

Intel® Advisor XE 2016 for Windows* Release Notes

Installation Guide and Release Notes

13 April 2016

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1 Introduction

Intel® Advisor XE 2016 provides two tools to help ensure your Fortran and native/managed C++ applications take full performance advantage of today's processors:

- **Vectorization Advisor** is a vectorization analysis tool that lets you identify loops that will benefit most from vectorization, identify what is blocking effective vectorization, explore the benefit of alternative data reorganizations, and increase the confidence that vectorization is safe.
- **Threading Advisor** is a threading design and prototyping tool that lets you analyze, design, tune, and check threading design options without disrupting your normal development.

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

To learn more about this product's:

- Documentation, help, and samples, click: **Start > All Programs > Intel Parallel Studio XE 2016 > Getting Started > Advisor XE**. You can access the product help in a web browser as well by opening the index.htm in the documentation help directory.
- Technical support, including answers to questions not addressed in the installed product, please visit: <http://software.intel.com/en-us/support/>

Please remember to register your product at <https://registrationcenter.intel.com/> by providing your email address. This helps Intel recognize you as a valued customer in the support forum.

2 What's New

Intel® Advisor XE 2016 Update 4

- Tech preview precise **FLOPS** metric.
- **Gather and Scatter instructions** analysis with a special stride category in the Details section of MAP source view
- Improved MPI flow: improved support for non-Intel MPI libraries and enabled creating snapshots for MPI results.
- **Batch mode**, which lets you automate collecting multiple analysis types at once with auto-selection for MAP and Dependencies analysis using pre-defined criteria
- **Variable names** detection in the Refinements report, including heap-allocated variables
- More accurate memory **footprint metric**, showing the maximum footprint across all loop instances.
- Improved usability of multi-ISA binaries analysis, so you can see ISA and traits in the virtual loops and sort and find **AVX512 code paths** more easily
- Loop Analytics tab with trip counts and extended **instruction mix**, so you can see compute vs memory instruction distribution, scalar vs vector, ISA details, etc.
- Exposed innermost loops with **vector intrinsics** as vectorized in the Survey grid
- New recommendation to use **SDLT** for loops with an “Ineffective memory access” issue

Intel® Advisor XE 2016 Update 3

- Analysis of non-Executed code paths that allows exploring Instruction Set Architecture that is different from the host machine. E.g. you can analyze AVX-512 code paths when running on an older machine.
- New tab “Loop Analytics” in Survey view, combining several loop metrics in single place, including ISA, Traits and Instruction mix (percentage of Memory, Compute and other instructions).

- Ability to filter result data by thread in Survey view to narrow down performance metrics.
- New Recommendations tab in Memory Access Patterns analysis results with actionable hints.
- New AVX512-specific traits, e.g. Scatter, Compress/Expand, etc.
- Added new recommendations:
 - Indirect function calls, that can be replaced with direct ones to allow vectorization.
 - Better utilization of FMA instructions.
 - Updated recommendation for Fortran "contiguous" attribute.
- Extended CLI snapshot feature with caching of sources and binaries. So you can make self-contained packed result snapshot on a remote server or a cluster node, which then can be easily copied to your workstation for investigation.

Intel® Advisor XE 2016 Update 2

- Support variable names for object-oriented code in MAP/Dependencies analysis.
- Extended Survey grid by adding user functions and improved SIMD-enabled function representation.
- Ability to run Trip Counts and Survey analyses in any order. Trip Counts data is kept after recollecting Survey data.
- New recommendations for scalar math functions and OpenMP function calls.
- Introduced new issue "Vector register spilling" with appropriate recommendations. Number of actually used vector registers is reported in separate column.
- List of selected loops is stored in separate file. This allows to select loops in GUI and run analysis in CLI for the same project, without markup in CLI. Loop selection is editable from CLI and persistent, so no need to specify markup list for "-collect" command every time.
- Memory footprint metric estimate
- Bug fixes

Intel® Advisor XE 2016 Update 1

- Microsoft Windows* 10 OS support
- Microsoft Visual Studio* 2015 IDE integration
- Ability to filter in Refinement report
- Packed snapshot to transfer read-only result as a single file
- Significantly improved performance and responsiveness in Survey, Trip Counts, MAP and Correctness reports data loading and finalization
- Better GUI co-existence of Threading and Vectorization Advisor layouts
- Differentiated inlined functions in the Survey top-down grid
- Improved Summary report
- Added ability to sort by loop selection in Survey report
- Separate recommendations for Fortran and C++
- Improved data representation (parent-child relationship, filtering and highlight) in Survey.
- Added new MAP problem type: uniform stride (for stride = 0), improved variable resolution for MAP
- Exposed loops with estimated max trip count of loop = 1

