

Building a Microsoft Azure hybrid cloud: the essentials

Deliver Microsoft Azure-consistent services from your data center



Table of contents

- 3 In today's world, everything computes**
- 4 A new generation of apps and data drives a new speed of business**
- 5 Hybrid IT—the new reality for operating apps and data across multiple technologies and platforms**
- 7 Your vision, your cloud, with Microsoft Azure**
- 9 Microsoft Azure Stack—enabling a true hybrid cloud**
- 11 Better together**
- 12 Put Azure Stack to work in your hybrid cloud**
- 14 Right-fit platform for Microsoft Azure Stack and your hybrid cloud**
- 16 Why choose HPE for your Azure Stack solution?**
- 18 Capitalize on the HPE difference**

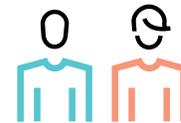


In today's world, everything computes

We live in an era of digital transformation, where the accessibility of emerging digital technologies enables enterprises to reimagine the business in new ways—creating new experiences, new products and services, and new efficiencies.

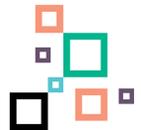
Today, everyone and everything is connected and sharing data: cars, homes, workplaces, museums, stadiums, hospitals, and factory floors have embedded artificial intelligence (AI) and fleet learning technology. Through connectedness, one thing learns from others to improve functionality, performance, and safety. The possibilities to turn all this shared data into action are driving us to a faster, more intelligent world and improving the way we live and work.

HPE recently conducted a global survey of more than 800 IT and business executives, and 80% of the respondents agreed that digital transformation is a reality for their business.¹ Digital transformation—fueled by the explosion of apps and data—is creating a world where everything computes at a new speed.



800 IT and business executives

80% of the respondents agreed that digital transformation is a reality for their business



¹ HPE Digital Transformation Index Research.



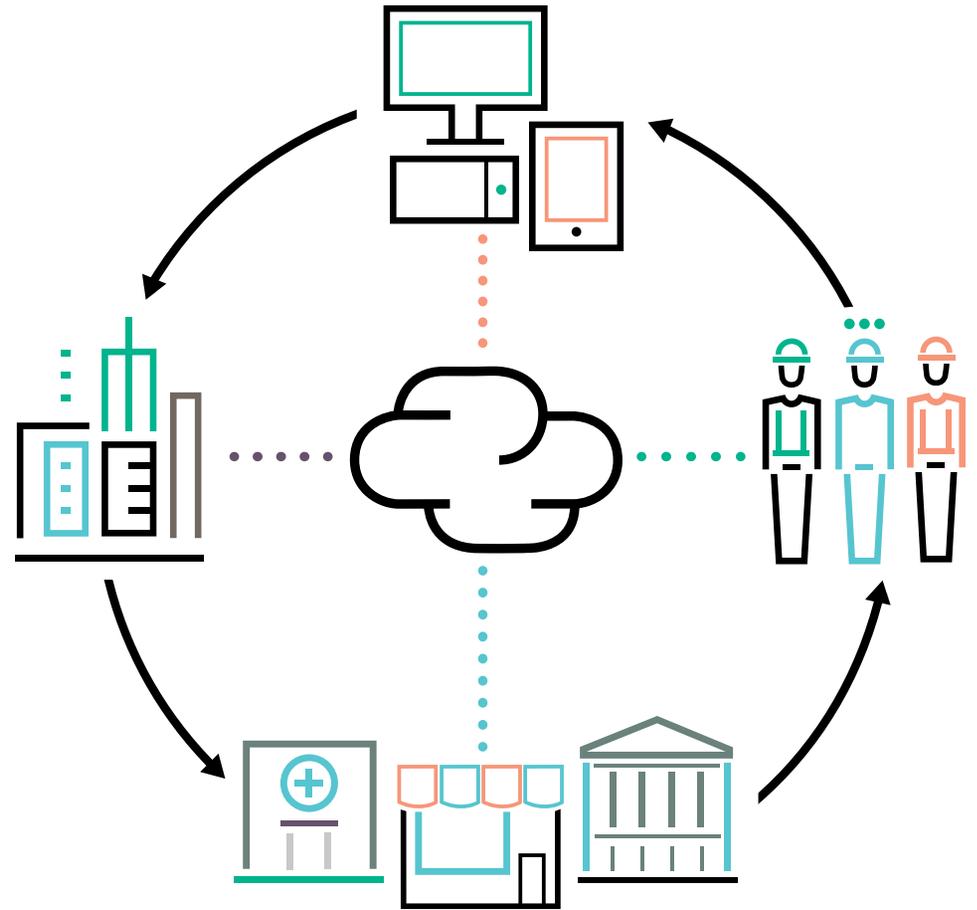
A new generation of apps and data drives a new speed of business

In today's connected world, expectations continue to grow for more engaging, personal, and seamless experiences across platforms and channels. Anything but static, these expectations can change at any given moment, depending on context.

