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Intel Core i5-4460 testing with a Mouse Z97-S01 v1.0 (V2.0B5 BIOS) and MSI Intel Xeon E3-1200 v3/4th Gen Core IGP on Ubuntu 20.04 via the Phoronix Test Suite.

Automated Executive Summary

bcachefs replicas=1 had the most wins, coming in first place for 50% of the tests.

Based on the geometric mean of all complete results, the fastest (bcachefs replicas=1) was 2.577x the speed of the slowest (ext4+lvmcache tentative). bcachefs replicas=2 was 0.509x the speed of bcachefs replicas=1, bcachefs replicas=3 was 0.866x the speed of bcachefs replicas=2, ext4+lvmcache tentative was 0.881x the speed of bcachefs replicas=3.

Test Systems:

bcachefs replicas=3

bcacheFS replicas=2

bcacheFS replicas=1

Processor: Intel Core i5-4460 @ 3.40GHz (4 Cores), Motherboard: Mouse Z97-S01 v1.0 (V2.0B5 BIOS), Chipset: Intel 4th Gen Core DRAM, Memory: 2 x 8192 MB DDR3-1600MT/s, Disk: 2 x 1000GB TOSHIBA DT01ACA1 + 500GB SAMSUNG HD501LJ + 120GB Western Digital WDS120G1G0A-, Graphics: MSI Intel Xeon E3-1200 v3/4th Gen Core IGP (1100MHz), Audio: Intel Xeon E3-1200 v3/4th, Network: 4 x Intel 10-Gigabit X540-AT2 + Realtek RTL8111/8168/8411

OS: Ubuntu 20.04, Kernel: 6.7.3 (x86_64), Desktop: GNOME Shell 3.36.9, Display Server: X Server 1.20.13, Vulkan: 1.2.182, Compiler: GCC 9.4.0, File-System: BcacheFS

Kernel Notes: Transparent Huge Pages: madvise
 Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-9QD0t0/gcc-9-9.4.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix -host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
 Disk Notes: MQ-DEADLINE / relatime,rw / Block Size: 512

Processor Notes: Scaling Governor: intel_cpfufreq performance - CPU Microcode: 0x28 - ThermalD 1.9.1

Security Notes: gather_data_sampling: Not affected + itlb_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + mmio_stale_data: Unknown: No mitigations + rebleed: Not affected + spec_rstack_overflow: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Retpolines IBPB: conditional IBRS_FW STIBP: disabled RSB filling PBRSB-eIBRS: Not affected + srbd: Mitigation of Microcode + tsx_async_abort: Not affected

ext4+lvmcache tentative

Processor: Intel Core i5-4460 @ 3.40GHz (4 Cores), Motherboard: Mouse Z97-S01 v1.0 (V2.0B5 BIOS), Chipset: Intel 4th Gen Core DRAM, Memory: 2 x 8192 MB DDR3-1600MT/s, Disk: 2 x 1000GB TOSHIBA DT01ACA1 + 500GB SAMSUNG HD501LJ + 120GB Western Digital WDS120G1G0A-, Graphics: MSI Intel Xeon E3-1200 v3/4th Gen Core IGP (1100MHz), Audio: Intel Xeon E3-1200 v3/4th, Network: 4 x Intel 10-Gigabit X540-AT2 + Realtek RTL8111/8168/8411

OS: Ubuntu 20.04, Kernel: 6.7.3 (x86_64), Desktop: GNOME Shell 3.36.9, Display Server: X Server 1.20.13, Vulkan: 1.2.182, Compiler: GCC 9.4.0, File-System: ext4

Kernel Notes: Transparent Huge Pages: madvise
 Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-9QD0t0/gcc-9-9.4.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix -host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
 Disk Notes: MQ-DEADLINE / relatime,rw / Block Size: 4096

Processor Notes: Scaling Governor: intel_cpfufreq performance - CPU Microcode: 0x28 - ThermalD 1.9.1

