INTEL® PARALLEL STUDIO XE 2020 UPDATE 4

22 October 2020

Contents

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™ Profiler 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_2020/en/ps2020` 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 2020.

Tool	Composer Edition[1]	Professional Edition	Cluster Edition
Intel® C++ Compiler	X	X	X
Intel® Fortran Compiler	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
Intel® Advisor		X	X
Intel® Inspector		X	X
Intel® VTune™ Profiler		X	X
Intel® Cluster Checker **(For Linux* OS only)**			X
Intel® MPI Benchmarks			X
Intel® MPI Library			X
Intel® Trace Analyzer and Collector			X

The table below lists the product tools and related documentation.

---

[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.

Tool	Version	Documentation
Intel® Advisor	2020 Update 3	get_started.htm
Intel® C++ Compiler	19.1 Update 3	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 10	get_started.htm
Intel® Data Analytics Acceleration Library (Intel® DAAL)	2020 Update 3	get_started.htm
Intel® Distribution for Python*	2020 Update 4	
Intel® Fortran Compiler	19.1 Update 3	get_started_wf.htm for Windows* OS get_started_lf.htm for Linux* OS get_started_mf.htm for macOS*
Intel® Inspector	2020 Update 3	get_started.htm
Intel® Integrated Performance Primitives (Intel® IPP)	2020 Update 3	get_started.htm
Intel® Math Kernel Library (Intel® MKL)	2020 Update 4	get_started.htm
Intel® MPI Benchmarks	2019 Update 7	ReadMe_IMB.txt IMB_Users_Guide.htm
Intel® MPI Library	2019 Update 9	get_started.htm
Intel® Threading Building Blocks (Intel® TBB)	2020 Update 3	get_started.htm
Intel® Trace Analyzer and Collector	2020 Update 3	get_started.htm
Intel® VTune™ Profiler	2020 Update 3	get_started.htm
Intel-provided Debug Solutions		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-2020-composer-edition-fortran-debug-solutions-release-notes and https://software.intel.com/en-us/articles/intel-parallel-studio-xe-2020-composer-edition-c-debug-solutions-release-notes for information specific to this tool.

2.2   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 2020 Update 4:
- All tools updated to the latest version.
- Intel® Parallel Studio XE 2020 Update 4 includes functional and security updates. Users should update to the latest version.
- Intel® C/C++ Compiler:
  - Added support for Intel® Advanced Matrix Extensions intrinsics.
- Intel® Cluster Checker:
  - Added feature to propagate environment variables to all nodes using pdsh for remote execution.
  - Improvements to data collection and messaging for several frameworks.
  - Changes to third-party components for resolution of CVEs to those components.
- Intel® Data Analytics Acceleration Library:
  - Improved Intel® DAAL and daal4py performance for certain algorithms.
  - Acceleration of KNeighborsClassifier, RandomForestClassifier, and RandomForestRegressor scikit-learn estimator.
  - Conversion of trained XGBoost* and LightGBM* models into a daal4py Gradient Boosted Trees model for fast prediction.
- Intel® Distribution for Python*:
  - Releasing scikit-ipp 1.2.0 for image warping, image filtering, and morphological operations with scikit-image like API.

- o Releasing mkl_umath Python package for Intel technologies-powered NumPy universal function.
- o Added new features for some functions in scikit-learn.
- Intel® Fortran Compiler:
  - o Added support for Intel® Advanced Matrix Extensions intrinsics.
- Intel® Integrated Performance Primitives:
  - o Extended optimization for Intel® IPP CRC functions on 10th Generation Intel® Core™ processor family.
  - o Extended optimizations for Intel® IPP Image Processing and Color Conversions functions for selected algorithms for Intel® Advanced Vector Extensions 512 (Intel® AVX-512).
  - o Extended Intel® IPP Cryptography with ECDSA (Sign) and ECDHE for the NIST curves p256r1 and p384r1.
- Intel® Math Kernel Library:
  - o Introduced Intel® Advanced Matrix Extensions (Intel® AMX) based GEMM with MKL_ENABLE_INSTRUCTIONS=AVX512_E4.
- Intel® MPI Benchmarks:
  - o Bug fixes.
- Intel® MPI Library:
  - o Added Intel® Ethernet 800 series support.
  - o Added MPI + OpenMP offload examples.
  - o Added new algorithm for MPI_Sendrecv_replace (I_MPI_ADJUST_SENDRECV_REPLACE=2).
- Intel® Trace Analyzer and Collector:
  - o Bug fixes.
- Intel® VTune™ Profiler:
  - o Added support for remote profiling of applications running in Amazon Web Services* (AWS) EC2 instances.
  - o Source-level Memory Mapped I/O (MMIO) analysis now supports InfiniBand* devices.
  - o Added support for 11th Gen Intel® Core™ processors code named Tiger Lake.

