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2.6.39 Disk

Running pts/apache-1.3.0, pts/pgbench-1.2.0, pts/postmark-1.0.0, pts/sqlite-1.8.0, pts/dbench-1.0.0, pts/fio-1.1.0, pts/fs-mark-1.0.0, pts/tiobench-1.1.0, pts/iozone-1.7.0 via the Phoronix Test Suite.

Automated Executive Summary

XFS: Linux 2.6.37 had the most wins, coming in first place for 18% of the tests.

Based on the geometric mean of all complete results, the fastest (Btrfs: Linux 2.6.39) was 1.861x the speed of the slowest (XFS: Linux 2.6.38). EXT4: Linux 2.6.38 was 0.998x the speed of EXT4: Linux 2.6.37, EXT4: Linux 2.6.39 was 1.021x the speed of EXT4: Linux 2.6.38, Btrfs: Linux 2.6.37 was 1.25x the speed of EXT4: Linux 2.6.39, Btrfs: Linux 2.6.38 was 1.049x the speed of Btrfs: Linux 2.6.37, Btrfs: Linux 2.6.39 was 1.003x the speed of Btrfs: Linux 2.6.38, XFS: Linux 2.6.37 was 0.539x the speed of Btrfs: Linux 2.6.39, XFS: Linux 2.6.38 was 0.997x the speed of XFS: Linux 2.6.37, XFS: Linux 2.6.39 was 1.339x the speed of XFS: Linux 2.6.38.

Test Systems:

EXT4: Linux 2.6.37

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

OS: Ubuntu 11.04, Kernel: 2.6.37-020637-generic (x86_64), Desktop: GNOME 2.32.1, Display Server: X Server 1.10.1, Display Driver: nouveau 0.0.16, Compiler: GCC 4.5.2, File-System: ext4, Screen Resolution: 1680x1050

System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

EXT4: Linux 2.6.38

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

OS: Ubuntu 11.04, Kernel: 2.6.38-020638-generic (x86_64), Desktop: GNOME 2.32.1, Display Server: X Server 1.10.1, Display Driver: nouveau 0.0.16, Compiler: GCC 4.5.2, File-System: ext4, Screen Resolution: 1680x1050

System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

EXT4: Linux 2.6.39

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

OS: Ubuntu 11.04, Kernel: 2.6.39-999-generic (x86_64), Desktop: GNOME 2.32.1, Display Server: X Server 1.10.1, Display Driver: nouveau 0.0.16, Compiler: GCC 4.5.2, File-System: ext4, Screen Resolution: 1680x1050

System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

Btrfs: Linux 2.6.37

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

OS: Ubuntu 11.04, Kernel: 2.6.37-020637-generic (x86_64), Desktop: GNOME 2.32.1, Display Server: X Server 1.10.1, Display Driver: nouveau 0.0.16, Compiler: GCC 4.5.2, File-System: btrfs, Screen Resolution: 1680x1050

System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

Btrfs: Linux 2.6.38

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

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System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

Btrfs: Linux 2.6.39

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System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

XFS: Linux 2.6.37

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

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System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

XFS: Linux 2.6.38

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

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System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

XFS: Linux 2.6.39

Processor: Intel Core 2 Duo T9300 @ 2.50GHz (2 Cores), Motherboard: LENOVO 6459CTO, Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M-E, Memory: 4096MB, Disk: 100GB Hitachi HTS72201, Graphics: NVIDIA Quadro NVS 140M (400/600MHz), Audio: Analog Devices AD1984

