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Building CompuCell3D on Linux

Building CompuCell3D from source on Unix/Linux systems is fairly straightforward once all of it's dependencies have been satisfied. The following commands should build and install CC3D on most Unix/Linux systems.

Prerequisites

Hardware

CompuCell3D may build and run with less capable hardware, but has been tested with the following:

- 512MB RAM
- Hardware 3D Graphics Acceleration (most modern graphics cards)

Build Tools and Dependencies for PyQt4

In addition to the common Unix/Linux build tools, interpreters and, libraries, building and running CompuCell3D requires:

- Qt (version 4.6 or higher recommended)
- PyQt (with OpenGL modules)
- SWIG (version 1.3 or higher recommended)
- VTK (with Python wrappers, version 5.4 or higher recommended)
- Qwt (and PyQtwt, version 4.2 or higher recommended)
- QScintilla (version 1.7 or higher recommended)
- CMake (CMake-GUI is recommended)
- Python (version 2.6 or higher recommended)

Build Tools and Dependencies for PyQt5

In addition to the common Unix/Linux build tools, interpreters and, libraries, building and running CompuCell3D requires:

- Qt (version 5.6 or higher recommended)
- PyQt5 (with OpenGL modules)
- SWIG (version 1.3 or higher recommended)
- VTK (with Python wrappers, version 6.3 or higher recommended)
- pyqtgraph (version 0.10.0 or higher recommended)
- QScintilla (version 2.9 or higher recommended)
- CMake (CMake-GUI is recommended)
- Python (version 2.7)

When building CC3D 3.7.6 or higher we suggest you use PyQt5 dependencies (PyQt4 will also work but then you will have to change PYQT_VERSION in CMake to 4, because PYQT_VERSION=5 is a default in CMAKE)

On Debian distributions, for PyQt5-based CC3D builds the following command should install all the required dependencies:

```
sudo apt-get install g++ swig cmake-gui python-numpy python-pyqt5 python-pyqt5.qsci python-pyqt5.qtopengl python-pyqt5.qtsvg libvtk6-dev python-vtk6 python-dev libxml2-dev build-essential git
```

to get plots working you may need to install pyqtgraph

```
pip install pyqtgraph
```

For [PyQt4](#) based-builds the following command should install all the required dependencies (to change PYQT_VERSION in CMake to 4 when using PyQt4):

```
sudo apt-get install libvtk5-qt4-dev g++ swig libqwt5-qt4-dev python-qt4 python-qscintilla2 cmake-gui python-qt4-gl python-vtk python-qwt5-qt4 python-dev libxml2-dev build-essential git
```

Source Code

Once the dependencies have been satisfied make directory where you want to store source code, in my case it is in **/home/m/CC3D_GIT**

```
mkdir /home/m/CC3D_GIT
cd /home/m/CC3D_GIT
```

Once the directory has been created, obtain the source code from our GIT repository using the following command:

```
git clone https://github.com/CompuCell3D/CompuCell3D.git .
```

