



Case Study

Promise Technology Inc.

Intel® storage processors

RAID storage subsystems and HBAs

SAS/SATA storage solutions

**PROMISE[®]
TECHNOLOGY, INC.**

Developing SAS Solutions Using Intel® Storage Processors

Summary

Business Need

Promise Technology is developing dual-controller RAID storage systems to meet the stringent data protection requirements of customers ranging from enterprise IT organizations to small-to-mid-sized businesses (SMBs). To address customer demand for high availability, all field-replaceable units are redundant, allowing for no single point of failure. RAID 6 technology virtually eliminates the potential of user data loss—an especially critical feature in SMB environments that lack a comprehensive backup strategy. The solutions also feature a SAS back-end infrastructure that supports both SAS and SATA drives, a design feature that allows Promise's direct customers—value-added resellers and storage integrators—to adopt various price/performance combinations and address their customers' needs using the same storage enclosures.

Challenge

Promise aimed to come to market quickly with a feature set that would meet or exceed those requirements. To achieve that objective, developers sought a platform that could deliver on customers' ever-increasing demand for performance and functionality. At the same time, Promise needed a platform that would preserve the majority of its previously developed intellectual property so the company wouldn't have to spend valuable resources reinventing the wheel.

Solution

To achieve high performance for its RAID storage systems and help ensure a streamlined product development process, Promise chose the new Intel® IOP341 I/O processor. Designed to deliver performance, efficiency, reliability and flexibility, the IOP341 combines a low-power, ultra-fast 90nm Intel XScale® processor, a high-performance multi-ported memory controller and high-speed PCI Express, as well as an extra layer of data protection via Intel® Block Protection Technology.

Seizing the SAS Opportunity

The industry move toward next-generation serial technologies continues to shift into higher gear as parallel storage technologies prove increasingly inadequate for the ballooning growth in data requirements and drive capacity. Serial ATA (SATA) has effectively raised the bar on I/O performance, especially for entry-level and mid-range storage solutions, but Serial Attached SCSI (SAS) is poised to become the interface of choice wherever storage administrators place high priority on bandwidth and availability.

With attributes that include robustness, reliability and scalability, SAS promises end user benefits that have traditionally been reserved for enterprise environments. Plus, its design as a “universal” interconnect technology offers a high degree of flexibility. Support for both SAS and SATA direct-attached devices gives users and system integrators unprecedented choice to configure storage solutions in accordance with varying cost and/or application considerations.

Factors like these make SAS a compelling technology for leading storage vendors such as Promise Technology, Inc. A pioneer in ATA RAID technologies, Promise has also made its mark delivering innovative SATA storage solutions for desktop to enterprise applications, including host bus adapters, RAID controllers and external storage subsystems. Recognizing a new juncture in the storage technology industry, Promise has set its sights on developing products that effectively penetrate the SAS marketplace.

Capacity and Availability: Demand is High and Rising

Promise Technology markets a selection of external storage solutions to value-added resellers (VARs) and system integrators (SIs). The Advanced Storage Group’s target end customers span essentially all industries, but developers are looking most closely at backup solutions for digital video, video surveillance, medical imaging, government and other higher-end applications. Two requirements predominate in this marketplace: the escalating capacity needed on the customer side and the high level of compatibility demanded by specialized resellers who want to integrate storage with their solutions.

Historically, Promise has focused on developing single-controller subsystems marketed primarily as entry-level and small-business solutions. But in an effort to address the opportunity of the high-end SMB and enterprise marketplace, the company began developing a dual-controller product designed to deliver high availability for storage applications with stringent uptime requirements.

The new product design calls for all field-replaceable units to be redundant, allowing for no single point of failure, as well as a RAID 6 configuration that enables the storage subsystem to continue delivering reliable data even in the event of two disk failures. The RAID 6 functionality virtually eliminates the vulnerability of user data loss—an especially critical feature in SMB environments that lack a comprehensive backup strategy. The design also calls for a SAS back-end infrastructure with support for both SAS and SATA drives so VARs and SIs can adopt various performance/price combinations to address their customers’ needs with the same storage enclosures.

