Multicore Software Development Kit for High-Performance Computing

Release Notes

TEXAS
INSTRUMENTS

Document License

Contents

MCSDK-HPC Release 3.0.0

1 Overview

This document is the Release Notes for Release 3.0.x of the Multicore Software Development Kit for High-Performance Computing (MCSDK-HPC). MCSDK-HPC is built as an add-on on top of the foundational Multicore Software Development Kit (MCSDK). MCSDK-HPC, along with MCSDK, provides the complete environment to develop HPC applications on a cluster of TI Keystone II devices.

2 Licensing

Please refer to the software manifest which outlines the licensing status for all packages included in this release.

3 Documentation

- **README**: Provides information on setting up the environment to compile the provided components and build out-of-box demos.

- **MCSDK-HPC Software Manifest**: Provides license information on software included in the MCSDK-HPC release. This document can be found in the release at [INSTALL-DIR]/mcsdk-hpc_<ver>/docs.

4 Platform and Device Support

The device and platforms supported with this release include:

Platform	Supported Devices	Supported EVM
[K2H]	66AK2H12	XTCIEVMK2X

5 Technical Support and Product Updates

For technical discussions and issues, please visit:

- **KeyStone Multicore forum**
- **BIOS Embedded Software forum**
- **Linux Embedded Software forum**
- **Code Composer Studio forum**

- **TI C/C++ Compiler forum**
- **Embedded Processors wiki**

For local support in China, please visit

- **China Support forum**

6 Releases

6.1 Components/Versions packaged in this release

Component	Version
Framework Components Lite	03.30.00.06
OpenEM	01.10.00.00
OpenMP	02.01.14.00
ti-openmpi	01.00.00.09
XDAIS	07.24.00.04
FFTLIB	02.00.00.02
OpenCL	00.09.00
BLAS	03.11.00.03
OpenMP Acc Model	00.03.03
OOB Demos	(Same as MCSDK-HPC)

6.2 Release Features

6.2.1 DEV.MCSDK_HPC.03.00.00.19

Changes from previous release:
- Upgraded the dependency on MCSDK from 3.0.4.17 to 3.0.4.18
- All bundled components promoted to GA status (except for OpenMPacc)
- OpenMPI over SRIO with packet forwarding for switch-less topologies
- Default Hyperlink bandwidth increased from 3.125 to 6.25 Gbps
- Support to natively compile all out of box examples on EVM
- All out of box examples (opencl, openmp, openmpi, hpc) have been consolidated and installed to /usr/share/ti/examples
- mpi_examples present as separate package in previous release have been removed
- Dropbear patch has been removed
- Additional documentation and collateral on wiki pages
- HPC additions to the file system are delivered as IPKs and via apt-get

6.2.2 DEV.MCSDK_HPC.03.00.00.18

Changes from previous release:
- Upgraded the dependency on MCSDK from 3.0.4.16 to 3.0.4.17
- Bug fixes in OpenMPI over Hyperlink. Now support both Hyperlink ports to be concurrently turned ON
- Transport for MPI need not be explicitly specified any more. When MPI is launched, it probes for Hyperlink availability. If Hyperlink is not available, then the transport defaults to Ethernet
- OpenMP, OpenCL, OpenMPI, OpenMP accelerator model components are upgraded
- Fixed udev rules to properly set the permissions for hyperlink
- Documentation (Getting Started Guide) is moved to an online wiki page
- UIO module and edma3lld are now available from PPA

- Mailbox, Sync modules are moved from MCSDK-HPC/comp folder to MPM and delivered as part of MCSDK
- OpenMPI over SRIO/RIONET. For this feature, user needs to fetch the necessary Kernel, U-boot, and DTS from git.ti.com and re-build the kernel. The feature is not available in the pre-built images supplied with MCSDK. Please see GSG for more details.
- Codegen tools are upgraded to Beta status and now available on the web.
- Release made publicly available on ti.com

