

www.phoronix-test-suite.com

Linux 4.16 File-System Tests

HDD and SSD file-system tests on Linux 4.16 for a future article on Phoronix.

Automated Executive Summary

TR150 SSD: F2FS had the most wins, coming in first place for 40% of the tests.

Based on the geometric mean of all complete results, the fastest (TR150 SSD: F2FS) was 2.126x the speed of the slowest (WD500GB HDD ZFS ARC20G). TR150 SSD: EXT4 was 0.979x the speed of TR150 SSD: F2FS, TR150 SSD: XFS was 0.952x the speed of TR150 SSD: EXT4, TR150 SSD: Btrfs was 0.715x the speed of TR150 SSD: XFS, Seagate HDD: EXT4 was 0.905x the speed of TR150 SSD: Btrfs, Seagate HDD: XFS was 0.91x the speed of Seagate HDD: EXT4, Seagate HDD: Btrfs was 0.98x the speed of Seagate HDD: XFS, Samsung 860 EVO SSD ext4 was 0.961x the speed of Seagate HDD: Btrfs, WD500GB HDD ZFS ARC20G was 0.91x the speed of Samsung 860 EVO SSD ext4.

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

Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 353.896x
Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 343.448x
SQLite (Timed SQLite Insertions) at 29.016x
Dbench (Client Count: 6) at 21.905x

Compile Bench (Test: Compile) at 6.418x
Compile Bench (Test: Initial Create) at 5.69x
AIO-Stress (Test: Random Write) at 5.412x
BlogBench (Test: Write) at 4.857x
Flexible IO Tester (Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 3.849x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 3.684x.

Test Systems:

TR150 SSD: EXT4

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, 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,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

TR150 SSD: F2FS

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, File-System: f2fs, 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 / acl,active_logs=6,background_gc=on,extent_cache,flush_merge,inline_data,inline_dentry,inline_xattr,lazytime,mode=adaptive,no_heap,relatime,rw,user_xattr
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

TR150 SSD: Btrfs

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, File-System: btrfs, 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 / relatime,rw,space_cache,ssd,subvol=/,subvolid=5
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

TR150 SSD: XFS

Seagate HDD: XFS

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, File-System: xfs, 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 / attr2,inode64,noquota,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Seagate HDD: Btrfs

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, File-System: btrfs, 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 / relatime,rw,space_cache,subvol=/,subvolid=5
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Seagate HDD: EXT4

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 8192 MB DDR4-2666MT/s Micron 9ASF1G72PZ-2G6B1, Disk: 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.0-999-generic (x86_64) 20180323, Desktop: GNOME Shell 3.28.0, Display Server: X Server 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, 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,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.14+ + Python 3.6.5rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

WD500GB HDD ZFS ARC20G

Processor: 2 x Intel Xeon X5660 @ 2.80GHz (12 Cores), Motherboard: TYAN S7012 (V3.01 BIOS), Memory: 16384MB, Disk: 2 x 500GB Western Digital WD5000AAKX-0 + 4 x 500GB Samsung SSD 860, Graphics: astdrmfb, Monitor: DELL 2007FP

OS: Debian GNU/Linux 9, Kernel: 4.15.17-1-pve (x86_64), Compiler: GCC 6.3.0 20170516, File-System: zfs, Screen Resolution: 1600x1200, System Layer: lxc

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,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-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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Disk Scheduler Notes: NOOP
Python Notes: Python 2.7.13 + Python 3.5.3
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Samsung 860 EVO SSD ext4

Processor: 2 x Intel Xeon X5660 @ 2.80GHz (12 Cores), Motherboard: TYAN S7012 (V3.01 BIOS), Memory: 12 x 4096 MB 1333MHz Kingston, Disk: 2 x 500GB Western Digital WD5000AAKX-0 + 4 x 500GB Samsung SSD 860, Graphics: astdrmfb, Monitor: DELL 2007FP

OS: Debian GNU/Linux 9, Kernel: 4.15.17-1-pve (x86_64), Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1600x1200, System Layer: lxc

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,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-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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Disk Notes: NOOP / data=ordered,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.13 + Python 3.5.3

Linux 4.16 File-System Tests

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

	TR150 SSD: EXT4	TR150 SSD: F2FS	TR150 SSD: Btrfs	TR150 SSD: XFS	Seagate HDD: XFS	Seagate HDD: Btrfs	Seagate HDD: EXT4	WD500GB HDD ZFS ARC20G	Samsung 860 EVO SSD ext4
AIO-Stress - Rand Write (MB/s)	2301	**3018**	2936	2971	2979	2954	2410	681.70	**557.55**
Normalized	76.26%	100%	97.3%	98.47%	98.73%	97.89%	79.87%	22.59%	18.48%
Standard Deviation	3.5%	2.9%	2.3%	1.5%	1.3%	2.3%	2.9%	1.1%	7.6%
SQLite - T.S.I (sec)	41.27	**34.89**	99.08	36.76	417.70	**1012**	576.02	249.61	61.00
Normalized	84.54%	100%	35.21%	94.91%	8.35%	3.45%	6.06%	13.98%	57.2%
Standard Deviation	3.3%	3.4%	3.4%	3.4%	0.4%	0.4%	3.3%	1%	1.3%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (MB/s)	230	212	212	212	1.53	1.52	**1.45**		**498**
Normalized	46.18%	42.57%	42.57%	42.57%	0.31%	0.31%	0.29%		100%
Standard Deviation	0.8%	0.8%	0.5%		0.3%	0.3%	1.3%		8.4%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (IOPS)	58967	**54200**	54367	54400					**127333**
Normalized	46.31%	42.57%	42.7%	42.72%					100%
Standard Deviation	0.7%	0.6%	0.4%						8.5%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (MB/s)	275	**282**	73.28	273	1.17	23.02	**1.03**		190
Normalized	97.52%	100%	25.99%	96.81%	0.41%	8.16%	0.37%		67.38%
Standard Deviation	3.6%	1.1%	11.2%	3.5%	8.4%	178.8%	13.6%		6.8%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (IOPS)	70250	**72167**	**18750**	69967		27400			48683
Normalized	97.34%	100%	25.98%	96.95%		37.97%			67.46%
Standard Deviation	3.5%	1.1%	11.2%	3.5%					6.9%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (MB/s)	227	228	327	202	148	**1.54**	155		**545**
Normalized	41.65%	41.83%	60%	37.06%	27.16%	0.28%	28.44%		100%
Standard Deviation		0.5%	3.3%	1.5%		0.8%	7.1%		3.2%

