Lenovo

THE DEFINITIVE GUIDE TO

Hyperconvergence for the Small and Medium-Sized Business

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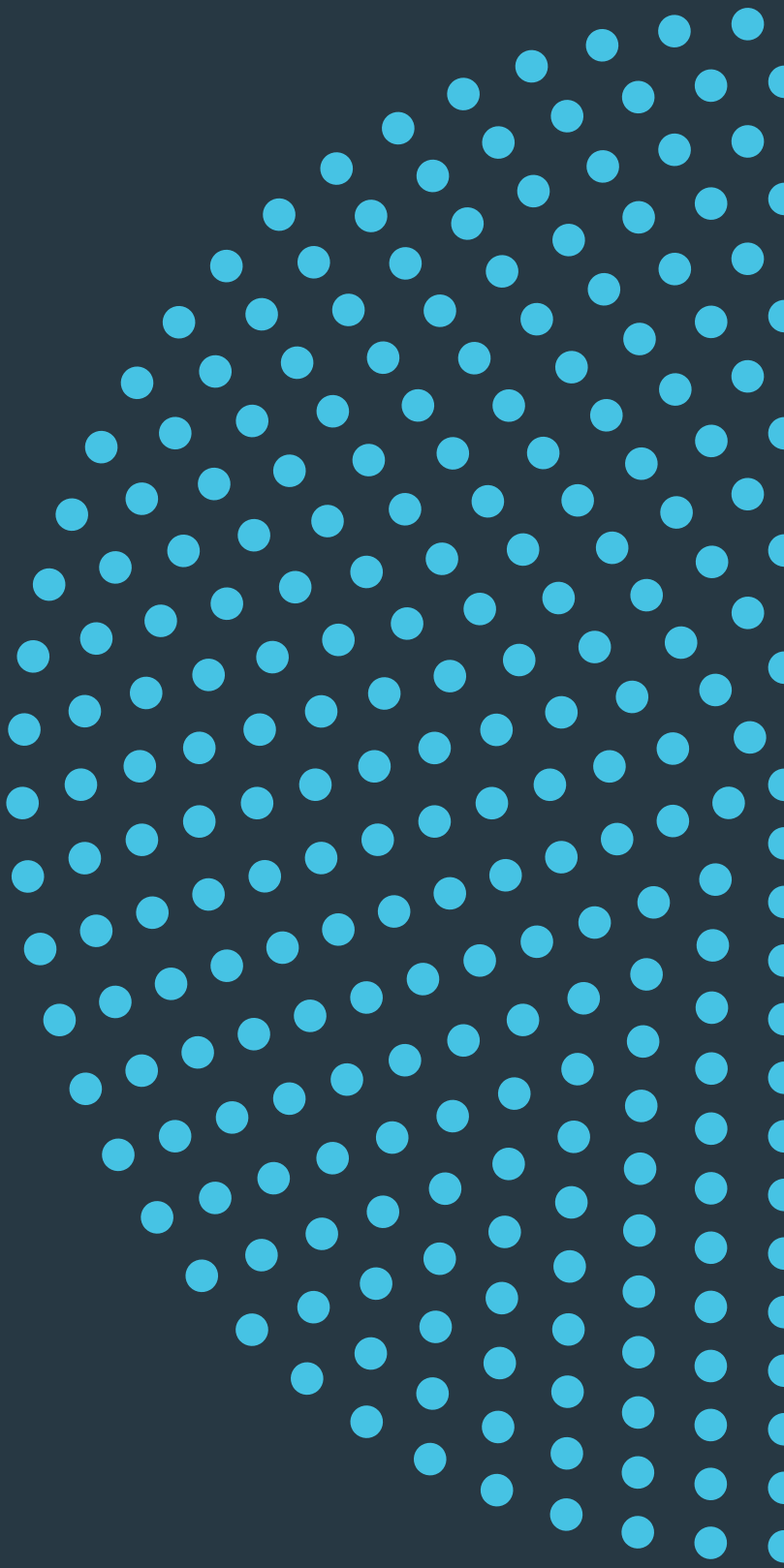
TABLE OF CONTENTS



WHAT THIS BOOK COVERS

For small and medium-sized businesses, purchasing, installing and managing IT infrastructure poses significant challenges. Existing infrastructure solutions may simply be too complicated, requiring specialized IT skills and stretching IT budgets to the breaking point.
Lenovo Converged HX 2000 Series appliances powered by Intel® Xeon® processors with integrated Nutanix Xpress edition software is a complete, turnkey solution that eliminates complicated IT integration and set-up, solving the challenges faced by smaller organizations. Simple to install and manage, Lenovo HX Series takes the risk and cost out of deploying new IT systems. A single system can support all business applications and services. This book explains the benefits of this integrated solution for the small and medium-sized business, including zero-cost virtualization options and affordable options for disaster recovery.

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Unique IT Challenges for Small and Medium-Sized Business

When it comes to IT, many small and medium-sized businesses find themselves in a tough position. You need the same IT services as larger companies, but providing those services can be more challenging for a number of reasons:

- **Complexity.** Traditional IT infrastructure is assembled from multiple suppliers and different technologies, making it complex and fragile. Standalone servers, dedicated data backup products, and add-on virtualization can be difficult for smaller companies to deploy and maintain. Troubleshooting may require calls to multiple vendors—a waste of valuable time.

- **Lack of specialized skills.** Traditional IT infrastructure requires specialized technology skills that are often scarce. This is a real challenge for smaller companies where there may be only a few IT staff members and everyone has to wear many hats.

- **Tight budgets.** Making significant investments in new technology can be difficult or even impossible, but your existing infrastructure may be expensive to maintain and unable to support future business growth. Inability to gain the same technology advantage as larger competitors puts your business at a disadvantage.

If the above challenges sound familiar, you'll be happy to learn that there is an easier way for small and medium-sized businesses to maximize IT investments: **Lenovo HX 2000 Series appliances with integrated Nutanix Xpress software.**

You may already have heard about hyperconverged infrastructure and how it radically simplifies IT. As a pioneer and acknowledged leader in hyperconvergence, Nutanix created the Xpress platform, now integrated with Lenovo HX 2000 Series appliances powered by Intel® Xeon® processors to meet the needs of the small and medium-sized business, simplifying your IT infrastructure, reducing the need for specialized skills, and helping you live within your budget, while freeing up your IT staff to focus on satisfying business needs. This integrated solution makes on-premises infrastructure as simple to consume as public cloud services.

