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# Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

POWER9 2x22 Core Talos II system, Fedora 34 with current kernel as of 13OCT2021

**Automated Executive Summary**

*Talos II 2 x 22c POWER 9 - Spec Kernel Only had the most wins, coming in first place for 41% of the tests.*

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

*PHPBench (PHP Benchmark Suite) at 8.679x*
*Rust Prime Benchmark (Prime Number Test To 200,000,000) at 8.514x*
*7-Zip Compression (Compress Speed Test) at 7.893x*
*7-Zip Compression (System Power Consumption Monitor) at 6.63x*
*PyBench (Total For Average Test Times) at 6.551x*
*Timed LLVM Compilation (System Power Consumption Monitor) at 6.465x*
*PHPBench (PHP Benchmark Suite) at 6.324x*
*Stockfish (System Power Consumption Monitor) at 6.32x*
*PostgreSQL pgbench (System Power Consumption Monitor) at 6.1x*
*C-Ray (System Power Consumption Monitor) at 6.029x.*

# Test Systems:

## Threadripper 2990WX

Processor: AMD Ryzen Threadripper 2990WX 32-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: ASUS ROG ZENITH EXTREME (1402 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel I211 Gigabit Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

## Core i9 7980XE

Processor: Intel Core i9-7980XE @ 4.20GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A (1503 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

## Threadripper 2950X

Processor: AMD Ryzen Threadripper 2950X 16-Core @ 3.50GHz (16 Cores / 32 Threads), Motherboard: MSI MEG X399 CREATION (MS-7B92) v1.0 (1.10 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel I211 Gigabit Connection + Intel Wireless-AC 9260

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new

--with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

## 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: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

## 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: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

## Threadripper 2920X

Processor: AMD Ryzen Threadripper 2920X 12-Core @ 3.50GHz (12 Cores / 24 Threads), Motherboard: Gigabyte X399 AORUS Gaming 7 (F11e BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Qualcomm Atheros Killer E2500 Gigabit + Intel Wireless 8265 / 8275

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes

--enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

## Threadripper 2970WX

Processor: AMD Ryzen Threadripper 2970WX 24-Core @ 3.00GHz (24 Cores / 48 Threads), Motherboard: Gigabyte X399 AORUS Gaming 7 (F11e BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Qualcomm Atheros Killer E2500 Gigabit + Intel Wireless 8265 / 8275

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

## Talos II 2 x 22c POWER9

## Talos II 2 x 22c POWER 9 - Spec Kernel Only

Processor: POWER9 altivec supported @ 3.80GHz (44 Cores / 176 Threads), Motherboard: PowerNV T2P9D01 REV 1.01, Memory: 65536MB, Disk: Samsung SSD 960 EVO 500GB, Graphics: AMD Radeon RX Vega 8GB, Monitor: VE228, Network: Broadcom NetXtreme BCM5719 Gigabit PCIe

OS: Ubuntu 18.10, Kernel: 4.18.0-10-generic (ppc64le), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 1920x1080

Environment Notes: CXXFLAGS=-O3-mtune=power9-mcpu=power9 CFLAGS=-O3-mtune=power9-mcpu=power9
Compiler Notes: --build=powerpc64le-linux-gnu --disable-libphobos --disable-multilib --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-secureplt --enable-shared --enable-targets=powerpcle-linux --enable-threads=posix --host=powerpc64le-linux-gnu --program-prefix=powerpc64le-linux-gnu- --target=powerpc64le-linux-gnu --with-cpu=power8 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-long-double-128 -v
Processor Notes: Scaling Governor: powernv-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7
Security Notes: __user pointer sanitization ori31 speculation barrier enabled + Indirect branch serialisation (kernel only) + Kernel entry/exit barrier (eieio)

## 2x6386 32G ECC

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 32GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie

--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## 6262

Processor: AMD Opteron 6262 HE @ 1.60GHz (8 Cores / 16 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 16GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x600063e
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## test

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 32GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## RCS 6386

## RCS6386

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: ASUS KGPE-D16 v1.0 (4.8-722-g32cdff5f08 BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 252GB, Disk: 180GB INTEL SSDSC2BF18 + 4 x 1920GB SAMSUNG MZ7KH1T9, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: PL2274HD, Network: 2 x Intel 82574L + Mellanox MT27520

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## POWER9

## TalosII-DD2.2Stepping

Processor: POWER9 @ 3.80GHz (44 Cores / 176 Threads), Motherboard: PowerNV T2P9S01 REV 1.01, Memory: 256GB, Disk: 1000GB Samsung SSD 970 EVO Plus 1TB, Graphics: AMD Radeon Pro WX 7100 8GB (1243/1750MHz), Audio: AMD Ellesmere HDMI Audio, Monitor: 2 x CB282K, Network: 2 x Broadcom NetXtreme BCM5719 PCIe + 2 x Intel 82599ES 10-Gigabit SFI/SFP+

OS: Fedora 34, Kernel: 5.14.10-200.fc34.ppc64le (ppc64le), Desktop: GNOME Shell 40.4, Display Server: X Server 1.20.11, Compiler: GCC 11.2.1 20210728, File-System: btrfs, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=ppc64le-redhat-linux --disable-libunwind-exceptions --disable-multilib --enable-__cxa_atexit --enable-bootstrap --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,lto --enable-offload-targets=nvptx-none --enable-plugin --enable-secureplt --enable-shared --enable-targets=powerpcle-linux --enable-threads=posix --mandir=/usr/share/man --with-cpu-32=power8 --with-cpu-64=power8 --with-gcc-major-version-only --with-linker-hash-style=gnu --with-long-double-128 --with-tune-32=power8 --with-tune-64=power8 --without-cuda-driver
Processor Notes: SMT (threads per core): 4
Python Notes: Python 3.9.7
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Mitigation of RFI Flush L1D private per thread + mds: Not affected + meltdown: Mitigation of RFI Flush L1D private per thread + spec_store_bypass: Mitigation of Kernel entry/exit barrier (eieio) + spectre_v1: Mitigation of __user pointer sanitization ori31 speculation barrier enabled + spectre_v2: Mitigation of Indirect branch cache disabled Software link stack flush + srbds: Not affected + tsx_async_abort: Not affected

| | Threadripper 2990WX | Core i9 7980XE | Threadripper 2950X | Core i9 7960X | Core i9 7900X | Threadripper 2920X | Threadripper 2970WX | Talos II 2 x 22c POWER9 | Talos II 2 x 22c POWER 9 - Spec Kernel Only | 2x6386 32G ECC | 6262 test | RCS6386 | RCS6386 | POWER9 | Talos II-DD2.2Stepping |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PHPBench - P.B.S (Score/Watt)** | 3795 | 5806 | 4479 | **6137** | | 4525 | 3492 | **707.13** | 1419 | | | | | | |
| **Normalized** | 61.84% | 94.6% | 72.99% | 100% | | 73.72% | 56.9% | 11.52% | 23.12% | | | | | | |

# Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

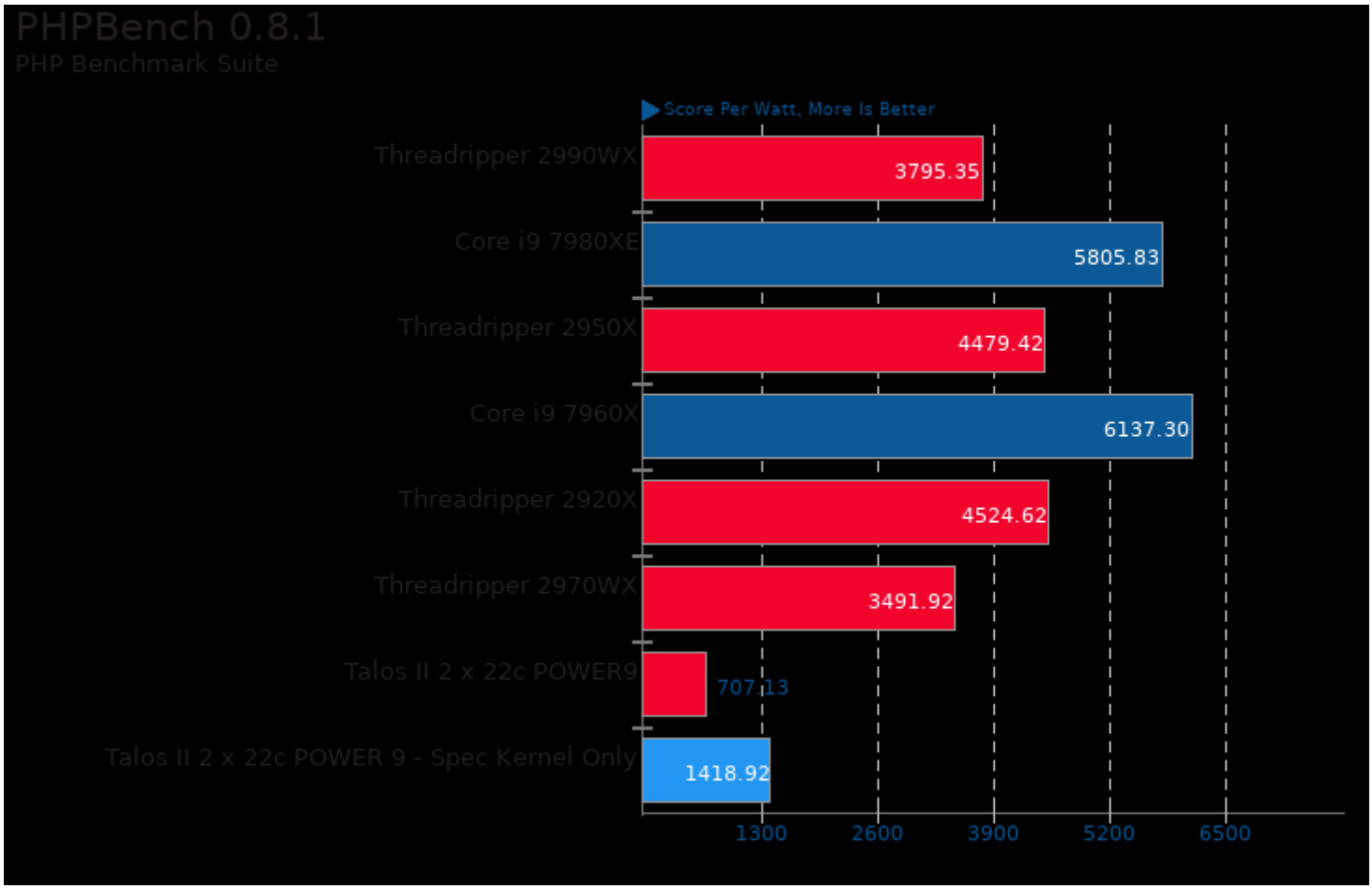
| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rust Prime Benchmark - P.N.T.T.2.0.0 (sec)** | 12.49 | 8.18 | 21.21 | 6.71 | 11.55 | **30.14** | 17.64 | 3.64 | **3.54** | 16.403 | 16.428 | 16.476 | 4.288 |
| **Normalized** | 28.34% | 43.28% | 16.69% | 52.76% | 30.65% | 11.75% | 20.07% | 97.25% | 100% | 21.58% | 21.55% | 21.49% | 82.56% |
| **Standard Deviation** | 0.1% | 0.2% | 0.1% | 0.1% | 0% | 0% | 0.2% | 12% | 4.8% | 0% | 0.1% | 0.7% | 2.4% |
| **7-Zip Compression - C.S.T (MIPS)** | 85484 | 95662 | 73967 | 89432 | 62788 | 61894 | 84493 | **162969** | 149050 | **20646** | 20771 | 28390 | |
| **Normalized** | 52.45% | 58.7% | 45.39% | 54.88% | 38.53% | 37.98% | 51.85% | 100% | 91.46% | 12.67% | 12.75% | 17.42% | |
| **Standard Deviation** | 3.1% | 0.4% | 0.2% | 0.3% | 1.3% | 0.7% | 3.3% | 2.7% | 8.1% | 0.5% | 0.1% | 0.3% | |
| **PyBench - T.F.A.T.T (Millisecond** | 1147 | 955 | 1136 | 960 | **942** | 1133 | 1165 | 4088 | 1936 | 2269 | 2260 | 2259 | **6171** |
| **Normalized** | 82.13% | 98.64% | 82.92% | 98.13% | 100% | 83.14% | 80.86% | 23.04% | 48.66% | 41.52% | 41.68% | 41.7% | 15.26% |
| **Standard Deviation** | 0.4% | 0.3% | 0.3% | | 0.6% | 0.6% | 0.1% | 0.3% | 0.2% | 0.5% | 0.5% | 0.3% | 0.2% |
| **PHPBench - P.B.S** | 525276 | 703666 | 537467 | 701357 | **717281** | 535263 | 520064 | 161286 | 328546 | 323744 | 327452 | 323158 | **113421** |
| **Normalized** | 73.23% | 98.1% | 74.93% | 97.78% | 100% | 74.62% | 72.5% | 22.49% | 45.8% | 45.13% | 45.65% | 45.05% | 15.81% |
| **Standard Deviation** | 0.2% | 0.1% | 0.8% | 0.8% | 0.9% | 0.3% | 0.1% | 0.1% | 0.6% | 1.1% | 1.1% | 1.3% | 0.2% |
| **PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)** | 472250 | 522155 | 317019 | 493203 | 327587 | 271596 | 430861 | 544186 | **574403** | **101566** | 103743 | 109602 | 431471 |
| **Normalized** | 82.22% | 90.9% | 55.19% | 85.86% | 57.03% | 47.28% | 75.01% | 94.74% | 100% | 17.68% | 18.06% | 19.08% | 75.12% |
| **Standard Deviation** | 2.3% | 0.4% | 0.1% | 0.3% | 1.2% | 0.2% | 0.3% | 0.6% | 0.2% | 2% | 1.8% | 0.8% | 1.1% |
| **Timed LLVM Compilation - Time To Compile** | 221 | 227 | 303 | 248 | 359 | 373 | 255 | 183 | **172** | 916.158 | **944.978** | 740.446 | 230.347 |
| **Normalized** | 77.83% | 75.77% | 56.77% | 69.35% | 47.91% | 46.11% | 67.45% | 93.99% | 100% | 18.77% | 18.2% | 23.23% | 74.67% |
| **C-Ray - Total Time - 4.1.R.P.P (sec)** | **17.97** | 33.51 | 33.08 | 35.71 | 51.28 | 41.30 | 23.12 | 19.14 | 19.09 | 76.950 | **77.009** | 76.994 | 21.448 |
| **Normalized** | 100% | 53.63% | 54.32% | 50.32% | 35.04% | 43.51% | 77.72% | 93.89% | 94.13% | 23.35% | 23.33% | 23.34% | 83.78% |
| **Standard Deviation** | 0.2% | 0.1% | 0.1% | 0.1% | 0.1% | 0.7% | 2% | 0.5% | 1.2% | 0% | 0.1% | 0% | 0.3% |
| **OpenSSL - R.4.b.P (Signs/sec)** | 5821 | 4686 | 3287 | 4421 | 3059 | 2566 | 4561 | 7356 | **7408** | 2010 | **2010** | 2011 | 6692 |
| **Normalized** | 78.58% | 63.26% | 44.37% | 59.68% | 41.29% | 34.64% | 61.57% | 99.3% | 100% | 27.13% | 27.13% | 27.14% | 90.33% |

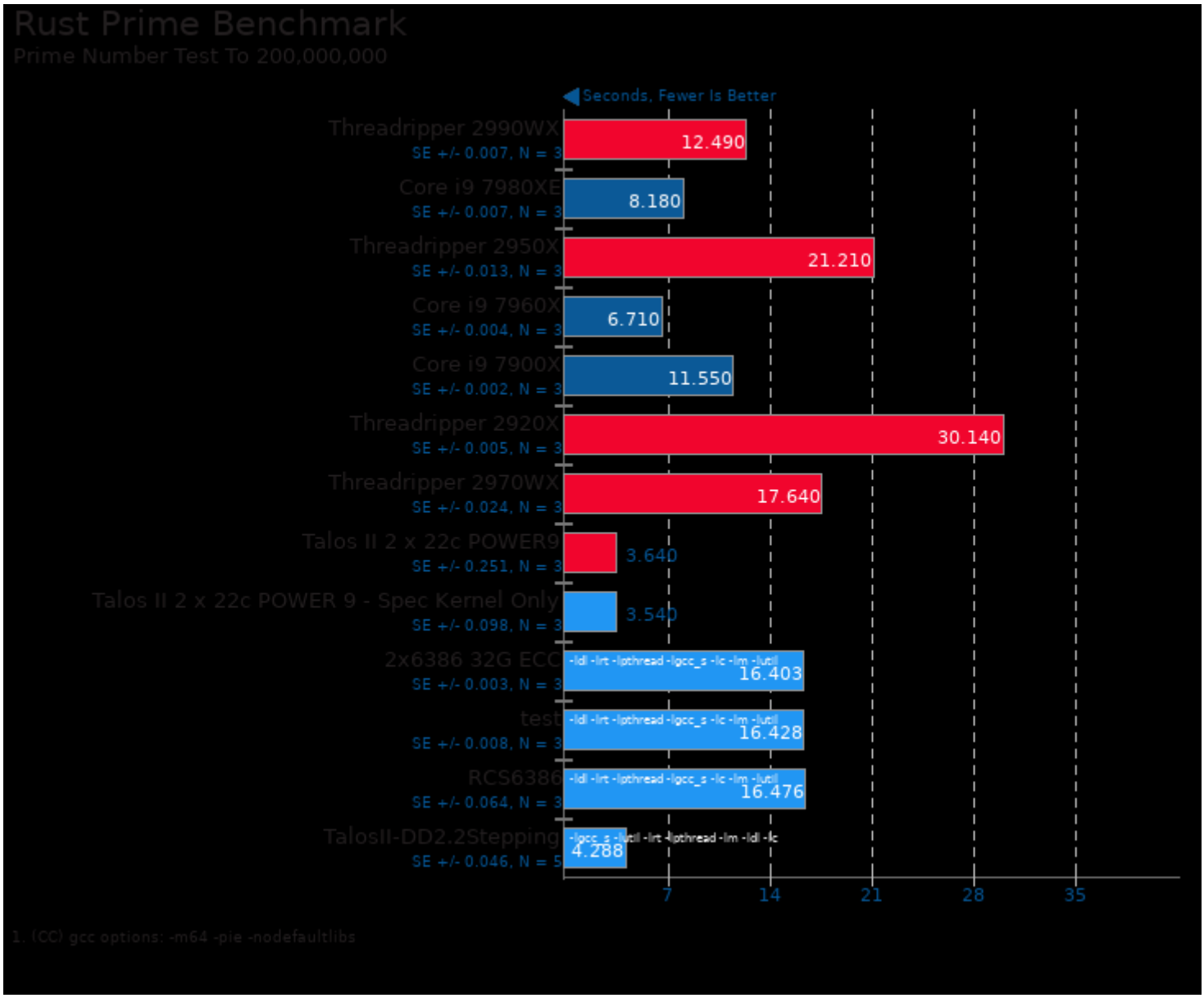
# Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

