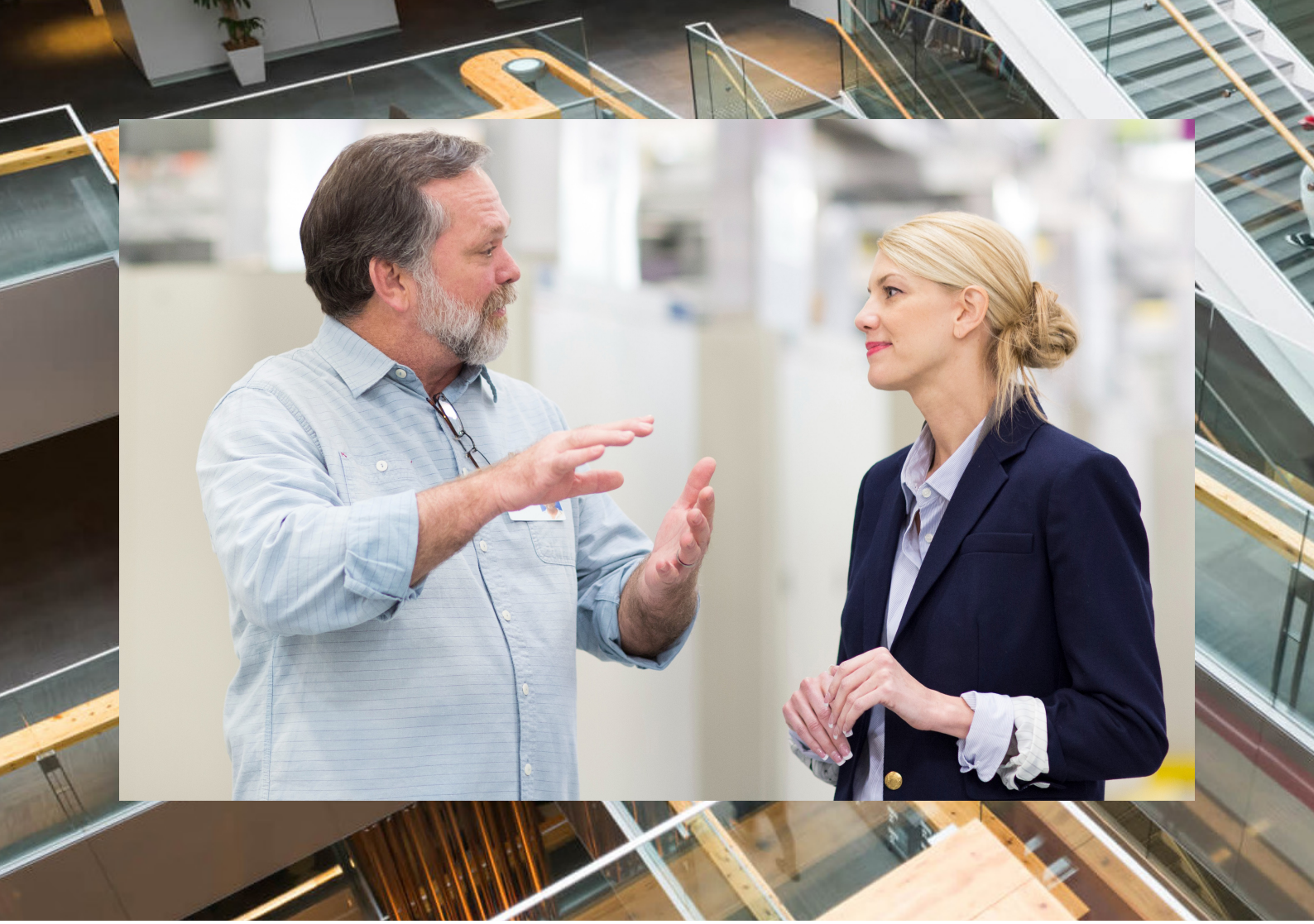
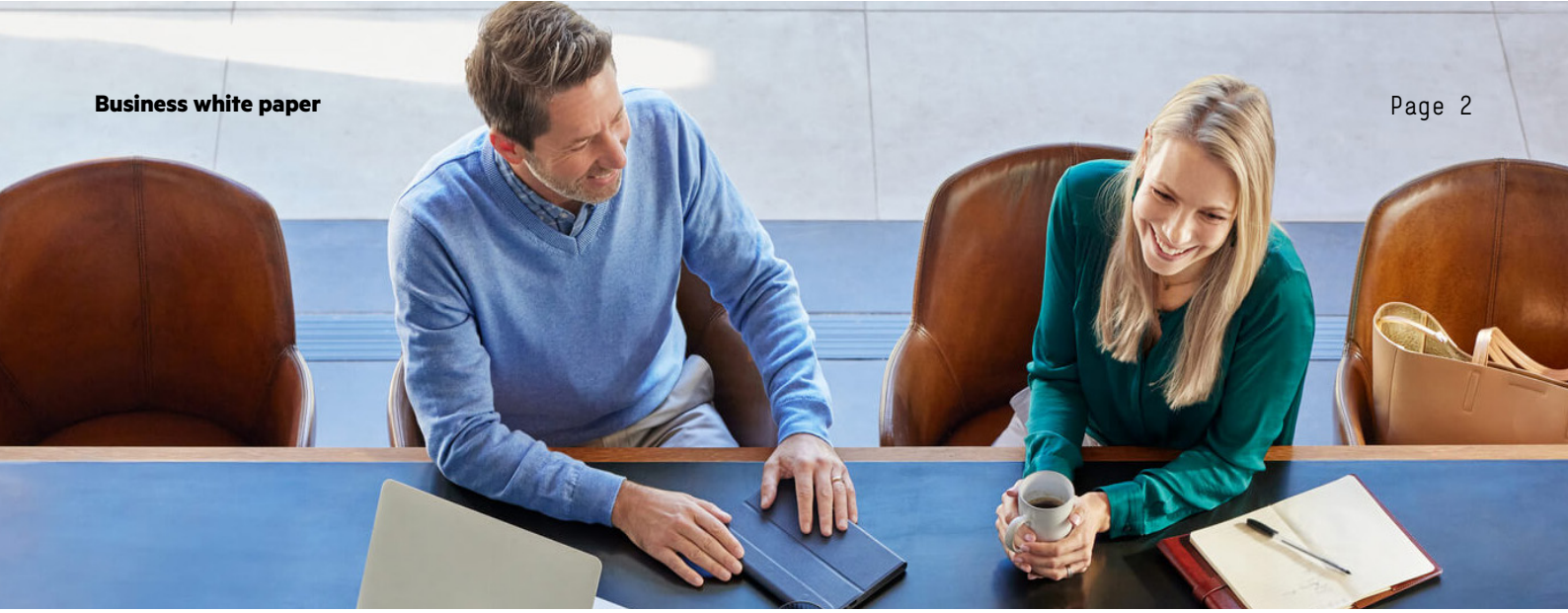


