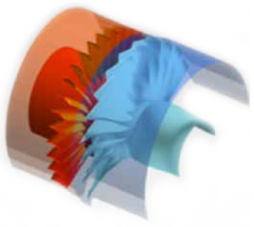
PANASAS® ACTIVESTOR® AND ANSYS

Parallel Storage Accelerates Simulation Performance

The combination of scalable ANSYS design and simulation software and HPC clusters with Panasas parallel storage has demonstrated new and significant productivity advantages for workflows in computer aided engineering (CAE) applications. The combination provides dramatic cost-performance improvements and speeds time-to-results for engineering simulation solutions on commodity HPC clusters.



FEATURES AND BENEFITS

PANASAS® DIRECTFLOW™ PROTOCOL

Maximizes Performance
Parallel I/O enables faster simulations.

Maximizes Productivity
Drives ANSYS efficiency with increased job throughput and scalability

UNIFIED STORAGE INFRASTRUCTURE

Empowers Collaboration
Engineers can speed-up collaboration tasks of pre- and post-processing because of shared data and storage for all platforms.

SINGLE GLOBAL NAMESPACE

Reduces IT Overhead
Simplifies storage and data management to streamline storage administration and provide seamless scalability as ANSYS model sizes and numbers of jobs grow.

NFS AND CIFS SUPPORT

Easy to Integrate
Supports heterogeneous CAE environments with Linux, Unix, or Windows.

The Panasas and ANSYS alliance with joint engineering collaboration ensures that ANSYS technology and its user community achieve their ongoing CAE simulation, engineering and business objectives. Companies that deploy ANSYS applications and HPC clusters for high-fidelity CFD and FEA simulations, design optimization, fluid-structure coupling, and other complex requirements can be more productive, more profitable and attain greater market leadership when they deploy an ANSYS and Panasas solution.

I/O BOTTLENECKS IN THE CAE WORKFLOW

CAE models have become more sophisticated, requiring the use of HPC clusters for parallel processing and ever-increasing volumes of storage to achieve results in a timely manner. As organizations rapidly expand their cluster deployments, many encounter I/O bottlenecks when using legacy network attached storage (NAS) architectures.

Few legacy NAS systems provide the scalability required today for effective I/O performance in parallel CAE simulations. Panasas parallel storage is the leading solution of parallel, scale-out NAS, meeting the most advanced and I/O demanding CAE challenges. Examples include high-fidelity transient CFD, large eddy simulation (LES), aero-coustics, large DOF structural dynamic response, parameterized non-deterministic CAE simulations for design optimization, and the coupling of CAE disciplines such as fluid-structure interaction (FSI).

> "Panasas ActiveStor dramatically improves the performance and scalability of our CAE solutions. Our partnership with Panasas makes it easier for our customers to design better products, faster."

Barbara Hutchings,
Director, Strategic Partnerships

CAE workflows are overburdened with lost productivity when engineers and scientists must wait for serial I/O operations and large file transfers to complete. Further, as simulation and workflow performance degrades, so does CAE analyst efficiency and effective workgroup collaboration. Panasas parallel storage eliminates the I/O bottlenecks with a cost-saving solution that restores productivity and drives analyst creativity.

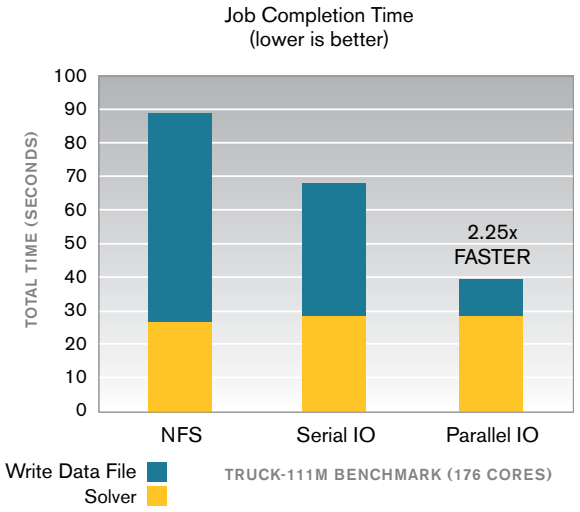
ANSYS FLUENT AND PARALLEL I/O

ANSYS Fluent fluid dynamics software leverages parallel I/O based on MPI-IO under the MPI-2 standard. This enables Fluent scalability for even the heaviest I/O applications, including large steady state models with frequent checkpoints, and more challenging transient CFD models that can require 100 solution writes per simulation or more.