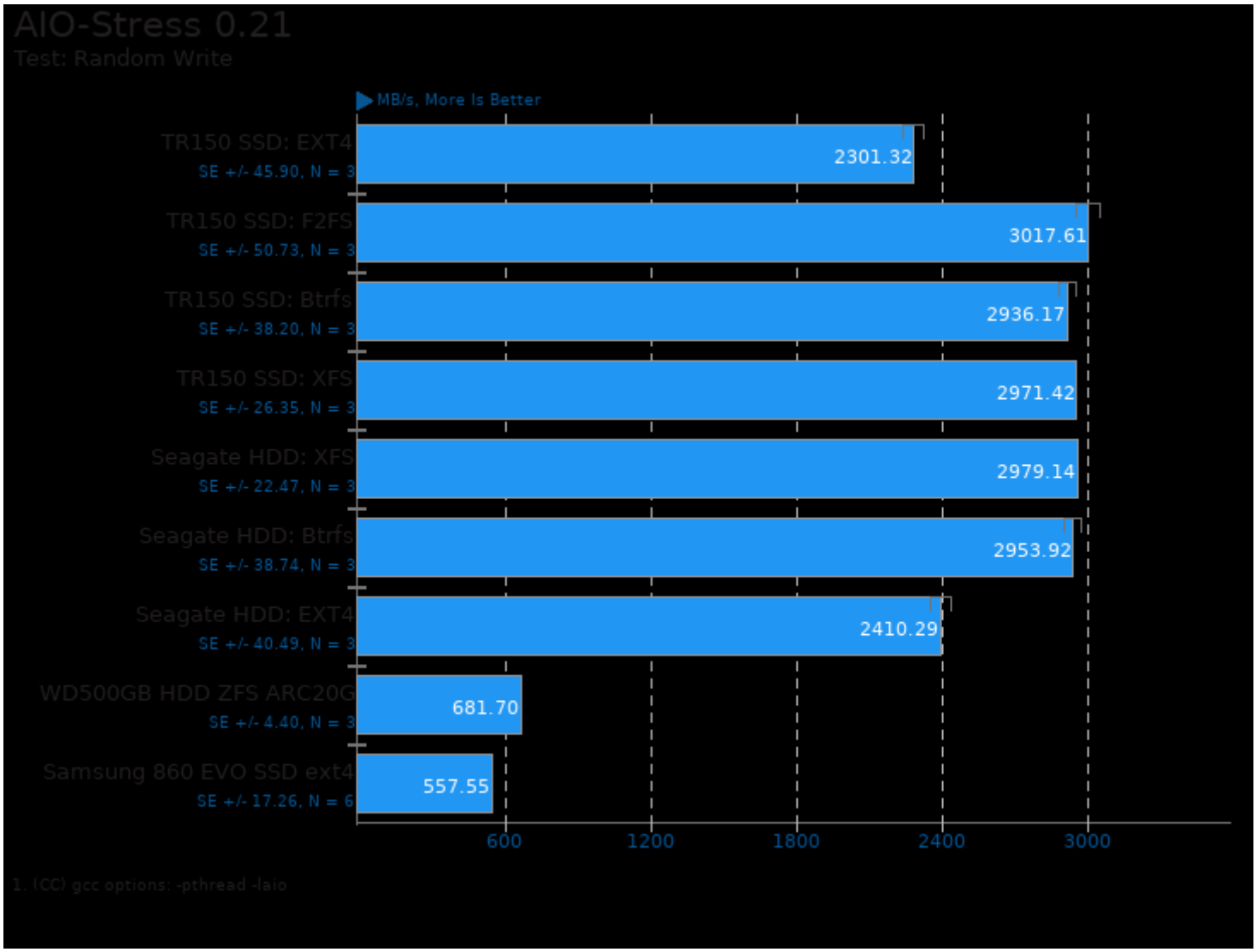
Linux 4.16 File-System Tests

Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (IOPS)	58300	58467	83633	51667	**37800**		39767		**139250**
Normalized	41.87%	41.99%	60.06%	37.1%	27.15%		28.56%		100%
Standard Deviation	0.3%	0.4%	3.2%	1.6%			7.2%		3.1%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (MB/s)	413	**416**	83.68	395	145	**4.04**	149		173
Normalized	99.28%	100%	20.12%	94.95%	34.86%	0.97%	35.82%		41.59%
Standard Deviation	1.5%	0.7%	14.5%	12.7%	3.5%	6.4%	3.5%		9.4%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (IOPS)	106000	**106333**	**21500**	101167	37050		38233		44200
Normalized	99.69%	100%	20.22%	95.14%	34.84%		35.96%		41.57%
Standard Deviation	1.6%	0.5%	14.1%	13.2%	3.3%		3.6%		9.5%
BlogBench - Read (Final Score)	2097180	2054932	2269750	2084376	2197243	2293433	**2415373**	1109674	**826832**
Normalized	86.83%	85.08%	93.97%	86.3%	90.97%	94.95%	100%	45.94%	34.23%
Standard Deviation	0.5%	17.5%	1%	4.4%	3.1%	0.1%	1.2%	1.9%	9.3%
BlogBench - Write (Final Score)	**10325**	9156	3458	4039	**2126**	2370	6473	4539	7273
Normalized	100%	88.68%	33.49%	39.12%	20.59%	22.95%	62.69%	43.96%	70.44%
Standard Deviation	1.5%	1.6%	1.3%	4%	3.3%	3.4%	0.6%	9.6%	9.5%
Dbench - 6 (MB/s)	369.21	276.31	247.49	**442.69**	**20.21**	45.74	25.73	110.86	108.90
Normalized	83.4%	62.42%	55.91%	100%	4.57%	10.33%	5.81%	25.04%	24.6%
Standard Deviation	5.5%	0.1%	2%	0.8%	0.1%	3.1%	6.4%	1.9%	0.6%
IOzone - 4Kb - 8GB - Write Performance (MB/s)	103.49	**88.99**	93.20	96.10	153.08	161.01	155.45	**397.13**	231.31
Normalized	26.06%	22.41%	23.47%	24.2%	38.55%	40.54%	39.14%	100%	58.25%
Standard Deviation	4.3%	5.7%	9%	12.5%	2.1%	10%	5.8%	1.5%	1.4%
Compile Bench - Compile (MB/s)	1687	**2272**	1372	2101	2093	2178	1679	938.09	**354.00**
Normalized	74.23%	100%	60.38%	92.49%	92.11%	95.86%	73.89%	41.29%	15.58%
Standard Deviation	1.3%	5.9%	4.4%	0.4%	0.2%	2.9%	1%	1.2%	7.3%
Compile Bench - Initial Create (MB/s)	505.73	**550.41**	109.66	395.06	402.86	262.66	494.62	**96.74**	163.52
Normalized	91.88%	100%	19.92%	71.78%	73.19%	47.72%	89.86%	17.58%	29.71%
Standard Deviation	2.8%	3.1%	23.3%	2.1%	3.9%	4.5%	3.9%	1.6%	12.1%
Compile Bench - Read Compiled Tree	837.97	878.02	881.31	**892.28**	833.32	804.92	801.75	**600.14**	843.88
Normalized	93.91%	98.4%	98.77%	100%	93.39%	90.21%	89.85%	67.26%	94.58%
Standard Deviation	9.2%	1.3%	2.2%	1.3%	2.6%	1.5%	2.9%	1.3%	6.6%
Unpacking The Linux Kernel - linux-4.15.tar.xz	**6.40**	6.67	9.44	6.82	7.65	7.25	6.67	**11.26**	8.71
Normalized	100%	95.95%	67.8%	93.84%	83.66%	88.28%	95.95%	56.84%	73.48%
Standard Deviation	1.2%	3.5%	3.4%	3.4%	6.1%	6.1%	3.6%	1.4%	8.6%

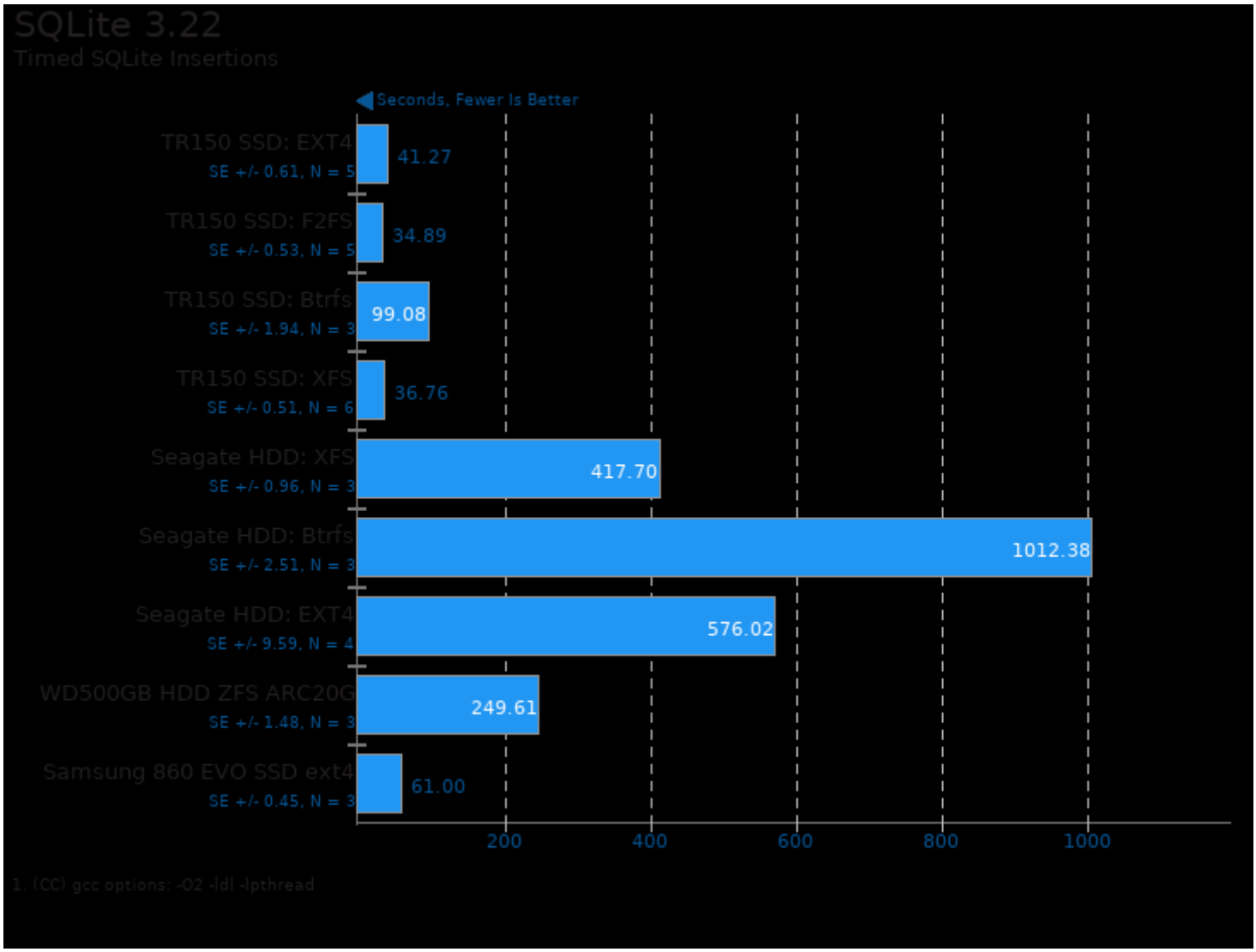
Linux 4.16 File-System Tests

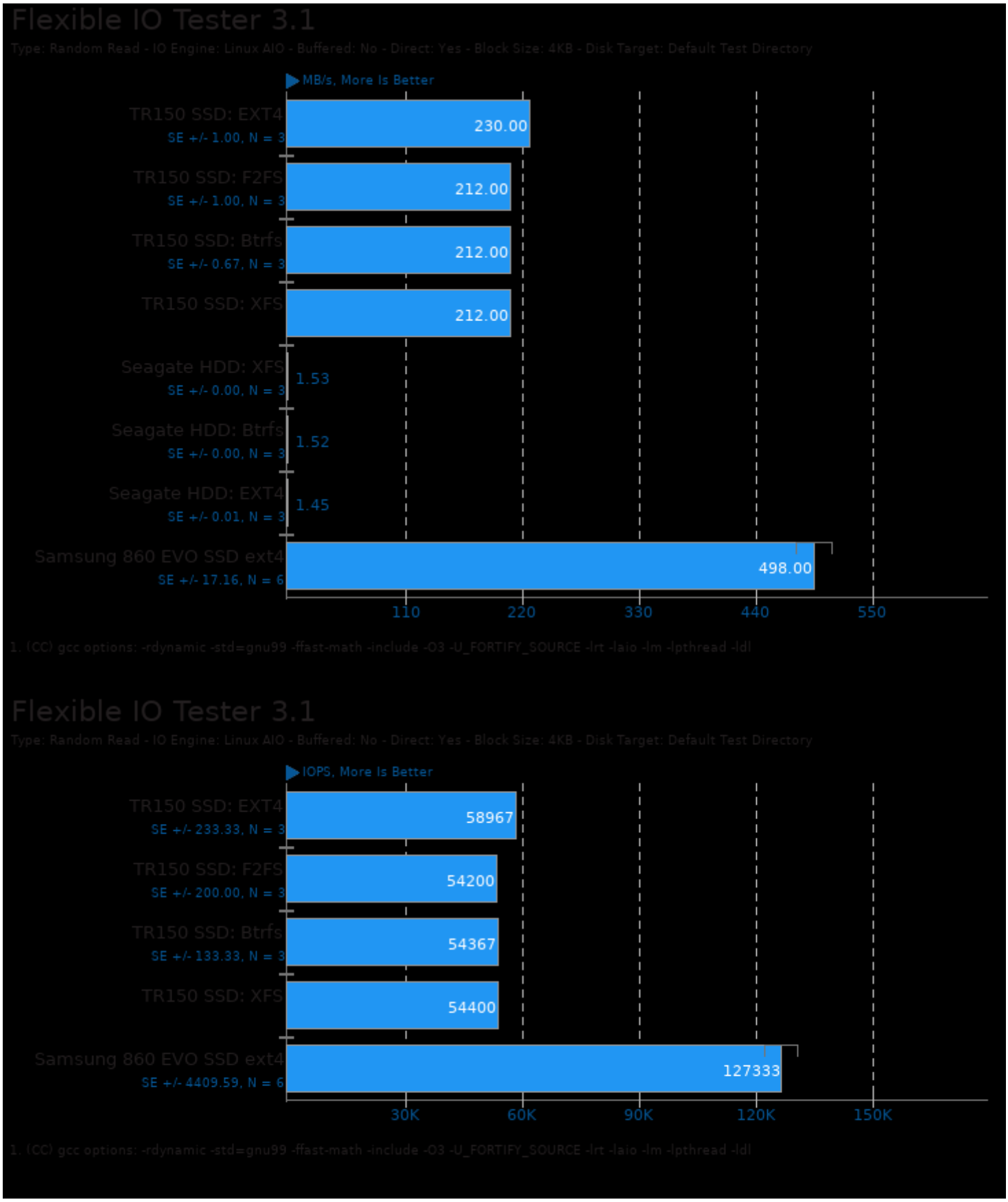
Git - T.T.C.C.G.C (sec)	**6.31**	6.40	6.36	6.65	6.76	6.59	6.57	**11.39**	10.72
Normalized	100%	98.59%	99.21%	94.89%	93.34%	95.75%	96.04%	55.4%	58.86%
Standard Deviation	0.8%	1.3%	2%	3.1%	2.5%	3.5%	6.5%	0.6%	8.5%

