24 NVMe Drive R7525:
Designed for Maximum Storage Bandwidth

Tech Note by

Mohan Rokkam

Summary

The PowerEdge R7525 featuring 2nd Gen AMD EPYC 7002 series processors with 24 NVMe drives provides a unique combination non-oversubscribed NVMe storage along with plenty of peripheral options to support applications that require maximum performance.

Introduction

NVMe drives are designed for high speed, low latency access to storage. The NVMe protocol is a lightweight protocol that is built on top of the PCIe bus. Most NVMe devices use x4 PCIe lanes, allowing maximum bandwidth to the device. Since PCIe is the default interface between the CPU and peripherals, NVMe drives can be connected directly to the CPU.

The number of available PCIe lanes usually dictates the number of NVMe devices that can be directly connected to the CPU. In case a system does not have enough free PCIe lanes, one or more PCIe switches can be used to connect more NVMe devices to the CPU. This results in a design that is considered as oversubscribed. For example, if 24 x4 NVMe devices are connected to the CPUs using 32 PCIe lanes, this would be considered as a 3:1 oversubscription.

2nd Gen AMD EPYC 7002 series and PCIe

The 2U 2-socket Dell PowerEdge R7525 featuring 2nd Gen AMD EPYC 7002 series processors has plenty of available PCIe lanes. Each 2nd Gen AMD EPYC processor has 128 available PCIe lanes for use. In the standard 2-socket configuration, 128 PCIe lanes are available for peripherals, with the rest being used for inter-socket communication. However, some of the inter-socket xGMI2 lanes can also be repurposed to add PCIe lanes. In this way, some configurations have an additional 32 lanes giving a total of 160 PCIe lanes for peripherals.
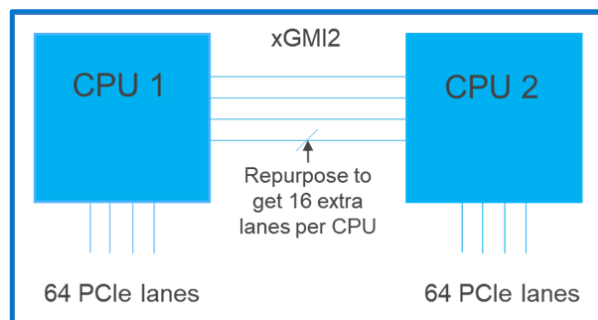

Figure 1 - Diagram showing PCIe lanes in a 2-socket configuration

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Dell PowerEdge R7525 with 24 NVMe drives

The Dell Poweredge R7525 24 NVMe configuration takes advantage of the above configuration. All 24 x4 NVMe drives are directly connected to the CPUs using up 96 of the available 160 lanes. This ensures that none of the NVMe drives have any oversubscription. All NVMe drives are directly connected maximizing throughput and reducing latency. The high core count of the 2nd Gen AMD EPYC 7002 series also helps take advantage of this available lanes. The remaining 64 PCIe lanes are split up across 2 x16 slots, 1 x16 OCP 3.0 slot and 2 x8 slots that can be used for other peripherals like network cards.

Figure 2 - R7525 in 24 drive NVMe Configuration

In Conclusion

The 24 NVMe drive R7525 is a very flexible platform. It has support for high powered 2nd Generation AMD EPYC 7002 series processors with up to 64 physical cores per processor, 24 NVMe drives directly connected to the CPUs and multiple PCIe Gen4 slots for peripheral support. This combination provides a platform that is optimized for storage bandwidth yet does not scrimp on additional peripheral support.

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