Learning Cmake

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Slides: http://www.elpauer.org/stuff/learning_cmake.pdf

Part I

Build systems – what for?

Why?

- You write an application (source code) and need to:
  - Compile the source
  - Link to other libraries
  - Distribute your application as source and/or binary
- You would also love if you were able to:
  - Run tests on your software
  - Run test of the redistributable package
  - See the results of that

Compiling

- Manually?

```
gcc -DMYDEFINE -c myapp.o myapp.cpp
```

- Unfeasible when:
  - you have many files
  - some files should be compiled only in a particular platform, are you going to trust your brain?
  - different defines depending on debug/release, platform, compiler, etc
- You really want to automate this step

Linking

- Manually?

```
ld -o myapp file1.o file2.o file3.o -lc -lmylib
```

- Again, unfeasiable if you have many files, dependence on platforms, etc
- You also want to automate this step

Distribute your software

- Traditional way of doing things:
  - Developers develop code
  - Once the software is finished, other people package it
  - There are many packaging formats depending on operating system version, platform, Linux distribution, etc: .deb, .rpm, .msi, .dmg, .src.tar.gz, .tar.gz, InstallShield, etc
- You'd like to automate this but, is it possible to bring packagers into the development process?

Testing

- You all use unit tests when you develop software, don't you? You should!
- When and how to run unit tests? Usually a three-step process:
  - You manually invoke the build process (e.g. make)
  - When it's finished, you manually run a test suite
  - When it's finished, you look at the results and search for errors and/or warnings
  - Can you test the packaging? Do you need to invoke the individual tests or the unit test manually?

Testing and gathering results

- Someone needs to do testing for feach platform, then merge the results
- Is it possible to automate this? “make test”? what about gathering the results?

Automate!

- Your core business is software development, not software building
- What are you selling?
  - A flight simulator? or,
  - A “flight simulator built with an awesome in-house developed built system”?
- The client does not care about how you built your software, they are only interested in having the best software application possible
- So should you: modern build systems should be able to build the software, package it, test it and tell

Part II

Build systems tour

Autotools

- 👍 It's been in use for many years and it's still widely used
  - Autohell?
    - 👎 You need to write scripts in Bourne shell ('sh'), m4 (you all develop software in m4, don't you?),
    - 👎 Only Unix platform => Visual Studio, Borland, etc in Win32 are unsupported (Cygwin/MinGW supported)
    - 👎 Dependency discovery is mostly manual (no bundled “finders” grouping several steps)
    - 👎 Usually long, difficult to understand scripts
- 👍 Autotools create a Makefile for 'make'

Jam

- 👎 The original implementation (Perforce Jam) is quite buggy
  - 👎 There are many slightly different implementations
- 👍 Cross platform
- 👎 Dependency discovery is mostly manual (no bundled “finders” grouping several steps)
  - Compiles and links by itself
    - 👎 Users cannot use the tools they are used to
    - 👎 What if Jam is not available for that platform?
    - 👍 Allows parallel linking

SCons

👎 Python DSL

- The interpreter is not always available
- You need to learn almost a programming language

👍 Cross-platform

- You are actually writing a software app which happens to build another software app

👎 Does not scale well

👎 Dependency discovery is mostly manual (no bundled “finders” grouping several steps)

Compiles and links by itself

Waf

- Second generation of bksys, tries to fix Scons
- No installation: it's a 100KB script you redistribute with your source

  👎 It's a security issue: if a bug is found, every app needs to redistribute a new waf version

👍 ~~Not cross-platform, won't ever be~~ Recently added Win32

👎 Dependency discovery is mostly manual (you can write “finders” but you cannot reuse them)

Compiles and links by itself

CMake

- 👍 Cross-platform
- 👍 Very simple script language
- 👍 Dependency discovery is awesome: FIND_PACKAGE
- 👍 Scales very well: KDE4 is using it (4+ MLOC)
  - Creates a project files for Makefile, Visual Studio, Kdevelop, Eclipse, etc
    - 👍 Users can use the tools they are used to
    - 👎 Cannot overcome the limitations those IDEs/'make' have

