

Altera SDK for OpenCL Version 15.0 Release Notes

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OCL004-15.0.0



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The *Altera SDK for OpenCL Version 15.0 Release Notes* provides late-breaking information about the Altera® Software Development Kit (SDK) for OpenCL™⁽¹⁾ (AOCL⁽²⁾) and the Altera Runtime Environment (RTE) for OpenCL version 15.0.

New Features and Enhancements

The AOCL and the RTE version 15.0 include the following new features:

- Support for double precision floating-point built-in scalar data types. The following double precision floating-point functions conform to the OpenCL Specification version 1.0:

add / subtract / multiply / divide / ceil / floor / rint / trunc / fabs / fmax / fmin / sqrt / rsqrt / exp / exp2 / exp10 / log / log2 / log10 / sin / cos / asin / acos

The AOCL version 15.0 includes the following beta features:

- Implementation of OpenCL pipes
- An `--high-effort` Altera Offline Compiler (AOC) command option for resolving hardware generation fitting errors during kernel compilation
- Support for the OpenCL Installable Client Driver (ICD) extension from the Khronos Group
- Inclusion of the Altera Client Driver in Custom Platforms to allow the AOCL to find and load Custom Platform libraries at host runtime

Changes to Software Behavior

Items listed in the following table represent cases in which the behavior of the current release of the AOCL and the RTE differs from the previous version.

⁽¹⁾ OpenCL and the OpenCL logo are trademarks of Apple Inc. used by permission of the Khronos Group™.

⁽²⁾ The Altera SDK for OpenCL is based on a published Khronos Specification, and has passed the Khronos Conformance Testing Process. Current conformance status can be found at www.khronos.org/conformance.

Description	Workaround
When you link your host application to the ACD, you cannot directly reference Custom Platform-specific user-accessible functions.	To reference Custom Platform-specific user-accessible functions while linking to the ACD, include the <code>clGetBoardExtensionFunctionAddressAltera</code> extension in your host application. Refer to <i>Accessing Custom Platform-Specific Functions</i> in the <i>Altera SDK for OpenCL Programming Guide</i> for more information.
If you design a kernel that transfers data via channels, you cannot port your design to a third-party OpenCL SDK.	Starting in 15.0, if you want to leverage the capabilities of channels but have the ability to use your design in a third-party OpenCL SDK, modify your kernel to transfer data via OpenCL pipes instead. Refer to <i>Implementing OpenCL Pipes</i> in the <i>Altera SDK for OpenCL Programming Guide</i> for more information.

Items listed in the following table represent cases in which the behavior of the current releases of the AOCL Custom Platform Toolkit and Reference Platforms differ from the previous version.

Description	Workaround
Starting in 14.1, the AOCL automatically migrates an existing Custom Platform to make it compatible with the current version of the AOCL.	Automigration works when you do not modify your Custom Platform. If you modify your Custom Platform, you must manually update the automigration fields to enable future automigration flows. Refer to <i>Custom Platform Automigration for Forward Compatibility</i> in the <i>Altera SDK for OpenCL Custom Platform Toolkit User Guide</i> for more information.

Related Information

- [Accessing Custom Platform-Specific Functions](#)
- [Implementing OpenCL Pipes](#)
- [Custom Platform Automigration for Forward Compatibility](#)

Known Issues and Workarounds

This section provides information about the following known issues that affect the AOCL and the RTE version 15.0.

Description	Workaround
If you include a memory barrier at the end of an NDRange kernel, compilation fails.	Do not include a memory barrier at the end of your NDRange kernel.

Description	Workaround
Naming a kernel source file as kernel.cl causes the AOC to generate intermediate design files that have the same file names, which leads to a compilation error.	Do not name your .cl OpenCL kernel source file "kernel".
The AOCL Emulator does not support cross-compilation to ARM® processor.	To run emulation on a design that targets an SoC, emulate your kernel on a non-SoC board and then target the kernel on the SoC board for subsequent optimization steps.
If your kernel targets a Cyclone V device (for example, Cyclone V SoC), declaring <code>__constant</code> pointer kernel arguments might degrade kernel performance.	—
The AOCL Profiler does not support directory and file names that contain spaces.	Do not include spaces in directory and file names when you profile a kernel using the AOCL Profiler.
If multiple, different .aocx files in your OpenCL application have the same kernel names in them, the profile data will be wrong for these kernels.	When profiling kernels, do not use the same kernel names across different .aocx files.
In the Kernel Execution tab of the Profiler GUI, adjusting the magnification by zooming in or out might cause subtle changes to the granularity of the time scale.	—
If you port a kernel that implements OpenCL pipes from a third-party SDK to the AOCL, you must modify the host code and the kernel code so that they are AOCL-compatible.	Refer to <i>Ensuring Compatibility with Other OpenCL SDKs</i> in the <i>Altera SDK for OpenCL Programming Guide</i> .
If you modify the pipes implementation in your kernel code to enable concurrent execution, you cannot port your modified kernel to a third-party OpenCL SDK.	Refer to <i>Channels and Pipes Characteristics</i> in the <i>Altera SDK for OpenCL Best Practices Guides</i> for more information.

