Lenovo ThinkAgile SX for Microsoft Azure Stack Hub: SXM4600

Product Guide

Lenovo ThinkAgile SXM delivers a pre-integrated, easy-to-deploy rack-level solution for hybrid cloud to dramatically reduce time-to-value and total cost of ownership (TCO). The solution is based on Lenovo's industry-leading data center infrastructure and Microsoft Azure Stack Hub, an extension of Microsoft Azure Services to on-premises environments.

Suggested workloads for the ThinkAgile SXM include virtual desktop infrastructure (VDI), back-office applications, server consolidation, enterprise applications, databases, test and development environments, and hybrid and private cloud implementation. Starting with as few as four nodes to keep your acquisition costs down, the solution offers “pay as you grow” scalability as your needs grow.

Figure 1. Lenovo ThinkAgile SXM

Did you know?

The ThinkAgile SXM ships fully integrated into a rack cabinet, tested, configured, and ready to be plugged in and turned on; it is designed to integrate into an existing infrastructure effortlessly, to accelerate time to value and reduce infrastructure maintenance costs.

There is no up-front cloud software license acquisition cost for the ThinkAgile SXM, monthly billing is based on the actual resource usage (capacity-based licenses are also available).

Lenovo provides ThinkAgile Advantage Single Point of Support for the entire ThinkAgile solution with the nodes, networking, and software, for quicker problem determination and minimized downtime.

Key features

The Lenovo ThinkAgile SXM solution integrates computing, storage, networking, and management, and it is designed with industry-standard building blocks, including hyperconverged nodes that are built on powerful and highly reliable Lenovo ThinkSystem servers and Microsoft Azure Stack Hub software that extends Azure technologies on-premises.

The ThinkAgile SXM4600 is a 42U model that can be scaled from 4 to 16 nodes.

The ThinkAgile SXM can also be deployed in a customer-provided rack cabinet with scaling from 4 to 16 nodes.

ThinkAgile SXM offers the following key features:

- Scalable ThinkAgile SXM configurations of an on-premises, hyperconverged, hybrid cloud platform designed to optimize workload performance and provide the IT agility for business demands.
- Flexible monthly billing that is based on actual resource usage helps lower acquisition cost for the entire solution by eliminating upfront cloud software licensing fees.
- Factory-integrated, pre-configured ready-to-go solutions that are delivered in a Lenovo rack cabinet or can be installed in a customer-provided rack cabinet, with all the hardware customers need for their workloads: servers, storage, and network switches, plus Azure Stack Hub cloud software and Lenovo XClarity hardware management tools.
- Designed for effortless integration into existing infrastructures, thereby reducing deployment time and saving money.
- Lenovo deployment services that are included with the solution help get customers up and running quickly.
- Proven and reliable Lenovo ThinkSystem servers featuring the fourth generation of the Intel Xeon Scalable Processor Family provide compute power for a variety of workloads and applications.
- Microsoft Azure Stack Hub provides a scalable, highly available solution for hybrid cloud extension to deliver Microsoft Azure cloud services on-premises with integrated compute, networking, storage, security, and management services that manage VM lifecycle and automate and orchestrate workload provisioning.
- Powerful tools to manage both hardware and applications that come with the ThinkAgile SXM simplify and automate the management of the entire cloud solution, allowing customers to manage the infrastructure as a single system, rather than as individual components.
- Lenovo ThinkAgile Advantage provides a single point of contact for all support issues that customers might encounter with the server, networking, storage, and software used in the solution, for quicker problem determination and minimized downtime.

Components

The ThinkAgile SXM solution consists of the following hardware components:

- One ThinkSystem SXM630 V3 management node.
- ThinkSystem SXM650 V3 hyperconverged scale unit nodes:
  - SXM4600 42U, or customer-provided rack cabinet: From 4 to 16 nodes.
- Two Mellanox SN2410 25 GbE network switches.

The SXM630 V3 management node, referred to as the “Hardware Lifecycle Host” or “HLH”, provides hardware management services and includes the following software components:

- Windows Server 2019 with Hyper-V
- Lenovo XClarity Administrator VM: Provides hardware management services.

The SXM650 V3 hyperconverged scale unit nodes provide compute and storage resources and include the following software components:

- Windows Server 2019 with Hyper-V.
- Azure Stack Hub software: Provides scalable hybrid cloud platform.

Network connectivity is provided by two Mellanox SN2410 25 GbE Top of Rack (TOR) network switches, referred to as “TOR-1” and “TOR-2”.

The front and rear views of the ThinkAgile SXM4600 Hybrid 42U are shown in the following figure. Scale unit nodes 05-16 are optional.

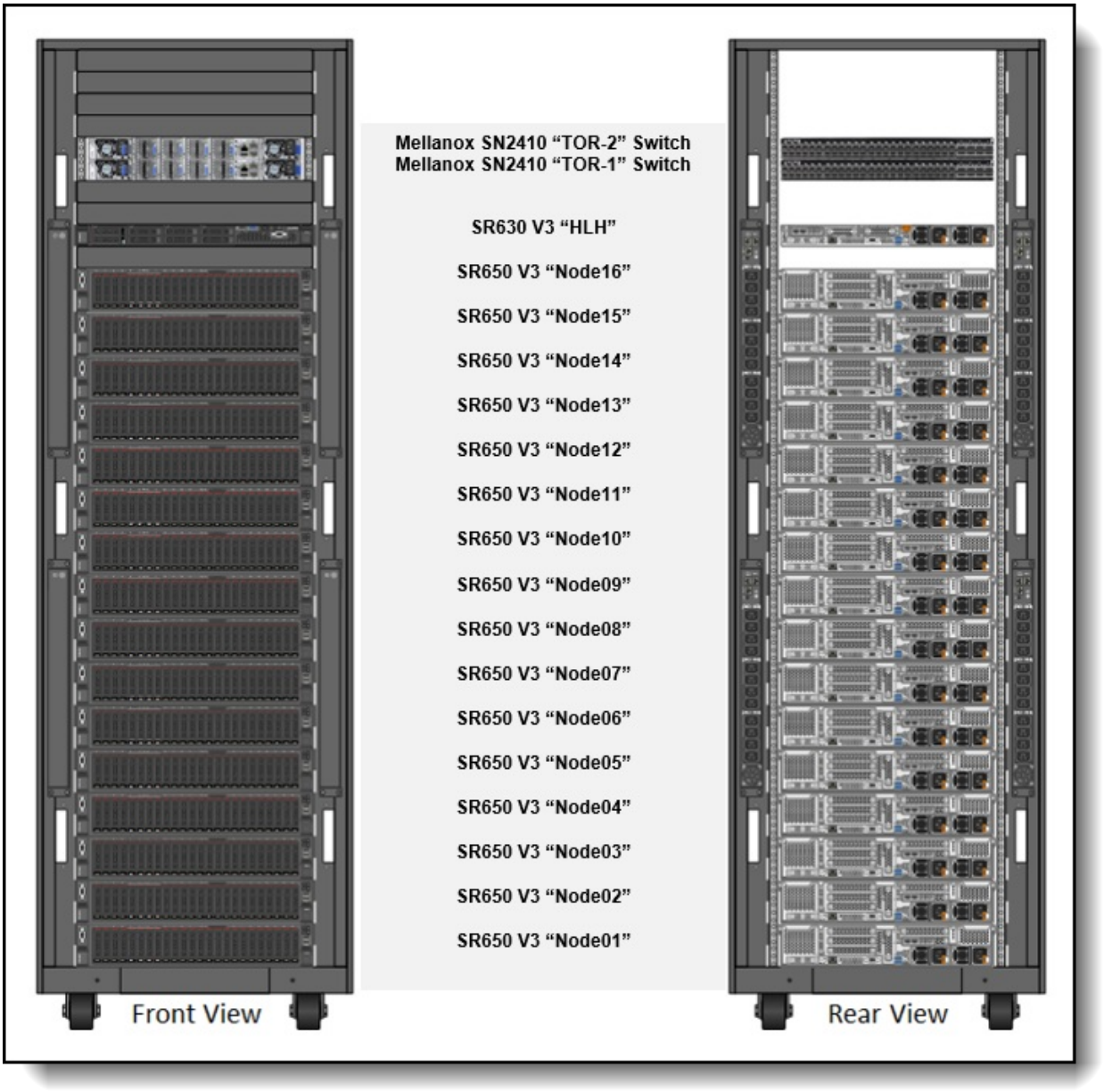

Figure 2. ThinkAgile SXM4600 42U front and rear views

System specifications

The following table lists the system specifications of the ThinkAgile SXM.

