



ClearSpeed Base Package Software Installation guide

Software installation

This document details the installation instructions for the ClearSpeed base package software.

Please refer to the support website for more information:

<http://support.clearspeed.com/>

Download are available at:

<http://support.clearspeed.com/downloads/software/>

Documentation can be found at:

<http://support.clearspeed.com/documentation/overview/>

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1 Base package installation information

Note: To install the software for your ClearSpeed Advance™ Accelerator card you will require root/administrator access.

Before you install:

- Prior to installing a new version of the software, please check the release notes for any changes or limitations in this release.
- You **must** uninstall any previous version of this software before installing this release.

1.1 Checking and upgrading the card firmware

The Advance card contains an FPGA (field programmable gate array) which provides the host interface and other logic. The data for this FPGA is stored in a flash memory on the card.

If you already have a previous version of the runtime software and a card installed, then you should check and upgrade the firmware, if necessary, before continuing with the installation.

The version of the FPGA image can be checked using the command `csreset -v`. This will display information about the installed card including the version of the FPGA image. See the FPGA update release notes for the latest version numbers. If your card does not report the latest version number, it will need to be updated. The latest version can be downloaded from the ClearSpeed support web site. See the FPGA update release notes.

1.2 Obtaining the software

The software is delivered on CD-ROM with the Advance card or is available for download from the ClearSpeed support website⁽¹⁾. Before installing this software, check the support website for updates or new releases.

The contents of the base package include:

- runtime components
- diagnostic tools
- CSXL library

1.2.1 Installing from CD-ROM

The CD-ROM has a directory for each supported operating system that contains the installation files for that OS. The files in this directory have names of the form `clearspeed-<os>-<component>-<release>-<build>.<arch>.<ext>`

1. <http://support.clearspeed.com/>

where:

`<os>` identifies the operating system, for example, `rhel14` or `sles10`

`<component>` is the software component, for example, `runtime` or `CSXL`

`<release>` is the release version, for example, `3.0`

`<build>` is the build version of this component, for example: `1.82.1.49`

`<arch>` is the target architecture, for example: `x86` or `x86_64`

`<ext>` is the file type extension; `rpm` for linux or `exe` for Microsoft Windows

1.2.2 Download the software

1. Download the Base Package zip file or tarball from the ClearSpeed support site:
<http://support.clearspeed.com/downloads/software/>
2. Extract the contents of the Base Package. This will create a directory called something similar to `x.xx_base` (depending upon the version number) containing the components of the package.
3. Change to the directory containing the contents of the Base Package; for example, `cd ~/x.xx_base` (note that the actual directory name may vary).

The files in this directory have names of the form:

`clearspeed-<os>-<component>-<release>-<build>.<arch>.<ext>`

where:

`<os>` identifies the operating system, for example, `rhel14` or `sles10`

`<component>` is the software component, for example, `runtime` or `csxl`

`<release>` is the release version, for example, `3.1`

`<build>` is the build version of this component, for example: `1.82.1.49`

`<arch>` is the target architecture, for example: `x86` or `x86_64`

`<ext>` is the file type extension; `rpm` for linux or `exe` for Microsoft Windows

Release notes and full documentation can be found on the ClearSpeed support site:

<http://support.clearspeed.com/documentation/>

2 Linux operating systems

2.1 Step 1: Install the runtime components

The runtime package includes a driver to interface between the Advance card and libraries allowing communication between host software and programs running on the card. The runtime package is provided as an RPM file and is installed using the `rpm` command:

```
rpm -i clearspeed-rhel5-runtime-3.1-1.339.1.43.x86_64.rpm
```

Note: The filename may vary depending on the software version and operating system.

This copies the runtime software to your machine.

Next, you must install the kernel driver.

2.2 Step 2: Install the kernel module

To complete the installation of the software drivers, a kernel module needs to be built and installed, and some configuration files need to be changed. Shell scripts are provided to do all of this.

