

# Intel® Integrated Performance Primitives (Intel® IPP) 2019 Update 3 Release Notes

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## Overview

This document provides a general summary of new features and important notes about the Intel® Integrated Performance Primitives (Intel® IPP) library software product.

Please see the following resources available online for the latest information regarding the Intel® Integrated Performance Primitives (Intel® IPP):

- [Intel® IPP Main Product Page](#)
- [Intel® IPP Installation Guide](#)
- [Intel® IPP 2019 System Requirements](#)
- [Intel® IPP Documentation](#)

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## What's New in Intel® IPP 2019 Update 3

- Extended Intel® AVX2 and Intel® AVX-512 optimization for `ippSFIRMR32f_32fc` functions.
- Added a threading layer example on building custom pipeline code with the sobel filter functions.
- Added new implementation in the IIR Filter functions to improve precision. The implementation provides similar performance for long length vectors, but reduces the performance for short length vectors.
- Fixed several bugs in the bzip2 optimization patch files, including Makefile errors, and inconsistency with original code.
- Fixed the following dispatching issues in Intel® IPP libraries:
  - The IPP functions dispatched Intel® AVX2 optimization code on the Intel® AVX-512 processors with macOS\* systems.
  - The cryptography libraries dispatched incorrect code on the systems that do not support Intel® AVX instructions.
  - The cryptography libraries dispatched incorrect optimization code when the libraries were linked dynamically.

## What's New in Intel® IPP 2019 Update 2

- Intel® IPP Update 2 includes functional and security updates. Users should update to the latest version.
- The previous version of Intel IPP Custom Library Tool is removed in the releases. Users can use the new version of Intel IPP Custom Library Tool based on Python\*.

## What's New in Intel® IPP 2019 Update 1

- Added new functions to support SM2 public key cryptographic algorithm.
- Added support for Universal Windows driver and Universal Windows Platform (UWP) in the sequential static libraries.
- Added optimization for Intel® AVX-512 instruction set in the `ippsFIRMR32f_32fc` functions.
- Added support for Android\* OS and Threading Layer libraries in the Intel IPP Custom Library Tool based on Python\*.
- Removed support for IA-32 libraries on macOS\* in this release.

## What's New in Intel® IPP 2019

- Added new functions to support [ZFP](#) floating-point data compression and decompression. This release also introduces the optimization patch files for ZFP 0.5.2 source to provide drop-in optimization with the Intel® IPP functions.
  - ZFP is a lossy floating point data compression with controlled compression accuracy and compression rate. Intel® IPP ZFP functions are highly optimized for Intel® AVX2 and Intel® AVX-512 instruction sets.
  - Intel® IPP ZFP provides easy-to-use interfaces which allow for use of its functions directly in application source code. Intel® IPP ZFP also provides drop-in optimization patch files for open-source ZFP 0.5.2. Users' applications can use open-source ZFP library interfaces with Intel® IPP optimized functions.
- Added Intel® Threading Building Blocks threading technology support in the Threading Layer APIs. Check the “Threading Notes” below to get more information.
- Added new version of Intel IPP Custom Library Tool based on Python\*. This version provides better compatibility on different operation systems. The previous version of

Intel IPP Custom Library Tool is deprecated and will be removed in the future Intel IPP releases.

- Added new APIs to compute CRC24 and CRC16 checksum with 1U input data. The APIs support CRC24A, CRC24B, CRC24C and CRC16 polynomial functions, and are included in the Intel® IPP embedded domain.
- Color Conversion:
  - Added color conversion functions to convert RGB image to CIE Lab color model, or CIE Lab color model to RGB (ippiRGBToLab/ ippiLabToRGB).
- Data Compression:
  - Added the optimization patch files for the bzip2 source to provide drop-in optimization with Intel® IPP functions. The patches now supports bzip2 version 1.0.6.
- Performance:
  - Extended optimization for the Intel® Advanced Vector Extensions 512 (Intel® AVX-512) instruction sets.
- Other Changes:
  - Removed support for Intel® Xeon Phi™ 72\*\* product family coprocessor (formerly code name Knights Landing) on Windows\* platform in this release.
  - Removed support for Intel® Quark™ microprocessors in this release.
  - The IA-32 libraries on macOS\* are deprecated and will be removed in a future release.

