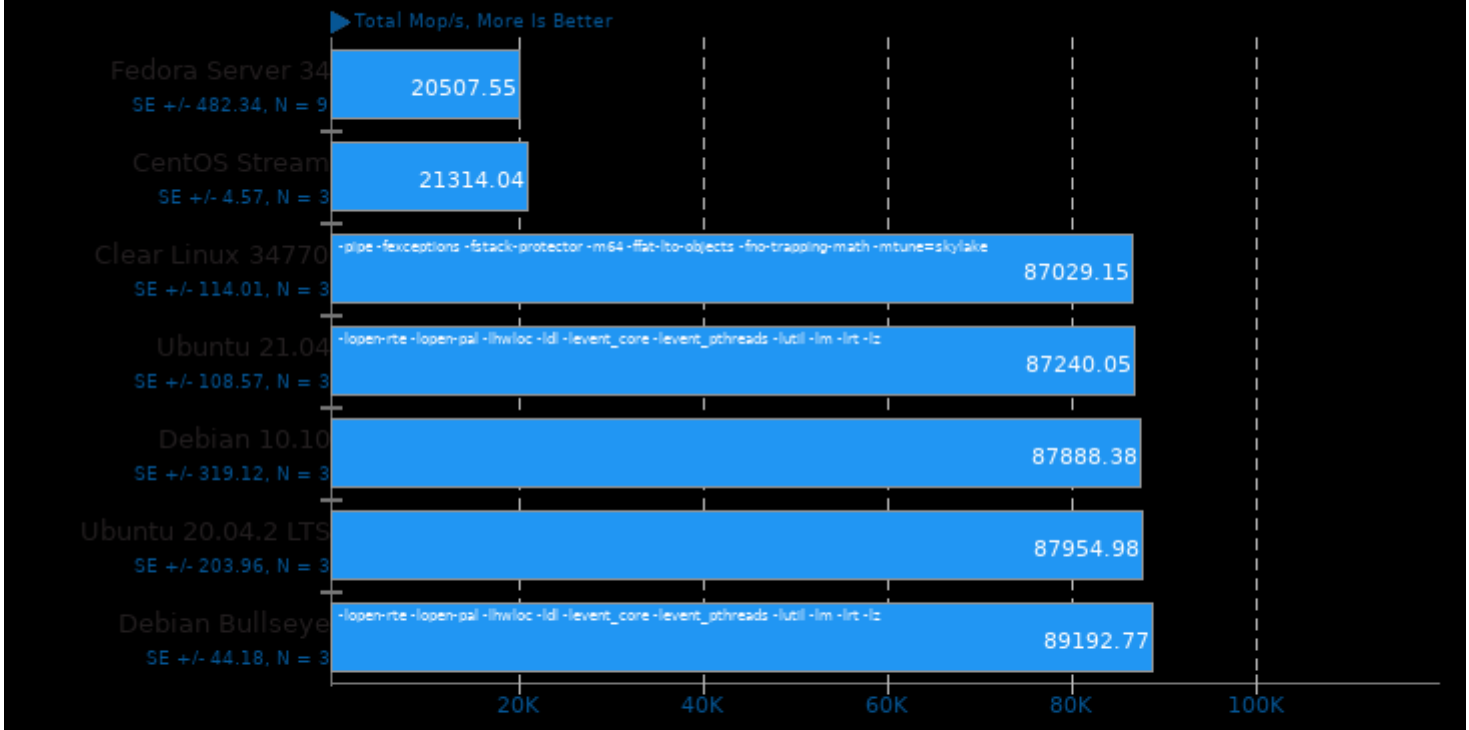
High Performance Conjugate Gradient 3.1



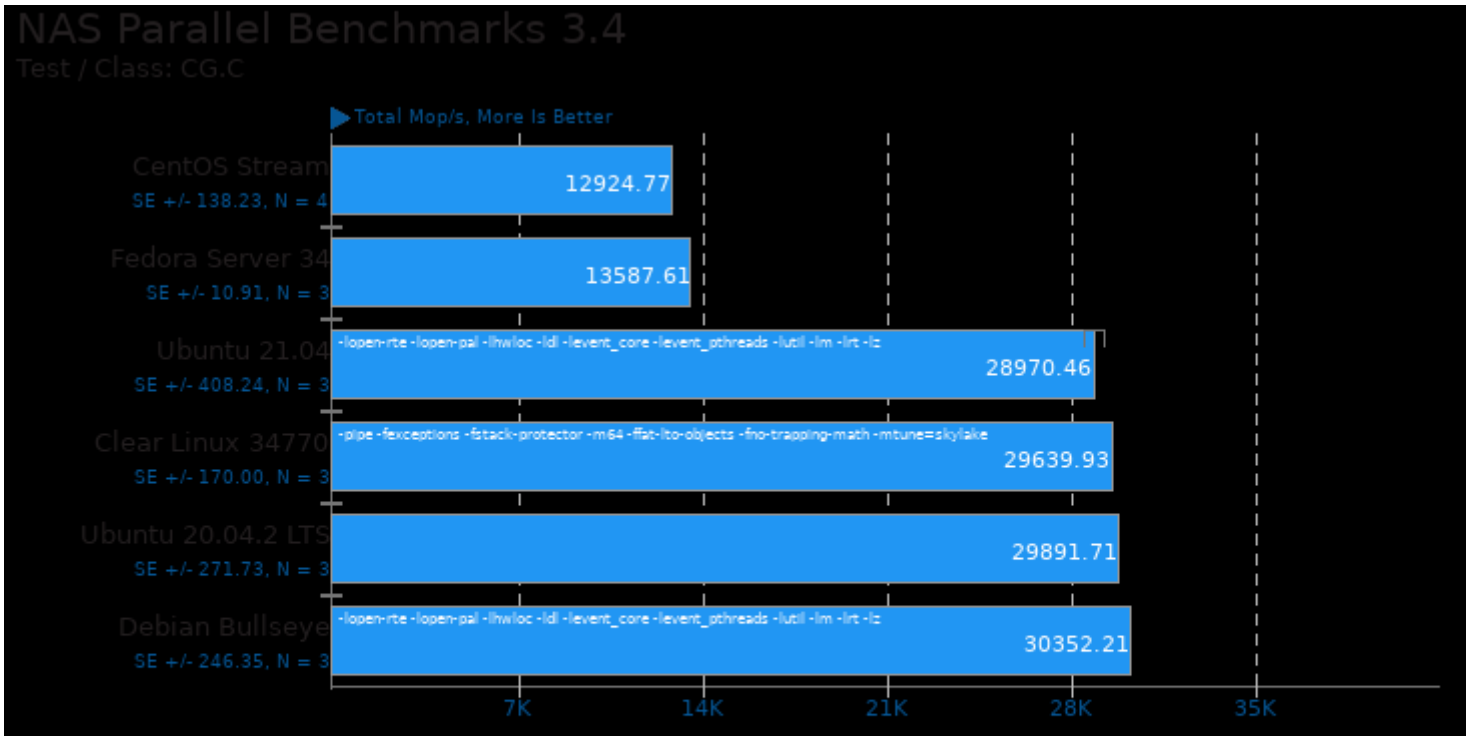
1. (CXX) g++ options: -O3 -ffast-math -ftree-vectorize -pthread -lmpi

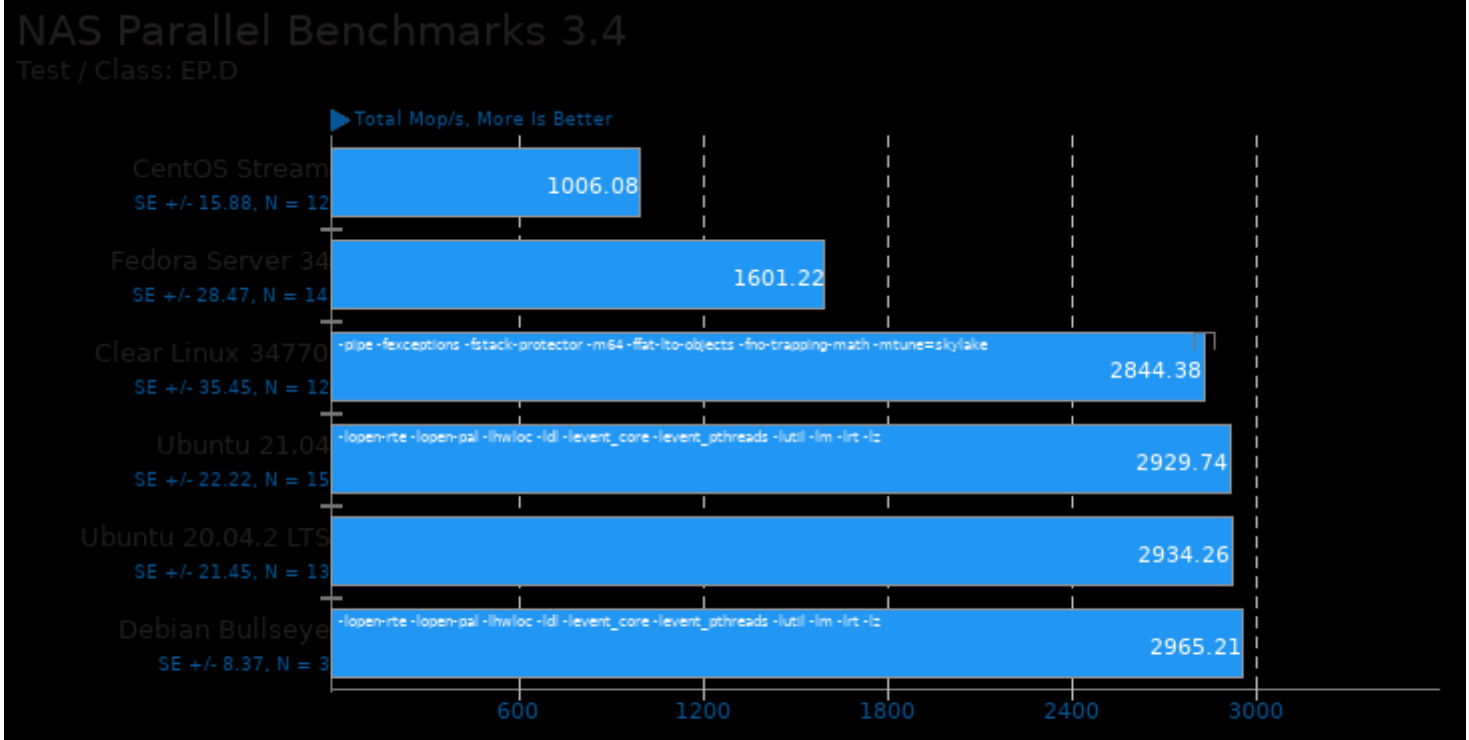
NAS Parallel Benchmarks 3.4

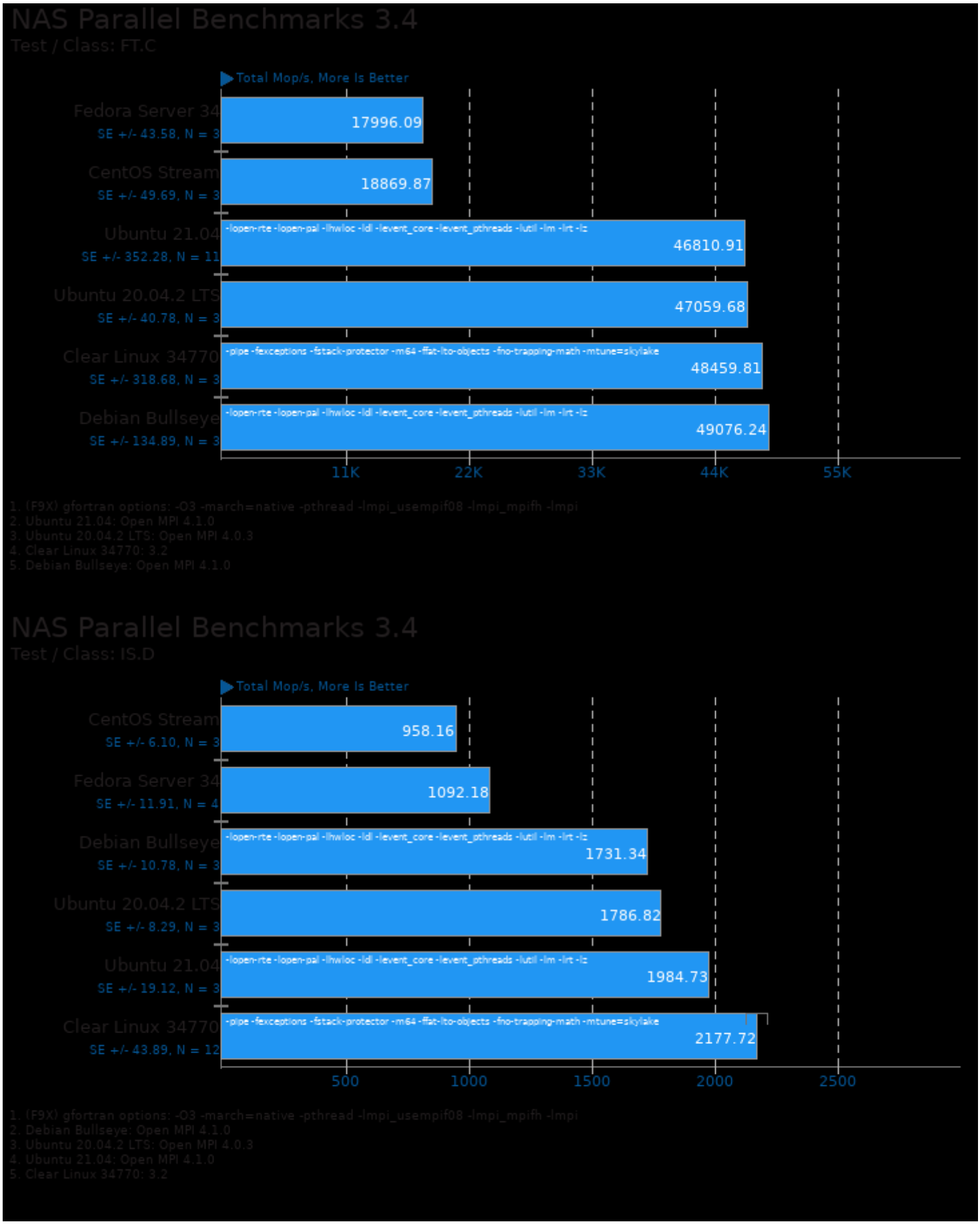
Test / Class: BT.C



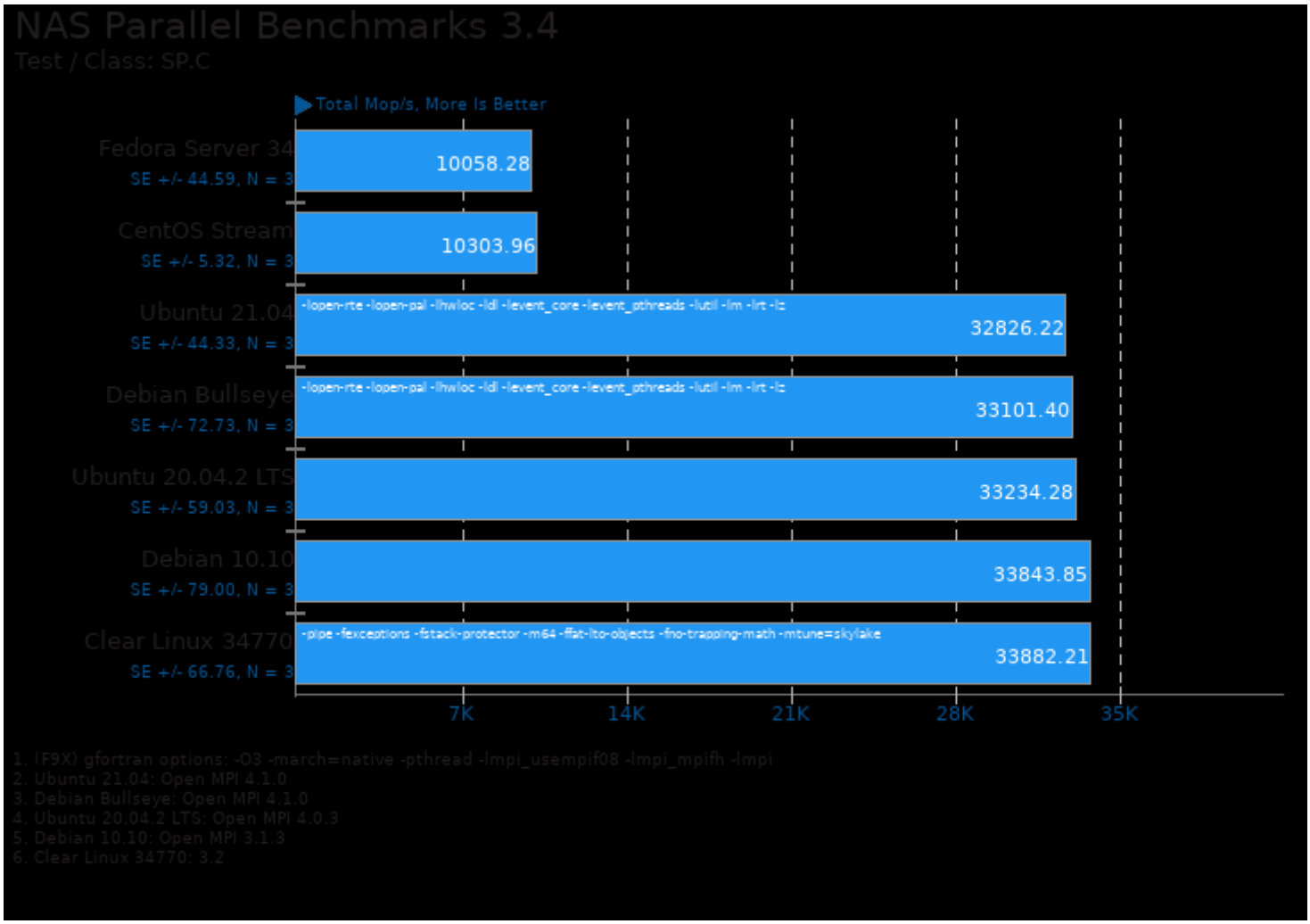
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Clear Linux 34770: 3.2
3. Ubuntu 21.04: Open MPI 4.1.0
4. Debian 10.10: Open MPI 3.1.3
5. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
6. Debian Bullseye: Open MPI 4.1.0

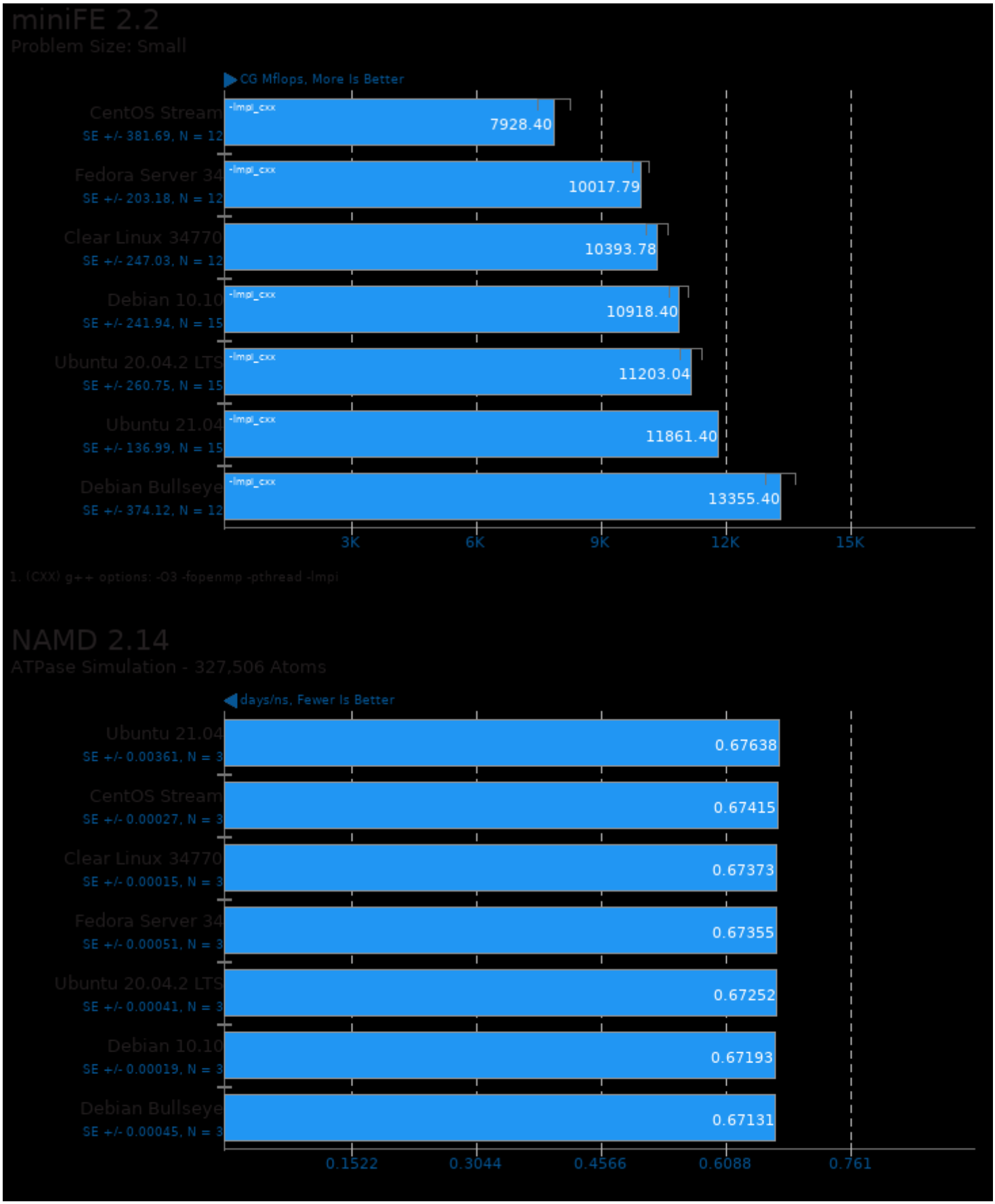

NAS Parallel Benchmarks 3.4
Test / Class: CG.C
Total Mop/s, More Is Better
CentOS Stream
SE +/- 138.23, N = 4
12924.77
Fedora Server 34
SE +/- 10.91, N = 3
13587.61
Ubuntu 21.04
SE +/- 408.24, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
28970.46
Clear Linux 34770
SE +/- 170.00, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
29639.93
Ubuntu 20.04.2 LTS
SE +/- 271.73, N = 3
29891.71
Debian Bullseye
SE +/- 246.35, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
30352.21
7K
14K
21K
28K
35K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Ubuntu 21.04: Open MPI 4.1.0
3. Clear Linux 34770: 3.2
4. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
5. Debian Bullseye: Open MPI 4.1.0

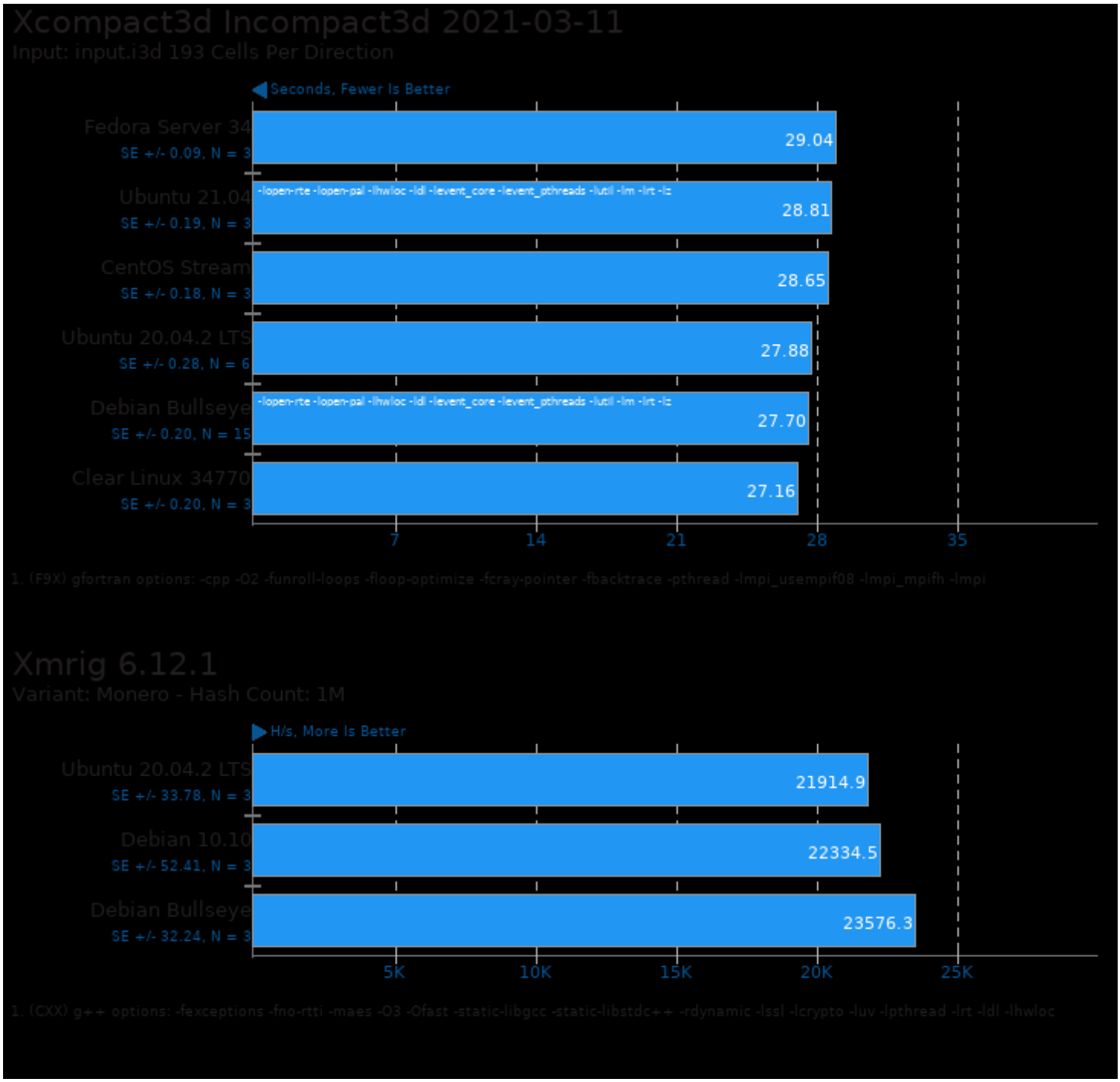

NAS Parallel Benchmarks 3.4
Test / Class: EP.D
Total Mop/s, More Is Better
CentOS Stream
SE +/- 15.88, N = 12
1006.08
Fedora Server 34
SE +/- 28.47, N = 14
1601.22
Clear Linux 34770
SE +/- 35.45, N = 12
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
2844.38
Ubuntu 21.04
SE +/- 22.22, N = 15
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
2929.74
Ubuntu 20.04.2 LTS
SE +/- 21.45, N = 13
2934.26
Debian Bullseye
SE +/- 8.37, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
2965.21
600
1200
1800
2400
3000
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Clear Linux 34770: 3.2
3. Ubuntu 21.04: Open MPI 4.1.0
4. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
5. Debian Bullseye: Open MPI 4.1.0

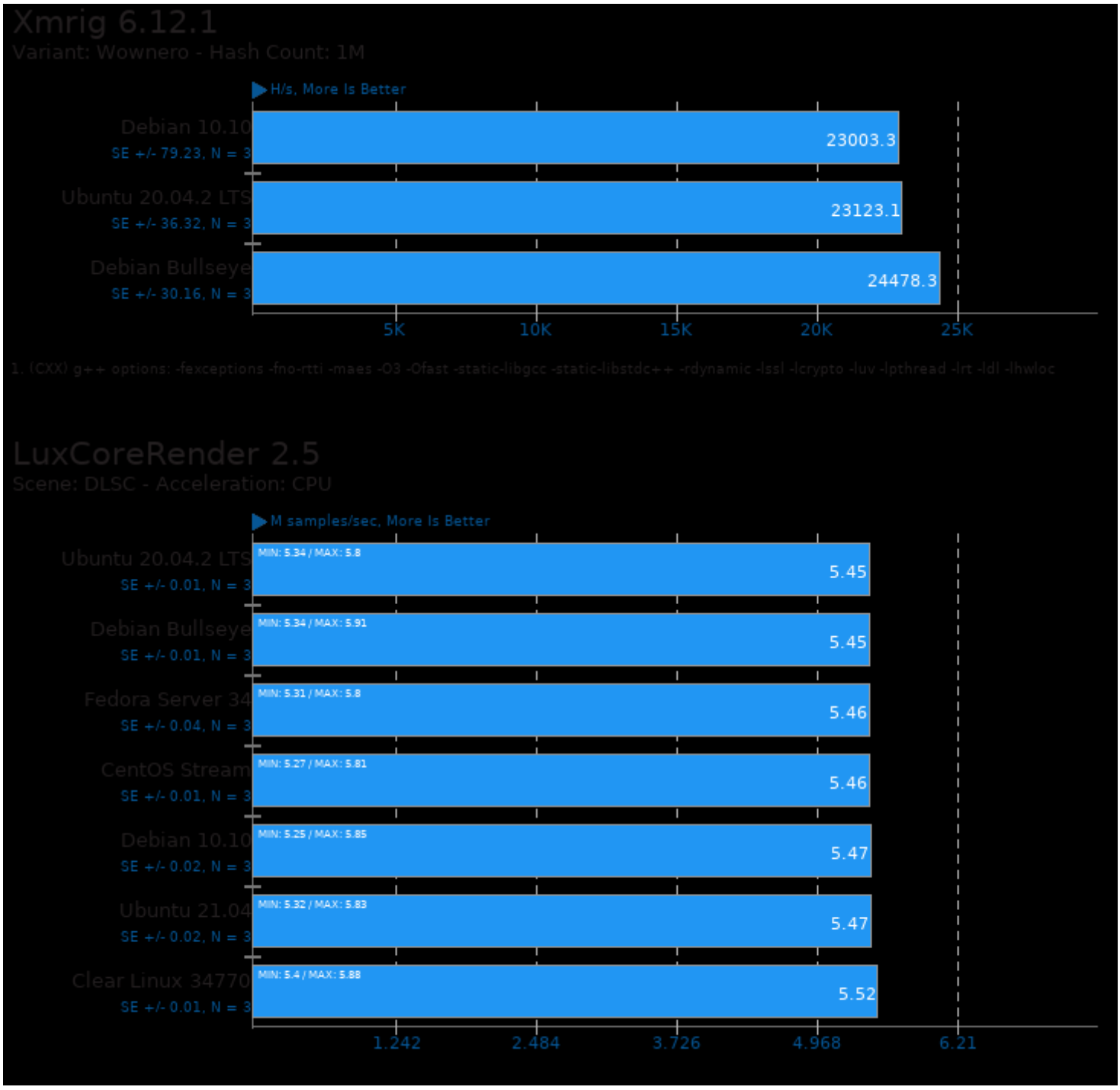

NAS Parallel Benchmarks 3.4
Test / Class: FT.C
Total Mop/s, More Is Better
Fedora Server 34
SE +/- 43.58, N = 3
17996.09
CentOS Stream
SE +/- 49.69, N = 3
18869.87
Ubuntu 21.04
SE +/- 352.28, N = 11
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
46810.91
Ubuntu 20.04.2 LTS
SE +/- 40.78, N = 3
47059.68
Clear Linux 34770
SE +/- 318.68, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
48459.81
Debian Bullseye
SE +/- 134.89, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
49076.24
11K
22K
33K
44K
55K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Ubuntu 21.04: Open MPI 4.1.0
3. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
4. Clear Linux 34770: 3.2
5. Debian Bullseye: Open MPI 4.1.0

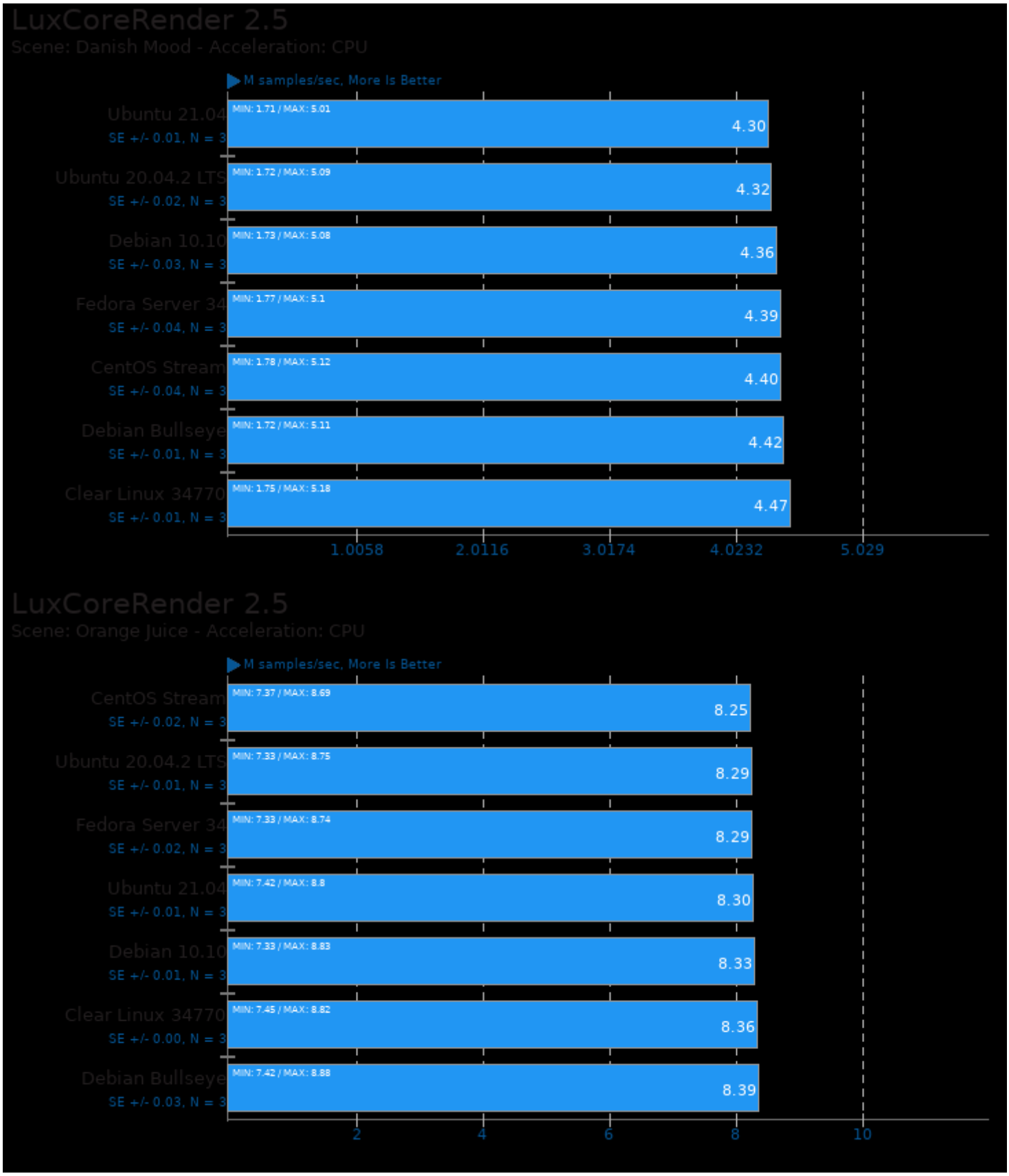
NAS Parallel Benchmarks 3.4
Test / Class: IS.D
Total Mop/s, More Is Better
CentOS Stream
SE +/- 6.10, N = 3
958.16
Fedora Server 34
SE +/- 11.91, N = 4
1092.18
Debian Bullseye
SE +/- 10.78, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
1731.34
Ubuntu 20.04.2 LTS
SE +/- 8.29, N = 3
1786.82
Ubuntu 21.04
SE +/- 19.12, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
1984.73
Clear Linux 34770
SE +/- 43.89, N = 12
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
2177.72
500
1000
1500
2000
2500
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Debian Bullseye: Open MPI 4.1.0
3. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
4. Ubuntu 21.04: Open MPI 4.1.0
5. Clear Linux 34770: 3.2