WHAT IS HYPERCONVERGED INFRASTRUCTURE?

Hyperconverged infrastructure natively integrates compute and storage into a single turnkey x86-based system that reduces power and space, and dramatically eliminates storage complexity, making IT infrastructure as easy to consume as public cloud services.

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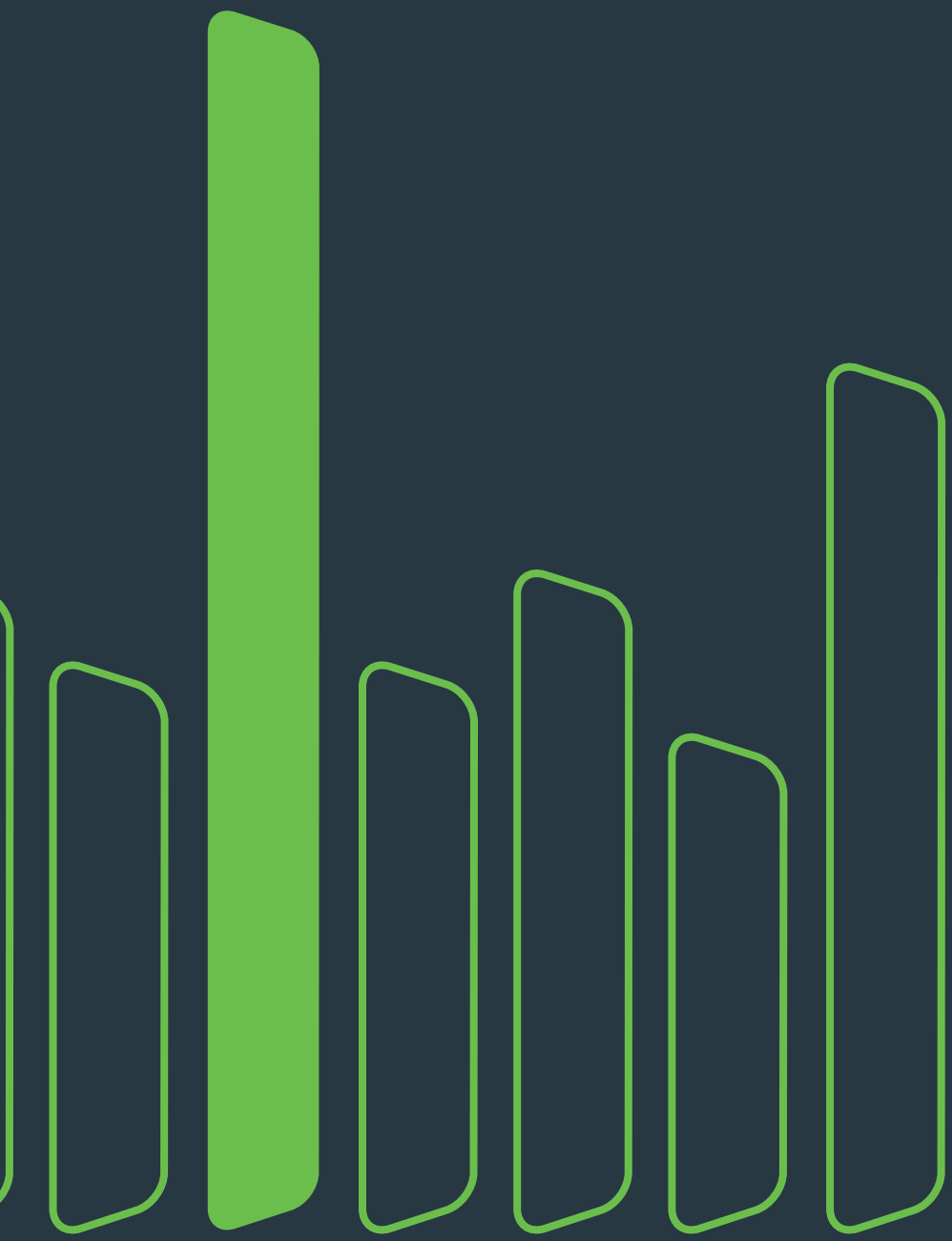
MEETING THE IT NEEDS OF THE SMALL AND MEDIUM-SIZED BUSINESS

Wouldn't it be great if a single IT solution could:

- Simplify IT to make it as easy to consume as public cloud services?
- Reduce the cost of purchasing, installing, and managing infrastructure?
- Streamline backups and enable disaster recovery?
- Run your full set of applications without dedicated or specialized hardware?
- Increase application availability?

Lenovo HX 2000 Series appliances powered by Intel® Xeon® processors and Nutanix Xpress software do all this and more, elevating IT to focus on adding business value.



Hyperconverged Infrastructure

Conventional IT architecture—with separate servers and storage arrays connected by a storage network—originated at a time when compute power was growing at a much faster rate than the I/O performance of storage devices.

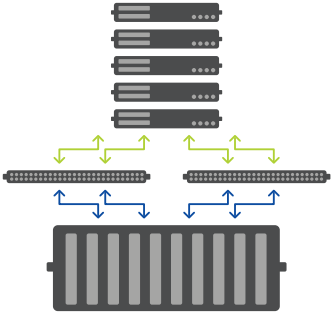


Figure 1. Conventional IT infrastructure—with separate servers, storage networks and storage—is complex and difficult to deploy and manage

To deliver adequate I/O performance, you needed a lot of hard disk drives (HDDs). Putting them in a separate array—with RAID for resilience—and connecting the array to a network created a resource that could be shared.

By the late 1990s, this had become the entrenched way of doing things. However, three important developments have occurred since then:

- **Standard servers** based on Intel processors have become the dominant computing platform.
- **Server virtualization** has enabled multiple applications to share server resources efficiently, simplifying server and application management.
- **Solid-state disks (SSDs)**, built using flash memory, deliver far greater performance than HDDs and have come down in price.

