www.phoronix-test-suite.com

Linux Retpoline Spectre Security Benchmark

Tests for a future article on Phoronix by Michael Larabel.

Automated Executive Summary

Core i7 8700K: noretpoline had the most wins, coming in first place for 28% of the tests.

Based on the geometric mean of all complete results, the fastest (Core i9 7980XE: noretpoline) was 1.697x the speed of the slowest (Core i3 7100: Retpoline + GCC).

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

Parboil (Test: OpenMP MRI Gridding) at 20.447x
C-Ray (Total Time) at 13.74x
John The Ripper (Test: Blowfish) at 13.253x
Rodinia (Test: OpenMP LavaMD) at 12.433x
PostgreSQL pgbench (Scaling: Buffer Test - Test: Normal Load - Mode: Read Only) at 10.062x
Parboil (Test: OpenMP CUTCP) at 9.702x
Rodinia (Test: OpenMP CFD Solver) at 8.356x
Timed Linux Kernel Compilation (Time To Compile) at 8.148x
Flexible IO Tester (Type: Random Read - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 6.73x

Flexible IO Tester (Type: Random Read - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 6.573x.

Test Systems:

Core i3 7100: noretpoline

Core i3 7100: Retpoline

Processor: Intel Core i3-7100 @ 3.90GHz (2 Cores / 4 Threads), Motherboard: Gigabyte B250M-DS3H-CF, Chipset: Intel Xeon E3-1200 v6/7th + B250, Memory: 8192MB, Disk: 250GB Western Digital WDS250G1B0A-, Graphics: Intel HD 630 3072MB (1100MHz), Audio: Realtek ALC887-VD, Monitor: DELL S2409W, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.1, Display Server: Wayland, OpenGL: 4.5 Mesa 17.2.2, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 1920x1080

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Core i3 7100: Retpoline + GCC

Processor: Intel Core i3-7100 @ 3.90GHz (2 Cores / 4 Threads), Motherboard: Gigabyte B250M-DS3H-CF, Chipset: Intel Xeon E3-1200 v6/7th + B250, Memory: 8192MB, Disk: 250GB Western Digital WDS250G1B0A-, Graphics: Intel HD 630 (1100MHz), Audio: Realtek ALC887-VD, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Compiler: GCC 7.2.0, File-System: ext4

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
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Core i7 8700K: noretpoline

Core i7 8700K: Retpoline

Processor: Intel Core i7-8700K @ 4.70GHz (6 Cores / 12 Threads), Motherboard: ASUS PRIME Z370-A, Chipset: Intel Device 3ec2, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NV132 11264MB, Audio: Realtek ALC1220, Monitor: DELL P2415Q, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.1, Display Server: Wayland,

OpenGL: 4.3 Mesa 17.2.2, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Core i7 8700K: Retpoline + GCC

Processor: Intel Core i7-8700K @ 4.70GHz (6 Cores / 12 Threads), Motherboard: ASUS PRIME Z370-A, Chipset: Intel Device 3ec2, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NV132 11264MB, Audio: Realtek ALC1220, Monitor: DELL P2415Q, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Desktop: GNOME Shell 3.26.1, Display Server: Wayland, OpenGL: 4.3 Mesa 17.2.2, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Core i9 7980XE: noretpoline

Core i9 7980XE: Retpoline

Processor: Intel Core i9-7980XE @ 4.40GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A, Chipset: Intel Device 2020, Memory: 16384MB, Disk: 120GB Force MP500, Graphics: NV137 2048MB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.1, Display Server: Wayland, OpenGL: 4.3 Mesa 17.2.2, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Core i9 7980XE: Retpoline + GCC

Processor: Intel Core i9-7980XE @ 4.40GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A, Chipset: Intel Device 2020, Memory: 16384MB, Disk: 120GB Force MP500, Graphics: NV137 2048MB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Desktop: GNOME Shell 3.26.1, Display Server: Wayland, OpenGL: 4.3 Mesa 17.2.2, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

2 x Xeon Gold 6138: noretpoline

2 x Xeon Gold 6138: Retpoline

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106, Chipset: Intel Device 2020, Memory: 96256MB, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: ASPEED ASPEED Family, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.5, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 1920x1080

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
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

2 x Xeon Gold 6138: Retpoline + GCC

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106, Chipset: Intel Device 2020, Memory: 96256MB, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: ASPEED ASPEED Family, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.5, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 1920x1080

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
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
System Notes: Python 2.7.14.

Ryzen 7 1800X: noretpoline

Ryzen 7 1800X: Retpoline

Processor: AMD Ryzen 7 1800X Eight-Core @ 3.60GHz (8 Cores / 16 Threads), Motherboard: MSI X370 XPOWER GAMING TITANIUM (MS-7A31) v1.0, Chipset: AMD Family 17h, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G7, Graphics: Sapphire AMD Radeon RX 560 4096MB, Audio: AMD Device aae0, Monitor: DELL P2415Q, Network: Intel I211 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.2, Display Driver: modesetting 1.19.5, OpenGL: 4.5 Mesa 17.4.0-devel (git-6a36bfc64d) (LLVM 6.0.0), Vulkan: 1.0.61, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
System Notes: Python 2.7.14.

Ryzen 7 1800X: Retpoline + GCC

Processor: AMD Ryzen 7 1800X Eight-Core @ 3.60GHz (8 Cores / 16 Threads), Motherboard: MSI X370 XPOWER GAMING TITANIUM (MS-7A31) v1.0, Chipset: AMD Family 17h, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G7, Graphics: Sapphire AMD Radeon RX 560 4096MB, Audio: AMD Device aae0, Monitor: DELL P2415Q, Network: Intel I211 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Desktop: GNOME Shell 3.26.2, Display Driver: modesetting 1.19.5, OpenGL: 4.5 Mesa 17.4.0-devel (git-6a36bfc64d) (LLVM 6.0.0), Vulkan: 1.0.61, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
System Notes: Python 2.7.14.

EPYC 7601: noretpoline

EPYC 7601: Retpoline

Processor: AMD EPYC 7601 32-Core @ 2.20GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED ASPEED Family, Monitor: VE228, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.5, OpenCL: OpenCL 1.2 pocl 1.0 LLVM 5.0.0, Compiler: GCC 7.2.0 + Clang 5.0.0-3 + LLVM 5.0.0, File-System: ext4, Screen Resolution: 1920x1080

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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
System Notes: Python 2.7.14.

EPYC 7601: Retpoline + GCC

Processor: AMD EPYC 7601 32-Core @ 2.20GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED ASPEED Family, Monitor: VE228, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.14.0-phx-retpoline-gcc-retpo (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.5, OpenCL: OpenCL 1.2 pocl 1.0 LLVM 5.0.0, Compiler: GCC 7.2.0 + Clang 5.0.0-3 + LLVM 5.0.0,

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File-System: ext4, Screen Resolution: 1920x1080

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
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
System Notes: Python 2.7.14.

	Core i3 7100 : noretpoline	Core i3 7100 : Retpoline	Core i3 7100 : Retpoline + GCC	Core i7 8700 K: noretpoline	Core i7 8700 K: Retpoline	Core i7 8700 K: Retpoline + GCC	Core i9 7980 XE: noretpoline	Core i9 7980 XE: Retpoline	Core i9 7980 XE: Retpoline + GCC	2 x Xeon Gold 6138 : noretpoline	2 x Xeon Gold 6138 : Retpoline	2 x Xeon Gold 6138 : Retpoline +	Ryzen 7 1800 X: noretpoline	Ryzen 7 1800 X: Retpoline	Ryzen 7 1800 X: Retpoline + GCC	EPYC 7601 : noretpoline	EPYC 7601 : Retpoline	EPYC 7601 : Retpoline + GCC
Flexible IO Tester - Rand Read - Libaio - No - Yes - 4KB (MB/s)	298.93	293.00	293.76	777.17	775.35	776.94	586.09	387.73	376.78	383.14	384.79	388.19	286.45	184.88	**178.94**	**1176**	1166	1129
Normalized	25.41%	24.91%	24.98%	66.07%	65.92%	66.06%	49.83%	32.96%	32.03%	32.57%	32.71%	33%	24.35%	15.72%	15.21%	100%	99.13%	95.95%
Standard Deviation	13.8%	0.1%	0.2%	0%	0%	0%	0%	0%	0%	1.9%	0.6%	0.9%	0%	0%	0%	2.5%	2%	0.3%
Flexible IO Tester - Rand Read - Libaio - No - Yes - 4KB (IOPS)	74729	73245	73437	194289	193833	194232	146520	96930	94191	95782	96194	97043	71610	46216	**44732**	**301037**	298428	288951
Normalized	24.82%	24.33%	24.39%	64.54%	64.39%	64.52%	48.67%	32.2%	31.29%	31.82%	31.95%	32.24%	23.79%	15.35%	14.86%	100%	99.13%	95.99%
Standard Deviation	13.8%	0.1%	0.2%	0%	0%	0%	0%	0%	0%	1.9%	0.6%	0.9%	0%		0%	2.5%	2%	0.4%

Linux Retpoline Spectre Security Benchmark

Flexible IO Tester - Rand Write - Libaio - No - Yes - 2MB (MB/s)	344.62	**255.09**	271.36	926.04	925.33	927.23	905.82	746.16	745.78	523.89	514.67	512.18	512.69	512.01	491.15	1973	2158	**2158**
Normalized	15.97%	11.82%	12.57%	42.91%	42.87%	42.96%	41.97%	34.57%	34.55%	24.27%	23.85%	23.73%	23.75%	23.72%	22.76%	91.4%	99.97%	100%
Standard Deviation	1.3%	22.8%	22%	0.5%	0.6%	0.8%	0.7%	38.8%	10.7%	0.3%	0.7%	0.7%	14%	13.5%	22.1%	0.1%	0.3%	0.3%
Flexible IO Tester - Rand Write - Libaio - No - Yes - 2MB (IOPS)	164	**121**	129	449	448	449	439	361	360	252	248	246	247	246	236	983	1075	**1076**
Normalized	15.24%	11.25%	11.99%	41.73%	41.64%	41.73%	40.8%	33.55%	33.46%	23.42%	23.05%	22.86%	22.96%	22.86%	21.93%	91.36%	99.91%	100%
Standard Deviation	1.4%	23.6%	22.7%	0.5%	0.7%	0.8%	0.7%	39.2%	10.9%	0.4%	0.8%	0.8%	14.2%	13.8%	22.5%	0.1%	0.2%	0.3%
Flexible IO Tester - Rand Write - Libaio - No - Yes - 4KB (MB/s)	290.08	**288.55**	289.85	326.03	324.73	326.62	843.96	758.92	669.20	338.58	341.01	341.98	503.78	505.04	508.50	**1060**	1047	1049
Normalized	27.37%	27.23%	27.35%	30.77%	30.64%	30.82%	79.64%	71.61%	63.15%	31.95%	32.18%	32.27%	47.54%	47.66%	47.98%	100%	98.79%	98.97%
Standard Deviation	0.1%	0.5%	0.3%	0.2%	0.1%	0.1%	0.2%	1.5%	2.2%	1%	0.9%	0.9%	3.3%	3.3%	0.6%	1.9%	4%	1.9%
Flexible IO Tester - Rand Write - Libaio - No - Yes - 4KB (IOPS)	72515	**72135**	72458	81504	81179	81651	210985	189726	167296	84641	85249	85492	125941	126258	127122	**271273**	268041	268542
Normalized	26.73%	26.59%	26.71%	30.05%	29.93%	30.1%	77.78%	69.94%	61.67%	31.2%	31.43%	31.52%	46.43%	46.54%	46.86%	100%	98.81%	98.99%
Standard Deviation	0.1%	0.5%	0.3%	0.2%	0.1%	0.1%	0.2%	1.5%	2.2%	1%	0.9%	0.9%	3.3%	3.3%	0.6%	1.9%	4%	1.9%
Flexible IO Tester - Seq Write - Libaio - No - Yes - 2MB (MB/s)	477.64	496.68	**469.03**	930.24	930.94	919.58	885.94	847.79	714.83	514.75	526.12	527.34	548.01	549.39	557.86	1971	**2158**	2157
Normalized	22.13%	23.02%	21.73%	43.11%	43.14%	42.61%	41.05%	39.29%	33.12%	23.85%	24.38%	24.44%	25.39%	25.46%	25.85%	91.34%	100%	99.95%
Standard Deviation	5.7%	3.2%	5.7%	0.3%	0.1%	1.2%	1.5%	3.1%	2%	3.4%	0.3%	0.1%	3.3%	2.2%	0.3%	0.1%	0.3%	0.3%

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Flexible IO Tester - Seq Write - Libaio - No - Yes - 2MB (IOPS)	230	239	**226**	451	451	445	429	411	346	248	253	254	264	265	269	982	**1075**	**1075**
Normalized	21.4%	22.23%	21.02%	41.95%	41.95%	41.4%	39.91%	38.23%	32.19%	23.07%	23.53%	23.63%	24.56%	24.65%	25.02%	91.35%	100%	100%
Standard Deviation	5.8%	3.4%	5.8%	0.3%		1.2%	1.5%	3.2%	2%	3.5%			3.3%	2.2%	0.4%	0.1%	0.3%	0.3%
Flexible IO Tester - Seq Write - Libaio - No - Yes - 4KB (MB/s)	363.27	364.25	**362.63**	938.64	934.00	923.85	772.97	745.61	691.87	415.49	413.25	416.94	516.26	517.47	514.78	1081	**1092**	1073
Normalized	33.28%	33.37%	33.22%	86%	85.57%	84.64%	70.82%	68.31%	63.39%	38.07%	37.86%	38.2%	47.3%	47.41%	47.16%	99.06%	100%	98.27%
Standard Deviation	0.2%	0.2%	0.1%	0.2%	0.1%	0.9%	2%	2.9%	1.1%	1%	0.4%	0.6%	0.4%	3.2%	3.4%	2.3%	3.8%	1.2%
Flexible IO Tester - Seq Write - Libaio - No - Yes - 4KB (IOPS)	90813	91060	**90654**	234656	233496	230959	193239	186398	172965	103868	103308	104232	129061	129364	128690	276778	**279404**	274530
Normalized	32.5%	32.59%	32.45%	83.98%	83.57%	82.66%	69.16%	66.71%	61.9%	37.17%	36.97%	37.31%	46.19%	46.3%	46.06%	99.06%	100%	98.26%
Standard Deviation	0.2%	0.2%	0.1%	0.2%	0.1%	0.9%	2%	2.9%	1.1%	1%	0.4%	0.6%	0.4%	3.2%	3.4%	2.3%	3.8%	1.2%
Compile Bench - Compile (MB/s)	335.87	**325.56**	342.43	1573	1550	1501	1690	1501	1185	1497	1694	1637	727.40	720.39	691.92	**1697**	1691	1693
Normalized	19.79%	19.19%	20.18%	92.68%	91.34%	88.46%	99.62%	88.48%	69.81%	88.21%	99.83%	96.47%	42.87%	42.45%	40.78%	100%	99.68%	99.78%
Standard Deviation	3.5%	11.6%	3.7%	2.3%	3%	3.4%	5.1%	12.7%	7.4%	0.8%	9.1%	6%	1.8%	3.8%	3.1%	1%	0.4%	0.5%
Compile Bench - Initial Create	307.51	**294.62**	297.72	650.48	634.57	593.86	**664.68**	648.38	600.38	533.70	508.92	478.76	500.61	491.58	487.87	410.85	406.41	406.91
Normalized	46.26%	44.33%	44.79%	97.86%	95.47%	89.35%	100%	97.55%	90.33%	80.29%	76.57%	72.03%	75.32%	73.96%	73.4%	61.81%	61.14%	61.22%
Standard Deviation	3.8%	5.9%	6.6%	0.8%	2.8%	2.3%	7.1%	4.6%	4.9%	0.6%	8.6%	10%	1.9%	2.9%	2.4%	1.1%	1.7%	1.8%
t-test1 - 1 (sec)	19.66	19.72	19.72	**17.82**	21.87	19.24	50.35	49.14	47.77	65.91	**66.56**	64.45	27.41	27.52	27.24	37.76	36.68	38.18
Normalized	90.64%	90.37%	90.37%	100%	81.48%	92.62%	35.39%	36.26%	37.3%	27.04%	26.77%	27.65%	65.01%	64.75%	65.42%	47.19%	48.58%	46.67%
Standard Deviation	0.6%	0.4%	1.4%	1.8%	2.6%	0.9%	1.6%	1.3%	1.5%	0.4%	0.2%	0.4%	0.9%	0.3%	0.2%	0.4%	0.5%	0.6%

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t-test1 - 2 (sec)	6.62	6.64	6.61	**5.22**	**5.22**	5.41	17.32	17.20	17.18	23.12	**23.29**	23.04	9.10	9.15	9.15	14.38	14.46	14.66
Normalized	78.85%	78.61%	78.97%	100%	100%	96.49%	30.14%	30.35%	30.38%	22.58%	22.41%	22.66%	57.36%	57.05%	57.05%	36.3%	36.1%	35.61%
Standard Deviation	0.3%	0.1%	0.2%	0.3%	0.2%	0.5%	4.3%	4.4%	4.4%	1%	0.4%	0.7%	0.6%	0.4%	0.7%	0.6%	0.4%	0.7%
Parboil - OpenMP CUTCP (sec)	22.60	22.70	**22.80**	7.08	7.10	7.08	3.42	3.17	3.39	**2.35**	2.38	2.38	5.58	5.56	5.66	2.71	2.73	2.70
Normalized	10.4%	10.35%	10.31%	33.19%	33.1%	33.19%	68.71%	74.13%	69.32%	100%	98.74%	98.74%	42.11%	42.27%	41.52%	86.72%	86.08%	87.04%
Standard Deviation	0.4%	0.1%	0.8%	0.6%	0.3%	0.4%	16.6%	0.6%	16.4%	1.1%	3.1%	0.2%	1.4%	0.3%	3.2%	0.6%	3.7%	0.4%
Parboil - O.M.G (sec)	**20.24**	21.06	21.03	39.98	39.28	40.17	143.95	141.90	142.81	407.91	**413.85**	405.25	95.75	95.59	95.85	283.16	283.25	288.36
Normalized	100%	96.11%	96.24%	50.63%	51.53%	50.39%	14.06%	14.26%	14.17%	4.96%	4.89%	4.99%	21.14%	21.17%	21.12%	7.15%	7.15%	7.02%
Standard Deviation	2.3%	2.2%	4.1%	3.4%	5.5%	2.5%	1.6%	0.7%	1.3%	2.9%	2.9%	3.4%	0.1%	0.1%	0.2%	0.2%	0.1%	0.8%
Rodinia - OpenMP LavaMD (sec)	**353.47**	352.94	351.80	107.30	107.87	107.30	46.33	46.38	46.42	28.50	28.70	**28.43**	82.56	82.52	82.68	31.65	31.86	31.87
Normalized	8.04%	8.06%	8.08%	26.5%	26.36%	26.5%	61.36%	61.3%	61.25%	99.75%	99.06%	100%	34.44%	34.45%	34.39%	89.83%	89.23%	89.21%
Standard Deviation	0.4%	0.5%	0.2%	0.1%	0.3%	0.4%	1.9%	1.3%	1.4%	0.7%	1%	0.5%	0.2%	0.1%	0.2%	0.8%	0.4%	0.8%
Rodinia - OpenMP CFD Solver (sec)	**81.30**	81.22	81.19	29.41	29.42	29.52	12.03	12.24	12.13	**9.73**	9.93	10.54	29.98	30.19	29.91	10.97	10.76	11.08
Normalized	11.97%	11.98%	11.98%	33.08%	33.07%	32.96%	80.88%	79.49%	80.21%	100%	97.99%	92.31%	32.45%	32.23%	32.53%	88.7%	90.43%	87.82%
Standard Deviation	0.2%	0.1%	0.1%	0.3%	0.5%	0.1%	6%	6%	5.9%	2.8%	3.4%	7%	0.2%	1.5%	0.6%	1.3%	0.6%	1.7%
lzbench - XZ 0 - Compression (MB/s)	35	35	35	**42**	**42**	41	39	39	39	32	30	31	32	32	32	**24**	**24**	**24**
Normalized	83.33%	83.33%	83.33%	100%	100%	97.62%	92.86%	92.86%	92.86%	76.19%	71.43%	73.81%	76.19%	76.19%	76.19%	57.14%	57.14%	57.14%
Standard Deviation							3%	4.3%	1.5%	5.6%	4.5%	4%		1.8%	1.8%			
lzbench - XZ 0 - Decompression (MB/s)	98	98	97	**118**	**118**	115	113	113	113	89	87	86	100	100	100	77	**76**	77
Normalized	83.05%	83.05%	82.2%	100%	100%	97.46%	95.76%	95.76%	95.76%	75.42%	73.73%	72.88%	84.75%	84.75%	84.75%	65.25%	64.41%	65.25%
Standard Deviation			1.2%			1%	2.5%	2.7%	3.1%	2.8%	5.7%	5%			0.6%			

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lzbench - Zstd 1 - Compression (MB/s)	389	389	389	466	466	**467**	459	459	460	361	369	370	414	414	413	**335**	336	**335**
Normalized	83.3%	83.3%	83.3%	99.79%	99.79%	100%	98.29%	98.29%	98.5%	77.3%	79.01%	79.23%	88.65%	88.65%	88.44%	71.73%	71.95%	71.73%
Standard Deviation	0.1%	0.1%	0.1%	0.2%	0.3%	0.1%	0.9%	0.3%	0.5%	0.4%	1.2%	1%	0.1%			0.7%	0.7%	0.6%
lzbench - Zstd 1 - Decompression (MB/s)	1049	1048	1049	1267	**1269**	1268	1239	1240	1240	975	982	983	1169	1165	1164	911	911	**910**
Normalized	82.66%	82.58%	82.66%	99.84%	100%	99.92%	97.64%	97.71%	97.71%	76.83%	77.38%	77.46%	92.12%	91.8%	91.73%	71.79%	71.79%	71.71%
Standard Deviation				0.1%	0.1%	0.1%			0%	0.8%	0.7%	0.5%	0.1%	0.1%	0.5%	0.8%	0.9%	0.7%
CacheBench - Read (MB/s)	3305	3267	3289	**3974**	3936	3912	3623	3554	3648	2973	2872	2840	2841	2841	2841	**2206**	2215	2214
Normalized	83.15%	82.2%	82.75%	100%	99.04%	98.42%	91.15%	89.43%	91.79%	74.81%	72.27%	71.45%	71.48%	71.47%	71.49%	55.5%	55.74%	55.71%
Standard Deviation	0%	0.5%	0.6%	0.2%	0.9%	1.6%	0.3%	2.6%	1%	0.4%	0.7%	0.7%	0%	0%	0%	0.7%	0%	0.1%
CacheBench - Write (MB/s)	27496	27555	27596	**33318**	31907	27144	30426	30391	30630	24955	23883	23754	27822	27903	28057	21623	**21557**	21836
Normalized	82.53%	82.7%	82.83%	100%	95.76%	81.47%	91.32%	91.21%	91.93%	74.9%	71.68%	71.29%	83.5%	83.75%	84.21%	64.9%	64.7%	65.54%
Standard Deviation	1%	0.1%	0.4%	0.1%	8.3%	14.6%	0.7%	0.2%	0.1%	0.2%	1.4%	0.6%	1.3%	0.4%	0%	0.4%	1.1%	0.2%
CacheBench - R.M.W (MB/s)	30431	30442	**37339**	33679	34967	31498	31490	31834	30450	25778	25061	24928	29435	29372	29414	22924	22919	**22901**
Normalized	81.5%	81.53%	100%	90.2%	93.65%	84.36%	84.33%	85.26%	81.55%	69.04%	67.12%	66.76%	78.83%	78.66%	78.77%	61.39%	61.38%	61.33%
Standard Deviation	3%	1.7%	0.6%	3.6%	0.1%	7.5%	2.8%	0.4%	13.6%	0.8%	1.9%	1.6%	0%	0.1%	0.1%	0%	0.1%	0.1%
John The Ripper - Blowfish (Real C/S)	3857	**3855**	3856	12758	12748	12749	31335	31292	31328	49652	48399	**51089**	12457	12448	12448	35458	35714	35715
Normalized	7.55%	7.55%	7.55%	24.97%	24.95%	24.95%	61.33%	61.25%	61.32%	97.19%	94.73%	100%	24.38%	24.37%	24.37%	69.4%	69.91%	69.91%
Standard Deviation	0.1%	0.1%	0.1%		0.1%	0.1%	0.1%	0%	0.1%	2%	9.5%	1.2%	0%	0.1%	0.1%	2%	0.9%	1.1%
ebizzy (Records/s)	110097	**107840**	114770	375559	382991	388219	628425	632312	588395	946321	954773	950671	447428	457727	414423	**1093230**	1073587	952691
Normalized	10.07%	9.86%	10.5%	34.35%	35.03%	35.51%	57.48%	57.84%	53.82%	86.56%	87.34%	86.96%	40.93%	41.87%	37.91%	100%	98.2%	87.14%
Standard Deviation	6.4%	7.8%	1.8%	2.7%	4.4%	3.4%	2.5%	3.2%	5.7%	1.4%	3.5%	3.2%	6.5%	4.6%	2.3%	3.2%	6%	6%

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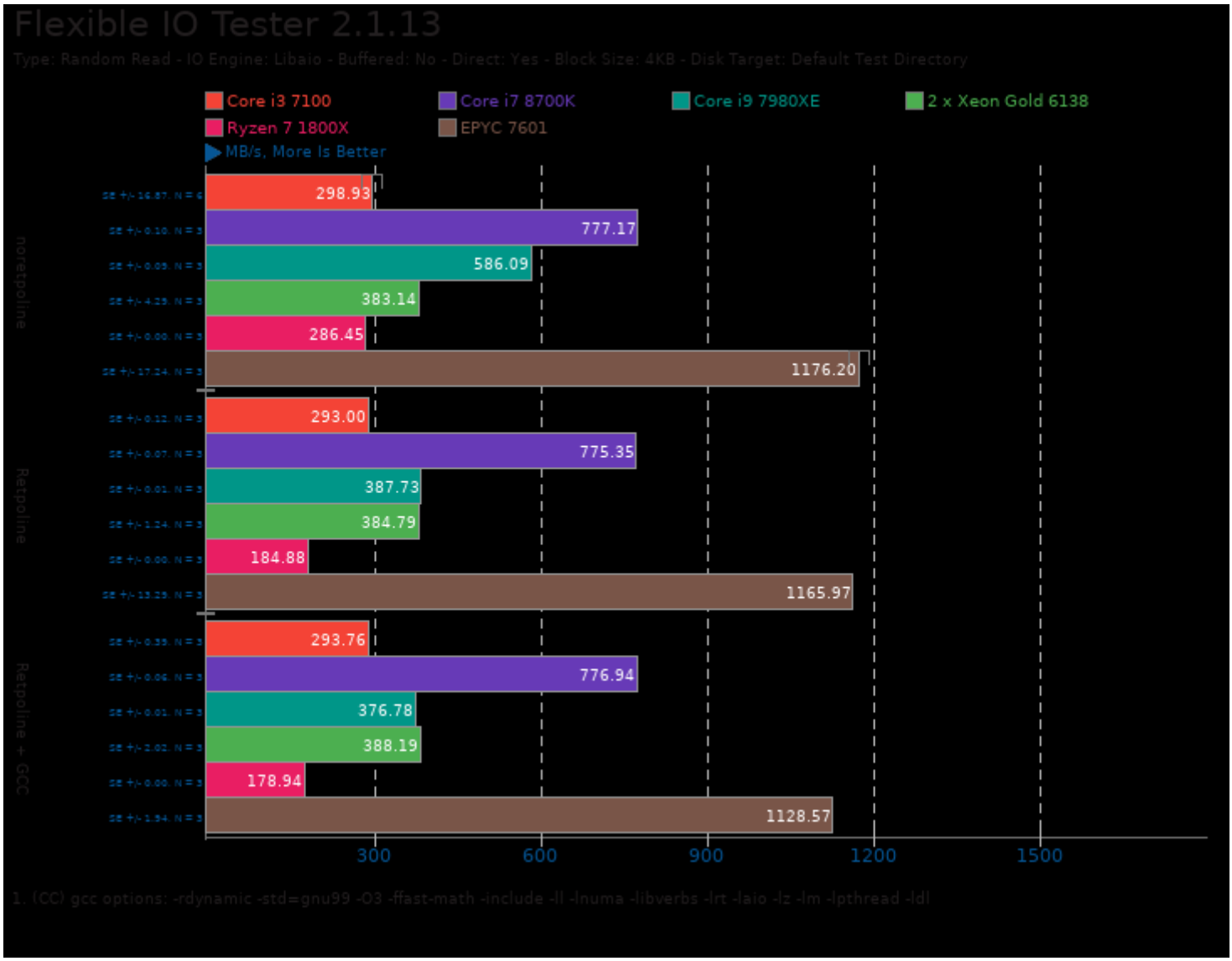
Timed Apache Compilation - Time To Compile (sec)	38.56	**38.73**	38.70	**18.72**	18.83	18.91	22.63	22.33	22.87	26.24	26.31	26.32	26.62	26.15	26.16	31.71	32.21	32.12
Normalized	48.55%	48.33%	48.37%	100%	99.42%	99%	82.72%	83.83%	81.85%	71.34%	71.15%	71.12%	70.32%	71.59%	71.56%	59.04%	58.12%	58.28%
Standard Deviation	0%	0.2%	0.3%	0%	0.2%	0.3%	3.1%	3.4%	3.1%	0.4%	0.9%	0.7%	1.2%	1%	0.7%	0.8%	0.4%	0.4%
Timed Linux Kernel Compilation - Time To Compile	246.30	**246.49**	246.00	77.14	76.85	77.47	39.03	38.89	38.61	**30.25**	30.46	30.63	83.84	83.99	83.44	38.30	38.44	38.52
Normalized	12.28%	12.27%	12.3%	39.21%	39.36%	39.05%	77.5%	77.78%	78.35%	100%	99.31%	98.76%	36.08%	36.02%	36.25%	78.98%	78.69%	78.53%
Standard Deviation	0.7%	0.8%	0.6%	1.9%	1.8%	1.8%	5.4%	3.8%	4.1%	6.1%	6.2%	6.4%	1.5%	1.9%	2.4%	4.3%	4.8%	4%
C-Ray - Total Time (sec)	41.97	**43.28**	41.97	12.78	12.78	12.79	5.26	5.47	5.70	3.16	**3.15**	3.18	9.71	9.73	9.70	3.50	3.45	3.48
Normalized	7.51%	7.28%	7.51%	24.65%	24.65%	24.63%	59.89%	57.59%	55.26%	99.68%	100%	99.06%	32.44%	32.37%	32.47%	90%	91.3%	90.52%
Standard Deviation	0%	5.4%	0.1%	0.1%	0.1%	0.1%	0.1%	10%	12.5%	0.6%	0.1%	0.3%	0.1%	0.2%	0%	0.8%	0.7%	0.5%
Stockfish - Total Time (ms)	3390	3381	3380	2773	**2758**	2760	3212	2997	2809	3437	3654	3613	3540	3533	3526	**4507**	**4507**	4501
Normalized	81.36%	81.57%	81.6%	99.46%	100%	99.93%	85.87%	92.03%	98.18%	80.24%	75.48%	76.34%	77.91%	78.06%	78.22%	61.19%	61.19%	61.28%
Standard Deviation	0.2%	0.1%	0.2%	1.2%	0.2%	0.1%	23.2%	3.5%	2.9%	1.9%	13.6%	14.3%	0.2%	0.2%	0.3%	0.1%		0.1%
LZMA Compression - 2.F.C (sec)	277.50	275.51	277.61	**208.92**	210.91	211.33	233.49	238.43	233.40	281.84	281.25	282.04	265.56	265.34	264.75	**329.57**	328.95	329.00
Normalized	75.29%	75.83%	75.26%	100%	99.06%	98.86%	89.48%	87.62%	89.51%	74.13%	74.28%	74.07%	78.67%	78.74%	78.91%	63.39%	63.51%	63.5%
Standard Deviation	0.6%	0.3%	0.5%	0.2%	1.3%	1.6%	1.1%	0.4%	1.9%	0.2%	0.4%	1.7%	0.1%	0.2%	0.2%	0.1%	0.1%	0.2%
glibc bench - ffs (nanoseconds)	6.16	**6.45**	6.15	4.78	4.81	5.07	4.06	3.73	3.94	**3.26**	**3.26**	**3.26**	6.17	6.17	6.17	4.83	4.83	4.83
Normalized	52.92%	50.54%	53.01%	68.2%	67.78%	64.3%	80.3%	87.4%	82.74%	100%	100%	100%	52.84%	52.84%	52.84%	67.49%	67.49%	67.49%
Standard Deviation	4%	12.6%	2.6%	0.1%	1.1%	5%	8.2%	0.1%	6.7%	0%	0%	0%	0.1%	0%	0.2%	0%	0%	0%

