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Core i9 10900K/9900KS vs. AMD Ryzen 9 3950X/3900X - BENCHMARK

Ryzen 9 5950X benchmarks for a future article by gaojie20

Automated Executive Summary

Ryzen 9 5950X had the most wins, coming in first place for 73% of the tests.

Based on the geometric mean of all complete results, the fastest (Ryzen 9 5950X) was 1.875x the speed of the slowest (Core i9 9900KS). Ryzen 9 3950X was 0.835x the speed of Ryzen 9 5950X, Core i9 10900K was 0.866x the speed of Ryzen 9 3950X, Ryzen 9 3900X was 0.961x the speed of Core i9 10900K, Core i9 9900KS was 0.767x the speed of Ryzen 9 3900X.

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

IndigoBench (Scene: Supercar) at 14.294x
IndigoBench (Scene: Bedroom) at 10.836x
Sysbench (Test: CPU) at 4.358x
GraphicsMagick (Operation: Sharpen) at 3.192x
Cpuminer-Opt (Algorithm: m7m) at 2.918x
m-queens (Time To Solve) at 2.827x
N-Queens (Elapsed Time) at 2.731x
GraphicsMagick (Operation: Swirl) at 2.712x

Stress-NG (Test: CPU Stress) at 2.688x
Stress-NG (Test: Crypto) at 2.65x.

Test Systems:

Core i9 9900KS

Processor: Intel Core i9-9900KS @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (1302 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16GB, Disk: 2000GB Force MP600, Graphics: AMD Radeon RX 56/64 8GB (1630/945MHz), Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel I219-V

OS: Ubuntu 20.04, Kernel: 5.4.0-9-generic (x86_64), Desktop: GNOME Shell 3.34.3, Display Server: X Server 1.20.5, OpenGL: 4.5 Mesa 19.2.4 (LLVM 9.0.0), Compiler: GCC 9.2.1 20191130, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xca
Java Notes: OpenJDK Runtime Environment (build 11.0.5+10-post-Ubuntu-2ubuntu1)
Python Notes: Python 2.7.17 + Python 3.7.6
Security Notes: itlb_multihit: KVM: Vulnerable + 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 Enhanced IBRS IBPB: conditional RSB filling + tsx_async_abort: Mitigation of TSX disabled

Ryzen 9 3900X

Processor: AMD Ryzen 9 3900X 12-Core @ 3.80GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (WI-FI) (1201 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 2000GB Force MP600, Graphics: AMD Radeon RX 56/64 8GB (1630/945MHz), Audio: AMD Vega 10 HDMI Audio, Monitor: Acer B286HK, Network: Realtek RTL8125 2.5GbE + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.4.0-9-generic (x86_64), Desktop: GNOME Shell 3.34.3, Display Server: X Server 1.20.5, OpenGL: 4.5 Mesa 19.2.4 (LLVM 9.0.0), Compiler: GCC 9.2.1 20191130, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8701013
Java Notes: OpenJDK Runtime Environment (build 11.0.5+10-post-Ubuntu-2ubuntu1)
Python Notes: Python 2.7.17 + Python 3.7.6
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 STIBP: conditional RSB filling + tsx_async_abort: Not affected

Ryzen 9 3950X

Processor: AMD Ryzen 9 3950X 16-Core @ 3.50GHz (16 Cores / 32 Threads), Motherboard: ASUS ROG CROSSHAIR

VIII HERO (WI-FI) (1201 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 2000GB Force MP600, Graphics: AMD Radeon RX 56/64 8GB (1630/945MHz), Audio: AMD Vega 10 HDMI Audio, Monitor: Acer B286HK, Network: Realtek RTL8125 2.5GbE + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.4.0-9-generic (x86_64), Desktop: GNOME Shell 3.34.3, Display Server: X Server 1.20.5, OpenGL: 4.5 Mesa 19.2.4 (LLVM 9.0.0), Compiler: GCC 9.2.1 20191130, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8701013
Java Notes: OpenJDK Runtime Environment (build 11.0.5+10-post-Ubuntu-2ubuntu1)
Python Notes: Python 2.7.17 + Python 3.7.6
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 STIBP: conditional RSB filling + tsx_async_abort: Not affected

Core i9 10900K

Processor: Intel Core i9-10900K @ 3.60GHz (10 Cores / 20 Threads), Motherboard: ASRock Z490 Taichi (P1.30A BIOS), Chipset: Intel Comet Lake PCH, Memory: 64GB, Disk: 1024GB PLEXTOR PX-1TM9PGN +, Graphics: eVGA NVIDIA GeForce RTX 2080 Ti 11GB (450/405MHz), Audio: Realtek ALC1220, Monitor: BenQ SW271, Network: Intel + Realtek RTL8125 2.5GbE + Intel Wi-Fi 6 AX200

OS: Ubuntu 20.04, Kernel: 5.4.0-31-generic (x86_64), Desktop: GNOME Shell 3.36.1, Display Server: X Server 1.20.8, Display Driver: NVIDIA 440.64, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 10.2.141, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0xca
OpenCL Notes: GPU Compute Cores: 4352
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-3ubuntu1)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 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 Enhanced IBRS IBPB: conditional RSB filling + tsx_async_abort: Not affected

Ryzen 9 5950X

Processor: AMD Ryzen 9 5950X 16-Core @ 3.40GHz (16 Cores / 32 Threads), Motherboard: ASRock X570 Taichi Razer Edition (P1.40 BIOS), Chipset: AMD Device 1480, Memory: 126GB, Disk: 1024GB SAMSUNG MZVL21T0HCLR-00BL2 + 62GB FLASH DRIVE, Graphics: Zotac NVIDIA GeForce RTX 3090 24GB, Audio: NVIDIA Device 1aef, Monitor: CYS-R101-2K, Network: Realtek Device 3000 + Intel Device 2723

OS: Ubuntu 18.04, Kernel: 5.4.0-66-generic (x86_64), Desktop: GNOME Shell 3.28.4, Display Server: X Server 1.20.8, Display Driver: NVIDIA 460.32.03, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.2.109, Vulkan: 1.2.155, Compiler: GCC 7.5.0, File-System: ext4, Screen Resolution: 2560x1600

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new

Core i9 10900K/9900KS vs. AMD Ryzen 9 3950X/3900X - BENCHMARK

--with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xa201009
OpenCL Notes: GPU Compute Cores: 10496
Java Notes: OpenJDK Runtime Environment (build 11.0.10+9-Ubuntu-0ubuntu1.18.04)
Python Notes: Python 2.7.17 + Python 3.6.9
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	Core i9 9900KS	Ryzen 9 3900X	Ryzen 9 3950X	Core i9 10900K	Ryzen 9 5950X
CloverLeaf - L.E.H (sec)	**5.10**	3.75	3.81	3.83	**2.53**
Normalized	49.61%	67.47%	66.4%	66.06%	100%
Standard Deviation	0.4%	0.2%	0.2%	0.8%	1%
Rodinia - OpenMP LavaMD (sec)	29.231	20.020	**14.803**	21.629	**33.835**
Normalized	50.64%	73.94%	100%	68.44%	43.75%
Standard Deviation	0.8%	0.2%	0.2%	0.5%	0.4%
Rodinia - OpenMP CFD Solver (sec)	**21.319**	13.263	10.601	18.602	**10.428**
Normalized	48.91%	78.62%	98.37%	56.06%	100%
Standard Deviation	0.1%	0.2%	0.4%	2.9%	0.2%
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	**1.69240**	1.44793	1.10353	1.26388	**0.99766**
Normalized	58.95%	68.9%	90.41%	78.94%	100%
Standard Deviation	0.3%	0.6%	0.4%	4.7%	0.5%
GROMACS - Water Benchmark (Ns/Day)	**0.871**	1.156	1.226	1.125	**1.600**
Normalized	54.44%	72.25%	76.63%	70.31%	100%
Standard Deviation	0.4%	0.3%	0.2%	0.5%	0.1%
Mlpack Benchmark - scikit_svm (sec)	13.31	10.90	10.90	**21.13**	**10.44**
Normalized	78.44%	95.78%	95.78%	49.41%	100%
Standard Deviation	0.1%	0.1%	1.2%	0.3%	0.1%
Sunflow Rendering System - G.I.I.S (sec)	**1.138**	1.003	0.785	0.807	**0.605**
Normalized	53.16%	60.32%	77.07%	74.97%	100%
Standard Deviation	1.8%	0.4%	4.6%	2.9%	1.2%
Polyhedron Fortran Benchmarks - air (sec)	**2.03**	1.61	1.6	1.97	**1.24**
Normalized	61.08%	77.02%	77.5%	62.94%	100%
Polyhedron Fortran Benchmarks - channel2 (sec)	**44.43**	42.53	41.88	40.11	**31.07**
Normalized	69.93%	73.05%	74.19%	77.46%	100%
Polyhedron Fortran Benchmarks - gas_dyn2 (sec)	**42.8**	41.73	41.57	39.77	**19.97**
Normalized	46.66%	47.86%	48.04%	50.21%	100%
Polyhedron Fortran Benchmarks - test_fpu2 (sec)	**28.64**	26.42	26.29	27.45	**20.72**
Normalized	72.35%	78.43%	78.81%	75.48%	100%
ACES DGEMM - S.F.P.R (GFLOP/s)	**3.829720**	4.196614	5.714047	5.264166	**8.892966**
Normalized	43.06%	47.19%	64.25%	59.19%	100%

Standard Deviation	2.7%	1.1%	2.9%	2.7%	1.4%
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	**382099**	527168	717533	516200	**850901**
Normalized	44.91%	61.95%	84.33%	60.67%	100%
Standard Deviation	0.8%	0.4%	0.4%	1%	0.1%
FFTW - Stock - 1D FFT Size 4096 (Mflops)	9085	**9009**	9252	9594	**12538**
Normalized	72.46%	71.85%	73.79%	76.52%	100%
Standard Deviation	0.1%	0.3%	0.5%	0.8%	0.3%
Timed MrBayes Analysis - P.P.A (sec)	74.269	73.296	69.103	**64.120**	**84.139**
Normalized	86.33%	87.48%	92.79%	100%	76.21%
Standard Deviation	0.2%	0.7%	0.8%	0.1%	0.3%
Himeno Benchmark - P.P.S (MFLOPS)	**4298**	**5231**	5073	4473	5131
Normalized	82.15%	100%	96.97%	85.5%	98.08%
Standard Deviation	0.3%	2.3%	1.4%	0.1%	5.8%
Timed HMMer Search - P.D.S (sec)	4.271	**5.194**	5.054	**3.489**	3.866
Normalized	81.69%	67.17%	69.03%	100%	90.25%
Standard Deviation	0.3%	2%	1.8%	1.5%	0.7%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	**7.034**	9.127	**11.990**	8.729	10.688
Normalized	58.67%	76.12%	100%	72.8%	89.14%
Standard Deviation	0.6%	0.9%	1.9%	0.2%	1.4%
John The Ripper - Blowfish (Real C/S)	**17136**	20364	27750	23098	**37945**
Normalized	45.16%	53.67%	73.13%	60.87%	100%
Standard Deviation	0.2%	0.5%	0.4%	0.1%	10.4%
GraphicsMagick - Swirl (Iterations/min)	**379**	776	**1028**	524	996
Normalized	36.87%	75.49%	100%	50.97%	96.89%
Standard Deviation		0.3%	0.1%	0.2%	0.4%
GraphicsMagick - Rotate (Iterations/min)	879	**774**	783	859	**955**
Normalized	92.04%	81.05%	81.99%	89.95%	100%
Standard Deviation		0.3%	0.2%	2.4%	1.6%
GraphicsMagick - Sharpen (Iterations/min)	**78**	184	**249**	174	234
Normalized	31.33%	73.9%	100%	69.88%	93.98%
Standard Deviation		0.3%	0.2%		0.4%
GraphicsMagick - Enhanced (Iterations/min)	**197**	297	403	268	**425**
Normalized	46.35%	69.88%	94.82%	63.06%	100%
Standard Deviation		0.2%			0.3%
GraphicsMagick - Resizing (Iterations/min)	**938**	1435	1822	1272	**1889**
Normalized	49.66%	75.97%	96.45%	67.34%	100%
Standard Deviation	0.2%		0.2%	0.2%	
GraphicsMagick - Noise-Gaussian (Iterations/min)	**243**	365	464	316	**497**
Normalized	48.89%	73.44%	93.36%	63.58%	100%

Standard Deviation	0.2%	0.2%		0.4%	0.1%
GraphicsMagick - HWB Color Space (Iterations/min)	**1164**	1453	1644	1212	**1686**
Normalized	69.04%	86.18%	97.51%	71.89%	100%
Standard Deviation		0.1%	0%		0.6%
MKL-DNN DNNL - IP Batch 1D - f32 (ms)	**4.85639**	4.30950	4.33759	3.31693	**2.99802**
Normalized	61.73%	69.57%	69.12%	90.39%	100%
Standard Deviation	0.4%	1.1%	1%	0.5%	1.2%
MKL-DNN DNNL - IP Batch All - f32 (ms)	**30.9518**	27.4336	27.2671	22.5422	**16.8466**
Normalized	54.43%	61.41%	61.78%	74.73%	100%
Standard Deviation	0.1%	0.6%	0.3%	0.4%	2.3%
MKL-DNN DNNL - C.B.c - f32	**23.2365**	18.3541	17.5900	17.1808	**10.6540**
Normalized	45.85%	58.05%	60.57%	62.01%	100%
Standard Deviation	0.2%	0.9%	0.4%	0%	4.9%
MKL-DNN DNNL - C.B.c - f32	**2778**	2059	1833	1912	**1466**
Normalized	52.77%	71.21%	79.98%	76.69%	100%
Standard Deviation	0%	0.3%	0%	0.1%	0.1%
MKL-DNN DNNL - D.B.d - f32	**5.60639**	4.23896	3.40978	3.80809	**3.16009**
Normalized	56.37%	74.55%	92.68%	82.98%	100%
Standard Deviation	0.8%	0.5%	0.2%	0.8%	1%
MKL-DNN DNNL - D.B.d - f32	**6.57956**	4.91797	4.35244	4.79945	**3.44265**
Normalized	52.32%	70%	79.1%	71.73%	100%
Standard Deviation	0.1%	0.5%	0.1%	0.3%	0.3%
MKL-DNN DNNL - C.B.c - f32	**348.128**	251.103	217.189	243.409	**184.310**
Normalized	52.94%	73.4%	84.86%	75.72%	100%
Standard Deviation	0.2%	0.8%	0.9%	0.6%	0.4%
MKL-DNN DNNL - D.B.d - f32	**3101**	2970	2555	2422	**1643**
Normalized	52.99%	55.32%	64.31%	67.84%	100%
Standard Deviation	0.2%	0.3%	0.1%	4.2%	0.4%
MKL-DNN DNNL - R.N.N.T - f32 (ms)	**254.290**	240.842	233.509	195.525	**165.535**
Normalized	65.1%	68.73%	70.89%	84.66%	100%
Standard Deviation	0.1%	0.9%	0.3%	0.7%	0.1%
MKL-DNN DNNL - C.B.c - f32	**156.764**	109.496	98.0608	106.293	**77.5459**
Normalized	49.47%	70.82%	79.08%	72.95%	100%
Standard Deviation	0.1%	0.6%	0.6%	0.1%	0.4%
OSPray - San Miguel - SciVis (FPS)	**15.87**	19.61	25.64	23.26	**29.41**
Normalized	53.96%	66.68%	87.18%	79.09%	100%
Standard Deviation	0%	0%	0%	0%	0%
OSPray - XFrog Forest - SciVis (FPS)	**2.65**	3.60	4.72	3.96	**5.51**
Normalized	48.09%	65.34%	85.66%	71.87%	100%
Standard Deviation	0.2%	0.2%	0.3%	0.2%	0.3%
OSPray - San Miguel - Path Tracer (FPS)	**1.38**	1.47	1.94	2.02	**2.53**
Normalized	54.55%	58.1%	76.68%	79.84%	100%
Standard Deviation	0.1%	0.1%	0.1%	0.2%	0.3%
OSPray - NASA Streamlines - SciVis (FPS)	**19.23**	27.78	35.71	28.57	**41.11**
Normalized	46.78%	67.57%	86.86%	69.5%	100%
Standard Deviation	0%	0%	0%	0%	2.3%

OSPray - XFrog Forest - Path Tracer (FPS)	**1.44**	1.88	2.48	2.14	**2.97**
Normalized	48.48%	63.3%	83.5%	72.05%	100%
Standard Deviation	0.2%	0.1%	0.1%	0.1%	0.2%
OSPray - M.R - SciVis (FPS)	15.87	**12.99**	16.95	21.74	**23.26**
Normalized	68.23%	55.85%	72.87%	93.47%	100%
Standard Deviation	0%	0%	0%	0%	0%
OSPray - NASA Streamlines - Path Tracer (FPS)	**3.99**	5.60	7.30	5.95	**8.33**
Normalized	47.9%	67.23%	87.64%	71.43%	100%
Standard Deviation	0.2%	0.3%	0%	0.2%	0%
OSPray - M.R - Path Tracer (FPS)	**200**	**200**	250	319.44	**333.33**
Normalized	60%	60%	75%	95.83%	100%
Standard Deviation				10.2%	0%
Intel Open Image Denoise - Memorial (Images / Sec)	**7.72**	10.42	11.97	10.91	**14.72**
Normalized	52.45%	70.79%	81.32%	74.12%	100%
Standard Deviation	0.2%	0%	0.3%	0.3%	0.3%
Embree - Pathtracer - Crown	**10.4784**	15.4725	20.2703	14.9209	**24.0024**
Normalized	43.66%	64.46%	84.45%	62.16%	100%
Standard Deviation	0.4%	0.5%	0.3%	0.1%	0.2%
Embree - Pathtracer ISPC - Crown (FPS)	**11.7146**	14.7654	19.4376	17.1208	**23.5507**
Normalized	49.74%	62.7%	82.54%	72.7%	100%
Standard Deviation	0.2%	0.2%	0.1%	0.1%	0.4%
Embree - Pathtracer - Asian Dragon (FPS)	**12.5475**	16.6188	21.2493	17.5239	**25.4692**
Normalized	49.27%	65.25%	83.43%	68.8%	100%
Standard Deviation	0.1%	0%	0.1%	0.1%	0.1%
Embree - Pathtracer - Asian Dragon Obj (FPS)	**11.1602**	14.8655	18.9394	15.5503	**22.4620**
Normalized	49.68%	66.18%	84.32%	69.23%	100%
Standard Deviation	0.3%	0%	0.1%	0.2%	0.3%
Embree - Pathtracer ISPC - Asian Dragon (FPS)	**14.5046**	16.5206	21.3114	20.5513	**25.4938**
Normalized	56.89%	64.8%	83.59%	80.61%	100%
Standard Deviation	0.1%	0.2%	0.1%	0%	0.1%
Embree - Pathtracer ISPC - Asian Dragon Obj (FPS)	**12.4787**	14.3022	18.3485	17.6644	**22.0589**
Normalized	56.57%	64.84%	83.18%	80.08%	100%
Standard Deviation	0.1%	0.1%	0.1%	0.1%	0.1%
SVT-AV1 - Enc Mode 0 - 1080p (FPS)	0.141	**0.123**	0.128	0.156	**0.202**
Normalized	69.8%	60.89%	63.37%	77.23%	100%
Standard Deviation	0.3%	0.5%	0.4%	0%	0.6%
SVT-AV1 - Enc Mode 4 - 1080p (FPS)	**3.304**	4.497	5.324	4.604	**7.345**
Normalized	44.98%	61.23%	72.48%	62.68%	100%
Standard Deviation	0.2%	0.2%	0.2%	0.1%	0.7%
SVT-AV1 - Enc Mode 8 - 1080p (FPS)	**28.985**	36.644	43.764	38.861	**58.434**
Normalized	49.6%	62.71%	74.89%	66.5%	100%
Standard Deviation	0.1%	0.3%	0.4%	0.5%	1%

SVT-HEVC - 1.8.b.Y.T.H.V.E (FPS)	48.93	77.95	101.99	72.03	104.99
Normalized	46.6%	74.25%	97.14%	68.61%	100%
Standard Deviation	0.1%	0.5%	0.6%	0.3%	0%
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS)	166.09	202.38	212.77	212.29	
Normalized	78.06%	95.12%	100%	99.77%	
Standard Deviation	1.6%	2.8%	2.8%	1.3%	
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS)	172.28	210.40	219.06	220.40	
Normalized	78.17%	95.46%	99.39%	100%	
Standard Deviation	0.2%	0.2%	0.3%	0.2%	
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	136.44	185.91	202.89	182.91	
Normalized	67.25%	91.63%	100%	90.15%	
Standard Deviation	0.3%	0.2%	0.4%	0.1%	
dav1d - Summer Nature 4K (FPS)	150.78	180.05	183.05	180.83	
Normalized	82.37%	98.36%	100%	98.79%	
Standard Deviation	0.3%	0.1%	0.1%	0.4%	
dav1d - S.N.1 (FPS)	534.44	502.13	533.25	482.44	
Normalized	100%	93.95%	99.78%	90.27%	
Standard Deviation	0.2%	0.5%	0.1%	0.5%	
x264 - H.2.V.E (FPS)	94.49	139.05	160.58	129.86	200.81
Normalized	47.05%	69.24%	79.97%	64.67%	100%
Standard Deviation	2.9%	2.1%	2.4%	1.3%	0.4%
x265 - H.2.1.V.E (FPS)	60.32	61.94	63.57	66.81	82.55
Normalized	73.07%	75.03%	77.01%	80.93%	100%
Standard Deviation	0.2%	0.2%	0.5%	0.4%	0.5%
7-Zip Compression - C.S.T	51526	78218	89449	73771	118560
Normalized	43.46%	65.97%	75.45%	62.22%	100%
Standard Deviation	0.5%	0.5%	1.1%	0.8%	1%
Stockfish - Total Time (Nodes/s)	25278284	38535267	51274695	35209764	57404287
Normalized	44.04%	67.13%	89.32%	61.34%	100%
Standard Deviation	1.4%	1.8%	1.5%	1%	2.1%
asmFish - 1.H.M.2.D (Nodes/s)	29161214	38802682	52308986	41044805	60298893
Normalized	48.36%	64.35%	86.75%	68.07%	100%
Standard Deviation	2.2%	0.9%	0.4%	1.9%	3.3%
Timed ImageMagick Compilation - Time To Compile (sec)	27.503	19.302	18.213	23.830	17.264
Normalized	62.77%	89.44%	94.79%	72.45%	100%
Standard Deviation	0.5%	0.6%	0.7%	0.3%	0.2%
Timed Linux Kernel Compilation - Time To Compile (sec)	71.910	45.492	39.611	61.848	35.847
Normalized	49.85%	78.8%	90.5%	57.96%	100%
Standard Deviation	1.6%	1.9%	2.2%	1.3%	2.1%
Timed LLVM Compilation - Time To Compile (sec)	379.086	236.905	210.393	312.641	201.202
Normalized	53.08%	84.93%	95.63%	64.36%	100%
Timed PHP Compilation - Time To Compile (sec)	49.435	41.347	40.583	47.397	31.099
Normalized	62.91%	75.21%	76.63%	65.61%	100%
Standard Deviation	0.2%	0.3%	0.5%	0.5%	0.9%
Build2 - Time To Compile (sec)	95.975	66.912	62.218	84.851	51.716
Normalized	53.88%	77.29%	83.12%	60.95%	100%

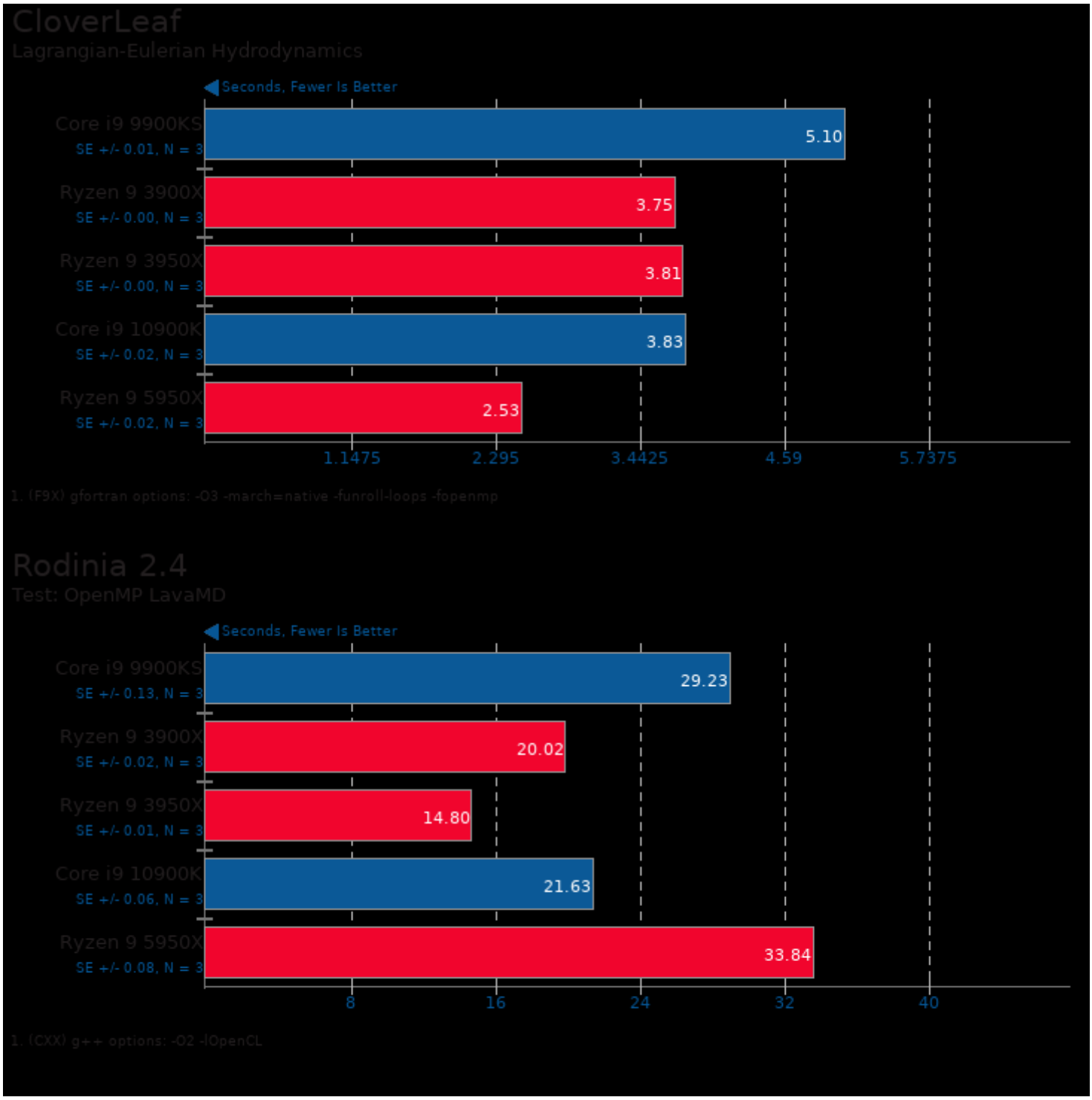
Standard Deviation	1.1%	0.6%	0.5%	1.3%	0.2%
C-Ray - Total Time - 4.1.R.P.P (sec)	72.835	42.908	31.567	52.169	35.905
Normalized	43.34%	73.57%	100%	60.51%	87.92%
Standard Deviation	0%	0.4%	0.2%	0.1%	0.1%
Primesieve - 1.P.N.G (sec)	24.562	15.748	11.853	17.215	11.559
Normalized	47.06%	73.4%	97.52%	67.14%	100%
Standard Deviation	0.3%	0.5%	0.4%	0.5%	0.3%
Rust Mandelbrot - T.T.C.S.P.M (sec)	43.412	36.900	33.580	39.856	32.566
Normalized	75.02%	88.25%	96.98%	81.71%	100%
Standard Deviation	0.7%	1.3%	0.3%	0.3%	0.1%
XZ Compression - C.u.1.0.3.s.i.i.C.L.9 (sec)	28.866	25.424	24.557	18.023	19.884
Normalized	62.44%	70.89%	73.39%	100%	90.64%
Standard Deviation	0.2%	0.7%	1.3%	1.1%	0.8%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	24.550	17.966	15.522	16.282	11.441
Normalized	46.6%	63.68%	73.71%	70.27%	100%
Standard Deviation	0.1%	0.3%	0.2%	0.3%	0.2%
DeepSpeech - CPU (sec)	71.47098	63.56071	64.02520	73.43767	
Normalized	88.93%	100%	99.27%	86.55%	
Standard Deviation	1%	1%	0.8%	0.3%	
FLAC Audio Encoding - WAV To FLAC (sec)	7.524	7.530	7.490	7.095	6.444
Normalized	85.65%	85.58%	86.03%	90.82%	100%
Standard Deviation	0.4%	0.4%	1.5%	0.2%	0.6%
LAME MP3 Encoding - WAV To MP3 (sec)	7.252	7.062	7.003	6.892	5.885
Normalized	81.15%	83.33%	84.04%	85.39%	100%
Standard Deviation	0.3%	2.5%	2%	0.2%	1.1%
Ogg Encoding - WAV To Ogg	4.997	4.985	4.987	4.678	4.296
Normalized	85.97%	86.18%	86.14%	91.83%	100%
Standard Deviation	0.1%	0.3%	0.2%	0.8%	2.4%
eSpeak Speech Engine - T.T.S.S (sec)	28.826	26.193	26.263	24.682	21.079
Normalized	73.12%	80.48%	80.26%	85.4%	100%
Standard Deviation	0.8%	0.8%	0.8%	1.7%	0.8%
m-queens - Time To Solve (sec)	89.640	46.633	34.182	59.772	31.712
Normalized	35.38%	68%	92.77%	53.05%	100%
Standard Deviation	0.2%	0.5%	0.3%	0%	0.3%
Minion - Graceful (sec)	46.110833	41.506921	40.482514	42.708274	37.347325
Normalized	80.99%	89.98%	92.26%	87.45%	100%
Standard Deviation	0.2%	0.6%	1.5%	0.2%	1%
Minion - Solitaire (sec)	59.261523	57.743785	57.847923	57.354942	52.794652
Normalized	89.09%	91.43%	91.26%	92.05%	100%
Standard Deviation	1.2%	0.2%	0.6%	2.3%	0.5%
Minion - Quasigroup (sec)	101.119195	106.632268	102.787184	97.157773	89.520035
Normalized	88.53%	83.95%	87.09%	92.14%	100%
Standard Deviation	0.2%	2.2%	1%	0.7%	0.4%
N-Queens - Elapsed Time (sec)	16.119	9.079	6.662	10.377	5.902
Normalized	36.62%	65.01%	88.59%	56.88%	100%
Standard Deviation	0.3%	0.2%	0.2%	0.1%	0.1%
Radiance Benchmark - Serial (sec)	613.042	557.349	555.025	578.566	458.28

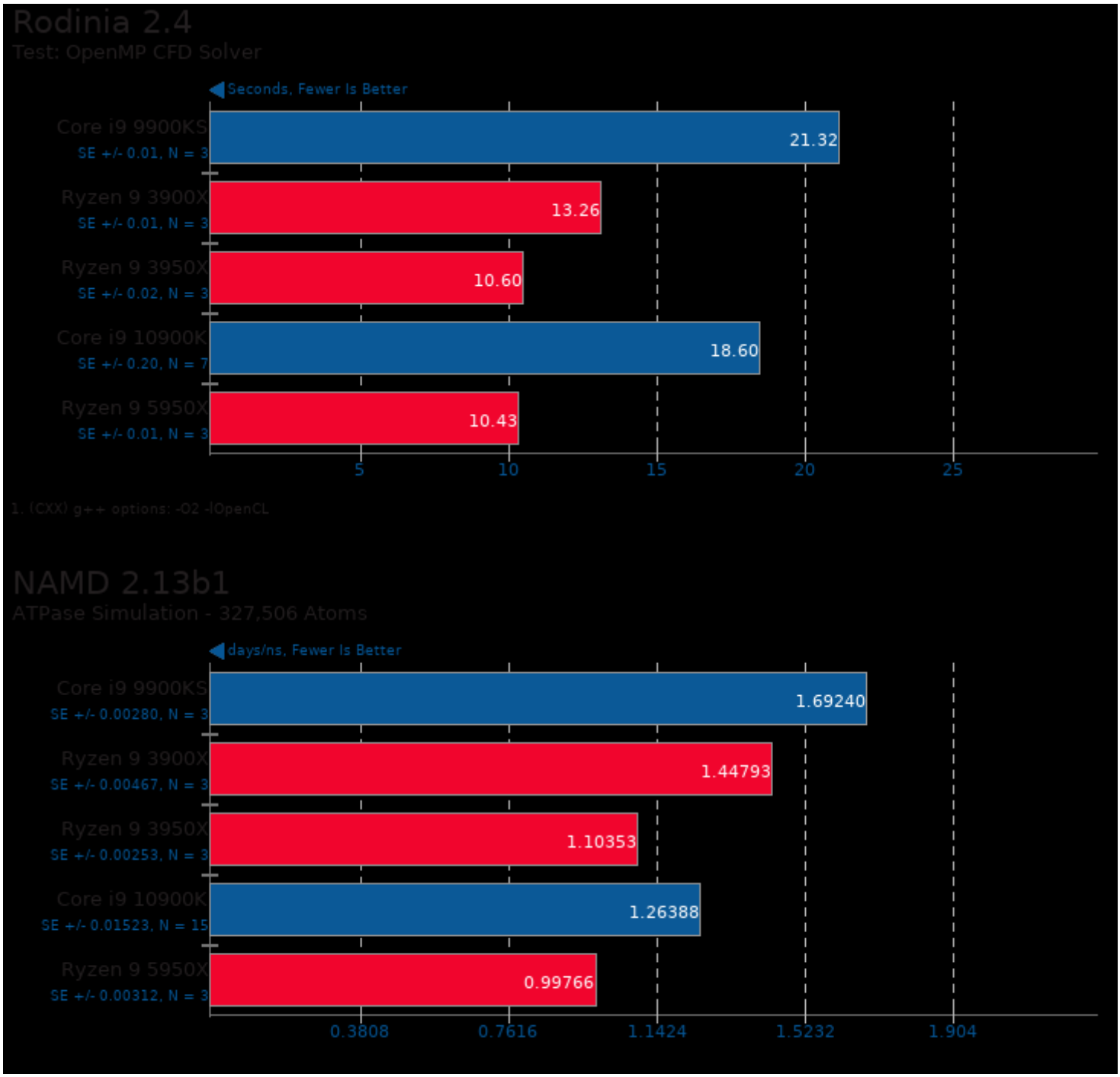
Normalized	74.76%	82.22%	82.57%	79.21%	100%
Radiance Benchmark - SMP Parallel (sec)	196.07	179.279	169.557	185.473	151.308
Normalized	77.17%	84.4%	89.24%	81.58%	100%
Tachyon - Total Time (sec)	4.6331	3.3463	2.5044	3.3747	2.8870
Normalized	54.05%	74.84%	100%	74.21%	86.75%
Standard Deviation	0.3%	0.3%	0.4%	0.1%	0.5%
OpenSSL - R.4.b.P (Signs/sec)	2710	3523	4734	3753	4848
Normalized	55.9%	72.68%	97.65%	77.42%	100%
Standard Deviation	0.1%	0.4%	0.3%	0%	0.3%
Cpuminer-Opt - m7m (kH/s - Hash Speed)	290.88	626.76	848.89	408.26	789.60
Normalized	34.27%	73.83%	100%	48.09%	93.02%
Standard Deviation	0.1%	0.1%	0.2%	0.1%	2.3%
Cpuminer-Opt - deep (kH/s - Hash Speed)	8722	11263	15523	9913	16757
Normalized	52.05%	67.21%	92.64%	59.16%	100%
Standard Deviation	0.1%	0.1%	2.6%	51.6%	0.1%
Cpuminer-Opt - lbry (kH/s - Hash Speed)	27040	33983	47227	39487	56233
Normalized	48.09%	60.43%	83.98%	70.22%	100%
Standard Deviation	0.1%	1.3%	1.1%	1.3%	2.1%
Cpuminer-Opt - skein (kH/s - Hash Speed)	31313	39457	54123	45223	66017
Normalized	47.43%	59.77%	81.98%	68.5%	100%
Standard Deviation	0%	0.1%	1.2%	0.2%	1.2%
Cpuminer-Opt - sha256t (kH/s - Hash Speed)	69993	84060	121480	102739	145440
Normalized	48.13%	57.8%	83.53%	70.64%	100%
Standard Deviation	0.9%	1.7%	1.2%	2.9%	1.5%
LibreOffice - 2.D.T.P (sec)	6.801	6.484	6.541	6.329	
Normalized	93.06%	97.61%	96.76%	100%	
Standard Deviation	2.9%	3.7%	4%	6%	
Stress-NG - Crypto (Bogo Ops/s)	1977	3471	4734	2666	5240
Normalized	37.74%	66.24%	90.35%	50.87%	100%
Standard Deviation	0.2%	0.4%	0.4%	0%	0.2%
Stress-NG - CPU Stress (Bogo Ops/s)	3443	4487	6086	4629	9254
Normalized	37.21%	48.49%	65.77%	50.02%	100%
Standard Deviation	0.2%	0.4%	0.3%	0%	0.6%
Stress-NG - Matrix Math (Bogo Ops/s)	64691	95162	120222	95628	110474
Normalized	53.81%	79.16%	100%	79.54%	91.89%
Standard Deviation	2.9%	0.2%	2.9%	0.1%	0.1%
Stress-NG - Socket Activity (Bogo Ops/s)	8438	10271	13378	8792	13394
Normalized	63%	76.69%	99.88%	65.65%	100%
Standard Deviation	1.4%	1.2%	0.4%	0.7%	2.2%
Stress-NG - Context Switching (Bogo Ops/s)	4181704	6134287	11632446	9607229	7957639
Normalized	35.95%	52.73%	100%	82.59%	68.41%
Standard Deviation	1.5%	11.1%	16.3%	15.6%	5.5%
Sysbench - CPU (Events/sec)	20698	25764	34933	27096	90209
Normalized	22.95%	28.56%	38.72%	30.04%	100%

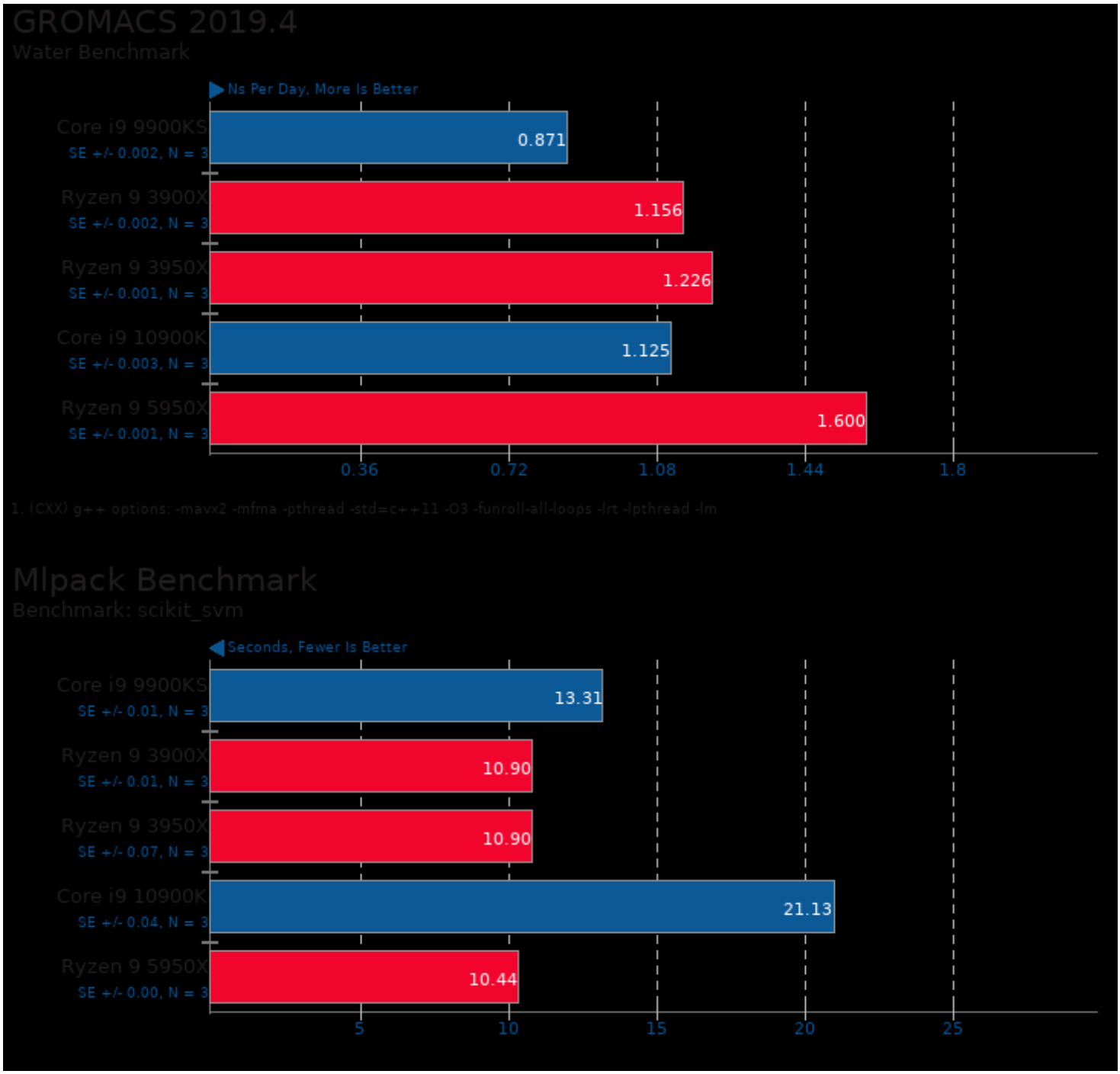
Standard Deviation	0.1%	0.1%	0%	0%	0%
Facebook RocksDB - Rand Fill (Op/s)	**969754**	1023642	**1162116**	1058697	
Normalized	83.45%	88.08%	100%	91.1%	
Standard Deviation	0.8%	0.5%	1.8%	1.2%	
Facebook RocksDB - Rand Read (Op/s)	**47997201**	70265661	**93650315**	68423923	
Normalized	51.25%	75.03%	100%	73.06%	
Standard Deviation	0.1%	2.9%	2.9%	0.3%	
Facebook RocksDB - Read While Writing (Op/s)	**2092753**	2891981	**3729069**	2989357	
Normalized	56.12%	77.55%	100%	80.16%	
Standard Deviation	0.3%	1.7%	1.7%	1.5%	
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**542.617**	672.760	830.940	700.448	**1041**
Normalized	52.11%	64.61%	79.8%	67.27%	100%
Standard Deviation	0.3%	0.4%	0.4%	0.3%	0.3%
Blender - BMW27 - CPU-Only (sec)	**168.62**	111.42	**84.53**	113.41	85.35
Normalized	50.13%	75.87%	100%	74.53%	99.04%
Standard Deviation	0.5%	0.5%	0.2%	0.2%	0.2%
Blender - Classroom - CPU-Only (sec)	**503.00**	301.60	**226.65**	335.53	236.92
Normalized	45.06%	75.15%	100%	67.55%	95.67%
Standard Deviation	0.4%	0.1%	0.5%	0.4%	0%
Blender - Fishy Cat - CPU-Only (sec)	**261.60**	161.56	122.48	176.79	**122.24**
Normalized	46.73%	75.66%	99.8%	69.14%	100%
Standard Deviation	0.2%	0.1%	0.2%	0.1%	0%
Blender - Barbershop - CPU-Only (sec)	**685.66**	444.25	339.04	471.42	**318.39**
Normalized	46.44%	71.67%	93.91%	67.54%	100%
Standard Deviation	0.4%	0%	0.4%	0.3%	0.2%
Blender - Pabellon Barcelona - CPU-Only (sec)	**627.86**	376.32	**284.92**	420.93	291.28
Normalized	45.38%	75.71%	100%	67.69%	97.82%
Standard Deviation	0.1%	0.1%	0.1%	0.2%	0.1%
POV-Ray - Trace Time (sec)	**47.706**	30.730	23.473	33.227	**23.188**
Normalized	48.61%	75.46%	98.79%	69.79%	100%
Standard Deviation	0.2%	0.6%	0.1%	0.4%	0.1%
IndigoBench - Bedroom (M samples/s)	**1.376**	2.055	2.670	8.657	**14.911**
Normalized	9.23%	13.78%	17.91%	58.06%	100%
Standard Deviation	0.3%	0.3%	0.3%	0.2%	0.1%
IndigoBench - Supercar (M samples/s)	**3.196**	4.407	5.697	29.508	**45.683**
Normalized	7%	9.65%	12.47%	64.59%	100%
Standard Deviation	0.3%	0.1%	0.5%	0.1%	0.1%
LuxCoreRender - DLSC (M samples/sec)	**1.79**	2.37	2.77	2.45	**3.24**
Normalized	55.25%	73.15%	85.49%	75.62%	100%
Standard Deviation	0.3%	1.1%	1.5%	0.2%	5%

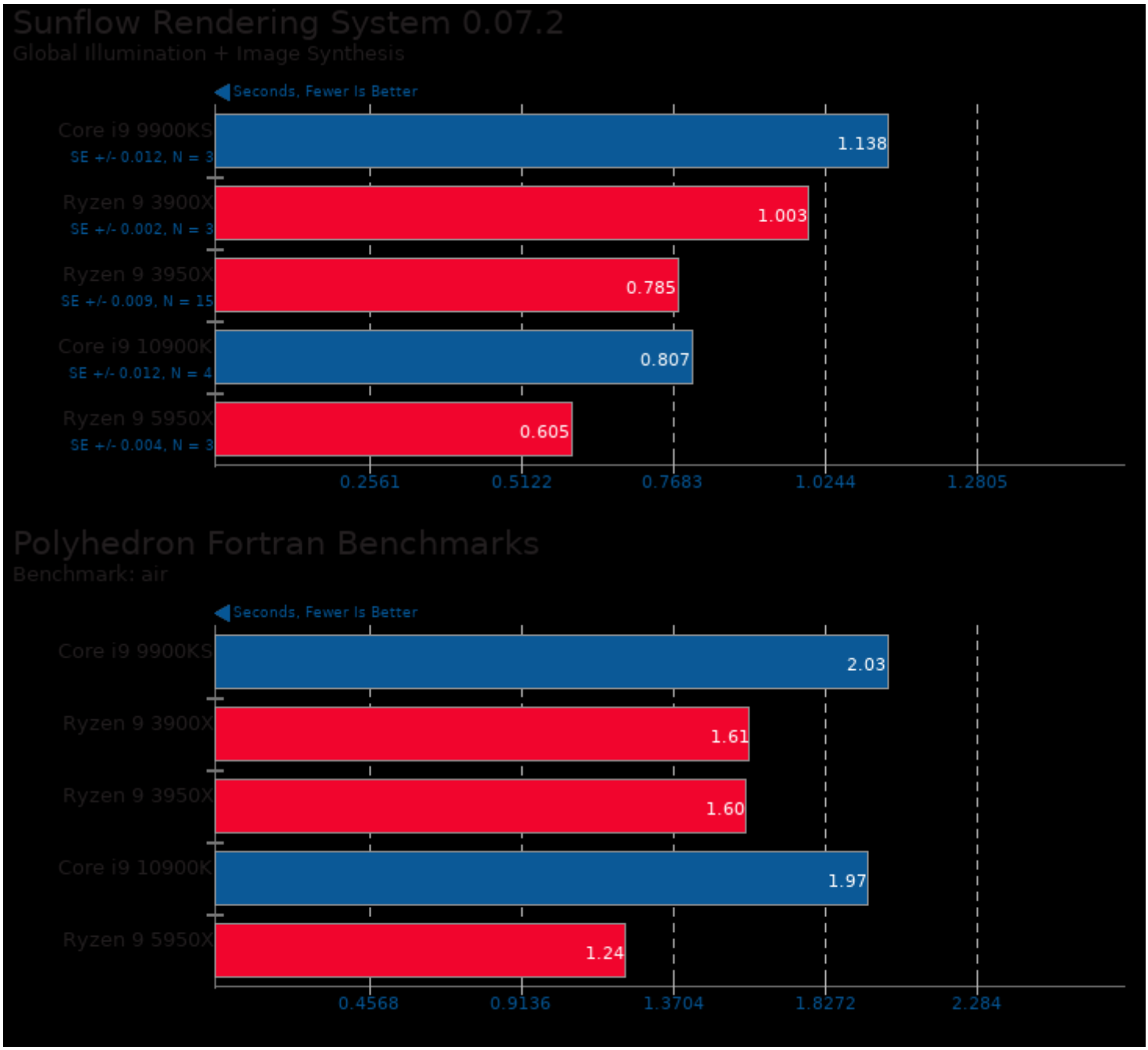
LuxCoreRender - R.C.a.P (M samples/sec)	**1.75**	2.29	2.74	2.48	**3.04**
Normalized	57.57%	75.33%	90.13%	81.58%	100%
Standard Deviation	0.3%	3.8%	7.6%	0.3%	1.2%
Smallpt - G.I.R.1.S (sec)	**10.838**	6.983	**5.188**	7.866	5.311
Normalized	47.87%	74.29%	100%	65.95%	97.68%
Standard Deviation	0.4%	0.3%	0.2%	0.1%	0.2%
Tungsten Renderer - Hair (sec)	**28.8506**	17.7254	**13.6953**	20.3451	
Normalized	47.47%	77.26%	100%	67.31%	
Standard Deviation	0.1%	0.4%	0.5%	0.4%	
Tungsten Renderer - Water Caustic (sec)	**25.7288**	23.8127	**21.3362**	22.6273	
Normalized	82.93%	89.6%	100%	94.29%	
Standard Deviation	0.3%	0.4%	0.1%	0.4%	
Tungsten Renderer - Non-Exponential (sec)	**7.63031**	5.78162	5.21621	**5.17650**	
Normalized	67.84%	89.53%	99.24%	100%	
Standard Deviation	0.7%	0.1%	0.4%	0.2%	
Tungsten Renderer - Volumetric Caustic (sec)	**10.0442**	7.30224	**5.47756**	7.02035	
Normalized	54.53%	75.01%	100%	78.02%	
Standard Deviation	0.4%	0.2%	0.2%	0.7%	
rays1bench - Large Scene (mrays/s)	**54.82**	86.37	**108.48**	81.72	106.99
Normalized	50.53%	79.62%	100%	75.33%	98.63%
Standard Deviation	0.2%	0.2%	0.1%	0.1%	0.4%
PyBench - T.F.A.T.T	856	**933**	932	**737**	811
Normalized	86.1%	78.99%	79.08%	100%	90.88%
Standard Deviation		2.1%	2%	0.4%	1.3%
Appleseed - Emily (sec)	**425.938906**	262.960147	211.195543	303.882939	**196.258588**
Normalized	46.08%	74.63%	92.93%	64.58%	100%
Appleseed - Disney Material	**250.136194**	161.493057	122.803189	174.204116	**120.230772**
Normalized	48.07%	74.45%	97.91%	69.02%	100%
Appleseed - Material Tester (sec)	**232.787184**	161.096239	129.764547	165.441003	**119.751125**
Normalized	51.44%	74.34%	92.28%	72.38%	100%
Darktable - Masskrug - CPU-only (sec)				4.493	
Standard Deviation				0.3%	
Darktable - Server Room - CPU-only (sec)				3.096	
Standard Deviation				0.2%	
GIMP - resize (sec)				6.974	
Standard Deviation				0.3%	
GIMP - rotate (sec)				10.980	
Standard Deviation				0.3%	
Darktable - Masskrug - CPU-only (sec)					4.452
Standard Deviation					0.7%
Darktable - Server Room - CPU-only (sec)					3.350
Standard Deviation					0.2%
GIMP - resize (sec)					5.694
Standard Deviation					0.2%

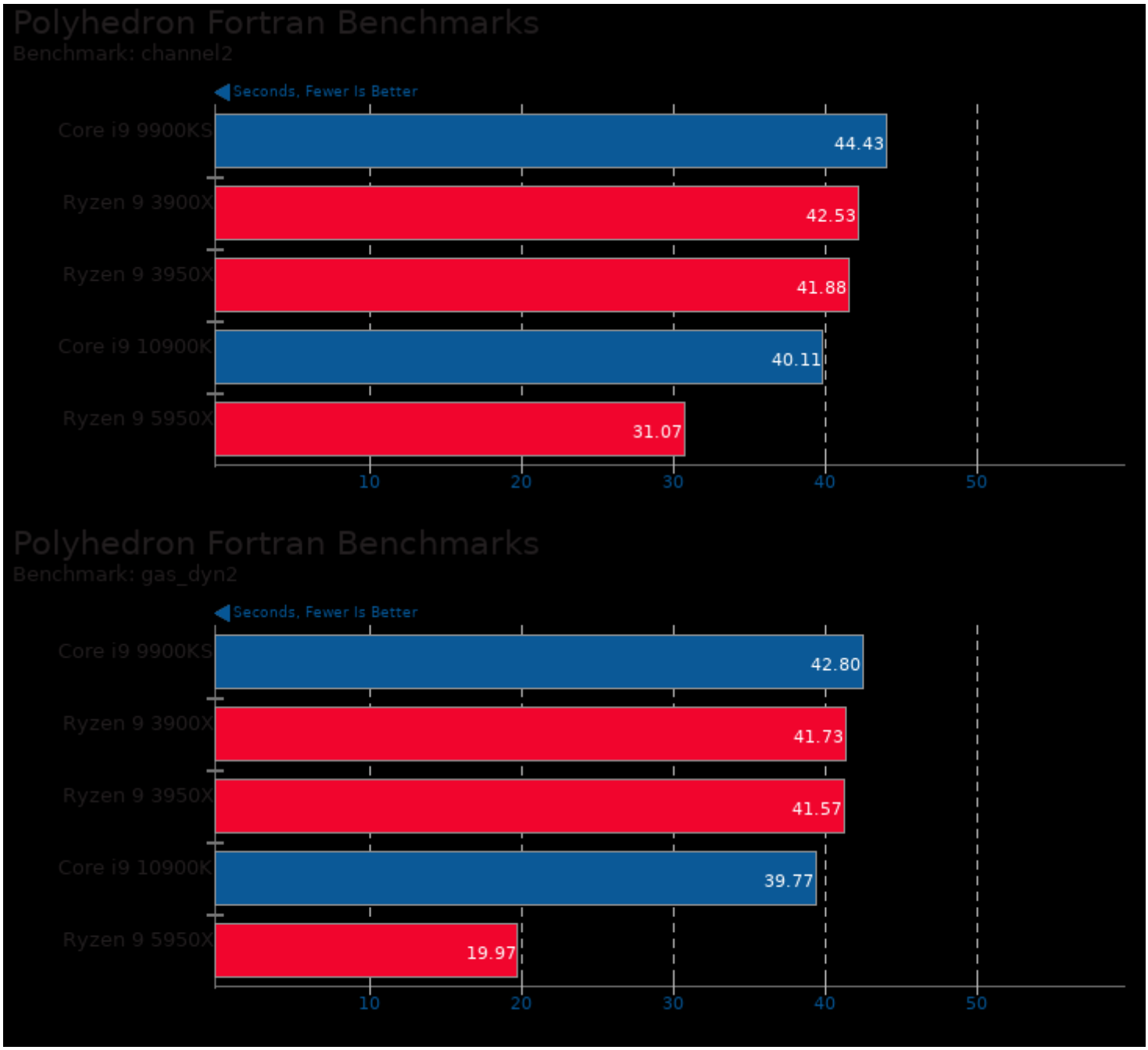
GIMP - rotate (sec)	12.331
Standard Deviation	0.2%

