Intel® Inspector XE 2011 Update 10 Release Notes for Linux* OS

Installation Guide and Release Notes

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Contents:

1 Introduction

The Intel® Inspector XE 2011 helps developers identify and resolve memory and threading correctness issues in their C, C++ and Fortran programs.

The Intel Inspector XE is a static and dynamic error checking tool for developing multithreaded applications on Windows* or Linux* operating systems. The Intel Inspector XE maximizes code quality and reliability by quickly detecting memory, threading, and source code security errors during the development cycle. You can also use the Intel Inspector XE to visualize and manage static security analysis results created by Intel(R) Composer XE 2011 in various suite products. The Intel Inspector XE is an easy, comprehensive solution that delivers rapid results in isolating memory and multithreading errors.

The Intel Inspector XE has a standalone graphical user interface (GUI) as well as a command-line interface (CLI).

This document provides system requirements, installation instructions, issues and limitations, and legal information.

Use the Getting Started tutorial and reference documentation to learn more about the Intel Inspector XE. For documentation, open the `documentation_inspector_xe.htm` file in the following directory: `<install-dir>\documentation\<locale>\`. For example, if you choose the default installation path, you can find the `documentation_inspector_xe.htm` file in the `/opt/intel/inspector_xe_2011/documentation/en` directory.

If you did not register this product during installation, please do so at the Intel® Software Development Products Registration Center (https://registrationcenter.intel.com/). Registration entitles you to free technical support, product updates and upgrades for the duration of the support term.

For Technical Support, Product Updates, User Forums, FAQs, tips and tricks, and other support information, please visit http://www.intel.com/software/products/support/. **Note**: If your distributor provides technical support for this product, please contact them for support rather than Intel.

2 What's New

Intel® Inspector XE 2011 Update 10:

- Added stability and performance improvements

Intel® Inspector XE 2011 Update 9:

- C++-based Getting Started Tutorials redesigned to focus on a single task/problem
- New Fortran-based Getting Started Tutorials designed to focus on a single task/problem
- Added stability and performance improvements

Intel® Inspector XE 2011 Update 8:

- Added support for recently released operating systems (see *System Requirements* for more information)
- Added support for analysis of applications that use Intel® Cilk™ Plus support
- Added support for threading analysis of applications that use Qt* APIs
- Enhanced suppressions management
- Improved leak detection during memory analysis at the mi1 level
- Added interactive debug support during analysis
- Added stability and performance improvements

Intel® Inspector XE 2011 Update 7:

- Added stability and performance improvements

Intel® Inspector XE 2011 Update 6:

- Adds support for analysis of MPI programs that use the Intel® MPI library

- Simpler, more intuitive memory growth reporting - Use new Set Transaction Start and Set Transaction End buttons during dynamic analysis to detect if a block of memory is allocated but not deallocated within a specific time segment during application execution
- Simpler, more intuitive custom analysis creation - Use the new Copy button to create a new custom analysis type based on the currently selected analysis type, then fine-tune the copy to meet your needs
- More robust project support in the standalone GUI - Use the new Project Navigator pane to see a hierarchical view of your projects and results based on the directory where the opened project resides
- A new Static Security Analysis (SSA) tutorial and accompanying sample code - Use a pair of end-to-end examples to learn how to:
    - Use the Intel® Parallel Studio XE SSA feature to identify and resolve problems
    - Apply that learning to your own applications
- New Fortran sample code
- Added stability and performance improvements

Intel® Inspector XE 2011 Update 5:

- Enhanced module inclusion/exclusion capability when configuring projects for analysis - for example, you can inspect specific modules and disable inspection of all other modules, or disable inspection of specific modules and inspect all other modules
- Fix to present fully resolved function names for internal procedures in Fortran programs on Linux
- Added stability and performance improvements

Intel® Inspector XE 2011 Update 4:

- Added stability and performance improvements

Intel® Inspector XE 2011 Update 3:

- Performance improvement for memory analysis at the mi2 and mi3 levels
- Significant reduction in false positives during memory analysis
- Enhanced exception handling during threading analysis
- Improved messages during threading analysis

- Enhanced warnings when cross-thread stack accesses are detected
- Support for analysis of Intel® Cilk™ binaries
- Added stability improvements

Intel® Inspector XE 2011 Update 2:

- NOTE: Update 2 only applies to the Windows* Operating System.

