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optane

2 x Intel Xeon Platinum 8380 testing with a Supermicro X12DPi-NT6 v1.00 (1.0a BIOS) and llvmpipe on Fedora 34 via the Phoronix Test Suite.

Automated Executive Summary

Optane had the most wins, coming in first place for 54% of the tests.

Based on the geometric mean of all complete results, the fastest (Optane) was 1.319x the speed of the slowest (4 way P4511 Raid0). Optane + Xeon 8380 2 was 0.882x the speed of Optane and 4 way P4511 Raid0 was 0.859x the speed of Optane + Xeon 8380 2.

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

Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane) at 13.156x
Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane) at 13.014x
Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane) at 10.216x
Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane) at 9.874x

Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane) at 6.825x
Threaded I/O Tester (Test: Random Write - Size Per Thread: 32MB - Thread Count: 4) at 1.819x
Threaded I/O Tester (Test: Write - Size Per Thread: 128MB - Thread Count: 4) at 1.6x
Flexible IO Tester (Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16MB - Disk Target: /home/w/optane) at 1.56x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane) at 1.285x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane) at 1.284x.

Test Systems:

Optane + Xeon 8380 2

Processor: 2 x Intel Xeon Platinum 8380 @ 3.40GHz (80 Cores / 160 Threads), Motherboard: Supermicro X12DPi-NT6 v1.00 (1.0a BIOS), Chipset: Intel Device 0998, Memory: 8 x 64 GB DDR4-3200MT/s Micron 36ASF8G72PZ-3G2B2, Disk: 4 x 1000GB INTEL SSDPELKX010T8 + 800GB INTEL SSDPF21Q800GB, Graphics: llvmpipe, Monitor: DELL P1914S, Network: 2 x Intel 10G X550T

OS: Fedora 34, Kernel: 5.12.12-300.fc34.x86_64 (x86_64), Desktop: GNOME Shell 40.2, Display Server: X Server 1.20.11, OpenGL: 4.5 Mesa 21.1.3 (LLVM 12.0.0 256 bits), Compiler: GCC 11.1.1 20210531, File-System: ext4, Screen Resolution: 1280x1024

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-redhat-linux --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,d,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=i686 --with-gcc-major-version-only --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Disk Notes: NONE / relatime,rw,seclabel,stripe=512 / raid0 nvme2n1p3[2] nvme0n1p3[0] nvme1n1p3[1] nvme3n1p3[3] Block Size: 4096
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xd0001b2
Python Notes: Python 3.9.5
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

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4 way P4511 Raid0

Processor: 2 x Intel Xeon Platinum 8380 @ 3.40GHz (80 Cores / 160 Threads), Motherboard: Supermicro X12DPi-NT6 v1.00 (1.0a BIOS), Chipset: Intel Device 0998, Memory: 504GB, Disk: 4 x 1000GB INTEL SSDPELKX010T8 + 800GB INTEL SSDPF21Q800GB, Graphics: llvmpipe, Monitor: DELL P1914S, Network: 2 x Intel 10G X550T

OS: Fedora 34, Kernel: 5.12.12-300.fc34.x86_64 (x86_64), Desktop: GNOME Shell 40.2, Display Server: X Server 1.20.11, OpenGL: 4.5 Mesa 21.1.3 (LLVM 12.0.0 256 bits), Compiler: GCC 11.1.1 20210531, File-System: ext4, Screen Resolution: 1280x1024

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-redhat-linux --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,d,lto --enable-multilib

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--enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=i686 --with-gcc-major-version-only --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Disk Notes: NONE / relatime,rw,seclabel,stripe=512 / raid0 nvme2n1p3[2] nvme0n1p3[0] nvme1n1p3[1] nvme3n1p3[3] Block Size: 4096
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xd0001b2
Python Notes: Python 3.9.5
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	Optane + Xeon 8380 2	Optane	4 way P4511 Raid0
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)	**118000**	116750	**11950**
Normalized	100%	98.94%	10.13%
Standard Deviation		2.7%	0.5%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (MB/s)	1755	**1795**	**269**
Normalized	97.77%	100%	14.99%
Standard Deviation	2.4%	0.8%	13.4%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (MB/s)	1141	**1160**	**104**
Normalized	98.11%	99.74%	8.94%
Standard Deviation	1%	3.3%	17.9%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (MB/s)	654	**665**	**61.4**
Normalized	98.35%	100%	9.23%
Standard Deviation	3.5%	2%	21.3%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)		**118000**	**11550**
Normalized		100%	9.79%
Standard Deviation		0.8%	4.2%
Threaded I/O Tester - Rand Write - 32MB - 4 (MB/s)	**3054**	**5556**	3239
Normalized	54.97%	100%	58.3%
Standard Deviation	4.3%	3.4%	3.4%
Threaded I/O Tester - Write - 128MB - 4	25.563	**40.848**	**25.532**
Normalized	62.58%	100%	62.5%
Standard Deviation	2.3%	2.5%	3.4%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 16MB - /home/w/optane (MB/s)	**1452**	**931**	1131
Normalized	100%	64.12%	77.89%
Standard Deviation	2.2%	3.3%	3.1%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (MB/s)	2401	**2555**	**1989**
Normalized	93.97%	100%	77.85%
Standard Deviation	3.4%	2.7%	0.2%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)	614533	**653667**	**509000**
Normalized	94.01%	100%	77.87%
Standard Deviation	3.3%	2.7%	0.2%

Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (MB/s)	2961	**3116**	**2501**
Normalized	95.03%	100%	80.26%
Standard Deviation	5.9%	1.3%	3.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 64MB - /home/w/optane (MB/s)	**3380**	3359	**2666**
Normalized	100%	99.38%	78.88%
Standard Deviation	0.9%	1.2%	3.7%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 1MB - /home/w/optane (MB/s)	**3223**	3171	**2558**
Normalized	100%	98.39%	79.37%
Standard Deviation	2.1%	1%	1.9%
LevelDB - Rand Delete (us/Op)	**2722**	**3427**	3415
Normalized	100%	79.42%	79.71%
Standard Deviation	3.2%	4.5%	0.3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)	53063	**53333**	**42500**
Normalized	99.49%	100%	79.69%
Standard Deviation	2.4%	0.2%	1%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (MB/s)	3317	**3334**	**2657**
Normalized	99.49%	100%	79.69%
Standard Deviation	2.4%	0.2%	0.9%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)	379167	**399000**	**320000**
Normalized	95.03%	100%	80.2%
Standard Deviation	5.9%	1.4%	3.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)		**53333**	**42800**
Normalized		100%	80.25%
Standard Deviation		0.3%	0.8%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)		**389400**	**314000**
Normalized		100%	80.64%
Standard Deviation		3.4%	3.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 32MB - /home/w/optane (MB/s)	**3319**	3200	**2681**
Normalized	100%	96.41%	80.78%
Standard Deviation	0.8%	1.4%	0.8%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)		**639333**	**517400**
Normalized		100%	80.93%
Standard Deviation		1.9%	3.3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 4MB - /home/w/optane (MB/s)	3170	**3198**	**2629**
Normalized	99.12%	100%	82.21%
Standard Deviation	0.4%	0.2%	3.3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (MB/s)	3206	**3219**	**2691**
Normalized	98.19%	98.59%	82.42%
Standard Deviation	2.4%	2.7%	1.3%

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Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 16MB - /home/w/optane (MB/s)	**3265**	3214	**2693**
Normalized	100%	98.44%	82.48%
Standard Deviation	1.6%	2.3%	1.6%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 128MB - /home/w/optane (MB/s)	**2037**	2042	**2466**
Normalized	82.6%	82.81%	100%
Standard Deviation	2.6%	2%	2.9%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 8MB - /home/w/optane (MB/s)	3208	**3216**	**2659**
Normalized	99.75%	100%	82.68%
Standard Deviation	0.6%	0.3%	3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (MB/s)	3161	**3180**	**2647**
Normalized	98.97%	99.56%	82.87%
Standard Deviation	0.7%	0.2%	0.8%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)	202333	**203667**	**169333**
Normalized	99.35%	100%	83.14%
Standard Deviation	0.8%	0.3%	0.9%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4MB - /home/w/optane (MB/s)	**1665**	1690	**2002**
Normalized	83.17%	84.42%	100%
Standard Deviation	2.5%	1.4%	3.4%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 512KB - /home/w/optane (MB/s)	**3306**	3287	**2753**
Normalized	100%	99.43%	83.27%
Standard Deviation	2.4%	0.4%	0.9%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 8MB - /home/w/optane (MB/s)	**1695**	1724	**2035**
Normalized	83.29%	84.72%	100%
Standard Deviation	1.7%	0.7%	1.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)		**104667**	**87200**
Normalized		100%	83.31%
Standard Deviation		0.6%	1.4%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)	102567	**103267**	**86100**
Normalized	99.32%	100%	83.38%
Standard Deviation	2.4%	2.9%	1.3%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)		**204667**	**170667**
Normalized		100%	83.39%
Standard Deviation		1%	0.9%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 32MB - /home/w/optane (MB/s)	1758	**1737**	**2070**
Normalized	84.93%	83.91%	100%
Standard Deviation	1.3%	1.4%	2.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)		**164769**	**138667**
Normalized		100%	84.16%
Standard Deviation		3.5%	1.5%

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Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)	12300	**12400**	**10500**
Normalized	99.19%	100%	84.68%
Standard Deviation	2.4%		
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)	**294333**	287750	**249467**
Normalized	100%	97.76%	84.76%
Standard Deviation	1.9%	3.3%	5.7%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)		**46320**	**39320**
Normalized		100%	84.89%
Standard Deviation		4.6%	5.7%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 64MB - /home/w/optane (MB/s)	**1815**	1846	**2138**
Normalized	84.89%	86.34%	100%
Standard Deviation	4.3%	1.4%	1.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)	23827	**24067**	**20500**
Normalized	99%	100%	85.18%
Standard Deviation	5.9%	2.4%	4.6%
LevelDB - Seek Rand (us/Op)	**201.242**	233.637	**234.690**
Normalized	100%	86.13%	85.75%
Standard Deviation	1.5%	0.8%	0.2%
LevelDB - Hot Read (us/Op)	**173.881**	**202.528**	200.317
Normalized	100%	85.86%	86.8%
Standard Deviation	2.6%	3.5%	4.5%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 16MB - /home/w/optane (MB/s)	**1702**	1719	**1976**
Normalized	86.13%	86.99%	100%
Standard Deviation	0.4%	0.5%	1.1%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 2MB - /home/w/optane (MB/s)	**3167**	3139	**2732**
Normalized	100%	99.12%	86.26%
Standard Deviation	2.4%	1.3%	4.6%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 256KB - /home/w/optane (MB/s)	3241	**3374**	**2926**
Normalized	96.06%	100%	86.72%
Standard Deviation	2%	1.6%	0.8%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 256KB - /home/w/optane (IOPS)	13000	**13500**	**11733**
Normalized	96.3%	100%	86.91%
Standard Deviation	2%	1.5%	0.5%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 512KB - /home/w/optane (MB/s)	**1461**	1457	**1272**
Normalized	100%	99.73%	87.06%
Standard Deviation	5.3%	5.2%	3.4%
LevelDB - Rand Read (us/Op)	**174.142**	199.724	**199.901**
Normalized	100%	87.19%	87.11%
Standard Deviation	2.4%	5.5%	4.4%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (MB/s)	3291	**3298**	**2924**
Normalized	98.77%	98.98%	87.76%
Standard Deviation	2.8%	2.3%	0.9%

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Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)	26327	**26367**	**23367**
Normalized	99.85%	100%	88.62%
Standard Deviation	2.8%	2.2%	1.1%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 256KB - /home/w/optane (IOPS)		**13367**	**11967**
Normalized		100%	89.53%
Standard Deviation		0.4%	1.7%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)		**26667**	**23967**
Normalized		100%	89.88%
Standard Deviation		1.1%	5.3%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)		**11829**	**10725**
Normalized		100%	90.67%
Standard Deviation		3.8%	4.6%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 2MB - /home/w/optane (MB/s)	1659	**1694**	**1561**
Normalized	97.93%	100%	92.15%
Standard Deviation	3.6%	0.6%	0.6%
LevelDB - Rand Fill (MB/s)	6.3	**6.2**	**6.6**
Normalized	95.45%	93.94%	100%
Standard Deviation	3.8%	1.6%	1.5%
Flexible IO Tester - Seq Read - Linux AIO - Yes - Yes - 128MB - /home/w/optane (MB/s)	**3503**	3485	**3291**
Normalized	100%	99.49%	93.95%
Standard Deviation	1.1%	1.4%	1%
IOR - 32MB - /home/w/optane (MB/s)	**640.63**	**681.52**	642.58
Normalized	94%	100%	94.29%
Standard Deviation	0.3%	1%	0.6%
LevelDB - Rand Fill (us/Op)	2830	**2845**	**2685**
Normalized	94.86%	94.36%	100%
Standard Deviation	3.7%	1%	1%
Threaded I/O Tester - Rand Read - 32MB - 4 (MB/s)	48791	**46911**	**49361**
Normalized	98.85%	95.04%	100%
Standard Deviation	1.8%	2.1%	1.8%
IOR - 1024MB - /home/w/optane (MB/s)	**747.48**	**711.84**	716.13
Normalized	100%	95.23%	95.81%
Standard Deviation	0.7%	0.7%	0.4%
LevelDB - Seq Fill (MB/s)	**6.4**	**6.1**	6.2
Normalized	100%	95.31%	96.88%
Standard Deviation	3.5%	5.6%	5.9%
IOR - 512MB - /home/w/optane (MB/s)	**760.29**	**793.02**	781.88
Normalized	95.87%	100%	98.6%
Standard Deviation	0.3%	0.4%	0.6%
IOR - 64MB - /home/w/optane (MB/s)	**607.55**	**633.54**	622.65
Normalized	95.9%	100%	98.28%
Standard Deviation	0.6%	0.4%	0.7%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)	**52150**	**54167**	
Normalized	96.28%	100%	
Standard Deviation	2.4%	2.2%	
SQLite - 64 (sec)	**86.953**	**89.362**	89.167

Normalized	100%	97.3%	97.52%
Standard Deviation	3.2%	3.4%	3.4%
IOR - 256MB - /home/w/optane (MB/s)	521.75	**534.86**	**520.56**
Normalized	97.55%	100%	97.33%
Standard Deviation	0.6%	0.3%	0.2%
IOR - 8MB - /home/w/optane (MB/s)	672.36	**683.62**	**668.73**
Normalized	98.35%	100%	97.82%
Standard Deviation	2.3%	1.8%	3%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)	**14029**	**14333**	
Normalized	97.88%	100%	
Standard Deviation	2.4%	0.8%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)	**36500**	**37125**	
Normalized	98.32%	100%	
Standard Deviation	1%	3.3%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)	**83720**	**85067**	
Normalized	98.42%	100%	
Standard Deviation	3.5%	2.1%	
IOR - 16MB - /home/w/optane (MB/s)	634.98	**638.13**	**628.40**
Normalized	99.51%	100%	98.48%
Standard Deviation	0.8%	1.2%	1.6%
Compile Bench - Initial Create (MB/s)	**501.74**	**494.23**	497.94
Normalized	100%	98.5%	99.24%
Standard Deviation	1.5%	0.4%	1.1%
BlogBench - Write (Final Score)	**54748**	**53970**	54405
Normalized	100%	98.58%	99.37%
Standard Deviation	0.6%	1.1%	1.8%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)	**23967**	**23667**	
Normalized	100%	98.75%	
Standard Deviation	2.1%	2.7%	
BlogBench - Read (Final Score)	1865961	**1851604**	**1870387**
Normalized	99.76%	99%	100%
Standard Deviation	1.2%	1.7%	2.8%
PostMark - D.T.P (TPS)	**6097**	**6148**	**6097**
Normalized	99.17%	100%	99.17%
Standard Deviation		1.4%	
Compile Bench - Compile (MB/s)	**1981**	1970	**1968**
Normalized	100%	99.42%	99.33%
Standard Deviation	0.9%	0.3%	0.6%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)		14029	
Standard Deviation		3.4%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)		24700	
Standard Deviation		2.5%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)		37200	
Standard Deviation		3.3%	

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Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)		53800	
Standard Deviation		3.2%	
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)		84767	
Standard Deviation		2.1%	
Dbench - 128 (MB/s)	5645		
Standard Deviation	0.1%		
Application Start-up Time - S.R.W - LibreOffice Writer - /home/w/optane (sec)	3.15889		
Standard Deviation	4%		
Application Start-up Time - O.S.R - LibreOffice Writer - /home/w/optane (sec)	8.06272		
Standard Deviation	5.4%		
Application Start-up Time - O.S.R - xterm - /home/w/optane (sec)	2.15867		
Standard Deviation	1.9%		
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)		**11214**	**10536**
Normalized		100%	93.95%
Standard Deviation		7.8%	3.8%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)		**19383**	**20933**
Normalized		92.6%	100%
Standard Deviation		15.8%	1.7%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)		**41867**	**41627**
Normalized		100%	99.43%
Standard Deviation		14.9%	5.9%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)		**79487**	**80467**
Normalized		98.78%	100%
Standard Deviation		17.6%	2.8%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)		**154067**	**155667**
Normalized		98.97%	100%
Standard Deviation		14.5%	1%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)		**263467**	**275867**
Normalized		95.51%	100%
Standard Deviation		14.3%	3.7%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)		**23790**	**20100**
Normalized		100%	84.49%
Standard Deviation		3.5%	6.3%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)		**88280**	**71393**
Normalized		100%	80.87%
Standard Deviation		3.9%	7.7%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)		**294333**	**250333**
Normalized		100%	85.05%
Standard Deviation		3.3%	7.1%

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Unpacking The Linux Kernel - linux-4.15.tar.xz (sec)	**6.670**	6.593	**6.426**
Normalized	96.34%	97.47%	100%
Standard Deviation	8%	7.2%	3.3%
Compile Bench - Read Compiled Tree (MB/s)	**995.23**	**2738**	2728
Normalized	36.35%	100%	99.63%
Standard Deviation	22.5%	0%	0.6%
Threaded I/O Tester - Rand Write - 256MB - 32 (MB/s)	**46001**	**161971**	46836
Normalized	28.4%	100%	28.92%
Standard Deviation	13.8%	9.2%	12.2%
Threaded I/O Tester - Rand Write - 256MB - 16 (MB/s)	55810	**128910**	**54218**
Normalized	43.29%	100%	42.06%
Standard Deviation	4.7%	6.3%	1.1%
Threaded I/O Tester - Rand Write - 128MB - 32 (MB/s)	25171	**83648**	**24375**
Normalized	30.09%	100%	29.14%
Standard Deviation	6.6%	8.3%	19%
Threaded I/O Tester - Rand Write - 128MB - 16 (MB/s)	28896	**60595**	**27185**
Normalized	47.69%	100%	44.86%
Standard Deviation	2.4%	9.6%	1.7%
Threaded I/O Tester - Rand Write - 64MB - 32 (MB/s)	**11377**	**41396**	12596
Normalized	27.48%	100%	30.43%
Standard Deviation	9.6%	10.8%	5.3%
Threaded I/O Tester - Rand Write - 64MB - 16 (MB/s)	**13733**	**30796**	13916
Normalized	44.59%	100%	45.19%
Standard Deviation	6.9%	11.2%	6.1%
Threaded I/O Tester - Rand Write - 32MB - 32 (MB/s)	**5338**	**20447**	6531
Normalized	26.11%	100%	31.94%
Standard Deviation	14.7%	12.9%	0.7%
Threaded I/O Tester - Rand Write - 32MB - 16 (MB/s)	**6650**	**15172**	6827
Normalized	43.83%	100%	45%
Standard Deviation	7.8%	8%	6.7%
Threaded I/O Tester - Rand Write - 256MB - 8 (MB/s)	**39366**	**74649**	42352
Normalized	52.73%	100%	56.74%
Standard Deviation	9.9%	8.9%	1.8%
Threaded I/O Tester - Rand Write - 256MB - 4 (MB/s)	**23982**	**44691**	26578
Normalized	53.66%	100%	59.47%
Standard Deviation	0.6%	9.6%	8.3%
Threaded I/O Tester - Rand Write - 128MB - 8 (MB/s)	**19357**	**41662**	19743
Normalized	46.46%	100%	47.39%
Standard Deviation	5.8%	13.4%	8.6%

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Threaded I/O Tester - Rand Write - 128MB - 4 (MB/s)	12488	**21756**	**11695**
Normalized	57.4%	100%	53.75%
Standard Deviation	8.2%	2.8%	2.9%
Threaded I/O Tester - Rand Read - 256MB - 32 (MB/s)	**1745580**	1696524	**1551397**
Normalized	100%	97.19%	88.88%
Standard Deviation	14.6%	17.1%	21.1%
Threaded I/O Tester - Rand Read - 256MB - 16 (MB/s)	**955903**	**1232303**	1053499
Normalized	77.57%	100%	85.49%
Standard Deviation	19.6%	2.9%	14.6%
Threaded I/O Tester - Rand Read - 128MB - 32 (MB/s)	**927001**	**817397**	864145
Normalized	100%	88.18%	93.22%
Standard Deviation	15.2%	20.7%	11.3%
Threaded I/O Tester - Rand Read - 128MB - 16 (MB/s)	**636875**	635569	**534055**
Normalized	100%	99.79%	83.86%
Standard Deviation	2.3%	12%	2.9%
Threaded I/O Tester - Rand Write - 64MB - 8 (MB/s)	10359	**18917**	**9878**
Normalized	54.76%	100%	52.22%
Standard Deviation	6.7%	14.9%	3.3%
Threaded I/O Tester - Rand Write - 64MB - 4 (MB/s)	**6017**	**11713**	6370
Normalized	51.37%	100%	54.38%
Standard Deviation	4.2%	12%	2%
Threaded I/O Tester - Rand Write - 32MB - 8 (MB/s)	5283	**9789**	**5264**
Normalized	53.96%	100%	53.77%
Standard Deviation	7.1%	11.8%	11.9%
Threaded I/O Tester - Rand Read - 64MB - 32 (MB/s)	**401698**	**425179**	416968
Normalized	94.48%	100%	98.07%
Standard Deviation	18.9%	14.3%	14.2%
Threaded I/O Tester - Rand Read - 64MB - 16 (MB/s)	**299302**	**307721**	300048
Normalized	97.26%	100%	97.51%
Standard Deviation	12.8%	18%	3.4%
Threaded I/O Tester - Rand Read - 32MB - 32 (MB/s)	**192649**	197089	**202281**
Normalized	95.24%	97.43%	100%
Standard Deviation	11.3%	13.4%	13.2%
Threaded I/O Tester - Rand Read - 32MB - 16 (MB/s)	154416	**166765**	**146325**
Normalized	92.59%	100%	87.74%
Standard Deviation	2.4%	16.4%	12.2%
Threaded I/O Tester - Rand Read - 256MB - 8 (MB/s)	**672970**	662605	**637321**
Normalized	100%	98.46%	94.7%
Standard Deviation	3.2%	13.5%	1%

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Threaded I/O Tester - Rand Read - 256MB - 4 (MB/s)	**368965**	340726	**310922**
Normalized	100%	92.35%	84.27%
Standard Deviation	3.7%	11%	19.7%
Threaded I/O Tester - Rand Read - 128MB - 8 (MB/s)	342341	**375922**	**298916**
Normalized	91.07%	100%	79.52%
Standard Deviation	3.4%	11.6%	17.9%
Threaded I/O Tester - Rand Read - 128MB - 4 (MB/s)	189548	**201370**	**166437**
Normalized	94.13%	100%	82.65%
Standard Deviation	2.4%	14.1%	18.1%
Threaded I/O Tester - Rand Read - 64MB - 8 (MB/s)	**174642**	174254	**163682**
Normalized	100%	99.78%	93.72%
Standard Deviation	5.8%	12%	5.2%
Threaded I/O Tester - Rand Read - 64MB - 4 (MB/s)	96750	**97675**	**93634**
Normalized	99.05%	100%	95.86%
Standard Deviation	1.4%	2.1%	14%
Threaded I/O Tester - Rand Read - 32MB - 8 (MB/s)	86624	**93206**	**84907**
Normalized	92.94%	100%	91.1%
Standard Deviation	2.3%	15.4%	12.2%
Threaded I/O Tester - Write - 256MB - 32 (MB/s)	**105.725**	**117.992**	112.176
Normalized	89.6%	100%	95.07%
Standard Deviation	5.3%	9.5%	4.5%
Threaded I/O Tester - Write - 256MB - 16 (MB/s)	**70.199**	**180.016**	70.358
Normalized	39%	100%	39.08%
Standard Deviation	0.2%	10%	0.5%
Threaded I/O Tester - Write - 128MB - 32 (MB/s)	105.854	**147.605**	**105.126**
Normalized	71.71%	100%	71.22%
Standard Deviation	5.7%	30.6%	3.3%
Threaded I/O Tester - Write - 128MB - 16 (MB/s)	70.656	**206.790**	**70.299**
Normalized	34.17%	100%	34%
Standard Deviation	2%	11.4%	2.4%
Threaded I/O Tester - Write - 64MB - 32	**102.183**	**223.863**	103.428
Normalized	45.65%	100%	46.2%
Standard Deviation	4.6%	29.8%	5.3%
Threaded I/O Tester - Write - 64MB - 16	**70.309**	**206.957**	73.533
Normalized	33.97%	100%	35.53%
Standard Deviation	1.9%	16.1%	3.4%
Threaded I/O Tester - Write - 32MB - 32	**105.322**	**293.213**	113.398
Normalized	35.92%	100%	38.67%
Standard Deviation	1.6%	22.4%	11.1%
Threaded I/O Tester - Write - 32MB - 16	**77.678**	**230.886**	82.823
Normalized	33.64%	100%	35.87%
Standard Deviation	1%	19.4%	9.1%
Threaded I/O Tester - Write - 256MB - 8	**45.394**	**139.605**	46.044
Normalized	32.52%	100%	32.98%

Standard Deviation	2.5%	22.1%	1%
Threaded I/O Tester - Write - 256MB - 4	26.531	**58.390**	**26.143**
Normalized	45.44%	100%	44.77%
Standard Deviation	2.3%	29.4%	1.3%
Threaded I/O Tester - Write - 128MB - 8	**46.554**	**139.198**	46.758
Normalized	33.44%	100%	33.59%
Standard Deviation	1.4%	22.6%	1.6%
Threaded I/O Tester - Read - 256MB - 32 (MB/s)	**68443**	67298	**66375**
Normalized	100%	98.33%	96.98%
Standard Deviation	11.7%	2.1%	9.2%
Threaded I/O Tester - Read - 256MB - 16 (MB/s)	**36196**	**40512**	37675
Normalized	89.35%	100%	93%
Standard Deviation	1.9%	10.6%	3%
Threaded I/O Tester - Read - 128MB - 32 (MB/s)	**59505**	**60387**	59916
Normalized	98.54%	100%	99.22%
Standard Deviation	11.3%	2.8%	5.3%
Threaded I/O Tester - Read - 128MB - 16 (MB/s)	**32024**	**36393**	34370
Normalized	87.99%	100%	94.44%
Standard Deviation	7.4%	9.5%	3.4%
Threaded I/O Tester - Write - 64MB - 8 (MB/s)	**48.500**	**76.727**	51.553
Normalized	63.21%	100%	67.19%
Standard Deviation	0.4%	42.5%	1.1%
Threaded I/O Tester - Write - 64MB - 4 (MB/s)	**26.117**	**60.724**	28.813
Normalized	43.01%	100%	47.45%
Standard Deviation	1.4%	10.3%	2.8%
Threaded I/O Tester - Write - 32MB - 8 (MB/s)	**52.372**	**79.991**	55.954
Normalized	65.47%	100%	69.95%
Standard Deviation	2.2%	31.7%	3.1%
Threaded I/O Tester - Write - 32MB - 4 (MB/s)	**28.542**	34.057	**37.020**
Normalized	77.1%	92%	100%
Standard Deviation	4.6%	0.6%	24.8%
Threaded I/O Tester - Read - 64MB - 32	**54437**	52087	**50999**
Normalized	100%	95.68%	93.68%
Standard Deviation	4%	7.2%	6.1%
Threaded I/O Tester - Read - 64MB - 16	33706	**37688**	**30434**
Normalized	89.43%	100%	80.75%
Standard Deviation	5%	7.1%	7.8%
Threaded I/O Tester - Read - 32MB - 32	**46000**	**44639**	45432
Normalized	100%	97.04%	98.76%
Standard Deviation	8.6%	10.2%	5.6%
Threaded I/O Tester - Read - 32MB - 16	**28171**	**32823**	28179
Normalized	85.83%	100%	85.85%
Standard Deviation	7.7%	9.6%	8.8%
Threaded I/O Tester - Read - 256MB - 8	**18744**	**21866**	19171
Normalized	85.73%	100%	87.68%
Standard Deviation	6.5%	11.8%	2.5%
Threaded I/O Tester - Read - 256MB - 4	**11364**	11197	**9954**
Normalized	100%	98.53%	87.59%
Standard Deviation	2.1%	12.7%	10.7%
Threaded I/O Tester - Read - 128MB - 8	17510	**20114**	**17395**
Normalized	87.06%	100%	86.48%

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Standard Deviation	1.8%	13.1%	9.2%
Threaded I/O Tester - Read - 128MB - 4	11218	**11252**	**9361**
Normalized	99.7%	100%	83.2%
Standard Deviation	2.2%	14.3%	8.4%
Threaded I/O Tester - Read - 64MB - 8 (MB/s)	**16464**	**19677**	17285
Normalized	83.67%	100%	87.84%
Standard Deviation	1.6%	17.5%	10.1%
Threaded I/O Tester - Read - 64MB - 4 (MB/s)	**9131**	**10764**	9570
Normalized	84.82%	100%	88.9%
Standard Deviation	8.8%	3.4%	9%
Threaded I/O Tester - Read - 32MB - 8 (MB/s)	16949	**18047**	**16350**
Normalized	93.92%	100%	90.6%
Standard Deviation	4.1%	10.9%	7%
Threaded I/O Tester - Read - 32MB - 4 (MB/s)	**9336**	9547	**9739**
Normalized	95.87%	98.03%	100%
Standard Deviation	6.6%	14.1%	3.3%
IOR - 4MB - /home/w/optane (MB/s)	672.97	**691.25**	**665.55**
Normalized	97.36%	100%	96.28%
Standard Deviation	2.2%	8.1%	1.3%
IOR - 2MB - /home/w/optane (MB/s)	**728.02**	709.05	**665.25**
Normalized	100%	97.39%	91.38%
Standard Deviation	13.6%	16.2%	3.2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 512KB - /home/w/optane (MB/s)	**1483**	**1123**	1368
Normalized	100%	75.72%	92.25%
Standard Deviation	3%	9.7%	3.4%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 256KB - /home/w/optane (MB/s)	**1482**	**1266**	1277
Normalized	100%	85.43%	86.17%
Standard Deviation	2.3%	15.4%	7.5%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 128MB - /home/w/optane (MB/s)	1428	**1276**	**1584**
Normalized	90.15%	80.56%	100%
Standard Deviation	13.7%	2.8%	6%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (IOPS)	**11947**	11617	**10350**
Normalized	100%	97.24%	86.63%
Standard Deviation	6.4%	12%	2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (MB/s)	**1491**	1291	**1264**
Normalized	100%	86.59%	84.78%
Standard Deviation	6.4%	16%	3.2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 64MB - /home/w/optane (MB/s)	1341	**1249**	**1418**
Normalized	94.57%	88.08%	100%
Standard Deviation	13.9%	10.4%	4.5%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (IOPS)	**22858**	**19940**	20747
Normalized	100%	87.23%	90.76%
Standard Deviation	7.5%	15.3%	7.4%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (MB/s)	**1429**	**1247**	1297
Normalized	100%	87.26%	90.76%
Standard Deviation	7.5%	15.3%	7.4%

Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 32MB - /home/w/optane (MB/s)	**1408**	**1188**	1302
Normalized	100%	84.38%	92.47%
Standard Deviation	1.7%	14.4%	6.1%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)	**47273**	**37847**	42233
Normalized	100%	80.06%	89.34%
Standard Deviation	4%	12.5%	2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (MB/s)	**1477**	**1183**	1319
Normalized	100%	80.09%	89.3%
Standard Deviation	4%	12.5%	2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 16MB - /home/w/optane (MB/s)	**1450**	**1142**	1254
Normalized	100%	78.76%	86.48%
Standard Deviation	0.9%	17.4%	5.2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)	**93560**	**72025**	76083
Normalized	100%	76.98%	81.32%
Standard Deviation	3%	13.8%	8%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (MB/s)	**1462**	**1126**	1189
Normalized	100%	77.02%	81.33%
Standard Deviation	3.1%	13.8%	8%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 8MB - /home/w/optane (MB/s)	**1393**	**1152**	1218
Normalized	100%	82.7%	87.44%
Standard Deviation	4.2%	16.2%	6.2%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)	**166000**	**149083**	149267
Normalized	100%	89.81%	89.92%
Standard Deviation	1.8%	15.7%	7.7%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (MB/s)	**1299**	**1166**	**1166**
Normalized	100%	89.76%	89.76%
Standard Deviation	1.8%	15.7%	7.7%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4MB - /home/w/optane (MB/s)	**1357**	**1169**	1257
Normalized	100%	86.15%	92.63%
Standard Deviation	4.4%	14.9%	1.8%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (IOPS)	**303000**	**262733**	275667
Normalized	100%	86.71%	90.98%
Standard Deviation	3.2%	12.4%	3.4%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (MB/s)	**1184**	**1026**	1077
Normalized	100%	86.66%	90.96%
Standard Deviation	3.2%	12.4%	3.4%
Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 2MB - /home/w/optane (MB/s)	**1402**	**1051**	1244
Normalized	100%	74.96%	88.73%
Standard Deviation	2.3%	15.2%	3.3%

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Flexible IO Tester - Seq Write - Linux AIO - Yes - Yes - 1MB - /home/w/optane (MB/s)	**1401**	**1107**	1235
Normalized	100%	79.01%	88.15%
Standard Deviation	2.4%	12.9%	6.8%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 256KB - /home/w/optane (MB/s)	**1498**	**1498**	**1296**
Normalized	100%	100%	86.52%
Standard Deviation	8.2%	2%	8.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 128MB - /home/w/optane (MB/s)	**1471**	**1408**	1459
Normalized	100%	95.72%	99.18%
Standard Deviation	11.9%	12.3%	8.8%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 128KB - /home/w/optane (MB/s)	1537	**1549**	**1258**
Normalized	99.23%	100%	81.21%
Standard Deviation	2.3%	2.5%	3.5%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 64MB - /home/w/optane (MB/s)	1171	**1131**	**1399**
Normalized	83.7%	80.84%	100%
Standard Deviation	12.5%	14.5%	4.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 64KB - /home/w/optane (MB/s)	1489	**1505**	**1283**
Normalized	98.94%	100%	85.25%
Standard Deviation	6%	2.3%	4.6%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 32MB - /home/w/optane (MB/s)	**1178**	1179	**1262**
Normalized	93.34%	93.42%	100%
Standard Deviation	14%	13.5%	0.3%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (IOPS)	**45973**	44600	**39953**
Normalized	100%	97.01%	86.91%
Standard Deviation	5.8%	1.6%	6.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 32KB - /home/w/optane (MB/s)	1436	**1394**	**1249**
Normalized	99.17%	96.27%	86.26%
Standard Deviation	5.8%	1.5%	6.2%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (IOPS)	**90367**	88167	**71275**
Normalized	100%	97.57%	78.87%
Standard Deviation	1.6%	2.7%	9.5%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 16KB - /home/w/optane (MB/s)	**1412**	1378	**1114**
Normalized	100%	97.59%	78.9%
Standard Deviation	1.6%	2.7%	9.5%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 512KB - /home/w/optane (MB/s)	1717	**1749**	**578**
Normalized	98.17%	100%	33.05%
Standard Deviation	2.9%	1.5%	11.3%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 256KB - /home/w/optane (MB/s)	1766	**1797**	**435**
Normalized	98.27%	100%	24.21%
Standard Deviation	2.2%	1.3%	12.2%

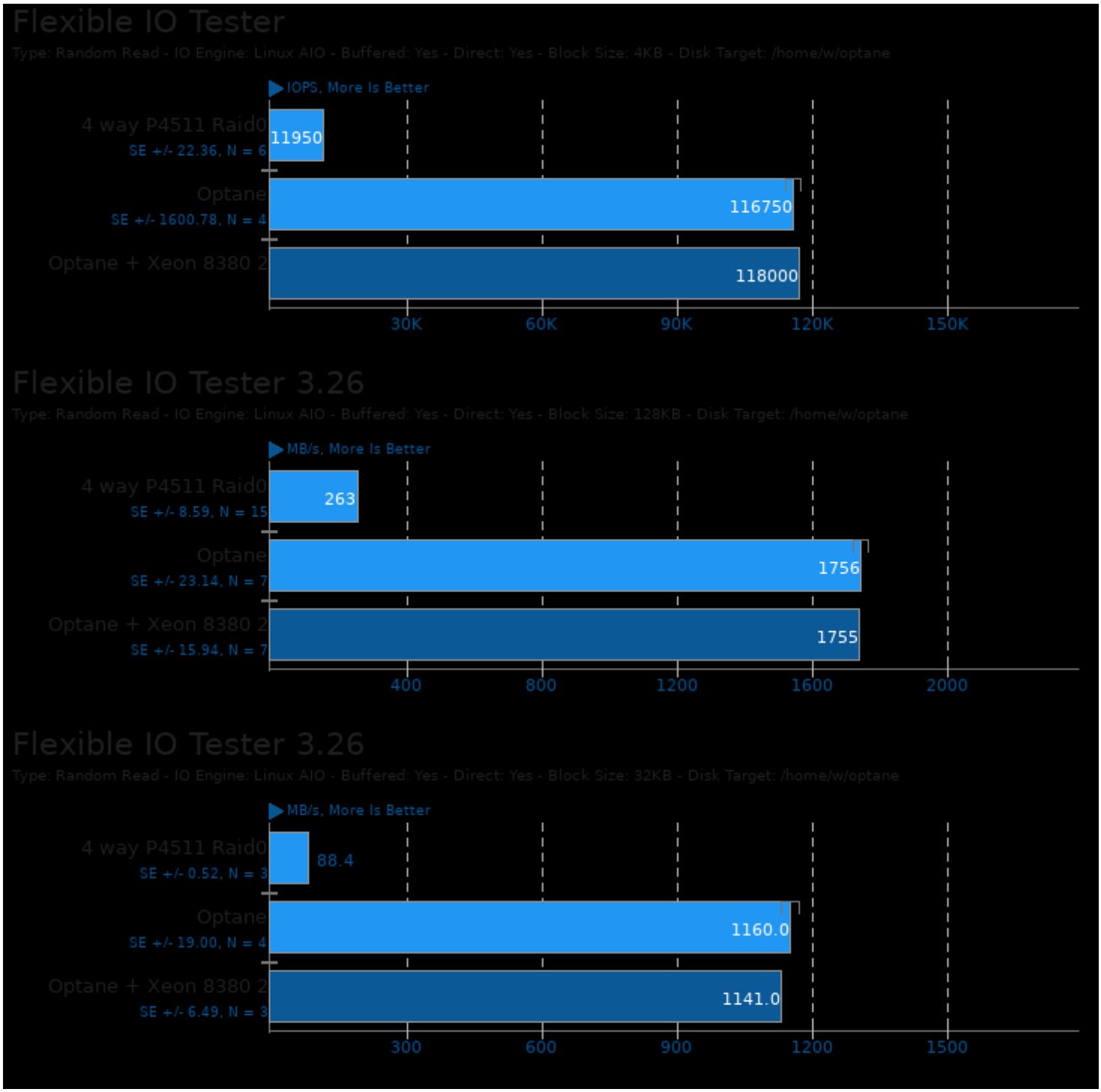
optane

Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 8MB - /home/w/optane (MB/s)	**1378**	**1177**	1232
Normalized	100%	85.41%	89.4%
Standard Deviation	2.4%	15.2%	6.5%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (IOPS)	**168533**	165400	**140200**
Normalized	100%	98.14%	83.19%
Standard Deviation	3.7%	3.3%	8.1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 8KB - /home/w/optane (MB/s)	**1316**	1292	**1095**
Normalized	100%	98.18%	83.21%
Standard Deviation	3.8%	3.4%	8.1%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4MB - /home/w/optane (MB/s)	**1429**	**1194**	1197
Normalized	100%	83.55%	83.76%
Standard Deviation	2.9%	15.6%	7.6%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 4KB - /home/w/optane (MB/s)	1149	**1125**	**975**
Normalized	99.91%	97.83%	84.78%
Standard Deviation	1.9%	3.3%	5.7%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 2MB - /home/w/optane (MB/s)	**1467**	**1195**	**1195**
Normalized	100%	81.46%	81.46%
Standard Deviation	2%	14.6%	7%
Flexible IO Tester - Rand Write - Linux AIO - Yes - Yes - 1MB - /home/w/optane (MB/s)	**1431**	1328	**1246**
Normalized	100%	92.8%	87.07%
Standard Deviation	2.4%	8.7%	7.1%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 64KB - /home/w/optane (MB/s)	1498	**1480**	**194**
Normalized	97.08%	95.92%	12.57%
Standard Deviation	2%	2.6%	15.7%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 16KB - /home/w/optane (MB/s)	815	**847**	**89.3**
Normalized	96.22%	100%	10.54%
Standard Deviation	2.4%	2.3%	21.9%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 4KB - /home/w/optane (MB/s)	**461**	**456**	**38.0**
Normalized	100%	98.92%	8.24%
Standard Deviation	0.7%	2.9%	20.8%
Flexible IO Tester - Rand Read - Linux AIO - Yes - Yes - 1MB - /home/w/optane (MB/s)	1660	**1683**	**1106**
Normalized	98.63%	100%	65.72%
Standard Deviation	1%	1.1%	8.2%
Application Start-up Time - S.R.W - GNOME Terminal - /home/w/optane (sec)	3.46604		
Standard Deviation	7.6%		
Application Start-up Time - O.S.R - GNOME Terminal - /home/w/optane (sec)	8.82933		
Standard Deviation	8.1%		

