

Executive Summary

Modern operating systems, including Linux and Windows, support software-based RAID. Using built-in software is the standard choice for protecting data stored on drives.

However, software RAID consumes significant system resources while protecting data, especially when using solid-state drives (SSDs). Increasing storage workloads generate higher CPU workloads, creating unavoidable bottlenecks that slow systems, databases, and applications.

SupremeRAID™ works differently. It combines two powerful technologies — software-defined storage (SDS) and GPU acceleration — to create an innovative solution ideal for NVMe SSD data protection. The result is better RAID-protected storage with the same PCIe NVMe SSDs.

Competitor Examples

- **Linux MD** – Open-source software RAID included with the Linux OS.
- **ZFS RAIDZ** – Open-source software RAID included with the ZFS file system for Linux.
- **Xinnor xiRAID** – Commercial software RAID available as an add-on for Linux.
- **Microsoft Disk Management** – Commercial software RAID included with the Windows OS.

Key Value Propositions

- 1. Instant Return on Investment** – SupremeRAID™ exceeds performance requirements with fewer SSDs. The amount of money saved more than pays for the SupremeRAID™ solution.
- 2. Non-blocking Performance** – SupremeRAID™ software runs on a GPU add-in card, leaving CPUs available for operating systems, databases, applications, and other workloads.
- 3. Higher System Efficiency** – SupremeRAID™ needs minimal resources to protect data, leaving more CPU cores for applications and more PCIe bandwidth for data.
- 4. Better Storage Availability** – SupremeRAID™ performance remains little changed during SSD failures, protecting service levels for databases, applications, and users.
- 5. Faster RAID Recovery** – SupremeRAID™ rebuilds data at multiple TBs per hour with a low impact on performance, enabling recovery to begin anytime and complete quickly.
- 6. Fast and Easy Installation** – SupremeRAID™ installation couldn't be easier. Just plug it in and go. It is more convenient than upgrading the system to handle software RAID workloads.
- 7. Future-proof Solution** – SupremeRAID™ supports Linux and Windows servers with the same solution. A technology refresh might trigger a switch to a different software RAID.

Top Reasons SupremeRAID™ Wins

Features	Benefits	Advantages
Record-setting RAID storage performance	Scale up to 28M IOPS and 260GB/s throughput	Use more of your SSD's performance while protecting data
Modern software-defined storage	Relies on flexible software to deliver functionality	Combines best-in-class hardware and software for RAID
GPU add-in card for RAID acceleration	Offloads RAID computations from the system's CPU	Frees-up CPU cores to process database and app workloads
Predictable system & RAID performance	Dedicated hardware processes RAID storage workloads	System runs optimally regardless of RAID storage workloads
High-performance in degraded mode	GPU add-in card effortlessly recreates missing data	Minimal impact on system performance during SSD failure
High-performance in rebuild mode	GPU add-in card effortlessly recovers to the replaced drive	Minimal impact on system performance during SSD rebuild
Fast and easy setup and usage	Install add-in card and configure SSDs for RAID in minutes	Less complicated than OS and file system RAID
Same solution for Linux and Windows	Standardize on one RAID solution across multiple data centers	Simplify system design, management, and administration

Winning Sales Strategy

- **Rescue Wasted Performance** – Every system with NVMe SSDs needs SupremeRAID™. The math is simple: software RAID 10 mirrors data across drive pairs, reducing bandwidth by 50%.

Aggregate Read Bandwidth		
SSDs	SupremeRAID™	Software RAID 10
Four	28 GB/s	14 GB/s
Eight	56 GB/s	28 GB/s
Twelve	84 GB/s	42 GB/s
Sixteen	112 GB/s	56 GB/s

Note: Assumes PCIe Gen 4 SSDs.

- **Propose Alternative Configuration** – RAID 10 is wasteful but used for “extra” speed. SupremeRAID™ with RAID 5 delivers faster performance and up to 50% higher capacity with the same SDDs. SupremeRAID™ delivers the required usable capacity using fewer SSDs, and the money saved pays for SupremeRAID™.

Usable Capacity		
SSDs	SupremeRAID™ 5	Software RAID 10
Four	12 TB	8 TB
Six	20 TB	12 TB
Eight	28 TB	16 TB

Note: Assumes 4 TB SSDs.

- **Review Architectural & Technical Pros and Cons** – It’s modern GPU-based SupremeRAID™ versus legacy CPU-based software RAID. SupremeRAID™ includes a GPU add-in card for RAID acceleration. Software RAID uses CPU cores for RAID processing, consuming up to 87% of system resources.
 - **Performance & Scalability:** SupremeRAID™ offers consistent scaling in performance that is up to 1.8 times higher vs. xiRAID.
 - **CPU Utilization:** SupremeRAID™ demonstrates superior CPU utilization that is up to 20 times lower vs. xiRAID.
 - **Power Consumption:** SupremeRAID™ stands out in power efficiency by consuming up to 30% less power vs. xiRAID.

Comparison

Specifications	Graid Technology SupremeRAID™	Linux MD	ZFS RAIDZ	Xinnor xiRAID	Microsoft Disk Management
RAID					
Acceleration technology	Dedicated GPU	Shared CPU	Shared CPU	Shared CPU	Shared CPU
Claimed performance	Up to 260GB/s and 28M IOPS	Unpublished	Unpublished	Up to 150 GB/s and 30M IOPS	Unpublished
Tested performance	Up to 260GB/s and 28M IOPS	Not available	Not available	Up to 117 GB/s and 11M IOPS	Not available
Levels supported	0, 1, 5, 6, 10	0, 1, 4, 5, 6, 10	RAID-Z0 (~RAID 0), RAID-Z1 (~RAID 5), RAID-Z2 (~RAID 6), RAID-Z3 (~RAID 7), Mirror (~RAID 1)	0, 1, 5, 6, 7, 10, 50, 60, 70	0, 1, 5, 10
Systems					
Linux distributions supported	CentOS, RHEL, Rocky Linux, AlmaLinux, Ubuntu, openSUSE Leap, SLES	Modern Linux distributions	Modern Linux distributions	CentOS, RHEL, Oracle Linux, Ubuntu, Promox	None
Windows releases supported	Windows, Windows Server	None	None	None	Windows, Windows Server
CPU utilization (writes)	Less than 10% (typical)	Unpublished	Unpublished	Up to 87% (based on testing)	Unpublished