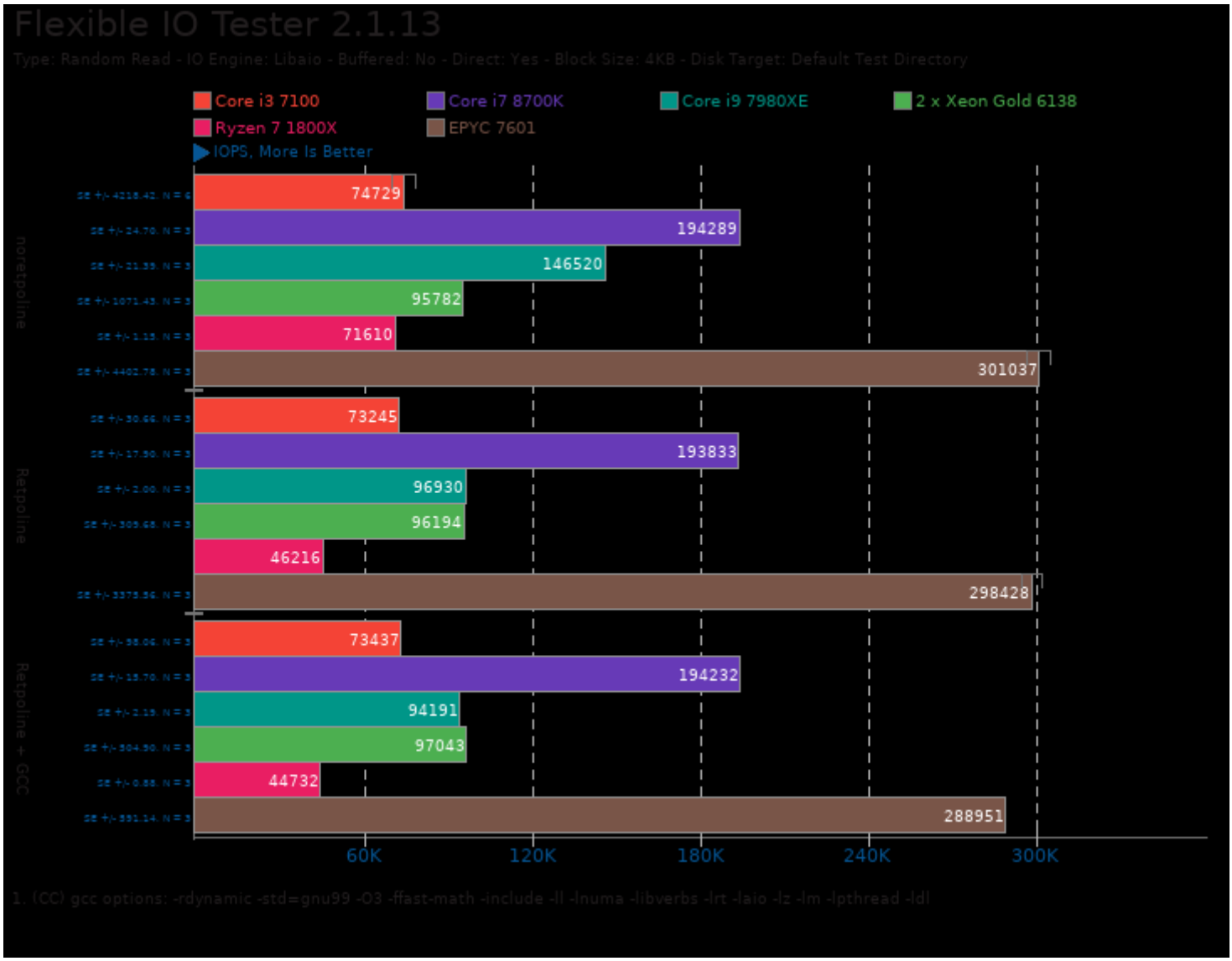
Linux Retpoline Spectre Security Benchmark

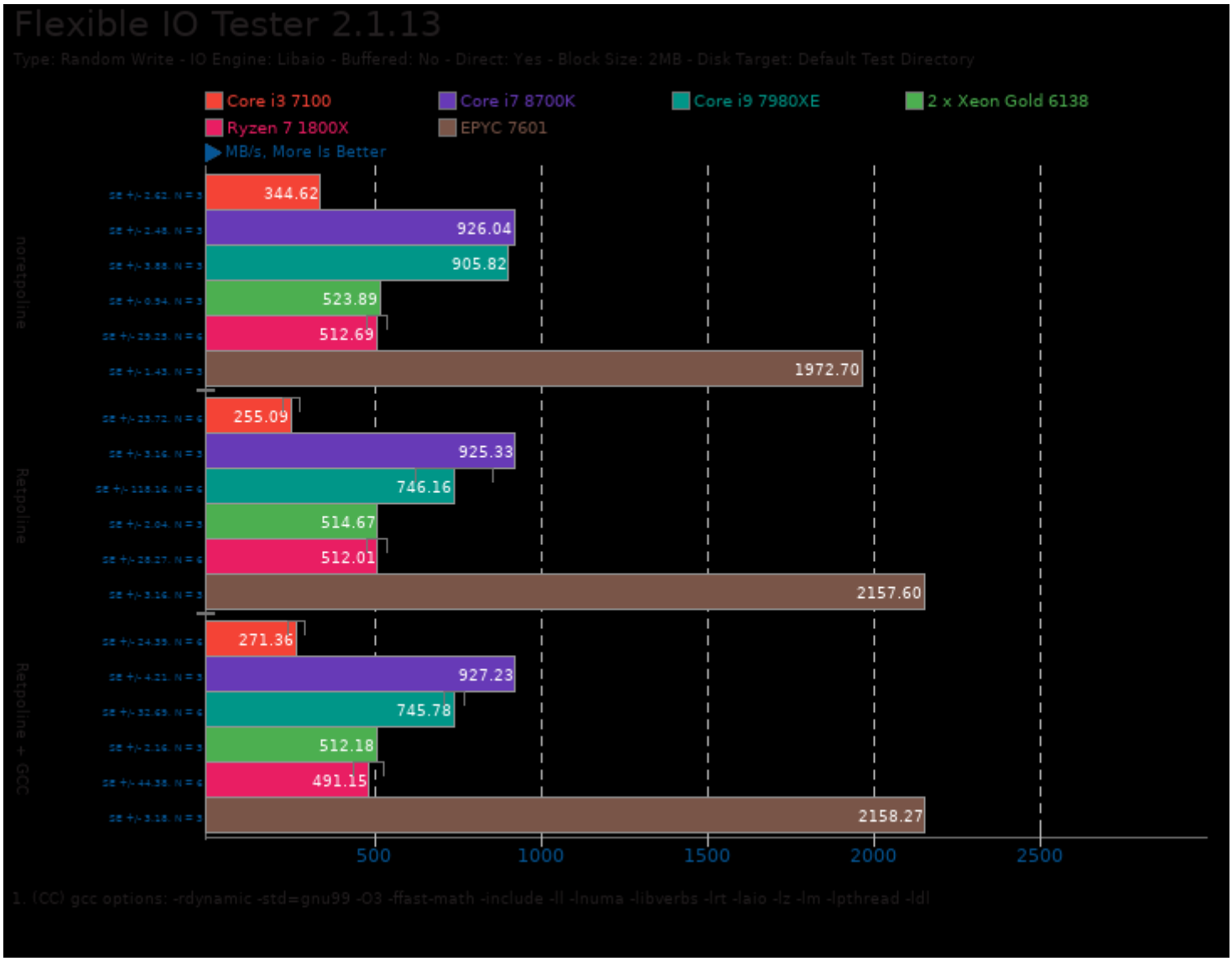
glibc bench - sqrt (nanoseconds)	**16.66**	**16.66**	**16.66**	13.14	13.20	13.13	9.88	11.70	10.17	12.30	9.95	9.96	6.01	6.00	6.00	**4.70**	**4.70**	**4.70**
Normalized	28.21%	28.21%	28.21%	35.77%	35.61%	35.8%	47.57%	40.17%	46.21%	38.21%	47.24%	47.19%	78.2%	78.33%	78.33%	100%	100%	100%
Standard Deviation	0%	0%	0%	0.2%	1%	0%	1.5%	8%	0.8%	0%	15.3%	15.2%	0.1%	0%	0.1%	0%	0%	0%
glibc bench - pthread_once (nanosecon	7.05	**7.25**	7.22	5.56	5.55	5.55	4.58	4.27	4.72	3.87	**3.80**	4.49	6.18	6.18	6.18	4.83	4.83	4.83
Normalized	53.9%	52.41%	52.63%	68.35%	68.47%	68.47%	82.97%	88.99%	80.51%	98.19%	100%	84.63%	61.49%	61.49%	61.49%	78.67%	78.67%	78.67%
Standard Deviation	0.2%	4.4%	5.9%	0.1%	0.2%	0.1%	9.2%	0.7%	0.9%	2.5%	0%	13.1%	0.1%	0.2%	0%	0%	0%	0%
libjpeg-turbo tjbench - D.T (Megapixels/sec)	163.94	162.90	160.73	**197.58**	193.81	194.07	173.39	168.98	171.78	145.81	154.02	146.51	180.44	180.31	180.31	**140.83**	140.99	140.87
Normalized	82.97%	82.45%	81.35%	100%	98.09%	98.22%	87.76%	85.52%	86.94%	73.8%	77.95%	74.15%	91.33%	91.26%	91.26%	71.28%	71.36%	71.3%
Standard Deviation	0.9%	0.7%	2.5%	0.4%	2.4%	1.9%	12.2%	18.2%	17.5%	8.9%	1.4%	10.5%	0.1%	0.2%	0.2%	0.1%	0%	0.1%
Redis - LPOP (Reqs/sec)	3286675	2800940	2186381	**3676579**	2857252	2747637	2838763	2208537	2133849	1423431	1486377	1347143	2273063	1768869	1978009	1520530	1394466	**1230732**
Normalized	89.39%	76.18%	59.47%	100%	77.71%	74.73%	77.21%	60.07%	58.04%	38.72%	40.43%	36.64%	61.83%	48.11%	53.8%	41.36%	37.93%	33.47%
Standard Deviation	1.9%	14.8%	3.1%	5.2%	0.8%	1.4%	3.6%	3.8%	3.2%	6.2%	12.8%	4.6%	1.5%	0.1%	14.5%	0.2%	10.7%	1.6%
Redis - SADD (Reqs/sec)	2496492	2438077	2268956	2910083	**2910646**	2832967	2359719	2304848	2201119	1589704	1573308	1604657	1814326	1818507	1796632	**1233208**	1293173	1249051
Normalized	85.77%	83.76%	77.95%	99.98%	100%	97.33%	81.07%	79.19%	75.62%	54.62%	54.05%	55.13%	62.33%	62.48%	61.73%	42.37%	44.43%	42.91%
Standard Deviation	5.5%	6.5%	7.4%	1.2%	2.1%	0.7%	2.8%	6.5%	5.2%	10.5%	14.8%	9.6%	2.1%	3.4%	1.4%	3.1%	9.8%	1.1%
Redis - LPUSH (Reqs/sec)	2177472	2061932	1934011	**2525458**	2415807	2409704	1988004	1989929	1927608	1357639	1382896	1454926	1543679	1589065	1595789	**1117860**	1147687	1123252
Normalized	86.22%	81.65%	76.58%	100%	95.66%	95.42%	78.72%	78.79%	76.33%	53.76%	54.76%	57.61%	61.12%	62.92%	63.19%	44.26%	45.44%	44.48%
Standard Deviation	1.7%	0.7%	8.4%	1.1%	5.1%	0.6%	4.9%	4.7%	6.2%	10.4%	9%	8.4%	3.5%	0.9%	0.6%	1.3%	0.5%	1%
Redis - GET (Reqs/sec)	2893529	2803262	2663224	**3614658**	3335312	3264656	2314694	2575699	2493721	1627718	1738340	1574731	2180249	2058608	2058836	1394713	1362256	**1352327**
Normalized	80.05%	77.55%	73.68%	100%	92.27%	90.32%	64.04%	71.26%	68.99%	45.03%	48.09%	43.57%	60.32%	56.95%	56.96%	38.58%	37.69%	37.41%
Standard Deviation	12.2%	5.6%	3.4%	0.9%	3%	1%	37.2%	4.9%	3.1%	7.7%	13.6%	12.6%	0.3%	3.8%	3%	0.4%	3.5%	5.1%

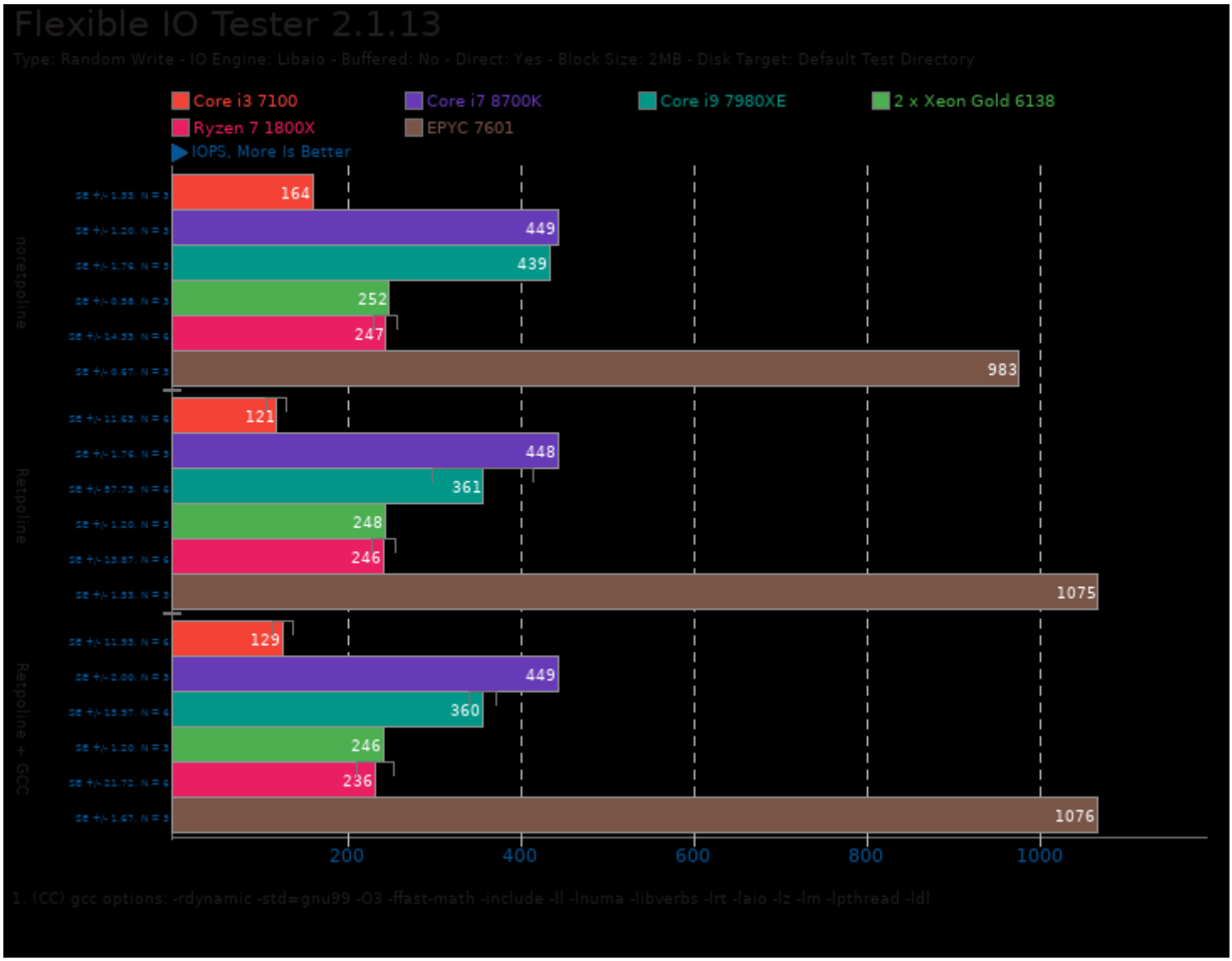
Linux Retpoline Spectre Security Benchmark

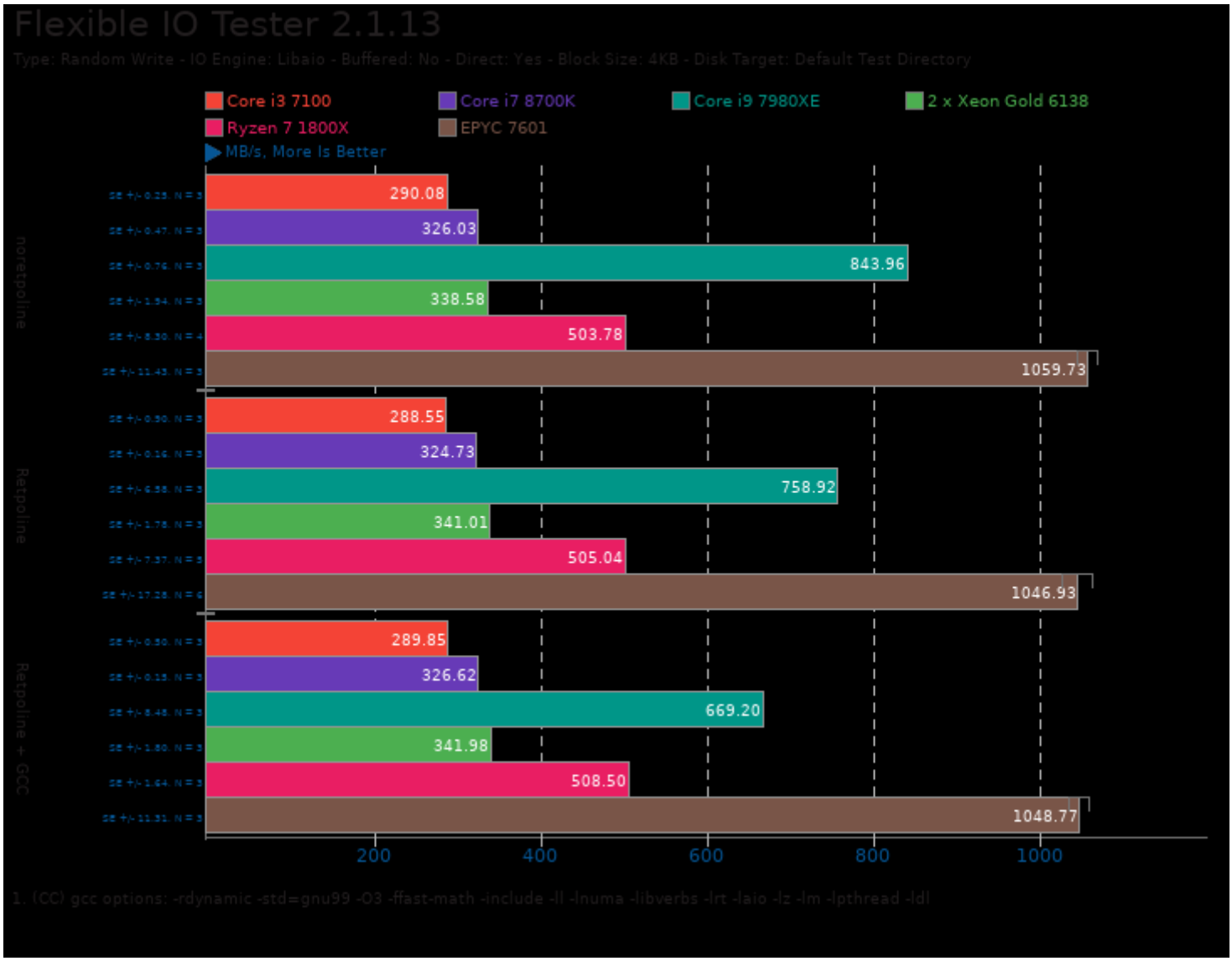
Redis - SET (Reqs/sec)	2221862	2150241	1998048	2622442	**2624828**	2508928	2089420	2153718	1980559	1564339	1525833	1399642	1651235	1634375	1637684	**1131890**	1161528	1162400
Normalized	84.65%	81.92%	76.12%	99.91%	100%	95.58%	79.6%	82.05%	75.45%	59.6%	58.13%	53.32%	62.91%	62.27%	62.39%	43.12%	44.25%	44.28%
Standard Deviation	3%	3%	9.3%	0.6%	0.9%	1.8%	1.4%	3.4%	7.7%	3.1%	14.5%	9.8%	1.2%	1.9%	1.1%	5.8%	1.1%	0.9%
PyBench - T.F.A.T.T (Milliseconds)	1237	1237	1241	1028	1027	**1026**	1107	1092	1053	1307	1306	1315	1400	1400	1400	1794	**1801**	1795
Normalized	82.94%	82.94%	82.68%	99.81%	99.9%	100%	92.68%	93.96%	97.44%	78.5%	78.56%	78.02%	73.29%	73.29%	73.29%	57.19%	56.97%	57.16%
Standard Deviation	0.1%	0.3%	0.3%	0.4%	0.2%	0.1%		2%	0.3%	0.2%	0.2%		0.2%			0.8%	1.1%	
Apache Benchmark - S.W.P.S (Reqs/sec)	33831	33820	30812	45692	**46364**	41187	38830	38598	35290	22259	21348	18758	31924	31913	30677	**16587**	16839	16716
Normalized	72.97%	72.94%	66.46%	98.55%	100%	88.83%	83.75%	83.25%	76.12%	48.01%	46.04%	40.46%	68.85%	68.83%	66.17%	35.78%	36.32%	36.05%
Standard Deviation	0.4%	0.3%	0.5%	0.5%	0.3%	0.2%	1.6%	3%	3.2%	1.1%	0.5%	0.5%	0.3%	0.6%	0.6%	0.4%	1%	3.1%
Scikit-Learn (sec)	151.60	151.42	151.14	127.00	127.08	127.32	154.26	158.46	156.31	184.75	185.68	**186.08**	113.87	113.29	113.28	34.00	**33.91**	34.47
Normalized	22.37%	22.39%	22.44%	26.7%	26.68%	26.63%	21.98%	21.4%	21.69%	18.35%	18.26%	18.22%	29.78%	29.93%	29.93%	99.74%	100%	98.38%
Standard Deviation	0.1%	0%	0.1%	0.1%	0.1%	0.2%	0.9%	1.4%	3.2%	0.9%	0.3%	2.4%	0.8%	0.1%	0.1%	0.3%	0.1%	2.4%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only	60804	60854	**59556**	195245	197404	193302	541953	535381	530652	**599258**	597483	577642	176327	176632	175544			
Normalized	10.15%	10.15%	9.94%	32.58%	32.94%	32.26%	90.44%	89.34%	88.55%	100%	99.7%	96.39%	29.42%	29.48%	29.29%			
Standard Deviation	0.4%	0.4%	0.2%	0.4%	0.7%	0.4%	0.7%	0.7%	0.3%	0.8%	0.5%	1.3%	0.3%	0.7%	0.5%			
PostgreSQL pgbench - Buffer Test - Normal Load - Read Write	5692	5822	5744	4595	4494	4536	7051	**12110**	11742	**2137**	2467	3976	11841	12068	12076			
Normalized	47%	48.08%	47.43%	37.95%	37.11%	37.45%	58.22%	100%	96.96%	17.64%	20.37%	32.83%	97.78%	99.65%	99.72%			
Standard Deviation	3.4%	0.3%	2.6%	2.4%	1.7%	1.3%	3.3%	1.7%	3.5%	3.2%	4.9%	0.7%	8.2%	8.8%	8.8%			

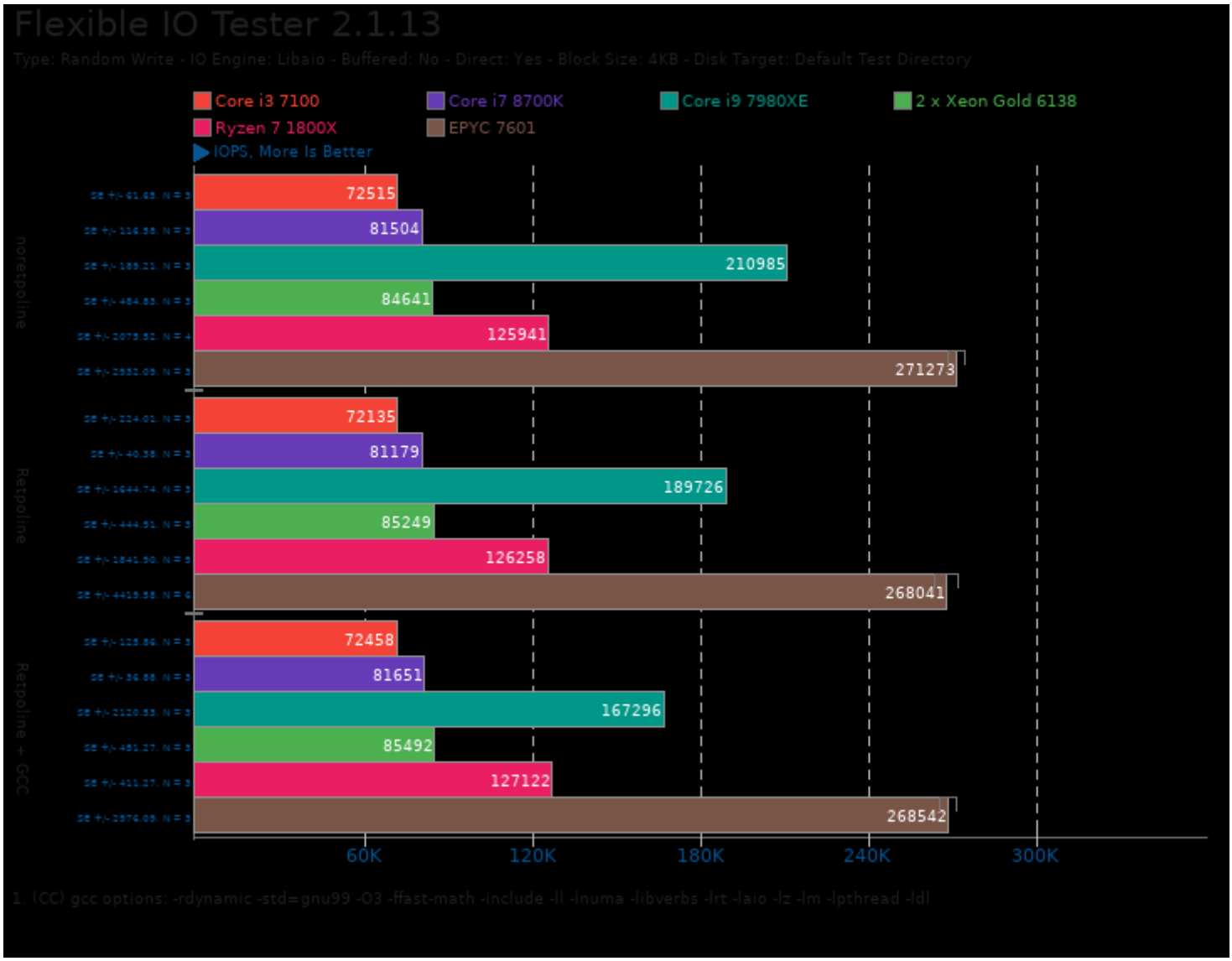

Flexible IO Tester 2.1.13
Type: Random Read - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
298.93
777.17
586.09
383.14
286.45
1176.20
293.00
775.35
387.73
384.79
184.88
1165.97
293.76
776.94
376.78
388.19
178.94
1128.57
300
600
900
1200
1500
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

