An Introduction to CMake

Scratching the Surface...

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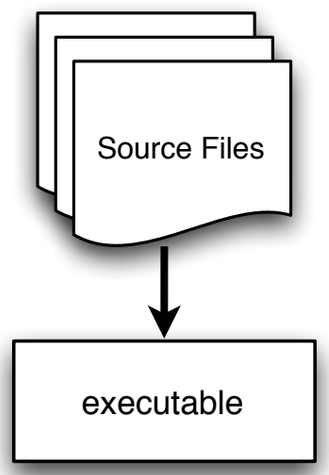
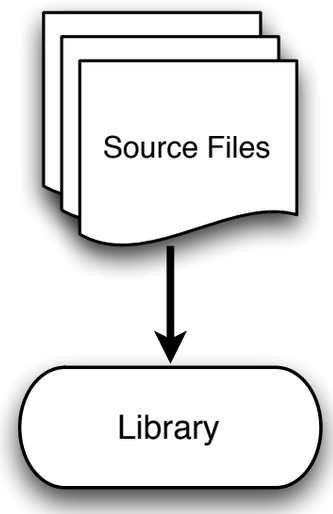
Common Tasks when Building

Compile one or more files into an executable



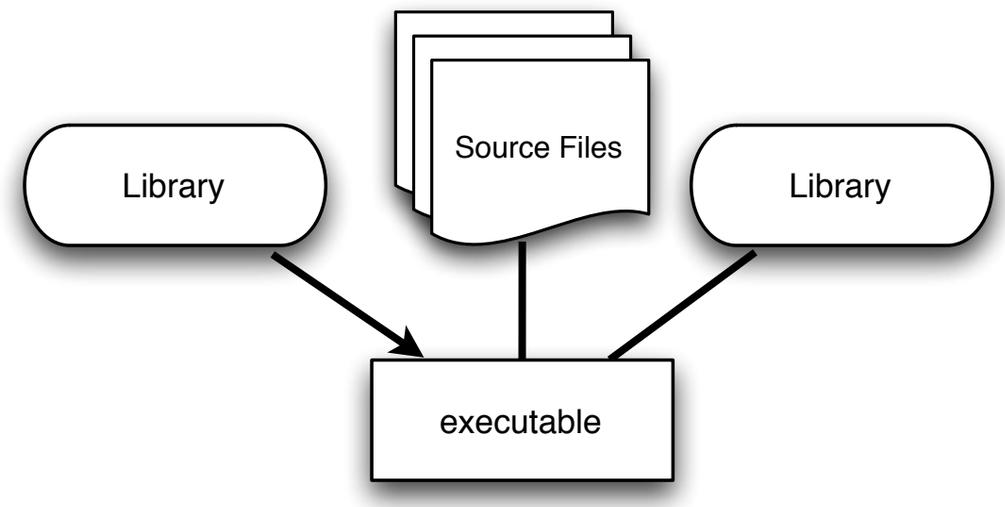
binary code that can be run on your system

Compile files to form a *library*



binary code

Compile files and *link* with libraries to get an executable



Options for "build systems"

- Maintain a full build system directly
  - Works okay for small projects that don't do too much fancy stuff if you are willing to dig into regularly
  - If you want to use different build systems (e.g. XCode, MS Visual Studio, etc.) then you must maintain a build system for each platform. YUCK!
- Auto-tools
  - Scripting level that generates makefiles - only useable on Unix/Linux like platforms
  - Quite awkward to use and a steep learning curve.
- CMake
  - High-level scripting language. Outputs build systems for various platforms.
  - Integrated support for testing and installing/packaging
  - very powerful - lots of capabilities!
  - Large and small projects alike are turning to CMake.
  - Download from http://www.cmake.org/cmake/resources/software.html

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Using CMake

- Create a "CMakeLists.txt" file in the directory containing your source files.
  - In this, tell CMake what you want to do
- Create a "build" directory where you will build the code.
  - Do NOT do this in the source directory.
- Run CMake in the build directory, and point to the source directory.
- Run "make" in the build directory.

