Lenovo Business Partner Onboarding
- Portfolio Overview -

Investing in our partners' success

Lenovo.

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1

Being open means offering the Data-Centered a breadth of open infrastructure solutions

Solutions

We work closely with our software partners to provide engineered, tested, and certified IT solutions that are high performance, scalable, and cost-effective.

AI	HPC
Big Data / Analytics	Hyperscale
Cloud	IoT / Edge
Database	Client Virtualization
Back Up & Disaster Recovery	

Infrastructure

Open, reliable and secure platforms that seamlessly integrate with your environment.

Servers	Hyperscale
Storage	IoT / Edge
Hyperconverged	

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ThinkSystem
Enterprise Infrastructure

ThinkAgile
Software-Defined Infrastructure

(intel)

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2

Being Open means a Global Partnership with Intel

Lenovo and Intel deliver the right High Performance and AI computing solutions to meet your business needs - **From Exascale to Everyscale™**
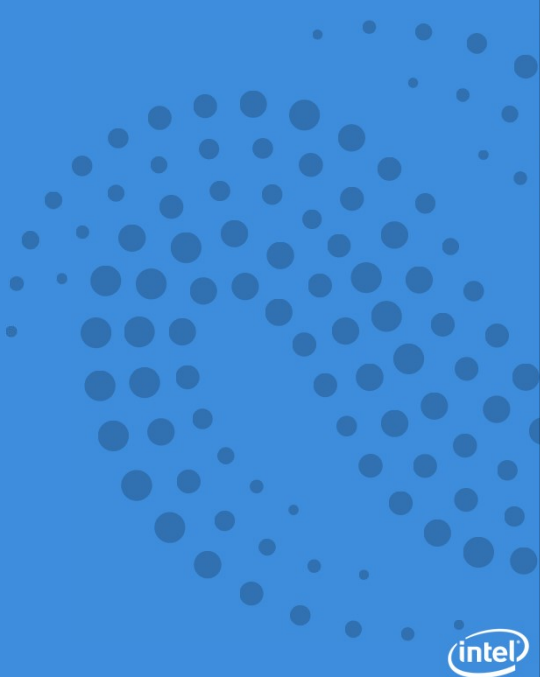
1

Get fast insights with HPC innovation
Innovate faster by leveraging maximum efficiency and performance using Lenovo's Everyscale innovation, fueled by Intel's latest technologies

2

Discover what's possible before deployment
Achieve breakthrough discoveries using HPC and AI on converged systems through offerings located in the Global Innovations Centers.

3

Adopt HPC faster with flexibility
Access HPC at Everyscale with Lenovo's flexible consumption models, industry-leading portfolio, and Intel Select Solutions

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ThinkSystem
and
ThinkAgile

Eddie Martin   September 30, 2020

(intel)

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Slide 5

UNIFIED BRAND

SERVER

STORAGE

ThinkSystem

The best combination of performance, flexibility, and reliability in the industry

World Record Performance
- Solving mankind's most complex challenges
- Real-time insights at the speed of digital business

Most Flexible Platform Design for Service Delivery
- Adaptable platforms span mission critical, dense, and software-defined
- Massive storage scale at cost and flexibility of public cloud

Industry-Leading Reliability
- Drives increased revenue and lowering OPEX

(intel)

5

5

Slide 6

HYPERCONVERGED INFRASTRUCTURE

SOFTWARE-DEFINED STORAGE

ThinkAgile

IT Agility
- Software defined infrastructure with foundational **ThinkSystem** platforms and ecosystem partners

Simplicity
- Simplified experience with planning, deployment and automated management

Transformative Experience
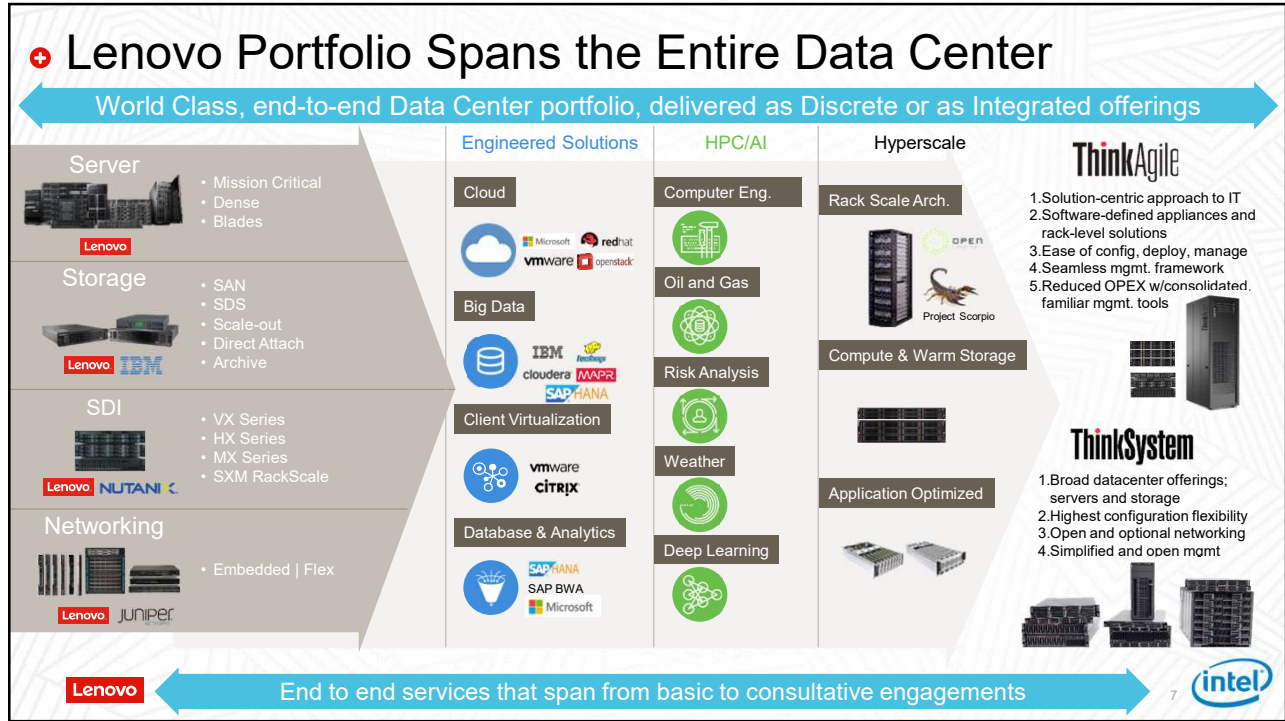- Better end-to-end experience throughout the product lifecycle

SOFTWARE-DEFINED INFRASTRUCTURE

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Lenovo Portfolio Spans the Entire Data Center

World Class, end-to-end Data Center portfolio, delivered as Discrete or as Integrated offerings

Server
- Mission Critical
- Dense
- Blades

Lenovo

Storage
- SAN
- SDS
- Scale-out
- Direct Attach
- Archive

Lenovo IBM

SDI
- VX Series
- HX Series
- MX Series
- SXM RackScale

Lenovo NUTANIX

Networking
- Embedded | Flex

Lenovo JUNIPER

Engineered Solutions

Cloud
- Microsoft, redhat, vmware, openstack

Big Data
- IBM, cloudera, MAPR, SAP HANA

Client Virtualization
- vmware, CITRIX

Database & Analytics
- SAP HANA, SAP BWA, Microsoft

HPC/AI
- Computer Eng.
- Oil and Gas
- Risk Analysis
- Weather
- Deep Learning

Hyperscale
- Rack Scale Arch.
  - OPEN
  - Project Scorpio
- Compute & Warm Storage
- Application Optimized

ThinkAgile
1. Solution-centric approach to IT
2. Software-defined appliances and rack-level solutions
3. Ease of config, deploy, manage
4. Seamless mgmt. framework
5. Reduced OPEX w/consolidated, familiar mgmt. tools

ThinkSystem
1. Broad datacenter offerings; servers and storage
2. Highest configuration flexibility
3. Open and optional networking
4. Simplified and open mgmt

Lenovo — End to end services that span from basic to consultative engagements

intel

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Server Platforms

Industry Leading Reliability—**Servers** for Cloud and Next-Gen IT

Racks and Towers
Most versatile platform for entry to business-critical workloads

Dense Systems
Space optimized with extreme performance and energy efficiency

Blades
Easily managed integration of compute, storage and networking

Mission Critical
For scale-up applications with the largest workloads

EDGE
Edge locations looking for a purpose-built server for traditional and **IOT** applications
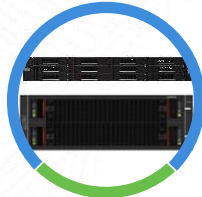
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Storage Platforms

Revolutionizing **Storage** Economics

SAN
DE Series
DM Series
DB Series FC SAN
Switches and
Directors
High performance
shared storage

DAS
D Series
Capacity expansion
for servers or
storage

Archive
Tape Drive,
Autoloader, Library
Low-cost long-term
retention or
infrequent access

DSS
DSS-G
Storage solutions
for HPC and
Distributed File
Systems

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Lenovo Systems Management

Customer-Centric, Strategic Partner-Based Approach

Lenovo XClarity

Integration and Scripting

Infrastructure Tools

Operations Management

Orchestration Engines

REST APIs

DMTF
Redfish

Simplify

Deliver hardware like software
and automate complex
infrastructure tasks

Accelerate

Accelerate and scale system
deployment to reduce time to
market of critical systems and
workloads

Integrate

Deliver hardware with your IT apps
by integrating with REST APIs,
running available software plugins,
or scripting

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➕ Naming Convention – ThinkSystem Server

ST550

| S: Server | R: Rack
T: Tower
N: Node (Blade)
D: Dense
E: Edge | Series performance within server portfolio
1-4 1x CPU Entry
5   1x CPU Performance
       2x CPU Entry
6   2x CPU Mainstream
8   4x CPU Price/Performance
9   8x CPU High-end
                    Performance | Capability within series | 0: Intel |
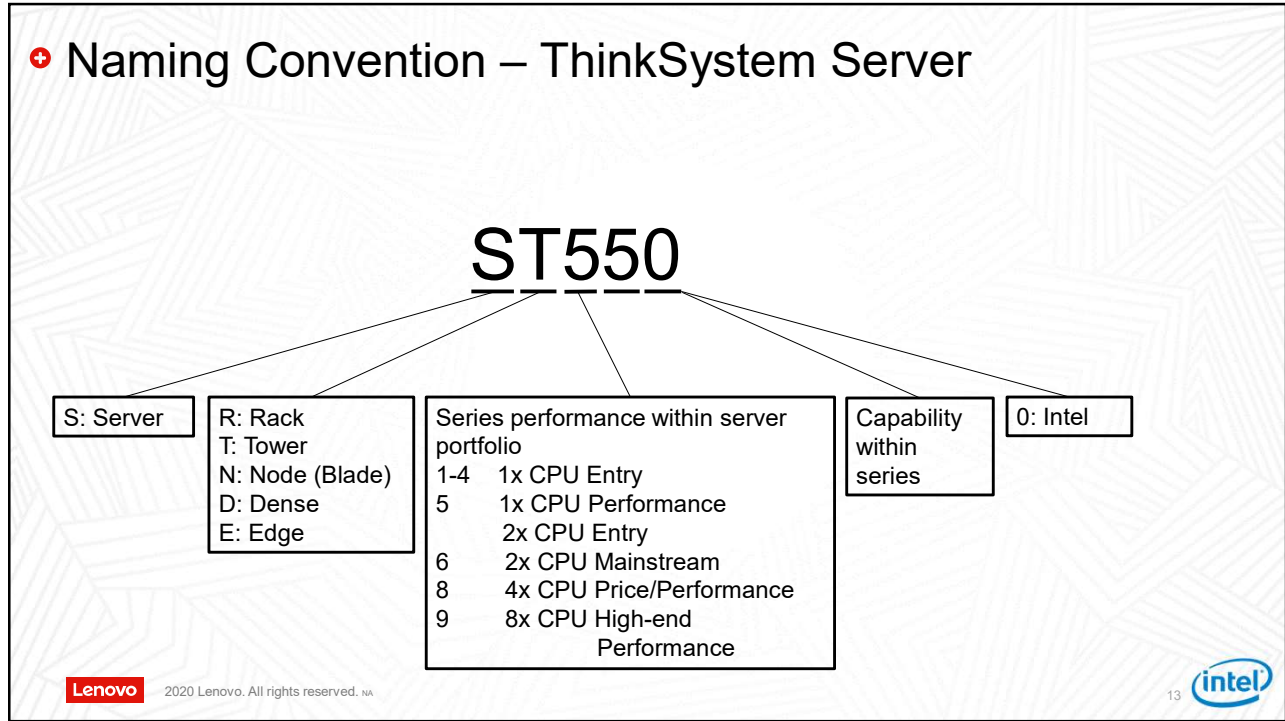
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The Lenovo ThinkSystem Server Portfolio