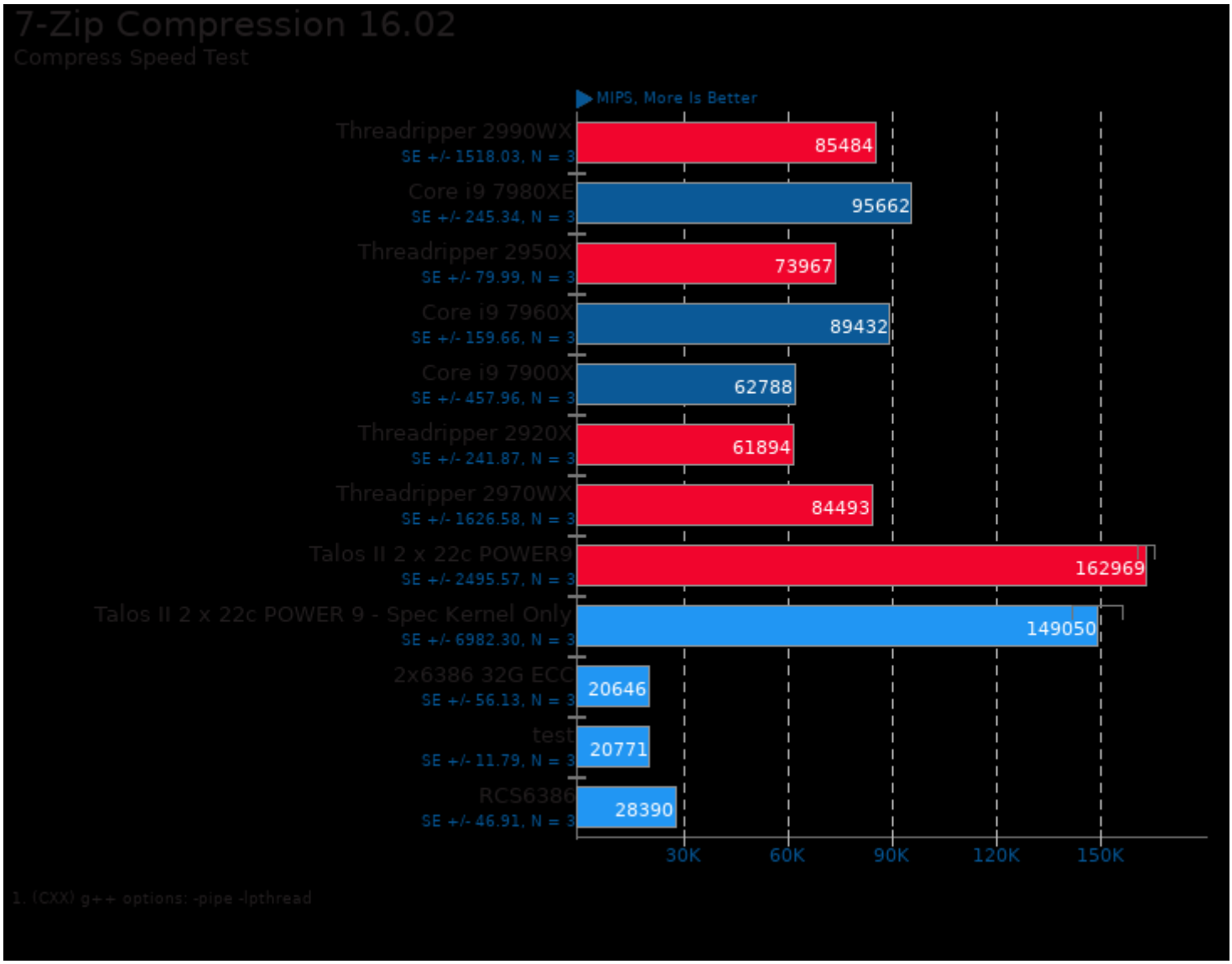
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standard Deviation | 0.3% | 0.3% | 0.5% | 0.1% | 0.4% | 0.8% | 0.1% | 1.7% | 0.7% | 0.1% | 0.1% | | 0% | | 2.2% |
| Stockfish - Total Time (Nodes/s) | 67300757 | 46289588 | 41553292 | 43638299 | 28320368 | 33023827 | 54575580 | 79137127 | 80530953 | 25582390 | 25930236 | | 27549921 | 73382195 | 72568429 |
| Normalized | 83.57% | 57.48% | 51.6% | 54.19% | 35.17% | 41.01% | 67.77% | 98.27% | 100% | 31.77% | 32.2% | | 34.21% | 91.12% | 90.11% |
| Standard Deviation | 1.4% | 1% | 1.2% | 0.8% | 1% | 2% | 0.2% | 0.5% | 1.9% | 1.5% | 0.9% | | 0.8% | 2.1% | 0.6% |
| Rodinia - OpenMP LavaMD | 11.75 | 20.08 | 20.74 | 21.47 | 31.25 | 25.77 | 14.52 | 19.74 | 19.30 | 32.691 | 32.640 | 33.193 | 33.290 | 15.966 | 17.411 |
| Normalized | 100% | 58.52% | 56.65% | 54.73% | 37.6% | 45.6% | 80.92% | 59.52% | 60.88% | 35.94% | 36% | 35.4% | 35.3% | 73.59% | 67.49% |
| Standard Deviation | 0.2% | 0% | 0.6% | 0.9% | 0.6% | 1.8% | 0.8% | 5.9% | 5.3% | 0% | 0.1% | 2.7% | 2.8% | 1.3% | 3.6% |
| POV-Ray - Trace Time (sec) | 17.92 | 28.29 | 30.56 | 30.72 | 44.22 | 37.92 | 22.39 | 25.28 | 23.44 | 49.394 | 49.537 | | 49.276 | | 29.701 |
| Normalized | 100% | 63.34% | 58.64% | 58.33% | 40.52% | 47.26% | 80.04% | 70.89% | 76.45% | 36.28% | 36.17% | | 36.37% | | 60.33% |
| Standard Deviation | 0.6% | 0.3% | 0.4% | 0.2% | 0.2% | 0.6% | 1.8% | 0.3% | 1.3% | 0.2% | 0.3% | | 0.3% | | 0.4% |
| GNU Octave Benchmark (sec) | 16.78 | 17.47 | 16.64 | 17.57 | 17.07 | 16.43 | 17.87 | 14.92 | 16.35 | 37.886 | 36.421 | | 36.281 | | |
| Normalized | 88.92% | 85.4% | 89.66% | 84.92% | 87.4% | 90.81% | 83.49% | 100% | 91.25% | 39.38% | 40.97% | | 41.12% | | |
| Standard Deviation | 1% | 0.3% | 0.4% | 0.4% | 0.6% | 1.4% | 4.1% | 1.1% | 1.5% | 8.4% | 11.8% | | 1.4% | | |
| PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS/Watt) | 1705 | 1971 | 1565 | 2079 | | 1262 | 1496 | 1596 | 1626 | | | | | | |
| Normalized | 82.01% | 94.77% | 75.24% | 100% | | 60.71% | 71.96% | 76.75% | 78.21% | | | | | | |
| 7-Zip Compression - C.S.T (MIPS/Watt) | 272.59 | 370.74 | 317.27 | 368.12 | | 281.57 | 274.35 | 406.82 | 380.29 | | | | | | |
| Normalized | 67.01% | 91.13% | 77.99% | 90.49% | | 69.21% | 67.44% | 100% | 93.48% | | | | | | |
| OpenSSL - R.4.b.P (Signs/sec/Watt) | 17.12 | 15.88 | 13.40 | 17.20 | | 11.70 | 14.64 | 17.00 | 15.90 | | | | | | |
| Normalized | 99.53% | 92.33% | 77.91% | 100% | | 68.02% | 85.12% | 98.84% | 92.44% | | | | | | |
| Stockfish - Total Time (Nodes/s/Watt) | 182420 | 142237 | 162569 | 148184 | | 134942 | 153013 | 159850 | 162777 | | | | | | |
| Normalized | 100% | 77.97% | 89.12% | 81.23% | | 73.97% | 83.88% | 87.63% | 89.23% | | | | | | |

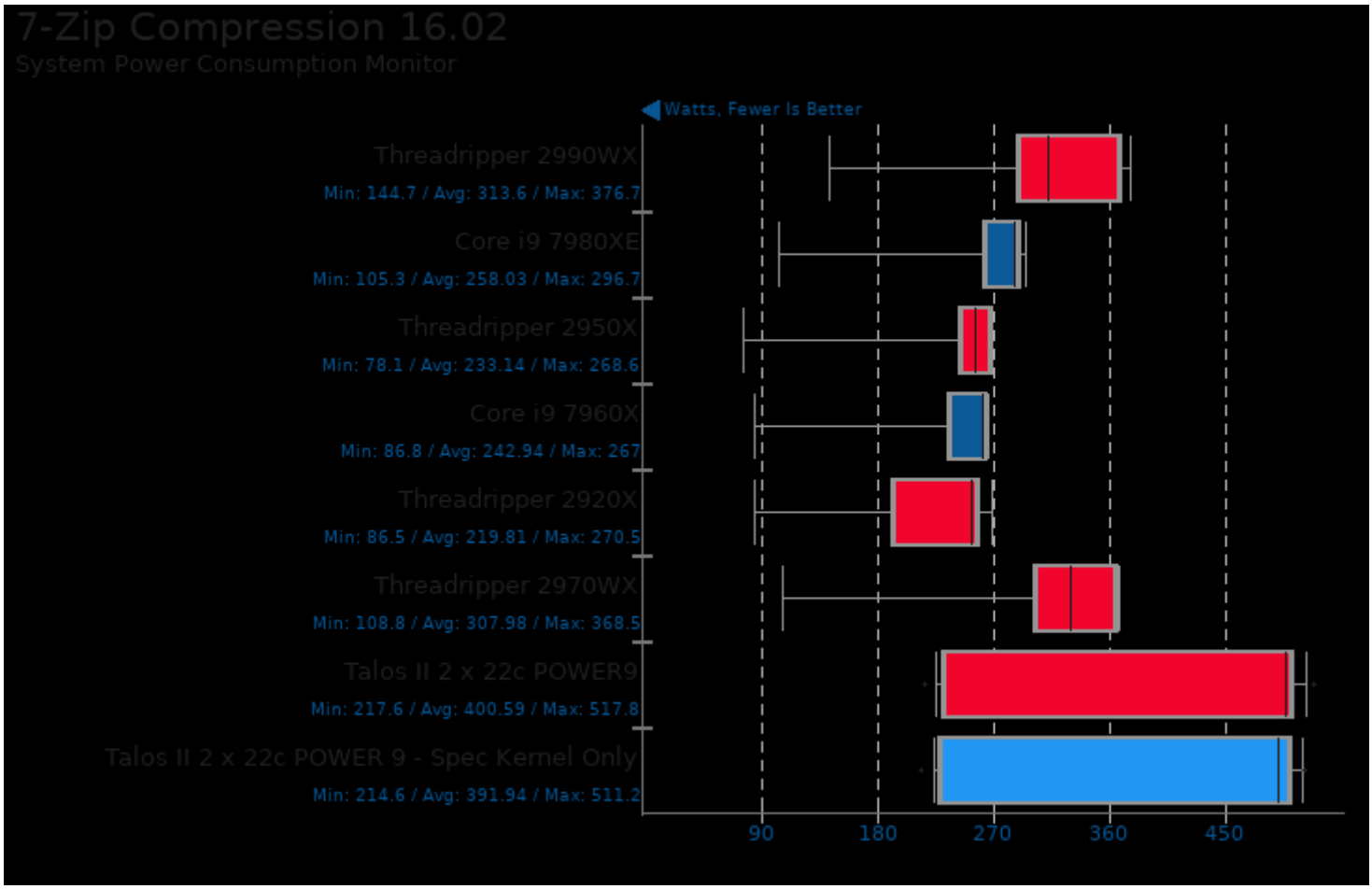
| | |
|---|---|
| **GNU Octave Benchmark (sec)** | 16.60 |
| | 2 |
| **Standard Deviation** | 0.6% |

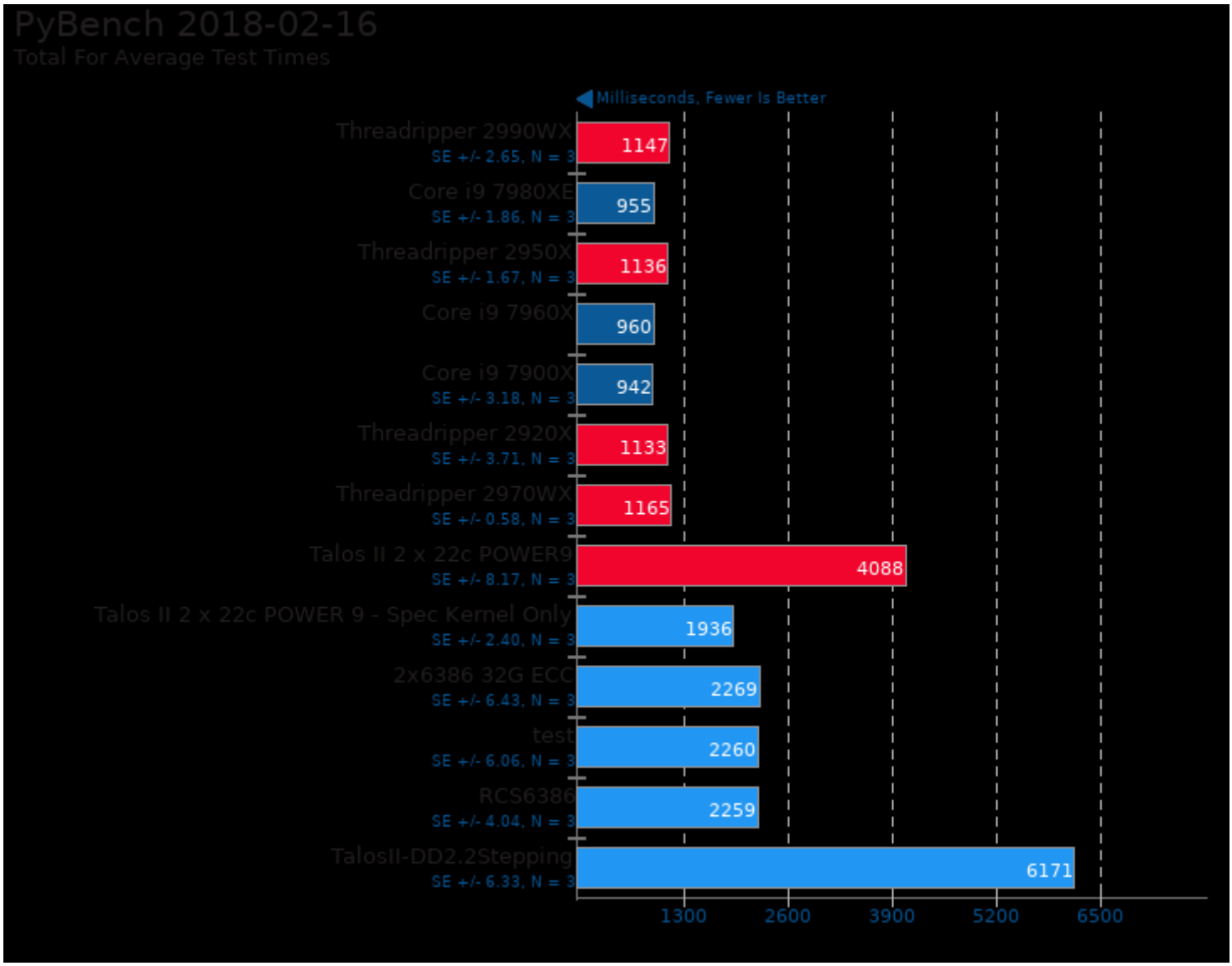
# Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