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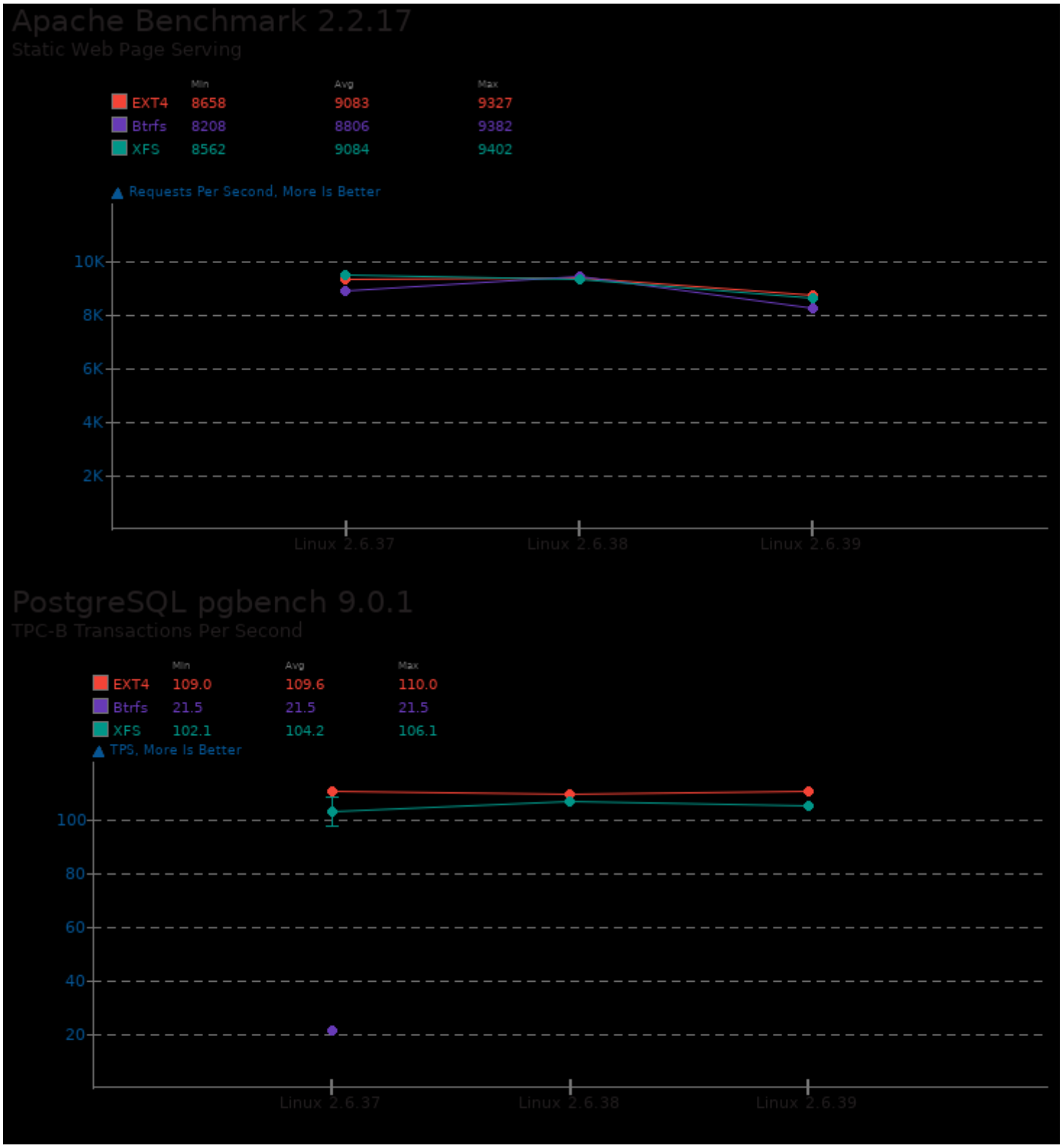
System Notes: Disk Scheduler: CFQ. Intel SpeedStep was enabled.