6.2.3   DEV.MCSDK_HPC.03.00.00.17

Changes from previous release:
- Upgraded the dependency on MCSDK from 3.0.3 to 3.0.4.
- The release includes pre-built binaries (as IPKs) and demos (as tar-ball). This means that end user doesn't have to compile anything for using MPI, OpenCL etc. and for running out of box demos
- Obsoleted Install Jammer created .bin files with GUI. The release is provided from now on as a tar-ball (with a bash script wrapper) and can be used on either 32-bit or 64-bit machines for either native or cross compilation (native compile when file system has all the dependent packages)
- 8 GB addressing with OpenCL Kernels. At a lower level, it involves following changes
    - Add MPAX LLD on DSP and A15
    - CMEM enhancements to allocate pools in high memory beyond 4 GB
    - CMEM enhancements to support >2 GB pool allocation
    - OpenCL enhancements to dynamically program MPAX registers
- OpenMPI over Hyperlink with performance improvements (See README @ TI-OPENMPI-README)
- OpenMP Accelerator Model
- Framework Components, XDAIS, OpenMP, MPM, MPM-transport, CMEM and PDK are now available from PPA. Users can fetch via a top level meta project using apt-get install keystone-hpc=<release version>
- Documentation (Getting Started Guide) is moved to an online wiki page
- Updated setup_hpc_env.sh script to search for dependencies listed in MCSDK_HPC_BOM.txt, where BOM means Bill of Materials, i.e. list of components and their versions), along the search paths supplied

6.2.4   DEV.MCSDK_HPC.03.00.00.16

Changes from previous release:
- Upgraded the dependency on MCSDK from 3.0.2 to 3.0.3.
- EdmaMgr component in Framework Components providing easy to use DMA APIs on DSP. EDMAMgr APIs are available for OpenCL Kernels to invoke.
- All the components and demos that used ECPY are now upgraded to use EDMAMgr.
- OpenMPI over hyperlink Engineering/Proof-of-concept Release using Hyperlink Port-0.
- Upgraded OpenCL which now has support to use system's CMEM settings
- Support to auto-insert CMEM and configure permissions
- Upgraded FFTLIB, OpenMP to beta versions.

6.2.5   DEV.MCSDK_HPC.03.00.00.15

Changes from previous release:
- Upgraded to OpenCL 0.3.3 which fixes issue with clocl utility.
- Includes PDK with MMAP-LLD support on DSP. This allows MPAX programming on DSP to map virtual memory to access anywhere in the 8 GB DDR3.
- Fixed issues with setup_hpc_env.sh such that it auto-detects whether release is being cross-compiled or natively compiled and sets up environment appropriately. Makefiles are updated to support both modes.

- Release installer is now available for both X86 and A15.
- Added an SRIO routing example to srio_filetestdemo.

6.2.6 DEV.MCSDK_HPC.03.00.00.14

Changes from previous release:
- Fixed the bit exactness issue and resource starvation issue in SRIO demo while transferring large files.
- Optimization and clean up of SRIO demo code.

6.2.7 DEV.MCSDK_HPC.03.00.00.13

Changes from previous release:
- Upgraded the dependency on MCSDK from 3.0.1 to 3.0.2
- MCSDK 3.0.2 brings in a newer version of CCS (v5.5)
- Included a custom device tree which disables QoS to obtain improved network performance on TI EVM.
- Fixed the issue in SRIO demos which needed reboots before every run of SRIO test.

