

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.clearpseed.com/>

Download are available at:

<http://support.clearpseed.com/downloads/>

Documentation can be found at:

<http://support.clearpseed.com/documents/>

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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; see [Section 2.8: Uninstalling the components on page 8](#).

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 version of the driver and diagnostics packages and a card installed then you can check, and upgrade if necessary, before continuing with the installation. Otherwise, you can do it after the installation instructions below.

The version of the FPGA image can be checked using the command `csreset -Av`. 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 and the *Advance Card User's Guide* for instructions.

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, you should check the support website for updates or new releases.

The contents of the base package include:

- runtime component,
- card diagnostics component,
- CSXL library,
- FFT library.

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

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 `csx600_m512_le-<component>-<version>.<target>.rpm`

where:

- `<component>` is the software component, for example runtime or CSXL
- `<version>` is the release version and the build version of this component, for example: 2.50-1.82.1.49
- `<target>` is the target architecture, for example: x86 or x86_64

Release notes and other documentation can be found in the docs subdirectory.

1.2.2 Download the software

1. Download the Base Package tarball from the ClearSpeed support site <http://support.clearspeed.com/downloads/>.
2. Unpack the contents of the Base Package. This will create a directory called something similar to `csx600_2.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 ~/csx600_2.xx_base` (note that the actual directory name may vary).

The files in this directory have names of the form:

`csx600_m512_le-<component>-<version>.<target>.rpm`

where:

- `<component>` is the software component, runtime, csxl, etc.
- `<version>` is the release version and the build version of this component, for example: 2.50-1.82.1.49
- `<target>` is the target architecture, for example: x86_64

Release notes and other documentation can be found in the docs subdirectory.

2 Software installation: Linux® operating systems only

2.1 Installing all components

For the following steps you will need to be logged in as root.

Note: If you use `su` to log in as root, please ensure you use the command `su -` to ensure that the correct environment and path is set up for the following steps.

If you wish to install all the components in the Base Package then you can use the command:

```
rpm -i *.rpm
```

2.2 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 csx600_m512_le-runtime-2.xx-1.118.1.25.x86_64.rpm
```

Note: The filename may vary depending on the version.

This copies the runtime software to your machine.

Next, you must install the appropriate kernel driver.

2.3 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.

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`.

Depending on your kernel version, you will either have a Jungo or a CSX driver available. If you are running a 2.4 kernel (that is, RHEL 3) you will need to use the Jungo driver which is included with this package. Any driver from a previous installation **must** be removed first. If you are running a 2.6 kernel then you will use the open source CSX driver and will need to uninstall any older ClearSpeed drivers first.

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/csx600_m512_le/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 `windr6`.

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

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
```

Jungo kernel driver (for 2.4 kernels)

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

```
cd /opt/clearspeed/csx600_m512_le/drivers/jungo/  
sh install-jungo (1)
```

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 `windr6`.

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

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/csx600-windr6 start
```

To stop the driver, execute the command:

```
/etc/init.d/csx600-windr6 stop
```

1. Kernel tainted message

The installation of the Jungo driver causes a message of the following format to be printed to the kernel log file:

```
machine kernel: windrvr6: no version for "struct_module" found: kernel tainted.
```

This message is normal and is caused by the fact that the kernel module `windr6` is not open source.

2.4 Step 3: Install the card diagnostics component

After the drivers have been installed, you can install the diagnostics package. This contains tools which will verify the correct functioning of the card and drivers.

Install the diagnostics package using the `rpm` command:

```
rpm -i csx600_m512_le-board_diagnostics-<version>.x86_64.rpm
```

Note: The filename may vary depending on the version.

2.5 Step 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 csx600_m512_le-csxl-<version>.x86_64.rpm
```

Note: The filename may vary depending on the version.

See the *CSXL User Guide* in the `docs` directory of the installation for more information on how to use the CSXL library.

2.6 Step 5: Install FFT library, if required

The CSDFT library provides acceleration for FFT functions. This can be installed using the `rpm` command:

```
rpm -i csx600_m512_le-csfft-<version>.x86_64.rpm
```

Note: The filename may vary depending on the version.

See the *CSDFT User Guide* in the `docs` directory of the installation for more information on how to use the CSDFT library.

2.7 Step 6: Verify the installation of the card and drivers

You can now run the diagnostic program to check that the card and associated drivers have been successfully installed. This utility runs a number of tests on the installed card(s) and reports any problems.

2.7.1 Initial test

An initial basic check that the hardware and software are correctly installed can be performed by resetting the card:

1. Use the shell script provided to set up the environment variables:

```
source /opt/clearspeed/csx600_m512_le/bin/bashrc
```
2. Run the board reset command

```
csreset --verbose
```

This will print a large amount of information about the state of the card. Any errors or warnings at this stage should be investigated before proceeding. Refer to the Troubleshooting section of the Advance Card User Guide for help. If the problem persists, please contact ClearSpeed via the support web site.

2.7.2 Diagnostic tests

Caution: The board diagnostics include a DGEMM (matrix multiply) test. In order to run this test the environment variable `CS_HOST_BLAS` must be set to the name of a host BLAS library. If this variable is not set then the DGEMM test will be skipped. Please refer to the CSXL User Guide for more information.

