SPC Performance

We once again return to the classic block storage benchmark, the latest Storage Performance Council (SPC) results*. Also we report on the new SPC-1C/E energy usage benchmark for the first time.

SPC-1* results

There have been only two new SPC-1 results this past quarter, one for IBM DS5300 with encryption and the other for IBM DS5020 Express. Neither of these made the top 10 in IOPS™, $/IOPS™ or IOPS™/$/GB so these charts can be found in prior dispatches#. However, one of these products did make the top 10 for LRT and both products made the top 10 for IOPS/drive (see below).

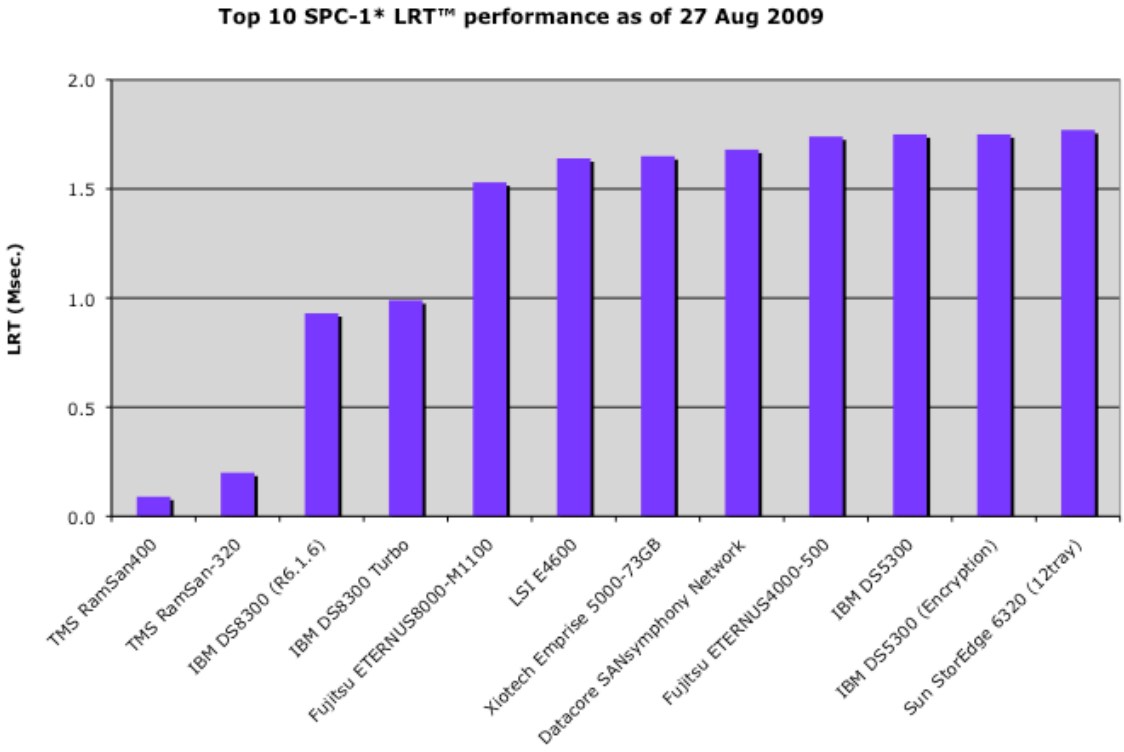

Figure 1 Top 10 SPC-1* LRT

Actually this shows the top 12 as there is currently a three-way tie for 10th place. Both the IBM DS5300 with and without full drive encryption (FDE) had the same LRT at 1.8msec. From my perspectiv,e the good news is, full drive encryption seems to have a negligible (un-measurable) affect on response time. Considering also that FDE has little to no impact on IOPS performance or cost, it should easily become widely adopted in this class of subsystems.

