

HPE PERFORMANCE OPTIMIZED DATA CENTER SOLUTIONS

Comprehensive, factory integrated, flexible, and easy to deploy
as a service



EDGE BUSINESS CASE NEEDS EDGE AND HPC COMPUTING

Edge computing allows for efficient data processing in which large amounts of data can be processed near the source, reducing internet bandwidth usage. This eliminates costs and ensures that applications can be used effectively in remote locations. In addition, the ability to process data without ever putting it into a public cloud adds a useful layer of security for sensitive data. Also, edge computing enables data stream acceleration, including real-time high-performance data processing without latency.

The common IT requirement for high-performance computing (HPC) is the need for extreme compute solutions that deliver massively parallel processing of large, unstructured data sets. This requirement exceeds the capabilities of typical industry-standard servers and data center facilities, which are sub-optimized for this activity.

The HPE Performance Optimized Data Center (POD) is therefore the logical response to HPC and special edge computing demands.

WHAT SIZE? DOES IT MATTER WHEN YOU CAN EASILY SCALE?

The computing requirements can be as small as a small form factor server, combined with a gateway connecting Internet of Things (IoT) sensor data to your business cloud servers for storage, analytics, and decision-making. Or, on the other end of the spectrum, there may be a need to host a large HPC infrastructure, equipped with CPU and GPU resources, along with large storage nodes to capture all the edge data and run use cases such as artificial intelligence (AI), machine learning (ML), or data analytics. Then, it needs to be computed and inferred locally to transfer the results to a central place. Legislation may also create challenges that consumer data may not leave certain areas and need to be safely secured within its boundaries.

HOW DO YOU FIT THEM ALL?

As the edge is distributed, many edge places will be different, often requiring specific approaches to build purpose-designed and prefabricated solutions addressing the HPC and special edge computing needs. These housing environments can be tight, harsh, confined, or wide-open spaces (university campuses, manufacturing plants, R&D and enterprise backyards, railway stations, airports, and such).

So, what is the common factor across all these sites? The IT infrastructure, the site conditions, or both? What can be done to standardize the solution and deployments to be as cost-effective as possible while keeping the pace of the rollout? Often, these edge computing initiatives are the next big bet for your business to support the new agile digital era and remain competitive or even lead the pack in your industry or business.

So, within this wide spectrum of challenges, does there exist a one size fits all? No, but data center technology services (DCTS) from Hewlett Packard Enterprise is your partner to assist in developing one of the best scalable housing solutions for your HPC and special edge computing needs across the world and be performant, agile, secure, scalable, sustainable, and economical to operate.

PERFORMANCE-OPTIMIZED MODULAR DATA CENTER SOLUTIONS FROM HPE

Scalability—at the spot or throughout a region?

In DCTS by HPE, we have the technical expertise to help plan, design, and implement your edge sites and scale them as your business needs increase significantly. Due to our modular concept, most parts of the data center can easily be extended just by adding another module to it. Through smart engineering, the controls have been incorporated at the beginning, but the expensive capacity modules are just added in time when business and IT demand.

Similarly, our worldwide project management organization (PMO) allows us to manage your parallel regional rollouts across the world. We work in close collaboration with our key corporate partners to ascertain logistics, keeping parts ready at their warehouse and delivering to your site in a few weeks' prefabricated modular modules.