Phoronix Test Suite

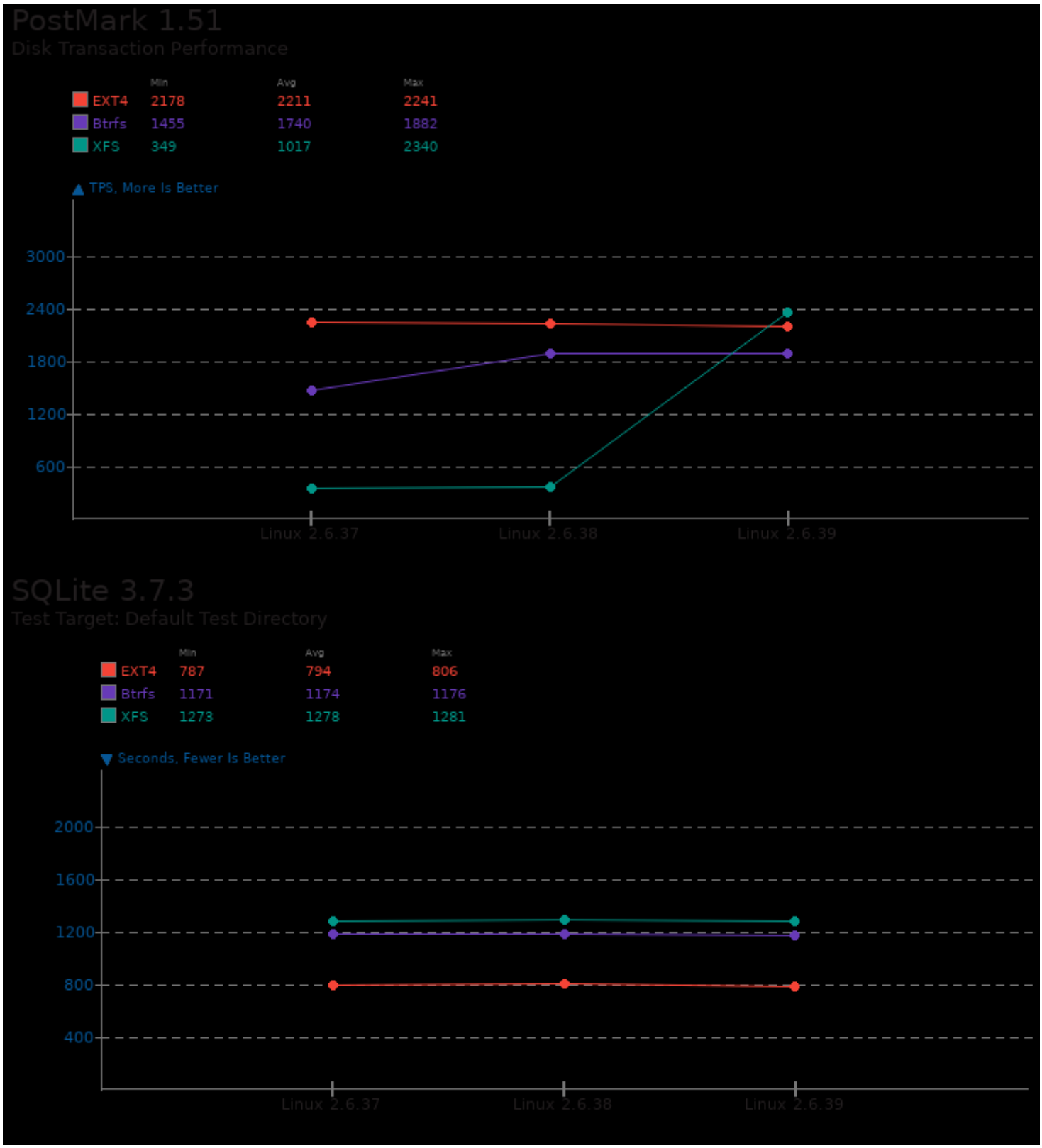
2.6.39 Disk

	EXT4: Linux 2.6.37	EXT4: Linux 2.6.38	EXT4: Linux 2.6.39	Btrfs: Linux 2.6.37	Btrfs: Linux 2.6.38	Btrfs: Linux 2.6.39	XFS: Linux 2.6.37	XFS: Linux 2.6.38	XFS: Linux 2.6.39
Apache Benchmark - S.W.P.S (Reqs/sec)	9263	9327	8658	8827	9382	**8208**	**9402**	9286	8562
Normalized	98.52%	99.2%	92.09%	93.88%	99.78%	87.3%	100%	98.77%	91.07%
Standard Deviation	0.6%	0.8%	0.6%	0.3%	1%	1.4%	0.9%	1.8%	1.7%
PostgreSQL pgbench - T.B.T.P.S	**109.95**	109.01	109.92	**21.49**			102.11	106.06	104.40
Normalized	100%	99.15%	99.97%	19.55%			92.87%	96.46%	94.95%
Standard Deviation	0.4%	1.2%	0.1%				12.2%	0.2%	2.5%
PostMark - D.T.P (TPS)	2241	2215	2178	1455	1882	1882	**349**	362	**2340**
Normalized	95.77%	94.66%	93.08%	62.18%	80.43%	80.43%	14.91%	15.47%	100%
Standard Deviation	3.4%	4.1%	4.6%	3.7%	3.5%	3.5%	0.8%	0%	4.7%
SQLite - D.T.D (sec)	789.28	805.78	**787.43**	1175	1176	1171	1273	**1281**	1280
Normalized	99.77%	97.72%	100%	67.03%	66.95%	67.26%	61.84%	61.45%	61.54%
Standard Deviation	0.8%	0.8%	1.3%	0.4%	0.8%	0.6%	0.8%	0.2%	0.1%
Dbench - 12 (MB/s)	54.85	55.36	54.32	51.42	63.15	**65.08**	**24.71**	25.49	30.39
Normalized	84.28%	85.06%	83.47%	79.01%	97.03%	100%	37.97%	39.17%	46.7%
Standard Deviation	1.4%	0.4%	1.5%	1%	1.1%	0.8%	1.1%	0.7%	0.7%