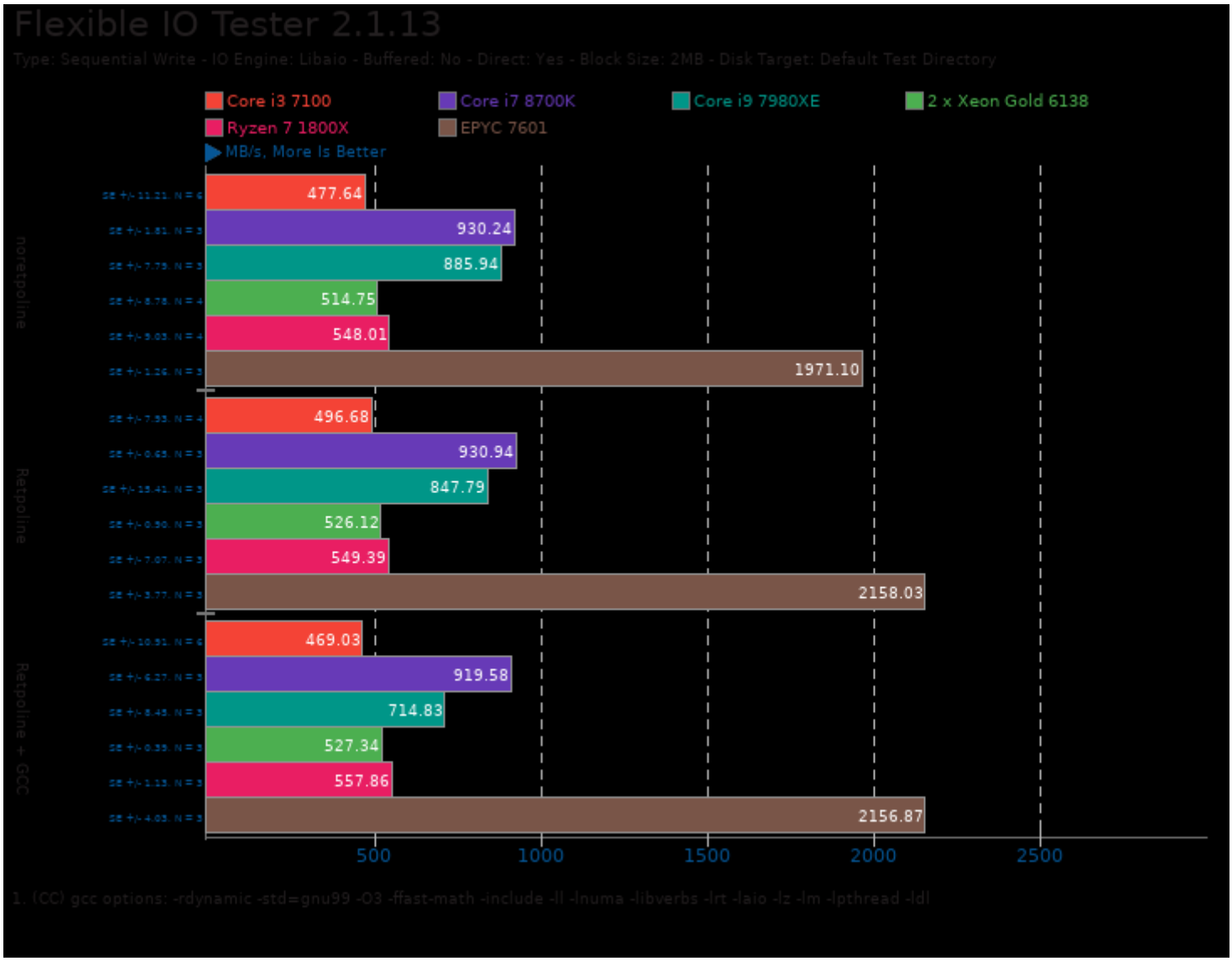

Flexible IO Tester 2.1.13
Type: Random Read - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
IOPS, More Is Better
74729
194289
146520
95782
71610
301037
73245
193833
96930
96194
46216
298428
73437
194232
94191
97043
44732
288951
60K
120K
180K
240K
300K
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

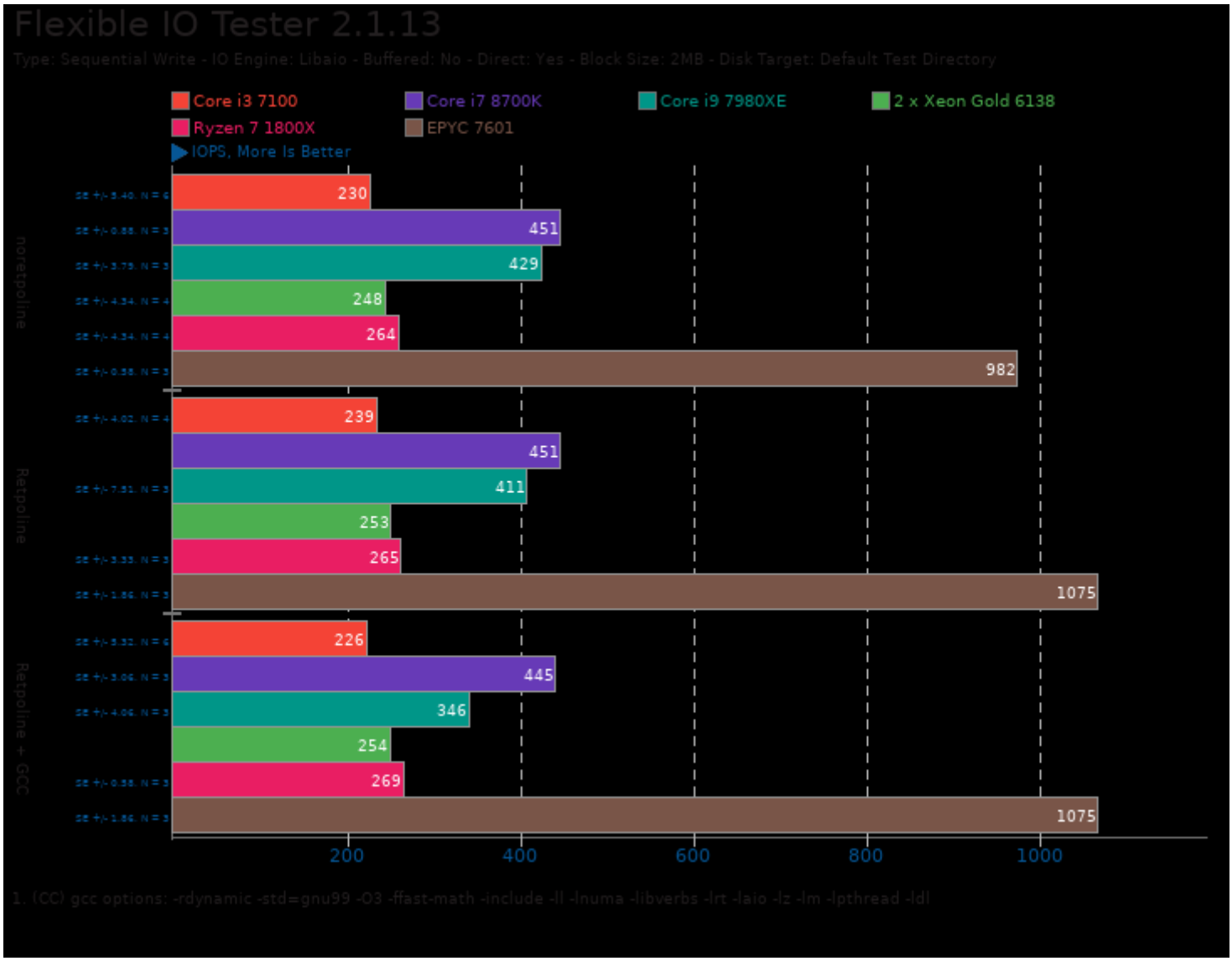

Flexible IO Tester 2.1.13
Type: Random Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 2MB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
344.62
926.04
905.82
523.89
512.69
1972.70
255.09
925.33
746.16
514.67
512.01
2157.60
271.36
927.23
745.78
512.18
491.15
2158.27
500
1000
1500
2000
2500
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

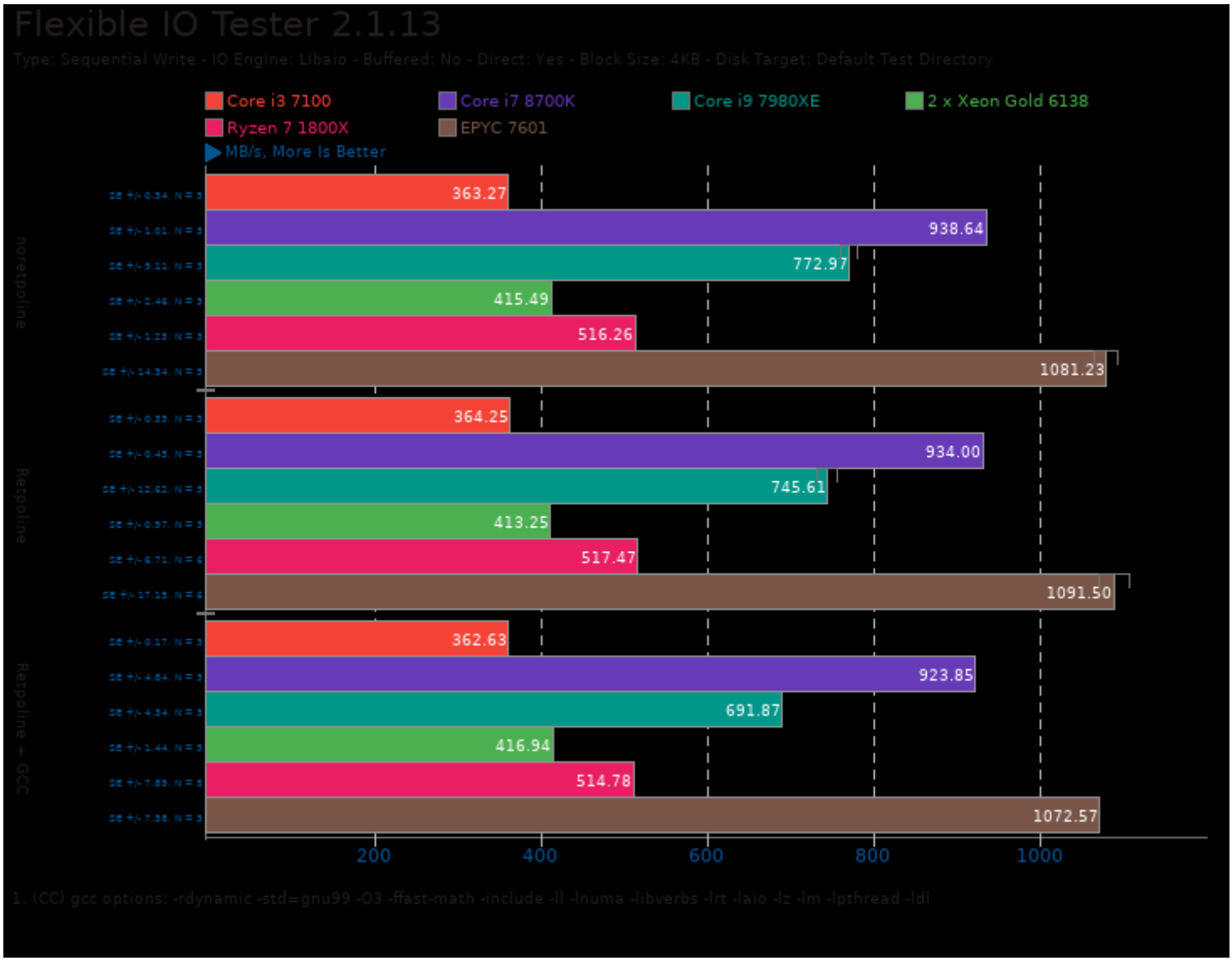

Flexible IO Tester 2.1.13
Type: Random Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 2MB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
IOPS, More Is Better
164
449
439
252
247
983
121
448
361
248
246
1075
129
449
360
246
236
1076
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

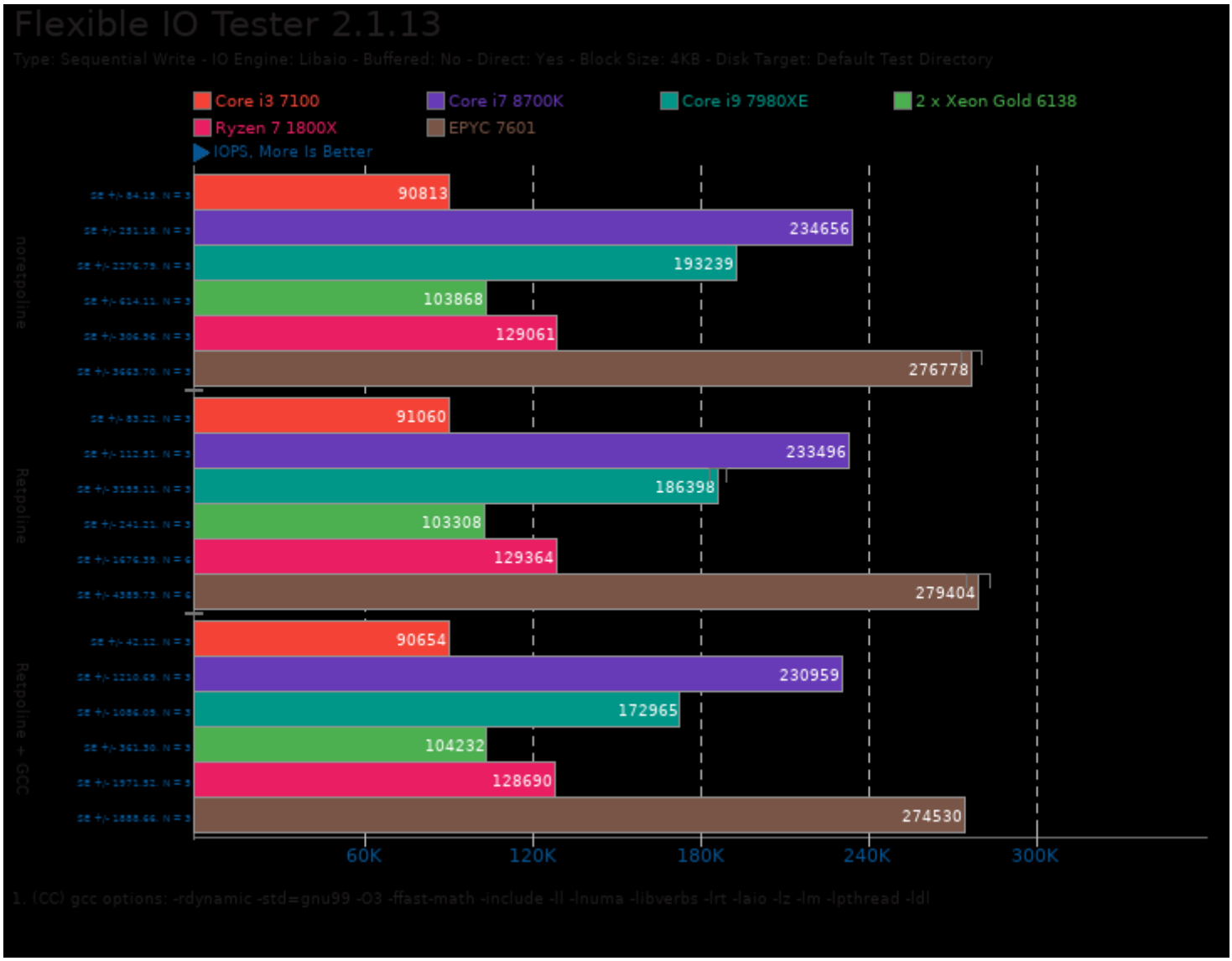

Flexible IO Tester 2.1.13
Type: Random Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
290.08
326.03
843.96
338.58
503.78
1059.73
288.55
324.73
758.92
341.01
505.04
1046.93
289.85
326.62
669.20
341.98
508.50
1048.77
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

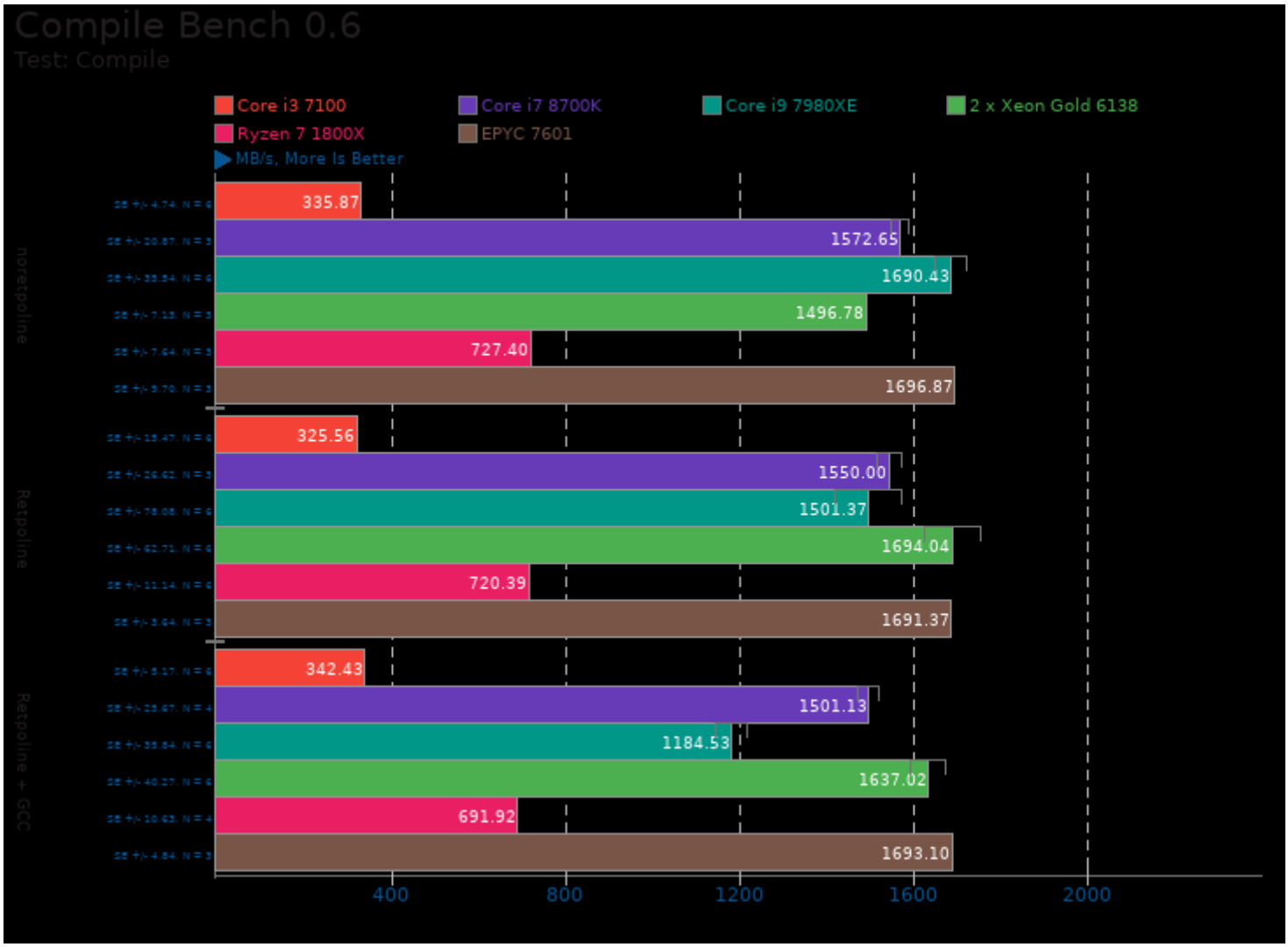

Flexible IO Tester 2.1.13
Type: Random Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
IOPS, More Is Better
noretpoline
Retpoline
Retpoline + GCC
72515
81504
210985
84641
125941
271273
72135
81179
189726
85249
126258
268041
72458
81651
167296
85492
127122
268542
60K
120K
180K
240K
300K
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl


Flexible IO Tester 2.1.13
Type: Sequential Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 2MB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
477.64
930.24
885.94
514.75
548.01
1971.10
496.68
930.94
847.79
526.12
549.39
2158.03
469.03
919.58
714.83
527.34
557.86
2156.87
500
1000
1500
2000
2500
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

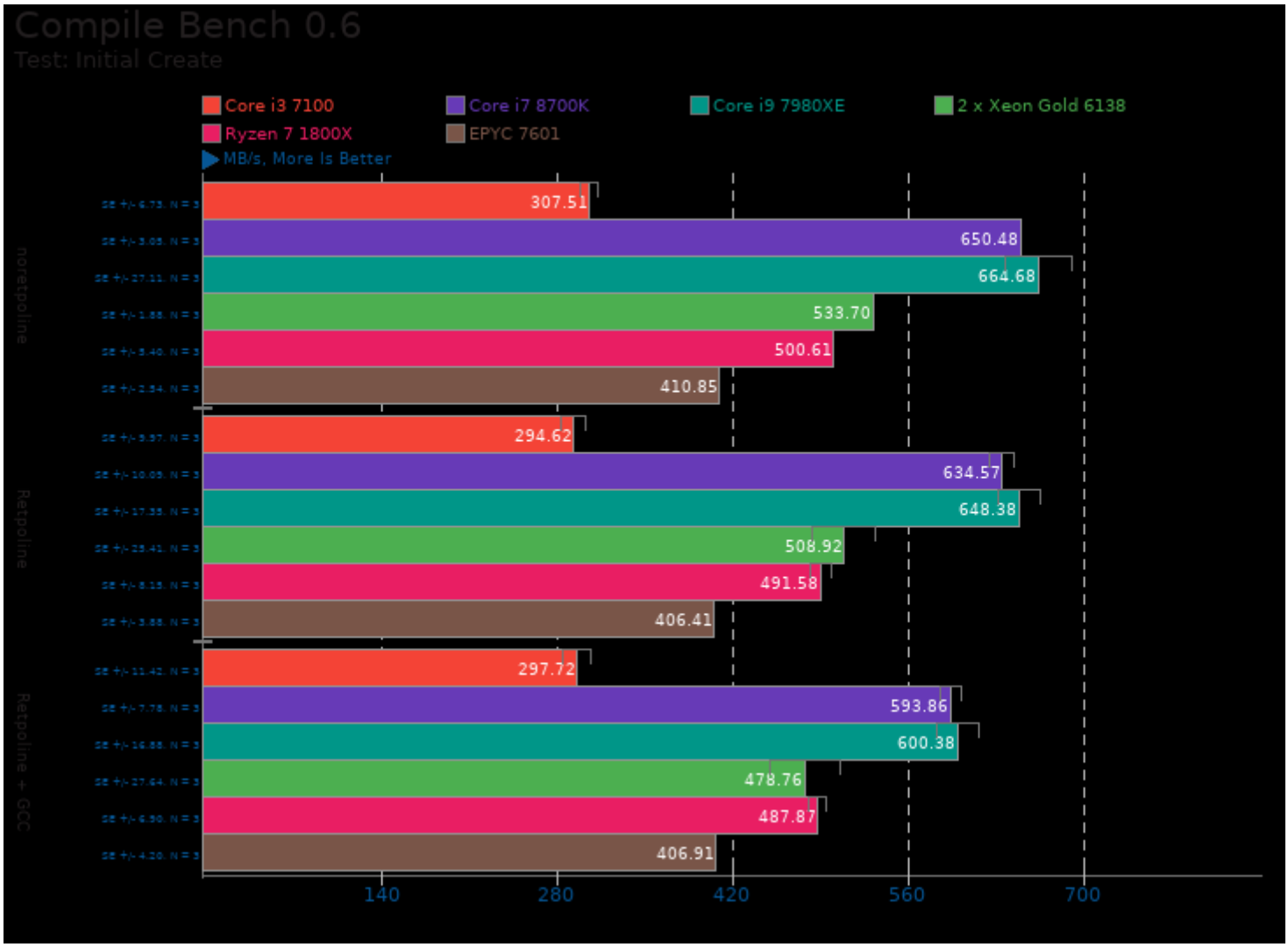

Flexible IO Tester 2.1.13
Type: Sequential Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 2MB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
IOPS, More Is Better
noretpoline
Retpoline
Retpoline + GCC
230
451
429
248
264
982
239
451
411
253
265
1075
226
445
346
254
269
1075
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl


Flexible IO Tester 2.1.13
Type: Sequential Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
363.27
938.64
772.97
415.49
516.26
1081.23
364.25
934.00
745.61
413.25
517.47
1091.50
362.63
923.85
691.87
416.94
514.78
1072.57
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl

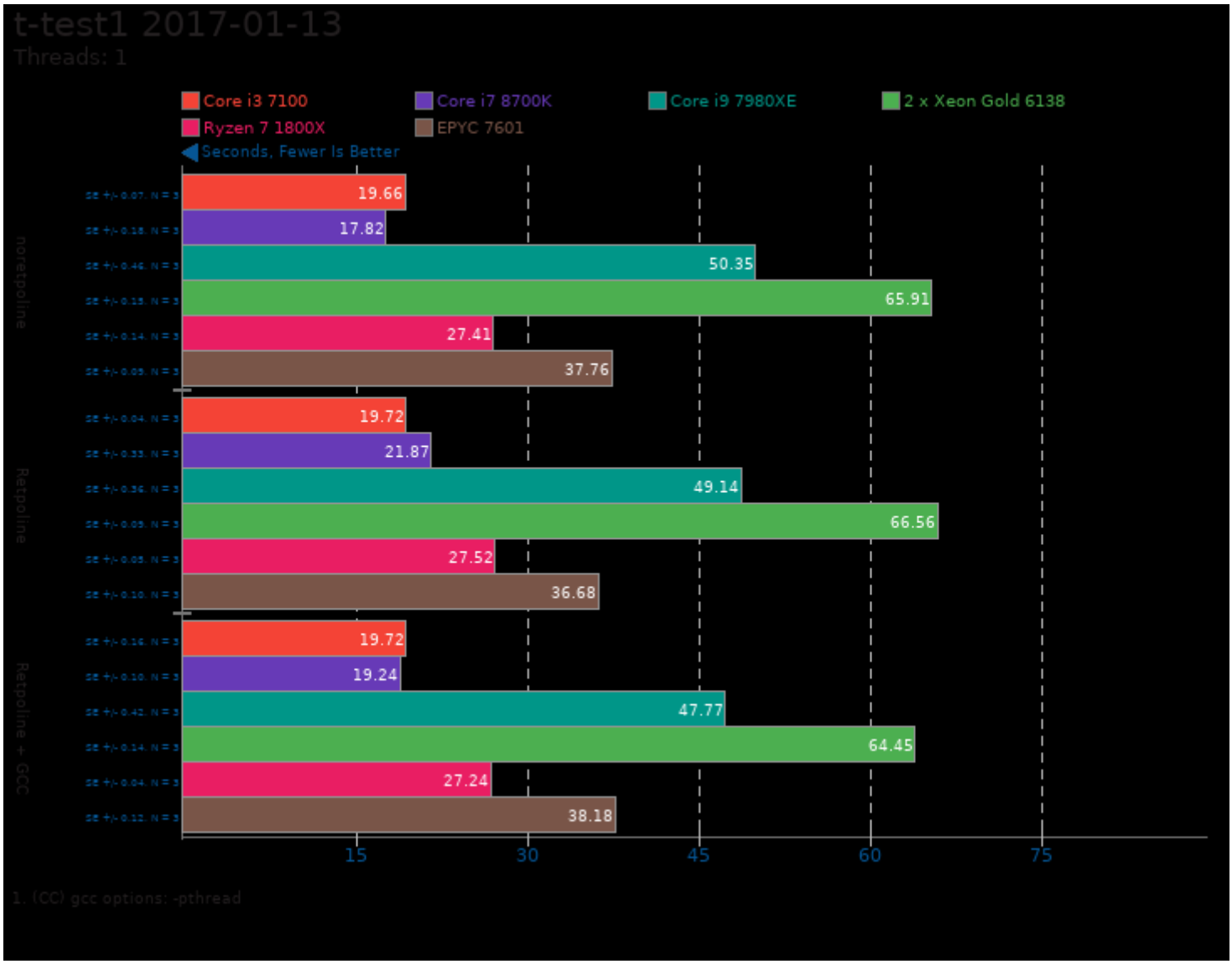

Flexible IO Tester 2.1.13
Type: Sequential Write - IO Engine: Libaio - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
IOPS, More Is Better
noretpoline
Retpoline
Retpoline + GCC
90813
234656
193239
103868
129061
276778
91060
233496
186398
103308
129364
279404
90654
230959
172965
104232
128690
274530
60K
120K
180K
240K
300K
1. (CC) gcc options: -rdynamic -std=gnu99 -O3 -ffast-math -include -ll -lnuma -libverbs -lrt -laio -lz -lm -lpthread -ldl


Compile Bench 0.6
Test: Compile
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
335.87
1572.65
1690.43
1496.78
727.40
1696.87
325.56
1550.00
1501.37
1694.04
720.39
1691.37
342.43
1501.13
1184.53
1637.02
691.92
1693.10
400
800
1200
1600
2000

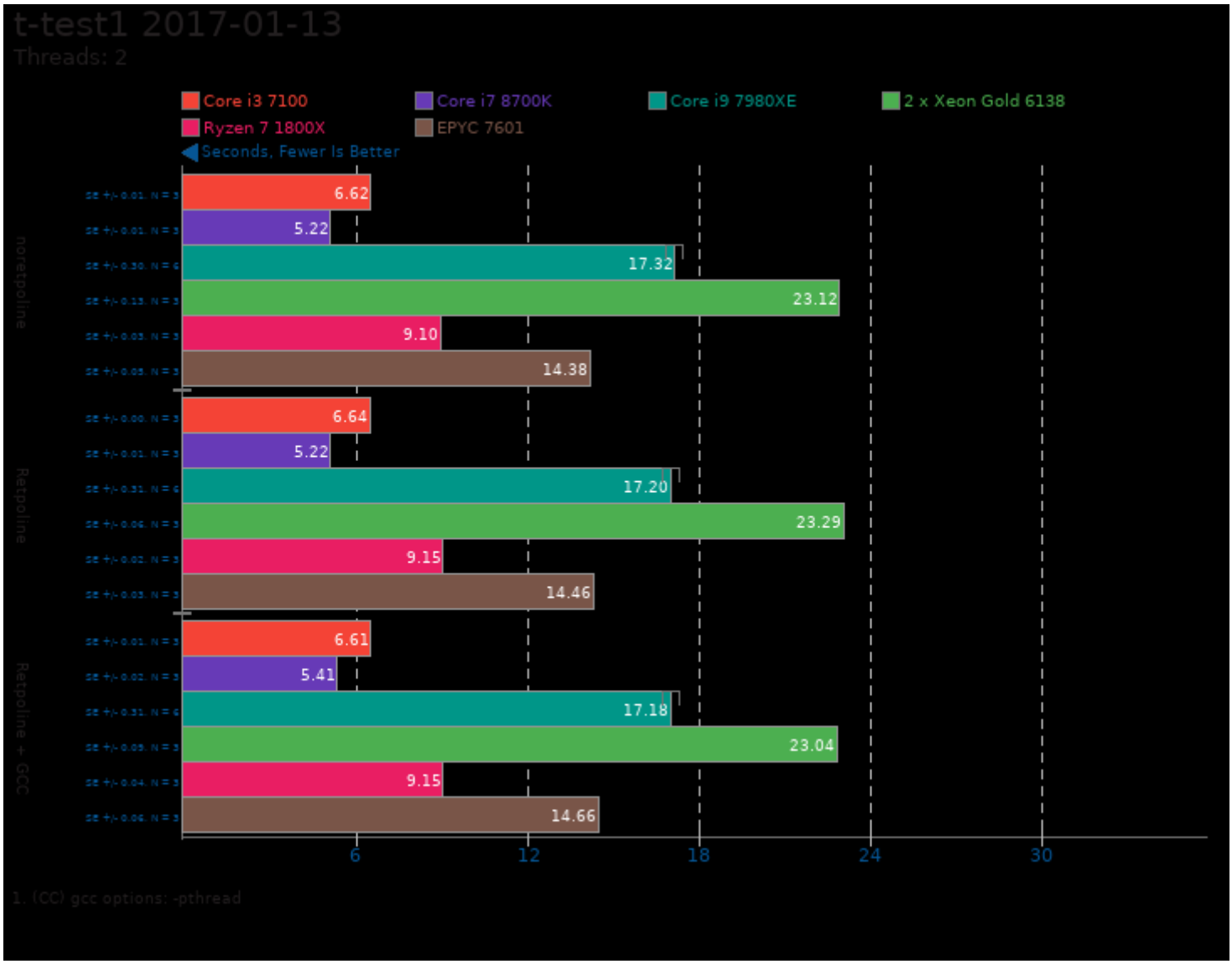
Linux Retpoline Spectre Security Benchmark