Intel® Inspector XE 2011 Update 1:

- Bug fixes

Intel® Inspector XE 2011:

This is the first release of the Intel Inspector XE product which is a successor to the Intel® Thread Checker. The following are some key new features in this next generation product:

- Find memory errors in addition to threading errors
- Find memory and threading errors in source code using the Static Security Analysis feature of Intel® Composer XE and then view, filter and process the results in the Intel Inspector XE when both the products are installed as part of Intel® Parallel Studio XE or Intel® C++ Studio XE
- New dynamic instrumentation implementation to accelerate analysis (only executed code is instrumented)
- New standalone GUI on all supported operating systems
- New grouping of related diagnostics, diagnostic suppression and a powerful results filtering interface

3 System Requirements

Supported Architectures and Terminology

The Intel Inspector XE supports the following architectures:

- **IA-32 Architecture** refers to systems based on 32-bit processors generally compatible with the Intel® Pentium® processors (such as, Intel® Pentium® 4 processor or Intel® Xeon® processor), or processors from other manufacturers supporting the same instruction set, running a 32-bit operating system.
- **Intel® 64 Architecture** refers to systems based on IA-32 architecture processors that have 64-bit architectural extensions (such as, Intel® Core™2 processor family), running

a 64-bit operating system. If the system is running a 32-bit operating system, then IA-32 architecture applies instead. Processors from other manufacturers supporting the same instruction set and running a 64-bit operating system are also supported.

Minimum System Requirements

- A system based on an IA-32 or Intel® 64 architecture processor supporting the Intel® Streaming SIMD Extensions 2 (Intel® SSE2) instructions (Intel® Pentium® 4 processor or later, or compatible non-Intel processor)
    - The Intel Inspector XE requires specific knowledge of assembly-level instructions. Its analysis may not operate correctly if a target executable contains instructions not supported by IA-32 or Intel® 64 architectures. In this case, run the analysis with a target executable that contains only supported instructions. After you finish using the Intel Inspector XE, you can revert to using unsupported instructions in the target executable.
    - For the best experience, a multi-core or multiprocessor system is recommended.

- 2GB RAM

- 4GB free disk space for all tool features and architectures

- Supported operating systems:
    - Red Hat* Enterprise Linux* 4.9, 5.8 and 6.2
    - CentOS* versions equivalent to Red Hat* Enterprise Linux* versions listed above
    - Red Hat* Fedora* 14, 15 and 16
    - SUSE* Linux Enterprise Server* 10 SP4 and 11 SP2
    - Asianux* 3.0 SP3 and 4.0
    - Debian* 5 and 6
    - Ubuntu* 10.04, 11.10 and 12.04

  NOTE: In a future major release of this product, support for installation and use on Asianux* will be removed.

- Supported compilers:
    - Intel® C/C++ Compiler 11 and higher
    - Intel® Fortran Compiler 11 and higher
    - GNU* C/C++ Compiler 3.4.6 and higher

- Supported debuggers:
    - Intel® Composer XE Update 6 debugger or later
    - GNU gdb* debugger versions 6.3 or later with working remote debugging support (there are known issues with gdb-7.1-xx.fc13 versions)

- Application coding requirements:
    - Supported programming languages:
        - Fortran
        - C
        - C++
    - Supported threading methodologies:
        - Intel® Threading Building Blocks (Intel® TBB)

    - POSIX* Threads on Linux* OS
    - OpenMP* (see note below)
    - Intel C/C++ parallel language extensions

- Adobe* Reader* 7.0 or later needed to read installed documentation

Note:

> The Intel Inspector XE supports analysis of applications built with the Intel® Fortran Compiler Professional Edition version 11 or higher, the Intel® C++ Compiler Professional Edition version 11.0 or higher, and the GNU* C/C++ Compiler 3.4.6. Applications that use OpenMP* technology and are built with the GNU* compiler must link to the OpenMP* compatibility library as supplied by an Intel Compiler.

