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AMD Threadripper 2990WX Linux Benchmarks

Initial AMD Ryzen Threadripper 2990WX benchmarks on Ubuntu 18.04 LTS Linux with upgrading to the Linux 4.18 Git kernel, CFLAGS/CXXFLAGS of "-O3 -march=native", using the newer GCC 8.2 code compiler for building out all tests on each respective Intel/AMD CPU microarchitecture, etc. Tests by Michael Larabel for a future article on Phoronix.com. Under embargo until 13 August.

Automated Executive Summary

Threadripper 2990WX had the most wins, coming in first place for 65% of the tests.

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

Smallpt (Global Illumination Renderer; 128 Samples) at 15.188x
Rodinia (Test: OpenMP LavaMD) at 10.526x
ebizzy at 5.26x
OpenSSL (RSA 4096-bit Performance) at 4.886x
C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 4.692x
Blender (Blend File: Classroom - Compute: CPU-Only) at 4.659x
N-Queens (Elapsed Time) at 4.645x
m-queens (Time To Solve) at 4.554x
Primesieve (1e12 Prime Number Generation) at 4.486x
Blender (Blend File: Barbershop - Compute: CPU-Only) at 4.259x.

Test Systems:

Core i7 5960X

Processor: Intel Core i7-5960X @ 3.50GHz (8 Cores / 16 Threads), Motherboard: ASRock X99 Extreme3 (P3.70 BIOS), Chipset: Intel Xeon E7 v3/Xeon, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW Protection

Core i7 8700K

Processor: Intel Core i7-8700K @ 4.70GHz (6 Cores / 12 Threads), Motherboard: ASUS TUF Z370-PLUS GAMING (1002 BIOS), Chipset: Intel Device 3ec2, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp Protection

Core i9 7900X

Processor: Intel Core i7-7900X @ 4.50GHz (10 Cores / 20 Threads), Motherboard: ASRock X299 Extreme4 (P1.30 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW Protection

Core i9 7960X

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5

Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW Protection

Core i9 7980XE

Processor: Intel Core i9-7980XE @ 4.20GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A (1401 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW Protection

Ryzen 7 2700X

Processor: AMD Ryzen 7 2700X Eight-Core @ 3.70GHz (8 Cores / 16 Threads), Motherboard: ASUS ROG CROSSHAIR VII HERO (WI-FI) (0804 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp Protection

Threadripper 1950X

Processor: AMD Ryzen Threadripper 1950X 16-Core @ 3.40GHz (16 Cores / 32 Threads), Motherboard: Gigabyte X399 AORUS Gaming 7 (F10 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp Protection

Threadripper 2950X

Processor: AMD Ryzen Threadripper 2950X 16-Core @ 3.50GHz (16 Cores / 32 Threads), Motherboard: MSI MEG X399 CREATION (MS-7B92) v1.0 (1.0EN43 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release

Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp Protection

Threadripper 2990WX

Processor: AMD Ryzen Threadripper 2990WX 32-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: ASUS ROG ZENITH EXTREME (0064 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 280GB INTEL SSDPE21D280GA

OS: Ubuntu 18.04, Kernel: 4.18.0-999-generic (x86_64) 20180728, Desktop: GNOME Shell 3.28.2, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 8.2.0, File-System: ext4

Environment Notes: CXXFLAGS=-O3-march=native LIBGL_AWLAYS_SOFTWARE=true CFLAGS=-O3-march=native
Compiler Notes: --disable-multilib --enable-checking=release
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp Protection

ASUS-defaults-No-OC

Processor: Intel Xeon W-3175X @ 4.30GHz (28 Cores / 56 Threads), Motherboard: ASUS ROG DOMINUS EXTREME (0704 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 94GB, Disk: 480GB INTEL SSDPE21D480GA, Graphics: MSI NVIDIA GeForce RTX 2080 Ti 11GB, Audio: Realtek ALC1220, Monitor: LG HDR 4K, Network: Intel I219-LM + Aquantia AQC107 NBase-T/IEEE + Intel-AC 9260

OS: Ubuntu 20.10, Kernel: 5.8.0-48-generic (x86_64), Desktop: GNOME Shell 3.38.2, Display Server: X Server 1.20.9, Display Driver: NVIDIA 460.67, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.2.162, Vulkan: 1.2.155, Compiler: GCC 10.2.0 + CUDA 11.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0x2006a08
OpenCL Notes: GPU Compute Cores: 4352
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Mitigation of Clear buffers; SMT vulnerable

ASUS-defaults-NO-OC

Processor: Intel Xeon W-3175X @ 4.30GHz (28 Cores / 56 Threads), Motherboard: ASUS ROG DOMINUS EXTREME (0704 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 94GB, Disk: 480GB INTEL SSDPE21D480GA, Graphics: MSI NVIDIA GeForce RTX 2080 Ti 11GB, Audio: Realtek ALC1220, Monitor: LG HDR 4K, Network: Intel I219-LM + Aquantia AQC107 NBase-T/IEEE + Intel-AC 9260

OS: Ubuntu 20.10, Kernel: 5.8.0-48-generic (x86_64), Desktop: GNOME Shell 3.38.2, Display Server: X Server 1.20.9, Display Driver: NVIDIA 460.67, OpenCL: OpenCL 1.2 CUDA 11.2.162, Vulkan: 1.2.155, Compiler: GCC 10.2.0 + CUDA 11.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug

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--enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0x2006a08
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Mitigation of Clear buffers; SMT vulnerable

	Core i7 5960X	Core i7 8700K	Core i9 7900X	Core i9 7960X	Core i9 7980XE	Ryzen 7 2700X	Threadripper 1950X	Threadripper 2950X	Threadripper 2990WX	ASUS-defaults-No-OC	ASUS-defaults-NO-OC
ebizzy (Records/s)	**264858**	421715	320321	533415	642517	542069	858325	856141	**1393189**		820017
Normalized	19.01%	30.27%	22.99%	38.29%	46.12%	38.91%	61.61%	61.45%	100%		58.86%
Standard Deviation	1.7%	2.6%	2.8%	2.4%	2.5%	3.2%	4.9%	4.5%	1.1%		0.3%
OpenSSL - R.4.b.P (Signs/sec)	**1200**	1977	3058	4418	4694	1715	3050	3354	**5863**		
Normalized	20.47%	33.72%	52.15%	75.35%	80.07%	29.25%	52.02%	57.21%	100%		
Standard Deviation	0%	0.3%	0.5%	0%	0.1%	0.3%	0.2%	0.2%	0.4%		
C-Ray - Total Time - 4.1.R.P.P (sec)	**82.76**	72.87	51.37	35.85	33.69	59.48	32.79	31.21	**17.64**		24.545
Normalized	21.31%	24.21%	34.34%	49.21%	52.36%	29.66%	53.8%	56.52%	100%		71.87%
Standard Deviation	0.1%	0%	0.1%	0%	0.1%	0.2%	0.6%	0.3%	0.4%		0.1%
Blender - Classroom - CPU-Only (sec)	**712.65**	621.84	418.71	276.04	260.34	503.96	292.83	276.57	155.55		**152.96**
Normalized	21.46%	24.6%	36.53%	55.41%	58.75%	30.35%	52.24%	55.31%	98.33%		100%
N-Queens - Elapsed Time	18.52	**19.60**	12.73	8.86	8.34	14.10	7.93	7.26	**4.22**		4.787
Normalized	22.79%	21.53%	33.15%	47.63%	50.6%	29.93%	53.22%	58.13%	100%		88.16%
Standard Deviation	0.1%	0%	0%	0.1%	0%	0.3%	0.1%	0%	1.6%		0%
m-queens - Time To Solve (sec)	107.82	**115.12**	75.04	52.81	50.49	77.99	44.61	40.74	**25.28**		31.085
Normalized	23.45%	21.96%	33.69%	47.87%	50.07%	32.41%	56.67%	62.05%	100%		81.33%
Standard Deviation	0.1%	0%	0.1%	0.1%	0.4%	0.1%	0.4%	0.5%	0.2%		0.2%
Primesieve - 1.P.N.G (sec)	**44.64**	35.62	26.72	16.98	15.44	30.37	18.20	17.31	**9.95**		10.515
Normalized	22.29%	27.93%	37.24%	58.6%	64.44%	32.76%	54.67%	57.48%	100%		94.63%
Standard Deviation	0%	1.4%	2.7%	2%	0.6%	0.2%	0.2%	0.4%	0.3%		1.2%
Blender - Barbershop - CPU-Only (sec)	**1433**	1298	889.28	577.94	539.24	1152	699.98	663.40	394.94		**336.37**
Normalized	23.48%	25.91%	37.82%	58.2%	62.38%	29.19%	48.05%	50.7%	85.17%		100%
Rodinia - OpenMP CFD Solver (sec)	**32.92**	28.04	18.51	12.43	11.53	27.05	13.63	13.20	9.23		**7.731**
Normalized	23.48%	27.57%	41.77%	62.2%	67.05%	28.58%	56.72%	58.57%	83.76%		100%
Standard Deviation	0.3%	3.2%	0.4%	0.4%	0.2%	0.2%	1%	0.6%	0.5%		0.3%

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John The Ripper - Traditional DES (Real C/S)	**43385667**	45037000	63557000	95470000	10126733	59713667	84073333	10998233	**18292767**	
Normalized	23.72%	24.62%	34.74%	52.19%	55.36%	32.64%	45.96%	60.12%	100%	
Standard Deviation	0.2%	0.1%	0.2%	0%	0%	1.2%	1.7%	0.2%	1.6%	
John The Ripper - Blowfish (Real	**11401**	12488	18468	26770	28373	14061	24990	27014	**47648**	
Normalized	23.93%	26.21%	38.76%	56.18%	59.55%	29.51%	52.45%	56.69%	100%	
Standard Deviation	0%	0%	0.3%		0.1%	0.4%	0.3%	0.1%	0.3%	
Sysbench - CPU (Events/sec)	**13595**	14330	22118	31814	33797	16851	30920	33082	56447	**56504**
Normalized	24.06%	25.36%	39.14%	56.3%	59.81%	29.82%	54.72%	58.55%	99.9%	100%
Standard Deviation	0.1%	0%	0.1%	0%	0%	0.2%	0%	0%	0.4%	0%
Blender - BMW27 - CPU-Only (sec)	**298.85**	269.12	182.38	123.08	115.67	228.07	136.60	129.32	78.54	**72**
Normalized	24.09%	26.75%	39.48%	58.5%	62.25%	31.57%	52.71%	55.68%	91.67%	100%
asmFish - 1.H.M.2.D (Nodes/s)	**21788413**	23008073	33548721	49904712	53208213	26470600	42408640	44415126	77600140	**87527105**
Normalized	24.89%	26.29%	38.33%	57.02%	60.79%	30.24%	48.45%	50.74%	88.66%	100%
Standard Deviation	0.8%	1.9%	0.8%	1.6%	1.1%	0.3%	2.6%	1.4%	1.1%	1.9%
POV-Ray - Trace Time (sec)	**68.75**	59.52	43.14	30.16	26.09	50.67	30.07	28.49	**17.16**	19.758
Normalized	24.96%	28.83%	39.78%	56.9%	65.77%	33.87%	57.07%	60.23%	100%	86.85%
Standard Deviation	0.1%	0.1%	0.1%	0.2%	0.4%	0.1%	0.7%	0.3%	0.3%	0.7%
Stockfish - Total Time (Nodes/s)	**19309300**	20315767	29615180	45347804	47333077	24581700	42131430	44134771	69672939	**76923196**
Normalized	25.1%	26.41%	38.5%	58.95%	61.53%	31.96%	54.77%	57.38%	90.57%	100%
Standard Deviation	0.8%	1.3%	2.3%	0.7%	2.2%	1.7%	0.9%	1.3%	0.6%	0.6%
Chaos Group V-RAY - CPU (sec)	**112.75**	93.07	63.66	43.84	40.89	79.57	50.37	48.02	**30.42**	
Normalized	26.98%	32.69%	47.79%	69.39%	74.39%	38.23%	60.39%	63.35%	100%	
Standard Deviation	1.2%	0.3%	0.7%	0.5%	0.3%	0.9%	0.3%	0.6%	0.7%	
IndigoBench - Bedroom (M samples/s)	**0.96**	1.01	1.48	2.29	2.47	1.25	2.18	2.20	**3.50**	
Normalized	27.43%	28.86%	42.29%	65.43%	70.57%	35.71%	62.29%	62.86%	100%	
Standard Deviation	0.2%	0.1%	1.3%	0.1%	0.2%	0.2%	0.3%	0.1%	0.7%	
Hackbench - 32 - Process (sec)	**97.08**	91.95	69.59	47.86	42.47	74.09	46.72	43.13	**26.83**	38.156
Normalized	27.64%	29.18%	38.55%	56.06%	63.17%	36.21%	57.43%	62.21%	100%	70.32%
Standard Deviation	0.9%	0.3%	0.7%	2%	0.4%	3.1%	3.2%	2.9%	15.8%	0.1%
Parboil - OpenMP CUTCP (sec)	**7.36**	6.62	4.45	3.23	3.05	4.91	3.14	2.94	**2.11**	
Normalized	28.67%	31.87%	47.42%	65.33%	69.18%	42.97%	67.2%	71.77%	100%	
Standard Deviation	0.2%	0.1%	0.5%	0.3%	0.5%	0.6%	0.6%	0.8%	1.6%	
HPC Challenge - G-HPL (GFLOPS)	**90.022800**	90.796200	116.44200	174.55700	185.69600	119.79800	185.84300	196.18200	**308.71600**	157.47933
Normalized	29.16%	29.41%	37.72%	56.54%	60.15%	38.81%	60.2%	63.55%	100%	51.01%
Standard Deviation										0.5%

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Timed Linux Kernel Compilation -	**93.82**	80.79	56.67	39.55	37.49	77.07	49.87	47.22	**32.04**	
Normalized	34.15%	39.66%	56.54%	81.01%	85.46%	41.57%	64.25%	67.85%	100%	
Standard Deviation	2.2%	1.3%	1.8%	2.7%	3.1%	1.6%	3.1%	2.3%	3.5%	
ebizzy - Performance / Cost -					**341.95**				**774.42**	
Normalized					44.16%				100%	
GraphicsMagick - Noise-Gaussian (Iterations/min)	**106**	125	154	177	177	130	165	180	203	**230**
Normalized	46.09%	54.35%	66.96%	76.96%	76.96%	56.52%	71.74%	78.26%	88.26%	100%
Standard Deviation						0.9%	0.9%	0.8%	0.5%	
m-queens - Performance / Cost - Time To Solve (sec x					**94871**				**45479**	
Normalized					47.94%				100%	
Darktable - Server Room - CPU-only (sec)	**5.25**	4.76	3.23	2.63	2.56	4.17	2.74	2.56	**2.52**	
Normalized	48%	52.94%	78.02%	95.82%	98.44%	60.43%	91.97%	98.44%	100%	
Standard Deviation	0.1%	0%	0.2%	0.1%	0.1%	0.7%	0.4%	1.2%	0.4%	
N-Queens - Performance / Cost - Elapsed Time (sec x					**15671**				**7592**	
Normalized					48.45%				100%	
GraphicsMagick - Enhanced (Iterations/min)	**116**	181	201	218	215	181	206	227	**232**	226
Normalized	50%	78.02%	86.64%	93.97%	92.67%	78.02%	88.79%	97.84%	100%	97.41%
Standard Deviation				0.3%				0.3%	0.7%	
Smallpt - G.I.R.1.S (sec)	16.53	13.93	9.49	6.42	6.13	12.16	6.94	6.54	**3.89**	**59.081**
Normalized	23.53%	27.93%	40.99%	60.59%	63.46%	31.99%	56.05%	59.48%	100%	6.58%
Standard Deviation	0.1%	0.4%	0.2%	0.4%	0.1%	0.1%	0.1%	0.8%	0.4%	0.9%
Rodinia - OpenMP LavaMD (sec)	**108.25**	97.95	64.97	44.38	41.53	83.95	48.82	44.87	26.15	**10.284**
Normalized	9.5%	10.5%	15.83%	23.17%	24.76%	12.25%	21.07%	22.92%	39.33%	100%
Standard Deviation	0.2%	1.2%	0.4%	0.3%	0.3%	0.1%	0.2%	0.2%	0.2%	0.3%
C-Ray - Performance / Cost - Total Time - 4.1.R.P.P (sec x Dollar)					**63304**				**31734**	
Normalized					50.13%				100%	

AMD Threadripper 2990WX Linux Benchmarks

John The Ripper - Performance / Cost - Traditional DES (Real					**53894**				**101683**	
Normalized					53%				100%	
GraphicsMagick - Sharpen (Iterations/min)	**116**	141	169	191	189	155	186	203	**217**	203
Normalized	53.46%	64.98%	77.88%	88.02%	87.1%	71.43%	85.71%	93.55%	100%	93.55%
Standard Deviation						0.6%	1.1%	0.3%		
John The Ripper - Performance / Cost - Blowfish (Real C/S/Dollar)					**15.10**				**26.49**	
Normalized					57%				100%	
Blender - Performance / Cost - Classroom - CPU-Only (sec x Dollar)					**489179**				**279834**	
Normalized					57.2%				100%	
Sysbench - Performance / Cost - CPU (Events/sec/Dollar					**17.99**				**31.38**	
Normalized					57.33%				100%	
HPC Challenge - Performance / Cost - G-HPL (GFLOPS/Dollar)					**0.10**				**0.17**	
Normalized					58.82%				100%	
FLAC Audio Encoding - WAV To FLAC (sec)	**11.91**	**7.12**	8.17	8.83	7.77	9.31	9.87	9.21	9.50	10.587
Normalized	59.78%	100%	87.15%	80.63%	91.63%	76.48%	72.14%	77.31%	74.95%	67.25%
Standard Deviation	0.2%	0.2%	0.1%	0.1%	0.2%	0.2%	0.6%	0.2%	0.1%	0.2%
Rodinia - Performance / Cost - OpenMP LavaMD (sec x					**78035**				**47044**	
Normalized					60.29%				100%	
Hackbench - Performance / Cost - 32 - Process (sec x					**79801**				**48267**	
Normalized					60.48%				100%	

AMD Threadripper 2990WX Linux Benchmarks

Smallpt - Performance / Cost - G.I.R.1.S (sec x Dollar)	**11518**	**6998**
Normalized	60.76%	100%
Primesieve - Performance / Cost - 1.P.N.G (sec x Dollar)	**29012**	**17900**
Normalized	61.7%	100%
POV-Ray - Performance / Cost - Trace Time (sec x Dollar)	**49023**	**30871**
Normalized	62.97%	100%
Blender - Performance / Cost - BMW27 - CPU-Only (sec x Dollar)	**217344**	**141293**
Normalized	65.01%	100%
Stockfish - Performance / Cost - Total Time (Nodes/s/Dollar)	**25191**	**38729**
Normalized	65.04%	100%
asmFish - Performance / Cost - 1.H.M.2.D (Nodes/s/Dollar)	**28317**	**43135**
Normalized	65.65%	100%
Parboil - Performance / Cost - OpenMP CUTCP (sec x	**5731**	**3796**
Normalized	66.23%	100%
Blender - Performance / Cost - Barbershop - CPU-Only (sec x Dollar)	**1013232**	**710497**
Normalized	70.12%	100%

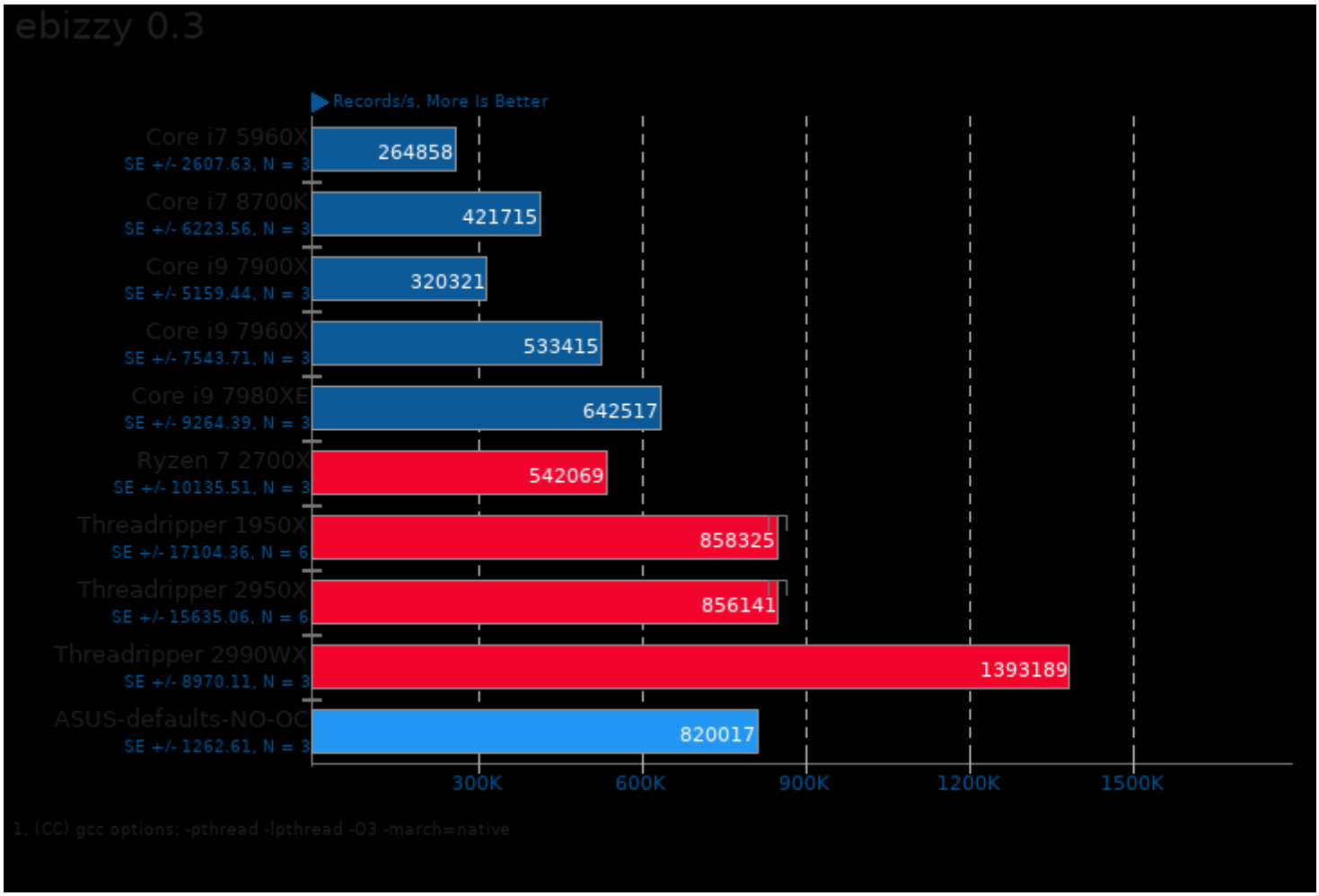
AMD Threadripper 2990WX Linux Benchmarks