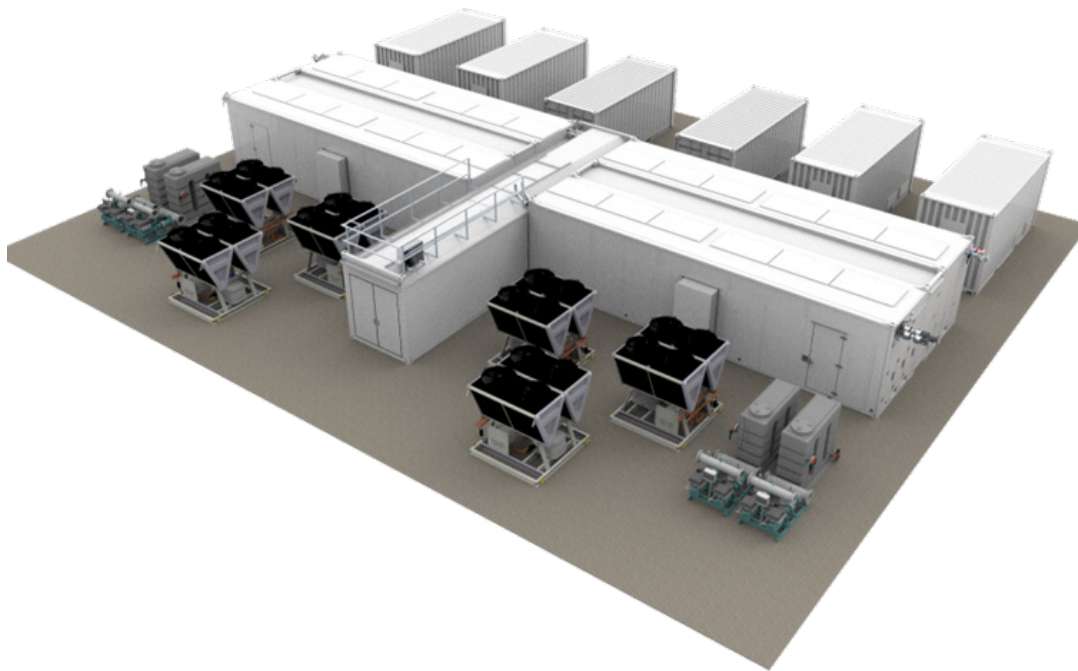


FIGURE 1. Example—HPE Performance Optimized Data Center solution layout

Does it need to be rectangular?

Although the big bet is well thought of, capturing and computing new data at the edge, who did know years ago that your business would need a remote and secure data center at those places?

Modularity—the basis of HPE Performance Optimized Data Center modular data center solutions—allows flexibility on how we distribute the data center components at your site. It can be concatenated, mirrored, coupled as a butterfly arrangement, being ready for expansion—all made possible by the modularity of the different modules.

Our standard HPE Performance Optimized Data Center portfolio has modules serving different purposes, from all-in-one small workloads to high density. Several options exist to enhance the standard capabilities to fit your specific needs and site conditions.

MDC POD Portfolio

Optimized Infrastructure for Multiple Markets



FIGURE 2. Overview HPE Performance Optimized Data Center portfolio



What matters really at the edge—security, reliability, remote manageability?

Edge is the next digital frontier, with organizations needing to process data where it is being produced—at the edge. Edge computing is typically a significant distance from the core/central data center. Does your business have IT/facility resources in place? What remote manageability will be needed? How physically/virtually secure are these sites? What about the availability of reliable power? How do we keep the IT infrastructure cool? All of these are valid concerns where HPE Data Center Facilities experts can help select the right HPE Performance Optimized Data Center solution components and implement them for you at your edge locations.

Is there a physical perimeter? Can the confined space distinguish between different access levels? Once you are within the physical perimeters of the edge site, can you access all other components: container, power or cooling units, IT rack, active NW device, IT servers, and data storage? We have defined zones of physical secure zones in our modular data center blueprints such that if physical access is needed, this access can be split across the authorization levels you use and restricted up to four levels.

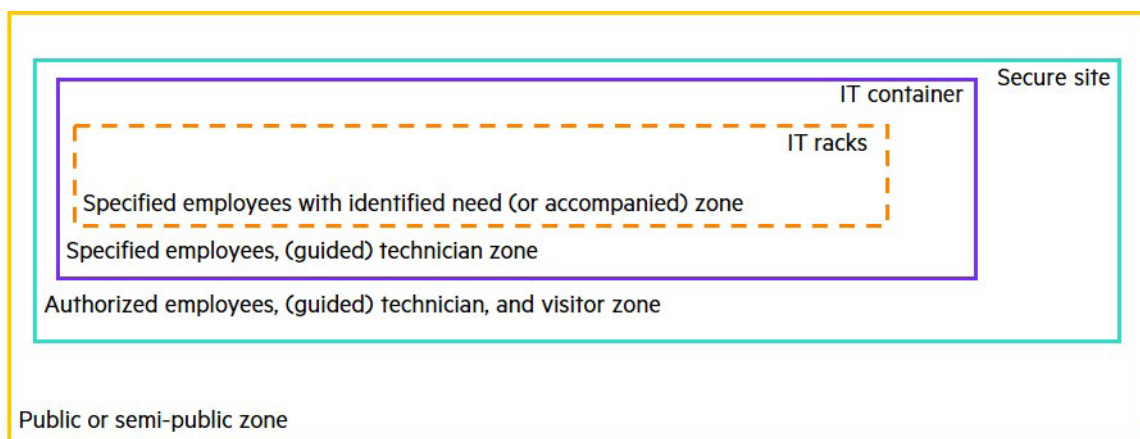


FIGURE 3. Physical security zoning at a typical edge site

Applying the utmost reliable design choices may sound the way forward, but who has the investment budget for this. So, what about some smart choices in design. What we can achieve for your business is a reliable design that meets your business needs for an affordable investment that enables you to host your edge and HPC reliably.