HPC as a service to accelerate transformational growth

Business white paper

HPE GreenLake



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Executive summary

High-performance computing (HPC) offers enterprises better data analytics, simulations, and artificial intelligence (AI). It enables them to be smarter, faster, and more competitive. However, deploying HPC infrastructure has often been complex and challenging. Skills to operate, tune, and manage HPC are hard to come by and harder to afford. Using on-premises data centers has led to large capital outlays, steep learning curves, inflexibility for growth, and low return on investment (ROI). The public cloud has not met requirements for data sovereignty, security, compliance, data transfer, and latency. Getting the expected performance—and predictable cost—can be difficult.

There have simply been too many barriers to progress. Until now. It's time to modernize without compromise—with HPE GreenLake for HPC.

With the HPE GreenLake edge-to-cloud platform, the cloud comes to you—delivering one operating model and a unified experience, across your edges, data centers, and clouds. Maximum flexibility and scalability, with zero compromise.

HPC delivered as a service through HPE GreenLake combines the power and compliance of on-premises systems, with cloud-like financial flexibility, ease of management, and consumption-based pricing. HPE managed services and support help accelerate HPC time to value. Without upheaval, customers get a smoother, faster path to better business through HPC.

"At HPE we are always working to include more solutions under HPE GreenLake. In addition to the latest HPC features, we are bringing Exascale to HPE GreenLake in the near future, as only HPE could."

HPE GreenLake for HPC enables you to fully unlock the value of your apps and data. You can leverage advanced AI, ML, and HPC techniques with simplicity, speed, and scalability—without the cost, risk, and time to move data and refactor apps into the public cloud.

With HPC delivered as a cloud service in your data center or colocation, you can refocus on your customers, clients, citizens, and partners, solving business problems and inventing new solutions with accurate predictions using the right, workload-optimized platforms delivered as a service. We agree with Constellation Research, HPE GreenLake should be on your cloud short list.[1]

HPE is speeding up deployment of HPC projects by up to 75% and reducing capital expenditures by up to 40% by offering its world-leading HPC portfolio through HPE GreenLake cloud services.[2]

Powered by AMD

Our preintegrated physical infrastructure is built on AMD EPYC™ processors with advanced security features—and can be deployed in any data center or colocation facility of your choice, to meet your data residency and low-latency requirements.

Introduction: The pervasive need for HPC

Enterprises aiming for continuous innovation and the top spot in the market, depend increasingly on the strengths of their compute infrastructure. More specifically, they depend on their HPC capabilities.

According to Intersect360 Research, the HPC market will grow by more than 40%, reaching almost $55 billion in revenue by 2024.[3]

[1] Constellation ShortList™ Digital Transformation Target Platforms.

[2] Sourced from a commissioned study conducted by Forrester Consulting, The Total Economic Impact of HPE GreenLake, May 2020.

[3] Hewlett Packard Enterprise accelerates mainstream enterprise adoption for high performance computing with world's most powerful solutions delivered as a service through HPE GreenLake—Sourced from a commissioned study conducted by Forrester Consulting, The Total Economic Impact, May 2020.

We're building out "blueprints" for customers to deliver HPC-AI workflows in engineering and manufacturing (VDI, CAE, CFD) and biosciences/ life sciences (structural biology and genomics).

Business advantages of different sectors include the following examples:

Manufacturing
HPC enables improved computer-aided engineering (CAE) for advanced virtual prototyping, more design iterations, and higher design creativity, all with fewer costly physical resources. Larger numbers of experiments and simulations can be achieved, with faster more comprehensive testing before product release. Analytics on machine sensors and performance data allow predictive maintenance to minimize unscheduled downtime.

Life sciences and healthcare
Empowering analysis across patient health records and multiple data pools (genomics, imaging, clinical, behavioral, drug efficacy, and claims), HPC opens the door to higher fidelity experiments, more accurate drug discovery, and more effective cures for diseases. Through more extensive simulations, including post-procedural, HPC can help improve all areas of medical product design and patient outcomes.

Financial services
HPC is particularly suited to high-frequency trading and risk analysis simulations, for example, Monte Carlo simulations that are used by banks to assess risks and take decisions accordingly. HPC also allows the design, build, and launch of new financial services tailored to highly specific customer segments while easing the process of compliance and adherence to regulatory requirements.