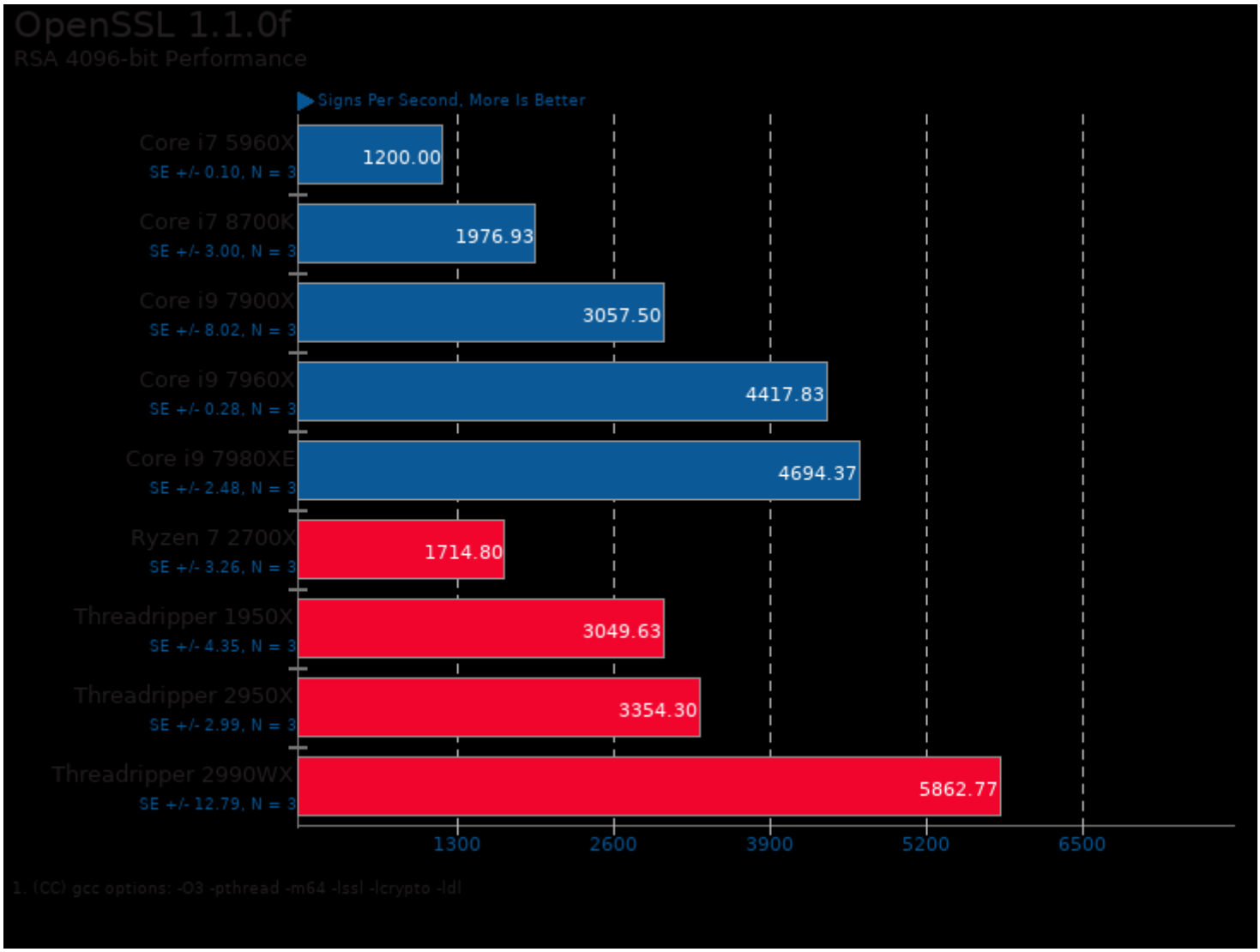
Chaos Group V-RAY - Performance / Cost - CPU (sec x Dollar)	**76832**	**54726**
Normalized	71.23%	100%
Rodinia - Performance / Cost - OpenMP CFD Solver (sec x Dollar)	**21665**	**16605**
Normalized	76.64%	100%
OpenSSL - Performance / Cost - R.4.b.P (Signs/sec/Dollar)	**2.50**	**3.26**
Normalized	76.69%	100%
GraphicsMagick - Performance / Cost - Noise-Gaussian (Iterations/min/Dol	**0.09**	**0.11**
Normalized	81.82%	100%
Timed Linux Kernel Compilation - Performance / Cost - Time To	**70444**	**57640**
Normalized	81.82%	100%
GraphicsMagick - Performance / Cost - Sharpen (Iterations/min/Dollar)	**0.10**	**0.12**
Normalized	83.33%	100%
GraphicsMagick - Performance / Cost - Enhanced (Iterations/min/Dollar)	**0.11**	**0.13**
Normalized	84.62%	100%

AMD Threadripper 2990WX Linux Benchmarks

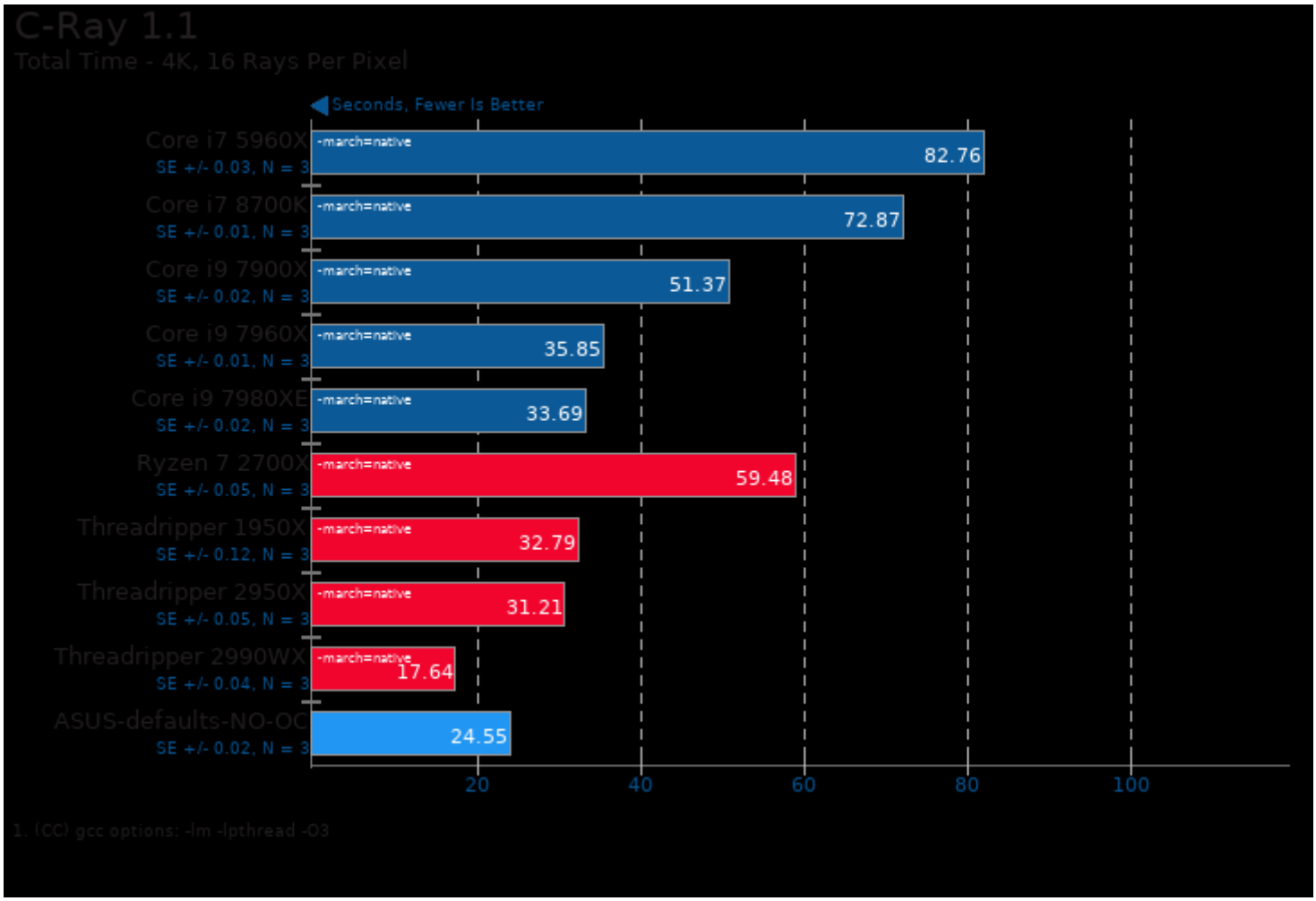
FLAC Audio Encoding - Performance / Cost - WAV To FLAC (sec x	**14600**	**17091**	
Normalized	100%	85.43%	
Darktable - Performance / Cost - Server Room - CPU-only (sec x Dollar)	**4810**	**4533**	
Normalized	94.25%	100%	
Darktable - Server Room - CPU-only (sec)			2.100
Standard Deviation			0.5%

AMD Threadripper 2990WX Linux Benchmarks

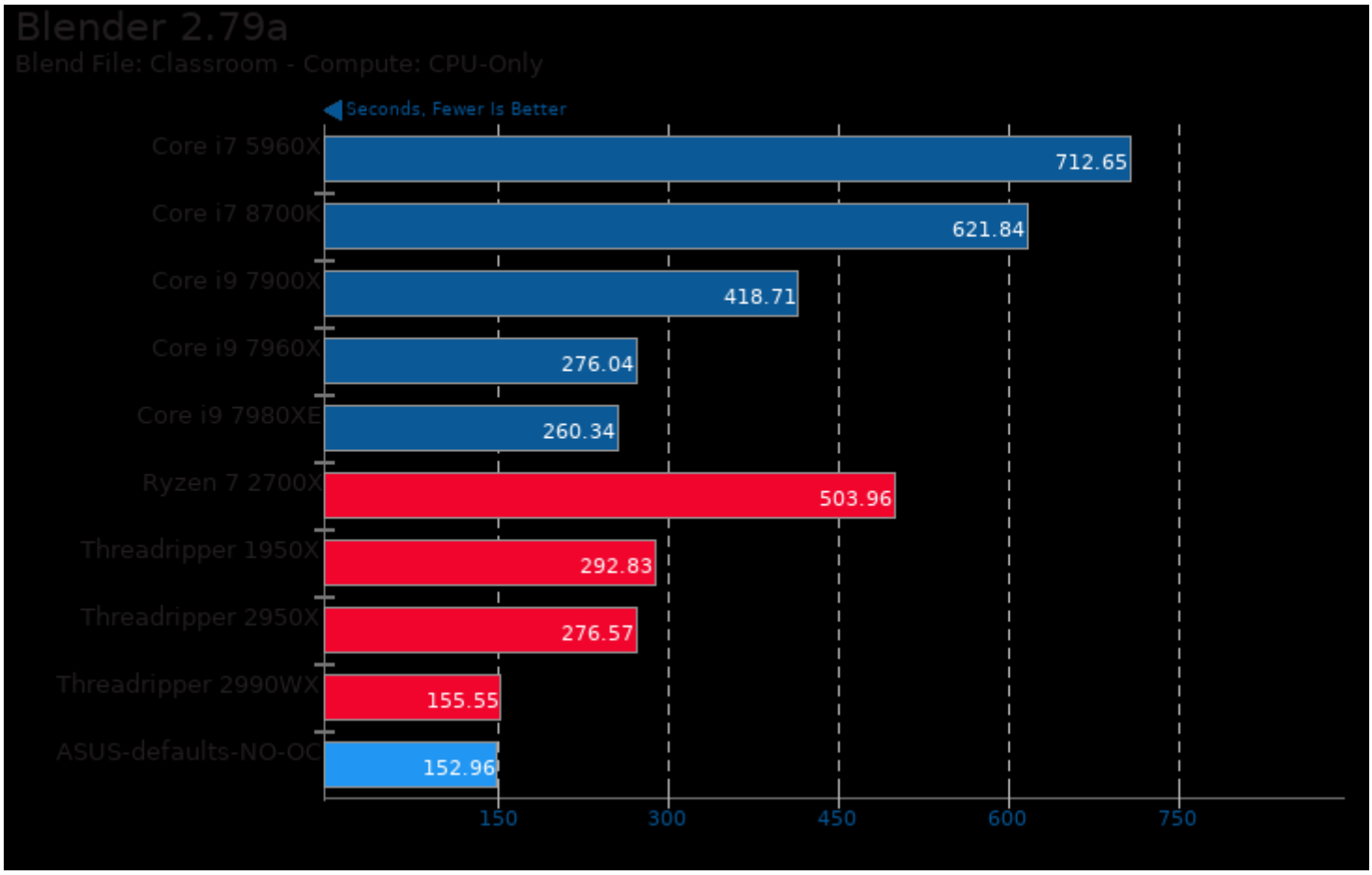


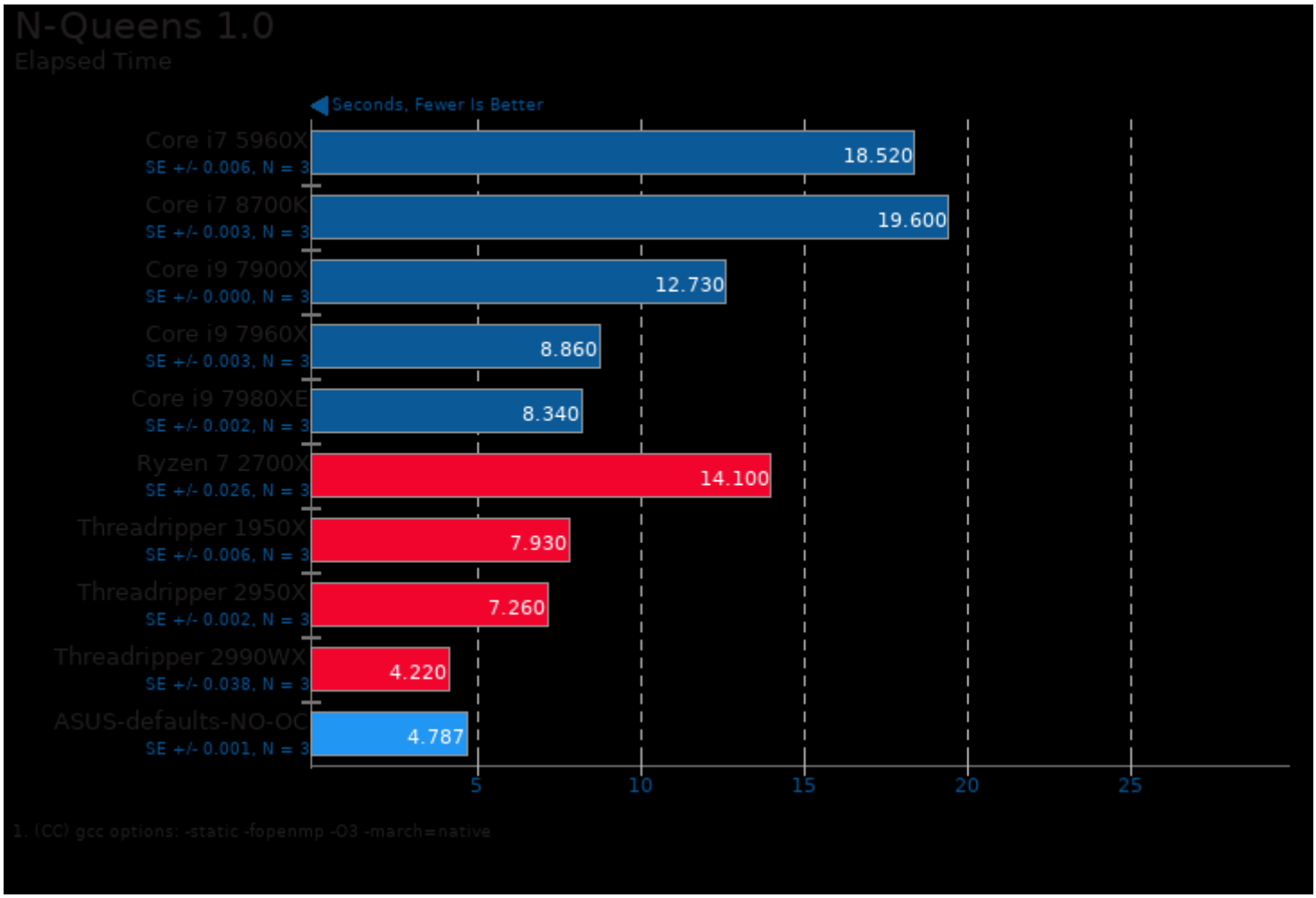

OpenSSL 1.1.0f
RSA 4096-bit Performance
Signs Per Second, More Is Better
Core i7 5960X
SE +/- 0.10, N = 3
1200.00
Core i7 8700K
SE +/- 3.00, N = 3
1976.93
Core i9 7900X
SE +/- 8.02, N = 3
3057.50
Core i9 7960X
SE +/- 0.28, N = 3
4417.83
Core i9 7980XE
SE +/- 2.48, N = 3
4694.37
Ryzen 7 2700X
SE +/- 3.26, N = 3
1714.80
Threadripper 1950X
SE +/- 4.35, N = 3
3049.63
Threadripper 2950X
SE +/- 2.99, N = 3
3354.30
Threadripper 2990WX
SE +/- 12.79, N = 3
5862.77
1300
2600
3900
5200
6500
1. (CC) gcc options: -O3 -pthread -m64 -lssl -lcrypto -ldl