Intel® Advisor XE 2016

- Extended Summary to support Vectorization.
- New Memory Access Pattern (MAP) recommendations to guide MAP analysis usage
- Improved quality and the types of data available in MAP and Correctness, including limited support for variable names-centric analysis.
- More information and better configuration in Source/Assembly views

Intel® Advisor XE 2016 Beta Update 3

- Added traits information in source and assembly views for selected loop.
- Highlighted some traits for loop:

- instruction classes (masked stores, vgather (for AVX2), horizontal instructions (for AVX and SSE));
 - small trip counts for vectorized body;
 - 128 vector width for AVX/AVX2; 128/256 vector width for AVX2.
- Correctness analysis re-named to Dependencies.
 - Added variable names to Dependencies view.
 - Added assembly page in product options to change assembler code representation style.
 - New CLI --help: better structure, new text, more examples.
 - Enabled restoration of loops selection after results re-opening.

Intel® Advisor XE 2016 Beta Update 2

- Fixed compatibility issue with Intel® Compilers 16.0 Beta Update 1

Intel® Advisor XE 2016 Beta Update 1

- Ability to set environment variables to manage collectors
- Added operand type and vector length information to the MAP Source view
- Stop/cancel for Trip Counts collection
- Improvements in command-line for MPI
- Slow scrolling in Survey fixed
- Search is now available in Source view and assembly view
- Survey finalization performance improvements
- Multiple stability and usability fixes

Intel® Advisor XE 2016 Beta

Intel Advisor XE 2016 Beta is a successor product to Intel® Advisor XE 2015. Intel Advisor XE 2016 Beta provides a set of tools that help you decide where to add threading and vectorization to your applications. The key features provided by this new major version since the Intel Advisor XE 2015 release include:

- Vectorization assistance in addition to the threading assistance available in the previous product

- Significant changes to the product workflow because of the addition of vectorization assistance

3 System Requirements

Supported Architectures and Terminology

Intel® Advisor XE supports the following architectures:

- **IA-32 Architecture** refers to systems based on 32-bit processors generally compatible with the Intel® Pentium® processors (for example, Intel® Pentium® 4 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 which have 64-bit architectural extensions, for example, Intel® Core™ processor family, running a 64-bit operating system such as Microsoft Windows XP* Professional x64 Edition or Microsoft Windows* 7 x64. If the system is running a 32-bit version of the Windows* operating system, then IA-32 architecture applies instead. Processors from other manufactures supporting the same instruction set running a 64-bit version of the Windows 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)
 - Since the Intel Advisor XE requires specific knowledge of assembly-level instructions, its analysis may not operate correctly if code contains non-Intel instructions. In this case, run the analysis with a target executable that contains only Intel® instructions. After you finish using the Intel Advisor XE, you can use the assembler or optimizing compiler options that provide the non-Intel instructions.
 - For the best experience, a multi-core or multi-processor system is recommended
- 2GB RAM
- 4GB free disk space for all product features and architectures
- Supported operating systems:
 - Microsoft Windows* 7 SP1
 - Microsoft Windows Server* 2008 SP2 and 2008 R2 SP1, 32-bit or “x64” editions - embedded editions are not supported
 - Microsoft Windows 8* and 8.1* operating system
 - Microsoft Windows Server* 2012
- Supported Microsoft Visual Studio (and Microsoft Visual C++* compiler) versions:
 - Microsoft Visual Studio* 2012

- Microsoft Visual Studio* 2013
- Supported Intel compilers (optional):
 - Intel® C++ Compiler 15 or higher
 - Intel® Visual Fortran Compiler 15 or higher
- Native application coding requirements
 - Supported programming languages:
 - Fortran
 - C
 - C++
 - Supported threading methodologies:
 - Intel® Threading Building Blocks (Intel® TBB)
 - Intel® Cilk™ Plus
 - OpenMP
 - Windows* Threads (low-level)
- Managed application coding requirements
 - Supported programming languages:
 - C# (.NET* versions 3.0 to 4.0)
 - Supported threading methodologies
 - C# Thread Class
 - Microsoft* Task Parallel Library (TPL)
- To view PDF documents, you need a PDF reader, such as Adobe Reader* 6 or later

Floating licensing service requirements

Intel® Software License Manager version 2.3, available on the [Intel® Registration Center](#) (choose the right OS and platform; only users with floating license registrations have access to this link).

