



➞ Storage

NVMe, RAID, and AnyBay introduction



Supported storage types

ThinkSystem servers support:

- Different RAID options
 - Intel SW, 530-4i, 530-8i, 730-8i, 930-4i, 930-8i, 930-16i, 930-24i, and 930-8e
 - RAID adapters also support JBOD drives
- 12 Gb SAS HBA
 - 430-8i, 430-16i, 430-8e, and 430-16e
- NVMe
 - A PCIe switch card is needed to support NVMe on the lower-end systems, for example, 500 series and prior series.
- M.2
 - One SATA M.2 or two SATA M.2 drives with mirroring

Note: For more detailed information on these features, refer to [ES51780 - Servicing the ThinkSystem storage controllers](#) course.

Non-Volatile Memory Express

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Non-Volatile Memory Express (NVMe) is an industry standard that enables data centers to realize full flash potential without compatibility issues. NVMe is the new PCIe 3.0 high-performance SSD technology that provides high I/O throughput and low latency. NVMe interfaces remove SAS/SATA bottlenecks and enable all of the capabilities of contemporary NAND flash memory.

NVMe technology has the following key characteristics:

- PCIe 3.0 connection. There is a PCIe 3.0 x4 connection for each NVMe drive with up to 4 GBps overall throughput.
- Up to 2800 MBps sequential read speed with 128 KB blocks, and up to 2000 MBps sequential write speed with 128 KB blocks per drive.

Note: A PCIe switch card may be needed to support NVMe. For NVMe information on Purley systems, refer to [ES51780 - Servicing the ThinkSystem storage controllers](#) course.

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- Up to 460,000 IOPS of random read with 4 KB blocks, and up to 175,000 IOPS of random writes with 4 KB blocks.
- A total of 65,536 I/O queues is supported and 65,536 commands per queue is supported, which provides great performance on heavily multithreaded workloads with combined sequential and random access.
- High endurance: The Intel P3700 drives, for example, include High Endurance Technology (HET) which combines NAND silicon enhancements and SSD NAND management techniques to extend SSD write endurance up to 17 drive writes per day (DWPD) for five years.
- Available drive capacities of 400 GB, 800 GB, 1.6 TB, and 2.0 TB.
- Support for software RAID under operating system management.

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- Hot add and hot remove features are available on specific servers with supported operating systems.
- Most operating systems have native support of NVMe drives or provide support through software drivers, such as:
 - RHEL 6.5 and 7.0
 - SLES 11 SP3 and SLES 12
 - Windows Server 2008 R2, 2012, and 2012 R2
 - VMware ESXi 5.5 and 6.0 (does not support NVMe hotswap)
- NVMe drives can be used as boot drives.
- For more information about NVMe, refer to [Implementing NVMe Drives on Lenovo Servers](#)

Note: A PCIe switch card may be needed to support NVMe. For NVMe information on Purley systems, refer to [ES51780 - Servicing the ThinkSystem storage controllers](#) course.

AnyBay

AnyBay is a trademark of Lenovo and is an advantage for Lenovo servers. AnyBay is a unique design of drive bays that offers the flexibility for users to install NVMe/U.2 drives, SAS drives, or SATA drives in any drive bays.

This feature differentiates Lenovo servers from competitors' as competitors' products often lack this flexible capability. Instead, NVMe/U.2 bays are dedicated for NVMe/U.2 drives only, and SAS/SATA drive bays are dedicated for SAS/SATA drives only.



Summary

This course enabled you to:

- Describe the key components and technology of the Purley platforms.
- Identify the differences between the Grantley, Brickland, and Purley platforms.
- Describe the different processor levels, features, and configurations.
- Identify ThinkSystem servers supported memory and storage features.