Memory Configurator

Lenovo ThinkStation PX

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Overview

The purpose of this document is to provide high-level guidance for users to optimally configure their system memory in the ThinkStation PX platform to yield best system performance.

Section 1 - Platform Memory Architecture

The launch of the Intel Eagle Stream platform introduces support for the new DDR5 memory DIMM architecture. DDR5 memory offers a variety of new key features including the ability to reach higher memory bandwidth speeds up to 5600MHz using a single DIMM per channel design. The ThinkStation PX platform has been closely designed to take full advantage of this new memory architecture.

Channels	16 channels (8 channels per CPU), 1 DIMM per Channel (DPC)
Slots	16 slots (8 slots per CPU)
Type	DDR5-4800 ECC RDIMM DDR5-4800 ECC 3DS-RDIMM DDR5-5600 ECC RDIMM
Speed	Up to 4800 MHz[1] (Intel Sapphire Rapids CPUs) Up to 5600MHz[2] (Intel Emerald Rapids CPUs)
Qualified DIMM Sizes	16GB, 32GB, 64GB RDIMM / 128GB 3DS-RDIMM
Max System Memory	Up to 2TB maximum

[1] For Intel Sapphire Rapids CPUs, memory bus speed is capable of 4800MHz speed but may be limited by CPU memory support capability.
[2] For Intel Emerald Rapids CPUs, memory bus speed is capable of up to 5600MHz speed but may be limited by CPU memory support capability.

Section 2 – PX Memory Configurations

The Lenovo ThinkStation PX platform is the only new Lenovo dual CPU socket workstation with 16 memory DIMM slots (8 memory DIMM slots per CPU) that can support up to 2TB of system memory capacity. One of the key benefits used in the ThinkStation PX platform is the 8-channel, single DIMM per channel (DPC) design per CPU with higher top supported memory bus speeds of 5600MHz.

Intel Sapphire Rapids Processors:

The Lenovo ThinkStation PX supports 16/32/64GB DDR5 ECC RDIMMs and 128GB DDR5 ECC 3DS RDIMM at the maximum memory bus speeds of 4800MHz utilizing Intel Sapphire Rapids CPUs.

- 16GB DDR5 ECC RDIMM PC5-4800
- 32GB DDR5 ECC RDIMM PC5-4800
- 64GB DDR5 ECC RDIMM PC5-4800
- 128GB DDR5 ECC 3DS-RDIMM PC5-4800[1]

Intel Emerald Rapids Processors:

The Lenovo ThinkStation PX supports 16/32/64GB DDR5 ECC RDIMMs at the maximum memory bus speeds of 5600MHz utilizing Intel Emerald Rapids CPUs.

- 16GB DDR5 ECC RDIMM PC5-5600
- 32GB DDR5 ECC RDIMM PC5-5600
- 64GB DDR5 ECC RDIMM PC5-5600[1]

[1] Requires memory DIMM fans (FRU: 5M11H28536).

The following guidelines are recommended by Lenovo for obtaining the best memory bandwidth from the ThinkStation PX platform.

- In single CPU configurations, only DIMM slots 1-8 can be utilized. For dual CPU configurations, all DIMM slots can be utilized.
- In dual CPU configurations, memory DIMM quantity should be balanced between both CPUs.
- 3DS-RDIMMs cannot be mixed with RDIMMs.
- ECC and non-ECC UDIMMs are not supported.
- DIMMs should be of the same type and capacity.
- Memory DIMM fans (*FRU: 5M11H28536*) are required for 128GB 4800MHz 3DS-RDIMMs or 64GB 5600MHz RDIMMs.
- Memory speed is dependent on the processor used.
- Lenovo recommends populating every DIMM slot for optimal memory performance.
- See table 1 below for OS disk capacity rules related to the amount of total system memory capacity.

Table 1 - Memory Capacity and Boot Drive

Memory DIMM Quantity	Memory DIMM Size	Bootable Disk
12, 16	64GB DDR5 ECC RDIMM PC5-4800 64GB DDR5 ECC RDIMM PC5-5600	> 512GB M.2 PCIe SSD
6, 8	128GB DDR5 ECC 3DS-RDIMM PC5-4800	> 512GB M.2 PCIe SSD
12, 16	128GB DDR5 ECC 3DS-RDIMM PC5-4800	> 1TB M.2 PCIe SSD

Section 3 – PX Memory Layout Visual

The below diagram in Figure 1 shows a high-level visual layout of the memory DIMM slots in the new ThinkStation PX platform.