Changes in Intel® Parallel Studio XE 2020 Update 3:
- Intel® Parallel Studio XE 2020 Composer Edition for Fortran and C++ Linux* contains an update to the Intel® C++ Compiler next generation code generator. This is invoked using the -qnextgen option to the ICC and ICPC compilers. This update to the Intel® C++ Compiler next generation code generator includes our latest updates and features for our C++ next generation compiler invoked with the -qnextgen option. There are no new features, bug fixes, or security enhancements for the Intel® Fortran Compiler or the Intel® C++ Compiler without the -qnextgen option.

Changes in Intel® Parallel Studio XE 2020 Update 2:
- All tools updated to the latest version.

- Intel® Parallel Studio XE 2020 Update 2 includes functional and security updates. Users should update to the latest version.
- Intel® Advisor:
  - Added Memory-Level Roofline feature (previously known as Integrated Roofline in tech preview).
- Intel® Cluster Checker:
  - Clarification, enhancements and improvements to the console output and reports.
  - Improved the heterogeneous node group configuration input file example along with changes to the output of the report when using node groups.
  - Changed the execution and reporting of IMB and OSU benchmark environments for better handling of the workloads and exceptions.
- Intel® Distribution for Python*:
  - Implemented Scikit-Learn compatible Gradient Boosted Tree classifier, Decision Tree Classifier and tree-based Adaboost classifier in daal4py.
  - Implemented computation of prediction probabilities in Scikit-Learn compatible RandomForest and Gradient Boosted Trees classifiers in daal4py.
  - Updated numpy package to v1.18.5.
- Intel® Inspector:
  - Updated 3rd party components, which include functional and security updates. Users should update to the latest version.
- Intel® Integrated Performance Primitives:
  - Added new universal CRC function to compute CRC8, CRC16, CRC24, CRC32 checksums.
  - Enabled the Intel® IPP Threading Layer for the ippiCrossCorr function.
  - Reinstated the ippiComplement function optimized for Intel® AVX-512, Intel® AVX2, Intel® SSE4.2 instruction sets.
- Intel® Math Kernel Library:
  - Introduced {cblas_}?axpy_batch APIs.
  - Introduced bfloat16 data type support for GEMM and pack-API.
  - Introduced strided API for Vector Math.
- Intel® MPI Library:
  - Implemented optimizations and platform recognition for Intel® Xeon® Platinum 9282/9242/9222/9221 family.
  - Implemented Distributed Asynchronous Object Storage (DAOS) file system support.
  - Implemented NetworkDirect API support for MS Windows* (technical preview).
- Intel® Threading Building Blocks:
  - Changed body type concept of the flow::input_node.
  - Fixed compilation errors in C++20 mode due to ambiguity of comparison operators.
  - Fixed an issue in TBBBuild.cmake that causes the build with no arguments to fail.

- Intel® Trace Analyzer and Collector:
  - Bug fixes.

