INTEL® PARALLEL STUDIO XE 2019 UPDATE 5

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1 Introduction

Intel® Parallel Studio XE has three editions: Composer Edition, Professional Edition, and Cluster Edition.

Intel® Parallel Studio XE Composer Edition provides a software tools environment for developing Fortran, C, and/or C++ code using Intel® Compilers. Intel® Parallel Studio XE Composer Edition also includes Intel® Math Kernel Library, Intel® Integrated Performance Primitives, Intel® Threading Building Blocks, and Intel® Data Analytics Acceleration Library (Intel® DAAL).

Intel® Parallel Studio XE Professional Edition adds Intel® VTune™ Amplifier for performance analysis, Intel® Inspector for correctness analysis, and Intel® Advisor for parallelism discovery.

Intel® Parallel Studio XE Cluster Edition adds support for distributed memory computing via Intel® MPI Library, Intel® MPI Benchmarks, and Intel® Trace Analyzer and Collector. Intel® Cluster Checker provides cluster health monitoring tools.

On completing the Intel® Parallel Studio XE installation process, locate the `getstart*.htm` file in the `documentation_2019/en/ps2019` folder under the target installation path. This file is a documentation map to navigate to various information resources of Intel® Parallel Studio XE.

For licensing information, please refer to the Intel End User Licensing Agreement (EULA) available at https://software.intel.com/en-us/articles/end-user-license-agreement.

When you install Intel® Parallel Studio XE, we collect information that helps us understand your installation status and environment. Information collected is anonymous and is not shared outside of Intel. See https://software.intel.com/en-us/articles/data-collection for more information on what is collected and how to opt-out.

2 Product Contents

The following table shows which Intel® Software Development Tools are present in each edition of Intel® Parallel Studio XE 2019.

Tool	Composer Edition[1]	Professional Edition	Cluster Edition
Intel® C++ Compiler	X	X	X
Intel® Fortran Compiler / Intel® Visual Fortran	X	X	X
Intel® Distribution for Python*	X	X	X
Intel® Integrated Performance Primitives (Intel® IPP)	X	X	X
Intel® Math Kernel Library (Intel® MKL)	X	X	X
Intel® Data Analytics Acceleration Library (Intel® DAAL)[2]	X	X	X
Intel® Threading Building Blocks (Intel® TBB)	X	X	X
Intel-provided Debug Solutions	X	X	X
Microsoft Visual Studio Shell* for Intel® Visual Fortran **(for Windows* OS only)**	X	X	X
Intel® Advisor		X	X
Intel® Inspector		X	X
Intel® VTune™ Amplifier		X	X
Intel® Cluster Checker **(For Linux* OS only)**			X
Intel® MPI Benchmarks			X
Intel® MPI Library			X
Intel® Trace Analyzer and Collector			X

[1] Intel® Parallel Studio XE is only available in Composer Edition for macOS*.

[2] Intel® Integrated Performance Primitives, Intel® Data Analytics Acceleration Library, and Intel® Threading Building Blocks are not included in Fortran language only editions.

The table below lists the product tools and related documentation.

Tool	Version	Documentation
Intel® Advisor	2019 Update 5	get_started.htm
Intel® C++ Compiler	19.0 Update 5	get_started_wc.htm for Windows* OS get_started_lc.htm for Linux* OS get_started_mc.htm for macOS*
Intel® Cluster Checker **(For Linux* OS only)**	2019 Update 5	get_started.htm
Intel® Data Analytics Acceleration Library (Intel® DAAL)	2019 Update 5	get_started.htm
Intel® Distribution for Python*	2019 Update 5	
Intel® Fortran Compiler / Intel® Visual Fortran Compiler	19.0 Update 5	get_started_wf.htm for Windows* OS get_started_lf.htm for Linux* OS get_started_mf.htm for macOS*
Intel® Inspector	2019 Update 5	get_started.htm
Intel® Integrated Performance Primitives (Intel® IPP)	2019 Update 5	get_started.htm
Intel® Math Kernel Library (Intel® MKL)	2019 Update 5	get_started.htm
Intel® MPI Benchmarks	2019 Update 4	ReadMe_IMB.txt IMB_Users_Guide.htm
Intel® MPI Library	2019 Update 5	get_started.htm
Intel® Threading Building Blocks (Intel® TBB)	2019 Update 8	get_started.htm
Intel® Trace Analyzer and Collector	2019 Update 5	get_started.htm
Intel® VTune™ Amplifier	2019 Update 6	get_started.htm
Intel-provided Debug Solutions		See below for additional information.
Microsoft Visual Studio Shell* for Intel® Visual Fortran **(For Windows* OS; installs only on the master node)**		See below for additional information.

