

## Case study

# HP optimizes high-performance computing in the cloud



**HP Engineering Cloud provides ASIC design teams with greater compute power and job capacity to accelerate project deployments**

### Industry

Information Technology

### Objective

Improve efficiency and productivity for ASIC design teams across multiple business units

### Approach

Deploy ASIC Engineering Cloud built on next-generation HP technology, including HP ProLiant BL460c Gen8 Servers, HP XP P9500 Storage, and HP 12508 Switches

### IT matters

- Enabled 200% greater job throughput with 40% fewer compute nodes
- Doubled server compute slot utilization from approximately 30% to 60%
- Achieved 100% system availability over most recent 12 months

### Business matters

- Estimated savings of \$1.5 million for one business unit by eliminating local servers and duplicate software licenses
- Accelerated project deployment with triple the compute power now available from the cloud compared to local server farms
- Optimized the verification methodology for focused random testing to improve project quality

**“With the cloud, we don’t have to worry about having enough compute power. That allows us to get the most value possible from our software investment with guaranteed availability.”**

– Michael McBride, Director, Systems VLSI Lab – HP Servers

Technology innovation leader HP needed to improve the efficiency and productivity of its ASIC design teams. The company eliminated multiple local server farms and moved design teams onto the ASIC Engineering Cloud built on HP servers, storage, and networking. With shared resources in the cloud, design teams gained greater compute power and capacity while improving efficiency and accelerating project deployment.

One of the largest technology companies in the world, HP develops, manufactures, and sells a broad portfolio of solutions spanning printing, personal systems, software, services, and IT infrastructure. The company has a 75-year history of innovation and excellence, serving individuals, businesses, and governments around the globe.

HP is continually developing new products and capabilities across its portfolio, relying on advanced engineering tools and a rich pool of human talent. Multiple business units within HP staff engineers who design custom application-specific integrated circuits (ASICs). Traditionally, each business unit deployed and maintained its own high-performance computing (HPC) infrastructures to support ASIC design. This practice, however, had a number of serious drawbacks impeding efficiency and limiting the number of projects that could be advanced through the pipeline.

For example, the business units had to size their local infrastructures for expected peak usage, but since ASIC design is cyclical, valuable compute resources often sat idle for long periods. What's more, some business units did not have the budget to build an infrastructure to support peak demand, resulting in longer timelines to bring their products to market. Each HPC infrastructure also had to be maintained—either by IT personnel, business unit staff, or a combination—and the ASIC engineers also spent significant amounts of their time on administrative tasks rather than design.

To relieve this strain on individual business units, as well as improve overall efficiency and productivity for ASIC design, HP created a centralized HPC infrastructure hosted in a private cloud that enables multiple business units to share resources. This “ASIC Engineering Cloud” leverages virtualization and automation to deliver optimal performance and capacity to each design team as needed, saving them time and money while accelerating projects.

Deshraj Singh, EG R&D business engagement manager, comments, “By centralizing compute in the cloud and sharing resources we can better utilize capacity since not every business unit experiences peak demand at the same time. It also reduces the overall space and energy footprint across HP, and replaces disparate islands of infrastructure with a next-generation solution that's much easier to manage and support.”

## Shared resources in the cloud

The ASIC Engineering Cloud is comprised of 416 HP ProLiant BL460c Gen8 Servers to power the HPC server farm, along with file serving enabled by eight HP ProLiant DL580 Servers virtualized with VMware vSphere for 284 guests and 160 terabytes of HP XP P9500 Storage. A virtual desktop infrastructure is built on 32 HP ProLiant blade servers and virtualized with VMware vSphere to support 550 Linux guests and 25 Microsoft® Windows® guests. Tying the cloud together is a high-speed network equipped with HP 12508 Switches.

