Elevate Workload Performance with Lenovo ThinkAgile HX V3 Systems

Solution Brief

Business Trends

Accelerating Hybrid Cloud Adoption: The growth of technology, cloud and data-driven ecosystems bring the need for on-premise infrastructure to meet hybrid cloud requirements. Servers need to have virtualization and hybrid cloud capabilities – and be able to scale and operationalize quickly. Also, due to cost and operational factors a variety of workloads are being migrated back to on-premises infrastructure. This trend means businesses need faster servers and storage to achieve the performance and low latency required.

Infrastructure and Workloads Modernization: Many business-critical applications - database, Virtual Desktop Infrastructure (VDI), data science and Artificial Intelligence / Machine Learning (AI/ML) workloads - need increased processing and data storage capabilities. Ever growing data and AI/ML workloads require processors with built-in acceleration and servers with high-speed memory, network adapters, drives and interconnects that are pre-tested and pre-validated engineered solution to reduce deployment complexities.

Lenovo Solution

Lenovo ThinkAgile HX V3 hyperconverged systems are equipped with 4th generation Intel® Xeon® Scalable processors and Nutanix software to address these customer trends and lower operations management. The systems unite public cloud simplicity and agility with private cloud performance and security. Whether on-premises or hybrid, you'll ensure cost-effective business continuity through unified management, one-click operations, and AI-driven automation.

Lenovo ThinkAgile HX V3 systems based on Nutanix software are **Accelerated by Intel** offerings that drive greater performance through a number of enhancements, including higher cores, embedded accelerators, GPU, DDR5 and PCIe Gen 5 components.

Highlights

- **Realize up to 50% better performance on workloads** with double the number of cores in Lenovo servers equipped with 4th gen Intel Xeon Scalable processors than on similar servers equipped with Intel's previous generation processors.

- **Double the density** for virtual desktops, web and general compute workloads.

- Reduce operations and management and consolidate more applications with unified storage

- Accelerate Big Data and AI/ML applications with Intel embedded accelerators, DDR5, GPU and PCIe Gen 5 components

ThinkAgile HX V3 Systems

Lenovo ThinkAgile HX Series V3 servers powered by 4th Gen Intel Xeon Scalable processors provide increased performance, bandwidth and speed than ThinkAgile V2 with 3rd Gen Intel Xeon Scalable processors. The 4th Gen processors are modernized to support more cores and performance and embedded accelerators.

Applications and situations where the servers would excel include:

- ROBO (Remote Office / Branch Office)
- Virtual Desktops
- Databases and Data Warehouse
- SAP HANA
- ERP and CRM applications
- Data Science and AI
- Server Consolidation

ThinkAgile HX650 V3

ThinkAgile HX630 V3

Lenovo ThinkAgile HX V3 servers are available as Integrated Systems and Certified Nodes. Both are pre-validated and factory integrated systems with Lenovo hardware, Nutanix software, and deployment services. Integrated systems provide a quick and convenient path to implement a hyperconverged solution powered by Nutanix and a single point of contact provided by Lenovo for purchasing, deploying, and supporting the solution. HX Certified Nodes come with optional Nutanix software and services. All ThinkAgile HX V3 models support configurations for all flash and hybrid storage deployments to support a wide range of workload requirements.

Hypervisors supported are Nutanix Acropolis Hypervisor based on KVM (AHV) and VMware ESXi 6.7 and 7.0. The table below shows all ThinkAgile HX models and supported configurations.

