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AMD EPYC 7F72 2P Linux 5.11 Perf Governor

2 x AMD EPYC 7F72 24-Core testing looking at CPU freq invariance on 5.11 with patch. CPU power consumption monitoring via AMD_Energy interface at 1 second polling. Additional data with CPUFreq performance governor included.

Automated Executive Summary

CPUFreq Performance had the most wins, coming in first place for 48% of the tests.

Based on the geometric mean of all complete results, the fastest (CPUFreq Performance) was 1.04x the speed of the slowest (Linux 5.11 Git). Linux 5.11 Patched was 0.98x the speed of CPUFreq Performance and Linux 5.11 Git was 0.981x the speed of Linux 5.11 Patched.

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

Cpuminer-Opt (Algorithm: LBC, LBRY Credits) at 1.465x
dav1d (Video Input: Chimera 1080p 10-bit) at 1.393x
OSPray (Demo: Magnetic Reconnection - Renderer: Path Tracer) at 1.333x
x265 (Video Input: Bosphorus 1080p) at 1.307x
DaCapo Benchmark (Java Test: Tradebeans) at 1.275x
InfluxDB (Concurrent Streams: 4 - Batch Size: 10000 - Tags: 2,5000,1 - Points Per Series: 10000) at 1.184x
dav1d (Video Input: Summer Nature 4K) at 1.179x
LAMMPS Molecular Dynamics Simulator (Model: Rhodopsin Protein) at 1.166x

Timed GDB GNU Debugger Compilation (Time To Compile) at 1.145x
DaCapo Benchmark (Java Test: Tradesoap) at 1.119x.

Test Systems:

Linux 5.11 Git

Processor: 2 x AMD EPYC 7F72 24-Core @ 3.20GHz (48 Cores / 96 Threads), Motherboard: Supermicro H11DSi-NT v2.00 (2.1 BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 8192 MB DDR4-3200MT/s HMA81GR7CJR8N-XN, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Network: 2 x Intel 10G X550T

OS: Ubuntu 20.10, Kernel: 5.11.0-051100rc4daily20210122-generic (x86_64) 20210121, Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw / Block Size: 4096
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0x8301034
Java Notes: OpenJDK Runtime Environment (build 11.0.9.1+1-Ubuntu-0ubuntu1.20.10)
Python Notes: Python 3.8.6
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: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Linux 5.11 Patched

Processor: 2 x AMD EPYC 7F72 24-Core @ 3.20GHz (48 Cores / 96 Threads), Motherboard: Supermicro H11DSi-NT v2.00 (2.1 BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 8192 MB DDR4-3200MT/s HMA81GR7CJR8N-XN, Disk: 1000GB Western Digital WD_BLACK SN850 1TB, Graphics: ASPEED, Monitor: VE228, Network: 2 x Intel 10G X550T

OS: Ubuntu 20.10, Kernel: 5.11.0-rc4-max-boost-inv-patch (x86_64) 20210121, Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw / Block Size: 4096
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0x8301034
Java Notes: OpenJDK Runtime Environment (build 11.0.9.1+1-Ubuntu-0ubuntu1.20.10)
Python Notes: Python 3.8.6
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: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

CPUFreq Performance

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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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw / Block Size: 4096
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0x8301034
Java Notes: OpenJDK Runtime Environment (build 11.0.9.1+1-Ubuntu-0ubuntu1.20.10)
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	Linux 5.11 Git	Linux 5.11 Patched	CPUFreq
Algebraic Multi-Grid Benchmark (Figure Of Merit)	**1437771333**	**1448718333**	1444174667
Normalized	99.24%	100%	99.69%
Standard Deviation	0.3%	0.1%	0.5%
Algebraic Multi-Grid Benchmark (Figure Of Merit/Watt)	**4559172**	4631995	**4634187**
Normalized	98.38%	99.95%	100%
BlogBench - Read (Final Score)	**1084405**	**1103118**	1086347
Normalized	98.3%	100%	98.48%
Standard Deviation	3%	0.3%	2.2%
BlogBench - Read (Final Score/Watt)	**4600**	**4753**	4639
Normalized	96.78%	100%	97.61%
dav1d - Summer Nature 4K (FPS)	**308.29**	317.45	**363.33**
Normalized	84.85%	87.37%	100%
Standard Deviation	1%	0.3%	3.8%
dav1d - C.1.1.b (FPS)	**130.61**	133.37	**181.95**
Normalized	71.78%	73.3%	100%
Standard Deviation	0.3%	0.2%	0.2%
OSPray - M.R - SciVis (FPS)	**32.26**	32.62	**32.80**
Normalized	98.35%	99.45%	100%
Standard Deviation	0%	1.7%	1.8%
OSPray - M.R - Path Tracer (FPS)	**250**	**250**	**333.33**
Normalized	75%	75%	100%
Standard Deviation			0%
OSPray - XFrog Forest - SciVis (FPS)	**11.11**	**11.19**	**11.19**
Normalized	99.29%	100%	100%
Standard Deviation	0%	0.6%	0.6%

OSPray - XFrog Forest - Path Tracer (FPS/Watt)	0.01	0.01	0.01
OSPray - XFrog Forest - Path Tracer (FPS)	**5.91**	**5.95**	**5.95**
Normalized	99.33%	100%	100%
Standard Deviation	0.3%	0%	0%
OSPray - NASA Streamlines - SciVis (FPS)	71.43	71.43	71.43
Standard Deviation	0%	0%	0%
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS/Watt)	**2.59**	2.70	**2.74**
Normalized	94.53%	98.54%	100%
OSPray - NASA Streamlines - Path Tracer (FPS)	16.39	16.39	16.39
Standard Deviation	0%	0%	0%
OSPray - San Miguel - SciVis (FPS)	**52.63**	54.97	**55.56**
Normalized	94.73%	98.94%	100%
Standard Deviation	0%	2.4%	0%
OSPray - San Miguel - Path Tracer (FPS)	**4.30**	4.32	**4.33**
Normalized	99.31%	99.77%	100%
Standard Deviation	0.2%	0.2%	0%
PlaidML - No - Inference - ResNet 50 - CPU (FPS)	4.65	**4.63**	**4.66**
Normalized	99.79%	99.36%	100%
Standard Deviation	0.8%	1%	1.5%
PlaidML - No - Inference - VGG16 - CPU	**25.12**	**25.42**	25.22
Normalized	98.82%	100%	99.21%
Standard Deviation	3.4%	4.6%	3.6%
PlaidML - No - Inference - VGG19 - CPU	**22.09**	**22.49**	22.43
Normalized	98.22%	100%	99.73%
Standard Deviation	3.5%	2.7%	3.5%
PlaidML - No - Inference - ResNet 50 - CPU (FPS/Watt)	0.03	0.03	0.03
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**627.208**	655.225	**665.448**
Normalized	94.25%	98.46%	100%
Standard Deviation	5.6%	0.9%	3.4%
dav1d - Summer Nature 4K (FPS/Watt)	1.77	**1.72**	**1.84**
Normalized	96.2%	93.48%	100%
dav1d - C.1.1.b (FPS/Watt)	**0.91**	0.92	**1.21**
Normalized	75.21%	76.03%	100%
OSPray - M.R - SciVis (FPS/Watt)	**0.10**	**0.11**	**0.10**
Normalized	90.91%	100%	90.91%
OSPray - M.R - Path Tracer (FPS/Watt)	**1.61**	1.65	**1.99**
Normalized	80.9%	82.91%	100%
OSPray - XFrog Forest - SciVis (FPS/Watt)	0.03	0.03	0.03
OSPray - NASA Streamlines - SciVis (FPS/Watt)	**0.29**	**0.30**	**0.30**
Normalized	96.67%	100%	100%
OSPray - NASA Streamlines - Path Tracer (FPS/Watt)	0.05	0.05	0.05
OSPray - San Miguel - SciVis (FPS/Watt)	**0.30**	0.32	**0.33**
Normalized	90.91%	96.97%	100%
OSPray - San Miguel - Path Tracer (FPS/Watt)	0.01	0.01	0.01

PlaidML - No - Inference - VGG16 - CPU (FPS/Watt)	0.09	0.09	0.09
PlaidML - No - Inference - VGG19 - CPU (FPS/Watt)	0.08	0.08	0.08
rav1e - 10 (FPS/Watt)	0.02	0.02	0.02
rav1e - 6 (FPS/Watt)	0.01	0.01	0.01
rav1e - 5 (FPS/Watt)	0.01	0.01	0.01
SVT-AV1 - Enc Mode 8 - 1080p (FPS)	**68.229**	68.231	**68.465**
Normalized	99.66%	99.66%	100%
Standard Deviation	6.7%	6%	3.7%
SVT-AV1 - Enc Mode 4 - 1080p (FPS)	**7.663**	7.648	**7.488**
Normalized	100%	99.8%	97.72%
Standard Deviation	1.3%	0.7%	0.8%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	311.85	**323.81**	**309.61**
Normalized	96.31%	100%	95.61%
Standard Deviation	20.1%	5%	19.1%
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS)	**381.08**	371.48	**363.18**
Normalized	100%	97.48%	95.3%
Standard Deviation	1.7%	1.4%	1.5%
SVT-AV1 - Enc Mode 8 - 1080p (FPS/Watt)	0.33	0.33	0.33
SVT-AV1 - Enc Mode 0 - 1080p (FPS)	**0.092**	**0.091**	**0.091**
Normalized	100%	98.91%	98.91%
Standard Deviation	1.3%	2.4%	0.6%
x265 - Bosphorus 1080p (FPS)	**47.66**	49.45	**62.29**
Normalized	76.51%	79.39%	100%
Standard Deviation	2.3%	2.1%	4.6%
SVT-AV1 - Enc Mode 4 - 1080p (FPS/Watt)	0.03	0.03	0.03
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS)	**369.01**	364.81	**346.71**
Normalized	100%	98.86%	93.96%
Standard Deviation	1%	0.8%	2.9%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS/Watt)	1.70	**1.74**	**1.68**
Normalized	97.7%	100%	96.55%
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS/Watt)	**2.16**	2.11	**2.07**
Normalized	100%	97.69%	95.83%
x265 - Bosphorus 4K (FPS)	**18.63**	19.74	**20.75**
Normalized	89.78%	95.13%	100%
Standard Deviation	1%	1.2%	0.7%
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS/Watt)	**2.09**	2.08	**1.97**
Normalized	100%	99.52%	94.26%
x265 - Bosphorus 1080p (FPS/Watt)	0.30	**0.29**	**0.31**
Normalized	96.77%	93.55%	100%
x265 - Bosphorus 4K (FPS/Watt)	0.08	0.08	0.08
rav1e - 10 (FPS)	**2.902**	3.054	**3.177**
Normalized	91.34%	96.13%	100%
Standard Deviation	1%	0.5%	1%
rav1e - 6 (FPS)	**1.370**	1.408	**1.446**
Normalized	94.74%	97.37%	100%
Standard Deviation	0.3%	0.4%	0.1%

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

rav1e - 5 (FPS)	**1.045**	1.068	**1.095**
Normalized	95.43%	97.53%	100%
Standard Deviation	0.2%	0.1%	0.5%
rav1e - 1 (FPS)	**0.368**	0.372	**0.375**
Normalized	98.13%	99.2%	100%
Standard Deviation	1%	0.5%	0%
simdjson - LargeRand (GB/s)	**0.37**	**0.36**	**0.37**
Normalized	100%	97.3%	100%
Standard Deviation	0%	1.6%	0%
simdjson - Kostya (GB/s)	0.57	0.57	0.57
Standard Deviation	1%	0%	1%
simdjson - DistinctUserID (GB/s/Watt)	0.00	0.01	0.01
simdjson - PartialTweets (GB/s)	**0.62**	**0.63**	**0.63**
Normalized	98.41%	100%	100%
Standard Deviation	0.9%	0%	0%
simdjson - DistinctUserID (GB/s)	0.65	0.65	0.65
Standard Deviation	0.9%	0%	0.9%
High Performance Conjugate Gradient (GFLOP/s)	**30.2415**	30.8262	**30.9260**
Normalized	97.79%	99.68%	100%
Standard Deviation	0.7%	0.7%	0.1%
High Performance Conjugate Gradient (GFLOP/s/Watt)	**0.08**	**0.08**	**0.09**
Normalized	88.89%	88.89%	100%
Intel Open Image Denoise - Memorial (Images / Sec)	**28.09**	**28.39**	28.33
Normalized	98.94%	100%	99.79%
Standard Deviation	0.8%	0.3%	1.4%
Intel Open Image Denoise - Memorial (Images / Sec/Watt)	0.08	0.08	0.08
ONNX Runtime - yolov4 - OpenMP CPU (Inferences/min/Watt)	**0.67**	0.69	**0.70**
Normalized	95.71%	98.57%	100%
ONNX Runtime - super-resolution-10 - OpenMP CPU (Inferences/min/Watt)	**15.72**	**15.26**	15.49
Normalized	100%	97.07%	98.54%
ONNX Runtime - yolov4 - OpenMP CPU (Inferences/min)	**175**	181	**185**
Normalized	94.59%	97.84%	100%
Standard Deviation	3.2%	1.8%	2.5%
ONNX Runtime - super-resolution-10 - OpenMP CPU (Inferences/min)	**4393**	4210	**4190**
Normalized	100%	95.83%	95.38%
Standard Deviation	5.3%	1.8%	5.6%
Cpuminer-Opt - Q.S.2.P (kH/s)	297502	**296995**	**420231**
Normalized	70.79%	70.67%	100%
Standard Deviation	2.4%	6.2%	15.7%
Cpuminer-Opt - x25x (kH/s)	**1524**	**1542**	1538
Normalized	98.86%	100%	99.72%
Standard Deviation	5.4%	4.5%	2.5%
Cpuminer-Opt - Garlicoin (kH/s)	**9937**	9950	**9964**
Normalized	99.73%	99.85%	100%
Standard Deviation	3.3%	3.9%	5.8%

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

Cpuminer-Opt - Skeincoin (kH/s)	**363784**	364017	**522948**
Normalized	69.56%	69.61%	100%
Standard Deviation	3.8%	5.3%	6.4%
Cpuminer-Opt - LBC, LBRY Credits (kH/s)	**132477**	139037	**194087**
Normalized	68.26%	71.64%	100%
Standard Deviation	1.4%	1.7%	0.8%
Cpuminer-Opt - Q.S.2.P (kH/s/Watt)	2373	**2358**	**2899**
Normalized	81.87%	81.35%	100%
Cpuminer-Opt - x25x (kH/s/Watt)	**6.04**	**6.08**	**6.04**
Normalized	99.34%	100%	99.34%
Cpuminer-Opt - Garlicoin (kH/s/Watt)	**61.06**	59.91	**57.99**
Normalized	100%	98.12%	94.97%
Cpuminer-Opt - Skeincoin (kH/s/Watt)	2899	**2898**	**3626**
Normalized	79.96%	79.92%	100%
Cpuminer-Opt - LBC, LBRY Credits	**1053**	1092	**1315**
Normalized	80.03%	82.98%	100%
Chaos Group V-RAY - CPU (Ksamples/Watt)	130.07	**127.59**	**130.65**
Normalized	99.56%	97.66%	100%
Chaos Group V-RAY - CPU (Ksamples)	54803	**53460**	**55014**
Normalized	99.62%	97.18%	100%
Standard Deviation	1.6%	6.9%	1.6%
BYTE Unix Benchmark - Dhrystone 2 (LPS)	**38181644**	38319340	**38656226**
Normalized	98.77%	99.13%	100%
Standard Deviation	1.9%	1.5%	2.2%
BYTE Unix Benchmark - Dhrystone 2 (LPS/Watt)	**301516**	306193	**307169**
Normalized	98.16%	99.68%	100%
LuxCoreRender - DLSC (M samples/sec)	7.81	**7.80**	**7.89**
Normalized	98.99%	98.86%	100%
Standard Deviation	0.8%	2.2%	2%
LuxCoreRender - DLSC (M	0.02	0.02	0.02
LuxCoreRender - R.C.a.P (M samples/sec)	**8.72**	**8.76**	**8.76**
Normalized	99.54%	100%	100%
Standard Deviation	2.4%	1.8%	0.9%
LuxCoreRender - R.C.a.P (M	0.02	0.02	0.02
IOR - 2MB (MB/s)	505.19	**475.25**	**517.33**
Normalized	97.65%	91.87%	100%
Standard Deviation	0.6%	0.8%	1.8%
IOR - 8MB (MB/s)	531.09	**520.72**	**539.63**
Normalized	98.42%	96.5%	100%
Standard Deviation	0.7%	0.9%	1.9%
IOR - 8MB (MB/s/Watt)	2.50	**2.49**	**2.55**
Normalized	98.04%	97.65%	100%
Zstd Compression - 3 (MB/s/Watt)	53.45	**54.88**	**50.56**
Normalized	97.39%	100%	92.13%
Zstd Compression - 3 (MB/s)	8205	**8271**	**7770**
Normalized	99.21%	100%	93.95%
Standard Deviation	0.6%	1.4%	28.9%
LZ4 Compression - 1 - D.S (MB/s/Watt)	**81.09**	81.34	**81.46**
Normalized	99.55%	99.85%	100%
LZ4 Compression - 1 - Compression Speed (MB/s)	**9623**	**9757**	9652
Normalized	98.62%	100%	98.92%
Standard Deviation	1.7%	0.3%	1.3%

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

LZ4 Compression - 1 - D.S (MB/s)	**11334**	11305	**11151**
Normalized	100%	99.74%	98.38%
Standard Deviation	0.7%	0.4%	1.7%
LZ4 Compression - 3 - Compression Speed (MB/s)	**49.43**	**48.95**	49.29
Normalized	100%	99.03%	99.72%
Standard Deviation	2.3%	0.4%	2.3%
LZ4 Compression - 3 - D.S (MB/s)	**10405**	**10666**	10410
Normalized	97.55%	100%	97.6%
Standard Deviation	0.7%	1%	1.3%
LZ4 Compression - 9 - Compression Speed (MB/s)	**47.63**	47.76	**48.02**
Normalized	99.19%	99.46%	100%
Standard Deviation	0.1%	0.5%	0.9%
LZ4 Compression - 9 - D.S (MB/s)	**10488**	10490	**10555**
Normalized	99.36%	99.38%	100%
Standard Deviation	2.9%	0.5%	1.6%
IOR - 2MB (MB/s/Watt)	2.56	**2.43**	**2.64**
Normalized	96.97%	92.05%	100%
LZ4 Compression - 3 - D.S (MB/s/Watt)	**77.28**	**80.07**	79.05
Normalized	96.52%	100%	98.73%
LZ4 Compression - 9 - D.S (MB/s/Watt)	78.48	**78.46**	**80.12**
Normalized	97.95%	97.93%	100%
QuantLib (MFLOPS)	**2150**	**2157**	2156
Normalized	99.66%	100%	99.96%
Standard Deviation	1.1%	0.7%	1.3%
FFTE - N.2.3.C.F.R (MFLOPS)	**174206**	178738	**180038**
Normalized	96.76%	99.28%	100%
Standard Deviation	3.6%	3.8%	3.5%
FFTW - Float + SSE - 2D FFT Size 4096 (Mflops)	**18468**	**17015**	17335
Normalized	100%	92.13%	93.87%
Standard Deviation	0.2%	2.2%	3.5%
Himeno Benchmark - P.P.S (MFLOPS)	4234	**4287**	**4136**
Normalized	98.76%	100%	96.47%
Standard Deviation	2.3%	1%	1.1%
QuantLib (MFLOPS/Watt)	**16.11**	16.34	**16.49**
Normalized	97.7%	99.09%	100%
FFTE - N.2.3.C.F.R (MFLOPS/Watt)	**638.23**	656.40	**664.85**
Normalized	96%	98.73%	100%
FFTW - Float + SSE - 2D FFT Size 4096 (Mflops/Watt)	**138.49**	**127.83**	131.21
Normalized	100%	92.3%	94.74%
Himeno Benchmark - P.P.S (MFLOPS/Watt)	31.72	**31.94**	**31.13**
Normalized	99.31%	100%	97.46%
ASKAP - tConvolve MPI - Gridding (Million Grid Points/sec)	**7426**	**7454**	7442
Normalized	99.63%	100%	99.84%
Standard Deviation	0.1%	0.1%	0.2%
ASKAP - tConvolve MPI - Degridding (Million Grid Points/sec)	11870	**11944**	**11493**
Normalized	99.38%	100%	96.22%
Standard Deviation	0.1%	0.1%	2.1%

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

ASKAP - tConvolve MPI - Degridding (Million Grid Points/sec/Watt)	36.17	**40.51**	**33.50**
Normalized	89.29%	100%	82.7%
Etcpak - ETC1 (Mpx/s/Watt)	**2.07**	2.10	**2.11**
Normalized	98.1%	99.53%	100%
Etcpak - ETC1 + Dithering (Mpx/s)	**244.793**	**245.595**	245.453
Normalized	99.67%	100%	99.94%
Standard Deviation	0.1%	0.1%	0.1%
Etcpak - ETC1 + Dithering (Mpx/s/Watt)	**1.89**	1.91	**1.93**
Normalized	97.93%	98.96%	100%
Etcpak - ETC1 (Mpx/s)	**266.315**	**267.587**	267.136
Normalized	99.52%	100%	99.83%
Standard Deviation	0.2%	0.2%	0.2%
Etcpak - ETC2 (Mpx/s)	**155.182**	**155.798**	155.783
Normalized	99.6%	100%	99.99%
Standard Deviation	0.1%	0%	0%
Etcpak - ETC2 (Mpx/s/Watt)	**1.19**	1.21	**1.22**
Normalized	97.54%	99.18%	100%
LeelaChessZero - BLAS (Nodes/s/Watt)	**9.69**	**9.72**	**9.72**
Normalized	99.69%	100%	100%
LeelaChessZero - BLAS (Nodes/s)	4106	**4061**	**4147**
Normalized	99.01%	97.93%	100%
Standard Deviation	2.1%	3.7%	0.7%
LeelaChessZero - Eigen (Nodes/s)	**4284**	4433	**4450**
Normalized	96.27%	99.62%	100%
Standard Deviation	2.3%	1.4%	1%
Stockfish - Total Time (Nodes/s)	**97945089**	97042601	**96082114**
Normalized	100%	99.08%	98.1%
Standard Deviation	2%	1.4%	2.4%
TSCP - A.C.P (Nodes/s)	1115133	**1114562**	**1116255**
Normalized	99.9%	99.85%	100%
Standard Deviation	0.3%	0.2%	0.2%
LeelaChessZero - Eigen (Nodes/s/Watt)	**10.08**	**10.45**	10.39
Normalized	96.46%	100%	99.43%
Stockfish - Total Time (Nodes/s/Watt)	**223085**	220990	**218753**
Normalized	100%	99.06%	98.06%
TSCP - A.C.P (Nodes/s/Watt)	**8954**	8993	**9017**
Normalized	99.31%	99.73%	100%
asmFish - 1.H.M.2.D (Nodes/s/Watt)	251757	**259519**	**251626**
Normalized	97.01%	100%	96.96%
asmFish - 1.H.M.2.D (Nodes/s)	**117310985**	**117632955**	117370871
Normalized	99.73%	100%	99.78%
Standard Deviation	1.3%	0.5%	2.4%
GROMACS - Water Benchmark (Ns/Day/Watt)	0.01	0.01	0.01
GROMACS - Water Benchmark (Ns/Day)	**5.239**	**5.261**	5.255
Normalized	99.58%	100%	99.89%
Standard Deviation	1.3%	0.7%	0.7%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day/Watt)	**0.12**	0.13	**0.14**
Normalized	85.71%	92.86%	100%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	**21.129**	23.787	**24.639**
Normalized	85.75%	96.54%	100%
Standard Deviation	4.1%	2.4%	3%

LAMMPS Molecular Dynamics Simulator - 20k Atoms (ns/day)	**24.993**	25.077	**25.116**
Normalized	99.51%	99.84%	100%
Standard Deviation	0.6%	0.3%	0.2%
LAMMPS Molecular Dynamics Simulator - 20k Atoms (ns/day/Watt)	0.06	0.06	0.06
Swet - Average (Operations/sec)	**685888863**	**687480262**	686132109
Normalized	99.77%	100%	99.8%
Standard Deviation	1.3%	0.4%	0.9%
Swet - Average (Operations/sec/Watt)	**5364162**	5408273	**5450164**
Normalized	98.42%	99.23%	100%
KeyDB (Ops/sec/Watt)	**1930**	1865	**1762**
Normalized	100%	96.66%	91.29%
KeyDB (Ops/sec)	302894	**294214**	**303171**
Normalized	99.91%	97.05%	100%
Standard Deviation	5.4%	4%	6.6%
Hierarchical INTegration - FLOAT	2518731	**2496421**	**2527557**
Normalized	99.65%	98.77%	100%
Hierarchical INTegration - FLOAT (QUIPs)	**322702844**	**323144417**	322775284
Normalized	99.86%	100%	99.89%
Standard Deviation	0.1%	0.1%	0.1%
John The Ripper - MD5 (Real C/S)	**4550333**	4612308	**4762000**
Normalized	95.56%	96.86%	100%
Standard Deviation	1.9%	4.2%	0.3%
John The Ripper - MD5 (Real C/S/Watt)	**10023**	10085	**10378**
Normalized	96.58%	97.17%	100%
John The Ripper - Blowfish (Real C/S)	**70824**	**72636**	71757
Normalized	97.51%	100%	98.79%
Standard Deviation	0.8%	0.2%	1.2%
John The Ripper - Blowfish (Real C/S/Watt)	**182.56**	**185.47**	183.88
Normalized	98.43%	100%	99.14%
Redis - SET (Reqs/sec/Watt)	**11016**	11501	**11684**
Normalized	94.28%	98.43%	100%
Redis - GET (Reqs/sec/Watt)	**13515**	13846	**14376**
Normalized	94.01%	96.31%	100%
Redis - SET (Reqs/sec)	**1380890**	1427348	**1454741**
Normalized	94.92%	98.12%	100%
Standard Deviation	2.9%	3.6%	2.5%
Redis - GET (Reqs/sec)	**1689203**	1711622	**1782756**
Normalized	94.75%	96.01%	100%
Standard Deviation	0.8%	2.5%	6.3%
Redis - LPUSH (Reqs/sec/Watt)	**9715**	9780	**10016**
Normalized	96.99%	97.64%	100%
Redis - SADD (Reqs/sec/Watt)	**12421**	**13036**	12967
Normalized	95.28%	100%	99.47%
Redis - LPUSH (Reqs/sec)	1220974	**1217219**	**1251006**
Normalized	97.6%	97.3%	100%
Standard Deviation	1.6%	2%	1.6%
Redis - SADD (Reqs/sec)	**1539146**	**1611164**	1610485
Normalized	95.53%	100%	99.96%
Standard Deviation	1.8%	1.9%	4.3%
Numpy Benchmark (Score/Watt)	**2.42**	2.43	**2.46**
Normalized	98.37%	98.78%	100%
AI Benchmark Alpha - D.I.S (Score)	**1697**	1720	**1775**

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

Normalized	95.61%	96.9%	100%
AI Benchmark Alpha - D.T.S (Score)	1059	1067	1133
Normalized	93.47%	94.17%	100%
AI Benchmark Alpha - Device AI Score	2756	2787	2908
Normalized	94.77%	95.84%	100%
AI Benchmark Alpha - Device AI Score (Score/Watt)	12.95	12.98	11.59
Normalized	99.77%	100%	89.29%
Numpy Benchmark (Score)	323.93	323.00	324.48
Normalized	99.83%	99.54%	100%
Standard Deviation	0.9%	0.1%	0.1%
CLOMP - Static OMP Speedup (Speedup)	43.9	47.8	47.4
Normalized	91.84%	100%	99.16%
Standard Deviation	2.4%	1.7%	2%
CLOMP - Static OMP Speedup	0.29	0.31	0.31
Normalized	93.55%	100%	100%
NAS Parallel Benchmarks - EP.C	17.43	17.62	17.84
Normalized	97.7%	98.77%	100%
NAS Parallel Benchmarks - EP.D	10.25	10.24	10.29
Normalized	99.61%	99.51%	100%
NAS Parallel Benchmarks - LU.C	440.23	469.62	466.44
Normalized	93.74%	100%	99.32%
NAS Parallel Benchmarks - EP.C (Mop/s)	3789	3841	3857
Normalized	98.23%	99.59%	100%
Standard Deviation	0.9%	0.4%	0.3%
NAS Parallel Benchmarks - EP.D (Mop/s)	3855	3863	3867
Normalized	99.67%	99.9%	100%
Standard Deviation	0.4%	0.1%	0.1%
NAS Parallel Benchmarks - LU.C (Mop/s)	147444	154377	153771
Normalized	95.51%	100%	99.61%
Standard Deviation	4.7%	0.7%	0.2%
InfluxDB - 64 - 10000 - 2,5000,1 - 10000 (val/sec)	1231991	1256112	1360163
Normalized	90.58%	92.35%	100%
Standard Deviation	0.9%	0.4%	1.2%
InfluxDB - 4 - 10000 - 2,5000,1 - 10000 (val/sec/Watt)	5060	4857	4964
Normalized	100%	95.99%	98.09%
InfluxDB - 64 - 10000 - 2,5000,1 - 10000 (val/sec/Watt)	6781	6672	6626
Normalized	100%	98.39%	97.71%
InfluxDB - 4 - 10000 - 2,5000,1 - 10000	807463	812194	956189
Normalized	84.45%	84.94%	100%
Standard Deviation	0.5%	0.3%	0.4%
BRL-CAD - V.P.M (VGR Performance Metric/Watt)	1356	1370	1355
Normalized	99.01%	100%	98.95%
BRL-CAD - V.P.M (VGR Performance Metric)	638971	636521	635725
Normalized	100%	99.62%	99.49%
Google SynthMark - VoiceMark_100 (Voices)	712.252	714.914	714.181
Normalized	99.63%	100%	99.9%
Standard Deviation	0.3%	0%	0.3%

Google SynthMark - VoiceMark_100 (Voices/Watt)	**5.50**	5.54	**5.57**
Normalized	98.74%	99.46%	100%
LULESH (z/s)	19576	**19771**	**19335**
Normalized	99.01%	100%	97.79%
Standard Deviation	0.8%	1.9%	2.1%
LULESH (z/s/Watt)	79.61	**80.77**	**78.80**
Normalized	98.56%	100%	97.56%
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	**0.45451**	0.44472	**0.44469**
Normalized	97.84%	99.99%	100%
Standard Deviation	1.2%	0%	0.3%
TensorFlow Lite - Mobilenet Float (us)	**46659**	**39524**	39982
Normalized	84.71%	100%	98.85%
Standard Deviation	9.5%	1.7%	2%
TensorFlow Lite - Mobilenet Quant (us)	**45084**	**41034**	41180
Normalized	91.02%	100%	99.65%
Standard Deviation	6.5%	2.4%	0.9%
TensorFlow Lite - NASNet Mobile (us)	**189771**	134044	**132844**
Normalized	70%	99.1%	100%
Standard Deviation	15%	6.9%	6.3%
TensorFlow Lite - SqueezeNet (us)	**65193**	62195	**61347**
Normalized	94.1%	98.64%	100%
Standard Deviation	1.8%	2.6%	2.3%
TensorFlow Lite - I.R.V (us)	**765726**	**736285**	737993
Normalized	96.16%	100%	99.77%
Standard Deviation	1%	2.4%	0.5%
TensorFlow Lite - Inception V4 (us)	**894640**	**810750**	818887
Normalized	90.62%	100%	99.01%
Standard Deviation	0.5%	0.2%	1%
FinanceBench - Bonds OpenMP (ms)	**57601**	56769	**56094**
Normalized	97.38%	98.81%	100%
Standard Deviation	2.2%	1.8%	1.1%
FinanceBench - Repo OpenMP (ms)	**40124**	**39407**	39948
Normalized	98.21%	100%	98.64%
Standard Deviation	1.4%	1.7%	2%
TNN - CPU - MobileNet v2 (ms)	**303.449**	**289.764**	297.132
Normalized	95.49%	100%	97.52%
Standard Deviation	2.2%	1.7%	0%
TNN - CPU - SqueezeNet v1.1 (ms)	**274.944**	274.869	**274.097**
Normalized	99.69%	99.72%	100%
Standard Deviation	0.2%	0.4%	0%
oneDNN - C.B.S.A - f32 - CPU (ms)	**0.914198**	**0.863782**	0.867545
Normalized	94.49%	100%	99.57%
Standard Deviation	1.8%	0.5%	0.5%
oneDNN - D.B.s - f32 - CPU (ms)	**2.40549**	2.33290	**2.30467**
Normalized	95.81%	98.79%	100%
Standard Deviation	2.4%	1.2%	4.3%
oneDNN - IP Shapes 1D - f32 - CPU (ms)	**1.62088**	**1.55447**	1.57963
Normalized	95.9%	100%	98.41%
Standard Deviation	1.9%	1.7%	1.7%
oneDNN - IP Shapes 3D - f32 - CPU (ms)	**0.881348**	0.849248	**0.813628**
Normalized	92.32%	95.81%	100%
Standard Deviation	1.3%	1.1%	1.5%

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

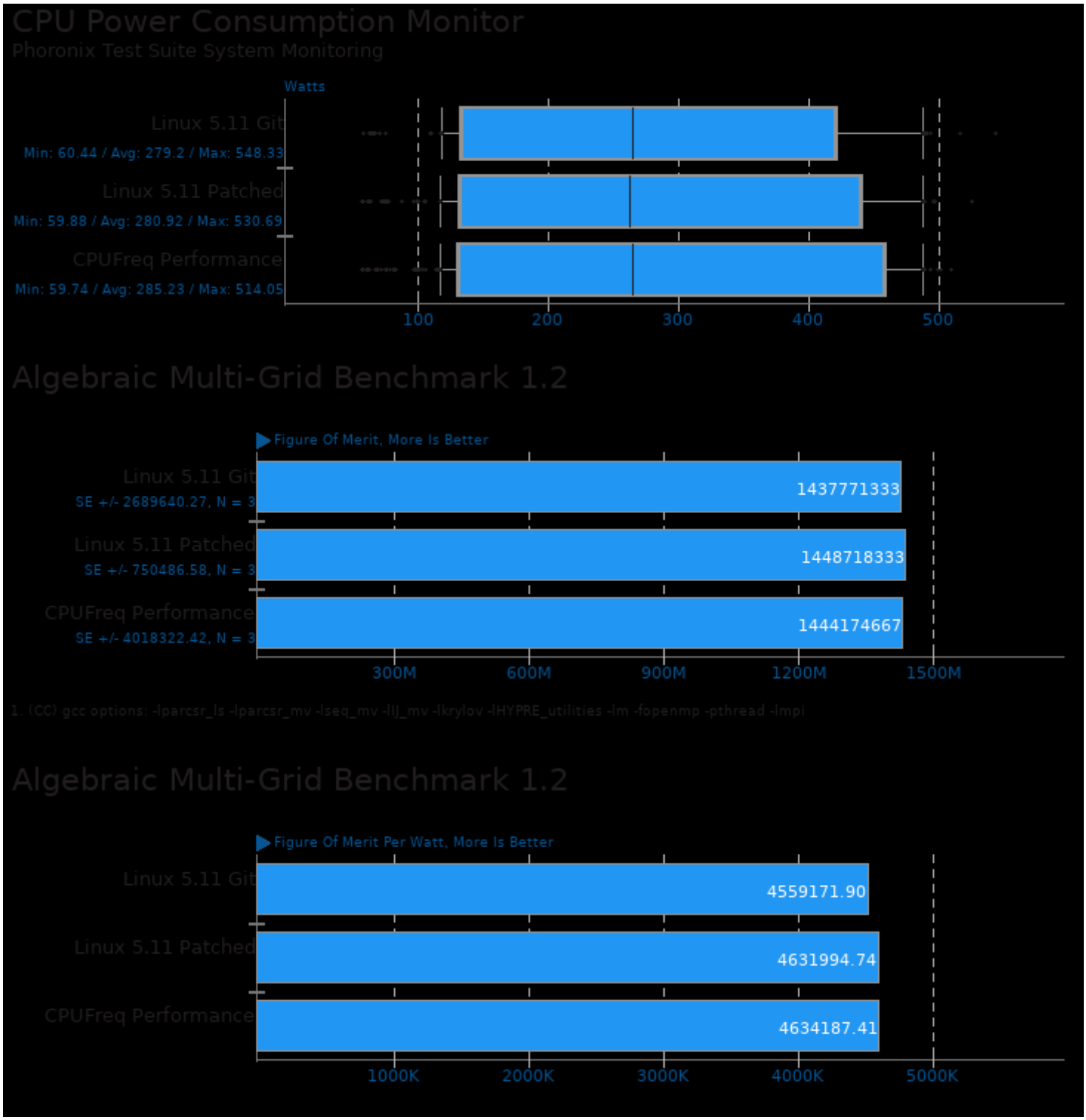
oneDNN - M.M.B.S.T - f32 - CPU (ms)	**0.547674**	0.521968	**0.514604**
Normalized	93.96%	98.59%	100%
Standard Deviation	1.8%	1.8%	2.3%
oneDNN - R.N.N.T - f32 - CPU (ms)	**1317**	**1123**	1247
Normalized	85.27%	100%	90.05%
Standard Deviation	7.7%	0.5%	11%
DaCapo Benchmark - H2 (msec)	**5310**	5217	**4570**
Normalized	86.06%	87.6%	100%
Standard Deviation	3.1%	6.3%	6.9%
DaCapo Benchmark - Jython (msec)	**4897**	4778	**4740**
Normalized	96.79%	99.2%	100%
Standard Deviation	2.5%	2.3%	1.1%
DaCapo Benchmark - Tradebeans (msec)	**5954**	5591	**4671**
Normalized	78.45%	83.54%	100%
Standard Deviation	3.8%	5.3%	5%
DaCapo Benchmark - Tradesoap (msec)	**5170**	5148	**4621**
Normalized	89.38%	89.76%	100%
Standard Deviation	1.7%	2.4%	2.1%
Timed Godot Game Engine Compilation - Time To Compile (sec)	**60.858**	59.177	**58.746**
Normalized	96.53%	99.27%	100%
Standard Deviation	0.3%	0.5%	0.8%
Timed GDB GNU Debugger Compilation - Time To Compile (sec)	**97.641**	92.916	**85.277**
Normalized	87.34%	91.78%	100%
Standard Deviation	0.7%	0.8%	0.3%
Timed Linux Kernel Compilation - Time To Compile (sec)	**25.923**	25.752	**25.414**
Normalized	98.04%	98.69%	100%
Standard Deviation	2.3%	2.4%	2.4%
Timed LLVM Compilation - Time To Compile (sec)	**210.347**	208.786	**208.043**
Normalized	98.9%	99.64%	100%
Standard Deviation	1.1%	0.7%	2.3%
Cython Benchmark - N-Queens (sec)	**26.950**	**26.604**	26.895
Normalized	98.72%	100%	98.92%
Standard Deviation	1%	1.4%	0.4%
Gcrypt Library (sec)	**233.825**	**232.542**	232.760
Normalized	99.45%	100%	99.91%
Standard Deviation	0.6%	0.6%	0.5%
GnuPG - 2.7.S.F.E (sec)	**77.302**	77.179	**77.022**
Normalized	99.64%	99.8%	100%
Standard Deviation	0.5%	0.5%	1%
OpenFOAM - Motorbike 30M (sec)	**18.71**	18.30	**18.29**
Normalized	97.76%	99.95%	100%
Standard Deviation	1.3%	0.8%	0.9%
OpenFOAM - Motorbike 60M (sec)	**129.67**	**128.28**	128.81
Normalized	98.93%	100%	99.59%
Standard Deviation	0.1%	0.1%	0.1%
Quantum ESPRESSO - AUSURF112 (sec)	1217	**1171**	**1249**
Normalized	96.18%	100%	93.75%
Standard Deviation	1.6%	2.1%	4.6%
RELION - Basic - CPU (sec)	**349.852**	**348.294**	348.338
Normalized	99.55%	100%	99.99%
Standard Deviation	2.5%	2.6%	2.7%

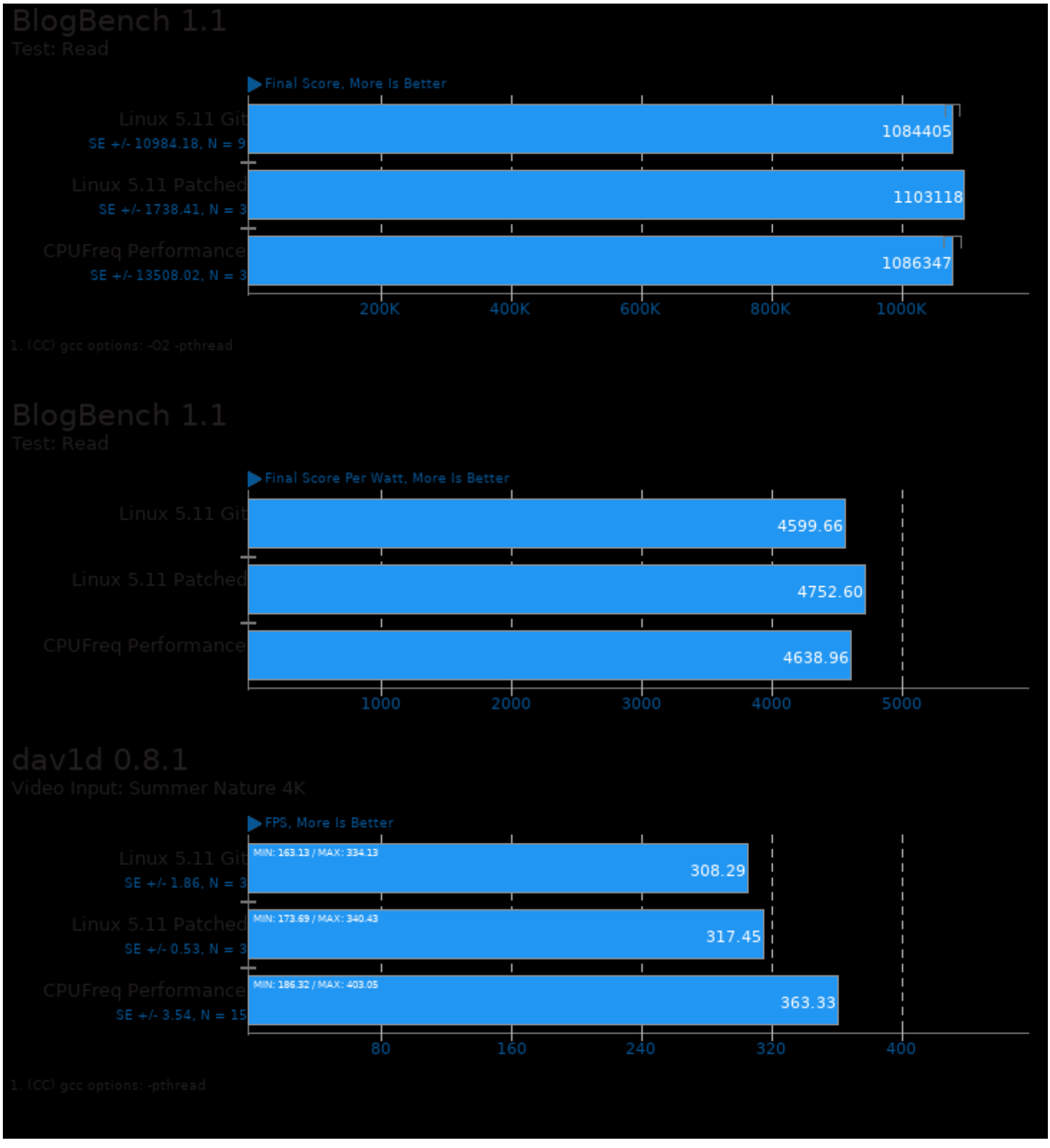
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

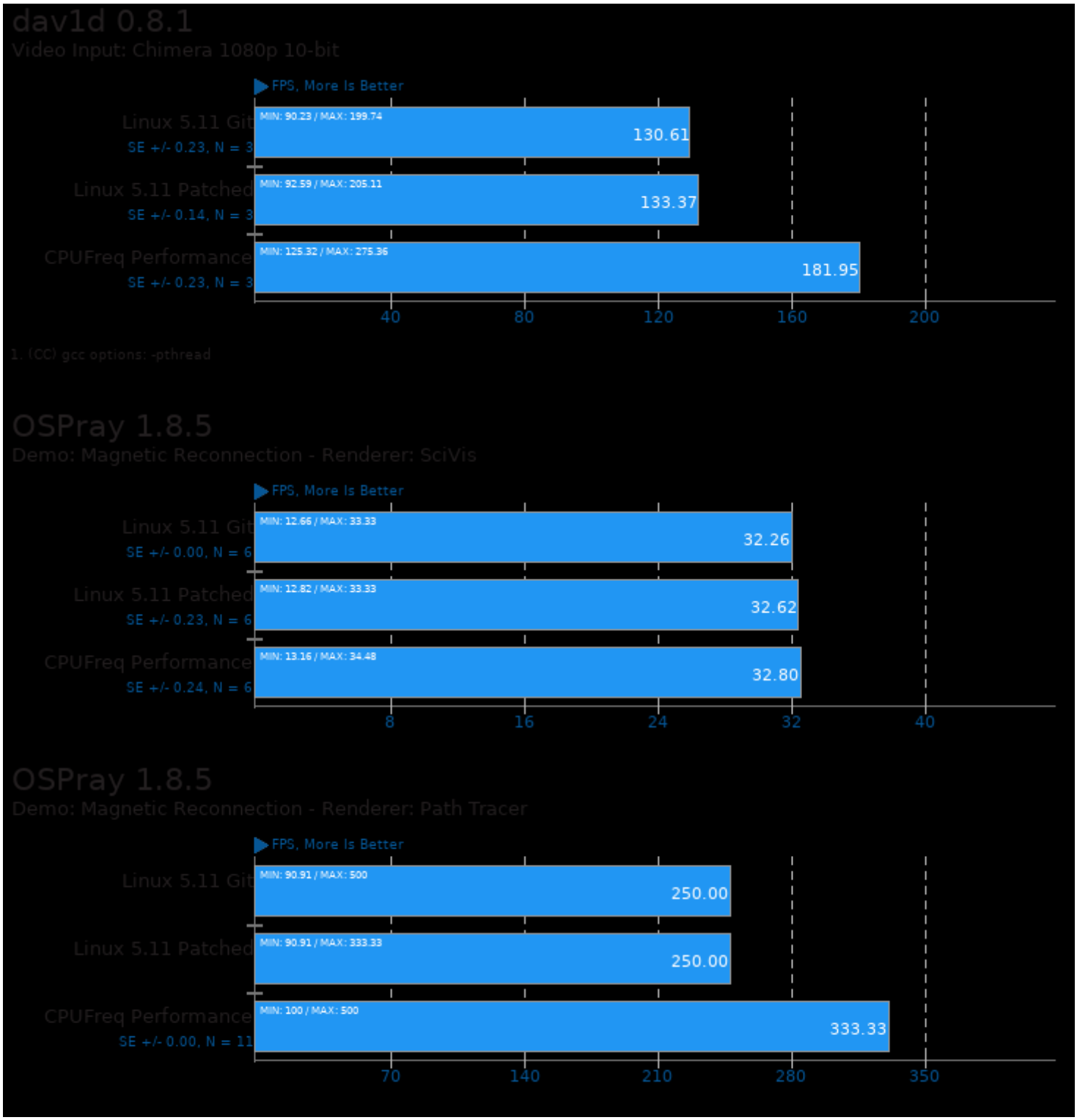
ASTC Encoder - Thorough (sec)	**5.69**	**5.65**	5.67
Normalized	99.3%	100%	99.65%
Standard Deviation	0.1%	0.2%	0.2%
ASTC Encoder - Exhaustive (sec)	**41.17**	**40.97**	41.07
Normalized	99.51%	100%	99.76%
Standard Deviation	0.1%	0.1%	0.2%
Blender - Barbershop - CPU-Only (sec)	**158.64**	**156.83**	158.07
Normalized	98.86%	100%	99.22%
Standard Deviation	0.1%	0.1%	1%
Build2 - Time To Compile (sec)	**68.141**	**67.322**	67.334
Normalized	98.8%	100%	99.98%
Standard Deviation	1.7%	1.3%	0.8%
Dolfyn - C.F.D (sec)	**18.718**	18.652	**18.635**
Normalized	99.56%	99.91%	100%
Standard Deviation	0.1%	0.3%	0.3%
POV-Ray - Trace Time (sec)	**11.485**	**11.305**	11.427
Normalized	98.43%	100%	98.93%
Standard Deviation	0.9%	1%	0.2%
YafaRay - T.T.F.S.S (sec)	**84.739**	87.143	**87.331**
Normalized	100%	97.24%	97.03%
Standard Deviation	0.8%	3.8%	3.1%
GPAW - Carbon Nanotube (sec)	**60.702**	59.851	**59.757**
Normalized	98.44%	99.84%	100%
Standard Deviation	0.5%	1.1%	0.9%
Timed MrBayes Analysis - P.P.A (sec)	**82.650**	**82.042**	82.261
Normalized	99.26%	100%	99.73%
Standard Deviation	0.2%	0.6%	0.6%
Nebular Empirical Analysis Tool (sec)	**27.067**	**24.633**	25.037
Normalized	91.01%	100%	98.39%
Standard Deviation	3.8%	7.8%	9.3%
Primesieve - 1.P.N.G (sec)	**4.540**	4.535	**4.489**
Normalized	98.88%	98.99%	100%
Standard Deviation	0.8%	1%	0.5%
Rodinia - OpenMP CFD Solver (sec)	**9.255**	8.882	**8.510**
Normalized	91.95%	95.81%	100%
Standard Deviation	6.2%	6.2%	1.4%
Rodinia - OpenMP LavaMD (sec)	**52.794**	**52.092**	52.360
Normalized	98.67%	100%	99.49%
Standard Deviation	0.2%	0.4%	0%
Rodinia - OpenMP Leukocyte (sec)	**53.862**	52.684	**51.290**
Normalized	95.22%	97.35%	100%
Standard Deviation	1.1%	2.3%	0.6%
Rodinia - O.S (sec)	**11.209**	**10.338**	10.432
Normalized	92.23%	100%	99.1%
Standard Deviation	7.4%	0.7%	0.8%
Rodinia - OpenMP HotSpot3D (sec)	**97.942**	**96.603**	96.885
Normalized	98.63%	100%	99.71%
Standard Deviation	0.4%	1%	1%
SQLite Speedtest - Timed Time - Size 1,000 (sec)	70.160	**70.540**	**69.883**
Normalized	99.61%	99.07%	100%
Standard Deviation	0.2%	0.3%	0.5%
Tachyon - Total Time (sec)	**17.9375**	18.0565	**18.2004**
Normalized	100%	99.34%	98.56%
Standard Deviation	0.5%	0.6%	1.4%

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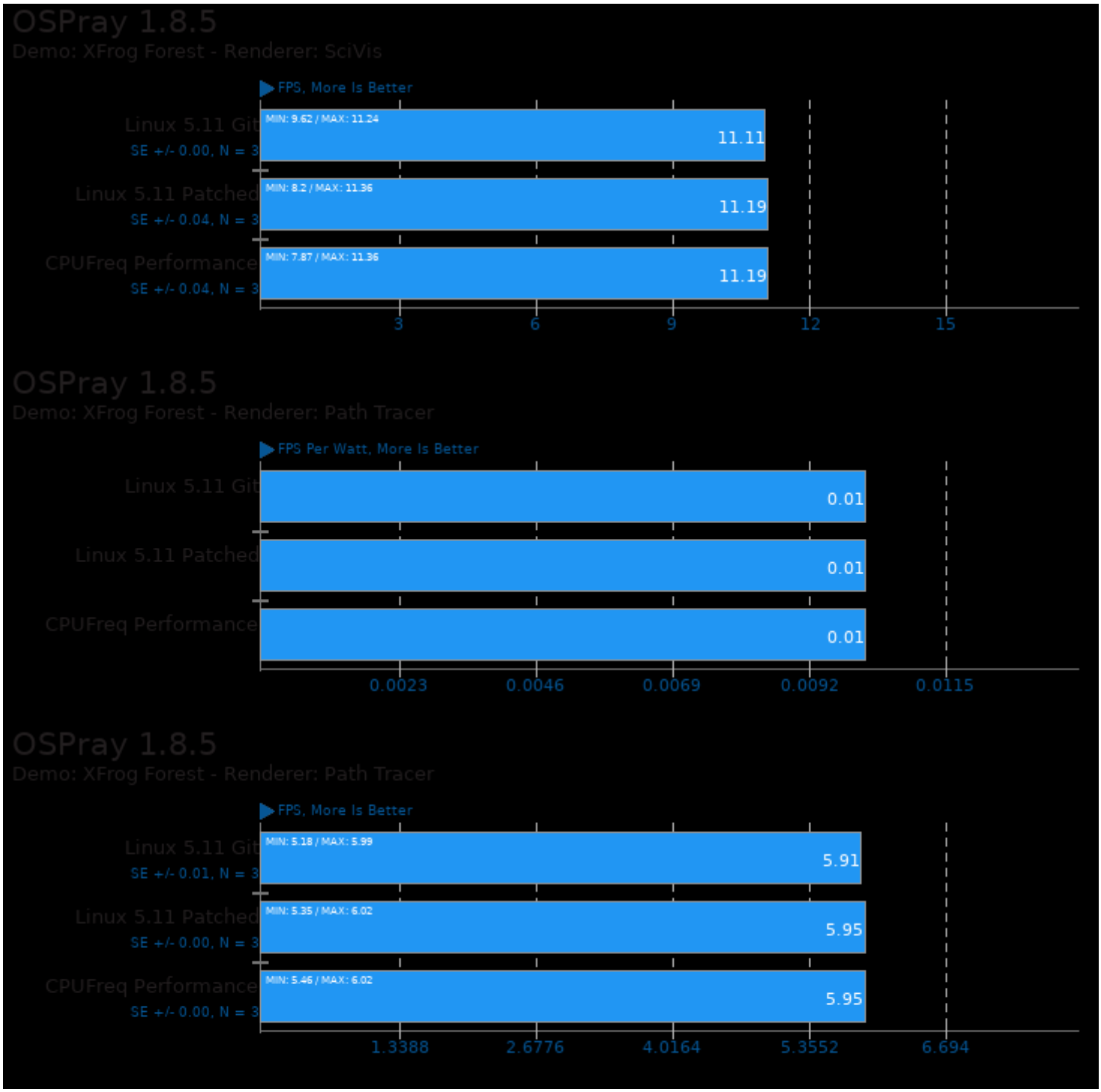
Tungsten Renderer - Hair (sec)	**6.60054**	6.69036	**6.69505**
Normalized	100%	98.66%	98.59%
Standard Deviation	2.2%	0.5%	2.2%
Tungsten Renderer - Water Caustic (sec)	**21.3253**	21.3329	**21.4652**
Normalized	100%	99.96%	99.35%
Standard Deviation	2%	3.8%	2.1%
Tungsten Renderer - Volumetric Caustic	5.30105	**5.26235**	**5.31183**
Normalized	99.27%	100%	99.07%
Standard Deviation	0.6%	1.8%	2.5%
QMCPACK - simple-H2O (Execution Time - sec)	**31.177**	29.281	**28.971**
Normalized	92.92%	98.94%	100%
Standard Deviation	6.6%	0.5%	0.4%

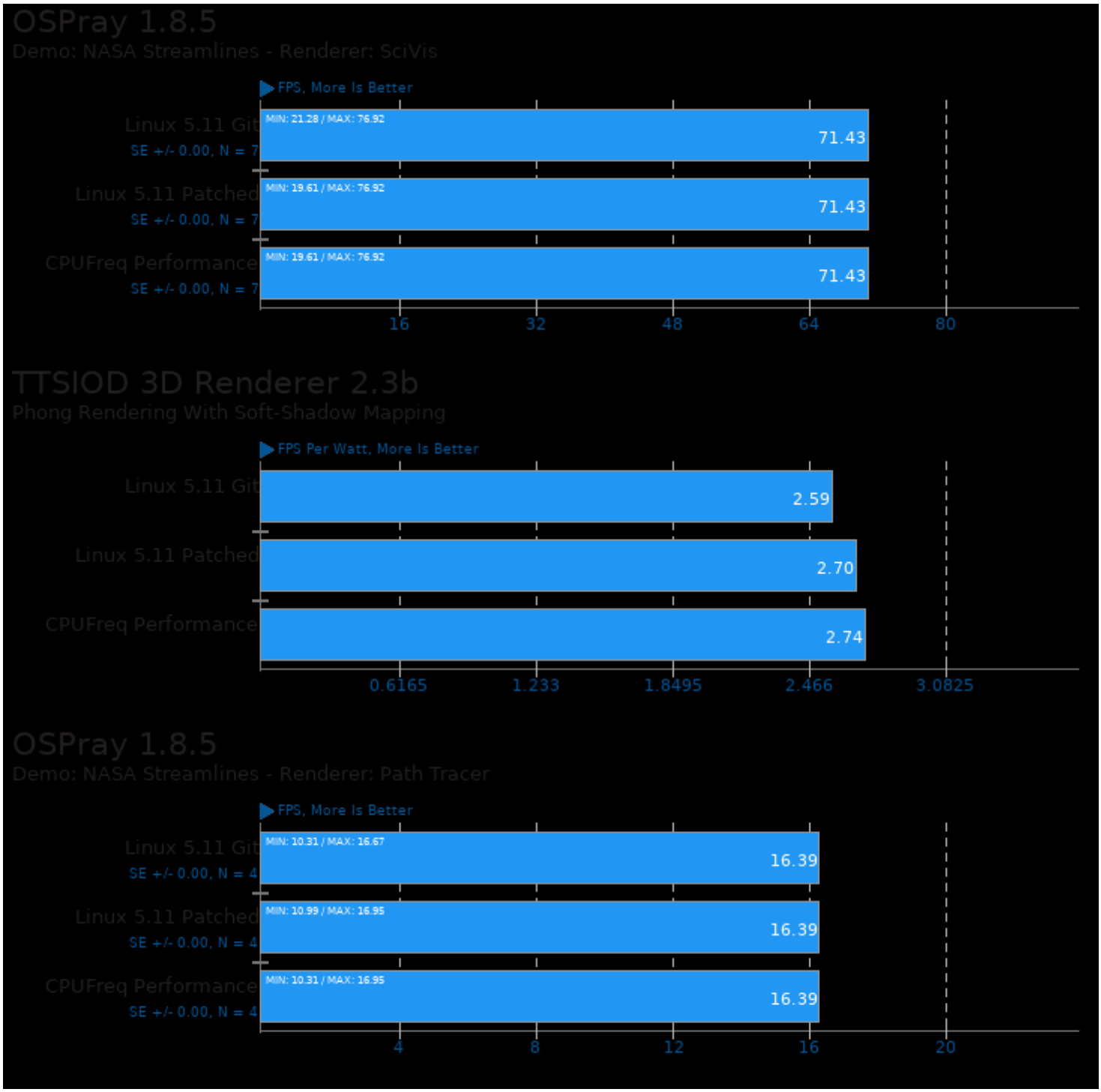

CPU Power Consumption Monitor
Phoronix Test Suite System Monitoring
Watts
Linux 5.11 Git
Min: 60.44 / Avg: 279.2 / Max: 548.33
Linux 5.11 Patched
Min: 59.88 / Avg: 280.92 / Max: 530.69
CPUFreq Performance
Min: 59.74 / Avg: 285.23 / Max: 514.05
100
200
300
400
500
Algebraic Multi-Grid Benchmark 1.2
Figure Of Merit, More Is Better
Linux 5.11 Git
SE +/- 2689640.27, N = 3
1437771333
Linux 5.11 Patched
SE +/- 750486.58, N = 3
1448718333
CPUFreq Performance
SE +/- 4018322.42, N = 3
1444174667
300M
600M
900M
1200M
1500M
1. (CC) gcc options: -lparcsr_ls -lparcsr_mv -lseq_mv -lIJ_mv -lkrylov -lHYPRE_utilities -lm -fopenmp -pthread -lmpi
Algebraic Multi-Grid Benchmark 1.2
Figure Of Merit Per Watt, More Is Better
Linux 5.11 Git
4559171.90
Linux 5.11 Patched
4631994.74
CPUFreq Performance
4634187.41
1000K
2000K
3000K
4000K
5000K

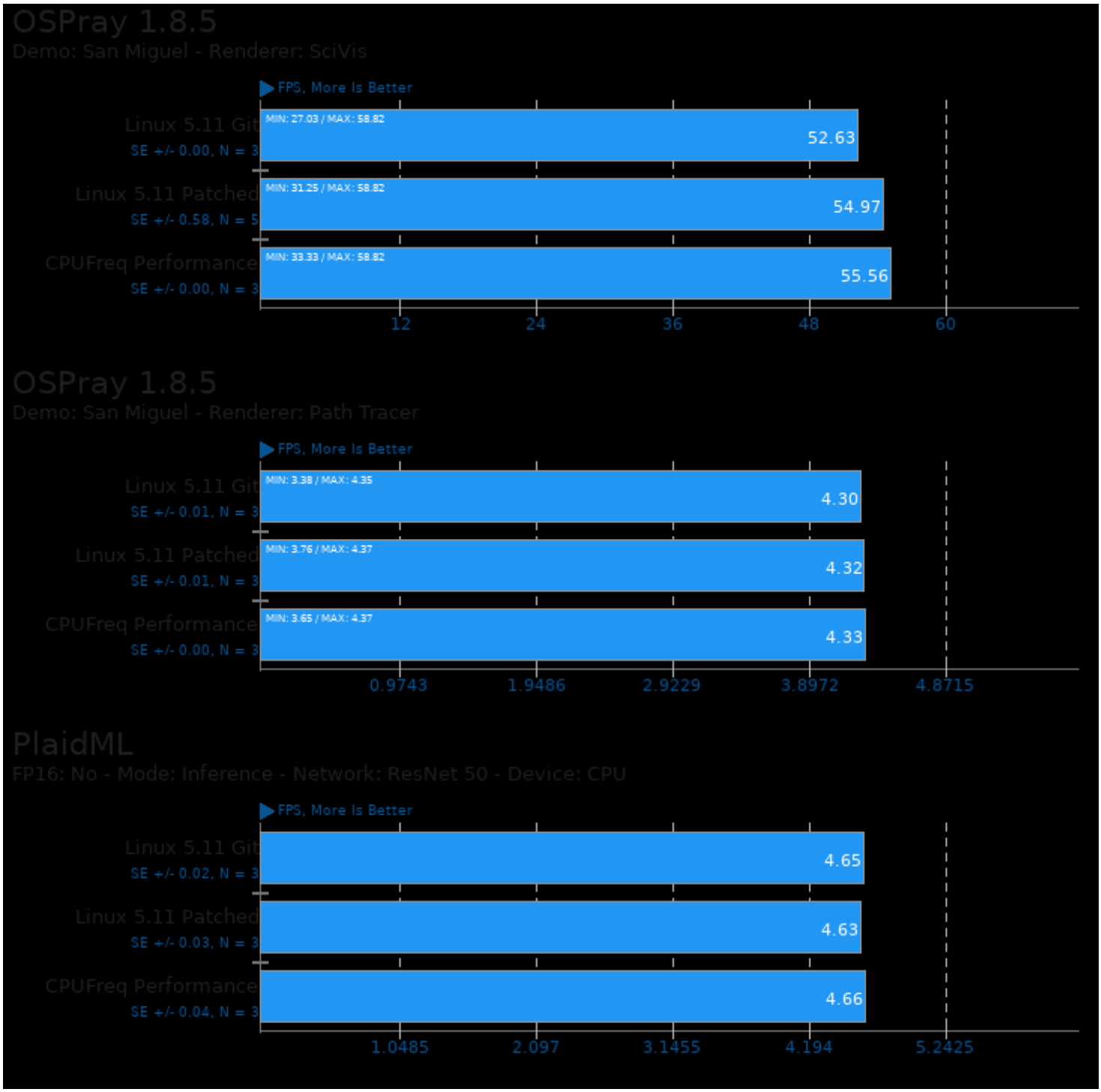

BlogBench 1.1
Test: Read
Final Score, More Is Better
Linux 5.11 Git
SE +/- 10984.18, N = 9
1084405
Linux 5.11 Patched
SE +/- 1738.41, N = 3
1103118
CPUFreq Performance
SE +/- 13508.02, N = 3
1086347
200K
400K
600K
800K
1000K
1. (CC) gcc options: -O2 -pthread
BlogBench 1.1
Test: Read
Final Score Per Watt, More Is Better
Linux 5.11 Git
4599.66
Linux 5.11 Patched
4752.60
CPUFreq Performance
4638.96
1000
2000
3000
4000
5000
dav1d 0.8.1
Video Input: Summer Nature 4K
FPS, More Is Better
Linux 5.11 Git
SE +/- 1.86, N = 3
MIN: 163.13 / MAX: 334.13
308.29
Linux 5.11 Patched
SE +/- 0.53, N = 3
MIN: 173.69 / MAX: 340.43
317.45
CPUFreq Performance
SE +/- 3.54, N = 15
MIN: 186.32 / MAX: 403.05
363.33
80
160
240
320
400
1. (CC) gcc options: -pthread


dav1d 0.8.1
Video Input: Chimera 1080p 10-bit
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.23, N = 3
MIN: 90.23 / MAX: 199.74
130.61
Linux 5.11 Patched
SE +/- 0.14, N = 3
MIN: 92.59 / MAX: 205.11
133.37
CPUFreq Performance
SE +/- 0.23, N = 3
MIN: 125.32 / MAX: 275.36
181.95
40
80
120
160
200
1. (CC) gcc options: -pthread
OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: SciVis
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 6
MIN: 12.66 / MAX: 33.33
32.26
Linux 5.11 Patched
SE +/- 0.23, N = 6
MIN: 12.82 / MAX: 33.33
32.62
CPUFreq Performance
SE +/- 0.24, N = 6
MIN: 13.16 / MAX: 34.48
32.80
8
16
24
32
40
OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: Path Tracer
FPS, More Is Better
Linux 5.11 Git
MIN: 90.91 / MAX: 500
250.00
Linux 5.11 Patched
MIN: 90.91 / MAX: 333.33
250.00
CPUFreq Performance
SE +/- 0.00, N = 11
MIN: 100 / MAX: 500
333.33
70
140
210
280
350

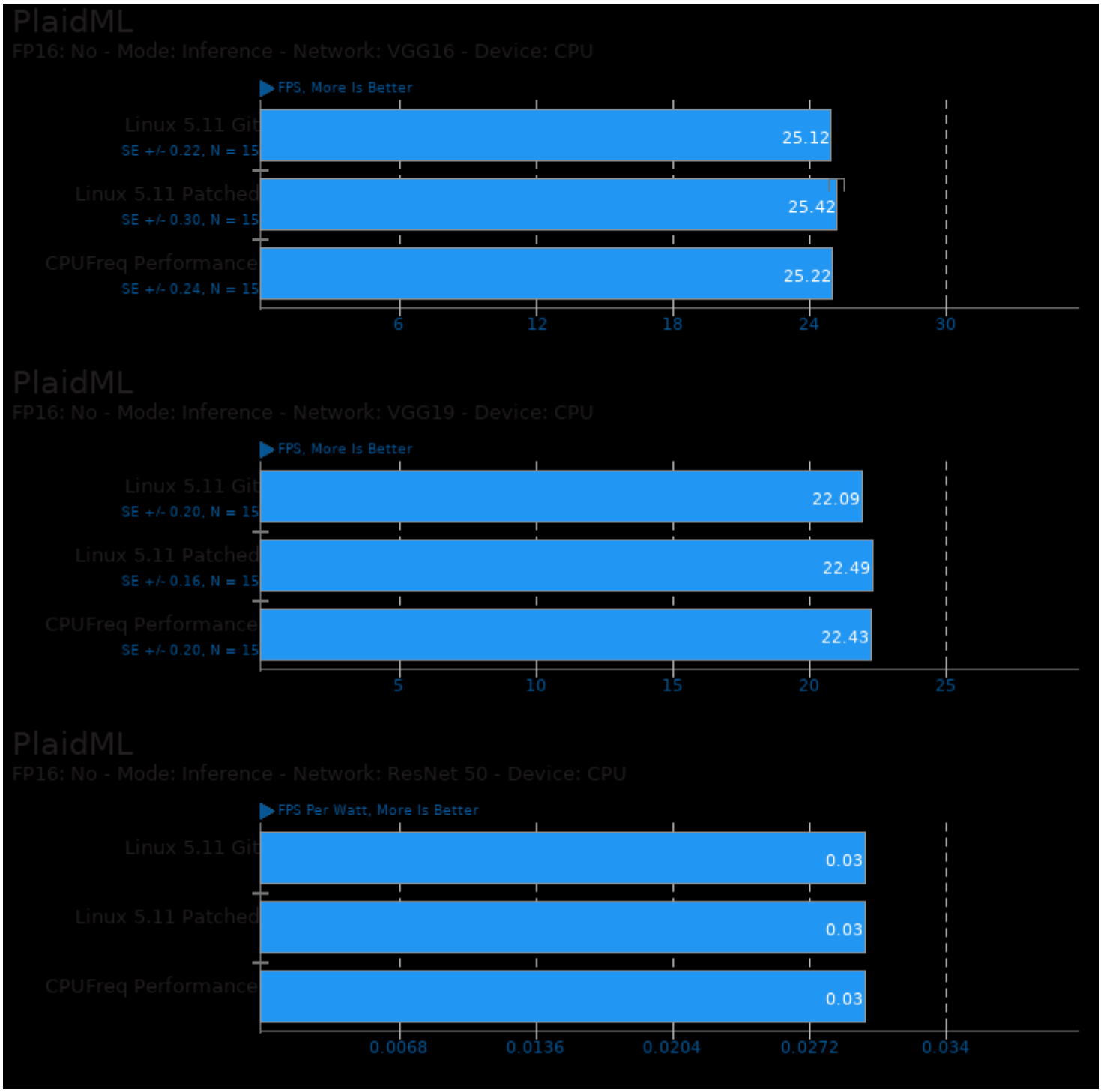
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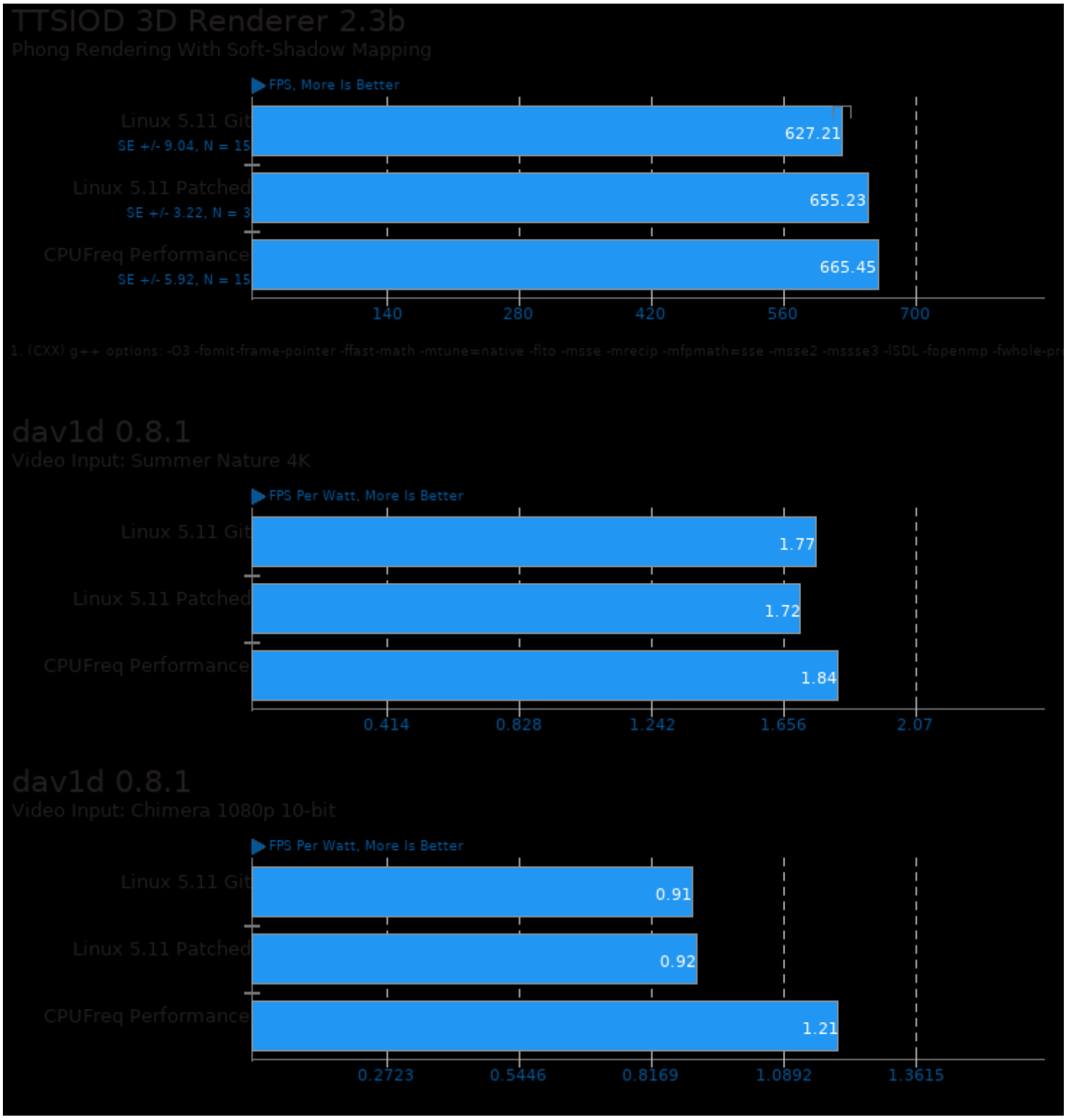


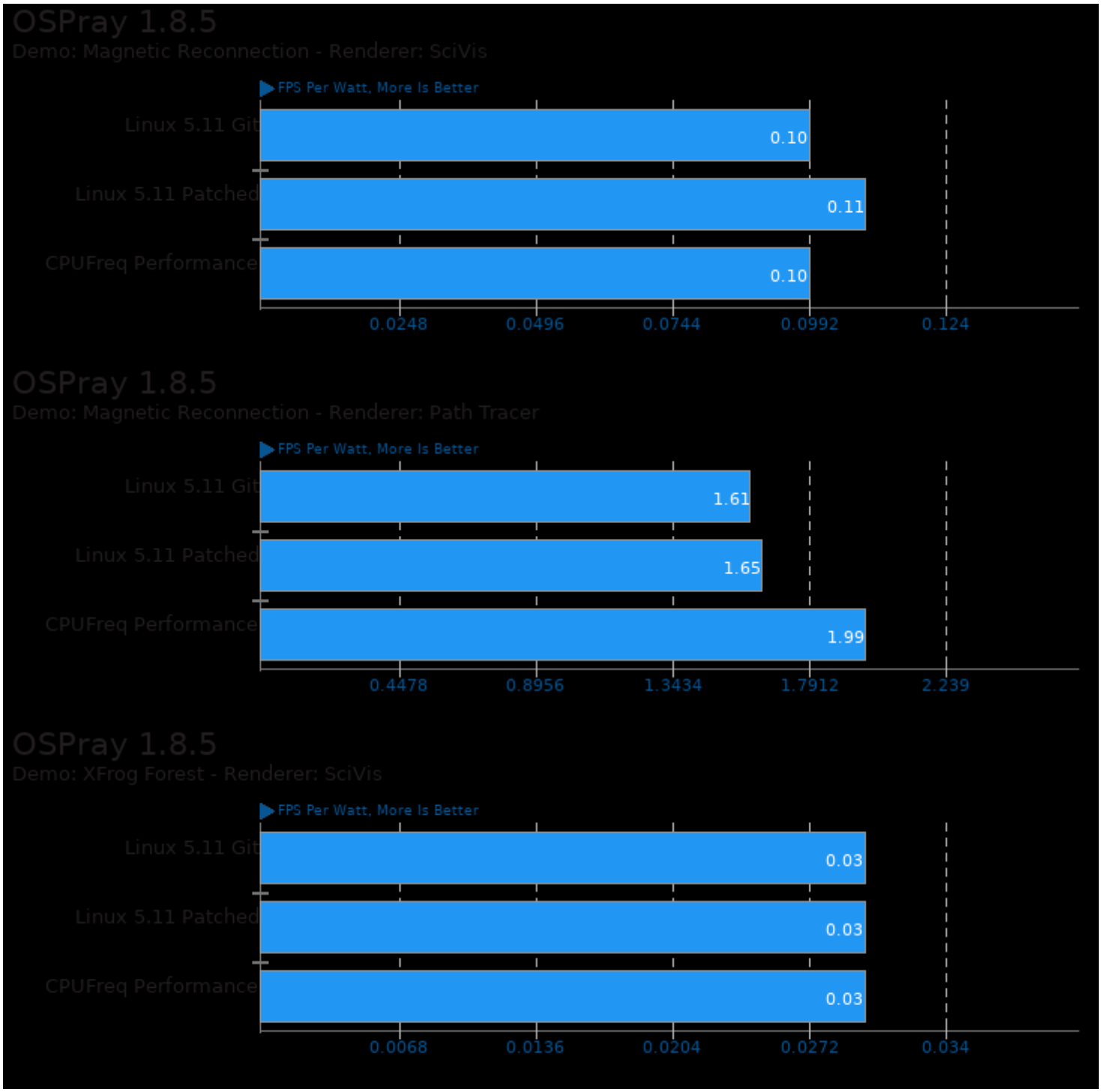

OSPray 1.8.5
Demo: NASA Streamlines - Renderer: SciVis
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 7
MIN: 21.28 / MAX: 76.92
71.43
Linux 5.11 Patched
SE +/- 0.00, N = 7
MIN: 19.61 / MAX: 76.92
71.43
CPUFreq Performance
SE +/- 0.00, N = 7
MIN: 19.61 / MAX: 76.92
71.43
16
32
48
64
80
TTSIOD 3D Renderer 2.3b
Phong Rendering With Soft-Shadow Mapping
FPS Per Watt, More Is Better
Linux 5.11 Git
2.59
Linux 5.11 Patched
2.70
CPUFreq Performance
2.74
0.6165
1.233
1.8495
2.466
3.0825
OSPray 1.8.5
Demo: NASA Streamlines - Renderer: Path Tracer
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 4
MIN: 10.31 / MAX: 16.67
16.39
Linux 5.11 Patched
SE +/- 0.00, N = 4
MIN: 10.99 / MAX: 16.95
16.39
CPUFreq Performance
SE +/- 0.00, N = 4
MIN: 10.31 / MAX: 16.95
16.39
4
8
12
16
20

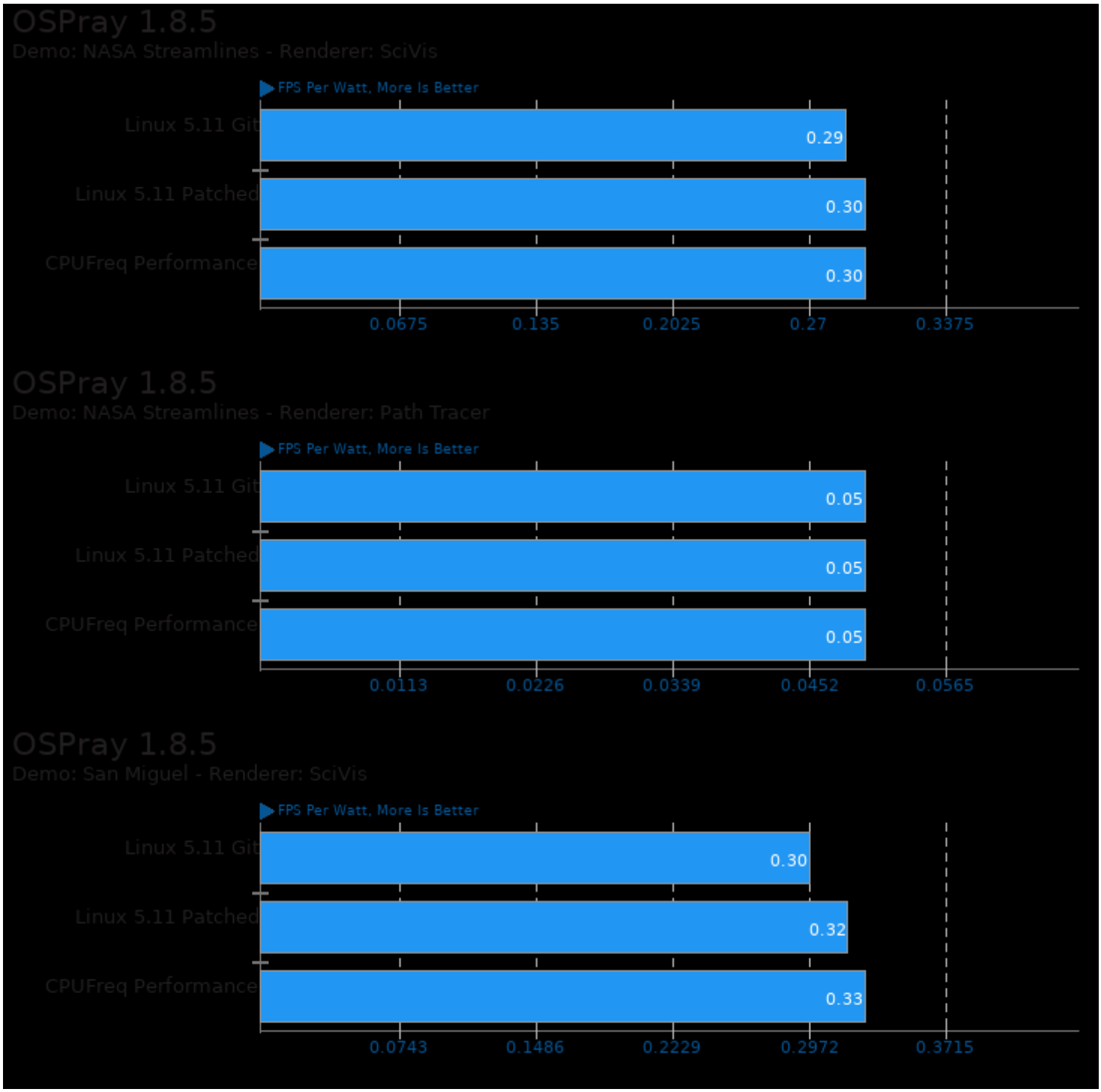

OSPray 1.8.5
Demo: San Miguel - Renderer: SciVis
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 3
MIN: 27.03 / MAX: 58.82
52.63
Linux 5.11 Patched
SE +/- 0.58, N = 5
MIN: 31.25 / MAX: 58.82
54.97
CPUFreq Performance
SE +/- 0.00, N = 3
MIN: 33.33 / MAX: 58.82
55.56
12
24
36
48
60
OSPray 1.8.5
Demo: San Miguel - Renderer: Path Tracer
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.01, N = 3
MIN: 3.38 / MAX: 4.35
4.30
Linux 5.11 Patched
SE +/- 0.01, N = 3
MIN: 3.76 / MAX: 4.37
4.32
CPUFreq Performance
SE +/- 0.00, N = 3
MIN: 3.65 / MAX: 4.37
4.33
0.9743
1.9486
2.9229
3.8972
4.8715
PlaidML
FP16: No - Mode: Inference - Network: ResNet 50 - Device: CPU
FPS, More Is Better
Linux 5.11 Git
SE +/- 0.02, N = 3
4.65
Linux 5.11 Patched
SE +/- 0.03, N = 3
4.63
CPUFreq Performance
SE +/- 0.04, N = 3
4.66
1.0485
2.097
3.1455
4.194
5.2425

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

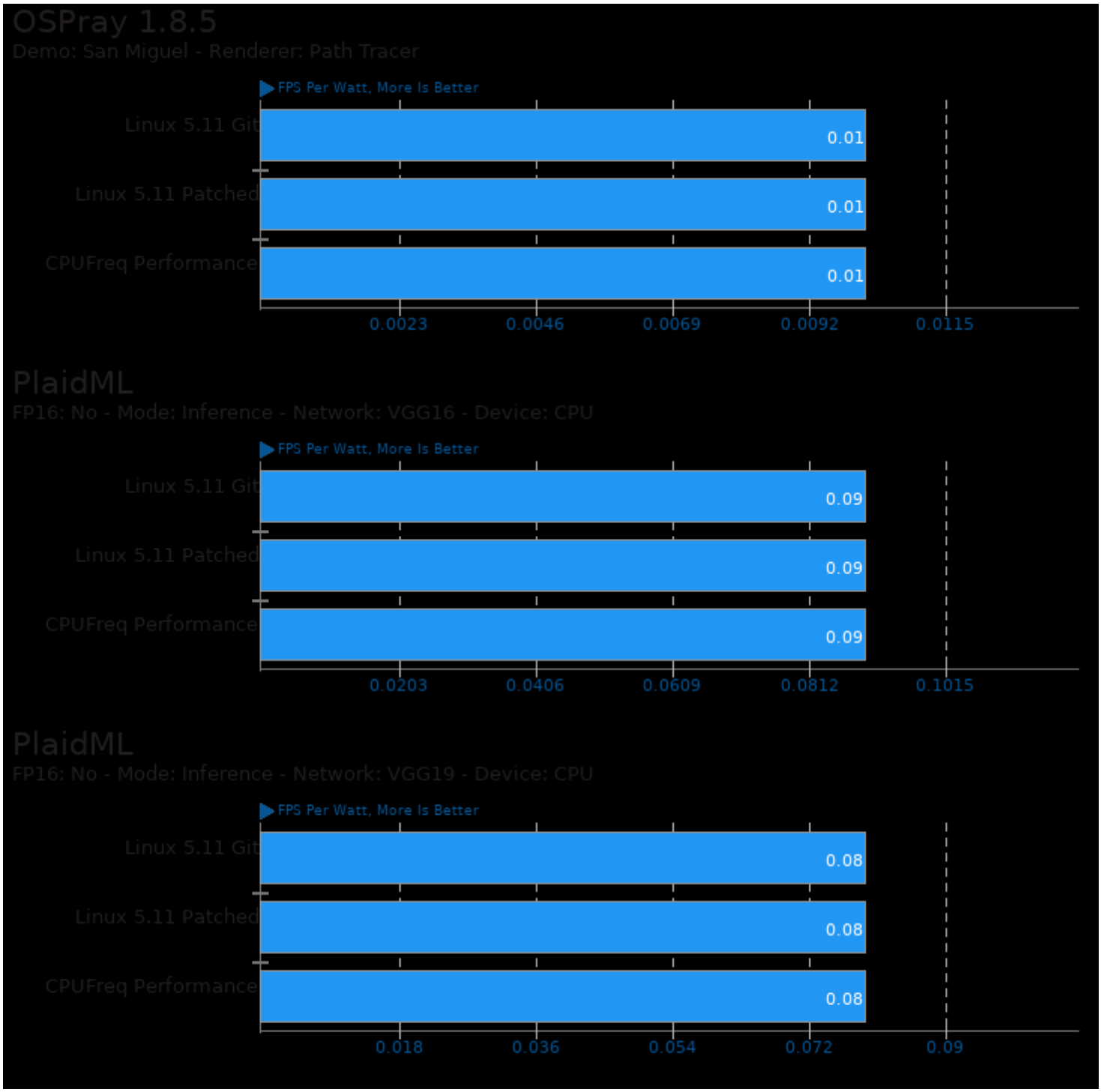



TTSIOD 3D Renderer 2.3b
Phong Rendering With Soft-Shadow Mapping
FPS, More Is Better
Linux 5.11 Git
SE +/- 9.04, N = 15
627.21
Linux 5.11 Patched
SE +/- 3.22, N = 3
655.23
CPUFreq Performance
SE +/- 5.92, N = 15
665.45
140
280
420
560
700
1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -msse -mrecip -mfpmath=sse -msse2 -mssse3 -lSDL -fopenmp -fwhole-pr
dav1d 0.8.1
Video Input: Summer Nature 4K
FPS Per Watt, More Is Better
Linux 5.11 Git
1.77
Linux 5.11 Patched
1.72
CPUFreq Performance
1.84
0.414
0.828
1.242
1.656
2.07
dav1d 0.8.1
Video Input: Chimera 1080p 10-bit
FPS Per Watt, More Is Better
Linux 5.11 Git
0.91
Linux 5.11 Patched
0.92
CPUFreq Performance
1.21
0.2723
0.5446
0.8169
1.0892
1.3615

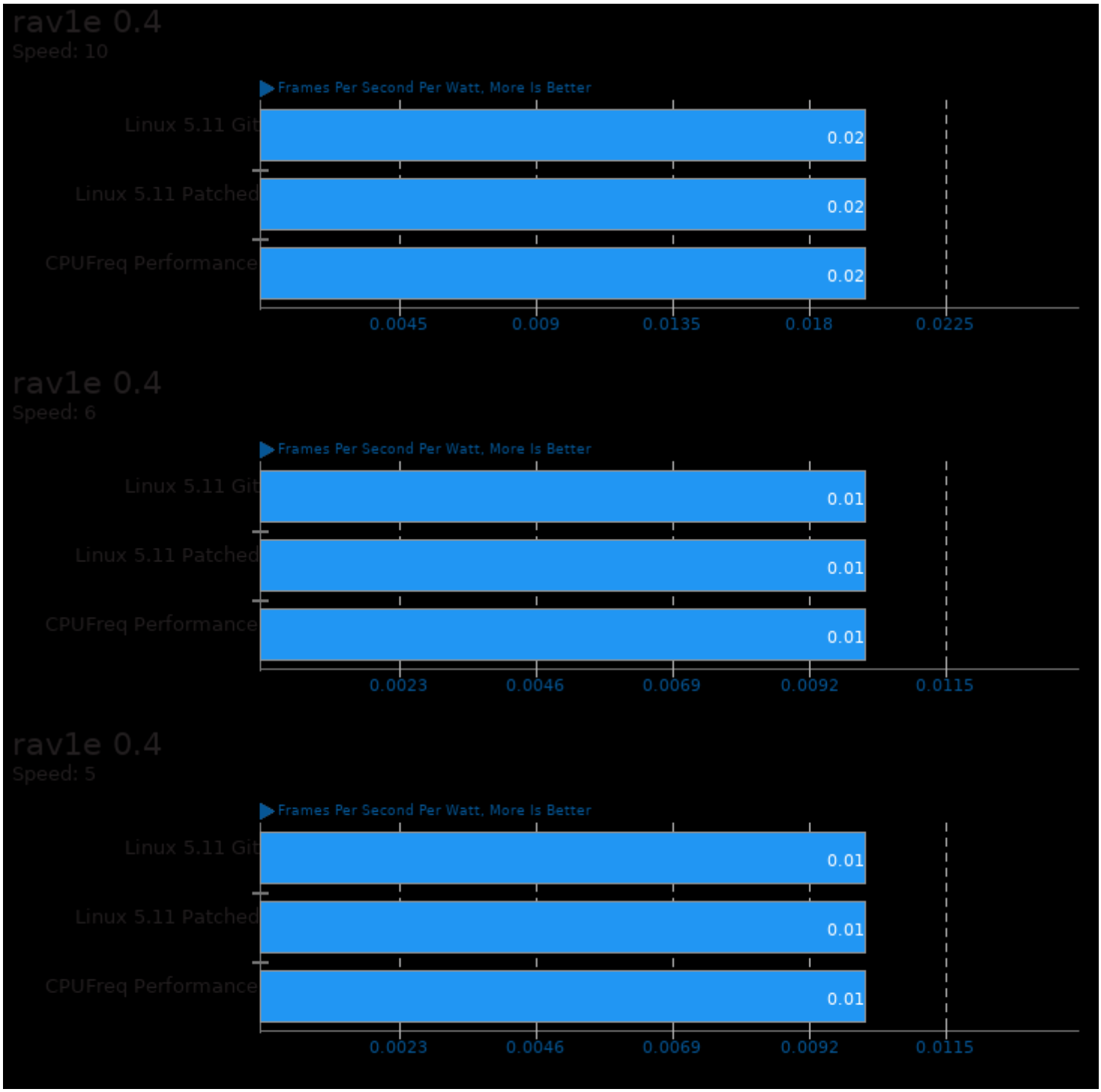

OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: SciVis
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
0.10
0.11
0.10
0.0248
0.0496
0.0744
0.0992
0.124
OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: Path Tracer
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
1.61
1.65
1.99
0.4478
0.8956
1.3434
1.7912
2.239
OSPray 1.8.5
Demo: XFrog Forest - Renderer: SciVis
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
0.03
0.03
0.03
0.0068
0.0136
0.0204
0.0272
0.034