Flexible IO Tester - I.I.F.S.A.P (sec (Run Time))	**99.42**	99.30	99.02	81.28	82.69	82.36	**78.98**	79.27	79.39
Normalized	79.44%	79.54%	79.76%	97.17%	95.51%	95.9%	100%	99.63%	99.48%
Standard Deviation	8.9%	8.6%	10.5%	1.2%	0.9%	2.6%	0.4%	0.2%	0.3%
FS-Mark - 1.F.1.S (Files/s)	17.57	17.67	17.70	17	**16.87**	17.23	21.30	**21.43**	21.37
Normalized	81.99%	82.45%	82.59%	79.33%	78.72%	80.4%	99.39%	100%	99.72%
Standard Deviation	0.7%	0.3%	0%	0%	0.3%	0.3%	0.5%	0.3%	0.3%
FS-Mark - 1.F.1.S.N.S.F	67.47	67.03	67.97	86.47	**87.83**	85.77	**41.80**	43.35	80.37
Normalized	76.82%	76.32%	77.39%	98.45%	100%	97.65%	47.59%	49.36%	91.51%
Standard Deviation	0.7%	0.3%	0.4%	1.2%	0.2%	3.2%	3.1%	4.2%	1.9%
Threaded I/O Tester - Rand Write - 128MB - 8 (MB/s)	1.96	1.95	1.96	28.88	28.21	**29.61**	1.75	1.72	**1.71**
Normalized	6.62%	6.59%	6.62%	97.53%	95.27%	100%	5.91%	5.81%	5.78%
Standard Deviation	1%	1%	1.1%	15.7%	21%	15%	0.8%	0.2%	1.1%
IOzone - 64Kb - 8GB - Write Performance (MB/s)	50.87	50.88	50.64	**60.35**	59.76	60.27	52.20	**49.38**	50.33
Normalized	84.29%	84.31%	83.91%	100%	99.02%	99.87%	86.5%	81.82%	83.4%
Standard Deviation	11.8%	11.8%	11.9%	0.3%	0.3%	0.3%	2.9%	5.6%	4.3%
IOzone - 64Kb - 8GB - Read Performance (MB/s)	51.73	51.67	67.92	55.78	55.45	59.59	51.61	**49.29**	**68.54**
Normalized	75.47%	75.39%	99.1%	81.38%	80.9%	86.94%	75.3%	71.91%	100%
Standard Deviation	8.6%	8.5%	5.9%	0%	0.2%	0.8%	0.7%	0.1%	3.2%