This section provides information about the following known issues that affect the current releases of the AOCL Custom Platform Toolkit and Reference Platforms. These issues might also affect Custom Platforms you create for use with the AOCL.

Description	Workaround
If your Custom Platform includes a board that has only one bank of memory, the Altera Offline Compiler (AOC) might generate incorrect hardware for a kernel targeting that board.	In the board_spec.xml file of your Custom Platform, if there is exactly one <code>interface</code> element specified for the <code>global_mem</code> element, remove the <code>interleaved_bytes</code> and <code>config_addr</code> attributes from <code>global_mem</code> .

Related Information

- [Ensuring Compatibility with Other OpenCL SDKs](#)
- [Channels and Pipes Characteristics](#)

Software Issues Resolved

The following issues were corrected or otherwise resolved in the AOCL and the RTE version 15.0.

Description	Workaround
<p>In the AOCL version 14.1, the <code>\$ALTERAOCLSDKROOT/init_opencl.sh</code> script for big-endian systems adds the following paths to the <code>LD_LIBRARY_PATH</code> environment variable:</p> <p><code>\$ALTERAOCLSDKROOT/host/linux64/lib</code> <code>\$AOCL_BOARD_PACKAGE_ROOT/linux64/lib</code></p>	<p>Starting in the AOCL version 15.0, the <code>\$ALTERAOCLSDKROOT/init_opencl.sh</code> script adds the following paths to the <code>LD_LIBRARY_PATH</code> environment variable for Linux Power systems:</p> <p>For big-endian systems, the path is <code>\$ALTERAOCLSDKROOT/host/ppc64/lib</code></p> <p>For little-endian systems, the path is <code>\$AOCL_BOARD_PACKAGE_ROOT/ppc641e/lib</code></p>

Document Revision History

Table 1: Altera SDK for OpenCL Version 15.0 Release Notes Document Revision History

Date	Document Version	Changes
May 2015	15.0.0	<ul style="list-style-type: none"> • Included support for double precision floating-point functions as a new feature and listed the OpenCL-conformant functions. • Included the following beta features: <ul style="list-style-type: none"> • Implementation of OpenCL pipes • <code>--high-effort</code> Altera Offline Compiler (AOC) command option • OpenCL Installable Client Driver (ICD) extension support • Altera Client Driver (ACD) • Noted that naming a kernel source file <code>kernel.cl</code> causes a compilation error. • Noted that emulation of an OpenCL kernel design targeting an SoC must be performed on a non-SoC board. • Noted automigration is a change in software behavior starting in 14.1. • Noted that declaring a <code>__constant</code> pointer kernel argument in a kernel targeting a Cyclone V device might degrade kernel performance. • Noted the following Profiler limitations: <ul style="list-style-type: none"> • Do not include spaces in directory and file names. • Do not use the same kernel names across different <code>.aocx</code> files. • Adjusting the magnification of the Kernel Executaion tab might cause subtle changes to the time scale. • Noted that for Linux Power systems, the <code>init_opencl.sh</code> script now sets the correct paths for the <code>LD_LIBRARY_PATH</code> environment variable. • Noted that a third-party OpenCL SDK kernel with pipes implementation must be modified before running on the AOCL. • Noted that if a kernel with pipes implementation is

Date	Document Version	Changes
December 2014	14.1.0	<ul style="list-style-type: none"> • Included the following new features: <ul style="list-style-type: none"> • Single OpenCL license. • AOCL <code>uninstall</code> utility. • Hard floating-point support. • An ALTERAOCLSDKROOT/init_opencl script for setting environment variables transiently. • Custom Platform automigration as a beta functionality. • Noted that RHEL version 5.x is no longer supported. • Noted that a routing error might be solved by reducing kernel size. • Added notice the AOCL <code>program</code> and <code>diagnose</code> utilities now support the Cyclone V SoC Development Kit (c5soc). • Noted that emulation is not available to kernels targeting c5soc. • Noted that the end of an NDRange kernel cannot include a memory barrier. • Noted the erroneous <code>LD_LIBRARY_PATH</code> settings in the ALTERAOCLSDKROOT/init_opencl.sh script for big-endian systems. • Added notice that improper installation of the PLDA QuickUDP IP license might result in an error message that refers to the QuickTCP IP. • Added change notice for the command you run to verify that CMA is enabled successfully for c5soc. • Noted that the AOC might generate incorrect hardware for kernels targeting a board with only one bank of memory. • Noted that the <code>--util <N></code> and <code>-O3</code> AOC options are deprecated. • Noted that the board_spec.xml file now includes a <code>compile</code> XML element. • Added notice of updated specifications for the <code>version</code> XML attributes in the board_env.xml and board_spec.xml files. • Added notice about new enum value arguments for the <code>aocl_mmd_get_offline_info</code> MMD API call. • Added notice about board partition in the c5soc Reference Platform. • Added notice that you no longer need to remove the libstdc++ library files from the ALTERAOCLSDKROOT/host/linux64/lib directory.