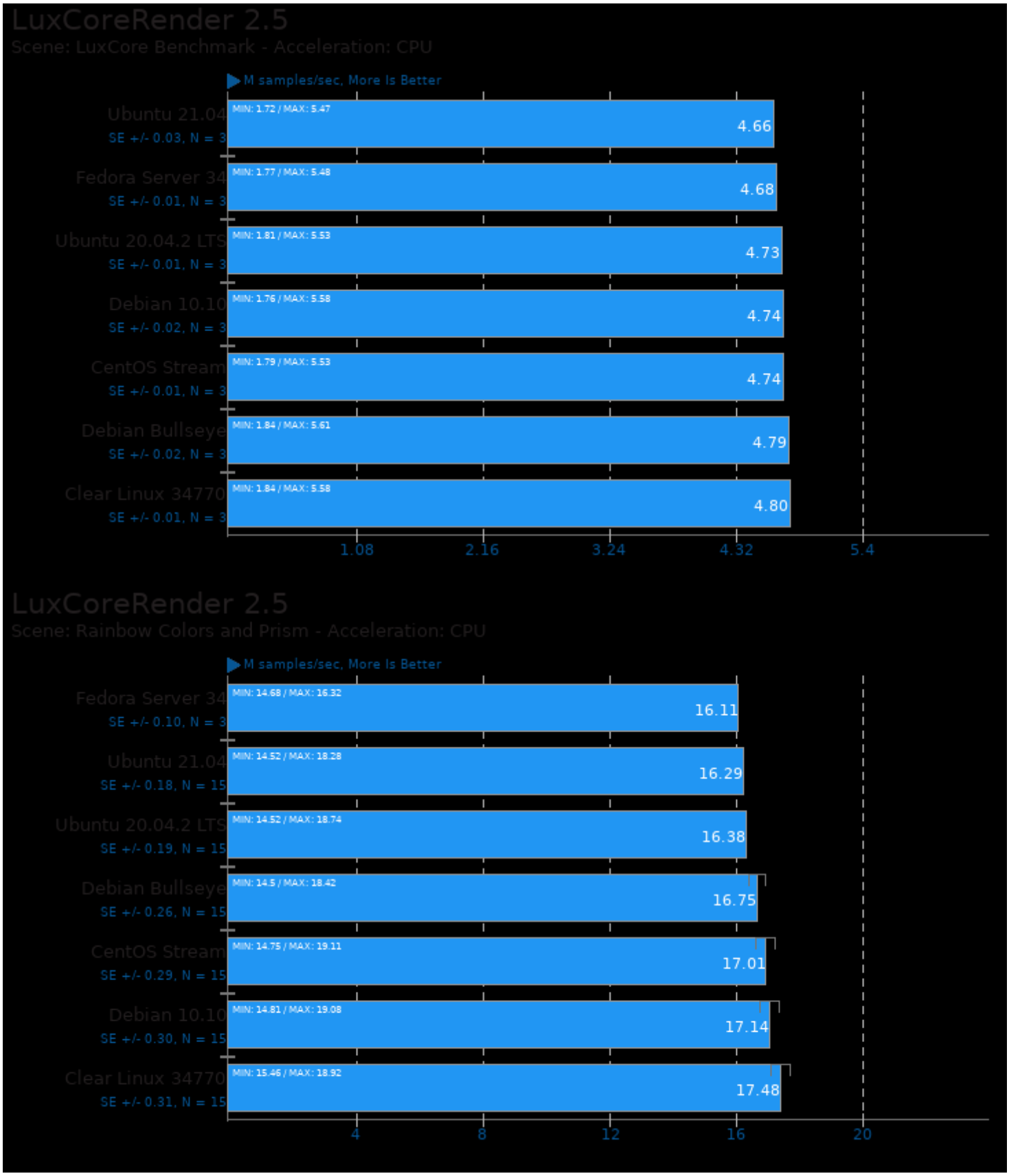

NAS Parallel Benchmarks 3.4
Test / Class: SP.C
Total Mop/s, More Is Better
Fedora Server 34
SE +/- 44.59, N = 3
10058.28
CentOS Stream
SE +/- 5.32, N = 3
10303.96
Ubuntu 21.04
SE +/- 44.33, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
32826.22
Debian Bullseye
SE +/- 72.73, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
33101.40
Ubuntu 20.04.2 LTS
SE +/- 59.03, N = 3
33234.28
Debian 10.10
SE +/- 79.00, N = 3
33843.85
Clear Linux 34770
SE +/- 66.76, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
33882.21
7K
14K
21K
28K
35K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Ubuntu 21.04: Open MPI 4.1.0
3. Debian Bullseye: Open MPI 4.1.0
4. Ubuntu 20.04.2 LTS: Open MPI 4.0.3
5. Debian 10.10: Open MPI 3.1.3
6. Clear Linux 34770: 3.2

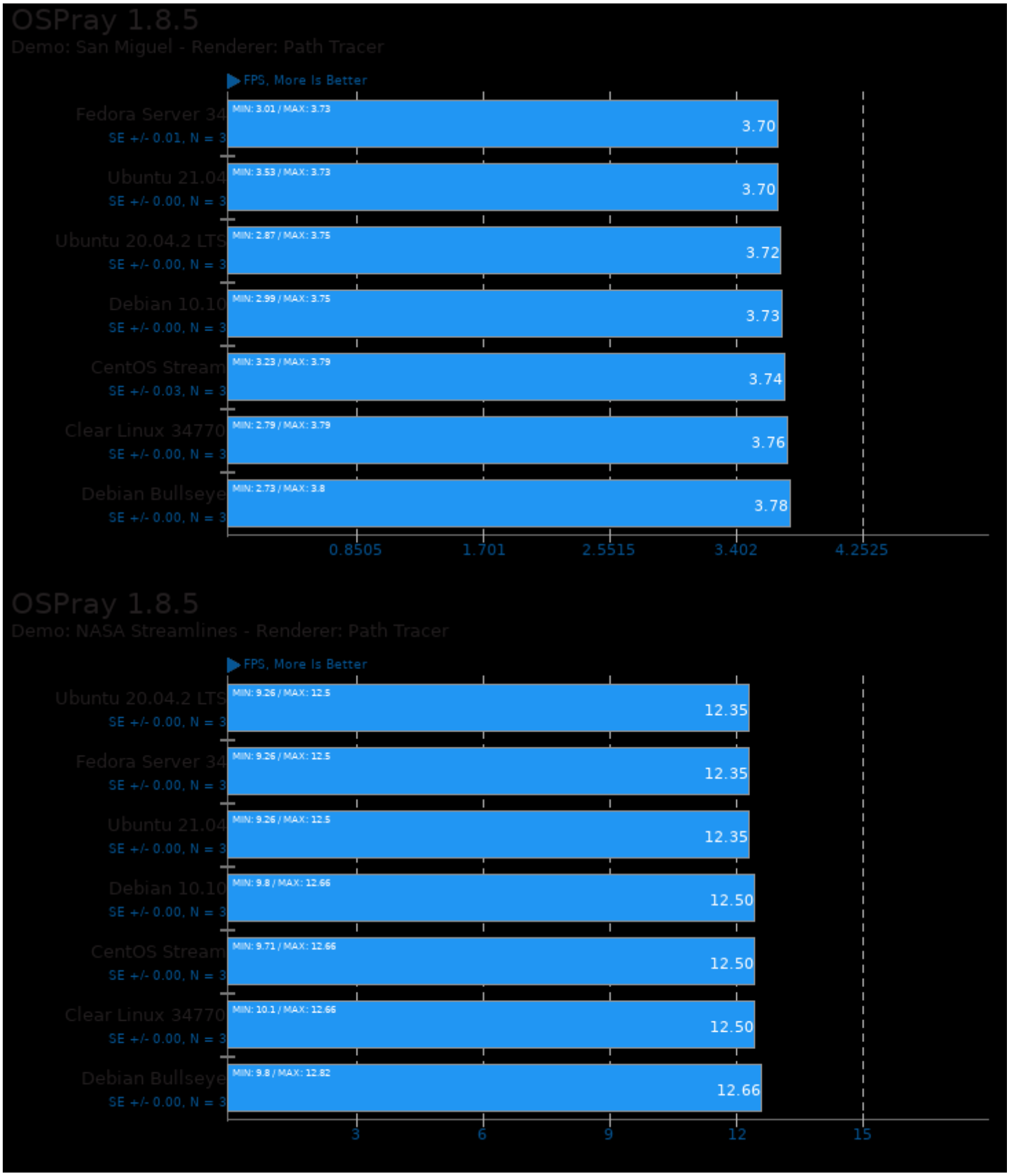

miniFE 2.2
Problem Size: Small
CG Mflops, More Is Better
CentOS Stream
SE +/- 381.69, N = 12
-lmpi_cxx
7928.40
Fedora Server 34
SE +/- 203.18, N = 12
-lmpi_cxx
10017.79
Clear Linux 34770
SE +/- 247.03, N = 12
10393.78
Debian 10.10
SE +/- 241.94, N = 15
-lmpi_cxx
10918.40
Ubuntu 20.04.2 LTS
SE +/- 260.75, N = 15
-lmpi_cxx
11203.04
Ubuntu 21.04
SE +/- 136.99, N = 15
-lmpi_cxx
11861.40
Debian Bullseye
SE +/- 374.12, N = 12
-lmpi_cxx
13355.40
3K
6K
9K
12K
15K
1. (CXX) g++ options: -O3 -fopenmp -pthread -lmpi
NAMD 2.14
ATPase Simulation - 327,506 Atoms
days/ns, Fewer Is Better
Ubuntu 21.04
SE +/- 0.00361, N = 3
0.67638
CentOS Stream
SE +/- 0.00027, N = 3
0.67415
Clear Linux 34770
SE +/- 0.00015, N = 3
0.67373
Fedora Server 34
SE +/- 0.00051, N = 3
0.67355
Ubuntu 20.04.2 LTS
SE +/- 0.00041, N = 3
0.67252
Debian 10.10
SE +/- 0.00019, N = 3
0.67193
Debian Bullseye
SE +/- 0.00045, N = 3
0.67131
0.1522
0.3044
0.4566
0.6088
0.761

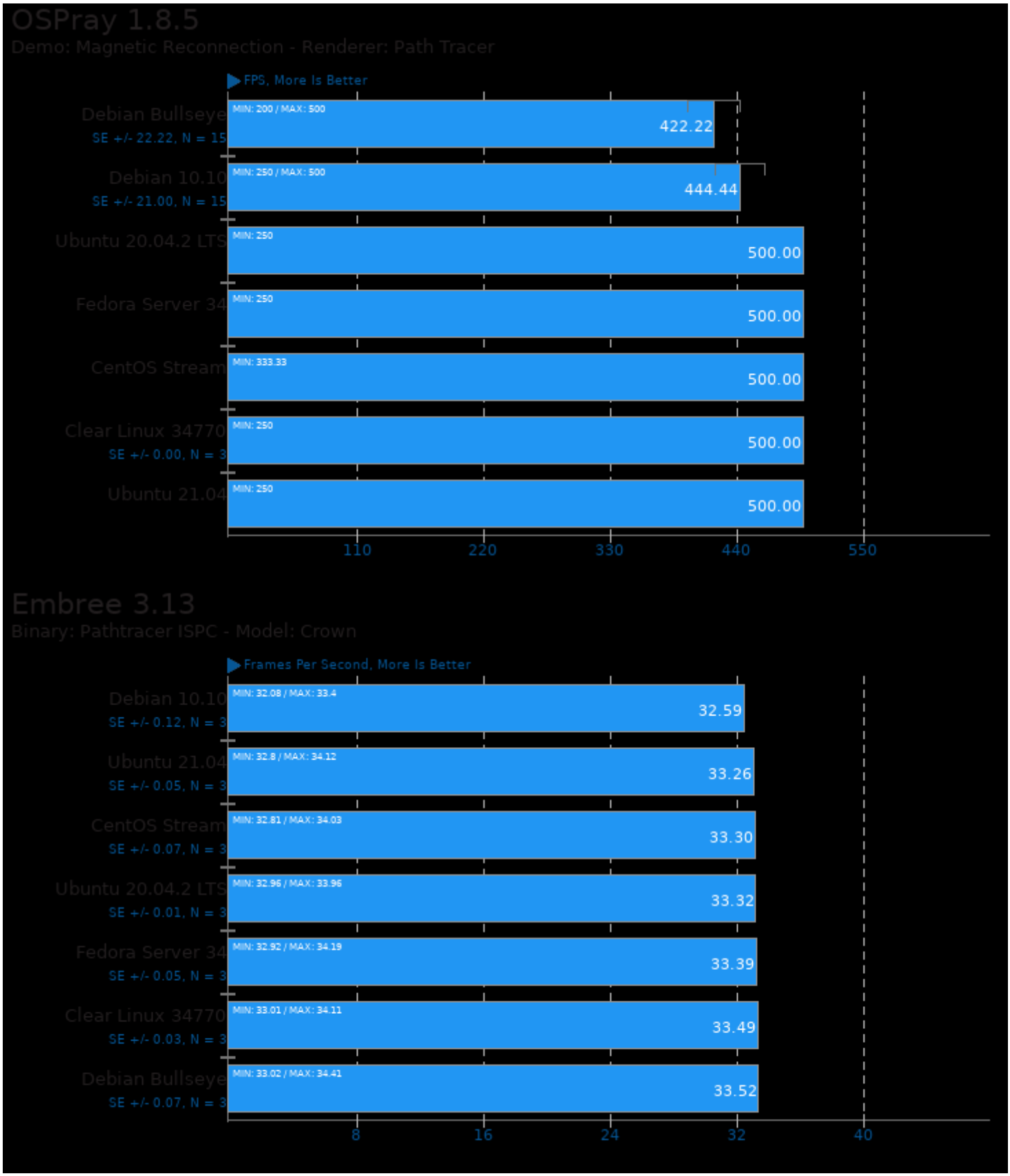

Xcompact3d Incompact3d 2021-03-11
Input: input.i3d 193 Cells Per Direction
Seconds, Fewer Is Better
Fedora Server 34
SE +/- 0.09, N = 3
29.04
Ubuntu 21.04
SE +/- 0.19, N = 3
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
28.81
CentOS Stream
SE +/- 0.18, N = 3
28.65
Ubuntu 20.04.2 LTS
SE +/- 0.28, N = 6
27.88
Debian Bullseye
SE +/- 0.20, N = 15
-lopen-rte -lopen-pal -lhwloc -ldl -levent_core -levent_pthreads -lutil -lm -lrt -lz
27.70
Clear Linux 34770
SE +/- 0.20, N = 3
27.16
7
14
21
28
35
1. (F9X) gfortran options: -cpp -O2 -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
Xmrig 6.12.1
Variant: Monero - Hash Count: 1M
H/s, More Is Better
Ubuntu 20.04.2 LTS
SE +/- 33.78, N = 3
21914.9
Debian 10.10
SE +/- 52.41, N = 3
22334.5
Debian Bullseye
SE +/- 32.24, N = 3
23576.3
5K
10K
15K
20K
25K
1. (CXX) g++ options: -fexceptions -fno-rtti -maes -O3 -Ofast -static-libgcc -static-libstdc++ -rdynamic -lssl -lcrypto -luv -lpthread -lrt -ldl -lhwloc

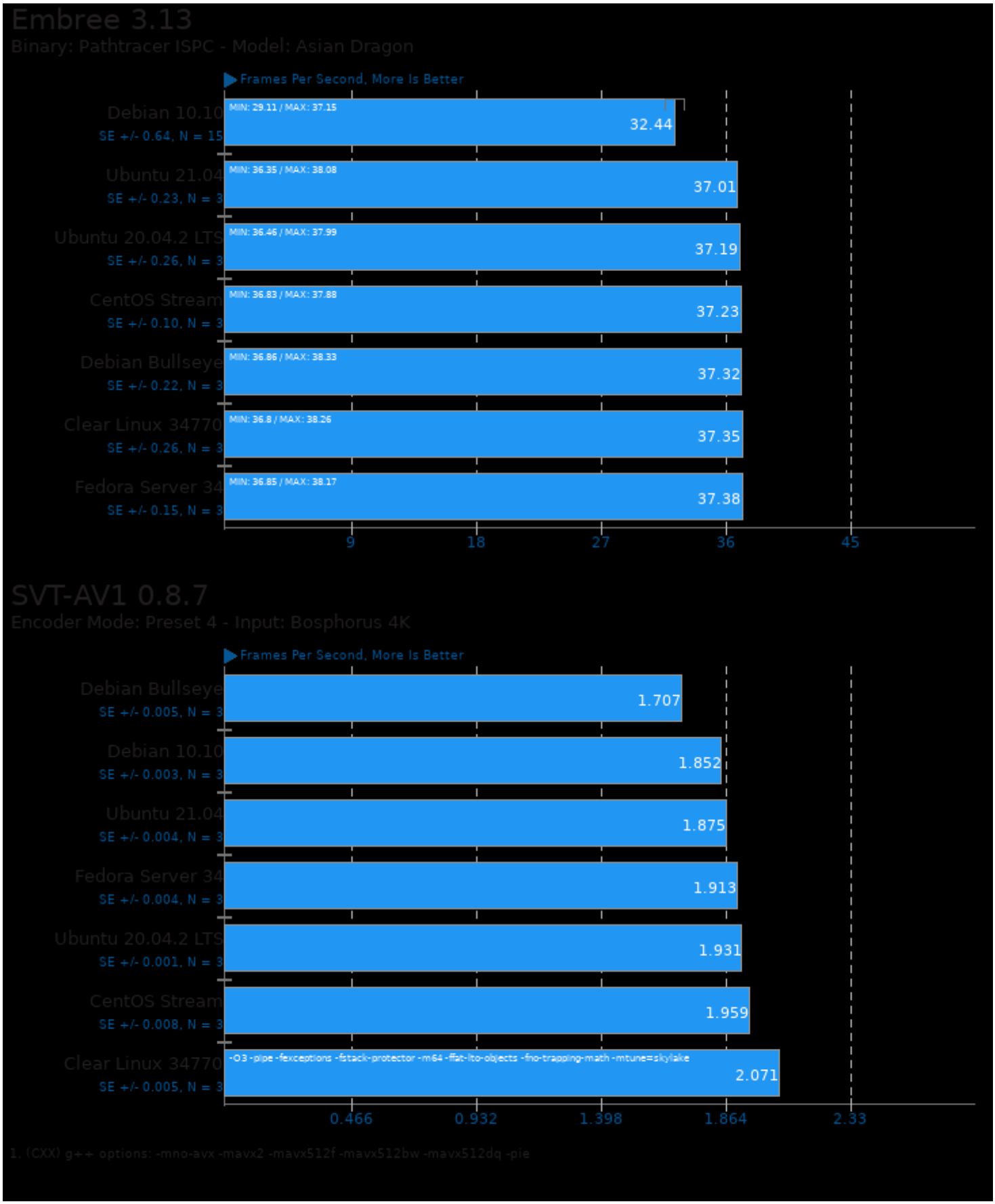

Xmrig 6.12.1
Variant: Wownero - Hash Count: 1M
H/s, More Is Better
Debian 10.10
SE +/- 79.23, N = 3
23003.3
Ubuntu 20.04.2 LTS
SE +/- 36.32, N = 3
23123.1
Debian Bullseye
SE +/- 30.16, N = 3
24478.3
5K
10K
15K
20K
25K
1. (CXX) g++ options: -fexceptions -fno-rtti -maes -O3 -Ofast -static-libgcc -static-libstdc++ -rdynamic -lssl -lcrypto -luv -lpthread -lrt -ldl -lhwloc
LuxCoreRender 2.5
Scene: DLSC - Acceleration: CPU
M samples/sec, More Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
MIN: 5.34 / MAX: 5.8
5.45
Debian Bullseye
SE +/- 0.01, N = 3
MIN: 5.34 / MAX: 5.91
5.45
Fedora Server 34
SE +/- 0.04, N = 3
MIN: 5.31 / MAX: 5.8
5.46
CentOS Stream
SE +/- 0.01, N = 3
MIN: 5.27 / MAX: 5.81
5.46
Debian 10.10
SE +/- 0.02, N = 3
MIN: 5.25 / MAX: 5.85
5.47
Ubuntu 21.04
SE +/- 0.02, N = 3
MIN: 5.32 / MAX: 5.83
5.47
Clear Linux 34770
SE +/- 0.01, N = 3
MIN: 5.4 / MAX: 5.88
5.52
1.242
2.484
3.726
4.968
6.21

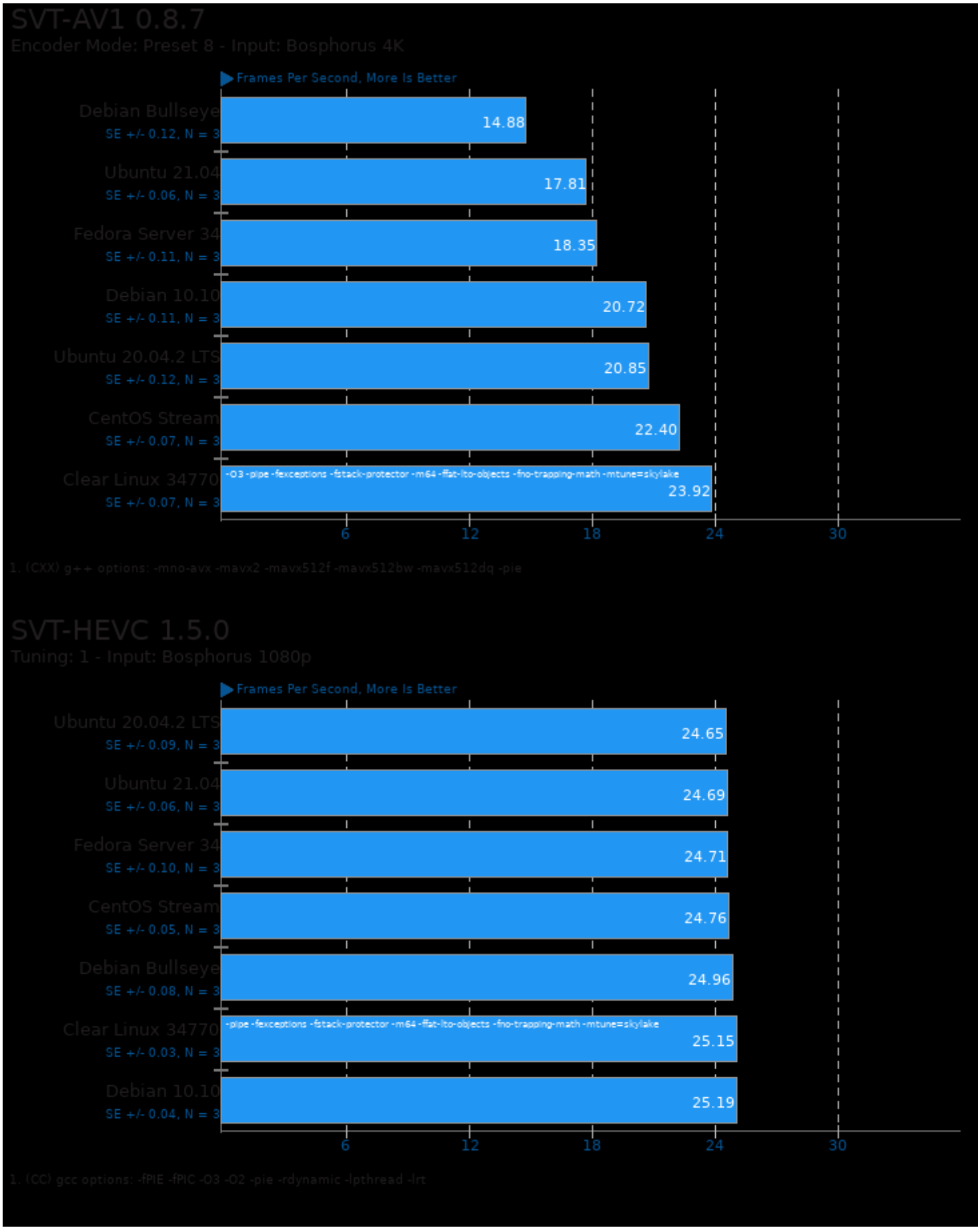

LuxCoreRender 2.5
Scene: Danish Mood - Acceleration: CPU
M samples/sec, More Is Better
Ubuntu 21.04
SE +/- 0.01, N = 3
MIN: 1.71 / MAX: 5.01
4.30
Ubuntu 20.04.2 LTS
SE +/- 0.02, N = 3
MIN: 1.72 / MAX: 5.09
4.32
Debian 10.10
SE +/- 0.03, N = 3
MIN: 1.73 / MAX: 5.08
4.36
Fedora Server 34
SE +/- 0.04, N = 3
MIN: 1.77 / MAX: 5.1
4.39
CentOS Stream
SE +/- 0.04, N = 3
MIN: 1.78 / MAX: 5.12
4.40
Debian Bullseye
SE +/- 0.01, N = 3
MIN: 1.72 / MAX: 5.11
4.42
Clear Linux 34770
SE +/- 0.01, N = 3
MIN: 1.75 / MAX: 5.18
4.47
1.0058
2.0116
3.0174
4.0232
5.029
LuxCoreRender 2.5
Scene: Orange Juice - Acceleration: CPU
M samples/sec, More Is Better
CentOS Stream
SE +/- 0.02, N = 3
MIN: 7.37 / MAX: 8.69
8.25
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
MIN: 7.33 / MAX: 8.75
8.29
Fedora Server 34
SE +/- 0.02, N = 3
MIN: 7.33 / MAX: 8.74
8.29
Ubuntu 21.04
SE +/- 0.01, N = 3
MIN: 7.42 / MAX: 8.8
8.30
Debian 10.10
SE +/- 0.01, N = 3
MIN: 7.33 / MAX: 8.83
8.33
Clear Linux 34770
SE +/- 0.00, N = 3
MIN: 7.45 / MAX: 8.82
8.36
Debian Bullseye
SE +/- 0.03, N = 3
MIN: 7.42 / MAX: 8.88
8.39
2
4
6
8
10

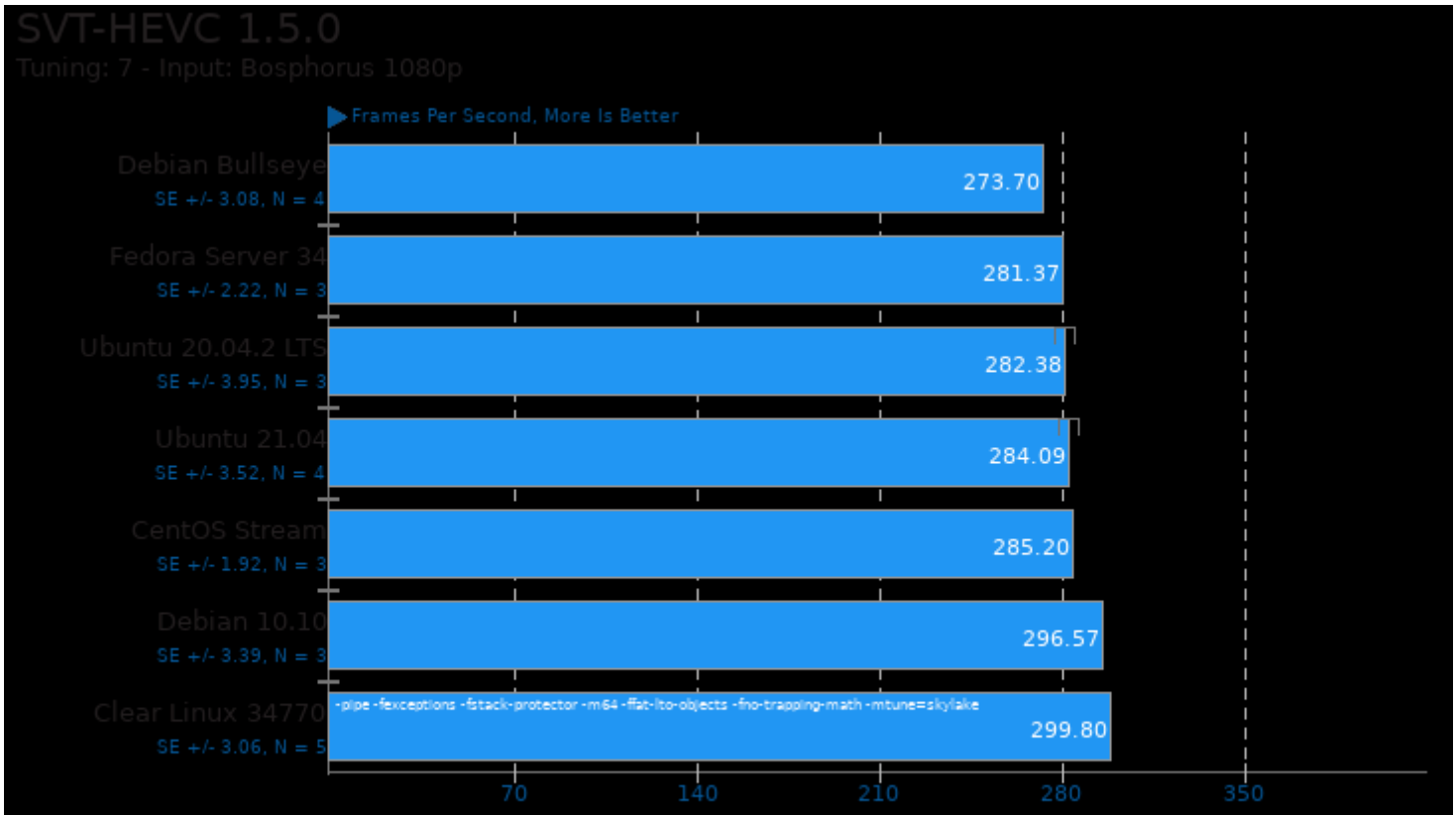

LuxCoreRender 2.5
Scene: LuxCore Benchmark - Acceleration: CPU
M samples/sec, More Is Better
Ubuntu 21.04
SE +/- 0.03, N = 3
MIN: 1.72 / MAX: 5.47
4.66
Fedora Server 34
SE +/- 0.01, N = 3
MIN: 1.77 / MAX: 5.48
4.68
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
MIN: 1.81 / MAX: 5.53
4.73
Debian 10.10
SE +/- 0.02, N = 3
MIN: 1.76 / MAX: 5.58
4.74
CentOS Stream
SE +/- 0.01, N = 3
MIN: 1.79 / MAX: 5.53
4.74
Debian Bullseye
SE +/- 0.02, N = 3
MIN: 1.84 / MAX: 5.61
4.79
Clear Linux 34770
SE +/- 0.01, N = 3
MIN: 1.84 / MAX: 5.58
4.80
1.08
2.16
3.24
4.32
5.4
LuxCoreRender 2.5
Scene: Rainbow Colors and Prism - Acceleration: CPU
M samples/sec, More Is Better
Fedora Server 34
SE +/- 0.10, N = 3
MIN: 14.68 / MAX: 16.32
16.11
Ubuntu 21.04
SE +/- 0.18, N = 15
MIN: 14.52 / MAX: 18.28
16.29
Ubuntu 20.04.2 LTS
SE +/- 0.19, N = 15
MIN: 14.52 / MAX: 18.74
16.38
Debian Bullseye
SE +/- 0.26, N = 15
MIN: 14.5 / MAX: 18.42
16.75
CentOS Stream
SE +/- 0.29, N = 15
MIN: 14.75 / MAX: 19.11
17.01
Debian 10.10
SE +/- 0.30, N = 15
MIN: 14.81 / MAX: 19.08
17.14
Clear Linux 34770
SE +/- 0.31, N = 15
MIN: 15.46 / MAX: 18.92
17.48
4
8
12
16
20

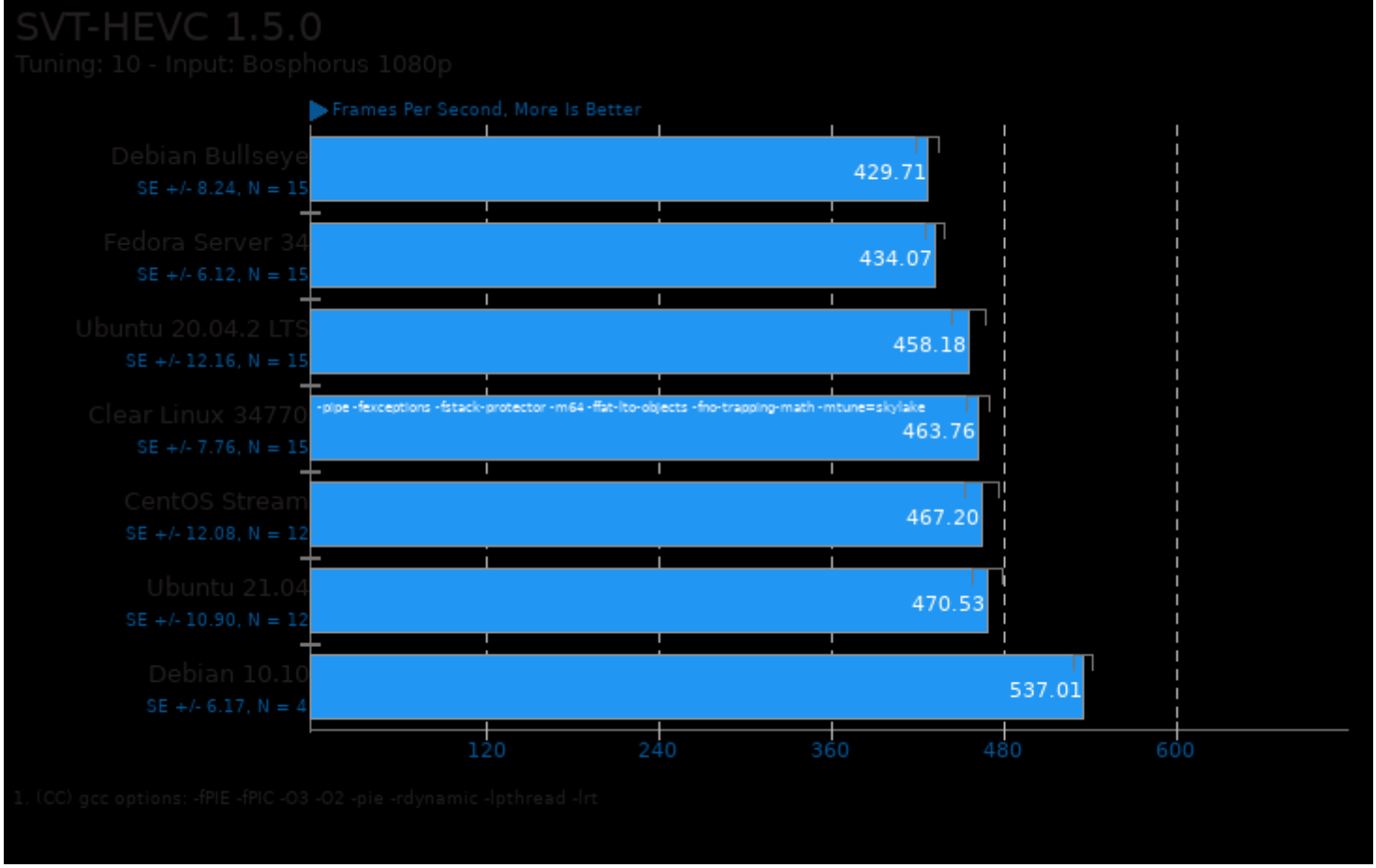

OSPray 1.8.5
Demo: San Miguel - Renderer: Path Tracer
FPS, More Is Better
Fedora Server 34
SE +/- 0.01, N = 3
MIN: 3.01 / MAX: 3.73
3.70
Ubuntu 21.04
SE +/- 0.00, N = 3
MIN: 3.53 / MAX: 3.73
3.70
Ubuntu 20.04.2 LTS
SE +/- 0.00, N = 3
MIN: 2.87 / MAX: 3.75
3.72
Debian 10.10
SE +/- 0.00, N = 3
MIN: 2.99 / MAX: 3.75
3.73
CentOS Stream
SE +/- 0.03, N = 3
MIN: 3.23 / MAX: 3.79
3.74
Clear Linux 34770
SE +/- 0.00, N = 3
MIN: 2.79 / MAX: 3.79
3.76
Debian Bullseye
SE +/- 0.00, N = 3
MIN: 2.73 / MAX: 3.8
3.78
0.8505
1.701
2.5515
3.402
4.2525
OSPray 1.8.5
Demo: NASA Streamlines - Renderer: Path Tracer
FPS, More Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.00, N = 3
MIN: 9.26 / MAX: 12.5
12.35
Fedora Server 34
SE +/- 0.00, N = 3
MIN: 9.26 / MAX: 12.5
12.35
Ubuntu 21.04
SE +/- 0.00, N = 3
MIN: 9.26 / MAX: 12.5
12.35
Debian 10.10
SE +/- 0.00, N = 3
MIN: 9.8 / MAX: 12.66
12.50
CentOS Stream
SE +/- 0.00, N = 3
MIN: 9.71 / MAX: 12.66
12.50
Clear Linux 34770
SE +/- 0.00, N = 3
MIN: 10.1 / MAX: 12.66
12.50
Debian Bullseye
SE +/- 0.00, N = 3
MIN: 9.8 / MAX: 12.82
12.66
3
6
9
12
15

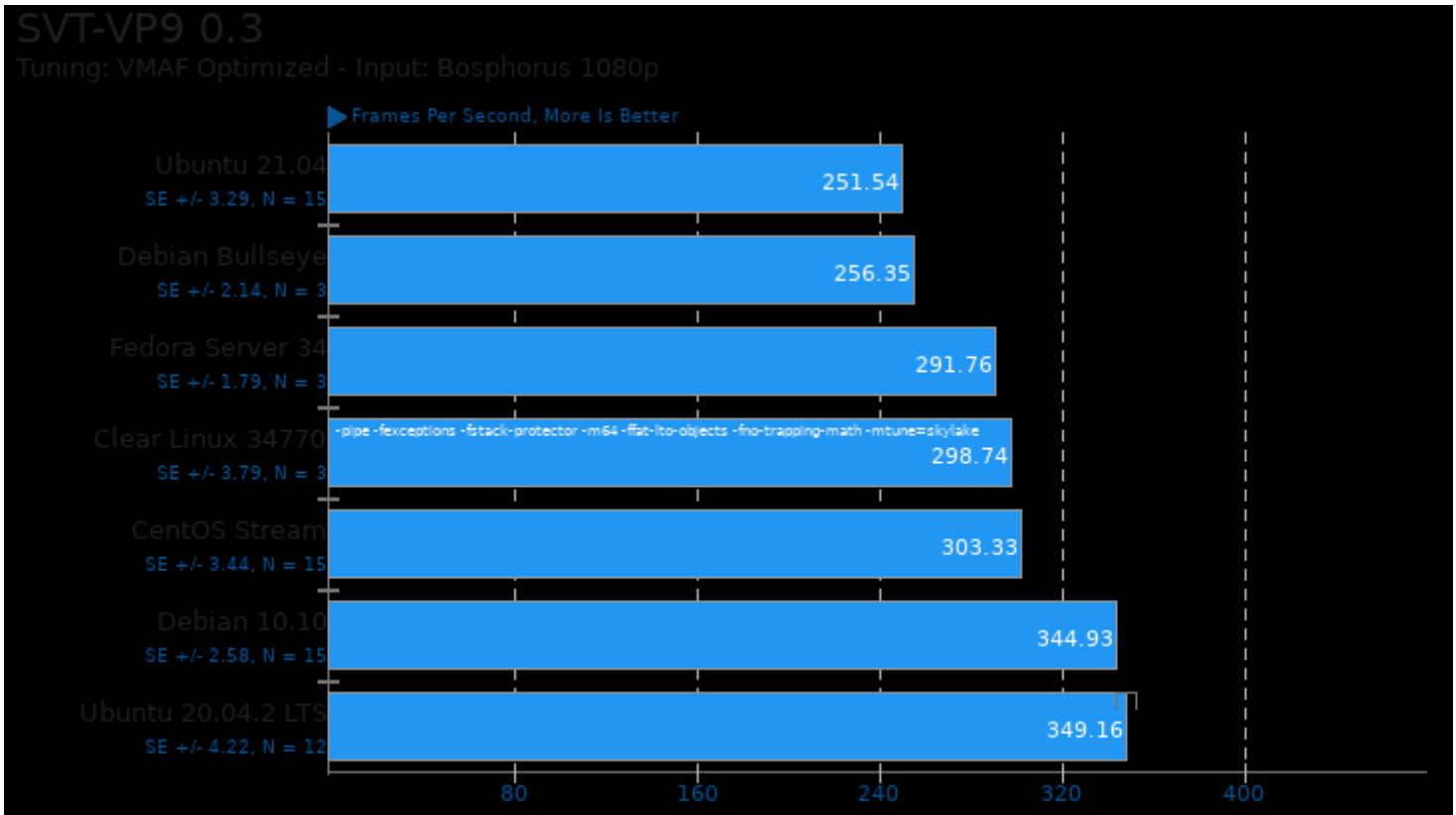

OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: Path Tracer
FPS, More Is Better
Debian Bullseye
SE +/- 22.22, N = 15
MIN: 200 / MAX: 500
422.22
Debian 10.10
SE +/- 21.00, N = 15
MIN: 250 / MAX: 500
444.44
Ubuntu 20.04.2 LTS
MIN: 250
500.00
Fedora Server 34
MIN: 250
500.00
CentOS Stream
MIN: 333.33
500.00
Clear Linux 34770
SE +/- 0.00, N = 3
MIN: 250
500.00
Ubuntu 21.04
MIN: 250
500.00
110
220
330
440
550
Embree 3.13
Binary: Pathtracer ISPC - Model: Crown
Frames Per Second, More Is Better
Debian 10.10
SE +/- 0.12, N = 3
MIN: 32.08 / MAX: 33.4
32.59
Ubuntu 21.04
SE +/- 0.05, N = 3
MIN: 32.8 / MAX: 34.12
33.26
CentOS Stream
SE +/- 0.07, N = 3
MIN: 32.81 / MAX: 34.03
33.30
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
MIN: 32.96 / MAX: 33.96
33.32
Fedora Server 34
SE +/- 0.05, N = 3
MIN: 32.92 / MAX: 34.19
33.39
Clear Linux 34770
SE +/- 0.03, N = 3
MIN: 33.01 / MAX: 34.11
33.49
Debian Bullseye
SE +/- 0.07, N = 3
MIN: 33.02 / MAX: 34.41
33.52
8
16
24
32
40