Oil and gas exploration
Seismic exploration requires massive datasets to be stored, processed, and interpreted to produce accurate modeling and yield forecasts. HPC provides the necessary infrastructure for organizations to effectively manage their data, discover oil reservoirs, and reduce risks. By analyzing more data faster, HPC enables better, more timely cost estimates, and greater precision in the timing and locations for drilling for oil.

What makes HPC deployments unique?

For many businesses, investing in HPC infrastructure is commercially advantageous. However, deployment can be complex.

Where many organizations have tended to deploy cloud-first strategies for their conventional enterprise computing, HPC has been perceived as more of an outlier, with the specific challenges of migrating HPC workloads to the cloud forming a barrier for organizations to consider full cloud adoption.

Further challenges include:

- Complexity in configuring HPC workloads for efficiency, needs for custom workload tuning options that may not be available from public cloud providers
- Large volumes of data that need to be processed by HPC applications cannot be moved to the cloud owing to security, cost, and timing constraints
- Compliance and security requirements that providers cannot meet

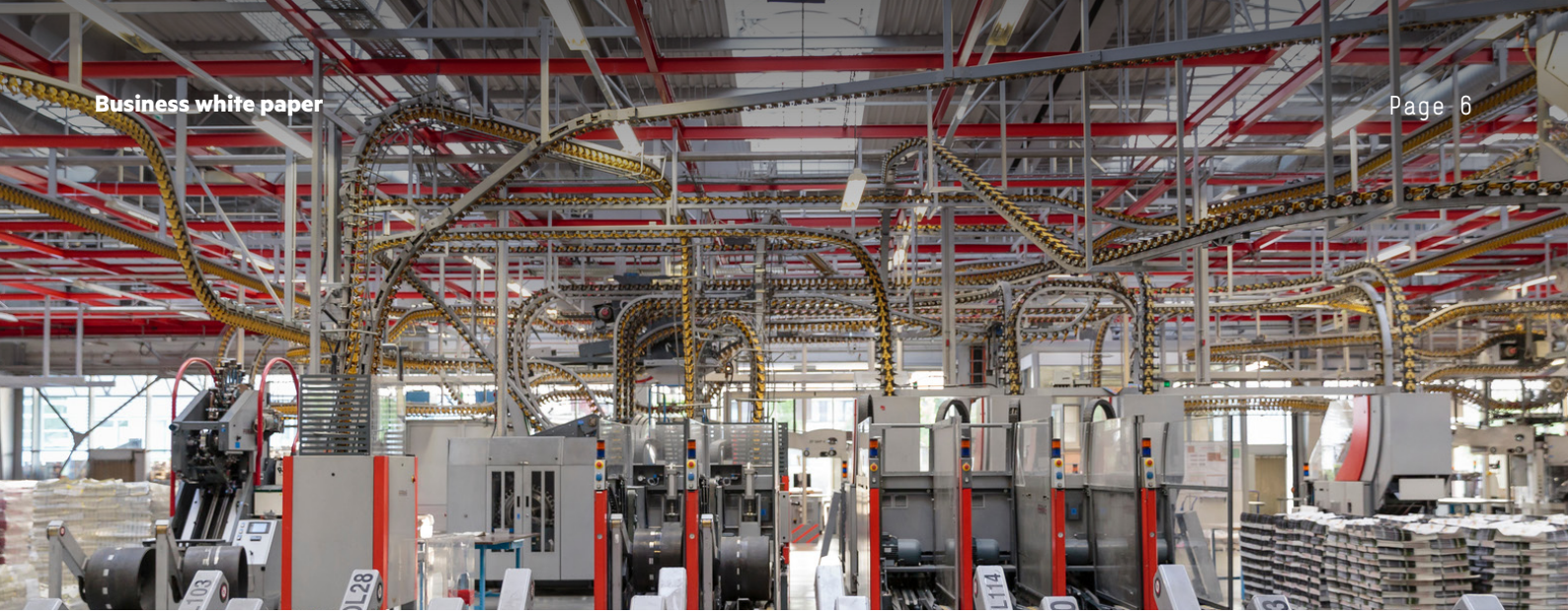
Yet a traditional on-premises computing approach to HPC may not be satisfactory either:

- Server overprovisioning is often the only way to manage peaks and variability of HPC but is expensive and wasteful
- Enterprises may lack skilled HPC technical staff
- IT team attention is diverted to the daily grind of HPC operations and maintenance, instead of creating strategic value

Designing a better HPC solution

Enterprises need a better way to consume HPC. Hewlett Packard Enterprise has identified five key factors that alleviate common challenges with conventional HPC setups.

Decision factor	Solutions to improve outcomes
Time to value	Achieve the shortest and most cost-effective time-to-value for enterprises using HPC.
Simplicity	Make using HPC simple, ideally as simple as consuming a utility like power or water. Ensure on-site administration and user self-service are easy, leveraging existing, effective management tools where possible to avoid new learning curves.
Agility	Handle disparate HPC workloads effectively and easily, offer comprehensive customization options, and elastic provisioning.
Cost	Pay per use, instead of fixed capital outlay/investment. Move to variable, predictable costs.
Risk	Mitigate and reduce risk through managed services, get access to expert advice, and support as needed. Scale and deploy AI without breaking the bank. With a lower entry point, test HPE GreenLake for HPC, test your workloads, test your organization, and scale as needed.



HPC solution architecture from HPE

HPE holds a leadership position in the HPC market with comprehensive end-to-end solutions accompanied by its expertise, support, and services.

HPC infrastructure building blocks from HPE
The HPC infrastructure components from HPE include dense compute, high-speed storage, interconnects, and software to run and manage HPC clusters. High-end HPE Cray systems can run massive, converged modeling, simulation, AI and Machine Learning, and analytics, with high-bandwidth, low-latency interconnects such as HPE Slingshot for high-speed, large-volume data transfers—as well as parallel file systems to remove storage bottlenecks.