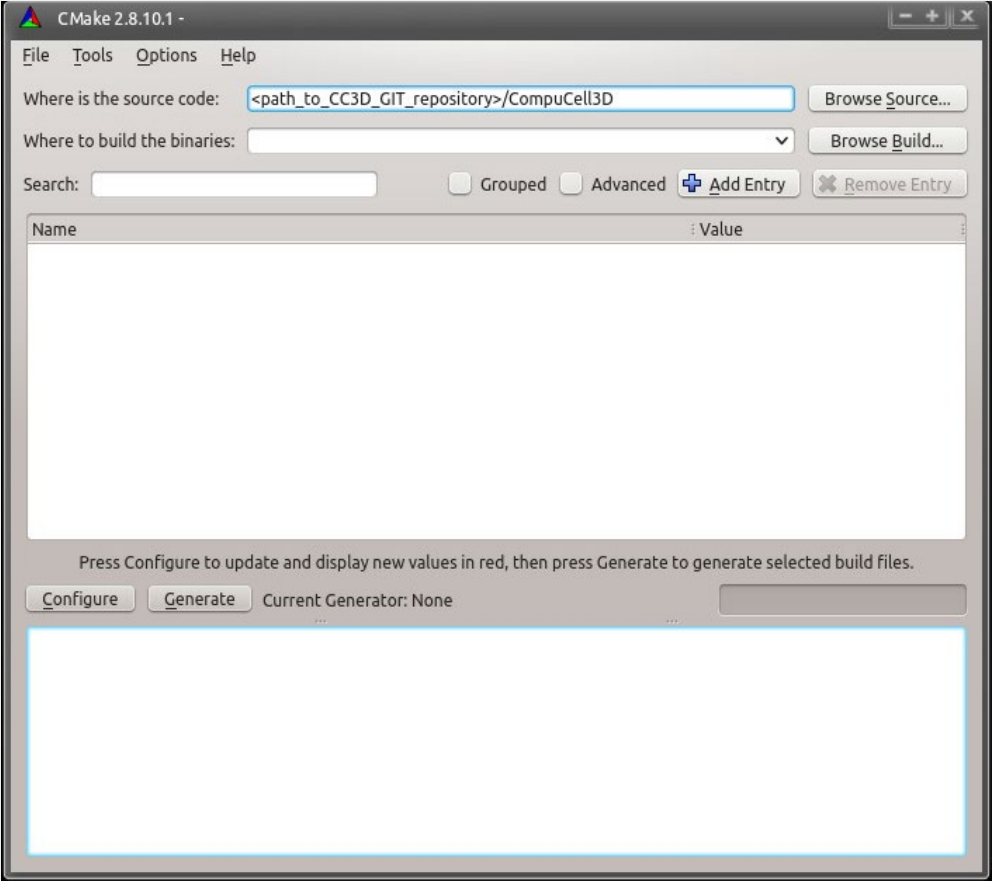
This will clone CC3D Git repository into current directory (remember about the . at the end of last command - it is important)

Build Configuration: Starting CMake

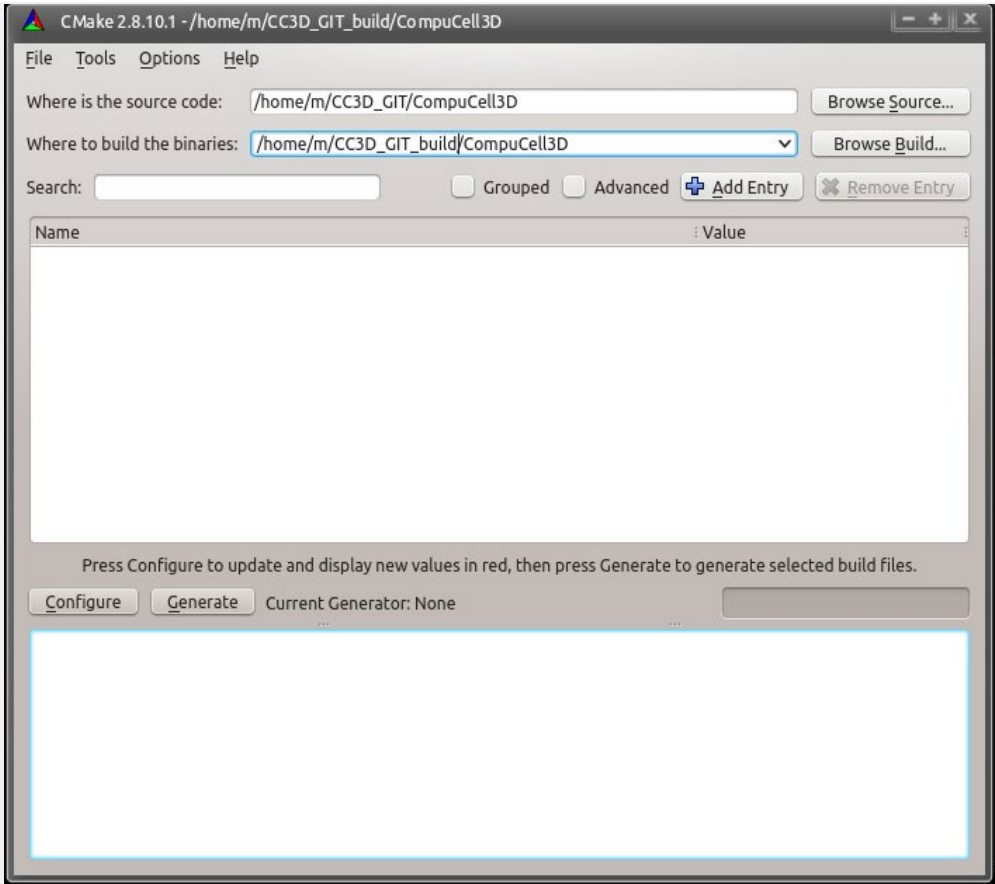
CompuCell3D is configured using the CMake build system. The following command starts the CMake GUI:

```
cmake-gui
```