One such example of a smart design choice is to secure the data in case of incidents. Consider a thermal runaway, caused by a malfunction in the power grid systems, your IT is protected by UPS, but what about the cooling system? If there is no active cooling, IT hardware becomes hot quickly, especially in small spaces. Does it need continuous cooling or just enough accumulated cooling capacity to safely shut down the edge computing infrastructure and alert the central system? Quite some businesses do not need to have their edge or HPC IT running in a fault-tolerant environment, as long as the data is safe (legislation). Within the HPE Performance Optimized Data Center portfolio, we have solution features that enhance the standard functionality to protect against, in other words, to predict and omit such scenarios by right solutions. And in case such catastrophic scenarios occur, provide ample time to gracefully shut down IT.

Lastly, lights-out management and remote management are key. We provide a monitoring (and/or management) system that can report to your central data center infrastructure management (DCIM). Our technical experts can help with advanced integrations. Some functions also have a local connection to the building management systems of the site. For example, fire detection alarms need to trigger the local system as well as the central system. But that's not all, further integration and a higher level of monitoring into distributed DCIM systems make the edge computing site fully lights out, all areas where our technology experts can help you with.



Invest less

The HPE Performance Optimized Data Center modules are more economical than a traditional data center design since they are constructed to standardized designs at scale by key corporate partners. While the smart combination and all customization options allow us to adapt to your specific needs, upgrades can be planned per module instead of whole plant systems in more traditional data center designs.

HPE Performance Optimized Data Center portfolio products use commercial off-the-shelf (sub) parts from regional industry partners to support massive rollouts in your regions. The blueprints for your edge site can be enhanced for common attributes allowing a certain degree of standardization and thus reducing costs substantially across multiple implementations. Off-the-shelf approach and portfolio standardization also help optimize operational costs for routine activities such as maintenance and incident resolutions.

Definitely a data center

HPE Performance Optimized Data Center solutions are complete; we do not limit HPE offering to IT containers only or force you to look for a backup generator from a local vendor. DCTS data center facilities consultants from HPE work with you throughout the entire process to make sure your edge computing needs are accounted for from the IT infrastructure to underpinning facilities; these are embedded part of the solution blueprints.



FIGURE 4. HPE Performance Optimized Data Center features make it a data center

One challenge in the traditional brick-and-mortar data center design is to make sure the building fits the purpose for over 20 years; roughly speaking, four to six lifecycles of IT hardware can be hosted in that environment. To achieve that, there are typically trade-offs made during the design and build but not with our modular data center solutions. Consider a lifecycle change, such as an IT infrastructure refresh (double IT workload density) or technology change (change to Li-ion batteries in the UPS). Due to the nature of modularity, the change often is to just replace/ exchange the impacted module with the new technology to adapt to the lifecycle change.

Portable by nature

It is not brick and mortar, so if the business moves or business needs to change, your HPE Performance Optimized Data Center solution can too. With proper planning, the modules can be moved to your newest edge location.

Deploying modular HPE Performance Optimized Data Center is a fairly short time process; it only takes several weeks to a few months depending on on-site conditions, solution scale and complexity, and local construction regulations.



Economical to run

A sustainable, hosted solution for your HPC and special edge computing is not only achieved by making use of commercially available parts but also by designing for the environment so that it runs as efficiently as possible given the local climate and design topology.

Additionally, to make sure you can invest wisely, the proper size, density, and reliability can be defined, reducing stranded capacity.

Enable your edge business case with HPE Performance Optimized Data Center modular data center solutions from HPE

HPE as an IT leader and DCTS from HPE as a leader in the data center design space have the expertise to develop the hosting blueprints, build with corporate partners, and deploy these at the majority of locations in the world, ready to host your edge business case.

