



# **Intel® VTune™ Amplifier XE 2017 Release Notes - OS X\***

Intel Corporation

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# Intel VTune Amplifier XE 2017 Release Notes - OS X\*

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## Introduction

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Intel® VTune™ Amplifier XE 2017 provides an integrated performance analysis and tuning environment with graphical user interface that helps you analyze code performance on systems with IA-32 or Intel® 64 architectures.

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

VTune Amplifier has a standalone graphical user interface (GUI) as well as a command-line interface (CLI).

Intel VTune Amplifier for OS X\* supports viewing of results collected on other OSs. Native collection on OS X\* is not currently available.

Please visit our web site for training videos, technical articles, documentation and support: <https://software.intel.com/en-us/intel-vtune-amplifier-xe>.

## What's New

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### VTune Amplifier XE 2017

- Support for Intel® Xeon Phi™ processor codenamed Knights Landing and Intel® Xeon® Processor E5 v4 Family (formerly codenamed Broadwell EP), including General Exploration, Memory Access (including high bandwidth analysis), and HPC Performance Characterization analysis
- Disk Input and Output analysis that monitors utilization of the disk subsystem, CPU and PCIe buses, helps identify long latency of I/O requests and imbalance between I/O and compute operations. Use the *Analyzing an Input/Output Bound Application* tutorial for a hands-on exercise with sample code.
- Memory Access analysis improvements:
  - Automatic detection of maximum system DRAM bandwidth characteristics. This option helps understand how you utilize the available DRAM bandwidth.
  - Support for custom memory allocators via Memory Allocation API that help correctly determine memory objects
  - *Identifying False Sharing* tutorial providing a hands-on exercise for running Memory Access analysis for a sample application to identify and remove false sharing issues
- HPC workloads profiling improvements:
  - HPC Performance Characterization analysis that explores the following performance aspects of the application scalability: CPU utilization with parallel efficiency for MPI and OpenMP\*, memory access efficiency and FPU utilization with basic vectorization metrics
  - MPI analysis extended with the event-based sampling collection supported for multiple ranks per node with an arbitrary MPI launcher and natural syntax. Arbitrary targets command line configuration extended with MPI launcher options. You can now use the **Copy Command Line to Clipboard** dialog box to automatically generate a command line for MPI analysis from GUI.
  - An option enabling/disabling the OpenMP\* regions analysis added to selected analysis configurations
  - An option controlling result finalization, `finalization-mode`, that enables you to perform a full finalization on the target, defer or skip the finalization. The deferred finalization mode is especially useful on target platforms with a single-thread performance lower than on the host. In this mode, the VTune Amplifier calculates a binary checksum to match the binaries for finalization on the host machine.

- *Analyzing an OpenMP and MPI Application* tutorial providing a hands-on exercise to identify memory utilization inefficiencies and load imbalance for a sample hybrid application
- More languages support:
  - Python\* applications profiling with Basic Hotspots analysis running via the Launch Application or Attach to Process modes
  - Go\* applications profiling with hardware event-based analysis types
- GPU analysis improvements:
  - GPU Hotspots analysis targeted for GPU-bound applications and providing options to analyze execution of OpenCL™ kernels and Intel Media SDK tasks
  - GPU analysis Summary introducing a set of metrics to estimate GPU utilization per engine, identify stalled or idle Execution Units and explore the most typical problems with low occupancy or frequent sampler accesses
  - Navigation from the Hottest GPU computing tasks summary to the details provided in the **Graphics** tab
  - Support for the **Attach to Process** target analysis for Intel Media SDK and OpenCL™ programs
  - Detection of the OpenCL™ 2.0 Shared Virtual Memory (SVM) usage types per kernel instance
- Usability improvements:
  - Support for the **Attach to Process** target analysis with the event-based sampling for low privileged Java\* daemons on Linux\*
  - Event selection mechanism for custom hardware event-based sampling analysis extended with filtering options
  - Arbitrary target GUI configuration to generate a command line for performance analysis on a system that is not accessible from the current host
  - UI improvements for the grid views and identification of performance issues
- Intel Performance Snapshot (Preview) introducing the following tools as part of the VTune Amplifier:
  - Application Performance Snapshot tool provides a quick look at your application performance and helps you understand whether your application will benefit from tuning. It identifies how effectively your application uses the hardware platform and displays basic performance enhancement opportunities.
  - Storage Performance Snapshot tool analyzes your system's storage, CPU, memory, and network usage and displays basic performance enhancement opportunities for systems using Intel hardware.