That will start the build system, click **Browse Source...** and select the **CompuCell3D** source directory from the CompuCell3D GIT directory we have created above - in my case the CompuCell3D source directory is located in **/home/m/CC3D_GIT/CompuCell3D**:

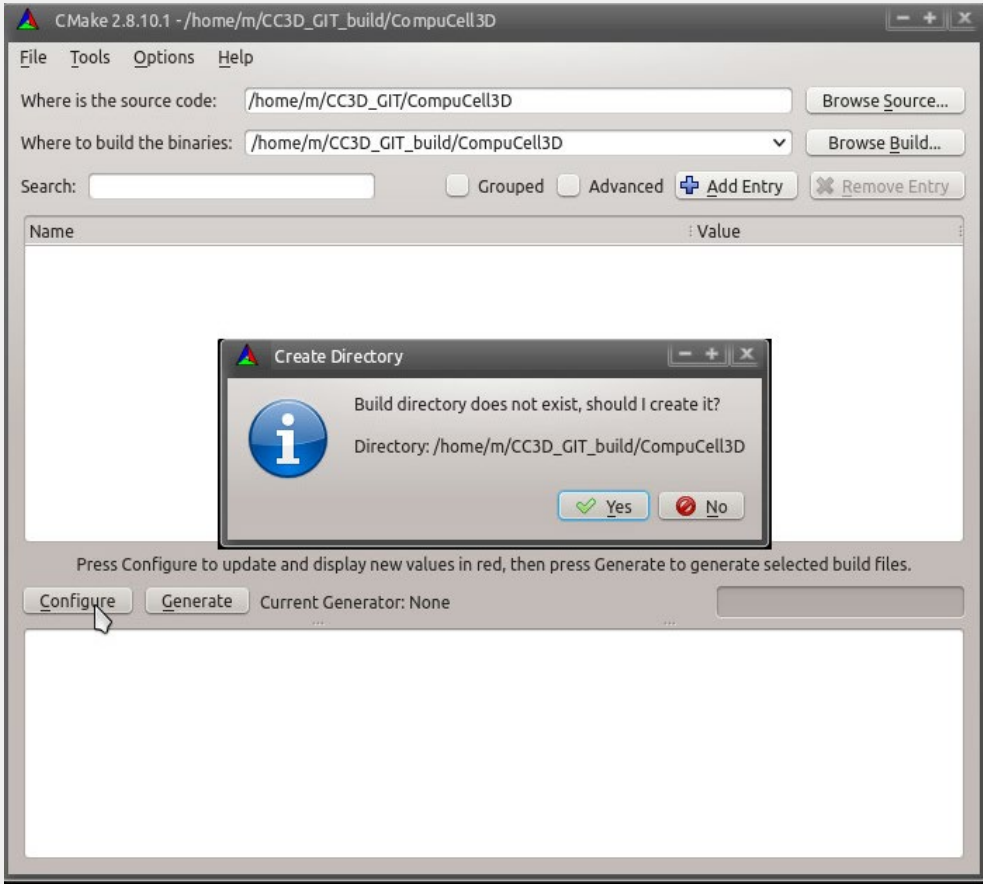


in addition to specifying source directory we also specify the location of the build directory i.e. a directory where compilation files will be stored. in my case it is **/home/m/CC3D_GIT_build/CompuCell3D**