AMD Threadripper 2990WX Linux Benchmarks

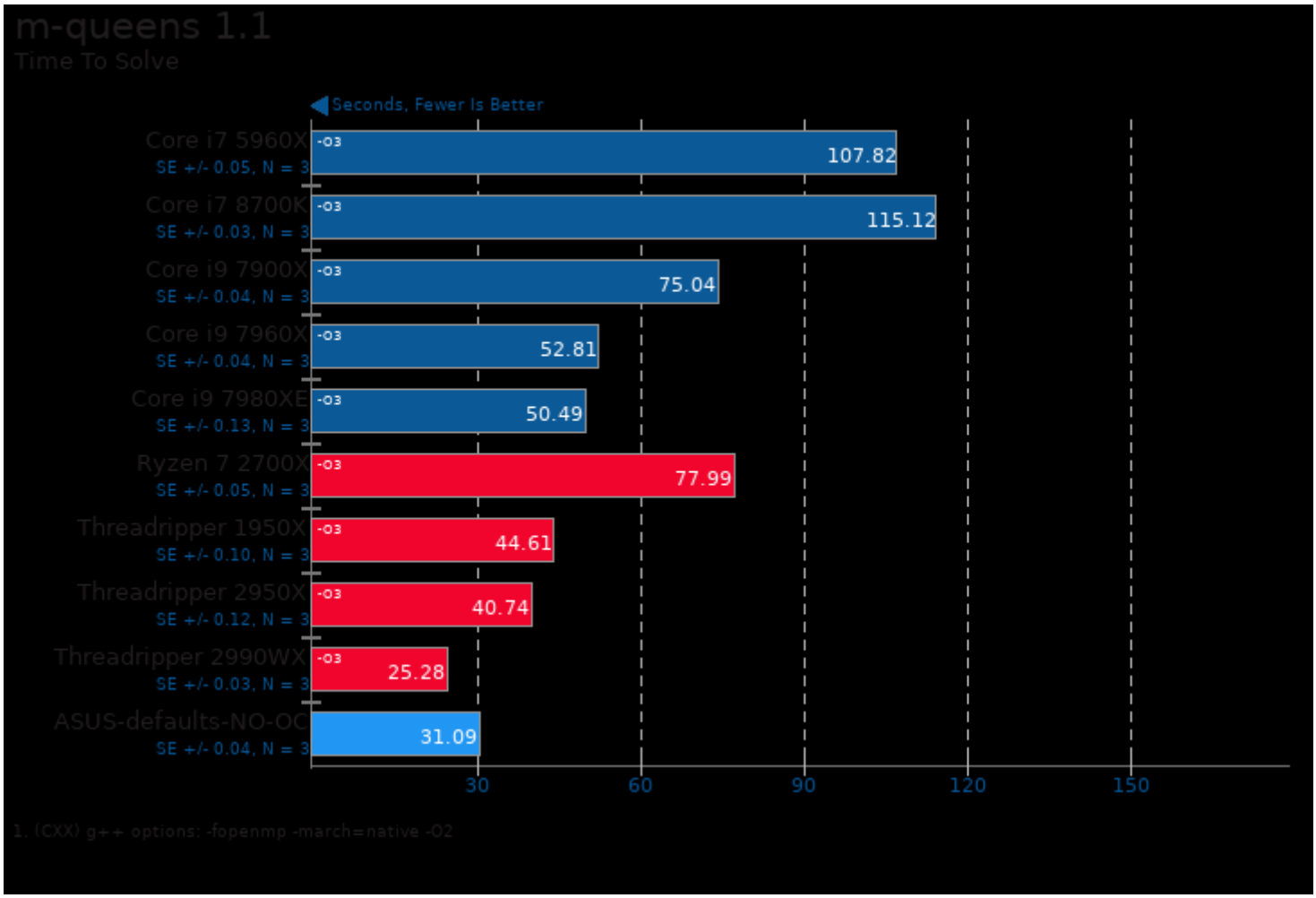


AMD Threadripper 2990WX Linux Benchmarks

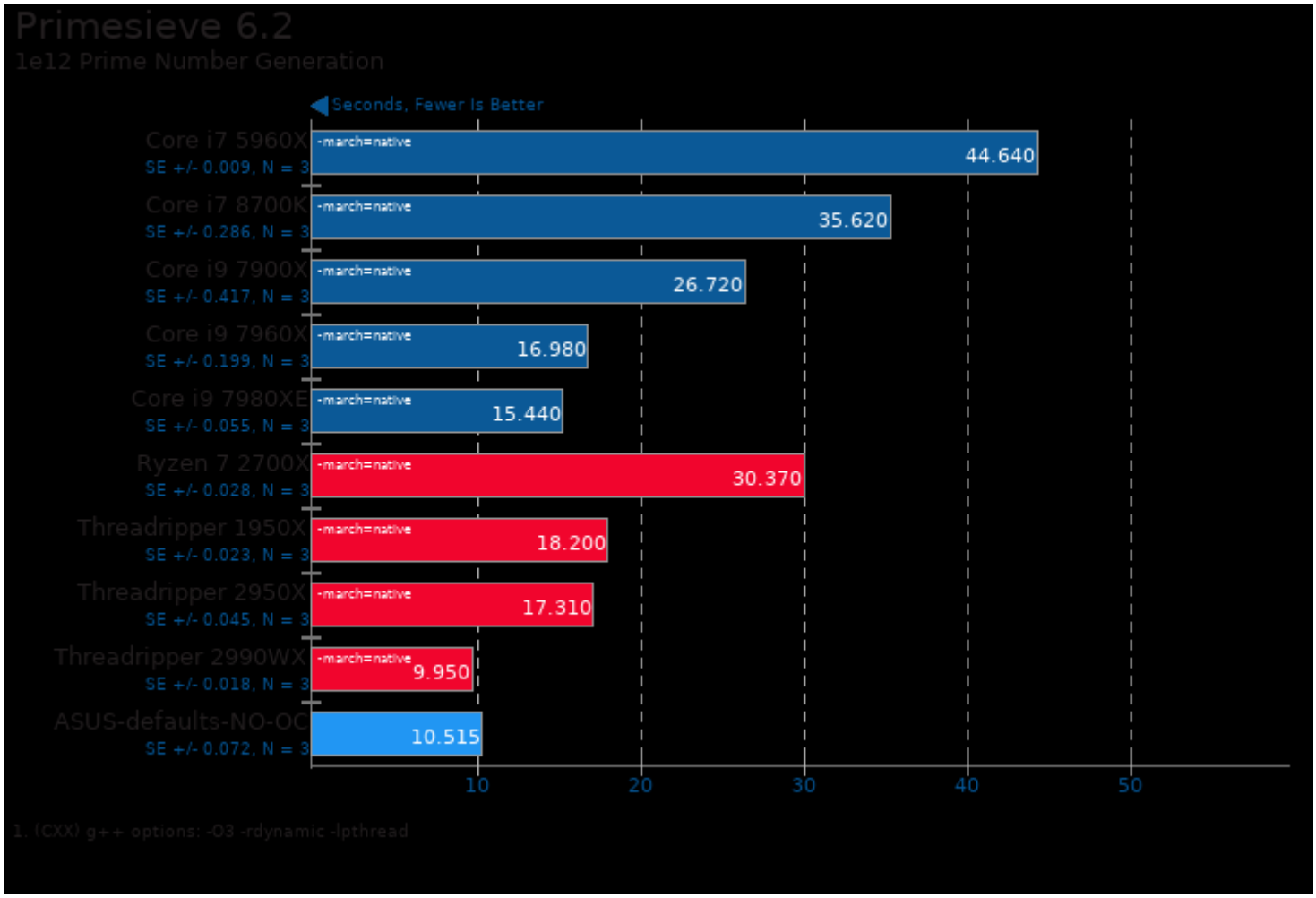



N-Queens 1.0
Elapsed Time
Seconds, Fewer Is Better
Core i7 5960X
SE +/- 0.006, N = 3
18.520
Core i7 8700K
SE +/- 0.003, N = 3
19.600
Core i9 7900X
SE +/- 0.000, N = 3
12.730
Core i9 7960X
SE +/- 0.003, N = 3
8.860
Core i9 7980XE
SE +/- 0.002, N = 3
8.340
Ryzen 7 2700X
SE +/- 0.026, N = 3
14.100
Threadripper 1950X
SE +/- 0.006, N = 3
7.930
Threadripper 2950X
SE +/- 0.002, N = 3
7.260
Threadripper 2990WX
SE +/- 0.038, N = 3
4.220
ASUS-defaults-NO-OC
SE +/- 0.001, N = 3
4.787
5
10
15
20
25
1. (CC) gcc options: -static -fopenmp -O3 -march=native

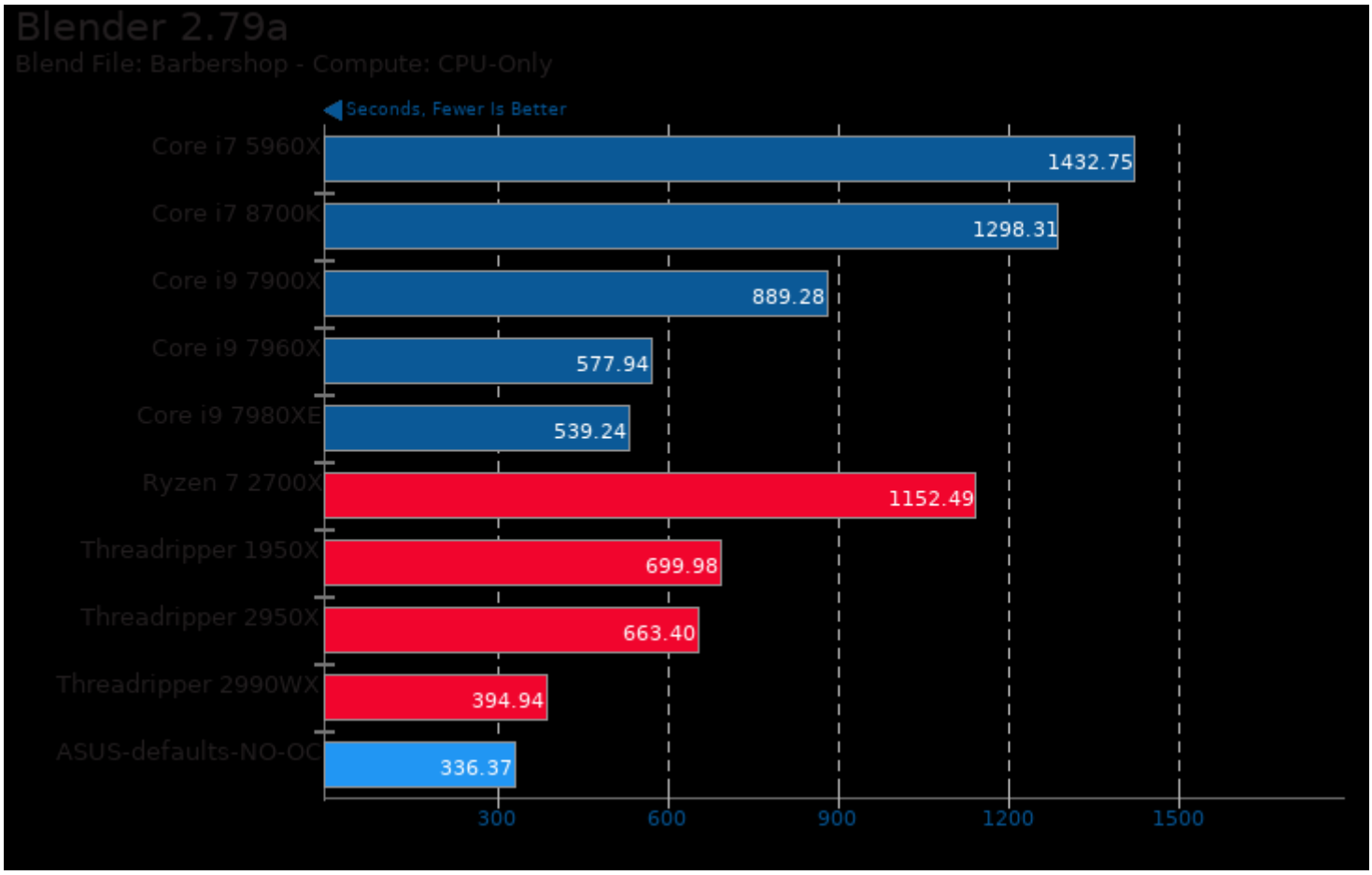
AMD Threadripper 2990WX Linux Benchmarks

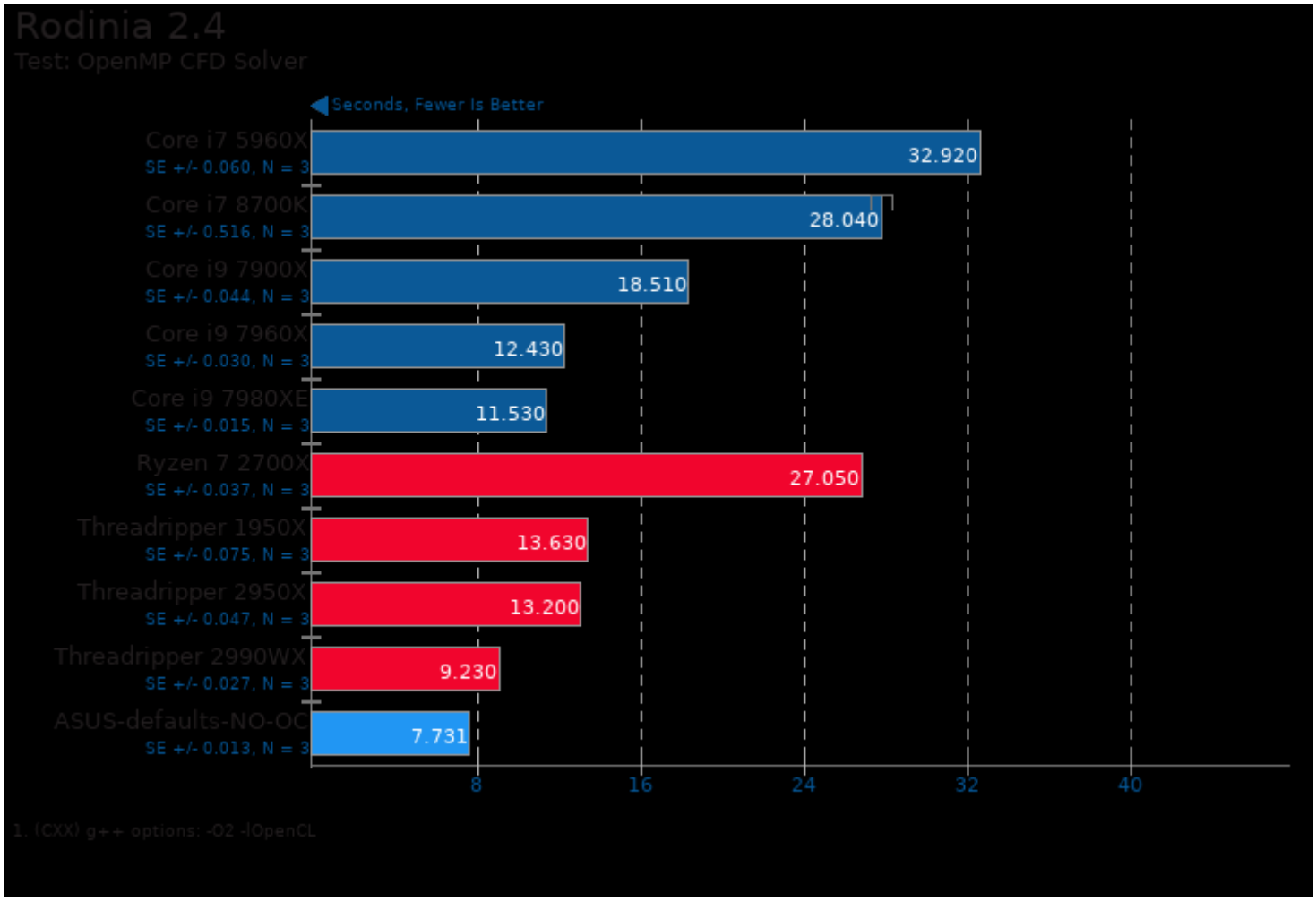


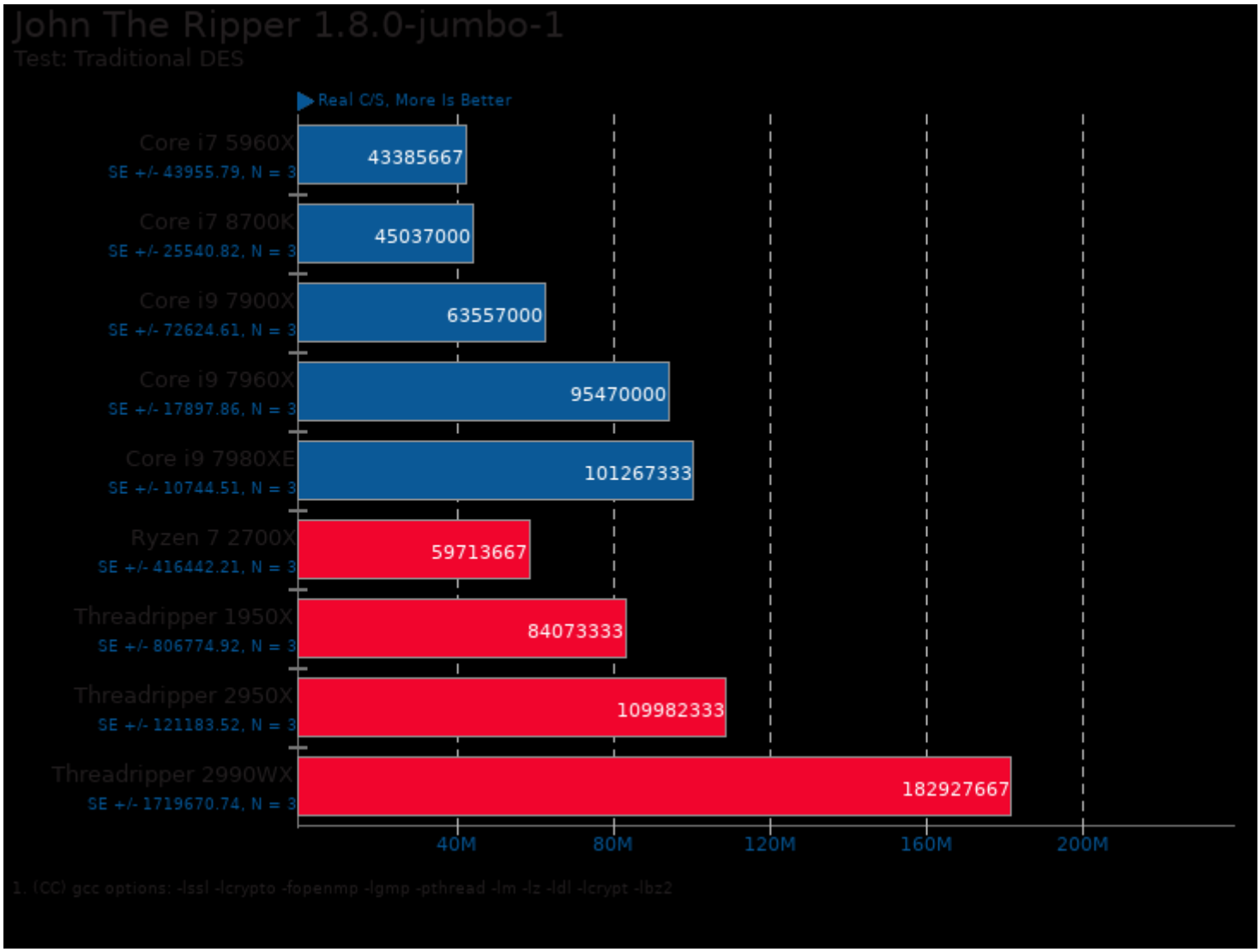
AMD Threadripper 2990WX Linux Benchmarks



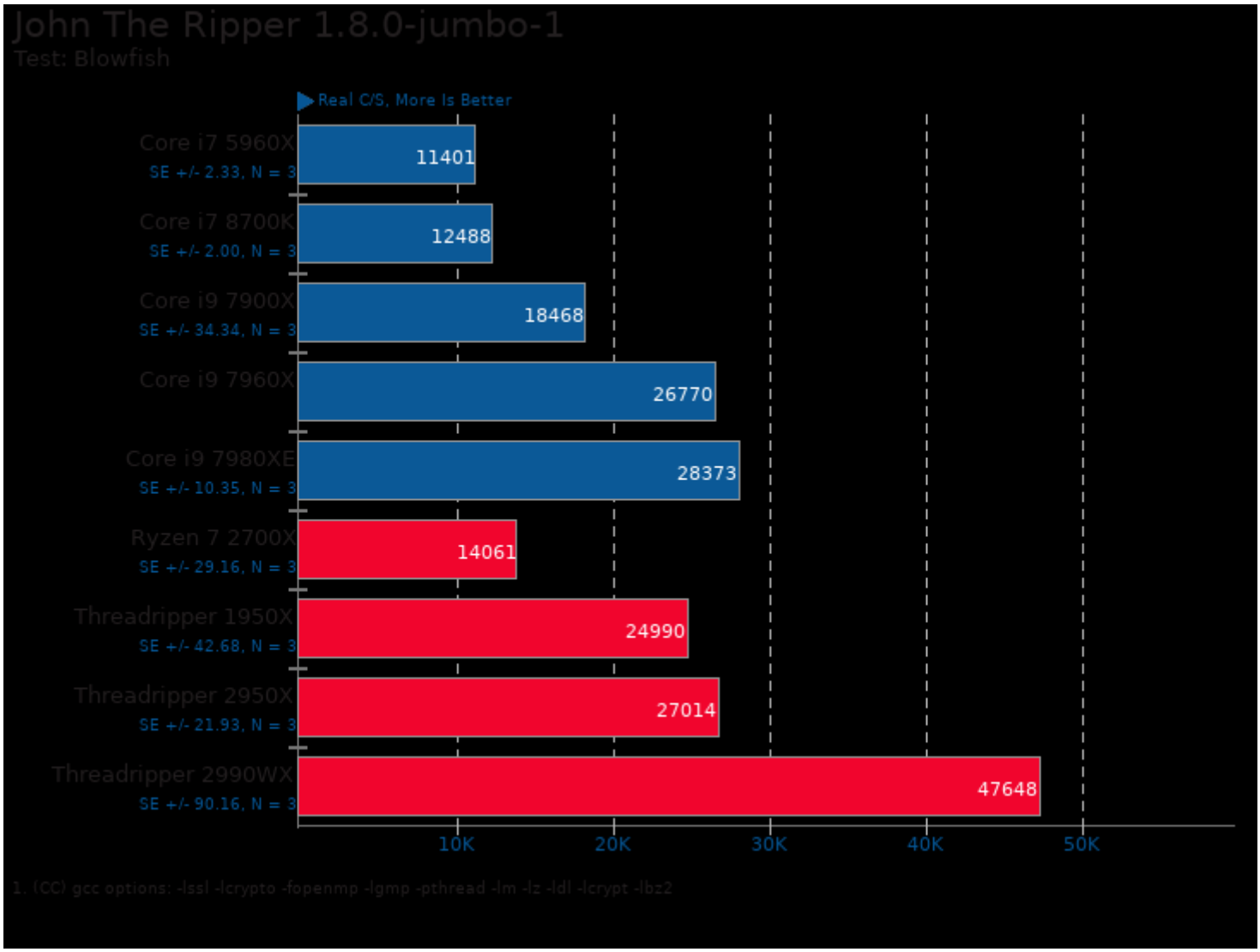
AMD Threadripper 2990WX Linux Benchmarks



