LSI
Storage. Networking. Accelerated.

Product Brief

LSI® 6Gb/s Serial Attached SCSI (SAS) Integrated RAID

Extending Its RAID and SAS Technology Leadership, LSI Introduces Its Third Generation Integrated RAID Solution

Integrated Raid Features

- Supported RAID levels
  – RAID 0, 1, 1E and 10
- Two volumes supported per controller
- 12 Integrated RAID drives supported per controller
- Two hot spares per controller
- Single virtual drive presented to the OS per IR volume
- Ability to boot from an IR volume
- Supports SAS and SATA drives
  – Drives in a volume must be the same type
- > 2 TB array support for R0, 1E, 10
- RAID 1 Online capacity expansion
- Consistency check
- Allows import of volumes created on LSI's first generation SAS controllers and maintains legacy data layouts
- High reliability and data integrity
  – Non-volatile write journaling
  – Physical disks not volatile to OS or to application software
- Hot swap capability
- Disk Data Format (DDF) compliant
- S.M.A.R.T. support
- Enclosure Management
  – LED via SGPIO
- Additional connectivity such as tape, JBOD or external storage.
- High performance
  – Low host CPU and PCI bus utilization
- Ease of use – Simple configuration utility
- No special drivers required
- Fusion-MPT™ architected

LSI's Integrated RAID is a low cost, hardware RAID solution made possible by Fusion-MPT™ architecture. Integrated RAID (IR) is a processor-based RAID solution designed for system environments requiring redundancy and high availability where a full-featured RAID implementation is not desired, or may be cost prohibitive, and does not require any special drivers. By providing RAID at the hardware level, the host CPU is off-loaded from performing RAID functions allowing for more efficient operation.

LSI's advanced IR options include Integrated Mirroring™, which is RAID 1, Integrated Mirroring Enhanced, also known as RAID 1E, Integrated Striping, RAID 0, and Integrated Mirroring and Striping, RAID 10. By simplifying the RAID configuration options, LSI can offer the Integrated RAID solution at a lower cost than a full-featured RAID implementation.

The LSI Integrated Mirroring (IM) feature simultaneously mirrors two drives which provide data protection for the system boot volume to safeguard critical information such as the operating system on servers and high performance workstations. The mirroring capability is extended to three to ten drives by the Integrated Mirroring Enhanced (IME) capability to provide fault-tolerant protection for critical data. Each mirrored stripe is written to a disk and mirrored to an adjacent disk.

LSI's write journaling feature allows for quick data recovery in the event of a failure by automatically verifying that all drives in the IM volume are synchronized and have identical data. In the event of a drive failure, an automatic resynchronization is performed, to a replacement drive, in the background while I/Os continue.

Integrated Striping (IS) is ideal for today's data intensive applications, such as video streaming and document imaging that require greater system performance and storage efficiency with reduced latency of the drives. The IS feature writes data across multiple disks instead of onto one disk. The host I/Os are split over multiple disks and the disks are presented as a single logical drive.

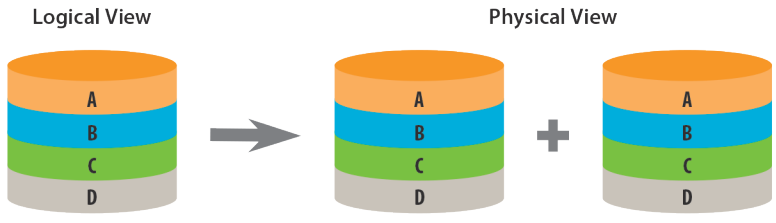

Figure 1. Integrated Mirroring (RAID 1)

Memory Requirements

- 4MB flash part for IR code
- 32KB NVSRAM for write journaling and other read/write persistent data

Supported Products

- LSISAS2004, PCI Express to 4 port 6Gb/s SAS controller
- LSISAS2008, PCI Express to 8 port 6Gb/s SAS controller

Integrated Mirroring and Striping (IMS) stripes the data across the drives for performance and all striped drives are mirrored for data protection. IMS is ideal for applications that require the fault tolerance provided by RAID 1 but need extra performance.

IM, IME, IS and IMS volumes can be configured on the same LSI SAS controller where a single volume supports up to ten drives. Two Integrated RAID volumes are supported per controller. A total of 12 RAID devices are supported between the two volumes per controller. IR also supports two additional drives that can be configured as hot spares.

Integrated RAID is easy to install and configure and meets the needs of most internal RAID requirements. Other benefits include operating system independence, support of SAS and SATA drives, and the ability to boot from an IR volume. IR also uses the same device driver as the standard LSI Fusion-MPT™ based controllers eliminating the need for special drivers, and is currently available as an optional feature on the LSI 6Gb/s SAS controllers, the LSISAS2004 and LSISAS2008.

Fusion-MPT Architecture

Fusion-MPT architecture marks the next generation of I/O architecture designed to deliver the highest performance available today while reducing time to market, integration, and certification time. Fusion-MPT devices are high performance, cost-effective protocol controllers that represent the newest system-level integration technology in intelligent I/O processors from LSI.

Fusion-MPT is based on industry standard PowerPC technology to control the system interface and the hardware assisted ports. The controller frees the host CPU for other processing tasks while maximizing overall I/O performance. The processing power of the Fusion-MPT architecture also allows for advanced embedded features such as LSI's Integrated RAID.

Fusion-MPT is a message passing architecture that provides an open programming interface for developers and has a single binary device driver. LSI provides a complete suite of industry standard operating system drivers. High performance, easy adoption, and an open programming interface allow for reduced software development, seamless integration and certification time, and reduced time to market benefits.

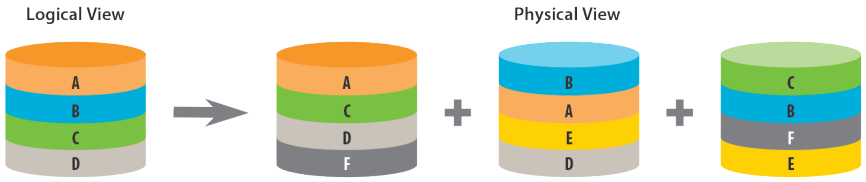

Figure 2. Integrated Mirroring Enhanced (RAID 1E)

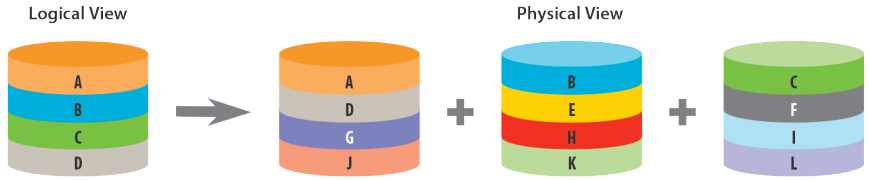

Figure 3. Integrated Striping (RAID 0)

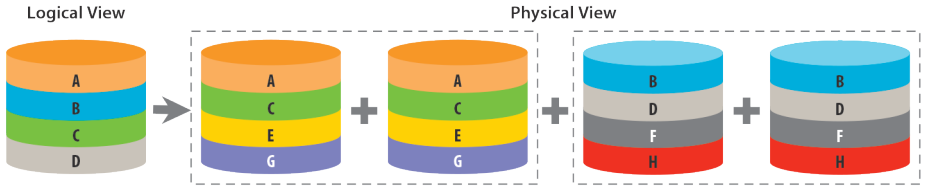

Figure 4. Integrated Mirroring and Striping (RAID 10)

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