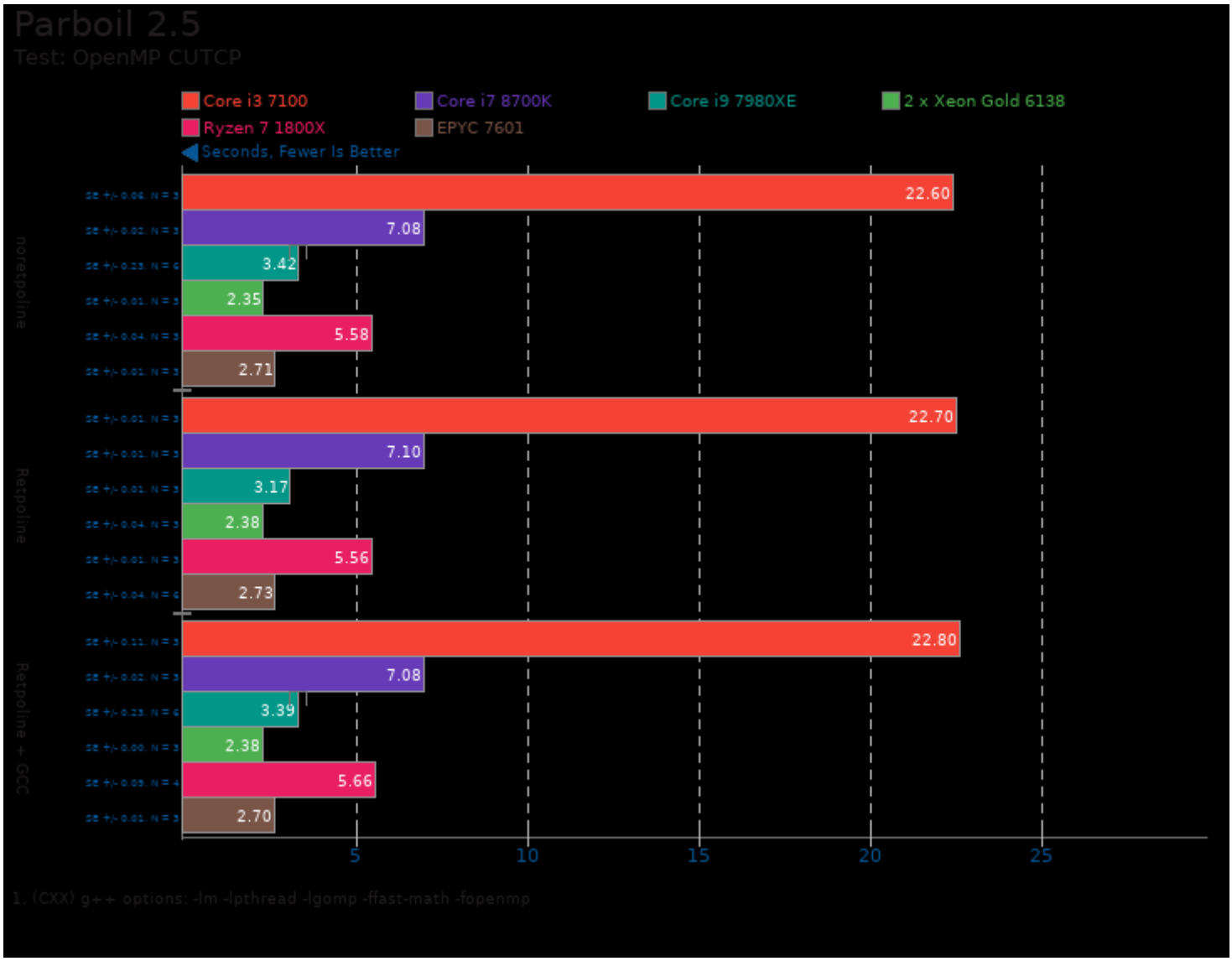
Linux Retpoline Spectre Security Benchmark



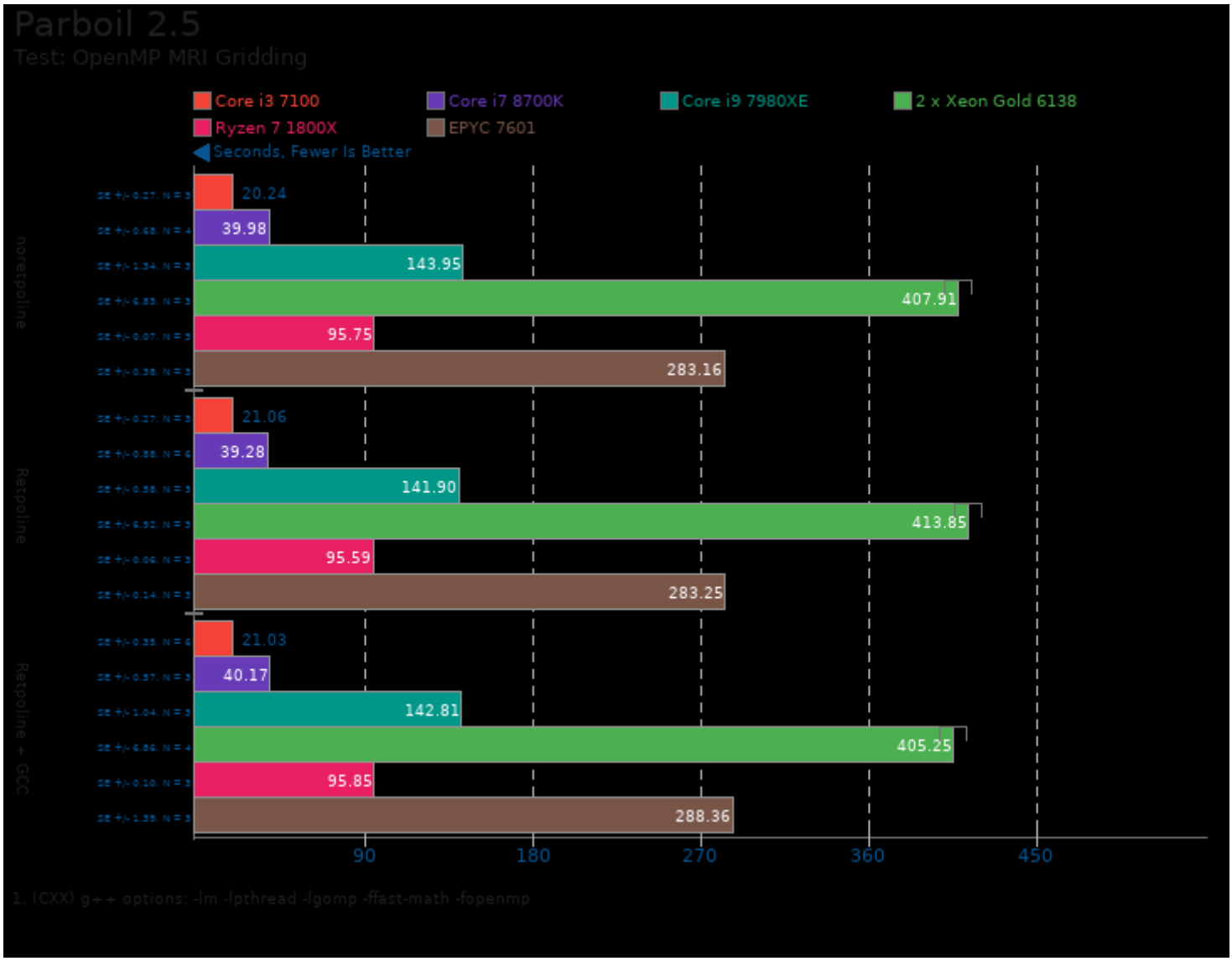
Linux Retpoline Spectre Security Benchmark

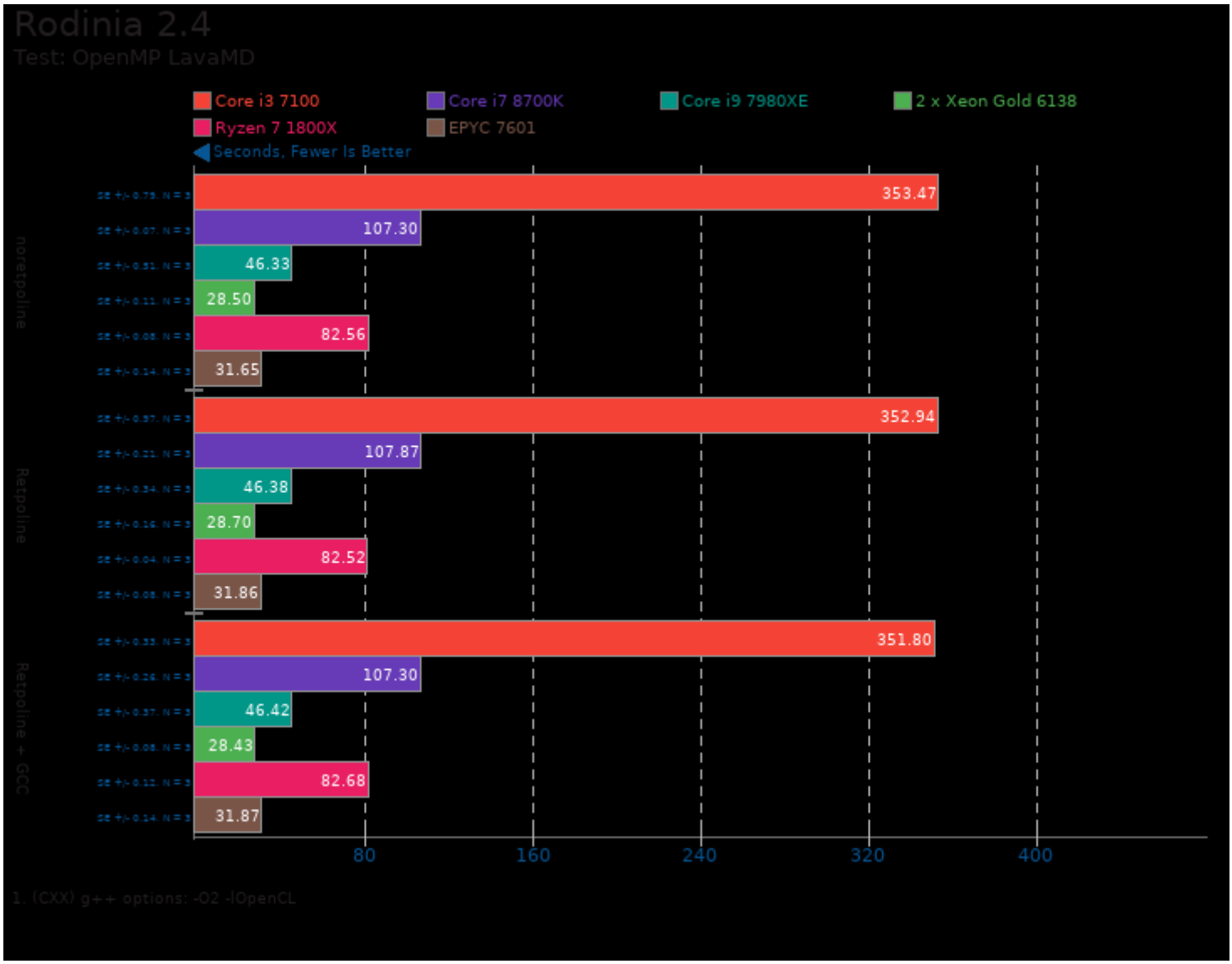


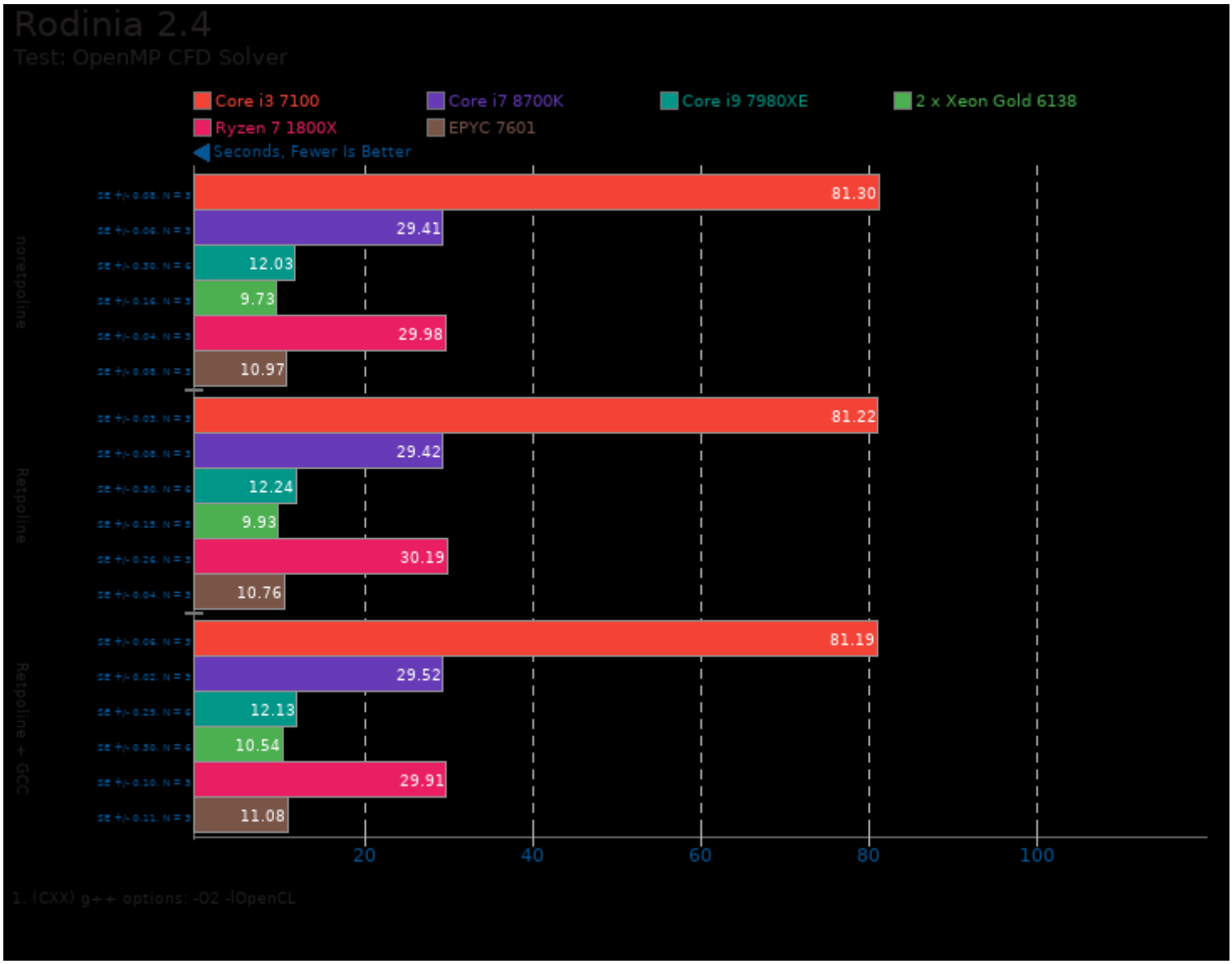
Linux Retpoline Spectre Security Benchmark

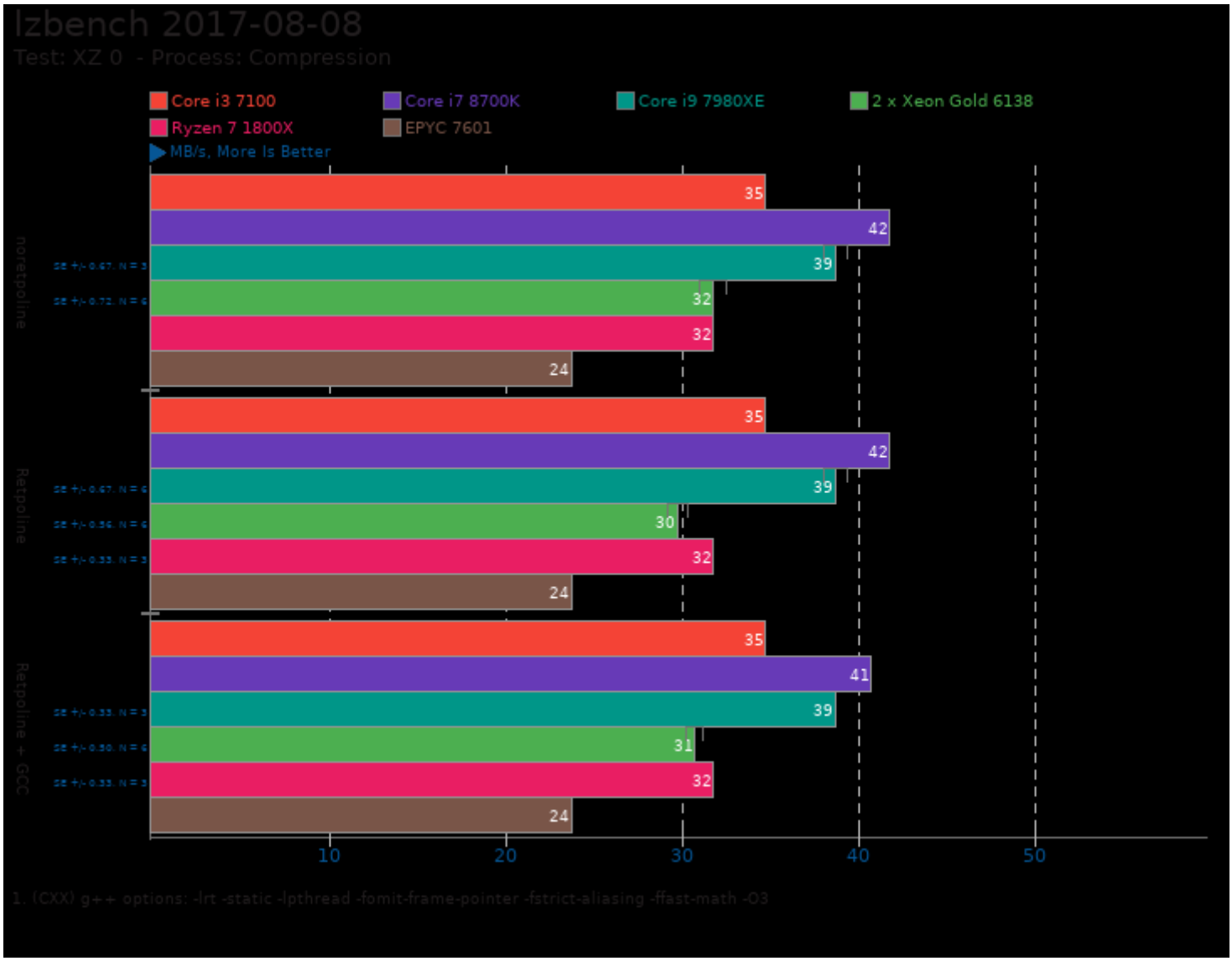


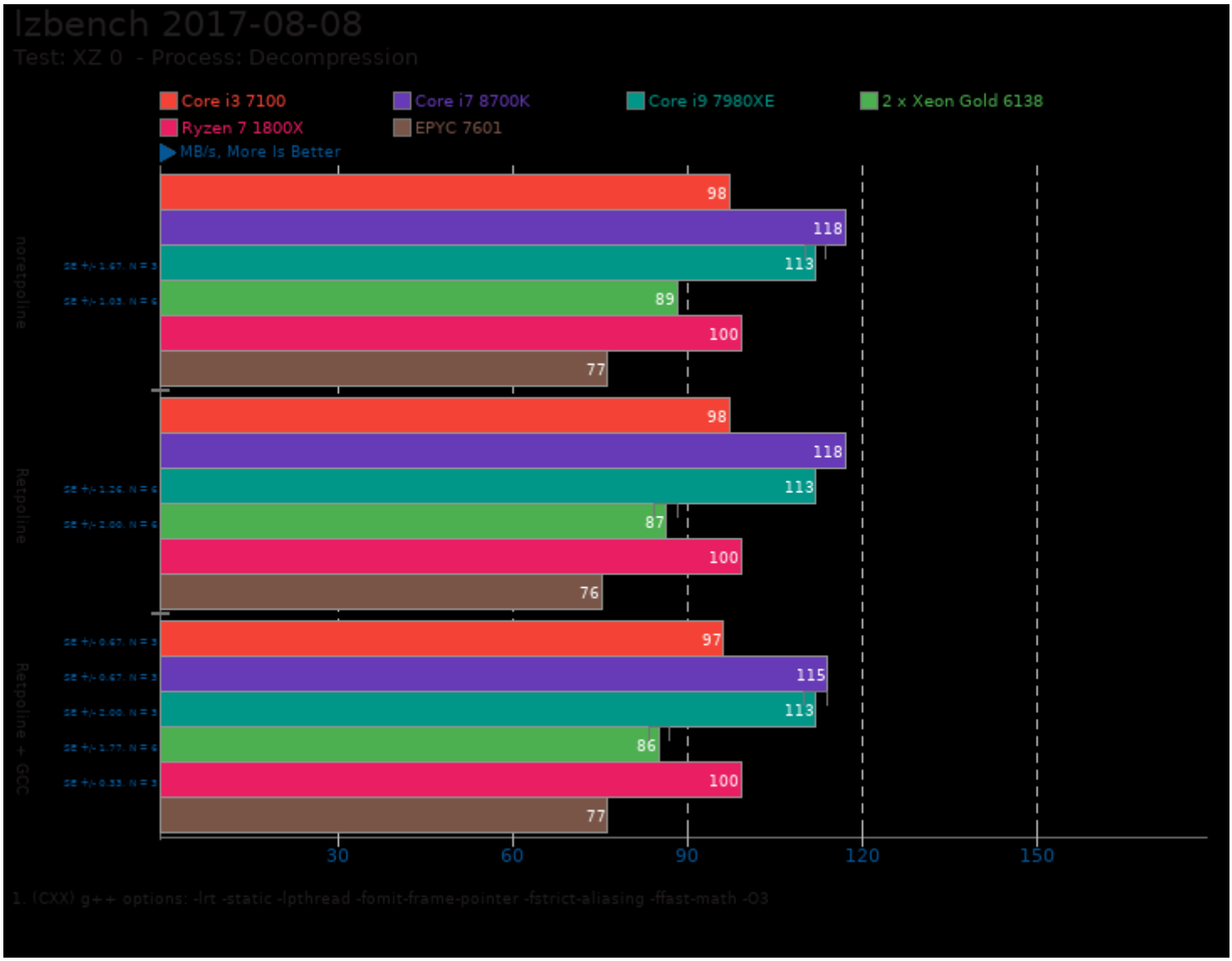
Linux Retpoline Spectre Security Benchmark



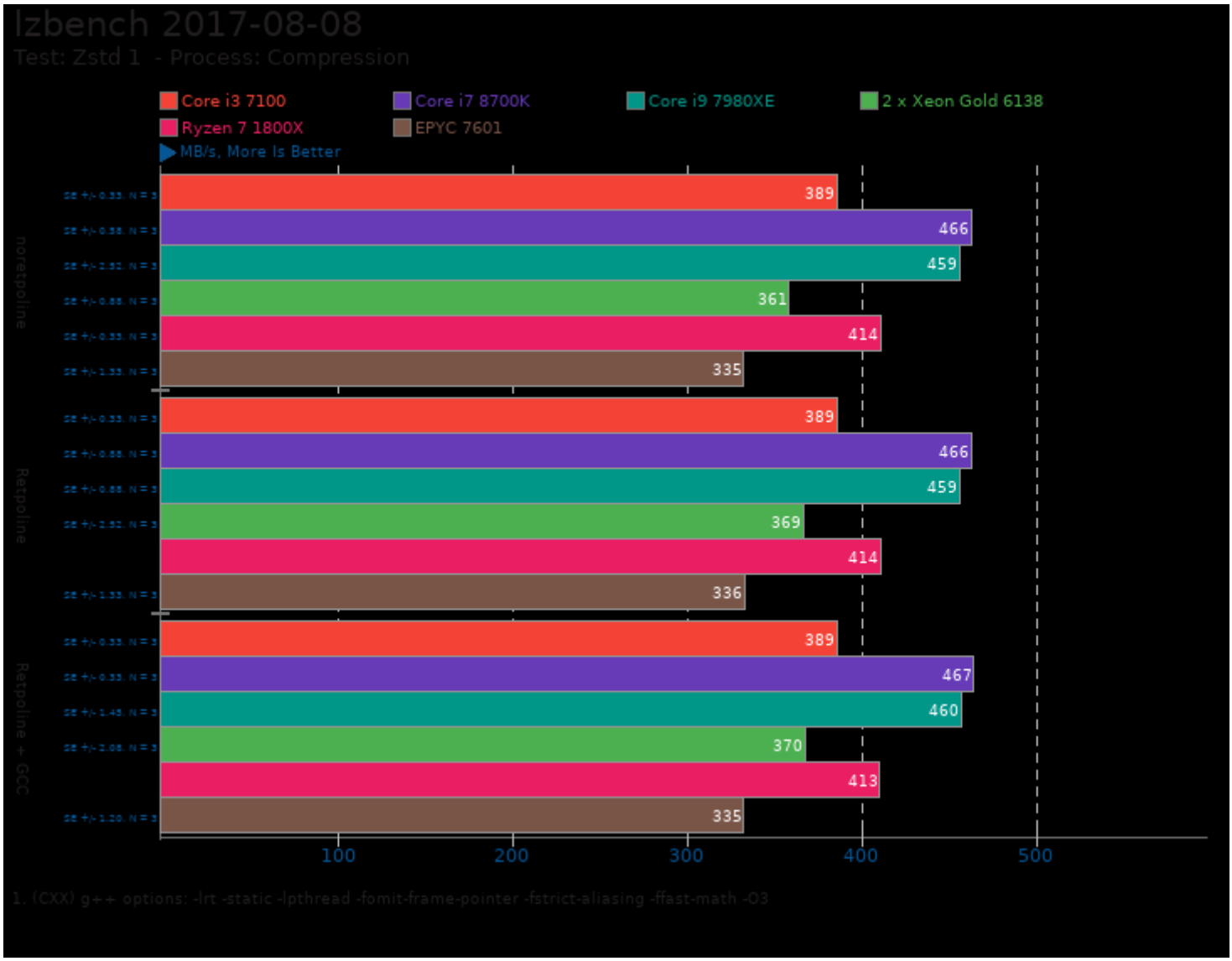

Rodinia 2.4
Test: OpenMP LavaMD
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Seconds, Fewer Is Better
353.47
107.30
46.33
28.50
82.56
31.65
352.94
107.87
46.38
28.70
82.52
31.86
351.80
107.30
46.42
28.43
82.68
31.87
80
160
240
320
400
1. (CXX) g++ options: -O2 -lOpenCL

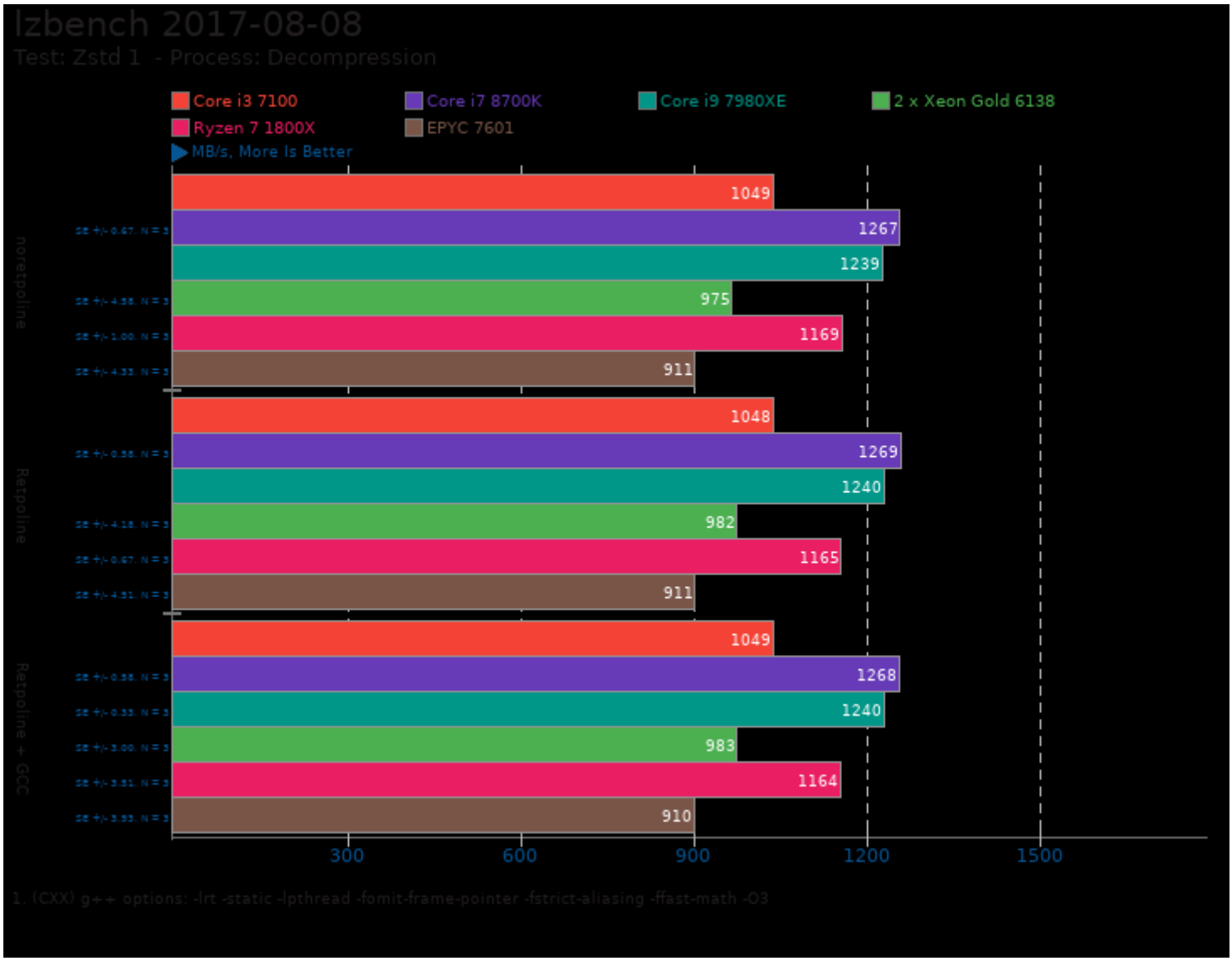

Rodinia 2.4
Test: OpenMP CFD Solver
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Seconds, Fewer Is Better
noretpoline
Retpoline
Retpoline + GCC
81.30
29.41
12.03
9.73
29.98
10.97
81.22
29.42
12.24
9.93
30.19
10.76
81.19
29.52
12.13
10.54
29.91
11.08
20
40
60
80
100
1. (CXX) g++ options: -O2 -lOpenCL