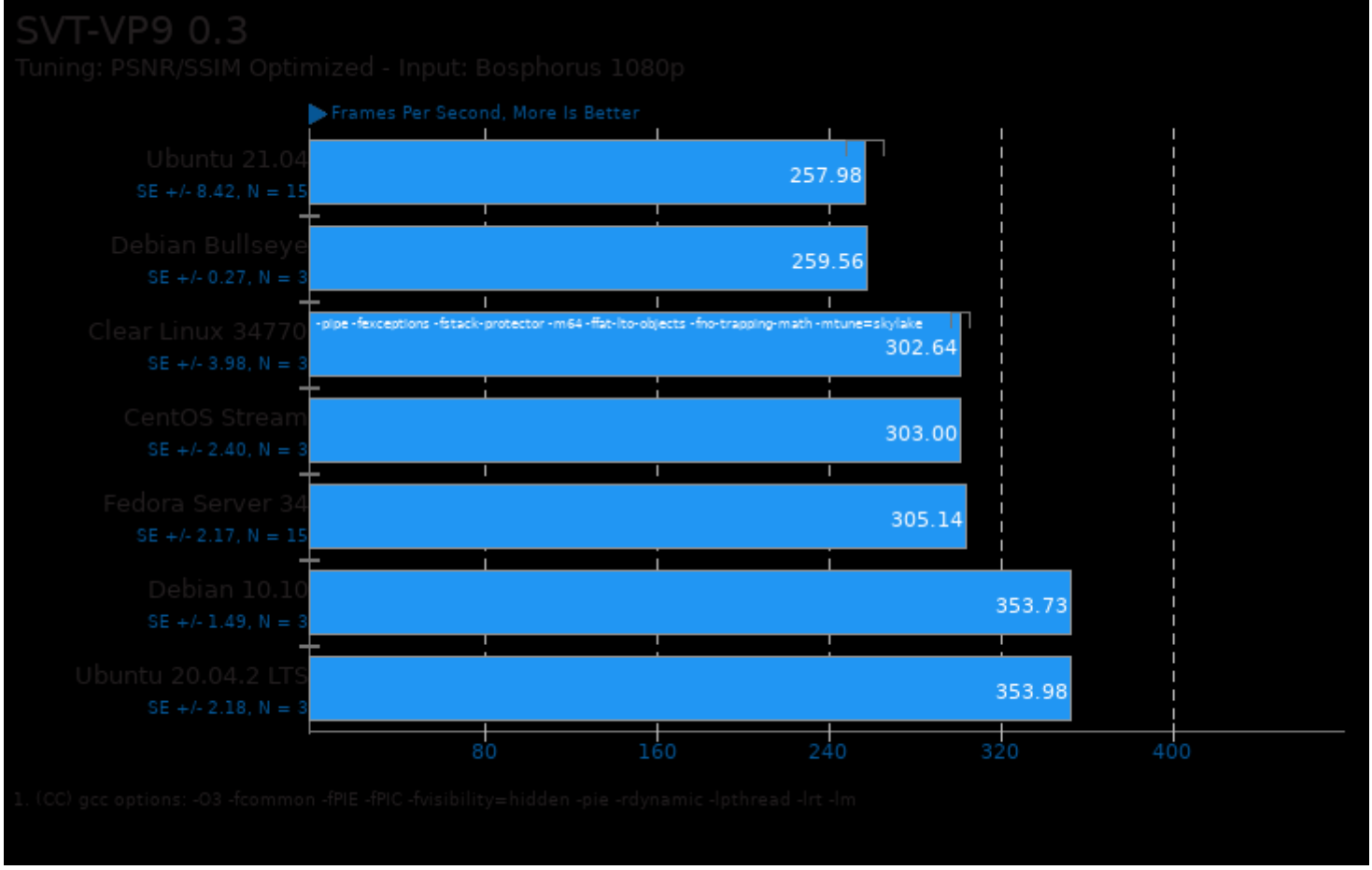

Embree 3.13
Binary: Pathtracer ISPC - Model: Asian Dragon
Frames Per Second, More Is Better
Debian 10.10
SE +/- 0.64, N = 15
MIN: 29.11 / MAX: 37.15
32.44
Ubuntu 21.04
SE +/- 0.23, N = 3
MIN: 36.35 / MAX: 38.08
37.01
Ubuntu 20.04.2 LTS
SE +/- 0.26, N = 3
MIN: 36.46 / MAX: 37.99
37.19
CentOS Stream
SE +/- 0.10, N = 3
MIN: 36.83 / MAX: 37.88
37.23
Debian Bullseye
SE +/- 0.22, N = 3
MIN: 36.86 / MAX: 38.33
37.32
Clear Linux 34770
SE +/- 0.26, N = 3
MIN: 36.8 / MAX: 38.26
37.35
Fedora Server 34
SE +/- 0.15, N = 3
MIN: 36.85 / MAX: 38.17
37.38
9
18
27
36
45
SVT-AV1 0.8.7
Encoder Mode: Preset 4 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 0.005, N = 3
1.707
Debian 10.10
SE +/- 0.003, N = 3
1.852
Ubuntu 21.04
SE +/- 0.004, N = 3
1.875
Fedora Server 34
SE +/- 0.004, N = 3
1.913
Ubuntu 20.04.2 LTS
SE +/- 0.001, N = 3
1.931
CentOS Stream
SE +/- 0.008, N = 3
1.959
Clear Linux 34770
SE +/- 0.005, N = 3
-O3 -pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
2.071
0.466
0.932
1.398
1.864
2.33
1. (CXX) g++ options: -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie

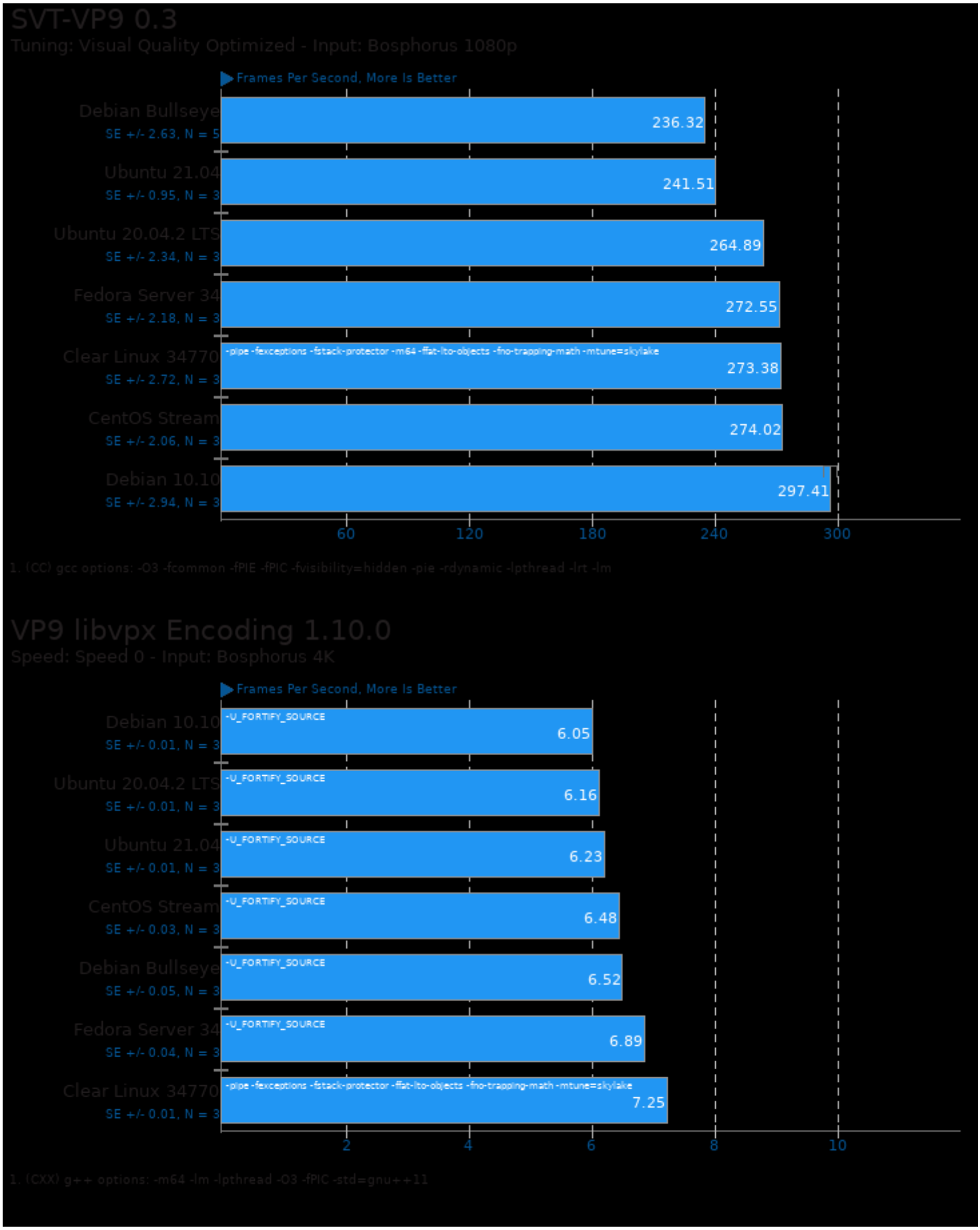

SVT-AV1 0.8.7
Encoder Mode: Preset 8 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 0.12, N = 3
14.88
Ubuntu 21.04
SE +/- 0.06, N = 3
17.81
Fedora Server 34
SE +/- 0.11, N = 3
18.35
Debian 10.10
SE +/- 0.11, N = 3
20.72
Ubuntu 20.04.2 LTS
SE +/- 0.12, N = 3
20.85
CentOS Stream
SE +/- 0.07, N = 3
22.40
Clear Linux 34770
SE +/- 0.07, N = 3
-O3 -pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
23.92
6
12
18
24
30
1. (CXX) g++ options: -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie
SVT-HEVC 1.5.0
Tuning: 1 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.09, N = 3
24.65
Ubuntu 21.04
SE +/- 0.06, N = 3
24.69
Fedora Server 34
SE +/- 0.10, N = 3
24.71
CentOS Stream
SE +/- 0.05, N = 3
24.76
Debian Bullseye
SE +/- 0.08, N = 3
24.96
Clear Linux 34770
SE +/- 0.03, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
25.15
Debian 10.10
SE +/- 0.04, N = 3
25.19
6
12
18
24
30
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

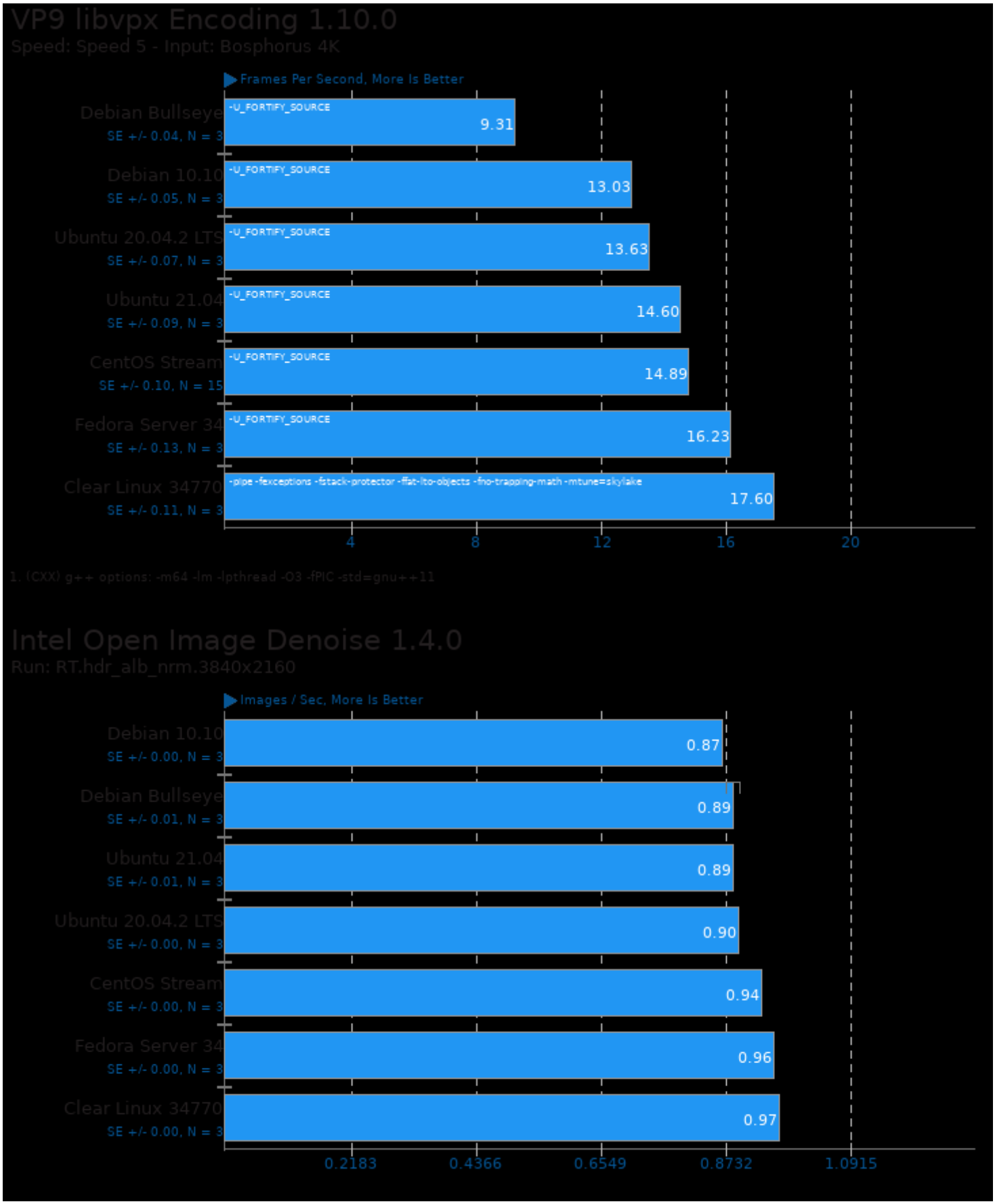

SVT-HEVC 1.5.0
Tuning: 7 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 3.08, N = 4
273.70
Fedora Server 34
SE +/- 2.22, N = 3
281.37
Ubuntu 20.04.2 LTS
SE +/- 3.95, N = 3
282.38
Ubuntu 21.04
SE +/- 3.52, N = 4
284.09
CentOS Stream
SE +/- 1.92, N = 3
285.20
Debian 10.10
SE +/- 3.39, N = 3
296.57
Clear Linux 34770
SE +/- 3.06, N = 5
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
299.80
70
140
210
280
350
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

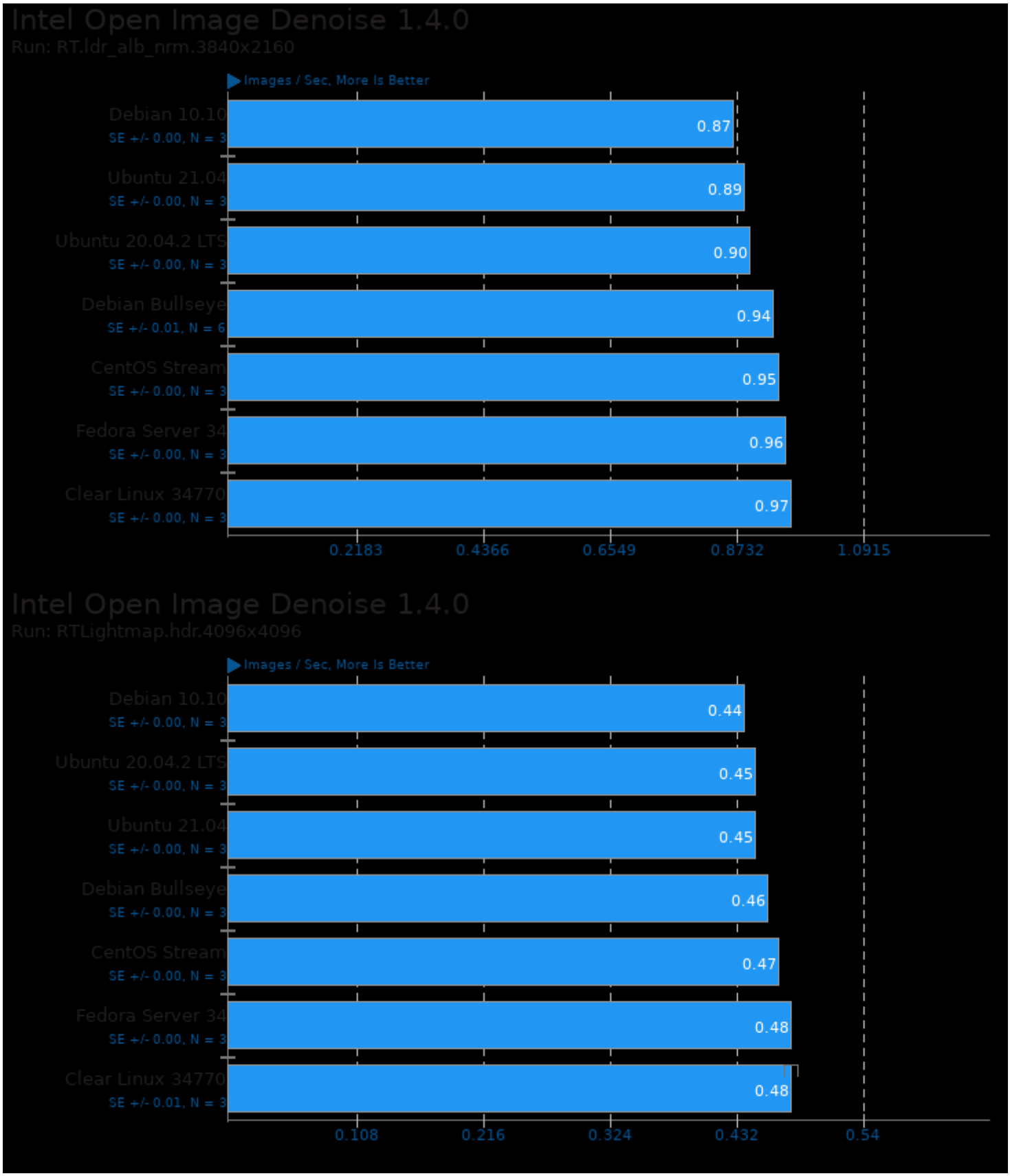

SVT-HEVC 1.5.0
Tuning: 10 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 8.24, N = 15
429.71
Fedora Server 34
SE +/- 6.12, N = 15
434.07
Ubuntu 20.04.2 LTS
SE +/- 12.16, N = 15
458.18
Clear Linux 34770
SE +/- 7.76, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
463.76
CentOS Stream
SE +/- 12.08, N = 12
467.20
Ubuntu 21.04
SE +/- 10.90, N = 12
470.53
Debian 10.10
SE +/- 6.17, N = 4
537.01
120
240
360
480
600
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

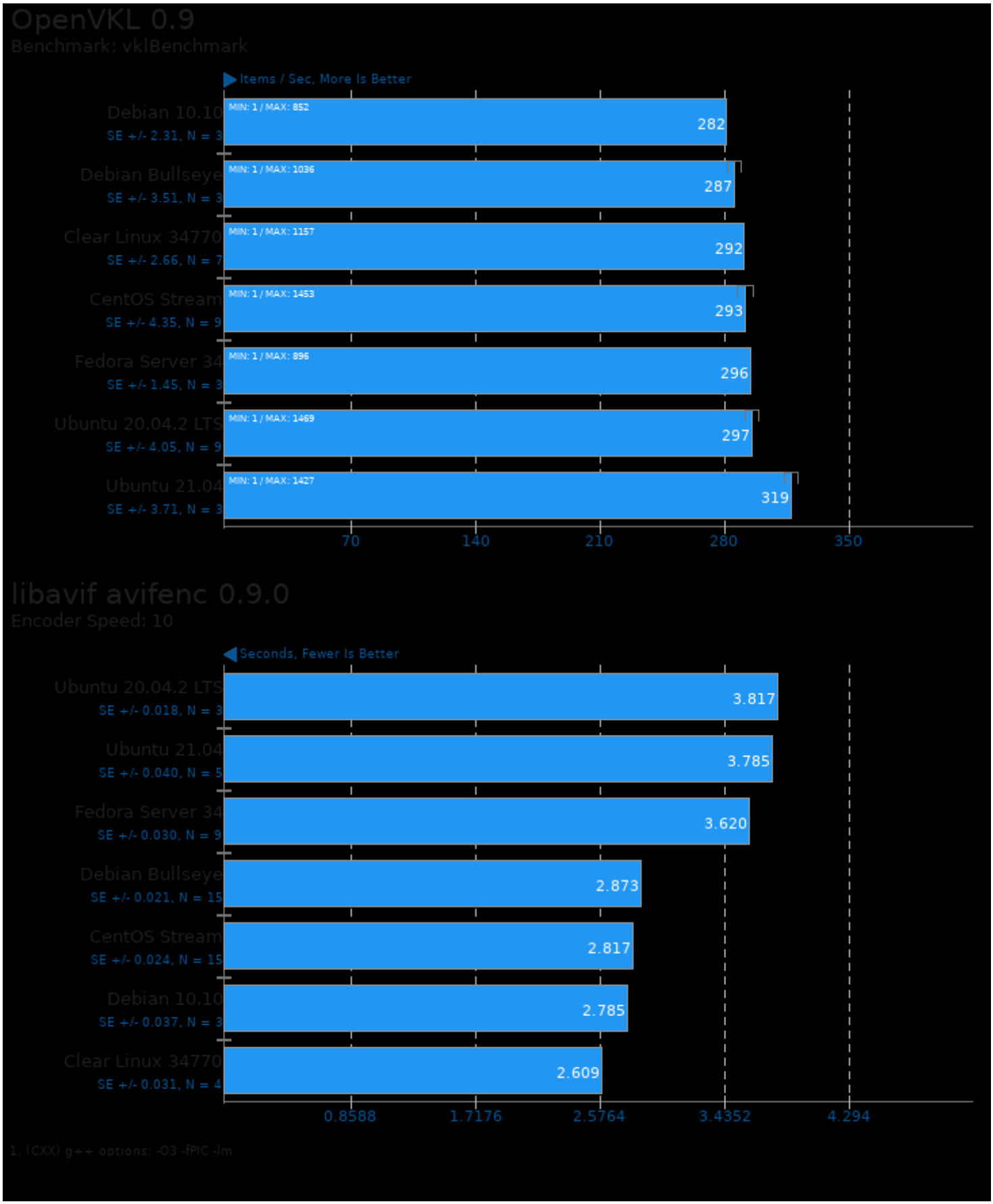

SVT-VP9 0.3
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Ubuntu 21.04
SE +/- 3.29, N = 15
251.54
Debian Bullseye
SE +/- 2.14, N = 3
256.35
Fedora Server 34
SE +/- 1.79, N = 3
291.76
Clear Linux 34770
SE +/- 3.79, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
298.74
CentOS Stream
SE +/- 3.44, N = 15
303.33
Debian 10.10
SE +/- 2.58, N = 15
344.93
Ubuntu 20.04.2 LTS
SE +/- 4.22, N = 12
349.16
80
160
240
320
400
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm

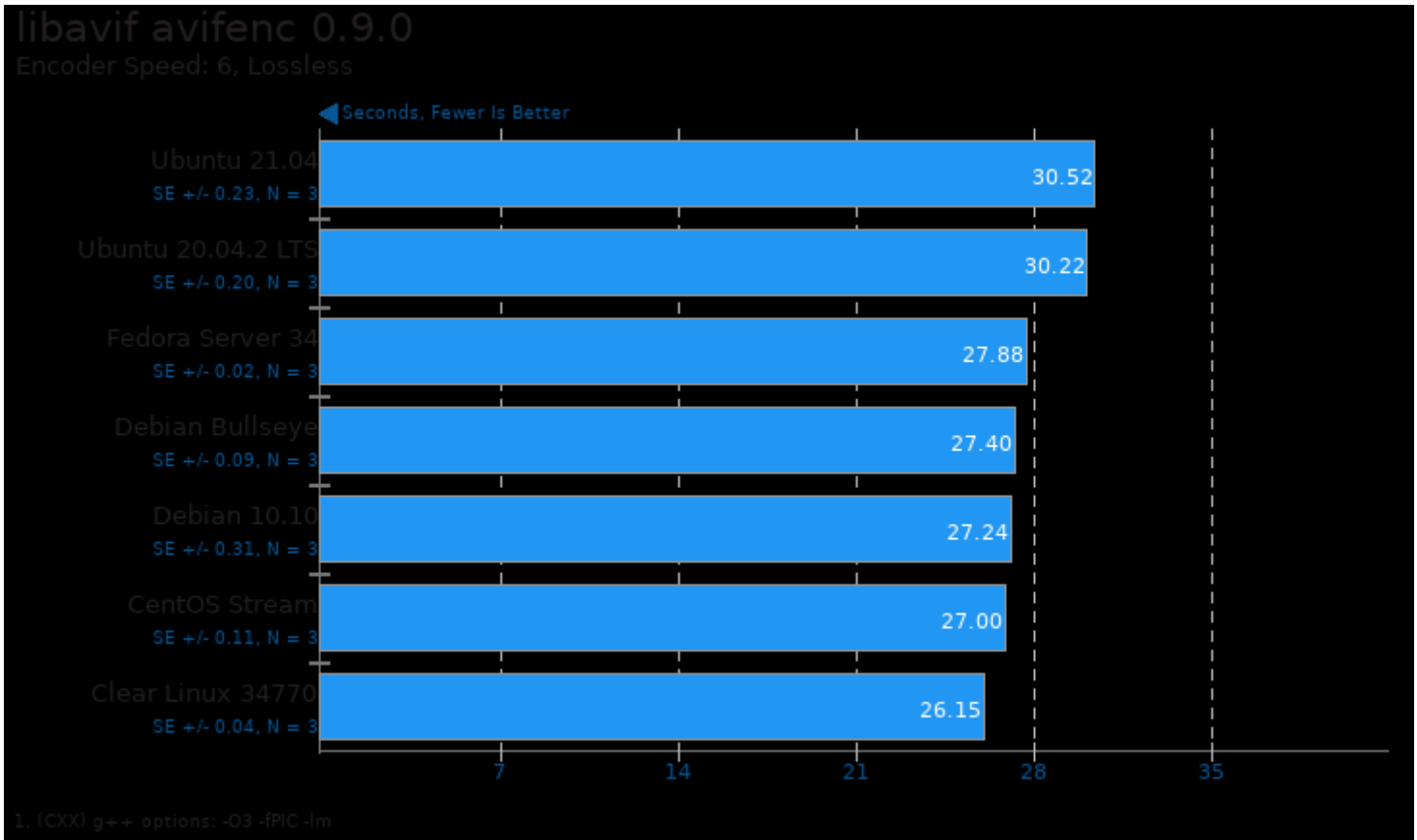

SVT-VP9 0.3
Tuning: PSNR/SSIM Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Ubuntu 21.04
SE +/- 8.42, N = 15
257.98
Debian Bullseye
SE +/- 0.27, N = 3
259.56
Clear Linux 34770
SE +/- 3.98, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
302.64
CentOS Stream
SE +/- 2.40, N = 3
303.00
Fedora Server 34
SE +/- 2.17, N = 15
305.14
Debian 10.10
SE +/- 1.49, N = 3
353.73
Ubuntu 20.04.2 LTS
SE +/- 2.18, N = 3
353.98
80
160
240
320
400
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm

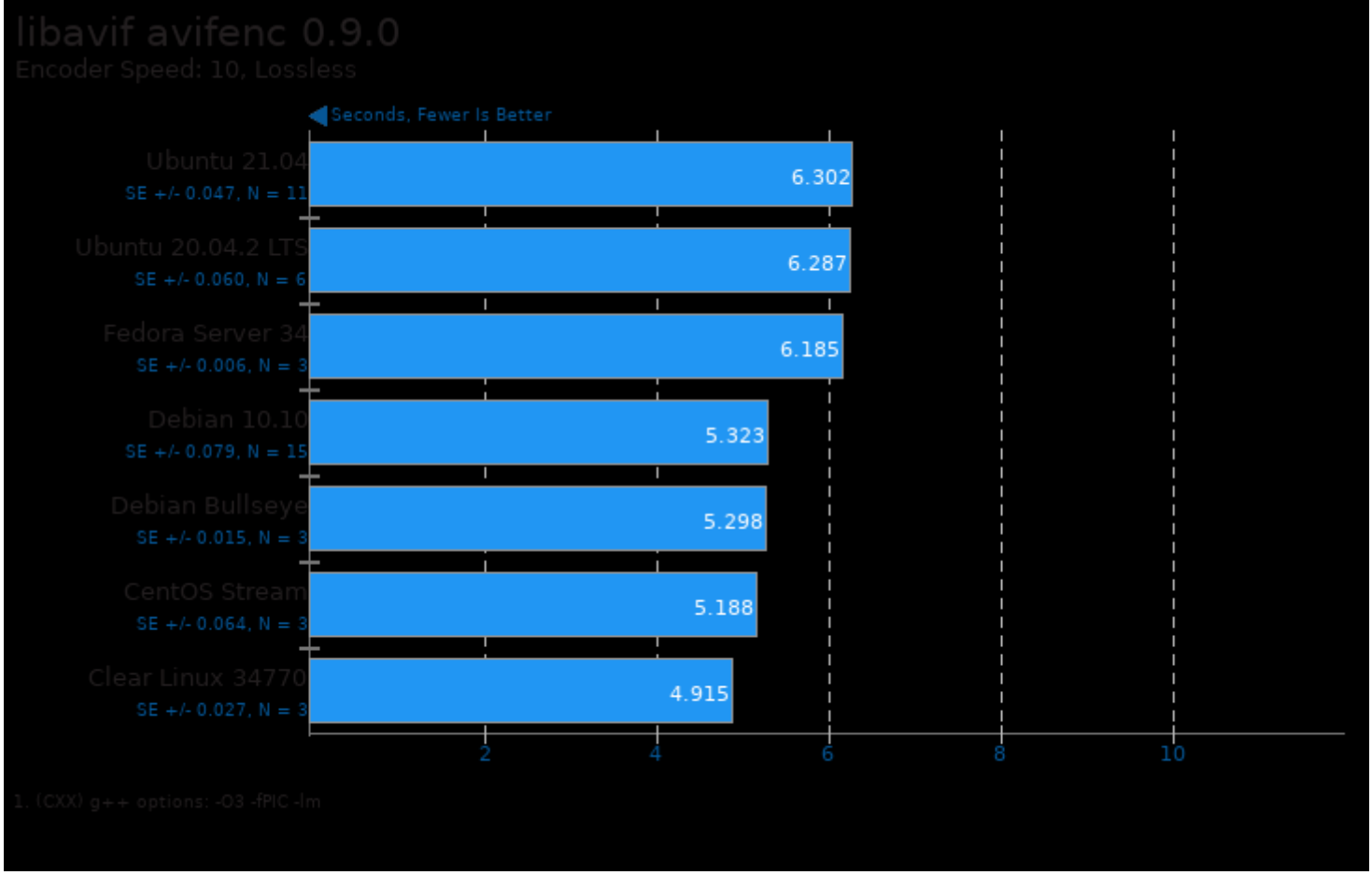

SVT-VP9 0.3
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 2.63, N = 5
236.32
Ubuntu 21.04
SE +/- 0.95, N = 3
241.51
Ubuntu 20.04.2 LTS
SE +/- 2.34, N = 3
264.89
Fedora Server 34
SE +/- 2.18, N = 3
272.55
Clear Linux 34770
SE +/- 2.72, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
273.38
CentOS Stream
SE +/- 2.06, N = 3
274.02
Debian 10.10
SE +/- 2.94, N = 3
297.41
60
120
180
240
300
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm
VP9 libvpx Encoding 1.10.0
Speed: Speed 0 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Debian 10.10
SE +/- 0.01, N = 3
-U_FORTIFY_SOURCE
6.05
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
-U_FORTIFY_SOURCE
6.16
Ubuntu 21.04
SE +/- 0.01, N = 3
-U_FORTIFY_SOURCE
6.23
CentOS Stream
SE +/- 0.03, N = 3
-U_FORTIFY_SOURCE
6.48
Debian Bullseye
SE +/- 0.05, N = 3
-U_FORTIFY_SOURCE
6.52
Fedora Server 34
SE +/- 0.04, N = 3
-U_FORTIFY_SOURCE
6.89
Clear Linux 34770
SE +/- 0.01, N = 3
-pipe -fexceptions -fstack-protector -flat-lto-objects -fno-trapping-math -mtune=skylake
7.25
2
4
6
8
10
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -std=gnu++11

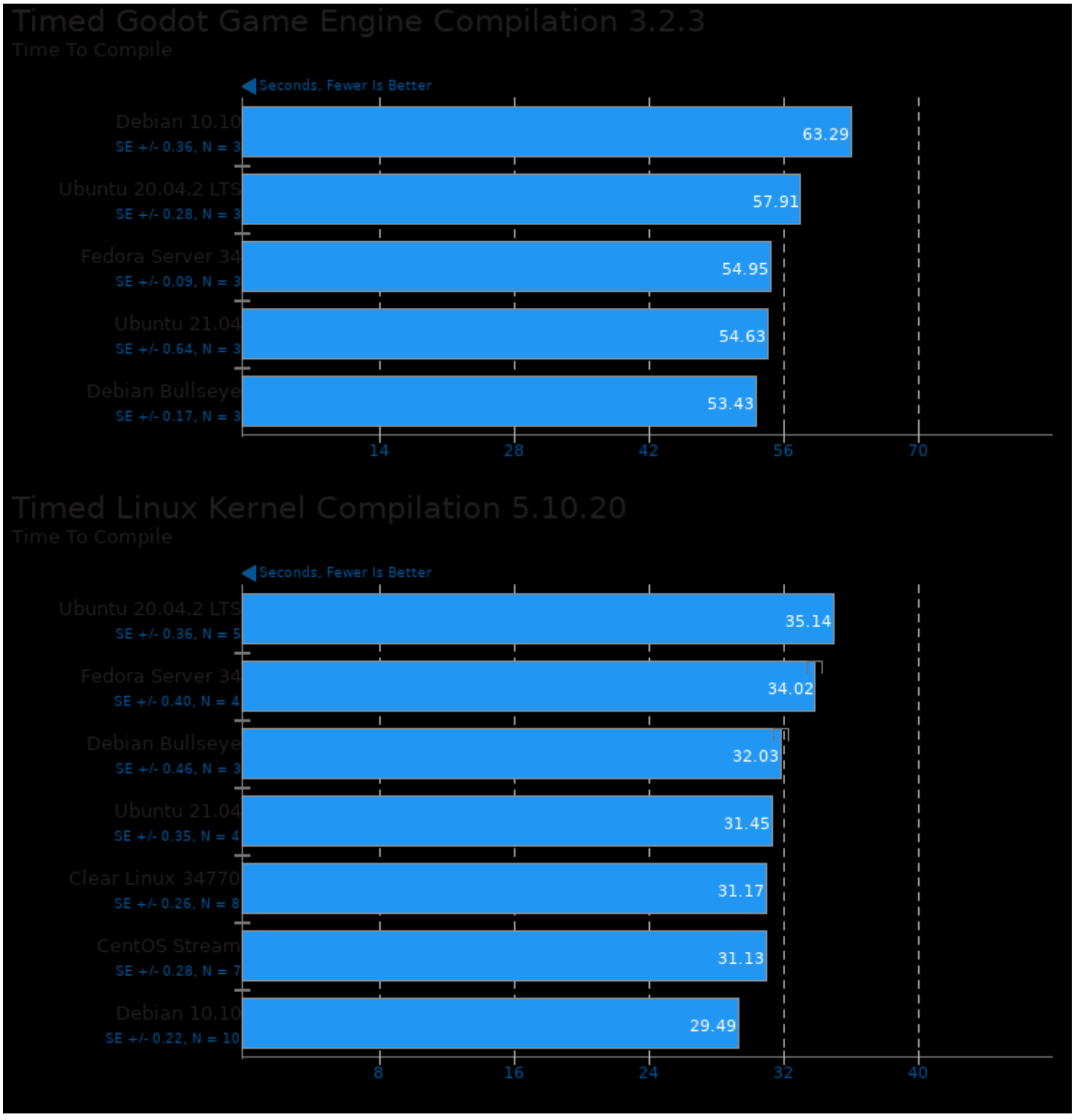

VP9 libvpx Encoding 1.10.0
Speed: Speed 5 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Debian Bullseye
SE +/- 0.04, N = 3
-U_FORTIFY_SOURCE
9.31
Debian 10.10
SE +/- 0.05, N = 3
-U_FORTIFY_SOURCE
13.03
Ubuntu 20.04.2 LTS
SE +/- 0.07, N = 3
-U_FORTIFY_SOURCE
13.63
Ubuntu 21.04
SE +/- 0.09, N = 3
-U_FORTIFY_SOURCE
14.60
CentOS Stream
SE +/- 0.10, N = 15
-U_FORTIFY_SOURCE
14.89
Fedora Server 34
SE +/- 0.13, N = 3
-U_FORTIFY_SOURCE
16.23
Clear Linux 34770
SE +/- 0.11, N = 3
-pipe -fexceptions -fstack-protector -ffat-lto-objects -fno-trapping-math -mtune=skylake
17.60
4
8
12
16
20
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -std=gnu++11
Intel Open Image Denoise 1.4.0
Run: RT.hdr_alb_nrm.3840x2160
Images / Sec, More Is Better
Debian 10.10
SE +/- 0.00, N = 3
0.87
Debian Bullseye
SE +/- 0.01, N = 3
0.89
Ubuntu 21.04
SE +/- 0.01, N = 3
0.89
Ubuntu 20.04.2 LTS
SE +/- 0.00, N = 3
0.90
CentOS Stream
SE +/- 0.00, N = 3
0.94
Fedora Server 34
SE +/- 0.00, N = 3
0.96
Clear Linux 34770
SE +/- 0.00, N = 3
0.97
0.2183
0.4366
0.6549
0.8732
1.0915

