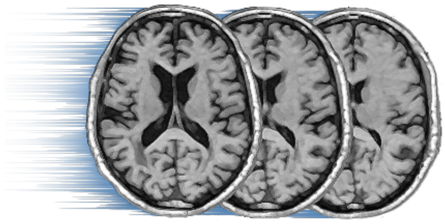
How to install NiftyReg - Linux and MacOs



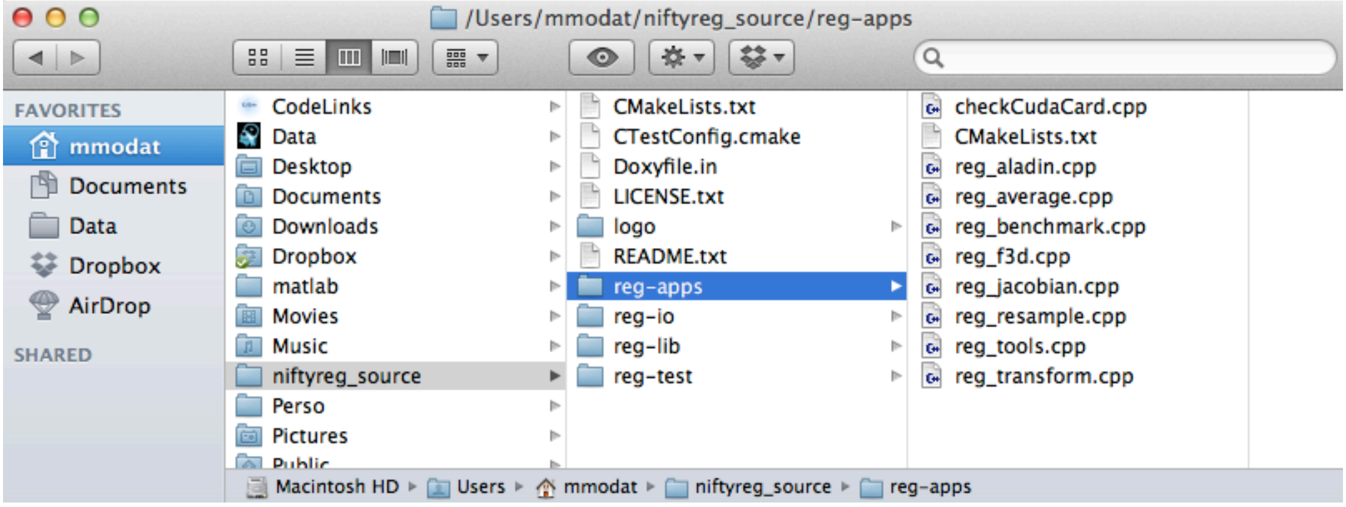
In order to install NiftyReg, you need to have:

- CMake - version 2.8.0 or higher (http://www.cmake.org)
- a C/C++ compiler

The first step is to download the sources. You have two options:
- Downloading a released version from http://sourceforge.net/projects/niftyreg/files
- Getting the latest version from the trunk using svn. e.g. from the terminal:

```
$ svn co https://niftyreg.svn.sourceforge.net/svnroot/niftyreg/trunk/nifty_reg niftyreg_source
```

where the niftyreg_source folder will be created and populated with the source files:



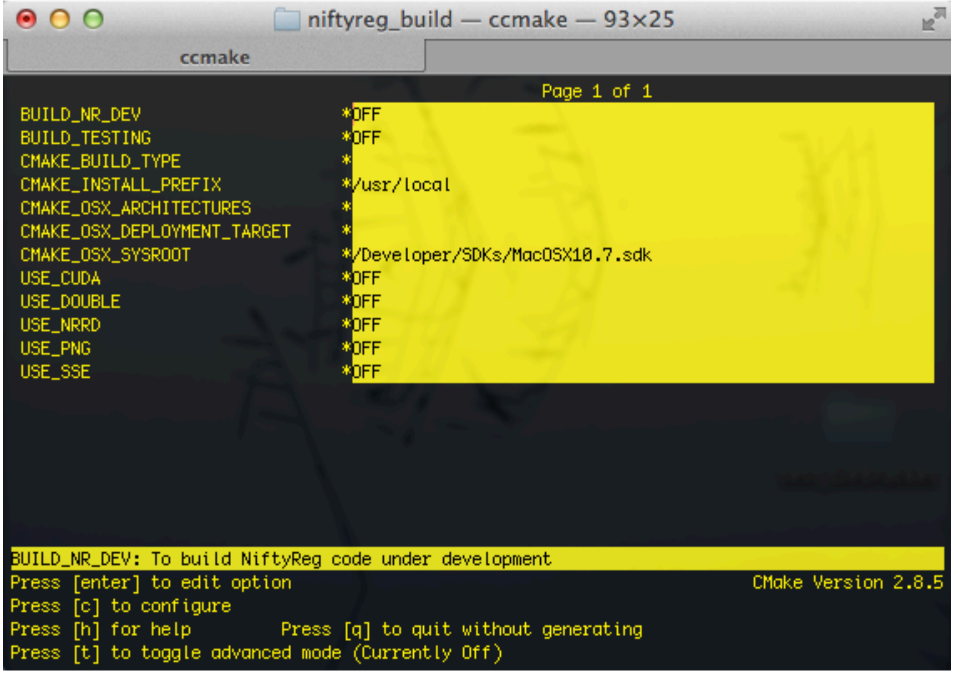
The second step is to create two folders. The first folder will contain the build of NiftyReg while the second will contain the final install:

```
$ mkdir niftyreg_build niftyreg_install
```

