

# ThinkSystem V2

## architecture introduction

Lenovo

ES42108B  
February 2021

# Prerequisites

- [ES41758 - ThinkSystem servers architecture introduction](#)
- [ES41950 - ThinkSystem servers with Intel second-generation Xeon Scalable processors](#)
- [ES51965 - Introducing the Intel Optane DC persistent memory module](#)

# Objectives

After completing the course, you will be able to:

- Describe the features of the 3<sup>rd</sup> Generation Intel Xeon Scalable processor
- Identify the differences between the 1<sup>st</sup> Generation, 2<sup>nd</sup> Generation, and 3<sup>rd</sup> Generation Intel Xeon Scalable processors
- Describe the different processor heat sink modules (PHMs) used in ThinkSystem V2 servers
- Describe the Intel Xeon Scalable processor naming rules
- Describe ThinkSystem server supported memory and storage features

# New: ThinkSystem V2 two-socket product overview

Intel Whitley platform

Lenovo

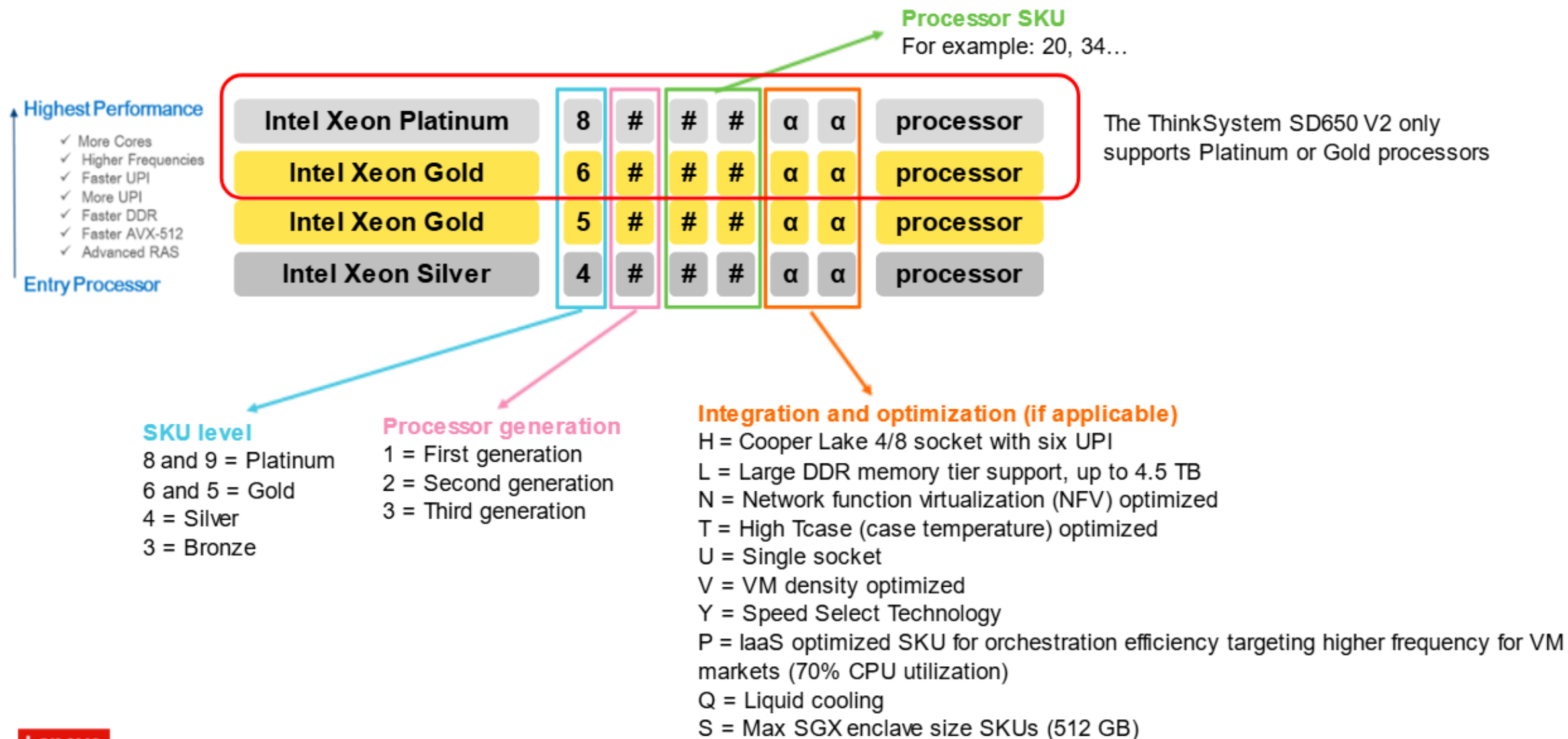
# ThinkSystem V2 two-socket servers – architecture overview