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A Simple Example

```
#include <iostream>
using namespace std;
int main()
{
  cout << "Hello" << endl;
}
```

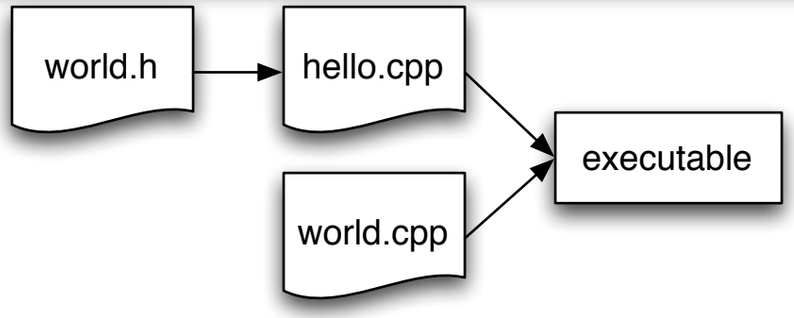
hello.cpp

```
# required: set the minumum version of
# CMake (for backward compatibility)
cmake_minimum_required( VERSION 2.8 )

# required: set a name for this project
project( Hello )

# optional: set the language(s) used in
# this project. CXX is the default.
# Also supports C and Fortran.
enable_language( CXX )

# create an executable.  First argument
# is the name. Remaining arguments are
# the source files that are to be
# compiled to form the executable.
add_executable( hello hello.cpp )
```

CMakeLists.txt

1. Create `hello.cpp`
2. Create `CMakeLists.txt`
3. Create a build directory anywhere.
4. Run "`cmake [path to src]`"
5. Run "`make`"

Multiple Source Files



hello.cpp

```
#include <iostream>
#include "world.h"
using namespace std;
int main()
{
  cout << "Hello" << endl;
  world(cout);
}
```

world.h

```
#include <iostream>
void world( std::ostream& );
```

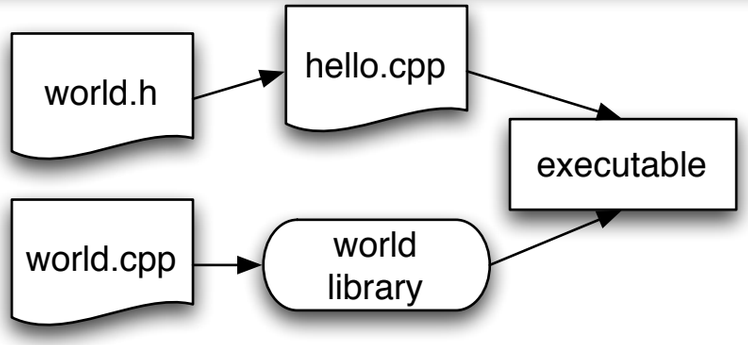
world.cpp

```
#include <iostream>
void world( std::ostream& os )
{
  os << " world!" << std::endl;
}
```

```
cmake_minimum_required( VERSION 2.8 )
project( HelloWorld )

# create an executable.  First argument
# is the name. Remaining arguments are
# the source files that are to be
# compiled to form the executable.
add_executable(
 hello
 hello.cpp
 world.cpp
 )
```

CMakeLists.txt

Creating & Linking Libraries



hello.cpp

```
#include <iostream>
#include "world.h"
using namespace std;
int main()
{
  cout << "Hello" << endl;
  world(cout);
}
```

world.h

```
#include <iostream>
void world( std::ostream& );
```

world.cpp

```
#include <iostream>
void world( std::ostream& os )
{
  os << " world!" << std::endl;
}
```