Enterprises are capitalizing on new ways to engage with and better understand customers, due to deeper insights that drive smarter design and better experiences with less friction at every step. Businesses are also tapping machine learning, the Internet of Things (IoT), and AI to create new services and drive operational efficiencies, using predictive insights to reduce downtime and keep the business running more efficiently.

All these changes are fueled by a new generation of apps and data that reside on multiple platforms, from the data center to the cloud to the edge of the network. In this connected environment, people, places, and things converge to create new intelligent digital experiences based on massive amounts of data being collected, analyzed, and acted upon—often instantaneously.

The new generation of apps and data, working together in a connected intelligent environment, can create practically limitless possibilities—when the underlying IT is optimally designed.



Hybrid IT—the new reality for operating apps and data across multiple technologies and platforms

The answer to achieving speed and flexibility in our digital world is Hybrid IT—where traditional IT systems work in concert with private and public clouds to create the right mix of technologies to support a variety of apps, technologies, and platforms.

To simplify Hybrid IT and optimize deployments, enterprises must accomplish three things.

1 Keep the business running and address the inefficiencies of existing environments—inflexibility, legacy systems, siloes, overprovisioning, underutilization, and high capital intensity—to free resources for innovation. Today, enterprises spend a disproportionate amount of budget keeping the lights on.² In fact, 55% of IT

leaders surveyed report that the share of their IT budget dedicated to ongoing maintenance and management has increased over the past three years. Another 30% of respondents continue to spend the same amount. In total, 85% of IT organizations spend at least as much to keep the lights on as they spent three years ago.

2 Deliver new products and services faster by speeding the creation of new apps and services—using agile development, minimum viable product (MVP) strategies, containers, and as-a-service—across mobile, IoT, AI, and more, amid a growing ecosystem of partners. Faster time to market demands a more experimental development approach, which is well suited to the myriad as-a-service models available, particularly the pay-per-use models that help accelerate innovation and growth. Companies achieving growth build experimentation and innovation into everyday operations. These companies take numerous small steps with no large lurches, enabling them to readjust their processes as necessary and avoid large, costly errors.³

3 Create and deliver apps and data across multiple platforms and technologies while understanding the critical new dimensions created by operating in a Hybrid IT environment. Hybrid IT must:

- Meet control, cost, performance, and agility drivers—from the edge to the core
- Align to responsiveness requirements for both conventional and high-performance compute
- Scale to new heights, at the right performance
- Include a central learning engine designed to keep pace with an explosion of data

Headlong growth for cloud computing

According to Gartner, cloud compute services are expected to grow from **\$23.3 billion in 2016 to \$68.4 billion in 2020**. Spending on colocation and hosting is also expected to increase, from **\$53.9 billion in 2016 to \$74.5 billion in 2020**. In addition, infrastructure utility services will grow from **\$21.3 billion in 2016 to \$37 billion in 2020**, and storage as a service will increase from **\$1.7 billion in 2016 to \$2.7 billion in 2020**.⁴

² Stephen Watts, “[IT Budgeting: Top Trends for 2017](#),” BMC blog, June 2017.

³ Rita Gunther McGrath, *The End of Competitive Advantage*, Harvard University Press, 2013.

⁴ Gartner, “[Gartner Says a Massive Shift to Hybrid Infrastructure Services Is Underway](#),” April 2017.



Guide

In a nutshell...

For today's enterprises, Hybrid IT combines the delivery of applications, data, and services to not only keep the business running, but also accelerate innovation. Hybrid IT encompasses people, processes, and technology. It spans both on- and off-premises environments across the data center, private cloud, public cloud, and increasingly the edge of the network. In a Hybrid IT environment, enterprises blend capital expenditures (CAPEX), operating expenditures (OPEX), and as-a-service and pay-per-use consumption models. The result? Hybrid IT creates an agile environment that can:



Speed time to market for new products and services.



Increase flexibility to support change.



Optimize costs by running each workload in the right-fit environment.



Extend competitive advantage.

For a growing number of organizations, Microsoft® Azure® Stack—working in conjunction with Microsoft Azure—is the solution of choice for deploying a secure, compliant multicloud/Hybrid IT environment that supports both on-premises private clouds and public clouds.

⁵ Data gathered during Q2 2016.

