SUSE and HPE Deliver High-Performance Computing Power to Enterprises

Once the domain of research institutions and government labs, high-performance computing (HPC) systems were very expensive bespoke supercomputers. Now big data is changing everything. Organizations see that HPC can run data-intensive workloads and process massive amounts of information in ways that help them improve business outcomes, innovation and competitiveness. Now SUSE and Hewlett Packard Enterprise (HPE) have teamed up to make HPC systems accessible to businesses of all sizes. As market leaders in HPC, they offer secure, scalable HPC solutions that are easy to implement and use.

SUSE and HPE HPC Solution at a Glance:

+ *Get a complete, integrated solution that is optimized and proven to work together.*
+ *Easily, cost-effectively scale HPC capabilities and capacity as you grow.*
+ *Combine the innovation of open source technology with expert support from industry leaders.*
+ *Reduce complexity with management features and seamless integration with many third-party solutions.*

■ **Products:**

SUSE Linux Enterprise Server for High
   Performance Computing
SUSE Enterprise Storage
HPE hardware:
• HPE SGI 8600
• HPE Apollo 2000
• HPE Apollo 4000
• HPE Apollo 6000
• HPE Apollo 10 Systems
• HPE Superdome Flex
• HPE Apollo 70

Many organizations are realizing the power of HPC for delivering greater insight into operations and empowering a new level of innovation never before possible. In addition to the traditional number crunching done by research facilities and government labs, HPC is being used today for product design, simulations, fraud detection, machine learning, big data analytics and much more. When it comes to high-performance computing, enterprises are looking for scalable, easy-to-use solutions that enable a speedier time to value.

To find an effective HPC system for your needs, there are a few key capabilities to keep in mind: security and resilience; ease

1 **www.hpe.com/us/en/product-catalog/detail/pip.5379857.html**

of use; performance; and data access and storage. You also need to team up with experienced technology partners who know the unique world of HPC well. That's where SUSE and HPE come in.

SUSE and HPE Help You Stay Ahead of the Competition

SUSE and HPE have worked together for more than 25 years—that's longer than some Linux vendors have been in existence. Since 2003, SUSE® Linux Enterprise Server has been bundled as a native install option for SGI supercomputers and servers. And today, the SUSE Linux Enterprise operating system is the preferred OS for all HPE HPC environments.[1]

SUSE is a longtime leader in HPC, in use in 50 percent of supercomputing's top 50

SUSE is a longtime leader in HPC in use in **50**% of supercomputing's top **50** machines.

machines. And HPE is the single largest hardware vendor in the HPC market[2], with a long history of innovation in mid- and large-tier HPC systems.

Together, SUSE and HPE can deliver performance and capabilities that others can't. For instance, SUSE adopts new Linux kernels faster than the competition, which lets the HPE HPC team take advantage of those new features to improve your server performance. And the close cooperation between SUSE and HPE means that SUSE can include HPE feature requests quickly and smoothly integrate them into the Linux kernel. It also means that SUSE can add the HPC packages that HPE users want—sooner.

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2 *"Trends in the Worldwide HPC Market,"*
   Hyperion Research, September 2017,
   www.slideshare.net/insideHPC/trends-in-the-worldwide-hpc-market.
3 *Based on external firm conducting cybersecurity penetration testing of a range of server products from a range of manufacturers, May 2017.*

Running SUSE Linux Enterprise Server for High Performance Computing on HPE Apollo, Superdome and SGI servers, you can solve your most demanding computational and data-intensive problems.

How We Make HPC Work for You

The combined SUSE-HPE solution for HPC offers advanced features and capabilities that make the solution secure and resilient, easy to use, and scalable. It is a cost-effective choice that doesn't compromise on high performance or data availability.