These are key components of hyperconverged infrastructure. Commodity servers with internal SSDs for performance and HDDs for capacity are an ideal platform for virtualized applications, challenging the logic of the traditional approach.

SSDs PROVIDE STORAGE PERFORMANCE

A single SSD provides as many I/O operations per second (IOPS) as hundreds of HDDs and streams data at 500MB/sec or more. Placing an SSD in each server puts the storage closer to the application for lower latency and more predictable performance. By now, most of you have probably had the experience of moving from a desktop or laptop with an HDD to one with an SSD. The effect of an SSD on a server is similar. From an I/O standpoint, installing an SSD in a server is like giving each server the resources of a dedicated storage array—but with latency measured in micro-seconds. And without the complexity that comes along with sourcing, deploying, and managing separate storage arrays and storage networks.

> **"The convergence of high-performance flash storage with hyperconverged platforms is the next leap forward in the evolution of data storage. While these two technologies have already demonstrated their relative merits in the market, the combination of flash and hyperconvergence is more than just an accretive blending of benefits; it provides a transformative value boost because the strengths of flash amplify the benefits of hyperconvergence and vice versa."**
> *451 Research*[1]

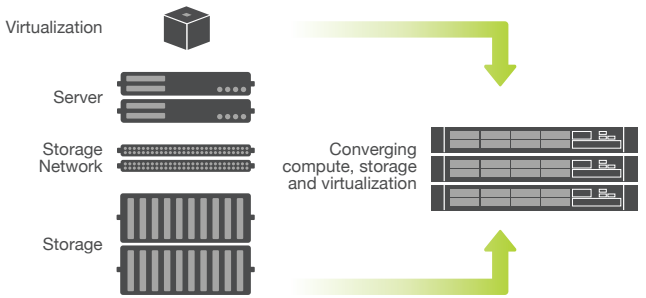


Figure 2. Hyperconverged infrastructure integrates, storage, storage networking, servers, and virtualization in simple-to-deploy and simple-to-manage building blocks

VIRTUAL MACHINE (VM) AWARENESS

In all likelihood, your company is either on the path—or trying to get on the path—to server virtualization. Virtualization offers significant and well-documented advantages for applications including easier management, higher availability, and better utilization of server resources.

However, if you look at popular virtualization solutions such as VMware vSphere, you'll see that a lot of the development effort has been focused on dealing with the vagaries—and limitations—of network storage. Most storage solutions on the market are based on technology that predates the rise of virtualization. Hyperconverged infrastructure has its roots in the virtualization era. Nutanix Xpress has been designed to provide VM-centric data services that work with multiple hypervisors and simplify the operation of virtual environments.

100% SOFTWARE-DEFINED

The final component of hyperconverged infrastructure is intelligent software that allows multiple servers to operate as a coordinated system. Nutanix enables the storage from multiple servers to be managed as a single, flexible storage pool with superior resilience and advanced services. Xpress solutions provide the same or better sharing and resiliency as a storage array, with higher performance and lower cost and complexity.

WHAT HYPERCONVERGENCE MEANS FOR YOUR BUSINESS

If you're using separate servers and storage, Lenovo HX 2000 Series appliance running Nutanix Xpress software will consolidate and simplify your hardware environment. All management tasks are greatly simplified, and most companies find they reduce rack space requirements by up to 70% and power requirements by up to 50%.

If you rely on servers with direct-attached storage, you likely face constant challenges with capacity planning, provisioning, and backups. By creating a single, flexible pool of storage, Lenovo HX 2000 Series with integrated Nutanix Xpress software simplifies provisioning, data management, and backup tasks, leaving your IT team with more time for strategic tasks that help your business succeed.

In either case, big savings result from simplified purchasing and installation, improved system availability, and reduced management overhead. End users will notice improvements in both performance and availability, making employees more productive and improving the experience of your customers.

WHO IS NUTANIX?

In today's dynamic business environment, IT plays a larger role in businesses of all sizes and types. Nutanix was founded with the goal of simplifying IT infrastructure and reducing routine management, elevating IT teams to focus attention on critical applications and processes. Nutanix has developed a deep engineering, sales and support partnership with Lenovo to offer customers as a tightly integrated scale-out appliance. The resulting Lenovo HX 2000 Series hyperconverged appliance carries forward Lenovo's renowned product reliability and customer satisfaction. Throughout this book, you'll see case studies of small and medium-sized business customers who have transformed their IT operations—and their businesses—**with Lenovo and Nutanix.**

By combining industry-standard hardware with innovative software—and focusing tirelessly on customer needs and customer service—Lenovo and Nutanix have created a new and simpler kind of IT infrastructure, designed to propel IT into the next era of computing. The Lenovo Converged HX Series powered by Intel® Xeon® processors and Nutanix Xpress edition software offer the agility of the public cloud, without sacrificing security, predictable costs, or high levels of service.

Compared to traditional infrastructure, this solution is easier and faster to source, simpler to deploy and manage, easier to upgrade and scale, more reliable, and more economical. Eliminating management tasks, simplifying data protection, and increasing availability minimizes your operational expenses for significant ongoing savings.

Nutanix is the acknowledged front runner in hyperconverged infrastructure. More than 4,000 organizations across nearly all industries, including retail, finance, healthcare, professional services and more, rely on Nutanix software:

- Gartner positioned Nutanix as a leader in its 2016 Magic Quadrant for Integrated Systems
- IDC named Nutanix a leader in its MarketScape report on the global hyperconverged infrastructure market Hyperconverged infrastructure is changing the face of IT, and Nutanix is uniquely positioned to help small and medium-sized businesses take the first step toward the IT of the future.

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[1] 451 Research, Pathfinder Report: All-Flash Datacenter — Hyperconvergence and Web-scale, 2016.
[2] Gartner, Magic Quadrant for Integrated Systems, 10 October 2016
[3] IDC, IDC MarketScape: Worldwide Hyperconverged Systems, 2014

Introducing Nutanix Xpress

The Lenovo HX 2000 Series with Nutanix Xpress edition software is designed to address the IT needs of small and medium-sized businesses through simple, risk-free deployment, ease of management, and lower total cost of ownership (TCO).