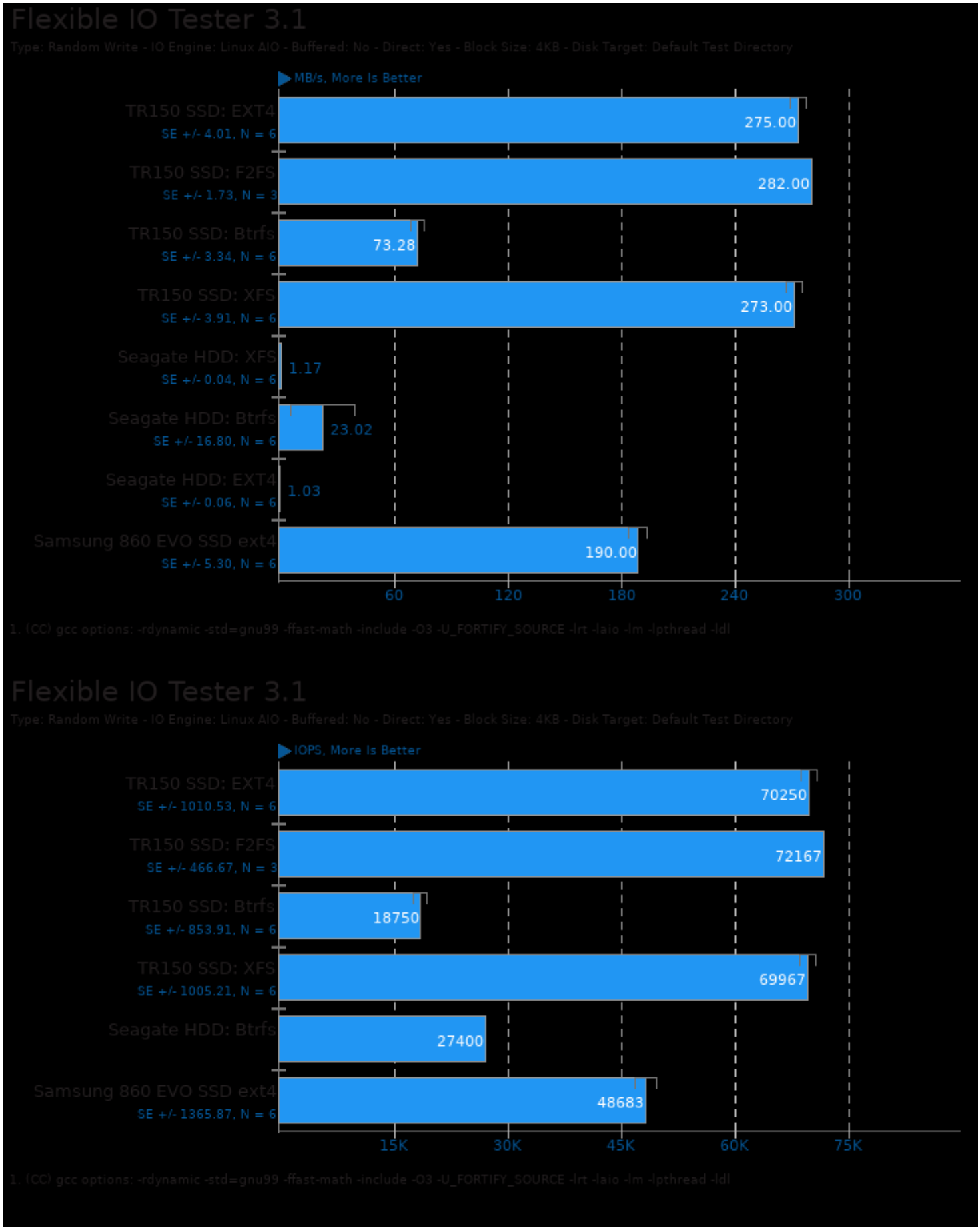
Linux 4.16 File-System Tests



Linux 4.16 File-System Tests

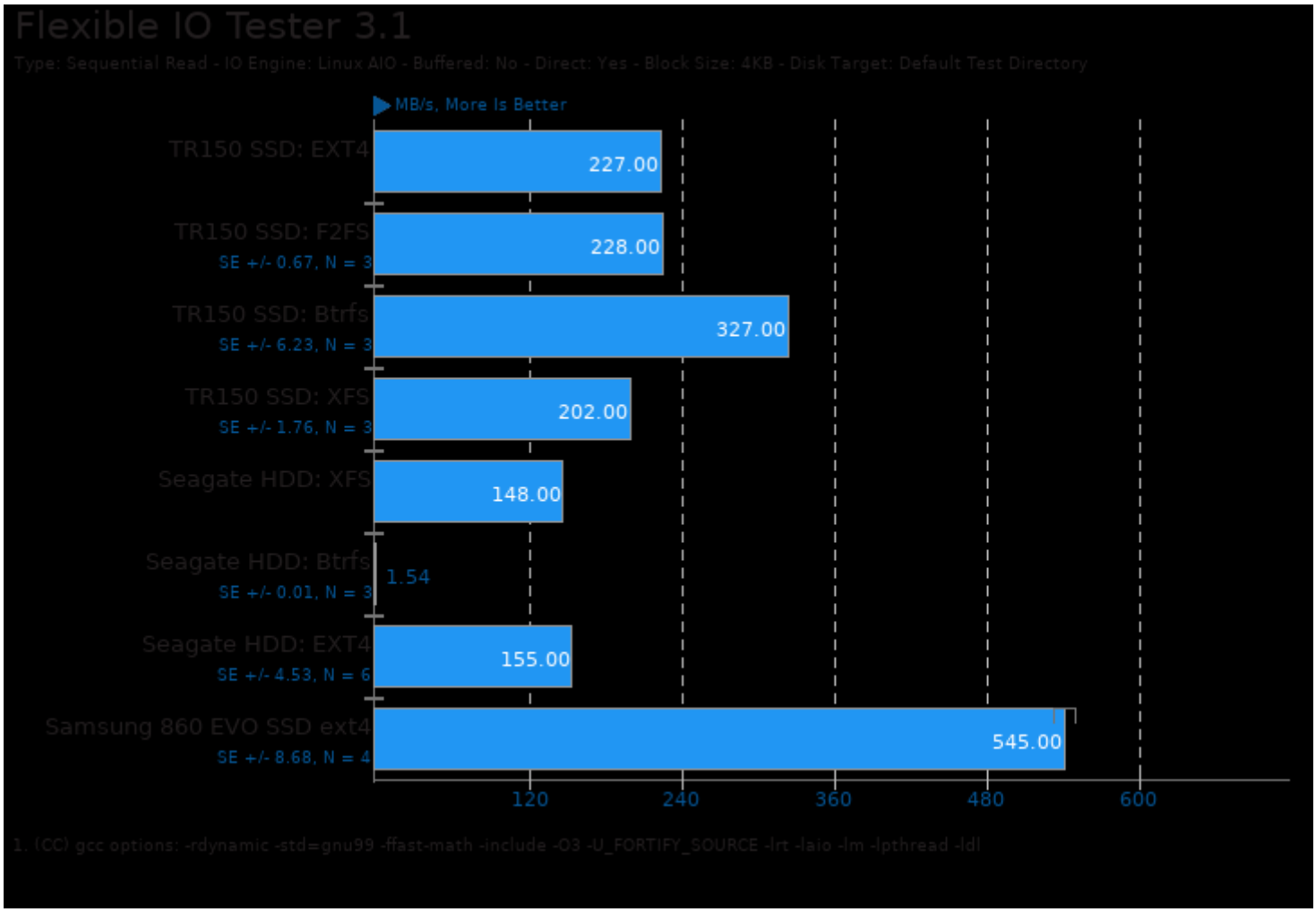



Flexible IO Tester 3.1
Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
TR150 SSD: EXT4
SE +/- 1.00, N = 3
230.00
TR150 SSD: F2FS
SE +/- 1.00, N = 3
212.00
TR150 SSD: Btrfs
SE +/- 0.67, N = 3
212.00
TR150 SSD: XFS
212.00
Seagate HDD: XFS
SE +/- 0.00, N = 3
1.53
Seagate HDD: Btrfs
SE +/- 0.00, N = 3
1.52
Seagate HDD: EXT4
SE +/- 0.01, N = 3
1.45
Samsung 860 EVO SSD ext4
SE +/- 17.16, N = 6
498.00
110
220
330
440
550
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
TR150 SSD: EXT4
SE +/- 233.33, N = 3
58967
TR150 SSD: F2FS
SE +/- 200.00, N = 3
54200
TR150 SSD: Btrfs
SE +/- 133.33, N = 3
54367
TR150 SSD: XFS
54400
Samsung 860 EVO SSD ext4
SE +/- 4409.59, N = 6
127333
30K
60K
90K
120K
150K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lm -lpthread -ldl

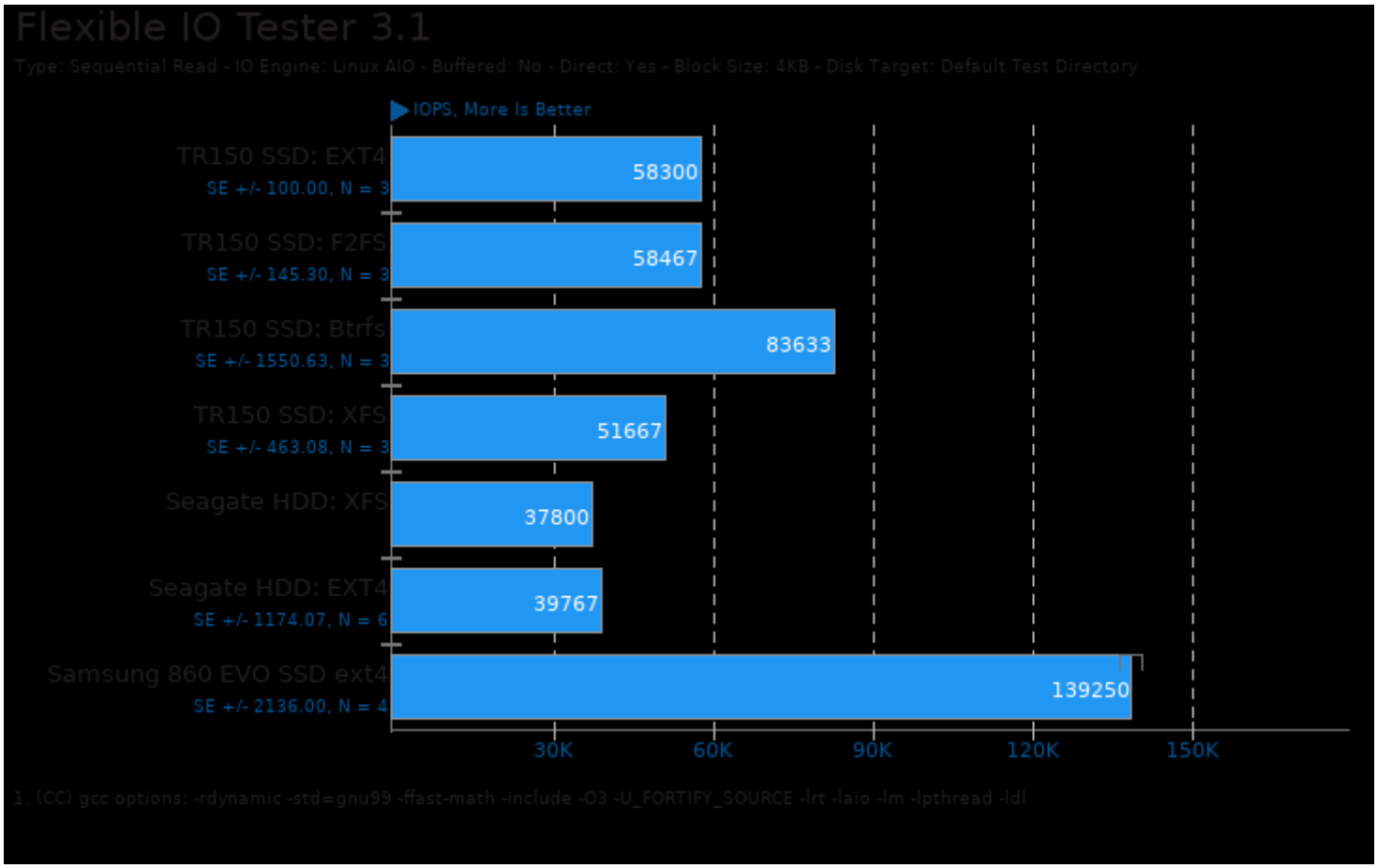

Flexible IO Tester 3.1
Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
TR150 SSD: EXT4
SE +/- 4.01, N = 6
275.00
TR150 SSD: F2FS
SE +/- 1.73, N = 3
282.00
TR150 SSD: Btrfs
SE +/- 3.34, N = 6
73.28
TR150 SSD: XFS
SE +/- 3.91, N = 6
273.00
Seagate HDD: XFS
SE +/- 0.04, N = 6
1.17
Seagate HDD: Btrfs
SE +/- 16.80, N = 6
23.02
Seagate HDD: EXT4
SE +/- 0.06, N = 6
1.03
Samsung 860 EVO SSD ext4
SE +/- 5.30, N = 6
190.00
60
120
180
240
300
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lm -lpthread -ldl

