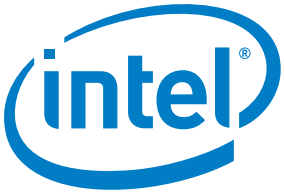

Intel® SDK for OpenCL™ Applications 2019

Release Notes

4 October 2018

Version History/Revision History

These are the main releases of Intel® SDK for OpenCL™ Applications:

Date	Revision	Description
August 2018	2019	Coffee Lake support, support of Intel® CPU Runtime for OpenCL™ Applications 18.1
December 2017	2017 R2	Eclipse Oxygen (4.7) support, bug fixes and improvements
July 2017	2017 R1	Microsoft Visual Studio* 2017 support, new OSes and platforms support
October 2016	2016 R3	7th Generation Intel® Core™ Processor support, Microsoft Windows* 10 Anniversary Update, OpenCL 2.1 experimental CPU only runtime for Linux*
July 2016	2016 R2 (Linux)	GPU Kernel debugger Beta and kernel level analysis for Linux
June 2016	2016 R2 (Windows)	OpenCL 2.1 support, new features in Kernel Development Framework
April 2016	2016	GPU Kernel debugger Beta and standalone release for Linux
Nov. 17, 2016	2015 R3	Standalone release for Windows
April 28, 2015	2015 R2	Visual Studio 2015 support
Jan 22, 2015	2015 R1	Released as part of Intel® Integrated Native Developer Experience (Intel® INDE)

Customer Support

For technical support, including answers to questions not addressed in this product, visit the technical support forum, FAQs, and other support information at Intel OpenCL Support or http://www.intel.com/software/products/support/.

Please remember to register your product at https://registrationcenter.intel.com/ by providing your email address. Registration entitles you to free technical support, product updates and upgrades for the duration of the support term. It also helps Intel recognize you as a valued customer in the support forum.

To provide feedback and suggestions or submit an issue, go to the Intel OpenCL Forum.

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1 Introduction

Intel® SDK for OpenCL™ Applications helps to create, build, debug, and analyze PC and mobile applications developed with OpenCL™ API on Windows* and Linux* OSes.

NOTE: Running applications developed with the SDK requires OpenCL™ driver/runtime packages installed for Intel® Processors.

For more information on how to choose which driver/runtime package you need and how to download it, please see https://software.intel.com/en-us/articles/opencl-drivers.

This document contains information about new features, system requirements, installation instructions, fixed bugs, limitations, and known issues.

To learn more about the product, see:

- New features listed in the New in This Release section below, or in the help
- Reference documentation listed in the Related Documentation section below
- Installation instructions at Installation Notes

2 New in This Release

2.1 New Features

- **Added support for 8th Generation Intel® Core™ Processors (code-named Coffee Lake) on Microsoft Windows* and Linux* operating systems**
- **Intel® CPU Runtime for OpenCL™ Applications 18.1 is now supported by the Intel® SDK for OpenCL™ - offline compiler**
    - Added support for Intel® Advanced Vector Extensions 512 (Intel® AVX-512)
    - For more information about OpenCL™ Runtime, please see https://software.intel.com/en-us/articles/opencl-runtime-release-notes
- **Support for SRB5.0 has been deprecated**
- **Support for Windows* 7 has been deprecated. Please consider the latest available package supporting Windows* 7 platforms, Intel® SDK for OpenCL™ Applications 2017 R2, available at https://software.intel.com/en-us/intel-opencl/download. Intel® SDK for OpenCL™ Applications 2017 R2 will be removed at the time of Intel® SDK for OpenCL™ Applications 2019 Update 1 release. Intel® SDK for OpenCL™ Applications 2019 Update 1 will not support Windows* 7.**
- **Bug fixes**
    - Enable support for Intel® Streaming SIMD Extensions for Intel® FPGA Emulation Platform for OpenCL™

This release contains an experimental version of the CPU Runtime supporting OpenCL™ 2.1. It will be deprecated in Intel® SDK for OpenCL™ Applications 2019 Update 1. The experimental status implies that OpenCL 2.1 is enabled on all CPU models, but the overall product stability is not guaranteed. Support for the Experimental product is not planned, only critical issues will be fixed.

