



PowerVault MD3 Storage Array Enterprise 99.999% Availability

Dell Engineering
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1 Introduction

Each year, information becomes more and more vital to a company's success. And in today's global marketplace, accessing and protecting that information 24x7 is crucial to a company's future. Designed to deliver industry leading performance and 99.999 percent data availability, the Dell PowerVault MD3 series of arrays are perfectly suited for your business critical applications.

1.1 99.999% Data Availability

Most storage systems provide a required set of high availability features such as automated IO path failover, redundant components (controllers, power supplies and fans), RAID protection, global hot spares and replicated data cache with battery backup. Differentiation comes from the additional aspects of the storage system design that can significantly improve data availability, integrity and protection. The MD3 series of arrays goes above and beyond the basic high availability features with technologies such as proactive monitoring, background repair, advanced protection and extensive diagnostic features. This unique combination of features and technologies enables the MD3 series of arrays to deliver enterprise-class 99.999 percent availability for uninterrupted access to data.

1.2 Proactive Monitoring to Identify Issues Before They Become Problems

Having a disaster recovery plan is important, but avoiding disaster should be the primary goal. RAID protects data stored on an individual disk drive in the event that the drive fails, but why wait for a failure to know the drive was having trouble? There are several ways the MD3 series of arrays monitors the "health" of a disk drive and determines when corrective actions need to be taken before the drive fails — proactively protecting your data.

Correcting unrecoverable read errors has become a seamless process for the MD3 series of arrays, and is most often occurring undetected by the application or administrator. Left unchecked, however, a drive can become degraded over time due to too many "recoveries." In most cases, drives show warning signs before failing, but not all storage systems are looking for them. In an effort to identify drives with developing reliability problems, the MD3 series of arrays offers industry-unique proactive drive health monitoring. In addition to tracking the drive-reported SMART data, the MD3 series of arrays examines every completed drive IO and tracks the rate of drive reported error and exception conditions returned by the drives (in the form of sense keys), as well as drive performance degradation often associated with unreported internal drive issues. Utilizing predictive failure analysis technology, when any error rate or degraded performance threshold is exceeded — indicating a drive is showing signs of an impending failure — the MD3 series of arrays will issue a critical alert message and take any corrective action deemed necessary and safe to protect your data. In addition to drives, the MD3 series of arrays' IO paths are continually monitored. IO paths that require abnormal retry activities are marked as degraded and IOs are discontinued down that path. The administrator is alerted to this condition and repairs can be made on the defective IO path, assuring continued availability. Additionally, performance is optimized as the controller does not spend time attempting IOs on the path that is failing.



The unique combination of features and technologies of the MD34/MD38 series of arrays provides uninterrupted access to data.

1.3 Background Operations to Detect and Repair Drive Errors

When a bad data block is discovered during a read operation, most enterprise-class storage systems use redundancy data to recreate the “lost” data on the fly. Encountering one of these uncorrectable errors during a failed-drive reconstruction, however, can be a disaster. The MD 34/38 series of arrays’ user-initiated background media scans proactively check drives for defects and initiate repairs before they can cause problems. This includes rewriting sectors that may not have been properly written, reallocating defective sectors, and finding and repairing parity inconsistencies.

1.4 Advanced Protection Features Ensure Data Integrity, Security, and Availability

When data is trusted to your storage system, protecting its integrity and security is vital. The MD3 series of arrays provides several key technologies that go above and beyond the capabilities of other offerings. For instance, the MD3 series of arrays can provide an additional level of data integrity verification by using RAID redundancy information to perform a final validation check before returning the requested information to the host application. Securing valuable data is often equally important. Disk drives will, eventually, be out of a user’s control — either through off-site service/repair, theft, or when simply trying to dispose of old drives. The MD3 series of arrays’ encryption services combines local key management and drive-level encryption for comprehensive data security that ensures data is secured throughout the drive’s lifecycle without sacrificing storage system performance or ease of use. Even with proactive monitoring, a drive can fail without warning. And when an unrecoverable media error is detected during a drive rebuild, most systems will lose all of the data on entire drive group. The MD3 series of arrays includes a patented software algorithm to limit the data loss to the stripe with the unrecoverable sectors — preserving the rest of the data on the drive. This can allow the administrator to use available application and file system tools to recover data. When this is not feasible, only the affected LUN needs to be restored from backup.

1.5 Advanced Diagnostics Enable Timely Problem Resolution

Redundant components ensure data is accessible when components fail or become degraded. The longer it takes to identify and diagnose a failure or problem, the overall storage system performance will be degraded and data availability is at risk. The MD3 series of arrays provides instant notifications of failing devices so that they can be quickly and efficiently replaced or repaired. Additionally, the MD3 series of arrays collects extensive diagnostic and statistic data to provide comprehensive fault isolation and simplify analysis of unanticipated events. Its Capture All Support Data (CASD) command provides many different diagnostic and log outputs in a single package for the support team. This ensures the support team has the information needed to resolve unanticipated issues in a timely manner.



1.6 Replication Services Are the Final Safeguard

Site disasters range in scale (from user errors to building fires), but have similar effects — data is lost. The criticality of the data dictates its recovery point objective (RPO) and recovery time objective (RTO). The MD3 series of arrays provides multiple replication options designed to protect against a range of disasters and ensure data is back online as quickly as possible. Local replication features protect against accidentally deleted files and data corruption, while remote mirrors duplicate primary-site data to an off-site location.

2 Conclusion

Uninterrupted access to information and its unwavering protection is critical to a company's success. Trusting your vital data to the Dell MD3 series of arrays storage systems ensures the highest levels of availability, integrity, and security.