Flexible IO Tester 3.1
Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
TR150 SSD: EXT4
SE +/- 1010.53, N = 6
70250
TR150 SSD: F2FS
SE +/- 466.67, N = 3
72167
TR150 SSD: Btrfs
SE +/- 853.91, N = 6
18750
TR150 SSD: XFS
SE +/- 1005.21, N = 6
69967
Seagate HDD: Btrfs
27400
Samsung 860 EVO SSD ext4
SE +/- 1365.87, N = 6
48683
15K
30K
45K
60K
75K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lm -lpthread -ldl

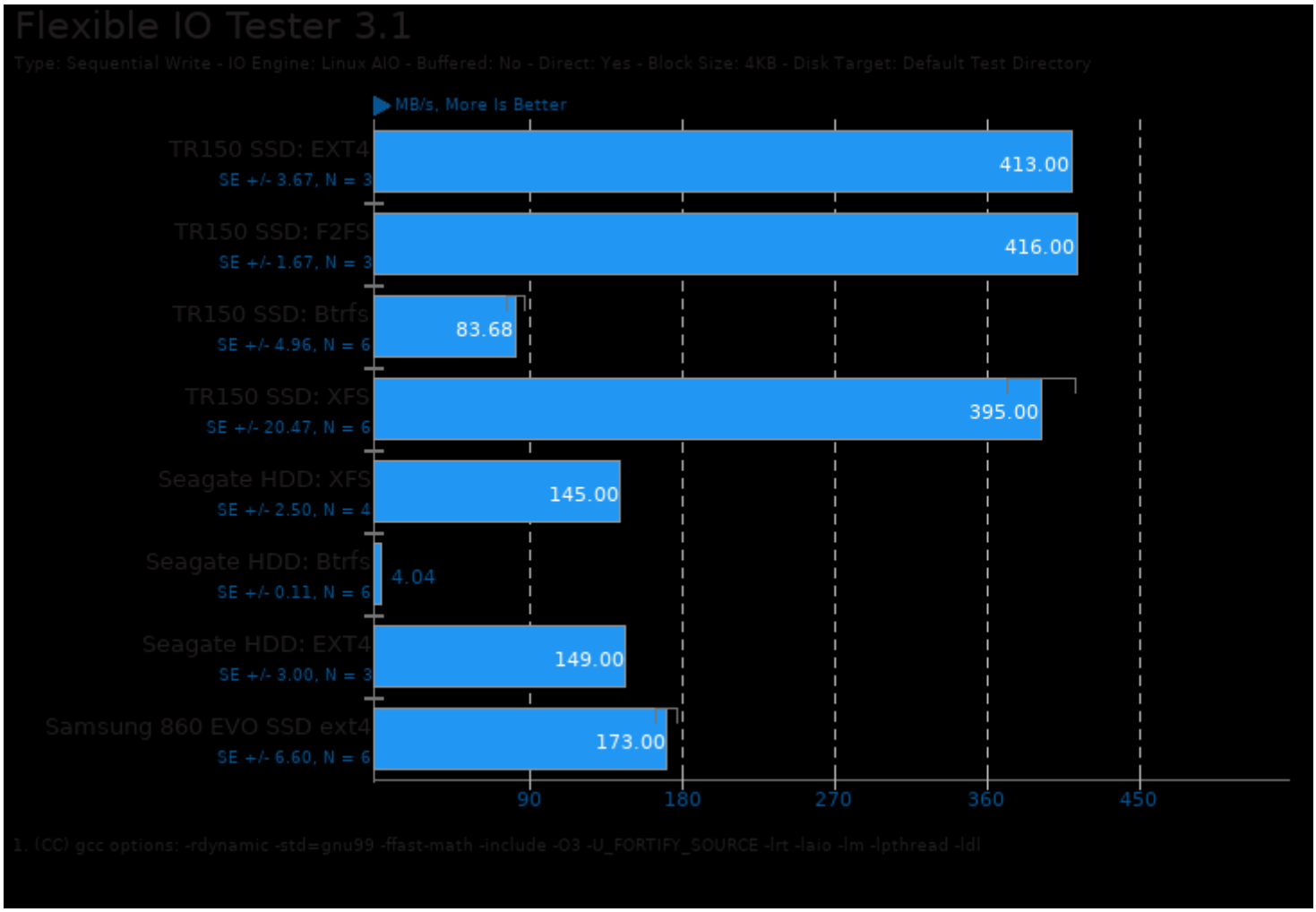
Linux 4.16 File-System Tests

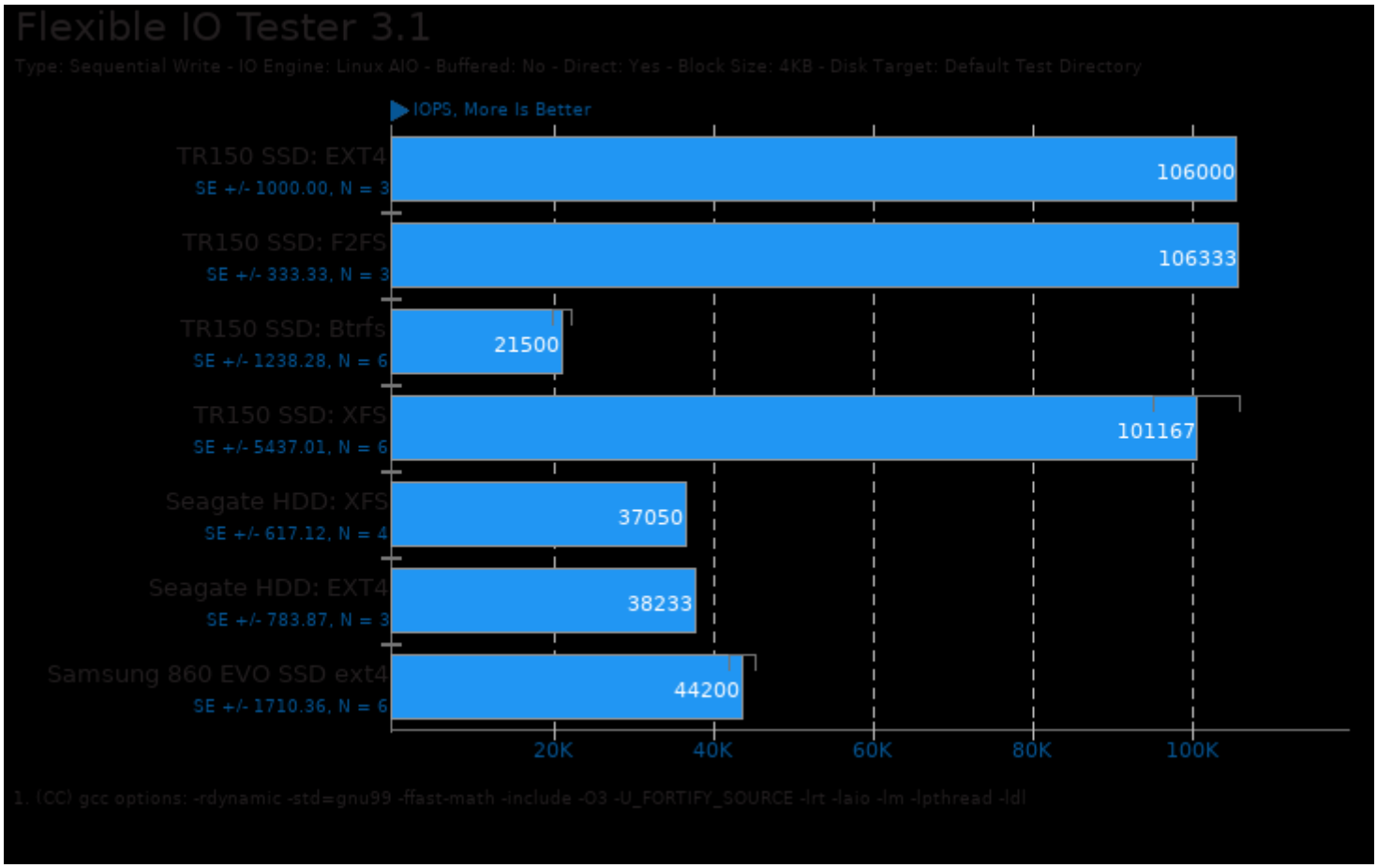


Linux 4.16 File-System Tests