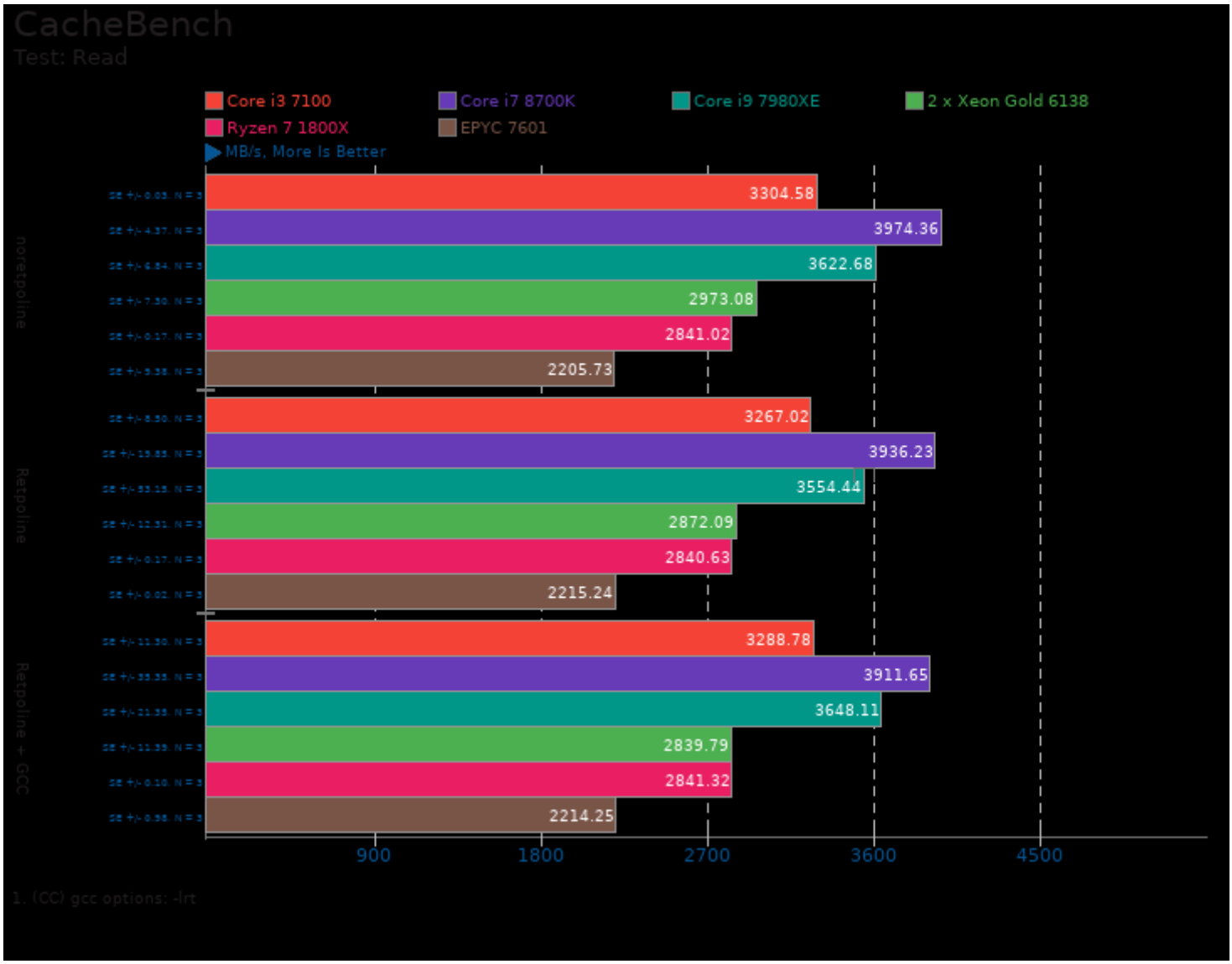

lzbench 2017-08-08
Test: XZ 0 - Process: Compression
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
35
42
39
32
32
24
35
42
39
30
32
24
35
41
39
31
32
24
10
20
30
40
50
1. (CXX) g++ options: -lrt -static -lpthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3


lzbench 2017-08-08
Test: XZ 0 - Process: Decompression
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
98
118
113
89
100
77
98
118
113
87
100
76
97
115
113
86
100
77
30
60
90
120
150
1. (CXX) g++ options: -lrt -static -lpthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

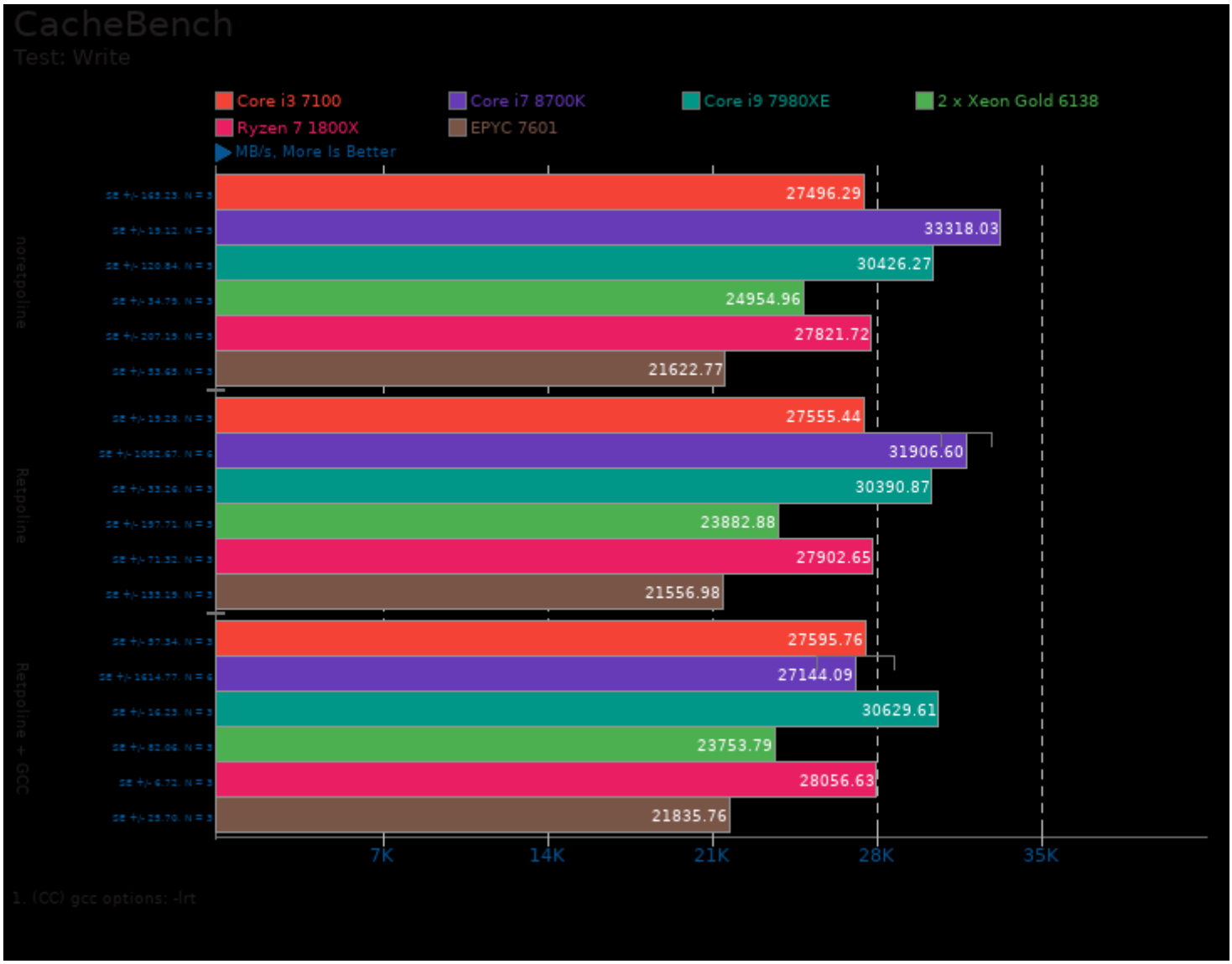
Linux Retpoline Spectre Security Benchmark



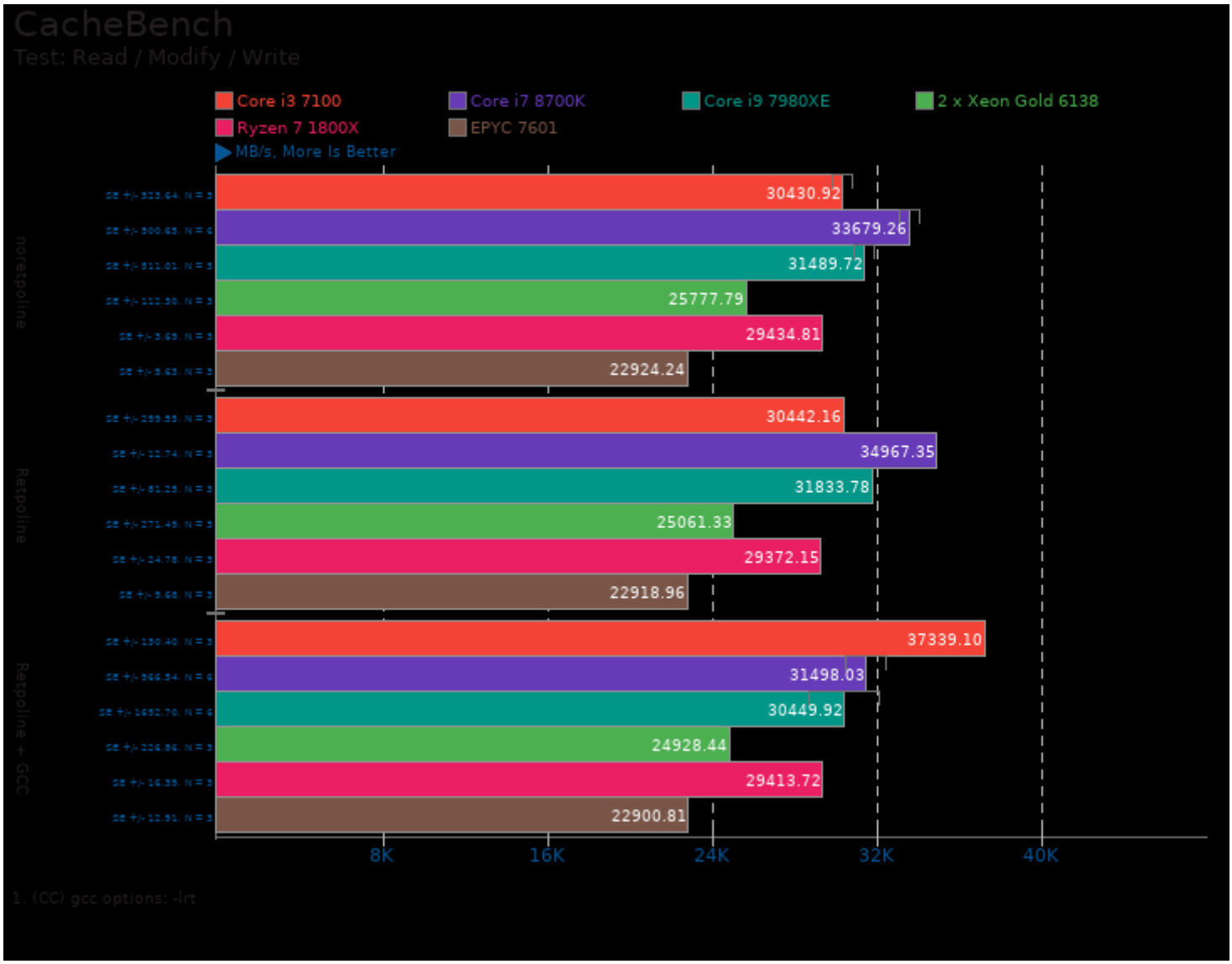

lzbench 2017-08-08
Test: Zstd 1 - Process: Decompression
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
1049
1267
1239
975
1169
911
1048
1269
1240
982
1165
911
1049
1268
1240
983
1164
910
300
600
900
1200
1500
1. (CXX) g++ options: -lrt -static -lpthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

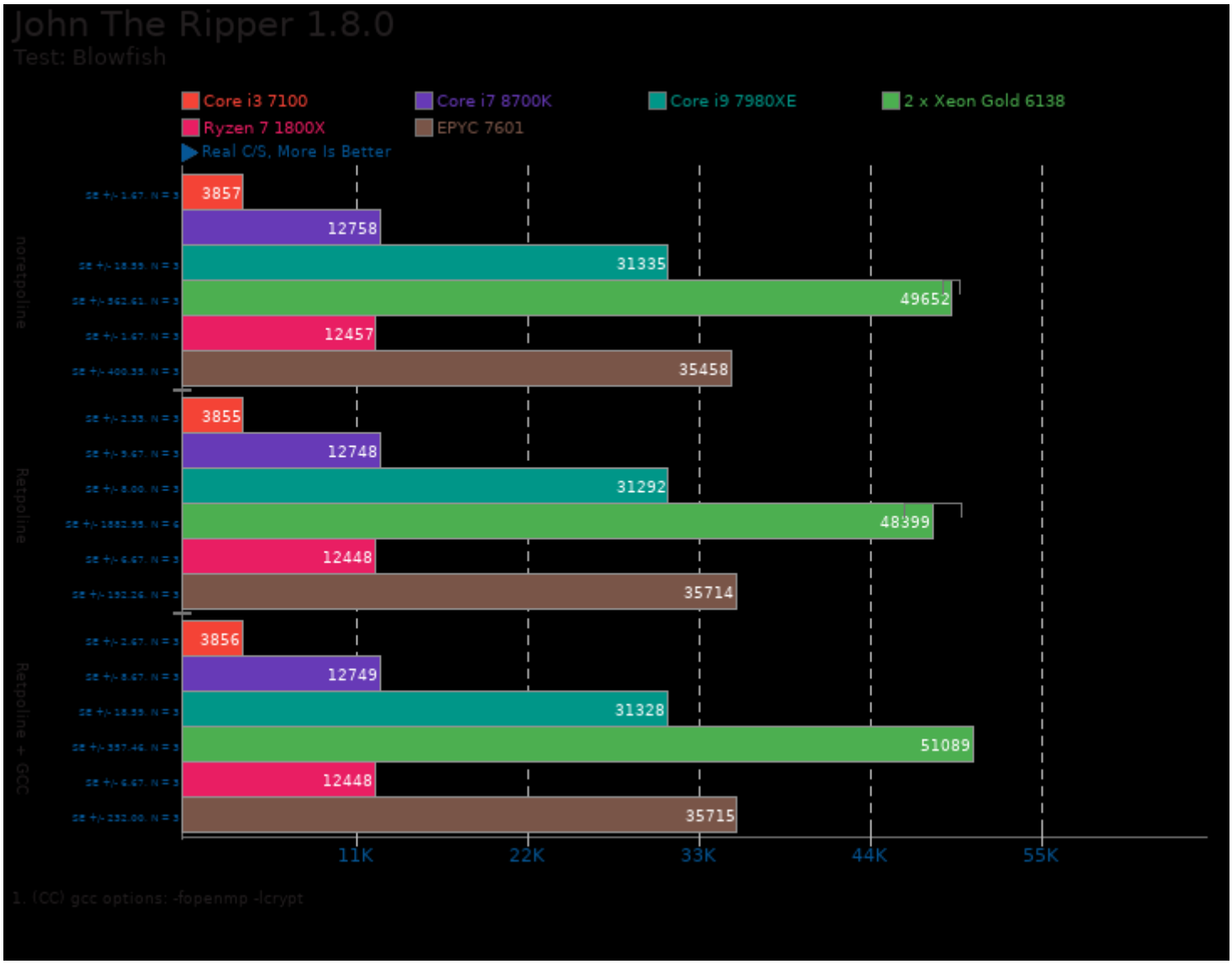

CacheBench
Test: Read
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
MB/s, More Is Better
noretpoline
Retpoline
Retpoline + GCC
3304.58
3974.36
3622.68
2973.08
2841.02
2205.73
3267.02
3936.23
3554.44
2872.09
2840.63
2215.24
3288.78
3911.65
3648.11
2839.79
2841.32
2214.25
900
1800
2700
3600
4500
1. (CC) gcc options: -lrt

Linux Retpoline Spectre Security Benchmark

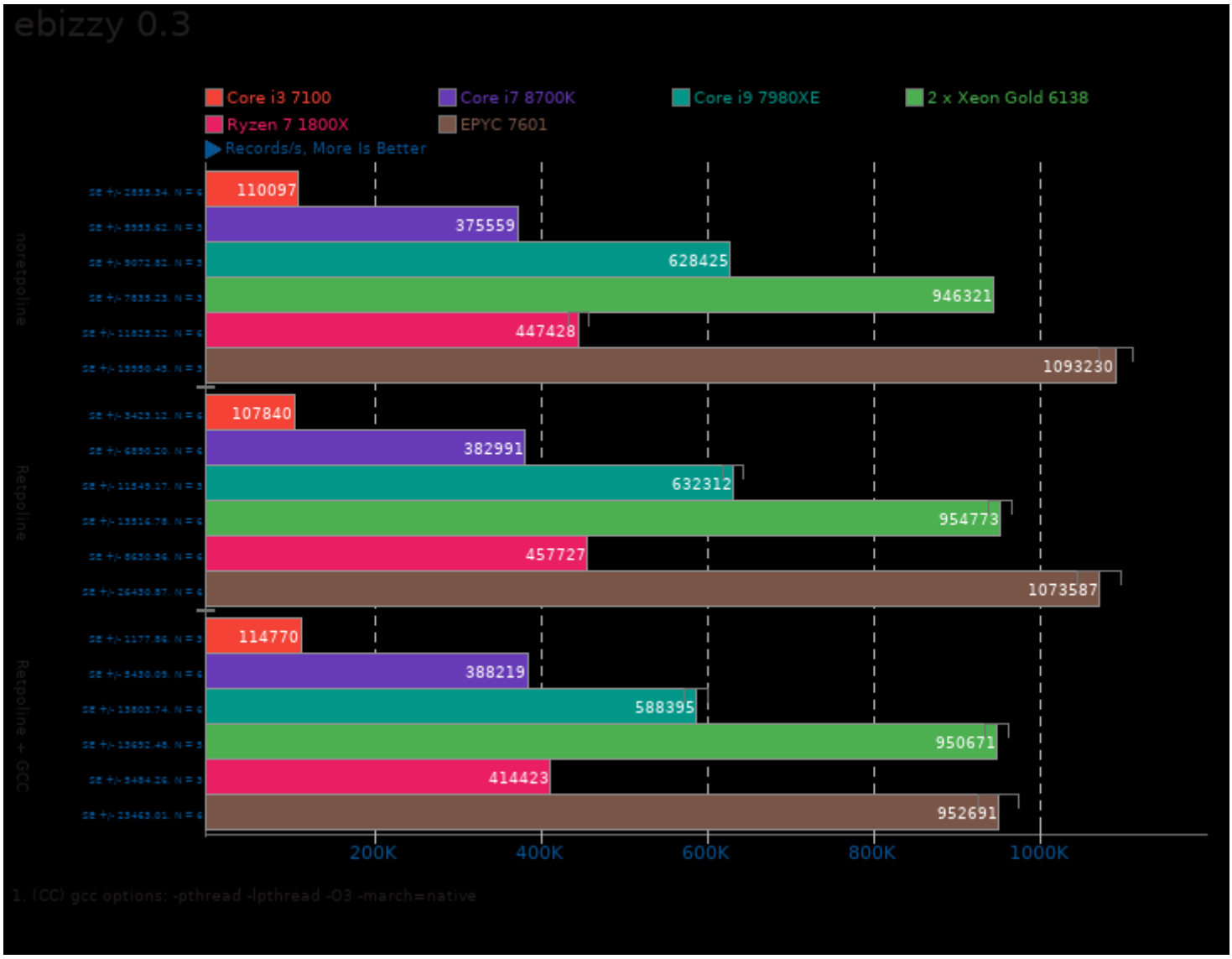


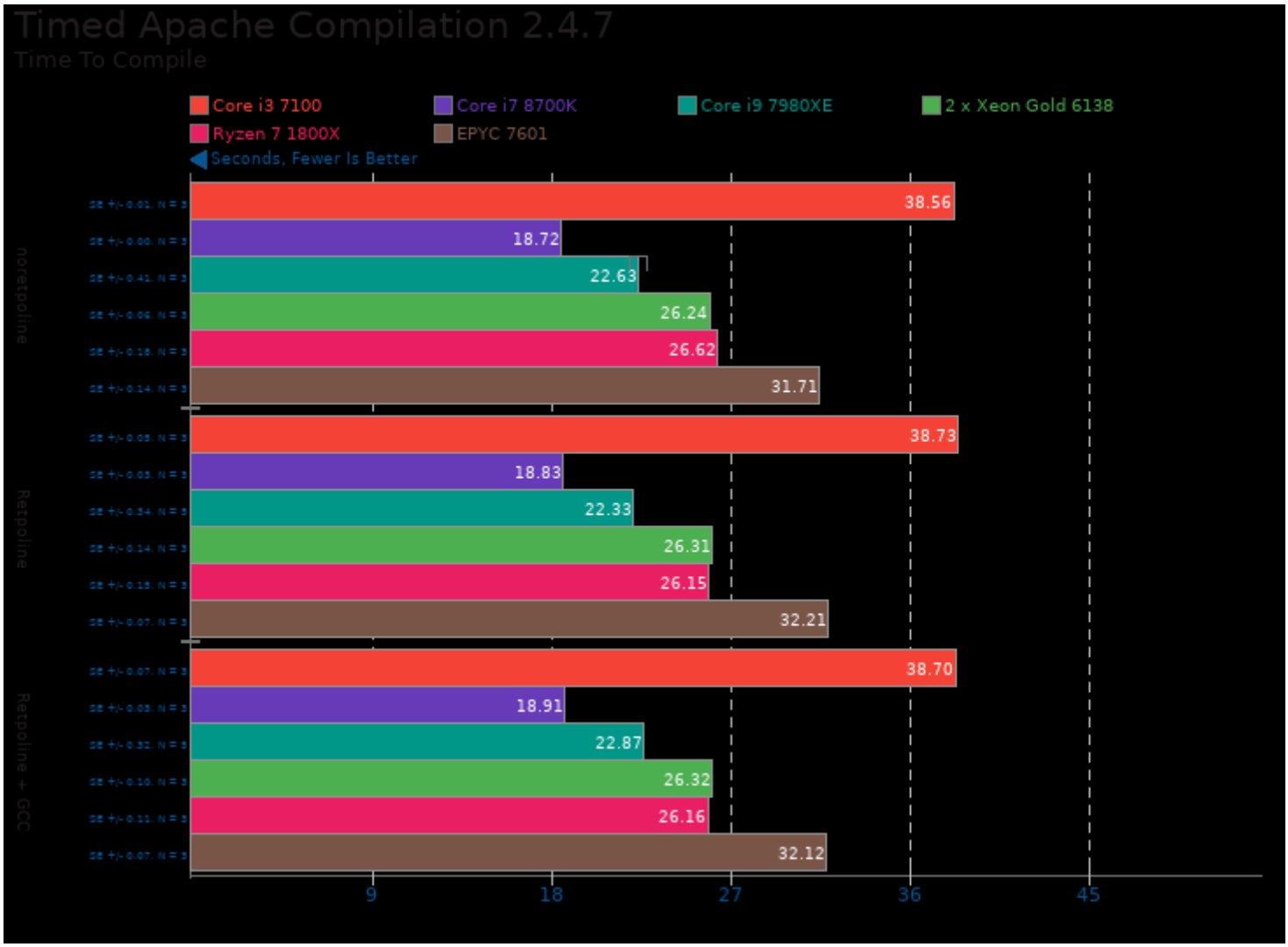
Linux Retpoline Spectre Security Benchmark



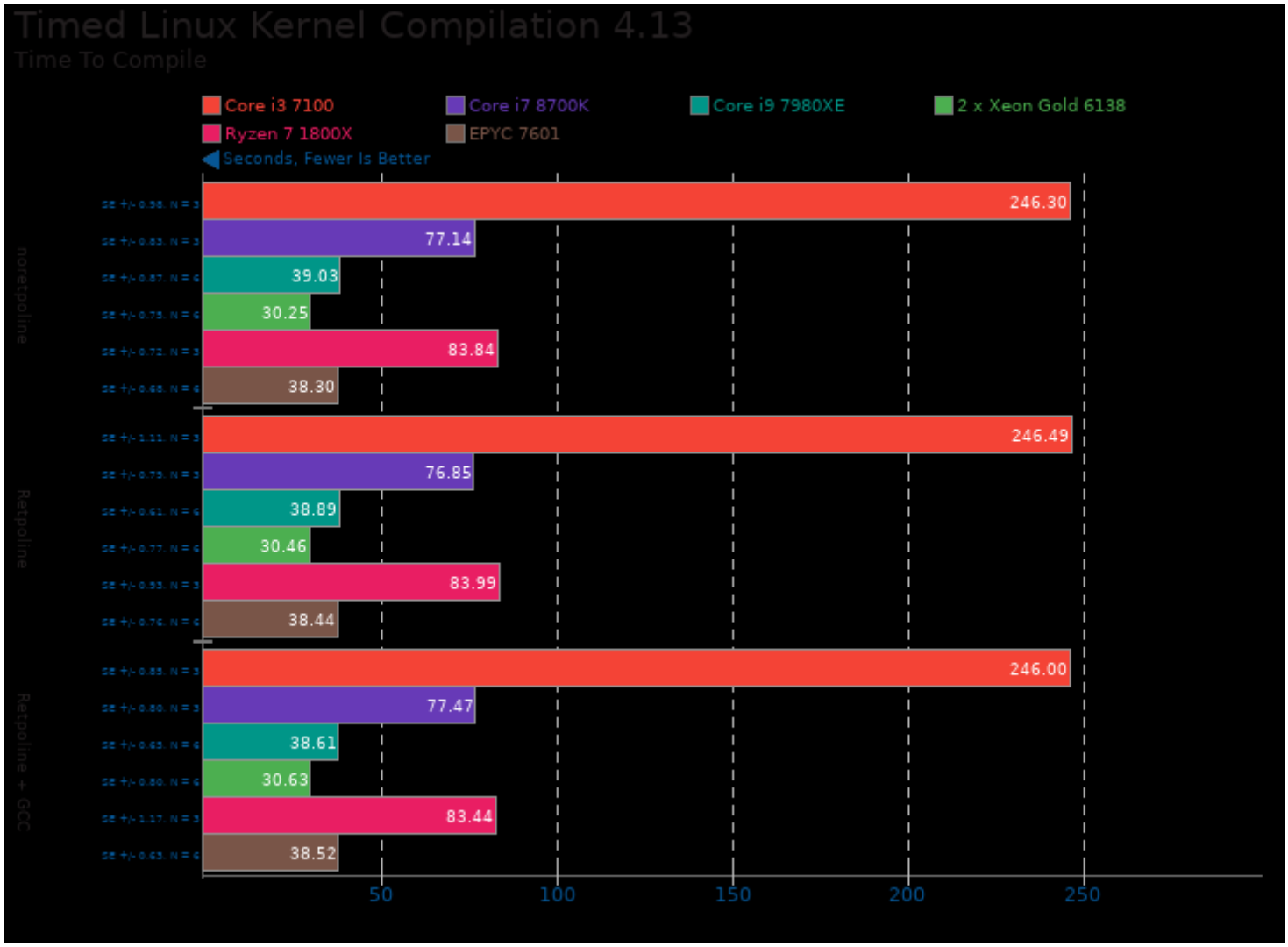

John The Ripper 1.8.0
Test: Blowfish
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Real C/S, More Is Better
noretpoline
Retpoline
Retpoline + GCC
3857
12758
31335
49652
12457
35458
3855
12748
31292
48399
12448
35714
3856
12749
31328
51089
12448
35715
11K
22K
33K
44K
55K
1. (CC) gcc options: -fopenmp -lcrypt

Linux Retpoline Spectre Security Benchmark

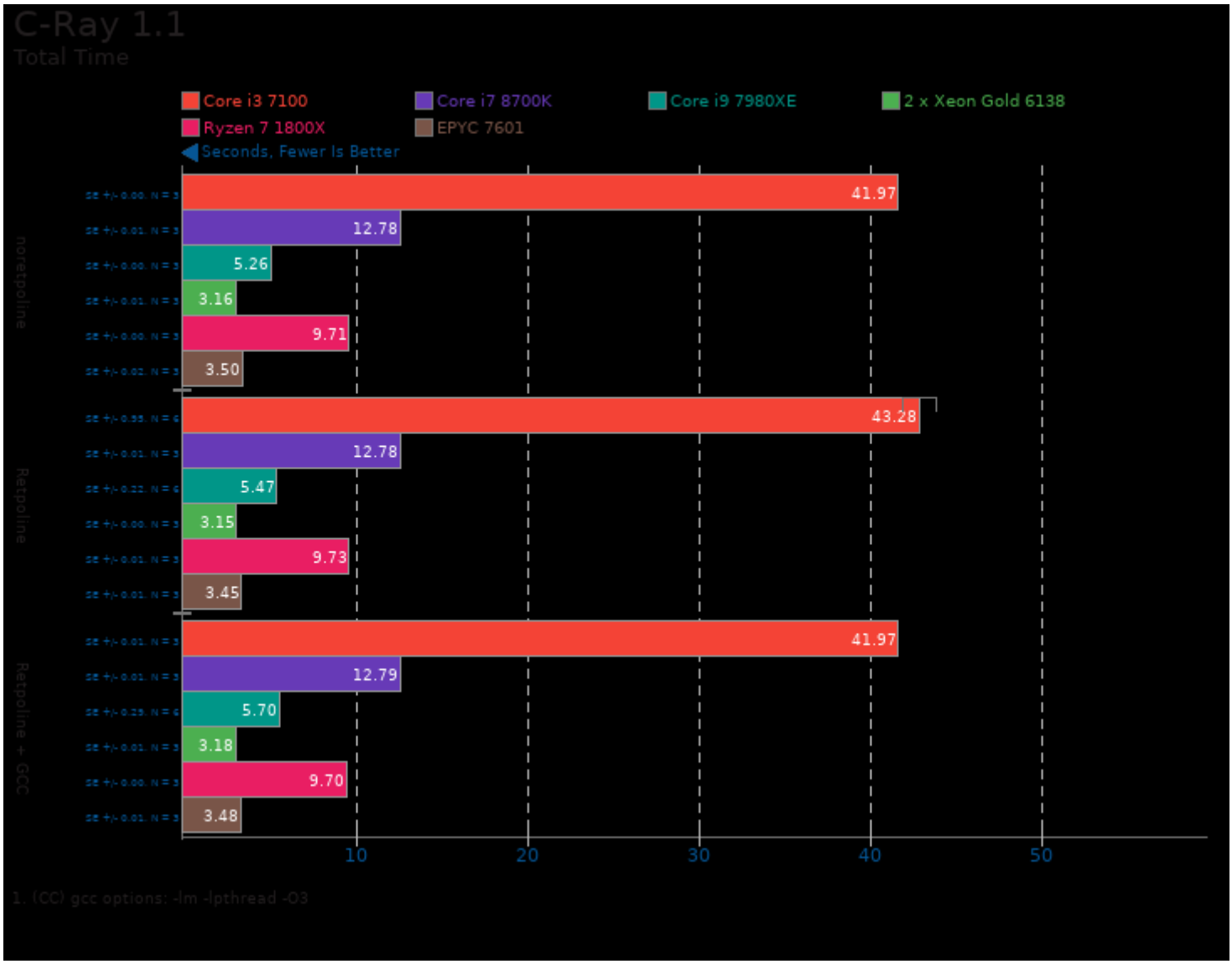



Timed Apache Compilation 2.4.7
Time To Compile
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Seconds, Fewer Is Better
38.56
18.72
22.63
26.24
26.62
31.71
38.73
18.83
22.33
26.31
26.15
32.21
38.70
18.91
22.87
26.32
26.16
32.12
9
18
27
36
45

