



Deliver global access and reduce costs with Lenovo Client Virtualization for VMware Horizon

Gain the benefits of client virtualization while maximizing your Lenovo infrastructure



Highlights

- A complete, validated solution for VMware Horizon
- Complete, end-to-end Lenovo infrastructure offerings
- Powered by proven System x, Flex System or NeXtScale servers
- Increased performance and reduced cost with Atlantis USX
- Hyper-converged through Atlantis USX or VMware VSAN
- Definitive and thorough reference architecture for quick time to value

Today's business and IT leaders know that a client virtualization solution can help their organization meet multiple challenges, including ever-rising IT costs, increased complexity of maintaining remote client devices, and the need for flexibility and global availability of compute resources.

Lenovo Client Virtualization (LCV) helps your organization meet these business requirements by centrally managing the desktop image within the corporate IT environment rather than at the remote worker or office location. With user data, user profiles and application data files on centralized servers, data center security and manageability are extended down to the user resources. Users have anywhere, anytime, secure access to data and applications from any device, including tablets and smartphones.

The combination of LCV and VMware Horizon with View provides a flexible client virtualization solution that helps minimize complexity, improve user productivity and reduce costs.

Customers' choice
Lenovo general-purpose servers are ranked no. 1 in reliability¹ and no. 1 in customer satisfaction.²

Working together

Lenovo has a long history of industry firsts with a continued investment in research and development, a robust product road map and industry partnerships that augment Lenovo offerings.

System x was:

- The first VMware system vendor
- The first VMware joint development partner
- First to offer comprehensive VMware support

VMware and Lenovo drive innovation through R&D collaboration, end-to-end service offerings, and joint planning and marketing.

A complete, validated solution

Lenovo offers a complete, validated LCV solution for VMware Horizon with View, which is continually updated with the latest-generation Intel Xeon processors, new VMware vSphere features and leading-edge graphics cards for accelerating applications that require GPUs.

VMware Horizon delivers multiple advantages for organizations implementing LCV, including choice of delivery with support for private cloud and cloud-hosted services, as well as comprehensive image management across any combination of virtual, physical and bring-your-own device (BYOD). Hybrid delivery through Horizon Desktop as a Service (DaaS) provides organizations with choice when it comes to services for end users. VMware's closed-loop management and optimization for the software defined data center enables organizations to truly extend the power of virtualization from the data center to devices.

The Lenovo solution for VMware consists of the following components:

- **Server building blocks:** Includes System x servers, Flex System and NeXtScale servers
- **Storage:** SAN-attached or converged storage or hyper-converged storage in the server
- **Networking:** Lenovo Ethernet Networking and Brocade FC SAN
- **Clients:** Endpoints for users, which can be laptops, tablets and other mobile devices, thin clients or workstations
- **Hypervisor:** VMware ESXi
- **Connection broker:** VMware Horizon with View

Reference architecture is available for Lenovo Client Virtualization with VMware Horizon (see <http://lenovopress.com/tips1279> for more information); Figure 1 shows the main architectural features.

Options for matching the solution to the need

The key to a successful client virtualization deployment depends largely on matching the solution to your organization's workload requirements. Running VMware Horizon on industry-standard x86 servers from Lenovo helps reduce costs and gives you the flexibility to choose configurations. The Lenovo and VMware reference architecture offers an array of infrastructure choices for general-purpose workloads, accelerated graphics workloads, hyper-converged solutions and shared storage deployments.