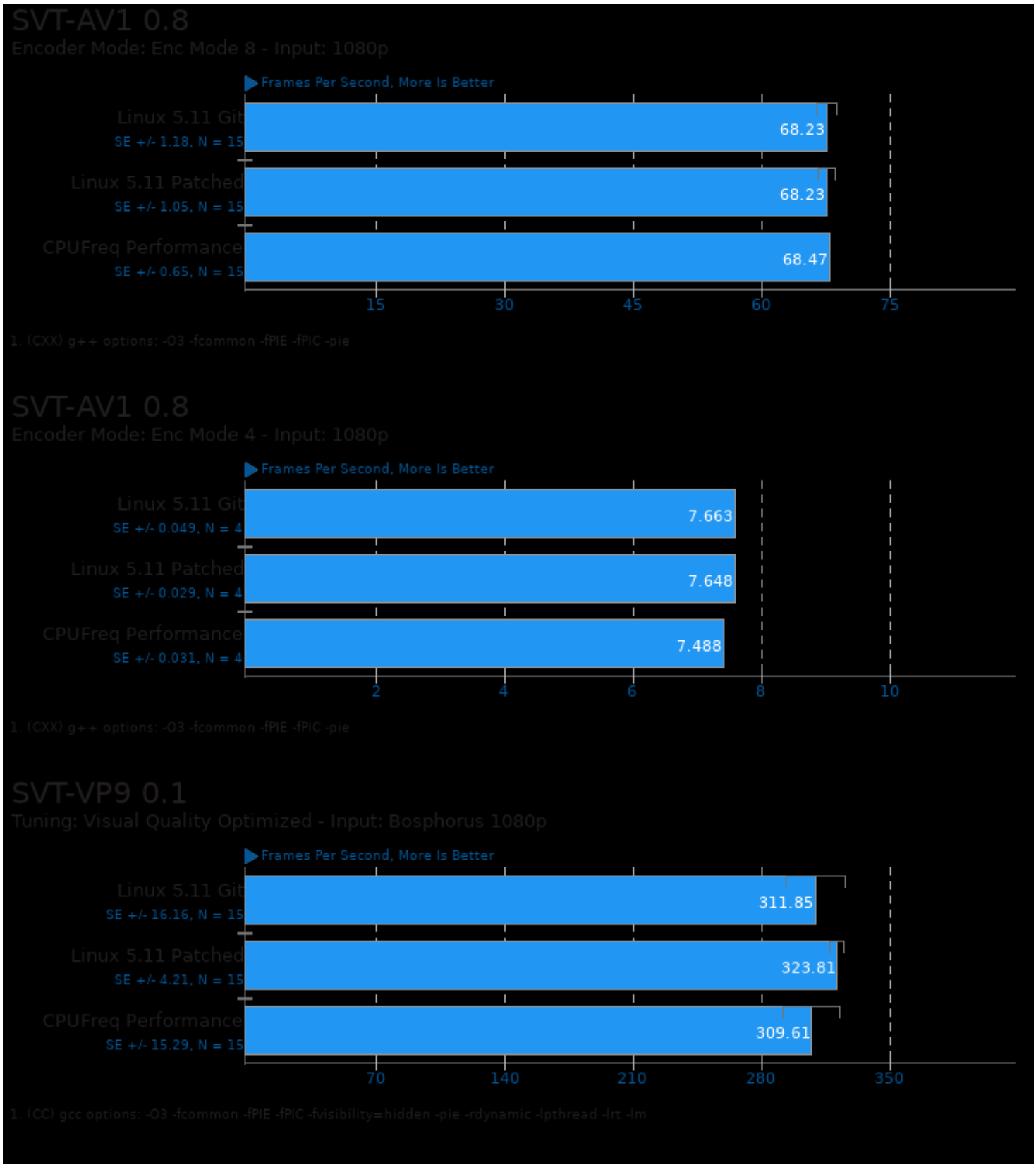

OSPray 1.8.5
Demo: NASA Streamlines - Renderer: SciVis
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
0.29
0.30
0.30
0.0675
0.135
0.2025
0.27
0.3375
OSPray 1.8.5
Demo: NASA Streamlines - Renderer: Path Tracer
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
0.05
0.05
0.05
0.0113
0.0226
0.0339
0.0452
0.0565
OSPray 1.8.5
Demo: San Miguel - Renderer: SciVis
FPS Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
0.30
0.32
0.33
0.0743
0.1486
0.2229
0.2972
0.3715

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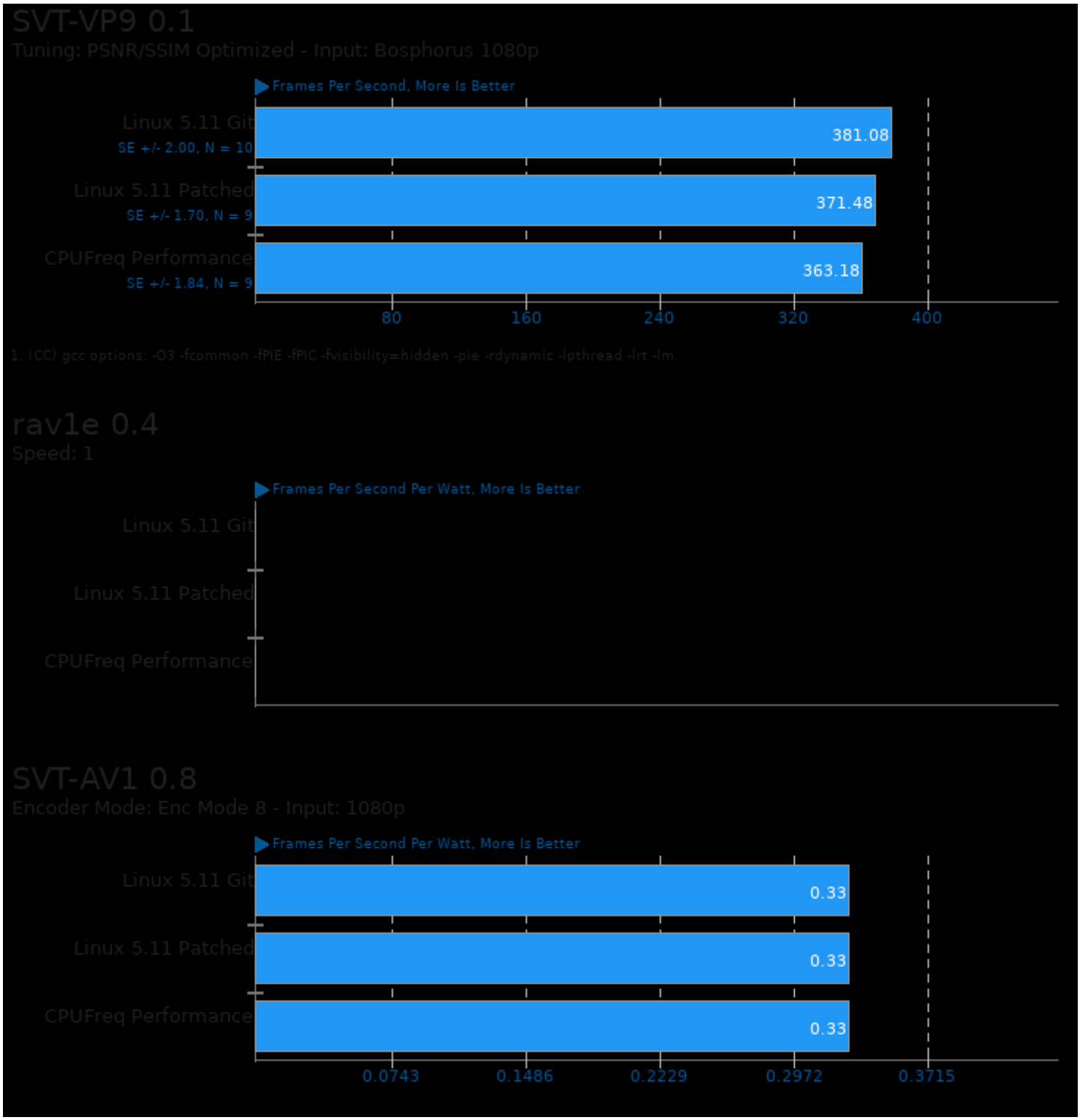


AMD EPYC 7F72 2P Linux 5.11 Perf Governor



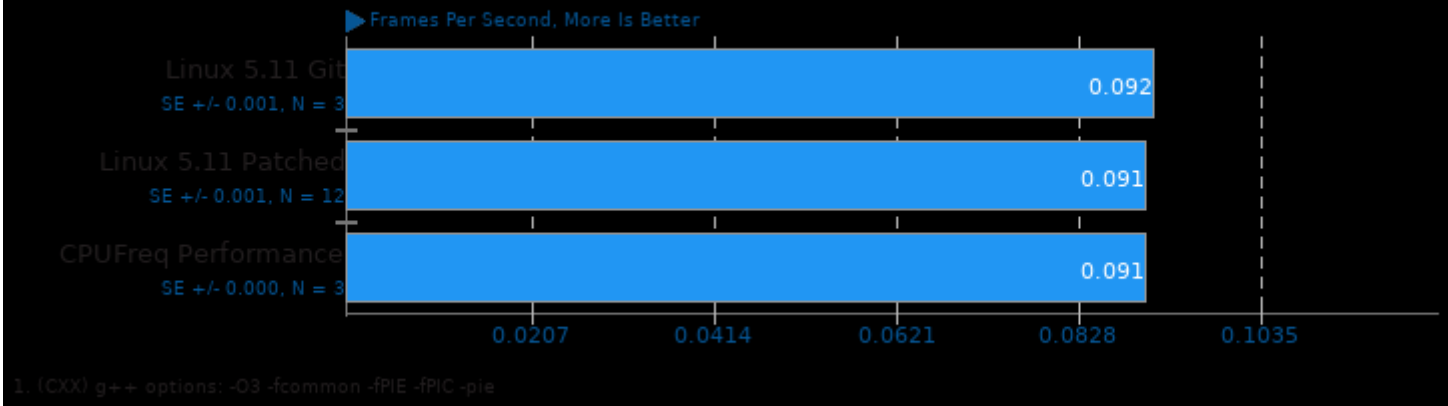

SVT-AV1 0.8
Encoder Mode: Enc Mode 8 - Input: 1080p
Frames Per Second, More Is Better
Linux 5.11 Git
SE +/- 1.18, N = 15
68.23
Linux 5.11 Patched
SE +/- 1.05, N = 15
68.23
CPUFreq Performance
SE +/- 0.65, N = 15
68.47
15
30
45
60
75
1. (CXX) g++ options: -O3 -fcommon -fPIE -fPIC -pie
SVT-AV1 0.8
Encoder Mode: Enc Mode 4 - Input: 1080p
Frames Per Second, More Is Better
Linux 5.11 Git
SE +/- 0.049, N = 4
7.663
Linux 5.11 Patched
SE +/- 0.029, N = 4
7.648
CPUFreq Performance
SE +/- 0.031, N = 4
7.488
2
4
6
8
10
1. (CXX) g++ options: -O3 -fcommon -fPIE -fPIC -pie
SVT-VP9 0.1
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Linux 5.11 Git
SE +/- 16.16, N = 15
311.85
Linux 5.11 Patched
SE +/- 4.21, N = 15
323.81
CPUFreq Performance
SE +/- 15.29, N = 15
309.61
70
140
210
280
350
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm

AMD EPYC 7F72 2P Linux 5.11 Perf Governor



SVT-AV1 0.8

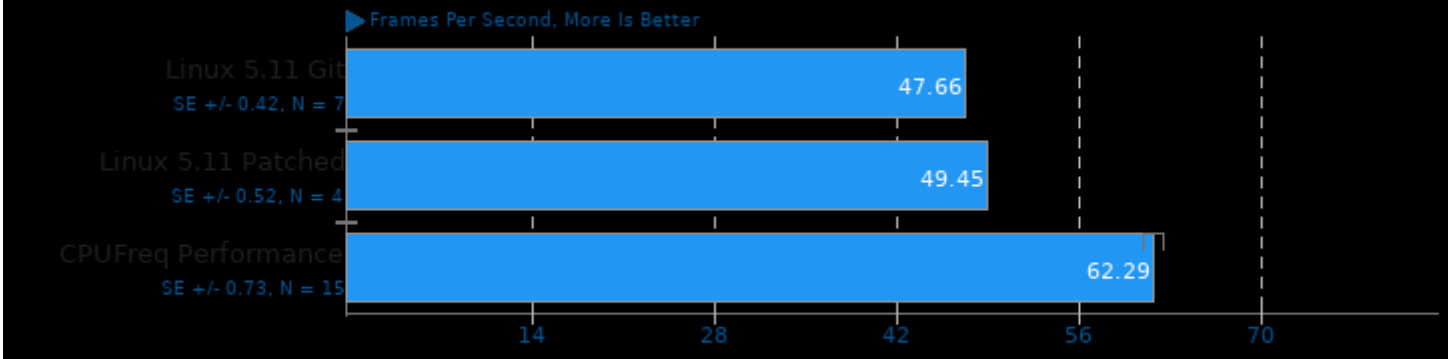
Encoder Mode: Enc Mode 0 - Input: 1080p



1. (CXX) g++ options: -O3 -fcommon -fPIE -fPIC -pie

x265 3.4

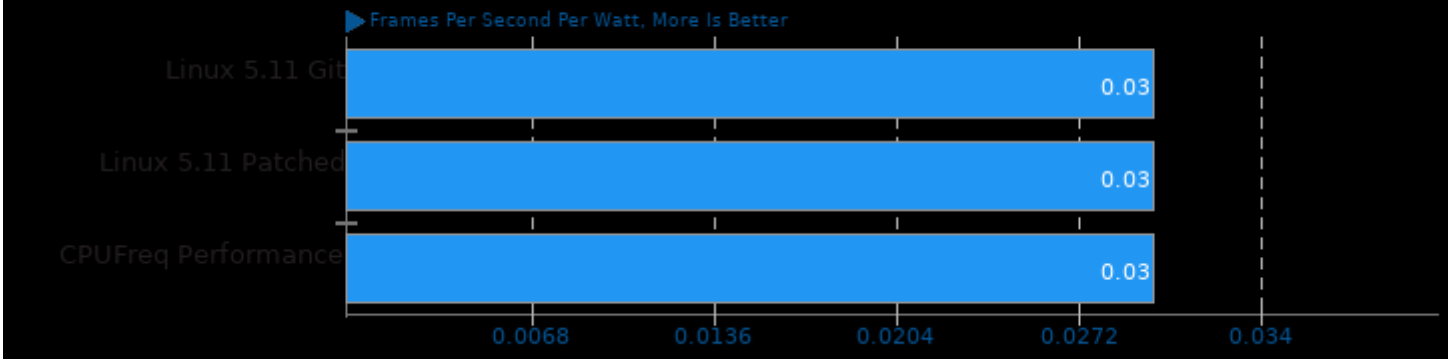
Video Input: Bosphorus 1080p

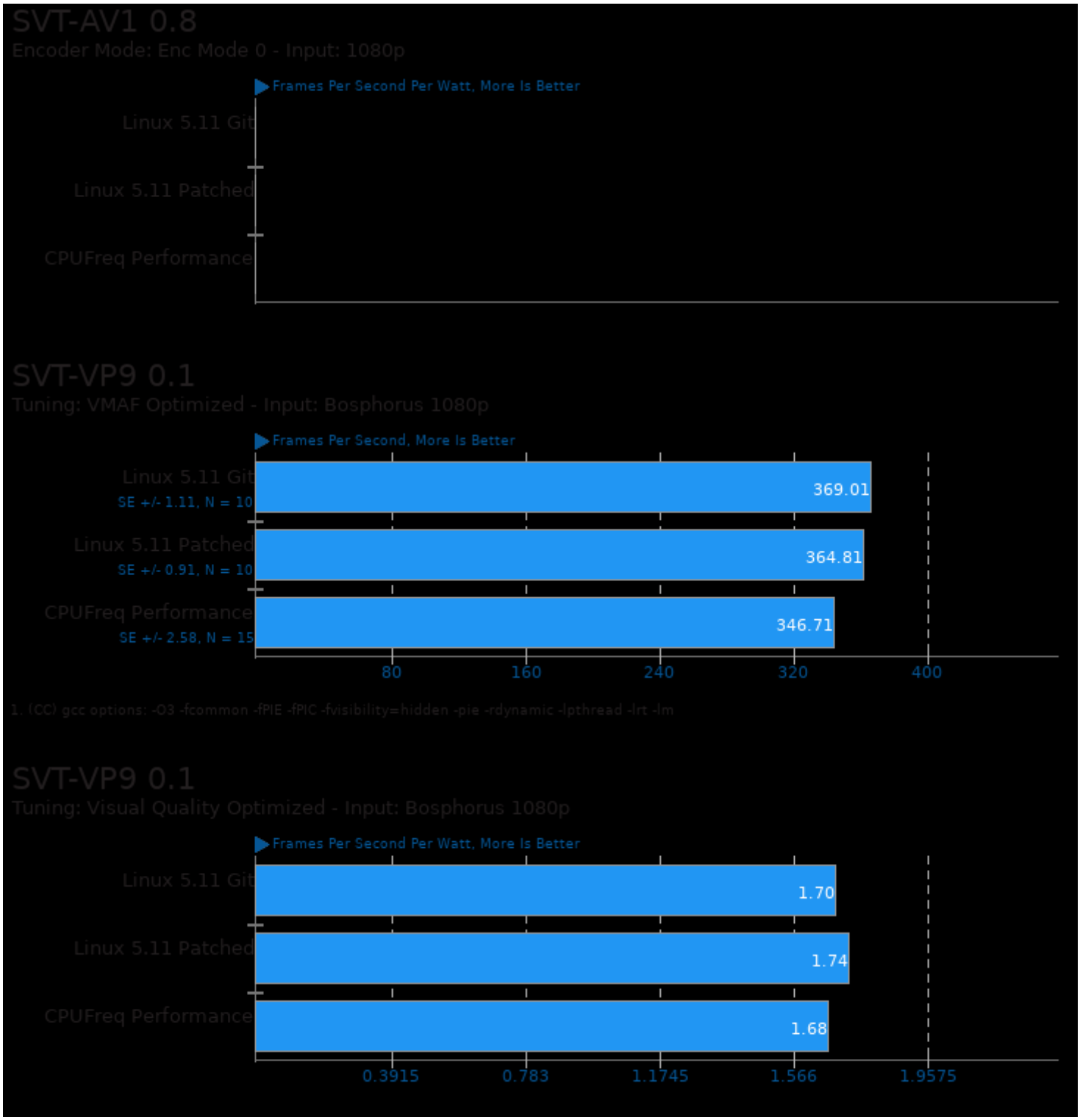


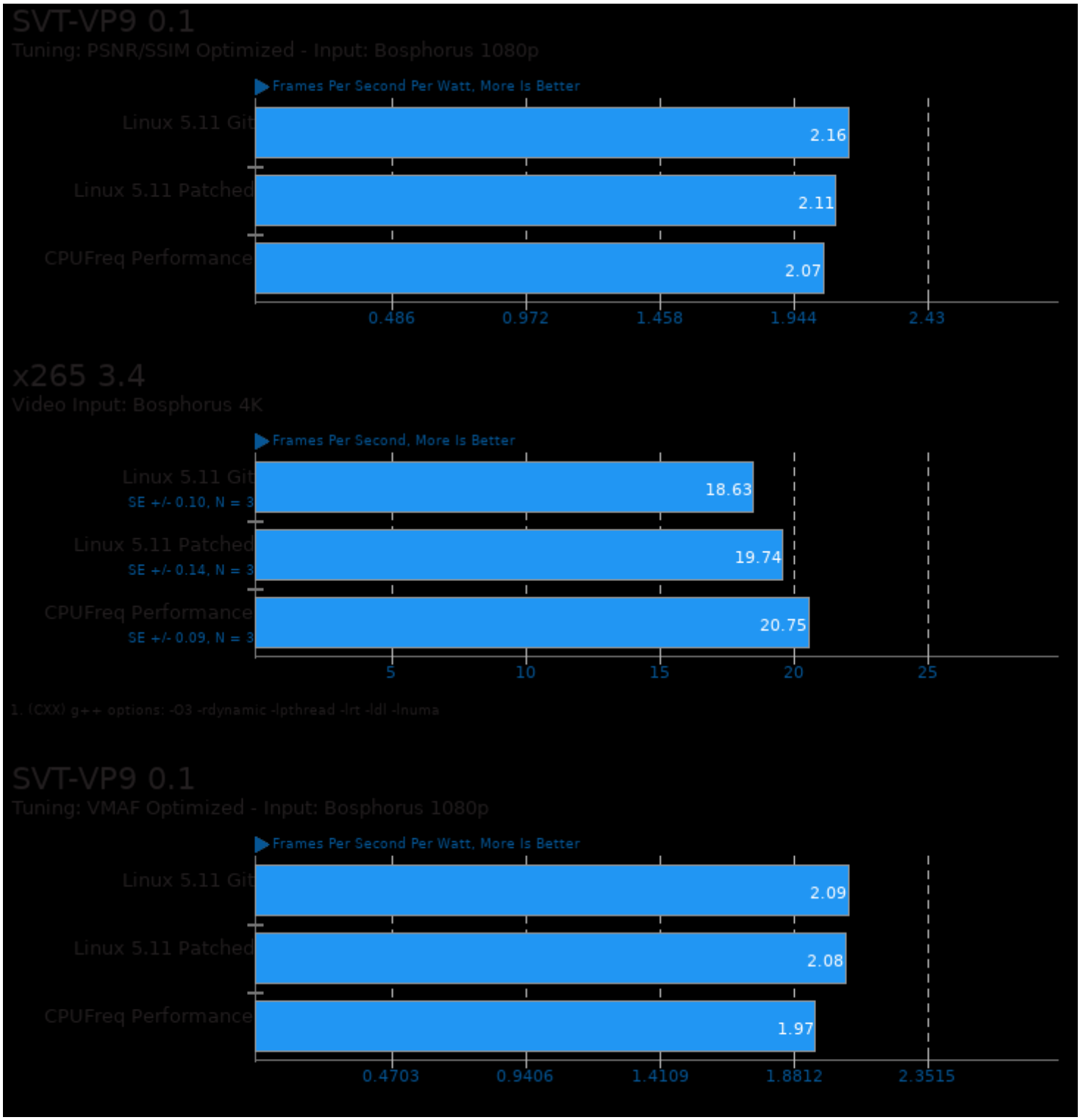
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

SVT-AV1 0.8

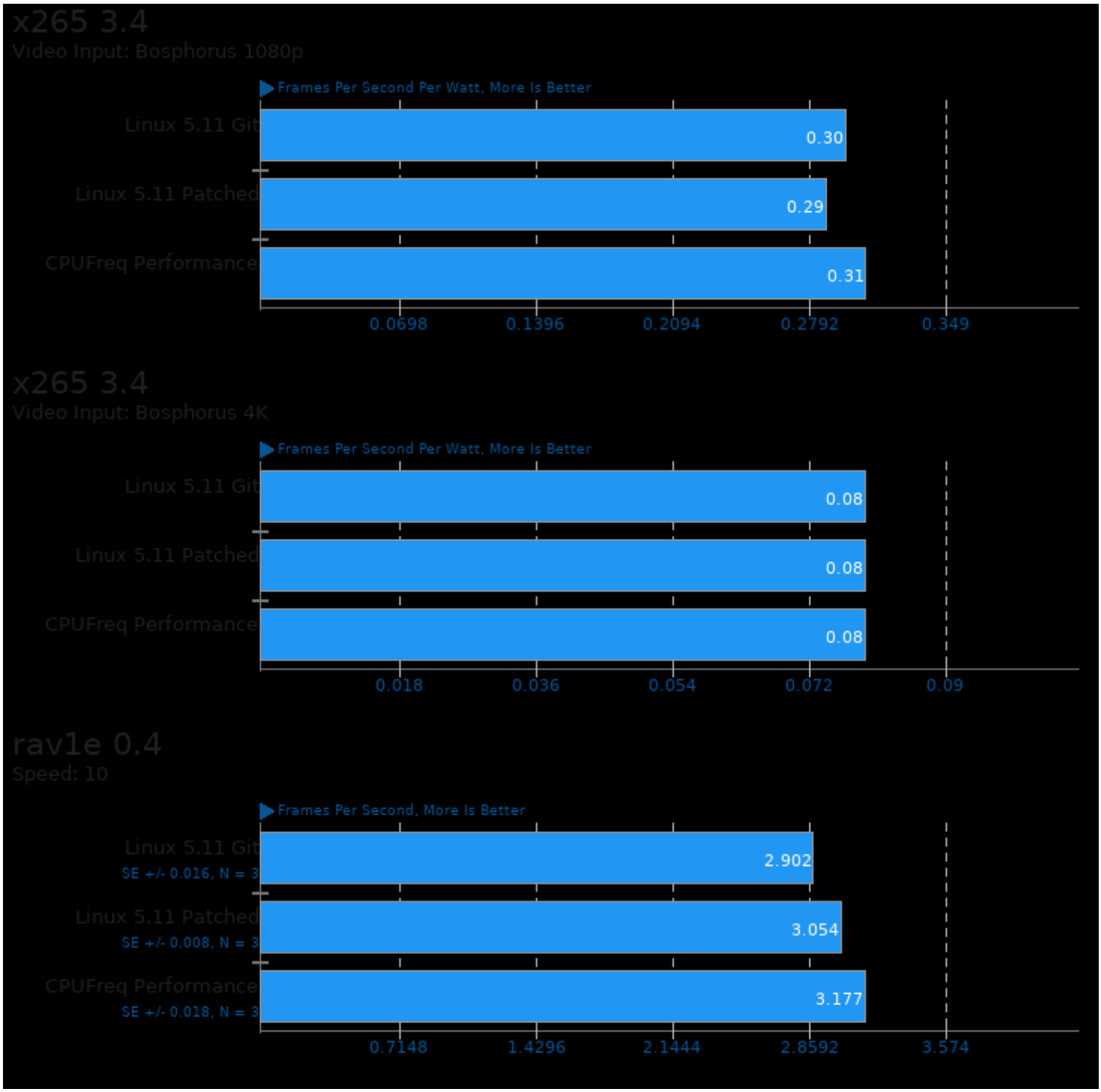
Encoder Mode: Enc Mode 4 - Input: 1080p



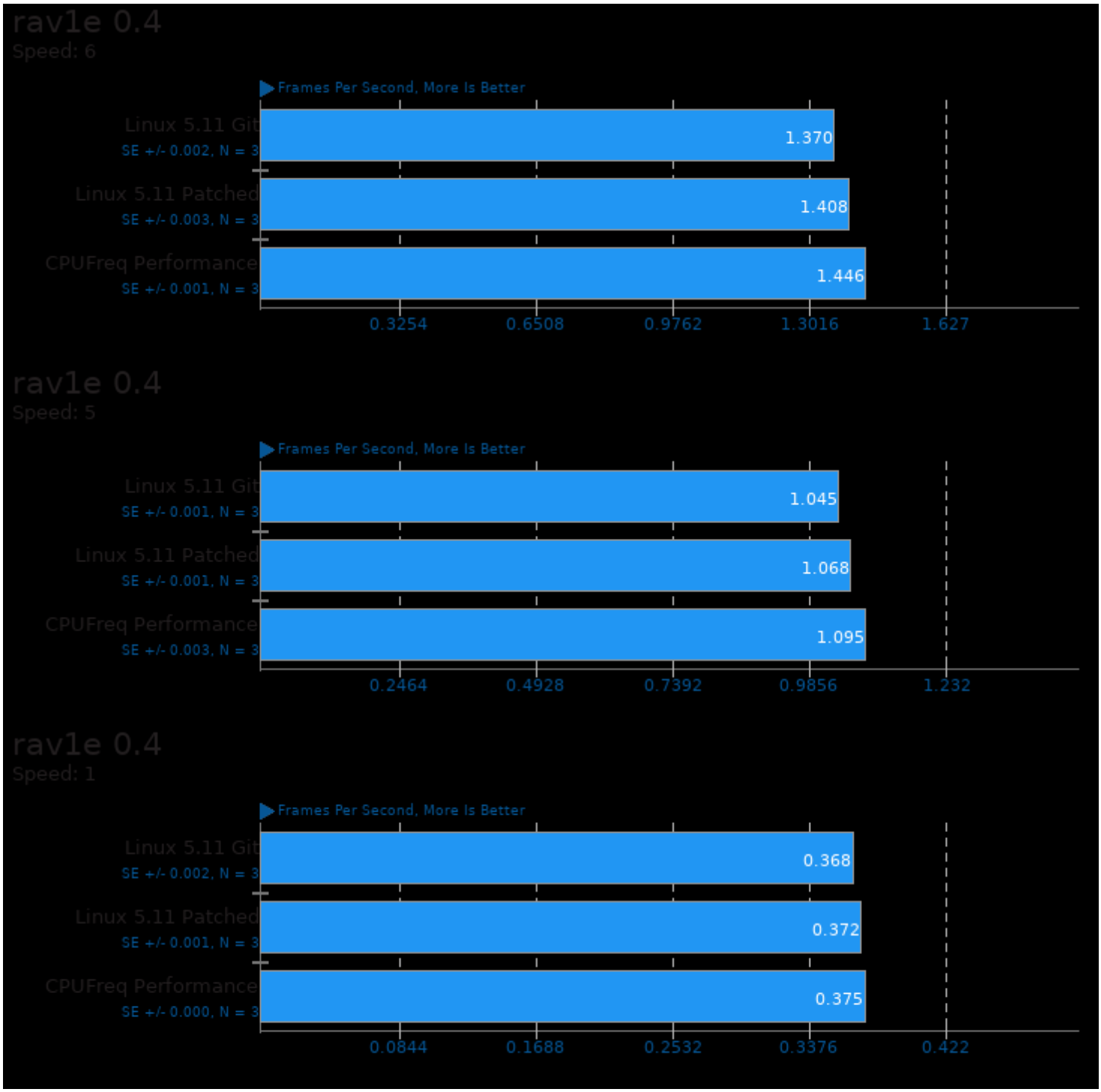

SVT-AV1 0.8
Encoder Mode: Enc Mode 0 - Input: 1080p
Frames Per Second Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
SVT-VP9 0.1
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Linux 5.11 Git
SE +/- 1.11, N = 10
369.01
Linux 5.11 Patched
SE +/- 0.91, N = 10
364.81
CPUFreq Performance
SE +/- 2.58, N = 15
346.71
80
160
240
320
400
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm
SVT-VP9 0.1
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second Per Watt, More Is Better
Linux 5.11 Git
1.70
Linux 5.11 Patched
1.74
CPUFreq Performance
1.68
0.3915
0.783
1.1745
1.566
1.9575

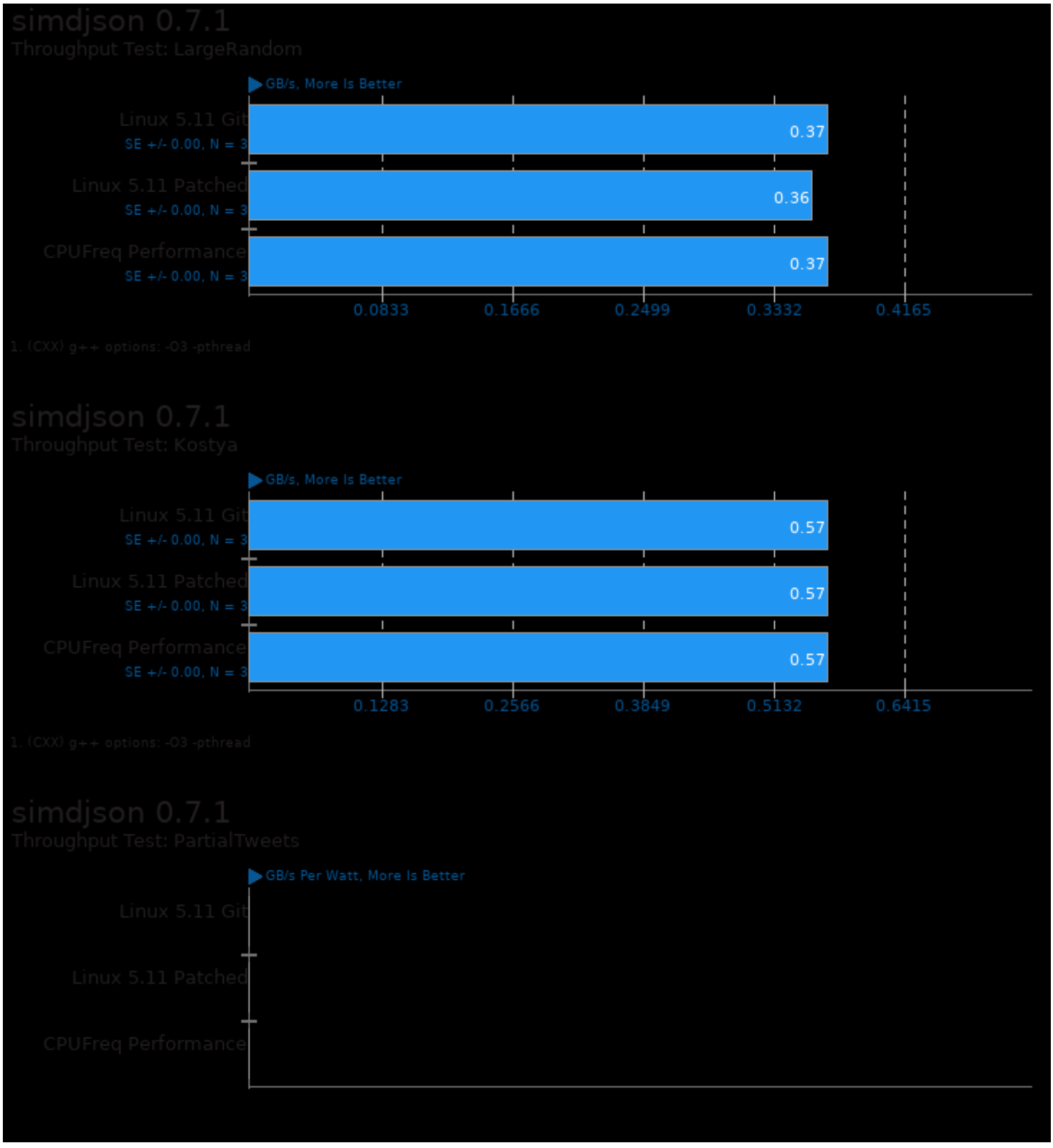

SVT-VP9 0.1
Tuning: PSNR/SSIM Optimized - Input: Bosphorus 1080p
Frames Per Second Per Watt, More Is Better
Linux 5.11 Git
2.16
Linux 5.11 Patched
2.11
CPUFreq Performance
2.07
0.486
0.972
1.458
1.944
2.43
x265 3.4
Video Input: Bosphorus 4K
Frames Per Second, More Is Better
Linux 5.11 Git
SE +/- 0.10, N = 3
18.63
Linux 5.11 Patched
SE +/- 0.14, N = 3
19.74
CPUFreq Performance
SE +/- 0.09, N = 3
20.75
5
10
15
20
25
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma
SVT-VP9 0.1
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second Per Watt, More Is Better
Linux 5.11 Git
2.09
Linux 5.11 Patched
2.08
CPUFreq Performance
1.97
0.4703
0.9406
1.4109
1.8812
2.3515

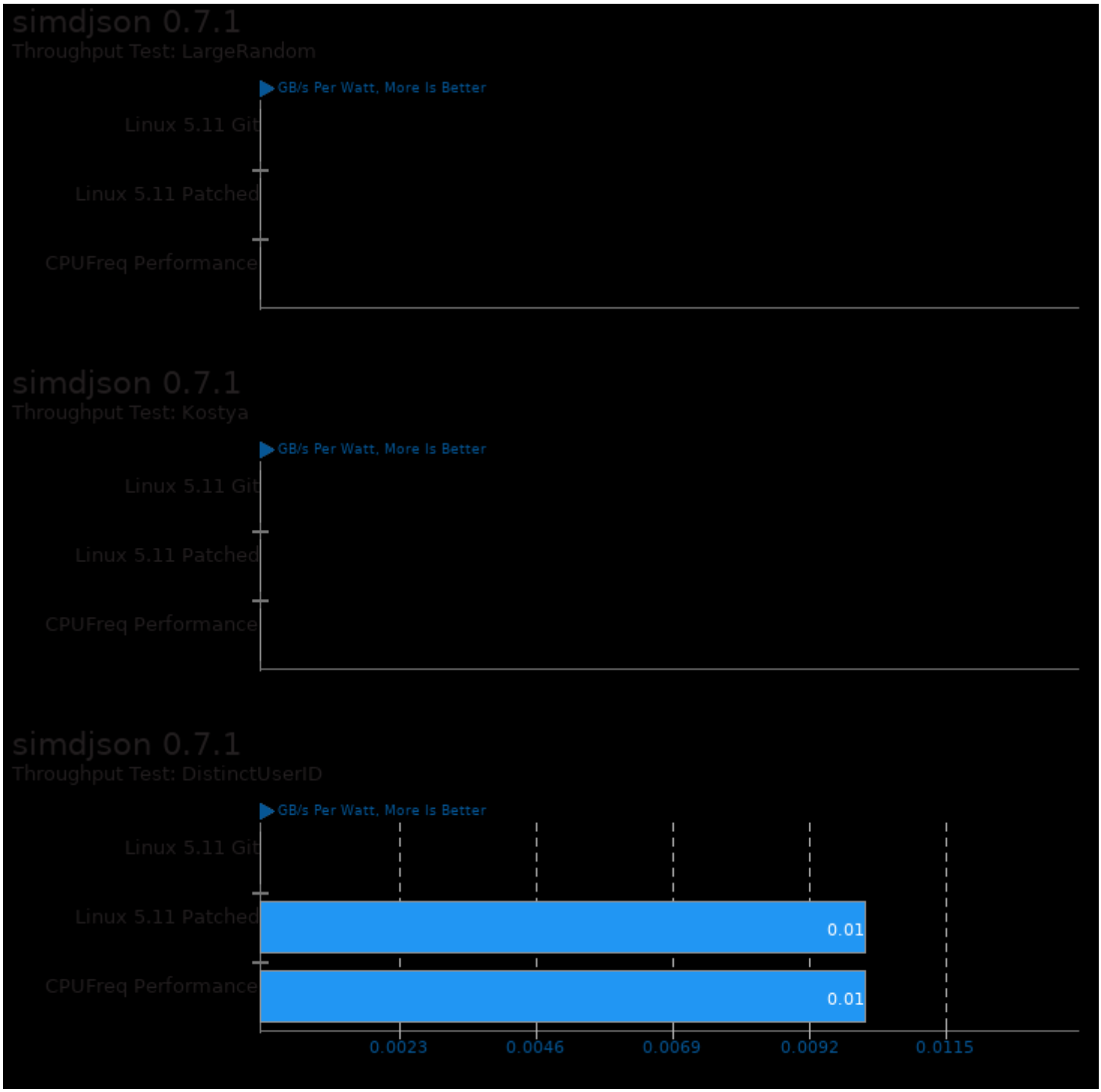
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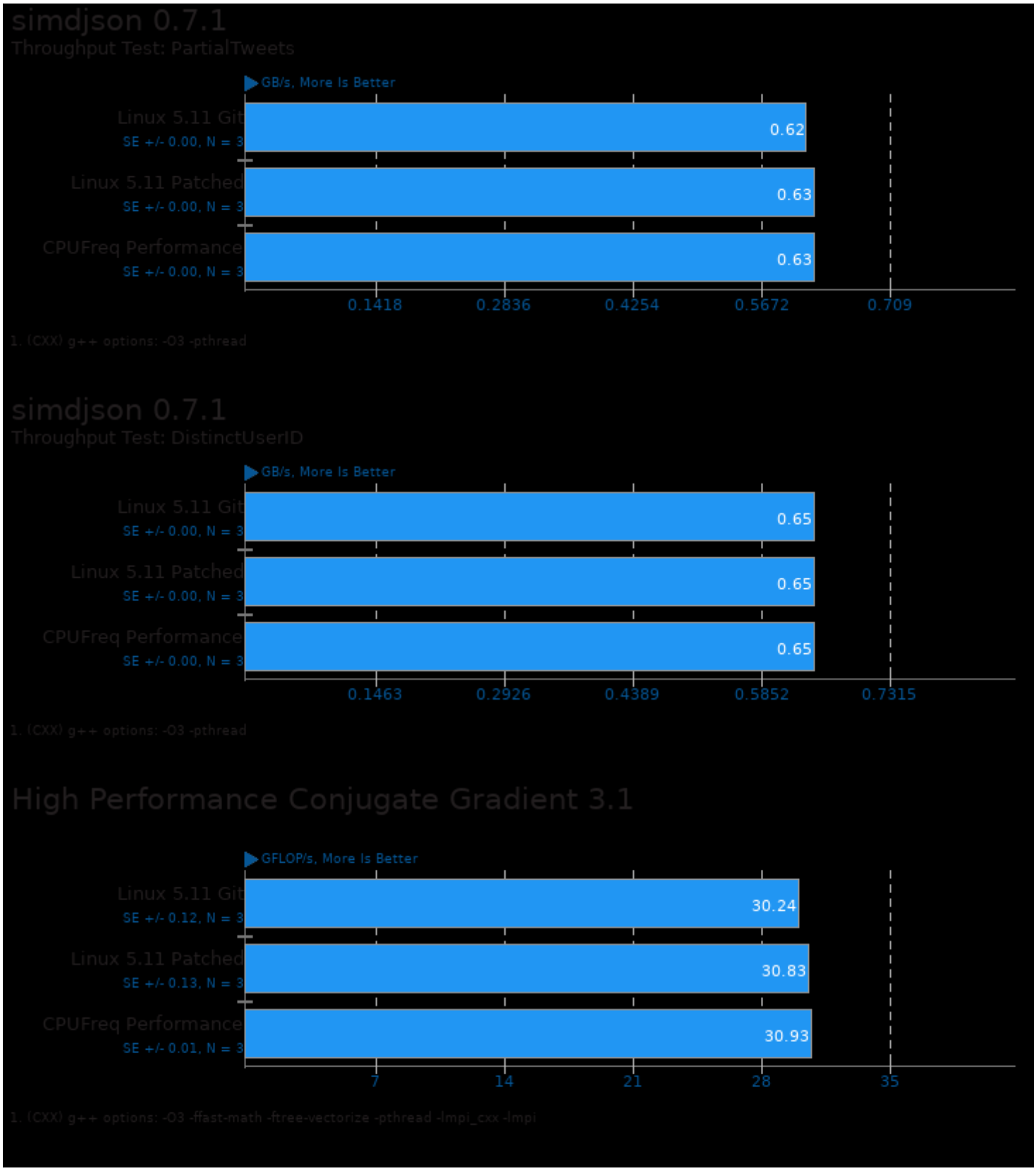


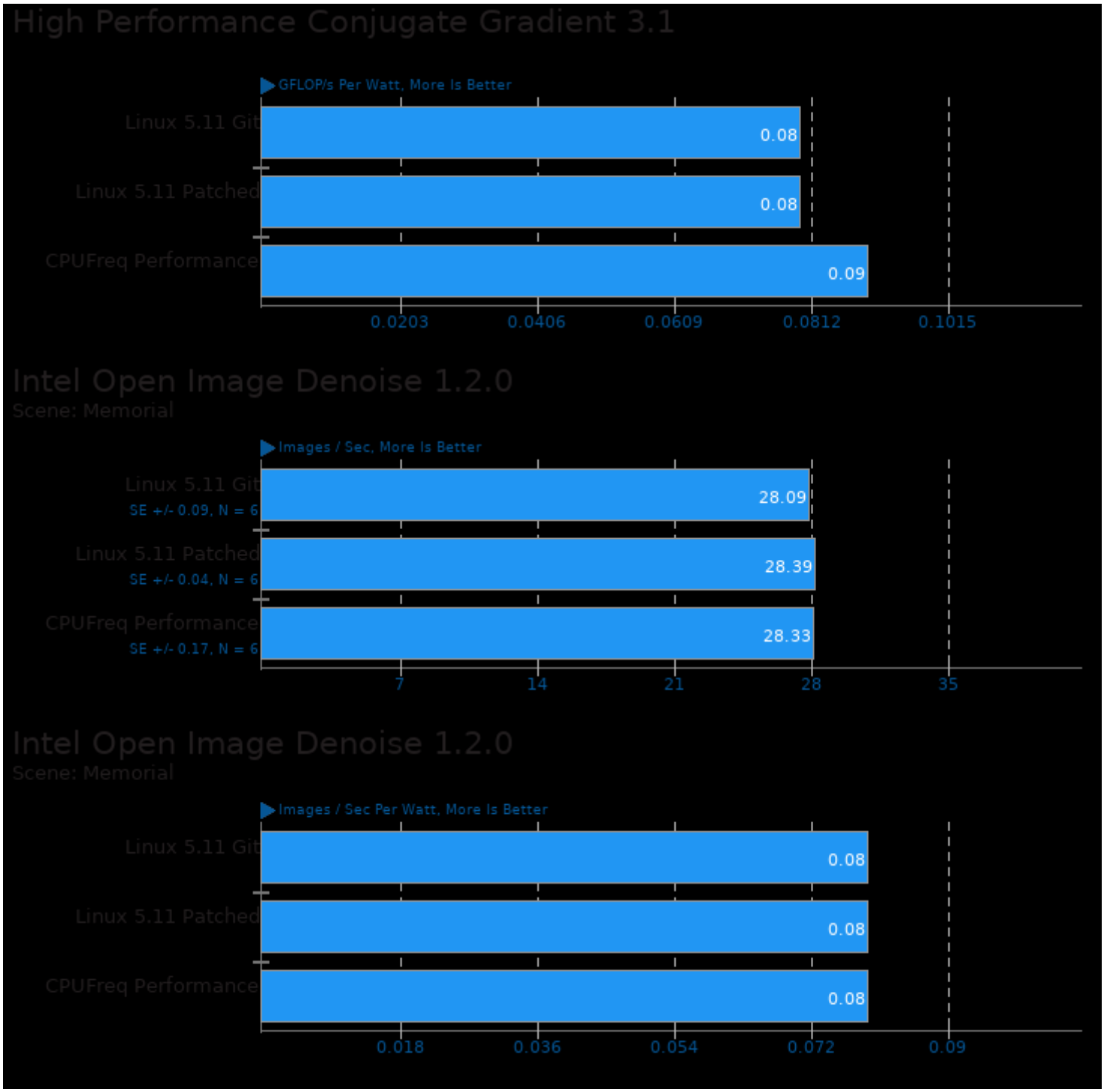
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

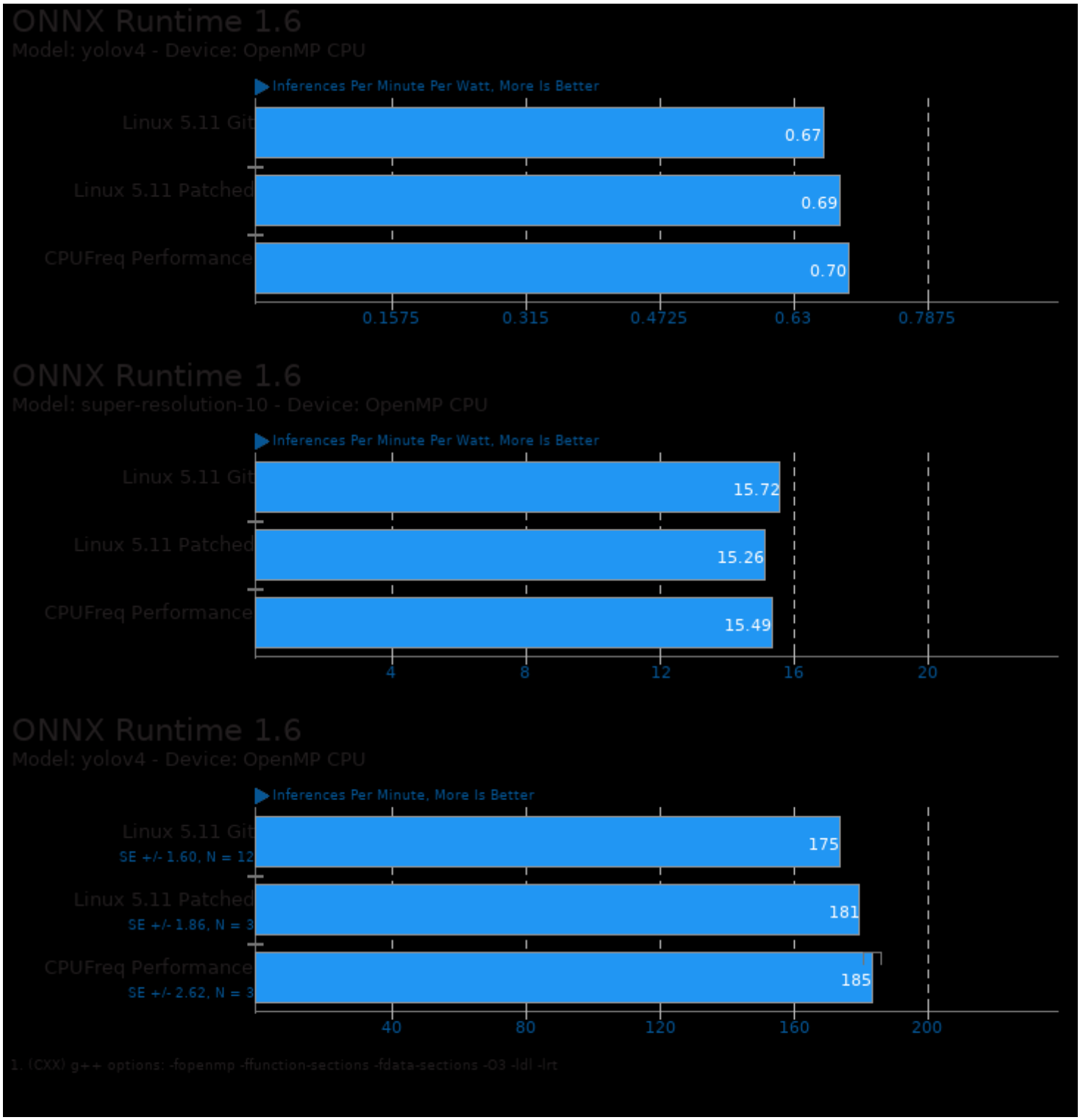


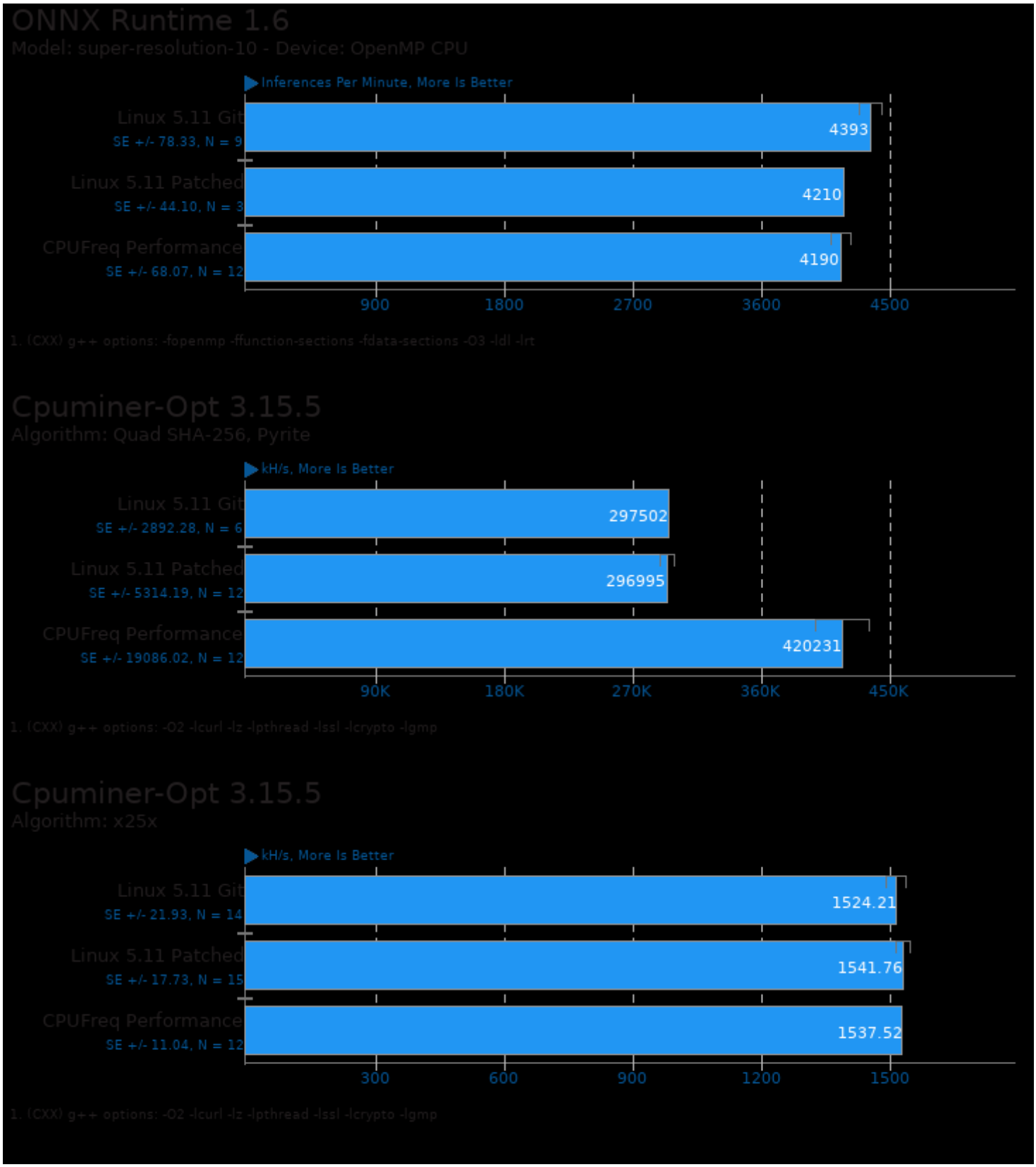

simdjson 0.7.1
Throughput Test: LargeRandom
GB/s, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 3
0.37
Linux 5.11 Patched
SE +/- 0.00, N = 3
0.36
CPUFreq Performance
SE +/- 0.00, N = 3
0.37
0.0833
0.1666
0.2499
0.3332
0.4165
1. (CXX) g++ options: -O3 -pthread
simdjson 0.7.1
Throughput Test: Kostya
GB/s, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 3
0.57
Linux 5.11 Patched
SE +/- 0.00, N = 3
0.57
CPUFreq Performance
SE +/- 0.00, N = 3
0.57
0.1283
0.2566
0.3849
0.5132
0.6415
1. (CXX) g++ options: -O3 -pthread
simdjson 0.7.1
Throughput Test: PartialTweets
GB/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance

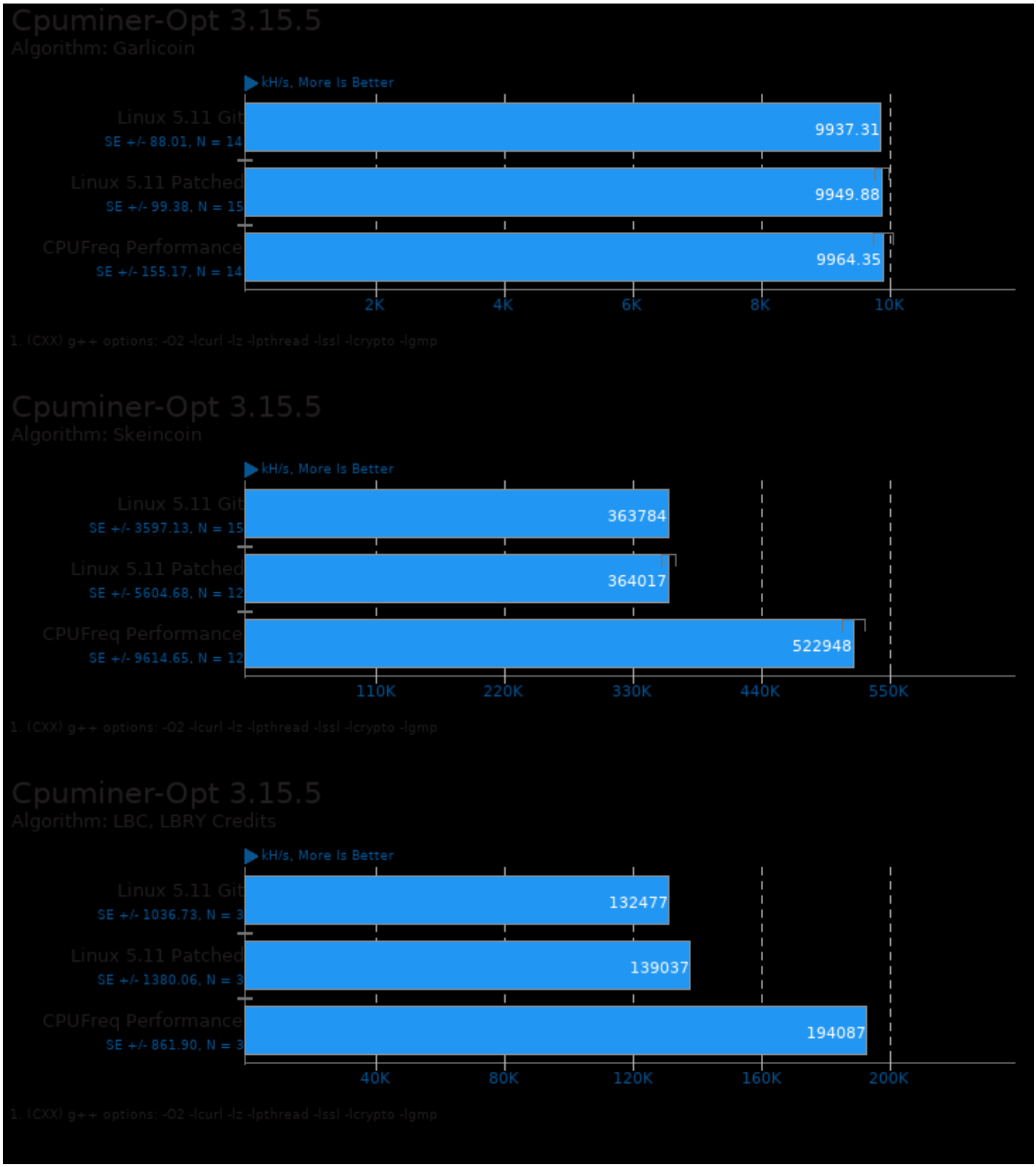

simdjson 0.7.1
Throughput Test: LargeRandom
GB/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
simdjson 0.7.1
Throughput Test: Kostya
GB/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
simdjson 0.7.1
Throughput Test: DistinctUserID
GB/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
0.01
CPUFreq Performance
0.01
0.0023
0.0046
0.0069
0.0092
0.0115


simdjson 0.7.1
Throughput Test: PartialTweets
GB/s, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 3
0.62
Linux 5.11 Patched
SE +/- 0.00, N = 3
0.63
CPUFreq Performance
SE +/- 0.00, N = 3
0.63
0.1418
0.2836
0.4254
0.5672
0.709
1. (CXX) g++ options: -O3 -pthread
simdjson 0.7.1
Throughput Test: DistinctUserID
GB/s, More Is Better
Linux 5.11 Git
SE +/- 0.00, N = 3
0.65
Linux 5.11 Patched
SE +/- 0.00, N = 3
0.65
CPUFreq Performance
SE +/- 0.00, N = 3
0.65
0.1463
0.2926
0.4389
0.5852
0.7315
1. (CXX) g++ options: -O3 -pthread
High Performance Conjugate Gradient 3.1
GFLOP/s, More Is Better
Linux 5.11 Git
SE +/- 0.12, N = 3
30.24
Linux 5.11 Patched
SE +/- 0.13, N = 3
30.83
CPUFreq Performance
SE +/- 0.01, N = 3
30.93
7
14
21
28
35
1. (CXX) g++ options: -O3 -ffast-math -ftree-vectorize -pthread -lmpi_cxx -lmpi

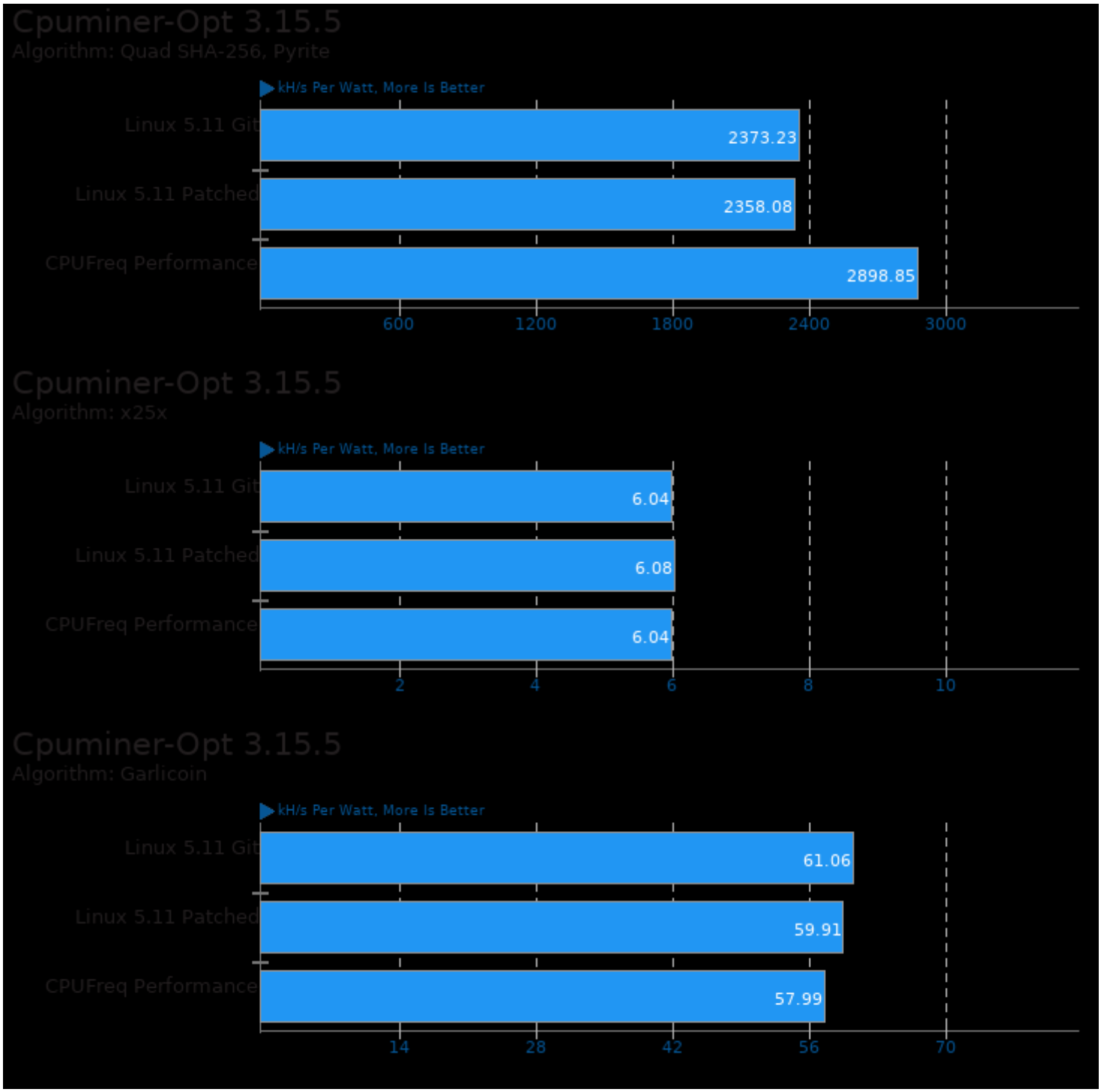

High Performance Conjugate Gradient 3.1
GFLOP/s Per Watt, More Is Better
Linux 5.11 Git
0.08
Linux 5.11 Patched
0.08
CPUFreq Performance
0.09
0.0203
0.0406
0.0609
0.0812
0.1015
Intel Open Image Denoise 1.2.0
Scene: Memorial
Images / Sec, More Is Better
Linux 5.11 Git
SE +/- 0.09, N = 6
28.09
Linux 5.11 Patched
SE +/- 0.04, N = 6
28.39
CPUFreq Performance
SE +/- 0.17, N = 6
28.33
7
14
21
28
35
Intel Open Image Denoise 1.2.0
Scene: Memorial
Images / Sec Per Watt, More Is Better
Linux 5.11 Git
0.08
Linux 5.11 Patched
0.08
CPUFreq Performance
0.08
0.018
0.036
0.054
0.072
0.09

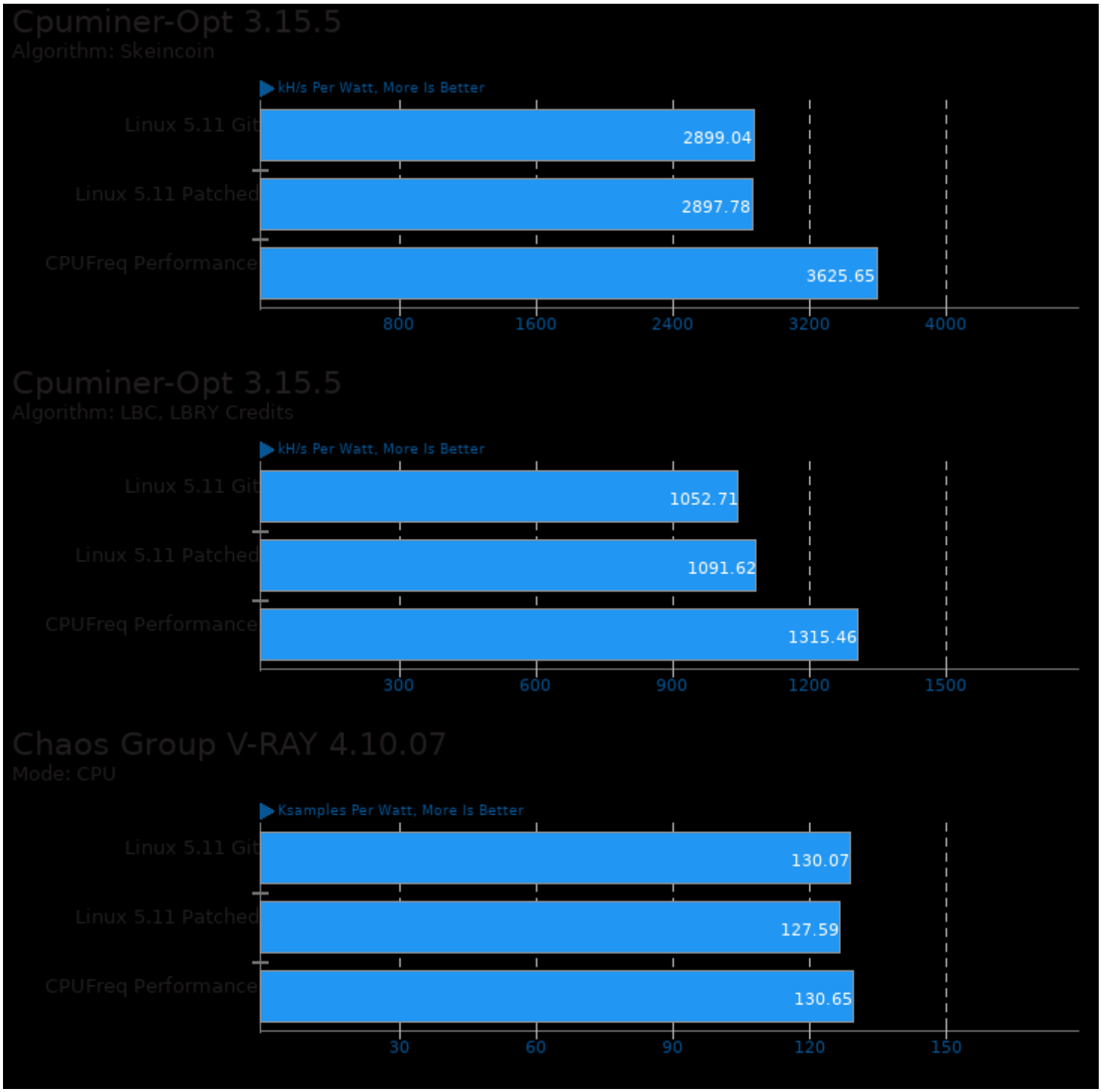

ONNX Runtime 1.6
Model: yolov4 - Device: OpenMP CPU
Inferences Per Minute Per Watt, More Is Better
Linux 5.11 Git
0.67
Linux 5.11 Patched
0.69
CPUFreq Performance
0.70
0.1575
0.315
0.4725
0.63
0.7875
ONNX Runtime 1.6
Model: super-resolution-10 - Device: OpenMP CPU
Inferences Per Minute Per Watt, More Is Better
Linux 5.11 Git
15.72
Linux 5.11 Patched
15.26
CPUFreq Performance
15.49
4
8
12
16
20
ONNX Runtime 1.6
Model: yolov4 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
Linux 5.11 Git
SE +/- 1.60, N = 12
175
Linux 5.11 Patched
SE +/- 1.86, N = 3
181
CPUFreq Performance
SE +/- 2.62, N = 3
185
40
80
120
160
200
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt

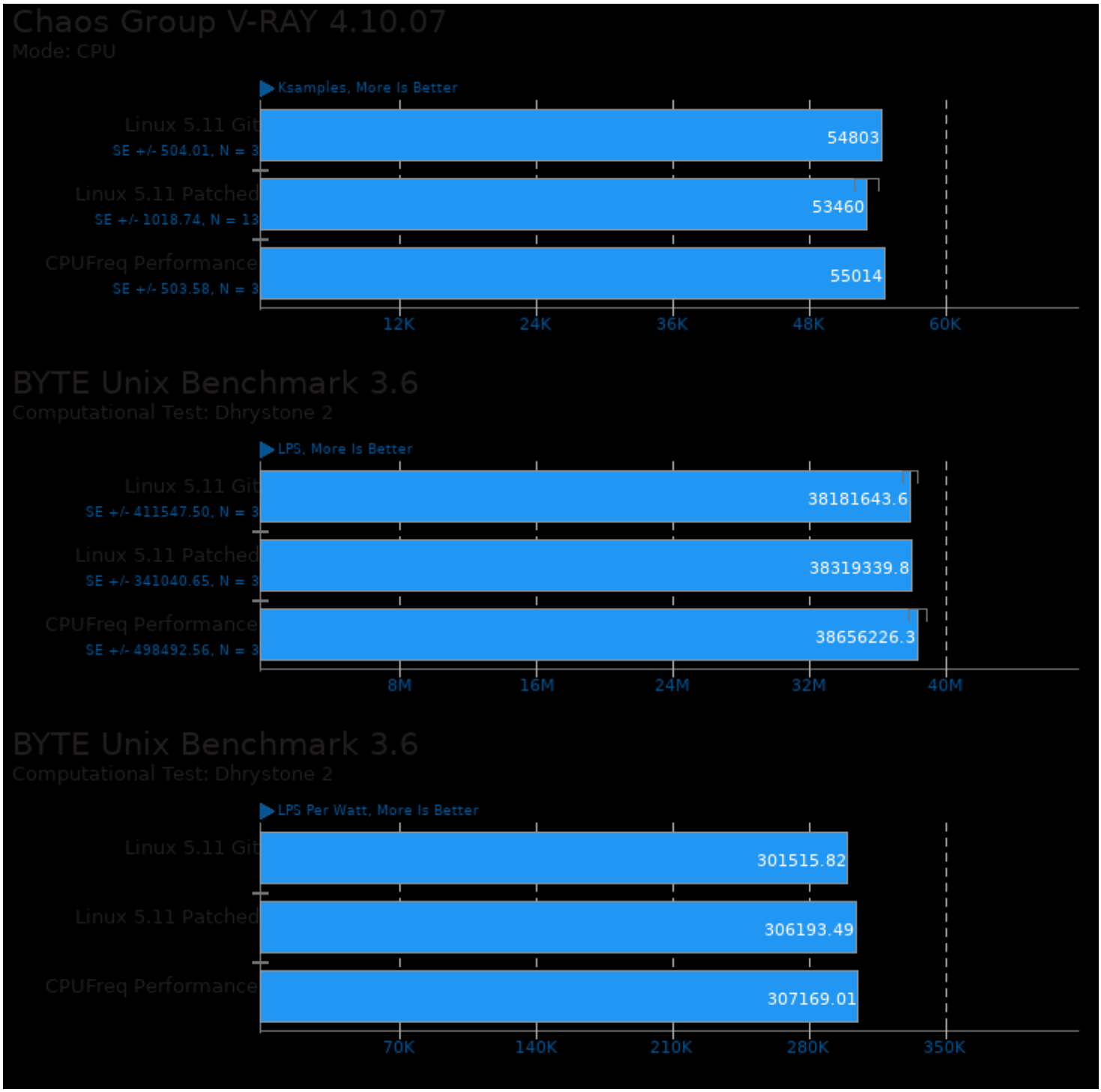

ONNX Runtime 1.6
Model: super-resolution-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
Linux 5.11 Git
SE +/- 78.33, N = 9
4393
Linux 5.11 Patched
SE +/- 44.10, N = 3
4210
CPUFreq Performance
SE +/- 68.07, N = 12
4190
900
1800
2700
3600
4500
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt
Cpuminer-Opt 3.15.5
Algorithm: Quad SHA-256, Pyrite
kH/s, More Is Better
Linux 5.11 Git
SE +/- 2892.28, N = 6
297502
Linux 5.11 Patched
SE +/- 5314.19, N = 12
296995
CPUFreq Performance
SE +/- 19086.02, N = 12
420231
90K
180K
270K
360K
450K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.15.5
Algorithm: x25x
kH/s, More Is Better
Linux 5.11 Git
SE +/- 21.93, N = 14
1524.21
Linux 5.11 Patched
SE +/- 17.73, N = 15
1541.76
CPUFreq Performance
SE +/- 11.04, N = 12
1537.52
300
600
900
1200
1500
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp

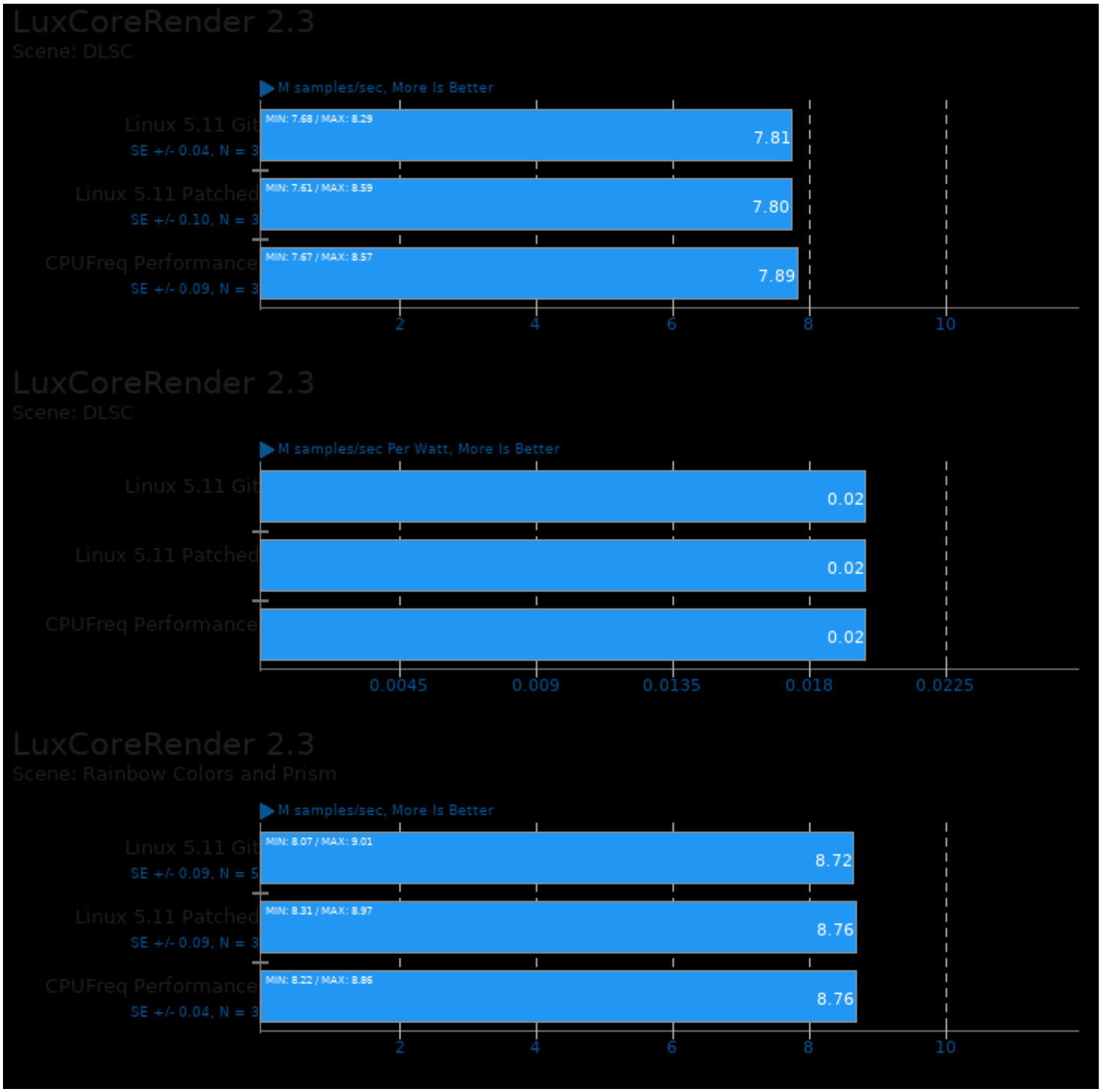

Cpuminer-Opt 3.15.5
Algorithm: Garlicoin
kH/s, More Is Better
Linux 5.11 Git
SE +/- 88.01, N = 14
9937.31
Linux 5.11 Patched
SE +/- 99.38, N = 15
9949.88
CPUFreq Performance
SE +/- 155.17, N = 14
9964.35
2K
4K
6K
8K
10K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.15.5
Algorithm: Skeincoin
kH/s, More Is Better
Linux 5.11 Git
SE +/- 3597.13, N = 15
363784
Linux 5.11 Patched
SE +/- 5604.68, N = 12
364017
CPUFreq Performance
SE +/- 9614.65, N = 12
522948
110K
220K
330K
440K
550K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.15.5
Algorithm: LBC, LBRY Credits
kH/s, More Is Better
Linux 5.11 Git
SE +/- 1036.73, N = 3
132477
Linux 5.11 Patched
SE +/- 1380.06, N = 3
139037
CPUFreq Performance
SE +/- 861.90, N = 3
194087
40K
80K
120K
160K
200K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp

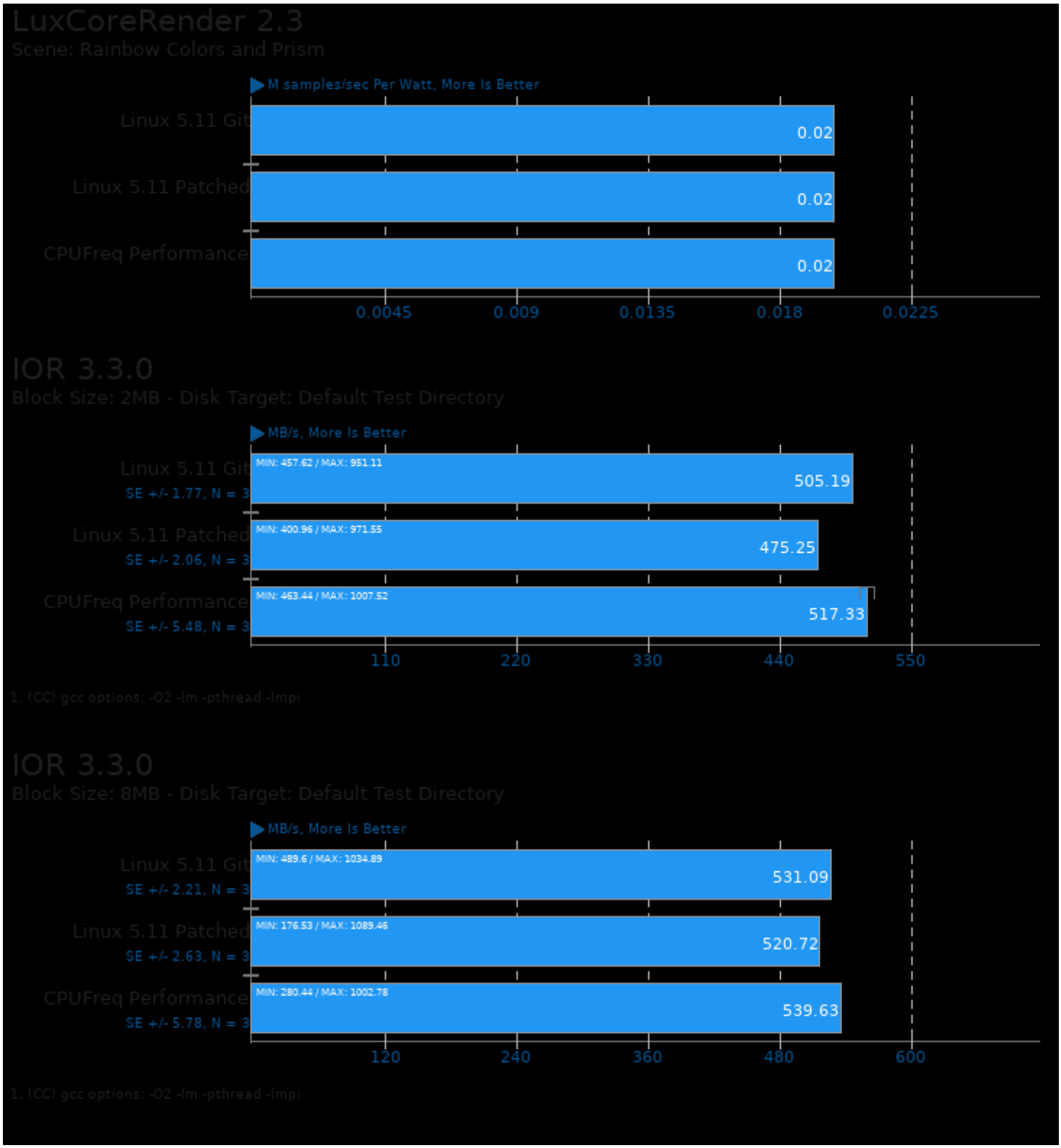
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

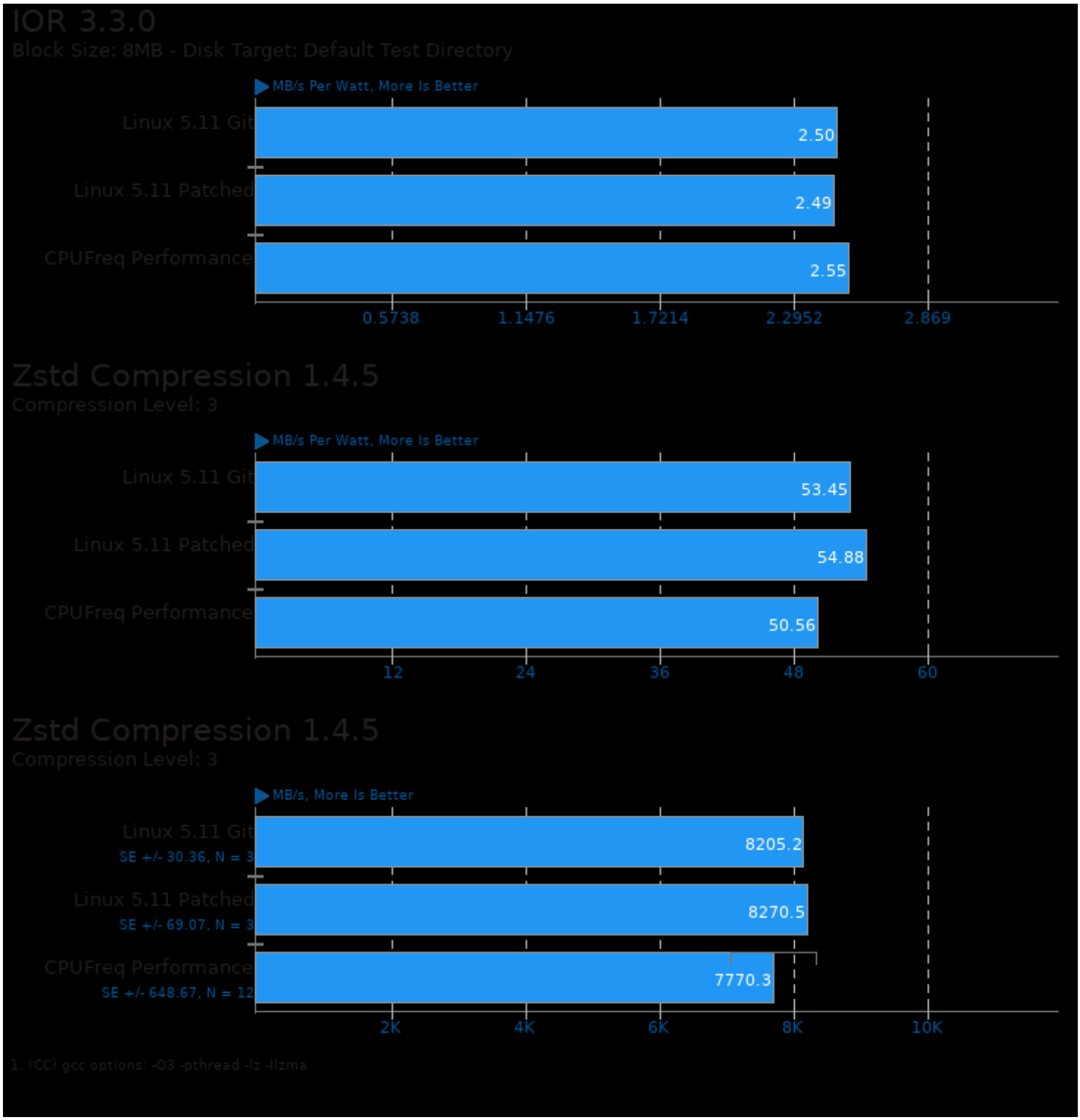


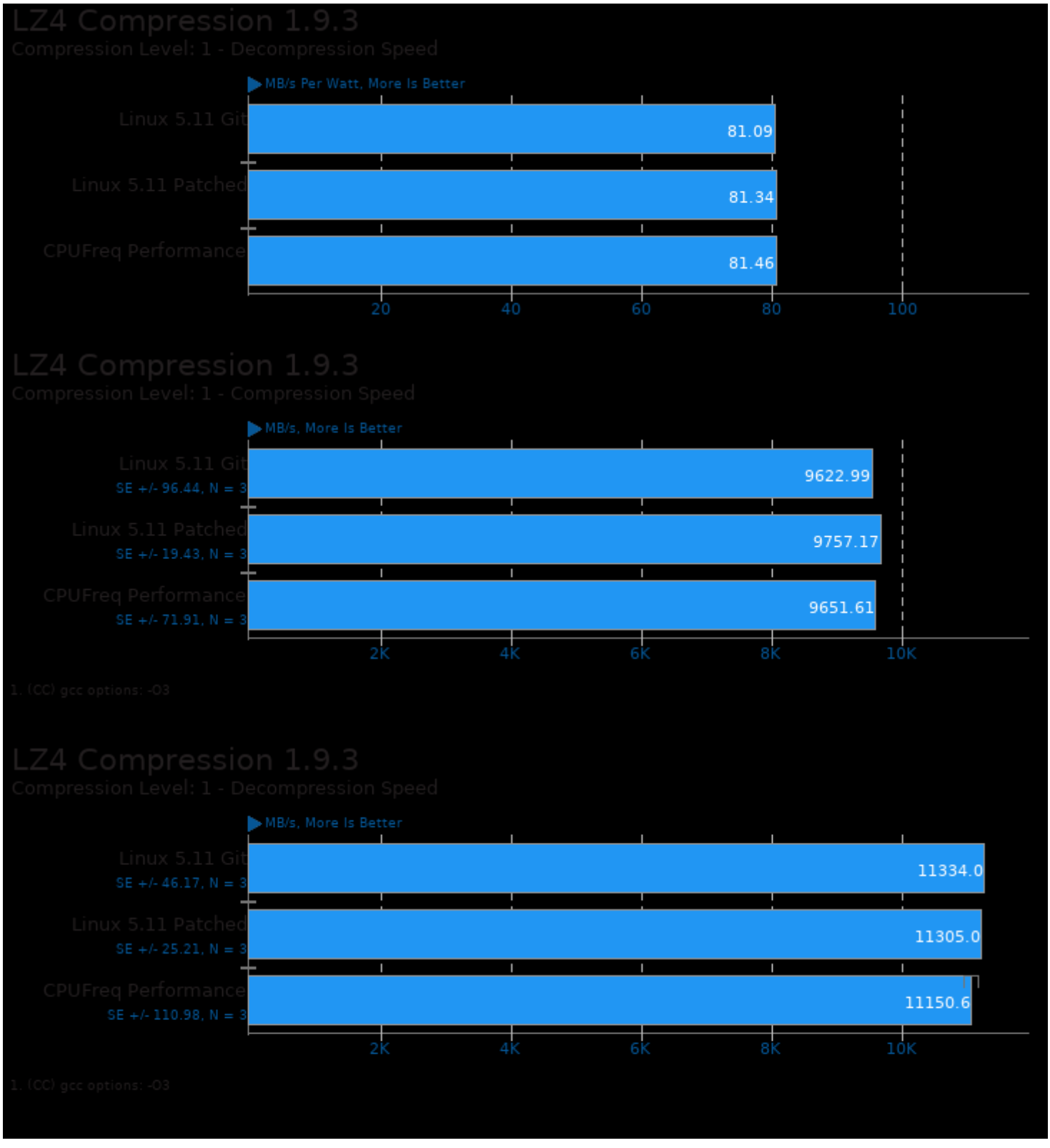

Cpuminer-Opt 3.15.5
Algorithm: Skeincoin
kH/s Per Watt, More Is Better
Linux 5.11 Git
2899.04
Linux 5.11 Patched
2897.78
CPUFreq Performance
3625.65
800
1600
2400
3200
4000
Cpuminer-Opt 3.15.5
Algorithm: LBC, LBRY Credits
kH/s Per Watt, More Is Better
Linux 5.11 Git
1052.71
Linux 5.11 Patched
1091.62
CPUFreq Performance
1315.46
300
600
900
1200
1500
Chaos Group V-RAY 4.10.07
Mode: CPU
Ksamples Per Watt, More Is Better
Linux 5.11 Git
130.07
Linux 5.11 Patched
127.59
CPUFreq Performance
130.65
30
60
90
120
150