2.1 Additional Information for Intel-provided Debug Solutions

The Intel-provided Debug solutions are based on GNU* GDB. Please see https://software.intel.com/en-us/articles/intel-parallel-studio-xe-2019-composer-edition-fortran-debug-solutions-release-notes and https://software.intel.com/en-us/articles/intel-parallel-studio-xe-2019-composer-edition-c-debug-solutions-release-notes for information specific to this tool.

2.2 Additional Information for Microsoft Visual Studio Shell* for Intel® Visual Fortran

A Fortran-only Integrated Development Environment (IDE) based on Microsoft Visual Studio Shell 2015* is provided for systems that do not have a supported Microsoft Visual Studio installed. Installation of the Fortran IDE has the following additional requirements:

- Microsoft Windows 7 SP1* or newer, or Microsoft Windows Server 2012* or newer operating system
  - On Windows 8.1* and Windows Server 2012 R2*, KB2883200 is required
- Microsoft Windows 10 SDK*

2.2.1 Microsoft Visual Studio Shell Deprecation

Microsoft* has announced the stand-alone Microsoft Visual Studio Shell* will not be available for Visual Studio 2017. As such, starting with Intel® Parallel Studio XE 2019 U3 (all editions), we will no longer be providing a standalone shell. An integrated shell is available as part of the full Microsoft Visual Studio bundle. Please refer to https://visualstudio.microsoft.com/vs/ for further information on the Microsoft Visual Studio product offerings.

2.3 Intel® Software Manager

On Windows* OS only, the installation provides an Intel® Software Manager to provide a simplified delivery mechanism for product updates and provide current license status and news on all installed Intel® Software Development Products.

Intel® Software Manager has been removed from the Linux* and macOS* versions of Intel® Parallel Studio XE.

2.4 Supported and Unsupported Versions

Please see https://software.intel.com/en-us/articles/intel-parallel-studio-xe-supported-and-unsupported-product-versions for information on supported and unsupported versions of Intel® Parallel Studio XE.

3 What's New

This section highlights important changes from previous product versions. For more information on what is new in each tool, see the individual tool release notes. Documentation for all tools is online at https://software.intel.com/en-us/intel-software-technical-documentation.

Changes in Intel® Parallel Studio XE 2019 Update 5:

- All tools updated to the latest version.
- Intel® Parallel Studio XE 2019 Update 5 includes functional and security updates. Users should update to the latest version.
- Intel® Advisor:
  - Added Roofline Guidance in Code Analytics.
  - Implemented support for Visual Studio* 2019 Update 1.
  - Improved Roofline configuration menu for easier chart customization.

- Intel® C/C++ Compiler:
  - Added support for macOS* 10.14.6 and Xcode* 10.3.
  - CATALINA UPGRADE NOT RECOMMENDED if you plan to upgrade to macOS* 10.15 Catalina or Xcode* 11 – this Update is NOT COMPATIBLE with macOS* 10.15 or Xcode* 11. See the Intel® C/C++ Compiler Release Notes for more information. We will support macOS* 10.15 Catalina and Xcodde* 11 in a future update.
- Intel® Cluster Checker:
  - Faster default test execution.
  - Enhanced summary output lists brief facts on nodes and issues.
  - Troubleshooting tests on prerequisites for Intel® MPI Library.
- Intel® Data Analytics Acceleration Library:
  - Added new algorithms: DBSCAN, LASSO, Coordinate Descent optimization solver, and Model convertors.
  - Implemented initial Apache Arrow* support.
  - Improved performance for certain algorithms.
- Intel® Distribution for Python*:
  - Added single node support for DBSCAN, LASSO, and Coordinate Descent (CD) solver algorithms through daal4py package.
  - Added new distributed model support for SVD, QR, K-means init++ and parallel++ algorithms through daal4py package.
  - Optimized new Scikit-learn algorithms using Intel® Data Analytics Acceleration Library: Linear, Ridge, Logistic, PCA, KMeans, pairwise_distances, and SVC.
- Intel® Fortran Compiler:
  - Added support for macOS* 10.14.6 and Xcode* 10.3.
  - CATALINA UPGRADE NOT RECOMMENDED if you plan to upgrade to macOS* 10.15 Catalina or Xcode* 11 – this Update is NOT COMPATIBLE with macOS* 10.15 or Xcode* 11. See the Intel® Fortran Compiler Release Notes for more information. We will support macOS* 10.15 Catalina and Xcodde* 11 in a future update.
- Intel® Inspector:
  - Implemented support for Visual Studio* 2019 Update 1 including integration with Visual Studio debugger.
  - Bug fixes.
- Intel® Integrated Performance Primitives:
  - Fixed issues with kernel mode libraries on Linux* OS.
- Intel® Math Kernel Library:
  - Enabled Intel® Threading Building Blocks threading for GEMM_S8U8S32 and GEMM_S16S16S32.
  - Improved performance of ?GEQR for tall-and-skinny matrices on Intel® Advanced Vector Extensions 512 architecture sets.
  - Added new ILU smoother support in Sparse Solver.
- Intel® MPI Benchmarks:
  - Bug fixes.