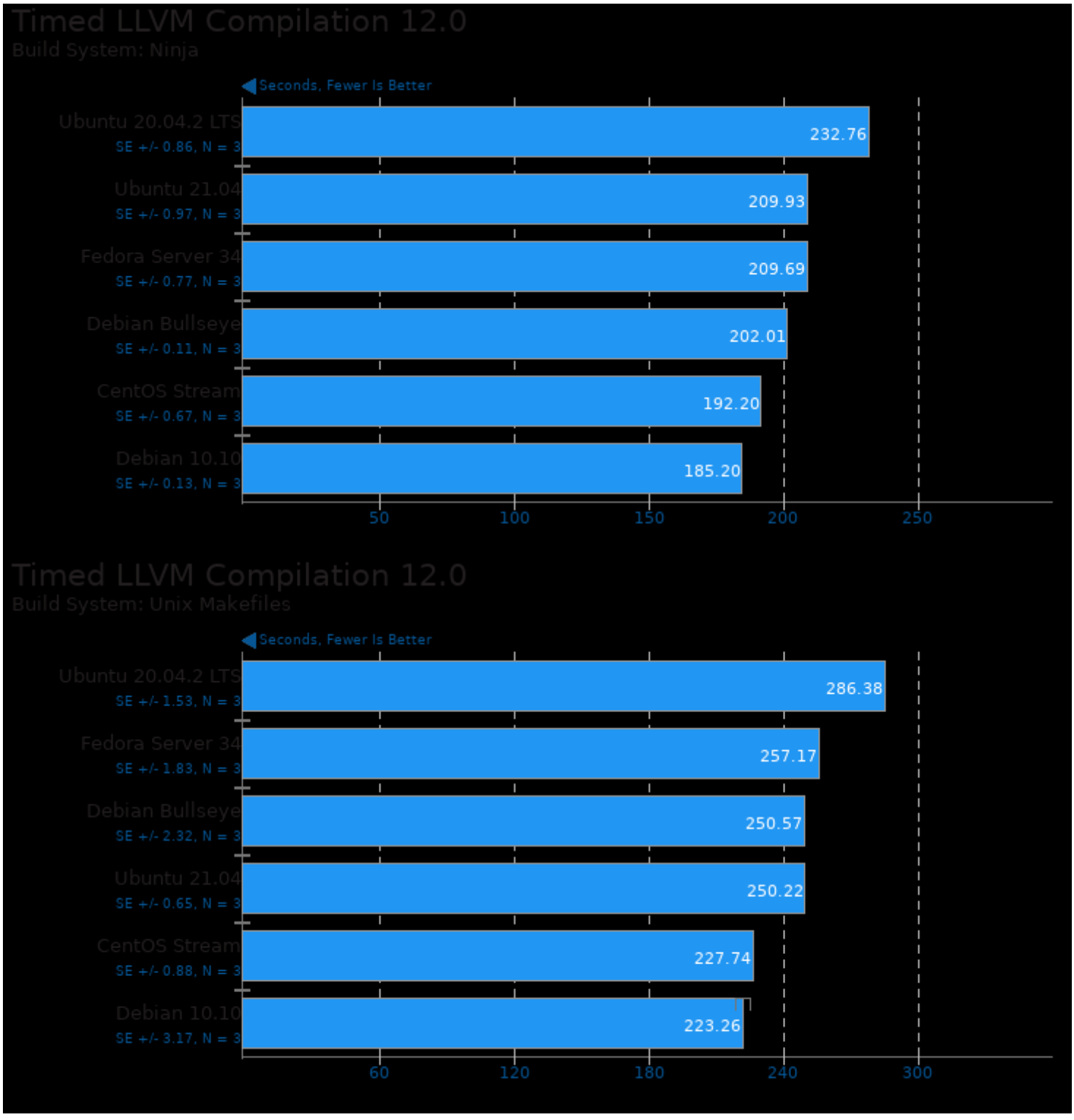

Intel Open Image Denoise 1.4.0
Run: RT.ldr_alb_nrm.3840x2160
Images / Sec, More Is Better
Debian 10.10
SE +/- 0.00, N = 3
0.87
Ubuntu 21.04
SE +/- 0.00, N = 3
0.89
Ubuntu 20.04.2 LTS
SE +/- 0.00, N = 3
0.90
Debian Bullseye
SE +/- 0.01, N = 6
0.94
CentOS Stream
SE +/- 0.00, N = 3
0.95
Fedora Server 34
SE +/- 0.00, N = 3
0.96
Clear Linux 34770
SE +/- 0.00, N = 3
0.97
0.2183
0.4366
0.6549
0.8732
1.0915
Intel Open Image Denoise 1.4.0
Run: RTLightmap.hdr.4096x4096
Images / Sec, More Is Better
Debian 10.10
SE +/- 0.00, N = 3
0.44
Ubuntu 20.04.2 LTS
SE +/- 0.00, N = 3
0.45
Ubuntu 21.04
SE +/- 0.00, N = 3
0.45
Debian Bullseye
SE +/- 0.00, N = 3
0.46
CentOS Stream
SE +/- 0.00, N = 3
0.47
Fedora Server 34
SE +/- 0.00, N = 3
0.48
Clear Linux 34770
SE +/- 0.01, N = 3
0.48
0.108
0.216
0.324
0.432
0.54

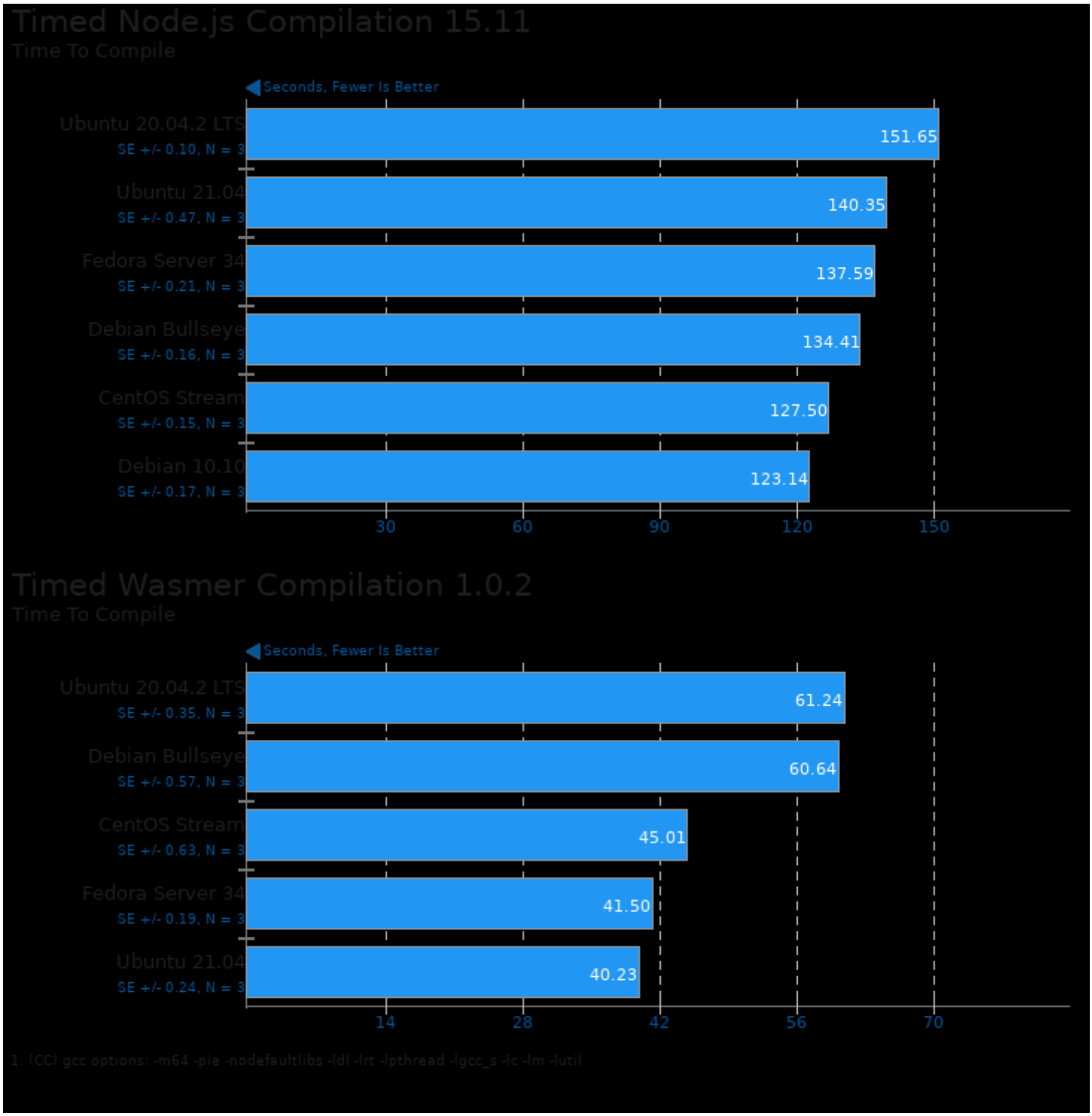

OpenVKL 0.9
Benchmark: vklBenchmark
Items / Sec, More Is Better
Debian 10.10
SE +/- 2.31, N = 3
MIN: 1 / MAX: 852
282
Debian Bullseye
SE +/- 3.51, N = 3
MIN: 1 / MAX: 1036
287
Clear Linux 34770
SE +/- 2.66, N = 7
MIN: 1 / MAX: 1157
292
CentOS Stream
SE +/- 4.35, N = 9
MIN: 1 / MAX: 1453
293
Fedora Server 34
SE +/- 1.45, N = 3
MIN: 1 / MAX: 896
296
Ubuntu 20.04.2 LTS
SE +/- 4.05, N = 9
MIN: 1 / MAX: 1469
297
Ubuntu 21.04
SE +/- 3.71, N = 3
MIN: 1 / MAX: 1427
319
70
140
210
280
350
libavif avifenc 0.9.0
Encoder Speed: 10
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.018, N = 3
3.817
Ubuntu 21.04
SE +/- 0.040, N = 5
3.785
Fedora Server 34
SE +/- 0.030, N = 9
3.620
Debian Bullseye
SE +/- 0.021, N = 15
2.873
CentOS Stream
SE +/- 0.024, N = 15
2.817
Debian 10.10
SE +/- 0.037, N = 3
2.785
Clear Linux 34770
SE +/- 0.031, N = 4
2.609
0.8588
1.7176
2.5764
3.4352
4.294
1. (CXX) g++ options: -O3 -fPIC -lm

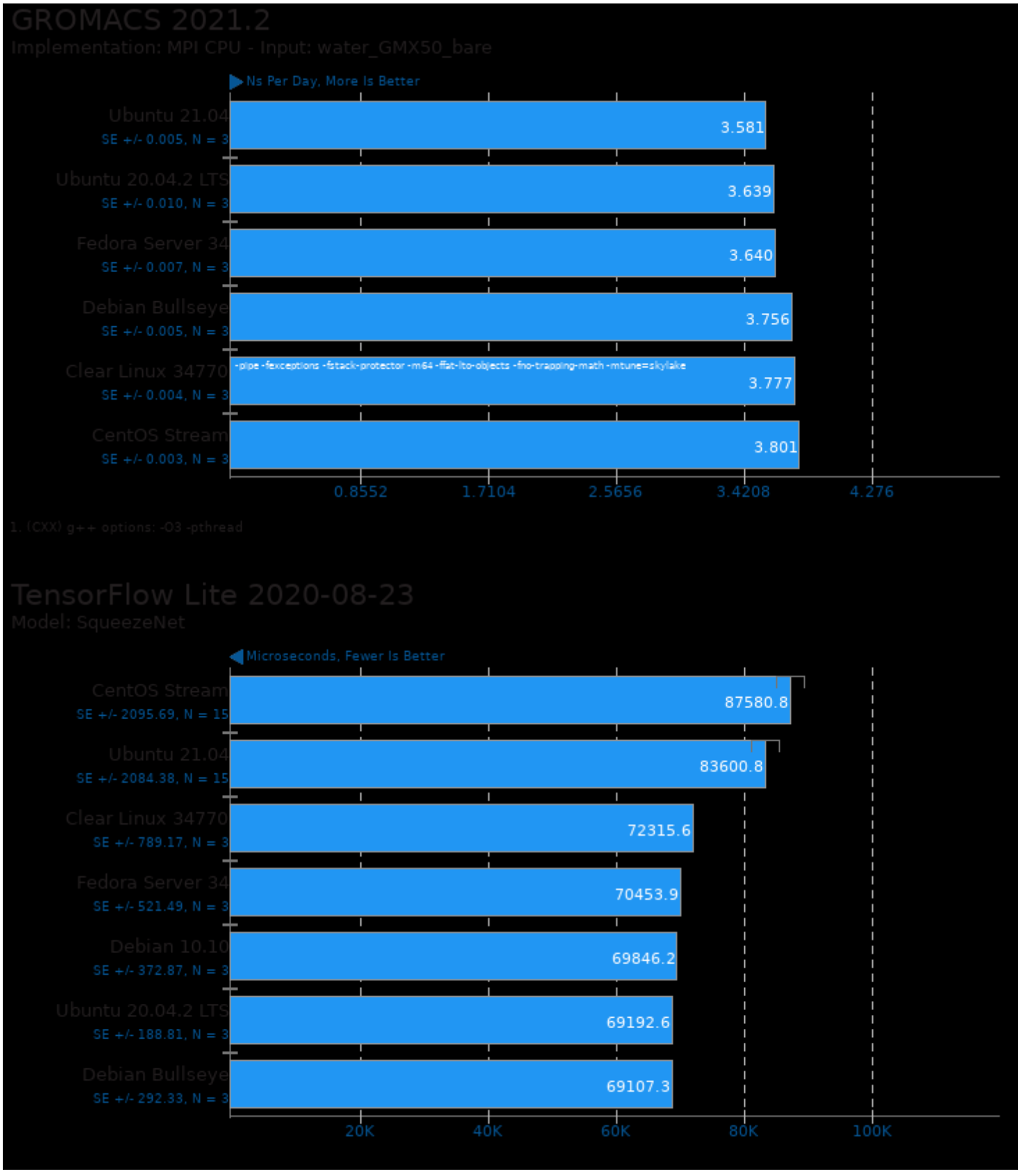

libavif avifenc 0.9.0
Encoder Speed: 6, Lossless
Seconds, Fewer Is Better
Ubuntu 21.04
SE +/- 0.23, N = 3
30.52
Ubuntu 20.04.2 LTS
SE +/- 0.20, N = 3
30.22
Fedora Server 34
SE +/- 0.02, N = 3
27.88
Debian Bullseye
SE +/- 0.09, N = 3
27.40
Debian 10.10
SE +/- 0.31, N = 3
27.24
CentOS Stream
SE +/- 0.11, N = 3
27.00
Clear Linux 34770
SE +/- 0.04, N = 3
26.15
7
14
21
28
35
1. (CXX) g++ options: -O3 -fPIC -lm

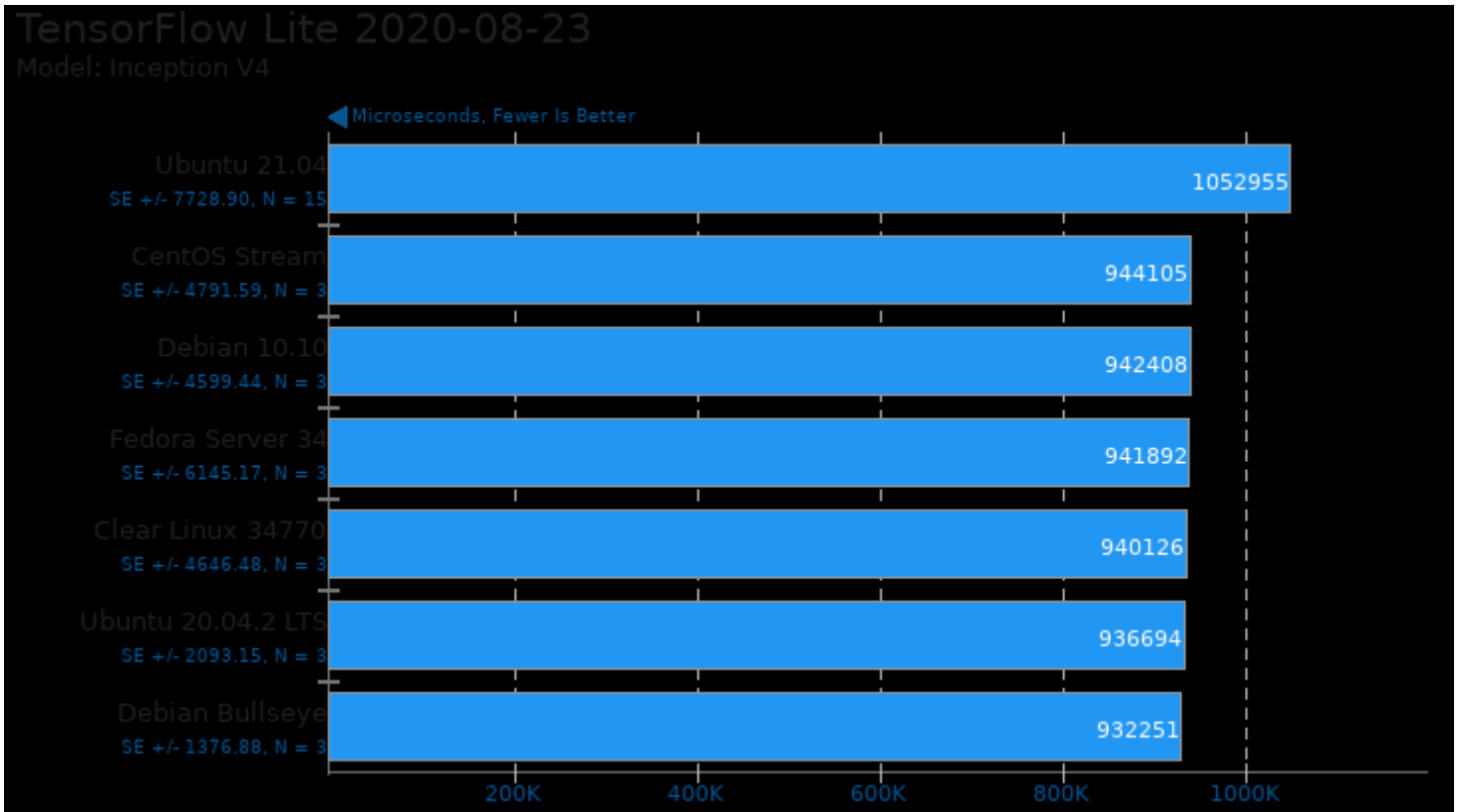

libavif avifenc 0.9.0
Encoder Speed: 10, Lossless
Seconds, Fewer Is Better
Ubuntu 21.04
SE +/- 0.047, N = 11
6.302
Ubuntu 20.04.2 LTS
SE +/- 0.060, N = 6
6.287
Fedora Server 34
SE +/- 0.006, N = 3
6.185
Debian 10.10
SE +/- 0.079, N = 15
5.323
Debian Bullseye
SE +/- 0.015, N = 3
5.298
CentOS Stream
SE +/- 0.064, N = 3
5.188
Clear Linux 34770
SE +/- 0.027, N = 3
4.915
2
4
6
8
10
1. (CXX) g++ options: -O3 -fPIC -lm

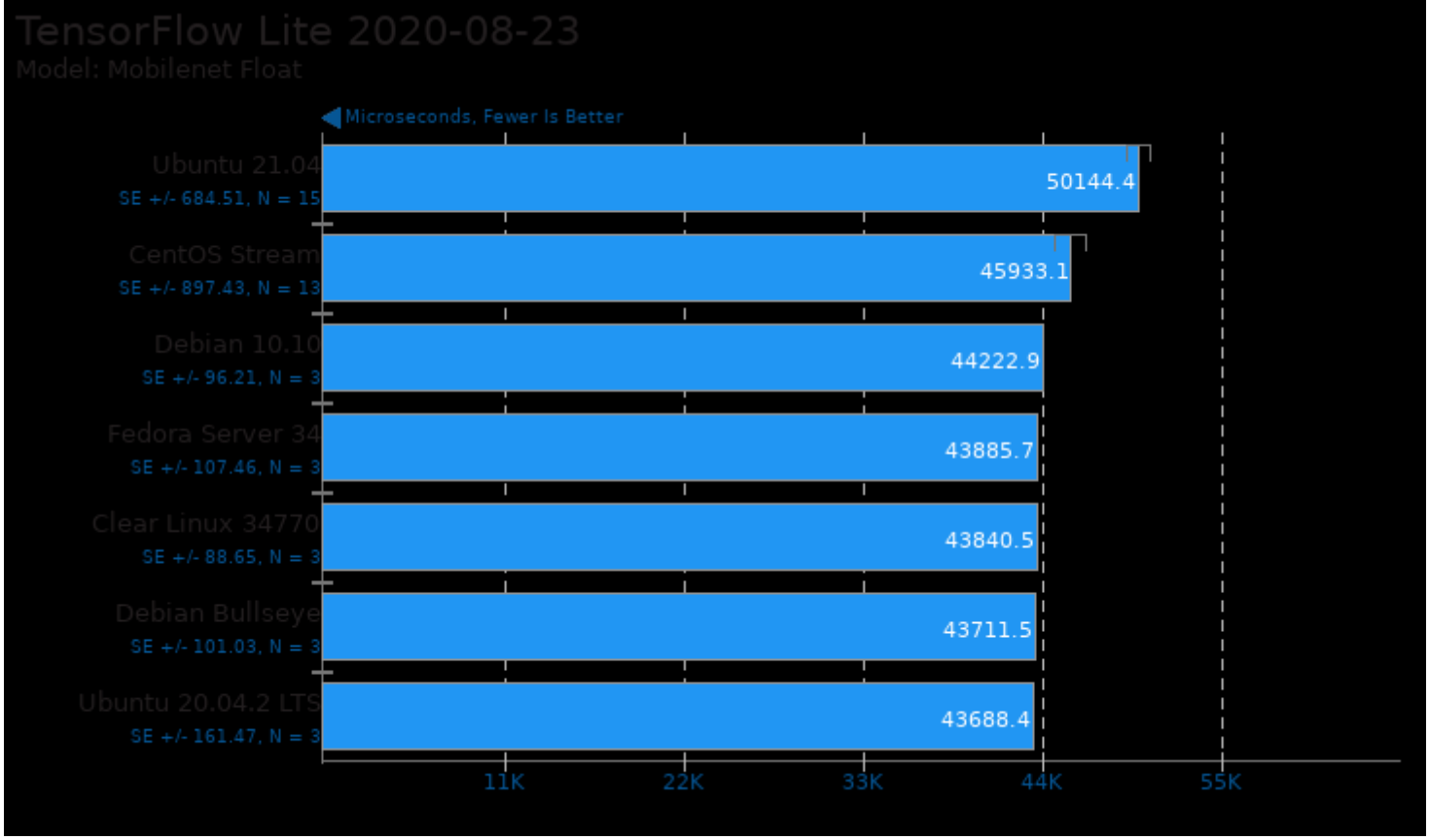

Timed Godot Game Engine Compilation 3.2.3
Time To Compile
Seconds, Fewer Is Better
Debian 10.10
SE +/- 0.36, N = 3
63.29
Ubuntu 20.04.2 LTS
SE +/- 0.28, N = 3
57.91
Fedora Server 34
SE +/- 0.09, N = 3
54.95
Ubuntu 21.04
SE +/- 0.64, N = 3
54.63
Debian Bullseye
SE +/- 0.17, N = 3
53.43
14
28
42
56
70
Timed Linux Kernel Compilation 5.10.20
Time To Compile
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.36, N = 5
35.14
Fedora Server 34
SE +/- 0.40, N = 4
34.02
Debian Bullseye
SE +/- 0.46, N = 3
32.03
Ubuntu 21.04
SE +/- 0.35, N = 4
31.45
Clear Linux 34770
SE +/- 0.26, N = 8
31.17
CentOS Stream
SE +/- 0.28, N = 7
31.13
Debian 10.10
SE +/- 0.22, N = 10
29.49
8
16
24
32
40

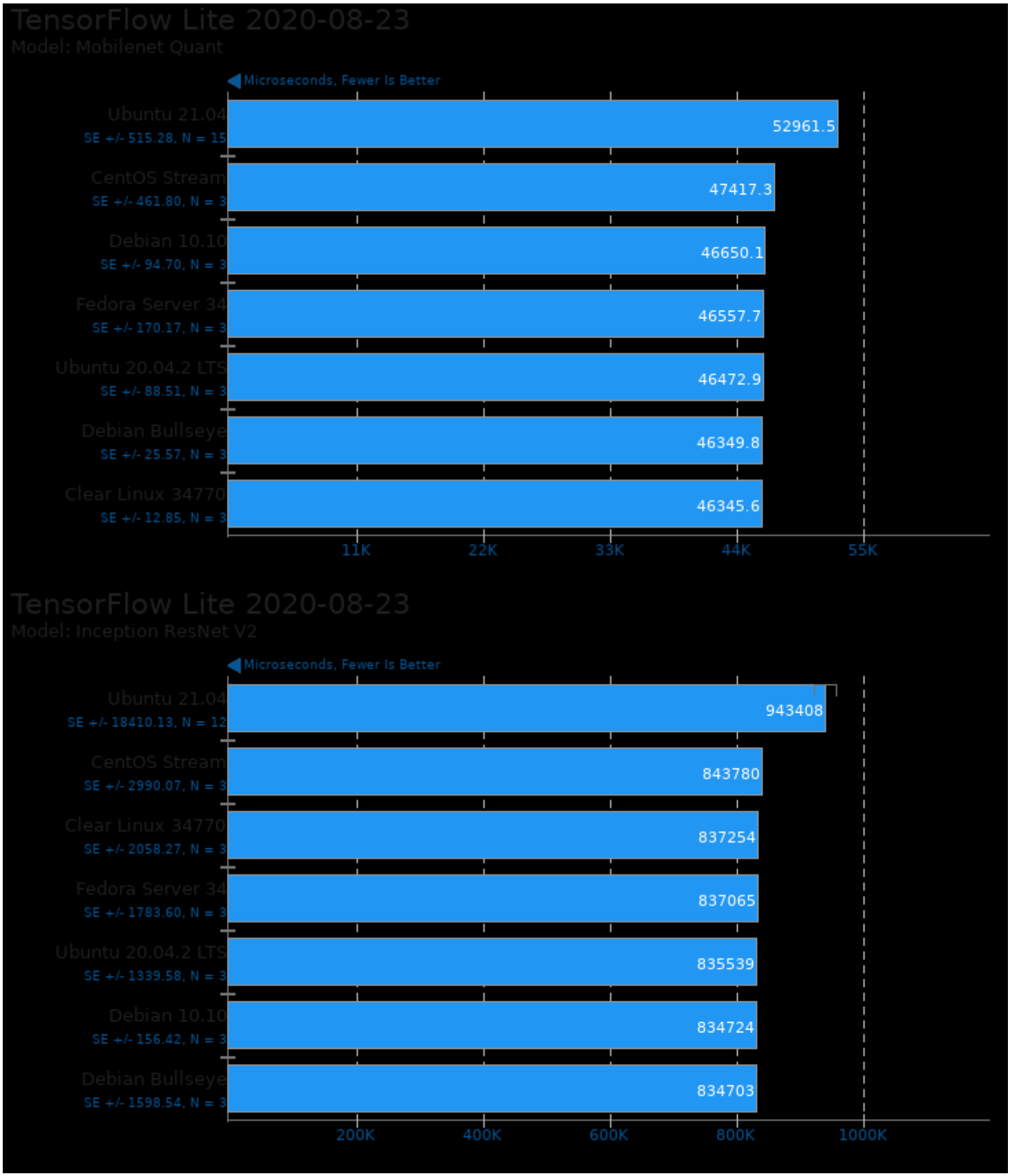

Timed LLVM Compilation 12.0
Build System: Ninja
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.86, N = 3
232.76
Ubuntu 21.04
SE +/- 0.97, N = 3
209.93
Fedora Server 34
SE +/- 0.77, N = 3
209.69
Debian Bullseye
SE +/- 0.11, N = 3
202.01
CentOS Stream
SE +/- 0.67, N = 3
192.20
Debian 10.10
SE +/- 0.13, N = 3
185.20
50
100
150
200
250
Timed LLVM Compilation 12.0
Build System: Unix Makefiles
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 1.53, N = 3
286.38
Fedora Server 34
SE +/- 1.83, N = 3
257.17
Debian Bullseye
SE +/- 2.32, N = 3
250.57
Ubuntu 21.04
SE +/- 0.65, N = 3
250.22
CentOS Stream
SE +/- 0.88, N = 3
227.74
Debian 10.10
SE +/- 3.17, N = 3
223.26
60
120
180
240
300

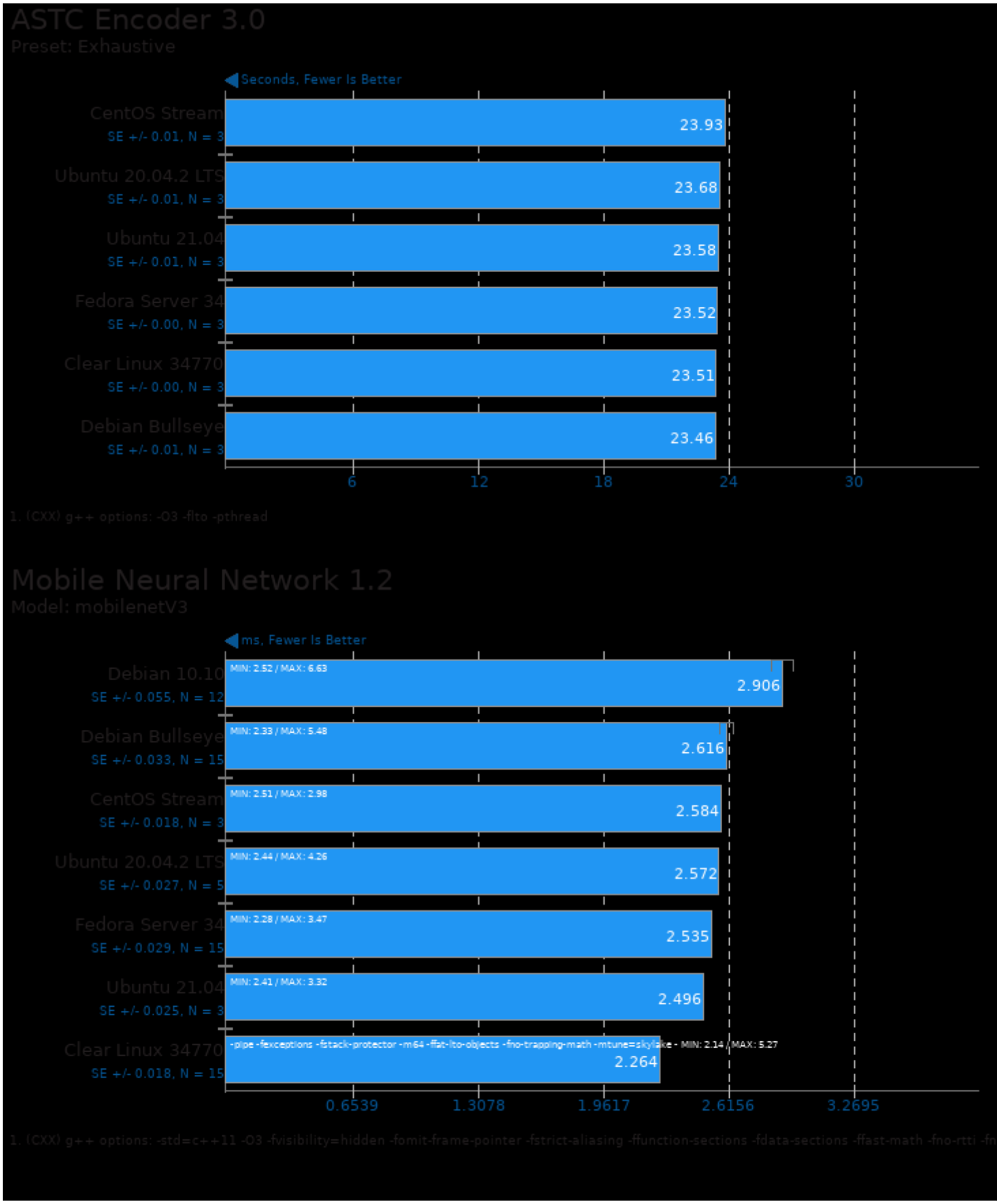

Timed Node.js Compilation 15.11
Time To Compile
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.10, N = 3
151.65
Ubuntu 21.04
SE +/- 0.47, N = 3
140.35
Fedora Server 34
SE +/- 0.21, N = 3
137.59
Debian Bullseye
SE +/- 0.16, N = 3
134.41
CentOS Stream
SE +/- 0.15, N = 3
127.50
Debian 10.10
SE +/- 0.17, N = 3
123.14
30
60
90
120
150
Timed Wasmer Compilation 1.0.2
Time To Compile
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.35, N = 3
61.24
Debian Bullseye
SE +/- 0.57, N = 3
60.64
CentOS Stream
SE +/- 0.63, N = 3
45.01
Fedora Server 34
SE +/- 0.19, N = 3
41.50
Ubuntu 21.04
SE +/- 0.24, N = 3
40.23
14
28
42
56
70
1. (CC) gcc options: -m64 -pie -nodefaultlibs -ldl -lrt -lpthread -lgcc_s -lc -lm -lutil

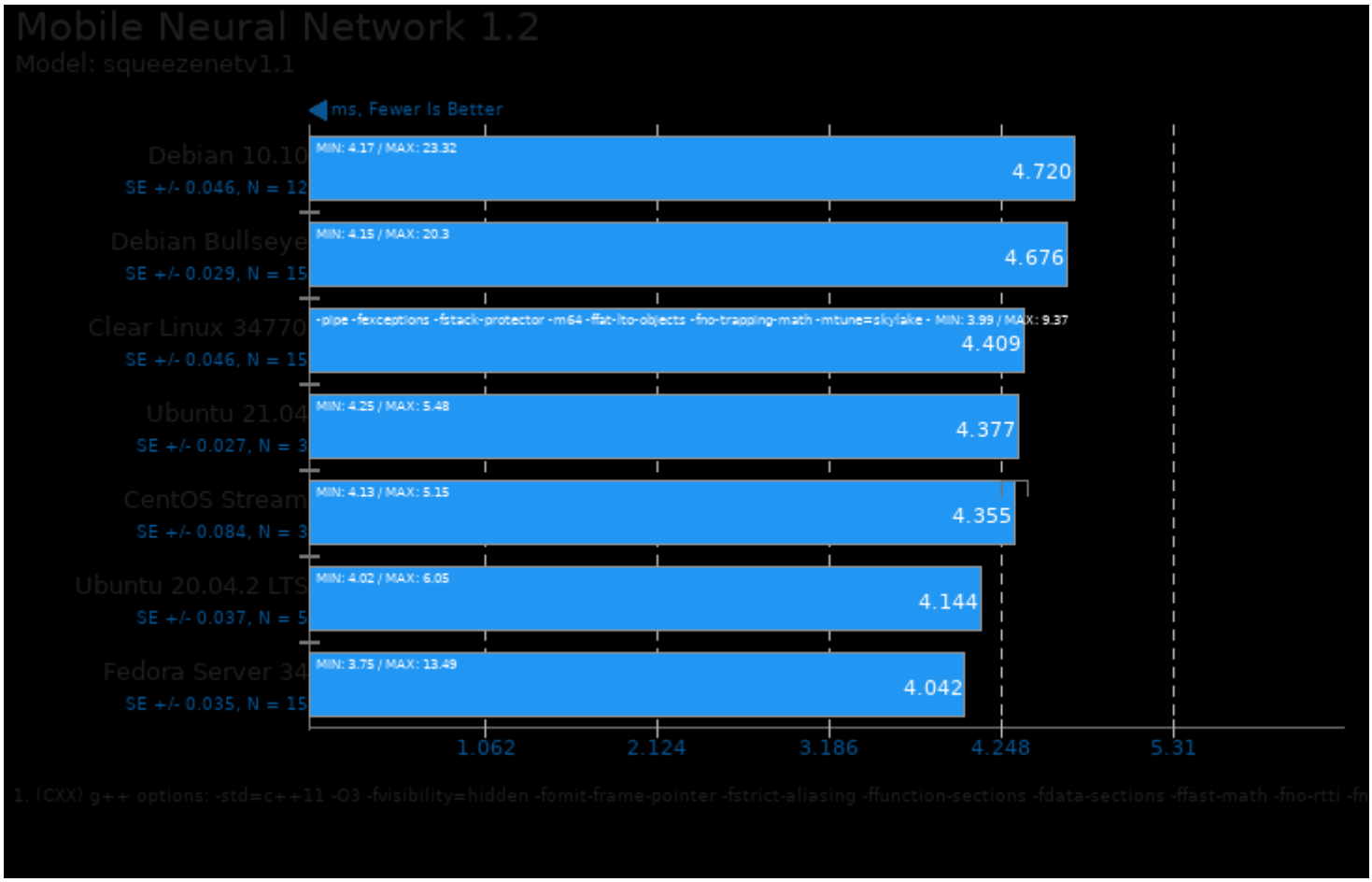

GROMACS 2021.2
Implementation: MPI CPU - Input: water_GMX50_bare
Ns Per Day, More Is Better
Ubuntu 21.04
SE +/- 0.005, N = 3
3.581
Ubuntu 20.04.2 LTS
SE +/- 0.010, N = 3
3.639
Fedora Server 34
SE +/- 0.007, N = 3
3.640
Debian Bullseye
SE +/- 0.005, N = 3
3.756
Clear Linux 34770
SE +/- 0.004, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
3.777
CentOS Stream
SE +/- 0.003, N = 3
3.801
0.8552
1.7104
2.5656
3.4208
4.276
1. (CXX) g++ options: -O3 -pthread
TensorFlow Lite 2020-08-23
Model: SqueezeNet
Microseconds, Fewer Is Better
CentOS Stream
SE +/- 2095.69, N = 15
87580.8
Ubuntu 21.04
SE +/- 2084.38, N = 15
83600.8
Clear Linux 34770
SE +/- 789.17, N = 3
72315.6
Fedora Server 34
SE +/- 521.49, N = 3
70453.9
Debian 10.10
SE +/- 372.87, N = 3
69846.2
Ubuntu 20.04.2 LTS
SE +/- 188.81, N = 3
69192.6
Debian Bullseye
SE +/- 292.33, N = 3
69107.3
20K
40K
60K
80K
100K