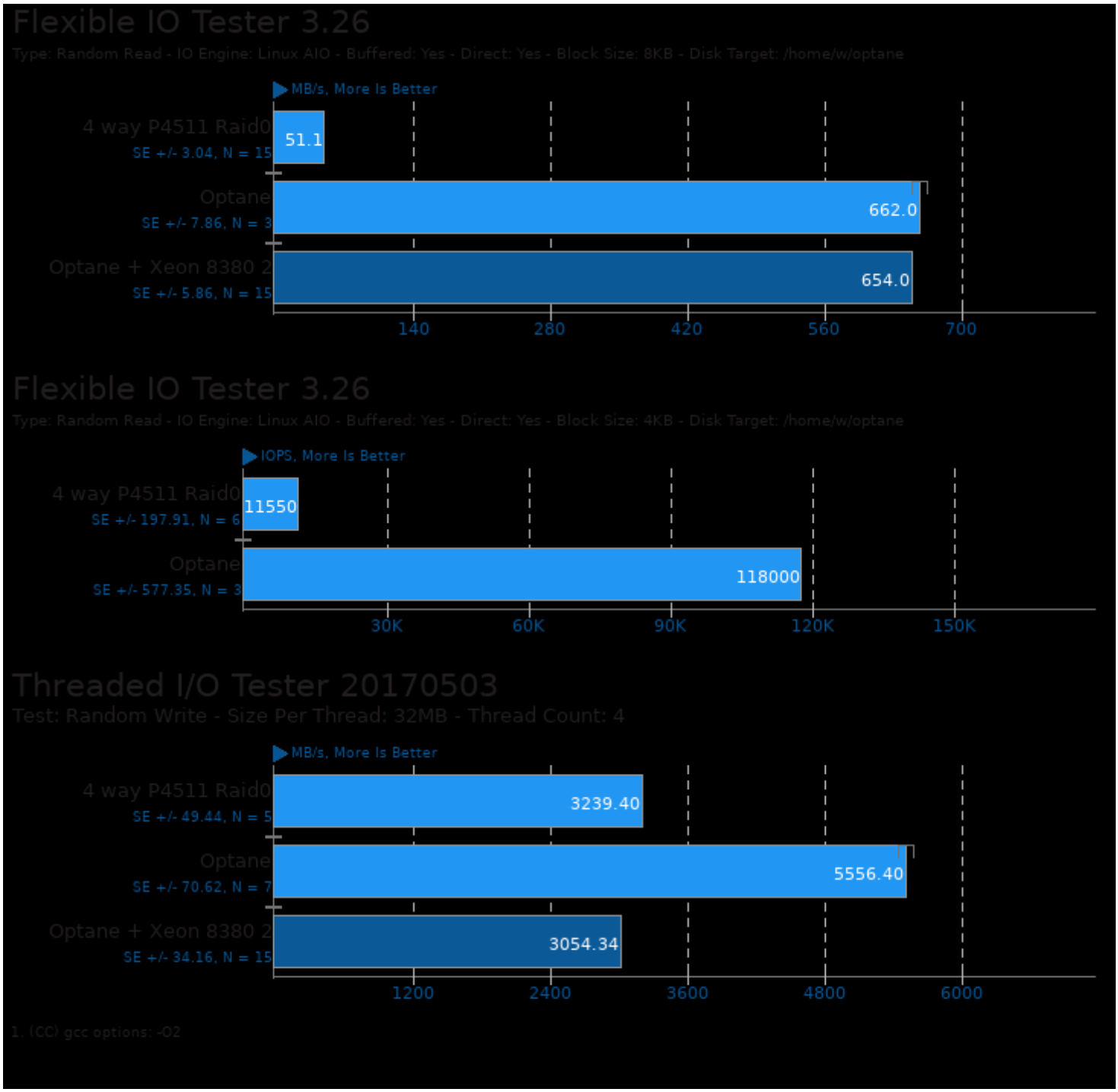
optane

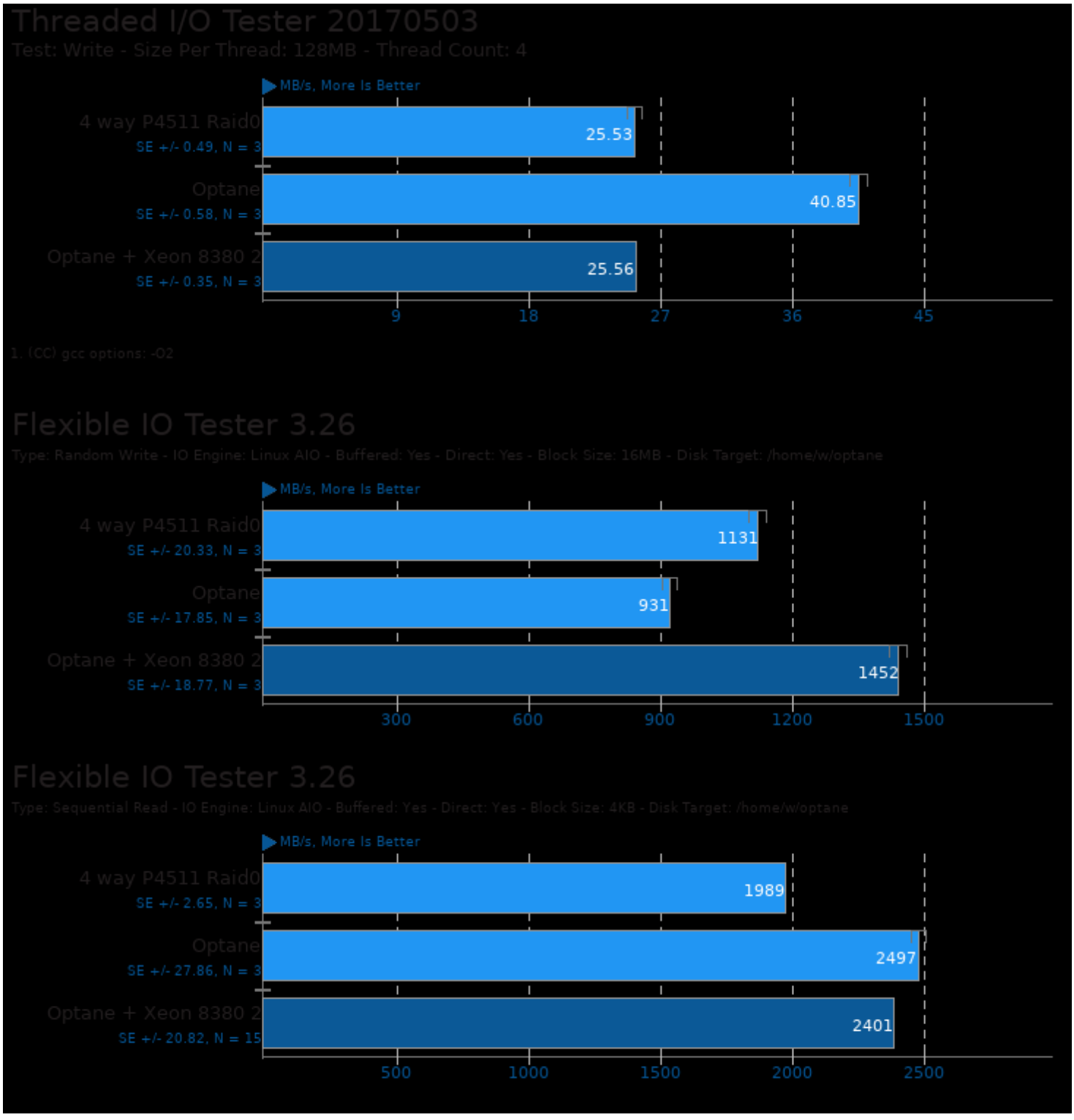
Application Start-up Time - S.R.W - xterm - /home/w/optane (sec)	0.960816		
Standard Deviation	17.8%		
LevelDB - Seq Fill (us/Op)	**2789**	**2883**	2864
Normalized	100%	96.75%	97.39%
Standard Deviation	3.6%	6.1%	6%
LevelDB - Overwrite (us/Op)	**2834**	**2922**	2877
Normalized	100%	96.96%	98.48%
Standard Deviation	0.1%	5.5%	6.9%
LevelDB - Overwrite (MB/s)	**6.2**	**6.1**	**6.1**
Normalized	100%	98.39%	98.39%
Standard Deviation	0%	5.3%	6.5%
LevelDB - Fill Sync (us/Op)	**3105**	3440	**3527**
Normalized	100%	90.26%	88.02%
Standard Deviation	5.1%	14%	4%
LevelDB - Fill Sync (MB/s)	**5.5**	5.1	**4.9**
Normalized	100%	92.73%	89.09%
Standard Deviation	4.7%	24.4%	3.1%

optane

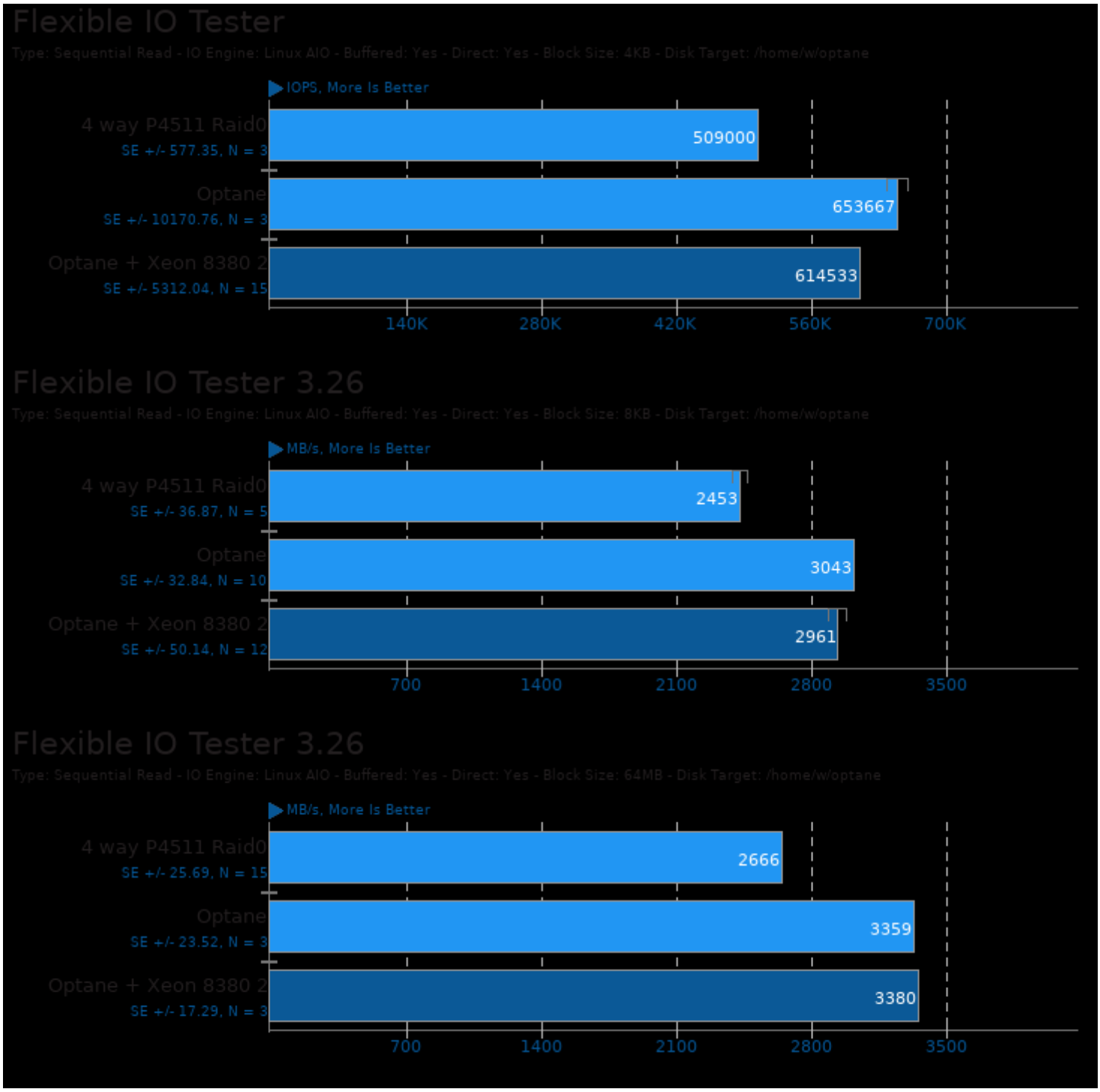

Flexible IO Tester
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 22.36, N = 6
11950
Optane
SE +/- 1600.78, N = 4
116750
Optane + Xeon 8380 2
118000
30K
60K
90K
120K
150K
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 8.59, N = 15
263
Optane
SE +/- 23.14, N = 7
1756
Optane + Xeon 8380 2
SE +/- 15.94, N = 7
1755
400
800
1200
1600
2000
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.52, N = 3
88.4
Optane
SE +/- 19.00, N = 4
1160.0
Optane + Xeon 8380 2
SE +/- 6.49, N = 3
1141.0
300
600
900
1200
1500

optane

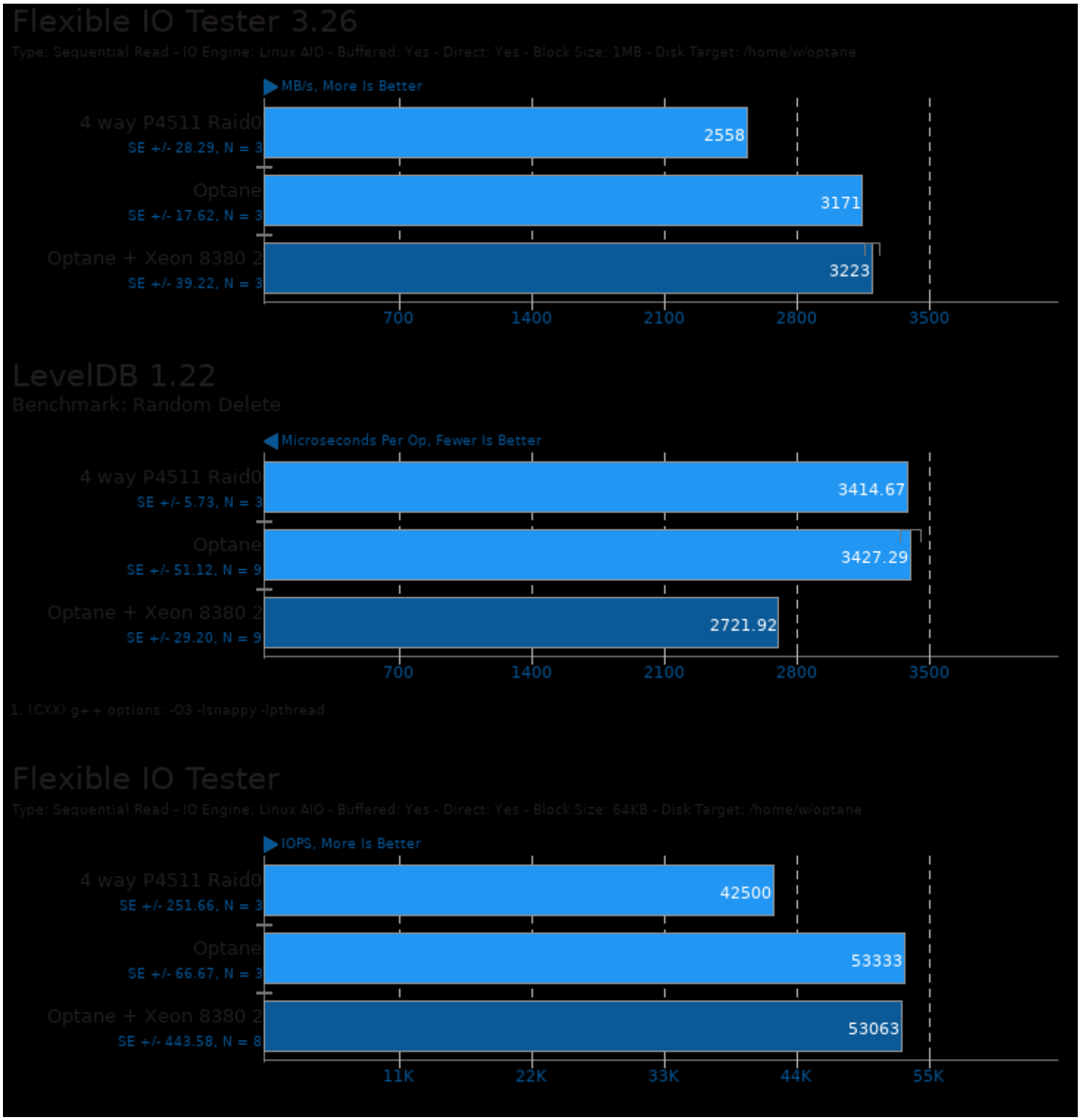

Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 3.04, N = 15
51.1
Optane
SE +/- 7.86, N = 3
662.0
Optane + Xeon 8380 2
SE +/- 5.86, N = 15
654.0
140
280
420
560
700
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 197.91, N = 6
11550
Optane
SE +/- 577.35, N = 3
118000
30K
60K
90K
120K
150K
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 32MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 49.44, N = 5
3239.40
Optane
SE +/- 70.62, N = 7
5556.40
Optane + Xeon 8380 2
SE +/- 34.16, N = 15
3054.34
1200
2400
3600
4800
6000
1: (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 128MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.49, N = 3
25.53
Optane
SE +/- 0.58, N = 3
40.85
Optane + Xeon 8380 2
SE +/- 0.35, N = 3
25.56
9
18
27
36
45
1. (CC) gcc options: -O2
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.33, N = 3
1131
Optane
SE +/- 17.85, N = 3
931
Optane + Xeon 8380 2
SE +/- 18.77, N = 3
1452
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.65, N = 3
1989
Optane
SE +/- 27.86, N = 3
2497
Optane + Xeon 8380 2
SE +/- 20.82, N = 15
2401
500
1000
1500
2000
2500

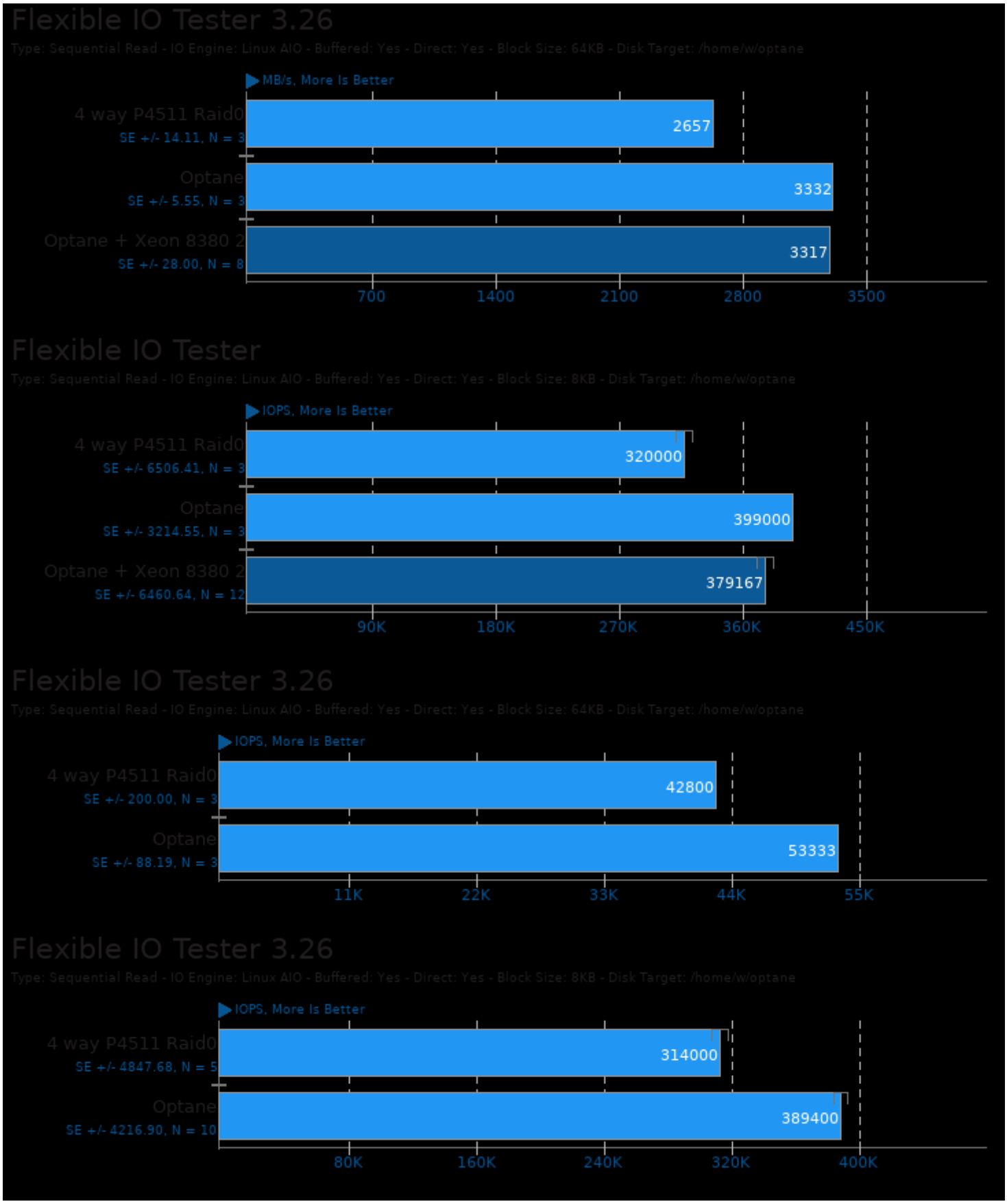
optane

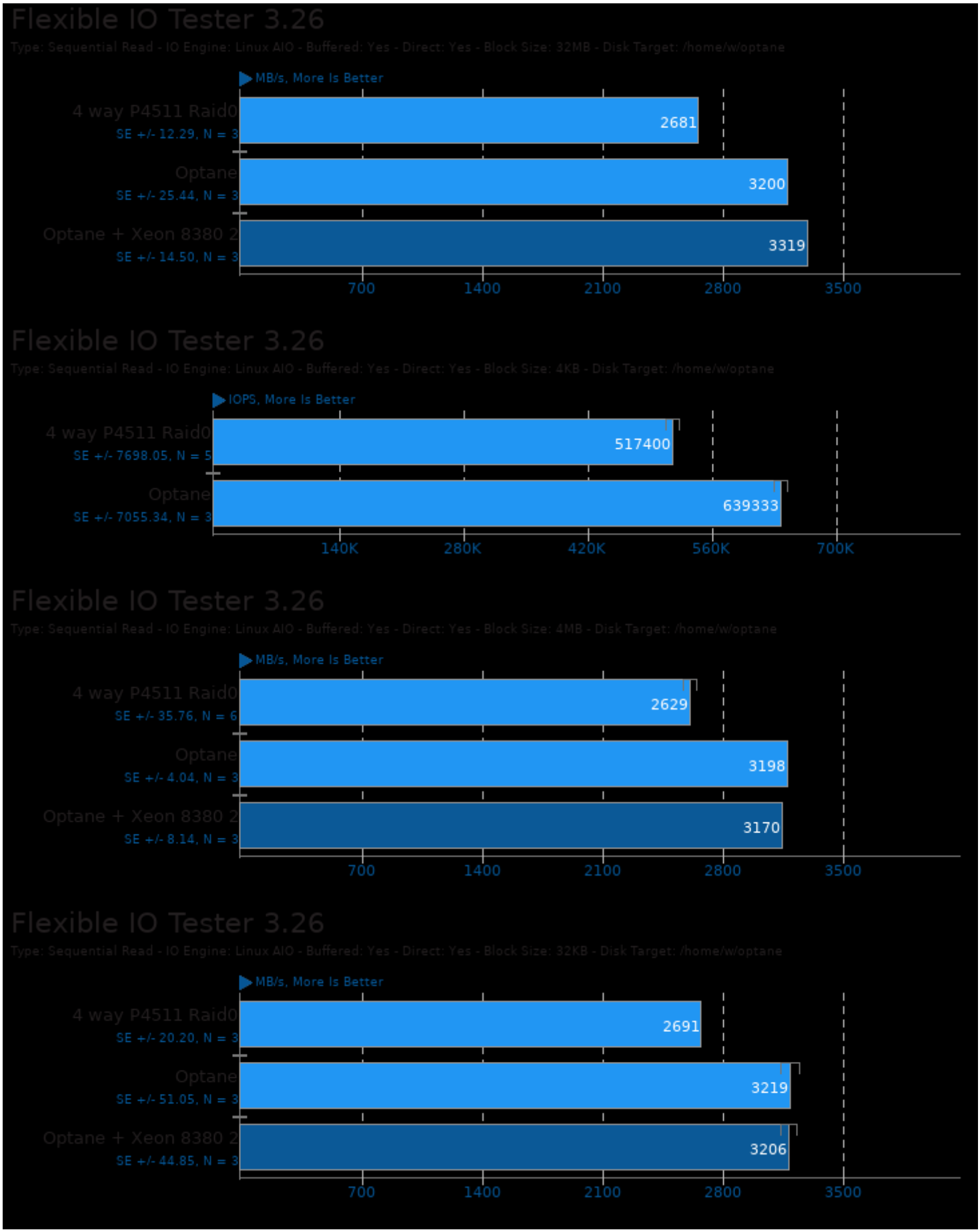

Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 577.35, N = 3
509000
Optane
SE +/- 10170.76, N = 3
653667
Optane + Xeon 8380 2
SE +/- 5312.04, N = 15
614533
140K
280K
420K
560K
700K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 36.87, N = 5
2453
Optane
SE +/- 32.84, N = 10
3043
Optane + Xeon 8380 2
SE +/- 50.14, N = 12
2961
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 25.69, N = 15
2666
Optane
SE +/- 23.52, N = 3
3359
Optane + Xeon 8380 2
SE +/- 17.29, N = 3
3380
700
1400
2100
2800
3500

optane

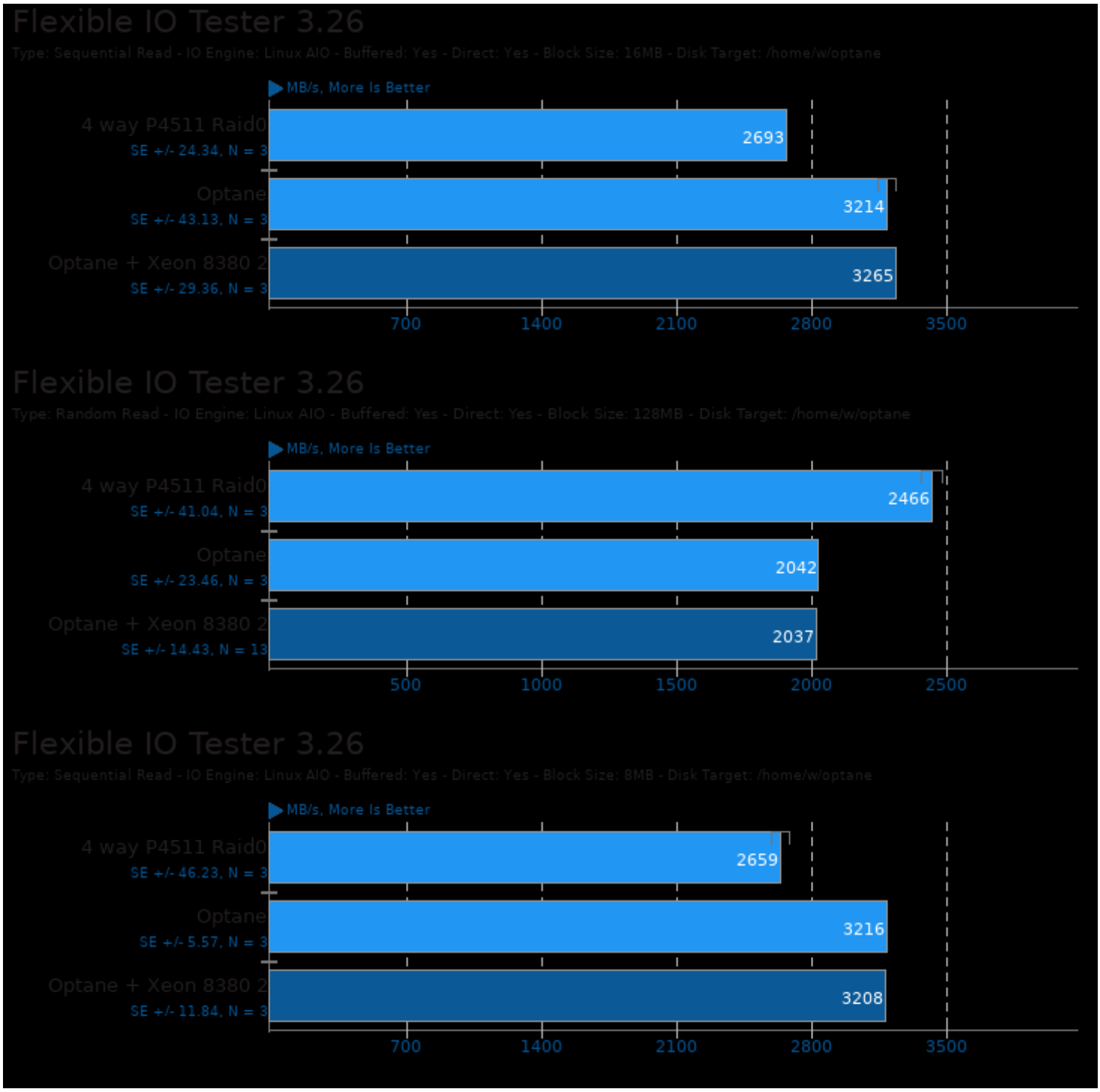

Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 28.29, N = 3
2558
Optane
SE +/- 17.62, N = 3
3171
Optane + Xeon 8380 2
SE +/- 39.22, N = 3
3223
700
1400
2100
2800
3500
LevelDB 1.22
Benchmark: Random Delete
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 5.73, N = 3
3414.67
Optane
SE +/- 51.12, N = 9
3427.29
Optane + Xeon 8380 2
SE +/- 29.20, N = 9
2721.92
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -lsnappy -lpthread
Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 251.66, N = 3
42500
Optane
SE +/- 66.67, N = 3
53333
Optane + Xeon 8380 2
SE +/- 443.58, N = 8
53063
11K
22K
33K
44K
55K

optane

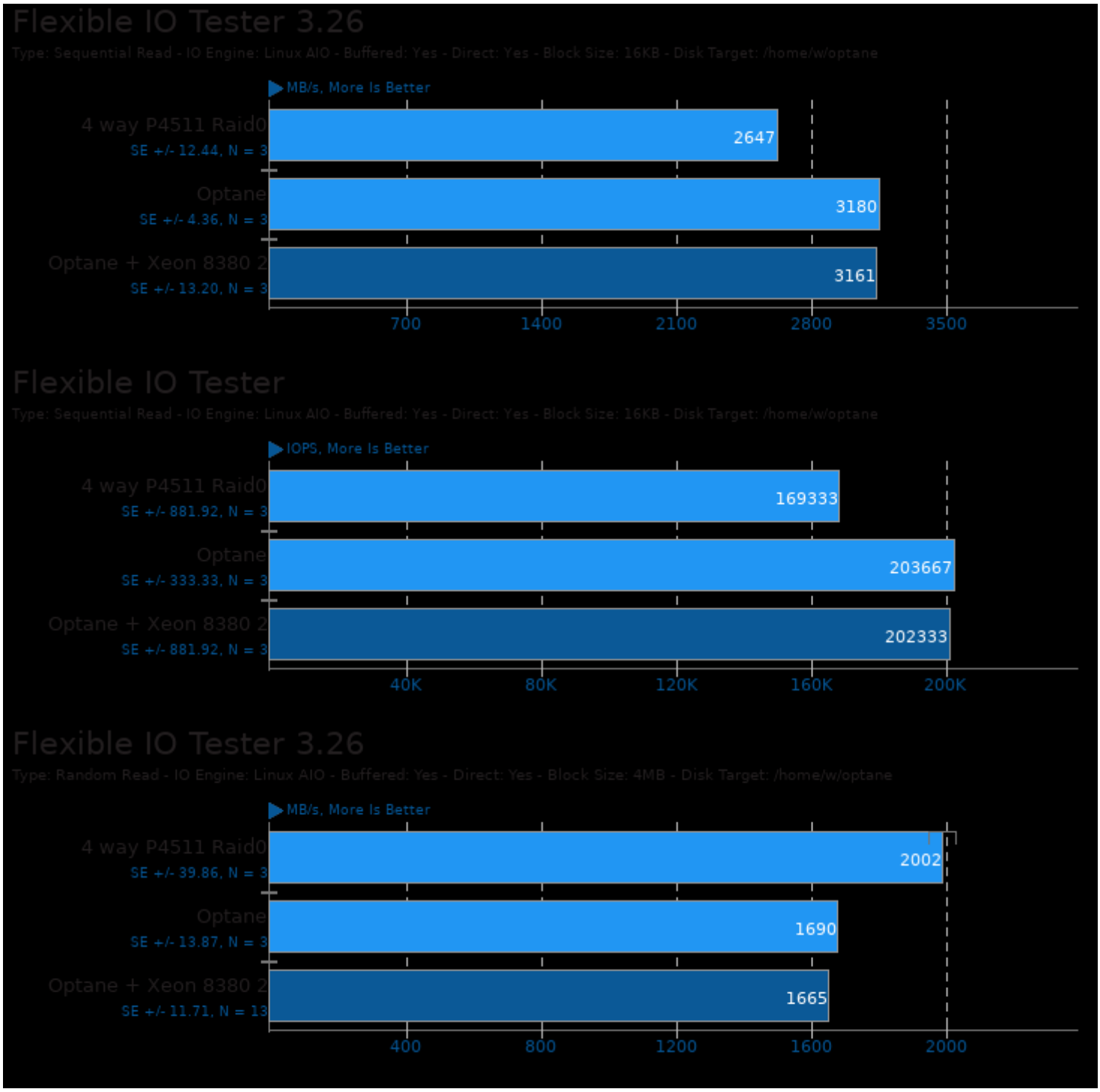

Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 14.11, N = 3
2657
Optane
SE +/- 5.55, N = 3
3332
Optane + Xeon 8380 2
SE +/- 28.00, N = 8
3317
700
1400
2100
2800
3500
Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 6506.41, N = 3
320000
Optane
SE +/- 3214.55, N = 3
399000
Optane + Xeon 8380 2
SE +/- 6460.64, N = 12
379167
90K
180K
270K
360K
450K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 200.00, N = 3
42800
Optane
SE +/- 88.19, N = 3
53333
11K
22K
33K
44K
55K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 4847.68, N = 5
314000
Optane
SE +/- 4216.90, N = 10
389400
80K
160K
240K
320K
400K


Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 12.29, N = 3
2681
Optane
SE +/- 25.44, N = 3
3200
Optane + Xeon 8380 2
SE +/- 14.50, N = 3
3319
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 7698.05, N = 5
517400
Optane
SE +/- 7055.34, N = 3
639333
140K
280K
420K
560K
700K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 35.76, N = 6
2629
Optane
SE +/- 4.04, N = 3
3198
Optane + Xeon 8380 2
SE +/- 8.14, N = 3
3170
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.20, N = 3
2691
Optane
SE +/- 51.05, N = 3
3219
Optane + Xeon 8380 2
SE +/- 44.85, N = 3
3206
700
1400
2100
2800
3500

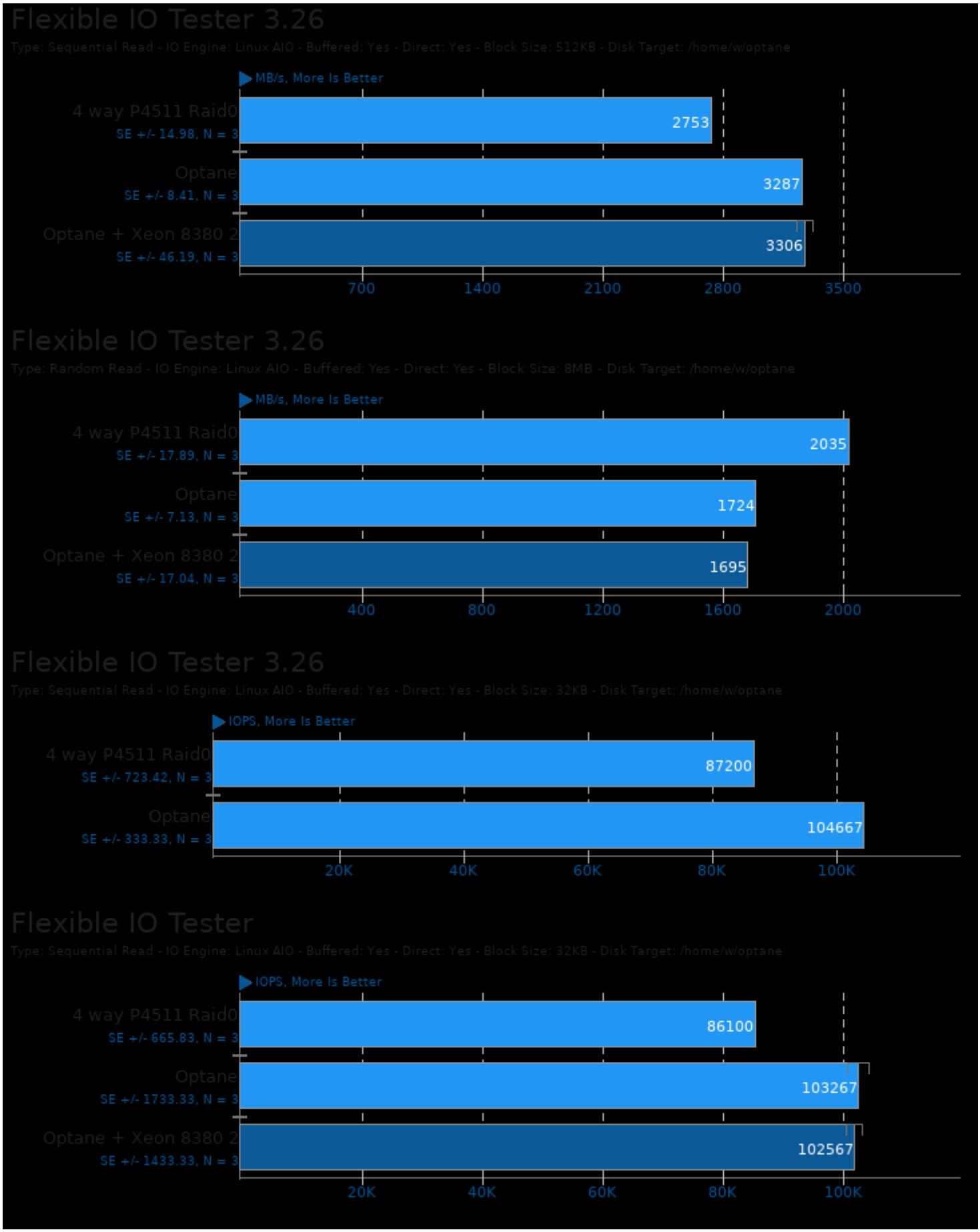
optane


Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 24.34, N = 3
2693
Optane
SE +/- 43.13, N = 3
3214
Optane + Xeon 8380 2
SE +/- 29.36, N = 3
3265
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 41.04, N = 3
2466
Optane
SE +/- 23.46, N = 3
2042
Optane + Xeon 8380 2
SE +/- 14.43, N = 13
2037
500
1000
1500
2000
2500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 46.23, N = 3
2659
Optane
SE +/- 5.57, N = 3
3216
Optane + Xeon 8380 2
SE +/- 11.84, N = 3
3208
700
1400
2100
2800
3500

