

*MathCode* Fortran90 installation  
instructions for MacOSX machines and  
license administration

*Version 1.2.4,  
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# Chapter 1 Installation step by step

Please follow these steps for successful *MathCode* F90 installation.

## 1.1 Check your Mathematica, GCC version

*Mathematica* 6.0,7.0, 8.0 are supported only, for Intel processors only.

You need the GCC compiler which is included in free XCode tool (<http://developer.apple.com/tools/download/>).

The following MacOSX releases were tested:

Mac OS X version 10.4.\* ("Tiger") with XCode 2.4.1,

Mac OS X version 10.5.\* ("Leopard") with XCode 3.1.1,

Mac OS X version 10.6.\* ("SnowLeopard") with XCode 3.2.1

MathCode relies on compatibility between GCC and G95 versions.

GCC versions between 3.3 and 4.4 were tested. If you have a different GCC version please read the Section 2.1.

## 1.2 Choice of compilers

MathCode F90 for MacOSX requires the G95 compiler.

## 1.3 Install G95 properly before MathCode installation

MathCode F90 requires the G95 compiler. It is available from <http://www.g95.org>. Download a stable version for "x86 OSX" platform.

G95 version 0.91 (March 2008) was tested. Later releases should work as well.

Choose a directory for installation. In order to make possible for other users to run **g95** you should grant read permissions for this directory.

Unpack the downloaded tarball (e.g. **g95-x86-osx.tgz**) in a directory of your choice:

```
tar -zxvf g95-x86-osx.tgz
```

Create a symbolic link from a directory in your **\$PATH** (e.g. **~/bin**) to the executable

```
ln -s $PWD/g95-install/bin/*g95* ~/bin/g95
```

You should now be able to run `g95` and create executables.

As an alternative, in order to make possible for other users to run `g95` you should use a common directory which is present in everyone's `$PATH`, and create a symbolic link with name `/usr/bin/g95` or `/usr/local/bin/g95` :

```
sudo ln -s $PWD/g95-install/bin/*g95* /usr/bin/g95
```

In this case make sure that `$PWD` is readable for other users.

In MacOSX environment you start normally Mathematica using an icon before any adjustments to your `PATH` are applied. Therefore, for Mathematica the directory `$HOME/bin` will not occur in the path (even if you tell that in your `$HOME/.profile`). The following command creates a symbolic link such way that `g95` is directly available from Mathematica in `/bin` :

```
sudo ln -s $PWD/g95-install/bin/*g95* /usr/bin/g95
```

If you have no administrative rights you can adjust "g95" everywhere in the make-files `System/u95.unx` and `lib/sheep/u95.mak`.

## 1.4 Installing Intel Fortran compiler before MathCode installation

This section does not apply to MathCode for MacOSX

## 1.5 Determine your \$MachineID

The `$MachineID` is needed for registration. It is the identity of the machine you want a license for. To find out your `$MachineID`, evaluate the following in *Mathematica*:

```
$MachineID
```

## 1.6 Obtain license key for purchased license

You should register to get a key file that will enable you to use the software. If you purchased the software you can register it online at the following URL:

```
http://www.mathcore.com/register.html
```

Please do not use this page for demo (trial) licenses, see **Section 1.7!**

When you start installation of *MathCode* you can click the button **Register** to register your software.

Within two business days you should receive an e-mail with the key file attached. Save the attachment to a file. Remember where you saved it; you will need to select this location during *MathCode* C++ installation.

## 1.7 Obtaining license key for demo (trial) license

You apply for demo (trial) license using online demo request form at <http://www.mathcore.com/products/mathcode/> and click on **Download Trial version**

When you start installation of *MathCode* you should not click the **Register** button to register your software.

Within two business days you should receive an e-mail with the key file attached. Save the attachment to a file. Remember where you saved it; you will need to select this location during MathCode C++ installation.

## 1.8 Previous MathCode installations

You can have only one MathCode installation available in your UNIX account at a time. The setup will disable any previous installation of MathCode C++ or MathCode F90. The current installation is determined by settings in file (which is created during installation):

`~/Library/Mathematica/Applications/MathCode.m`

## 1.9 Different Mathematica installations

An installed MathCode can be used with *only one* Mathematica installation. If you switch to a different Mathematica version you must *re-install* MathCode. Otherwise difficult linking error messages will occur.

## 1.10 Check for the latest release

Since MathCode relies on many other software products that often change their versions and properties please **always download the latest version** from the address you get from us together with your key file; currently it is

<http://www.mathcore.com/products/mathcode/download/downloadframe.shtml>

## 1.11 Decide whether you need personal installation or root installation.

We recommend you to log in with your personal user name and install MathCode under your own home directory. *MathCode* will be available for you only.

On **MacOSX** machines you should install MathCode under your own home directory.

## 1.12 Installation procedure

Go to the `linux` directory on the *MathCode* CD or obtain the latest release from `www.mathcore.com`.

You obtain file `mathcode-macosx-version.tar`

Use command `tar -xvf mathcode-macosx-version.tar` to unpack this archive.

Run the file `install.system`, either by `./install.system` (preferred) or `sh`

`install.system` (if the file is not flagged as executable on the CD) and follow the on-screen instructions.

The installation script compiles all necessary MathCode runtime libraries, therefore you do not need to care about libc library versions (as it was in MathCode C++ for Linux 1.2.2 and earlier).

