Accelerating Redis
with Cloud Onload®

Redis is a leading open-source (BSD licensed) in-memory data base (IMDB). In addition to being a full IMDB, Redis enables data persistence and high availability through its embedded replication and backup capabilities. It can function as a database, a cache, and a memory broker that supports a variety of data structures. Typical uses of Redis include real-time analytics, complex statistical analysis, machine learning, and geospatial data. Redis is built to provide millions of database operations per second, with extremely low latency and system resource utilization.

Solarflare's Cloud Onload® - Providing Redis With World-Class Network Acceleration

Like all IMDBs, Redis performance is significantly affected by network I/O performance. Solarflare's Cloud Onload software solution provides unmatched acceleration for Redis (and other I/O-intensive applications). The business benefits of accelerating Redis with Solarflare's Cloud Onload software solution include:

• Reduced CapEx/OpEx benefits by increasing Redis transaction rates per server instance

• Increased server headroom for peak Redis transaction periods, reducing service "brownouts"

• Near-elimination of network jitter, resulting in improved Redis QoS (quality of service)

These capabilities result in significantly reduced TCO and much higher ROI for your both your Redis and network infrastructure investment.

Solarflare's Kernel Bypass Technology – The Key to Accelerating Redis

Whenever a Redis instance wishes to utilize server hardware storage or I/O resources, it must invoke the driver for that resource. For kernel-based drivers (which make up the bulk of all I/O drivers), the application must make one or more calls to the operating system kernel to invoke the driver. Each of these calls results in a context switch, where the memory space of the application is put into system storage. These context switches consume significant amounts of system resources, reducing the amount of processing time available for Redis.

In contrast, the Cloud Onload software solution runs in user space, utilizing Solarflare's patented kernel bypass technology. By operating in user space instead of kernel space, Cloud Onload reduces CPU interrupts, eliminates context switches, and minimizes data copies during I/Os. These improvements in network I/O processing allow Solarflare's Cloud Onload to significantly accelerate network transactions, which in turn allows Cloud Onload to increase overall Redis performance.

Cloud Onload's Impact on Redis Performance

To determine the acceleration of Redis that could be achieved through the use of Cloud Onload, Solarflare ran Redis "GET" transactions against a Redis instance running on a typical dual-processor server. One set of tests were run on Solarflare network adapters utilizing the standard Redis Ethernet stack, while the second set of tests were run utilizing the same network adapter, but utilizing Cloud Onload. The benchmarks were run at 10GbE, 25GbE, and 100GbE speeds, with between one and 22 Redis instances.

The results of the benchmarks are shown in the graphs below.

- Cloud Onload provided a nearly 100% performance improvement in Redis GET transactions on a 25GbE network with 12 Redis instances, and an 88% improvement in Redis SET transactions with 12 instances versus the kernel driver.

- Cloud Onload allowed Redis to completely "fill the wire" on both 10GbE and 25GbE networks. The kernel driver could not fill the wire on a 25GbE network.

- Cloud Onload achieved 38 million GET transactions and 28 million SET transactions on a 100GbE network.

The impact of this performance increase on Redis's business value is significant. Cloud Onload enabled Redis at 100GbE speeds to achieve 66% more performance than could be achieved using the standard Redis kernel driver. This means that a Redis implementation can produce 66% more revenue than a standard Redis implementation. Alternatively, an organization can cut its Capital Expense (CapEx), and likely its Operational Expense (OpEx), costs by over 60% by reducing the number of servers it utilizes. Or it could sustain an even greater load at peak times by as much as 100%.
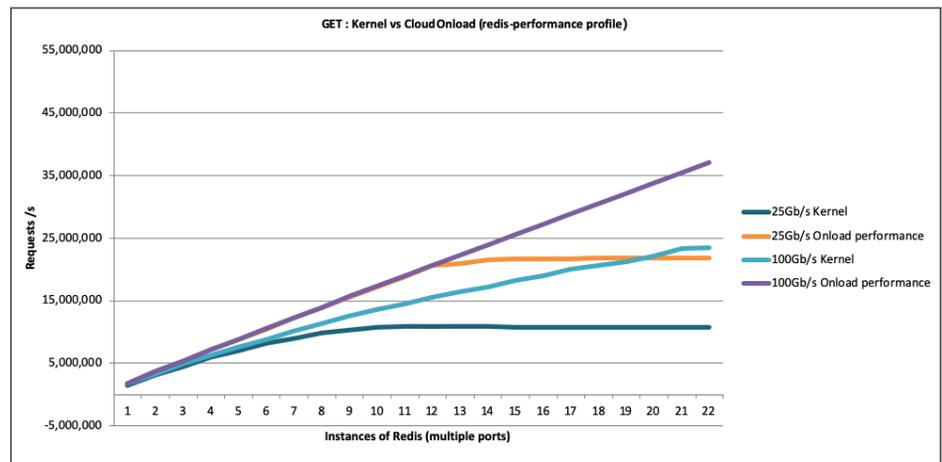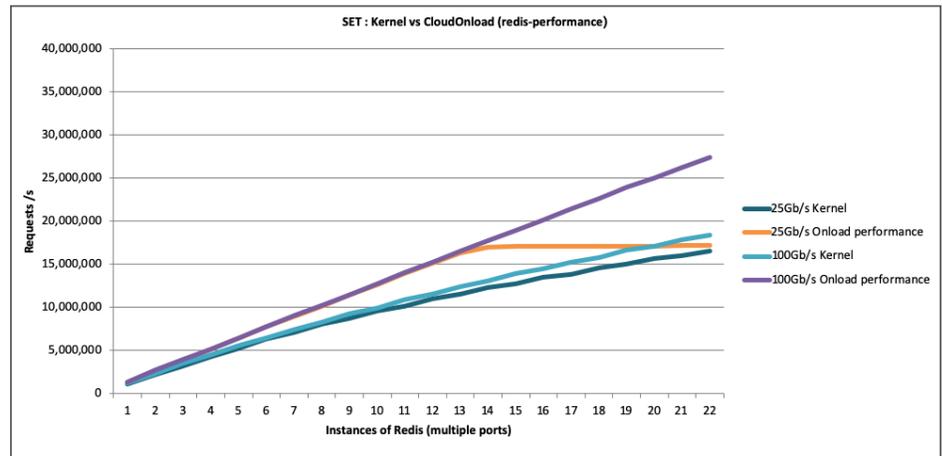
Hardware and Software Requirements

Cloud Onload runs on industry-standard off-the-shelf single or dual socket x86-based servers with a PCIe slots, and supports a variety of Linux OS releases, without modifying existing infrastructure.

For more information please visit:
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