Part III

Meeting CMake

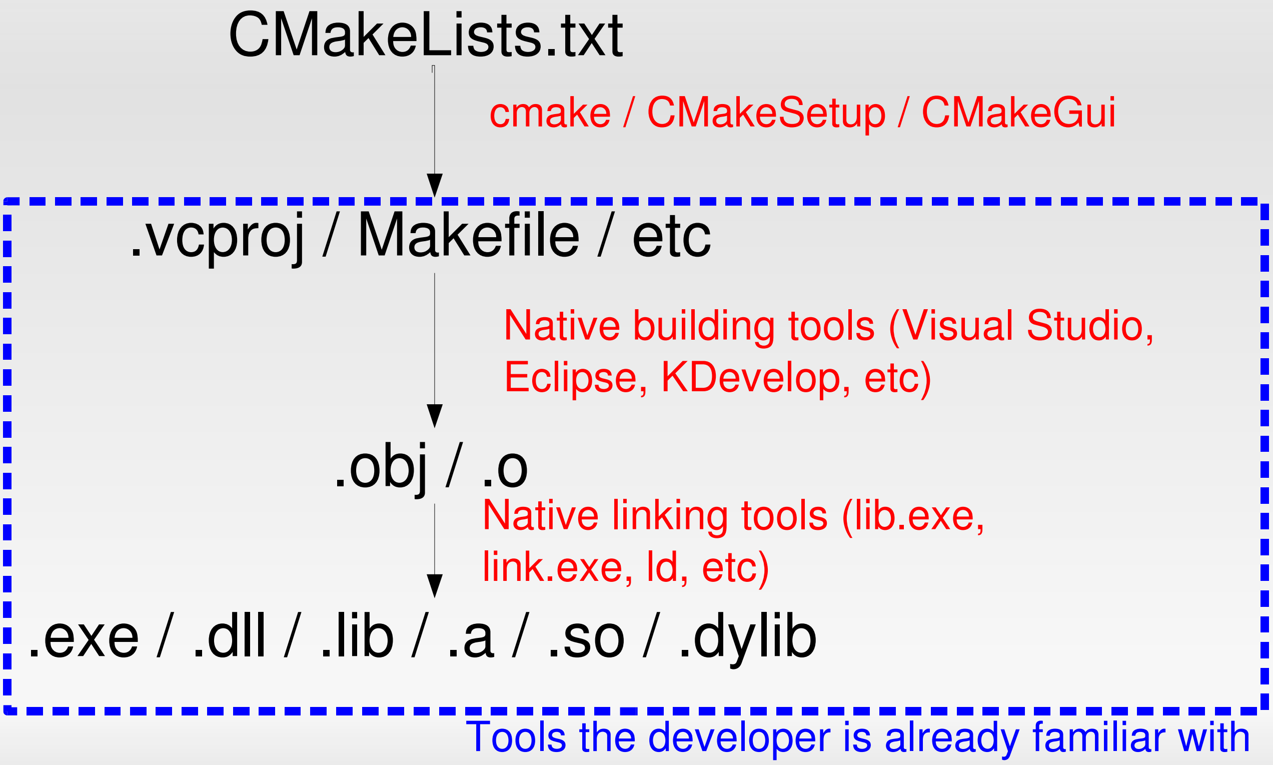
The Kitware build and test chain

- Cmake
- CPack
- CTest + BullsEye/gcov
- CDash

What is CMake

- Think of it as a meta-Make
- CMake is used to control the software compilation process using simple platform and compiler independent configuration files
- CMake generates native makefiles and workspaces that can be used in the compiler environment of your choice: Visual C++, Kdevelop3, Eclipse, XCode, makefiles (Unix, NMake, Borland, Watcom, MinGW, MSYS, Cygwin), Code::Blocks etc
- Projects are described in CMakeLists.txt files

Build flow



CMakeLists.txt

cmake / CMakeSetup / CMakeGui

.vcproj / Makefile / etc

Native building tools (Visual Studio, Eclipse, KDevelop, etc)

.obj / .o

Native linking tools (lib.exe, link.exe, ld, etc)

