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Reduce costs and enhance user access with Lenovo Client Virtualization solutions

Gain the benefits of client virtualization while maximizing your Lenovo infrastructure

Highlights

- Complete, end-to-end infrastructure offerings
- Integrated solutions for leading ISVs: VMware, Citrix and Microsoft
- Virtual desktop, shared desktop or shared application deployment options
- Powered by proven System x, Flex System or NeXtScale servers
- Increased shared storage performance and reduced cost with Atlantis USX
- Hyper-converged solutions through VMware VSAN or Atlantis USX

Today's IT staff are faced with ever-rising costs, increased complexity of maintaining remote client devices, a growing need to avoid security problems, and the need for flexibility and global availability of compute resources. Mobile workers require access to files, applications and other corporate resources from a variety of user devices, and they rely on IT to manage those resources and ensure data security. Remote and branch offices also need to know their desktops are properly managed, upgrades and patches are applied, and data is backed up—without incurring the cost of deskside IT visits.

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. LCV offers three different deployment scenarios—virtual desktops, shared desktops and shared applications—depending on your requirements.

Customers' choice

Lenovo general-purpose servers are ranked no. 1 in reliability[1] and no. 1 in customer satisfaction.[2]

A flexible portfolio to meet your business needs

An LCV solution can help your organization easily manage, secure and deploy the technology users require while reducing IT costs. But the key to a successful deployment depends in large part on matching the solution to your specific workload demands. To meet these demands, the Lenovo portfolio of solutions encompasses an array of platform choices with proven performance, and partnerships with the leading software vendors. Businesses of all sizes can benefit, from small environments with a few hundred users to enterprises with users numbering in the thousands.

The Lenovo Client Virtualization portfolio supports virtualization software from VMware, Citrix and Microsoft, delivering the flexibility to choose from a range of hypervisors and brokers. When it comes to hardware, Lenovo offers you a choice of end-to-end infrastructure, including servers, networking, storage and software as well as front-end client devices (see Figure 1). These choices fit easily into your Lenovo or other x86-based environment, helping to maximize your organization's technology investment.
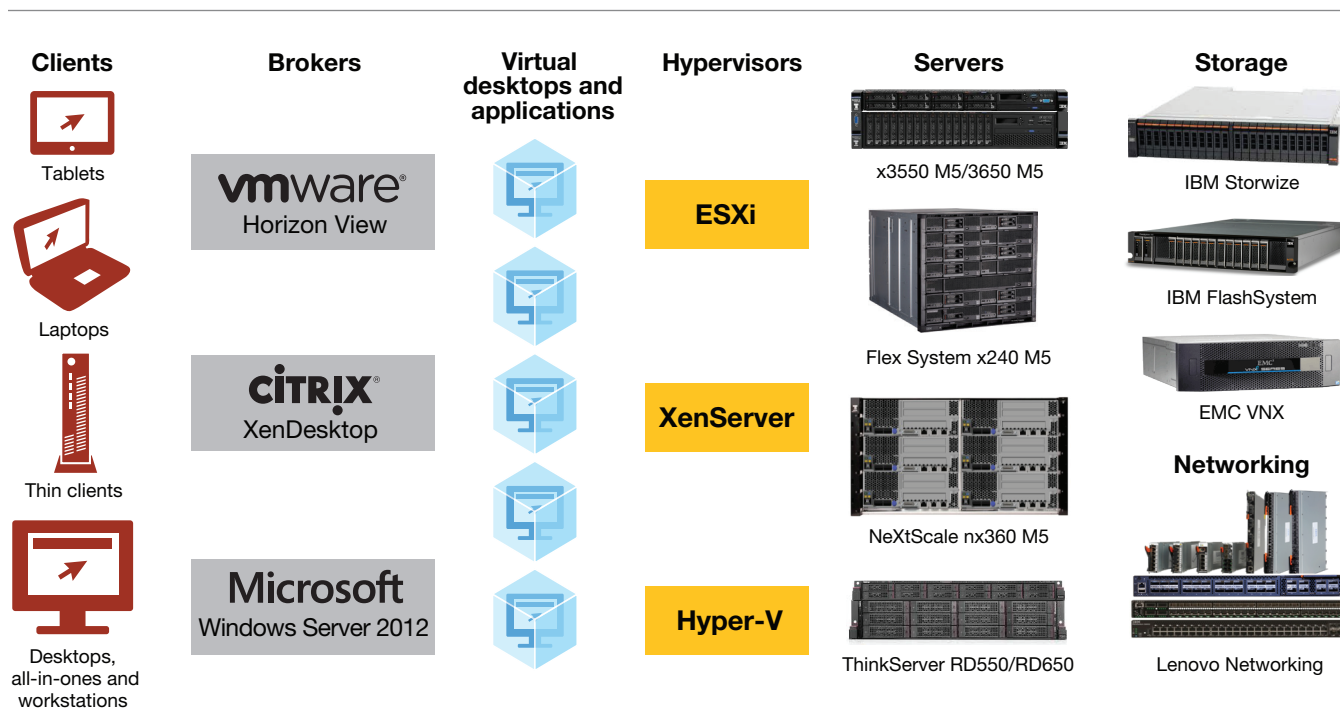
Clients	Brokers	Virtual desktops and applications	Hypervisors	Servers	Storage
Tablets	**vmware** Horizon View		**ESXi**	x3550 M5/3650 M5	IBM Storwize
Laptops				Flex System x240 M5	IBM FlashSystem
Thin clients	**CITRIX** XenDesktop		**XenServer**	NeXtScale nx360 M5	EMC VNX
Desktops, all-in-ones and workstations	**Microsoft** Windows Server 2012		**Hyper-V**	ThinkServer RD550/RD650	**Networking** Lenovo Networking