4 Installation Notes

This product package can be used to install the software on both IA-32 systems and Intel® 64 systems. The installer determines the system architecture and installs the appropriate files. Both 32-bit and 64-bit versions of the software are automatically installed on an Intel® 64 system.

The installation of the Intel Inspector XE removes any earlier installed minor version of this product (with the same major version number). Different major versions can co-exist with each other.

If you are installing the product for the first time, you need the product serial number or a valid license file to activate the product.

To install, perform the following steps:

1. Uncompress the package: `gunzip <package-name>.tar.gz`

2. Extract the files: `tar xf <package-name>.tar`

3. Start the installation. (**Note**: For successful installation, you should have read and write permissions for the `/tmp` directory.)

    - To install on a local system enter the following:

      ```
      cd <package-name>
      ```

    - `./install.sh`
      Note: If you want to install the software for use by any user, you must do this as the root user. To install to a network-mounted drive or shared file system for multiple users, become the root user then enter:

      ```
      cd <package-name>

      ./install.sh --SHARED_INSTALL
      ```

4. Follow the prompts to complete the installation and activation of the software.

Default Installation Folders

The default top-level installation folder for this product is:

```
/opt/intel/inspector_xe_2011
```

A different top-level folder name can be chosen during a custom installation.

Installing Collectors On Remote Systems

You can install just the data collection support features of the product on remote systems where run-time license checking is not feasible. The results of any data collection that is run on the remote system must then be copied to the system where the regular install was done for analysis, viewing, and reporting.

To do this:

1. Copy the `CLI_install` folder (found at the top level in the untarred product install package) to the remote machine.
2. Execute the `./install.sh` script file (this file is located inside the `CLI_install` folder). Activation is not required.

Activating Your Evaluation Software After Purchasing

Users of evaluation versions of Intel Developer Products have a new tool that allows converting evaluation-licensed products to fully licensed products once the product is purchased and a serial number is obtained. The activation tool is a utility that allows users of evaluation products to enter a valid product serial number to convert the product to fully licensed status.

Run the `/opt/intel/ActivationTool/Activate` script and provide your purchased product serial number, either as an argument to the program or when prompted. For example:

```
/opt/intel/ActivationTool/Activate ABCD-123AB45C
```

Be sure to login or `su` to root if you want the product license to be available to all system users.

Removing The Product

To remove the product, execute the following commands:

> **Note:** Replace `/opt/intel` with the chosen install folder name if the default folder was not used.

1. `cd /opt/intel/inspector_xe_2011`
2. `uninstall.sh` (as a root user or the same user who performed the install)

Establishing the Intel Inspector XE Command Line Environment

To easily access the command-line interface, establish the Intel Inspector XE environment settings in a terminal session using the following command:

```
      source <install-dir>/inspxe-vars.sh
```