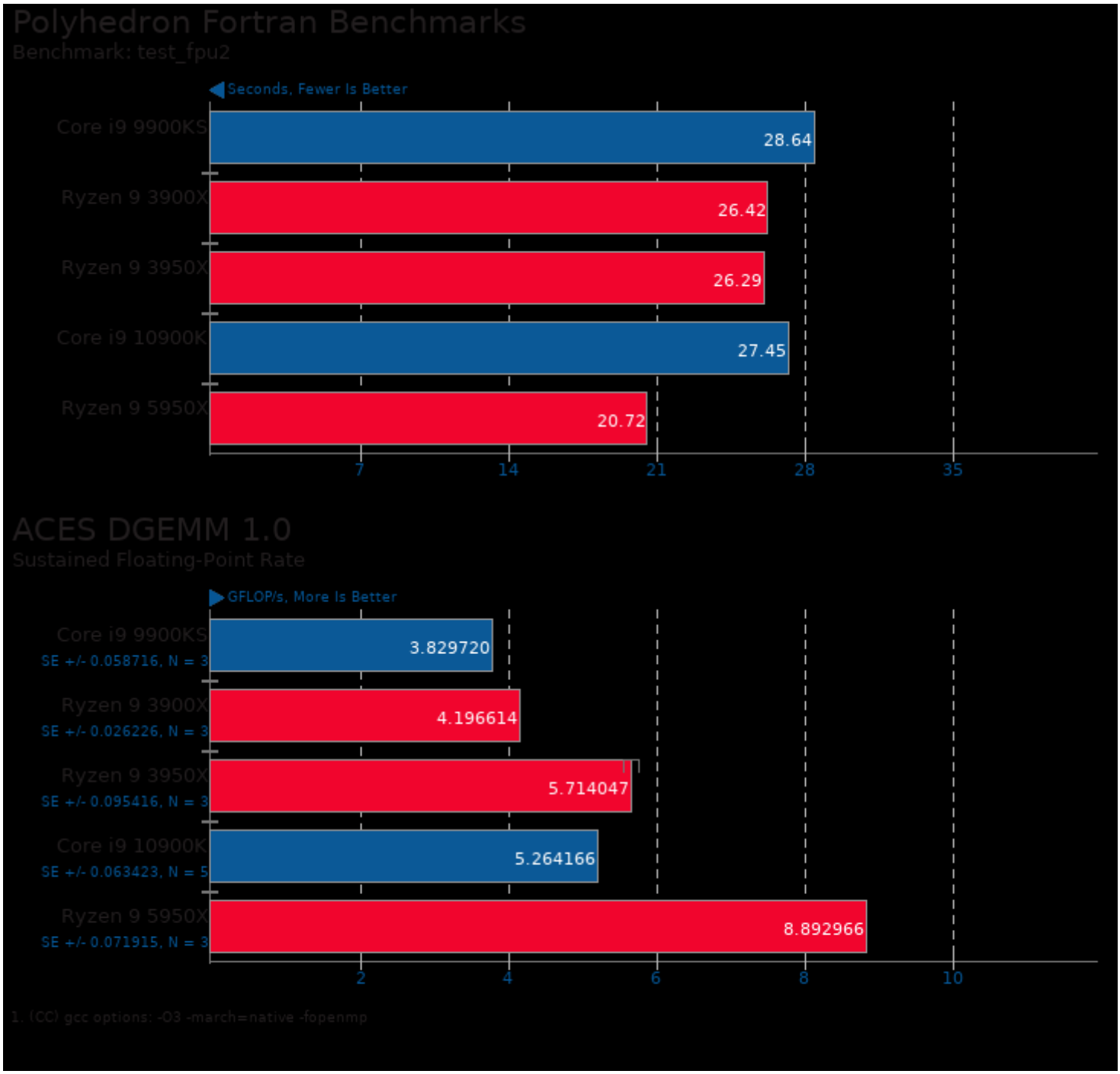

CloverLeaf
Lagrangian-Eulerian Hydrodynamics
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
5.10
Ryzen 9 3900X
SE +/- 0.00, N = 3
3.75
Ryzen 9 3950X
SE +/- 0.00, N = 3
3.81
Core i9 10900K
SE +/- 0.02, N = 3
3.83
Ryzen 9 5950X
SE +/- 0.02, N = 3
2.53
1.1475
2.295
3.4425
4.59
5.7375
1. (F9X) gfortran options: -O3 -march=native -funroll-loops -fopenmp
Rodinia 2.4
Test: OpenMP LavaMD
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.13, N = 3
29.23
Ryzen 9 3900X
SE +/- 0.02, N = 3
20.02
Ryzen 9 3950X
SE +/- 0.01, N = 3
14.80
Core i9 10900K
SE +/- 0.06, N = 3
21.63
Ryzen 9 5950X
SE +/- 0.08, N = 3
33.84
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL


Rodinia 2.4
Test: OpenMP CFD Solver
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
21.32
Ryzen 9 3900X
SE +/- 0.01, N = 3
13.26
Ryzen 9 3950X
SE +/- 0.02, N = 3
10.60
Core i9 10900K
SE +/- 0.20, N = 7
18.60
Ryzen 9 5950X
SE +/- 0.01, N = 3
10.43
5
10
15
20
25
1. (CXX) g++ options: -O2 -lOpenCL
NAMD 2.13b1
ATPase Simulation - 327,506 Atoms
days/ns, Fewer Is Better
Core i9 9900KS
SE +/- 0.00280, N = 3
1.69240
Ryzen 9 3900X
SE +/- 0.00467, N = 3
1.44793
Ryzen 9 3950X
SE +/- 0.00253, N = 3
1.10353
Core i9 10900K
SE +/- 0.01523, N = 15
1.26388
Ryzen 9 5950X
SE +/- 0.00312, N = 3
0.99766
0.3808
0.7616
1.1424
1.5232
1.904

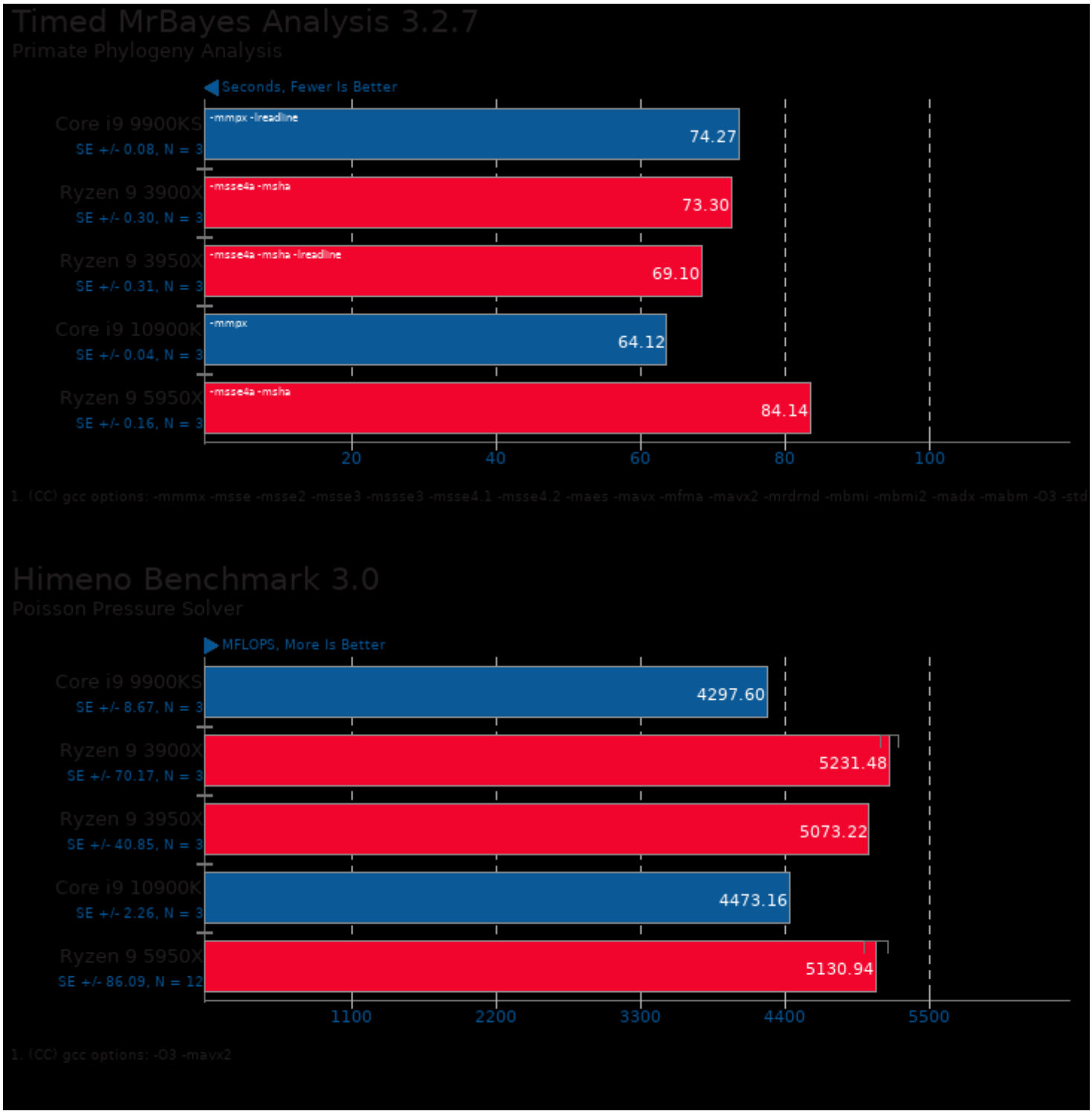

GROMACS 2019.4
Water Benchmark
Ns Per Day, More Is Better
Core i9 9900KS
SE +/- 0.002, N = 3
0.871
Ryzen 9 3900X
SE +/- 0.002, N = 3
1.156
Ryzen 9 3950X
SE +/- 0.001, N = 3
1.226
Core i9 10900K
SE +/- 0.003, N = 3
1.125
Ryzen 9 5950X
SE +/- 0.001, N = 3
1.600
0.36
0.72
1.08
1.44
1.8
1. (CXX) g++ options: -mavx2 -mfma -pthread -std=c++11 -O3 -funroll-all-loops -lrt -lpthread -lm
Mlpack Benchmark
Benchmark: scikit_svm
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
13.31
Ryzen 9 3900X
SE +/- 0.01, N = 3
10.90
Ryzen 9 3950X
SE +/- 0.07, N = 3
10.90
Core i9 10900K
SE +/- 0.04, N = 3
21.13
Ryzen 9 5950X
SE +/- 0.00, N = 3
10.44
5
10
15
20
25

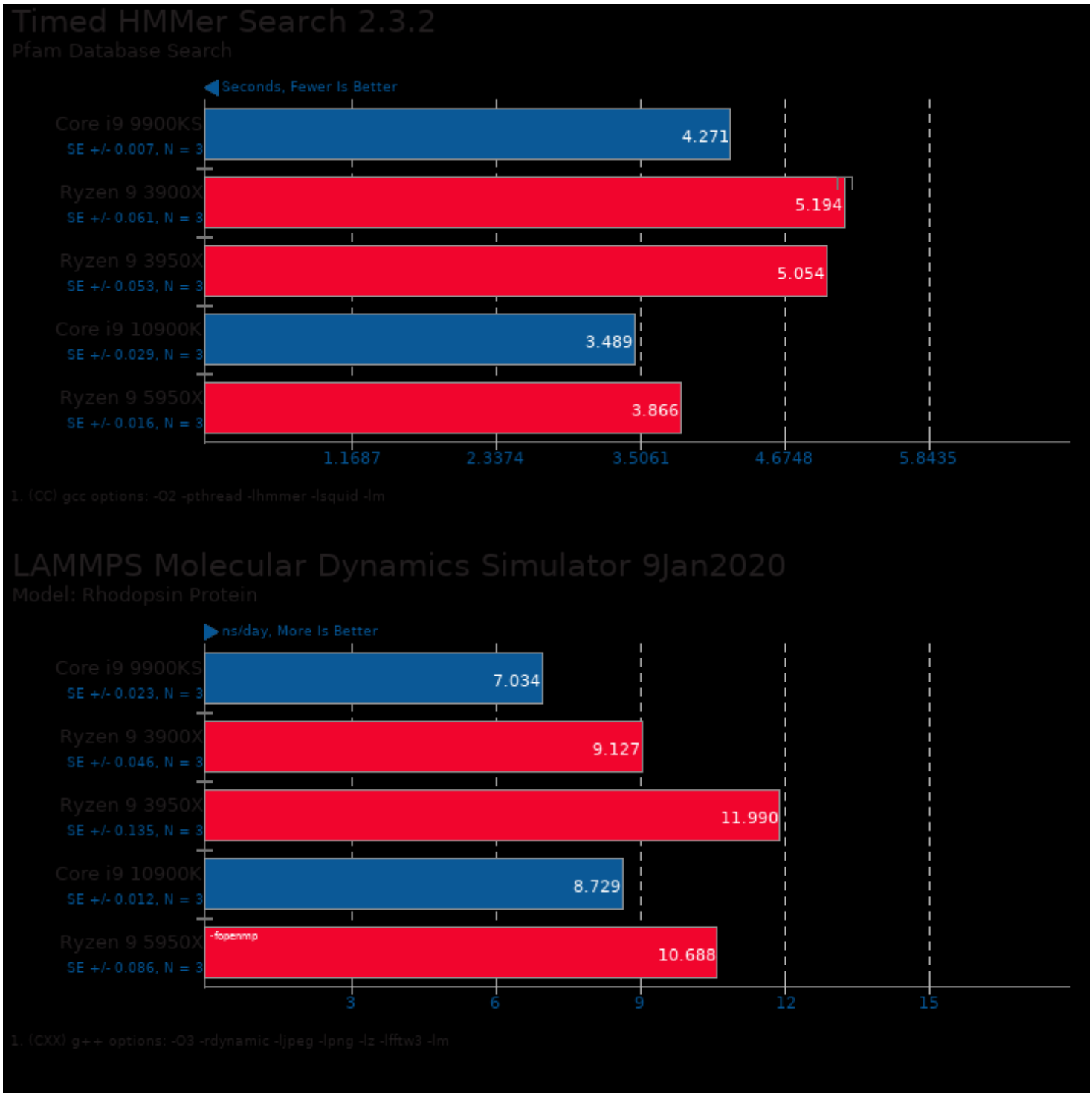

Sunflow Rendering System 0.07.2
Global Illumination + Image Synthesis
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.012, N = 3
1.138
Ryzen 9 3900X
SE +/- 0.002, N = 3
1.003
Ryzen 9 3950X
SE +/- 0.009, N = 15
0.785
Core i9 10900K
SE +/- 0.012, N = 4
0.807
Ryzen 9 5950X
SE +/- 0.004, N = 3
0.605
0.2561
0.5122
0.7683
1.0244
1.2805
Polyhedron Fortran Benchmarks
Benchmark: air
Seconds, Fewer Is Better
Core i9 9900KS
2.03
Ryzen 9 3900X
1.61
Ryzen 9 3950X
1.60
Core i9 10900K
1.97
Ryzen 9 5950X
1.24
0.4568
0.9136
1.3704
1.8272
2.284

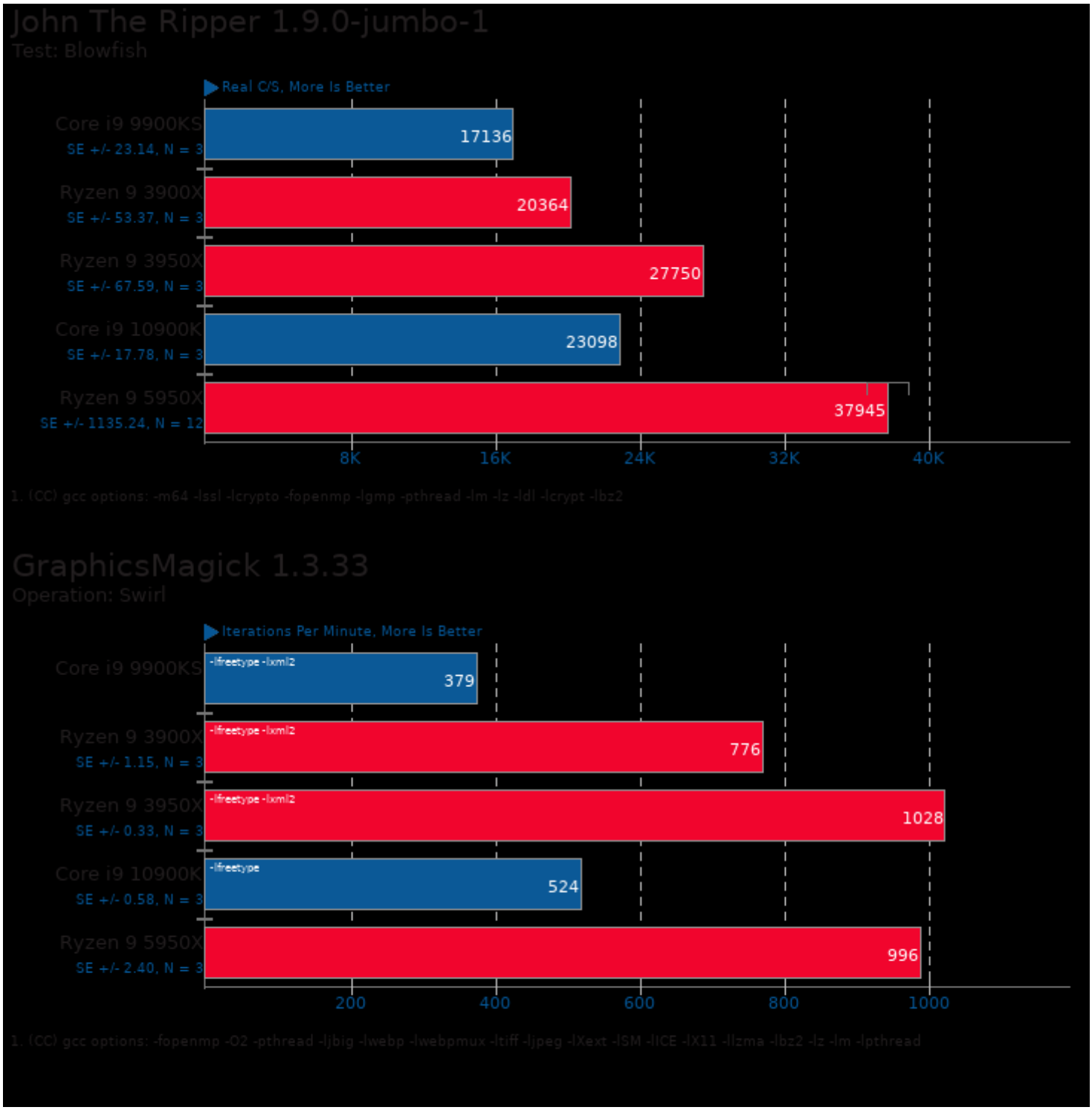

Polyhedron Fortran Benchmarks
Benchmark: channel2
Seconds, Fewer Is Better
Core i9 9900KS
44.43
Ryzen 9 3900X
42.53
Ryzen 9 3950X
41.88
Core i9 10900K
40.11
Ryzen 9 5950X
31.07
10
20
30
40
50
Polyhedron Fortran Benchmarks
Benchmark: gas_dyn2
Seconds, Fewer Is Better
Core i9 9900KS
42.80
Ryzen 9 3900X
41.73
Ryzen 9 3950X
41.57
Core i9 10900K
39.77
Ryzen 9 5950X
19.97
10
20
30
40
50

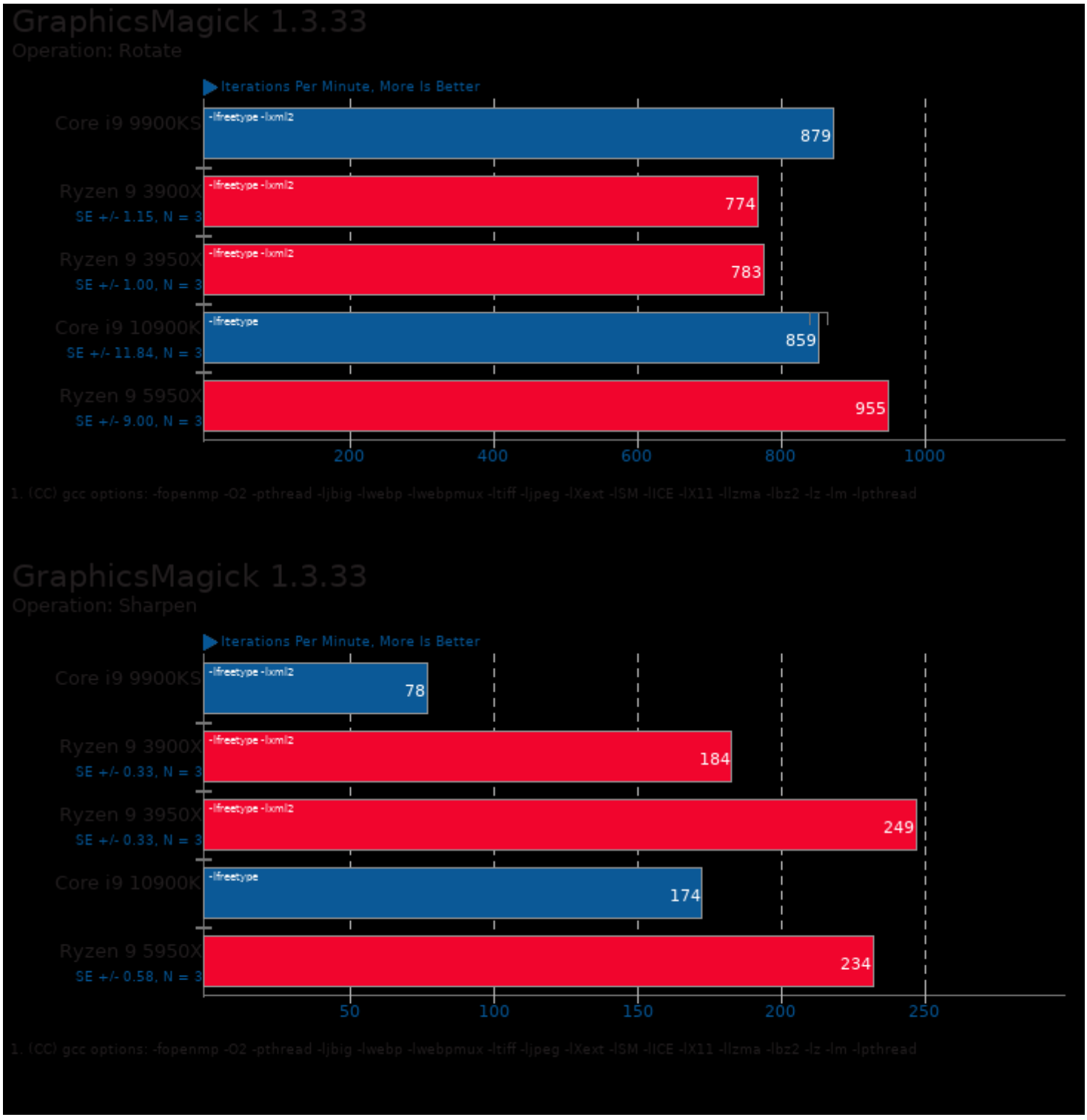

Polyhedron Fortran Benchmarks
Benchmark: test_fpu2
Seconds, Fewer Is Better
Core i9 9900KS
28.64
Ryzen 9 3900X
26.42
Ryzen 9 3950X
26.29
Core i9 10900K
27.45
Ryzen 9 5950X
20.72
7
14
21
28
35
ACES DGEMM 1.0
Sustained Floating-Point Rate
GFLOP/s, More Is Better
Core i9 9900KS
SE +/- 0.058716, N = 3
3.829720
Ryzen 9 3900X
SE +/- 0.026226, N = 3
4.196614
Ryzen 9 3950X
SE +/- 0.095416, N = 3
5.714047
Core i9 10900K
SE +/- 0.063423, N = 5
5.264166
Ryzen 9 5950X
SE +/- 0.071915, N = 3
8.892966
2
4
6
8
10
1. (CC) gcc options: -O3 -march=native -fopenmp

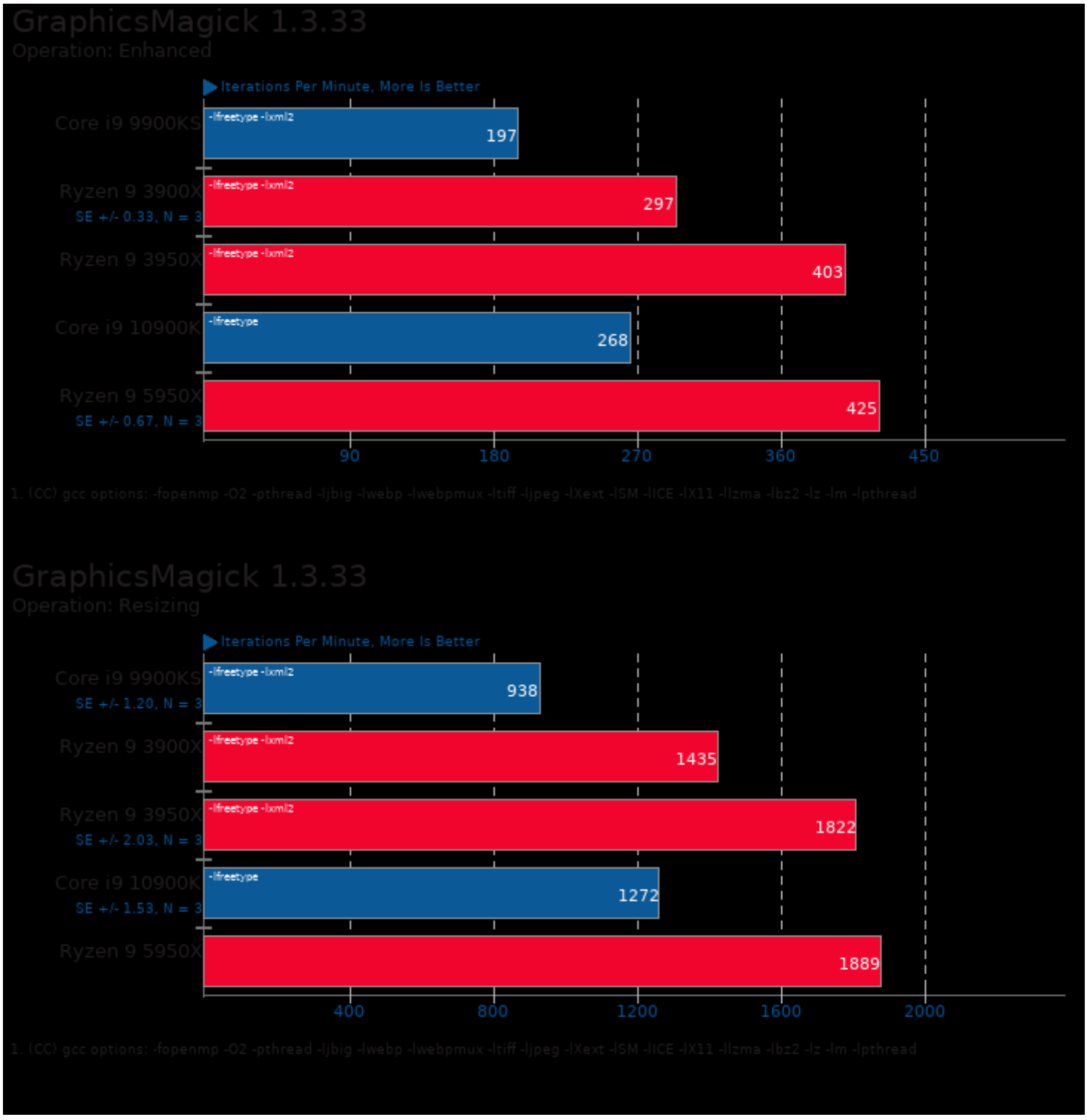

Coremark 1.0
CoreMark Size 666 - Iterations Per Second
Iterations/Sec, More Is Better
Core i9 9900KS
SE +/- 1676.87, N = 3
382099.22
Ryzen 9 3900X
SE +/- 1088.66, N = 3
527168.06
Ryzen 9 3950X
SE +/- 1720.75, N = 3
717532.77
Core i9 10900K
SE +/- 2966.97, N = 3
516200.34
Ryzen 9 5950X
SE +/- 446.13, N = 3
850900.86
200K
400K
600K
800K
1000K
1. (CC) gcc options: -O2 -lrt" -lrt
FFTW 3.3.6
Build: Stock - Size: 1D FFT Size 4096
Mflops, More Is Better
Core i9 9900KS
SE +/- 5.03, N = 3
9084.7
Ryzen 9 3900X
SE +/- 13.18, N = 3
9008.9
Ryzen 9 3950X
SE +/- 24.08, N = 3
9251.6
Core i9 10900K
SE +/- 46.05, N = 3
9593.8
Ryzen 9 5950X
SE +/- 24.94, N = 3
12538.0
3K
6K
9K
12K
15K
1. (CC) gcc options: -pthread -O3 -fomit-frame-pointer -mtune=native -malign-double -fstrict-aliasing -fno-schedule-insns -ffast-math -lm

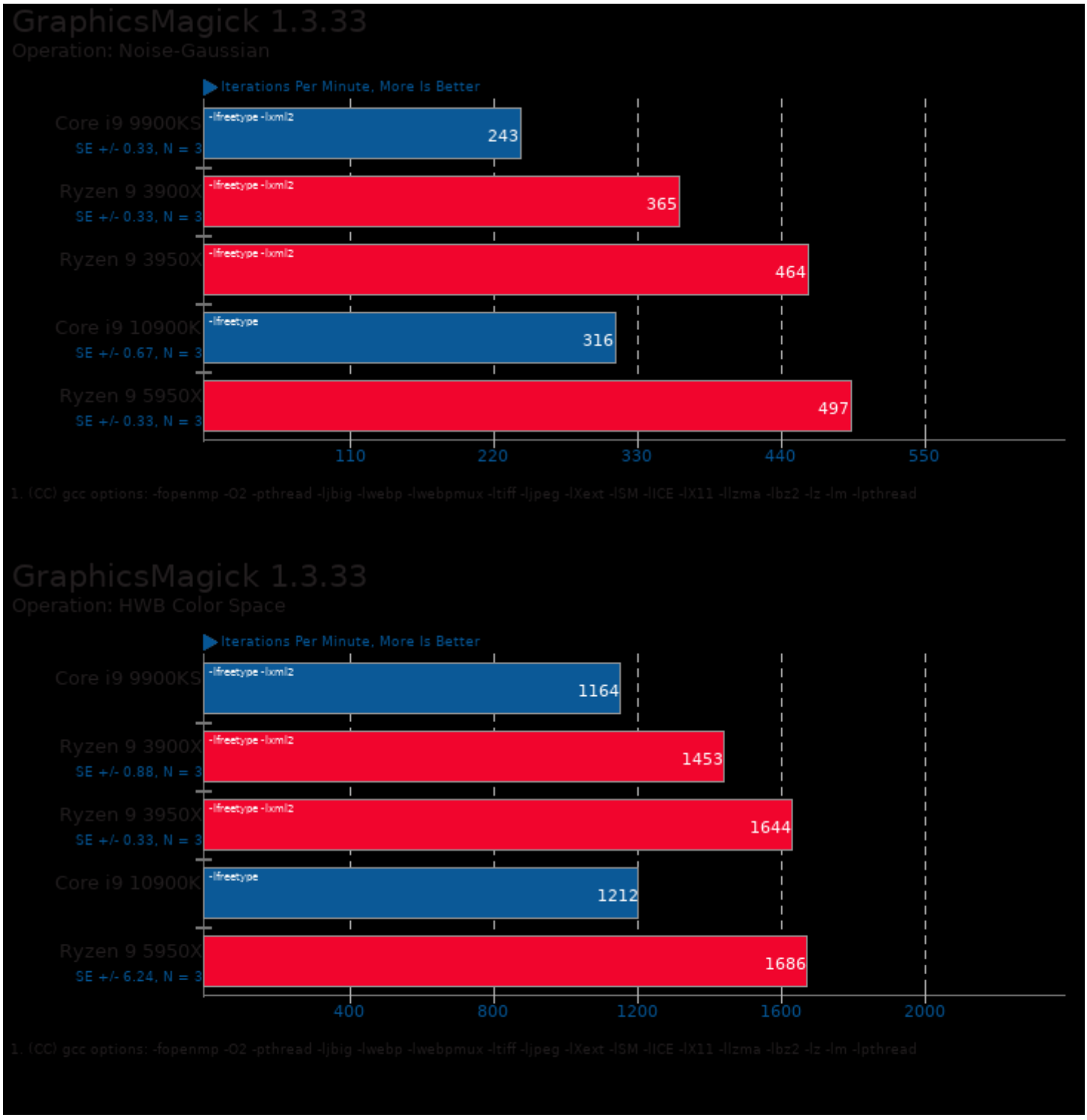

Timed MrBayes Analysis 3.2.7
Primate Phylogeny Analysis
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.08, N = 3
-mmpx -lreadline
74.27
Ryzen 9 3900X
SE +/- 0.30, N = 3
-msse4a -msha
73.30
Ryzen 9 3950X
SE +/- 0.31, N = 3
-msse4a -msha -lreadline
69.10
Core i9 10900K
SE +/- 0.04, N = 3
-mmpx
64.12
Ryzen 9 5950X
SE +/- 0.16, N = 3
-msse4a -msha
84.14
20
40
60
80
100
1. (CC) gcc options: -mmmx -msse -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -maes -mavx -mfma -mavx2 -mrdrnd -mbmi -mbmi2 -madx -mabm -O3 -std
Himeno Benchmark 3.0
Poisson Pressure Solver
MFLOPS, More Is Better
Core i9 9900KS
SE +/- 8.67, N = 3
4297.60
Ryzen 9 3900X
SE +/- 70.17, N = 3
5231.48
Ryzen 9 3950X
SE +/- 40.85, N = 3
5073.22
Core i9 10900K
SE +/- 2.26, N = 3
4473.16
Ryzen 9 5950X
SE +/- 86.09, N = 12
5130.94
1100
2200
3300
4400
5500
1. (CC) gcc options: -O3 -mavx2

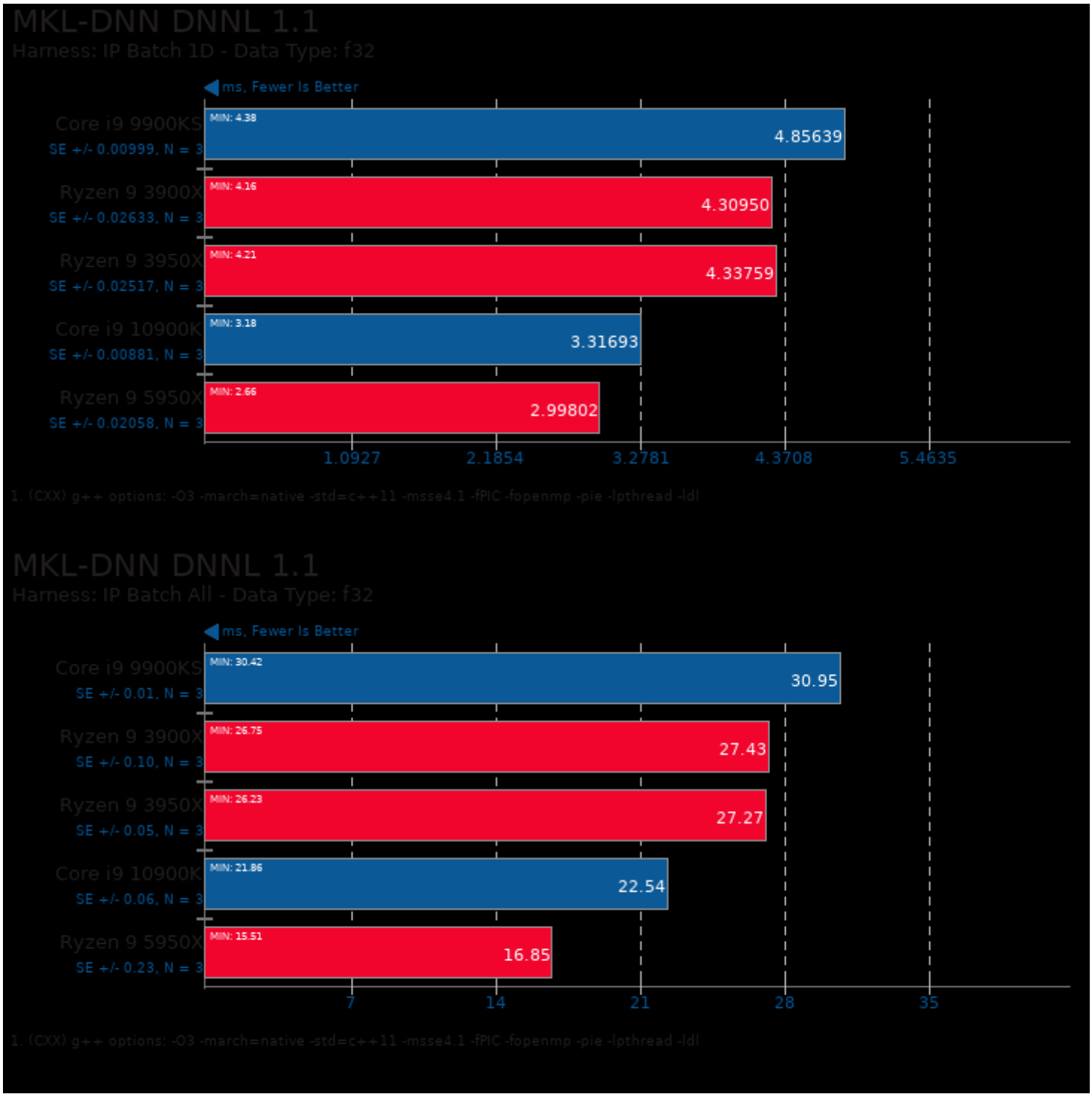

Timed HMMer Search 2.3.2
Pfam Database Search
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.007, N = 3
4.271
Ryzen 9 3900X
SE +/- 0.061, N = 3
5.194
Ryzen 9 3950X
SE +/- 0.053, N = 3
5.054
Core i9 10900K
SE +/- 0.029, N = 3
3.489
Ryzen 9 5950X
SE +/- 0.016, N = 3
3.866
1.1687
2.3374
3.5061
4.6748
5.8435
1. (CC) gcc options: -O2 -pthread -lhmmer -lsquid -lm
LAMMPS Molecular Dynamics Simulator 9Jan2020
Model: Rhodopsin Protein
ns/day, More Is Better
Core i9 9900KS
SE +/- 0.023, N = 3
7.034
Ryzen 9 3900X
SE +/- 0.046, N = 3
9.127
Ryzen 9 3950X
SE +/- 0.135, N = 3
11.990
Core i9 10900K
SE +/- 0.012, N = 3
8.729
Ryzen 9 5950X
SE +/- 0.086, N = 3
-fopenmp
10.688
3
6
9
12
15
1. (CXX) g++ options: -O3 -rdynamic -ljpeg -lpng -lz -lfftw3 -lm

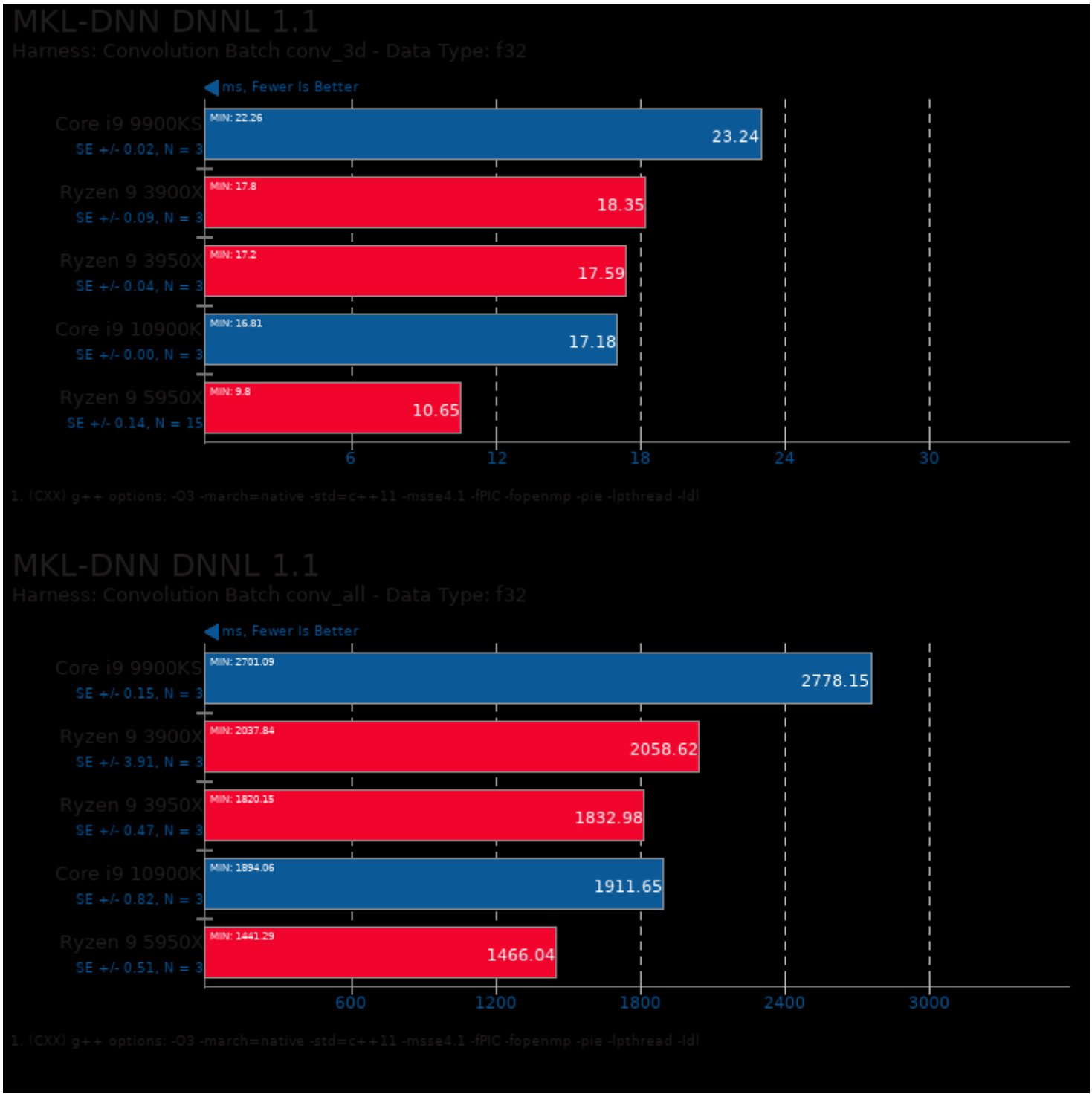

John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
Core i9 9900KS
SE +/- 23.14, N = 3
17136
Ryzen 9 3900X
SE +/- 53.37, N = 3
20364
Ryzen 9 3950X
SE +/- 67.59, N = 3
27750
Core i9 10900K
SE +/- 17.78, N = 3
23098
Ryzen 9 5950X
SE +/- 1135.24, N = 12
37945
8K
16K
24K
32K
40K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2
GraphicsMagick 1.3.33
Operation: Swirl
Iterations Per Minute, More Is Better
Core i9 9900KS
-lfreetype -lxml2
379
Ryzen 9 3900X
SE +/- 1.15, N = 3
-lfreetype -lxml2
776
Ryzen 9 3950X
SE +/- 0.33, N = 3
-lfreetype -lxml2
1028
Core i9 10900K
SE +/- 0.58, N = 3
-lfreetype
524
Ryzen 9 5950X
SE +/- 2.40, N = 3
996
200
400
600
800
1000
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

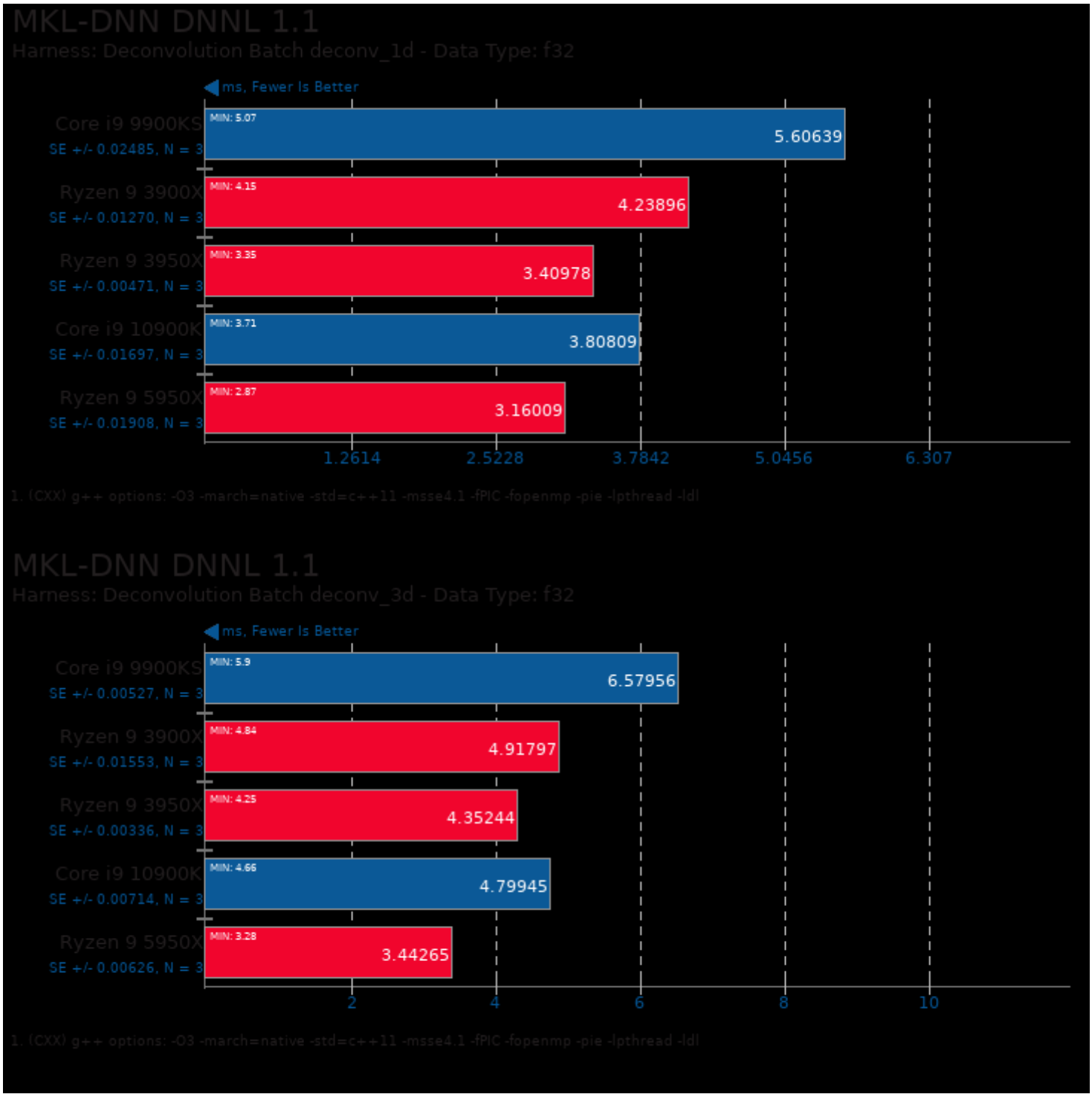

GraphicsMagick 1.3.33
Operation: Rotate
Iterations Per Minute, More Is Better
Core i9 9900KS
-lfreetype -lxml2
879
Ryzen 9 3900X
SE +/- 1.15, N = 3
-lfreetype -lxml2
774
Ryzen 9 3950X
SE +/- 1.00, N = 3
-lfreetype -lxml2
783
Core i9 10900K
SE +/- 11.84, N = 3
-lfreetype
859
Ryzen 9 5950X
SE +/- 9.00, N = 3
955
200
400
600
800
1000
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread
GraphicsMagick 1.3.33
Operation: Sharpen
Iterations Per Minute, More Is Better
Core i9 9900KS
-lfreetype -lxml2
78
Ryzen 9 3900X
SE +/- 0.33, N = 3
-lfreetype -lxml2
184
Ryzen 9 3950X
SE +/- 0.33, N = 3
-lfreetype -lxml2
249
Core i9 10900K
-lfreetype
174
Ryzen 9 5950X
SE +/- 0.58, N = 3
234
50
100
150
200
250
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

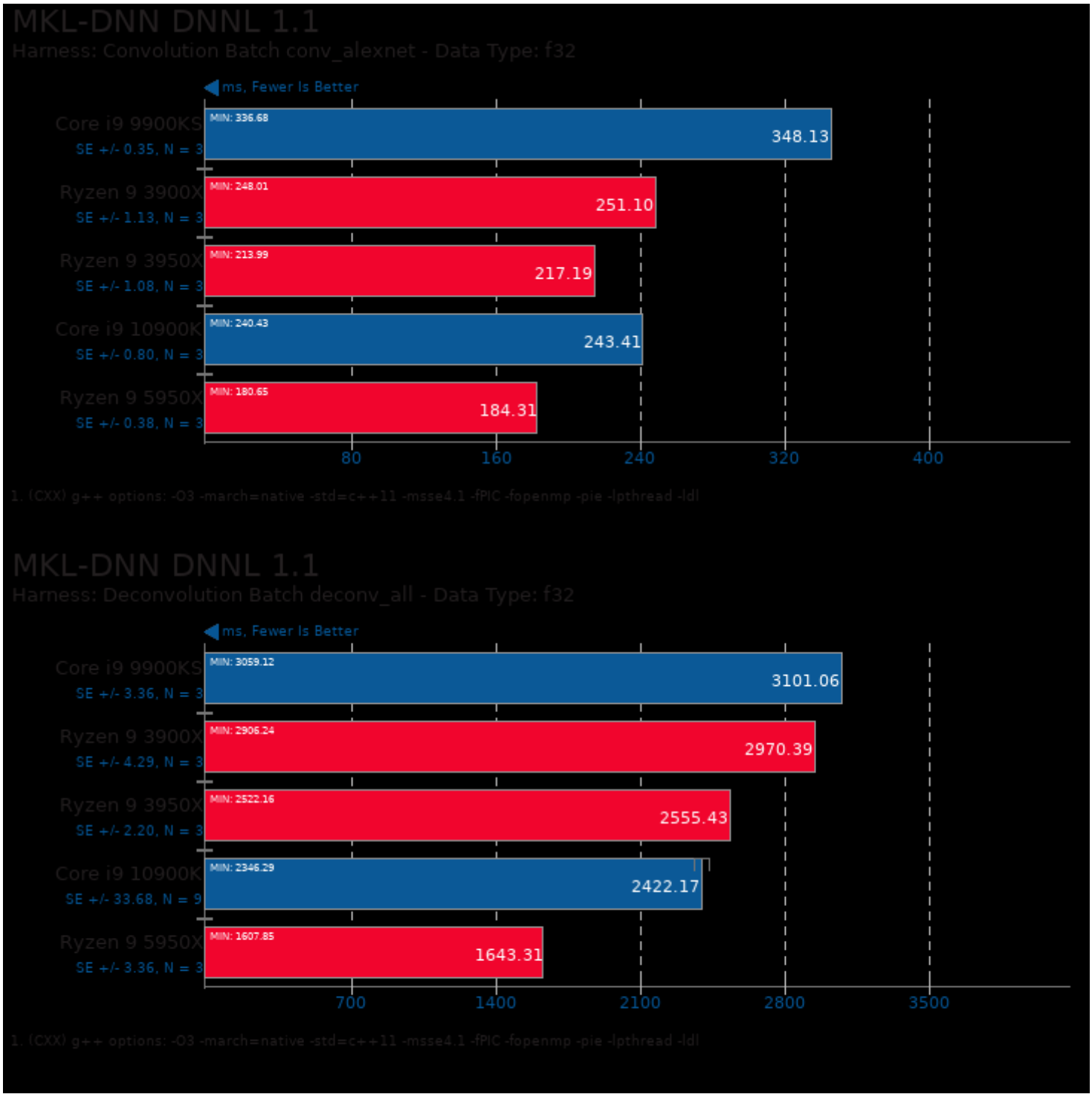

GraphicsMagick 1.3.33
Operation: Enhanced
Iterations Per Minute, More Is Better
Core i9 9900KS
-lfreetype -lxml2
197
Ryzen 9 3900X
SE +/- 0.33, N = 3
-lfreetype -lxml2
297
Ryzen 9 3950X
-lfreetype -lxml2
403
Core i9 10900K
-lfreetype
268
Ryzen 9 5950X
SE +/- 0.67, N = 3
425
90
180
270
360
450
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread
GraphicsMagick 1.3.33
Operation: Resizing
Iterations Per Minute, More Is Better
Core i9 9900KS
SE +/- 1.20, N = 3
-lfreetype -lxml2
938
Ryzen 9 3900X
-lfreetype -lxml2
1435
Ryzen 9 3950X
SE +/- 2.03, N = 3
-lfreetype -lxml2
1822
Core i9 10900K
SE +/- 1.53, N = 3
-lfreetype
1272
Ryzen 9 5950X
1889
400
800
1200
1600
2000
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