The Lenovo ThinkSystem V2 two-socket (2S) is equipped with 3<sup>rd</sup> Generation Intel Xeon Scalable processors (codenamed Ice Lake-SP), which are based on the Intel Whitley platform. They're 10 nm processors with a new core, and they support Intel Software Guard Extensions (SGX), Total Memory Encryption (TME-MT), PCIe 4.0, and Intel Optane Persistent Memory 200 Series (PMem).



**Note:** Not every ThinkSystem V2 two-socket server supports PMems.

# Intel Xeon Scalable processor naming rules for 2S





## ThinkSystem V2 Scalable processor production SKUs – examples

The following list of supported processors applies to the ThinkSystem SD650 V2 only.

Intel(R) Xeon(R) ICX Gold 6330 28c 205W 2.0GHz Processor
Intel(R) Xeon(R) ICX Gold 6338 32c 205W 2.0GHz Processor
Intel(R) Xeon(R) ICX Gold 6348 28c 235W 2.6GHz Processor
Intel(R) Xeon(R) ICX Platinum 8352Y 32c 205W 2.2GHz Processor
Intel(R) Xeon(R) ICX Platinum 8358P 32c 240W 2.6GHz Processor
Intel(R) Xeon(R) ICX Platinum 8380 40c 270W 2.3 GHz Processor
Intel(R) Xeon(R) ICX Gold 6346 16c 205W 3.1GHz Processor
Intel(R) Xeon(R) ICX Gold 6354 18c 205W 3.0GHz Processor
Intel(R) Xeon(R) ICX Platinum 8358 32c 250W 2.6GHz Processor
Intel(R) Xeon(R) ICX Platinum 8360Y 36c 250W 2.4GHz Processor
Intel(R) Xeon(R) ICX Platinum 8368 38c 270W 2.4GHz Processor
Intel(R) Xeon(R) ICX Platinum 8368Q 38c 270W 2.6GHz Processor
Intel(R) Xeon(R) ICX Gold 6336Y 24c 185W 2.4GHz Processor
Intel(R) Xeon(R) ICX Gold 6342 24c 220W 2.7GHz Processor
Intel(R) Xeon(R) ICX Gold 6334 8c 165W 3.5GHz Processor
Intel(R) Xeon(R) ICX Gold 6326 16c 185W 2.8GHz Processor

# Intel 3rd Gen Xeon Scalable processor features

Scroll down for more information

Items	3 <sup>rd</sup> Gen Intel Xeon Scalable processor two-socket	3 <sup>rd</sup> Gen Intel Xeon Scalable processor four-socket
Platform code name	Whitley	Cedar Island
Processor code name	Ice Lake (ICX)	Cooper Lake (CPX6)
CPU TDP (with IVR)	Up to 270 watts	150 to 250 watts
Socket	Socket P+ (LGA 4189)	Socket P+ (LGA 4189)
Scalability	1S, 2S	2S, 4S, 8S
Cores	Up to 40 cores with Intel HT Technology	Up to 28 cores with Intel HT Technology
Memory	<ul style="list-style-type: none"> <li>Eight channels DDR4 per CPU, two DIMMs per channel (2DPC)</li> <li>RDIMM, 3DS RDIMM               <ul style="list-style-type: none"> <li>Note: Future memory SKUs are subject to change without notice</li> </ul> </li> <li>Memory speed: 2933, 3200 MHz</li> <li>Support for PMems               <ul style="list-style-type: none"> <li><b>Note:</b> PMems do not work with Intel SGX</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Six channels DDR4 per CPU, 2DPC</li> <li>RDIMM, 3DS RDIMM</li> <li>Memory speed: 2666, 2933, 3200 MHz</li> <li>3200 MHz only supports 1DPC</li> <li>Support for PMems               <ul style="list-style-type: none"> <li>For four sockets only, only App Direct Mode is supported</li> </ul> </li> </ul>



