GRAID

KIOXIA

GRAID Technology & Kioxia Partner to Revolutionize Enterprise Data Protection Architecture
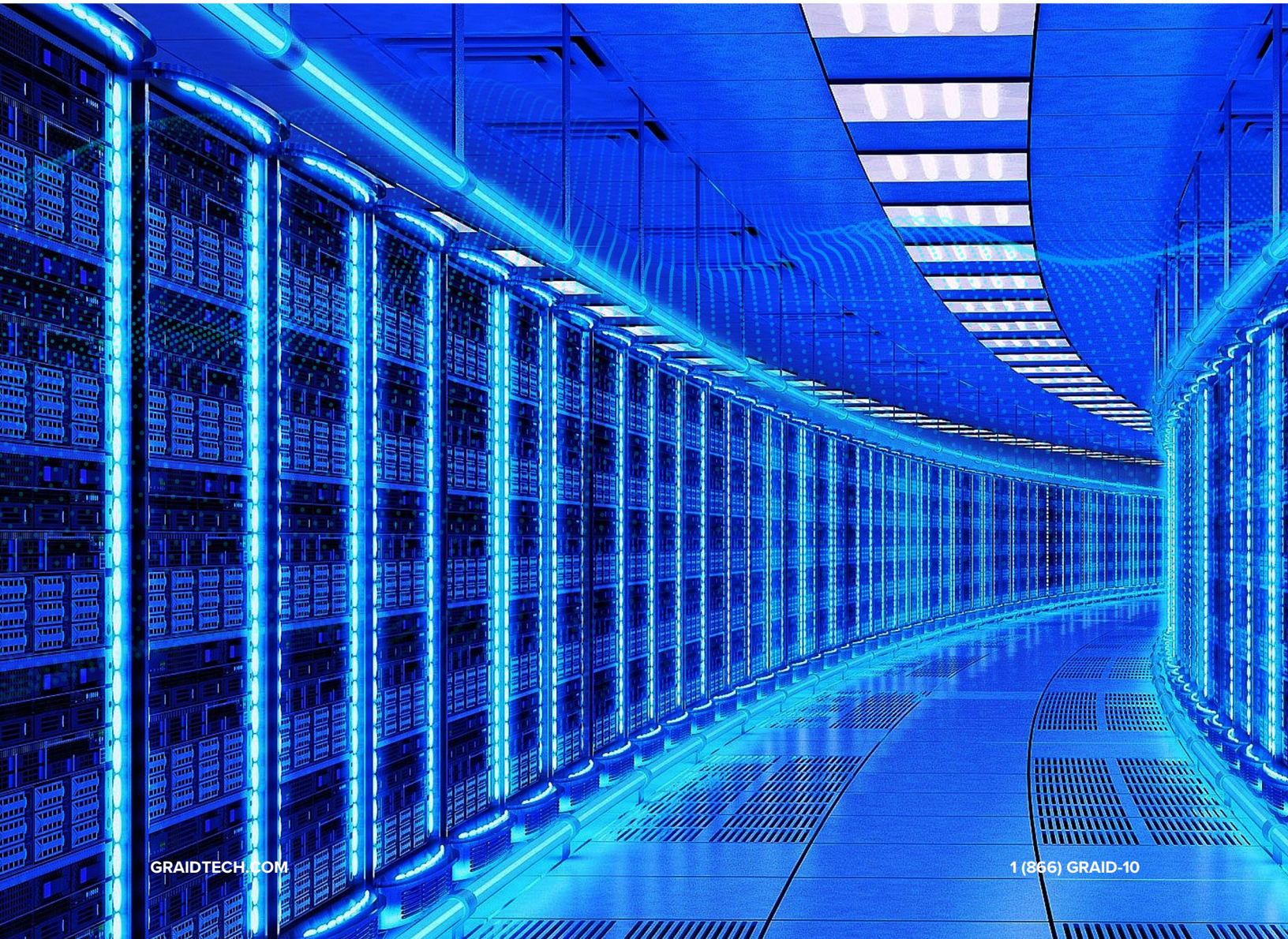
MAY 2021

Table of Contents

Introduction

Revolutionize your data protection architecture with SupremeRAID™, which enables industry leading performance. Powered by GRAID's virtual NVMe controller and KIOXIA's CM6 PCIe® 4.0 solid state drives, fully integrated into Gigabyte's next generation R-series server.