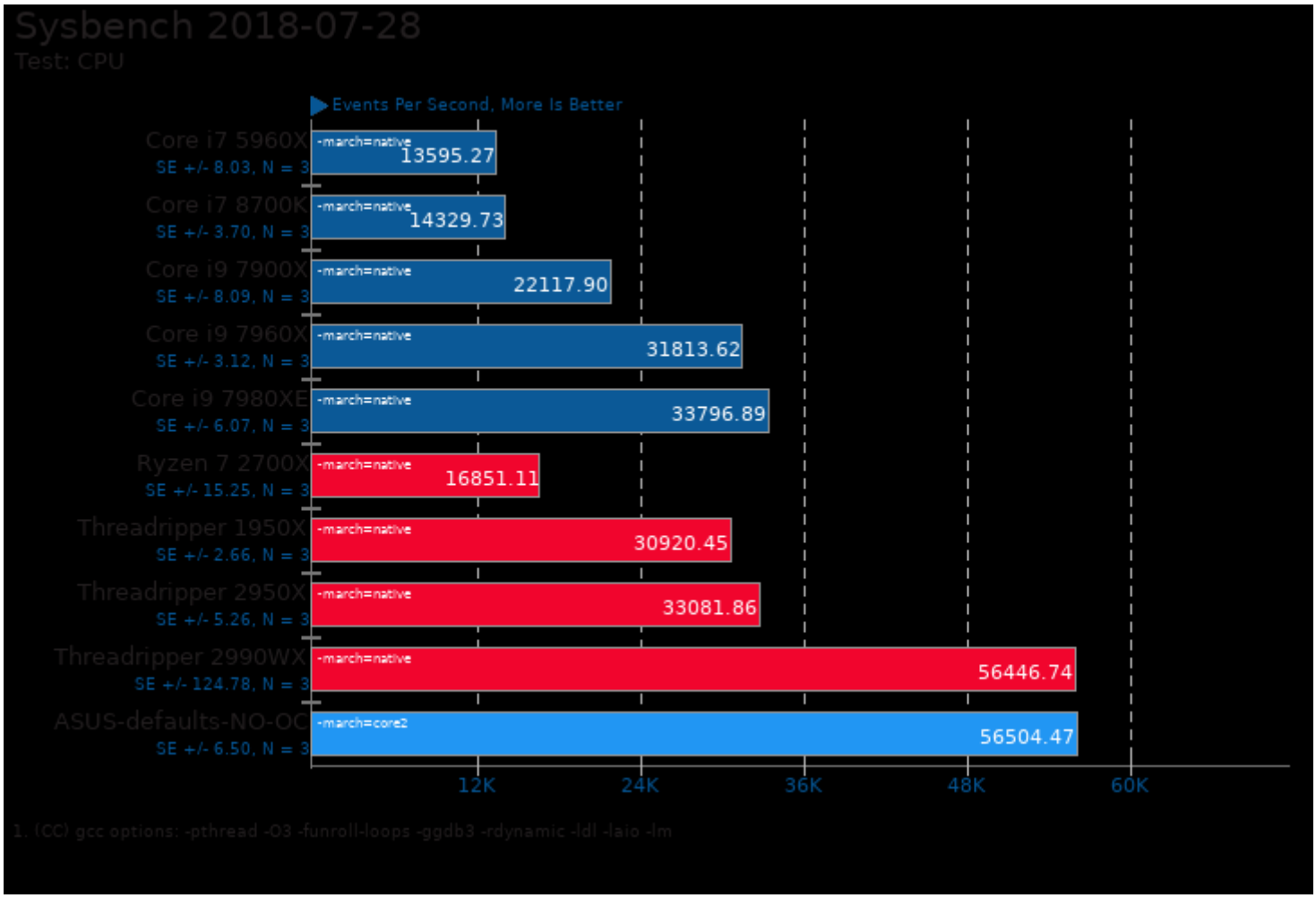

Rodinia 2.4
Test: OpenMP CFD Solver
Seconds, Fewer Is Better
Core i7 5960X
SE +/- 0.060, N = 3
32.920
Core i7 8700K
SE +/- 0.516, N = 3
28.040
Core i9 7900X
SE +/- 0.044, N = 3
18.510
Core i9 7960X
SE +/- 0.030, N = 3
12.430
Core i9 7980XE
SE +/- 0.015, N = 3
11.530
Ryzen 7 2700X
SE +/- 0.037, N = 3
27.050
Threadripper 1950X
SE +/- 0.075, N = 3
13.630
Threadripper 2950X
SE +/- 0.047, N = 3
13.200
Threadripper 2990WX
SE +/- 0.027, N = 3
9.230
ASUS-defaults-NO-OC
SE +/- 0.013, N = 3
7.731
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL


John The Ripper 1.8.0-jumbo-1
Test: Traditional DES
Real C/S, More Is Better
Core i7 5960X
SE +/- 43955.79, N = 3
43385667
Core i7 8700K
SE +/- 25540.82, N = 3
45037000
Core i9 7900X
SE +/- 72624.61, N = 3
63557000
Core i9 7960X
SE +/- 17897.86, N = 3
95470000
Core i9 7980XE
SE +/- 10744.51, N = 3
101267333
Ryzen 7 2700X
SE +/- 416442.21, N = 3
59713667
Threadripper 1950X
SE +/- 806774.92, N = 3
84073333
Threadripper 2950X
SE +/- 121183.52, N = 3
109982333
Threadripper 2990WX
SE +/- 1719670.74, N = 3
182927667
40M
80M
120M
160M
200M
1. (CC) gcc options: -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2

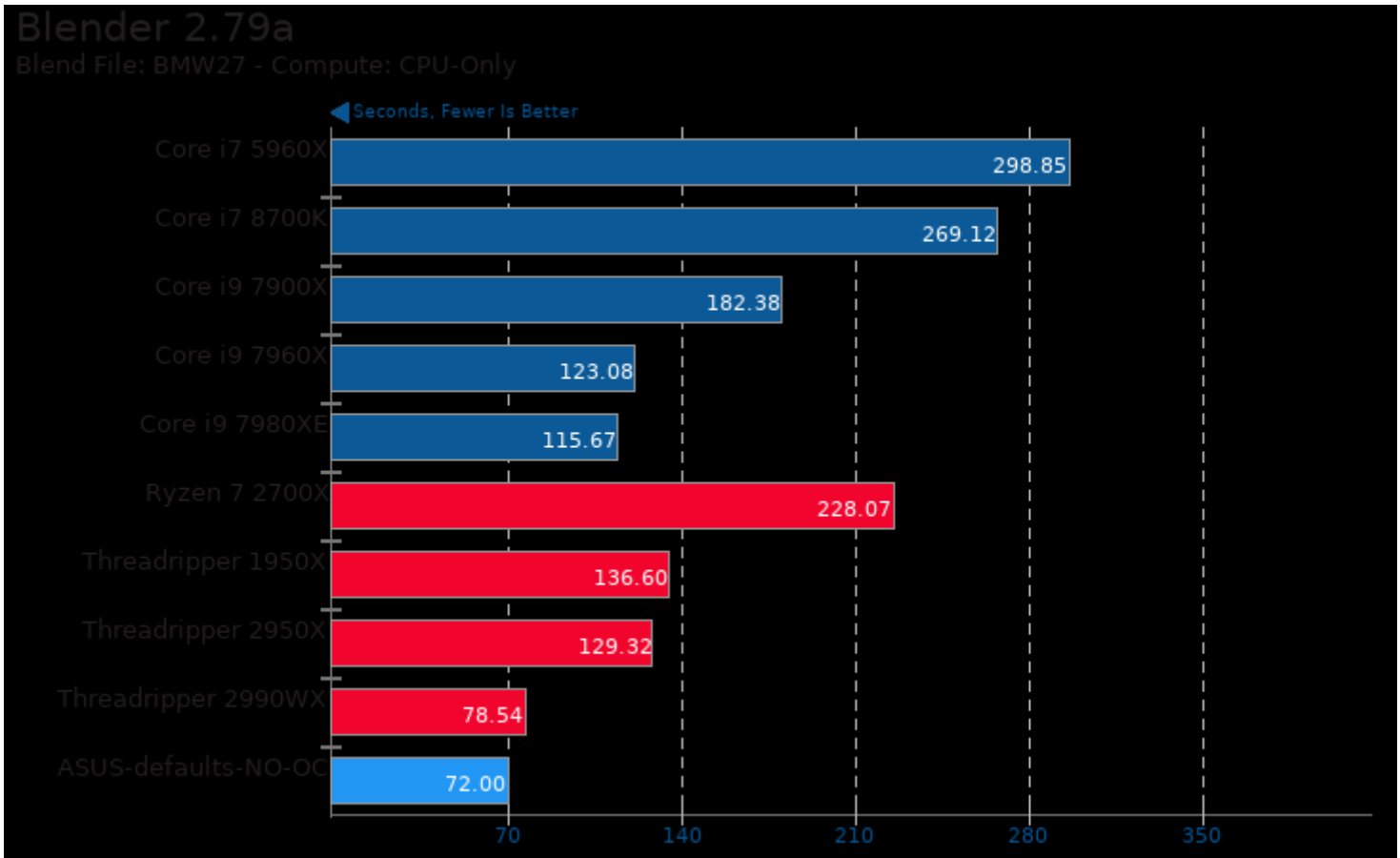
AMD Threadripper 2990WX Linux Benchmarks

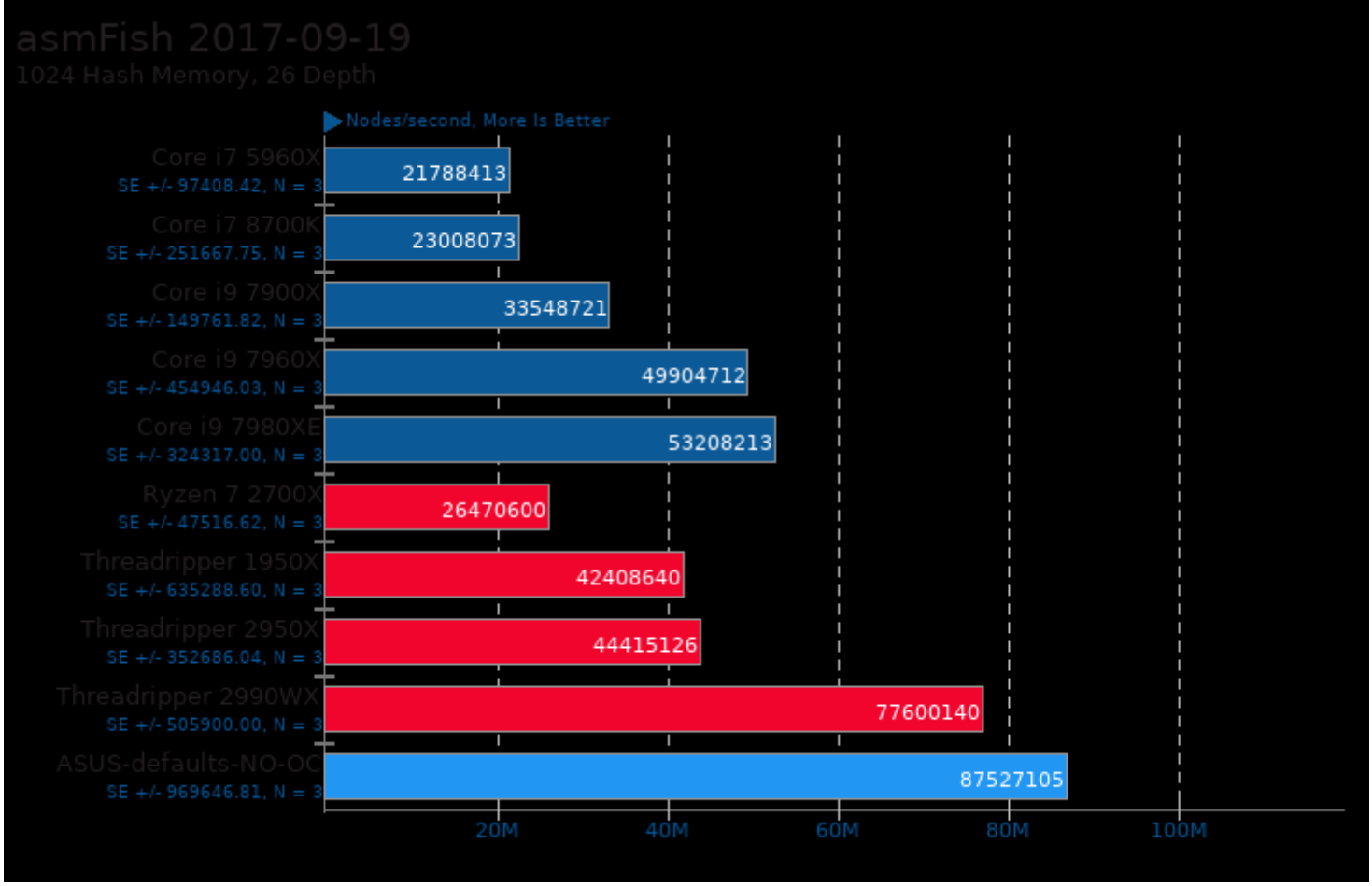


AMD Threadripper 2990WX Linux Benchmarks

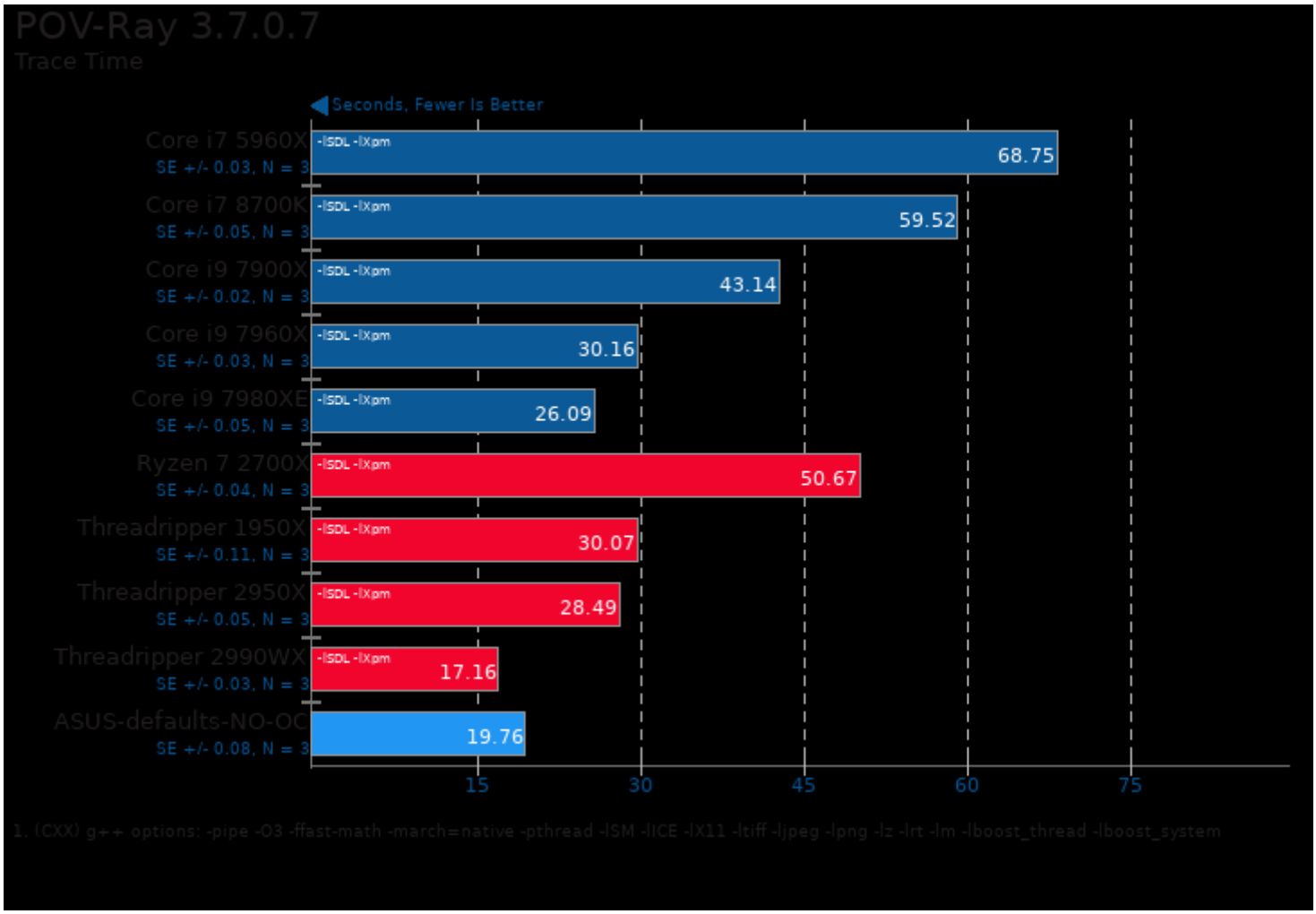


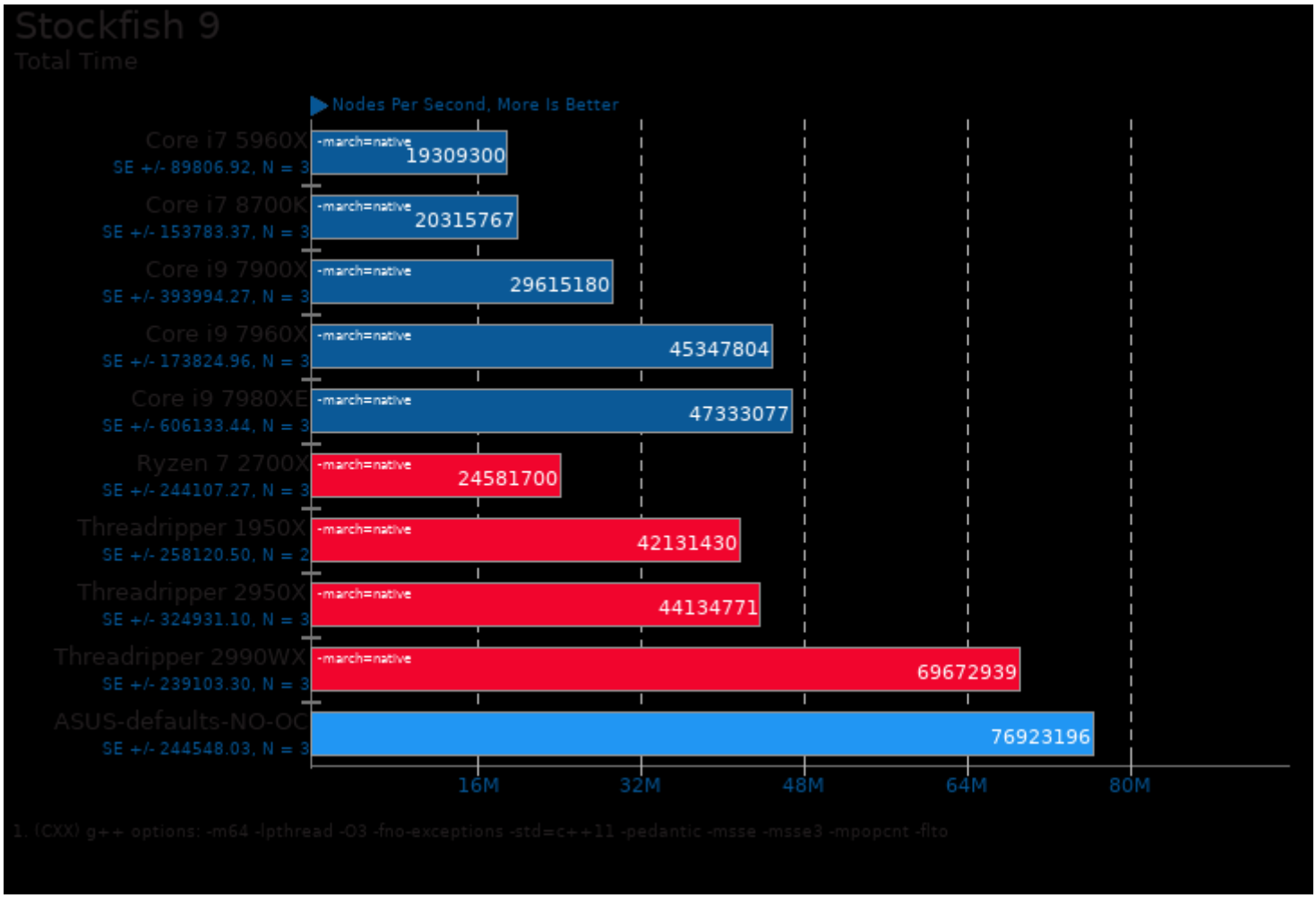
AMD Threadripper 2990WX Linux Benchmarks

