Intel® Threading Tools:
Intel® VTune™ Amplifier XE
Intel® Inspector XE

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Notice revision #20101101
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- Intel® Parallel Studio XE
- Intel® GAP
- Intel® Debugger
- Intel® VTune™ Amplifier XE
- Intel® Inspector XE
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• Intel® Parallel Studio XE
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• Intel® VTune™ Amplifier XE
• Intel® Inspector XE
Three Product Lines for Diverse Needs

Essential Performance
C/C++ developers
Microsoft Visual Studio*
Take advantage of multicore

Advanced Performance
C++ and Fortran developers
Windows* and Linux*
High performance, cross platform apps

Distributed Performance
C++ and Fortran developers
on Windows* and Linux*
High performance MPI clusters

intel.com/software/products

Use under NDA only
Software Tools to Drive Multicore

For Microsoft Visual Studio* C++ architects, developers, and software innovators creating parallel Windows* applications.

- Microsoft Visual Studio* plug-ins
- End-to-end product suite for parallelism
- Forward scaling to many-core
  - Parallel Advisor
  - Parallel Composer
  - Parallel Inspector
  - Parallel Amplifier
Intel® Parallel Studio

• The ultimate all-in-one toolset for the software development lifecycle
  – DESIGN
  – CODE & DEBUG
  – VERIFY
  – TUNE
## Intel® Parallel Studio XE 2011
Powerful tools to create fast, reliable and secure code

<table>
<thead>
<tr>
<th>Phase</th>
<th>Productivity Tool</th>
<th>Feature</th>
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<tr>
<td>Advanced Build &amp; Debug</td>
<td><img src="image" alt="Intel Composer XE" /></td>
<td><strong>Intel® Composer XE</strong> C/C++ and Fortran compilers, performance libraries, and parallel models</td>
<td>Application performance, scalability and quality for current multicore and future many-core systems.</td>
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<tr>
<td>Advanced Verify</td>
<td><img src="image" alt="Intel Inspector XE" /></td>
<td><strong>Intel® Inspector XE</strong> Memory &amp; threading error checking tool for higher code reliability &amp; quality</td>
<td>Increases productivity and lowers cost, by catching memory and threading defects early</td>
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<tr>
<td>Advanced Tune</td>
<td><img src="image" alt="Intel VTune™ Amplifier XE" /></td>
<td><strong>Intel® VTune™ Amplifier XE</strong> Performance Profiler to optimize performance and scalability</td>
<td>Removes guesswork, saves time, makes it easier to find performance and scalability bottlenecks Combines ease of use with deeper insights.</td>
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+ **Extra Feature in Parallel Studio XE 2011 only:**
Static Security Analyzer
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Optimization Reports

- GAP – Guided Auto Parallelism (New in Composer 2011 XE!)
  - -guide switch
  - Provides advice on source changes that could enable parallelism
  - Doesn’t actually generate code, just provides analysis and suggestions

- Other reports
  - -vec-report
    - Which loops were vectorized, which were not
    - Why they weren’t vectorized
  - -par-report
  - -opt-report
    - Reports available for a variety of optimizations
  - icc -help reports for more details
Intel® Guided Auto Parallelism

GAP Workflow

1. Application Source C/C++/Fortran → Compiler → Application Binary → Performance Tools → Identify hotspots, problems

2. Application Source + Hotspots → Compiler in advice-mode → Advice messages

   - Compiler suggests compiler source modifications to enable vectorization, parallelization

3. Feed modified source back to compiler for optimization

   - Modified Application Source → Compiler (extra options) → Improved Application Binary
Using GAP

- Requires optimization level set to /O2 or higher
  - Works with both command line options or in the MSVC IDE
  - IPO or PGO is not require, but advice may change based on options
  - User may apply all or a subset of the advice provided by GAP
    - However, when multiple messages apply to a given loop ALL suggestions for that loop must be applied to get desired optimization

- User can specify regions of a file or routine that are considered “hot”
  - Advice will be restricted to the hot region
  - Default is to provide advice on entire compilation-unit

- Advice may involve
  - suggestions for source-change that assert new properties
  - adding pragmas for loop if semantics are satisfied
  - adding new options

- In GAP mode, output is a set of GAP messages
  - no executable-code generated
GAP Command Line Options

- [-]guide=<n>, where
  - N:1-3 for Composer (Default level is 2)
  - N:1-4 for Next version of Compiler Pro (Default 4)

Other useful options:
- [-]guide-file – output GAP messages to a file
- [-]guide-file-append – append GAP messages to file
- [-]guide-opts – analyze file, routine, range of code.
- [-]guide-par – guidance for auto-parallelization
- [-]guide-vec – guidance for auto-vectorization
- [-]guide-data-trans – guidance for data transformation
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**Intel® Parallel Debugger Extension**

- Included in Parallel Composer XE products for Windows
- Integrates into Microsoft* Visual Studio*
- Enhances Microsoft Debugger, does not replace it.
- Debugger extension focus: debugging parallel apps
  - Highly configurable, interactive data race detection
  - Detailed OpenMP* execution state™ views
  - Full Intel® Cilk™ Plus call stack view

**Intel® Parallel Debugger Extension: Great Add-on to Help Visual Studio*-Based Developers Debug Parallel Apps**
Intel® Parallel Debugger Extension
Parallel Debugger Toolbar
Intel® Debugger for Linux*

- Included in Parallel Composer XE products for Linux.
- Great for debugging optimized code
- Ease of Use
  - Sophisticated GUI
  - Full multi-threading and OpenMP* tasking support
  - Intel® SSE and Intel® AVX register evaluation
  - Visualization of C++ containers (std::string, std::map ...) and Intel® TBB data structure
- Command script language for automated testing
- C++ and Fortran support

Intel® Debuggers for C/C++ and Fortran: Identify & Fix Bugs Faster
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LIVE DEMO