The driver installation procedure depends on having the header files for the currently running kernel⁽¹⁾. If the `configure` or `make steps` fail, it is most likely that these header files are not available. To obtain the appropriate header files refer to the installation guide for your kernel distribution.

CSX kernel driver (for 2.6 kernels)

To install the CSX kernel module (still logged in as root) execute the following commands (assuming the driver has been installed to the default directory):

```
cd /opt/clearspeed/drivers/csx/  
sh install-csx
```

Any error messages at this stage should be investigated as these may indicate problems that prevent the driver working properly. If the machine has previously had an older driver installed, you should remove any entries in `/etc/rc.local` that refer to `windrvr6`.

The driver is now installed as a kernel module and should also restart after a reboot.

1. Installing kernel sources

The installation of the kernel driver requires that the kernel source files be installed. By default, most Linux distributions do not install these kernel sources and so, before installing the kernel driver, these sources must be installed.

How the source packages are obtained depends on the Linux distribution being used and varies with releases of these distributions. The guidelines that follow are believed to be correct with the distributions currently available but the reader should be aware that the area of updates tends to be subject to change and development.

Generally, sources are available as RPM packages which are obtained and installed like any other package. It is vital that the sources which match the kernel distribution are installed. The running kernel version number can be obtained with the command:

```
uname -r
```

For Red Hat, the kernel source RPM is called `kernel-devel-xxx` (where `xxx` is the kernel version number).

For SLES, the kernel source RPM is currently called `kernel-sources`.

When the card is installed, the driver can be controlled manually via the following commands (as root).

To start the driver, execute the command:

```
/etc/init.d/csx start
```

To stop the driver, execute the command:

```
/etc/init.d/csx stop
```

2.3 Install diagnostics and validate installation

The diagnostics package includes some tools to confirm the correct functioning of the installed hardware and software. This can be installed using the `rpm` command:

```
rpm -i clearspeed-rhel5-diagnostics-3.1-1.4.1.9.x86_64.rpm
```

Note: The filename may vary depending on the software version and operating system.

See the *Runtime User Guide* for more information on the diagnostics tools. A simple, quick test is to initialise the Advance card(s) and run the diagnostics utility:

```
source /opt/clearspeed/bin/bashrc
csreset --all
csdiag --all
```

This will run a standard set of tests on all the installed cards and report the results. If your hardware fails any tests, please consult the diagnostics chapter of the *Runtime User Guide* and the troubleshooting section of the appropriate *Advance Card User Guide*. If the problem persists, you can report your problem by submitting an online report via the ClearSpeed support website: <http://support.clearspeed.com>.

Note: The Advance card must be initialised after power up using the `csreset` utility.

2.4 Install CSXL library, if required

The CSXL library provides acceleration for functions such as DGEMM. This can be installed using the `rpm` command:

```
rpm -i clearspeed-rhel5-csxl-3.1-1.220.1.37.x86_64.rpm
```

Note: The filename may vary depending on the software version and operating system.

See the *CSXL User Guide* for more information on how to use the CSXL library. A simple example program is provided with CSXL which will allow you to validate the correct installation and function of CSXL.

2.5 Uninstalling the components

The components can be uninstalled using the `rpm -e` command. Components must be uninstalled in the reverse of the order in which they were installed. You can get a list of the installed ClearSpeed RPMs with the command:

```
rpm -qa | grep clearspeed
```

Before removing the driver component, you should remove the kernel module. To remove the kernel module, you should first change to the directory

`/opt/clearspeed/drivers/csx/` and execute the following command:

```
sh uninstall-csx
```

These steps will remove the `init.d` script and stop the driver from running. The RPM can then be removed.

3 Microsoft Windows operating systems

For the following steps you will need to be logged in with Administrator privileges.

Note: If you see a “Cannot Install this Hardware” message, this may be due to insufficient user privileges. This can be caused by a group policy option, even if you are an administrator. Your local system administrator will be able to tell you if this is the case. Please see the following Microsoft article for details on the privileges required and how to grant them.