For more details please refer to the <https://software.intel.com/en-us/articles/intel-software-license-manager-getting-started-tutorial>

Notes:

1. Intel Advisor XE samples work with the Intel TBB by using the environment variable TBBROOT. Intel TBB is included with the Intel compiler and is available from <http://software.intel.com/en-us/intel-tbb/>. To build the Intel TBB projects, you will need to define the TBBROOT environment variable. To set the TBBROOT environment variable, see the Intel Advisor XE Help or Getting Started Tutorial.

4 Installation Notes

If you are installing the product for the first time, please be sure to have the product serial number available so you can type it in during installation. A valid license is required for installation and use.

To begin installation:

- Double-click on the executable file to begin installation. If several different downloadable files are available (such as for different components), please read the download web page carefully to determine which file is appropriate for you.

Intel® Advisor XE can be installed on the same system as the Intel® Parallel Advisor 2011.

Activation

You must activate the product to finish installation. Use one of these methods:

- Activation using serial number. Internet connection is required;
- Remote activation using serial number. Used when your computer is not connected to the internet. You can use another computer with internet access;
- Activation using license file;
- Activation using license server.

You can also evaluate the product for 31 days.

Floating licensing service requirements

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For more details please refer to the <https://software.intel.com/en-us/articles/intel-software-license-manager-getting-started-tutorial>

Intel® Software Manager

Intel® Software Manager is a utility that allows users to:

- Download and install updates for your Intel® Software Development Products.
- Manage subscription status of installed software.
- Activate serial numbers.
- Find out about the latest news for Intel Software Development Products.

- Intel Software Manager requires an Internet connection to connect to a remote server for information and updates.

Intel Software Manager installs with Intel Software Development Products on Windows*, Linux*, and Mac OS* X operating systems.

To obtain more information about the Intel Software Manager, please refer to the <https://registrationcenter-ssl.intel.com/Docs/ism.htm> web-page.

Default Installation Folders

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

- `C:\Program Files (x86)\Intel_sw_development_tools\Advisor XE 2016`

If you are installing on a system with a non-English language version of Windows OS, the name of the `Program Files (x86)` folder may be different. On IA-32 architecture systems, the folder name is `Program Files`.

This product installs into an arrangement of folders shown in the diagram below. Not all folders will be present in a given installation.

- `C:\Program Files (x86)\Intel_sw_development_tools\Advisor XE 2016`
 - `bin32`
 - `bin64`
 - `config`
 - `documentation`
 - `include`
 - `lib32`
 - `lib64`
 - `message`
 - `resource`
 - `samples`

Changing, Repairing and Removing the Product

If you want to modify, repair, or remove the Intel Advisor XE components, open the Control Panel and select the **Add or Remove Programs** applet (or **Programs and Features** in the Microsoft Windows 7 OS), select **Intel Advisor XE 2016** and click **Change/Remove** (or **Uninstall/Change** in the Microsoft Windows 7 OS). Follow the installation instructions. You may need the original installation files to complete this process. If you do not have the extracted files, you can use the original installer executable to complete this process as well.

Silent Installation

To learn details of silent non-interactive installation on Windows* systems, refer to the following link: http://software.intel.com/en-us/windows_silent_installation_guide.

Known Installation and Configuration Issues

- Please close Visual Studio sessions before installing, modifying, or removing the Intel Advisor XE from a non-administrator account. Not doing so will affect Visual Studio integration and may result in obscure error messages.

If you encounter problems viewing the Intel Parallel Studio XE (local) help: click **Help > Manage Help Settings > Settings**, and check **I want to use local help**. These set-up steps are needed only once.

- By default, Microsoft Visual Studio 2012 software sets the **Launch in Browser** option to display documentation for integrated products. To view the Intel Advisor XE local help documentation: Choose **Help > Intel Advisor XE 2016 Help** or use context-sensitive help. If you still encounter problems viewing the help, Choose **Help > Set Help Preferences > Launch in Help Viewer**.
- If you have multiple versions of Microsoft Visual Studio software installed on your system and integrate the Intel Advisor XE into each IDE, removing the integration from one of the IDEs will remove the integrated Intel Advisor XE documentation from both. There are two options to restore the documentation:

First option:

1. Open the Intel Parallel Studio XE command prompt: **Start > All Programs > Intel Parallel Studio XE 2016 > Analyzers > Command prompt**. You can choose any shortcut here, for example, “IA-32 Visual Studio 2012 mode”).
2. Remove the integration for the Visual Studio version that is missing integrated help. For example, to remove the Intel Advisor XE integration:

With:	Type:
Visual Studio 2012	advixe-vsreg -d 2012

3. Restore the integration. For example, to restore the Intel Advisor XE integration:

With:	Type:
Visual Studio 2012	advixe-vsreg -i 2012

Second option:

- Uninstall the product.
- Install it again with the desired Visual Studio integration selected.