.exe / .dll / .lib / .a / .so / .dylib

Tools the developer is already familiar with

In-source vs out-of-source

- Where to place object files, executables and libraries?
- In-source:
  - helloapp/hello.cpp
  - helloapp/hello.exe
- Out-of-source:
  - helloapp/hello.cpp
  - helloapp-build/hello.exe
- CMake prefers out-of-source builds

The CMake workflow

- Have this tree:

  -
    ```
    myapp
       build
       trunk
    ```
- `cd myapp/build`
- `cmake ../trunk`
- `make` (Unix) or open project (VC++)
- On Windows, you can also use CMakeSetup (GUI). Cmake 2.6 includes a multiplatform Qt4-based GUI.

- If Eclipse:
  - `myapp/trunk`
  - `myapp-build`
- Eclipse has problems if the build dir is a subdir of the source dir

Very simple executable

- `PROJECT( helloworld )`
- `SET( hello_SRCS hello.cpp )`
- `ADD_EXECUTABLE( hello ${hello_SRCS} )`

- PROJECT is not mandatory but you should use it
- ADD_EXECUTABLE creates an executable from the listed sources
- Tip: add sources to a list (hello_SRCS), do not list them in ADD_EXECUTABLE

Showing verbose info

- To see the command line CMake produces:
  - SET(CMAKE_VERBOSE_MAKEFILE on)
- Or:
  - $ make VERBOSE=1
- Or:
  - $ export VERBOSE=1
  - $ make
- Tip: only use it if your build is failing and you need to find out why

Very simple library

- `PROJECT( mylibrary )`
- `SET( mylib_SRCS library.cpp )`
- `ADD_LIBRARY( my SHARED ${mylib_SRCS} )`

- ADD_LIBRARY creates an static library from the listed sources
- Add SHARED to generate shared libraries (Unix) or dynamic libraries (Windows)

Shared vs static libs

- Static libraries: on linking, add the used code to your executable
- Shared/Dynamic libraries: on linking, tell the executable where to find some code it needs
- If you build shared libs in C++, you should also use soversioning to state binary compatibility (too long to be discussed here)