Date	Document Version	Changes
June 2014	14.0.0	<ul style="list-style-type: none"> • Included Cyclone V SoC support and big-endian architecture support as new features. • Included the following new features: RTE, AOCL channels extension, optimization report for single work-item kernels, and AOCL Custom Platform. • Included emulator and profiler as new beta features. • Included RPM installation option for AOCL and RTE. • Added notice that <code>float3</code> argument types are supported in 14.0. • Added notice that kernel clock reconfiguration issue during <code>.aocx</code> file generation is fixed in 14.0. • Added notice that the issue with excessive memory consumption during full compilation is fixed in 14.0. • Added deprecation notices for the <code>--estimate-throughput</code> and <code>--sw-dimm-partition</code> AOC options. • Added deprecation notices for the <code>num_share_resources</code>, <code>max_share_resources</code>, <code>max_unroll_loop</code> and <code>task</code> kernel attributes. • Updated Linux version support. • Added support notice for OpenCL C++ bindings. • Added notice that, for Windows systems, trailing slashes in include paths are illegal. • Added notice that, for Windows systems, compilation fails if the file path to the kernel source file exceeds 260 characters in length. • Added notice that to disable burst-interleaving for the default global memory, <code>--no-interleaving</code> requires a default argument. • Added notice that AOC options for floating-point operations have been renamed (that is, <code>--fp-relaxed</code> and <code>--fpc</code>). • Added notice that the <code>program</code> and <code>flash</code> AOCL utilities require a device name argument. • Added notice that <code>aocl diagnostic</code> has been renamed to <code>aocl diagnose</code>. Invoking <code>aocl diagnose</code> queries a list of devices. Invoking <code>aocl diagnose <device_name></code> runs board vendor's diagnostic tests on a specific board. • Added notices of Cyclone V SoC-specific AOCL limitations. • Added notice to exclude the <code>num_compute_units</code> kernel attribute in OpenCL kernel programs targeting big-endian systems. • Added notices of the <i>Altera SDK for OpenCL Optimization Guide</i> and the APBPP board package have been renamed.

Date	Document Version	Changes
December 2013	13.1.1	<ul style="list-style-type: none"> • Included multiple devices support as a new beta feature. • Included heterogeneous memory system as a new beta feature. • Included the <code>--no-interleaving <memory_type></code> option of the <code>aoc</code> command. • Included new <code>buffer_location</code> kernel attribute. • Added notice to modify the contents of <code>\$ALTERAOCLSDKROOT/host/linux64/lib</code> to remove OpenCL runtime incompatibility with C++ code compiled with GCC versions 4.3 and later.
November 2013	13.1.0	<ul style="list-style-type: none"> • Included the <code>--estimate-throughput</code> option of the <code>aoc</code> command. • Included new <code>task</code> kernel attribute. • Included restrictions on OpenCL filenames. • Updated installation and uninstallation instructions. • Updated location where OpenCL example applications can be downloaded. • Updated the name of the folder or directory to which the installer extracts the AOCL. • Updated setting of the <code>PATH</code> environment variable. • Updated setting to <code>LD_LIBRARY_PATH</code> environment variable. • Updated output of the <code>--report</code> flag of the <code>aoc</code> command. • Updated the AOCL support status for BittWare FPGA boards. • Updated the AOCL support status for kernel parameters. • Updated support status for <code>float3</code> argument types. • Included notice on premature termination of host application debugging process in GDB. • Included notice to modify <code>top.qsf</code> to avoid large memory consumption during full compilation.

Date	Document Version	Changes
June 2013	13.0 SP1.0	<ul style="list-style-type: none"> • Included new kernel attributes and new design example. • Updated <i>LM_LICENSE_FILE</i> setting for Windows and Linux systems. • Updated board driver installation instructions. • Updated the SDK installation instructions for Linux systems without preexisting <i>.cshrc</i> or <i>.bashrc</i> files. • Updated the locations of the board drivers for Nallatech and Bittware boards. • Updated the implementation status of the AOCL utility for the BittWare board. • Updated vendor and device IDs on Windows systems. • Updated path to design examples. • Updated path to the moving_average design example. • Updated flash programming instructions. • Updated file type support for <i>.aocx</i> files. • Updated support status of complex exit paths in kernel source code. • Added notices on figure updates in the <i>Altera SDK for OpenCL Optimization Guide</i>.
May 2013	13.0.0	<ul style="list-style-type: none"> • Initial Release.