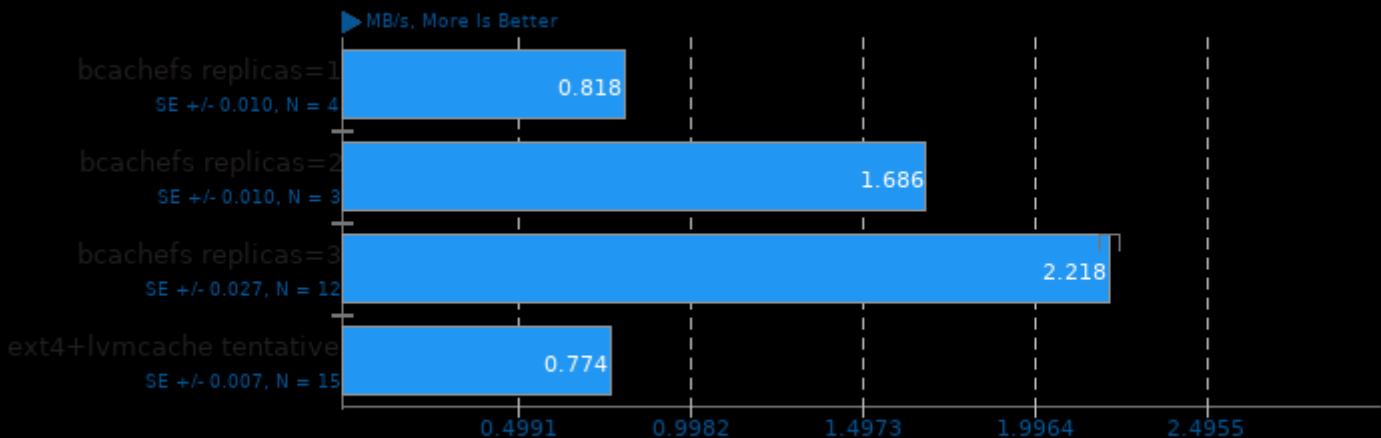
Security Notes: gather_data_sampling: Not affected + itlb_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + mmio_stale_data: Unknown: No mitigations + rebleed: Not affected + spec_rstack_overflow: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Retpolines IBPB: conditional IBRS_FW STIBP: disabled RSB filling PBRSB-eIBRS: Not affected + srbd: Mitigation of Microcode + tsx_async_abort: Not affected

bcacheFS replicas=3	bcacheFS replicas=2	bcacheFS replicas=1	ext4+lvmcache tentative
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Flexible IO Tester - Rand Read -	2.218	1.686	0.818	0.774
IO_uring - Yes - 4KB - 4 (MB/s)				
Normalized	100%	76.01%	36.88%	34.9%
Standard Deviation	4.2%	1.1%	2.3%	3.5%
Flexible IO Tester - Rand Read -	553	420	203	192
IO_uring - Yes - 4KB - 4 (IOPS)				
Normalized	100%	75.95%	36.71%	34.72%
Standard Deviation	4.2%	1%	2.4%	3.5%
Flexible IO Tester - Rand Write -	7.361	10.292	47.8	0.437
IO_uring - Yes - 4KB - 4 (MB/s)				
Normalized	15.4%	21.53%	100%	0.91%
Standard Deviation	8.1%	4.9%	1%	2.5%
Flexible IO Tester - Rand Write -	1839	2617	12233	108
IO_uring - Yes - 4KB - 4 (IOPS)				
Normalized	15.03%	21.39%	100%	0.88%
Standard Deviation	8.1%	5.5%	1.2%	2.4%
Flexible IO Tester - Seq Read -	5.957	7.319	7.195	33.8
IO_uring - Yes - 4KB - 4 (MB/s)				
Normalized	17.62%	21.65%	21.29%	100%
Standard Deviation	1.8%	3%	2.5%	3.6%
Flexible IO Tester - Seq Read -	1488	1828	1797	8637
IO_uring - Yes - 4KB - 4 (IOPS)				
Normalized	17.23%	21.16%	20.81%	100%
Standard Deviation	1.8%	3%	2.5%	3.6%
Flexible IO Tester - Seq Write -	7.271	9.813	65.3	36.7
IO_uring - Yes - 4KB - 4 (MB/s)				
Normalized	11.13%	15.03%	100%	56.2%
Standard Deviation	7.8%	1.5%	1.4%	0.2%
Flexible IO Tester - Seq Write -	1816	2452	16700	9382
IO_uring - Yes - 4KB - 4 (IOPS)				
Normalized	10.87%	14.68%	100%	56.18%
Standard Deviation	7.8%	1.5%	1.6%	0.1%