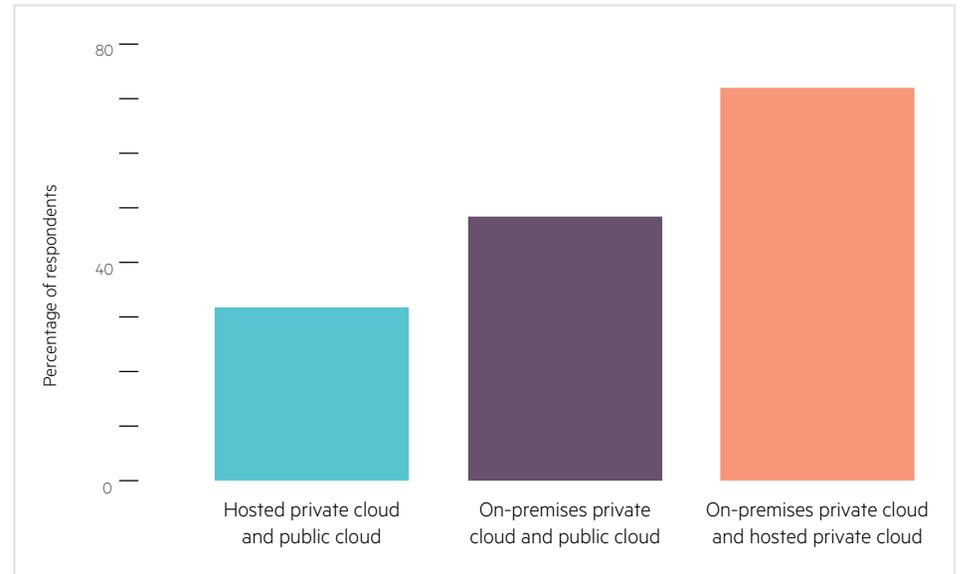


Table 1. Significant interest in cloud interoperability and deploying multicloud solutions

According to the 451 Research Market Monitor: Cloud Computing,⁵ the majority of enterprises now view cloud interoperability/Hybrid IT as an important consideration.



Your vision, your cloud, with Microsoft Azure

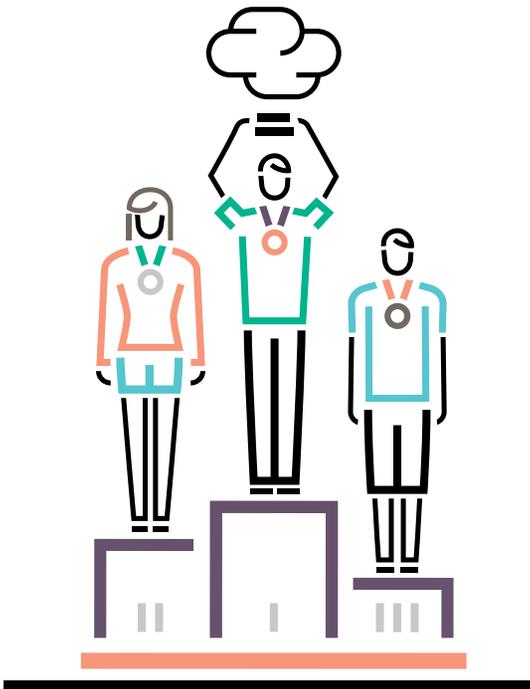
Offering a comprehensive suite of public cloud services, **Microsoft Azure** enables developers and IT professionals to build, deploy, and manage applications through a global network of data centers. Integrated tools, DevOps, and an online marketplace support efficient development of everything from simple mobile apps to internet-scale solutions.⁶

For developers, Azure helps get new apps to market faster. Azure boosts productivity by supporting integrated tools—from mobile DevOps to serverless computing—as well as supporting a range of operating systems, programming languages, frameworks, databases, and devices. Developers can build the way they prefer using the tools and open source technologies they already know. With Azure, developers can:

- Continuously innovate and deliver high-quality apps.
- Provide cross-device experiences with support for all major mobile platforms.
- Run any stack based on either Linux® or Microsoft Windows®.
- Use advanced capabilities such as a Kubernetes cluster in Azure Container Service.

For building intelligent data-driven apps, you can use Azure to create anything from image recognition to bot services. Azure data services and AI enable you to create new experiences that scale and support deep learning, high-performance computing (HPC) simulations, and real-time analytics on any shape and size of data. With Azure, you can:

- Develop breakthrough apps with built-in AI.
- Build and deploy custom AI models at scale, on any data.
- Combine the best of Microsoft and open source data and AI innovations.