6.2.8 DEV.MCSDK_HPC.03.00.00.12

Changes from previous release:
- Added multimode_batch_fftdemo which offloads batch FFTs over multiple DSP cores using OpenCL and multiple K2H EVMs using MPI.
- Added SRIO demo which uses the SRIO interface to send data between two K2H EVMs. File transfer (A15 initiated) between two EVMs supported. Additional test is loopback benchmark testing based on Type-11 or DIO messages.
- Added BLAS (Basic Linear Algebra Subprograms) library to package, and added blas_demo which uses OpenCL to offload BLAS library calls (sgemm). More details on BLAS implementation in blas-lib-3.11.0.pdf in BLAS folder.
- Upgraded to FFTLIB 2.0.0.2 which supports batch FFT execution on multiple DSP cores, radix-3 and implementation for FFT of any size (more details in release notes in FFTLIB folder)
- Upgraded to OpenCL 0.3.1 which includes the enhancement to support kernels with up to 19 arguments and arguments with size < 4 bytes (more details on this release in readme.txt in OpenCL folder).

Known Issues:
- SRIO-filetestdemo demo restart does not work w/o EVM reboot (to be addressed in next release).

6.2.9 DEV.MCSDK_HPC.03.00.00.11
- Modified setup_hpc_env.sh so that the base installation directory, TI_INSTALL_DIR, can be set before running the script. If TI_INSTALL_DIR is not set, it will use the default directory of "~/ti"
- Other minor changes and optimizations to release procedure which do not affect the actual release.

6.2.10 DEV.MCSDK_HPC.03.00.00.10
- Upgraded to OpenMP 2.1.3.0 which which was built with compiler tool version 7.4.2 and used MCSDK 3.0.1.12 components.
- Added nbody MPI example to MCSDK-HPC/demos to show
- Upgraded MPI Examples which include the following new examples:
    - miniFE : Finite-element mini-application

- HPCCG : A simple conjugate gradient benchmark application on an arbitrary number of process nodes.
- AMG2013 : A parallel algebraic multigrid solver for linear systems arising from problems on unstructured grids.

6.2.11 DEV.MCSDK_HPC.03.00.00.09
- Upgraded to OpenCL 0.2.0 which uses CMEM and has support for kernels using ECPY
- Add ECPY hello world example to MCSDK-HPC/demos to show how to offload ECPY enabled Kernel to C66x from A15

6.2.12 DEV.MCSDK_HPC.03.00.00.08
- Minor changes & optimizations to the installer creation process. No changes in the generated installer itself.

6.2.13 DEV.MCSDK_HPC.03.00.00.07
- Changed the dependency from MCSDK 3.0 GA to MCSDK 3.0.1 GA. This means that some of the packages we used to package in MCSDK-HPC are now available through MCSDK itself. So, we removed MPM, CMEM, EDMA3LLD, IPC, XDCTools, and BIOS from MCSDK-HPC

6.2.14 DEV.MCSDK_HPC.03.00.00.06
- Enhanced multinode FFT demo to also use OpenMP.
- Upgraded fftlib to version 1.0.0.4
- Upgraded OpenCL to version 0.1.9

6.2.15 DEV.MCSDK_HPC.03.00.00.05
- Multinode FFT demo (using MPI+OpenCL+fftlib) added as an additional OOB demo
- EDMA3LLD (packaged in MCSDK 3.0.0.11) needs changes to place far sections in Local L2 to interop with OpenMP
- XDCtools support for: evmTCI6636K2H platform and TMS320TCI6636 device
- BIOS, IPC, EDMA3LLD, XDCtools versions upgraded from MCSDK 3.0.0.11 and delivered as part of MCSDK-HPC installer. Once we migrate to use MCSDK 3.0.1 release, these components will be delivered as part of MCSDK and will be dropped from MCSDK-HPC installer
- OpenCL is now packaged in MCSDK-HPC

6.2.16 DEV.MCSDK_HPC.03.00.00.04
- SSH support through dropbear
- OpenMPI over Ethernet and MPI examples
- Framework components, dropbear, XDAIS, OpenEM, multiprocmgr components
- A15 / DSP data transfers through mpm_transport
- Multiprocessor barriers and locks through the sync module
- A15 / DSP communication through mailBox module
- DSP buffer management through bufmgr
- filetestdemo enhanced to use ECPY and LUDEV-CMEM