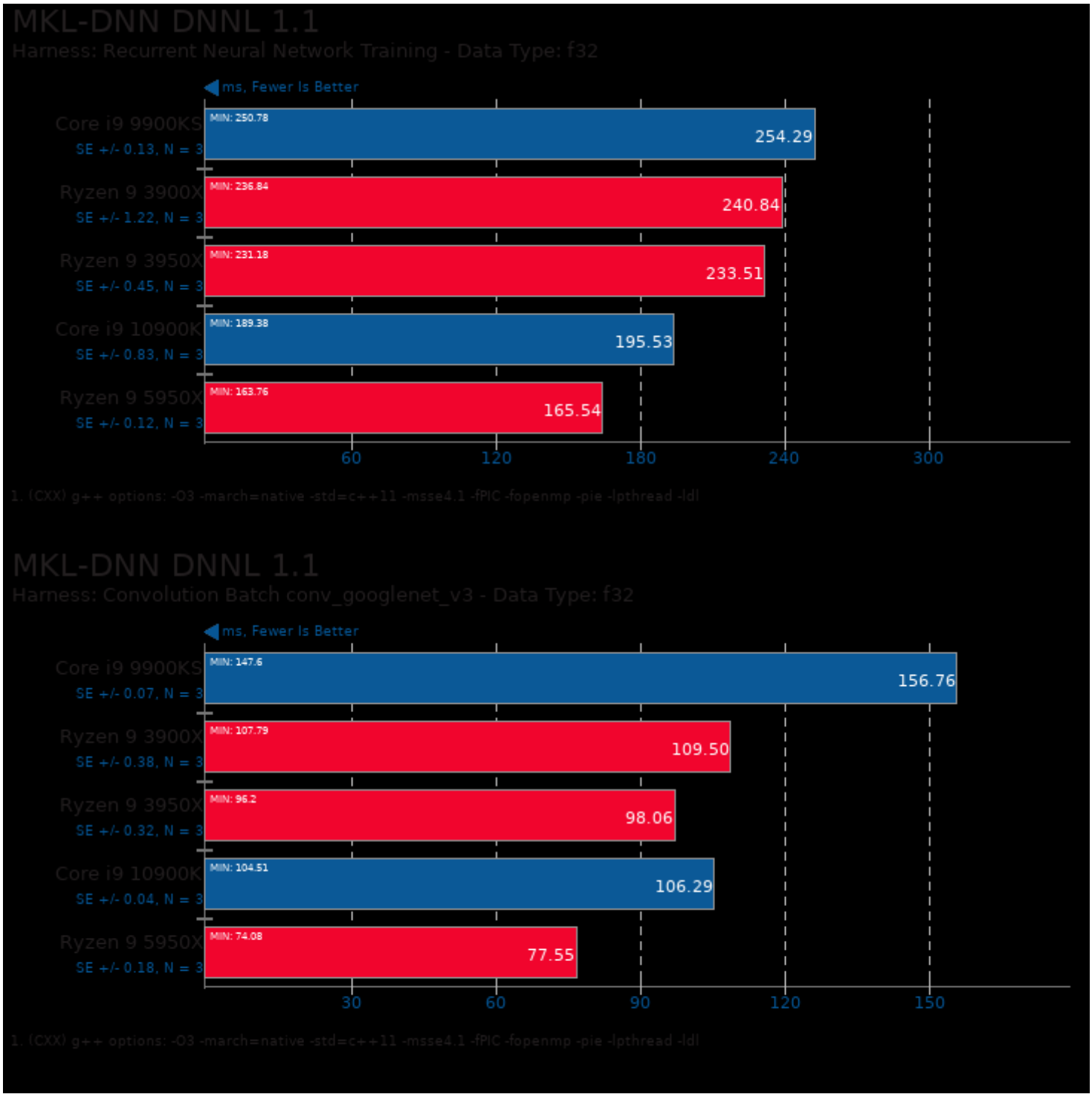

GraphicsMagick 1.3.33
Operation: Noise-Gaussian
Iterations Per Minute, More Is Better
Core i9 9900KS
SE +/- 0.33, N = 3
-lfreetype -lxml2
243
Ryzen 9 3900X
SE +/- 0.33, N = 3
-lfreetype -lxml2
365
Ryzen 9 3950X
-lfreetype -lxml2
464
Core i9 10900K
SE +/- 0.67, N = 3
-lfreetype
316
Ryzen 9 5950X
SE +/- 0.33, N = 3
497
110
220
330
440
550
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread
GraphicsMagick 1.3.33
Operation: HWB Color Space
Iterations Per Minute, More Is Better
Core i9 9900KS
-lfreetype -lxml2
1164
Ryzen 9 3900X
SE +/- 0.88, N = 3
-lfreetype -lxml2
1453
Ryzen 9 3950X
SE +/- 0.33, N = 3
-lfreetype -lxml2
1644
Core i9 10900K
-lfreetype
1212
Ryzen 9 5950X
SE +/- 6.24, N = 3
1686
400
800
1200
1600
2000
1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

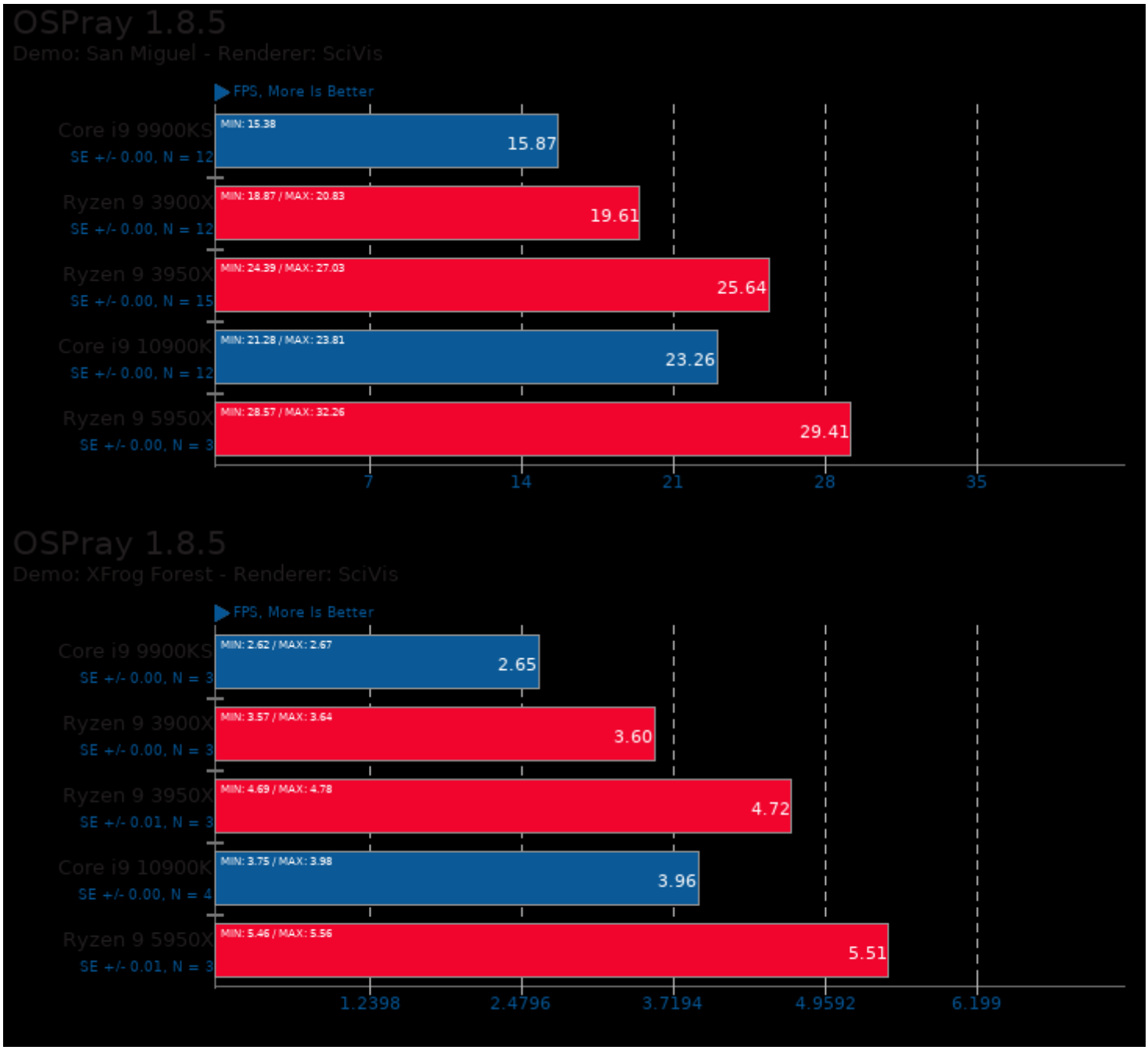

MKL-DNN DNNL 1.1
Harness: IP Batch 1D - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.00999, N = 3
MIN: 4.38
4.85639
Ryzen 9 3900X
SE +/- 0.02633, N = 3
MIN: 4.16
4.30950
Ryzen 9 3950X
SE +/- 0.02517, N = 3
MIN: 4.21
4.33759
Core i9 10900K
SE +/- 0.00881, N = 3
MIN: 3.18
3.31693
Ryzen 9 5950X
SE +/- 0.02058, N = 3
MIN: 2.66
2.99802
1.0927
2.1854
3.2781
4.3708
5.4635
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl
MKL-DNN DNNL 1.1
Harness: IP Batch All - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
MIN: 30.42
30.95
Ryzen 9 3900X
SE +/- 0.10, N = 3
MIN: 26.75
27.43
Ryzen 9 3950X
SE +/- 0.05, N = 3
MIN: 26.23
27.27
Core i9 10900K
SE +/- 0.06, N = 3
MIN: 21.86
22.54
Ryzen 9 5950X
SE +/- 0.23, N = 3
MIN: 15.51
16.85
7
14
21
28
35
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

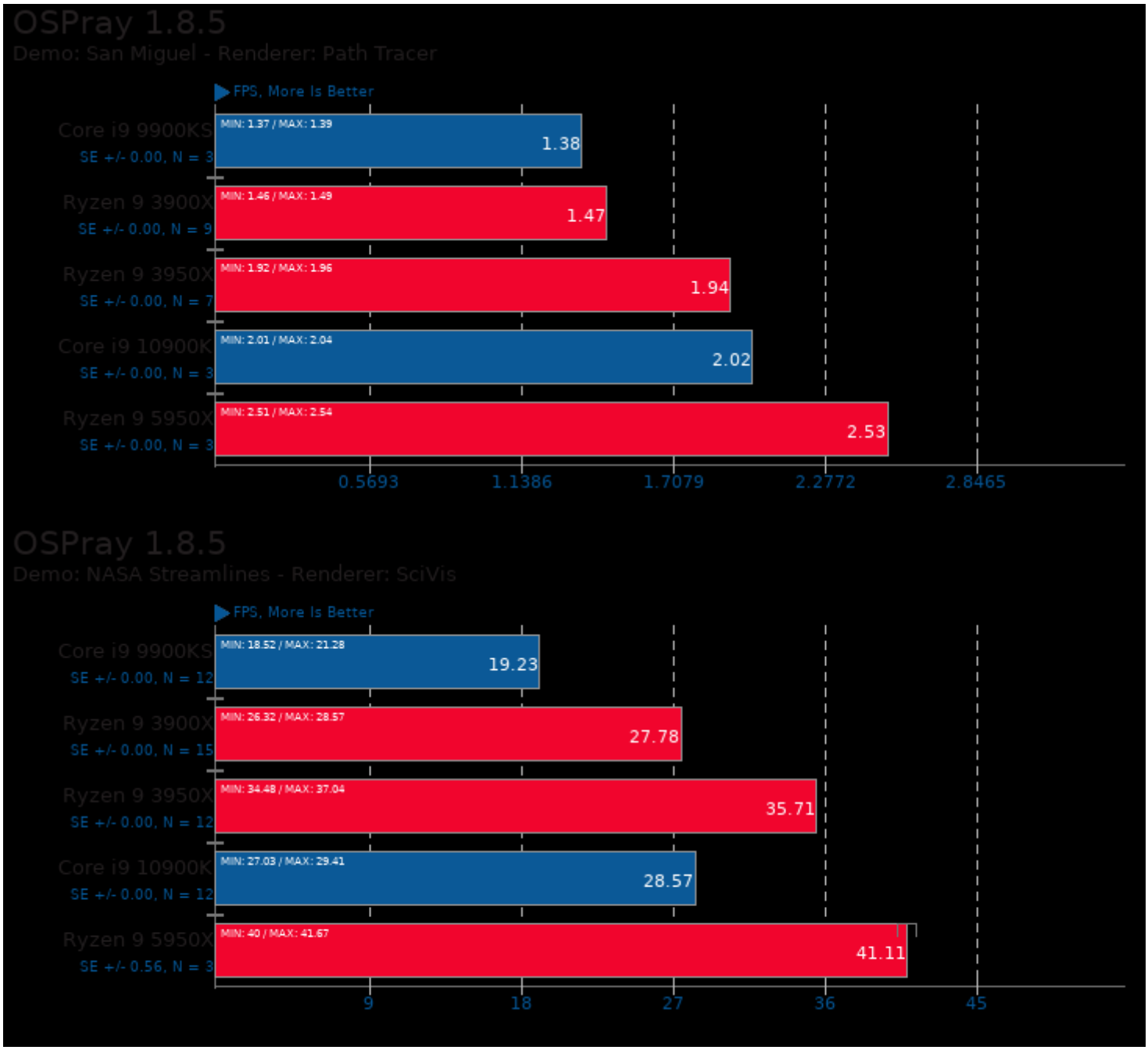

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_3d - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.02, N = 3
MIN: 22.26
23.24
Ryzen 9 3900X
SE +/- 0.09, N = 3
MIN: 17.8
18.35
Ryzen 9 3950X
SE +/- 0.04, N = 3
MIN: 17.2
17.59
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 16.81
17.18
Ryzen 9 5950X
SE +/- 0.14, N = 15
MIN: 9.8
10.65
6
12
18
24
30
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl
MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_all - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.15, N = 3
MIN: 2701.09
2778.15
Ryzen 9 3900X
SE +/- 3.91, N = 3
MIN: 2037.84
2058.62
Ryzen 9 3950X
SE +/- 0.47, N = 3
MIN: 1820.15
1832.98
Core i9 10900K
SE +/- 0.82, N = 3
MIN: 1894.06
1911.65
Ryzen 9 5950X
SE +/- 0.51, N = 3
MIN: 1441.29
1466.04
600
1200
1800
2400
3000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

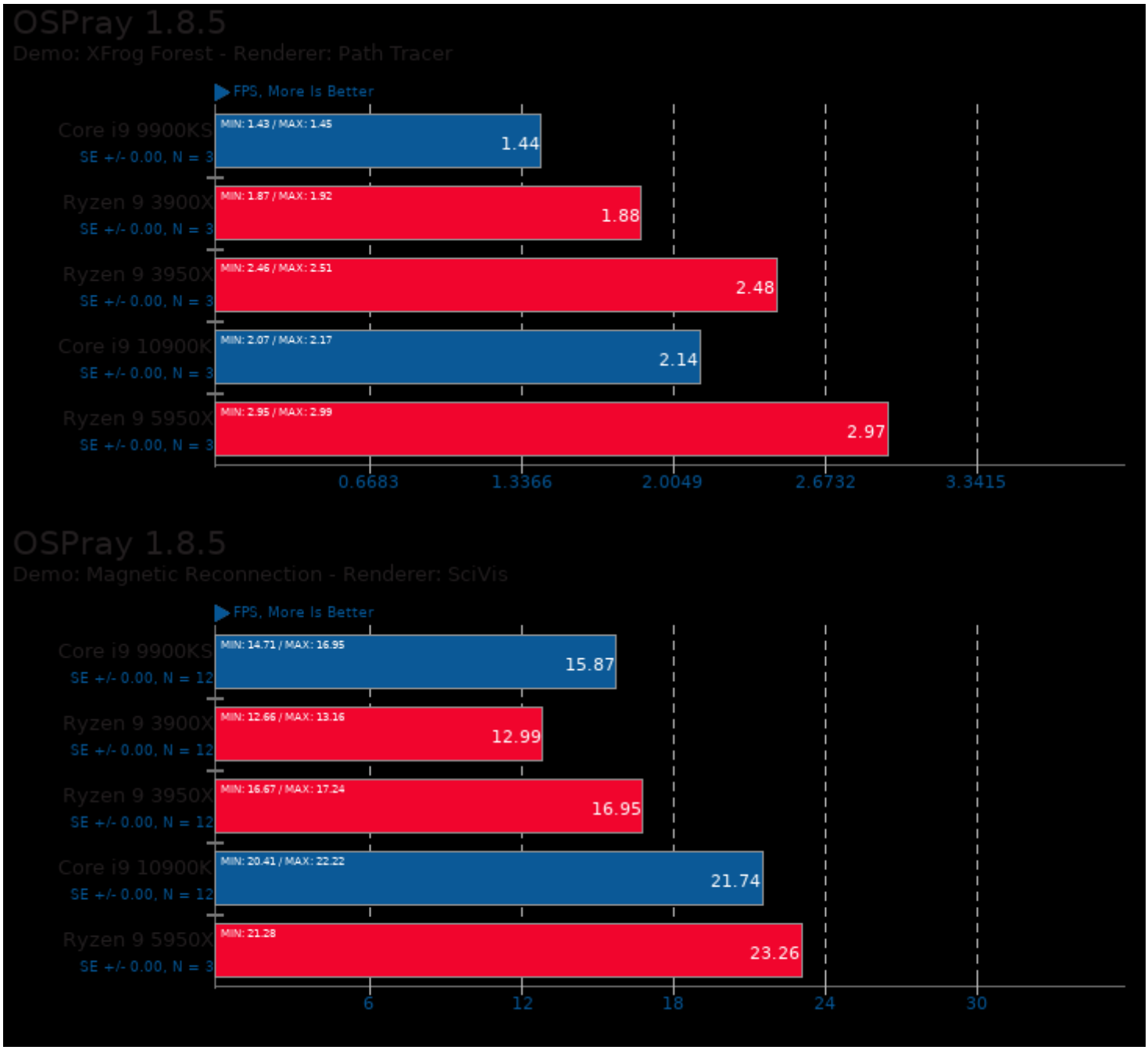

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_1d - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.02485, N = 3
MIN: 5.07
5.60639
Ryzen 9 3900X
SE +/- 0.01270, N = 3
MIN: 4.15
4.23896
Ryzen 9 3950X
SE +/- 0.00471, N = 3
MIN: 3.35
3.40978
Core i9 10900K
SE +/- 0.01697, N = 3
MIN: 3.71
3.80809
Ryzen 9 5950X
SE +/- 0.01908, N = 3
MIN: 2.87
3.16009
1.2614
2.5228
3.7842
5.0456
6.307
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl
MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_3d - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.00527, N = 3
MIN: 5.9
6.57956
Ryzen 9 3900X
SE +/- 0.01553, N = 3
MIN: 4.84
4.91797
Ryzen 9 3950X
SE +/- 0.00336, N = 3
MIN: 4.25
4.35244
Core i9 10900K
SE +/- 0.00714, N = 3
MIN: 4.66
4.79945
Ryzen 9 5950X
SE +/- 0.00626, N = 3
MIN: 3.28
3.44265
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

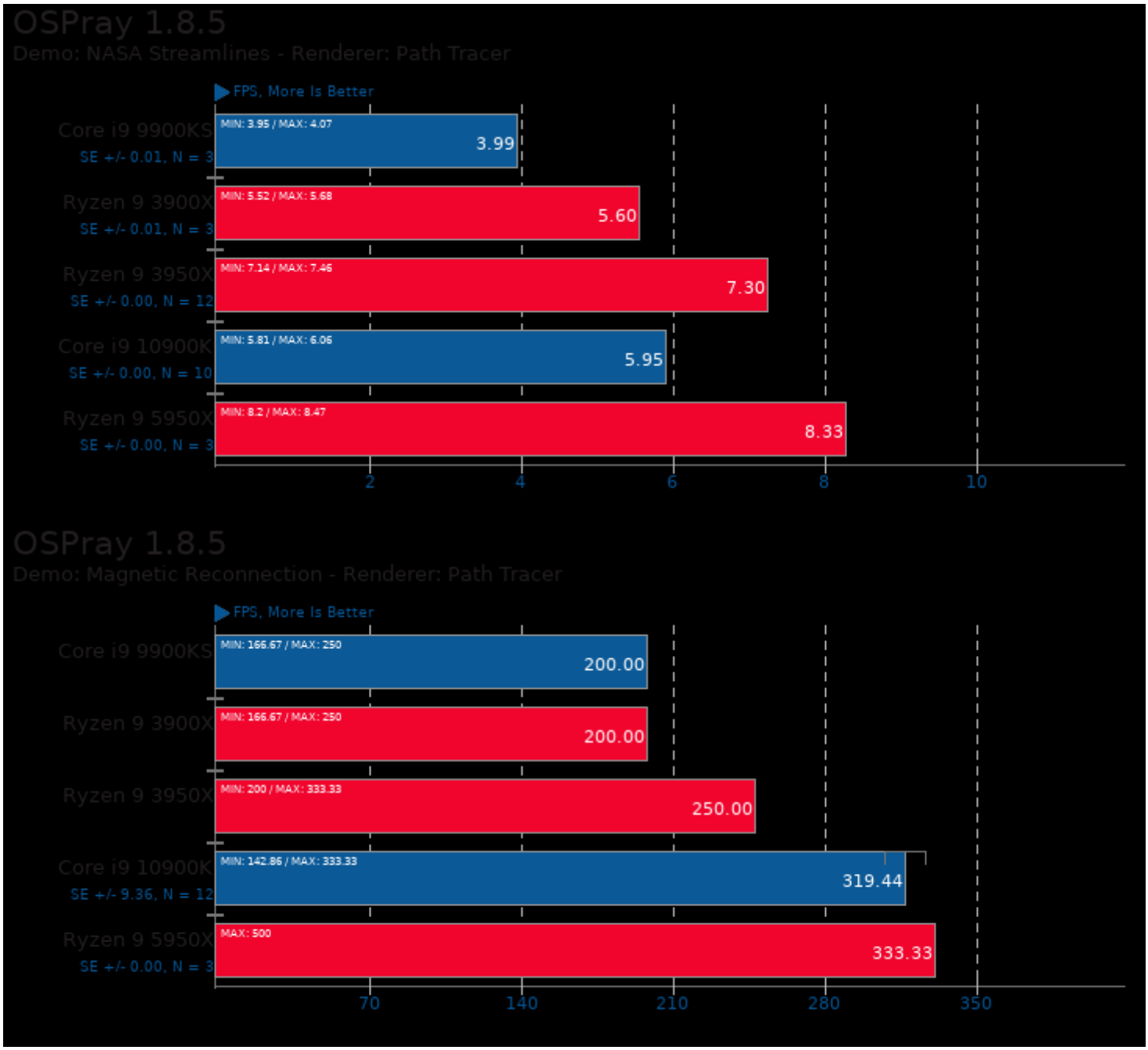

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_alexnet - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.35, N = 3
MIN: 336.68
348.13
Ryzen 9 3900X
SE +/- 1.13, N = 3
MIN: 248.01
251.10
Ryzen 9 3950X
SE +/- 1.08, N = 3
MIN: 213.99
217.19
Core i9 10900K
SE +/- 0.80, N = 3
MIN: 240.43
243.41
Ryzen 9 5950X
SE +/- 0.38, N = 3
MIN: 180.65
184.31
80
160
240
320
400
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl
MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_all - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 3.36, N = 3
MIN: 3059.12
3101.06
Ryzen 9 3900X
SE +/- 4.29, N = 3
MIN: 2906.24
2970.39
Ryzen 9 3950X
SE +/- 2.20, N = 3
MIN: 2522.16
2555.43
Core i9 10900K
SE +/- 33.68, N = 9
MIN: 2346.29
2422.17
Ryzen 9 5950X
SE +/- 3.36, N = 3
MIN: 1607.85
1643.31
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

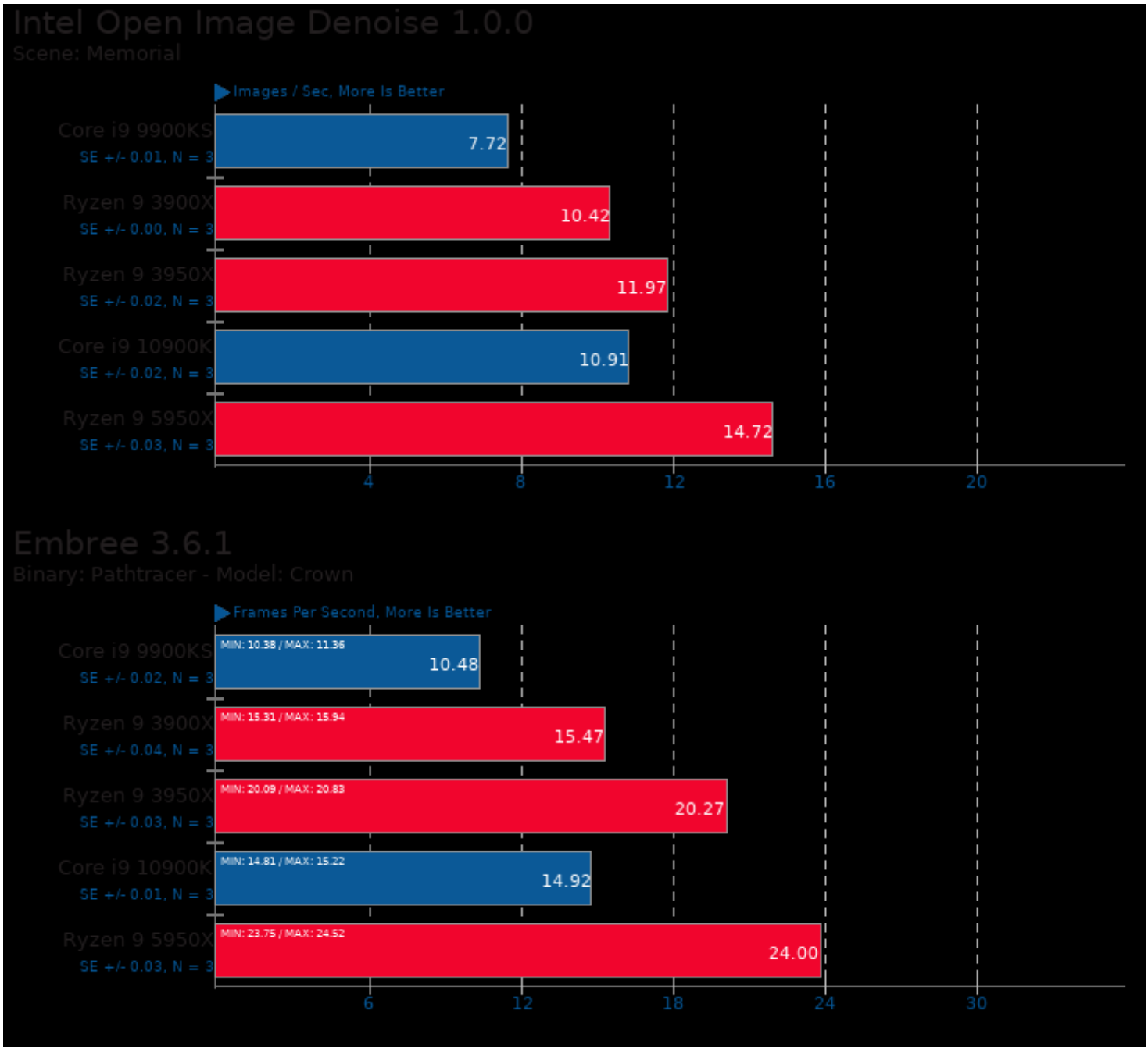

MKL-DNN DNNL 1.1
Harness: Recurrent Neural Network Training - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.13, N = 3
MIN: 250.78
254.29
Ryzen 9 3900X
SE +/- 1.22, N = 3
MIN: 236.84
240.84
Ryzen 9 3950X
SE +/- 0.45, N = 3
MIN: 231.18
233.51
Core i9 10900K
SE +/- 0.83, N = 3
MIN: 189.38
195.53
Ryzen 9 5950X
SE +/- 0.12, N = 3
MIN: 163.76
165.54
60
120
180
240
300
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl
MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32
ms, Fewer Is Better
Core i9 9900KS
SE +/- 0.07, N = 3
MIN: 147.6
156.76
Ryzen 9 3900X
SE +/- 0.38, N = 3
MIN: 107.79
109.50
Ryzen 9 3950X
SE +/- 0.32, N = 3
MIN: 96.2
98.06
Core i9 10900K
SE +/- 0.04, N = 3
MIN: 104.51
106.29
Ryzen 9 5950X
SE +/- 0.18, N = 3
MIN: 74.08
77.55
30
60
90
120
150
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

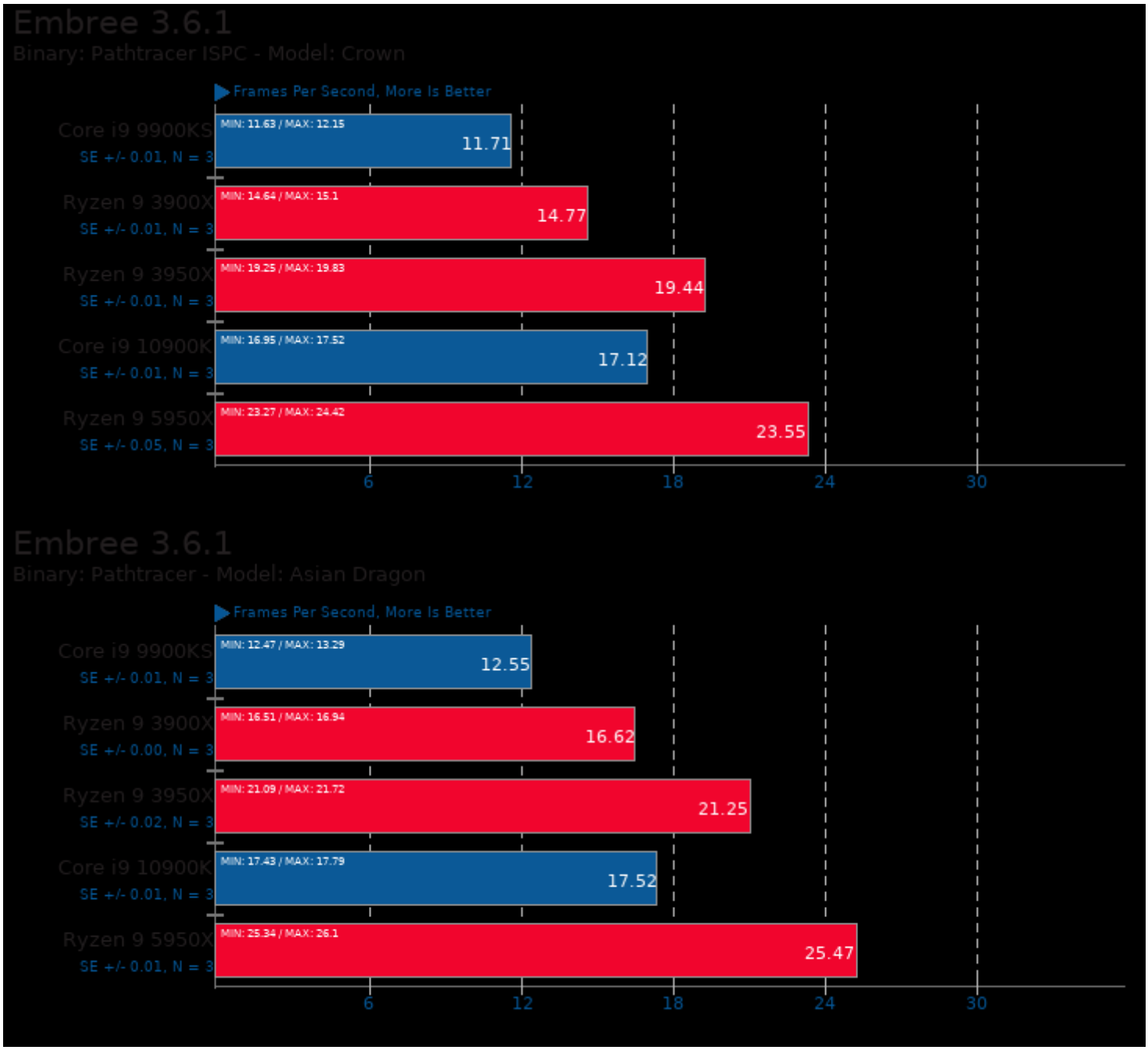

OSPray 1.8.5
Demo: San Miguel - Renderer: SciVis
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 12
MIN: 15.38
15.87
Ryzen 9 3900X
SE +/- 0.00, N = 12
MIN: 18.87 / MAX: 20.83
19.61
Ryzen 9 3950X
SE +/- 0.00, N = 15
MIN: 24.39 / MAX: 27.03
25.64
Core i9 10900K
SE +/- 0.00, N = 12
MIN: 21.28 / MAX: 23.81
23.26
Ryzen 9 5950X
SE +/- 0.00, N = 3
MIN: 28.57 / MAX: 32.26
29.41
7
14
21
28
35
OSPray 1.8.5
Demo: XFrog Forest - Renderer: SciVis
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 2.62 / MAX: 2.67
2.65
Ryzen 9 3900X
SE +/- 0.00, N = 3
MIN: 3.57 / MAX: 3.64
3.60
Ryzen 9 3950X
SE +/- 0.01, N = 3
MIN: 4.69 / MAX: 4.78
4.72
Core i9 10900K
SE +/- 0.00, N = 4
MIN: 3.75 / MAX: 3.98
3.96
Ryzen 9 5950X
SE +/- 0.01, N = 3
MIN: 5.46 / MAX: 5.56
5.51
1.2398
2.4796
3.7194
4.9592
6.199

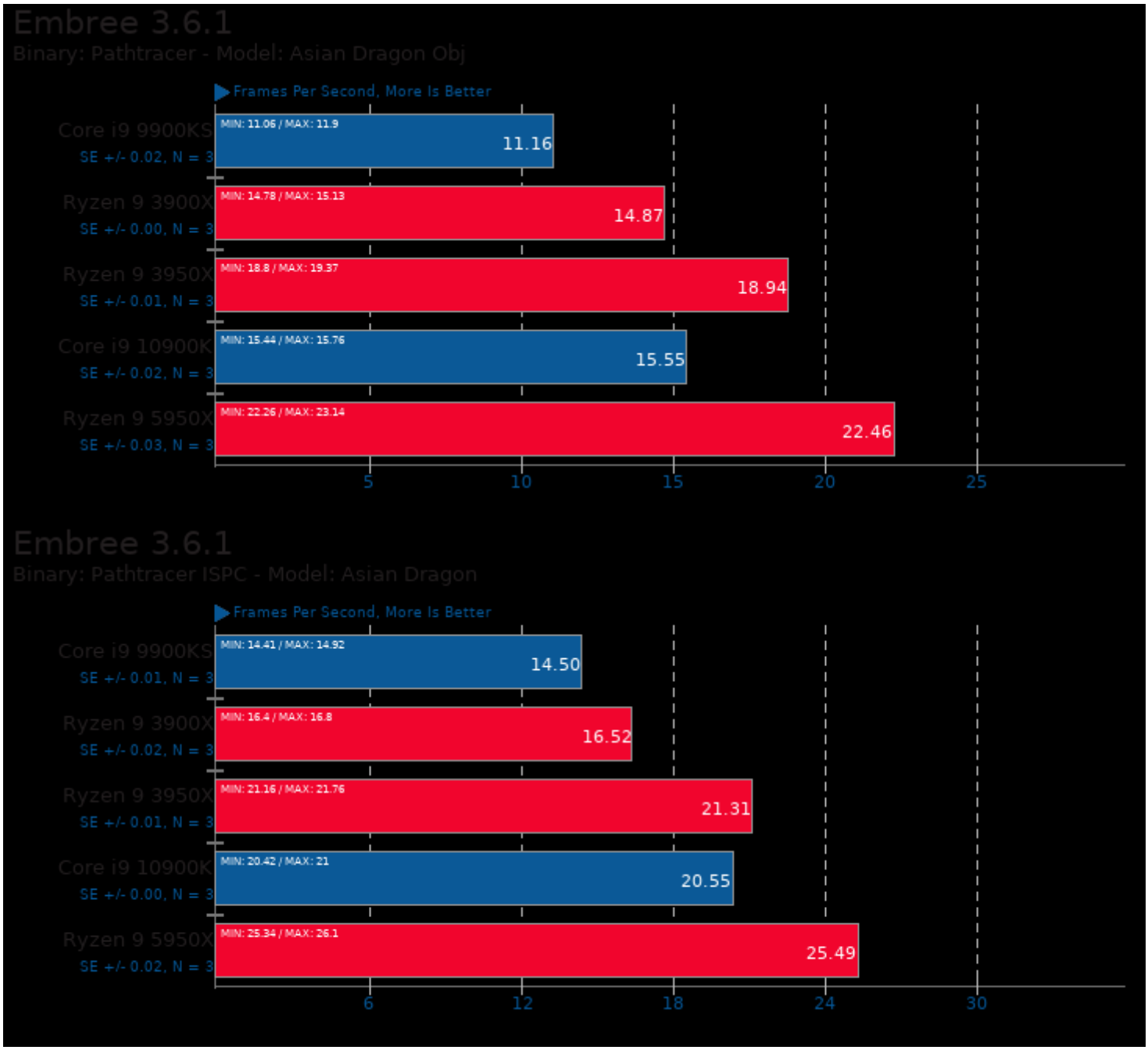

OSPray 1.8.5
Demo: San Miguel - Renderer: Path Tracer
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 1.37 / MAX: 1.39
1.38
Ryzen 9 3900X
SE +/- 0.00, N = 9
MIN: 1.46 / MAX: 1.49
1.47
Ryzen 9 3950X
SE +/- 0.00, N = 7
MIN: 1.92 / MAX: 1.96
1.94
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 2.01 / MAX: 2.04
2.02
Ryzen 9 5950X
SE +/- 0.00, N = 3
MIN: 2.51 / MAX: 2.54
2.53
0.5693
1.1386
1.7079
2.2772
2.8465
OSPray 1.8.5
Demo: NASA Streamlines - Renderer: SciVis
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 12
MIN: 18.52 / MAX: 21.28
19.23
Ryzen 9 3900X
SE +/- 0.00, N = 15
MIN: 26.32 / MAX: 28.57
27.78
Ryzen 9 3950X
SE +/- 0.00, N = 12
MIN: 34.48 / MAX: 37.04
35.71
Core i9 10900K
SE +/- 0.00, N = 12
MIN: 27.03 / MAX: 29.41
28.57
Ryzen 9 5950X
SE +/- 0.56, N = 3
MIN: 40 / MAX: 41.67
41.11
9
18
27
36
45

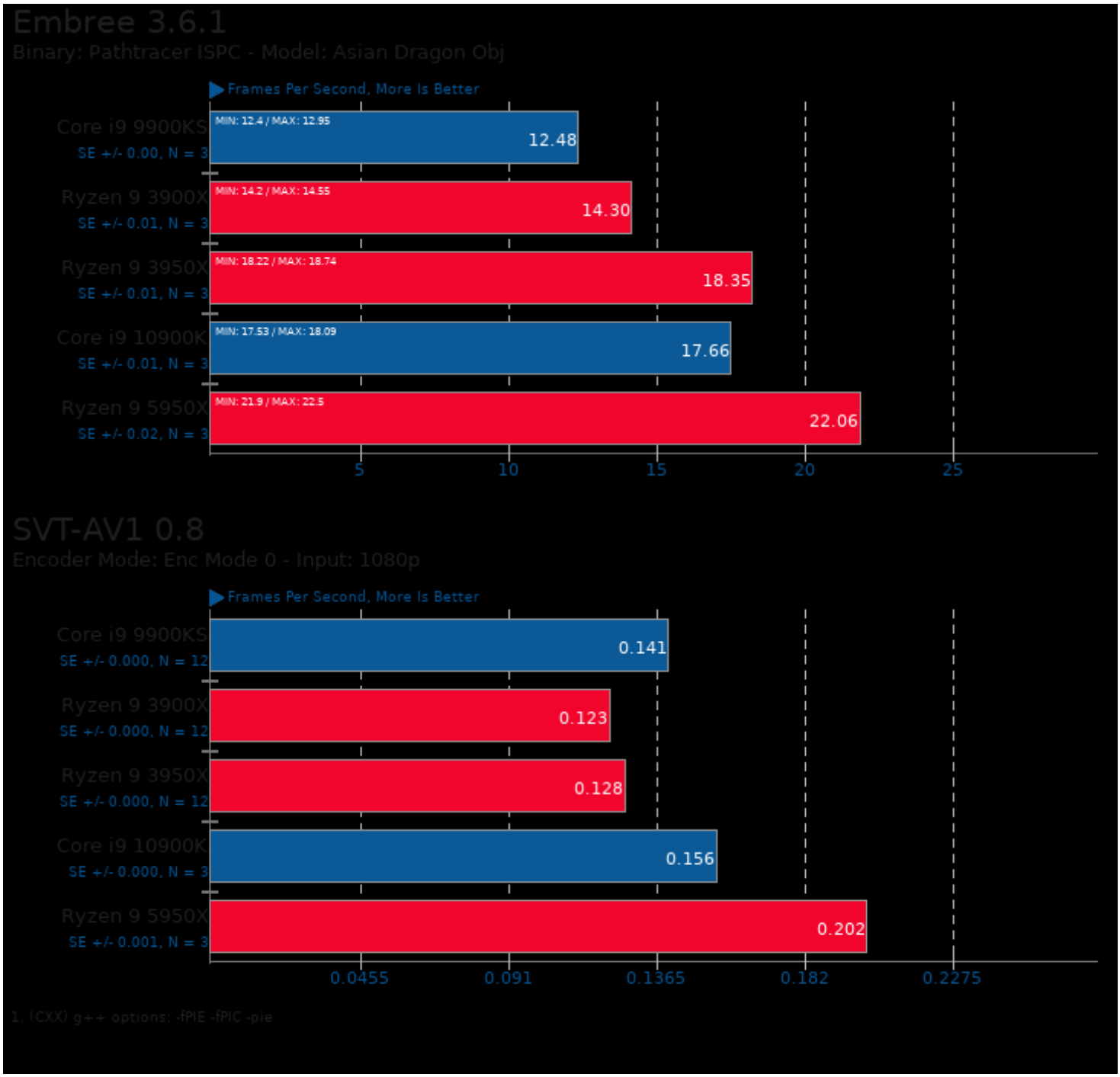

OSPray 1.8.5
Demo: XFrog Forest - Renderer: Path Tracer
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 1.43 / MAX: 1.45
1.44
Ryzen 9 3900X
SE +/- 0.00, N = 3
MIN: 1.87 / MAX: 1.92
1.88
Ryzen 9 3950X
SE +/- 0.00, N = 3
MIN: 2.46 / MAX: 2.51
2.48
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 2.07 / MAX: 2.17
2.14
Ryzen 9 5950X
SE +/- 0.00, N = 3
MIN: 2.95 / MAX: 2.99
2.97
0.6683
1.3366
2.0049
2.6732
3.3415
OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: SciVis
FPS, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 12
MIN: 14.71 / MAX: 16.95
15.87
Ryzen 9 3900X
SE +/- 0.00, N = 12
MIN: 12.66 / MAX: 13.16
12.99
Ryzen 9 3950X
SE +/- 0.00, N = 12
MIN: 16.67 / MAX: 17.24
16.95
Core i9 10900K
SE +/- 0.00, N = 12
MIN: 20.41 / MAX: 22.22
21.74
Ryzen 9 5950X
SE +/- 0.00, N = 3
MIN: 21.28
23.26
6
12
18
24
30

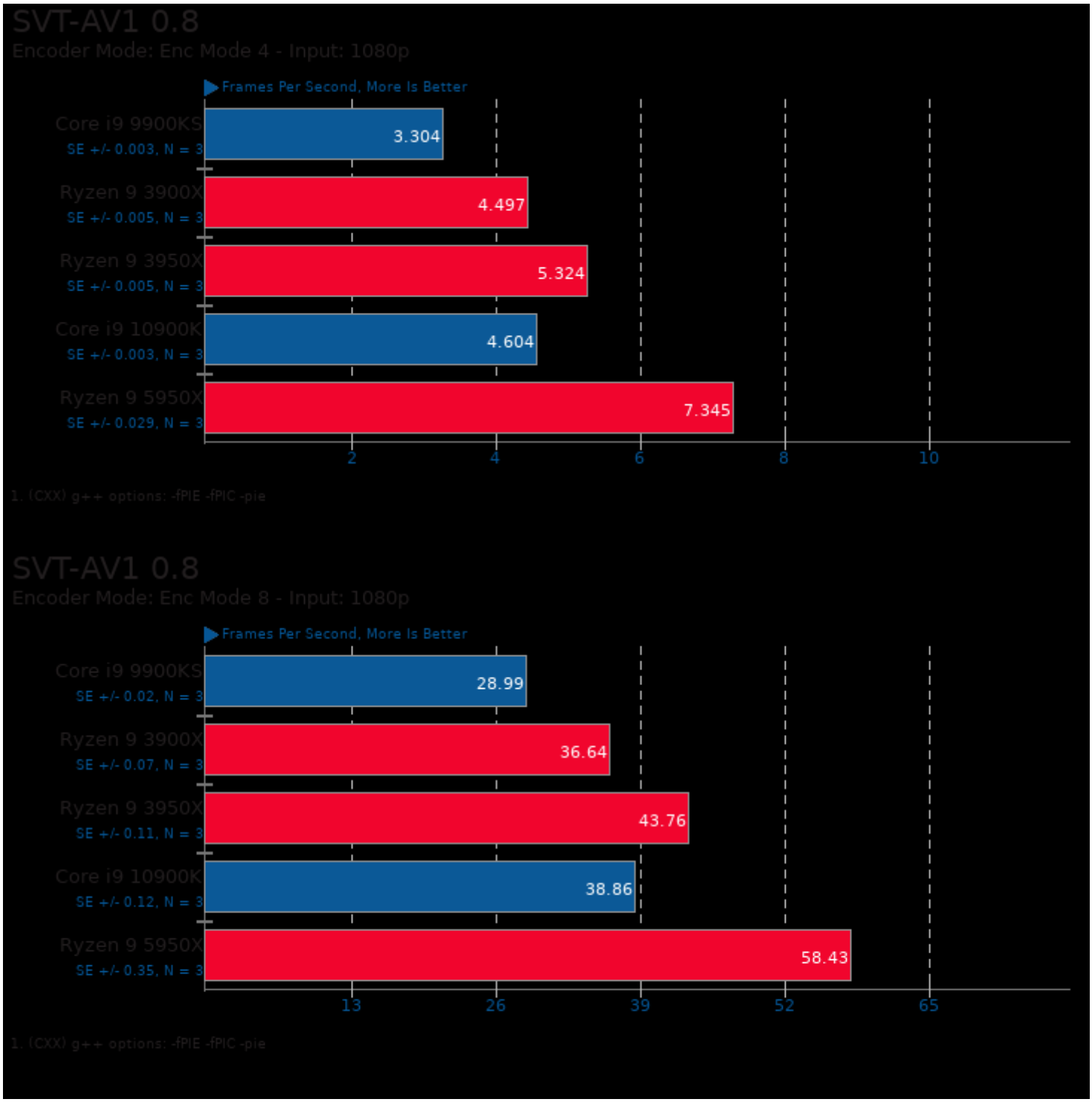

OSPray 1.8.5
Demo: NASA Streamlines - Renderer: Path Tracer
FPS, More Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
MIN: 3.95 / MAX: 4.07
3.99
Ryzen 9 3900X
SE +/- 0.01, N = 3
MIN: 5.52 / MAX: 5.68
5.60
Ryzen 9 3950X
SE +/- 0.00, N = 12
MIN: 7.14 / MAX: 7.46
7.30
Core i9 10900K
SE +/- 0.00, N = 10
MIN: 5.81 / MAX: 6.06
5.95
Ryzen 9 5950X
SE +/- 0.00, N = 3
MIN: 8.2 / MAX: 8.47
8.33
2
4
6
8
10
OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: Path Tracer
FPS, More Is Better
Core i9 9900KS
MIN: 166.67 / MAX: 250
200.00
Ryzen 9 3900X
MIN: 166.67 / MAX: 250
200.00
Ryzen 9 3950X
MIN: 200 / MAX: 333.33
250.00
Core i9 10900K
SE +/- 9.36, N = 12
MIN: 142.86 / MAX: 333.33
319.44
Ryzen 9 5950X
SE +/- 0.00, N = 3
MAX: 500
333.33
70
140
210
280
350

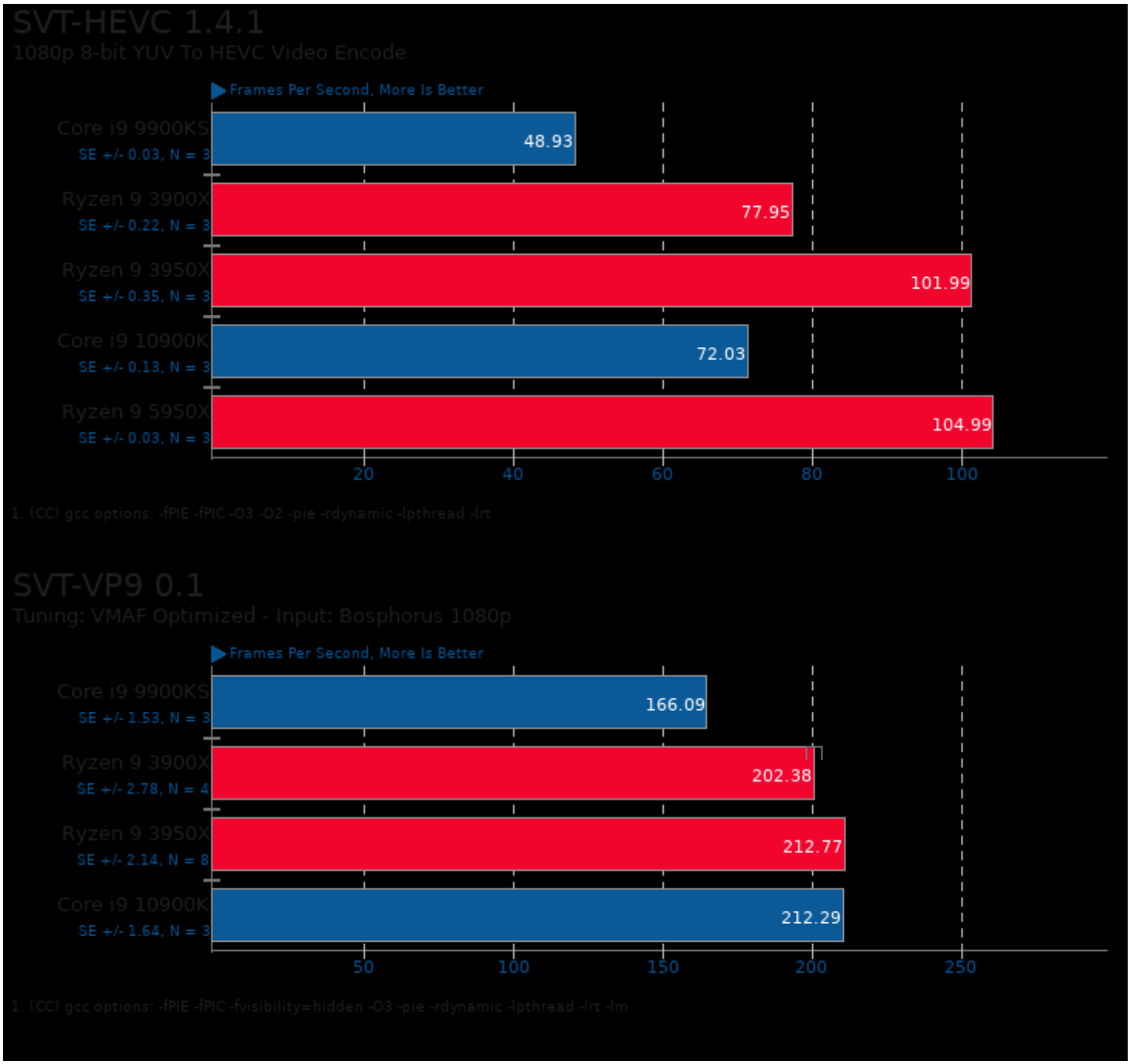

Intel Open Image Denoise 1.0.0
Scene: Memorial
Images / Sec, More Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
7.72
Ryzen 9 3900X
SE +/- 0.00, N = 3
10.42
Ryzen 9 3950X
SE +/- 0.02, N = 3
11.97
Core i9 10900K
SE +/- 0.02, N = 3
10.91
Ryzen 9 5950X
SE +/- 0.03, N = 3
14.72
4
8
12
16
20
Embree 3.6.1
Binary: Pathtracer - Model: Crown
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.02, N = 3
MIN: 10.38 / MAX: 11.36
10.48
Ryzen 9 3900X
SE +/- 0.04, N = 3
MIN: 15.31 / MAX: 15.94
15.47
Ryzen 9 3950X
SE +/- 0.03, N = 3
MIN: 20.09 / MAX: 20.83
20.27
Core i9 10900K
SE +/- 0.01, N = 3
MIN: 14.81 / MAX: 15.22
14.92
Ryzen 9 5950X
SE +/- 0.03, N = 3
MIN: 23.75 / MAX: 24.52
24.00
6
12
18
24
30

