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## Base Package for Release 3.1 Release Notes

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### Release Notes for the Base Package

This document describes the most important changes to the base package since the previous release. In addition, it lists the known open issues and limitations in this release.

For more information regarding the status and workarounds related to any of these issues, please contact ClearSpeed support quoting the relevant CTS number.

You should check the ClearSpeed customer support website (<http://support.clearspeed.com>) for updates to these release notes.

# 1 What's new in Release 3.1

Release 3.1 contains many improvements to the software which have been made since Release 3.0. The major changes are summarized in this section.

- The documentation is no longer installed with the software. Please obtain the latest documentation directly from <http://support.clearspeed.com/documentation/>
- The software and tools in the 3.1 release adds support for CSX700-based products such as the Advance e710 and Advance e720 accelerators.
- The names of the installation packages have also changed. The string "csx600" has been removed from the package names and "clearspeed" has been added as a common prefix.
- The installation path for the software has changed to remove the target specific directory. The software now installs directly under the `clearspeed` directory, that is:
  - For Linux: `/opt/clearspeed`
  - For Microsoft Windows: `C:\Program Files\clearspeed`

- **Dual channel DMA**

The driver and CSAPI now support the dual channel DMA feature of the Advance e710 and Advance e720 accelerators under Linux platforms.

Dual channel DMA provides the ability to read and write at the same time across the PCI express bus, making use of the increased combined bandwidth. It also provides the ability to interleave large DMA transfers with smaller DMA transfers in the same direction. The total bandwidth remains the same, but the smaller transfers can start and finish before the larger transfer has completed.

When the `CSAPI_read_mono_memory` and `CSAPI_write_mono_memory` functions are called from separate threads, they will each block until their transfer has started and completed. Each call will take the next available DMA channel and start the transfer as soon as possible. There is no defined order in which multiple threads are allocated a DMA engine. Optimum use is achieved by performing one large read and one large write operation at the same time.

The `CSAPI_feature` function can be used to determine the number of DMA channels supported by the currently connected hardware.

- A new set of diagnostic tools are provided. These can be used to validate the correct installation of you hardware and software. They can also be used to assist investigation of problems.

## 2 Issues fixed in Release 3.1

The following issues have been fixed in this release:

### 2.1 Installation

**CTS 6021:** The `csx` install script expected to find the kernel header files in the directory `/lib/modules/`uname -r`/source`. The driver installation would fail if this directory did not exist. In some operating systems, the header files are in the directory `/lib/modules/`uname -r`/build`. In this case, a symbolic link should be created pointing `source` to `build`.

### 2.2 Runtime

**CTS 2004:** previous releases included a script (`recover_board`) for resetting the Advance accelerator card when `csreset` failed to do so. This functionality has now been included in `csreset`. If the normal use of `csreset` fails to fully reset the card then the command line option `--pci` can be used. This will perform a full hardware reset.

**CTS 5702:** If a semaphore handle was passed to `CSAPI_allocate_duplicate_shared_semaphore`, for allocation on a different card, it could not be released using `CSAPI_free_semaphore`.

**CTS 5703:** The hot pragma described in the SDK Reference Manual was not fully implemented in the previous release.

**CTS 6030:** The software temperature alert message issued with e710 and e720 cards reported the current temperature incorrectly. In addition, the message was printed each time the card crossed the temperature alert threshold, even though the message states that further temperature alerts are ignored.

**CTS 6044:** The `csreset` program printed four temperature values for the board when run with the `--verbose` flag (`-v`) on e710 and e720 cards. The fourth value was invalid and should be ignored.

**CTS 6247:** The `CSAPI_load` function no longer recognizes the value `ANY` for the list of sections to be loaded into internal SRAM (ESRAM). This is because `data` should not be loaded into ESRAM as the access alignment requirements of ECC memory cannot be guaranteed for data accesses. If `ANY` is specified, `CSAPI_load` will, instead, load all sections into external DRAM. `CSAPI_load` will return an error to indicate that the requested operation cannot be carried out.

### 2.3 CSXL

**CTS 1108:** If a host application program using the CSXL library was terminated abnormally (for example, by using `[Ctrl]+[C]`), the Advance Accelerator board may have been left in an undefined state. It may have been necessary to reset the board (using the `csreset` command) before restarting the application.

