

It's All About Your Data

Technical Information:

Challenges:

- SAS/SATA drives are being used in applications that have more demanding availability requirements
- SAS/SATA drives lack the sophisticated error recovery commands of SCSI drives
- Today's demanding applications have little tolerance for downtime nor data loss
- RAID 5 and 6 although great technologies for balancing performance, cost and capacity are negatively affected by drive failures
- Drive failures always seem to happen at the worst times

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 is done in the background and only affects the source and destination drives.

Results:

- Drive migration using PDM is up to 150% faster than a XOR rebuild
- Performance of the entire storage solution is barely affected

Predictive Data Migration delivers Advanced Data Protection



**VTrak and Vess
RAID Storage Systems**



**SuperTrak Hardware IOP
RAID Controller**

Predictive Data Migration is Promise's unique technology that proactively detects possible drive failures before they 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 Management software monitors its hard drives for:

- bad blocks
- SMART events
- 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 suspect 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 sick drive is set down and the new drive is automatically built into the affected logical drive with zero downtime.

Predictive Data Migration prevents the logical drive from reaching a critical unprotected state and impacting data access. WebPAM Pro enables the administrator to manage the entire process simply and efficiently from anywhere.

The Solution

The solution is to remove the need for a complicated and time intensive RAID XOR drive rebuild altogether.

That is the purpose of PDM. Because it proactively monitors the health of all hard drives in the system it reacts before the drive fails to migrate 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. So not only it is much faster to copy data from one drive to the next but it has less impact on the performance of the RAID engine and the affected logical drive.



Predictive Data Migration dramatically reduces the impact of drive failures. The time to migrate data off of a 'sick' drive to a healthy one is up to 150% faster than a traditional RAID 5 rebuild. Average of 33 hours for a 400GB drive to rebuild, and only less than 22 hours for PDM to migrate the same drive

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

- Bad blocks (Number of blocks that are re-assigned, threshold is user configurable (1-32) Default is set to 32)
- SMART errors (DA SMART condition is set)
- Bad Sectors-the number of disk bad sectors which are scanned during media patrol is user configurable, default is set to 32.

When any or all of these reaches a predetermined threshold the PDM process is automatically launched and the data is copied off of the sick drive and onto the healthy drive in the background (if a hot spare is present).

These thresholds are preset from Promise and can also be adjusted either up or down for more or less proactive failure analysis in Promise's WebPAM Pro storage.

PerfectRAID:

Predictive Data Migration is part of Promise's unique PerfectRAID Technology!

- RAID Data Protection
- RAID Redundancy Management
- HotSpare and HotSwap Support
- Write Hole Prevention
- Read Check Tables
- Error Management
- Bad Block Remapping
- Media Patrol
- SMART Support
- Multi Dead Drive Prevention
- Predictive Data Migration

Product overview with Predictive Data Migration:



External Storage Subsystems	Number of HDDs	Rack size	RAID Level	PDM	External interface
VTrak E610f	16 SAS/SATA	3 U	0, 1, 1E, 5, 6, 10, 50, 60	Yes	FibreChannel 4 Gb/s
VTrak E310f	12 SAS/SATA	2 U	0, 1, 1E, 5, 6, 10, 50, 60	Yes	FibreChannel 4 Gb/s
VTrak E610s	16 SAS/SATA	3 U	0, 1, 1E, 5, 6, 10, 50, 60	Yes	SAS x4 (SFF8088)
VTrak E310s	12 SAS/SATA	2 U	0, 1, 1E, 5, 6, 10, 50, 60	Yes	SAS x4 (SFF8088)
VTrak M610i	16 SATA	3 U	0, 1, 1E, 5, 6, 10, 50	Yes	iSCSI
VTrak M310i/210i	12/8 SATA	2 U	0, 1, 1E, 5, 6, 10, 50	Yes	iSCSI
VTrak M610p	16 SATA	3 U	0, 1, 1E, 5, 6, 10, 50	Yes	U320 SCSI
VTrak M310p/210p	12/8 SATA	2 U	0, 1, 1E, 5, 6, 10, 50	Yes	U320 SCSI
VessRAID1x40s	16 SAS/SATA	3 U	0, 1, 5, 6, 10, 50, 60	Yes	2 x SAS x4 (SFF8088)
VessRAID1x30s	12 SAS/SATA	2 U	0, 1, 5, 6, 10, 50, 60	Yes	2 x SAS x4 (SFF8088)
VessRAID1x20s	8 SAS/SATA	2 U	0, 1, 5, 6, 10, 50, 60	Yes	2 x SAS x4 (SFF8088)
RAID Controller	SAS/SATA (ext.)	SAS/SATA (int.)			
SuperTrak EX8654	4 ports (up 116 HDDs)	4 channels	0, 1, 1E, 5, 6, 10, 50, 60	Yes	1 x SAS x4 (SFF8088)
SuperTrak EX8658	8 ports (up 232 HDDs)	no	0, 1, 1E, 5, 6, 10, 50, 60	Yes	2 x SAS x4 (SFF8088)
SuperTrak EXx650	no	4/8/16 channels	0, 1, 1E, 5, 6, 10, 50, 60	Yes	no

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