"GRAID Technology is proud to partner with Kioxia and GIGABYTE to unveil the next generation of NVMe server, storage and data protection technology, capable of delivering industry leading performance for the future of 5G, AI and IoT workloads,"

Leander Yu,
CEO at GRAID Technology

"With each generational leap there are more demanding workloads that require fast throughput from storage solutions. GIGABYTE has partnered with GRAID Technology and Kioxia to develop industry leading performance for Gen 4 NVMe SSDs showcased in R282-Z94, that deliver blazing fast performance in a storage dense 2U chassis."

Daniel Hou, VP of Networking and
Communication at GIGABYTE

While traditional RAID technology has become the bottleneck of SSD disks, GRAID Technology has developed a disruptive software plus hardware solution to unlock the performance bottleneck of RAID protection for SSDs.

GRAID SupremeRAID™ works by installing a virtual NVMe controller onto the operating system and integrating a PCIe device into the system equipped with a high-performance AI processor to handle all RAID operations of the virtual NVMe controller.

This solution offers many advantages:

- Takes full advantage of NVMe performance – 6 million random IOPS and 100 GB/s throughput which is currently the industry leading performance benchmark

- Unlike traditional software RAID, it does not consume a large amount of CPU resources

- Overcomes the limitations of hardware RAID cards, such as computing performance, PCIe bandwidth, number of SSDs supported, as well as the effort of battery maintenance

- Plug and play, and can be used even for systems without PCIe switches that use SSDs directly connected to the CPU via PCIe, without needing to change the hardware design

- SCI (Software Composable Infrastructure) compatible and can be used for external SSDs connected via NVMeoF

- Highly scalable, and new software functions such as compression and encryption can easily be added

Industry

- Online transaction processing (OLTP) and online analytical processing (OLAP)

- Real-time editing of 4K/8K video content

- HPC (high power computing) and technical computing

- High-frequency trading (HFT) and real-time bidding (RTB)

- Large SQL and NoSQL database processing

Solution

This solution uses the Kioxia CM6-R high-performance enterprise-class SSD, with the Gigabyte R282-Z94 full NVMe server, and uses the GRAID SupremeRAID™ SR-1000 for data protection. The SupremeRAID™ SR-1000 can flexibly configure RAID groups for different performance requirements of workloads.

Challenge

With various of the workloads that require the performance of NVMe SSD, to protect the business continuity, using traditional RAID becomes a challenge to get the performance that NVMe SSD should performed. Current existing solutions, whether software RAID or hardware RAID, are incapable of driving more than 4 NVMe SSDs. It's too complex and costly to get the full power of NVMe SSD.

Benefits

This solution comes with 128-core CPU in a single 2U server, with storage capable of delivering more than 100 GB/s of bandwidth, 6 million IOPS and up to 570 TB of usable space with comprehensive data protection at the same time, which greatly reduces system complexity and total cost of ownership.

About the Architecture
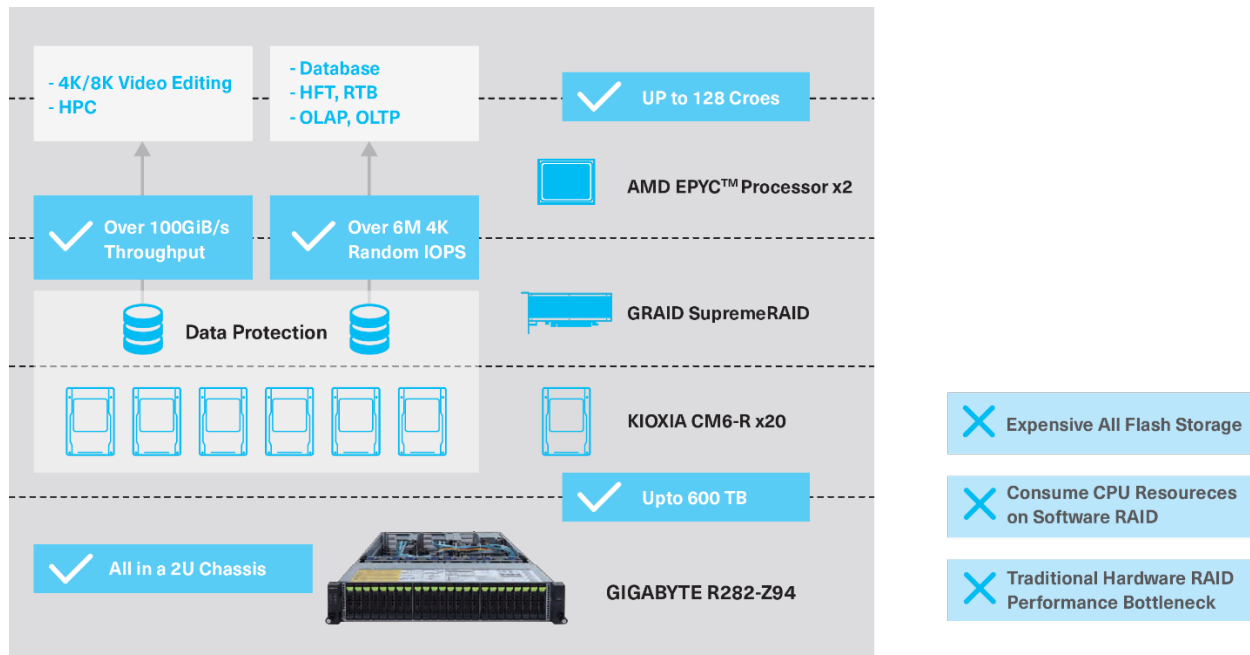
Deliver high performance for enterprise applications and workloads with CM6 Series Enterprise NVMe SSDs