The CMake cache

- Cmake is very fast on Unix but noticeably slow on Windows with Microsoft Visual C++ due to VC++ slowliness to check types
- The CMake cache stores values which are not usually changed
- Edit the cache using ccmake (Unix) or CMakeSetup (Windows)

Variables & cache (I)

- Unconditional set
- SET(var1 13)
  - "var1" is set 13
  - If “var1” already existed in the cache, it is **shadowed** by this value
  - This call does not overwrite “var1” value in the cache, if it existed

Variables & cache (II)

- Reuse the cache
- SET(var2 17 ... CACHE ...)
  - “var2” already in cache => keep cache value
  - “var2” not yet in cache (usually during first cmake run) => var2 is set to 17 and this goes into the cache
  - The value in the cache can be changed by editing CMakeCache.txt, or "make edit_cache", or running ccmake or running cmake-gui.

Variables & cache (III)

- Unconditional set & overwrite cache
- SET(var3 23 ... CACHE FORCE)
  - “var3” always takes this value, whether it was already in the cache or not
  - Cached value will always be overwritten => this makes editing the cache manually impossible

Regular expressions

- Worst side of Cmake: they are non-PCRE
- Use STRING(REGEX MATCH ...), STRING (REGEX MATCHALL ...), STRING(REGEX REPLACE ...)
- You will need to try once and again until you find the right regex
- I'm implementing STRING(PCRE_REGEX MATCH ...), etc based on PCRE. Not sure if it will be on time for Cmake 2.6.0 – It won't be

Back/Forward compatibility

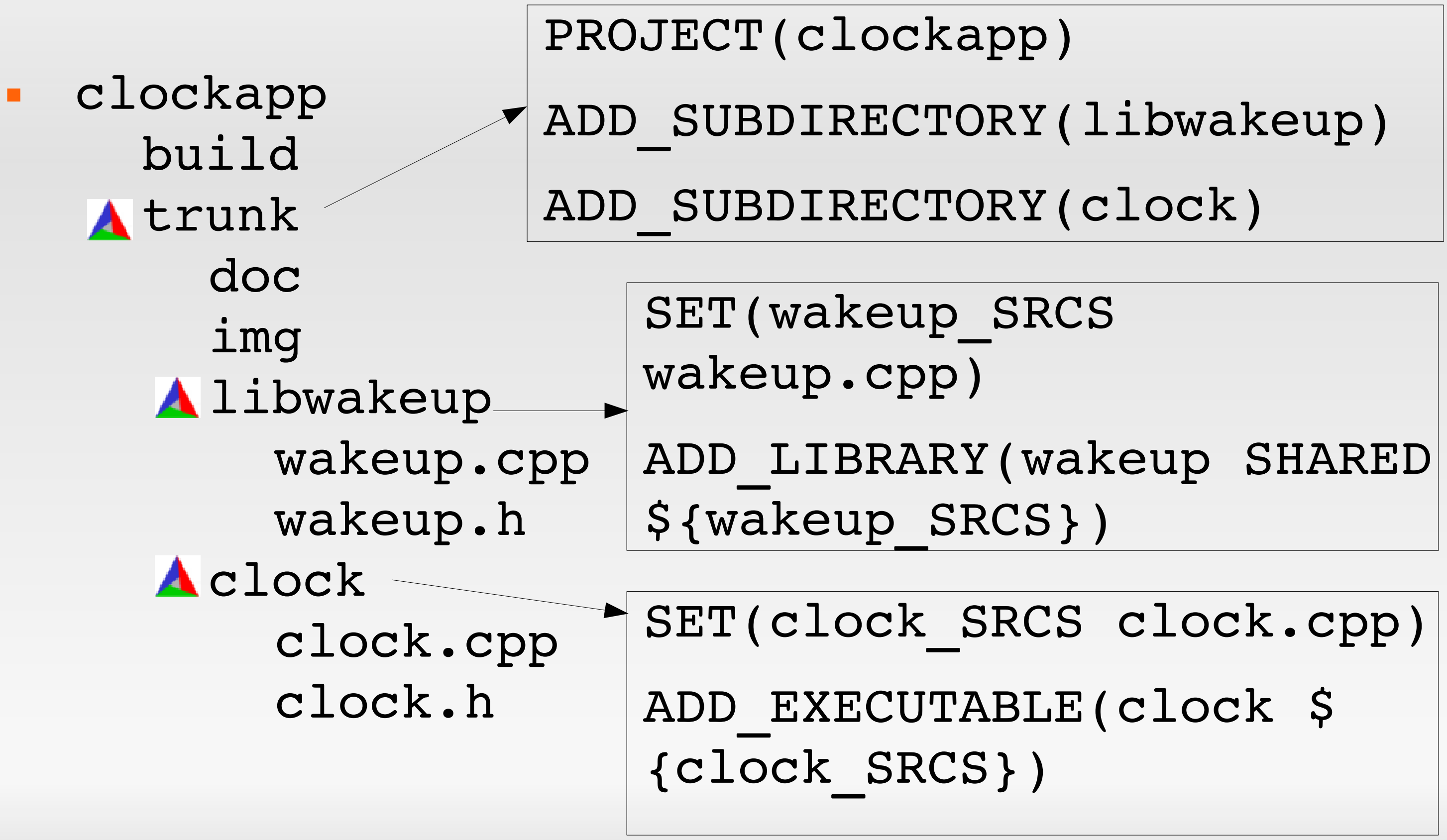
- Since Cmake 2.0, ask for at least a certain version with CMAKE_MINIMUM_REQUIRED
- Since Cmake 2.6, tell Cmake to behave like a certain version (> 2.4) with CMAKE_POLICY(VERSION major.minor[.patch])

Part IV

Real world CMake:

dependencies between targets

Adding other sources