Meeting Customer Demand for Performance and Functionality

For Promise developers, the key challenge was coming to market quickly with a feature set that would meet or exceed customer requirements. To achieve that objective, they sought a platform that could deliver on customers’ ever-increasing demand for performance and functionality. At the same time, Promise needed a platform that would preserve the majority of its previously developed intellectual property (IP) so the company didn’t have to spend valuable resources reinventing the wheel.

In the past, when the Advanced Storage Group focused mainly on developing low-cost, entry-level solutions, products were designed around internally developed ASICs. But as the company’s storage systems grew more complex to address customer requirements for reliability and high availability, developers began designing products based on Intel I/O processors. Jin-Lon Hon, vice president of engineering in the Advanced Storage Group at Promise, sees a connection between the shift to Intel IOPs and the company’s marketplace growth.

“We are ahead of our industry in working with IOP development,” Hon says, adding that Promise continues to evaluate other vendors’ I/O processors but ultimately decides to stay “in lock-step” with Intel. “Intel IOPs have always offered the best price/performance and architecture that is suitable for our subsystems.”

Based on the success that Promise continues to have in developing entry-level solutions using the Intel IOP331 and IOP333 I/O processors, developers selected the new Intel IOP341 I/O processor to implement a feature set that meets market demand in its new dual-controller, high-availability storage subsystems.

“The Intel IOP family continues to provide cutting-edge technology that allows us to continue developing new IP based on the same platform,” explains Wayne Yen, senior firmware manager in the Advanced Storage Group at Promise. “We can retain and reuse 90

percent of the IP we developed previously, plus we can develop new IP because of the new technology and capabilities offered in the next generation of the Intel IOP.”

A Next-Generation IOP for a Next-Generation Storage Solution

The Intel IOP341 is a highly integrated, high-performance, system-on-a-chip I/O processor incorporating a low-power Intel XScale® processor. It provides open, full-function IOP-based RAID, including enhanced hardware acceleration for the RAID 6 feature set and the flexibility to add various types of controllers, such as Fibre Channel and SAS/SATA. The IOP341 is designed to be used in any embedded market controllers, such as hardware video accelerators and high-end networking applications.

Developers at Promise selected the IOP341 as the ideal platform for their new series of VTrak E-Class enterprise-to-SMB RAID storage systems. With an eye toward delivering enterprise features at a price that’s affordable to SMBs, Promise engineers set out to develop a family of intelligent, SAS/SATA-based 3Gb/s RAID storage systems that fundamentally change storage economics from purchase and setup to operation and upgrades. The Promise VTrak E-Class series consists of the E310f, E310s and E310i—featuring a Fibre Channel, SAS and iSCSI interface, respectively. The first E-Class product offering is due out later in 2006. Equipped with the SAS or SATA disk drives of the customer’s choice, the products are designed to provide more than 9 terabytes of high-performance storage in a fully-redundant, dual-controller, “no single point of failure” system.

Promise customers can choose the E-Class system that fits their current requirements while having the flexibility to change the interface (Fibre Channel, SAS and iSCSI) simply by changing the controllers. In addition, the VTrak E-Class solutions are designed to take maximum advantage of SATA drives for reference and high-bandwidth data applications, such as disk-based backup, document imaging and video surveillance; and SAS drives for enterprise transactional applications, such as modeling, simulation and billing. For simplified data management, businesses can easily expand SAS storage as their critical business transactions increase and migrate less-accessed data to SATA storage.

Promise Sees Benefits of Developing With Intel Storage Processors

Fast-track development is a key drawing point of Intel IOPs for Promise. Yen estimates that engineers shave six to nine months off new product time to market by using the evolving Intel IOP family because they can add new functionality based

on the same platform and reuse the bulk of Promise’s existing IP. Assuming a two-person project and a 6-to-9-month shorter development cycle, Yen says, Promise saves a quarter-million dollars—and that’s a “conservative estimate”—by avoiding a complete re-do every time engineers begin developing a new storage platform.