To run the diagnostics tests:

1. Go to a directory where you have write privileges; for example:

```
cd /tmp
```
2. Use the shell script provided to set up the environment variables:

```
source /opt/clearspeed/csx600_m512_le/bin/bashrc
```
3. Run the program:

```
perl /opt/clearspeed/csx600_m512_le/bin/run_tests.pl
```

Note: *Some of these tests may take several minutes to run to completion.*

The diagnostics write the results of the tests to the file `test.log` in the current directory. ClearSpeed technical support may require the output of this utility to help diagnose any installation problems. If any of the tests fail, refer to the 'Troubleshooting' section of the *Advance Card User Guide* for help. If the problem persists, please contact ClearSpeed via the support web site.

2.7.3 Mandelbrot demonstration

A simple Mandelbrot program can also be run. This is a graphical program and requires X to be running. This can be run as follows:

Use the shell script provided to set up the environment variables:

```
source /opt/clearspeed/csx600_m512_le/bin/bashrc
```

Reset the card:

```
csreset -Av
```

Run the Mandelbrot demo:

```
/opt/clearspeed/csx600_m512_le/bin/app_mandelbrot
```

When the program starts, it opens a window to display views of a Mandelbrot set. This program requires an X server to be running.

2.8 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 csx
```

Before removing the driver component, you should remove the Jungo or CSX driver as appropriate. To remove the CSX driver, you should first change to the directory `/opt/clearspeed/csx600_m512_le/drivers/csx/` and execute the following command:

```
sh uninstall-csx
```

To remove the Jungo driver, you should first change to the directory `/opt/clearspeed/csx600_m512_le/drivers/jungo/` and execute the following command:

```
sh uninstall-jungo
```

Note: If you are not sure which kernel driver is installed on your system, you can safely run both uninstall scripts.

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

3 Microsoft Windows operating system installation

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 Step 1: 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, csx600_m512_le-runtime-
<version>.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.

3.2 Step 2: Install the card diagnostics component

After the drivers have been installed, you can install the diagnostics component. This contains tools which will verify the correct functioning of the card and drivers.

To install the diagnostics package double-click the setup file (for example, csx600_m512_le-board_diagnostics-<version>.i386.exe) to start the installation.

3.3 Step 3: Install CSXL library, if required

The CSXL library provides acceleration for functions such as DGEMM. To install the diagnostics package double-click the setup file (for example, csx600_m512_le-csxl-<version>.i386.exe) to start the installation.

See the *CSXL User Guide* in the docs directory of the installation for more information on how to use the CSXL library.

3.4 Step 4: Install FFT library, if required

The CSDFT library provides acceleration for FFT functions. To install the diagnostics package double-click the setup file (for example, `csx600_m512_1e-csdft-<version>.i386.exe`) to start the installation.

See the *CSDFT User Guide* in the docs directory of the installation for more information on how to use the CSDFT library.

3.5 Step 5: Verify the installation of the card and drivers

You can now run the diagnostic program to check that the card and associated drivers have been successfully installed. This utility runs a number of tests on the installed card(s) and reports any problems.

3.5.1 Initial test

An initial basic check that the hardware and software are correctly installed can be performed by resetting the card:

1. Double-click the desktop shortcut `csx600_m512_1e` created by the installation. This opens a command window.
2. In the new window, run the board reset command
`csreset --verbose`

This will print a large amount of information about the state of the card. Any errors or warnings at this stage should be investigated before proceeding. Refer to the Troubleshooting section of the Advance Card User Guide for help. If the problem persists, please contact ClearSpeed via the support web site.

3.5.2 Mandelbrot demonstration

1. You can run a simple Mandelbrot demonstration program as follows:
Double-click the desktop shortcut `csx600_m512_1e` created by the installation; this opens a command window.
2. In the new window, run the following commands exactly as they appear here:

Reset the chip:

```
csreset -Av
```

Run the Mandelbrot demo:

```
app_mandelbrot
```

When the program starts, it opens a window to display views of a Mandelbrot set. If this does not happen, please run the full diagnostic tests described below or contact ClearSpeed support via the website.

3. Press [**Esc**] to exit from the Mandelbrot program.

3.5.3 Diagnostic tests

Caution: The board diagnostics include a DGEMM (matrix multiply) test. In order to run this test the environment variable `CS_HOST_BLAS` must be set to the name of a host BLAS library. If this variable is not set then the DGEMM test will be skipped. Please refer to the CSXL User Guide for more information.

In order to run the board diagnostic tests you must have the Perl interpreter installed⁽¹⁾. You can run the tests as follows:

1. Double-click the desktop shortcut `csx600_m512_1e` to open a command window.
2. In the new window, run the following commands:

```
perl -S run_tests.pl
```

Note: Some of these tests might take several minutes to run to completion.

The diagnostics write the results of the tests to the file `test.log` in the current directory. ClearSpeed technical support may require the output of this utility to help diagnose any problems. If any of the tests fail, refer to the 'Troubleshooting' section of the *Advance Card User Guide* for help. If the problem persists, please contact ClearSpeed via the support web site.

3.6 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.

1. If you want to install Perl, you can download the latest version of this free software from:

<http://www.activestate.com/Products/ActivePerl/>

4 Revision history

Date	Revision	Changes
July 2007	2.0	Initial version of this document produced in document format.

Table 1. Document revision history

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Acknowledgements:

Windows is a registered trademark of Microsoft Corporation in the United States and other countries

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app_mandelbrot is based in part on the work of the FLTK project (<http://www.fltk.org>)

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