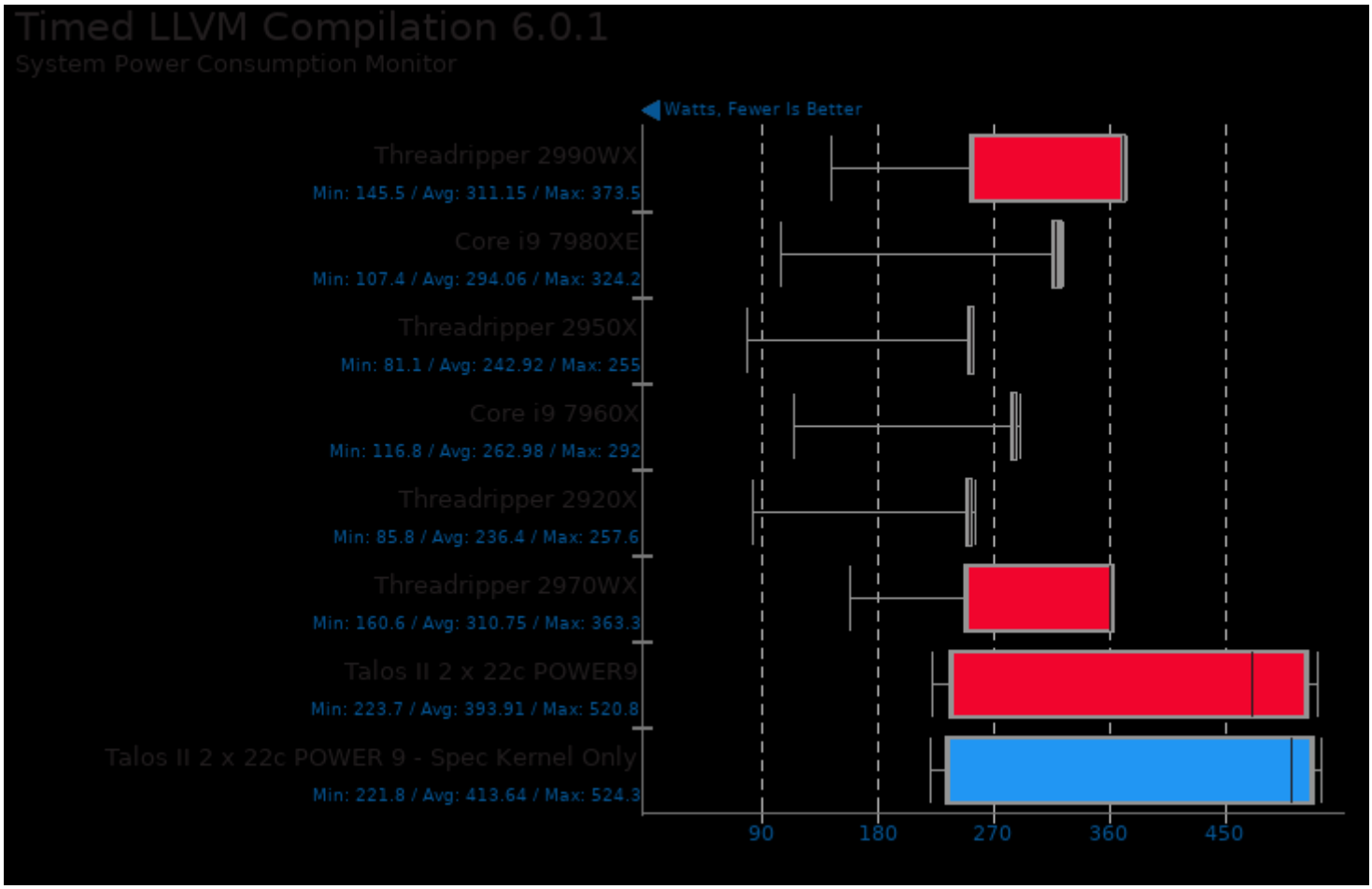


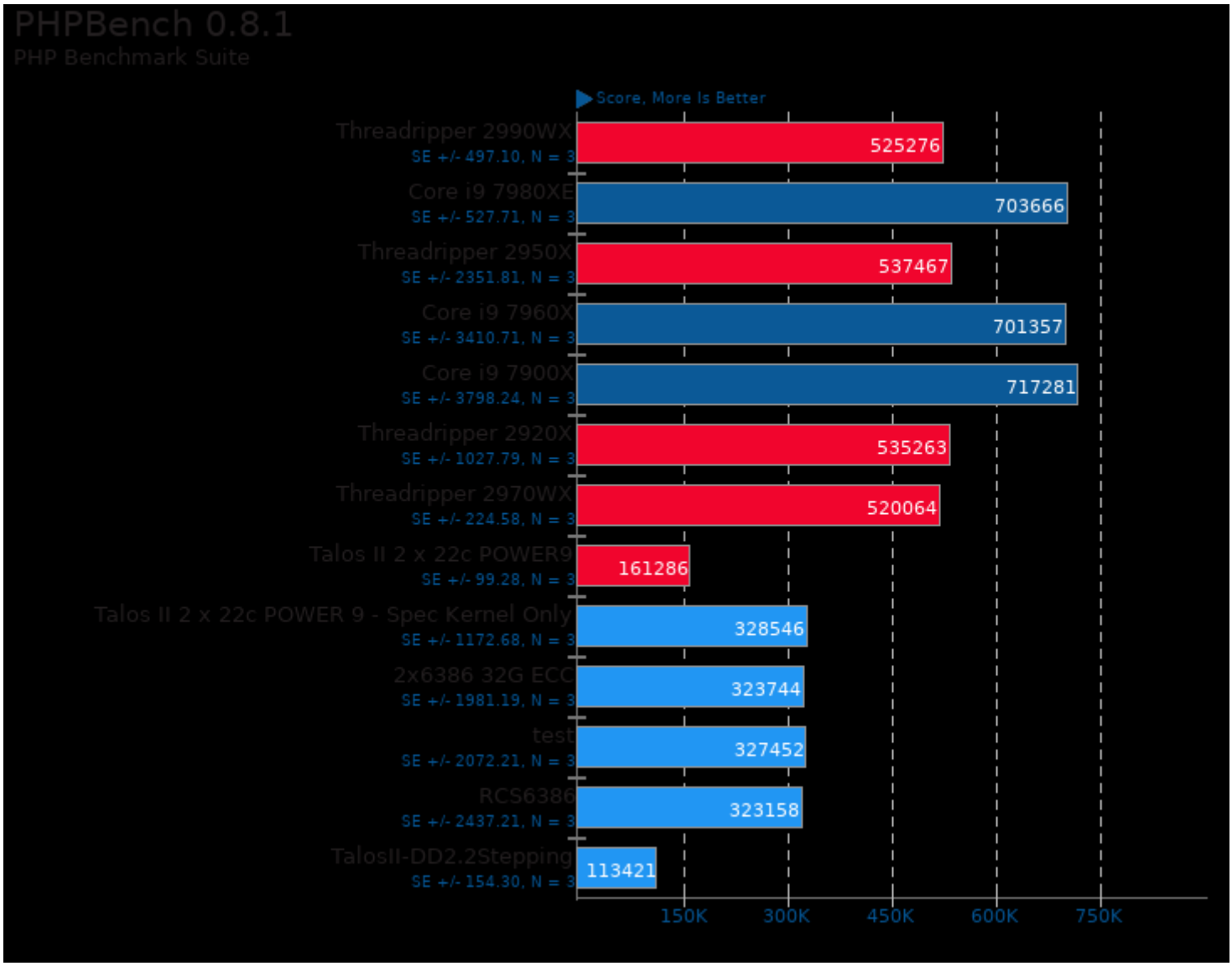

Rust Prime Benchmark
Prime Number Test To 200,000,000
Seconds, Fewer Is Better
Threadripper 2990WX
SE +/- 0.007, N = 3
12.490
Core i9 7980XE
SE +/- 0.007, N = 3
8.180
Threadripper 2950X
SE +/- 0.013, N = 3
21.210
Core i9 7960X
SE +/- 0.004, N = 3
6.710
Core i9 7900X
SE +/- 0.002, N = 3
11.550
Threadripper 2920X
SE +/- 0.005, N = 3
30.140
Threadripper 2970WX
SE +/- 0.024, N = 3
17.640
Talos II 2 x 22c POWER9
SE +/- 0.251, N = 3
3.640
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.098, N = 3
3.540
2x6386 32G ECC
SE +/- 0.003, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.403
test
SE +/- 0.008, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.428
RCS6386
SE +/- 0.064, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.476
TalosII-DD2.2Stepping
SE +/- 0.046, N = 5
-lgcc_s -lutil -lrt -lpthread -lm -ldl -lc
4.288
7
14
21
28
35
1. (CC) gcc options: -m64 -pie -nodefaultlibs

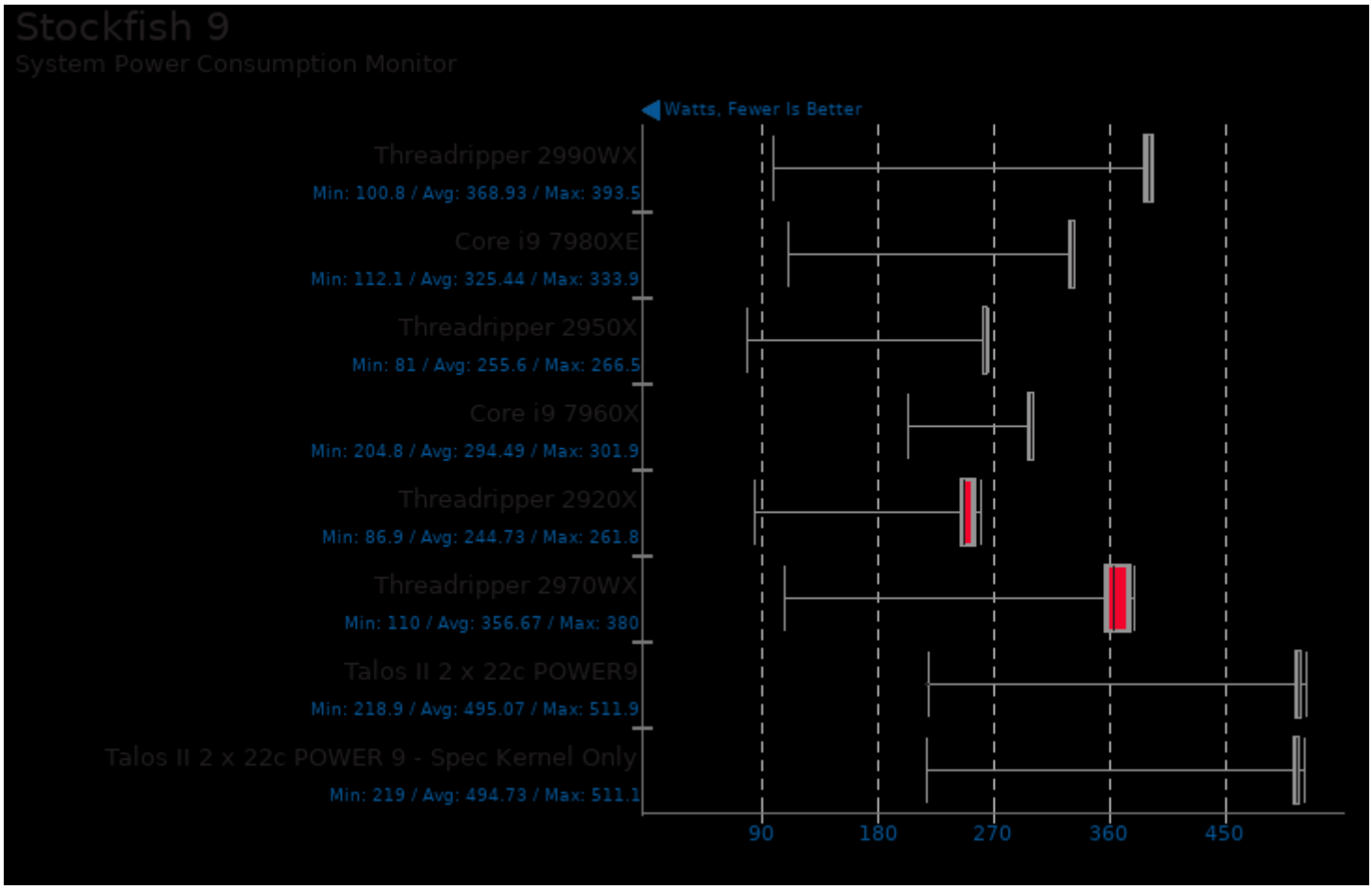

7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
Threadripper 2990WX
SE +/- 1518.03, N = 3
85484
Core i9 7980XE
SE +/- 245.34, N = 3
95662
Threadripper 2950X
SE +/- 79.99, N = 3
73967
Core i9 7960X
SE +/- 159.66, N = 3
89432
Core i9 7900X
SE +/- 457.96, N = 3
62788
Threadripper 2920X
SE +/- 241.87, N = 3
61894
Threadripper 2970WX
SE +/- 1626.58, N = 3
84493
Talos II 2 x 22c POWER9
SE +/- 2495.57, N = 3
162969
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 6982.30, N = 3
149050
2x6386 32G ECC
SE +/- 56.13, N = 3
20646
test
SE +/- 11.79, N = 3
20771
RCS6386
SE +/- 46.91, N = 3
28390
30K
60K
90K
120K
150K
1. (CXX) g++ options: -pipe -lpthread

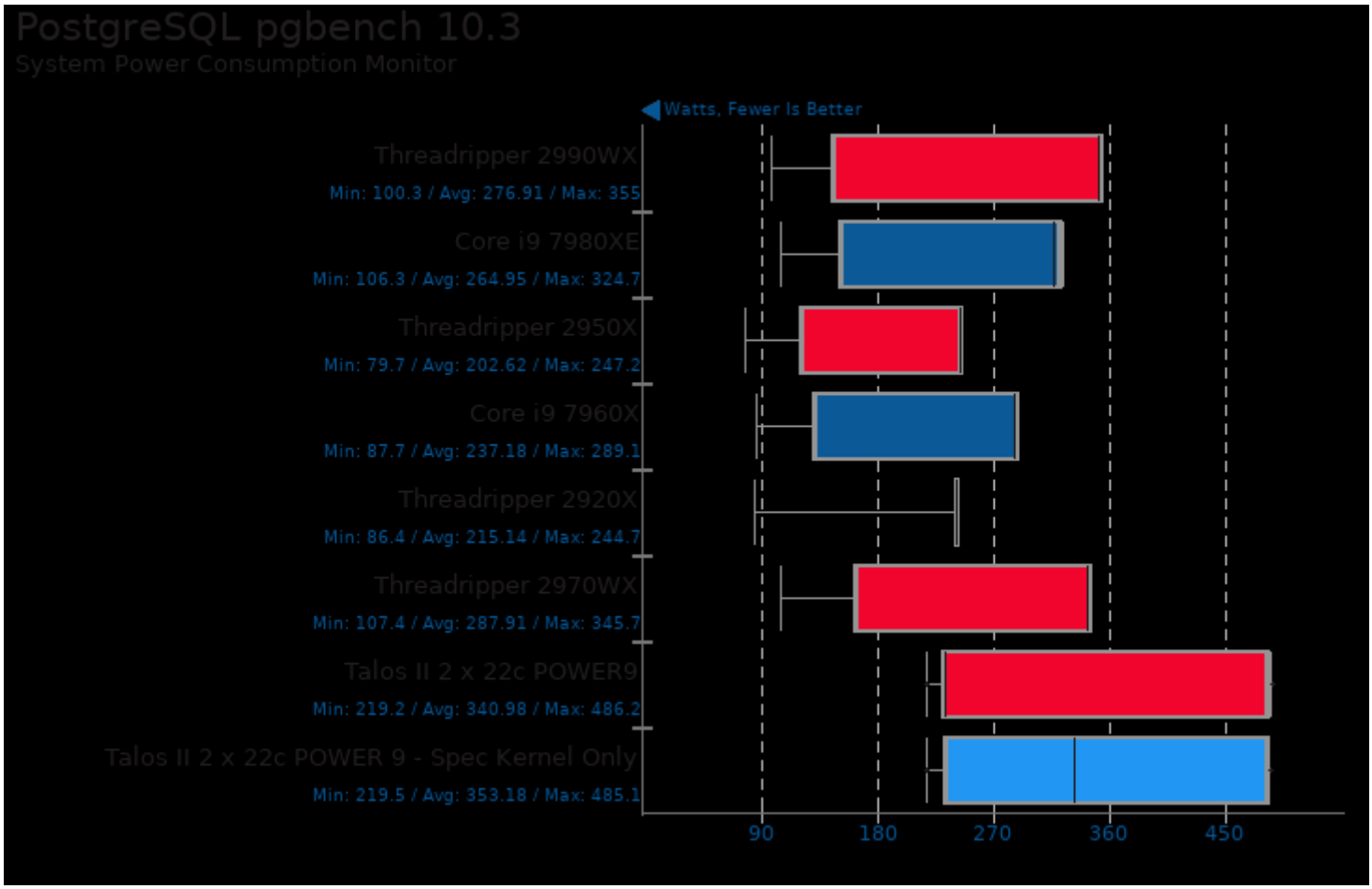

7-Zip Compression 16.02
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 144.7 / Avg: 313.6 / Max: 376.7
Core i9 7980XE
Min: 105.3 / Avg: 258.03 / Max: 296.7
Threadripper 2950X
Min: 78.1 / Avg: 233.14 / Max: 268.6
Core i9 7960X
Min: 86.8 / Avg: 242.94 / Max: 267
Threadripper 2920X
Min: 86.5 / Avg: 219.81 / Max: 270.5
Threadripper 2970WX
Min: 108.8 / Avg: 307.98 / Max: 368.5
Talos II 2 x 22c POWER9
Min: 217.6 / Avg: 400.59 / Max: 517.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 214.6 / Avg: 391.94 / Max: 511.2
90
180
270
360
450

