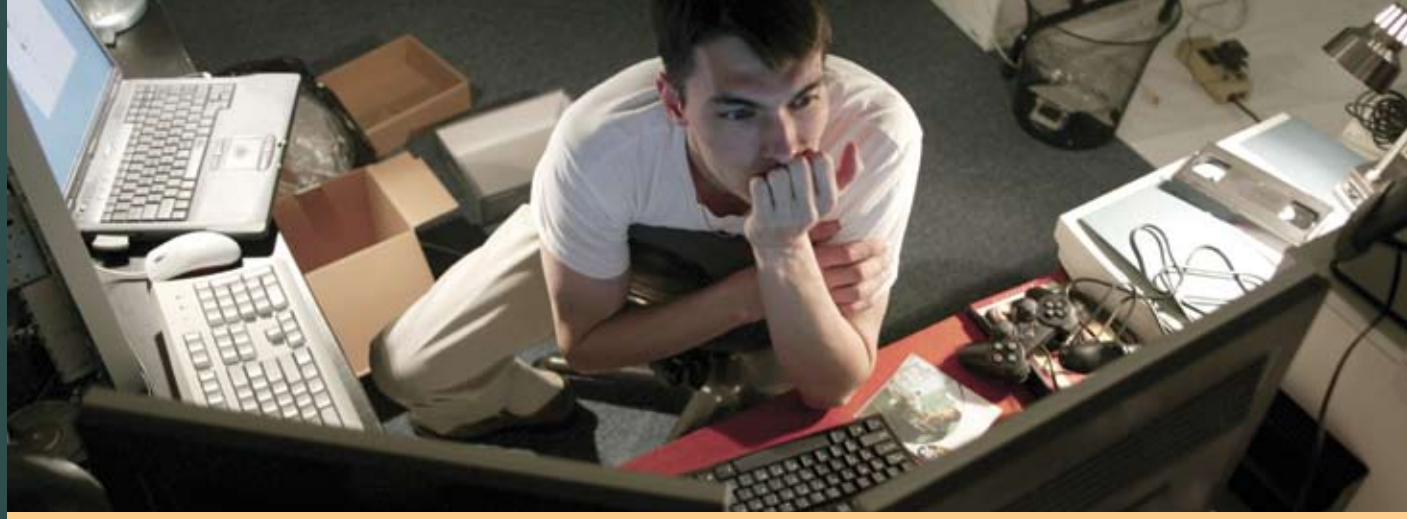
Solution Brief



Etnus TotalView®

Built from the beginning to debug complex multi-threaded code

Value Proposition

The ability to use tools to debug complex multi-threaded code has become increasingly important. With the advent of multi-core processors from Intel, the performance benefits of concurrent processing are improving mainstream computing and enriching applications in both home and business environments. Indeed, multi-core processing has opened up new markets and new opportunities for software developers who make use of multi-threaded coding to improve application performance. To keep up with these dynamic market changes and the complexity they bring to application development, developers need a resource like Etnus TotalView®; an advanced debugging tool tailored to take advantage of Intel multi-core processors and the Intel compilers. Software companies and internal development groups will benefit as Intel and Etnus bring the advantages of multi-core processing to the masses.

The power behind Etnus TotalView was born twenty years ago when the notion of "supercomputing" conjured images of mysterious laboratories and remote research facilities. Concurrent processing was then in its infancy, but the idea of running multiple processes or program threads in parallel fueled the development of high-performance computing. It quickly became apparent that the ability to debug multiple streams of code execution was essential and TotalView was built from the beginning to debug complex concurrent code.

TotalView provides an environment that reduces the time, effort and expense needed to create and debug multi-threaded code, and helps developers leverage the performance advantages of Intel multi-core processors.

TotalView is the most proven and scalable debugging product of its kind and is able to handle from one to thousands of processes. The advanced debugging capabilities of TotalView, like independent thread control, multi-platform support, register and instruction level debugging, and a built-in memory debugger, are not found in standard debugging tools. By giving developers individual control over each program stream, TotalView eliminates the timing variability that is inherent in multi-threaded code. Through the easily understood graphic interface, developers have a tool that allows them to concentrate on fixing code, not learning new commands.

Over the past five years Etnus has worked closely with Intel to ensure that TotalView is optimized to work seamlessly with Intel compilers. As a result, TotalView gives developers an enhanced development environment tuned for Intel platforms. Exacting control over multi-threading techniques and register-level visibility into processor operations results in a streamlined development process for creating reliable, high-performing applications that take advantage of the concurrent processing features of multi-core processors like the Intel® Core™ Duo and Intel® Core™2 Duo processors, both Quad-core and Dual-core Intel® Xeon® processors, and the Dual-core Intel® Itanium® 2 processor.