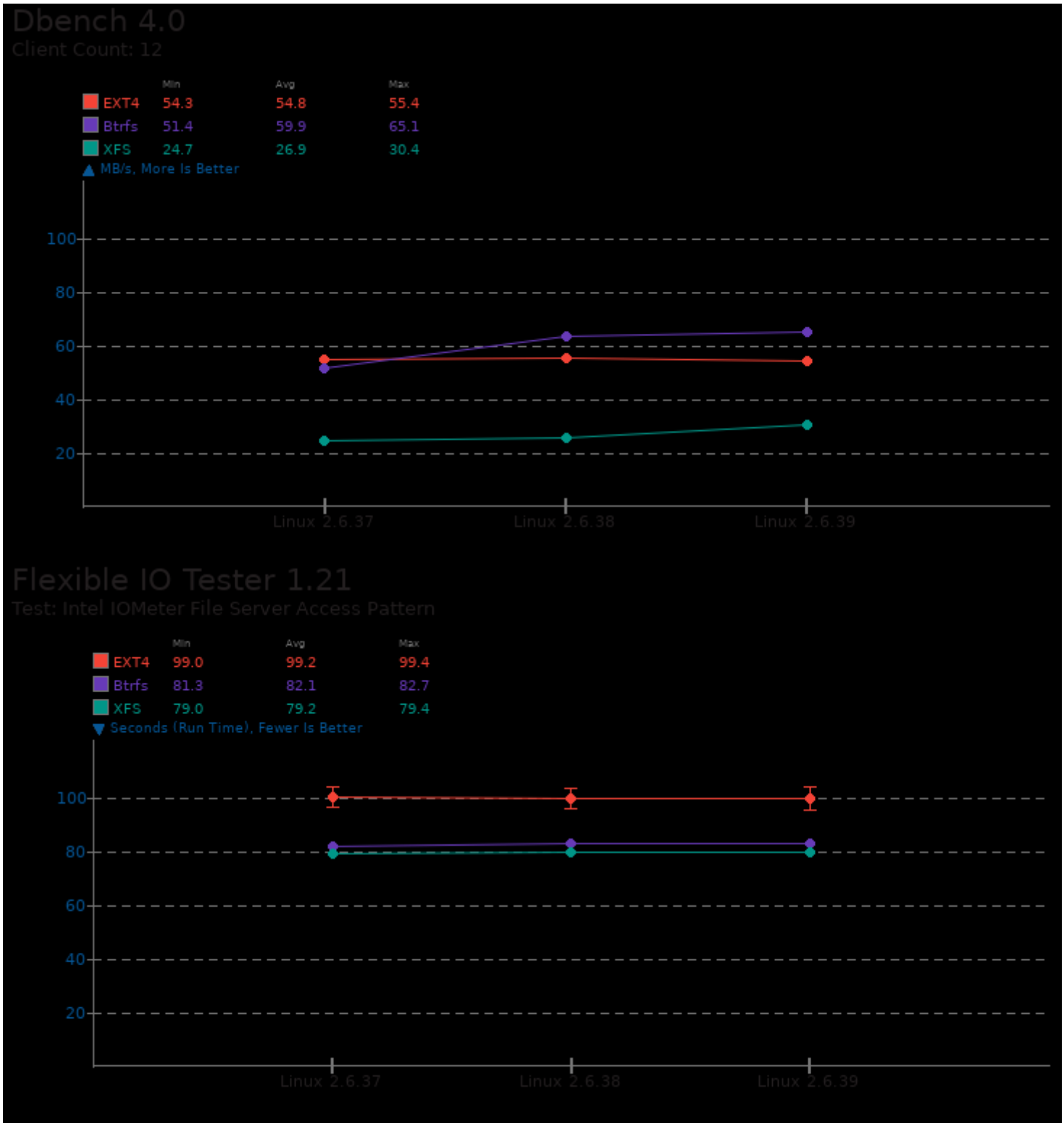
2.6.39 Disk


Apache Benchmark 2.2.17
Static Web Page Serving
Min
Avg
Max
EXT4 8658 9083 9327
Btrfs 8208 8806 9382
XFS 8562 9084 9402
Requests Per Second, More Is Better
10K
8K
6K
4K
2K
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39
PostgreSQL pgbench 9.0.1
TPC-B Transactions Per Second
Min
Avg
Max
EXT4 109.0 109.6 110.0
Btrfs 21.5 21.5 21.5
XFS 102.1 104.2 106.1
TPS, More Is Better
100
80
60
40
20
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39