Flexible IO Tester 3.36

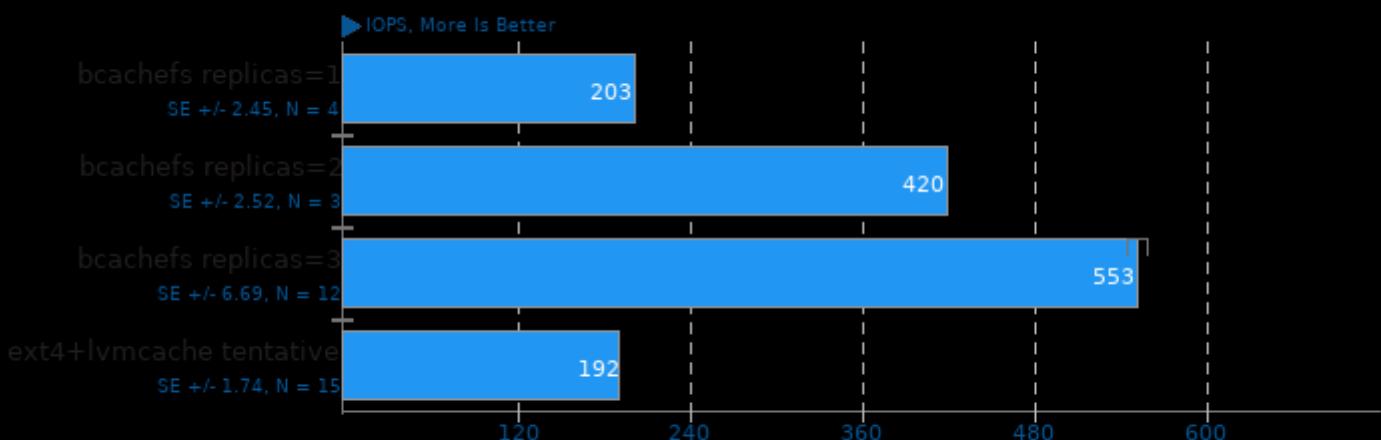
Type: Random Read - Engine: IO_uring - Direct: Yes - Block Size: 4KB - Job Count: 4 - Disk Target: Default Test Directory



1. (CC) gcc options: -rdynamic -fPIE -fnuma -fPIRT -fPIZ -fPIthread -fPIm -fPIaio -fPIDL -fstd=gnu99 -ffast-math -finclude -O3 -fcommon -fno-march=native