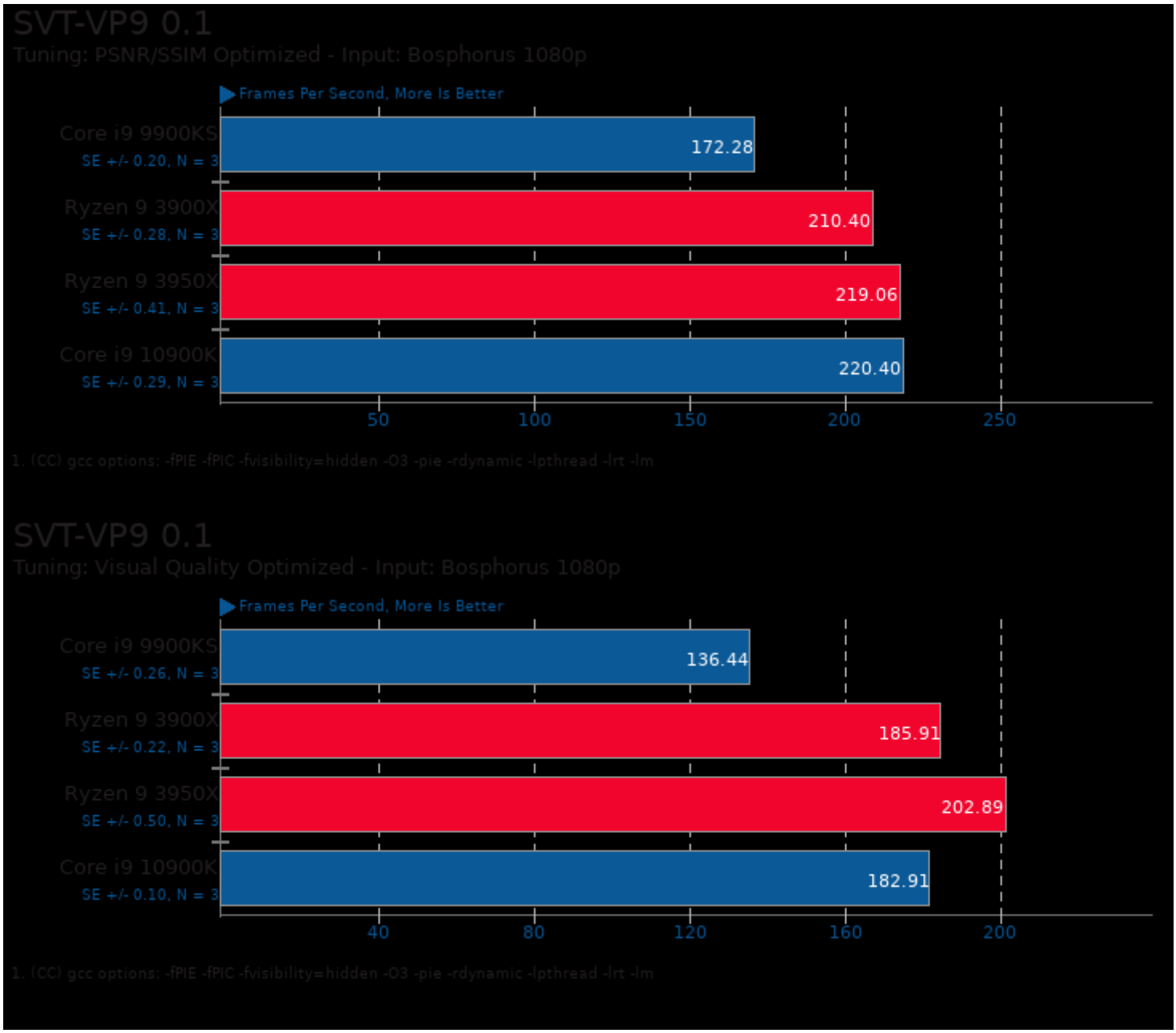

Embree 3.6.1
Binary: Pathtracer ISPC - Model: Crown
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
MIN: 11.63 / MAX: 12.15
11.71
Ryzen 9 3900X
SE +/- 0.01, N = 3
MIN: 14.64 / MAX: 15.1
14.77
Ryzen 9 3950X
SE +/- 0.01, N = 3
MIN: 19.25 / MAX: 19.83
19.44
Core i9 10900K
SE +/- 0.01, N = 3
MIN: 16.95 / MAX: 17.52
17.12
Ryzen 9 5950X
SE +/- 0.05, N = 3
MIN: 23.27 / MAX: 24.42
23.55
6
12
18
24
30
Embree 3.6.1
Binary: Pathtracer - Model: Asian Dragon
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
MIN: 12.47 / MAX: 13.29
12.55
Ryzen 9 3900X
SE +/- 0.00, N = 3
MIN: 16.51 / MAX: 16.94
16.62
Ryzen 9 3950X
SE +/- 0.02, N = 3
MIN: 21.09 / MAX: 21.72
21.25
Core i9 10900K
SE +/- 0.01, N = 3
MIN: 17.43 / MAX: 17.79
17.52
Ryzen 9 5950X
SE +/- 0.01, N = 3
MIN: 25.34 / MAX: 26.1
25.47
6
12
18
24
30

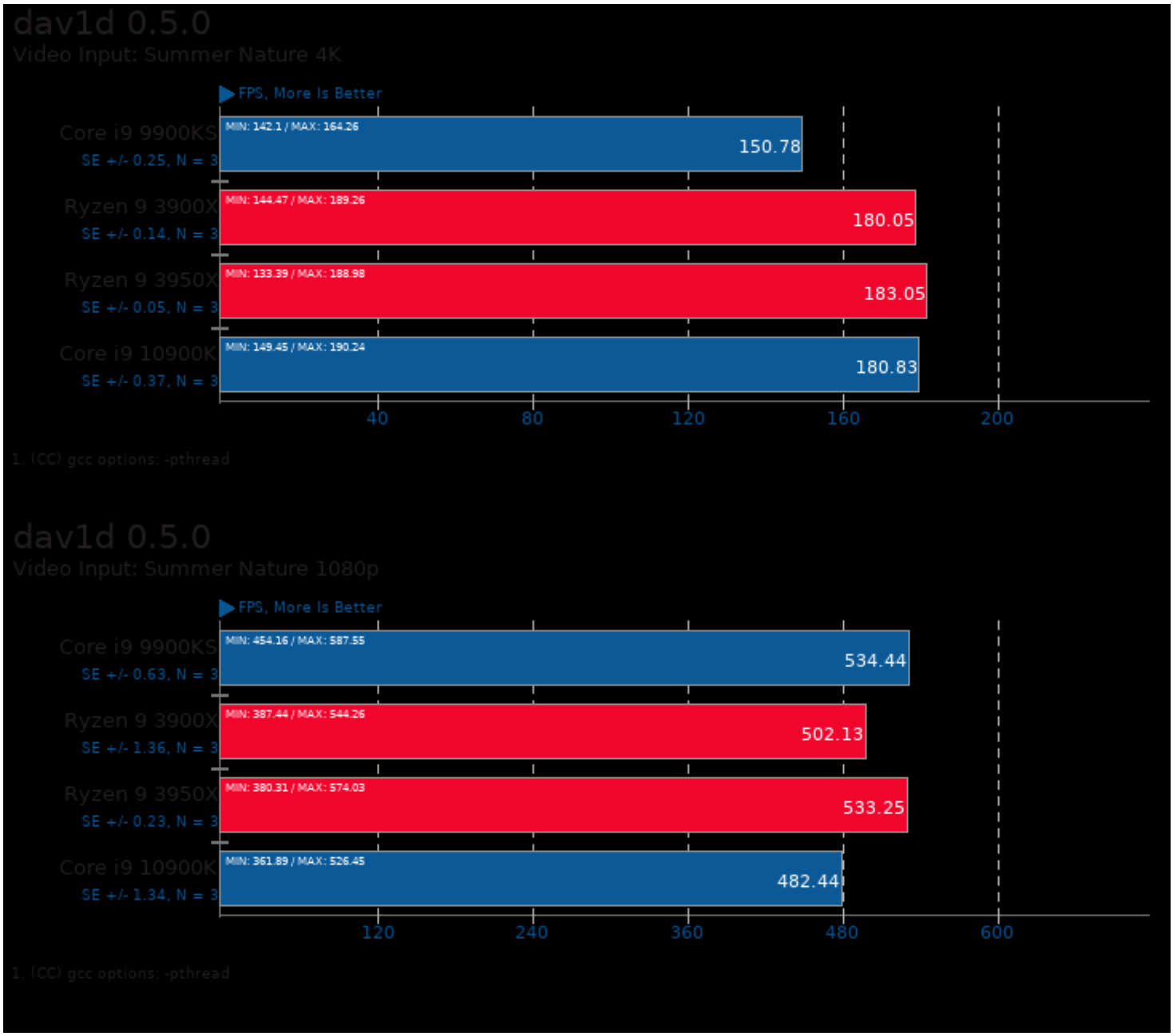

Embree 3.6.1
Binary: Pathtracer - Model: Asian Dragon Obj
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.02, N = 3
MIN: 11.06 / MAX: 11.9
11.16
Ryzen 9 3900X
SE +/- 0.00, N = 3
MIN: 14.78 / MAX: 15.13
14.87
Ryzen 9 3950X
SE +/- 0.01, N = 3
MIN: 18.8 / MAX: 19.37
18.94
Core i9 10900K
SE +/- 0.02, N = 3
MIN: 15.44 / MAX: 15.76
15.55
Ryzen 9 5950X
SE +/- 0.03, N = 3
MIN: 22.26 / MAX: 23.14
22.46
5
10
15
20
25
Embree 3.6.1
Binary: Pathtracer ISPC - Model: Asian Dragon
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
MIN: 14.41 / MAX: 14.92
14.50
Ryzen 9 3900X
SE +/- 0.02, N = 3
MIN: 16.4 / MAX: 16.8
16.52
Ryzen 9 3950X
SE +/- 0.01, N = 3
MIN: 21.16 / MAX: 21.76
21.31
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 20.42 / MAX: 21
20.55
Ryzen 9 5950X
SE +/- 0.02, N = 3
MIN: 25.34 / MAX: 26.1
25.49
6
12
18
24
30

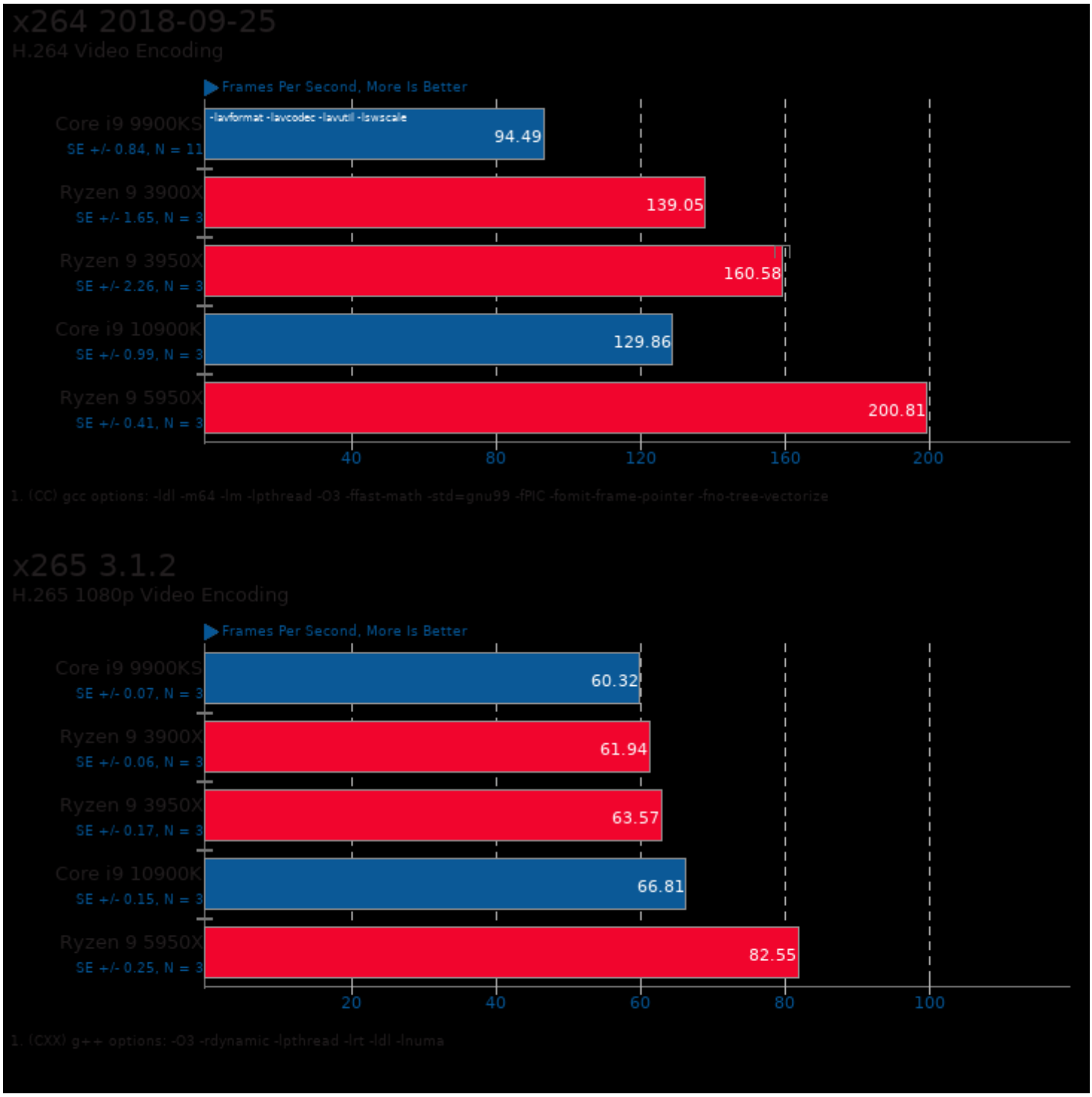

Embree 3.6.1
Binary: Pathtracer ISPC - Model: Asian Dragon Obj
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 12.4 / MAX: 12.95
12.48
Ryzen 9 3900X
SE +/- 0.01, N = 3
MIN: 14.2 / MAX: 14.55
14.30
Ryzen 9 3950X
SE +/- 0.01, N = 3
MIN: 18.22 / MAX: 18.74
18.35
Core i9 10900K
SE +/- 0.01, N = 3
MIN: 17.53 / MAX: 18.09
17.66
Ryzen 9 5950X
SE +/- 0.02, N = 3
MIN: 21.9 / MAX: 22.5
22.06
5
10
15
20
25
SVT-AV1 0.8
Encoder Mode: Enc Mode 0 - Input: 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.000, N = 12
0.141
Ryzen 9 3900X
SE +/- 0.000, N = 12
0.123
Ryzen 9 3950X
SE +/- 0.000, N = 12
0.128
Core i9 10900K
SE +/- 0.000, N = 3
0.156
Ryzen 9 5950X
SE +/- 0.001, N = 3
0.202
0.0455
0.091
0.1365
0.182
0.2275
1. (CXX) g++ options: -fPIE -fPIC -pie

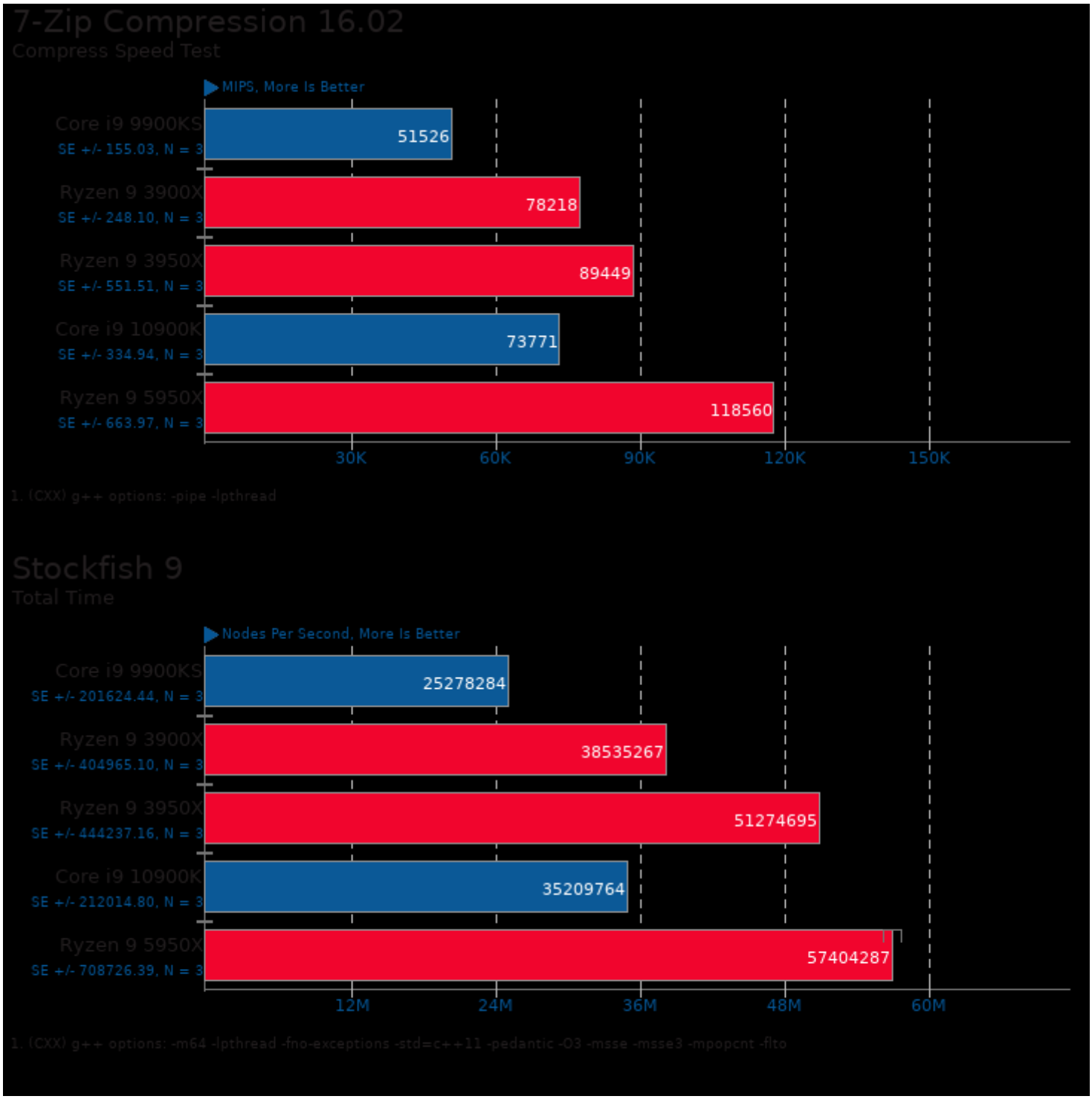

SVT-AV1 0.8
Encoder Mode: Enc Mode 4 - Input: 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.003, N = 3
3.304
Ryzen 9 3900X
SE +/- 0.005, N = 3
4.497
Ryzen 9 3950X
SE +/- 0.005, N = 3
5.324
Core i9 10900K
SE +/- 0.003, N = 3
4.604
Ryzen 9 5950X
SE +/- 0.029, N = 3
7.345
2
4
6
8
10
1. (CXX) g++ options: -fPIE -fPIC -pie
SVT-AV1 0.8
Encoder Mode: Enc Mode 8 - Input: 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.02, N = 3
28.99
Ryzen 9 3900X
SE +/- 0.07, N = 3
36.64
Ryzen 9 3950X
SE +/- 0.11, N = 3
43.76
Core i9 10900K
SE +/- 0.12, N = 3
38.86
Ryzen 9 5950X
SE +/- 0.35, N = 3
58.43
13
26
39
52
65
1. (CXX) g++ options: -fPIE -fPIC -pie

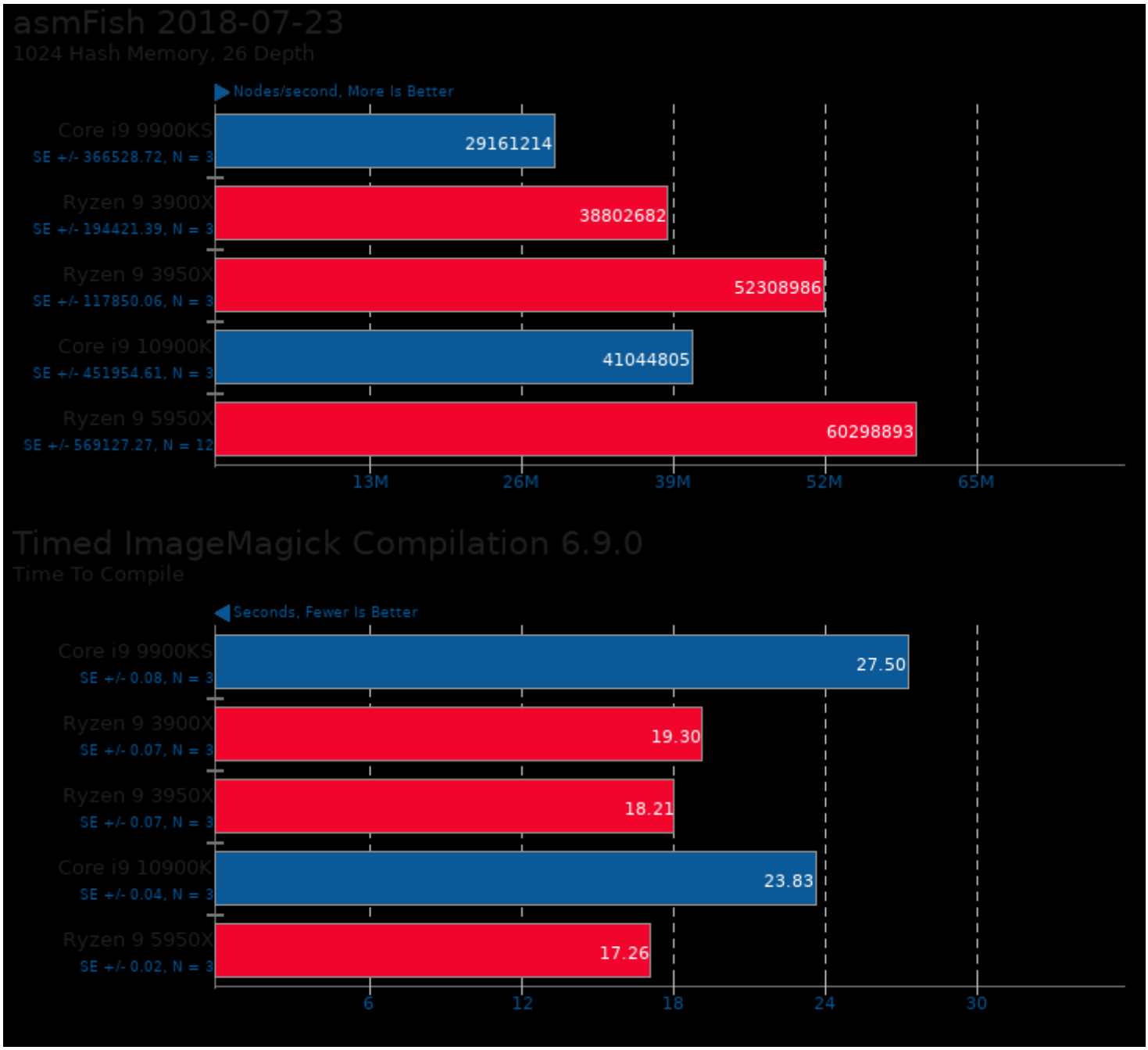

SVT-HEVC 1.4.1
1080p 8-bit YUV To HEVC Video Encode
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.03, N = 3
48.93
Ryzen 9 3900X
SE +/- 0.22, N = 3
77.95
Ryzen 9 3950X
SE +/- 0.35, N = 3
101.99
Core i9 10900K
SE +/- 0.13, N = 3
72.03
Ryzen 9 5950X
SE +/- 0.03, N = 3
104.99
20
40
60
80
100
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt
SVT-VP9 0.1
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 1.53, N = 3
166.09
Ryzen 9 3900X
SE +/- 2.78, N = 4
202.38
Ryzen 9 3950X
SE +/- 2.14, N = 8
212.77
Core i9 10900K
SE +/- 1.64, N = 3
212.29
50
100
150
200
250
1. (CC) gcc options: -fPIE -fPIC -fvisibility=hidden -O3 -pie -rdynamic -lpthread -lrt -lm

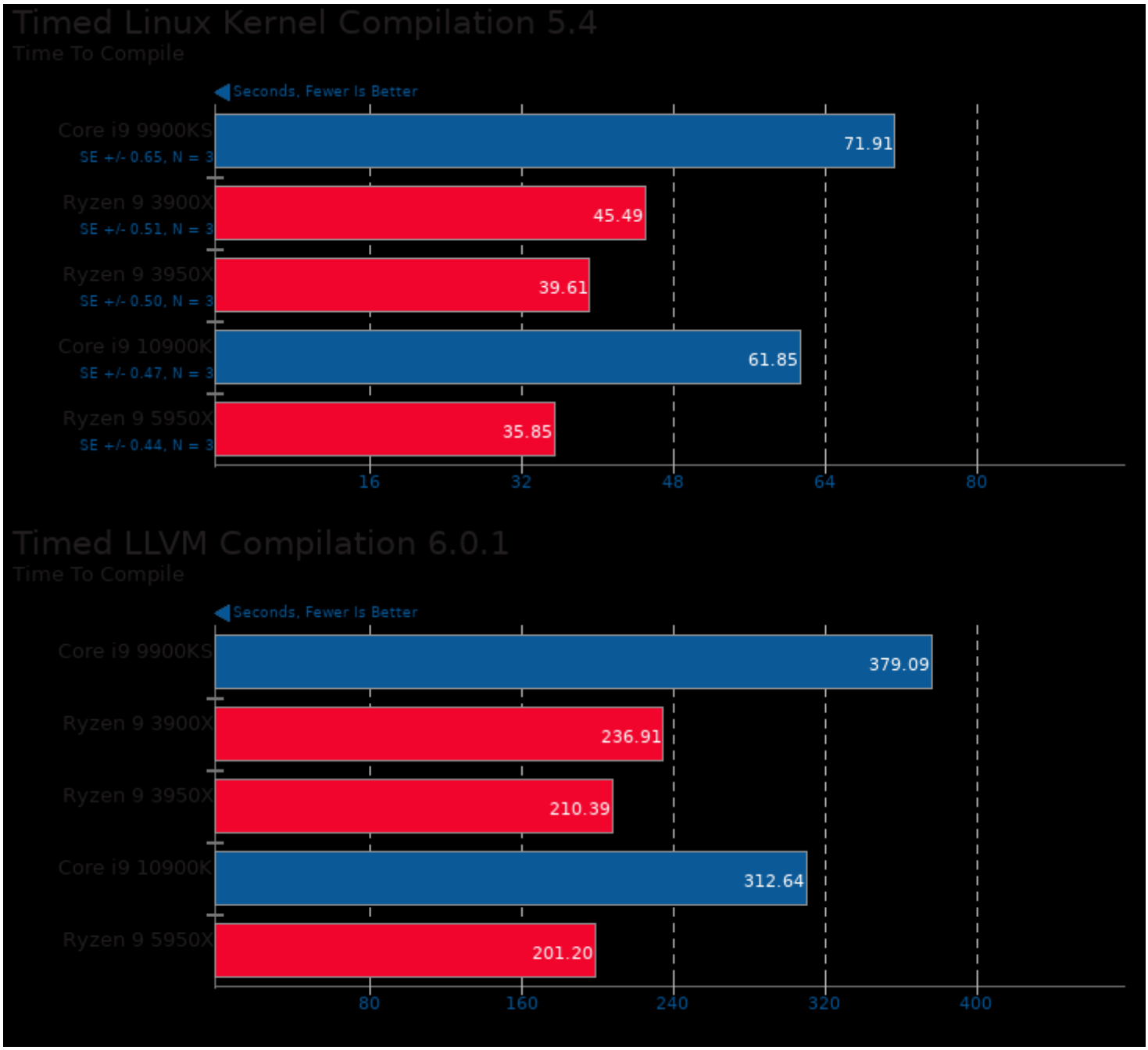

SVT-VP9 0.1
Tuning: PSNR/SSIM Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.20, N = 3
172.28
Ryzen 9 3900X
SE +/- 0.28, N = 3
210.40
Ryzen 9 3950X
SE +/- 0.41, N = 3
219.06
Core i9 10900K
SE +/- 0.29, N = 3
220.40
50
100
150
200
250
1. (CC) gcc options: -fPIE -fPIC -fvisibility=hidden -O3 -pie -rdynamic -lpthread -lrt -lm
SVT-VP9 0.1
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.26, N = 3
136.44
Ryzen 9 3900X
SE +/- 0.22, N = 3
185.91
Ryzen 9 3950X
SE +/- 0.50, N = 3
202.89
Core i9 10900K
SE +/- 0.10, N = 3
182.91
40
80
120
160
200
1. (CC) gcc options: -fPIE -fPIC -fvisibility=hidden -O3 -pie -rdynamic -lpthread -lrt -lm

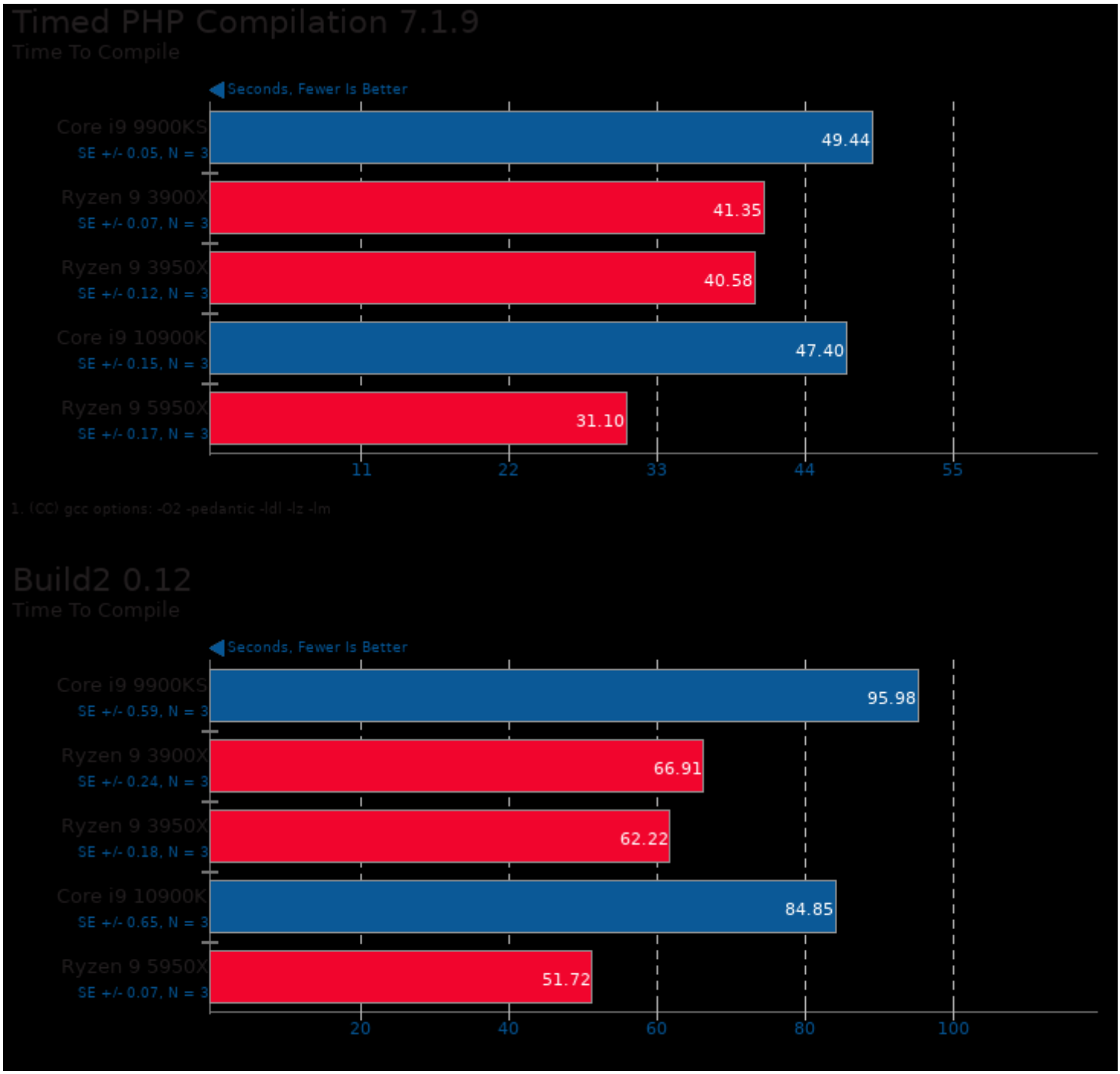

dav1d 0.5.0
Video Input: Summer Nature 4K
FPS, More Is Better
Core i9 9900KS
SE +/- 0.25, N = 3
MIN: 142.1 / MAX: 164.26
150.78
Ryzen 9 3900X
SE +/- 0.14, N = 3
MIN: 144.47 / MAX: 189.26
180.05
Ryzen 9 3950X
SE +/- 0.05, N = 3
MIN: 133.39 / MAX: 188.98
183.05
Core i9 10900K
SE +/- 0.37, N = 3
MIN: 149.45 / MAX: 190.24
180.83
40
80
120
160
200
1. (CC) gcc options: -pthread
dav1d 0.5.0
Video Input: Summer Nature 1080p
FPS, More Is Better
Core i9 9900KS
SE +/- 0.63, N = 3
MIN: 454.16 / MAX: 587.55
534.44
Ryzen 9 3900X
SE +/- 1.36, N = 3
MIN: 387.44 / MAX: 544.26
502.13
Ryzen 9 3950X
SE +/- 0.23, N = 3
MIN: 380.31 / MAX: 574.03
533.25
Core i9 10900K
SE +/- 1.34, N = 3
MIN: 361.89 / MAX: 526.45
482.44
120
240
360
480
600
1. (CC) gcc options: -pthread

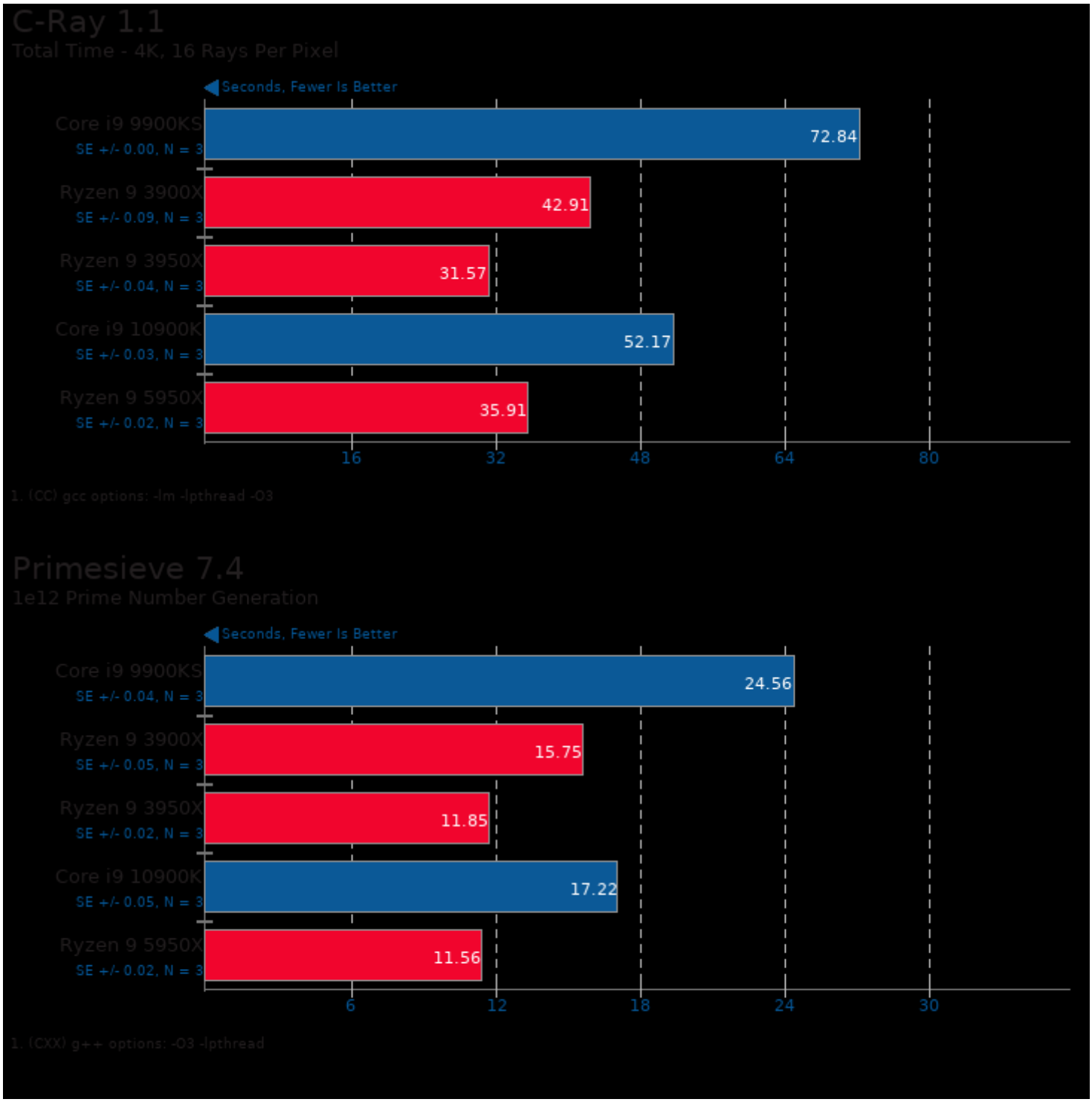

x264 2018-09-25
H.264 Video Encoding
Frames Per Second, More Is Better
-lavformat -lavcodec -lavutil -lswscale
Core i9 9900KS
SE +/- 0.84, N = 11
94.49
Ryzen 9 3900X
SE +/- 1.65, N = 3
139.05
Ryzen 9 3950X
SE +/- 2.26, N = 3
160.58
Core i9 10900K
SE +/- 0.99, N = 3
129.86
Ryzen 9 5950X
SE +/- 0.41, N = 3
200.81
40
80
120
160
200
1. (CC) gcc options: -ldl -m64 -lm -lpthread -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize
x265 3.1.2
H.265 1080p Video Encoding
Frames Per Second, More Is Better
Core i9 9900KS
SE +/- 0.07, N = 3
60.32
Ryzen 9 3900X
SE +/- 0.06, N = 3
61.94
Ryzen 9 3950X
SE +/- 0.17, N = 3
63.57
Core i9 10900K
SE +/- 0.15, N = 3
66.81
Ryzen 9 5950X
SE +/- 0.25, N = 3
82.55
20
40
60
80
100
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

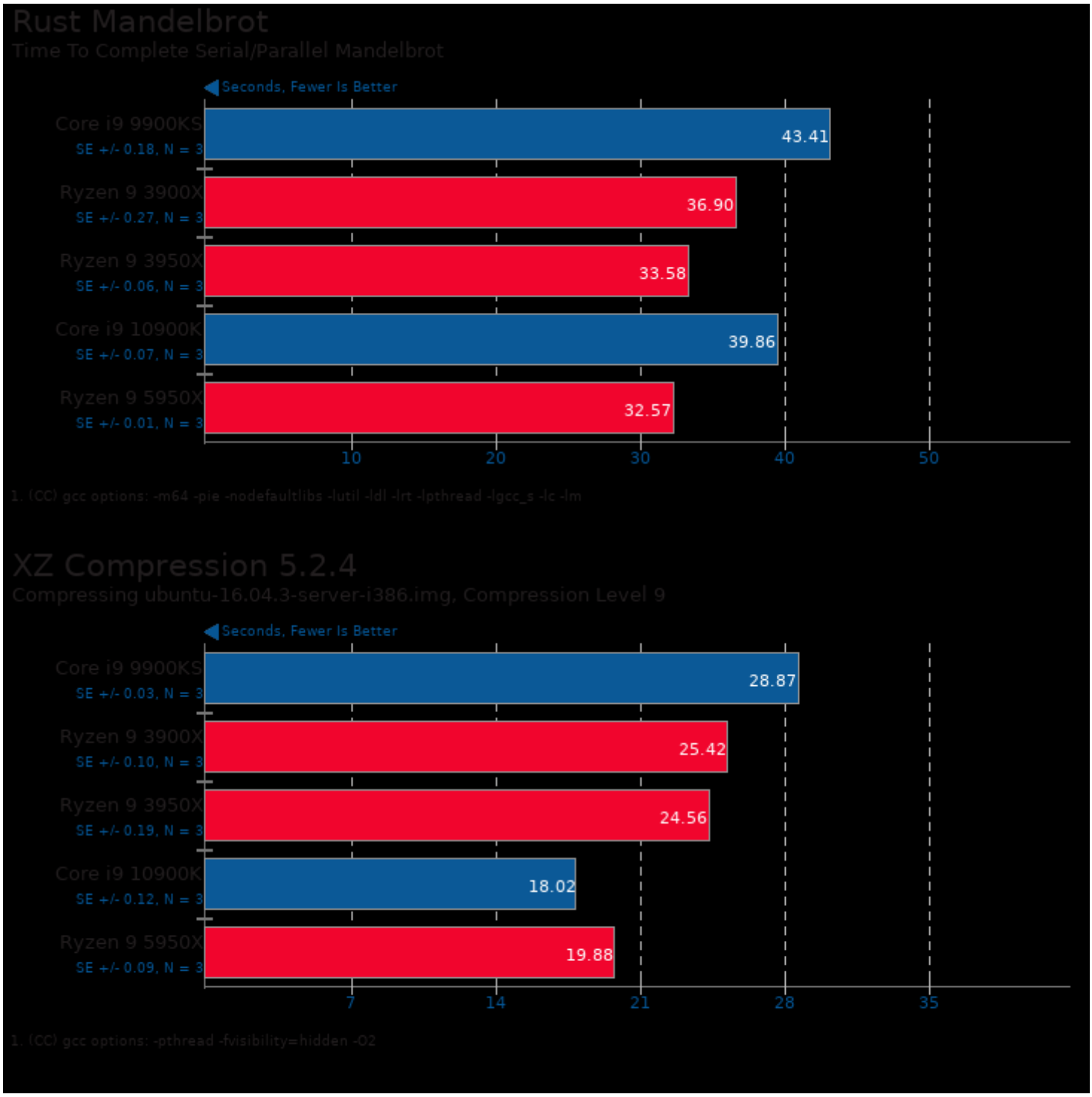

7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
Core i9 9900KS
SE +/- 155.03, N = 3
51526
Ryzen 9 3900X
SE +/- 248.10, N = 3
78218
Ryzen 9 3950X
SE +/- 551.51, N = 3
89449
Core i9 10900K
SE +/- 334.94, N = 3
73771
Ryzen 9 5950X
SE +/- 663.97, N = 3
118560
30K
60K
90K
120K
150K
1. (CXX) g++ options: -pipe -lpthread
Stockfish 9
Total Time
Nodes Per Second, More Is Better
Core i9 9900KS
SE +/- 201624.44, N = 3
25278284
Ryzen 9 3900X
SE +/- 404965.10, N = 3
38535267
Ryzen 9 3950X
SE +/- 444237.16, N = 3
51274695
Core i9 10900K
SE +/- 212014.80, N = 3
35209764
Ryzen 9 5950X
SE +/- 708726.39, N = 3
57404287
12M
24M
36M
48M
60M
1. (CXX) g++ options: -m64 -lpthread -fno-exceptions -std=c++11 -pedantic -O3 -msse -msse3 -mpopcnt -flto

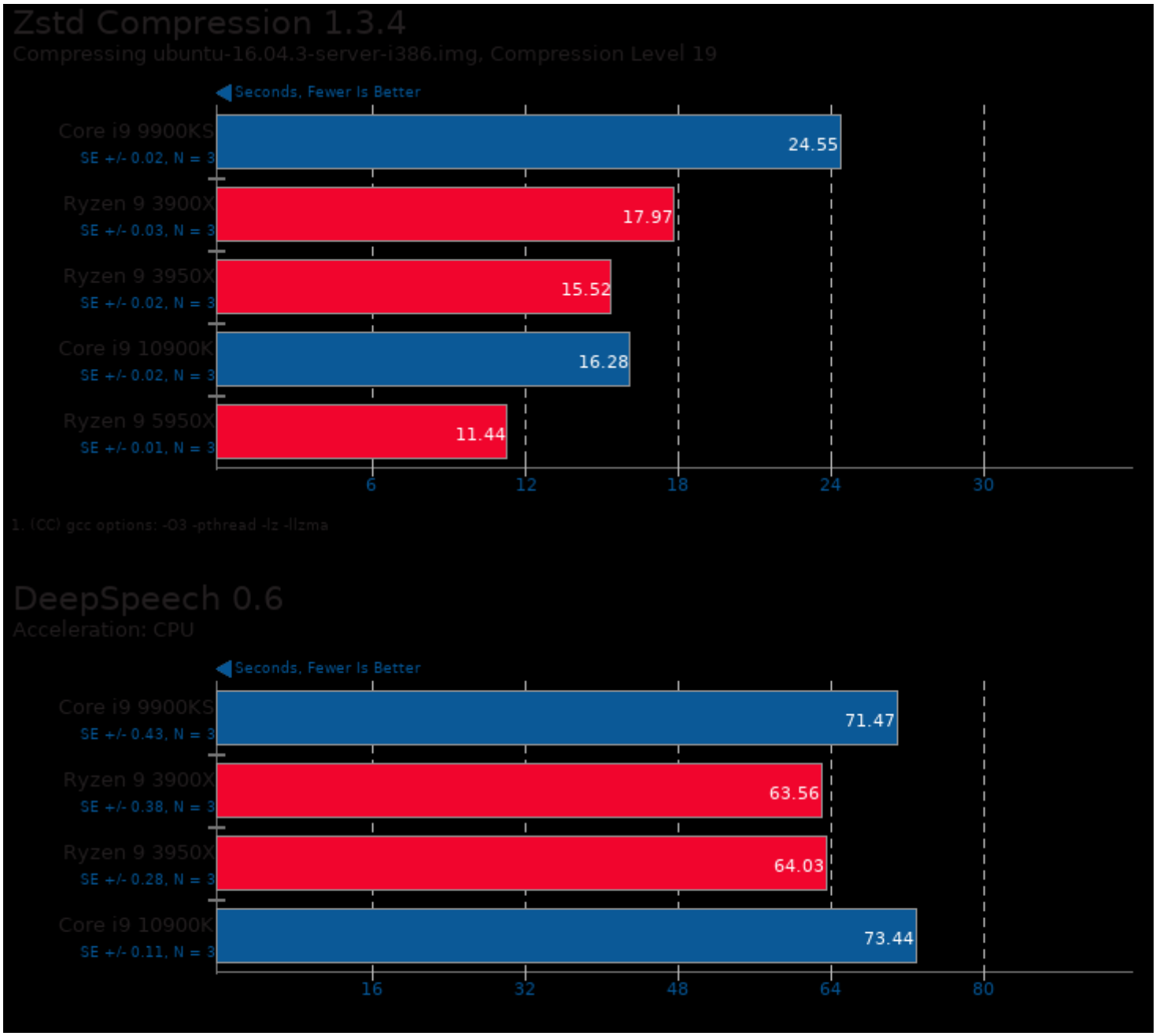

asmFish 2018-07-23
1024 Hash Memory, 26 Depth
Nodes/second, More Is Better
Core i9 9900KS
SE +/- 366528.72, N = 3
29161214
Ryzen 9 3900X
SE +/- 194421.39, N = 3
38802682
Ryzen 9 3950X
SE +/- 117850.06, N = 3
52308986
Core i9 10900K
SE +/- 451954.61, N = 3
41044805
Ryzen 9 5950X
SE +/- 569127.27, N = 12
60298893
13M
26M
39M
52M
65M
Timed ImageMagick Compilation 6.9.0
Time To Compile
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.08, N = 3
27.50
Ryzen 9 3900X
SE +/- 0.07, N = 3
19.30
Ryzen 9 3950X
SE +/- 0.07, N = 3
18.21
Core i9 10900K
SE +/- 0.04, N = 3
23.83
Ryzen 9 5950X
SE +/- 0.02, N = 3
17.26
6
12
18
24
30

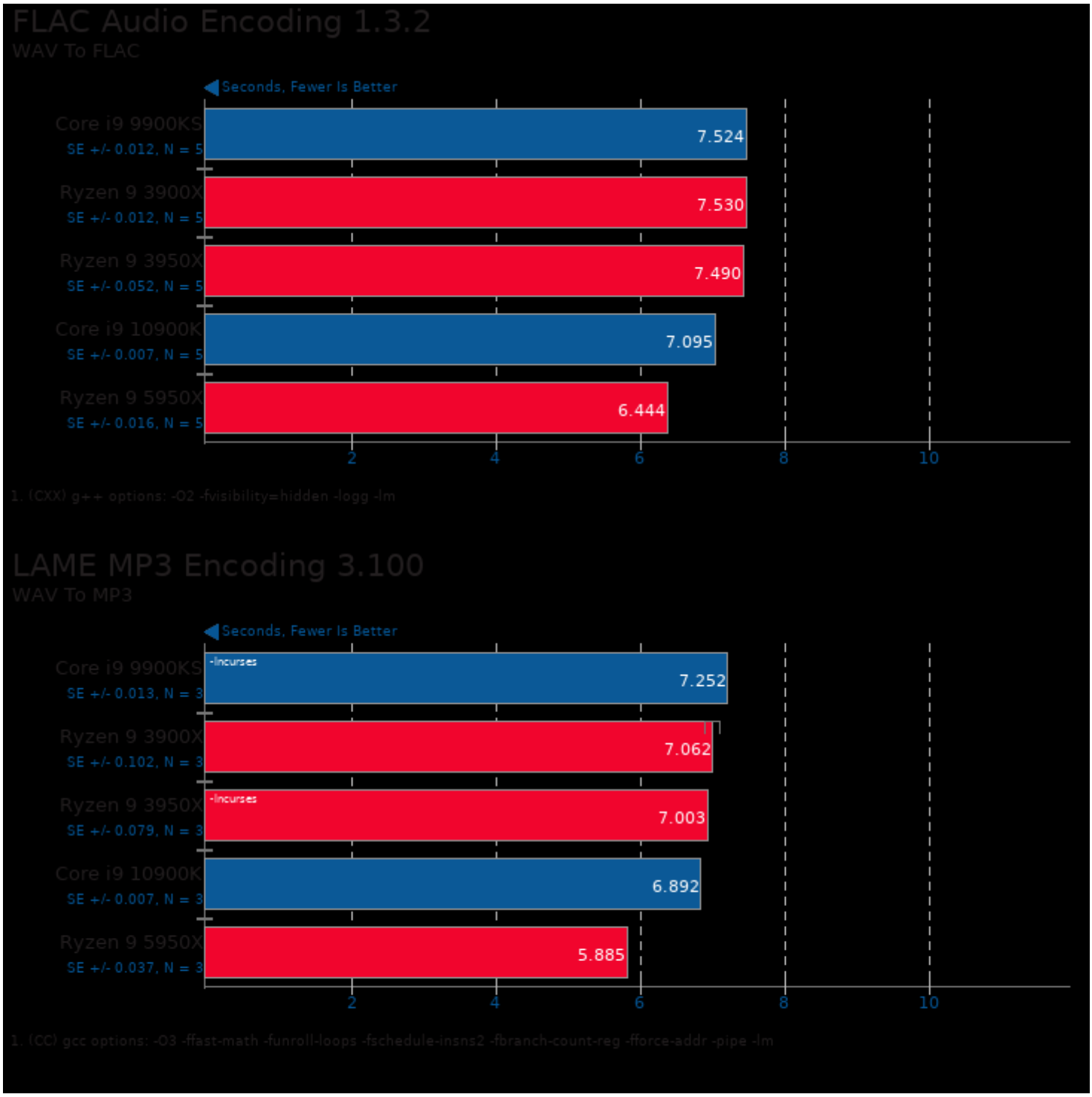

Timed Linux Kernel Compilation 5.4
Time To Compile
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.65, N = 3
71.91
Ryzen 9 3900X
SE +/- 0.51, N = 3
45.49
Ryzen 9 3950X
SE +/- 0.50, N = 3
39.61
Core i9 10900K
SE +/- 0.47, N = 3
61.85
Ryzen 9 5950X
SE +/- 0.44, N = 3
35.85
16
32
48
64
80
Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
Core i9 9900KS
379.09
Ryzen 9 3900X
236.91
Ryzen 9 3950X
210.39
Core i9 10900K
312.64
Ryzen 9 5950X
201.20
80
160
240
320
400