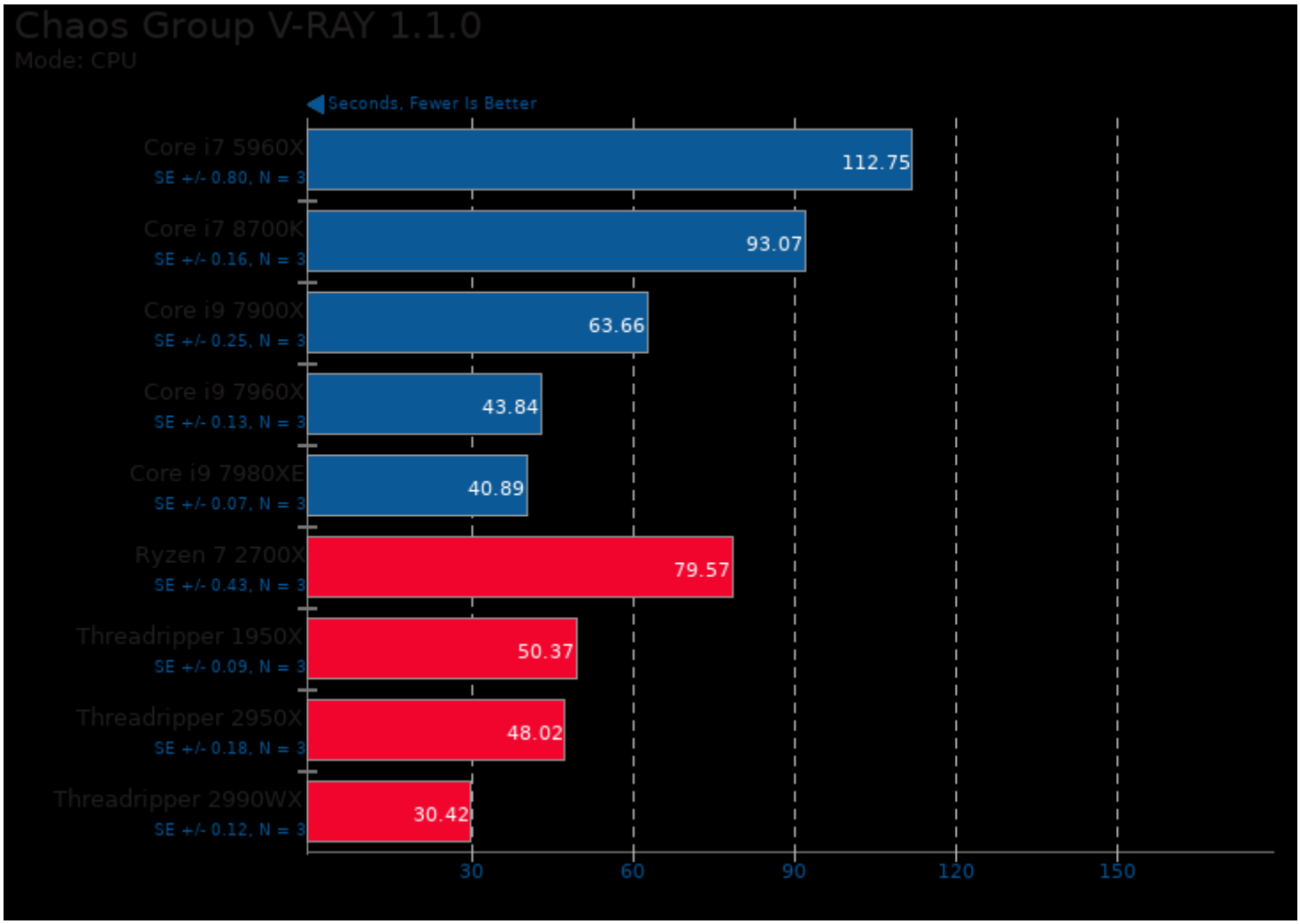




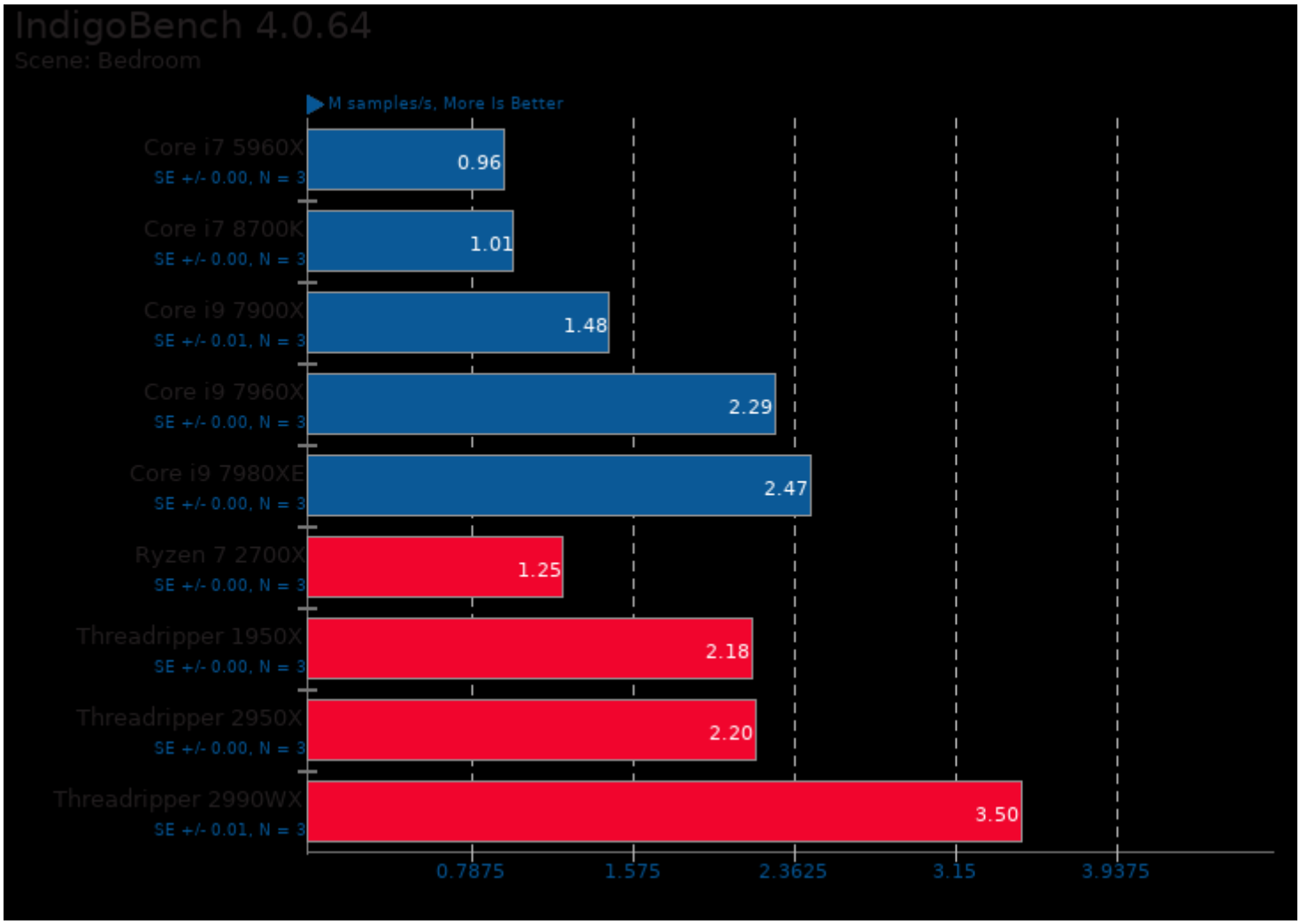
AMD Threadripper 2990WX Linux Benchmarks



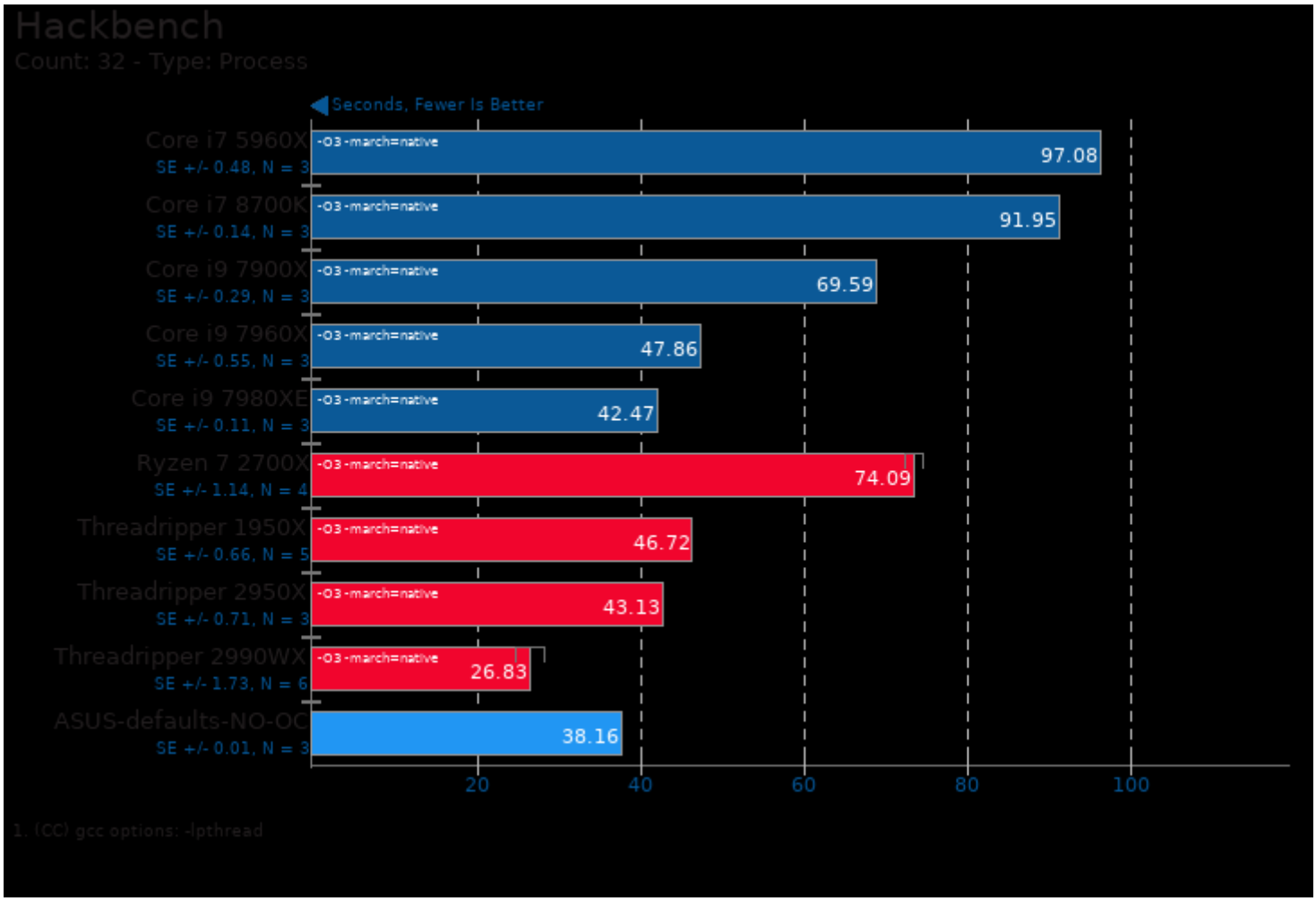

Stockfish 9
Total Time
Nodes Per Second, More Is Better
Core i7 5960X
SE +/- 89806.92, N = 3
-march=native
19309300
Core i7 8700K
SE +/- 153783.37, N = 3
-march=native
20315767
Core i9 7900X
SE +/- 393994.27, N = 3
-march=native
29615180
Core i9 7960X
SE +/- 173824.96, N = 3
-march=native
45347804
Core i9 7980XE
SE +/- 606133.44, N = 3
-march=native
47333077
Ryzen 7 2700X
SE +/- 244107.27, N = 3
-march=native
24581700
Threadripper 1950X
SE +/- 258120.50, N = 2
-march=native
42131430
Threadripper 2950X
SE +/- 324931.10, N = 3
-march=native
44134771
Threadripper 2990WX
SE +/- 239103.30, N = 3
-march=native
69672939
ASUS-defaults-NO-OC
SE +/- 244548.03, N = 3
76923196
16M
32M
48M
64M
80M
1. (CXX) g++ options: -m64 -lpthread -O3 -fno-exceptions -std=c++11 -pedantic -msse -msse3 -mpopcnt -flto


Chaos Group V-RAY 1.1.0
Mode: CPU
Seconds, Fewer Is Better
Core i7 5960X
SE +/- 0.80, N = 3
112.75
Core i7 8700K
SE +/- 0.16, N = 3
93.07
Core i9 7900X
SE +/- 0.25, N = 3
63.66
Core i9 7960X
SE +/- 0.13, N = 3
43.84
Core i9 7980XE
SE +/- 0.07, N = 3
40.89
Ryzen 7 2700X
SE +/- 0.43, N = 3
79.57
Threadripper 1950X
SE +/- 0.09, N = 3
50.37
Threadripper 2950X
SE +/- 0.18, N = 3
48.02
Threadripper 2990WX
SE +/- 0.12, N = 3
30.42
30
60
90
120
150

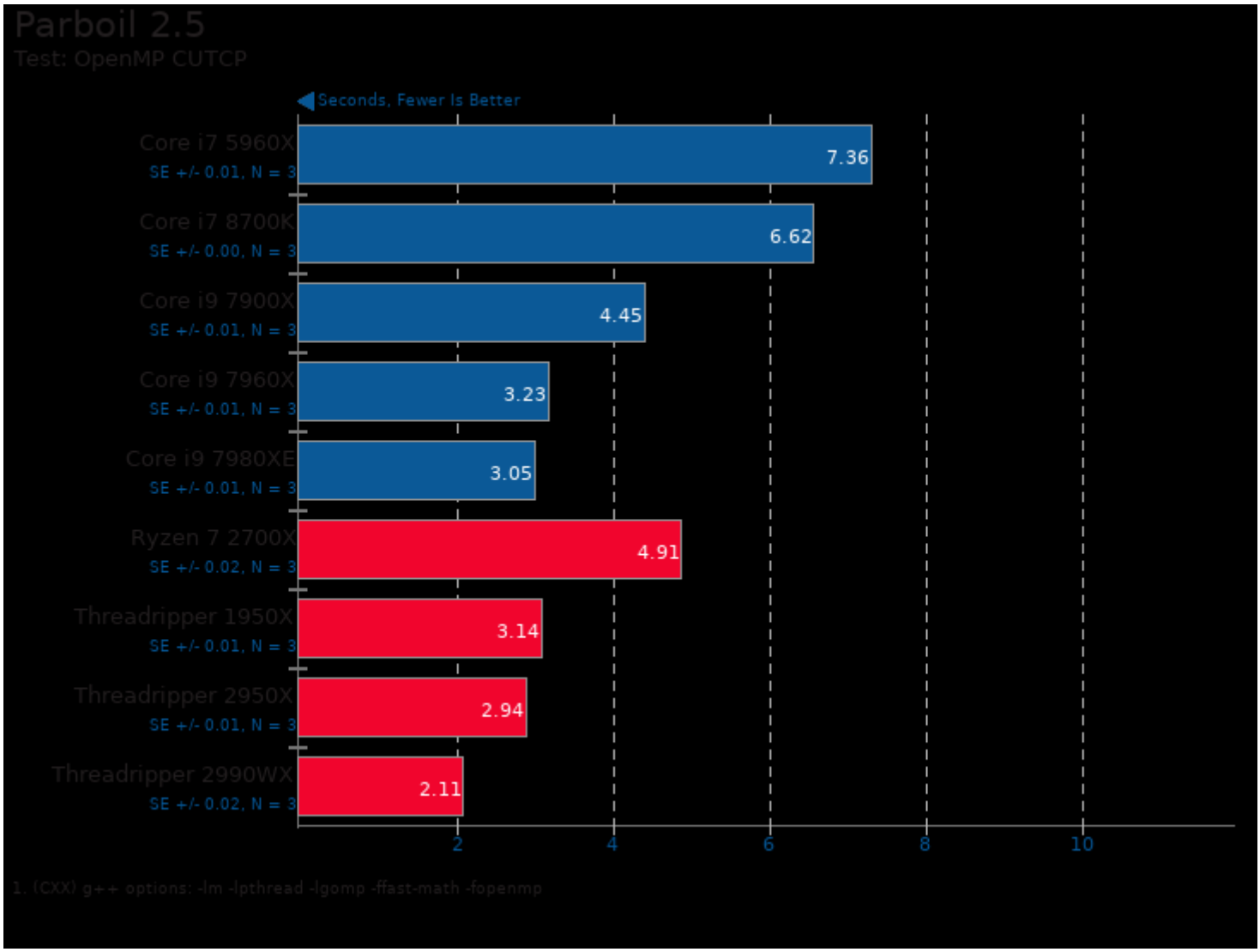
AMD Threadripper 2990WX Linux Benchmarks



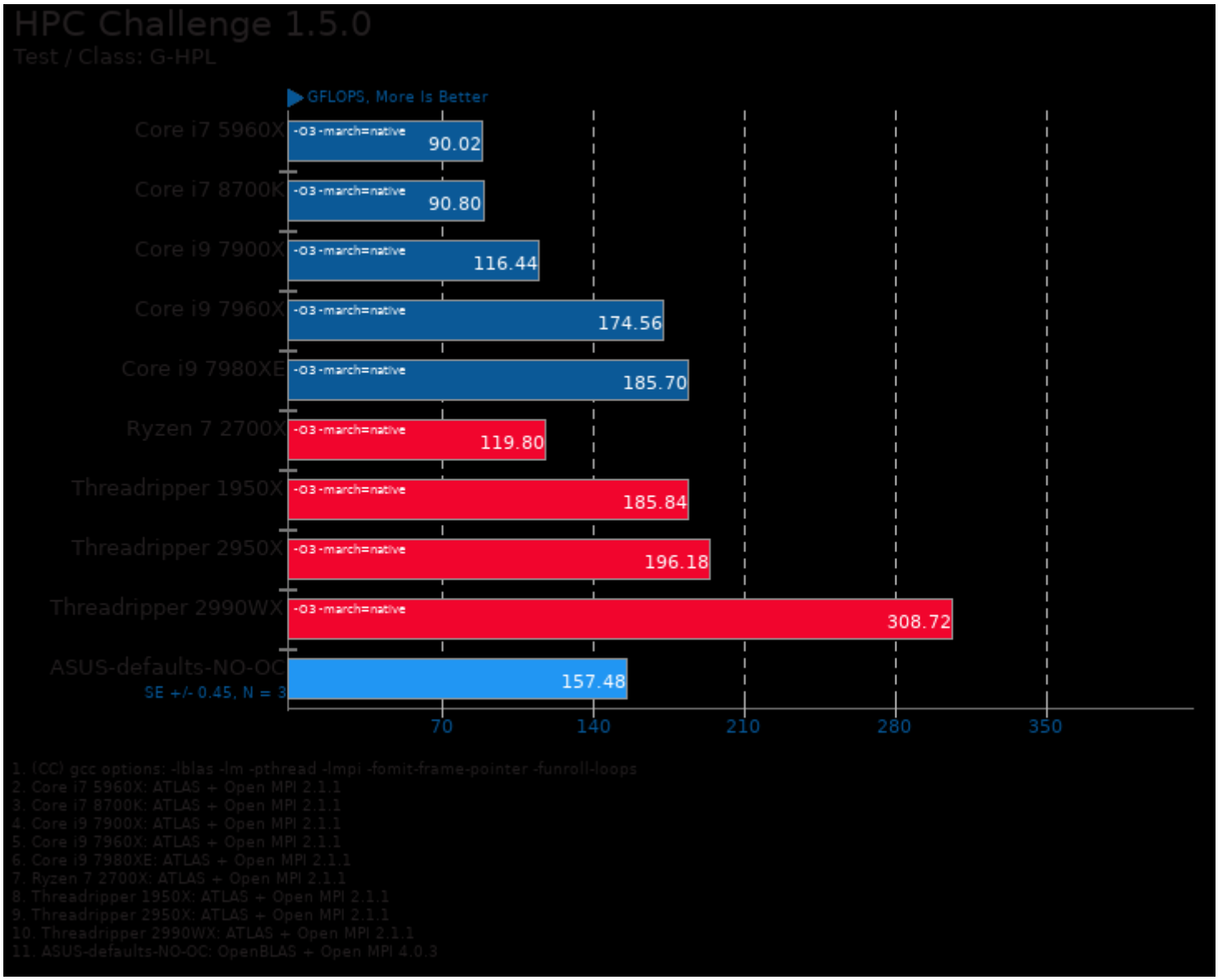
AMD Threadripper 2990WX Linux Benchmarks



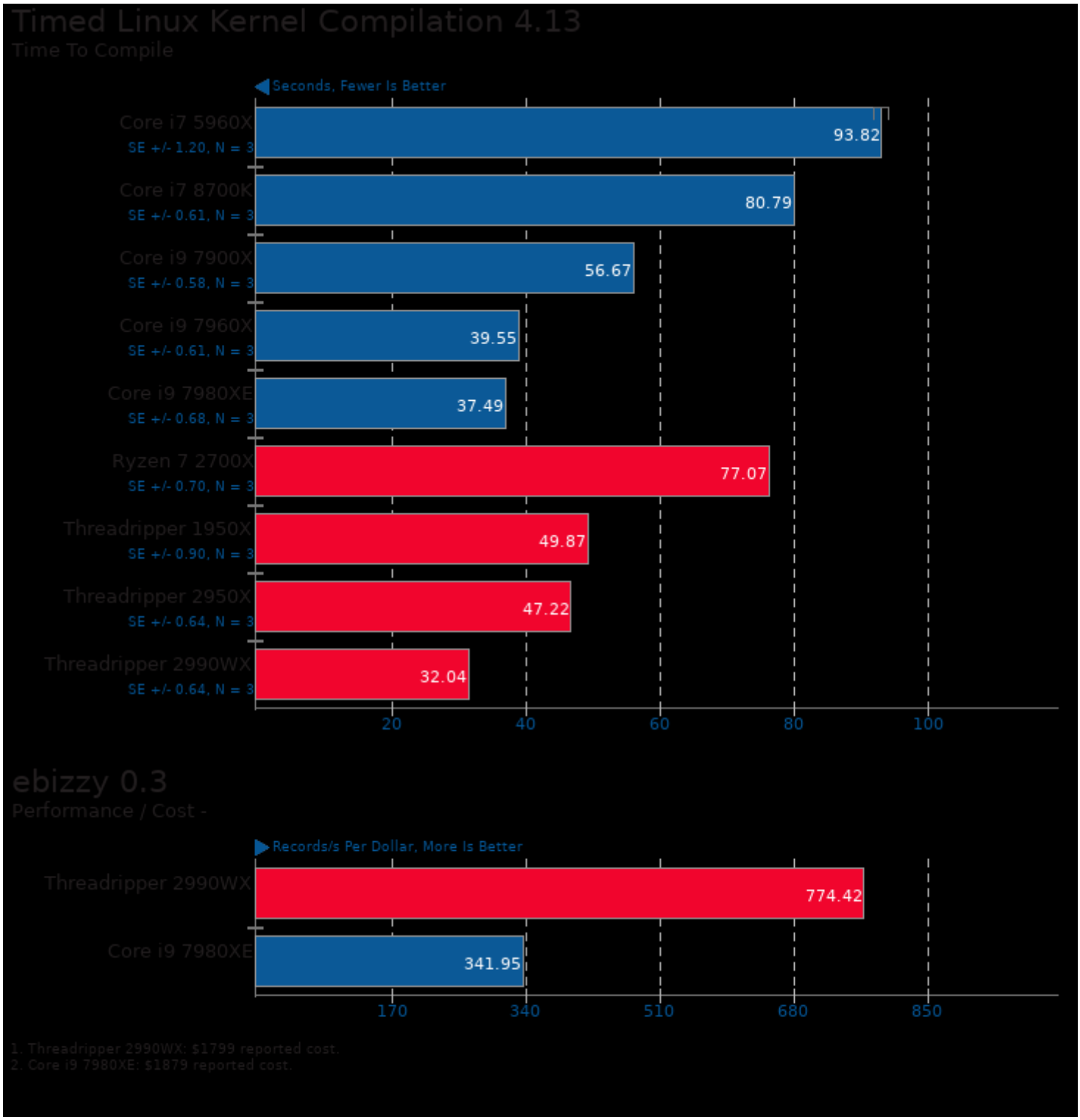
AMD Threadripper 2990WX Linux Benchmarks