TAKING THE RISK OUT OF INFRASTRUCTURE DEPLOYMENT

By packaging together servers, storage, and virtualization in a space-saving solution, Lenovo HX 2000 Series takes the risk out of deploying new hardware. Software-defined infrastructure natively converges storage, compute, data protection, and virtualization, making Lenovo simpler for smaller companies to install, manage, and support.

LENOVO HX 2000 SERIES POWERED BY NUTANIX XPRESS

Lenovo HX 2000 Series appliances are available in 1U 1-node, and 2U 4-node form factors with pre-integrated Nutanix Xpress software which contains a rich set of features optimized for small and medium businesses (SMBs).
The Lenovo HX2310-E appliance can be configured in a 3x or 4x 1U nodes cluster, while with Lenovo HX2710-E contains four servers nodes in only 2U. The appliances come as configure to order to provide the right mix of cores, memory, and storage resources to support your application needs. Servers communicate with each other over GbE or 10GbE network connections.

Figure 3. Lenovo HX 2000 Series appliances with Intel® Xeon® processors

Because Lenovo HX 2000 Series powered by Nutanix Xpress software is a fully integrated, turnkey solution, it eliminates complicated IT integration and setup. Built-in hardware and software redundancy saves space, simplifies management, and ensures reliability; world-class support for your entire infrastructure stack is just a phone call or email away.

NUTANIX XPRESS RESILIENCY AND SELF-HEALING

Unlike traditional infrastructure with dual-controller storage and RAID, Nutanix Xpress software integrated with Lenovo HX Series appliances takes a different approach to resiliency. Two copies of all data are stored, with each copy on a different Lenovo HX 2000 Series node. Should a drive fail, the data it contains is accessible from the other nodes with little or no decrease in performance. The solution self-heals, using spare capacity to create new copies and restore full redundancy. Because copying is much faster than RAID reconstruction, full resiliency is restored quickly.

Should a Lenovo HX 2000 Series node fail, its virtual machines are restarted on other nodes and alternate data copies are accessed. Full redundancy is restored automatically in the background, even before the failed hardware is replaced.

As a small or medium-sized business, you may not have staff available 24/7 to respond to hardware failures. Self-healing protects your data and your business—even when no one's around.

FULL INFRASTRUCTURE SUPPORT FROM A SINGLE VENDOR

With traditional IT infrastructure, you could end up with support contracts with three or more vendors. When a problem arises, you first have to determine which vendor to call. Because Nutanix supports the entire infrastructure, including virtualization and many popular applications, support is simplified and finger-pointing among vendors is eliminated. One call gets you the help you need, saving time and accelerating problem resolution.

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EASY TO INSTALL AND MANAGE

One of the biggest advantages of the Lenovo HX 2000 Series appliance with integrated Nutanix Xpress software is that it makes on-premises infrastructure as simple to consume as public cloud services. The solution can be installed, configured, and ready to run virtualized applications in 60 minutes or less.

ONE-CLICK NON-DISRUPTIVE UPGRADES

Unlike most other solutions on the market, Nutanix Xpress allows software, hypervisor, and firmware upgrades through a simple and non-disruptive process that can be performed with a single click. If you've ever wasted a weekend, you'll understand the value immediately. Nutanix eliminates the need for planned downtime and takes the pain out of upgrade planning.

ELIMINATES THE NEED FOR SPECIAL SKILLS

Lenovo HX 2000 Series reduces the need for specialized IT skills. Eliminating separate storage arrays and storage networks—with complicated LUN provisioning, zoning, and masking—greatly simplifies your IT environment. Almost anyone can quickly learn to manage storage with the platform.

Virtualization is also greatly simplified, especially for those who choose to run Nutanix AHV. Xpress makes it simple for your business to take advantage of all the benefits of virtualization without having to spend a lot of time and money on staff training or hiring consultants with special skills. (Virtualization is discussed further in a later chapter.)

Small IT teams can cross-train to handle all aspects of Lenovo HX Series appliance management, so there's less reliance—and less pressure—on one or two key individuals in an organization.

SIMPLIFIES THE MANAGEMENT ENVIRONMENT

Among the biggest challenges with traditional infrastructure is a painful and disjointed management experience. Servers, storage systems, and storage networks come with their own management tools, and you have to be an expert on both the technology and the tools to use them effectively. Lenovo HX 2000 Series appliance incorporates management as part of a complete solution.

The Nutanix Prism management platform delivers consumer-grade simplicity to IT management and makes it easy to keep infrastructure up and running. Powered by advanced data analytics and heuristics, Prism streamlines common IT workflows, providing a single interface for managing servers, storage, data protection, and virtualization. Prism makes configuring, monitoring, and managing Xpress solutions remarkably simple. One-click management reduces the administrative burden and the potential for operator error.

Figure 4. Nutanix Prism lets you manage the entire infrastructure stack. Rich data and analytics support decision-making

One-click software upgrades. A consistent pain point for any IT environment is keeping system software and firmware up to date. IT administrators spend countless evening and weekend hours on upgrade tasks.

By taking advantage of the fully distributed architecture of Lenovo HX 2000 Series appliances running Nutanix Xpress, Prism takes the pain and disruption out of upgrades, allowing them to be executed during normal business hours. Intelligent software does all the heavy lifting, eliminating the need for detailed upfront planning.

Nutanix operating software installed on Intel-based Lenovo HX Series is updated using a rolling methodology. While a node is being upgraded, the virtual machines on that node continue to run uninterrupted, accessing data from the other nodes in the cluster.

Hypervisor upgrades are similarly painless. To accomplish the upgrade, Prism temporarily live migrates running VMs to other nodes as each node is rebooted with the new hypervisor software.

One-click remediation. In the event of alerts or failures, Prism suggests remediation actions that you can initiate to correct problems quickly. With one-click remediation, the mean time to repair and restore services is greatly reduced, significantly improving availability.