ThinkAgile HX V3 with 4th Gen Intel Xeon Scalable Processors

Table 1. ThinkAgile HX V3 Models with Intel 4th Gen Xeon Scalable Processors

Model	HX630 V3	HX650 V3	HX650 V3
Configuration	All Flash	All Flash	Hybrid Storage
Form Factor	1U 2S	2U 2S	2U 2S
Memory	TruDDR5 32 DIMMs (8 TB Max)	TruDDR5 32 DIMMs (8 TB Max)	TruDDR5 32 DIMMs (8 TB Max)
GPU	2xSW 75W	7xSW 4xDW	
Drives NVMe/SAS/SATA	10x2.5" + 2x2.5"	16x3.5" + 8x2.5"	12x3.5" + 4x2.5"
PCIe 5.0	2 Slots 1/10/25/100 GbE	7 Slots 1/10/25/100 GbE	7 Slots 1/10/25 GbE
OCP 3.0	1x1Gb, 10Gb, 25Gb	1x1Gb, 10Gb, 25Gb	1x1Gb, 10Gb, 25Gb
HX Integrated System	7D6MCTO1WW	7D6NCTO1WW	7D6NCTO2WW
HX Certified Node	7D6MCTO3WW	7D6NCTO3WW	7D6NCTO4WW
Max Possible Capacity	24x7.68 TB	24x7.68 TB	16x7.68 TB

4th Gen Intel Xeon Scalable Processors

All processors support the following configurations:

- 8 DDR5 memory channels at 2 DIMMs per channel. Many of the 4th Gen processors support a maximum speed of 4800MHz and low-end processors support 4000MHz-4400MHz
- Up to 4 UPI links between processors at 16 GT/s
- 80 PCIe 5.0 I/O lanes
- Embedded accelerators including Intel Data Streaming Accelerator (Intel DSA), QuickAssist Technology (Intel QAT), Intel Dynamic Load Balancer (Intel DLB) and Intel In-Memory Analytics Accelerator (Intel IAA)

Table 2. 4th Generation Intel Xeon Scalable Processors

Cores	<=16 Cores	<=32 Cores	<=48 Cores	<=60 Cores
<=200W	6434 8C 195W 3.7GHz 6434H 8C 195W 3.7GHz 6426Y 16C 185W 2.5GHz	6416H 18C 165W 2.2GHz 6418H 24C 185W 2.1GHz 6428N 32C 185W 1.8GHz		
201-250W		6442Y 24C 225W 2.6GHz 6438M 32C 205W 2.2GHz 6438N 32C 205W 2.0GHz 6438Y+ 32C 205W 2.0GHz 6448H 32C 250W 2.4GHz 6448Y 32C 225W 2.1GHz 8450H 28C 250W 2.0GHz		
251-300W	6444Y 16C 270W 3.6GHz 8444H 16C 270W 2.9GHz	6430 32C 270W 2.1GHz 6454S 32C 270W 2.2GHz 8454H 32C 270W 2.1GHz	8452Y 36C 300W 2.0GHz 8460Y+ 40C 300W 2.0GHz	8470N 52C 300W 1.7GHz
301-350W			8458 44C 350W 2.7GHz 8460H 40C 330W 2.2GHz 8468 48C 350W 2.1GHz 8468H 48C 330W 2.1GHz 8468V 48C 330W 2.4GHz	8470 52C 350W 2.0GHz 8480+ 56C 350W 2.0GHz 8490H 60C 350W 1.9GHz

Performance Gain from 3rd Gen Intel Xeon SP

4th generation Intel Xeon Scalable processors support more cores, DDR5 memory and accelerators, providing better performance than 3rd generation Intel Xeon Scalable processors. Here is the comparison between Intel Xeon 8480 56C (4th generation) vs Intel Xeon 8380 40C (3rd generation) processors.

- Up to 40% increase in memory bandwidth
- Up to 50-60% increase in general compute
- Up to 30-50% increase in technical compute
- Up to 40% increase in web workloads
- Up to 45% increase in media workloads
- Up to 200-400% increase in AI inference performance

Nutanix Cloud Platform with ThinkAgile HX V3

Nutanix Cloud Platform (NCP) is a unified solution built on top of hyperconverged infrastructure to address hybrid cloud requirements and simplify operations for different workload scenarios. Lenovo ThinkAgile HX systems support NCP to provide reliable infrastructure as a foundation for a variety of use cases in hybrid cloud deployments. The platform comprises of the following key components which can be chosen based on the solution requirements:

Nutanix Cloud Infrastructure is a software defined infrastructure solution with compute, storage and networking for virtual machines and containers that can be deployed in private data centers on the hardware of your choice or in public clouds. The core platform is designed with AOS Storage, AHV, Karbon (Kubernetes Engine), Leap (Disaster Recovery) and Flow Network Security and Virtual Networking.