Changes in Intel® Parallel Studio XE 2020 Update 1:
- All tools updated to the latest version.
- The initially released build (085) of Intel® Parallel Studio XE 2020 Update 1 for Windows* was released with an installer bug. This was corrected and a new installer build (086) was released. The only change between the two builds is the installer.
- Intel® Parallel Studio XE 2020 Update 1 includes functional and security updates. Users should update to the latest version.
- Intel® Advisor:
  - Integrated Roofline feature preview added First Bottleneck visualization and single kernel view and guidance.
  - Advisor Python* API support moved to Python 3 version. Python 2 is not supported due to EOL and security concerns.
- Intel® C/C++ Compiler:
  - Bug fixes.
- Intel® Cluster Checker:
  - Output format changes to improve readability and parsing of analysis reports.
  - Beta feature to perform analysis on user-defined groups of nodes and framework definitions.
  - Option to output reports in JSON format.
- Intel® Data Analytics Acceleration Library:
  - New algorithms implemented: Elastic Net and Probabilistic classification for Decision Forest.
  - Performance optimizations for K-means, Gradient Boosted Trees training stage, Decision Forest prediction stage, Spark samples, and across algorithms that use SOA (Structure Of Arrays) NumericTable.
- Intel® Distribution for Python*:
  - daal4py accelerates DBSCAN algorithm in Scikit-Learn.
  - Added support for Elastic net algorithm and Classification probabilities for Decision Forest algorithm in daal4py.
- Intel® Fortran Compiler:
  - Bug fixes.
- Intel® Inspector:
  - Bug fixes.
- Intel® Integrated Performance Primitives:
  - Extended ippsFIRSparse_32fc algorithm.
  - Optimized Resize 8u for ICX and ippsAddProduct_32fc for AVX2 and AVX-512.
  - Optimized RSA multi-buffer for ICX.
- Intel® Math Kernel Library:
  - ScaLAPACK introduced distributed nonsymmetric eigensolver functionality (P?GEEVX).

- o Graph functionality has been added as a preview feature with limited functionality.
- Intel® MPI Benchmarks:
  - o Bug fixes.
- Intel® MPI Library:
  - o Implemented dynamic processes support in OFI/mlx provider (disabled by default, FI_MLX_ENABLE_SPAWN=1).
  - o Added IBM* Platform LSF* support to Hydra process manager for Windows* OS.
  - o Added PMI2 support (I_MPI_PMI_LIBRARY, I_MPI_PMI).
- Intel® Threading Building Blocks:
  - o Added input_node to the flow graph API. It acts like a source_node except for being inactive by default; source_node is deprecated.
  - o Cross-allocator copying constructor and copy assignment operator for concurrent_vector are deprecated.
  - o Allocator template parameter for flow graph nodes is deprecated. Set TBB_DEPRECATED_FLOW_NODE_ALLOCATOR to 1 to avoid compilation errors.
- Intel® Trace Analyzer and Collector:
  - o Bug fixes.
- Intel® VTune™ Profiler:
  - o Microarchitecture Exploration analysis is now supported on Intel processors formerly code-named Icelake.
  - o Added support for GPU accelerators.
  - o Improvements to Platform Analysis.

Changes in Intel® Parallel Studio XE 2020:
- All tools updated to the latest version.
- Intel® Parallel Studio XE 2020 includes functional and security updates. Users should update to the latest version.
- Intel® Cluster Checker:
  - o Added support for multiple databases.
  - o Added environment module support.
  - o Added patch to address SQLite CVE.
- Intel® Data Analytics Acceleration Library (Intel® DAAL):
  - o Introduced new functionality for Gradient Boosted Trees, Classification and Regression Stump algorithms.
  - o Extended existing boosting (AdaBoost, BrownBoost, and LogitBoost) functionality by supports weighted data.
  - o Neural Network is deprecated, no new features. The support will be completely discontinued beginning with Intel® DAAL 2021.
- Intel® Distribution for Python*:
  - o Updated Python version to 3.7.

- Intel® Integrated Performance Primitives:
  - Implemented the pattern matching algorithm to calculate the similarity of binary patterns and top-k selection algorithm to select the top K elements from a vector.
  - Enabled RSA and AES crypto algorithms optimization for processors formerly code-named Ice Lake.
  - Accelerated ZFP 0.5.4 version for the Intel® Advanced Vector Extensions 512 (Intel® AVX-512) instruction set.
- Intel® Math Kernel Library:
  - Enabled Intel® Threading Building Blocks threading for GEMM_S8U8S32 and GEMM_S16U16S32.
  - Introduced P{D,S}TREVC functions for computing some or all of the right and/or left eigenvectors of a real upper quasi-triangular matrix.
  - Introduced an advanced SkipAhead method for parallel random number generation by MRG32k3a/Philox4x32-10/ARS-5 basic generator.
- Intel® MPI Benchmarks:
  - Bug fixes.
- Intel® MPI Library:
  - Improved Mellanox InfiniBand* EDR/HDR interconnect support.
  - Improved Amazon* Elastic Fabric Adapter (EFA) support.
  - Added performance optimizations for Intel® Xeon® Platinum 9200 (formerly Cascade Lake-AP).
- Intel® Threading Building Blocks:
  - Extended task_arena interface to simplify development of NUMA-aware applications specifically enabling composable scalable performance within.
  - Added a possibility to suspend task execution at a specific point and resume it later thus reducing the code complexity when integrating I/O threads in compute intensive applications.
  - Extended the flow graph API to simplify connecting nodes (preview feature).
- Intel® Trace Analyzer and Collector:
  - Increased default value of VT_MEM_BLOCKSIZE from 64KB to 2M.
  - Moved to Qt 5.13.
  - Bug fixes.