⁶ Microsoft.com, "[What is Azure?](#)"



Guide

Did you know?

Microsoft Azure is experiencing strong, rapid growth in all regions of the world. In fact, more than 90% of Fortune 500 companies use Microsoft Azure Cloud. In addition:

120,00

new customers subscribe to Azure each month.

715

million customers use Azure Active Directory services.

150

billion Azure SQL query requests are processed each day.

120

billion website hits run on Azure Web App Service.



For a cloud you can trust, join the 90% of Fortune 500 companies that already use the Microsoft cloud. Take advantage of Microsoft security, privacy, transparency, and comprehensive compliance coverage. Trust Azure to help you:



Achieve global scale on a worldwide network of Microsoft-managed data centers across 42 announced regions.



Detect and mitigate threats with a central view of all your Azure resources through Azure Security Center.



Deliver comprehensive compliance coverage (70+ compliance offerings)—recognized as the most trusted cloud for US government institutions.

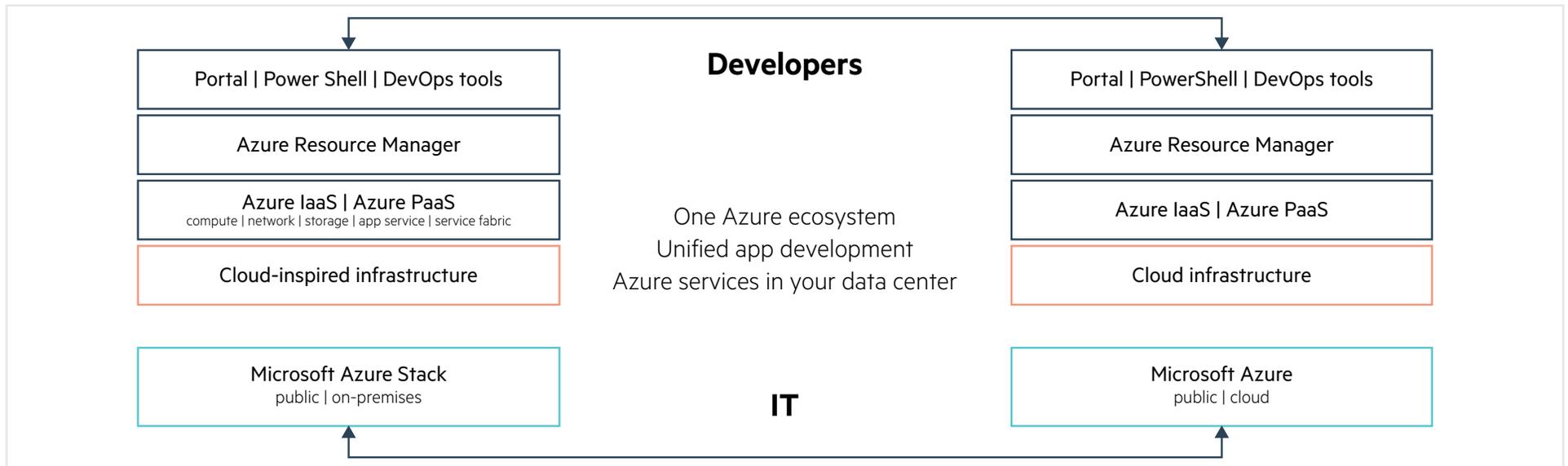


Figure 1. Software-defined, cloud-inspired Azure Stack is Azure in the data center

Microsoft Azure Stack—enabling a true hybrid cloud

Cloud adoption is growing at an exponential rate, so developing a cloud-first strategy is high on the list of practically every CIO’s agenda. Even so, many CIOs worry about moving on-premises workloads to the public cloud. They fear that placing core business functions outside the enterprise data center could create regulatory and data compliance issues. CIOs also worry about the complexity of deploying and managing a Hybrid IT environment.

To bridge the gap between private and public clouds, Microsoft developed **Azure Stack**—a new hybrid cloud platform that enables enterprises to deliver Azure-consistent services within their on-premises data centers. Azure Stack delivers the power and flexibility of Azure public cloud services, enhanced by the ability to ensure the performance and security each business requires.



Guide

For building a hybrid cloud, Azure works seamlessly with Azure Stack, enabling you to build and deploy wherever you want. To gain maximum portability and value from your existing investments, Azure enables you to connect data and apps in the cloud and on-premises. Azure offers hybrid consistency in application development, management, security, and identity management, as well as across the data platform. You can use Azure Stack to:

- **Build innovative**, hybrid apps hosted on either Azure or Azure Stack.
- **Connect on-premises** data and apps to overcome complexity and optimize your existing assets.
- **Seamlessly distribute and analyze** data across cloud and on-premises environments. In addition, Azure Stack enables enterprises to run Azure infrastructure as a service (IaaS) and platform as a service (PaaS) directly from their own data centers. This way, enterprises can maintain Azure services on their own hardware in a private or hybrid platform. Doing so eliminates numerous security concerns about running certain workloads in the public cloud.