## Threading Notes

Intel® IPP provides Threading Layer APIs on top of sequential Intel® IPP libraries. The APIs include two variants 1) functions with `_T` suffix in the names, providing threading implementation based on classic IPP APIs; 2) functions with `_LT` suffix, providing threading implementation based on Intel IPP Platform-Aware functions. The Threading Layer APIs support both OpenMP\* and Intel® Threading Building Blocks threading technology. Source code of Intel® IPP Threading Layer is also available in IPP package as example and basis to organize threading for pipeline inside a customer application.

The legacy Intel IPP threaded libraries are still available by custom installation, and the code written with these libraries will work as before. However, the threaded library will

not expand its threading functions, and the new threading will be developed only in the new Intel® IPP threading layer APIs.

User applications are recommended to use the new Intel® IPP Threading Layer APIs or implement the threading based on IPP Threading Layer source code examples in their applications. Check the “Threading Layer Functions” section in the Intel® IPP Developer Reference, to get more information on these APIs.

## Known Intel® IPP 2019 Update 3 Issues and Limitations

- The Erode and Dilate APIs added additional optimization branches. Some optimization branches have performance degradation on the Intel® AVX optimization code.
- The threading layer examples on macOS\* fail to build because of the incorrect Makefile. To work around the issue, remove *intel64/* suffix from G\_IPP\_PATH\_SUFFIX variable in the *components/interfaces/tl/Makefile\_base.mk* file.
- Intel® IPP non-PIC libraries are intended for Linux kernel mode. Intel® 64 version of these libraries contains a bug which might lead to unexpected exceptions when they are used in Linux kernel mode. The root cause of this issue is because of the non-standard stack frame alignment in some Linux 64-bit kernel code. If you are going to use these IPP non-PIC libraries then please follow the recommended workaround as mentioned below:
  - Use the *cdispatch.pl* script from the components folder  
`\components\examples_core\ipp_custom_dispatcher`
  - Generate C-dispatcher sources based on description available in the corresponding *readme.html* under folder  
`\components\examples_core\ipp_custom_dispatcher`
  - Compile these sources with one of the latest GCC versions ( $\geq 5.3$ ) with the switch `-mincoming-stack-boundary=3`
  - Link these dispatcher objects and IPP Linux 64-bit non-PIC libraries with your kernel-mode application.

Performing these steps will make your application safe for non-standard stack frame alignment in the Linux 64-bit kernel mode.

## System Requirements

For information about the Intel® IPP system requirements, please visit the [Intel® Integrated Performance Primitives \(Intel® IPP\) 2019 System Requirements](#) page.

## Intel® IPP 2019 Documentation

Starting with this version of Intel IPP, most of the documentation is only available online at [Intel® Software Documentation Library](#). You can also download it from the [Intel® Software Development Products Registration Center](#) > Product List > Intel® Parallel Studio XE(or Intel® System Studio) Documentation.

## Product Contents

The Intel® IPP for Windows\*, Linux\* OS, and macOS\* is provided as part of the Intel® Parallel Studio XE and Intel® System Studio product. It is also available from the [free Intel® performance libraries](#) program:

- Installation package only supports 64-bit host system. It includes both the 64-bit and 32-bit target libraries.
- Installation package also provides the online installer that downloads materials chosen during installation

Intel® IPP Cryptography is provided as the following optional packages:

- [Intel® IPP Cryptography for Windows\\*](#)
- [Intel® IPP Cryptography for Linux\\* OS](#)
- [Intel® IPP Cryptography for macOS\\*](#)

## Intel® IPP Cryptography

Intel® IPP Cryptography is a separate installation package that contains the binaries and header files needed to utilize the functions contained in the Intel IPP cryptography domain. To obtain the Intel IPP Cryptography libraries, please review the knowledge base article: [where do I download the Intel® IPP cryptography libraries](#).

Intel® IPP Cryptography library is also available through open source. Visit the [Intel® IPP cryptography open source page](#) on GitHub to access the library source code.

## Technical Support

If you did not register your Intel® software product during installation, please do so now 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 technical information about Intel® IPP, including FAQ's, tips and tricks, and other support information, please visit the Intel® IPP forum: <http://software.intel.com/en-us/forums/intel-integrated-performance-primitives/> and browse the Intel® IPP support page: <https://software.intel.com/en-us/intel-ipp-support/>.

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- zlib library:

zlib.h -- interface of the 'zlib' general purpose compression library version 1.2.8, April 28th, 2013

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