DCTS from HPE is designed together with our corporate partners' solutions whereby we integrate their equipment seamlessly into the HPE Performance Optimized Data Center product portfolio, making use of best-of-breed technology components.

All-in-one HPE Performance Optimized Data Center portfolio

An all-in-one solution (IT, as well as facility cooling and power components, are integrated into one packaged container.) approach is applied for HPE Performance Optimized Data Center to host up to five rack enclosures. It is pre-engineered, available in models from 3 kW to 44 kW of IT capacity, and redundant or nonredundant from a power and cooling perspective. It can host your HPC and edge IT in industrial harsh environments. This all-in-one solution allows for very rapid and easy deployment.



FIGURE 5. All-in-one HPE Performance Optimized Data Center solution portfolio

Modular HPE Performance Optimized Data Center portfolio—IT modules

HPE Performance Optimized Data Center portfolio consists of separate IT modules—cooling and power modules to host IT workloads as of 8 racks up to 44 racks, reaching an IT critical load of up to 1,500 MW in a single unit in our most dense solution.

The IT modules are optimized to maximizing available height for rack space. As such we have units with IT racks of 50U, significantly higher than the standard rack height of 42U.

Various combinations of IT load, level of resiliency, and deployment strategies are allowed by a wide range of IT module options (DC8, DC10, DC18, DC20, DC21, DC44, and DC16 Direct Liquid Cooling [DLC]). The peak IT load is scalable up to 44 kW per rack for air-to-water cooled while the average IT load is scalable up to 27.5 kW per rack enclosure. In our latest IT module equipped with DLC, we even reach a cooling capacity of 120 kW/rack enclosure, helping our clients to deploy very dense HPC and AI workloads at the edge.





FIGURE 6. IT modules—HPE Performance Optimized Data Center DC8, DC10, DC18



FIGURE 7. IT modules—HPE Performance Optimized Data Center DC20, DC21, DC44

Modular HPE Performance Optimized Data Center portfolio—Power modules

HPE has defined a wide range of electric power modules (PM) of various sizes to combine with the IT modules. The main characteristics are that they provide power distribution panels, UPS power, automatic transfer switches (ATSs), and/or a diesel generator for backup power. Sizes range from 80, 150, 250, 350, 600, 900, or 1100 kW capacities.

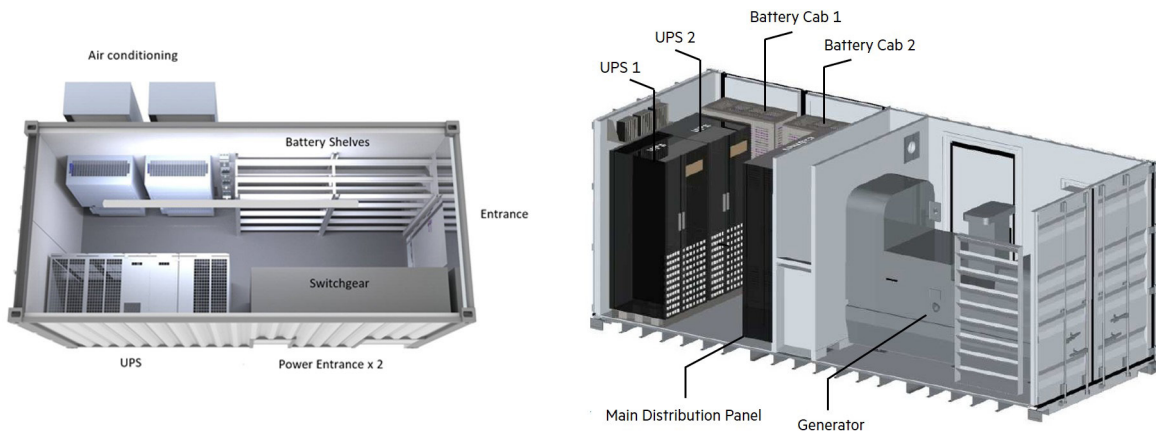


FIGURE 8. Electric power modules—left with UPS of 600 kW and right with an emergency power generator of 250 kW

Modular HPE Performance Optimized Data Center portfolio—Cooling modules

Similarly, HPE has defined a set of cooling modules (CM) and pump skids to deploy reliable, scalable, efficient, and modular chilled water sources to the IT modules. Our DCTS consultants work with you to select the best combinations to achieve the redundancy and functionality underpinning your business case. Redundancies vary from N+1, N+N, and capacities from 120 to more than 1 MW cooling capacity per unit.