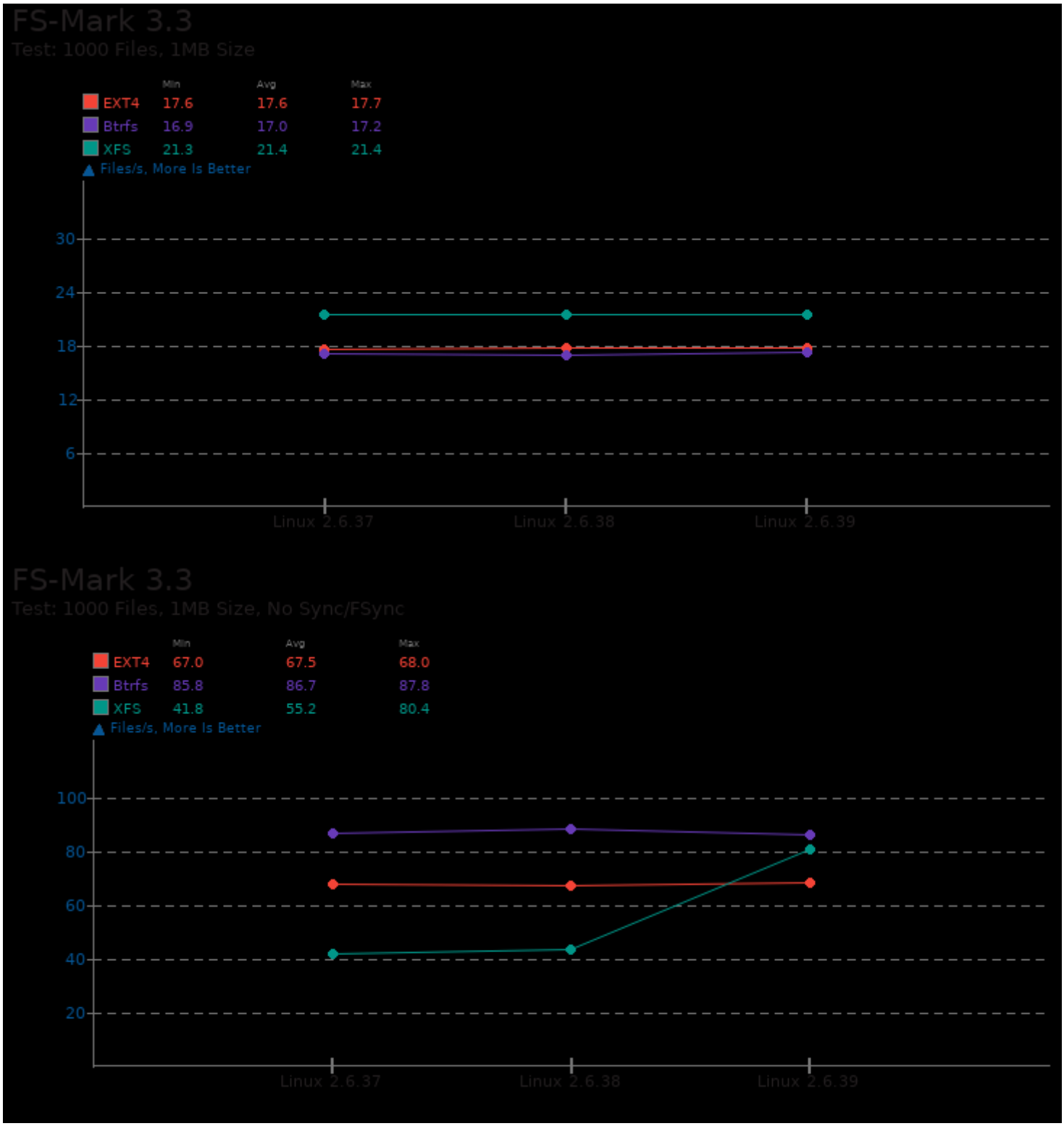
2.6.39 Disk


PostMark 1.51
Disk Transaction Performance
Min
Avg
Max
EXT4 2178 2211 2241
Btrfs 1455 1740 1882
XFS 349 1017 2340
TPS, More Is Better
3000
2400
1800
1200
600
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39
SQLite 3.7.3
Test Target: Default Test Directory
Min
Avg
Max
EXT4 787 794 806
Btrfs 1171 1174 1176
XFS 1273 1278 1281
Seconds, Fewer Is Better
2000
1600
1200
800
400
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39