PRISM IS HIGHLY AVAILABLE BY DESIGN

Because Prism runs on every node in a Nutanix Xpress cluster, there are no external servers or databases to configure. Unlike other management products, Prism is always highly available. You don't have to deploy and manage extra VMs to ensure it remains accessible.

LENOVO XCLARITY

Lenovo XClarity simplifies lifecycle management for HX hyperconverged systems. XClarity automates identification and handling of faults, calling home to open support tickets on serviceable events, and maintaining firmware compliance. XClarity is built with open REST APIs to make it easy to integrate into external IT applications, to help manage HX systems from familiar tools.

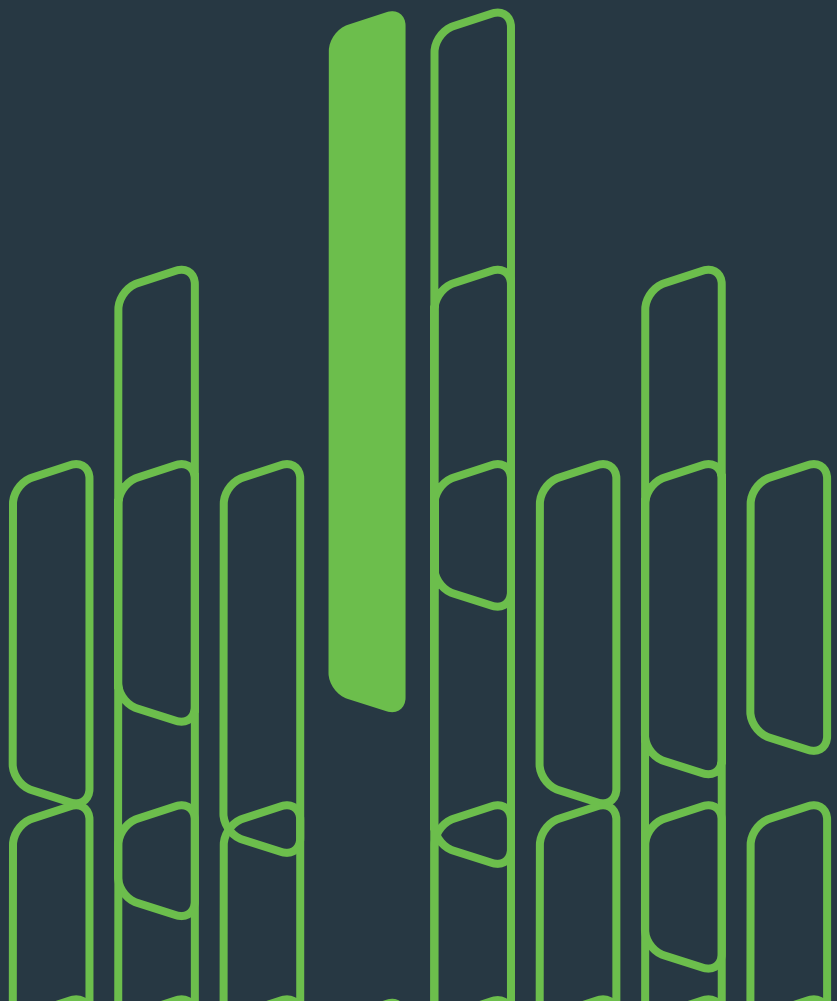
REDUCES TOTAL COST OF OWNERSHIP

Lenovo HX 2000 Series appliances powered by Nutanix Xpress software help you stretch your IT budget by decreasing the time needed to source hardware and reducing the cost of purchasing and managing infrastructure. Because of the simplicity and power of Prism, a single IT generalist can manage the solution, reducing operating costs. Total cost of ownership (TCO) is up to 2.5X less than for comparable traditional infrastructure.

A recent ESG study looked at Lenovo HX and Nutanix customers who either migrated workloads from conventional infrastructure or deployed new workloads on Nutanix. ESG measured a 3-year ROI of 387%, with savings and benefits totaling over $3.2M. The average reduction in time spent managing a Nutanix environment was 70%. This is the result of decreases in deployment time, total management time, and application-related productivity gains.

[1] ESG Economic Value Validation Report, Quantifying the Value of Simplified IT Infrastructure with Lenovo Converged HX Series, December 2016.

Figure 5: A recent ESG study identified significant ROI and operational time savings improvements versus traditional infrastructure



TOP TEN ADVANTAGES OF LENOVO HX 2000 SERIES RUNNING NUTANIX XPRESS

1. **SIMPLE TO MANAGE.** Makes IT infrastructure as simple as public cloud services, eliminating the need for specialized storage and virtualization skills.
2. **RUNS ALL APPLICATIONS.** A single Lenovo HX 2000 Series system powers nearly any business application or service, using the same hyperconverged technology as hundreds of Global 2000 companies
3. **REDUCES COSTS.** Efficient hyperconverged infrastructure combines zero-cost virtualization with intuitive consumer-grade management, reducing TCO of IT infrastructure up to 2.5X.
4. **ELIMINATES RISK.** A fully integrated, turnkey solution eliminates complicated IT integration and set-up, enabling IT teams to focus on enhancing business services.
5. **FUTURE-PROOFS IT.** Frees applications from vendor lock-in. Move virtual machines between on-premises and cloud environments.
6. **DECREASES STORAGE COMPLEXITY.** Eliminates the need for separate storage systems and the complexity of managing disks, RAID, and LUNs.
7. **DELIVERS PREDICTABLE PERFORMANCE.** Get optimal performance for critical apps right out of the box. No complex configuration or tuning.
8. **PROVIDES BUILT-IN RESILIENCY.** Ensures that applications can always access data by eliminating single points of failure, providing highly available virtualization, and performing ongoing data integrity checks.
9. **IMPROVES BACKUP AND DISASTER RECOVERY.** Simplifies backup and restore and makes disaster recovery affordable and effective.
10. **FEATURES WORLD-CLASS SERVICES AND SUPPORT.** A single call reaches support for the entire infrastructure stack: servers, storage, virtualization, and more, eliminating vendor finger-pointing.