Datacenter
Business Intelligence
Analytics
Cloud
Virtualization
Retail
Distributed Enterprise
Small/Med Business

Tower
2P — ST550
1P — ST250
ST50

Racks
2P — SR650
SR630
SR590
SR570
SR550
SR530
1P — SR250

Dense
2P — SD650
SD530

Blades
4P — SN850
2P — SN550

Mission Critical
8P — SR950
4P — SR850

A.I.
2P — SR670

Edge
1P — SE350
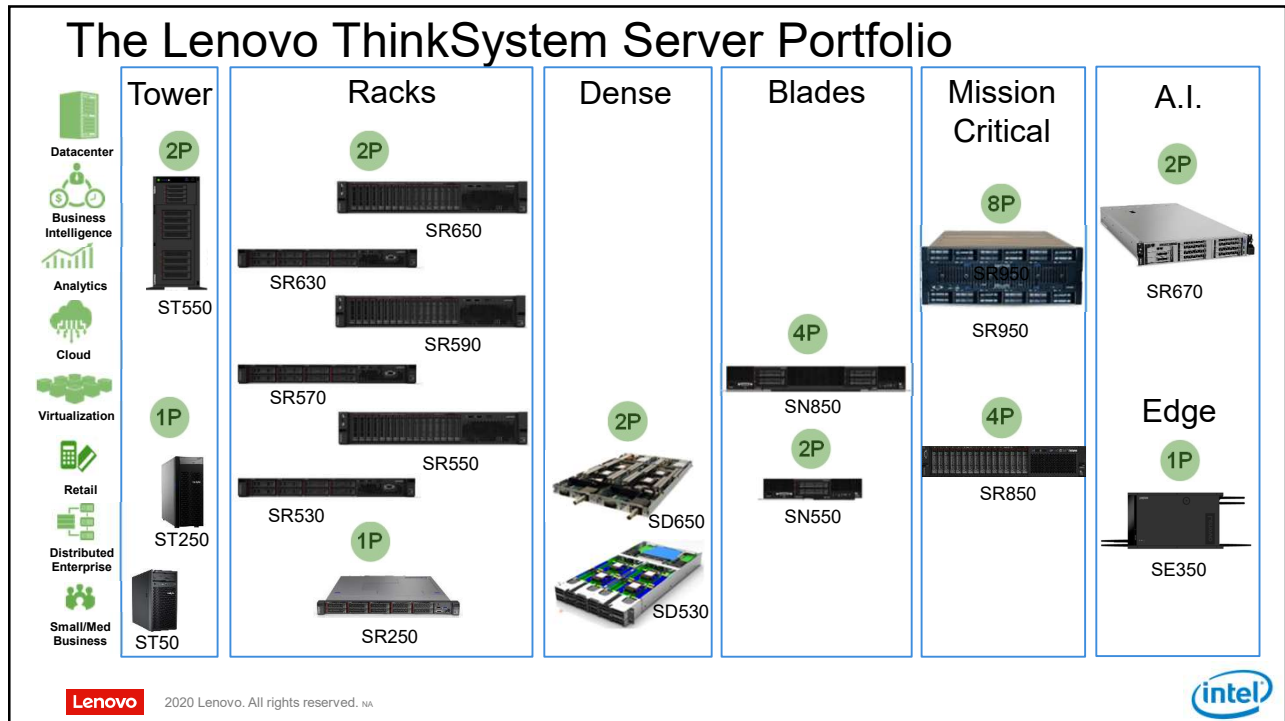
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Rack and Tower Servers

Leadership **cost / performance**

Versatile – platforms with strong balance of performance, memory capacity, storage and I/O options

Support for a wide range of diverse industries and business-critical workloads like basic infrastructure

Tower – Entry All-in-one server – can be converted to 4U Rack via conversion kit

Rack – Entry to Mainstream

Integrates better – unique XClarity design with RedFish integration (Open and Flexible)

Reduce costs – management and serviceability features that help lower TCO

Infrastructure Cloud / Virtualization Analytics Database

SDI, SDS Business Applications Retail POS

(intel)

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Single-Socket Server Portfolio
Enabling Small Business Success

ST50
1S Value Tower

Key Specs

- **Support 1S 3rd Gen Intel® Xeon® Scalable processors**
- 4 TruDDR4 2666 MHz UDIMMs
- Up to 4 3.5" NHS HDD/SSD
- 1x 1GbE onboard LAN
- 3x PCIe Slots
- **Management: Intel AMT 12.0 XClarity Provisioning Manager Lite**

Workloads
E-Mail / Work Group/ File & Print /Web/Office Automation

(intel XEON)

ST250
1S Mainstream Tower

Key Specs

- **Support 1S 3rd Gen Intel® Xeon® Scalable processors (full stack)**
- **One Intel® Xeon® E, Core i3, Pentium Gold, or Celeron**
- 4 TruDDR4 2666 MHz UDIMMs
- Up to 8 3.5" HDD/SSD
- Up to 16 2.5" HDD/SSD
- SW & HW RAID
- 2x 1GbE onboard LAN
- 4x PCIe Slots
- Fixed & RDN PSU (Platinum)
- Fixed Fan (Support Redundancy)
- **Management: Lenovo XClarity Mgmt**

Workloads
E-Mail/Work Group/File & Print/System Management/ Data backup/Web/Office Automation

(intel XEON)

SR250
1S Mainstream Rack

Key Specs

- **Support 1S Intel Coffeelakeprocessors (full stack)**
- 4 TruDDR4 2666 MHz UDIMMs
- Up to 4 3.5" HDD/SSD
- Up to 10 2.5" HDD/SSD
- Up to 2 2.5" NVMe SSD
- SW & HW RAID

- **One Intel® Xeon® E, Core i3, Pentium Gold, or Celeron**
- 2x 1GbE onboard LAN + 1 manage port
- 3x PCIe slots
- Fixed/RDN PSU (Gold/Platinum)
- **Management: Lenovo XClarity Mgmt**

Workloads
IT Infrastructure / Web / Entry Cloud / Virtualization / Database / Data Analytics

(intel XEON)

(intel)

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2-Socket Rack and Tower Server Positioning

2P Racks & Tower

Value	Value +	Mainstream

Performance ↑

1U

SR530
2 x processor up to 125W
12 DDR4 DIMMs
Up to 4 3.5" HDD/SSD
Up to 8 2.5" HDD/SSD
SW & HW RAID
2x 1GbE onboard LAN
1GbE, 10Gb LAN Choices

IT Infrastructure/Web/Entry Cloud/Virtualization

2U

SR550
2 x processor up to 125W
12 DDR4 DIMMs
Up to 12 3.5" HDD/SSD
Up to 16 2.5" HDD/SSD
SW & HW RAID
2x 1GbE onboard LAN
1GbE, 10Gb LAN Choices

IT Infrastructure/Web/Entry Cloud/Mail server/Scale Out

1U

SR570
2 x processors Up to 150W
16 DDR4 DIMMs
Up to 4 3.5" HDD/SSD
Up to 8 2.5" HDD/SSD
Flexible LAN up to 4 ports
1GbE, 10Gb LAN Choices
4 x NVMe support
Hotswap fan support

2U

SR590
2 x processors Up to 150W
16 DDR4 DIMMs
Up to 12 3.5" HDD/SSD
Up to 16 2.5" HDD/SSD
Flexible LAN up to 4 ports
1GbE, 10Gb LAN Choices
4 x NVMe support
Hotswap fan support

Collaborative/IT Infrastructure/Web/ Business Process/POS

Tower / 4U

ST550
2 x processors
12 DDR4 DIMMs
Up to 8x 3.5" & 20x 2.5" HDD
Up to Hybrid 8x 3.5"+4x 2.5"
2x 1GbE onboard LAN

1U

SR630
2 x processors
24 DDR4 DIMMs
Up to 12 2.5" HDD/SSD
Up to 4 3.5" HDD/SSD
HW RAID
Flexible LAN up to 4 ports
1GbE, 10Gb LAN Choices
10 x NVMe support

IT Infrastructure/Web/ Enterprise Cloud/ Virtualization/Database

2U

SR650
2 x processors
24 DDR4 DIMMs
Up to 24 2.5" HDD/SSD
Up to 14 3.5" HDD/SSD
HW RAID
Flexible LAN up to 4 ports
1GbE, 10Gb LAN Choices
24 x NVMe support

IT Infrastructure/Web/ Enterprise Cloud/Database/ Data Analytic/Virtualization/ Hyper-Converged

intel XEON PLATINUM inside

Cost →

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Mission Critical Servers

Better uptime
Build-in Reliability Availability Servicability features

Scalability – Unique ability to scale up to 8 processors

High density – 4 CPUs on 2U rack or Blade

Maximum performance – optimized for leadership performance in large memory applications like SAP HANA