SECURE AND RESILIENT
SUSE Linux Enterprise Server comes certified with Common Criteria EAL4+—the highest certification level for a commercial operating system—and is validated to FIPS 140-2, a U.S. government computer

security standard. Additionally, HPE has been recognized as having the "world's most secure industry-standard servers."[3]

EASY TO USE
SUSE is a founding member of OpenHPC, which works to simplify installation, configuration and maintenance of a custom software stack. Plus, SUSE Linux Enterprise Server supports both x86_64 and ARM64 architectures. With HPE's HPC software and the HPC packages available in SUSE Linux Enterprise Server for High Performance Computing, you have everything you need to run HPC workloads—so you can focus more on your business challenges.
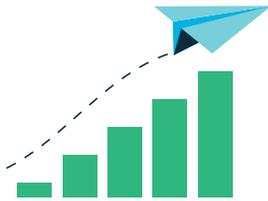
SCALABLE
SUSE Linux Enterprise Server pricing allows you to scale economically, with no difference in price between head and compute nodes. It also offers an extended support lifecycle so you don't have to interrupt work for operating system upgrades. SUSE

Enterprise Storage delivers unlimited storage capacity with linear scaling, and Ceph technology exists today in multipetabyte- and even exabyte-scale implementations. And HPE is fast approaching 100,000-node clusters to support exascale systems in the near future.

HIGH PERFORMANCE

SUSE Linux Enterprise Server is optimized for performance in HPC environments, unlike community distributions. The SUSE HPC module includes many of the HPC software packages you need to run an HPC cluster. HPE enhances application performance with HPE Performance Software—Message Passing Interface (HPE MPI), and HPE engineers are available to help you optimize and benchmark your applications and workloads.

DATA READY

SUSE Enterprise Storage offers software-defined storage based on the latest version of Ceph, with double the write performance of previous releases, and significant reductions in I/O latency through BlueStore. And

the HPE Data Management Framework helps keep data and storage resources accessible by enabling a hierarchical, tiered storage management architecture.

A Closer Look at the Components

SUSE HPC MODULE

This module contains a selected set of the most in-demand tools and components used in HPC environments. The selection is inspired by, but not limited to, what is available at the OpenHPC community project. And unlike community distributions of HPC software, this module comes with full SUSE support. SUSE and HPE are continually evaluating which new packages to add as they become available.

> **"SUSE Linux Enterprise Server is the only distribution that supports the full capabilities of the SGI machine. It was a no-brainer for this application. We use it. We recommend it. SUSE has a newer kernel than other options, making it the best choice."**

JIM KASDORF
Director of Special Projects
Pittsburgh Supercomputing Center[4]

SUSE PACKAGE HUB

The SUSE Package Hub offers access to additional HPC packages that are frequently requested by HPC users and supported by the open source community. This includes the popular container engine Singularity. Find out more at **https://packagehub.suse.com/**.

HPE SOFTWARE

With its acquisition of SGI, HPE can now offer a full portfolio of best-of-breed HPC

> **"We clearly saw that the price-performance of SUSE Linux Enterprise Server on the SGI platform was better than the competing OS options. And from our point of view, SGI plus SUSE Linux Enterprise Server was a complete, integrated solution."**

DIEGO KLAHR
HPC Engineer
Total Exploration & Production[5]

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4 **www.suse.com/media/success-story/pittsburgh_supercomputing_center.pdf**
5 **www.suse.com/media/success-story/total_success_story.pdf**

software. The HPE software works with the SUSE HPC Module to allow you to run massively parallel and HPC workloads easily, without having to worry about the underlying software. The portfolio includes system management tools, an application acceleration suite and an out-of-the-box software stack for HPC systems.