Table 1. ThinkAgile SXM system specifications

ThinkAgile SXM 4600 Attribute	**SXM4600 42U or Customer-provided rack cabinet***
Form factor	42U Rack cabinet (7D6DBHC3)
Dimensions	Height: 2011 mm Width: 600 mm Depth: 1200 mm
Total rack load capacity	953 kg
Maximum rack weight	1588 kg
AC power distribution	4x C19/C13 PDUs: • 3-Ph, 80A/200-240V C13/C19 PDU • 3-Ph, 60A/200-240V C13/C19 PDU • 3-Ph, 48A/200-240V C13/C19 PDU • 3-Ph, 48A/346-415V C13/C19 PDU • 3-Ph, 32A/200-240V C13/C19 PDU
	All PDUs in a rack cabinet should be of the same type. IEC 320-C13 to C14 AC power cables for connecting all the equipment in a rack cabinet to PDUs are included.
Hardware warranty	Three-, four, or five-year customer-replaceable unit and onsite limited warranty with ThinkAgile Advantage Support and selectable service levels: 9x5 next business day (NBD) parts delivered or onsite response, 24x7x4 or 24x7x2 onsite response or 6-hour or 24-hour committed repair (select countries). Also available are 1-year and 2-year post-warranty extensions, YourDrive YourData, and Premier Support.
Software	Microsoft Windows Server 2019 with Hyper-V, Microsoft Storage Spaces Direct, Microsoft Azure Stack Hub, Lenovo XClarity Administrator Pro
Management node	
Base model	Lenovo SXM630 V3 (7D73CTOAWW)
Quantity	1
Processor	Two Intel Xeon Gold processors
Memory	128 GB (8x 16GB TruDDR5 RDIMMs). ECC, patrol scrubbing, and demand scrubbing memory protection
Drive bays	8x 2.5-inch SAS/SATA hot-swap
Internal storage	2x ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSDs (RAID-1 boot volume)
Storage controller	ThinkSystem RAID 540-8i PCIe Adapter (12 Gbps SAS)

ThinkAgile SXM 4600 Attribute	SXM4600 42U or Customer-provided rack cabinet*
Network interfaces	Management network: • 1x 1 GbE dedicated XCC management port (RJ-45) VM/storage network: • 1x ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port PCIe Ethernet Adapter
Ports	• Front: 1x USB 2.0 port with XClarity Controller access, 1x USB 3.0 port • Rear: 2x USB 3.0 ports and 1x VGA port
I/O expansion slots	BLKF V3 1U x16/x16 BF PCIe Gen4 Riser1 BLKG - V3 1U x16 PCIe Gen4 Riser2 Three slots: • Slot 1: x16; low profile (for the network adapter) • Slot 2: x16; low profile • Slot 3: x16 (for the RAID adapter)
Management features	Lenovo XClarity Controller 2 (XCC2) Enterprise, proactive platform alerts, light path diagnostics, Lenovo XClarity Administrator with Pro license
Security features	Chassis intrusion switch, Power-on password, administrator's password, Root of Trust module supporting TPM 2.0 and Platform Firmware Resiliency (PFR). Optional lockable front security bezel
Video	Embedded graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller 2 management controller. Maximum resolution is 1920x1200 at 60 Hz with 32 bits per pixel
Cooling	Seven hot-swap system fans with N+1 redundancy
Power supplies	Two redundant hot-swap 750 W High Efficiency Platinum or Titanium AC power supplies
Hyperconverged nodes - Hybrid storage	
Base model	ThinkAgile SXM650 V3 Hybrid (7D76CTOAWW)
Expansion model	ThinkAgile SXM650 V3 Hybrid - Expansion (7D76CTOBWW)
Quantity	4 - 16
Processor	Two Intel Xeon Gold, or Platinum Gen 4 processors
Memory	32 DIMM slots for TruDDR5 RDIMMs (16 DIMMs per processor; 8 memory channels per processor with two DIMMs per channel) with support for the following RDIMM capacities: • 128 GB, 256GB Performance+ 4800 MHz • 32 GB and 64 GB 4800 MHz
Memory capacity	Up to 8 TB
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs excluding 9x4 RDIMMs, requires Platinum or Gold processors), and memory mirroring

ThinkAgile SXM 4600 Attribute	SXM4600 42U or Customer-provided rack cabinet*
Drive bays	16x 3.5-inch hot-swap: 12x SAS/SATA + 4x NVMe PCIe

Internal storage	• Boot volume:
	  ◦ 2x ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSD in a RAID-1 drive group
	• Storage Spaces Direct Cache Tier
	  ◦ 4x NVMe PCIe 4.0 x4 HS SSD
	• Storage Spaces Direct Capacity Tier
	  ◦ 12x 3.5" 7.2K SAS 12Gb Hot Swap 512n HDD

Storage controllers	• ThinkSystem M.2 Kit with Mirroring Enablement Kit (for boot volume) Depending on the number and type of storage devices selected, the following are available: • ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA • Onboard NVMe interface (for the NVMe PCIe SSDs)
Network interfaces	Management: • 1x 1 GbE dedicated XCC2 management port (RJ-45) Workload: • 1x ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter;
Ports	• Front: 1x USB 2.0 port with XClarity Controller access, 1x USB 3.0 port • Rear: 2x USB 3.0 ports and 1x VGA port
I/O expansion slots	2x BLKP - V3 2U x16 PCIe Gen4 Riser1 or 2 Four slots: • Slot 4: PCIe 5.0 x16; low profile (for a network adapter) • Slot 5: PCIe 5.0 x16; full-height, half-length • Slot 6: PCIe 5.0 x16; full-height, half-length (for a network adapter) • Slot 7: PCIe 5.0 x8 (for an HBA)
Management features	Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. XClarity Controller 2 (XCC2) embedded management controller, XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XClarity Controller Platinum to enable remote control and other functions.

ThinkAgile SXM 4600 Attribute	SXM4600 42U or Customer-provided rack cabinet*
Security features	Chassis intrusion switch, Power-on password, administrator's password, Root of Trust module supporting TPM 2.0 and Platform Firmware Resiliency (PFR). Optional lockable front security bezel
Video	Embedded graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller 2 management controller. Maximum resolution is 1920x1200 at 60 Hz with 32 bits per pixel
Cooling	Six hot-swap system fans with N+1 redundancy
Power supplies	Two redundant hot-swap 1800 W High Efficiency Platinum or Titanium AC power supplies
Hyperconverged nodes - All Flash storage	
Base model	ThinkAgile SXM650 V3 All Flash (7D76CTOCWW)
Expansion model	ThinkAgile SXM650 V3 All Flash - Expansion (7D76CTODWW)
Quantity	4 - 16
Processor	Two Intel Xeon Gold, or Platinum Gen 4 processors
Memory	32 DIMM slots for TruDDR5 RDIMMs (16 DIMMs per processor; 8 memory channels per processor with two DIMMs per channel) with support for the following RDIMM capacities: • 128 GB, 256GB Performance+ 4800 MHz • 32 GB and 64 GB 4800 MHz
Memory capacity	Up to 8 TB
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs excluding 9x4 RDIMMs, requires Platinum or Gold processors), and memory mirroring
Drive bays	24x 2.5-inch hot-swap: 20x SAS/SATA + 4x NVMe PCIe 24x 2.5-inch hot-swap: 24x NVMe PCIe

Internal storage	• Boot volume:
	  ◦ 2x ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSDs in a RAID-1 drive group
	• Storage Spaces Direct Cache Tier, choice of the following:
	  ◦ None; or
	  ◦ 4x ThinkSystem 2.5" U.2 NVMe PCIe 4.0 x4 HS SSD
	• Storage Spaces Direct Capacity Tier, choice of 12, 16, or 20 of the following:
	  ◦ ThinkSystem 2.5" SATA 6Gb HS SSD or
	  ◦ ThinkSystem 2.5" SAS 24Gb HS SSD or
	  ◦ ThinkSystem 2.5" U.2 NVMe PCIe 4.0 x4 HS SSD
	  ◦ ThinkSystem 2.5" U.3 NVMe PCIe 4.0 x4 HS SSD

