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We return now to another block storage benchmark, Storage Performance Council (SPC) results*. There have been four new SPC-1 submissions since our last report, two from IBM DS3524 Express Turbo (one at 13.4TB and the other at 6.7TB), one from Huawei Symantec OceanSpace™ S8100 8-node, and one from SGI InfiniteStorage 5000-SP. Also there were three new SPC-2 submissions this past quarter, all from IBM, one each for the IBM DS8800, IBM DS3524 Express Turbo and IBM StorWize® V7000 storage systems.

SPC-1*results

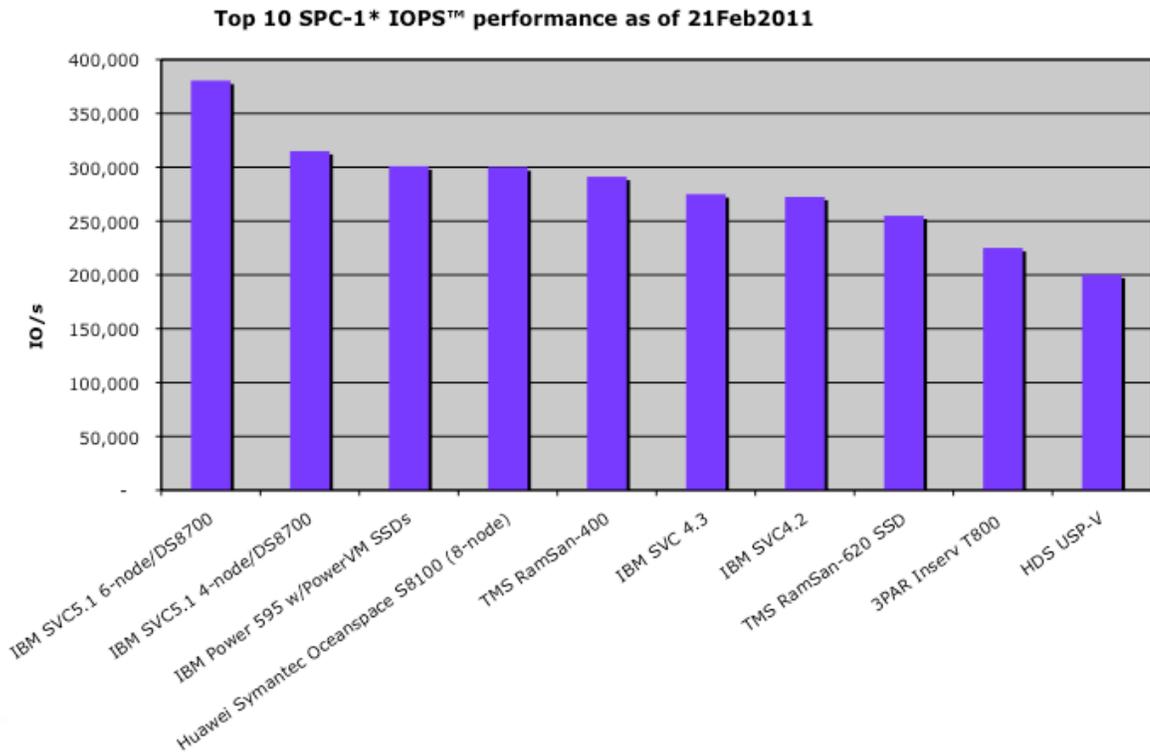We start our discussion with the top 10 IO/sec, or as SPC calls it IOPS™

Figure 1 Top 10 SPC-1* IOPS

Higher is better on the IOPS chart. The only new submission here is the new Huawei Symantec OceanSpace S8100 8-node system that came in at #4 with just over 300K IO/sec using 16-8GFC links, 128GB of cache across the 8-node system and 1152 FC disk drives (628@600GB, 330@450GB and 194@300GB!?). IBM SVC storage continues to dominate this chart coming in at the top two slots with over 380K and 315K IO/sec respectively. The other three new submissions this quarter were mostly mid-range system and didn't exceed 25K IO/sec.

Next let's turn to storage price performance and $/IOPS.