* All results from www.storageperformance.org as of 27 August 2009

Prior SPC performance dispatches can be found at http://www.silvertonconsulting.com/page2/page2d/storage_int_dispatch.html

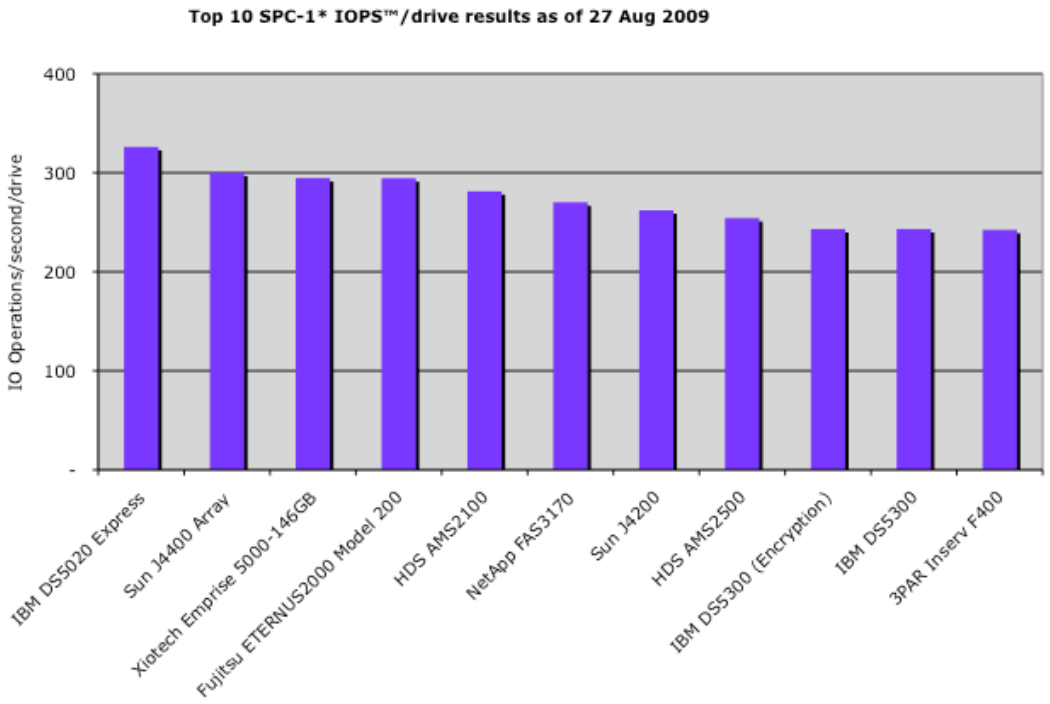

Figure 2 Top 10 IOPS/drive results

Actually this shows the top 11 as there is a tie for 9th place. The latest IBM DS5020 Express (channel ready product) managed to be the top subsystem here with an average IOPS per drive of 326. Also the DS5300 with encryption made it into the top 10 matching the performance of the DS5300 without encryption. As can be seen above, most products that do well here are midrange and not the high-end subsystems.

Recall that in our last report we now restrict this chart to only those subsystems using 140GB drives or larger. Also, this metric is for only those subsystems using rotating media.