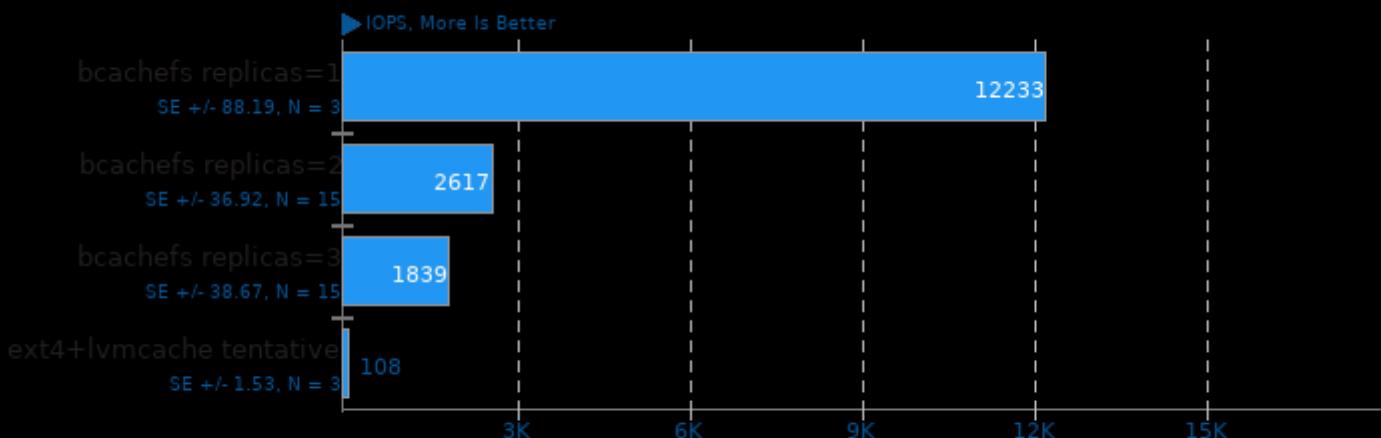
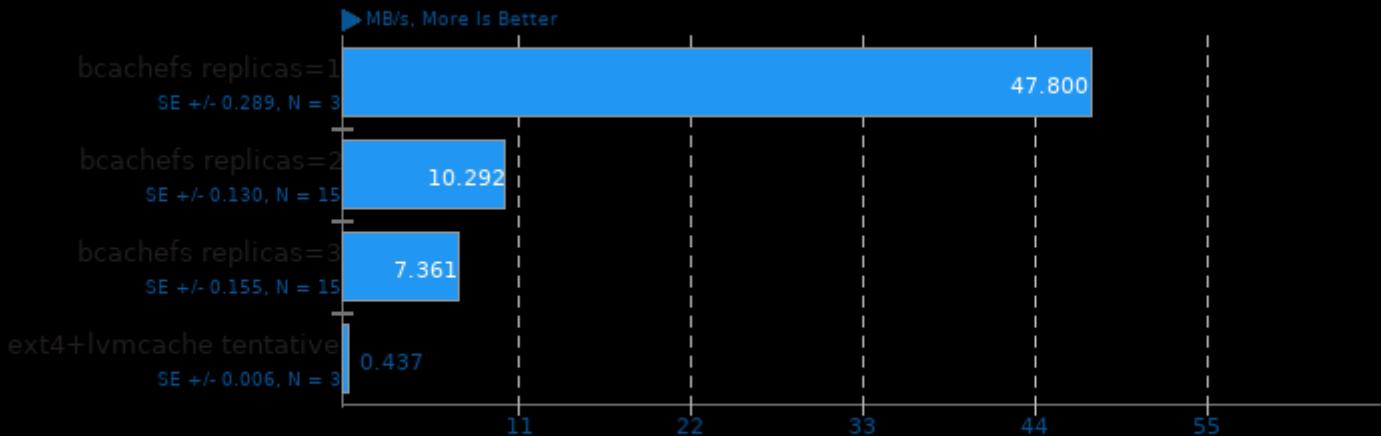
Flexible IO Tester 3.36

Type: Random Read - Engine: IO_uring - Direct: Yes - Block Size: 4KB - Job Count: 4 - Disk Target: Default Test Directory

