



# Cloud-Ready High Performance Computing for Data-Intensive Workloads with SUSE Linux and Microsoft Azure

Many modern technologies require high performance computing (HPC) resources and infrastructure to reach their full potential. Artificial intelligence, machine learning and advanced analytics all deliver great business benefits, but due to their data-intensive nature, they might be beyond the reach of most organizations' existing infrastructure. SUSE Linux Enterprise High Performance Computing on Microsoft Azure gives you the scalability and flexibility that your process-intensive workloads demand, while helping you control costs.

## SUSE and Microsoft Azure for HPC at a Glance:

- Boost performance with Azure-tuned Linux kernel
- Speed up tasks using high-throughput networking
- Control costs with cloud flexibility and reserved compute power
- Scale resources easily to tackle any size job

### Products:

- + SUSE Linux Enterprise High Performance Computing
- + SUSE Enterprise Storage
- + Microsoft Azure

Traditionally, HPC required a significant investment in specialized equipment. And as workloads grew, the need for additional investments and equipment arose. Fortunately, that's no longer the case. Moving HPC workloads to the cloud gives enterprises the same capabilities as on-premises equipment, but at much lower costs.

SUSE Linux Enterprise High Performance Computing on Microsoft Azure delivers a cost-effective, cloud-based platform built for parallel computing and handling the needs of today's resource-hungry HPC applications. The combined solution enables you to take advantage of cloud computing's built-in elasticity and scalability to get workloads up and running quickly and easily.

The SUSE-Microsoft solution can be used in two configurations. It offers a fully native, all-cloud HPC environment that can replace your existing on-premises infrastructure. Or, you can use your existing on-premises configuration and add an Azure-based HPC system for additional capacity. In both cases, you'll save deployment time and costs, because with Microsoft Azure, there's no equipment to set up and configure.

If you want to use your existing on-premises HPC infrastructure without having to start from scratch, cloud-bursting is the way to go. This configuration improves your ability to handle inconsistent demand spikes. In doing so, you gain greater control over compute resources without having to invest time or money in additional on-premises infrastructure.

The SUSE HPC solution is also eligible for **Azure Reservations**, which further helps you control costs. You can save up to 60 percent with a one-year reservation, or up to 64 percent with a three-year reservation, when you run SUSE HPC workloads on Microsoft Azure.

### Built-in Scaling Support and Workload Management

The SUSE-Microsoft solution includes several features that help you streamline HPC processes and operations for greater efficiency. SUSE Linux Enterprise High Performance Computing on Microsoft Azure provides built-in autoscaling capabilities to simplify HPC workload management and monitoring. In an all-cloud HPC configuration, you can reduce the need to continually monitor system performance. The solution can quickly and easily add or remove compute resources as needed.

A cloud-bursting HPC configuration uses different management options to handle workloads. The SUSE HPC solution comes with an HPC module that contains a set of popular tools, including Slurm for on-premises cloud-bursting workload management and scheduling and Ganglia for cloud-bursting workload performance, monitoring capabilities and more.

### Linux Remote Direct Memory Access (RDMA) Support

Support for RDMA technology enables Linux virtual machines running in Microsoft Azure to communicate directly with each other using the InfiniBand network. This

feature helps to boost communications speeds between virtual machines and delivers a lower network latency for parallel workloads or applications that use the Message Passing Interface (MPI). Microsoft Azure is the only public cloud that supports InfiniBand for tightly coupled jobs, giving you real scalability in the cloud.

In addition to using RDMA connectivity through InfiniBand, you can use Azure ExpressRoute to maintain a fast, private connection to the cloud. ExpressRoute connections don't go over the public internet and thus offer greater reliability, faster speeds, consistent latencies and higher security than typical internet connections.

### Azure-Tuned Kernel

SUSE and Microsoft jointly developed an Azure-tuned kernel, which is included in SUSE Linux Enterprise High Performance Computing. The SUSE Azure-tuned kernel is the first enterprise Linux kernel optimized for Azure, giving you faster access to new features while increasing agility and efficiency. This kernel delivers enhanced performance, faster boot speeds and throughput, lower network latency and a decreased memory footprint.

Running SUSE Linux Enterprise High Performance Computing on Microsoft Azure also gives you access to additional tools and resources built for cloud-native deployments, as part of the SUSE Public Cloud Module.

### Leaders in HPC Innovation

SUSE Linux is the leading operating system for HPC, with SUSE Linux Enterprise High Performance Computing being used in 21 of the 50 supercomputers and 37 percent of the top 100 systems. More than half of the paid Linux operating systems on the HPC TOP500 use SUSE Linux Enterprise.<sup>1</sup> And, it is complemented by SUSE Enterprise Storage to meet your data storage needs. SUSE Enterprise Storage uses open source Ceph technology to provide a highly scalable, cost-effective virtual storage environment.

Microsoft Azure offers the most productive HPC infrastructure of any cloud provider. Independent researcher Exabyte found that Azure was the best performing cloud, above the competition and most traditional on-premises clusters.<sup>2</sup> Microsoft Azure offers HPC-optimized infrastructure components, including high memory virtual machines, the latest generation GPUs, high IOPS storage and mission-specific field-programmable gate arrays (FPGAs). For more demanding workloads, Microsoft also has a partnership with Cray, which enables you to use dedicated supercomputer resources on your virtual network.

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<sup>1</sup> *Top500 Supercomputer Report, June 2019*

<sup>2</sup> *Top500: Exabyte Measures Linpack Performance Across Major Cloud Vendors*  
<https://www.top500.org/news/exabyte-measures-linpack-performance-across-major-cloud-vendors/>

**A cost-effective, cloud-based platform built to handle the needs of today's resource-hungry HPC applications.**

Contact us at:  
[www.suse.com](http://www.suse.com)

### **A Partnership Built for Performance**

SUSE and Microsoft have long worked together to drive open innovation for our joint customers. We're dedicated to providing open source, developer-focused solutions that deliver scalable, highly available compute resources for enterprises. Our partnership embraces the power of communities and supports SUSE platforms running on Microsoft Azure. When you use SUSE Linux Enterprise Server for High Performance Computing on Microsoft Azure, you gain the ability to run data-intensive workloads with the reliability and high scalability you need, on demand.