



Intel® Software Development Products for Intel Platforms and Technologies

Intel® Thread Checker for Windows*

Overview

Intel® Threading Tools make it easier to create multithreaded applications that take advantage of the performance benefits of Hyper-Threading Technology included in Intel® Pentium® and Intel® Xeon™ processor-based computer systems. Hyper-Threading Technology from Intel enables the processor to execute two threads (parts of a software program) in parallel — so your software can run more efficiently.

Intel Threading Tools include Intel® Thread Checker, to locate threading errors, and Thread Profiler to identify thread performance issues.

Intel Thread Checker automatically locates bugs in threaded software that might otherwise go undetected. It eliminates this guesswork and pinpoints the location of errors to help quickly analyze and correct them.

Intel Thread Checker graphical displays and groups errors by context for easy review. It can identify six levels of threading issues, from errors and warnings to informative comments. In addition, it classifies each issue it finds for easy prioritization: errors, warnings, cautions, informational and remarks. Sort errors by severity to focus on the most important issues first. Sorting by file lets you focus on bugs you own. Once you find the bugs, easily drill down to the root causes with several graphical tools.

Thread Profiler monitors your application's execution to detect threading performance issues, including thread overhead and synchronization impact. Thread Profiler provides graphical displays to help analyze and correct threading bottlenecks for Win32* or OpenMP* threaded software.

Features and Benefits

- **Automatic Error Detection** saves time to create enough tests to catch the common, uncommon, and intermittent threading bugs
- **Detection of race conditions, thread deadlocks, and thread stalls** saves execution time by finding even subtle parallel programming issues
- **Bug Isolation** shows exactly which variables are causing the bug, where variables get used by the threads, where variables are declared, and the call stack to offending lines of code
- **Compatibility with Win32* APIs for Threads, C runtime library functions, and OpenMP*** — Uses familiar Win32 API and C runtime library function plus all OpenMP pragmas and clauses.
- **Choose any of several Microsoft compilers** to build your software for analysis
- **Intel® Fortran and Intel® C++ Compilers** — Displays additional details and the actual variable names, even when using pointers, if you build your software with an Intel compiler and the /Qtcheck command-line option
- **Trial version** is available

Intel® Thread Checker Results Window

Diagnostics List

Displays specific information about every issue identified by Intel Thread Checker. Each entry includes an error description — with one-click diagnostic help — a color-coded severity estimate, and a source code line number. Double-clicking an entry in the diagnostics list shows source code locations where the error occurred.

Source Code View

Displays the line of source code where errors occur.

The Stack Traces tab graphically displays the code path(s) taken by threads to arrive at the code error.

The screenshot shows the 'Diagnostics' window in Microsoft Visual C++ with the following data:

Context	ID	Severity	Description	Counts	1st Access
Group 1: "pi.cpp": 32					
"pi.cpp": 32	0	●	Memory read of unknown at "pi.cpp": 33 conflicts with a prior memory write of unknown at "pi.cpp": 62 (flow dependence)	3	main
"pi.cpp": 32	1	●	Memory read of unknown at "pi.cpp": 42 conflicts with a prior memory write of unknown at "pi.cpp": 42 (flow dependence)	12	PiFunc

The 'Stack Trace' for 'PiFunc "pi.cpp": 42' shows the following source code:

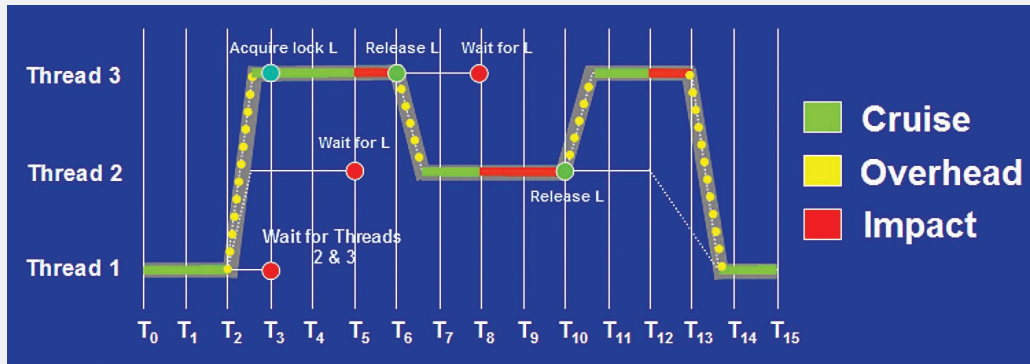
```

start = myThreadNum+1;
for(int i = start; i < maxIterations; i+=maxThreads)
{
    dx = (i-0.5) * dStep;
    dSum = dSum + 4.0/ (1.0 + dx*dx);
}
  
```

Thread Profiler Timeline View

Displays information from critical path analysis that impacts execution time of Win32 threaded software. The timeline view displays synchronization constructs that lengthen execution time. You can drill down to source where relevant synchronization objects are signaled. Color coding by category helps you locate and prioritize performance issues.

In this example, the objective is to minimize Impact Time (red) and maximize Cruise Time (green) with a resulting shortened execution time.



What's New in Intel Thread Checker 2.0 for Windows

- Integration with the Microsoft Visual Studio* .NET means you can run Intel Thread Checker and view results in the Microsoft Visual Studio .NET development environment
- With the choice of more compilers to build your software, you can select the compiler to build your software for analysis: Intel® C++ Compiler, 7.0 or higher; Intel® Fortran Compiler 7.0 or higher; Microsoft Visual C++* .NET 2002, 2003 Editions; and Microsoft Visual C++, 6.0
- Provides one-click help for diagnostics to show possible causes and solution; when using the diagnostic view, just right-click for diagnostic help
- Supports user-defined synchronization primitives, if you do not use Win32 or OpenMP libraries
- Now supports thread-count dependent OpenMP APIs and nested OpenMP parallel regions

PERFORMANCE

Get Insight into Threading Glitches

Intel Thread Checker helps you find and fix threading errors in Win32 and OpenMP threaded software, letting you tune your threaded software for better performance.

COMPATIBILITY

Works Within Visual Studio*

Use Intel Thread Checker within the Microsoft Visual Studio .NET development environment. Intel Thread Checker is compatible with the Win32 APIs for Threads, the C runtime library functions, and OpenMP pragmas and clauses. It is integrated with the Intel® VTune™ Performance Analyzer.

SUPPORT

Intel® Premier Support

Every purchase of an Intel® Software Development Product includes a year of support services, which provides access to Intel® Premier Support and all product updates during that time. Intel Premier Support gives you online access to technical notes, application notes, and documentation. Install the product, and then register to get support and product update information.

REQUIREMENTS

Hardware and Software

For IA-32 and Intel Itanium processor system requirements visit: www.intel.com/software/products/threading

Intel provides both the tools and support to enhance the performance, functionality and efficiency of software applications.

Compatible with leading Windows* and Linux* development environments, Intel® Software Development Products are the fastest and easiest way to take advantage of the latest features of Intel processors. Intel Software Development Products are designed for use in the full development cycle, and include Intel® Performance Libraries, Intel Compilers (C++, Fortran for Windows and Linux), Intel® VTune™ analyzers, Intel® Threading Tools and Intel® Cluster Tools.

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