**CTS 3003:** CSXL did not work with the latest version of the Goto BLAS host library. See also CTS 4708.

**CTS 4633:** Calling the ZGEMM and ZGEMM3M with large matrices could exceed the available memory on the host system.

**CTS 5717:** Each of the DGEMM matrices (A, B and C) were limited to  $4 \times 10^9$  elements. For square matrices this limited the dimensions to  $m=n=k=65535$ . Incorrect results were expected beyond this limit.

## 2.4 Firmware

**CTS 6018:** The *Firmware Installation Guide* (02-XX-1510, September 2007) made incorrect reference to the diagnostics package as the source of the `xsvfplayer` tool for updating the firmware on Advance cards. For software releases after 3.0 the `xsvfplayer` is now installed by the runtime/driver package of the base software.

## 3 Known Issues in Release 3.1

### 3.1 Runtime

**CTS 239:** `csr` or host client applications cannot check whether the CSX processor has been reset. Running code on a processor that has not been reset should not be attempted. It is the responsibility of the user to reset the processor before running code (using `csreset -A`<sup>(1)</sup>).

**CTS 3161:** Release 3.0 and later releases are not supported with obsolete versions of the firmware. See the firmware upgrade release notes on the customer support site (<http://support.clearspeed.com>) for details.

### 3.2 CSXL

**CTS 3891:** This release of CSXL does not support the C pass-by-value interface for ACML. The C pass-by-reference and Fortran interfaces are supported.

**CTS 4591:** ClearSpeed provides a driver for the supported 64-bit Microsoft Windows operating systems (Windows Server 2003 and Compute Cluster Server) but currently we only have 32-bit libraries and tools. It is not possible to mix 32 and 64-bit application software and so only 32-bit applications can be used with the CSXL library, for example.

If you are using a 64-bit Windows operating system, you can install the ClearSpeed software for Microsoft Windows. The runtime package will install a 64-bit driver on 64-bit operating systems. You may now use these components as you would on a 32-bit operating system with the caveat that the application and all the libraries that you run against the installed 32-bit ClearSpeed software stack must also be 32-bit.

So for example if you have a 64-bit native version of MATLAB installed this will not work correctly and you will have to install the 32-bit version of the application software. Similarly if you build (ATLAS or GotoBLAS) or install (Intel MKL or AMD ACML) math libraries from third party sources then you will need to make sure they are also 32-bit versions.

**CTS 4708:** When using a version of the Goto BLAS host library then the string "goto" must appear in the file name specified in the `CS_HOST_BLAS` environment. If this is not present then incorrect results may be obtained.

For other host BLAS libraries, the string "goto" should *not* appear in the `CS_HOST_BLAS` path. If this string is present then the results will be correct but there may be some performance degradation.

**CTS 5584:** MKL has changed the way linkage with the different libraries work in version 10. Currently MKL version 10 will work with CSXL on Linux but not on Windows.

On Linux, when using MKL version 10 with CSXL, the environment variable `CS_HOST_BLAS` is specified differently than when using older versions of MKL with CSXL.

For MKL 10, `CS_HOST_BLAS` must include the interface library, threading library and

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1. `csreset -A` will reset ALL cards.

computational library. When calling BLAS/LAPACK routines, you must include `libmkl_intel_lp64.so`, `libguide.so`, `libmkl_intel_thread.so` and `libmkl_core.so`. If for example MKL is installed in `/opt/intel/mkl/10.0.3.020` and you are using Intel or GNU compilers, then

```
% export CS_HOST_BLAS = \  
/opt/intel/mkl/10.0.3.020/lib/em64t/libmkl_intel_lp64.so: \  
/opt/intel/mkl/10.0.3.020/lib/em64t/libguide.so: \  
/opt/intel/mkl/10.0.3.020/lib/em64t/libmkl_intel_thread.so: \  
/opt/intel/mkl/10.0.3.020/lib/em64t/libmkl_core.so
```

We have tested CSXL with MKL 10. If you encounter failures when using MKL 10, we recommend using MKL 10.1 Beta or later (if applicable), as test failures we have encountered are resolved in this Beta. If you continue to see issues, please report these via a support request to ClearSpeed at <http://support.clearspeed.com/support/case/>.

**CTS 6238:** While CSXL is compatible with Mathematica 6.0, the notebook provided with the CSXL examples is compatible only with Mathematica 5.2 and earlier.

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