Who
Etnus is the provider of the world's leading debugging solutions on Linux*, UNIX, and Mac OS X*. Since the birth of supercomputing, Etnus has focused on the advancement of the state of the art in debugging technology.

What
Etnus TotalView® is an advanced multi-threaded debugging tool that helps developers create and troubleshoot complex, multi-threaded code more quickly, completely and accurately.

Why
Using TotalView, companies can maximize the performance benefits of platforms featuring Intel multi-core processors and reduce the time, effort and expense of creating complex concurrent code.

Why Etnus
For 20 years, Etnus has helped advance the state of the art of high-performance computing. Built from the beginning to support complex, multi-threaded applications, TotalView provides advanced debugging features simply not found using standard debuggers.

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About Etnus

Etnus provides the world's leading debugging solutions. As computers of all kinds provide technical advances through multi-core processors, developers will need to use the right tools to keep their applications competitive. The days of relying on clock-speed bumps to improve application performance are in the past. Using TotalView to develop applications for Intel multi-core processors will speed application delivery and keep you and your customers competitive.

The Etnus mission is focused on advancing the state-of-the-art in debugging technology and providing tools that help software developers complete projects on time and within budget, while fully leveraging the potential of their creativity and available technology. Etnus products are at work in large and small companies and organizations over a large variety of industries and markets. The company maintains a leadership role in the marketplace through continuous product development and refinement, and by working with Intel to discover and implement advanced debugging functionality for professional developers in all markets.

Etnus is a closely held company based near Boston that offers worldwide sales, distribution and support through field offices in Minneapolis, Toronto, and Starkville, Mississippi, and complemented by distributors in China, France, Germany, Japan, India, and Israel. The company is sustained by a highly experienced engineering and support staff; and by emphasizing service and software quality as central elements of corporate culture.

"With the growing prominence of multi-core processing in the mainstream, there is significant potential for developers of concurrent code to introduce exciting new capabilities into their applications. TotalView is the solution that helps developers lay claim to the performance advantages promised by Intel multi-core processors."

Jim Chafel
Vice President
Etnus, LLC

Solution Overview

Multi-Core Processing

"Moore's Law," suggests that processor performance will double roughly every two years. That prediction made in 1965 by Gordon Moore, cofounder of Intel, has been maintained and still holds true today. But performance increases typically involved increasing clock frequency—driving up power consumption and heat generation. Until recently, this was not a problem, since neither had risen to significant levels. Now both have become limiting factors in processor and system designs. Increasing clock frequencies is no longer viable as the primary means for boosting processor performance. Computer speed will continue to increase, but processors today are getting faster in a different way than before. By improving the performance of each processor core while adding more cores per processor, the clock speeds of each core can actually be reduced while substantially improving overall performance and energy efficiency.

In this manner, the performance benefits are achieved by having more processor cores on a given chip, not solely through continued development of faster processors. One way to take advantage of multi-core processing is for developers to spread application workloads over multiple processors instead of running them on a single processor. In applications where different parts of the workload can be processed simultaneously, this can dramatically improve the performance and usability of the application.

For developers today, proven and reliable debugging for multi-threaded applications can offer a competitive advantage as multi-core processors grow into more and broader computing markets. Software developers writing complex code for high-performance computing industries such as oil and gas or financial services require a development tool capable of multi-threaded, multi-processor debugging on a versatile and high-performance platform.

Built from the beginning to debug complex multi-threaded code, TotalView makes it easy to support this ongoing transition in computing and programming development. Developers are now in position to take advantage of the performance benefits of multi-core processing while reducing the time and effort needed to debug multi-threaded code.

Multi-Threaded Applications

Multi-core processing provides improved performance across a wide range of applications in both home and business environments. Multi-threaded applications running on desktops and mobile platforms featuring multi-core processors from Intel can deliver a greatly enhanced user experience. Gaming, photography and graphic software are just a few of the many applications that benefit in terms of both performance and features. Gone are the days when users had to wait impatiently for their PC, workstation, or notebook to complete processor-intensive tasks. More processors mean more efficient processing of multiple tasks. With multi-threaded applications that take full advantage of new Intel multi-core processors, users can experience superior platform responsiveness—even during the most demanding multitasking.

Developers of multi-threaded applications can leverage advancements in multi-core processor technology to deliver faster, more fully featured applications. With a legacy of advanced multi-threaded debugging capabilities, TotalView simplifies the process of building new applications, or modifying old ones, to take advantage of the new markets and expanded capabilities made possible by Intel multi-core processors.

