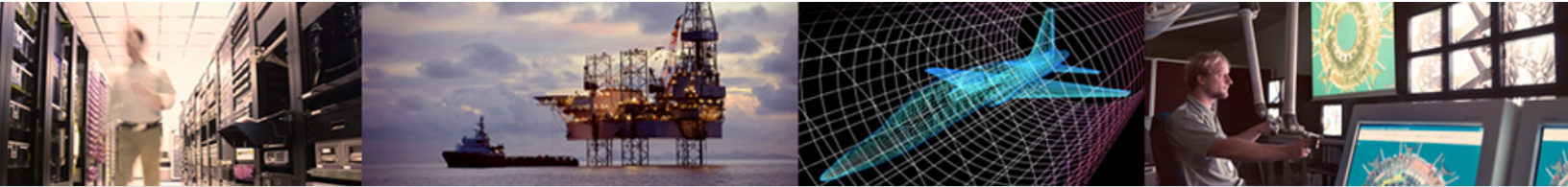


Solarflare 10G Ethernet Adapters Accelerate Memcached

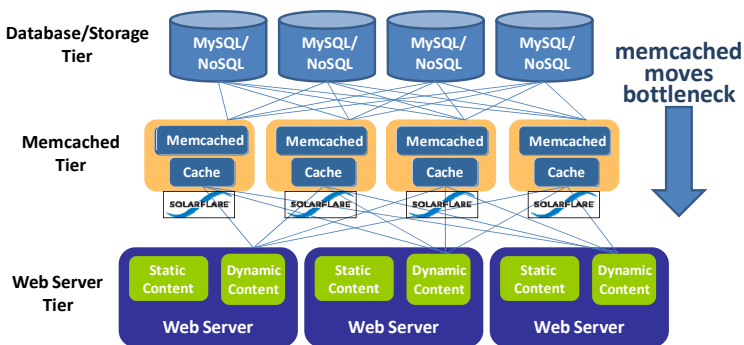
Solarflare Dramatically Improves Transactions Per Second and Response Times in Web 2.0 Applications



Solarflare benchmarking reveals that any online enterprise, including social networking sites, can boost their memcached performance by migrating to 10G Ethernet from 1G Ethernet, and can further accelerate their applications and increase their customer satisfaction by choosing Solarflare 10GbE server adapters with OpenOnload[®] middleware.

Memcached is a widely-deployed distributed database caching technology, implemented in a rapidly growing user-base consisting of tens of thousands of web implementations, including sites such as Salesforce.com, Wikipedia, Craigslist, Facebook, YouTube, and Twitter. Although memcached can be implemented in application servers, it is typically a dedicated tier in the database, creating a large, shared pool of virtual object-based cache accessible to all servers. Memcached accelerates dynamic web applications in environments that support large numbers of users, and is now a well-established and important part of many big data and social networking infrastructures.

Memcached Acceleration With Solarflare



Memcached improves the performance of distributed database and dynamic web applications by caching dynamic object requests which reduces the volume of accesses to the database and storage tiers. This reduced back-end database load enables memcached to increase transaction rates of dynamic web applications. This increased web transaction load shifts the bottleneck to the front-end network connecting web servers and memcached servers, which requires a high-performance, highly efficient 10G Ethernet solution.

MEMCACHED PERFORMANCE METRICS

Commonly measured performance parameters of memcached servers are transactions per second (TPS) and server response time. Memslap is a popular memcached server load generation and benchmark tool used to simulate loads on memcached server clusters and then measure the resultant performance. Memslap generates configurable workloads such as threads and connections, and then reports transactions per second and memcached server response times.

PERFORMANCE TESTING OF 1GBE, 10GBE, AND 10GBE WITH SOLARFLARE APPLICATION ACCELERATION

Solarflare evaluated memcached servers with various network connections. Solarflare first evaluated performance utilizing a quad 1GbE adapter. Solarflare then evaluated its 10GbE server adapter, first utilizing its kernel driver and then running Solarflare’s application acceleration middleware, OpenOnload, typically installed in high-performance servers.

Solarflare configured a memslap server to generate a memcached server load of 256 logical connections each with 8 threads, and then measured the memcached server performance running memcached with an incremental number processing threads (“server worker threads”). In all tests the memslap server is directly connected to the memcached server over physical Ethernet connections, as illustrated in Figure 1.

