HIGH-PERFORMANCE STORAGE FOR DISCOVERY THAT SOARS
OVERVIEW

When storage demands and budget constraints collide, discovery suffers. And it’s a growing problem. Driven by ever-increasing performance and capacity requirements, storage is expected to account for 21 percent of high-performance computing (HPC) budgets by 2021. That’s up from just 10 percent in 2008.

As storage annexes more of the budget, it leaves less for the tools of real problem solving — compute, staff, and applications. When that happens, your ability to make rapid, meaningful discoveries erodes.

Reverse the storage budget creep with Cray® ClusterStor® high-performance storage solutions.

ClusterStor systems give you industry-leading performance, speed, scalability, data protection, and availability sized and configured for your requirements and budget. Additionally, built-in energy efficiencies, a small datacenter footprint, easy installation — and a range of expert Cray service and support options — mean you maximize your investment without increasing your investment.
MORE PERFORMANCE, BETTER ROI

STORAGE FOR EVERY NEED

GET THE HIGHEST-PERFORMING, MOST EFFICIENT DATA STORAGE PLATFORM ON THE MARKET MATCHED TO YOUR REQUIREMENTS
Three Storage Solutions, Zero Challenges

ClusterStor L300 All-HDD Lustre® Storage System
Achieves performance requirements with the lowest number of components by getting the maximum amount of performance from each storage device. Ideal for large, sequential I/O workloads.

ClusterStor L300N Hybrid (SSD/HDD) Storage System
Enabled by NXD flash acceleration software to cost-effectively solve the mixed I/O challenge while shielding the application, file system, and users from complexity.

ClusterStor L300F Flash Hybrid Storage System
The ability to add a flash storage pool creates a truly hybrid system.

Who’s Using ClusterStor Storage?

- 8 of the top 20 supercomputers — twice as many as the next vendor
- 6 out of 7 global oil and gas supermajors
- 8 out of the world’s top 9 weather centers
- Over 80 universities, national labs and multinational companies worldwide
MORE PERFORMANCE, BETTER ROI
ClusterStor gives you enterprise-level performance with more capacity, fewer drives, less need for IT support and more data access. It supports the industry’s fastest HPC-sustained throughput at 1.7 TB/s with data capacity over 80 PB.

TIME AND MONEY SAVED
The ClusterStor system is designed for efficiency, with minimal components and efficient data flow. We build each system to your requirements so you don’t waste time or money on technology you don’t need.

BUSINESS-BOOSTING INSIGHTS
Faster discovery is a competitive advantage. The ClusterStor system speeds your time to insight by minimizing maintenance, performance gaps and mixed-workload I/O issues. It scales up to 100 PB with no loss of efficiency or performance.

THE CLUSTERSTOR DIFFERENCE
We run rigorous component, system, and manufacturing test cycles to ensure excellent system-level integration and device-level reliability. Storage enclosures feature “cluster in a box” integration of dual high-availability object storage, metadata, and management servers, monitored by the ClusterStor Manager software stack — a single management system for both hardware and software.

This component-level approach creates modular building blocks for granular performance and capacity scalability. Its design reduces setup to production time and optimizes system availability and efficiency.
CRAY CLUSTERSTOR L300
The ClusterStor L300 all-HDD Lustre storage solution is optimized to deliver the level of performance you need with the smallest possible number of disks, enclosures, and racks. This complete rack-scale solution delivers dense performance, accessible data, and actionable insights.

It’s a good choice for environments running several applications with large, sequential I/O workloads.

CRAY CLUSTERSTOR L300N
ClusterStor L300N hybrid SSD/HDD storage with our flash-accelerated NXD software minimizes the unpredictable application performance caused by mixed I/O patterns. It selectively routes I/O and uses transparent flash acceleration to shield the application, file system and users from complexity.

It’s your best value for mixed I/O workload performance.

CRAY CLUSTERSTOR L300F
Our ClusterStor L300F model allows you to add a flash storage pool, creating a truly hybrid system. It’s optimized to overcome the latency experienced by rotating media — the remaining IOPS bottleneck for Lustre.