Nutanix Xpress Virtualization

Server virtualization divides up the resources of a physical server to create multiple isolated virtual machines or VMs. Most small and medium-sized businesses have started down the path of server virtualization, but may still have significant work to do to complete the process. The move to virtualization entails some cost and deployment hurdles that can be harder for small IT teams to overcome. However, once you make the transition, virtualization provides significant advantages in efficiency, cost, availability, and overall business agility that are impossible to ignore.

For no-compromise virtualization, Nutanix Xpress edition software provides AHV, included as part of your Lenovo HX 2000 Series appliance purchase with no additional licensing costs. AHV was designed specifically for hyperconvergence. Nutanix Xpress also provides full support for the two most commonly deployed hypervisors: VMware vSphere and Microsoft Hyper-V.

NUTANIX ACROPOLIS HYPERVISOR [AHV]

Other hypervisors were designed for the traditional IT infrastructure model and were built to accommodate thousands of combinations of servers, NICs, and drivers as well as network storage. AHV was built from the ground up to provide a much simpler and more scalable hypervisor and management platform by leveraging Nutanix software intelligence. AHV liberates virtualization from the domain of specialists—making it simple and easily manageable by almost anyone—a significant advantage for small IT teams. AHV is based on the proven Linux KVM hypervisor and has been hardened to provide stringent security. It is designed to take advantage of the intelligent storage services of Nutanix Xpress software.

Because all Xpress data services such as snapshots, clones, provisioning, and data protection are performed at VM granularity, AHV is much leaner than other hypervisors.

LIVE MIGRATION

AHV Live Migration lets you move a VM from one host to another while the VM is powered on without disrupting application activity.

HIGH AVAILABILITY

High availability is built into AHV, not a premium option you have to pay more for. Out of the box, a Lenovo HX 2000 Series solution running AHV provides best-effort high availability. It automatically responds to node failures by restarting VMs on healthy nodes as long as there is available capacity. When VM-HA is explicitly enabled, the AHV software reserves failover capacity to ensure that HA is available to all powered-on VMs.

VM-HA minimizes the need for configuration but offers fine-grained control for advanced users. You can enable/disable HA on a per-VM level, specify the relative priorities to restart VMs in case of a node failure, and manually override policies.

> **BUILT-IN HIGH AVAILABILITY**
>
> AHV delivers high availability with minimal configuration and no additional software purchase. When a node fails, VMs are automatically restarted on other nodes in the cluster.

VMWARE VSPHERE AND MICROSOFT HYPER-V

VMware vSphere and Microsoft Hyper-V benefit greatly from the simplicity of Intel-based Lenovo HX Series infrastructure. The Nutanix software functions mentioned in this book are largely transparent to these hypervisors. All performance acceleration, capacity optimization, and data protection features can be used with these hypervisors.

Nutanix supports the VMware API for Array Integration (VAAI) as well as offloaded data transfers (ODX) for integration with Hyper-V.

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TOP 10 ADVANTAGES OF DEPLOYING APPLICATIONS ON NUTANIX AHV

1. NATIVELY INTEGRATED
2. NO ADDITIONAL LICENSING COSTS
3. BUILT-IN HIGH AVAILABILITY
4. TIGHTER QUALITY ASSURANCE
5. DRAMATICALLY REDUCED ATTACK SURFACE FOR SECURITY
6. BUILT ON PROVEN OPEN-SOURCE TECHNOLOGY, NUTANIX-HARDENED
7. LEANER INFRASTRUCTURE STACK, WITH NO HYPERVISOR BLOAT OR SHELFWARE
8. UP TO 80% LOWER VIRTUALIZATION COSTS
9. INTEGRATES VIRTUALIZATION MANAGEMENT WITH INFRASTRUCTURE MANAGEMENT
10. INTELLIGENT STORAGE SERVICES TO PROTECT DATA

Flexible, High-Performance Data Services

With both network storage and direct-attached storage, the complexity of data management and performance tuning create constant challenges, especially when your IT team is just one or two people. Nutanix Xpress software running on the Lenovo HX 2000 Series provides a Distributed Storage Fabric (DSF) that delivers reliable, high-performance data services for every VM, eliminating the need for constant tuning and streamlining the overall operating experience.

DSF pools all SSD and HDD storage across all HX 2000 Series and exports it to the virtualization and application layer, providing SAN and NAS capabilities without the complexity of a separate storage array. Hypervisors, VMs, and applications have access to VM-centric, software-defined services, including replication for high availability and disaster recovery, VM snapshots, clones, and more. DSF also includes native support for deduplication and compression. These capabilities simplify data management, protect the availability of critical applications, and significantly reduce the total amount of storage you need.

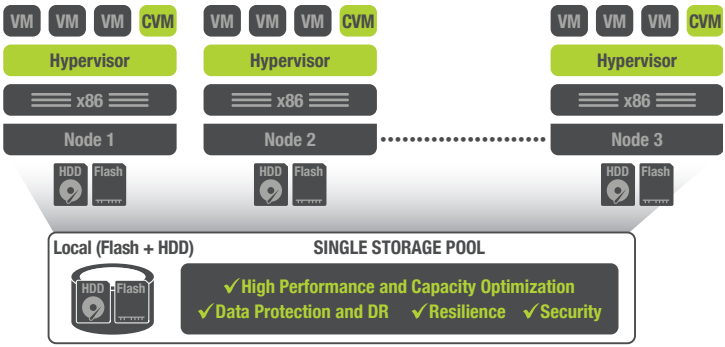


Figure 6: Distributed Storage Fabric uses intelligent tiering and data locality to optimize performance

THE PERFORMANCE OF FLASH WITH THE CAPACITY OF DISK

The Lenovo HX 2000 Series appliances use SSD storage for high-performance and HDDs for capacity. DSF distributes data intelligently across these tiers to deliver optimum performance for every application. It adapts automatically to workload changes, so you don't have to spend valuable time tuning performance.

Data access patterns are continually monitored and data placement is optimized. A VM's data is stored on the node where the VM is running. This data locality ensures predictable performance and low latency. When a VM is moved from one node to another, the data automatically follows the VM in the background. DSF delivers excellent random read/write performance for transactional workloads such as databases and excellent sequential read/write performance for streaming workloads.