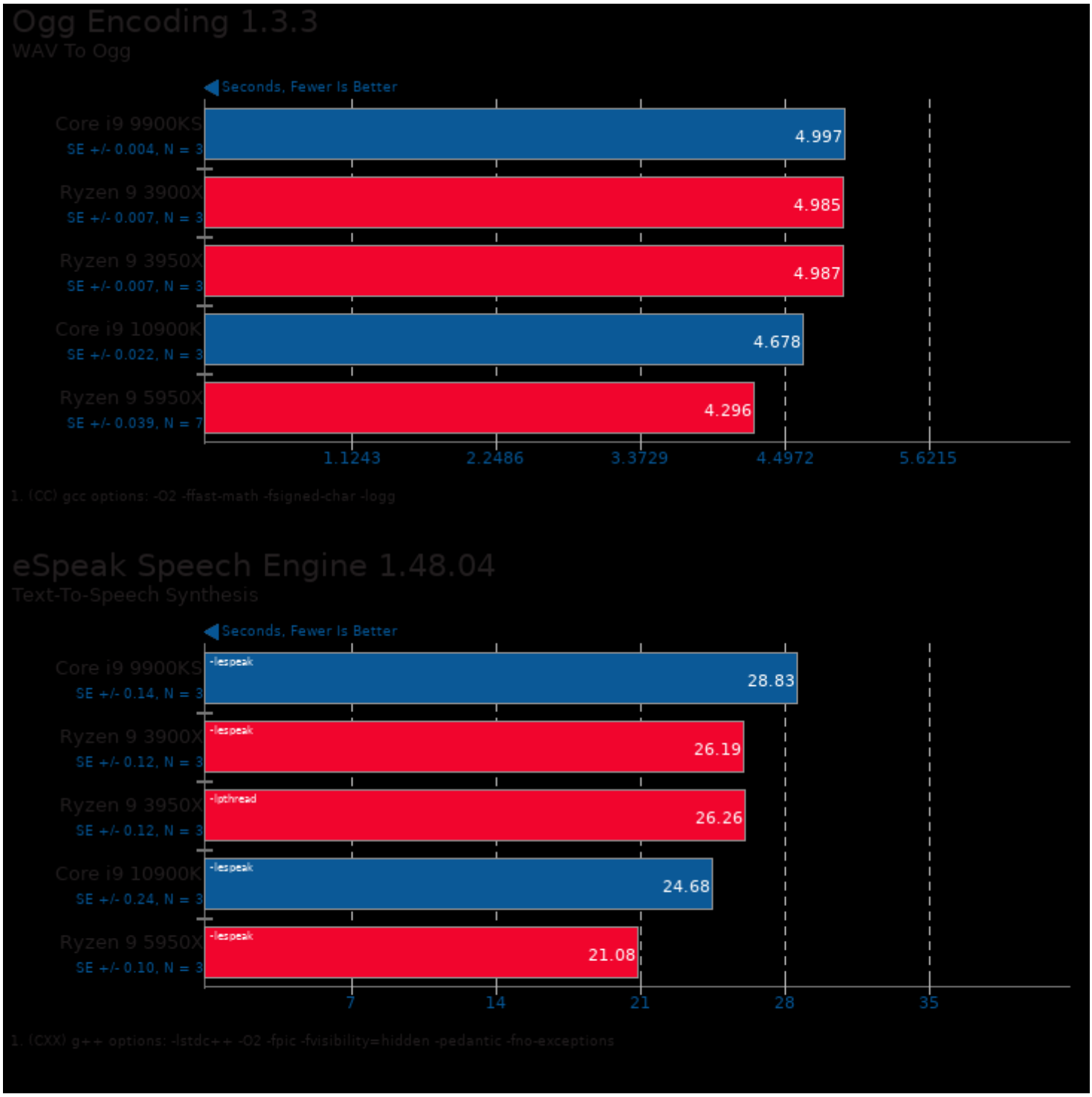

Timed PHP Compilation 7.1.9
Time To Compile
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.05, N = 3
49.44
Ryzen 9 3900X
SE +/- 0.07, N = 3
41.35
Ryzen 9 3950X
SE +/- 0.12, N = 3
40.58
Core i9 10900K
SE +/- 0.15, N = 3
47.40
Ryzen 9 5950X
SE +/- 0.17, N = 3
31.10
11
22
33
44
55
1. (CC) gcc options: -O2 -pedantic -ldl -lz -lm
Build2 0.12
Time To Compile
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.59, N = 3
95.98
Ryzen 9 3900X
SE +/- 0.24, N = 3
66.91
Ryzen 9 3950X
SE +/- 0.18, N = 3
62.22
Core i9 10900K
SE +/- 0.65, N = 3
84.85
Ryzen 9 5950X
SE +/- 0.07, N = 3
51.72
20
40
60
80
100

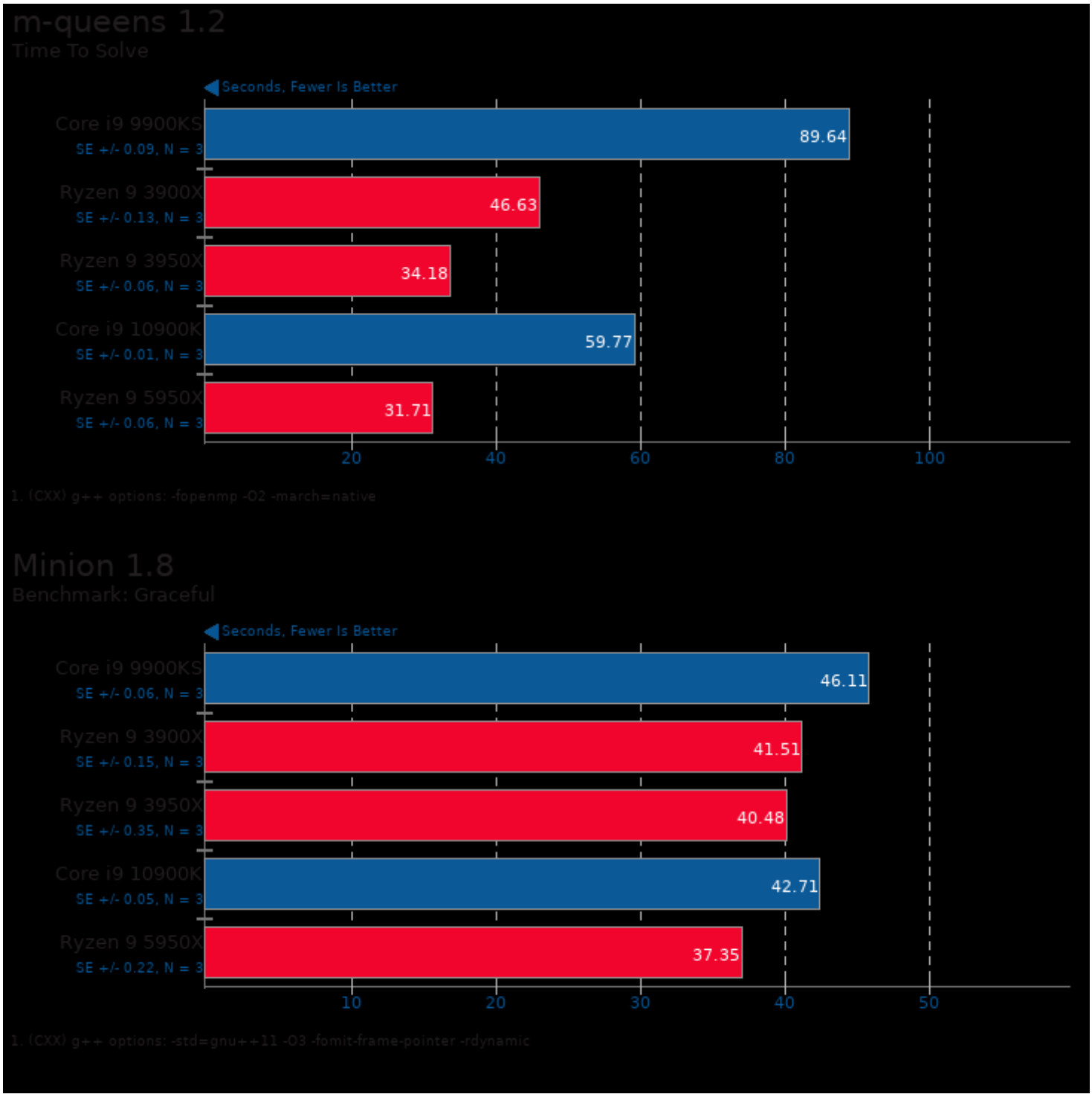

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
72.84
Ryzen 9 3900X
SE +/- 0.09, N = 3
42.91
Ryzen 9 3950X
SE +/- 0.04, N = 3
31.57
Core i9 10900K
SE +/- 0.03, N = 3
52.17
Ryzen 9 5950X
SE +/- 0.02, N = 3
35.91
16
32
48
64
80
1. (CC) gcc options: -lm -lpthread -O3
Primesieve 7.4
1e12 Prime Number Generation
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.04, N = 3
24.56
Ryzen 9 3900X
SE +/- 0.05, N = 3
15.75
Ryzen 9 3950X
SE +/- 0.02, N = 3
11.85
Core i9 10900K
SE +/- 0.05, N = 3
17.22
Ryzen 9 5950X
SE +/- 0.02, N = 3
11.56
6
12
18
24
30
1. (CXX) g++ options: -O3 -lpthread

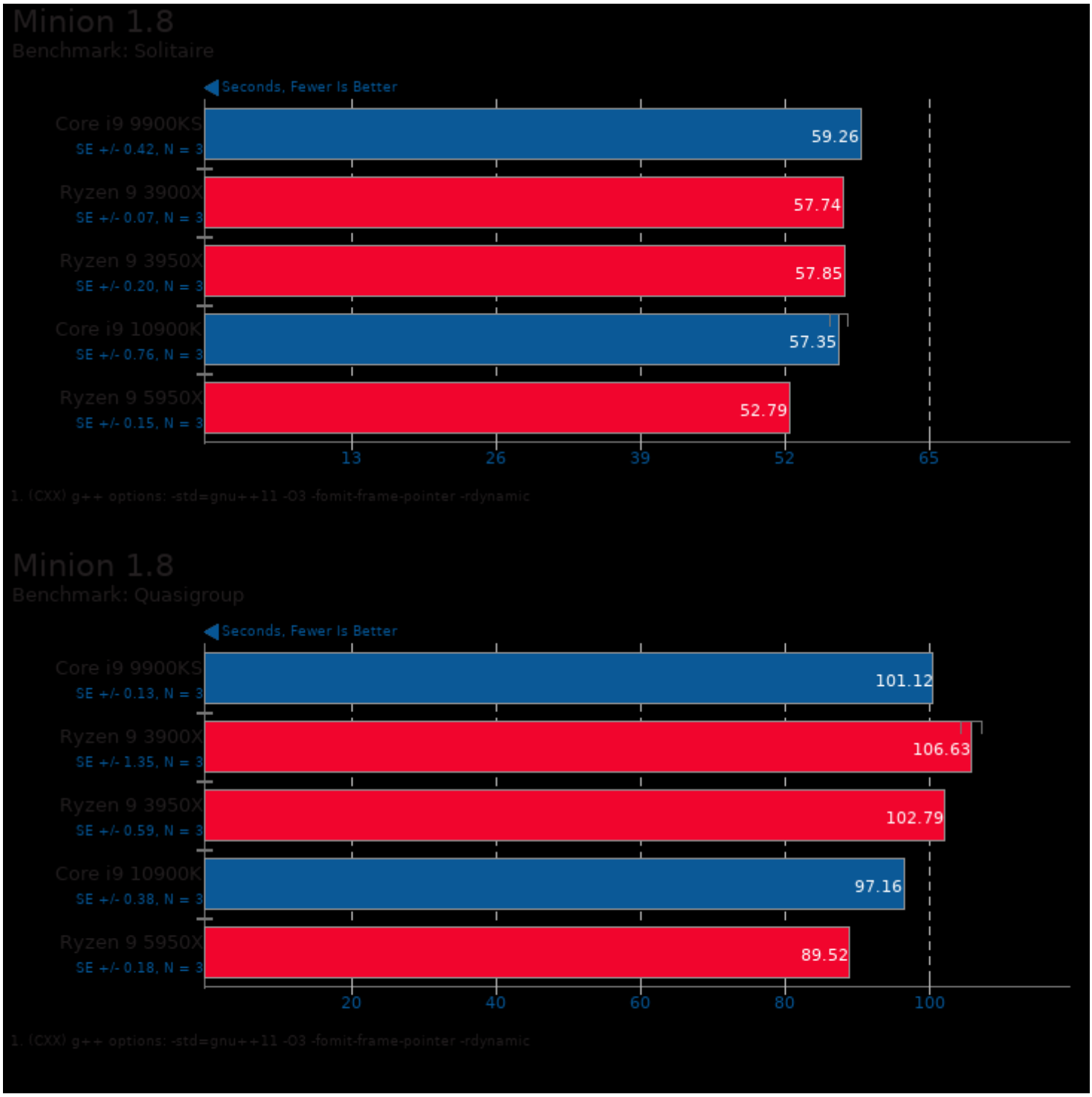

Rust Mandelbrot
Time To Complete Serial/Parallel Mandelbrot
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.18, N = 3
43.41
Ryzen 9 3900X
SE +/- 0.27, N = 3
36.90
Ryzen 9 3950X
SE +/- 0.06, N = 3
33.58
Core i9 10900K
SE +/- 0.07, N = 3
39.86
Ryzen 9 5950X
SE +/- 0.01, N = 3
32.57
10
20
30
40
50
1. (CC) gcc options: -m64 -pie -nodefaultlibs -lutil -ldl -lrt -lpthread -lgcc_s -lc -lm
XZ Compression 5.2.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 9
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.03, N = 3
28.87
Ryzen 9 3900X
SE +/- 0.10, N = 3
25.42
Ryzen 9 3950X
SE +/- 0.19, N = 3
24.56
Core i9 10900K
SE +/- 0.12, N = 3
18.02
Ryzen 9 5950X
SE +/- 0.09, N = 3
19.88
7
14
21
28
35
1. (CC) gcc options: -pthread -fvisibility=hidden -O2

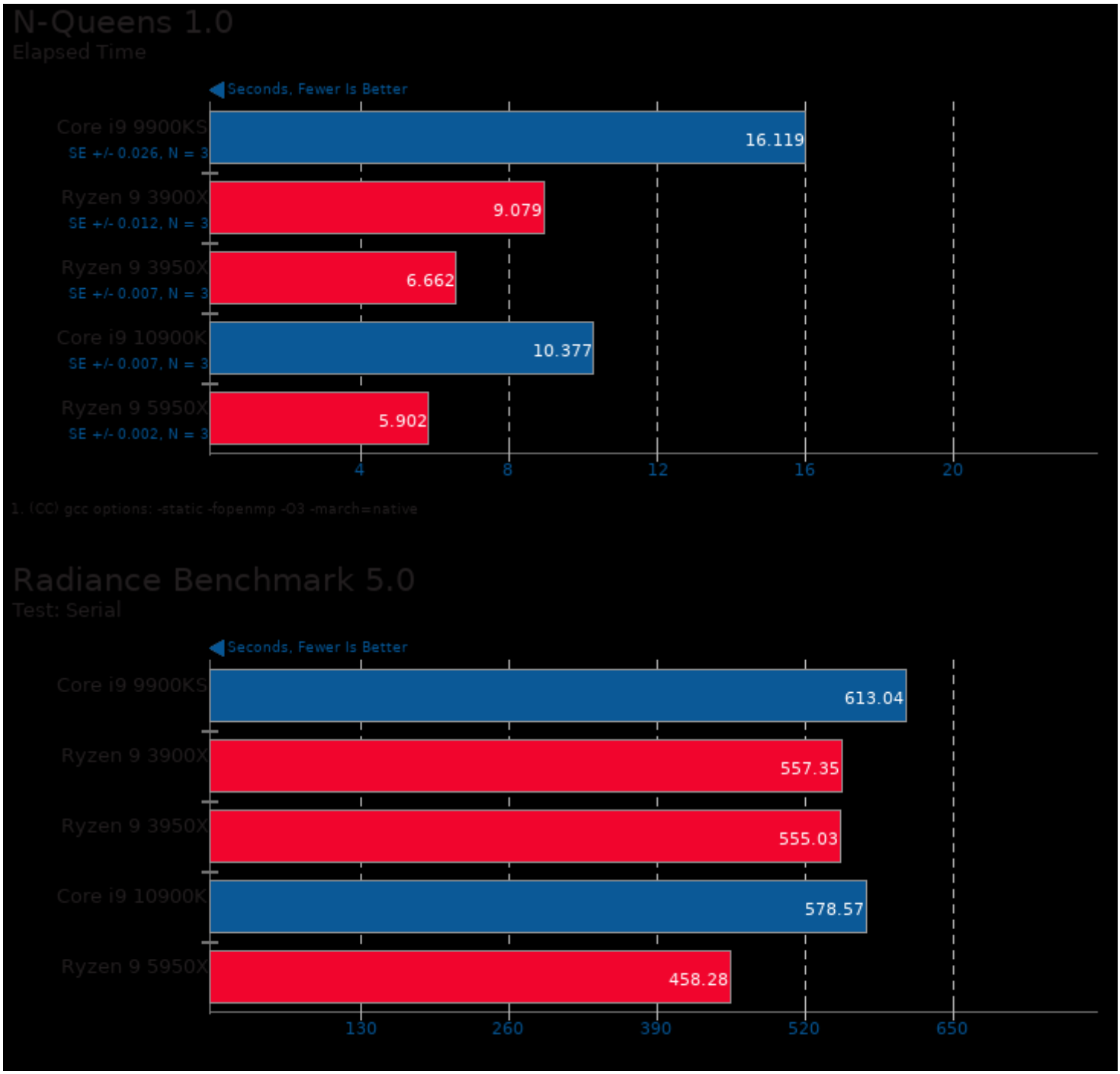

Zstd Compression 1.3.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.02, N = 3
24.55
Ryzen 9 3900X
SE +/- 0.03, N = 3
17.97
Ryzen 9 3950X
SE +/- 0.02, N = 3
15.52
Core i9 10900K
SE +/- 0.02, N = 3
16.28
Ryzen 9 5950X
SE +/- 0.01, N = 3
11.44
6
12
18
24
30
1. (CC) gcc options: -O3 -pthread -lz -llzma
DeepSpeech 0.6
Acceleration: CPU
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.43, N = 3
71.47
Ryzen 9 3900X
SE +/- 0.38, N = 3
63.56
Ryzen 9 3950X
SE +/- 0.28, N = 3
64.03
Core i9 10900K
SE +/- 0.11, N = 3
73.44
16
32
48
64
80

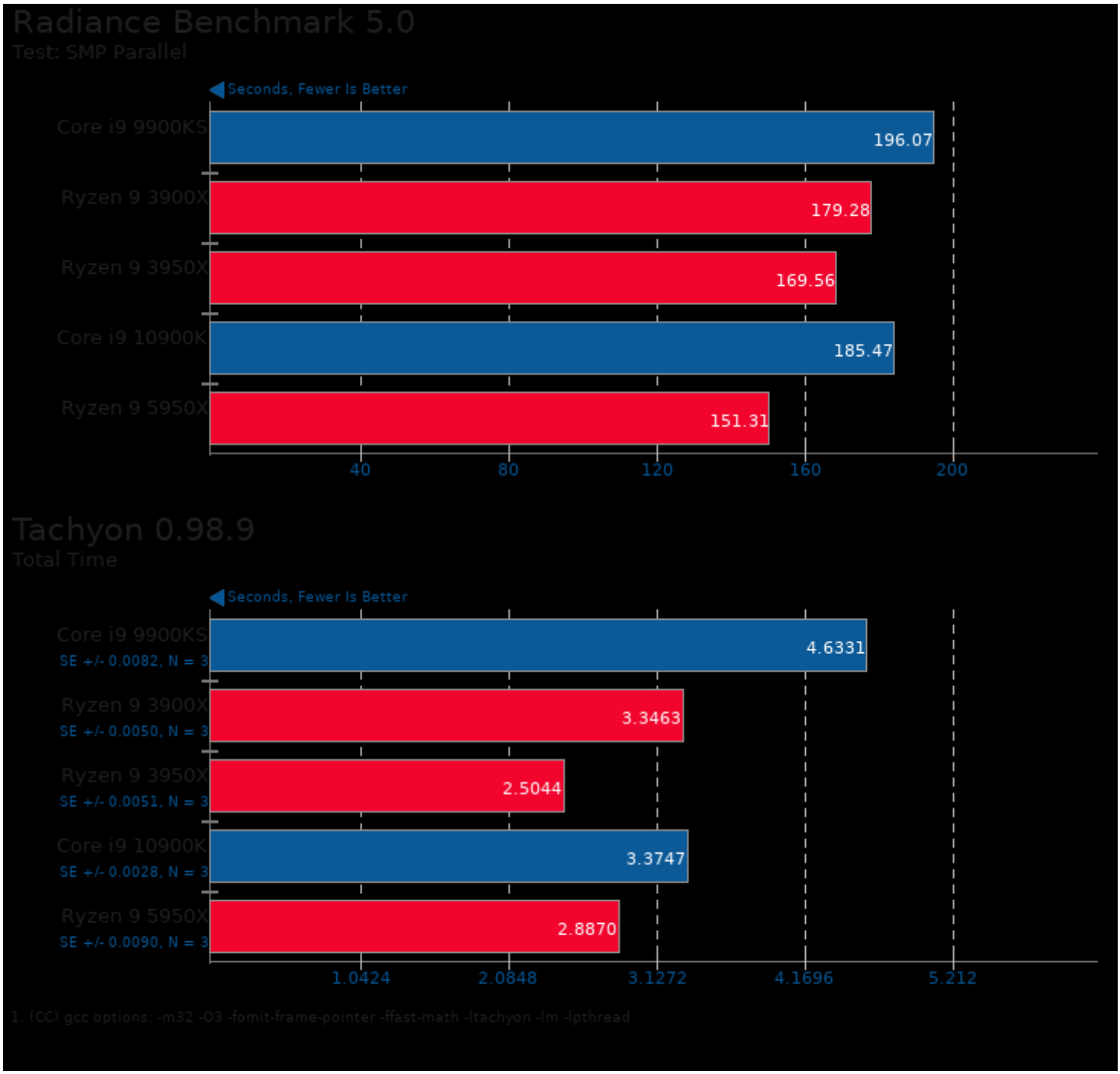

FLAC Audio Encoding 1.3.2
WAV To FLAC
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.012, N = 5
7.524
Ryzen 9 3900X
SE +/- 0.012, N = 5
7.530
Ryzen 9 3950X
SE +/- 0.052, N = 5
7.490
Core i9 10900K
SE +/- 0.007, N = 5
7.095
Ryzen 9 5950X
SE +/- 0.016, N = 5
6.444
2
4
6
8
10
1. (CXX) g++ options: -O2 -fvisibility=hidden -logg -lm
LAME MP3 Encoding 3.100
WAV To MP3
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.013, N = 3
-lncurses
7.252
Ryzen 9 3900X
SE +/- 0.102, N = 3
7.062
Ryzen 9 3950X
SE +/- 0.079, N = 3
-lncurses
7.003
Core i9 10900K
SE +/- 0.007, N = 3
6.892
Ryzen 9 5950X
SE +/- 0.037, N = 3
5.885
2
4
6
8
10
1. (CC) gcc options: -O3 -ffast-math -funroll-loops -fschedule-insns2 -fbranch-count-reg -fforce-addr -pipe -lm

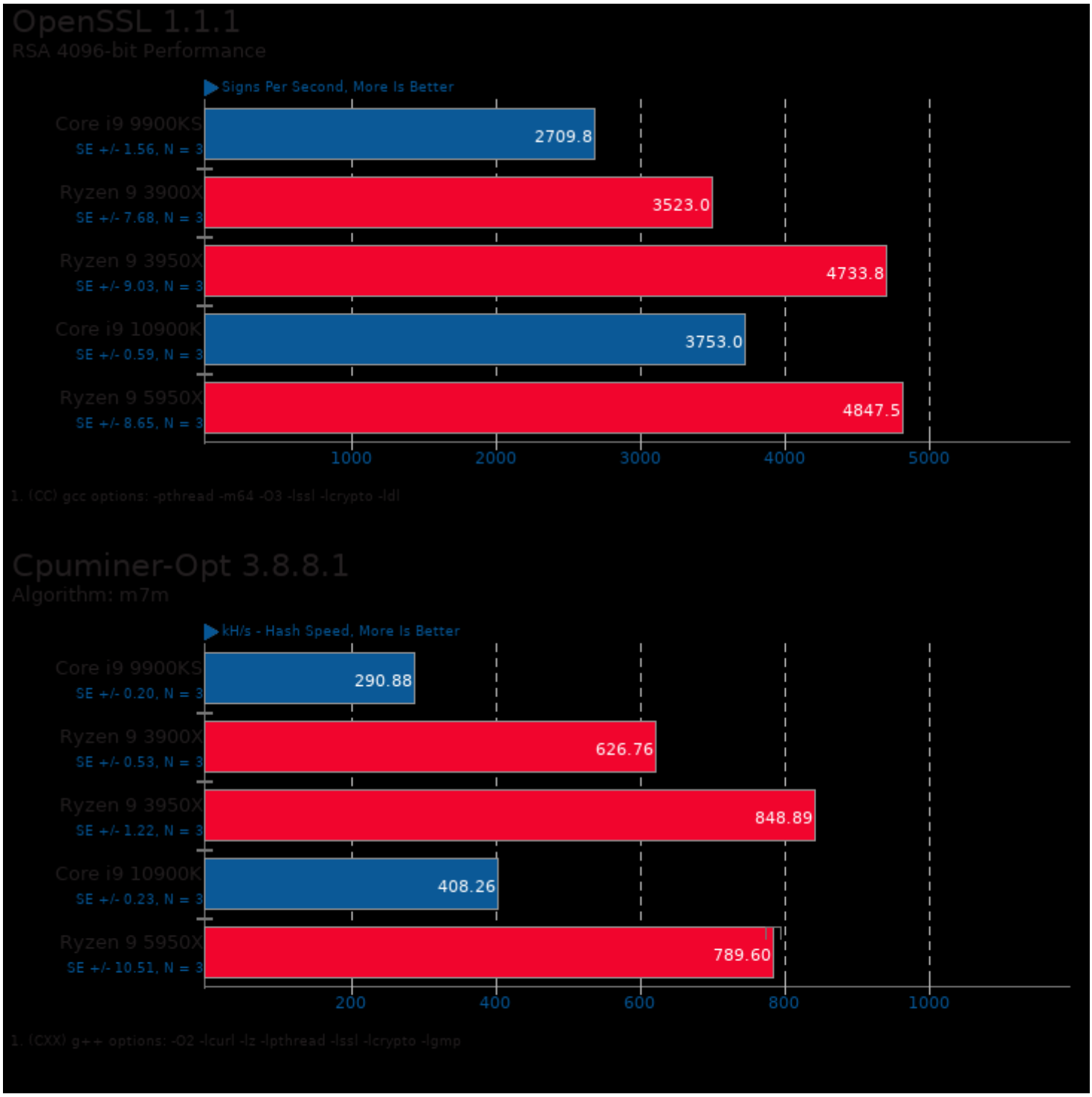

Ogg Encoding 1.3.3
WAV To Ogg
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.004, N = 3
4.997
Ryzen 9 3900X
SE +/- 0.007, N = 3
4.985
Ryzen 9 3950X
SE +/- 0.007, N = 3
4.987
Core i9 10900K
SE +/- 0.022, N = 3
4.678
Ryzen 9 5950X
SE +/- 0.039, N = 7
4.296
1.1243
2.2486
3.3729
4.4972
5.6215
1. (CC) gcc options: -O2 -ffast-math -fsigned-char -logg
eSpeak Speech Engine 1.48.04
Text-To-Speech Synthesis
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.14, N = 3
-lespeak
28.83
Ryzen 9 3900X
SE +/- 0.12, N = 3
-lespeak
26.19
Ryzen 9 3950X
SE +/- 0.12, N = 3
-lpthread
26.26
Core i9 10900K
SE +/- 0.24, N = 3
-lespeak
24.68
Ryzen 9 5950X
SE +/- 0.10, N = 3
-lespeak
21.08
7
14
21
28
35
1. (CXX) g++ options: -lstdc++ -O2 -fpic -fvisibility=hidden -pedantic -fno-exceptions

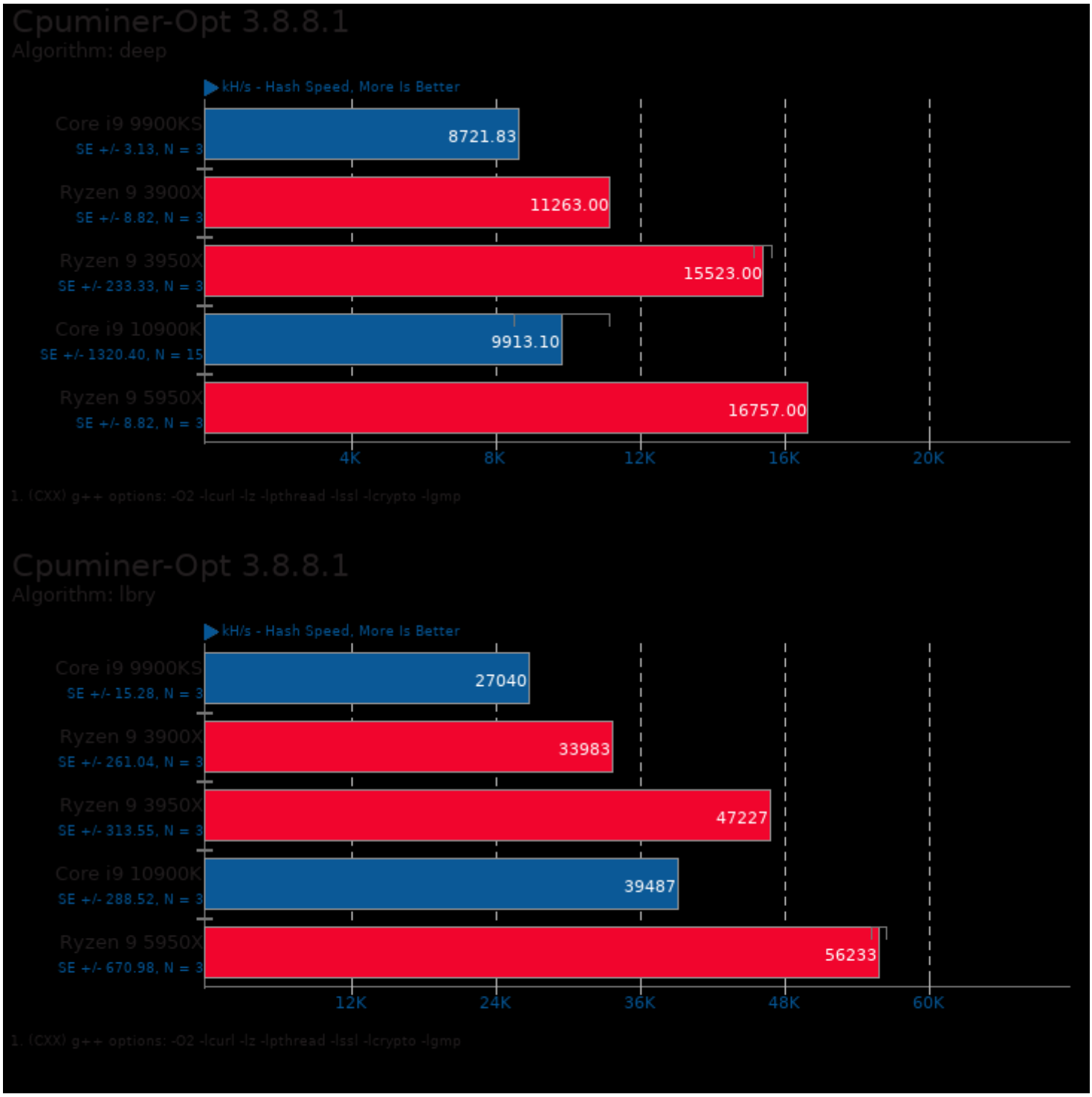

m-queens 1.2
Time To Solve
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.09, N = 3
89.64
Ryzen 9 3900X
SE +/- 0.13, N = 3
46.63
Ryzen 9 3950X
SE +/- 0.06, N = 3
34.18
Core i9 10900K
SE +/- 0.01, N = 3
59.77
Ryzen 9 5950X
SE +/- 0.06, N = 3
31.71
20
40
60
80
100
1. (CXX) g++ options: -fopenmp -O2 -march=native
Minion 1.8
Benchmark: Graceful
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.06, N = 3
46.11
Ryzen 9 3900X
SE +/- 0.15, N = 3
41.51
Ryzen 9 3950X
SE +/- 0.35, N = 3
40.48
Core i9 10900K
SE +/- 0.05, N = 3
42.71
Ryzen 9 5950X
SE +/- 0.22, N = 3
37.35
10
20
30
40
50
1. (CXX) g++ options: -std=gnu++11 -O3 -fomit-frame-pointer -rdynamic

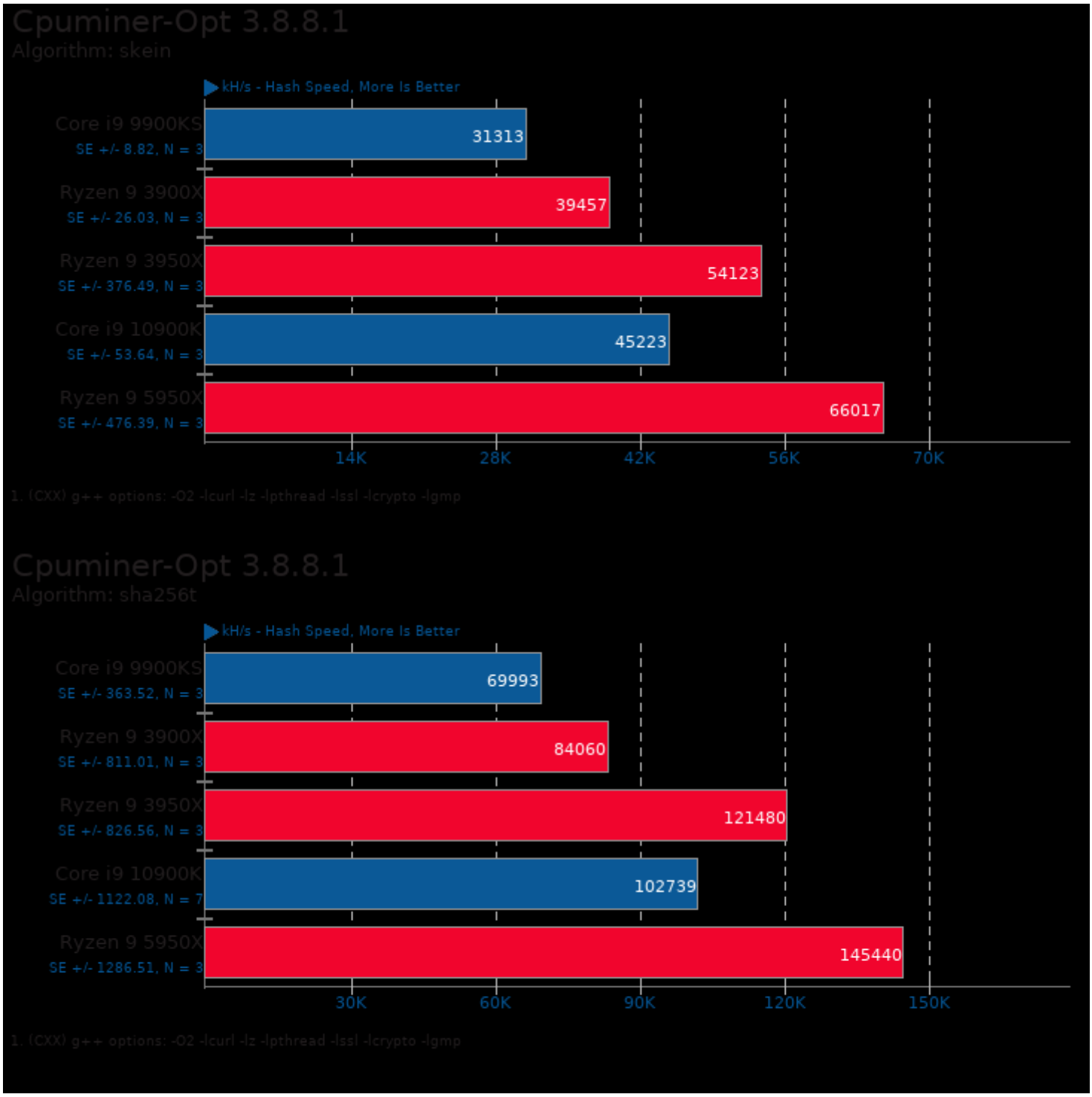

Minion 1.8
Benchmark: Solitaire
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.42, N = 3
59.26
Ryzen 9 3900X
SE +/- 0.07, N = 3
57.74
Ryzen 9 3950X
SE +/- 0.20, N = 3
57.85
Core i9 10900K
SE +/- 0.76, N = 3
57.35
Ryzen 9 5950X
SE +/- 0.15, N = 3
52.79
13
26
39
52
65
1. (CXX) g++ options: -std=gnu++11 -O3 -fomit-frame-pointer -rdynamic
Minion 1.8
Benchmark: Quasigroup
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.13, N = 3
101.12
Ryzen 9 3900X
SE +/- 1.35, N = 3
106.63
Ryzen 9 3950X
SE +/- 0.59, N = 3
102.79
Core i9 10900K
SE +/- 0.38, N = 3
97.16
Ryzen 9 5950X
SE +/- 0.18, N = 3
89.52
20
40
60
80
100
1. (CXX) g++ options: -std=gnu++11 -O3 -fomit-frame-pointer -rdynamic

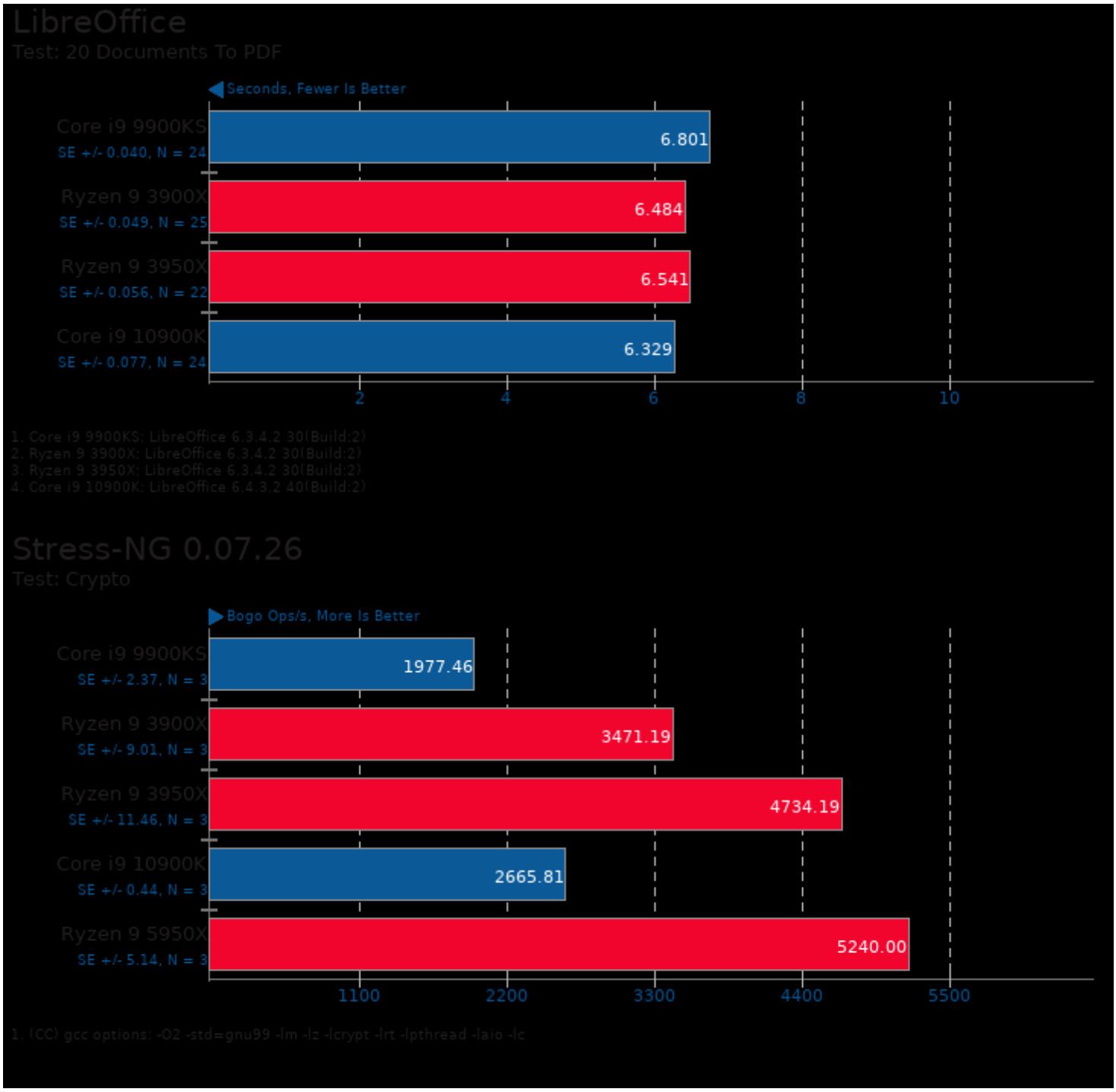

N-Queens 1.0
Elapsed Time
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.026, N = 3
16.119
Ryzen 9 3900X
SE +/- 0.012, N = 3
9.079
Ryzen 9 3950X
SE +/- 0.007, N = 3
6.662
Core i9 10900K
SE +/- 0.007, N = 3
10.377
Ryzen 9 5950X
SE +/- 0.002, N = 3
5.902
4
8
12
16
20
1. (CC) gcc options: -static -fopenmp -O3 -march=native
Radiance Benchmark 5.0
Test: Serial
Seconds, Fewer Is Better
Core i9 9900KS
613.04
Ryzen 9 3900X
557.35
Ryzen 9 3950X
555.03
Core i9 10900K
578.57
Ryzen 9 5950X
458.28
130
260
390
520
650

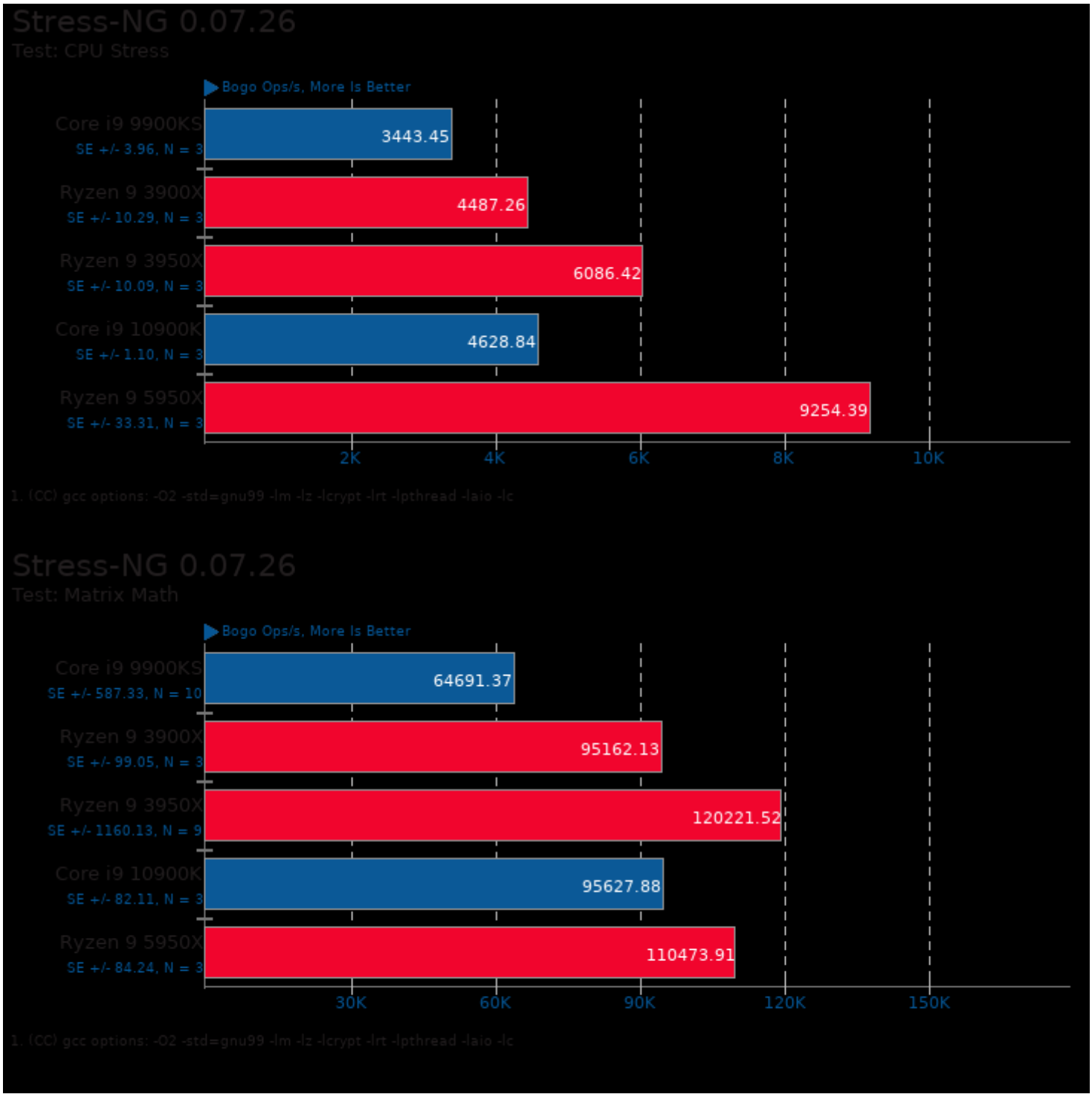

Radiance Benchmark 5.0
Test: SMP Parallel
Seconds, Fewer Is Better
Core i9 9900KS
196.07
Ryzen 9 3900X
179.28
Ryzen 9 3950X
169.56
Core i9 10900K
185.47
Ryzen 9 5950X
151.31
40
80
120
160
200
Tachyon 0.98.9
Total Time
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.0082, N = 3
4.6331
Ryzen 9 3900X
SE +/- 0.0050, N = 3
3.3463
Ryzen 9 3950X
SE +/- 0.0051, N = 3
2.5044
Core i9 10900K
SE +/- 0.0028, N = 3
3.3747
Ryzen 9 5950X
SE +/- 0.0090, N = 3
2.8870
1.0424
2.0848
3.1272
4.1696
5.212
1. (CC) gcc options: -m32 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread

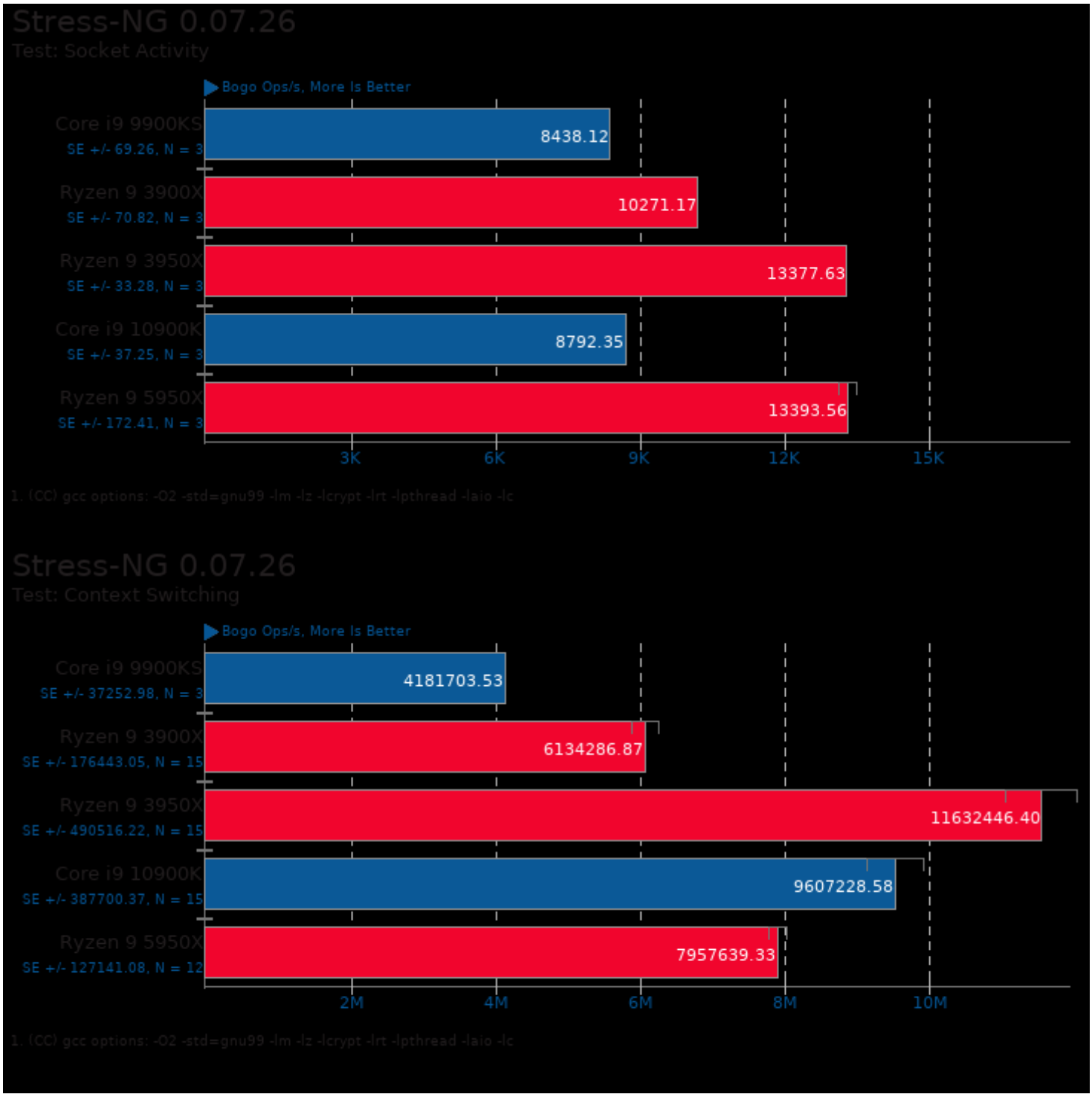

OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second, More Is Better
Core i9 9900KS
SE +/- 1.56, N = 3
2709.8
Ryzen 9 3900X
SE +/- 7.68, N = 3
3523.0
Ryzen 9 3950X
SE +/- 9.03, N = 3
4733.8
Core i9 10900K
SE +/- 0.59, N = 3
3753.0
Ryzen 9 5950X
SE +/- 8.65, N = 3
4847.5
1000
2000
3000
4000
5000
1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl
Cpuminer-Opt 3.8.8.1
Algorithm: m7m
kH/s - Hash Speed, More Is Better
Core i9 9900KS
SE +/- 0.20, N = 3
290.88
Ryzen 9 3900X
SE +/- 0.53, N = 3
626.76
Ryzen 9 3950X
SE +/- 1.22, N = 3
848.89
Core i9 10900K
SE +/- 0.23, N = 3
408.26
Ryzen 9 5950X
SE +/- 10.51, N = 3
789.60
200
400
600
800
1000
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp

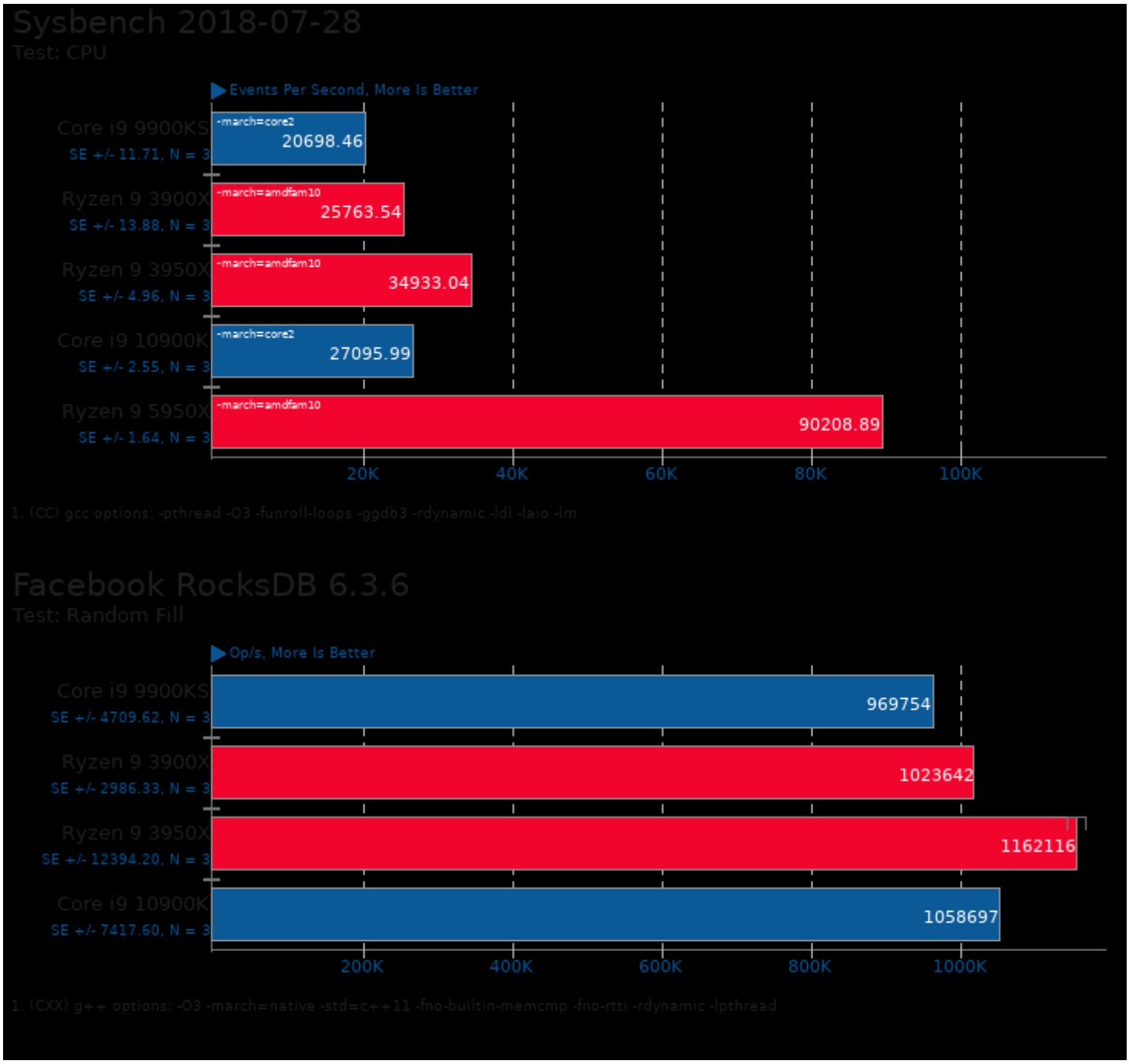

Cpuminer-Opt 3.8.8.1
Algorithm: deep
kH/s - Hash Speed, More Is Better
Core i9 9900KS
SE +/- 3.13, N = 3
8721.83
Ryzen 9 3900X
SE +/- 8.82, N = 3
11263.00
Ryzen 9 3950X
SE +/- 233.33, N = 3
15523.00
Core i9 10900K
SE +/- 1320.40, N = 15
9913.10
Ryzen 9 5950X
SE +/- 8.82, N = 3
16757.00
4K
8K
12K
16K
20K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.8.8.1
Algorithm: lbry
kH/s - Hash Speed, More Is Better
Core i9 9900KS
SE +/- 15.28, N = 3
27040
Ryzen 9 3900X
SE +/- 261.04, N = 3
33983
Ryzen 9 3950X
SE +/- 313.55, N = 3
47227
Core i9 10900K
SE +/- 288.52, N = 3
39487
Ryzen 9 5950X
SE +/- 670.98, N = 3
56233
12K
24K
36K
48K
60K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp

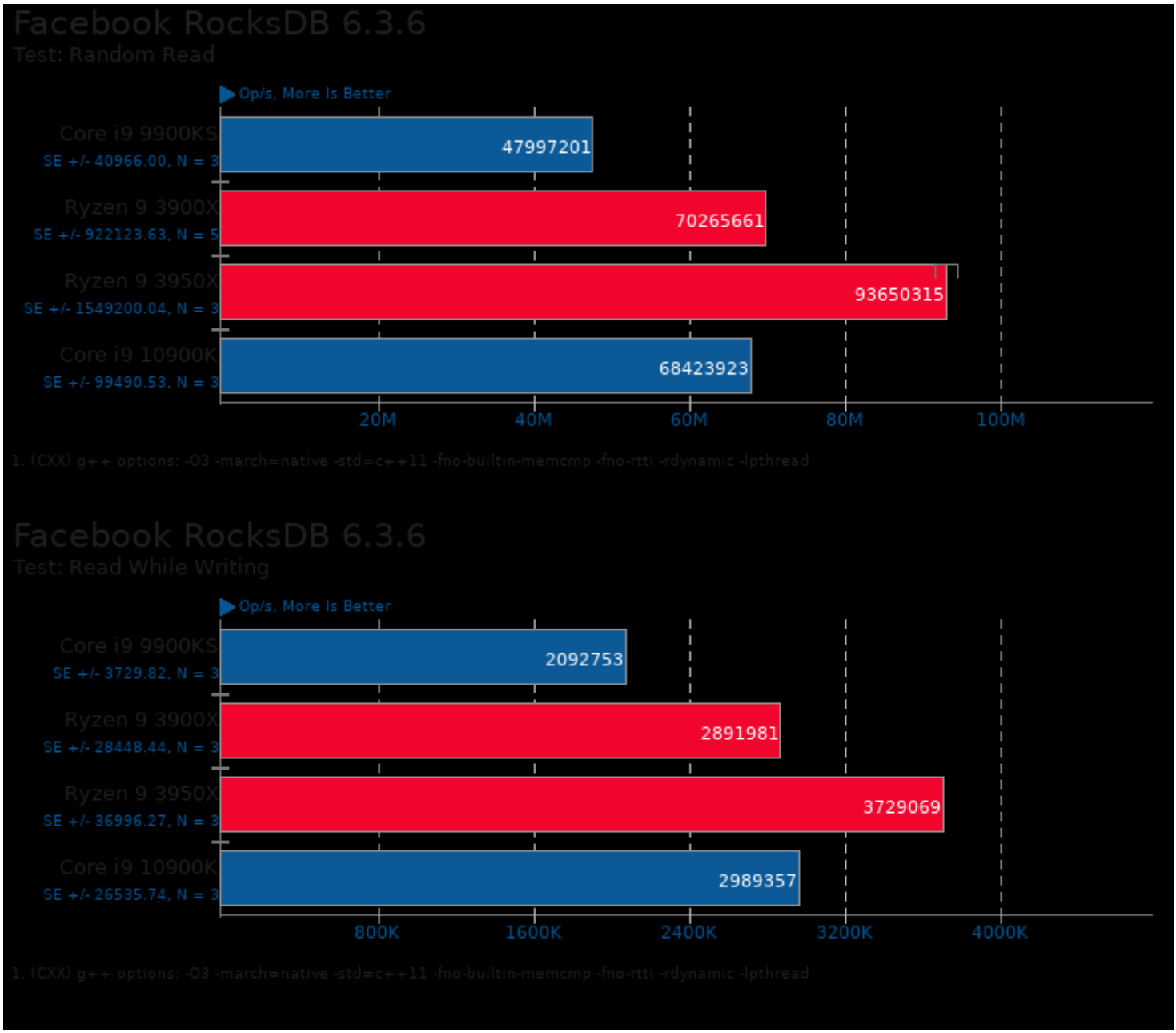

Cpuminer-Opt 3.8.8.1
Algorithm: skein
kH/s - Hash Speed, More Is Better
Core i9 9900KS
SE +/- 8.82, N = 3
31313
Ryzen 9 3900X
SE +/- 26.03, N = 3
39457
Ryzen 9 3950X
SE +/- 376.49, N = 3
54123
Core i9 10900K
SE +/- 53.64, N = 3
45223
Ryzen 9 5950X
SE +/- 476.39, N = 3
66017
14K
28K
42K
56K
70K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.8.8.1
Algorithm: sha256t
kH/s - Hash Speed, More Is Better
Core i9 9900KS
SE +/- 363.52, N = 3
69993
Ryzen 9 3900X
SE +/- 811.01, N = 3
84060
Ryzen 9 3950X
SE +/- 826.56, N = 3
121480
Core i9 10900K
SE +/- 1122.08, N = 7
102739
Ryzen 9 5950X
SE +/- 1286.51, N = 3
145440
30K
60K
90K
120K
150K
1. (CXX) g++ options: -O2 -lcurl -lz -lpthread -lssl -lcrypto -lgmp

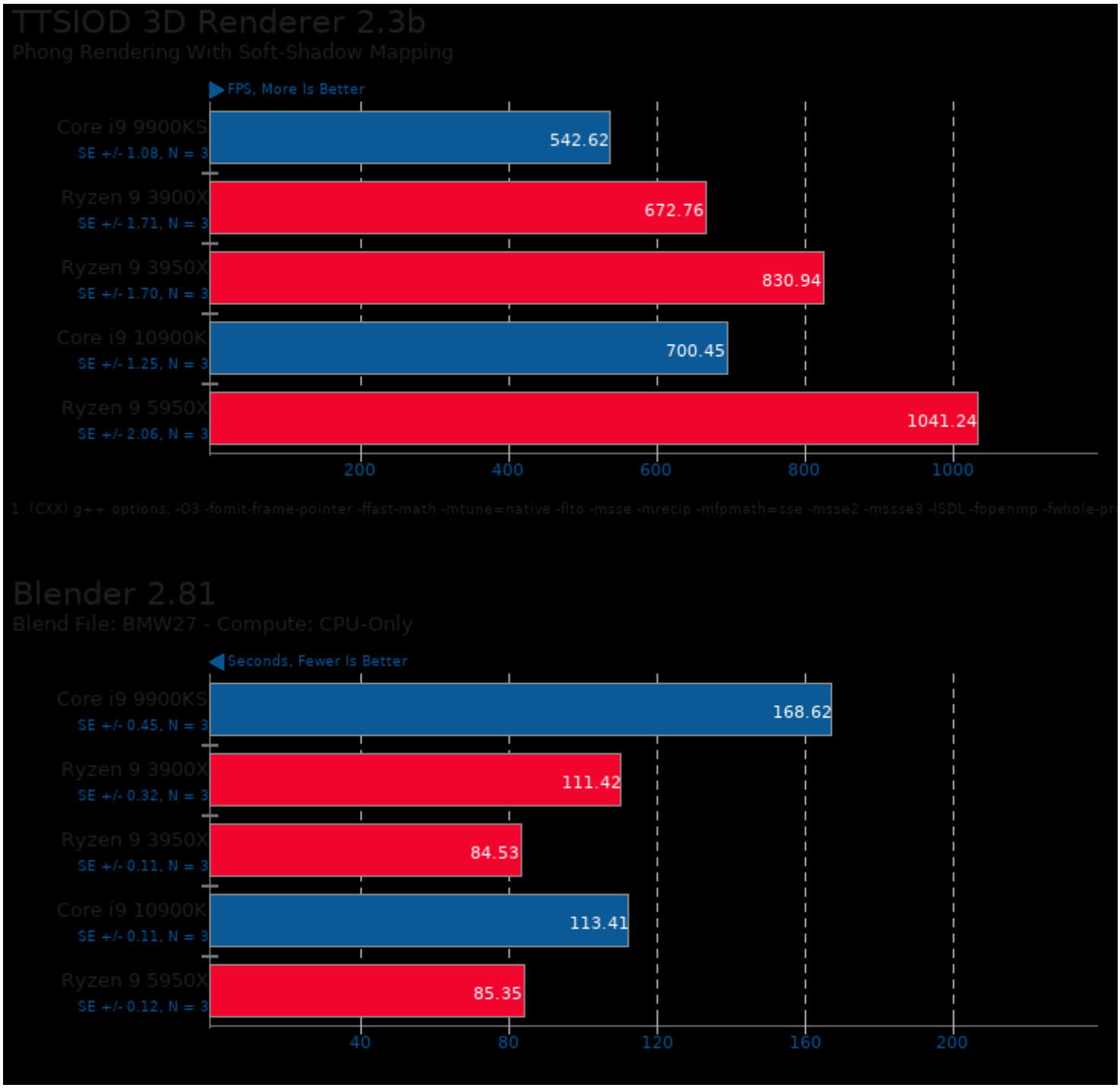

LibreOffice
Test: 20 Documents To PDF
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.040, N = 24
6.801
Ryzen 9 3900X
SE +/- 0.049, N = 25
6.484
Ryzen 9 3950X
SE +/- 0.056, N = 22
6.541
Core i9 10900K
SE +/- 0.077, N = 24
6.329
2
4
6
8
10
1. Core i9 9900KS: LibreOffice 6.3.4.2 30(Build:2)
2. Ryzen 9 3900X: LibreOffice 6.3.4.2 30(Build:2)
3. Ryzen 9 3950X: LibreOffice 6.3.4.2 30(Build:2)
4. Core i9 10900K: LibreOffice 6.4.3.2 40(Build:2)
Stress-NG 0.07.26
Test: Crypto
Bogo Ops/s, More Is Better
Core i9 9900KS
SE +/- 2.37, N = 3
1977.46
Ryzen 9 3900X
SE +/- 9.01, N = 3
3471.19
Ryzen 9 3950X
SE +/- 11.46, N = 3
4734.19
Core i9 10900K
SE +/- 0.44, N = 3
2665.81
Ryzen 9 5950X
SE +/- 5.14, N = 3
5240.00
1100
2200
3300
4400
5500
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

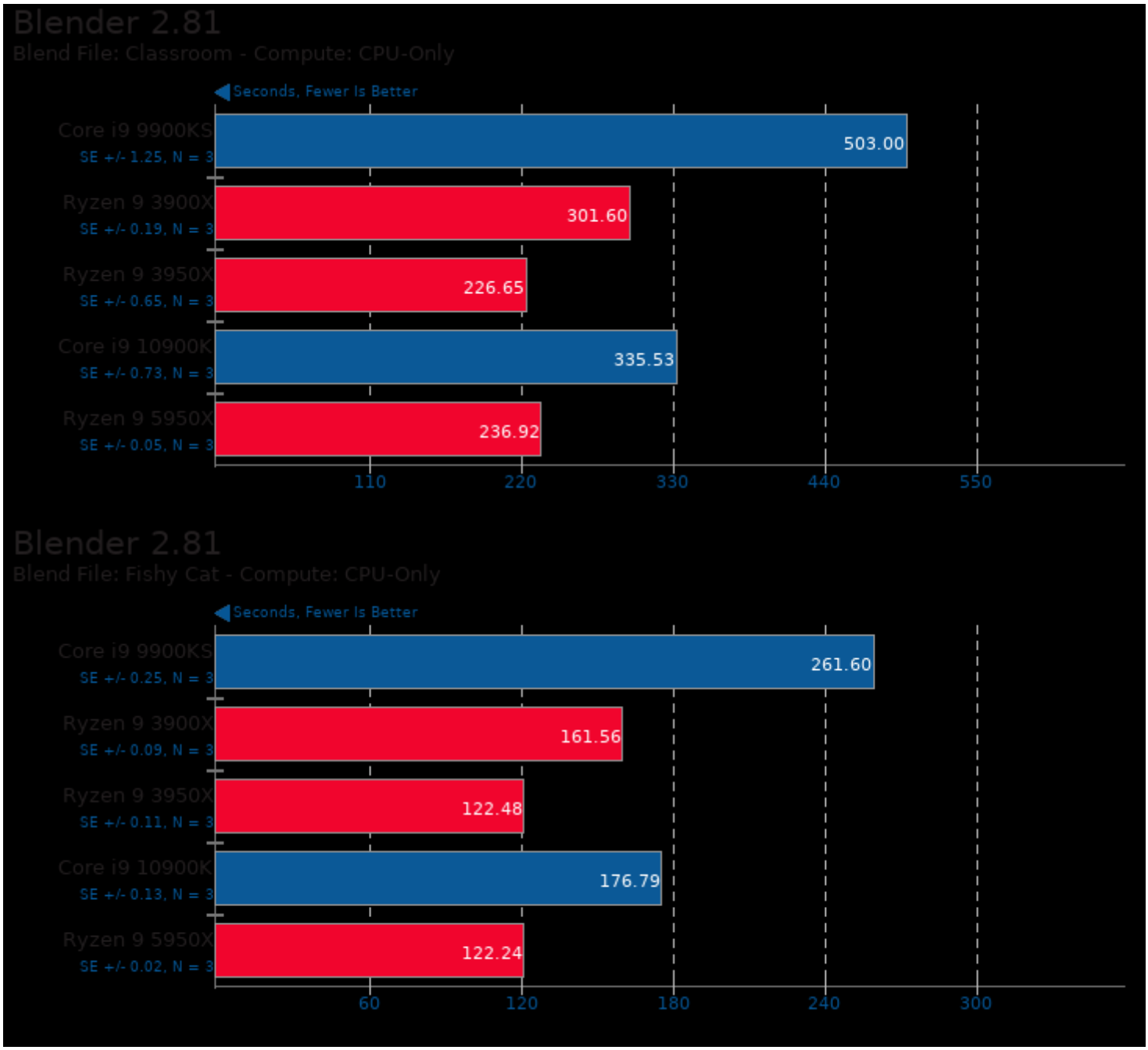

Stress-NG 0.07.26
Test: CPU Stress
Bogo Ops/s, More Is Better
Core i9 9900KS
SE +/- 3.96, N = 3
3443.45
Ryzen 9 3900X
SE +/- 10.29, N = 3
4487.26
Ryzen 9 3950X
SE +/- 10.09, N = 3
6086.42
Core i9 10900K
SE +/- 1.10, N = 3
4628.84
Ryzen 9 5950X
SE +/- 33.31, N = 3
9254.39
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc
Stress-NG 0.07.26
Test: Matrix Math
Bogo Ops/s, More Is Better
Core i9 9900KS
SE +/- 587.33, N = 10
64691.37
Ryzen 9 3900X
SE +/- 99.05, N = 3
95162.13
Ryzen 9 3950X
SE +/- 1160.13, N = 9
120221.52
Core i9 10900K
SE +/- 82.11, N = 3
95627.88
Ryzen 9 5950X
SE +/- 84.24, N = 3
110473.91
30K
60K
90K
120K
150K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

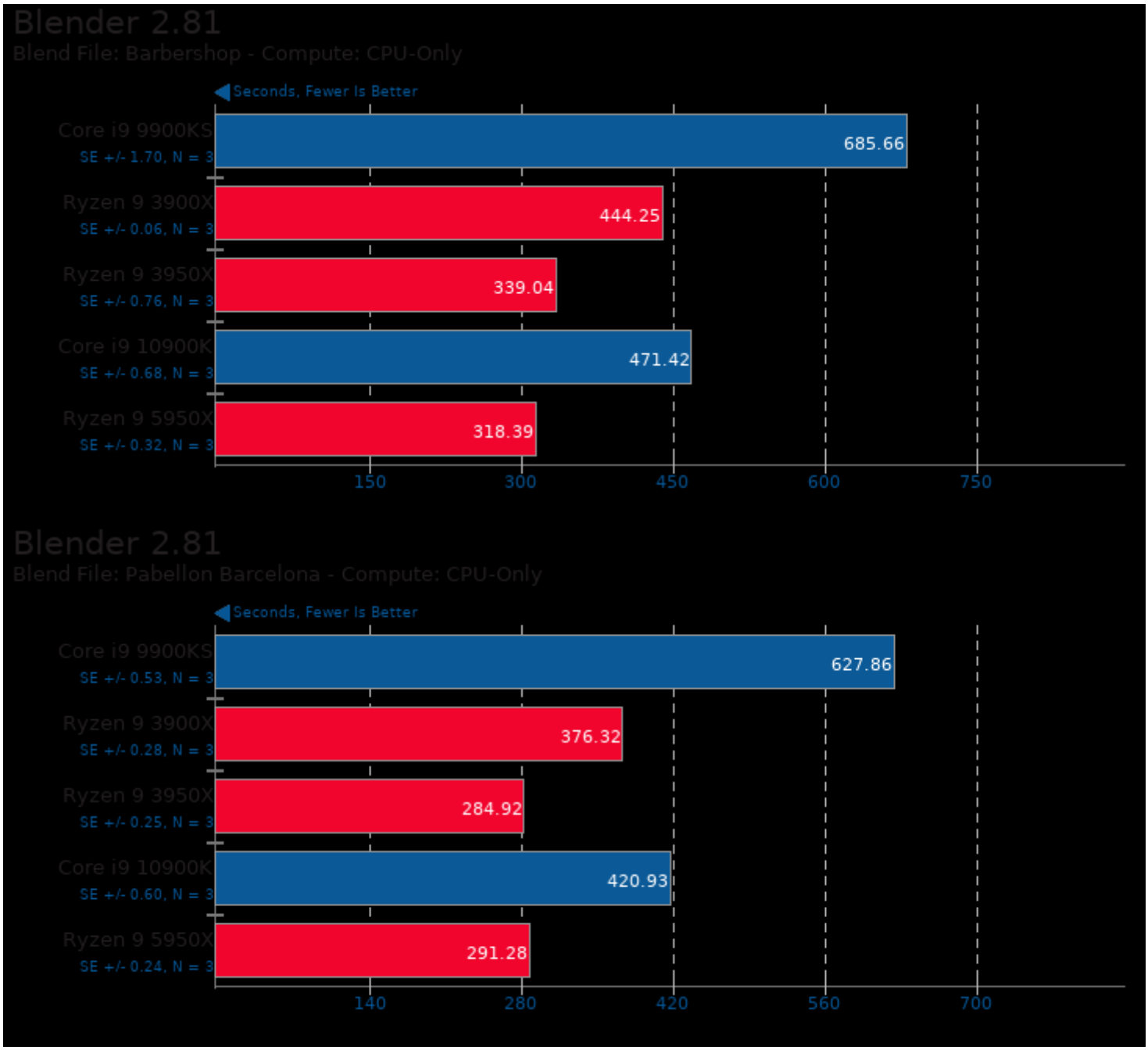

Stress-NG 0.07.26
Test: Socket Activity
Bogo Ops/s, More Is Better
Core i9 9900KS
SE +/- 69.26, N = 3
8438.12
Ryzen 9 3900X
SE +/- 70.82, N = 3
10271.17
Ryzen 9 3950X
SE +/- 33.28, N = 3
13377.63
Core i9 10900K
SE +/- 37.25, N = 3
8792.35
Ryzen 9 5950X
SE +/- 172.41, N = 3
13393.56
3K
6K
9K
12K
15K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc
Stress-NG 0.07.26
Test: Context Switching
Bogo Ops/s, More Is Better
Core i9 9900KS
SE +/- 37252.98, N = 3
4181703.53
Ryzen 9 3900X
SE +/- 176443.05, N = 15
6134286.87
Ryzen 9 3950X
SE +/- 490516.22, N = 15
11632446.40
Core i9 10900K
SE +/- 387700.37, N = 15
9607228.58
Ryzen 9 5950X
SE +/- 127141.08, N = 12
7957639.33
2M
4M
6M
8M
10M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

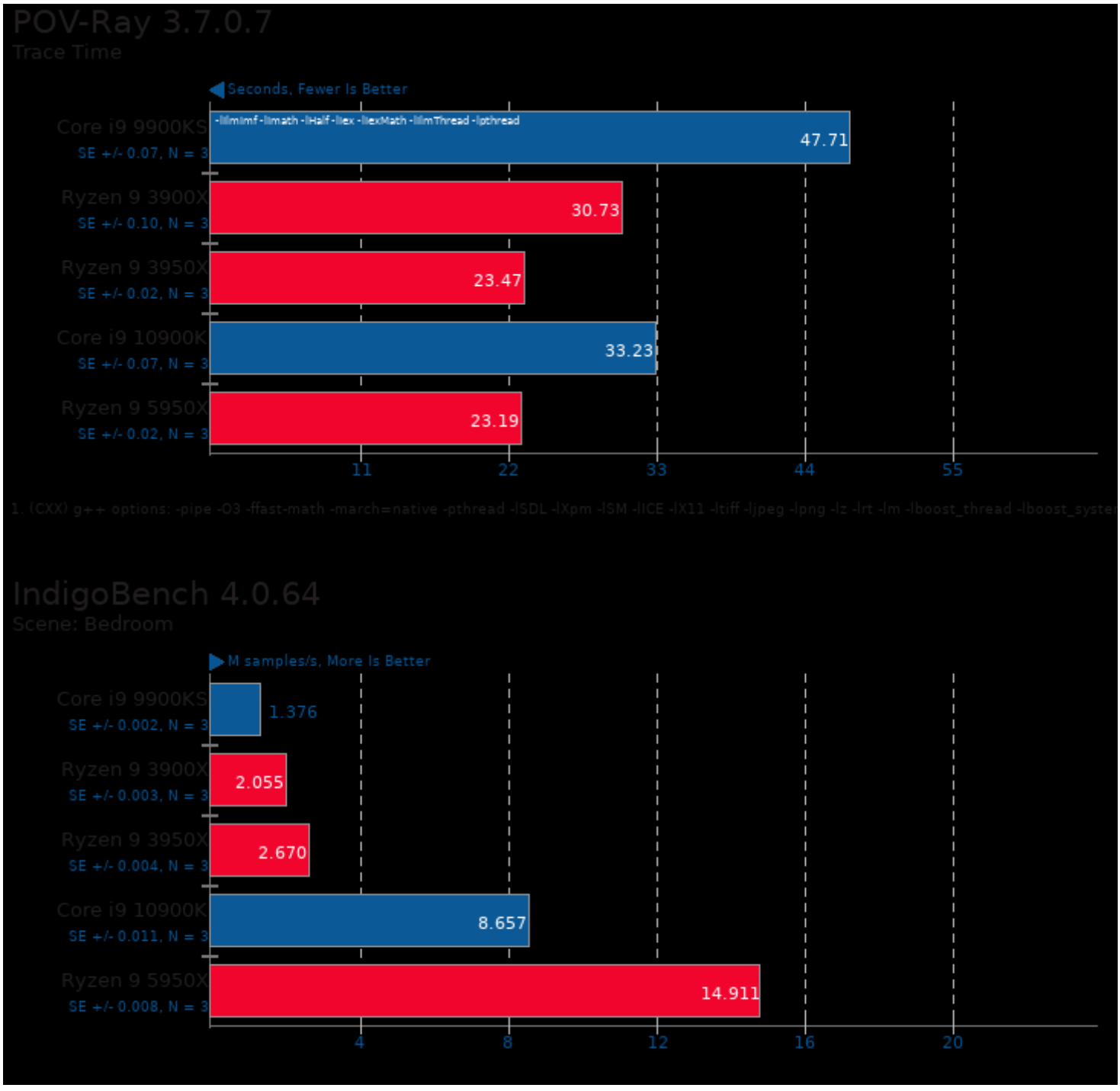

Sysbench 2018-07-28
Test: CPU
Events Per Second, More Is Better
Core i9 9900KS
SE +/- 11.71, N = 3
-march=core2
20698.46
Ryzen 9 3900X
SE +/- 13.88, N = 3
-march=amdfam10
25763.54
Ryzen 9 3950X
SE +/- 4.96, N = 3
-march=amdfam10
34933.04
Core i9 10900K
SE +/- 2.55, N = 3
-march=core2
27095.99
Ryzen 9 5950X
SE +/- 1.64, N = 3
-march=amdfam10
90208.89
20K
40K
60K
80K
100K
1. (CC) gcc options: -pthread -O3 -funroll-loops -ggdb3 -rdynamic -ldl -laio -lm
Facebook RocksDB 6.3.6
Test: Random Fill
Op/s, More Is Better
Core i9 9900KS
SE +/- 4709.62, N = 3
969754
Ryzen 9 3900X
SE +/- 2986.33, N = 3
1023642
Ryzen 9 3950X
SE +/- 12394.20, N = 3
1162116
Core i9 10900K
SE +/- 7417.60, N = 3
1058697
200K
400K
600K
800K
1000K
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fno-builtin-memcmp -fno-rtti -rdynamic -lpthread

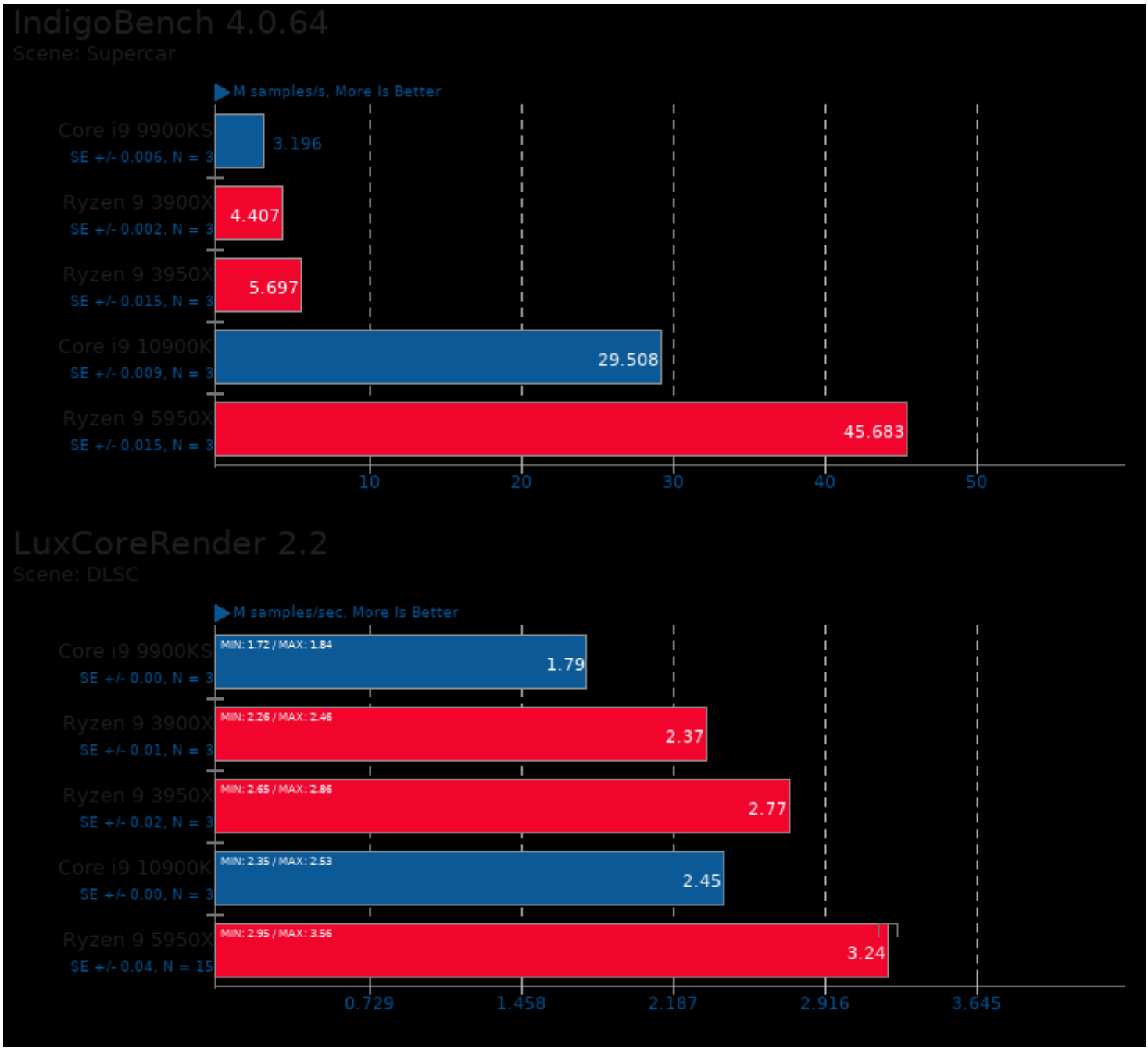

Facebook RocksDB 6.3.6
Test: Random Read
Op/s, More Is Better
Core i9 9900KS
SE +/- 40966.00, N = 3
47997201
Ryzen 9 3900X
SE +/- 922123.63, N = 5
70265661
Ryzen 9 3950X
SE +/- 1549200.04, N = 3
93650315
Core i9 10900K
SE +/- 99490.53, N = 3
68423923
20M
40M
60M
80M
100M
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fno-builtin-memcmp -fno-rtti -rdynamic -lpthread
Facebook RocksDB 6.3.6
Test: Read While Writing
Op/s, More Is Better
Core i9 9900KS
SE +/- 3729.82, N = 3
2092753
Ryzen 9 3900X
SE +/- 28448.44, N = 3
2891981
Ryzen 9 3950X
SE +/- 36996.27, N = 3
3729069
Core i9 10900K
SE +/- 26535.74, N = 3
2989357
800K
1600K
2400K
3200K
4000K
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fno-builtin-memcmp -fno-rtti -rdynamic -lpthread

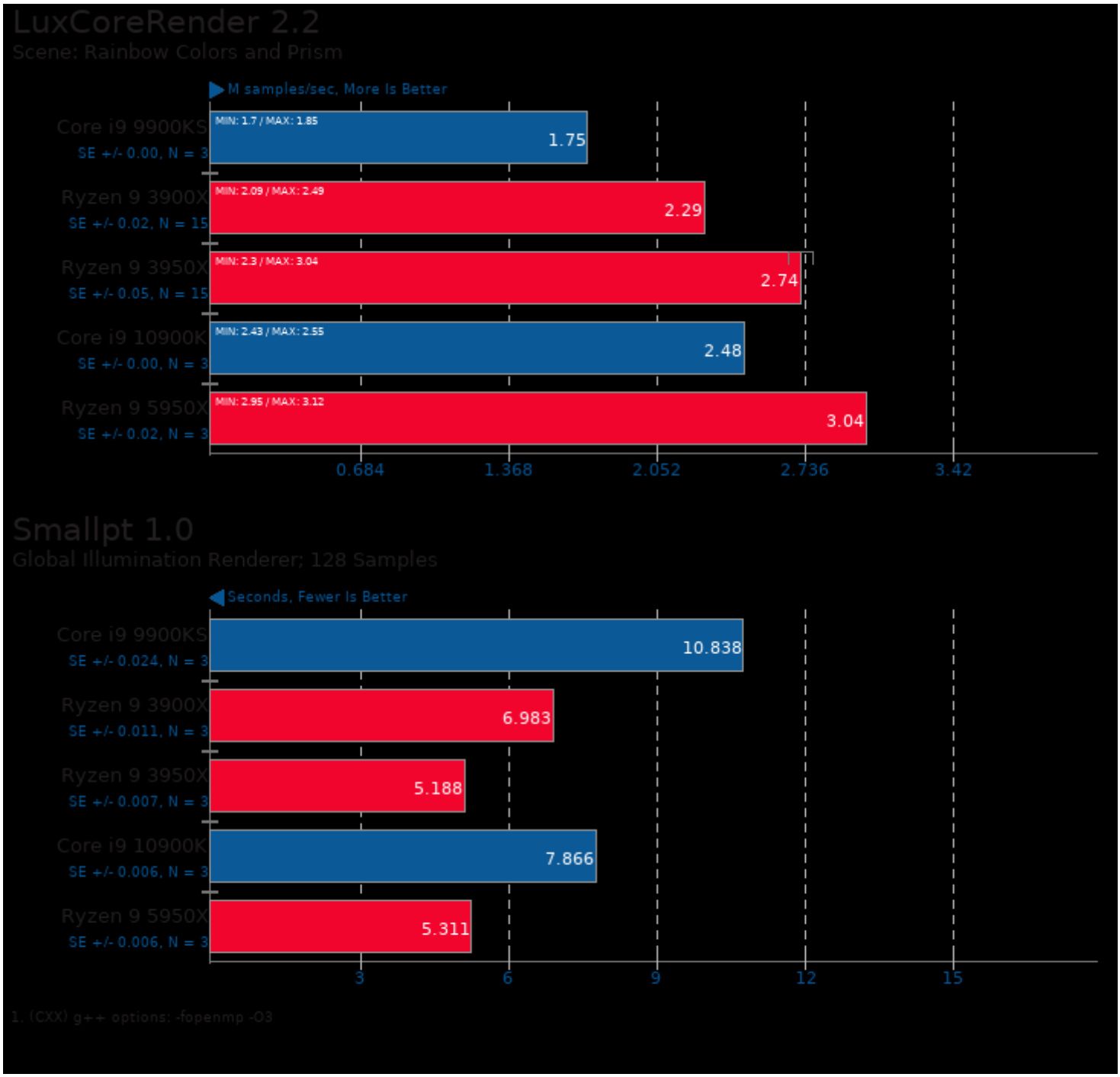

TTSIOD 3D Renderer 2.3b
Phong Rendering With Soft-Shadow Mapping
FPS, More Is Better
Core i9 9900KS
SE +/- 1.08, N = 3
542.62
Ryzen 9 3900X
SE +/- 1.71, N = 3
672.76
Ryzen 9 3950X
SE +/- 1.70, N = 3
830.94
Core i9 10900K
SE +/- 1.25, N = 3
700.45
Ryzen 9 5950X
SE +/- 2.06, N = 3
1041.24
200
400
600
800
1000
1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -msse -mrecip -mfpmath=sse -msse2 -mssse3 -lSDL -fopenmp -fwhole-pr
Blender 2.81
Blend File: BMW27 - Compute: CPU-Only
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.45, N = 3
168.62
Ryzen 9 3900X
SE +/- 0.32, N = 3
111.42
Ryzen 9 3950X
SE +/- 0.11, N = 3
84.53
Core i9 10900K
SE +/- 0.11, N = 3
113.41
Ryzen 9 5950X
SE +/- 0.12, N = 3
85.35
40
80
120
160
200

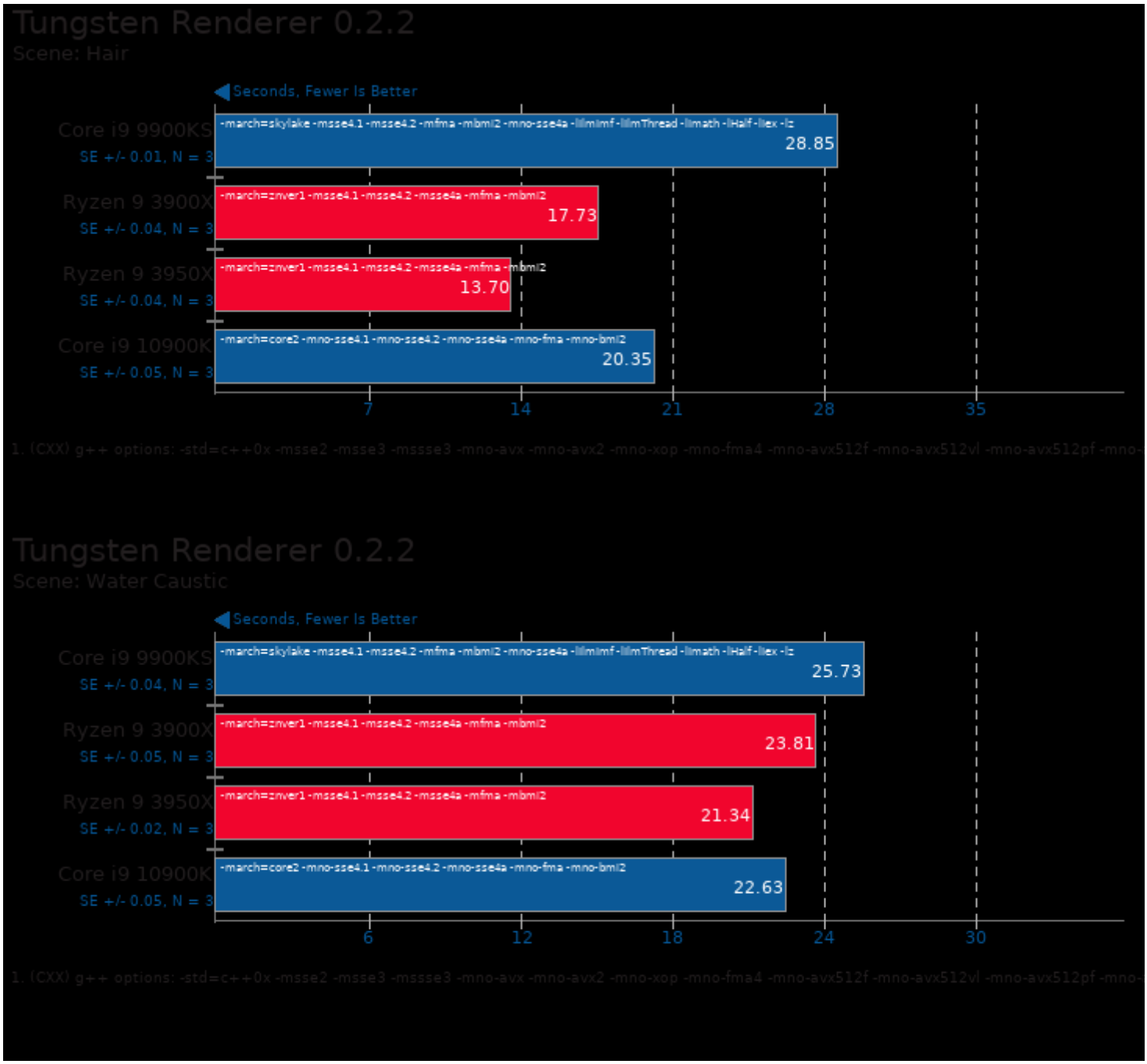

Blender 2.81
Blend File: Classroom - Compute: CPU-Only
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 1.25, N = 3
503.00
Ryzen 9 3900X
SE +/- 0.19, N = 3
301.60
Ryzen 9 3950X
SE +/- 0.65, N = 3
226.65
Core i9 10900K
SE +/- 0.73, N = 3
335.53
Ryzen 9 5950X
SE +/- 0.05, N = 3
236.92
110
220
330
440
550
Blender 2.81
Blend File: Fishy Cat - Compute: CPU-Only
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.25, N = 3
261.60
Ryzen 9 3900X
SE +/- 0.09, N = 3
161.56
Ryzen 9 3950X
SE +/- 0.11, N = 3
122.48
Core i9 10900K
SE +/- 0.13, N = 3
176.79
Ryzen 9 5950X
SE +/- 0.02, N = 3
122.24
60
120
180
240
300

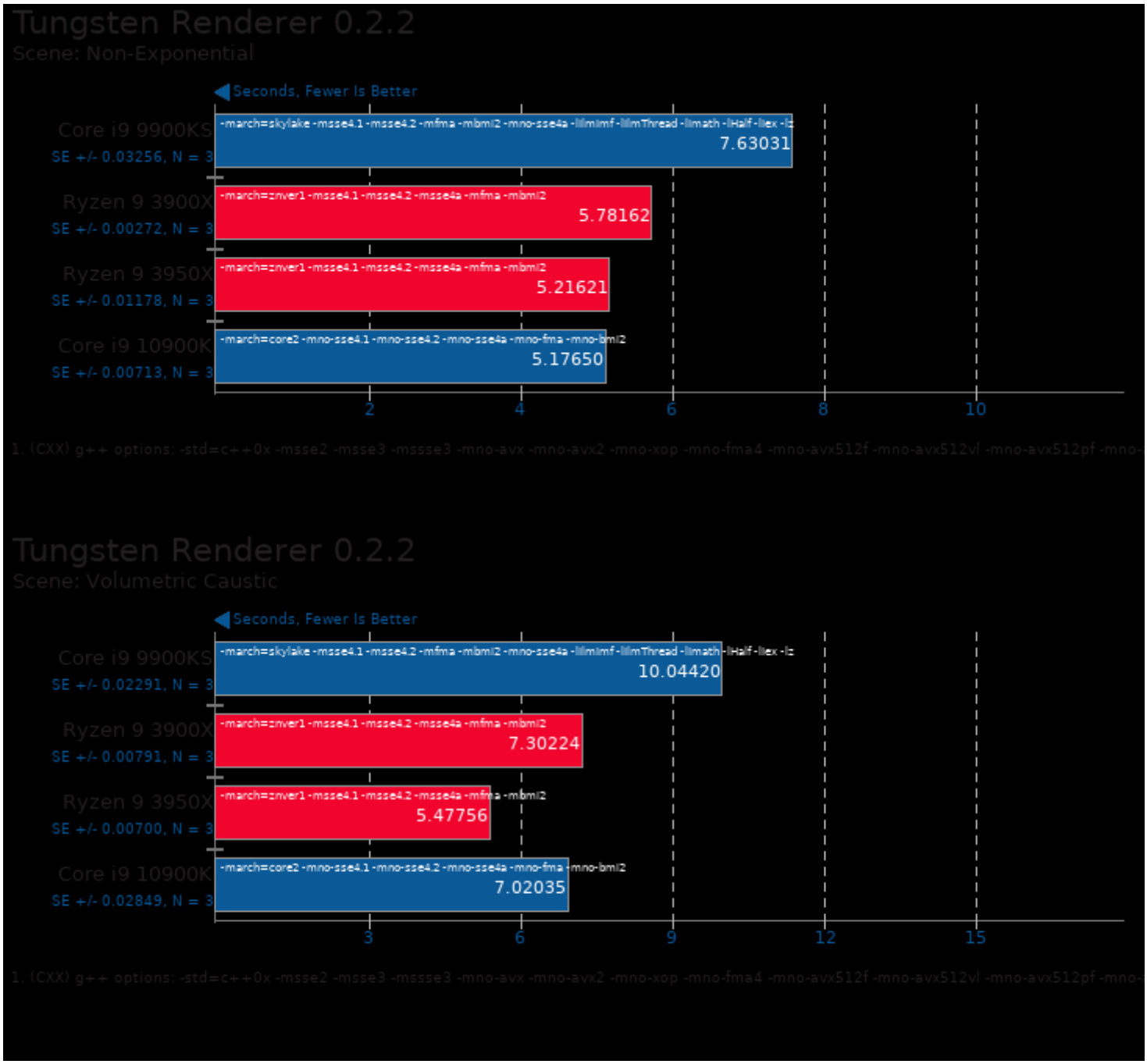

Blender 2.81
Blend File: Barbershop - Compute: CPU-Only
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 1.70, N = 3
685.66
Ryzen 9 3900X
SE +/- 0.06, N = 3
444.25
Ryzen 9 3950X
SE +/- 0.76, N = 3
339.04
Core i9 10900K
SE +/- 0.68, N = 3
471.42
Ryzen 9 5950X
SE +/- 0.32, N = 3
318.39
150
300
450
600
750
Blender 2.81
Blend File: Pabellon Barcelona - Compute: CPU-Only
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.53, N = 3
627.86
Ryzen 9 3900X
SE +/- 0.28, N = 3
376.32
Ryzen 9 3950X
SE +/- 0.25, N = 3
284.92
Core i9 10900K
SE +/- 0.60, N = 3
420.93
Ryzen 9 5950X
SE +/- 0.24, N = 3
291.28
140
280
420
560
700

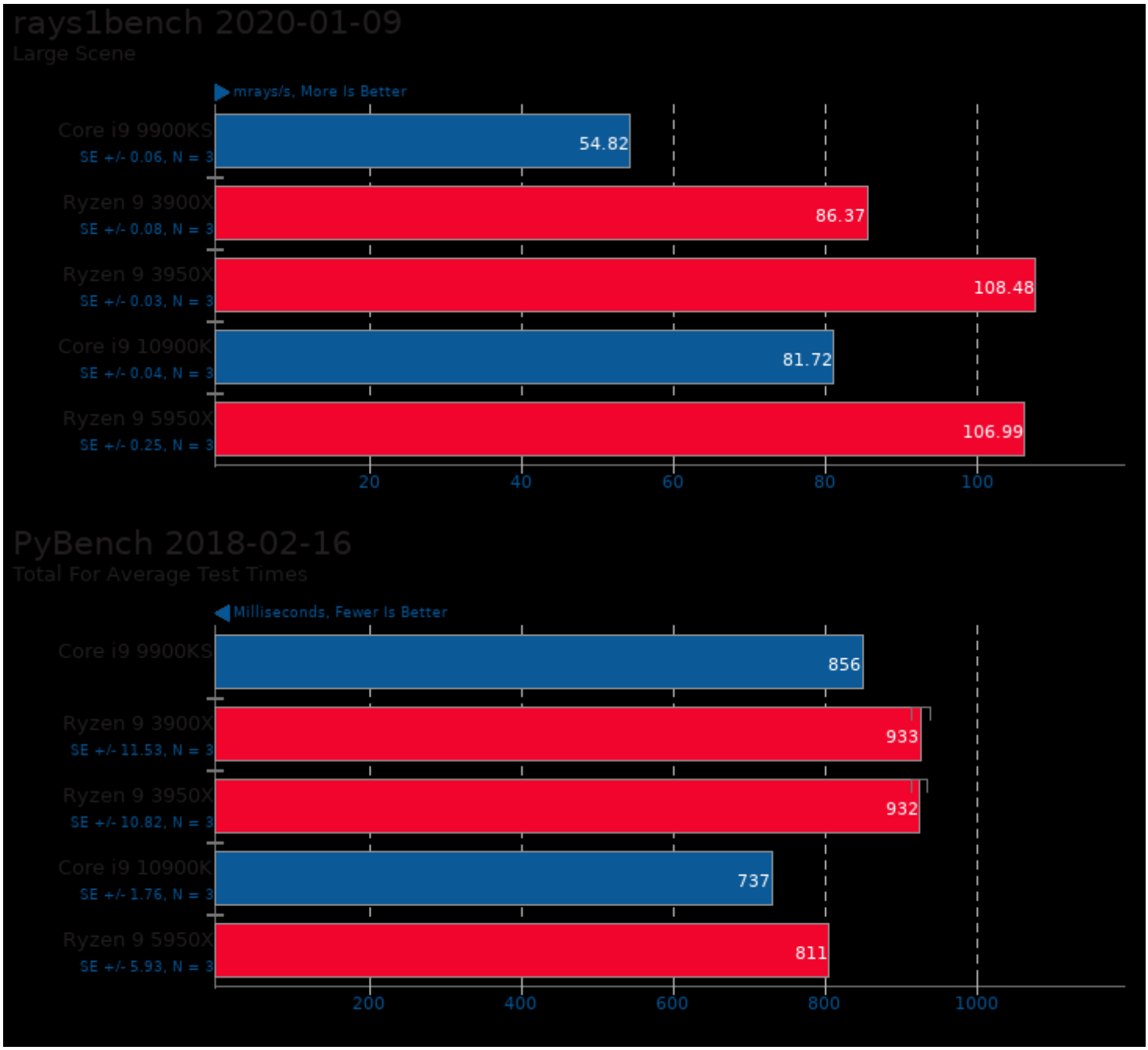

POV-Ray 3.7.0.7
Trace Time
Seconds, Fewer Is Better
-lIlmImf -lImath -lIlmThread -lpthread
Core i9 9900KS
SE +/- 0.07, N = 3
47.71
Ryzen 9 3900X
SE +/- 0.10, N = 3
30.73
Ryzen 9 3950X
SE +/- 0.02, N = 3
23.47
Core i9 10900K
SE +/- 0.07, N = 3
33.23
Ryzen 9 5950X
SE +/- 0.02, N = 3
23.19
11
22
33
44
55
1. (CXX) g++ options: -pipe -O3 -ffast-math -march=native -pthread -lSDL -lXpm -lSM -lICE -lX11 -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_syste
IndigoBench 4.0.64
Scene: Bedroom
M samples/s, More Is Better
Core i9 9900KS
SE +/- 0.002, N = 3
1.376
Ryzen 9 3900X
SE +/- 0.003, N = 3
2.055
Ryzen 9 3950X
SE +/- 0.004, N = 3
2.670
Core i9 10900K
SE +/- 0.011, N = 3
8.657
Ryzen 9 5950X
SE +/- 0.008, N = 3
14.911
4
8
12
16
20

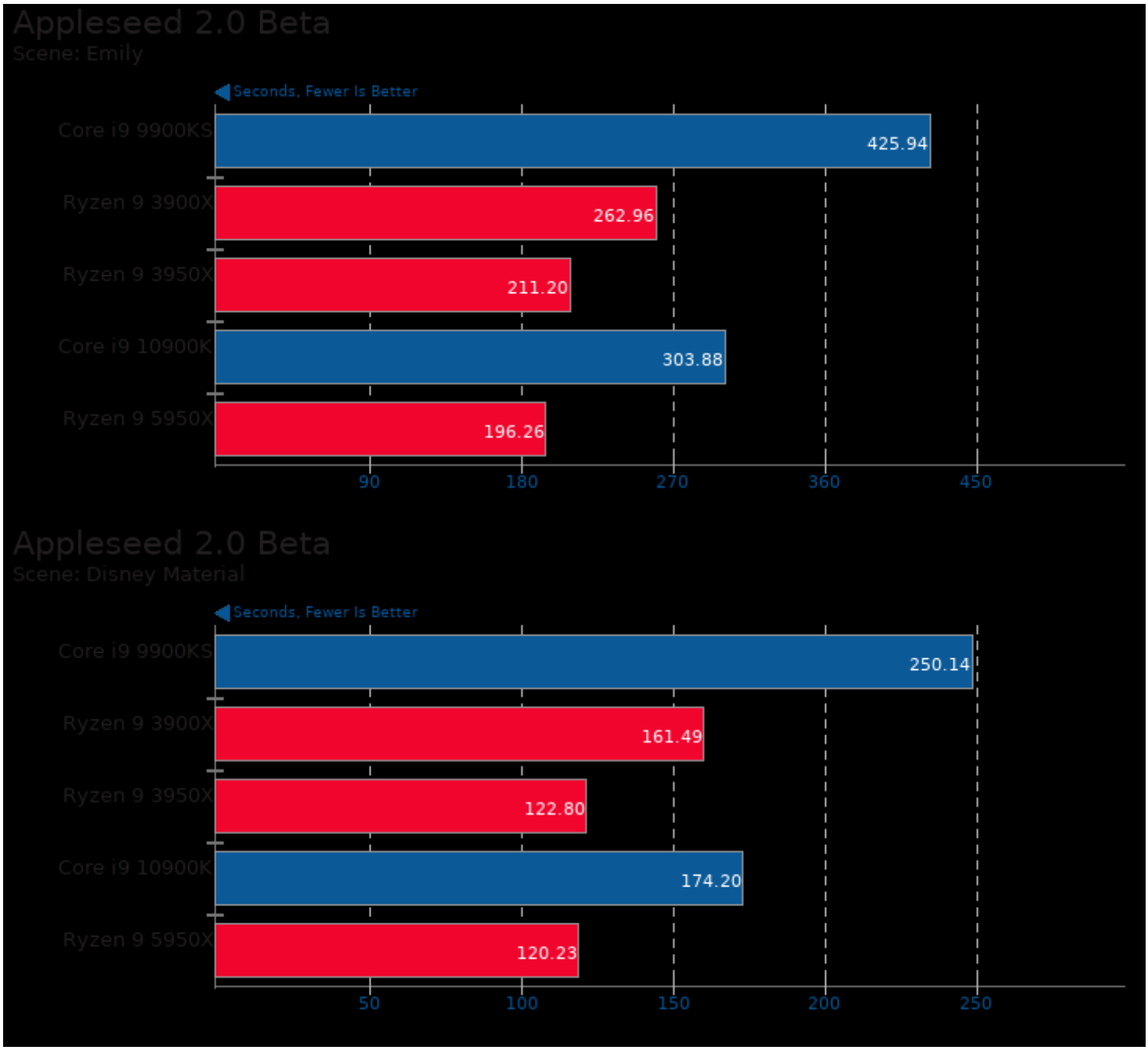

IndigoBench 4.0.64
Scene: Supercar
M samples/s, More Is Better
Core i9 9900KS
SE +/- 0.006, N = 3
3.196
Ryzen 9 3900X
SE +/- 0.002, N = 3
4.407
Ryzen 9 3950X
SE +/- 0.015, N = 3
5.697
Core i9 10900K
SE +/- 0.009, N = 3
29.508
Ryzen 9 5950X
SE +/- 0.015, N = 3
45.683
10
20
30
40
50
LuxCoreRender 2.2
Scene: DLSC
M samples/sec, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 1.72 / MAX: 1.84
1.79
Ryzen 9 3900X
SE +/- 0.01, N = 3
MIN: 2.26 / MAX: 2.46
2.37
Ryzen 9 3950X
SE +/- 0.02, N = 3
MIN: 2.65 / MAX: 2.86
2.77
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 2.35 / MAX: 2.53
2.45
Ryzen 9 5950X
SE +/- 0.04, N = 15
MIN: 2.95 / MAX: 3.56
3.24
0.729
1.458
2.187
2.916
3.645