ThinkAgile SXM 4600 Attribute	SXM4600 42U or Customer-provided rack cabinet*
Storage controller	• ThinkSystem M.2 Kit with Mirroring Enablement Kit (for boot volume) • ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA • ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA • Onboard NVMe interface (for the NVMe PCIe SSDs) • All-NVMe config requires 1x 4-port Retimer (B98C) when configured with 24x NVMe drives
Network interfaces	Management: • 1x 1 GbE dedicated XCC2 management port (RJ-45) Workload: • 1x ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter
Ports	• Front: 1x USB 2.0 port with XClarity Controller access, 1x USB 3.0 port • Rear: 2x USB 3.0 ports and 1x VGA port
I/O expansion slots	Up to six slots: • Slot 1: PCIe 5.0 x16; full-height, half-length (for a network adapter) • Slot 2: PCIe 5.0 x8; full-height, half-length (not used) • Slot 3: PCIe 5.0 x8; low profile (for a network adapter) • Slot 4: PCIe 5.0 x16; full-height, half-length (not used) • Slot 5: PCIe 5.0 x8; full-height, half-length (for a network adapter) • Slot 5: PCIe 5.0 x8 (for an HBA)
Management features	Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. XClarity Controller 2 (XCC2) embedded management controller, XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XClarity Controller Platinum to enable remote control and other functions.
Security features	Chassis intrusion switch, Power-on password, administrator's password, Root of Trust module supporting TPM 2.0 and Platform Firmware Resiliency (PFR). Optional lockable front security bezel
Video	Embedded graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller 2 management controller. Maximum resolution is 1920x1200 at 60 Hz with 32 bits per pixel
Cooling	Six hot-swap system fans with N+1 redundancy

ThinkAgile SXM 4600 Attribute	SXM4600 42U or Customer-provided rack cabinet*
Power supplies	Two redundant hot-swap 1800 W High Efficiency Platinum ot Titanium AC power supplies
Networking	
VM/storage network	2x Mellanox SN2410 25 GbE network switches, each with 48x 25 GbE SFP28/SFP+ and 8x 100 GbE QSFP28/QSFP+ ports
VM network uplinks	4x 10 GbE SFP+ SR or 4x 25 GbE SFP28 SR upstream connections (2x per SN2410 switch) with customer-supplied MMF OM3 or OM4 fiber optic cables with LC connectors
Cooling	4x hot-swap fans
Power supplies	2x 460 W AC redundant hot-swap power supplies

* For customer-provided rack cabinets, the Form factor, Dimensions, Total rack load capacity, Maximum rack weight, and AC power distribution attributes do not apply.

Models

Factory-integrated models of the ThinkAgile SXM are configured by using the Lenovo Data Center Solution Configurator (DCSC):
http://dcsc.lenovo.com

Note: You are required to engage a Lenovo representative in the project that includes the ThinkAgile SXM.

The configuration process includes the following steps:

- Model selection
  - SXM4600
- Rack cabinet selection
  - 42U (SXM4600)
  - Customer-provided rack cabinet
- Power distribution infrastructure selection (SXM4600 only; does not apply to the customer-provided rack cabinet)
  - 200- 240V AC three-phase
  - 346-415V AC three-phase
- Node configuration (The type and configuration of all hyperconverged nodes must be the same)
  - One management node is derived
  - Hyperconverged nodes:
    - Node type (Hybrid or All-Flash storage)
    - Processor model
    - Memory capacity
    - Storage capacity
    - Node quantity
- Networking selection
  - Switch models are derived
- Software selection
  - Microsoft Azure Stack Hub software is derived
  - Lenovo XClarity Administrator with Pro license is derived
- Warranty:
  - Lenovo ThinkAgile Advantage support
  - Three, four, or five years of warranty service coverage
  - 9x5 Next Business Day response with parts delivered (default selection) or onsite response

    - 24x7 4-hour or 2-hour onsite response or 24x7 6-hour committed service repair (available only in select regions)
    - Premier services (optional)
    - YourDrive YourData (optional)
- Lenovo Professional Services:
    - Solution deployment services (included)
    - Solution health check services (optional)
    - Steady-state managed services (optional)

Lenovo deployment services are included, providing remote solution preparation and planning activities, reviewing customer datacenter readiness, configuring solution components, validating deployment milestones, and delivering post-installation documentation to customer on project closure.

For solutions that are to be housed in a customer-supplied rack cabinet, Lenovo Professional Services deployment services will mount and cable the solution components into the rack and provide verification services to ensure the physical hardware and setup is ready for solution deployment.

Existing ThinkAgile SXM deployments can be expanded up to the maximum number of hyperconverged nodes supported by ordering the expansion node models. Field expansion is handled by Lenovo Professional Services via a service contract.

Note: The configuration of the expansion nodes must be the same as the existing nodes.

Rack cabinets

The following table lists the base models of the ThinkAgile SXM rack cabinets.

Table 2. Base models of the ThinkAgile SXM rack cabinets

Description	Machine Type-Model	Feature code	SXM4600 42U	Customer rack
ThinkAgile SXM4600 42U Rack	7DDECTO1WW	BW4Z	Y	N
ThinkAgile SXM Customer Provided Rack Kit	7DDFCTO1WW	BW51	N	Y

Configuration note: For SXM4600, 1U, 3U, and 5U Filler panels are derived based on the number of nodes selected.

Power distribution

Power distribution units (PDUs) are used to distribute power from an uninterruptible power supply (UPS) or utility power to the equipment within the ThinkAgile SXM 4600brack cabinet and to provide fault-tolerant power redundancy for high availability.

Each of the nodes and network switches has two redundant power supplies, and each of two power supplies is connected to a separate PDU to support topologies with redundant AC power sources.

The power distribution topology is illustrated in the following figure.

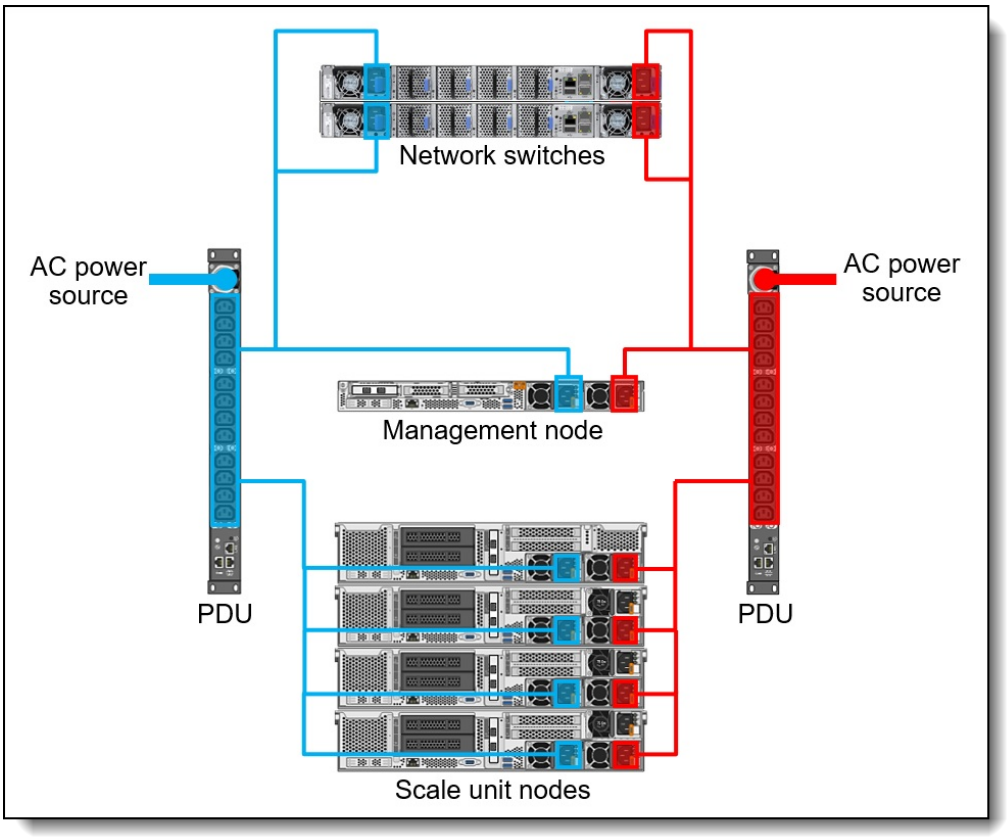

Figure 3. Power distribution topology

The following table lists the power distribution units for the ThinkAgile SXM rack cabinets.

Table 3. Power distribution units

Description	Feature code	Quantity	SXM4600 42U
1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	BLC4	4	Y
1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	BLC6	4	Y
1U 18 C19/C13 switched and monitored 48A 3P WYE PDU – ETL	BNDV	4	Y
1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	BLC5	4	Y
1U 18 C19/C13 switched and monitored 48A 3P WYE PDU – CE	BNDW	4	Y

Configuration notes:

- Only one type of PDU is supported within the ThinkAgile SXM rack cabinet; different PDU types cannot be mixed within the rack cabinet.
- Power cables are derived based on the ThinkAgile SXM model and the number of nodes selected.