Azure Stack resolves myriad top-of-mind cloud-related concerns:

- **Consistent hybrid** application development
- **Accelerated cloud-native** application development

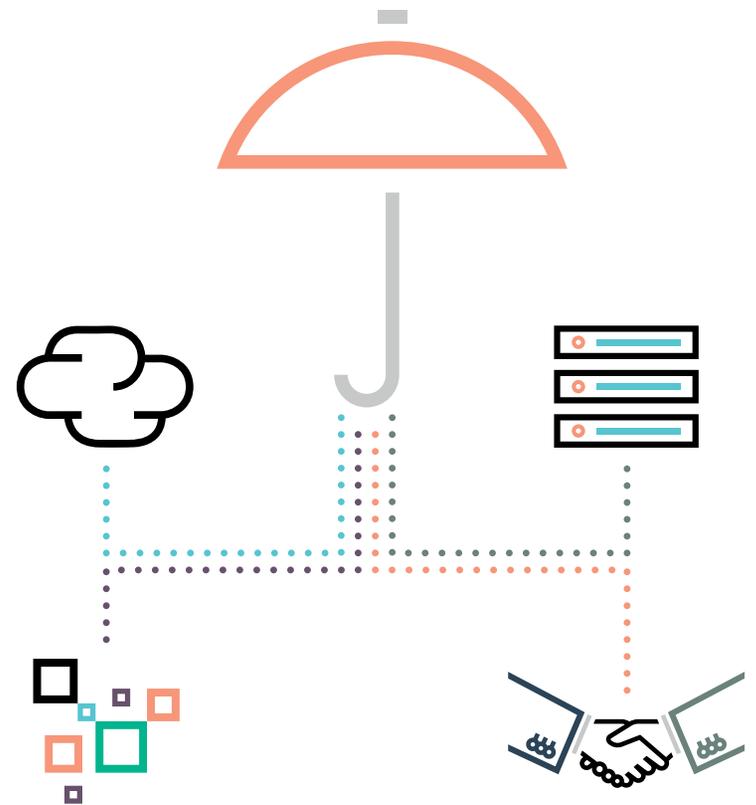
- **Protecting data** as it moves from private to public clouds
- Using a common set of **open source DevOps tools** and cross-platform development tools to boost productivity and cost-efficiency
- **Delivering Azure** public cloud services on-premises
- **Enabling live workload** migration/movement between public and private clouds—with Azure Stack you can move workloads as required for testing or meeting compliance or regulatory requirements
- Using **Azure Resource Manager** (ARM) to build application templates to automate deployment and management of network, storage, and compute resources
- Using **role-based access** control to audit resource capabilities
- **Supporting containers**, where an app can be written once and deployed anywhere
- **Boosting application adoption** by making it available in the Azure Marketplace—an online market for purchasing and selling software as a service (SaaS) applications



Better together

Working in concert, Azure and Azure Stack deliver a wide range of game-changing benefits by:

- ✓ **Extending the agility** and accelerated innovation of cloud computing to your on-premises data center
- ✓ **Integrating public and private cloud** capabilities to create a consistent, familiar user experience across workloads and environments
- ✓ **Creating, deploying, running, and scaling** applications from an open source PaaS that supports both Windows and Linux operating environments
- ✓ **Accelerating the speed** of application and service deployment
- ✓ **Using the public cloud's** pay-as-you-go pricing model in your private cloud environment
- ✓ **Supporting legacy and cloud-native** Windows and Linux applications, as well as new technologies such as containers
- ✓ **Boosting productivity** by deploying applications in the same way on both Azure and Azure Stack



Put Azure Stack to work in your hybrid cloud

While the use cases for Azure Stack will certainly evolve over time, four have resonated since the introduction of the solution.



Data sovereignty, security, and compliance

A primary allure of the cloud is its ability to standardize and simplify service delivery, regardless of physical and geographic boundaries. But with new government regulations on data sovereignty—stating that information converted and stored in digital form is subject to the laws of the country in which it is located—cloud computing’s delivery model might create new concerns for organizations operating in multiple countries. Because each country has its own data sovereignty regulations, navigating the requirements for delivering cloud services across locations can become costly in terms of time and resources.