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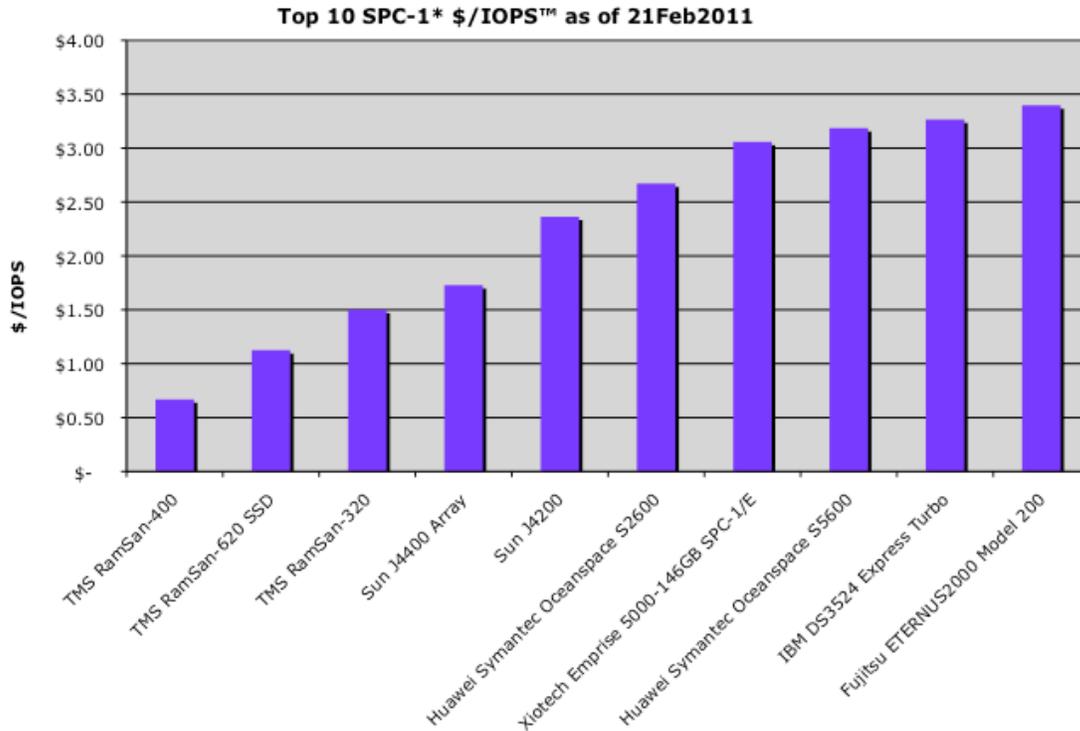
Top 10 SPC-1* $/IOPS™ as of 21Feb2011

Figure 2 Top $/IOPS results

Lower is better on the $/IOPS. The only new submission on this chart is the IBM DS3524 Express Turbo (6.7TB) that came in at #9 with $3.26/IOPS using 4-Gb/s SAS connecitions, 4GB of cache, and RAID1 protection for 48-300GB 10Krpm SAS disk drives. TMS storage continues to dominate this chart with the top 3 slots at $0.67, $1.13 and $1.50 respectively. Recall that the two SUN systems (#4&5) had no RAID protection, which would provide a significant cost advantage over the other, mostly RAID1 subsystems, but seriously increases risk of data loss.
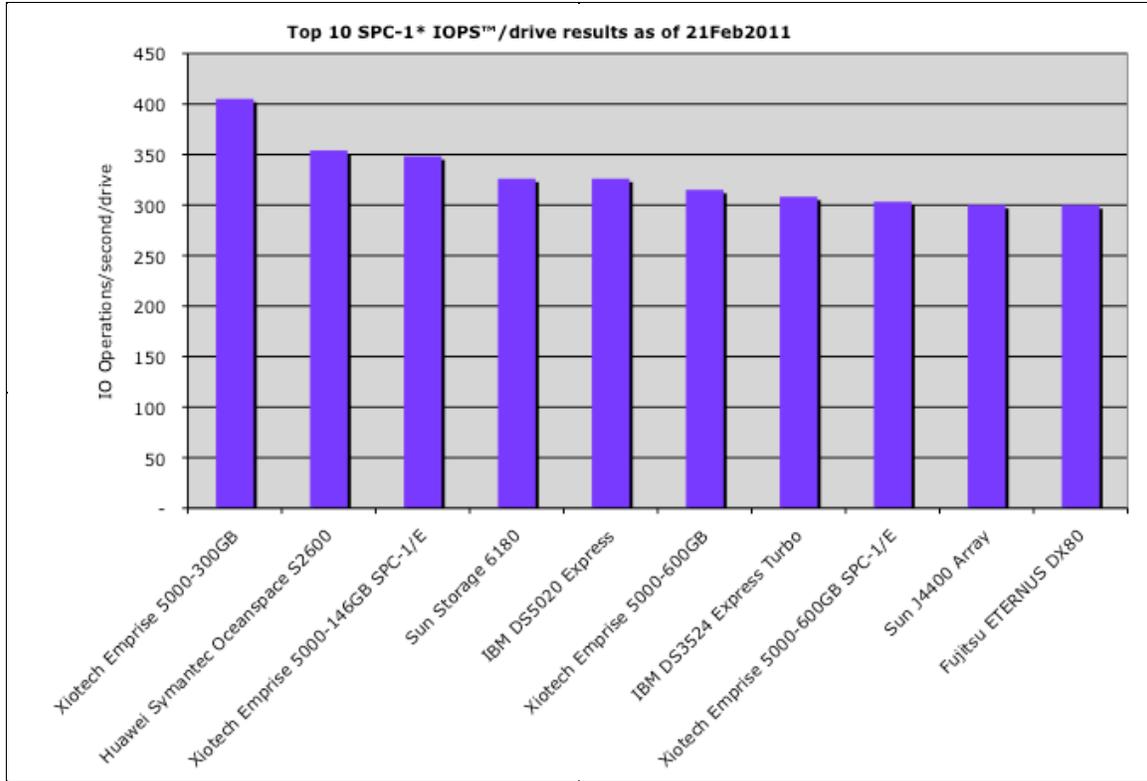
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Figure 3 Top IOPS/drive spindle