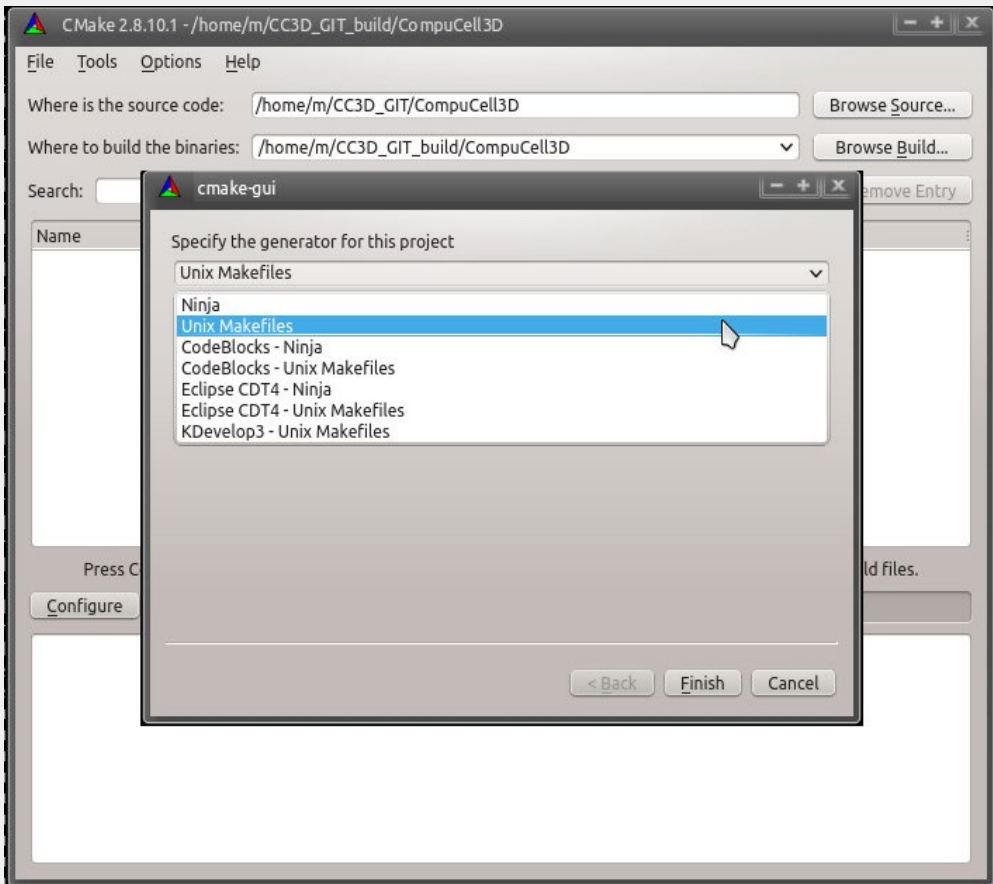


Build Configuration: Selecting Build System

We are ready to click **Configure**. A dialog box asking to create the build directory will appear:



and then one asking about the build system:



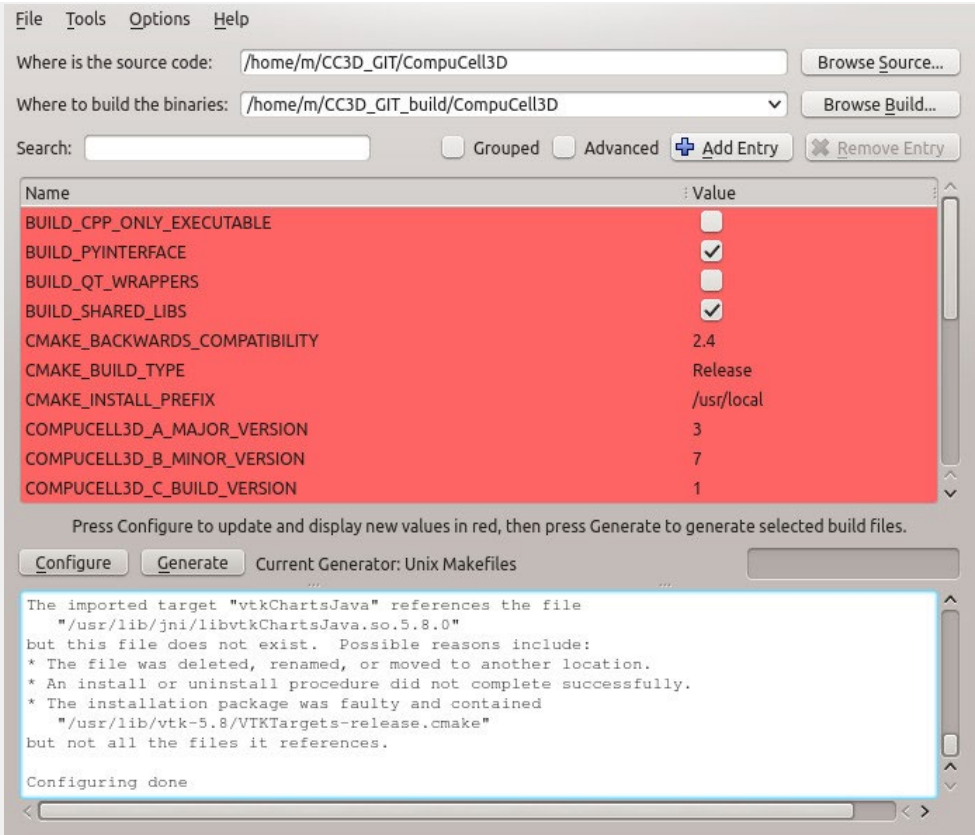
Select **Unix Makefiles** for the generator, select **Use default native compilers** and then click **Finish**. CMake will begin the configuration process. CMake will attempt to locate all of the dependencies installed above. If the following error occurs, ignore it:

```
CMake Error: Could not open file for write in copy operation /usr/local/pythonSetupScripts/Version.py.tmp
CMake Error: : System Error: No such file or directory
CMake Error at core/post_install tasks/CMakeLists.txt:134 (configure_file):
  configure_file Problem configuring file
```

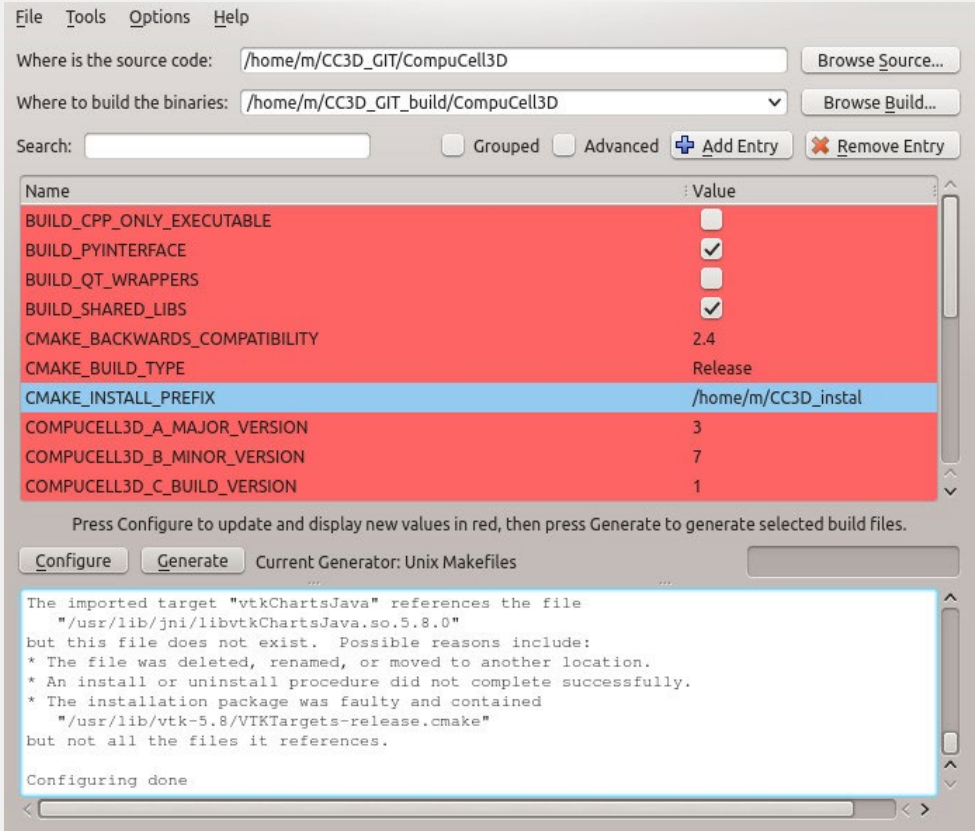
After the initial configuration has completed select **Grouped** and **Advanced** to make entering configuration values easier.