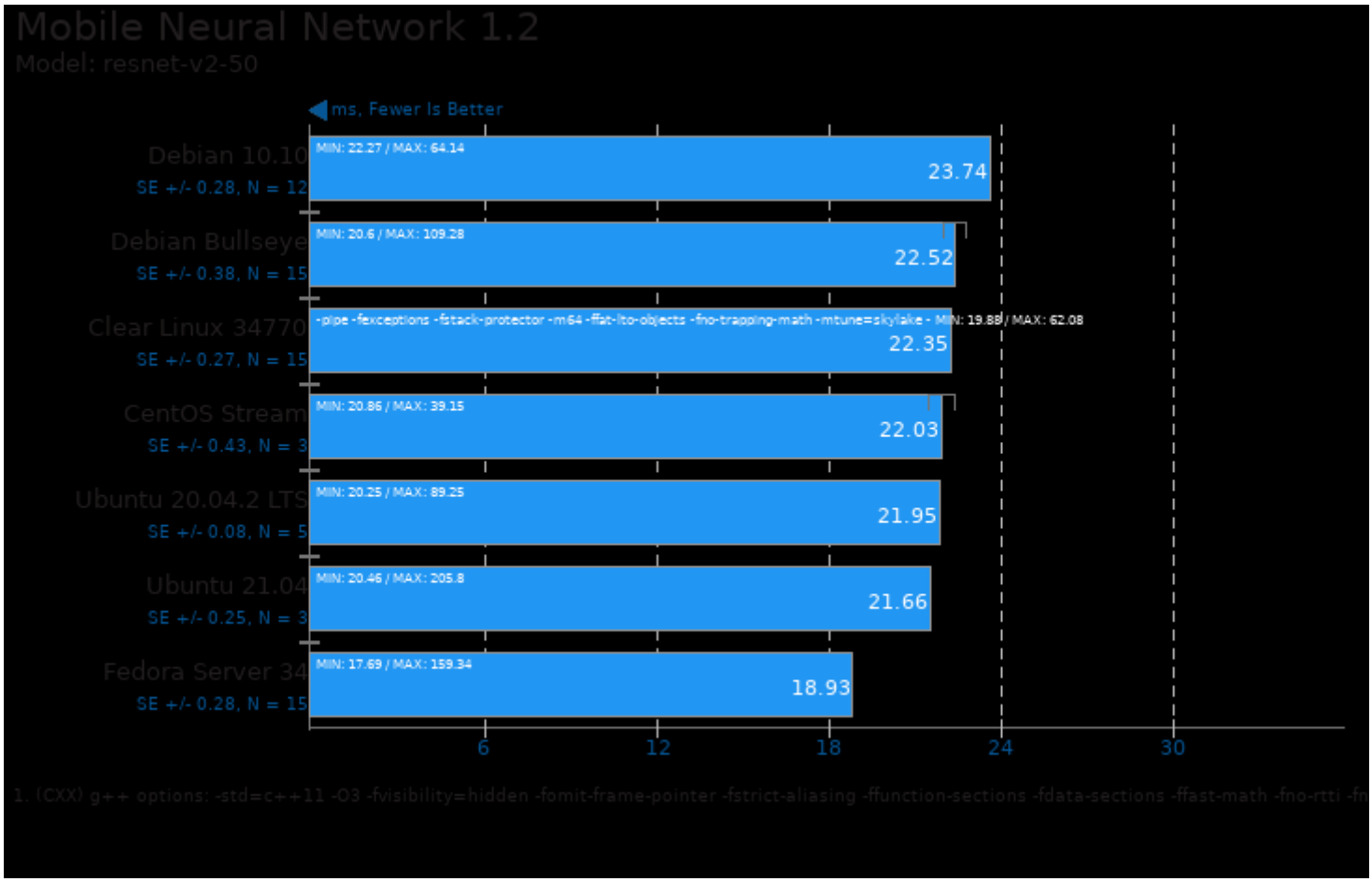

TensorFlow Lite 2020-08-23
Model: Inception V4
Microseconds, Fewer Is Better
Ubuntu 21.04
SE +/- 7728.90, N = 15
1052955
CentOS Stream
SE +/- 4791.59, N = 3
944105
Debian 10.10
SE +/- 4599.44, N = 3
942408
Fedora Server 34
SE +/- 6145.17, N = 3
941892
Clear Linux 34770
SE +/- 4646.48, N = 3
940126
Ubuntu 20.04.2 LTS
SE +/- 2093.15, N = 3
936694
Debian Bullseye
SE +/- 1376.88, N = 3
932251
200K
400K
600K
800K
1000K

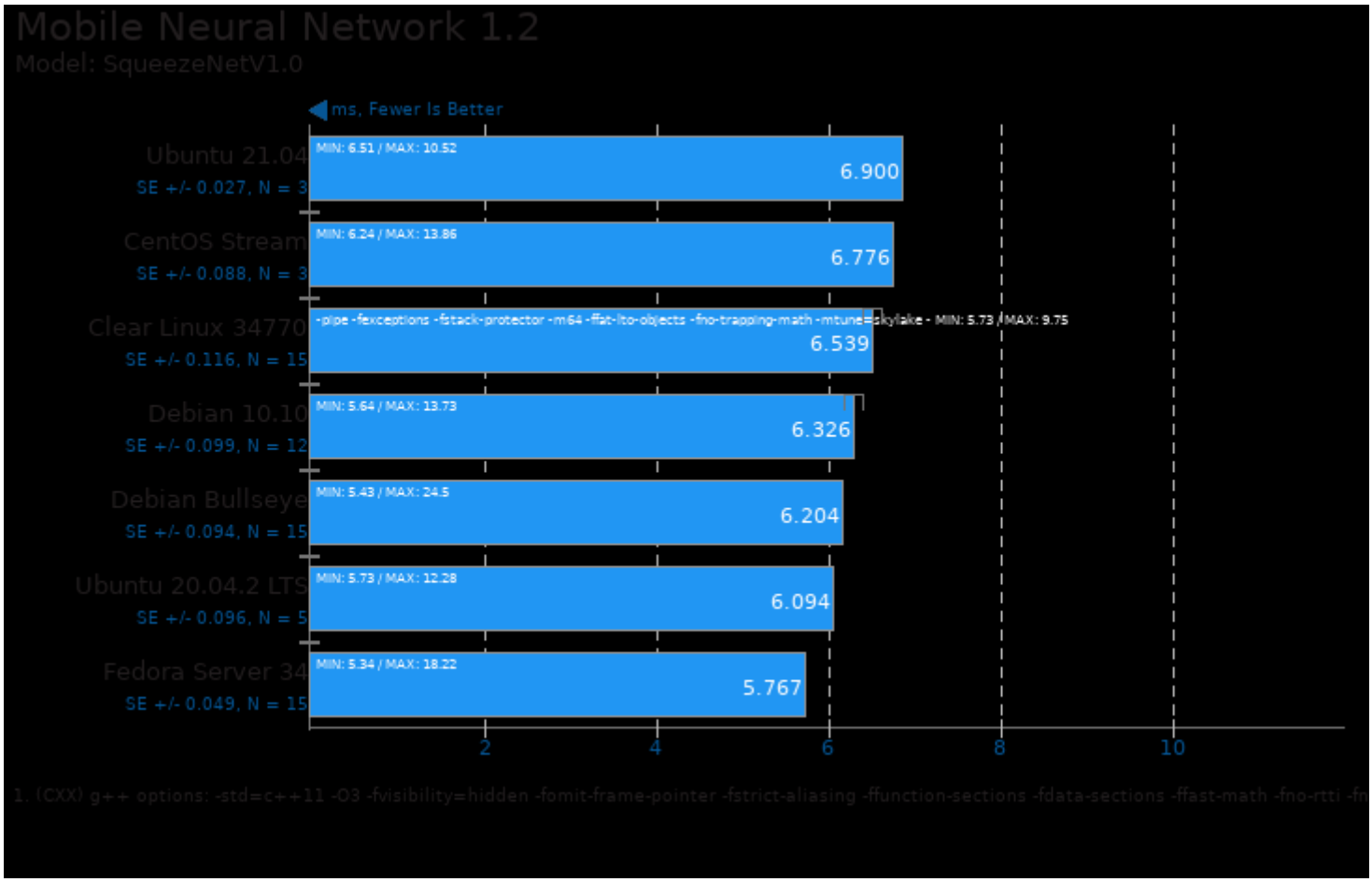

TensorFlow Lite 2020-08-23
Model: Mobilenet Float
Microseconds, Fewer Is Better
Ubuntu 21.04
SE +/- 684.51, N = 15
50144.4
CentOS Stream
SE +/- 897.43, N = 13
45933.1
Debian 10.10
SE +/- 96.21, N = 3
44222.9
Fedora Server 34
SE +/- 107.46, N = 3
43885.7
Clear Linux 34770
SE +/- 88.65, N = 3
43840.5
Debian Bullseye
SE +/- 101.03, N = 3
43711.5
Ubuntu 20.04.2 LTS
SE +/- 161.47, N = 3
43688.4
11K
22K
33K
44K
55K

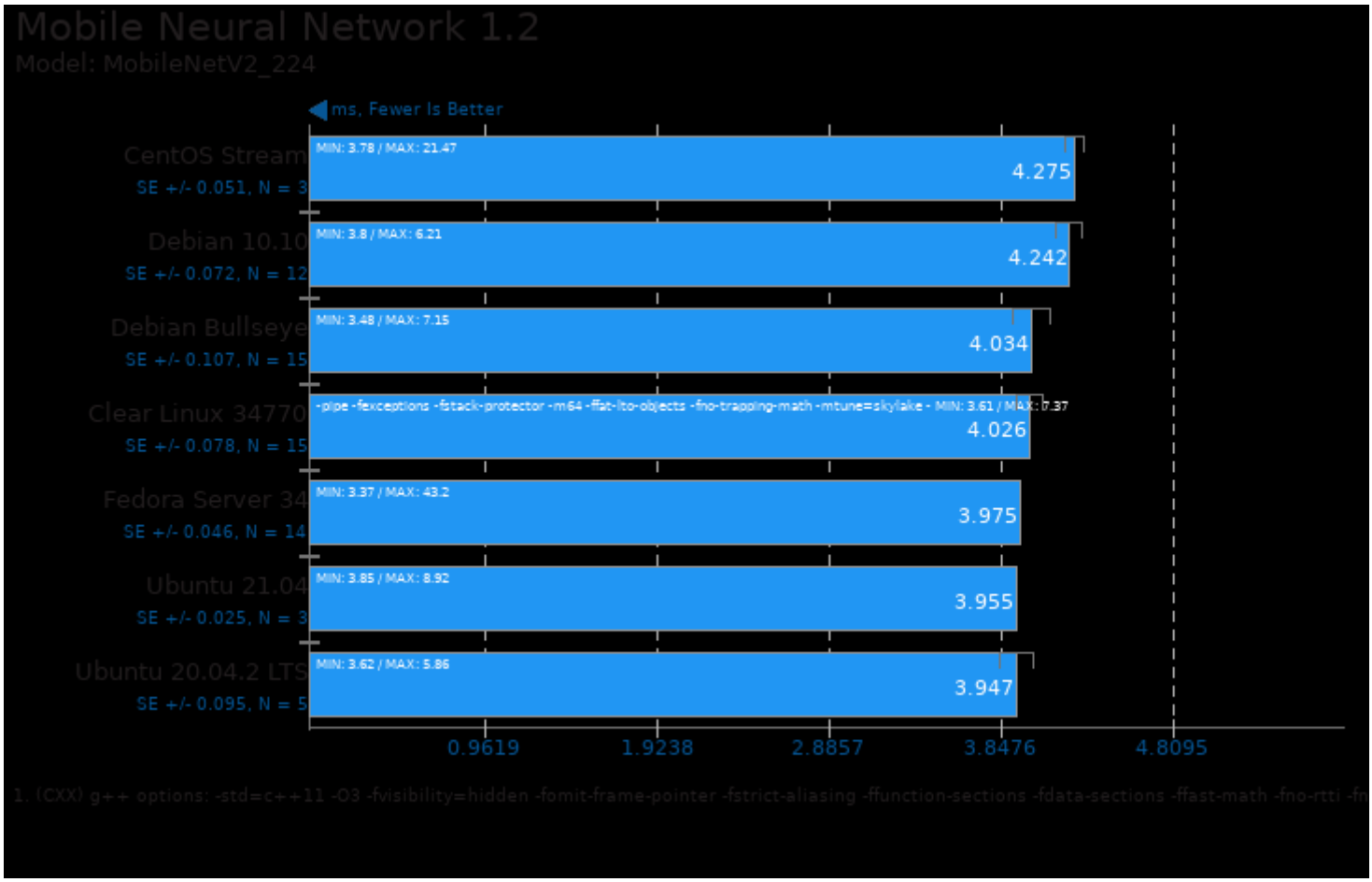

TensorFlow Lite 2020-08-23
Model: Mobilenet Quant
Microseconds, Fewer Is Better
Ubuntu 21.04
SE +/- 515.28, N = 15
52961.5
CentOS Stream
SE +/- 461.80, N = 3
47417.3
Debian 10.10
SE +/- 94.70, N = 3
46650.1
Fedora Server 34
SE +/- 170.17, N = 3
46557.7
Ubuntu 20.04.2 LTS
SE +/- 88.51, N = 3
46472.9
Debian Bullseye
SE +/- 25.57, N = 3
46349.8
Clear Linux 34770
SE +/- 12.85, N = 3
46345.6
11K
22K
33K
44K
55K
TensorFlow Lite 2020-08-23
Model: Inception ResNet V2
Microseconds, Fewer Is Better
Ubuntu 21.04
SE +/- 18410.13, N = 12
943408
CentOS Stream
SE +/- 2990.07, N = 3
843780
Clear Linux 34770
SE +/- 2058.27, N = 3
837254
Fedora Server 34
SE +/- 1783.60, N = 3
837065
Ubuntu 20.04.2 LTS
SE +/- 1339.58, N = 3
835539
Debian 10.10
SE +/- 156.42, N = 3
834724
Debian Bullseye
SE +/- 1598.54, N = 3
834703
200K
400K
600K
800K
1000K

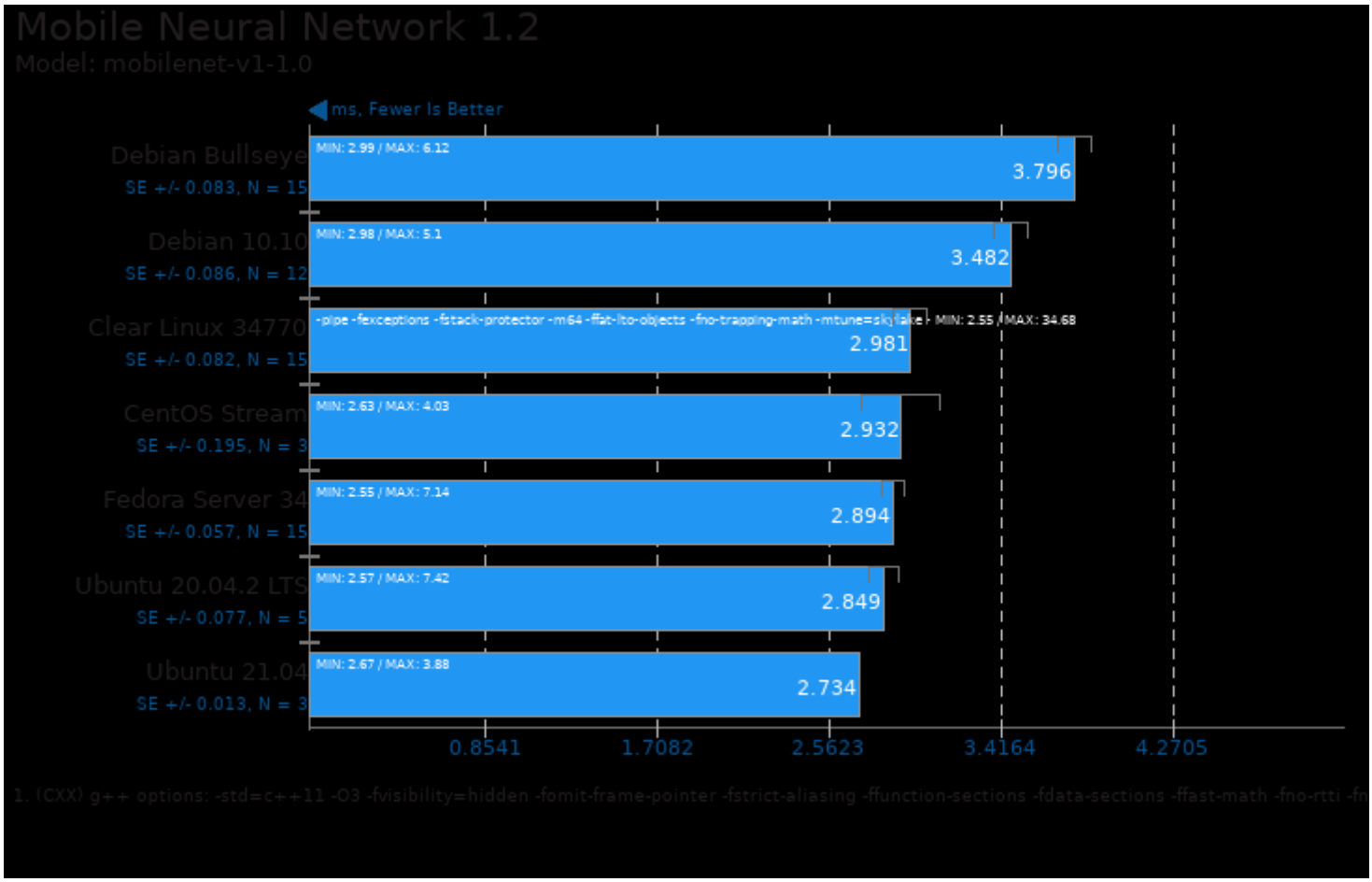

ASTC Encoder 3.0
Preset: Exhaustive
Seconds, Fewer Is Better
CentOS Stream
SE +/- 0.01, N = 3
23.93
Ubuntu 20.04.2 LTS
SE +/- 0.01, N = 3
23.68
Ubuntu 21.04
SE +/- 0.01, N = 3
23.58
Fedora Server 34
SE +/- 0.00, N = 3
23.52
Clear Linux 34770
SE +/- 0.00, N = 3
23.51
Debian Bullseye
SE +/- 0.01, N = 3
23.46
6
12
18
24
30
1. (CXX) g++ options: -O3 -flto -pthread
Mobile Neural Network 1.2
Model: mobilenetV3
ms, Fewer Is Better
Debian 10.10
SE +/- 0.055, N = 12
MIN: 2.52 / MAX: 6.63
2.906
Debian Bullseye
SE +/- 0.033, N = 15
MIN: 2.33 / MAX: 5.48
2.616
CentOS Stream
SE +/- 0.018, N = 3
MIN: 2.51 / MAX: 2.98
2.584
Ubuntu 20.04.2 LTS
SE +/- 0.027, N = 5
MIN: 2.44 / MAX: 4.26
2.572
Fedora Server 34
SE +/- 0.029, N = 15
MIN: 2.28 / MAX: 3.47
2.535
Ubuntu 21.04
SE +/- 0.025, N = 3
MIN: 2.41 / MAX: 3.32
2.496
Clear Linux 34770
SE +/- 0.018, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 2.14 / MAX: 5.27
2.264
0.6539
1.3078
1.9617
2.6156
3.2695
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

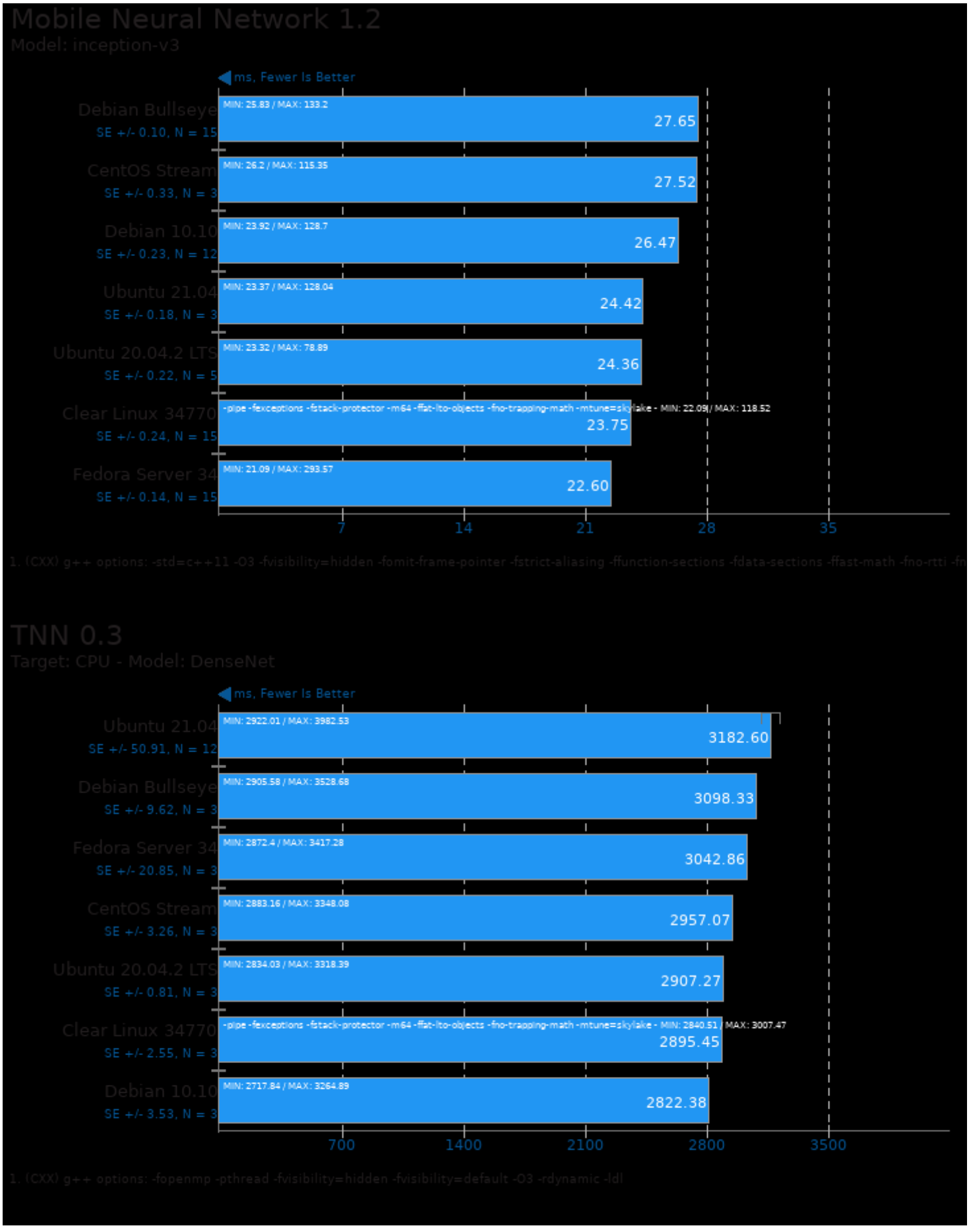

Mobile Neural Network 1.2
Model: squeezenetv1.1
ms, Fewer Is Better
Debian 10.10
SE +/- 0.046, N = 12
MIN: 4.17 / MAX: 23.32
4.720
Debian Bullseye
SE +/- 0.029, N = 15
MIN: 4.15 / MAX: 20.3
4.676
Clear Linux 34770
SE +/- 0.046, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 3.99 / MAX: 9.37
4.409
Ubuntu 21.04
SE +/- 0.027, N = 3
MIN: 4.25 / MAX: 5.48
4.377
CentOS Stream
SE +/- 0.084, N = 3
MIN: 4.13 / MAX: 5.15
4.355
Ubuntu 20.04.2 LTS
SE +/- 0.037, N = 5
MIN: 4.02 / MAX: 6.05
4.144
Fedora Server 34
SE +/- 0.035, N = 15
MIN: 3.75 / MAX: 13.49
4.042
1.062
2.124
3.186
4.248
5.31
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

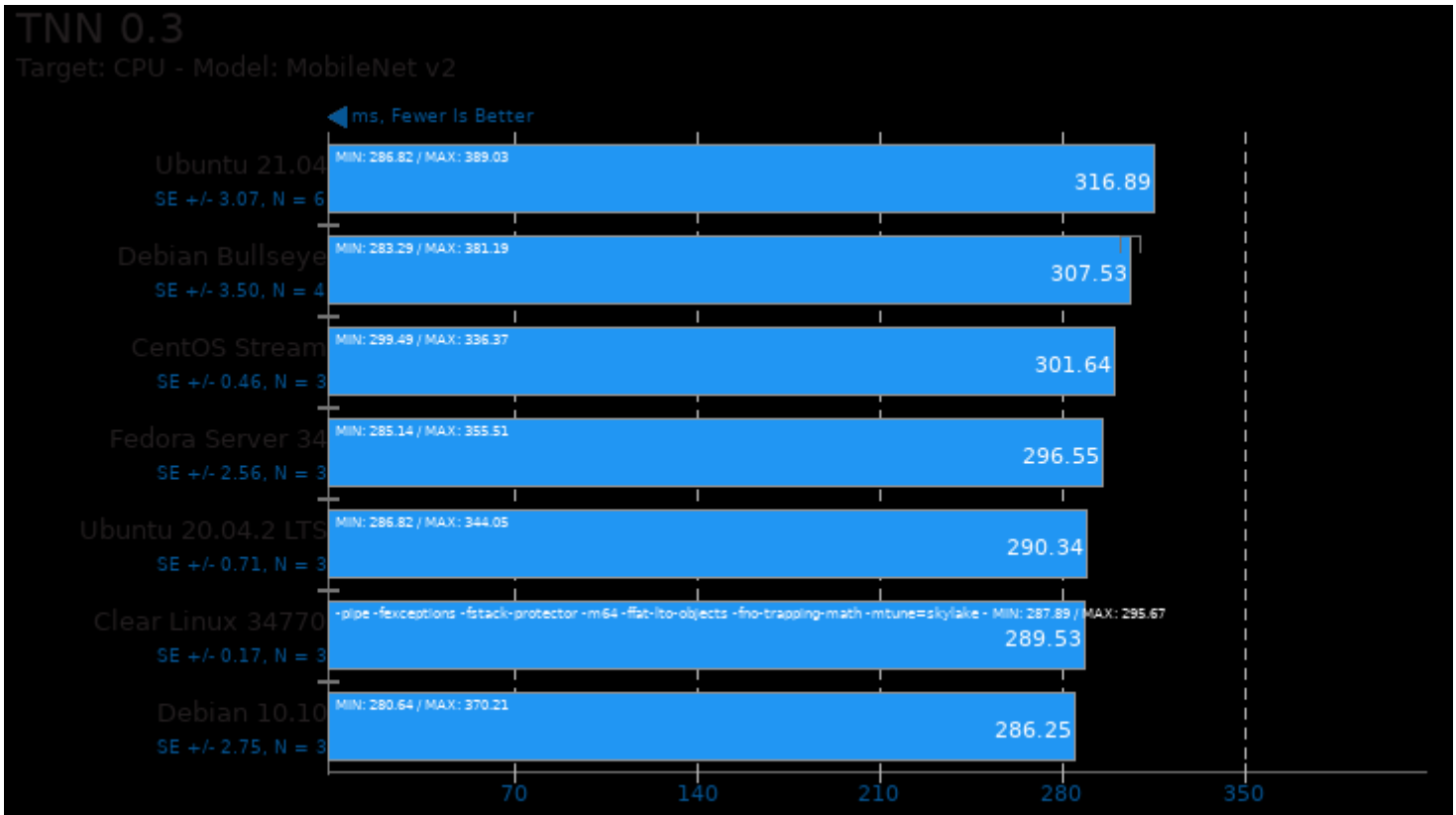

Mobile Neural Network 1.2
Model: resnet-v2-50
ms, Fewer Is Better
Debian 10.10
SE +/- 0.28, N = 12
MIN: 22.27 / MAX: 64.14
23.74
Debian Bullseye
SE +/- 0.38, N = 15
MIN: 20.6 / MAX: 109.28
22.52
Clear Linux 34770
SE +/- 0.27, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 19.88 / MAX: 62.08
22.35
CentOS Stream
SE +/- 0.43, N = 3
MIN: 20.86 / MAX: 39.15
22.03
Ubuntu 20.04.2 LTS
SE +/- 0.08, N = 5
MIN: 20.25 / MAX: 89.25
21.95
Ubuntu 21.04
SE +/- 0.25, N = 3
MIN: 20.46 / MAX: 205.8
21.66
Fedora Server 34
SE +/- 0.28, N = 15
MIN: 17.69 / MAX: 159.34
18.93
6
12
18
24
30
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

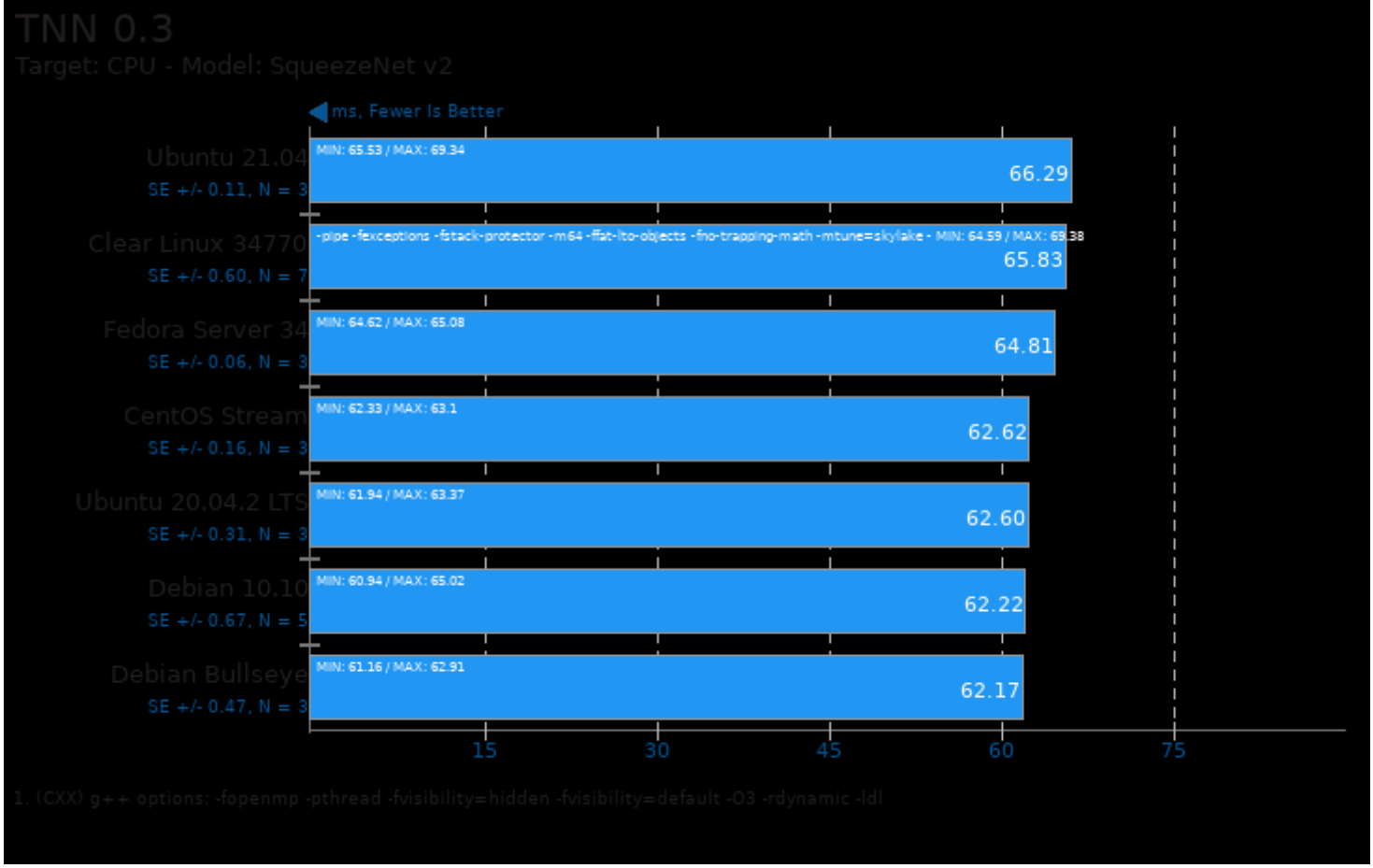

Mobile Neural Network 1.2
Model: SqueezeNetV1.0
ms, Fewer Is Better
Ubuntu 21.04
SE +/- 0.027, N = 3
MIN: 6.51 / MAX: 10.52
6.900
CentOS Stream
SE +/- 0.088, N = 3
MIN: 6.24 / MAX: 13.86
6.776
Clear Linux 34770
SE +/- 0.116, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 5.73 / MAX: 9.75
6.539
Debian 10.10
SE +/- 0.099, N = 12
MIN: 5.64 / MAX: 13.73
6.326
Debian Bullseye
SE +/- 0.094, N = 15
MIN: 5.43 / MAX: 24.5
6.204
Ubuntu 20.04.2 LTS
SE +/- 0.096, N = 5
MIN: 5.73 / MAX: 12.28
6.094
Fedora Server 34
SE +/- 0.049, N = 15
MIN: 5.34 / MAX: 18.22
5.767
2
4
6
8
10
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

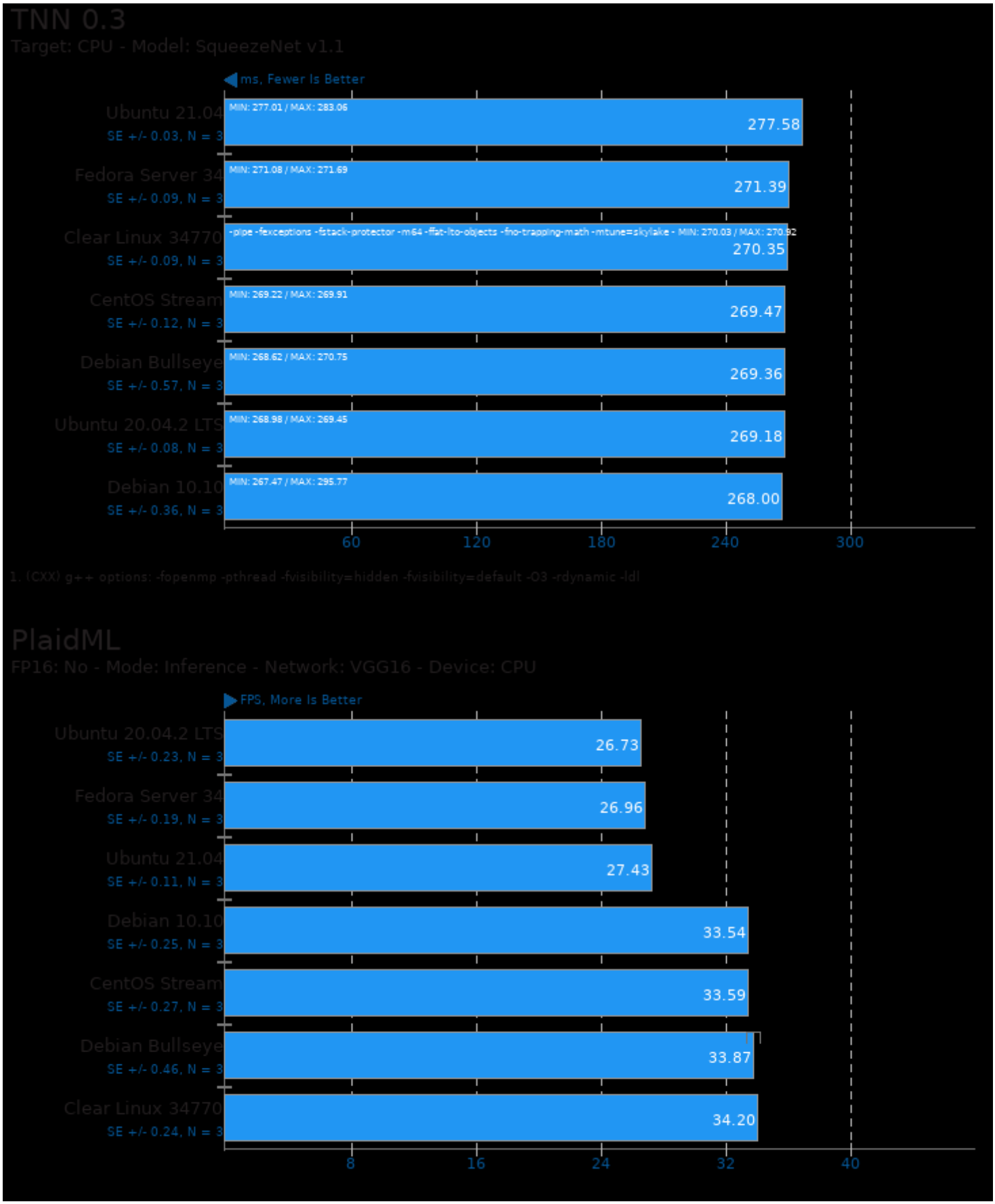

Mobile Neural Network 1.2
Model: MobileNetV2_224
ms, Fewer Is Better
CentOS Stream
SE +/- 0.051, N = 3
MIN: 3.78 / MAX: 21.47
4.275
Debian 10.10
SE +/- 0.072, N = 12
MIN: 3.8 / MAX: 6.21
4.242
Debian Bullseye
SE +/- 0.107, N = 15
MIN: 3.48 / MAX: 7.15
4.034
Clear Linux 34770
SE +/- 0.078, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 3.61 / MAX: 7.37
4.026
Fedora Server 34
SE +/- 0.046, N = 14
MIN: 3.37 / MAX: 43.2
3.975
Ubuntu 21.04
SE +/- 0.025, N = 3
MIN: 3.85 / MAX: 8.92
3.955
Ubuntu 20.04.2 LTS
SE +/- 0.095, N = 5
MIN: 3.62 / MAX: 5.86
3.947
0.9619
1.9238
2.8857
3.8476
4.8095
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