Microsoft Azure Stack addresses the concerns of global deployments by enabling you to host different instances of the same application to Azure or Azure Stack, depending on your business and technical needs. You can develop and deploy applications in Azure, with complete flexibility to deploy on-premises using Azure Stack to meet your specific regulatory or policy requirements—without changing any code.

With Azure Stack, you can run the same service across multiple countries—as you would using a public cloud—but deploy the same application in data centers located in each country. This meets data sovereignty requirements by ensuring personal data remains within the respective country’s borders.

For example, let’s consider a fictional multinational bank where each branch has its own private cloud environment running on Microsoft Azure Stack. Each branch runs the exact same services, but in a private on-premises environment that meets the security, data privacy, and data sovereignty rules of the country in which the branch resides.

Edge and disconnected applications

A growing number of organizations runs many of their applications in the public cloud. While this approach is cost-efficient, there are some instances where an area of the business is disconnected to some or all of the corporate infrastructure for certain periods of time.



Guide

To address connectivity and latency requirements—and ensure productivity levels remain high and consistent—Microsoft Azure Stack processes data locally. Azure Stack can then aggregate the data in Azure for further analytics, sharing common application logic across both Azure Stack and Azure. This way, you receive the benefits of edge computing and cloud computing to unlock never-before-possible business value.

From factory floors to airplanes to remote offices, Azure Stack enables businesses to harness the power of truly consistent hybrid cloud technology to enable aggregated analytics and enhanced decision making.

For example, let's consider a cruise ship, which uses a mini data center to manage its onboard operations. When the ship is in port, the mini data center is connected to the main data center, but when the ship is at sea, the mini data center runs disconnected from the main data center. The mini data center collects massive amounts of data while the ship is at sea, where it performs local analysis. When the ship returns to port, the data uploads to the main data center for further analysis.



Performance

Many applications—including big data, analytics, and low-latency apps—require an infrastructure that delivers the highest performance possible. Using the public cloud to run these apps might not meet performance expectations due to latency problems created by moving information from the on-premises data center to the public cloud and back again.

When you run high-performance workloads in an Azure Stack environment, you negate latency problems because the applications run in your data center, with no back-and-forth transfer to a public cloud. Azure Stack provides the performance you need, while also keeping everything under your control.

Let's consider running quarter-end reports, when data volume is higher than usual. In this situation, it makes good sense to run your analytics application on-premises through Azure Stack, rather than run it in the public cloud. You benefit from higher performance, lower latency, and faster decision-making capabilities.



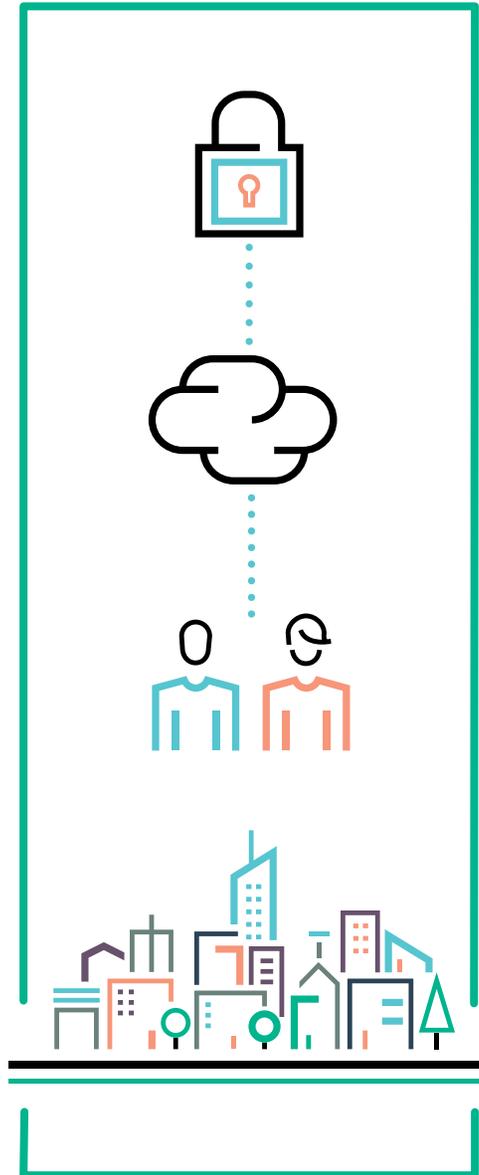
Modern application development

Numerous modern, cloud-native applications are designed to run as microservices in numerous environments. Rather than use different development tools for each microservice running in each location, developers would prefer to use a single set of consistent tools, and then deploy the application wherever it is required.

