DATACENTER
STORAGE
TECHNOLOGY BY WD®

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WD DATACENTER
Storage Technology

Datacenters are building out at an incredible rate to keep up with the tremendous growth of data. A 42U storage rack may include over 900 drives, providing almost 5.4 PB of storage. A system that contains many drives needs to be specially designed with features and technologies that ensure reliability, scalability, high availability and deliver consistent levels of performance. However, some of these features and technologies create challenges for hard drives – environmental, compatibility and workload challenges.

Here is a deeper look at these challenges and an explanation of how hard drives need to be designed for enterprise-class datacenter and cloud storage environments. Needless to say, datacenters present challenging environments for hard disk drives, and therefore require a fundamentally different class of drive – an enterprise-class drive.

CHALLENGE ONE

Environment | The datacenter environment employs specialized server and storage systems containing high-speed fans, densely-packed drives and temperature fluctuations.

IT Concerns:

- High-speed fans are necessary to manage thermals but generate a wide range of vibrations

- Densely-packed drives induce vibration on each other, potentially causing system-level performance degradation

- Redundant power supplies reflect the multiple fail-over technologies that ensure 24/7 operation

- Datacenter geographical location and cooling solutions vary, creating temperature and altitude extremes

WD's Solution: A storage portfolio built to withstand harsh datacenter conditions.

- RAFF + tied shaft motors are designed to compensate for multi-drive enclosures while ensuring consistent levels of performance

- Higher quality components - designed for 24/7/365 operation (8,760 power-on hours per year)

- Support for a wide range of temperature and altitude ratings

CHALLENGE TWO

Workload | Datacenter and cloud storage systems use a wide variety of operating systems and applications that need to work flawlessly with their chosen device. Workloads are typically ten times greater than the workload of desktop or notebook computers and the storage devices must be able to handle workload-intensive applications 24 hours a day, 365 days a year.

IT Concerns:

- Applications have varying workloads – heavy reads or writes, sequential or random performance, low latency

- Some datacenter applications require 100% workload, 24 hours per day, 365 days per year

- OEMs are typically not aware of the types of workloads being employed on systems they sell

WD's Solution: Purpose-built storage devices that have undergone millions of hours of testing in different systems running various workloads.

- Higher RPM models for performance demanding applications

- Products are designed for 8,760 power-on hours per year, reading and writing continuously

- Massive testing – actual systems, actual workloads

- Specialized manufacturing and test processes

CHALLENGE THREE

Compatibility | Datacenters require different host bus adapters and fault-tolerance schemes like RAID and replication to ensure maximum performance, manageability and availability of a large amount of storage space.

IT Concerns:

- RAID-based arrays demand high performance, tight performance variation, high error tolerance, and multiple interface options

- Replication-based systems deliver high levels of data availability vs.traditional RAID and can tolerate lower reliability and lower performing devices

- IT managers require interoperability across a wide range of host bus adapters that are deployed within their datacenters

WD's Solution: Storage devices that work flawlessly with hundreds of different controllers in both RAID and replication arrays.

- Higher error tolerances, tight performance variation, and extensive validation in RAID systems

- Broad HBA compatibility including functional and signal-integrity testing also tuned and optimized for system interoperability

CHALLENGE FOUR

Total Cost of Ownership | Large-scale datacenters are expensive to operate. IT managers are confronted with the challenge of continuously expanding the infrastructure to keep up with the massive growth of data. Operating expenses are becoming a larger percentage of overall Total Cost of Ownership, bringing considerations like power efficiency and application-matched storage attributes to the center of many critical discussions and decisions.

IT Concerns:

- IT managers must continue to expand storage capacity with budgets that can't grow as fast

- Datacenter applications vary in terms of performance needs, capacity demands, and footprint

- Datacenter architectures must be tiered further to strip costs where possible; need storage devices that can work in different tiers

WD's Solution: Application-specific storage devices that deliver the right mix of performance, power-efficiency, cost-efficiency and robustness to meet the needs of different application intensities.

- Performance-optimized devices for the most demanding high-workload applications

- Power-optimized devices for large-scale datacenters with limited power budgets

- Cost-per-terabyte optimized devices for cold-storage applications to minimize data footprint and costs

- Lower-cost performance-optimized solutions for low-scale entry-level enterprise applications

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WD's datacenter hard drives are built to run in always-on environments where they are required to maintain maximum performance and data integrity within complex systems running massive scale applications.

In addition to overall performance and reliability, these drives feature additional attributes that are unique to enterprise-class hard drives for datacenter deployments:

- Cleanliness
- Error Rate
- Drive to Drive Variation Linear and Radial Vibration

- Performance Degradation
- Number of Mapped Defects, Defects per Surface

- Head Amplitude, Track Width
- Tracks per Disk
- Robust Factory Process and Procedures

From multiple processors and redundant power supplies to specialized storage devices and high-availability technologies such as RAID, datacenters demand the highest quality and most reliable components to ensure maximum uptime, expandability and data integrity.

Through fundamental enterprise-class design, specialized features and technologies and rigorous manufacturing and test processes, WD delivers the right storage for the modern datacenter.

Capacity Storage
for the Modern Datacenter