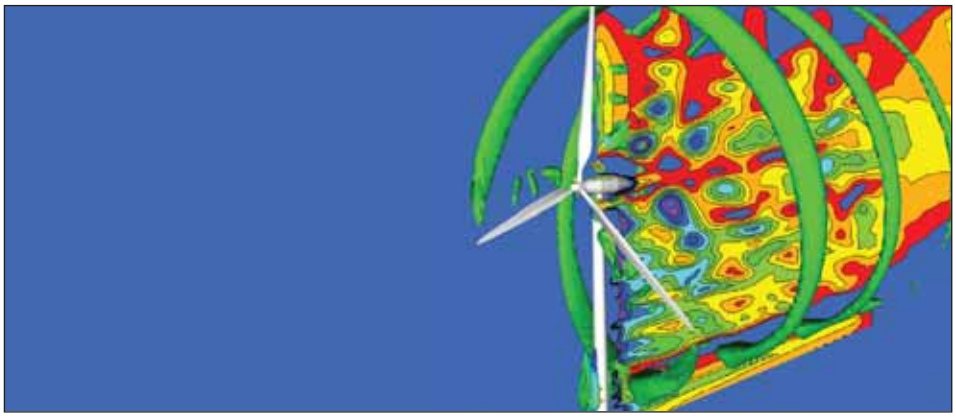
Solutions Brief

Visual Area Networking



Wind turbine image courtesy of AdvantageCFD

Saving Time and Costs with Remote Visualization for CAE

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- Mark Taylor, Senior CFD Engineer, McLaren Racing

Manufacturers rely increasingly on CAE to improve product design and quality. CAE simulations allow engineers to evaluate the effects of mechanical and thermal stress, vibration, impact loading, fluid-induced pressure, and many complex physical phenomena on potential designs while avoiding costly and time-consuming physical prototypes.

Visualization technology is critical to the understanding of a CAE simulation and well established as a tool that can improve product quality, reduce process costs, and move products to market more quickly. Visual Area Networking (VAN) solutions from SGI further enhance the power of CAE with remote visualization capabilities and by enabling collaborative environments in which cross-disciplinary teams can meet to review and visually interact with complex CAE results, improving design quality and cutting the development cycle by hours or even days. As the size and fidelity of CAE models continue to increase, and the industry advances toward multidiscipline simulations, VAN offers a highly cost-effective solution for large-scale visualization, for both current and future demands.

Challenge: Data Explosion

Ever increasing size and resolution demanded by CAE post-processing—over a terabyte, in some cases—require hundreds of gigabytes of memory and terabytes of disk space to effectively analyze and interact with these data sets. Desktop workstations are becoming inadequate and engineers are struggling to overcome system limitations with a variety of compromises and workarounds. And to provide high-performance graphics hardware to every engineer who occasionally needs access to such systems is cost-prohibitive.

Solution: Visual Area Networking

SGI has developed VAN to address the growing challenge with solutions that are powerful yet cost-effective. These solutions combine the large-data-manipulation and visualization power of Silicon

"With VAN, we can bring the compute and visualization power of our SGI visualization system directly to our engineers' desktops. Our engineers no longer require expensive desktop systems to do their work, and the quality of the output, even on a laptop system, is sufficient to allow us to use visualization regularly in meetings and design reviews, thus improving productivity."

- Iain Gibb, Manager, MSX International

Crash image courtesy of National Crash Analysis Center

Graphics Prism™ family of advanced visualization systems with the interactive remote access and collaboration capabilities of SGI® OpenGL Vizserver™ software and deliver them in a compact, departmental-friendly form over standard corporate networks. Without leaving their work spaces, designers and engineers can post-process models of virtually any size—from massive structural analysis models to time-accurate CFD simulations—on their PCs, laptops and workstations.

Seamlessly Integrated Solution for Enhancing CAE Workflow

Silicon Graphics Prism system-based VAN solutions use the SGI® NUMAflex™ architecture and offer high-performance computing (HPC) capabilities in addition to visualization power. These systems can act as departmental compute servers during nights and weekends, reducing the need for additional dedicated computational resources. Silicon Graphics Prism systems are also full members in SGI® SAN environments that eliminate data copying between compute, storage, and visualization systems within the same compute environment. This allows results generated on HPC servers and clusters

like Linux® OS-based SGI® Altix® to be visualized anywhere in an organization without time-consuming data copying between systems. VAN also eliminates data copying from centralized data servers to end-user workstations by delivering a stream of images representing the 3D visualization to user's desktops over standard local area networks or wide area networks.

"The big step forward is that our CFD engineers can now really focus their efforts on getting the geometry right, and then on results," says Mark Taylor, Senior CFD Engineer, McLaren Racing. "We estimate that by automating much of the process in-between, SGI has been able to speed up work involving our full car model many fold. That's of enormous value, because it makes the engineer available for the next design or improvement, and means there's more coming from the CFD group to increase the performance of the car. The fact that SGI has the detailed hardware and software expertise to deliver such a powerful solution really has contributed to this."

Benefits of VAN

An immediate enhancement in problem-solving power. There is no learning curve. Engineers can use standard off-the-shelf applications and existing CAE framework to post-process CAE models.

Reduced IT costs through shared resources. High-level compute, I/O, and visualization capabilities can be accessed from any desktop, laptop, or wireless system anywhere, anytime. The Silicon Graphics Prism system can support many users and serve as an HPC compute resource at other times.

Huge time savings. Users have direct access to the data. Hours-long copying and download waits are eliminated. This is an immense time-saver, cutting cycle times by weeks or months.

Faster decision-making through enhanced collaboration. SGI VAN solutions enable users at widely separated and remote locations to share applications interactively. Domain experts can work with multiple teams within a single day. Virtual teams can function globally without excessive travel.

Streamlined data management. Because data and software applications reside in a single location, system configuration management, software version control, and security are greatly simplified. Storage and management costs can be significantly reduced.

Race car image courtesy of AdvantageCFD

A Simpler, Less-costly Path to Multidiscipline Analysis

The growing trend in CAE analysis today involves a team of engineers from multiple disciplines collaborating on the development of a system-level model. SGI remote visualization solutions have the ability to make this cost-effective and practical. These solutions combine HPC and visualization resources into a centralized platform whereby all users can have simultaneous access to the largest of CAE models. For example, team members working from both a structures group and CFD group can access the same file and the same post-processor from any location.

A Complete CAE Workflow

Point solutions for CAE analysis tend to fragment workflow. SGI's VAN solutions can bring all phases of engineering product development—pre-processing, solver, and post-processing—together on a single universally accessible platform that provides compute serving, visualization serving, and simulation data storage and management.

Leveraging SGI Technology Partners

Third-party applications from SGI technology partners enable users to access large, high-fidelity models in standard application software and display them on desktop or laptop systems. They include FIELDVIEW, from Intelligent Light; Tecplot, from Tecplot, Inc., and EnSight Gold from CEI. EnSight Gold is the world's most advanced software tool for the interactive visualization and animation of data from a wide variety of CAE simulations in fields such as CFD, combustion modeling, structural analysis, crash and impact analysis, thermodynamics, electromagnetics, and others.

"Our experience with VAN has been impressive, and our software is well matched to the concept of remote visualization. SGI technology and VAN permit easier access to EnSight's powerful visualization feature set. As most of our customers are large scientific and engineering organizations with offices in different geographic locations, remote visualization is an important aspect of the overall solution," says Kent Misegades, president of CEI.

Missile CFD image courtesy of CRAFT Tech

Race car image courtesy of AdvantageCFD

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