<http://support.microsoft.com/kb/888791>

You will be able to see which privileges are missing by clicking Start->Run and then entering `notepad %SYSTEMROOT%\Wdf01005Inst.log`
The log will contain a message such as “Failed To Enable SE_BACKUP_PRIVILEGE”.

3.1 Using 32-bit software on 64-bit Microsoft Windows

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 our CSXL library, for example.

If you are using a 64-bit Windows operating system, you can install the ClearSpeed software for Microsoft Windows.

Note: There is a single Windows installer for both 32- and 64-bit Windows operating systems. The runtime package will install a 64-bit driver on 64-bit operating systems.

You may 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.

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 Goto BLAS) or install (Intel MKL or AMD ACML) math libraries from third party sources then you will need to make sure there are also 32-bit versions.

3.2 Install the runtime component

The runtime component includes a driver to interface between the Advance card and libraries allowing communication between host software and programs running on the card.

Note: If the **Windows New Hardware Wizard** appears before the driver has been installed, click **[Cancel]** and continue with the installation as described below.

1. Double-click the installer, for example:
`clearspeed-windows-runtime-3.1-1.339.1.43.i386.exe`
to start the installation process.
2. Follow the on-screen instructions to install the runtime package.

The Windows “**New Hardware**” wizard may appear during software installation. If it does, then choose the option to not check for a driver on Windows Update, then choose the

“**Install the software automatically**” option. This process will repeat for every ClearSpeed card you have installed in your system.

3.3 Install diagnostics and validate installation

The diagnostics package includes some tools to confirm the correct functioning of the installed hardware and software. To install the diagnostics package double-click the setup file, for example:

```
clearspeed-windows-diagnostics-3.1-1.4.1.9.i386.exe
```

Note: The filename may vary depending on the software version and operating system.

See the *Runtime User Guide* for more information on the diagnostics tools. A simple, quick test is to initialise the Advance card(s) and run the diagnostics utility. Using the ClearSpeed Command Prompt provided on the start menu, run the following commands:

```
csreset --all  
csdiag --all
```

This will run a standard set of tests on all the installed cards and report the results. If your hardware fails any tests, please consult the diagnostics chapter of the *Runtime User Guide* and the troubleshooting section of the appropriate *Advance Card User Guide*. If the problem persists, you can report your problem by submitting an online report via the ClearSpeed support website: <http://support.clearspeed.com>.

The Advance card must be initialised after power up using the csreset utility.

3.4 Install CSXL library, if required

The CSXL library provides acceleration for functions such as DGEMM. To install the CSXL library double-click the setup file, for example:

```
clearspeed-windows-csxl-3.1-1.220.1.37.i386.exe
```

See the *CSXL User Guide* for more information on how to use the CSXL library. A simple example program is provided with CSXL which will allow you to validate the correct installation and function of CSXL.

3.5 Uninstalling the components

The software can be uninstalled using the **Add or Remove Programs** wizard in the Windows **Control Panel**, or by using the **Uninstall Package** menu command under the **Start** menu.

4 Revision history

Date	Revision	Changes
July 2007	2.0	Initial version of this document produced in document format.
October 2007	3.0	Removed instructions on FFT installation; updated validation instructions.
November 2007	3.A	Made several minor adjustments.
January 2008	3.B 3.C	Miscellaneous bug fixes.
January 2008	3.D	New template applied.
July 2008	3.E	Documented the package naming changes. Added diagnostics package. Referenced website for documentation.
September 2008	3.F	Amendment to copyright statement.
June 2010	3.G	Add csreset before csdiag. Update company details.

Table 1. Document revision history

ClearSpeed Technology Ltd

130 Aztec West
Park Avenue
Bristol BS32 4UB
United Kingdom

Tel: +44 (0)1454 629 623

Fax: +44 (0)1454 629 624

Email: info@clearspeed.com

Web: <http://www.clearspeed.com>

Support: <http://support.clearspeed.com>

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