The servers were configured as follows:

- Dual-socket 3.4Ghz quad-core CPU (X5677) with Hyper-Threading and 6GB of RAM, running Linux 2.6.39.2
- Two cores in each socket dedicated to processing interrupts (shielded from application cores)
- Interrupt moderation disabled to optimize response latency
- One memcached v1.4.5 instance per socket, with all threads pinned to cores on the same socket
 - `memcached -m 2500 -k -u rs -L -t 2 -p 11212`
- Memslap v0.4406
 - `memslap -s SUT:11212,SUT:11213 -t 90s -T 8 -c 256 -B -S10M -S1s`
- Network server adapters tested:
 - Quad-port 1GbE server adapter running vendor-supplied Linux driver
 - SFN5122F dual-port SFP+ 10GbE server adapter with Solarflare kernel driver v3.1.0.4047
 - SFN5122F dual-port SFP+ 10GbE server adapter with Solarflare OpenOnload v201104

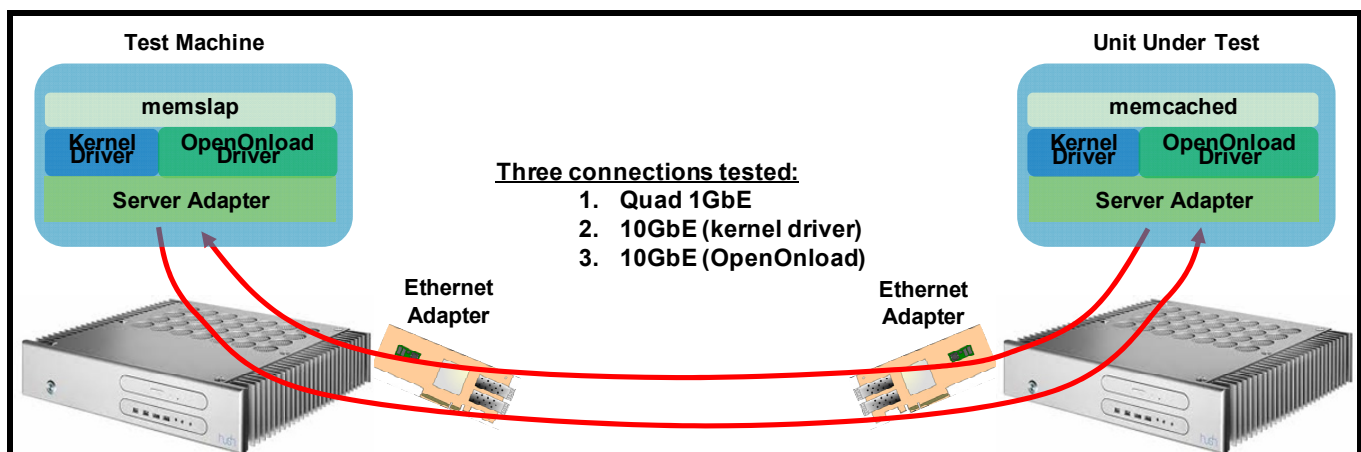


Figure 1. Solarflare test environment setup

BENCHMARK RESULTS IDENTIFY THE NEED FOR SOLARFLARE 10GBE WITH APPLICATION ACCELERATION

The results in Figure 2 illustrate that the quad 1G Ethernet connection runs out of I/O bandwidth before the CPU is fully utilized. Migrating to the single 10G Ethernet connection improves performance until I/O processing in the kernel becomes

the bottleneck (and adding more memcached processing threads to available processor cores yields no incremental transactions per second). Finally, OpenOnload application acceleration middleware yields the highest performance, and lock contention within the memcached server process becomes the performance bottleneck.

Quantitative benchmark results in Figure 2 indicate that the 10GbE server adapter running with the kernel driver increases server transactions per second (TPS) performance by 67%, from 470 KTPS to 790 KTPS, as compared to the quad 1GbE server adapter. However, the 10GbE server adapter running with OpenOnload application acceleration middleware adds an incremental 40% boost, to over 1100 KTPS.