# Intel 3rd Gen Xeon Scalable processor features

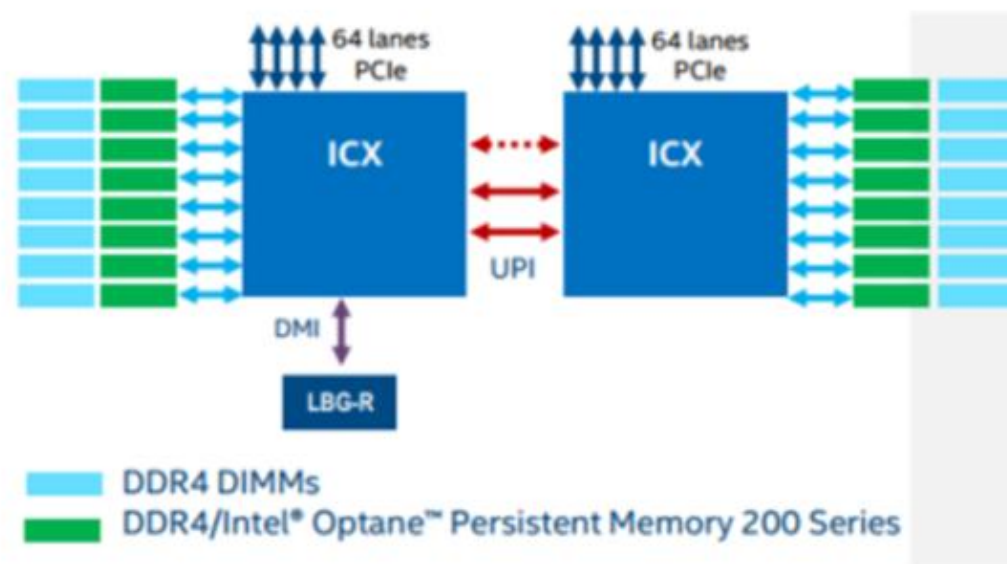
Scroll down for more information

Items	3 <sup>rd</sup> Gen Intel Xeon Scalable processor two-socket	3 <sup>rd</sup> Gen Intel Xeon Scalable processor four-socket
Cores	Up to 40 cores with Intel HT Technology	Up to 28 cores with Intel HT Technology
Memory	<ul style="list-style-type: none"> <li>Eight channels DDR4 per CPU, two DIMMs per channel (2DPC)</li> <li>RDIMM, 3DS RDIMM               <ul style="list-style-type: none"> <li>Note: Future memory SKUs are subject to change without notice</li> </ul> </li> <li>Memory speed: 2933, 3200 MHz</li> <li>Support for PMems               <ul style="list-style-type: none"> <li><b>Note:</b> PMems do not work with Intel SGX</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Six channels DDR4 per CPU, 2DPC</li> <li>RDIMM, 3DS RDIMM</li> <li>Memory speed: 2666, 2933, 3200 MHz</li> <li>3200 MHz only supports 1DPC</li> <li>Support for PMems               <ul style="list-style-type: none"> <li>For four sockets only, only App Direct Mode is supported</li> </ul> </li> </ul>
Intel UPI	<ul style="list-style-type: none"> <li>Up to three UPI links per CPU</li> <li>UPI speed: 10.4 and 11.2 GT/s</li> </ul>	<ul style="list-style-type: none"> <li>Six UPI links per CPU</li> <li>UPI speed: 10.4 GT/s</li> </ul>
PCIe	<ul style="list-style-type: none"> <li>PCIe 4.0</li> <li>Up to 64 lanes (per socket) at 16 GT/s</li> </ul>	<ul style="list-style-type: none"> <li>PCIe 3.0 (2.5, 5.0, 8.0 GT/s)</li> <li>48 lanes per CPU</li> </ul>
PCH	<ul style="list-style-type: none"> <li>Intel C620A series (Lewisburg, LBG-R)</li> <li>No Integrated 10 GbE/1 GbE LAN ports</li> </ul>	<ul style="list-style-type: none"> <li>Intel C620A series (Lewisburg, LBG-R)</li> <li>No Integrated 10 GbE/1 GbE LAN ports</li> </ul>