Nutanix Cloud Manager provides infrastructure management and operational support to build, manage and monitor deployments of virtual machines, containers and applications. It also delivers insights and automated remediation. The management stack includes Prism(Operations and Management), Calm (Self Service), Beam(Cost Governance) and Security Central.

Nutanix Unified Storage is software defined storage for multiple protocol volumes, files, and objects with Mine integrated backup.

Nutanix Virtual Desktop infrastructure(VDI) enables delivering virtual apps and desktops to users from public, private, and hybrid cloud infrastructure and supports Citrix, VMware Horizon and Nutanix Frame platforms.

Nutanix Database Service (NDB) is a database as a service solution that provides management and deployment across hybrid multicloud environments for database engines like PostgreSQL®, MySQL®, Microsoft® SQL Server, and Oracle® Database.
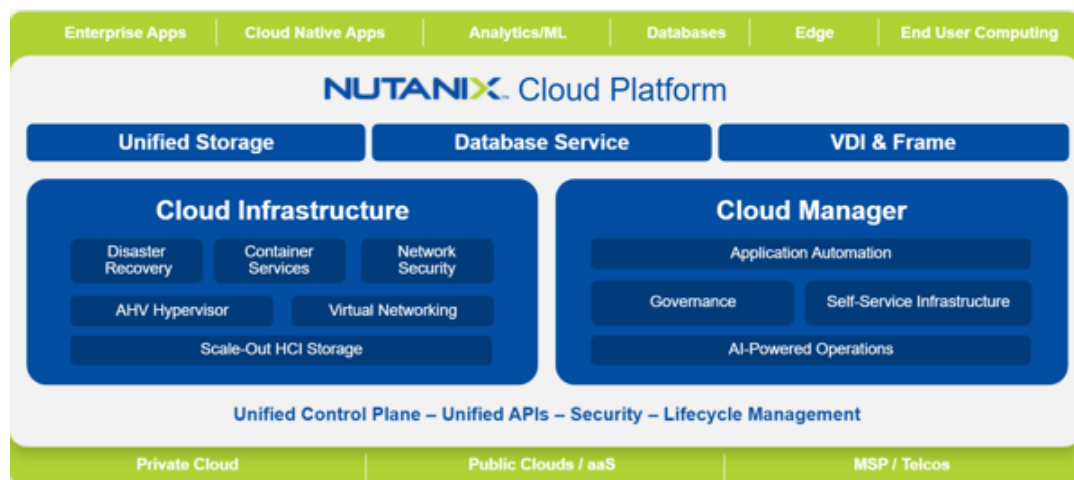

Figure 1. Nutanix Cloud Platform

Prism Central is the global control plane for Nutanix. Many of the Nutanix Cloud Platform components can be deployed as virtual machines from Prism Central. Nutanix NCP software editions are available on all Lenovo ThinkSystem and ThinkAgile HX models based on Nutanix Portfolio 2.0 (PnP) Licensing Model

Nutanix Licensing

Table 3. Nutanix Licensing

License Tier	Nutanix Cloud Platform (NCP)	Nutanix Cloud Infrastructure (NCI)	Nutanix Cloud Manager (NCM)	NCI-Data
Ultimate	NCI Ultimate NCM Ultimate	Advanced DR: Sync, Near-Sync Runbook Security: Micro-segmentation, Encryption Cloud Native: Kubernetes Services	Application Automation Security General	No Mseg No Karbon
Pro	NCI Ultimate NCI Pro	Multisite Async DR Overlay Networking	Self Service Cost Governance	No Flow Networking
Starter	NCI Pro NCM Pro	AOS Storage + Compression + Dedup	AI Operations	No AHV Support