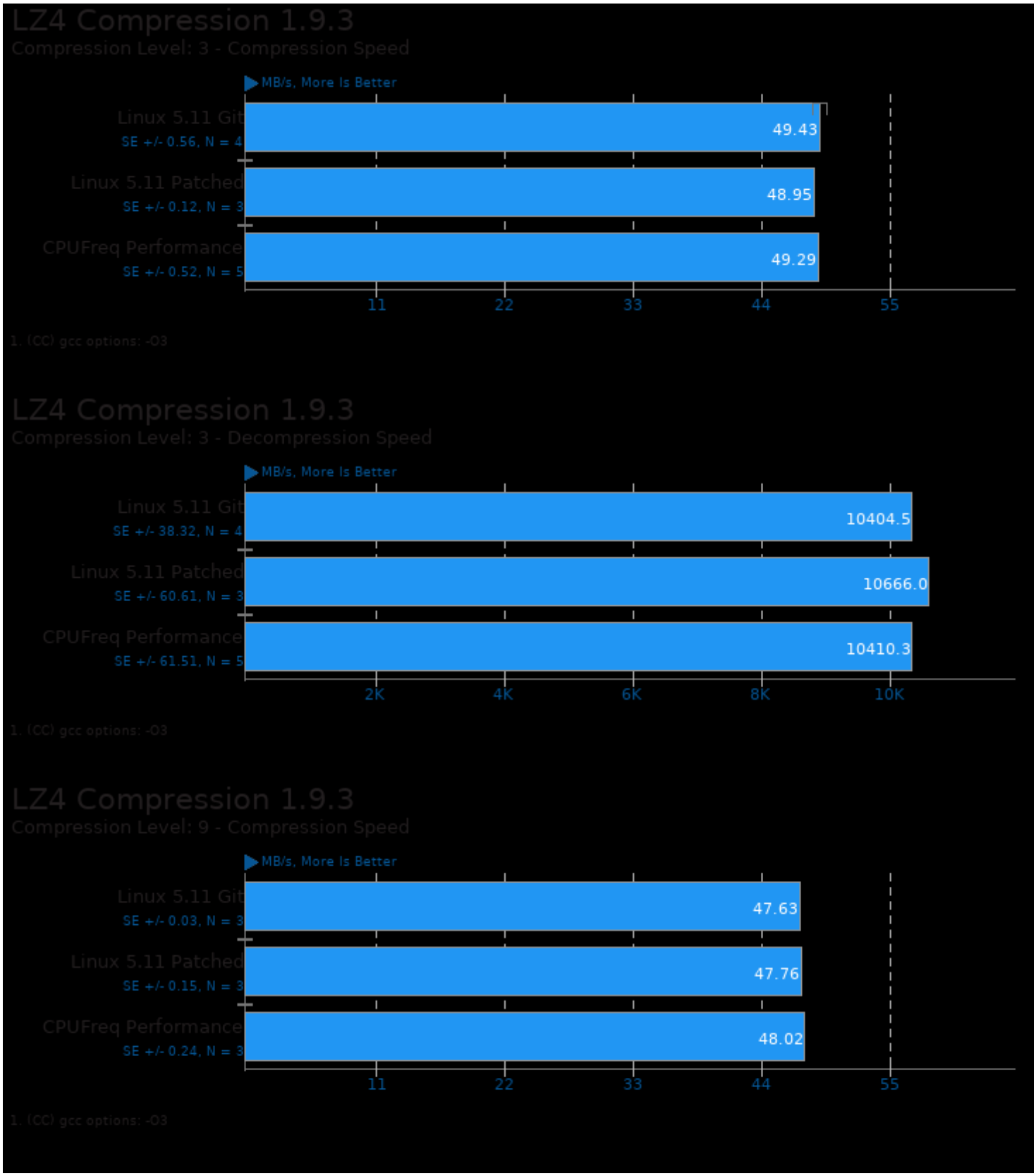

Chaos Group V-RAY 4.10.07
Mode: CPU
Ksamples, More Is Better
Linux 5.11 Git
SE +/- 504.01, N = 3
54803
Linux 5.11 Patched
SE +/- 1018.74, N = 13
53460
CPUFreq Performance
SE +/- 503.58, N = 3
55014
12K
24K
36K
48K
60K
BYTE Unix Benchmark 3.6
Computational Test: Dhrystone 2
LPS, More Is Better
Linux 5.11 Git
SE +/- 411547.50, N = 3
38181643.6
Linux 5.11 Patched
SE +/- 341040.65, N = 3
38319339.8
CPUFreq Performance
SE +/- 498492.56, N = 3
38656226.3
8M
16M
24M
32M
40M
BYTE Unix Benchmark 3.6
Computational Test: Dhrystone 2
LPS Per Watt, More Is Better
Linux 5.11 Git
301515.82
Linux 5.11 Patched
306193.49
CPUFreq Performance
307169.01
70K
140K
210K
280K
350K

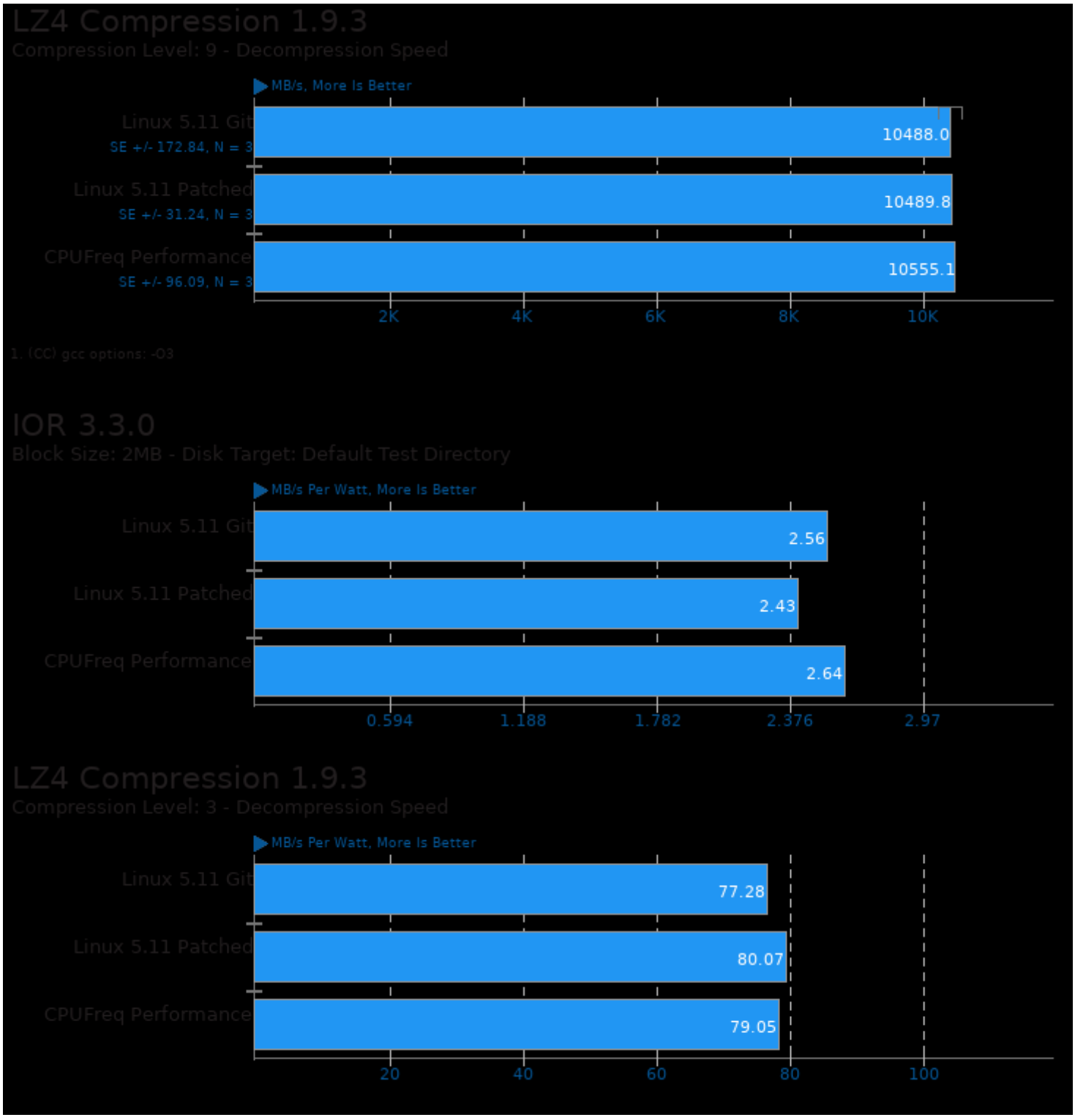

LuxCoreRender 2.3
Scene: DLSC
M samples/sec, More Is Better
Linux 5.11 Git
SE +/- 0.04, N = 3
MIN: 7.68 / MAX: 8.29
7.81
Linux 5.11 Patched
SE +/- 0.10, N = 3
MIN: 7.61 / MAX: 8.59
7.80
CPUFreq Performance
SE +/- 0.09, N = 3
MIN: 7.67 / MAX: 8.57
7.89
2
4
6
8
10
LuxCoreRender 2.3
Scene: DLSC
M samples/sec Per Watt, More Is Better
Linux 5.11 Git
0.02
Linux 5.11 Patched
0.02
CPUFreq Performance
0.02
0.0045
0.009
0.0135
0.018
0.0225
LuxCoreRender 2.3
Scene: Rainbow Colors and Prism
M samples/sec, More Is Better
Linux 5.11 Git
SE +/- 0.09, N = 5
MIN: 8.07 / MAX: 9.01
8.72
Linux 5.11 Patched
SE +/- 0.09, N = 3
MIN: 8.31 / MAX: 8.97
8.76
CPUFreq Performance
SE +/- 0.04, N = 3
MIN: 8.22 / MAX: 8.86
8.76
2
4
6
8
10

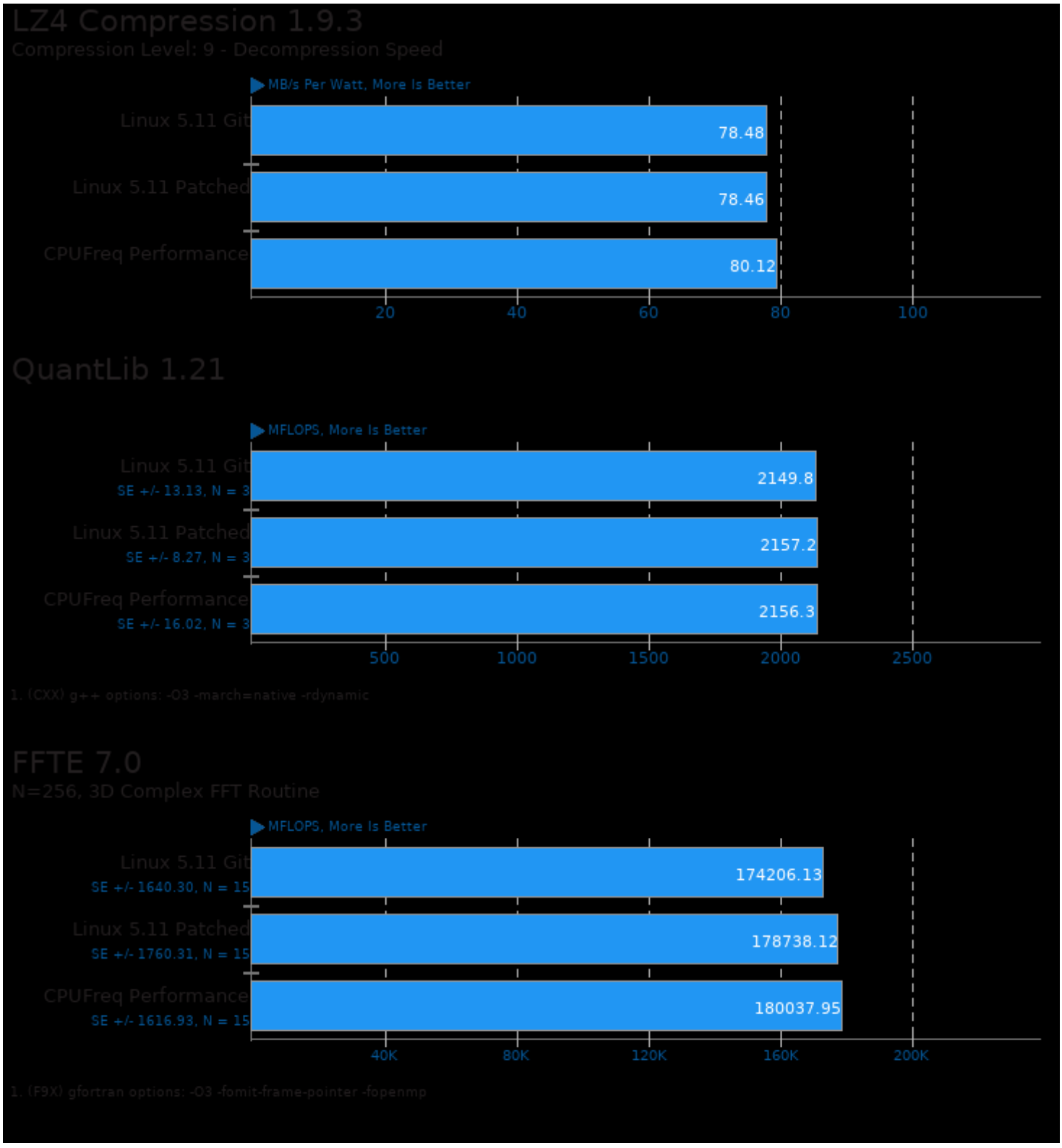

LuxCoreRender 2.3
Scene: Rainbow Colors and Prism
M samples/sec Per Watt, More Is Better
Linux 5.11 Git
0.02
Linux 5.11 Patched
0.02
CPUFreq Performance
0.02
0.0045
0.009
0.0135
0.018
0.0225
IOR 3.3.0
Block Size: 2MB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.11 Git
SE +/- 1.77, N = 3
MIN: 457.62 / MAX: 951.11
505.19
Linux 5.11 Patched
SE +/- 2.06, N = 3
MIN: 400.96 / MAX: 971.55
475.25
CPUFreq Performance
SE +/- 5.48, N = 3
MIN: 463.44 / MAX: 1007.52
517.33
110
220
330
440
550
1. (CC) gcc options: -O2 -lm -pthread -lmpi
IOR 3.3.0
Block Size: 8MB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.11 Git
SE +/- 2.21, N = 3
MIN: 489.6 / MAX: 1034.89
531.09
Linux 5.11 Patched
SE +/- 2.63, N = 3
MIN: 176.53 / MAX: 1089.46
520.72
CPUFreq Performance
SE +/- 5.78, N = 3
MIN: 280.44 / MAX: 1002.78
539.63
120
240
360
480
600
1. (CC) gcc options: -O2 -lm -pthread -lmpi


IOR 3.3.0
Block Size: 8MB - Disk Target: Default Test Directory
MB/s Per Watt, More Is Better
Linux 5.11 Git
2.50
Linux 5.11 Patched
2.49
CPUFreq Performance
2.55
0.5738
1.1476
1.7214
2.2952
2.869
Zstd Compression 1.4.5
Compression Level: 3
MB/s Per Watt, More Is Better
Linux 5.11 Git
53.45
Linux 5.11 Patched
54.88
CPUFreq Performance
50.56
12
24
36
48
60
Zstd Compression 1.4.5
Compression Level: 3
MB/s, More Is Better
Linux 5.11 Git
SE +/- 30.36, N = 3
8205.2
Linux 5.11 Patched
SE +/- 69.07, N = 3
8270.5
CPUFreq Performance
SE +/- 648.67, N = 12
7770.3
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3 -pthread -lz -llzma


LZ4 Compression 1.9.3
Compression Level: 1 - Decompression Speed
MB/s Per Watt, More Is Better
Linux 5.11 Git
81.09
Linux 5.11 Patched
81.34
CPUFreq Performance
81.46
20
40
60
80
100
LZ4 Compression 1.9.3
Compression Level: 1 - Compression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 96.44, N = 3
9622.99
Linux 5.11 Patched
SE +/- 19.43, N = 3
9757.17
CPUFreq Performance
SE +/- 71.91, N = 3
9651.61
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3
LZ4 Compression 1.9.3
Compression Level: 1 - Decompression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 46.17, N = 3
11334.0
Linux 5.11 Patched
SE +/- 25.21, N = 3
11305.0
CPUFreq Performance
SE +/- 110.98, N = 3
11150.6
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3

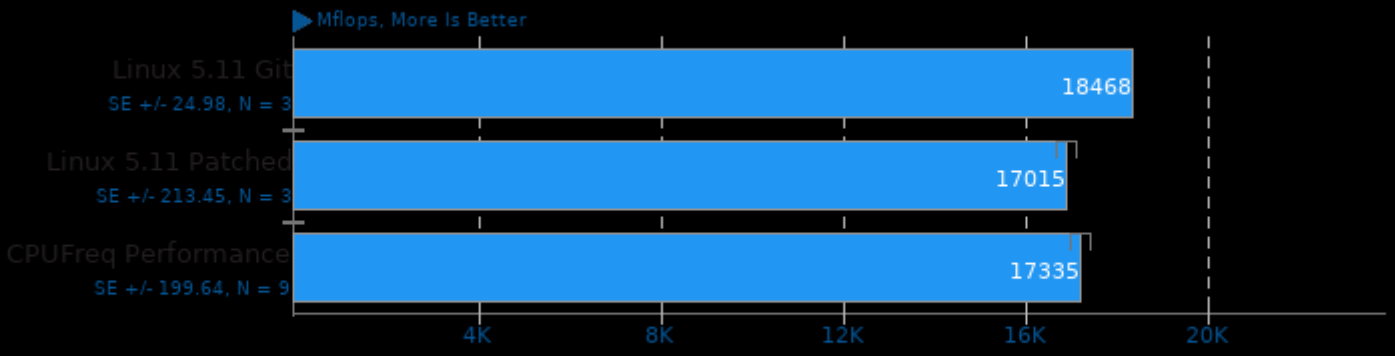

LZ4 Compression 1.9.3
Compression Level: 3 - Compression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 0.56, N = 4
49.43
Linux 5.11 Patched
SE +/- 0.12, N = 3
48.95
CPUFreq Performance
SE +/- 0.52, N = 5
49.29
11
22
33
44
55
1. (CC) gcc options: -O3
LZ4 Compression 1.9.3
Compression Level: 3 - Decompression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 38.32, N = 4
10404.5
Linux 5.11 Patched
SE +/- 60.61, N = 3
10666.0
CPUFreq Performance
SE +/- 61.51, N = 5
10410.3
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3
LZ4 Compression 1.9.3
Compression Level: 9 - Compression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 0.03, N = 3
47.63
Linux 5.11 Patched
SE +/- 0.15, N = 3
47.76
CPUFreq Performance
SE +/- 0.24, N = 3
48.02
11
22
33
44
55
1. (CC) gcc options: -O3


LZ4 Compression 1.9.3
Compression Level: 9 - Decompression Speed
MB/s, More Is Better
Linux 5.11 Git
SE +/- 172.84, N = 3
10488.0
Linux 5.11 Patched
SE +/- 31.24, N = 3
10489.8
CPUFreq Performance
SE +/- 96.09, N = 3
10555.1
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3
IOR 3.3.0
Block Size: 2MB - Disk Target: Default Test Directory
MB/s Per Watt, More Is Better
Linux 5.11 Git
2.56
Linux 5.11 Patched
2.43
CPUFreq Performance
2.64
0.594
1.188
1.782
2.376
2.97
LZ4 Compression 1.9.3
Compression Level: 3 - Decompression Speed
MB/s Per Watt, More Is Better
Linux 5.11 Git
77.28
Linux 5.11 Patched
80.07
CPUFreq Performance
79.05
20
40
60
80
100


LZ4 Compression 1.9.3
Compression Level: 9 - Decompression Speed
MB/s Per Watt, More Is Better
Linux 5.11 Git
78.48
Linux 5.11 Patched
78.46
CPUFreq Performance
80.12
20
40
60
80
100
QuantLib 1.21
MFLOPS, More Is Better
Linux 5.11 Git
SE +/- 13.13, N = 3
2149.8
Linux 5.11 Patched
SE +/- 8.27, N = 3
2157.2
CPUFreq Performance
SE +/- 16.02, N = 3
2156.3
500
1000
1500
2000
2500
1. (CXX) g++ options: -O3 -march=native -rdynamic
FFTE 7.0
N=256, 3D Complex FFT Routine
MFLOPS, More Is Better
Linux 5.11 Git
SE +/- 1640.30, N = 15
174206.13
Linux 5.11 Patched
SE +/- 1760.31, N = 15
178738.12
CPUFreq Performance
SE +/- 1616.93, N = 15
180037.95
40K
80K
120K
160K
200K
1. (F9X) gfortran options: -O3 -fomit-frame-pointer -fopenmp

FFTW 3.3.6

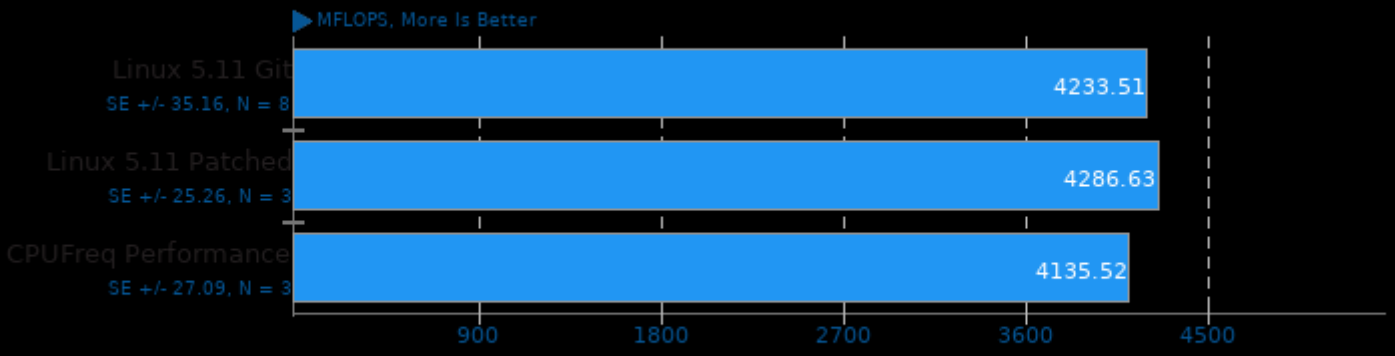
Build: Float + SSE - Size: 2D FFT Size 4096



1. (CC) gcc options: -pthread -O3 -fomit-frame-pointer -mtune=native -malign-double -fstrict-aliasing -fno-schedule-insns -ffast-math -lm

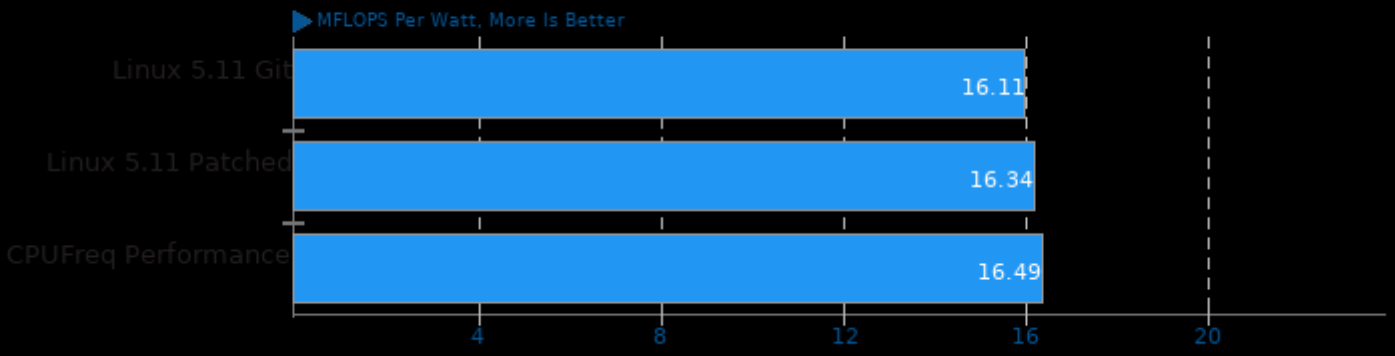
Himeno Benchmark 3.0

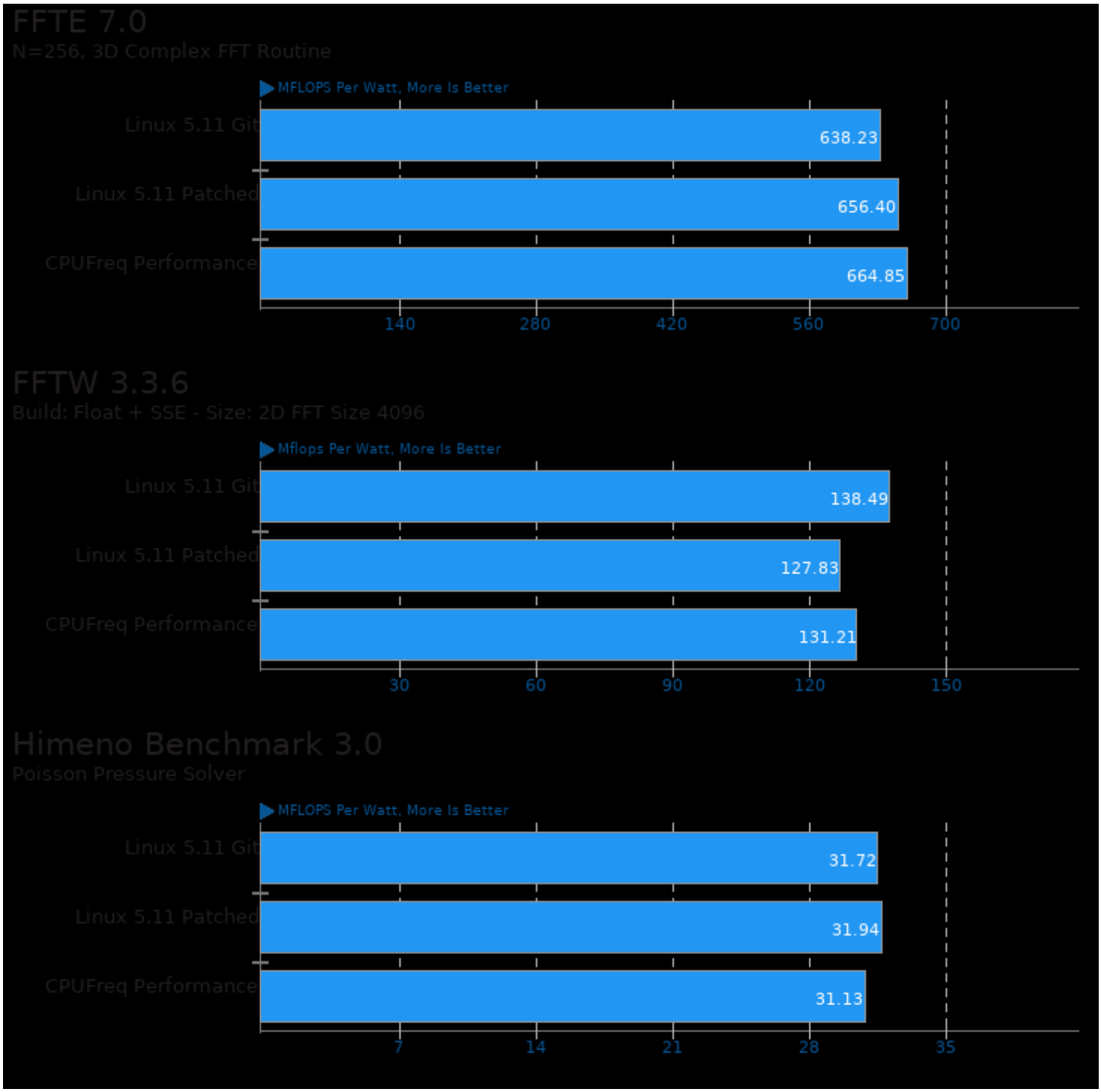
Poisson Pressure Solver

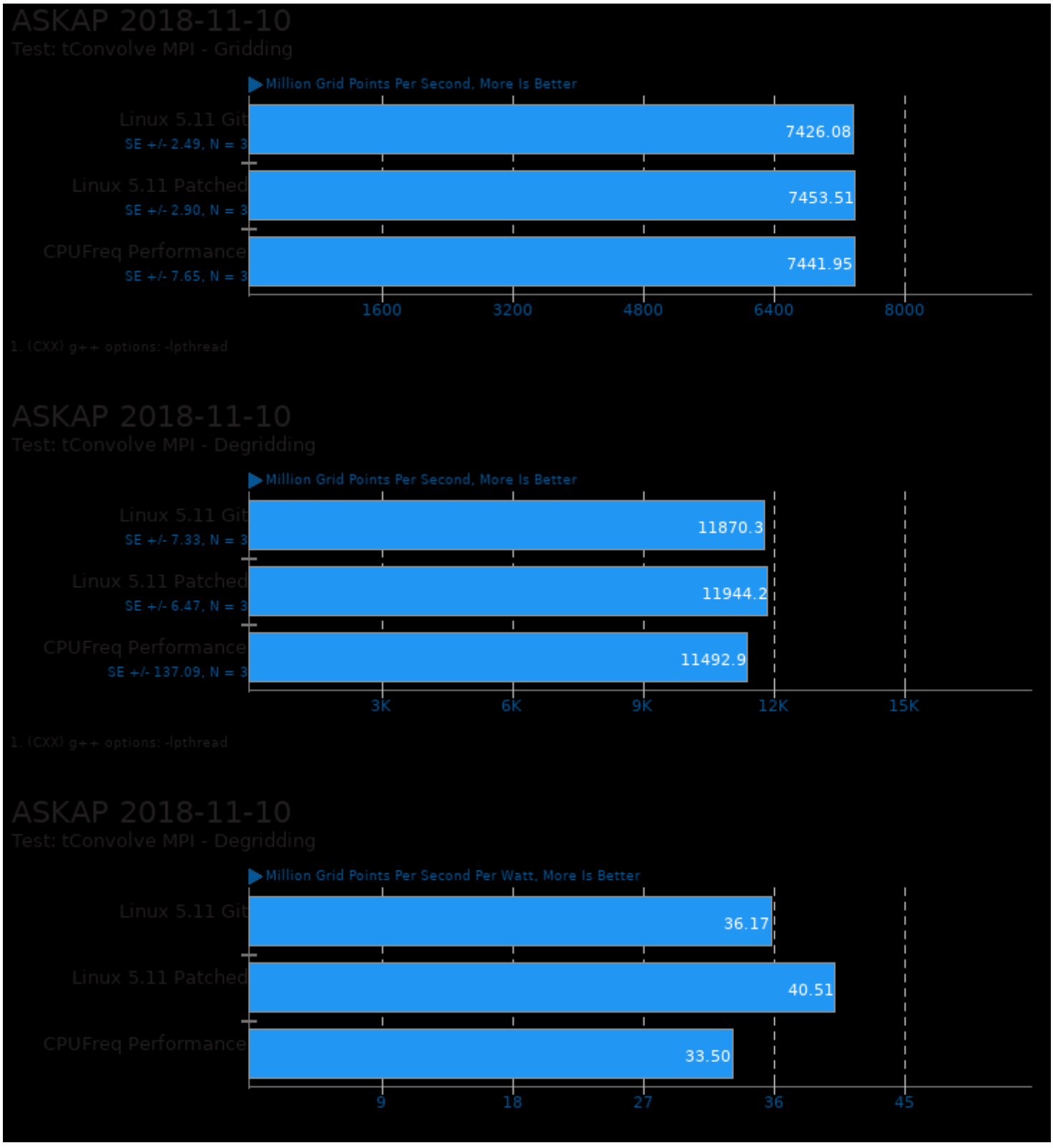


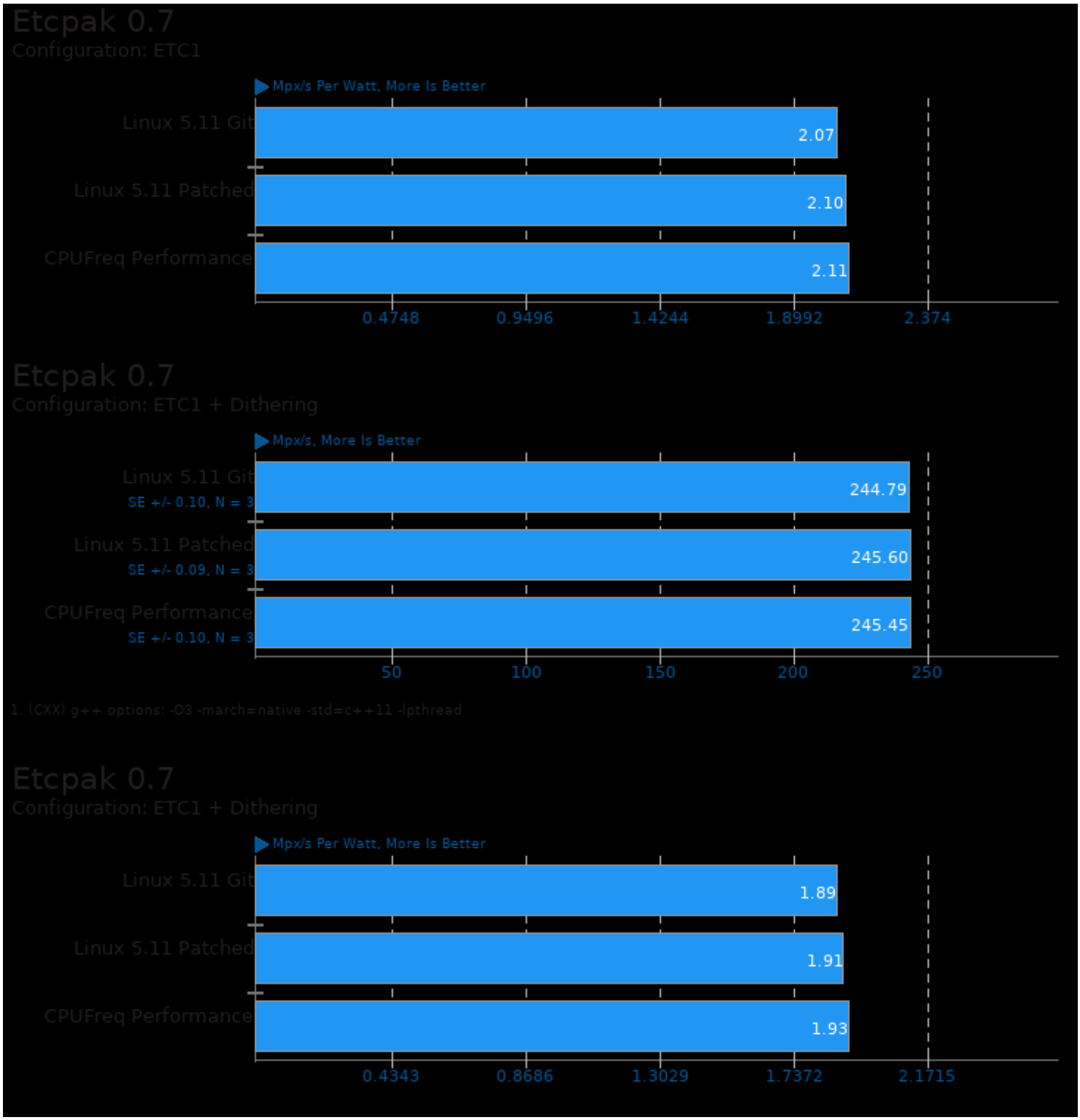
1. (CC) gcc options: -O3 -mavx2

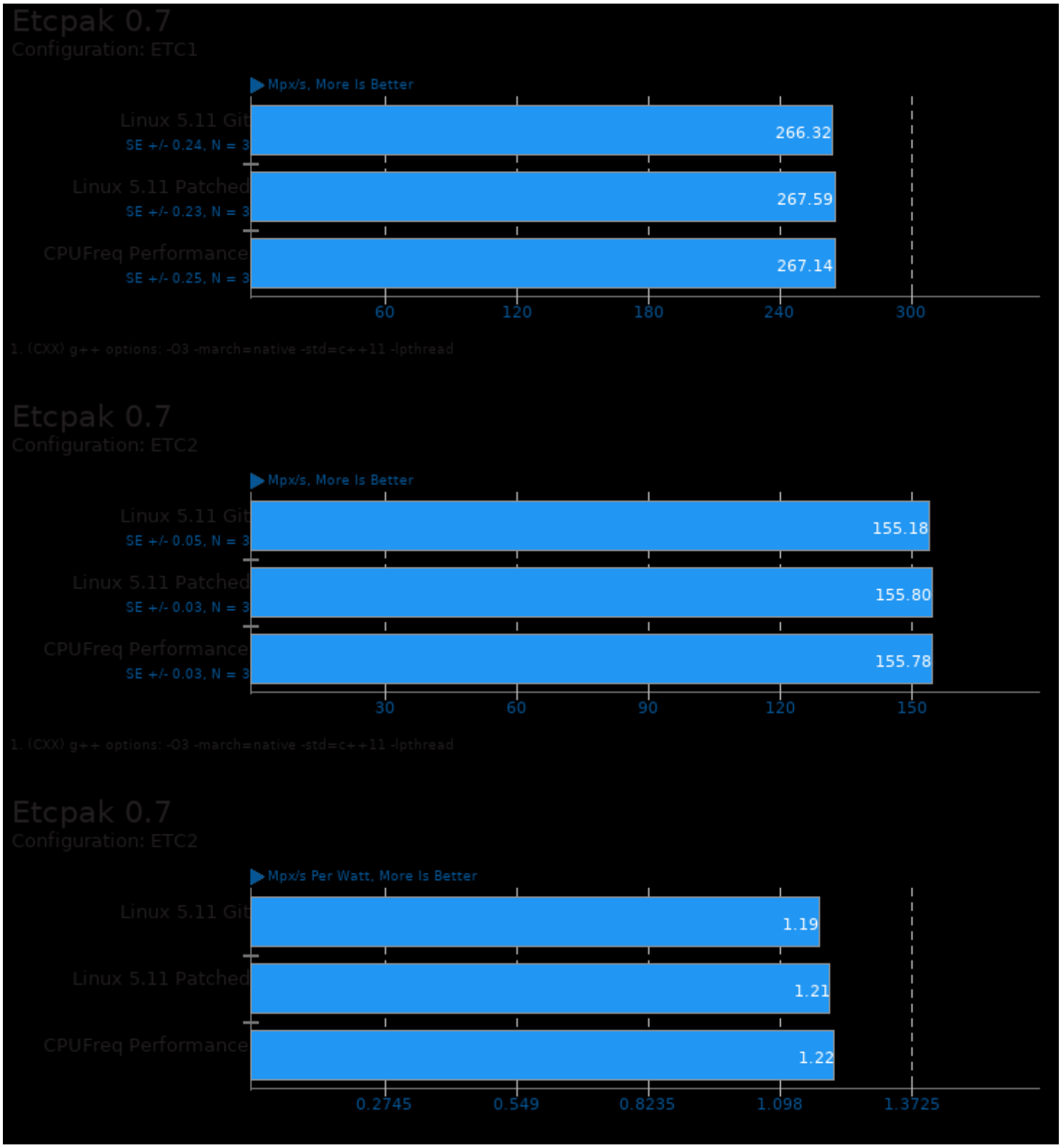
QuantLib 1.21

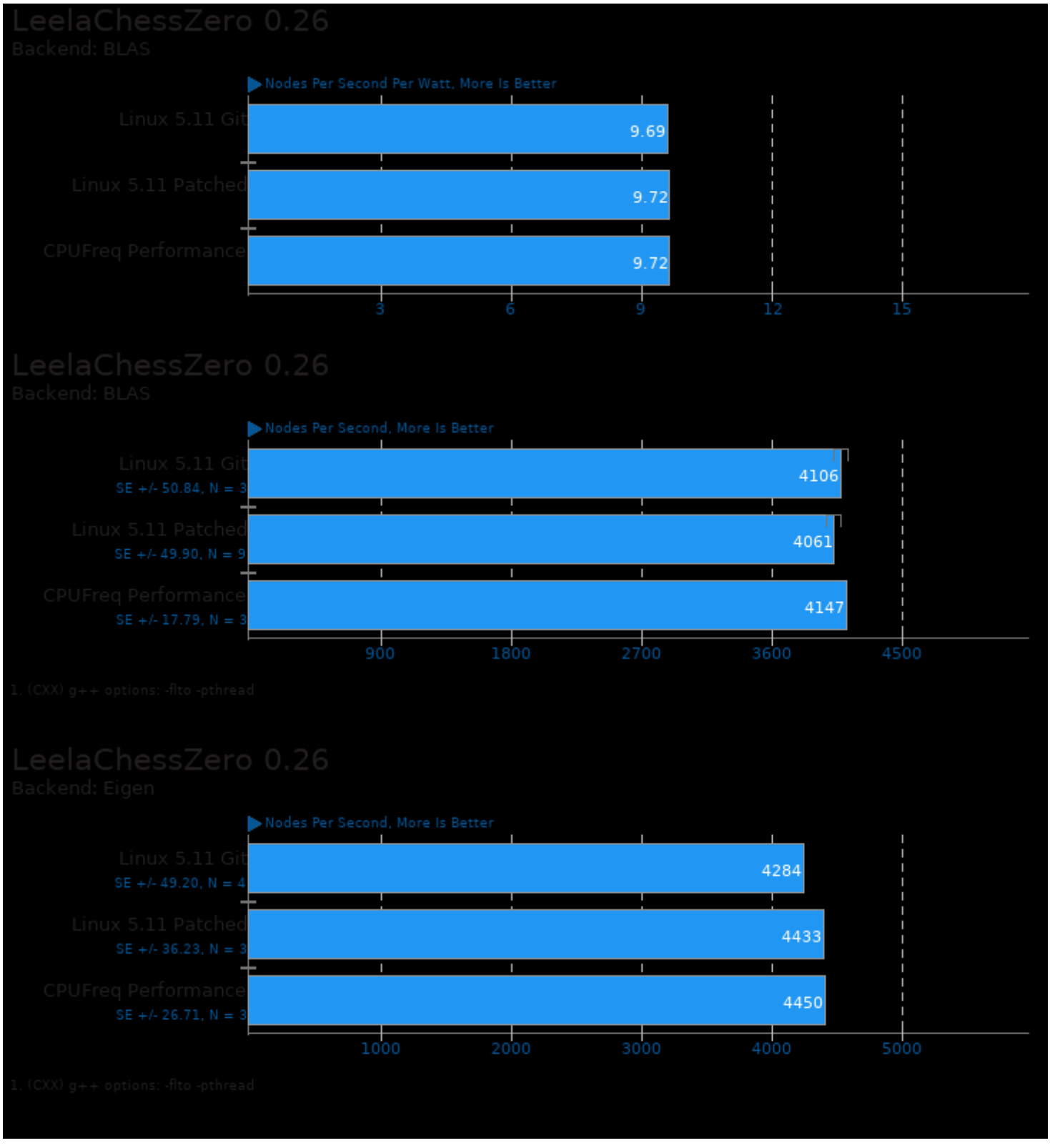



FFTE 7.0
N=256, 3D Complex FFT Routine
MFLOPS Per Watt, More Is Better
Linux 5.11 Git
638.23
Linux 5.11 Patched
656.40
CPUFreq Performance
664.85
140
280
420
560
700
FFTW 3.3.6
Build: Float + SSE - Size: 2D FFT Size 4096
Mflops Per Watt, More Is Better
Linux 5.11 Git
138.49
Linux 5.11 Patched
127.83
CPUFreq Performance
131.21
30
60
90
120
150
Himeno Benchmark 3.0
Poisson Pressure Solver
MFLOPS Per Watt, More Is Better
Linux 5.11 Git
31.72
Linux 5.11 Patched
31.94
CPUFreq Performance
31.13
7
14
21
28
35


ASKAP 2018-11-10
Test: tConvolve MPI - Gridding
Million Grid Points Per Second, More Is Better
Linux 5.11 Git
SE +/- 2.49, N = 3
7426.08
Linux 5.11 Patched
SE +/- 2.90, N = 3
7453.51
CPUFreq Performance
SE +/- 7.65, N = 3
7441.95
1600
3200
4800
6400
8000
1. (CXX) g++ options: -lpthread
ASKAP 2018-11-10
Test: tConvolve MPI - Degridding
Million Grid Points Per Second, More Is Better
Linux 5.11 Git
SE +/- 7.33, N = 3
11870.3
Linux 5.11 Patched
SE +/- 6.47, N = 3
11944.2
CPUFreq Performance
SE +/- 137.09, N = 3
11492.9
3K
6K
9K
12K
15K
1. (CXX) g++ options: -lpthread
ASKAP 2018-11-10
Test: tConvolve MPI - Degridding
Million Grid Points Per Second Per Watt, More Is Better
Linux 5.11 Git
36.17
Linux 5.11 Patched
40.51
CPUFreq Performance
33.50
9
18
27
36
45

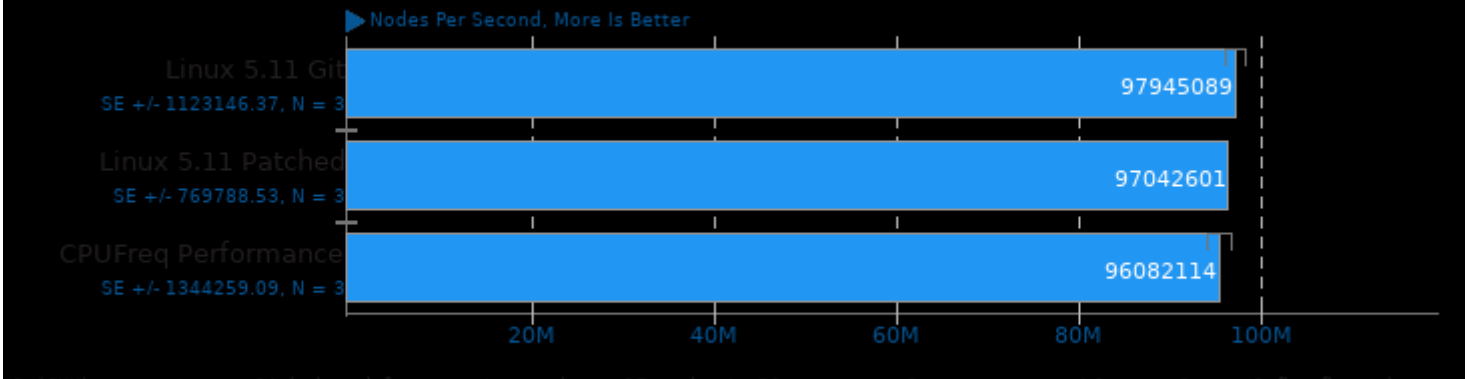

Etcpak 0.7
Configuration: ETC1
Mpx/s Per Watt, More Is Better
Linux 5.11 Git
2.07
Linux 5.11 Patched
2.10
CPUFreq Performance
2.11
0.4748
0.9496
1.4244
1.8992
2.374
Etcpak 0.7
Configuration: ETC1 + Dithering
Mpx/s, More Is Better
Linux 5.11 Git
SE +/- 0.10, N = 3
244.79
Linux 5.11 Patched
SE +/- 0.09, N = 3
245.60
CPUFreq Performance
SE +/- 0.10, N = 3
245.45
50
100
150
200
250
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Etcpak 0.7
Configuration: ETC1 + Dithering
Mpx/s Per Watt, More Is Better
Linux 5.11 Git
1.89
Linux 5.11 Patched
1.91
CPUFreq Performance
1.93
0.4343
0.8686
1.3029
1.7372
2.1715


Etcpak 0.7
Configuration: ETC1
Mpx/s, More Is Better
Linux 5.11 Git
SE +/- 0.24, N = 3
266.32
Linux 5.11 Patched
SE +/- 0.23, N = 3
267.59
CPUFreq Performance
SE +/- 0.25, N = 3
267.14
60
120
180
240
300
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Etcpak 0.7
Configuration: ETC2
Mpx/s, More Is Better
Linux 5.11 Git
SE +/- 0.05, N = 3
155.18
Linux 5.11 Patched
SE +/- 0.03, N = 3
155.80
CPUFreq Performance
SE +/- 0.03, N = 3
155.78
30
60
90
120
150
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Etcpak 0.7
Configuration: ETC2
Mpx/s Per Watt, More Is Better
Linux 5.11 Git
1.19
Linux 5.11 Patched
1.21
CPUFreq Performance
1.22
0.2745
0.549
0.8235
1.098
1.3725


LeelaChessZero 0.26
Backend: BLAS
Nodes Per Second Per Watt, More Is Better
Linux 5.11 Git
9.69
Linux 5.11 Patched
9.72
CPUFreq Performance
9.72
3
6
9
12
15
LeelaChessZero 0.26
Backend: BLAS
Nodes Per Second, More Is Better
Linux 5.11 Git
SE +/- 50.84, N = 3
4106
Linux 5.11 Patched
SE +/- 49.90, N = 9
4061
CPUFreq Performance
SE +/- 17.79, N = 3
4147
900
1800
2700
3600
4500
1. (CXX) g++ options: -flto -pthread
LeelaChessZero 0.26
Backend: Eigen
Nodes Per Second, More Is Better
Linux 5.11 Git
SE +/- 49.20, N = 4
4284
Linux 5.11 Patched
SE +/- 36.23, N = 3
4433
CPUFreq Performance
SE +/- 26.71, N = 3
4450
1000
2000
3000
4000
5000
1. (CXX) g++ options: -flto -pthread

Stockfish 12

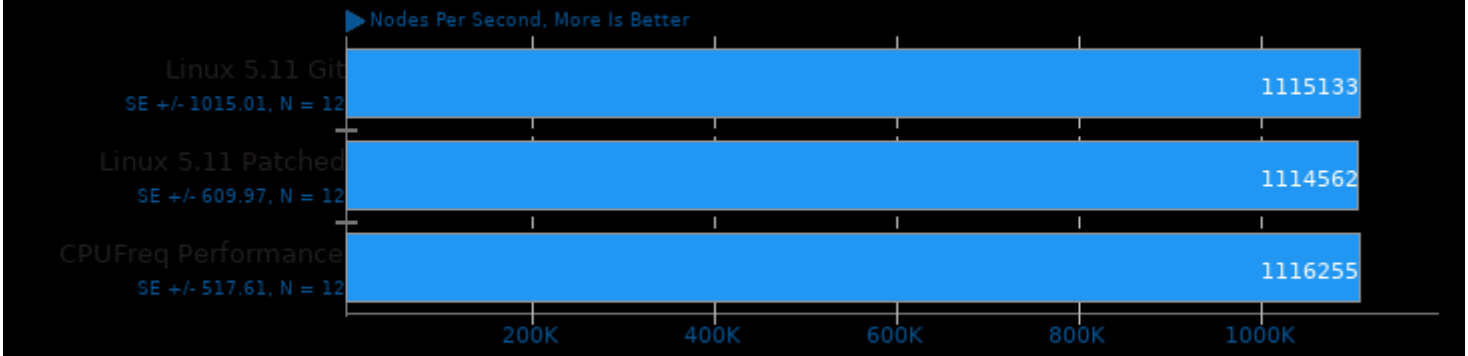
Total Time



1. (CXX) g++ options: -m64 -lpthread -fno-exceptions -std=c++17 -pedantic -O3 -msse -msse3 -mpopcnt -msse4.1 -mssse3 -msse2 -flto -flto=jobserver

TSCP 1.81

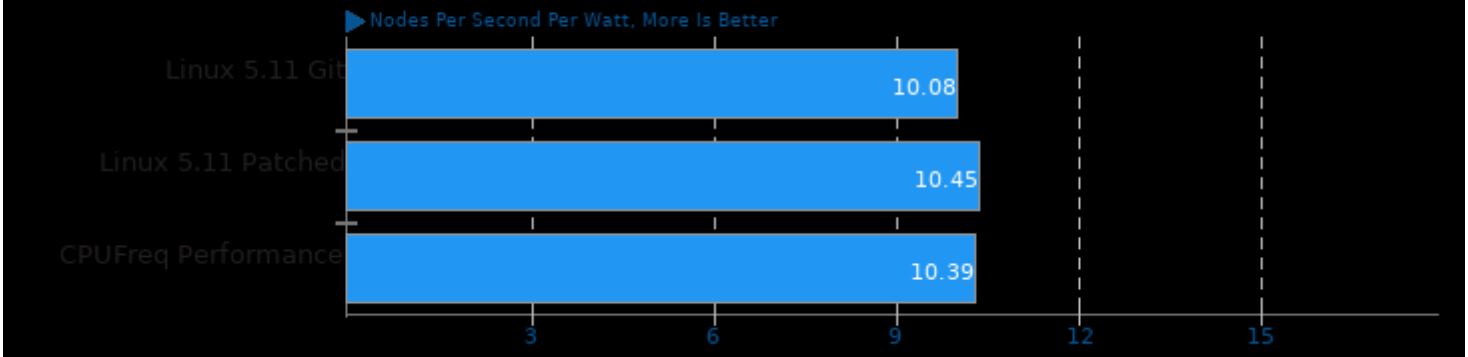
AI Chess Performance



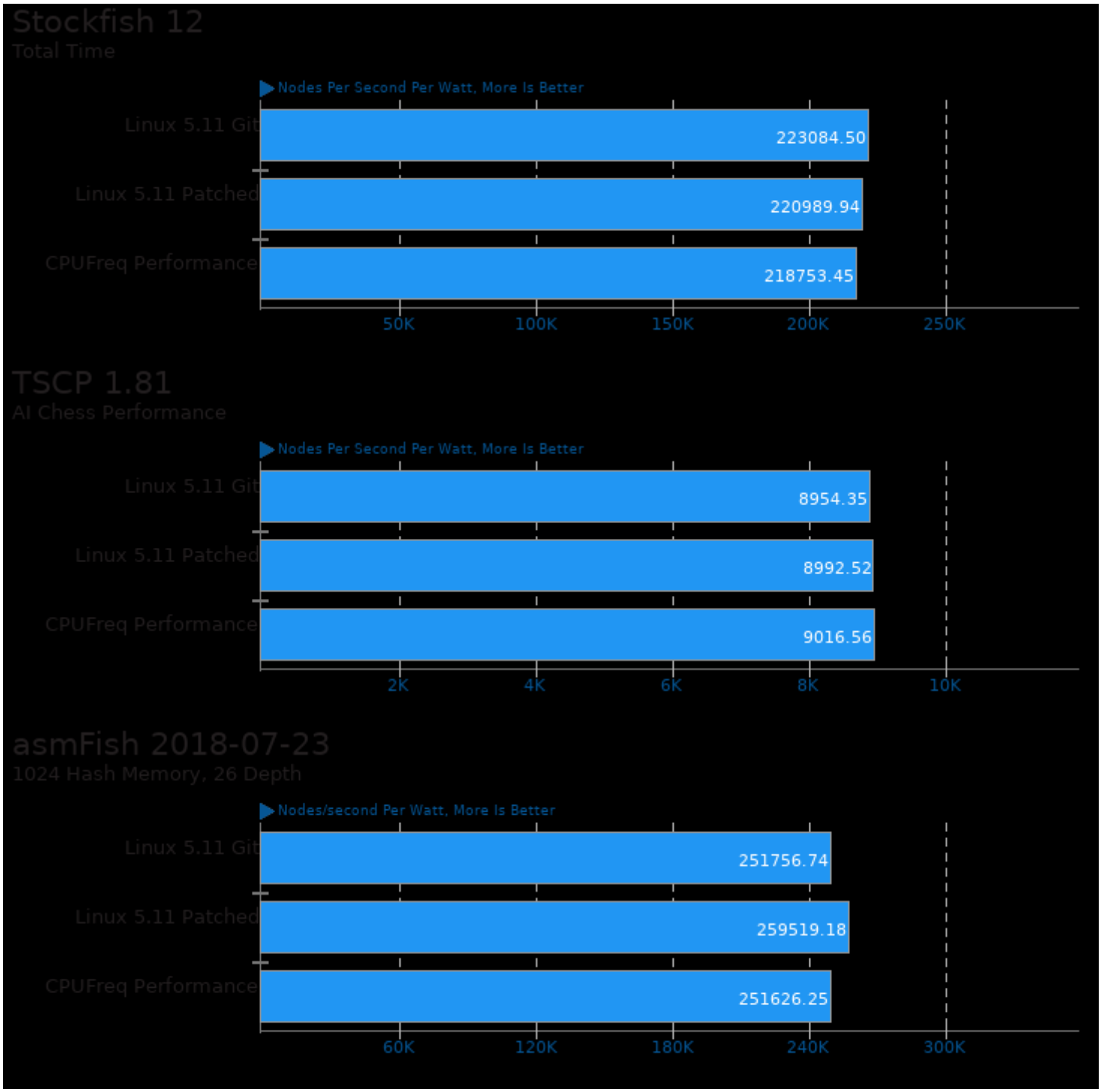
1. (CC) gcc options: -O3 -march=native

LeelaChessZero 0.26

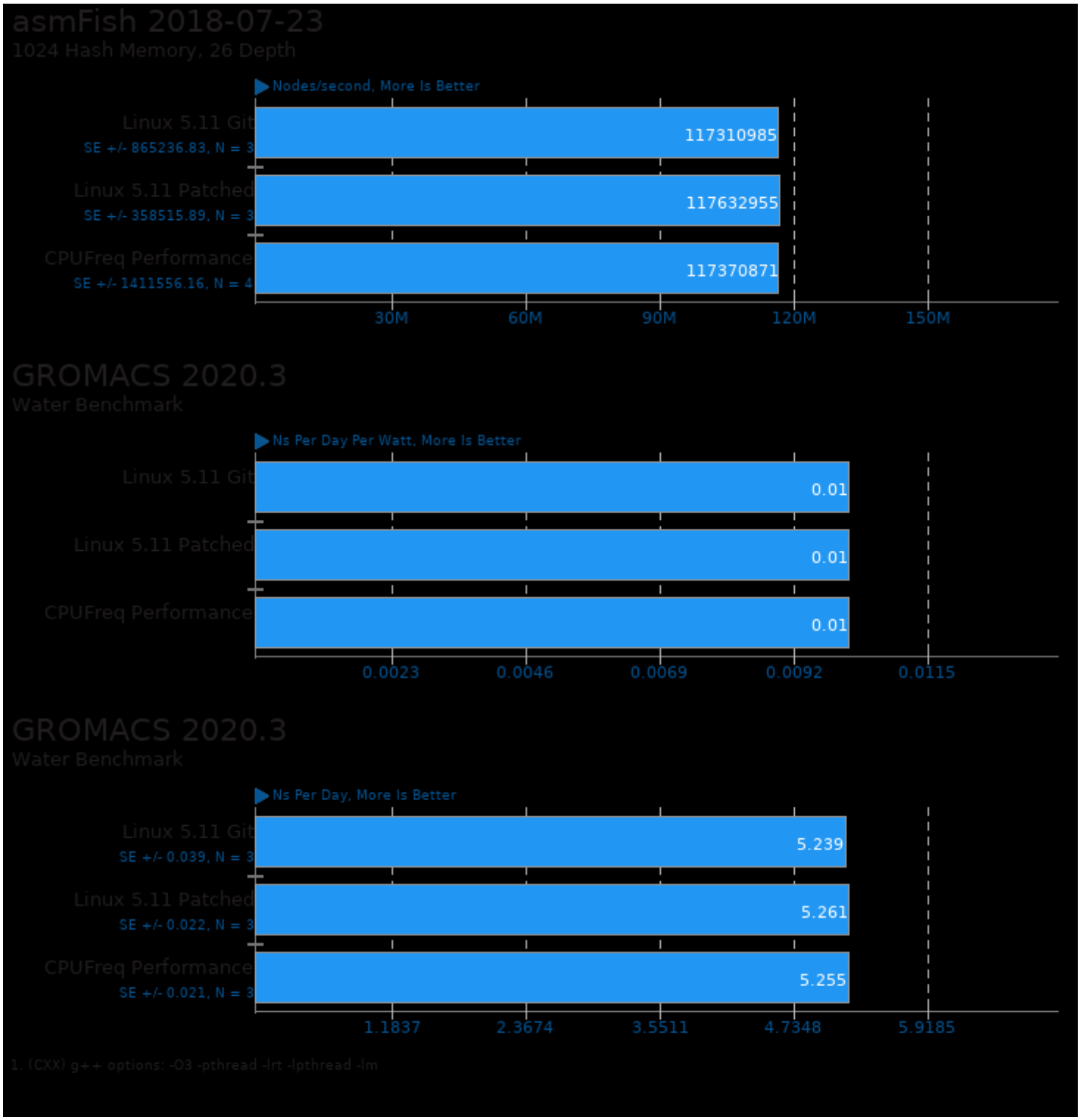
Backend: Eigen

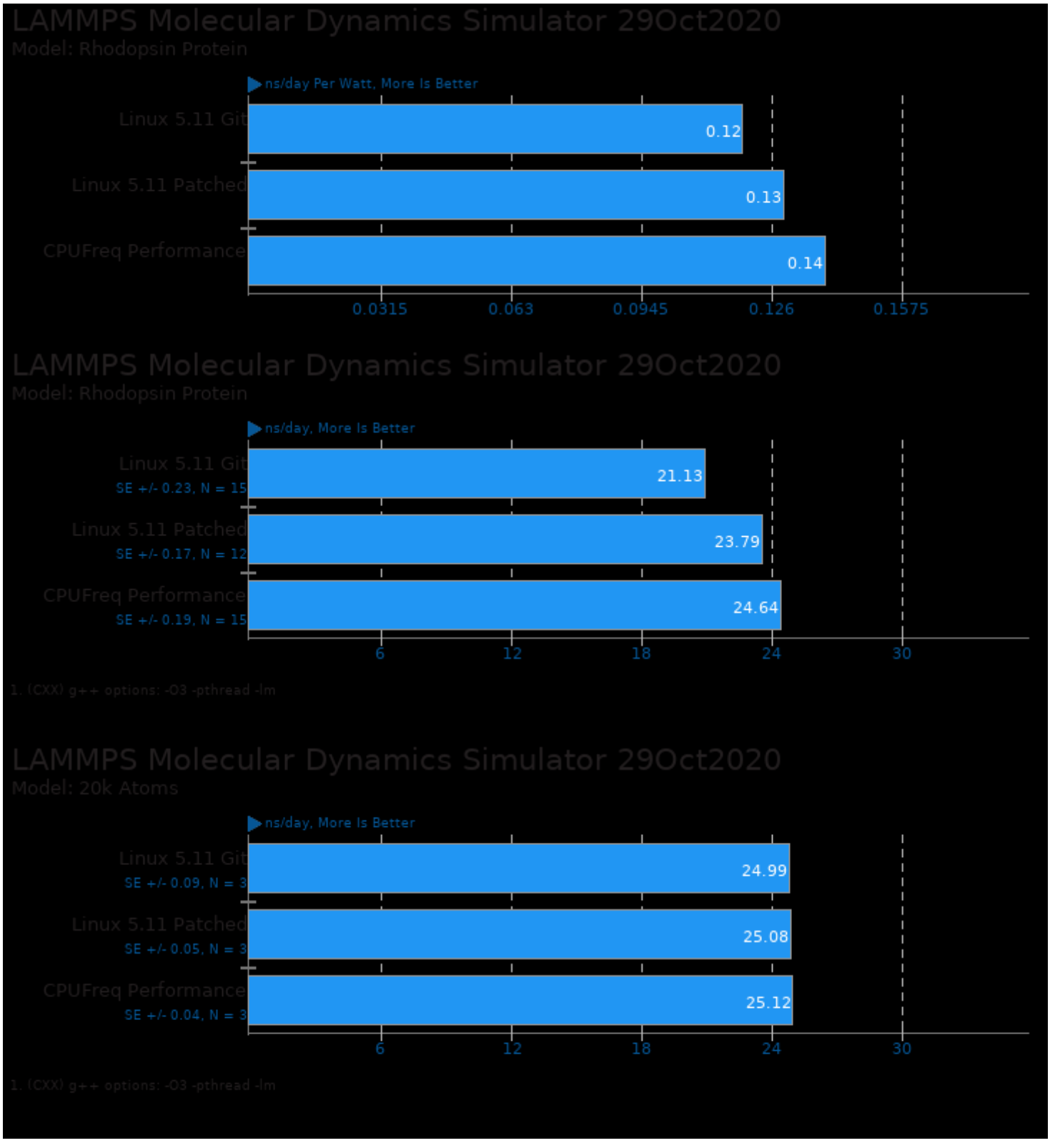


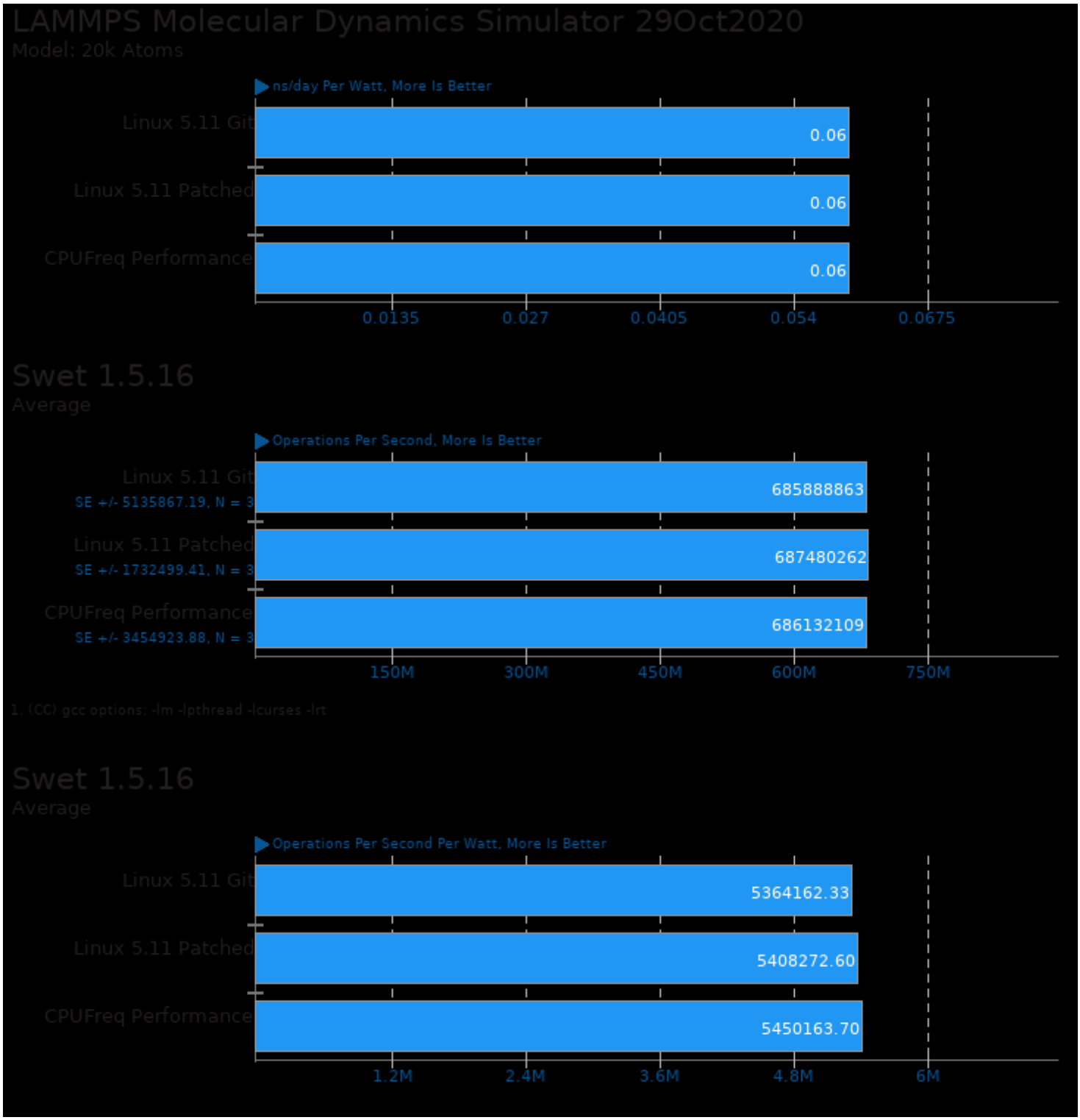
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

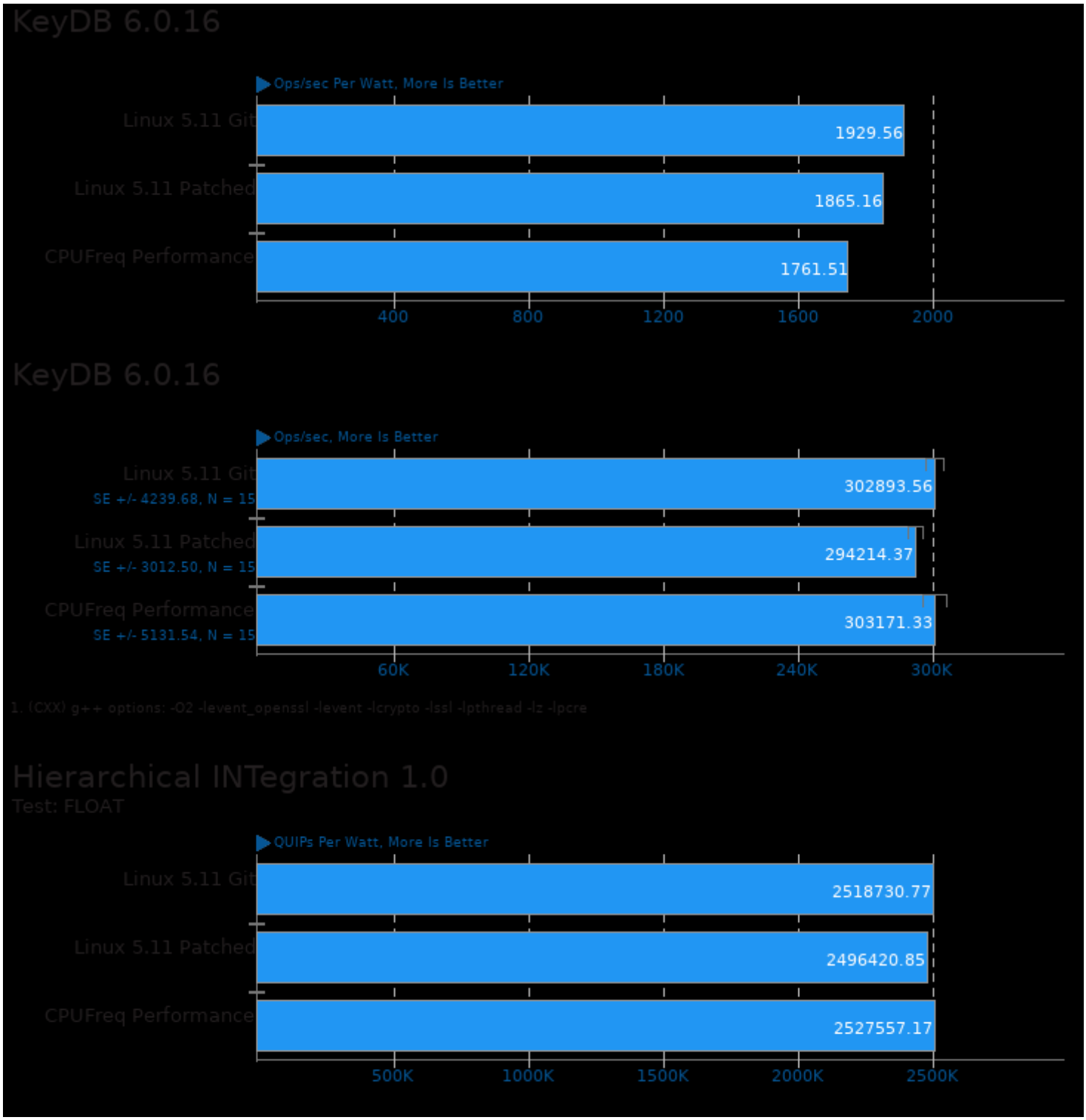


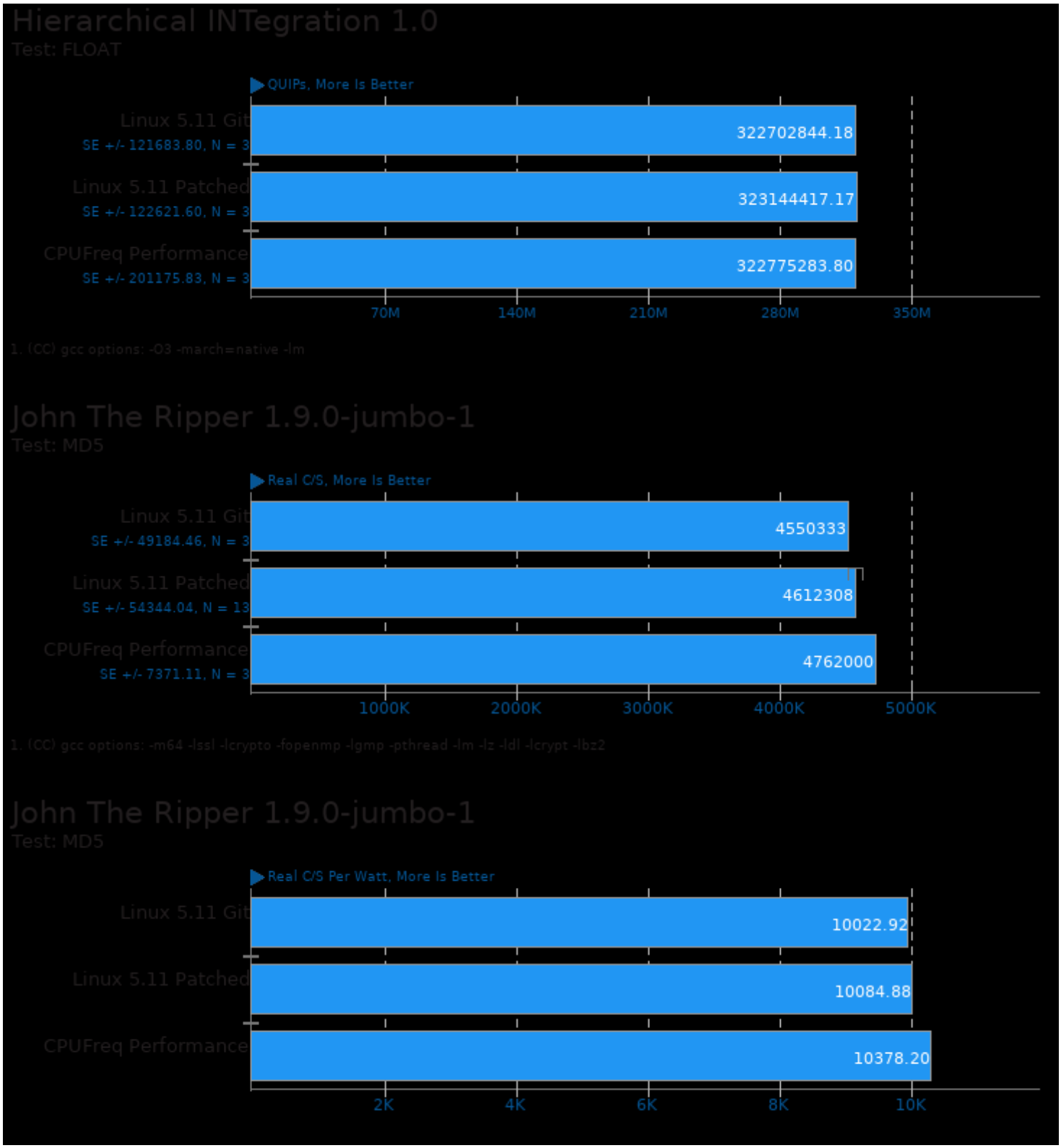
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

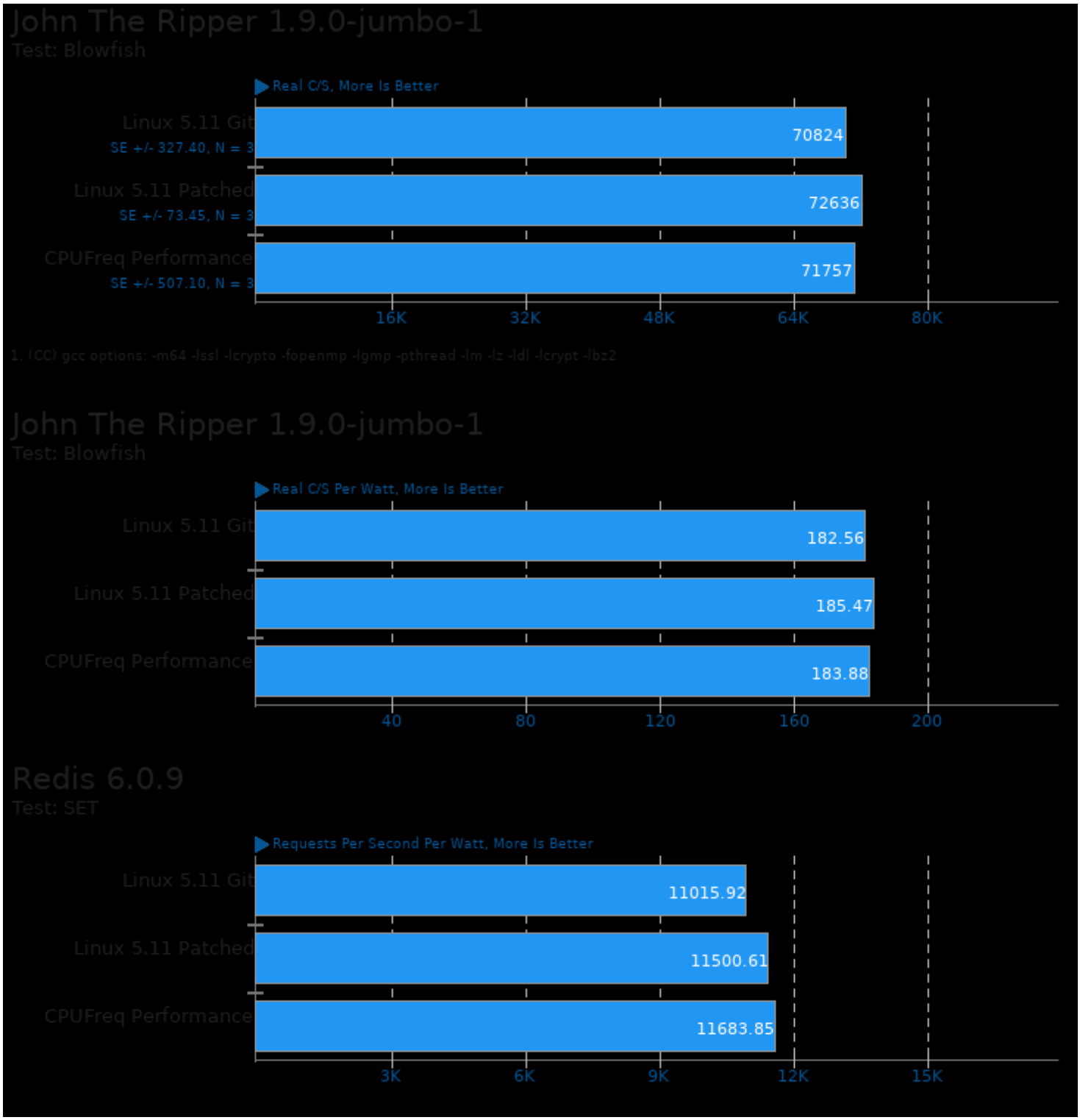


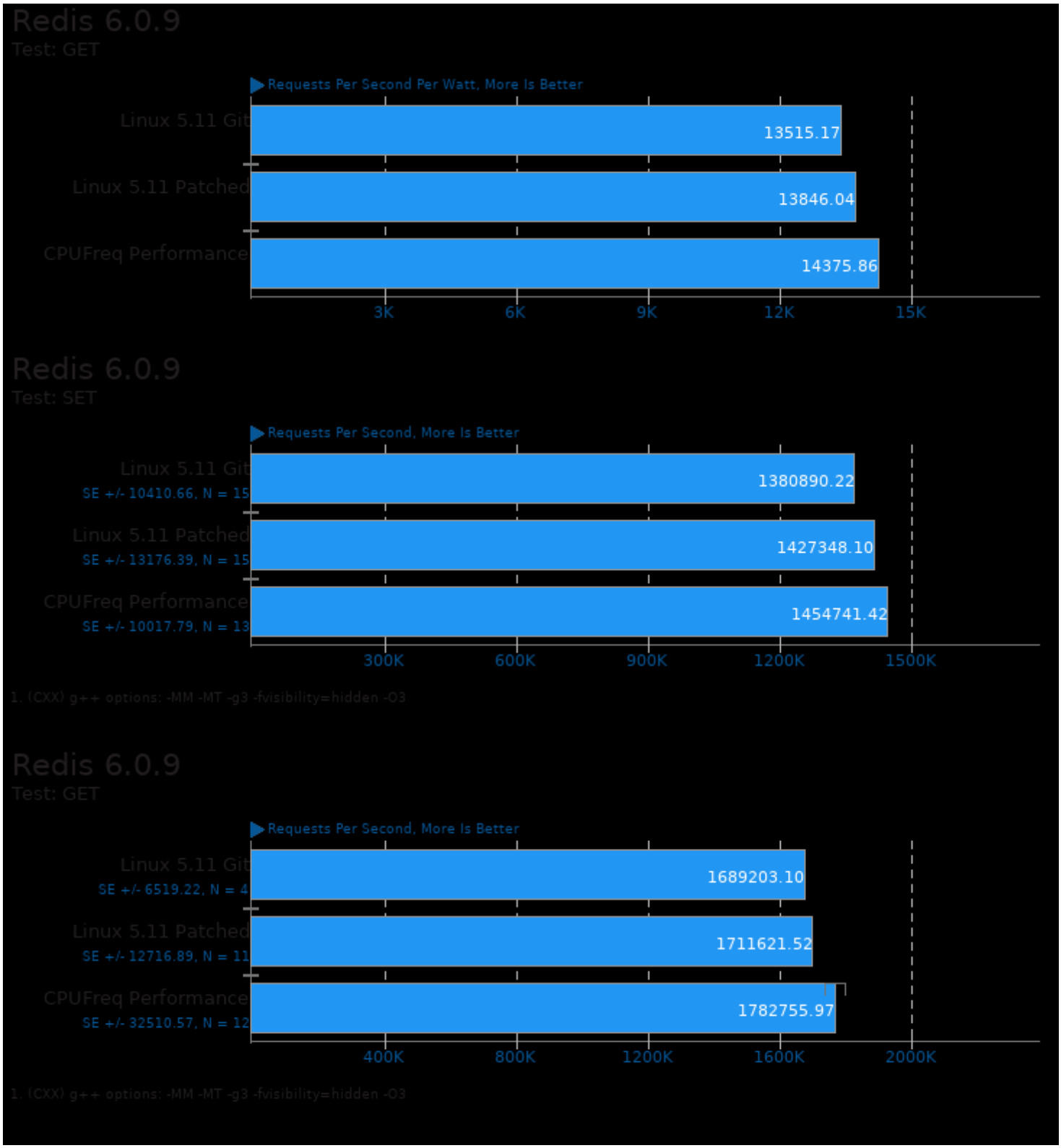

LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: Rhodopsin Protein
ns/day Per Watt, More Is Better
Linux 5.11 Git
0.12
Linux 5.11 Patched
0.13
CPUFreq Performance
0.14
0.0315
0.063
0.0945
0.126
0.1575
LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: Rhodopsin Protein
ns/day, More Is Better
Linux 5.11 Git
SE +/- 0.23, N = 15
21.13
Linux 5.11 Patched
SE +/- 0.17, N = 12
23.79
CPUFreq Performance
SE +/- 0.19, N = 15
24.64
6
12
18
24
30
1. (CXX) g++ options: -O3 -pthread -lm
LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: 20k Atoms
ns/day, More Is Better
Linux 5.11 Git
SE +/- 0.09, N = 3
24.99
Linux 5.11 Patched
SE +/- 0.05, N = 3
25.08
CPUFreq Performance
SE +/- 0.04, N = 3
25.12
6
12
18
24
30
1. (CXX) g++ options: -O3 -pthread -lm


LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: 20k Atoms
ns/day Per Watt, More Is Better
Linux 5.11 Git
0.06
Linux 5.11 Patched
0.06
CPUFreq Performance
0.06
0.0135
0.027
0.0405
0.054
0.0675
Swet 1.5.16
Average
Operations Per Second, More Is Better
Linux 5.11 Git
SE +/- 5135867.19, N = 3
685888863
Linux 5.11 Patched
SE +/- 1732499.41, N = 3
687480262
CPUFreq Performance
SE +/- 3454923.88, N = 3
686132109
150M
300M
450M
600M
750M
1. (CC) gcc options: -lm -lpthread -lcurses -lrt
Swet 1.5.16
Average
Operations Per Second Per Watt, More Is Better
Linux 5.11 Git
5364162.33
Linux 5.11 Patched
5408272.60
CPUFreq Performance
5450163.70
1.2M
2.4M
3.6M
4.8M
6M

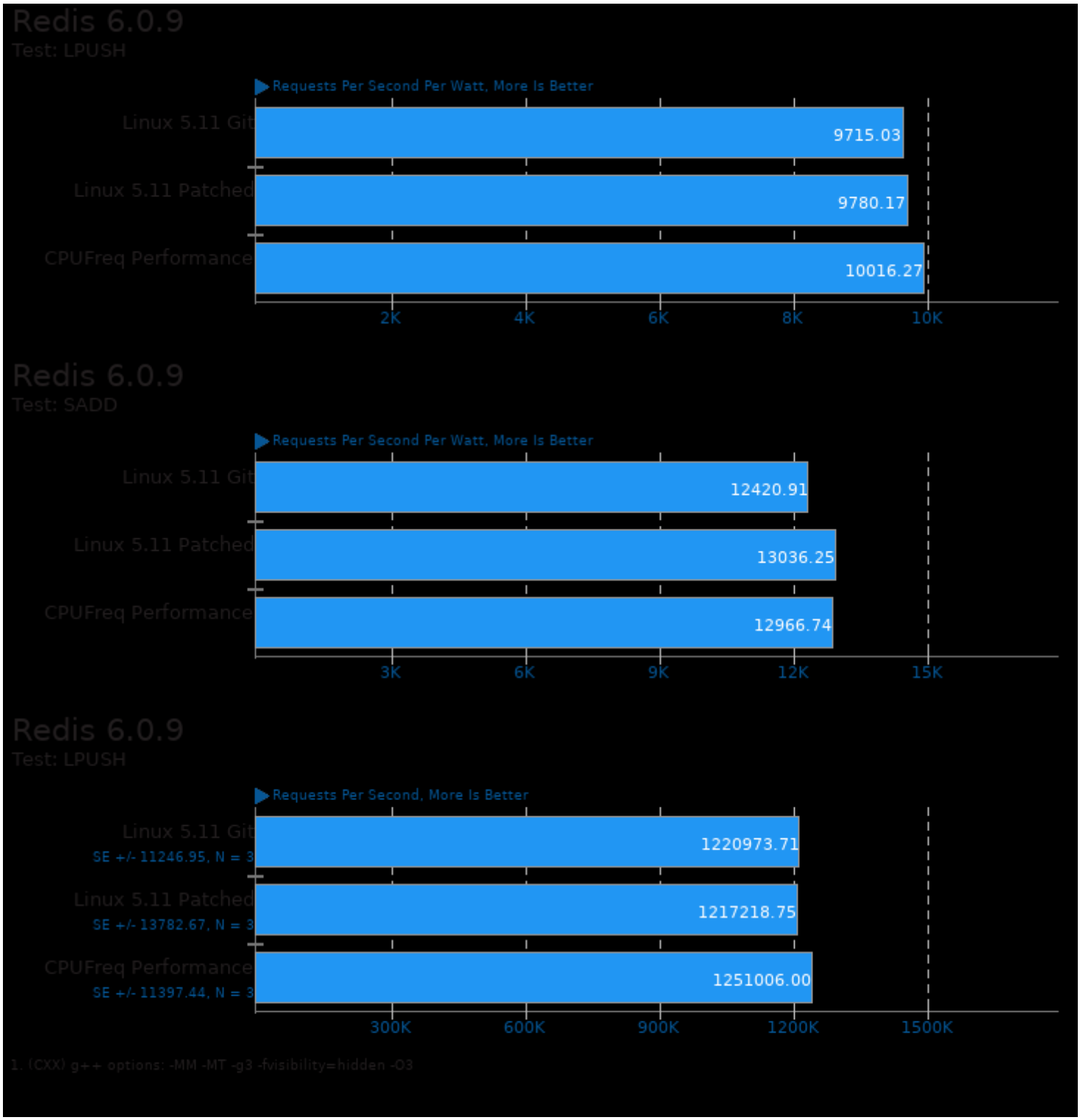

KeyDB 6.0.16
Ops/sec Per Watt, More Is Better
Linux 5.11 Git
1929.56
Linux 5.11 Patched
1865.16
CPUFreq Performance
1761.51
400
800
1200
1600
2000
KeyDB 6.0.16
Ops/sec, More Is Better
Linux 5.11 Git
SE +/- 4239.68, N = 15
302893.56
Linux 5.11 Patched
SE +/- 3012.50, N = 15
294214.37
CPUFreq Performance
SE +/- 5131.54, N = 15
303171.33
60K
120K
180K
240K
300K
1. (CXX) g++ options: -O2 -levent_openssl -levent -lcrypto -lssl -lpthread -lz -lpcre
Hierarchical INTegration 1.0
Test: FLOAT
QUIPs Per Watt, More Is Better
Linux 5.11 Git
2518730.77
Linux 5.11 Patched
2496420.85
CPUFreq Performance
2527557.17
500K
1000K
1500K
2000K
2500K


Hierarchical INTegration 1.0
Test: FLOAT
QUIPs, More Is Better
Linux 5.11 Git
SE +/- 121683.80, N = 3
322702844.18
Linux 5.11 Patched
SE +/- 122621.60, N = 3
323144417.17
CPUFreq Performance
SE +/- 201175.83, N = 3
322775283.80
70M
140M
210M
280M
350M
1. (CC) gcc options: -O3 -march=native -lm
John The Ripper 1.9.0-jumbo-1
Test: MD5
Real C/S, More Is Better
Linux 5.11 Git
SE +/- 49184.46, N = 3
4550333
Linux 5.11 Patched
SE +/- 54344.04, N = 13
4612308
CPUFreq Performance
SE +/- 7371.11, N = 3
4762000
1000K
2000K
3000K
4000K
5000K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2
John The Ripper 1.9.0-jumbo-1
Test: MD5
Real C/S Per Watt, More Is Better
Linux 5.11 Git
10022.92
Linux 5.11 Patched
10084.88
CPUFreq Performance
10378.20
2K
4K
6K
8K
10K


John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
Linux 5.11 Git
SE +/- 327.40, N = 3
70824
Linux 5.11 Patched
SE +/- 73.45, N = 3
72636
CPUFreq Performance
SE +/- 507.10, N = 3
71757
16K
32K
48K
64K
80K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2
John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S Per Watt, More Is Better
Linux 5.11 Git
182.56
Linux 5.11 Patched
185.47
CPUFreq Performance
183.88
40
80
120
160
200
Redis 6.0.9
Test: SET
Requests Per Second Per Watt, More Is Better
Linux 5.11 Git
11015.92
Linux 5.11 Patched
11500.61
CPUFreq Performance
11683.85
3K
6K
9K
12K
15K

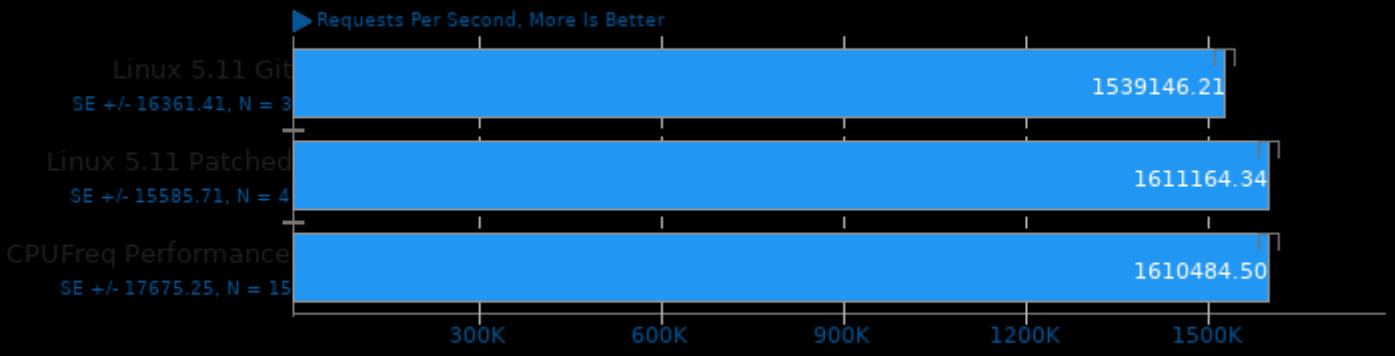

Redis 6.0.9
Test: GET
Requests Per Second Per Watt, More Is Better
Linux 5.11 Git
13515.17
Linux 5.11 Patched
13846.04
CPUFreq Performance
14375.86
3K
6K
9K
12K
15K
Redis 6.0.9
Test: SET
Requests Per Second, More Is Better
Linux 5.11 Git
SE +/- 10410.66, N = 15
1380890.22
Linux 5.11 Patched
SE +/- 13176.39, N = 15
1427348.10
CPUFreq Performance
SE +/- 10017.79, N = 13
1454741.42
300K
600K
900K
1200K
1500K
1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3
Redis 6.0.9
Test: GET
Requests Per Second, More Is Better
Linux 5.11 Git
SE +/- 6519.22, N = 4
1689203.10
Linux 5.11 Patched
SE +/- 12716.89, N = 11
1711621.52
CPUFreq Performance
SE +/- 32510.57, N = 12
1782755.97
400K
800K
1200K
1600K
2000K
1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