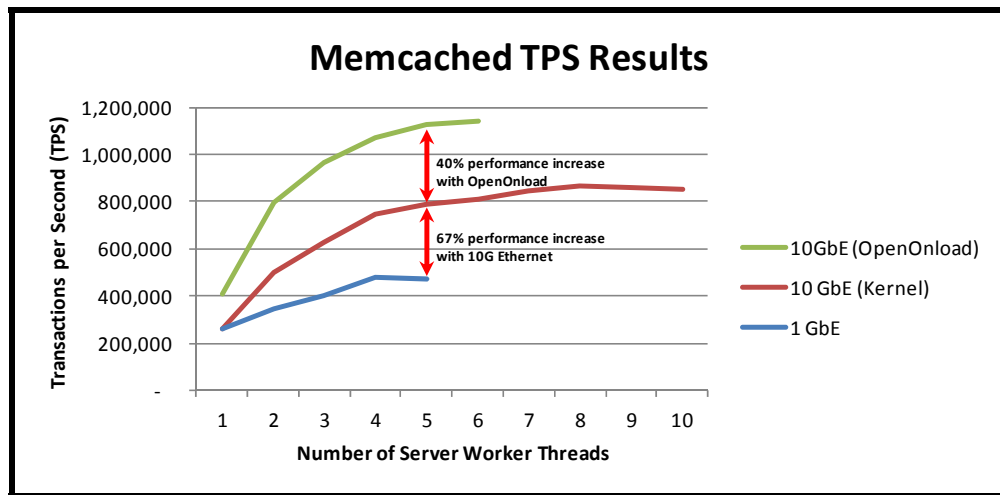


Figure 2. Memcached TPS comparative performance

Benchmark results in Figure 3 indicate that the 10GbE server adapter running with the kernel driver reduces average response times by 40%, from 530us to 320us, as compared to the quad 1GbE server adapter. Additionally, the 10GbE server adapter running with OpenOnload application acceleration middleware further reduces average response times by 30%, to 220us.

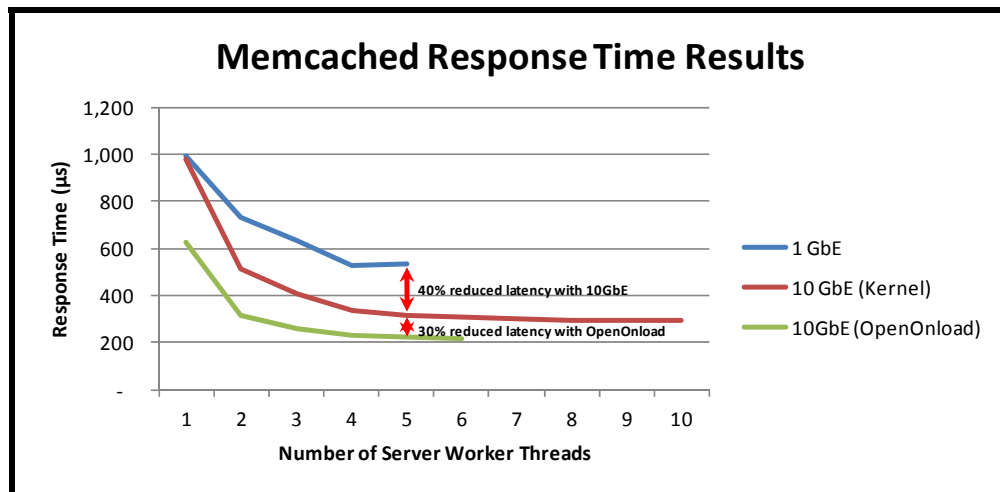


Figure 3. Memcached response time comparative performance

BENEFITS OF SOLARFLARE ENHANCED MEMCACHED PERFORMANCE

Solarflare estimates that 10% to 15% of Web 2.0 server farms are typically dedicated to memcached front-end servers. Deploying Solarflare 10G Ethernet with OpenOnload application acceleration middleware improves the efficiency of a critical tier of their infrastructure. Solarflare 10G Ethernet with OpenOnload enables organizations to provide a better user experience, more fully utilize their 10GbE investment, and reduce their capex and opex spending. By providing the lowest latency and highest throughput Ethernet, OpenOnload application acceleration middleware enables big data, social networking, and other scale-out web applications to dramatically increase aggregate transaction rates, and significantly reduce server response times and access bottlenecks, while also supporting increasing numbers of users and traffic growth.

Solarflare's OpenOnload application acceleration middleware significantly increases the return on investment (ROI) when migrating to 10GbE, since it installs as easily as a network driver and operates seamlessly with all sockets-based applications and standard Ethernet hardware, while providing unsurpassed 10GbE performance.