5 Issues and Limitations

General Issues

- Future generations of the Intel Inspector XE product may not support processing of results generated by the legacy Intel® Thread Checker product. However, such Intel® Thread Checker generated results can still be processed and converted by the Intel® Inspector XE 2011 product (either Standalone or Visual Studio* integrated version of the product).
- Intel does not guarantee this software tool will detect or report every memory and threading error in an application.
  - Not all logic errors are detectable.
  - Heuristics used to eliminate false positives may hide real issues.
  - Highly correlated events are grouped into a single problem.
- You can use the Intel Inspector XE to analyze applications in debug and release modes. To learn more about options necessary to produce the most accurate, complete results, refer to the following related resources:
  - Memory error analysis: http://software.intel.com/en-us/articles/compiler-settings-for-memory-error-analysis-in-intel-inspector-xe/
  - Threading error analysis: http://software.intel.com/en-us/articles/compiler-settings-for-threading-error-analysis-in-intel-inspector-xe/
- If no symbols are found for a module in which a problem is detected, the Intel Inspector XE displays the call stack and observation source code of the first location where it can find symbols. If it cannot find any location in the call stack with symbols, it displays the module name and relative virtual address (RVA) for the location.
- Applications that crash when run outside the Intel Inspector XE may crash or hang the Intel Inspector XE runtime analysis engine. For example, a corrupt return address on an application call stack crashes the runtime analysis engine. If a crash occurs, problems detected prior to that time can be viewed, but memory leaks will not be reported. **Recommendation:** Review the reported problems – it is likely one of them caused the crash.
- The Intel Inspector XE uses a socket to communicate between the graphical user interface and the runtime analysis engine. Preventing an application from opening a socket prevents an analysis of the application from being started by the graphical user interface. The command-line interface can be used to run an analysis in this case and the results can subsequently be viewed using the graphical interface.
- The Intel Inspector XE may report an incorrect call stack following an interruption of normal call flow, such as when an exception is thrown and caught. While the Intel Inspector XE recognizes and attempts to correct result data when this situation occurs, it is possible for a threading or memory problem to be reported before the call stack is fully corrected.

- If the Intel Inspector XE reports insufficient memory errors while analyzing OpenMP* applications, try setting OMP_NUM_THREADS to limit the number of OpenMP* threads. In most cases, OMP_NUM_THREADS=2 is sufficient.
- If the Intel Inspector XE reports insufficient memory errors during analysis, try analyzing your application in sections by running several analyses and excluding a different set of modules for each run.
  Note: The Intel Inspector XE does not detect or report issues in excluded modules.
- If you parallelize your application using the OpenMP* threading methodology (e.g., using pragma *omp parallel*), the Intel Inspector XE may not detect created threads when you use the memory error analysis type with the narrowest scope. This may result in a timeline view where the main thread is shown but no OpenMP* threads are present.
  Recommendation: Use a memory error analysis type with a wider scope. [200142169]
- On Ubuntu* 10.04 systems with Ambience and Radiance themes, the error message "CRITICAL **: murrine_style_draw_box: assertion `width >= -1' failed" is printed in console for `inspxe-gui`. [200159955]
  Recommendation: Change to another theme. See https://bugs.launchpad.net/ubuntu/+source/light-themes/+bug/538499/ for more information.
- On Ubuntu* 10.10 systems, the Intel Inspector XE client silently disappears when you open the Intel Inspector XE results. [200159955]
  Recommendation: Change the visual theme to New wave or switch to another window manager (for example, KDE* manager).
- The Intel Inspector XE may fail to collect data for threading or memory analysis types on the Ubuntu 10.10, 11.04 and 11.10 operating systems. Collection fails with an internal error.
  Recommendation: To work around this problem for the current session, use the command: `echo 0 | tee /proc/sys/kernel/yama/ptrace_scope` to set `/proc/sys/kernel/yama/ptrace_scope sysctl` to 0. To make this change permanent, `set kernel.yama.ptrace_scope value` to 0 in the `/etc/sysctl.d/10-ptrace.conf` file using root permissions, then reboot the machine. [200197563]
- On Ubuntu* 10.10 or later operating systems, the Intel Inspector XE may exit when you open results because of issues involving license checking with enabled trusted storage.
  Recommendation: Disable `ptrace` protection using the command: `echo 0 | tee /proc/sys/kernel/yama/ptrace_scope`. Note: The Intel Inspector XE expects you to provide a license before use. [200197888]
- The Intel Inspector XE does not currently support Security-enhanced Linux* settings (SELinux); it supports only Permissive mode.
  Recommendation: Either disable SELinux (set the line "`SELINUX=disabled`" in your `/etc/sysconfig/selinux` file or add the "`selinux=0`" kernel argument in `lilo.conf` or `grub.conf` files) or make a SELinux mode adjustment (set the line "`SELINUX=permissive`" in your `/etc/sysconfig/selinux` file or ask your system administrator to make a SELinux mode adjustment). You may need to reboot your system after changing the system parameters. See http://www.nsa.gov/selinux/ for more information about SELinux.[200155374]
- If a child application is selected for analysis, the Intel Inspector XE analyzes only the first instance of that application, even if multiple instances of that application occur.