AMD EPYC 7F72 2P Linux 5.11 Perf Governor



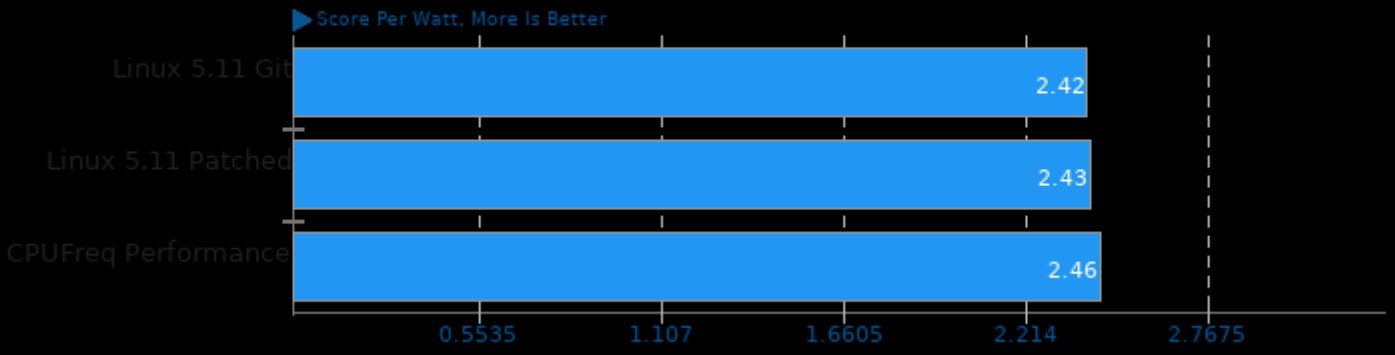
Redis 6.0.9

Test: SADD



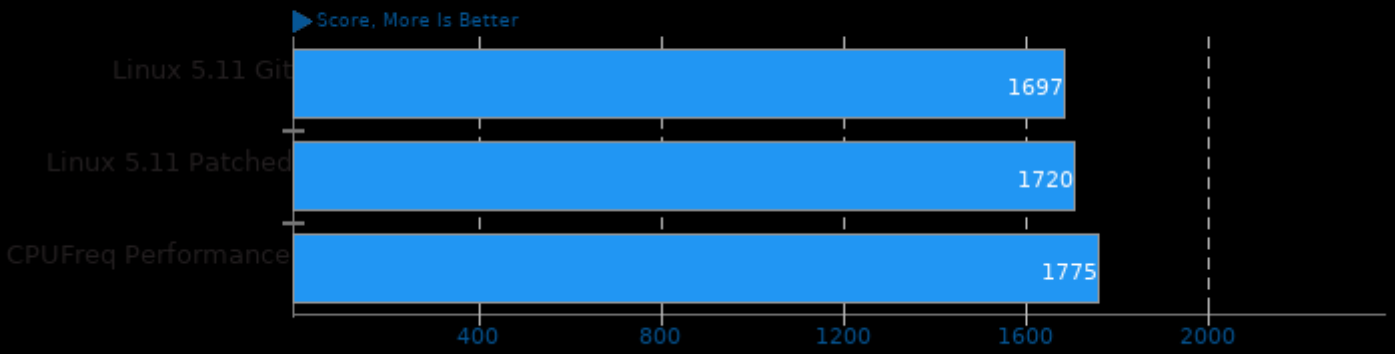
1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

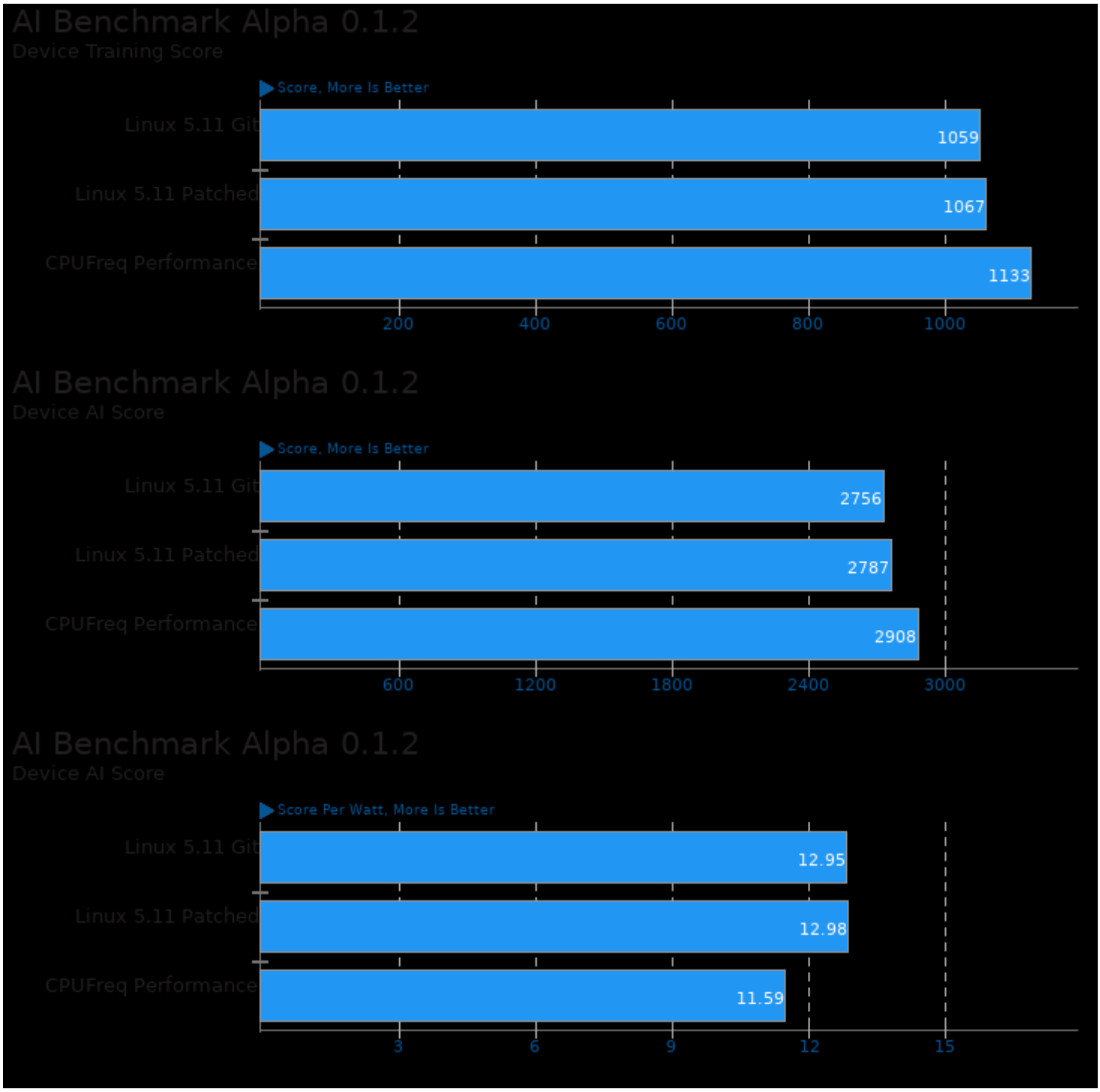
Numpy Benchmark

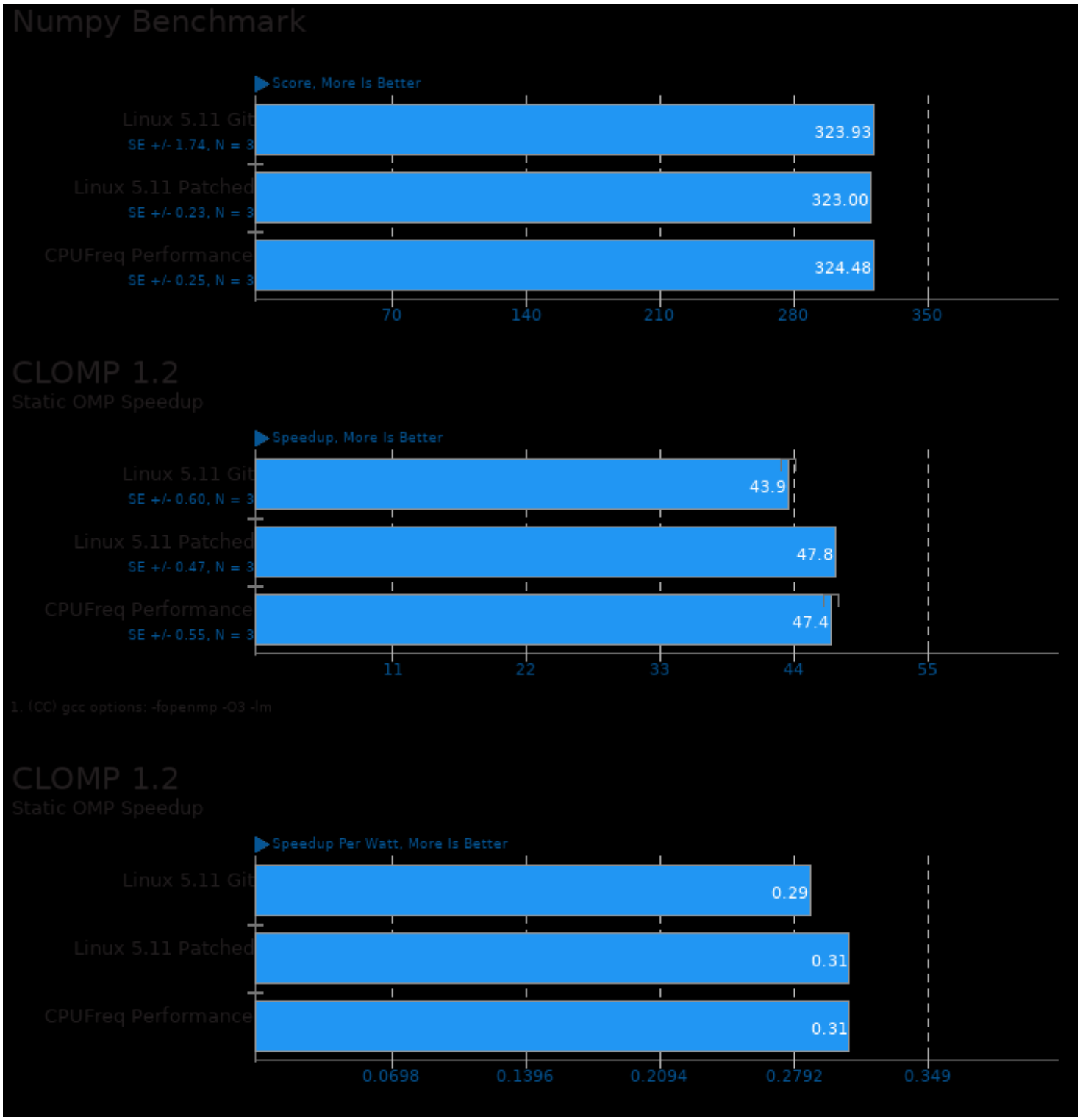


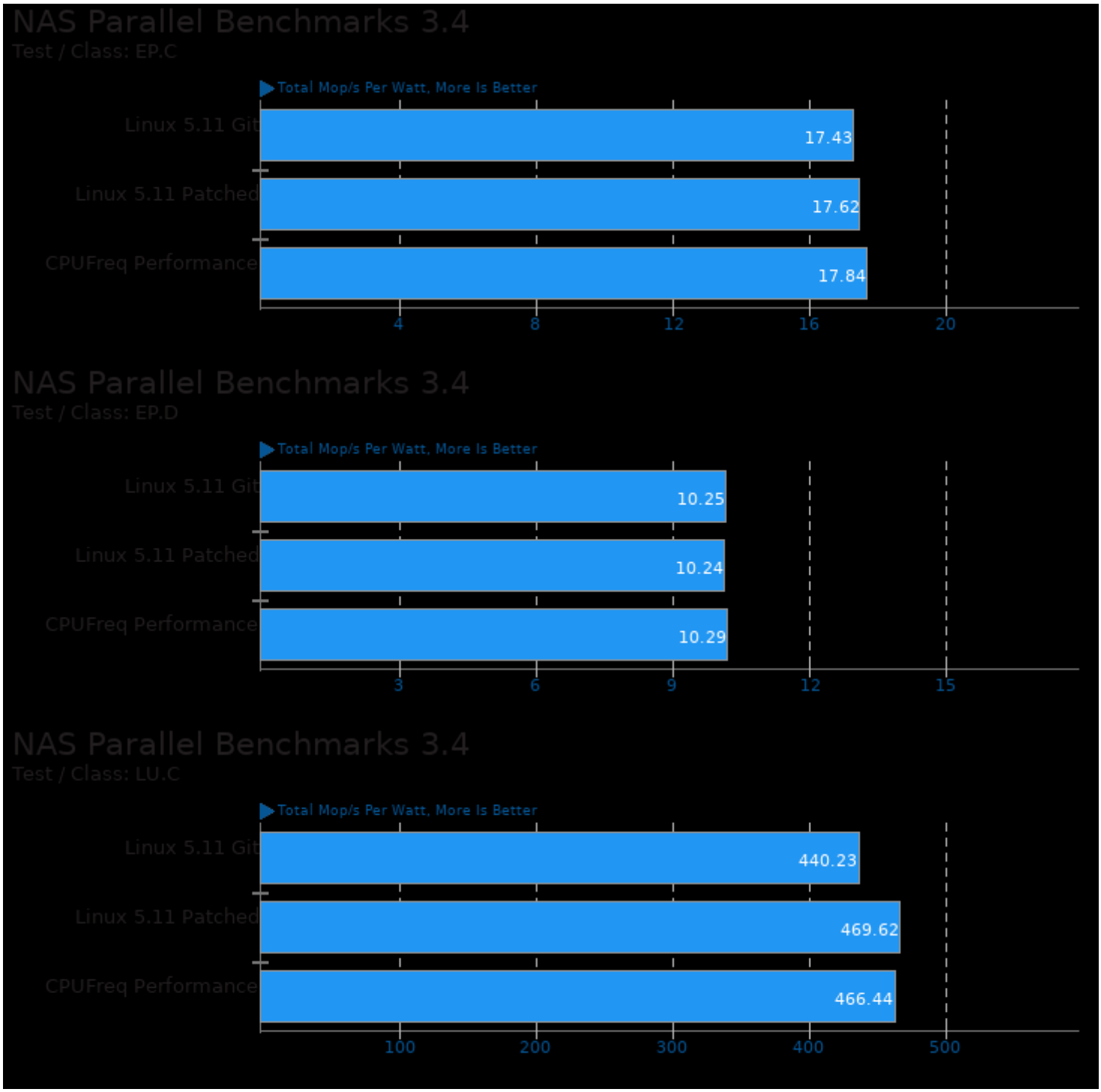
AI Benchmark Alpha 0.1.2

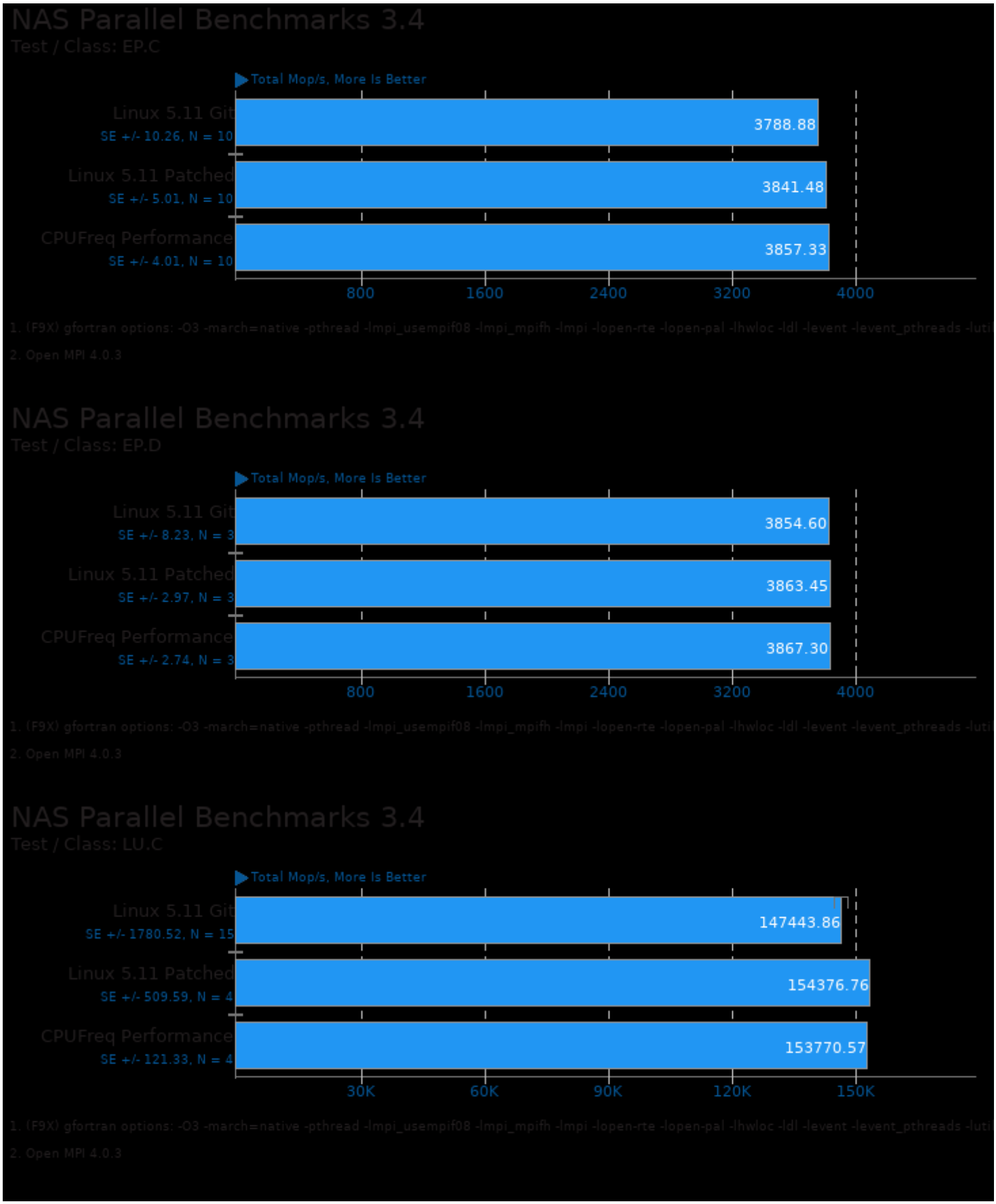
Device Inference Score

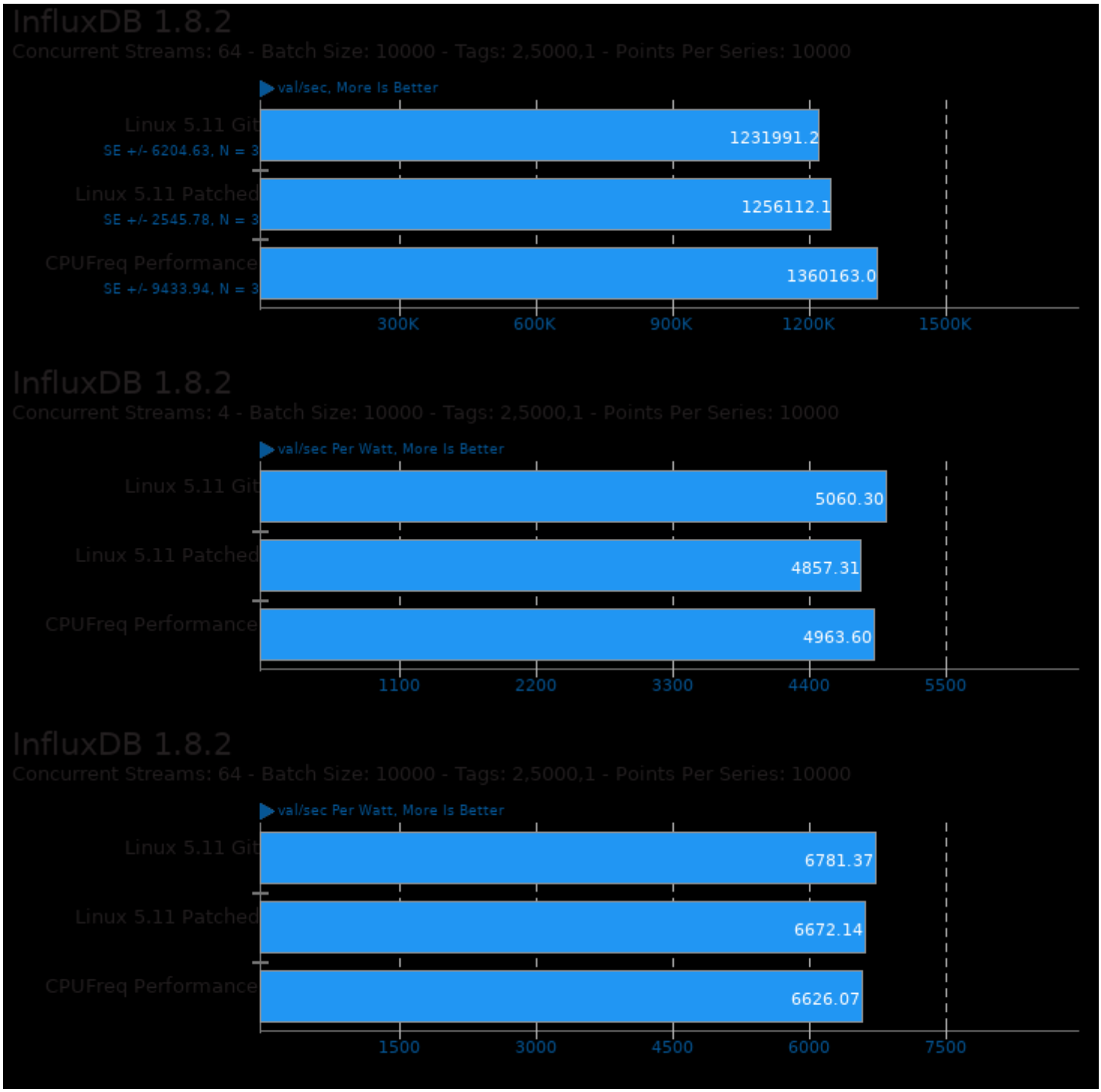


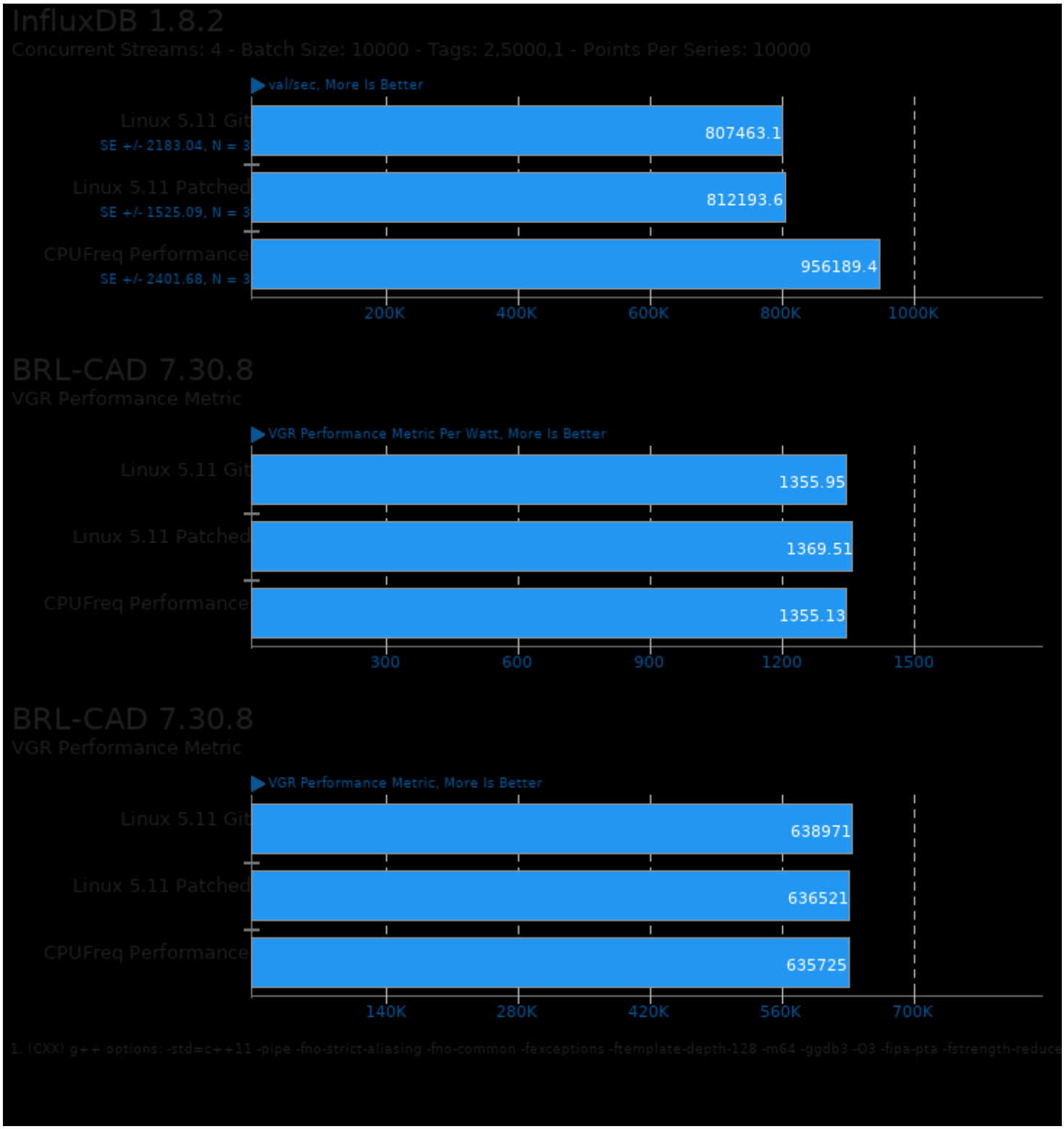

AI Benchmark Alpha 0.1.2
Device Training Score
Score, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
1059
1067
1133
200
400
600
800
1000
AI Benchmark Alpha 0.1.2
Device AI Score
Score, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
2756
2787
2908
600
1200
1800
2400
3000
AI Benchmark Alpha 0.1.2
Device AI Score
Score Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
12.95
12.98
11.59
3
6
9
12
15

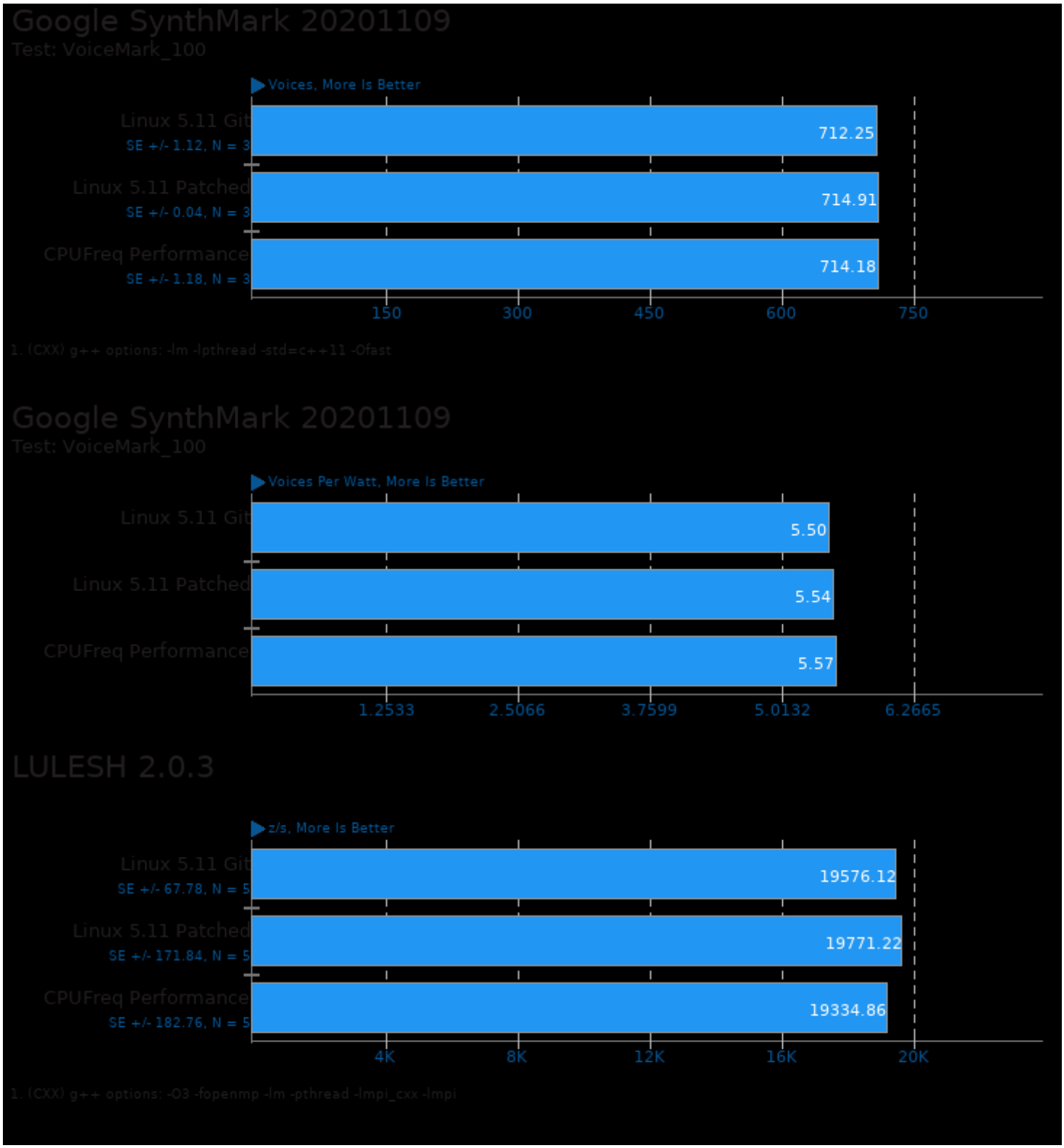

Numpy Benchmark
Score, More Is Better
Linux 5.11 Git
SE +/- 1.74, N = 3
323.93
Linux 5.11 Patched
SE +/- 0.23, N = 3
323.00
CPUFreq Performance
SE +/- 0.25, N = 3
324.48
70
140
210
280
350
CLOMP 1.2
Static OMP Speedup
Speedup, More Is Better
Linux 5.11 Git
SE +/- 0.60, N = 3
43.9
Linux 5.11 Patched
SE +/- 0.47, N = 3
47.8
CPUFreq Performance
SE +/- 0.55, N = 3
47.4
11
22
33
44
55
1. (CC) gcc options: -fopenmp -O3 -lm
CLOMP 1.2
Static OMP Speedup
Speedup Per Watt, More Is Better
Linux 5.11 Git
0.29
Linux 5.11 Patched
0.31
CPUFreq Performance
0.31
0.0698
0.1396
0.2094
0.2792
0.349


NAS Parallel Benchmarks 3.4
Test / Class: EP.C
Total Mop/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
17.43
17.62
17.84
4
8
12
16
20
NAS Parallel Benchmarks 3.4
Test / Class: EP.D
Total Mop/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
10.25
10.24
10.29
3
6
9
12
15
NAS Parallel Benchmarks 3.4
Test / Class: LU.C
Total Mop/s Per Watt, More Is Better
Linux 5.11 Git
Linux 5.11 Patched
CPUFreq Performance
440.23
469.62
466.44
100
200
300
400
500

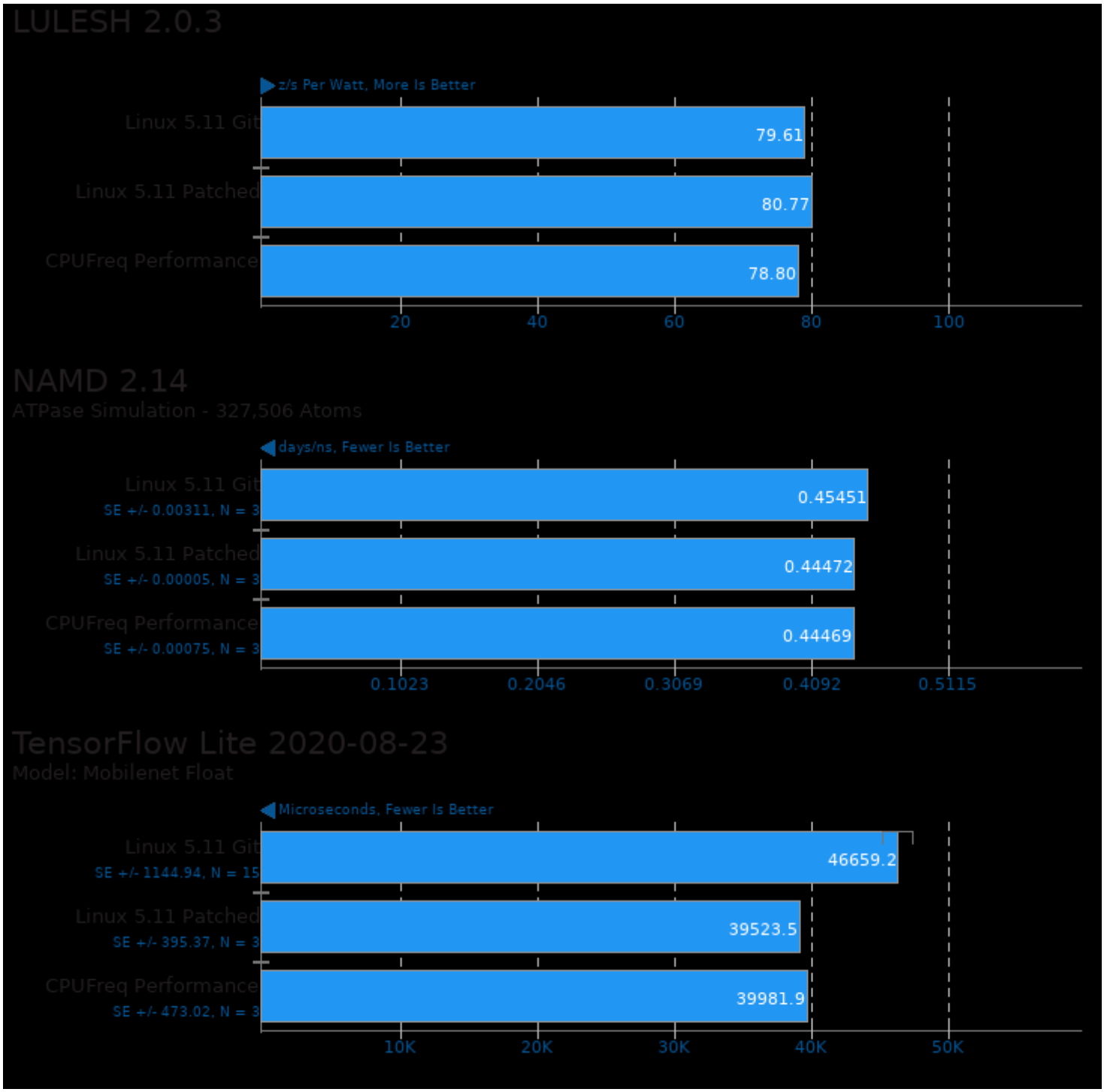

NAS Parallel Benchmarks 3.4
Test / Class: EP.C
Total Mop/s, More Is Better
Linux 5.11 Git
SE +/- 10.26, N = 10
3788.88
Linux 5.11 Patched
SE +/- 5.01, N = 10
3841.48
CPUFreq Performance
SE +/- 4.01, N = 10
3857.33
800
1600
2400
3200
4000
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -ldl -levent -levent_pthreads -luti
2. Open MPI 4.0.3
NAS Parallel Benchmarks 3.4
Test / Class: EP.D
Total Mop/s, More Is Better
Linux 5.11 Git
SE +/- 8.23, N = 3
3854.60
Linux 5.11 Patched
SE +/- 2.97, N = 3
3863.45
CPUFreq Performance
SE +/- 2.74, N = 3
3867.30
800
1600
2400
3200
4000
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -ldl -levent -levent_pthreads -luti
2. Open MPI 4.0.3
NAS Parallel Benchmarks 3.4
Test / Class: LU.C
Total Mop/s, More Is Better
Linux 5.11 Git
SE +/- 1780.52, N = 15
147443.86
Linux 5.11 Patched
SE +/- 509.59, N = 4
154376.76
CPUFreq Performance
SE +/- 121.33, N = 4
153770.57
30K
60K
90K
120K
150K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -ldl -levent -levent_pthreads -luti
2. Open MPI 4.0.3

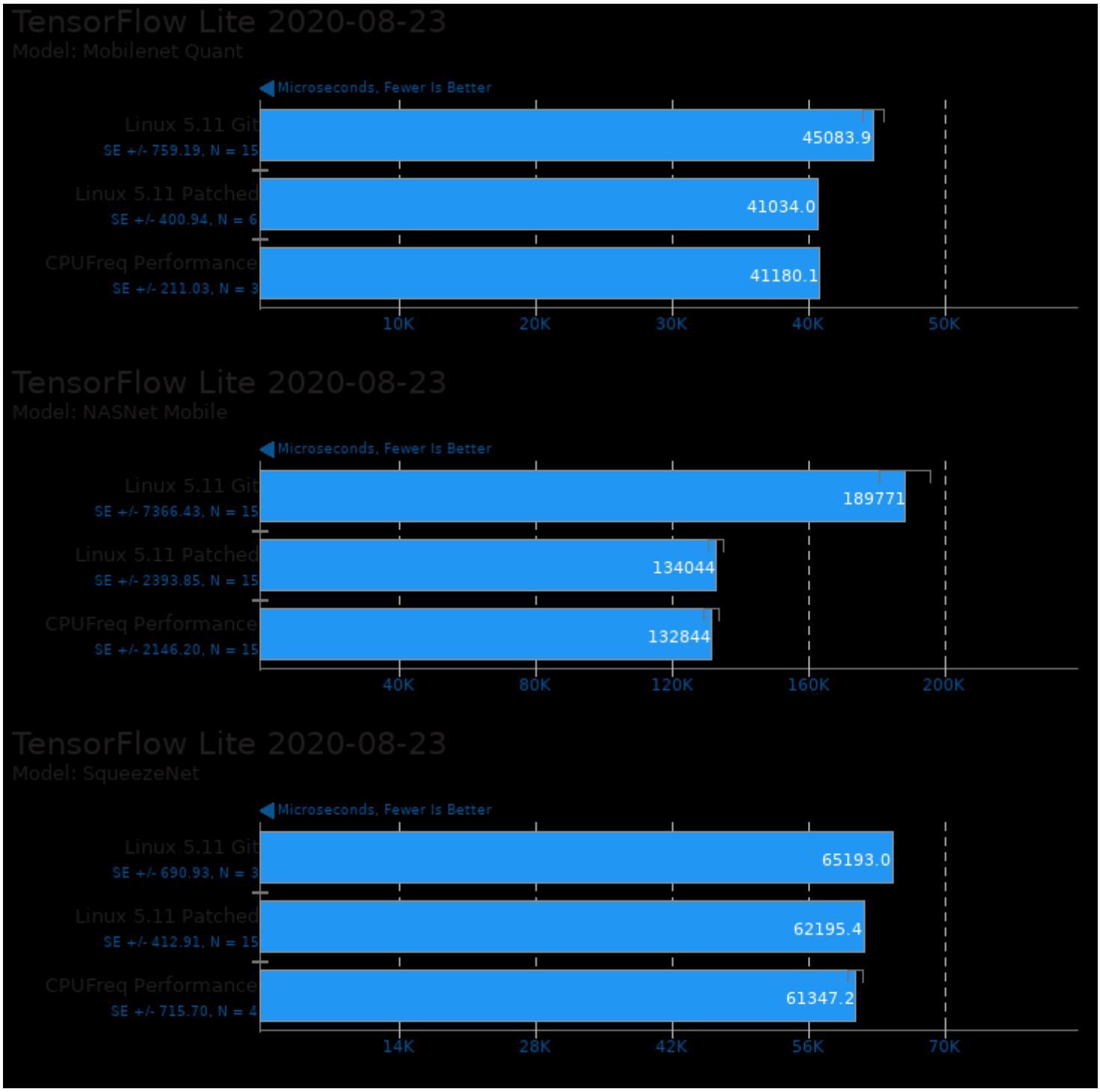

InfluxDB 1.8.2
Concurrent Streams: 64 - Batch Size: 10000 - Tags: 2,5000,1 - Points Per Series: 10000
val/sec, More Is Better
Linux 5.11 Git
SE +/- 6204.63, N = 3
1231991.2
Linux 5.11 Patched
SE +/- 2545.78, N = 3
1256112.1
CPUFreq Performance
SE +/- 9433.94, N = 3
1360163.0
300K
600K
900K
1200K
1500K
InfluxDB 1.8.2
Concurrent Streams: 4 - Batch Size: 10000 - Tags: 2,5000,1 - Points Per Series: 10000
val/sec Per Watt, More Is Better
Linux 5.11 Git
5060.30
Linux 5.11 Patched
4857.31
CPUFreq Performance
4963.60
1100
2200
3300
4400
5500
InfluxDB 1.8.2
Concurrent Streams: 64 - Batch Size: 10000 - Tags: 2,5000,1 - Points Per Series: 10000
val/sec Per Watt, More Is Better
Linux 5.11 Git
6781.37
Linux 5.11 Patched
6672.14
CPUFreq Performance
6626.07
1500
3000
4500
6000
7500

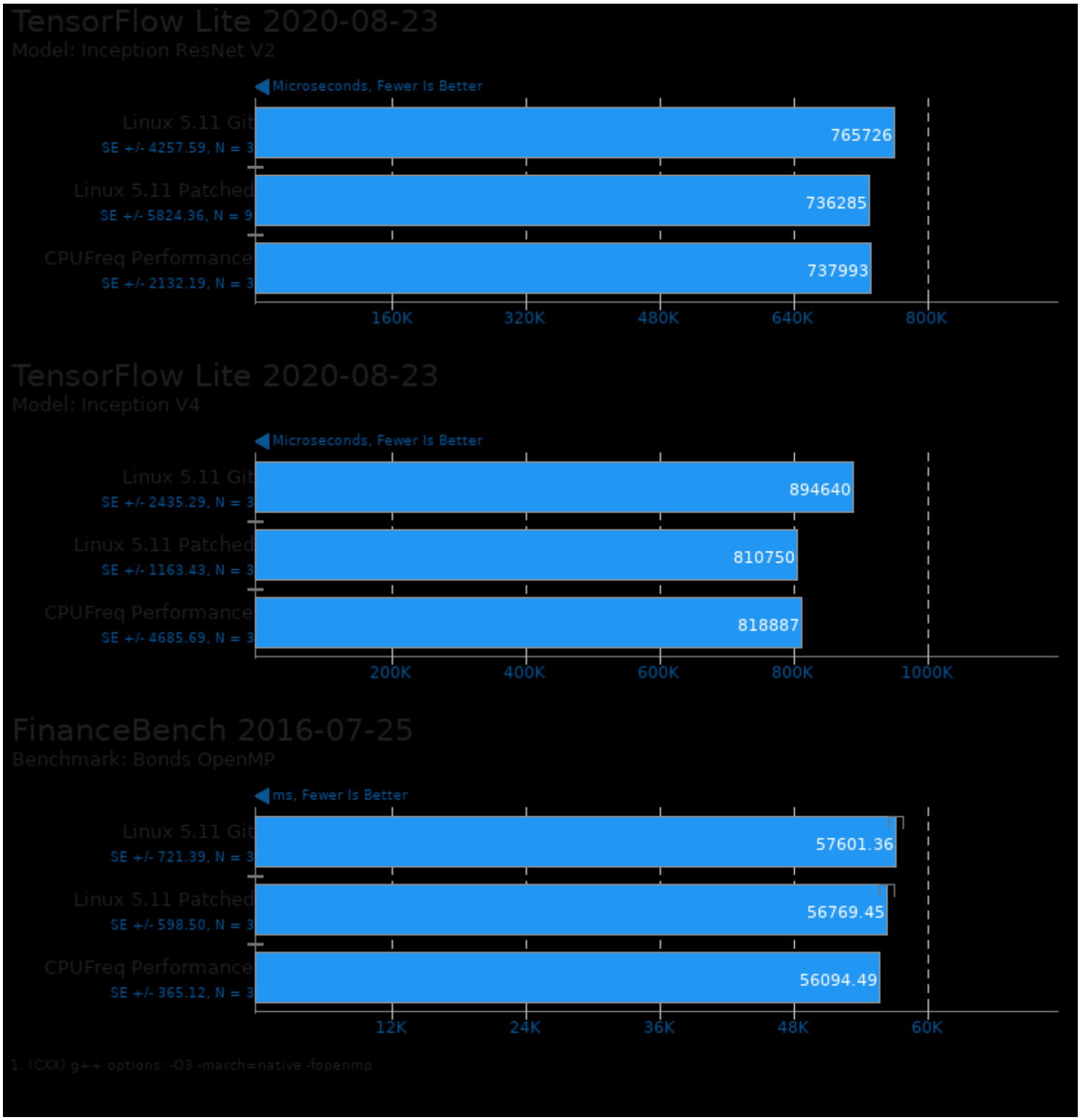

InfluxDB 1.8.2
Concurrent Streams: 4 - Batch Size: 10000 - Tags: 2,5000,1 - Points Per Series: 10000
val/sec, More Is Better
Linux 5.11 Git
SE +/- 2183.04, N = 3
807463.1
Linux 5.11 Patched
SE +/- 1525.09, N = 3
812193.6
CPUFreq Performance
SE +/- 2401.68, N = 3
956189.4
200K
400K
600K
800K
1000K
BRL-CAD 7.30.8
VGR Performance Metric
VGR Performance Metric Per Watt, More Is Better
Linux 5.11 Git
1355.95
Linux 5.11 Patched
1369.51
CPUFreq Performance
1355.13
300
600
900
1200
1500
BRL-CAD 7.30.8
VGR Performance Metric
VGR Performance Metric, More Is Better
Linux 5.11 Git
638971
Linux 5.11 Patched
636521
CPUFreq Performance
635725
140K
280K
420K
560K
700K
1. (CXX) g++ options: -std=c++11 -pipe -fno-strict-aliasing -fno-common -fexceptions -ftemplate-depth-128 -m64 -ggdb3 -O3 -fipa-pta -fstrength-reduce

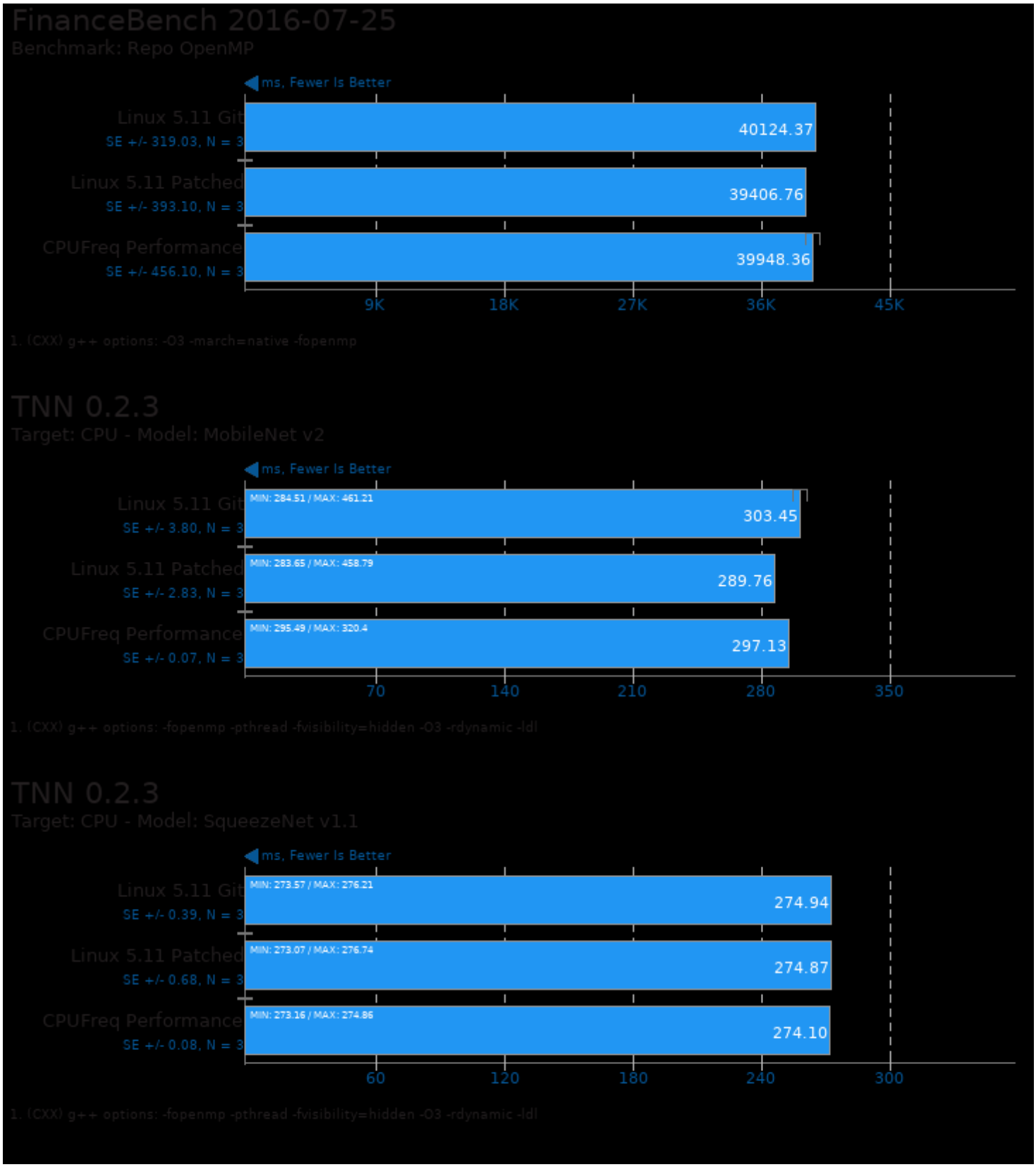

Google SynthMark 20201109
Test: VoiceMark_100
Voices, More Is Better
Linux 5.11 Git
SE +/- 1.12, N = 3
712.25
Linux 5.11 Patched
SE +/- 0.04, N = 3
714.91
CPUFreq Performance
SE +/- 1.18, N = 3
714.18
150
300
450
600
750
1. (CXX) g++ options: -lm -lpthread -std=c++11 -Ofast
Google SynthMark 20201109
Test: VoiceMark_100
Voices Per Watt, More Is Better
Linux 5.11 Git
5.50
Linux 5.11 Patched
5.54
CPUFreq Performance
5.57
1.2533
2.5066
3.7599
5.0132
6.2665
LULESH 2.0.3
z/s, More Is Better
Linux 5.11 Git
SE +/- 67.78, N = 5
19576.12
Linux 5.11 Patched
SE +/- 171.84, N = 5
19771.22
CPUFreq Performance
SE +/- 182.76, N = 5
19334.86
4K
8K
12K
16K
20K
1. (CXX) g++ options: -O3 -fopenmp -lm -pthread -lmpi_cxx -lmpi

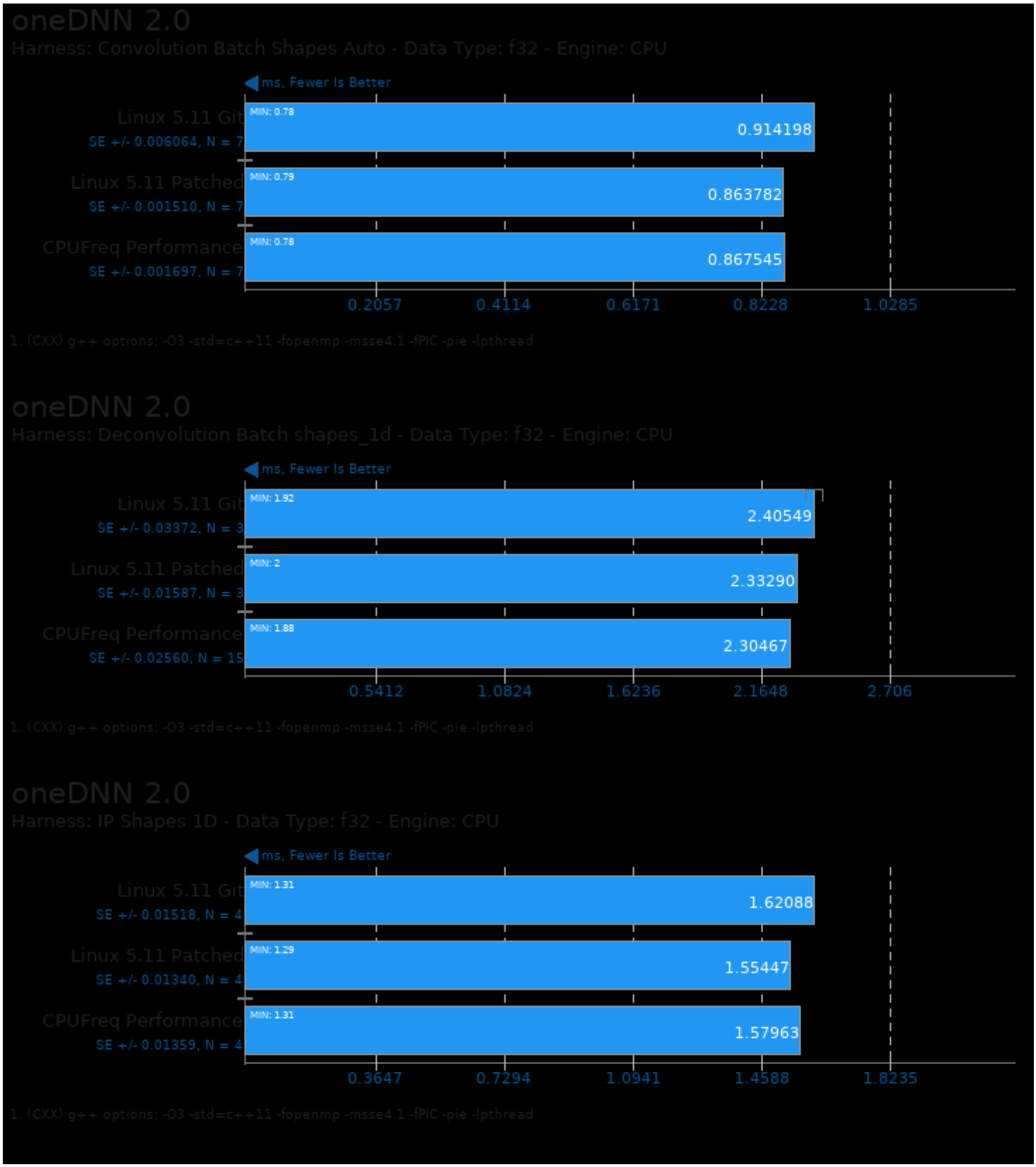
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

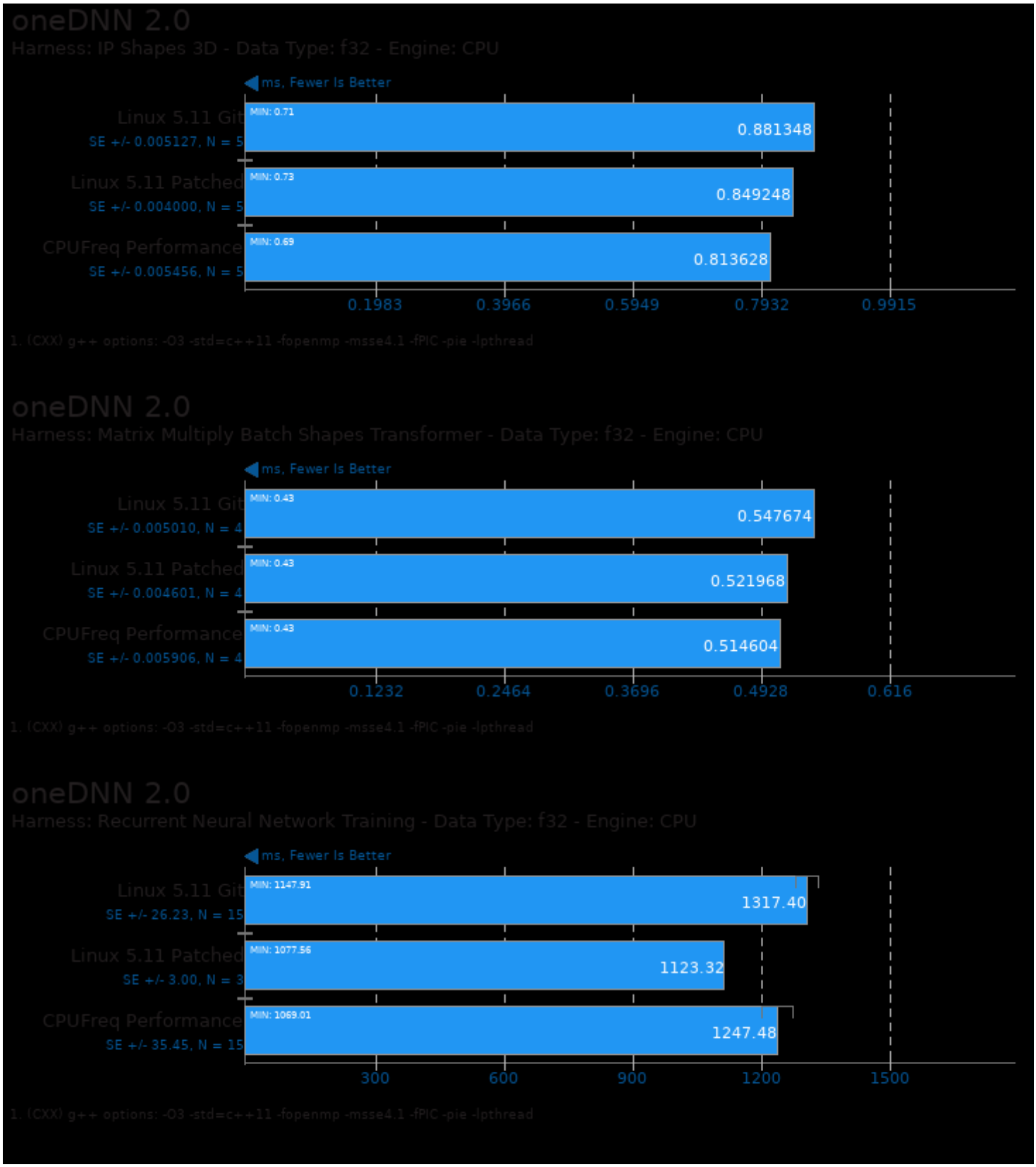


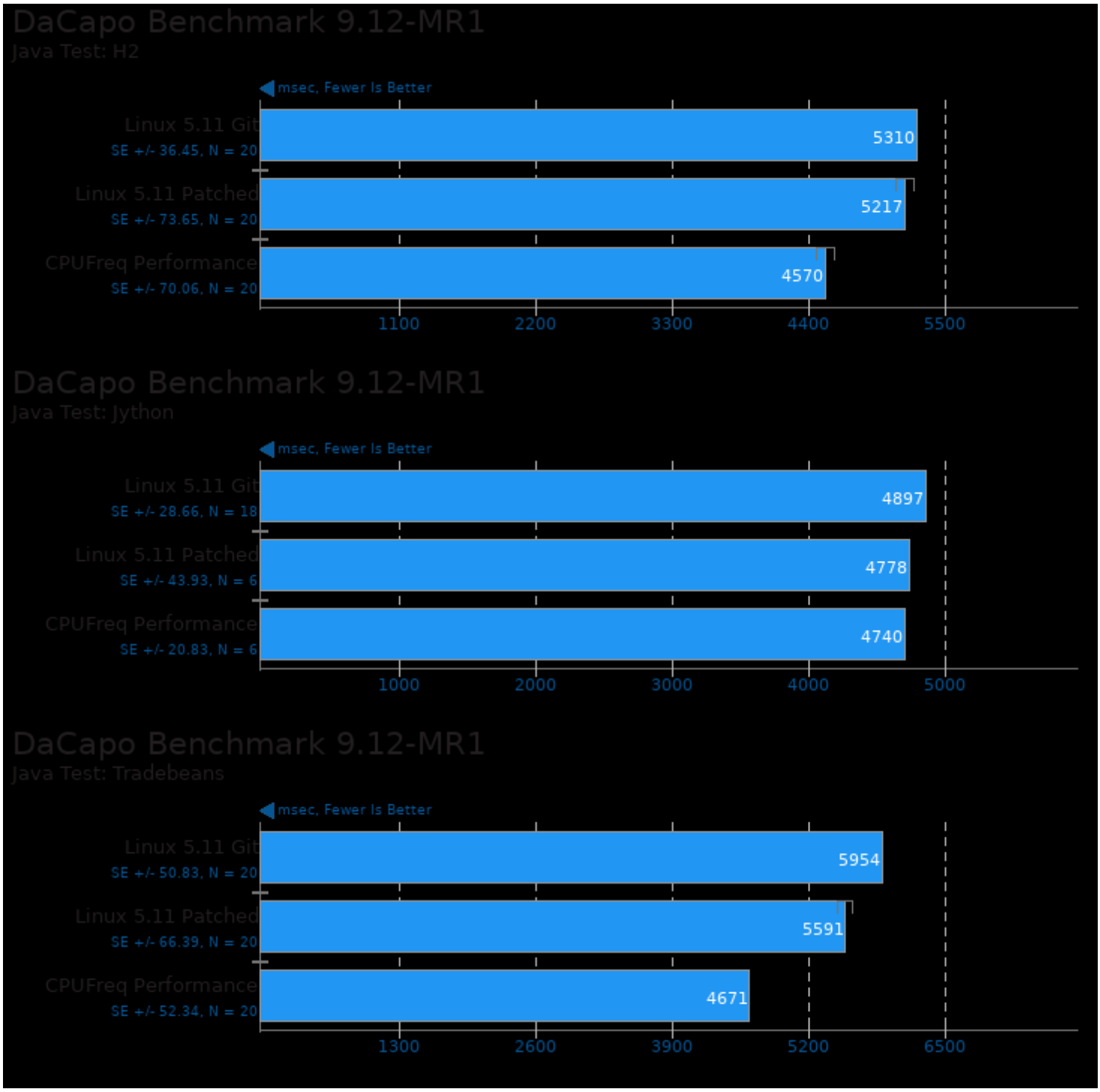

TensorFlow Lite 2020-08-23
Model: Mobilenet Quant
Microseconds, Fewer Is Better
Linux 5.11 Git
SE +/- 759.19, N = 15
45083.9
Linux 5.11 Patched
SE +/- 400.94, N = 6
41034.0
CPUFreq Performance
SE +/- 211.03, N = 3
41180.1
10K
20K
30K
40K
50K
TensorFlow Lite 2020-08-23
Model: NASNet Mobile
Microseconds, Fewer Is Better
Linux 5.11 Git
SE +/- 7366.43, N = 15
189771
Linux 5.11 Patched
SE +/- 2393.85, N = 15
134044
CPUFreq Performance
SE +/- 2146.20, N = 15
132844
40K
80K
120K
160K
200K
TensorFlow Lite 2020-08-23
Model: SqueezeNet
Microseconds, Fewer Is Better
Linux 5.11 Git
SE +/- 690.93, N = 3
65193.0
Linux 5.11 Patched
SE +/- 412.91, N = 15
62195.4
CPUFreq Performance
SE +/- 715.70, N = 4
61347.2
14K
28K
42K
56K
70K

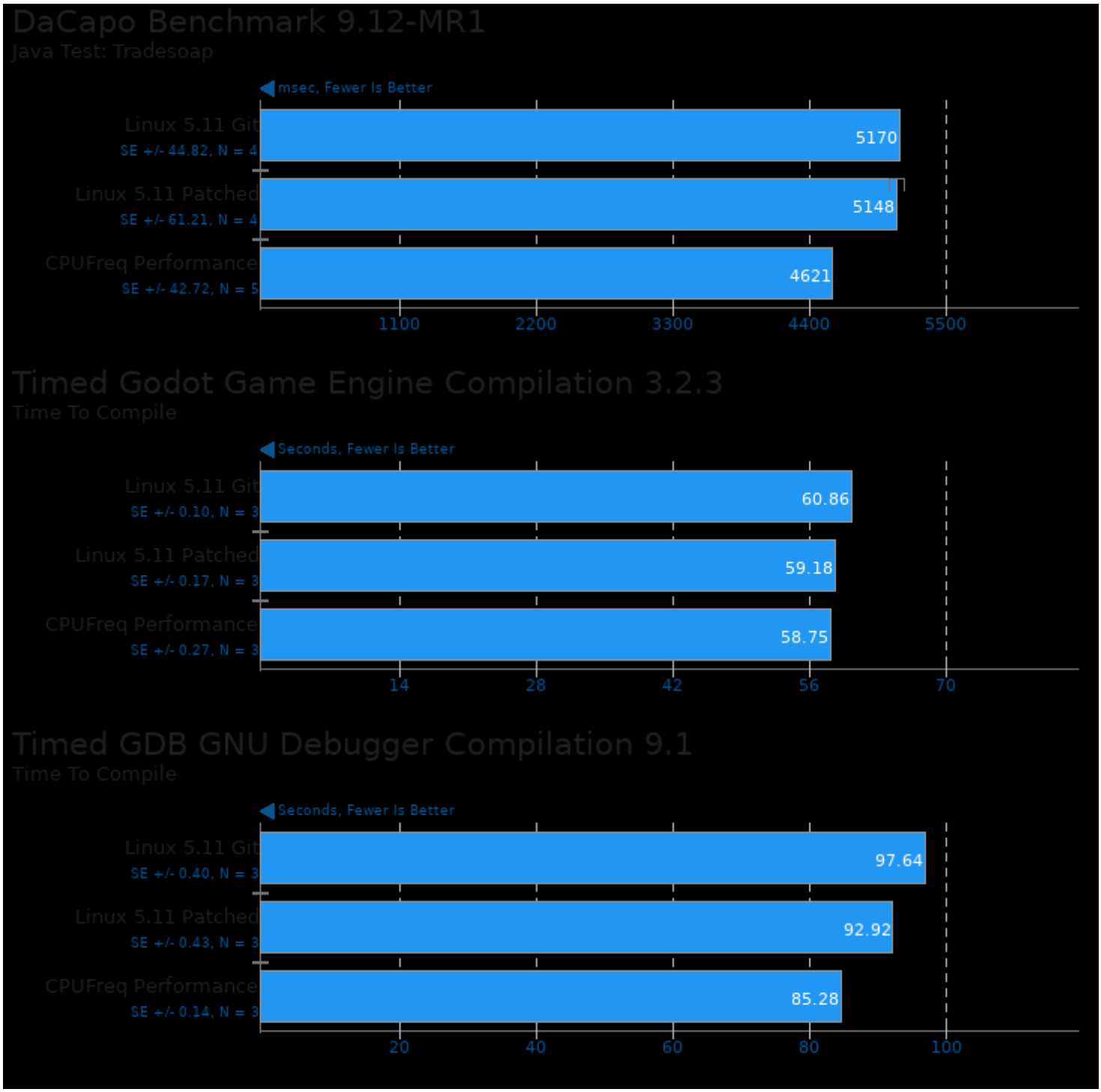

TensorFlow Lite 2020-08-23
Model: Inception ResNet V2
Microseconds, Fewer Is Better
Linux 5.11 Git
SE +/- 4257.59, N = 3
765726
Linux 5.11 Patched
SE +/- 5824.36, N = 9
736285
CPUFreq Performance
SE +/- 2132.19, N = 3
737993
160K
320K
480K
640K
800K
TensorFlow Lite 2020-08-23
Model: Inception V4
Microseconds, Fewer Is Better
Linux 5.11 Git
SE +/- 2435.29, N = 3
894640
Linux 5.11 Patched
SE +/- 1163.43, N = 3
810750
CPUFreq Performance
SE +/- 4685.69, N = 3
818887
200K
400K
600K
800K
1000K
FinanceBench 2016-07-25
Benchmark: Bonds OpenMP
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 721.39, N = 3
57601.36
Linux 5.11 Patched
SE +/- 598.50, N = 3
56769.45
CPUFreq Performance
SE +/- 365.12, N = 3
56094.49
12K
24K
36K
48K
60K
1. (CXX) g++ options: -O3 -march=native -fopenmp

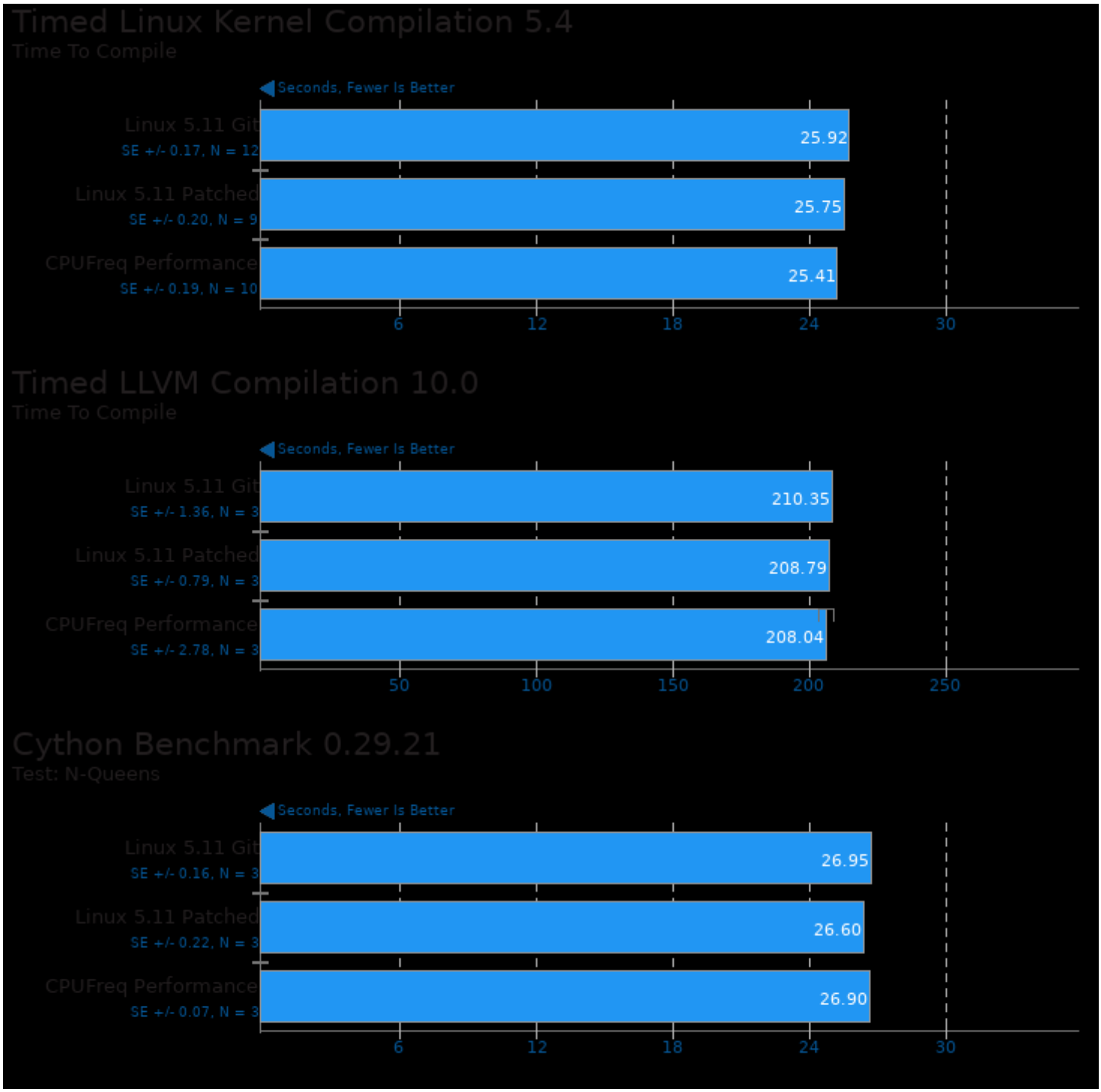

FinanceBench 2016-07-25
Benchmark: Repo OpenMP
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 319.03, N = 3
40124.37
Linux 5.11 Patched
SE +/- 393.10, N = 3
39406.76
CPUFreq Performance
SE +/- 456.10, N = 3
39948.36
9K
18K
27K
36K
45K
1. (CXX) g++ options: -O3 -march=native -fopenmp
TNN 0.2.3
Target: CPU - Model: MobileNet v2
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 3.80, N = 3
MIN: 284.51 / MAX: 461.21
303.45
Linux 5.11 Patched
SE +/- 2.83, N = 3
MIN: 283.65 / MAX: 458.79
289.76
CPUFreq Performance
SE +/- 0.07, N = 3
MIN: 295.49 / MAX: 320.4
297.13
70
140
210
280
350
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl
TNN 0.2.3
Target: CPU - Model: SqueezeNet v1.1
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.39, N = 3
MIN: 273.57 / MAX: 276.21
274.94
Linux 5.11 Patched
SE +/- 0.68, N = 3
MIN: 273.07 / MAX: 276.74
274.87
CPUFreq Performance
SE +/- 0.08, N = 3
MIN: 273.16 / MAX: 274.86
274.10
60
120
180
240
300
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl


oneDNN 2.0
Harness: Convolution Batch Shapes Auto - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.006064, N = 7
MIN: 0.78
0.914198
Linux 5.11 Patched
SE +/- 0.001510, N = 7
MIN: 0.79
0.863782
CPUFreq Performance
SE +/- 0.001697, N = 7
MIN: 0.78
0.867545
0.2057
0.4114
0.6171
0.8228
1.0285
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread
oneDNN 2.0
Harness: Deconvolution Batch shapes_1d - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.03372, N = 3
MIN: 1.92
2.40549
Linux 5.11 Patched
SE +/- 0.01587, N = 3
MIN: 2
2.33290
CPUFreq Performance
SE +/- 0.02560, N = 15
MIN: 1.88
2.30467
0.5412
1.0824
1.6236
2.1648
2.706
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread
oneDNN 2.0
Harness: IP Shapes 1D - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.01518, N = 4
MIN: 1.31
1.62088
Linux 5.11 Patched
SE +/- 0.01340, N = 4
MIN: 1.29
1.55447
CPUFreq Performance
SE +/- 0.01359, N = 4
MIN: 1.31
1.57963
0.3647
0.7294
1.0941
1.4588
1.8235
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread

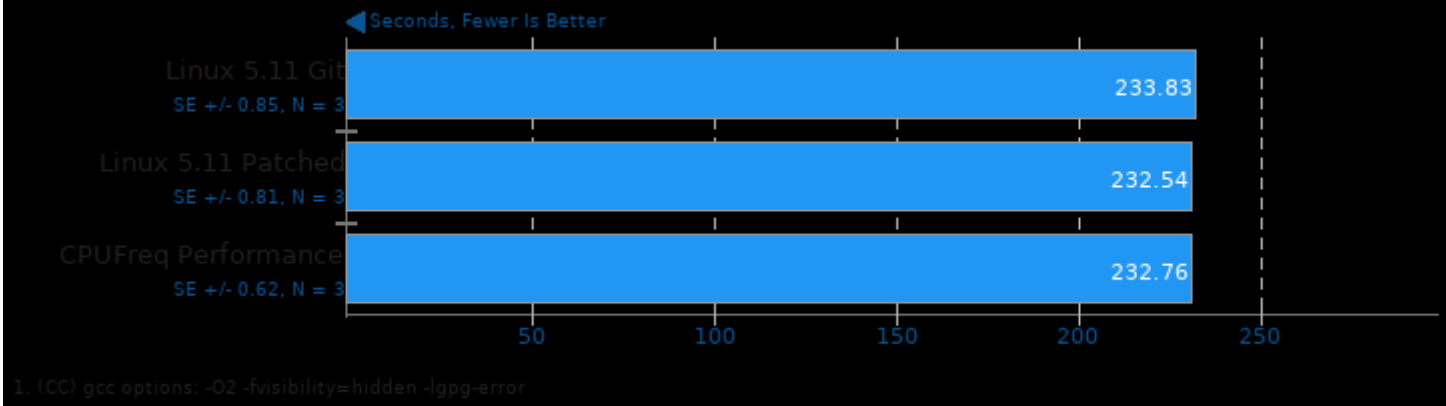

oneDNN 2.0
Harness: IP Shapes 3D - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.005127, N = 5
MIN: 0.71
0.881348
Linux 5.11 Patched
SE +/- 0.004000, N = 5
MIN: 0.73
0.849248
CPUFreq Performance
SE +/- 0.005456, N = 5
MIN: 0.69
0.813628
0.1983
0.3966
0.5949
0.7932
0.9915
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread
oneDNN 2.0
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 0.005010, N = 4
MIN: 0.43
0.547674
Linux 5.11 Patched
SE +/- 0.004601, N = 4
MIN: 0.43
0.521968
CPUFreq Performance
SE +/- 0.005906, N = 4
MIN: 0.43
0.514604
0.1232
0.2464
0.3696
0.4928
0.616
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread
oneDNN 2.0
Harness: Recurrent Neural Network Training - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Linux 5.11 Git
SE +/- 26.23, N = 15
MIN: 1147.91
1317.40
Linux 5.11 Patched
SE +/- 3.00, N = 3
MIN: 1077.56
1123.32
CPUFreq Performance
SE +/- 35.45, N = 15
MIN: 1069.01
1247.48
300
600
900
1200
1500
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread


DaCapo Benchmark 9.12-MR1
Java Test: H2
msec, Fewer Is Better
Linux 5.11 Git
SE +/- 36.45, N = 20
5310
Linux 5.11 Patched
SE +/- 73.65, N = 20
5217
CPUFreq Performance
SE +/- 70.06, N = 20
4570
1100
2200
3300
4400
5500
DaCapo Benchmark 9.12-MR1
Java Test: Jython
msec, Fewer Is Better
Linux 5.11 Git
SE +/- 28.66, N = 18
4897
Linux 5.11 Patched
SE +/- 43.93, N = 6
4778
CPUFreq Performance
SE +/- 20.83, N = 6
4740
1000
2000
3000
4000
5000
DaCapo Benchmark 9.12-MR1
Java Test: Tradebeans
msec, Fewer Is Better
Linux 5.11 Git
SE +/- 50.83, N = 20
5954
Linux 5.11 Patched
SE +/- 66.39, N = 20
5591
CPUFreq Performance
SE +/- 52.34, N = 20
4671
1300
2600
3900
5200
6500


DaCapo Benchmark 9.12-MR1
Java Test: Tradesoap
msec, Fewer Is Better
Linux 5.11 Git
SE +/- 44.82, N = 4
5170
Linux 5.11 Patched
SE +/- 61.21, N = 4
5148
CPUFreq Performance
SE +/- 42.72, N = 5
4621
1100
2200
3300
4400
5500
Timed Godot Game Engine Compilation 3.2.3
Time To Compile
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.10, N = 3
60.86
Linux 5.11 Patched
SE +/- 0.17, N = 3
59.18
CPUFreq Performance
SE +/- 0.27, N = 3
58.75
14
28
42
56
70
Timed GDB GNU Debugger Compilation 9.1
Time To Compile
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.40, N = 3
97.64
Linux 5.11 Patched
SE +/- 0.43, N = 3
92.92
CPUFreq Performance
SE +/- 0.14, N = 3
85.28
20
40
60
80
100


Timed Linux Kernel Compilation 5.4
Time To Compile
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.17, N = 12
25.92
Linux 5.11 Patched
SE +/- 0.20, N = 9
25.75
CPUFreq Performance
SE +/- 0.19, N = 10
25.41
6
12
18
24
30
Timed LLVM Compilation 10.0
Time To Compile
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 1.36, N = 3
210.35
Linux 5.11 Patched
SE +/- 0.79, N = 3
208.79
CPUFreq Performance
SE +/- 2.78, N = 3
208.04
50
100
150
200
250
Cython Benchmark 0.29.21
Test: N-Queens
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.16, N = 3
26.95
Linux 5.11 Patched
SE +/- 0.22, N = 3
26.60
CPUFreq Performance
SE +/- 0.07, N = 3
26.90
6
12
18
24
30

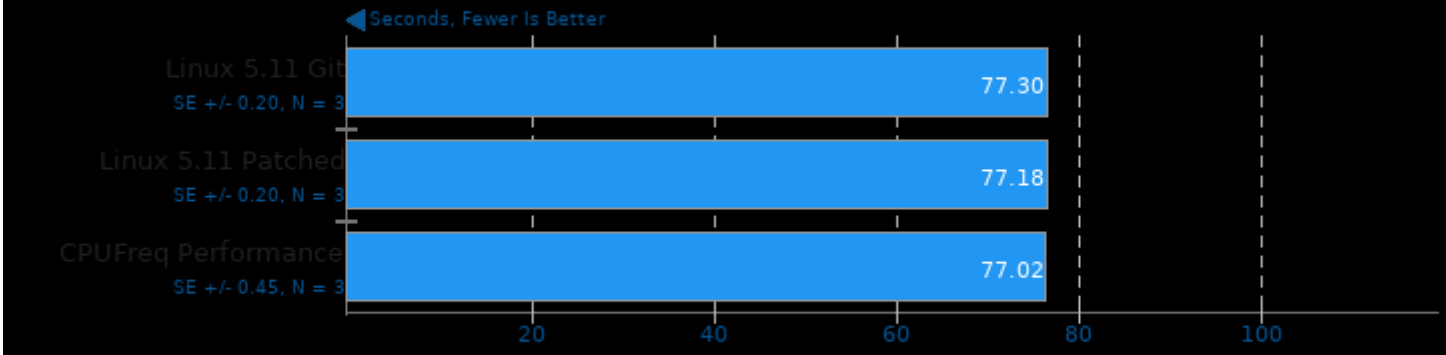
Gcrypt Library 1.9



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

GnuPG 2.2.27

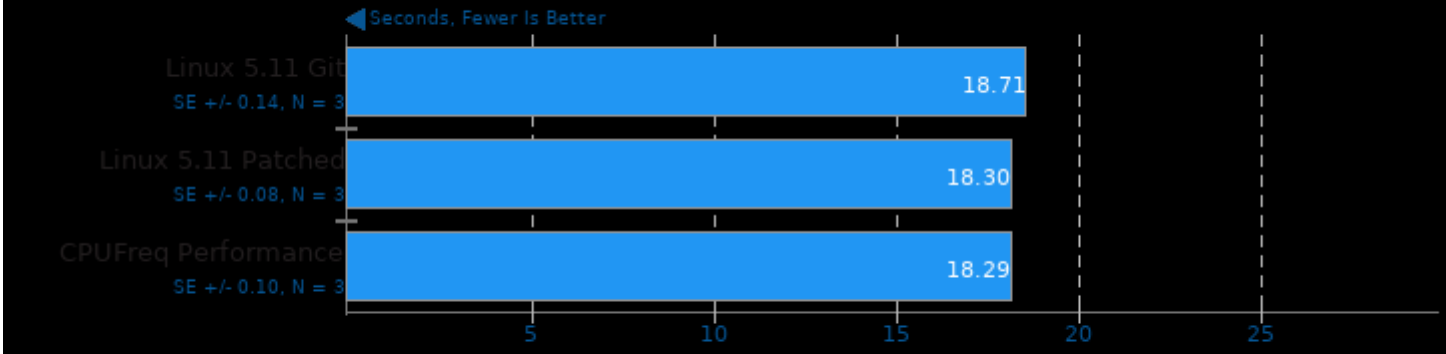
2.7GB Sample File Encryption



1. (CC) gcc options: -O2

OpenFOAM 8

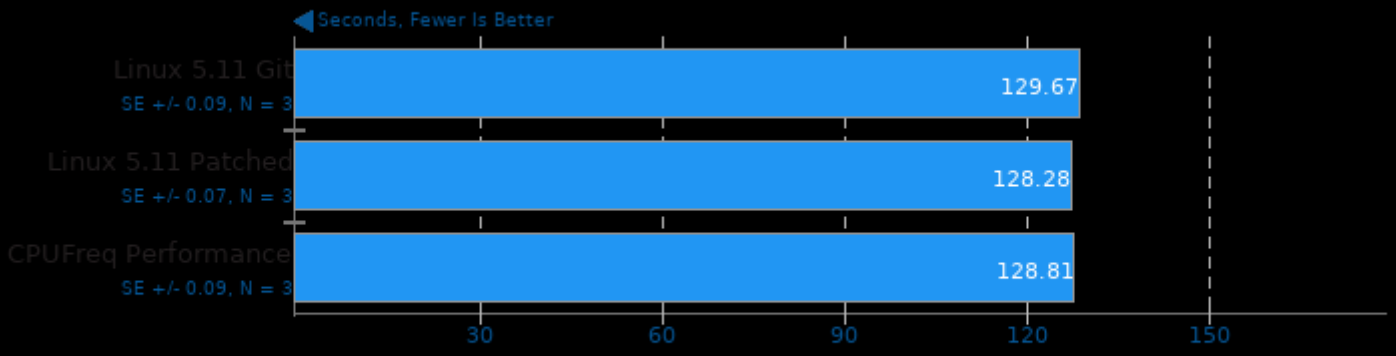
Input: Motorbike 30M



1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -lfoamToVTK -ldynamicMesh -

OpenFOAM 8

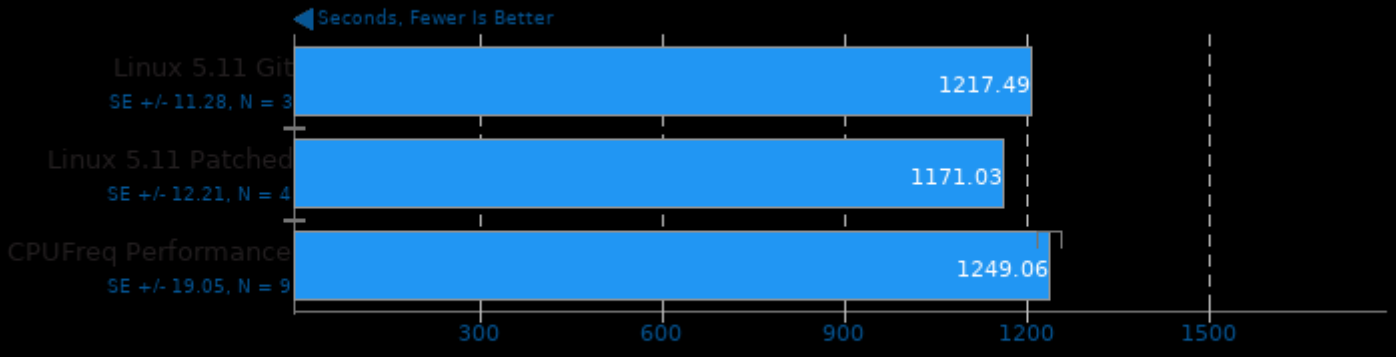
Input: Motorbike 60M



1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -lfoamToVTK -ldynamicMesh -

Quantum ESPRESSO 6.7

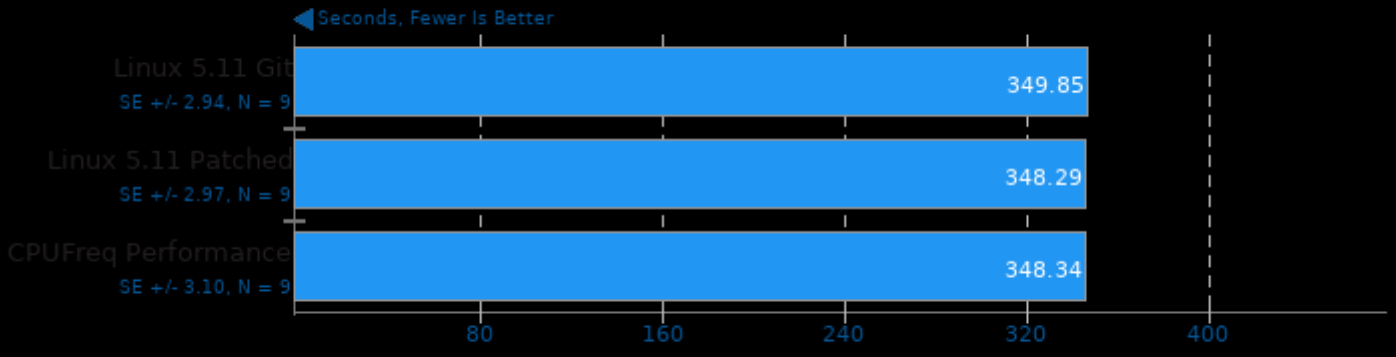
Input: AUSURF112



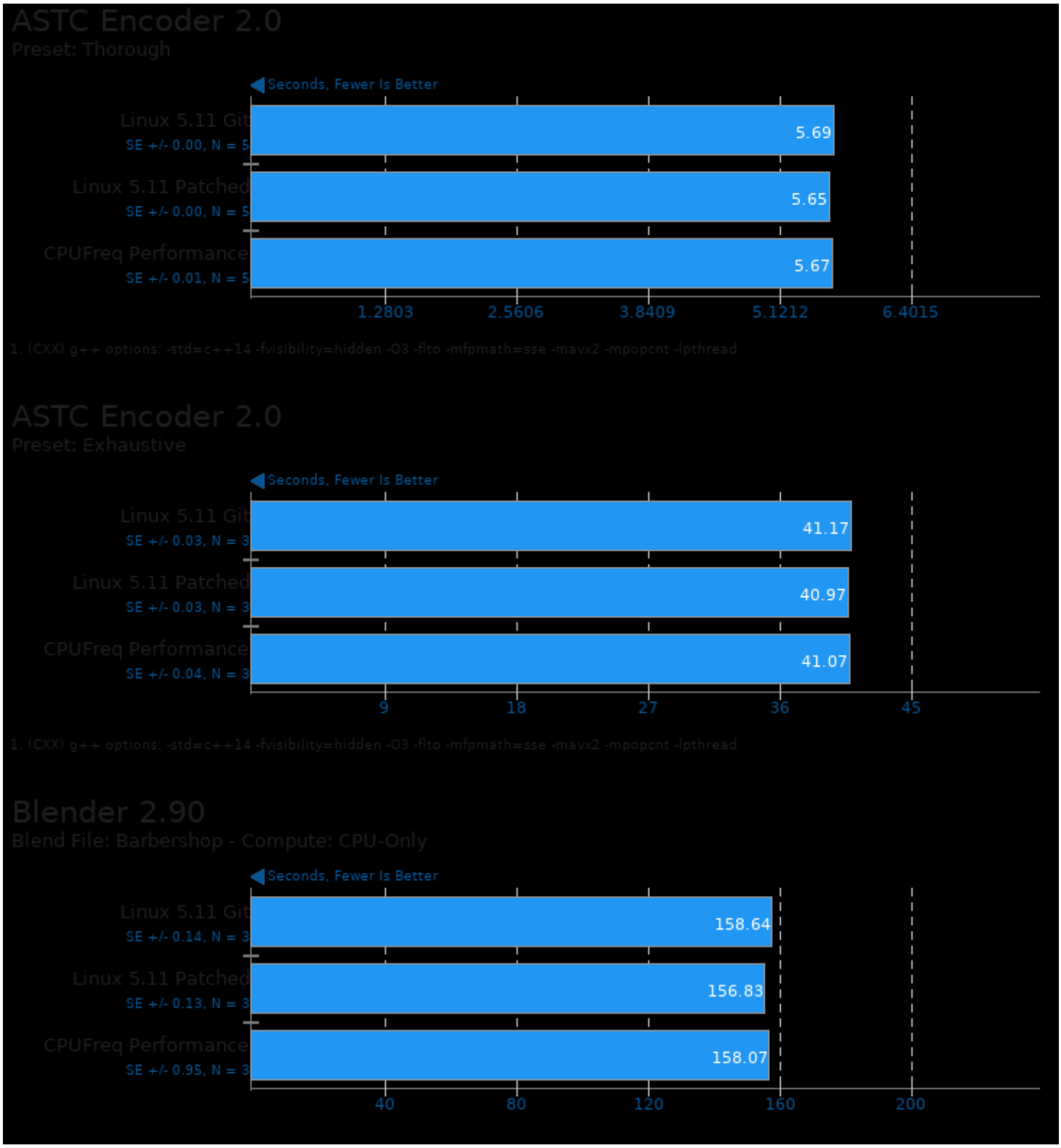
1. (F9X) gfortran options: -lopenblas -lFoX_dom -lFoX_sax -lFoX_wxml -lFoX_common -lFoX_utils -lFoX_fsys -lfftw3 -pthread -lmpi_usempif08 -lmpi_mpifh -