For data centers of all sizes, HPC purpose-built, plug-and-play, scalable HPE Apollo systems offer modular, leading-edge technology.

New HPE GreenLake for high performance computing

HPE Cray and NVIDIA® technologies. Delivering unprecedented throughput in a cloud service.

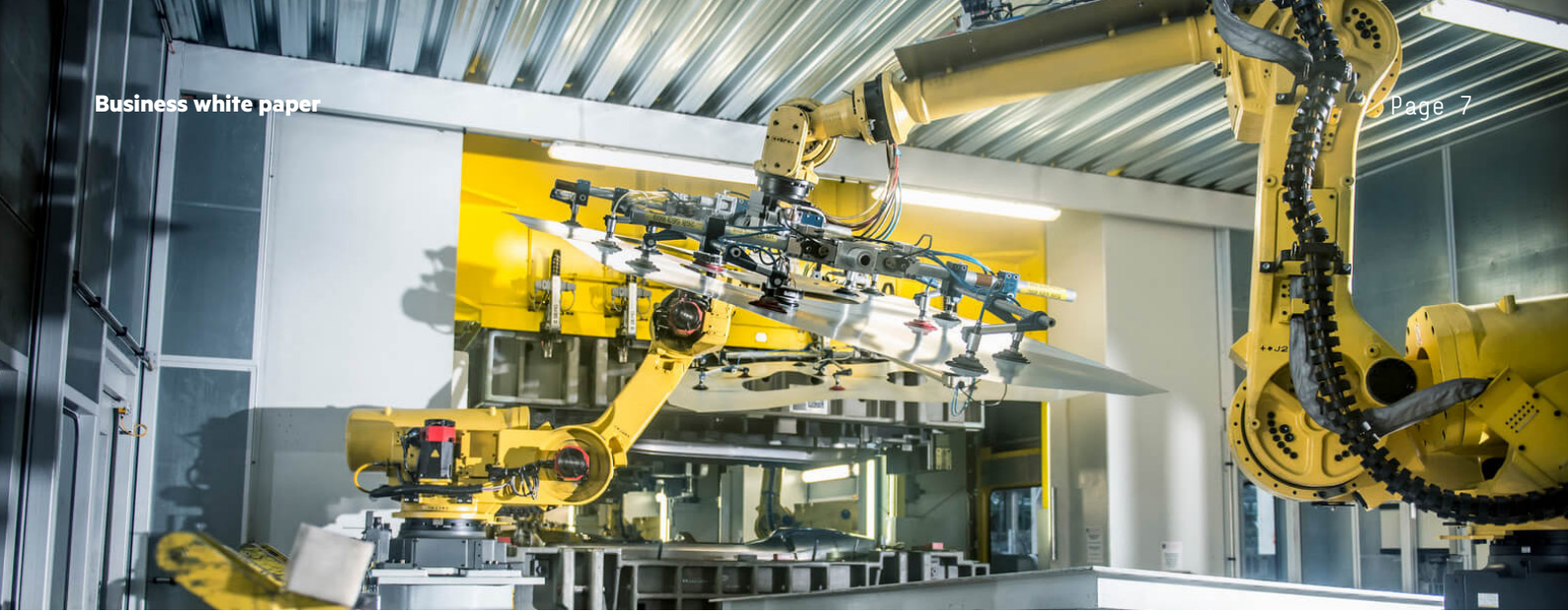
Extensive HPC Partner ecosystem. Value-added software and services integrate with HPE GreenLake for HPC by a partner program, with carefully design business interfaces.

HPE Apollo 6500 Gen10 System. More flexibility to open up AI, Machine Learning and more HPC techniques.

GPU Enhancement. General-purpose graphics processing unit (GPGPU) and accelerator solutions to enhance performance for the matrix and tensor calculations prevalent in AI/deep learning (DL) applications. Support for NVLink, NVIDIA A100, A40, A30 in increments of 2-4-8 accelerators.

HPE Slingshot. Cray technology with extremely high speed, tunable Ethernet-based interconnection supercharging performance

Comprehensive storage. Local scratch storage, enterprise, and parallel storage options purpose built for HPC and AI. The **HPE Parallel Storage System** is a scalable, high performance storage system that can match the other components, delivering unprecedented throughput.



Lower entry point. Reduce risk of introducing HPC, test workloads with HPE GreenLake for HPC and scale as needed.

Energy efficiency. More energy-efficient CPUs suited for compute-intensive workloads.

Optimize space. High-density systems that allow to fit more servers into data center racks compared to conventional enterprise servers.

Flexibility. HPC workload management, containers, and orchestration for a range of requirements.

Efficient cooling. Cooling technology that adjusts with the number of HPC servers used and fits with existing enterprise infrastructure to avoid large up-front investment.

Secure. Silicon root of trust from HPE security for a robust security foundation that permits only trusted firmware to be loaded onto the server that can rapidly mitigate the impact of firmware attacks.