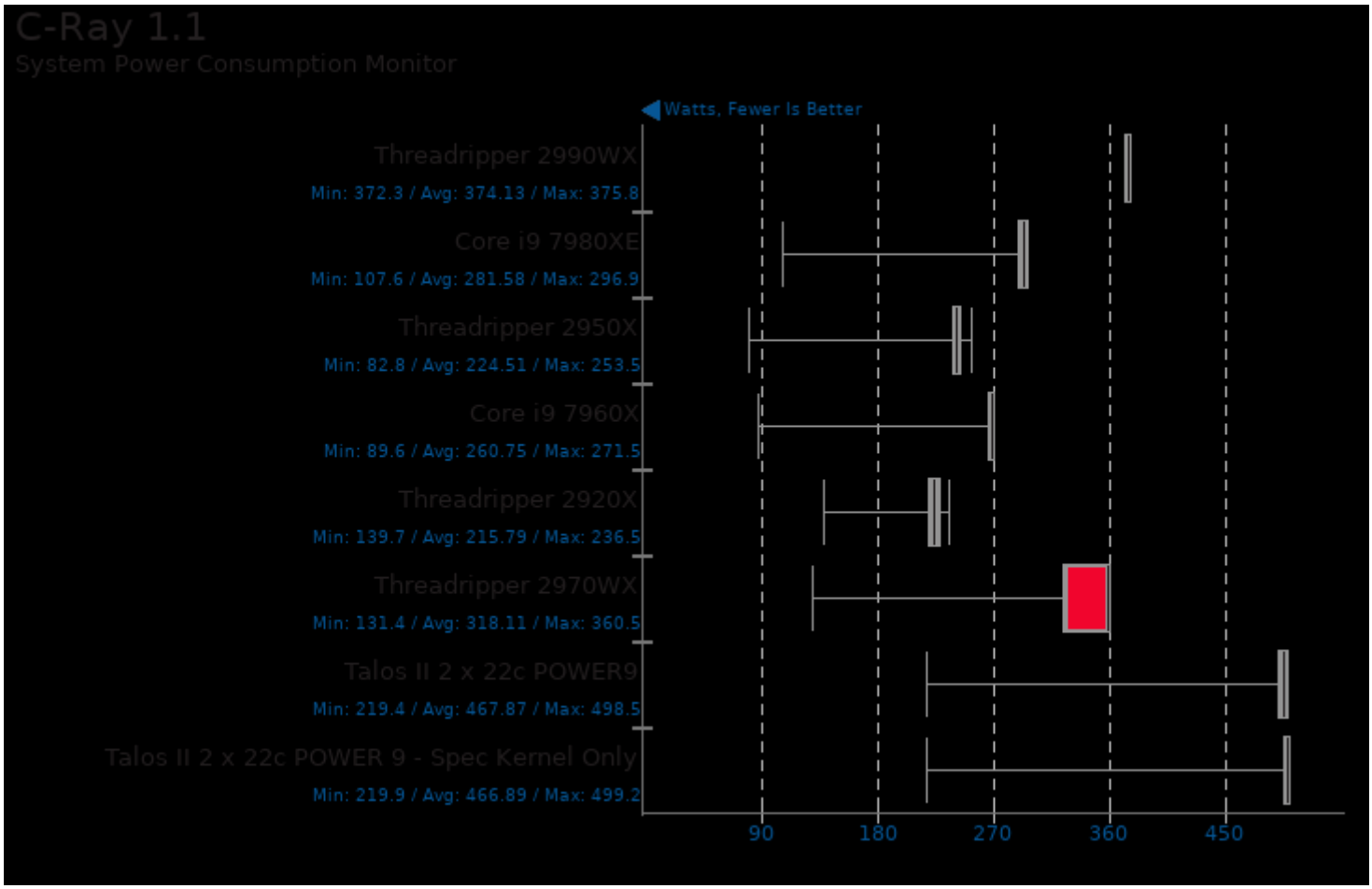

PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Threadripper 2990WX
SE +/- 2.65, N = 3
1147
Core i9 7980XE
SE +/- 1.86, N = 3
955
Threadripper 2950X
SE +/- 1.67, N = 3
1136
Core i9 7960X
960
Core i9 7900X
SE +/- 3.18, N = 3
942
Threadripper 2920X
SE +/- 3.71, N = 3
1133
Threadripper 2970WX
SE +/- 0.58, N = 3
1165
Talos II 2 x 22c POWER9
SE +/- 8.17, N = 3
4088
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 2.40, N = 3
1936
2x6386 32G ECC
SE +/- 6.43, N = 3
2269
test
SE +/- 6.06, N = 3
2260
RCS6386
SE +/- 4.04, N = 3
2259
TalosII-DD2.2Stepping
SE +/- 6.33, N = 3
6171
1300
2600
3900
5200
6500

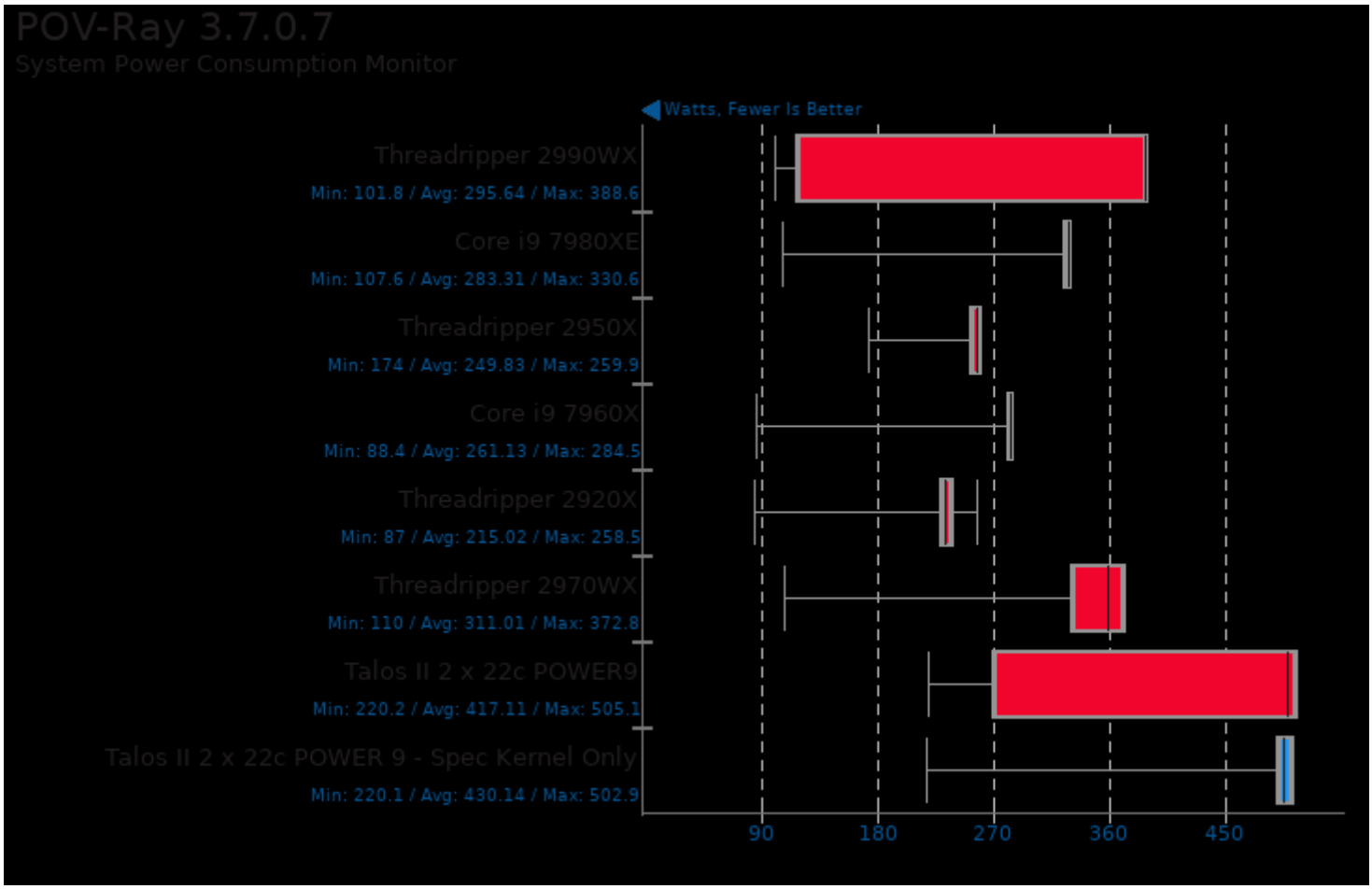

Timed LLVM Compilation 6.0.1
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 145.5 / Avg: 311.15 / Max: 373.5
Core i9 7980XE
Min: 107.4 / Avg: 294.06 / Max: 324.2
Threadripper 2950X
Min: 81.1 / Avg: 242.92 / Max: 255
Core i9 7960X
Min: 116.8 / Avg: 262.98 / Max: 292
Threadripper 2920X
Min: 85.8 / Avg: 236.4 / Max: 257.6
Threadripper 2970WX
Min: 160.6 / Avg: 310.75 / Max: 363.3
Talos II 2 x 22c POWER9
Min: 223.7 / Avg: 393.91 / Max: 520.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 221.8 / Avg: 413.64 / Max: 524.3
90
180
270
360
450

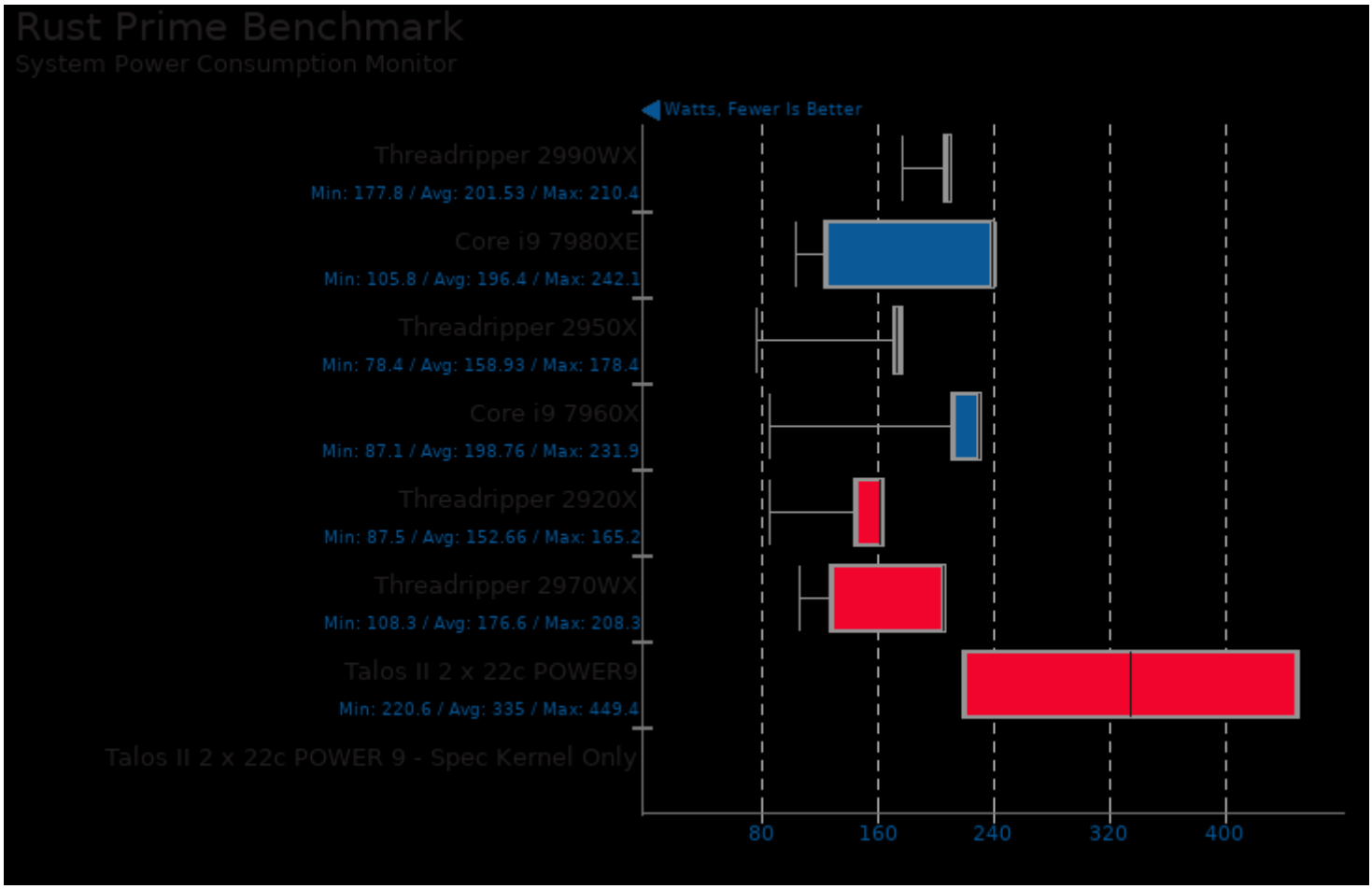

PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
Threadripper 2990WX
SE +/- 497.10, N = 3
525276
Core i9 7980XE
SE +/- 527.71, N = 3
703666
Threadripper 2950X
SE +/- 2351.81, N = 3
537467
Core i9 7960X
SE +/- 3410.71, N = 3
701357
Core i9 7900X
SE +/- 3798.24, N = 3
717281
Threadripper 2920X
SE +/- 1027.79, N = 3
535263
Threadripper 2970WX
SE +/- 224.58, N = 3
520064
Talos II 2 x 22c POWER9
SE +/- 99.28, N = 3
161286
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 1172.68, N = 3
328546
2x6386 32G ECC
SE +/- 1981.19, N = 3
323744
test
SE +/- 2072.21, N = 3
327452
RCS6386
SE +/- 2437.21, N = 3
323158
TalosII-DD2.2Stepping
SE +/- 154.30, N = 3
113421
150K
300K
450K
600K
750K

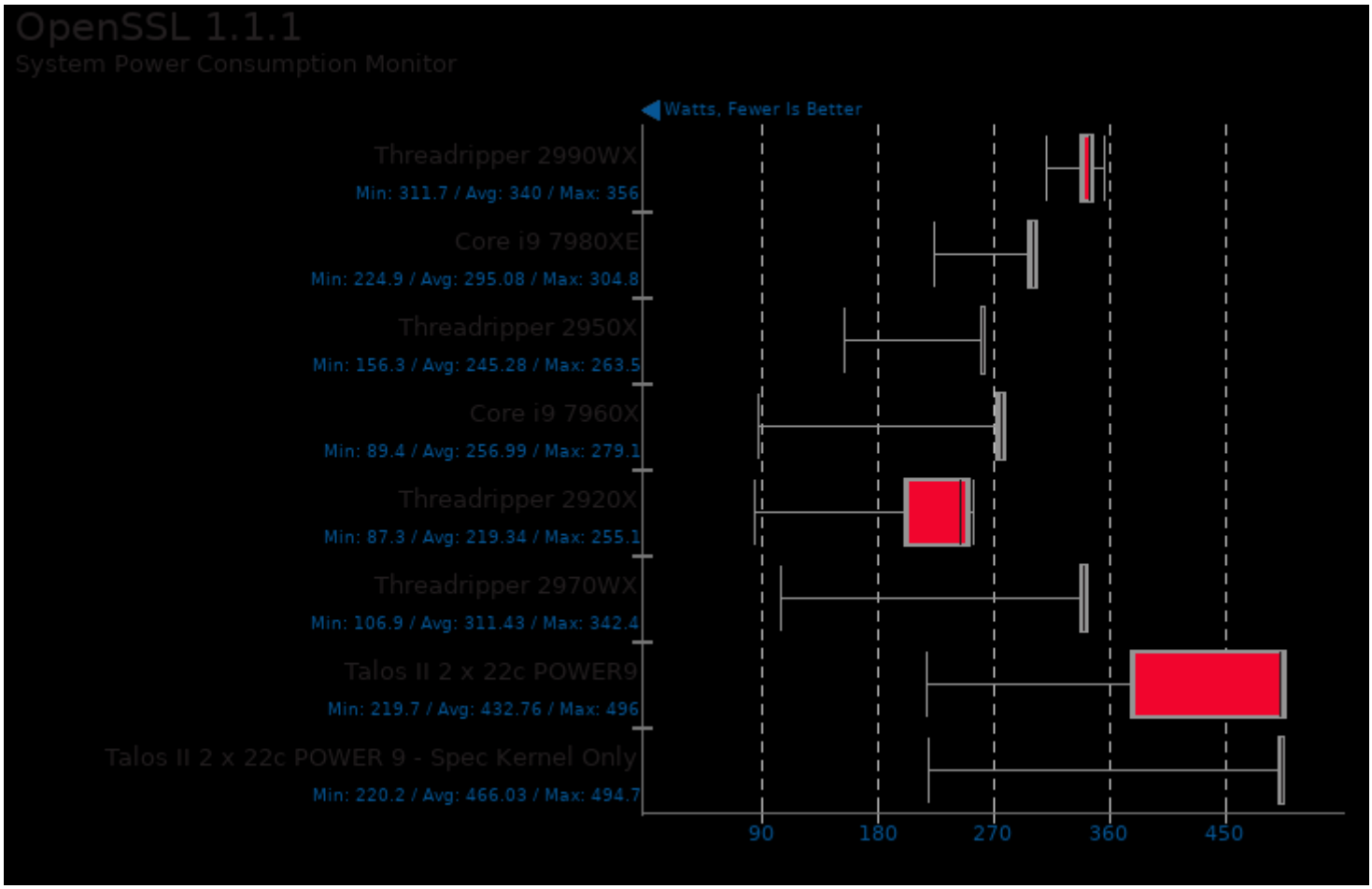

Stockfish 9
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 100.8 / Avg: 368.93 / Max: 393.5
Core i9 7980XE
Min: 112.1 / Avg: 325.44 / Max: 333.9
Threadripper 2950X
Min: 81 / Avg: 255.6 / Max: 266.5
Core i9 7960X
Min: 204.8 / Avg: 294.49 / Max: 301.9
Threadripper 2920X
Min: 86.9 / Avg: 244.73 / Max: 261.8
Threadripper 2970WX
Min: 110 / Avg: 356.67 / Max: 380
Talos II 2 x 22c POWER9
Min: 218.9 / Avg: 495.07 / Max: 511.9
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219 / Avg: 494.73 / Max: 511.1
90
180
270
360
450