Debugging Multi-Threaded Code

Debugging multi-threaded code presents some unique challenges that are overcome using TotalView. Differences between development environment and working environments result in subtle timing variations that are inherent in multi-threaded processing. TotalView allows developers to precisely control each individual program thread and thereby more accurately troubleshoot elusive bugs in the lab.

TotalView's multi-threaded debugging capabilities have a heritage in high-performance concurrent applications. Now that multi-core processing has opened up new markets and new opportunities, developers will benefit from the TotalView fundamental focus on multi-threaded debugging with the ability to quickly identify the root cause of failure. TotalView provides a source-level, window-oriented tool that quickly and accurately debugs multi-process, multi-threaded and multi-processor applications and systems.

No matter how many threads are created or how complex they become, TotalView lets developers examine the interplay between them by automatically acquiring threads as they are created and dynamically organizing them by what they do. As a result, the performance benefits of multi-core processing can be more fully realized while the development and debugging time associated with each application is greatly reduced.

Start exploring the benefits of multi-core processing today. Evaluate a full version of TotalView for 15 days. To download, visit: **www.etnus.com**

Advanced Code Development and Debugging

TotalView provides a number of advanced features that help speed code development and eliminate bugs quickly. TotalView provides visibility into thread creation and grouping via a full graphical user interface that brings clarity to the process. TotalView's data display capabilities, such as the ability to present a host of values and variables, aids developers in thread diagnosis and data manipulation. During debugging, independent control over each program thread gives developers the ability to quickly analyze bugs and manipulate threads as needed. Once elusive bugs are found, TotalView allows developers to test fixes within TotalView, without having to recompile a program until all the bugs are eliminated.

The intuitive graphical environment of TotalView minimizes the need for developer training and reduces development cycles. Developers can visualize the different states of a multi-process application and display complex threaded code

in a simple, understandable format. For programmers that prefer to directly enter commands to drive debugging sessions, TotalView can be operated in command-line mode as well, accommodating both approaches.

Each debugging session within TotalView can be fine-tuned to meet individual requirements because TotalView supports a rich set of breakpoints that can be used to synchronize threads, test program behavior against expectations, call functions, and visualize array. These breakpoints can be stored and shared across debugging sessions. Developers can use these breakpoints to write and test fixes on the fly within the debugging environment, saving valuable time and attention. TotalView reduces development time and reinforces best practices of enterprise programming.

TotalView provides an intuitive interface that helps developers focus on the behavior of their applications rather than on learning commands. Developers can take advantage of the sophisticated debugging environment to achieve unequalled control over and insight into the behavior of their multi-threaded applications.

This allows organizations to:

- Shorten the time needed to develop and debug multi-threaded applications.
- Take advantage of the performance benefits of multi-core processing.
- Reinforce best practices of enterprise programming.

The time is right to take advantage of multi-core processing. TotalView simplifies the process of debugging multi-threaded applications so software developers can take advantage of the performance benefits made possible by Intel multi-core processors and compilers. Evaluations of TotalView are available at: **www.etnus.com** Evaluations of Intel compilers are available at: **www.intel.com/software/products/compilers**

The Etnus/Intel Advantage

Intel compilers make it easier to get exceptional performance from Intel multi-core processors by offering optimization technology, threaded application support, and compatibility with leading tools and standards. Etnus has developed a close working relationship with the Intel compiler team. Through this collaborative relationship, the two teams can better ensure that TotalView is optimized to work seamlessly with Intel compilers.

TotalView makes it easier for developers to create and debug multi-threaded code for deployment within today's computing infrastructure. Whether at home, on the road, or in the data center, multi-core processors from Intel enable entirely new computing possibilities. The benefits gained in server and client platforms, as well as the home and enterprise environments, are more quickly achieved and more fully realized using TotalView.

Designed to fully support Intel multi-core processors like the Intel® Core™ Duo and Intel® Core™2 Duo processors, both Quad-core and Dual-core Intel® Xeon® processors, and the Dual-core Intel® Itanium® 2 processor, TotalView can be deployed and launched with minimal effort and run directly out of the box. Through register-level support for the individual processors in each of the Intel families, TotalView gives developers an edge in creating multi-threaded applications that can achieve optimum performance on Intel compilers and processors.

For more information on Etnus or to download a free 15-day trial of TotalView visit: **www.etnus.com**

For more info on Intel multi-core processing visit: **www.intel.com**

Evaluations of Intel compilers are available at: **www.intel.com/software/products/compilers**

For more information on Intel® Software Development Tools visit: **www.intel.com/software/products**

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