Change then directory to the niftyreg_build folder and run CMake using either the graphical interface or the terminal interface:

```
$ cd niftyreg_build
$ ccmake ../niftyreg_source
```
(note that cmake-gui might be installed instead of ccmake)

Press “c” to configure the NiftyReg project, it should lead to the following screen:



```
                                           Page 1 of 1
 BUILD_NR_DEV                     *OFF
 BUILD_TESTING                    *OFF
 CMAKE_BUILD_TYPE                 *
 CMAKE_INSTALL_PREFIX             */usr/local
 CMAKE_OSX_ARCHITECTURES          *
 CMAKE_OSX_DEPLOYMENT_TARGET      *
 CMAKE_OSX_SYSROOT                */Developer/SDKs/MacOSX10.7.sdk
 USE_CUDA                         *OFF
 USE_DOUBLE                       *OFF
 USE_NRRD                         *OFF
 USE_PNG                          *OFF
 USE_SSE                          *OFF

BUILD_NR_DEV: To build NiftyReg code under development
Press [enter] to edit option                                         CMake Version 2.8.5
Press [c] to configure
Press [h] for help           Press [q] to quit without generating
Press [t] to toggle advanced mode (Currently Off)
```

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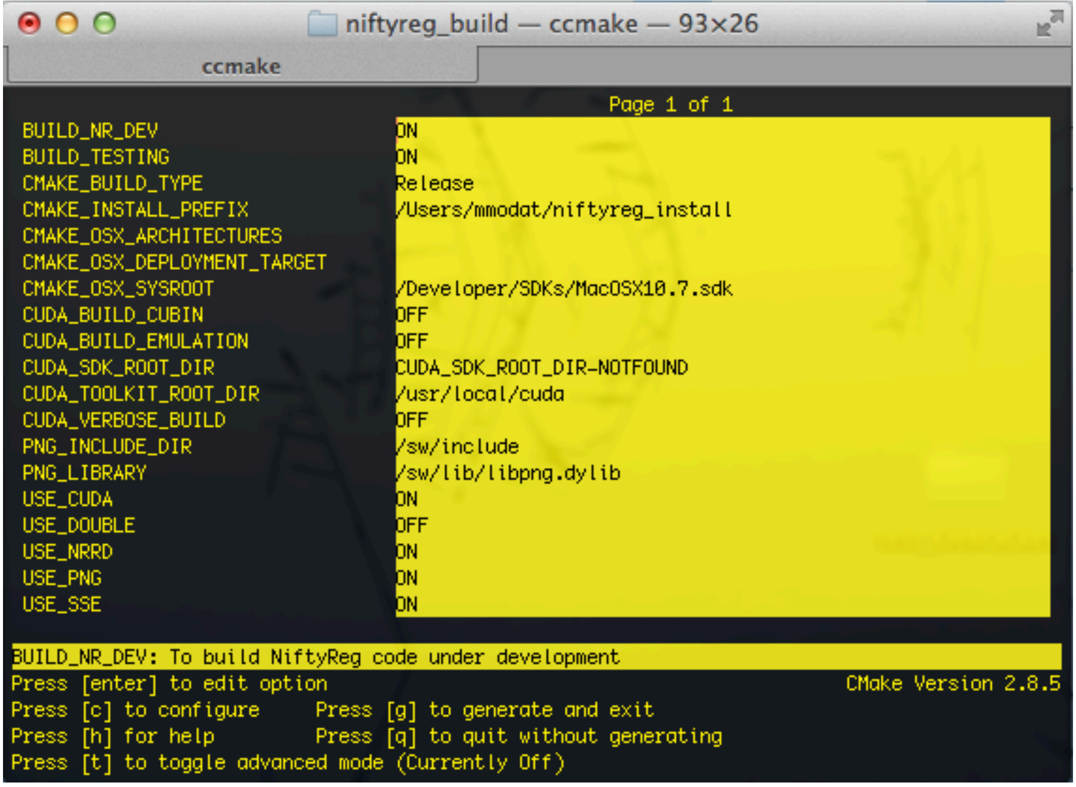
where the different options are:

BUILD_NR_DEV	Set to ON if you want to build the code under development
BUILD_TESTING	Set to ON if you want to build the unit tests
CMAKE_BUILD_TYPE	Compiling options: Debug Release RelWithDebInfo MinSizeRel
CMAKE_INSTALL_PREFIX	Set the path where the final install will be copied
CMAKE_OSX_ARCHITECTURES	MacOS specific - do not change
CMAKE_OSX_DEPLOYMENT_TARGET	MacOS specific - do not change
CMAKE_OSX_SYSROOT	MacOS specific - do not change
USE_CUDA	Set to ON if you want to build the GPU code. The CUDA toolkit must be install otherwise CMake will return an error message
USE_DOUBLE	Set to ON if you want to set the NiftyReg executables double precision for internal computation. Single precision is used otherwise. Note that this flag has to be set to OFF to use CUDA or SSE computation.
USE_OPENMP	Set to ON to use OpenMP for multi-CPU implementation. Note that the flag is disabled for MacOS Lion due to some error with OpenMP.
USE_NRRD	Set to ON if you want NiftyReg to support the NRRD file format
USE_PNG	Set to ON if you want NiftyReg to support the PNG file format for 2D images. Note that CMake will try to find the libpng on your system and will build it automatically if it does not find it.
USE_SSE	Set to ON to use SIMD based implementation, mostly for cubic B-Spline related computation. Note that SIMD implementation has only be done for single precision. USE_SEE and USE_CUDA are mutually exclusive.

After you fill the required options, press “c” to configure the project. For this example, I obtained:



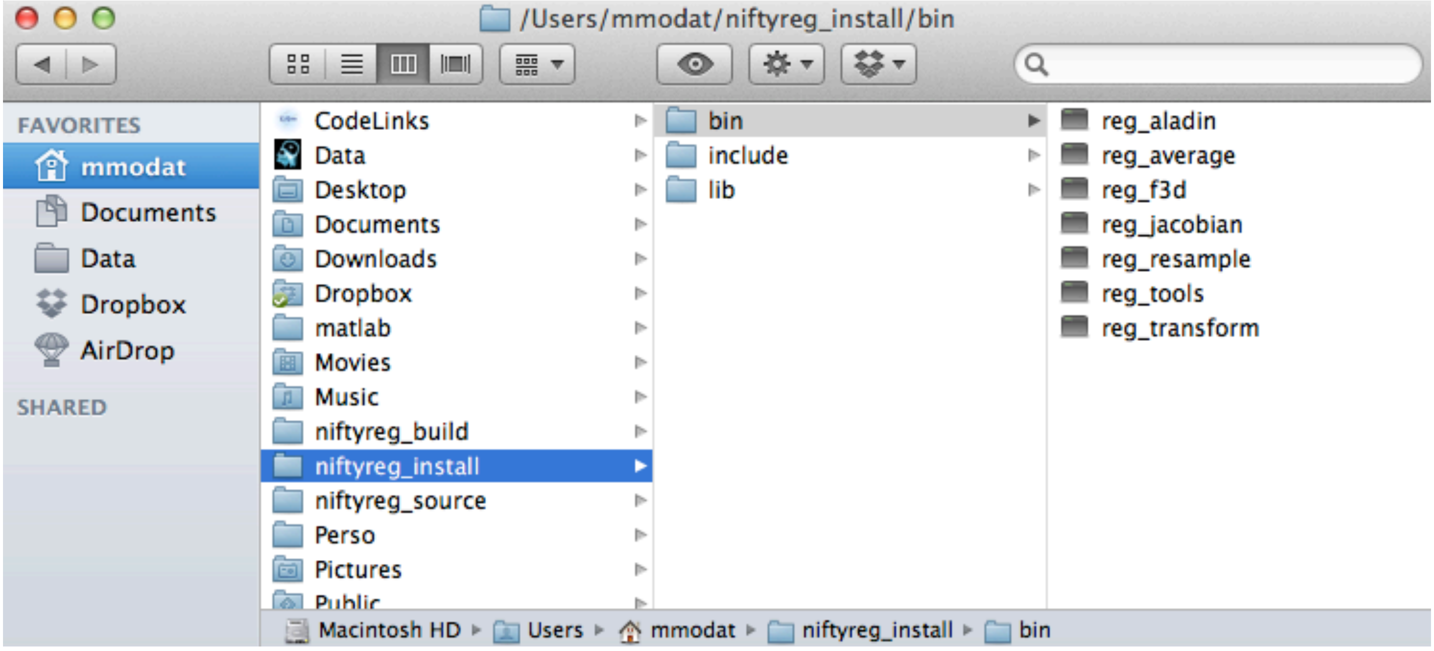
```
                                                   Page 1 of 1
 BUILD_NR_DEV                    ON
 BUILD_TESTING                   ON
 CMAKE_BUILD_TYPE                Release
 CMAKE_INSTALL_PREFIX            /Users/mmodat/niftyreg_install
 CMAKE_OSX_ARCHITECTURES
 CMAKE_OSX_DEPLOYMENT_TARGET
 CMAKE_OSX_SYSROOT               /Developer/SDKs/MacOSX10.7.sdk
 CUDA_BUILD_CUBIN                OFF
 CUDA_BUILD_EMULATION            OFF
 CUDA_SDK_ROOT_DIR               CUDA_SDK_ROOT_DIR-NOTFOUND
 CUDA_TOOLKIT_ROOT_DIR           /usr/local/cuda
 CUDA_VERBOSE_BUILD              OFF
 PNG_INCLUDE_DIR                 /sw/include
 PNG_LIBRARY                     /sw/lib/libpng.dylib
 USE_CUDA                        ON
 USE_DOUBLE                      OFF
 USE_NRRD                        ON
 USE_PNG                         ON
 USE_SSE                         ON

BUILD_NR_DEV: To build NiftyReg code under development
Press [enter] to edit option                                         CMake Version 2.8.5
Press [c] to configure     Press [g] to generate and exit
Press [h] for help         Press [q] to quit without generating
Press [t] to toggle advanced mode (Currently Off)
```