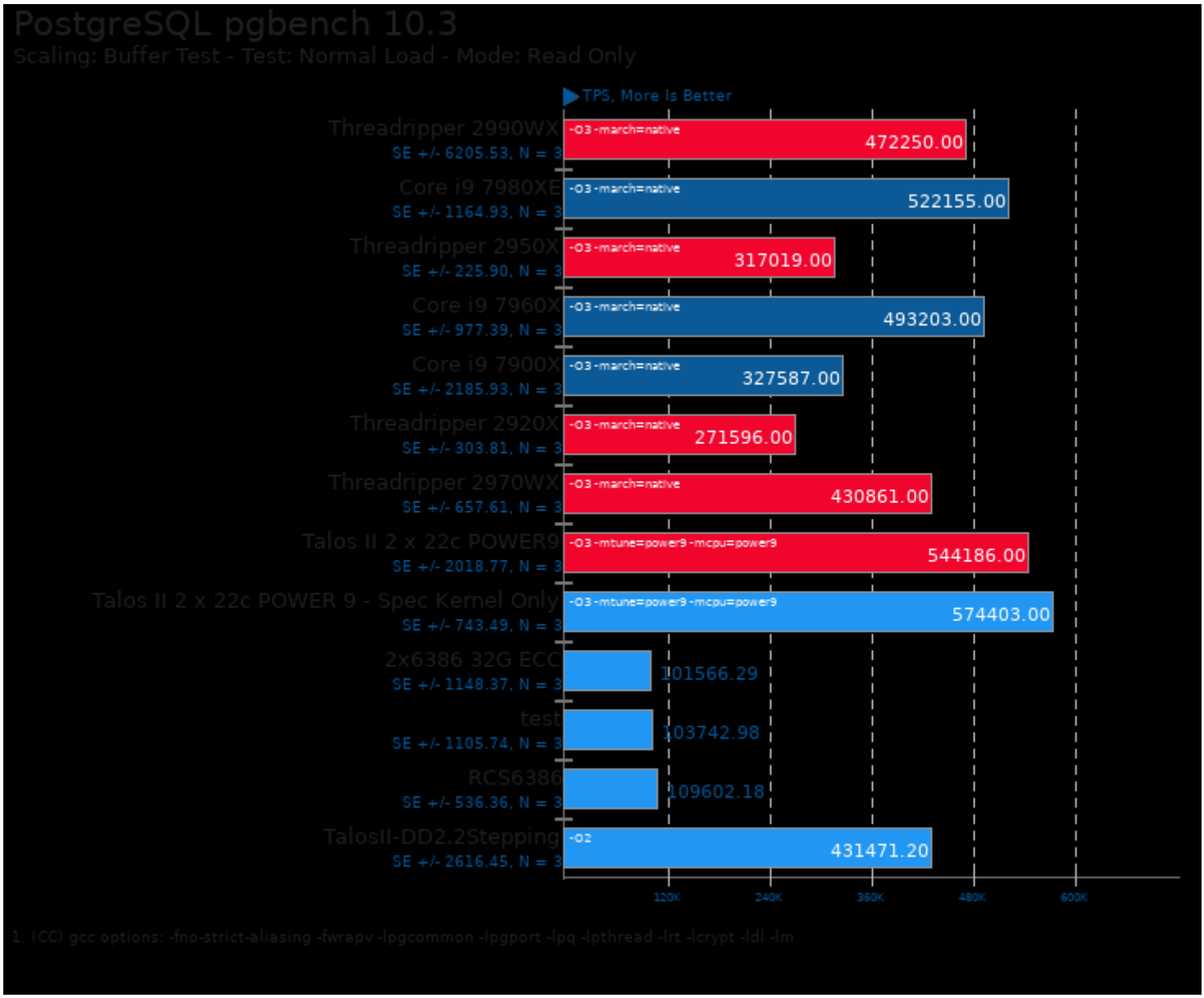

PostgreSQL pgbench 10.3
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 100.3 / Avg: 276.91 / Max: 355
Core i9 7980XE
Min: 106.3 / Avg: 264.95 / Max: 324.7
Threadripper 2950X
Min: 79.7 / Avg: 202.62 / Max: 247.2
Core i9 7960X
Min: 87.7 / Avg: 237.18 / Max: 289.1
Threadripper 2920X
Min: 86.4 / Avg: 215.14 / Max: 244.7
Threadripper 2970WX
Min: 107.4 / Avg: 287.91 / Max: 345.7
Talos II 2 x 22c POWER9
Min: 219.2 / Avg: 340.98 / Max: 486.2
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.5 / Avg: 353.18 / Max: 485.1
90
180
270
360
450

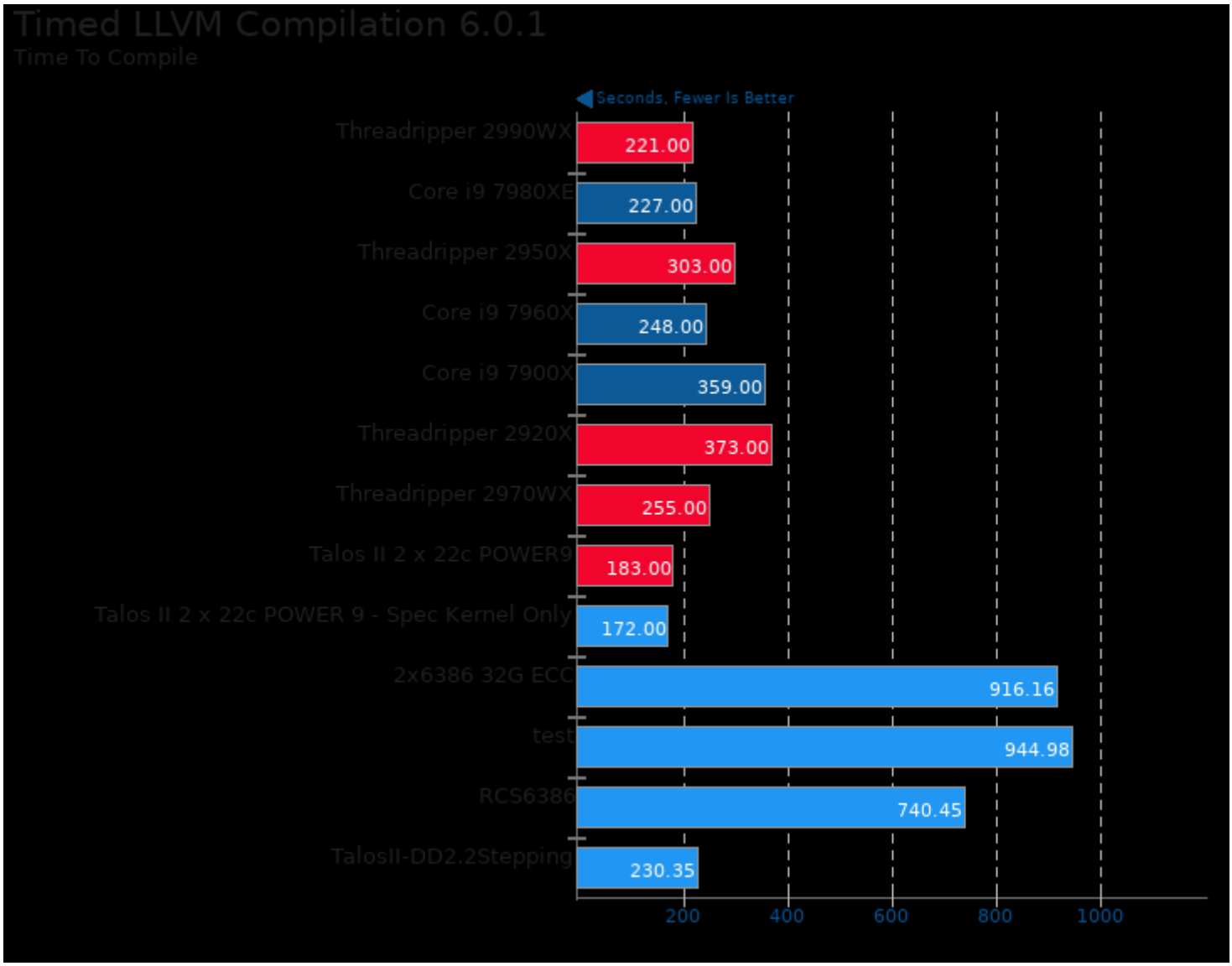

C-Ray 1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 372.3 / Avg: 374.13 / Max: 375.8
Core i9 7980XE
Min: 107.6 / Avg: 281.58 / Max: 296.9
Threadripper 2950X
Min: 82.8 / Avg: 224.51 / Max: 253.5
Core i9 7960X
Min: 89.6 / Avg: 260.75 / Max: 271.5
Threadripper 2920X
Min: 139.7 / Avg: 215.79 / Max: 236.5
Threadripper 2970WX
Min: 131.4 / Avg: 318.11 / Max: 360.5
Talos II 2 x 22c POWER9
Min: 219.4 / Avg: 467.87 / Max: 498.5
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.9 / Avg: 466.89 / Max: 499.2
90
180
270
360
450

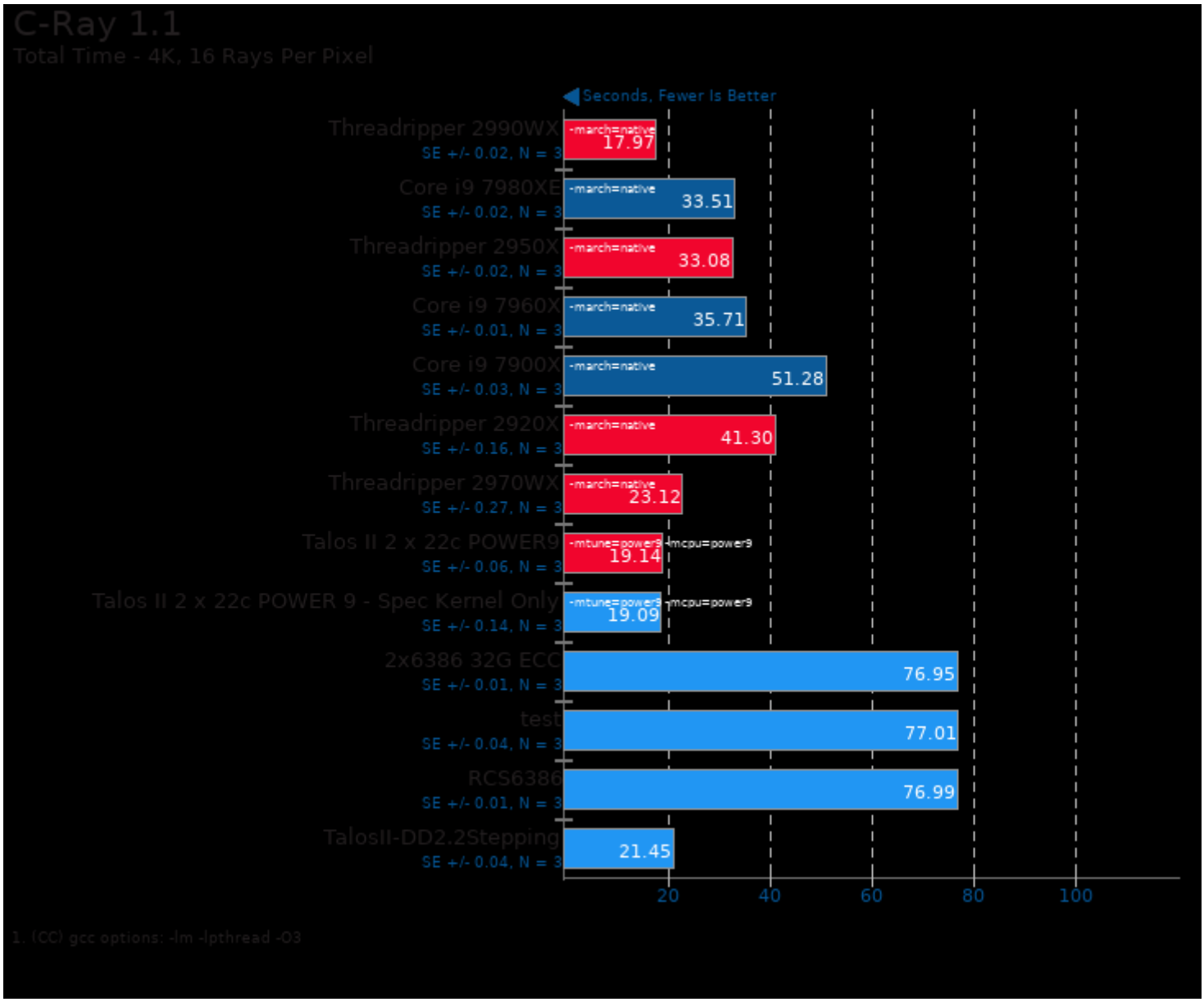

POV-Ray 3.7.0.7
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 101.8 / Avg: 295.64 / Max: 388.6
Core i9 7980XE
Min: 107.6 / Avg: 283.31 / Max: 330.6
Threadripper 2950X
Min: 174 / Avg: 249.83 / Max: 259.9
Core i9 7960X
Min: 88.4 / Avg: 261.13 / Max: 284.5
Threadripper 2920X
Min: 87 / Avg: 215.02 / Max: 258.5
Threadripper 2970WX
Min: 110 / Avg: 311.01 / Max: 372.8
Talos II 2 x 22c POWER9
Min: 220.2 / Avg: 417.11 / Max: 505.1
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 220.1 / Avg: 430.14 / Max: 502.9
90
180
270
360
450

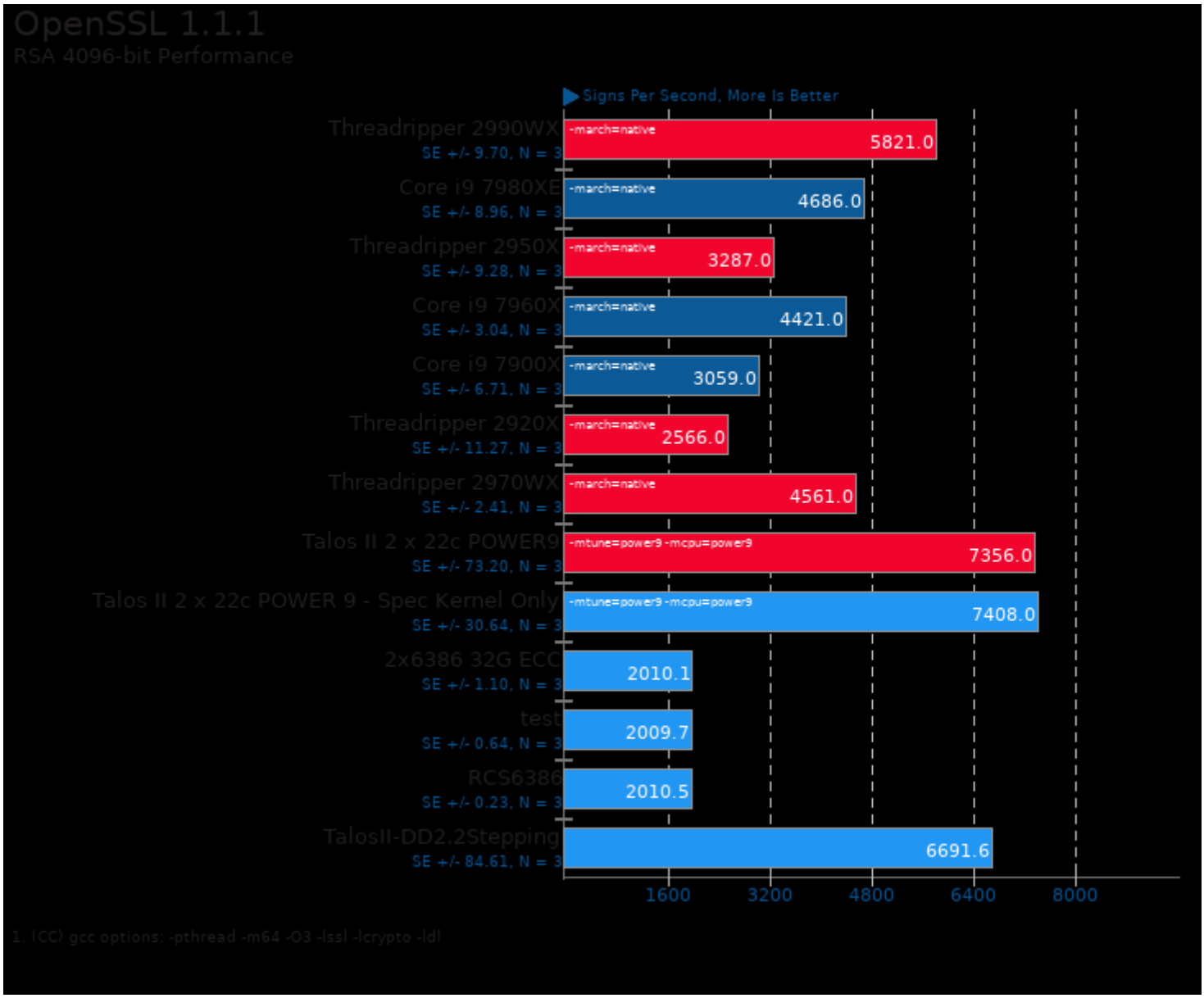

Rust Prime Benchmark
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 177.8 / Avg: 201.53 / Max: 210.4
Core i9 7980XE
Min: 105.8 / Avg: 196.4 / Max: 242.1
Threadripper 2950X
Min: 78.4 / Avg: 158.93 / Max: 178.4
Core i9 7960X
Min: 87.1 / Avg: 198.76 / Max: 231.9
Threadripper 2920X
Min: 87.5 / Avg: 152.66 / Max: 165.2
Threadripper 2970WX
Min: 108.3 / Avg: 176.6 / Max: 208.3
Talos II 2 x 22c POWER9
Min: 220.6 / Avg: 335 / Max: 449.4
Talos II 2 x 22c POWER 9 - Spec Kernel Only
80
160
240
320
400