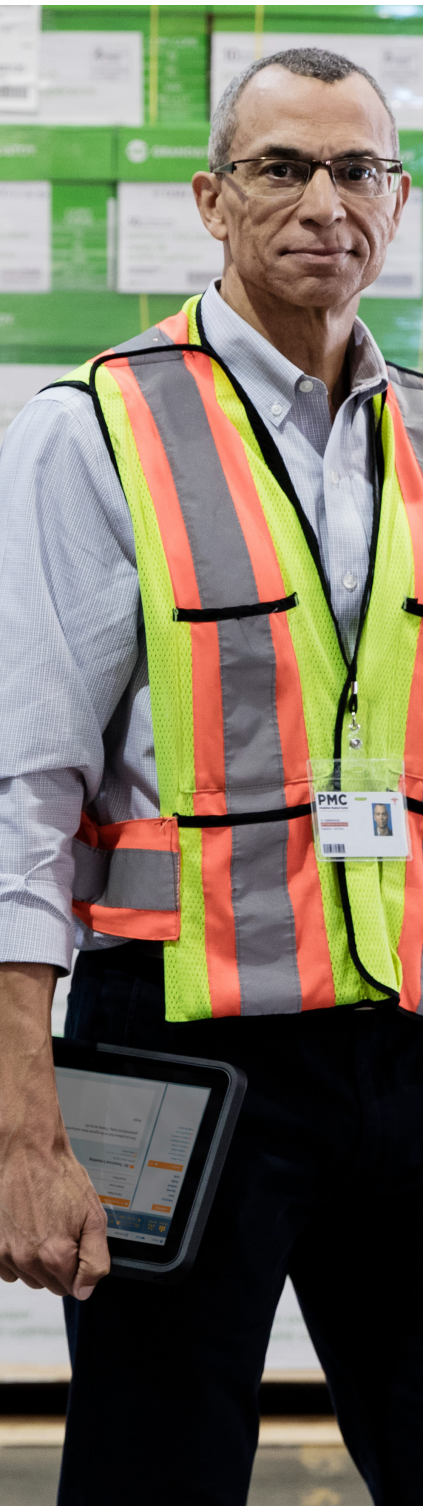
Sustainability. Sustainable manufacturing and components to allow a high level of recycling.

HPC as a service through HPE GreenLake

With HPE GreenLake, customers can choose an on-premises HPC solution with all the flexibility, scalability, and utility-like consumption of the cloud. Customers can increase their agility with pay-per-use pricing and preinstalled buffer capacity that is ready to provision when needs grow. Whether demand for HPC resources spikes suddenly or grows steadily, customers are always ready to meet new needs.

Customers can design their own HPC infrastructure solution within HPE GreenLake using industry-leading HPE technologies. Alternatively, they can standardize their service with presized configurations that offer self-service and are managed for them.

With access to the latest technology available in the market, HPE can also buy out—and recycle—customers' existing infrastructure, helping them meet sustainability targets. Six key benefits of HPE GreenLake enable customers to meet business goals around HPC more easily, economically, and with stronger results. HPC solutions delivered with HPE GreenLake offer the best of both worlds—a fully managed, end-to-end HPC solution that can be placed wherever the customer needs enterprise-grade performance and control, and a consumption-based financial model that eliminates large up-front payments. It also provides an on-site capacity buffer to meet new needs in minutes.



HPE GreenLake advantage	Customer benefits
Turnkey HPC solution	• Right-sized HPC infrastructure is architected, installed, and configured by HPE • Deploy in your data centers and colocation facility • Infrastructure is fully managed and operated by HPE
Improved transparency	• Monitor HPC usage, costs, and performance • HPE manages capacity based on actual metered usage, to have capacity ahead of demand • Continuum of configuration options for reserved versus on-demand burst capacity available on-site
Flexible financial model	• Align costs to business outcomes with metered usage • Reduce up-front capital outlay • Consumption-based, predictable pay-per-use model • Reduce TCO by helping to eliminate overprovisioning
Simplified operation	• Easily provision HPC resources (manage clusters, queues, and users, orchestrate batch and interactive work) with HPE GreenLake Central, a self-serve point-and-click portal • Be free to focus on strategic initiatives, with time-saving centralized management • Get expert help to design, deliver, and operate
On-demand capacity buffer	• Buffer capacity is ready on-site to meet unexpected demand momentarily • Ready-to-use staging sandbox environment for new technologies adoption • Protect availability with downtime-free maintenance leveraging the capacity buffer
HPE systems and services	• Choose from a broad portfolio of industry-leading solutions that are prevalidated, preconfigured, and customized for HPC use cases • Access professional, workload-specific services needed to achieve HPC goals for performance, resilience
New hybrid models	• Connect HPE GreenLake to HPE GreenLake, or HPE GreenLake to public cloud • Multicloud connector APIs, published soon, will allow you to submit HPC jobs to a diverse pool of computing resources • Orchestrate workflows with user-defined policies to determine best computing target for each job