Build Configuration: CMAKE

In **CMAKE** confirm that CMake has located all the build tools. In the **CMAKE_BUILD_TYPE** field you may enter **Debug**, **RelWithDebInfo** or **Release** to specify the type of the binary you want to have - if you are developing extra modules compiling in the **Debug** or **RelWithDebInfo** can be helpful. By default CompuCell3D build type is set to **Release**:

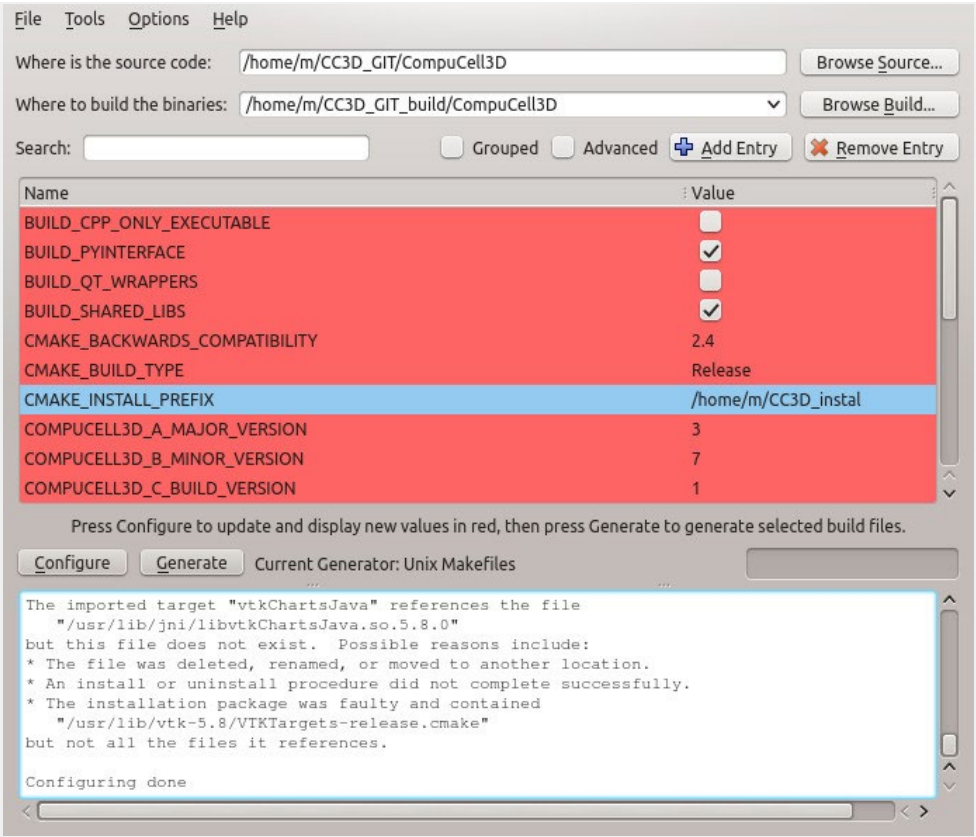


In the `CMAKE_INSTALL_PREFIX` field enter the directory you would like to install CompuCell3D into - this is important. We recommend that unless necessary you should install CC3D into local directory - in my case it is `/home/m/CC3D_install`, .