ALL-FLASH PERFORMANCE WITHOUT THE EXPENSE

Nutanix VM Flash Mode allows you to support high-priority work-loads—such as critical databases—alongside other workloads on the Lenovo HX 2000 Series by pinning specific VMs in the SSD tier so that they are only stored in flash. This gives you fine-grained control over I/O performance. For instance, you might pin all database transaction logs in flash or a set of hot tables. Or you might pin financial data in flash during quarter-end reporting.

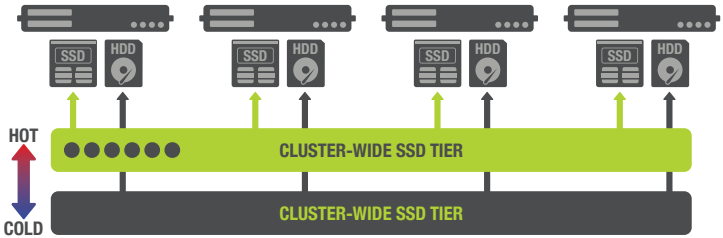
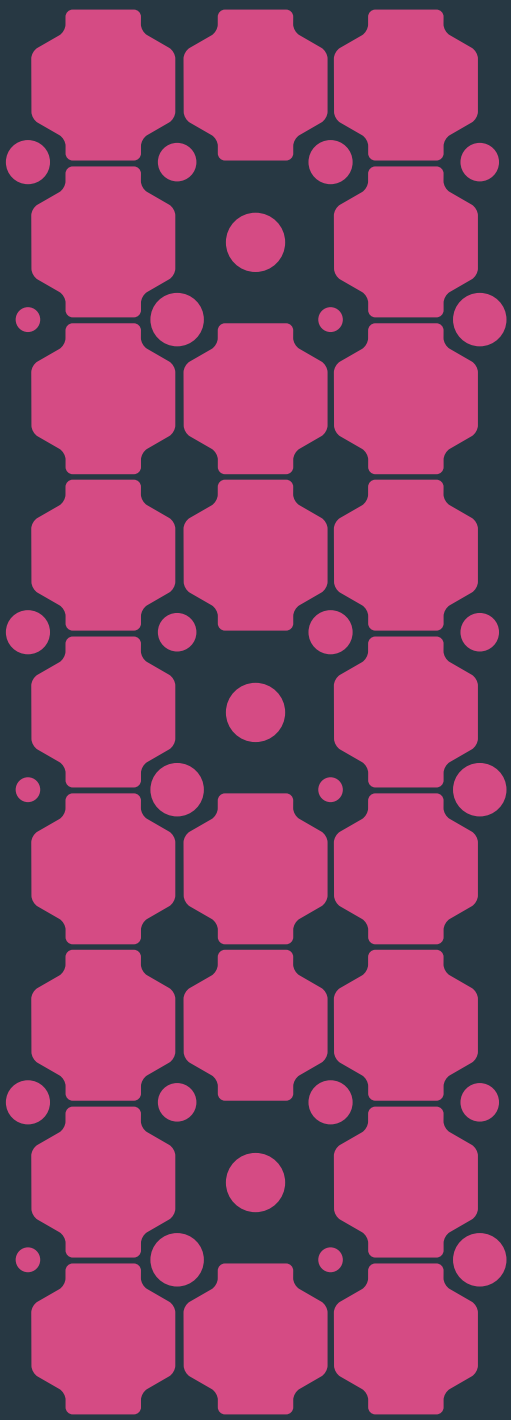


Figure 7: VM Flash Mode allows individual VMs or vDisks to be "pinned" in the cluster-wide SSD tier for maximum IOPS and low latency

> **"Hyperconverged systems shorten the I/O path from the application to the storage, resulting in significantly lower latencies than network storage can deliver."**
> *IDC*[5]

[5] *IDC Technology Spotlight: Optimizing Flash for the Most Demanding Application Requirements, April, 2015 (IDC #253267)*



Connecting to the Cloud

Small and medium-sized businesses are attracted to the simplicity and flexibility of the cloud and are adopting cloud at a rapid rate. But if you haven't adopted cloud services yet, it can be difficult to figure out how to get started and how to integrate with your on-premises IT systems.

Hyperconverged infrastructure solutions facilitate moving workloads into the cloud. Nutanix Xpress running on Lenovo HX 2000 Series with latest Intel® Xeon® processors supports the ability to back up to the cloud using Cloud Connect.

Cloud Connect lets you use public cloud services, such as Amazon Web Services (AWS) and Microsoft Azure, as a long-term backup destination for all types of workloads, making the cloud a logical extension of Lenovo HX cluster. Cloud Connect allows you to back up to and recover from the cloud with just a few clicks.

WHAT IS A NUTANIX ENTERPRISE CLOUD?

You want the agility, simplicity, and pay-as-you-grow economics of the cloud, but you still need the security and control of on-premises infrastructure. A Nutanix-based Lenovo HX 2000 Series enterprise cloud gives your small or medium-sized business the best of both worlds. You gain the agility advantages of the public cloud, including fast provisioning and fractional IT consumption, without sacrificing security, predictable long-term costs, or service levels. An enterprise cloud has four key elements:

- **Simple infrastructure.** 100% software-defined, resilient, and distributed, delivering predictable performance for a wide range of applications
- **Control fabric.** Consumer-grade design leverages machine intelligence, extensive automation, and rich analytics
- **Mobility.** Applications can be deployed in a variety of virtual and cloud environments and moved between environments as needs change
- **Security-first design.** Security is not bolted on, but is an integral part of the architecture

Backup/Restore and Disaster Recovery

The complexity and cost of data protection is a particular challenge for many smaller IT teams who often make due with a variety of backup solutions with offsite tape storage for disaster recovery. Nutanix Xpress software running on Lenovo HX 2000 Series includes integrated VM-centric data protection to help you protect your business operations against component failure, node failure, or a site-wide outage.

All Nutanix data protection capabilities are based on efficient VM-centric snapshots that provide production-level data protection without sacrificing performance. Integrated Lenovo HX Series solution provides data protection and greatly simplifies your infrastructure to eliminate bottlenecks, streamline management, and reduce costs.