Figure 1 - PX Motherboard DIMM Layout

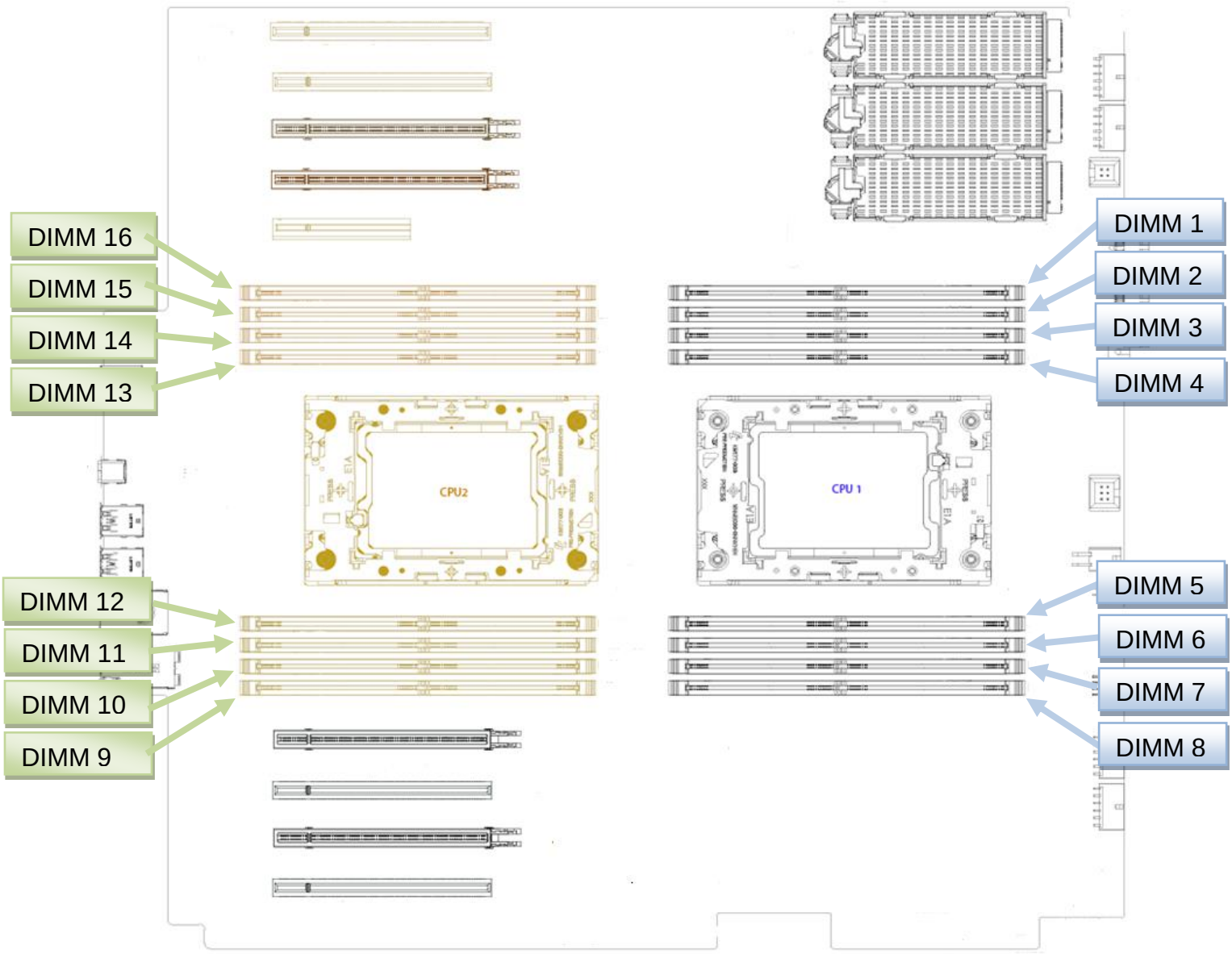
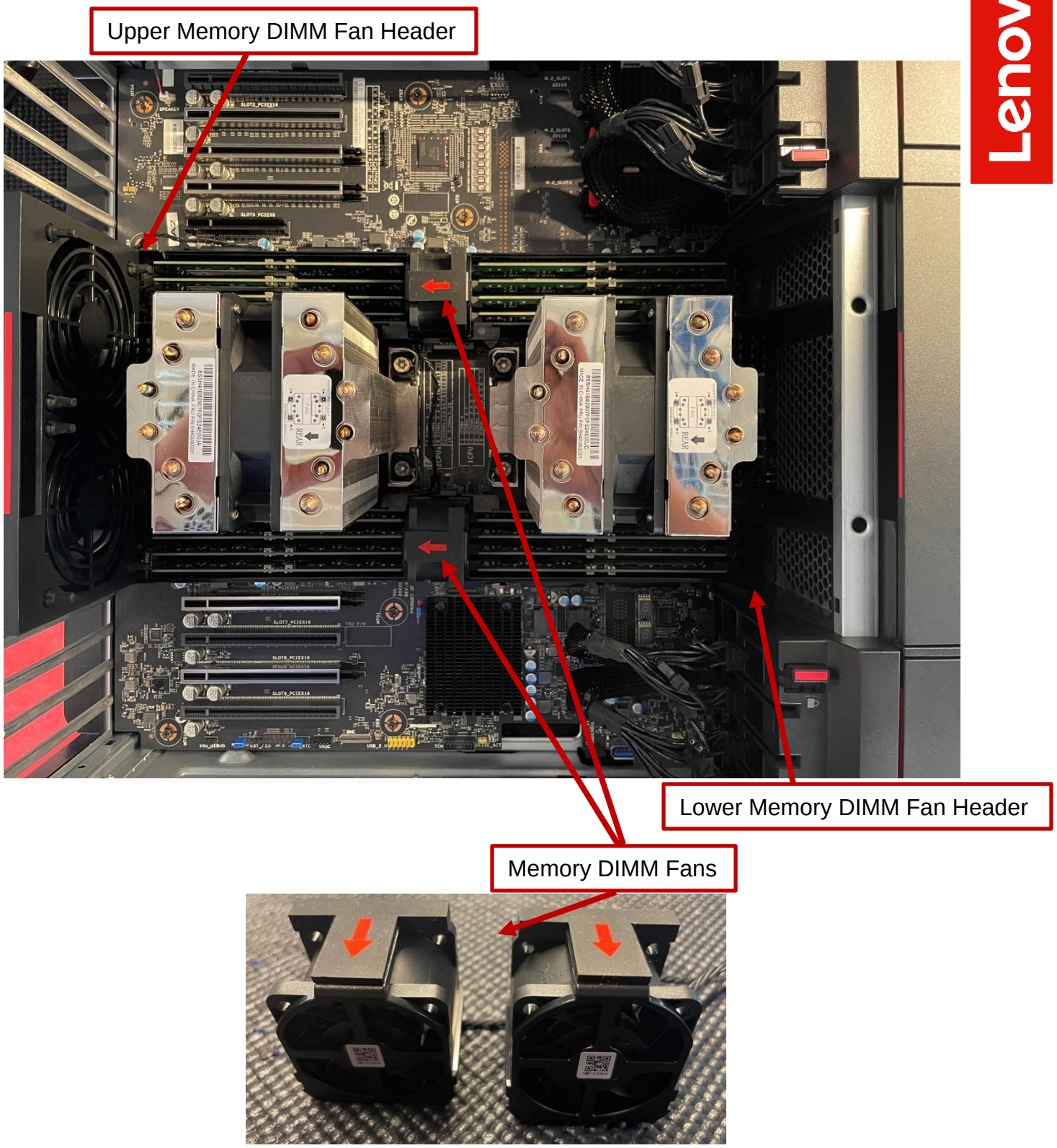