It is recommended to use Intel® CPU Runtime for OpenCL™ Applications 18.1.

Intel® SDK for OpenCL™ Applications 2019 includes all the features previously available in Intel® SDK for OpenCL™ Applications 2017.

For a full list of features, refer to the Intel® SDK for OpenCL™ Applications Developer Guide.

3 Known Issues

3.1 General Limitations

- Eclipse* Oxygen is only supported on Linux* OS.
- Conversion from a Visual Studio* Visual C++ project to an OpenCL™ project does not work properly.

3.2 Intel® Code Builder for OpenCL™ API IDE Plug-in Limitations

- Build feature limitations:
  - Source code mapping between GPU assembly code and OpenCL code is not supported with the latest OpenCL driver for GPU.
- GPU Kernel Debugger for the Visual Studio IDE:
  - The GPU kernel debugger is supported for 64-bit applications only.
  - When passing `-s` build option to a `clBuildProgram()` method call, if path to the source file contains spaces, you must enclose it in double quotes. Note that enclosing path containing spaces in single quotes or escaping spaces *does not work correctly*.
- CPU Kernel Debugger for the Visual Studio IDE does not support:
  - Edit and continue capability
  - Multithreaded debugging
  - Two instances of Visual Studio running simultaneously
  - Unions
- OpenCL API Debugger:
  - Concurrent debug sessions with **API Debugger** are not supported. This includes attaching the Visual Studio debugger to more than one process, or opening multiple instances of Visual Studio and debugging processes concurrently.
- Code Analyzer Limitations:
  - Kernel analysis features are not supported on Intel® processors older than 4th Generation Intel® Core™ Processors
  - Latency and occupancy reports cannot be generated for built-in kernels which are generated with `clCreateProgramWithBuiltInKernels`
  - Calling the API `clCreateProgramWithBuiltInKernels` or `clCreateAcceleratorINTEL` generates additional OpenCL APIs in the API Analyze report, these APIs do not appear in the code.
  - Occupancy analysis is not supported on an application that includes a call to Microsoft D3D11 API `GetData()`. Running Occupancy analysis on such an application leads to application crash with an exception.
  - Kernel analysis, hardware counters, and some of the hints are available only for kernels that run on GPU (shared context is not supported)
  - Host and kernel level analysis are not supported on an application that uses the motion estimation extension
- Intel® Code Builder for OpenCL™ API's Report does not work correctly in Konqueror* browser.

3.3 Known Installation and Configuration Issues

- On Microsoft Windows* OS systems, components in Intel® Parallel Studio XE 2018 and earlier may conflict with the Intel® SDK for OpenCL™ Applications install process.
    - Consider upgrading Intel® Parallel Studio XE 2018 to a newer version.
- On Microsoft Windows* OS, if the debugger tools, analysis tools, or OpenCL™ applications have an issue detecting available Intel® Graphics Technology platforms after installing the SDK, update the Intel® Graphics driver for your platform. The Intel® Graphics driver deployment package for Microsoft Windows* OS contains OpenCL™ implementations for Intel® Graphics Technology and Intel® CPUs. The following are graphics driver distribution options:
    - Many vendors provide their own distributions of Intel®-compatible graphics drivers online. Intel® does not support these drivers, but such graphics drivers may be functional for OpenCL™ runtime distributions. Vendors may tie vendor support to exclusive usage of vendor provided drivers. Review any support agreements in vendor documentation.
    - Obtain the latest version of the Intel® Graphics driver from https://downloadcenter.intel.com.
    - Recent revisions of Microsoft Windows* OS systems will preinstall a reference Intel® Graphics driver package.
    - See https://software.intel.com/en-us/articles/opencl-drivers for more information.
- If the PATH environment variable exceeds 256 character length upon installation, you might encounter issues related to `System32` directory use.
- In case of uninstallation through **Control panel** > **Uninstall a program** you may face the "*Error opening installation log file. Verify that the specified log file location exists and is writable*" error. It is a known issue in the Microsoft* data base at http://support.microsoft.com/kb/2564571. Uninstall the SDK running the original installer or reboot the machine to proceed with the uninstallation.
- In case of uninstallation through **Control panel** > **Uninstall a program** you may face the error similar to "*ERROR: MSI Error: An installation package for the product Intel® SDK for OpenCL™ Applications 2019 for Windows* cannot be found. Try the installation again using a valid copy of the installation package 'intel_sdk_for_opencl_2019_x64_setup.msi*". To resolve the issue, uninstall the SDK running the original installer. If it doesn't help, collect the uninstallation log files from the `%temp%\intel_tmp_<userid>` and ask for support on the Intel® SDK for OpenCL™ Applications forum.
- If the Mozilla Firefox* browser shows the **Network Error (dns_unresolved_hostname)** screen with the message *"Your requested host "localhost" could not be resolved by DNS. For assistance, contact your network support team."* instead of a report, please use the *"Auto-detect proxy settings for this network"* option: **Options** > **Advanced** > **Network tab** > **Settings...**