Red Hat OpenShift Container Platform on Lenovo ThinkAgile HX V3

The evolution of microservices, containers and DevOps/DevSecOps and hybrid cloud deployment requires a first in class container orchestration platform and robust software defined infrastructure solution without compromising performance and security. Lenovo ThinkAgile HX with Intel 4th Gen Xeon Scalable Processors and Nutanix AHV provide a solid base to enable Red Hat OpenShift container application platform to develop and deploy modern applications by substantially hosting more containers per node. Red Hat OpenShift on Nutanix Cloud Platform is an enterprise grade unified solution stack to meet hybrid cloud deployments and accelerate cloud native applications at scale.

Nutanix AHV is a Red Hat certified hypervisor and Red Hat Enterprise Linux is certified on Nutanix AHV. Lenovo ThinkAgile HX systems are designed to outperform for a wide range of workloads, and with Lenovo Open Cloud Automation (LOCA) simplify deployment, provisioning and management of Red Hat OpenShift infrastructure. Refer to the Lenovo reference architecture RedHat OpenShift on Lenovo Servers for a detailed design.
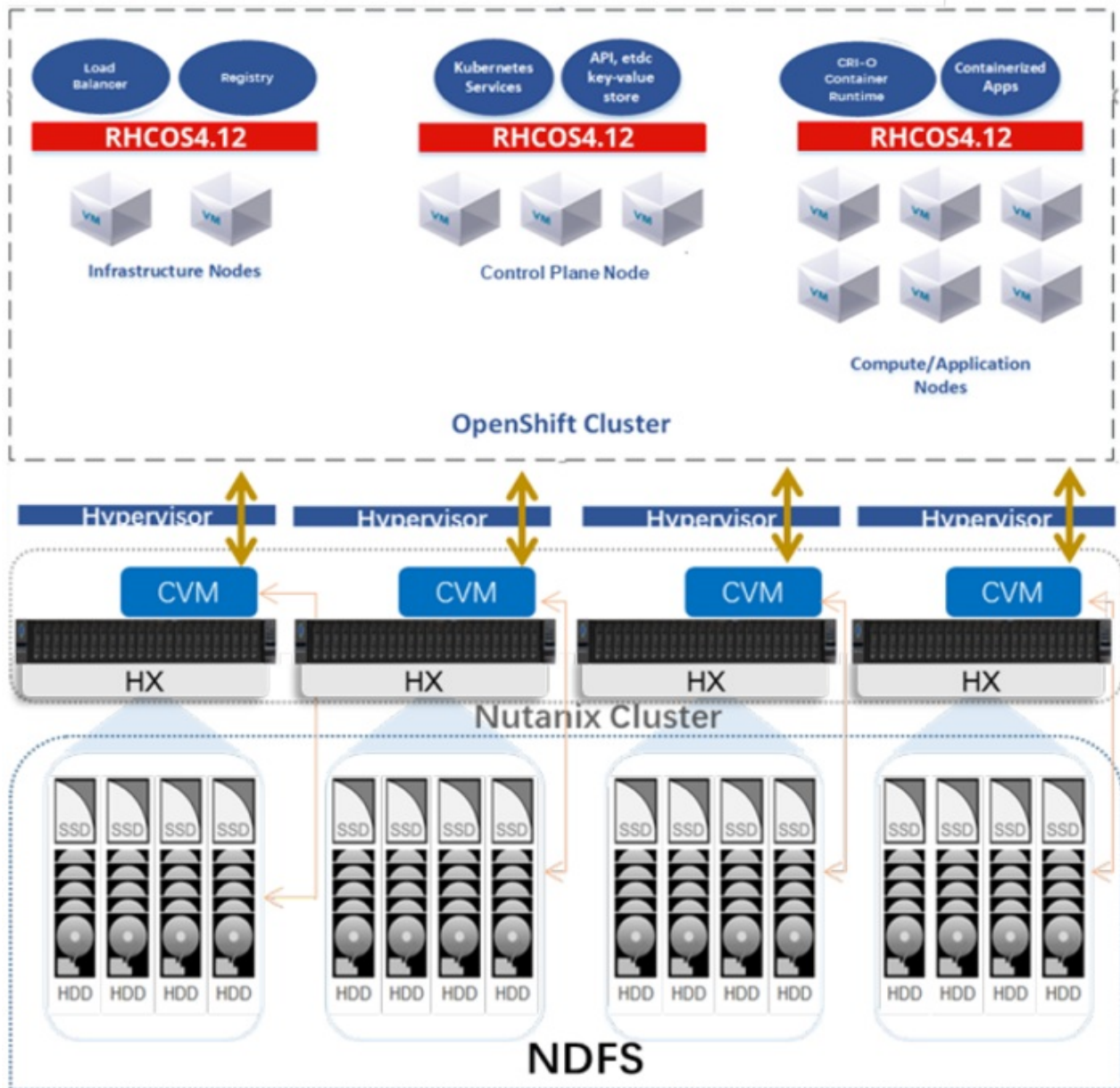