RELION 3.1.1

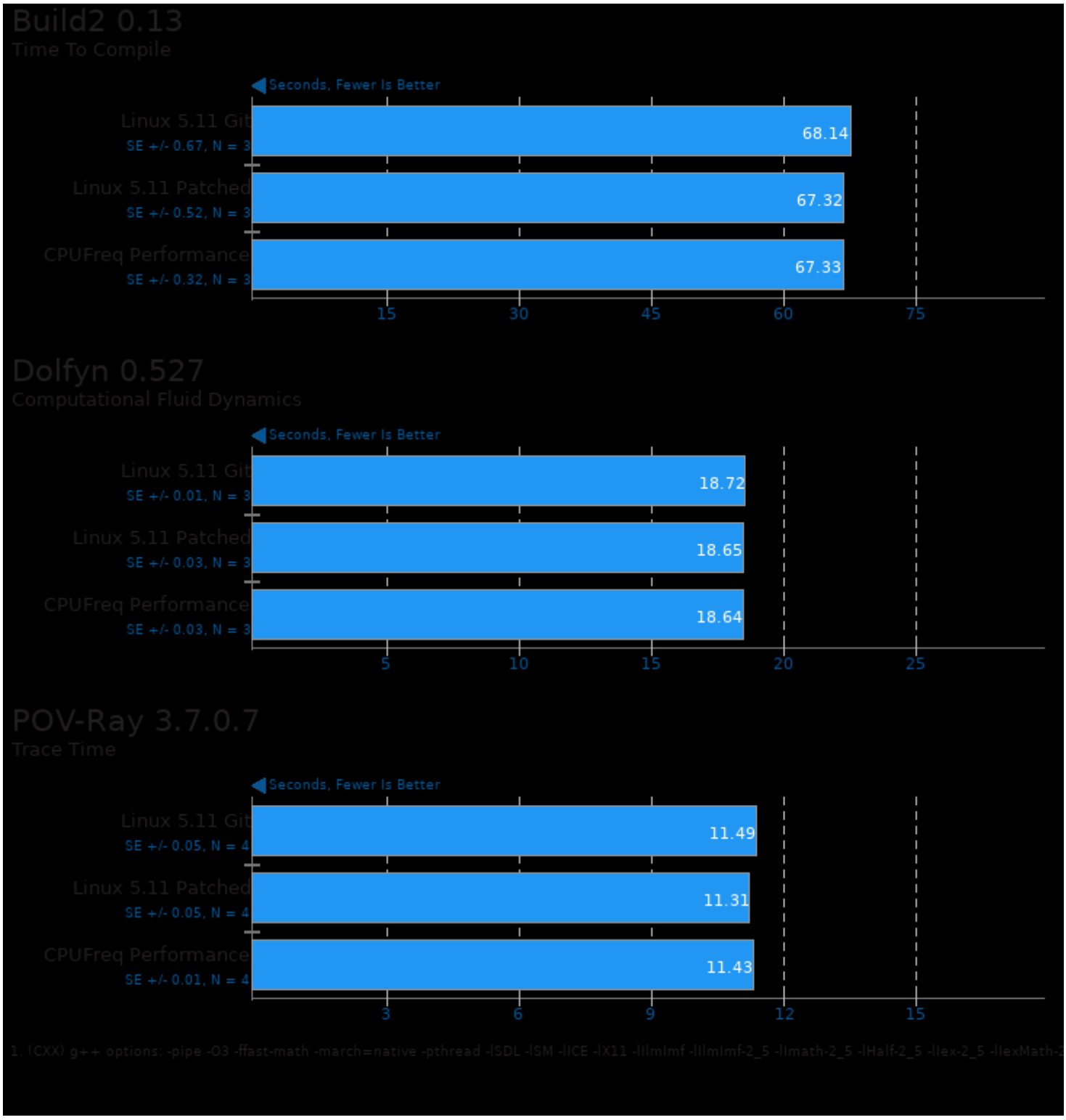
Test: Basic - Device: CPU



1. (CXX) g++ options: -fopenmp -std=c++0x -O3 -rdynamic -ldl -ltiff -lfftw3f -lfftw3 -lpng -pthread -lmpi_cxx -lmpi

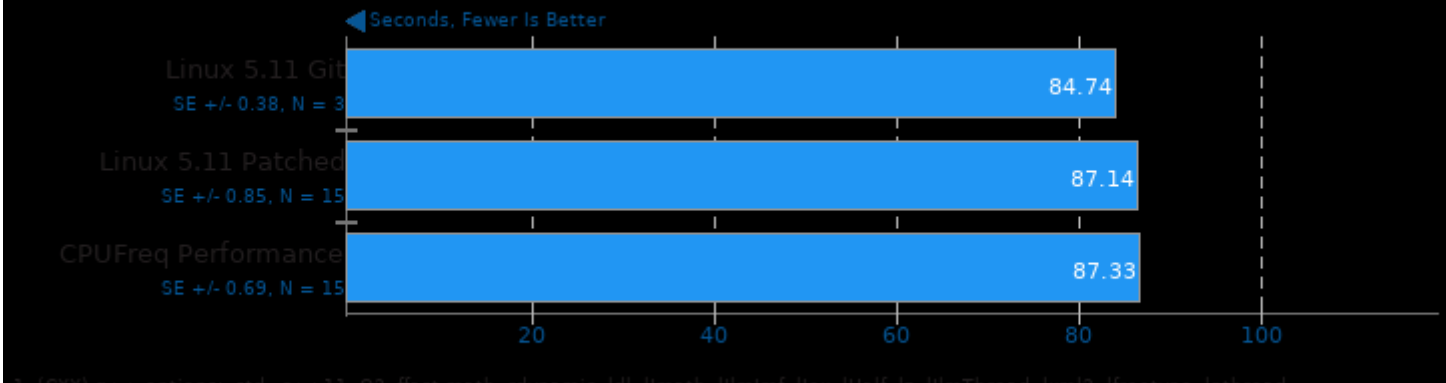

ASTC Encoder 2.0
Preset: Thorough
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.00, N = 5
5.69
Linux 5.11 Patched
SE +/- 0.00, N = 5
5.65
CPUFreq Performance
SE +/- 0.01, N = 5
5.67
1.2803
2.5606
3.8409
5.1212
6.4015
1. (CXX) g++ options: -std=c++14 -fvisibility=hidden -O3 -flto -mfpmath=sse -mavx2 -mpopcnt -lpthread
ASTC Encoder 2.0
Preset: Exhaustive
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.03, N = 3
41.17
Linux 5.11 Patched
SE +/- 0.03, N = 3
40.97
CPUFreq Performance
SE +/- 0.04, N = 3
41.07
9
18
27
36
45
1. (CXX) g++ options: -std=c++14 -fvisibility=hidden -O3 -flto -mfpmath=sse -mavx2 -mpopcnt -lpthread
Blender 2.90
Blend File: Barbershop - Compute: CPU-Only
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.14, N = 3
158.64
Linux 5.11 Patched
SE +/- 0.13, N = 3
156.83
CPUFreq Performance
SE +/- 0.95, N = 3
158.07
40
80
120
160
200

AMD EPYC 7F72 2P Linux 5.11 Perf Governor



YafaRay 3.4.1

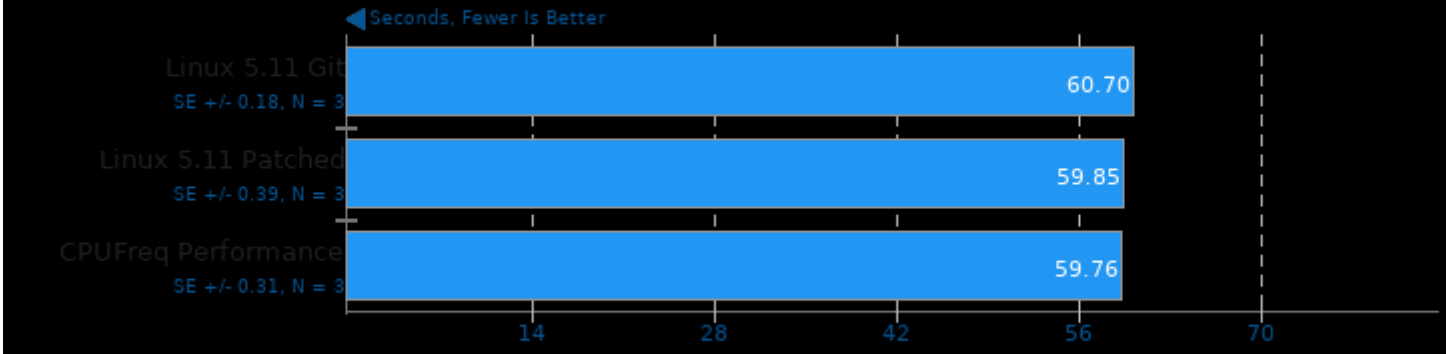
Total Time For Sample Scene



1. (CXX) g++ options: -std=c++11 -O3 -ffast-math -rdynamic -ldl -lImath -lIlmImf -lIex -lHalf -lz -lIlmThread -lxml2 -lfreetype -lpthread

GPAW 20.1

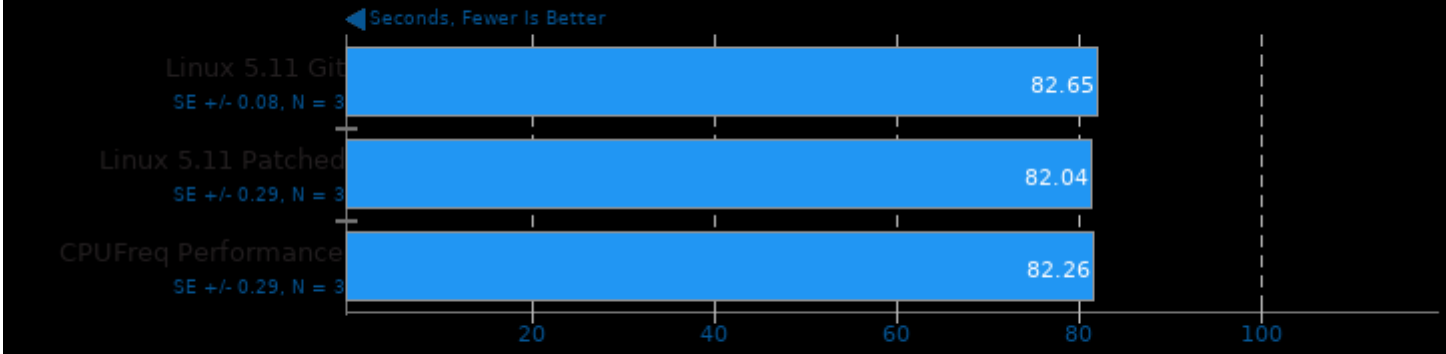
Input: Carbon Nanotube



1. (CC) gcc options: -pthread -shared -fwrapv -O2 -lxc -lblas -lmpi

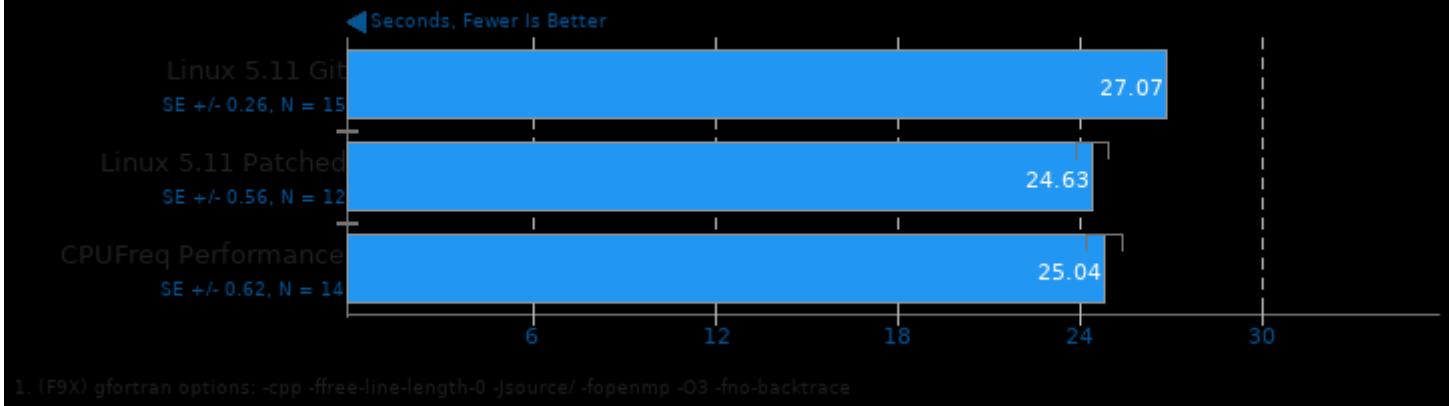
Timed MrBayes Analysis 3.2.7

Primate Phylogeny Analysis



1. (CC) gcc options: -mmmx -msse -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -msse4a -msha -maes -mavx -mfma -mavx2 -mrdrnd -mbmi -mbmi2 -madx

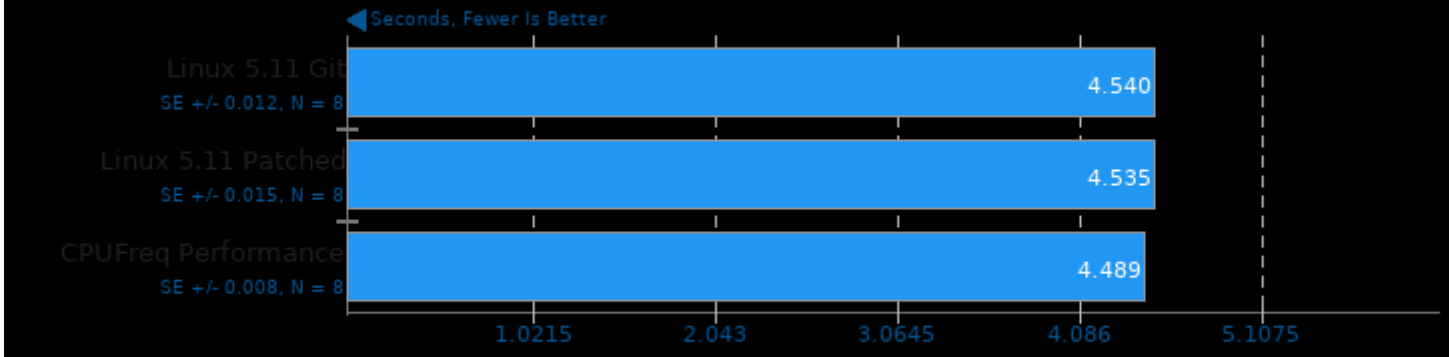
Nebular Empirical Analysis Tool 2020-02-29



1. (F9X) gfortran options: -cpp -ffree-line-length-0 -Jsource/ -fopenmp -O3 -fno-backtrace

Primesieve 7.4

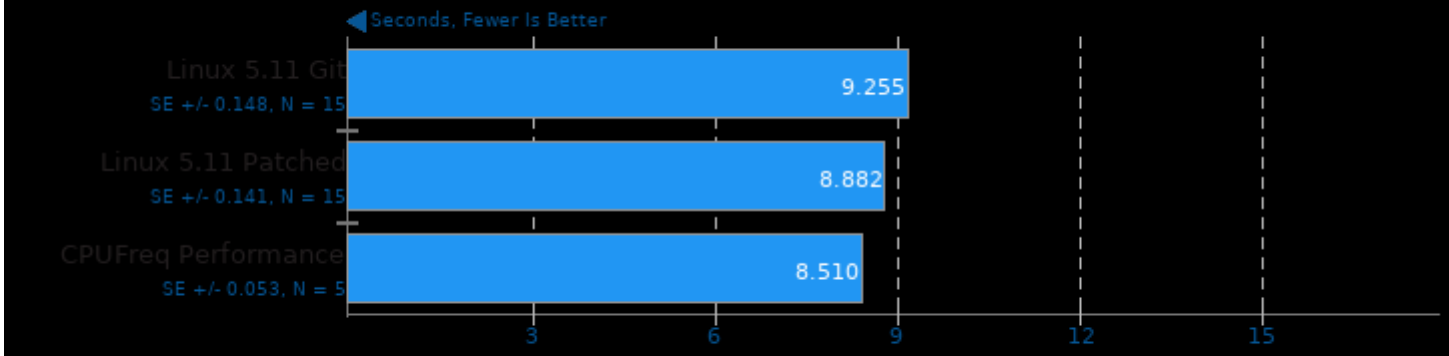
1e12 Prime Number Generation



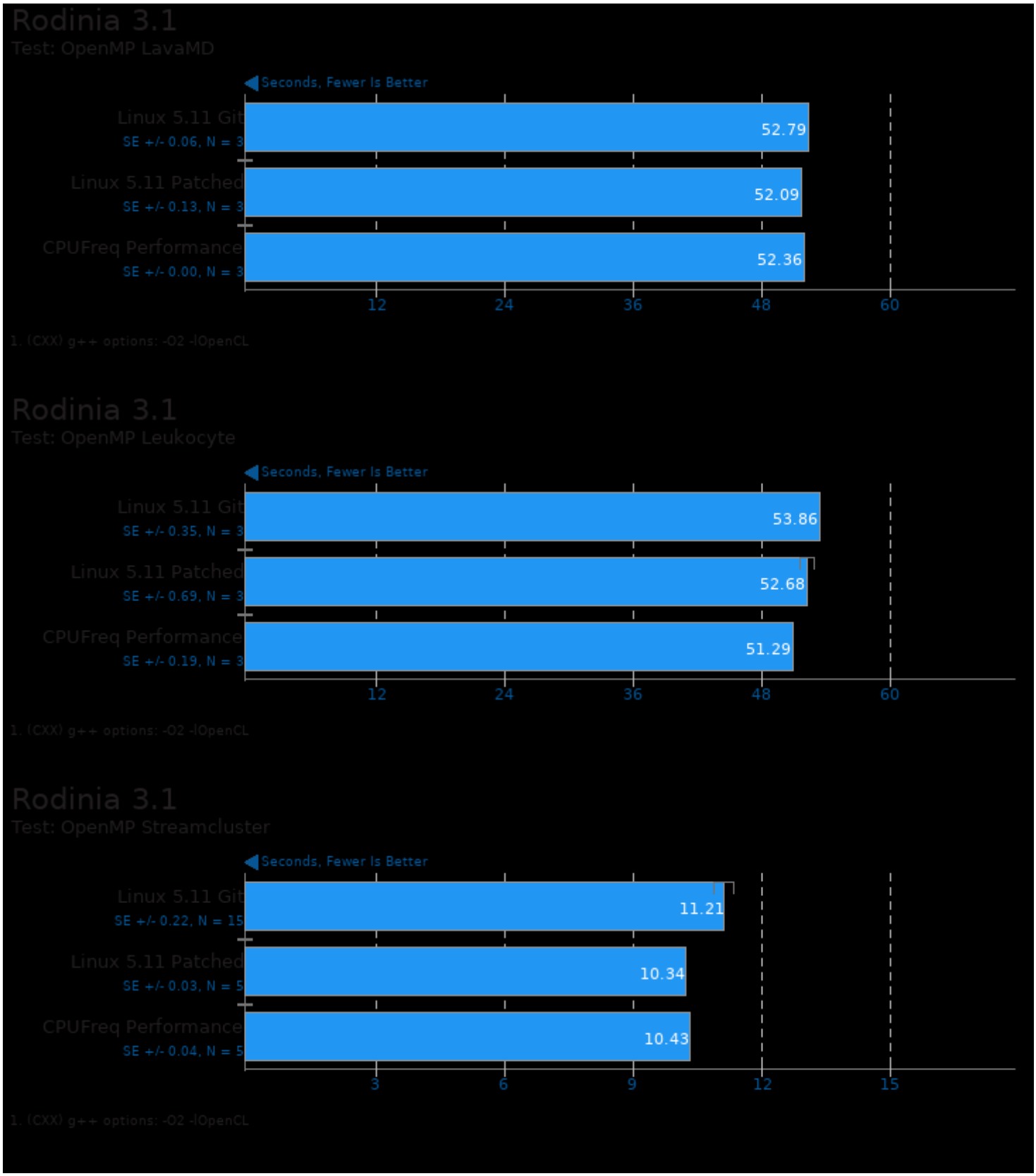
1. (CXX) g++ options: -O3 -lpthread

Rodinia 3.1

Test: OpenMP CFD Solver

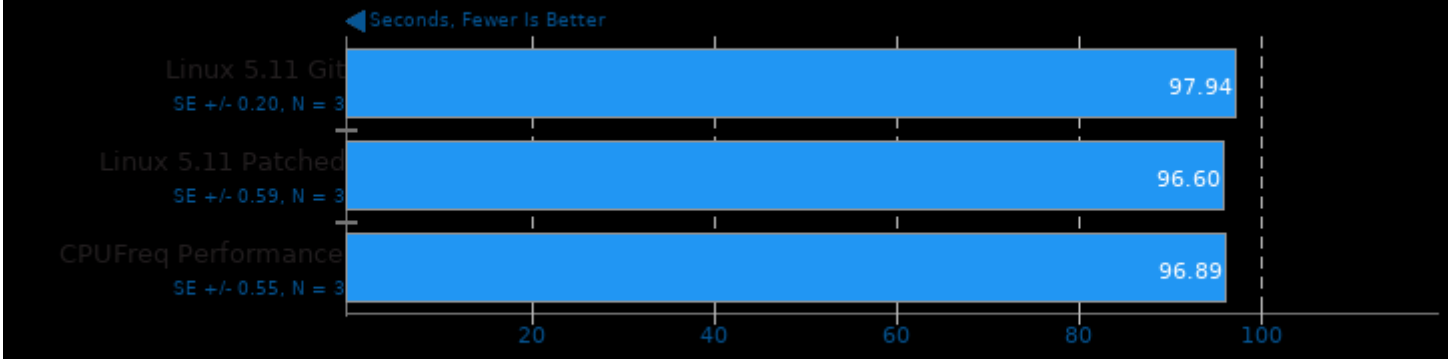


1. (CXX) g++ options: -O2 -lOpenCL


Rodinia 3.1
Test: OpenMP LavaMD
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.06, N = 3
52.79
Linux 5.11 Patched
SE +/- 0.13, N = 3
52.09
CPUFreq Performance
SE +/- 0.00, N = 3
52.36
12
24
36
48
60
1. (CXX) g++ options: -O2 -lOpenCL
Rodinia 3.1
Test: OpenMP Leukocyte
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.35, N = 3
53.86
Linux 5.11 Patched
SE +/- 0.69, N = 3
52.68
CPUFreq Performance
SE +/- 0.19, N = 3
51.29
12
24
36
48
60
1. (CXX) g++ options: -O2 -lOpenCL
Rodinia 3.1
Test: OpenMP Streamcluster
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.22, N = 15
11.21
Linux 5.11 Patched
SE +/- 0.03, N = 5
10.34
CPUFreq Performance
SE +/- 0.04, N = 5
10.43
3
6
9
12
15
1. (CXX) g++ options: -O2 -lOpenCL

Rodinia 3.1

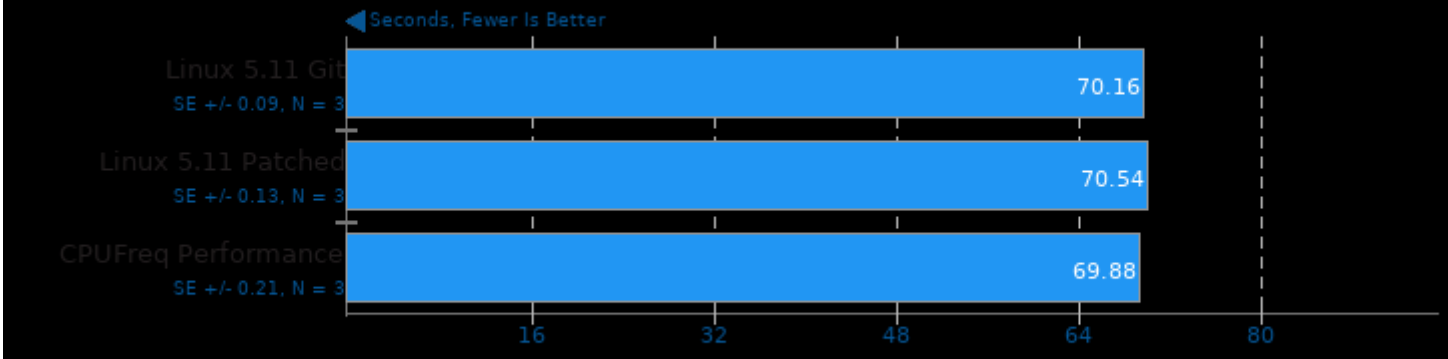
Test: OpenMP HotSpot3D



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

SQLite Speedtest 3.30

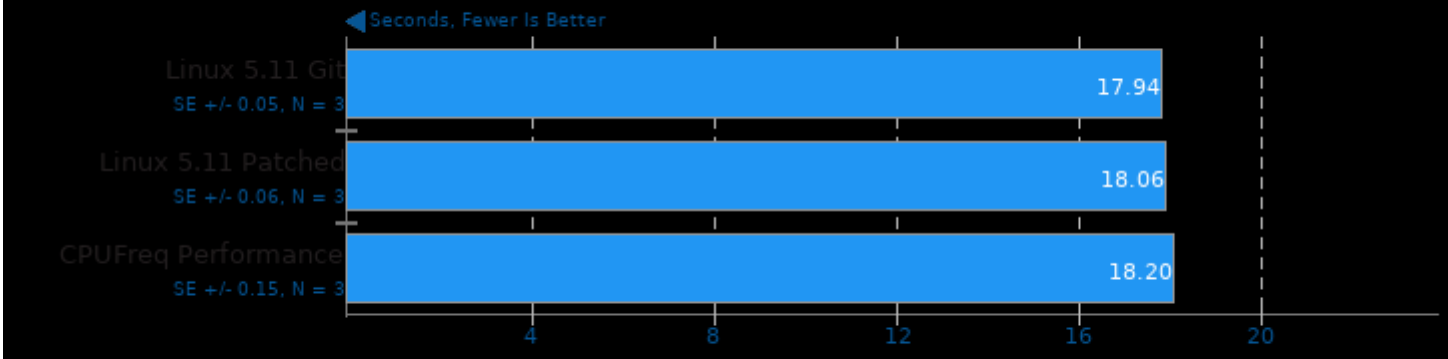
Timed Time - Size 1,000



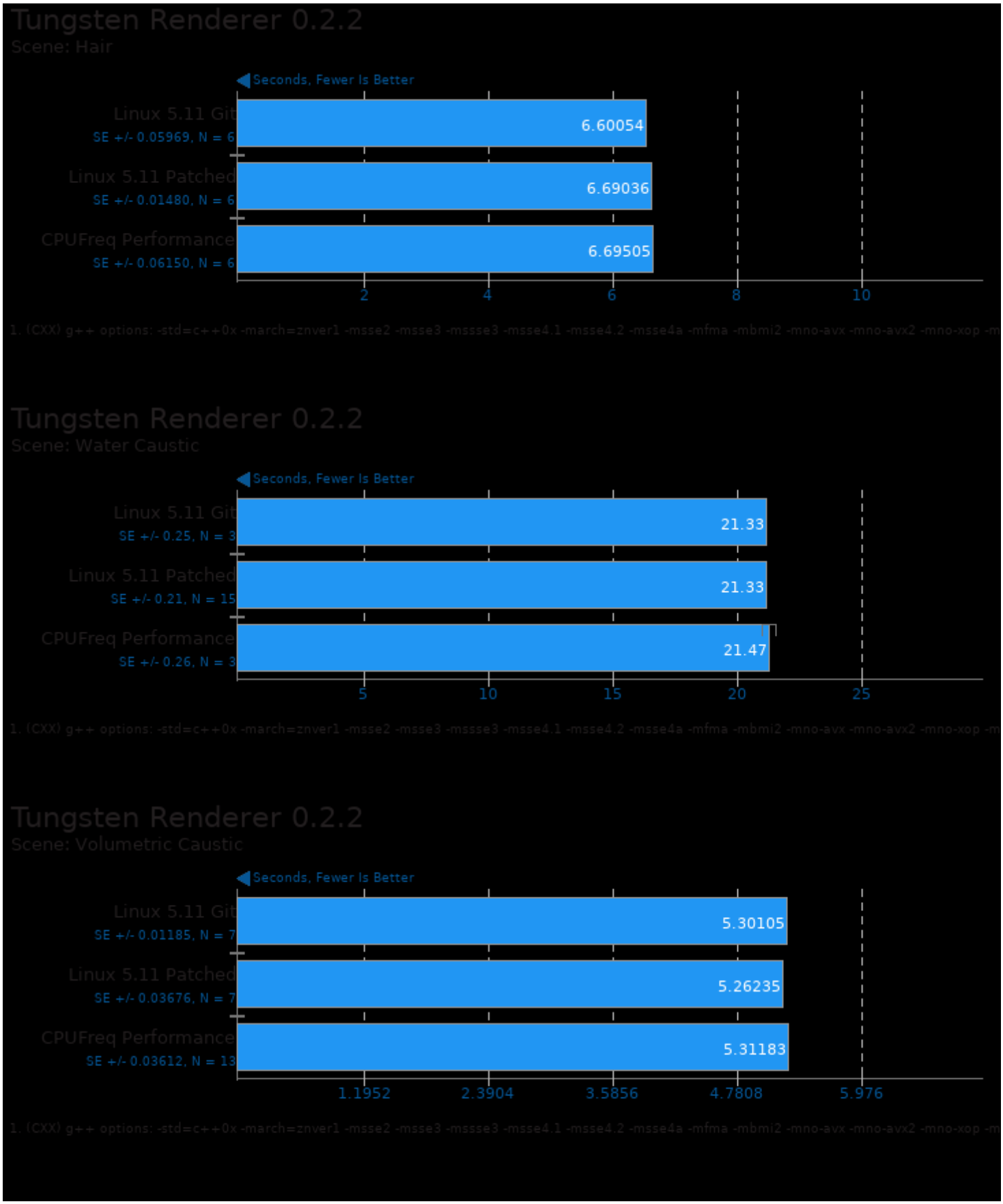
1. (CC) gcc options: -O2 -ldl -lz -lpthread

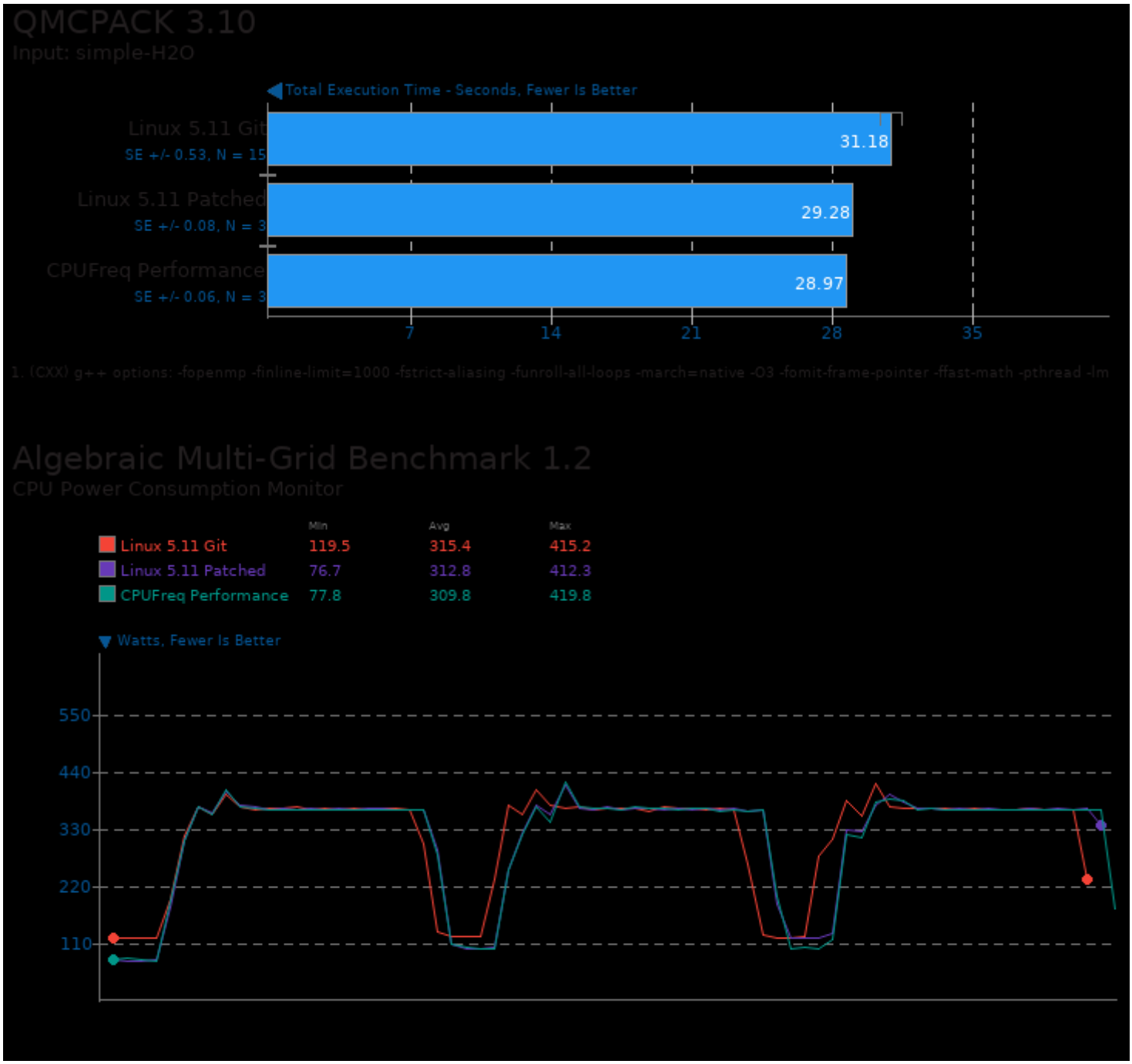
Tachyon 0.99b6

Total Time

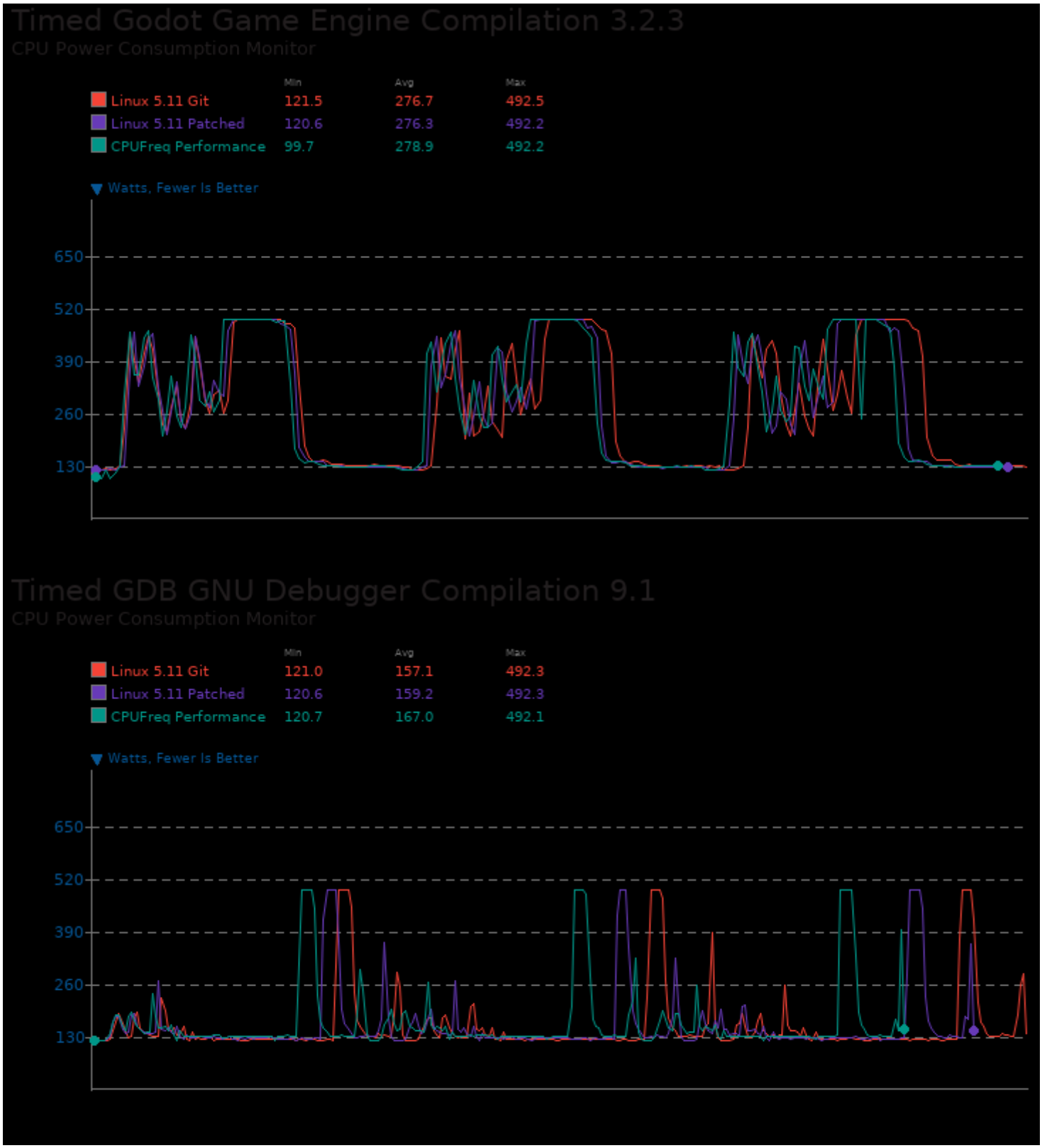


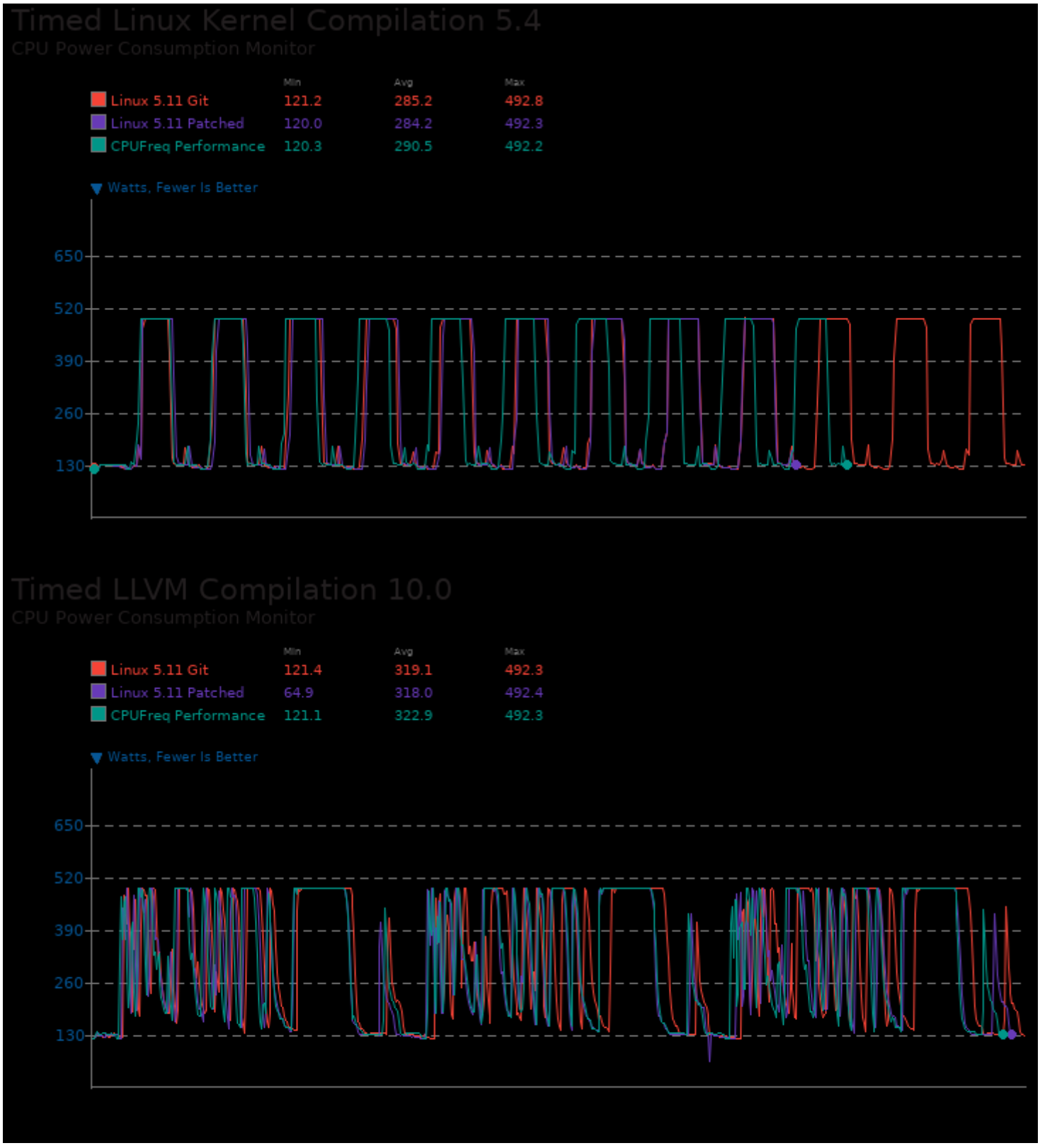
1. (CC) gcc options: -m64 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread

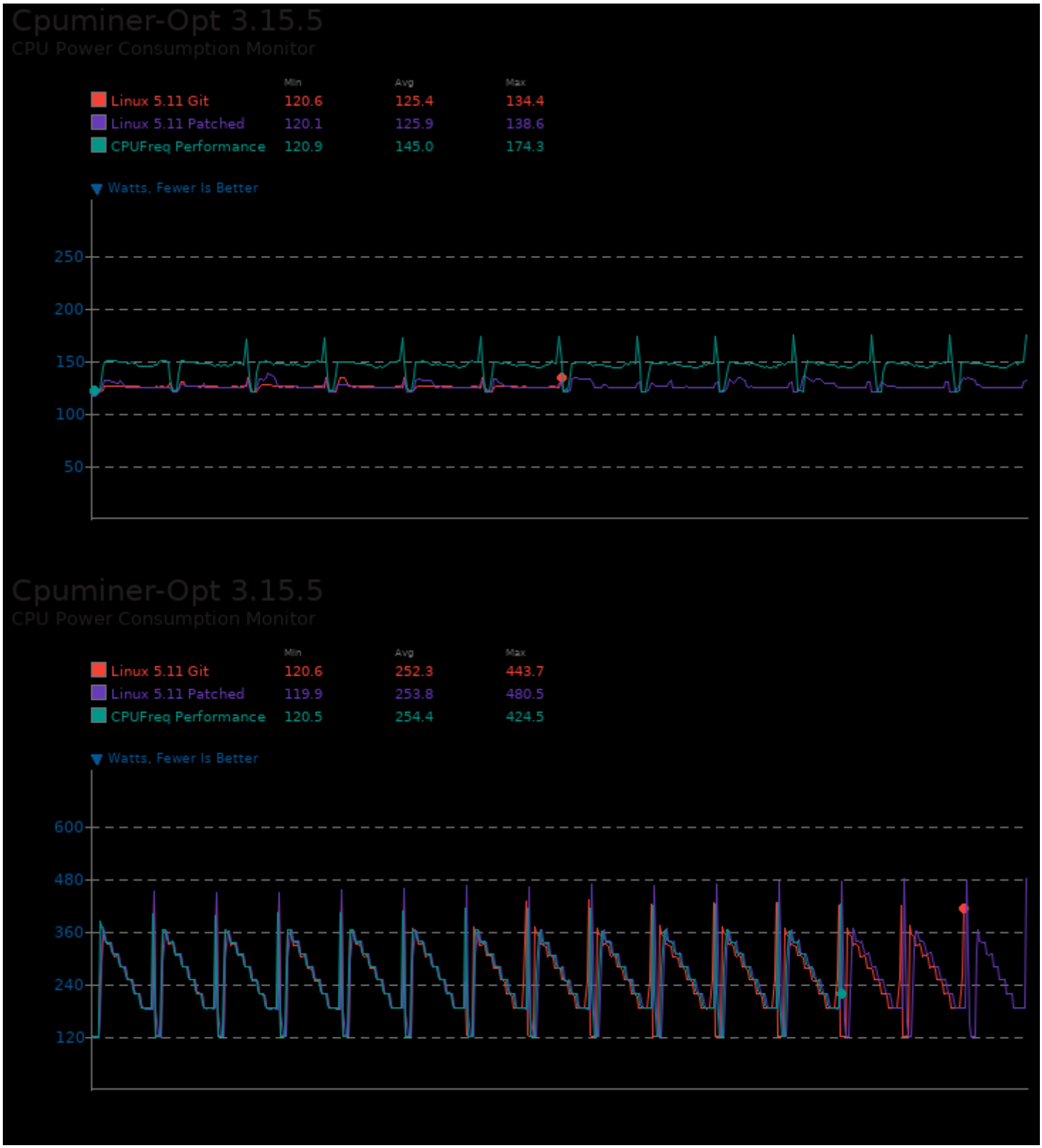

Tungsten Renderer 0.2.2
Scene: Hair
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.05969, N = 6
6.60054
Linux 5.11 Patched
SE +/- 0.01480, N = 6
6.69036
CPUFreq Performance
SE +/- 0.06150, N = 6
6.69505
2
4
6
8
10
1. (CXX) g++ options: -std=c++0x -march=znver1 -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -m
Tungsten Renderer 0.2.2
Scene: Water Caustic
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.25, N = 3
21.33
Linux 5.11 Patched
SE +/- 0.21, N = 15
21.33
CPUFreq Performance
SE +/- 0.26, N = 3
21.47
5
10
15
20
25
1. (CXX) g++ options: -std=c++0x -march=znver1 -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -m
Tungsten Renderer 0.2.2
Scene: Volumetric Caustic
Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.01185, N = 7
5.30105
Linux 5.11 Patched
SE +/- 0.03676, N = 7
5.26235
CPUFreq Performance
SE +/- 0.03612, N = 13
5.31183
1.1952
2.3904
3.5856
4.7808
5.976
1. (CXX) g++ options: -std=c++0x -march=znver1 -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -m

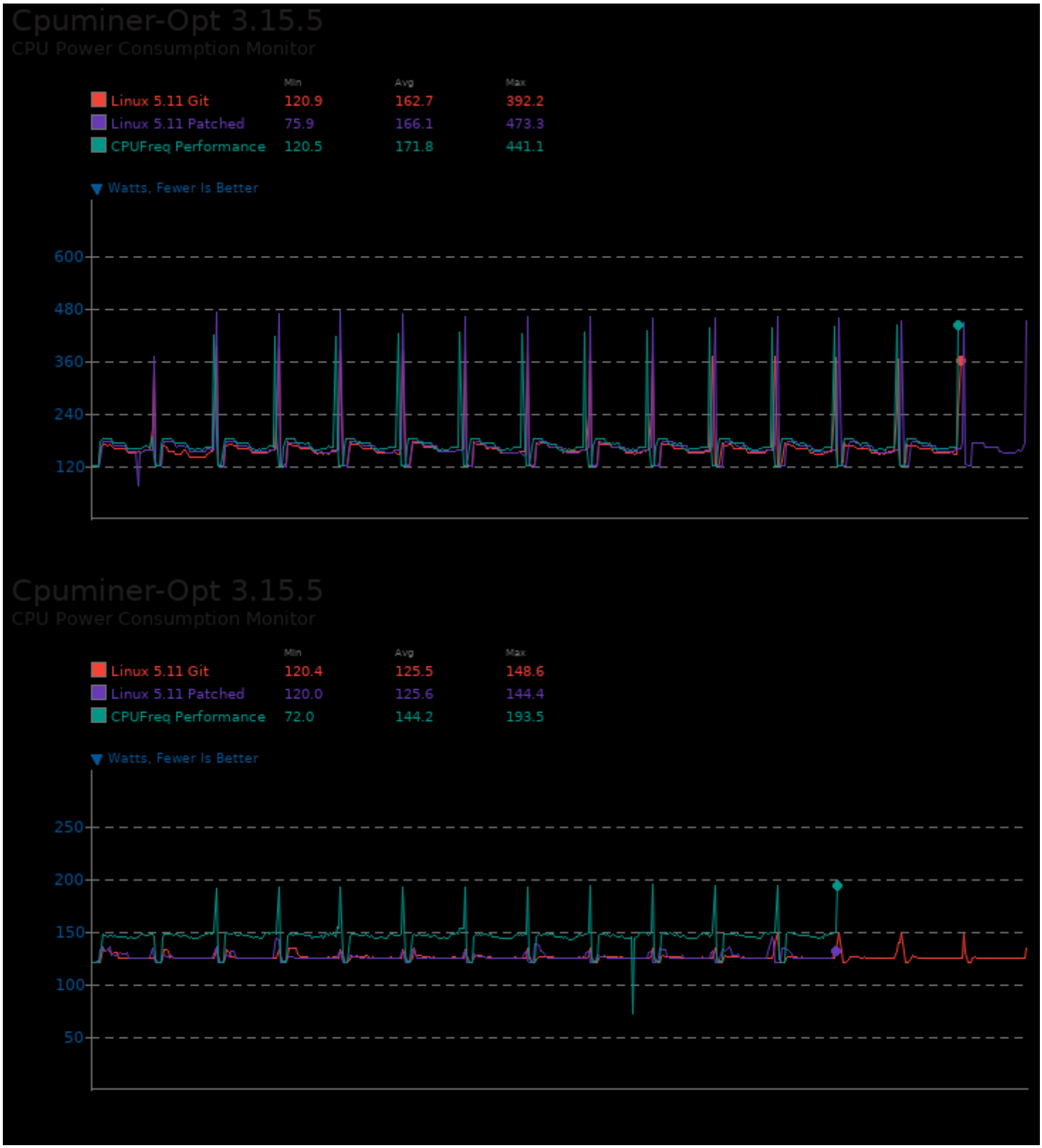

QMCPACK 3.10
Input: simple-H2O
Total Execution Time - Seconds, Fewer Is Better
Linux 5.11 Git
SE +/- 0.53, N = 15
31.18
Linux 5.11 Patched
SE +/- 0.08, N = 3
29.28
CPUFreq Performance
SE +/- 0.06, N = 3
28.97
7
14
21
28
35
1. (CXX) g++ options: -fopenmp -finline-limit=1000 -fstrict-aliasing -funroll-all-loops -march=native -O3 -fomit-frame-pointer -ffast-math -pthread -lm

Algebraic Multi-Grid Benchmark 1.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 119.5 315.4 415.2
Linux 5.11 Patched 76.7 312.8 412.3
CPUFreq Performance 77.8 309.8 419.8
Watts, Fewer Is Better
550
440
330
220
110

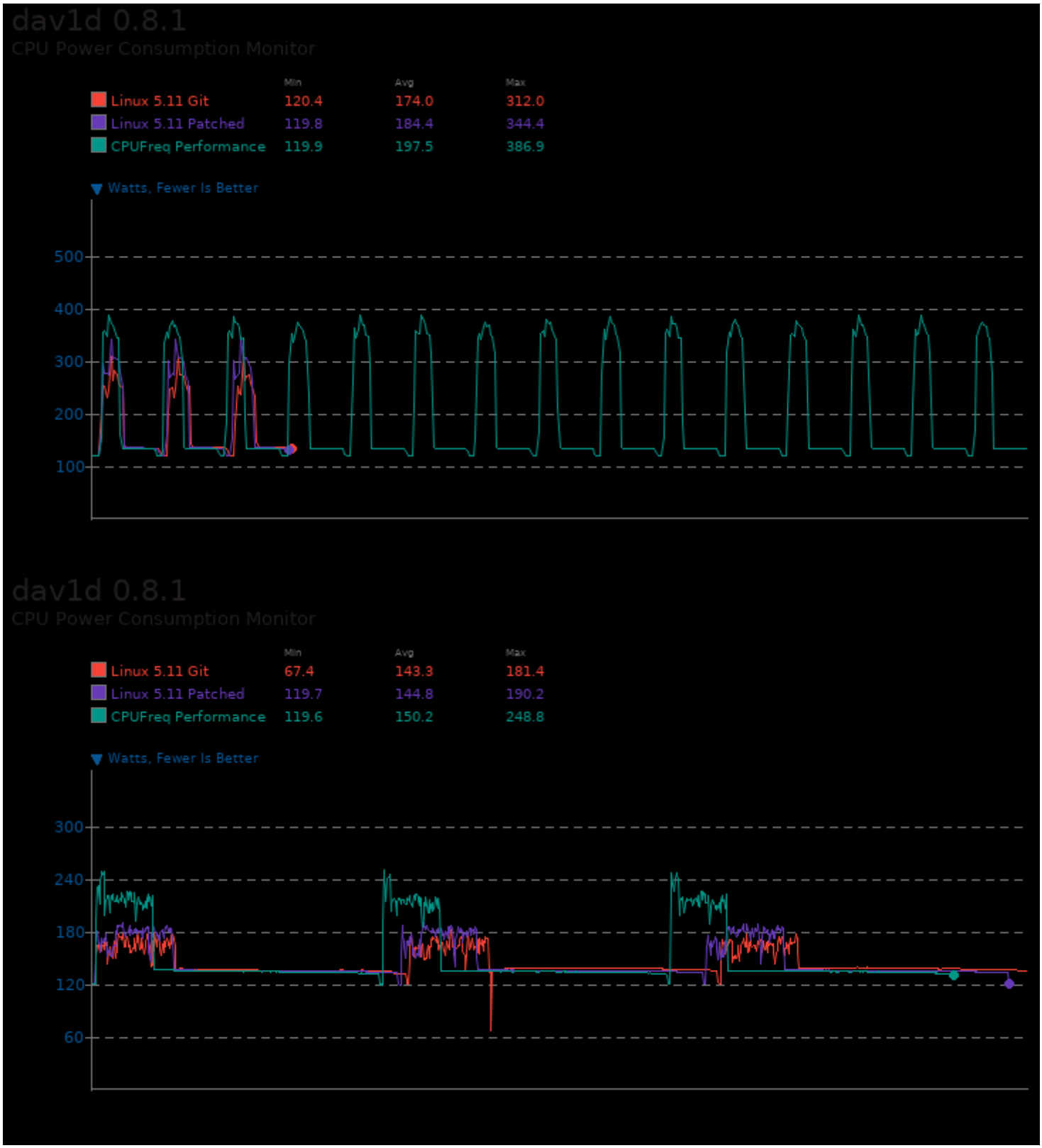

Timed Godot Game Engine Compilation 3.2.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git
121.5
276.7
492.5
Linux 5.11 Patched
120.6
276.3
492.2
CPUFreq Performance
99.7
278.9
492.2
Watts, Fewer Is Better
650
520
390
260
130
Timed GDB GNU Debugger Compilation 9.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git
121.0
157.1
492.3
Linux 5.11 Patched
120.6
159.2
492.3
CPUFreq Performance
120.7
167.0
492.1
Watts, Fewer Is Better
650
520
390
260
130

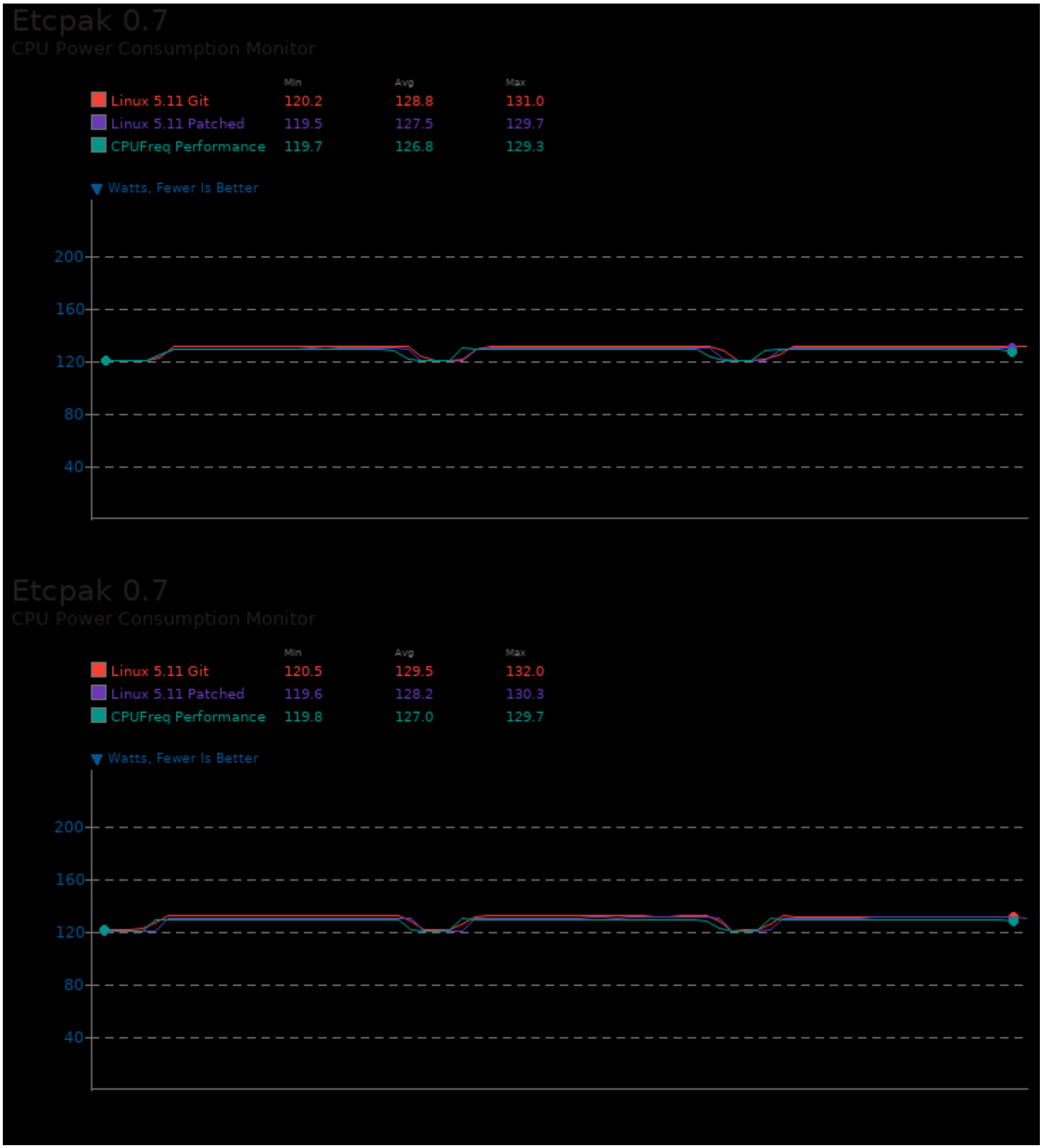

Timed Linux Kernel Compilation 5.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.2 285.2 492.8
Linux 5.11 Patched 120.0 284.2 492.3
CPUFreq Performance 120.3 290.5 492.2
Watts, Fewer Is Better
650
520
390
260
130
Timed LLVM Compilation 10.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.4 319.1 492.3
Linux 5.11 Patched 64.9 318.0 492.4
CPUFreq Performance 121.1 322.9 492.3
Watts, Fewer Is Better
650
520
390
260
130


Cpuminer-Opt 3.15.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 125.4 134.4
Linux 5.11 Patched 120.1 125.9 138.6
CPUFreq Performance 120.9 145.0 174.3
Watts, Fewer Is Better
250
200
150
100
50
Cpuminer-Opt 3.15.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 252.3 443.7
Linux 5.11 Patched 119.9 253.8 480.5
CPUFreq Performance 120.5 254.4 424.5
Watts, Fewer Is Better
600
480
360
240
120


Cpuminer-Opt 3.15.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 162.7 392.2
Linux 5.11 Patched 75.9 166.1 473.3
CPUFreq Performance 120.5 171.8 441.1
Watts, Fewer Is Better
600
480
360
240
120
Cpuminer-Opt 3.15.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 125.5 148.6
Linux 5.11 Patched 120.0 125.6 144.4
CPUFreq Performance 72.0 144.2 193.5
Watts, Fewer Is Better
250
200
150
100
50


Cpuminer-Opt 3.15.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.3 125.8 163.2
Linux 5.11 Patched 119.9 127.4 169.1
CPUFreq Performance 120.6 147.5 245.0
Watts, Fewer Is Better
300
240
180
120
60
Cython Benchmark 0.29.21
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 131.5 134.1
Linux 5.11 Patched 119.9 129.5 131.5
CPUFreq Performance 120.3 130.1 133.8
Watts, Fewer Is Better
200
160
120
80
40

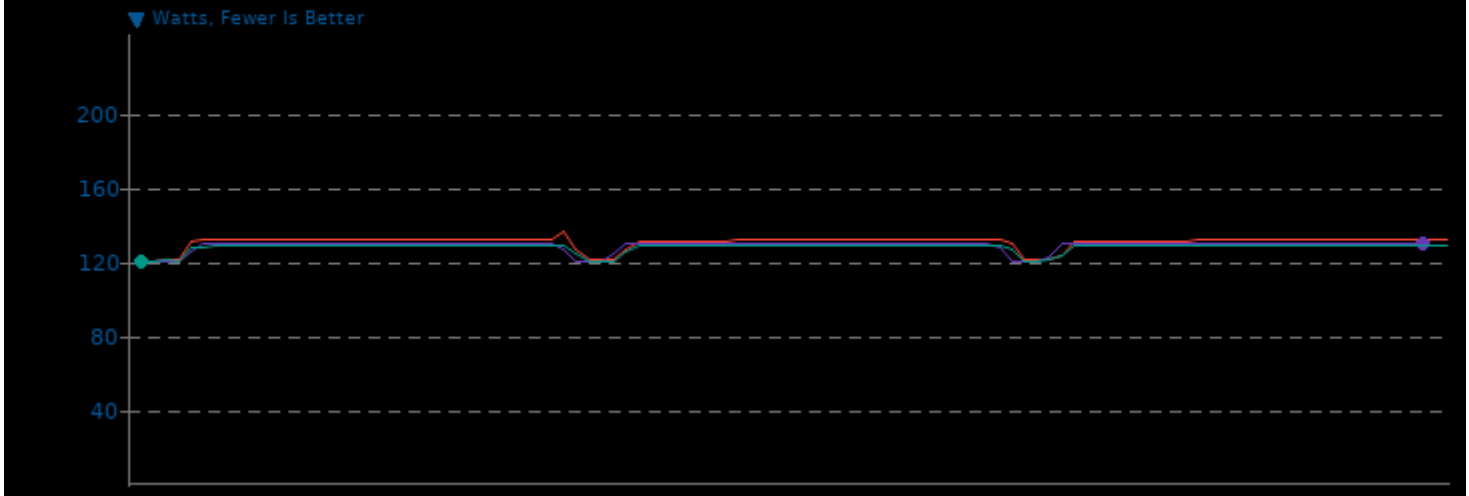

dav1d 0.8.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 174.0 312.0
Linux 5.11 Patched 119.8 184.4 344.4
CPUFreq Performance 119.9 197.5 386.9
Watts, Fewer Is Better
500
400
300
200
100
dav1d 0.8.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 67.4 143.3 181.4
Linux 5.11 Patched 119.7 144.8 190.2
CPUFreq Performance 119.6 150.2 248.8
Watts, Fewer Is Better
300
240
180
120
60


Etcpak 0.7
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.2 128.8 131.0
Linux 5.11 Patched 119.5 127.5 129.7
CPUFreq Performance 119.7 126.8 129.3
Watts, Fewer Is Better
200
160
120
80
40
Etcpak 0.7
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.5 129.5 132.0
Linux 5.11 Patched 119.6 128.2 130.3
CPUFreq Performance 119.8 127.0 129.7
Watts, Fewer Is Better
200
160
120
80
40

Etcpak 0.7

CPU Power Consumption Monitor

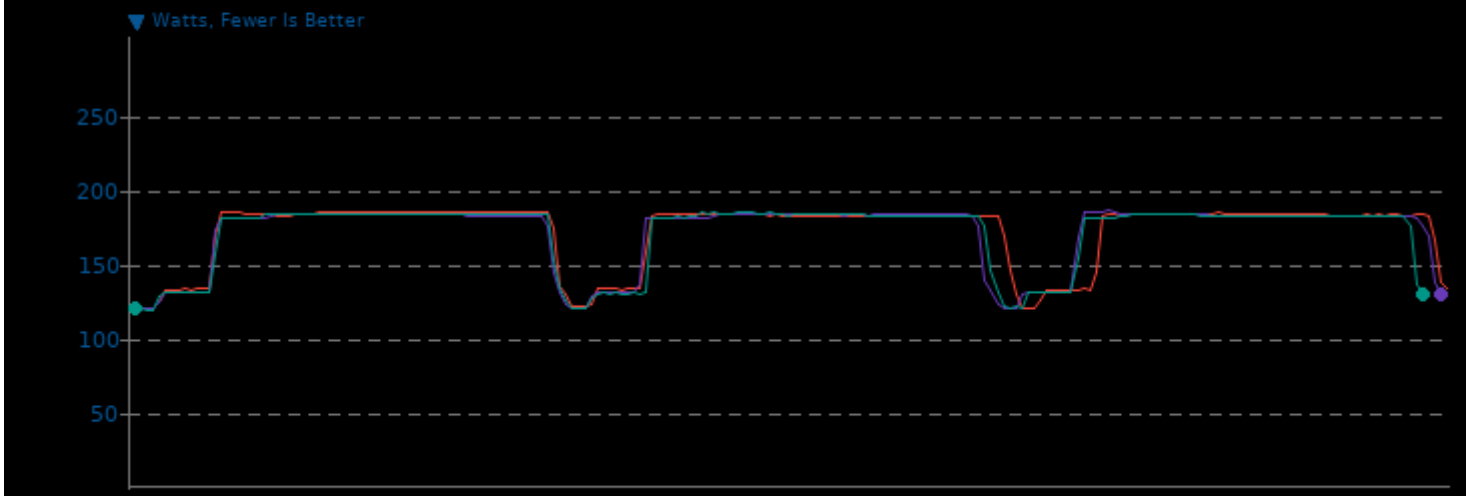
	Min	Avg	Max
Linux 5.11 Git	120.3	130.2	136.3
Linux 5.11 Patched	119.7	128.7	130.1
CPUFreq Performance	119.9	127.4	128.6

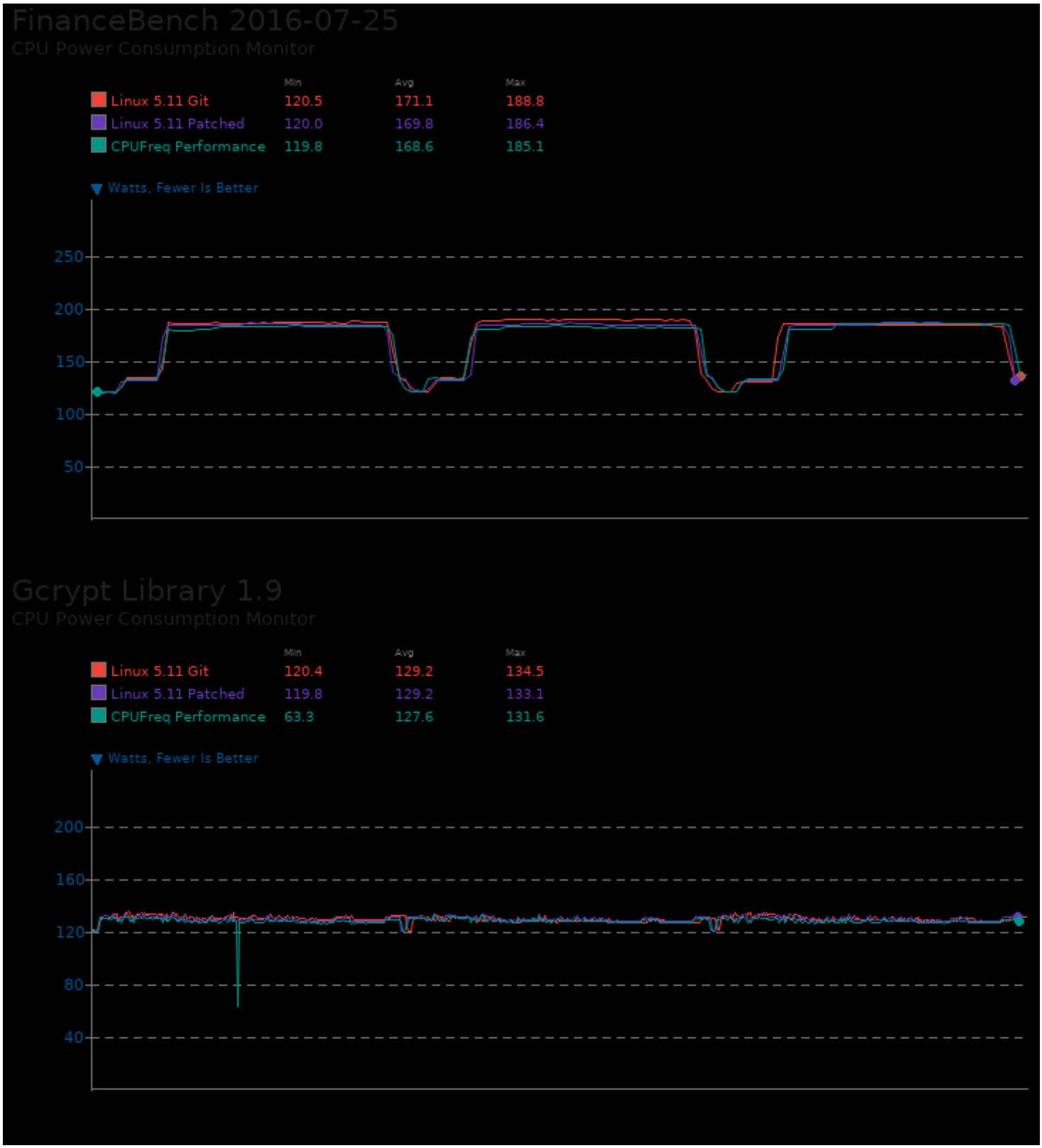


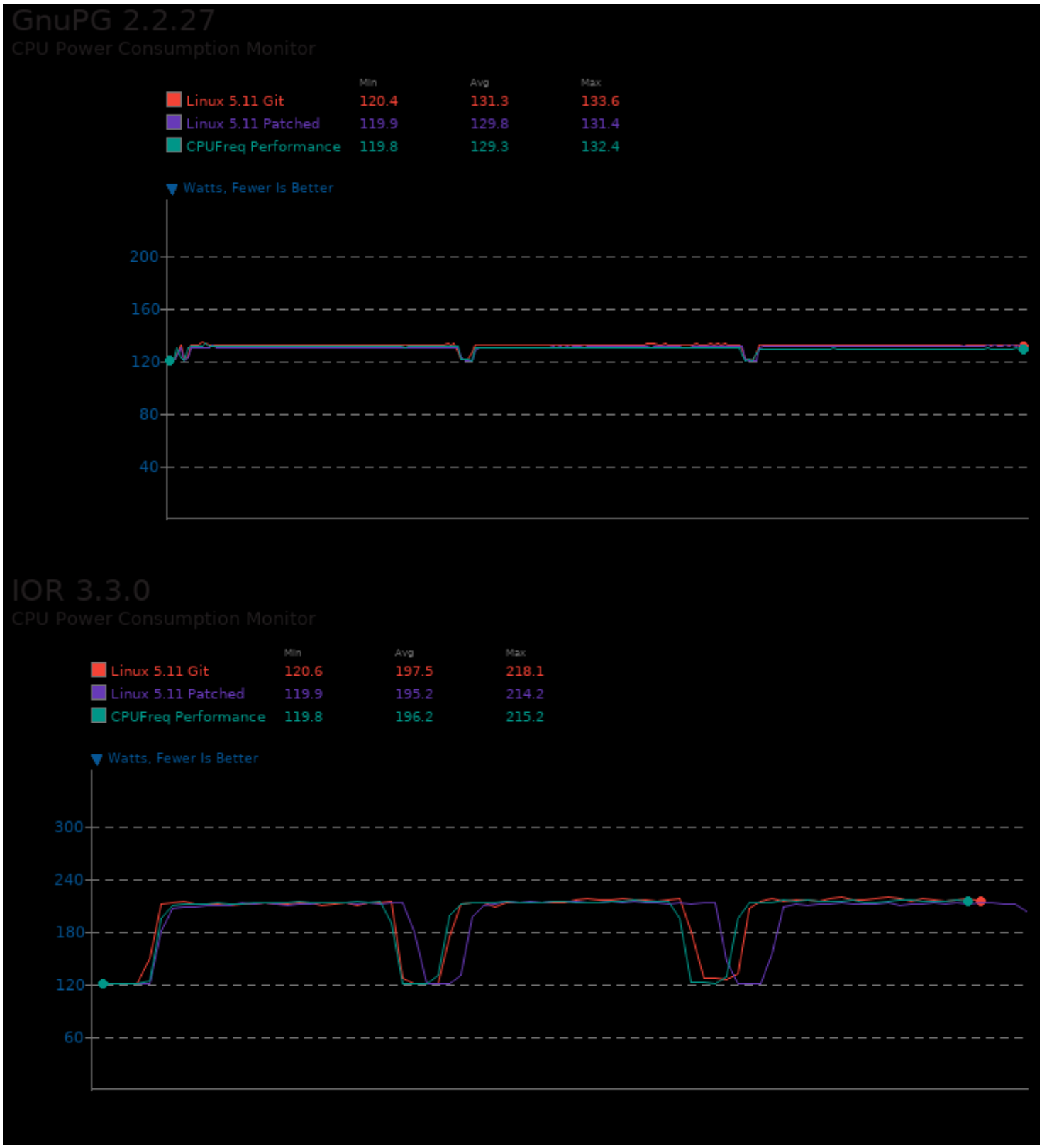
FinanceBench 2016-07-25

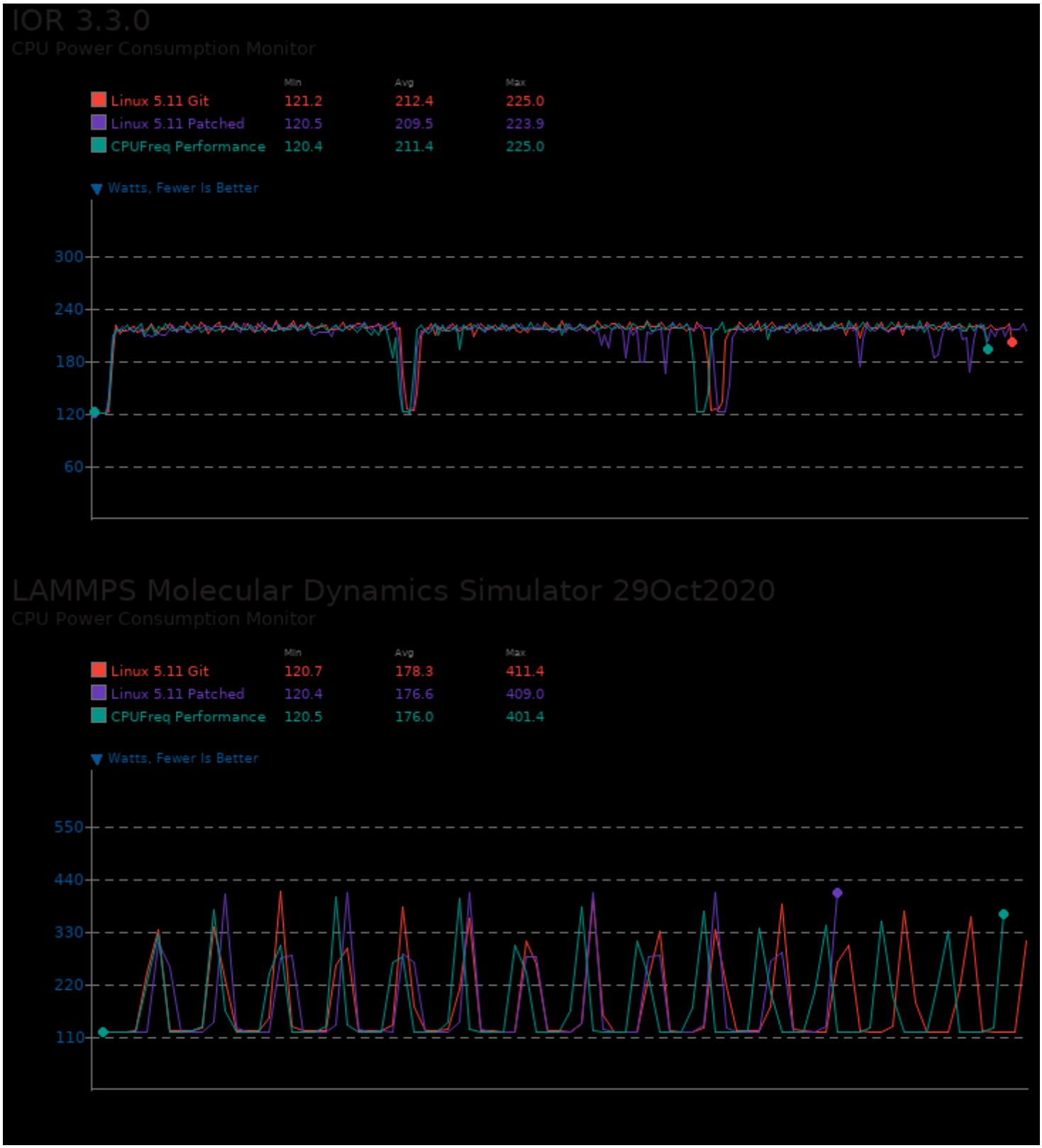
CPU Power Consumption Monitor

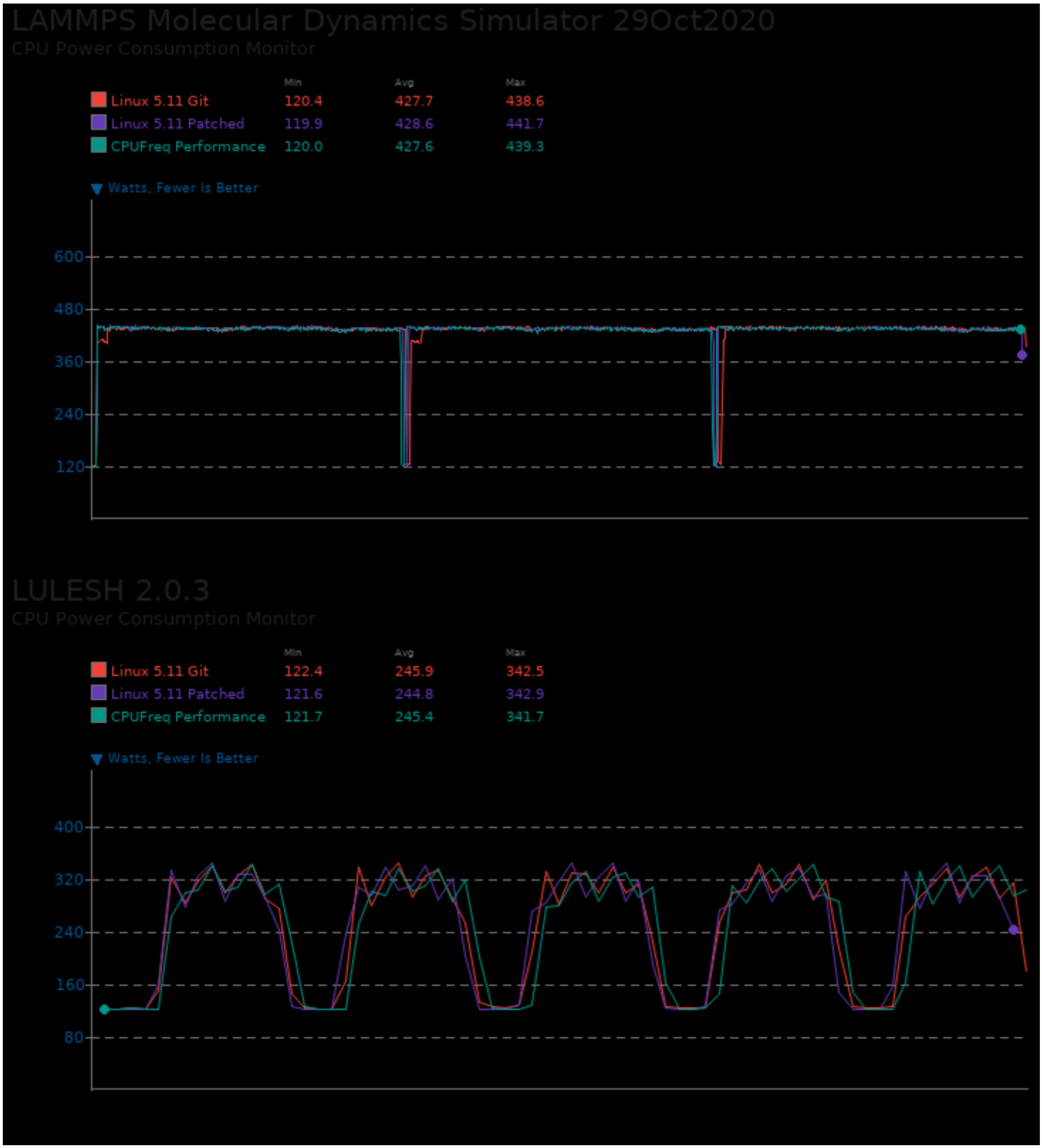
	Min	Avg	Max
Linux 5.11 Git	120.4	172.2	185.3
Linux 5.11 Patched	120.0	171.1	185.9
CPUFreq Performance	119.8	171.0	184.5

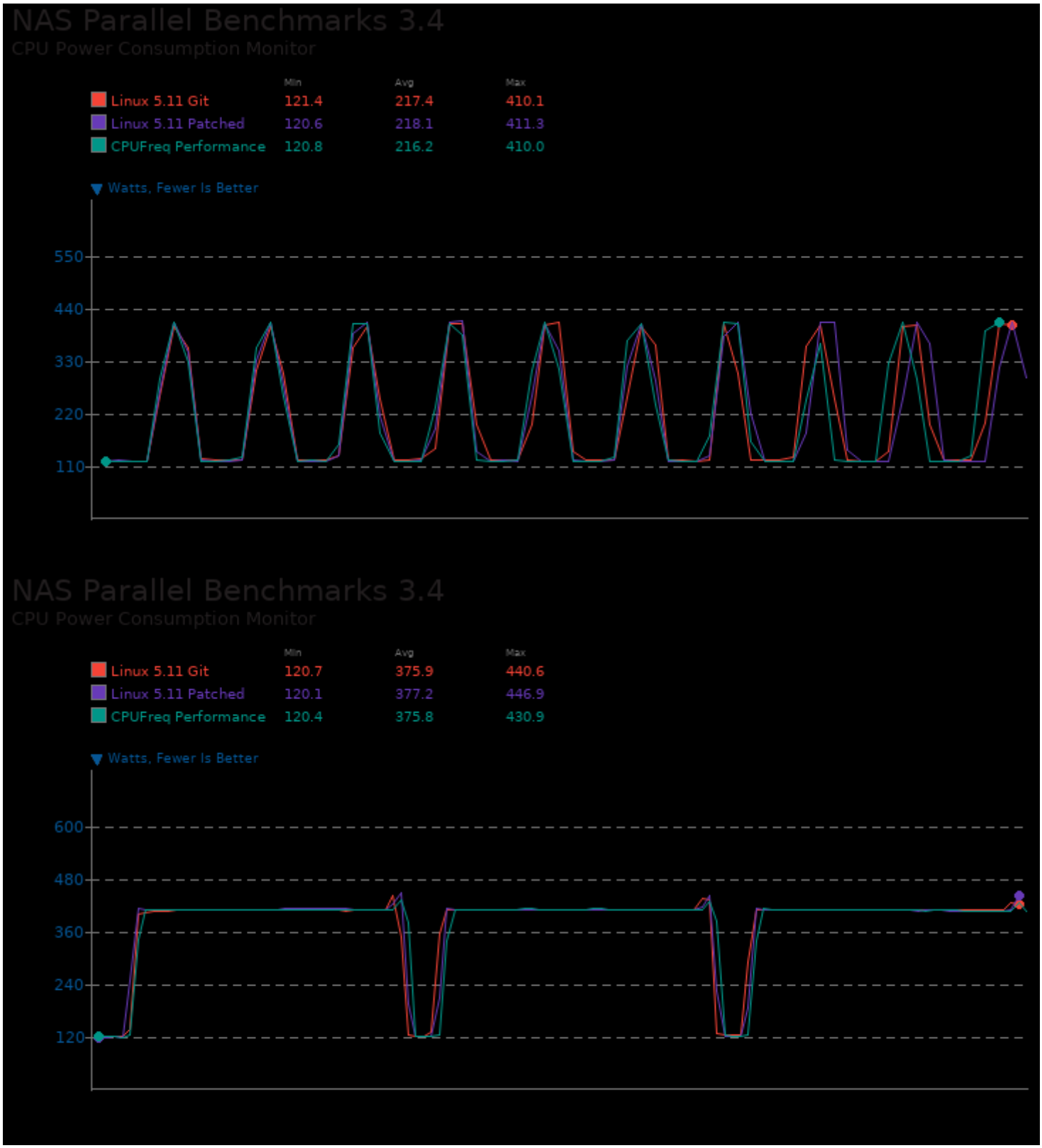


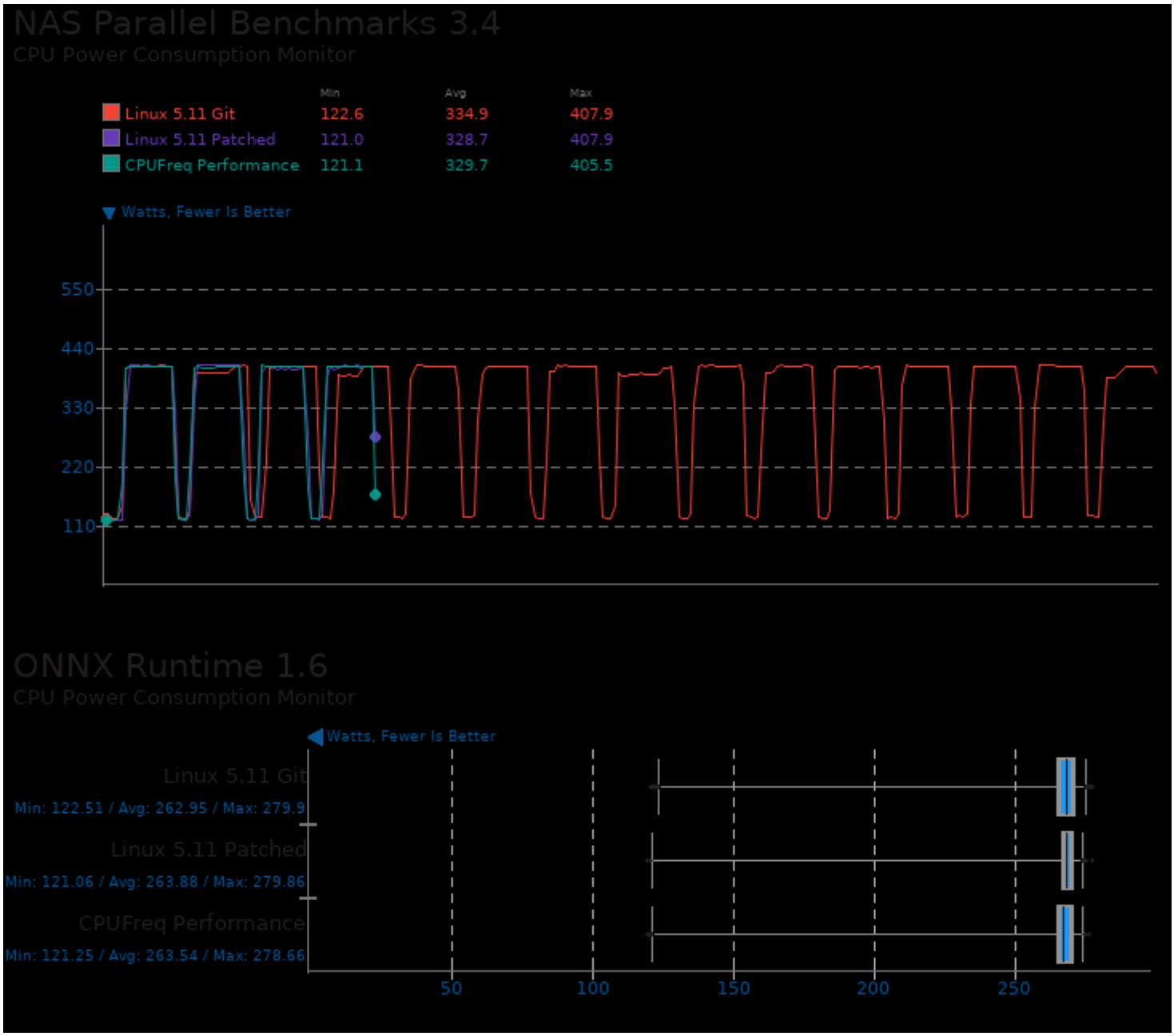

FinanceBench 2016-07-25
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.5 171.1 188.8
Linux 5.11 Patched 120.0 169.8 186.4
CPUFreq Performance 119.8 168.6 185.1
Watts, Fewer Is Better
250
200
150
100
50
Gcrypt Library 1.9
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 129.2 134.5
Linux 5.11 Patched 119.8 129.2 133.1
CPUFreq Performance 63.3 127.6 131.6
Watts, Fewer Is Better
200
160
120
80
40


GnuPG 2.2.27
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 131.3 133.6
Linux 5.11 Patched 119.9 129.8 131.4
CPUFreq Performance 119.8 129.3 132.4
Watts, Fewer Is Better
200
160
120
80
40
IOR 3.3.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 197.5 218.1
Linux 5.11 Patched 119.9 195.2 214.2
CPUFreq Performance 119.8 196.2 215.2
Watts, Fewer Is Better
300
240
180
120
60

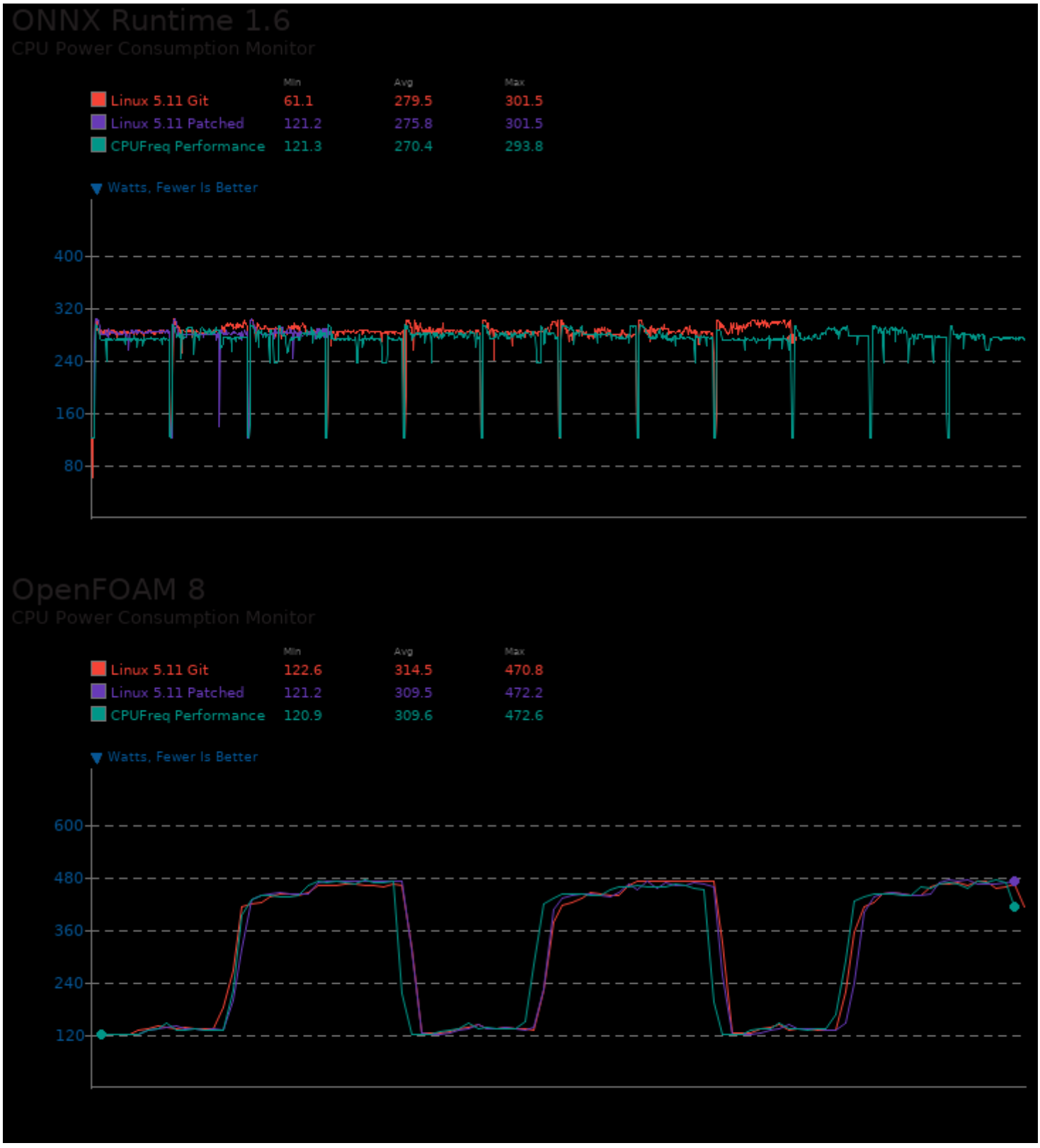

IOR 3.3.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.2 212.4 225.0
Linux 5.11 Patched 120.5 209.5 223.9
CPUFreq Performance 120.4 211.4 225.0
Watts, Fewer Is Better
300
240
180
120
60
LAMMPS Molecular Dynamics Simulator 29Oct2020
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 178.3 411.4
Linux 5.11 Patched 120.4 176.6 409.0
CPUFreq Performance 120.5 176.0 401.4
Watts, Fewer Is Better
550
440
330
220
110