ERP, CRM & Business Logic
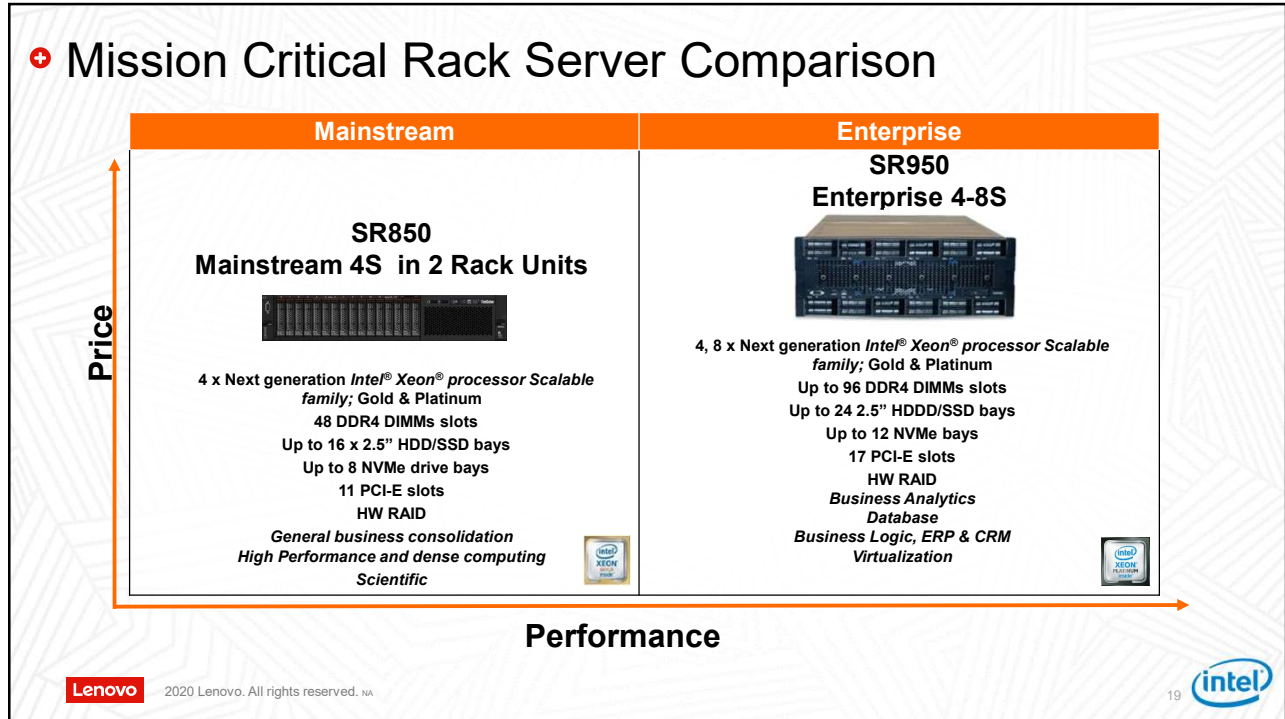
Business Analytics

In Memory Database

OLTP and Database

Hi-performance Applications

Enterprise Virtualization

intel XEON PLATINUM inside

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Mission Critical Rack Server Comparison

Mainstream	Enterprise
SR850 **Mainstream 4S in 2 Rack Units**	**SR950** **Enterprise 4-8S**
4 x Next generation *Intel® Xeon® processor Scalable family;* **Gold & Platinum** 48 DDR4 DIMMs slots Up to 16 x 2.5" HDD/SSD bays Up to 8 NVMe drive bays 11 PCI-E slots HW RAID *General business consolidation* *High Performance and dense computing* *Scientific*	4, 8 x Next generation *Intel® Xeon® processor Scalable family;* **Gold & Platinum** Up to 96 DDR4 DIMMs slots Up to 24 2.5" HDDD/SSD bays Up to 12 NVMe bays 17 PCI-E slots HW RAID *Business Analytics* *Database* *Business Logic, ERP & CRM* *Virtualization*

Price ↑ → **Performance**

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Lenovo & SAP HANA

Lenovo is a SAP HANA market leader with over **8000** units shipped

Next generation SAP HANA was developed using ThinkSystem SR950

Delivers lower TCO and on-going investment protection

Helps SAP run their business, and deliver the next generation of cloud applications

Value to leverage corporate data

- Drive top line and bottom line revenue

- Improve decision making and operational efficiency

- Drive business transformation and strategic change

SAPHANA

Up to **31%** lower TCO	Leader **8000+** shipped	SAP HANA **Innovation** Award	Performance **Records** for SAP

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Blade Systems
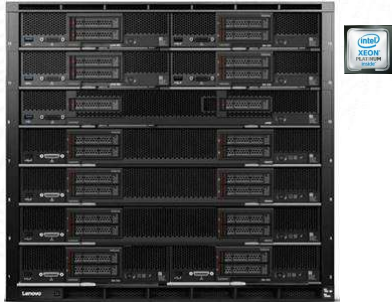
Composable Infrastructure Solution

- 2 and 4 CPU Socket Server Nodes

- Up to 14 Nodes / 28 CPUs in one Chassis – Dense, smaller footprint

- Shared Networking and Centralized Management

- Minimize cabling

Proven – same Flex chassis – different CPU generations working concurrently

Flexible – Midplane connecting servers with shared resources supports up to 100Gbps Networking enabling high performance workloads and protecting investment in the future

Integrates better – Leadership system management that leverages industry standards like RedFish

Infrastructure   Cloud / Virtualization   Analytics

OLTP   Database

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Blades | Flex

- Composable Infrastructure Solution
  - Updated 2 and 4P Blades
  - 28 core CPUs with faster memory
  - LAN Direct—4x10GbE LOM—no mezz card needed
  - High performance **mesh topology** (4P)

- Same Flex Chassis!
  - Houses four generations of CPUs concurrently
  - 40% more dense than rack systems
  - New! 25Gb switch & mezz card
  - Optimized and zoned cooling supporting the highest available CPU & RAM configurations
  - Midplane supports 100Gb per server node
  - Carrier grade NEBS level 3 compliant choice for rugged Telco environments

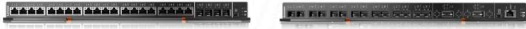SN550
2P ½ Wide

SN850
4P Full Wide

Flex Enterprise
Chassis

22

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Switches | Flex

Flex System Networking
Ethernet, Fibre Channel, Infiniband
connectivity for Flex Systems

ThinkSystem Flex Switch
25G/100G

Cloud /
Virtualization

Analytics

General Purpose
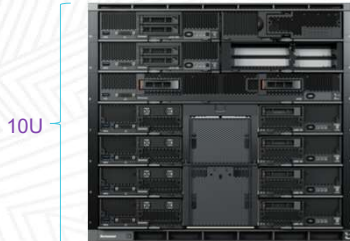Enterprise
Workloads

Infrastructure

VDI

Scalability – unlock additional ports with *Features on Demand* instead of removing & adding more switches

Flexibility – Reallocate internal and external ports as needed with *Flexible Port Mapping*

Management without complexity –*Flex System Interconnect Fabric* simplifies management of large-scale clusters— manage 9 switches as one

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Investment protection with the Flex Chassis
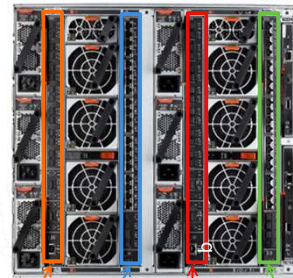
Flex System Enterprise Chassis

10U

Flex System Carrier Grade Chassis

11U

Key Feature	Benefit
Optimized and zoned cooling	Servers support highest available CPU & RAM configurations
Midplane supports up to 100Gb per server node	Investment protection
Carrier grade NEBS level 3 compliant choice	Ideal for rugged Telco environments

6 x PSU
10 x Fan
2 x CMM
4 x Switch

Redundant CMM's

Internal switches provide communication between servers without need to go to ToR Switches

Switch 1   Switch 2   Switch 3   Switch 4

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Lenovo Flex System Carrier-Grade Chassis

This Carrier-Grade Chassis is designed to **NEBS level 3** and **ETSI certification** levels and for operation within **earthquake Zone 4 areas**.

The chassis also includes dust filters and -48V DC power operation, as required for many Central Office telco environments.

ASHRAE 4 compliant – normal operation up to 45 °C
Temporary up to 55 °C for long as 4 days.

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Chassis Management Module v2

- The Chassis Management Module (CMM2) provides the following functions:
    - Power control and power policies
    - Fan management
    - Chassis and compute node initialization
    - Switch management
    - Monitor the status of the chassis components
    - Diagnostics
    - Resource discovery and inventory management
    - Resource alerts and monitoring management
    - Chassis and compute node power management
    - Network management

- There is one CMM2 as standard, maximum two can be installed – second one for redundancy only

- Supports up to 32 simultaneous sessions

Security policy settings:

- Secure
    - Strong password policies
    - Updated passwords after the initial setup
    - Only secure communication protocols SSH, SSL
    - Certificates to establish secure, trusted connections
- Legacy
    - Weak password policies with minimal controls
    - Manufacturing default passwords can be used
    - Decrypted communication protocols, such as Telnet, SNMPv1, TCP Command Mode, FTP Server, and TFTP Server

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Dense Systems
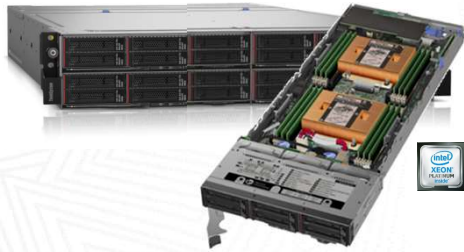
Better workload optimization – Ultra-dense 2U 4N system for HPC, hyperconverged and general purpose workloads

Better performance – design that supports unique IO shuttle, Omnipath and EDR Infiniband for HPC

Integrates better – Leadership system management that leverages industry standards like RedFish

Improve energy efficiency by 15%

Easier management – up to 7 Chassis and 28 Servers can be daisy chained together and managed via single ethernet port

Research

HPC Centers

Cloud Computing

Analytics

Modeling

Distributed Enterprise

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The Lenovo Dense Server Portfolio

HPC Centers

Research

Analytics

Modeling

Cloud Computing

Distributed Enterprise

Dense

2P

SD650 facing-left rear view - water cooling only

SD530 Four Compute Nodes in D2 Enclosure

D2 Enclosure Rear View and Shuttle

SD530 Compute Node HDDs Extended Straight-on Front View

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Develop on Lenovo AI Products
The right resources to get started

TRAINING PLATFORMS	**ThinkSystem SR650** 2U, 2 Intel® Xeon®, *Big Data Platform*	**ThinkSystem SD530** 2U, 2 x 2 Intel® Xeon®, 2 x 2 NVIDIA Tesla V100	**ThinkSystem SR670** 2U, 2 Intel® Xeon®, 4 x 2 NVIDIA Tesla V100 **NEW!**	**LiCO v5.1**

Increasing performance →

INFERENCE PLATFORMS	**ThinkSystem SD530** 2U, 4 x 2 Intel® Xeon®	**ThinkSystem SR650** 2U, 2 Intel® Xeon®, 2 NVIDIA Tesla P100	**ThinkSystem SD530** 2U, 2 x 2 Intel® Xeon®, 2 x 2 NVIDIA Tesla V100	**NEW! LiCO for AI** A single software stack to efficiently manage HPC and now AI workloads

ThinkSystem

Lenovo

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SR670 Marketing Message

Front View

Rear View

Accelerator Optimized
- Support the latest accelerator technology
- Support: 1:1 (1 socket to 1 GPU) - traditional HPC requirement
- Support: 1:2 (1 socket to 2 GPU - emerging requirement for HPC and AI

Flexible and Compact
- Flexible configurations tailored for required workloads
- Support Intel Xeon® Processor and up to 24 x DDR4 DIMMs
- Multiple IO Options
- Compact Storage Options (SATA, M.2)

Optimized for HPC and AI
- Highly customizable to the specific use case
- Enterprise grade quality for maximum scale