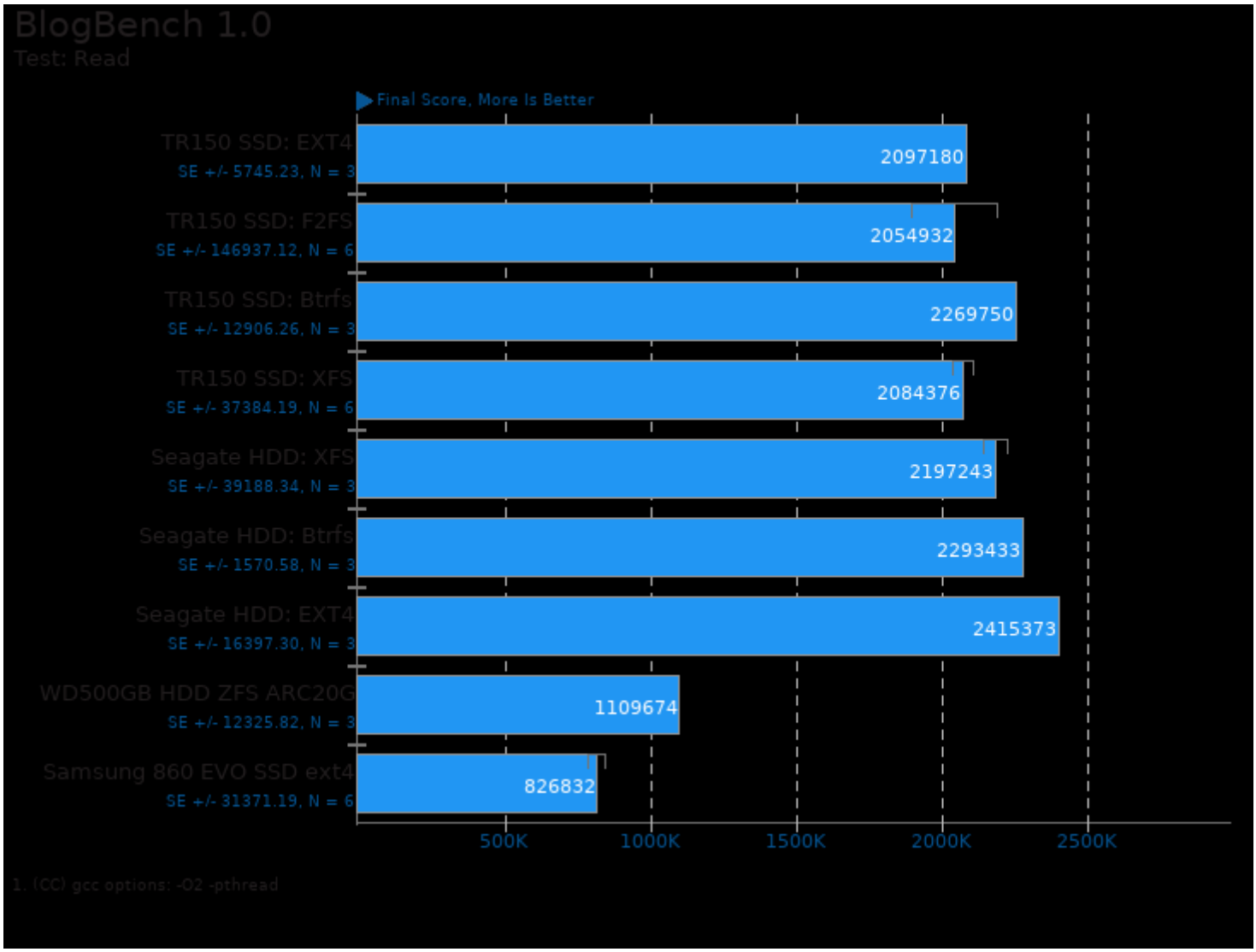


Linux 4.16 File-System Tests

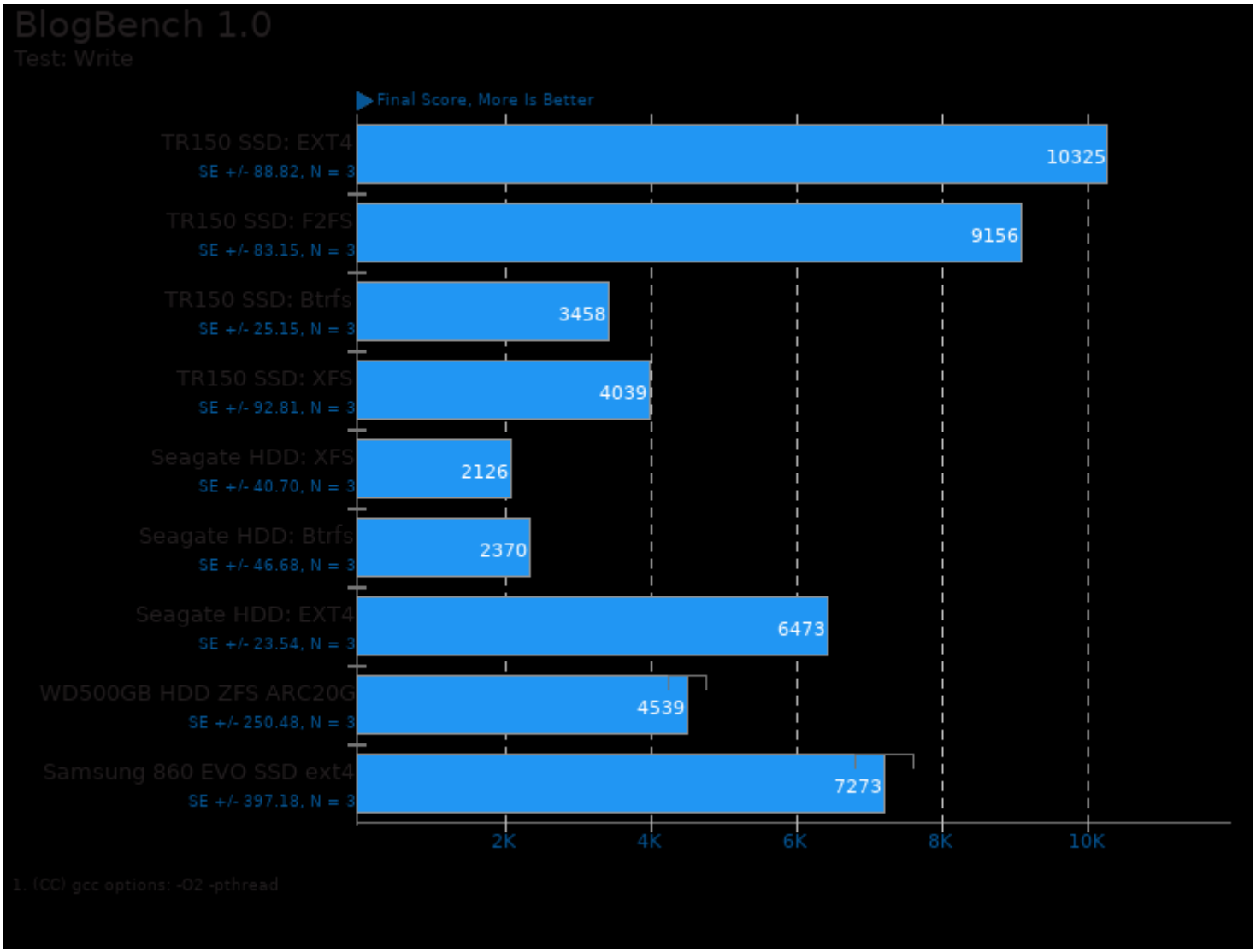



Flexible IO Tester 3.1
Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
TR150 SSD: EXT4
SE +/- 1000.00, N = 3
106000
TR150 SSD: F2FS
SE +/- 333.33, N = 3
106333
TR150 SSD: Btrfs
SE +/- 1238.28, N = 6
21500
TR150 SSD: XFS
SE +/- 5437.01, N = 6
101167
Seagate HDD: XFS
SE +/- 617.12, N = 4
37050
Seagate HDD: EXT4
SE +/- 783.87, N = 3
38233
Samsung 860 EVO SSD ext4
SE +/- 1710.36, N = 6
44200
20K
40K
60K
80K
100K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lm -lpthread -ldl