Note that when using CUDA, the CUDA_SDK_ROOT_DIR is not used for the project.

Once the project is correctly configured, press the “g” key to generate the Makefiles. You can then build and install the project:

```
	$ make
	$ make install
```

The project should then be installed into the niftyreg_install folder you previously created:



In order to use NiftyReg in any terminal, you will need to edit your .bashrc or .profile file by adding the following lines:

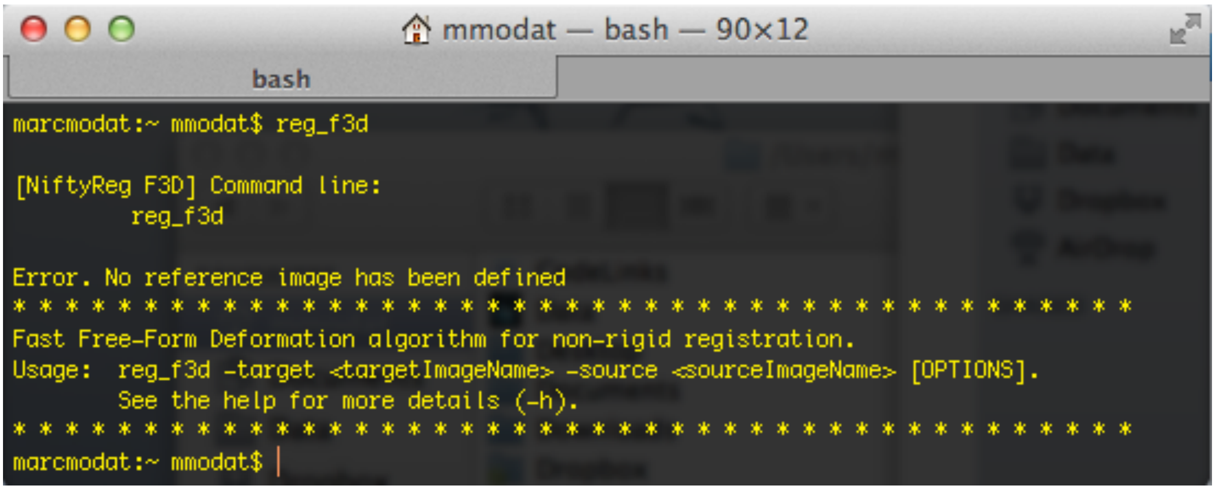
NIFTYREG_INSTALL=<path_to_your_niftyreg_install> (/Users/mmodat/niftyreg_install in the current example)

```
export PATH=${PATH}:/${NIFTYREG_INSTALL}/bin
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:${NIFTYREG_INSTALL}/lib
```

You should then be able to open a new terminal and type:

```
	$ reg_f3d
```

and it should return:



```
marcmodat:~ mmodat$ reg_f3d

[NiftyReg F3D] Command line:
	reg_f3d

Error. No reference image has been defined
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
Fast Free-Form Deformation algorithm for non-rigid registration.
Usage:	reg_f3d -target <targetImageName> -source <sourceImageName> [OPTIONS].
	See the help for more details (-h).
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
marcmodat:~ mmodat$
```

Please feel free to contact Marc Modat m.modat@ucl.ac.uk if you have any question or comment.