

CRAY HPC STORAGE SOLUTION FOR MANUFACTURING



High performance computing (HPC) plays a critical role in transforming manufacturing by accelerating innovation and establishing a competitive advantage. Consider this: 40 years ago airplane design was typically done by manually drawing the blueprints and laborious physical tests. New generations of airplanes often took years to come to the market. Today, most aerospace design work is done with simulation software such as CAE and CFD applications. This is possible thanks to the maturity of the modeling software, as well as the availability of HPC compute and storage systems that can run those parallel applications effectively.

For example, CFD is being used in almost every part of modern airplane design, from the tail to wing to the head cabin. Such transformations have not only reduced the overall design cycle and modeling costs dramatically, but they also made new generations of airplanes faster, more stable and more energy efficient. The transition from expensive, time consuming physical prototyping to virtual design is common in nearly every industry – from automotive, aerospace, construction to consumer goods. All are adopting the same approach to shorten the design cycle, reduce costs, and create innovative products never before possible.

KEY BENEFITS

FASTER TIME TO MARKET

Reduce product design cycle and bring innovations to market faster through Cray's end-to-end, performance optimized HPC storage solution – ClusterStor™ storage systems

IMPROVED OPERATIONAL EFFICIENCY

Achieve the highest performance efficiency and mixed workload acceleration with a purpose-engineered, integrated storage solution

REDUCED TOTAL COST

High efficiency and easy management reduces TCO by requiring less hardware, utility consumption and overhead

Problem

The growing adoption of virtual prototyping is made possible through the availability of HPC technologies. Today, HPC is indispensable in manufacturing. However, those enabling technologies, which themselves can be extremely complex and intricate, can hit limitations if they are not architected properly.

One of the biggest challenges in maintaining the sustained performance of the simulation applications as they grow in scale is the bottleneck caused by storage I/O. Legacy storage solutions relying on NAS-based technology may have coped with small datasets, however this serial I/O approach simply can't keep up with the speed of the compute clusters and the massive datasets generated by advanced simulations in modern manufacturing workflows.

Some large manufacturers turned to the first generation of parallel storage systems. However, these solutions have proven difficult to deploy, manage, and are extremely inefficient with storage utilization. In order to obtain the desired performance, HPC users have to buy additional expensive hardware, which leads to increased capital and operating expenditures.

As HPC is being adopted by more business units across the geographical regions within an organization, a storage solution needs to be able to effectively manage multiple user access and address different workload requirements to meet the optimal service level agreement. To stay innovative while maintaining operational efficiency, HPC users in manufacturing increasingly request a storage solution that can deliver the highest efficiency on all fronts, including performance, capacity, management, power and cooling consumption.

Solution

To address all of the above, Cray® ClusterStor™ storage systems are purpose-engineered, performance-optimized HPC storage solutions designed from the device level up by one company. This complete integration provides the performance, capacity and efficiency needed to tackle manufacturing's toughest storage challenges.

Performance & Efficiency: By improving efficiency and optimizing the entire system, demanding CFD and CAE applications can expect a performance boost. ClusterStor storage systems enable 80 percent of the raw performance from the underlying media which is unmatched by any other system available in the industry.

As needs grow, ClusterStor systems easily scale to meet demands without losing efficiency or increasing management costs.

I/O Bottlenecks & Mixed Workloads: In companies that rely on NAS or first-generation parallel storage architectures, I/O bottlenecks are a regular occurrence, particularly when they involve CAE and CFD applications. NAS and NFS-based file systems lack the scalability and performance needed to solve those bottlenecks. The ClusterStor with Lustre® solution is designed to provide actionable insights and enable data-intensive simulations.

To reduce the management burden while ensuring optimal application performance in a mixed workload environment, the ClusterStor L300N solution accelerates mixed I/Os on the same platform by monitoring and directing those small, random workloads to flash media and large, sequential I/O jobs to the disk storage automatically via the Intelligent I/O Manager integrated in the system. Unlike the traditional burst buffer approach, which requires either a separate file system tier or proprietary client software, the ClusterStor Intelligent I/O Manager is based on a high availability architecture and manages the different storage tiers transparently within the same file system.

Faster Time to Market: The tightly integrated, performance-optimized design of ClusterStor Storage Systems accelerates both traditional HPC and a new generation of data-intensive manufacturing workflows, which enables faster innovation, product design and virtual prototyping & testing. Cray is the only storage vendor who can deliver an end-to-end solution that is purpose-engineered, rigorously tested, and performance optimized to meet the most demanding storage needs for manufacturing.

Higher Operational Efficiency: ClusterStor storage systems maximize the performance efficiency offering users better performance with smaller hardware deployments and fewer management headaches. Manufacturers can fully exploit a hybrid storage environment by supporting mixed I/O

workloads on the same platform.

Reduced TCO: With superior efficiency and a smaller hardware footprint comes less complexity and reduced power, cooling and floor space costs. ClusterStor storage solutions help manufacturers achieve reduced total cost of ownership, including both capital and operating expenditures, without

CRAY® CLUSTERSTOR™ AT A GLANCE

ClusterStor storage systems are built on Cray's robust enterprise-class storage designs from the device level up. Powered by industry-leading parallel file systems including Lustre®, ClusterStor storage systems help customers accelerate their most demanding data-intensive workloads at scale.



WHAT MAKES CLUSTERSTOR™ DIFFERENT

- **An award-winning**, complete product portfolio including the industry's highest performing, scale-out parallel storage systems, systems supporting mixed workloads, and performance optimized, cost-effective archive systems
- **A truly integrated**, purpose-engineered storage solution capable of delivering optimal performance efficiency, high level reliability, availability and serviceability
- **Removes complexities** associated with HPC environments with a smaller storage footprint
- **Accelerate** mixed I/O workloads in a hybrid storage environment with minimum management complexity
- **Supported by** Cray

CRAY® CLUSTERSTOR™ SOLUTIONS

Learn more about ClusterStor at www.cray.com/products/storage/clusterstor

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