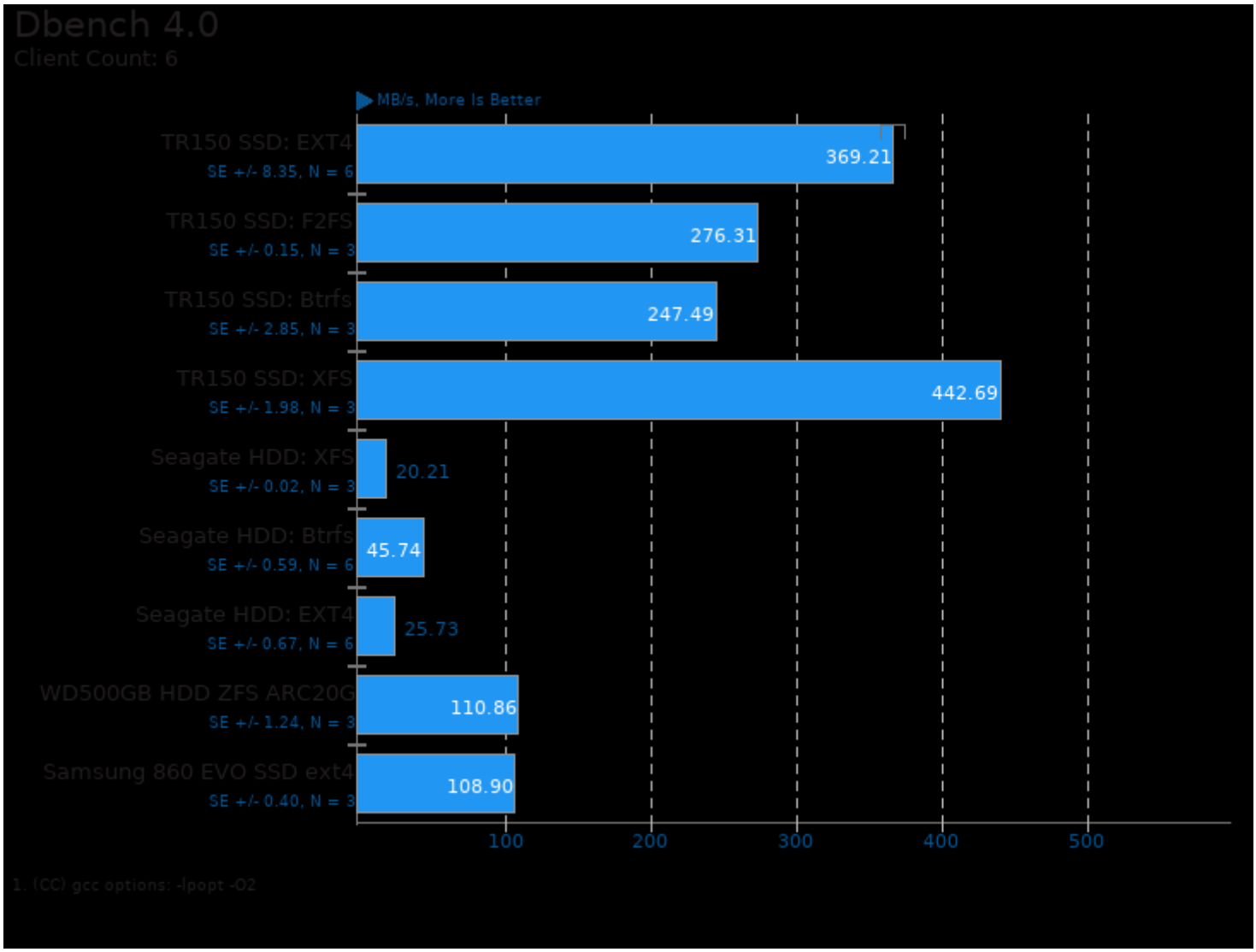
Linux 4.16 File-System Tests

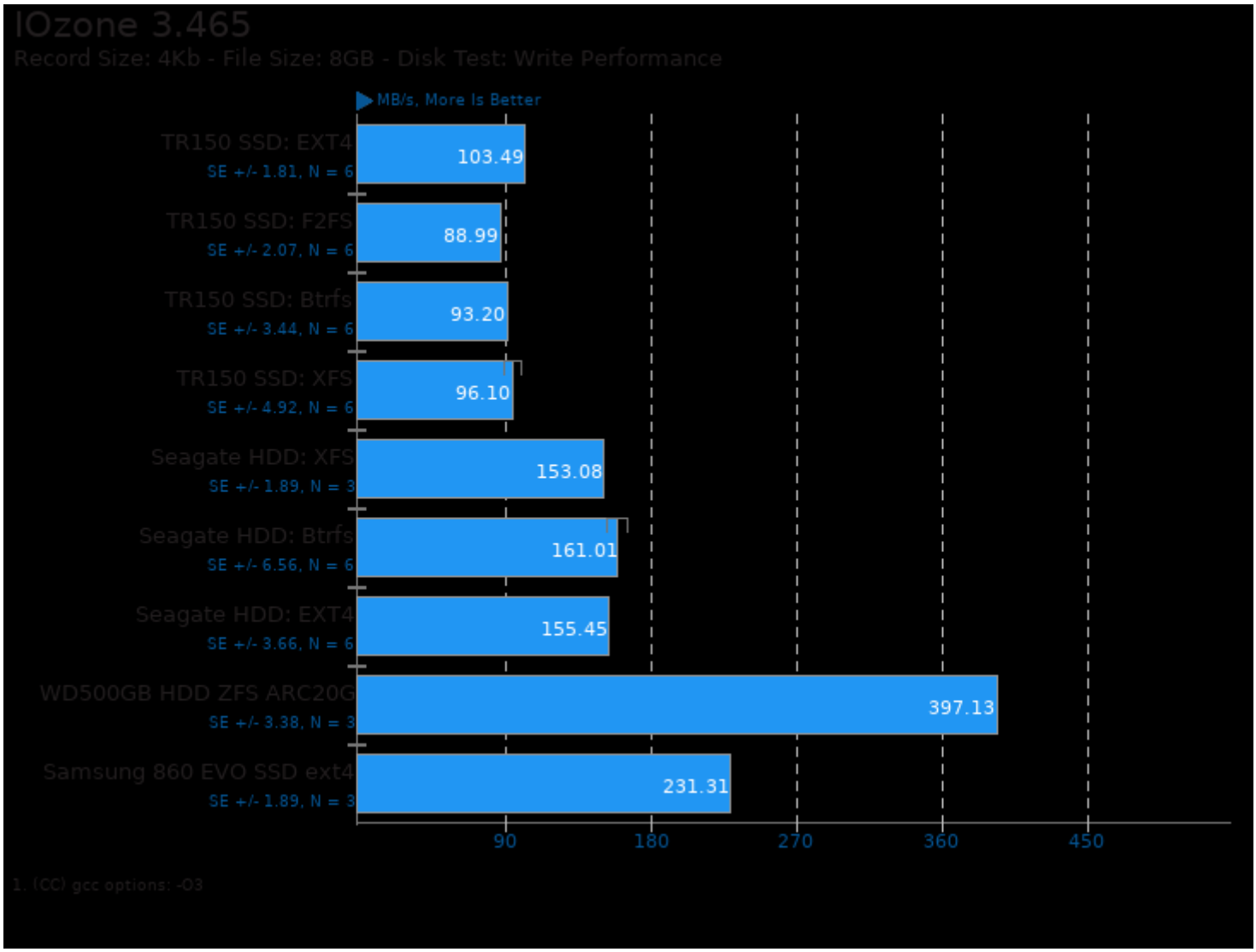


Linux 4.16 File-System Tests

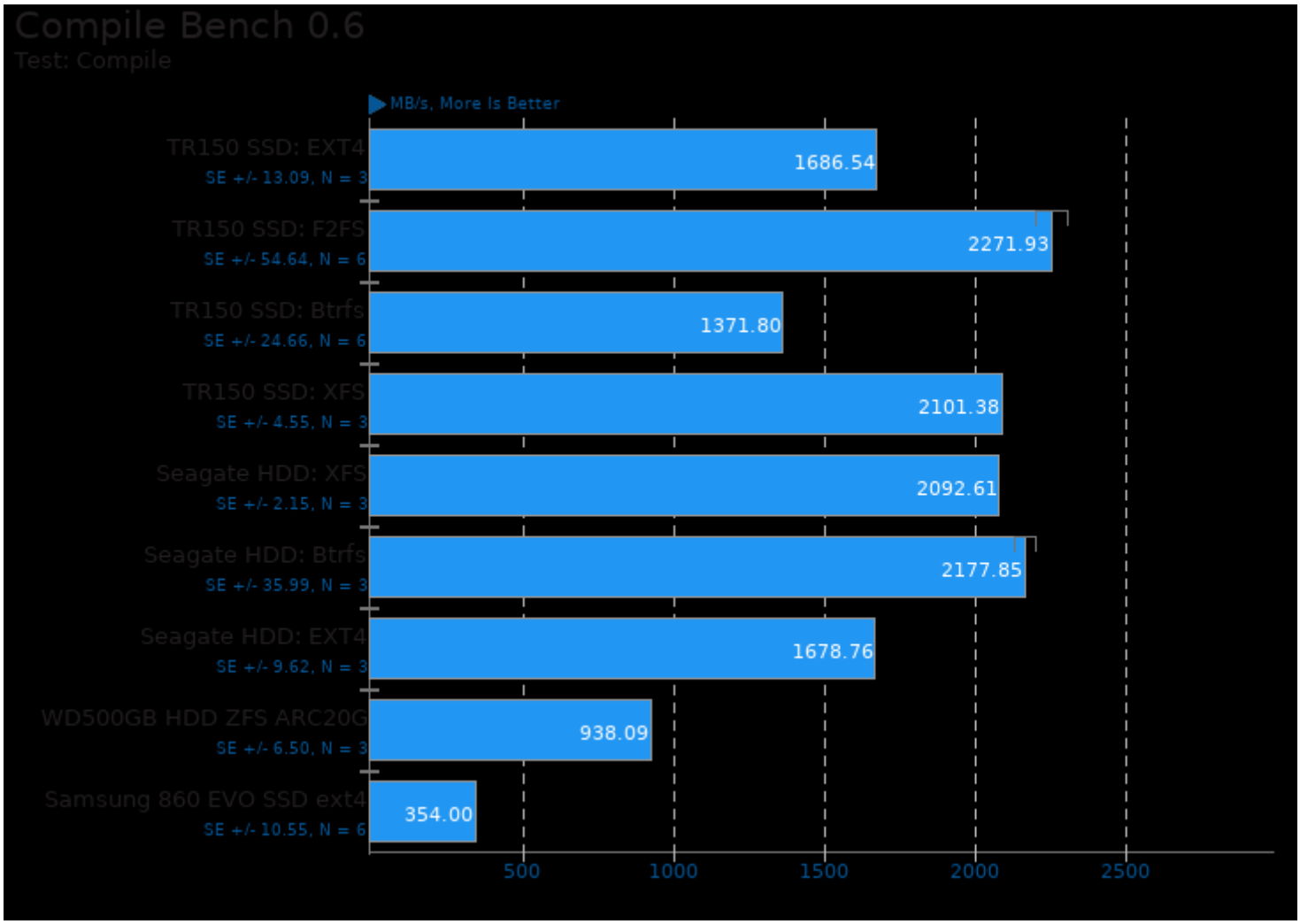


Linux 4.16 File-System Tests

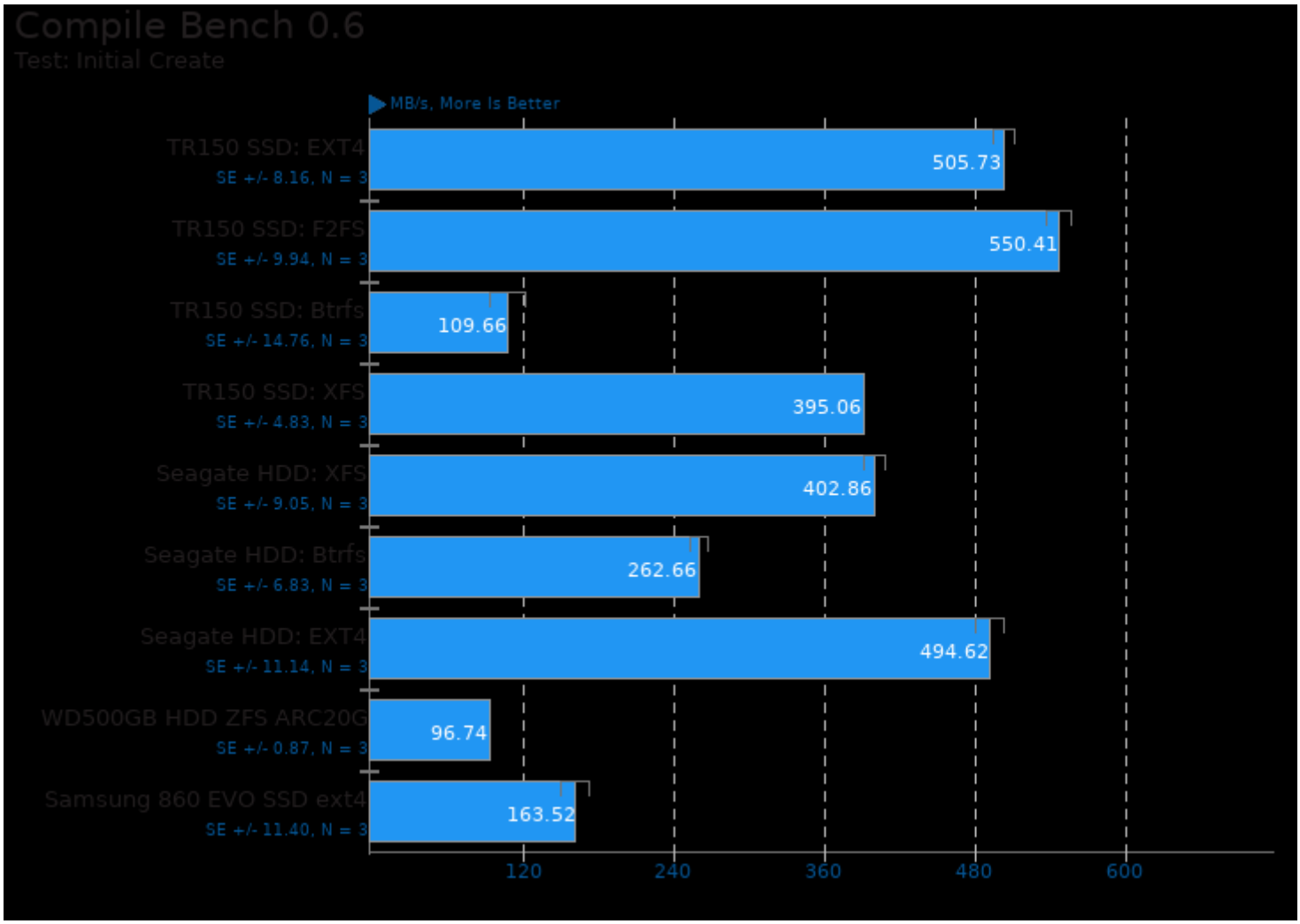



IOzone 3.465
Record Size: 4Kb - File Size: 8GB - Disk Test: Write Performance
MB/s, More Is Better
TR150 SSD: EXT4
SE +/- 1.81, N = 6
103.49
TR150 SSD: F2FS
SE +/- 2.07, N = 6
88.99
TR150 SSD: Btrfs
SE +/- 3.44, N = 6
93.20
TR150 SSD: XFS
SE +/- 4.92, N = 6
96.10
Seagate HDD: XFS
SE +/- 1.89, N = 3
153.08
Seagate HDD: Btrfs
SE +/- 6.56, N = 6
161.01
Seagate HDD: EXT4
SE +/- 3.66, N = 6
155.45
WD500GB HDD ZFS ARC20G
SE +/- 3.38, N = 3
397.13
Samsung 860 EVO SSD ext4
SE +/- 1.89, N = 3
231.31
90
180
270
360
450
1. (CC) gcc options: -O3

