

Math Vector Library Installation and User's Guide

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1 About this Guide

1.1 Legal Information

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1.2 Feedback and Contact

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For general contact details, please visit <https://adelsbach-research.eu/contact>.

1.3 Audience for This Guide

The audience of this guide is assumed to be the system administrators or users installing the *Compressible Flow Subroutine Library* distribution onto their system.

Usage of the Linux command line and basic system operations is assumed.

1.4 Conventions Used in This Guide

Mono

Monospace typesetting represents commands or file paths.

Italic

Italic typesetting refers to abbreviations or further literature.

2 System Requirements

Around 20MB of free disk space are required for installing the distribution for a single platform.

In order to extract the distribution on Linux an extraction tool for .tgz (TAR-GZIP) archives or for .zip (ZIP) archives is required. This can be the standard system tools `tar(1)` and `gunzip(1)` and or `unzip(1)`.

On Windows you need the ability to extract .zip (ZIP) archives, this is normally included by default and the archive can be opened in the explorer using a double-click.

3 Installation and Deinstallation

3.1 UNIX, Linux and BSD

3.1.1 Verifying the distribution (*optional*)

Verifying the integrity of the distribution archive can be used to ensure the integrity of the distribution archive in that the distribution has not been tampered in a potential malicious manner with during transit.

Checksum files using the MD5 and SHA256 algorithms are provided for every product, namely the files MD5SUM or SHA256SUM. These can be obtained in the product distribution portal or by contacting support.

NOTE: Both of these files must be re-downloaded each time a new distribution is released, as they only contain the checksums of the distributions released up until the time of download.

Assuming one or both of the aforementioned files are in the same directory as the distribution archive the integrity of the latter can be verified using:

MD5

```
md5sum -ignore-missing -c MD5SUM
```

SHA256

```
sha256sum -ignore-missing -c SHA256SUM
```

Any of these commands should show the filename of the distribution archive followed by an OK. If this is not the case re-download the distribution archive or contact customer support. If the output is empty, the checksum for the distribution is not present in the file(s).

3.1.2 Installation

The distribution is delivered as a `gzip(1)` compressed `tar(1)` archive. The distribution is simply extracted.

In order to install the software extract the distribution archive matching the hardware and operating system platform into `/opt/adelsbach` using a deviation of the following commands:

```
mkdir -p /opt/adelsbach
tar xvf cfs1.linux.amd64.generic.tgz /opt/adelsbach/
```

This will extract the distribution under `/opt/adelsbach/cfs1XY` where XY are the major and minor version numbers. As such this allows multiple major and minor versions to be simultaneously installed on the same system.

After installation ensure the file permissions are set accordingly using `chmod(1)` and or `chown(1)`, such that users have read permission to the distribution directory.

3.1.3 Updating to a Patch Release

A patch release is usually issued for minor improvements or bug-fixes, these have the same exact same file and directory names as the respective major and minor version of the distribution. In order to install a patch release follow the instructions in 3.1.2, thereby overwriting the files of the existing distribution installation to be updated.

The file `VERSION` inside the distribution directory of the product should then match the patch release version.

3.1.4 Deinstallation

To deinstall the product, delete the directory `/opt/adelsbach/cfs1XY` where XY are the major and minor version numbers. This can be accomplished using:

```
rm -rf /opt/adelsbach/cfs1XY
```

3.2 Microsoft Windows

3.2.1 Verifying the distribution (*optional*)

Verifying the integrity of the distribution archive can be used to ensure the integrity of the distribution archive in that the distribution has not been tampered in a potential malicious manner with during transit.

Checksum files using the MD5 and SHA256 algorithms are provided for every product, namely the files MD5SUM or SHA256SUM. These can be obtained in the product distribution portal or by contacting support.

NOTE: Both of these files must be re-downloaded each time a new distribution is released, as they only contain the checksums of the distributions released up until the time of download.

Assuming one or both of the aforementioned files are in the same directory as a distribution archive, for example `cfs110.win64.eoe.zip` the integrity of the latter can be verified using:

MD5

```
CertUtil -hashfile cfs110.win64.eoe.zip MD5
```

SHA256

```
CertUtil -hashfile cfs110.win64.eoe.zip SHA256
```

Both of these should print a checksum that equals the one found in the MD5SUM or SHA256SUM for the given distribution filename.

3.2.2 Installation

The distribution is delivered as a ZIP archive. The distribution is simply extracted.

In order to install the software extract the distribution archive matching the hardware and operating system platform into `C:\Program Files\Adelsbach`.

This will extract the distribution under `C:\Program Files\Adelsbach\cfs1XY` where XY are the major and minor version numbers. As such this allows multiple major and minor versions to be simultaneously installed on the same system.

3.2.3 Updating to a Patch Release

A patch release is usually issued for minor improvements or bug-fixes, these have the same exact same file and directory names as the respective major and minor version of the distribution. In order to install a patch release follow the instructions in 3.2.2, thereby overwriting the files of the existing distribution installation to be updated.

The file `VERSION` inside the distribution directory of the product should then match the patch release version.

3.2.4 Deinstallation

To deinstall the product, delete the directory `C:\Program Files\Adelsbach\cfs1XY` where XY are the major and minor version numbers.

4 Usage

4.1 Header Files

All function declarations can be found in the header file `cfs1.h`.

4.2 Compiling against the Library (C/C++)

In order to use the product, the header search path of the C/C++ compiler needs to be set to the include directory inside the distribution directory.

In order to link with the library the library search path needs to include `lib` or `lib64` in the distribution directory and the application needs to be linked against the respective library used.

This can be accomplished as follows for the following compilers:

GNU C/C++ Compiler, LLVM clang/clang++, Portland Group Compiler, IBM XL C/C++

For the include search path use the `-I` flag, such as: `-I/opt/adelsbach/cfs1XY/include`.

For the library search path use the `-L` flag, such as: `-L/opt/adelsbach/cfs1XY/lib` or `-L/opt/adelsbach/cfs1XY/lib64` for 64bit systems.

For linking against `libcfs1` use the `-l` flag, such as: `-lcfs1`.

Microsoft Visual Studio

Right-click in your Solution Explorer and Select **Properties**.

Add the folder the distribution was extracted to under **Additional Library Directories**.

Add the library to link against under **Linker -> Input -> Additional Dependencies**.

Add the header file folder under **C/C++ -> Additional Include Directories**.

4.3 Compiling against the Library (Fortran)

The Fortran subroutine entry points are contained in the same library files as the C/C++ version, as such the same compiler and linker instructions as provided in 4.2 apply.

By default it is assumed that the Fortran compiler and linker use suffix `"_"` function names and use the same calling conventions as C/C++. This is the default Fortran call specification on most platforms and supported compilers.