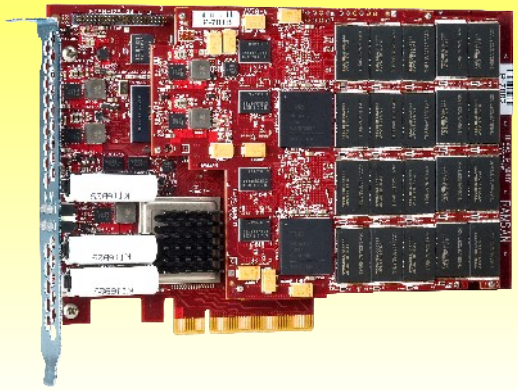
Texas Memory Systems

The World's Fastest Storage®

SERIES 7™

RamSan-70 "Gorilla"



- **900 GB Usable Storage**
- **1,280 GB Raw Storage**
- **330,000 IOPS**
- **2 GB/s Bandwidth**
- **PCIe 2.0 x8 Interface**
- **Series-7 Flash Controller™**

Overview

The RamSan-70 is the latest in-server Flash storage system from Texas Memory Systems, offering:

- **450 or 900 GB** of usable storage space
- Enterprise grade **32nm single level cell (SLC) Flash** media from Toshiba
- New proprietary **Series-7 Flash Controller™** featuring **low host overhead** and **patented reliability features**
- **Half-length**, full-height PCIe card form factor
- **PCIe 2.0 x8** interface for maximum performance

Key Applications

The RamSan-70 speeds up high-performance enterprise **direct attached storage (DAS)** applications. Customers around the world use RamSan in-server storage for applications like:

- **Distributed, scale-out databases**
- **Index files and metadata**
- **Rendering and video editing**
- **Modeling and simulation**

Fully supported on **Windows and Linux platforms**, the RamSan-70 appears as a **standard block device** to applications, ensuring **maximum compatibility**.

Performance

The RamSan-70 provides **maximum performance**:

Metric		Read	Write
IOPS	(4 KB)	330 K	160 K
Bandwidth		2 GB/s	1.4 GB/s
Latency	(512 B)	70 µs	45 µs
	(4 KB)	170 µs	45 µs

Reliability

The RamSan-70 has the reliability features required in true **enterprise storage**, including:

- Standard **chip-level RAID** and patented **Variable Stripe RAID™ (VSR™)** protection against plane and chip failures
- **Enhanced Error Correcting Code (ECC)** protection against block failures
- **Ultracapacitors** providing 5 seconds of power used to write out Flash metadata and **avoid lengthy table rebuilds** when power is restored

Learn more at **http://RamSan.com/Products/RamSan-70**.

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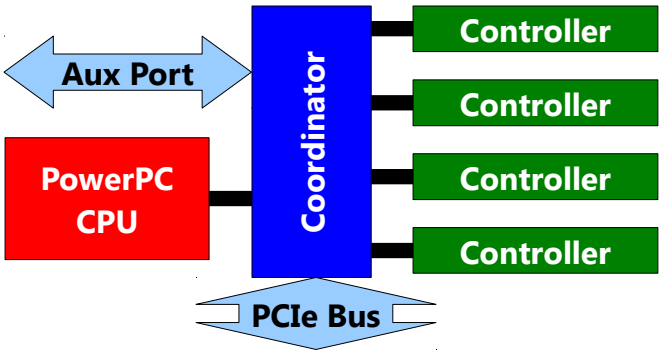

Architecture

The RamSan-70 is powered by the proprietary Texas Memory Systems **Series-7 Flash Controller™**, which incorporates a **PowerPC CPU**, **FPGA coordinator**, and **FPGA controllers** to form a **completely hardware-based Flash management system**. Each controller manages its own set of ten Flash chips. Four more controllers and Flash are added with a **mezzanine board** connected to the Aux Port.

Series-7 Flash Controller™

Exclusively available from Texas Memory Systems, the **Series-7 Flash Controller™** is the seventh generation of RamSan Flash controllers. Its main features over other architectures include:

- **Less host system overhead.** The Series-7 Flash Controller uses dedicated hardware for on-board Flash management. Other cards rely on heavyweight host drivers that use the host system's valuable CPU and memory for Flash management tasks.
- **Better performance.** The highly parallel architecture of the Series-7 Flash Controller takes full advantage of the performance of each Flash chip by minimizing individual FPGA load. This parallel architecture is a core component of the RamSan design and is why the RamSan is the uncontested performance leader.
- **More reliability features.** Patented Variable Stripe RAID™ (VSR™) technology, available exclusively in new Texas Memory Systems products, efficiently bypasses failed Flash planes and chips. Enhanced error correcting code (ECC) techniques help mitigate block failures.
- **Improved latency for small requests.** The Series-7 Flash Controller has new optimizations for small (512-byte) requests that significantly decrease latency.

Variable Stripe RAID™ (VSR™)

The exclusive patented Variable Stripe RAID™ feature offered by the Series-7 Flash Controller reduces business interruptions and improves mean time between failures (MTBF) by providing a higher level of **protection** against common Flash plane failures and less common Flash device failures. VSR complements standard error-correction techniques to enable continued system operation in the event of Flash failures. It improves on traditional RAID by providing **greater stripe size granularity** and **variable stripe sizes**, allowing the controller to **skip bad areas** rather than failing or replacing them with a full spare chip. VSR accomplishes this by allowing XOR RAID stripes to be dynamically resized for distribution across fewer Flash devices. When a Flash device failure is detected, data is migrated to new stripes that do not include the failed chip or plane.

Ultimate Write Performance and Reliability

The RamSan-70 includes **19% overprovisioned space** and **11% RAID overhead** (1280 GB raw vs. 900 GB usable) on each card to deliver industry leading performance and reliability to its users. Overprovisioning is the practice of including additional space that is not presented to the user to increase write performance. Texas Memory Systems products typically have more overprovisioned space than competing products.

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