Higher is better on IOPS/drive chart. Once again, the new entry here is the IBM DS3524 Express Turbo (6.7TB) that came in at #8 with over 308 IOPS/drive spindle. Recall that this chart excludes subsystems using any amount of SSDs and as of this report, also eliminates any subsystem that uses NAND for cache. Similar to the $/IOPS results above, the Sun J4400 subsystem had no RAID protection and enjoys an IOPS/drive advantage because of this.

SPC-2 Results

We have not seen much activity in SPC-2 submissions of late and was beginning to think no one cared about sequential performance. Thankfully, IBM has seen the light and released 3 new SPC-2 benchmarks for all their current enterprise class storage. Unclear why only a limited number of vendors participate in the SPC-2 submissions, mostly IBM and Oracle Sun submissions with a smattering from other vendors.
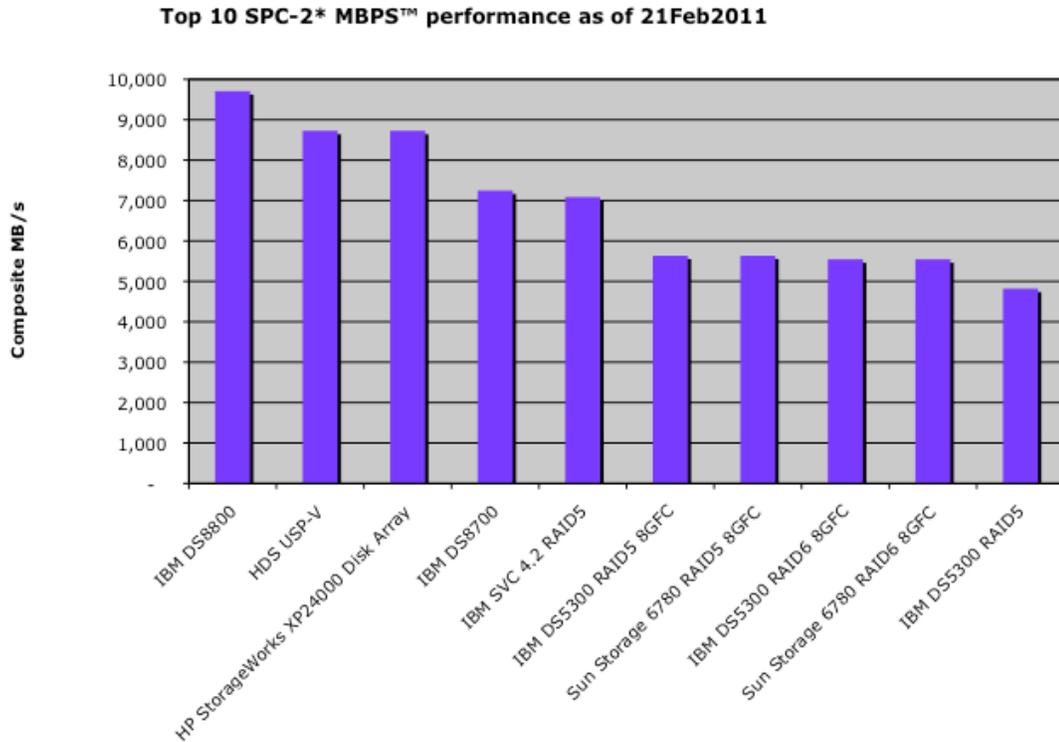
Top 10 SPC-2* MBPS™ performance as of 21Feb2011