3.4 Intel® Processor Graphics Device Limitations

- For known issues with the OpenCL™ implementation on Iris®, Iris® Pro, and Intel® HD Graphics, refer to the relevant driver release notes.

- Timeout Detection & Recovery (TDRs) may be observed when running OpenCL™ benchmarks including Kishonti CLBenchmark,Kishonti CompuBench CL*, and SiSoftware Sandra* (GP (GPU/CPU/APU) Processing OpenCL™ benchmarks). Also some OpenCL™ workloads may cause TDRs, especially workloads with complex, time-consuming kernels and large local work size or workloads that use profiling feature. Increase the TDR delay to avoid the TDRs. For details, refer to the article at https://msdn.microsoft.com/en-us/library/windows/hardware/ff570087(v=vs.85).aspx
- The OpenCL™ Driver is available on systems with Intel® Processor Graphics and discrete graphics cards (Microsoft Windows* OS only):
    - Capabilities of both discrete and integrated graphics are available if display is connected to:
        - Integrated graphics card display port.
        - Discrete and integrated graphics cards simultaneously.
    - Capabilities of a discrete card only are available if the display is connected to:
        - Discrete graphics card display port.
        - Integrated graphics card, and a discrete graphics card without display ports.

3.5 Intel® CPU Runtime for OpenCL™ Applications Limitations

- The `-llvm` option is no longer supported in Intel® CPU Runtime for OpenCL™ Applications 18.1.
- The `-asm` option does not produce the correct assembly code with Intel® CPU Runtime for OpenCL™ Applications 18.1.
- After OpenCL™ Contexts are created for both “Experimental OpenCL 2.1 CPU Only Platform” and “Intel® CPU Runtime for OpenCL™ Applications”, OpenCL™ Kernel compilation for any of the two may destabilize the application. Use “Intel® CPU Runtime for OpenCL™ Applications” platform for features of “Experimental OpenCL 2.1 CPU Only Platform” instead.
- Intel® CPU Runtime for OpenCL™ Applications has a dependency on Intel® Threading Building Blocks (Intel® TBB) version 2017 Update 8 on Linux* and 2018 Update 2 on Windows* OS. The library is included in the Intel® CPU Runtime installation directory.
    - In Linux* OS case:
      Make sure there is no other Threading Building Blocks (TBB) library in your OpenCL™ host application library search path on Linux* OS. Intel® CPU Runtime for OpenCL™ Applications was tested only with Intel® Threading Building Blocks (Intel® TBB) libraries included in the package.
      If OpenCL™ host application intentionally uses features of a standalone Threading Building Blocks (TBB), make sure that it is of a higher version than the library version in the package and is found earlier in the shared library search procedure. If standalone Threading Building Blocks (TBB) libraries are loaded, functionality and performance may vary.
    - In Windows* OS case:
      In Windows* OS product distribution, Intel® Threading Building Blocks (Intel® TBB) libraries included in the package have different names rather than in standard shipment. That ensures that no load conflict takes place with pre-installed libraries.

If OpenCL™ host code uses features of a standalone Threading Building Blocks (TBB) libraries, application performance may vary (for example, due to oversubscription issues in case of both standalone library pool and OpenCL thread pool being fully loaded).