Figure 2 - Memory DIMM Fans



[1] Memory DIMM fans (*FRU: 5M11H28536)* are required when using 3DS RDIMMs or 64GB PC5-5600 MHz RDIMMs.

Section 4 – PX Memory Fill Order

It is important to make sure the proper memory fill order is being utilized to get the best possible memory performance from the new ThinkStation PX workstation. The table in Figure 2 below shows the proper recommended fill order based on the number of memory DIMMs being used.

Table 2 - PX DIMM Slot Fill Order Recommendations

Quantity of DIMMs	Install Order (1 CPU)	Install Order (2 CPUs)
1 DIMM	DIMM 4	Not Supported[1]
2 DIMMs	DIMM 4, 7	DIMM 4, 12
3 DIMMs	Not Supported[1]	
4 DIMMs	DIMM 2, 4, 5, 7	DIMM 4, 7, 12, 15
5 DIMMs	Not Supported[1]	
6 DIMMs	DIMM 1, 2, 4, 5, 6, 7	Not Supported[1]
7 DIMMs	Not Supported[1]	
8 DIMMs	DIMM 1 – 8	DIMM 2, 4, 5, 7, 10, 12, 13, 15
9 DIMMs	Not Supported[1]	
10 DIMMs		
11 DIMMs		
12 DIMMs	Requires 2nd CPU	DIMM 1, 2, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15
13 DIMMs	Not Supported[1]	
14 DIMMs		
15 DIMMs		
16 DIMMs	Requires 2nd CPU	DIMM 1-16

[1]The specific memory configuration will function but is not recommended as it results in an unbalanced memory configuration across both CPU's that could result in memory performance degradation.

Revision History

Version	Date	Author	Changes/Updates
1.2	9/13/2024	Jason M.	Updated OS disk capacity rules.
1.1	5/8/2024	Jason M.	Updated for newer generation Intel Emerald Rapids CPUs.
1.0	5/26/2023	Jason M.	Initial launch release.