Enterprise class NVMe SSDs are designed to deliver the highest performance standard in 24/7 workload. Kioxia CM6 series includes such features as dual-port, high density, mix endurance grades, and high levels of data protection (data integrity checking, high reliability, media wear reporting and error reporting).

Feature	CM6 Series
NAND	BiCS FLASH™ 96-layer 3D TLC
Interface	PCIe 4.0
Specification	NVMe 1.4
Form Factors	2.5-inch
Capacity Range	960GB to 30,720GB (1DWPD) 800GB to 12,800GB (3DWPD)
Performance*	Sequential Read - 6900 MB/s Sequential Write - 4200 MB/s Random Read - 1400K IOPS Random Write - 350K IOPS

Highest performance during supported capacities and DWPDs

Performance Comparison (Gen3 vs. Gen4)

BANDWIDTH · I/O PREFORMANCE · RESPONSE TIME
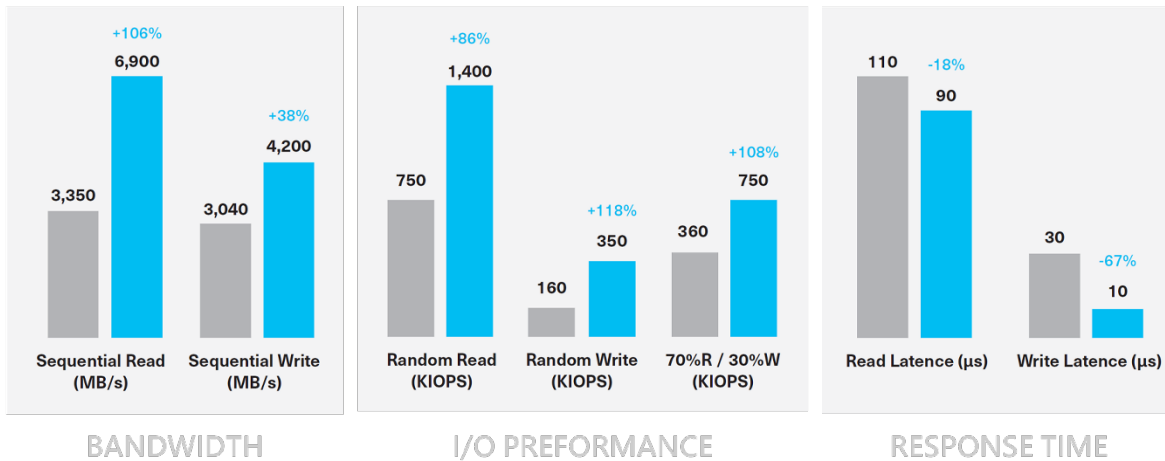
GRAID SupremeRAID™ is the most powerful, high-speed data protection solution specially designed for NVMe SSDs. The test results show that performance of different workloads can be met by the performance of different configurations.

A RAID-5 group composed of 3 CM6-R SSDs designed for database, OLAP use cases can achieve 4,671K IOPS random reads and 7,65K IOPS random writes and maintain extremely low latency. Even when an SSD is damaged, it can still sustain more than one million random read and write performance, which will not impact the performance of the application at all.

A RAID-5 group composed of 20 CM6-R SSDs can provide extremely high usable space, with 91 GB/s sequential read and 7 GB/s sequential write; a perfect solution for applications that require read throughput, such as AI training, big data analysis, or high powered computing.

Finally, a RAID-10 group composed of 20 CM6-R SSDs can provide 104 GB/s sequential read and 30 GB/s sequential write, which is almost 8 times the performance of a traditional hardware RAID card. When an SSD is damaged, it can still maintain a very high bandwidth and complete data reconstruction in very short time.