4 Related Documentation

Here is the documentation related to Intel® SDK for OpenCL™ Applications:

- Get Started with Intel® SDK for OpenCL™ Applications
- Developer Guide for Intel® SDK for OpenCL™ Applications
- Developer Guide for Intel® Processor Graphics

5 Where to Find the Release

Intel® SDK for OpenCL™ Applications is a part of Intel® System Studio.

To download Intel® System Studio: https://software.intel.com/en-us/system-studio.

For more info on how to choose which driver/runtime package you need and how to download it, please see https://software.intel.com/en-us/articles/opencl-drivers.

6 System Requirements

6.1 Supported Architectures and Terminology

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

The following tables determine Intel® processors support on Microsoft Windows* and Linux* operating systems.

6.1.1 Intel® SDK for OpenCL™ Applications *for Windows*:*

Intel® Platform	OpenCL version	Host Platform	Target Application Platform	
		Windows* 10	Windows* 10	
			CPU	GPU
7th and 8th Generation Intel® Core Processors with Intel® Iris™ Pro Graphics and HD Graphics	2.1	✓	✓	✓
6th and 5th Generation Intel® Core Processors with Intel® Iris™ Pro Graphics and HD Graphics	2.0	✓	✓	✓
Intel® Xeon® Processor E3-1200 v4 Family with C226 chipset and E3-1500 v5 Family with C236 chipset	2.0	✓	✓	✓
1st through 4th Generation Intel® Core™ Processors and Intel® Xeon® Processor (**CPU only**)	1.2	✓	✓	

6.1.2 Intel® SDK for OpenCL™ Applications *for Linux*:*

Intel® Platform	OpenCL version	Host Platform		Target Application Platform			
		Ubuntu 16.04	CentOS 7.4	CentOS* 7.4		Ubuntu* 16.04	
				CPU	GPU	CPU	GPU
8th, 7th and 6th Generation Intel® Core™ Processors with Intel® Iris™ Pro Graphics and HD Graphics	**2.1**	✓	✓	✓	✓	✓	✓
Intel® Pentium™ Processor N4200/5, N3350/5, N3450/5	**2.0**	✓				✓	✓
5th Generation Intel® Core™ Processors with Intel® Iris™ Pro Graphics and HD Graphics	**2.0**	✓	✓	✓	✓	✓	✓
Intel® Xeon® Processor E3-1200 v4 Family with C226 chipset and E3-1500 v5 Family with C236 chipset	**2.0**	✓	✓	✓	✓	✓	✓
1st-4th Generation Intel® Core™ Processors (**CPU only**)	**1.2**	✓	✓	✓		✓	
Intel® Xeon® Processor Product Family (**CPU only**)	**1.2**	✓	✓	✓		✓	

Note the following:

- For more information on OpenCL™ platforms and OS support, visit the Intel® OpenCL technology page at https://software.intel.com/en-us/intel-opencl.
- To run and use the Intel® Code Builder for OpenCL™ API IDE plug in, you must have a PC based on an IA-32 or Intel® 64 architecture processor.
- Incompatible or proprietary instructions in not-Intel® processors may cause the analysis capabilities of this product to function incorrectly. Any attempt to analyze code not supported by Intel® processors may lead to failures in this product.
- You must have administrator privileges to install and use the Intel® SDK for OpenCL™ Applications 2019 on Microsoft* Windows* operating systems.
- You must have root privileges (or use the sudo command) to run the Intel® SDK for OpenCL™ Applications 2019 on Linux* operating systems (including launching the Eclipse* IDE).
- Intel® SDK for OpenCL™ Applications 2019 for Linux* is compatible with the following OpenCL™ runtimes:
    - Intel® CPU Runtime for OpenCL™ Applications 18.1
    - Intel® CPU Runtime for OpenCL™ Applications 16.1.2

For more information on the supported runtime and kernel mode drivers, go to **OpenCL™ Drivers and Runtimes for Intel® Architecture** https://software.intel.com/en-us/articles/opencl-drivers.

- Intel® SDK for OpenCL™ Applications plugin for the Eclipse* IDE requires Java Runtime Environment 1.8 installed on your Microsoft Windows* or Linux* machine.