To streamline and simplify cloud-native application development, you can use Azure web and mobile services, containers, serverless computing, and microservice architectures to update and extend legacy applications with Azure Stack, while also following a consistent DevOps process in both cloud and on-premises deployments. Since Azure Stack and Azure are API-compatible, applications can be deployed to Azure public cloud or Azure Stack running on-premises—with no changes to the application.

Remember that a hybrid cloud is a blend of on-premises (private) cloud and off-premises (public) cloud environments. Orchestration between the two enables mobility of workloads between locations, depending on needs, costs, and flexibility. Across mainframe and core business process applications, Azure and Azure Stack create a hybrid cloud environment that meets your changing needs.





Right-fit platform for Microsoft Azure Stack and your hybrid cloud

As the right-fit software for running your hybrid cloud environment, Microsoft Azure Stack is only available as an integrated solution from select hardware vendors, one of which is Hewlett Packard Enterprise. To deliver a right-fit infrastructure platform running Azure Stack, HPE created HPE ProLiant for Microsoft Azure Stack.

Designed to deliver Azure-consistent services from your data center, **HPE ProLiant for Microsoft Azure Stack** delivers the largest memory capacity and highest performance—at full speed—giving you the ability to run more workloads, faster.

Built on the power of HPE ProLiant DL380 Servers, HPE ProLiant for Microsoft Azure Stack is a factory integrated, validated solution that you can customize to meet your unique workload requirements.

HPE ProLiant for Microsoft Azure Stack offers an extensive list of key features and functions:

- **Multiple configuration options**—To meet your workload requirements, you can choose from numerous configuration options, including the number of nodes (from 4 to 12, with single-node sizing), processor type, memory, and storage. HPE offers seven recommended configurations that provide an optimized balance of cores, memory, and storage.
- **Common developer experience**—You can deploy applications to either an Azure Stack private cloud or an Azure public cloud without modification. This powerful benefit makes it easier and faster to develop applications.
- **Workload portability**—Since Azure public cloud and Azure Stack are API-compatible, applications can be deployed in Azure Stack and in the Azure public cloud. You can decide where each workload should reside, according to security, regulatory, and cost-efficiency requirements.



Guide

• **Integrated systems management**—To simplify software and firmware updates and system monitoring, HPE ProLiant for Microsoft Azure Stack includes integrated system management, consisting of HPE OneView and HPE Insight Remote Support running on a separate HPE ProLiant DL360 management server.

– **HPE OneView** is an infrastructure automation engine built with software-defined intelligence. HPE OneView:

- Deploys infrastructure faster; increases reliability using template-based management
- Simplifies lifecycle operations and management tasks
- Increases productivity by consolidating management and monitoring of solution hardware

– **HPE Insight Remote Support** enables you to tap into the knowledge of millions of devices and thousands of experts. Get connected with HPE Insight Remote Support to:

- Prevent problems before they occur with system scans, health checks, and expert reviews and recommendations; speed problem resolution with automatic service request submission for detected issues.
- Solve problems faster with 24x7 real-time hardware event monitoring, secure internet event submission, and automated parts dispatch.
- Stay informed and in control using a personalized dashboard, global knowledge base, and a community of experts (HPE, partners, and peers).

• **Single-vendor support**—Regardless of which system component causes a problem—server, network switches, or software—HPE offers single-vendor support. In addition to building in HPE Proactive Care to the HPE ProLiant for Microsoft Azure Stack offering, HPE also works with Microsoft to provide Level 1 and Level 2 support for the Azure Stack software. Together, HPE and Microsoft can address any issues that might arise with the system.

• **Numerous packaging options**—To increase quality, reliability, and time to value, HPE ProLiant for Microsoft Azure Stack features factory integration with on-site installation. Rather than build the system in our factory using our rack and shipping it to your site, we can also build the system:

- In our factory using your rack and ship it to your site
- In your data center using your rack

• **Flexible financing options**—You can choose to pay as you go, lease the system, or select a capital purchase option.





Why choose HPE for your Azure Stack solution?

HPE is in the unique position to deliver not only the best product, but also the best overall solution including services, consulting, and support. Only HPE has a **long-standing partnership** with Microsoft (over 30 years), which benefits you with strong joint R&D, sales, and support to ensure the solution and deployment are exactly what you need.

With HPE, you benefit in three key areas:

- Hybrid cloud expertise
- Pay-as-you-consume pricing with HPE GreenLake Flex Capacity
- Simplicity

Hybrid cloud expertise

Unlike other vendors, HPE is not just a hardware vendor. HPE ProLiant for Microsoft Azure Stack delivers the strongest hardware platform, along with the expertise to enable you to get up and running fast. Only HPE can help you design and implement a true end-to-end hybrid cloud solution.