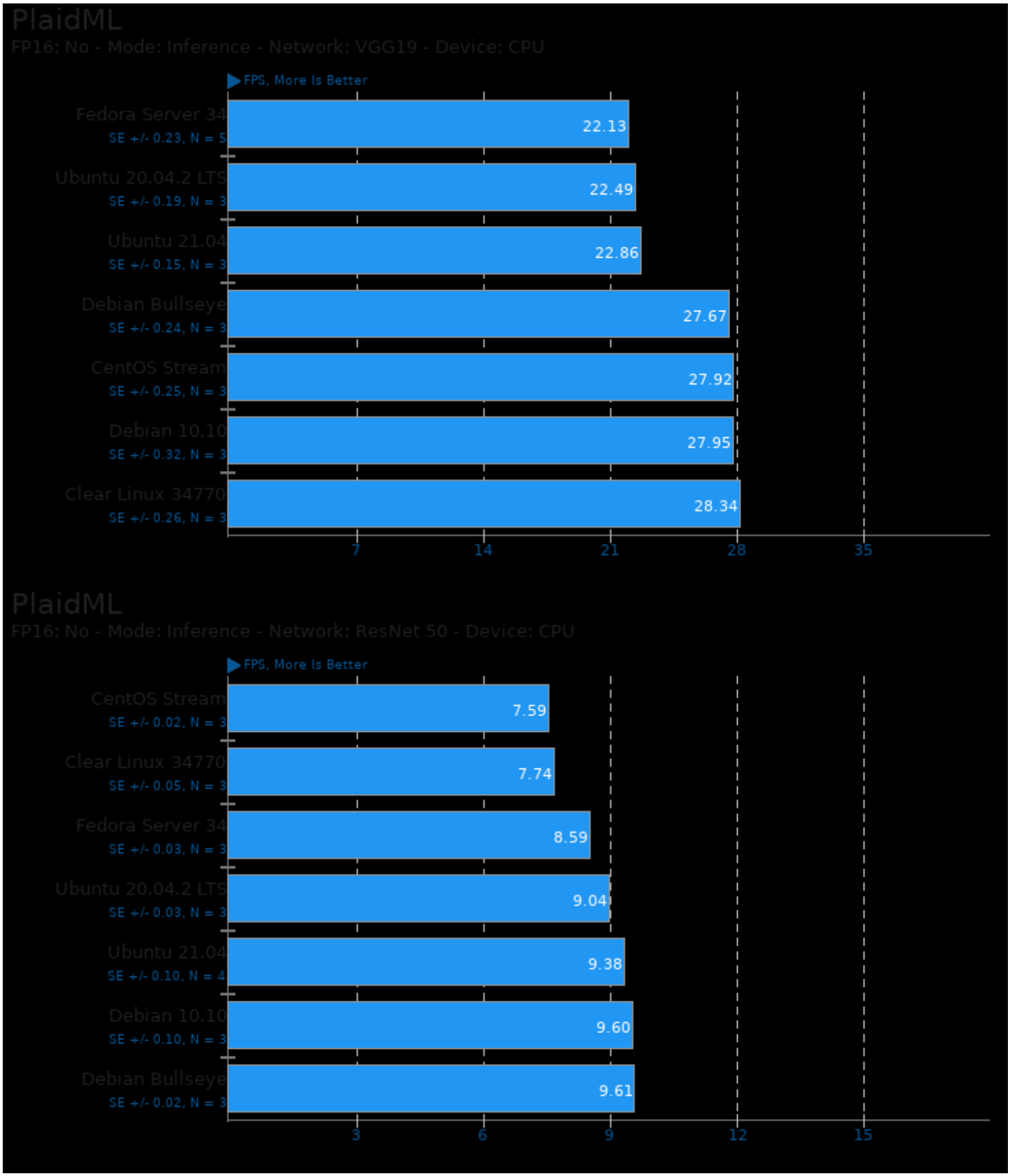

Mobile Neural Network 1.2
Model: mobilenet-v1-1.0
ms, Fewer Is Better
Debian Bullseye
SE +/- 0.083, N = 15
MIN: 2.99 / MAX: 6.12
3.796
Debian 10.10
SE +/- 0.086, N = 12
MIN: 2.98 / MAX: 5.1
3.482
Clear Linux 34770
SE +/- 0.082, N = 15
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
MIN: 2.55 / MAX: 34.68
2.981
CentOS Stream
SE +/- 0.195, N = 3
MIN: 2.63 / MAX: 4.03
2.932
Fedora Server 34
SE +/- 0.057, N = 15
MIN: 2.55 / MAX: 7.14
2.894
Ubuntu 20.04.2 LTS
SE +/- 0.077, N = 5
MIN: 2.57 / MAX: 7.42
2.849
Ubuntu 21.04
SE +/- 0.013, N = 3
MIN: 2.67 / MAX: 3.88
2.734
0.8541
1.7082
2.5623
3.4164
4.2705
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn

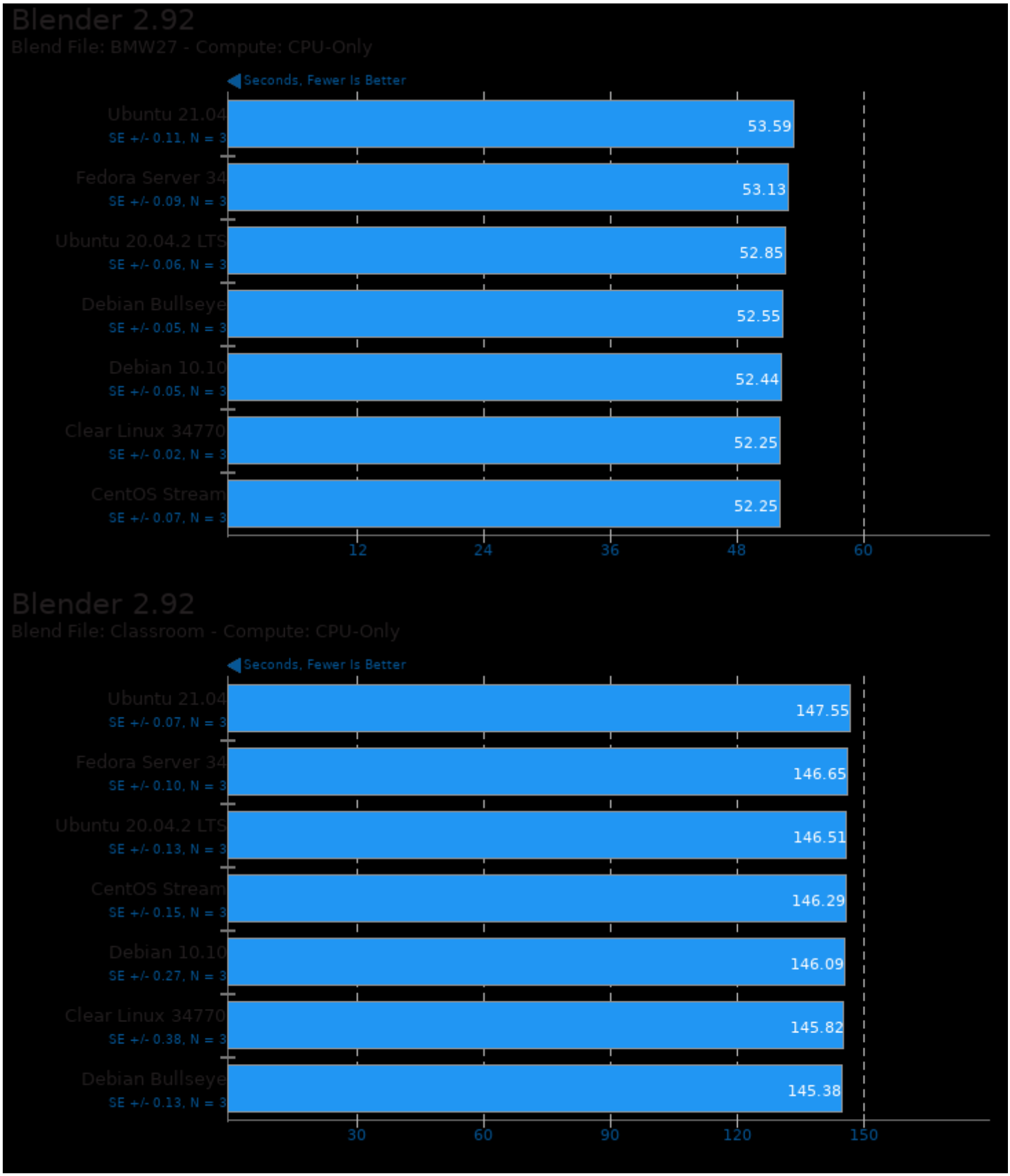

Mobile Neural Network 1.2
Model: inception-v3
ms, Fewer Is Better
Debian Bullseye
SE +/- 0.10, N = 15
MIN: 25.83 / MAX: 133.2
27.65
CentOS Stream
SE +/- 0.33, N = 3
MIN: 26.2 / MAX: 115.35
27.52
Debian 10.10
SE +/- 0.23, N = 12
MIN: 23.92 / MAX: 128.7
26.47
Ubuntu 21.04
SE +/- 0.18, N = 3
MIN: 23.37 / MAX: 128.04
24.42
Ubuntu 20.04.2 LTS
SE +/- 0.22, N = 5
MIN: 23.32 / MAX: 78.89
24.36
Clear Linux 34770
SE +/- 0.24, N = 15
-pipe -fexceptions -fstack-protector -m64 -flto=4 -flto-objects -fno-trapping-math -mtune=skylake - MIN: 22.09 / MAX: 118.52
23.75
Fedora Server 34
SE +/- 0.14, N = 15
MIN: 21.09 / MAX: 293.57
22.60
7
14
21
28
35
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fn
TNN 0.3
Target: CPU - Model: DenseNet
ms, Fewer Is Better
Ubuntu 21.04
SE +/- 50.91, N = 12
MIN: 2922.01 / MAX: 3982.53
3182.60
Debian Bullseye
SE +/- 9.62, N = 3
MIN: 2905.58 / MAX: 3528.68
3098.33
Fedora Server 34
SE +/- 20.85, N = 3
MIN: 2872.4 / MAX: 3417.28
3042.86
CentOS Stream
SE +/- 3.26, N = 3
MIN: 2883.16 / MAX: 3348.08
2957.07
Ubuntu 20.04.2 LTS
SE +/- 0.81, N = 3
MIN: 2834.03 / MAX: 3318.39
2907.27
Clear Linux 34770
SE +/- 2.55, N = 3
-pipe -fexceptions -fstack-protector -m64 -flto=4 -flto-objects -fno-trapping-math -mtune=skylake - MIN: 2840.51 / MAX: 3007.47
2895.45
Debian 10.10
SE +/- 3.53, N = 3
MIN: 2717.84 / MAX: 3264.89
2822.38
700
1400
2100
2800
3500
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -fvisibility=default -O3 -rdynamic -ldl

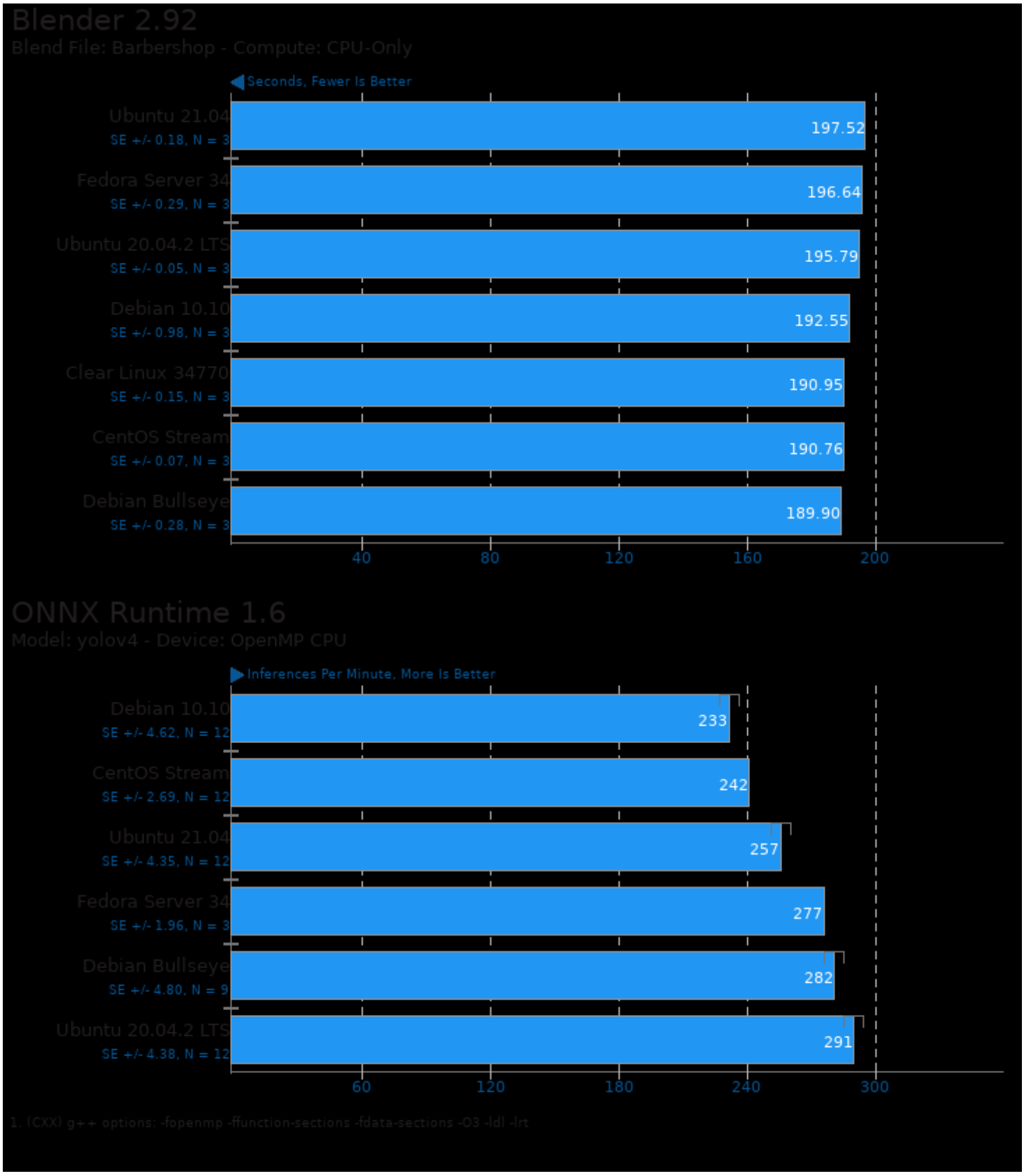

TNN 0.3
Target: CPU - Model: MobileNet v2
ms, Fewer Is Better
Ubuntu 21.04
SE +/- 3.07, N = 6
MIN: 286.82 / MAX: 389.03
316.89
Debian Bullseye
SE +/- 3.50, N = 4
MIN: 283.29 / MAX: 381.19
307.53
CentOS Stream
SE +/- 0.46, N = 3
MIN: 299.49 / MAX: 336.37
301.64
Fedora Server 34
SE +/- 2.56, N = 3
MIN: 285.14 / MAX: 355.51
296.55
Ubuntu 20.04.2 LTS
SE +/- 0.71, N = 3
MIN: 286.82 / MAX: 344.05
290.34
Clear Linux 34770
SE +/- 0.17, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 287.89 / MAX: 295.67
289.53
Debian 10.10
SE +/- 2.75, N = 3
MIN: 280.64 / MAX: 370.21
286.25
70
140
210
280
350
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -fvisibility=default -O3 -rdynamic -ldl

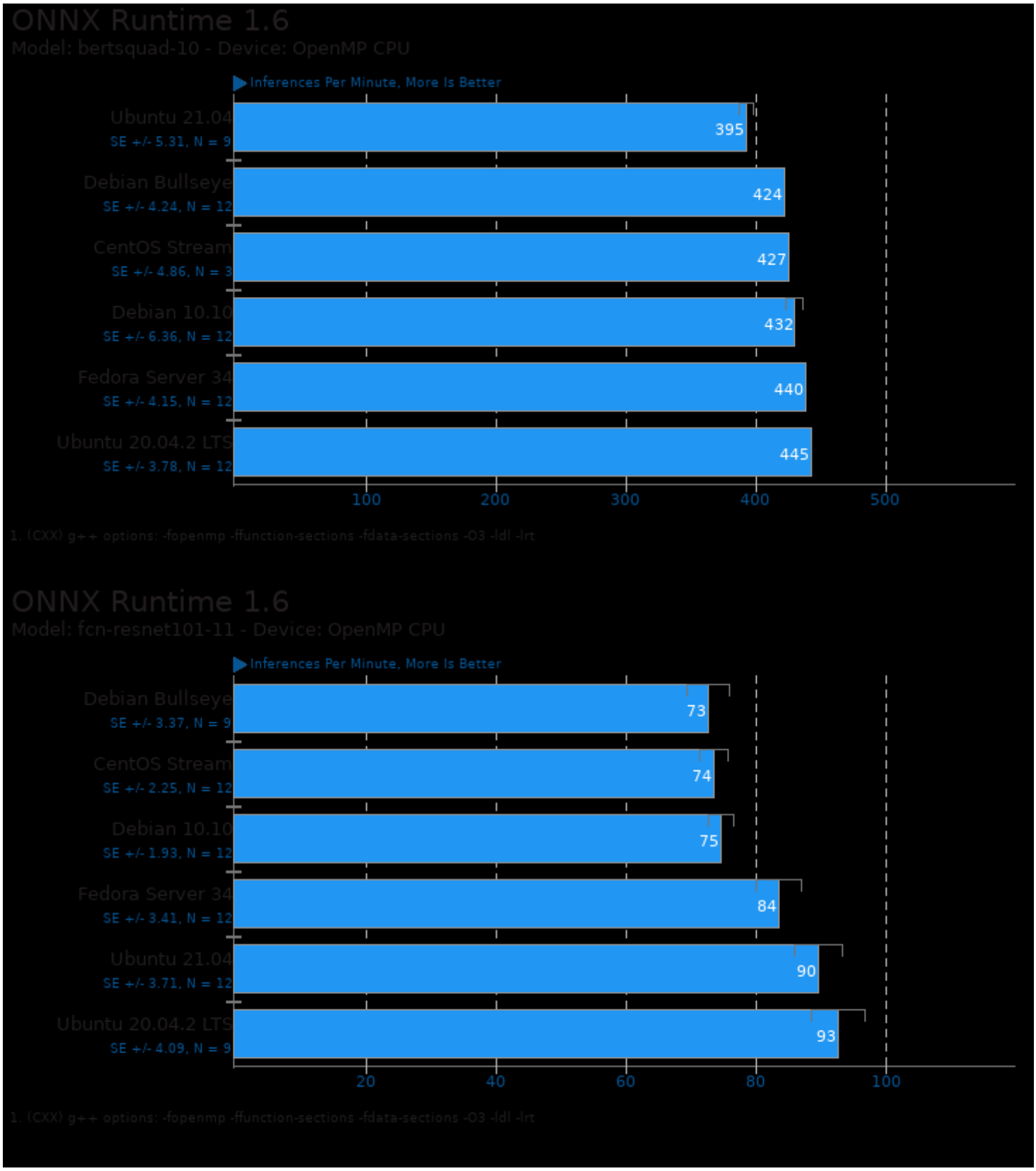

TNN 0.3
Target: CPU - Model: SqueezeNet v2
ms, Fewer Is Better
Ubuntu 21.04
SE +/- 0.11, N = 3
MIN: 65.53 / MAX: 69.34
66.29
Clear Linux 34770
SE +/- 0.60, N = 7
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 64.59 / MAX: 69.38
65.83
Fedora Server 34
SE +/- 0.06, N = 3
MIN: 64.62 / MAX: 65.08
64.81
CentOS Stream
SE +/- 0.16, N = 3
MIN: 62.33 / MAX: 63.1
62.62
Ubuntu 20.04.2 LTS
SE +/- 0.31, N = 3
MIN: 61.94 / MAX: 63.37
62.60
Debian 10.10
SE +/- 0.67, N = 5
MIN: 60.94 / MAX: 65.02
62.22
Debian Bullseye
SE +/- 0.47, N = 3
MIN: 61.16 / MAX: 62.91
62.17
15
30
45
60
75
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -fvisibility=default -O3 -rdynamic -ldl

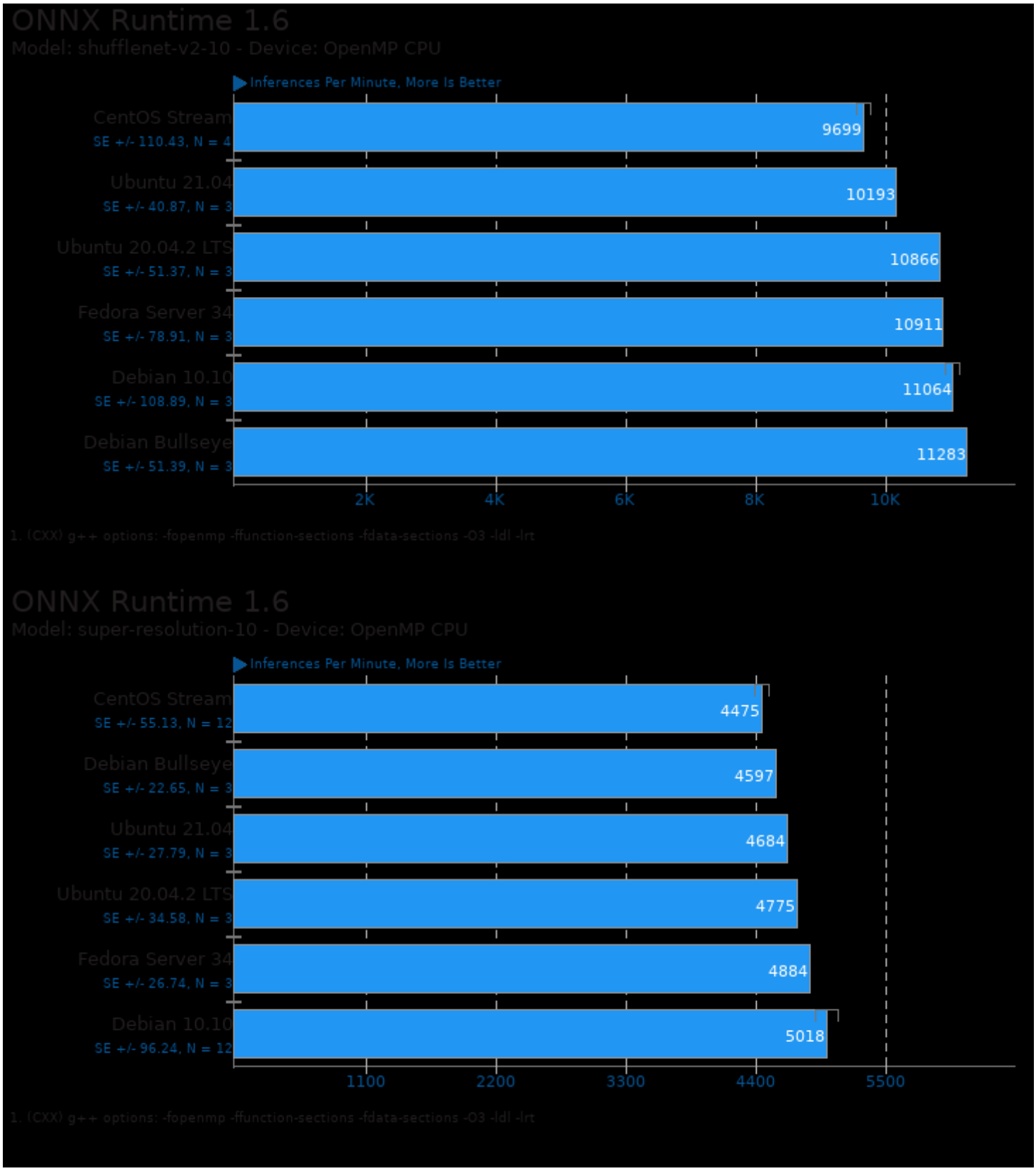

TNN 0.3
Target: CPU - Model: SqueezeNet v1.1
ms, Fewer Is Better
Ubuntu 21.04
SE +/- 0.03, N = 3
MIN: 277.01 / MAX: 283.06
277.58
Fedora Server 34
SE +/- 0.09, N = 3
MIN: 271.08 / MAX: 271.69
271.39
Clear Linux 34770
SE +/- 0.09, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake - MIN: 270.03 / MAX: 270.82
270.35
CentOS Stream
SE +/- 0.12, N = 3
MIN: 269.22 / MAX: 269.91
269.47
Debian Bullseye
SE +/- 0.57, N = 3
MIN: 268.62 / MAX: 270.75
269.36
Ubuntu 20.04.2 LTS
SE +/- 0.08, N = 3
MIN: 268.98 / MAX: 269.45
269.18
Debian 10.10
SE +/- 0.36, N = 3
MIN: 267.47 / MAX: 295.77
268.00
60
120
180
240
300
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -fvisibility=default -O3 -rdynamic -ldl
PlaidML
FP16: No - Mode: Inference - Network: VGG16 - Device: CPU
FPS, More Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.23, N = 3
26.73
Fedora Server 34
SE +/- 0.19, N = 3
26.96
Ubuntu 21.04
SE +/- 0.11, N = 3
27.43
Debian 10.10
SE +/- 0.25, N = 3
33.54
CentOS Stream
SE +/- 0.27, N = 3
33.59
Debian Bullseye
SE +/- 0.46, N = 3
33.87
Clear Linux 34770
SE +/- 0.24, N = 3
34.20
8
16
24
32
40

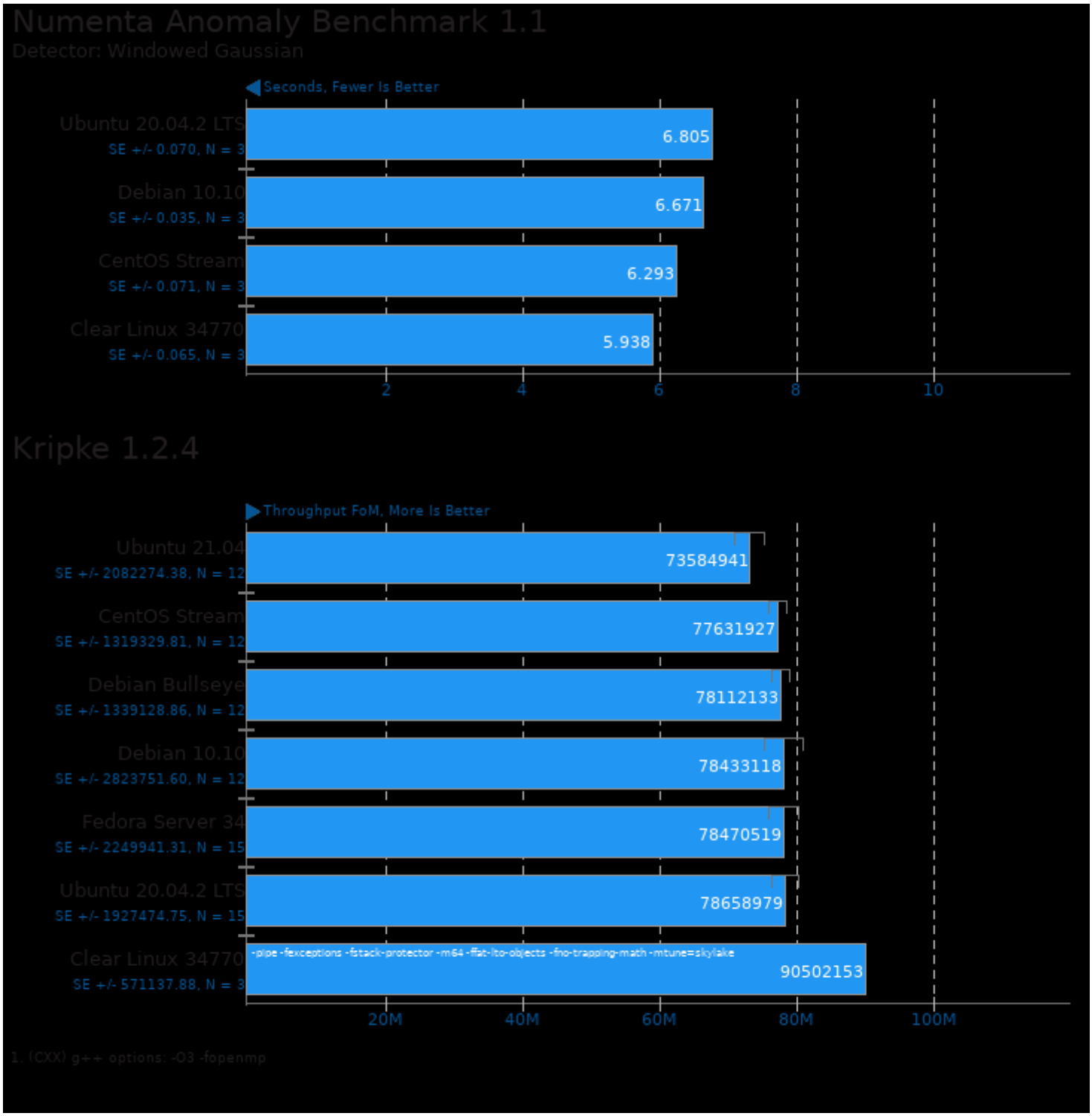

PlaidML
FP16: No - Mode: Inference - Network: VGG19 - Device: CPU
FPS, More Is Better
Fedora Server 34
SE +/- 0.23, N = 5
22.13
Ubuntu 20.04.2 LTS
SE +/- 0.19, N = 3
22.49
Ubuntu 21.04
SE +/- 0.15, N = 3
22.86
Debian Bullseye
SE +/- 0.24, N = 3
27.67
CentOS Stream
SE +/- 0.25, N = 3
27.92
Debian 10.10
SE +/- 0.32, N = 3
27.95
Clear Linux 34770
SE +/- 0.26, N = 3
28.34
7
14
21
28
35
PlaidML
FP16: No - Mode: Inference - Network: ResNet 50 - Device: CPU
FPS, More Is Better
CentOS Stream
SE +/- 0.02, N = 3
7.59
Clear Linux 34770
SE +/- 0.05, N = 3
7.74
Fedora Server 34
SE +/- 0.03, N = 3
8.59
Ubuntu 20.04.2 LTS
SE +/- 0.03, N = 3
9.04
Ubuntu 21.04
SE +/- 0.10, N = 4
9.38
Debian 10.10
SE +/- 0.10, N = 3
9.60
Debian Bullseye
SE +/- 0.02, N = 3
9.61
3
6
9
12
15

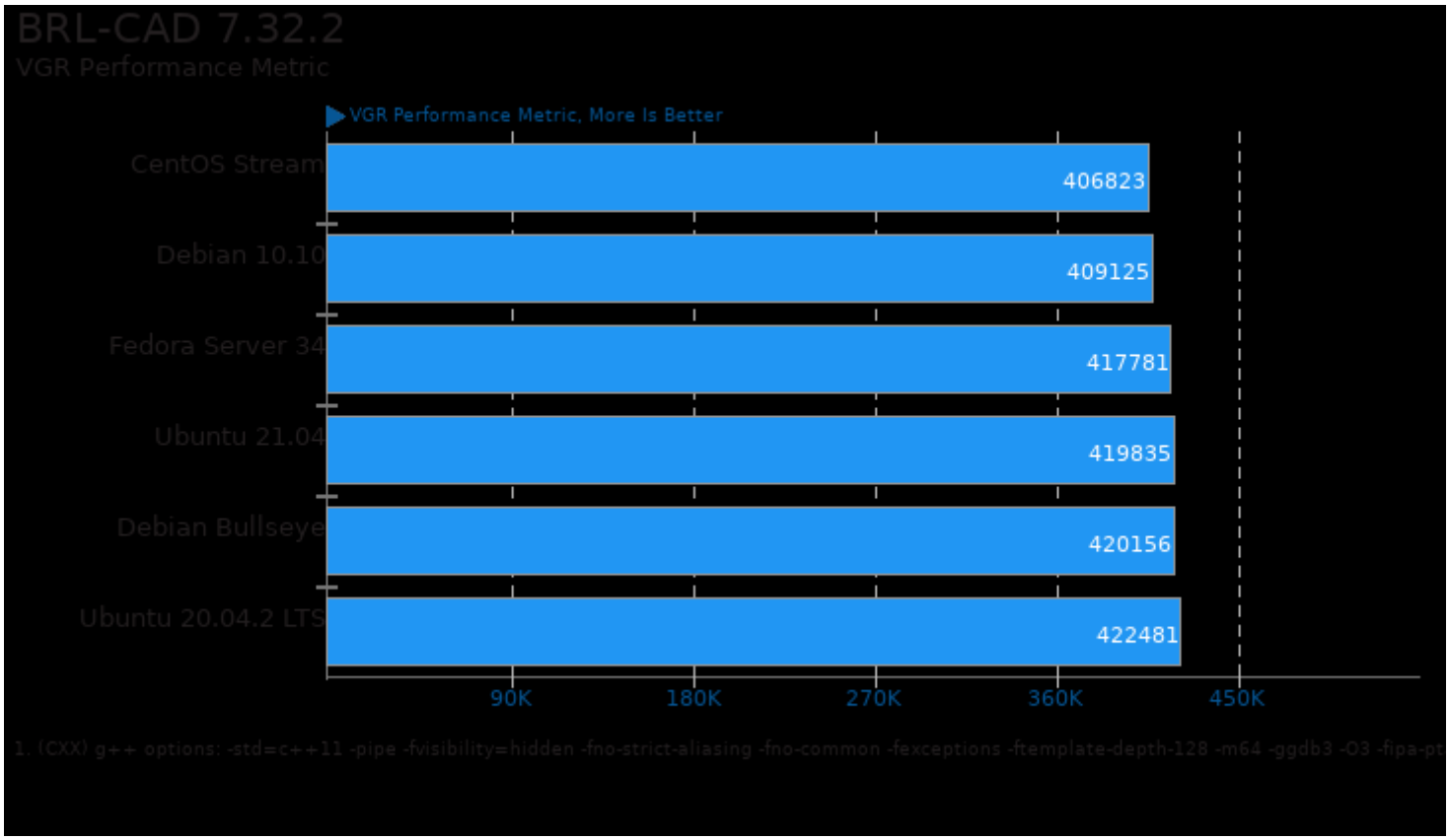

Blender 2.92
Blend File: BMW27 - Compute: CPU-Only
Seconds, Fewer Is Better
Ubuntu 21.04
SE +/- 0.11, N = 3
53.59
Fedora Server 34
SE +/- 0.09, N = 3
53.13
Ubuntu 20.04.2 LTS
SE +/- 0.06, N = 3
52.85
Debian Bullseye
SE +/- 0.05, N = 3
52.55
Debian 10.10
SE +/- 0.05, N = 3
52.44
Clear Linux 34770
SE +/- 0.02, N = 3
52.25
CentOS Stream
SE +/- 0.07, N = 3
52.25
12
24
36
48
60
Blender 2.92
Blend File: Classroom - Compute: CPU-Only
Seconds, Fewer Is Better
Ubuntu 21.04
SE +/- 0.07, N = 3
147.55
Fedora Server 34
SE +/- 0.10, N = 3
146.65
Ubuntu 20.04.2 LTS
SE +/- 0.13, N = 3
146.51
CentOS Stream
SE +/- 0.15, N = 3
146.29
Debian 10.10
SE +/- 0.27, N = 3
146.09
Clear Linux 34770
SE +/- 0.38, N = 3
145.82
Debian Bullseye
SE +/- 0.13, N = 3
145.38
30
60
90
120
150


Blender 2.92
Blend File: Barbershop - Compute: CPU-Only
Seconds, Fewer Is Better
Ubuntu 21.04
SE +/- 0.18, N = 3
197.52
Fedora Server 34
SE +/- 0.29, N = 3
196.64
Ubuntu 20.04.2 LTS
SE +/- 0.05, N = 3
195.79
Debian 10.10
SE +/- 0.98, N = 3
192.55
Clear Linux 34770
SE +/- 0.15, N = 3
190.95
CentOS Stream
SE +/- 0.07, N = 3
190.76
Debian Bullseye
SE +/- 0.28, N = 3
189.90
40
80
120
160
200
ONNX Runtime 1.6
Model: yolov4 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
Debian 10.10
SE +/- 4.62, N = 12
233
CentOS Stream
SE +/- 2.69, N = 12
242
Ubuntu 21.04
SE +/- 4.35, N = 12
257
Fedora Server 34
SE +/- 1.96, N = 3
277
Debian Bullseye
SE +/- 4.80, N = 9
282
Ubuntu 20.04.2 LTS
SE +/- 4.38, N = 12
291
60
120
180
240
300
1: (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt

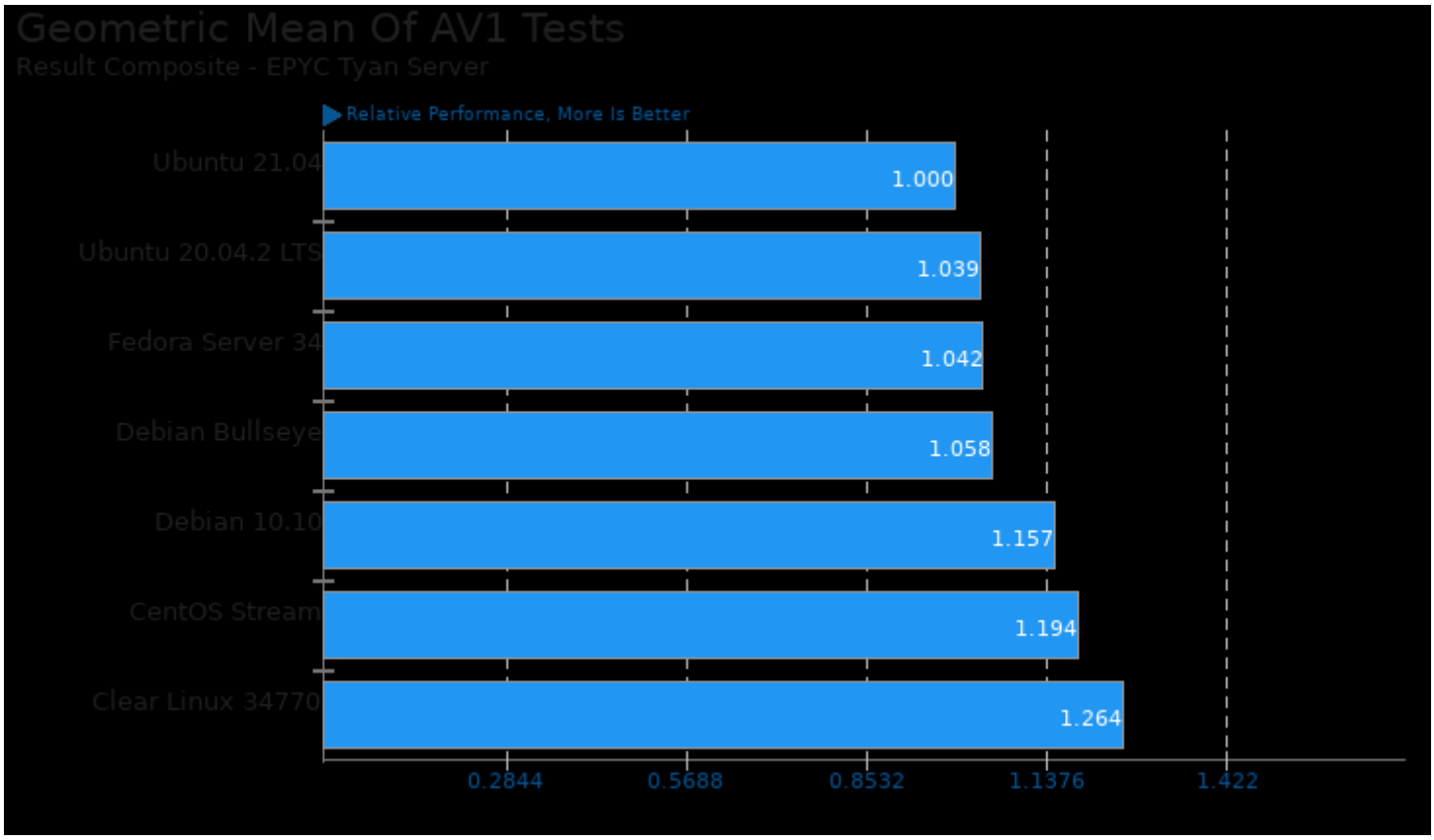

ONNX Runtime 1.6
Model: bertsquad-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
Ubuntu 21.04
SE +/- 5.31, N = 9
395
Debian Bullseye
SE +/- 4.24, N = 12
424
CentOS Stream
SE +/- 4.86, N = 3
427
Debian 10.10
SE +/- 6.36, N = 12
432
Fedora Server 34
SE +/- 4.15, N = 12
440
Ubuntu 20.04.2 LTS
SE +/- 3.78, N = 12
445
100
200
300
400
500
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt
ONNX Runtime 1.6
Model: fcn-resnet101-11 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
Debian Bullseye
SE +/- 3.37, N = 9
73
CentOS Stream
SE +/- 2.25, N = 12
74
Debian 10.10
SE +/- 1.93, N = 12
75
Fedora Server 34
SE +/- 3.41, N = 12
84
Ubuntu 21.04
SE +/- 3.71, N = 12
90
Ubuntu 20.04.2 LTS
SE +/- 4.09, N = 9
93
20
40
60
80
100
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt


ONNX Runtime 1.6
Model: shufflenet-v2-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
CentOS Stream
SE +/- 110.43, N = 4
9699
Ubuntu 21.04
SE +/- 40.87, N = 3
10193
Ubuntu 20.04.2 LTS
SE +/- 51.37, N = 3
10866
Fedora Server 34
SE +/- 78.91, N = 3
10911
Debian 10.10
SE +/- 108.89, N = 3
11064
Debian Bullseye
SE +/- 51.39, N = 3
11283
2K
4K
6K
8K
10K
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt
ONNX Runtime 1.6
Model: super-resolution-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
CentOS Stream
SE +/- 55.13, N = 12
4475
Debian Bullseye
SE +/- 22.65, N = 3
4597
Ubuntu 21.04
SE +/- 27.79, N = 3
4684
Ubuntu 20.04.2 LTS
SE +/- 34.58, N = 3
4775
Fedora Server 34
SE +/- 26.74, N = 3
4884
Debian 10.10
SE +/- 96.24, N = 12
5018
1100
2200
3300
4400
5500
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt

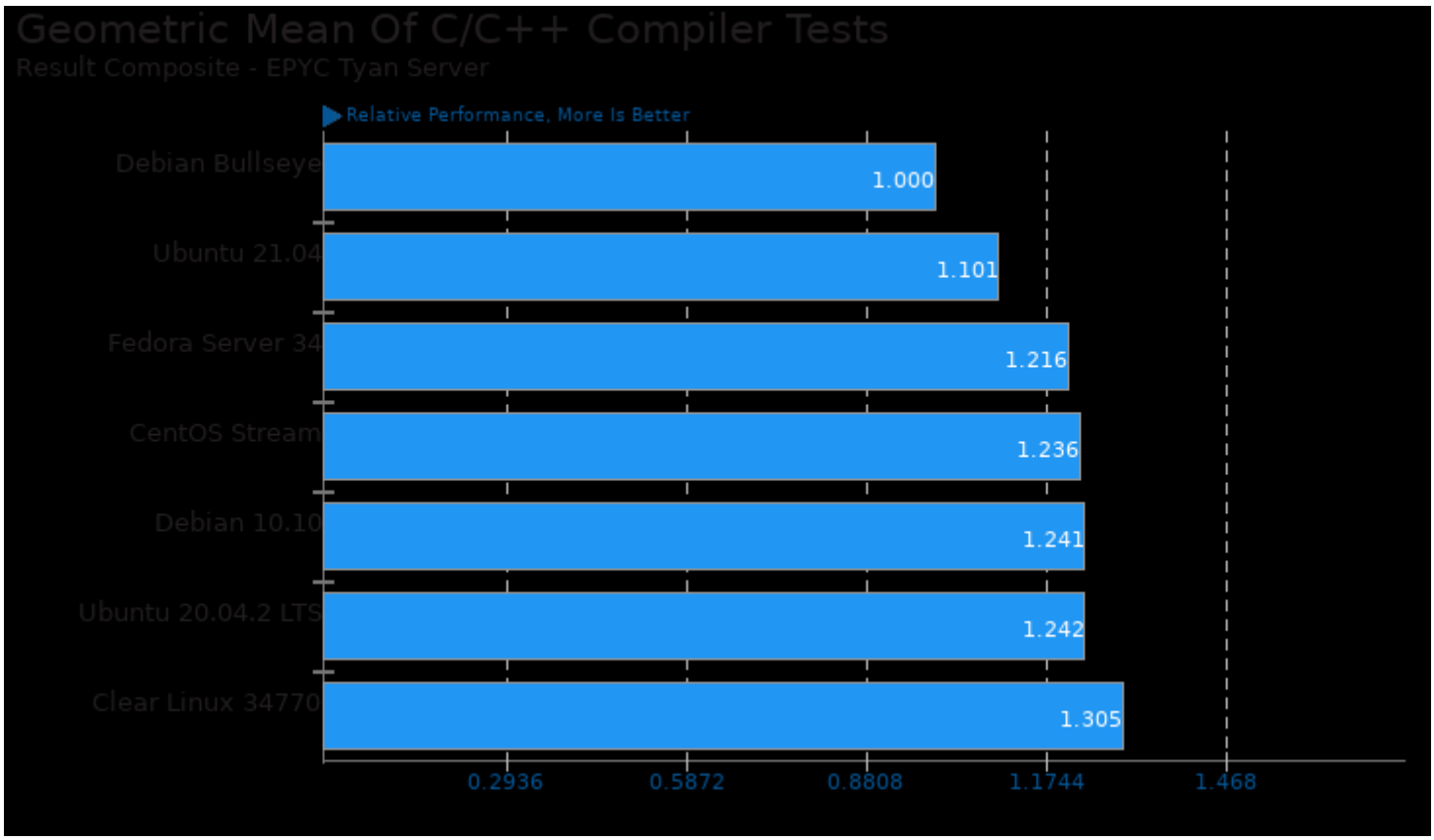

Numenta Anomaly Benchmark 1.1
Detector: Windowed Gaussian
Seconds, Fewer Is Better
Ubuntu 20.04.2 LTS
SE +/- 0.070, N = 3
6.805
Debian 10.10
SE +/- 0.035, N = 3
6.671
CentOS Stream
SE +/- 0.071, N = 3
6.293
Clear Linux 34770
SE +/- 0.065, N = 3
5.938
2
4
6
8
10
Kripke 1.2.4
Throughput FoM, More Is Better
Ubuntu 21.04
SE +/- 2082274.38, N = 12
73584941
CentOS Stream
SE +/- 1319329.81, N = 12
77631927
Debian Bullseye
SE +/- 1339128.86, N = 12
78112133
Debian 10.10
SE +/- 2823751.60, N = 12
78433118
Fedora Server 34
SE +/- 2249941.31, N = 15
78470519
Ubuntu 20.04.2 LTS
SE +/- 1927474.75, N = 15
78658979
Clear Linux 34770
SE +/- 571137.88, N = 3
-pipe -fexceptions -fstack-protector -m64 -flat-lto-objects -fno-trapping-math -mtune=skylake
90502153
20M
40M
60M
80M
100M
1. (CXX) g++ options: -O3 -fopenmp


BRL-CAD 7.32.2
VGR Performance Metric
VGR Performance Metric, More Is Better
CentOS Stream
Debian 10.10
Fedora Server 34
Ubuntu 21.04
Debian Bullseye
Ubuntu 20.04.2 LTS
406823
409125
417781
419835
420156
422481
90K
180K
270K
360K
450K
1. (CXX) g++ options: -std=c++11 -pipe -fvisibility=hidden -fno-strict-aliasing -fno-common -fexceptions -ftemplate-depth-128 -m64 -ggdb3 -O3 -fipa-pt

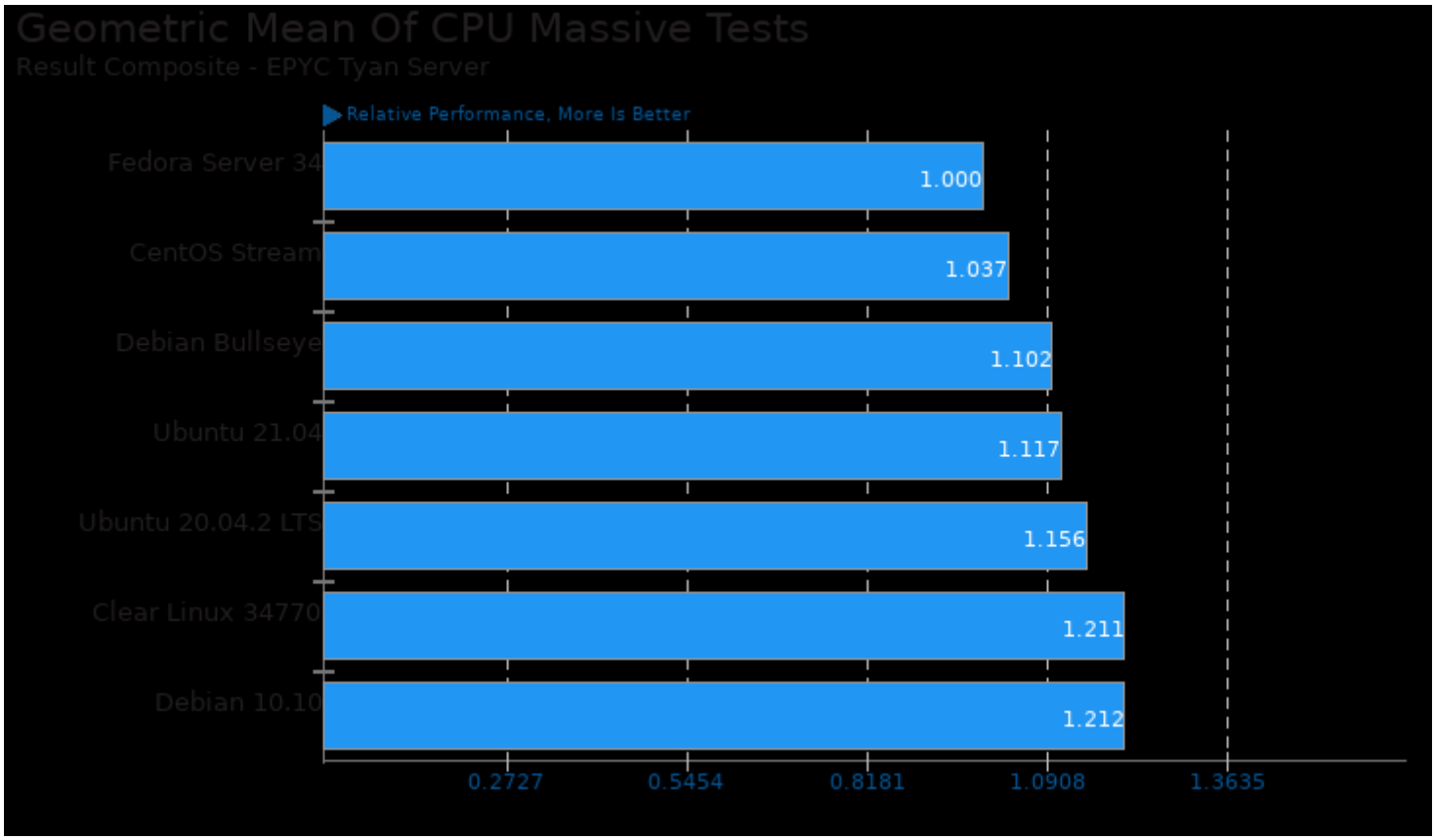
These geometric means are based upon test groupings / test suites for this result file.



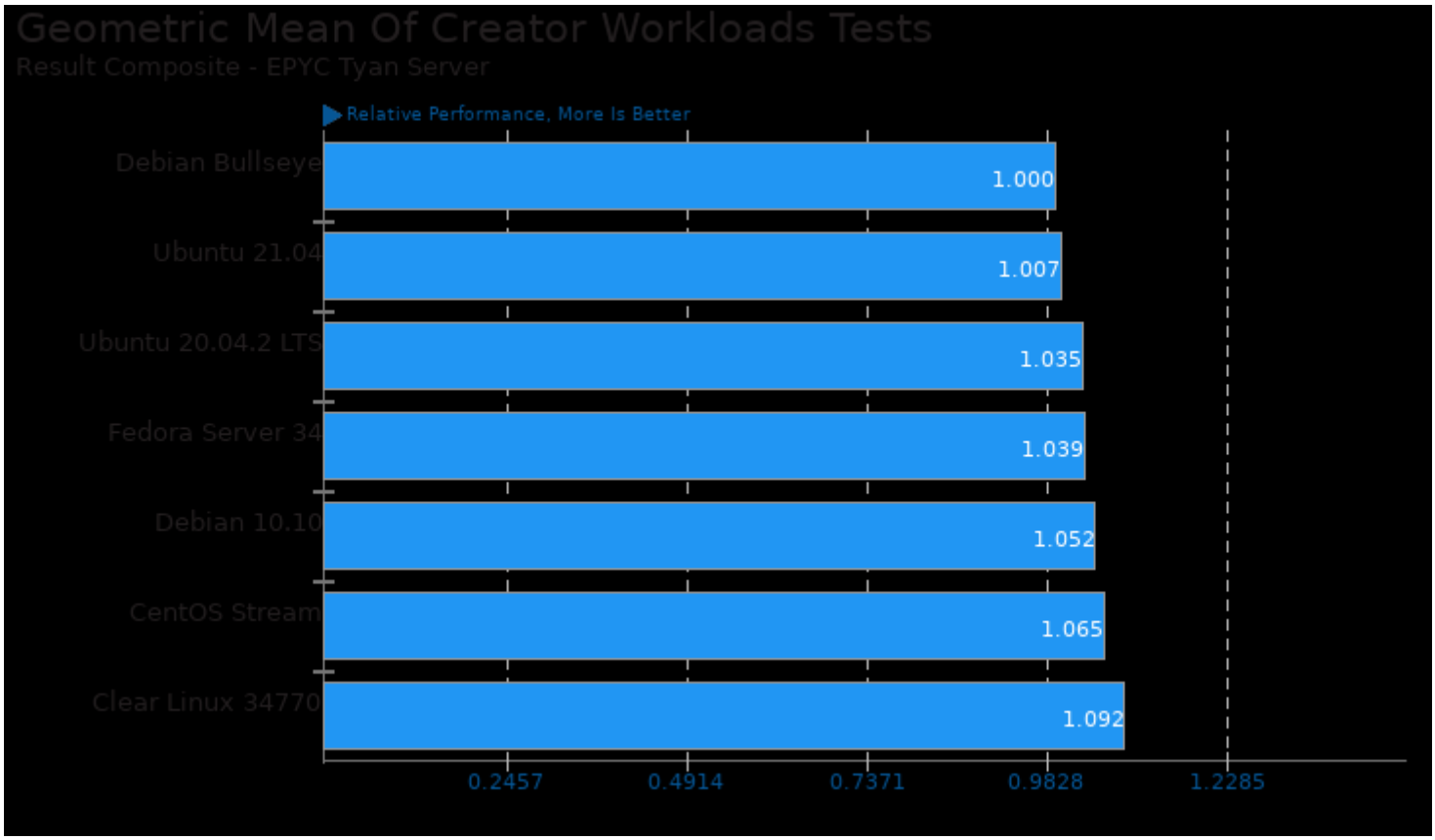
Geometric mean based upon tests: pts/svt-av1 and pts/avifenc



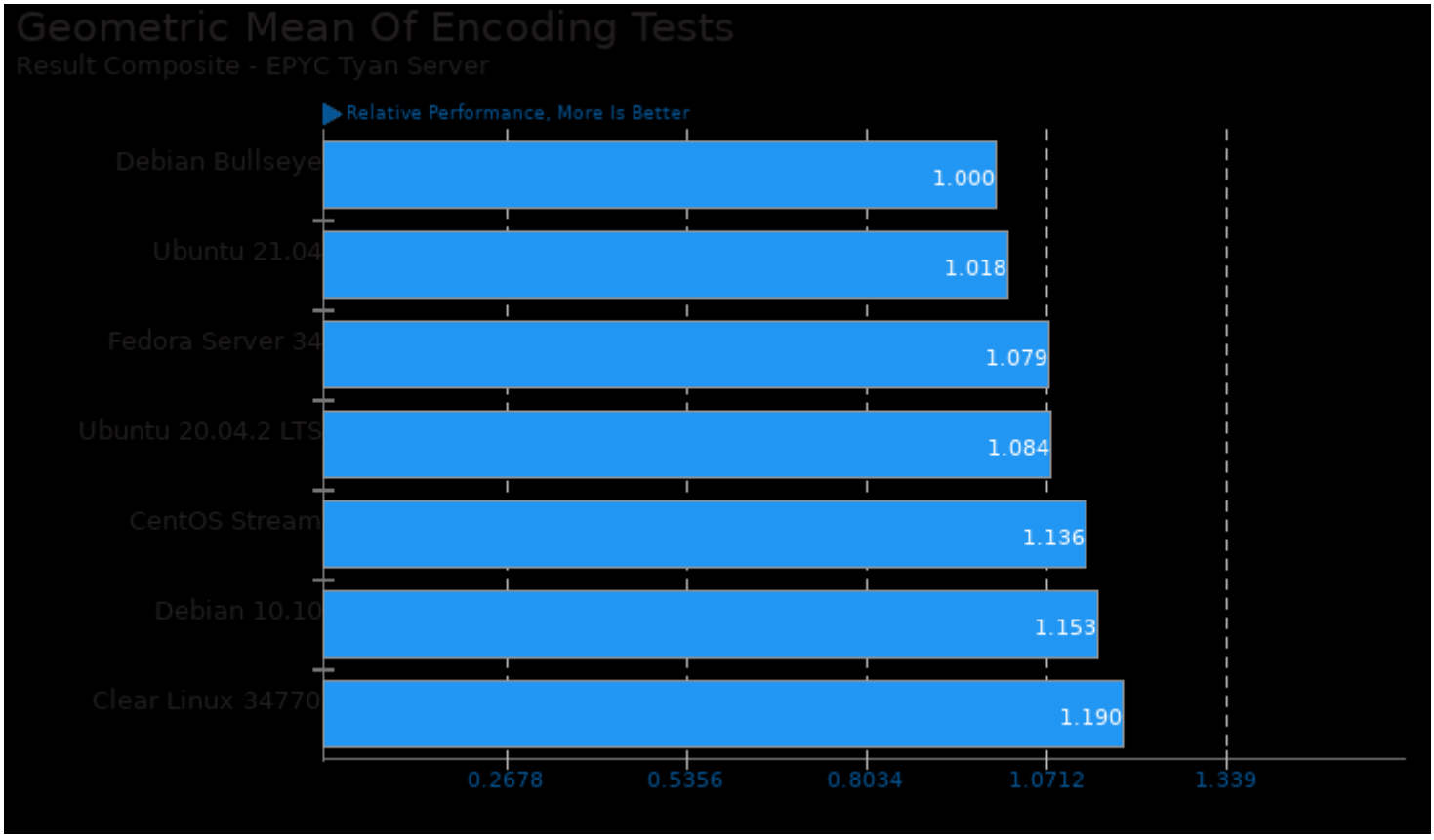
Geometric mean based upon tests: pts/vpxenc, pts/build-llvm, pts/svt-av1, pts/svt-vp9 and pts/gromacs



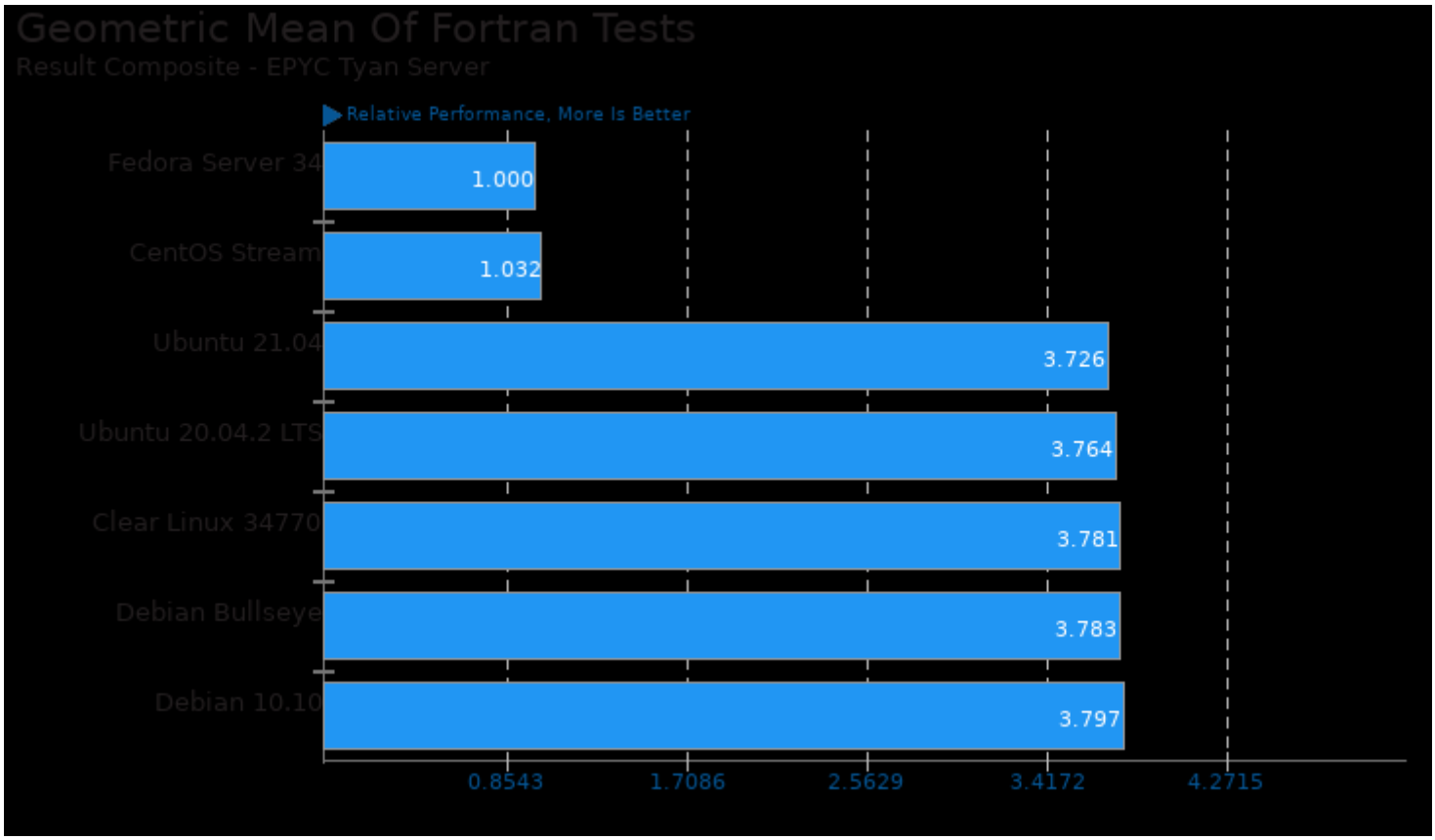
Geometric mean based upon tests: pts/brl-cad, pts/build-llvm, pts/build-linux-kernel, pts/svt-av1, pts/svt-hevc, pts/svt-vp9, pts/vpxenc, pts/hpcg, pts/namd, pts/npb, pts/numenta-nab, pts/plaidml and pts/blender



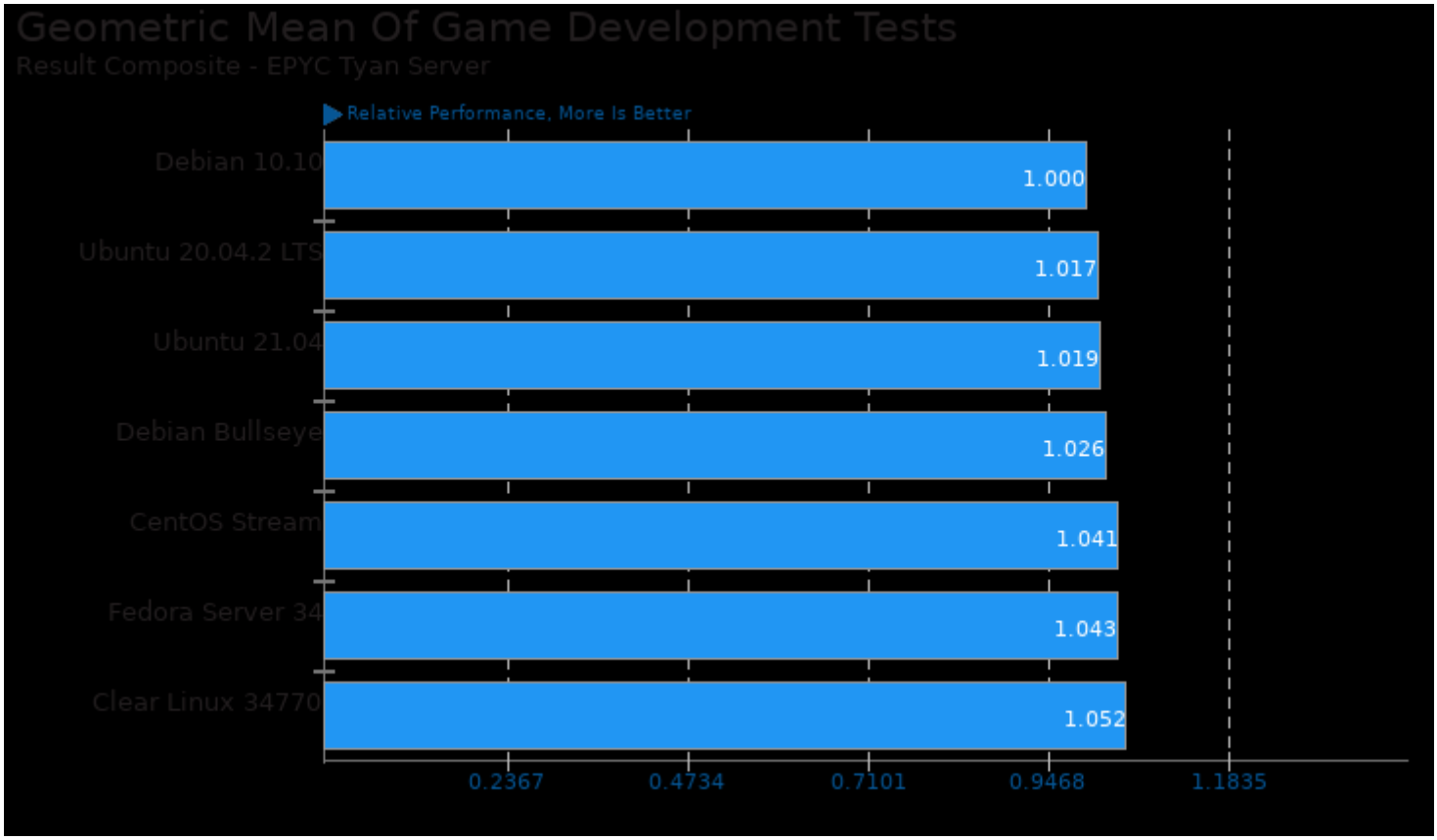
Geometric mean based upon tests: pts/ospray, pts/blender, pts/luxcorerender, pts/svt-vp9, pts/svt-hevc, pts/vpxenc, pts/svt-av1, pts/avifenc, pts/embree, pts/oidn, pts/openvkl, pts/astcenc, pts/build-godot and pts/brl-cad



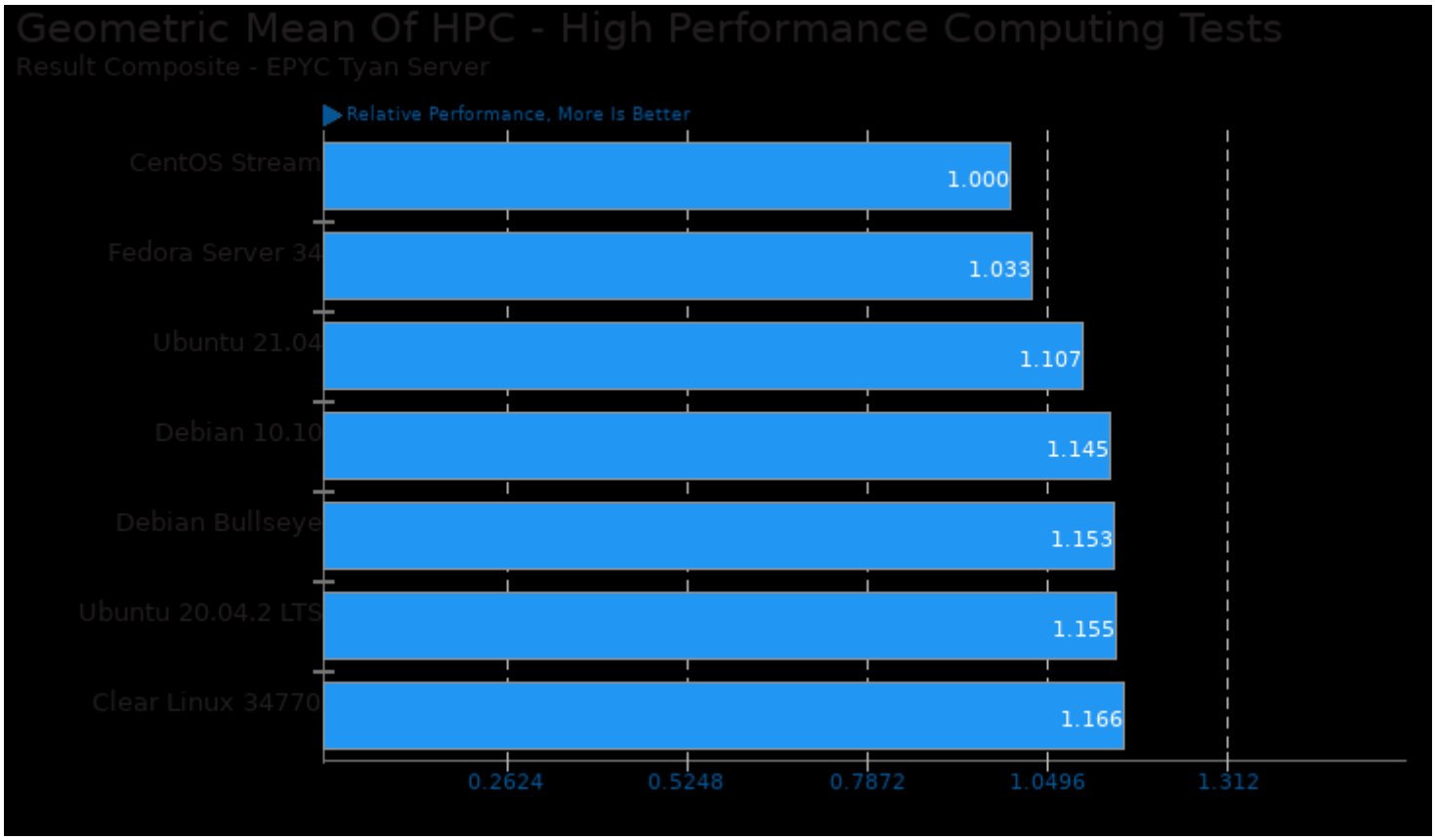
Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/vpxenc, pts/svt-av1 and pts/avifenc



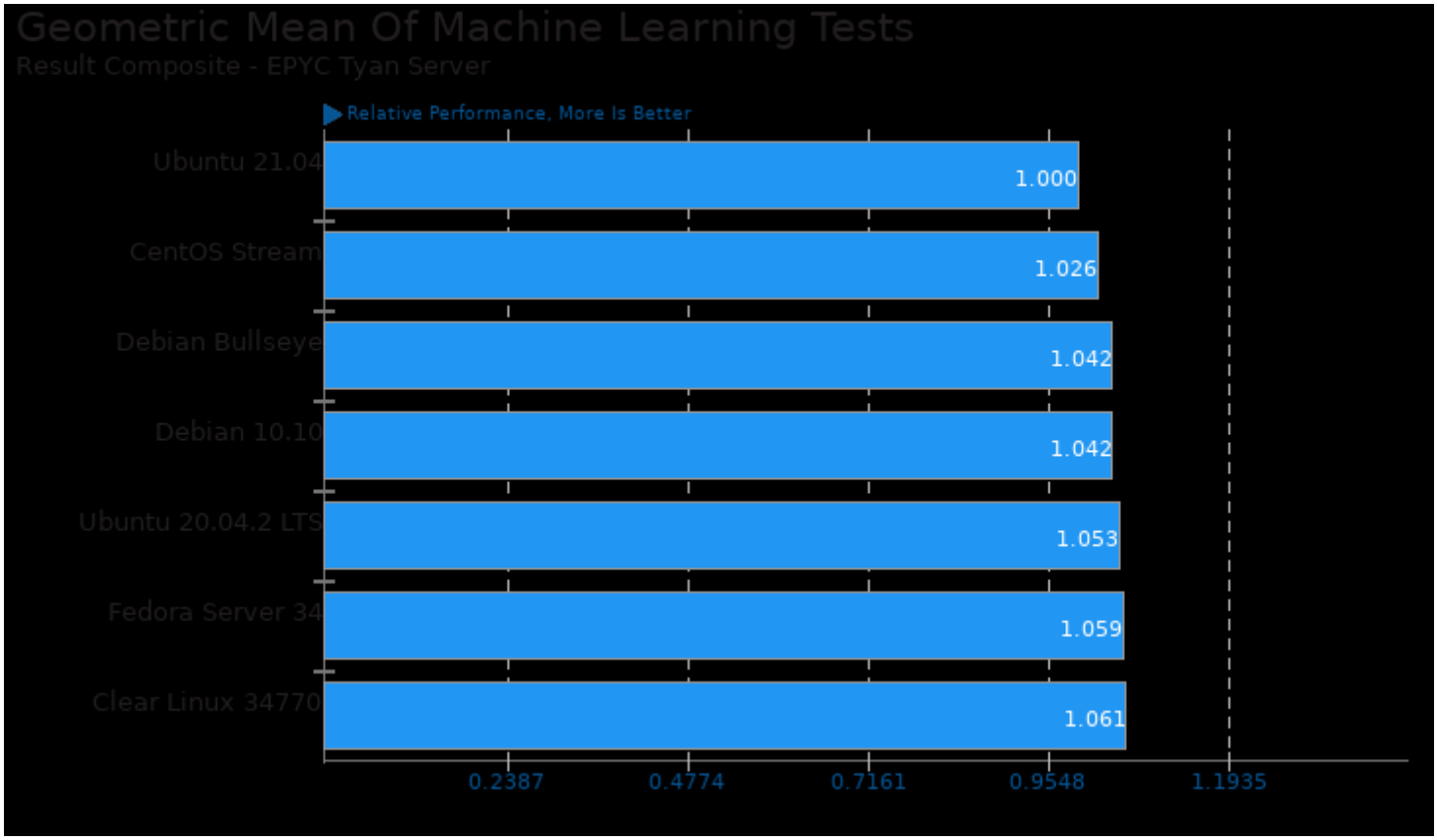
Geometric mean based upon tests: pts/hpcg, pts/npb and pts/incompact3d