The following table summarizes the PDU and line cord specifications.

For more information on the PDU's, refer to the Lenovo Press Product Guide:

https://lenovopress.lenovo.com/lp1556-lenovo-1u-switched-monitored-3-phase-pdu

Table 4. PDU specifications

Feature	1U 12x or 18x C19/C13 PDUs				
Feature code	BLC4	BLC6	BNDV	BLC5	BNDW
Phase	3-phase Delta	3-phase Delta	3-phase WYE	3-phase WYE	3-phase WYE
Voltage	208 V AC	230 V AC	208 V AC	230 V AC	380-415 V AC (220-240 V AC)
Line cord input amperage	100 A	60A	60 A	32 A	63 A
Line cord input connector	IEC 603309 3P+E	IEC 603309 3P+E	IEC 603309 3P+N+E	IEC 603309 3P+N+E	IEC 603309 3P+N+E
Output connectors	12x or 18x Combination C13/C19				

Management node

The ThinkAgile SXM solution uses the Lenovo ThinkSystem SR630 server as a management node.

Referred to as the Hardware Lifecycle Host (HLH), the SR630 is a density-optimized, 1U dual-socket server that offers outstanding uptime to keep cloud deployments running safely and comprehensive systems management tools that help make deployment easier. Outstanding reliability, availability, and serviceability and high-efficiency design improve your business environment and help save operational costs.

The following table lists the base configuration of the ThinkSystem SR630 for ThinkAgile SXM that is derived.

Table 5. ThinkSystem SR630 for ThinkAgile SXM base configuration

Machine Type-Model	Processor	Memory	Storage controller	Drives	Network	Power supply
7D73CTOAWW	2x Intel Xeon Gold	128 GB	1x RAID 540-8i	2x 2.5" 800 GB SSDs	1x 25 GbE	2x 750W HS

Components of the management node are described in the following sections:

- SR630 V3 processors
- SR630 V3 memory
- SR630 V3 internal storage
- SR630 V3 network connectivity

For more information about the SR630 V3 server, refer to the Lenovo Press Product Guide: https://lenovopress.lenovo.com/lp1600-thinksystem-sr630-v3-server

SR630 V3 processors

The SR630 V3 for ThinkAgile SXM ships with two Intel Xeon Gold processors. The following table lists feature codes of the processors that are available for selection.

Table 6. Processor feature codes

Description	Feature code
Intel Xeon Gold 5415+ 8C 150W 2.9GHz	BQ63

SR630 V3 memory

The SR630 V3 for ThinkAgile SXM supports 128 GB of memory with 8x 16 GB TruDDR5 RDIMMs. Each processor has eight memory channels, and supports 2 DIMMs per channel installed in four (16 GB RDIMMs) channels, and the remaining channels remain unpopulated.

The following memory protection technologies are supported:

- ECC
- Patrol scrubbing
- Demand scrubbing

The following table lists memory RDIMMs for the SR630 V3 for ThinkAgile SXM that are available for selection.

Table 7. Memory RDIMMs

Description	Feature code	Quantity
ThinkSystem 16GB TruDDR5 4800MHz (1Rx8) RDIMM	BKTL	8

SR630 V3 internal storage

The SR630 V3 management node has 8x 2.5" hot-swap drive bays connected to the ThinkSystem RAID 540-8i PCIe 12Gb Adapter.

The following table lists the internal drive configuration for the management node.

Table 8. Internal drive configuration: Management node

Model	4x 2.5-inch hot-swap front drive bays		
	Quantity, drive types	Drive layout	Storage controller
SR630 V3 for ThinkAgile SXM	2x 800GB 24Gb SAS SSDs	RAID-1 (2x SSDs) boot volume	1x RAID 540-8i

The following table lists the SSDs for the SR630 V3 management node.

Table 9. SSDs for management node

Description	Feature code	Quantity
ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	BNW8	2

SR630 V3 network connectivity

The SR630 V3 for ThinkAgile SXM uses 25 GbE connectivity with the dual-port 25 GbE Mellanox ConnectX-6 Lx network adapter: One port is connected to each network switch via a 25 GbE link. Also, the 1 GbE dedicated management port on the XCC is connected to the first network switch. For more information, refer to Networking.

The following table lists the network adapter derived for the management node.

Table 10. Network adapter

Description	Feature code	Quantity
ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	BE4U	1

Configuration note: The 1.5 m UTP Cat5e cable (1 GbE) and 1 m 25 GbE SFP28 DAC cables for the network connections are included.

Hyperconverged nodes

The ThinkAgile SXM solution uses Lenovo ThinkSystem SR650 V3 servers featuring the second generation of Intel Xeon Processor Scalable Family as hyperconverged scale unit nodes.

The SR650 V3 is a versatile 2U dual-socket server that offers outstanding uptime to keep cloud deployments running safely and comprehensive systems management tools that help make deployment easier. Outstanding reliability, availability, and serviceability and high-efficiency design to improve your business environment and help save operational costs.

The following table lists the base configuration of the ThinkSystem SR650 V3 for ThinkAgile SXM.

Table 11. ThinkSystem SR650 V3 for ThinkAgile SXM base configuration

Machine Type-Model	Intel Xeon processor	Memory (min / max)	Storage controllers	Drives	Network	Power supply
Initial deployment						
7D76CTOAWW (Hybrid storage)	2x Silver, Gold, or Platinum*	512 GB / 2,048 GB**	• 1x M.2 Kit with Mirroring • 1x 440-16i HBA	2x 960GB M.2 SSDs 4x 3.5" SSDs*** 12x 3.5" HDDs***	2x 25 GbE	2x 1800W HS
7D76CTOCWW (All Flash storage)	2x Silver, Gold, or Platinum*	512GB / 8,192GB**	• 1x M.2 Kit with Mirroring • 2x 440-16i HBA • 2x or 3x 440-8i HBA • 1x 4-port Retimer for All-NVME	2x 960 GB M.2 SSDs 4x 2.5" NVMe SSDs*** 12/16/20x 3.5" SATA SSDs*** 12/16/20/24x 2.5" All NVME***	2x 25 GbE	2x 1800W HS
Field expansion						
7D76CTOBWW (Hybrid storage)	2x Silver, Gold, or Platinum*	512GB / 2,048 GB**	• 1x M.2 Kit with Mirroring • 1x 440-16i HBA	2x 480 GB M.2 SSDs 4x 3.5" SSDs*** 10x 3.5" HDDs***	2x 25 GbE	2x 1800W HS
7D76CTODWW (All Flash storage)	2x Silver, Gold, or Platinum*	512 GB / 8,192 GB**	• 1x M.2 Kit with Mirroring • 2x 440-16i HBA • 2x or 3x 440-8i HBA • 1x 4-port Retimer for All-NVME	2x 960 GB M.2 SSDs 4x 2.5" NVMe SSDs*** 12/16/20x 3.5" SATA SSDs*** 12/16/20/24x 2.5" All-NVME***	2x 25 GbE	2x 1800W HS

* Processor model is selectable (See Processors for details).
** Memory capacity is configurable (See Memory for details).
*** Drive capacity is configurable (See Internal storage for details).

Components of the hyperconverged node are described in the following sections:

- SR650 V3 processors
- SR650 V3 memory
- SR650 V3 Internal Storage
- SR650 V3 network connectivity

For more information about the ThinkSystem SR650 V3(Xeon SP Gen 4) server, refer to the Lenovo Press Product Guide:
https://lenovopress.lenovo.com/lp1601-thinksystem-sr650-v3-server

SR650 V3 processors

The SR650 for ThinkAgile SXM requires two Intel Xeon Silver, Gold, or Platinum Gen 4 processors. The following table lists feature codes of the supported processors that are available for selection.