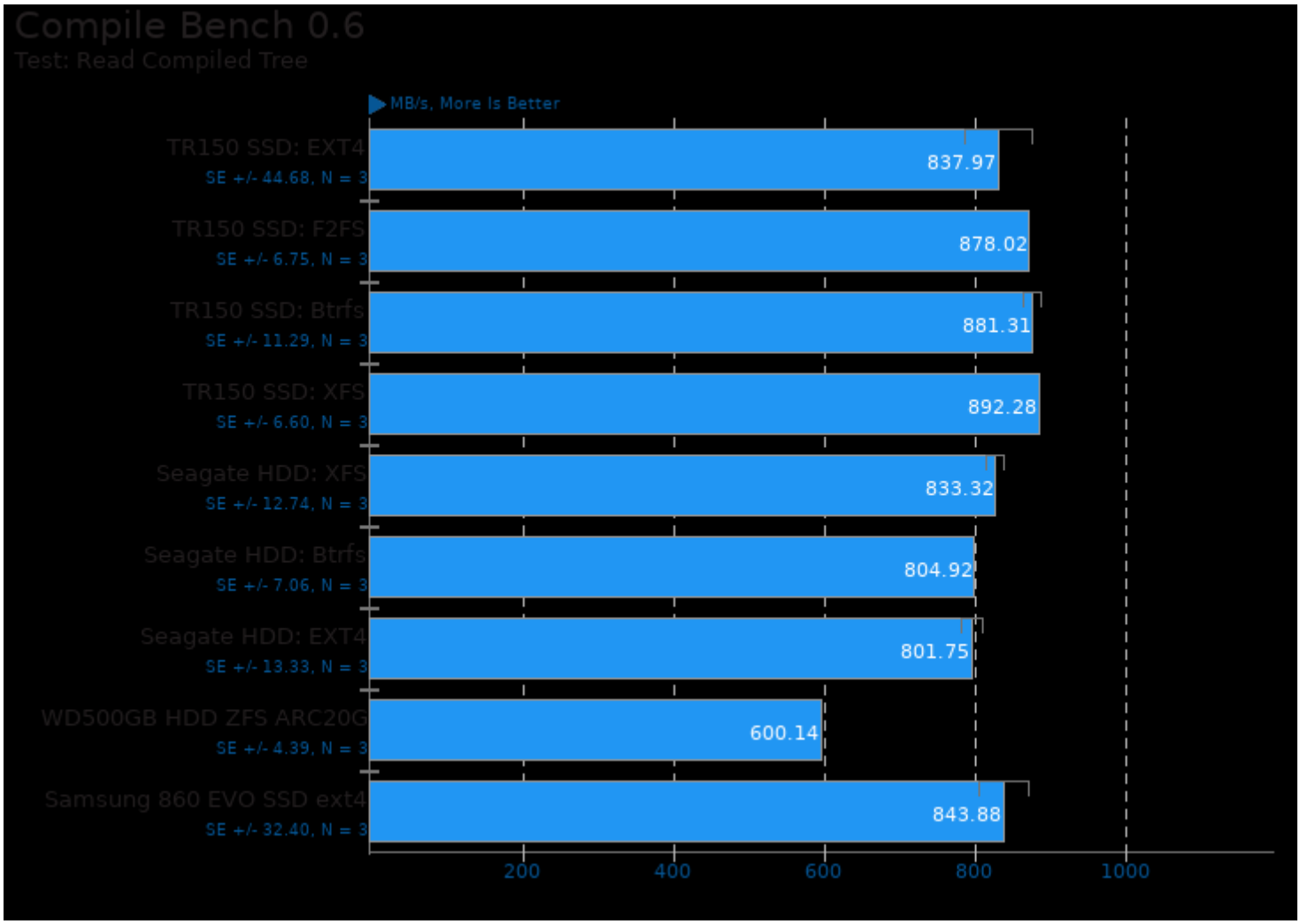
Linux 4.16 File-System Tests



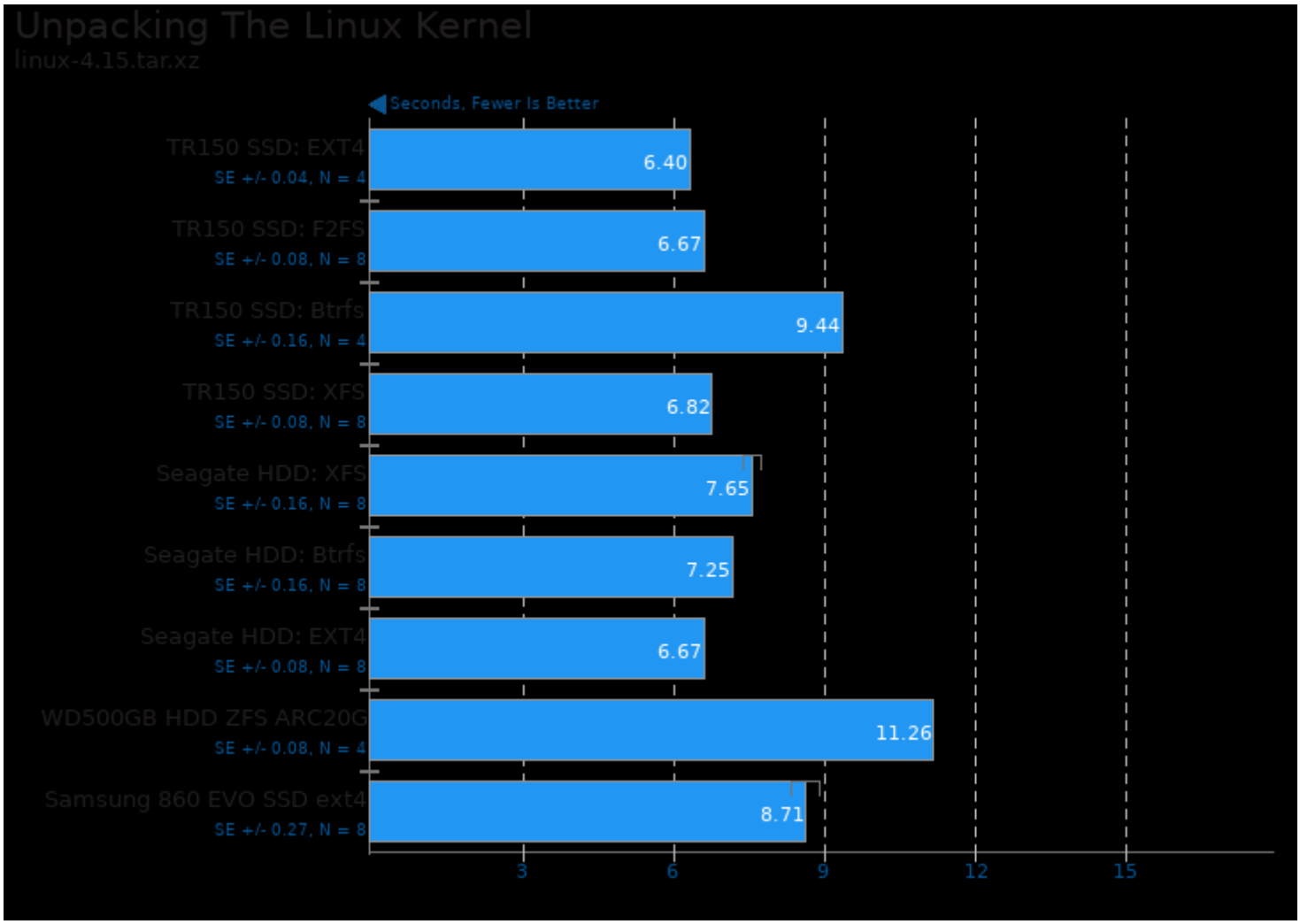
Linux 4.16 File-System Tests



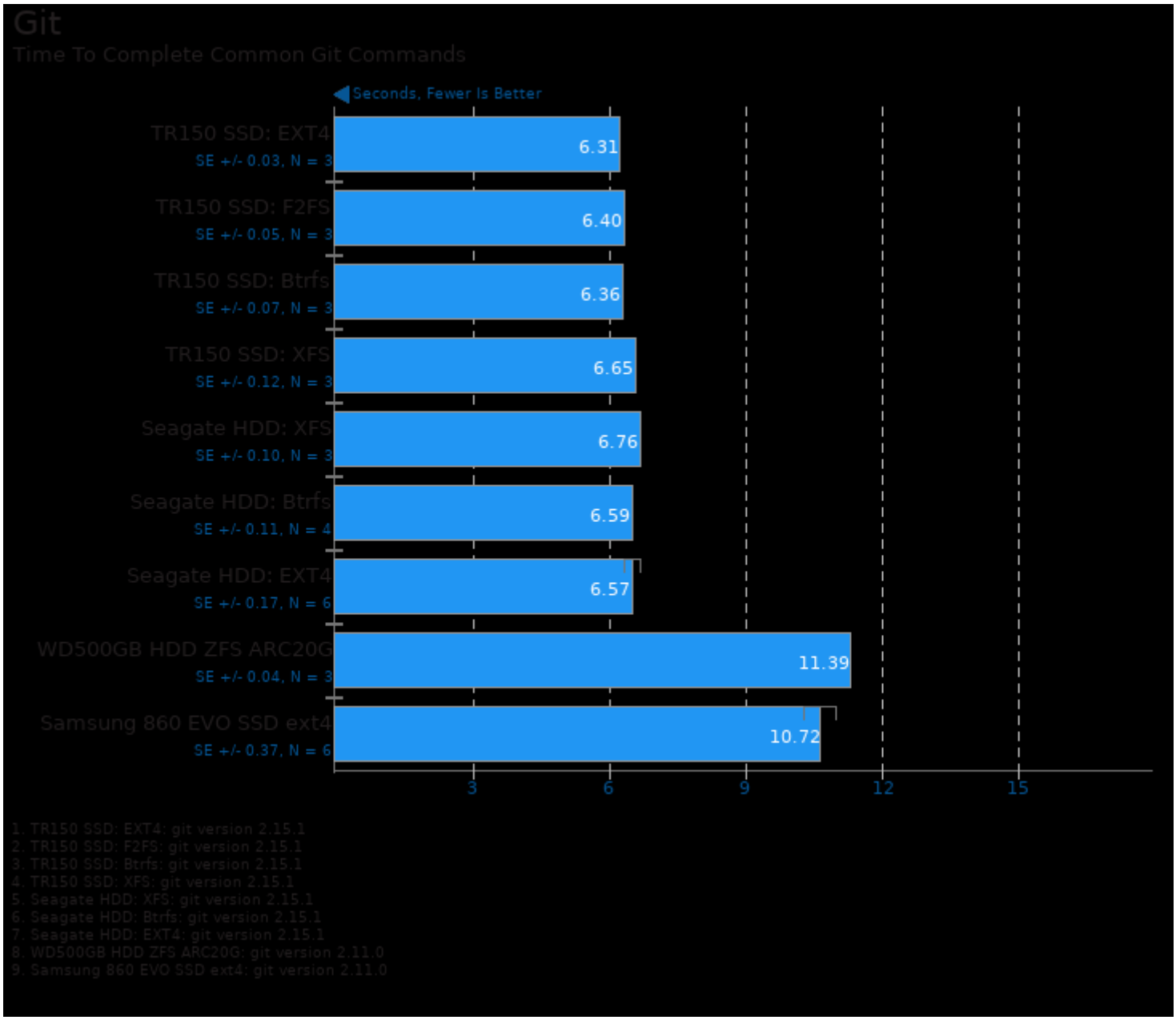
Linux 4.16 File-System Tests



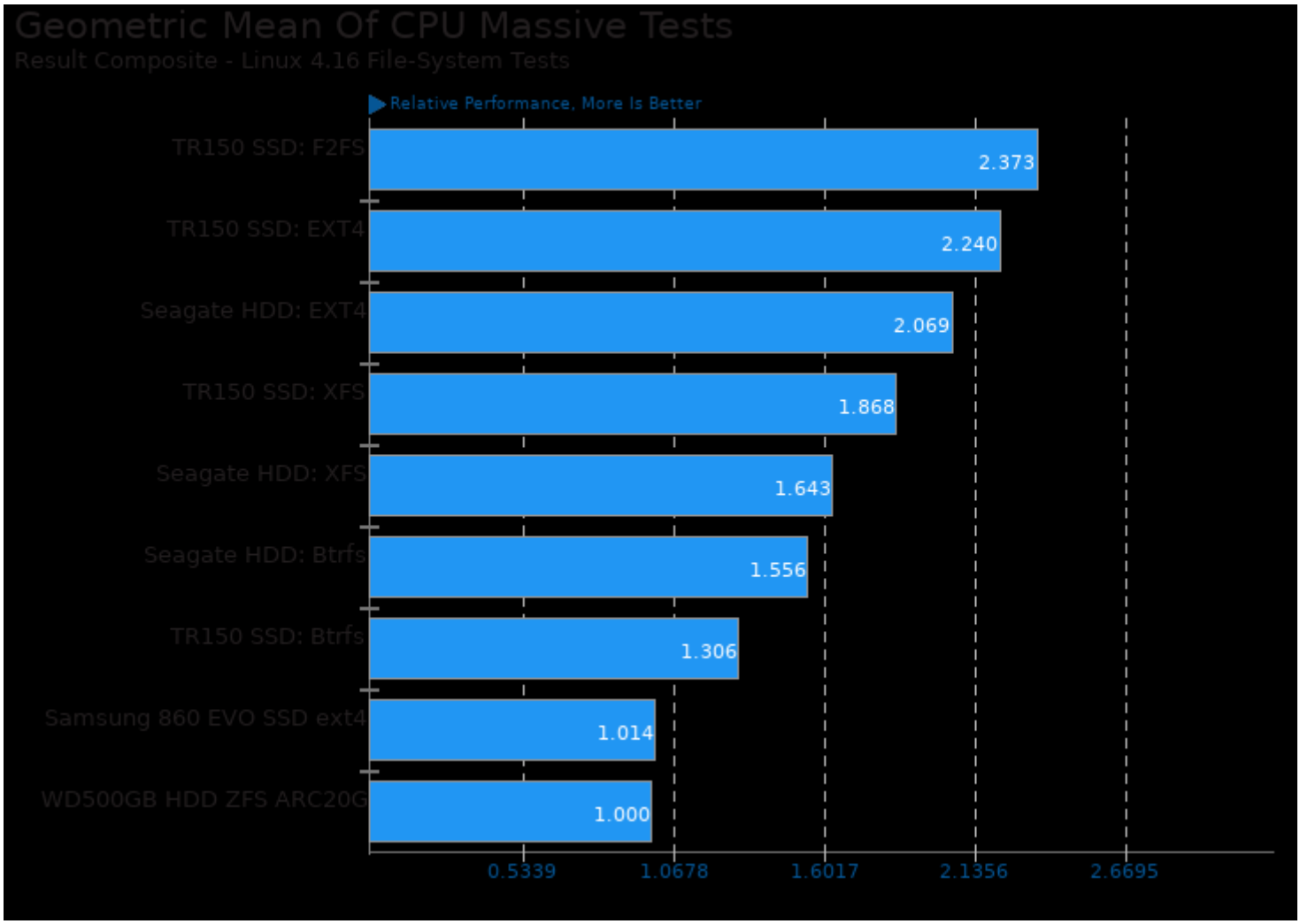
Linux 4.16 File-System Tests



Linux 4.16 File-System Tests

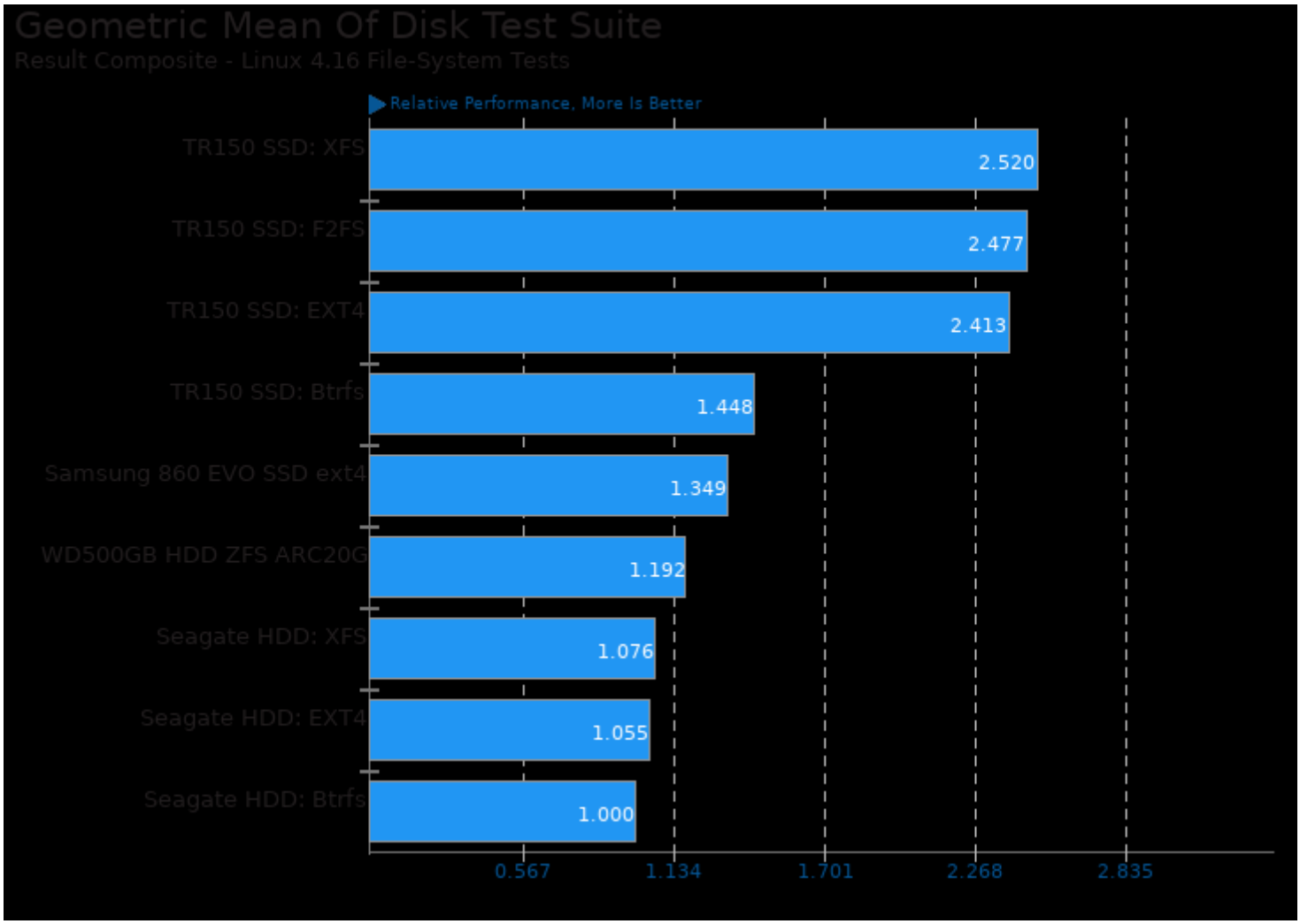


These geometric means are based upon test groupings / test suites for this result file.