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**NOTE:**

A **PREVIEW FEATURE** may or may not appear in a future production release. It is available for your use in the hopes that you will provide feedback on its usefulness and help determine its future. Data collected with a preview feature is not guaranteed to be backward compatible with future releases. Please send your feedback to [parallel.studio.support@intel.com](mailto:parallel.studio.support@intel.com).

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- Support for Fedora\* 23 and 24, Ubuntu\* 15.10 and 16.04
- Support for Linux\* kernel up to 4.4

## System Requirements

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For an explanation of architecture names, see <http://software.intel.com/en-us/articles/intel-architecture-platform-terminology/>

### Processor Requirements

- For general operations with user interface and all data collection except Hardware event-based sampling analysis:

- A PC 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).
- For the best experience, a multi-core or multi-processor system is recommended.
- Because the VTune Amplifier requires specific knowledge of assembly-level instructions, its analysis may not operate correctly if a program contains non-Intel instructions. In this case, run the analysis with a target executable that contains only Intel® instructions. After you finish using the VTune Amplifier, you can use the assembler code or optimizing compiler options that provide the non-Intel instructions.
- For Hardware event-based sampling analysis (EBS):
  - EBS analysis makes use of the on-chip Performance Monitoring Unit (PMU) and requires a genuine Intel processor for collection. EBS analysis is supported on Intel® Pentium® M, Intel® Core™ microarchitecture and newer processors (for more precise details, see the list below).
  - EBS analysis is not supported on the Intel Pentium 4 processor family (Intel® NetBurst® MicroArchitecture) and non-Intel processors. However, the results collected with EBS can be analyzed using any system meeting the less restrictive general operation requirements.

Event-Based Sampling and Sampling with stacks data collection is functional inside a virtual machine only for architectural events.

Please see the Performance Monitoring Unit Sharing Guide at <http://software.intel.com/file/30388/> for more details on the supported architectural events.

VTune Amplifier installation detects virtual environment and disable sampling drivers installation to avoid system instability.

Hardware Event-based Sampling (EBS) analysis runs a driverless sampling collection via Linux Perf\* tool.

- The list of supported processors is constantly being extended. Here is a partial list of processors where the EBS analysis is enabled:

#### **Mobile Processors**

- Intel® Atom™ Processor
- Intel® Core™ i7 Mobile Processor Extreme Edition (including 2nd, 3rd, 4th and 5th Generation Intel® Core™ processors)
- Intel® Core™ i7, i5, i3 Mobile Processors (including 2nd, 3rd, 4th, 5th and 6th Generation Intel® Core™ processors)
- Intel® Core™2 Extreme Mobile Processor
- Intel® Core™2 Quad Mobile Processor
- Intel® Core™2 Duo Mobile Processor
- Intel® Pentium® Mobile Processor

#### **Desktop Processors**

- Intel® Atom™ Processor
- Intel® Core™ i7 Desktop Processor Extreme Edition (including 2nd, 3rd, 4th and 5th Generation Intel® Core™ processors)
- Intel® Core™ i7, i5, i3 Desktop Processors (including 2nd, 3rd, 4th, 5th and 6th Generation Intel® Core™ processors)
- Intel® Core™2 Quad Desktop Processor
- Intel® Core™2 Extreme Desktop Processor
- Intel® Core™2 Duo Desktop Processor

#### **Server and Workstation Processors**

- Intel® Xeon® processors E7 family (including v2 and v3)
- Intel® Xeon® processor E5 family (including v2 and v3)

- Intel® Xeon® processors E3 family (including v2, v3 and v4)
- Intel® Xeon® Processor D family
- Intel® Xeon® Processor 7000 Sequence
- Intel® Xeon® Processor 6000 Sequence
- Intel® Xeon® Processor 5000 Sequence
- Intel® Xeon® Processor 3000 Sequence
- Intel® Xeon Phi™ Coprocessors codenamed Knights Corner
- Intel® Xeon Phi™ Processor codenamed Knights Landing
- Quad-Core Intel® Xeon® processors 7xxx, 5xxx, and 3xxx series
- Dual-Core Intel® Xeon® processors 7xxx, 5xxx, and 3xxx series

## System Memory Requirements

At least 2 GB of RAM

## Disk Space Requirements

900 MB free disk space required for all product features and all architectures

## Software Requirements

- Supported operational systems (Embedded editions not supported):
  - OS X\* 10.10.\*
  - OS X\* 10.11.\*

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### NOTE:

- 32-bit graphical user interface support is removed. A 64-bit operating system host is required to use the VTune Amplifier graphical user interface to analyze collected profile data. Command line profiling and reporting is supported on a 32-bit operating system host. Use the command line installer instructions to install on a 32-bit operating system.
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- Supported compilers:
  - Intel® C/C++ Compiler 11 and higher
  - Intel® Fortran Compiler 11 and higher
- Application coding requirements
  - Supported programming languages:
    - Fortran
    - C
    - C++
    - Java\*
    - OpenCL\*
    - Python
    - Go
  - Concurrency and Locks and Waits analysis types interpret the use of constructs from the following threading methodologies:
    - Intel® Threading Building Blocks
    - OpenMP\*
    - Intel's C/C++ Parallel Language Extensions

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**NOTE:**

- VTune Amplifier supports analysis of OpenMP\* applications built with Intel® Fortran Compiler Professional Edition version 11.0 or higher, Intel® C++ Compiler Professional Edition version 11.0 or higher, .
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- Supported Java\* environments:
  - Oracle\* JVM 6, 7 and 8 – Hotspots and Hardware event-based analysis types
  - IBM\* J9 – Hardware event-based analysis types only
- Supported OpenCL\* environments:
  - Intel® SDK for OpenCL Applications 2013 version 2013 and newer
- Supported Intel® Manycore Platform Software Stack (Intel® MPSS) versions for Intel® Xeon Phi™ coprocessor profiling:
  - Hardware event-based sampling analysis: the MPSS 2.1, 3.3.\*, 3.4.\*, 3.5.\*, 3.6.\* and 3.7.\*
  - To view PDF documents, use a PDF reader, such as Adobe Reader\*.
  - To enable automatic product updates with the Intel Software Update Manager, use Java\* version 1.6 or higher.

### Floating Licensing Service Requirements

Intel® Software License Manager version 2.4, 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>

## Technical Support

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If you did not register your product during installation, please do so at the Intel® Software Development Products Registration Center. Registration entitles you to free technical support, product updates and upgrades for the duration of the support term.

For information about how to find Technical Support, Product Updates, User Forums, FAQs, tips and tricks, and other support information, please visit <http://www.intel.com/software/products/support/>

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**NOTE:**

If your distributor provides technical support for this product, please contact them for support rather than Intel.

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## Installation Notes

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Please refer to the *Installation Guide* document that is also available online: <https://software.intel.com/en-us/Intel-VTune-Amplifier-XE-Install-Guide-OSX>.

## Issues and Limitations

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### Running time is attributed to the next instruction (200108041)

To collect the data about time-consuming running regions of the target, the Intel® VTune™ Amplifier interrupts executing target threads and attributes the time to the context IP address.

Due to the collection mechanism, the captured IP address points to an instruction AFTER the one that is actually consuming most of the time. This leads to the running time being attributed to the next instruction (or, rarely to one of the subsequent instructions) in the Assembly view. In rare cases, this can also lead to wrong attribution of running time in the source - the time may be erroneously attributed to the source line AFTER the actual hot line.

In case the inline mode is ON and the program has small functions inlined at the hotspots, this can cause the running time to be attributed to a wrong function since the next instruction can belong to a different function in tightly inlined code.

## **An application that allocates massive chunks of memory may fail to work under VTune Amplifier (200083850)**

If a 32-bit application allocates massive chunks of memory (close to 2 GB) in the heap, it may fail to launch under the VTune Amplifier while running fine on its own. This happens because the VTune Amplifier requires additional memory when profiling an application. The workaround could be in using larger address space (for example, converting the project to 64-bit).

## **Hardware event-based analysis may crash certain Intel® Core™ i7 processor-based systems when deep sleep states are enabled (200149603)**

On some Intel® Core™ i7 processor-based (code named Nehalem) systems with C-states enabled, sampling may cause system hanging due to a known hardware issue (see errata AAJ134 in <http://download.intel.com/design/processor/specupdt/320836.pdf>). To avoid this, disable the "Cn(ACPI Cn) report to OS" BIOS option before sampling with the VTune Amplifier on Intel Core i7 processor-based systems.

## **Instruction set reference document is not positioned on description of proper instruction. (200091200)**

The reference information for assembly instructions can be opened in any PDF viewer, but only Adobe Acrobat Reader\* supports positioning the instruction reference document on the required page. To ensure correct functionality of this feature, you are recommended to install the latest available version of Adobe Acrobat Reader.

## **VTune Amplifier does not support profiling an application launched under debugger (200092508)**

The Basic Hotspots, Concurrency, Lock and Waits, Memory Access with object tracking and Disk I/O analysis types provide incorrect results when analyzing an application launched under a debugger. VTune Amplifier does not detect whether a debugger is attached to a profiled application. Make sure that no debugging tools are attached to the application that is profiled with the VTune Amplifier.