# ThinkSystem V2 two-socket (2S) implementation diagram

The figure on the right shows the two-socket configuration, which has the following features:

- Memory:
  - Eight channels DDR4 per CPU at 3200 Hz, 2DPC is supported.
  - **Note:** The ThinkSystem SD650 V2 only supports 1DPC
  - Up to 16 DIMMs per socket
  - New PMem 200 Series Modules
  - **Note:** PMems are not supported on the ThinkSystem SD650 V2
- Up to three UPI links, up to 11.2 GT/s
- PCIe 4.0
  - Up to 64 lanes per CPU
  - Bifurcation: x16, x8, x4
- PCH
  - Intel C620A Series Chipset (LBG-R)



# Whitley Ice Lake-SP memory support

Ice Lake-SP processors support both 1DPC and 2DPC configurations. They also support RDIMM, 3DS RDIMM, LRDIMM, and 3DS LRDIMM. However, the HPC model ThinkSystem SD650 V2 supports 1DPC, RDIMM, and 3DS RDIMM only.

Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s) ; Voltage (V); Slot Per Channel (SPC) and DIMM Per Channel (DPC)	
				*Data below assumes 2 SPC unless otherwise noted	
				1DPC	2DPC
	64GB	8 Gb	16 Gb	1.2V	1.2V
RDIMM	SRx8	8 GB	16 GB	3200	2933 PTH 3200 SMT
	SRx4	16 GB	32 GB		
	DRx8	16 GB	32 GB		
	DRx4	32 GB	64GB		
RDIMM-3DS	(4R/8R) x4	2H- 64GB 4H-128 GB	2H- 128 GB 4H- 256 GB	2933 PTH 3200 PTH for 1 SPC config only 3200 SMT	2933 PTH 3200 SMT
LRDIMM	QRx4	64 GB	128 GB	3200	3200
LRDIMM - 3DS	(4R/8R) x4	4H-128 GB	2H- 128 GB 4H- 256 GB	3200	3200

## ThinkSystem V2 two-socket RAS features enhancement

The ThinkSystem V2 two-socket RAS features are based on the existing ThinkSystem RAS features, but the following enhancements are also included:

- Error detection and correction (coverage at socket level)
- Error reporting
  - Machine Check Architecture (MCA)
  - Advanced Error Reporting (AER)
  - Intel specific – core, Uncore and Integrated I/O Module (IIO)
- Out-of-band (OOB) access to error logs

**Note:** For more information about ThinkSystem RAS features, refer to the following Lenovo Press article: <https://lenovopress.com/lp0777.pdf>

## Whitley Ice Lake two-socket key features

- Faster UPI
  - With 3 Intel Ultra Path Interconnect (Intel UPI) at 11.2 GT/s
  - Available in new Intel Xeon Gold 5300 processors and higher, delivering enhanced inter-platform data movement performance
- More and faster I/O
  - With PCI Express 4 and up to 64 lanes (per socket) at 16 GT/s
- Enhanced Memory Performance with support for up to 3200MT/s DIMMs (2 DPC)
  - The ThinkSystem SD650 V2 only supports 1DPC
- Increased memory capacity with up to eight channels
- 16 Gb-based DDR4 DIMMs and up to 256 GB DDR4 DIMMs are supported
- Breakthrough system memory and storage with Intel Optane Persistent Memory 200 Series (PMem)
  - Up to 512 GB PMems for up to 6 TB of total system memory/socket DDR+PMem
  - Intel Optane SSD support