ANSYS Fluent was initially designed for traditional NAS systems, with read and write I/O requests handled serially. When run in an HPC compute cluster, in serial mode, calculations are processed by multiple nodes, but all I/O requests are managed by a single compute node. The Panasas ActiveStor system will provide better performance [than legacy NAS systems] even in serial mode due to the parallel file system on the back-end. However, parallel I/O mode enabled within Fluent, in partnership with Panasas, processes I/O requests from all compute nodes taking full advantage of the Panasas parallel file system and dramatically increases throughput and application performance.

PANASAS IMPROVED PRODUCTIVITY

Panasas® ActiveStor® dramatically improves time to market, taking full advantage of multi-core processing. In the example shown above, the simulation that ran over 90 seconds using traditional NAS, took only 66 seconds using Panasas storage in serial mode, and less than 40 seconds using Panasas storage with ANSYS Fluent configured for parallel I/O access—2.25 times faster overall. The calculation time (Solver), shown in blue, ran in the same time, but the time to write the data files was reduced by 80%, cutting the total time to complete the simulation by more than half. Panasas parallel storage allows customers to take full advantage of their compute clusters—improving productivity and speeding time to results.



ACTIVESTOR PARALLEL STORAGE

ActiveStor parallel storage architecture combines key advantages of legacy NAS, yet eliminates the drawbacks that have made them unsuitable for large simulation jobs and distributed clusters. ActiveStor storage offers high-performance access to disk, and the benefits of shared files and metadata. Just as clusters are designed to distribute computational work evenly across compute nodes, ActiveStor parallel storage distributes data evenly across storage devices for shared parallel data access between cluster nodes and the parallel file system.

ACCELERATE ANSYS FLUENT PERFORMANCE

Panasas ActiveStor dramatically improves throughput, taking full advantage of multi-core processing. In the sample simulation shown above, the throughput using legacy serial NAS (over NFS) was 229 MB per second. The same simulation run on Panasas storage increased throughput to 387 MB per second (69% faster) and when run using parallel access mode in the ANSYS software increased to 1183 MB per second (over 4 times faster).

PANASAS STORAGE DELIVERS:

- Faster simulation results
- Reduced project time
- Improved user productivity

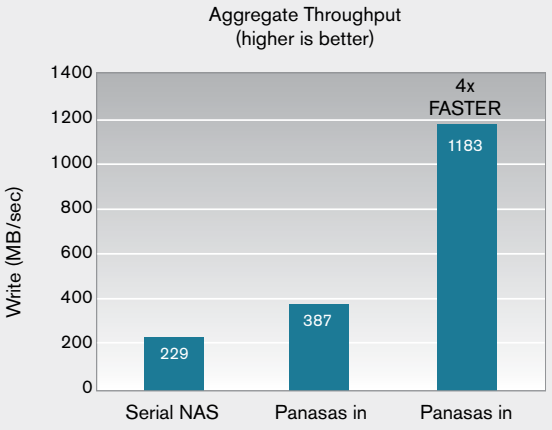
BENCHMARK PLATFORM

Application: ANSYS Fluent 14.0. Truck-111m benchmark

CPU: 24 GB memory Mellanox Technologies MT26428 (ConnectX IB QDR)

Cluster: 2340 cores; 24 nodes Intel Westmere

Storage File System: Panasas ActiveStor 12/PanFS, 4 shelves, 160 TB capacity



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