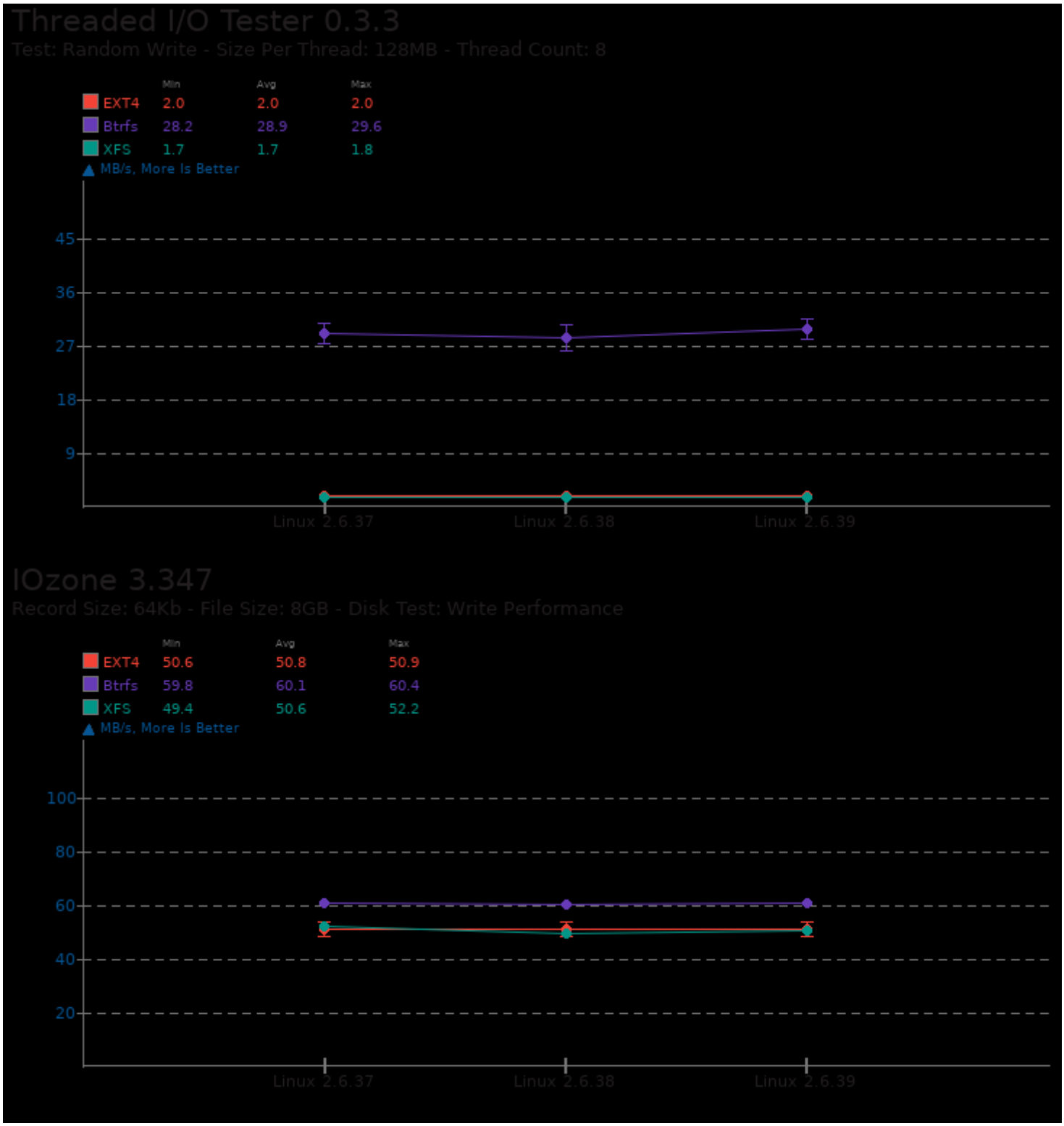
2.6.39 Disk


Dbench 4.0
Client Count: 12
Min
Avg
Max
EXT4 54.3 54.8 55.4
Btrfs 51.4 59.9 65.1
XFS 24.7 26.9 30.4
MB/s, More Is Better
100
80
60
40
20
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39
Flexible IO Tester 1.21
Test: Intel IOMeter File Server Access Pattern
Min
Avg
Max
EXT4 99.0 99.2 99.4
Btrfs 81.3 82.1 82.7
XFS 79.0 79.2 79.4
Seconds (Run Time), Fewer Is Better
100
80
60
40
20
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39