Figure 1. Architectural overview of the Lenovo client virtualization solution portfolio

Scalable solutions to match your workloads

Lenovo stands apart as a tier 1 technology company that can provide a full range of PCs, servers, smart connected devices and enterprise solutions. Drawing on this portfolio, you can select the best client virtualization elements for your organization's workload demands, including general-purpose workloads, accelerated graphics workloads and virtual storage deployments for workloads requiring performance at scale.

System x, Flex System and NeXtScale solutions offer powerful, efficient and scalable server infrastructure to meet your needs. These proven data center systems support enterprise-class performance, reliability and security. They are available with a full range of networking, storage and software as well as comprehensive services that support business needs throughout the IT lifecycle.

Powering general-purpose workloads

To fuel workloads for knowledge workers and other mainstream enterprise users, Lenovo offers 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.

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.

Lenovo advantages

The Lenovo approach to client virtualization delivers key advantages, including:

- Rapid desktop deployment, including updates, patches and security enhancements

- Overall cost savings in desktop support, a centralized approach to client OS management and reduced client machine energy consumption

- Unified management and reporting through a single administrator console

- Easy accessibility through various endpoint devices, locally and remotely

- Ability to use centralized data center resources and processes for backup and recovery

- Horizontal scalability, in which thousands of endpoint devices can be handled through a central point

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 high-performance shared storage 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 or VMware VSAN eliminates 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 GPI for higher densities for users that need graphics acceleration.

Helping to ensure your client virtualization success

The Lenovo solution portfolio is designed to give your organization a choice of cost-effective, high-performance platforms that will fit your particular workload needs and choice of hypervisor, while reducing project risk—whether you are starting with a single departmental deployment or 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:** Lenovo offers System x3550 M5 and System x3650 M5 rack servers, and dense Flex System x240 M5 offerings

- **Shared storage deployments:** High-performance shared storage and Atlantis USX storage optimization software

- **Hyper-converged systems:** Eliminate shared storage with Atlantis USX or VMware VSAN hyper-converged solutions using System x3550 M5 and System x3650 M5 rack servers, and dense Flex System x240 M5 servers

- **Accelerated graphics workloads:** NeXtScale System nx360 M5 or x3650 M5 servers with high-performance GPU graphics cards

For more information

For more information about **System x**, contact your Lenovo representative or visit:

www.lenovo.com/servers

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