Figure 2. Red Hat OpenShift on Lenovo ThinkAgile HX with Nutanix

Bill of Material - ThinkAgile HX650 V3 All Flash Configuration with Nutanix

Table 4. Bill of Materials

Part number Feature code	Product Description	Qty
7D6NCTO1WW	**Server : Lenovo ThinkAgile HX650 V3 Integrated System**	1
BRP4	ThinkAgile HX650 V3 Base	1
B15S	Nutanix Software Stack on Nutanix AHV	1
BVKV	Nutanix Cloud Platform (NCP) Pro Software License with Mission Critical Support	1
BQ6L	Intel Xeon Gold 5416S 16C 150W 2.0GHz Processor	2
BNF9	ThinkSystem 64GB TruDDR5 4800MHz (2Rx4) 10x4 RDIMM	16
B8P1	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA	1
B8P1	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA	1
B8LU	ThinkSystem 2U 8x2.5" SAS/SATA Backplane	2
B0SW	**Nutanix Flash Node Config**	1
BP3E	ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD	6
BM8X	ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit	1
BTTX	M.2 SATA	1
BQ1Z	ThinkSystem M.2 5400 PRO 240GB Read Intensive SATA 6Gb NHS SSD	1
BN2T	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-Port OCP Ethernet Adapter	1
BNFH	ThinkSystem 1100W 230V/115V Platinum Hot-Swap Gen2 Power Supply v3	2
6400	2.8m, 13A/100-250V, C13 to C14 Jumper Cord	2
B8LA	ThinkSystem Toolless Slide Rail Kit v2	1
BQQ2	ThinkSystem 2U V3 EIA Latch Standard	1
BLL6	ThinkSystem 2U V3 Performance Fan Module	6
BHSS	MI for PXE with RJ45 Network port	1
BVMC	Trigger MFG to scan the SN from the CPU Board via this MI	1
5977	Select Storage devices - no configured RAID required	1
BRPJ	XCC Platinum	1
BK14	Low voltage (100V+)	1
BPK3	ThinkSystem WW Lenovo LPK	1
BMPF	ThinkSystem V3 2U Power Cable from MB to Front 2.5" BP v2	2
BRQ3	ThinkSystem V3 2U WH CBL, 20Pin, 320mm,Tin-plated	1
BRQ1	ThinkSystem SR650 V3,SATA CBL,SLx8-SLx4,M.2-M.2(MB),150mm	1
BACB	ThinkSystem V3 2U SAS/SATA Y Cable from CFF C0,C1/ C2,C3 to Front 8x2.5" BP	2
BPED	ThinkSystem SR650 V3 MCIO8x to SL8x CBL, PCIe4, CFF RAID INPUT, 250mm	1
BMP2	ThinkSystem V3 2U Power Cable from MB to CFF / Exp v2	1
BE0E	N+N Redundancy With Over-Subscription	1
BQ11	G4 x16/x8/x8 PCIe Riser BLKL for Riser 1 Placement	1
ATSB	Nutanix Solution Code MFG Instruction	1
BTSC	ThinkAgile HX650 V3 IS	1
BC4X	MS 2FH Riser Filler	1
BQBP	ThinkSystem MCC CPU Clip	2
BM8T	ThinkSystem SR650 V3 Firmware and Root of Trust Security Module	1
B8JY	ThinkSystem 1100W Pt Power Rating Label WW	1
B986	ThinkSystem HV 2U WW General PKG BOM	1
BU8S	ThinkAgile HX650 V3 - Nutanix IP	1
BP46	ThinkSystem 2U Main Air Duct	1

