Intel® Advisor 2017 for Linux* Release Notes

Installation Guide and Release Notes 22 July 2016

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1 Introduction

Intel® Advisor 2017 provides two tools to help ensure your Fortran and 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 visit our web site or refer to documentation:

- Documentation, help, and samples, open the get_started.html file in the following directory: <install-dir>/documentation/<locale>/welcomepage/. You can access the product help in a web browser as well by opening the index.htm file in the following directory: <install-dir>/documentation/<locale>/help/. The default <install-dir> is /opt/intel/advisor_2017.

- Technical support, including answers to questions not addressed in the installed product, please visit: http://software.intel.com/en-us/support/

2 What's New

Intel® Advisor 2017

- Full support for Intel® Xeon Phi™ processor (codename**: Knights Landing**) for all analysis types.
- Precise **FLOPS** metric collection that considers usage of **masked** operations. FLOPS metrics are collected along with the Trip Counts analysis when enabled in project properties.
- 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.

Analysis workflow:

- **Batch mode**, which lets you automate collecting multiple analysis types at once with auto-selection for MAP and Dependencies analysis using pre-defined criteria.
- New **"Smart mode"** for Survey results, which is an effective way to simplify data representation and to automatically select the loops that can be most impactful and/or suitable from a SIMD vector performance perspective.
- Improved MPI flow: better support for non-Intel MPI libraries, enabled creating snapshots for MPI results. Project properties dialog was extended with command line **configuration for MPI** launcher.
- Cross-highlighting between the Survey and Refinements report, so you can easily correlate loops in Survey and Dependencies/MAP analyses.

Memory analysis:

- Added simultaneous profiling of nested loops in MAP analysis. Memory access strides are now detected relatively to each of the profiled nested loops.
- **Gather and Scatter instructions** analysis with a special stride category in the Details section of MAP source view.
- **Variable names** detection in the Refinements report, including heap-allocated variables.
- More accurate memory **footprint metric**, showing the maximum footprint across all loop instances.

New recommendations:

- New recommendation to use **SDLT** for loops with an "Ineffective memory access" issue.
- Consider outer loop vectorization in appropriate cases.
- Consider refactoring the code to avoid using single Gather or Scatter instructions if the pattern is regular.

System Requirements

Supported Architectures and Terminology

Intel® Advisor 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™ 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)
    - Since the Intel Advisor 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, 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:
    - Red Hat* Enterprise Linux* 6 and 7
    - CentOS* versions equivalent to Red Hat Enterprise Linux versions listed above
    - Fedora* 23 and 24 (`pangox-compat` package should be installed)
    - SUSE* Linux Enterprise Server* 11 and 12

    - Debian* 7 and 8
    - Ubuntu* 14.04 and 16.04
- Application coding requirements:
    - Programming Language:
        - C or C++
        - Fortran
- Supported compilers:
    - Intel® C++ Compiler XE 15 and higher
    - Intel® Fortran Compiler XE 15 and higher
    - GNU* C/C++ Compiler 3.4.6 and higher
- Supported threading methodologies:
    - Intel® Threading Building Blocks (Intel® TBB)
    - Intel® Cilk™ Plus
    - OpenMP*
    - POSIX* Threads (low-level)
- To view PDF documents, you need a PDF reader, such as Adobe Reader* 6 or later

Notes:

1. Intel Advisor 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 applications, you will need to define the TBBROOT environment variable. To set the `TBBROOT` environment variable, see the Intel Advisor Help or Getting Started Tutorial.

3 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:

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.)
4. 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
```

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

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

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

Intel® Software Manager

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

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

To obtain more information about 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:

- `/opt/intel/advisor_2017`

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

Setting Up Your Command Line Environment

Before you can use the Intel Advisor `advixe-cl` and `advixe-gui` commands or display the `advixe-cl(1)` man page, you must first set up your command line environment. Source the provided shell script `advixe-vars.sh` (if you are using csh, source `advixe-vars.csh`):

1. Locate the directory where the advixe-vars script file was installed. If you accepted the default location when installing the Intel Advisor XE, the location is `/opt/intel/advisor_2017`.
2. Open a command window and type the following source command to execute the script file: `source /opt/intel/advisor_2017/advixe-vars.sh`

The script file displays the product name and the build number. You can now use the `advixe-cl` and `advixe-gui` commands as well as display the `advixe-cl(1)` man page.

NOTE: To build the Intel Advisor sample applications, you need to first define the ADVISOR_XE_2017_DIR environment variable. Running the `advixe-vars.sh` script will do this automatically. This variable can also be set manually. For example, if you used the default path during installation, type:

```
export ADVISOR_XE_2017_DIR=/opt/intel/advisor_2017
```

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/advisor_2017`

2. `uninstall.sh` (as a root user or the same user who performed the install)

Known Installation and Configuration Issues

- None

4 Issues and Limitations

Known Issues and Limitations

- Only Survey analysis is supported on Intel® Xeon Phi™ coprocessor (codename: Knights Landing). Other analysis types support is subject for future updates.
- Running the Intel Advisor on a Fedora* 22 operating system may generate the following errors:
    - *Error: This operating systems is not supported. Suggestion: Check the Release Notes for a list of supported operating systems*.
    - *Error: [Instrumentation engine]: 4.0 is not a supported Linux release. Collection failed. The collection was not able to run.*

  Do one of the following to resolve:
    - Set the following environment variable:
      ADVIXE_MORE_PIN_OPTIONS='-ifeellucky'
    - If you are running a bash shell, use the following command:
      export ADVIXE_MORE_PIN_OPTIONS='-ifeellucky'
- Running Intel Advisor in the linux console in background mode (./advixe-gui &) and profiling an application that uses input from the console (stdin) cause a product stop by linux OS that looks like product hang. Do not use background mode OR run your application with input from a file.
- There is known issue on Ubuntu* 14.10 OS where GUI controls don’t work. To circumvent this start the GUI maximized. To avoid this issue upgrade the OS to a later version.
- Do not use background mode OR run your application with input from file specified in application arguments (app < input.txt)
- Opening links to HTML files, such as help or recommendations, is not guaranteed if the xdm-utils package is not installed. Possible solutions are:
    - Install the xdm-utils package.
    - Use the default terminal program for KDE or Gnome desktop environments.
- 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.)

- 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.

- Security-enhanced Linux* settings (SELinux) are currently not supported by the Intel Advisor and need to be either disabled or set to permissive for a successful tool suite installation. This product supports only "Permissive" mode. To run the product successfully you may either disable SELinux by - setting the line "SELINUX=disabled" in your `/etc/sysconfig/selinux` file - adding "selinux=0" kernel argument in lilo.conf or grub.conf files or make a SELinux mode adjustment by - setting 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. More information about SELinux can be found at http://www.nsa.gov/research/selinux/index.shtml.

- Intel Advisor samples (Tachyon sample, for example) may fail to compile Cilk and OpenMP binaries on the Ubuntu 12.04 operating system with the following error message:

```
compilation aborted for src/util.cpp (code 4)
/usr/include/features.h(324): catastrophic error: cannot
open source file "bits/predefs.h"
#include <bits/predefs.h>
```

  Adding /usr/include/i386-linux-gnu directory to the CXXFLAGS environment variable helps build the samples successfully.

- When using certain HTML browsers to view the Intel Advisor documentation, if the Contents tab width appears truncated and hides some of the topic titles:
  - Click the Index (or Search) button
  - Click the Contents button

- Navigating or interacting with the Intel Advisor Correctness Report while Correctness analysis is still running may cause the GUI to freeze or display empty Correctness results.

- The Intel Software Manager feature that enables automatic product updates requires Java* software version 1.6 or higher.

- 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 for C/C++ Applications or Build Settings for Fortran Applications. 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 for C/C++ Applications or Build Settings for Fortran Applications.

- If debug information correlating an instruction to source code is not available to an Intel Advisor 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 for C/C++ Applications or Build Settings for Fortran Applications.
    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, because it was not moved along with the executable to the location where the Intel Advisor is being run.
    7. When using the Intel Advisor 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.

- Intel Advisor may crash while opening results on Ubuntu 10.10 or later if a license file is not present. This is caused by checking a license with enabled trusted storage. To workaround this issue, disable the ptrace protection in the OS by using the command:
  `echo 0 | tee /proc/sys/kernel/yama/ptrace_scope`

- When the Intel Advisor GUI is launched from a Linux OS desktop GUI (such as the KDE* or GNOME* GUI) the output of the non-GUI target application being analyzed will not be

displayed. To avoid this, launch the Intel Advisor GUI from a command shell with the advixe-gui command instead of the desktop GUI, or redirect the non-GUI application output to the Intel Advisor output window by choosing **File > Options > Application output destination > Application output window**.

- If you encounter problems searching the Intel Advisor help using a certain web browser, consider using a newer version of that browser or use a different web browser as your default browser.

- Intel Advisor may detect which timer source to use incorrectly on extreme desktop SNB-E (e.g. Intel Core i7-3960X) processors. In Survey and Suitability collections the following message may be displayed in the command line or Debug Window:

  Warning: Cannot load data file `/tmp/linux/openmp_triad/r007hs/data.0/25448-25455.0.trace' (Data file is corrupted).

  To work around the problem, collect results from the command line using "-run-pass-thru" option: `advixe-cl -collect survey -run-pass-thru=-timestamp=sys -- <application>`

5 Attributions

```
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```

```
Libunwind

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wxWidgets Library

This product includes wxWindows software which can be downloaded from
www.wxwidgets.org/downloads.

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==========

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Modified source code and instructions for building the wxWebConnect package shipped as a part of the Intel® Advisor XE are available at the following link:

https://software.intel.com/en-us/articles/wxwebconnect-for-intel-advisor-xe

---

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

  Copyright (C) 1995-2005 Jean-loup Gailly and Mark Adler

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  Jean-loup Gailly jloup@gzip.org
  Mark Adler madler@alumni.caltech.edu

*/
```

```
Limxml2

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