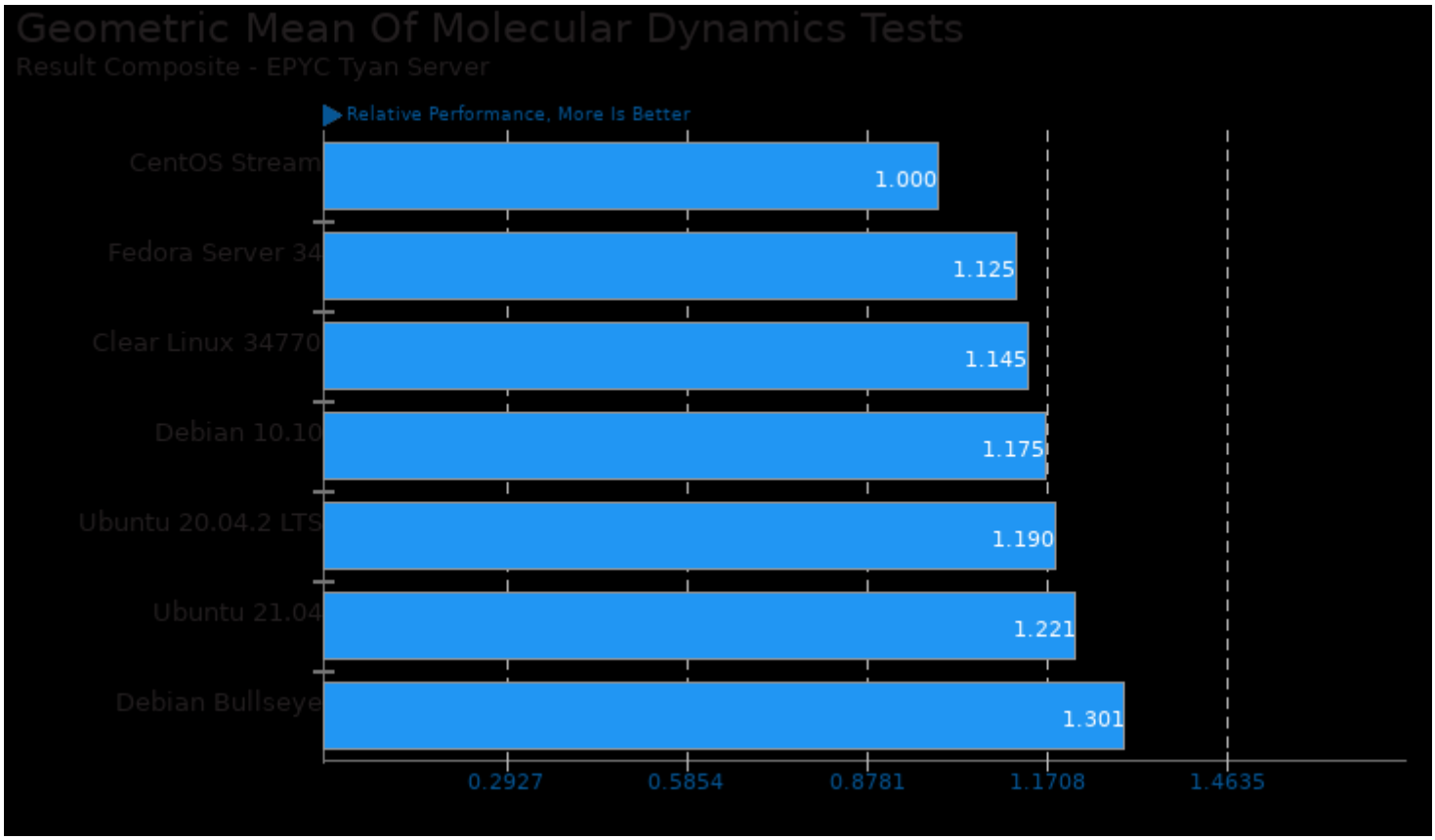
Geometric mean based upon tests: pts/astcenc, pts/build-godot, pts/blender, pts/oidn and pts/openvkl



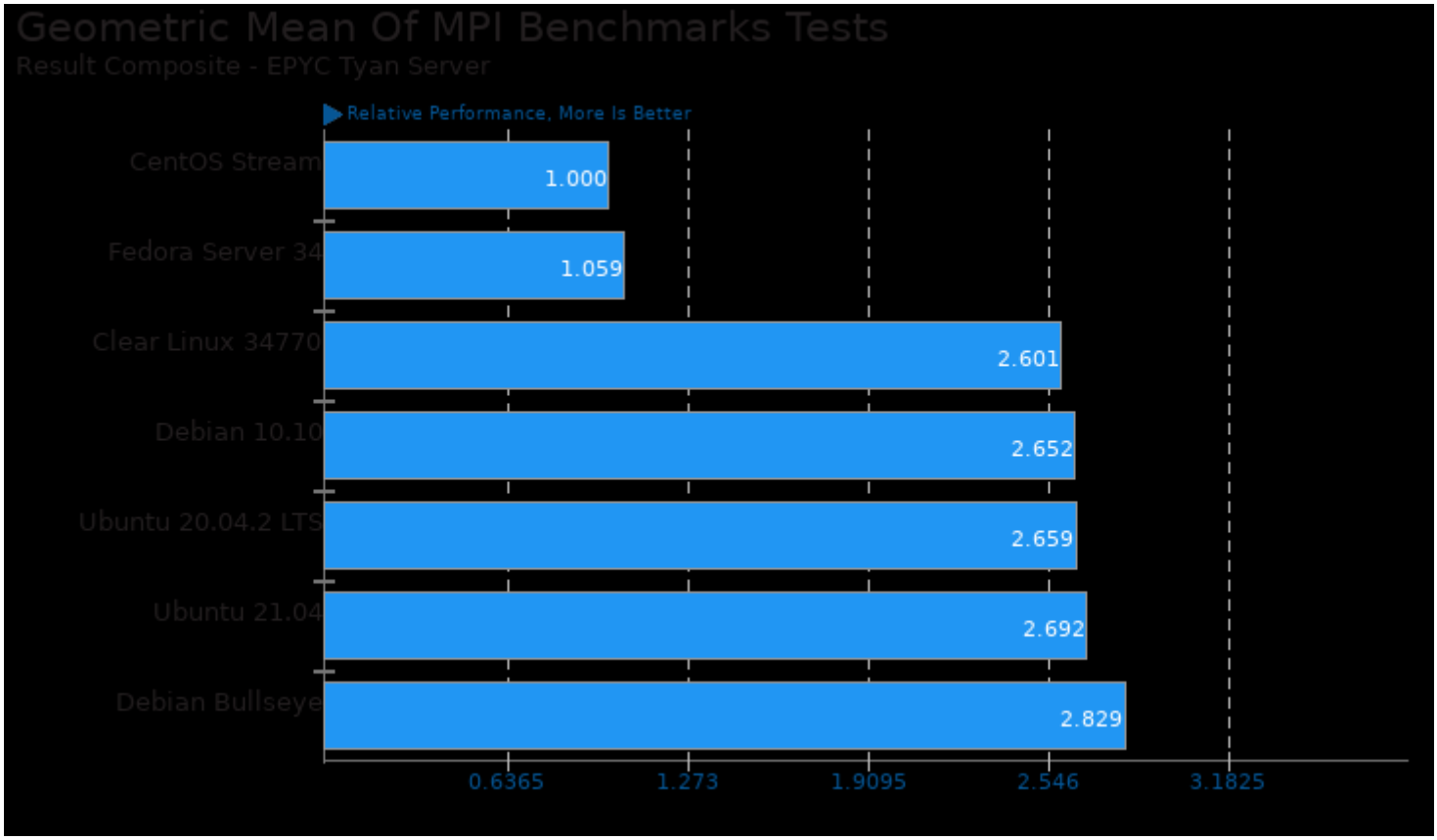
Geometric mean based upon tests: pts/npb, pts/hpcg, pts/namd, pts/gromacs, pts/minife, pts/incompact3d, pts/kripke, pts/mnn, pts/tnn, pts/numenta-nab, pts/tensorflow-lite, pts/onnx and pts/plaidml



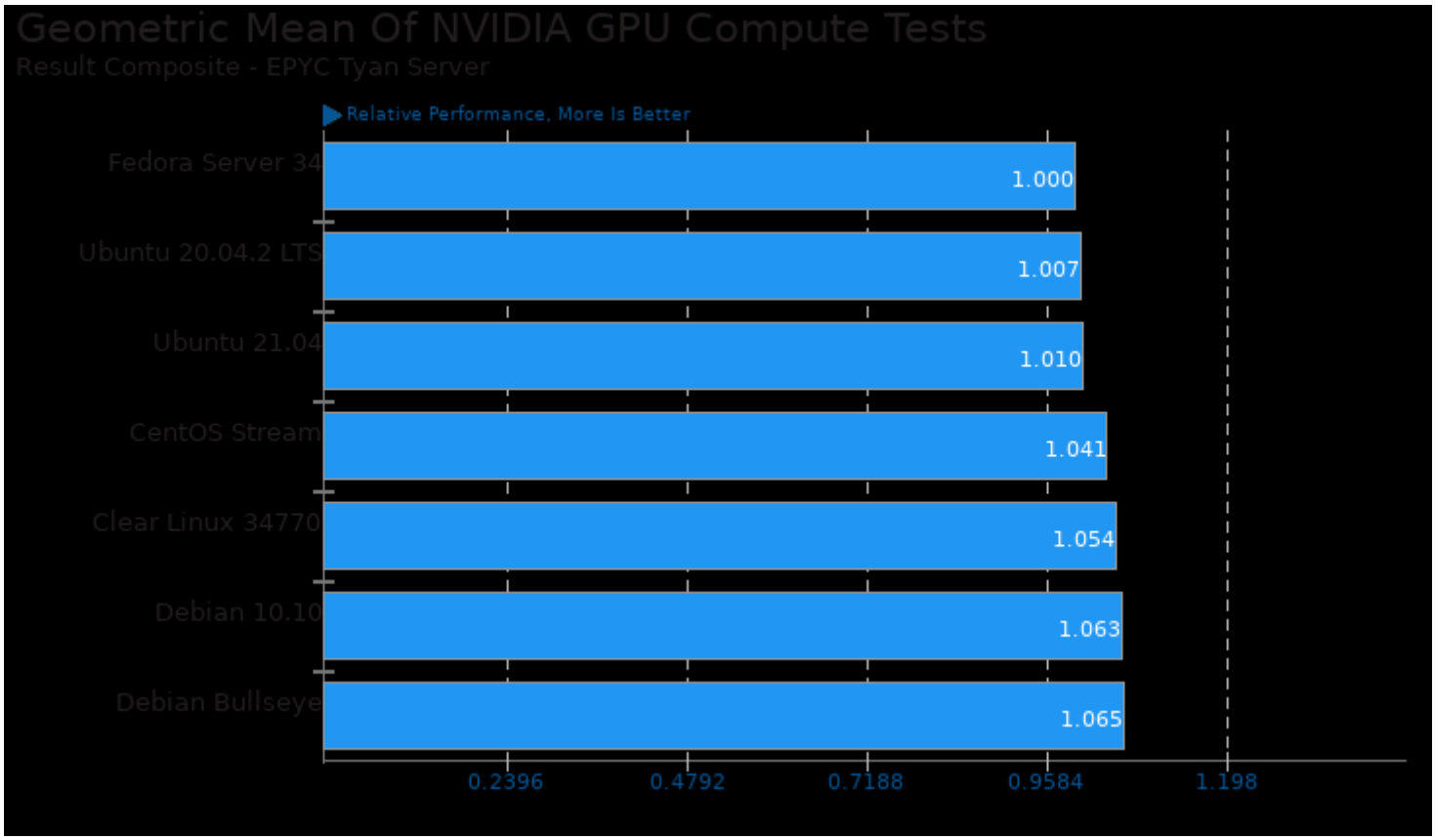
Geometric mean based upon tests: pts/mnn, pts/tnn, pts/numenta-nab, pts/tensorflow-lite, pts/onnx and pts/plaidml



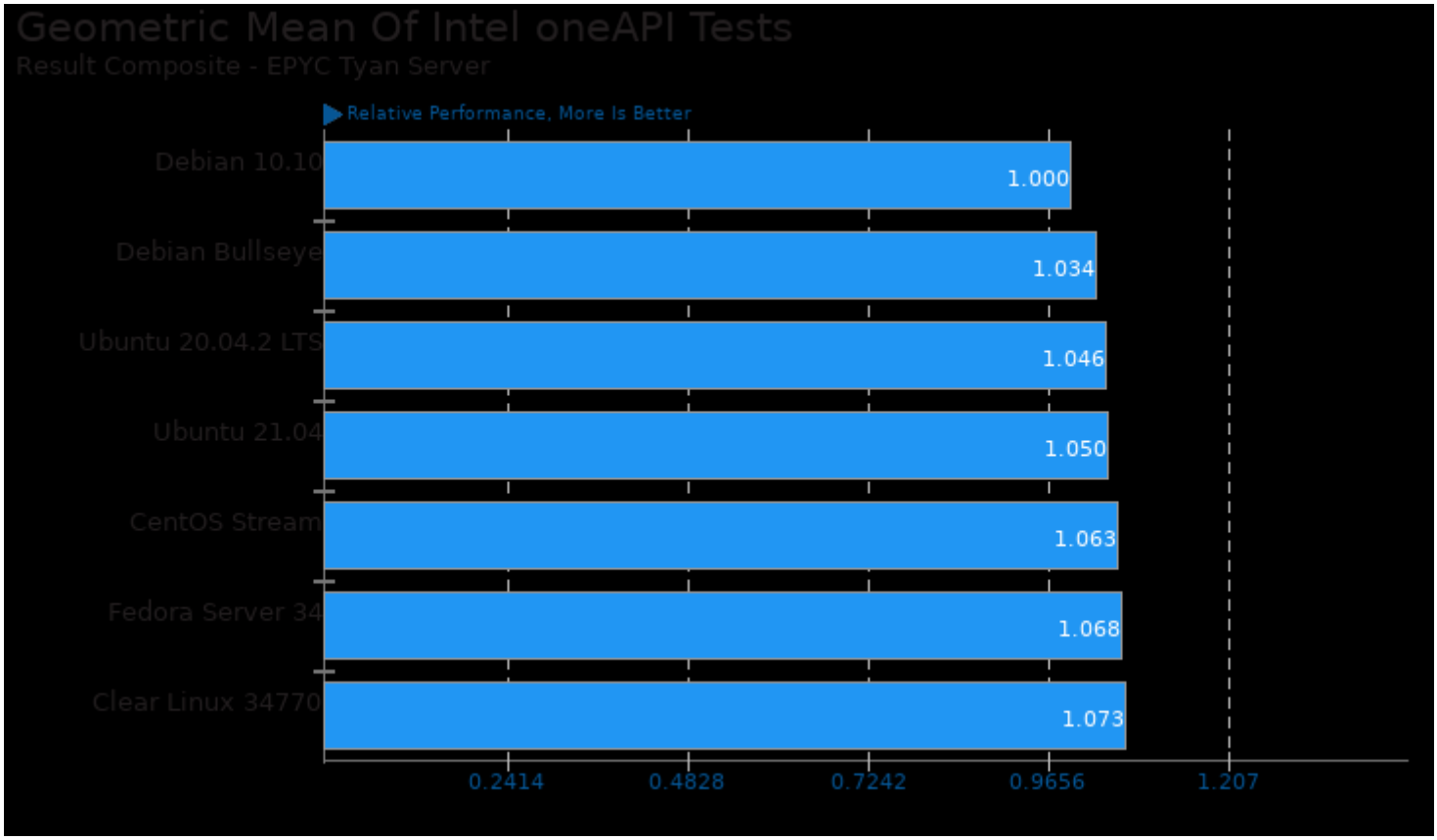
Geometric mean based upon tests: pts/namd, pts/gromacs, pts/minife and pts/incompact3d



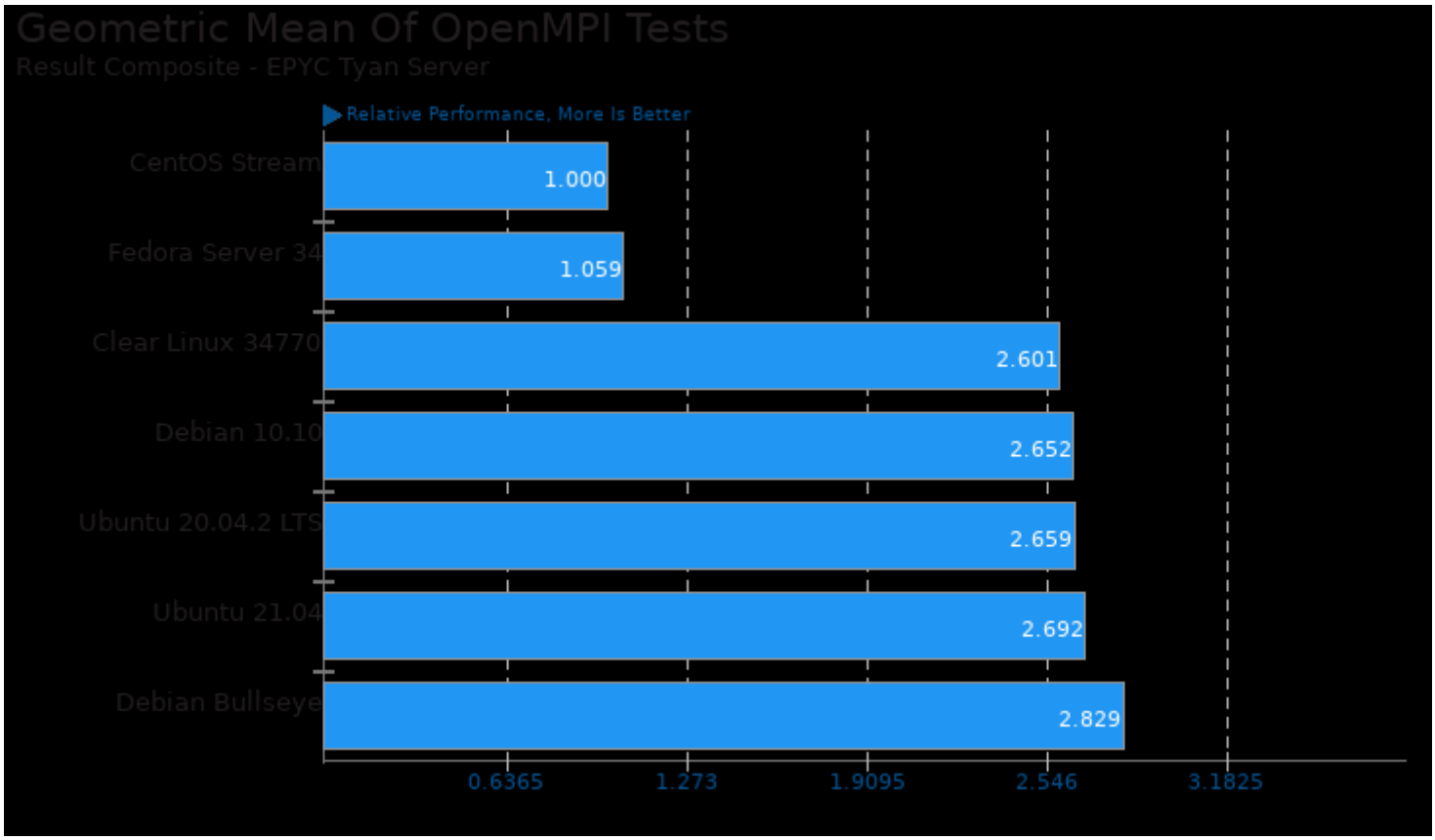
Geometric mean based upon tests: pts/incompact3d, pts/gromacs, pts/hpcg, pts/npb and pts/minife



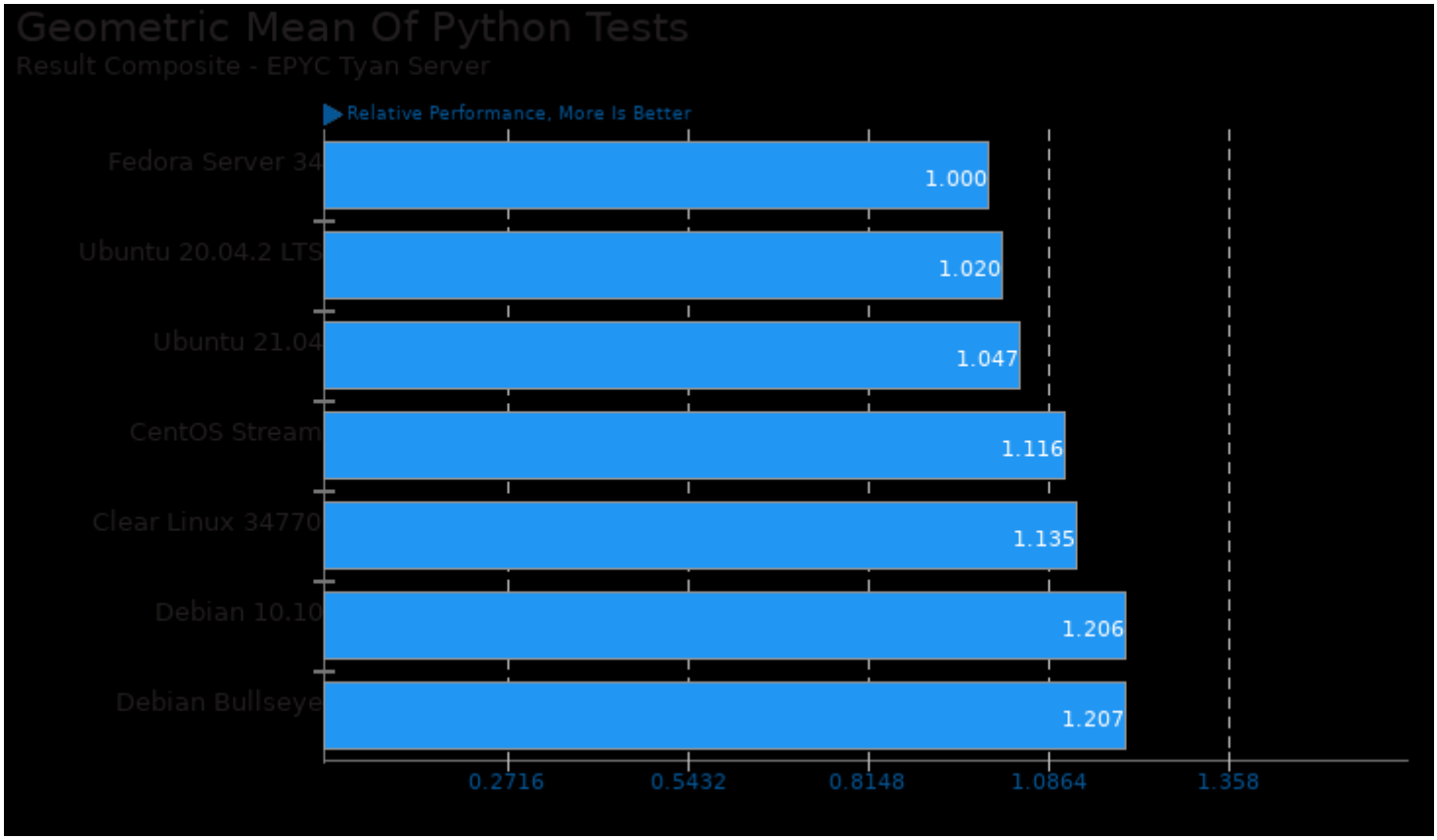
Geometric mean based upon tests: pts/gromacs, pts/luxcorerender, pts/plaidml and pts/blender



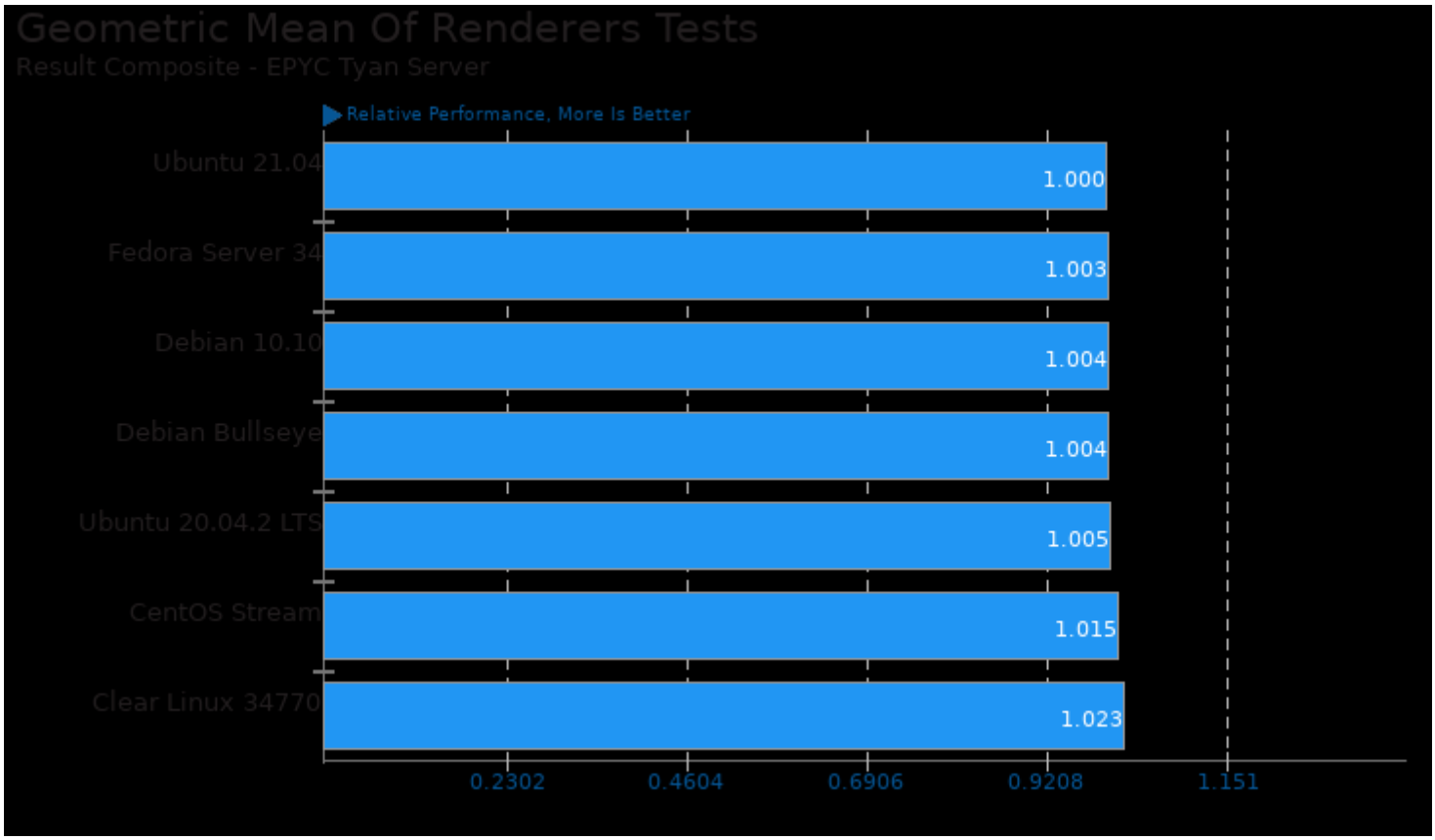
Geometric mean based upon tests: pts/embree, pts/oidn, pts/ospray and pts/openvkl



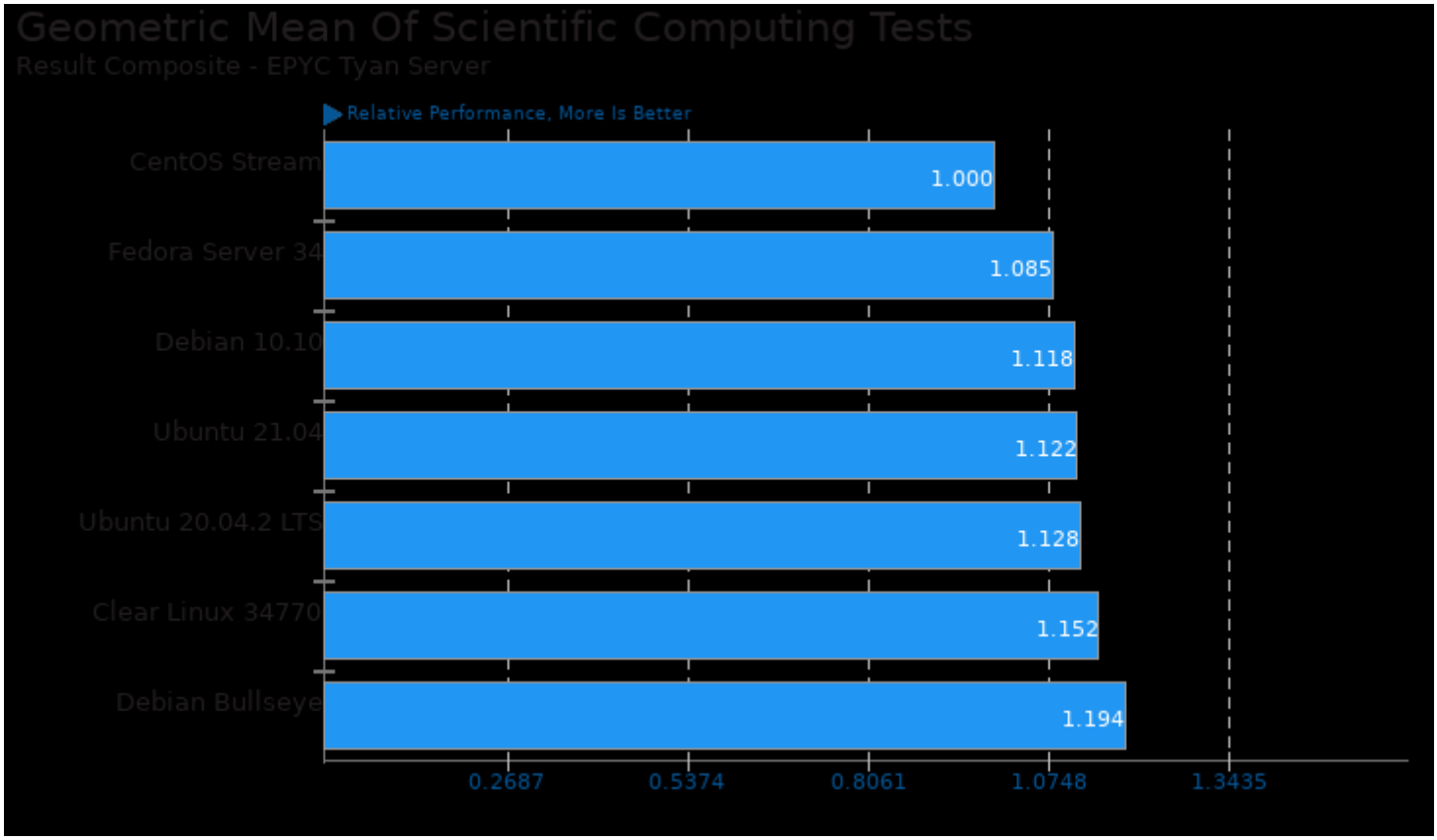
Geometric mean based upon tests: pts/hpcg, pts/npb, pts/minife, pts/incompact3d and pts/gromacs



Geometric mean based upon tests: pts/build-godot, pts/build-llvm, pts/build-nodejs, pts/plaidml, pts/onnx and pts/numenta-nab



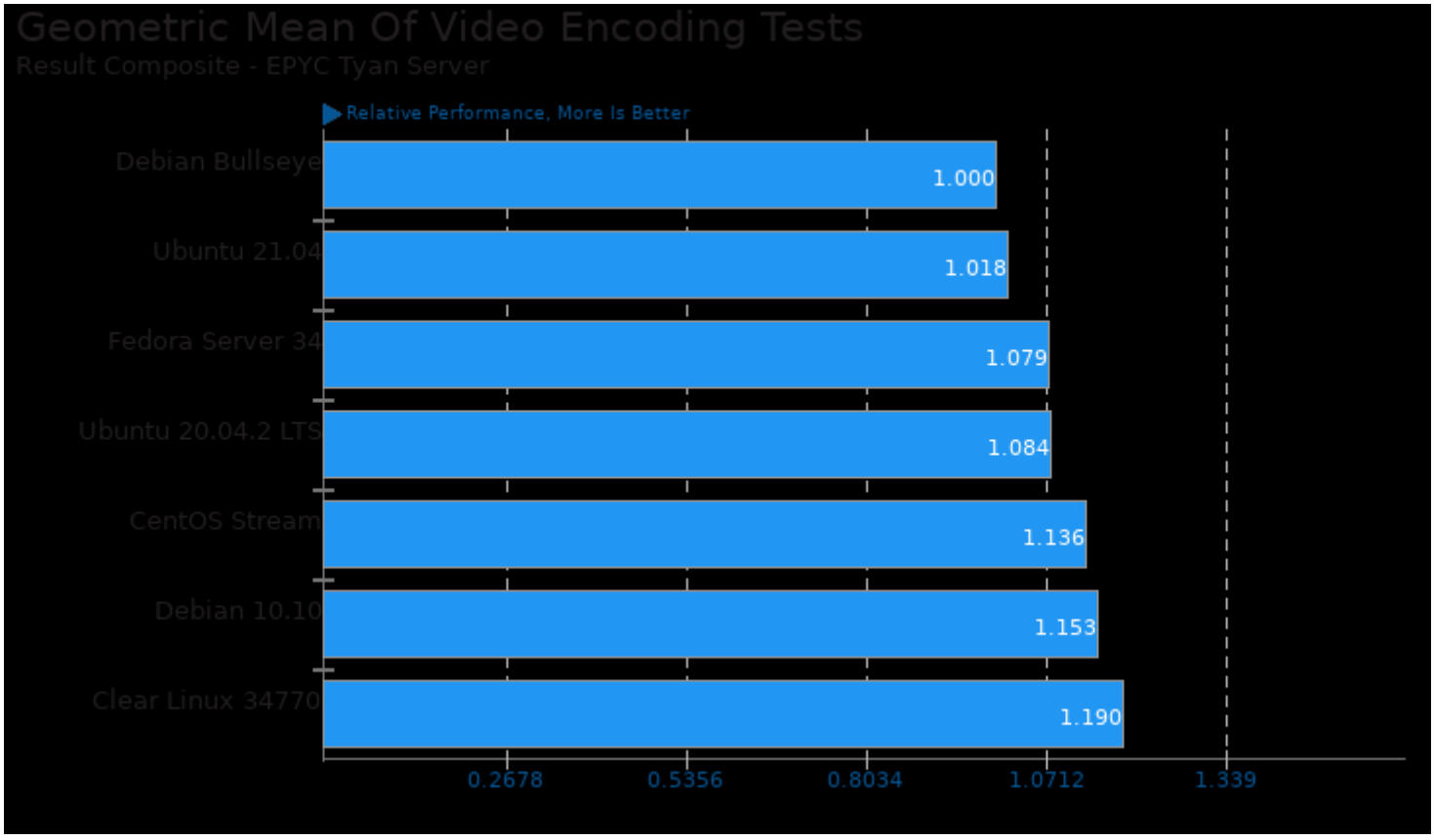
Geometric mean based upon tests: pts/ospray, pts/blender and pts/luxcorerender



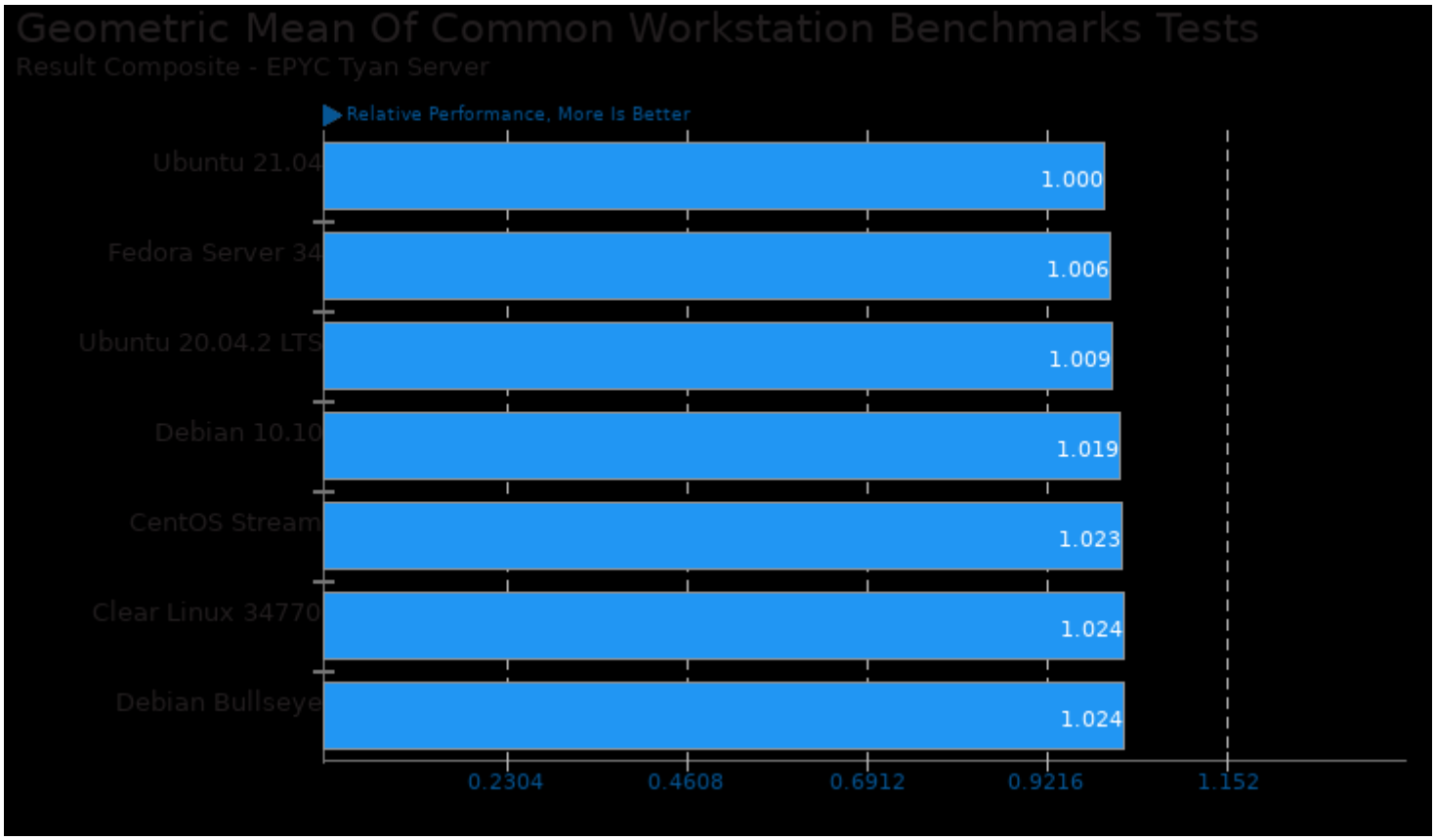
Geometric mean based upon tests: pts/namd, pts/gromacs, pts/minife, pts/incompact3d and pts/kripke



Geometric mean based upon tests: pts/npb, pts/namd, pts/svt-av1, pts/svt-hevc, pts/svt-vp9, pts/build-linux-kernel, pts/build-llvm, pts/blender and pts/numenta-nab



Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/vpxenc, pts/svt-av1 and pts/avifenc



Geometric mean based upon tests: pts/blender and pts/brl-cad

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 21:58.