Lenovo

Feature	ThinkSystem SR670
Form Factor	• 2U Rack-mount • Support up-to 4 GPUs from NVIDIA • Dual Socket Intel® Xeon® Scalable processor Architecture • Up-to 24x DDR4
Processor	• Support for dual-socket Intel® Xeon® processors (up to 205W)
Memory	• DDR4 RDIMM ECC • 16GB/32GB
Storage	• Max 8 x 2.5" SATA (Non Hot Swap) • M.2 Adapter (Single Drive, Dual Drive, Mirrored)
Raid	• Standard RAID SATA SW RAID 0/1/5/10 from chipset
Cooling	• Non hot-swap, redundant fans • Support ASHRAE A2/3/4*
Networking	• Two PCIe 3.0 x16 slots • One PCIe 3.0 x4 slot
Management	• Lenovo System Management (XCC) • LiCO • Redfish, BoMC, LXCE/OneCLI
USB Port	• USB 3.0 Port + USB 2.0 Port on the front of chassis • Serial port on the rear of chassis
VGA Port	• VGA video connector on the front of chassis
Power Supply	• Hot-swap redundant 1+1 2000W

*ASHRAE A2 w/ GPU present

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ThinkSystem SE350 Edge Server
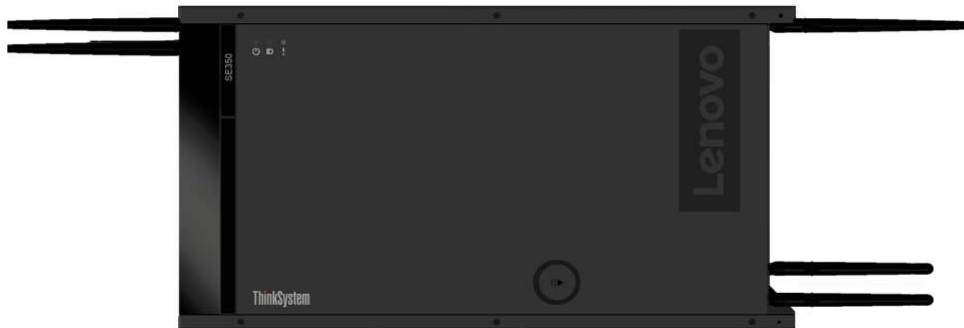
Target customer:
All Edge locations looking for a powerful, purpose-built server to handle both traditional and **IoT** applications and have limited IT expertise at their Edge locations
Retail, Telco, Manufacturing, Distribution

31 (intel)

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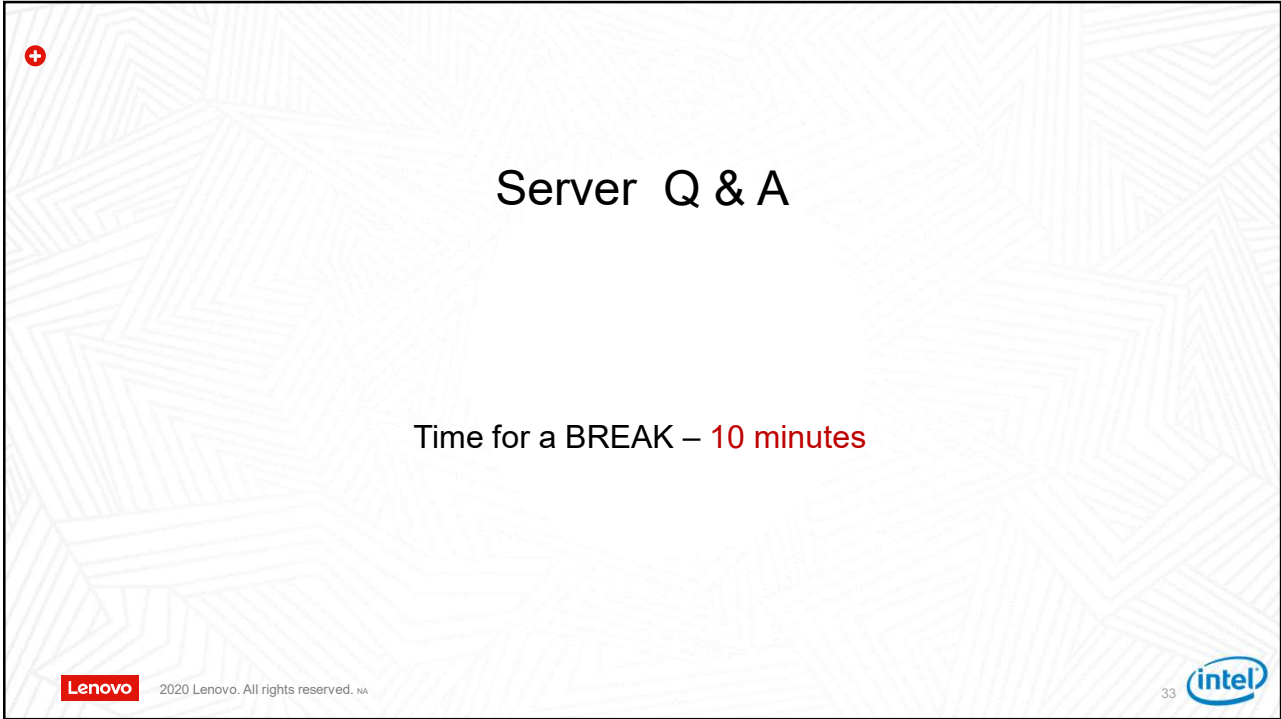
ThinkSystem SE350 Edge Server – Overview

- **A unique form factor**, compact in design, perfectly suited for remote non-datacenter locations. Mountable on a flat surface, in a rack, on a wall or DIN rail in any environment.

- **Unique environmental support** - the ThinkSystem SE350 is designed to perform in extended operating temperatures from 0-55C and also provides protection in dirty environments with a dust filter.

- **Runs on AC/DC, 12V and -48V DC power supplies**, the standard for Central Offices and other telco installations. The chassis is NEBS Level 3 compliant for increased safety.

- **Highly secure** with tamper detection, locking bezels, and encrypted storage

- **Simplified and secure management** thru Lenovo XClarity

- **Multiple connectivity** and configuration networking options with LTE/WIFI and 10GbE

32 (intel)

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Server Q & A

Time for a BREAK – 10 minutes

Lenovo

(intel)

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ThinkSystem
Storage

(intel)

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Lenovo ThinkSystem Storage Portfolio

ThinkSystem DE Series	ThinkSystem DM Series
Lenovo Performance Block	**Lenovo AFA & Midrange Unified**
• Entry to high performance	• ONTAP Data Management
• AFA and Hybrid Block	• Cloud Tiering
• Lenovo xClarity support	• Lenovo xClarity support
• MFG & Supported by Lenovo	• MFG & Supported by Lenovo

- Deliver complete end to end storage portfolio
- Differentiated technology and data management

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DE Series Core Values

Block Storage

FAST – leading price and performance

Driving value while reducing costs
- Up to 1M IOPS with submillisecond latency response times
- Up to 21GBps read throughput

SIMPLE - optimized for integrated solutions

Best-in-class solutions for integrated appliances
- Modular host interface flexibility, Various drive and expansion options
- Plug-ins, APIs
- XClarity integration

RELIABLE – leading durability and realiability

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⊕ DE Series Offering Overview

<u>All Flash</u>
- ➢ Maximum leaderhips price / performance
- ➢ Latency sensitive apps

<u>Hybrid</u>
- ➢ Most cost effective
- ➢ Streaming data
- ➢ Mixed workloads
- ➢ Backup and recovery

Different enclosures available;
- DE2000 – 2U12 and 2U24
- DE4000, DE6000 – 2U12, 2U24 and 4U60

DE6000F

DE6000H

DE4000F

DE4000H

DE2000H

PRICE

PERFORMANCE

100K   300K   1M

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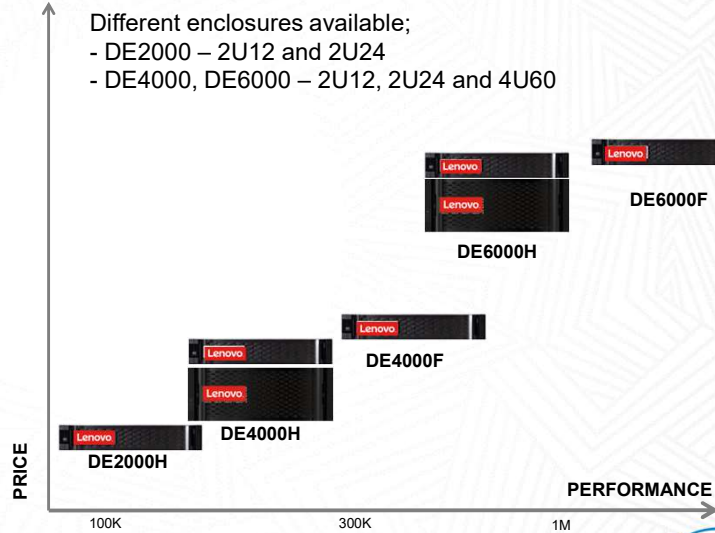
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⊕ DE Series Product Matrix

DE600S (4U60)	DE240S (2U24)	DE120S (2U12)
▪ 60 x 3.5" or 2.5" drives ▪ Highest throughput ▪ Largest capacity ▪ NL-SAS, 10K SAS, SSD	▪ 24 x 2.5" drives ▪ Highest throughput ▪ Largest capacity ▪ 10K SAS, hi-cap SSD	▪ 12 x 3.5" or 2.5" drives ▪ Lowest entry point ▪ NL-SAS, SSD

Expansions

+

Controller Systems

DE6000H/F 2U24 / 2U24* / 4U60 * AFA	DE4000H/F 2U12 / 2U24 / 2U24* / 4U60 * AFA	DE2000H 2U12 / 2U24 * Throttled E2800

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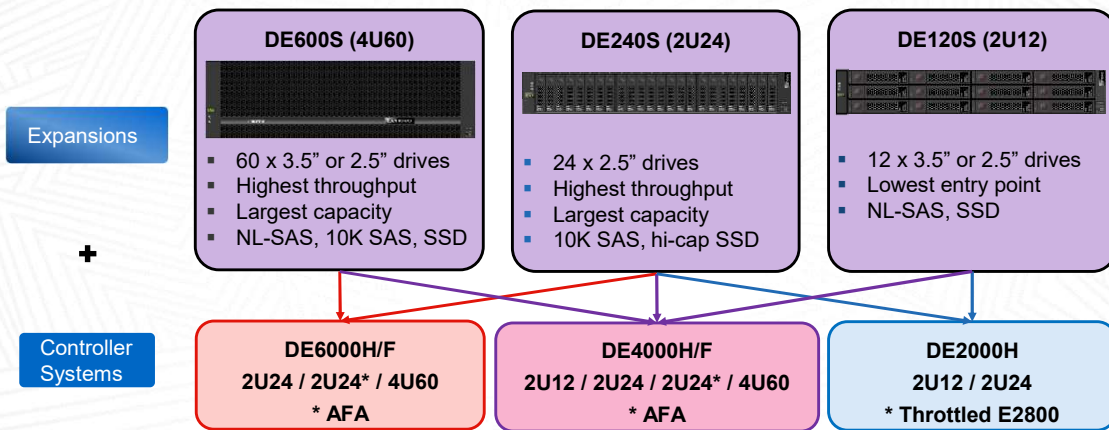
⊕ DE-Series Controller Firmware Features
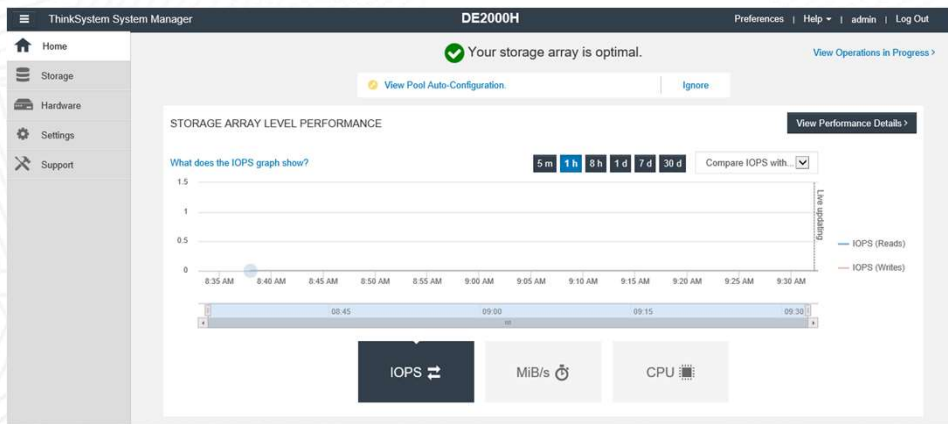
Dynamic Disk Pools
8 times faster rebuild (minutes, not days) and continuous high performance during drive rebuild