In total, the ASIC Engineering Cloud eliminated ten separate server farms and now provides engineers with approximately 200% greater job throughput with 40% fewer compute nodes. What's more, server compute slot utilization has doubled from approximately 30% to 60%. In tests conducted on the HP Apollo 6000 System for future implementation, HPC performance improved another 34% compared to the existing ASIC Engineering Cloud infrastructure.

To efficiently manage resource sharing, the ASIC Engineering Cloud uses IBM Platform LSF workload management software, which allocates compute power and application licenses among the business units. Under normal operating conditions each business unit has pre-defined allocations based on their typical workloads. When demand peaks, Platform LSF can be reconfigured to allocate additional resources to the pre-defined allocations so engineers are not constrained by limited resources.

Redundancy in both compute and storage ensures that the cloud delivers robust performance and high availability to support ASIC design around the clock.

## Accelerated deployment with greater efficiency

Since adopting the ASIC Engineering Cloud, HP has completed dozens of ASIC projects for its printers, industry-standard servers, and enterprise servers among others, with more than 57 million jobs executed through the cloud (two-thirds of a million jobs per month). The business units now have the compute power they need at peak times without the cost and hassle of managing their

## Customer at a glance

### HP Hardware

- HP Apollo 6000 System
- HP ProLiant BL460c Gen8 Servers
- HP ProLiant DL580 Servers
- HP XP P9500 Storage
- HP 12508 Switches

### Software

- Red Hat Enterprise Linux
- VMware vSphere
- IBM Platform LSF
- Microsoft Windows

own infrastructure. In fact, one business unit estimated savings of \$1.5 million by eliminating its aging servers and moving to the ASIC Engineering Cloud.

Michael McBride, director of Systems VLSI Lab – HP Servers, says, “The big benefit of the ASIC Engineering Cloud for us is we can share CPU cycles and licenses. Because our biggest investment is in software licenses, it makes sense to run on the fastest hardware, which wasn’t always possible when we managed our own server farm. With the cloud, we don’t have to worry about having enough compute power. That allows us to get the most value possible from our software investment with guaranteed availability.”

Often an ASIC design group will have as many as ten chips in various stages of development. With the dynamic resource sharing enabled by the ASIC Engineering Cloud, one group can take advantage of a simulation job while a different group is focused on another aspect of development.

Jeff Quigley, Program Manager, HP Integrated Circuit Center of Excellence, notes, “The efficiency of having resources available when needed is huge. We can hit simulation hard and use the full breadth of machine cycles to cut development time. It’s more than two times the number of cycles available to us compared to before.”

In another example, the ASIC Engineering Cloud enabled Quigley’s team to optimize the verification methodology around focused random testing. In this environment, more cycles translate to finding bugs faster to shrink the deployment timeline and improve quality.

“With the Engineering Cloud, we can rely on the compute capacity as a knob we can turn to accelerate our deployment,” Quigley points out. Compute capacity is reallocated as needed, based on short-term or long-term business demand.

Based on the success design groups have had with the ASIC Engineering Cloud, HP R&D plans to replicate the architecture and make it the standard for HPC across Hewlett-Packard Enterprise and HP Inc. Thanks to the flexibility built into the architecture, the ASIC Engineering Cloud team can plug in the best components to achieve optimal performance and throughput for various design groups. This strategy will begin with HP Apollo 6000 and evolve as HP continues to innovate.

## Improved collaboration

For many development teams, moving into a cloud environment and sharing critical design resources can be daunting. The elastic nature of the cloud to allocate compute power, its economies of scale, and guaranteed availability alleviated any concerns among the ASIC design groups at HP. In fact, representatives from each group now meet weekly to share project information, such as anticipated peak periods, improving collaboration to enable everyone to maximize their results from the cloud.

Michael McBride concludes, “The move to the Engineering Cloud was a fantastic experience and a model for collaboration between IT and the business units with tight communication, planning, priority-setting, and testing. The technical upgrade to the cloud infrastructure has delivered the desired performance improvement, but as importantly, we truly have IT and the BUs working closely together for the best outcome for One HP.”

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