WHITE PAPER

SSD CAPACITY CHOICES IMPACT SYSTEM PERFORMANCE

Optimization Involves Balancing Storage and Compute

- SSD CAPACITY CHALLENGES: The need for high capacity solid-state drives (SSDs) to store massive data sets is important. Managing that data is becoming a significant challenge.
- SYSTEM BOTTLENECK CHALLENGES: PCI Express 3 offers high bandwidth, but several SSDs will overrun the bus before a system is fully populated. This will continue to occur with PCI Gen 4 and 5.
- COMPUTATIONAL STORAGE SOLUTIONS: Having compute resources on-board NVMe SSDs allows local data processing to occur, which optimizes overall system performance.

INTRODUCTION

The economics of data storage have always been challenging, yet they are becoming increasingly more complex with the migration of data to fast solid-state drives (SSDs) with larger capacities. This shift to high-capacity SSDs has introduced an entirely new challenge with significant risks to system performance optimization.

SSD capacities continue increasing and PCI Express (PCIe) bandwidths are doubling with each new generation. Yet, server processor and memory speeds are advancing at a much slower pace and this continues exacerbating the magnitude of system bottlenecks. Switching to Computational Storage Drives (CSDs) is the best way to make the high-capacity NVMe SSDs more effective and productive.

CAPACITY COMPLICATES EVERYTHING

PCIe bandwidth is often consumed before the system has been fully populated with NVMe SSDs, as shown in Figure 1.

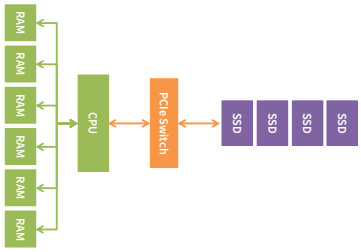

FIGURE 1
Four PCI NVMe SSDs Risk Unbalanced System Performance
>12 GB/s Storage Bandwidth | 16 GB/s System Bandwidth

A solution seems obvious—avoid PCIe traffic to avoid system bandwidth limitations. This can be achieved today, as follows:

1. **Maximize NVMe SSD storage capacities** to increase density and decrease PCIe interface sharing.
2. **Minimize NVMe SSD data movement to RAM** to mitigate PCIe and system bandwidth limits.

Figure 2 shows how a system will experience severe bottlenecks as NVMe SSDs are added. As a result, the NVMe SSD storage challenge is a performance crisis that will continue to intensify.

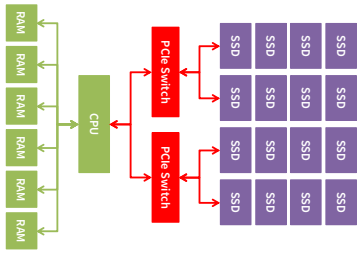

FIGURE 2
Twelve PCIe SSDs Experience System Bottlenecks
>36 GB/s Storage Bandwidth | 16 GB/s System Bandwidth

Computational Storage Drives (CSDs), like the Newport Platform NVMe SSDs from NGD Systems, addresses both requirements. With available capacities of up to 32 TB, a single Newport NVMe SSD substitutes for several lower capacity SSDs.

With multiple in-situ processors, Newport NVMe SSDs process data locally without having to transfer data to and from system CPUs and memory. These NGD Systems NVMe SSDs present an optimal solution to the SSD performance crisis.

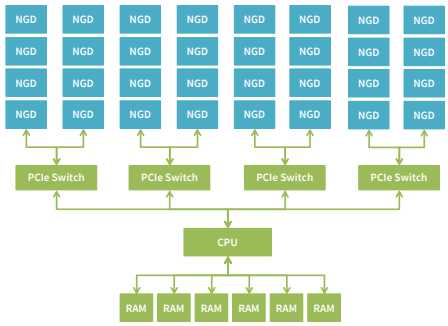

FIGURE 3
NDG Systems SSDs with In-situ Processing Avoid Bottlenecks
On-board CPUs Process Data Locally Without Excess PCIe Traffic

A shift to higher capacity SSDs with Computational Storage capabilities like those from NGD Systems enables massive parallelism and greater utilization of system resources. It ensures the highest levels of overall throughput and addresses use cases demanding new levels of performance.

ABOUT NGD SYSTEMS

NGD Systems enables infrastructure success and growth by delivering the industry's most innovative Computational Storage NVMe SSDs in the largest capacity and most power-efficient storage products available. This provides an increase in system-level performance for near-real-time processing at the edge where data is generated. The Newport Platform uses a patented In-Situ Processing solution to radically reduce the bandwidth required to analyze massive data sets and reduce the strain on customer infrastructure. NGD Systems' Computational Storage products enable compute at the edge without moving data from storage devices, overcoming challenges that current system architectures cannot solve. NGD Systems' breakthrough technology is ideal for hyperscale environments, edge computing, and AI/data analytic applications. For more information, please visit https://www.ngdsystems.com.