- Intel® MPI Library:
  - Added support for AWS* EFA (Elastic Fabric Adapter).
  - OFI/mlx provider added as a technical preview via FI_PROVIDER. Note: RMA and dynamic process functionality is not yet available for OFI/mlx.
  - Added transparent Singularity* (3.0+) container support without need for external mpirun or process manager.
- Intel® Threading Building Blocks:
  - Improved async_node to never block a thread that sends a message through its gateway.
  - Added support of Windows* to the CMake module TBBInstallConfig.
  - Added ordered associate container: concurrent_{map, multimap, set, multiset} as a Preview Feature. This requires C++11.
- Intel® Trace Analyzer and Collector:
  - Implemented support for tracing Fortran 2008 applications.
  - Bug fixes.
- Intel® VTune™ Amplifier:
  - Simplified configuration of a Windows-to-Linux remote collection supporting automate password-less access to a Remote Linux (SSH) target.
  - Added support for HW-based analysis on systems running under Hyper-V.
  - Application Performance Snapshot enhanced with Max and Bound metrics to estimate the efficiency of DRAM, MCDRAM, and Persistent Memory usage.

Changes in Intel® Parallel Studio XE 2019 Update 4:

- All tools updated to the latest version.
- Intel® Parallel Studio XE 2019 Update 4 includes certain functional and security updates. Intel® Parallel Studio XE 2019 Update 5 is targeted to be released in September 2019 and will include additional functional and security updates. Customers should update to the latest version as it becomes available.
- Some older versions of Intel® Parallel Studio XE are no longer supported. Please see https://software.intel.com/en-us/articles/intel-parallel-studio-xe-supported-and-unsupported-product-versions for details.
- Added support for Microsoft Visual Studio* 2019.
- The Intel® Software License Manager has been updated to version 2.9 for this release. You must upgrade to this version before installing Intel® Parallel Studio XE 2019 Update 4 with a floating license.
  - Intel® Software License Manager can be downloaded from the Intel® Registration Center.
  - Intel® Software License Manager Release Notes: https://software.intel.com/en-us/articles/intel-software-license-manager-release-notes
- Intel® Advisor:
  - Added preview feature: Roofline guidance in Code Analytics.
  - Added support for Intel® Advanced Vector Extensions 512 (Intel® AVX-512) Vector Neural Network Instructions in Survey view and Code Analytics.