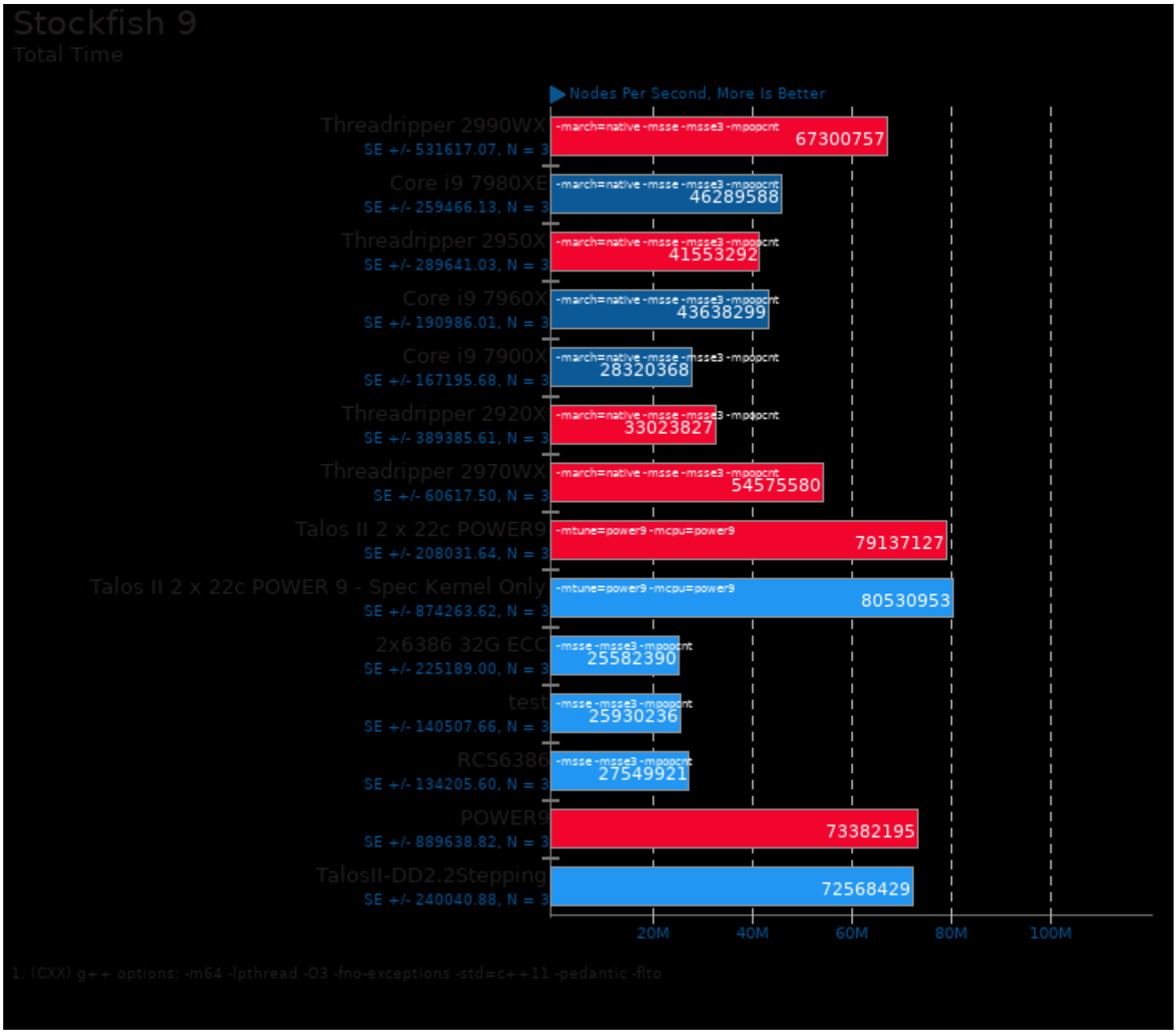

OpenSSL 1.1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 311.7 / Avg: 340 / Max: 356
Core i9 7980XE
Min: 224.9 / Avg: 295.08 / Max: 304.8
Threadripper 2950X
Min: 156.3 / Avg: 245.28 / Max: 263.5
Core i9 7960X
Min: 89.4 / Avg: 256.99 / Max: 279.1
Threadripper 2920X
Min: 87.3 / Avg: 219.34 / Max: 255.1
Threadripper 2970WX
Min: 106.9 / Avg: 311.43 / Max: 342.4
Talos II 2 x 22c POWER9
Min: 219.7 / Avg: 432.76 / Max: 496
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 220.2 / Avg: 466.03 / Max: 494.7
90
180
270
360
450

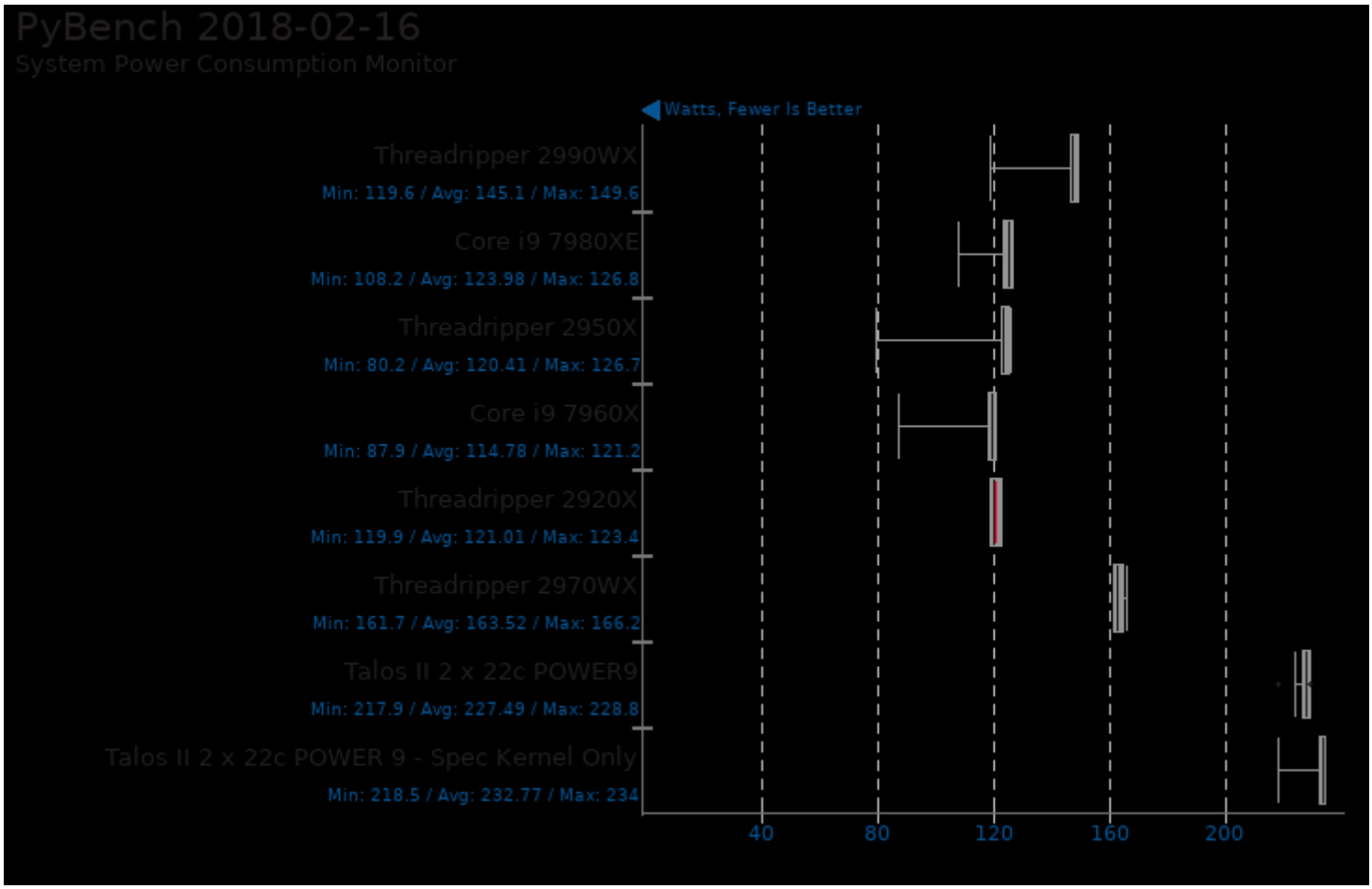

PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
Threadripper 2990WX
SE +/- 6205.53, N = 3
-O3 -march=native
472250.00
Core i9 7980XE
SE +/- 1164.93, N = 3
-O3 -march=native
522155.00
Threadripper 2950X
SE +/- 225.90, N = 3
-O3 -march=native
317019.00
Core i9 7960X
SE +/- 977.39, N = 3
-O3 -march=native
493203.00
Core i9 7900X
SE +/- 2185.93, N = 3
-O3 -march=native
327587.00
Threadripper 2920X
SE +/- 303.81, N = 3
-O3 -march=native
271596.00
Threadripper 2970WX
SE +/- 657.61, N = 3
-O3 -march=native
430861.00
Talos II 2 x 22c POWER9
SE +/- 2018.77, N = 3
-O3 -mtune=power9 -mcpu=power9
544186.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 743.49, N = 3
-O3 -mtune=power9 -mcpu=power9
574403.00
2x6386 32G ECC
SE +/- 1148.37, N = 3
101566.29
test
SE +/- 1105.74, N = 3
103742.98
RCS6386
SE +/- 536.36, N = 3
109602.18
TalosII-DD2.2Stepping
SE +/- 2616.45, N = 3
-O2
431471.20
120K
240K
360K
480K
600K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

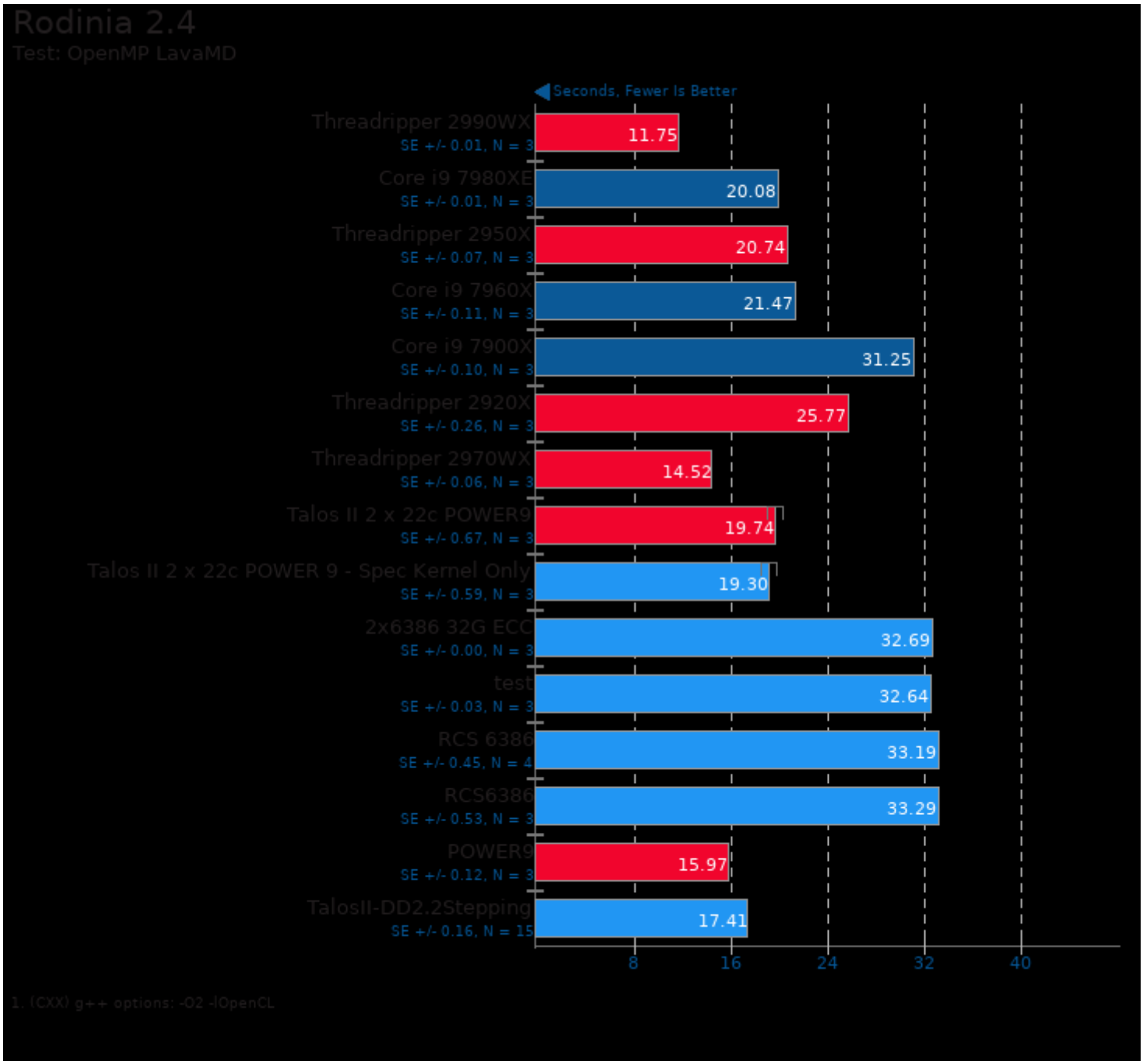

Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
Threadripper 2990WX
221.00
Core i9 7980XE
227.00
Threadripper 2950X
303.00
Core i9 7960X
248.00
Core i9 7900X
359.00
Threadripper 2920X
373.00
Threadripper 2970WX
255.00
Talos II 2 x 22c POWER9
183.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
172.00
2x6386 32G ECC
916.16
test
944.98
RCS6386
740.45
TalosII-DD2.2Stepping
230.35
200
400
600
800
1000

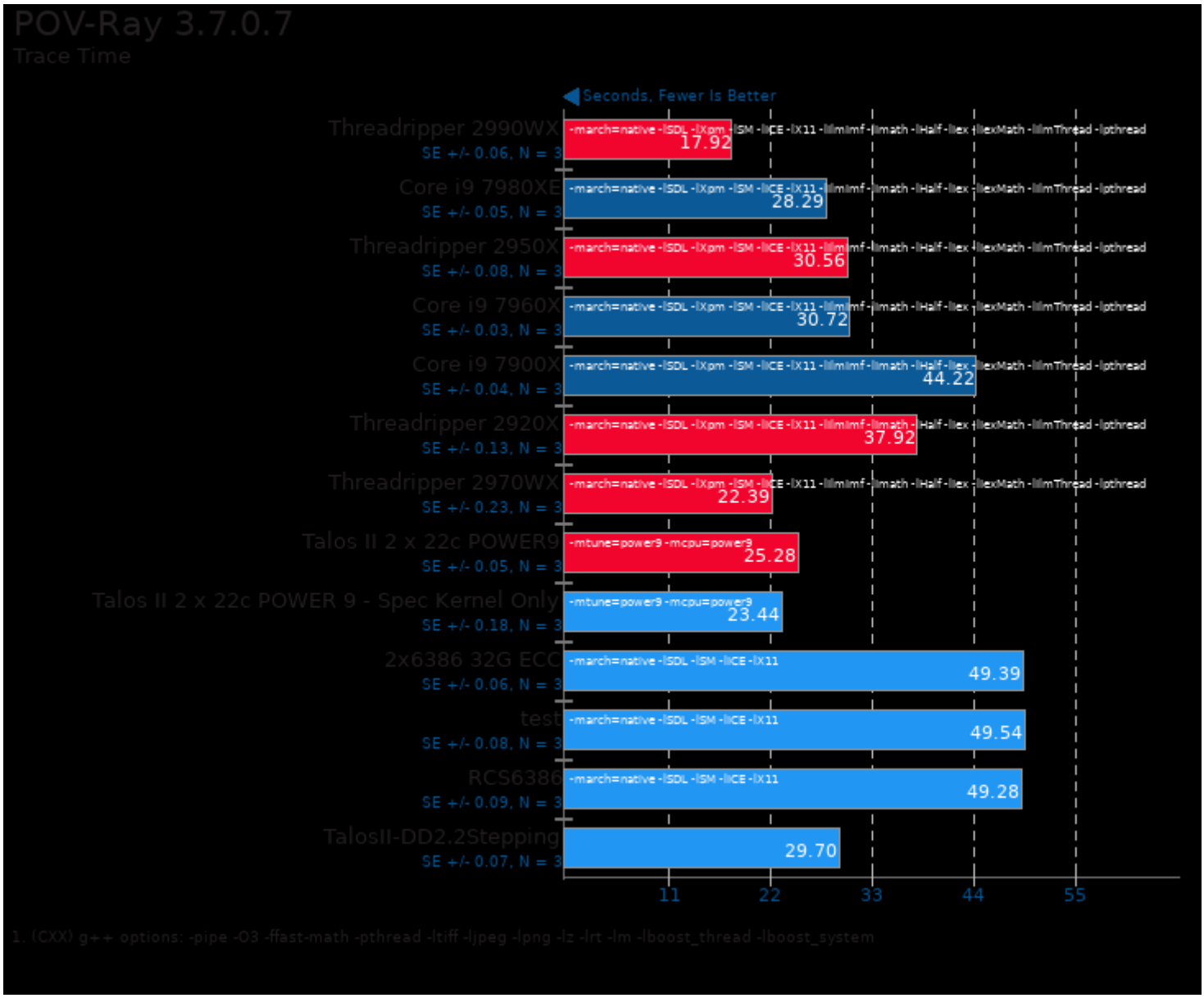

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
Threadripper 2990WX
SE +/- 0.02, N = 3
-march=native
17.97
Core i9 7980XE
SE +/- 0.02, N = 3
-march=native
33.51
Threadripper 2950X
SE +/- 0.02, N = 3
-march=native
33.08
Core i9 7960X
SE +/- 0.01, N = 3
-march=native
35.71
Core i9 7900X
SE +/- 0.03, N = 3
-march=native
51.28
Threadripper 2920X
SE +/- 0.16, N = 3
-march=native
41.30
Threadripper 2970WX
SE +/- 0.27, N = 3
-march=native
23.12
Talos II 2 x 22c POWER9
SE +/- 0.06, N = 3
-mtune=power9
-mcpu=power9
19.14
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.14, N = 3
-mtune=power9
-mcpu=power9
19.09
2x6386 32G ECC
SE +/- 0.01, N = 3
76.95
test
SE +/- 0.04, N = 3
77.01
RCS6386
SE +/- 0.01, N = 3
76.99
TalosII-DD2.2Stepping
SE +/- 0.04, N = 3
21.45
20
40
60
80
100
1. (CC) gcc options: -lm -lpthread -O3