LuxCoreRender 2.2
Scene: Rainbow Colors and Prism
M samples/sec, More Is Better
Core i9 9900KS
SE +/- 0.00, N = 3
MIN: 1.7 / MAX: 1.85
1.75
Ryzen 9 3900X
SE +/- 0.02, N = 15
MIN: 2.09 / MAX: 2.49
2.29
Ryzen 9 3950X
SE +/- 0.05, N = 15
MIN: 2.3 / MAX: 3.04
2.74
Core i9 10900K
SE +/- 0.00, N = 3
MIN: 2.43 / MAX: 2.55
2.48
Ryzen 9 5950X
SE +/- 0.02, N = 3
MIN: 2.95 / MAX: 3.12
3.04
0.684
1.368
2.052
2.736
3.42
Smallpt 1.0
Global Illumination Renderer; 128 Samples
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.024, N = 3
10.838
Ryzen 9 3900X
SE +/- 0.011, N = 3
6.983
Ryzen 9 3950X
SE +/- 0.007, N = 3
5.188
Core i9 10900K
SE +/- 0.006, N = 3
7.866
Ryzen 9 5950X
SE +/- 0.006, N = 3
5.311
3
6
9
12
15
1. (CXX) g++ options: -fopenmp -O3


Tungsten Renderer 0.2.2
Scene: Hair
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.01, N = 3
-march=skylake -msse4.1 -msse4.2 -mfma -mbmi2 -mno-sse4a -llilmimf -llimThread -limath -lHalf -liex -lz
28.85
Ryzen 9 3900X
SE +/- 0.04, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
17.73
Ryzen 9 3950X
SE +/- 0.04, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
13.70
Core i9 10900K
SE +/- 0.05, N = 3
-march=core2 -mno-sse4.1 -mno-sse4.2 -mno-sse4a -mno-fma -mno-bmi2
20.35
7
14
21
28
35
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -mno-avx512vl -mno-avx512pf -mno-
Tungsten Renderer 0.2.2
Scene: Water Caustic
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.04, N = 3
-march=skylake -msse4.1 -msse4.2 -mfma -mbmi2 -mno-sse4a -llilmimf -llimThread -limath -lHalf -liex -lz
25.73
Ryzen 9 3900X
SE +/- 0.05, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
23.81
Ryzen 9 3950X
SE +/- 0.02, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
21.34
Core i9 10900K
SE +/- 0.05, N = 3
-march=core2 -mno-sse4.1 -mno-sse4.2 -mno-sse4a -mno-fma -mno-bmi2
22.63
6
12
18
24
30
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -mno-avx512vl -mno-avx512pf -mno-

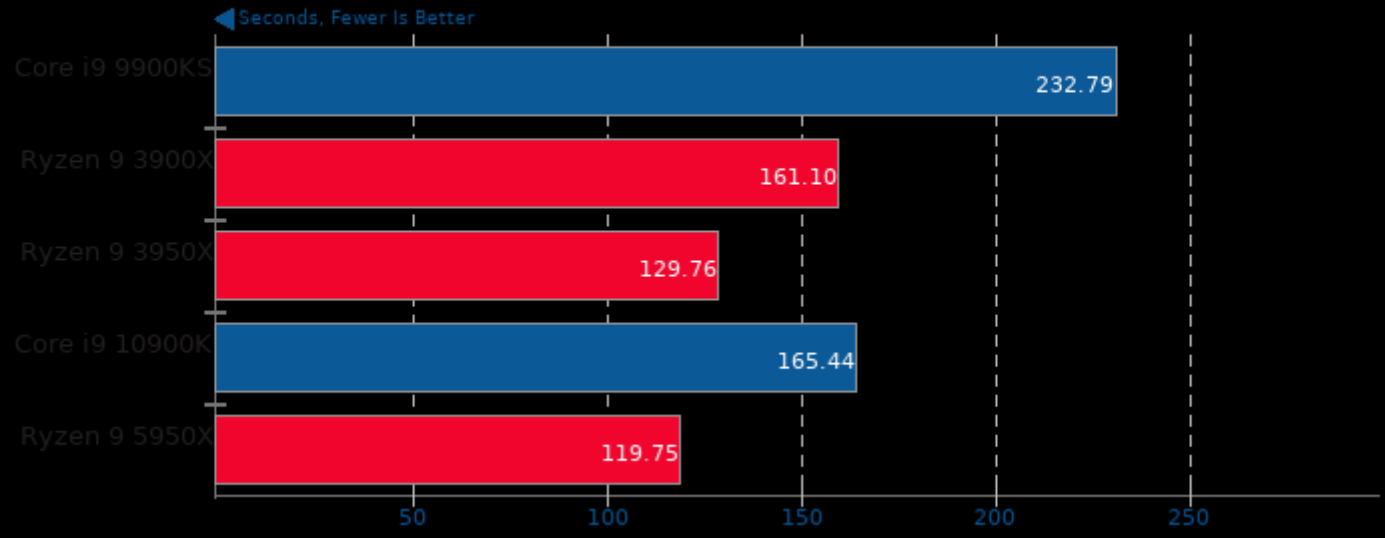

Tungsten Renderer 0.2.2
Scene: Non-Exponential
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.03256, N = 3
-march=skylake -msse4.1 -msse4.2 -mfma -mbmi2 -mno-sse4a -lilmImf -lilmThread -limath -lHalf -llex -l
7.63031
Ryzen 9 3900X
SE +/- 0.00272, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
5.78162
Ryzen 9 3950X
SE +/- 0.01178, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
5.21621
Core i9 10900K
SE +/- 0.00713, N = 3
-march=core2 -mno-sse4.1 -mno-sse4.2 -mno-sse4a -mno-fma -mno-bmi2
5.17650
2
4
6
8
10
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -mno-avx512vl -mno-avx512pf -mno-
Tungsten Renderer 0.2.2
Scene: Volumetric Caustic
Seconds, Fewer Is Better
Core i9 9900KS
SE +/- 0.02291, N = 3
-march=skylake -msse4.1 -msse4.2 -mfma -mbmi2 -mno-sse4a -lilmImf -lilmThread -limath -lHalf -llex -l
10.04420
Ryzen 9 3900X
SE +/- 0.00791, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
7.30224
Ryzen 9 3950X
SE +/- 0.00700, N = 3
-march=znver1 -msse4.1 -msse4.2 -msse4a -mfma -mbmi2
5.47756
Core i9 10900K
SE +/- 0.02849, N = 3
-march=core2 -mno-sse4.1 -mno-sse4.2 -mno-sse4a -mno-fma -mno-bmi2
7.02035
3
6
9
12
15
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -mno-avx512vl -mno-avx512pf -mno-


rays1bench 2020-01-09
Large Scene
mrays/s, More Is Better
Core i9 9900KS
SE +/- 0.06, N = 3
54.82
Ryzen 9 3900X
SE +/- 0.08, N = 3
86.37
Ryzen 9 3950X
SE +/- 0.03, N = 3
108.48
Core i9 10900K
SE +/- 0.04, N = 3
81.72
Ryzen 9 5950X
SE +/- 0.25, N = 3
106.99
20
40
60
80
100
PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Core i9 9900KS
856
Ryzen 9 3900X
SE +/- 11.53, N = 3
933
Ryzen 9 3950X
SE +/- 10.82, N = 3
932
Core i9 10900K
SE +/- 1.76, N = 3
737
Ryzen 9 5950X
SE +/- 5.93, N = 3
811
200
400
600
800
1000


Appleseed 2.0 Beta
Scene: Emily
Seconds, Fewer Is Better
Core i9 9900KS
425.94
Ryzen 9 3900X
262.96
Ryzen 9 3950X
211.20
Core i9 10900K
303.88
Ryzen 9 5950X
196.26
90
180
270
360
450
Appleseed 2.0 Beta
Scene: Disney Material
Seconds, Fewer Is Better
Core i9 9900KS
250.14
Ryzen 9 3900X
161.49
Ryzen 9 3950X
122.80
Core i9 10900K
174.20
Ryzen 9 5950X
120.23
50
100
150
200
250

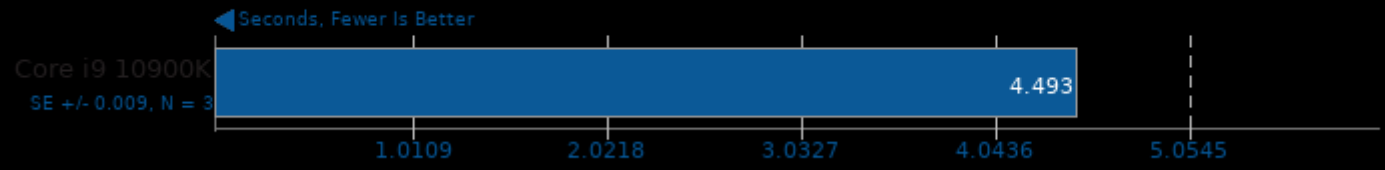
Appleseed 2.0 Beta

Scene: Material Tester



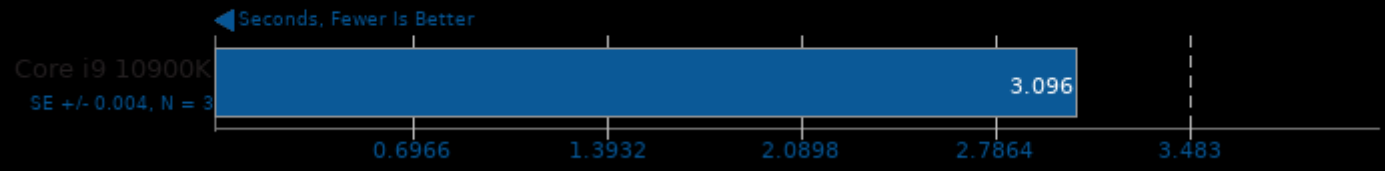
Darktable 3.0.1

Test: Masskrug - Acceleration: CPU-only



Darktable 3.0.1

Test: Server Room - Acceleration: CPU-only

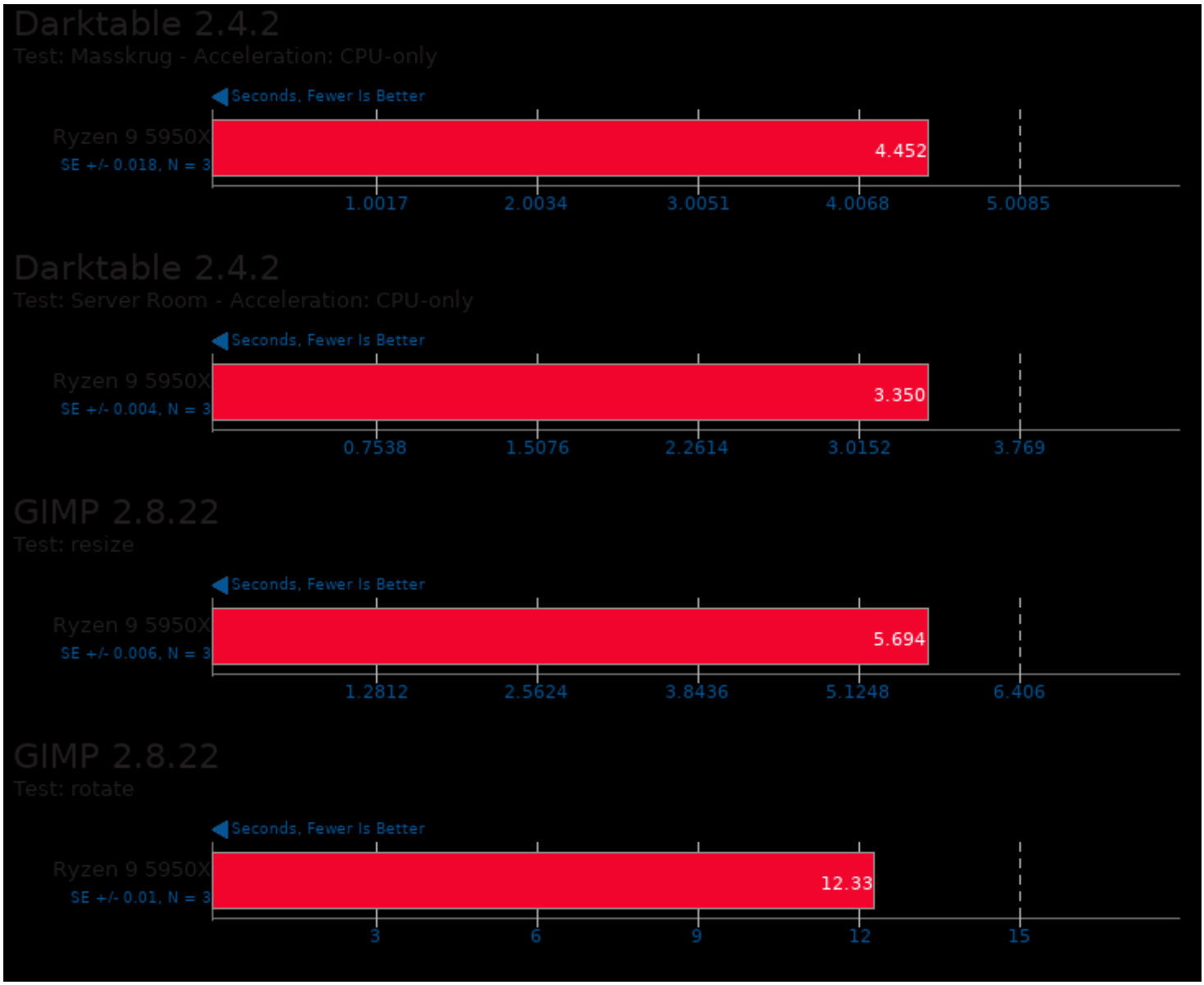


GIMP 2.10.18

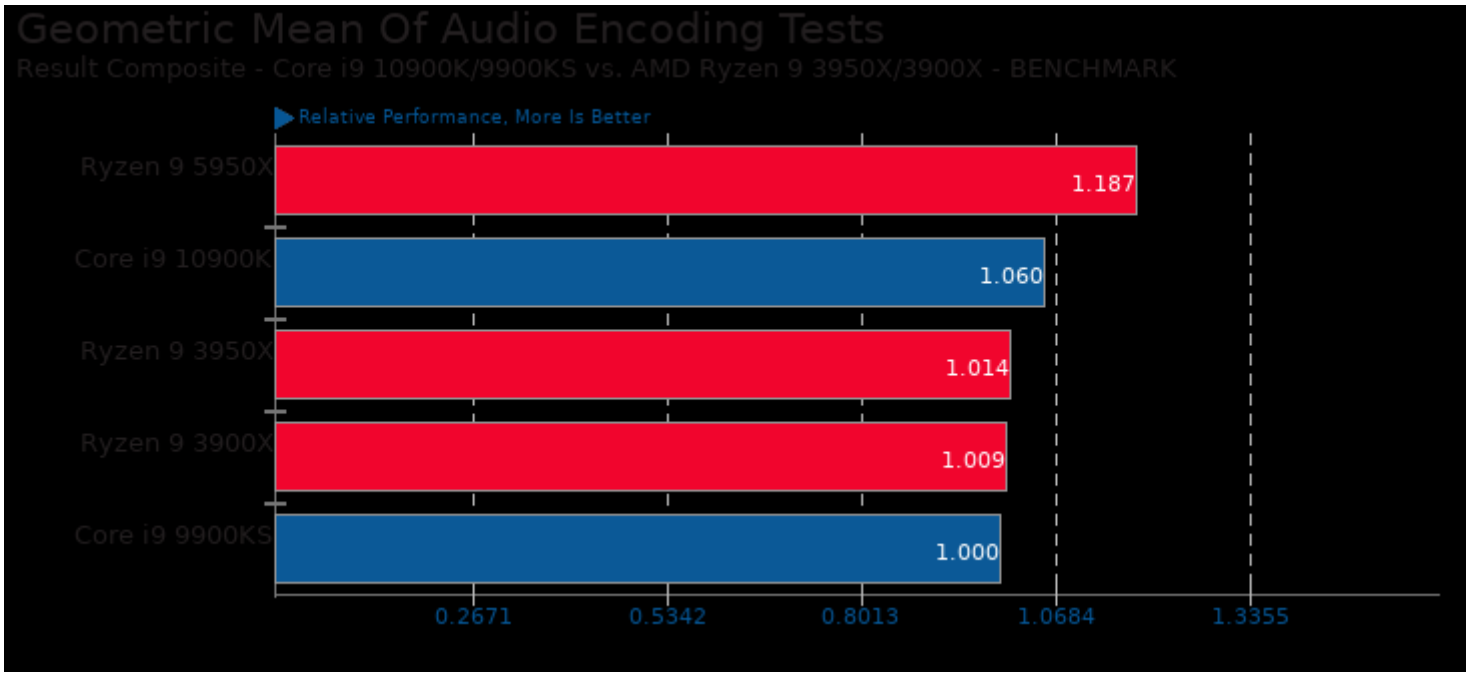
Test: resize

GIMP 2.10.18

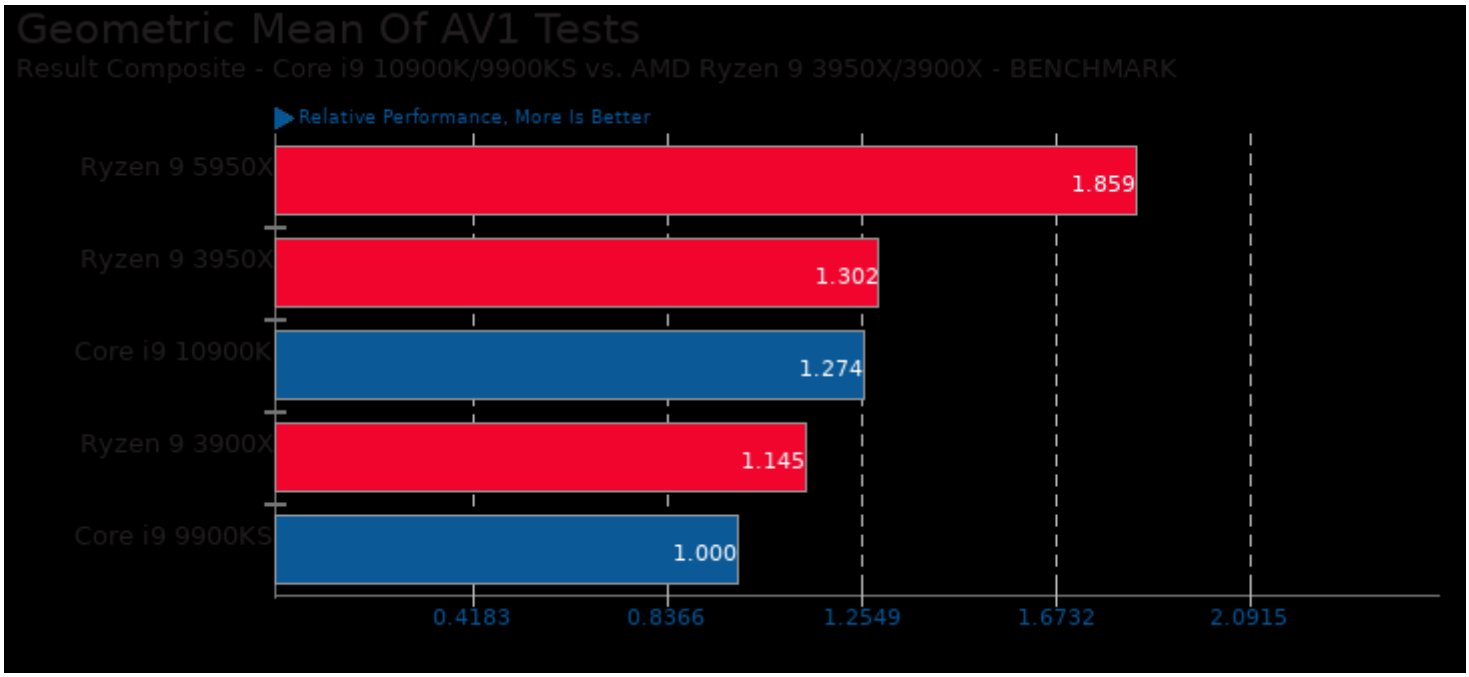
Test: rotate


Darktable 2.4.2
Test: Masskrug - Acceleration: CPU-only
Seconds, Fewer Is Better
Ryzen 9 5950X
SE +/- 0.018, N = 3
4.452
1.0017
2.0034
3.0051
4.0068
5.0085
Darktable 2.4.2
Test: Server Room - Acceleration: CPU-only
Seconds, Fewer Is Better
Ryzen 9 5950X
SE +/- 0.004, N = 3
3.350
0.7538
1.5076
2.2614
3.0152
3.769
GIMP 2.8.22
Test: resize
Seconds, Fewer Is Better
Ryzen 9 5950X
SE +/- 0.006, N = 3
5.694
1.2812
2.5624
3.8436
5.1248
6.406
GIMP 2.8.22
Test: rotate
Seconds, Fewer Is Better
Ryzen 9 5950X
SE +/- 0.01, N = 3
12.33
3
6
9
12
15

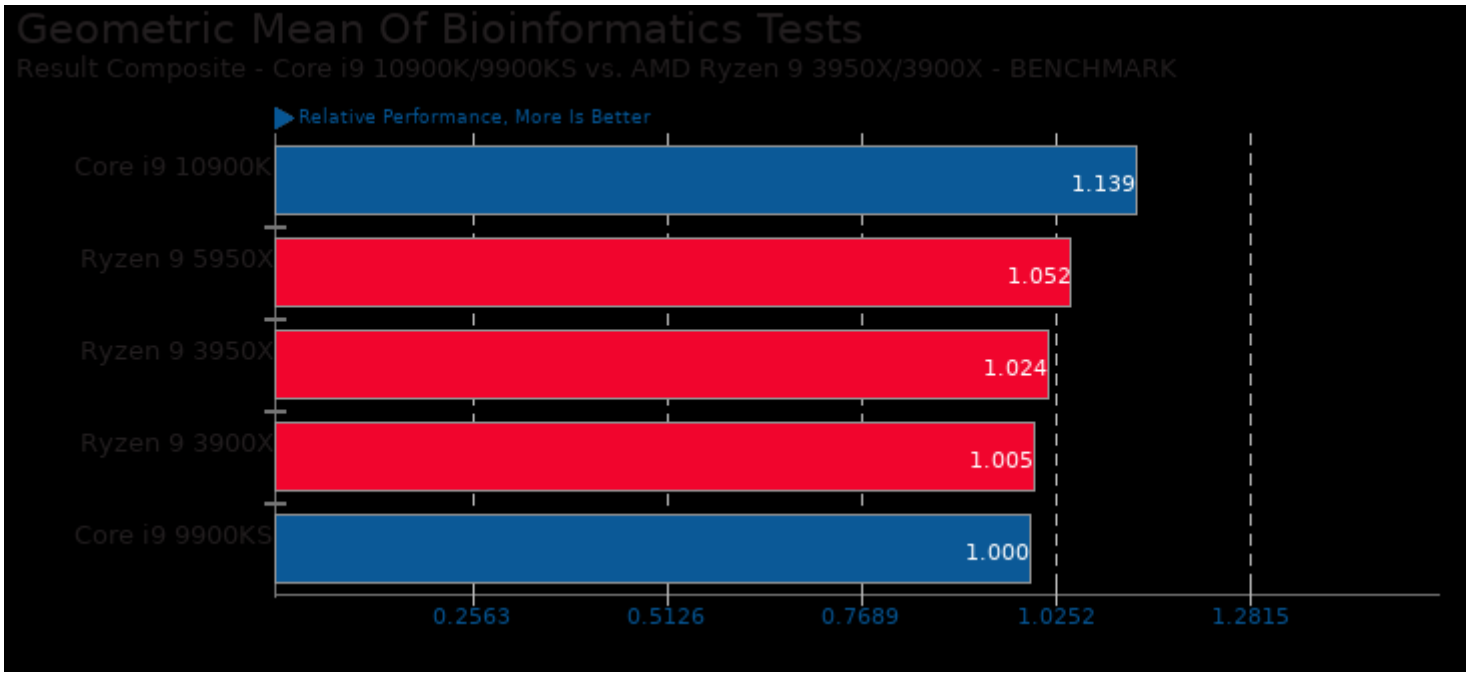
These geometric means are based upon test groupings / test suites for this result file.



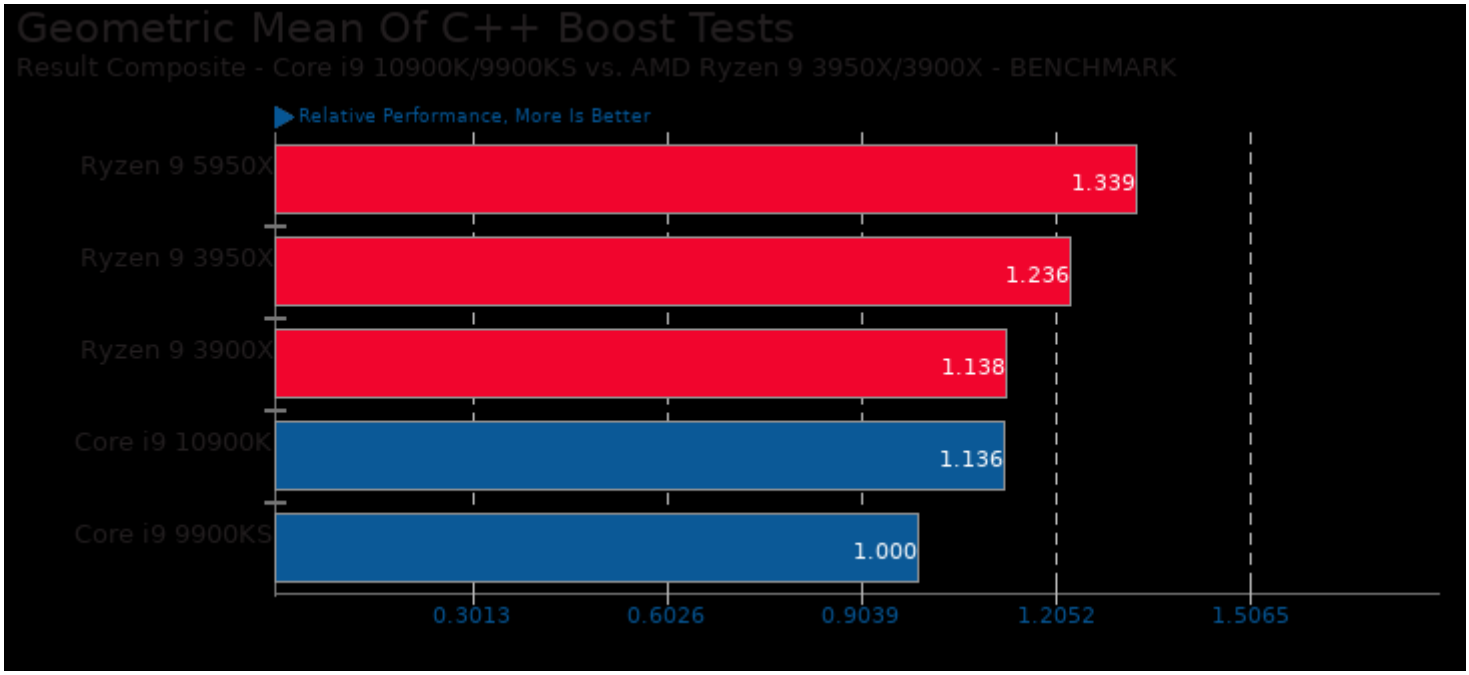
Geometric mean based upon tests: pts/encode-mp3, pts/encode-ogg and pts/encode-flac



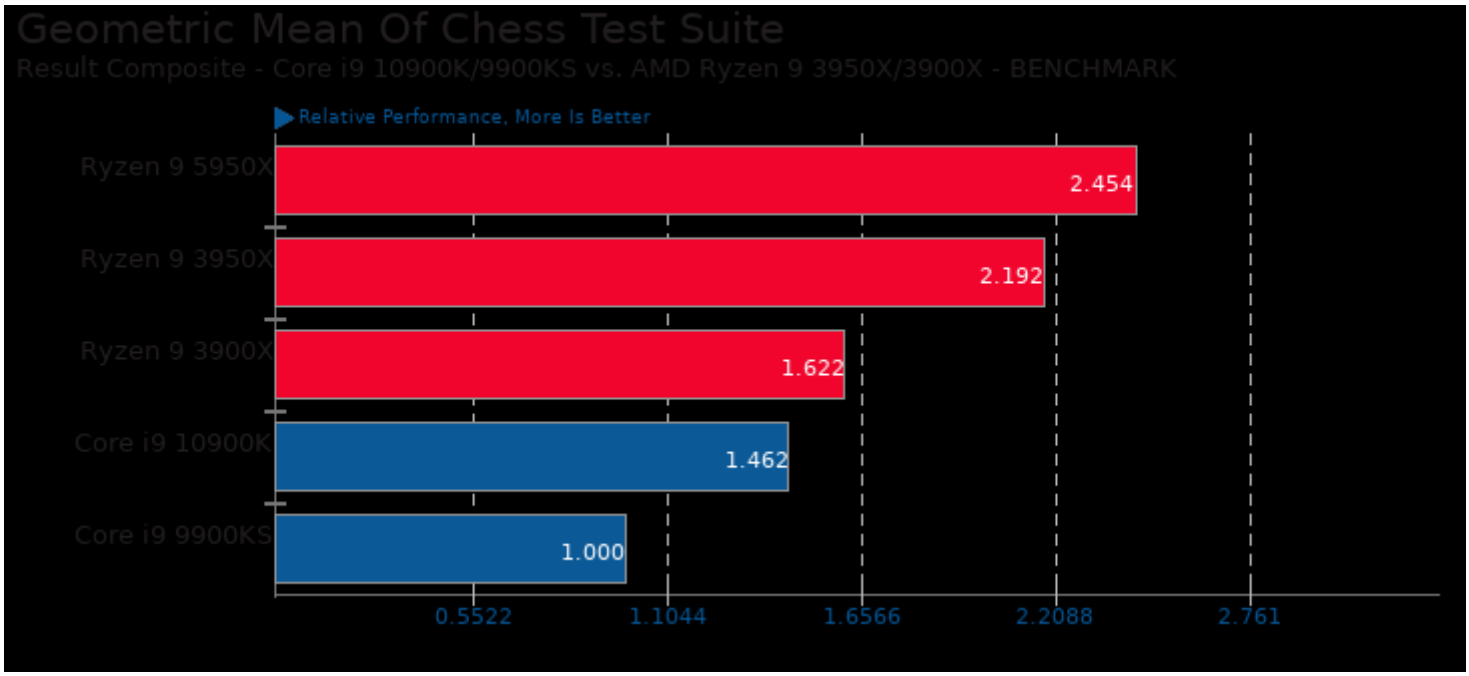
Geometric mean based upon tests: pts/dav1d and pts/svt-av1



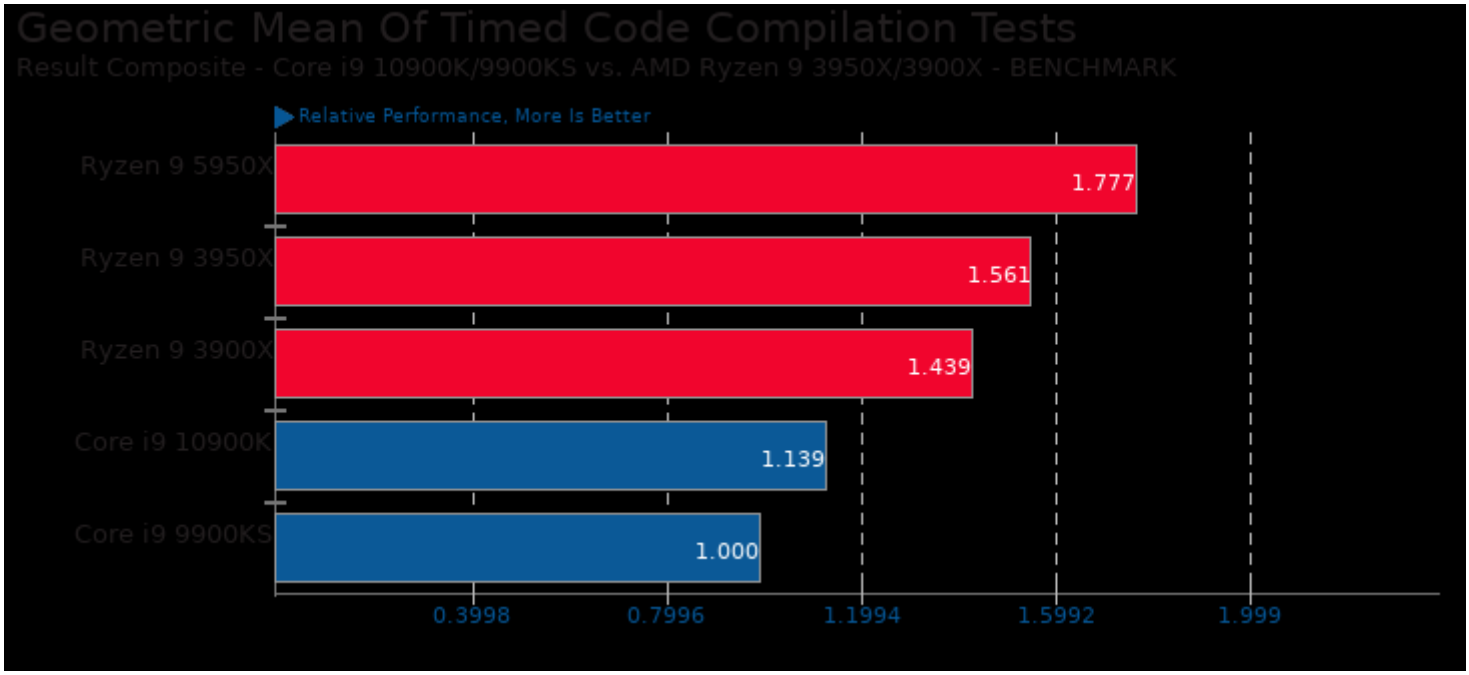
Geometric mean based upon tests: pts/himeno, pts/mrbayes and pts/hmmer



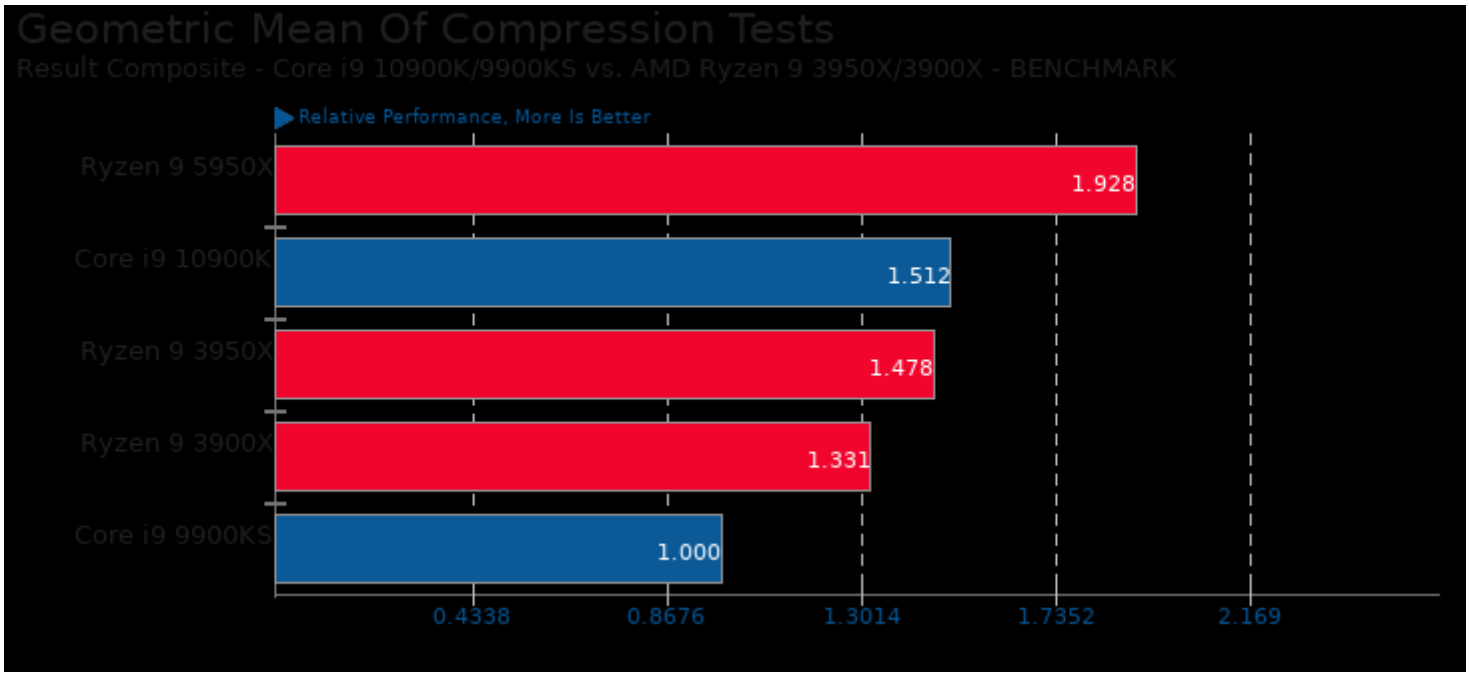
Geometric mean based upon tests: pts/minion and pts/povray



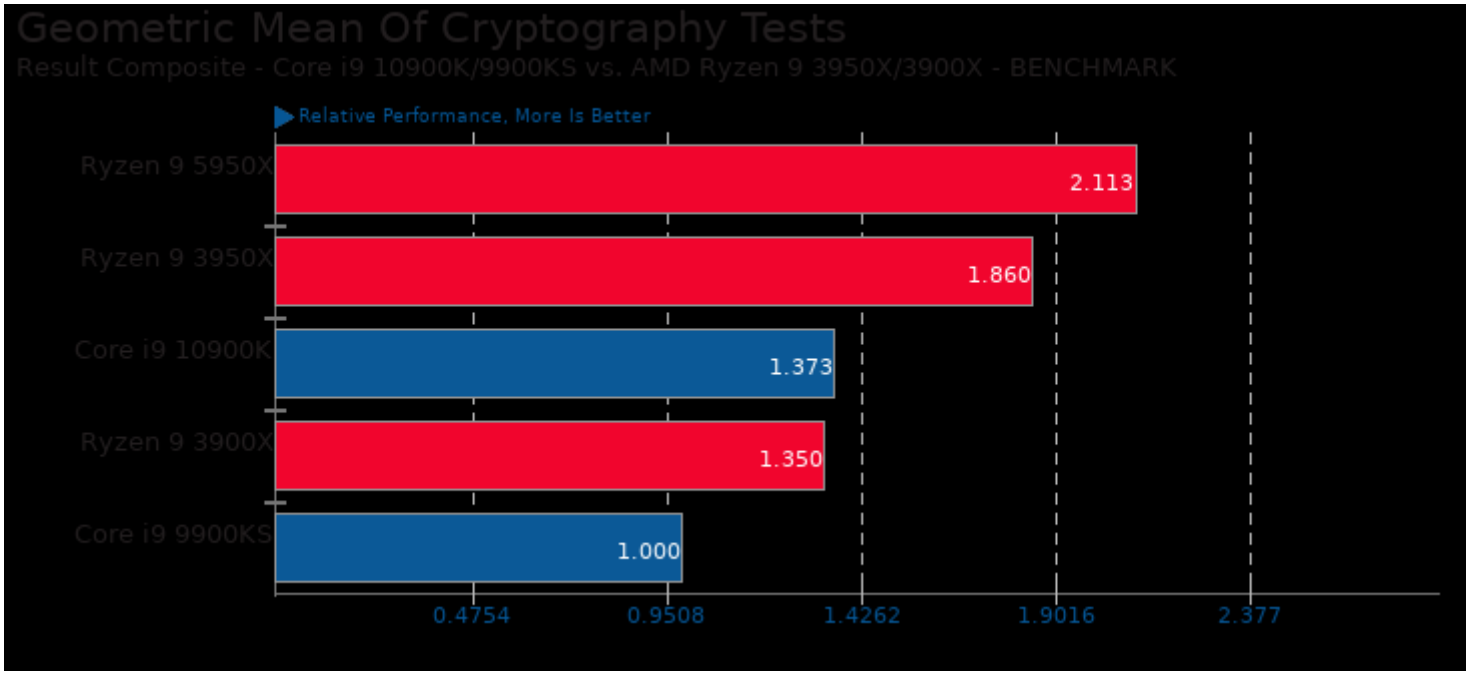
Geometric mean based upon tests: pts/stockfish, pts/asmfish, pts/n-queens and pts/m-queens



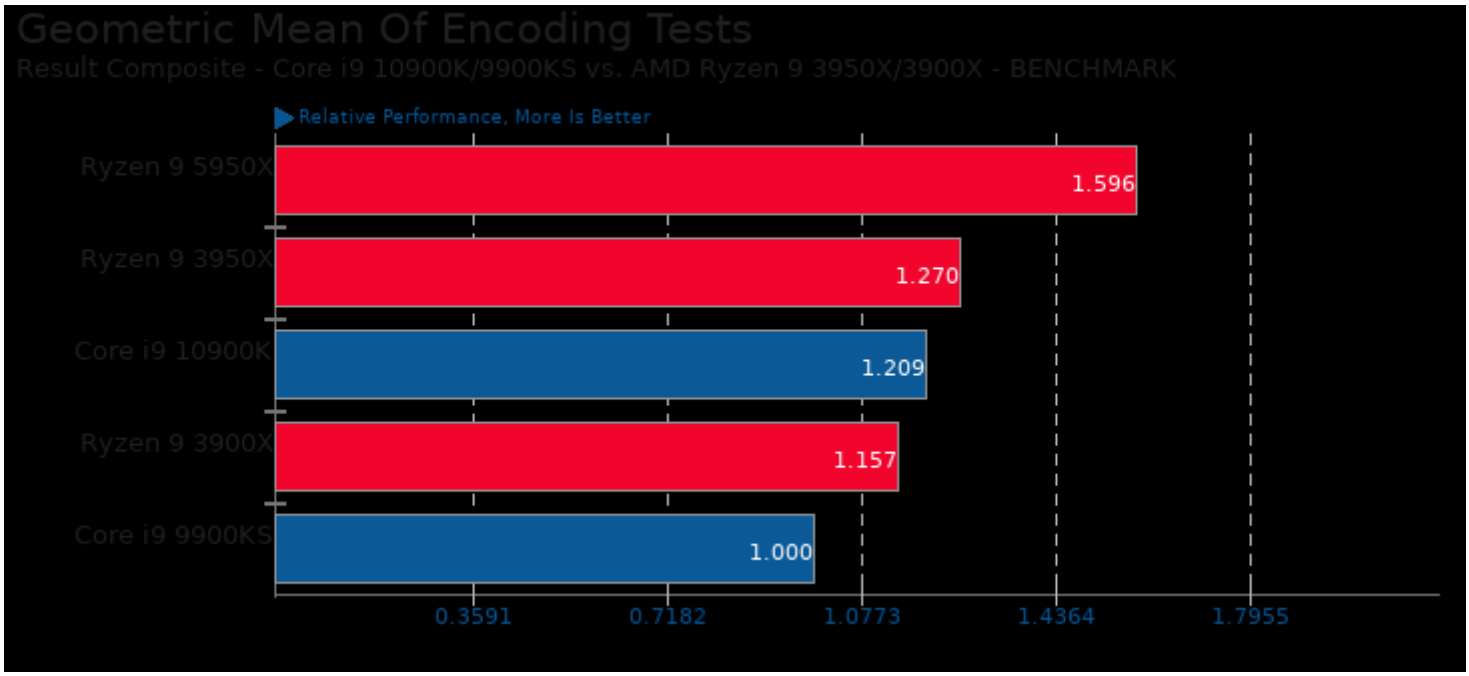
Geometric mean based upon tests: pts/build-php, pts/build-linux-kernel, pts/build-imagemagick, pts/build-llvm and pts/build2



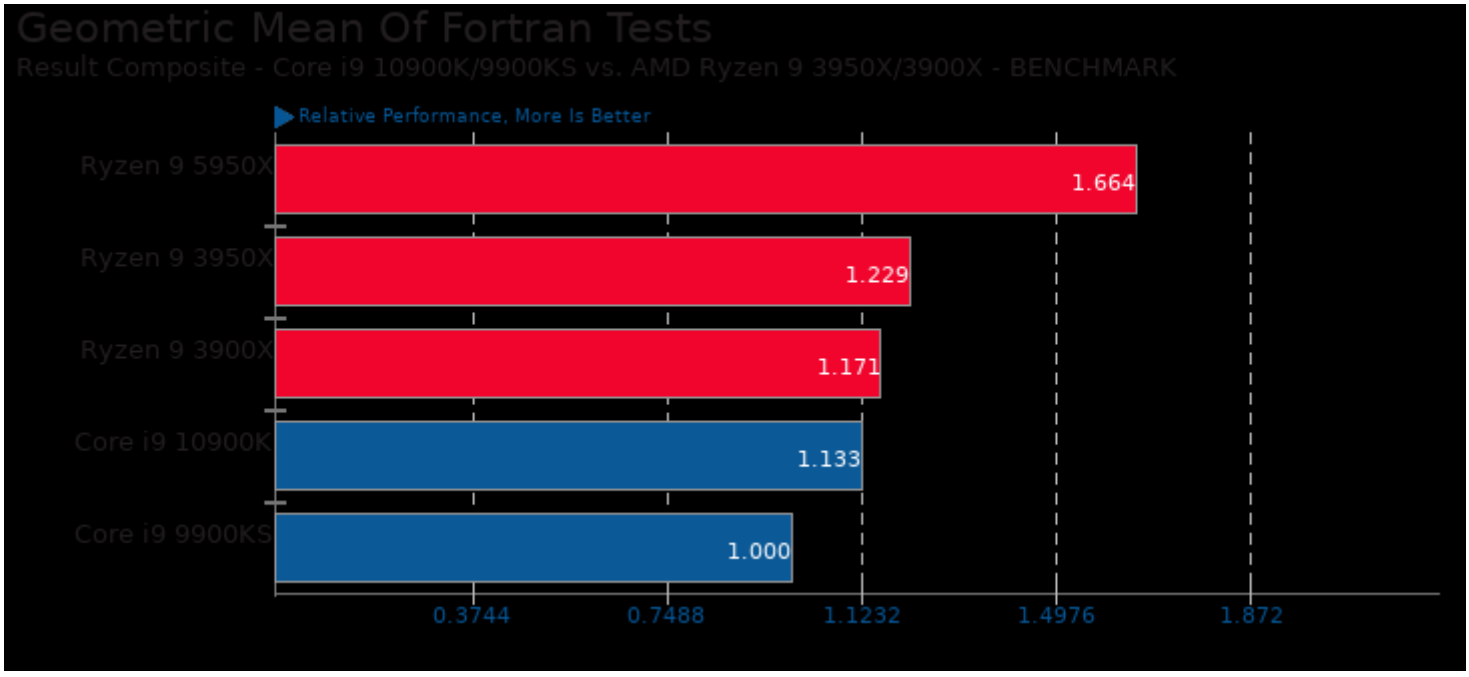
Geometric mean based upon tests: pts/compress-7zip, pts/compress-zstd and pts/compress-xz



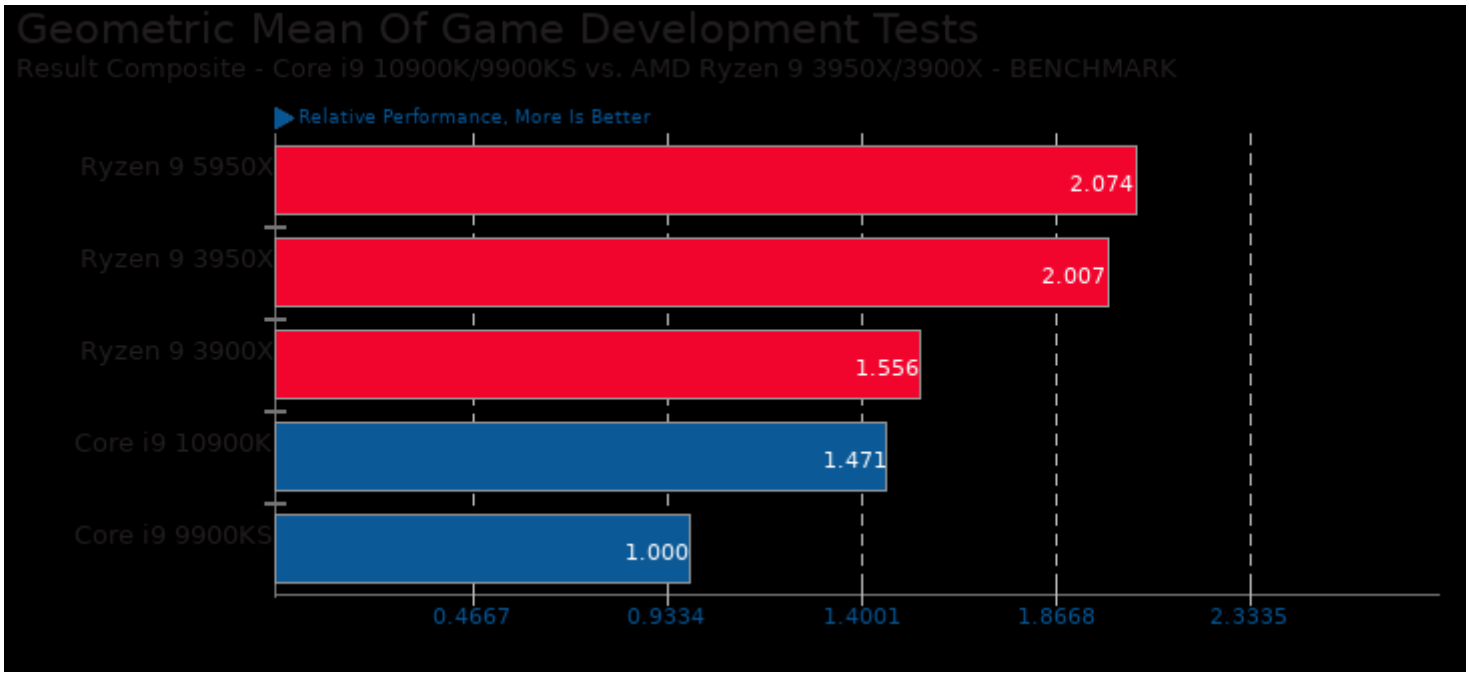
Geometric mean based upon tests: pts/openssl, pts/john-the-ripper and pts/cpuminer-opt



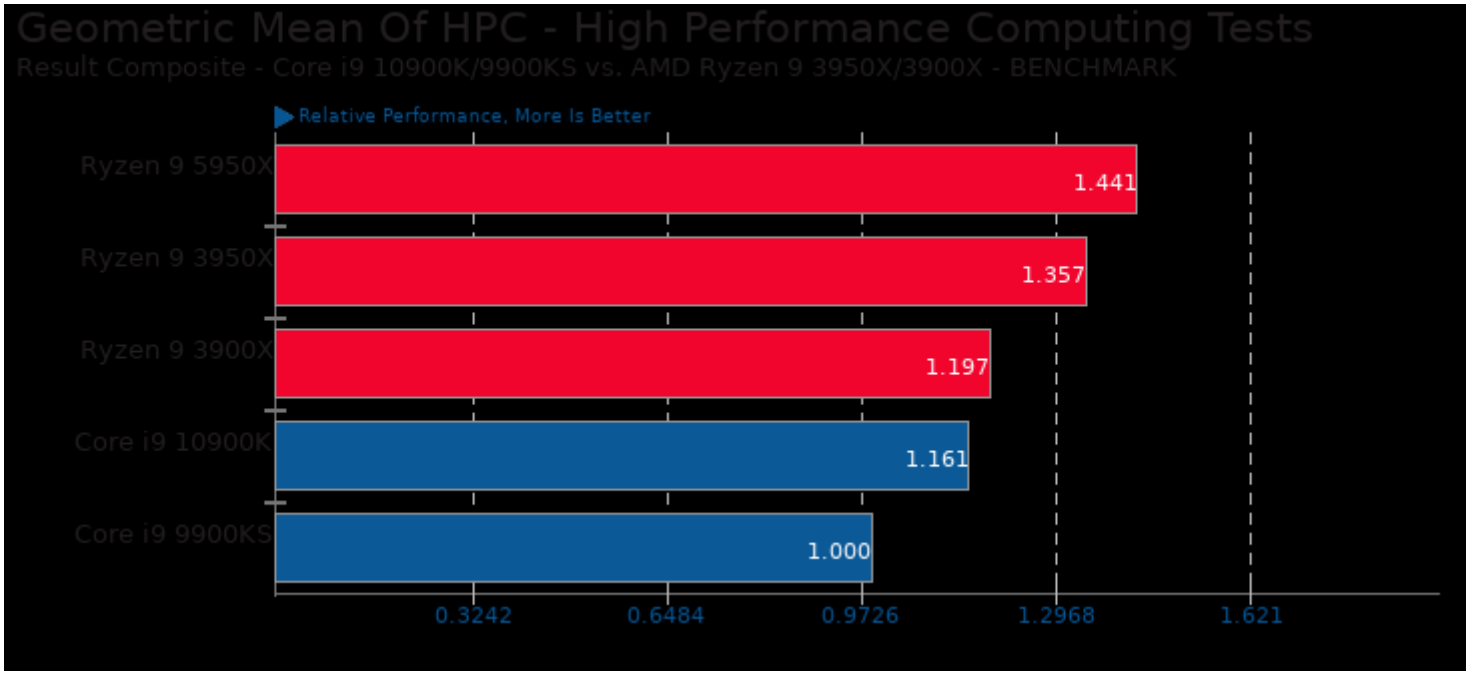
Geometric mean based upon tests: pts/encode-mp3, pts/encode-ogg, pts/encode-flac, pts/svt-vp9, pts/svt-hevc, pts/x264, pts/x265, pts/dav1d and pts/svt-av1