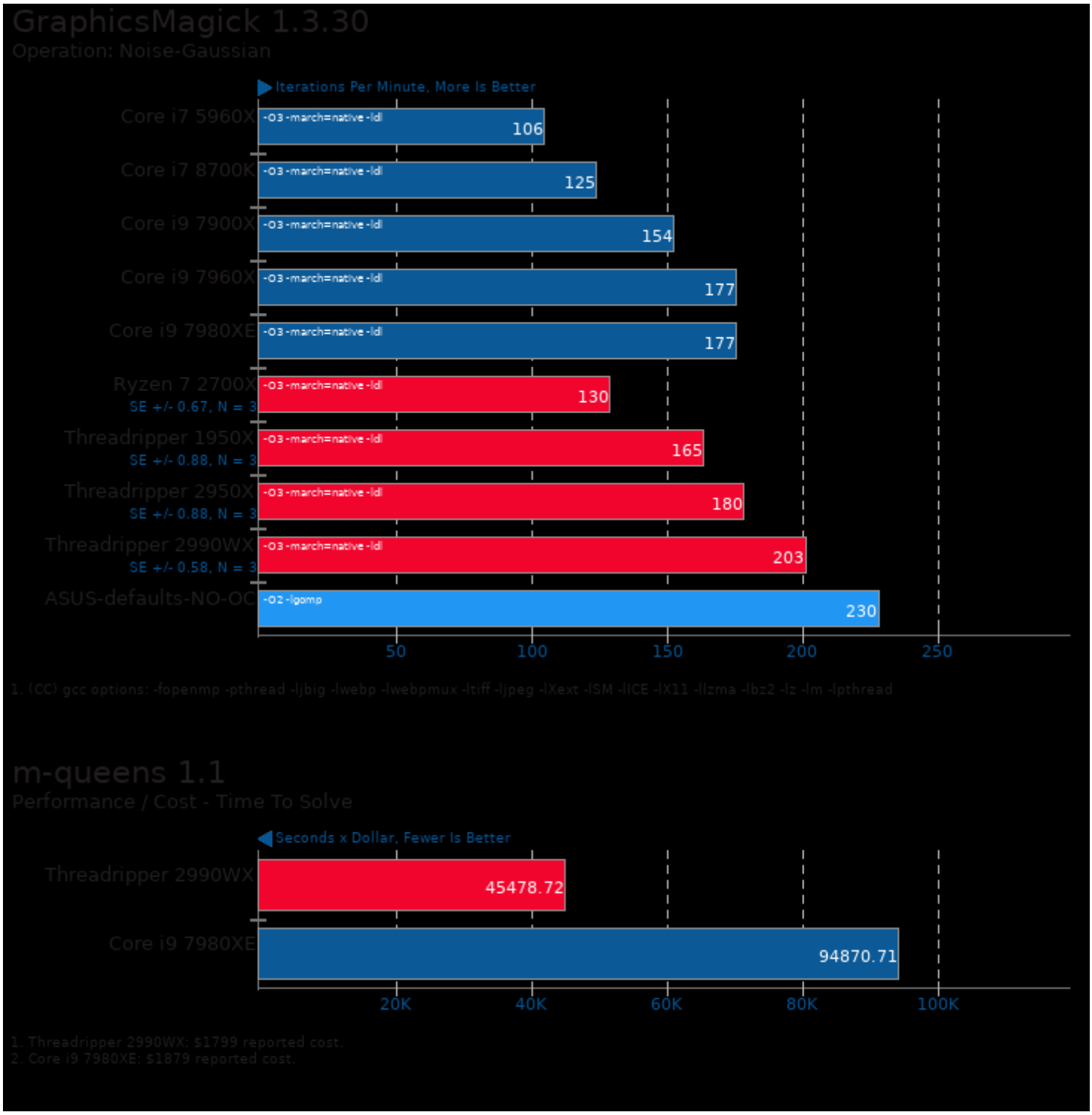


AMD Threadripper 2990WX Linux Benchmarks

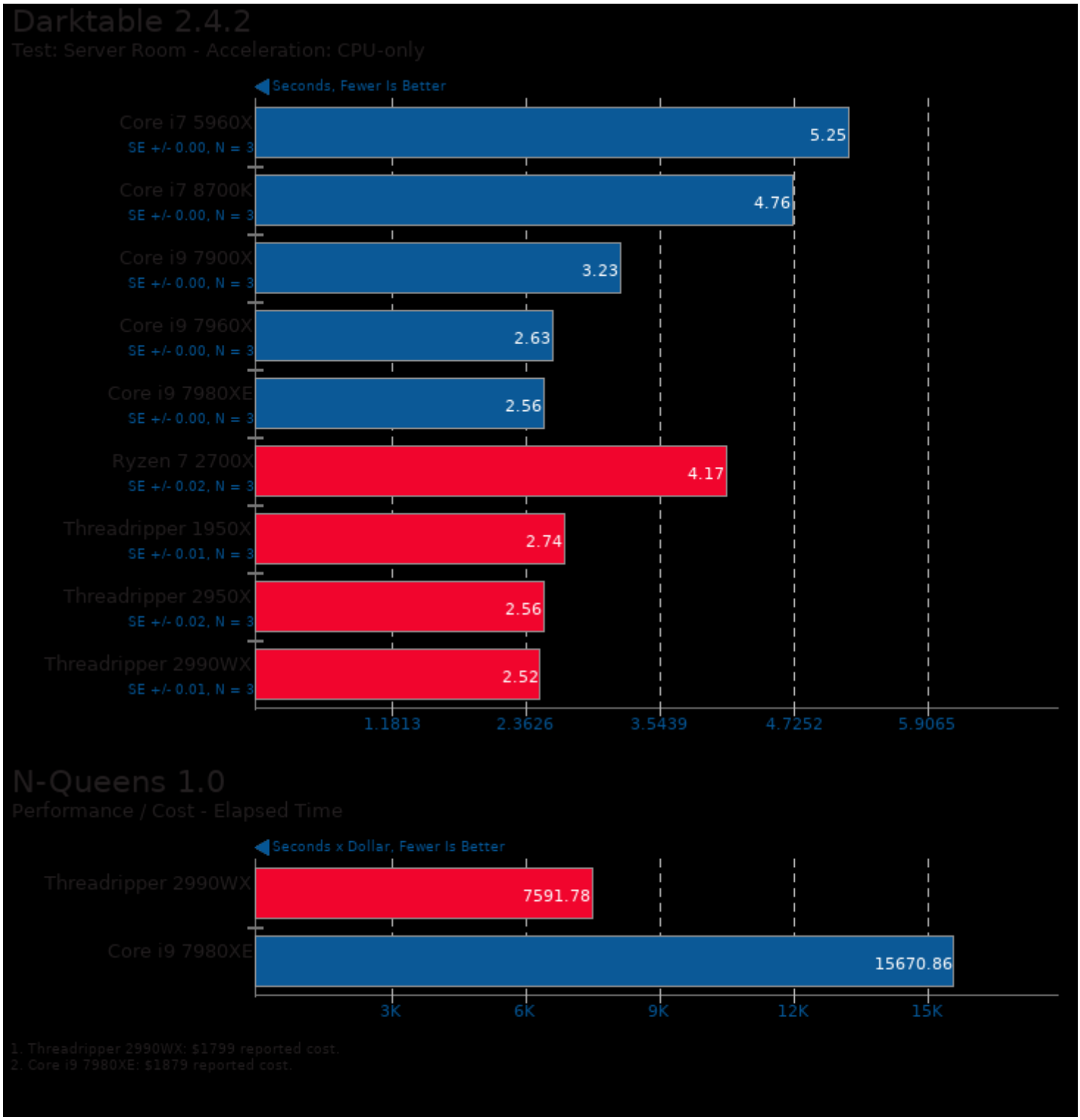


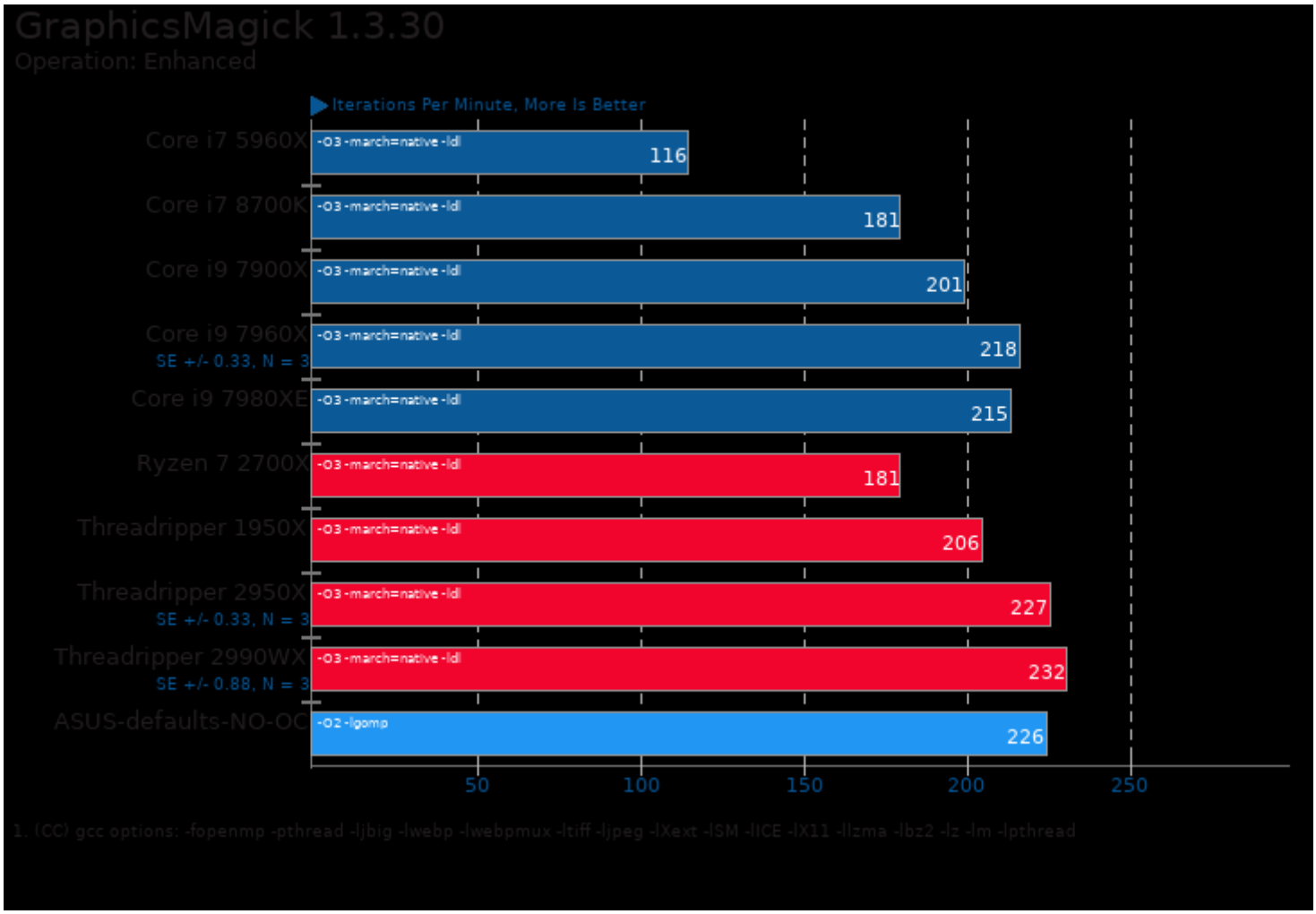
AMD Threadripper 2990WX Linux Benchmarks



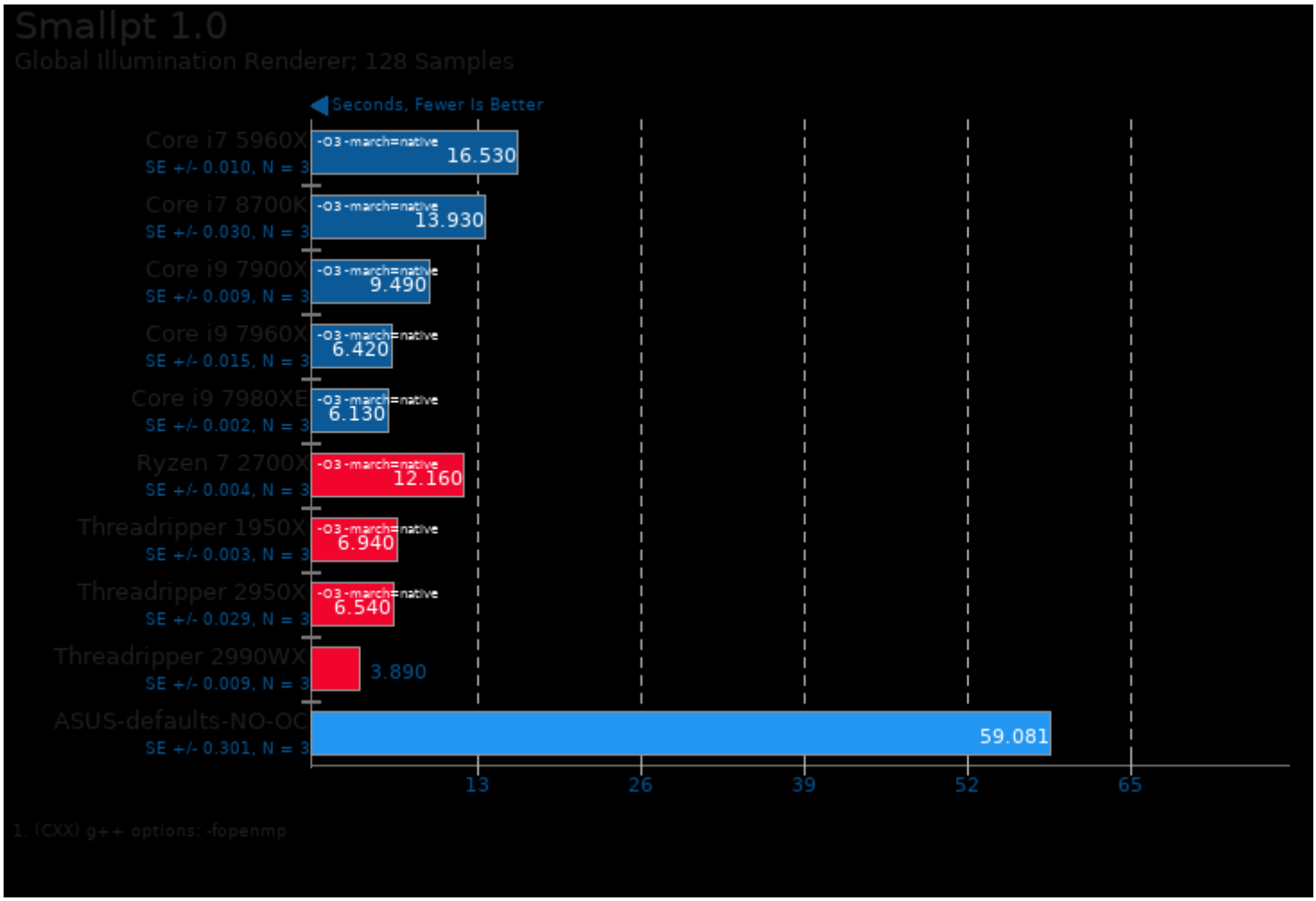

GraphicsMagick 1.3.30
Operation: Noise-Gaussian
Iterations Per Minute, More Is Better
Core i7 5960X
-O3 -march=native -ldl
106
Core i7 8700K
-O3 -march=native -ldl
125
Core i9 7900X
-O3 -march=native -ldl
154
Core i9 7960X
-O3 -march=native -ldl
177
Core i9 7980XE
-O3 -march=native -ldl
177
Ryzen 7 2700X
SE +/- 0.67, N = 3
-O3 -march=native -ldl
130
Threadripper 1950X
SE +/- 0.88, N = 3
-O3 -march=native -ldl
165
Threadripper 2950X
SE +/- 0.88, N = 3
-O3 -march=native -ldl
180
Threadripper 2990WX
SE +/- 0.58, N = 3
-O3 -march=native -ldl
203
ASUS-defaults-NO-OC
-O2 -lgomp
230
50
100
150
200
250
1. (CC) gcc options: -fopenmp -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread
m-queens 1.1
Performance / Cost - Time To Solve
Seconds x Dollar, Fewer Is Better
Threadripper 2990WX
45478.72
Core i9 7980XE
94870.71
20K
40K
60K
80K
100K
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