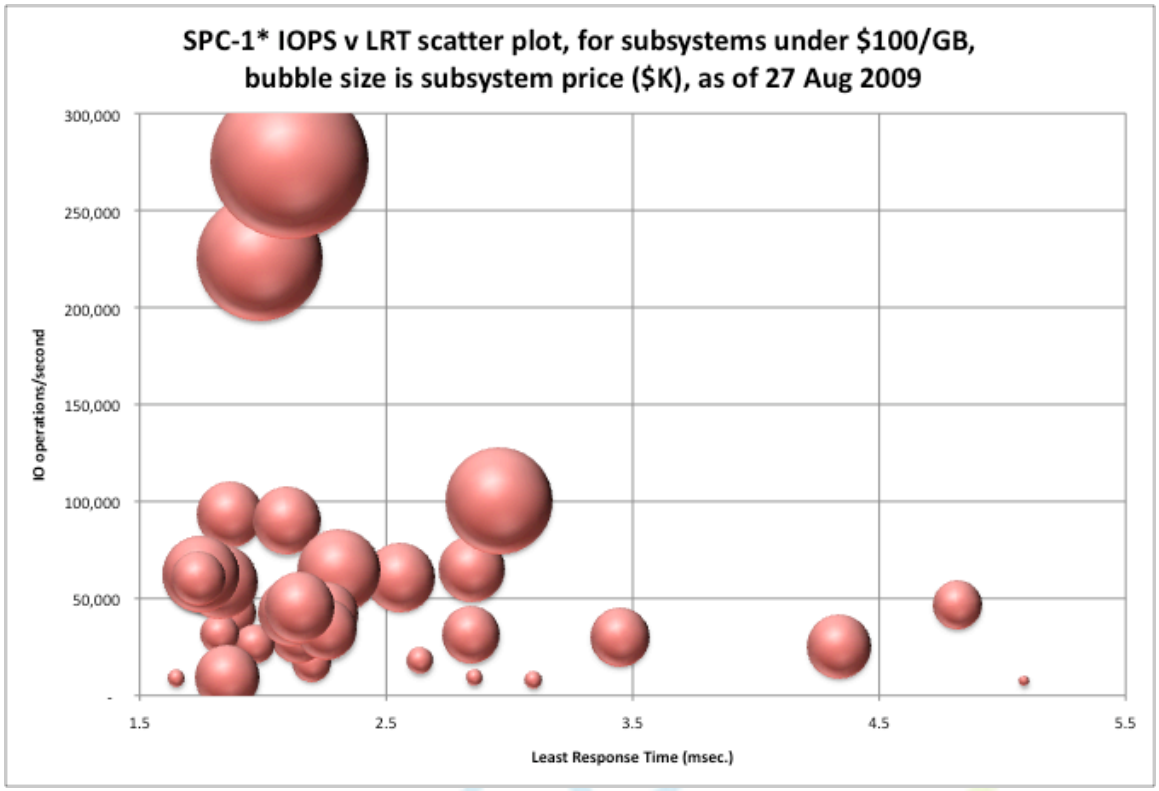

Figure 3 SPC-1 Bubble chart of IOPS against LRT, bubble size proportional to subsystem price

We return to the IOPs versus LRT bubble chart we have shown previously. The one thing always missing from a pure performance analysis is subsystem cost, added here as bubble size. To keep this interesting we capped the subsystems shown on the chart to a $100/GB maximum to eliminate the higher priced subsystems.

From an end-user perspective it's interesting to note that one can obtain a reasonably performing subsystem (~100K IOPS with LRT <2msec) for about 1/4th or less the price of truly high performance subsystem. Also, similarly priced or even more expensive subsystems can have much worse performance on an IOPS and/or a LRT basis indicating that price isn't always the best factor in subsystem selection.

SPC-1C/E

SPC has a new benchmark category that displays energy usage for storage subsystems. So far there have only been two results submitted, IBM System Storage EXP12S with SSDs and Seagate Savvio 10K.3 ST93000603S and show some interesting results. Both subsystems use a SAS interface with no RAID protection.