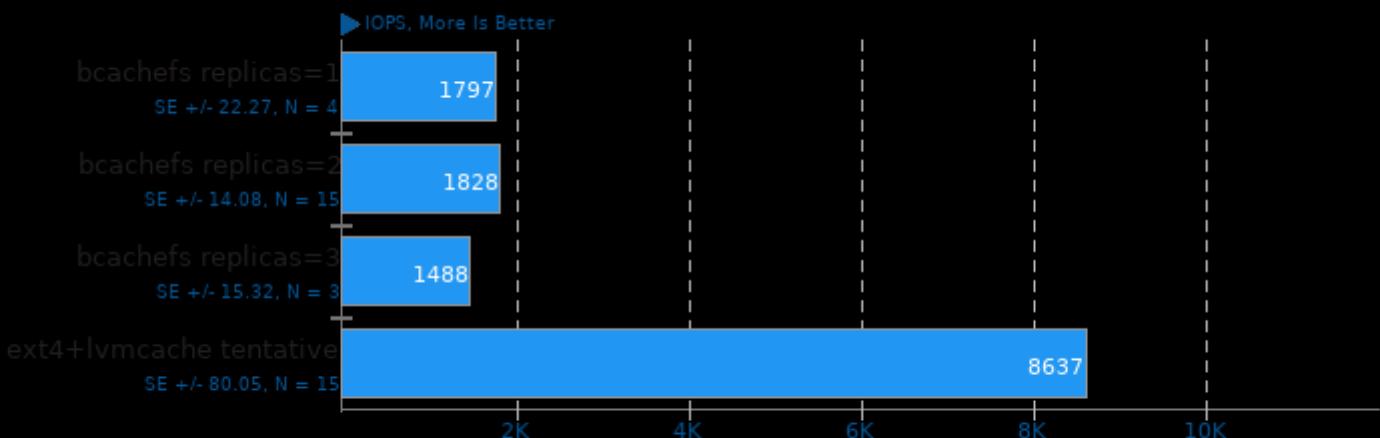
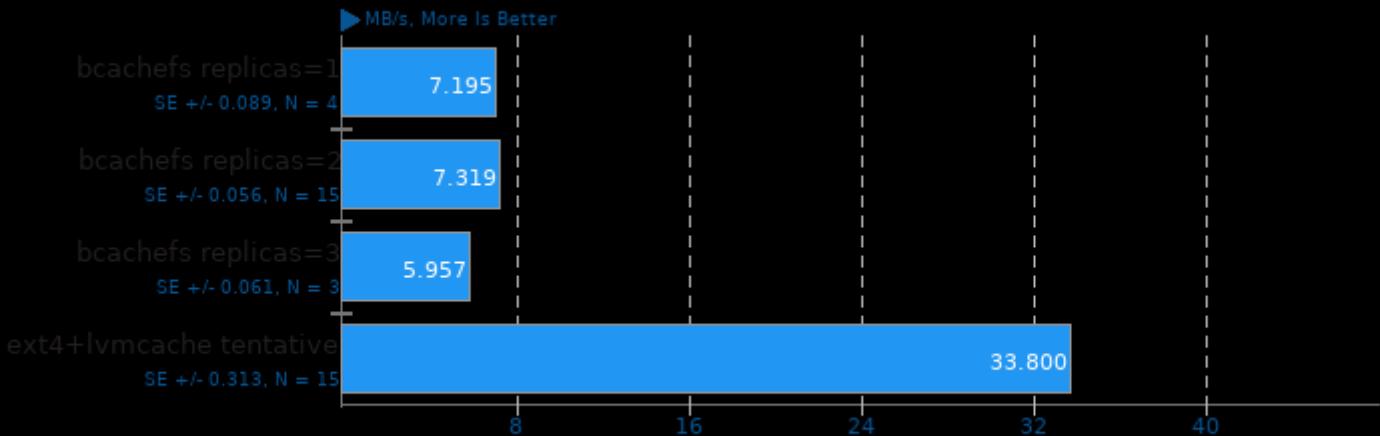


1. (CC) gcc options: -rdynamic -fPIE -fnuma -fPIRT -fPIZ -fPIthread -fPIm -fPIaio -fPIDL -fstd=gnu99 -ffast-math -finclude -O3 -fcommon -fno-march=native