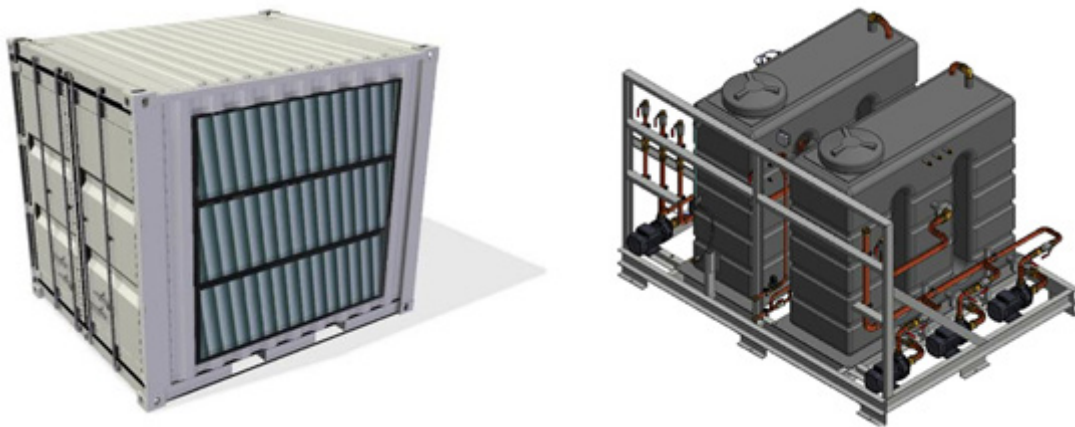


FIGURE 9. HPE Performance Optimized Data Center cooling module and pump skid

FACTORY INTEGRATION

Lastly, what makes our solutions unique, as an IT leader, is the ability to integrate your IT workload out of the factory into these moveable IT containers. All preparations can be tested in a central place, even accessed reliably and remotely by your IT specialist to test the IT infrastructure up front.

The results are that, on the final on-site location, it ends up in plug and play, both from facilities and IT perspective—just connect power, just connect to the local network, and off you go. This service enables us to shorten your site deployment typically with an additional two to four weeks. The compound effect on a regional or worldwide program is significant.

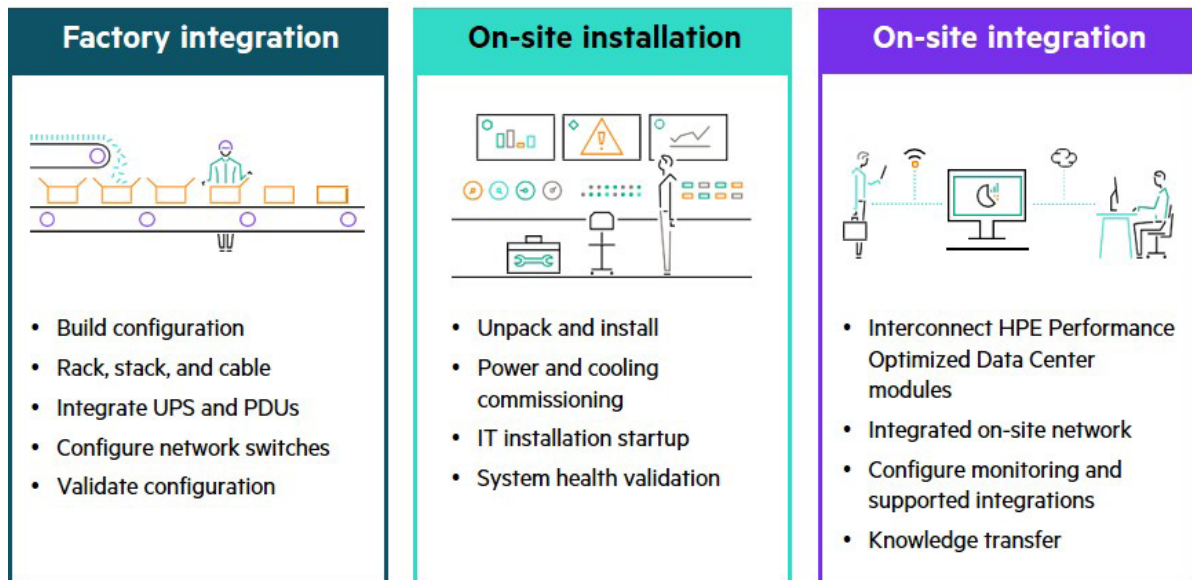


FIGURE 10. Reduce on-site IT integration through factory integration



USE CASE EXAMPLES

See a few examples of HPE Performance Optimized Data Center deployments.