Market momentum

$6.3B
TCV booked to date

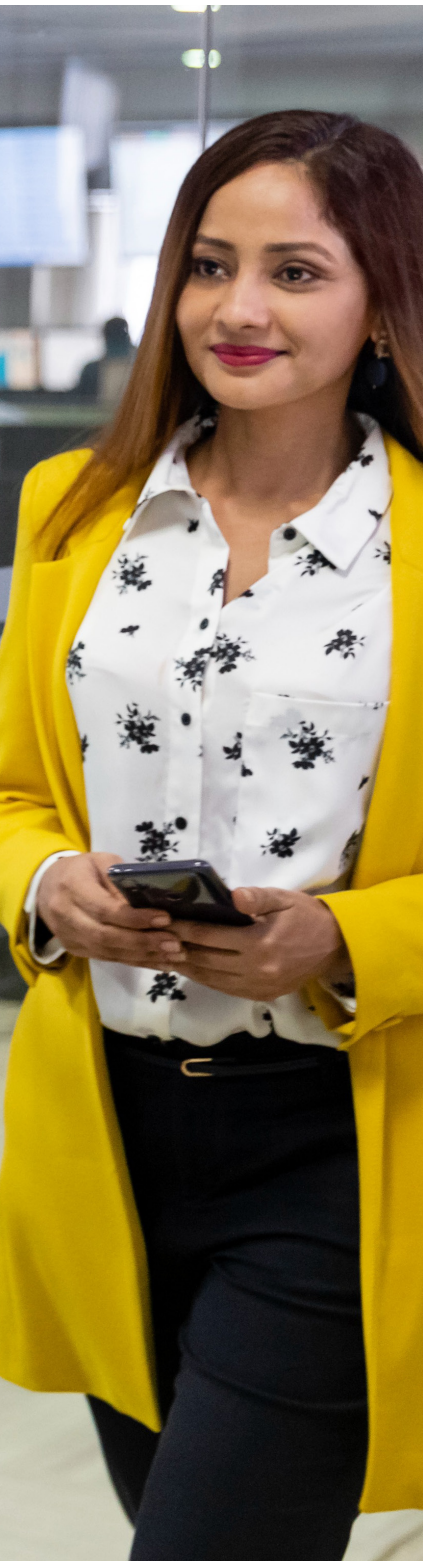
~1400
enterprise customers

50+
countries globally

900+
partners ready and selling

12+
years of IT-as-a-service on-premises

96%
customer retention



HPE GreenLake for HPC flexible offering

Configuration examples

	Racks	Nodes	Cores	Storage nodes	TB storage
X-Small	1	10	640	4	116
Small	1	20	1280	8	232
	2	44	2816	12	348
Medium	3	68	4352	16	464
	4	92	5888	20	580
	5	116	7424	24	696
Large	6	140	8960	28	812
	7	164	10496	32	928

Racks	**1**	**2**	**3**	**Up to 21**
# of GPUs supported	2–40	42–80	82–120	Up to 840

+

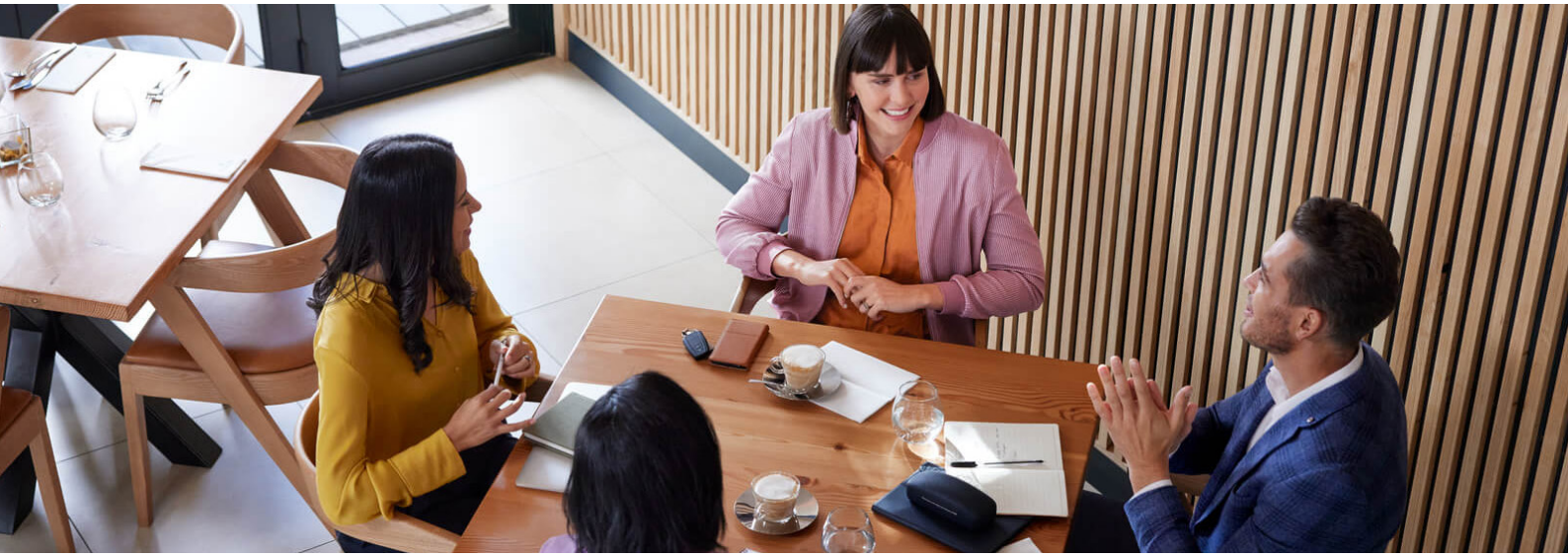
Standard services	**+**	**Standard service options**
• Managed & operated by HPE • HPE GreenLake Management Services • Complete care • A&PS HPC Cluster Management Service		• Terms 3-4-5 years • Variable usage: 70% to 100% • Optional services: CoLo, A&PS Consulting

= Your HPC Cluster tailored to your needs

HPE HPC management capabilities for customers

HPE offers additional functionality for customers to manage their HPC usage including:

- HPE GreenLake Central that offers administrators exceptional control and visibility. It configures and monitors scheduling queues through an HPC scheduler, managing user access and quotas, accessing historical job monitoring data, managing licenses and support for containerized workloads, and more—all through a single interface
- HPE Consumption Analytics for at-a-glance analytics of usage and cost based on metering through HPE GreenLake
- HPE Datacenter Care for managing ongoing maintenance and support of the HPC system
- HPC-related professional services focused on performance customization and containerization (optional)



Partnering on the HPC journey

High-performance computing (HPC) is a journey. Customers' HPC requirements will continue to evolve and so will the technologies and solutions.

HPE has an unparalleled record of innovation and engineering excellence for customer advantage, throughout its business activities. HPC delivered as a service via HPE GreenLake is an excellent example. Customers benefit from world-class HPE technology, services, and support in a solution that is future-proofed by design, to accompany them on their HPC journey without limits.

