



Giving customers twice the performance

Success Brief

Intel® Developer Products

Intel® Parallel Studio for Microsoft Visual Studio*

Scientific and Technical Computing

“Intel® Parallel Amplifier reported a common function to be a hotspot. Investigations revealed that a small overhead implied by a smart pointer rose to a considerable time, based on a great number of calls. Replacement with standard pointers was possible in this case, helping to gain 10X acceleration for the entire algorithm.”

Vlad Romashko
Software Development
Manager
Open CASCADE S.A.S.

Open CASCADE* utilizes Intel® Parallel Studio to optimize development of complex software simulations

Company	Open CASCADE develops solutions for integrating complex software simulation tools for the science and technical computing industry. The company relies on an international team of highly skilled engineers with proven competence in 3-D modeling, data exchange, numerical simulation, visualization and graphic user interfaces, and cross-platform environments, among other areas. In addition to providing custom development based on its own technologies or on other Open Source platforms, Open CASCADE also offers support services including training and consulting.
Mission	Open CASCADE is committed to becoming the leader in simulation integration, providing industry and research with advanced and user-friendly integrated tools. .
Product	Designed specifically for C/C++ developers, Open CASCADE’s powerful CAD/CAM/CAE kernel and development platform for 3-D modeling applications consists of reusable C++ object libraries and a set of development tools available in Open Source. .
Challenge	Maximize performance in complex software simulations, while eliminating errors and bottlenecks quickly for clients dependent on accurate scientific and technical computing.
Results	Open CASCADE saw improved algorithms with an overall performance increase up to 2X as hard-to-find memory leaks were revealed and corrected. .
Impact	Performance and reliability were enhanced among Open CASCADE development teams, and customer satisfaction was improved.

Intel® Parallel Studio brings comprehensive parallelism to C/C++ Microsoft Visual Studio* application development.

Parallel Studio was created in direct response to the concerns of software industry leaders and developers. From the way the products work together to support the development life cycle to their unique feature sets, Parallel Studio makes parallelism easier and more viable than ever before.

The tools are designed so those new to parallelism can learn as they go, and experienced parallel programmers can work more efficiently and with more confidence. Parallel Studio is interoperable with common parallel programming libraries and API standards, such as Intel® Threading Building Blocks (Intel® TBB) and OpenMP*, and provides an immediate opportunity to realize the benefits of multicore platforms.

Build Applications for Multicore

Intel® Parallel Composer is part of the larger Intel® Parallel Studio and brings an unprecedented breadth of parallelism development options for developers using Microsoft Visual C++*. Its combination of compilers, libraries, and an extension to the Microsoft Visual Studio debugger supports easier, faster multithreading of serial and parallel applications.

Easily Find Memory and Threading Errors

Intel® Parallel Inspector combines threading and memory error checking into one powerful error checking tool. It helps increase the reliability, security, and accuracy of C/C++ applications from within Microsoft Visual Studio*. Intel® Parallel Inspector uses dynamic instrumentation that requires no special test builds or compilers, so it's easier to test code more often.

Optimize Performance and Scalability

Intel® Parallel Amplifier makes it simple to quickly find multicore performance bottlenecks without needing to know the processor architecture or assembly code. Parallel Amplifier takes away the guesswork and analyzes performance behavior in Windows* applications, providing quick access to scaling information for faster and improved decision making.

Challenge: why Open CASCADE products benefit from utilizing parallelism

The Open CASCADE development team knows that even a simple function can become a significant bottleneck for an algorithm. For example, a function creates a plane using a reference point and a normal vector. This operation admits minimum time for the processor, but because of the great number of calls to the function, it dramatically slows the algorithm. High performance of applications is very important for Open CASCADE and its clients because of the complexity of the tasks under investigation. One of the recently impacted parallel applications was woodWop—designed together with Homag Holzbearbeitungssysteme AG, a designer of computer numerical controlled machines. For woodWop, Intel Parallel Amplifier helped Open CASCADE software engineers identify hotspots (i.e., functions where an application is spending significant time).

Results

Intel Parallel Studio helped shorten the learning curve for the new tools and their parallelization capabilities. In one instance, a single function calculated the depth of a leaf on a tree (the method `TDataStd_TreeNode::Depth()` used in Open CASCADE Technology). This function counted the number of parent leaves using smart pointers to access them. Intel Parallel Amplifier reported this function to be a hotspot. Investigations revealed that a small overhead implied by a smart pointer rose to a considerable time based on a great number of calls. Replacement with standard pointers was possible in this case, helping to gain 10X acceleration for the entire algorithm.

How Intel Parallel Studio Assisted

Intel Parallel Studio fits easily into Open CASCADE's development methodology and environment. The Open CASCADE development team tried Intel Parallel Studio components on applications based on Open CASCADE technology. They used Intel Parallel Amplifier to reveal bottlenecks in the most sensitive and complex algorithms of their applications, and Intel Parallel Inspector to check for memory leaks. Optimization with Intel Parallel Amplifier was simple: call the function once and memorize the plane, and then reuse it everywhere in the algorithm. The flexibility of Intel Parallel Studio, its advanced error checking and tuning capabilities, and its C++ development environment make it a valuable addition to Open CASCADE's software tools. Open CASCADE values Intel Parallel Studio for the speed and accuracy it brings to an array of Open Source parallelization techniques.

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