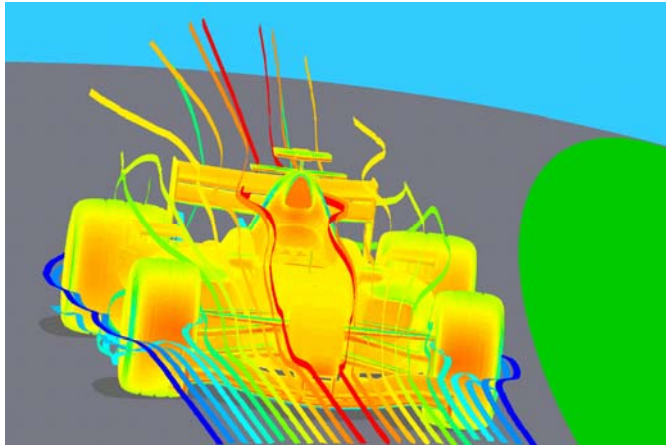


Case Study

Voltaire Provides Key Component for FLUENT® Simulations

Flow-Modeling Simulations Run Fast and Reliably Across Voltaire InfiniBand™ Switch



FLUENT Background

ANSYS, Inc. (NASDAQ: ANSS), a global innovator of simulation software and technologies designed to optimize product development processes. Its FLUENT software — developed by wholly owned subsidiary Fluent Inc.— is used for simulation, visualization and prediction of fluid flow, heat and mass transfer, and chemical reactions. It is a vital part of the computer-aided engineering (CAE) process for companies around the world and is deployed in nearly every manufacturing industry. Using FLUENT software, product development, design and research engineers build virtual prototypes and simulate the performance of proposed and existing designs, allowing them to improve design quality while reducing cost and speeding time to market.

Customers typically use FLUENT software on their own computing resources, often a cluster system that allows the outstanding parallel processing of FLUENT to reduce the turnaround time for results. Typical cluster configurations for FLUENT simulations include 32 to 64 CPUs, and even larger clusters can be required for faster turnaround on complex simulations. In addition to deploying internal resources, customers can turn to engineering consultants at ANSYS, Inc. who perform simulations on high-performance computing (HPC) systems

The Challenge

In order to impact engineering decision-making, simulations that use FLUENT need to be completed fast. If a simulation system can't come up with answers to an engineering problem quickly, it's often too late to do anything about the problem in the field. Typically, answers are needed within days or weeks, and multiple design options need to be considered. This implies a critical need to deploy FLUENT software on the top-performing HPC systems available.

When clusters are used as the HPC solution, the interconnect and switch technology are critical components in the cluster performance. These technologies must be tested for compatibility with FLUENT software to ensure that the simulations on the system will run robustly and error-free. Checking compatibility and tuning for high performance is an important focus for ANSYS staff during the software development cycle.

Key Performance Results For FLUENT Software Powered By Voltaire's GridSwitch™ 9024 InfiniBand Solution:

- ▶ Robust: Tested solution ensures that FLUENT flow-modeling software simulations consistently run to completion.
- ▶ Fast: Simulation results are available in time to impact engineering decision-making.
- ▶ Scalable: Cluster size can be scaled without communication bottlenecks.

Integrated Applications and Hardware Components on the ANSYS Cluster – Powered By Two Voltaire Grid Switch ISR 9024s:

- ▶ Linux® — Novell SUSE Enterprise Version SLES9
- ▶ FLUENT flow modeling software
- ▶ OpenFabrics(Open IB)
- ▶ Servers from Appro International
- ▶ Nodes: 40
- ▶ Cores: 160 – AMD Opteron™
- ▶ Message passing software: HP-MPI

Case Study:

The FLUENT Cluster — Powered By Voltaire

ANSYS maintains a range of HPC clusters used for software development and testing as well as for support of customers. Recently, the company's engineering consultants at subsidiary Fluent Inc. needed to expand cluster capacity to run simulations for a customer who had critical requirements for rapid turnaround. "Our customers sometimes turn to us to when their simulation requirements exceed the capacity of their internal HPC resources," said Barbara Hutchings, who coordinates partnerships at ANSYS, Inc. "We can deploy a cluster and begin producing results within a very short time, while it might take our customers significantly longer to procure and deploy the same HPC capacity."

To respond to the customer's engineering challenge, the ANSYS team decided to build a cluster utilizing an InfiniBand switch and OpenFabrics software. "Knowing the critical role that the switch plays in the performance of the cluster, we felt that an InfiniBand switch would provide great performance," said Hutchings. "And given our positive experience of working with Voltaire during software development and testing, we decided that a Voltaire solution for the switch made sense." Because of good previous experience using FLUENT software on Voltaire's high-speed, InfiniBand switches, ANSYS had confidence that the cluster configuration would be stable and robust, and it would deliver outstanding performance.

Voltaire recommended that ANSYS deploy two Grid Switch ISR 9024s, which provide high-performance, low-latency and fully non-blocking throughput for high-performance computing clusters and grids. The switches offer bandwidth up to 960 Gbps via two dozen 20- or 10-Gbps ports in a 1U chassis. In addition to working with the OpenFabrics stack, the Voltaire switches running FLUENT software also work well with the Message Passing Interface (MPI) software layers used by FLUENT, such as HP-MPI, MVAPICH and Intel[®]-MPI.

"We knew the Voltaire switches would provide the low latency performance we needed to run our customer's simulations in an acceptable time frame," Hutchings said. "But the key to the deployment was the ability of the switches to integrate easily with OpenFabrics and the FLUENT software drivers. That ensured that these critical simulations could get started immediately and would run error-free."

The decision to deploy Voltaire switches also was based on the consistent support ANSYS has received from Voltaire during the software development process. "When we need to work out problems, Voltaire responds immediately, and their relationship with other hardware vendors and software partners allow them to get to the root of any issues fast and effectively," Hutchings said.

The Customer Solution

ANSYS deployed the new cluster for its customer, powered by the two Voltaire Grid Switch ISR 9024s, within four days. The cluster performance was impressive. "The cluster was a solid performer, delivering the HPC horsepower we needed to get simulation results back to the customer in time to impact their engineering decision-making," said Hutchings.

Computer-aided engineering using FLUENT software on high-performance clusters can address critical business needs for ANSYS customers. Simulation offers an alternative to time-consuming and costly experiments or field measurements. In addition, simulation can provide more detailed insight into engineering issues and help eliminate problems that would cost money to address.

For More Information

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