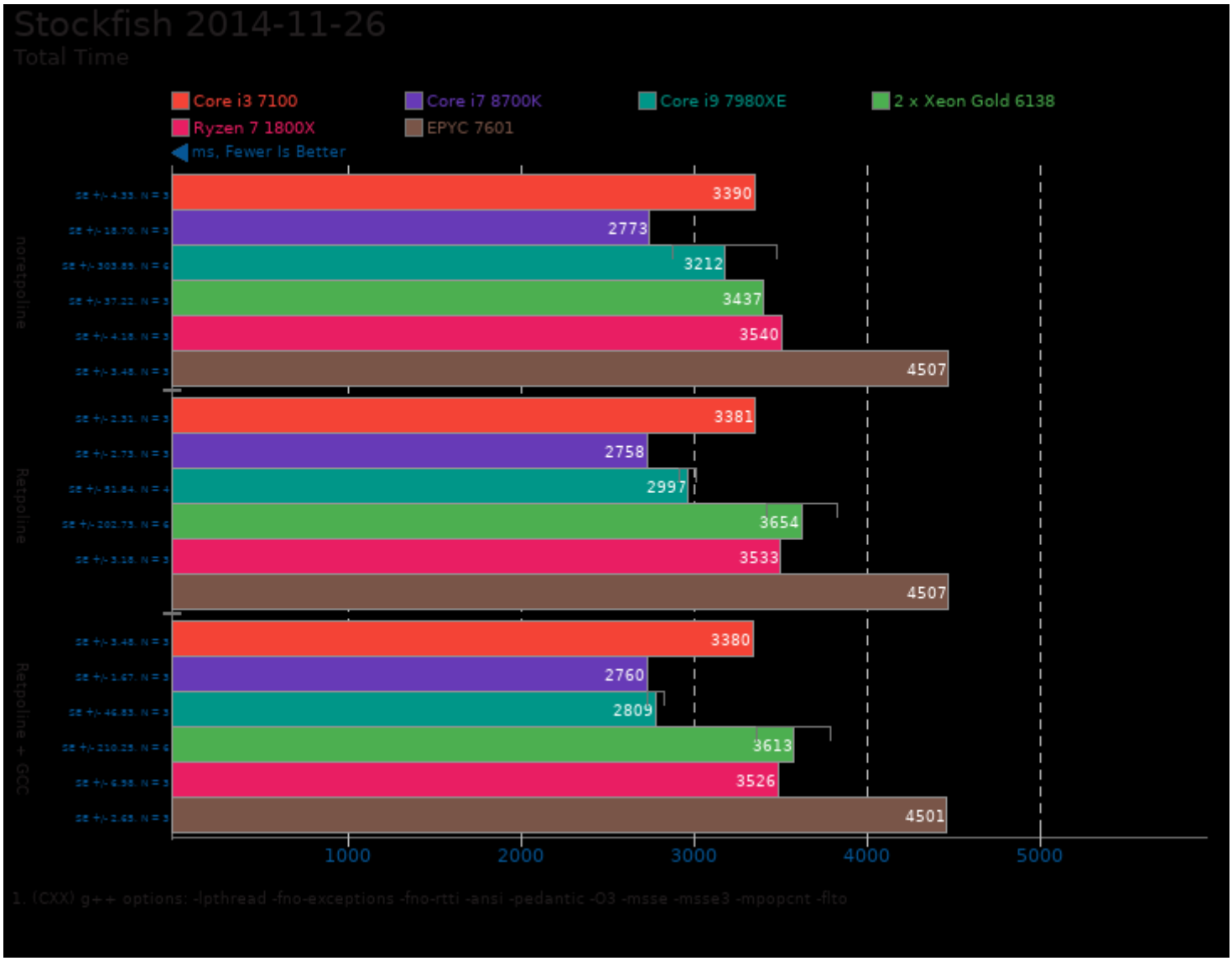
Linux Retpoline Spectre Security Benchmark



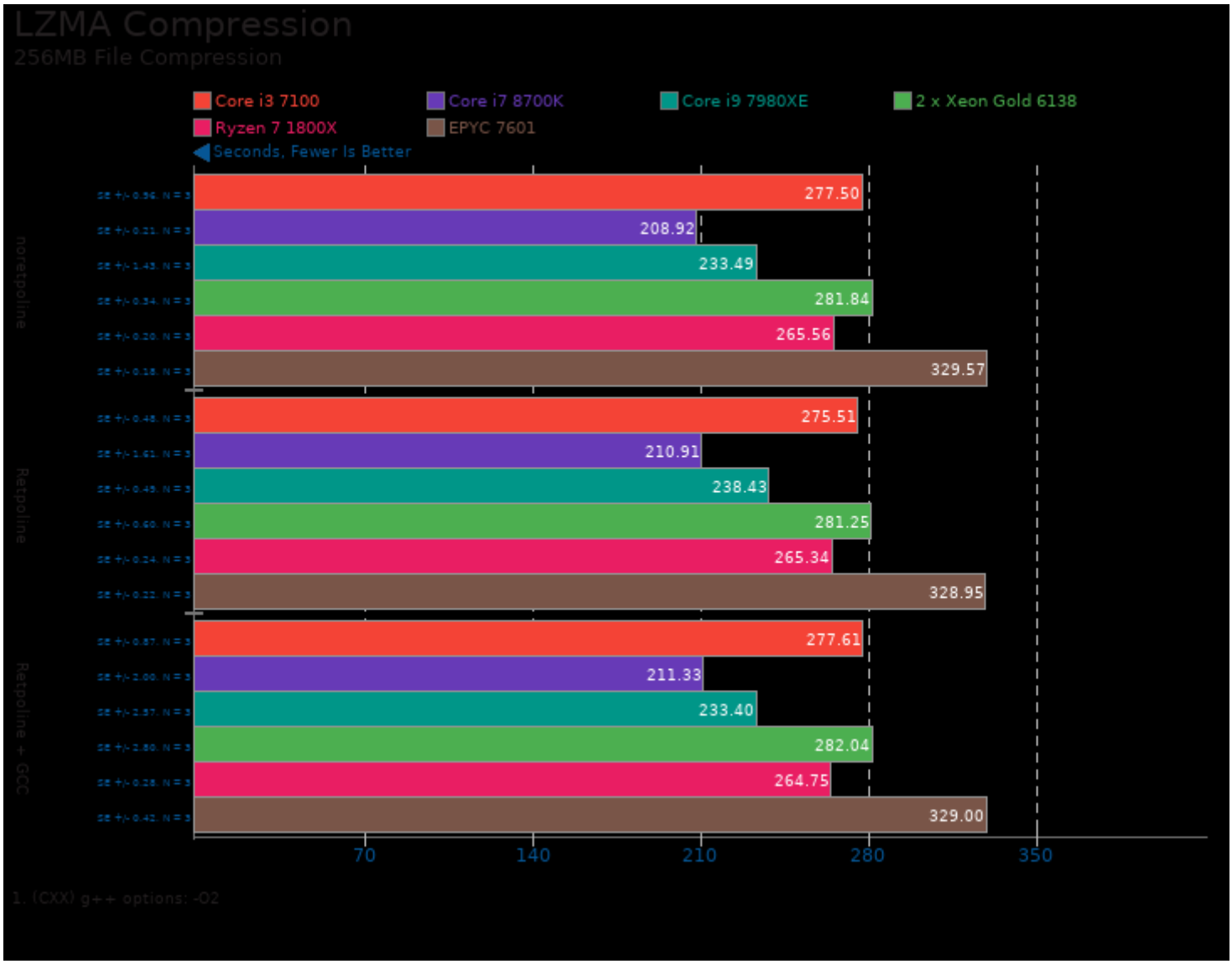
Linux Retpoline Spectre Security Benchmark



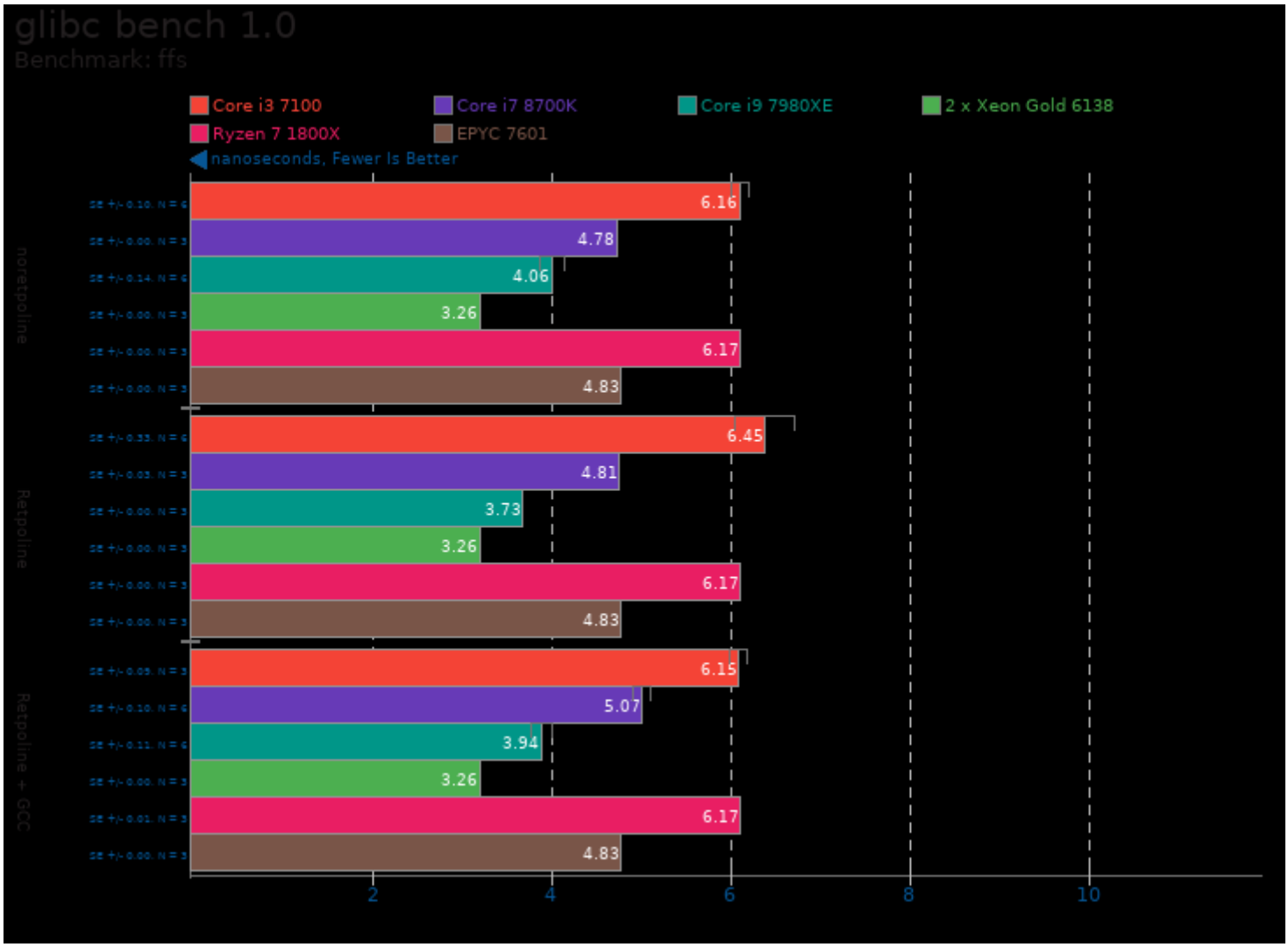
Linux Retpoline Spectre Security Benchmark



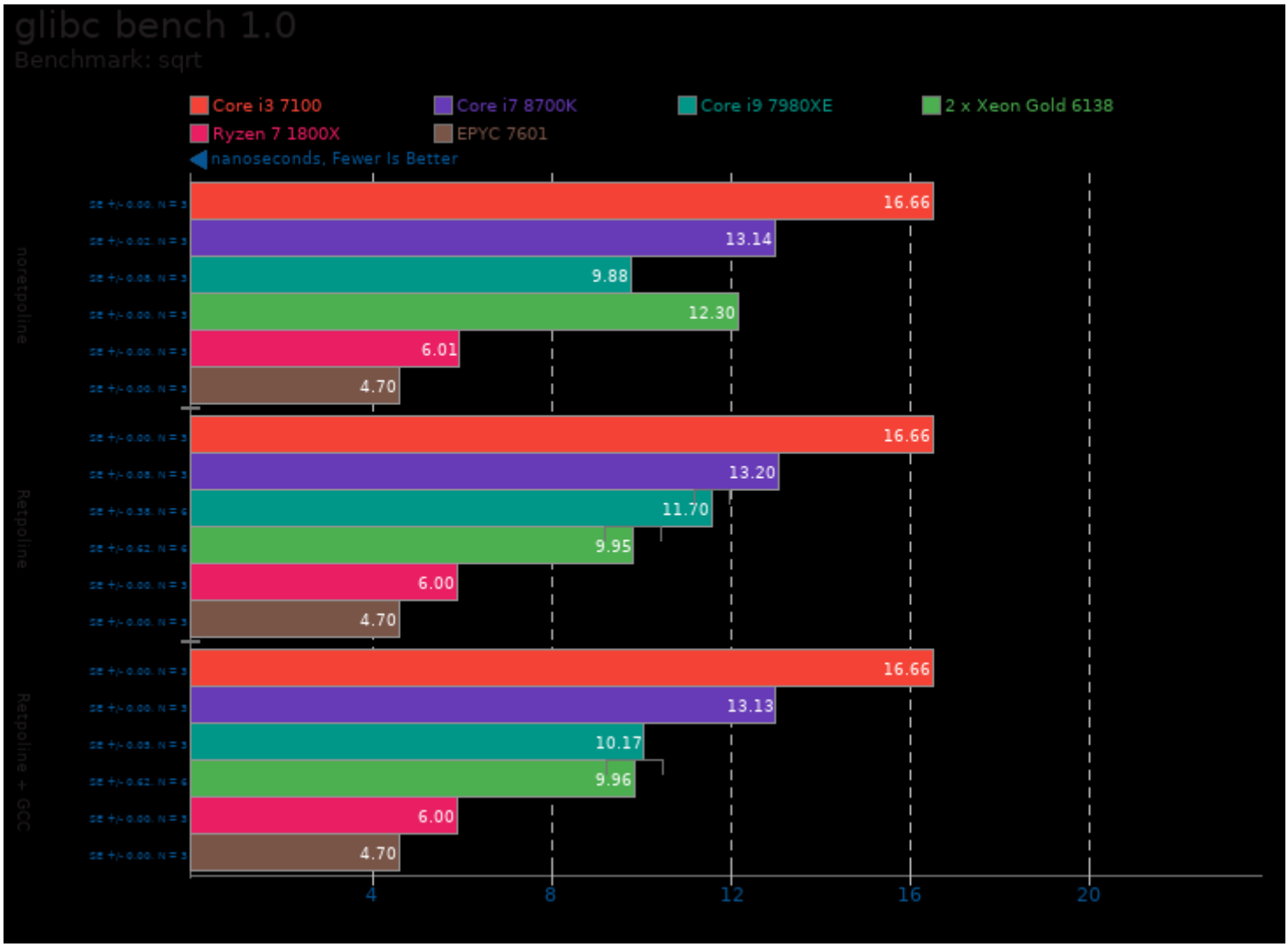
Linux Retpoline Spectre Security Benchmark



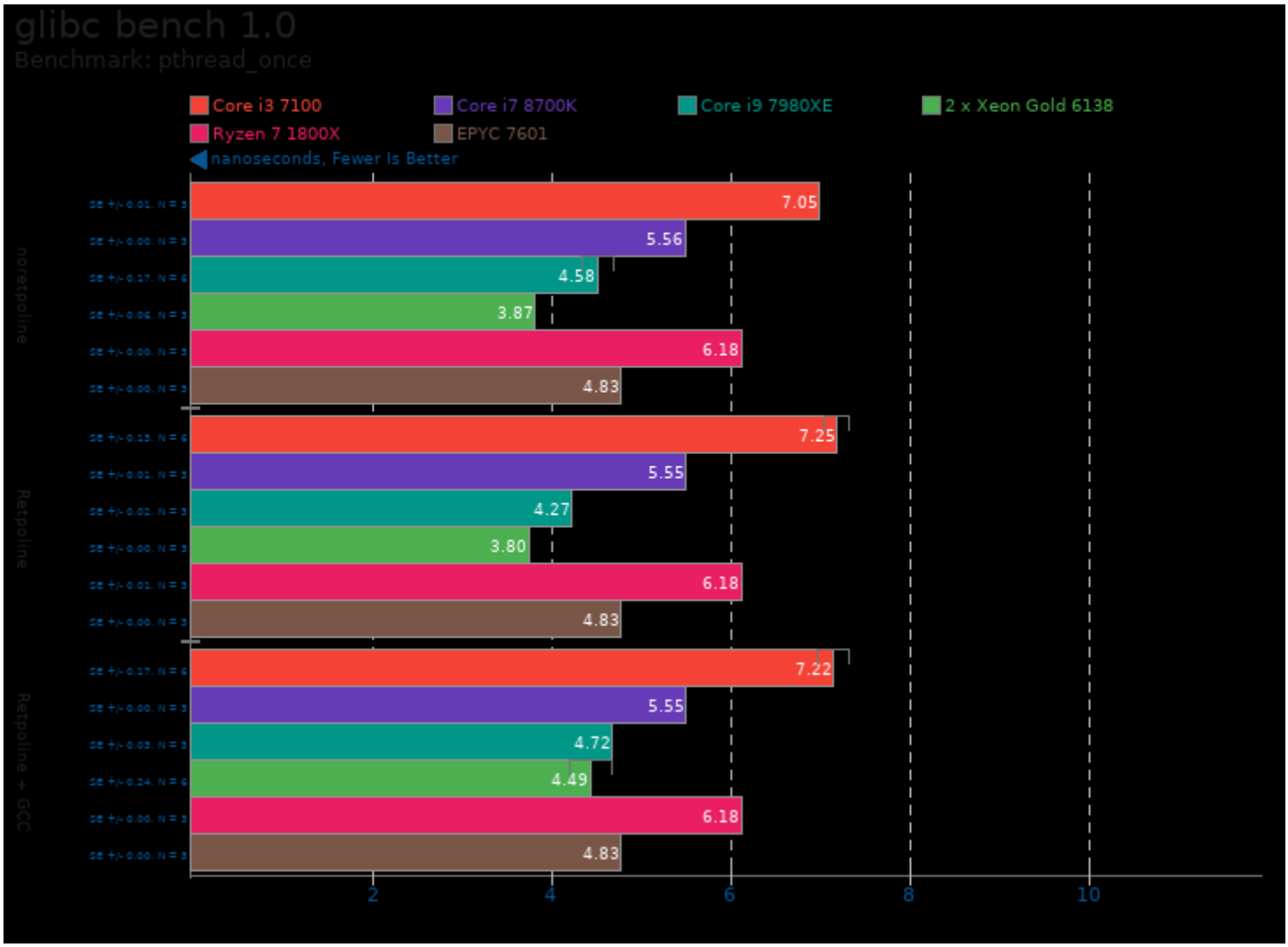
Linux Retpoline Spectre Security Benchmark

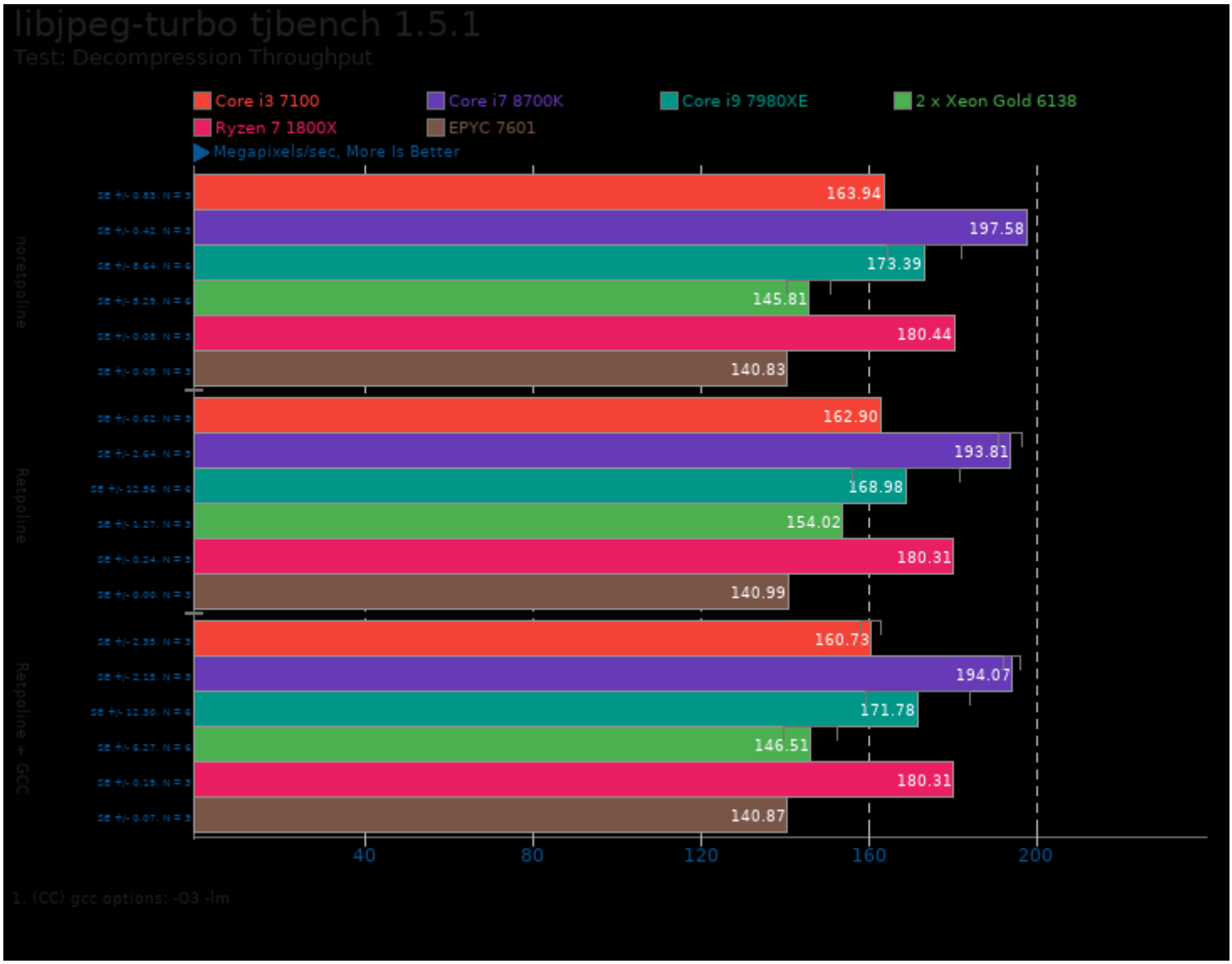


Linux Retpoline Spectre Security Benchmark

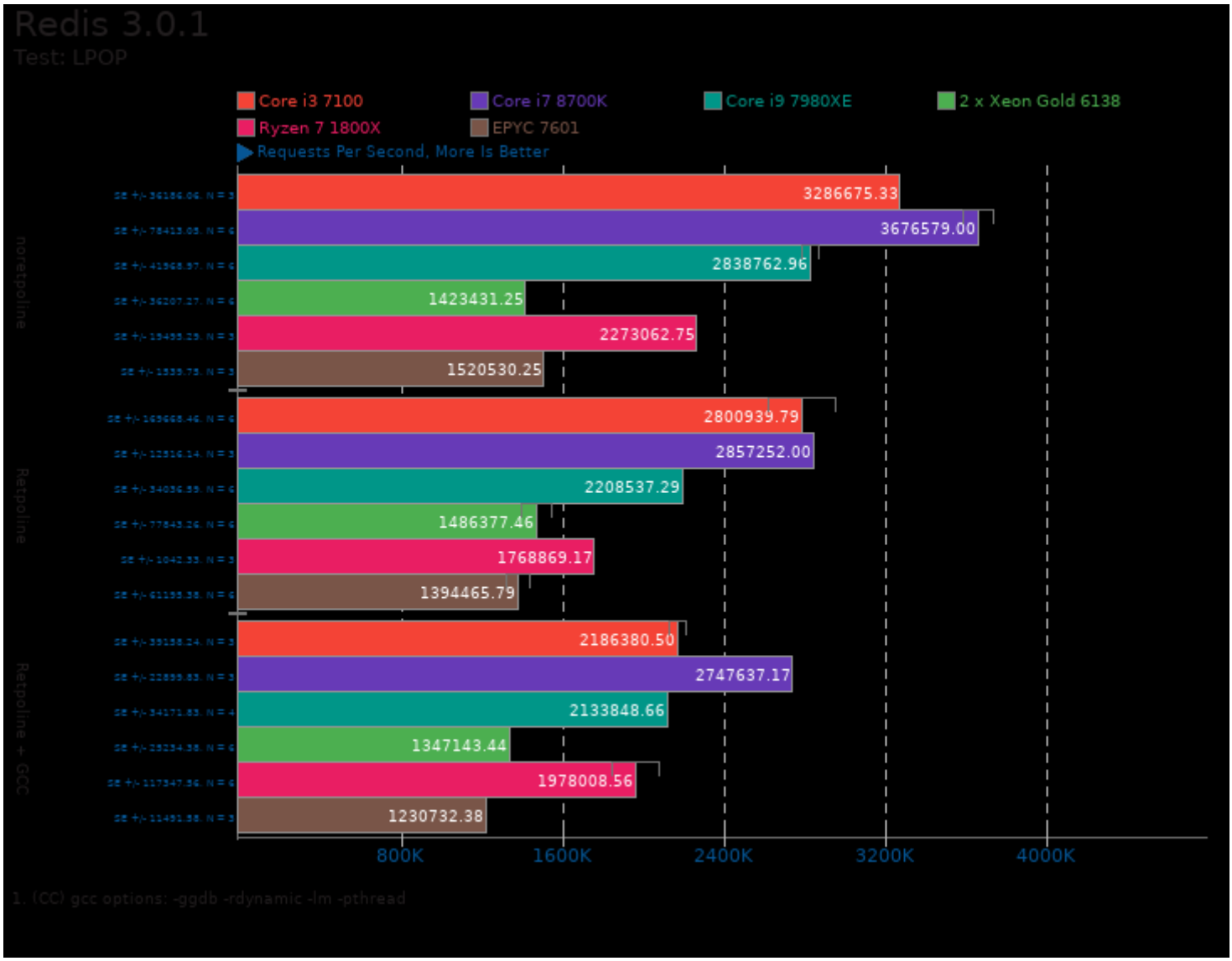


Linux Retpoline Spectre Security Benchmark

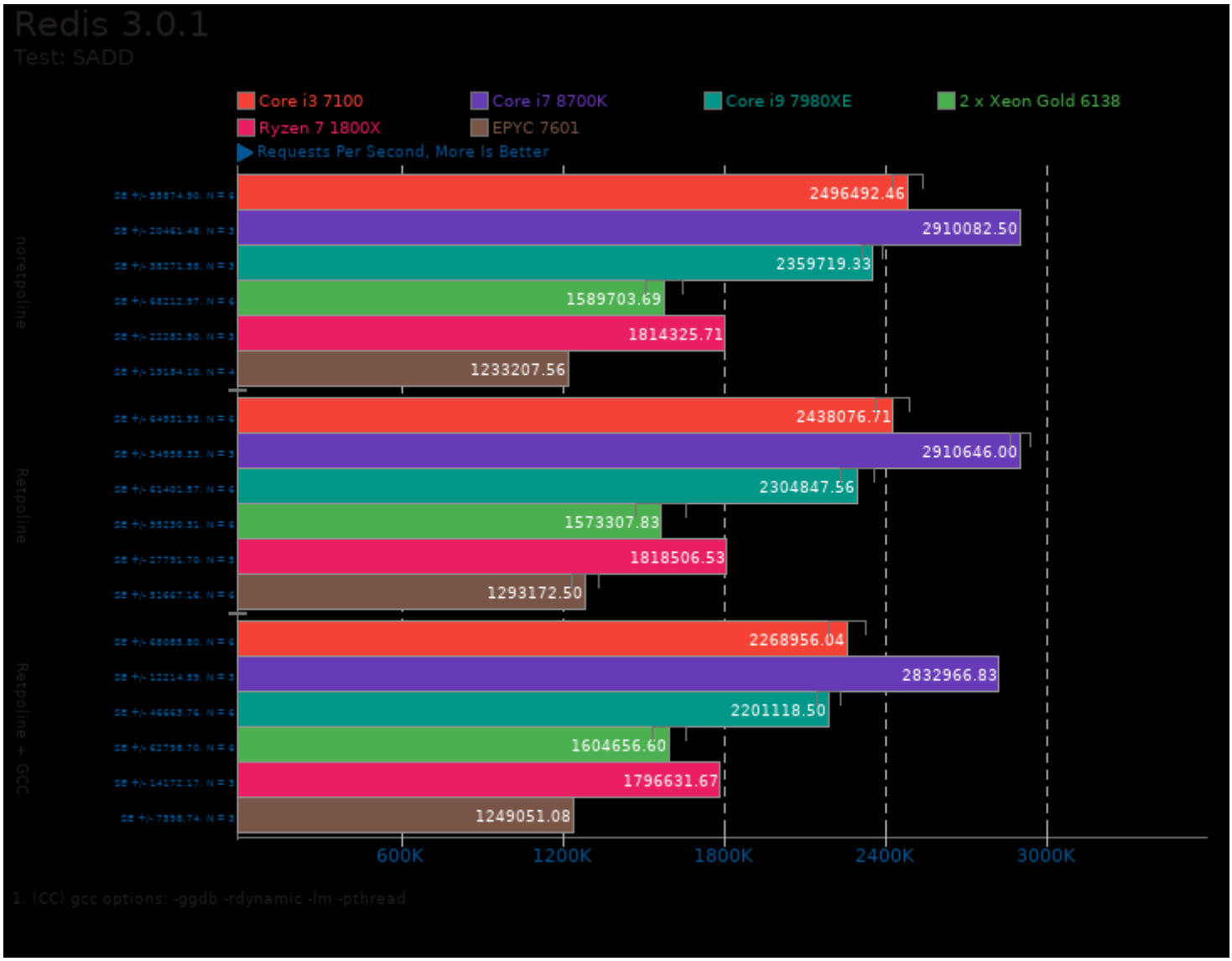


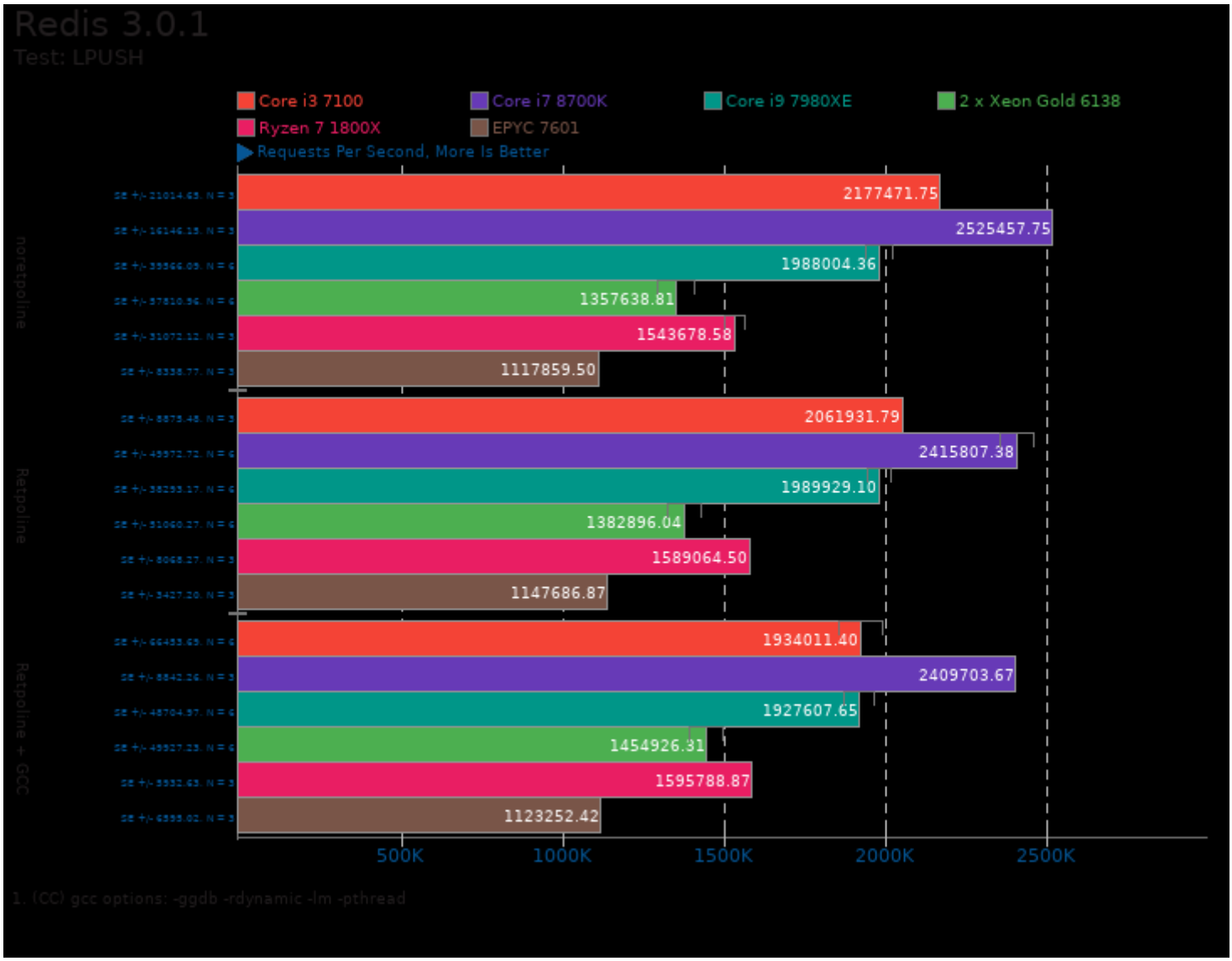

libjpeg-turbo tjbench 1.5.1
Test: Decompression Throughput
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Megapixels/sec, More Is Better
noretpoline
Retpoline
Retpoline + GCC
163.94
197.58
173.39
145.81
180.44
140.83
162.90
193.81
168.98
154.02
180.31
140.99
160.73
194.07
171.78
146.51
180.31
140.87
40
80
120
160
200
1. (CC) gcc options: -O3 -lm