Click on **Configure** to have all the values updated.

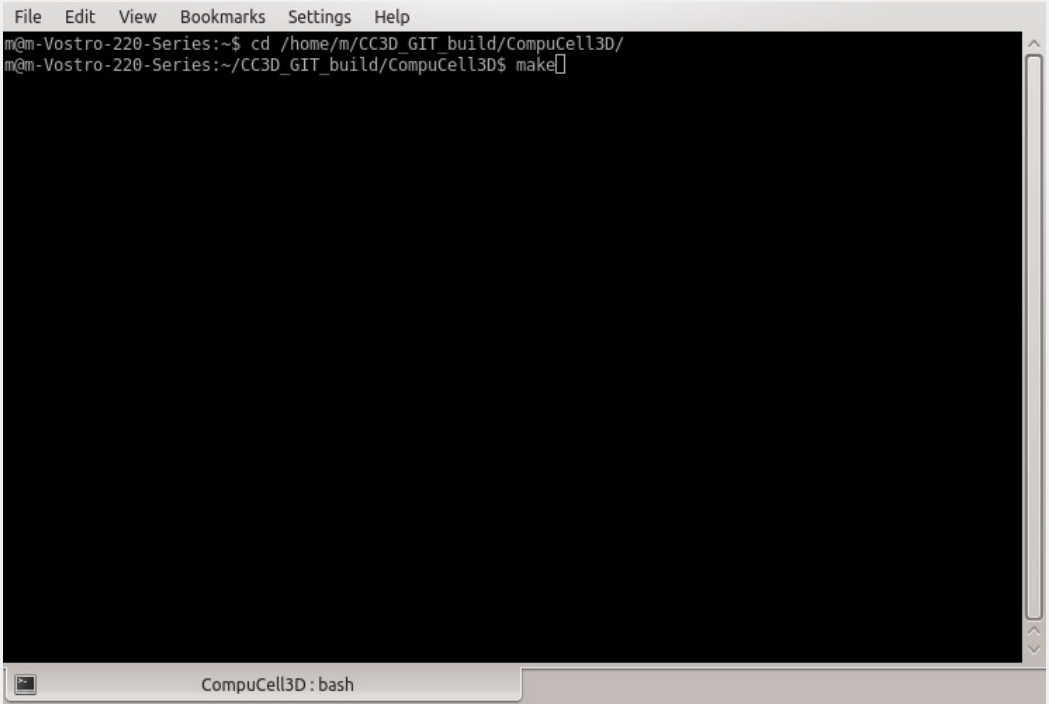
Click on **Configure** and then click on **Generate** to generate the Makefiles, ignore any warnings. Exit CMake



Building

To begin compiling CompuCell3D enter the build directory specified in the **Where to build the binaries** field of CMake earlier and use the following command: In my case I type:

```
cd /home/m/CC3D_GIT_build/CompuCell3D
make
```