    - Removed requirement for "flock" operation in file system, that is often disabled on clusters. Now running on file systems like Lustre* should be smooth.
- Intel® Cluster Checker:
    - Added support for checking of second-generation Intel® Xeon® Scalable Processors by privileged or non-privileged users.
    - Updated support of Intel® Select Solutions for Simulation and Modeling to include the second-generation Intel® Xeon® Scalable Processor solution.
    - Added support for checking Intel® Optane™ DC Persistent Memory configurations and uniformity.
- Intel® Data Analytics Acceleration Library:
    - Introduced new distribution channel NuGet*
    - Improved Gradient Boosted Trees training stage performance for large-dimensional data sets with inexact split mode.
    - Extended Z-score by adding a new parameter “doScale”. The feature is applicable for the PCA algorithm with svdDense method.
- Intel® Distribution for Python*:
    - New distributed model support for “Moments of low order” and “Covariance” algorithms through daal4py package.
    - Updated versions of python packages.
- Intel® Inspector:
    - Added support for Microsoft Visual Studio* 2019 integration.
    - Memory Checker analysis was refactored to simplify some collection modes and address several types of false positive diagnostics.
    - Several types of false positive diagnostics were addressed.
- Intel® Integrated Performance Primitives:
    - Introduced new distribution channel NuGet* packages
    - Accelerated LZO compression algorithm X1X mode.
- Intel® Math Kernel Library:
    - Improved performance of the triangular matrix inverse routines (?TRTRI) for Intel® Advanced Vector Extensions and higher with OpenMP* threading.
    - Improved performance of P?POTRF and P?(SY,HE)EVD for Intel® Advanced Vector Extensions and higher.
    - Improved performance of C2C and R2C FFT functions for several sizes for Intel® Advanced Vector Extensions 512 systems.
- Intel® MPI Benchmarks:
    - Added the –warm_up option to get more stable benchmark results.
    - Added the Reduce_local benchmark to the IMB-MPI1 family.
- Intel® MPI Library:
    - Optimized application performance with automated selection at runtime of collective algorithms with I_MPI_TUNING_AUTO.
    - Optimized application performance of pinned ranks by NUMA node with I_MPI_ADJUST_BCAST.
    - MPI application start optimization with the ability to terminate a job if it has not been started successfully during a specified time period in seconds I_MPI_JOB_STARTUP_TIMEOUT.

- Intel® Threading Building Blocks (Intel® TBB):
    - Improved support for allocator propagation on concurrent_hash_map assigning and swapping.
    - Backend memory regions are now used separately by different types of objects to reduce the chance of small objects holding a large memory region.
- Intel® Trace Analyzer and Collector:
    - Removed Red Hat Enterprise Linux* 6.x support.
    - Removed the integrated HTML browser from Intel® Trace Analyzer.
- Intel® VTune™ Amplifier:
    - GPU analysis improvements.
    - Quality and usability improvements.
    - Microarchitecture analysis improvements.

Changes in Intel® Parallel Studio XE 2019 Update 3:

- All tools updated to the latest version.
- Intel® Parallel Studio XE 2019 Update 3 includes functional and security updates. Users should update to the latest version.
- The Intel® Software Improvement Program has been updated. Please see https://software.intel.com/en-us/articles/software-improvement-program for details.
- Intel® Advisor:
    - Extended Roofline compare feature with automatic matching of dots between results.
    - Introduced Roofline zone highlighting.
    - Added Cache Simulator configuration dialog.
- Intel® C/C++ Compiler:
    - Added CMake support for convex_hull and dot_product samples to Parallel STL.
    - Bug fixes.
- Intel® Data Analytics Acceleration Library:
    - Added support for Maven* repositories.
    - SAGA optimization solver is now available.
    - Introduced Gradient Boosting training stage performance improvements for inexact split mode.
- Intel® Distribution for Python*:
    - Extended availability of Intel® DAAL algorithms through daal4py package.
    - Added support for daal4py distributed mode and streaming mode.
    - Updated Python packages and their supported platforms.
- Intel® Fortran Compiler:
    - Bug fixes.
- Intel® Inspector:
    - Bug fixes.
- Intel® Integrated Performance Primitives:

    - Added optimizations for ippsFIRMR32f_32fc functionality.
    - Implemented new Threading Layer example.
- Intel® Math Kernel Library:
    - Added JIT generation of CGEMM/ZGEMM kernels, accelerating small matrix performance on certain instruction sets.
    - Added strict CNR mode for bitwise reproducibility on certain functions and certain instruction sets.
    - Introduced Chi-Square continuous distribution random number generator.
- Intel® MPI Benchmarks:
    - Added IMB-P2P benchmarks for point-to-point shared memory benchmarking.
- Intel® MPI Library:
    - Improved performance.
    - Added custom memory allocator (I_MPI_MALLOC).
    - MPI-IO enhancements (I_MPI_EXTRA_FILE_SYSTEM).
- Intel® Threading Building Blocks:
    - The global_control class is now a fully supported feature.
    - Added deduction guides for certain tbb containers.
    - Added tbb::scalable_memory_resource function returning interface to TBB memory allocator.
- Intel® Trace Analyzer and Collector:
    - Added start paused feature for trace collector (VT_START_PAUSED).
    - Added trace archiving feature (VT_COMPRESS_DATA).
- Intel® VTune™ Amplifier:
    - Added ability to generate HTML-based rank-to-rank communication diagram by message volume in Application Performance Snapshot.
    - Added enhanced PCIe device metrics to Platform view.
    - Quality and usability improvements.