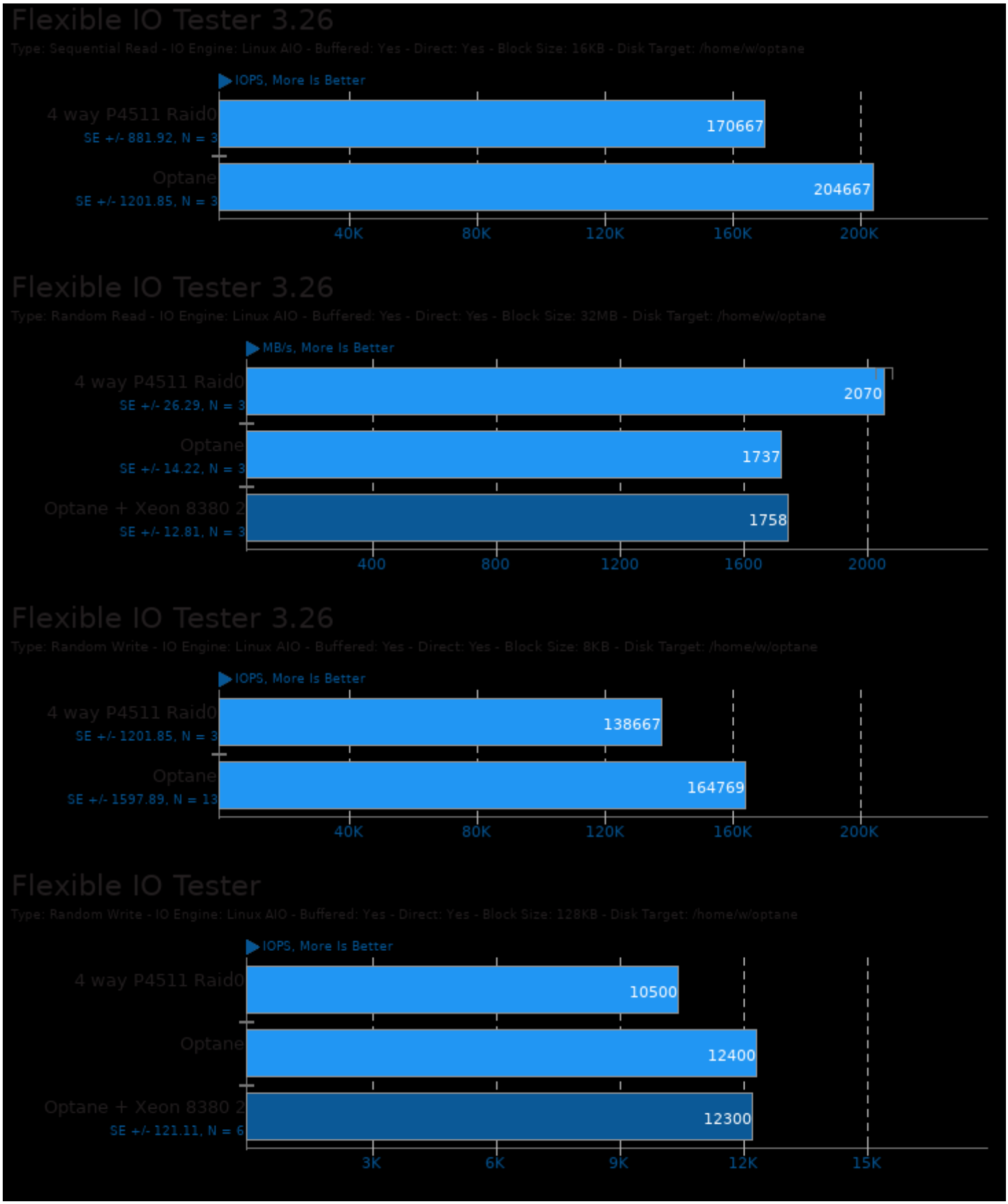
optane

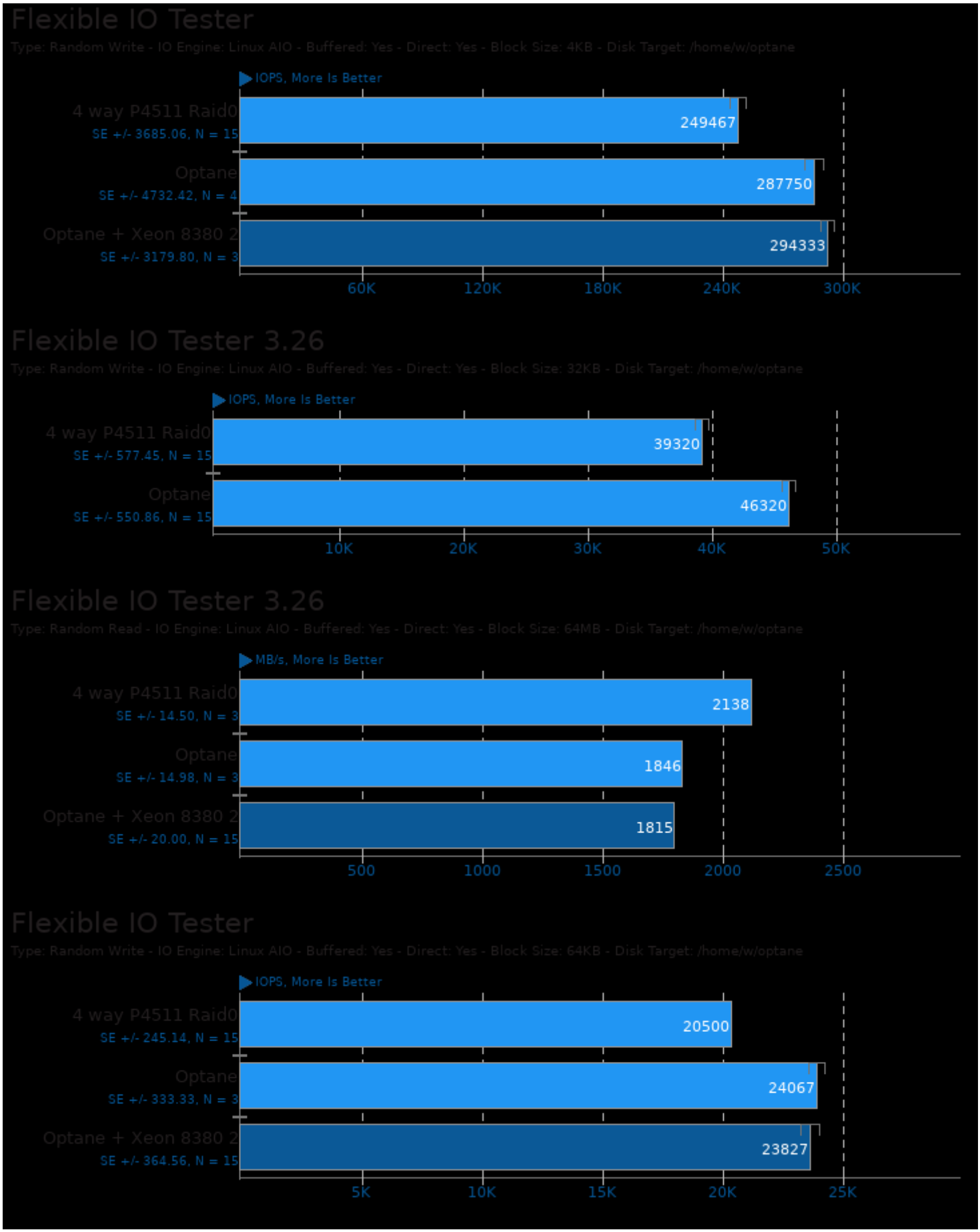

Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 12.44, N = 3
2647
Optane
SE +/- 4.36, N = 3
3180
Optane + Xeon 8380 2
SE +/- 13.20, N = 3
3161
700
1400
2100
2800
3500
Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 881.92, N = 3
169333
Optane
SE +/- 333.33, N = 3
203667
Optane + Xeon 8380 2
SE +/- 881.92, N = 3
202333
40K
80K
120K
160K
200K
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 39.86, N = 3
2002
Optane
SE +/- 13.87, N = 3
1690
Optane + Xeon 8380 2
SE +/- 11.71, N = 13
1665
400
800
1200
1600
2000

optane

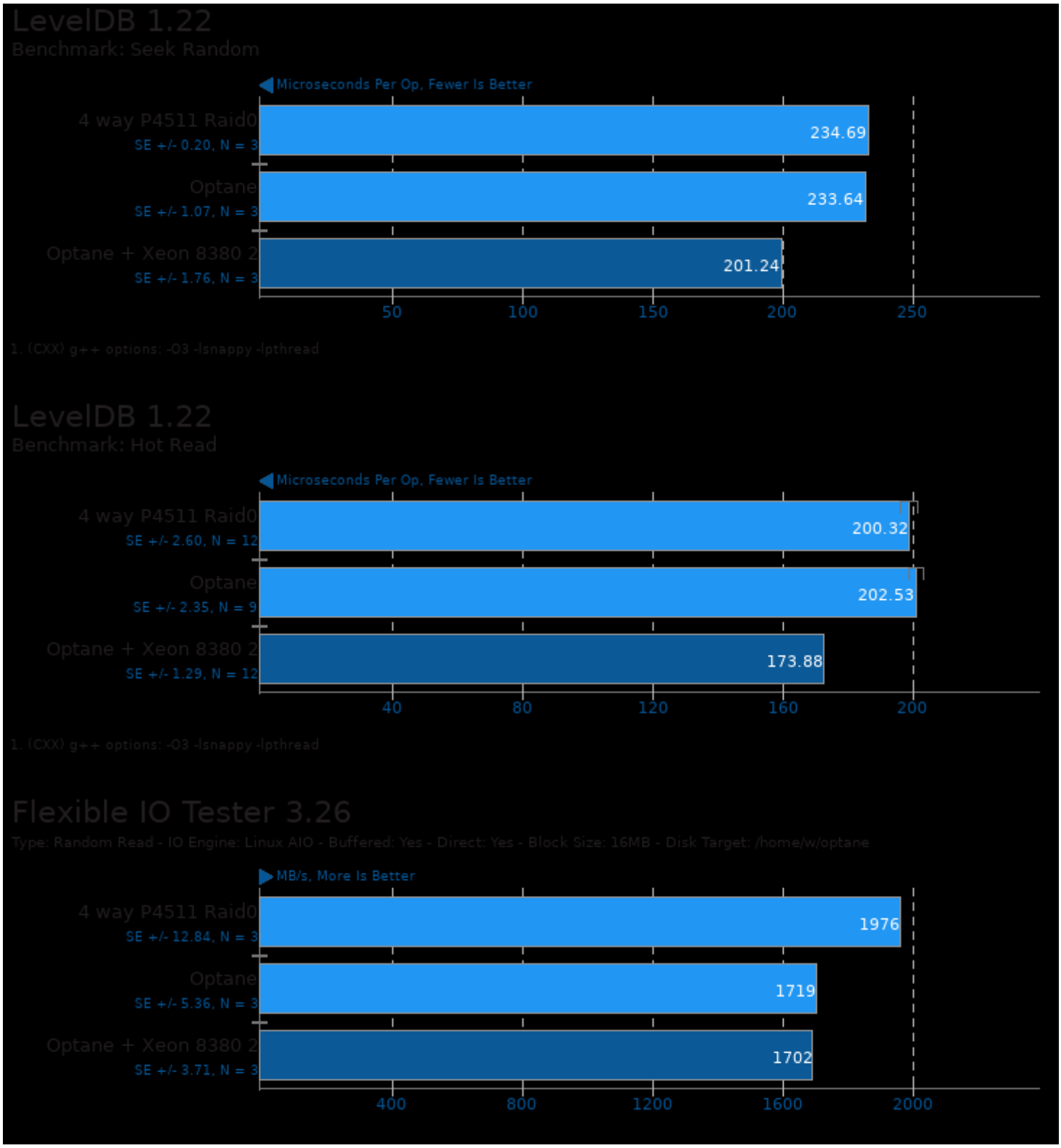

Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 512KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 14.98, N = 3
2753
Optane
SE +/- 8.41, N = 3
3287
Optane + Xeon 8380 2
SE +/- 46.19, N = 3
3306
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 17.89, N = 3
2035
Optane
SE +/- 7.13, N = 3
1724
Optane + Xeon 8380 2
SE +/- 17.04, N = 3
1695
400
800
1200
1600
2000
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 723.42, N = 3
87200
Optane
SE +/- 333.33, N = 3
104667
20K
40K
60K
80K
100K
Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 665.83, N = 3
86100
Optane
SE +/- 1733.33, N = 3
103267
Optane + Xeon 8380 2
SE +/- 1433.33, N = 3
102567
20K
40K
60K
80K
100K

optane

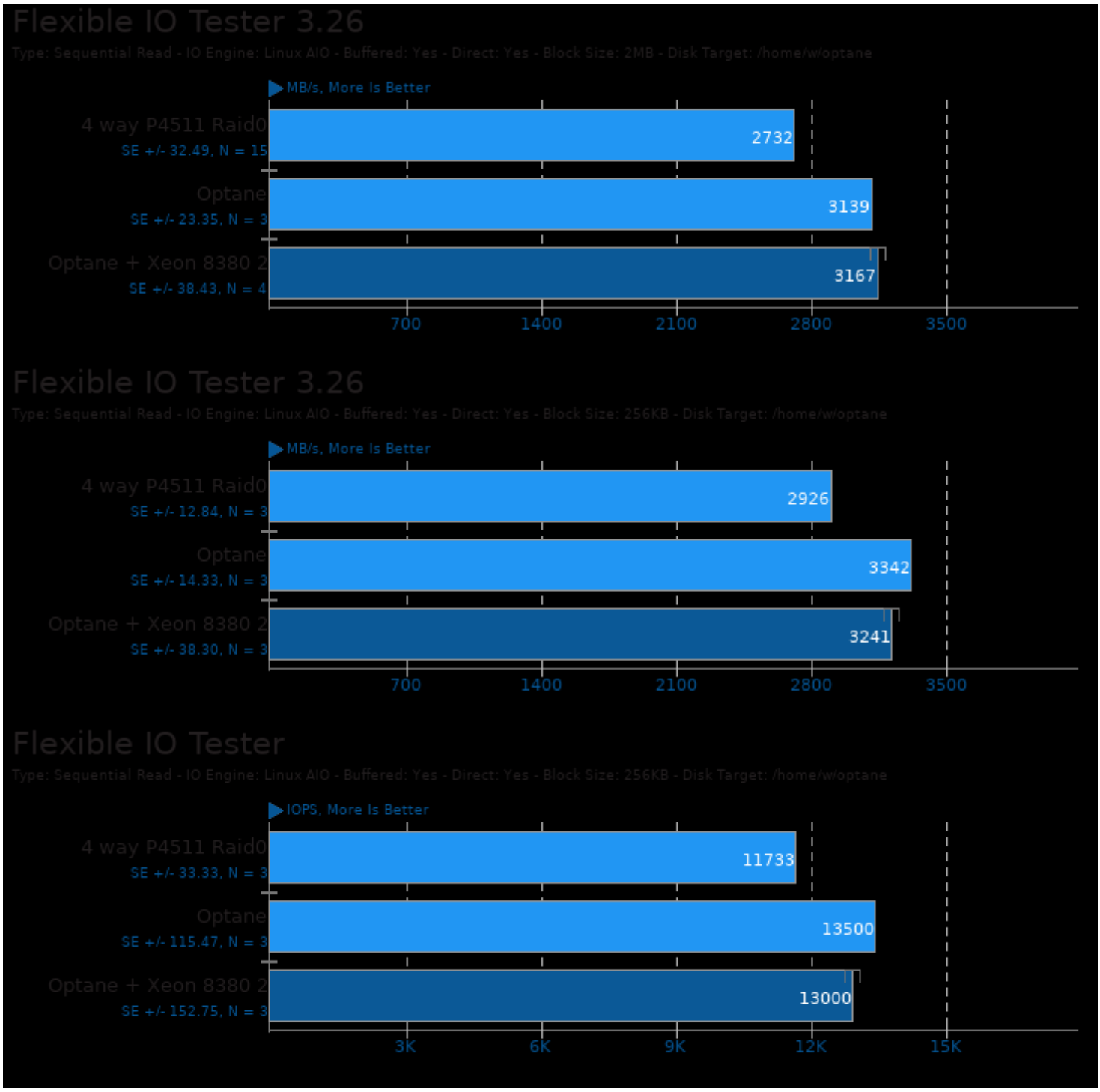

Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 881.92, N = 3
170667
Optane
SE +/- 1201.85, N = 3
204667
40K
80K
120K
160K
200K
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 26.29, N = 3
2070
Optane
SE +/- 14.22, N = 3
1737
Optane + Xeon 8380 2
SE +/- 12.81, N = 3
1758
400
800
1200
1600
2000
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 1201.85, N = 3
138667
Optane
SE +/- 1597.89, N = 13
164769
40K
80K
120K
160K
200K
Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
10500
Optane
12400
Optane + Xeon 8380 2
SE +/- 121.11, N = 6
12300
3K
6K
9K
12K
15K


Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 3685.06, N = 15
249467
Optane
SE +/- 4732.42, N = 4
287750
Optane + Xeon 8380 2
SE +/- 3179.80, N = 3
294333
60K
120K
180K
240K
300K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 577.45, N = 15
39320
Optane
SE +/- 550.86, N = 15
46320
10K
20K
30K
40K
50K
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 14.50, N = 3
2138
Optane
SE +/- 14.98, N = 3
1846
Optane + Xeon 8380 2
SE +/- 20.00, N = 15
1815
500
1000
1500
2000
2500
Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 245.14, N = 15
20500
Optane
SE +/- 333.33, N = 3
24067
Optane + Xeon 8380 2
SE +/- 364.56, N = 15
23827
5K
10K
15K
20K
25K

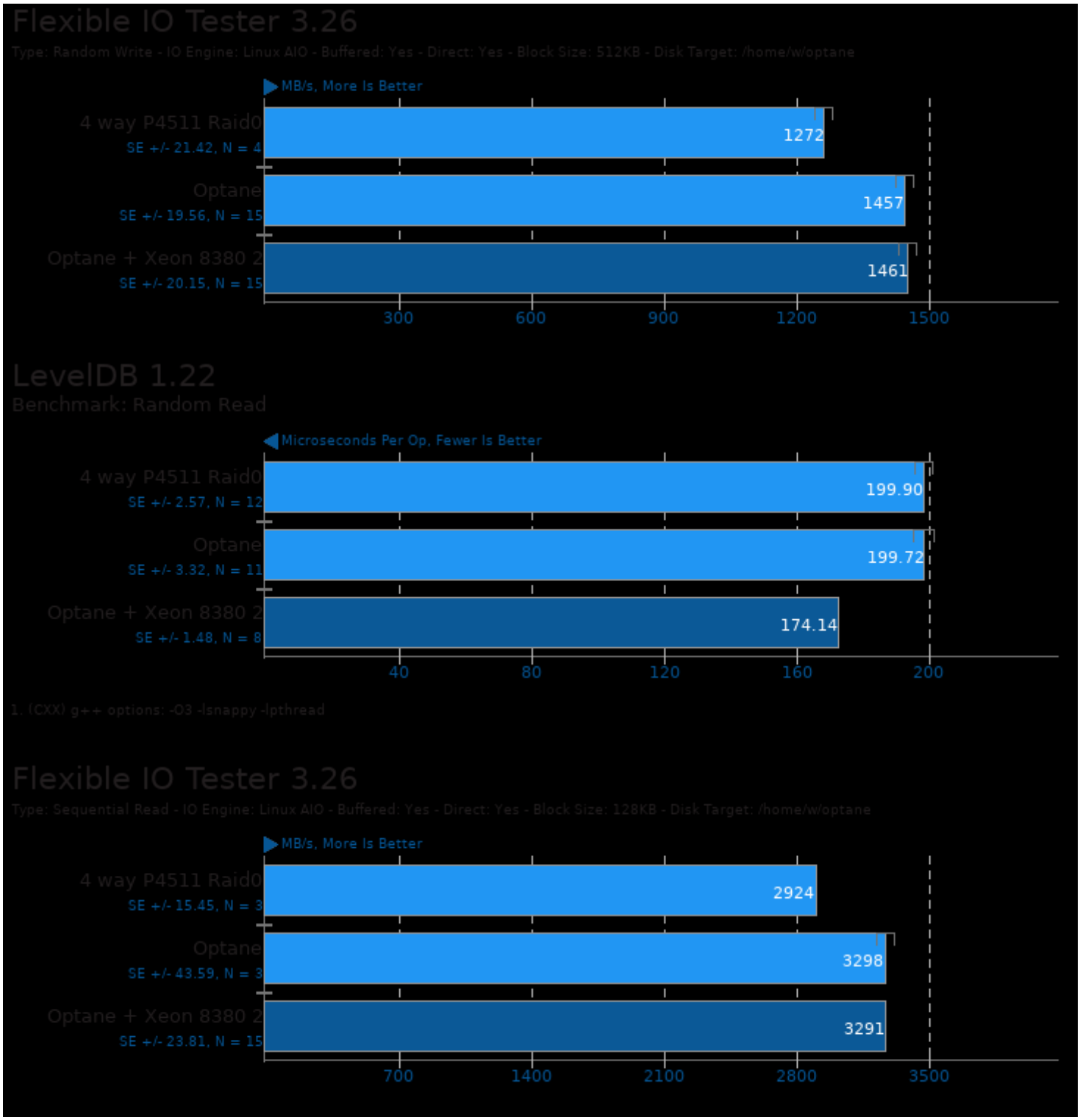
optane


LevelDB 1.22
Benchmark: Seek Random
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 0.20, N = 3
234.69
Optane
SE +/- 1.07, N = 3
233.64
Optane + Xeon 8380 2
SE +/- 1.76, N = 3
201.24
50
100
150
200
250
1. (CXX) g++ options: -O3 -lsnappy -lpthread
LevelDB 1.22
Benchmark: Hot Read
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 2.60, N = 12
200.32
Optane
SE +/- 2.35, N = 9
202.53
Optane + Xeon 8380 2
SE +/- 1.29, N = 12
173.88
40
80
120
160
200
1. (CXX) g++ options: -O3 -lsnappy -lpthread
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 12.84, N = 3
1976
Optane
SE +/- 5.36, N = 3
1719
Optane + Xeon 8380 2
SE +/- 3.71, N = 3
1702
400
800
1200
1600
2000

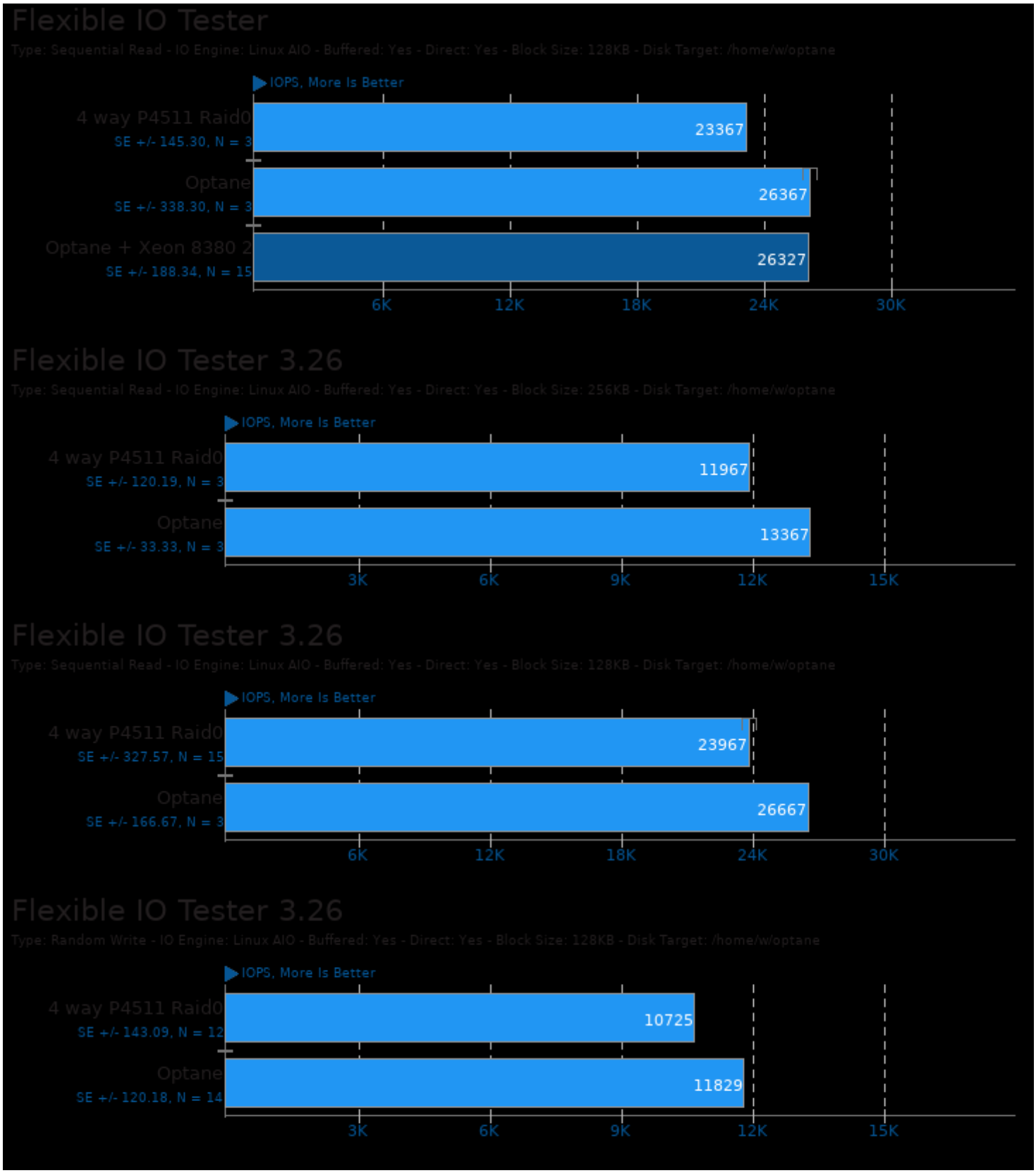
optane


Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 2MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 32.49, N = 15
2732
Optane
SE +/- 23.35, N = 3
3139
Optane + Xeon 8380 2
SE +/- 38.43, N = 4
3167
700
1400
2100
2800
3500
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 12.84, N = 3
2926
Optane
SE +/- 14.33, N = 3
3342
Optane + Xeon 8380 2
SE +/- 38.30, N = 3
3241
700
1400
2100
2800
3500
Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 33.33, N = 3
11733
Optane
SE +/- 115.47, N = 3
13500
Optane + Xeon 8380 2
SE +/- 152.75, N = 3
13000
3K
6K
9K
12K
15K

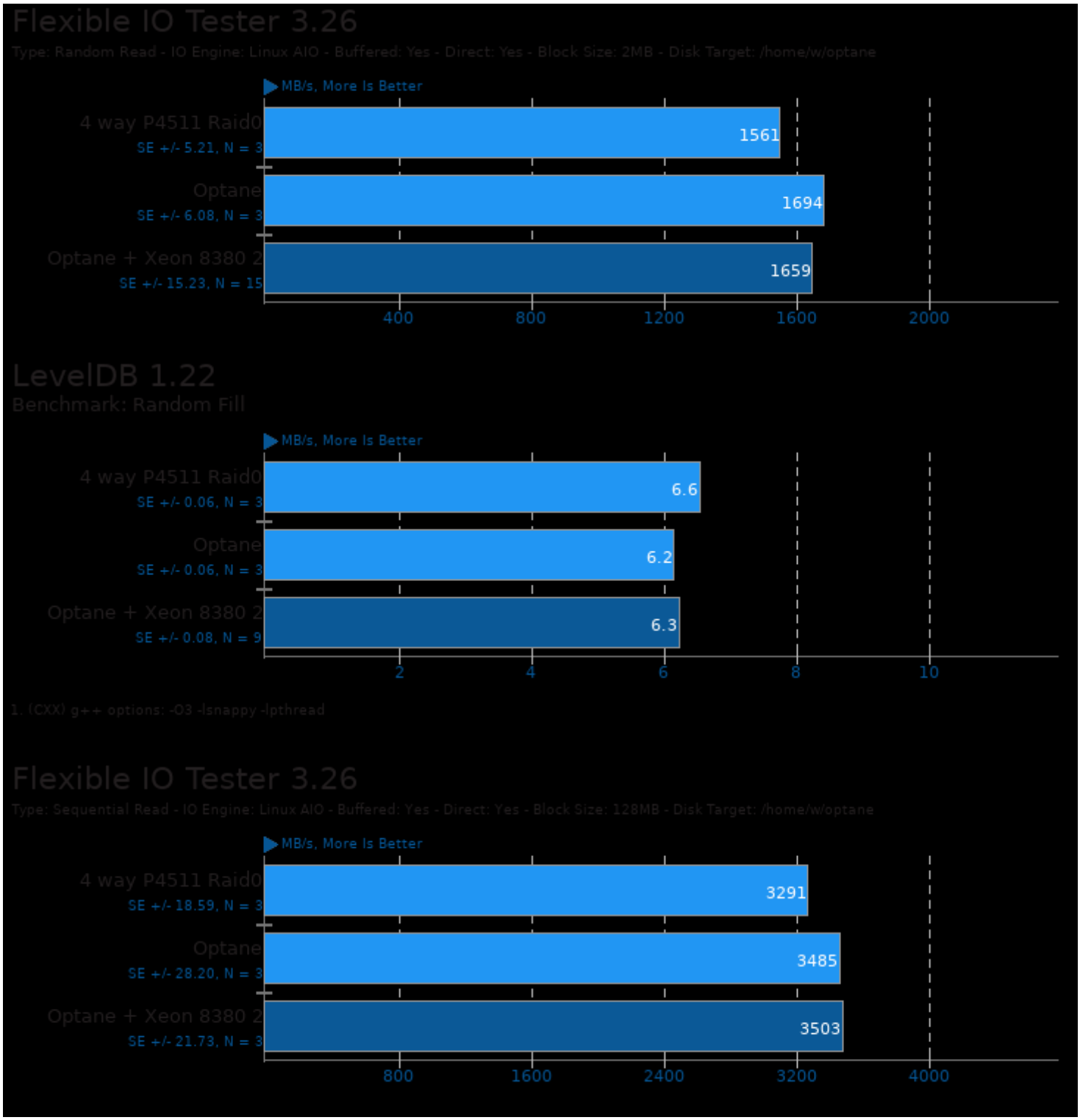
optane


Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 512KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 21.42, N = 4
1272
Optane
SE +/- 19.56, N = 15
1457
Optane + Xeon 8380 2
SE +/- 20.15, N = 15
1461
300
600
900
1200
1500
LevelDB 1.22
Benchmark: Random Read
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 2.57, N = 12
199.90
Optane
SE +/- 3.32, N = 11
199.72
Optane + Xeon 8380 2
SE +/- 1.48, N = 8
174.14
40
80
120
160
200
1. (CXX) g++ options: -O3 -lsnappy -lpthread
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 15.45, N = 3
2924
Optane
SE +/- 43.59, N = 3
3298
Optane + Xeon 8380 2
SE +/- 23.81, N = 15
3291
700
1400
2100
2800
3500

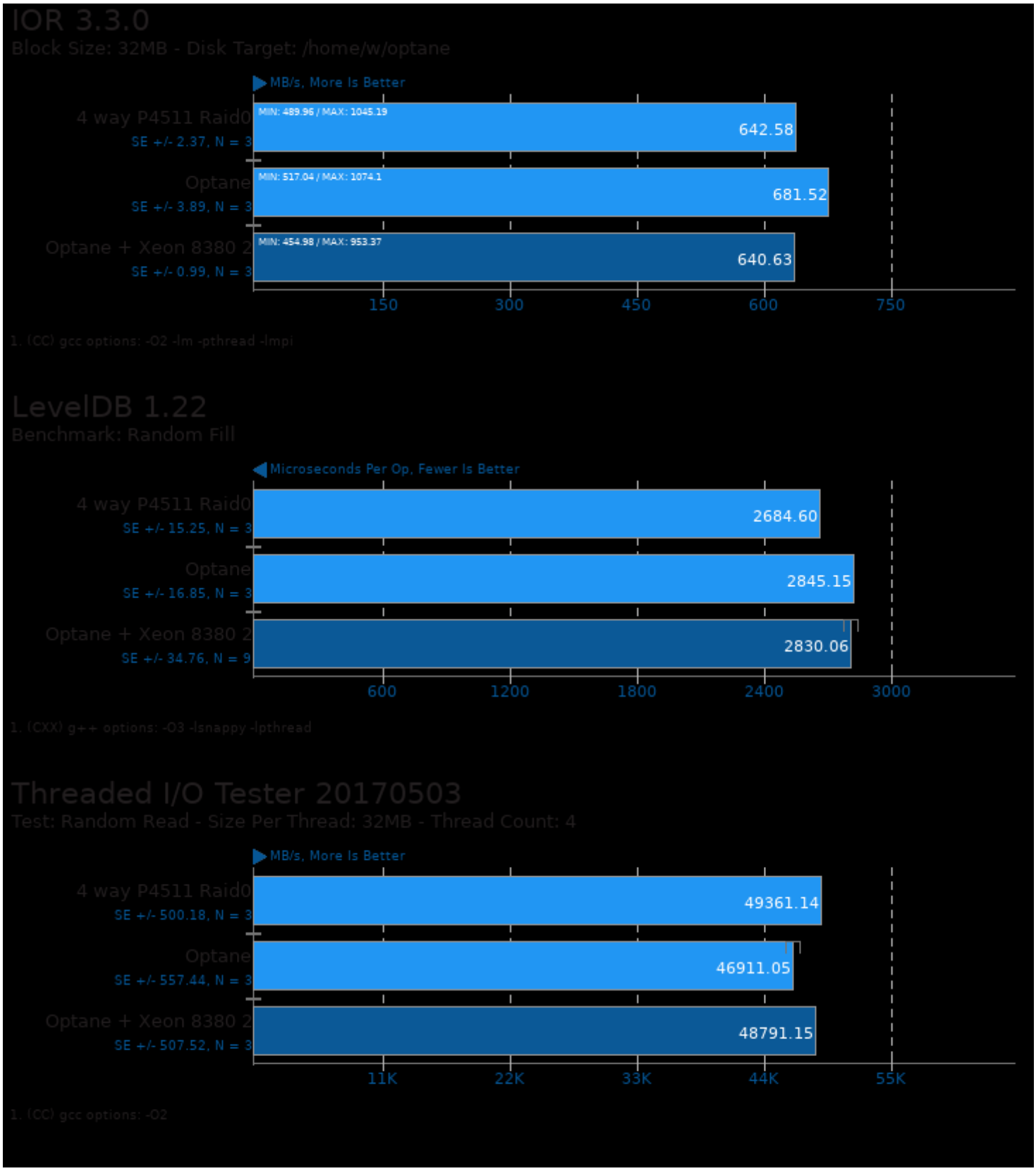
optane

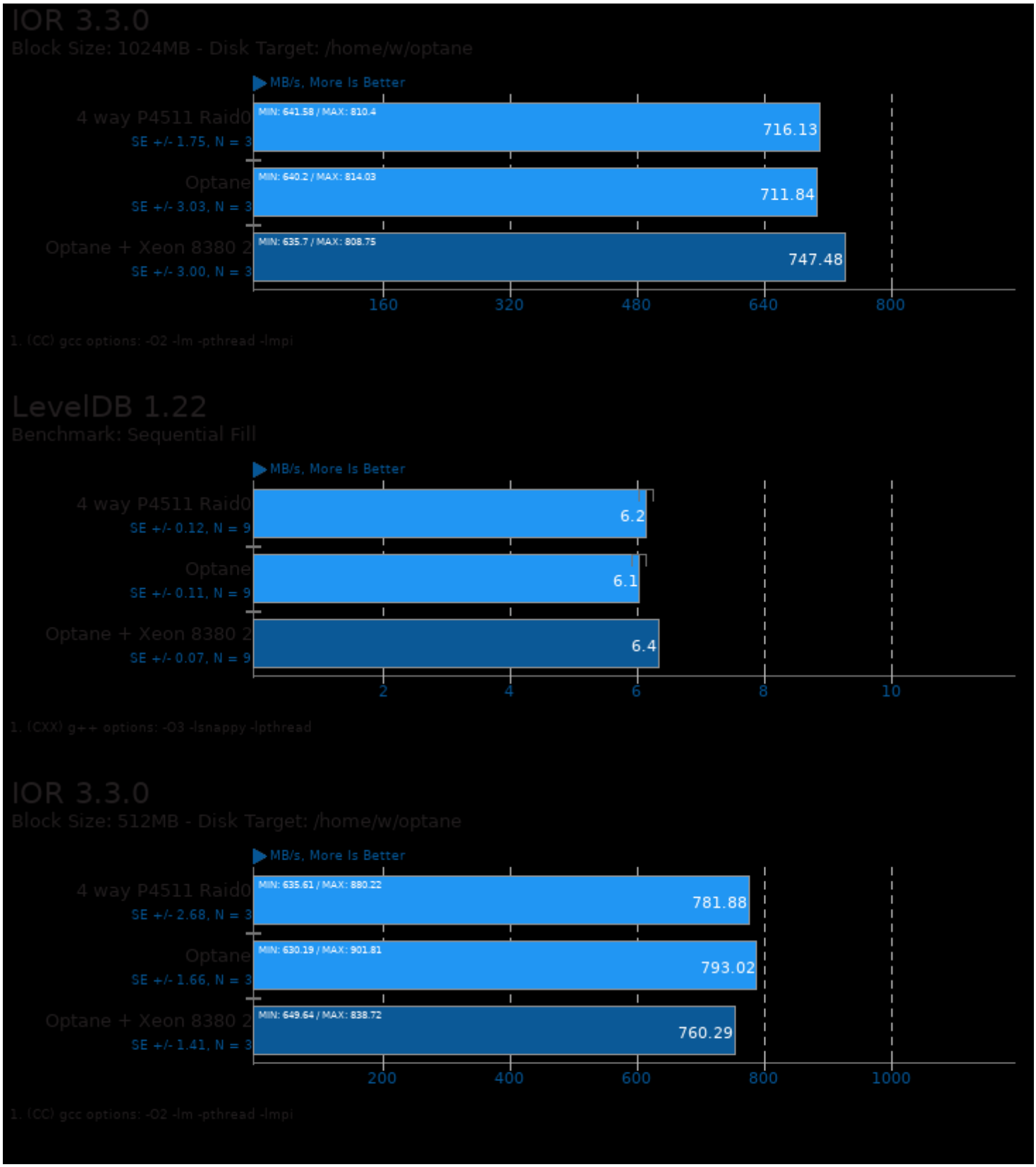

Flexible IO Tester
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 145.30, N = 3
23367
Optane
SE +/- 338.30, N = 3
26367
Optane + Xeon 8380 2
SE +/- 188.34, N = 15
26327
6K
12K
18K
24K
30K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 120.19, N = 3
11967
Optane
SE +/- 33.33, N = 3
13367
3K
6K
9K
12K
15K
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 327.57, N = 15
23967
Optane
SE +/- 166.67, N = 3
26667
6K
12K
18K
24K
30K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 143.09, N = 12
10725
Optane
SE +/- 120.18, N = 14
11829
3K
6K
9K
12K
15K

optane

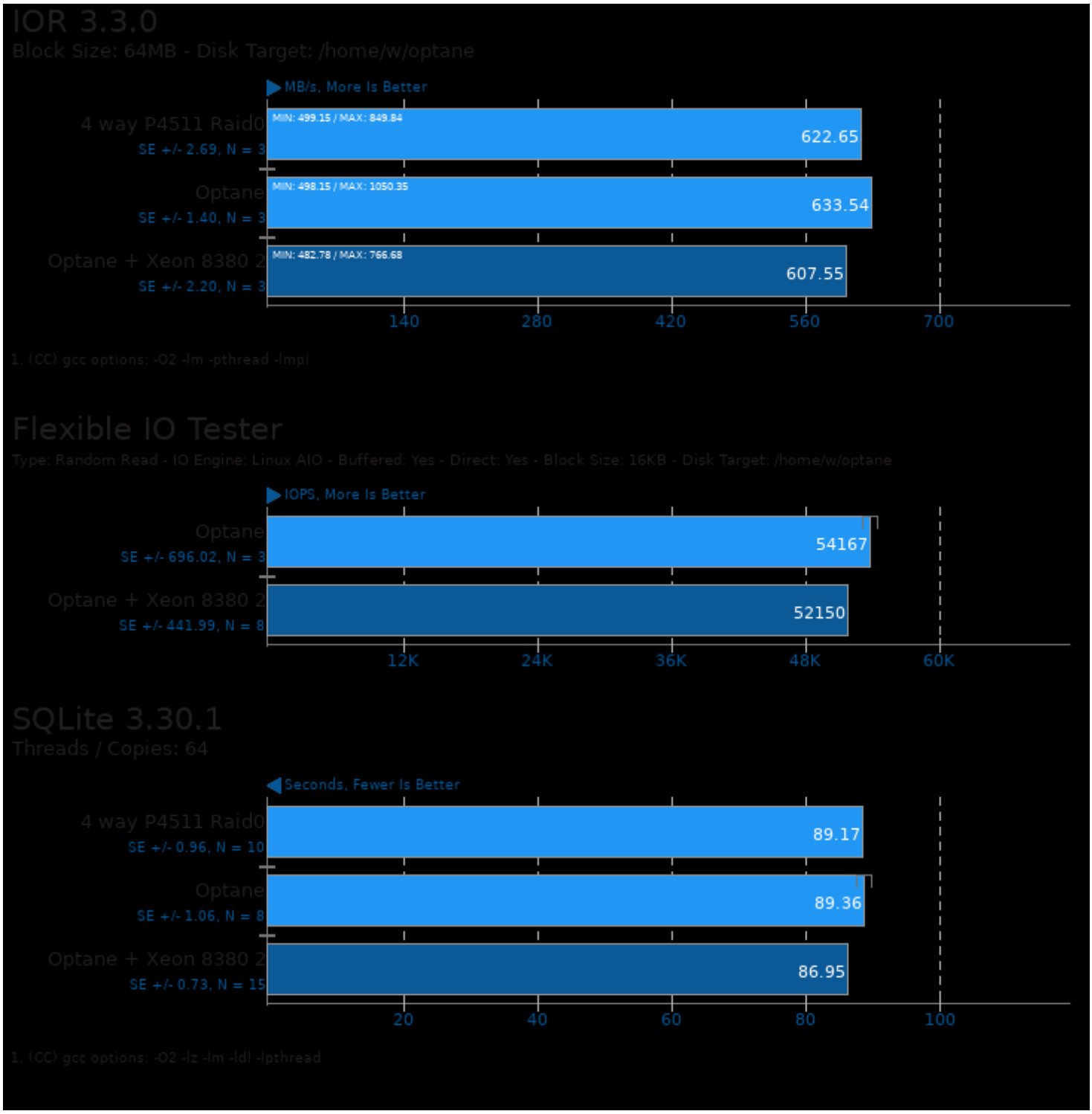

Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 2MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 5.21, N = 3
1561
Optane
SE +/- 6.08, N = 3
1694
Optane + Xeon 8380 2
SE +/- 15.23, N = 15
1659
400
800
1200
1600
2000
LevelDB 1.22
Benchmark: Random Fill
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.06, N = 3
6.6
Optane
SE +/- 0.06, N = 3
6.2
Optane + Xeon 8380 2
SE +/- 0.08, N = 9
6.3
2
4
6
8
10
1. (CXX) g++ options: -O3 -lsnappy -lpthread
Flexible IO Tester 3.26
Type: Sequential Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 18.59, N = 3
3291
Optane
SE +/- 28.20, N = 3
3485
Optane + Xeon 8380 2
SE +/- 21.73, N = 3
3503
800
1600
2400
3200
4000

optane

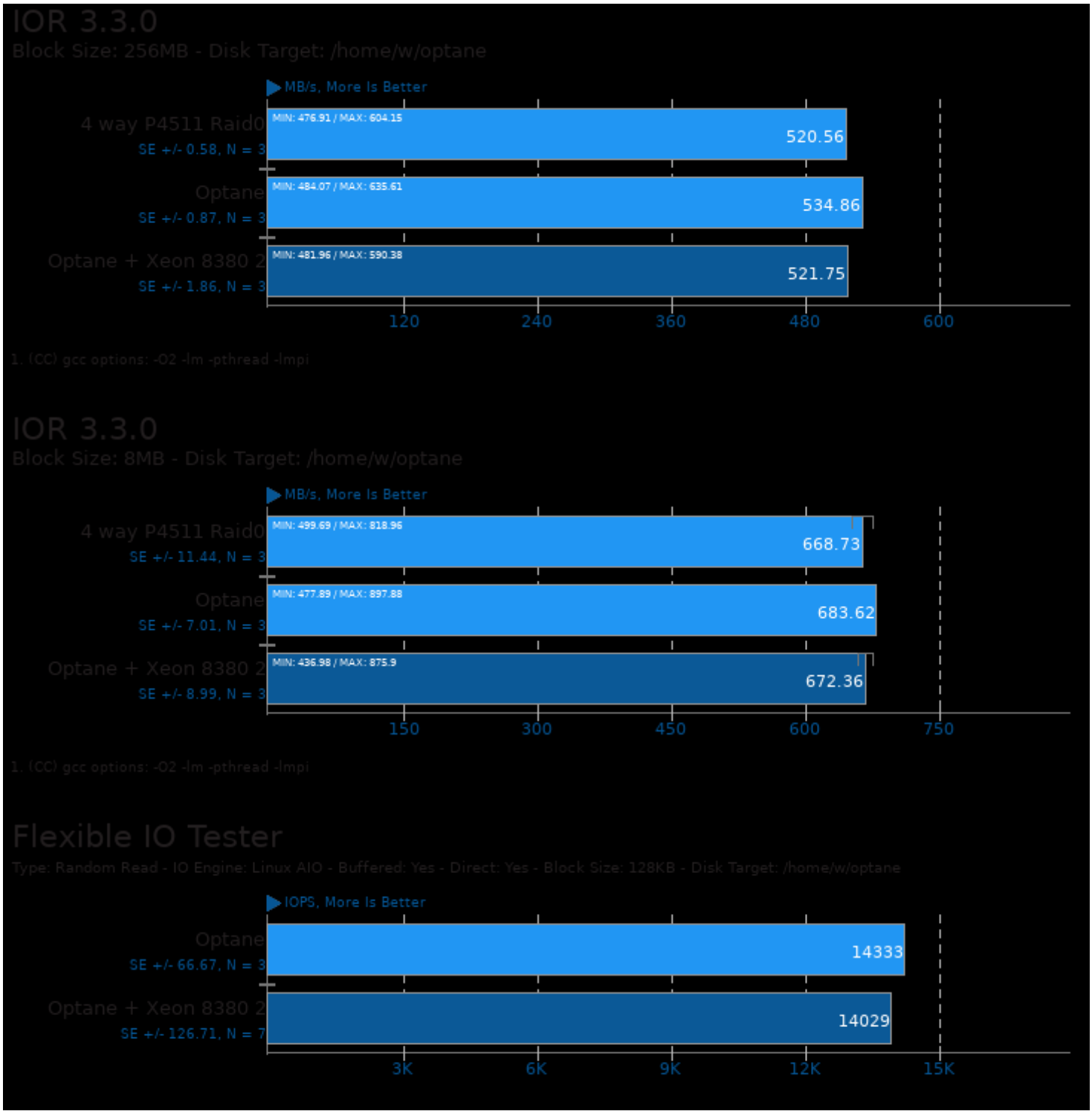

IOR 3.3.0
Block Size: 32MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.37, N = 3
MIN: 489.96 / MAX: 1045.19
642.58
Optane
SE +/- 3.89, N = 3
MIN: 517.04 / MAX: 1074.1
681.52
Optane + Xeon 8380 2
SE +/- 0.99, N = 3
MIN: 454.98 / MAX: 953.37
640.63
150
300
450
600
750
1. (CC) gcc options: -O2 -lm -pthread -lmpi
LevelDB 1.22
Benchmark: Random Fill
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 15.25, N = 3
2684.60
Optane
SE +/- 16.85, N = 3
2845.15
Optane + Xeon 8380 2
SE +/- 34.76, N = 9
2830.06
600
1200
1800
2400
3000
1. (CXX) g++ options: -O3 -lsnappy -lpthread
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 32MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 500.18, N = 3
49361.14
Optane
SE +/- 557.44, N = 3
46911.05
Optane + Xeon 8380 2
SE +/- 507.52, N = 3
48791.15
11K
22K
33K
44K
55K
1. (CC) gcc options: -O2