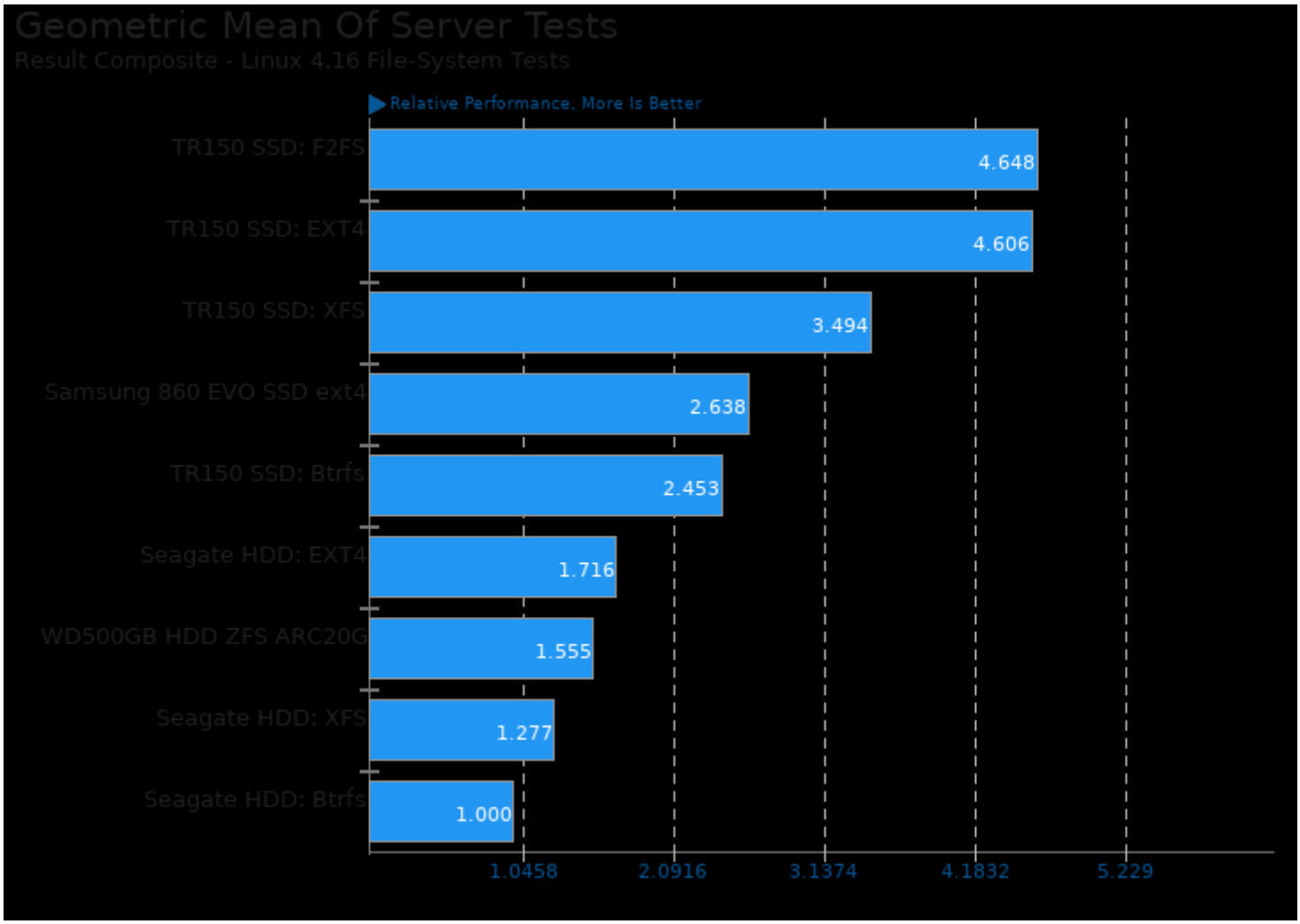
Geometric mean based upon tests: pts/blogbench and pts/compilebench

Linux 4.16 File-System Tests



Geometric mean based upon tests: pts/sqlite, pts/compilebench, pts/iozone, pts/dbench and pts/fio

Linux 4.16 File-System Tests



Geometric mean based upon tests: pts/blogbench and pts/sqlite

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 05:35.