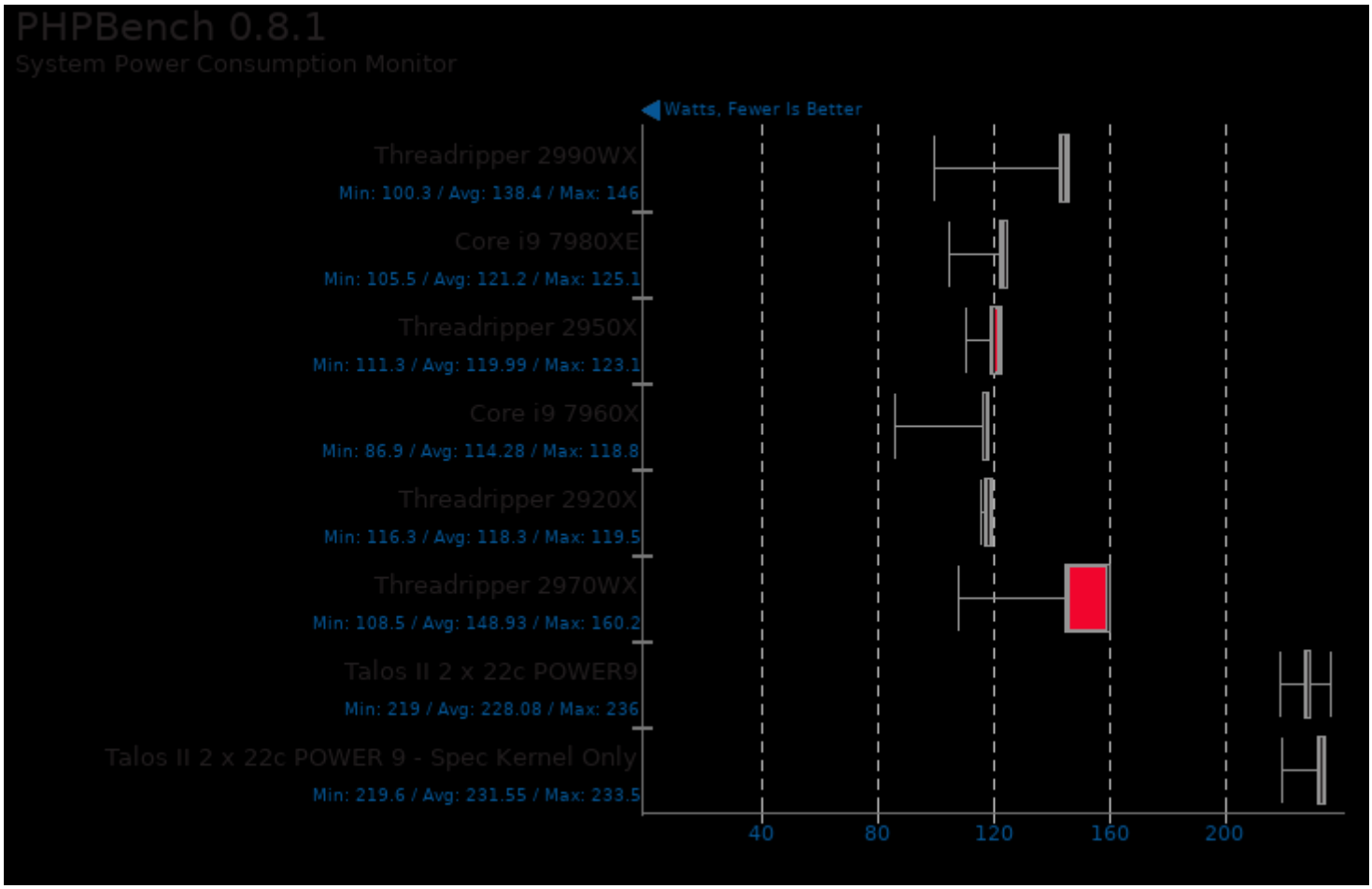

OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second, More Is Better
Threadripper 2990WX
SE +/- 9.70, N = 3
-march=native
5821.0
Core i9 7980XE
SE +/- 8.96, N = 3
-march=native
4686.0
Threadripper 2950X
SE +/- 9.28, N = 3
-march=native
3287.0
Core i9 7960X
SE +/- 3.04, N = 3
-march=native
4421.0
Core i9 7900X
SE +/- 6.71, N = 3
-march=native
3059.0
Threadripper 2920X
SE +/- 11.27, N = 3
-march=native
2566.0
Threadripper 2970WX
SE +/- 2.41, N = 3
-march=native
4561.0
Talos II 2 x 22c POWER9
SE +/- 73.20, N = 3
-mtune=power9 -mcpu=power9
7356.0
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 30.64, N = 3
-mtune=power9 -mcpu=power9
7408.0
2x6386 32G ECC
SE +/- 1.10, N = 3
2010.1
test
SE +/- 0.64, N = 3
2009.7
RCS6386
SE +/- 0.23, N = 3
2010.5
TalosII-DD2.2Stepping
SE +/- 84.61, N = 3
6691.6
1600
3200
4800
6400
8000
1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl

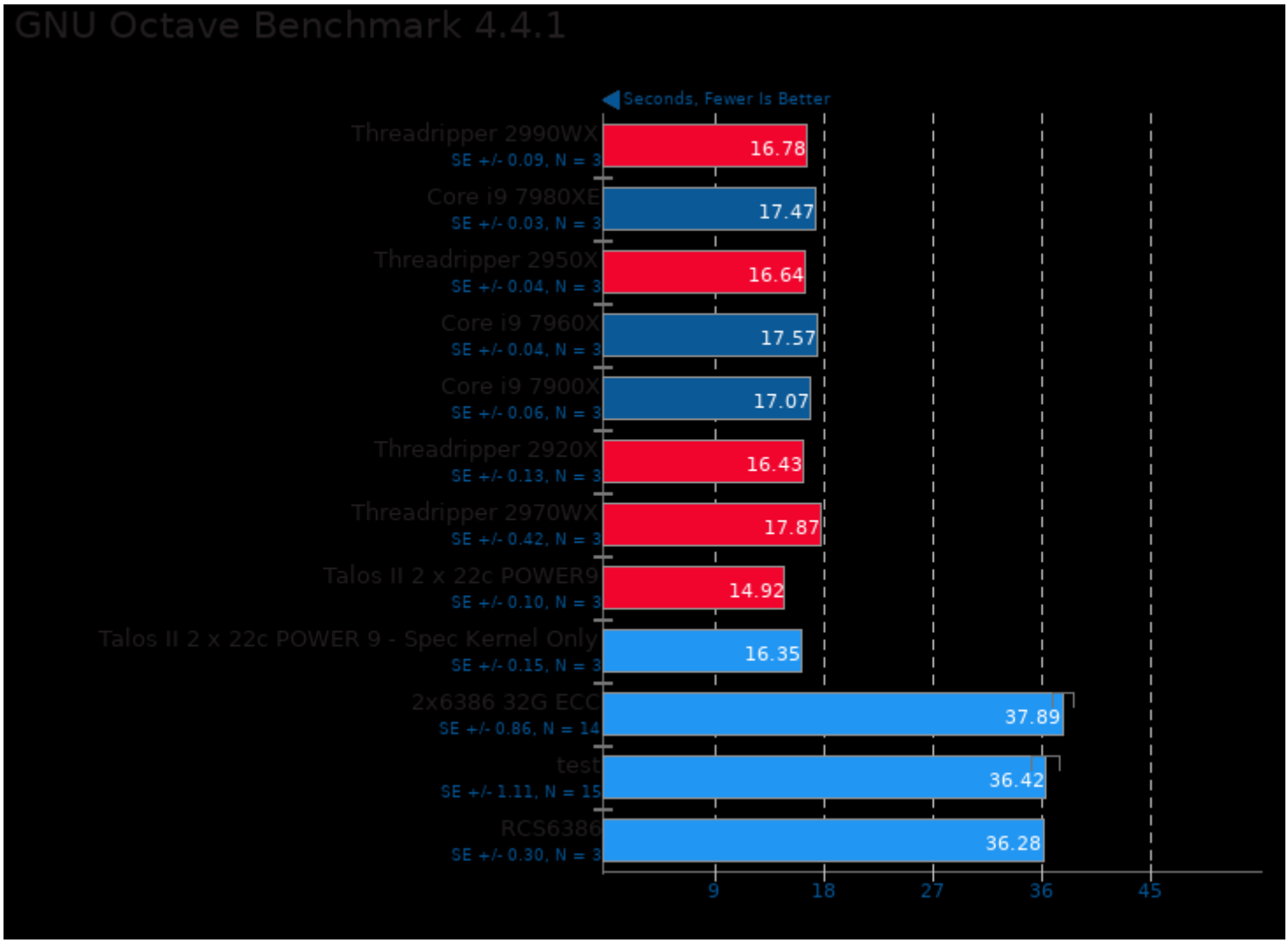

Stockfish 9
Total Time
Nodes Per Second, More Is Better
Threadripper 2990WX
SE +/- 531617.07, N = 3
-march=native -msse -msse3 -mpopcnt
67300757
Core i9 7980XE
SE +/- 259466.13, N = 3
-march=native -msse -msse3 -mpopcnt
46289588
Threadripper 2950X
SE +/- 289641.03, N = 3
-march=native -msse -msse3 -mpopcnt
41553292
Core i9 7960X
SE +/- 190986.01, N = 3
-march=native -msse -msse3 -mpopcnt
43638299
Core i9 7900X
SE +/- 167195.68, N = 3
-march=native -msse -msse3 -mpopcnt
28320368
Threadripper 2920X
SE +/- 389385.61, N = 3
-march=native -msse -msse3 -mpopcnt
33023827
Threadripper 2970WX
SE +/- 60617.50, N = 3
-march=native -msse -msse3 -mpopcnt
54575580
Talos II 2 x 22c POWER9
SE +/- 208031.64, N = 3
-mtune=power9 -mcpu=power9
79137127
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 874263.62, N = 3
-mtune=power9 -mcpu=power9
80530953
2x6386 32G ECC
SE +/- 225189.00, N = 3
-msse -msse3 -mpopcnt
25582390
test
SE +/- 140507.66, N = 3
-msse -msse3 -mpopcnt
25930236
RCS6386
SE +/- 134205.60, N = 3
-msse -msse3 -mpopcnt
27549921
POWER9
SE +/- 889638.82, N = 3
73382195
TalosII-DD2.2Stepping
SE +/- 240040.88, N = 3
72568429
20M
40M
60M
80M
100M
1. (CXX) g++ options: -m64 -lpthread -O3 -fno-exceptions -std=c++11 -pedantic -flto

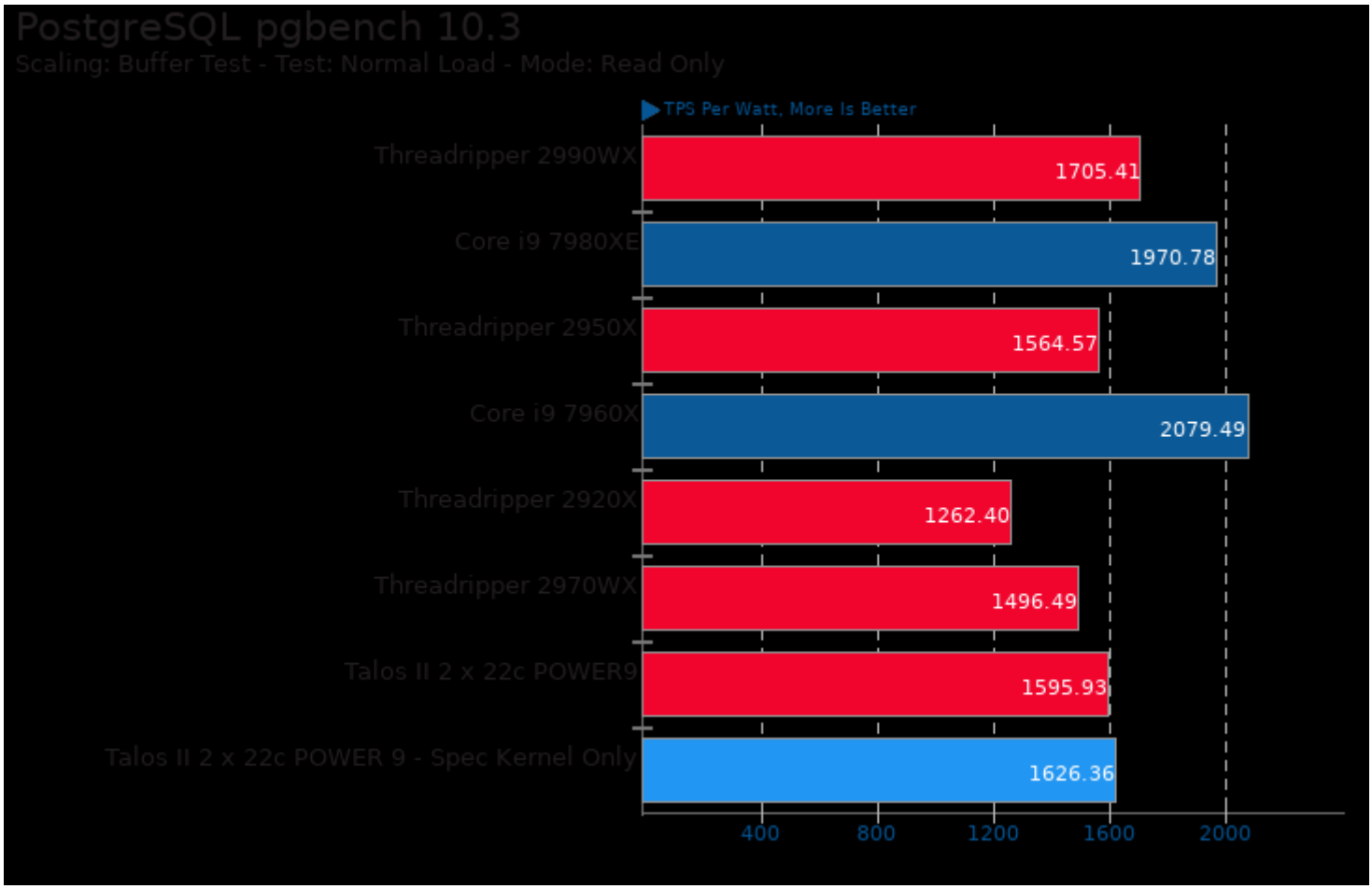

PyBench 2018-02-16
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 119.6 / Avg: 145.1 / Max: 149.6
Core i9 7980XE
Min: 108.2 / Avg: 123.98 / Max: 126.8
Threadripper 2950X
Min: 80.2 / Avg: 120.41 / Max: 126.7
Core i9 7960X
Min: 87.9 / Avg: 114.78 / Max: 121.2
Threadripper 2920X
Min: 119.9 / Avg: 121.01 / Max: 123.4
Threadripper 2970WX
Min: 161.7 / Avg: 163.52 / Max: 166.2
Talos II 2 x 22c POWER9
Min: 217.9 / Avg: 227.49 / Max: 228.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 218.5 / Avg: 232.77 / Max: 234
40
80
120
160
200

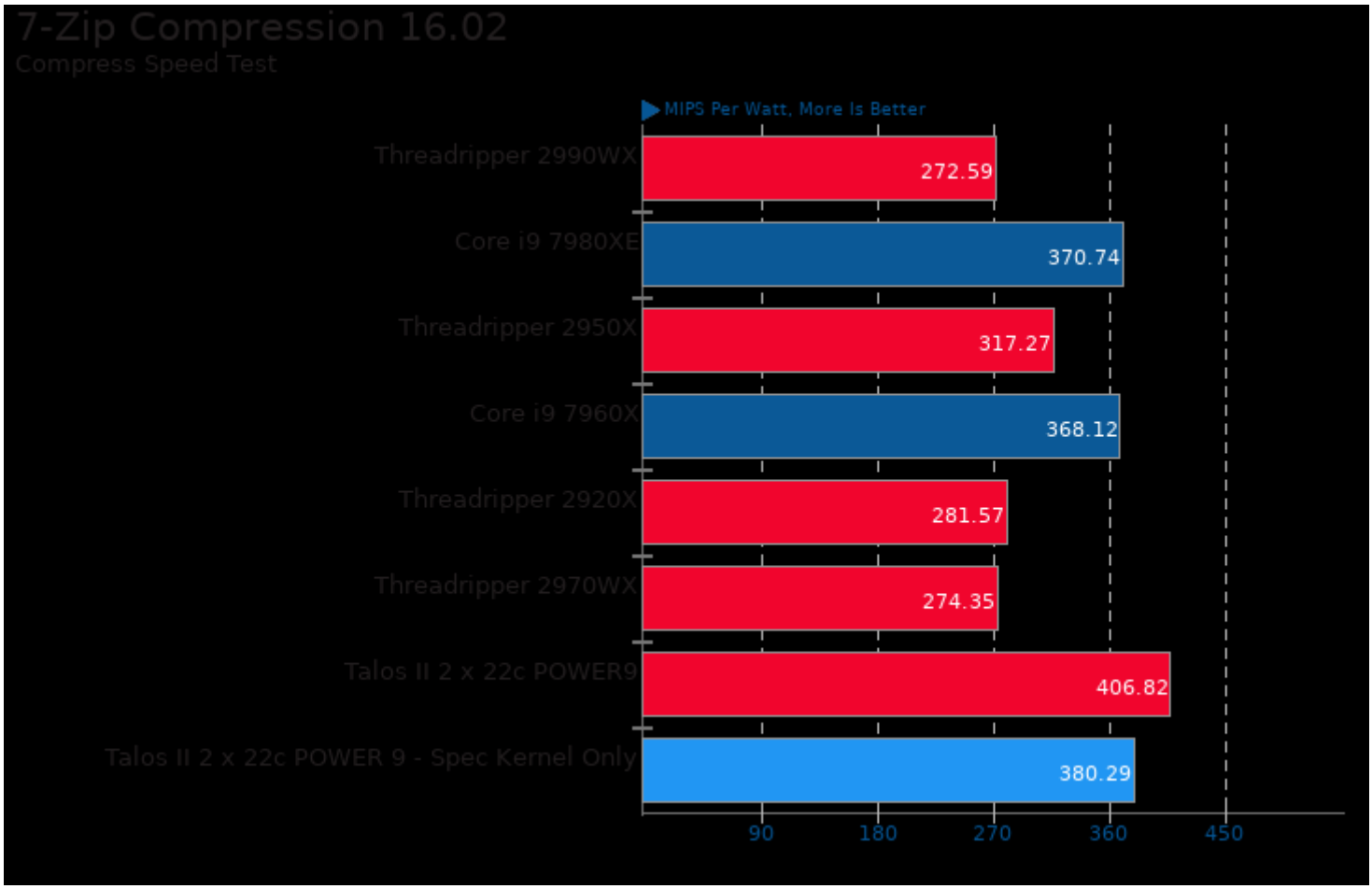

Rodinia 2.4
Test: OpenMP LavaMD
Seconds, Fewer Is Better
Threadripper 2990WX
SE +/- 0.01, N = 3
11.75
Core i9 7980XE
SE +/- 0.01, N = 3
20.08
Threadripper 2950X
SE +/- 0.07, N = 3
20.74
Core i9 7960X
SE +/- 0.11, N = 3
21.47
Core i9 7900X
SE +/- 0.10, N = 3
31.25
Threadripper 2920X
SE +/- 0.26, N = 3
25.77
Threadripper 2970WX
SE +/- 0.06, N = 3
14.52
Talos II 2 x 22c POWER9
SE +/- 0.67, N = 3
19.74
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.59, N = 3
19.30
2x6386 32G ECC
SE +/- 0.00, N = 3
32.69
test
SE +/- 0.03, N = 3
32.64
RCS 6386
SE +/- 0.45, N = 4
33.19
RCS6386
SE +/- 0.53, N = 3
33.29
POWER9
SE +/- 0.12, N = 3
15.97
TalosII-DD2.2Stepping
SE +/- 0.16, N = 15
17.41
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL

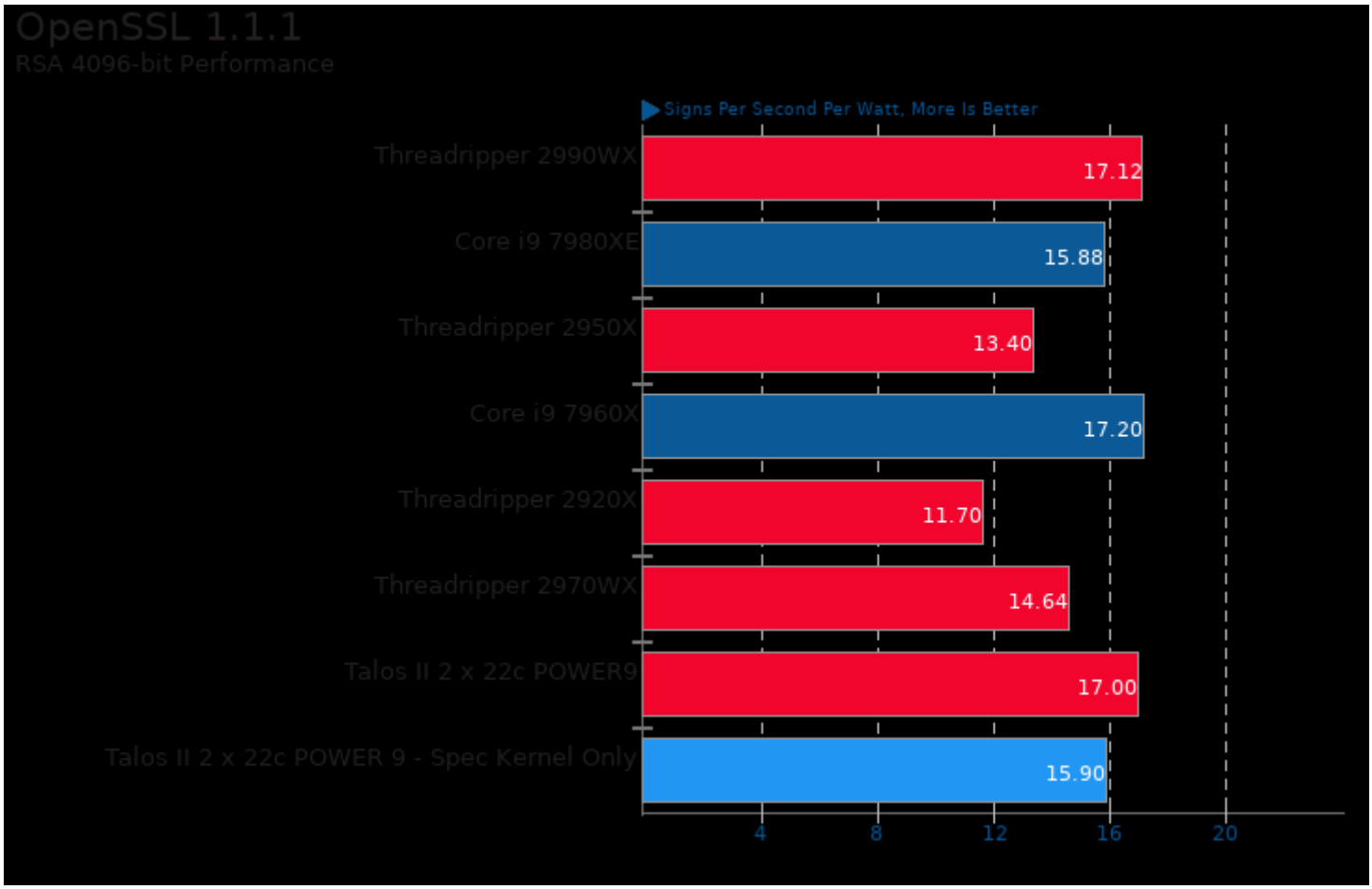

POV-Ray 3.7.0.7
Trace Time
Seconds, Fewer Is Better
Threadripper 2990WX
SE +/- 0.06, N = 3
17.92
Core i9 7980XE
SE +/- 0.05, N = 3
28.29
Threadripper 2950X
SE +/- 0.08, N = 3
30.56
Core i9 7960X
SE +/- 0.03, N = 3
30.72
Core i9 7900X
SE +/- 0.04, N = 3
44.22
Threadripper 2920X
SE +/- 0.13, N = 3
37.92
Threadripper 2970WX
SE +/- 0.23, N = 3
22.39
Talos II 2 x 22c POWER9
SE +/- 0.05, N = 3
-mtune=power9 -mcpu=power9
25.28
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.18, N = 3
-mtune=power9 -mcpu=power9
23.44
2x6386 32G ECC
SE +/- 0.06, N = 3
-march=native -ISDL -ISM -lICE -lX11
49.39
test
SE +/- 0.08, N = 3
-march=native -ISDL -ISM -lICE -lX11
49.54
RCS6386
SE +/- 0.09, N = 3
-march=native -ISDL -ISM -lICE -lX11
49.28
TalosII-DD2.2Stepping
SE +/- 0.07, N = 3
29.70
11
22
33
44
55
1. (CXX) g++ options: -pipe -O3 -ffast-math -pthread -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system


PHPBench 0.8.1
System Power Consumption Monitor
Watts, Fewer Is Better
Threadripper 2990WX
Min: 100.3 / Avg: 138.4 / Max: 146
Core i9 7980XE
Min: 105.5 / Avg: 121.2 / Max: 125.1
Threadripper 2950X
Min: 111.3 / Avg: 119.99 / Max: 123.1
Core i9 7960X
Min: 86.9 / Avg: 114.28 / Max: 118.8
Threadripper 2920X
Min: 116.3 / Avg: 118.3 / Max: 119.5
Threadripper 2970WX
Min: 108.5 / Avg: 148.93 / Max: 160.2
Talos II 2 x 22c POWER9
Min: 219 / Avg: 228.08 / Max: 236
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.6 / Avg: 231.55 / Max: 233.5
40
80
120
160
200

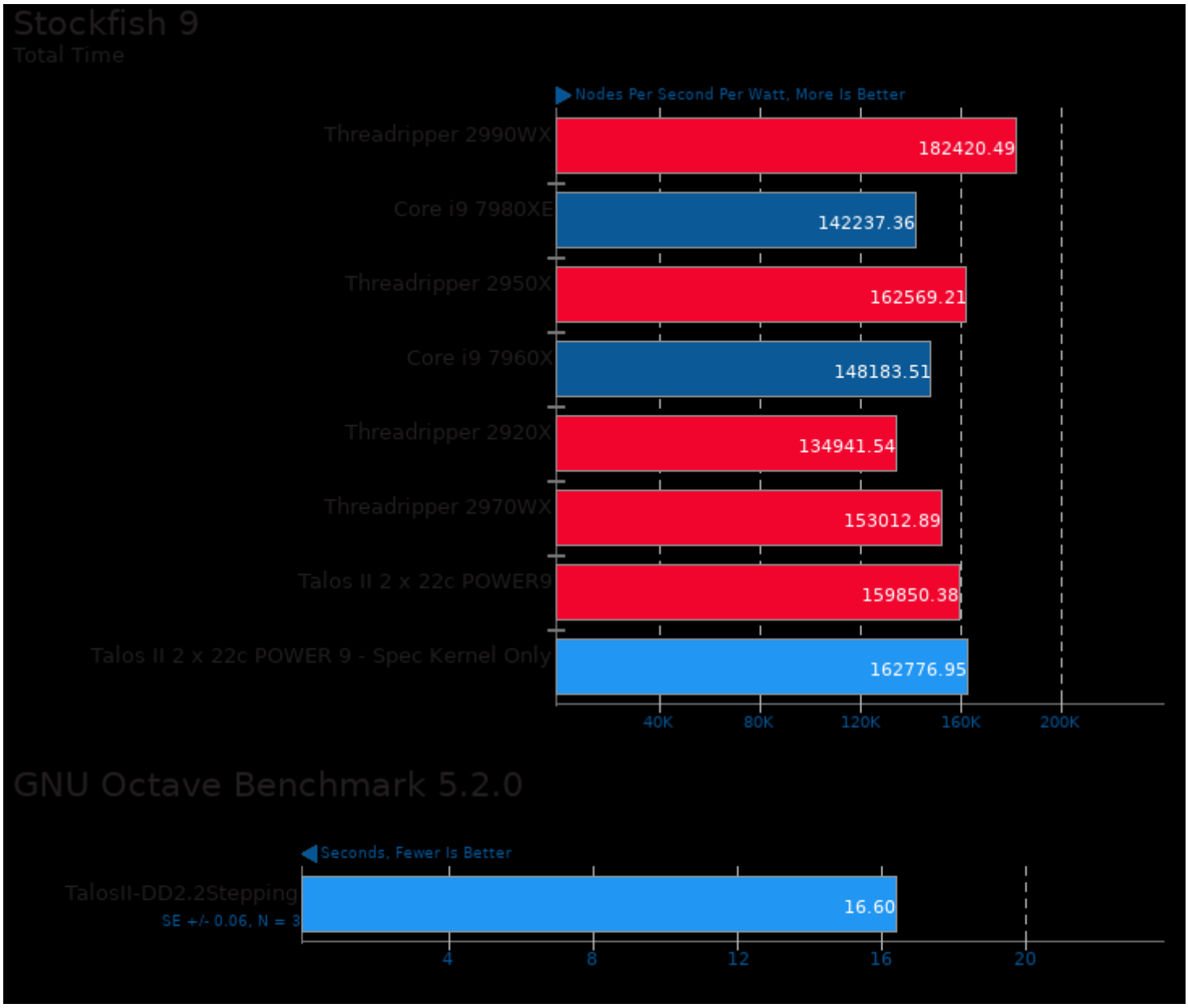

GNU Octave Benchmark 4.4.1
Seconds, Fewer Is Better
Threadripper 2990WX
SE +/- 0.09, N = 3
16.78
Core i9 7980XE
SE +/- 0.03, N = 3
17.47
Threadripper 2950X
SE +/- 0.04, N = 3
16.64
Core i9 7960X
SE +/- 0.04, N = 3
17.57
Core i9 7900X
SE +/- 0.06, N = 3
17.07
Threadripper 2920X
SE +/- 0.13, N = 3
16.43
Threadripper 2970WX
SE +/- 0.42, N = 3
17.87
Talos II 2 x 22c POWER9
SE +/- 0.10, N = 3
14.92
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.15, N = 3
16.35
2x6386 32G ECC
SE +/- 0.86, N = 14
37.89
test
SE +/- 1.11, N = 15
36.42
RCS6386
SE +/- 0.30, N = 3
36.28
9
18
27
36
45

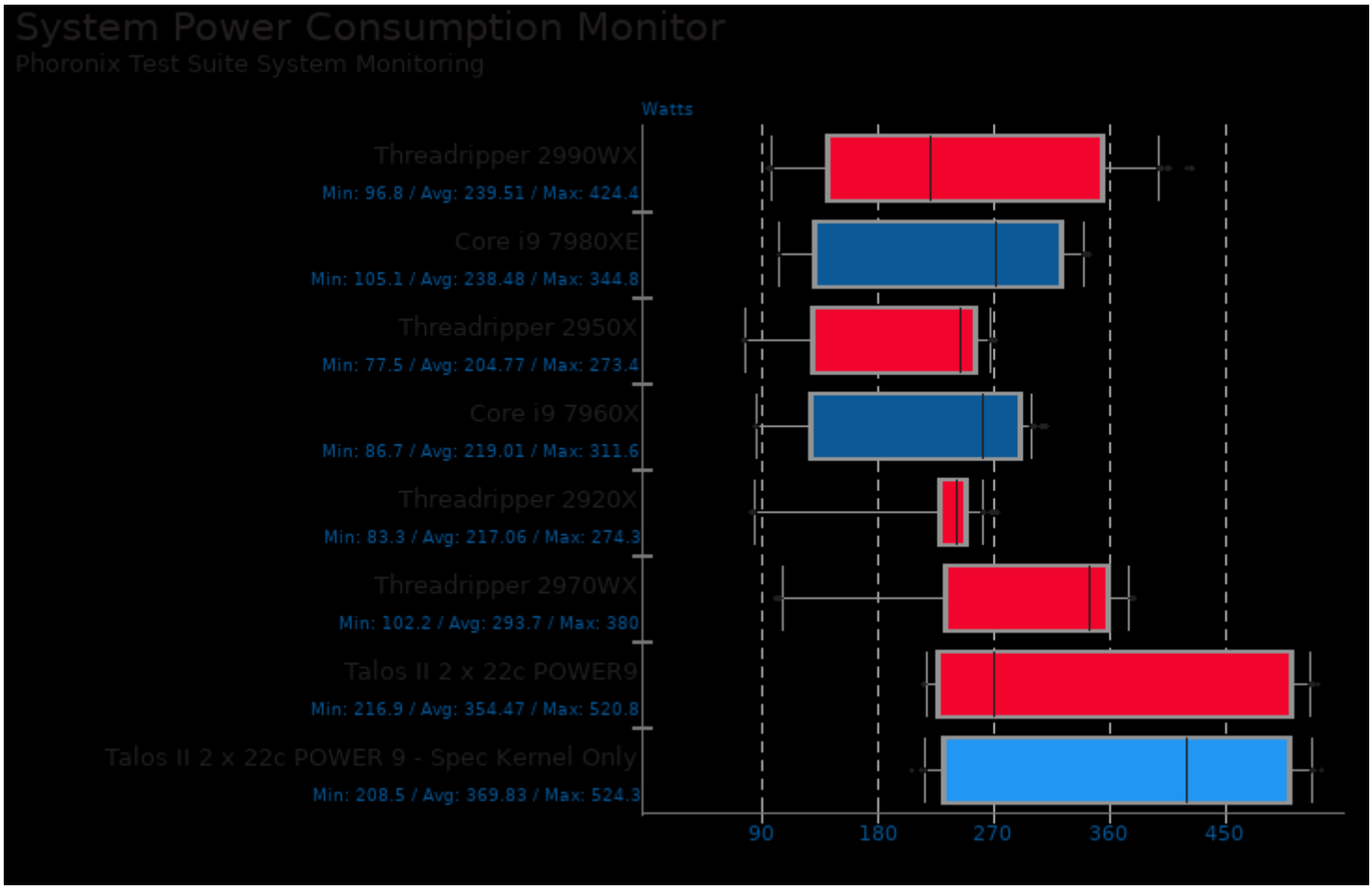

PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS Per Watt, More Is Better
Threadripper 2990WX
1705.41
Core i9 7980XE
1970.78
Threadripper 2950X
1564.57
Core i9 7960X
2079.49
Threadripper 2920X
1262.40
Threadripper 2970WX
1496.49
Talos II 2 x 22c POWER9
1595.93
Talos II 2 x 22c POWER 9 - Spec Kernel Only
1626.36
400
800
1200
1600
2000


7-Zip Compression 16.02
Compress Speed Test
MIPS Per Watt, More Is Better
Threadripper 2990WX
272.59
Core i9 7980XE
370.74
Threadripper 2950X
317.27
Core i9 7960X
368.12
Threadripper 2920X
281.57
Threadripper 2970WX
274.35
Talos II 2 x 22c POWER9
406.82
Talos II 2 x 22c POWER 9 - Spec Kernel Only
380.29
90
180
270
360
450


OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second Per Watt, More Is Better
Threadripper 2990WX
17.12
Core i9 7980XE
15.88
Threadripper 2950X
13.40
Core i9 7960X
17.20
Threadripper 2920X
11.70
Threadripper 2970WX
14.64
Talos II 2 x 22c POWER9
17.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
15.90
4
8
12
16
20

# Talos II POWER9 vs. AMD / Intel HEDT Benchmarks






*This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 18:18.*