IOR 3.3.0
Block Size: 1024MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.75, N = 3
MIN: 641.58 / MAX: 810.4
716.13
Optane
SE +/- 3.03, N = 3
MIN: 640.2 / MAX: 814.03
711.84
Optane + Xeon 8380 2
SE +/- 3.00, N = 3
MIN: 635.7 / MAX: 808.75
747.48
160
320
480
640
800
1. (CC) gcc options: -O2 -lm -pthread -lmpi
LevelDB 1.22
Benchmark: Sequential Fill
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.12, N = 9
6.2
Optane
SE +/- 0.11, N = 9
6.1
Optane + Xeon 8380 2
SE +/- 0.07, N = 9
6.4
2
4
6
8
10
1. (CXX) g++ options: -O3 -lsnappy -lpthread
IOR 3.3.0
Block Size: 512MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.68, N = 3
MIN: 635.61 / MAX: 880.22
781.88
Optane
SE +/- 1.66, N = 3
MIN: 630.19 / MAX: 901.81
793.02
Optane + Xeon 8380 2
SE +/- 1.41, N = 3
MIN: 649.64 / MAX: 838.72
760.29
200
400
600
800
1000
1. (CC) gcc options: -O2 -lm -pthread -lmpi

optane


IOR 3.3.0
Block Size: 64MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.69, N = 3
MIN: 499.15 / MAX: 849.84
622.65
Optane
SE +/- 1.40, N = 3
MIN: 498.15 / MAX: 1050.35
633.54
Optane + Xeon 8380 2
SE +/- 2.20, N = 3
MIN: 482.78 / MAX: 766.68
607.55
140
280
420
560
700
1. (CC) gcc options: -O2 -lm -pthread -lmpi
Flexible IO Tester
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
Optane
SE +/- 696.02, N = 3
54167
Optane + Xeon 8380 2
SE +/- 441.99, N = 8
52150
12K
24K
36K
48K
60K
SQLite 3.30.1
Threads / Copies: 64
Seconds, Fewer Is Better
4 way P4511 Raid0
SE +/- 0.96, N = 10
89.17
Optane
SE +/- 1.06, N = 8
89.36
Optane + Xeon 8380 2
SE +/- 0.73, N = 15
86.95
20
40
60
80
100
1. (CC) gcc options: -O2 -lz -lm -ldl -lpthread

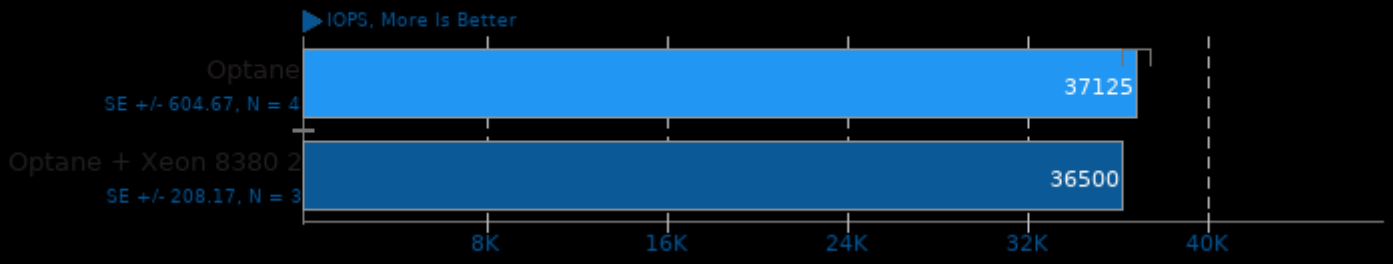
optane


IOR 3.3.0
Block Size: 256MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
MIN: 476.91 / MAX: 604.15
520.56
SE +/- 0.58, N = 3
Optane
MIN: 484.07 / MAX: 635.61
534.86
SE +/- 0.87, N = 3
Optane + Xeon 8380 2
MIN: 481.96 / MAX: 590.38
521.75
SE +/- 1.86, N = 3
120
240
360
480
600
1. (CC) gcc options: -O2 -lm -pthread -lmpi
IOR 3.3.0
Block Size: 8MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
MIN: 499.69 / MAX: 818.96
668.73
SE +/- 11.44, N = 3
Optane
MIN: 477.89 / MAX: 897.88
683.62
SE +/- 7.01, N = 3
Optane + Xeon 8380 2
MIN: 436.98 / MAX: 875.9
672.36
SE +/- 8.99, N = 3
150
300
450
600
750
1. (CC) gcc options: -O2 -lm -pthread -lmpi
Flexible IO Tester
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
Optane
14333
SE +/- 66.67, N = 3
Optane + Xeon 8380 2
14029
SE +/- 126.71, N = 7
3K
6K
9K
12K
15K

optane

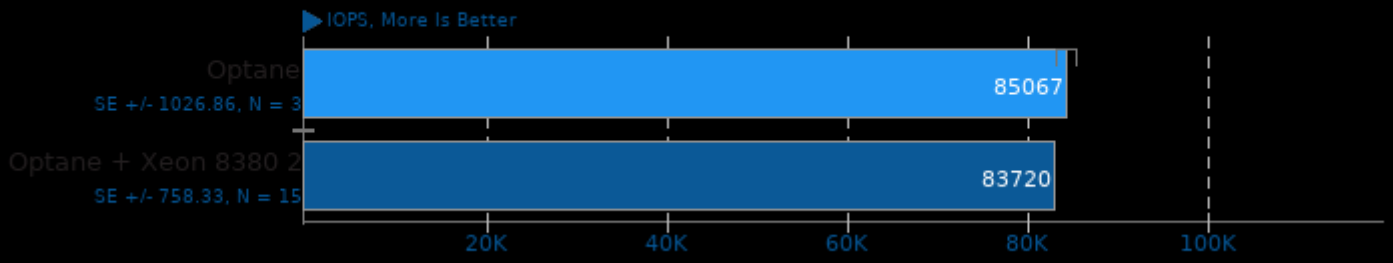
Flexible IO Tester

Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane



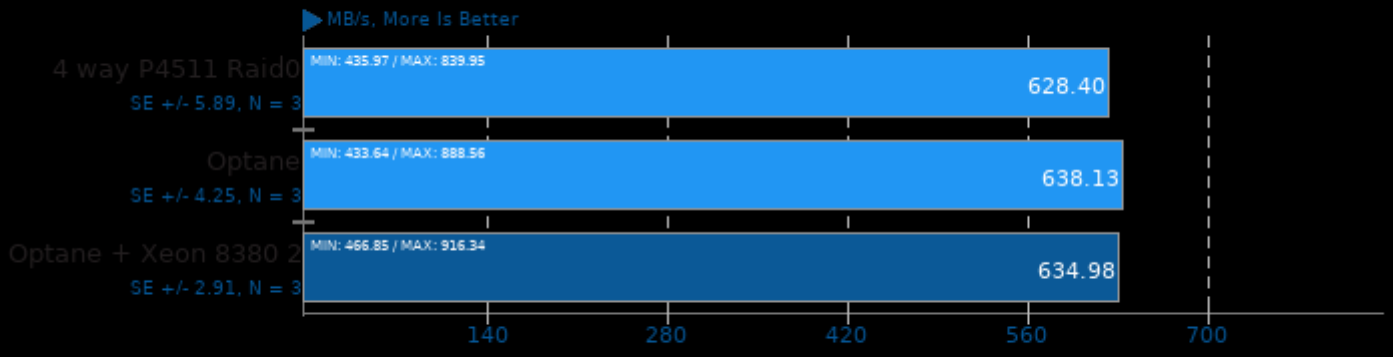
Flexible IO Tester

Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane



IOR 3.3.0

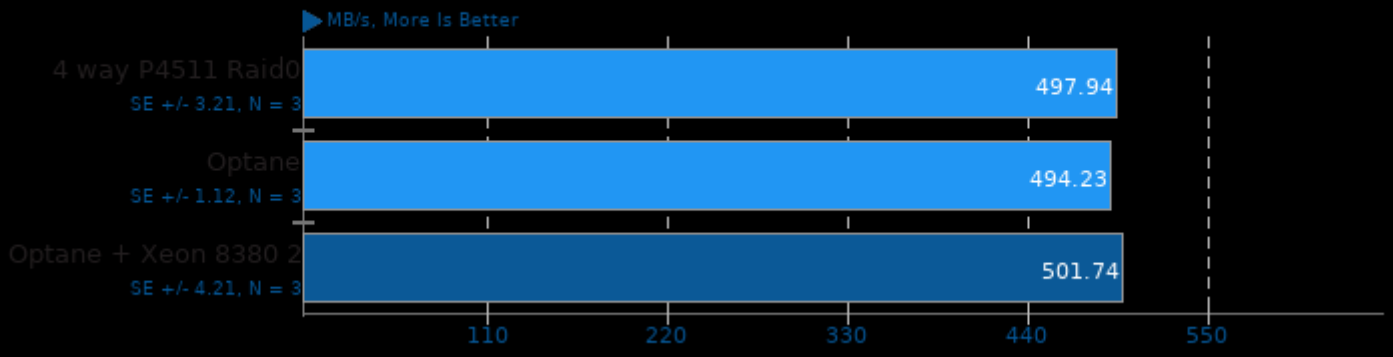
Block Size: 16MB - Disk Target: /home/w/optane



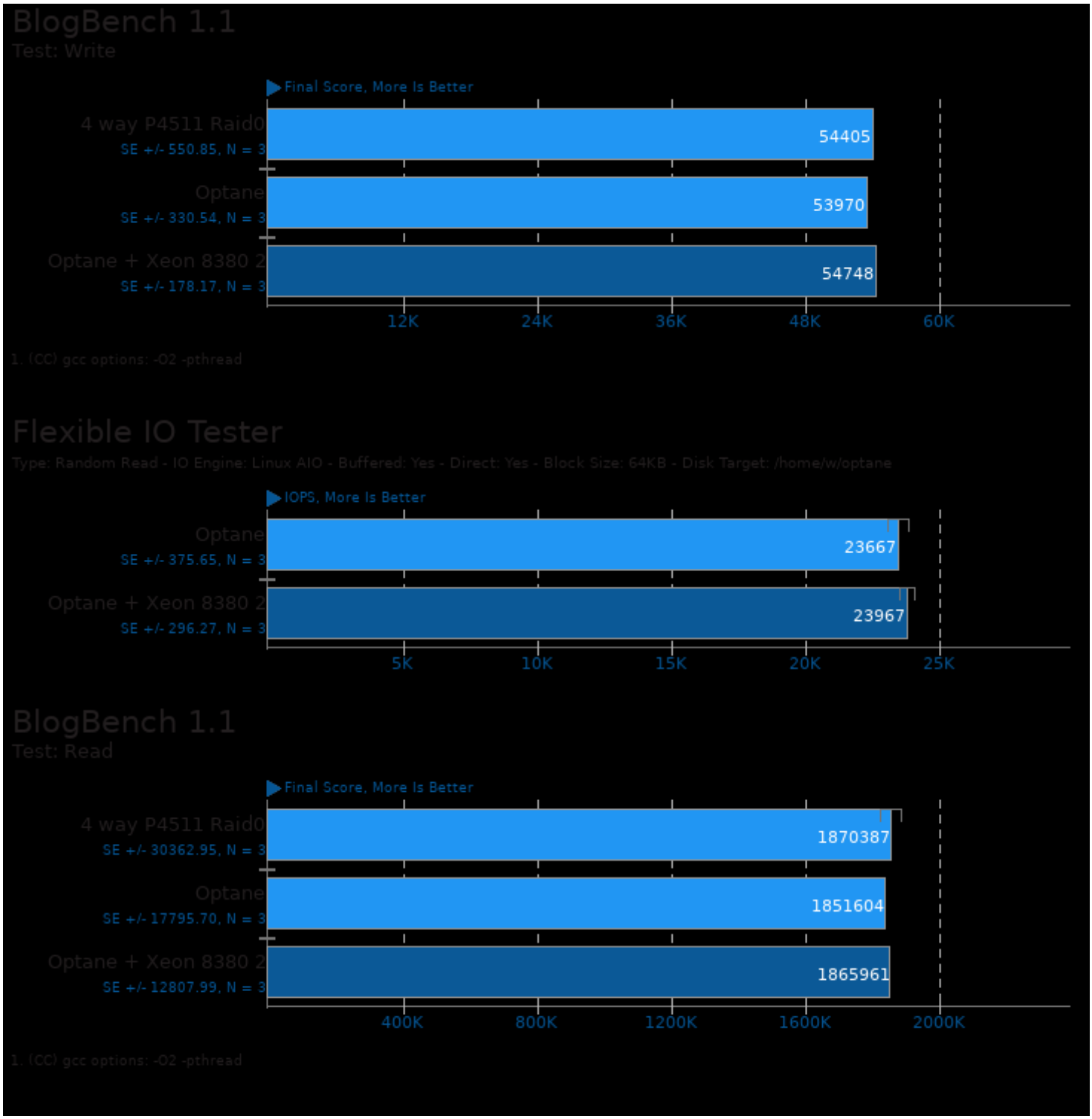
1. (CC) gcc options: -O2 -lm -pthread -lmpi

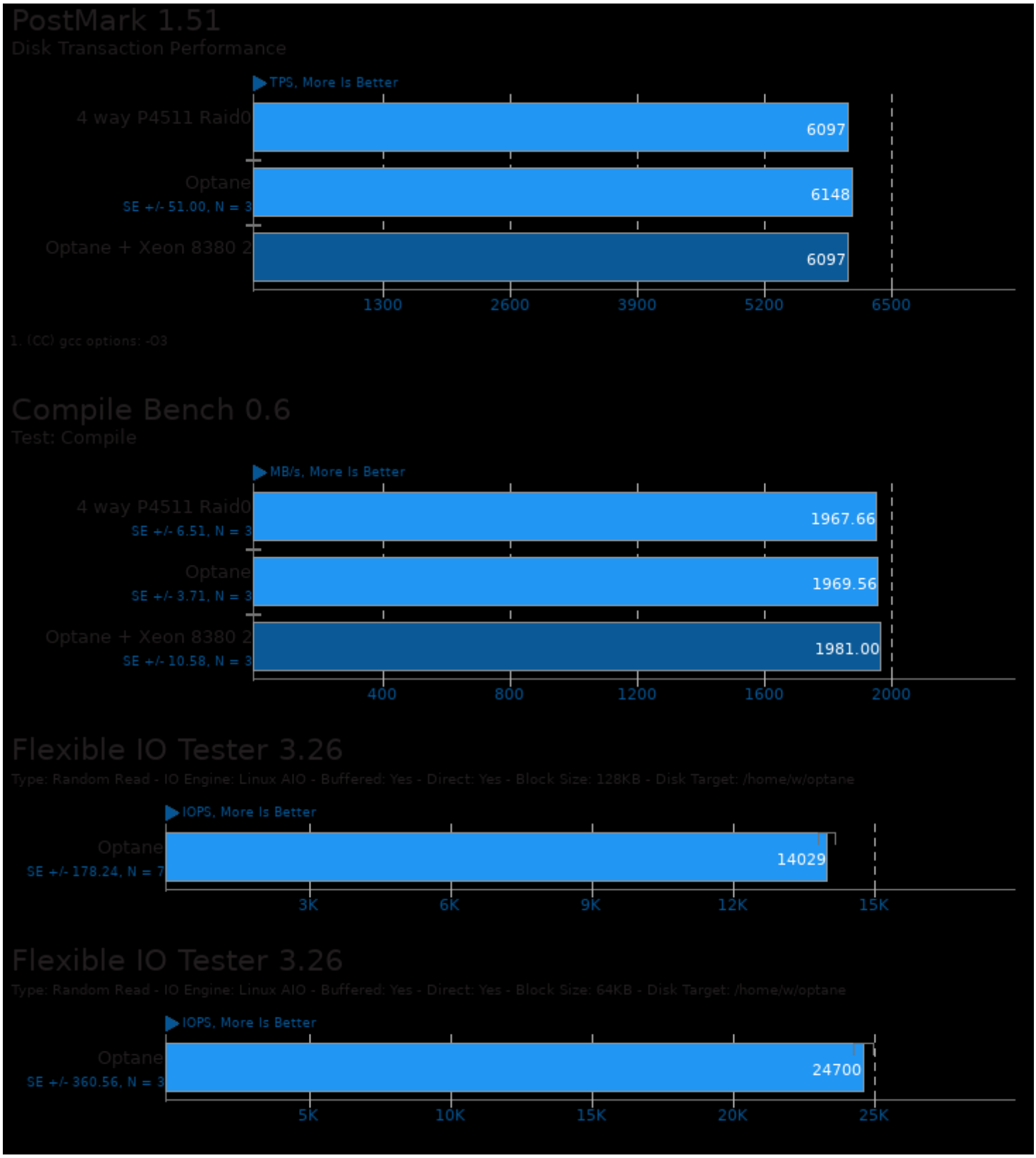
Compile Bench 0.6

Test: Initial Create



optane

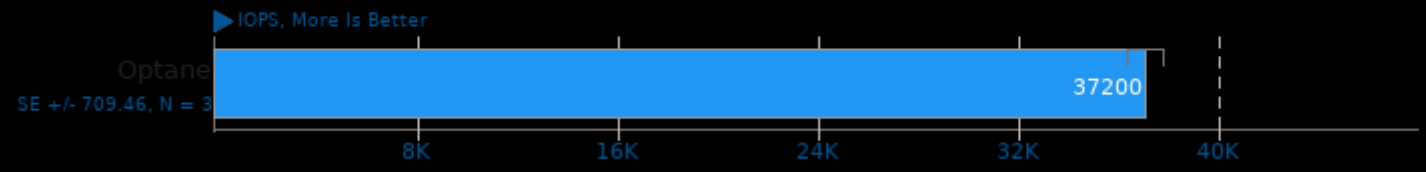

BlogBench 1.1
Test: Write
Final Score, More Is Better
4 way P4511 Raid0
SE +/- 550.85, N = 3
54405
Optane
SE +/- 330.54, N = 3
53970
Optane + Xeon 8380 2
SE +/- 178.17, N = 3
54748
12K
24K
36K
48K
60K
1. (CC) gcc options: -O2 -pthread
Flexible IO Tester
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
Optane
SE +/- 375.65, N = 3
23667
Optane + Xeon 8380 2
SE +/- 296.27, N = 3
23967
5K
10K
15K
20K
25K
BlogBench 1.1
Test: Read
Final Score, More Is Better
4 way P4511 Raid0
SE +/- 30362.95, N = 3
1870387
Optane
SE +/- 17795.70, N = 3
1851604
Optane + Xeon 8380 2
SE +/- 12807.99, N = 3
1865961
400K
800K
1200K
1600K
2000K
1. (CC) gcc options: -O2 -pthread


PostMark 1.51
Disk Transaction Performance
TPS, More Is Better
4 way P4511 Raid0
6097
Optane
SE +/- 51.00, N = 3
6148
Optane + Xeon 8380 2
6097
1300
2600
3900
5200
6500
1. (CC) gcc options: -O3
Compile Bench 0.6
Test: Compile
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 6.51, N = 3
1967.66
Optane
SE +/- 3.71, N = 3
1969.56
Optane + Xeon 8380 2
SE +/- 10.58, N = 3
1981.00
400
800
1200
1600
2000
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
Optane
SE +/- 178.24, N = 7
14029
3K
6K
9K
12K
15K
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
Optane
SE +/- 360.56, N = 3
24700
5K
10K
15K
20K
25K

optane

Flexible IO Tester 3.26

Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane



Flexible IO Tester 3.26

Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane



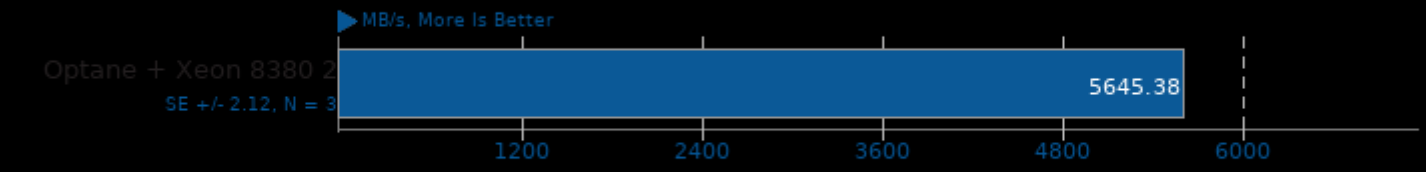
Flexible IO Tester 3.26

Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane



Dbench 4.0

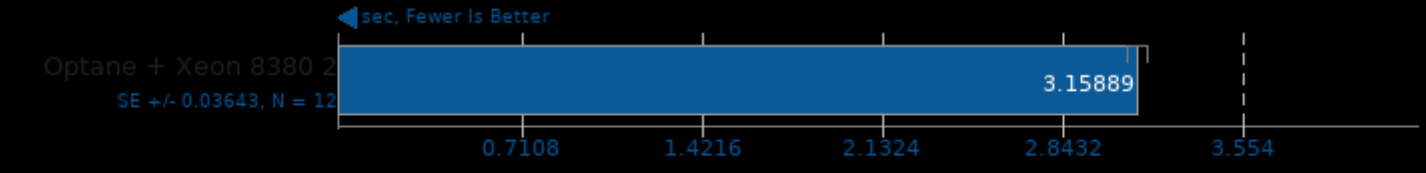
Client Count: 128



1. (CC) gcc options: -lpopt -O2

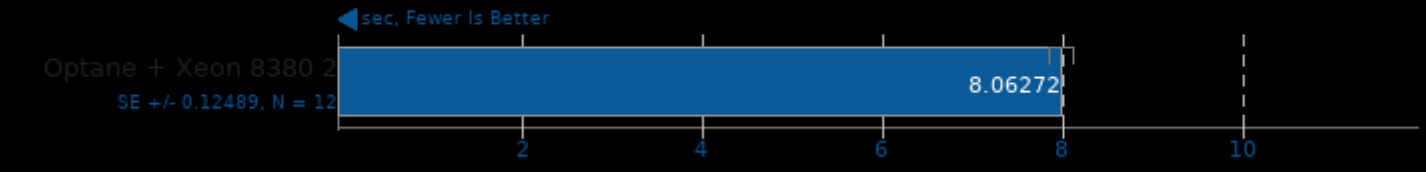
Application Start-up Time 3.4.0

Background I/O Mix: Sequential Reads + Writes - Application To Start: LibreOffice Writer - Disk Target: /home/w/optane



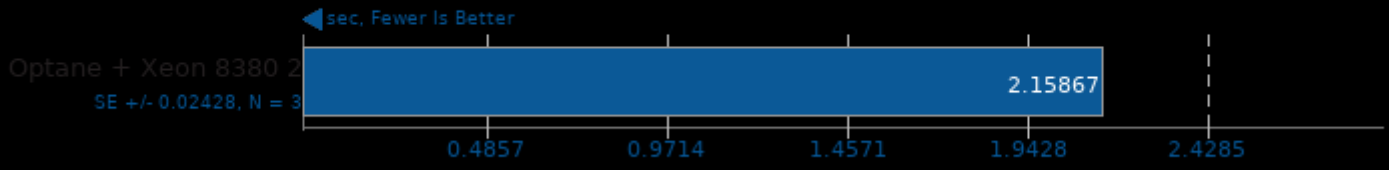
Application Start-up Time 3.4.0

Background I/O Mix: Only Sequential Reads - Application To Start: LibreOffice Writer - Disk Target: /home/w/optane



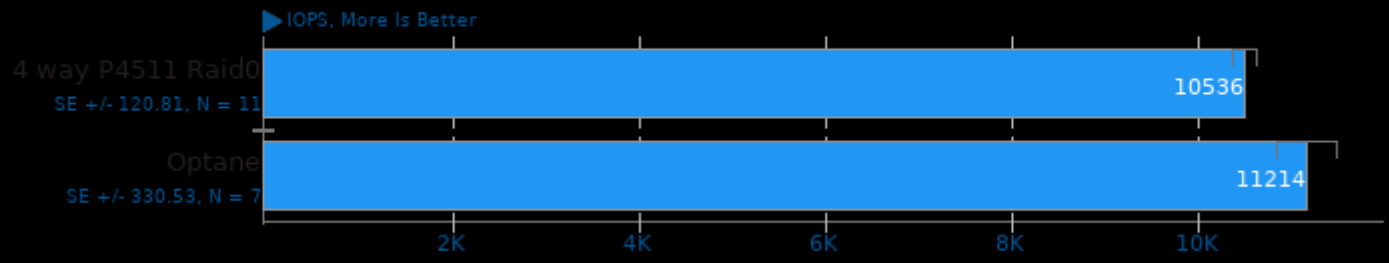
Application Start-up Time 3.4.0

Background I/O Mix: Only Sequential Reads - Application To Start: xterm - Disk Target: /home/w/optane



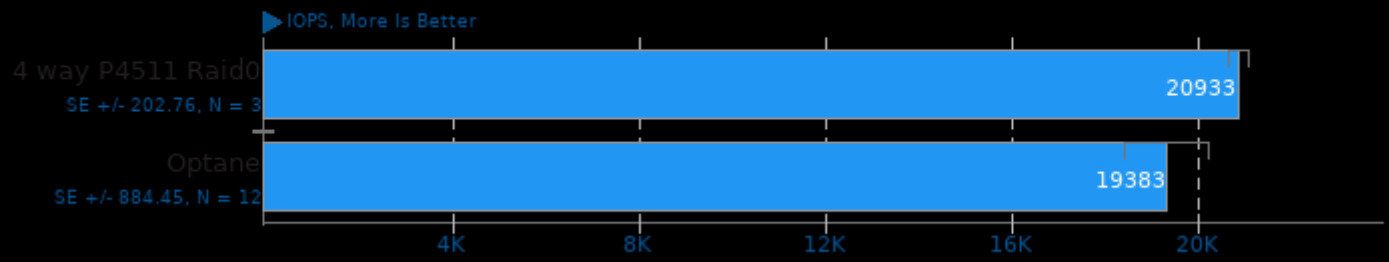
Flexible IO Tester 3.26

Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane



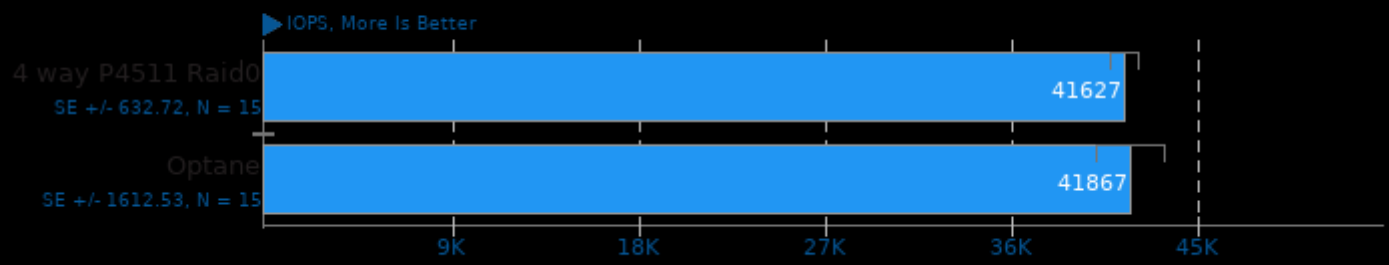
Flexible IO Tester 3.26

Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane



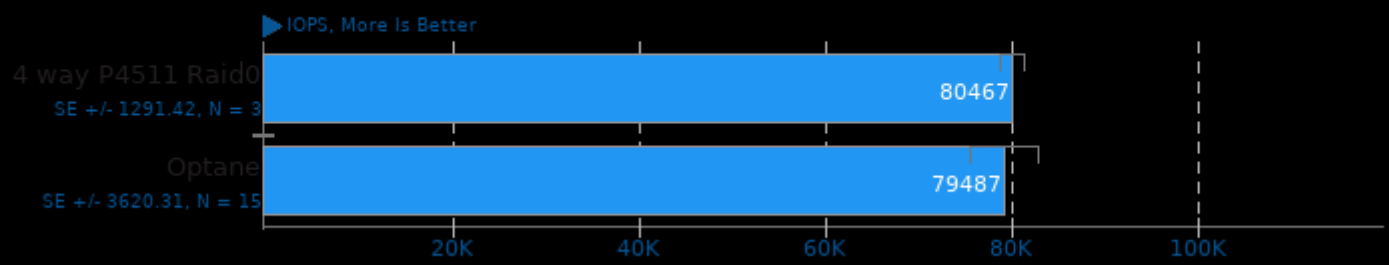
Flexible IO Tester 3.26

Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane

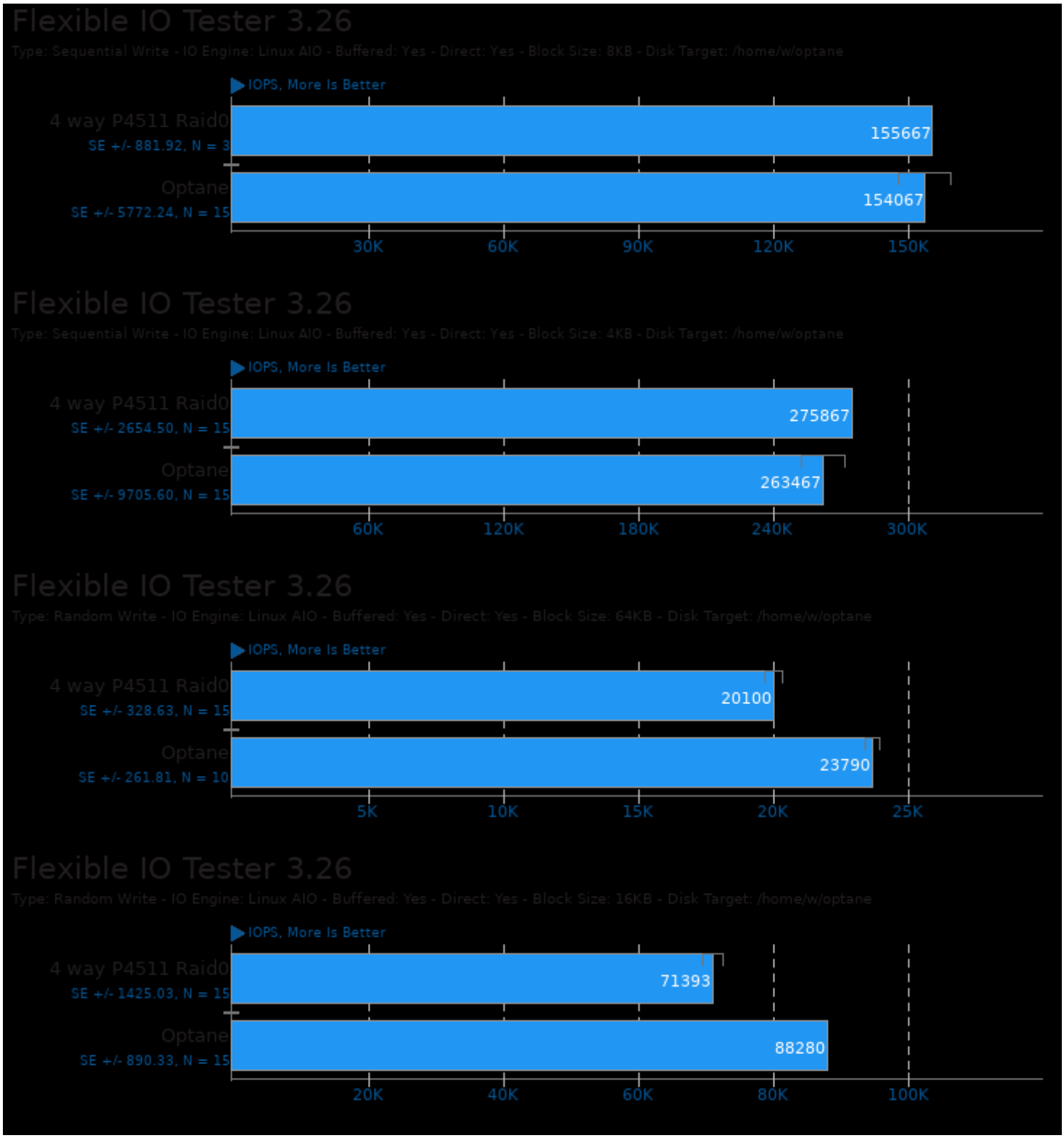


Flexible IO Tester 3.26

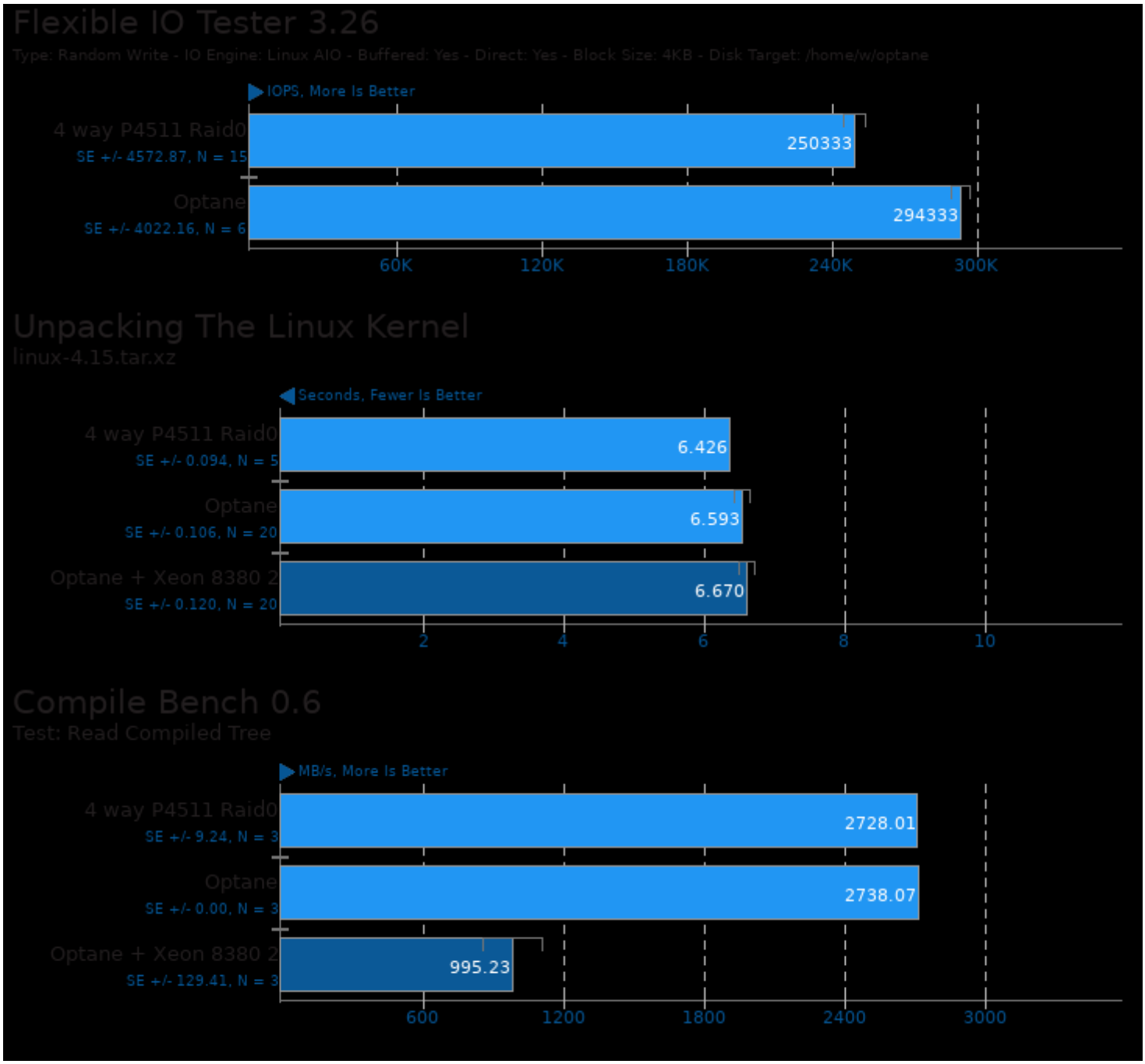
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane

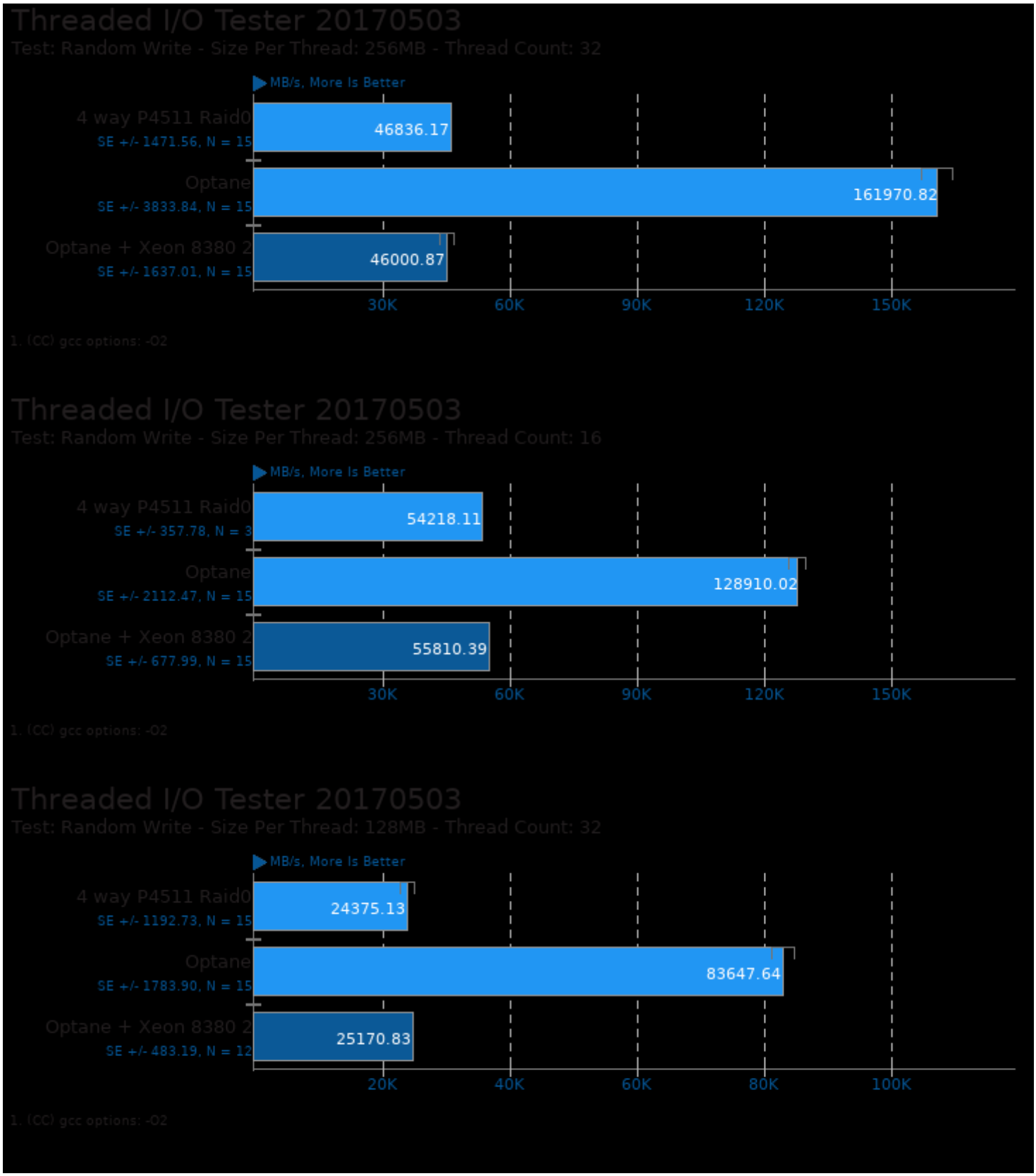


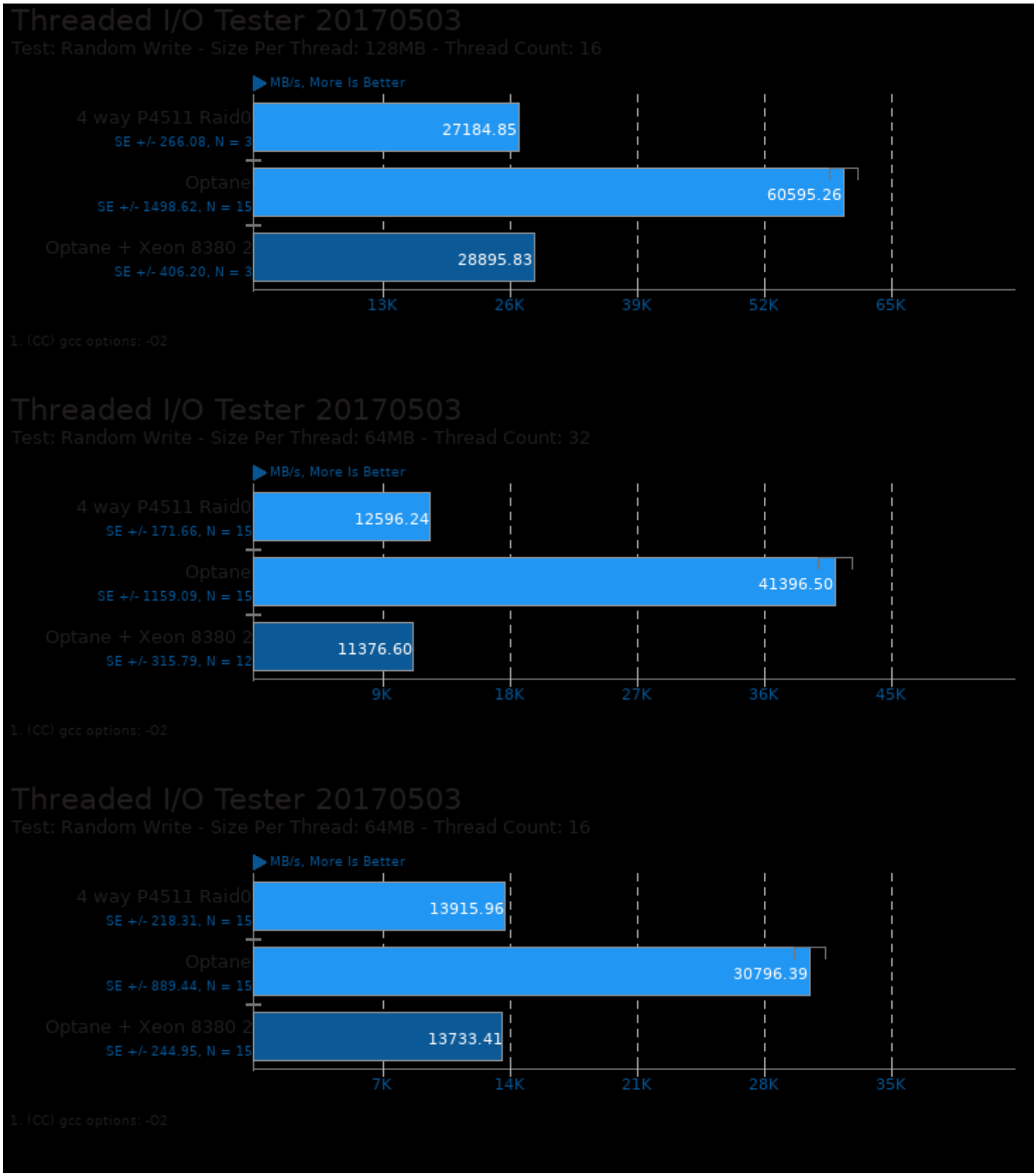
optane

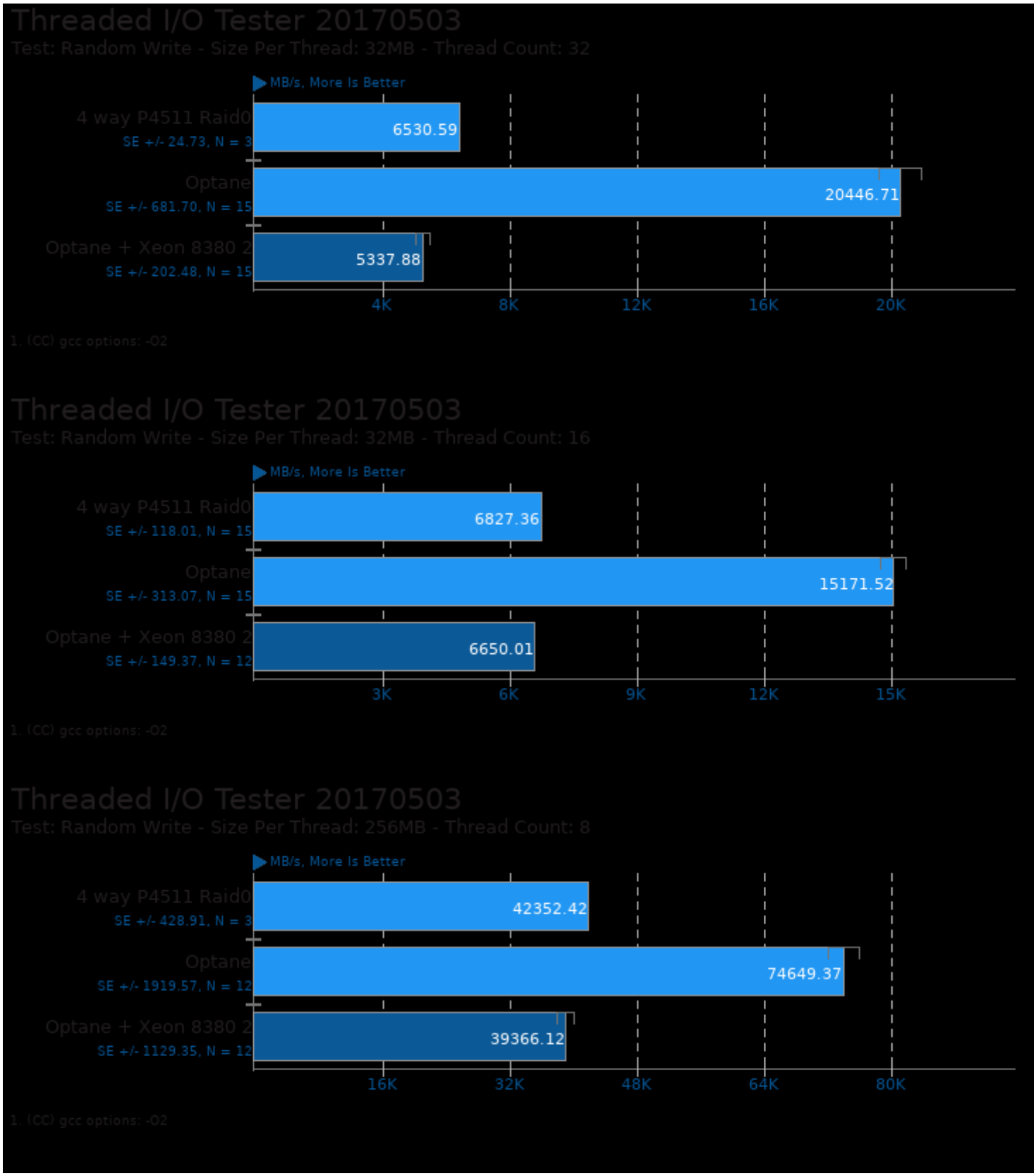

Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 881.92, N = 3
155667
Optane
SE +/- 5772.24, N = 15
154067
30K
60K
90K
120K
150K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 2654.50, N = 15
275867
Optane
SE +/- 9705.60, N = 15
263467
60K
120K
180K
240K
300K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 328.63, N = 15
20100
Optane
SE +/- 261.81, N = 10
23790
5K
10K
15K
20K
25K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 1425.03, N = 15
71393
Optane
SE +/- 890.33, N = 15
88280
20K
40K
60K
80K
100K