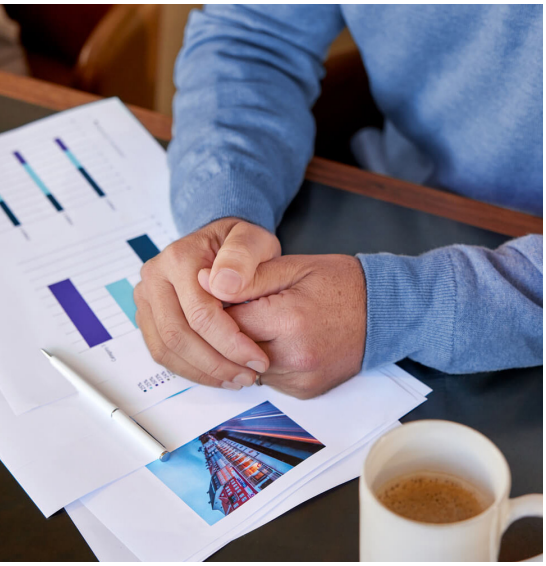
HPE Pointnext Services experts can assist in engineering digital transformation, in designing data flows, protection and management, and in turning customers' digital ambition into reality faster with the right technology and platforms. They can also advise on when to make such choices, including moving or extending from conventional enterprise computing to HPC.

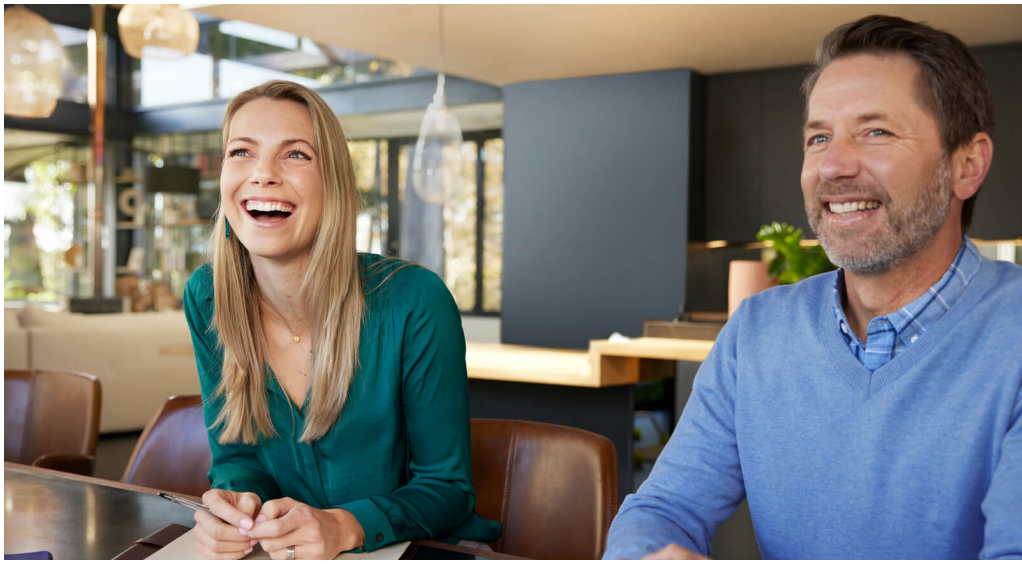
Customers can now move from HPC pilots to full deployment or extend existing facilities with HPE GreenLake and they can leverage additional HPE resources.

For example, the Center of Excellence (CoE) program helps IT departments to learn and incorporate new and developing technologies through a hands-on activity. Enterprises will be able to give seamless HPC access to interactive users, as they move to make batch jobs portable, facilitating builds and deployment. HPE accompanies them as they extend their HPC to form broader information systems with applications such as product lifecycle management (PLM).

Our coming partner program will better enable our partner ecosystem to provide value-added software and services integrated with HPE GreenLake for HPC.

New solutions and innovation will still be guided by business values and principles that have made HPE the vendor of choice among so many enterprises and organizations around the world. That includes our commitment to everything that we provide as a solution so that customers are not hassled.





As an as-a-service offer, HPE GreenLake provides clear business value. Forrester Research has closely examined HPE GreenLake and found the following benefits:[4]

30%
CAPEX savings due to the eliminated need for overprovisioning

65%
shorter time to deploy digital projects

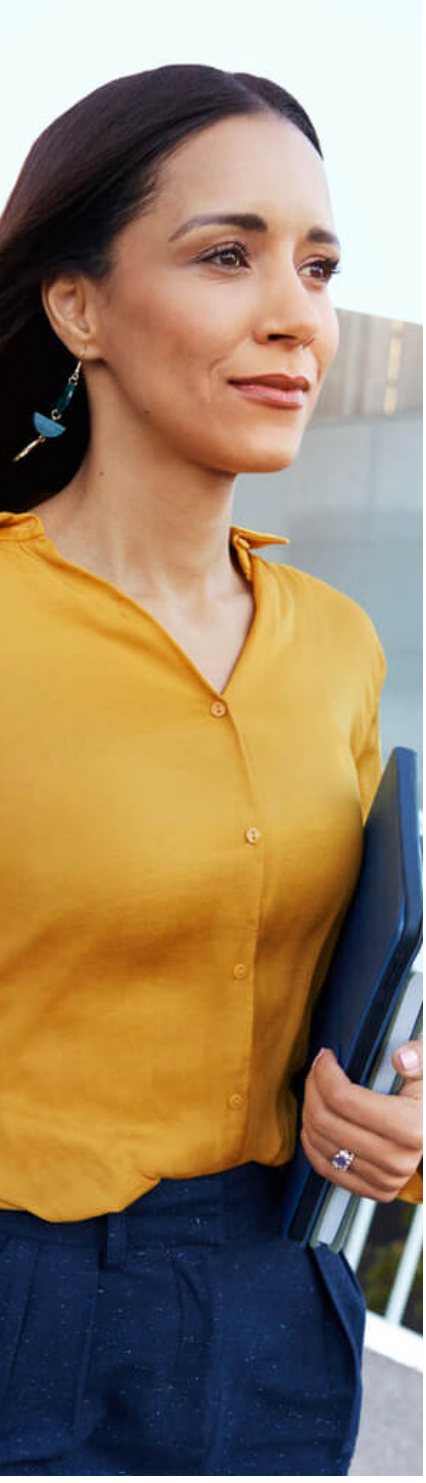
40%
increased IT team productivity by reducing the support load on IT

Delivering stronger results

The advantages in performance, economics, and ease of use of HPE solutions delivered as a service enable customers to improve outcomes in a range of areas.