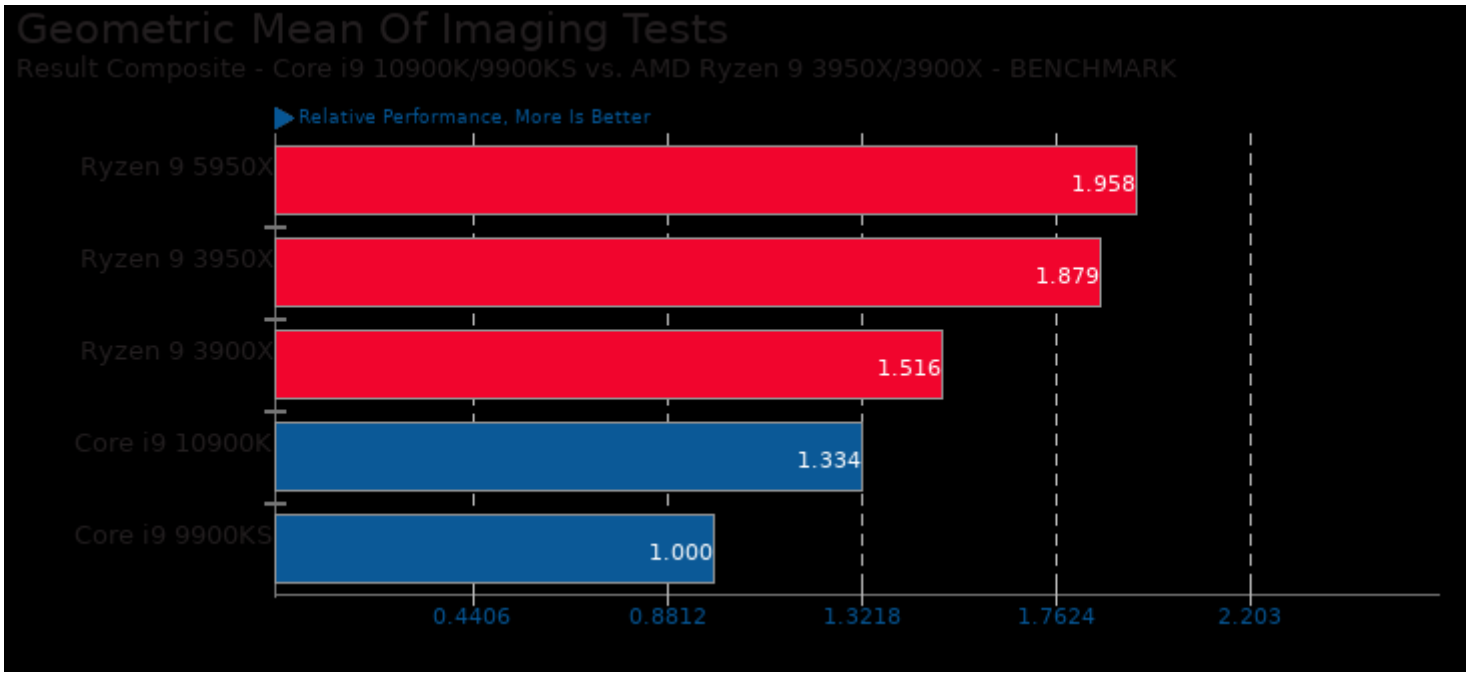
Geometric mean based upon tests: pts/cloverleaf, pts/polyhedron and pts/lammps



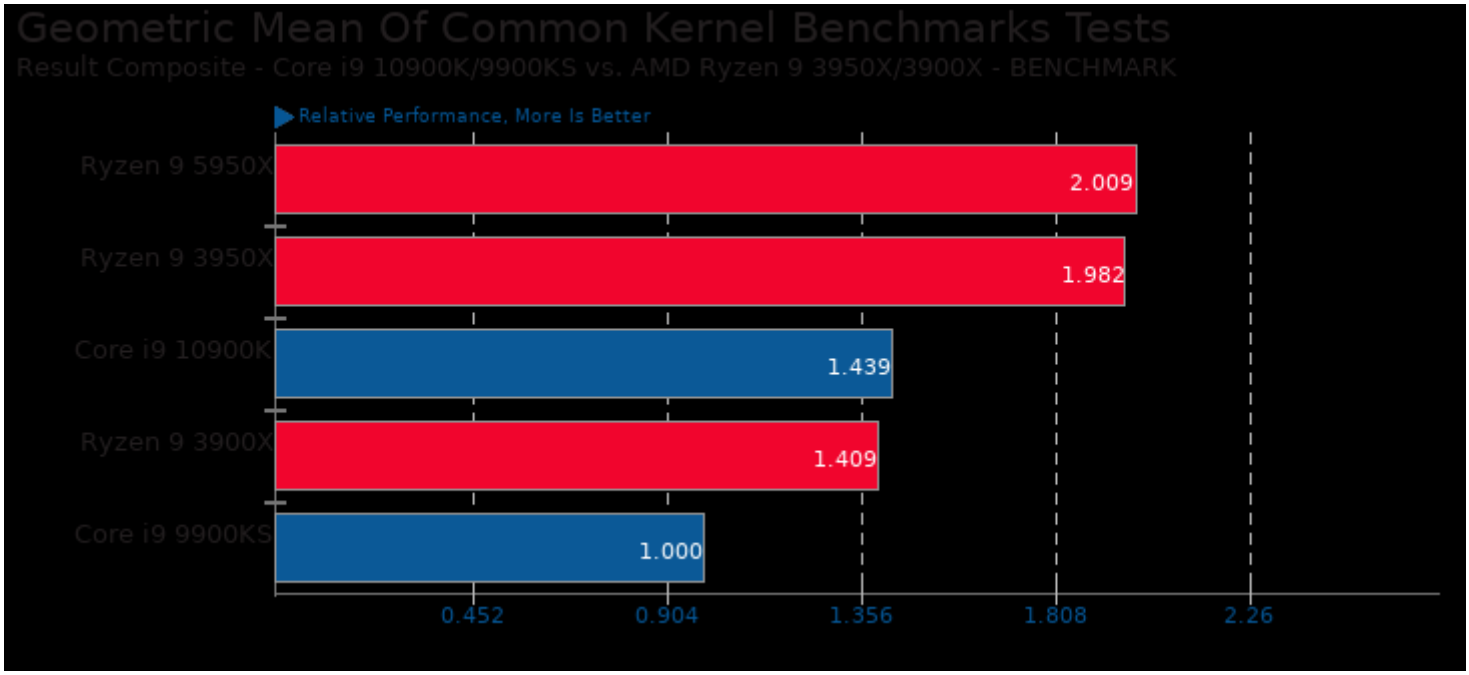
Geometric mean based upon tests: pts/blender and pts/oidn



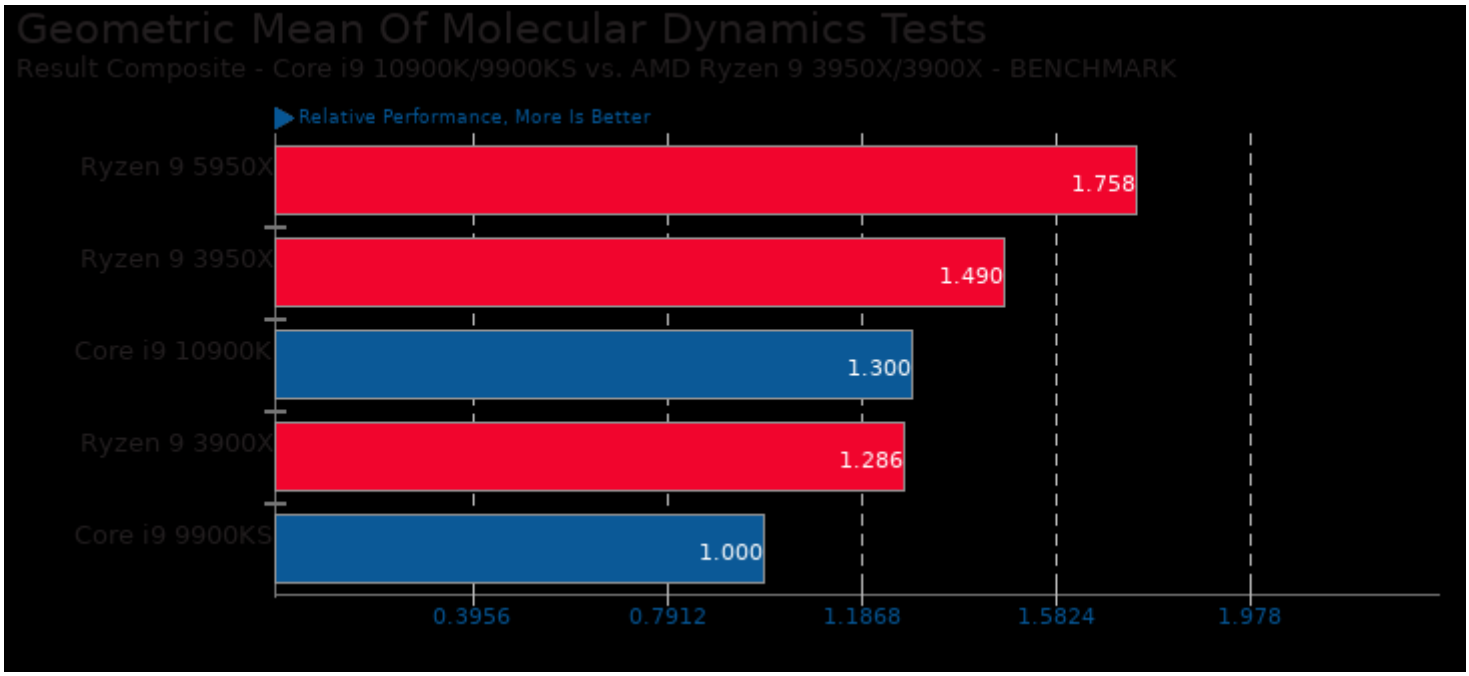
Geometric mean based upon tests: pts/rodinia, pts/fftw, pts/mt-dgemm, pts/namd, pts/gromacs, pts/cloverleaf, pts/lammps, pts/himeno, pts/mrbayes, pts/hmmer, pts/deepspeech and pts/mlpack



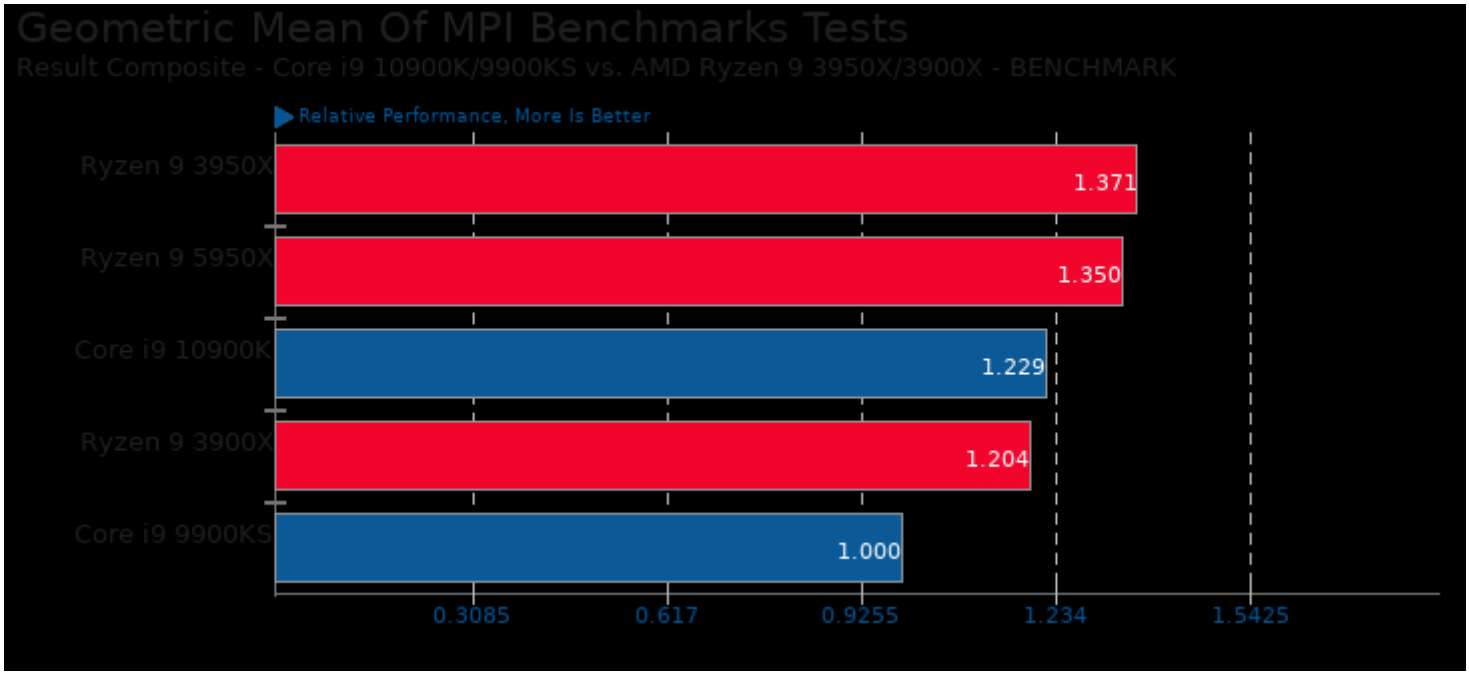
Geometric mean based upon tests: pts/graphics-magick, system/gimp and system/darktable



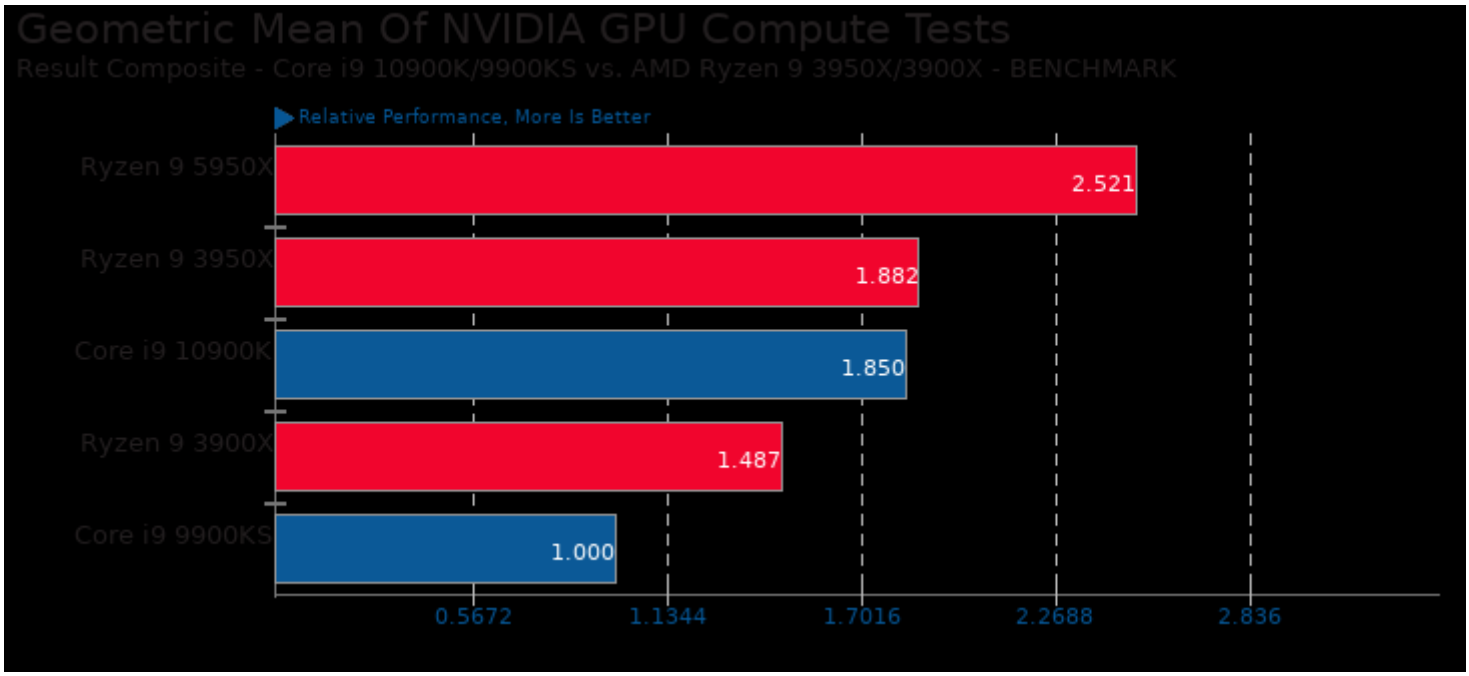
Geometric mean based upon tests: pts/openssl, pts/stress-ng and pts/rocksdb



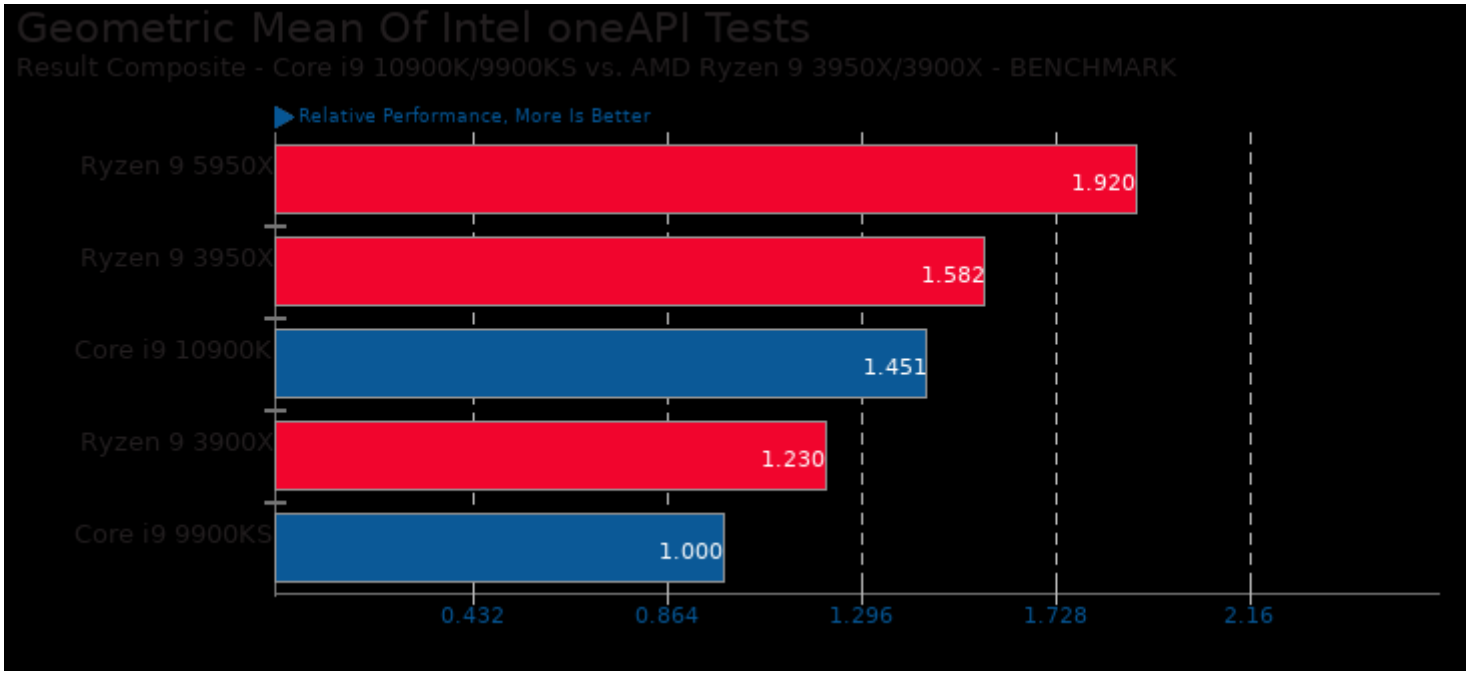
Geometric mean based upon tests: pts/namd, pts/gromacs, pts/cloverleaf and pts/lammps



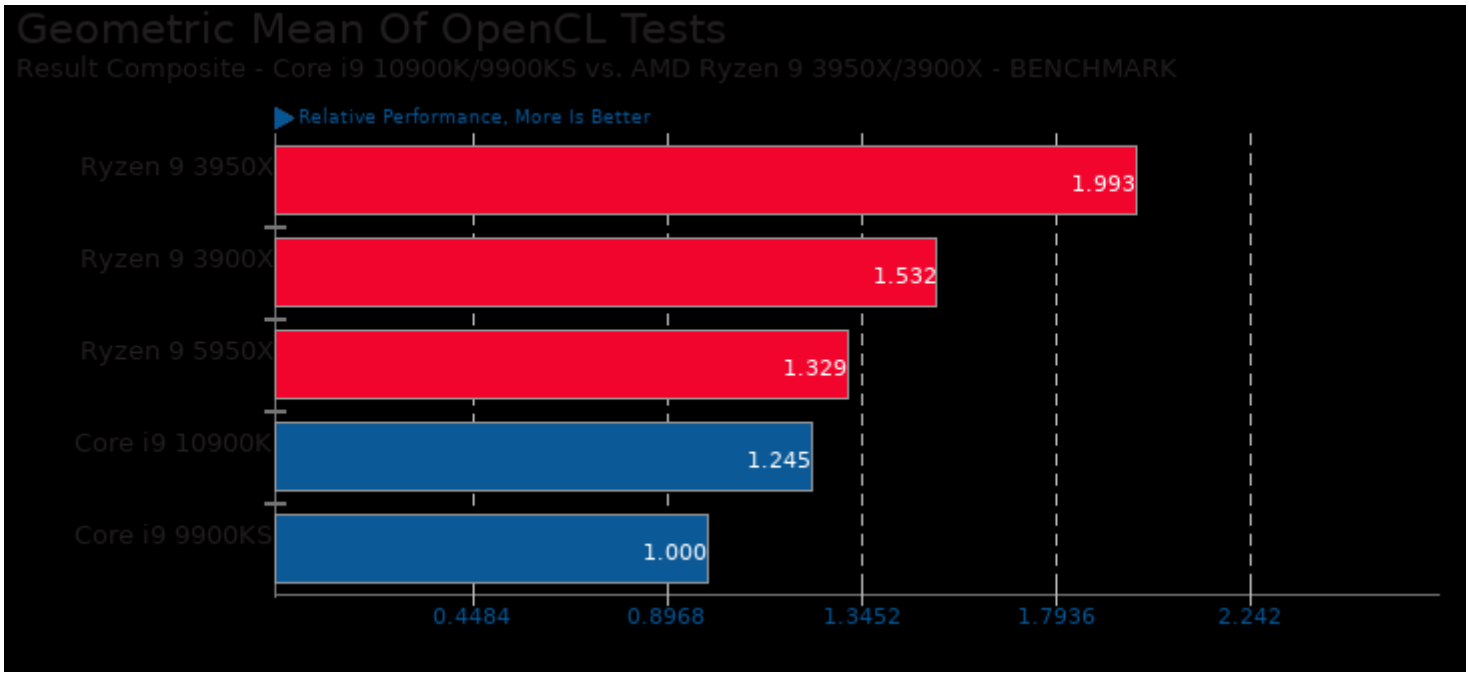
Geometric mean based upon tests: pts/lammps, pts/gromacs and pts/mrbayes



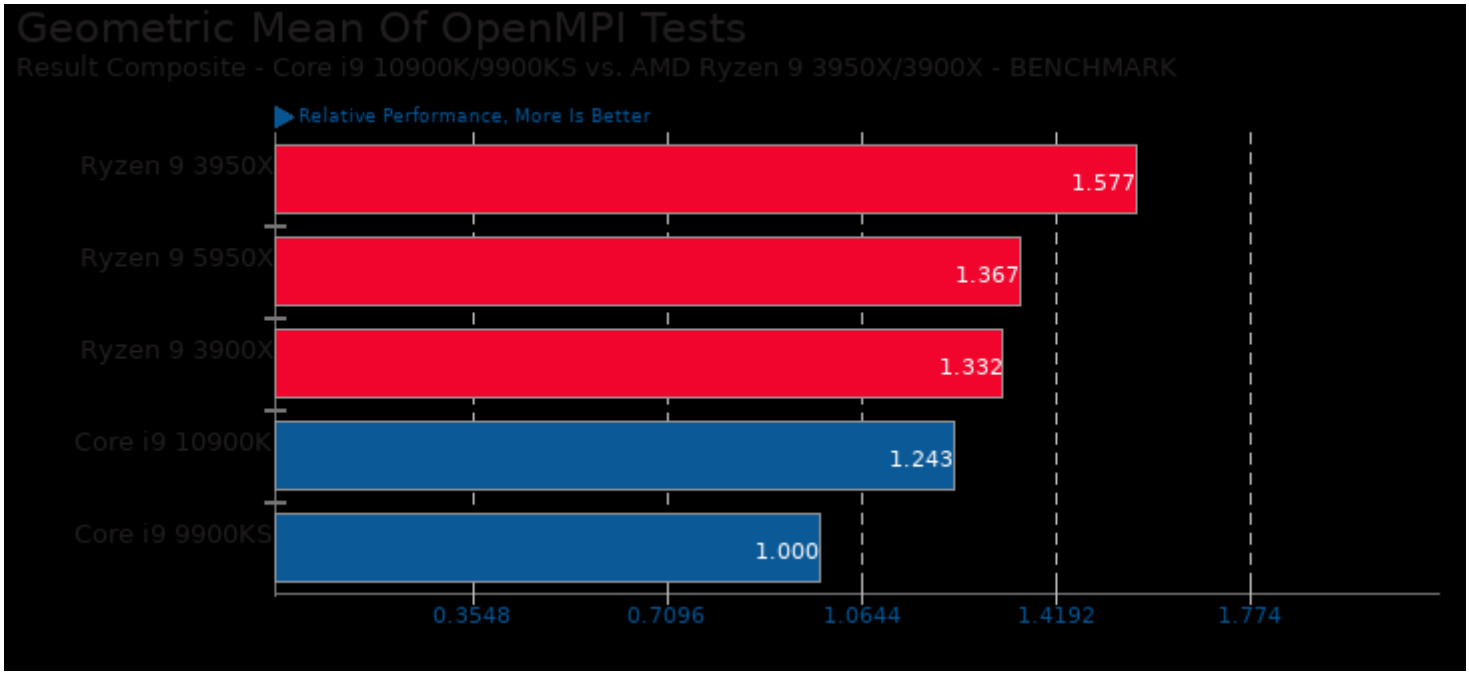
Geometric mean based upon tests: pts/gromacs, pts/luxcorerender, pts/rodinia, pts/indigobench and pts/blender



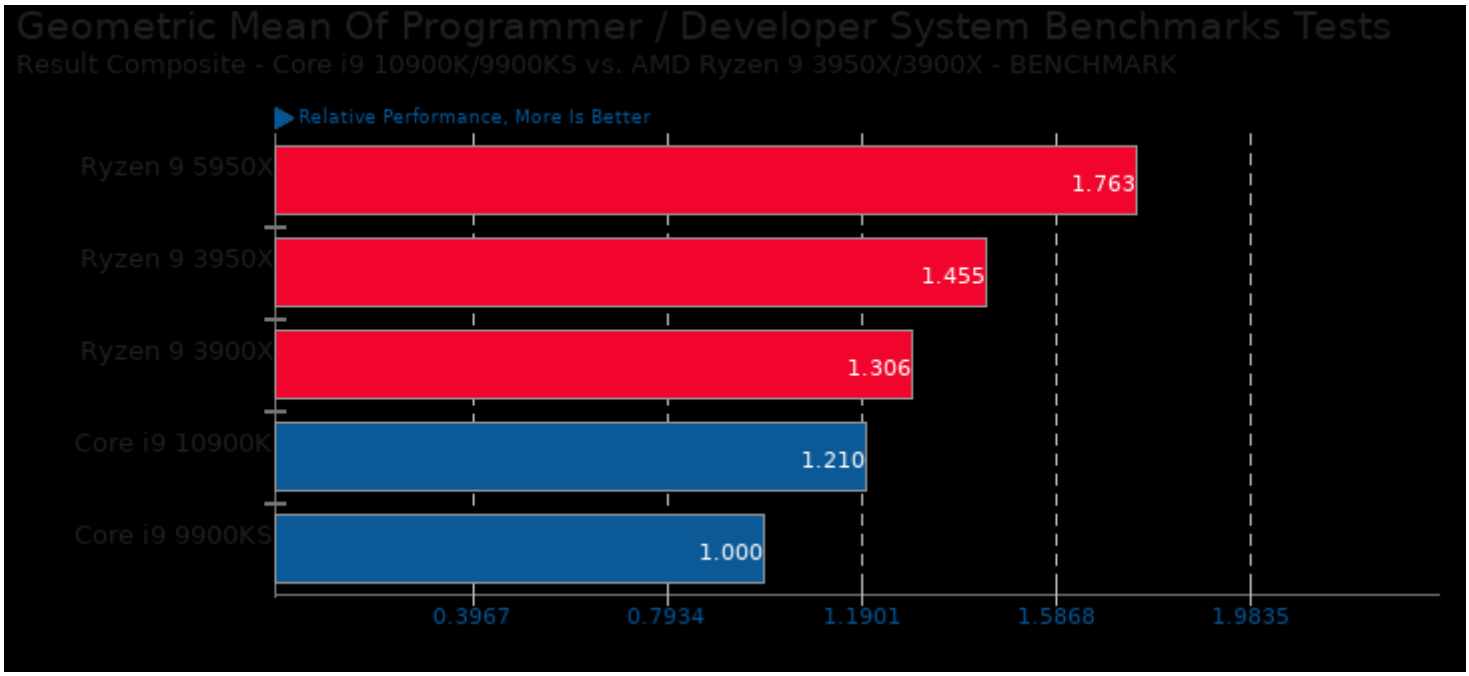
Geometric mean based upon tests: pts/embree, pts/oidn, pts/ospray and pts/tungsten



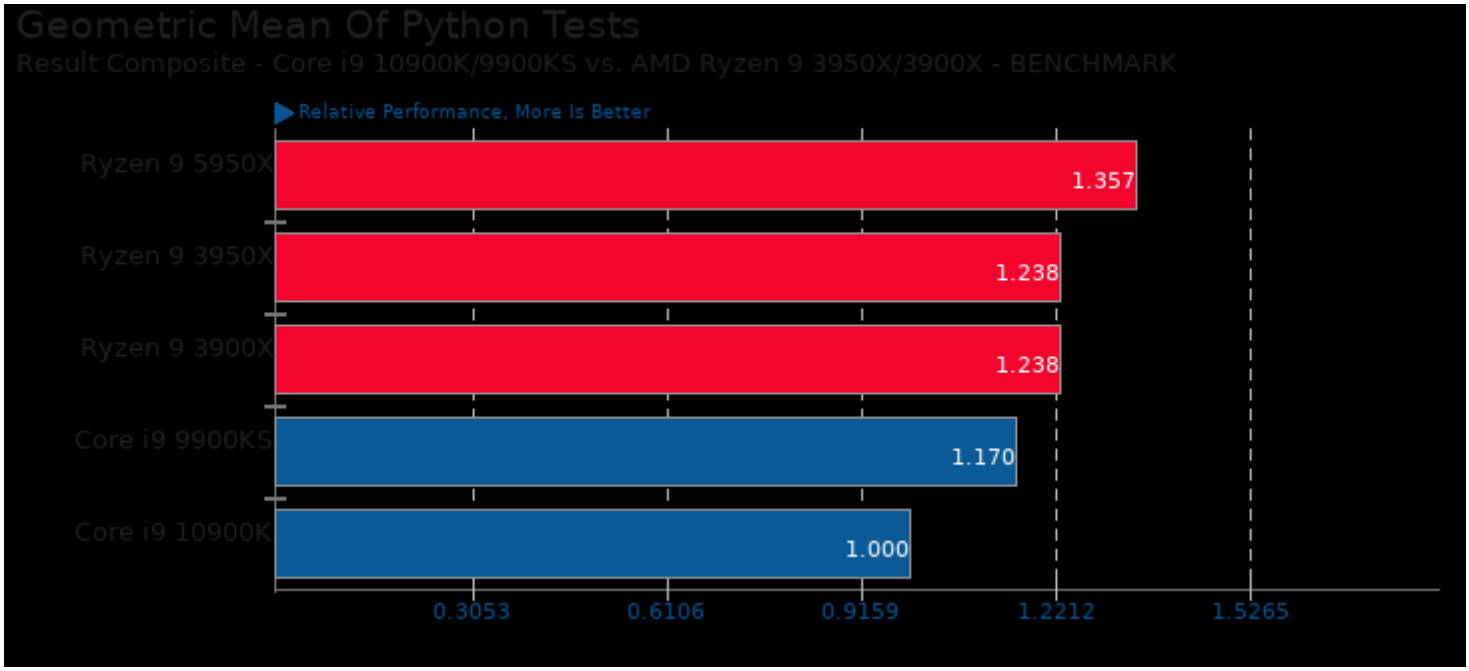
Geometric mean based upon tests: pts/rodinia and system/darktable



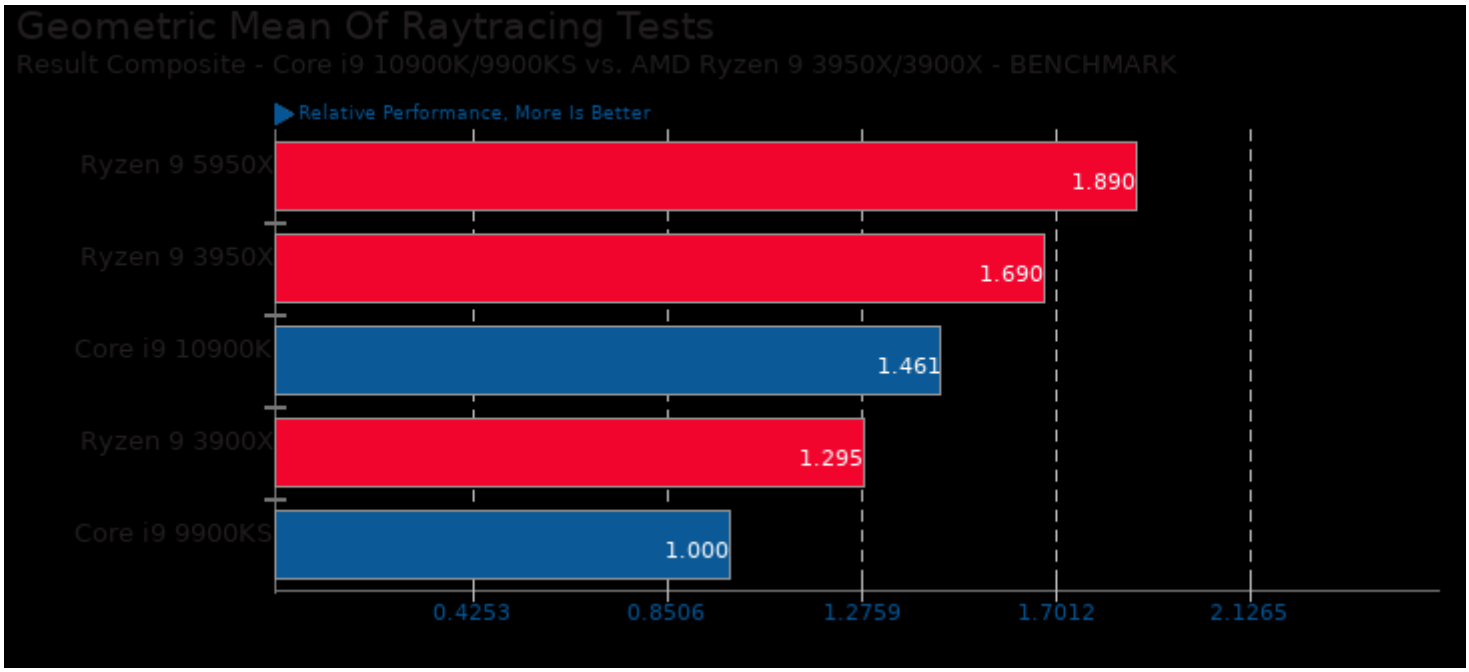
Geometric mean based upon tests: pts/cloverleaf, pts/rodinia, pts/mrbayes and pts/lammps



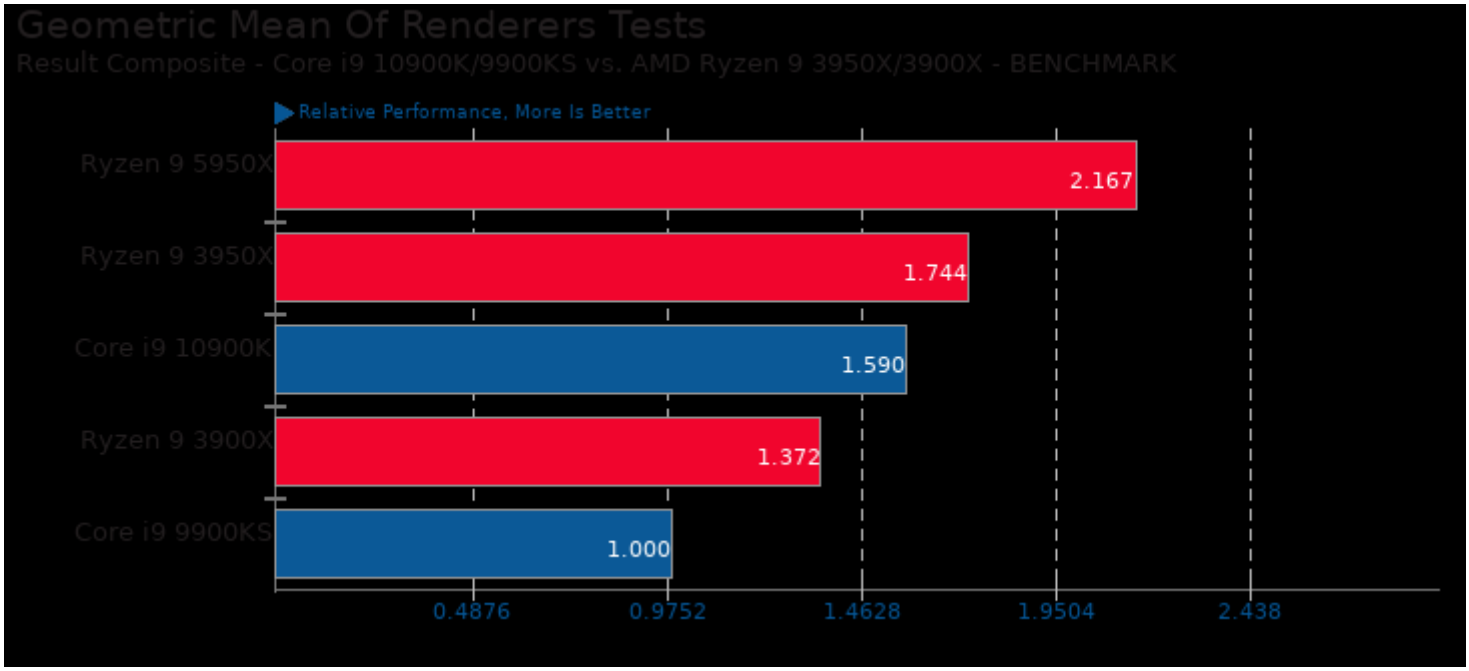
Geometric mean based upon tests: pts/compress-zstd, pts/pybench, pts/build-php, pts/build-linux-kernel, pts/build-imagemagick, pts/build-llvm, pts/build2 and pts/mt-dgemm



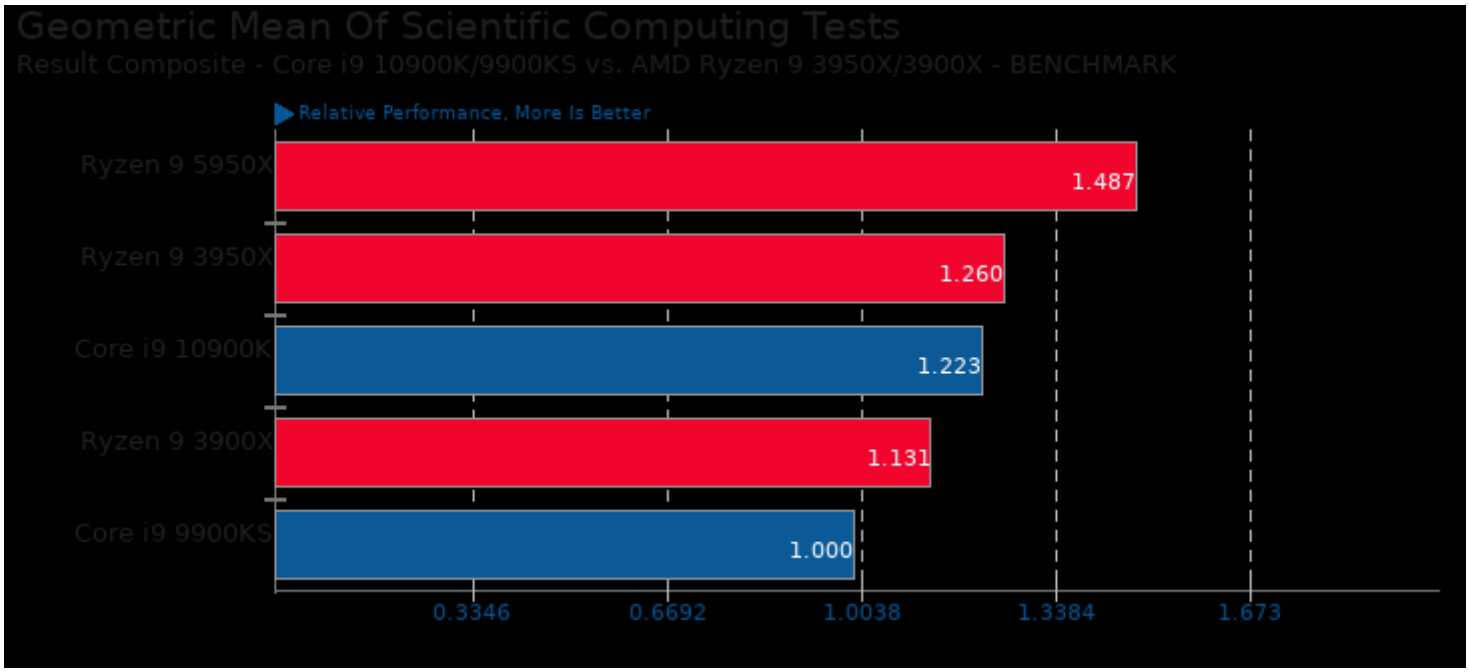
Geometric mean based upon tests: pts/pybench and pts/mlpack



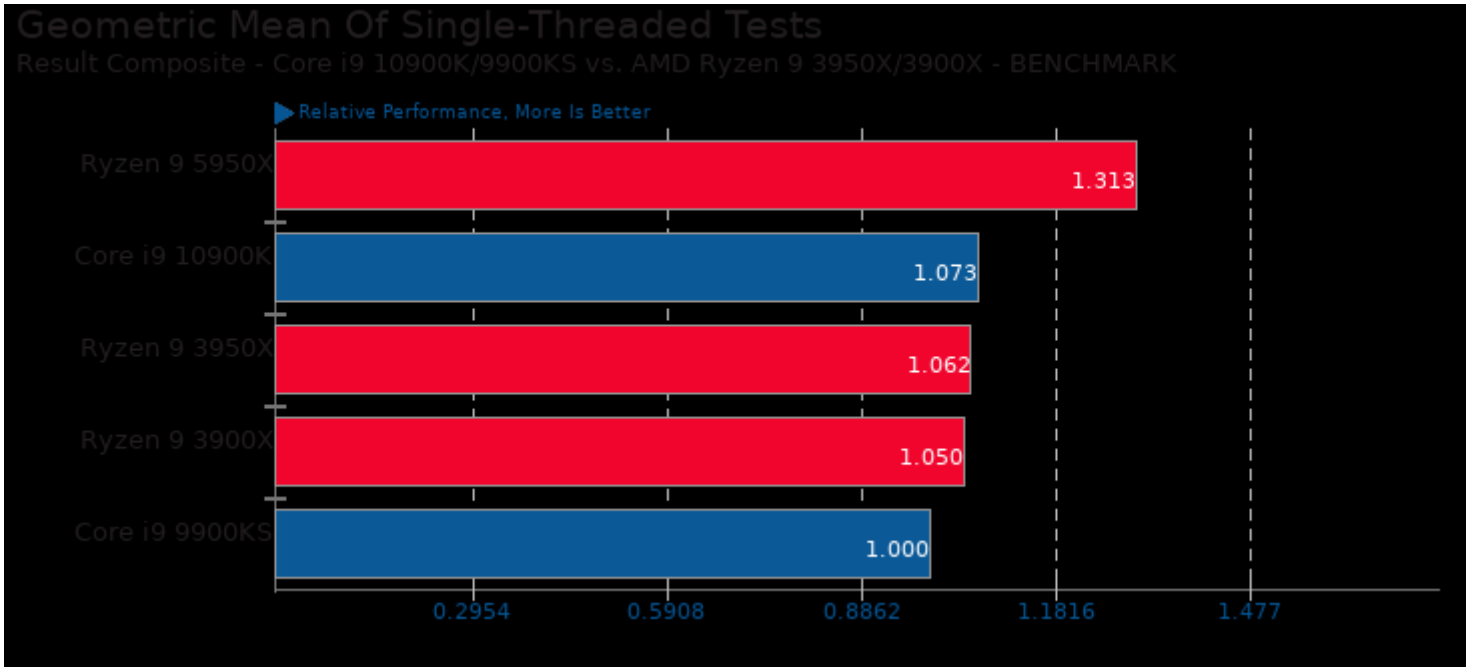
Geometric mean based upon tests: pts/ospray, pts/c-ray, pts/tachyon, pts/povray and pts/rays1bench



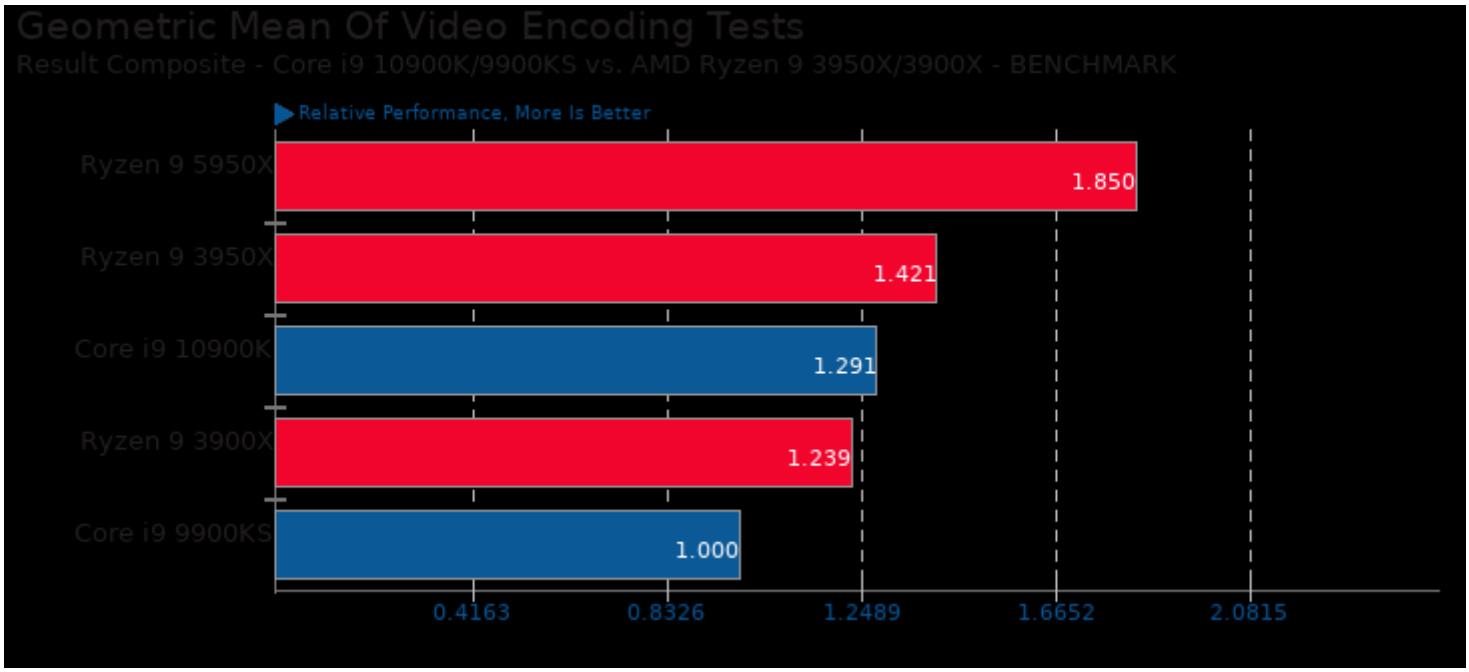
Geometric mean based upon tests: pts/ospray, pts/c-ray, pts/tachyon, pts/povray, pts/rays1bench, pts/blender, pts/tungsten, pts/appleseed, pts/radiance, pts/luxcorerender, pts/smallpt, pts/ttsiod-renderer and pts/indigobench



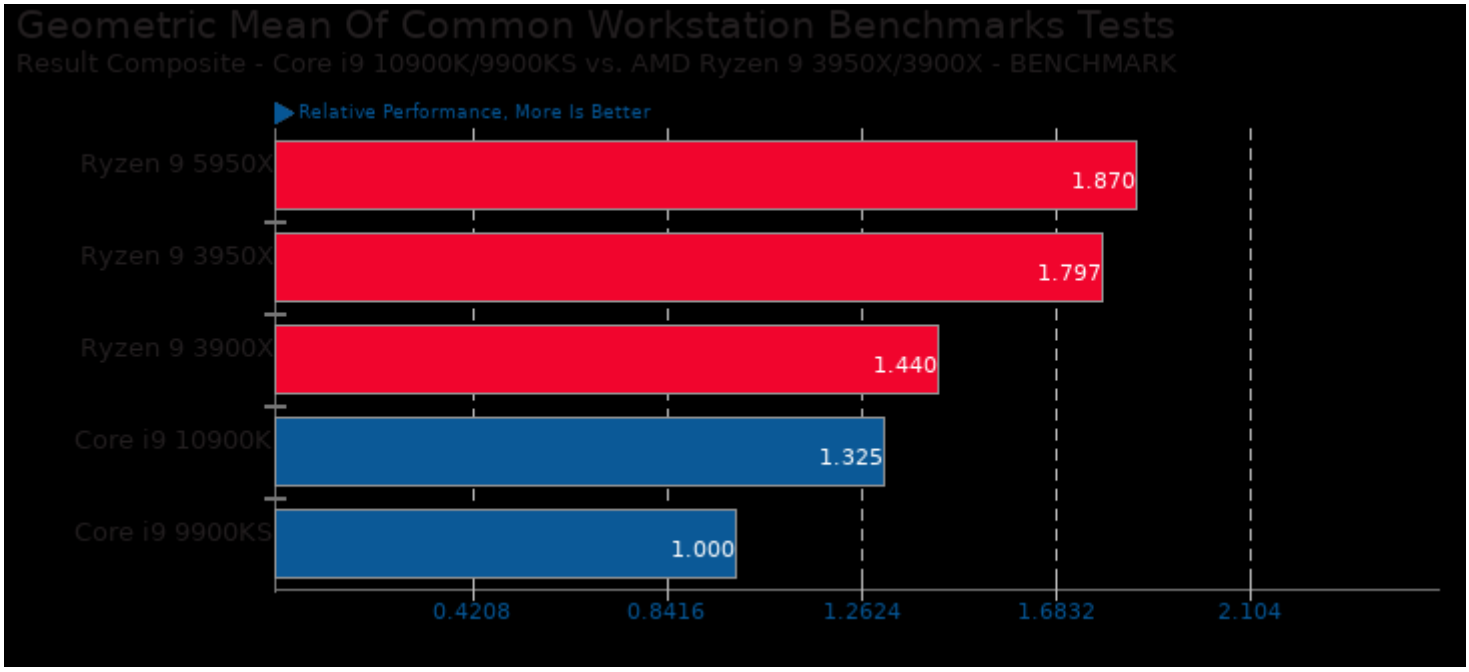
Geometric mean based upon tests: pts/fftw, pts/mt-dgemm, pts/namd, pts/gromacs, pts/cloverleaf, pts/lammps, pts/himeno, pts/mrbayes and pts/hmmer



Geometric mean based upon tests: pts/polyhedron, pts/deepspeech, pts/encode-flac, pts/encode-mp3, pts/encode-ogg, pts/espeak, pts/minion, pts/radiance and pts/pybench



Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x264, pts/x265, pts/dav1d and pts/svt-av1



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

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