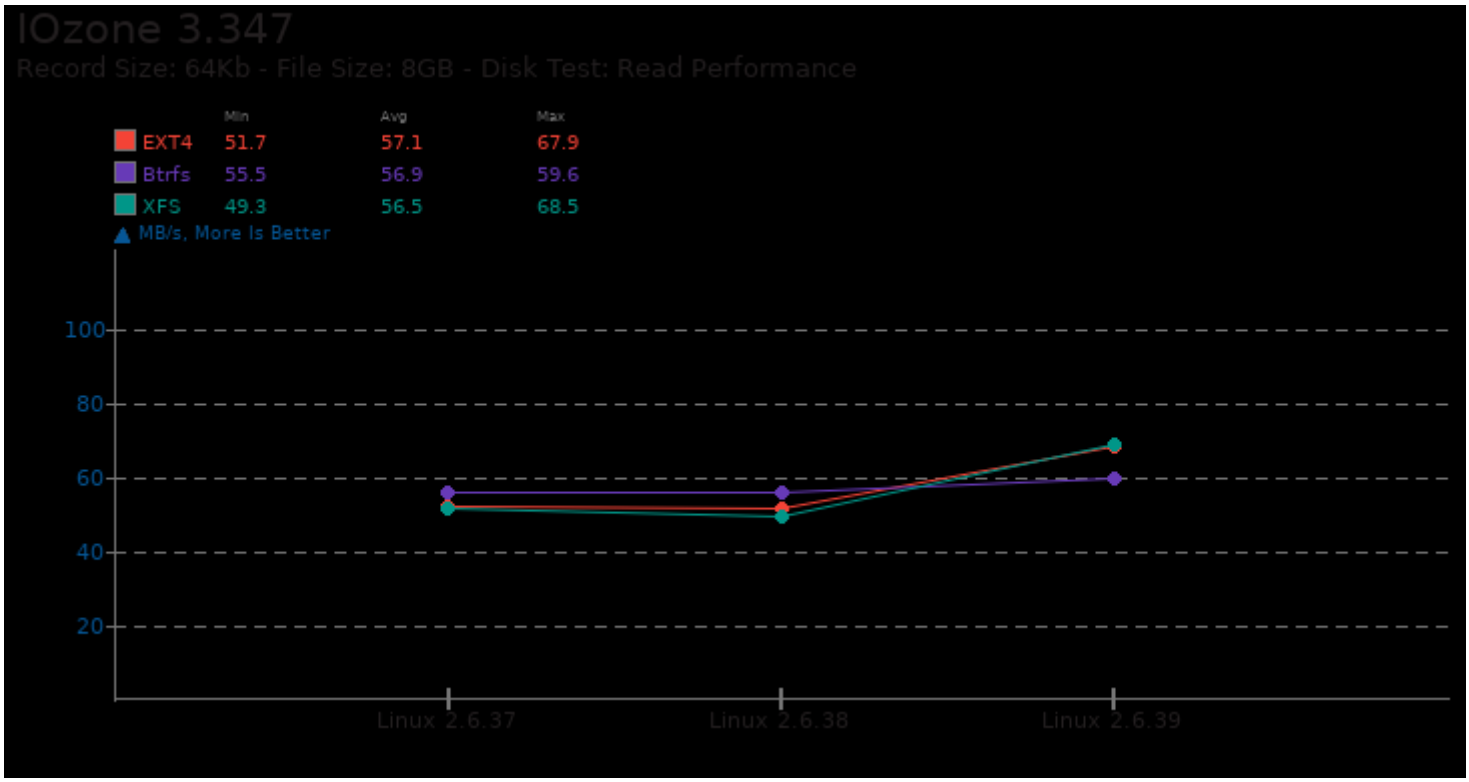
2.6.39 Disk


FS-Mark 3.3
Test: 1000 Files, 1MB Size
Min
Avg
Max
EXT4 17.6 17.6 17.7
Btrfs 16.9 17.0 17.2
XFS 21.3 21.4 21.4
Files/s, More Is Better
30
24
18
12
6
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39
FS-Mark 3.3
Test: 1000 Files, 1MB Size, No Sync/FSync
Min
Avg
Max
EXT4 67.0 67.5 68.0
Btrfs 85.8 86.7 87.8
XFS 41.8 55.2 80.4
Files/s, More Is Better
100
80
60
40
20
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39

2.6.39 Disk


Threaded I/O Tester 0.3.3
Test: Random Write - Size Per Thread: 128MB - Thread Count: 8
Min
Avg
Max
EXT4 2.0 2.0 2.0
Btrfs 28.2 28.9 29.6
XFS 1.7 1.7 1.8
MB/s, More Is Better
45
36
27
18
9
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39
IOzone 3.347
Record Size: 64Kb - File Size: 8GB - Disk Test: Write Performance
Min
Avg
Max
EXT4 50.6 50.8 50.9
Btrfs 59.8 60.1 60.4
XFS 49.4 50.6 52.2
MB/s, More Is Better
100
80
60
40
20
Linux 2.6.37
Linux 2.6.38
Linux 2.6.39

2.6.39 Disk



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