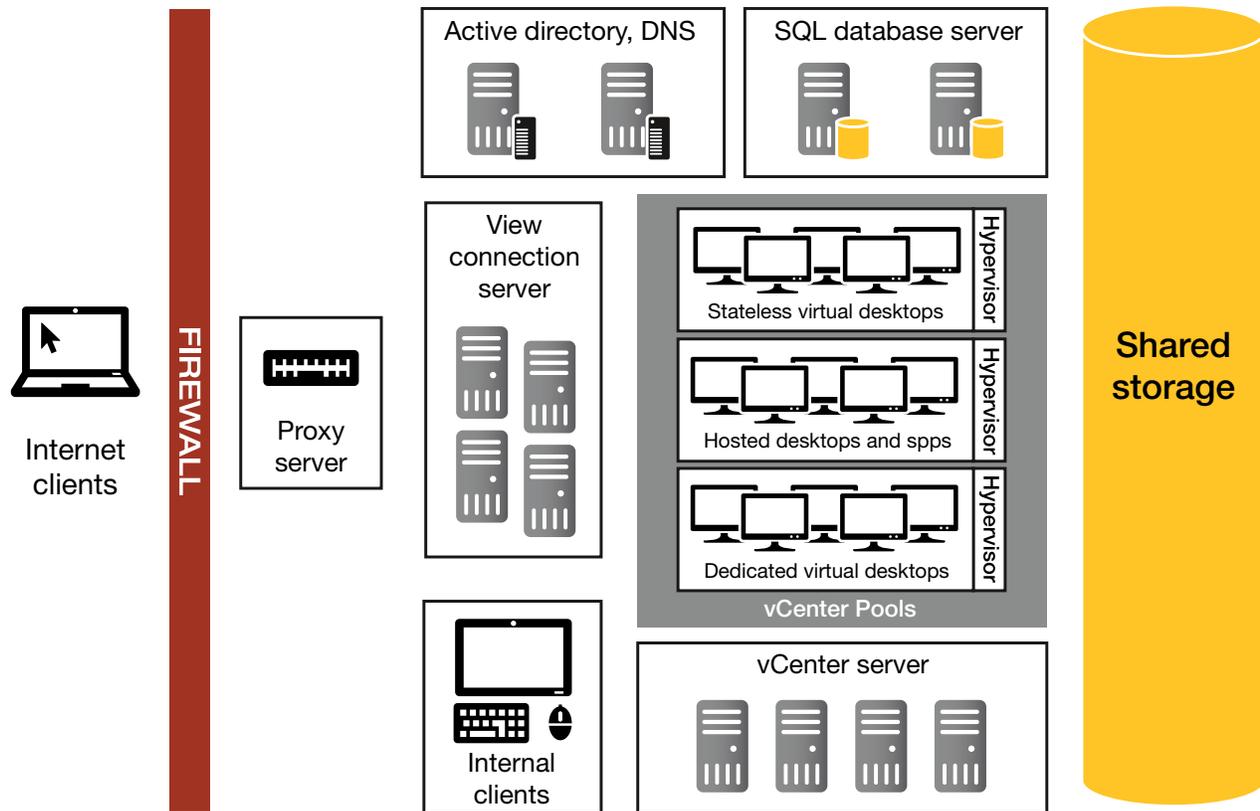


Figure 1. Architecture for Lenovo Client Virtualization with VMware Horizon

Powering general-purpose workloads

To fuel workloads for mainstream enterprise users, a powerful and efficient solution is VMware Horizon on a choice of System x3550 M5 and System x3650 M5 rack servers and dense Flex System x240 M5 offerings. Lenovo's general-purpose servers offer memory capacity up to 768 GB. They also include System x Trusted Platform Assurance, an exclusive set of System x security features and practices that protect data centers from low-level malware attacks, enabling customers to minimize risk and costs to their data centers.

The System x3550 M5 is a compact, versatile 1U two-socket rack server that provides leadership security, efficiency and reliability. Integrated with up to two latest-generation Intel Xeon processors, the x3550 M5 delivers exceptional performance. Storage can include up to 12 drives in a selection of sizes and types.



System x3550 M5 and x3650 M5 servers with local drives

With the 2U System x3650 M5 rack server, your organization can run even more workloads, with availability when you need it. The x3650 M5 is integrated with the latest-generation Intel Xeon processors and provides industry-leading, two-socket storage capacity. It can include up to 26 drive bays to optimize diverse workloads. It also supports up to two NVIDIA GRID graphics acceleration cards.

For greater density requirements, Flex System infrastructure features the next generation of blade technology. As a converged system, Flex System offers excellent integration of solution elements, and low latency through the mid-plane for improved performance. The Flex System Enterprise Chassis is the foundation of the Flex System offering, which features 14 compute node bays in a 10U chassis that delivers high-performance connectivity for integrated computing, storage, networking and management resources.

Flex System provides the efficiency you need now, along with a growth path for the future. Its flexible design can be fully customized to the specific needs of the computing environment and supports independently scalable IT resource pools. The Flex System x240 M5 compute node delivers maximum performance for a broad set of workloads.

Boosting performance of shared storage

For shared storage deployments, Lenovo offers a validated solution that leverages VMware Horizon and Atlantis USX storage optimization software. Your organization can improve the performance of storage with Atlantis USX, which includes advanced deduplication and local caching features for faster response times. Less data needs to travel back and forth over the network, reducing latency and accelerating the user experience.