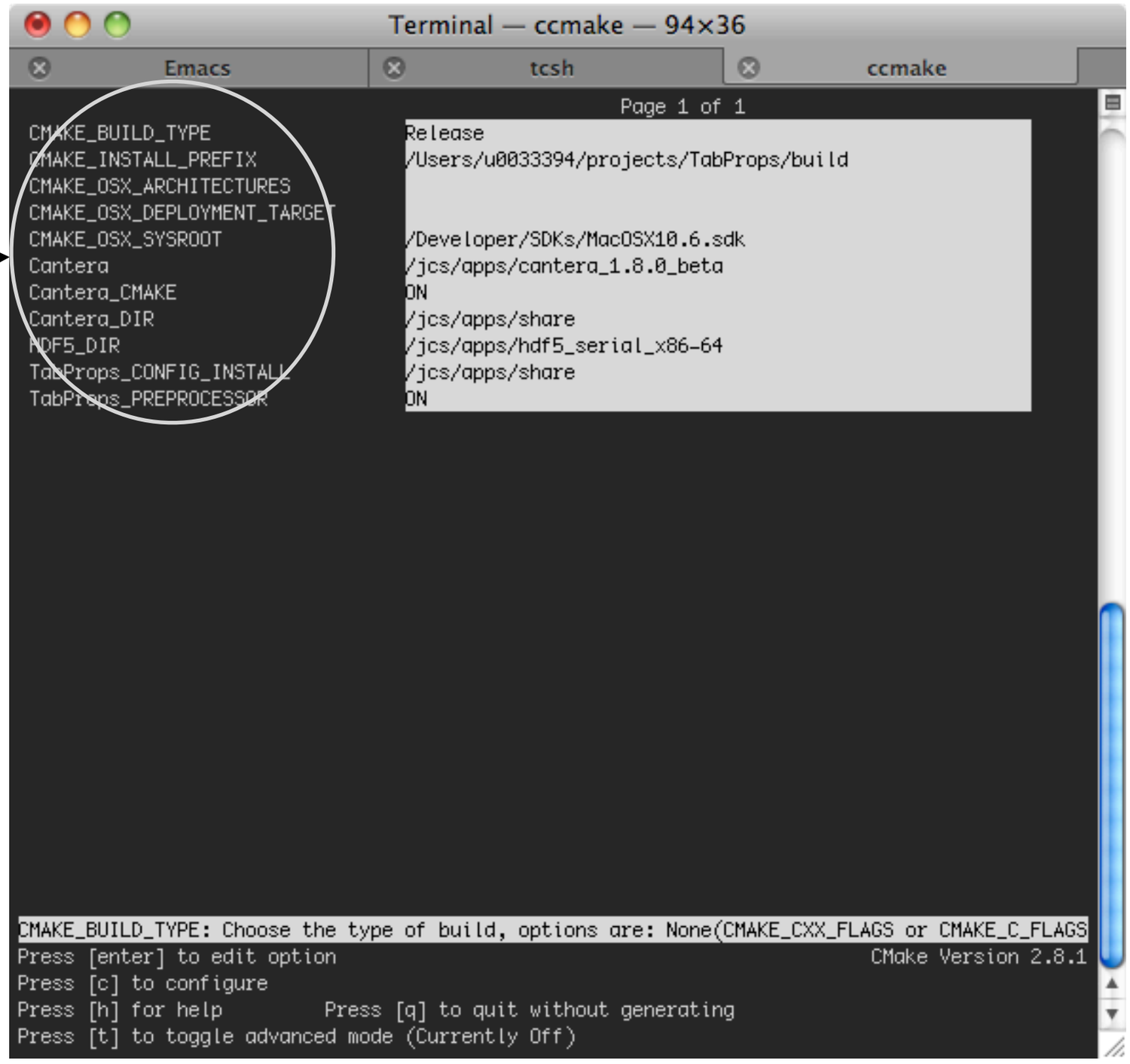
```
cmake_minimum_required( VERSION 2.8 )
project( HelloWorld )

add_library( world world.cpp )
add_executable(
 hello
 hello.cpp
 )

# link the “hello” executable with the
“world” library.
target_link_libraries(
  hello
  world
 )
```

CMakeLists.txt

CCMake

Things to pay attention to.

For simple cases (like our previous examples) there will not be very much here.



The CMake GUI

CMake 2.8.1 - /Users/u0033394/projects/TabProps/build

Where is the source code: /Users/u0033394/projects/TabProps [Browse Source...]

Where to build the binaries: /Users/u0033394/projects/TabProps/build [Browse Build...]

Search: [ ] Grouped View [Add Entry] [Remove Entry]

Name	Value
Ungrouped Entries	
CMAKE	
CPACK	
Cantera	
HDF5	
TabProps	

Press Configure to update and display new values in red, then press Generate to generate selected build files.

[Configure] [Generate] Current Generator: Unix Makefiles

```
Files will be installed to: /Users/u0033394/projects/TabProps/build/tabprops
Configuring done
```

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CMake Resources

- CMake wiki
- Online documentation
- The book (I have a copy)
- Me - I have done a lot of work with CMake and can help answer many of your questions.

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