Linux Retpoline Spectre Security Benchmark

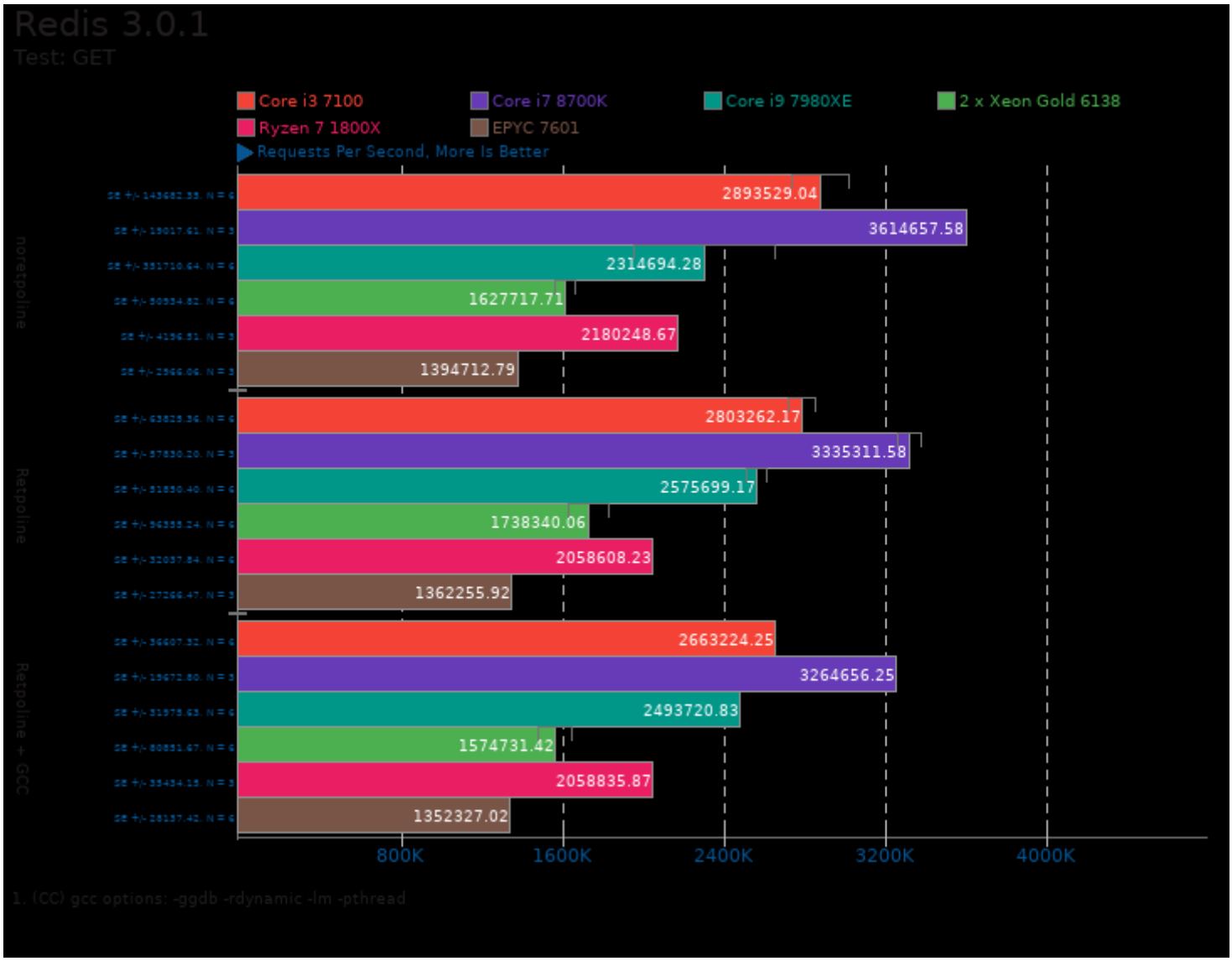


Linux Retpoline Spectre Security Benchmark

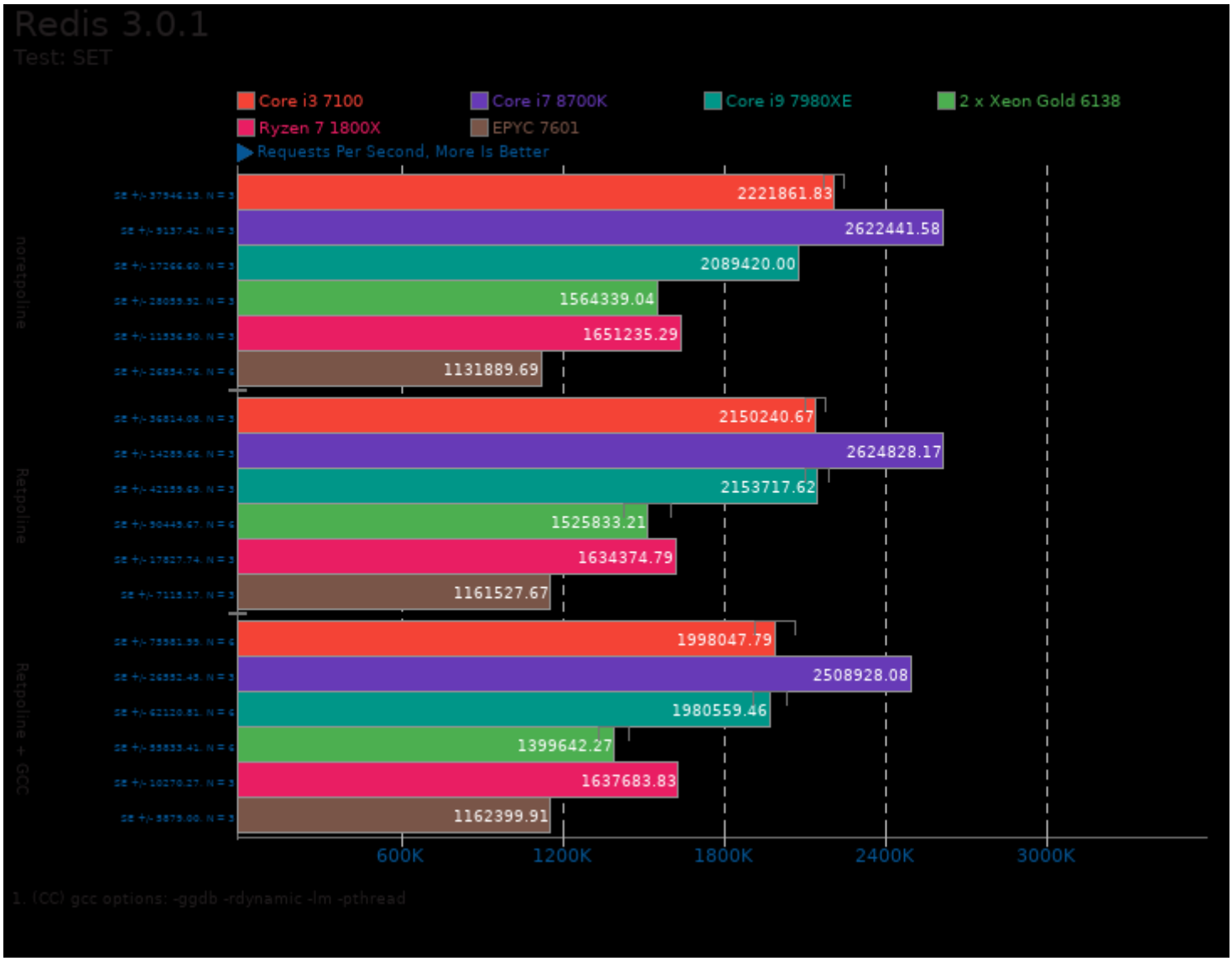


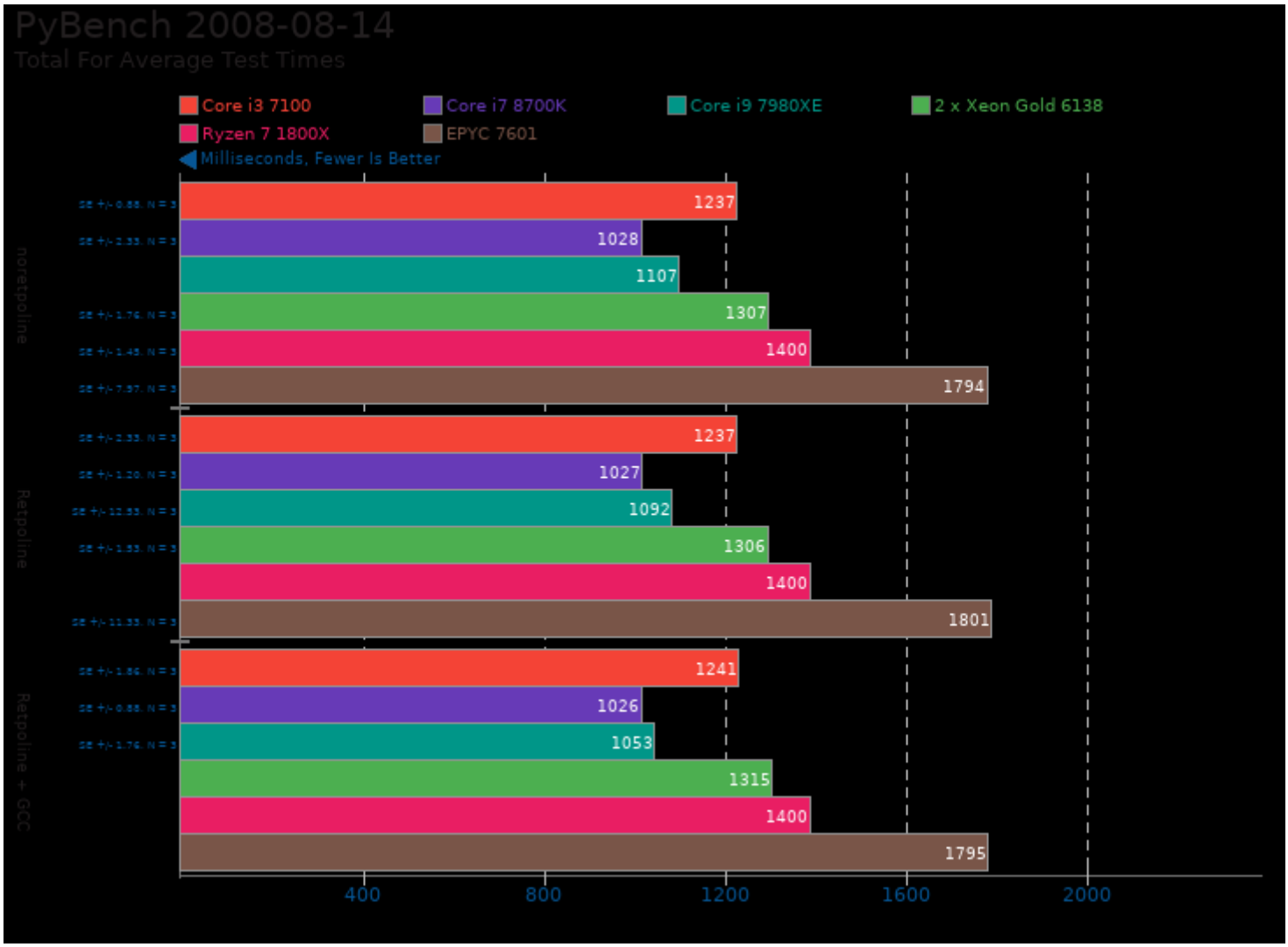

Redis 3.0.1
Test: LPUSH
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Requests Per Second, More Is Better
noretpoline
Retpoline
Retpoline + GCC
2177471.75
2525457.75
1988004.36
1357638.81
1543678.58
1117859.50
2061931.79
2415807.38
1989929.10
1382896.04
1589064.50
1147686.87
1934011.40
2409703.67
1927607.65
1454926.31
1595788.87
1123252.42
500K
1000K
1500K
2000K
2500K
1. (CC) gcc options: -ggdb -rdynamic -lm -pthread

Linux Retpoline Spectre Security Benchmark

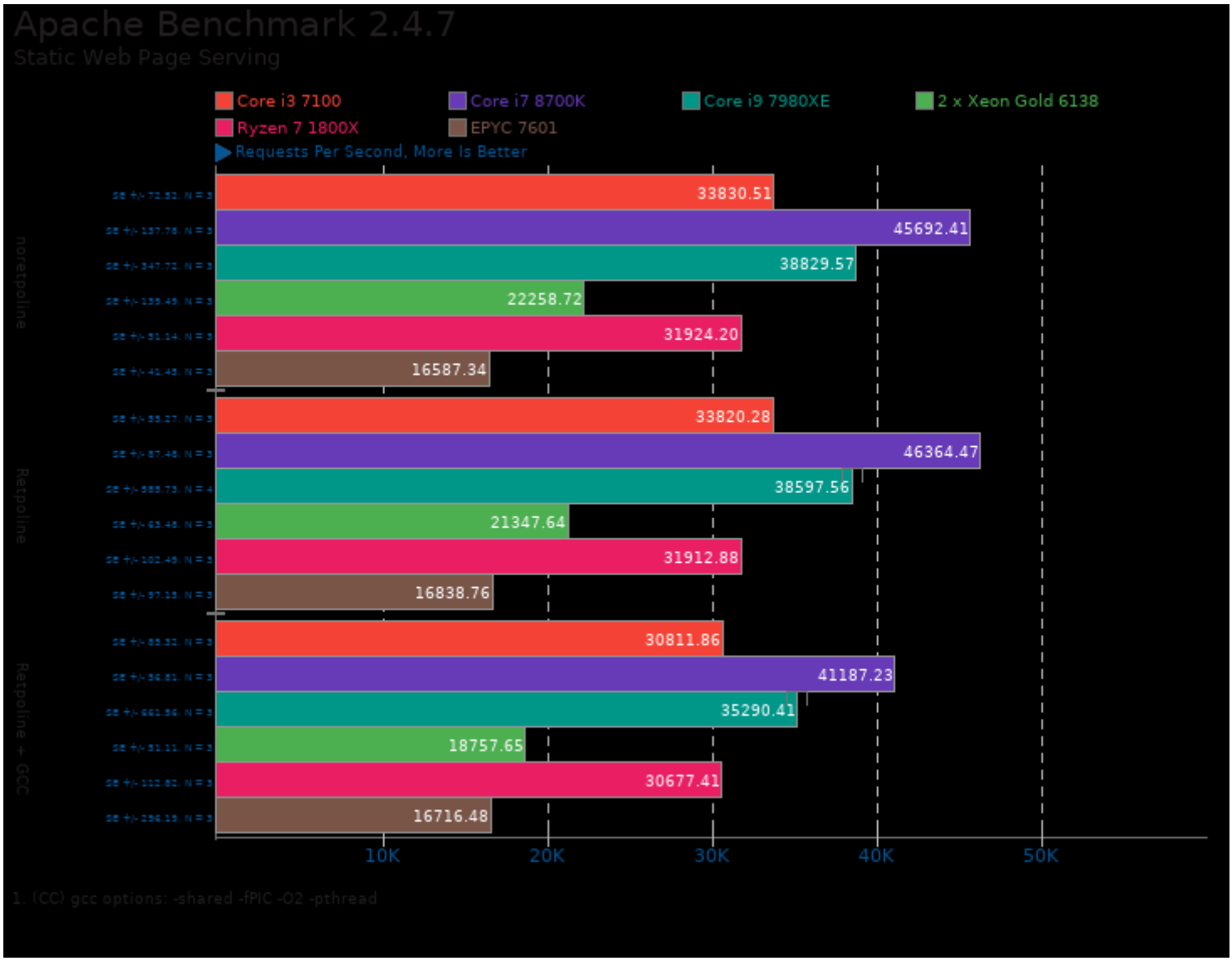


Linux Retpoline Spectre Security Benchmark

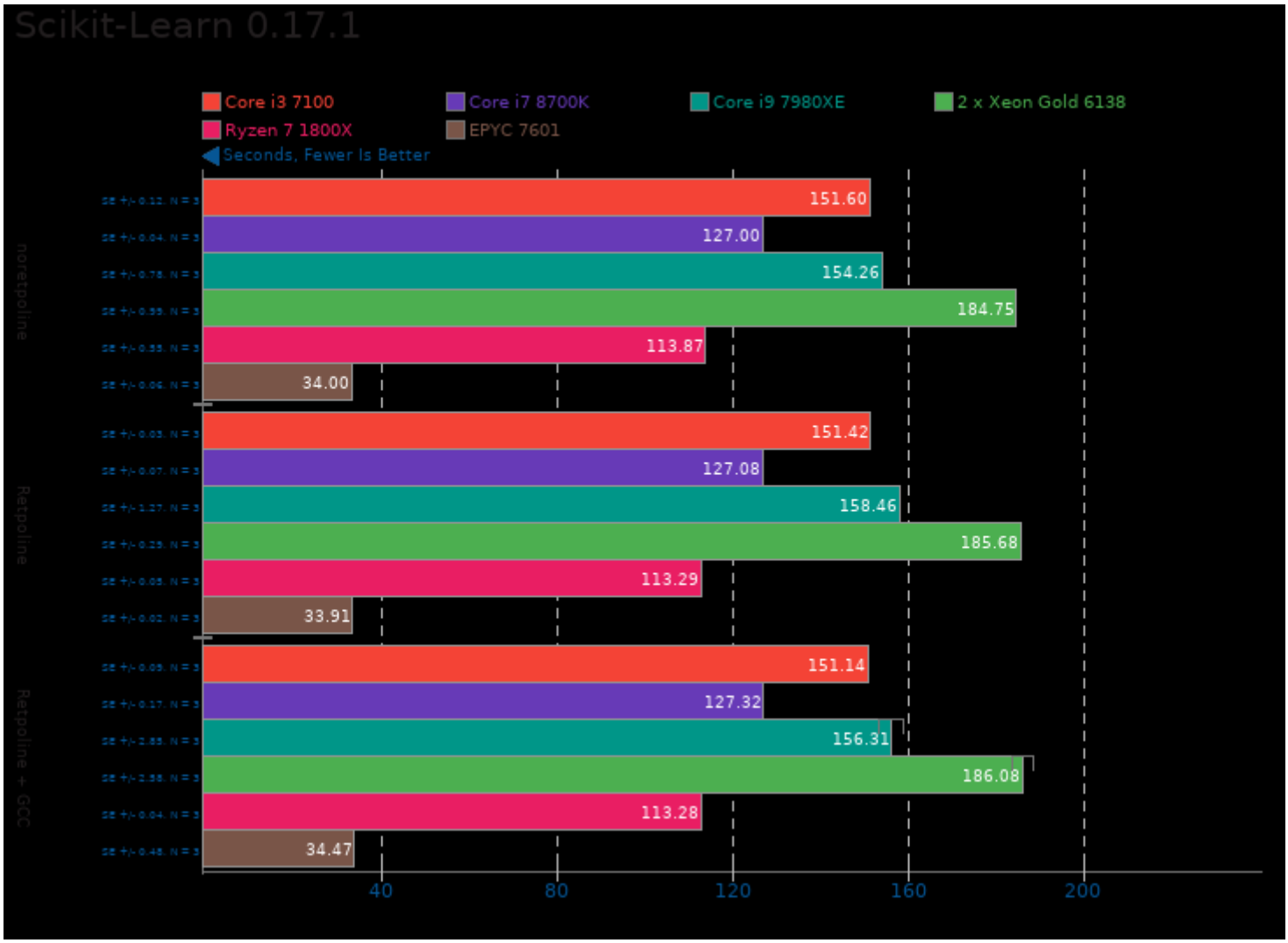


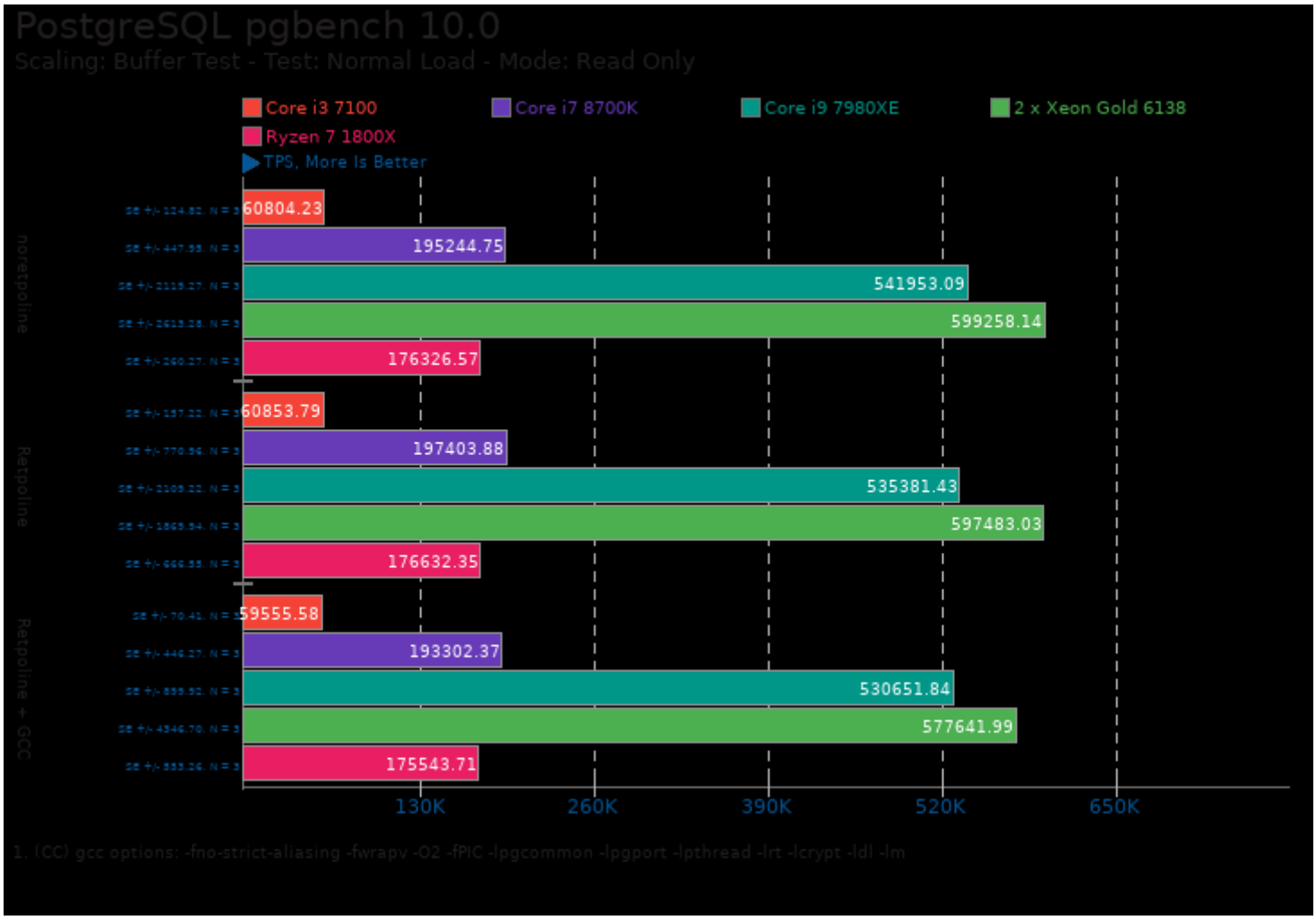

PyBench 2008-08-14
Total For Average Test Times
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
EPYC 7601
Milliseconds, Fewer Is Better
noretpoline
Retpoline
Retpoline + GCC
1237
1028
1107
1307
1400
1794
1237
1027
1092
1306
1400
1801
1241
1026
1053
1315
1400
1795
400
800
1200
1600
2000

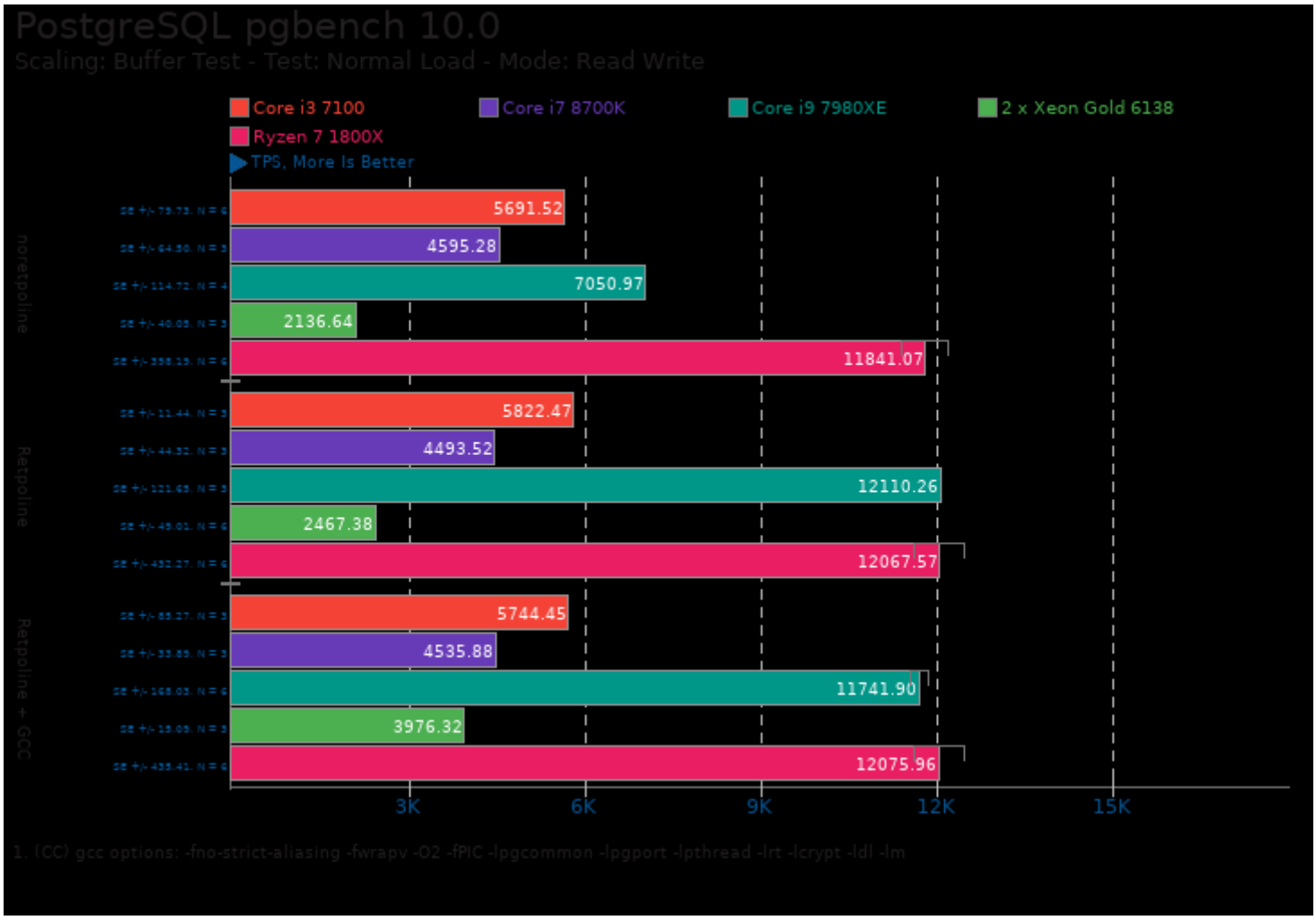
Linux Retpoline Spectre Security Benchmark