optane

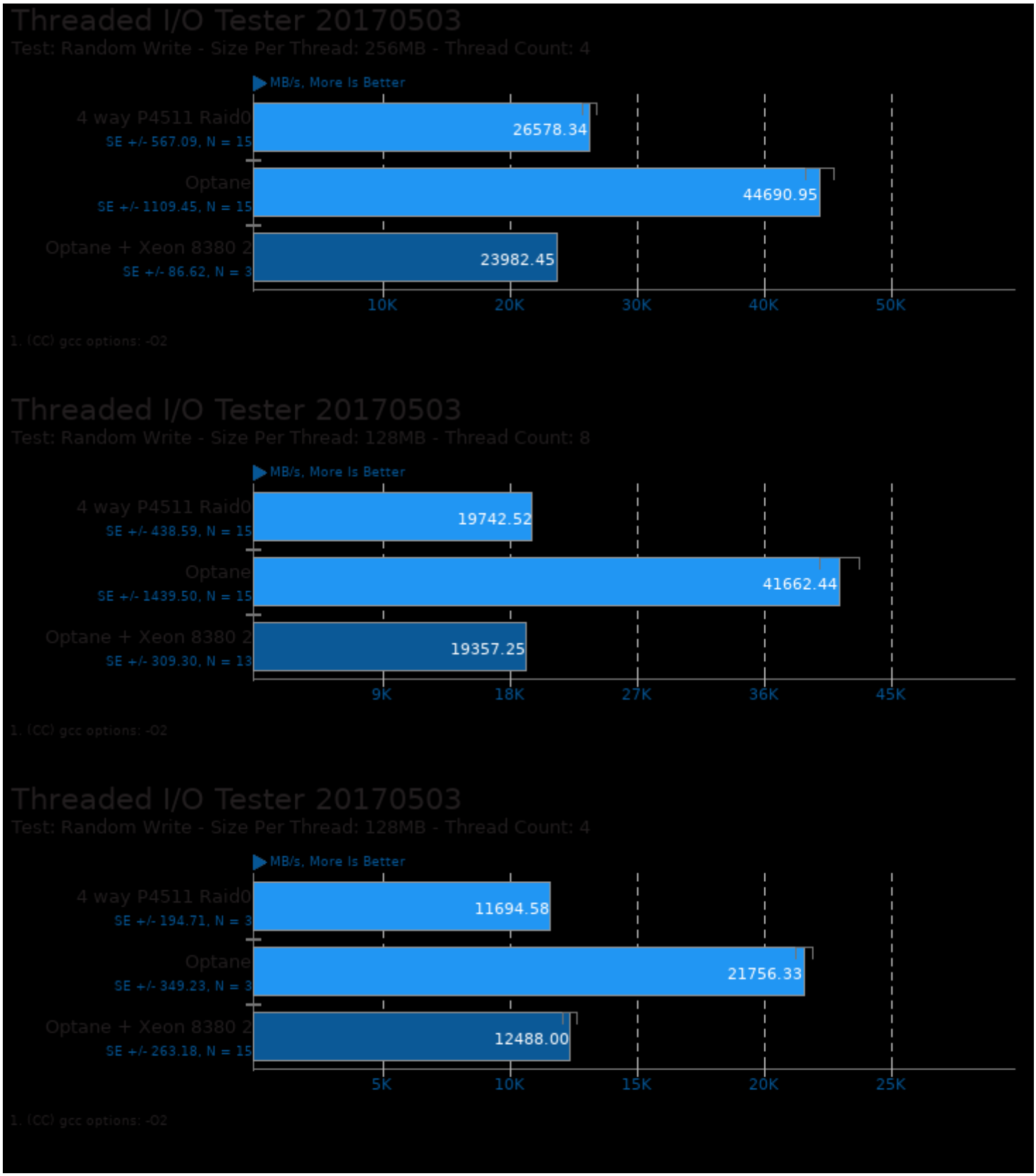

Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 4572.87, N = 15
250333
Optane
SE +/- 4022.16, N = 6
294333
60K
120K
180K
240K
300K
Unpacking The Linux Kernel
linux-4.15.tar.xz
Seconds, Fewer Is Better
4 way P4511 Raid0
SE +/- 0.094, N = 5
6.426
Optane
SE +/- 0.106, N = 20
6.593
Optane + Xeon 8380 2
SE +/- 0.120, N = 20
6.670
2
4
6
8
10
Compile Bench 0.6
Test: Read Compiled Tree
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 9.24, N = 3
2728.01
Optane
SE +/- 0.00, N = 3
2738.07
Optane + Xeon 8380 2
SE +/- 129.41, N = 3
995.23
600
1200
1800
2400
3000


Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 256MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1471.56, N = 15
46836.17
Optane
SE +/- 3833.84, N = 15
161970.82
Optane + Xeon 8380 2
SE +/- 1637.01, N = 15
46000.87
30K
60K
90K
120K
150K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 256MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 357.78, N = 3
54218.11
Optane
SE +/- 2112.47, N = 15
128910.02
Optane + Xeon 8380 2
SE +/- 677.99, N = 15
55810.39
30K
60K
90K
120K
150K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 128MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1192.73, N = 15
24375.13
Optane
SE +/- 1783.90, N = 15
83647.64
Optane + Xeon 8380 2
SE +/- 483.19, N = 12
25170.83
20K
40K
60K
80K
100K
1. (CC) gcc options: -O2

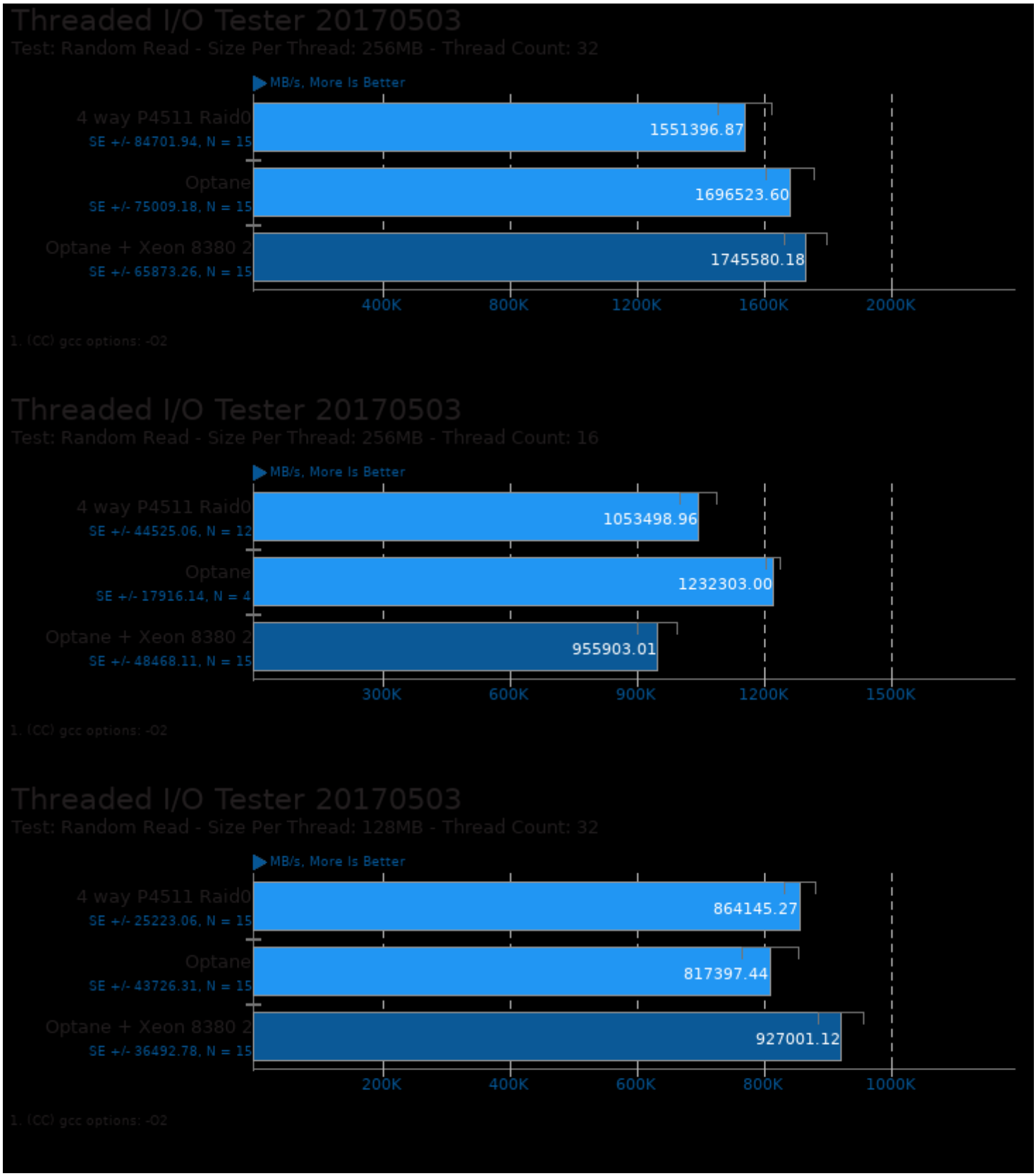

Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 128MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 266.08, N = 3
27184.85
Optane
SE +/- 1498.62, N = 15
60595.26
Optane + Xeon 8380 2
SE +/- 406.20, N = 3
28895.83
13K
26K
39K
52K
65K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 64MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 171.66, N = 15
12596.24
Optane
SE +/- 1159.09, N = 15
41396.50
Optane + Xeon 8380 2
SE +/- 315.79, N = 12
11376.60
9K
18K
27K
36K
45K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 64MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 218.31, N = 15
13915.96
Optane
SE +/- 889.44, N = 15
30796.39
Optane + Xeon 8380 2
SE +/- 244.95, N = 15
13733.41
7K
14K
21K
28K
35K
1. (CC) gcc options: -O2

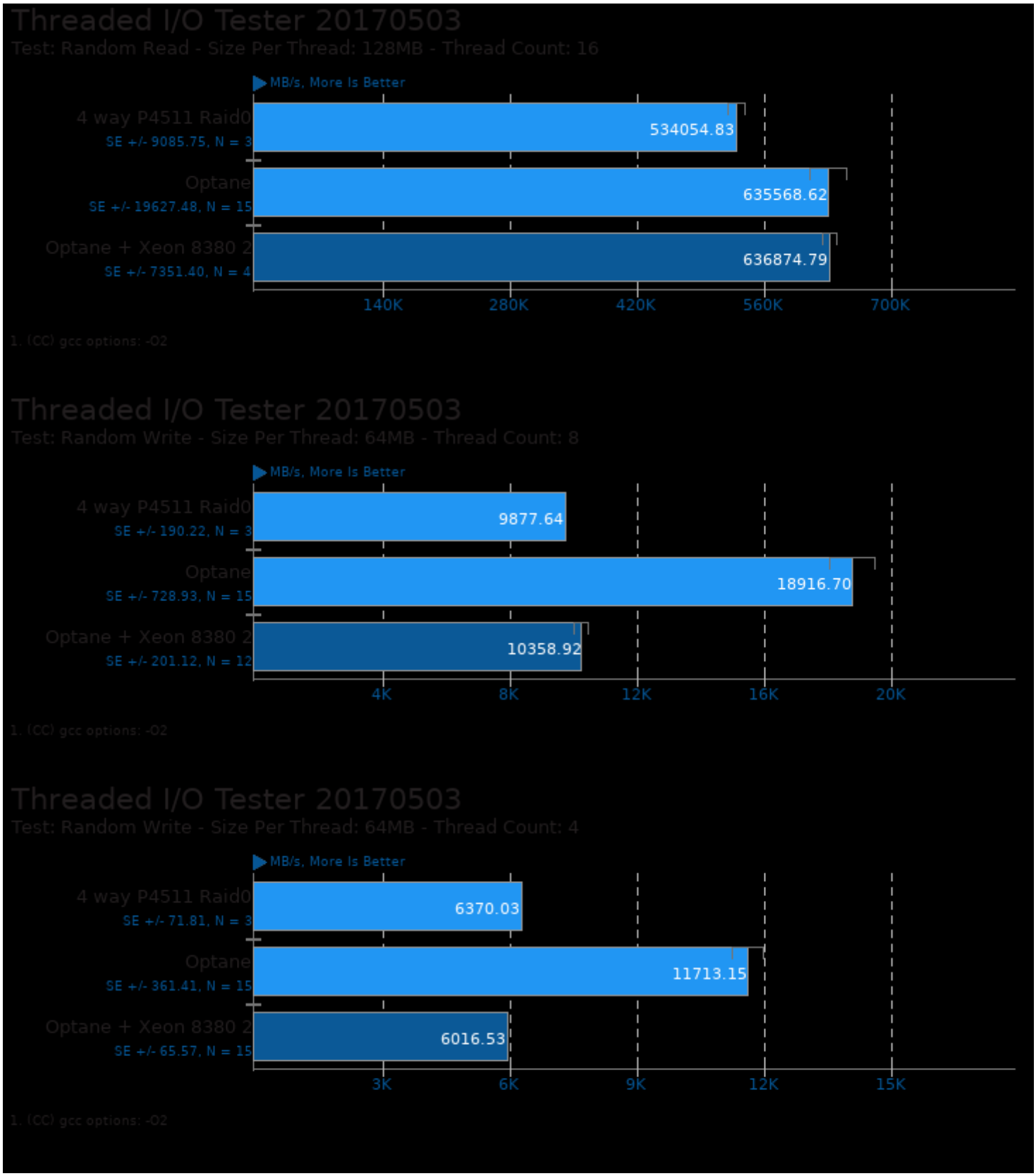

Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 32MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 24.73, N = 3
6530.59
Optane
SE +/- 681.70, N = 15
20446.71
Optane + Xeon 8380 2
SE +/- 202.48, N = 15
5337.88
4K
8K
12K
16K
20K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 32MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 118.01, N = 15
6827.36
Optane
SE +/- 313.07, N = 15
15171.52
Optane + Xeon 8380 2
SE +/- 149.37, N = 12
6650.01
3K
6K
9K
12K
15K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 256MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 428.91, N = 3
42352.42
Optane
SE +/- 1919.57, N = 12
74649.37
Optane + Xeon 8380 2
SE +/- 1129.35, N = 12
39366.12
16K
32K
48K
64K
80K
1. (CC) gcc options: -O2

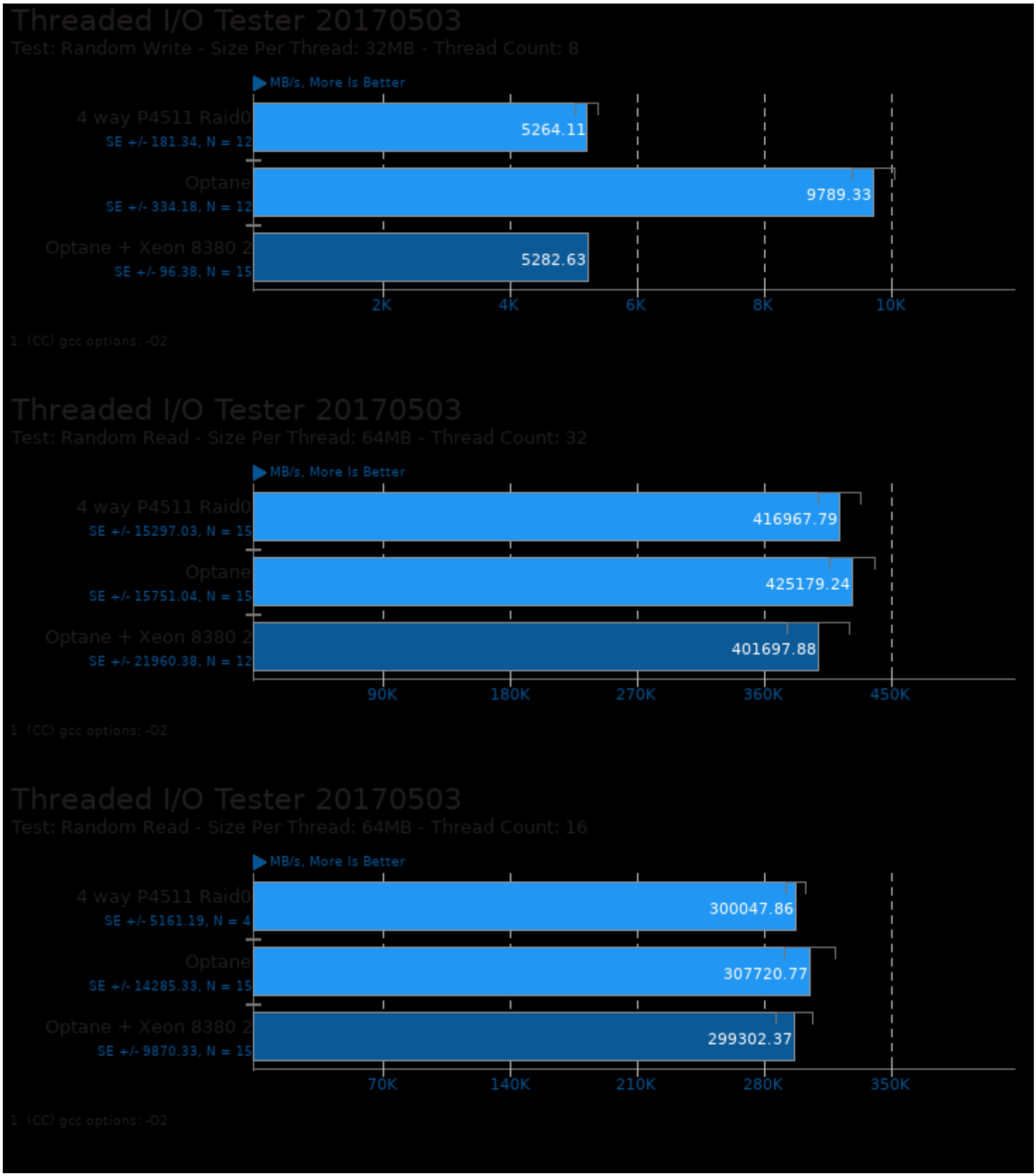
optane

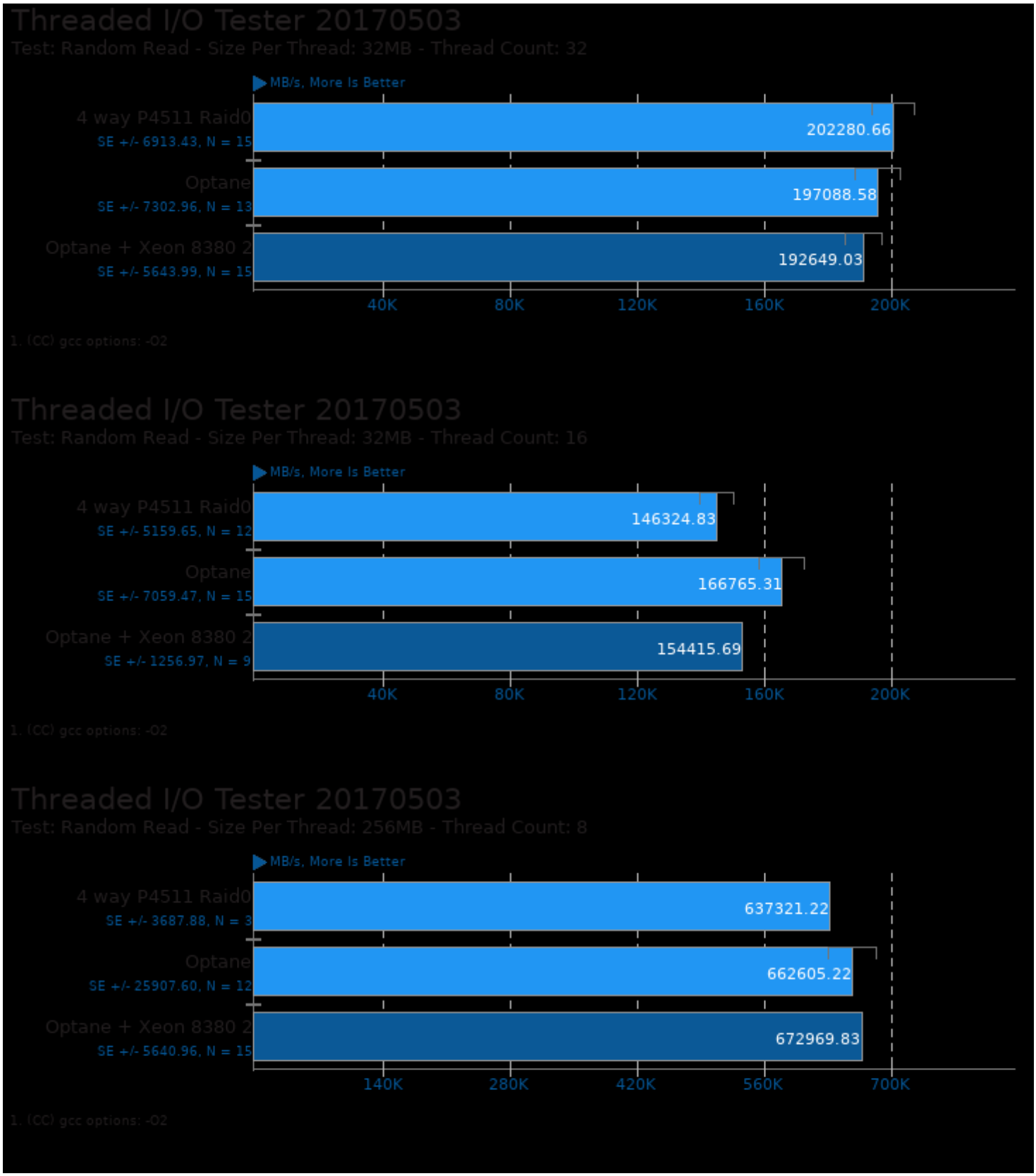

Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 256MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 567.09, N = 15
26578.34
Optane
SE +/- 1109.45, N = 15
44690.95
Optane + Xeon 8380 2
SE +/- 86.62, N = 3
23982.45
10K
20K
30K
40K
50K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 128MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 438.59, N = 15
19742.52
Optane
SE +/- 1439.50, N = 15
41662.44
Optane + Xeon 8380 2
SE +/- 309.30, N = 13
19357.25
9K
18K
27K
36K
45K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 128MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 194.71, N = 3
11694.58
Optane
SE +/- 349.23, N = 3
21756.33
Optane + Xeon 8380 2
SE +/- 263.18, N = 15
12488.00
5K
10K
15K
20K
25K
1. (CC) gcc options: -O2

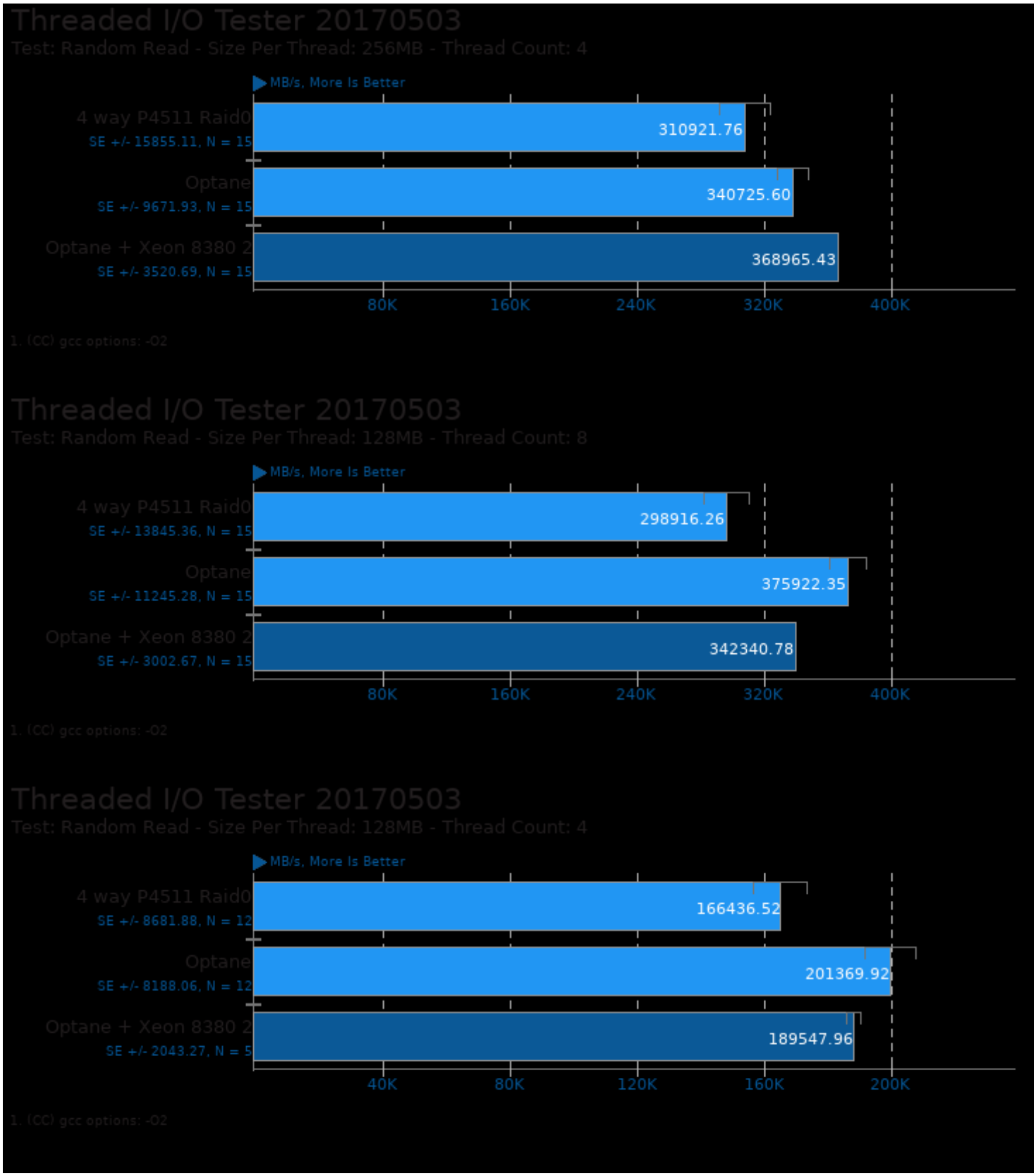
optane

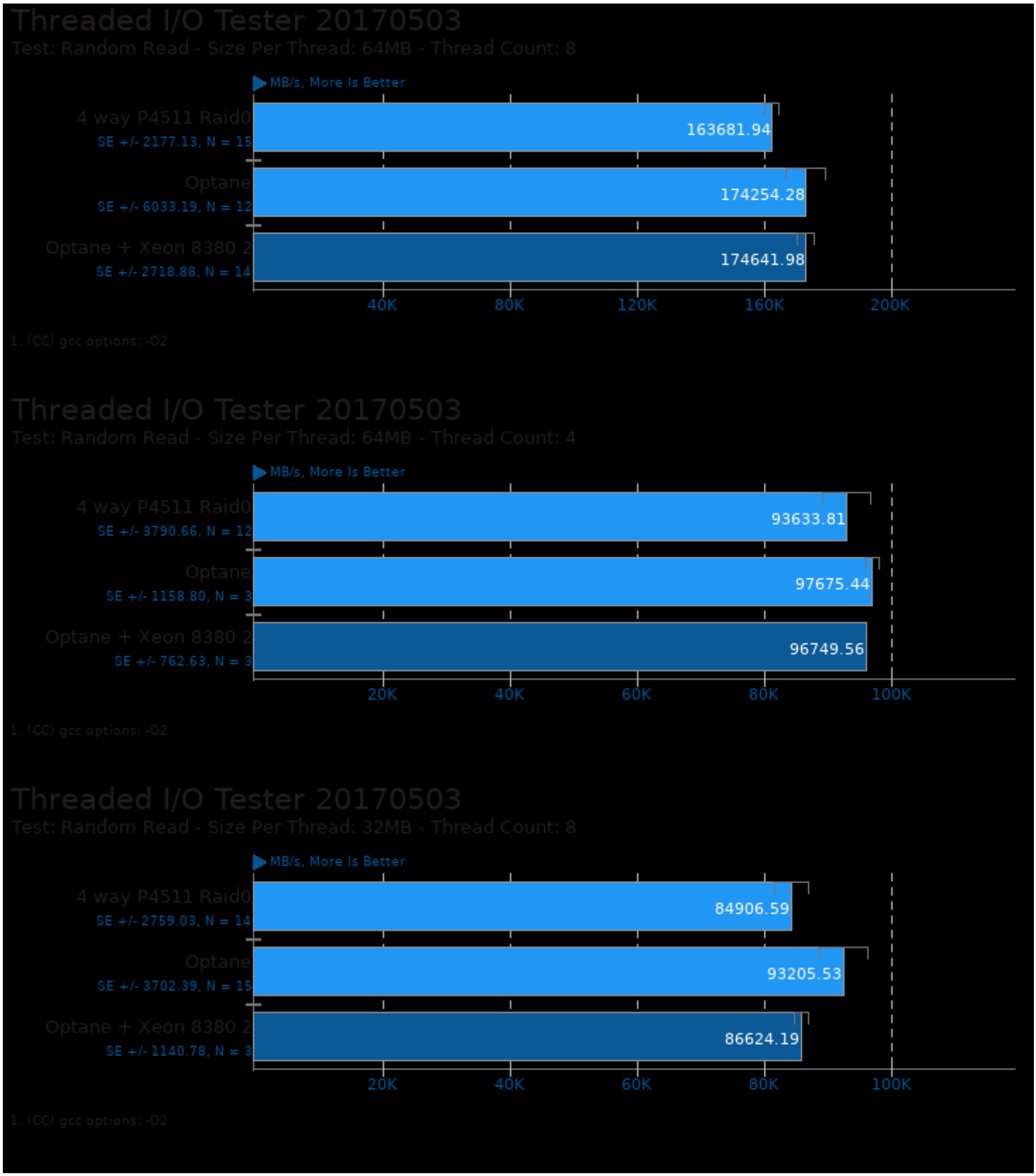

Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 256MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 84701.94, N = 15
1551396.87
Optane
SE +/- 75009.18, N = 15
1696523.60
Optane + Xeon 8380 2
SE +/- 65873.26, N = 15
1745580.18
400K
800K
1200K
1600K
2000K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 256MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 44525.06, N = 12
1053498.96
Optane
SE +/- 17916.14, N = 4
1232303.00
Optane + Xeon 8380 2
SE +/- 48468.11, N = 15
955903.01
300K
600K
900K
1200K
1500K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 128MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 25223.06, N = 15
864145.27
Optane
SE +/- 43726.31, N = 15
817397.44
Optane + Xeon 8380 2
SE +/- 36492.78, N = 15
927001.12
200K
400K
600K
800K
1000K
1. (CC) gcc options: -O2

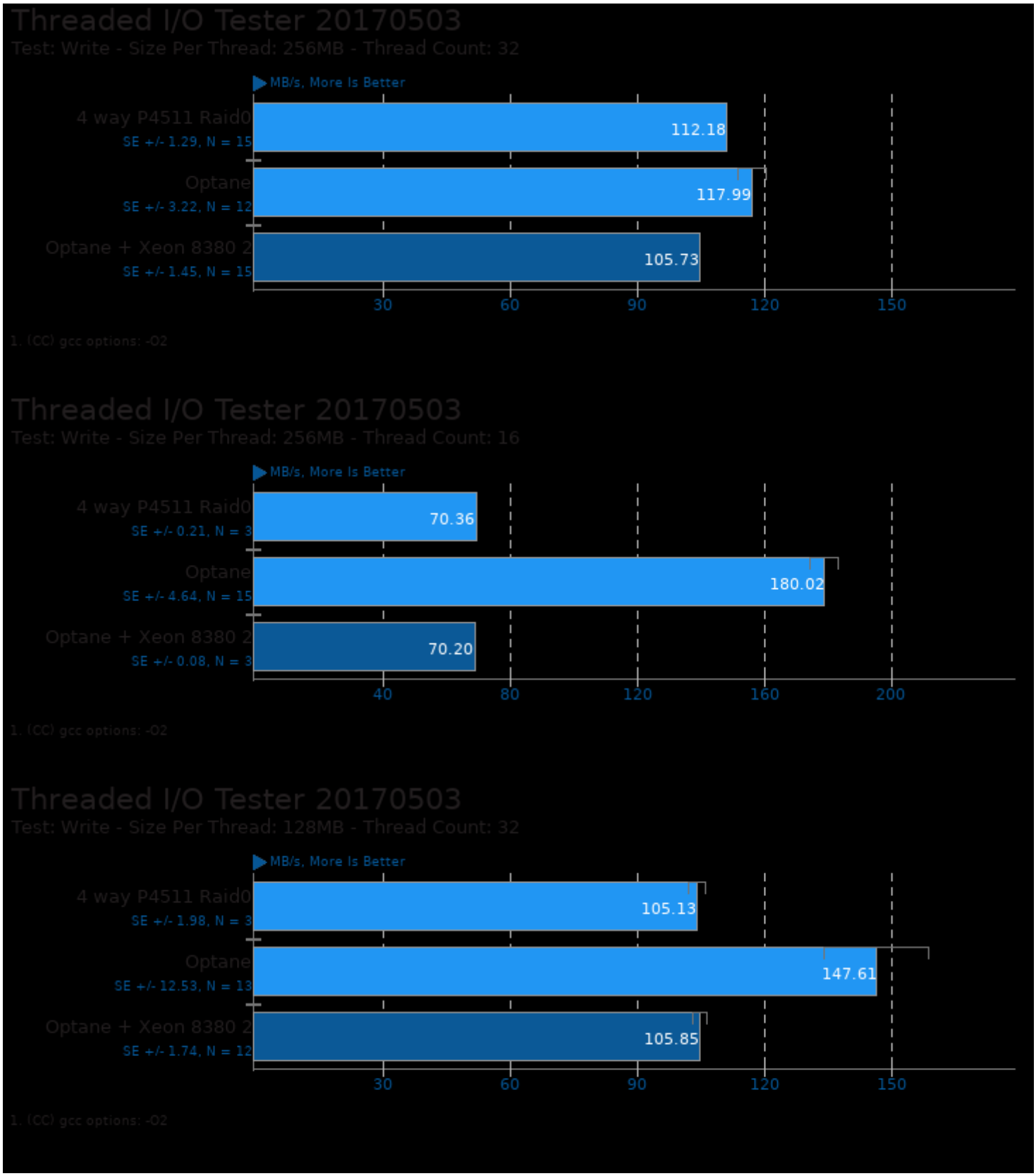

Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 128MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 9085.75, N = 3
534054.83
Optane
SE +/- 19627.48, N = 15
635568.62
Optane + Xeon 8380 2
SE +/- 7351.40, N = 4
636874.79
140K
280K
420K
560K
700K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 64MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 190.22, N = 3
9877.64
Optane
SE +/- 728.93, N = 15
18916.70
Optane + Xeon 8380 2
SE +/- 201.12, N = 12
10358.92
4K
8K
12K
16K
20K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 64MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 71.81, N = 3
6370.03
Optane
SE +/- 361.41, N = 15
11713.15
Optane + Xeon 8380 2
SE +/- 65.57, N = 15
6016.53
3K
6K
9K
12K
15K
1. (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Random Write - Size Per Thread: 32MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 181.34, N = 12
5264.11
Optane
SE +/- 334.18, N = 12
9789.33
Optane + Xeon 8380 2
SE +/- 96.38, N = 15
5282.63
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 64MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 15297.03, N = 15
416967.79
Optane
SE +/- 15751.04, N = 15
425179.24
Optane + Xeon 8380 2
SE +/- 21960.38, N = 12
401697.88
90K
180K
270K
360K
450K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 64MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 5161.19, N = 4
300047.86
Optane
SE +/- 14285.33, N = 15
307720.77
Optane + Xeon 8380 2
SE +/- 9870.33, N = 15
299302.37
70K
140K
210K
280K
350K
1. (CC) gcc options: -O2

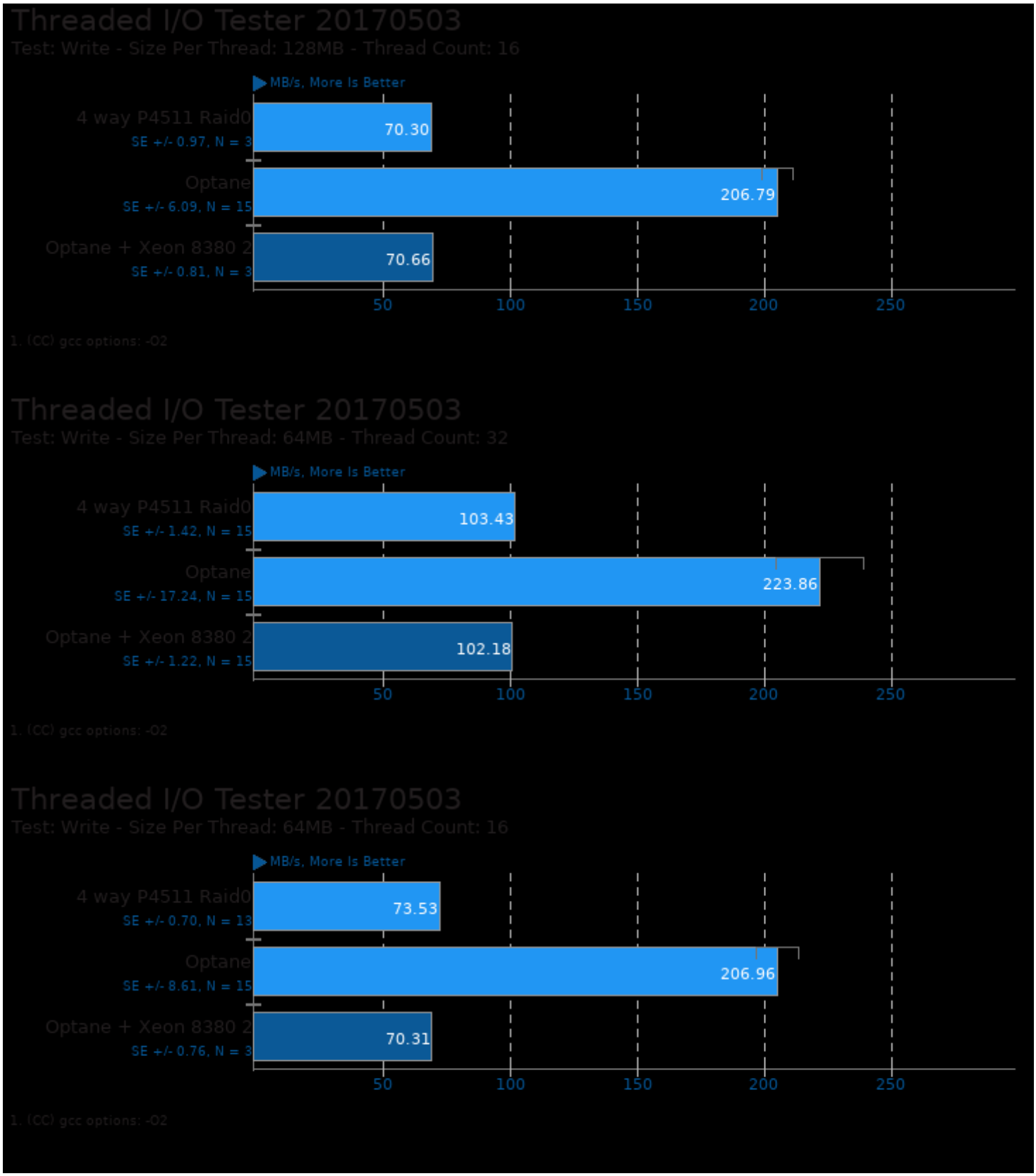

Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 32MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 6913.43, N = 15
202280.66
Optane
SE +/- 7302.96, N = 13
197088.58
Optane + Xeon 8380 2
SE +/- 5643.99, N = 15
192649.03
40K
80K
120K
160K
200K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 32MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 5159.65, N = 12
146324.83
Optane
SE +/- 7059.47, N = 15
166765.31
Optane + Xeon 8380 2
SE +/- 1256.97, N = 9
154415.69
40K
80K
120K
160K
200K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 256MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 3687.88, N = 3
637321.22
Optane
SE +/- 25907.60, N = 12
662605.22
Optane + Xeon 8380 2
SE +/- 5640.96, N = 15
672969.83
140K
280K
420K
560K
700K
1. (CC) gcc options: -O2