- The Intel Inspector XE cannot launch a debugger when the terminal type konsole is used on KDE* versions older than 4.6.
  Recommendation: Use a terminal such as xterm on older KDE versions when using the analysis with debug feature. [200223810]
- If you try to store results on a pvfs2 (Parallel Virtual File System 2), Intel Inspector XE analysis fails with the following error: “Error: Failed to create a database. Cannot continue.”
  Recommendation: Specify a result directory location that is not on a pvfs2 file system. [200213391]
- The choice of which debugger to connect to automatically when using debug in conjunction with analysis requires the setting of an environment variable prior to launching the standalone GUI or launching an analysis using the command-line interface. When configuring an analysis, you can choose to connect to a debugger when a problem is found. The default debugger to connect to is GDB. If you have installed Composer XE Update 6 you can use the IDB debugger instead. To do so, set an environment variable as follows:

  ```
  export INSPXE_DEBUGGER=<debugger>
  ```

  where *debugger* is one of:

`idb`	Graphical interface to IDB
`idbc`	Command-line interface to IDB
`gdb`	Command-line interface to GDB (reset to default)

Memory Error Analysis Issues

- An Intel® Cilk™ Plus program that does not run to completion when serialized will not run successfully under memory analysis. Intel Inspector XE memory analysis works with Intel Cilk Plus programs that have well-defined semantics with respect to the program's serialization (see the following resource for more details: http://software.intel.com/sites/products/documentation/hpc/composerxe/en-us/cpp/mac/cref_cls/common/cilk_serial.htm). [200174735]
- The Intel Inspector XE may report false positives when the analyzed application uses custom memory allocators. Use of `_itt_notify` to annotate your source code can reduce these false positives.
- If the semantics of standard C runtime allocators are changed, the behavior of the Intel Inspector XE is unknown and could lead to abnormal analysis termination. For instance, if the application is using non-standard versions of these allocators where the memory returned by the allocator is initialized when it would normally be uninitialized.
- The memory error analysis type with the narrowest scope may be slow for binaries that do not contain a binary search table in the `.eh_frame_hdr` section. [200154305]
- Memory error analysis of applications that use Qt* APIs may report false positives.

Threading Error Analysis Issues

- The Intel Inspector XE does not capture the main thread creation site if the binary is built without debug symbol information.
- The Intel Inspector XE does not detect deadlocks or potential deadlocks created with:
  - Some types of locks via Intel® C/C++ parallel extension `(__critical)` provided by the Intel® Compiler Professional Edition 11.0 or higher.
  - Some types of locks in Intel® TBB (`spin_mutex, spin_rw_mutex`)

    - Non-exclusive ownership synchronization objects involved, for example, condition variables, semaphores and events and reader/writer locks.
- The Intel Inspector XE does not detect inter-process data races or deadlocks.
- The Intel Inspector XE may report false positives for analyzed applications using customized synchronization primitives. Use of `_itt_notify` to annotate your source code can reduce these false positives.
- The Intel Inspector XE may report false positives if you have `libc` or `libpthread` statically linked in the application.
  Recommendation: Build your application with `libc` and `libpthread` dynamically linked in.
- To enable correct analysis of Intel® TBB based applications, set the following required macros before compiling:
    - **TBB_USE_DEBUG** (which sets **TBB_USE_THREADING_TOOLS**) if you use Intel® TBB debug libraries
    - **TBB_USE_THREADING_TOOLS** if you use Intel® TBB releas**e libraries**

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Libxml2

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