- **Shorter time to market:** Solutions are deployed faster and have a reduced learning curve, enabling teams to start using HPC sooner and more effectively. Customers can quickly and easily provision HPC resources to serve new projects.
- **Improved simulation accuracy and efficiency:** HPE servers are customized for HPC, which deliver world-class performance for a range of critical workloads, enabling customers to run detailed simulations and reach insight faster while using fewer processor cores and having a smaller IT footprint.
- **Increased business agility:** As HPC resource demands fluctuate, customers can quickly scale HPC resources up or down using the capacity buffer. The HPE GreenLake pay-per-use model means costs are aligned to business outcomes.
- **Capacity to explore new market opportunities:** When HPC infrastructure is delivered as an agile, managed service, customers have more freedom to focus on initiatives that can grow the business.
- **Reduced risk:** As well as leveraging HPE's decades of experience in providing industry-leading server solutions, customers benefit from the professional monitoring, resource management, and support that HPE GreenLake provides as a standard. Crucially, HPE GreenLake for HPC enables you to test, deploy, and scale advanced HPC techniques like AI/ML without breaking the bank.

[4] The Total Economic Impact of HPE GreenLake, Forrester Consulting, May 2020.

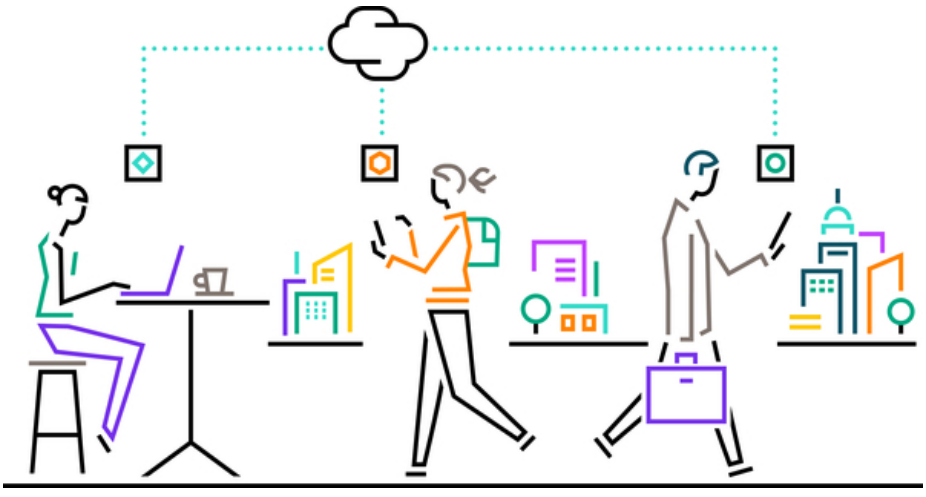


Better financials and lower risk

HPC delivered as a service through HPE GreenLake offers cloud economics with an even higher degree of financial flexibility. The result is a lower total cost of ownership (TCO) of HPC solutions. Because this HPC solution also blends with existing on-premises infrastructure, customers can protect existing investments and their return on investments. The vendor risk-sharing and the control and security of sensitive data on-premises lower the overall risk for customers too.

Enhanced sustainability

The ultra-efficient HPC technology helps enterprises and organizations to reduce their carbon footprint. The HPE road map includes technology to dramatically expand computing capacity without increasing power consumption, building on a long history of innovation in low carbon technologies. HPC delivered as a service is also helping to address the financial uncertainties that enterprises face in situations like the COVID-19 pandemic. While the HPC technology from HPE gives businesses the power to enhance their outcomes, the cloud-like experience for on-premises installations offered by HPE GreenLake services helps them avoid large up-front IT investments. Making the most of HPC and cloud, this solution also offers businesses the agility to leverage the economic upturn to follow.



Conclusion

HPC delivered as a service is a priority for many customers. HPE meets this need with HPC delivered as a service through HPE GreenLake, by combining advanced customized on-premises infrastructure with the flexibility of cloud to consume infrastructure on-demand. It enables organizations to use HPC the way that suits them best, including pay-per-use pricing and a lower entry point to scale and deploy advanced techniques like AI/ML. Customers can focus on using HPC for business value, instead of setting it up and maintaining it, with smooth evolution as new technologies and solutions become available. HPE has prepared tailored solutions for companies that need to accelerate complex simulations and computations to remain competitive through HPC. Our flexible as-a-service platform allows customers to locate their infrastructure on-premises or in a colocation facility as suitable. Customers can choose between small, medium, or large predefined configurations of HPE compute nodes with high throughput shared storage architecture, ultra-fast large scratch storage volumes, and a high-performance low-latency network. This standard offering is packaged as a turnkey HPC fully managed and fully operated solution.

Learn more at

hpe.com/us/en/greenlake/high-performance-compute.html

Visit **HPE GreenLake**

Make the right purchase decision.
Contact our presales specialists.

Chat now (sales)

Call now

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