Part number Feature code	Product Description	Qty
B8MM	ThinkSystem 2U MS 3FH Riser Filler	1
BXGY	Right EIA with FIO assembly	1
BQQ6	ThinkSystem 2U V3 EIA right with FIO	1
AVEQ	ThinkSystem 8x1 2.5" HDD Filler	1
AVEN	ThinkSystem 1x1 2.5" HDD Filler	6
AVEP	ThinkSystem 4x1 2.5" HDD Filler	1
BLL3	ThinkSystem SR650 V3 PSU Duct	1
BPDQ	ThinkSystem SR650 V3 AL Extrusion Entry Heatsink	2
BLKL	ThinkSystem V3 2U x16/x8/x8 PCIe Gen4 Riser1 or 2	1
7S0PCTO3WW	Nutanix P&P Software for ThinkAgile HX	1
SAPU	Nutanix Cloud Platform Pro, Mission Critical Support Per Core, 3Yr	32
B8Q8	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA Placement	1
5PS7B15003	Essential ThinkAgile IS - 3Yr 24x7 4Hr Resp + YDYD HX650 V3	1

Conclusion

ThinkAgile HX V3 integrated systems and certified nodes with Nutanix software and Intel Xeon 4th Gen Scalable Processors are a perfect fit for mission critical applications and provide higher consolidation for different workloads. ThinkAgile Systems are pre-validated and factory installed with Nutanix software which simplifies deployment and provides an integrated solution to address a wide range of use cases in hybrid cloud deployments - including Red Hat OpenShift. These next generation engineered hardware and software solutions from Lenovo, Intel and Nutanix are a one-stop scalable solution for modern application development with reduced TCO to achieve IT efficiency.

Accelerated by Intel

To deliver the best experience possible, Lenovo and Intel have optimized this solution to leverage Intel capabilities like processor accelerators not available in other systems. Accelerated by Intel means enhanced performance to help you achieve new innovations and insight that can give your company an edge.

Why Lenovo

Lenovo is a US$70 billion revenue Fortune Global 500 company serving customers in 180 markets around the world. Focused on a bold vision to deliver smarter technology for all, we are developing world-changing technologies that power (through devices and infrastructure) and empower (through solutions, services and software) millions of customers every day.

For More Information

To learn more about Lenovo workload solutions on ThinkAgile HX650 V3 and HX630 V3 servers, contact your Lenovo Business Partner or visit: https://www.lenovo.com/systems/solutions

References:

Lenovo ThinkAgile HX650 V3 Integrated System and Certified Node: https://lenovopress.lenovo.com/lp1668

Lenovo ThinkAgile HX630 V3 Integrated System and Certified Node: https://lenovopress.lenovo.com/lp1667

Related product families

Product families related to this document are the following:

- Nutanix Alliance
- ThinkAgile HX Series for Nutanix

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