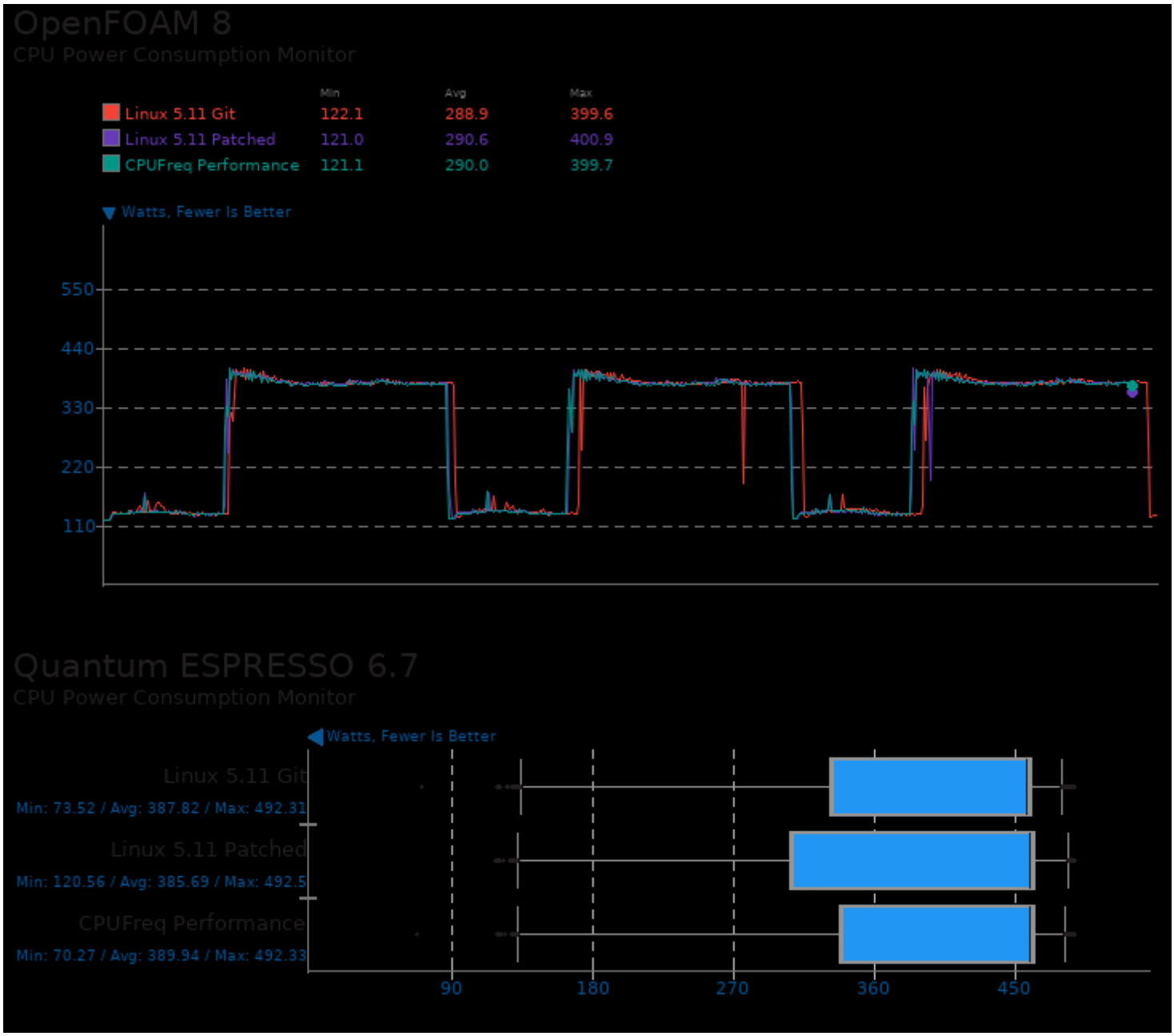

LAMMPS Molecular Dynamics Simulator 29Oct2020
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 427.7 438.6
Linux 5.11 Patched 119.9 428.6 441.7
CPUFreq Performance 120.0 427.6 439.3
Watts, Fewer Is Better
600
480
360
240
120
LULESH 2.0.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.4 245.9 342.5
Linux 5.11 Patched 121.6 244.8 342.9
CPUFreq Performance 121.7 245.4 341.7
Watts, Fewer Is Better
400
320
240
160
80

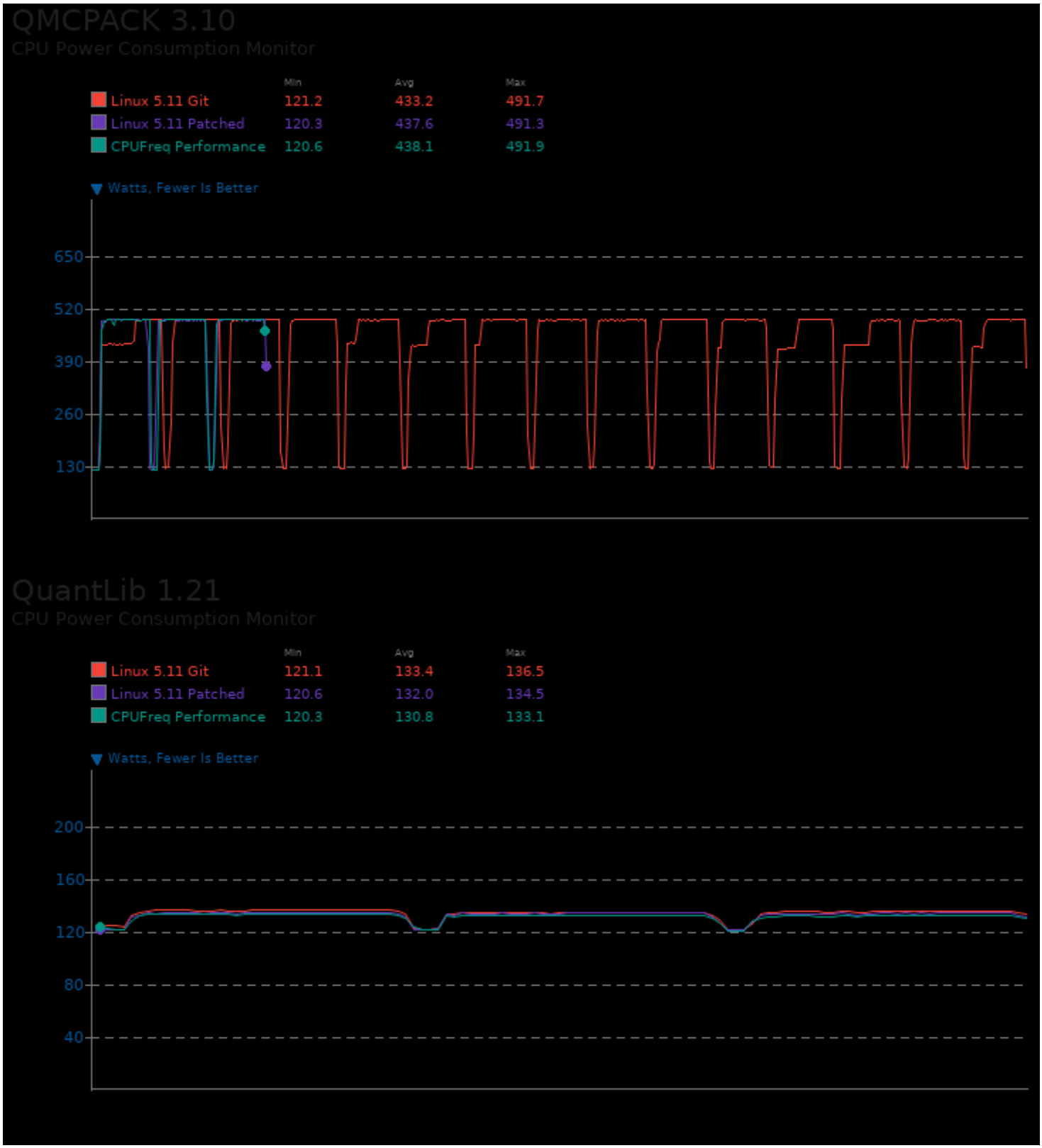

NAS Parallel Benchmarks 3.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.4 217.4 410.1
Linux 5.11 Patched 120.6 218.1 411.3
CPUFreq Performance 120.8 216.2 410.0
Watts, Fewer Is Better
550
440
330
220
110
NAS Parallel Benchmarks 3.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 375.9 440.6
Linux 5.11 Patched 120.1 377.2 446.9
CPUFreq Performance 120.4 375.8 430.9
Watts, Fewer Is Better
600
480
360
240
120


NAS Parallel Benchmarks 3.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.6 334.9 407.9
Linux 5.11 Patched 121.0 328.7 407.9
CPUFreq Performance 121.1 329.7 405.5
Watts, Fewer Is Better
550
440
330
220
110
ONNX Runtime 1.6
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 122.51 / Avg: 262.95 / Max: 279.9
Linux 5.11 Patched
Min: 121.06 / Avg: 263.88 / Max: 279.86
CPUFreq Performance
Min: 121.25 / Avg: 263.54 / Max: 278.66
50
100
150
200
250

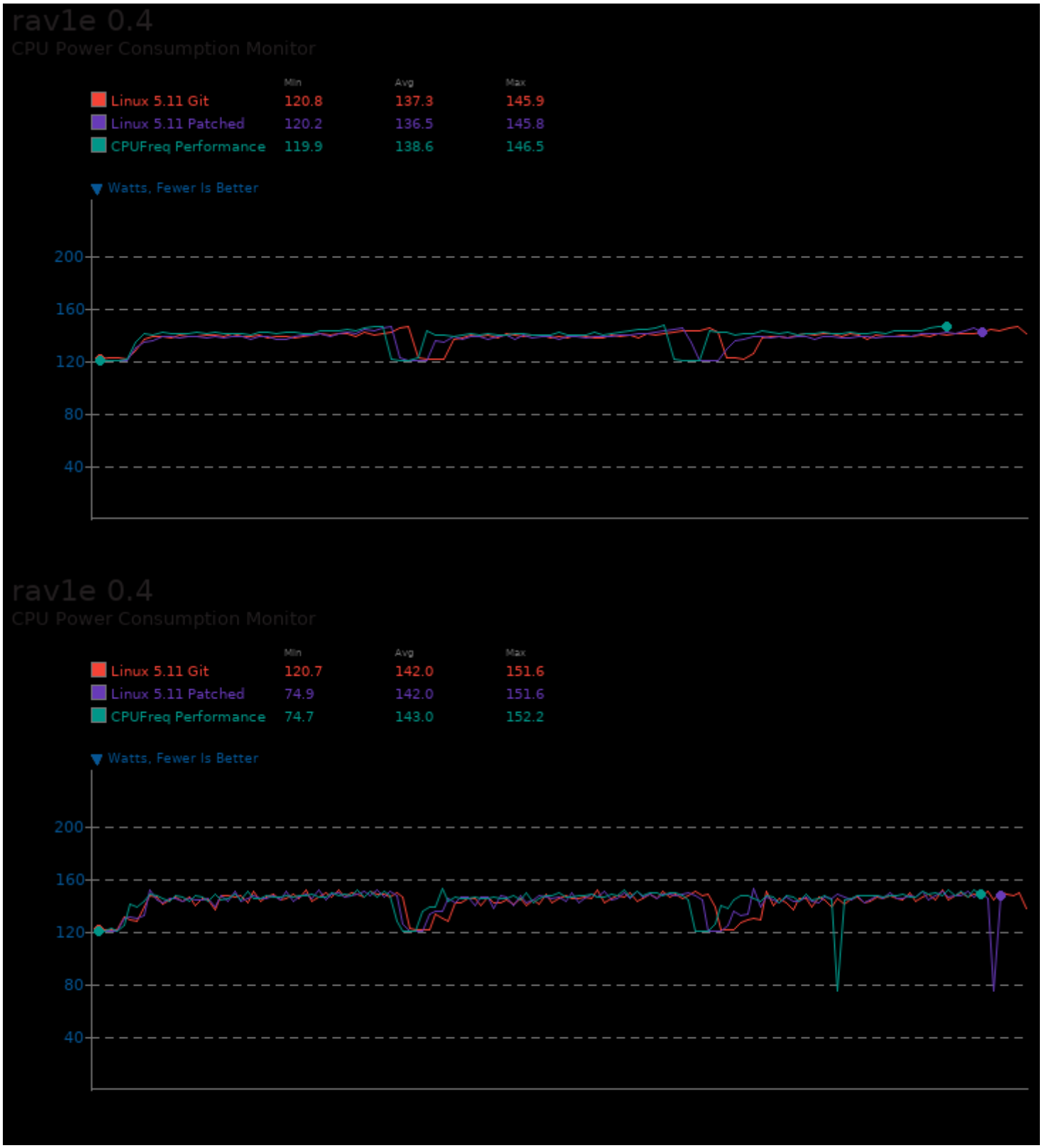
AMD EPYC 7F72 2P Linux 5.11 Perf Governor



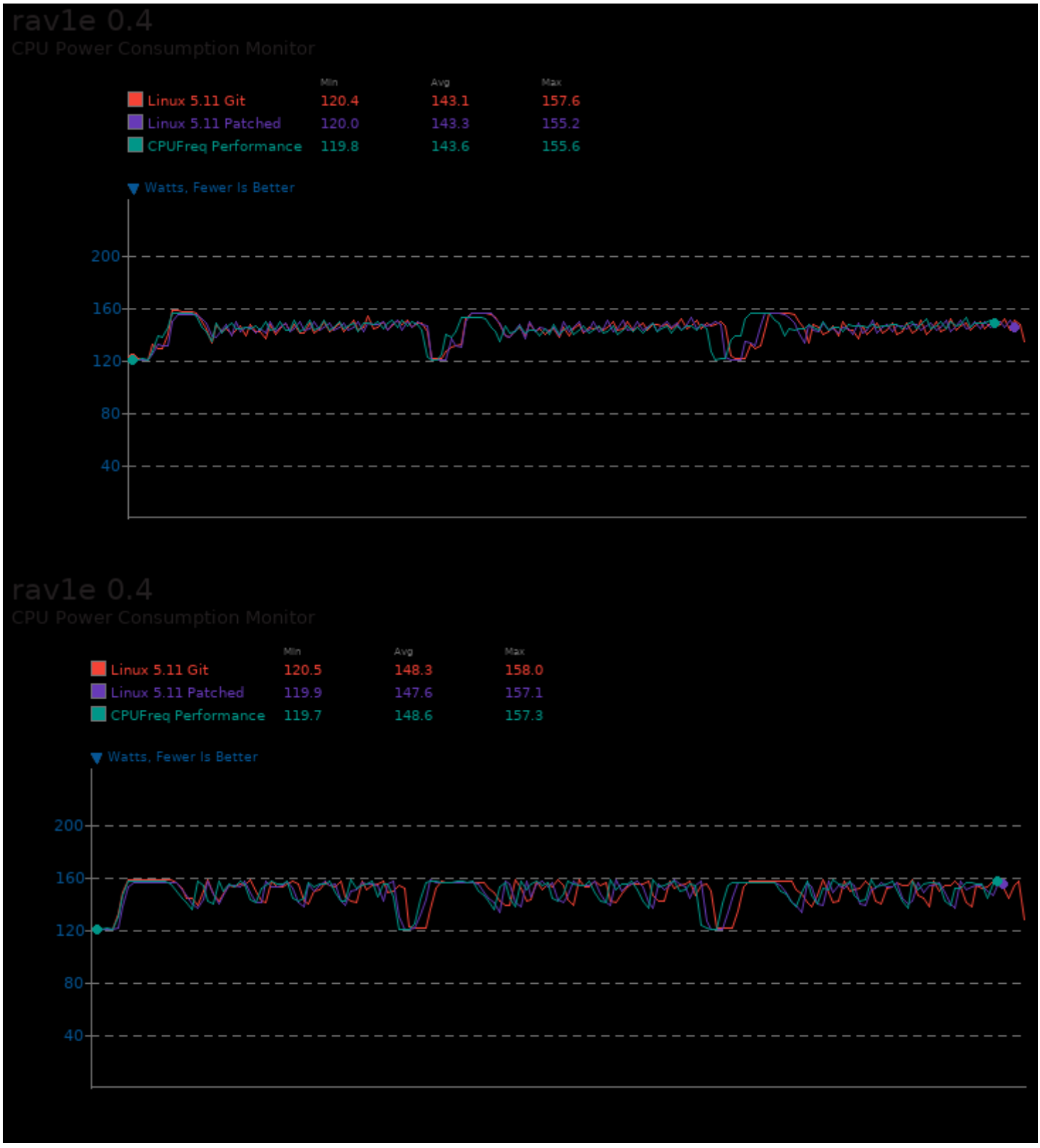

OpenFOAM 8
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.1 288.9 399.6
Linux 5.11 Patched 121.0 290.6 400.9
CPUFreq Performance 121.1 290.0 399.7
Watts, Fewer Is Better
550
440
330
220
110
Quantum ESPRESSO 6.7
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 73.52 / Avg: 387.82 / Max: 492.31
Linux 5.11 Patched
Min: 120.56 / Avg: 385.69 / Max: 492.5
CPUFreq Performance
Min: 70.27 / Avg: 389.94 / Max: 492.33
90
180
270
360
450

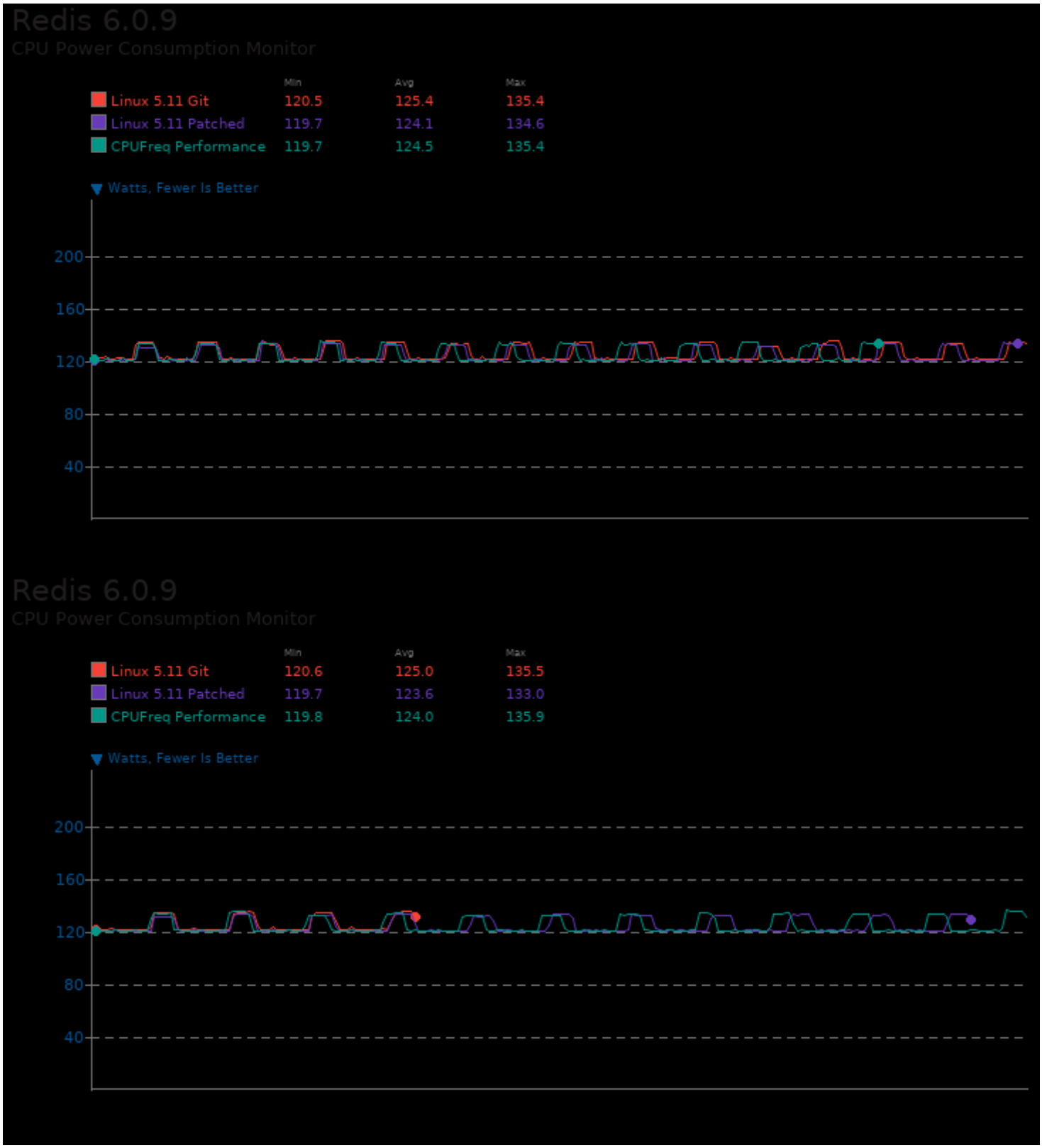

QMCPACK 3.10
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.2 433.2 491.7
Linux 5.11 Patched 120.3 437.6 491.3
CPUFreq Performance 120.6 438.1 491.9
Watts, Fewer Is Better
650
520
390
260
130
QuantLib 1.21
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.1 133.4 136.5
Linux 5.11 Patched 120.6 132.0 134.5
CPUFreq Performance 120.3 130.8 133.1
Watts, Fewer Is Better
200
160
120
80
40

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

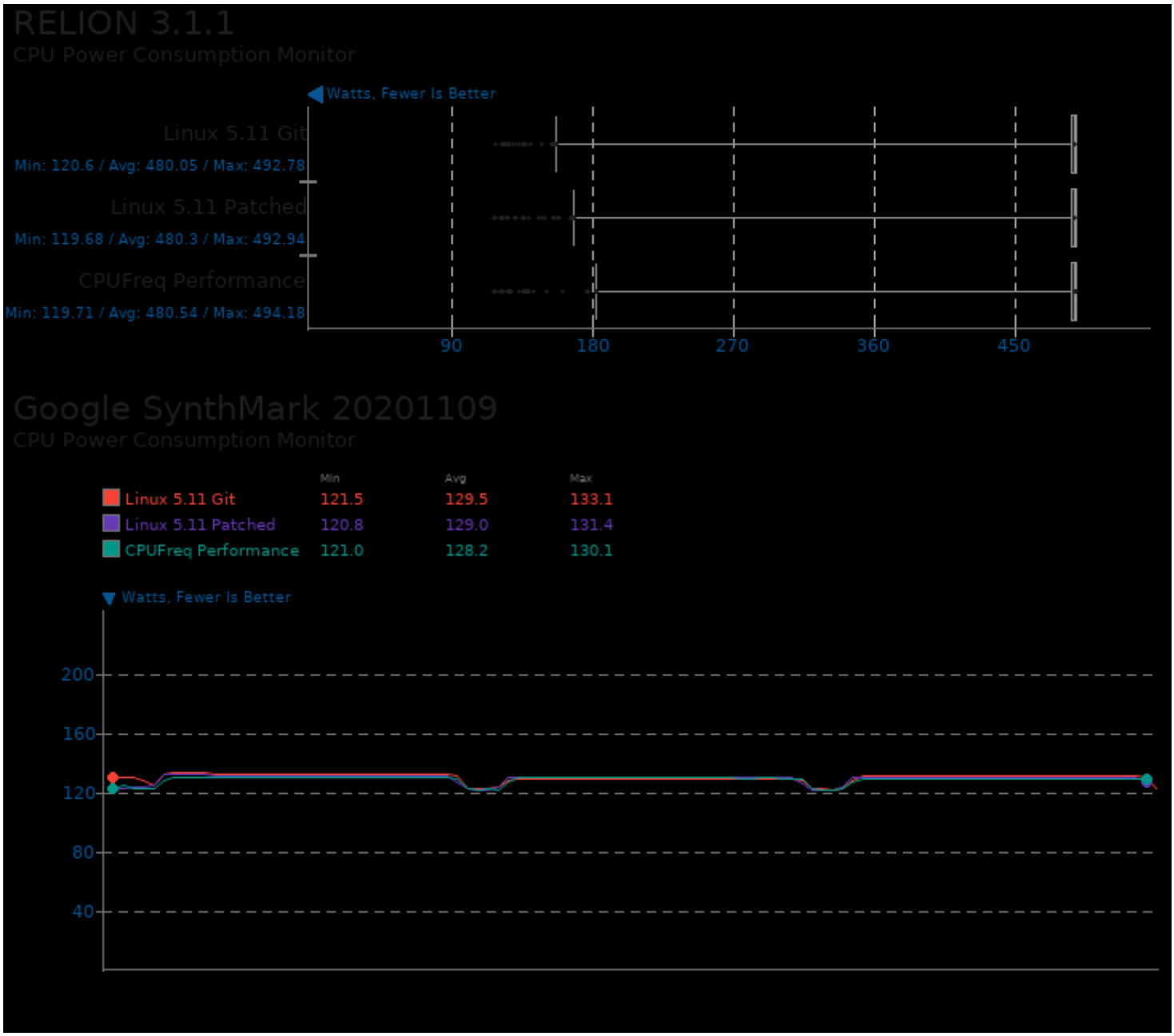


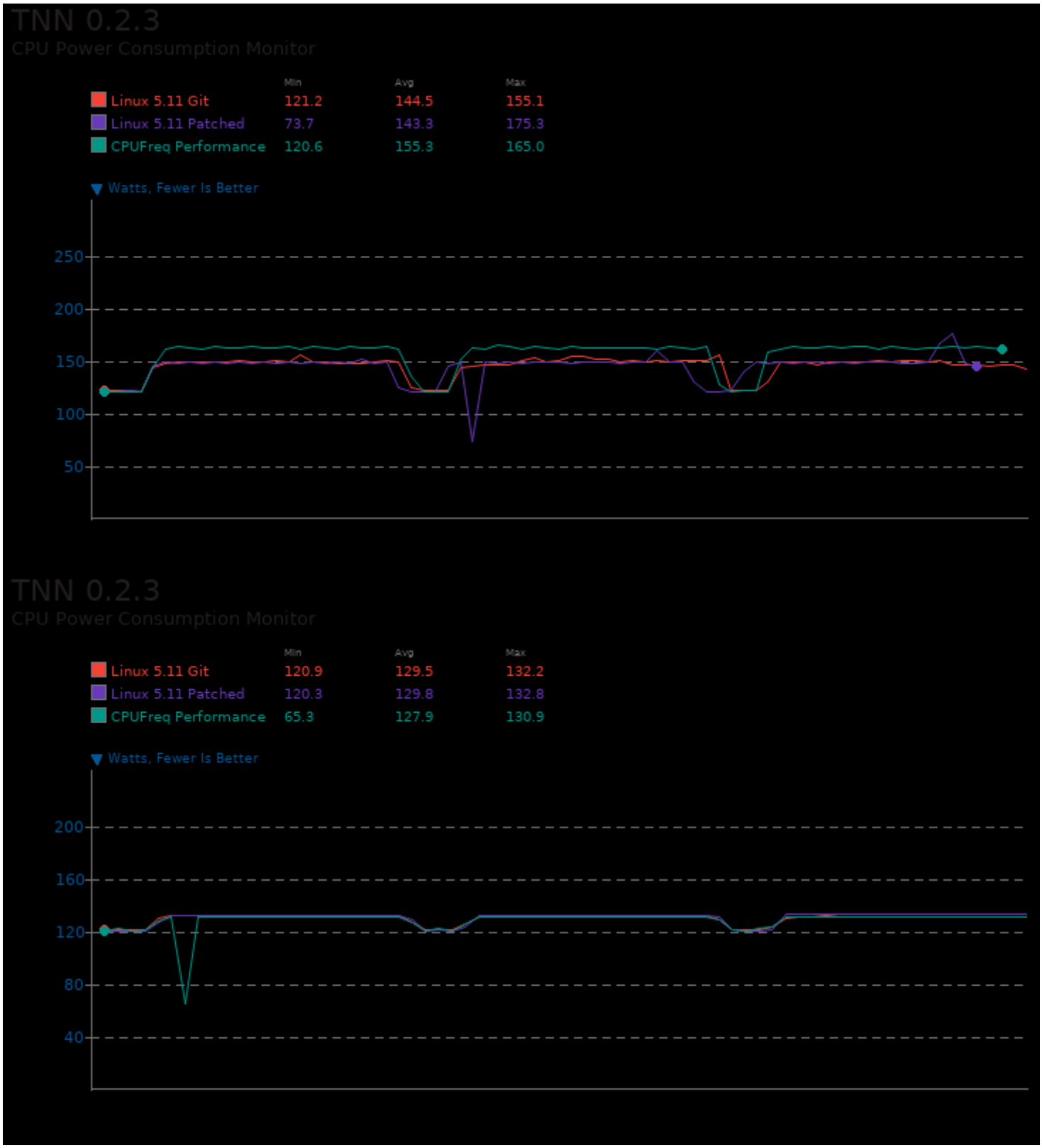
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

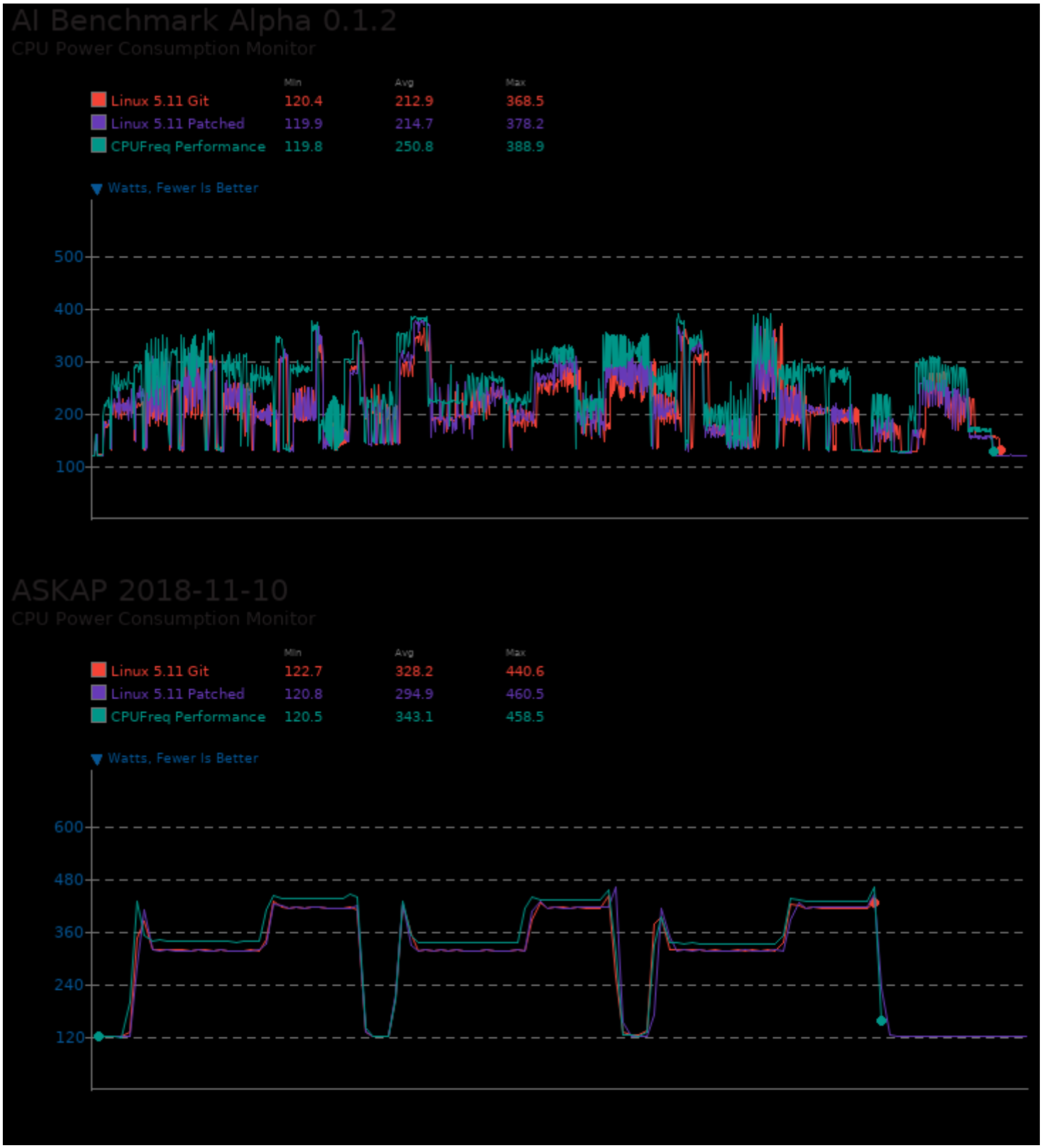


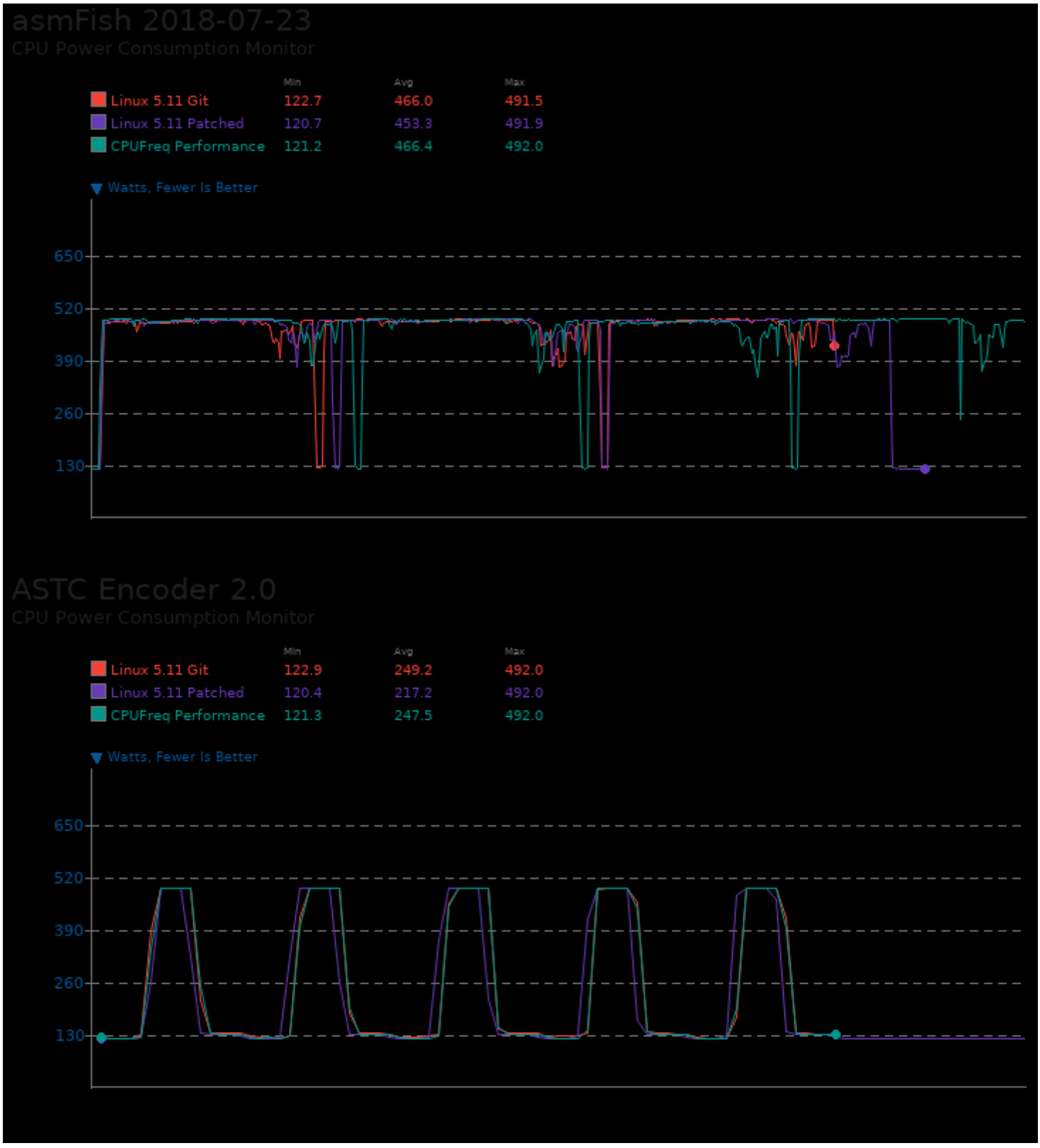

Redis 6.0.9
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.5 125.4 135.4
Linux 5.11 Patched 119.7 124.1 134.6
CPUFreq Performance 119.7 124.5 135.4
Watts, Fewer Is Better
200
160
120
80
40
Redis 6.0.9
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 125.0 135.5
Linux 5.11 Patched 119.7 123.6 133.0
CPUFreq Performance 119.8 124.0 135.9
Watts, Fewer Is Better
200
160
120
80
40

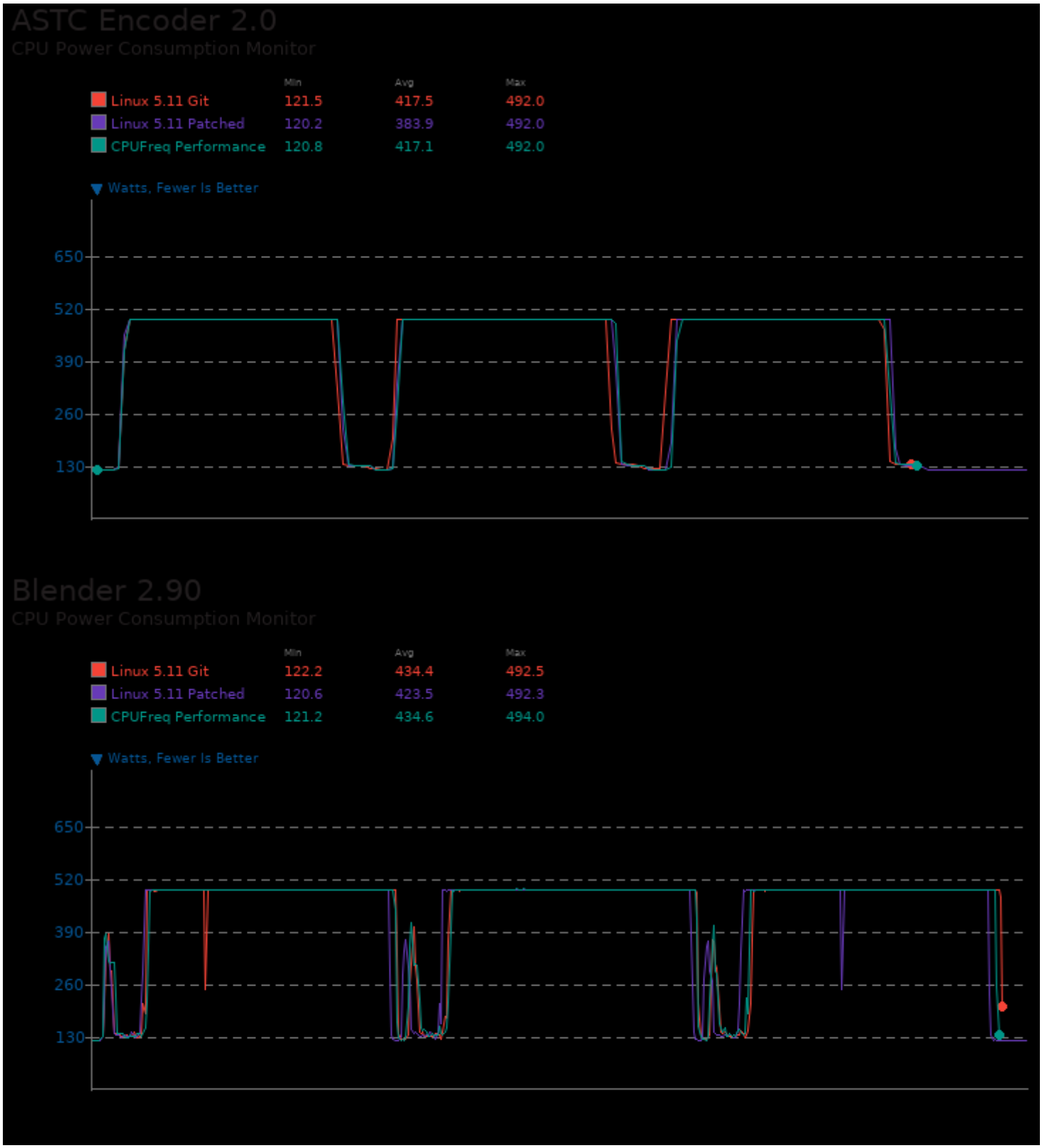

Redis 6.0.9
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.5 125.7 134.2
Linux 5.11 Patched 119.7 124.5 132.3
CPUFreq Performance 119.8 124.9 134.8
Watts, Fewer Is Better
200
160
120
80
40
Redis 6.0.9
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 66.7 123.9 133.7
Linux 5.11 Patched 119.6 123.6 132.8
CPUFreq Performance 119.7 124.2 136.0
Watts, Fewer Is Better
200
160
120
80
40

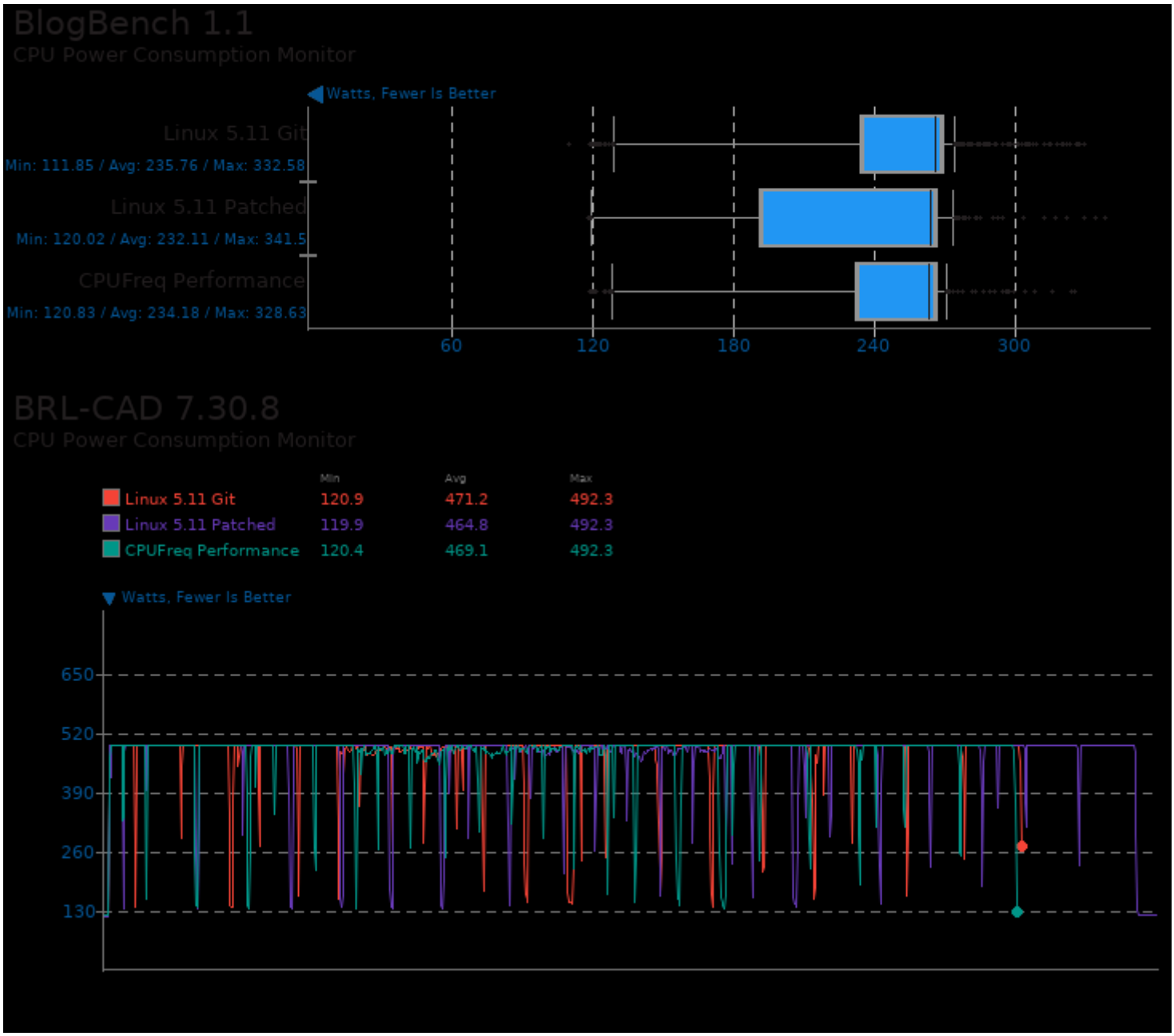

RELION 3.1.1
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 120.6 / Avg: 480.05 / Max: 492.78
Linux 5.11 Patched
Min: 119.68 / Avg: 480.3 / Max: 492.94
CPUFreq Performance
Min: 119.71 / Avg: 480.54 / Max: 494.18
90
180
270
360
450
Google SynthMark 20201109
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.5 129.5 133.1
Linux 5.11 Patched 120.8 129.0 131.4
CPUFreq Performance 121.0 128.2 130.1
Watts, Fewer Is Better
200
160
120
80
40


TNN 0.2.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.2 144.5 155.1
Linux 5.11 Patched 73.7 143.3 175.3
CPUFreq Performance 120.6 155.3 165.0
Watts, Fewer Is Better
250
200
150
100
50
TNN 0.2.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 129.5 132.2
Linux 5.11 Patched 120.3 129.8 132.8
CPUFreq Performance 65.3 127.9 130.9
Watts, Fewer Is Better
200
160
120
80
40


AI Benchmark Alpha 0.1.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.4 212.9 368.5
Linux 5.11 Patched 119.9 214.7 378.2
CPUFreq Performance 119.8 250.8 388.9
Watts, Fewer Is Better
500
400
300
200
100
ASKAP 2018-11-10
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.7 328.2 440.6
Linux 5.11 Patched 120.8 294.9 460.5
CPUFreq Performance 120.5 343.1 458.5
Watts, Fewer Is Better
600
480
360
240
120


asmFish 2018-07-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.7 466.0 491.5
Linux 5.11 Patched 120.7 453.3 491.9
CPUFreq Performance 121.2 466.4 492.0
Watts, Fewer Is Better
650
520
390
260
130
ASTC Encoder 2.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.9 249.2 492.0
Linux 5.11 Patched 120.4 217.2 492.0
CPUFreq Performance 121.3 247.5 492.0
Watts, Fewer Is Better
650
520
390
260
130

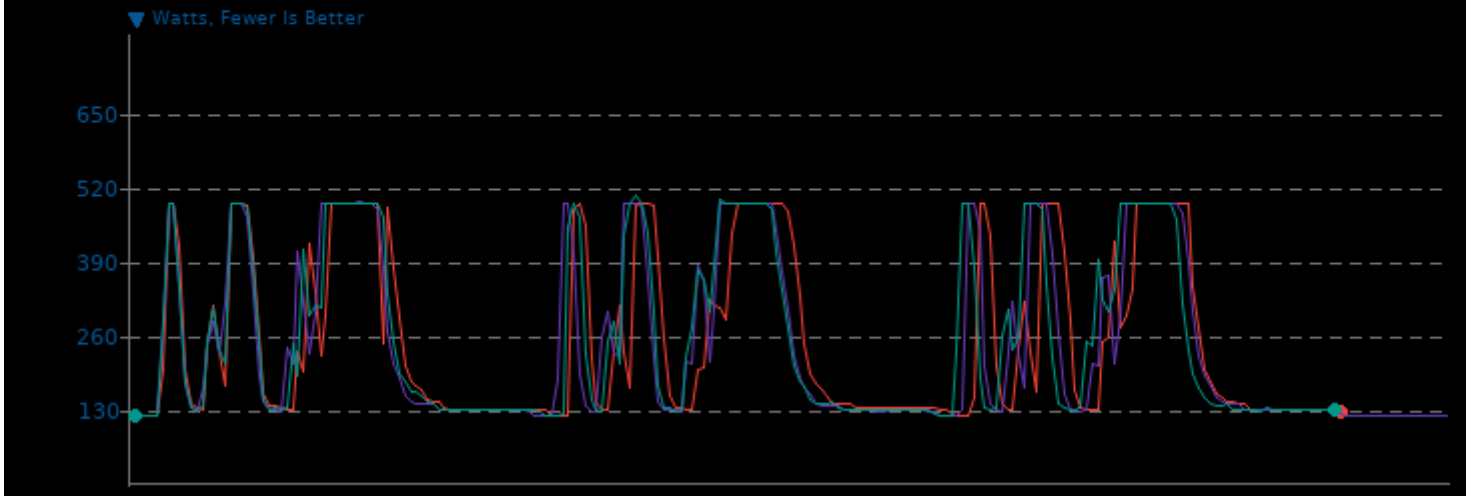

ASTC Encoder 2.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.5 417.5 492.0
Linux 5.11 Patched 120.2 383.9 492.0
CPUFreq Performance 120.8 417.1 492.0
Watts, Fewer Is Better
650
520
390
260
130
Blender 2.90
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 434.4 492.5
Linux 5.11 Patched 120.6 423.5 492.3
CPUFreq Performance 121.2 434.6 494.0
Watts, Fewer Is Better
650
520
390
260
130


BlogBench 1.1
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 111.85 / Avg: 235.76 / Max: 332.58
Linux 5.11 Patched
Min: 120.02 / Avg: 232.11 / Max: 341.5
CPUFreq Performance
Min: 120.83 / Avg: 234.18 / Max: 328.63
60
120
180
240
300
BRL-CAD 7.30.8
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 471.2 492.3
Linux 5.11 Patched 119.9 464.8 492.3
CPUFreq Performance 120.4 469.1 492.3
Watts, Fewer Is Better
650
520
390
260
130

Build2 0.13

CPU Power Consumption Monitor

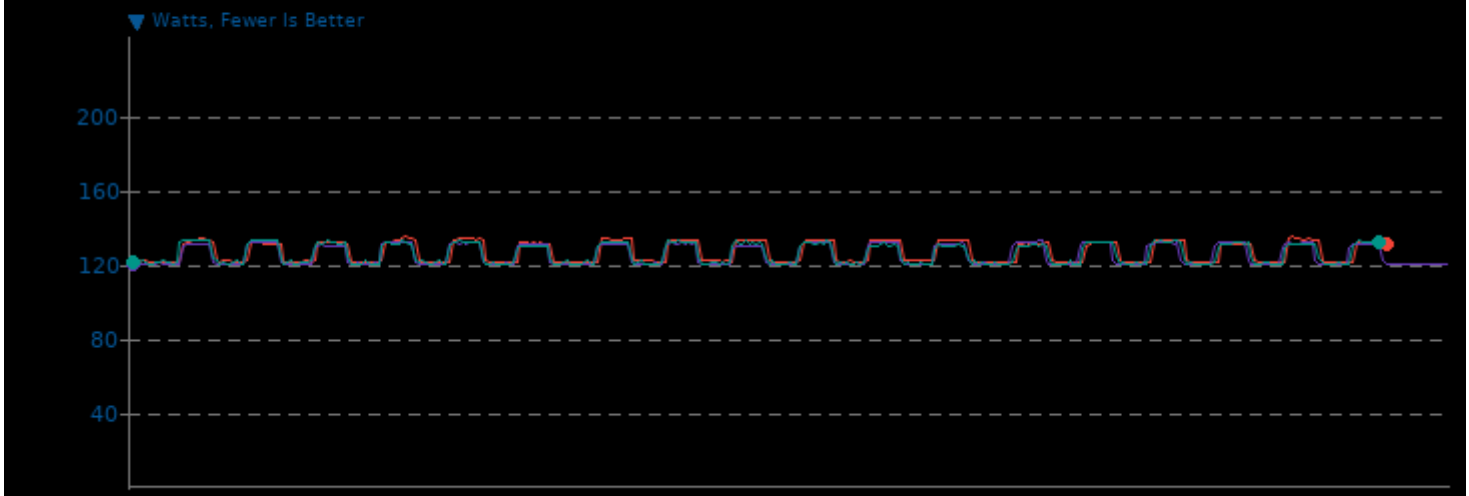
	Min	Avg	Max
Linux 5.11 Git	121.7	254.7	492.2
Linux 5.11 Patched	120.4	244.2	493.2
CPUFreq Performance	120.9	256.5	506.4



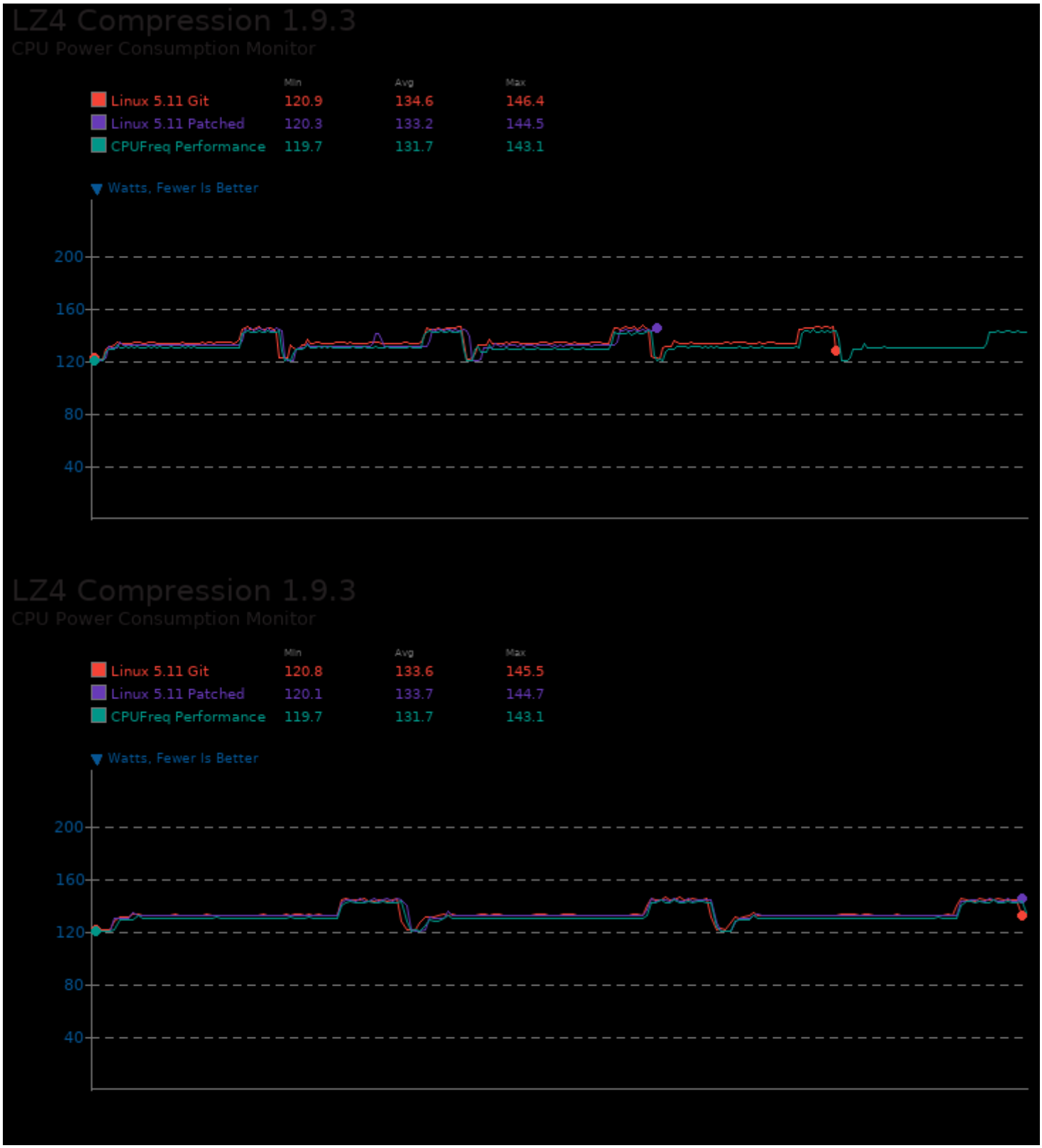
BYTE Unix Benchmark 3.6

CPU Power Consumption Monitor

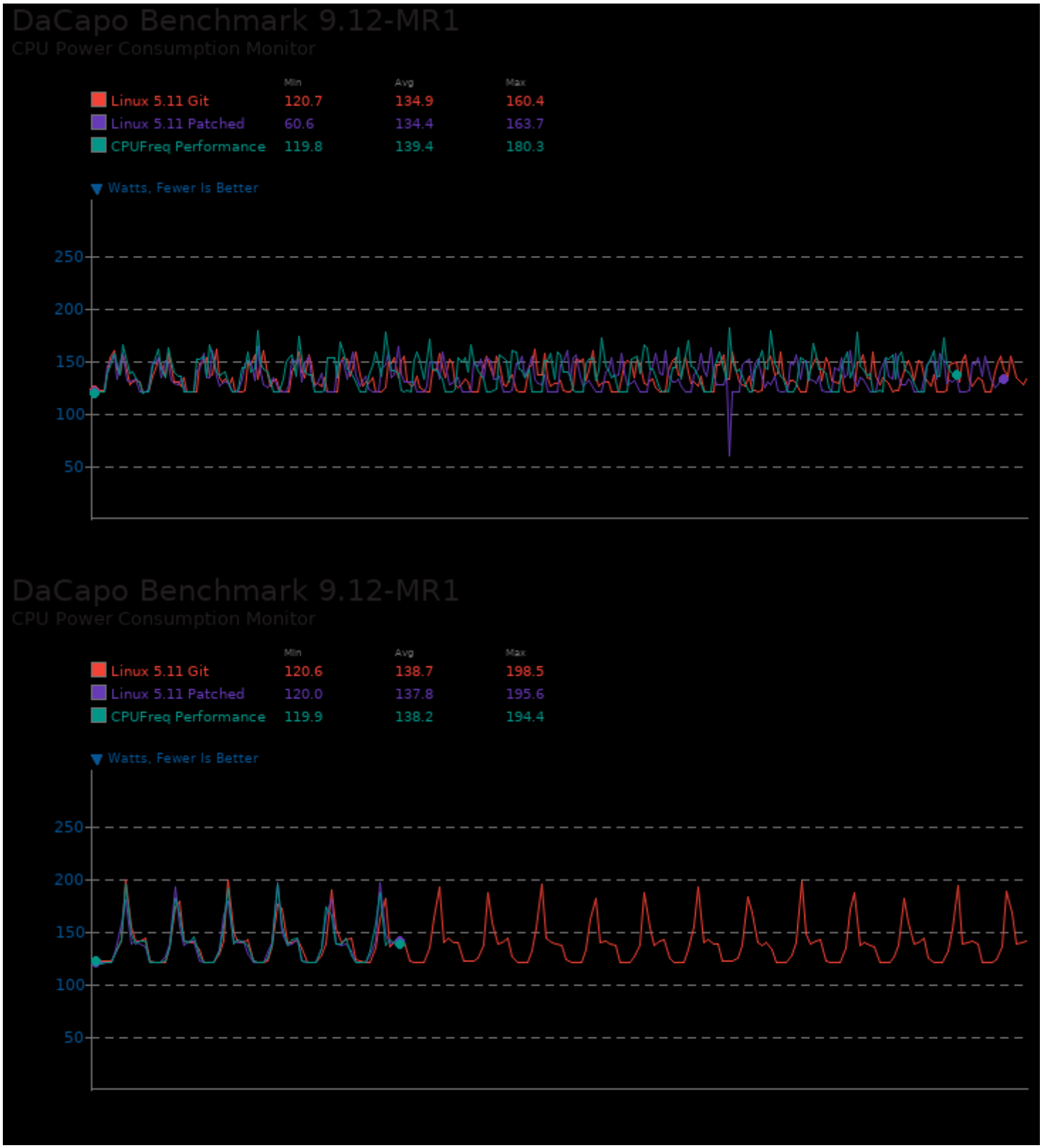
	Min	Avg	Max
Linux 5.11 Git	120.7	126.6	134.9
Linux 5.11 Patched	119.7	125.1	132.4
CPUFreq Performance	120.0	125.8	133.3




Zstd Compression 1.4.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.4 153.5 205.1
Linux 5.11 Patched 120.7 150.7 214.6
CPUFreq Performance 120.0 153.7 222.8
Watts, Fewer Is Better
300
240
180
120
60
LZ4 Compression 1.9.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.6 139.8 146.0
Linux 5.11 Patched 120.7 139.0 145.1
CPUFreq Performance 71.1 136.9 143.9
Watts, Fewer Is Better
200
160
120
80
40

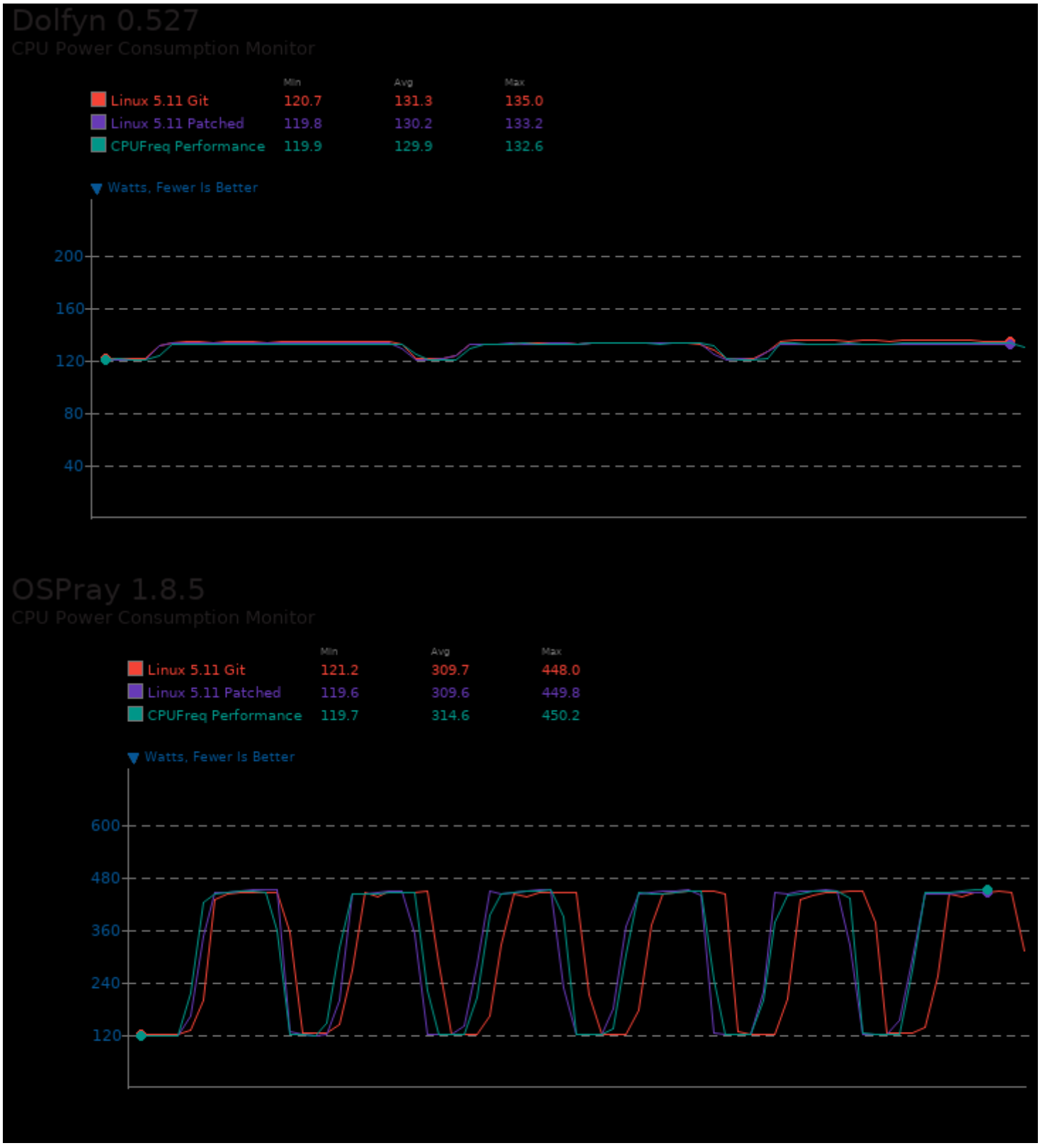

LZ4 Compression 1.9.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 134.6 146.4
Linux 5.11 Patched 120.3 133.2 144.5
CPUFreq Performance 119.7 131.7 143.1
Watts, Fewer Is Better
200
160
120
80
40

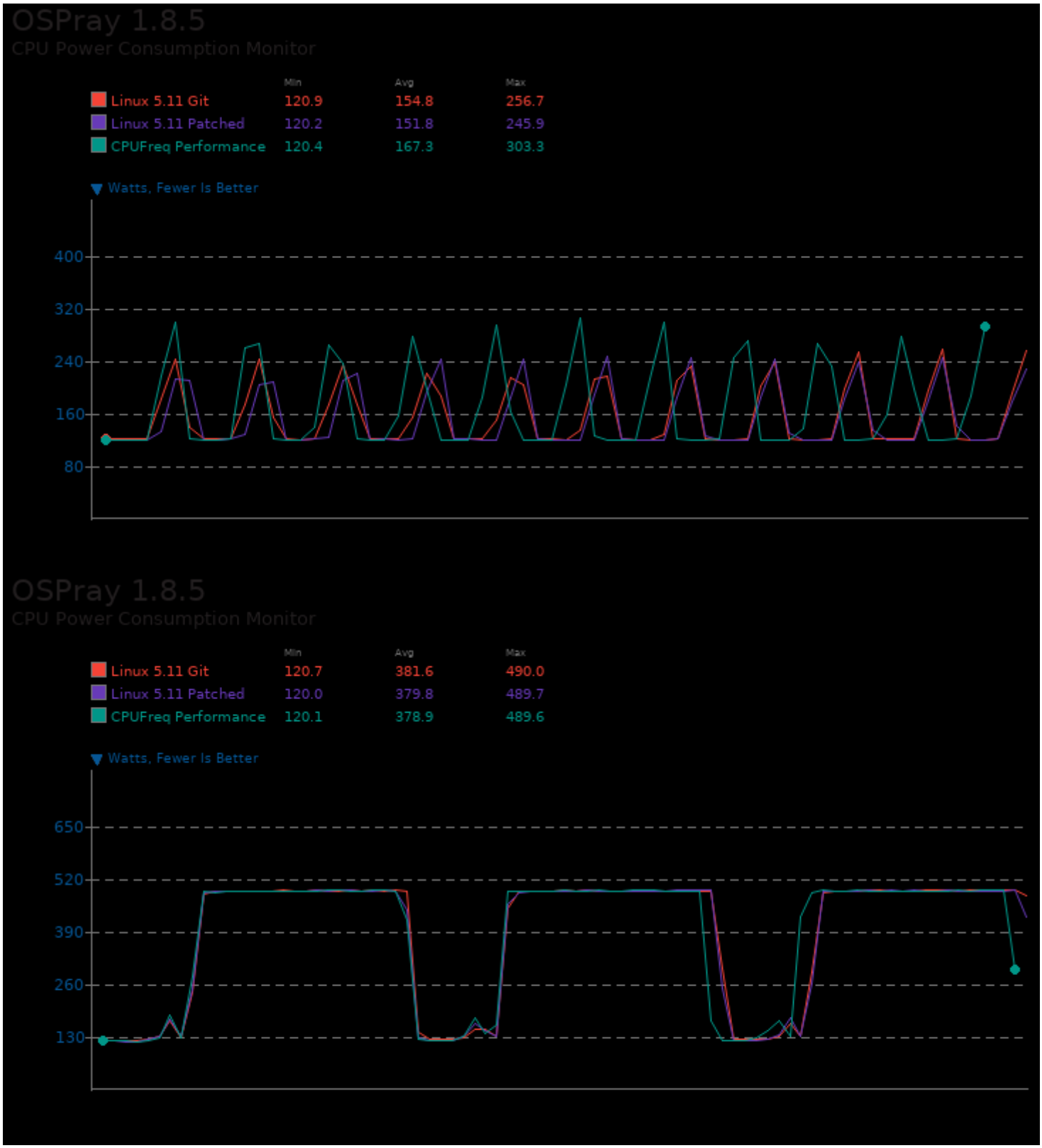
LZ4 Compression 1.9.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 133.6 145.5
Linux 5.11 Patched 120.1 133.7 144.7
CPUFreq Performance 119.7 131.7 143.1
Watts, Fewer Is Better
200
160
120
80
40

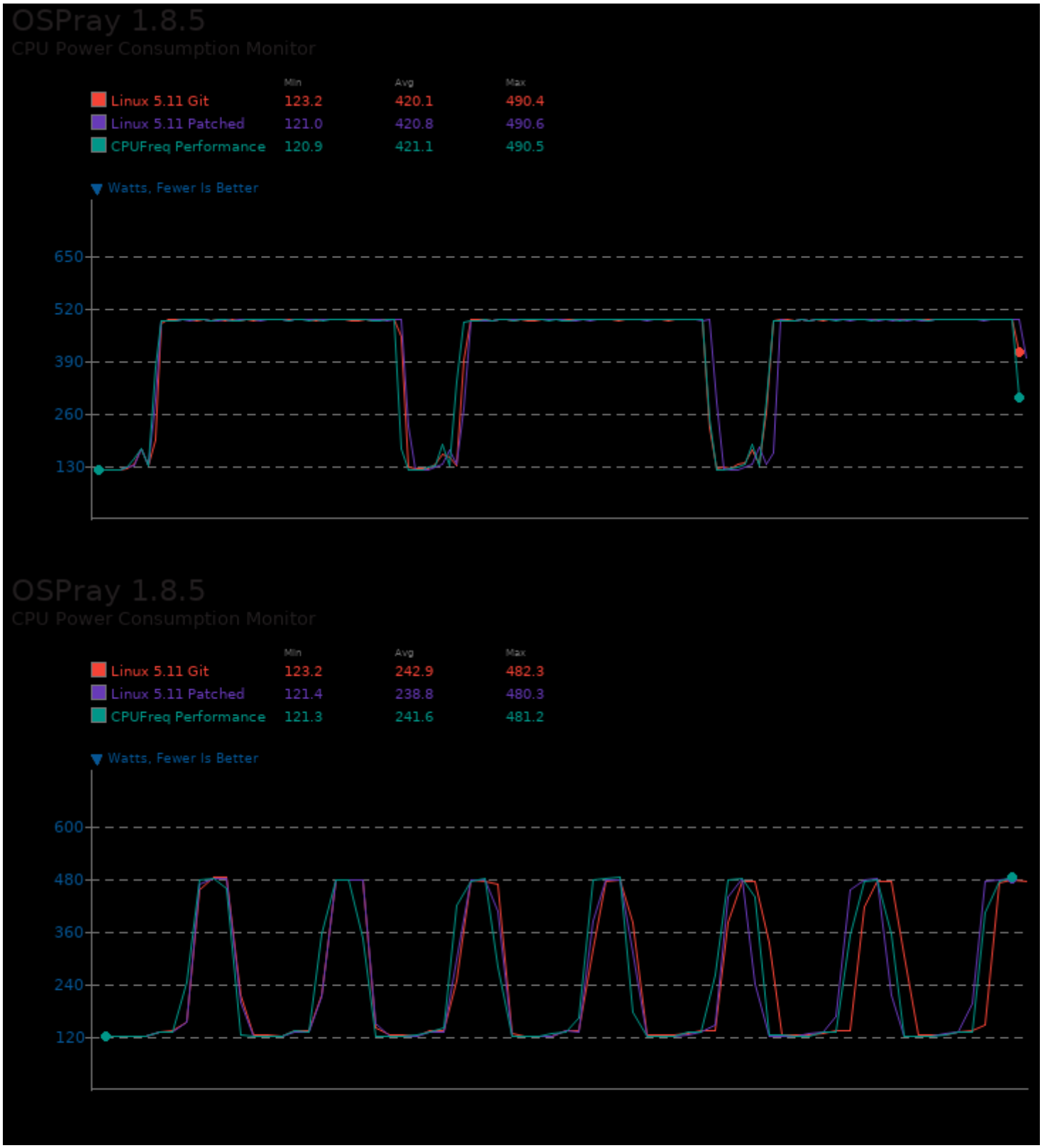

DaCapo Benchmark 9.12-MR1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 134.9 160.4
Linux 5.11 Patched 60.6 134.4 163.7
CPUFreq Performance 119.8 139.4 180.3
Watts, Fewer Is Better
250
200
150
100
50
DaCapo Benchmark 9.12-MR1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 138.7 198.5
Linux 5.11 Patched 120.0 137.8 195.6
CPUFreq Performance 119.9 138.2 194.4
Watts, Fewer Is Better
250
200
150
100
50

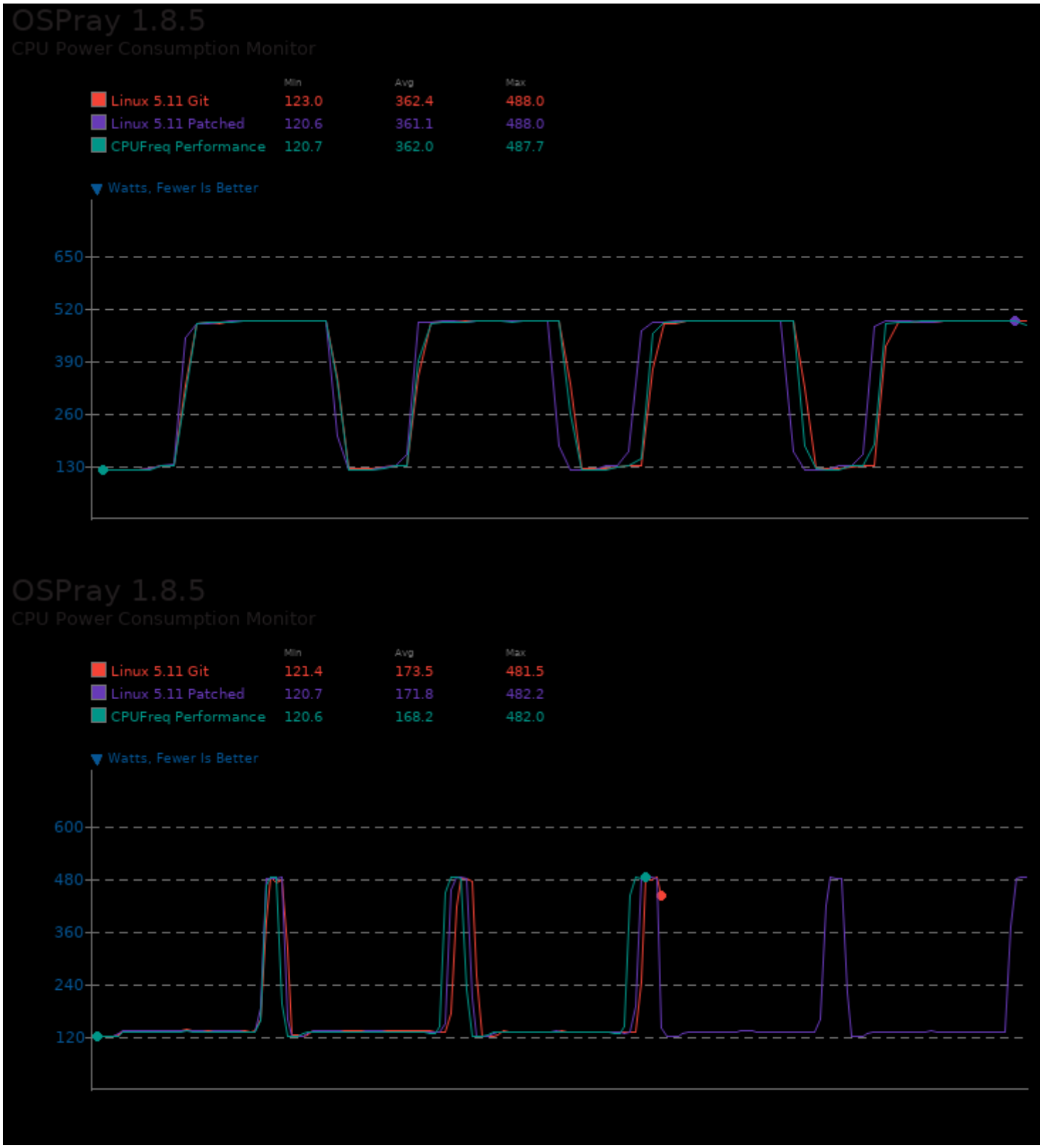

DaCapo Benchmark 9.12-MR1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 140.2 198.0
Linux 5.11 Patched 119.9 140.5 200.9
CPUFreq Performance 119.8 149.7 216.0
Watts, Fewer Is Better
300
240
180
120
60
DaCapo Benchmark 9.12-MR1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 163.6 307.8
Linux 5.11 Patched 120.1 165.5 309.0
CPUFreq Performance 120.2 171.7 314.7
Watts, Fewer Is Better
400
320
240
160
80

AMD EPYC 7F72 2P Linux 5.11 Perf Governor




OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 154.8 256.7
Linux 5.11 Patched 120.2 151.8 245.9
CPUFreq Performance 120.4 167.3 303.3
Watts, Fewer Is Better
400
320
240
160
80
OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 381.6 490.0
Linux 5.11 Patched 120.0 379.8 489.7
CPUFreq Performance 120.1 378.9 489.6
Watts, Fewer Is Better
650
520
390
260
130


OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.2 420.1 490.4
Linux 5.11 Patched 121.0 420.8 490.6
CPUFreq Performance 120.9 421.1 490.5
Watts, Fewer Is Better
650
520
390
260
130
OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.2 242.9 482.3
Linux 5.11 Patched 121.4 238.8 480.3
CPUFreq Performance 121.3 241.6 481.2
Watts, Fewer Is Better
600
480
360
240
120

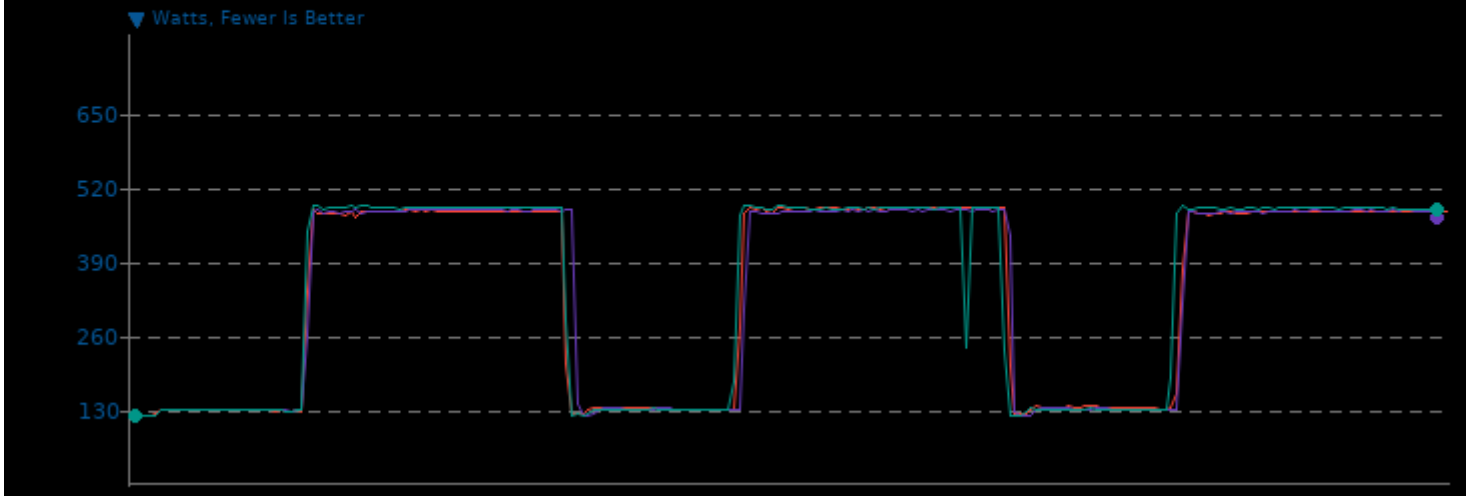

OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.0 362.4 488.0
Linux 5.11 Patched 120.6 361.1 488.0
CPUFreq Performance 120.7 362.0 487.7
Watts, Fewer Is Better
650
520
390
260
130
OSPray 1.8.5
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.4 173.5 481.5
Linux 5.11 Patched 120.7 171.8 482.2
CPUFreq Performance 120.6 168.2 482.0
Watts, Fewer Is Better
600
480
360
240
120

AMD EPYC 7F72 2P Linux 5.11 Perf Governor

OSPray 1.8.5

CPU Power Consumption Monitor

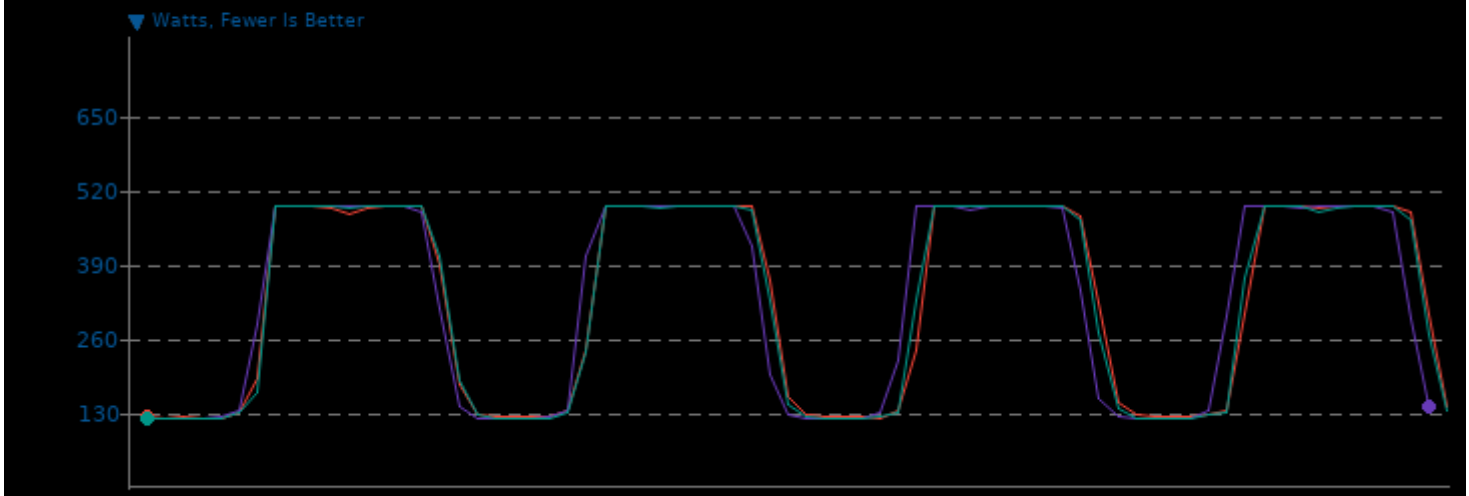
	Min	Avg	Max
Linux 5.11 Git	122.0	341.3	483.7
Linux 5.11 Patched	120.2	341.0	480.2
CPUFreq Performance	120.1	343.6	488.9

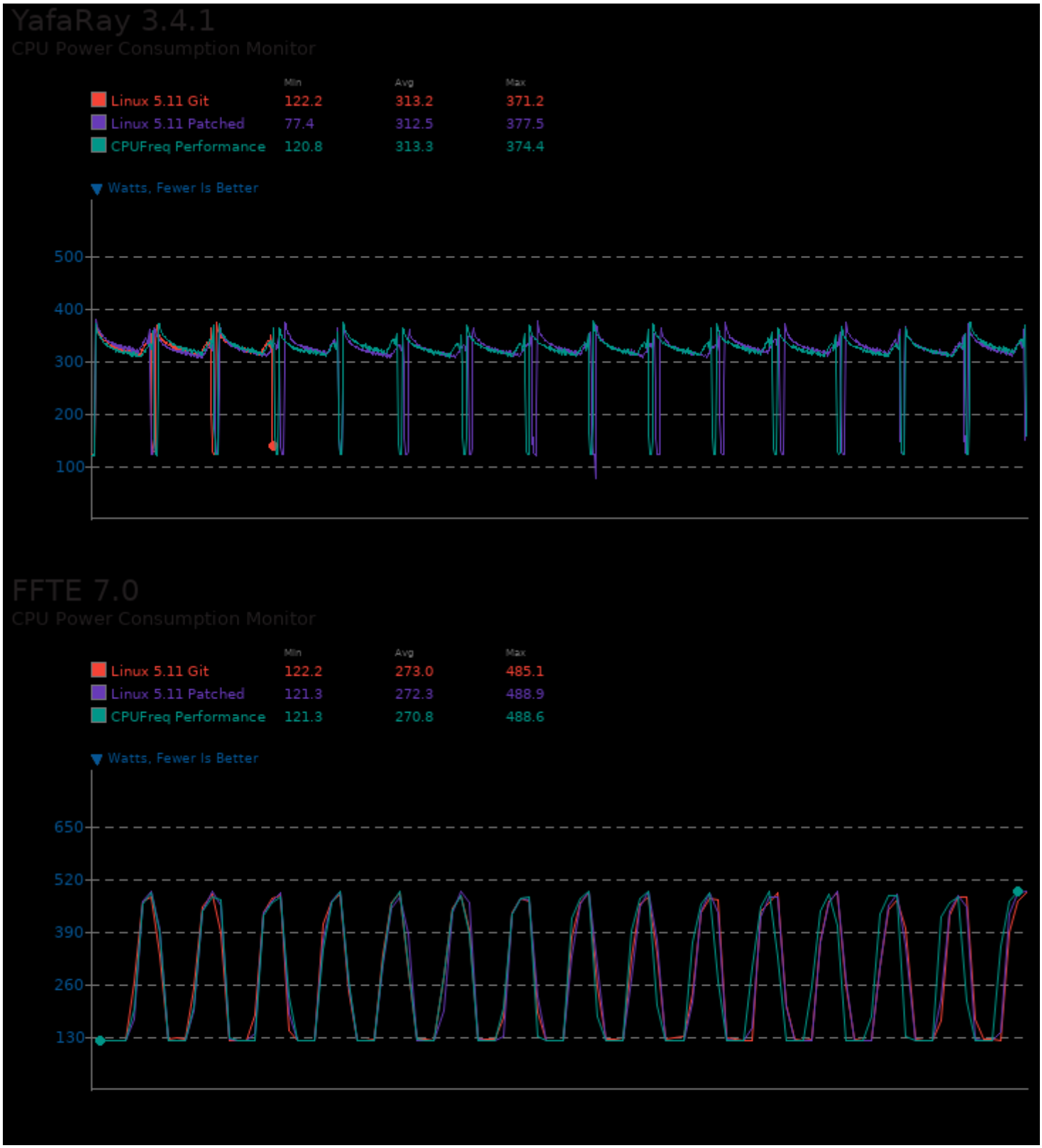


POV-Ray 3.7.0.7

CPU Power Consumption Monitor

	Min	Avg	Max
Linux 5.11 Git	123.4	328.8	492.1
Linux 5.11 Patched	121.5	329.6	492.1
CPUFreq Performance	121.6	327.6	492.1

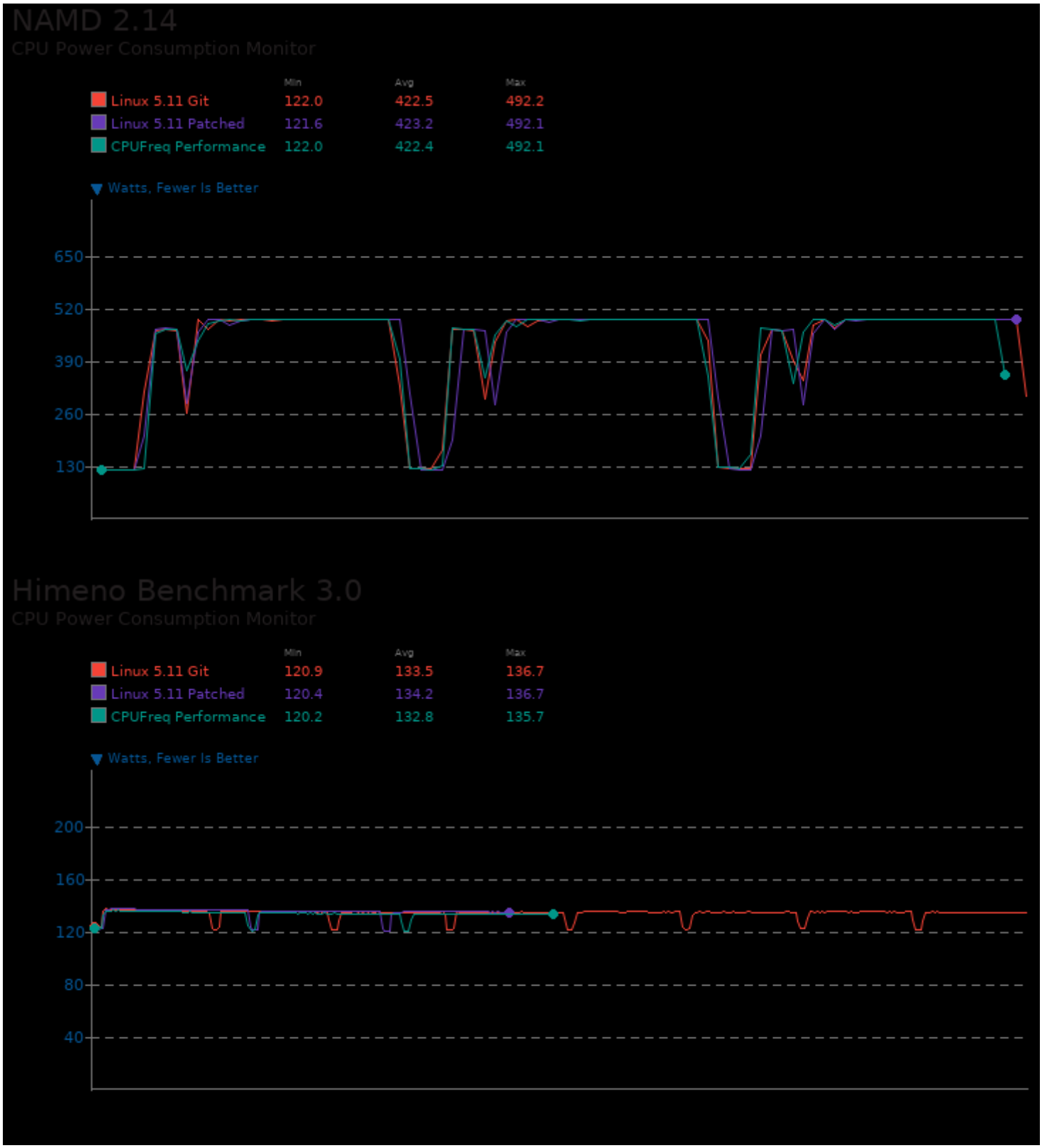


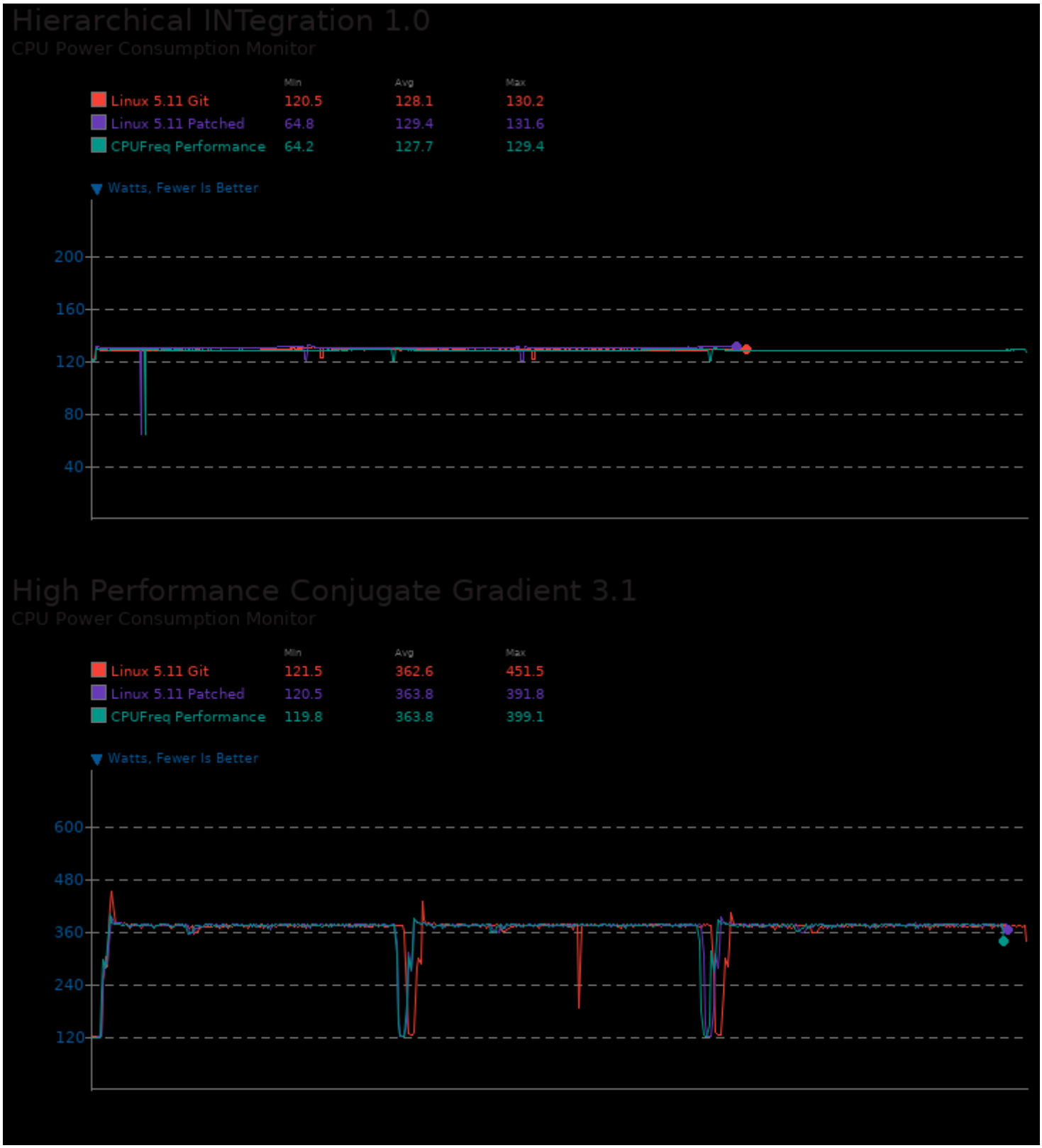

YafaRay 3.4.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 313.2 371.2
Linux 5.11 Patched 77.4 312.5 377.5
CPUFreq Performance 120.8 313.3 374.4
Watts, Fewer Is Better
500
400
300
200
100
FFTE 7.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 273.0 485.1
Linux 5.11 Patched 121.3 272.3 488.9
CPUFreq Performance 121.3 270.8 488.6
Watts, Fewer Is Better
650
520
390
260
130