## **Timeline pane displays incorrect concurrency and thread states for a paused region in the Concurrency and Locks and Waits analyses. (200204715)**

Concurrency and thread state data may be incorrect in the Timeline pane for a region corresponding to the time when data collection was paused. Ignore the timeline data in a paused region during result analysis.

## **Only one stack frame is shown in Java code if IBM\* J9\* JVM is used (200227950)**

Currently Java stack unwinding is not supported for IBM\* J9\* JVM.

## **Results not collected for processes terminated with `TerminateProcess()` (200108689)**

No results are displayed for any process being profiled that is terminated by a different process calling `TerminateProcess()`. Instead, a different method should be used to terminate the process.



### **Do not use option with Intel compiler version earlier than 13.0. (200260765)**

If using the Intel® compiler version earlier than 13.0, to get performance data on inline functions, use the additional option `/Qipo`, but avoid using the `/Qipo` option. Currently this option disables generating the inline debug information in the compiler. Note that the Intel compiler integrated into the Microsoft Visual Studio\* IDE uses the `/Qipo` by default in the Release configuration.

### **Java source line may be shown incorrectly for Oracle JDK 6u25 x64 (200167001)**

Drilling down to Java source code from VTune Amplifier XE results may show incorrect source line. The issue occurs with Java applications built with Oracle JDK 6u25 x64. This is the JDK problem, refer to issues JDK-7051767 and JDK-7047624 in Oracle bug database.

### **Result finalization may be slow if results are located in a remote network directory (200169322)**

The problem is caused by slow network access. To improve performance use local directory for result storage.

### **Call stack can't be unwound via no return functions (200263851)**

If analyzed application contains functions without `ret` instruction (for example, calling `exit()`), unwinding call stack to its caller and higher may fail (no stack frames shown).

### **Attaching the VTune Amplifier to a process may take some time (200276420)**

Your target application may complete before the data collection starts, so the VTune Amplifier may report an error. Increase the duration of your test application if necessary.

### **Command "status" is not supported for hardware event-based analysis types (200281661)**

Command line option "`$ amplxe-cl -command status`" is currently supported only for user-mode sampling and tracing based analysis types, but not for EBS analysis types.

### **Hardware event-based analysis may cause unpredictable system behavior on processors based on Intel® microarchitecture code named Sandy Bridge (200285401)**

On processors based on Intel microarchitecture code name Sandy Bridge, hardware event-based sampling may cause unpredictable system behavior due to a known hardware issue (see erratum BK105 in <http://www.intel.com/content/dam/www/public/us/en/documents/specification-updates/2nd-gen-core-family-mobile-specification-update.pdf>). To avoid this, you are not recommended to run General Exploration or Custom Hardware event-based analysis with precise events on these systems unless a BIOS workaround for the erratum is provided.

### **VTune Amplifier may detect which timer source to use incorrectly on Intel® Xeon® processor E5-XXXX processors (200287361)**

In User-mode Sampling and Tracing based analysis (Hotspots, Concurrency, Locks and Waits), the following message may be displayed in command line or Debug Window:

*Warning: Cannot load data file ``<path>\data.0\18385-18389.0.trace`' (SampleCallback: timestamps aren't ascended!).*

To work around the problem collect results from command line using the `-run-pass-thru` option:

```
amplxe-cl -collect hotspots -run-pass-thru=-timestamp=sys -- <application>
```

### **Hardware event-based analysis does not work if more than 128 events are gathered simultaneously (200293868)**

Decrease number of PMU events in analysis settings to resolve it.

## Results should be closed before comparing them (200236090)

VTune Amplifier does not support opening the same result twice. Due to that limitation it is not possible to compare (via the **Compare** button) results if one of them is already opened. You should close results first then compare them.

## ITT API task or frame is not shown in results if its end occurs when collector is inactive (200331811)

When ITT task or frame end notification occurs after collection was paused, or detach or stop command issued, the frame or task is not displayed in the result.

## An application may experience the stack overflow exception when running under the VTune Amplifier (200249394)

An application allocating massive chunks of memory on a thread stack may experience the stack overflow exception and fail when running under the VTune Amplifier, while running flawlessly on its own. This happens because the VTune Amplifier requires additional space on an application thread stack for profiling needs. To work around this problem, consider using larger thread stack space.

Intel VTune Amplifier for OS X\* supports viewing of results collected on other OSs. Native collection on OS X\* is not currently available.

## Attributions

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### Xulrunner

Modified source code and instructions for building the Xulrunnerpackage shipped as a part of the Intel® VTune Amplifier are available at the following link:

<https://software.intel.com/en-us/articles/xulrunner-for-intel-vtune-amplifier-xe>

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