Changes in Intel® Parallel Studio XE 2019 Update 2:

- All tools updated to the latest version.
- Intel® Parallel Studio XE 2019 Update 2 includes functional and security updates. Users should update to the latest version.
- Support for the following operating systems is being deprecated:
    - Red Hat Enterprise Linux* 6
    - Ubuntu* LTS 14.04, 18.10
    - Fedora* 27, 28, 29
    - SUSE Linux Enterprise Server* 11
    - Debian* 8
    - Microsoft Windows* 7, Server 2012
    - macOS* 10.13
- Support for the following IDEs is being deprecated:
    - Microsoft Visual Studio* 2013, 2015
    - Xcode* 9.x
- Support for the Microsoft Visual Studio Shell* is being deprecated.

Changes in Intel® Parallel Studio XE 2019 Update 1:

- All tools updated to the latest version.
- Japanese localization support.
- Removed 32-bit content for macOS*.
- Intel® Advisor:
    - Added ability to switch between “all integer operations” and “pure compute integer operations” in the Survey Grid column settings.
    - Added ability to export Integer and INT+FLOAT operations Roofline HTML report via the command line interface.
    - Added ability in the Integrated Roofline preview to select the mode of memory-related metrics by cache level and memory operations type in the Survey Grid column settings.
- Intel® Data Analytics Acceleration Library:
    - Added support for Apache Maven*.
    - Introduced support for MT2203 random number generators decision forest API changes.
    - The LBFGS algorithm now supports automatic step-length selection on each iteration of this algorithm.
- Intel® Distribution for Python:
    - Added new method for installing and upgrading.
    - Introduced a new high level Python* API for Intel® DAAL (daal4py) replacing pydaal. PyDAAL support will be deprecated in the Intel® Parallel Studio XE 2021 release.
    - Added access to Intel® MKL runtime settings through an easy-to-use Python control package (mkl-service).
- Intel® Inspector:
    - Bug fixes.
- Intel® Integrated Performance Primitives:
    - Added Custom Library Tool for Python*.
    - Optimized ippsFIRMR32f_32fc for Intel® Advanced Vector Extensions 2 and Intel® Advanced Vector Extensions 512.
    - Added example of pipeline in Intel® IPP TL.
- Intel® Math Kernel Library:
    - Introduced Universal Windows* Driver support.
    - Improved performance of specific BLAS, LAPACK, and FFT functions.
- Intel® MPI Library:
    - Improved performance.
    - Added I_MPI_* environment variables spell checker.
    - Customized libfabric-1.7.0 alpha sources and binaries are updated, internal OFI is now used by default.
- Intel® Threading Building Blocks:
    - Doxygen documentation can now be built with the ‘make doxygen’ command.

    - Enforced 8 byte alignment for tbb::atomic<long long> and tbb::atomic<double>.
    - Added constructors with HashCompare argument to concurrent_hash_map.
- Intel® Trace Analyzer and Collector:
    - Bug fixes.
- Intel® VTune™ Amplifier:
    - Extended threading analysis with the lower overhead hardware event-based sampling mode.
    - Added metrics and Top 5 Hotspots table to Hotspots command line report.
    - Added a sample matrix project to the Project Navigator.

3.1 Intel® Xeon Phi™ Product Family Updates

3.1.1 Intel® Xeon Phi™ 7200 Coprocessor (codenamed Knights Landing coprocessor)

Intel continually evaluates the markets for our products in order to provide the best possible solutions to our customer's challenges. As part of this on-going evaluation process Intel has decided to not offer Intel® Xeon Phi™ 7200 Coprocessor (codenamed Knights Landing Coprocessor) products to the market.