The continuing growth of computing power and other enhancements to Intel’s XScale offerings is another big reason why the company chooses Intel IOPs over alternative solutions.

“Intel’s XScale family of IOPs have been scaling up in terms of performance while preserving the bulk of the platform’s features,” Yen says. “That makes our transition to the newest member of the family [the IOP341] relatively smooth. Plus the XScale IOP is a stable platform, so we don’t encounter major issues during development.”

Developing with Intel IOPs also offers benefits for Promise customers, who expect to keep seeing performance gains while spending roughly the same amount of money.

“Every little advantage during a product’s development ultimately translates to value to our customer,” Yen says. “When we are able to offer products with the feature set that customers demand in a shorter time frame at lower cost, our customers will have a competitive edge over their competitors.”

Intel two-core technology also plays into Promise Technology’s longer-term product design strategy and storage solution development roadmap. Engineering VP Jin-Lon Hon says the Advanced Storage Group is developing on the single-core IOP341 today but expects to take advantage of Intel’s two-core IOP342 I/O processor in the future. He explains that the single XScale processor core is used today for the firmware to manage the disk I/O. Down the road, developers plan on devoting the second Intel XScale processor core to storage services—such as the storage application and remote metering—which will be in increasing demand as Promise ventures further into the enterprise space.

“Storage services integrated in our product is one of the functionalities that we will have to start providing our customers,” Yen says. “Intel two-core technology enables us to do that. It’s the same trend that we’re seeing in terms of customers demanding more functionality for the same dollar amount.”

A different group at Promise Technology is already moving to adopt these technologies in a related effort to penetrate the SAS marketplace. Jin Zhu, product marketing manager for the Network Storage and Server Group, says Promise is developing

SAS host bus adapters (HBAs) using the new Intel IOP348 I/O processor. The IOP348 is a next-generation storage system-on-a-chip with a low-power, high-performance Intel XScale processor for open, full-function IOP-based hardware RAID support. It integrates an I/O processor and a SAS/SATA I/O controller onto one chip, providing a flexible, efficient storage processor suited to both internal and external storage products.

Two new Promise products based on the IOP348—the SuperTrak EX1 2654 PCIe RAID 5/6 SAS/SATA 3G controller and the SuperTrak EX1 2604 PCI-X RAID 5/6 SAS/SATA 3G controller—are expected to be available by the end of 2006. As with Promise's new VTrak E-Class series of dual-controller RAID storage systems, the SuperTrak controllers are targeted to higher-end SMBs and enterprise IT environments that require high-availability solutions.

Collaborating With Intel on Storage

In the 10 years or so that Promise's Advanced Storage Group has worked with Intel IOPs, another area of advantage has repeatedly come to light: the opportunity to collaborate with Intel engineers during the development phase of new storage systems. According to Yen, the experience has been highly positive.

"Intel engineers have been knowledgeable, helpful and responsive with the technical aspects of integrating IOPs with our products," Yen says. "They have helped us look at issues that are unique to our solutions and as a result, our technical issues get resolved

promptly. When our bugs get fixed faster, that helps our schedule, and ultimately, our time to market."

Jennifer Juwono, product marketing manager for the Advanced Storage Group, says Promise also derives benefit from participating in Intel-sponsored industry events and activities, such as being a member of the Intel Storage Community and attending the Intel Developer Forum (IDF). At the most recent IDF, for example, Promise saw value in associating with other vendors serving the storage industry.

"When we are all in one place and focused in storage, we can see where the industry as a whole is moving," Juwono says, adding that seeing a number of SAS products at IDF helped confirm the company's move toward SAS product development. "IDF is also a good opportunity to see the design issues and problems that other vendors have also encountered on an engineering level."

For More Information

www.promise.com

www.intel.com

<http://developer.intel.com/design/iio>



The Intel® Storage Community is a network of technology providers that facilitate innovative modular storage solution and enable developers to accelerate time-to-market through access to a broad range of standards based building blocks. The Intel Storage Community is a resource for solutions aligned with the latest Intel silicon roadmaps, complemented by leading third-party solutions based on industry-standard architectures and form factors.

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