After the build begins you may see screen like this one:


```
File Edit View Bookmarks Settings Help
[ 14%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParser.cpp.o
[ 14%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserBase.cpp.o
[ 15%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserBytecode.cpp.o
[ 15%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserCallback.cpp.o
[ 16%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserError.cpp.o
[ 16%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserInt.cpp.o
[ 17%] Building CXX object core/muParser/CMakeFiles/muParserShared.dir/muParserTokenReader.cpp.o
Linking CXX shared library libCC3DmuParser.so
[ 17%] Built target muParserShared
Scanning dependencies of target ExpressionEvaluatorShared
[ 17%] Building CXX object core/muParser/ExpressionEvaluator/CMakeFiles/ExpressionEvaluatorShared.dir/ExpressionEvaluator.cpp.o
Linking CXX shared library libCC3DExpressionEvaluator.so
[ 17%] Built target ExpressionEvaluatorShared
Scanning dependencies of target cleaver
[ 18%] Building CXX object core/Cleaver/lib/CMakeFiles/cleaver.dir/Util.cpp.o
[ 18%] Building CXX object core/Cleaver/lib/CMakeFiles/cleaver.dir/InverseField.cpp.o
[ 18%] Building CXX object core/Cleaver/lib/CMakeFiles/cleaver.dir/TetMesh.cpp.o
In file included from /home/m/CC3D_GIT/CompuCell3D/core/Cleaver/lib/TetMesh.cpp:42:0:
/home/m/CC3D_GIT/CompuCell3D/core/Cleaver/lib/TetMesh.h: In constructor 'Cleaver::TetMesh::TetMesh(std::vector<Cleaver::Vertex3D*>&, std::vector<Cleaver::Tet*>&)':
/home/m/CC3D_GIT/CompuCell3D/core/Cleaver/lib/TetMesh.h:117:12: warning: 'Cleaver::TetMesh::time' will be initialized after [-Wreorder]
/home/m/CC3D_GIT/CompuCell3D/core/Cleaver/lib/TetMesh.h:112:11: warning: 'Cleaver::Face* Cleaver::TetMesh::faces' [-Wreorder]
/home/m/CC3D_GIT/CompuCell3D/core/Cleaver/lib/TetMesh.cpp:113:1: warning: when initialized here [-Wreorder]
[ 19%] Building CXX object core/Cleaver/lib/CMakeFiles/cleaver.dir/BCClattice3DMesher.cpp.o
[]
```

CompuCell3D : make

Installing

Once compiling has completed CompuCell3D can be installed into the directory specified in the `CMAKE_INSTALL_PREFIX` field earlier by issuing the following command:

```
make install
```

```
File Edit View Bookmarks Settings Help
/home/m/CC3D_GIT/CompuCell3D/core/BasicUtils/BasicException.h:153: Warning 314: 'print' is a python key word, renaming to '_print'
/home/m/CC3D_GIT/CompuCell3D/core/BasicUtils/BasicException.h:153: Warning 314: 'print' is a python key word, renaming to '_print'
/home/m/CC3D_GIT/CompuCell3D/core/Utils/Coordinates3D.h:49: Warning 362: operator= ignored
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Point3D.h:65: Warning 362: operator= ignored
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Dim3D.h:52: Warning 362: operator= ignored
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Dim3D.h:96: Warning 389: operator[] ignored (consider using %extend)
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Field3D.h:142: Warning 389: operator[] ignored (consider using %extend)
/home/m/CC3D_GIT/CompuCell3D/core/BasicUtils/BasicException.h:168: Warning 503: Can't wrap 'operator <<' unless renamed to a valid identifier.
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Point3D.h:106: Warning 503: Can't wrap 'operator <<' unless renamed to a valid identifier.
/home/m/CC3D_GIT/CompuCell3D/core/CompuCell3D/Field3D/Dim3D.h:98: Warning 503: Can't wrap 'operator <<' unless renamed to a valid identifier.
Scanning dependencies of target _Fields
[100%] Building CXX object core/pyinterface/Fields/CMakeFiles/_Fields.dir/FieldsPYTHON_wrap.o
In file included from /usr/include/python2.7/numpy/ndarraytypes.h:1728:0,
                 from /usr/include/python2.7/numpy/ndarrayobject.h:17,
                 from /usr/include/python2.7/numpy/arrayobject.h:15,
                 from /home/m/CC3D_GIT_build/CompuCell3D/core/pyinterface/Fields/FieldsPYTHON_wrap.cxx:3476:
/usr/include/python2.7/numpy/npymath/npymath.h:11:2: warning: #warning "Using deprecated NumPy API, disable it by #defining NPY_NO_DEPRECATED_API NPY_1_7_API_VERSION" [-Wcpp]
Linking CXX shared module _Fields.so
[100%] Built target _Fields
m@m-Vostro-220-Series:~/CC3D_GIT_build/CompuCell3D$ make install[]
```

CompuCell3D : bash m : mc

Running

After CompuCell3D has finished installing you can start CompuCell3D by entering the installation directory (in my case it is in `/home/m/CC3D_install`):

```
cd /home/m/CC3D_install
```

and issuing the following command:

```
./compuCell3d.sh
```