- Given the rapid adoption of Intel® Xeon Phi™ 7200 processors, Intel has decided to not deploy the Knights Landing Coprocessor to the general market.
- Intel® Xeon Phi™ Processors remain a key element of our solution portfolio for providing customers the most compelling and competitive solutions possible.

3.1.2 Support for the Intel® Xeon Phi™ x100 product family coprocessor (formerly code name Knights Corner) is removed in this release

The Intel® Xeon Phi™ x100 product family coprocessor (former code name Knights Corner) was officially announced end of life in January 2017. As part of the end of life process, the support for this family will only be available in the Intel® Parallel Studio XE 2017 version. Intel® Parallel Studio XE 2017 will be supported for a period of 3 years ending in January 2020 for the Intel® Xeon Phi™ x100 product family. Support will be provided for those customers with active support.

4 System Requirements

4.1 Processor Requirements

Systems based on IA-32 architecture are supported as target platforms on Windows* and Linux*. Systems based on Intel® 64 architectures below are supported both as host and target platforms.

Systems based on Intel® 64 architecture:

- Intel® Core™ processor family or higher
- Intel® Xeon® E5 v5 processor families recommended

- Intel® Xeon® E7 v5 processor families recommended

NOTE: It is assumed that the processors listed above are configured into homogeneous clusters.

4.2 Disk Space Requirements

12 GB of disk space (minimum) on a standard installation. Cluster installations require an additional 4 GB of disk space.

NOTE: During the installation process, the installer may need up to 12 GB of additional temporary disk storage to manage the intermediate installation files.

4.3 Operating System Requirements

The operating systems listed below are supported by all tools on Intel® 64 Architecture. Individual tools may support additional operating systems and architecture configurations. See the individual tool release notes for full details.

- Debian* 8 (deprecated), 9
- Fedora* 27 (deprecated), 28 (deprecated)
- Red Hat Enterprise Linux* 6 (deprecated), 7 (equivalent CentOS versions supported, but not separately tested)
- SUSE Linux Enterprise Server* 12, 15
- Ubuntu* 16.04, 18.04
- Microsoft* Windows* 7 (deprecated), 10
- Microsoft* Windows* Server 2012 (deprecated), 2012 R2 (deprecated), 2016
- macOS* 10.13 (deprecated), 10.14

The Intel® MPI Library and Intel® Trace Analyzer and Collector are supported on Intel® Cluster Ready systems and HPC versions of the listed versions of Microsoft* Windows* Server. These tools are not supported on Ubuntu non-LTS systems.

Intel® VTune™ Amplifier, Intel® Advisor, and Intel® Inspector graphical user interfaces may require newer operating system versions. Please see their respective Release Notes documents for details.

Installation on IA-32 hosts is no longer supported by any tools.

4.4 Memory Requirements

2 GB RAM (minimum)

4.5 Additional Software Requirements

Development for a 32-bit target on a 64-bit host may require optional library components (ia32-libs, lib32gcc1, lib32stdc++6, libc6-dev-i386, gcc-multilib, g++-multilib) to be installed from your Linux distribution.

On Microsoft Windows* OS, the Intel® C/C++ Compiler and Intel® Visual Fortran Compiler require a version of Microsoft Visual Studio* to be installed. The following versions are currently supported:

- Microsoft Visual Studio* 2013 (deprecated), 2015 (deprecated), 2017, 2019
- Microsoft Visual Studio Express* (only for command line compilation)

On macOS*, the Intel® C/C++ Compiler and Intel® Fortran Compiler require a version of Xcode* to be installed. The following versions are currently supported:

- Xcode* 9 (deprecated), 10

A 64-bit operating system host is required to use the Intel® VTune™ Amplifier graphical user interface to analyze collected profile data. Command line profiling and reporting is supported on a 32-bit operating system host. On Linux*, the following packages must be installed for the Intel® VTune™ Amplifier GUI:

- GTK+3
- X.Org (v1.0 or higher, v1.7 or higher is recommended)
- X.Org X11 libXss runtime library
- Network Security Services library (v3.22 or higher)
- ALSA library

5 Installation Notes

For instructions on installing and uninstalling the Intel® Parallel Studio XE see the Installation Guide for your operating system. These are available from the Intel® Software Development Products Registration Center page for Intel® Parallel Studio XE for your operating system. The installation of the product requires a valid license file or serial number.

