CrossCore® Development Tools by Analog Devices

Release Notes for CrossCore® Embedded Studio Rel.3.0.4

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2 Introduction

This document describes the changes for CrossCore Embedded Studio (CCES) 3.0.4. You can find the release notes for older releases in the `docs` sub-directory of your CCES installation as well as an Installation Guide which will help you install this release.

For information on Linux please refer to the general Linux documentation Linux for ADSP-SC5xx Processors [Analog Devices Wiki]. Other useful links for CrossCore and Linux Development are:

- http://www.analog.com/cces-quickstart
- EngineerZone > Processors and DSP > Software and Development Tools > CrossCore Embedded Studio and Add-ins
- EngineerZone > Processors and DSP > Software and Development Tools > CrossCore Embedded Studio and Add-ins > tags > CCES
- EngineerZone > Processors and DSP > Software and Development Tools > CrossCore Embedded Studio and Add-ins > tags > CCES 3.0.4
- How to debug SHARC cores in CCES while running Linux
- Configuring System Memory for the ADSP-SC5xx When Using Linux and SHARC Applications

For information regarding support for ADuCM302x and ADuCM4x50 families of Arm Cortex-M microcontrollers the links below may be useful:

- https://wiki.analog.com/resources/eval/user-guides/eval-adicup3029
- https://wiki.analog.com/resources/eval/user-guides/ev-cog-ad3029lz
- https://wiki.analog.com/resources/eval/user-guides/ev-cog-ad4050w

3 New and Noteworthy in CCES 3.0.4

3.1 System Services and Device Drivers

CCES 3.0.4 has the following improvements for SSLDD:

- ADSP-SC83x family of processors: **AD1164 ASPICE Compliant SSLDD sources/libraries have been provided for ADSP-SC83x family of processors** with the CCES-3.0.4 release.
- ADSP-SC59x/ADSP-2159x processors: New API "adi_mdma_CopyCircular1D" is provided as part of MDMA service to support MDMA Circular list descriptor mode along with trigger.

3.2 Initcode and preload updates

- For ADSP-21568, Preload Support is added for NOR flash at 125MHz and OctalRAM initialization at 70MHz.

3.3 Updated ADSP-SC83x and ADSP-2183x Toolchain for SHARC-FX

The Xtensa toolchain for ADSP-SC83x and ADSP-2183x parts support is updated in CCES 3.0.4, features in this update are:

- Xtensa Software Tools version 15.05 includes a preview version of Extra Clang Tools (most notably clang-tidy and clangd) in the `XtensaTools/llvm/bin` directory. For documentation, please refer to https://clang.llvm.org/extra/index.html.
- The xt-clang compiler now issues a warning when the same variable is passed to multiple out or inout arguments of a TIE intrinsic function (aka TIE proto).
- The `xtutil` library now provides a random number generation function. This enables an application to generate the same sequence of pseudorandom numbers regardless of the choice of C library.
- A new function `idma_release_loop_buffer()` has been added to the IDMA library, to enable freeing up of channel buffer slots for multi-threaded applications.
- Added new user-visible HAL APIs `xthal_interrupt_sens_set_level()` and `xthal_interrupt_sens_set_edge()`. Added new convenience defines `XTHAL_INTERRUPT_SENS_EDGE` and `XTHAL_INTERRUPT_SENS_LEVEL` for use with existing `xthal_interrupt_sens_set()` API.
- The Xtensa Processor Hardware Abstraction Layer (HAL) includes instruction cache invalidate functions that only invalidate the portion of the cache that has appropriate execute permissions (X on MPU).
- The XTOS Power Shut Off (PSO) support functions are being replaced by equivalent HAL functions. While the XTOS functions are still available, they are now deprecated and will be removed in a future release. They now call the HAL functions internally. For more information, refer to the Xtensa®System Software Reference Manual.
- This release includes a pthreads-compatible interface library for XOS, allowing pthread based applications to be ported to XOS. For more information see the Xtensa® XOS Reference Manual.

3.3.1 Bug Fixes:

- A bug in a previous release of linker script generation caused the size of the "l2ram" memory region in the memory map to be half of the configured L2 size. This has been fixed.
- A previous release of the xt-clang compiler could crash when used with precompiled header files. This issue has been fixed.
- A previous release of xt-objdump could generate spurious warnings "DWARF error: could not find variable specification at offset" when disassembling Xtensa object files. This issue has been fixed.
- The xt-genmpu tool was generating incorrect MPU table entries if the memory region start or end address was not aligned to the MPU minimum region size. Such entries get truncated when programmed into the hardware and can lead to incorrect behavior and crashes. This has been changed.
- Now the MPU table is not generated if such regions are encountered in the memory map, a warning message is displayed. An LSP with such a memory map will still have correct linker scripts, but will not have the generated mpu_table.c file and corresponding library. The MPU will be programmed with the fallback option of using the symbol `_memmap_cacheattr_reset` to create 8 regions of 512 MB each.
- A bug in a previous release of xt-gdb could cause it to crash when trying to print custom TIE types cast to standard integer types. This has been fixed.
- Both xt-gdb and Xtensa Xplorer displayed IDMA registers only for the first channel, if more than one channel was configured. This has been fixed.

4 Known Issues in CCES 3.0.4

4.1 Backward Compatibility for ADSP-SC83x/ADSP-2183x/ ADSP-21568 xSPI Projects

xSPI driver has been updated with certain Enums/Structures/Macros/API for ADSP-SC83x/ADSP-2183x/ ADSP-21568 family of processors. The xSPI driver static configuration "adi_xspi_config_SC8xx.h/ adi_xspi_config_2156x.h" files have been updated.

Any ADSP-SC83x/ADSP-21568 family projects with the xSPI driver added using CCES-3.0.0/CCES-3.0.1/ CCES-3.0.2/CCES-3.0.3 may get certain warnings/errors while importing these examples projects in CCES-3.0.4. In case of any warnings, please refer to updated adi_xspi_config_SC8xx.h & adi_xspi_config_2156x.h files and update the application accordingly.

Steps to update your "adi_xspi_config_SC8xx.h/adi_xspi_config_2156x.h" are:

- Take a backup of xSPI static configuration "adi_xspi_config_SC8xx.h" file at "$project/ system/drivers/xspi"
- Uninstall the xSPI addin from system.svc
- Re-install the xSPI add from system.svc
- Update the macros in the "adi_xspi_config_SC8xx.h/adi_xspi_config_2156x.h" file as per the backed-up file.

4.2 Problems Using Stack, Heap and Code all using xSPI RAM

Applications for ADSP-21568 family parts using xSPI as SRAM with Startup/LDF settings to put a custom stack and custom heap of minimum size in xSPI memory fail to run correctly. Using absolute size heap and stack or not using xSPI for heap and stack seems to avoid the problem where memory used for functions in xSPI can be corrupted.

4.3 ADSP-SC83x/ADSP-2183x xSPI boot fails booting when the initcode is used

xSPI boot will fail if the initcode with xSPI PHY training is used in the CrossCore SHARC-FX loader settings.