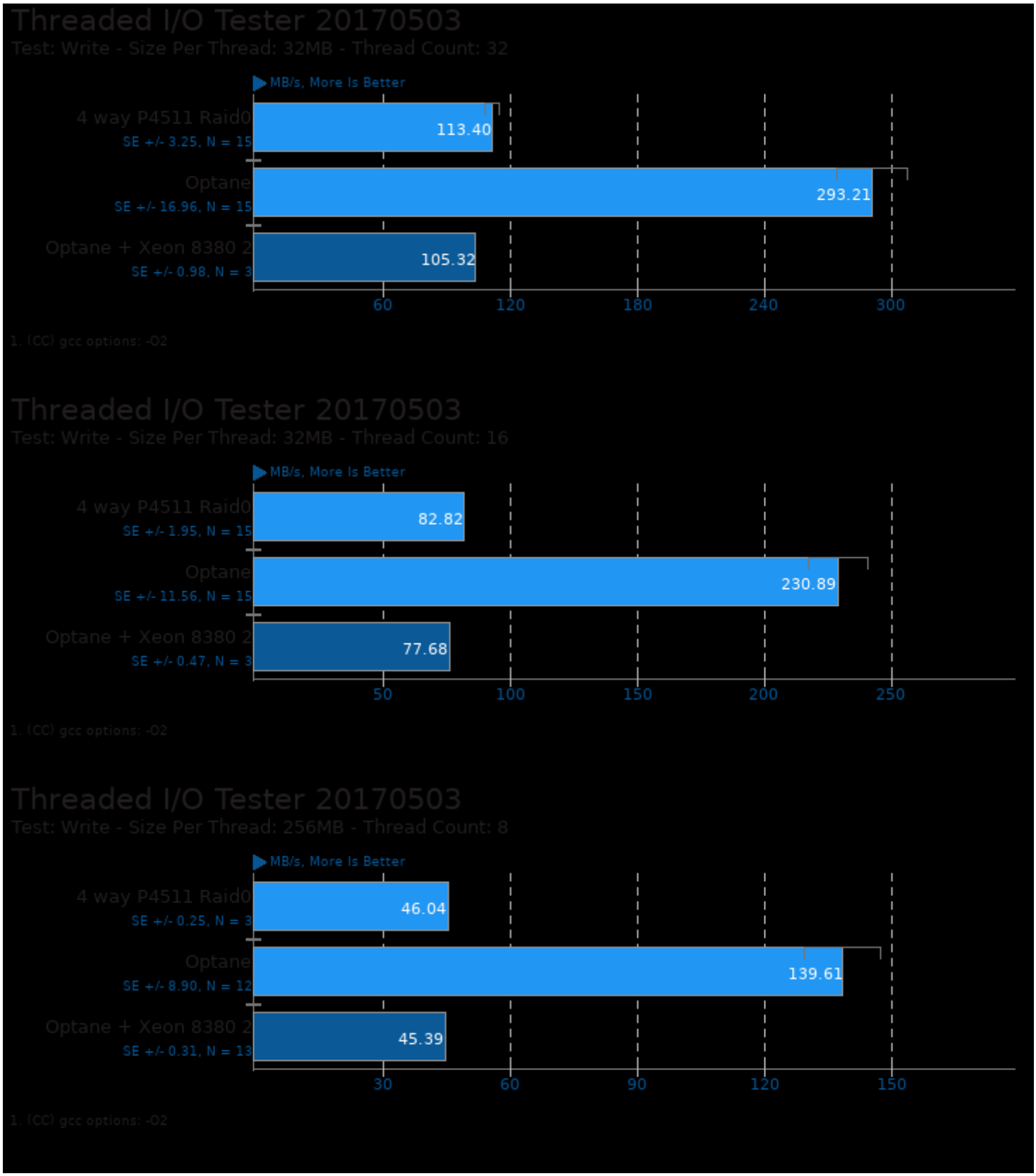

Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 256MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 15855.11, N = 15
310921.76
Optane
SE +/- 9671.93, N = 15
340725.60
Optane + Xeon 8380 2
SE +/- 3520.69, N = 15
368965.43
80K
160K
240K
320K
400K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 128MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 13845.36, N = 15
298916.26
Optane
SE +/- 11245.28, N = 15
375922.35
Optane + Xeon 8380 2
SE +/- 3002.67, N = 15
342340.78
80K
160K
240K
320K
400K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 128MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 8681.88, N = 12
166436.52
Optane
SE +/- 8188.06, N = 12
201369.92
Optane + Xeon 8380 2
SE +/- 2043.27, N = 5
189547.96
40K
80K
120K
160K
200K
1. (CC) gcc options: -O2

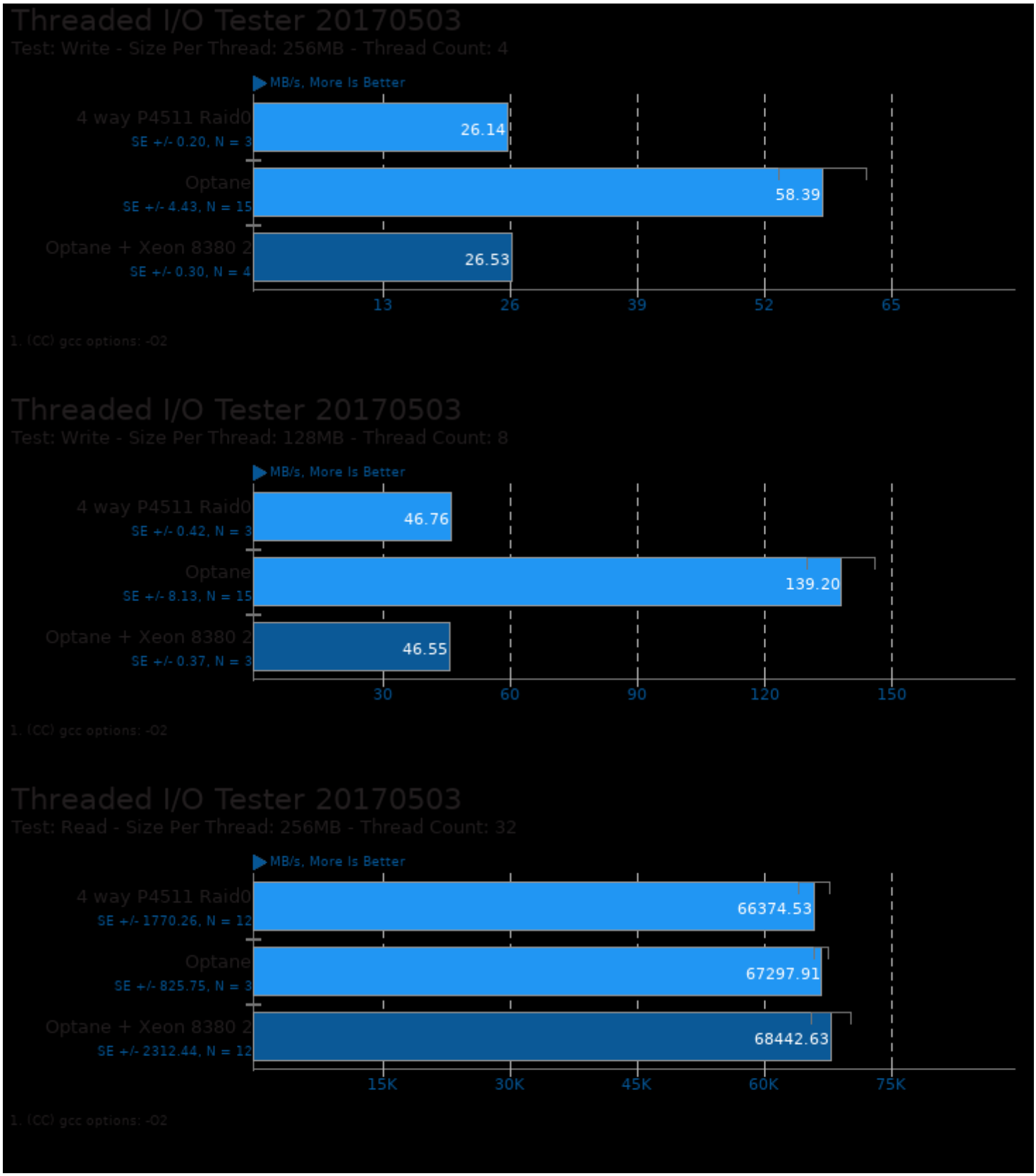

Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 64MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2177.13, N = 15
163681.94
Optane
SE +/- 6033.19, N = 12
174254.28
Optane + Xeon 8380 2
SE +/- 2718.88, N = 14
174641.98
40K
80K
120K
160K
200K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 64MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 3790.66, N = 12
93633.81
Optane
SE +/- 1158.80, N = 3
97675.44
Optane + Xeon 8380 2
SE +/- 762.63, N = 3
96749.56
20K
40K
60K
80K
100K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Random Read - Size Per Thread: 32MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2759.03, N = 14
84906.59
Optane
SE +/- 3702.39, N = 15
93205.53
Optane + Xeon 8380 2
SE +/- 1140.78, N = 3
86624.19
20K
40K
60K
80K
100K
1. (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 256MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.29, N = 15
112.18
Optane
SE +/- 3.22, N = 12
117.99
Optane + Xeon 8380 2
SE +/- 1.45, N = 15
105.73
30
60
90
120
150
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 256MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.21, N = 3
70.36
Optane
SE +/- 4.64, N = 15
180.02
Optane + Xeon 8380 2
SE +/- 0.08, N = 3
70.20
40
80
120
160
200
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 128MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.98, N = 3
105.13
Optane
SE +/- 12.53, N = 13
147.61
Optane + Xeon 8380 2
SE +/- 1.74, N = 12
105.85
30
60
90
120
150
1. (CC) gcc options: -O2

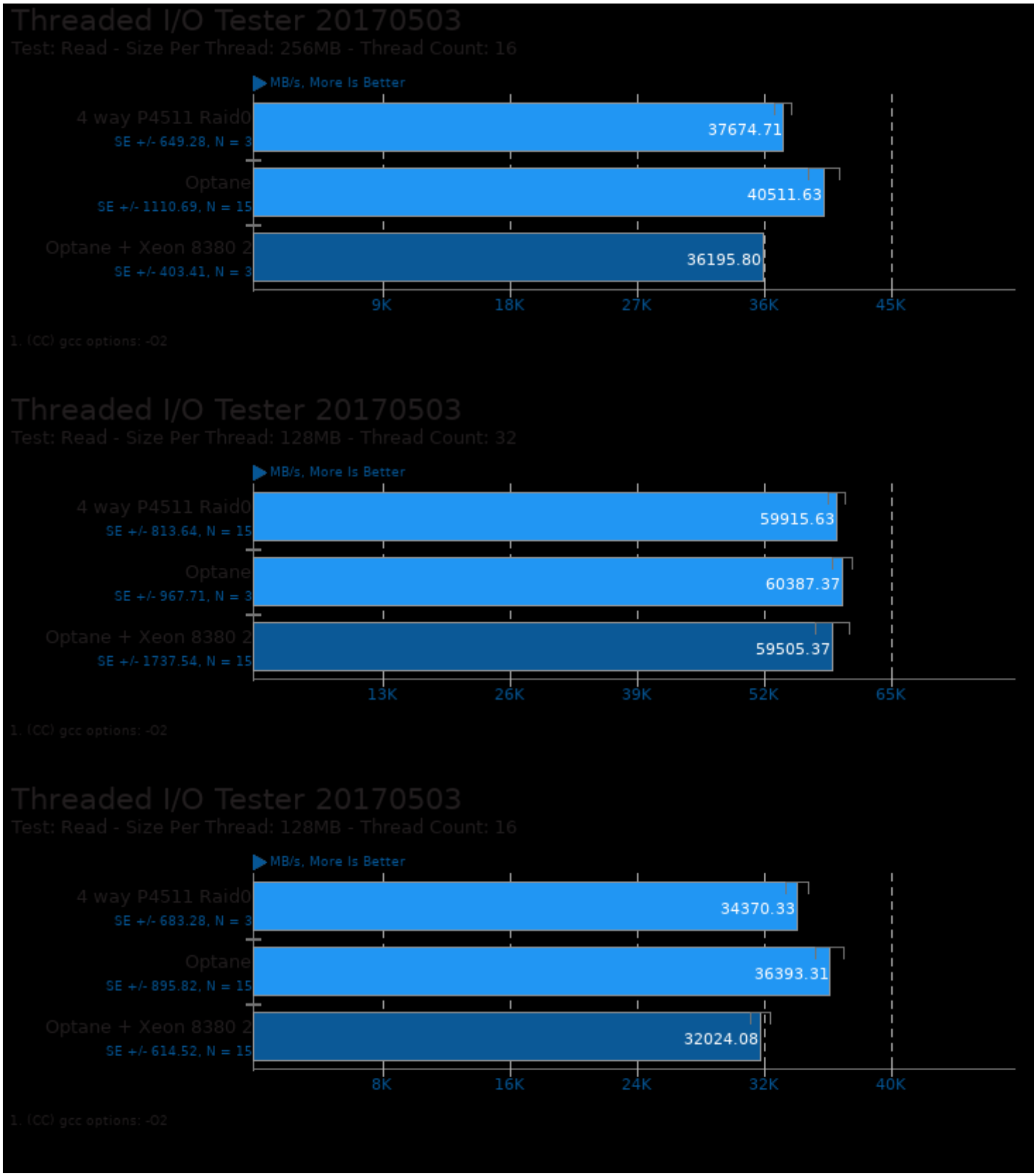
optane

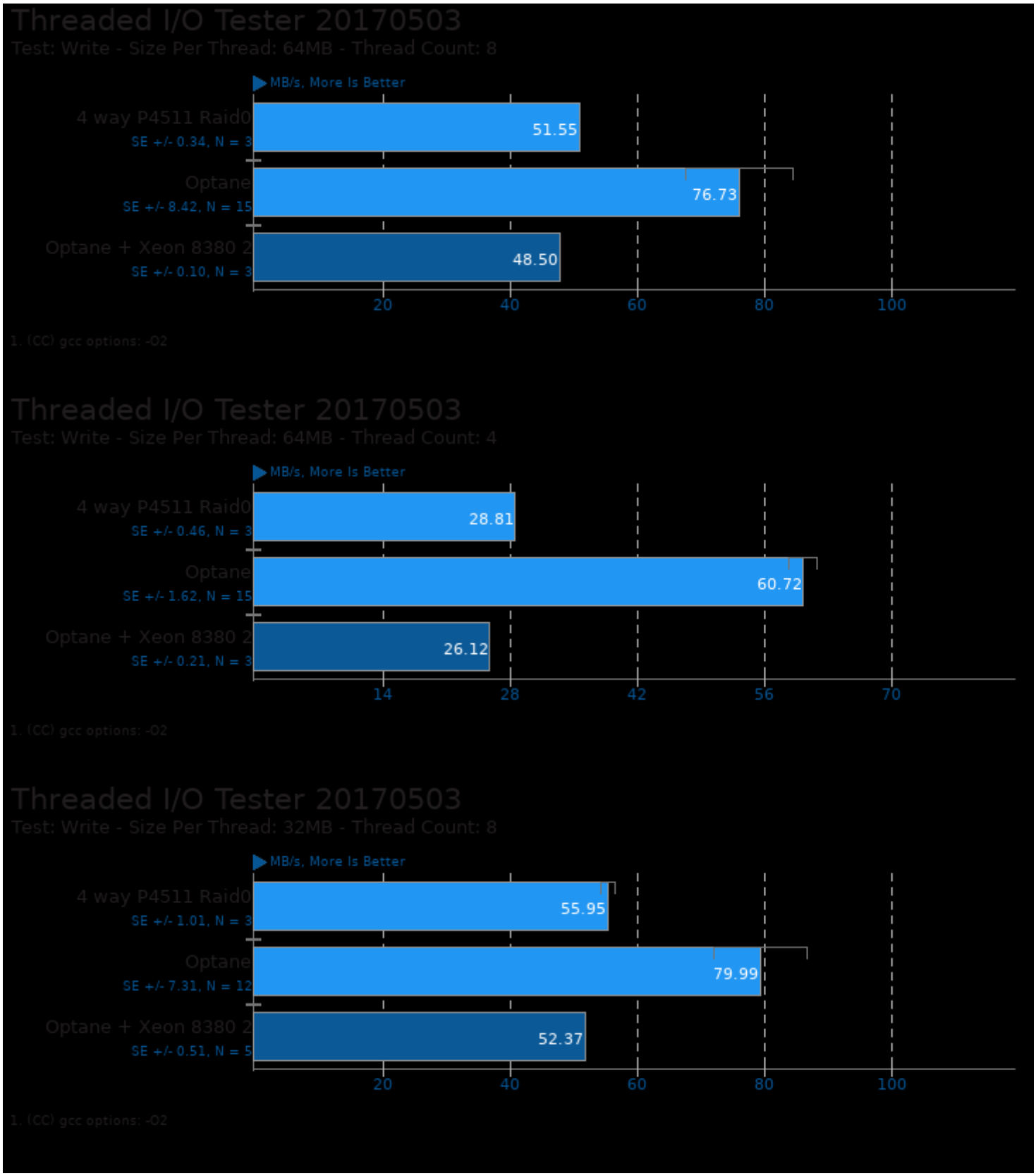

Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 128MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.97, N = 3
70.30
Optane
SE +/- 6.09, N = 15
206.79
Optane + Xeon 8380 2
SE +/- 0.81, N = 3
70.66
50
100
150
200
250
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 64MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.42, N = 15
103.43
Optane
SE +/- 17.24, N = 15
223.86
Optane + Xeon 8380 2
SE +/- 1.22, N = 15
102.18
50
100
150
200
250
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 64MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.70, N = 13
73.53
Optane
SE +/- 8.61, N = 15
206.96
Optane + Xeon 8380 2
SE +/- 0.76, N = 3
70.31
50
100
150
200
250
1. (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 32MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 3.25, N = 15
113.40
Optane
SE +/- 16.96, N = 15
293.21
Optane + Xeon 8380 2
SE +/- 0.98, N = 3
105.32
60
120
180
240
300
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 32MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.95, N = 15
82.82
Optane
SE +/- 11.56, N = 15
230.89
Optane + Xeon 8380 2
SE +/- 0.47, N = 3
77.68
50
100
150
200
250
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 256MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.25, N = 3
46.04
Optane
SE +/- 8.90, N = 12
139.61
Optane + Xeon 8380 2
SE +/- 0.31, N = 13
45.39
30
60
90
120
150
1. (CC) gcc options: -O2

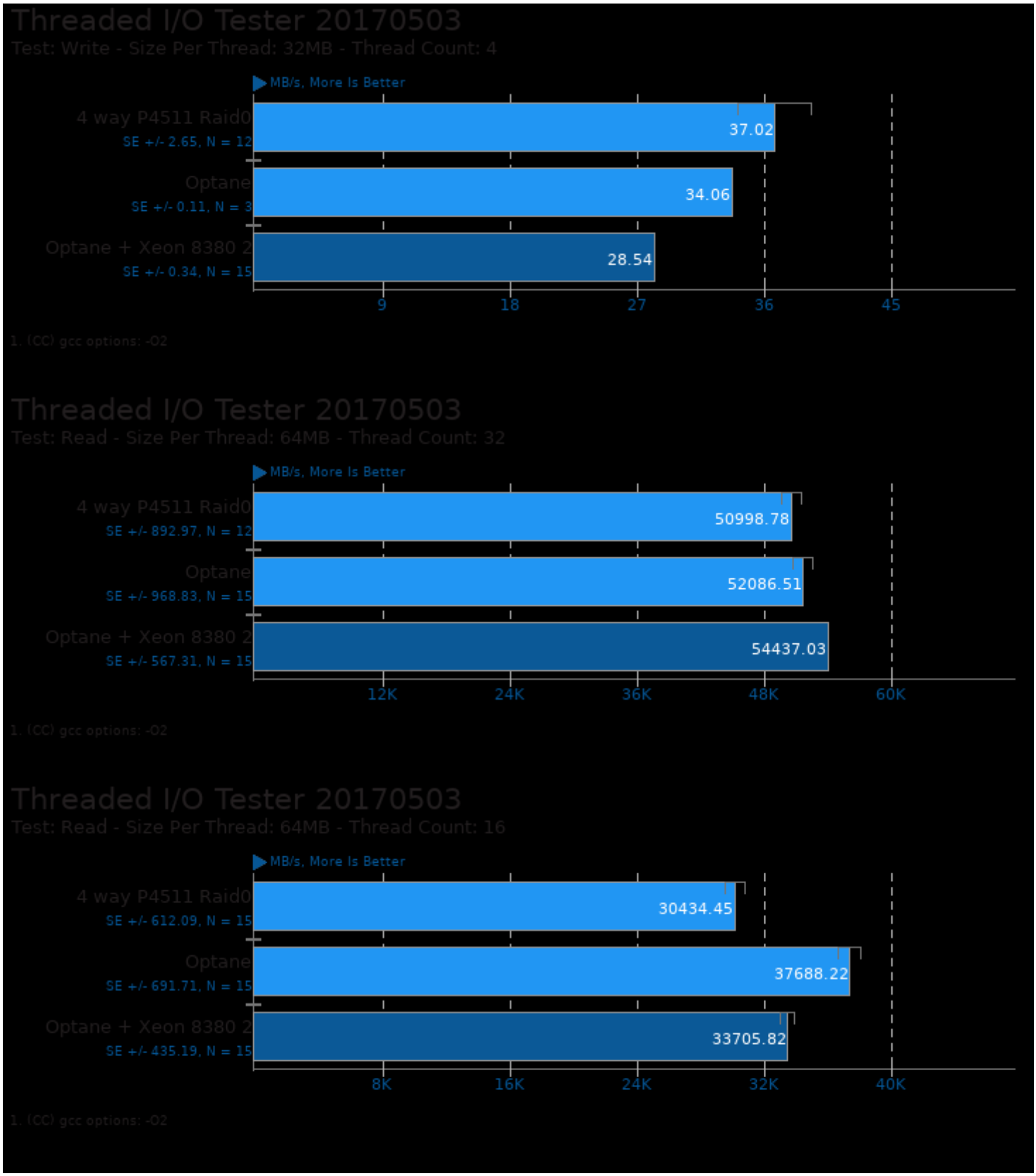

Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 256MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.20, N = 3
26.14
Optane
SE +/- 4.43, N = 15
58.39
Optane + Xeon 8380 2
SE +/- 0.30, N = 4
26.53
13
26
39
52
65
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 128MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.42, N = 3
46.76
Optane
SE +/- 8.13, N = 15
139.20
Optane + Xeon 8380 2
SE +/- 0.37, N = 3
46.55
30
60
90
120
150
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 256MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1770.26, N = 12
66374.53
Optane
SE +/- 825.75, N = 3
67297.91
Optane + Xeon 8380 2
SE +/- 2312.44, N = 12
68442.63
15K
30K
45K
60K
75K
1. (CC) gcc options: -O2

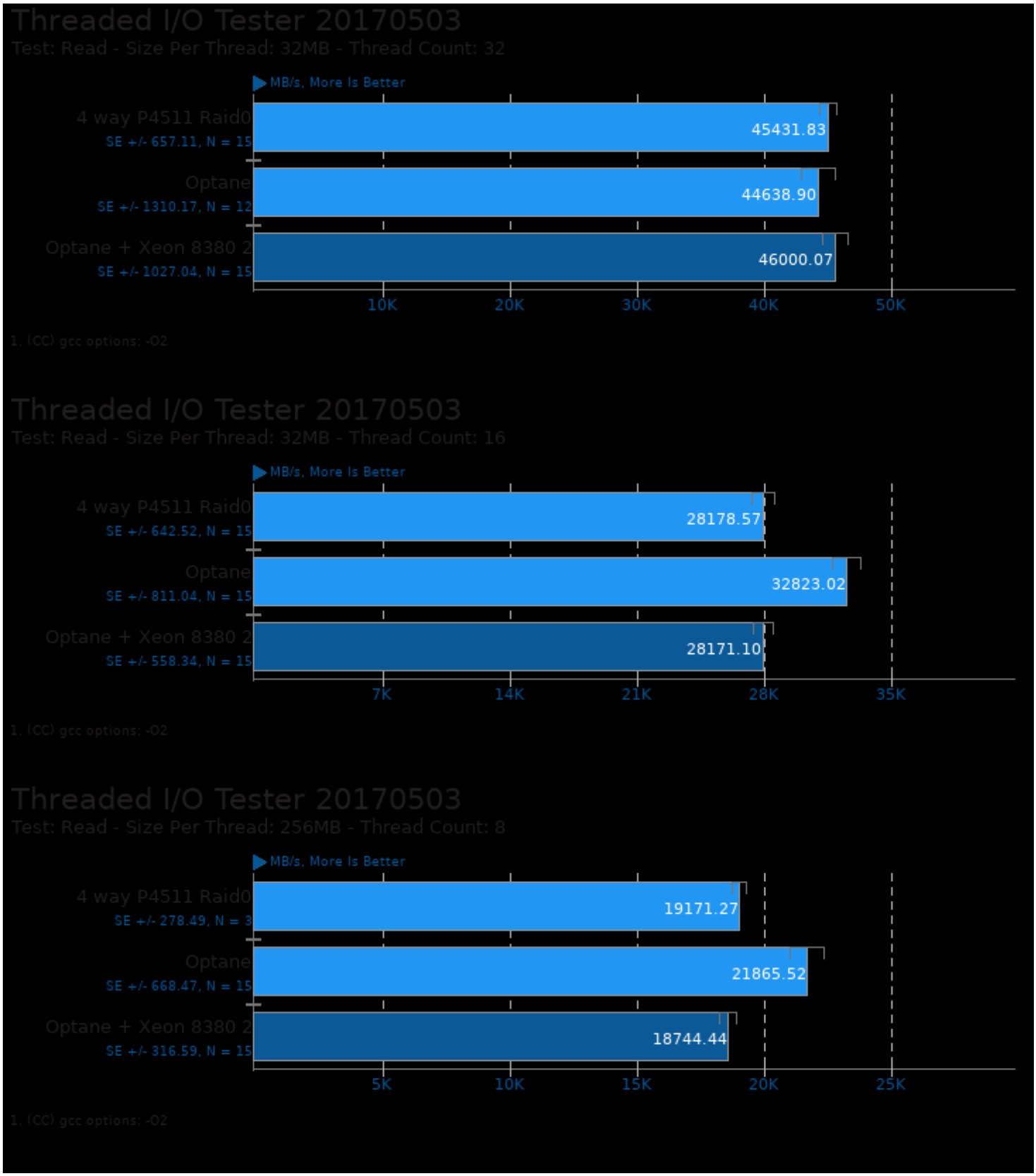
optane

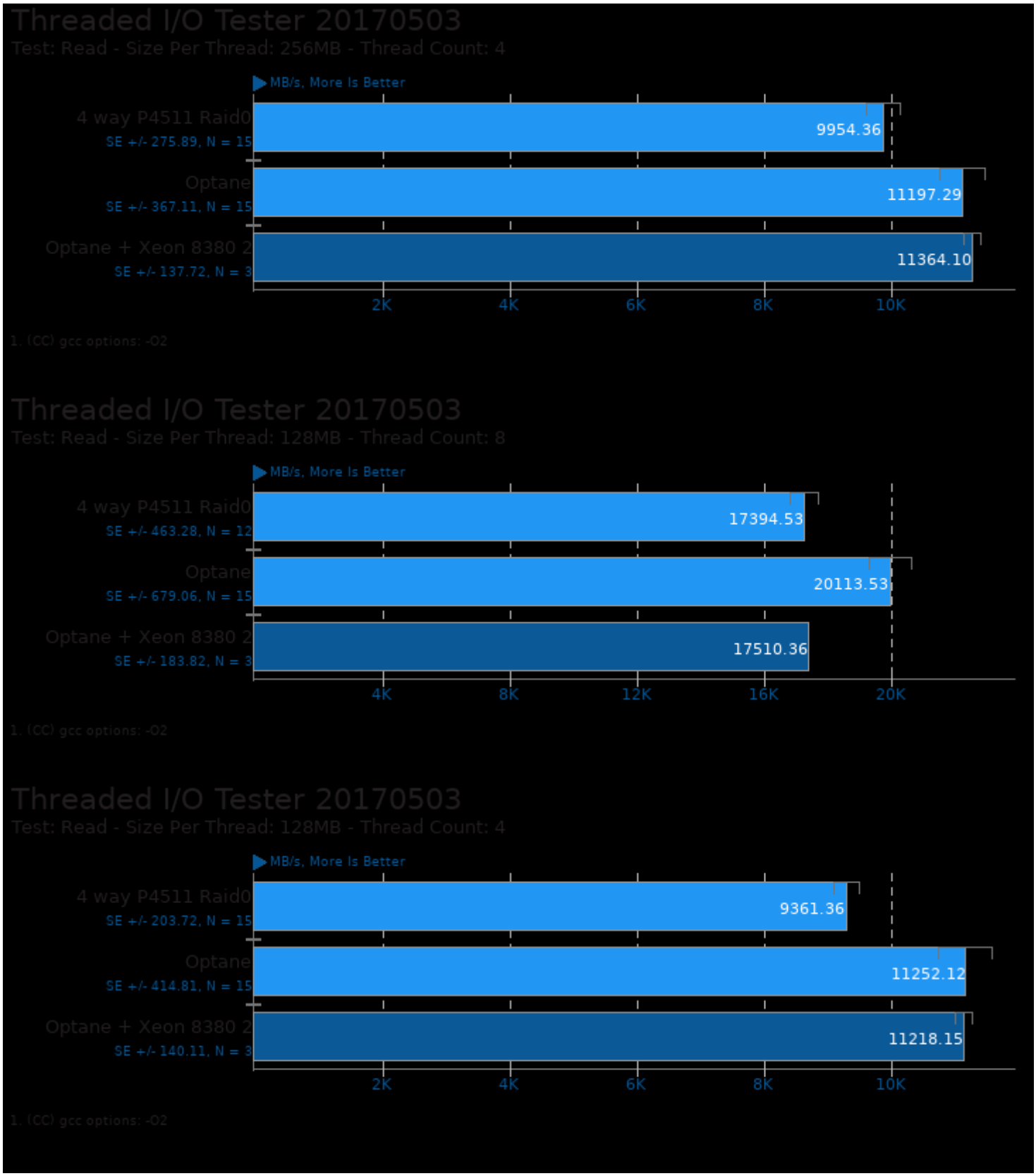

Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 256MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 649.28, N = 3
37674.71
Optane
SE +/- 1110.69, N = 15
40511.63
Optane + Xeon 8380 2
SE +/- 403.41, N = 3
36195.80
9K
18K
27K
36K
45K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 128MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 813.64, N = 15
59915.63
Optane
SE +/- 967.71, N = 3
60387.37
Optane + Xeon 8380 2
SE +/- 1737.54, N = 15
59505.37
13K
26K
39K
52K
65K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 128MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 683.28, N = 3
34370.33
Optane
SE +/- 895.82, N = 15
36393.31
Optane + Xeon 8380 2
SE +/- 614.52, N = 15
32024.08
8K
16K
24K
32K
40K
1. (CC) gcc options: -O2

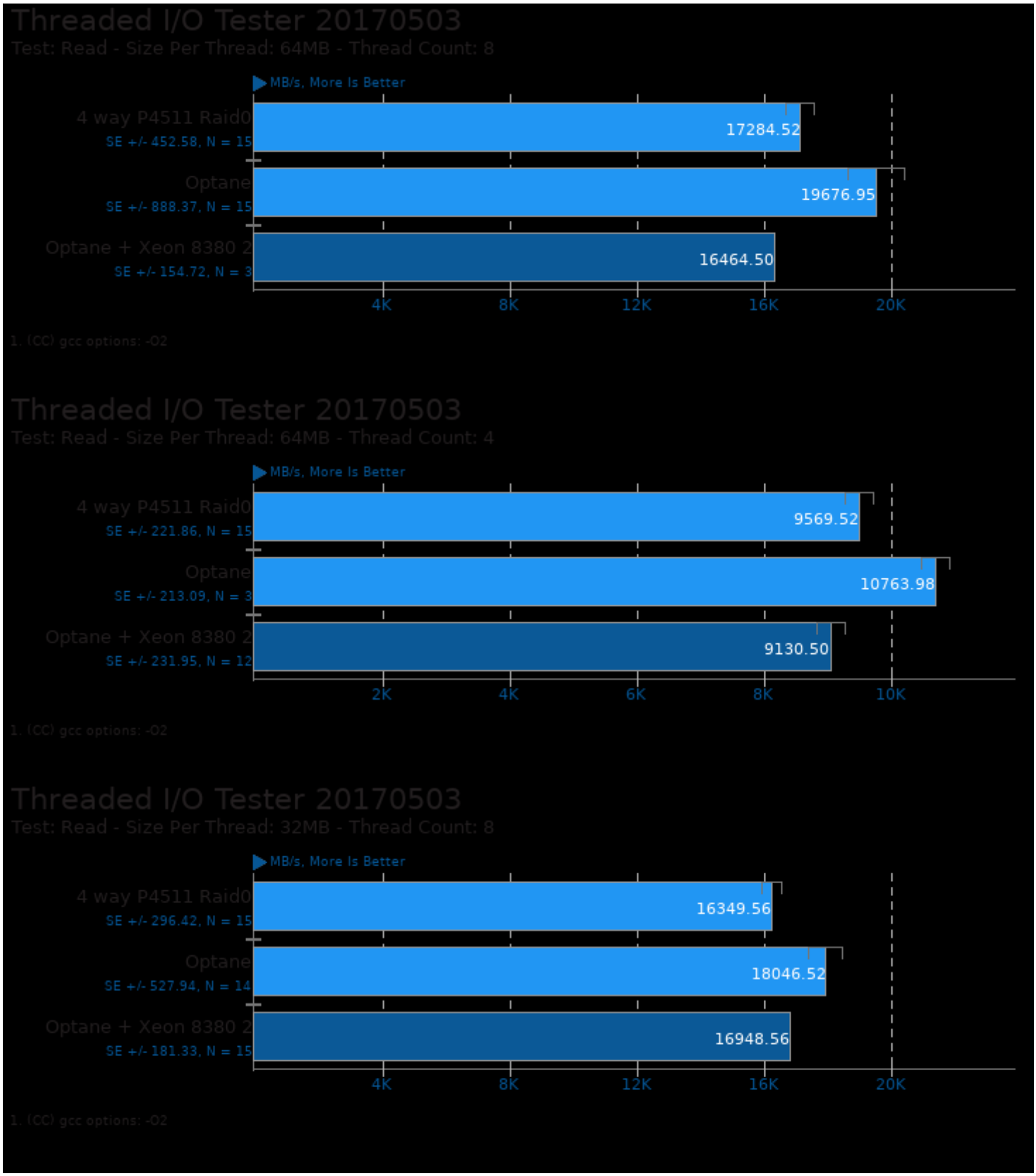

Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 64MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.34, N = 3
51.55
Optane
SE +/- 8.42, N = 15
76.73
Optane + Xeon 8380 2
SE +/- 0.10, N = 3
48.50
20
40
60
80
100
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 64MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.46, N = 3
28.81
Optane
SE +/- 1.62, N = 15
60.72
Optane + Xeon 8380 2
SE +/- 0.21, N = 3
26.12
14
28
42
56
70
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 32MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 1.01, N = 3
55.95
Optane
SE +/- 7.31, N = 12
79.99
Optane + Xeon 8380 2
SE +/- 0.51, N = 5
52.37
20
40
60
80
100
1. (CC) gcc options: -O2

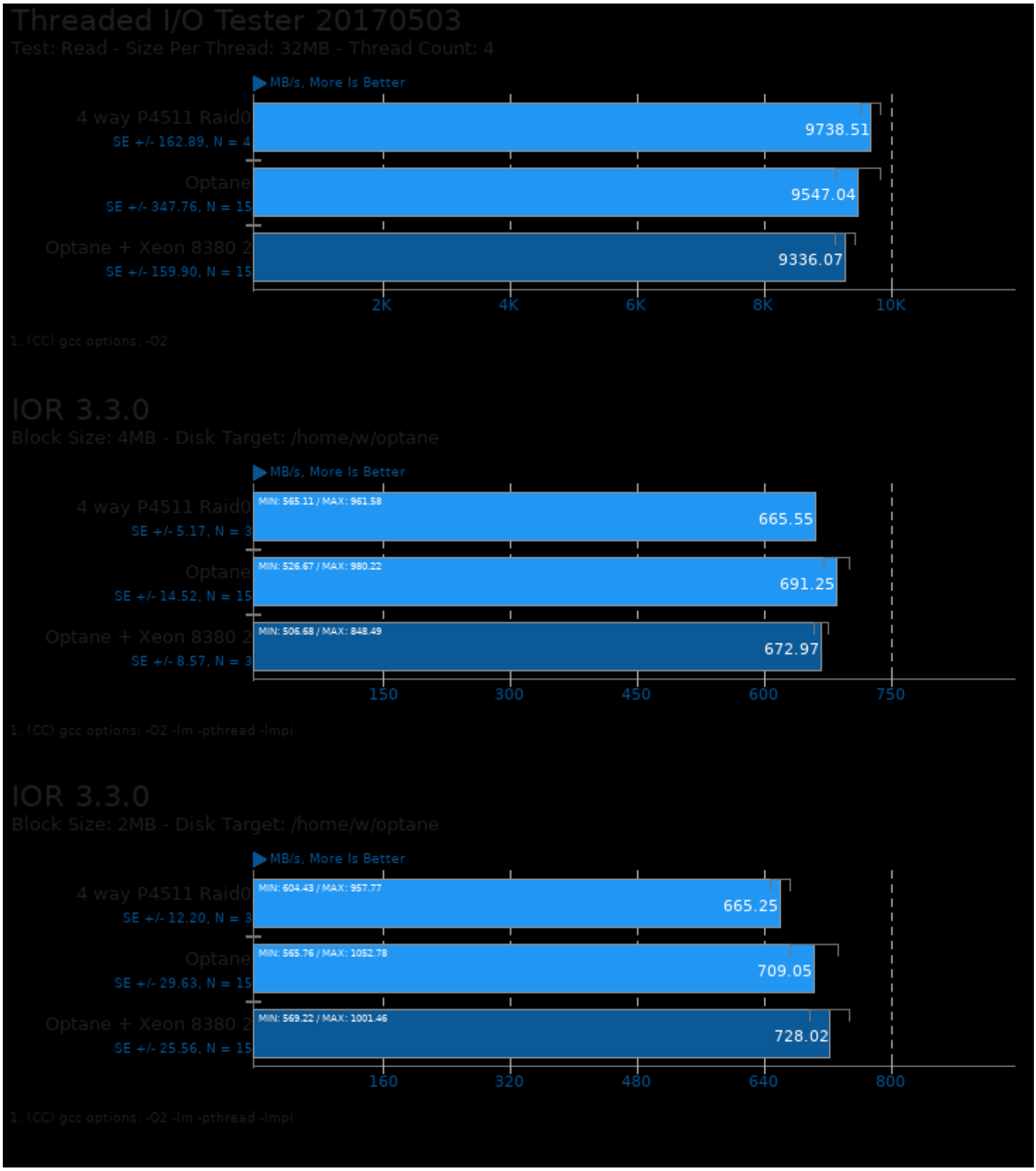
optane


Threaded I/O Tester 20170503
Test: Write - Size Per Thread: 32MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.65, N = 12
37.02
Optane
SE +/- 0.11, N = 3
34.06
Optane + Xeon 8380 2
SE +/- 0.34, N = 15
28.54
9
18
27
36
45
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 64MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 892.97, N = 12
50998.78
Optane
SE +/- 968.83, N = 15
52086.51
Optane + Xeon 8380 2
SE +/- 567.31, N = 15
54437.03
12K
24K
36K
48K
60K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 64MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 612.09, N = 15
30434.45
Optane
SE +/- 691.71, N = 15
37688.22
Optane + Xeon 8380 2
SE +/- 435.19, N = 15
33705.82
8K
16K
24K
32K
40K
1. (CC) gcc options: -O2