Table 12. Processor options

Feature	Description	Maximum supported			
		ThinkAgile SXM650 V3 Hybrid	ThinkAgile SXM650 V3 Hybrid Exp	ThinkAgile SXM650 V3 All Flash	ThinkAgile SXM650V3 All Flash Exp
Intel Xeon Silver processors					
BQ64	Intel Xeon Silver 4410T 10C 150W 2.7GHz Processor	2	2	2	2
BQ67	Intel Xeon Silver 4410Y 12C 150W 2.0GHz Processor	2	2	2	2
BQ69	Intel Xeon Silver 4416+ 20C 165W 2.0GHz Processor	2	2	2	2
Intel Xeon Gold processors					
BQ6B	Intel Xeon Gold 6418H 24C 185W 2.1GHz Processor	2	2	2	2
BPQF	Intel Xeon Gold 6426Y 16C 185W 2.5GHz Processor	2	2	2	2
BQ6F	Intel Xeon Gold 6428N 32C 185W 1.8GHz Processor	2	2	2	2
BPPC	Intel Xeon Gold 6430 32C 270W 2.1GHz Processor	0	0	2	2
BPQC	Intel Xeon Gold 6434 8C 195W 3.7GHz Processor	2	2	2	2
BQ6E	Intel Xeon Gold 6434H 8C 195W 3.7GHz Processor	2	2	2	2
BQ6K	Intel Xeon Gold 6438M 32C 205W 2.2GHz Processor	2	2	2	2
BQ6D	Intel Xeon Gold 6438N 32C 205W 2.0GHz Processor	2	2	2	2
BQ62	Intel Xeon Gold 6438Y+ 32C 205W 2.0GHz Processor	2	2	2	2
BPQE	Intel Xeon Gold 6442Y 24C 225W 2.6GHz Processor	2	2	2	2
BPQB	Intel Xeon Gold 6444Y 16C 270W 3.6GHz Processor	0	0	2	2
BQ6A	Intel Xeon Gold 6448H 32C 250W 2.4GHz Processor	2	2	2	2
BPQD	Intel Xeon Gold 6448Y 32C 225W 2.1GHz Processor	2	2	2	2
BPPM	Intel Xeon Gold 6454S 32C 270W 2.2GHz Processor	0	0	2	2
Intel Xeon Platinum processors					
BPPH	Intel Xeon Platinum 8444H 16C 270W 2.9GHz Processor	0	0	2	2
BPPG	Intel Xeon Platinum 8450H 28C 250W 2.0GHz Processor	2	2	2	2
BPPB	Intel Xeon Platinum 8452Y 36C 300W 2.0GHz Processor	0	0	2	2
BPPF	Intel Xeon Platinum 8454H 32C 270W 2.1GHz Processor	0	0	2	2
BPPT	Intel Xeon Platinum 8458P 44C 350W 2.7GHz Processor	0	0	2	2
BPPN	Intel Xeon Platinum 8460H 40C 330W 2.2GHz Processor	0	0	2	2
BPPQ	Intel Xeon Platinum 8460Y+ 40C 300W 2.0GHz Processor	0	0	2	2
BPQA	Intel Xeon Platinum 8462Y+ 32C 300W 2.8GHz Processor	0	0	2	2

Feature	Description	Maximum supported			
		ThinkAgile SXM650 V3 Hybrid	ThinkAgile SXM650 V3 Hybrid Exp	ThinkAgile SXM650 V3 All Flash	ThinkAgile SXM650V3 All Flash Exp
BPPU	Intel Xeon Platinum 8468 48C 350W 2.1GHz Processor	0	0	2	2
BPPE	Intel Xeon Platinum 8468H 48C 330W 2.1GHz Processor	0	0	2	2
BPPP	Intel Xeon Platinum 8468V 48C 330W 2.4GHz Processor	0	0	2	2
BN0N	Intel Xeon Platinum 8470 52C 350W 2.0GHz Processor	0	0	2	2
BPPJ	Intel Xeon Platinum 8470N 52C 300W 1.7GHz Processor	0	0	2	2
BN0M	Intel Xeon Platinum 8480+ 56C 350W 2.0GHz Processor	0	0	2	2
BPPS	Intel Xeon Platinum 8490H 60C 350W 1.9GHz Processor	0	0	2	2

SR650 V3 memory

The SR650 V3 for ThinkAgile SXM supports up to 8 TB of memory with 32x TruDDR5 DIMMs. Each processor has eight memory channels, and there are two DIMMs per channel.

The following rules apply when selecting the memory configuration:

- The SR650 V3 only supports quantities Min=16, Max=32 with mixing DIMM capacity or 16 DIMMs per processor;
- The server supports three types of DIMMs: 9x4 RDIMMs, RDIMMs, and 3DS RDIMMs; UDIMMs and LRDIMMs are not supported
- Mixing of DIMM types is not supported (9x4 DIMMs with 10x4 RDIMMs, 9x4 DIMMs with 3DS RDIMMs, 10x4 RDIMMs with 3DS RDIMMs)
- The mixing of 128GB 3DS RDIMMs and 256GB 3DS RDIMMs is supported, however all DIMM slots must be populated evenly: 8x 128GB DIMMs and 8x 256GB DIMMs per processor
- Mixing x4 and x8 DIMMs is not supported
- Mixing of DIMM rank counts is supported. Follow the required installation order installing the DIMMs with the higher rank counts first.
- Mixing of DIMM capacities is supported, however only two different capacities are supported across all channels of the processor. Follow the required installation order installing the larger DIMMs first.

The following memory protection technologies are supported:

- ECC detection/correction
- Bounded Fault detection/correction
- SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description)
- ADDDC (for 10x4-based memory DIMMs, not supported with 9x4 DIMMs)
- Memory mirroring

The following table lists memory selection options available for the SR650 for ThinkAgile SXM.

Table 13. Memory selection options

Part number	Feature	Description	Maximum supported			
			ThinkAgile SXM650 V3 Hybrid	ThinkAgile SXM650 V3 Hybrid Exp	ThinkAgile SXM650 V3 All Flash	ThinkAgile SXM650V3 All Flash Exp
4X77A77031	BKTM	ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMM	32	32	32	32
4X77A77483	BNW5	ThinkSystem 32GB TruDDR5 4800MHz (1Rx4) 9x4 RDIMM	32	32	32	32
4X77A77033	BKTN	ThinkSystem 64GB TruDDR5 4800MHz (2Rx4) 9x4 RDIMM	32	32	32	32
4X77A77030	BNF6	ThinkSystem 32GB TruDDR5 4800MHz (1Rx4) 10x4 RDIMM	32	32	32	32
4X77A77032	BNF9	ThinkSystem 64GB TruDDR5 4800MHz (2Rx4) 10x4 RDIMM	32	32	32	32
4X77A77034	BNFC	ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM	32	32	32	32
4X77A77035	BNF8	ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM	32	32	32	32

SR650 V3 Internal Storage

The SR650 V3 hyperconverged node for hybrid storage has 16x 3.5" hot-swap drive bays (12 on the front; 4 on the rear) connected to the ThinkSystem 440-16i SAS/SATA HBA , and an internal M.2 Kit with Mirroring for 2x M.2 non-hot-swap SSDs.

The SR650 hyperconverged node for all flash storage has 24x 2.5" hot-swap drive bays connected to 2x or 3x ThinkSystem 440-8i's, and an internal M.2 Kit with Mirroring for 2x M.2 non-hot-swap SSDs.

For the boot volume, the hyperconverged nodes use 2x M.2 960GB SSDs installed in the M.2 Kit with Mirroring. The drives are configured in a RAID-1 group that provides highly available boot volume for the system software.

The following table lists the internal drive configuration for the data storage of the hyperconverged nodes.

