PROMISE®
TECHNOLOGY, INC.

It's All About Your Data

Challenges

- Today's demanding applications have little tolerance for downtime or data loss

- SATA drives are being used in applications that have more demanding availability requirements

- SATA drives lack the sophisticated error recovery commands of SCSI drives

- RAID 5 and 6--although great technologies for balancing performance, cost and capacity--are negatively affected by drive failures

Solution

- Predictive Data Migration (PDM) is a Promise unique technology that automatically and intelligently migrates data off of sick drives BEFORE the drive fails.

- Instead of using XOR to rebuild the failed drive and thereby incurring a large performance penalty on the entire solution, PDM works quietly in the background, affecting only the source and destination drives.

Results

- Drive migration using PDM is up to 5 times faster than an XOR rebuild

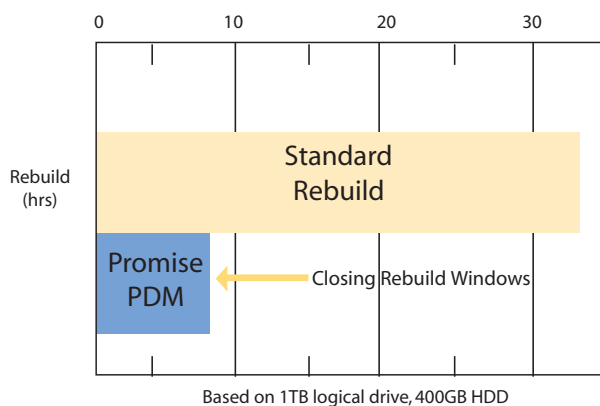- Performance of the entire storage solution is minimally affected

Predictive Data Migration
Delivers Advanced Data Protection

Overview

Predictive Data Migration (PDM) is Promise's unique technology that proactively detects possible drive failures before they could occur and migrates data to a new healthy drive. Predictive Data Migration dramatically reduces the potential for data loss as well as the likelihood of a logical drive (array) going critical.

The VTrak system monitors its hard drives for bad blocks, SMART events, and other hard drive reliability indicators. If a physical drive reaches a predetermined error threshold (becomes 'sick'), the data on the 'sick' drive is copied directly to a hot-spare drive before the sick drive fails. Since the drive is replaced in the background before it fails, the chance of data loss is dramatically reduced. Once the data is copied to the new drive, the RAID controller deactivates the sick drive, and the new drive is automatically built into the affected logical drive--with zero downtime. Thus, Predictive Data Migration prevents the logical drive from reaching a critical unprotected state and impacting data access.

Today's massive capacity hard drives and stringent data availability requirements are driving the need for more robust data protection and failure resiliency. With hard drives exceeding 500GBs in capacity and even larger drives on the horizon, the impact of a single drive failing and the resulting intensive XOR rebuild has reached the point of no return. During the rebuild process of the first failed drive, the likelihood of a second drive having an error or failing completely increases exponentially with both the size of the hard drives and the total capacity of the logical drive. With 400+GB hard drives, the amount of time required to completely rebuild a failed drive in a 12-15 drive RAID 5 logical drive is measured in days rather than hours. The longer the rebuild takes, the higher the risk to your data. In RAID 5, if you lose a second hard drive while the first one is still rebuilding, you lose 100% of your data. Even RAID 6 typically allows only two drives to fail before losing all data in the RAID set.

Based on 1TB logical drive, 400GB HDD

Waiting for a hard drive to fail and then beginning the RAID engine intensive task of rebuilding a drive using XOR is no longer an option for today's organizations.

The Solution

Predictive Data Migration eliminates the need for a complicated and time-intensive RAID XOR drive rebuild all together. Because PDM proactively monitors the health of all hard drives in the system, it activates before a drive fails and migrates data to a known healthy drive. This migration is a straight disk-to-disk copy that is many times faster and far less RAID engine intensive than a full XOR rebuild. As a result, not only is it much faster to copy data from one drive to the next, it also has minimal impact on the performance of the RAID engine and the affected logical drive.

PDM works by monitoring the following critical health indicators on every hard drive in the system:

1. Bad blocks: Number of blocks that are re-assigned. The threshold is user configurable, with the default set to 32.

2. SMART errors: As the physical drive's SMART error threshold is reached, the drive's SMART condition is set.

3. Media I/O errors: For VTrak M-Class and future products, the number of I/O errors on a physical drive is counted with a default threshold of 32. The threshold is user selectable.

4. Bad disk sectors: For earlier VTrak models, the number of bad disk sectors counted during media patrol is used instead of media I/O errors.

When any of these indicators reaches a predetermined threshold, the PDM process is automatically launched and the data is copied from the 'sick' drive onto a healthy drive in the background (if a hot spare is present). Most of the thresholds are user selectable for proactive failure prevention and analysis, and are accessible in Promise's Web-based storage management software (WebPAM PRO and WebPAM PROe) or through the Command Line Utility or Command Line Interface (CLU or CLI). WebPAM PRO and WebPAM PROe also allow the administrator to manage their VTrak systems simply and efficiently from anywhere in the world.

Predictive Data Migration is part of PerfectRAID, Promise's unique suite of data protection features built into every Promise RAID product. PerfectRAID incorporates robust data handling and error management features including write hole prevention, read check tables and SMART support. In addition, the VTrak system takes advantage of advanced PerfectRAID features including Bad Block Remapping and Media Patrol, which scan the system's drive media to ensure that even bad physical drives do not impact data availability. PerfectRAID features are carefully matched with Promise's resilient RAID engine to deliver substantial data protection.

PDM dramatically reduces the impact of drive failures. The time to migrate data from a 'sick' drive to a healthy one is up to 5 times faster than a traditional RAID 5 rebuild. A 1TB logical drive rebuild can take an average of 32 hours. With PDM, the same logical drive can be migrated in less than 7 hours.

To find out how to bring the data protection power of Promise's unique Predictive Data Migration and PerfectRAID technologies to keep your data flowing and protected, contact Promise Technology or your Promise authorized reseller today.

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