Figure 4 SPC-2 MBS results

Higher is better on MBPS chart. As one no doubt remembers, the SPC-2 MBPS is a composite score that averages storage performance for large file processing, large database query, and video on demand sequential workloads. The new IBM DS8800 came in at #1 with over 9700 MBPS, using 16-8GFC links, with RAID5 protection over 768-146GB disk drives. Also recall that the HP XP24000 is an OEM version of HDS USP-V, so the #2 and #3 slots are essentially the same subsystem.
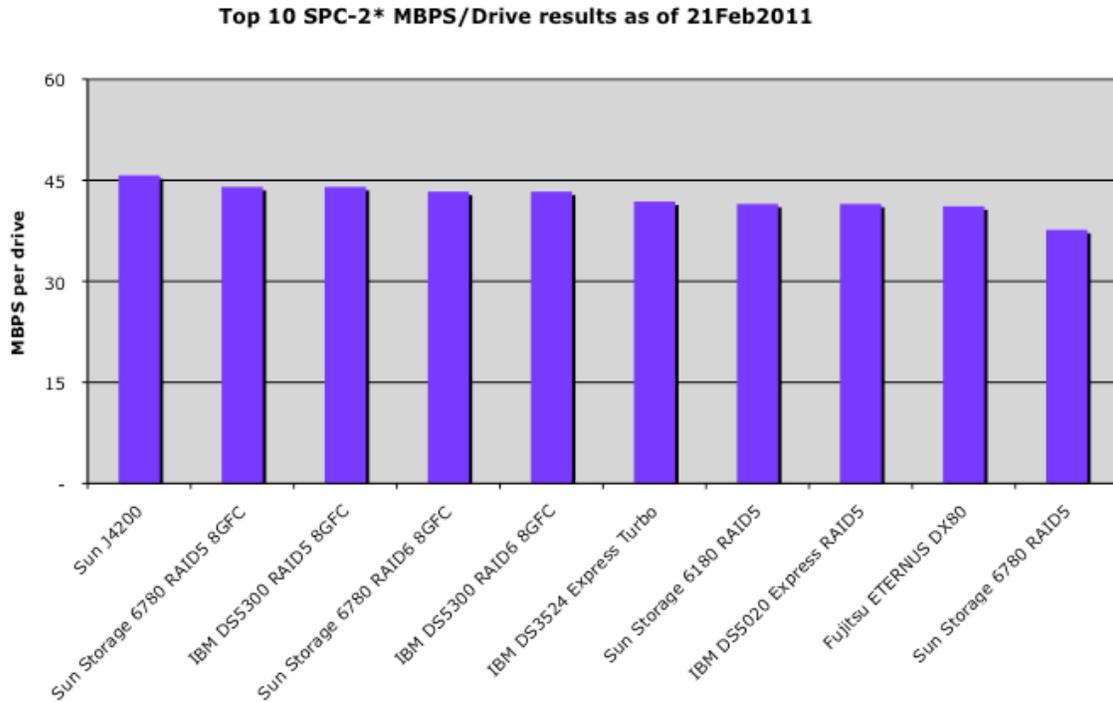
Top 10 SPC-2* MBPS/Drive results as of 21Feb2011

Figure 5 SPC2 MBPS/drive spindle

Higher is better on the MBPS/drive chart. This chart represents yet another way to view the overall MBPS performance but this time on a per spindle basis. The new IBM DS3524 Express Turbo broke in at #8 on this chart with 41.5 MBPS/drive using 4-6Gb/s SAS connections, 4GB of cache, and RAID 5 protection over 60-300GB 10Krpm SAS disk drives. Similar to the discussion on the SPC-1 IOPS/drive chart we eliminate subsystems using SSDs or NAND cache from this list. Recall that the Sun J4200 had no RAID protection and as such, enjoyed an MBPS/drive advantage.

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Significance

It's good to see the SPC-1 and SPC-2 recent submissions by IBM and others. Performance continues to be an important metric for block storage subsystems and random and sequential performance are complementary views of storage perfomance.

We are starting to see the emergence of high performing block storage subsystems based on a cluster of nodes (see Huawei 8- and 4-node SPC-1 results). This approach first emerged with 3PAR's storage system (now owned by HP). Of course the other prominent cluster based storage subsystem is EMC's VMAX but they do not submit SPC benchmark results.

We are still awaiting the latest HDS VSP benchmark results which hopefully, should take the block storage performance up another notch or two when published. Also NetApp's high-end storage with flash cache has yet to submit any SPC results.

As always, any suggestions on how to improve our performance analyses are welcomed. Additionally, if you are interested in more details, we now provide a fuller version of all these charts in SCI's SAN Storage Briefing which can be purchased separately from our website[1].

Silverton Consulting, Inc. is a Storage, Strategy & Systems consulting services company, based in the USA offering products and services to the data storage community

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[1] Available at http://silvertonconsulting.com/cms1/products/

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