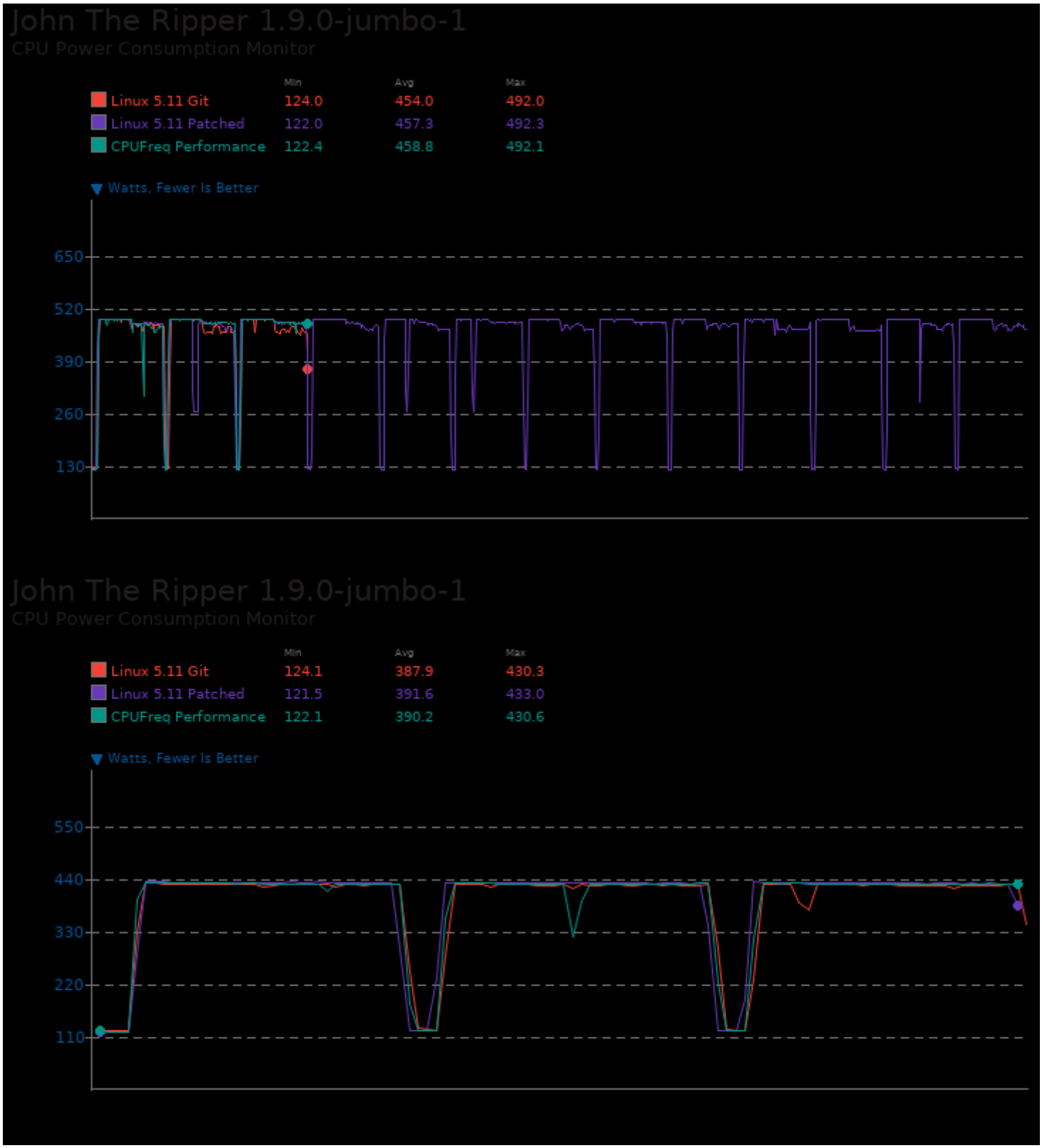
AMD EPYC 7F72 2P Linux 5.11 Perf Governor




GPAW 20.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.8 402.9 465.4
Linux 5.11 Patched 120.4 404.8 464.0
CPUFreq Performance 120.3 403.9 464.2
Watts, Fewer Is Better
600
480
360
240
120
GROMACS 2020.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.0 417.7 491.4
Linux 5.11 Patched 121.3 421.6 491.7
CPUFreq Performance 121.4 424.3 488.3
Watts, Fewer Is Better
650
520
390
260
130

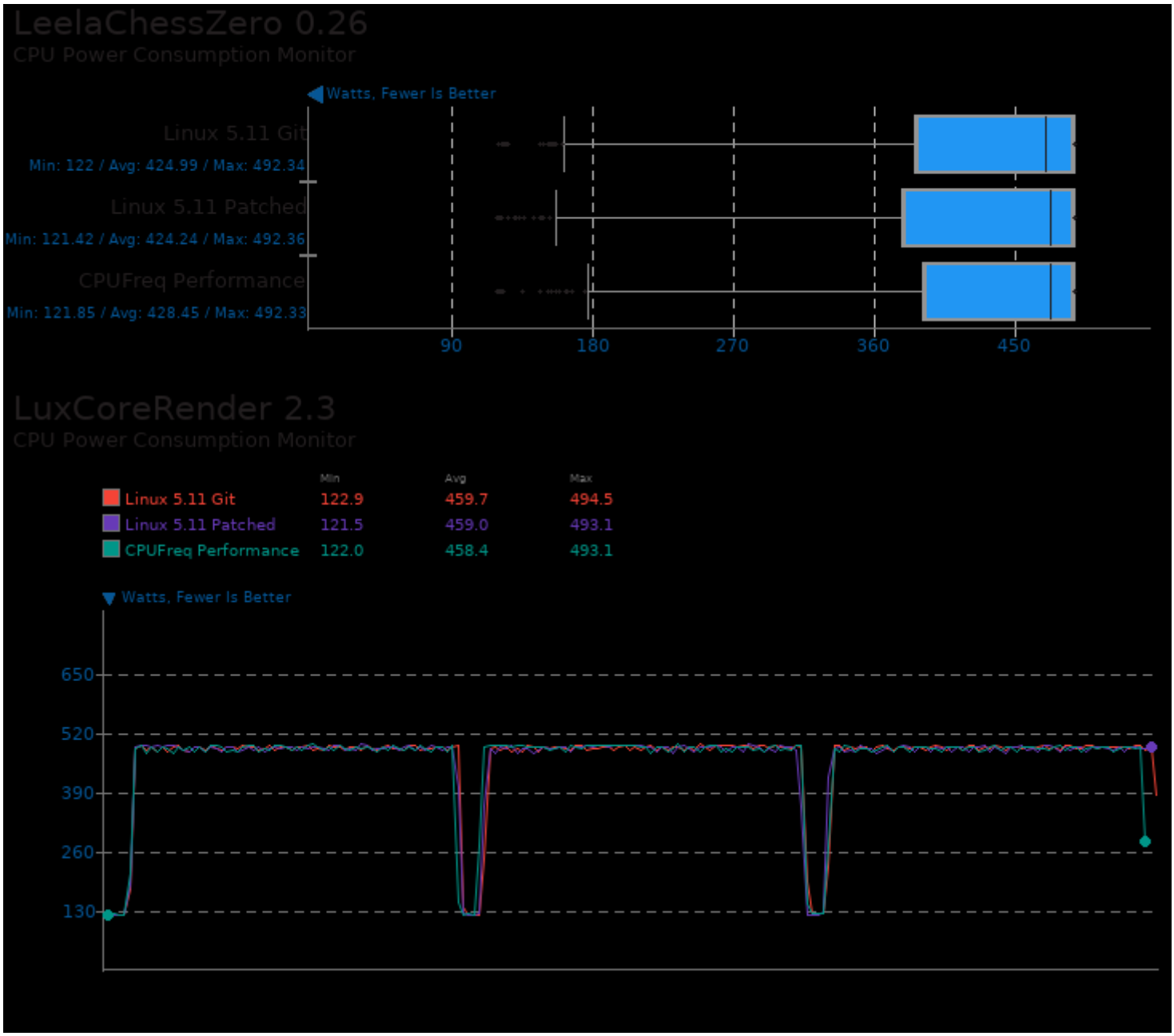

NAMD 2.14
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.0 422.5 492.2
Linux 5.11 Patched 121.6 423.2 492.1
CPUFreq Performance 122.0 422.4 492.1
Watts, Fewer Is Better
650
520
390
260
130
Himeno Benchmark 3.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 133.5 136.7
Linux 5.11 Patched 120.4 134.2 136.7
CPUFreq Performance 120.2 132.8 135.7
Watts, Fewer Is Better
200
160
120
80
40

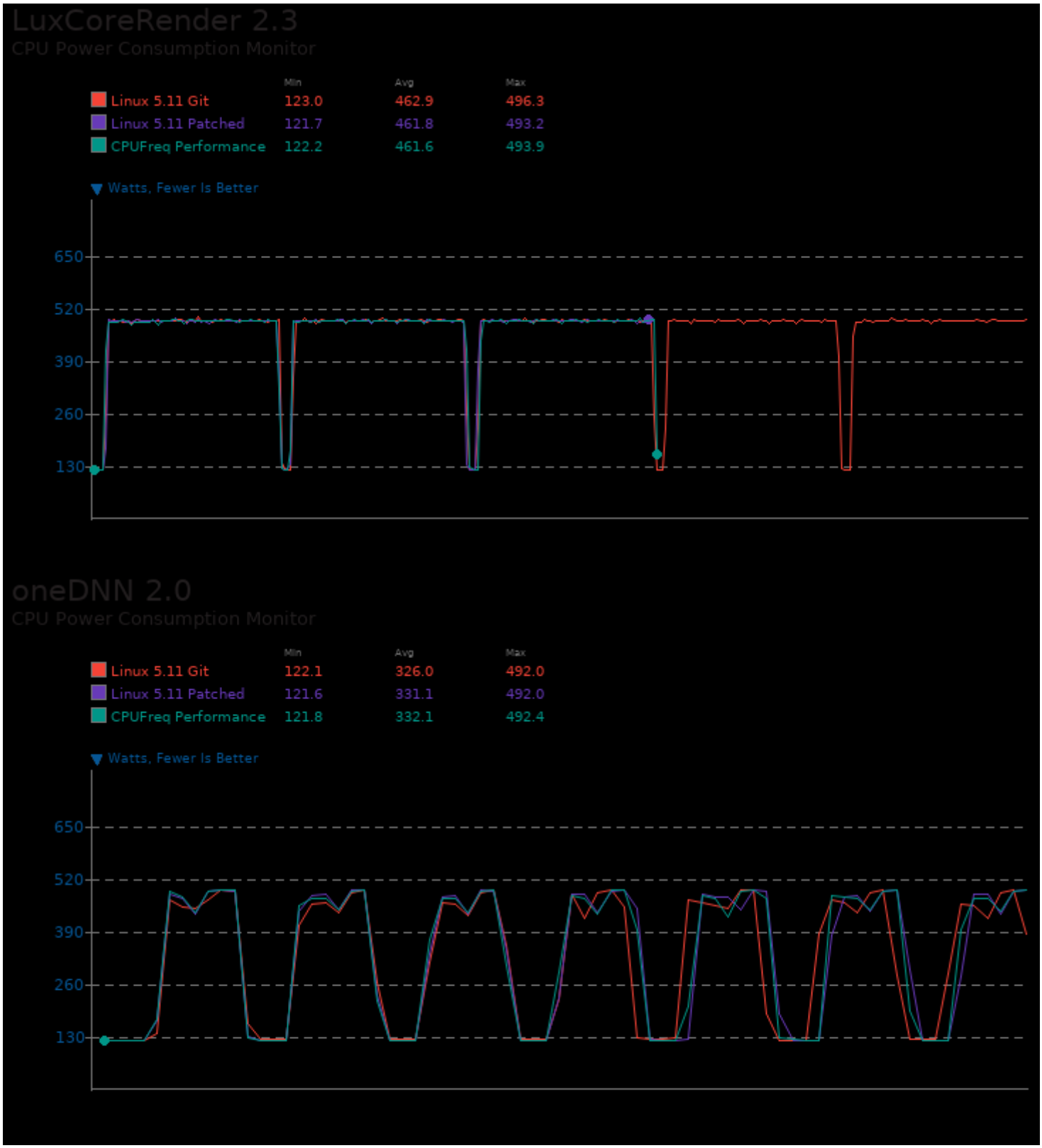

Hierarchical INTegration 1.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.5 128.1 130.2
Linux 5.11 Patched 64.8 129.4 131.6
CPUFreq Performance 64.2 127.7 129.4
Watts, Fewer Is Better
200
160
120
80
40
High Performance Conjugate Gradient 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.5 362.6 451.5
Linux 5.11 Patched 120.5 363.8 391.8
CPUFreq Performance 119.8 363.8 399.1
Watts, Fewer Is Better
600
480
360
240
120


John The Ripper 1.9.0-jumbo-1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git
124.0
454.0
492.0
Linux 5.11 Patched
122.0
457.3
492.3
CPUFreq Performance
122.4
458.8
492.1
Watts, Fewer Is Better
650
520
390
260
130
John The Ripper 1.9.0-jumbo-1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git
124.1
387.9
430.3
Linux 5.11 Patched
121.5
391.6
433.0
CPUFreq Performance
122.1
390.2
430.6
Watts, Fewer Is Better
550
440
330
220
110

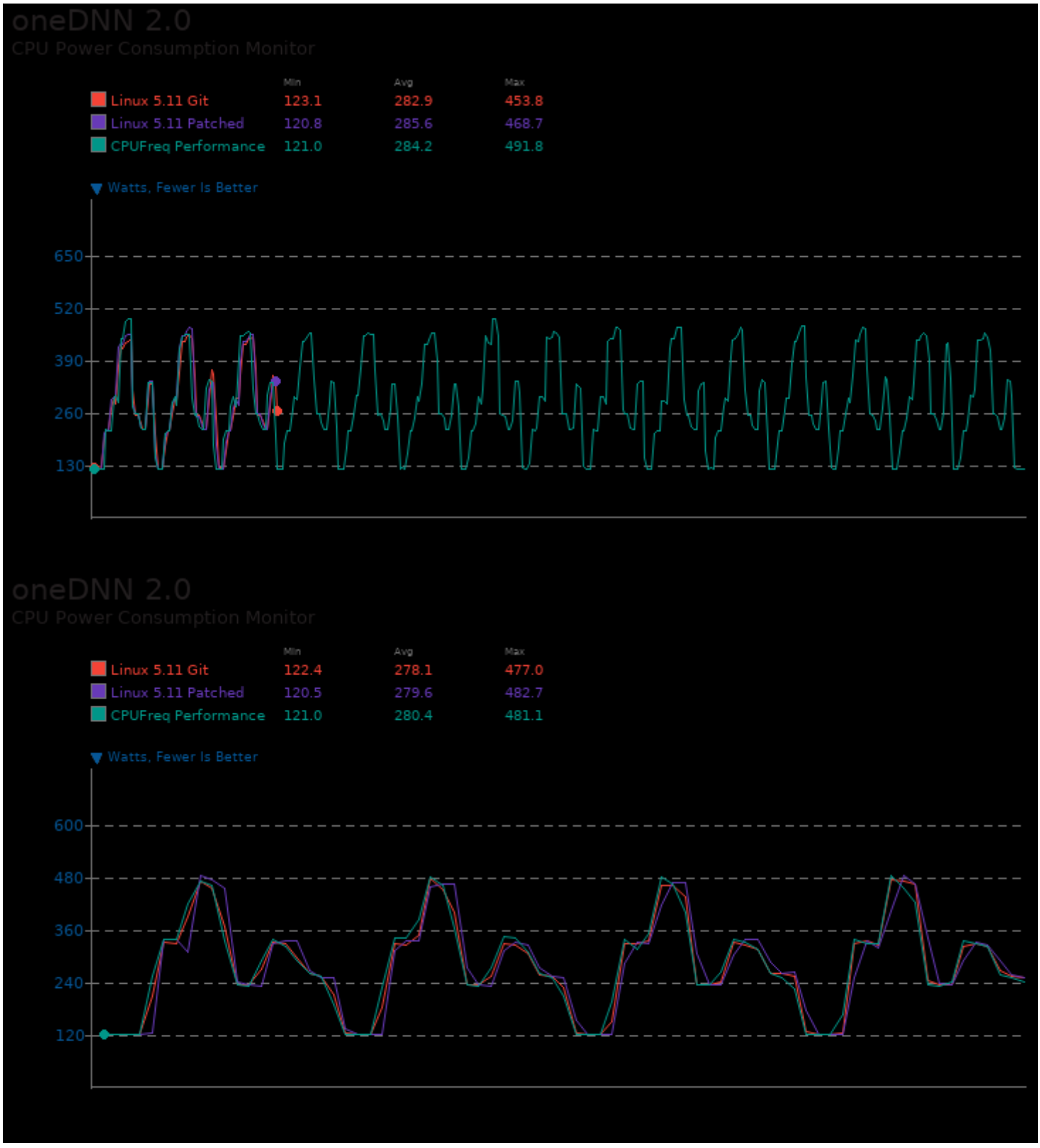

KeyDB 6.0.16
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 157.0 179.4
Linux 5.11 Patched 64.4 157.7 178.6
CPUFreq Performance 60.8 172.1 190.1
Watts, Fewer Is Better
250
200
150
100
50
InfluxDB 1.8.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 159.6 179.4
Linux 5.11 Patched 120.5 167.2 187.5
CPUFreq Performance 120.8 192.6 218.3
Watts, Fewer Is Better
300
240
180
120
60

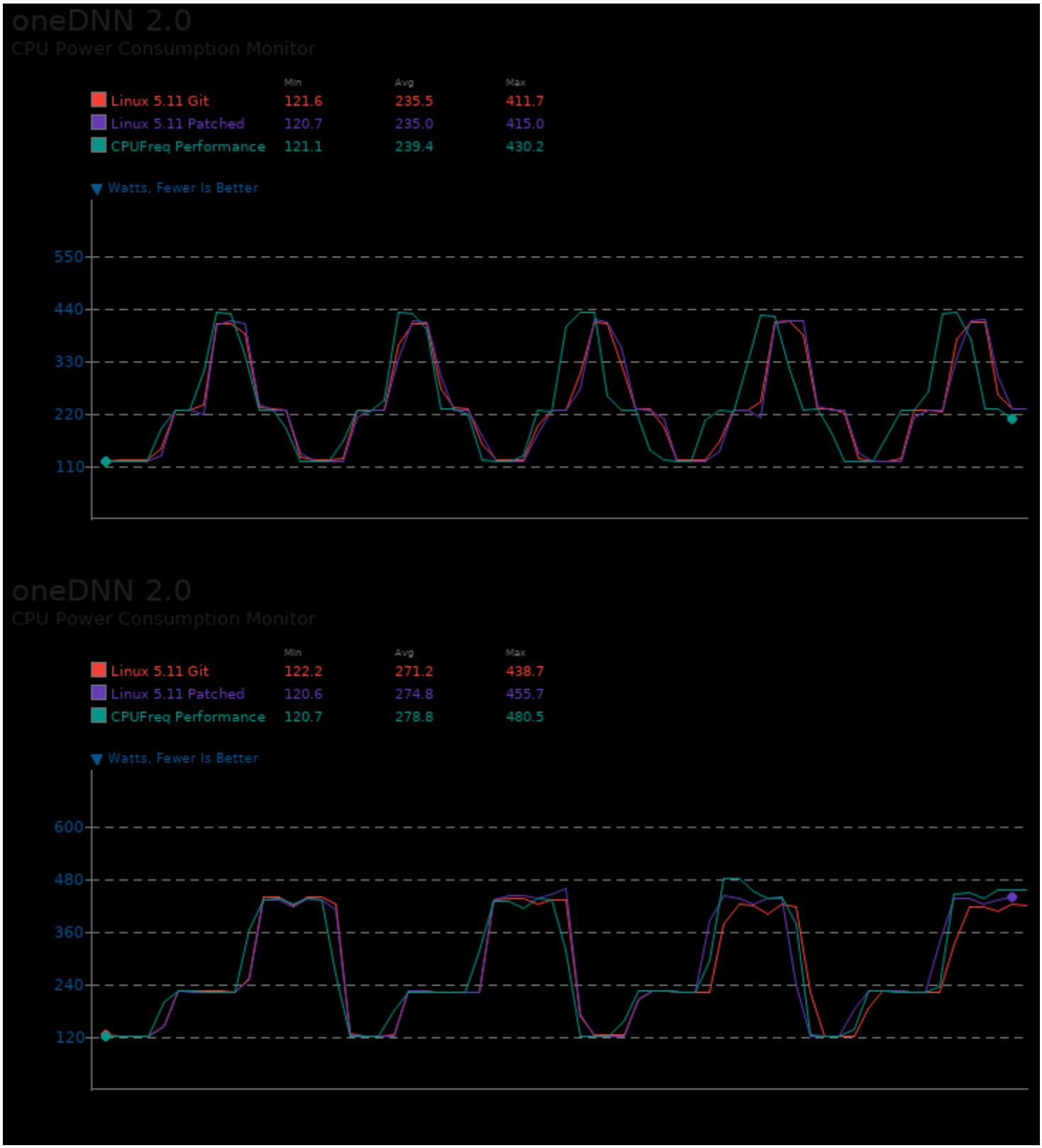

InfluxDB 1.8.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 181.7 213.6
Linux 5.11 Patched 120.3 188.3 217.2
CPUFreq Performance 120.9 205.3 232.0
Watts, Fewer Is Better
300
240
180
120
60
LeelaChessZero 0.26
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 423.8 492.3
Linux 5.11 Patched 120.4 417.7 492.3
CPUFreq Performance 121.0 426.6 492.4
Watts, Fewer Is Better
650
520
390
260
130

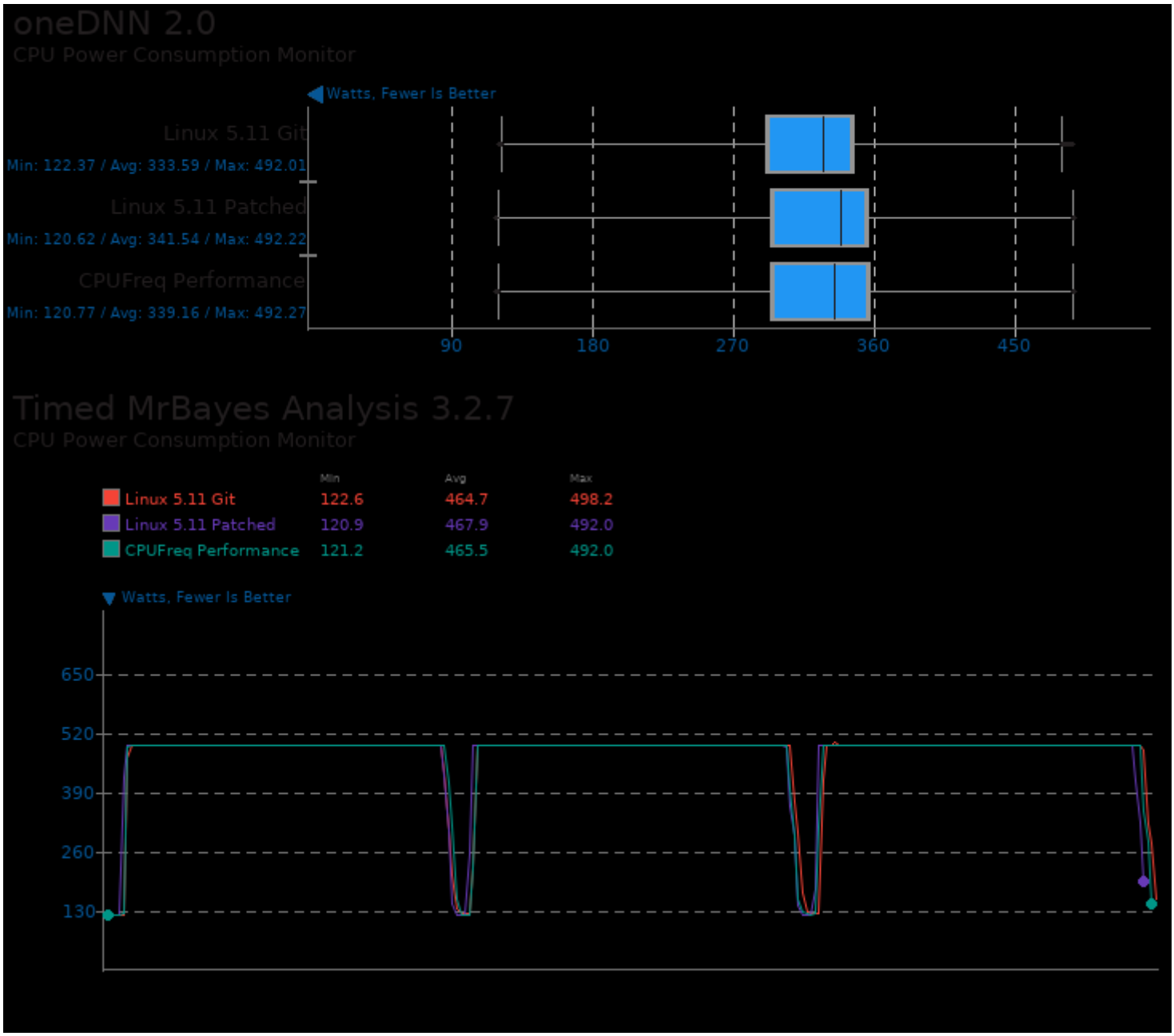

LeelaChessZero 0.26
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 122 / Avg: 424.99 / Max: 492.34
Linux 5.11 Patched
Min: 121.42 / Avg: 424.24 / Max: 492.36
CPUFreq Performance
Min: 121.85 / Avg: 428.45 / Max: 492.33
90
180
270
360
450
LuxCoreRender 2.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.9 459.7 494.5
Linux 5.11 Patched 121.5 459.0 493.1
CPUFreq Performance 122.0 458.4 493.1
Watts, Fewer Is Better
650
520
390
260
130

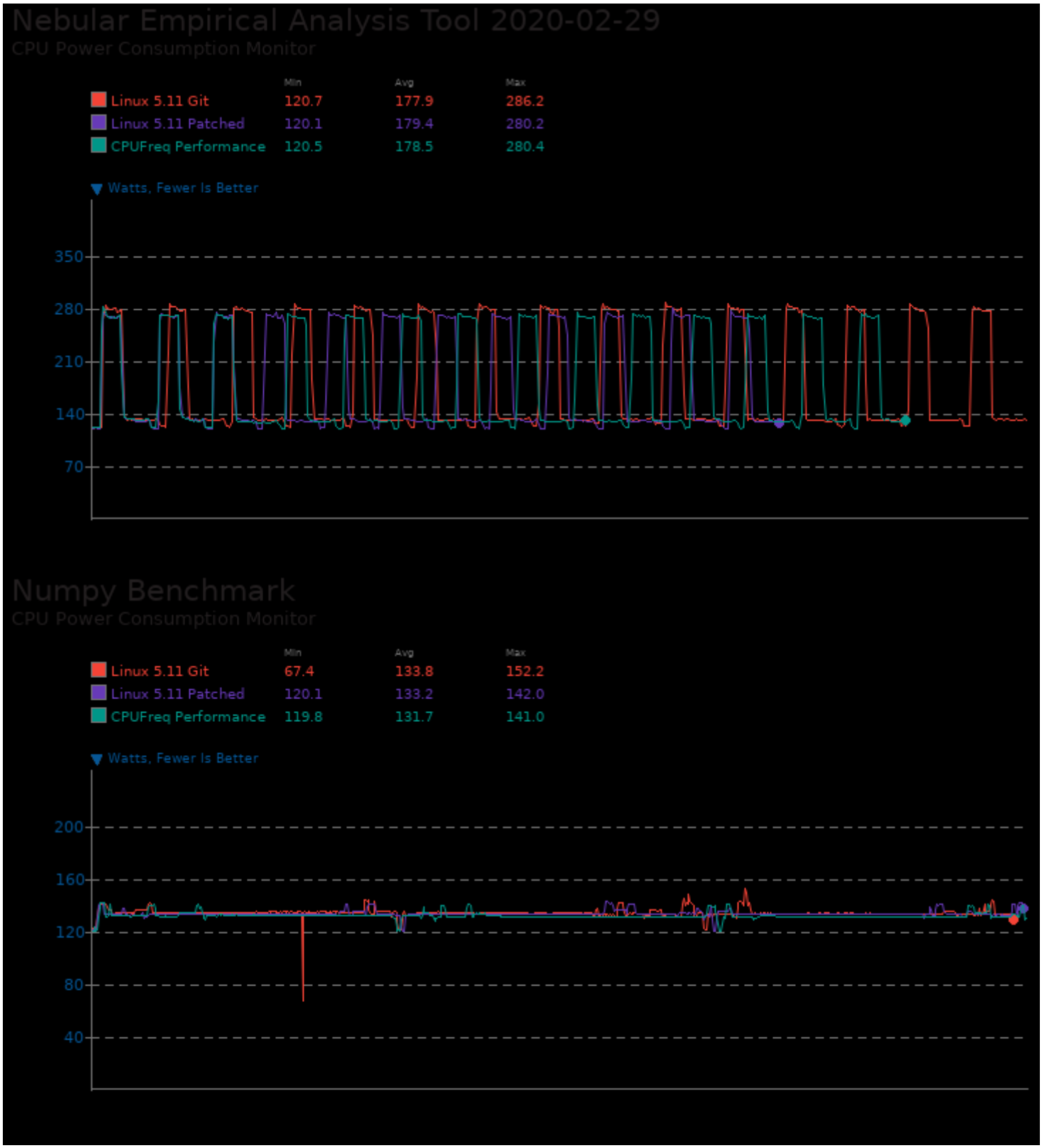

LuxCoreRender 2.3
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.0 462.9 496.3
Linux 5.11 Patched 121.7 461.8 493.2
CPUFreq Performance 122.2 461.6 493.9
Watts, Fewer Is Better
650
520
390
260
130
oneDNN 2.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.1 326.0 492.0
Linux 5.11 Patched 121.6 331.1 492.0
CPUFreq Performance 121.8 332.1 492.4
Watts, Fewer Is Better
650
520
390
260
130

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oneDNN 2.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.6 235.5 411.7
Linux 5.11 Patched 120.7 235.0 415.0
CPUFreq Performance 121.1 239.4 430.2
Watts, Fewer Is Better
550
440
330
220
110
oneDNN 2.0
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 271.2 438.7
Linux 5.11 Patched 120.6 274.8 455.7
CPUFreq Performance 120.7 278.8 480.5
Watts, Fewer Is Better
600
480
360
240
120

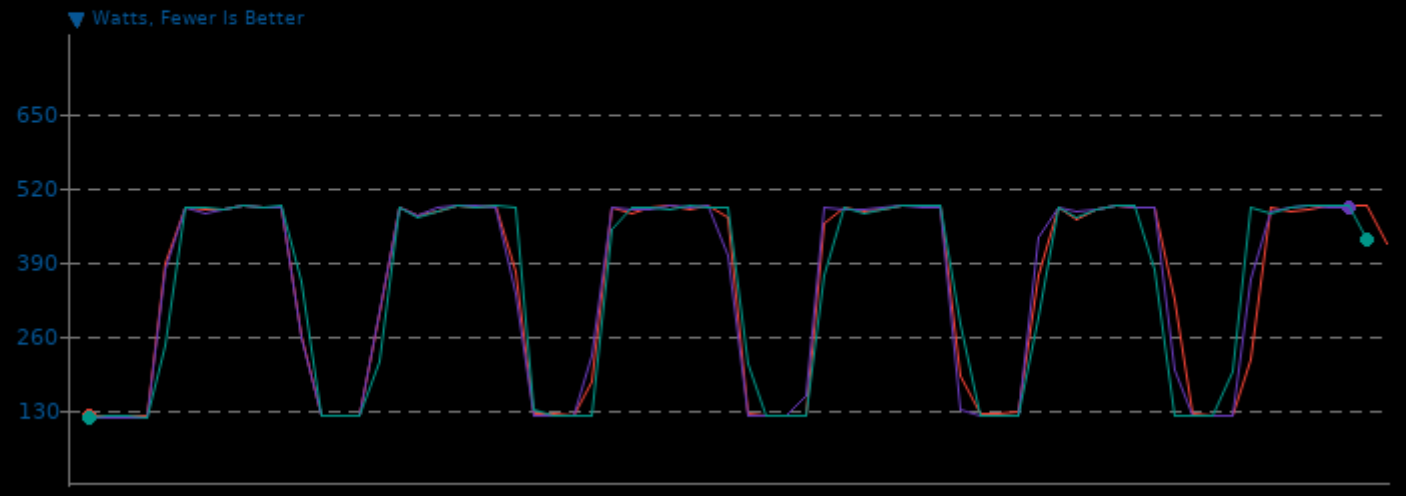

oneDNN 2.0
CPU Power Consumption Monitor
Watts, Fewer Is Better
Linux 5.11 Git
Min: 122.37 / Avg: 333.59 / Max: 492.01
Linux 5.11 Patched
Min: 120.62 / Avg: 341.54 / Max: 492.22
CPUFreq Performance
Min: 120.77 / Avg: 339.16 / Max: 492.27
90
180
270
360
450
Timed MrBayes Analysis 3.2.7
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.6 464.7 498.2
Linux 5.11 Patched 120.9 467.9 492.0
CPUFreq Performance 121.2 465.5 492.0
Watts, Fewer Is Better
650
520
390
260
130


Nebular Empirical Analysis Tool 2020-02-29
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 177.9 286.2
Linux 5.11 Patched 120.1 179.4 280.2
CPUFreq Performance 120.5 178.5 280.4
Watts, Fewer Is Better
350
280
210
140
70
Numpy Benchmark
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 67.4 133.8 152.2
Linux 5.11 Patched 120.1 133.2 142.0
CPUFreq Performance 119.8 131.7 141.0
Watts, Fewer Is Better
200
160
120
80
40

Intel Open Image Denoise 1.2.0

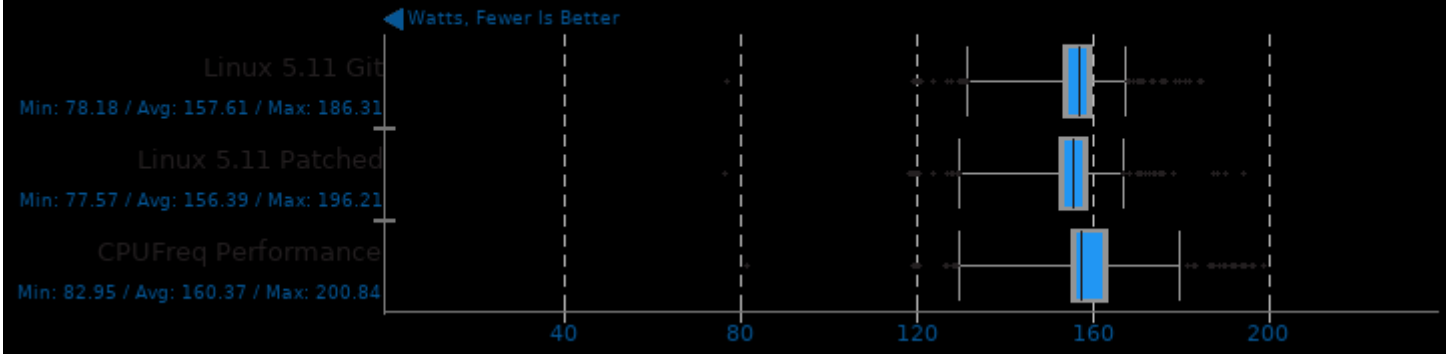
CPU Power Consumption Monitor

	Min	Avg	Max
Linux 5.11 Git	120.5	349.8	488.6
Linux 5.11 Patched	119.8	346.7	488.6
CPUFreq Performance	119.8	346.7	488.3



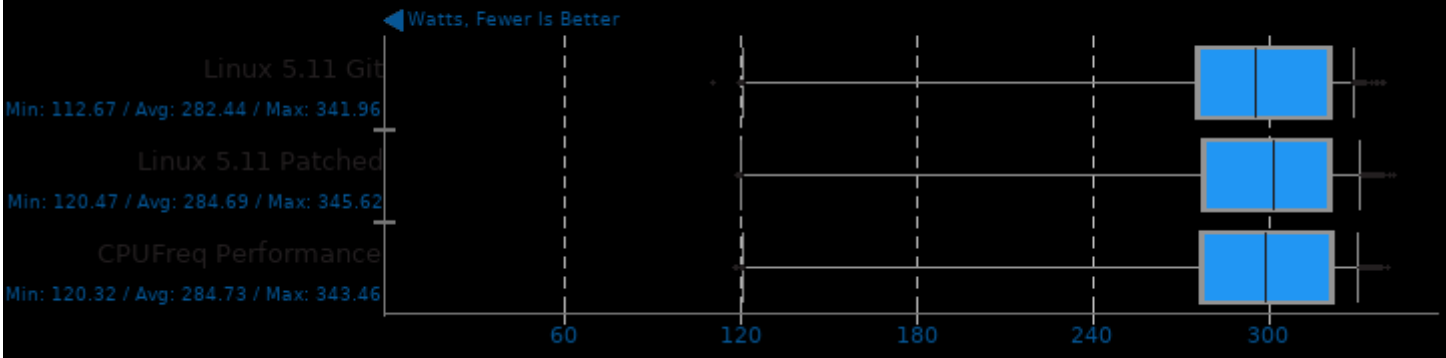
PlaidML

CPU Power Consumption Monitor

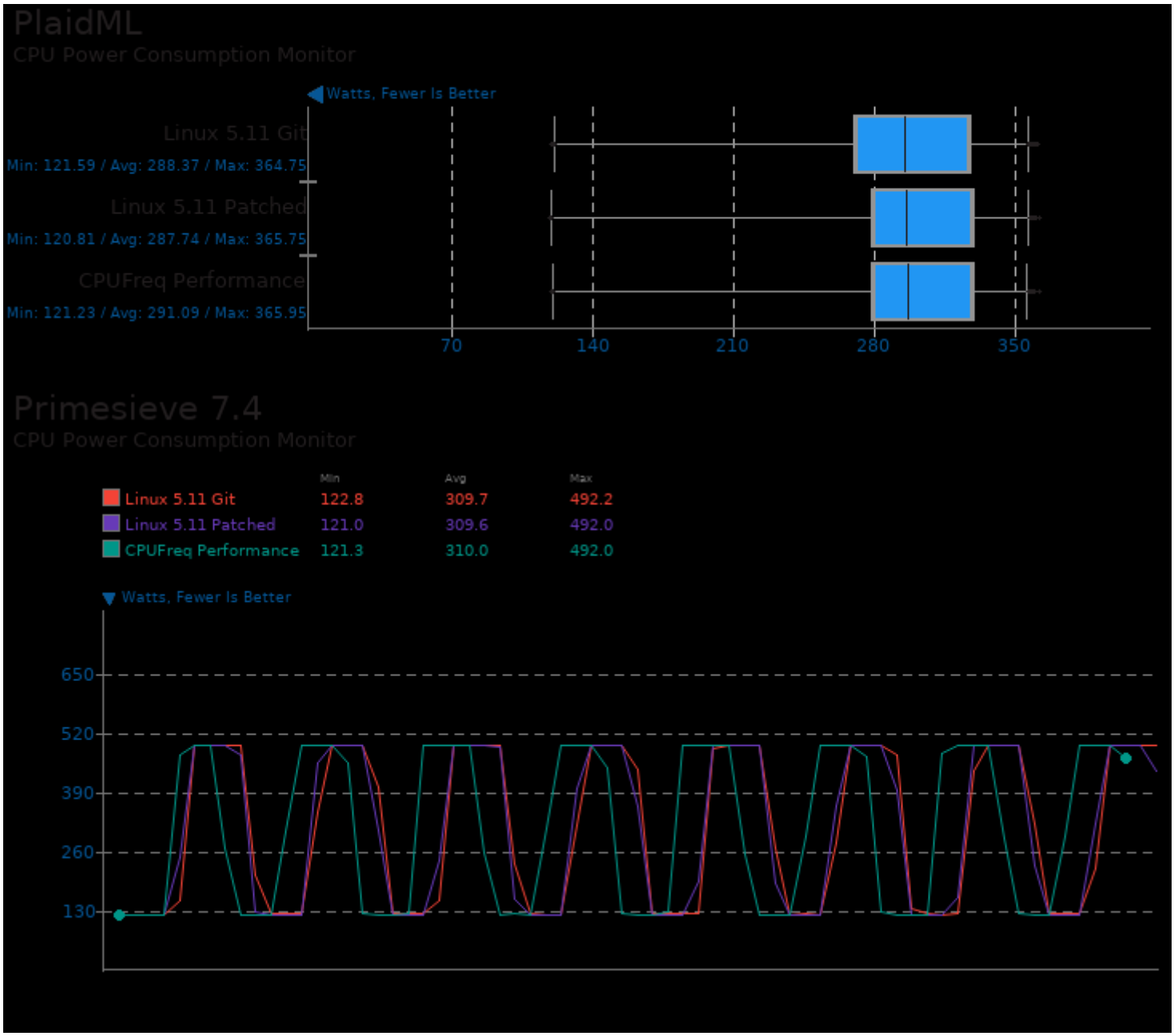


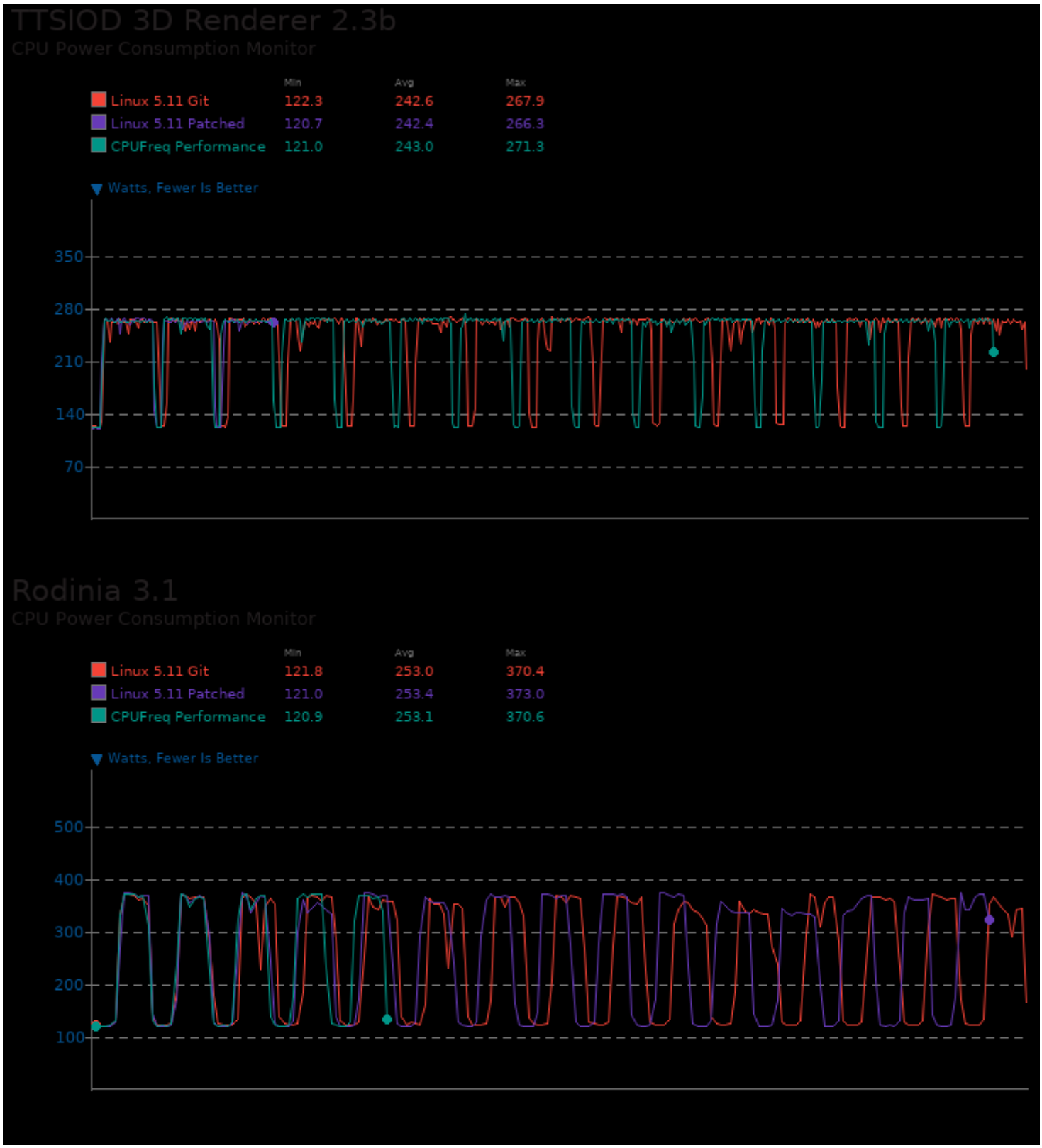
PlaidML

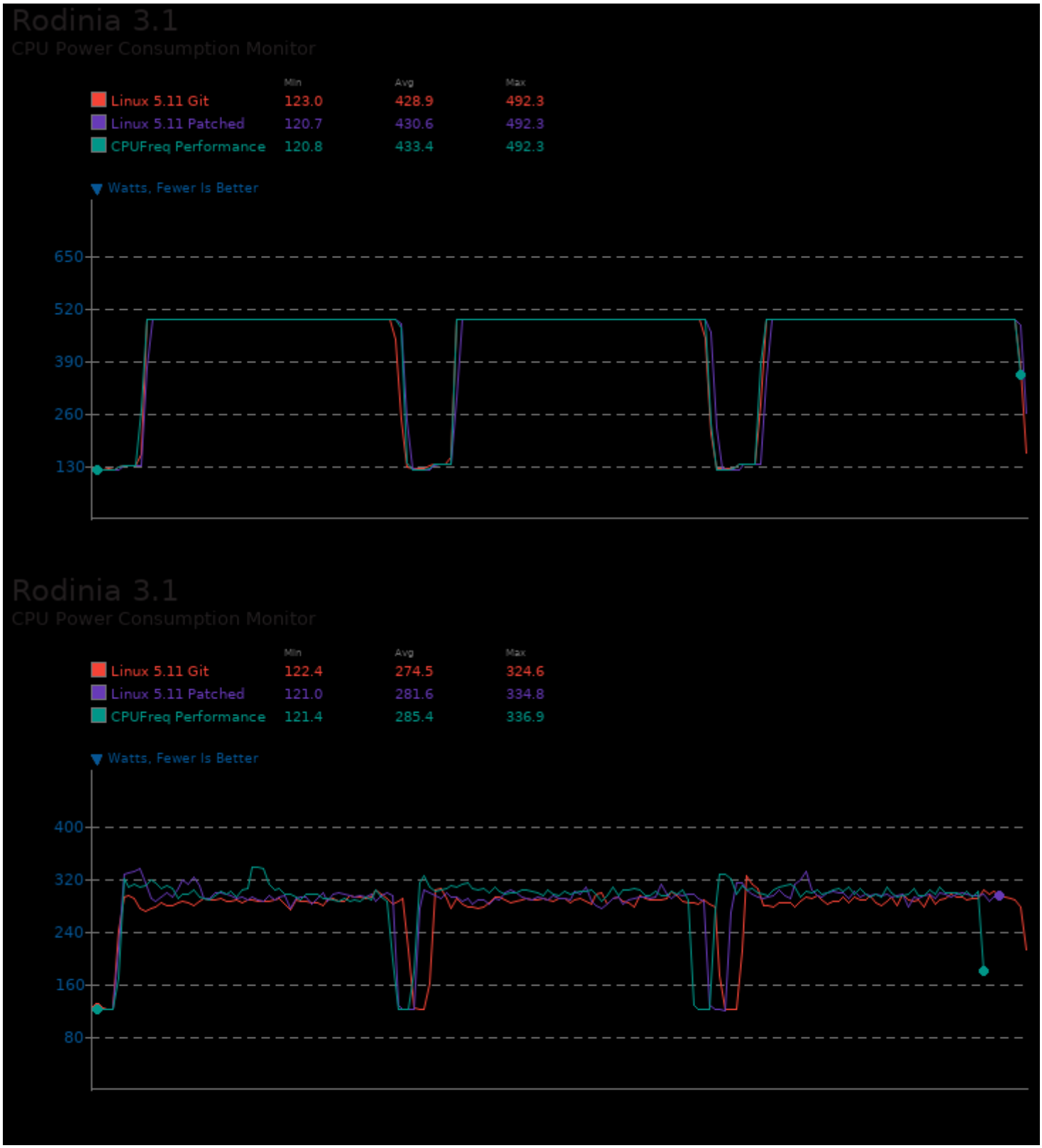
CPU Power Consumption Monitor

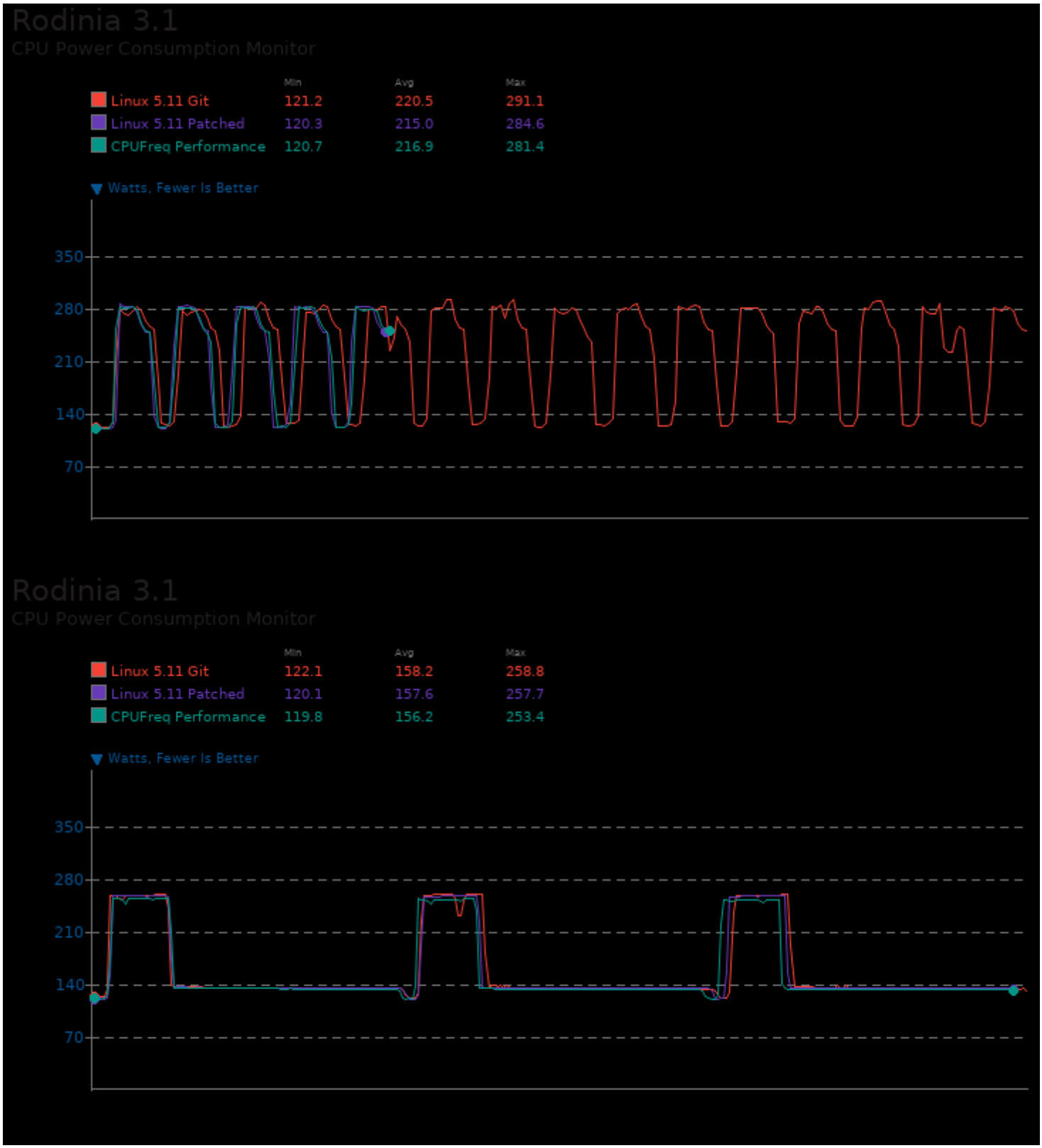


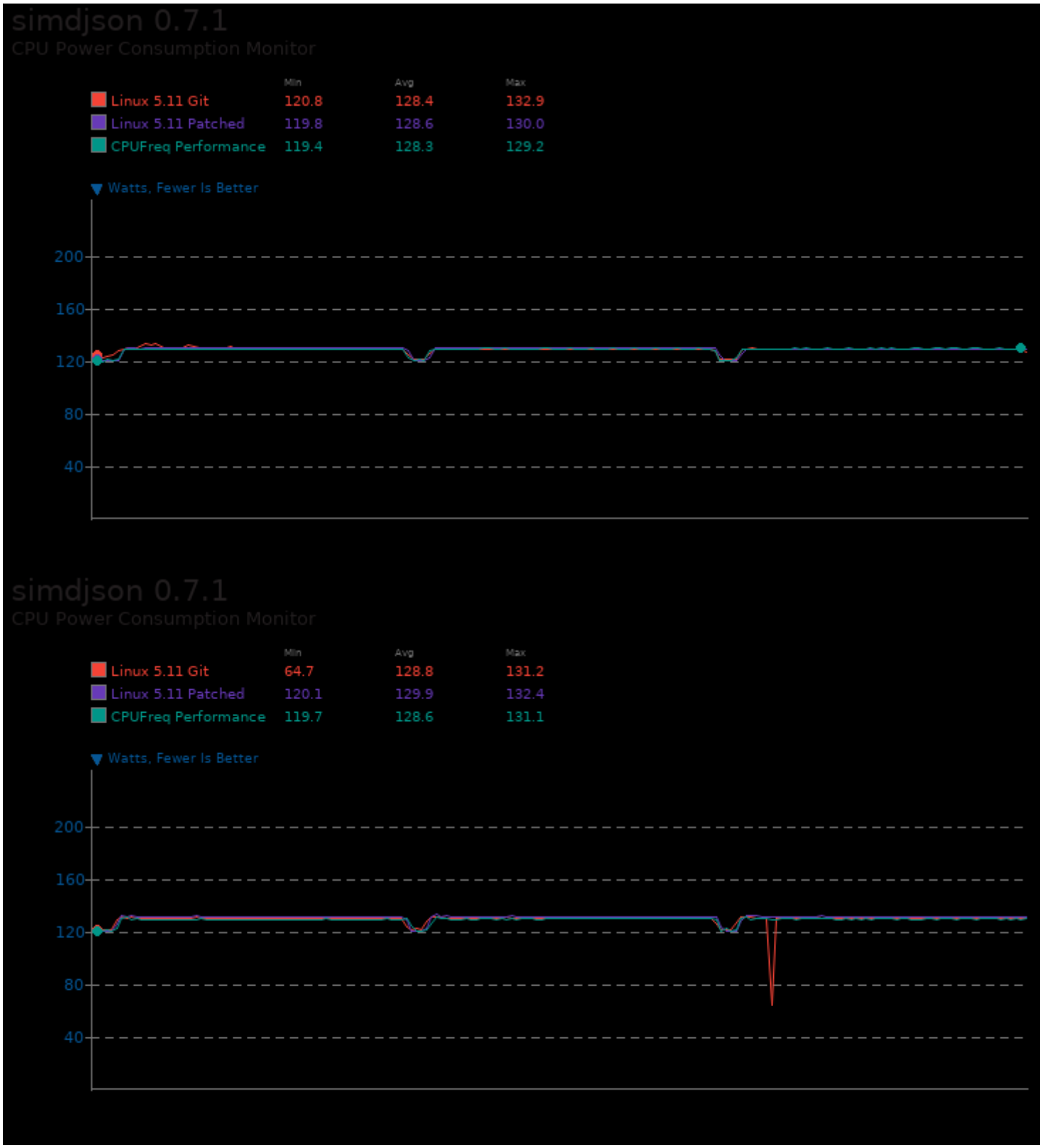
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

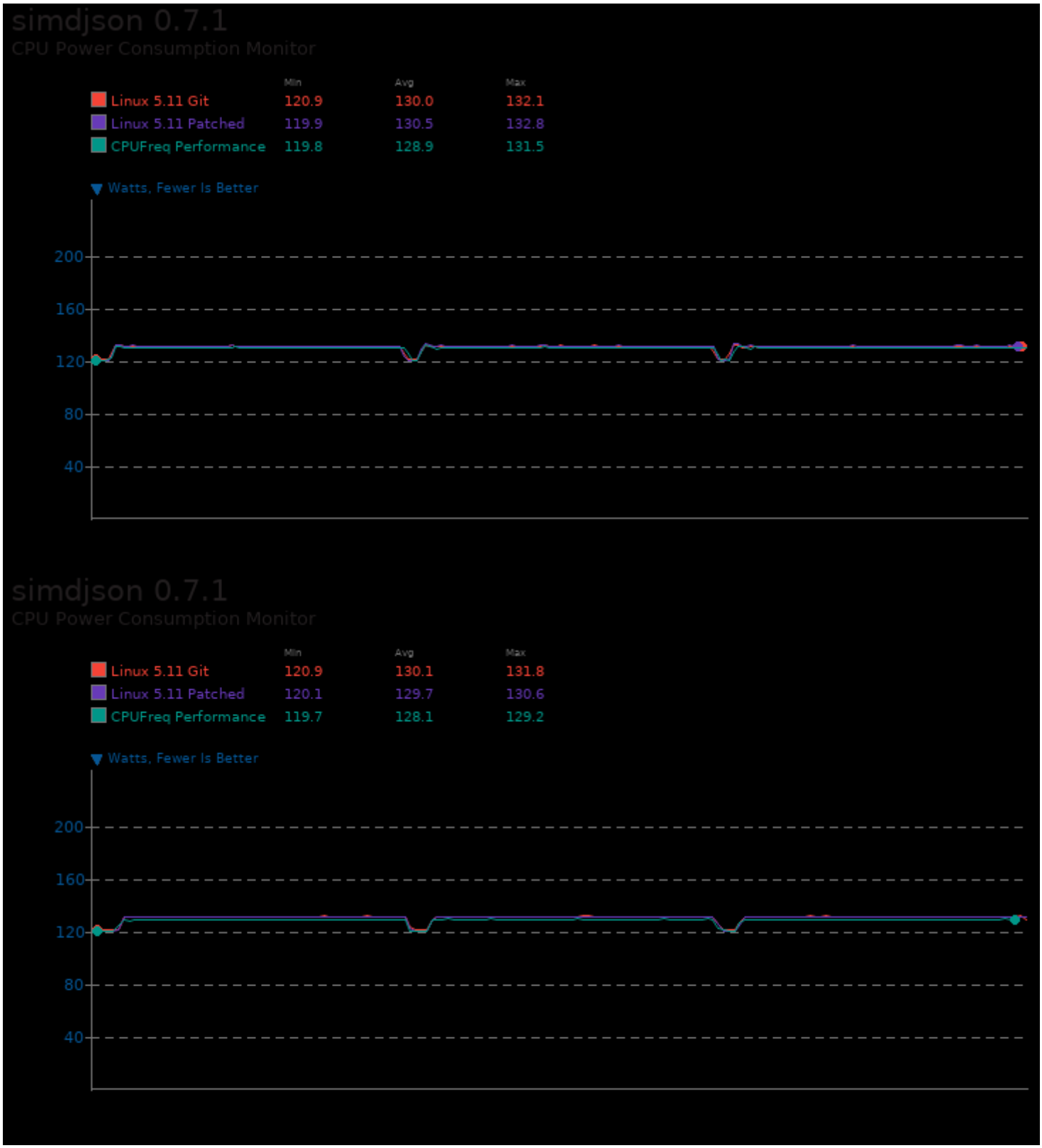


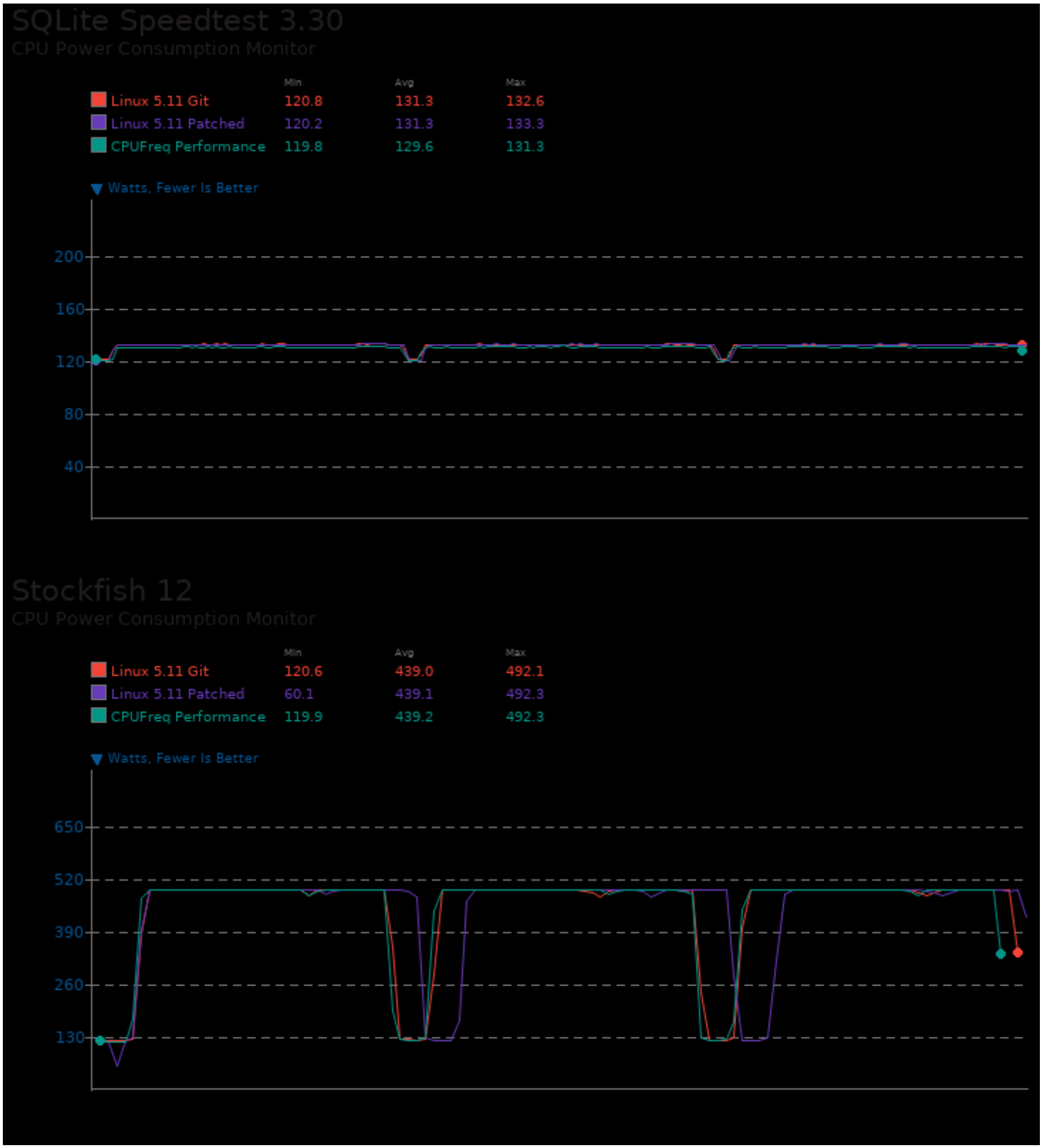

TTSIOD 3D Renderer 2.3b
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.3 242.6 267.9
Linux 5.11 Patched 120.7 242.4 266.3
CPUFreq Performance 121.0 243.0 271.3
Watts, Fewer Is Better
350
280
210
140
70
Rodinia 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.8 253.0 370.4
Linux 5.11 Patched 121.0 253.4 373.0
CPUFreq Performance 120.9 253.1 370.6
Watts, Fewer Is Better
500
400
300
200
100

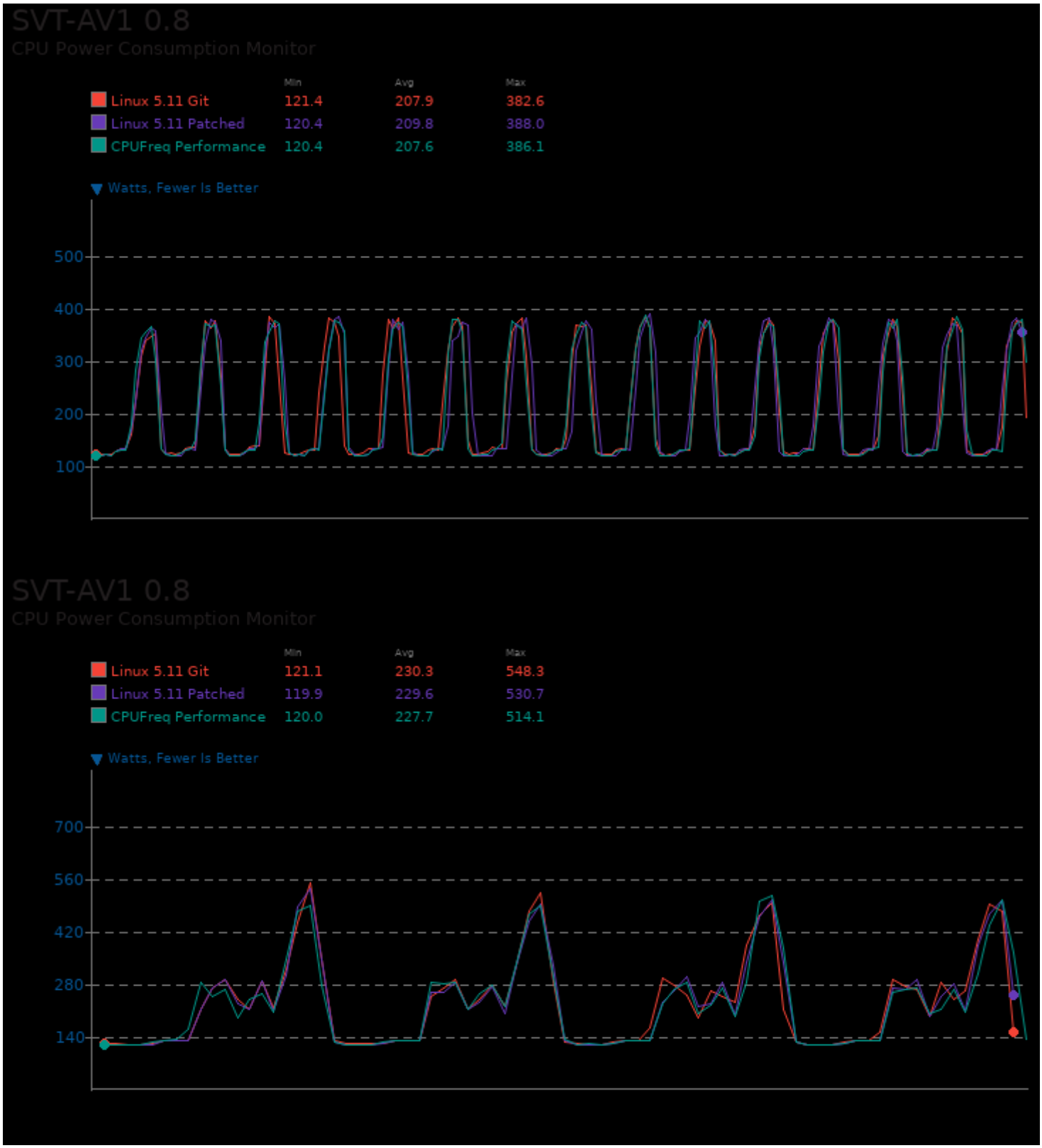

Rodinia 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.0 428.9 492.3
Linux 5.11 Patched 120.7 430.6 492.3
CPUFreq Performance 120.8 433.4 492.3
Watts, Fewer Is Better
650
520
390
260
130
Rodinia 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.4 274.5 324.6
Linux 5.11 Patched 121.0 281.6 334.8
CPUFreq Performance 121.4 285.4 336.9
Watts, Fewer Is Better
400
320
240
160
80

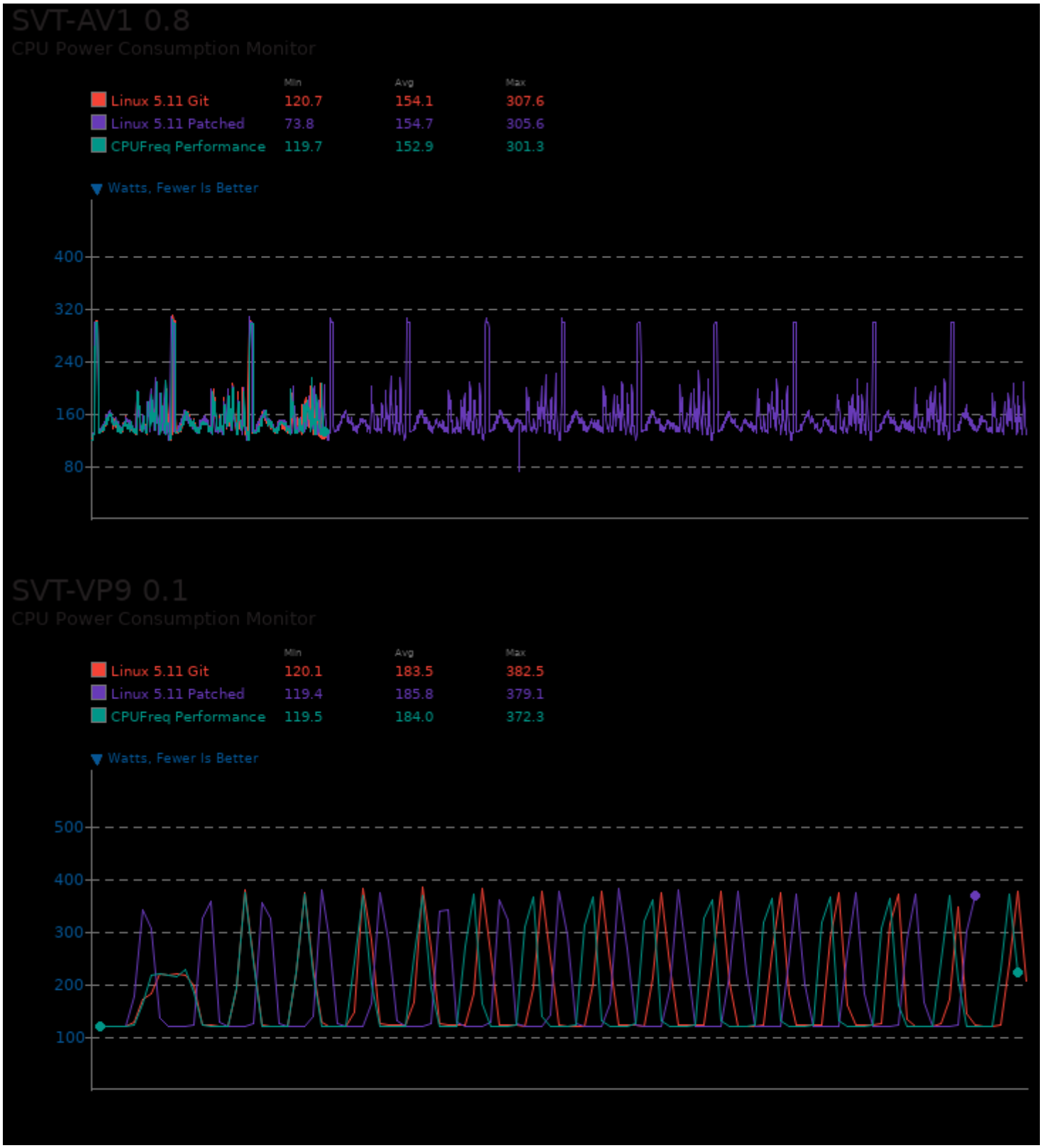

Rodinia 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.2 220.5 291.1
Linux 5.11 Patched 120.3 215.0 284.6
CPUFreq Performance 120.7 216.9 281.4
Watts, Fewer Is Better
350
280
210
140
70
Rodinia 3.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.1 158.2 258.8
Linux 5.11 Patched 120.1 157.6 257.7
CPUFreq Performance 119.8 156.2 253.4
Watts, Fewer Is Better
350
280
210
140
70

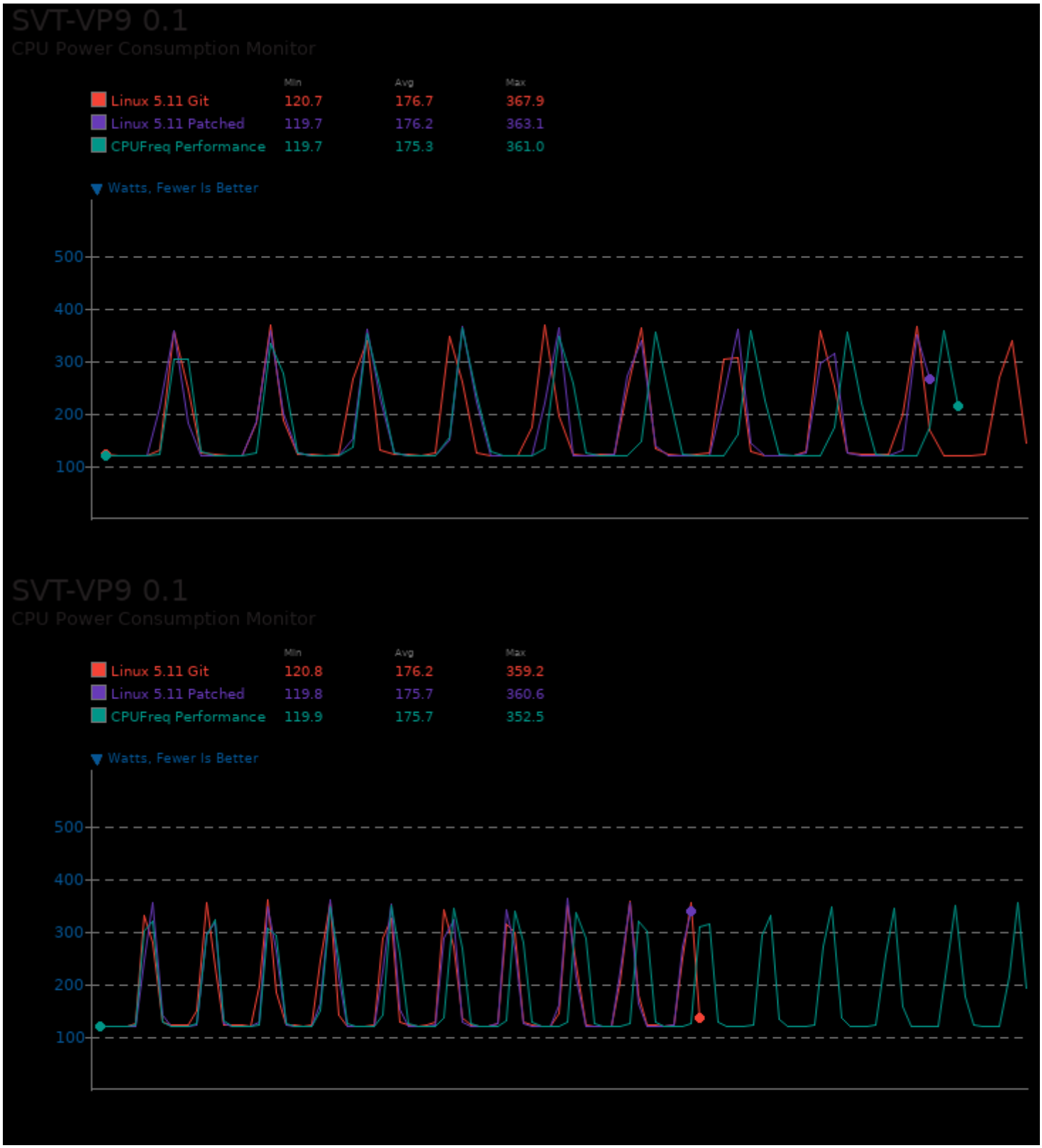

simdjson 0.7.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 128.4 132.9
Linux 5.11 Patched 119.8 128.6 130.0
CPUFreq Performance 119.4 128.3 129.2
Watts, Fewer Is Better
200
160
120
80
40
simdjson 0.7.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 64.7 128.8 131.2
Linux 5.11 Patched 120.1 129.9 132.4
CPUFreq Performance 119.7 128.6 131.1
Watts, Fewer Is Better
200
160
120
80
40


simdjson 0.7.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 130.0 132.1
Linux 5.11 Patched 119.9 130.5 132.8
CPUFreq Performance 119.8 128.9 131.5
Watts, Fewer Is Better
200
160
120
80
40
simdjson 0.7.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.9 130.1 131.8
Linux 5.11 Patched 120.1 129.7 130.6
CPUFreq Performance 119.7 128.1 129.2
Watts, Fewer Is Better
200
160
120
80
40

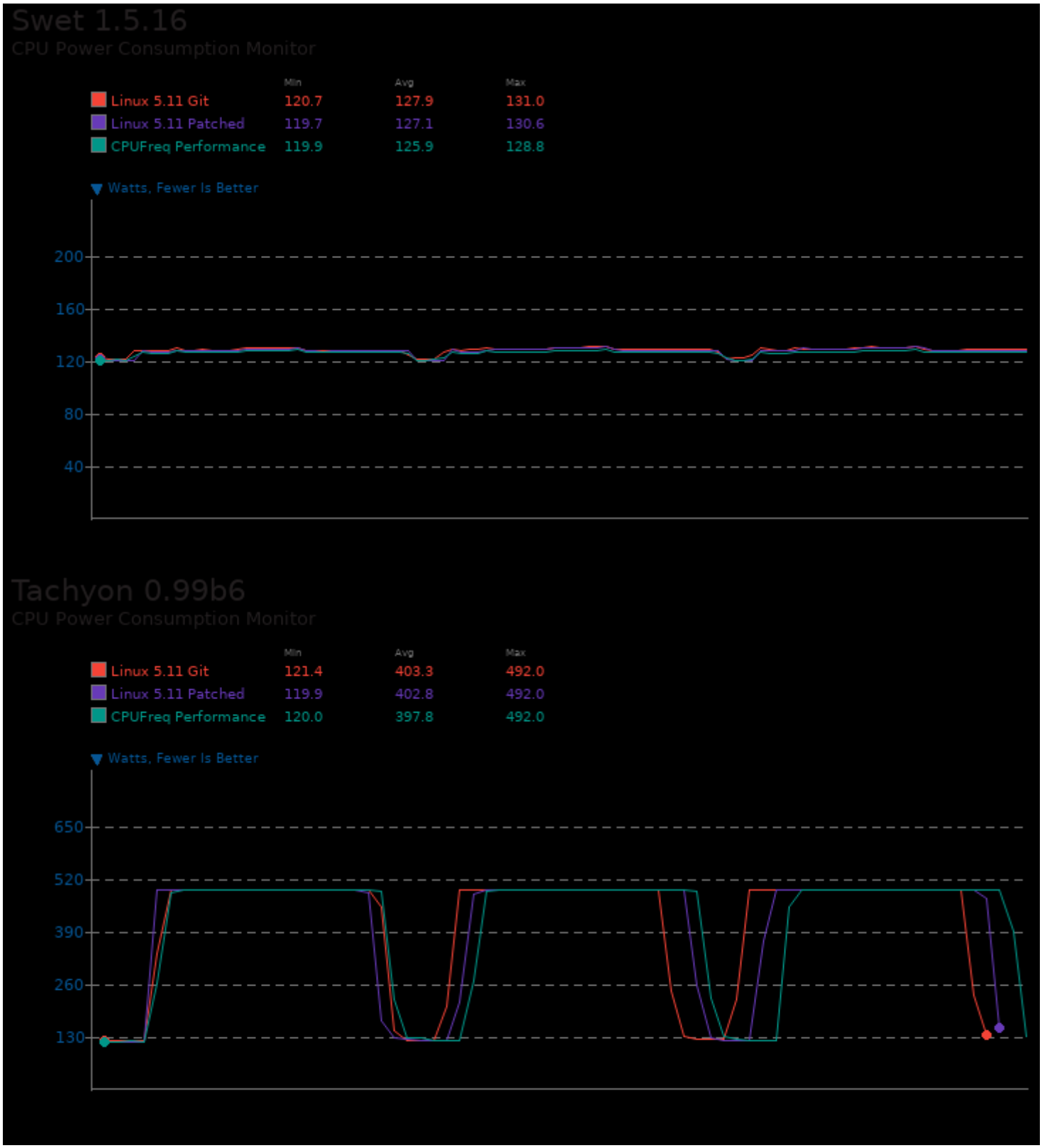

SQLite Speedtest 3.30
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 131.3 132.6
Linux 5.11 Patched 120.2 131.3 133.3
CPUFreq Performance 119.8 129.6 131.3
Watts, Fewer Is Better
200
160
120
80
40
Stockfish 12
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.6 439.0 492.1
Linux 5.11 Patched 60.1 439.1 492.3
CPUFreq Performance 119.9 439.2 492.3
Watts, Fewer Is Better
650
520
390
260
130

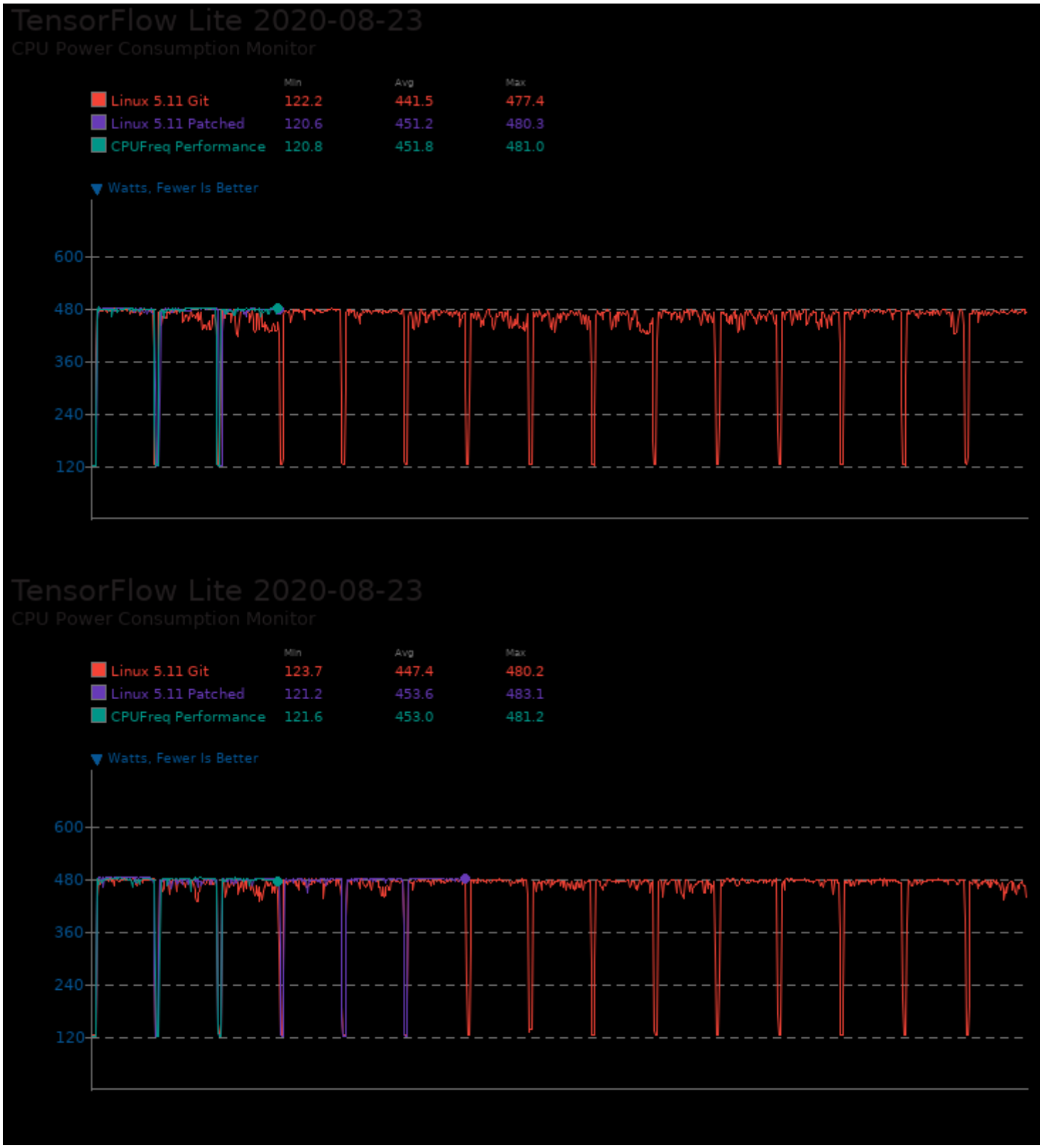

SVT-AV1 0.8
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.4 207.9 382.6
Linux 5.11 Patched 120.4 209.8 388.0
CPUFreq Performance 120.4 207.6 386.1
Watts, Fewer Is Better
500
400
300
200
100
SVT-AV1 0.8
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.1 230.3 548.3
Linux 5.11 Patched 119.9 229.6 530.7
CPUFreq Performance 120.0 227.7 514.1
Watts, Fewer Is Better
700
560
420
280
140

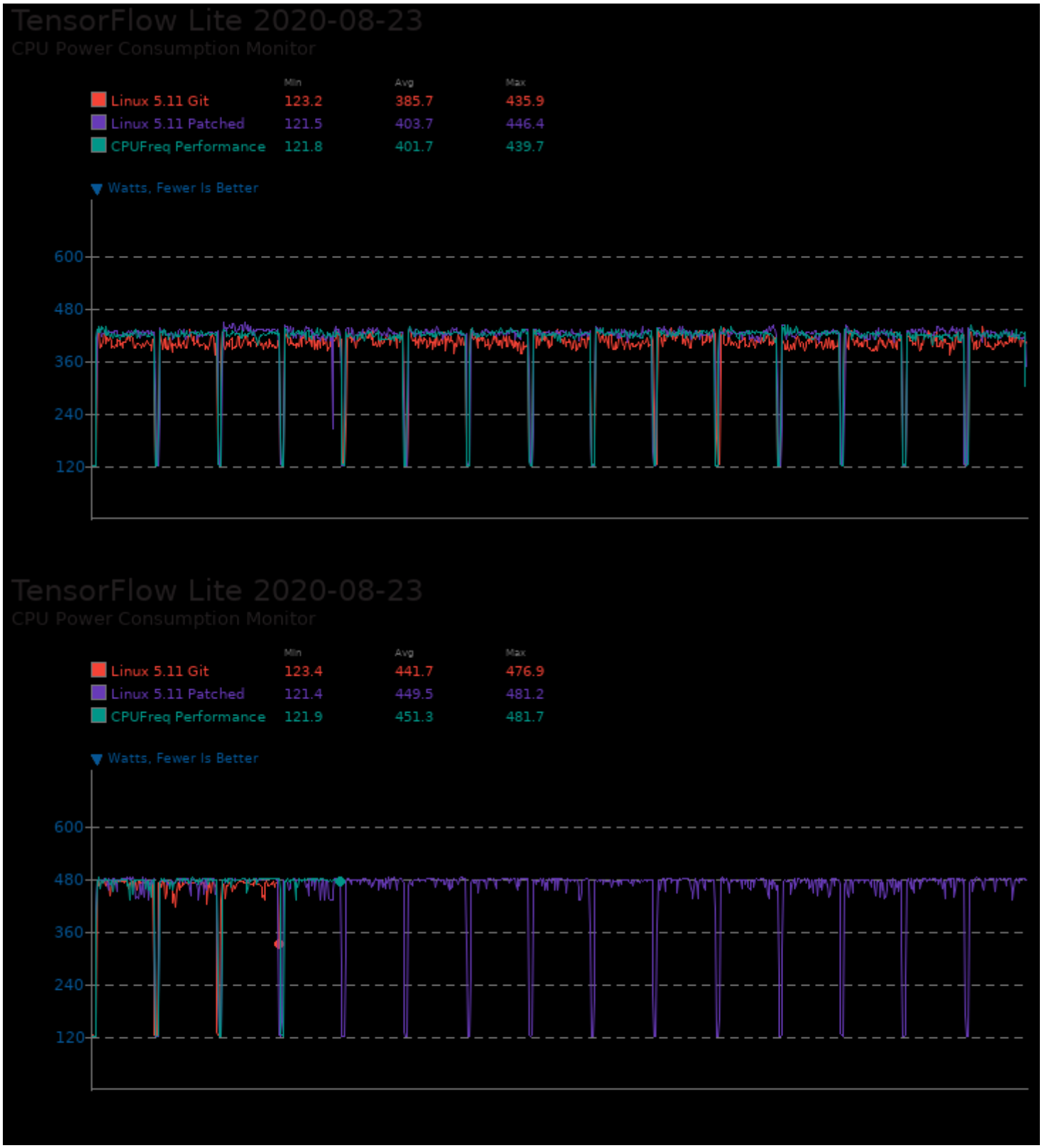

SVT-AV1 0.8
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 154.1 307.6
Linux 5.11 Patched 73.8 154.7 305.6
CPUFreq Performance 119.7 152.9 301.3
Watts, Fewer Is Better
400
320
240
160
80
SVT-VP9 0.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.1 183.5 382.5
Linux 5.11 Patched 119.4 185.8 379.1
CPUFreq Performance 119.5 184.0 372.3
Watts, Fewer Is Better
500
400
300
200
100