Lenovo HX 2000 Series running Nutanix Xpress software helps make replication—a priority for many small and medium-sized businesses—an affordable option for disaster recovery.

DATA PROTECTION API SUPPORT AND PARTNER INTEGRATION

Nutanix solutions integrate with popular offload capabilities, including VMware API for Array Integration (VAAI) and Microsoft Offloaded Data Transfer (ODX) to create clones in a matter of seconds with minimal overhead.

Additionally, with support for vStorage API for Data Protection (VADP) and application-level consistent snapshots using Volume Shadow Services (VSS), Nutanix backup and DR capabilities integrate with third-party tools such as Symantec NetBackup, Veeam, Commvault and VMware SRM. Commvault IntelliSnap integration combines Commvault backup capabilities with enterprise storage features from Lenovo HX 2000 Series.

LOCAL AND REMOTE BACKUP AND RESTORE

Nutanix Xpress running on Lenovo HX 2000 Series provides snapshots as the first line of defense and the fastest and most convenient recovery point for application problems or user errors. Remote backup lets you replicate these snapshots to a second Xpress system at a second location for longer-term retention and site-level resilience.

SELF-SERVICE FILE RESTORE

Lenovo HX 2000 Series data protection using Nutanix Xpress software includes self-service file restore, which allows users to recover individual files from VM snapshots without getting an administrator involved. Self-service file restore is easy to set up and manage and in most cases eliminates the need to recover an entire VM.

DISASTER RECOVERY

Lenovo HX 2000 Series appliances with Nutanix Xpress include asynchronous and synchronous replication for disaster recovery.
With asynchronous replication, snapshots are taken periodically based on your schedule and replicated to a second Lenovo HX 2000 Series system at a remote site. This VM-granular replication makes it possible to create an affordable DR solution. Groups of related VMs can be replicated together and brought up on the secondary site with a single command if the primary site is down.

Metro Availability uses synchronous replication to ensure continuous data availability across separate sites. Metro Availability is simple to set up and manage; because it doesn't rely on secondary solutions, it takes much of the complexity out of disaster recovery. Data is written synchronously to both sites, so it is always available to applications in the event a site fails or needs to undergo main-tenance. You can non-disruptively migrate virtual machines between sites for planned maintenance events or other needs.

What Applications Run on Xpress?

Because it is built with the same hyperconverged technology deployed in hundreds of Global 2000 companies, a single Lenovo HX 2000 Series system with integrated Nutanix Xpress software delivers high performance for nearly any business application or service, including popular Microsoft apps, infrastructure services (DHCP, DNS, file serving) and general VM workloads.

You can run all your applications simultaneously on a single solution, including transactional databases, critical business application servers, messaging and collaboration workloads, and others.

More than 4,000 organizations across nearly all industries, including retail, finance, healthcare, professional services and more, rely on Nutanix-based technology. Integrated data protection ensures that critical business data is always protected and accessible. The platform eliminates operational issues such as unpredictable performance and storage management complexity.

DATABASE AND BUSINESS APPLICATIONS

When used with multi-threaded, multi-core Lenovo HX 2000 Series systems, modern hypervisors deliver database performance comparable to bare metal. For popular databases, such as Microsoft SQL Server and Oracle, Nutanix Xpress provides great performance and availability and is simple to deploy, manage, and scale.

- Consolidate on a single platform with the performance of local SSDs
- Remove storage complexity and reduce storage costs without giving up availability, scalability, and manageability
- Eliminate planned downtime and protect against unplanned events

Intel® Xeon® processor.
Intel Inside®.
New Possibilities Outside.

WHO WOULD YOU RATHER CALL?

Nutanix wields support backing up the Lenovo HX Series experience as a competitive advantage with an industry-leading 90+ Net Promoter Score. Nutanix support covers the entire infrastructure stack compute, storage, and virtualization as well as business critical applications such as Microsoft SQL Server and Exchange. That's full-stack coverage from a single support team.

MESSAGING AND COLLABORATION APPLICATIONS

Lenovo HX 2000 Series appliances with Nutanix Xpress software provide superior support for messaging and collaboration applications such as Microsoft Exchange. For Exchange, this integrated solution delivers high performance by keeping data local to each server, aligning with Microsoft's recommendations. Lenovo HX Series powered by latest Intel® Xeon® processors delivers scalable and responsive Microsoft Exchange services without the excessive costs and complexity of traditional systems.

GENERAL IT VIRTUALIZATION

In addition to important business applications and industry-specific applications, most small and medium-sized businesses also have less important applications they have to support, as well as a variety of services such as Active Directory, file and print servers, management servers, and others. For smaller or less important applications, the goal is often to provide adequate performance and data protection at the lowest cost and with the least management overhead. Lenovo HX 2000 Series appliances with Nutanix Xpress software helps you accomplish this by virtualizing large numbers of applications on the hypervisor of your choice, using tools you already know. Nutanix AHV can help reduce your virtualization costs and management overhead when you have a lot of small applications to support.

VIRTUAL DESKTOP INFRASTRUCTURE (VDI)

VDI is popular for small and mid-sized companies to meet employee mobility needs and satisfy regulatory requirements. Lenovo HX 2000 Series running Nutanix Xpress is a great choice for smaller VDI and application virtualization environments because it delivers high performance and supports other workloads on the same platform.

Getting Started

As a leader in hyperconverged infrastructure, Nutanix understands the many challenges faced by IT teams at small and medium-sized businesses. Lenovo HX 2000 Series powered by Intel® Xeon® processors and integrated Nutanix Xpress software is uniquely designed—and priced—to meet your needs. It eliminates IT complexity and simplifies management so you don't need a team with specialized skills and extensive training to manage your IT infrastructure. Even if you're operating with just one or two IT staff, Nutanix Xpress on Lenovo HX 2000 Series appliances lets your team focus less time and effort on infrastructure and more time adding business value.

We hope you're intrigued by the possibilities of hyperconverged infrastructure with Lenovo HX Series appliances.

If you're ready to learn more: visit **www.lenovo.com** or follow us on **Twitter @LenovoServers**, or contact Lenovo representative or Business Partner in your country.

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