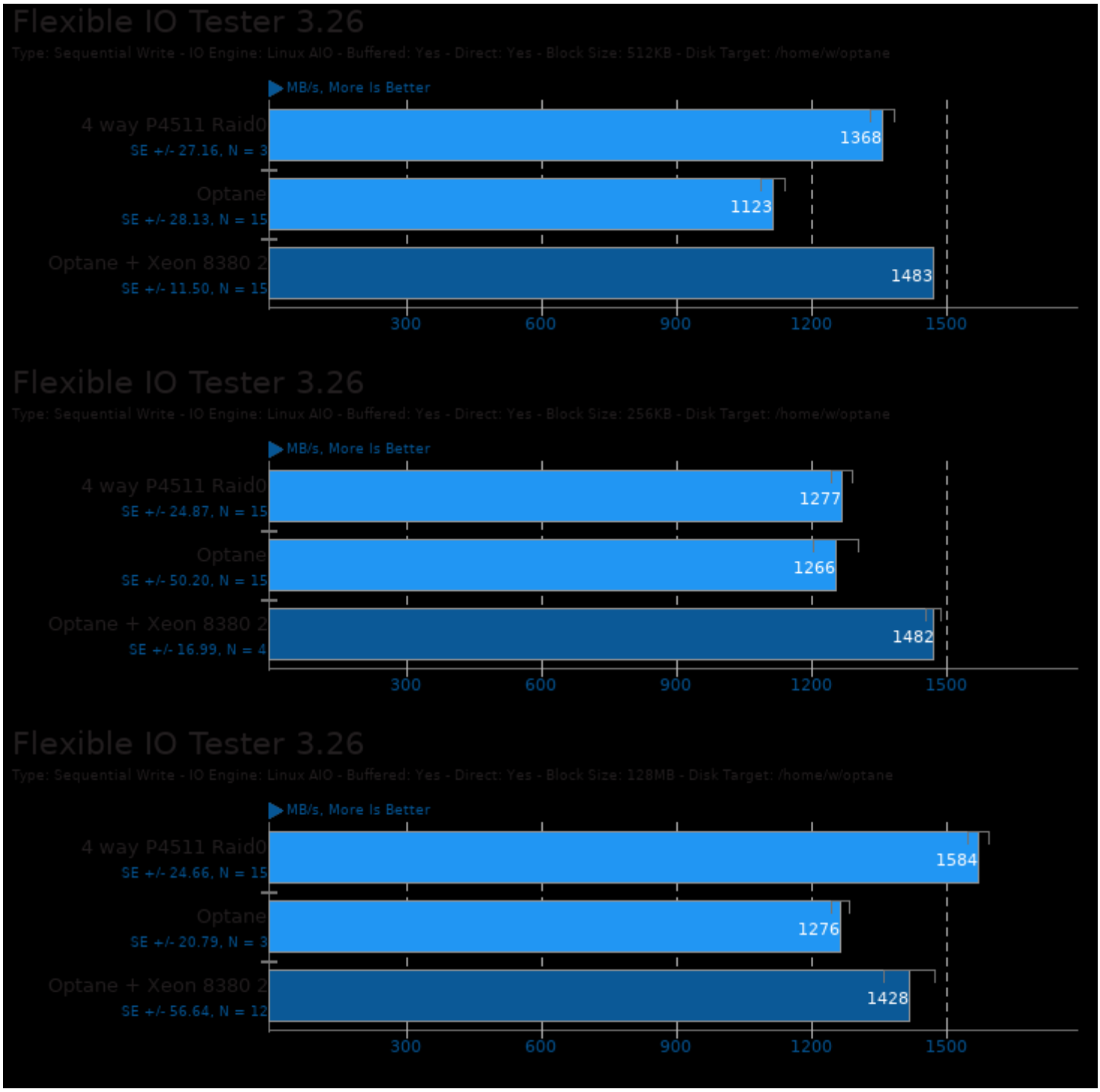

Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 32MB - Thread Count: 32
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 657.11, N = 15
45431.83
Optane
SE +/- 1310.17, N = 12
44638.90
Optane + Xeon 8380 2
SE +/- 1027.04, N = 15
46000.07
10K
20K
30K
40K
50K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 32MB - Thread Count: 16
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 642.52, N = 15
28178.57
Optane
SE +/- 811.04, N = 15
32823.02
Optane + Xeon 8380 2
SE +/- 558.34, N = 15
28171.10
7K
14K
21K
28K
35K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 256MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 278.49, N = 3
19171.27
Optane
SE +/- 668.47, N = 15
21865.52
Optane + Xeon 8380 2
SE +/- 316.59, N = 15
18744.44
5K
10K
15K
20K
25K
1. (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 256MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 275.89, N = 15
9954.36
Optane
SE +/- 367.11, N = 15
11197.29
Optane + Xeon 8380 2
SE +/- 137.72, N = 3
11364.10
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 128MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 463.28, N = 12
17394.53
Optane
SE +/- 679.06, N = 15
20113.53
Optane + Xeon 8380 2
SE +/- 183.82, N = 3
17510.36
4K
8K
12K
16K
20K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 128MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 203.72, N = 15
9361.36
Optane
SE +/- 414.81, N = 15
11252.12
Optane + Xeon 8380 2
SE +/- 140.11, N = 3
11218.15
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2

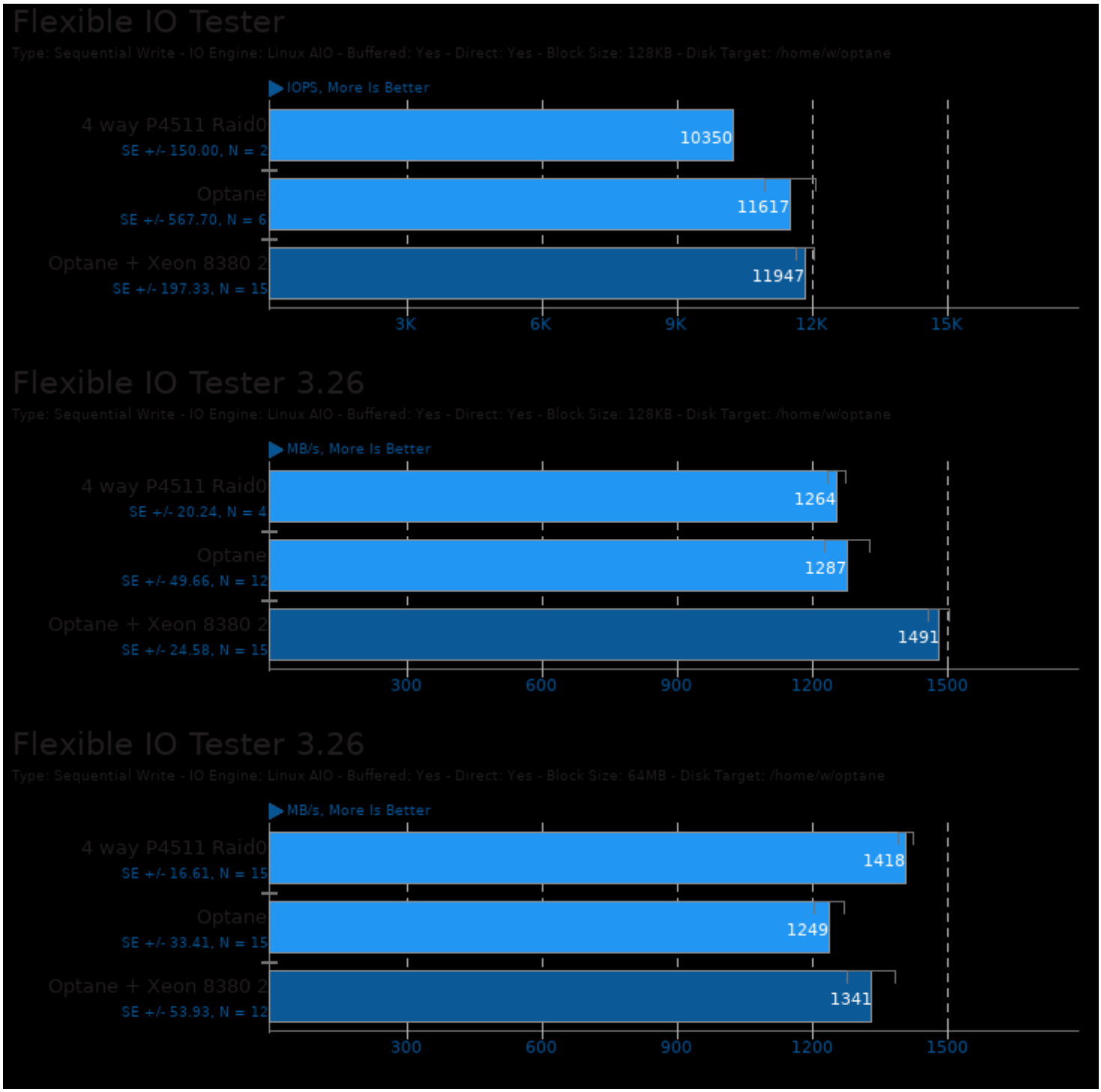

Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 64MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 452.58, N = 15
17284.52
Optane
SE +/- 888.37, N = 15
19676.95
Optane + Xeon 8380 2
SE +/- 154.72, N = 3
16464.50
4K
8K
12K
16K
20K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 64MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 221.86, N = 15
9569.52
Optane
SE +/- 213.09, N = 3
10763.98
Optane + Xeon 8380 2
SE +/- 231.95, N = 12
9130.50
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2
Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 32MB - Thread Count: 8
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 296.42, N = 15
16349.56
Optane
SE +/- 527.94, N = 14
18046.52
Optane + Xeon 8380 2
SE +/- 181.33, N = 15
16948.56
4K
8K
12K
16K
20K
1. (CC) gcc options: -O2


Threaded I/O Tester 20170503
Test: Read - Size Per Thread: 32MB - Thread Count: 4
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 162.89, N = 4
9738.51
Optane
SE +/- 347.76, N = 15
9547.04
Optane + Xeon 8380 2
SE +/- 159.90, N = 15
9336.07
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2
IOR 3.3.0
Block Size: 4MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 5.17, N = 3
MIN: 565.11 / MAX: 961.58
665.55
Optane
SE +/- 14.52, N = 15
MIN: 526.67 / MAX: 980.22
691.25
Optane + Xeon 8380 2
SE +/- 8.57, N = 3
MIN: 506.68 / MAX: 848.49
672.97
150
300
450
600
750
1. (CC) gcc options: -O2 -lm -pthread -lmpi
IOR 3.3.0
Block Size: 2MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 12.20, N = 3
MIN: 604.43 / MAX: 957.77
665.25
Optane
SE +/- 29.63, N = 15
MIN: 565.76 / MAX: 1052.78
709.05
Optane + Xeon 8380 2
SE +/- 25.56, N = 15
MIN: 569.22 / MAX: 1001.46
728.02
160
320
480
640
800
1. (CC) gcc options: -O2 -lm -pthread -lmpi

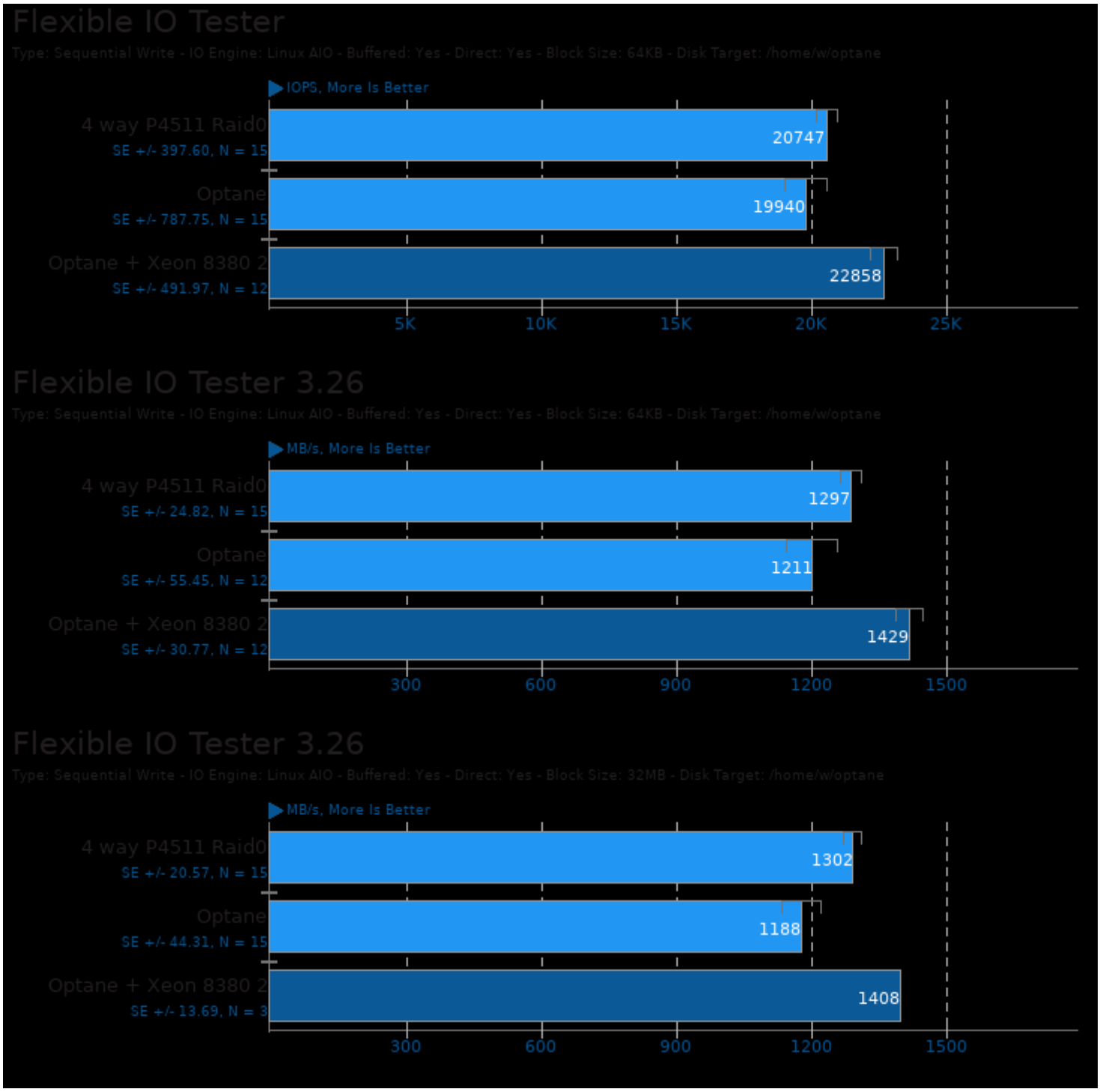
optane


Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 512KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 27.16, N = 3
1368
Optane
SE +/- 28.13, N = 15
1123
Optane + Xeon 8380 2
SE +/- 11.50, N = 15
1483
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 24.87, N = 15
1277
Optane
SE +/- 50.20, N = 15
1266
Optane + Xeon 8380 2
SE +/- 16.99, N = 4
1482
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 24.66, N = 15
1584
Optane
SE +/- 20.79, N = 3
1276
Optane + Xeon 8380 2
SE +/- 56.64, N = 12
1428
300
600
900
1200
1500

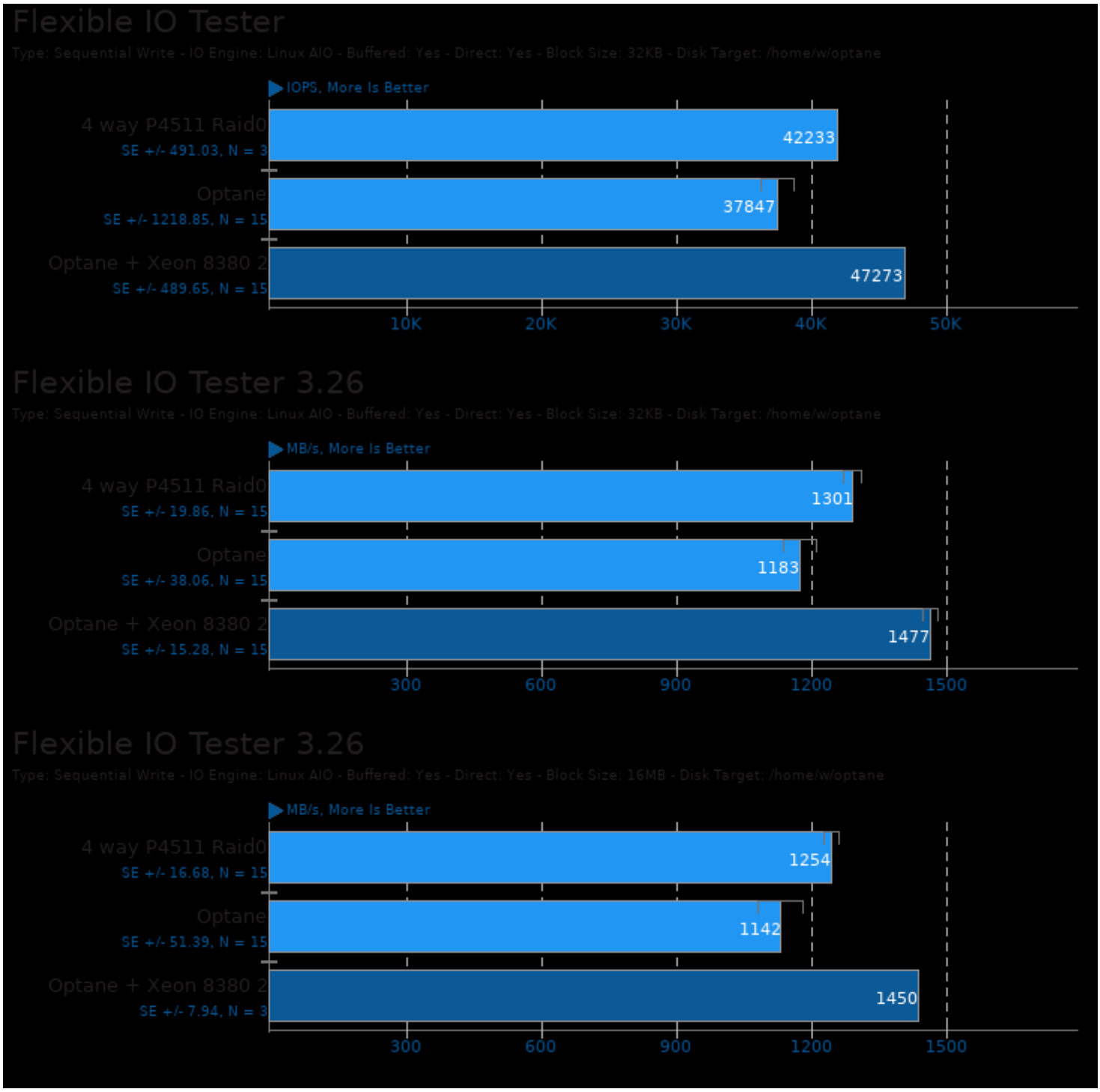
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 150.00, N = 2
10350
Optane
SE +/- 567.70, N = 6
11617
Optane + Xeon 8380 2
SE +/- 197.33, N = 15
11947
3K
6K
9K
12K
15K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.24, N = 4
1264
Optane
SE +/- 49.66, N = 12
1287
Optane + Xeon 8380 2
SE +/- 24.58, N = 15
1491
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 16.61, N = 15
1418
Optane
SE +/- 33.41, N = 15
1249
Optane + Xeon 8380 2
SE +/- 53.93, N = 12
1341
300
600
900
1200
1500

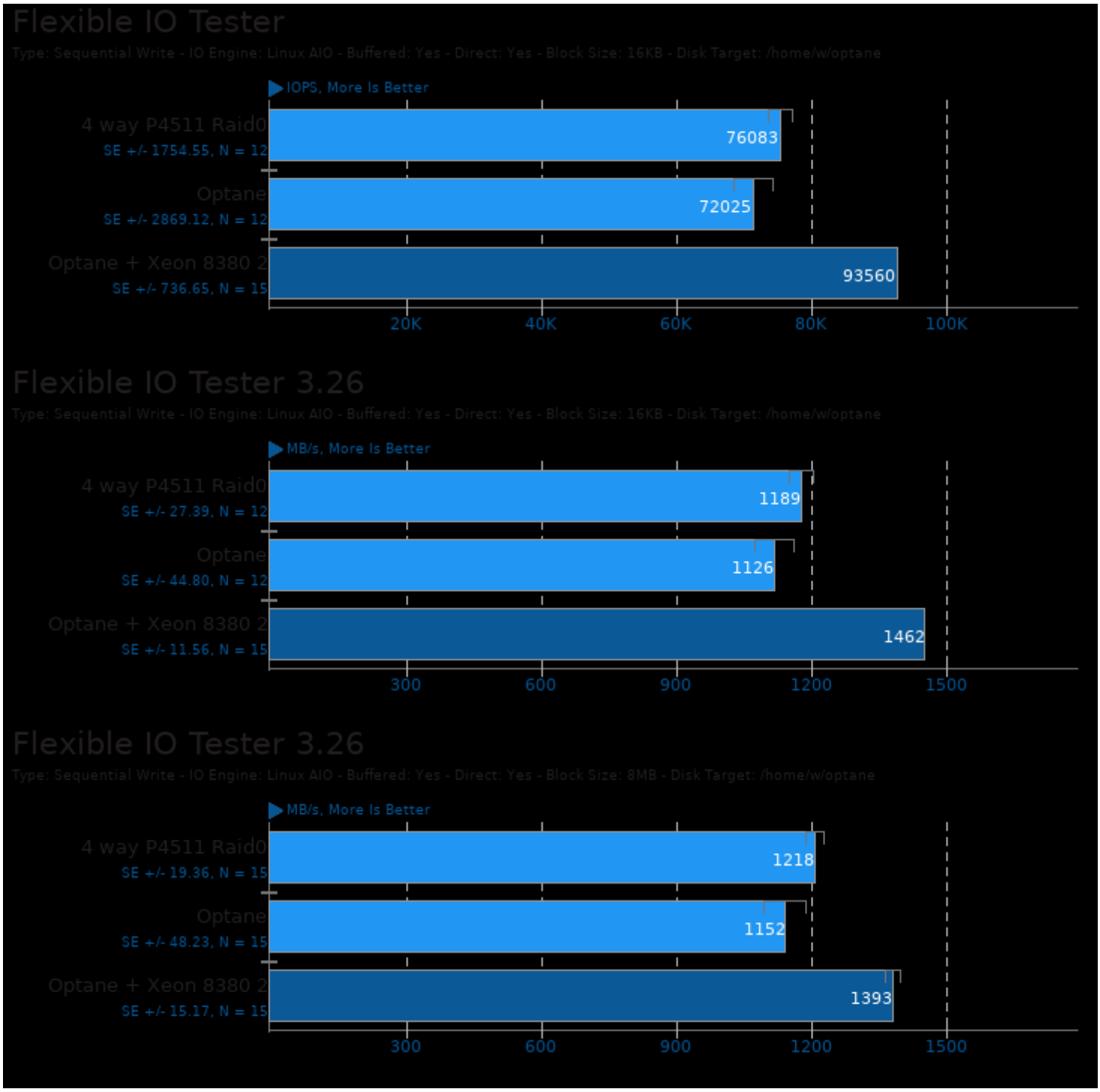
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 397.60, N = 15
20747
Optane
SE +/- 787.75, N = 15
19940
Optane + Xeon 8380 2
SE +/- 491.97, N = 12
22858
5K
10K
15K
20K
25K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 24.82, N = 15
1297
Optane
SE +/- 55.45, N = 12
1211
Optane + Xeon 8380 2
SE +/- 30.77, N = 12
1429
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.57, N = 15
1302
Optane
SE +/- 44.31, N = 15
1188
Optane + Xeon 8380 2
SE +/- 13.69, N = 3
1408
300
600
900
1200
1500

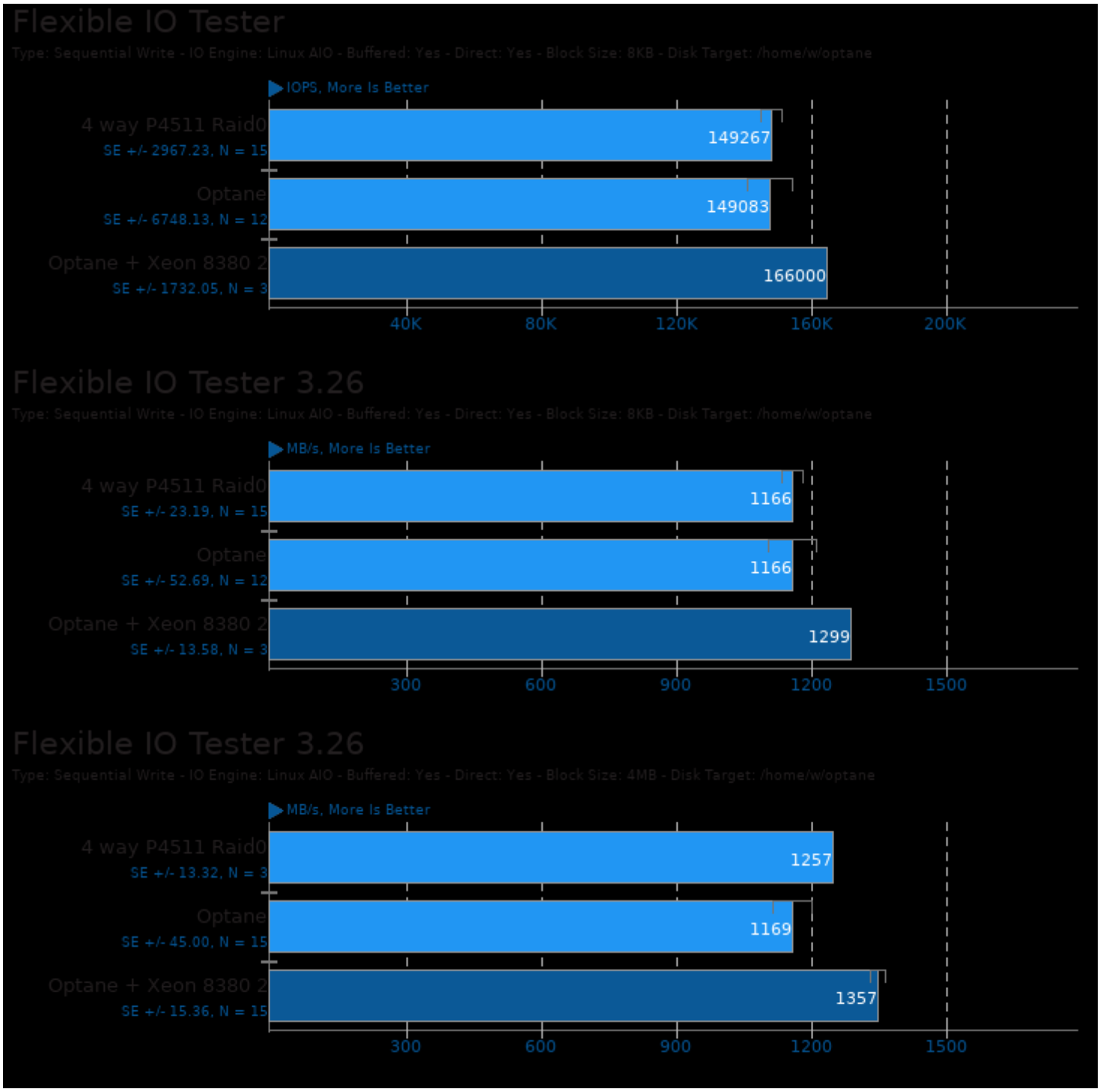
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 491.03, N = 3
42233
Optane
SE +/- 1218.85, N = 15
37847
Optane + Xeon 8380 2
SE +/- 489.65, N = 15
47273
10K
20K
30K
40K
50K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 19.86, N = 15
1301
Optane
SE +/- 38.06, N = 15
1183
Optane + Xeon 8380 2
SE +/- 15.28, N = 15
1477
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 16.68, N = 15
1254
Optane
SE +/- 51.39, N = 15
1142
Optane + Xeon 8380 2
SE +/- 7.94, N = 3
1450
300
600
900
1200
1500

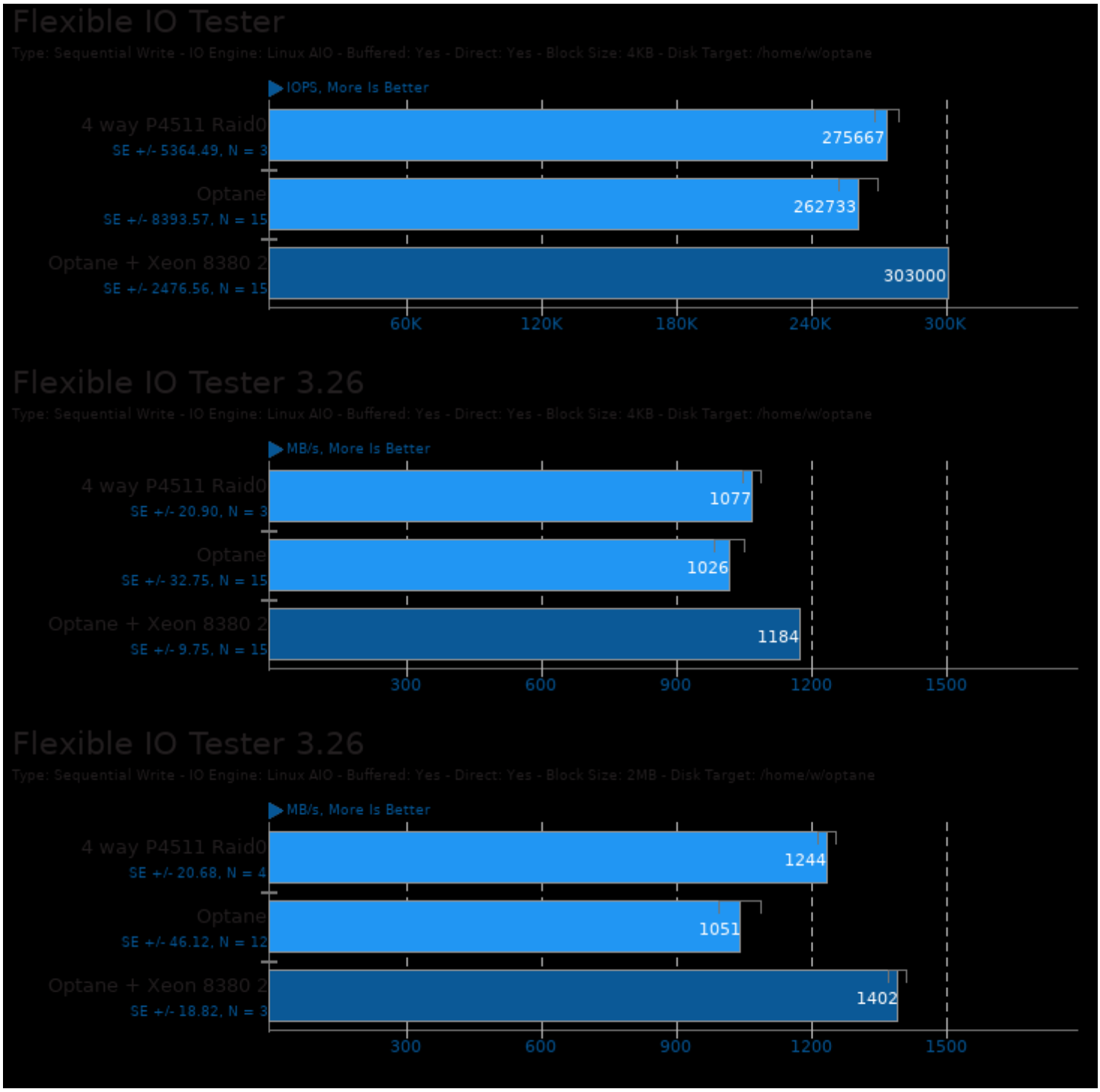
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 1754.55, N = 12
76083
Optane
SE +/- 2869.12, N = 12
72025
Optane + Xeon 8380 2
SE +/- 736.65, N = 15
93560
20K
40K
60K
80K
100K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 27.39, N = 12
1189
Optane
SE +/- 44.80, N = 12
1126
Optane + Xeon 8380 2
SE +/- 11.56, N = 15
1462
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 19.36, N = 15
1218
Optane
SE +/- 48.23, N = 15
1152
Optane + Xeon 8380 2
SE +/- 15.17, N = 15
1393
300
600
900
1200
1500

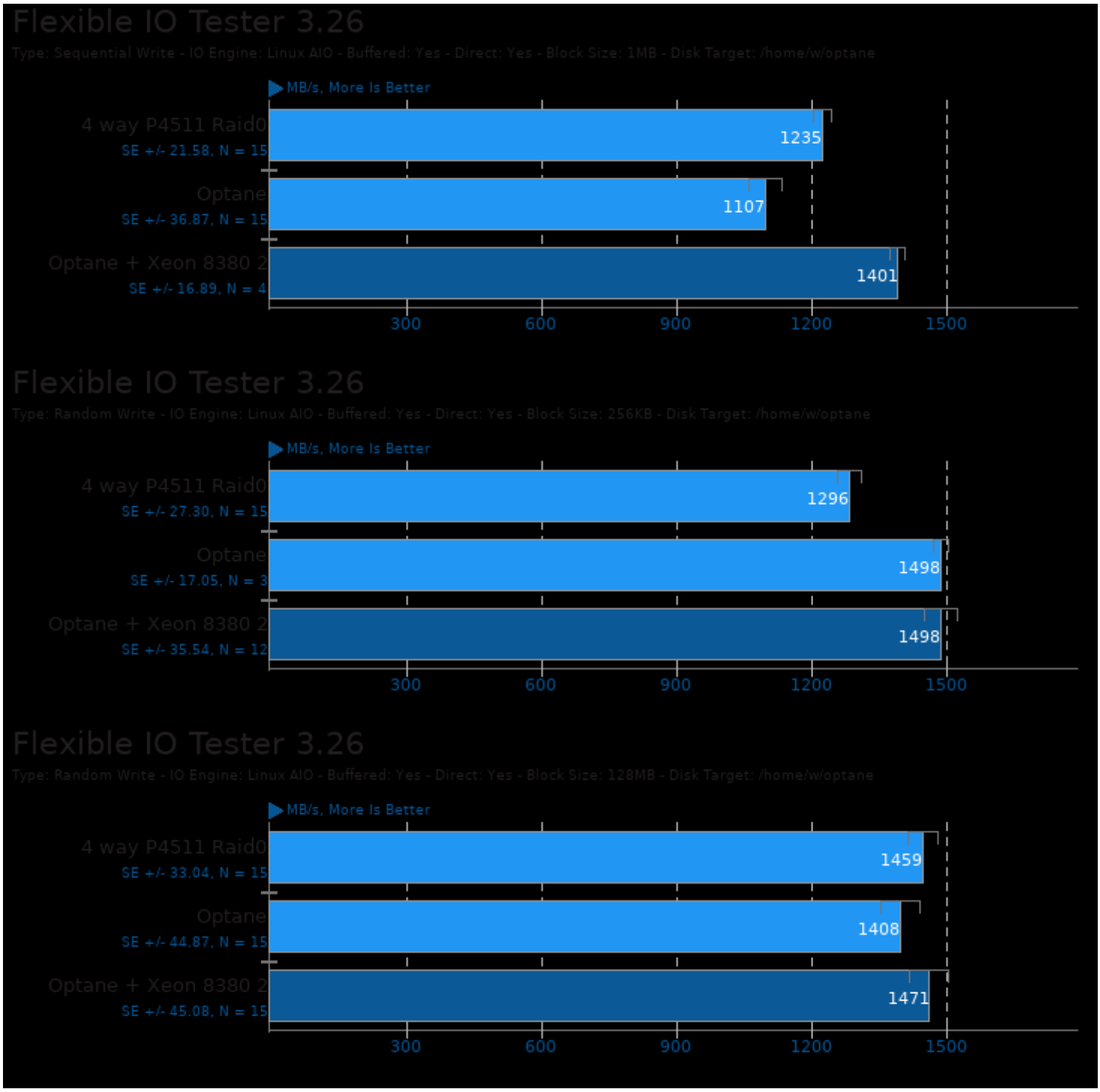
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 2967.23, N = 15
149267
Optane
SE +/- 6748.13, N = 12
149083
Optane + Xeon 8380 2
SE +/- 1732.05, N = 3
166000
40K
80K
120K
160K
200K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 23.19, N = 15
1166
Optane
SE +/- 52.69, N = 12
1166
Optane + Xeon 8380 2
SE +/- 13.58, N = 3
1299
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 13.32, N = 3
1257
Optane
SE +/- 45.00, N = 15
1169
Optane + Xeon 8380 2
SE +/- 15.36, N = 15
1357
300
600
900
1200
1500

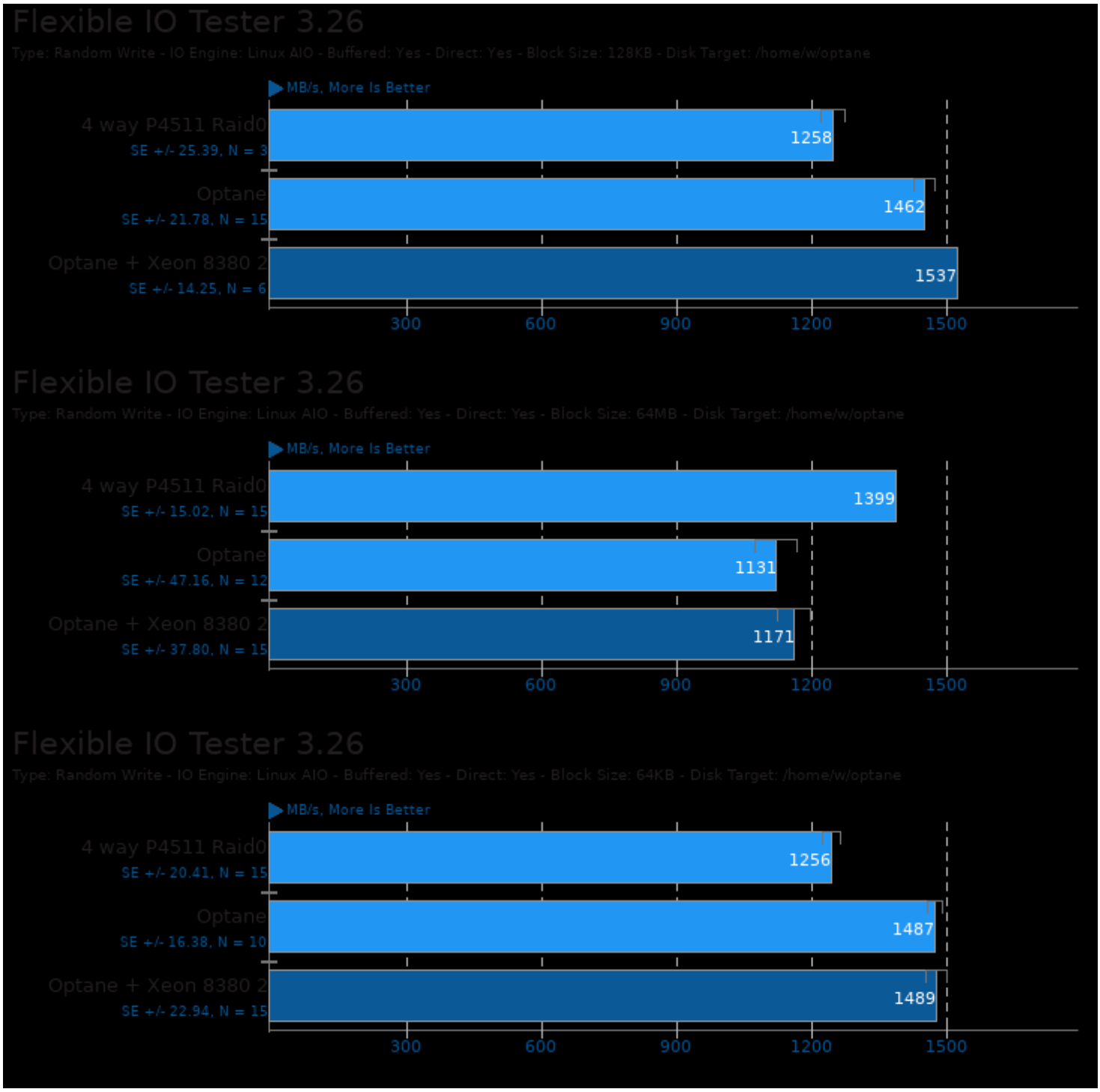
optane


Flexible IO Tester
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 5364.49, N = 3
275667
Optane
SE +/- 8393.57, N = 15
262733
Optane + Xeon 8380 2
SE +/- 2476.56, N = 15
303000
60K
120K
180K
240K
300K
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.90, N = 3
1077
Optane
SE +/- 32.75, N = 15
1026
Optane + Xeon 8380 2
SE +/- 9.75, N = 15
1184
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 2MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.68, N = 4
1244
Optane
SE +/- 46.12, N = 12
1051
Optane + Xeon 8380 2
SE +/- 18.82, N = 3
1402
300
600
900
1200
1500

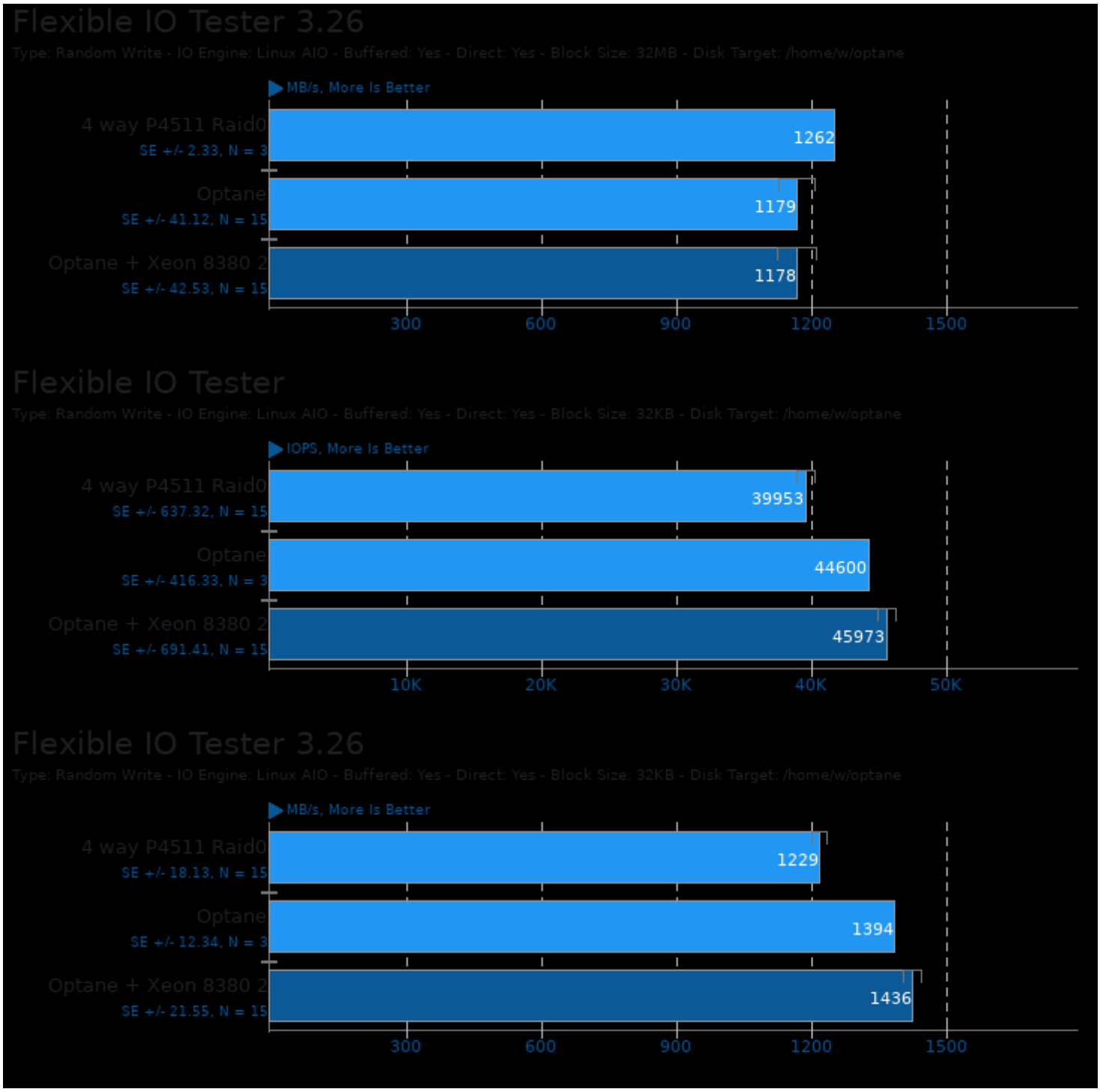
optane


Flexible IO Tester 3.26
Type: Sequential Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 21.58, N = 15
1235
Optane
SE +/- 36.87, N = 15
1107
Optane + Xeon 8380 2
SE +/- 16.89, N = 4
1401
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 27.30, N = 15
1296
Optane
SE +/- 17.05, N = 3
1498
Optane + Xeon 8380 2
SE +/- 35.54, N = 12
1498
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 33.04, N = 15
1459
Optane
SE +/- 44.87, N = 15
1408
Optane + Xeon 8380 2
SE +/- 45.08, N = 15
1471
300
600
900
1200
1500