5.1 Installation on macOS*

If you will be using Xcode*, please make sure that a supported version of Xcode is installed. If you install a new version of Xcode in the future, you must reinstall Intel® Parallel Studio XE afterwards.

The `Command Line Tools` component, required for command-line development, is not installed by default. It can be installed using the Components tab of the Downloads preferences panel.

You will need to have administrative or “sudo” privileges to install, change or uninstall the product.

Follow the prompts to complete installation.

Note that there are several different downloadable files available, each providing different combinations of tools. Please read the download web page carefully to determine which file is appropriate for you.

You do not need to uninstall previous versions or updates before installing a newer version – the new version will coexist with the older versions.

To perform a silent installation, you will need to be logged into the desktop with the same administrative account as you are using via the command line interface.

5.2 Some Features Require Installing as Root

Most of Intel® VTune™ Amplifier profiling features work with a non-root install. Many work on either a genuine Intel processor or a compatible processor.

Some advanced features that use event-based sampling require the latest OS kernel or sampling driver to be installed. Intel® Atom™ processors also require this driver for analysis.

To install the driver on a system with a genuine Intel processor, launch the installer as root or ask your system administrator to install the driver later. For information on building and setting up the drivers, see https://software.intel.com/en-us/sep_driver.

5.3 Online Installation

The electronic installation package for Intel® Parallel Studio XE now offers as an alternative a smaller installation package that dynamically downloads and then installs packages selected to be installed. This requires a working internet connection and potentially a proxy setting if you are behind an internet proxy. Full packages are provided alongside where you download this online install package if a working internet connection is not available. The online installer may be downloaded and saved as an executable file which can then be launched from the command line.

5.4 Silent Install

For information on automated or "silent" install capability, please refer to https://software.intel.com/en-us/download/parallel-studio-xe-2019-install-guide-windows for Windows*, https://software.intel.com/en-us/download/parallel-studio-xe-2019-install-guide-linux for Linux*, or https://software.intel.com/en-us/articles/silent-installation-guide-for-intel-parallel-studio-xe-for-os-x for macOS*.

5.4.1 Support of Non-Interactive Custom Installation

Intel® Parallel Studio XE supports the saving of user install choices during an 'interactive' install in a configuration file that can then be used for silent installs. This configuration file is created when the following option is used from the command line install:

- `--duplicate=config_file_name`: it specifies the configuration file name. If full path file name is specified, the "`--download-dir`" is ignored and the installable package will be created under the directory where configuration file is.

- `--download-dir=dir_name`: optional, it specifies where the configuration file will be created. If this option is omitted, the installation package and the configuration file will be created under the default download directory:

```
Windows: %Program Files%\Intel\Download\<package_id>
Linux: /tmp/<UID>/<package_id>
macOS:
/Volumes/<package_id>/<package_id>.app/Contents/MacOS/
```

For example: `parallel_studio_xe_<version>_setup.exe --duplicate=ic16_install_config.ini --download-dir="C:\temp\custom_pkg_ic16"`
The configuration file and installable package will be created under "`C:\temp\custom_pkg_ic16`".

5.5 Using a License Server

If you have purchased a "floating" license, see http://intel.ly/pjGfwC for information on how to install using a license file or license server. This article also provides a source for the Intel® License Server that can be installed on any of a wide variety of systems.

6 Documentation

The documentation index file getstart*.htm provides more information about Intel® Parallel Studio XE.

Note: Some hyperlinks in HTML documents may not work when you use Internet Explorer*. Try using another browser, such as Chrome* or Firefox*, or right-click the link, select **Copy shortcut**, and paste the link into a new Internet Explorer* window.

7 Issues and Limitations

1. Multiple problems have been encountered regarding integration with Microsoft Visual Studio* 2017. Please see https://software.intel.com/en-us/articles/intel-software-development-tools-integration-to-vs2017-issue for a current list of related issues along with known resolutions and workarounds.

2. There have been situations where during the installation process, `/tmp` has been filled up. We recommend that you have **at least 12 GB of free space** in `/tmp` when installing the Intel® Parallel Studio XE. Also, the installer script install.sh has the command-line options:

   `-t [FOLDER]`

   or

`--tmp-dir` *`[FOLDER]`*

where *`[FOLDER]`* is a directory path, which can direct the use of intermediate storage to another disk partition referenced by *`[FOLDER]`*. *`[FOLDER]`* should be a non-shared storage location on each node of the cluster. Note that *`[FOLDER]`* should also contain **at least 12 GB of free space**.