Utilizing the high-speed and stable read and write performance of Kioxia CM6-R, combined with GRAID SupremeRAID™ data protection solution, Gigabyte R282-Z94 server and AMD EPYC™ 7742 64 core processor, it can be applied to a variety of high-density computing in the most streamlined configuration without worrying about the performance bottleneck caused by data protection.
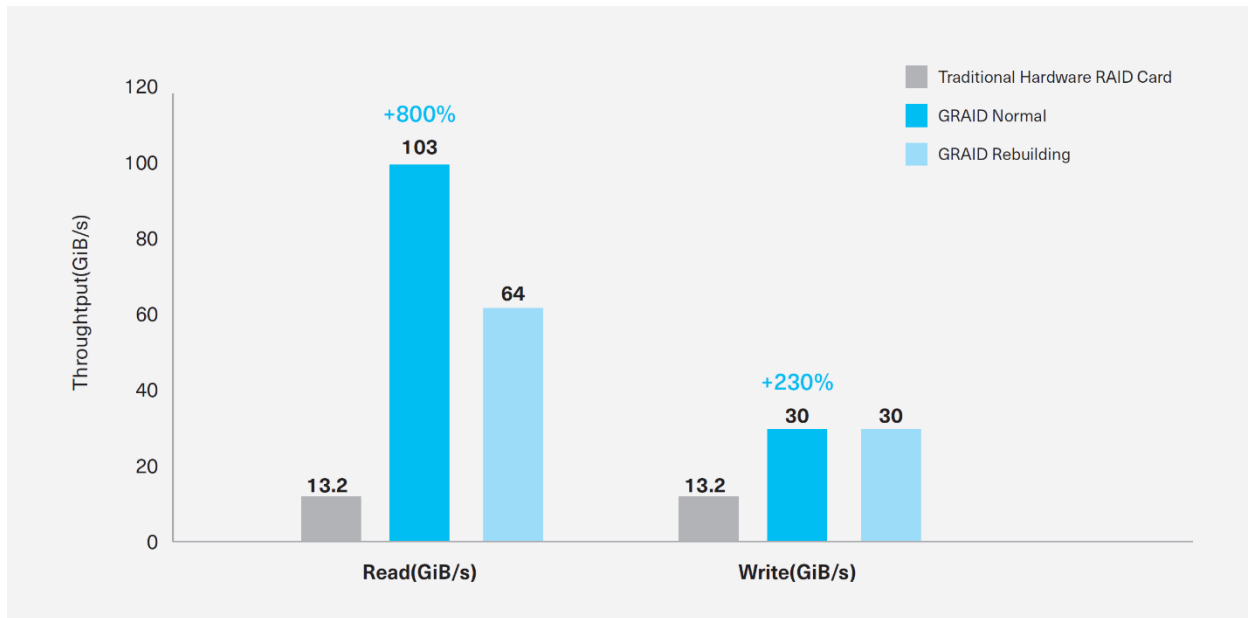
The Next Generation of Enterprise All Flash Server with AMD EPYC™ Processor

Gigabyte R-series server – R282-Z94 is a full-flash server with the second-generation AMD EPYC™ processor. The second-generation AMD EPYC™ processor is based on 7nm advanced process technology to increase the number of cores to 64 groups and PCIe channels up to 128 and supports a new generation of PCIe 4.0 transmission interface.

Based on these technical advantages, R282-Z94 provides powerful computing performance and can handle a large amount of data calculations in real time.

In addition, you can properly use the rich PCIe channels to provide flexible PCIe expansion slots. It also supports 24 2.5-inch U.2 storage devices on the front side of the chassis to meet the needs of a large amount of real-time read/write data.

Gigabyte's R282-Z94 has an optimized design with high-density computing, storage capacity configuration, and doubled I/O performance, which can meet increasingly demanding workload requirements such as software-defined and virtualized infrastructure, large-scale data analysis or all flash high-performance storage service, and more.

GIGABYTE R-series server – R282-Z94

Future Collaborations

As NVMe SSD is replacing fundamental storage infrastructure, we see data center storage infrastructure design has become the biggest challenge moving forward. Especially when PCIe Gen4 emerges, enterprises are looking for a solution that can deliver full NVMe SSD performance without sacrificing data security and business continuity.

GRAID SupremeRAID™ with NVMeoF support delivers tremendous performance with comprehensive data protection and flexibility, not only resolving the performance bottleneck but also significantly reducing total cost of ownership (TCO).

Together with most powerful PCIe Gen4 SSD from Kioxia and the most advanced Gen4 system from Gigabyte, the solution reveals true PCIe Gen4 performance without compromising data security for all data center/enterprise workloads as a total solution to the customer. We expect to continue this cooperation to deliver more solutions to our customers.