SSD Cache and Hybrid Storage
Expedited access to "hot" data through automated, real-time caching to SSD; mix and match SSDs and HDDs

Snapshot and Volume Copy
More precise recovery point objectives and faster recovery

Thin Provisioning
Improves storage use by up to 35% and eliminates overprovisioning

Mirroring (Sync and Async)
Cost-effective enterprise-class disaster recovery of data with FC and IP replication

1 to 1 only

Encrypted Drive Support
Extended security enhancements for compliance and regulations

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⊕ ThinkSystem System Manager

- Manage your DE Series system anytime, anywhere
- Easy-to-use, on-box, web-based interface
- Automated workflows and intelligent provisioning defaults
- Enhanced performance monitoring and tuning actions
- Manage role-based access control, audit log, and other security features

Embedded on DE-Series

Requires No Installation

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DE Series Storage Summary

Lenovo ThinkSystem DE Series AFA and Hybrid Arrays

Offering	• Entry and Mid range SAN Block storage portfolio
Segment	• Entry Block (SAN) and AFA workloads
Target Market	• Entry Level / Departmental / ROBO • Shared Data Center / OLTP databases / Video Surveilance
Value Proposition	• Unmatched Value on performance and price • Proven simplicity
Key Features	• AFA models • Dynamic Disk Pools • SSD cache and Hybrid storage • Thin provisioning • Advanced Snapshot • Synchronous mirroring and Asynchronous replication • XClarity integration supporting storage alerts

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DM Series Core Values
Unified Storage

PERFORMANCE

Customers can, with the click of a button, set their own performance rules for individual workloads.

EFFICIENCY

Thanks to advanced data reduction technologies, which work across all of the unified workloads, customers see on average of 5:1 space savings.

SECURITY AND COMPLIANCE

Software encryption is included standard, so customers can encrypt their data with the click of a button.

FUTURE-PROOF STORAGE

Your customer's investment is protected because they can always scale a single array up or scale out by clustering. They can also move cold data to the cloud for cost-effective storage.

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Lenovo Offering Overview

All Flash
- Maximum performance
- Latency sensitive apps
- Mission critical workload

Hybrid
- Cost effective
- Mixed workloads
- Secondary sites

UNIFIED

PERFORMANCE / SCALABILITY

DM7000/7100F

DM5000F

DM7000/7100H

DM5000H

Fundamentals DM3000H

Fundamentals DM5000H

DM3000H

Hybrid

Business Critical / Consolidation

PRICE

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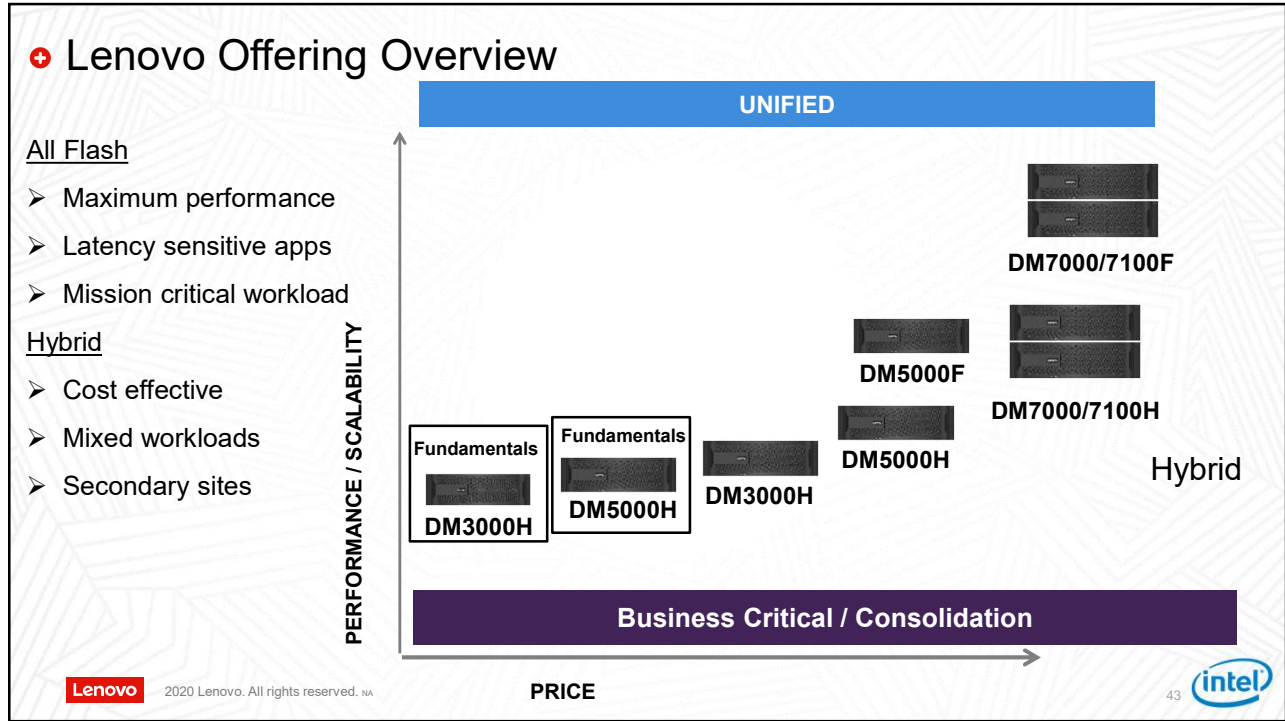
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DM Series Enclosures

	DM3000H	DM5000H / F	DM7000H / F	DM7100H / F
Form factor	2U12	2U24	3U0	4U0
Max # Drives	144	144	480	720

	DM120S	DM240S	DM600S	DM240N
Size	2U	2U	4U	2U
IO Connectivity		12Gb SAS		100Gb Eth
Max Drives	12	24	60	24
Drive Form Factor	3.5"	2.5"	3.5"	2.5"
Drives Supported	4TB 7K HDD 8TB 7K HDD 10TB 7K HDD	960GB SSD 3.84TB SSD 7.68TB SSD 15.36TB SSD 900GB 10K HDD 1.2TB 10K HDD 1.8TB 10K HDD	4TB 7K HDD 8TB 7K HDD 10TB 7K HDD	960GB NVMe SSD 3.84TB NVMe SSD 7.68TB NVMe SSD 15.36TB NVMe SSD

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✚ DM Series Storage Summary
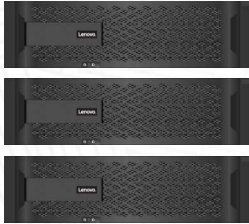
Lenovo Storage DM Series AFA and Hybrid Arrays

Offering	• Broad mid-range unified storage portfolio
Segment	• Midrange Block and File (SAN & NAS) workloads
Target Market	• Mid-market, SMB, and enterprise
Value Proposition	• Ultimate workload efficiency with unified architecture • Simplified configuring and ordering for mid-range storage • Future-proof growth with flexible scale up and scale out architecture
Key Features	• Data reduction including inline deduplication and compression • Guaranteed workload performance using Quality of Service • Latest NVMe tchnology support • Software encryption with embedded key manager • Advanced, application-aware snapshots • Synchronous mirroring and Asynchronous replication

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✚ ONTAP: Modernize your Storage

mature Storage OS – 25 years on the market

Performance assurance made easier
- Adaptive QoS: Automatically adapt QoS levels to changes in the workload

Remarkable performance
- Improve Flash network performance with NVME over FC with up to 55% latency improvement

Unbeatable Storage Efficiency
- Optimized compression, deduplication and compaction to increases space savings
- Works across all workloads with average of 5:1 data reduction

Strong security, plus compliance capabilities
- Software encryption with optoin for external key management for NVE, multi-factor authentication (GDPR & FIPS with cryptographic shredding)
- Apply compliance policies for legal holds and event-based retention

Integrated protection for Continuous Availability and Disaster Recovery
- Space-efficient Snapshot technology, near-instant backup and recovery with the SnapVault backup solution, and synchronous and asynchronous replication with MetroCluster software and SnapMirror technology

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⊕ Scalability & Simplifed Data Management

ONTAP®

Scale Out by Adding Controllers

Scale Up Individual Controllers

DM Series Hybrid

DM Series AFA

DM Series Expansion

New Capacity SSDs

ONTAP Cloud
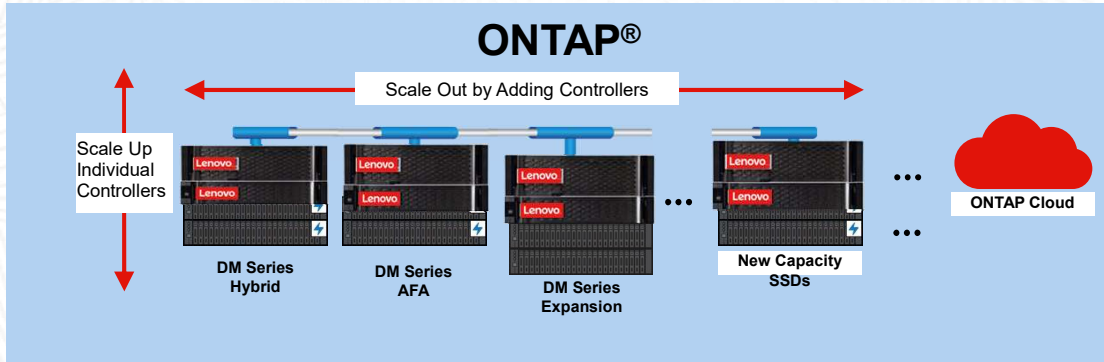
- Scale out by intermixing your choice of flash and hybrid nodes – up to 12 nodes
- Upgrade hardware/software or scale up without disrupting users – single array up to 140 PB overall capacity
- Scale to the public cloud by tiering cold data

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⊕ Integrated Data Protection

