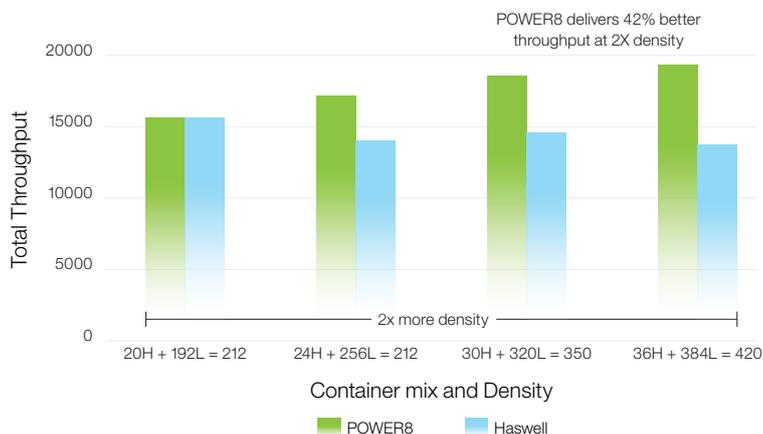


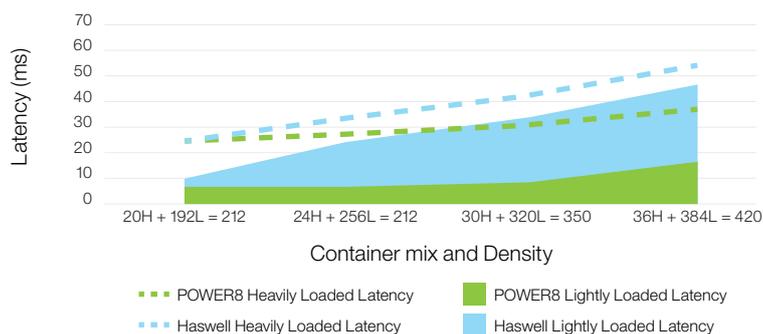
IBM POWER8 with Docker Delivers Superior Cloud Performance

Real world clouds need to support a range of users, from those running full production mode applications to developers working on their latest creations, to the casually curious who are just testing the waters. Docker's low overhead and quick deployments allow service providers to support many different types of users at once. IBM POWER8 systems are built to thrive in this massively multi-user, high throughput environment. POWER8 with Docker delivers superior cloud economics through higher container density, better throughput and better transaction latencies.

Docker Density POWER8 vs. Haswell: 12 cores



POWER8 delivers 4X better lightly loaded latency



Highlights:

POWER8 with Docker delivers better performance than the compared Haswell, for 12 cores:

 **Up to 42%**
better throughput

 **Up to 4X**
better latency

 **2X**
container density

The demonstration of the superior scale of Docker with POWER8 uses Acme Air's web based reservation system, a born-in-the-cloud application. A mix of three different usage patterns for the containerized Acme Air application were used:

- 1) High utilization (H) containers support 20 users with no think time between transactions and represent 10% of active containers.
- 2) Low utilization (L) containers support 20 users with 10 seconds of think time between transactions and represent 90% of the active containers.
- 3) 256 idle containers are added that drive no transactions, but consume system resources by being held in reserve.

For this application and workload mix, we monitored the average response times for the H and L containers along with total transaction throughput.

Using a single KVM guest with 12 cores and 120 GB of memory, we began with 20 H and 192 L containers. At this initial mix, the POWER8 and Haswell VMs have roughly equivalent QoS metrics. However, as we increase the density to 2X the initial container mix, while maintaining a 10L-to-1H ratio, we see significant POWER8 advantages in both total throughput and latency for H and L containers. POWER8 delivers up to a 4X L latency advantage, up to 1.45X better H latency, and up to a 42% total throughput advantage in this density experiment.

IBM Power Systems POWER8 with Docker provides superior density, better response times and better throughput, enabling service providers to deliver excellent customer satisfaction.

Test Environment Details:

- 1) IBM Power System S824 (POWER8), 256GB, V7000 HDD storage; POWER8 split-core with SMT-ST mode; cpufreq governor=performance; PowerKVM 2.1.1, IBM SDK v1.2, Node v0.12.1, Docker 1.6
- 2) Haswell system with Xeon E5 v3 processor, 768GB, V7000 HDD storage; Haswell Hyper Threading Enabled; RHEL 7 with KVM; cpufreq governor=performance; Node v0.12.1, Docker 1.6.2
- 3) Guest details: Ubuntu 15.04, 12 cores with 120GB bound guest via XML file to single socket; virtio Ethernet with multi-queue=2; Acme Air: <http://acmeair.github.io/acmeair/>
- 4) Private network switch used along with dedicated JMETER driver machine and dedicated MongoDB server machine: 1 MongoDB instance per 10H containers; 1 MongoDB instance per 50L containers.