Unlike other flash solutions, the ClusterStor Lustre-based L300F system requires no specialized training, tuning or benchmarking.

Lustre users with high IOPS needs can dramatically reduce the run times of their applications, resulting in more iterations and faster time to insight.

CRAY® VIEW FOR CLUSTERSTOR® MAKES YOUR STORAGE EXPERIENCE EVEN EASIER
Cray View for ClusterStor is the industry’s first complete Lustre® storage performance analysis application. With always-on metrics you can maximize your resources, optimize system throughput, and provide users with the best results — without impacting performance. All the information you need is right there at your fingertips, in a single view:

- **Job Runtime Variability:** Real-time and historical views of data to help you understand what’s impacting user jobs
- **Event Correlation:** A unified system view so you can correlate events that impact performance
- **Trend Analysis:** Data-driven visualization and analysis of historical data helps for identifying trends and shaping changes to the system
- **Alerting:** Threshold engine enables customized alerts on any metric
## CRAY® CLUSTERSTOR® SPECIFICATIONS

<table>
<thead>
<tr>
<th><strong>FILE SYSTEM CAPACITY (RAW)</strong></th>
<th>Up to 4,920 TB per base rack using 10 TB SAS HDDs; up to 5,740 TB per expansion rack using 10 TB SAS HDDs</th>
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<tbody>
<tr>
<td><strong>SCALABLE STORAGE UNIT (SSU)</strong></td>
<td>Up to 6 L300/L300N in the first rack in a system (base); up to 7 L300/L300N in the second/subsequent racks (storage base racks) Up to 16 L300F in any rack in a system (base &amp; storage base racks) Intermix of SSU types within a rack is configuration dependent; contact Cray for configuration rules</td>
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<tr>
<td><strong>OBJECT STORAGE SERVERS</strong></td>
<td>Up to 12 in base rack (first); up to 14 in storage expansion racks (second and greater)</td>
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<td><strong>META DATA MANAGEMENT UNIT (MMU)</strong></td>
<td>Base configuration: high-availability server pair; 2U24 drive enclosure Expansion option: up to 8 2U24 MMUs configured with the Lustre® 2.5 Distributed Namespace functionality</td>
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<tr>
<td><strong>SYSTEM MANAGEMENT UNIT (SMU)</strong></td>
<td>High-availability server pair; 2U24 drive enclosure</td>
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<td><strong>CLIENT NETWORK ACCESS</strong></td>
<td>InfiniBand™ EDR, FDR, QDR; Ethernet 40/100, Intel® Omni-Path</td>
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<td><strong>MANAGEMENT NETWORK</strong></td>
<td>1 Gigabit Ethernet (dual management network with high-availability failover)</td>
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<td><strong>FILE SYSTEM</strong></td>
<td>Lustre 2.7 + supported enhancements</td>
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<td><strong>MAXIMUM NODES</strong></td>
<td>Lustre 2.7 - up to 16 billion (requires optional distributed namespace servers)</td>
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<td><strong>SSU DRIVE CONFIGURATION</strong></td>
<td>L300: 2 SSDs, RAID 1, 1+1, 82 HDDs, 3.5” 7.2K RPM with ClusterStor GridRAID L300N: 2 SSDs, 3.2 TB, 10 DWPD, RAID 1, 1+1; 82 HDDs, 3.5” 7.2K RPM or 82 HDDs 3.5” 10K RPM with ClusterStor GridRAID L300F: 24 SSDs, 1.6 TB / 3.2 TB, RAID 10</td>
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<tr>
<td><strong>EXPANSION STORAGE UNIT CONFIGURATION</strong></td>
<td>82 HDDs, 3.5” 7.2K RPM with ClusterStor GridRAID</td>
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<td><strong>MMU CONFIGURATION</strong></td>
<td>22 HDDs, 2.5” 10K RPM, 5+5</td>
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<tr>
<td><strong>SMU CONFIGURATION</strong></td>
<td>7 HDDs, 2.5” 10K RPM, 1+1 &amp; 2+2, 1 spare, 5 HDDs, 2.5” 15K RPM, 1+1 x2, 1 spare</td>
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