Table 14. Internal drive configuration: Data storage

Model	12x 3.5-inch (front) + 4x 3.5-inch (rear) hot-swap drive bays (data storage)		
	Quantity, drive types	**Drive layout**	**Storage controllers**
SR650 V3 for ThinkAgile SXM Hybrid	Config 1: 54 TB • 4x 1.6TB NVMe PCIe 4.0 • 12x 4TB 7.2K 12Gb NL SAS HDDs	• 4x SSDs for cache • 12x HDDs for capacity	1x 440-16i HBA
	Config 2: 84TB • 4x 3.2TB NVMe PCIe 4.0 • 12x 6TB 7.2K 12Gb NL SAS HDDs	• 4x SSDs for cache • 12x HDDs for capacity	1x 440-16i HBA
	Config 3: 108 TB • 4x 3.2TB NVMe PCIe 4.0 • 12x 8TB 7.2K 12Gb NL SAS HDDs	• 4x SSDs for cache • 12x HDDs for capacity	1x 440-16i HBA
	Config 4: 132 TB • 4x 3.2TB NVMe PCIe 4.0 • 12x 10TB 7.2K 12Gb NL SAS HDDs	• 4x SSDs for cache • 12x HDDs for capacity	1x 440-16i HBA
	Config 5: 169 TB • 4x 6.4TB NVMe PCIe 4.0 • 12x 12TB 7.2K 12Gb NL SAS HDDs	• 4x SSDs for cache • 12x HDDs for capacity	1x 440-16i HBA
SR650 V3 for ThinkAgile SXM All Flash	Config 1: 52TB or 67TB • 4x 1.6TB NVMe PCIe 4.0 • 12x or 16x 3.84TB 6Gb or 24 Gb SATA SSDs	• 4x NVMe for cache • 12x or 16x SSDs for capacity	• 1x Onboard NVMe • 2x or 3x 440-8i HBAs
	Config 2: 89 TB • 4x 3.2TB NVMe PCIe 4.0 • 20x 3.84TB 6Gb or 24 Gb SATA SSDs	• 4x NVMe for cache • 20x SSDs for capacity	• 1x Onboard NVMe • 2x or 3x 440-8i HBAs
	Config 3: 104TB or 135TB • 4x 3.2TB NVMe PCIe 4.0 • 12x or 16x 7.68TB 6Gb or 24 Gb SATA SSDs	• 4x NVMe for cache • 12x or 16x SSDs for capacity	• 1x Onboard NVMe • 2x or 3x 440-8i HBAs
	Config 4:179TB • 4x 6.4TB NVMe PCIe 4.0 • 20x 7.68TB 6Gb or 24 Gb SATA SSDs	• 4x NVMe for cache • 20x SSDs for capacity	• 1x Onboard NVMe • 2x or 3x 440-8i HBAs
	Config 5: 38TB, 51TB, 64TB or 76TB • 12x, 16x, 20x, or 24x 3.2TB NVMe PCIe 4.0	12x, 16x, 20x, or 24x NVMe	• 1x Onboard NVMe • 1x 4-port Retimer for All-NVME • 2x or 3x 440-8i HBAs
	Config 6: 46TB, 61TB, 76TB or 92TB • 12x, 16x, 20x, or 24x 3.84TB NVMe PCIe 4.0	12x, 16x, 20x, or 24x NVMe	• 1x Onboard NVMe • 1x 4-port Retimer for All-NVME • 2x or 3x 440-8i HBAs
	Config 7: 76TB, 102TB, 128TB or 153TB • 12x, 16x, 20x, or 24x 6.4TB NVMe PCIe 4.0	12x, 16x, 20x, or 24x NVMe	• 1x Onboard NVMe • 1x 4-port Retimer for All-NVME • 2x or 3x 440-8i HBAs
	Config 8: 92TB, 122TB, 153TB or 184TB • 12x, 16x, 20x, or 24x 7.68TB NVMe PCIe 4.0	12x, 16x, 20x, or 24x NVMe	• 1x Onboard NVMe • 1x 4-port Retimer for All-NVME • 2x or 3x 440-8i HBAs

The following table lists the internal drive configurations for the boot volume of the hyperconverged nodes.

Table 15. Internal drive configurations: Boot volume

Model	2.5-inch non-hot-swap internal drive bays (boot volume)		
	Quantity, drive types	**Drive layout**	**Storage controller**
SR650 V3 for ThinkAgile SXM	2x M.2 960GB SATA 6Gbps Non-Hot-Swap SSDs	1x RAID 1 (2x SSDs) boot volume	M.2 Kit with Mirroring
	2x M.2 960GB NVMe PCIe 4.0	1x RAID 1 (2x SSDs) boot volume	M.2 Kit with Mirroring

Boot Drives

Table 16. Internal drive configurations: Boot Drives

Part number	Feature	Description	Maximum supported			
			ThinkAgile SXM650 V3 Hybrid	ThinkAgile SXM650 V3 Hybrid Exp	ThinkAgile SXM650 V3 All Flash	ThinkAgile SXM650V3 All Flash Exp
M.2 SATA drives						
4XB7A82288	BQ20	ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSD	2	2	2	2
M.2 NVME drives						
4XB7A13999	BKSR	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No	No	2	2

The following table lists the HDD and SSD selection options for the SR650 V3 hyperconverged nodes for hybrid storage.

Table 17. HDDs and SSDs for hyperconverged nodes: Hybrid storage

Part number	Feature	Description	Hybrid Storage	
			Cache	Capacity
3.5-inch hot-swap 6Gb SAS HDDs				
7XB7A00054	AUUB	ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	20
7XB7A00068	B118	ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	20
7XB7A00051	AUU8	ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD	No	20
7XB7A00052	AUUA	ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	20
7XB7A00053	AUU9	ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	20
3.5-inch hot-swap 12Gb SAS HDDs				
7XB7A00043	AUU6	ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD	No	12
7XB7A00044	AUU7	ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	12
7XB7A00045	B0YR	ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	12
7XB7A00046	AUUG	ThinkSystem 3.5" 10TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	12
7XB7A00067	B117	ThinkSystem 3.5" 12TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	12
3.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A17141	BNEK	ThinkSystem 3.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	No
4XB7A17143	BNEM	ThinkSystem 3.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	No
4XB7A17144	BNEN	ThinkSystem 3.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	No

Table 18. SSDs for hyperconverged nodes: All flash storage

Part number	Feature	Description	All Flash Storage	
			Cache	Capacity
2.5-inch hot-swap 24 Gb SAS SSDs				
4XB7A80320	BNWF	ThinkSystem 2.5" PM1653 3.84TB Read Intensive SAS 24Gb HS SSD	No	20
4XB7A80321	BP3E	ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD	No	20
2.5-inch hot-swap 6 Gb SAS SSDs				
4XB7A17128	BK7L	ThinkSystem 2.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD	No	20
4XB7A72441	BM88	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	No	20
4XB7A72442	BM87	ThinkSystem 2.5" PM893 7.68TB Read Intensive SATA 6Gb HS SSD	No	20
4XB7A17104	BK77	ThinkSystem 2.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD	No	20
4XB7A17105	BK78	ThinkSystem 2.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD	No	20
2.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A13942	BMGE	ThinkSystem 2.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	24
4XB7A13943	BNEF	ThinkSystem 2.5" U.2 P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	24
4XB7A79648	BNF5	ThinkSystem 2.5" U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	24
4XB7A79649	BNF4	ThinkSystem 2.5" U.3 7450 PRO 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	24
4XB7A17129	BNEG	ThinkSystem 2.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	4
4XB7A17130	BNEH	ThinkSystem 2.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24
4XB7A17133	BNEZ	ThinkSystem 2.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24
4XB7A13967	BNEJ	ThinkSystem 2.5" U.3 7450 MAX 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24
4XB7A13970	BNEY	ThinkSystem 2.5" U.3 7450 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24
4XB7A13971	BNEL	ThinkSystem 2.5" U.3 7450 MAX 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24
4XB7A84056	BRG0	ThinkSystem 2.5" U.3 7450 MAX 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	24	24

SR650 V3 network connectivity

For the management network, the SR650 V3 for ThinkAgile SXM uses 1 GbE connectivity with the 1 GbE dedicated management port on the XCC that is connected to one of the network switches included in the solution.

For the VM/storage network, the SR650 V3 for ThinkAgile SXM provides two-port 25 GbE connectivity: Each port is connected to a separate network switch included in the solution. For more information, refer to Networking.

The following table lists the network adapters available for selection.

Table 19. Network adapter

Part number	Feature	Description	Maximum supported			
			ThinkAgile SXM650 V3 Hybrid	ThinkAgile SXM650 V3 Hybrid Exp	ThinkAgile SXM650 V3 All Flash	ThinkAgile SXM650V3 All Flash Exp
4XC7A62580	BE4U	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	1	1	1	1
4XC7A08248	B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	No	No	1	1

Configuration notes:

- One dual-port adapters can be selected to provide dual-port connectivity.
- The 3 m UTP Category 5E cable for the 1 GbE management network connection and two 3 m passive 25 GbE SFP28 DAC cables for the VM/storage network connections are included for each hyperconverged node.

Networking

The ThinkAgile SXM solution uses two Mellanox SN2410 25 GbE switches for network connectivity.

Dedicated XClarity Controller 2 (XCC2) management ports on the management node and hyperconverged nodes are connected to one of the Mellanox SN2410 network switches via 1 GbE links. The management node and first 8 hyperconverged nodes are connected to TOR-1 while nodes 9-16 are connected to TOR-2.

25 GbE network ports on the management node and hyperconverged nodes are connected to a pair of Mellanox SN2410 network switches. The switches are connected to each other via two 100 GbE links (provided by two 100 Gb QSFP+ active optical cables (AOCs) included) that are configured in a link aggregation group (LAG). Each of the two SN2410 switches provides two 10 GbE uplinks (10 GbE SR SFP+ transceivers) or two 25 GbE uplinks (25 GbE SR SFP28 Transceiver) that are configured in a virtual link aggregation group for upstream network integration with the customer network.