Within HPE Experience Center in Geneva, an HPE Performance Optimized Data Center solution has been deployed to serve three purposes: hosting HPE enterprise applications for the region, hosting the latest HPE technology for customer demonstrations regularly, and finally benchmarking with HPE servers. This versatile IT workload is protected by 2N utilities for power and chilled water plant with a pump skid. Although admin challenges weren't overcome, the solution was ready to integrate with a district cooling system, based on the lake of Geneva.



FIGURE 11. HPE Experience Center Geneva—4 x IT modules with a capacity of up to 84 IT racks in total, 2N redundant utility containers for power and chilled water

HPE was selected by a French car manufacturer to host an HPC cluster application for simulation purposes of their design process. The solution needed an IT load capacity of 600 kW across 20 IT racks. The HPE Performance Optimized Data Center DC20 was the ideal match for such a dense workload. The criticality of the simulation calculations is protected by a single UPS module, and we integrated the power chain with a customer-provided emergency power generator.

In the last use case example, HPE delivered about 15 HPE Performance Optimized Data Center DC44 units to a worldwide IT service provider having their European data centers in the UK and France. These modules are providing enterprise hosting capabilities across a twin data center setup (~50 km) in the UK and a stand-alone in France. The IT service provider has hereby the ability to easily scale up their operations with units of 44 IT racks, anticipating their customer demand for their services across the European region. The data center building is just a shelf where the HPE Performance Optimized Data Center DC44 units are rolled in and hooked up to the pre-installed power and chilled water utilities.



FIGURE 12. Warehouse data center farm—6 x HPE Performance Optimized Data Center DC44 with space of up to 20 units



Contacts

For any information or request, send an email to [Data Center Technology Services](#).

Where do we start with your edge and HPE business case?

Wherever you are in your journey, DCTS from HPE can help, as we have experts in all stages of a modular HPE Performance Optimized Data Center solution—from reviewing the strategic impact on your data center landscape to tactical services for assessing possible site locations. HPE can help with the business case TCO, converting CAPEX to OPEX, spending throughout HPE GreenLake offerings, managing the rollout program through its project management office services, and helping ensure quality control through commission and startup services. Even providing operational services during its lifecycle is possible.

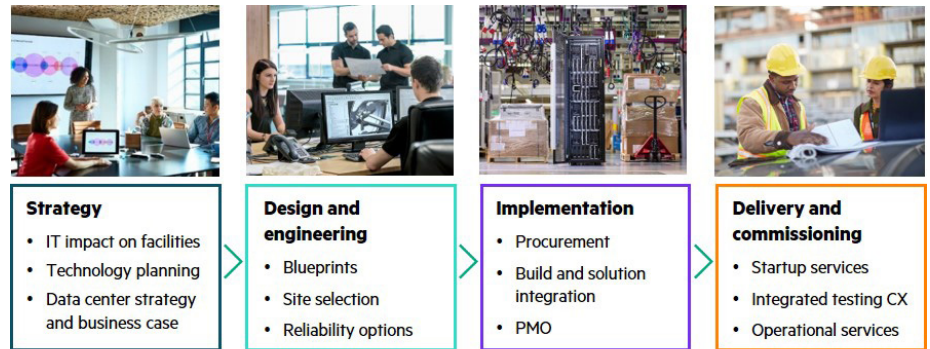


FIGURE 13. DCTS from HPE supporting HPE Performance Optimized Data Center modular data center solutions

DCTS from HPE is here to help you bring computing to where it's most performant and economical to run, analyze, and reliably store your data. DCTS from HPE is here to help you bring computing to where it's most performant and economical to run, analyze, and reliably store your data.

BREAK OUT OF TRADITIONAL DATA CENTERS

Move to a modular-based data center facility that can help service delivery not only from your core data center but also at the edge and for your distributed IT. Achieve higher levels of flexibility, cost containment, and a more agile data center footprint for your on-premises service delivery model with data center facilities consulting services from HPE. **Bring the ideal data center to life.**

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