AMD Threadripper 2990WX Linux Benchmarks

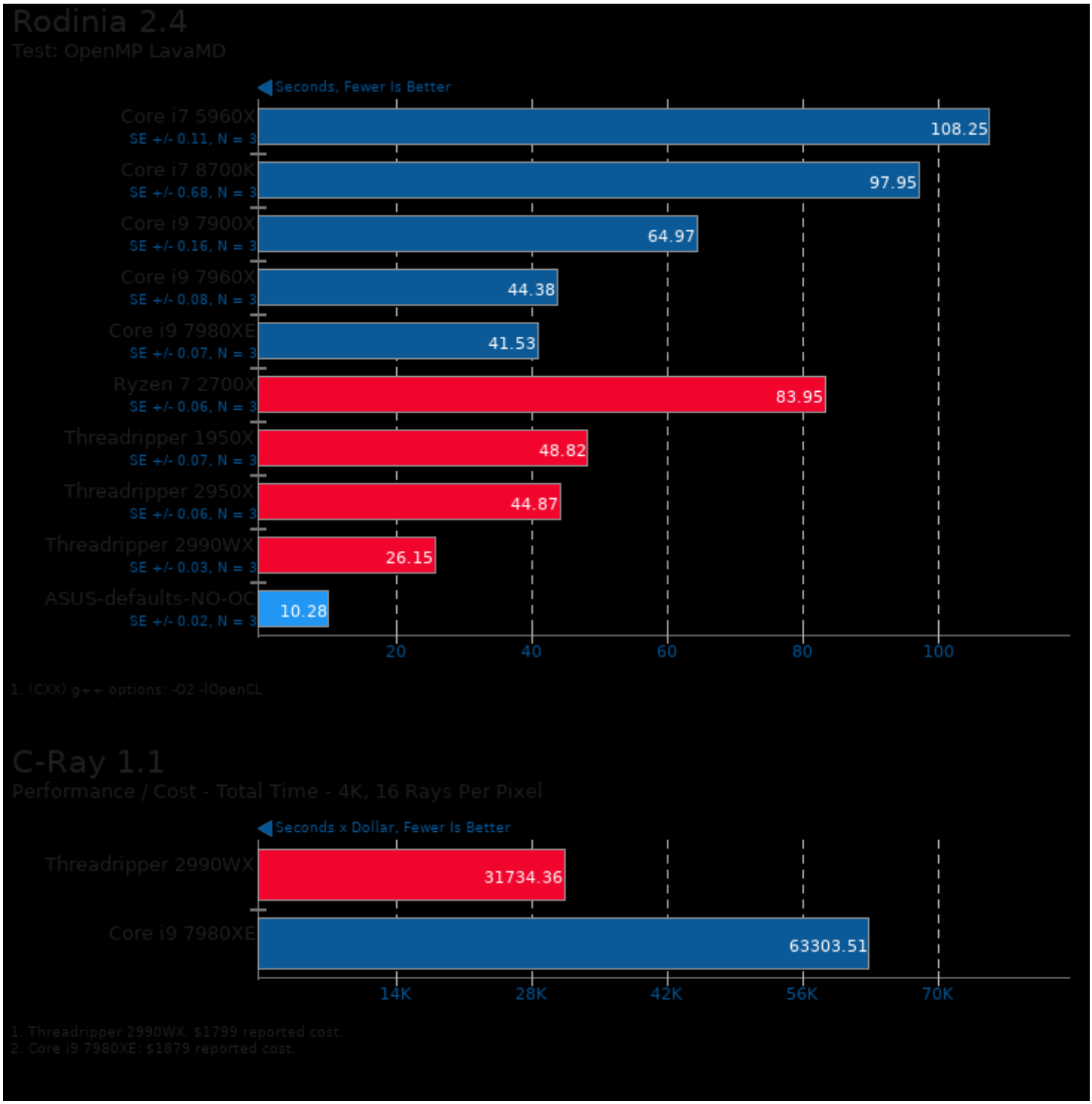


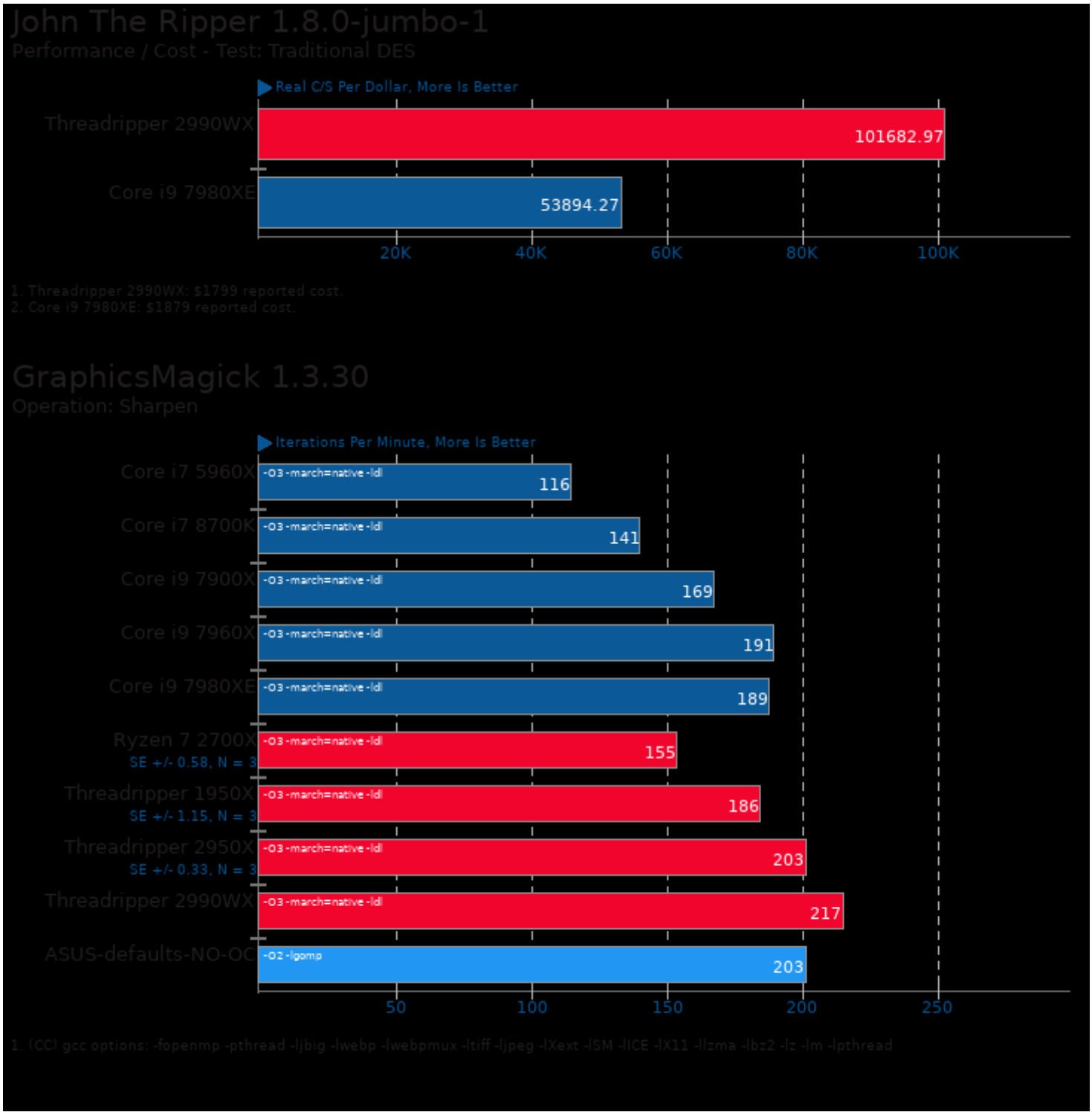

GraphicsMagick 1.3.30
Operation: Enhanced
Iterations Per Minute, More Is Better
Core i7 5960X
-O3 -march=native -ldl
116
Core i7 8700K
-O3 -march=native -ldl
181
Core i9 7900X
-O3 -march=native -ldl
201
Core i9 7960X
-O3 -march=native -ldl
218
SE +/- 0.33, N = 3
Core i9 7980XE
-O3 -march=native -ldl
215
Ryzen 7 2700X
-O3 -march=native -ldl
181
Threadripper 1950X
-O3 -march=native -ldl
206
Threadripper 2950X
-O3 -march=native -ldl
227
SE +/- 0.33, N = 3
Threadripper 2990WX
-O3 -march=native -ldl
232
SE +/- 0.88, N = 3
ASUS-defaults-NO-OC
-O2 -lgomp
226
50
100
150
200
250
1. (CC) gcc options: -fopenmp -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

AMD Threadripper 2990WX Linux Benchmarks



AMD Threadripper 2990WX Linux Benchmarks

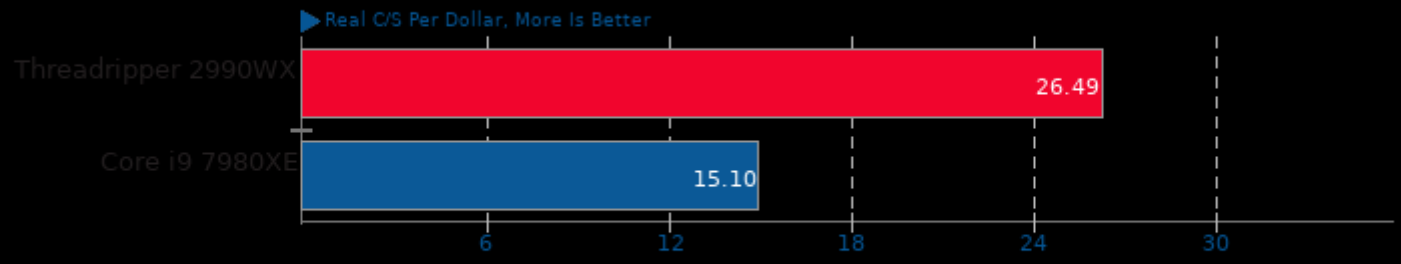



John The Ripper 1.8.0-jumbo-1
Performance / Cost - Test: Traditional DES
Real C/S Per Dollar, More Is Better
Threadripper 2990WX
101682.97
Core i9 7980XE
53894.27
20K
40K
60K
80K
100K
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.
GraphicsMagick 1.3.30
Operation: Sharpen
Iterations Per Minute, More Is Better
Core i7 5960X
-O3 -march=native -ldl
116
Core i7 8700K
-O3 -march=native -ldl
141
Core i9 7900X
-O3 -march=native -ldl
169
Core i9 7960X
-O3 -march=native -ldl
191
Core i9 7980XE
-O3 -march=native -ldl
189
Ryzen 7 2700X
SE +/- 0.58, N = 3
-O3 -march=native -ldl
155
Threadripper 1950X
SE +/- 1.15, N = 3
-O3 -march=native -ldl
186
Threadripper 2950X
SE +/- 0.33, N = 3
-O3 -march=native -ldl
203
Threadripper 2990WX
-O3 -march=native -ldl
217
ASUS-defaults-NO-OC
-O2 -lgomp
203
50
100
150
200
250
1. (CC) gcc options: -fopenmp -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -lX11 -llzma -lbz2 -lz -lm -lpthread

AMD Threadripper 2990WX Linux Benchmarks

John The Ripper 1.8.0-jumbo-1

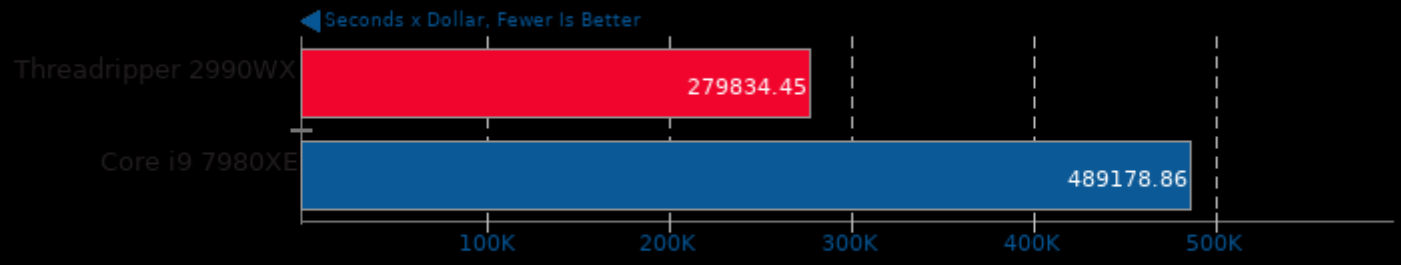
Performance / Cost - Test: Blowfish



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

Blender 2.79a

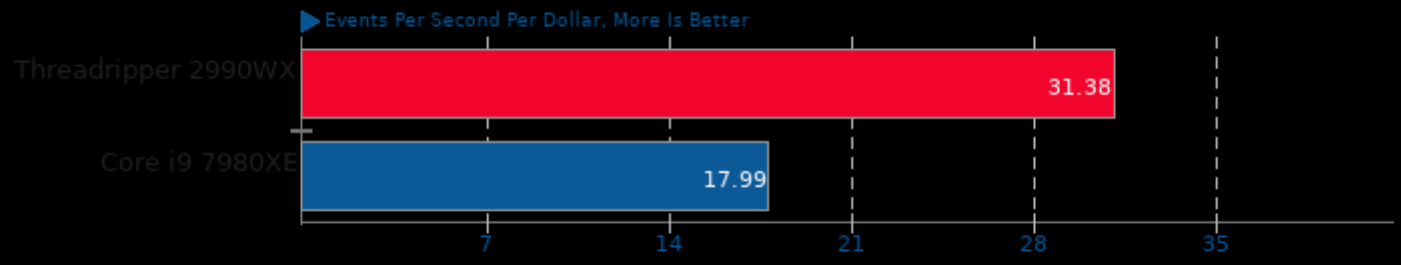
Performance / Cost - Blend File: Classroom - Compute: CPU-Only



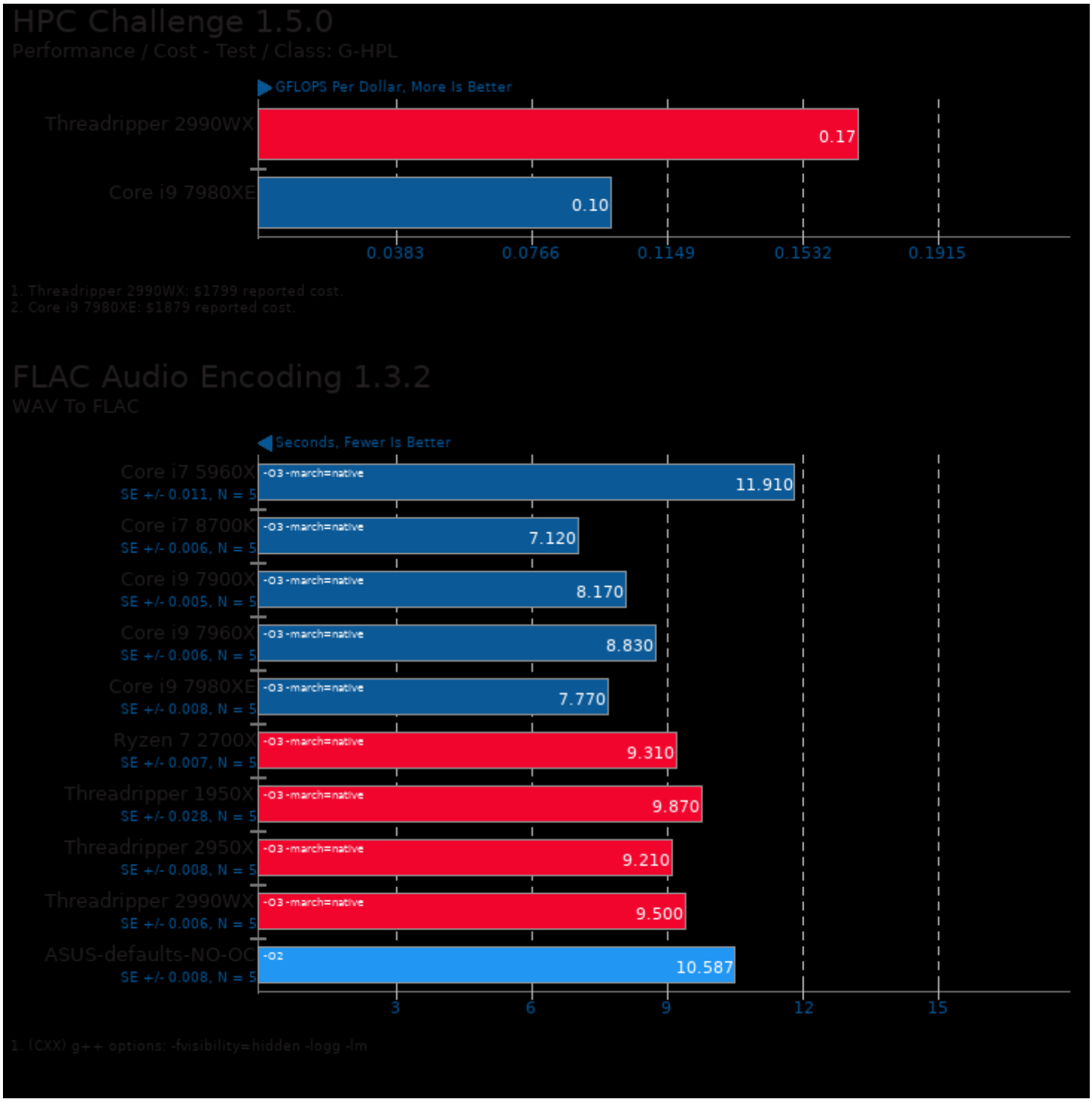
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

Sysbench 2018-07-28

Performance / Cost - Test: CPU



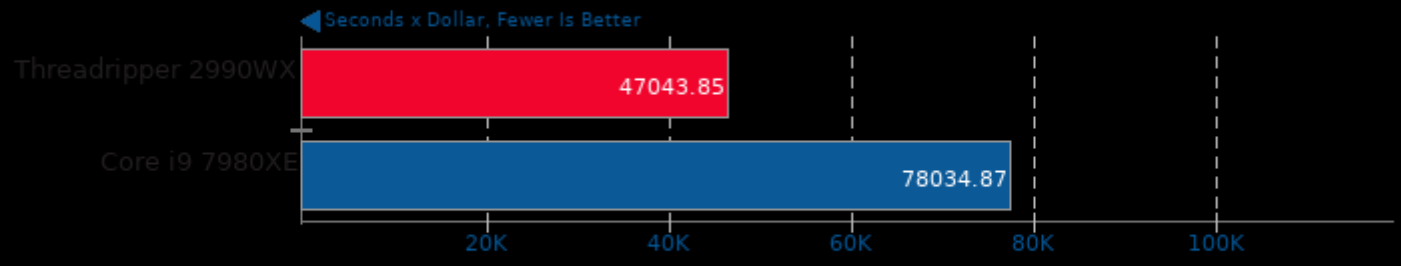
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.


HPC Challenge 1.5.0
Performance / Cost - Test / Class: G-HPL
GFLOPS Per Dollar, More Is Better
Threadripper 2990WX
0.17
Core i9 7980XE
0.10
0.0383
0.0766
0.1149
0.1532
0.1915
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.
FLAC Audio Encoding 1.3.2
WAV To FLAC
Seconds, Fewer Is Better
Core i7 5960X
SE +/- 0.011, N = 5
-O3 -march=native
11.910
Core i7 8700K
SE +/- 0.006, N = 5
-O3 -march=native
7.120
Core i9 7900X
SE +/- 0.005, N = 5
-O3 -march=native
8.170
Core i9 7960X
SE +/- 0.006, N = 5
-O3 -march=native
8.830
Core i9 7980XE
SE +/- 0.008, N = 5
-O3 -march=native
7.770
Ryzen 7 2700X
SE +/- 0.007, N = 5
-O3 -march=native
9.310
Threadripper 1950X
SE +/- 0.028, N = 5
-O3 -march=native
9.870
Threadripper 2950X
SE +/- 0.008, N = 5
-O3 -march=native
9.210
Threadripper 2990WX
SE +/- 0.006, N = 5
-O3 -march=native
9.500
ASUS-defaults-NO-OC
SE +/- 0.008, N = 5
-O2
10.587
3
6
9
12
15
1. (CXX) g++ options: -fvisibility=hidden -logg -lm

AMD Threadripper 2990WX Linux Benchmarks

Rodinia 2.4

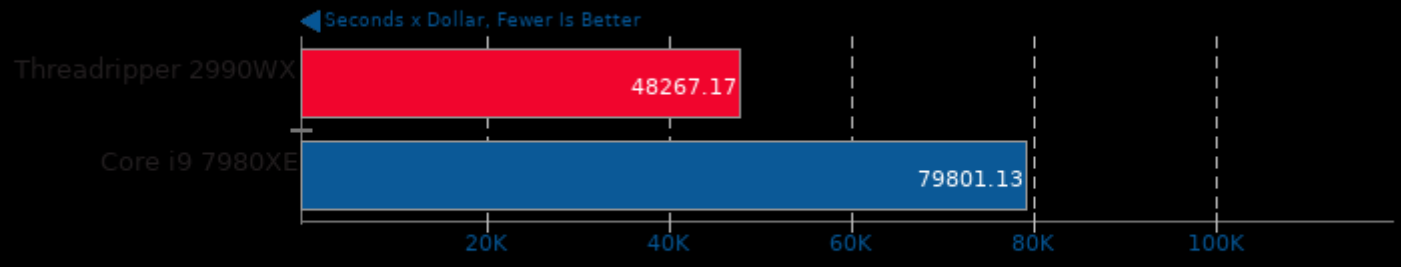
Performance / Cost - Test: OpenMP LavaMD



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

Hackbench

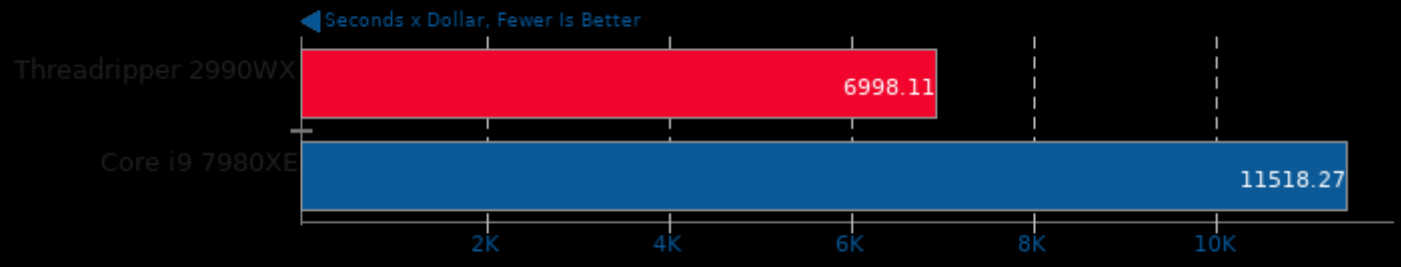
Performance / Cost - Count: 32 - Type: Process