If you have any special settings (PATH, GCC flags etc.) when you compile the runtime library, these settings should be preserved when you use MathCode C++ for compilation.

Please run the test `Demos/Verify/testlinux.m` after installation.

The message indirect jmp without '\*' is an internal to g95 on MacOSX and can be ignored.

### **1.13 Parallel installations**

You can install several installations of MathCode, but only one of them (the latest one) will be used within Mathematica.

### **1.14 Uninstall**

At the end of installation the script tells the name of a file (`uninstall.system.sh`) which contains commands for uninstall.

## Chapter 2 Advanced adjustments

### 2.1 Using different GCC version

If you have a different and unexpected GCC release, then installation may stop. Please install another gcc toolkit and place its directory first in the path, so that shell commands "gcc" and "g++" invoke the tools of different version.

Execute the command `Run["echo $PATH"]` from Mathematica to see the actual path.

In addition to this you will need to set up a symbolic link so that commands invoked from within Mathematica sessions search for correct g++ binary of correct gcc version. When shell commands are executed from within Mathematica, a modified path is used. Execute the command `Run["echo $PATH"]` from Mathematica to see the actual path.

Typical commands to adjust the g++ in use can be:

```
su
cd /usr/local/Wolfram/Mathematica/6.0/Executables
ln -s /usr/local/gcc/3.3.4/bin/g++ .
ln -s /usr/local/gcc/3.3.4/bin/gcc .
```

### 2.2 Using a different Fortran90 compiler

MathCore Engineering AB provides you with scripts needed for different Fortran90 compiler as a consultancy service.

Steps needed for attaching a different Fortran90 compiler on any UNIX-like operating system are:

1. Study **MathCodeConfig.m**, it refers to **u95.unx** and **unix.tmpl**.
2. Study how **unix.tmpl** makes **Global.cmd**.
3. Study how **Global.cmd** calls **System/u95.unx**.
4. Study how **System/u95.unx** calls **lib/sheep/u95.mak**.
5. Change **\*.f90** and **\*.c** files in **lib/sheep** so that they can be compiled by your Fortran90 and C++ compiler.
6. Change **lib/sheep/u95.mak** so that **sheep.lib** can be created.
7. Investigate whether your Fortran90 and C++ compiler can compile files like **Global.\***
8. Change **System/u95.unx** so that **GlobalML.exe** can be compiled and linked.
9. Possibly adjust **unix.tmpl** if necessary.

## Chapter 3 License management

### 3.1 What are licenses?

For each machine you wish to run *MathCode* on, you should obtain one key file containing the license. *MathCode* uses the same MathID as *Mathematica* does to distinguish between machines. A key file is a text file containing a mix of letters and digits. Key files should be put into the `Licensing` subdirectory of the *MathCode* installation. The names of the key files do not matter.

### 3.2 Adding a license

When you register for a new *MathCode* license, you will receive a file that should be put in the `Licensing` subdirectory of your *MathCode* installation.

### 3.3 The license index file

*MathCode* will use an index file `index.m` in the `Licensing` directory to speed up license lookups. If a new license is added, `index.m` is rebuilt automatically as needed.

If you experience problems with the licensing, you can remove the `index.m` file, forcing *MathCode* to rebuild it on the next license check.

For a site installation, users might not have write permissions to the `Licensing` subdirectory. In this case, the system administrator should rebuild the index file by evaluating the following in *Mathematica*:

```
Needs["MathCode`"];  
RebuildIndex[ToFileName[{$MCRoot, "Licensing"}]];
```

If `index.m` didn't exist, you will see an error message about opening it. This error message can safely be ignored.

## Chapter 4 More on compiler definitions

The file `MathCodeConfig.m` in the main *MathCode* directory controls the *MathCode* runtime configuration. This file is really a *Mathematica* package that contains some configuration directives; currently `DefineCompiler[]` and `DefaultCompiler[]`.

`DefineCompiler[]` is used to associate a symbolic compiler name (a string) with a make file, a command template, and a build command. You don't normally need to bother with these details.

`DefaultCompiler[]` is used to select the default compiler definition for a language. Currently the only language supported for code generation is C++. In `MathCodeConfig.m` you might find a line

```
DefaultCompiler["C++"->"mingw32"];
```

This tells *MathCode* to use the included "mingw32" compiler definition when generating C++ code. If you wish to use Visual C++ instead (assuming you are on the Windows platform), you should change this to read:

```
DefaultCompiler["C++"->"vc60"];
```

If there are several `DefaultCompiler` definitions, the last one is taken into account.

Using a different compiler can be easier than that, with the new options to `CompilePackage[]`, `MakeBinary[]` and `BuildCode[]`.

`CompilePackage[]` takes a `Language` option (currently only C++ is supported). *MathCode* will then use the default compiler for the specified language. Example:

```
CompilePackage[Language->"C++"];
```

`MakeBinary[]` takes a `Compiler` option; the option value should be one of the symbolic names (strings) defined using `DefineCompiler[]`. The `Compiler` option to `MakeBinary[]` overrides the default compiler specified for the selected language. Example:

```
MakeBinary[Compiler->"g++"];
```

As usual, `BuildCode[]` can be given both `CompilePackage[]` and `MakeBinary[]` options. The following example will generate C++ code and use the "CC" compiler to compile it, overriding any default specification:

```
BuildCode[Language->"C++", Compiler->"CC"];
```

The above example assumes that you are using *MathCode* on Solaris.