The network connectivity is illustrated in the following figure. Figure 6 shows connectivity when using a single dual-port network adapter in each scale unit node.

The following table lists the types of network switch connections, the purpose of each, and the physical layer used for traffic

Table 20. Network switch connections

Connection	Purpose	Speed	Physical layer
XCC	Management	1 GbE	1 GbE transceiver with Cat-6 Ethernet cable
TOR/Border	Customer access	10 or 25 GbE	SFP+ or SFP28 transceiver with fibre cable
Nodes	VM, storage, infrastructure	25 GbE	SFP28 Direct Attach Cable (DAC)
ISL/MLAG	Switch high availability	100 GbE	QSFP28 Active Optical Cable (AOC)

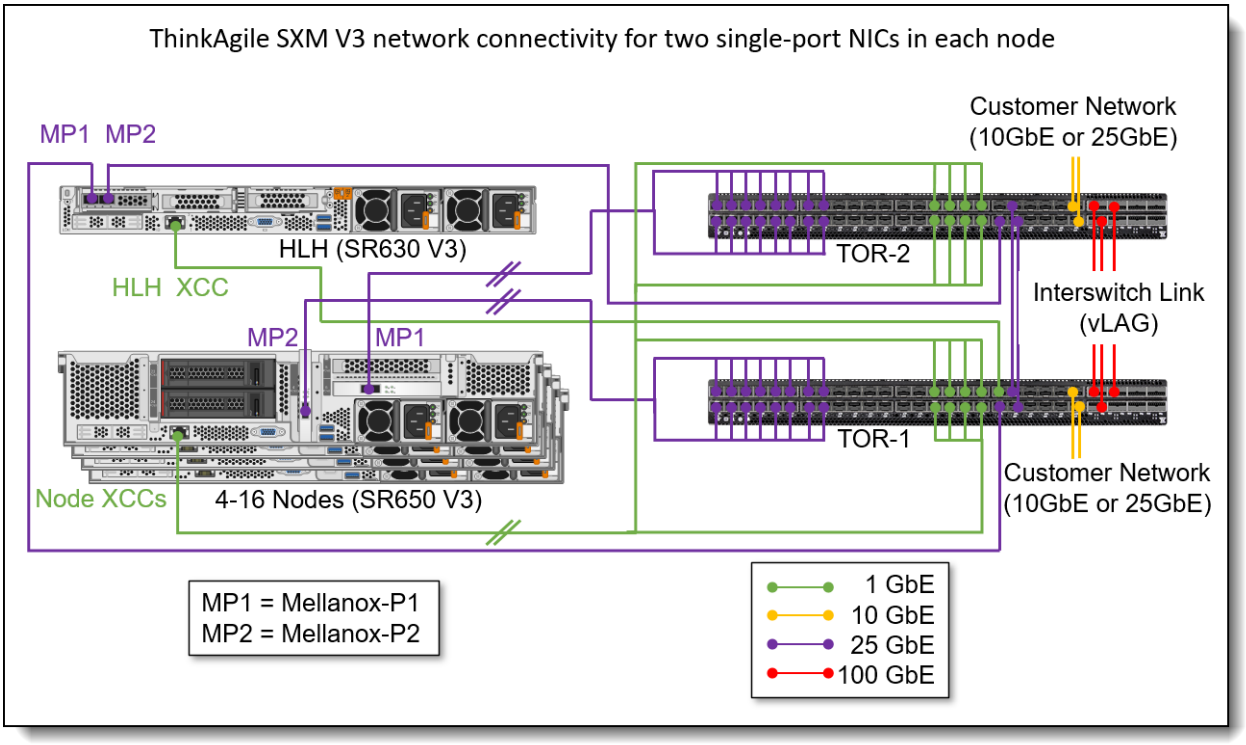

Figure 4. Network connectivity topology using dual-port network adapters

Two Mellanox SN2410 Ethernet switches are used in all current ThinkAgile SXM configurations. The SN2410 switch is an ONIE (Open Network Install Environment) based platform for allowing a multitude of operating systems to be mounted on it and utilizing the advantages of Open Networking and the capabilities of the Mellanox Spectrum ASIC. For ThinkAgile SXM solutions, it comes preinstalled with Cumulus Linux v4.3.0, an operating system that takes the Linux user experience from servers to switches and provides rich routing functionality for large scale applications.

The following table summarizes specifications of the Mellanox SN2410 Ethernet switch for ThinkAgile SXM.

Table 21. Mellanox SN2410 network switch

Feature	Mellanox SN2410
Software	Cumulus Linux v4.3.0
Ports	• 48 ports running at 1/10/25GbE • 8 ports running at 40/50/100GbE

Feature	Mellanox SN2410
Media types	• SFP28, QSFP28 short and long range optics • SFP28, QSFP28 DAC cable • SFP Base-T module
Management ports	• 1x 1 GbE RJ-45 (not used) • 1x Serial console
Layer 2 switching	Yes
Layer 3 switching	Yes
VLANs	Yes
VLAN tagging	Yes
Link aggregation	Yes
Virtual link aggregation	Yes
Quality of Service	Yes
Cooling	4x hot-swap fans
Power supplies	2x 460 W AC redundant hot-swap

The following table lists the transceivers that are available for the Mellanox SN2410 uplink ports.

Table 22. Transceiver for the SN2410 uplinks

Description	Feature code	Quantity (min / max)
Lenovo 10GbE SFP+ SR Transceiver (default selection)	5053	0 / 2
Lenovo 25GBASE-SR SFP28 Transceiver (optional selection)	AV1B	0 / 2

Configuration notes:

- All UTP Category 5E cables for the 1 GbE management network and 25 GbE SFP28 DAC cables for the VM/storage network are derived based on the number of nodes selected.
- VM/storage network uplinks require customer-supplied MMF OM3 or OM4 fiber optic cables with LC connectors.

Software

The ThinkAgile SXM solution includes the following software components:

- Microsoft Azure Stack Hub
- Lenovo XClarity 2

Microsoft Azure Stack Hub

The Microsoft Azure Stack Hub running on ThinkAgile SXM offers the following key features:

- Administrator portal
  - Provides a web-based interface for the cloud infrastructure to perform administrative tasks
  - Supports management of cloud resources and services
  - Enables creation of plans, offers, and subscriptions for tenant users
  - Allows monitoring of health and alerts and managing capacity
- User (Tenant) portal
  - Provides a web-based self-service interface for tenants to interact with the cloud
  - Supports provisioning, monitoring, and management of services for subscribed tenants
- Identity management
  - Provides authentication and authorization for cloud services
  - Uses Azure Active Directory (AAD) or Active Directory Federation Services (AD FS)
  - Supports role-based access control (RBAC) to manage access to resources and services
- Compute Resource Provider
  - Manages lifecycle of Virtual Machines (VMs) in a cloud environment
  - Creates, updates, and deletes VM images
  - Manages VM snapshots, restore points, and availability sets
- Network Resource Provider
  - Delivers Software Defined Networking (SDN) and Network Function Virtualization (NFV)
  - Implements network isolation and segmentation with virtual networks
  - Enables communications across virtual networks with traffic routing
  - Secures cloud resources by filtering network traffic with network security groups
  - Offers load balancing across multiple instances for enhanced availability and performance
- Storage Resource Provider
  - Delivers cloud storage services
  - Supports unstructured objects, structured datasets, message queuing, and SMB file storage
  - Offers storage cloud administration service
- Azure Resource Manager
  - Interacts with resource providers and enables cloud orchestration
  - Automates the deployment of infrastructure, services, and applications
  - Provisions cloud resources from JavaScript Object Notation (JSON) templates
  - Supports security, auditing, and tagging of cloud resources
- Usage data reporting
  - Provides metering for the cloud
  - Monitors various cloud resources and system components
  - Collects and aggregates the resource usage data across all resource providers
  - Transmits collected data to Azure commerce for billing processing

Microsoft Azure Stack Hub provides unified storage that offers the following features:

- Provides distributed scale-out storage for cloud services and resources
- Scales easily by simply adding more hyperconverged nodes
- Protects from node or drive failures with data redundancy and self-healing

Lenovo XClarity 2

Lenovo XClarity 2 offers the following features for the ThinkAgile SXM solution:

- Optional upgrade to XCC2 Platinum to provide remote control (keyboard video mouse) functions, support for the mounting of remote media files, boot capture, power capping, and other management and security features.
- Auto-discovery and monitoring of the scale unit nodes
- Firmware updates and compliance enforcement
- Pattern-based configuration management
- External alerts and notifications via SNMP traps, syslog remote logging, and e-mail
- Secure connections to managed endpoints
- NIST 800-193 or FIPS 140-3 compliant cryptographic standards between the management solution and managed endpoints
- Integration into existing higher level management systems such as cloud automation and orchestration tools through REST APIs, providing extensive external visibility and control over hardware resources
- An intuitive, easy-to-use GUI

Warranty and support

The ThinkAgile SXM solution can be configured with a three-, four, or five-year customer-replaceable unit (CRU) and onsite (for field-replaceable units [FRUs] only) limited hardware warranty with 24x7 ThinkAgile Advantage Single Point of Support (Lenovo hardware and Microsoft Azure Stack Hub software; requires an active Azure Stack Hub software support contract with Microsoft) and various levels of coverage with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

The Lenovo local support centers perform problem determination and resolution for hardware-related issues and escalate to Microsoft, on behalf of the customer, for software-related problem determination. Microsoft will contact the customer and will own the software-related problem resolution until closure.