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

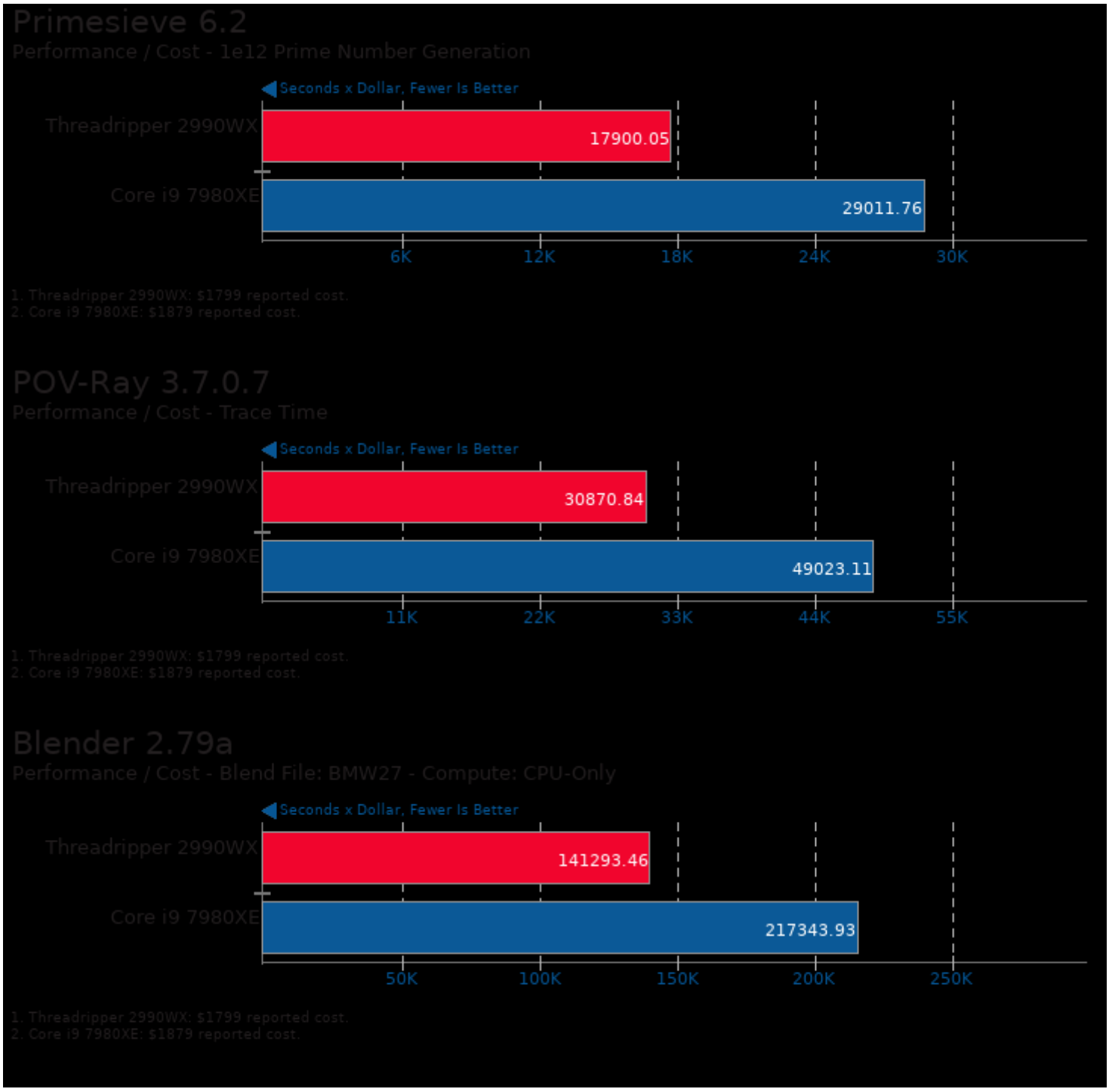
Smallpt 1.0

Performance / Cost - Global Illumination Renderer; 128 Samples



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

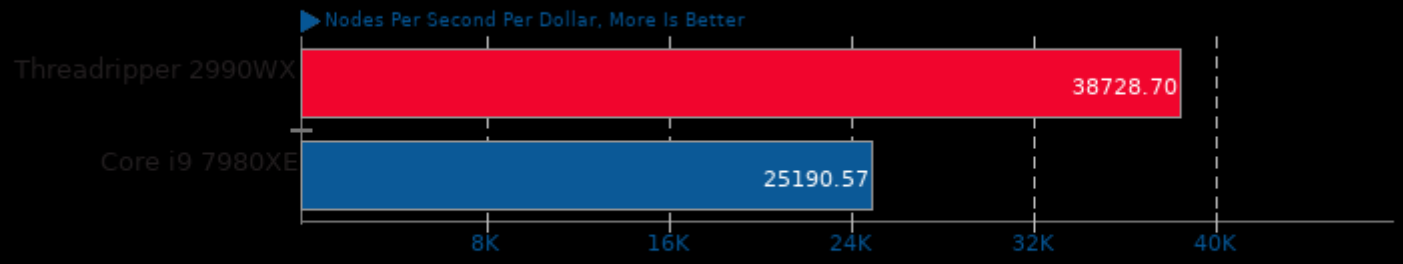
AMD Threadripper 2990WX Linux Benchmarks



AMD Threadripper 2990WX Linux Benchmarks

Stockfish 9

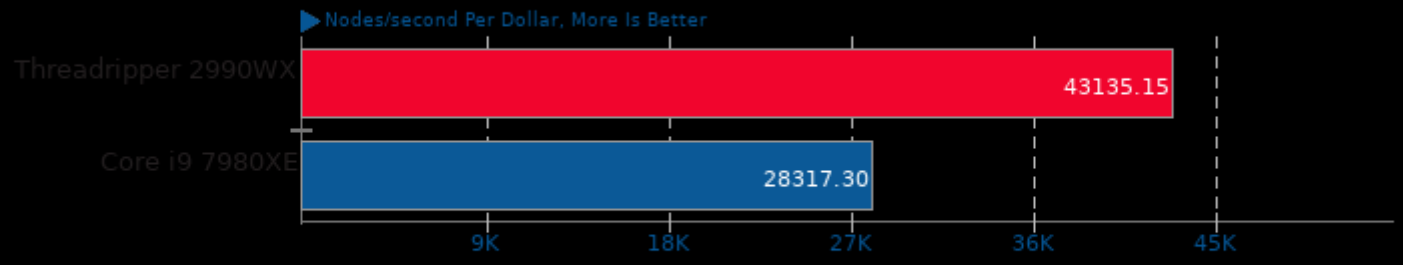
Performance / Cost - Total Time



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

asmFish 2017-09-19

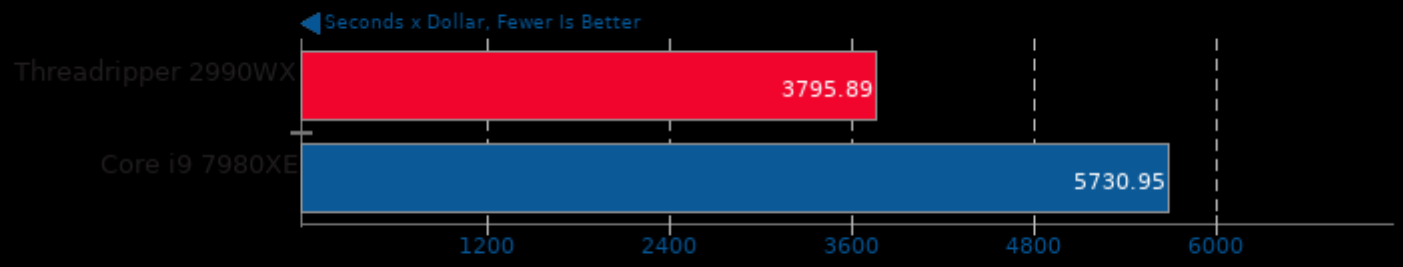
Performance / Cost - 1024 Hash Memory, 26 Depth



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

Parboil 2.5

Performance / Cost - Test: OpenMP CUTCP

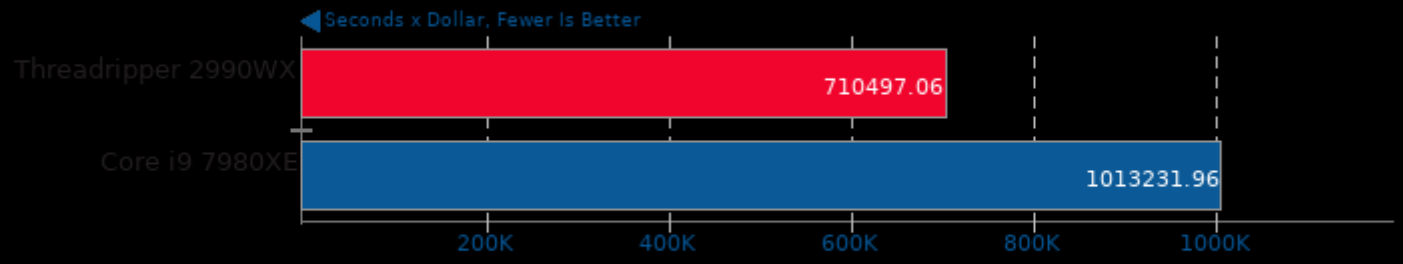


1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

AMD Threadripper 2990WX Linux Benchmarks

Blender 2.79a

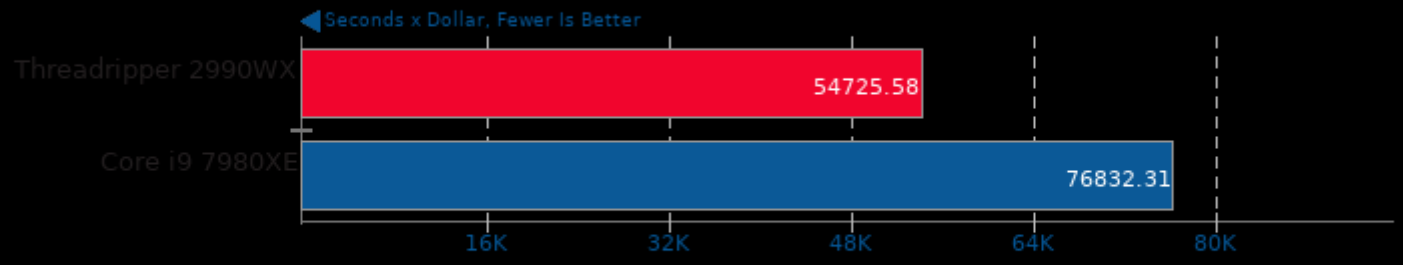
Performance / Cost - Blend File: Barbershop - Compute: CPU-Only



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

Chaos Group V-RAY 1.1.0

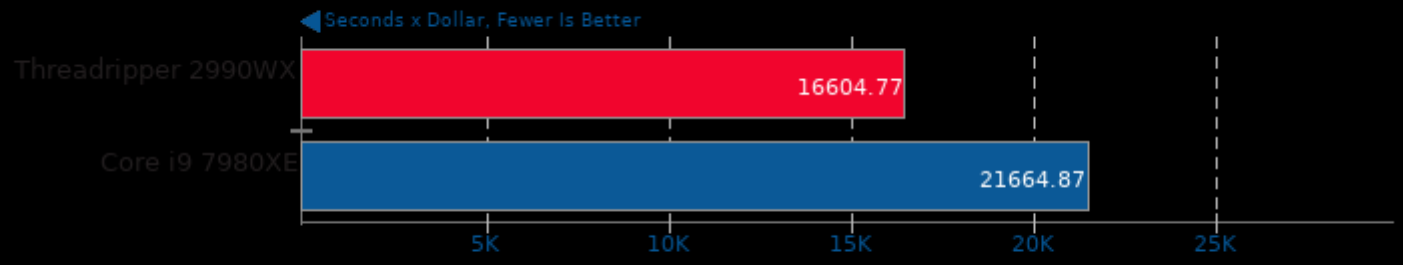
Performance / Cost - Mode: CPU



1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

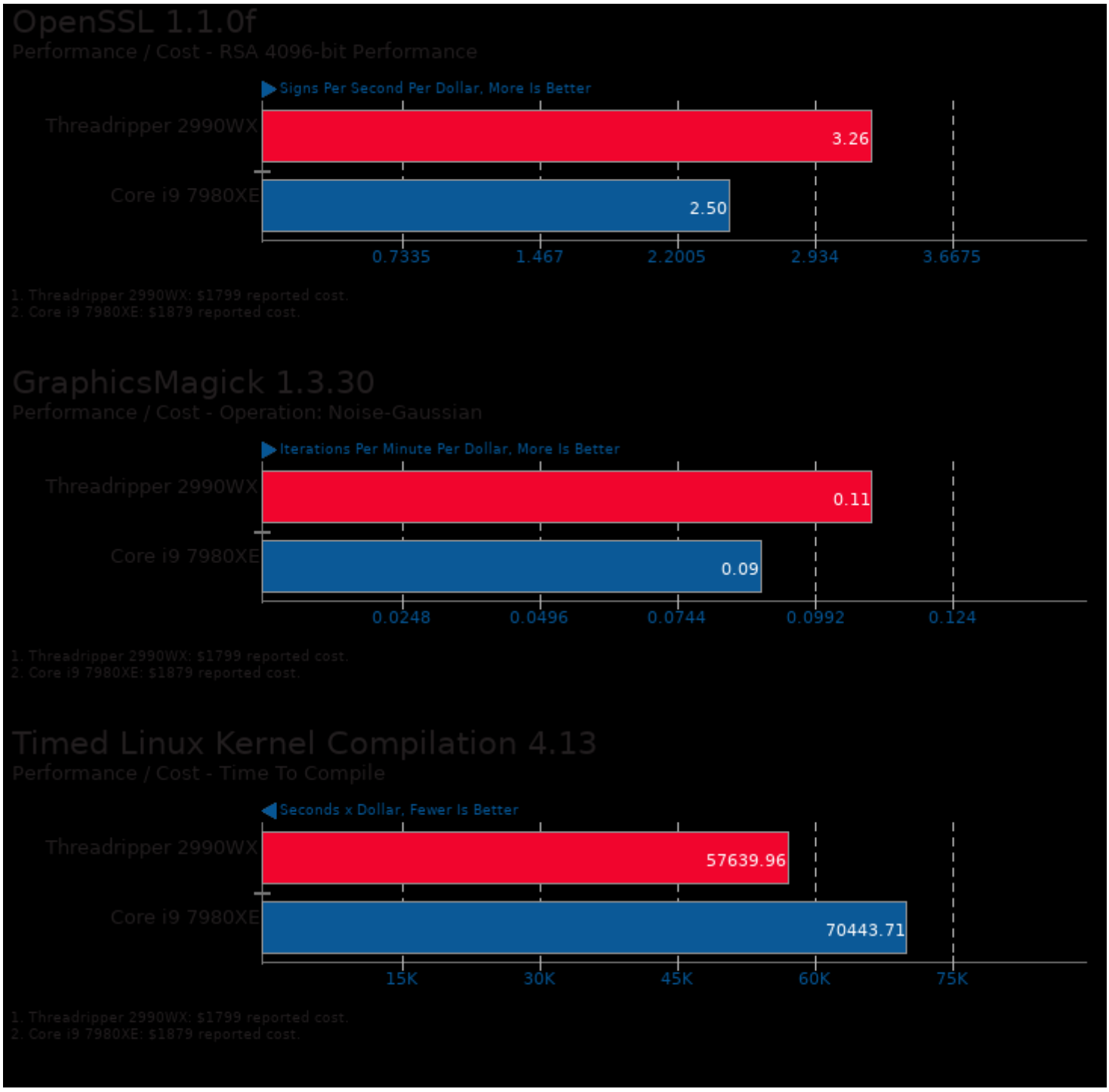
Rodinia 2.4

Performance / Cost - Test: OpenMP CFD Solver

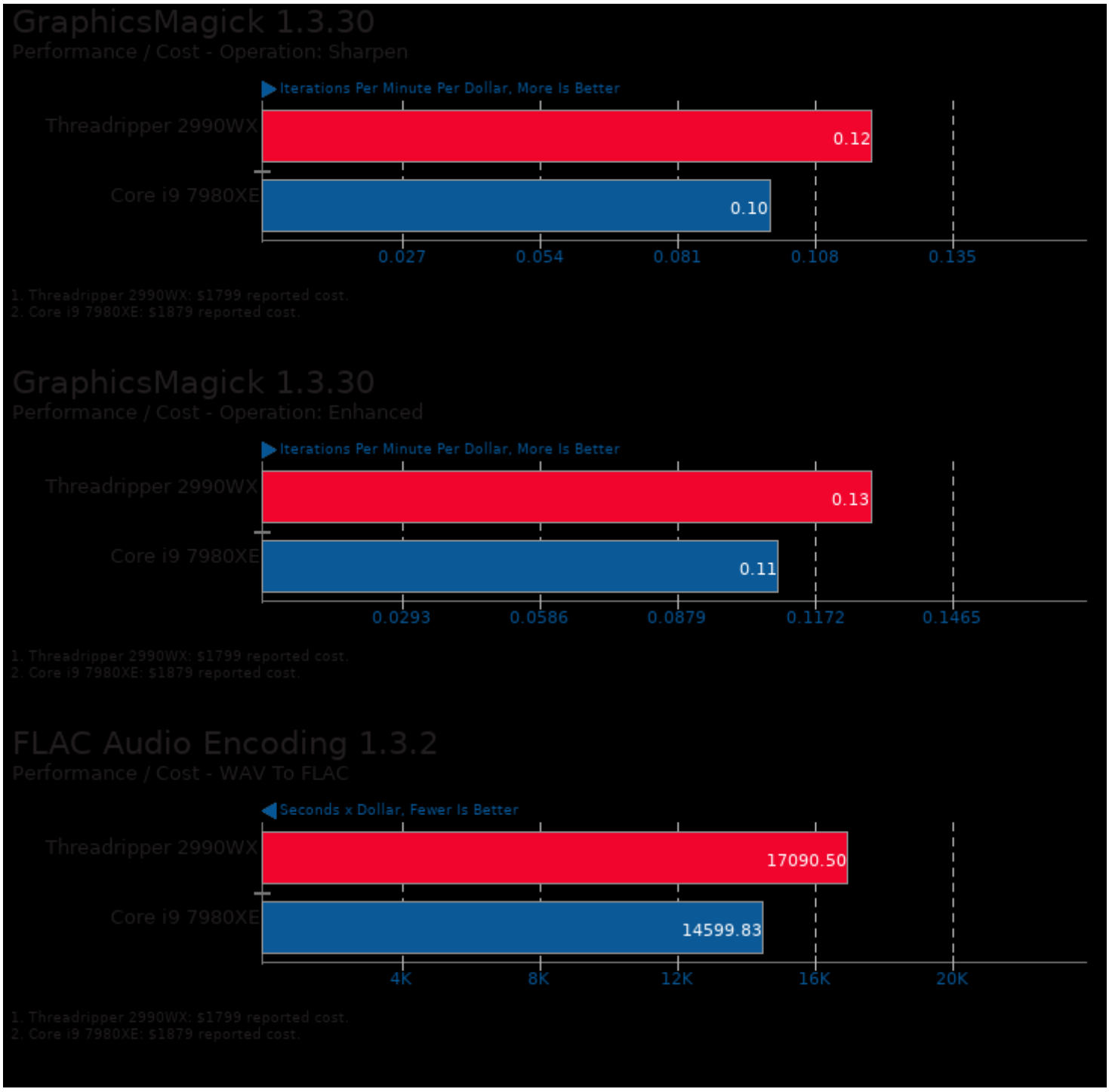


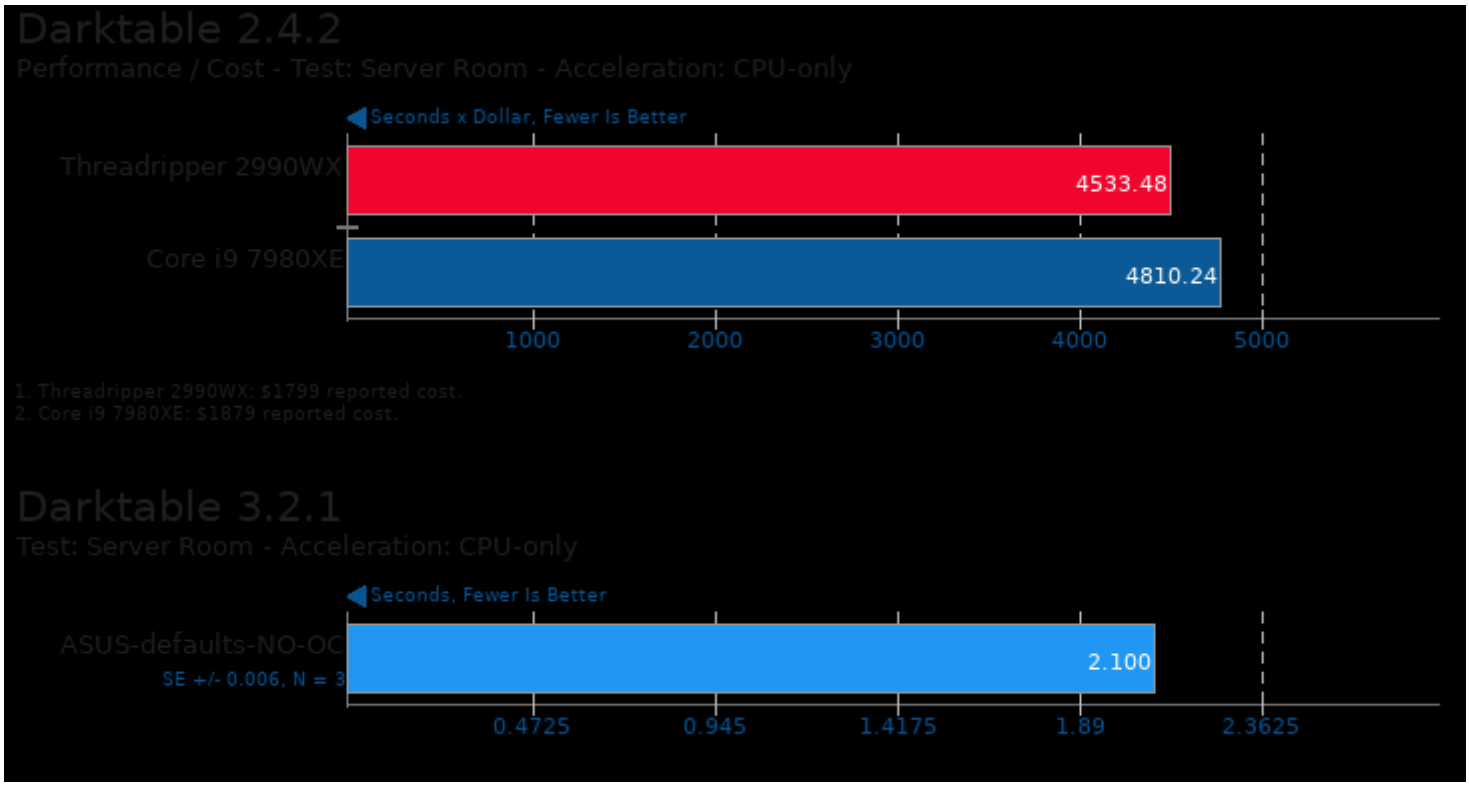
1. Threadripper 2990WX: $1799 reported cost.
2. Core i9 7980XE: $1879 reported cost.

AMD Threadripper 2990WX Linux Benchmarks



AMD Threadripper 2990WX Linux Benchmarks





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