HPE SERVERS
HPE offers one of the largest and most comprehensive portfolios of servers for HPC computing in the world. That portfolio includes everything from off-the-shelf supercomputers to flexible building blocks for HPC clusters:

- HPE SGI 8600
- HPE Apollo 2000
- HPE Apollo 4000
- HPE Apollo 6000
- HPE Apollo 10 Systems
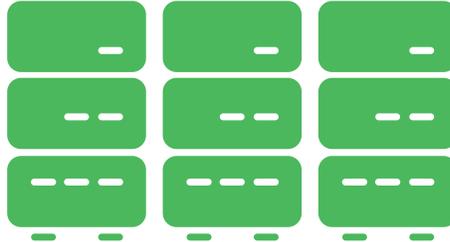- HPE Superdome Flex
- HPE Apollo 70

"SUSE Linux Enterprise Server is the ideal operating system for [our supercomputer] Fionn: It has a real lightness of touch, and doesn't get in the way of the computational workload. It features great tools for setup and configuration, like YaST®, but gives us the flexibility to use other tools, which simplifies maintenance."

NIALL WILSON
Infrastructure Manager
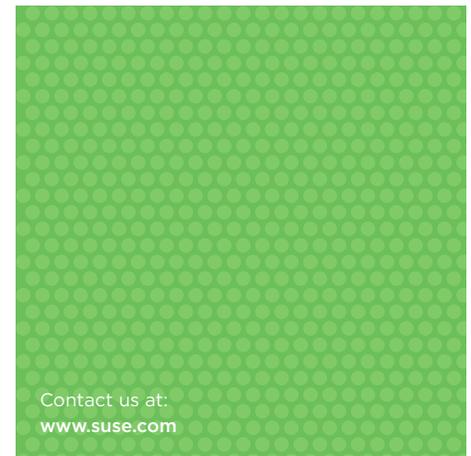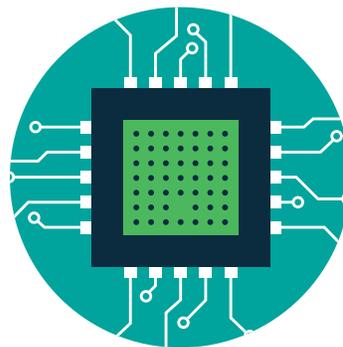Irish Centre for High-End Computing[6]

SUSE ENTERPRISE STORAGE
SUSE Enterprise Storage allows you to deploy a unified block, object and file storage environment. It has a flexible, cluster-based design for graceful and inexpensive upgrades and near-linear scaling. It can provide the constant, bidirectional flow of data that HPC systems often demand, and it works with HPE Data Management Framework to provide a tiered repository of both input and output data.

Enabling HPC around the Globe
The SUSE-HPE HPC solution is already helping some of the world's most eminent institutions solve big problems. Tokyo Institute of Technology adopted SUSE Linux Enterprise Server for High Performance Computing and helped make the institute's supercomputer Tsubame one of the world's top-ranked large-scale cluster-type supercomputers. The Irish Centre for High-End Computing chose SUSE and HPE SGI and can now perform larger and more extensive simulations in areas such as medical device development, nanotechnology, genomics and drug design. Oil and gas company Total put SUSE Linux Enterprise Server to work and achieved the smallest footprint and lowest total cost of ownership possible. Finally, SUSE and HPE were instrumental in helping the

Pittsburgh Supercomputing Center implement the largest cache-coherent shared-memory system in the world, delivering outstanding performance for over 1,300 researchers working on 373 projects.

Discover How HPC Can Revolutionize Your Enterprise
As more and more enterprises turn to HPC to run demanding workloads, analyze data and uncover new business opportunities, staying competitive will depend on your ability to harness HPC for your own business. With SUSE and HPE, you can experience the power of HPC, shored up by the lasting support and expertise of two world-class HPC leaders.

See for yourself what HPC can do for you.

LEARN MORE
Learn more about SUSE Linux Enterprise Server for High Performance Computing at **www.suse.com/products/server/hpc/**.

Learn more at: **suse.com/hpe**

Contact us at: **hpeteam@suse.com**

6 **www.suse.com/media/success-story/irish_centre_for_high_end_computing.pdf**

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