- With **HPE Pointnext**, you can leverage planning, migration, and operational expertise to design and implement a solution that works best for your needs and your applications.
- More than 4000 HPE experts trained on Azure and hybrid cloud technologies provide the best possible outcome for your deployments.
- Joint **HPE-Microsoft Innovation Centers** located in Bellevue and Geneva allow you to experience HPE ProLiant for Microsoft Azure Stack first hand. At the Innovation Centers, you can meet face-to-face with both HPE and Microsoft experts, test your specific workloads on the latest platforms available, and walk through deployment scenarios with the experts. This advantage is unique to HPE.

Pay-as-you-consume pricing with HPE GreenLake Flex Capacity

- **HPE GreenLake Flex Capacity** delivers a public cloud experience for on-premises IT. This HPE service delivers the capacity your business needs for success. HPE provides the on-premises infrastructure you need now, along with a “buffer” you can grow into, but don’t pay for until you use it. Your monthly payments can go up or down based on actual metered usage, and there is no upfront capital outlay. You get full support and planning for the environment, and if the buffer runs low, a simple change order replenishes it.
- Reduce costs by leveraging cloud-style economics that includes a consumption-based model. HPE GreenLake Flex Capacity gives you the cloud you need with:
 - Rapid scalability
 - Variable costs aligned to metered usage
 - No upfront expense
 - Enterprise-grade support
 - One monthly bill



Accelerate application performance and efficiency

- HPE combines solution configuration flexibility along with integrated, simplified management with HPE OneView to deliver the most efficient solution you need today.
- **HPE ProLiant for Microsoft Azure Stack** delivers the most configurable solution on the market today.
 - HPE offers greater choice with more configuration options than other solutions. As a fully customizable solution, you get to choose: the processor type that is right for the workload; memory; scalable storage capacity; support for third-party networking switches, power supplies, and rack options.

- Highest memory capacity with highest performance at full speed.
 - The HPE solution is uniquely architected to achieve both high capacity at 768 GB RAM, and high performance at full 2400 MHz memory speed, increasing memory bandwidth by up to 28%, as compared to other same-capacity solutions. This way, you can run more workloads—even faster.
- **HPE OneView** is integrated in HPE ProLiant for Microsoft Azure Stack, streamlining management.
 - HPE OneView is an infrastructure automation engine for the HPE ProLiant for Microsoft Azure Stack solution. HPE OneView unified infrastructure management capabilities enable you to closely monitor the health of your Microsoft Azure Stack solution hardware, including iPDUs. HPE OneView's powerful dashboards provide real-time status information and alerts, instrumental for tracking and maintaining the health of your solution. In addition, the HPE OneView API and broad composable ecosystem (including language bindings and expanding ecosystem of third-party integrations) provide the opportunity to integrate HPE ProLiant for Microsoft Azure Stack solution monitoring into your tool of choice.
 - HPE ProLiant for Microsoft Azure Stack leverages HPE OneView to increase reliability by integrating HPE OneView template-based management capabilities to simplify lifecycle management tasks. Each solution is deployed from the factory with an HPE OneView server profile template that has been designed and validated for use with Microsoft Azure Stack nodes.



Learn more

When the time is right to modernize your IT environment with a hybrid cloud based on Microsoft Azure Stack, trust HPE to deliver the flexibility, dependability, and scalability you need for successful solution deployment.

Contact your HPE representative today. Learn how your organization can benefit from a hybrid multicloud environment running on HPE ProLiant for Microsoft Azure Stack.

Visit

[**hpe.com/cloud/azure-stack**](https://hpe.com/cloud/azure-stack)



Make the right purchase decision. Click here to chat with our presales specialists.



Sign up for updates



Capitalize on the HPE difference

Faster return on investment (ROI) at a lower cost with lower risk

HPE ProLiant for Microsoft Azure Stack features	Your benefits
Higher memory capacity and performance with lower total cost	28% greater memory bandwidth moves workloads faster
Investment optimization	Right-sized solution to optimize your IT spend
Faster time to value	Assessment of applications to understand optimal cloud fit
Reduced operational risk	Ability to integrate Azure Stack into your IT environment
True cloud pricing model	Consumption-based subscription pricing
Investment protection	30-year HPE–Microsoft partnership for continuous innovation
Simplified management	Unified billing across the Azure hybrid cloud
Improved availability	Faster problem resolution with data center case support

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