- Intel® Graphics Compute Runtime for OpenCL™ Driver supports the following platforms:
  - Intel® Core Processors with 8th Generation Intel® Graphics Devices (formerly known as Intel® microarchitecture code name Broadwell) with OpenCL™ 2.1 Runtime;
  - Intel® Core Processors with 9th Generation Intel® Graphics Devices (formerly known as Intel® microarchitecture code name Skylake, Intel® microarchitecture code-named Kaby Lake, Intel® microarchitecture code-named Coffee Lake) with OpenCL™ 2.1 Runtime;
  - Intel® Atom Processors with 9th Generation Intel® Graphics Devices (formerly known as Intel® microarchitecture code-named Apollo Lake, Intel® microarchitecture code-named Gemini Lake) with OpenCL™ 1.2 Runtime;
  - Please look for future Intel® platform support to be added to Intel® Graphics Compute Runtime for OpenCL™ Driver.

  For more information about Intel® Graphics Compute Runtime for OpenCL™ Driver, go to https://github.com/intel/compute-runtime.

6.2 Driver Requirements

6.2.1 Windows* Driver Requirements:

For OpenCL™ support on Intel® processors with Intel® Processor Graphics, you must have an Intel® Graphics Driver (version 15.40 or higher) installed. For more information, please see the driver support matrix at https://software.intel.com/en-us/articles/driver-support-matrix-for-media-sdk-and-opencl and **OpenCL™ Drivers and Runtimes for Intel® Architecture** at https://software.intel.com/en-us/articles/opencl-drivers

6.2.2 Linux* Driver and Runtime Requirements:

OpenCL™ Driver for Intel® processors with Intel® Processor Graphics you must have an OpenCL® compatible Intel® Graphics driver.

For the CPU-only runtime package, please refer to the compatibility chart in 6.1.2.

For more information on supported runtimes and drivers for Linux* go to **OpenCL™ Drivers and Runtimes for Intel® Architecture** at https://software.intel.com/en-us/articles/opencl-drivers.

7 Installation Notes

7.1 Installation on Microsoft Windows* OS

For OpenCL™ support on Intel® processors with Intel® Processor Graphics, you must have the Intel® Graphics Driver (version 15.40 or higher) installed.

You can obtain the latest driver version using the Intel® Driver Update Utility, or manually here

You can obtain Intel® SDK for OpenCL™ Applications with Intel® System Studio from the Intel System Studio web page: https://software.intel.com/en-us/system-studio.

Before installing the Intel® SDK for OpenCL™ Applications for Windows operating systems, it is recommended to remove any previous version of the SDK from your computer.

The SDK installation includes the following components:

- OpenCL™ code C header files and libraries;
- Intel® SDK for OpenCL™ - offline compiler command-line utility 32- and 64-bit version;
- OpenCL™ Code Builder plug-in for Microsoft Visual Studio* 2013 and higher including comprehensive environment for building, debugging and analyzing OpenCL™ applications;
- OpenCL™ Code Builder plug-in for Eclipse* 4.2 and higher including Kernel Development Framework for building OpenCL™ applications.

NOTE: Intel® Graphics driver includes OpenCL support for both CPU and Intel® Processor Graphics.

7.2 Installation on Linux* OS

You can obtain Intel® SDK for OpenCL™ Applications with Intel® System Studio from the Intel® System Studio web page: https://software.intel.com/en-us/system-studio.

A driver or runtime package must also be installed: https://software.intel.com/en-us/articles/opencl-drivers

Mono package must be installed: https://www.mono-project.com/download/stable

Libicu55 package must be installed on Ubuntu*. Please, use this commands:

```
wget http://security.ubuntu.com/ubuntu/pool/main/i/icu/libicu55_55.1-
7ubuntu0.4_amd64.deb
sudo apt install ./libicu55_55.1-7ubuntu0.4_amd64.deb
```

You can use the install scripts here for automated install: https://software.intel.com/en-us/articles/sdk-for-opencl-gsg.

NOTE: All RPM packages of the Intel SDK for OpenCL Applications are digitally signed.

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