Availability

Continuous Availability

Disaster Recovery

Remote Backup

MetroCluster Software

Asynchronous SnapMirror

SnapVault Software

Local Backup

Snapshot Technology

Data Protection Functionality

(intel) 48
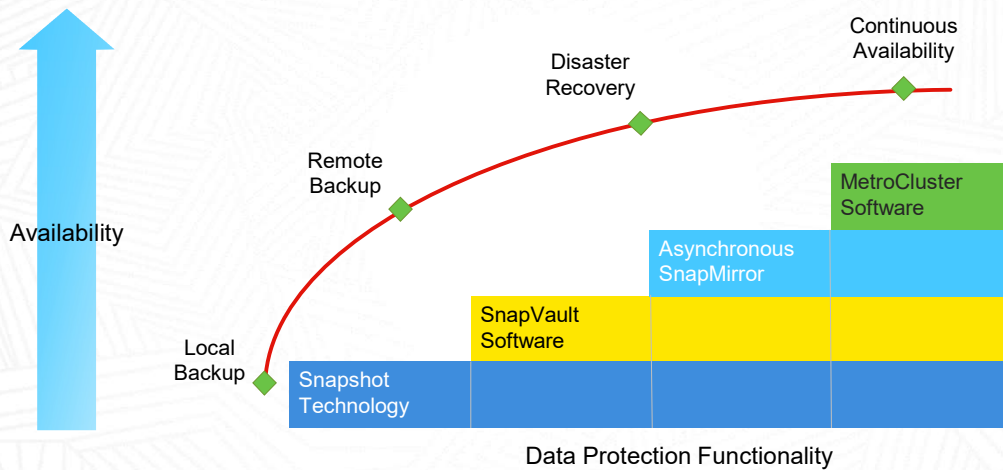
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⊕ Your ONTAP choices

Fulfill wide range of customer needs with two ONTAP offerings

ONTAP Fundamentals

- Available on DM3000H &DM5000H

- Includes:
  - Unified Storage
  - Asynchronous replication
  - SnapRestore
  - Scale up to 84 drives

ONTAP Premium

- Available on **all** DM Series

- Everything in Fundamentals **plus**:
  - Synchronous Replication
  - SnapCenter
  - MetroCluster
  - Scale up and out

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⊕ Offering Overview & Positioning

- Based off Brocade Gen 6 Fibre Channel networking
- Lenovo branded - Ideal for connecting to Lenovo servers with FC HBA's & Lenovo storage with FC ports

Performance and Functionality

ThinkSystem DB400D/DB800D

- Director Class - Mid-size/Large Enterprises
- Ideal for 140+ servers
- 9U, four blade slots, up to 256 x 32Gb SFP+ ports & 16 x 128Gbps ICL ports
- 14U, four blade slots, up to 512 x 32Gb SFP+ ports & 32 x 128Gbps ICL ports
- 99.999% Availability – PS, Fans, CR & CP blades, WWN cards

ThinkSystem DB630S

- Mid-range Top-of-Rack Switch
- Ideal for up to 100+ servers
- 2U, up to 128 x 32G SFP+
- Optional 8 x 128G QSFP ports
- 4 Tbps total bandwidth
- Two hot-swap power supplies
- Three hot-swap fan assemblies

ThinkSystem DB610S
ThinkSystem DB620S

- Entry / Mid Top-of-Rack Switch
- Ideal for 1-16 / 40 servers
- 1U, up to 24 / 48 x 32G SFP+
- Single / redundant power supply
- Only DB620S:
- Optional 4 x 128G QSFP ports
- 2 Tbps total bandwidth

Price & Availability

| Server HBA's | ✖ EMULEX | 8/16/32 Gbps Adapters |
| Storage Array | Lenovo DE or DM Series Storage | 8/16/32 Gbps Support |

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Product positioning DAS JBOD

The D1212/D1224/D3284 delivers maximum capacity and performance at an affordable price for single server

PERFORMANCE / SCALABILITY

TRADITIONAL	HIGH DENSITY

D1224
2U Rack mount
24x 2.5" HDD
Up to 8 total units chained
max 192 drives – 2.94 PB capacity

D3284
5U Rack mount
84x 3.5" HDD
Up to 4 total units chained
max 336 drives - 4.0 PB capacity

D1212
2U Rack mount
12x 3.5" HDD
Up to 8 total units chained
max 96 drives – 1.15 PB capacity

DAS Target Workloads:
• Big Data - Hadoop
• SAP HANA
• Server virtualization
• Extreme capacity for backup / archive or cold storage solutions

PRICE

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Archival Solutions

• **Cost-effective** – high capacity backup archive storage for long-term data retention – Media life up to 30 years

• **Secure** – protection and security with encryption to support long-term data retention requirements for compliance

• **Flexible** – backwards compatible to support older generation media

	TS2270 / TS2280	TS2900	TS4300
Positioning	**Entry** Designed for capacity requirements of less than 30TB compressed	**Entry** Compact tape library designed for capacity requirements greater than 30TB compressed	**Entry / Midrange** Designed to offer outstanding capacity, performance and reliability for midrange and network tape storage environments
Form factor	1U	1U	3U
Max # drives	1	1	3 to 21
Max # cartridges	1	9	32 to 272

Backup / Recovery   Remote Archive   Secure Data Retention   Regulatory Compliance

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Lenovo
XClarity™

Lenovo System Management

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⊕ **Lenovo** XClarity™ - Family of Software

Foundational Infrastructure Software for Precision Execution

Standardized Data Center Processes
External IT Applications

Lenovo XClarity Energy Manager   **Lenovo** XClarity Administrator

Lenovo XClarity Controller | DE and DM series integration | Cloud Network Operating System

Servers   Storage   Networking

ThinkSystem

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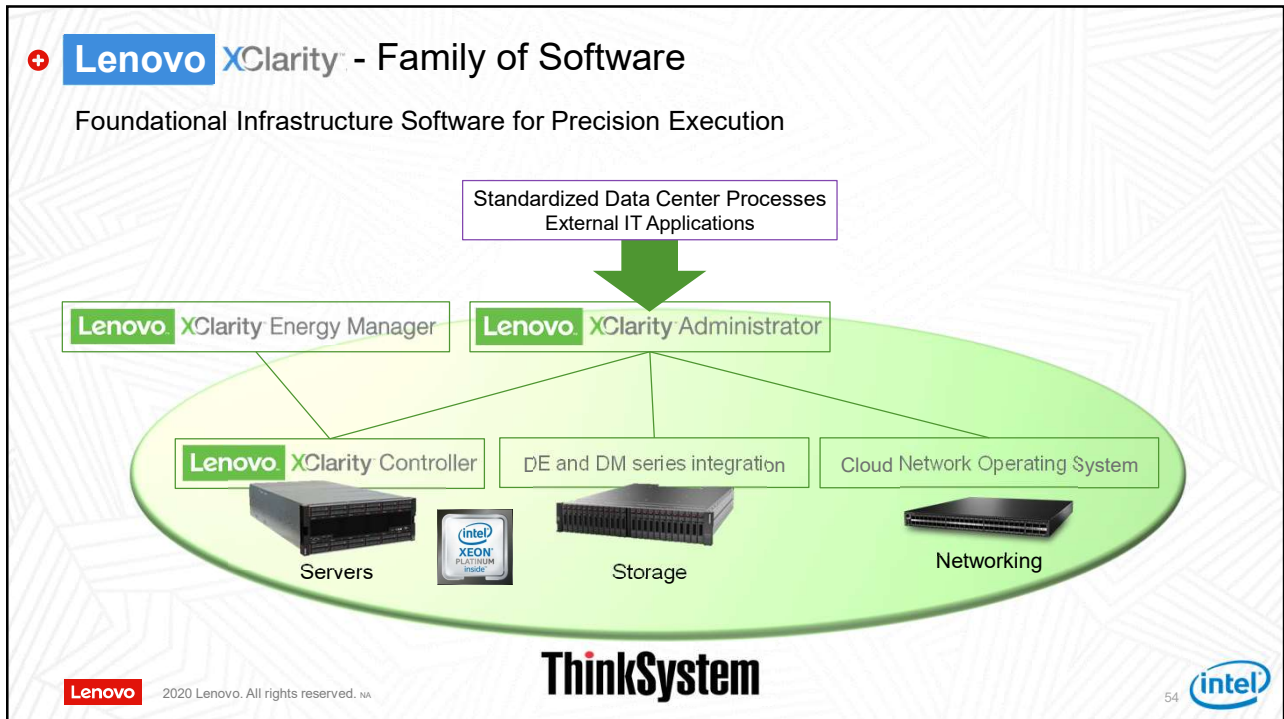
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XClarity Approach to Data Center Management

XClarity Energy Manager
Visibility and Policy-Based Control Over Server Power and Thermals

XClarity Integrators
Deliver ThinkSystem and ThinkAgile from Your Own IT Processes and Tools

XClarity Administrator, Pro, and Mobile
Fast, Flexible, and Scalable Infrastructure Deployment

XClarity Essentials
Suite of Utilities for ThinkSystem Servers

XClarity Provisioning Manager
Embedded Provisioning Tool Common in All ThinkSystem Servers

XClarity Controller
Embedded Management Engine Common in All ThinkSystem Servers

Lenovo Capacity Planner
Power consumption evaluation tool

Integrates with existing environments
Easily extends established frameworks for managing IT infrastructure and processes

Simplified management
No specialized training or skills needed to establish repeatable processes for managing the environment or individual systems

A foundation of industry standards
Increase compatibility with management environments making it easier to deploy new technologies

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Storage Q & A

Time for a BREAK – 10 minutes

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ThinkAgile
Why?
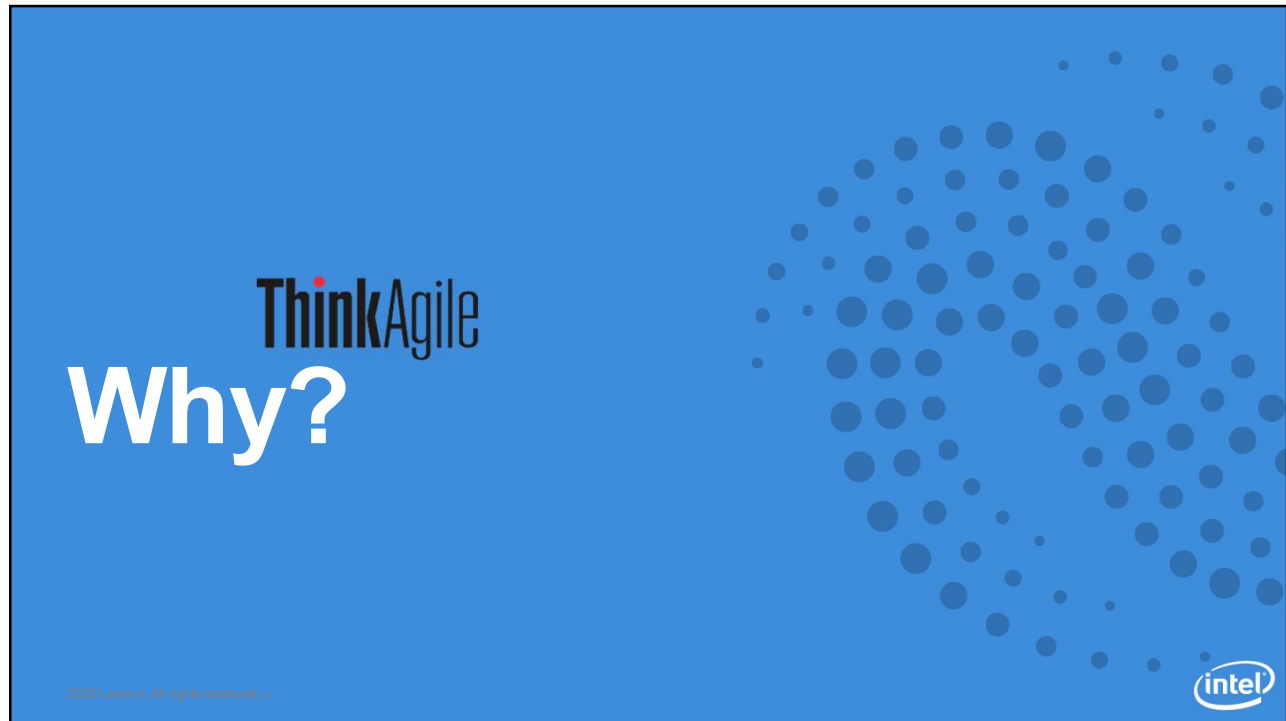
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⊕ Why Customers Choose to go to the Cloud?