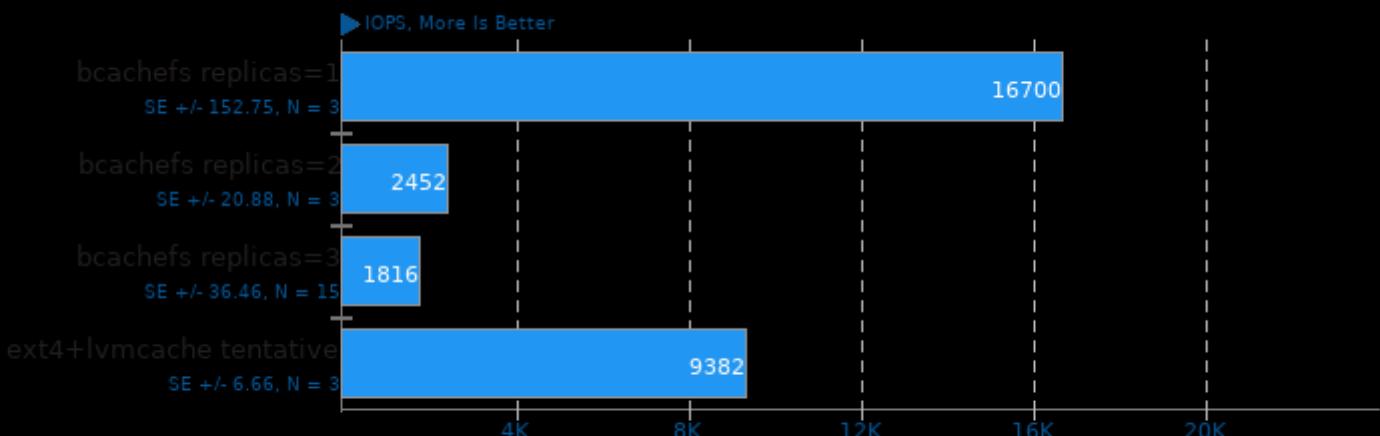
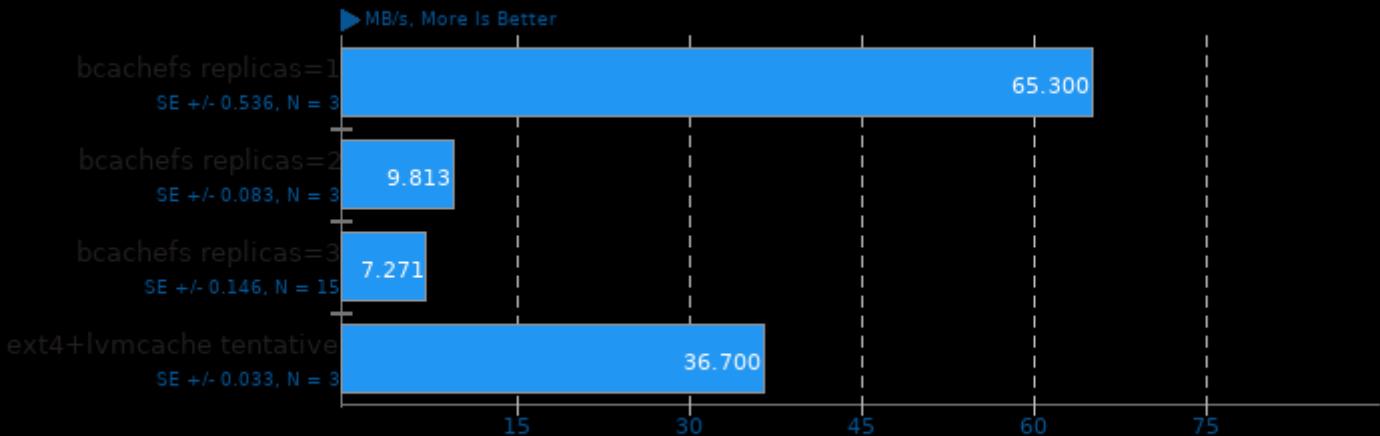
Flexible IO Tester 3.36



Flexible IO Tester 3.36



Flexible IO Tester 3.36



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