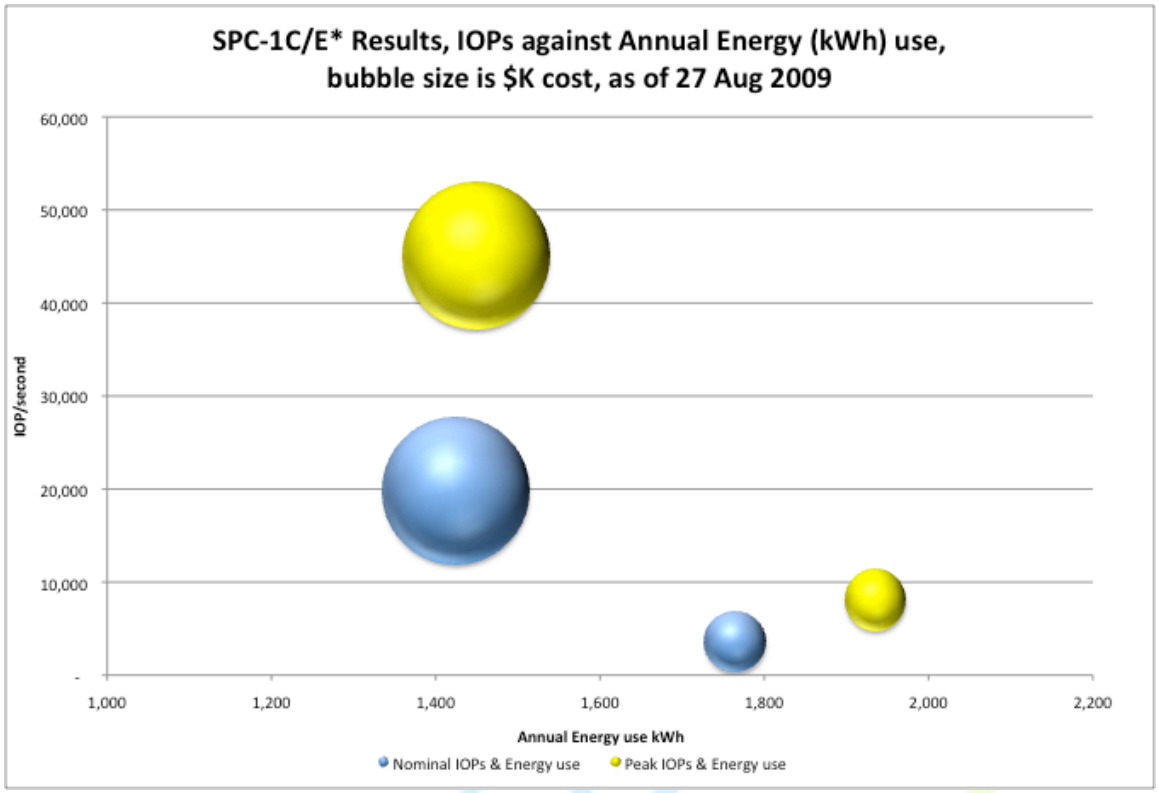

Figure 4 SPC-1C/E* Top Results

As can be inferred from the above the big bubbles are they IBM SSD system and the small bubbles are the Seagate Savvio 10Krpm drive system. The Blue bubbles show the nominal energy use and IOPS that are obtained from the two systems. Yellow bubbles show similar data at peak IOPS.

Nominal energy use is an aggregate workload constructed by SPC to show typical energy use and IOP/second obtainable from the subsystems. This data is summarized and reported directly off the SPC-1C/E report. Peak IOPs & Energy use took some hunting, but represents the max IOPS and the energy consumption at that IO rate.

I suppose it's no surprise that the rotating media would consume more power for higher IO operations per second. However, the difference in power consumption for the IBM's SSD subsystem at nominal versus peak IO rates, is almost negligible (less than 2%). We are not sure which is the more fair comparison so we have elected to show both here.

What is not shown here is at idle both subsystems have similar energy consumption. As such, rotating media has a much more slanted profile than SSD storage.

SPC-2, SPC-1C and SPC-2C results

There were no new SPC-2, SPC-1C and SPC-2C benchmarks released for this update and as such, can be found in prior reports.

Significance

Power use is starting to take on more importance. We should all applaud SPC for instituting a new energy use benchmark. As more results show up it will become a more interesting comparison but having SSDs vs a 10Krpm subsystem as starters is a great comparison.

The fact that drive encryption seems to have no impact on performance or subsystem cost seems counterintuitive. By all accounts, there should have been at least some cost differential and certainly some performance degradation. Once more my assumptions are overturned by reality. Drive encryption seems to be here and deserves more adoption if these results can hold up.

As always we welcome any feedback on how to do this better. So if you have any ideas please don't hesitate to contact us.

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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