WHAT IS CLOUD?
An IT **Delivery & Consumption Model** to provide infrastructure resources, applications and services *on-demand* or by *subscription*.

An IT **Operating Model** that can *easily adapt* to meet changing application and service requirements.

- Streamlines operations

- Provides IT agility

- Lessens the burden of administrative duties

- Provides more time for innovation

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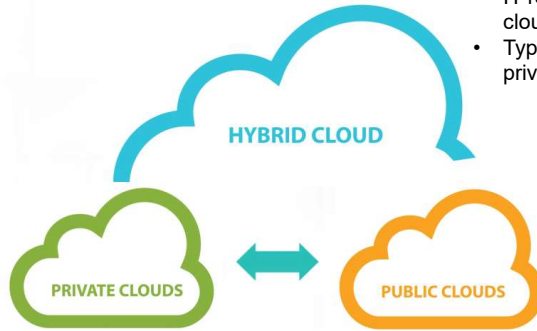# Cloud Deployment Models

- IT resources provisioned from two distinct cloud infrastructures.
- Typically this is a combination of public and private clouds.

HYBRID CLOUD

PRIVATE CLOUDS

PUBLIC CLOUDS

- IT resources provisioned for exclusive use by single organization.
- Infrastructure may be located on-premise or may be outsourced.

- Infrastructure shared with general public.
- IT provisioned by the Cloud service provider.
- Infrastructure is off premise.

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Cloud Service Models

IT Provider

IT Consumer

Infrastructure
as a Service
(IaaS)

Platform
as a Service
(PaaS)

Software
as a Service
(SaaS)

A fully-automated, self-service facility for IT consumers to obtain fundamental computing, networking, and storage resources for arbitrary application use cases.

A managed operating environment with utilities to streamline "Cloud-native" application development, for example: facilities for data management or computational offload.

A fully-managed application provided directly to end users, typically by subscription.

e.g. AWS EC2/S3/EBS, Azure, GCP

e.g. AWS RDS/Redshift/Lamda/Lex, Azure Functions/Cosmos/Media, GCP AppEngine

e.g. MS Office365, SalesForce, Workday, WebEx, GoToMeeting

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Lenovo DCG Cloud Strategy

Partner with Industry Software Leaders
- Largest Range of Customer Choice
- Solutions for Any Cloud Operating Model

Support Any Customer Path to Cloud
with Flexible Products and Services
- Help any customer
- No matter what the path
- No matter where they are in the journey

Leverage Industry-leading ThinkSystem
- Server and Storage
- World Record Performance Benchmarks
- #1 in Server Reliability

Superior Customer Experience
for all Cloud Products and Solutions
- Understanding Requirements
- Deployment and Support
- Life Cycle Management
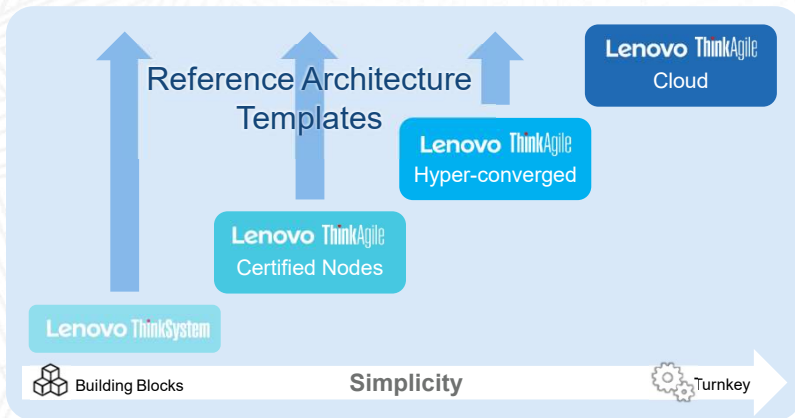
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Lenovo DCG: Delivering Fast Pathways to Cloud

Lenovo Products

Reference Architecture Templates

Lenovo ThinkAgile Cloud

Lenovo ThinkAgile Hyper-converged

Lenovo ThinkAgile Certified Nodes

Lenovo ThinkSystem

Building Blocks   **Simplicity**   Turnkey

Lenovo Professional Services

Migration Assessment

Design Workshop

Cluster Deployment

Workload Migration

Health Check

Managed Services

Microsoft   NUTANIX   vmware   SCALE COMPUTING   redhat   SUSE

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What is an Intel Select Solution from Lenovo?

Developed from collaboration with industry providers in solutions, data centers, and services, Intel® Select Solutions (ISS) take the guesswork out of compatibility with software and hardware stacks tailored to specific workloads.

In today's complex data center, hardware and software infrastructure is not "one size fits all". Intel Select Solutions eliminates guesswork with rigorously benchmark tested and verified solutions optimized for real-world performance. These solutions accelerate infrastructure deployment on Intel® Xeon® processors for today's critical workloads in advanced analytics, hybrid cloud, storage, and networking.

Lenovo has tested and reported performance of our recommended ISS configurations derived from a minimum specification by workload to Intel.

The Challenge
You need to quote a ready-to-use server solution that fits your customers workload needs.

The Solution
Use new Solution IDs in Lenovo's Data Center Solution Configurator
  Choose an optimized, ready-to-deploy Intel Select Solution from the drop-down menu.

1. Click 2. Export Config 3. Price to Win!

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Data Center Solution Configurator

| Servers | Storage | Networking | ON DEMAND Solutions | Software Defined Infrastructure | Deployment Ready Solutions | Software | Services |

| Client Virtualization | Databases | Intel Select | Networking | Promotions |

Link to Deployment Ready Intel Select Solutions - Lenovo Data Center Solutions Configurator

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Intel® Select Solutions Portfolio

(intel) select solution

Analytics	AI	Hybrid Cloud	Network Transformation	HPC
MICROSOFT SQL SERVER WINDOWS SERVER	BIGDL ON APACHE SPARK	MICROSOFT AZURE STACK	UNIVERSAL CUSTOMER PREMISES EQUIPMENT	SIMULATION & MODELING
MICROSOFT SQL SERVER LINUX	AI INFERENCING	RED HAT OPENSHIFT CONTAINER PLATFORM	NFVI: RED HAT	PROFESSIONAL VISUALIZATION
SAP HANA		VMWARE VSAN	NFVI: MEDIA ANALYTICS	GENOMICS ANALYTICS†
		MICROSOFT AZURE STACK HCI	NFVI: FORWARDING PLATFORM	HPC & AI CONVERGED CLUSTERS
		HUAWEI FUSIONSTORAGE	NFVI: FUSIONSPHERE	
		BLOCKCHAIN: HYPERLEDGER FABRIC	VISUAL CLOUD DELIVERY NETWORK	
		HARDENED SECURITY WITH LOCKHEED MARTIN	NFVI: UBUNTU	
		GOOGLE CLOUD'S ANTHOS		
		NUTANIX HCI		LENOVO SOLUTION AVAILABLE
		VMWARE HORIZON VDI ON VSAN		LENOVO SOLUTION INTENT ANNOUNCED

○ Optane PMem
● Optane SSD

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Intel Select Solution; New Solution IDs

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ThinkAgile Portfolio

ThinkAgile HX Series	ThinkAgile VX Series	ThinkAgile SX for Microsoft Azure Stack ThinkAgile MX	ThinkAgile CP Series
Nutanix-based HCI with multi-hypervisor support Market leader for HCI	vSAN-based HCI tightly integrated with vSphere and vCenter vSAN fastest growing HCI Vendor	Simplified, consistent hybrid cloud with on premise Azure Stack cloud services Extension of Azure to On-Premise	All-in-one Private Composable Cloud providing a public cloud user experience behind the client's firewall
▪ Positioned for clients who have a mixed hypervisor environment	▪ Positioned for clients who have preference for vSphere hypervisor and vCenter management tools	▪ Positioned for clients who have implemented Azure and want to extend to On Prem Hybrid Cloud ▪ MX for clients who look for WSSD certifed S2D as TurnKey solution	Positioned for clients who require cost-effective, modular, composable private cloud environment

Software Defined Storage

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ThinkAgile Hyperconverged

- Adds Simplicity
- Reduces Complexity and need for External Storage / SAN
- Allows customers to acquire products that can be easily and quickly deployed

Appliances	**ThinkAgile HX**	Certified Nodes
	NUTANIX	

Appliances	**ThinkAgile VX**	Certified Nodes
	vmware	

ThinkAgile MX Certified nodes

Microsoft
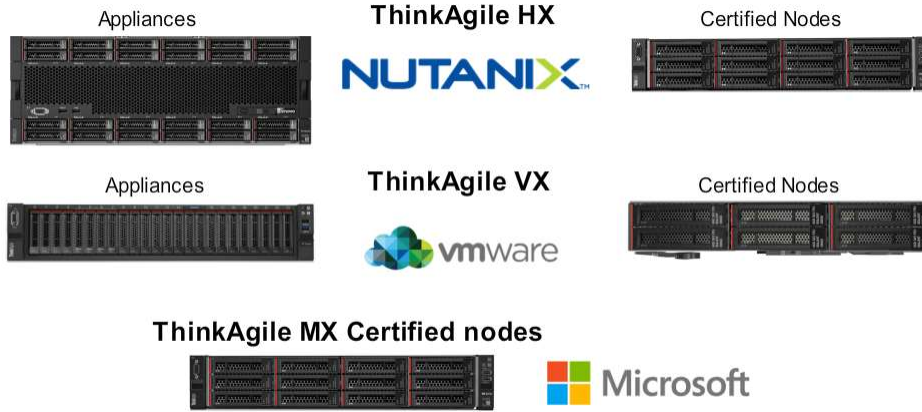
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How do you Build a Hyperconverged Server

	Build Your Own	Certified Node	Appliance	CUSTOMER BENEFITS
Firmware Controlled	✘	✔	✔	Ensure customer firmware configuration is valid
Certified Components	Not enforced	✔	✔	Ensures customer hardware configuration is valid
SW Pre-Installled	Optional	✔	✔	Ensures customer HW/Firmware/SW stack is optimized, validated and certified
SW Licenses	Optional	Optional	✔	All inclusive solution
ThinkAgile Support	Optional (Premier only)	Optional	✔	Single point of contact with a support team that understands the solution
PS Deployment	Custom SOW	Optional	✔	Deliver an operational solution at a fixed price based on known configurations

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Lenovo ThinkAgile HX – Certified Nodes & Appliance

Nutanix Acropolis Operating System (AOS) pre-loaded

Lenovo ThinkAgile Advantage support

Nutanix Prism and Lenovo XClarity for management

- **Simplify IT infrastructure** – significantly reduces time and resources to maintain