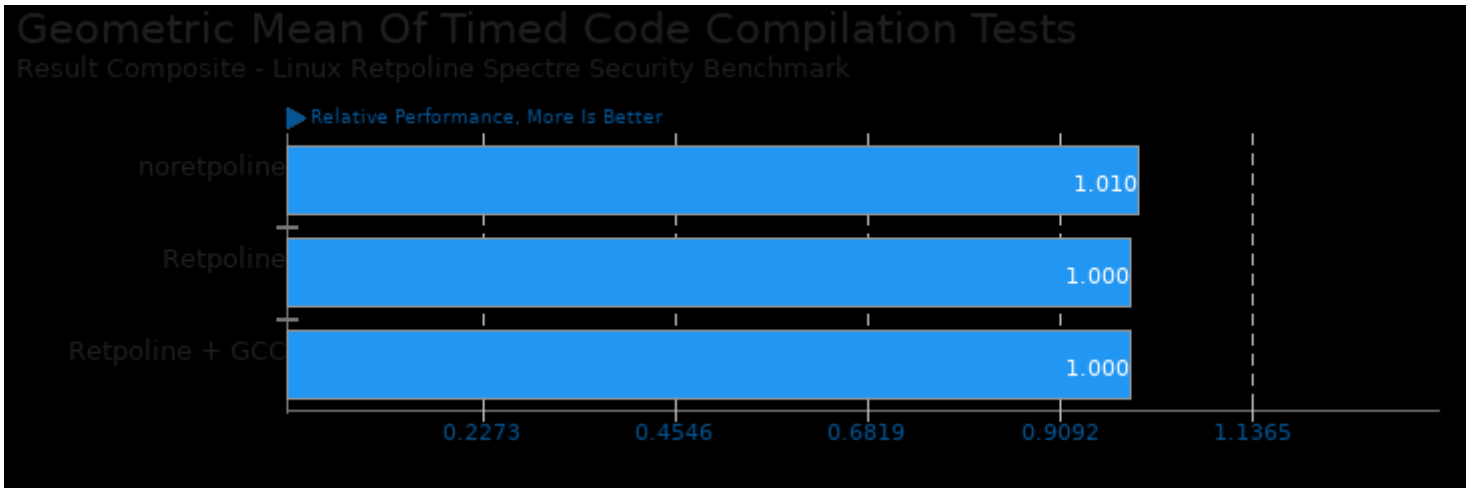
Linux Retpoline Spectre Security Benchmark



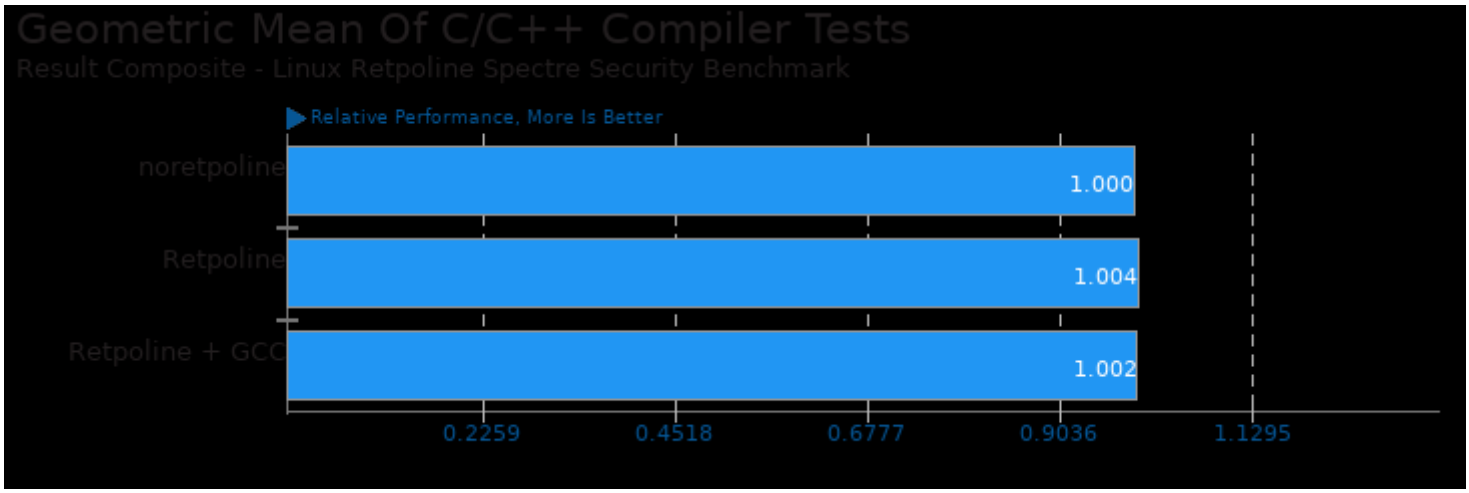

PostgreSQL pgbench 10.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
TPS, More Is Better
noretpoline
Retpoline
Retpoline + GCC
60804.23
195244.75
541953.09
599258.14
176326.57
60853.79
197403.88
535381.43
597483.03
176632.35
59555.58
193302.37
530651.84
577641.99
175543.71
130K
260K
390K
520K
650K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -fPIC -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm


PostgreSQL pgbench 10.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Write
Core i3 7100
Core i7 8700K
Core i9 7980XE
2 x Xeon Gold 6138
Ryzen 7 1800X
TPS, More Is Better
noretpoline
Retpoline
Retpoline + GCC
5691.52
4595.28
7050.97
2136.64
11841.07
5822.47
4493.52
12110.26
2467.38
12067.57
5744.45
4535.88
11741.90
3976.32
12075.96
3K
6K
9K
12K
15K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -fPIC -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm

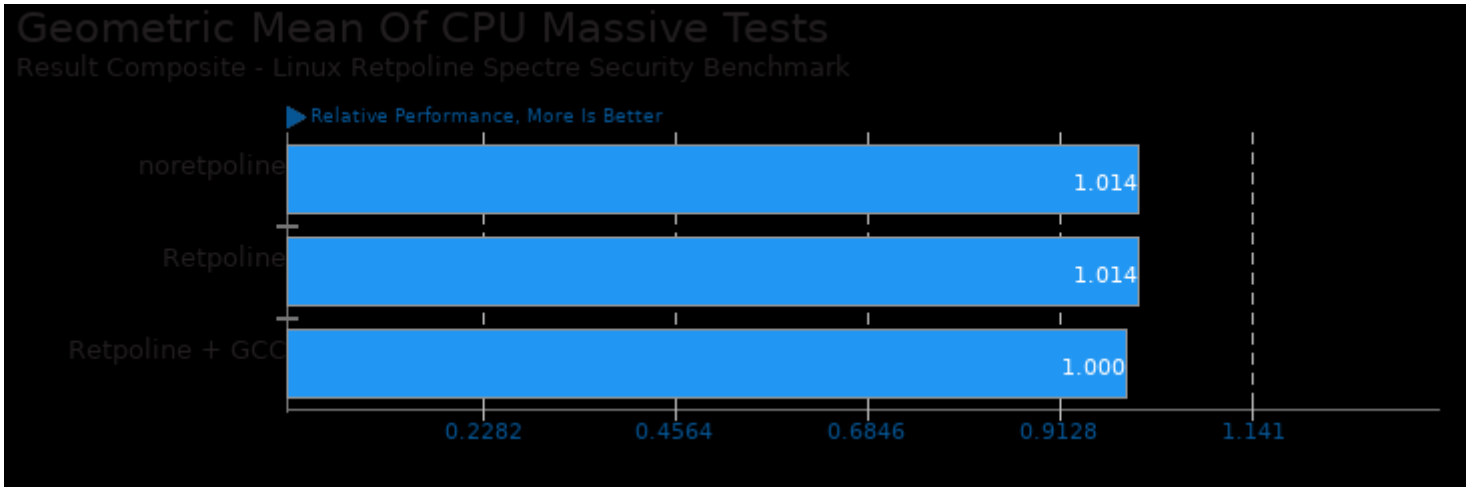
These geometric means are based upon test groupings / test suites for this result file.



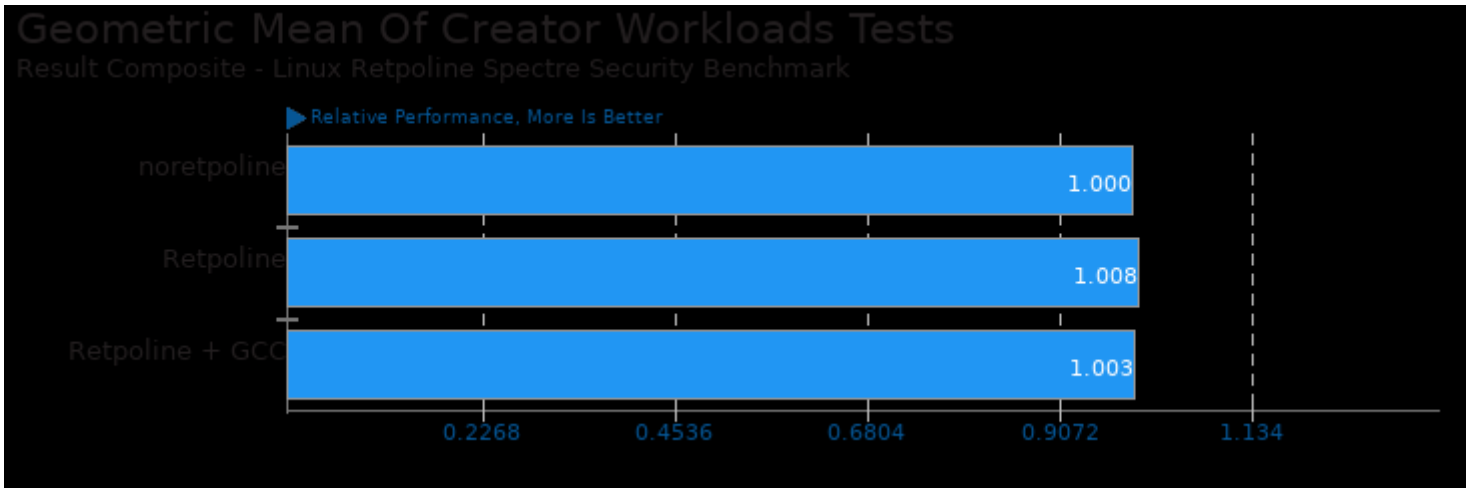
Geometric mean based upon tests: pts/build-apache and pts/build-linux-kernel



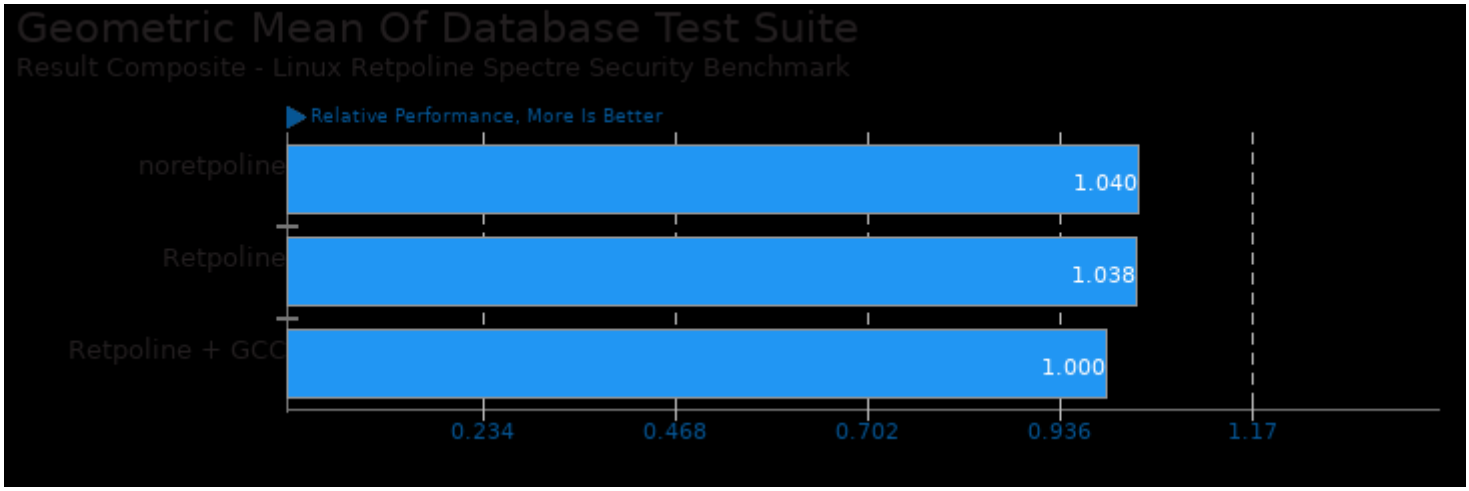
Geometric mean based upon tests: pts/stockfish, pts/c-ray, pts/pgbench, pts/apache, pts/john-the-ripper and pts/build-apache



Geometric mean based upon tests: pts/apache, pts/build-apache, pts/build-linux-kernel, pts/c-ray, pts/cachebench, pts/compilebench, pts/ebizzy, pts/glibc-bench, pts/john-the-ripper, pts/lzbench, pts/parboil, pts/pgbench, pts/redis, pts/rodinia, pts/scikit-learn, pts/stockfish, pts/t-test1 and pts/tjbench

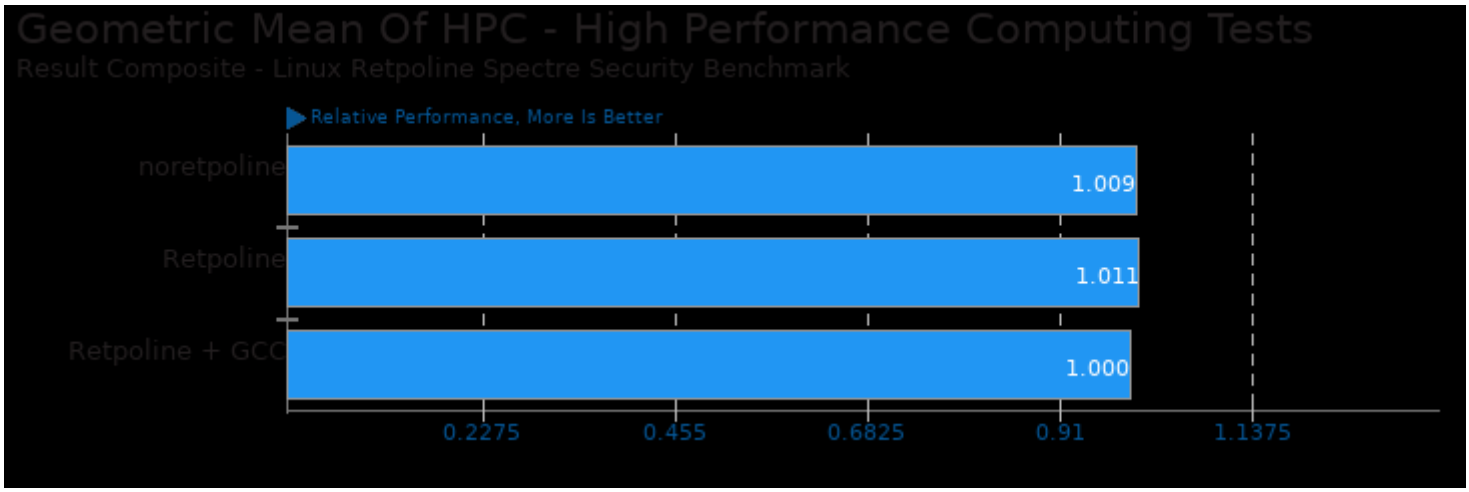


Geometric mean based upon tests: pts/c-ray and pts/tjbench

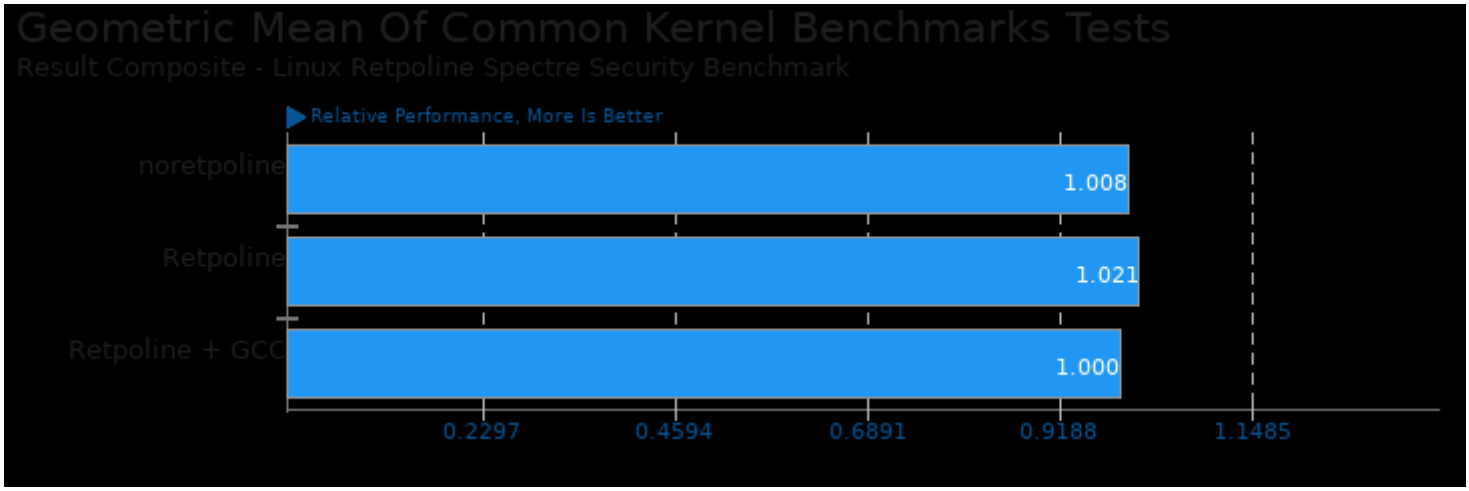


Geometric mean based upon tests: pts/redis and pts/pgbench

Geometric mean based upon tests: pts/compilebench and pts/fio

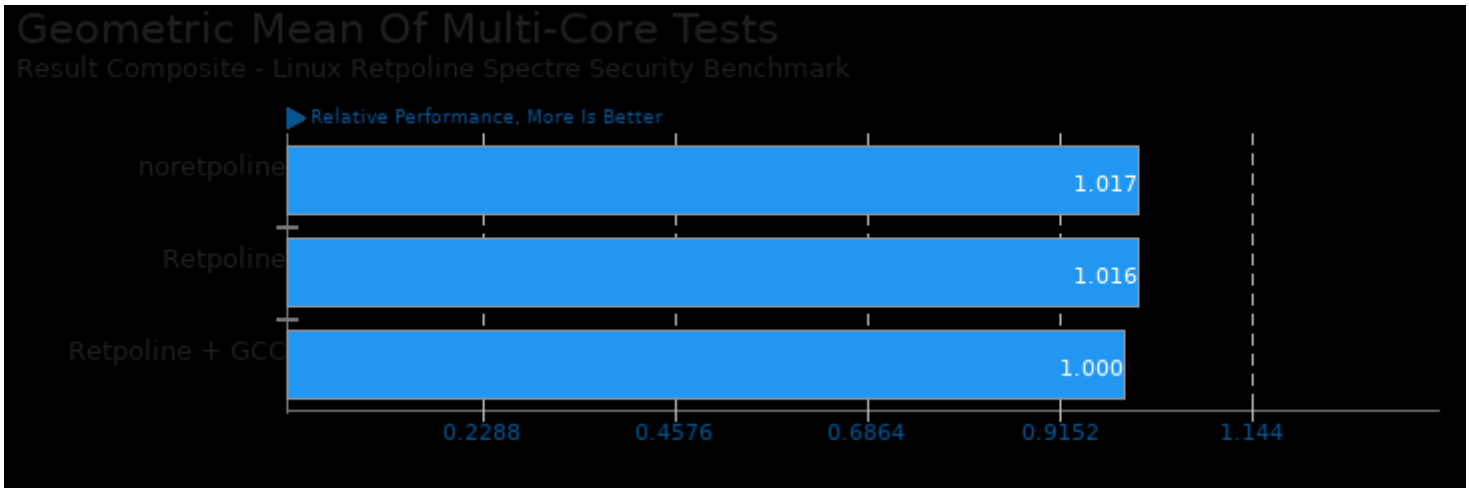


Geometric mean based upon tests: pts/rodinia, pts/parboil and pts/scikit-learn



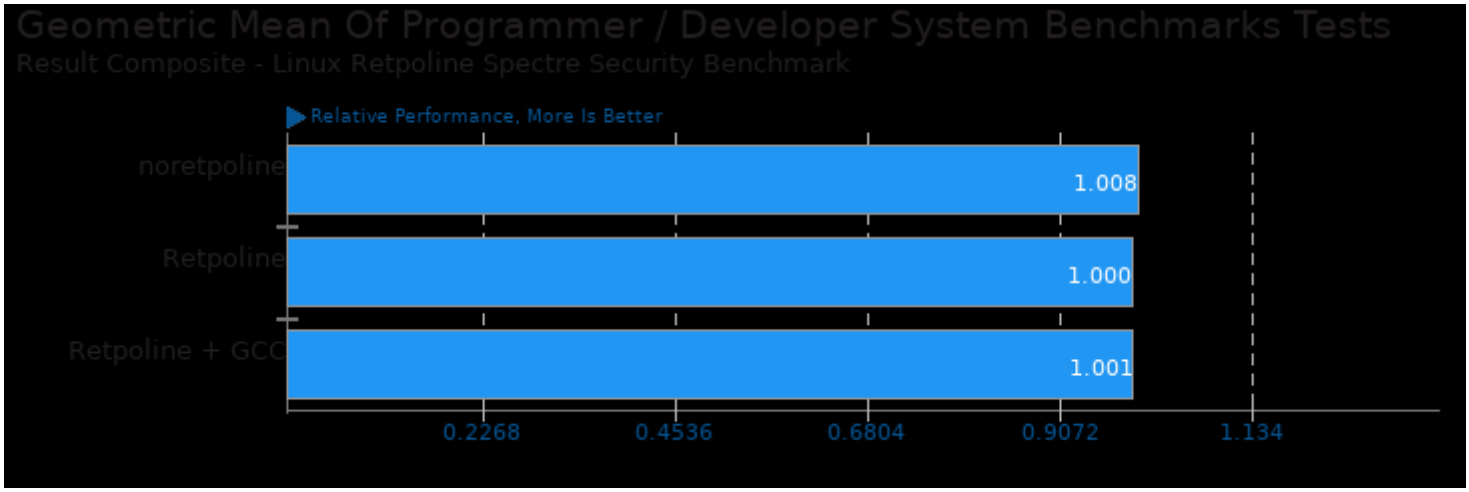
Geometric mean based upon tests: pts/apache, pts/pgbench and pts/t-test1

Geometric mean based upon tests: pts/t-test1 and pts/cachebench



Geometric mean based upon tests: pts/c-ray, pts/stockfish, pts/rodinia, pts/parboil, pts/john-the-ripper, pts/ebizzy, pts/build-apache, pts/build-linux-kernel and pts/pgbench

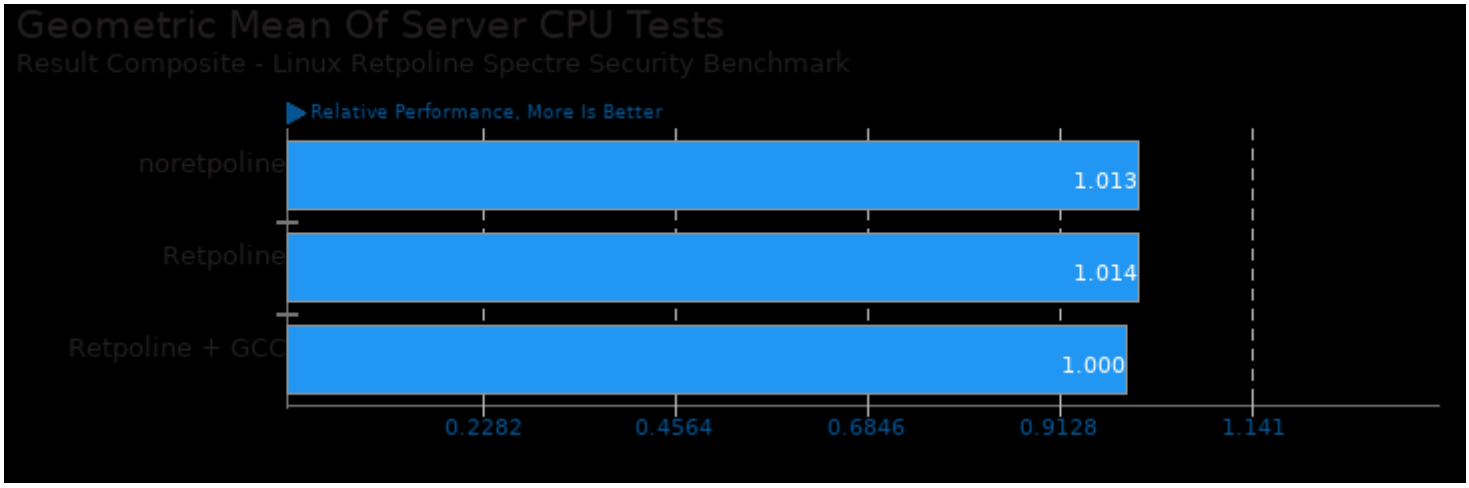
Geometric mean based upon tests: pts/rodinia and pts/parboil



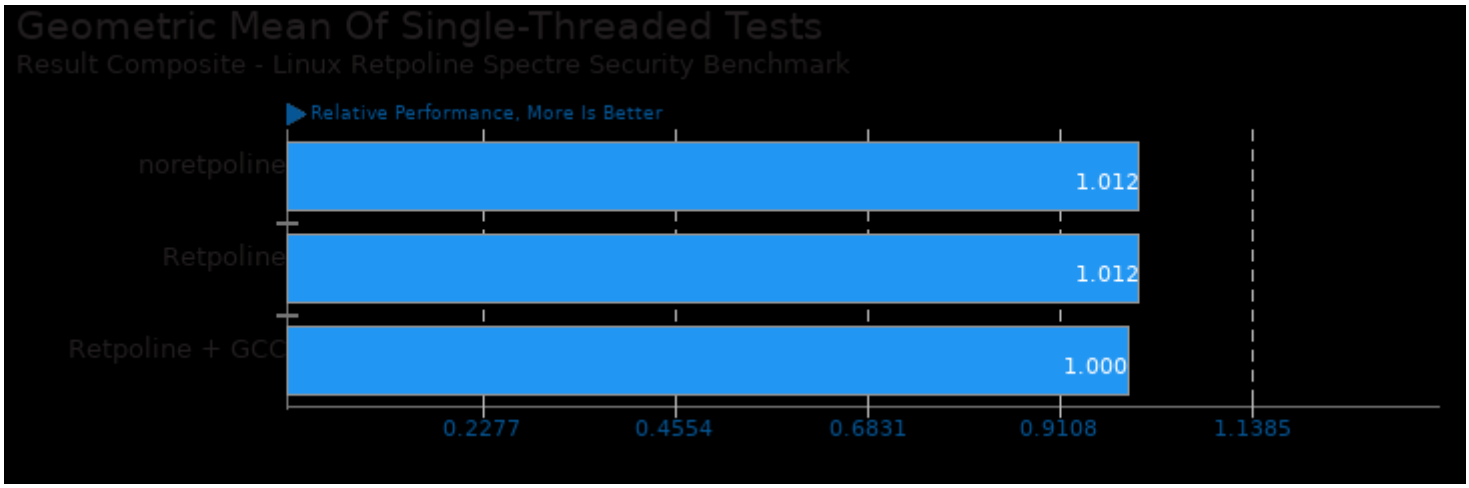
Geometric mean based upon tests: pts/pybench, pts/build-apache and pts/build-linux-kernel

Geometric mean based upon tests: pts/pybench and pts/scikit-learn

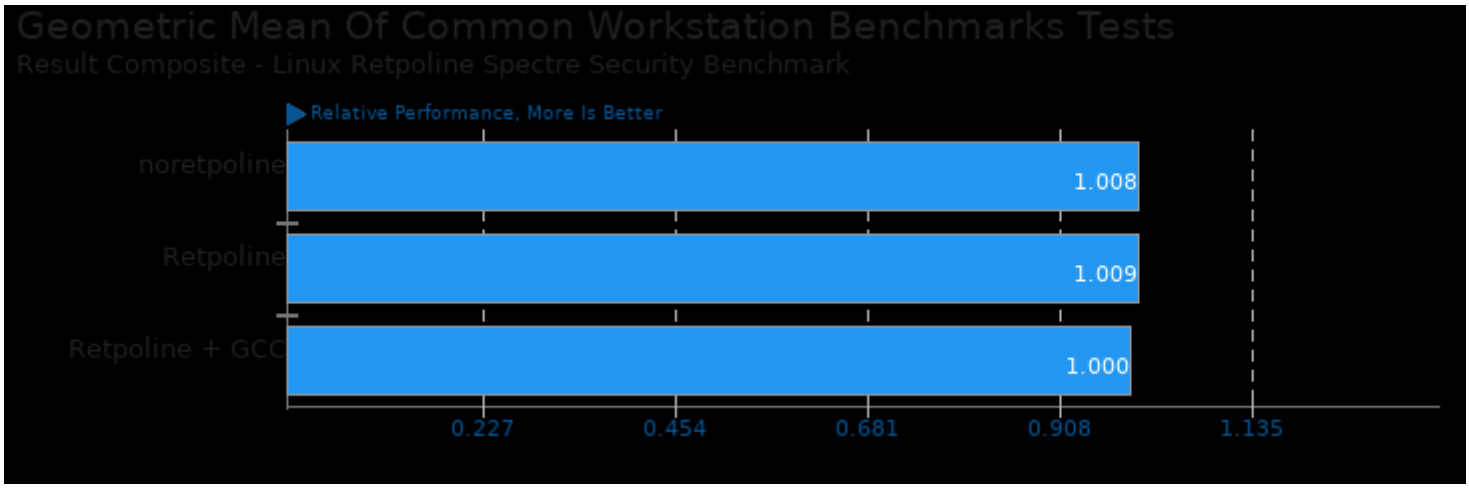
Geometric mean based upon tests: pts/apache, pts/ebizzy, pts/pgbench and pts/redis



Geometric mean based upon tests: pts/rodinia, pts/john-the-ripper, pts/stockfish, pts/build-linux-kernel, pts/c-ray, pts/glibc-bench, pts/tjbench, pts/redis, pts/pybench and pts/scikit-learn



Geometric mean based upon tests: pts/lzbench, pts/cachebench, pts/glibc-bench, pts/tjbench, pts/redis and pts/pybench



Geometric mean based upon tests: pts/rodinia and pts/parboil

This file was automatically generated via the Phoronix Test Suite benchmarking software on Sunday, 22 December 2024 06:52.