My Sun Storage 7410 perf limits

09 Jan 2009

I originally posted this at http://blogs.sun.com/brendan/entry/my_sun_storage_7410_perf.

As part of my role in Fishworks, I push systems to their limits to investigate and solve bottlenecks. Limits can be useful to consider as a possible upper bound of performance, as it shows what the target can do. Finding and properly analyzing these limits is a useful exercise, as I can determine the kernel code or hardware that is the bottleneck, leading to product changes and better overall performance. I thought these results would make for some interesting blog posts if I could explain the setup, describe what the tests were, and include screenshots of these results in action. (Update: I've included results from colleagues who have tested in the same manner.)

To summarize the performance limits that I found for a single Sun Storage 7410 head node (our top performing ZFS storage appliance):

Workload	7410 (Barcelona)	7410 (Istanbul)
NFS streaming read from DRAM	~1.90 Gbytes/sec	~3.06 Gbytes/sec
NFS streaming read from disk	1.04 Gbytes/sec	2.03 Gbytes/sec
NFS streaming write to disk	563 Mbytes/sec	932 Mbytes/sec
NFS 1b read IOPS from DRAM	281,000 IOPS	506,000 IOPS
NFS 4k read IOPS from DRAM	191,000 IOPS	404,000 IOPS
NFS 512b reads from L2ARC	128 - 260 us	
NFS 512b sync writes to SLOG	137 - 181 us	
NFS IB/RDMA streaming read from DRAM	N/A	2.93 Gbytes/sec
NFS IB/RDMA streaming read from disk	N/A	2.11 Gbytes/sec
NFS IB/RDMA streaming write to disk	N/A	984 Mbytes/sec
CIFS streaming read from DRAM	~1.03 Gbytes/sec	
CIFS streaming read from disk	849 Mbytes/sec	
CIFS streaming write to disk	620 Mbytes/sec	
CIFS 1b read IOPS from DRAM	203,000 IOPS	

All tests are performed on Ethernet (usually 10 GbE) unless otherwise specified ("IB" == InfiniBand).

Like many products, the 7410 will undergo software and hardware updates over time. This page currently has results for:

- **7410 Barcelona:** The initial release, with four quad-core AMD Opteron CPUs (Barcelona), and the 2008.Q4 software.

- **7410 Istanbul:** The latest release, with four six-core AMD Opteron CPUs (Istanbul), and the 2009.Q3 software.

I should make clear that these are provided as possible upper bounds. These aren't what to expect for any given workload, unless your workload was similar to what I used for these tests. Click on the results to see details of the workloads used.

These are also the limits that were found with a given farm of clients and JBODs. It's possible the 7410 could go faster with more clients and more JBODs.

Updated 3-Mar-2009: added CIFS results.

Updated 22-Sep-2009: added column for 7410 Istanbul. Results will be added as they are collected.

Updated 12-Nov-2009: added Cindi's InfiniBand results.