- **Greater reliability** – Powered by the most reliable servers[2] in the industry

- Hypervisors Preloaded:
  Nutanix Acropolis Hypervisor, optional VMware ESXi

- Hypervisors Supported:
  Nutanix Acropolis Hypervisor; VMware ESXi, Microsoft Hyper-V 2016

- Heterogeneous and Storage-only nodes in Cluster

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Naming Convention – Nutanix

HX5520-C

Nutanix servers start with "HX"	Series 1: ROBO 2: Express 3: Compute Heavy 5: Storage Heavy 7: High Performance	Performance of the server. Higher the number, the more powerful.	Generation 0 = 1st gen 1 = 2nd gen	Implementation 0 = appliance 1 = certified node	Subtype C: Capacity-Only E: Express F: All-Flash G: GPU Support
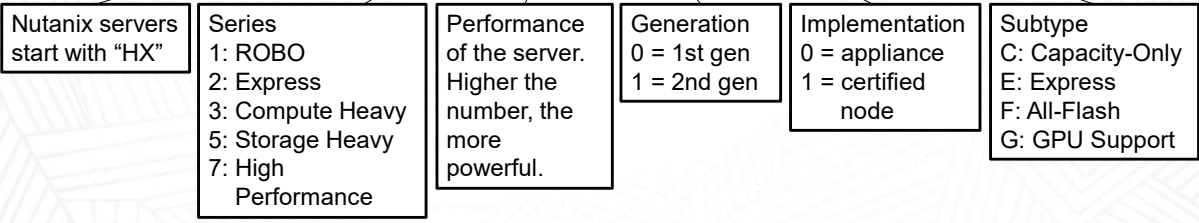
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Lenovo ThinkAgile HX

Solutions	Remote Office / Branch Office	Small Medium Business	Compute Heavy/ General Compute	Storage Heavy	Performance Intensive	
					High Performance	Mission Critical & SAP HANA
HX1320	▦					
HX2320/ HX2321		▦				
HX3320			▦			
HX3520-G			▦			
HX3720			▦			
HX5520				▦		
HX7520/ HX7521					▦	
HX7820/ HX7821						▦

The ThinkAgile HX series models are split into five categories:
1. Remote office / branch office
2. Small medium business
3. Compute heavy (general compute)
4. Storage heavy
5. Performance intensive
   - High performance
   - Mission critical and SAP HANA).

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ThinkAgile VX Appliance

ThinkAgile VX Appliance provides a turn-key solution for customers who want a vSAN Environment. **It includes vSAN Software Licenses and Deployment Services.**

Key Points:
- **ESXi Pre-loaded** at Factory
- Hardware firmware/drivers and software updates tested for interoperability and released in unison
- **Includes ThinkAgile Advantage support** including software
- Deployment Service Required
- VMware Licensing from Lenovo
- VX Installer Support

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✚ ThinkAgile VX Appliance
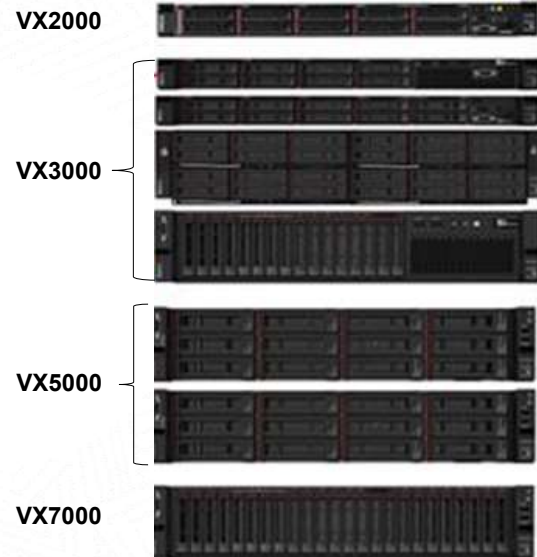
VX2000 – Xpress
VX3000 – Compute Heavy
VX5000 – Storage Heavy
VX7000 – High Performance

xClarity Integration
- vCenter
- vRealize Orchestrator
- vRealize Automation
- vRealize Log Insight

vmware®   **X**Clarity

VX2000

VX3000

VX5000

VX7000

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✚ ThinkAgile MX Certified Node

ThinkAgile MX Certified Node is based on SR650 Server

Windows Storage Spaces Direct – easily and more efficiently run S2D

Key Points:
- Hardware firmware/drivers and software updates tested for interoperability and released in unison
- Lenovo ThinkAgile Advantage Support

Key Benefits:
- Simplicity - Lenovo XClarity extension integrates with Windows Admin Center from Microsoft
- Flexibility – Wide range of processor, memory, and storage options
- Faster time to value – Lenovo designed, tested, and validated ThinkAgile MX Series
- Higher Performance Storage
  - Using multiple tiers of storage (SSDs, NVMe)
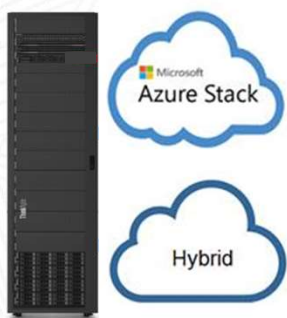 - **Further acceleration is achieved by using Remote Direct Memory Access (RDMA)**

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✚ ThinkAgile SX for Microsoft Azure Stack

Simplified, Consistent Hybrid Cloud
- Rack-scale, pre-integrated turnkey solution ready to deploy in hours
- On-premises Azure cloud services
- Ability for Hybrid Cloud based on Lenovo Servers and Networking
- Enriched lifecycle management

Increased IT Agility
- Ships up to 2x faster than alternative solutions
- No disruption to tenant availability or experience
- Professional installation

Transformative Support
- Lenovo has co-innovated with Microsoft for more than 20 years
- Lenovo was 1st to market with Azure Stack demos and is working with over 40 early Azure Stack customers
- Reduce support time with single point of contact

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	Lenovo ThinkAgile SXM4400, SXM6400
Product definition	• 25U or 42U Racks • 4-12 Nodes 　Per Node:　　　　System Maximum: 　• 28 -44 cores　　　528 cores 　• 256GB -768GB mem.　9TB 　• 40TB or 60TB storage　720TB Raw
Target environment	• Medium/Large Enterprises 　• Large SI/MSP 　• Smaller MSPs 　• End user customers • Microsoft collaborative applications • Test/Development - DevOps
Value proposition	• Easy and fast ordering (3 Weeks, order to ship) • Fully integrated and validated solution • Rapid, services led, deployment • Single Point of Support • Simplified Lifecycle Management • On-Premises Hybrid Cloud • Lower TCO vs traditional infrastructure
Performance	• Up to 800 VMs • 2 Million IOPS
Availability	• Lenovo will have product available at Microsoft GA

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Lenovo ThinkAgile CP

Pre-integrated, turnkey experience

Lenovo services & support

Simple to manage, no technology
 skills required

Only need an IT generalist to operate

ThinkAgile CP:
    Delivers the benefits of Public Cloud, safely behind customer's firewalls, with
    better cost containment

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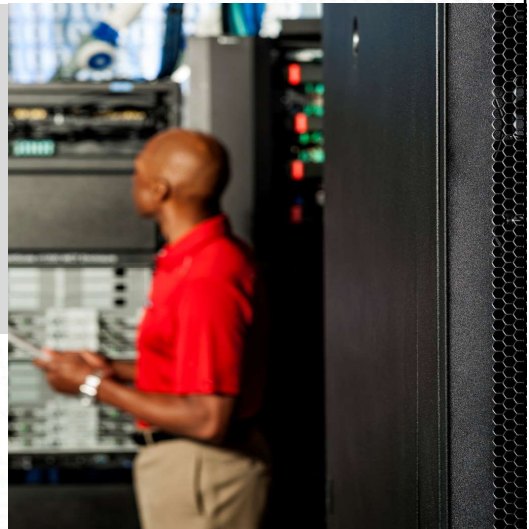## Lenovo Services - ThinkAgile Advantage

Expert Deployment and Support to Boost IT Effectiveness

Designed to deliver a first-class customer experience

Deployment by skilled technicians

Single point of contact for support

Onsite hardware repair

ThinkAgile
Next Generation IT
for software-defined infrastructure

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DCG Services

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New Options Make it Easy to Match to Business Needs

Select the service level that fits your needs, your workloads, and your budget. All our Services include onsite repair for even the most simple to replace parts, and our Essential and Advanced offerings protect your data at no additional cost.

Fully customizable by adding optional services like software support and installation, Lenovo's Services portfolio is designed to deliver simplicity and value to meet the needs of any business.

Advanced

MAXIMIZE UPTIME OF CRITICAL APPLICATIONS AND WORKLOADS.

You can add a 6 Hour Committed Service Level, returning your machine to operational performance.   In case of a hardware failure a technician will arrive at your facilities to replace your failed component

YourDrive YourData is included to provide you the ability to keep your failed drives and memory modules and dispose of that data in a secure way.

Recommended additions include: extend Advanced services up to 5 years, add Basic Hardware Installation and Enterprise Server Software Support.

Essential

ENHANCE UPTIME FOR CORE BUSINESS WORKLOADS AND SAFEGUARD FOR SENSITIVE DATA

You'll benefit from 4-hour onsite technician dispatch response times, 24 hours per day, 7 days per week, along with a technician to replace all parts onsite at your facilities.

YourDrive YourData is included to provide you the ability to keep your failed drives and memory modules and dispose of that data in a secure way.

Foundation

Supplement your standard hardware support with Foundation Services.

You'll get onsite, next-business-day response during normal business hours for service calls, including onsite installation of all replacement parts.

FOR NON MISSION CRITICAL SYSTEMS

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Simplified Portfolio Services

Base Warranty	9x5 Next Business Day Onsite (CRU/FRU Mix) (CRU Parts Shipped, FRU Onsite Tech Dispatch) 1 Year or 3 Years Coverage Depending on Machine Type		
Upgrades + Extensions	**Foundation**	**Essential**	**Advanced**
	Upgrade your base warranty and extend support of your systems.	Best choice for systems where maximum uptime is essential to the business.	Robust coverage for systems supporting workloads that are mission critical to the business.
	• **9x5 Next Business Day Response** • **CRU/FRU* Onsite Tech. Dispatch**	• **24x7 4 Hour Response** • **CRU/FRU* Onsite Tech. Dispatch** • Includes YourDrive YourData	• **24x7 6Hr Committed Repair** 2Hr response time + 4Hr fix time • **CRU/FRU* Onsite Tech. Dispatch** • Includes YourDrive YourData
	• Extend coverage up to 5 years • 1 and 2 year Post Warranty Options	• Extend coverage up to 5 years • 1 and 2 year Post Warranty Options	• Extend coverage up to 5 years • 1 and 2 year Post Warranty Options
Recommended Add-On Services	• YourDrive YourData • Enterprise Software Support (ESS) • Hardware Installation	• Upgrade to **24Hr Committed Repair** • Enterprise Software Support (ESS) • Hardware Installation	• Enterprise Software Support (ESS) • Hardware Installation

Remember YourDrive YourData includes HDDs, SSDs, and RAM modules   * Onsite Engineer to fit all Parts (CRU and FRU)

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ThinkAgile Q & A

Remember to complete the Survey

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thanks.

Different is better

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