SVT-VP9 0.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.7 176.7 367.9
Linux 5.11 Patched 119.7 176.2 363.1
CPUFreq Performance 119.7 175.3 361.0
Watts, Fewer Is Better
500
400
300
200
100
SVT-VP9 0.1
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 120.8 176.2 359.2
Linux 5.11 Patched 119.8 175.7 360.6
CPUFreq Performance 119.9 175.7 352.5
Watts, Fewer Is Better
500
400
300
200
100

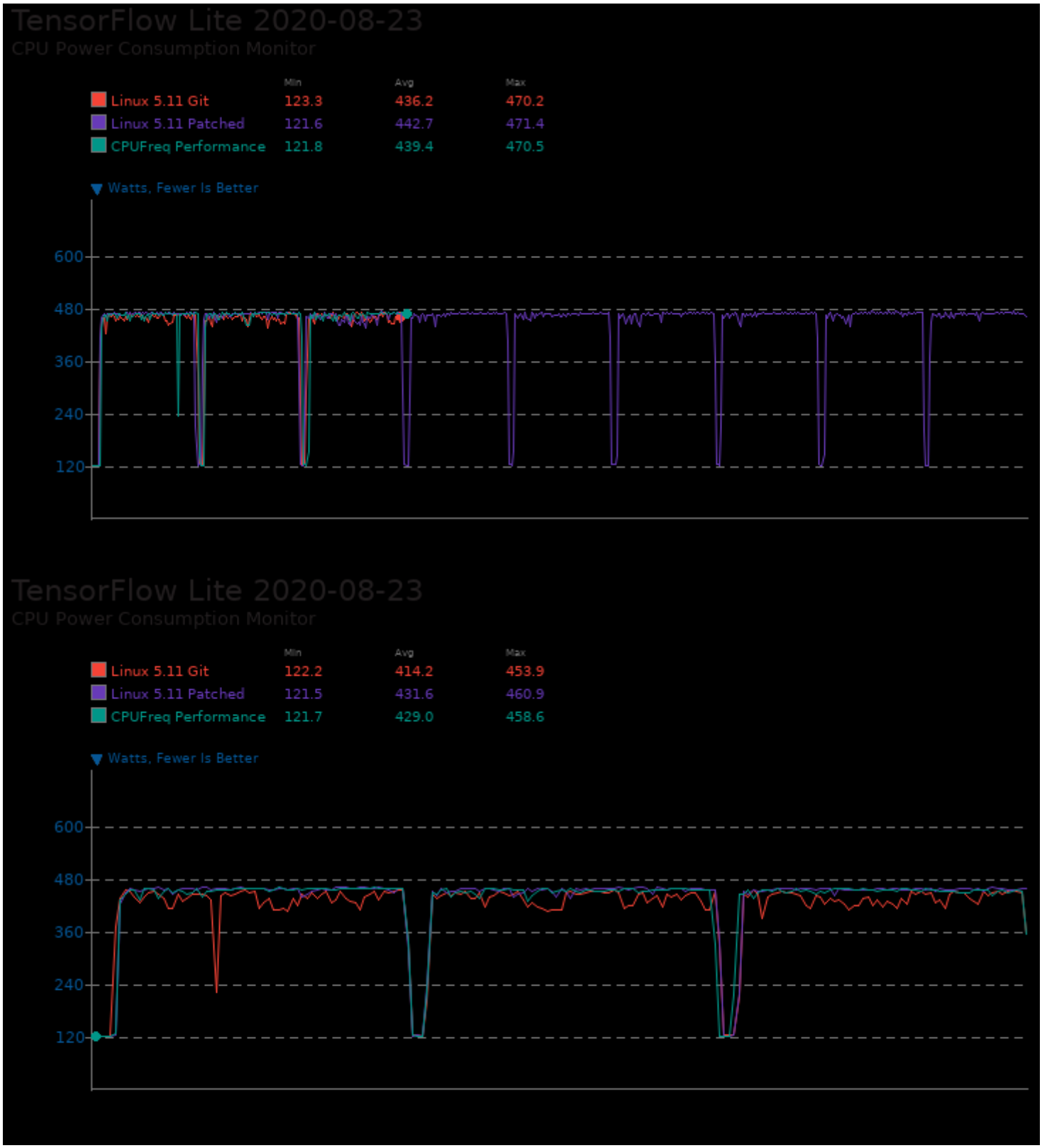
AMD EPYC 7F72 2P Linux 5.11 Perf Governor

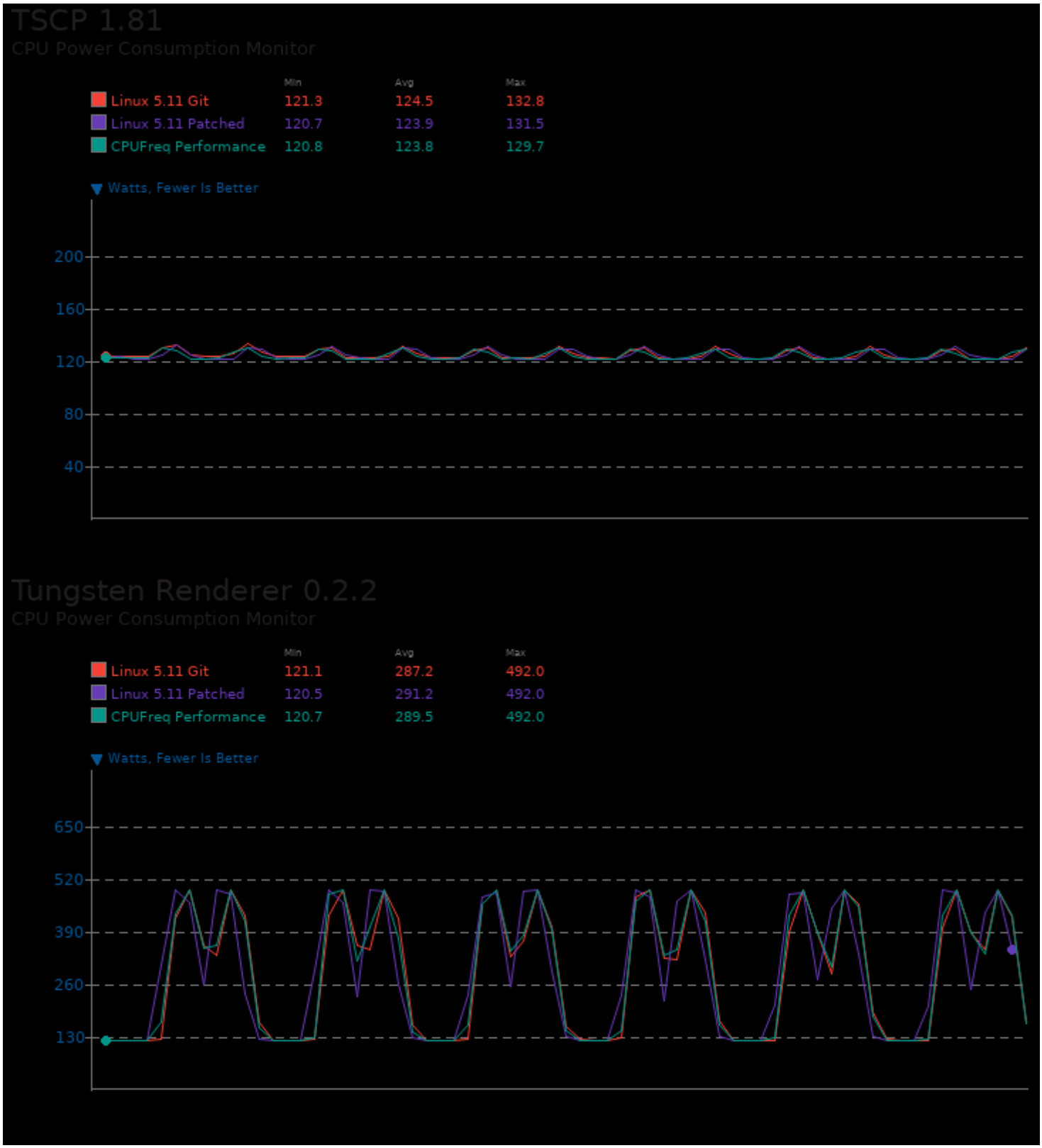


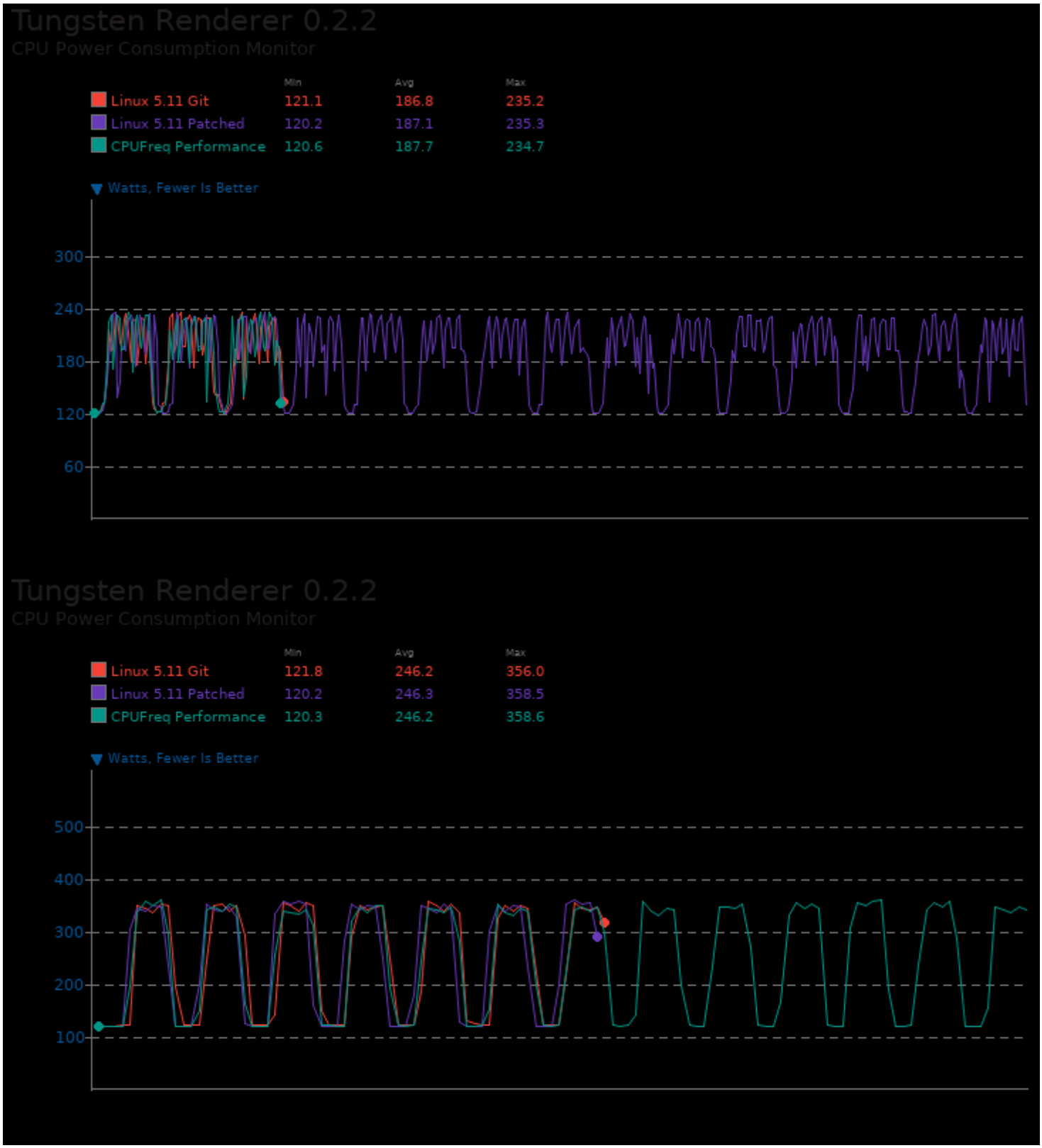

TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 441.5 477.4
Linux 5.11 Patched 120.6 451.2 480.3
CPUFreq Performance 120.8 451.8 481.0
Watts, Fewer Is Better
600
480
360
240
120
TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.7 447.4 480.2
Linux 5.11 Patched 121.2 453.6 483.1
CPUFreq Performance 121.6 453.0 481.2
Watts, Fewer Is Better
600
480
360
240
120

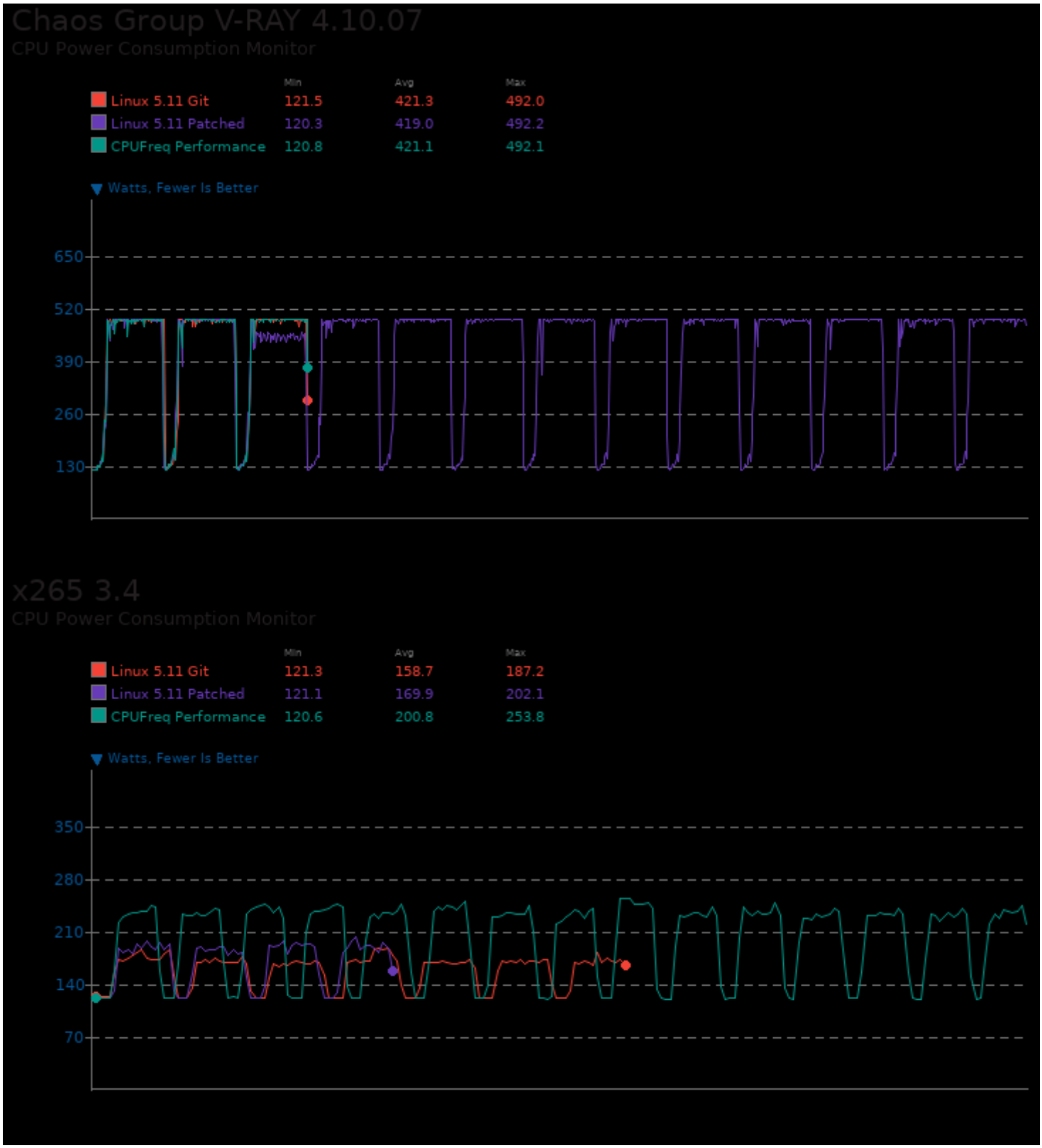

TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.2 385.7 435.9
Linux 5.11 Patched 121.5 403.7 446.4
CPUFreq Performance 121.8 401.7 439.7
Watts, Fewer Is Better
600
480
360
240
120

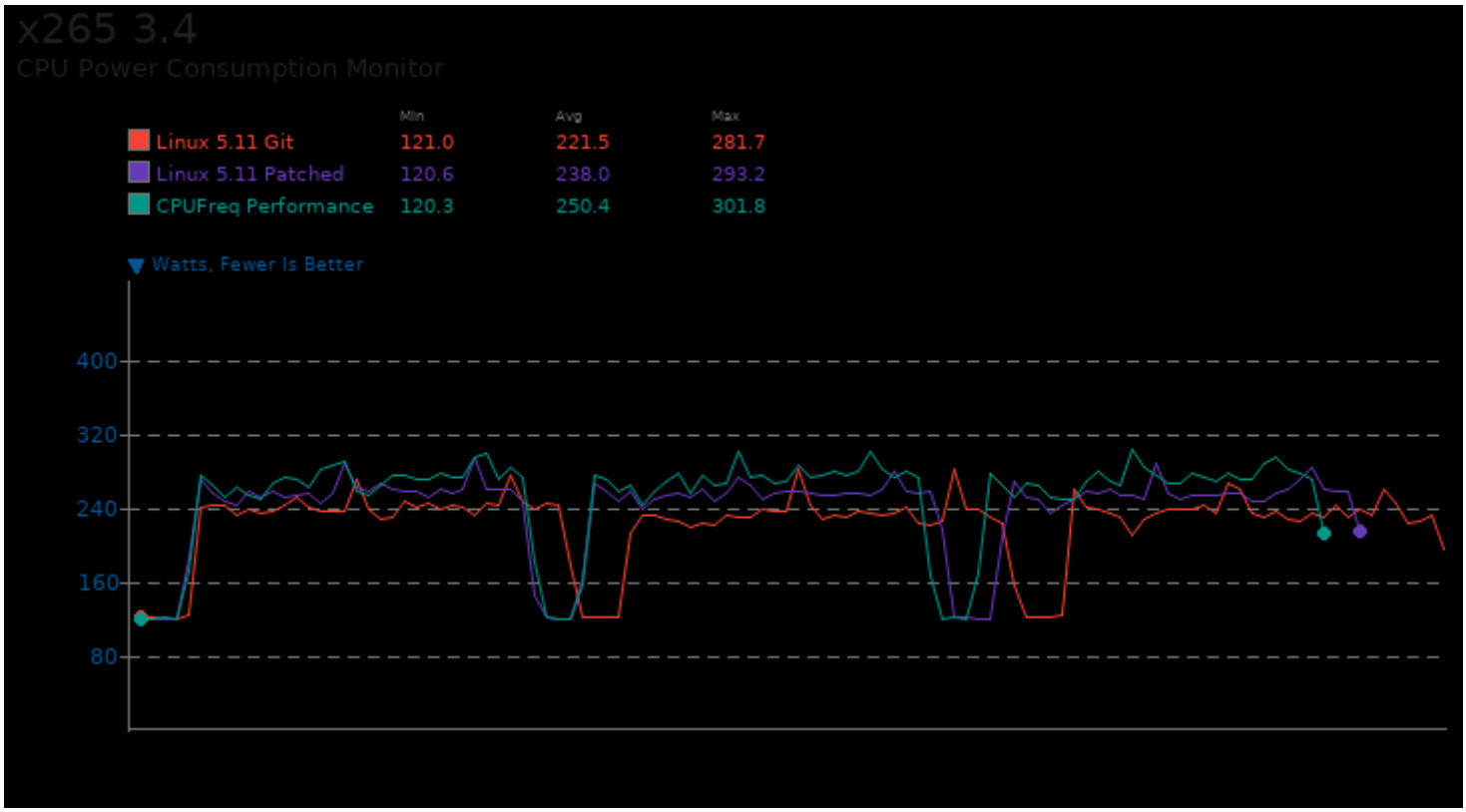
TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.4 441.7 476.9
Linux 5.11 Patched 121.4 449.5 481.2
CPUFreq Performance 121.9 451.3 481.7
Watts, Fewer Is Better
600
480
360
240
120


TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 123.3 436.2 470.2
Linux 5.11 Patched 121.6 442.7 471.4
CPUFreq Performance 121.8 439.4 470.5
Watts, Fewer Is Better
600
480
360
240
120
TensorFlow Lite 2020-08-23
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 122.2 414.2 453.9
Linux 5.11 Patched 121.5 431.6 460.9
CPUFreq Performance 121.7 429.0 458.6
Watts, Fewer Is Better
600
480
360
240
120

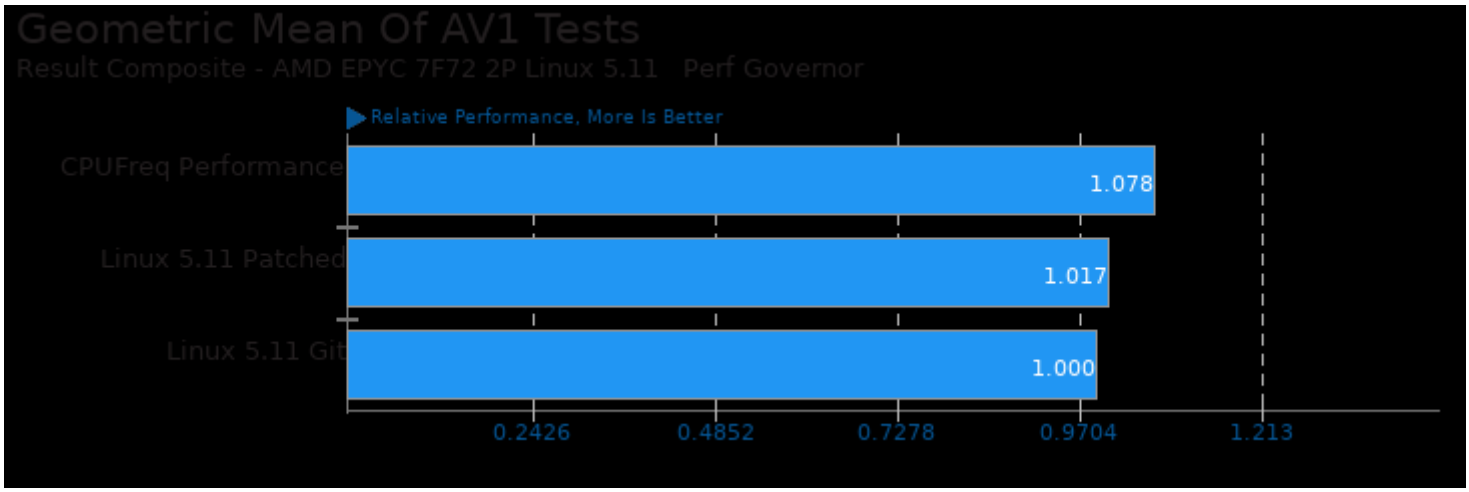

TSCP 1.81
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.3 124.5 132.8
Linux 5.11 Patched 120.7 123.9 131.5
CPUFreq Performance 120.8 123.8 129.7
Watts, Fewer Is Better
200
160
120
80
40
Tungsten Renderer 0.2.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.1 287.2 492.0
Linux 5.11 Patched 120.5 291.2 492.0
CPUFreq Performance 120.7 289.5 492.0
Watts, Fewer Is Better
650
520
390
260
130


Tungsten Renderer 0.2.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.1 186.8 235.2
Linux 5.11 Patched 120.2 187.1 235.3
CPUFreq Performance 120.6 187.7 234.7
Watts, Fewer Is Better
300
240
180
120
60
Tungsten Renderer 0.2.2
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.8 246.2 356.0
Linux 5.11 Patched 120.2 246.3 358.5
CPUFreq Performance 120.3 246.2 358.6
Watts, Fewer Is Better
500
400
300
200
100

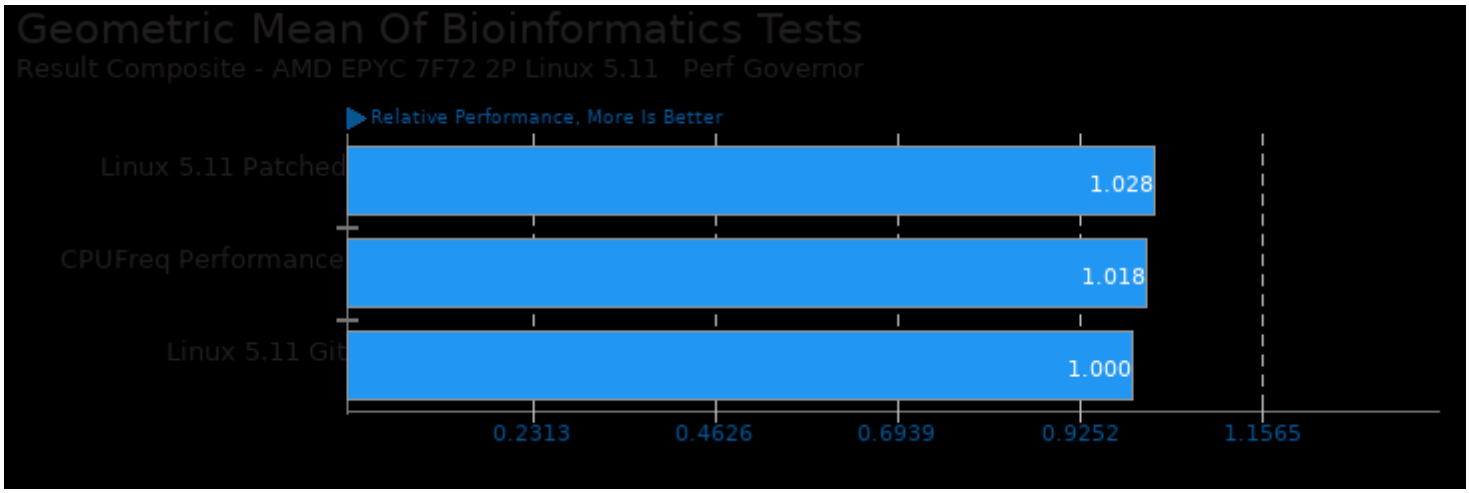

Chaos Group V-RAY 4.10.07
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.5 421.3 492.0
Linux 5.11 Patched 120.3 419.0 492.2
CPUFreq Performance 120.8 421.1 492.1
Watts, Fewer Is Better
650
520
390
260
130
x265 3.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.3 158.7 187.2
Linux 5.11 Patched 121.1 169.9 202.1
CPUFreq Performance 120.6 200.8 253.8
Watts, Fewer Is Better
350
280
210
140
70


x265 3.4
CPU Power Consumption Monitor
Min
Avg
Max
Linux 5.11 Git 121.0 221.5 281.7
Linux 5.11 Patched 120.6 238.0 293.2
CPUFreq Performance 120.3 250.4 301.8
Watts, Fewer Is Better
400
320
240
160
80

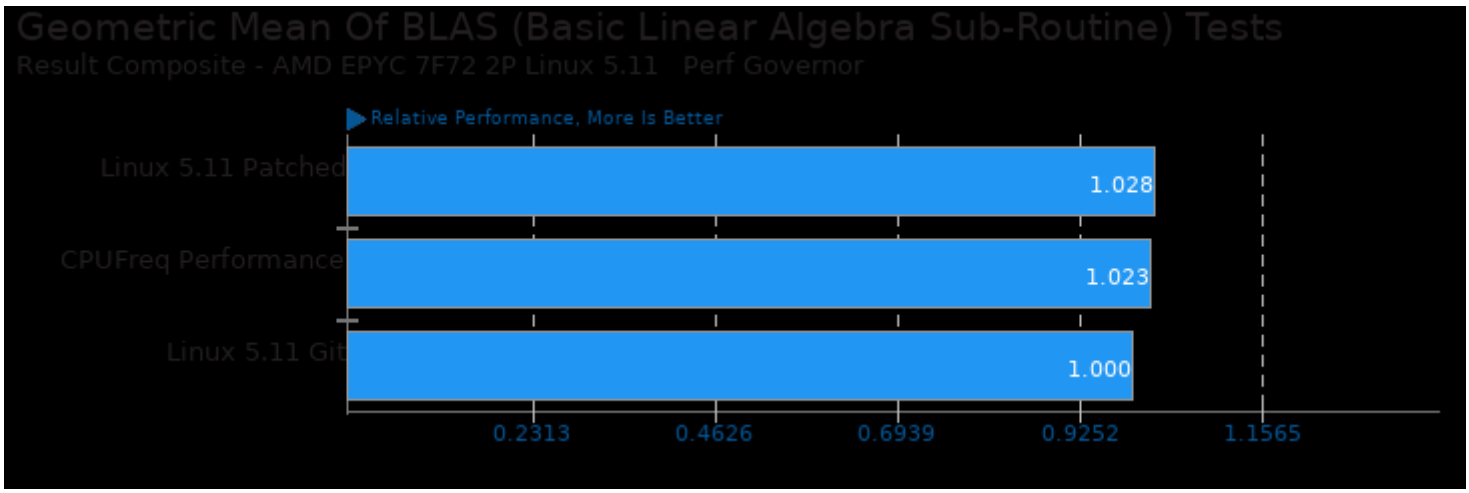
These geometric means are based upon test groupings / test suites for this result file.



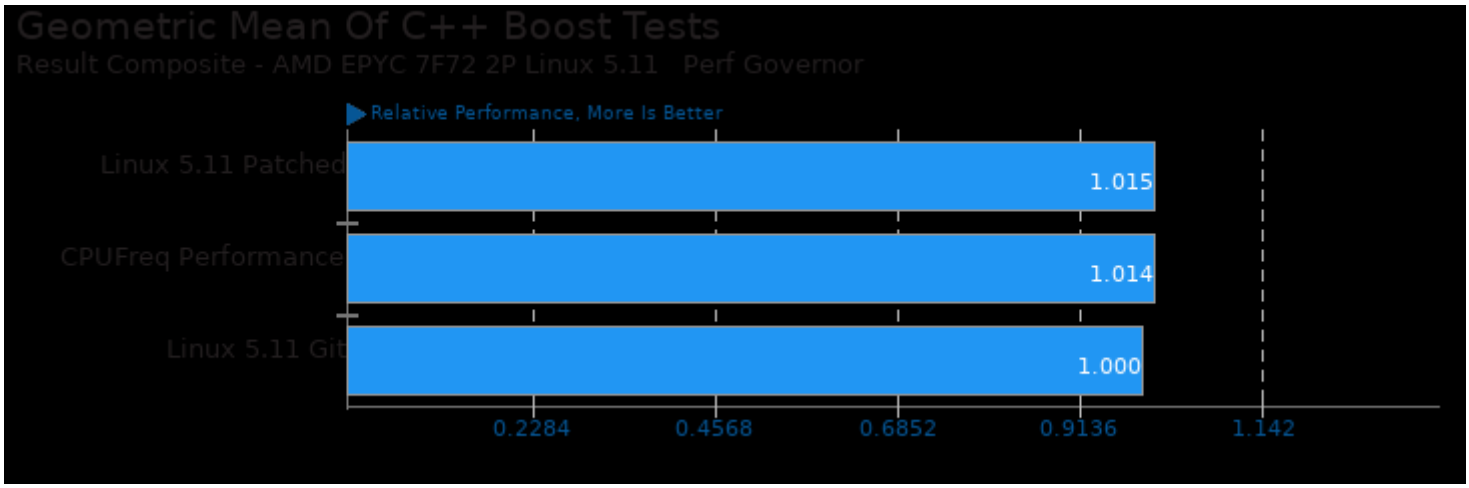
Geometric mean based upon tests: pts/dav1d, pts/svt-av1 and pts/rav1e



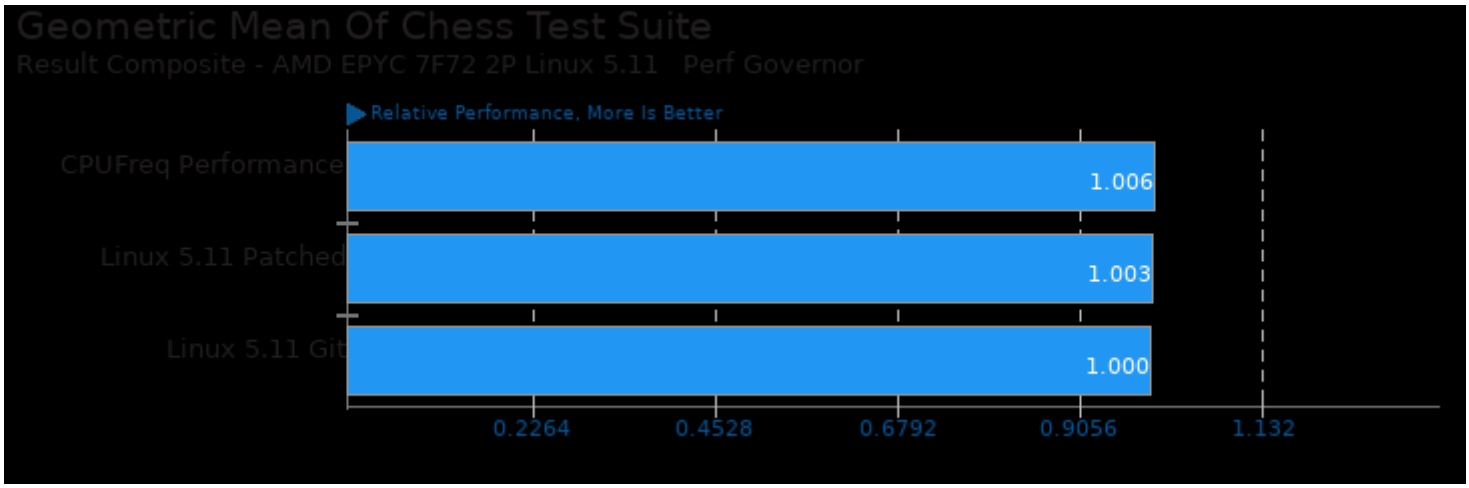
Geometric mean based upon tests: pts/himeno, pts/mrbayes and pts/qmcpack



Geometric mean based upon tests: pts/lczero, pts/qe, pts/gpaw and pts/qmcpack



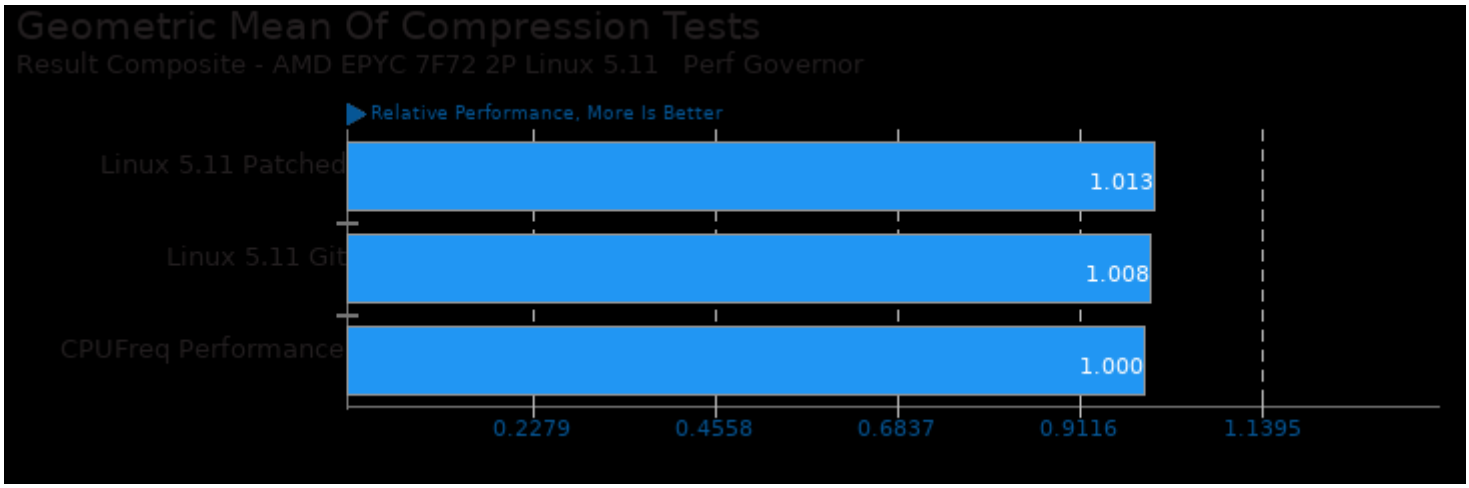
Geometric mean based upon tests: pts/quantlib, pts/openfoam, pts/povray, pts/yafaray and pts/qmcpack



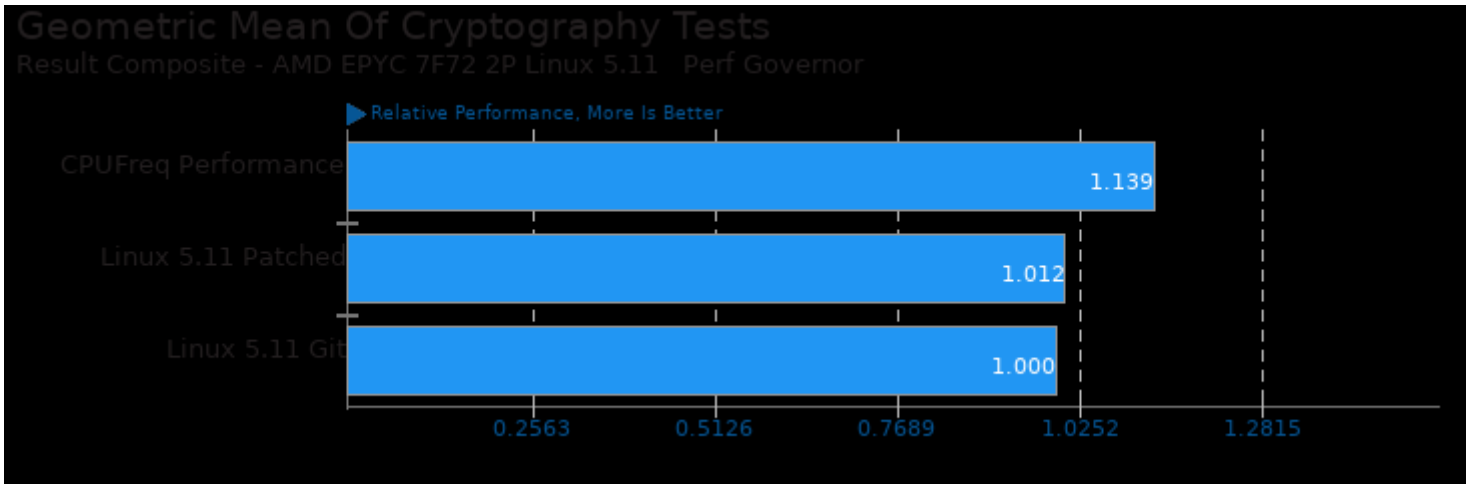
Geometric mean based upon tests: pts/tscp, pts/lczero, pts/stockfish and pts/asmfish



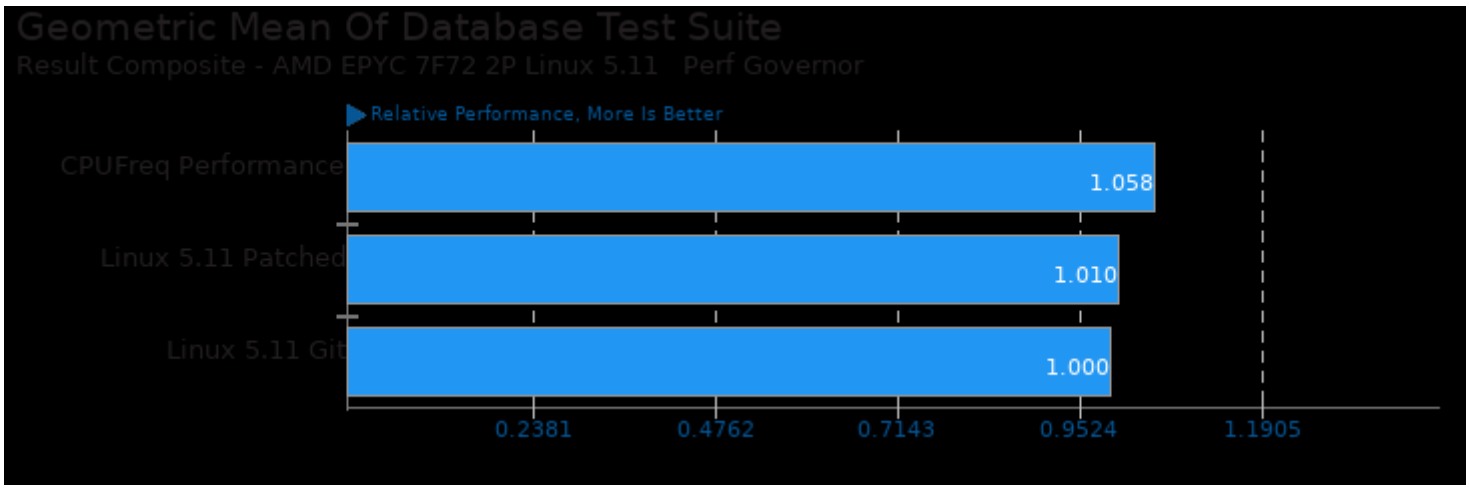
Geometric mean based upon tests: pts/build-linux-kernel, pts/build-gdb, pts/build-llvm, pts/build2 and pts/build-godot



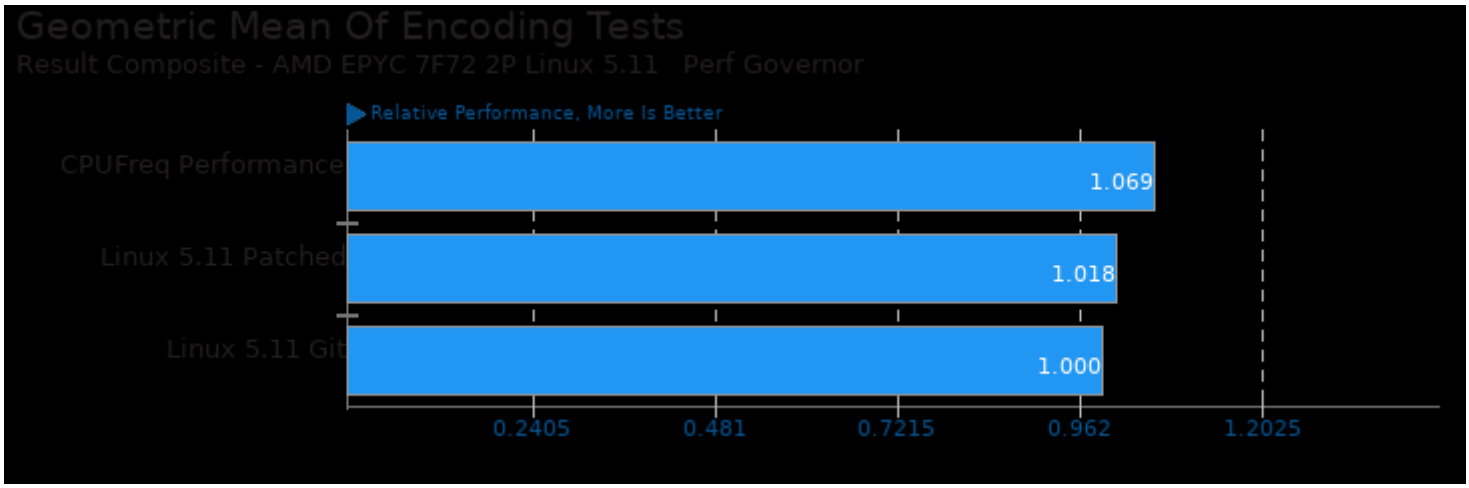
Geometric mean based upon tests: pts/compress-zstd and pts/compress-lz4



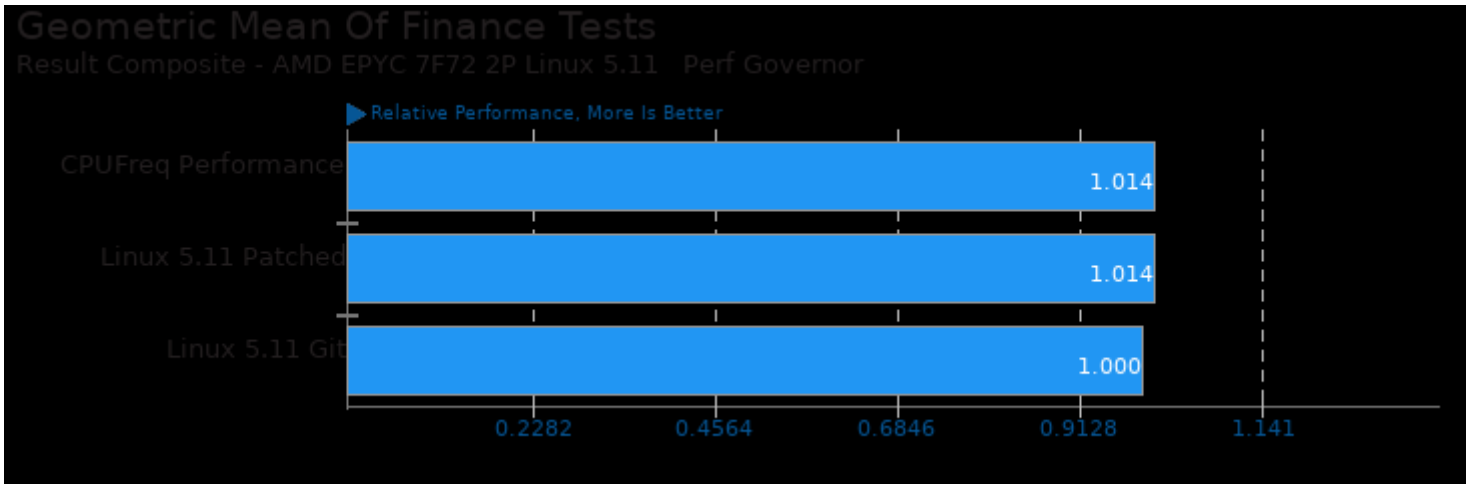
Geometric mean based upon tests: pts/gnupg, pts/gcrypt, pts/john-the-ripper and pts/cpuminer-opt



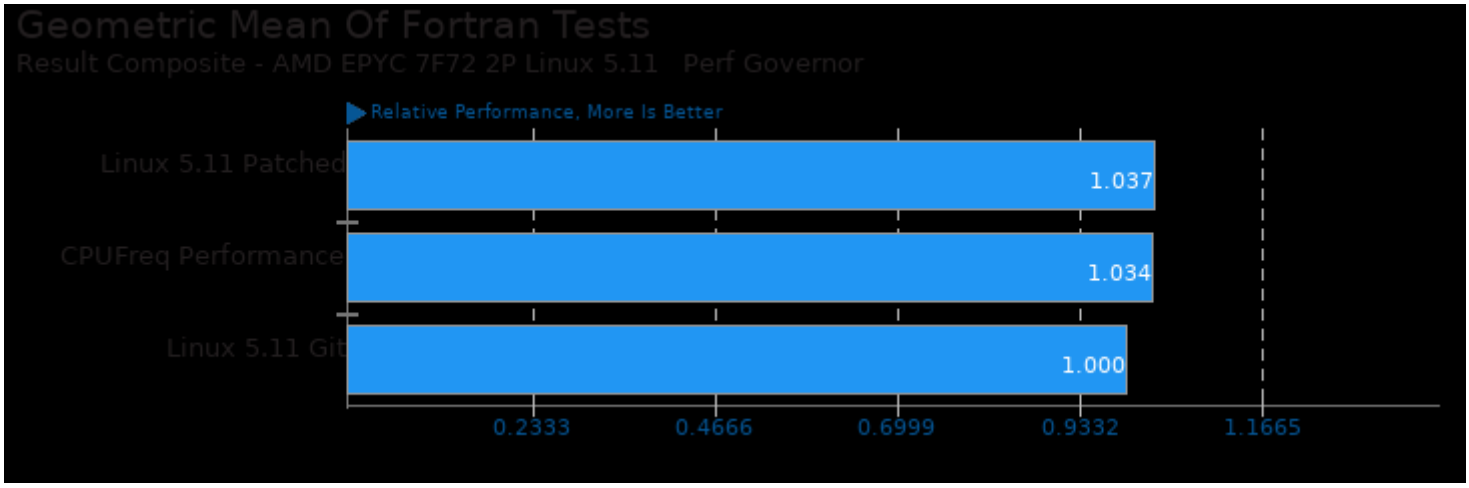
Geometric mean based upon tests: pts/sqlite-speedtest, pts/redis, pts/keydb and pts/influxdb



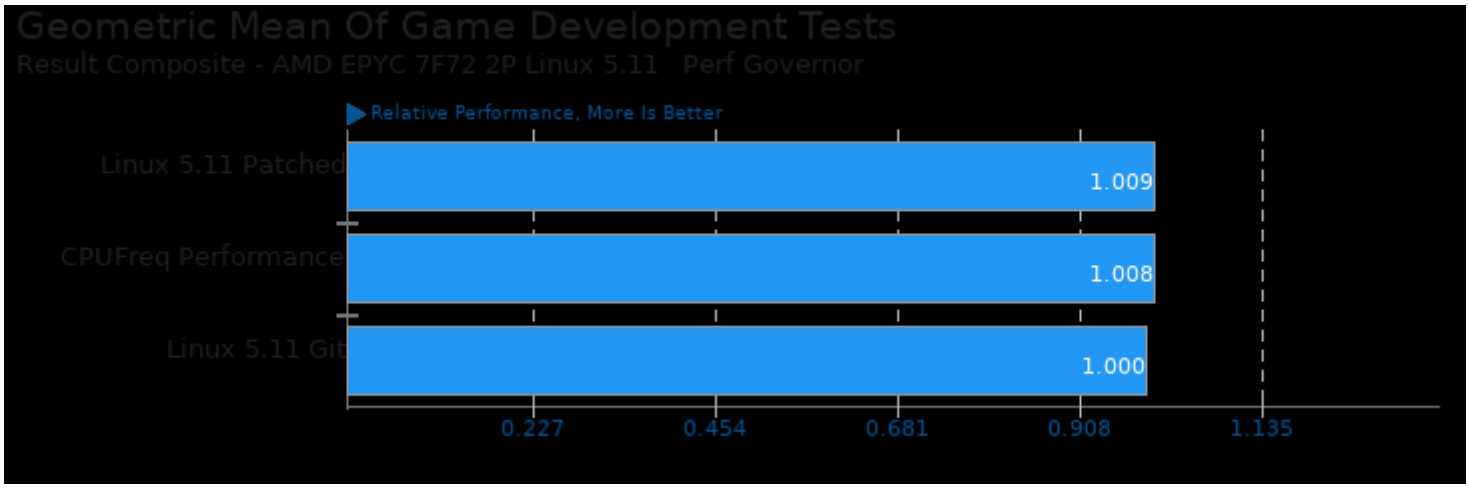
Geometric mean based upon tests: pts/svt-vp9, pts/x265, pts/dav1d, pts/svt-av1 and pts/rav1e



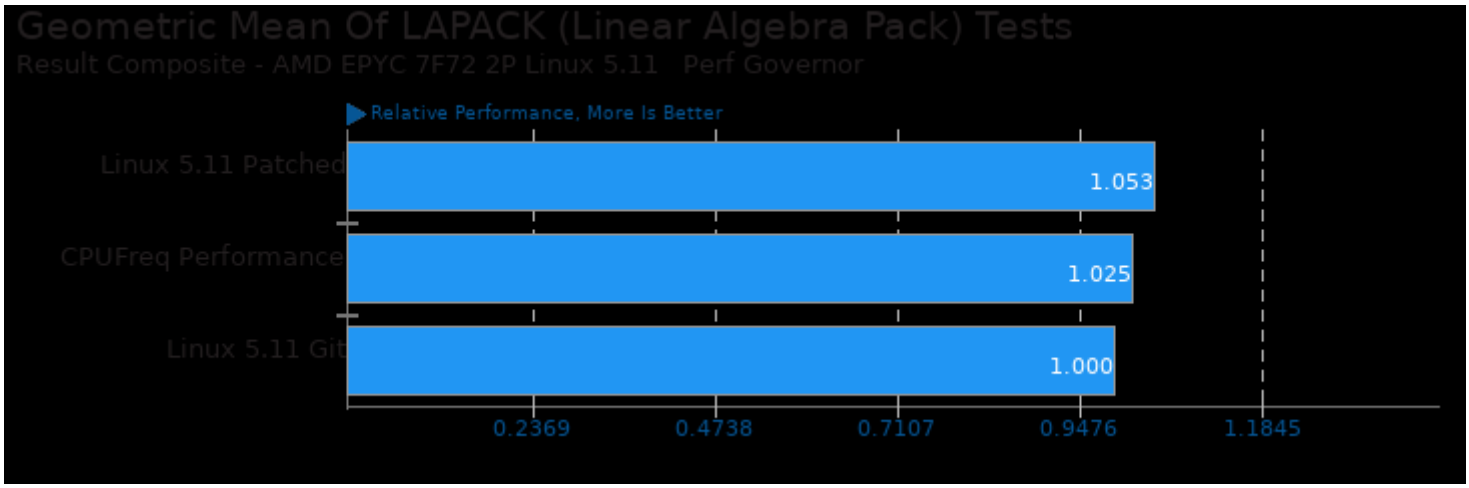
Geometric mean based upon tests: pts/financebench and pts/quantlib



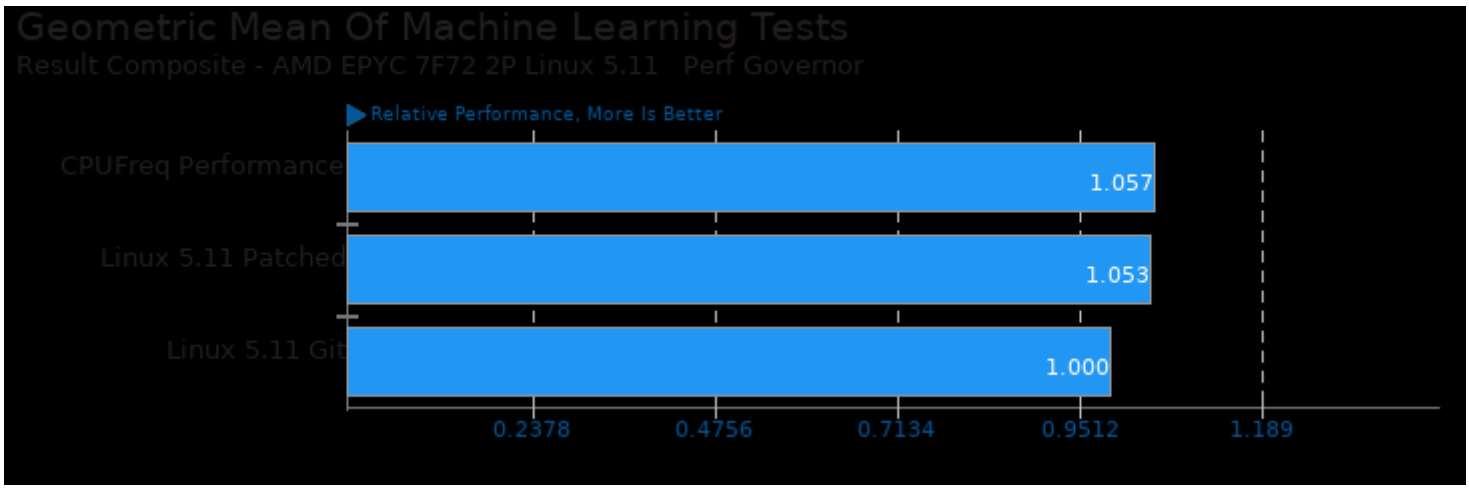
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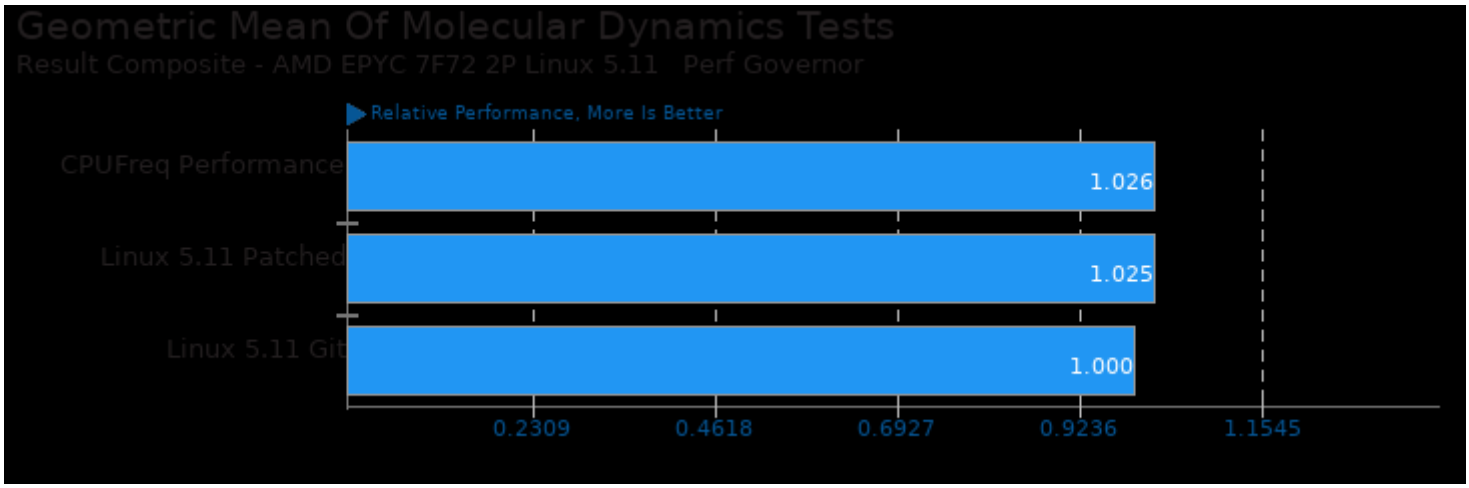
Geometric mean based upon tests: pts/astcenc, pts/etcpak, pts/build-godot, pts/blender and pts/oidn



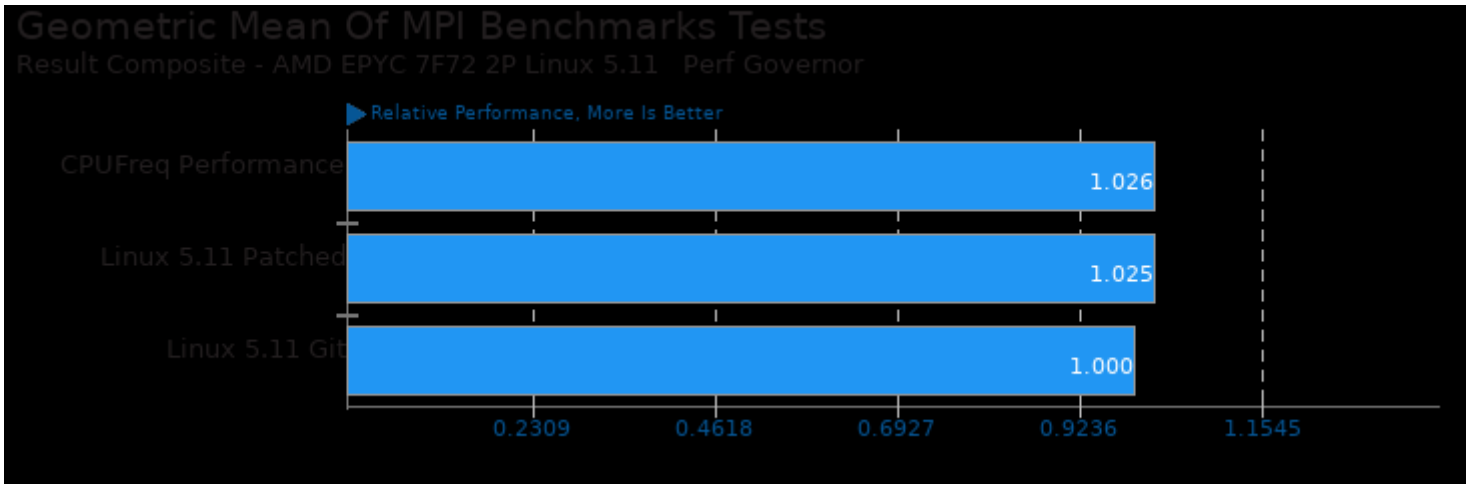
Geometric mean based upon tests: pts/qe and pts/qmcpack



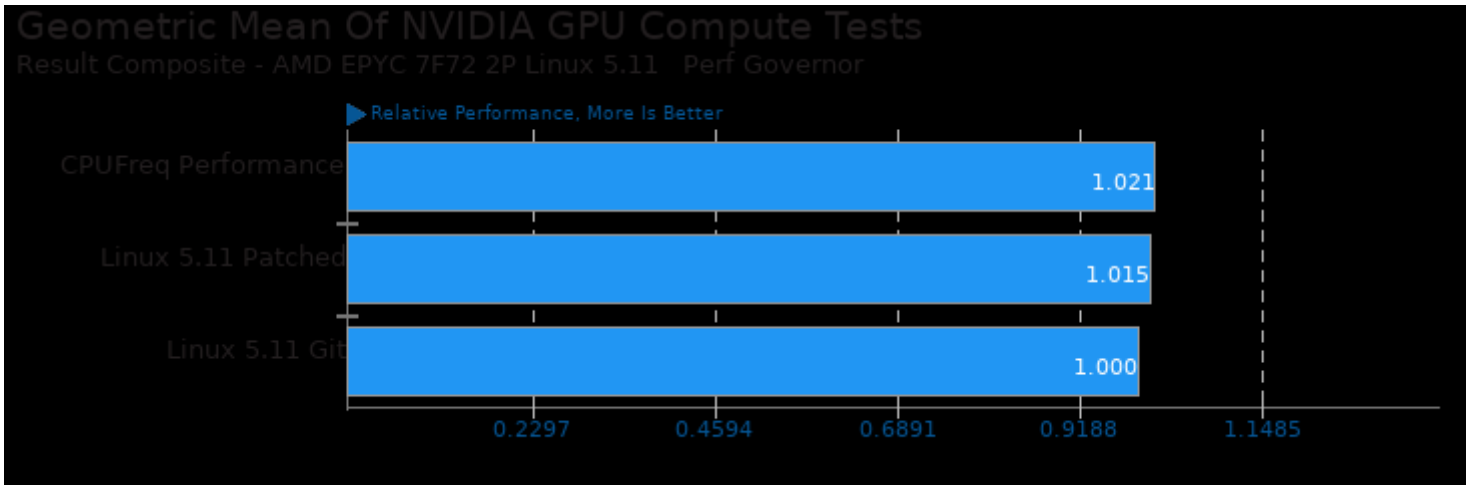
Geometric mean based upon tests: pts/tnn, pts/numpy, pts/ai-benchmark, pts/tensorflow-lite, pts/onednn, pts/onnx, pts/plaidml and pts/lczero



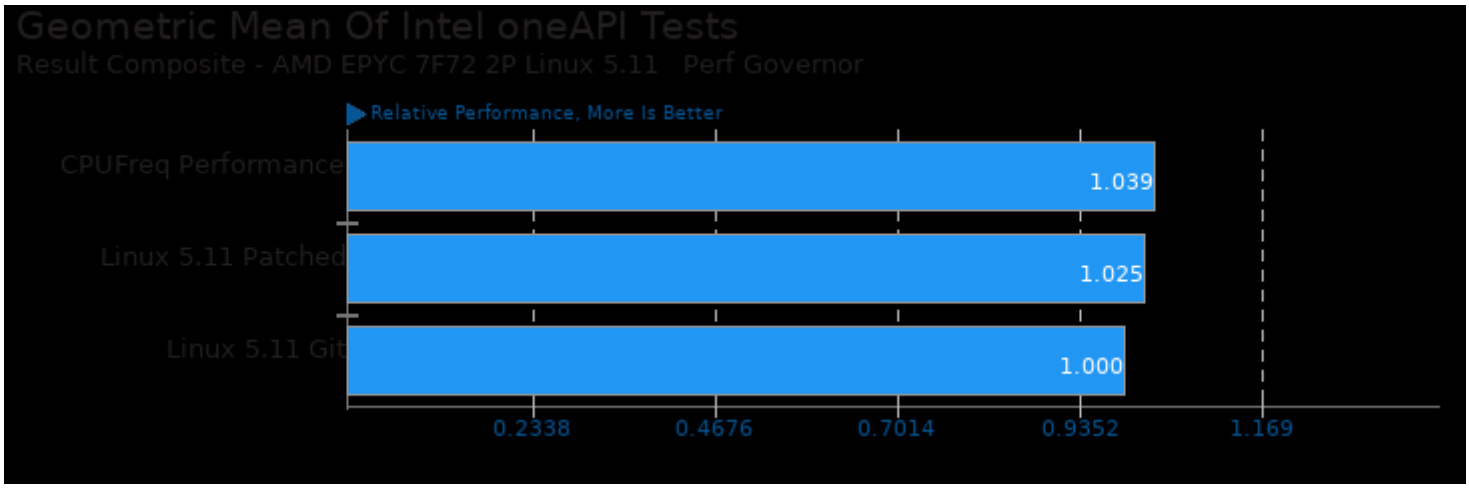
Geometric mean based upon tests: pts/namd, pts/gromacs, pts/dolfyn, pts/lammps, pts/lulesh and pts/openfoam



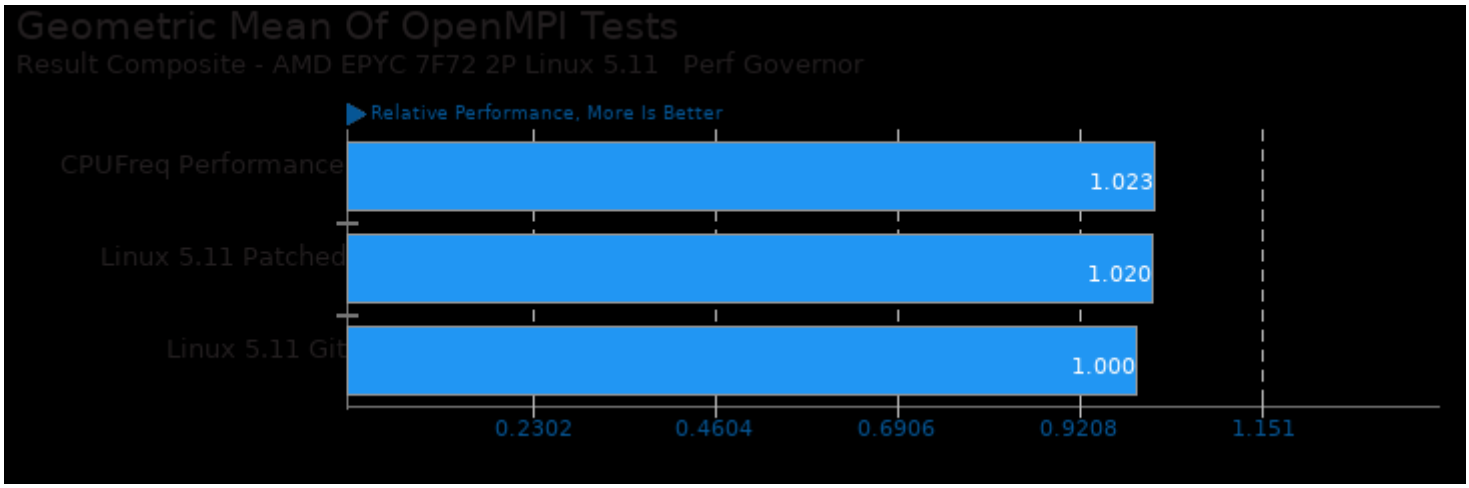
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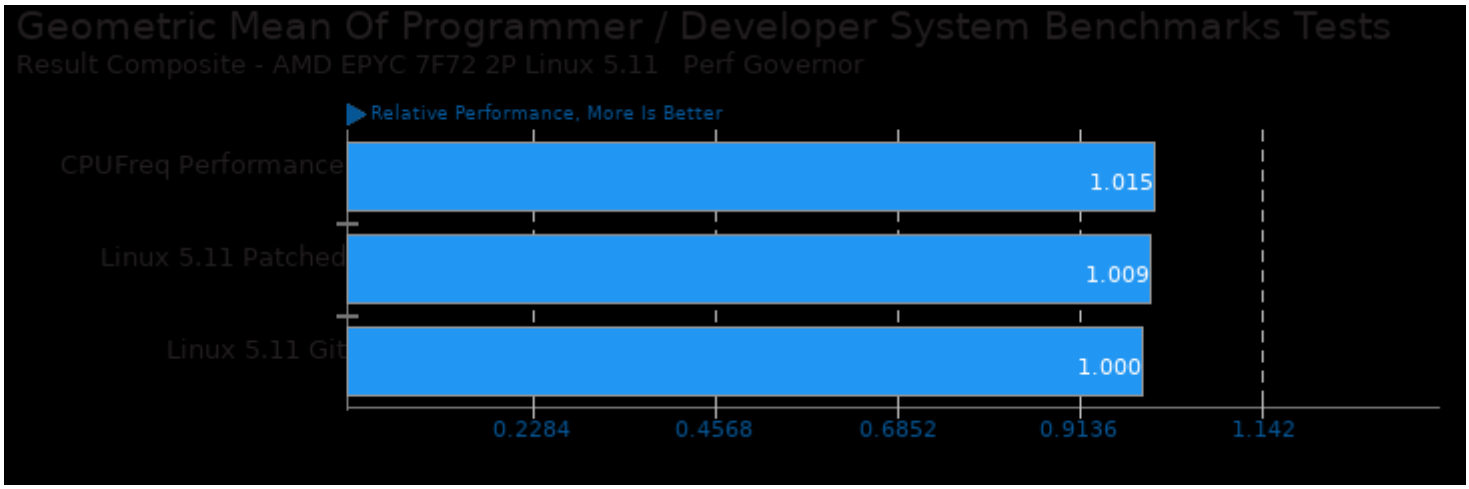
Geometric mean based upon tests: pts/gromacs, pts/luxcorerender, pts/rodinia, pts/financebench, pts/plaidml, pts/lczero, pts/v-ray and pts/blender



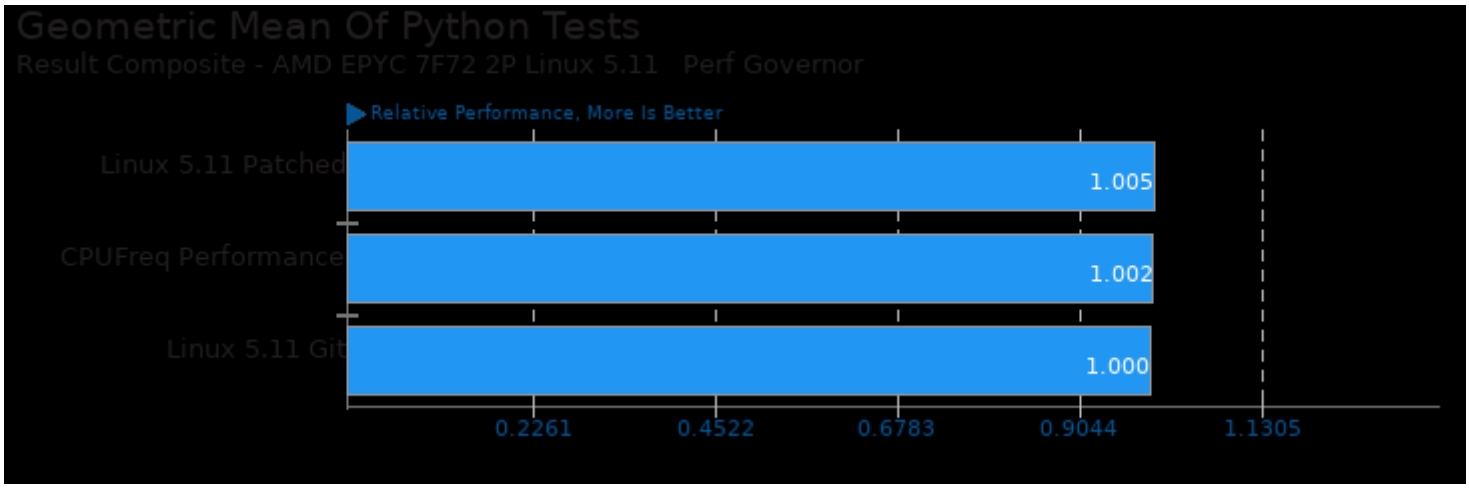
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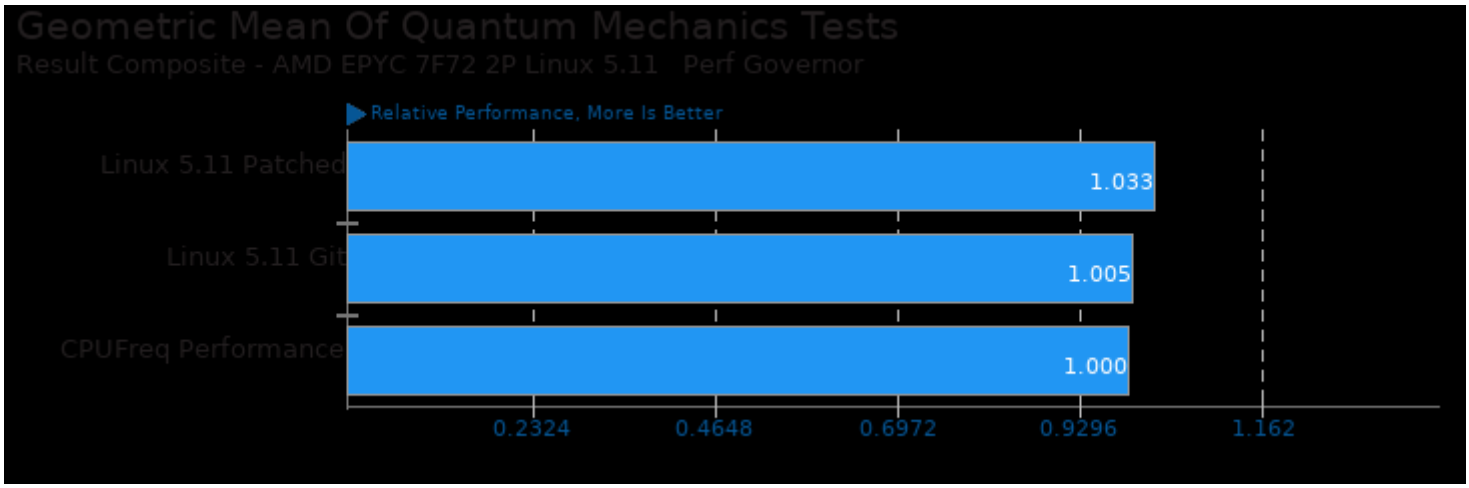
Geometric mean based upon tests: pts/amg, pts/hpcg, pts/ior, pts/askap, pts/gromacs, pts/lammps, pts/npb, pts/lulesh, pts/openfoam, pts/qe, pts/relion, pts/gpaw, pts/mrbayes, pts/rodinia and pts/qmcpack



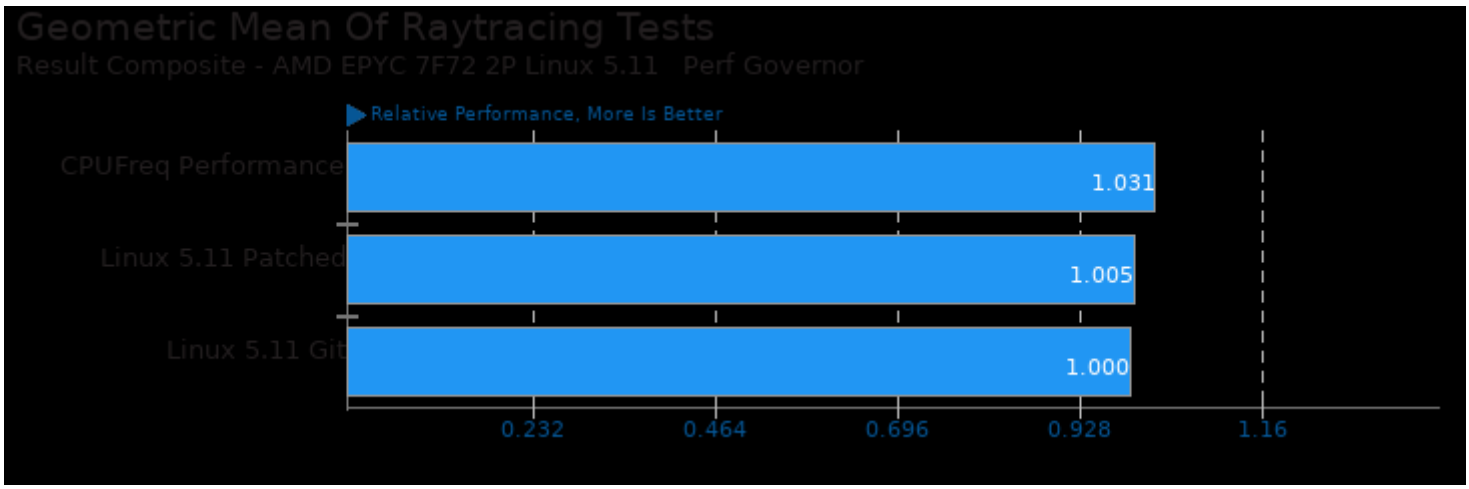
Geometric mean based upon tests: pts/simdjson, pts/sqlite-speedtest, pts/compress-zstd, pts/build-linux-kernel, pts/build-gdb, pts/build-llvm, pts/build2, pts/build-godot and pts/amg



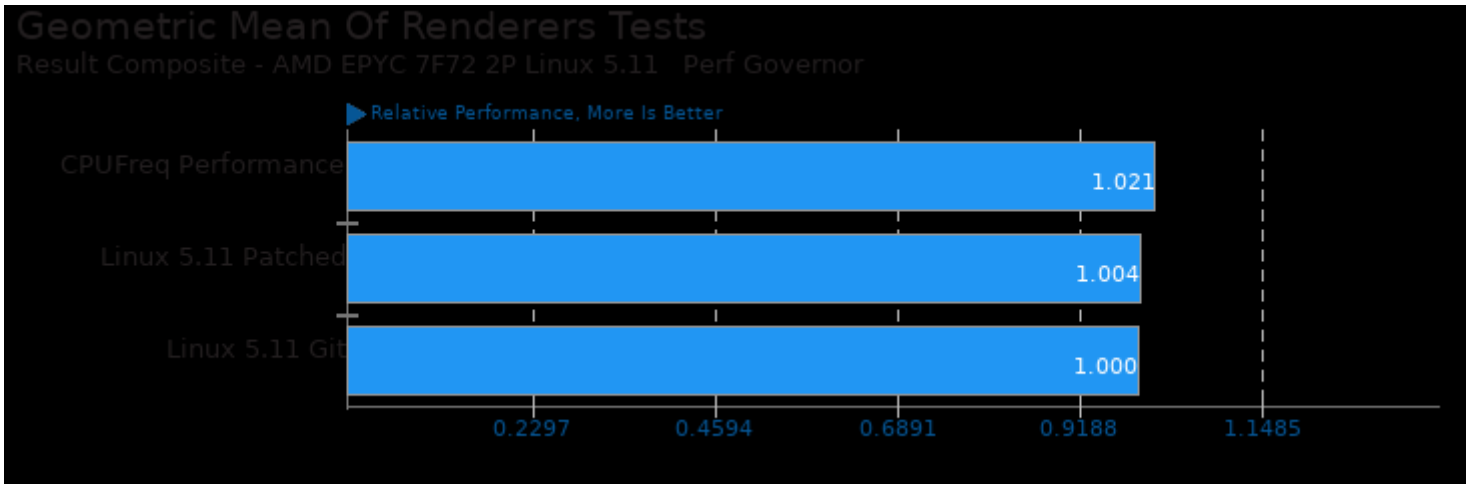
Geometric mean based upon tests: pts/cython-bench and pts/numpy



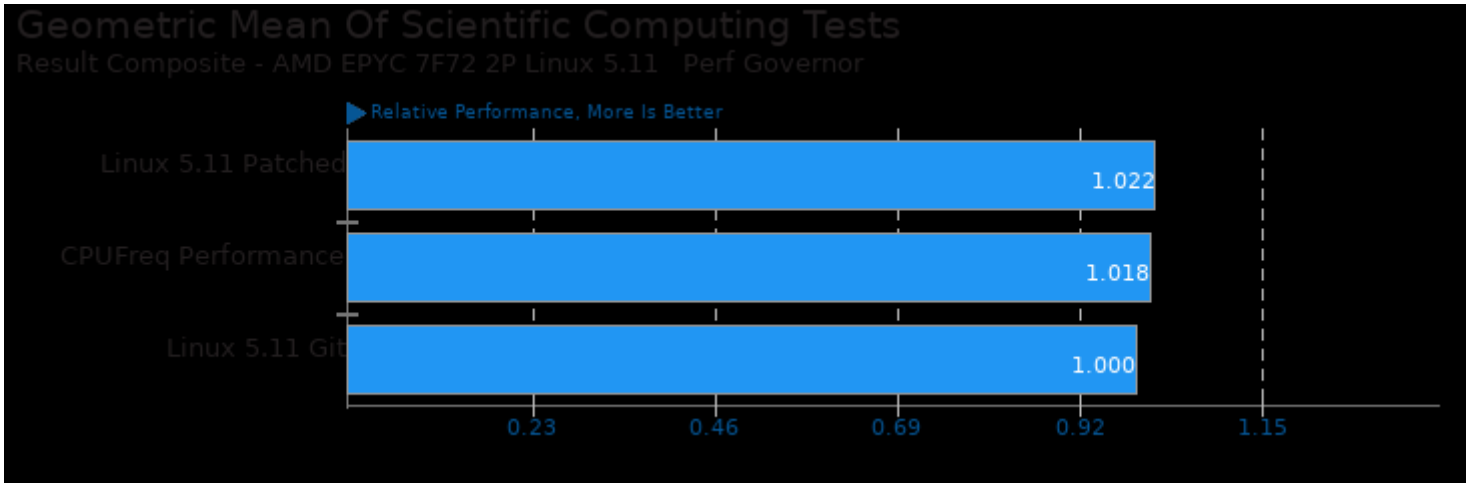
Geometric mean based upon tests: pts/gpaw and pts/qe



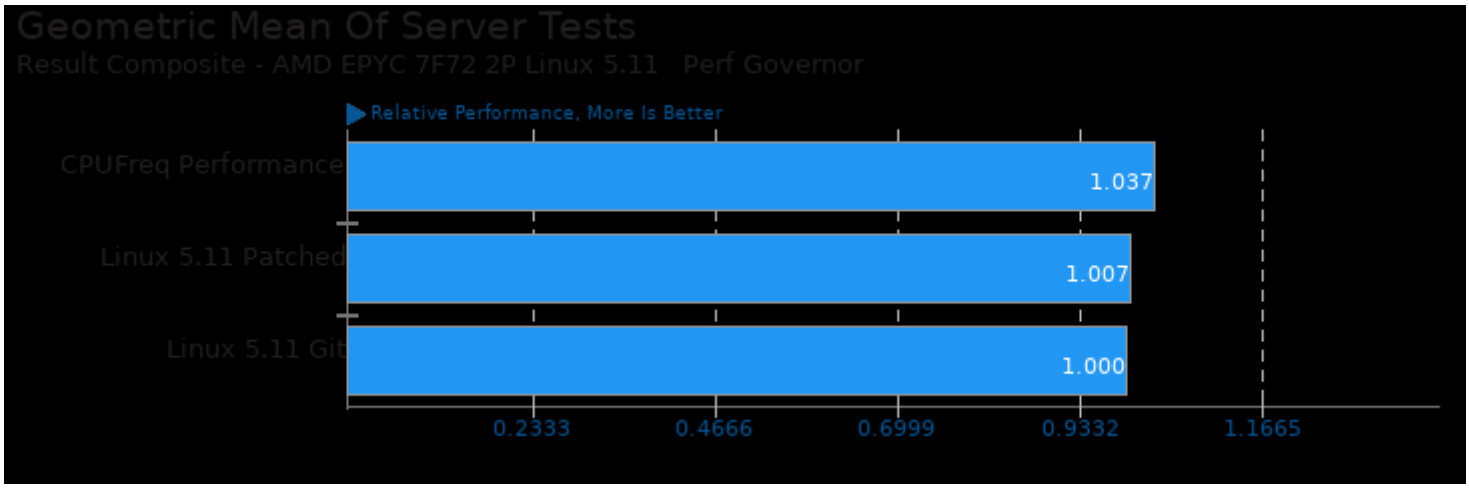
Geometric mean based upon tests: pts/ospray, pts/tachyon, pts/povray and pts/yafaray



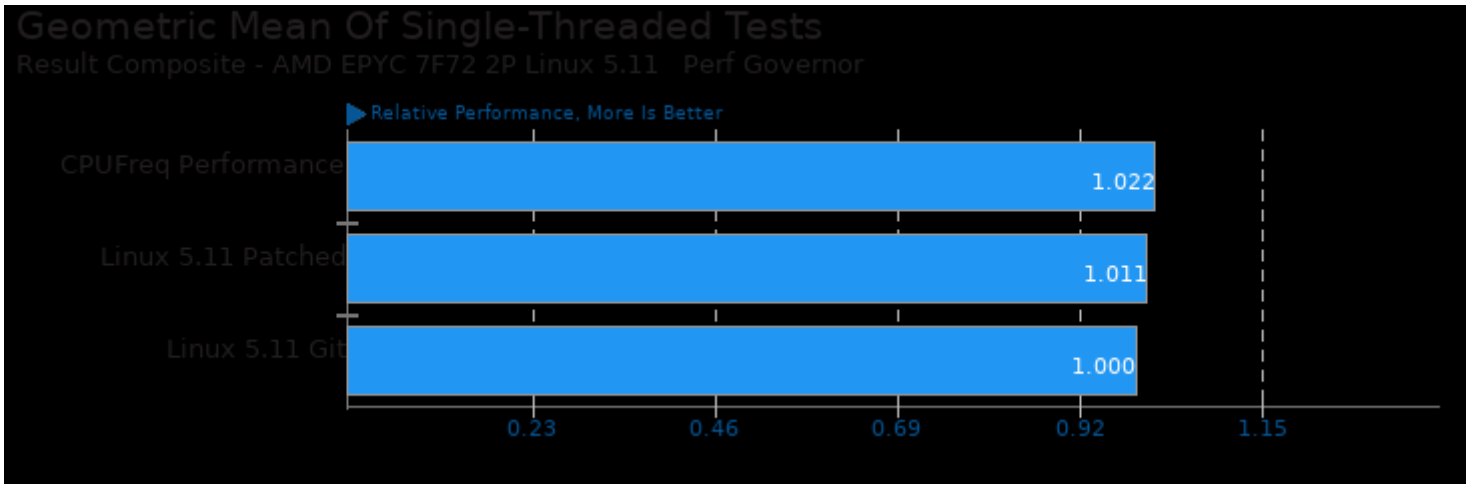
Geometric mean based upon tests: pts/ospray, pts/tachyon, pts/povray, pts/yafaray, pts/blender, pts/tungsten, pts/luxcorerender, pts/ttsiod-renderer and pts/v-ray



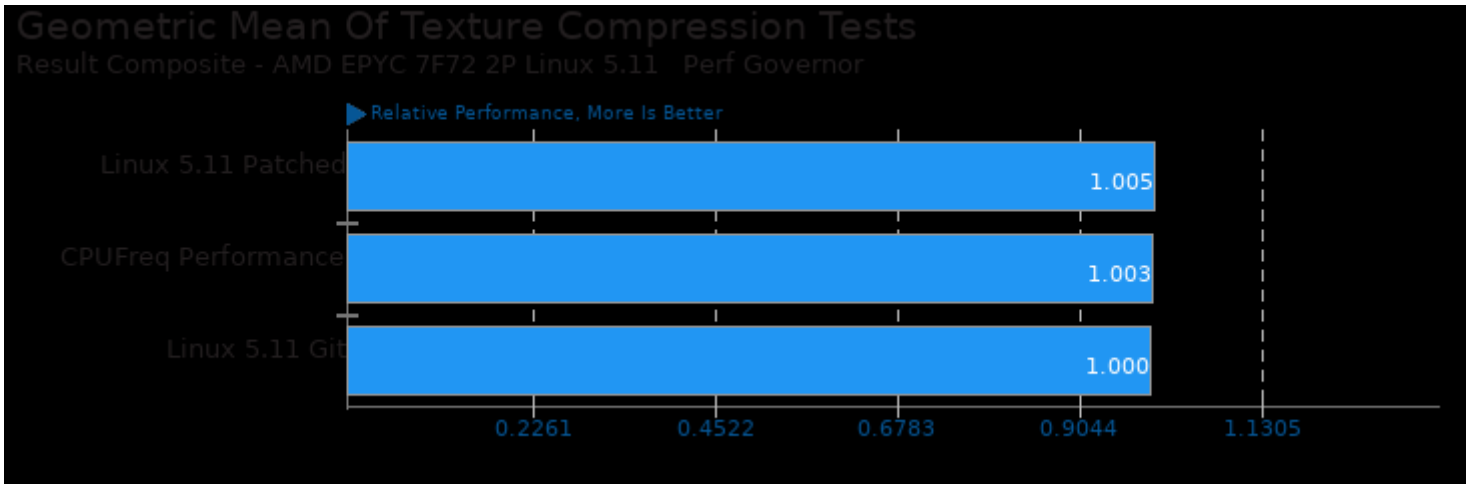
Geometric mean based upon tests: pts/ffte, pts/fftw, pts/neat, pts/amg, pts/namd, pts/gromacs, pts/dolfyn, pts/lammps, pts/lulesh, pts/openfoam, pts/himeno, pts/mrbayes, pts/qmcpack, pts/gpaw and pts/qe



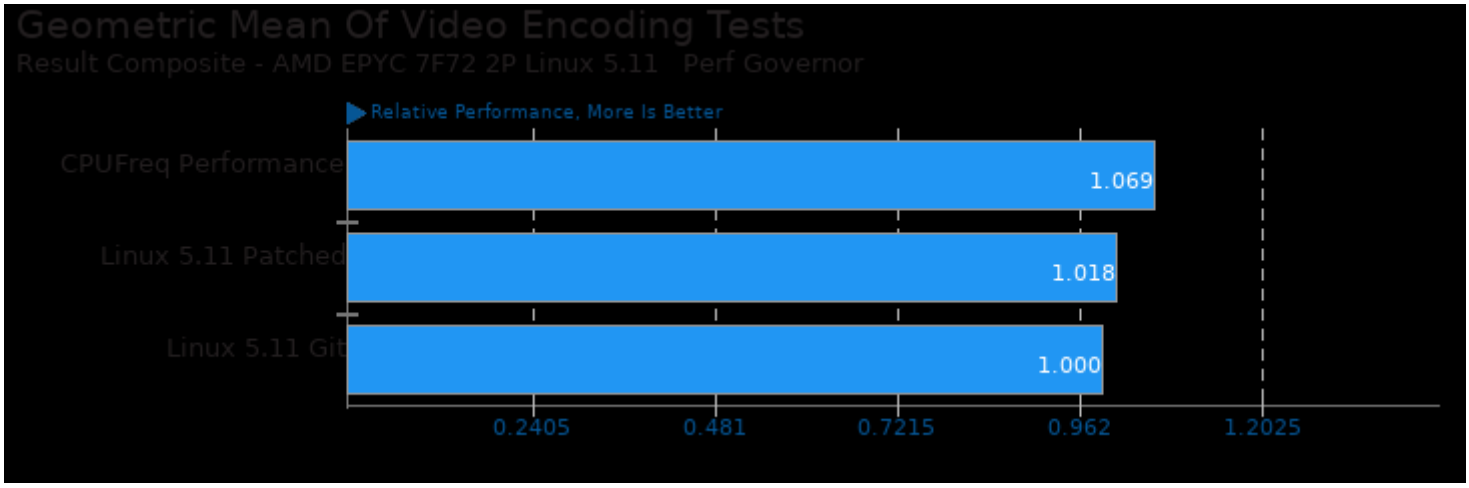
Geometric mean based upon tests: pts/blogbench, pts/redis, pts/keydb, pts/simdjson, pts/sqlite-speedtest and pts/influxdb



Geometric mean based upon tests: pts/byte, pts/swet, pts/numpy, pts/gnupg, pts/redis and pts/hint



Geometric mean based upon tests: pts/astcenc and pts/etcpak



Geometric mean based upon tests: pts/svt-vp9, pts/x265, pts/dav1d, pts/svt-av1 and pts/rav1e



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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 17:32.