A Microsoft Azure Stack Hub subscription and software support contract for ThinkAgile SXM should be obtained from Microsoft by the customer.

The base warranty provides 9x5 Next Business Day response with parts delivered. Lenovo’s additional support services provide a sophisticated, unified support structure for a customer's data center, with an experience consistently ranked number one in customer satisfaction worldwide.

The following additional Lenovo support services are available for selection:

- **Premier Support** provides a Lenovo-owned customer experience and delivers direct access to technicians skilled in hardware, software, and advanced troubleshooting, in addition to the following capabilities:
    - Direct technician-to-technician access through a dedicated phone line.
    - 24x7x365 remote support.
    - Single point of contact service.
    - End to end case management.
    - 3rd Party collaborative software support.
    - Online case tools and live chat support.
    - On-demand remote system analysis.

- **Warranty service level upgrades (Preconfigured Support)** are available to meet the on-site response time targets that match the criticality of customer's systems:
  - 3, 4, or 5 years of service coverage.
  - 1-year or 2-year post-warranty extensions.
  - **Foundation Service:** 9x5 service coverage with next business day onsite response.
  - **Essential Service:** 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select regions).
  - **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select regions).
- **Managed Services**
  Lenovo Managed Services provide continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of a customer's data center using state of the art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

  Quarterly reviews check error logs, verify firmware and operating system device driver levels, and software as needed. Lenovo will also maintain records of latest patches, critical updates, and firmware levels, to ensure customer's systems are providing business value through optimized performance.
- **Technical Account Management (TAM)**
  A Lenovo Technical Account Manager helps customers optimize operations of their data centers based on a deep understanding of customer's business. Customers gain direct access to a Lenovo TAM, who serves as their single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time. Also, a TAM helps proactively make service recommendations and manage service relationship with Lenovo to make certain that customer's needs are met.
- **YourDrive YourData**
  Lenovo’s YourDrive YourData service is a multi-drive retention offering that ensures that customer's data is always under their control, regardless of the number of drives that are installed in their Lenovo server. In the unlikely event of a drive failure, customers retain possession of their drive while Lenovo replaces the failed drive part. Customer's data stays safely on customer premises, in their hands. The YourDrive YourData service can be purchased in convenient bundles with Foundation, Essential, or Advanced services.
- **Health Check**
  Having a trusted partner who can perform regular and detailed health checks is central to maintaining efficiency and ensuring that customer systems and business are always running at their best. Health Check supports Lenovo-branded server, storage, and networking devices, as well as select Lenovo-supported products from other vendors that are sold by Lenovo or a Lenovo-Authorized Reseller.

Some regions might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific region. Local service teams can assist in explaining region-specific terms when needed. Examples of region-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at customer’s own cost and labor and defective parts must be returned following the instructions supplied with the spare parts.

Lenovo support services are region-specific. Not all support services are available in every region. For information about Lenovo support services that are available in a specific region, refer to the following resources:

- Service part numbers in Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com/#/services
- Lenovo Services Availability Locator
  https://lenovolocator.com/

For service definitions, region-specific details, and service limitations, refer to the following documents:

- Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) Servers and System Storage
  http://pcsupport.lenovo.com/us/en/solutions/ht503310
- Lenovo Data Center Services Agreement
  http://support.lenovo.com/us/en/solutions/ht116628

Deployment services

The following Lenovo Professional Services are included with the ThinkAgile SXM solution to get customers up and running quickly:

- Conducting remote preparation and planning
- Verifying firmware versions and performing firmware updates, if needed
- Configuring XCC2 management settings
- Installing Lenovo XClarity 2
- Configuring Lenovo XClarity 2 network settings and performing discovery and inventory
- Installing Azure Stack Hub software
- Transferring knowledge
- Developing post-installation documentation

Optional basic hardware installation services are also available from Lenovo Professional Services, including unpacking and inspecting the rack on the customer site, connecting to power and network, verifying operation, and disposing of the packaging materials.

For solutions that are to be housed in a customer-supplied rack cabinet, installation services from Lenovo Professional Services to mount and cable the solution components into the rack are included with these solutions.

Physical specifications

The ThinkAgile SXM4600 42U model have the following dimensions and weight (approximate):

- Height: 2011 mm (79.2 in)
- Width: 600 mm (23.6 in)
- Depth: 1200 mm (47.2 in)
- Total rack load capacity: 1588 kg (3500 lb)
- Total rack weight (maximum): 2086 kg (4599 lb)

Operating environment

ThinkAgile SXM models are supported in the following environment:

- Air temperature: 5 °C - 35 °C (41 °F - 95 °F)
- Humidity: 10% to 80% (non-condensing)
- Power load (rated maximum):
  - SXM4600 42U (fully configured solution): 23905 W
  - Solution components:
    - SR630 V3: 722 W
    - SR650 V3: 1408 W
- Heat output (maximum):
  - SXM4600 42U (fully configured solution): 81564 BTU/hour
  - Solution components:
    - SR630 V3: 2463 BTU/hour
    - SR650 V3: 4804 BTU/hour

Regulatory compliance

The ThinkAgile SXM solution components conform to the following regulations:

- United States: FCC Part 15, Class A; UL 60950-1
- Canada: ICES-003/NMB-03, Class A; CAN/CSA-C22.2 60950-1
- Argentina: IEC60950-1
- European Union: CE Mark (EN55022 Class A, IEC/EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- Germany: TUV-GS (IEC/EN 60950-1, EK1-ITB2000)
- China: CCC GB4943.1, GB9254 Class A, GB17625.1
- Japan: VCCI, Class A
- Taiwan: BSMI CNS13438, Class A; CNS14336-1
- Australia/New Zealand: AS/NZS CISPR 22 Class A
- Reduction of Hazardous Substances (ROHS)

Lenovo Financial Services

Lenovo Financial Services reinforces Lenovo's commitment to deliver pioneering products and services that are recognized for their quality, excellence, and trustworthiness. Lenovo Financial Services offers financing solutions and services that complement your technology solution anywhere in the world.

We are dedicated to delivering a positive finance experience for customers like you who want to maximize your purchase power by obtaining the technology you need today, protect against technology obsolescence, and preserve your capital for other uses.

We work with businesses, non-profit organizations, governments and educational institutions to finance their entire technology solution. We focus on making it easy to do business with us. Our highly experienced team of finance professionals operates in a work culture that emphasizes the importance of providing outstanding customer service. Our systems, processes and flexible policies support our goal of providing customers with a positive experience.

We finance your entire solution. Unlike others, we allow you to bundle everything you need from hardware and software to service contracts, installation costs, training fees, and sales tax. If you decide weeks or months later to add to your solution, we can consolidate everything into a single invoice.

Our Premier Client services provide large accounts with special handling services to ensure these complex transactions are serviced properly. As a premier client, you have a dedicated finance specialist who manages your account through its life, from first invoice through asset return or purchase. This specialist develops an in-depth understanding of your invoice and payment requirements. For you, this dedication provides a high-quality, easy, and positive financing experience.

For your region-specific offers, please ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/

Related publications and links

For more information, see these resources:

- Lenovo ThinkAgile SXM home page
  http://www3.lenovo.com/us/en/p/WMD00000272
- Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com
- Lenovo ThinkAgile SXM Documentation
  http://thinkagile.lenovofiles.com/help/topic/com.lenovo.thinkagile.sxm.doc/sxm_introduction.html
- Lenovo ThinkAgile SXM Best Recipes
  http://datacentersupport.lenovo.com/us/en/solutions/HT505122

Related product families

Product families related to this document are the following:

- Microsoft Alliance
- ThinkAgile SXM Series for Microsoft Azure Stack Hub

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