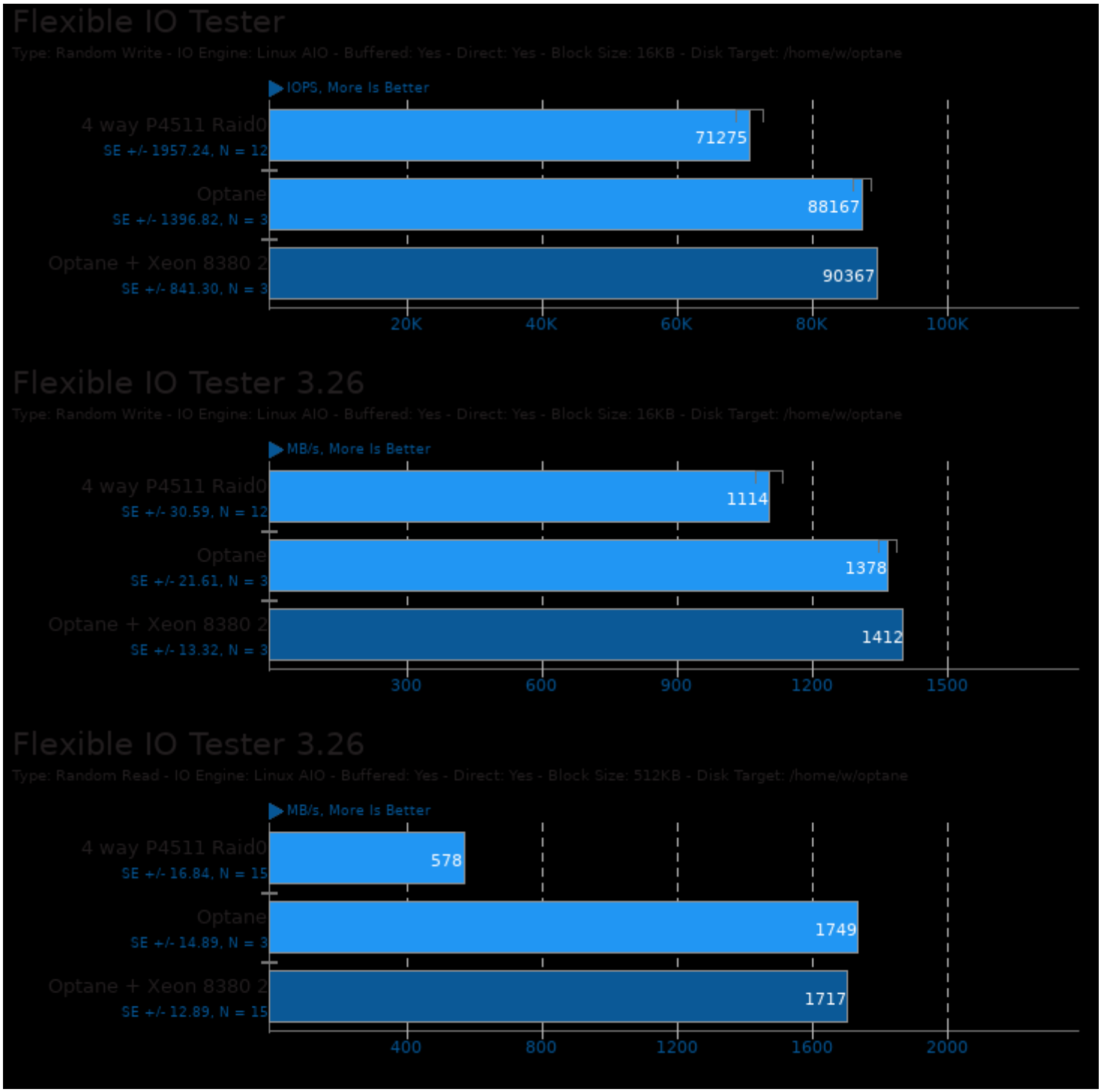
optane


Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 128KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 25.39, N = 3
1258
Optane
SE +/- 21.78, N = 15
1462
Optane + Xeon 8380 2
SE +/- 14.25, N = 6
1537
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 15.02, N = 15
1399
Optane
SE +/- 47.16, N = 12
1131
Optane + Xeon 8380 2
SE +/- 37.80, N = 15
1171
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.41, N = 15
1256
Optane
SE +/- 16.38, N = 10
1487
Optane + Xeon 8380 2
SE +/- 22.94, N = 15
1489
300
600
900
1200
1500

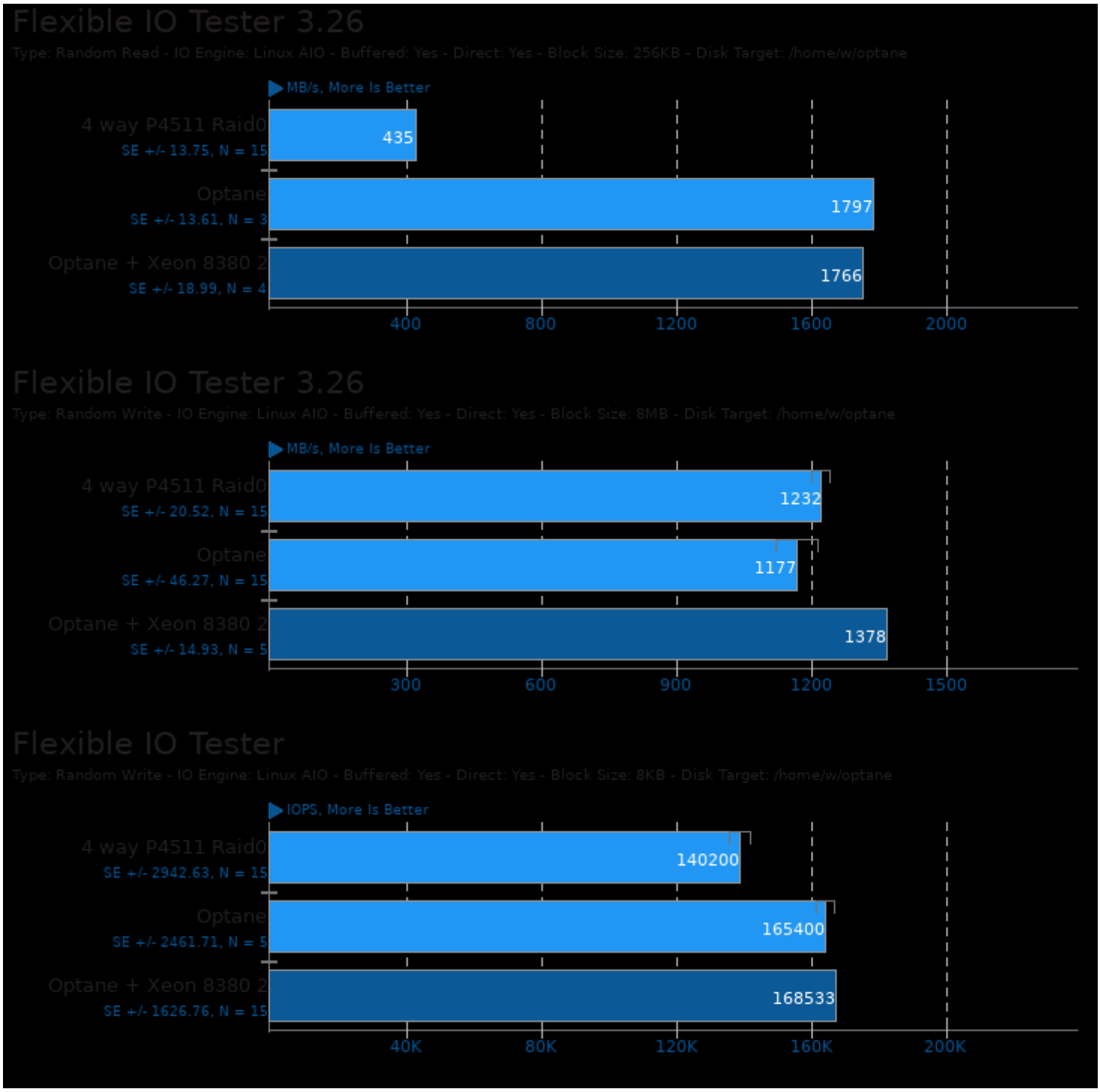
optane


Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.33, N = 3
1262
Optane
SE +/- 41.12, N = 15
1179
Optane + Xeon 8380 2
SE +/- 42.53, N = 15
1178
300
600
900
1200
1500
Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 637.32, N = 15
39953
Optane
SE +/- 416.33, N = 3
44600
Optane + Xeon 8380 2
SE +/- 691.41, N = 15
45973
10K
20K
30K
40K
50K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 32KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 18.13, N = 15
1229
Optane
SE +/- 12.34, N = 3
1394
Optane + Xeon 8380 2
SE +/- 21.55, N = 15
1436
300
600
900
1200
1500

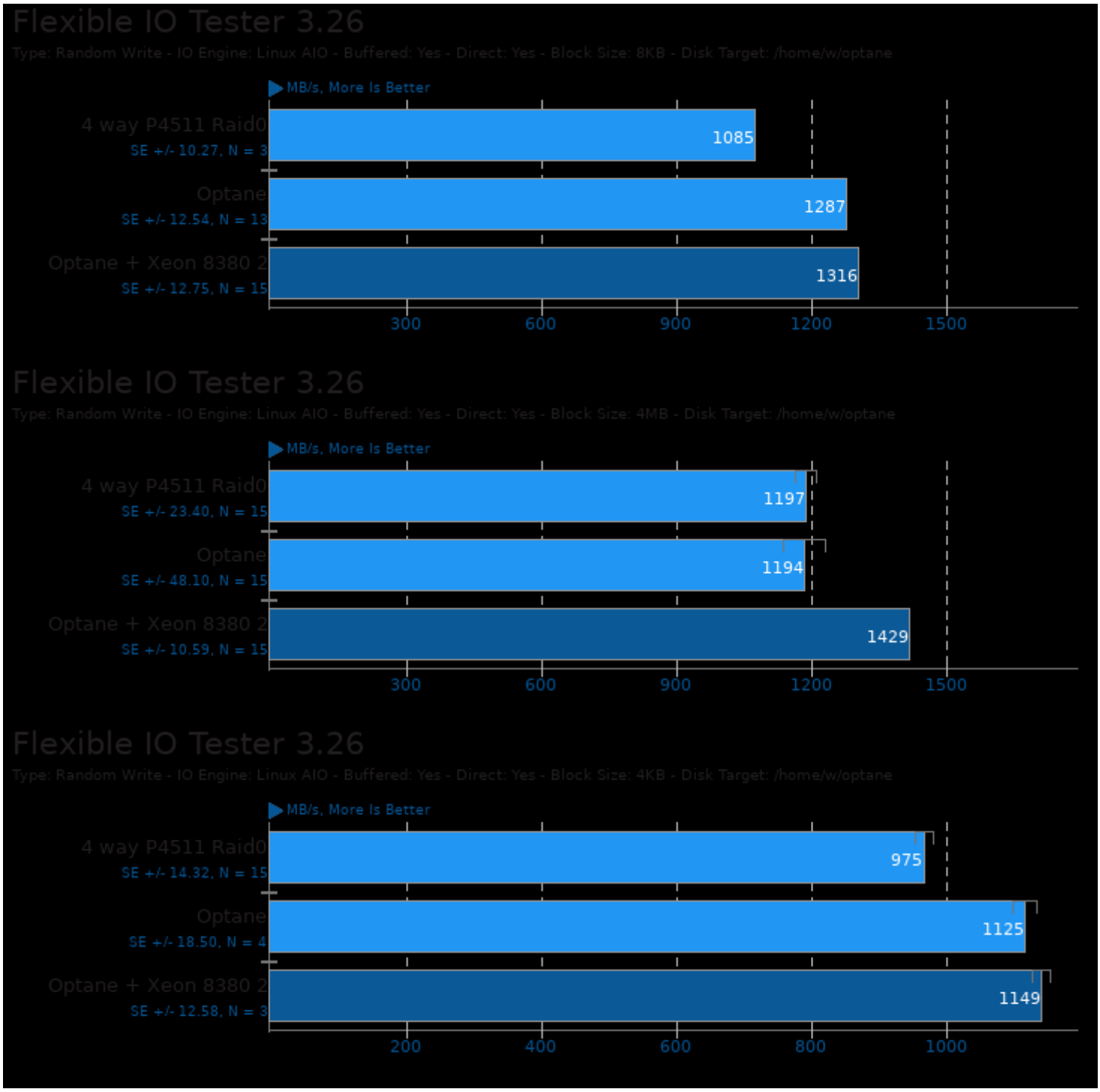
optane


Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 1957.24, N = 12
71275
Optane
SE +/- 1396.82, N = 3
88167
Optane + Xeon 8380 2
SE +/- 841.30, N = 3
90367
20K
40K
60K
80K
100K
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 30.59, N = 12
1114
Optane
SE +/- 21.61, N = 3
1378
Optane + Xeon 8380 2
SE +/- 13.32, N = 3
1412
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 512KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 16.84, N = 15
578
Optane
SE +/- 14.89, N = 3
1749
Optane + Xeon 8380 2
SE +/- 12.89, N = 15
1717
400
800
1200
1600
2000

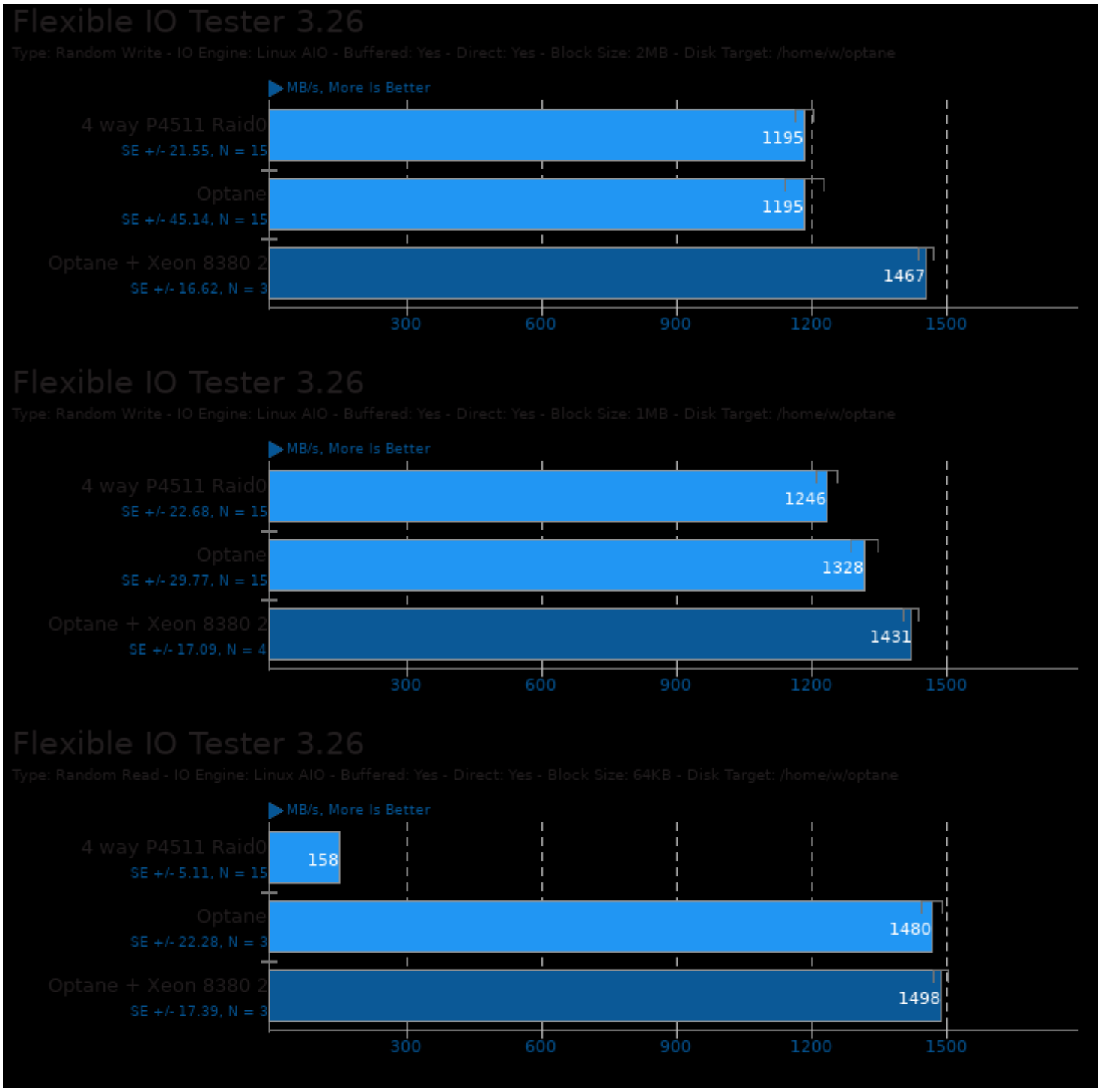
optane


Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 256KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 13.75, N = 15
435
Optane
SE +/- 13.61, N = 3
1797
Optane + Xeon 8380 2
SE +/- 18.99, N = 4
1766
400
800
1200
1600
2000
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 20.52, N = 15
1232
Optane
SE +/- 46.27, N = 15
1177
Optane + Xeon 8380 2
SE +/- 14.93, N = 5
1378
300
600
900
1200
1500
Flexible IO Tester
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
IOPS, More Is Better
4 way P4511 Raid0
SE +/- 2942.63, N = 15
140200
Optane
SE +/- 2461.71, N = 5
165400
Optane + Xeon 8380 2
SE +/- 1626.76, N = 15
168533
40K
80K
120K
160K
200K

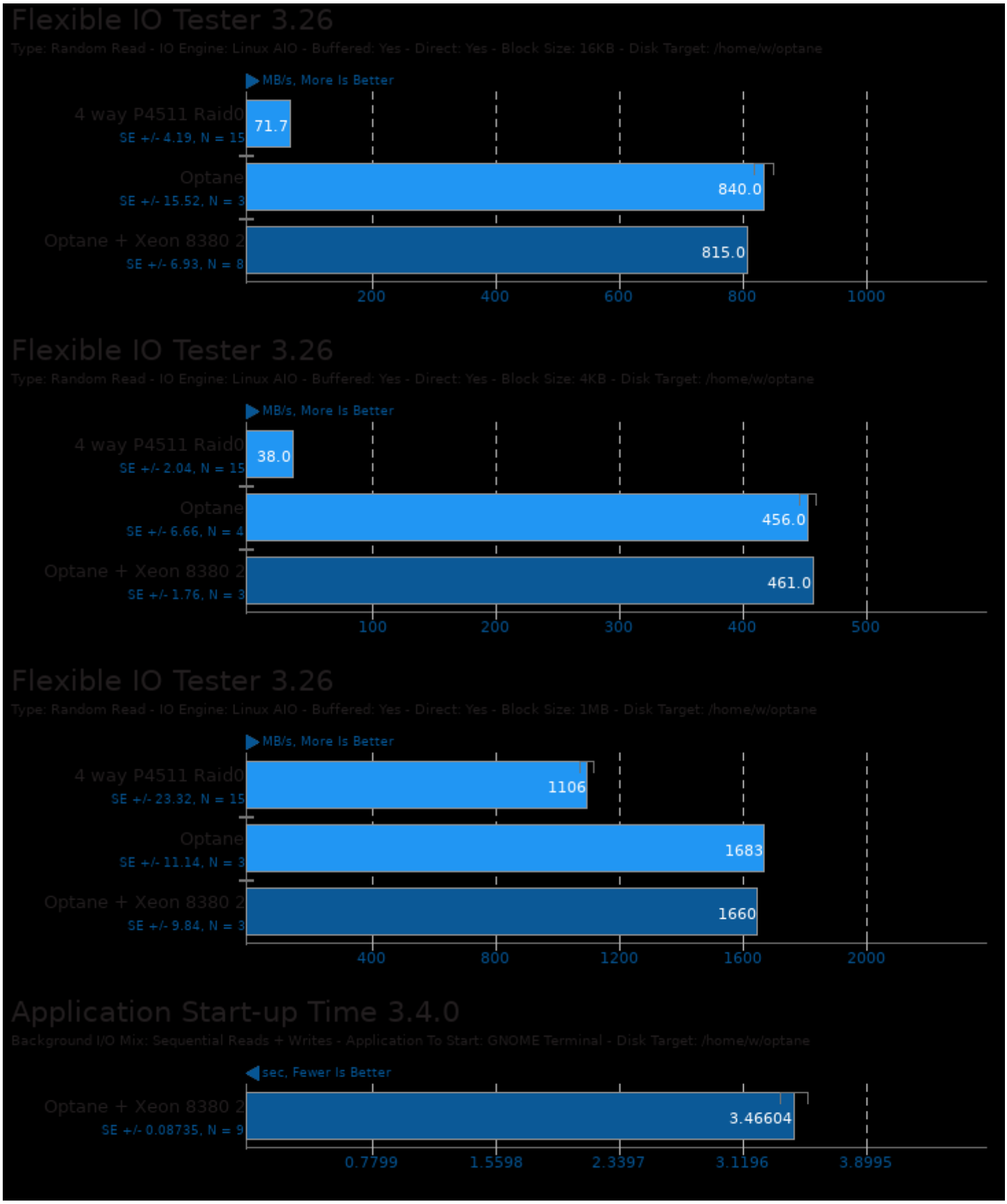
optane

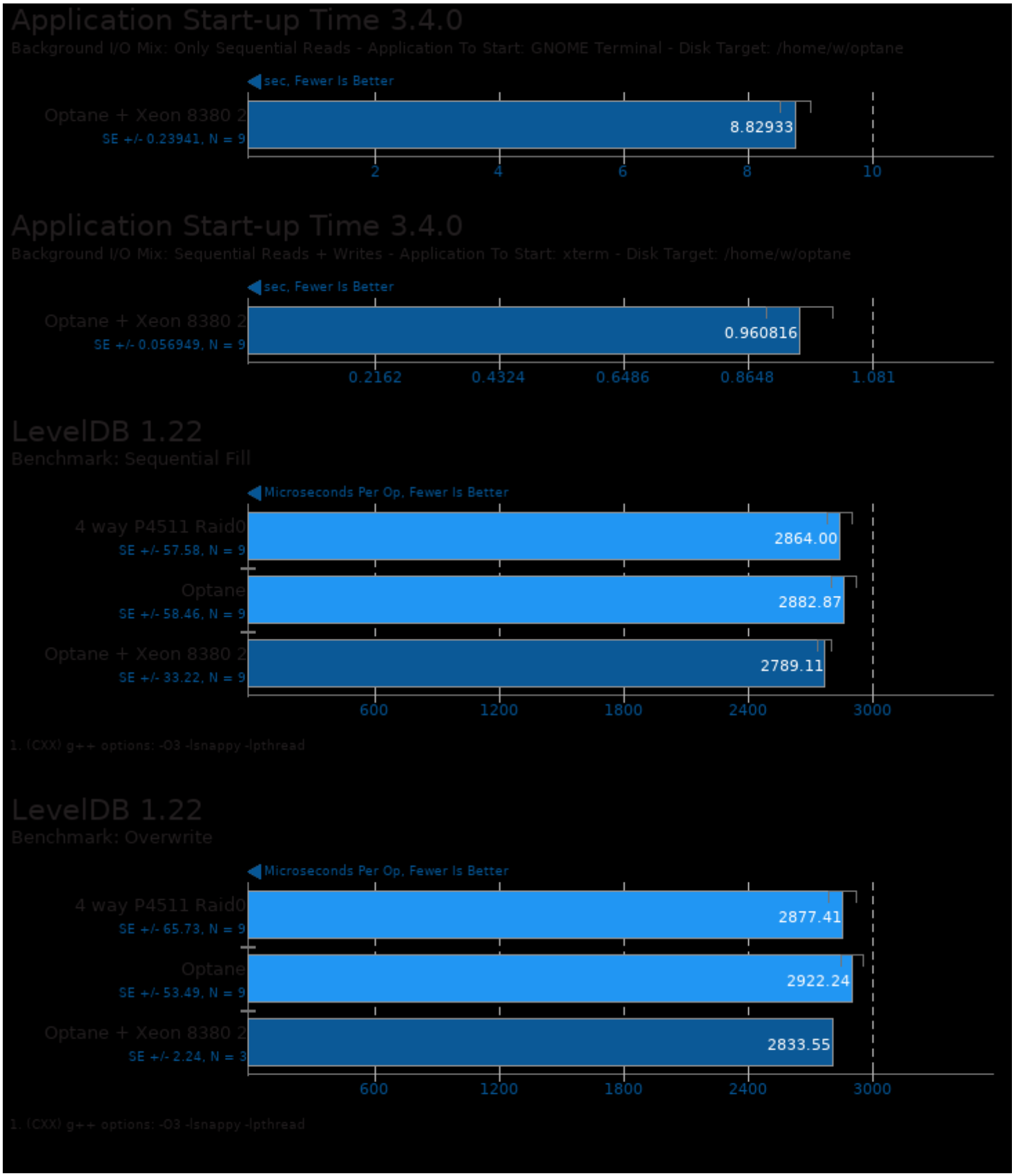

Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 8KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 10.27, N = 3
1085
Optane
SE +/- 12.54, N = 13
1287
Optane + Xeon 8380 2
SE +/- 12.75, N = 15
1316
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 23.40, N = 15
1197
Optane
SE +/- 48.10, N = 15
1194
Optane + Xeon 8380 2
SE +/- 10.59, N = 15
1429
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 14.32, N = 15
975
Optane
SE +/- 18.50, N = 4
1125
Optane + Xeon 8380 2
SE +/- 12.58, N = 3
1149
200
400
600
800
1000

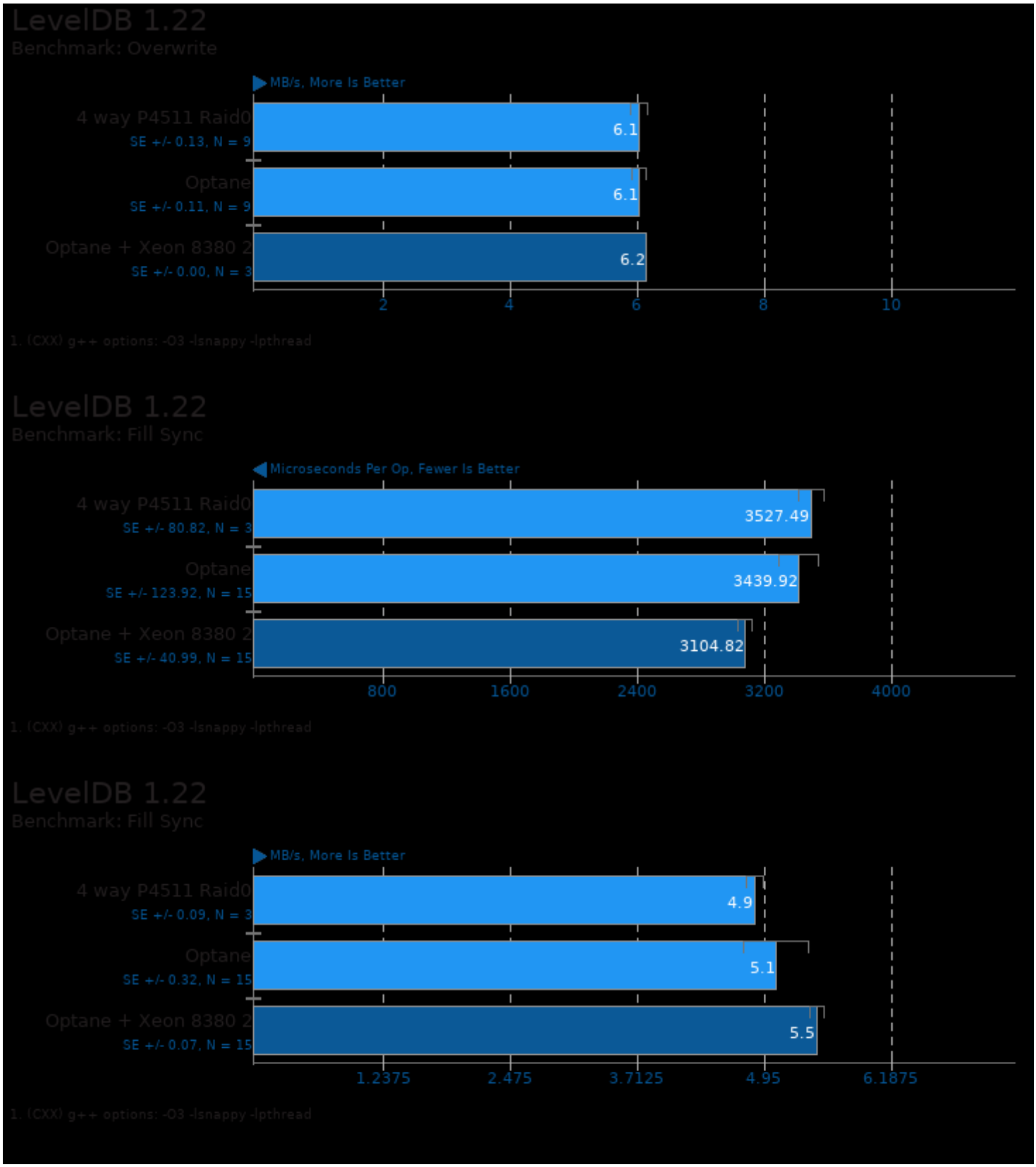
optane


Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 2MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 21.55, N = 15
1195
Optane
SE +/- 45.14, N = 15
1195
Optane + Xeon 8380 2
SE +/- 16.62, N = 3
1467
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Write - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 22.68, N = 15
1246
Optane
SE +/- 29.77, N = 15
1328
Optane + Xeon 8380 2
SE +/- 17.09, N = 4
1431
300
600
900
1200
1500
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 64KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 5.11, N = 15
158
Optane
SE +/- 22.28, N = 3
1480
Optane + Xeon 8380 2
SE +/- 17.39, N = 3
1498
300
600
900
1200
1500

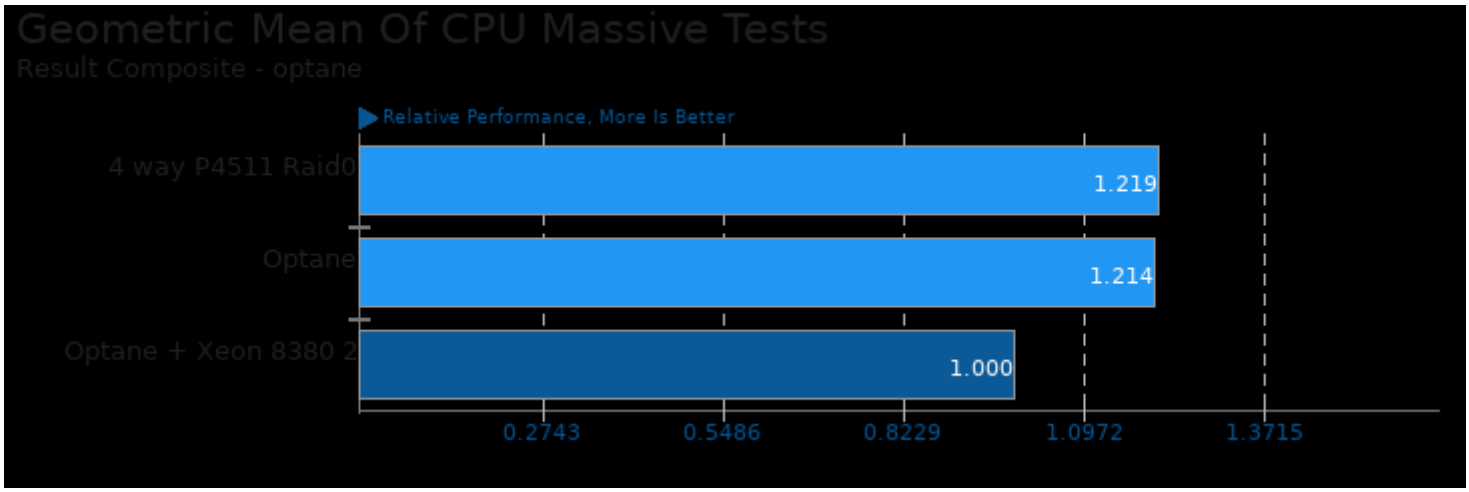
optane


Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 16KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 4.19, N = 15
71.7
Optane
SE +/- 15.52, N = 3
840.0
Optane + Xeon 8380 2
SE +/- 6.93, N = 8
815.0
200
400
600
800
1000
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 2.04, N = 15
38.0
Optane
SE +/- 6.66, N = 4
456.0
Optane + Xeon 8380 2
SE +/- 1.76, N = 3
461.0
100
200
300
400
500
Flexible IO Tester 3.26
Type: Random Read - IO Engine: Linux AIO - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: /home/w/optane
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 23.32, N = 15
1106
Optane
SE +/- 11.14, N = 3
1683
Optane + Xeon 8380 2
SE +/- 9.84, N = 3
1660
400
800
1200
1600
2000
Application Start-up Time 3.4.0
Background I/O Mix: Sequential Reads + Writes - Application To Start: GNOME Terminal - Disk Target: /home/w/optane
sec, Fewer Is Better
Optane + Xeon 8380 2
SE +/- 0.08735, N = 9
3.46604
0.7799
1.5598
2.3397
3.1196
3.8995


Application Start-up Time 3.4.0
Background I/O Mix: Only Sequential Reads - Application To Start: GNOME Terminal - Disk Target: /home/w/optane
sec, Fewer Is Better
Optane + Xeon 8380 2
SE +/- 0.23941, N = 9
8.82933
2
4
6
8
10
Application Start-up Time 3.4.0
Background I/O Mix: Sequential Reads + Writes - Application To Start: xterm - Disk Target: /home/w/optane
sec, Fewer Is Better
Optane + Xeon 8380 2
SE +/- 0.056949, N = 9
0.960816
0.2162
0.4324
0.6486
0.8648
1.081
LevelDB 1.22
Benchmark: Sequential Fill
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 57.58, N = 9
2864.00
Optane
SE +/- 58.46, N = 9
2882.87
Optane + Xeon 8380 2
SE +/- 33.22, N = 9
2789.11
600
1200
1800
2400
3000
1. (CXX) g++ options: -O3 -lsnappy -lpthread
LevelDB 1.22
Benchmark: Overwrite
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 65.73, N = 9
2877.41
Optane
SE +/- 53.49, N = 9
2922.24
Optane + Xeon 8380 2
SE +/- 2.24, N = 3
2833.55
600
1200
1800
2400
3000
1. (CXX) g++ options: -O3 -lsnappy -lpthread


LevelDB 1.22
Benchmark: Overwrite
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.13, N = 9
6.1
Optane
SE +/- 0.11, N = 9
6.1
Optane + Xeon 8380 2
SE +/- 0.00, N = 3
6.2
2
4
6
8
10
1. (CXX) g++ options: -O3 -lsnappy -lpthread
LevelDB 1.22
Benchmark: Fill Sync
Microseconds Per Op, Fewer Is Better
4 way P4511 Raid0
SE +/- 80.82, N = 3
3527.49
Optane
SE +/- 123.92, N = 15
3439.92
Optane + Xeon 8380 2
SE +/- 40.99, N = 15
3104.82
800
1600
2400
3200
4000
1. (CXX) g++ options: -O3 -lsnappy -lpthread
LevelDB 1.22
Benchmark: Fill Sync
MB/s, More Is Better
4 way P4511 Raid0
SE +/- 0.09, N = 3
4.9
Optane
SE +/- 0.32, N = 15
5.1
Optane + Xeon 8380 2
SE +/- 0.07, N = 15
5.5
1.2375
2.475
3.7125
4.95
6.1875
1. (CXX) g++ options: -O3 -lsnappy -lpthread

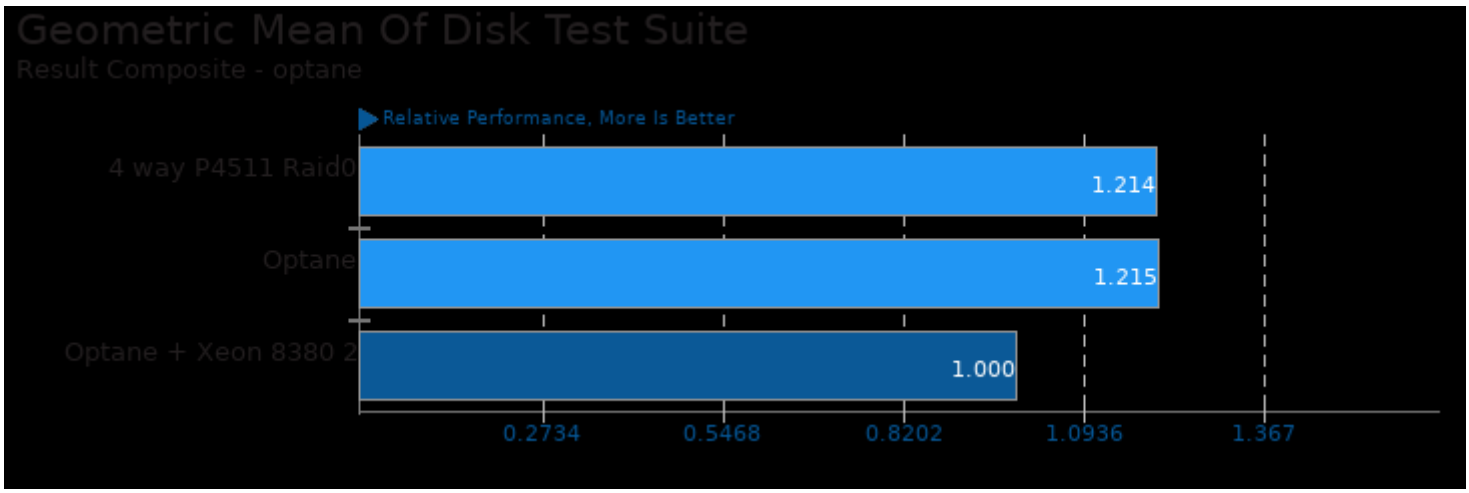
These geometric means are based upon test groupings / test suites for this result file.



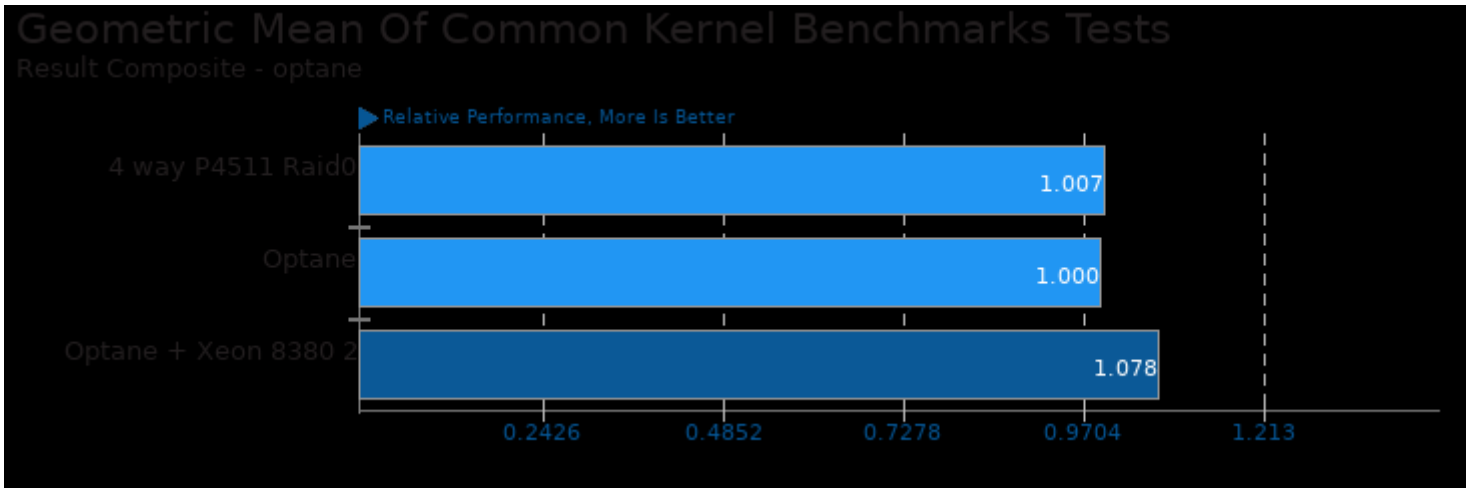
Geometric mean based upon tests: pts/blogbench and pts/compilebench



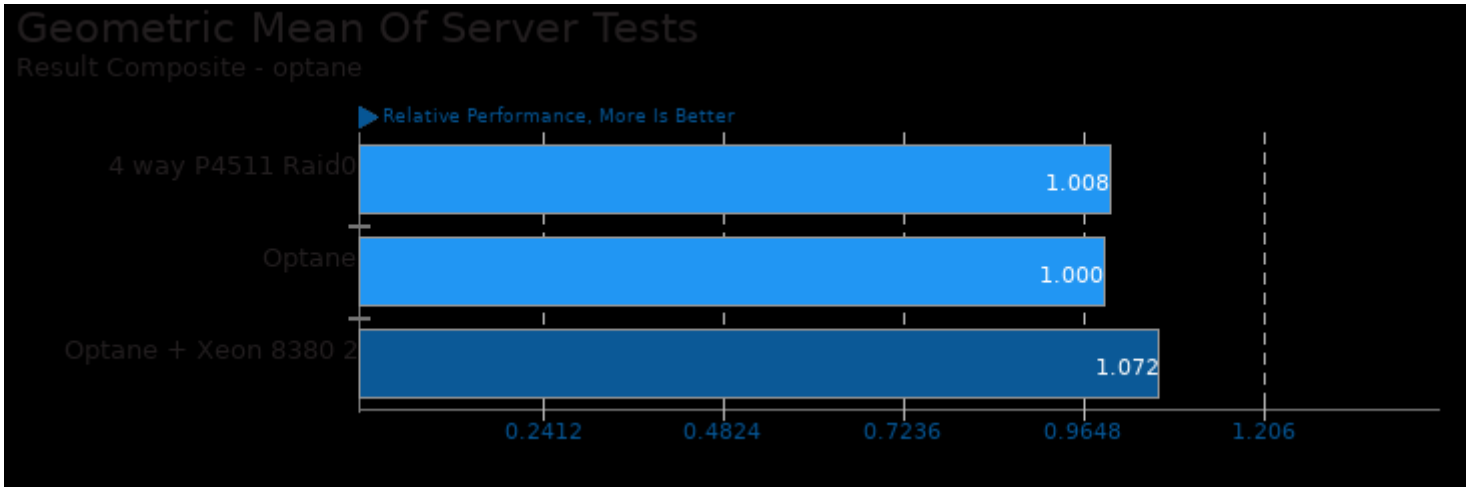
Geometric mean based upon tests: pts/sqlite and pts/leveldb



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



Geometric mean based upon tests: pts/postmark and pts/leveldb



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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 18:23.