3. On Linux* OS, if any software tool of the Intel® Parallel Studio XE is detected as pre-installed on the head node, that software tool will not be processed by the installer. There is a similar problem on Windows* OS in the 'Modify' mode. For Windows* OS, if some software tool of the Intel® Parallel Studio XE is pre-installed on the head node using the installer, that software tool will not be installed on the compute nodes of the cluster. For either Linux* OS or Windows* OS, if you already installed some of the software tools only on the head node, and you want to install them on the other nodes using the installer, you need to uninstall such tools from the head node manually before starting the installer.

4. Intel® Parallel Studio XE for Windows* OS requires **the creation and use of symbolic links for installation of the Intel® software product tools**. If you have a File Allocation Table (FAT32) file system deployed on your Windows* OS platform, these symbolic links cannot be created and the integrity of the Intel® Parallel Studio XE installation is compromised.

5. In some situations, if a Windows OS computer has been updated but not restarted and the Visual Studio Shell is to be installed, Intel® Parallel Studio XE installation will fail with the error message "Intel(R) Parallel Studio XE 2019 Cluster Edition for Windows* Setup Wizard ended prematurely because of an error(s)." The failing module is vs_isoshell.exe. To work around this issue, restart your computer and repeat the installation process.

8 Technical Support

Your feedback is very important to us. To receive technical support for the tools provided in this product and technical information including FAQ's and product updates, you are encouraged to register your product at the Intel® Software Development Products Registration Center.

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To register for an account, please visit the Intel® Software Development Products Registration Center website at http://www.intel.com/software/products/registrationcenter/index.htm. If you have forgotten your password, please follow the instructions on the login page for forgotten password.

Each purchase of Intel® Parallel Studio XE includes a year of support services, which includes priority support at Online Service Center. For more information on Online Service Center please see http://software.intel.com/en-us/support/online-service-center. When submitting a support request, please select the appropriate tool unless your request is related to the entire suite.

9 Attributions for Intel® Math Kernel Library

As referenced in the End User License Agreement, attribution requires, at a minimum, prominently displaying the full Intel product name (e.g. "Intel® Math Kernel Library") and providing a link/URL to the Intel® MKL homepage (http://www.intel.com/software/products/mkl) in both the product documentation and website.

The original versions of the BLAS from which that part of Intel® MKL was derived can be obtained from http://www.netlib.org/blas/index.html.

The original versions of LAPACK from which that part of Intel® MKL was derived can be obtained from http://www.netlib.org/lapack/index.html. The authors of LAPACK are E. Anderson, Z. Bai, C. Bischof, S. Blackford, J. Demmel, J. Dongarra, J. Du Croz, A. Greenbaum, S. Hammarling, A. McKenney, and D. Sorensen. Our FORTRAN 90/95 interfaces to LAPACK are similar to those in the LAPACK95 package at http://www.netlib.org/lapack95/index.html. All interfaces are provided for pure procedures.

The original versions of ScaLAPACK from which that part of Intel® MKL was derived can be obtained from http://www.netlib.org/scalapack/index.html. The authors of ScaLAPACK are L. S. Blackford, J. Choi, A. Cleary, E. D'Azevedo, J. Demmel, I. Dhillon, J. Dongarra, S. Hammarling, G. Henry, A. Petitet, K. Stanley, D. Walker, and R. C. Whaley.

The Intel® MKL Extended Eigensolver functionality is based on the Feast Eigenvalue Solver 2.0 http://www.ecs.umass.edu/~polizzi/feast/.

PARDISO in Intel® MKL is compliant with the 3.2 release of PARDISO that is freely distributed by the University of Basel. It can be obtained at http://www.pardiso-project.org.

Some FFT functions in this release of Intel® MKL have been generated by the SPIRAL software generation system (http://www.spiral.net/) under license from Carnegie Mellon University. The Authors of SPIRAL are Markus Puschel, Jose Moura, Jeremy Johnson, David Padua, Manuela Veloso, Bryan Singer, Jianxin Xiong, Franz Franchetti, Aca Gacic, Yevgen Voronenko, Kang Chen, Robert W. Johnson, and Nick Rizzolo.

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