5 Issues and Limitations

Known Issues and Limitations

- For the most complete vectorization analysis results using an Intel compiler (Version 15.0 or higher), set the /qopt-report compiler option to 5. (Alternatively, you can set the /qopt-report-phase Intel compiler option to vec.)
- Intel® Advisor XE may display a message that the “Project is out of date” before running the data collectors. You do not need to rebuild the project prior to running the collector if you know that the project is up-to-date.
- The Suitability tool cannot accurately measure and analyze the behavior of loops with very small task times (on the order of sub-microseconds) if those tasks are annotated with the TASK_BEGIN/TASK_END annotations. If possible, use the ITERATION_TASK annotation instead.
- The Suitability Report combines all lock data into a single lock and may not have source line information for LOCK_ACQUIRE and LOCK_RELEASE annotations.
- If your sources include huge source files that contain annotations, be aware that only the first 8 MB of each file will be parsed for annotations. If not all of your annotations are being parsed in such huge source files, consider breaking that source file into several source files each less than 8MB.
- When opening the Intel Advisor XE samples, Visual Studio software will display a warning message related to Intel Cilk Plus projects or list them as unsupported when the Intel C++ Compiler is not installed. This message may be ignored. However, Intel Cilk Plus projects will not compile without an Intel C++ Compiler with Intel Cilk Plus support, such as the Intel Parallel Studio XE (or similar Intel software suite).
- In the Correctness Report, the following sequence of actions may cause the Intel Advisor XE and Visual Studio software to crash: select the “Not fixed” **State** filter category in the Filter pane, mark the last remaining “Not fixed” problem as fixed in the Observation pane, and then remove the “Not fixed” filter by clicking the **All** button in the **State** filter or clicking the **Deselect all search criteria** button. To workaround this issue do one of the following:
 1. Avoid marking the last remaining problem as “Fixed” in the Observation pane while the “Not fixed” filter is applied.
 2. Avoid removing the “Not fixed” filter if all of the problems have been marked as “Fixed”.
- Navigating or interacting with the Intel Advisor XE Correctness Report while Correctness analysis is still running may cause the GUI to freeze or display empty Correctness results.

- The Survey Report may incorrectly report loops if a function contains calls to a non-returning function such as the `exit()` function.
- Loops within a function that does not contain debug information may not be reported as a loop in the Survey Report. For the suggested build settings, see the help topics under **Choosing and Building a Target > Build Settings**. After you fix the build settings to specify debug information, rebuild the target and run Survey analysis again.
- After analyzing the specified target executable, the Survey tool may report that no significant hotspot areas were detected. In this case, view the collected result using the Survey Report window. The suggested build settings are described in the help topics under **Choosing and Building a Target > Build Settings**.
- If debug information correlating an instruction to source code is not available to an Intel Advisor XE tool, the tool cannot correlate collected data with source code. In this case it will show an empty field, question mark, or broken icon. Source correlation may not be available for many different reasons, including:
 1. Omitting debug information options when building the target executable – see the help topics under **Choosing and Building a Target > Build Settings**.
 2. A compiler error.
 3. The compiler not generating debug information for this specific source line.
 4. The compiler not generating debug information for this specific source file.
 5. The linker not copying the debug information into the debug information database.
 6. The debug information database not being found by the finalization step in the Intel Advisor XE, because it was not moved along with the executable to the location where the Intel Advisor XE is being run.
 7. When using the Intel Advisor XE GUI, insufficient project properties were specified for the Binary/Symbol Search tab. In this case, see the help topic **Specifying Project Properties Using the Intel Advisor XE GUI**.
- Do not close the Intel Advisor XE GUI or Visual Studio software while expanding the Survey tree. Doing so may cause the product to crash or hang.
- Intel Advisor XE may present incorrect or incomplete information if local character sets are used. For general character set support, use Unicode.
- To build the Intel TBB versions of the samples using Visual Studio 2012, make sure the Intel TBB version installed is 4.1 or higher.
- On Windows Server 2012 systems, if you have problems viewing Microsoft Visual Studio 2012 help pages, check the settings for Internet Explorer in **Tools > Internet Options > Security**. To allow correct display of help, in the **Internet zone** enable **MIME Sniffing** and **Active scripting**.

- On Windows Server 2012 systems, if you find that you cannot display Getting Started Tutorials from within Internet Explorer 10, correcting a security setting for Microsoft Internet Explorer usually corrects the problem. From Tools > Internet Options > Security, add "about:internet" to the list of trusted sites. Optionally, you can remove "about:internet" from the list of trusted sites after you are finished viewing the documentation.

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wxWidgets Library

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/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.3, July 18th, 2005

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*/

Limxml2

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