Atlantis USX also provides software-only technology for deduplication and data compression, which significantly reduces the amount of data that must be stored. The net effect is reduced CAPEX, because it takes less storage hardware to support the same amount of performance. In fact, Atlantis USX enables your organization to economically improve performance over regular SAN disk arrays by using 100 percent solid-state disks (SSDs).

You can also avoid storage sprawl as the solution scales, even with persistent desktops that normally require large amounts of space—the solution is proven to scale to 5,000 or more users with just 2U of IBM FlashSystem storage. Additionally, the Lenovo solution with Atlantis USX supports centralized management. For example, Atlantis seamlessly integrates with the hypervisor's high-availability capabilities to provide automated recovery when a server or rack encounters a failure.

Eliminating shared storage using hyper-converged systems

Use System x3550 M5, x3650 M5 or x240 M5 servers with local drives including SSDs to eliminate shared storage using either VMware VSAN or Atlantis USX. The result is a hyper-converged, linearly scalable solution where adding more capacity is as simple as adding more servers.

Hyper-converged storage is a disruptive technology that can significantly reduce the CAPEX and OPEX for storage. Atlantis USX and VMware VSAN eliminate the inefficiencies of storage silos by unifying all storage types into a highly optimized pool of local storage resources that are available to all applications. Storage utilization is optimized for each VM workload, resulting in lower storage costs, better performance and increased flexibility.

Accelerating graphics workloads

For workloads that can benefit from graphics acceleration, your organization can use NeXtScale M5 or x3650 M5 servers for graphics acceleration workloads with up to two NVIDIA GRID K1 or K2 adapter cards per server. NeXtScale has density of two GPU cards per 1U, while the x3650 has density of two GPU cards per 2U but also allows combining a hyper-converged system with graphics acceleration.

NeXtScale nx360 M5 servers are designed to accelerate high-performance computing (HPC), technical computing, cloud and business applications that use 3-D. NeXtScale delivers this acceleration through dense performance across a variety of functions including compute, I/O and storage, as well as through GPUs. With NeXtScale, your organization can create a flexible, mix-and-match configuration of servers, chassis, networking switches and cables that integrate easily into standard 19-inch racks, with a choice of air cooling or water cooling.

The NVIDIA GRID virtualization solution, built on over 20 years of software and hardware innovations, delivers a rich graphics experience to users running virtual desktops or applications. The GRID K1 features four GPUs and 16 GB of graphics memory, while GRID K2 has two high-end GPUs and 8 GB of graphics memory. Enabling GPU virtualization through the hypervisor allows 2, 4 or even up to 8 users to share each GRID GPU for higher densities for users that need graphics acceleration.

Helping to ensure client virtualization project success

Lenovo Client Virtualization for VMware Horizon is designed to help reduce project risk whether you are starting with a single departmental deployment or a implementing a company-wide initiative.

Selecting from a wide array of front-end and back-end infrastructure options, you can deploy a solution that meets IT requirements for low cost and manageability, as well as user expectations for speed of logon time, application launch time and overall desktop response. By delivering performance on par or better than traditional PCs, the solution becomes essentially invisible to the user.

Workload-based infrastructure at a glance

Lenovo enables your organization to optimize infrastructure for any workload.

- **General-purpose workloads:** VMware Horizon on System x3550 M5 and System x3650 M5 rack servers, and dense Flex System x240 M5 offerings
- **Shared storage deployments:** High-performance shared storage with Atlantis USX storage optimization software
- **Hyper-converged systems:** Eliminate shared storage with Atlantis USX Hyper-converged solutions using System x3550 M5 and System x3650 M5 rack servers, and dense Flex System x240 M5 servers
- **Accelerated graphics workloads:** Citrix XenDesktop on NeXtScale System nx360 M5 x3650 M5 servers with high-performance GPU graphics cards

For more information

To learn more about System x, contact your Lenovo representative or visit:

www.lenovo.com/servers

For the Lenovo Client Virtualization with VMware Horizon reference architecture, visit:

<http://lenovopress.com/tips1279>



¹ TIC 2014-2015 Reliability Survey, May 2014. public.dhe.ibm.com/common/ssi/ecm/en/xsl03126usen/XSL03126USEN.PDF

² TBR Customer Satisfaction Survey, August 2014. ibm.com/common/ssi/ecm/en/xsw03117usen/XSW03117USEN.PDF

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