3.1   Intel® Xeon Phi™ Product Family Updates

3.1.1   Support for the Intel® Xeon Phi™ x100 product family coprocessor (formerly codenamed Knights Corner) is removed

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.

- Amazon Linux 2
- Clear Linux
- Debian* 9.x, 10.x
- Fedora* 30.x
- Red Hat Enterprise Linux* 7.x, 8.x (equivalent CentOS versions supported, but not separately tested)
- SUSE Linux Enterprise Server* 12.x, 15.x
- Ubuntu* 16.04, 18.04, 19.04
- Microsoft* Windows* 10
- Microsoft* Windows* Server 2016, 2019
- macOS* 10.14, 10.15

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™ Profiler, 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® Fortran Compiler require a version of Microsoft Visual Studio* to be installed. The following versions are currently supported:
- Microsoft Visual Studio* 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* 10.x, 11.x

A 64-bit operating system host is required to use the Intel® VTune™ Profiler 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™ Profiler 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™ Profiler 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-2020-install-guide-windows
for Windows*, https://software.intel.com/en-us/download/parallel-studio-xe-2020-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 2020 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.

NOTE: Registering for support varies for release product or pre-release products (alpha, beta, etc.) – only released software products have support web pages at http://software.intel.com/sites/support/.

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.

16

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.

10 Legal Information

No license (express or implied, by estoppel or otherwise) to any intellectual property rights is granted by this document.

Intel disclaims all express and implied warranties, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, as well as any warranty arising from course of performance, course of dealing, or usage in trade.

This document contains information on products, services and/or processes in development. All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest forecast, schedule, specifications and roadmaps.

The products and services described may contain defects or errors which may cause deviations from published specifications. Current characterized errata are available on request.

MPEG-1, MPEG-2, MPEG-4, H.261, H.263, H.264, MP3, DV, VC-1, MJPEG, AC3, AAC, G.711, G.722, G.722.1, G.722.2, AMRWB, Extended AMRWB (AMRWB+), G.167, G.168, G.169, G.723.1, G.726, G.728, G.729, G.729.1, GSM AMR, GSM FR are international standards promoted by ISO, IEC, ITU, ETSI, 3GPP and other organizations. Implementations of these standards, or the standard enabled platforms may require licenses from various entities, including Intel Corporation.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

Intel, the Intel logo, Intel Parallel Studio XE, Intel Fortran Compiler, Intel Visual Fortran, Intel C++ Compiler, Intel Distribution for Python*, Intel Integrated Performance Primitives, Intel Math Kernel Library, Intel Data Analytics Acceleration Library, Intel Threading Building Blocks, Intel Advisor, Intel Inspector, Intel VTune Amplifier, Intel Cluster Checker, Intel MPI Benchmarks, Intel MPI Library, Intel Trace Analyzer and Collector, Intel Xeon Scalable, Intel Xeon Phi, Intel Software Manager, Intel Cilk Plus, Intel Omni-Path Architecture, Intel AVX-512, Intel Core, Intel 64, Intel Atom, Intel Software Development Tools, and Intel Software License Manager are trademarks of Intel Corporation in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

Microsoft, Windows, and the Windows logo are trademarks, or registered trademarks of Microsoft Corporation in the United States and/or other countries.

Java is a registered trademark of Oracle and/or its affiliates.

OpenCL and the OpenCL logo are trademarks of Apple Inc. used by permission by Khronos.

Optimization Notice