```
clockapp
  build
  trunk
    doc
    img
    libwakeup
      wakeup.cpp
      wakeup.h
    clock
      clock.cpp
      clock.h
```

```
PROJECT(clockapp)

ADD_SUBDIRECTORY(libwakeup)

ADD_SUBDIRECTORY(clock)
```

```
SET(wakeup_SRCS
wakeup.cpp)

ADD_LIBRARY(wakeup SHARED
${wakeup_SRCS})
```

```
SET(clock_SRCS clock.cpp)

ADD_EXECUTABLE(clock $
{clock_SRCS})
```

Variables

- No need to declare them
- Usually, no need to specify type
- SET creates and modifies variables
- SET can do everything but LIST makes some operations easier
- Use SEPARATE_ARGUMENTS to split space-separated arguments (i.e. a string) into a list (semicolon-separated)
- In Cmake 2.4: global (name clashing problems)
- In Cmake 2.6: scoped

Changing build parameters

- Cmake uses common, sensible defaults for the preprocessor, compiler and linker
- Modify preprocessor settings with ADD_DEFINITIONS and REMOVE_DEFINITIONS
- Compiler settings: CMAKE_C_FLAGS and CMAKE_CXX_FLAGS variables
- Tip: some internal variables (CMAKE_*) are read-only and must be changed executing a command

Flow control

-
  ```
  IF(expression)
  ...
  ELSE(expression)
  ...
  ENDIF(expression)
  ```
- Process a list:
  ```
  FOREACH(loop_var)
  ...
  ENDFOREACH(loop_var)
  ```

-
  ```
  WHILE(condition)
  ...
  ENDWHILE(condition)
  ```

Always repeat the expression/condition

It's possible to avoid that but I won't tell you how

Visual Studio special

- To show .h files in Visual Studio, add them to the list of sources in ADD_EXECUTABLE / ADD_LIBRARY

-
  ```
  SET(wakeup_SRCS wakeup.cpp)
  IF(WIN32)
    SET(wakeup_SRCS ${wakeup_SRCS}
  wakeup.h)
  ENDIF(WIN32)
  ADD_LIBRARY(wakeup SHARED ${wakeup_SRCS})
  ```
- Use SOURCE_GROUP if all your sources are in the same directory

Managing debug and release builds

- `SET(CMAKE_BUILD_TYPE Debug)`
- As any other variable, it can be set from the command line:
  ```
  cmake -DCMAKE_BUILD_TYPE=Release ../trunk
  ```
- Specify debug and release targets and 3rdparty libs:
  ```
  TARGET_LINK_LIBRARIES(wakeup RELEASE $
  {wakeup_SRCS})
  TARGET_LINK_LIBRARIES(wakeupd DEBUG $
  {wakeup_SRCS})
  ```

Standard directories... not!

- Libraries built in your project (even if in a different CmakeLists.txt) is automatic (in rare occasions: ADD_DEPENDENCIES)
- If the 3rd party library or .h is in a “standard” directory (PATH and/or LD_LIBRARY_PATH) is automatic
- If in a non-standard dir:
  - Headers: use INCLUDE_DIRECTORIES
  - Libraries: use FIND_LIBRARY and link with the result of it (try to avoid LINK_DIRECTORIES)

make install

- INSTALL(TARGETS clock wakeup RUNTIME DESTINATION bin LIBRARY DESTINATION lib)
- Would install in /usr/local/bin and /usr/local/lib (Unix) or %PROGRAMFILES%\projectname (Windows)

Part V

Platform checks and external dependencies

Finding installed software

- `FIND_PACKAGE( Qt4 REQUIRED )`
- Cmake includes finders (FindXXXX.cmake) for ~130 software packages, many more available in Internet
- If using a non-CMake FindXXXX.cmake, tell Cmake where to find it by setting the CMAKE_MODULE_PATH variable
- Think of FIND_PACKAGE as an #include

Qt with CMake

```
PROJECT( pfrac )

FIND_PACKAGE( Qt4 REQUIRED )
INCLUDE( ${QT_USE_FILE} )

SET( pfrac_SRCS main.cpp client.h client.cpp )
SET( pfrac_MOC_HEADERS client.h )

QT4_ADD_RESOURCES( pfrac_SRCS
     ${PROJECT_SOURCE_DIR}/pfrac.qrc )
QT4_WRAP_CPP( pfrac_MOC_SRCS
     ${pfrac_MOC_HEADERS} )

ADD_EXECUTABLE( pfrac ${pfrac_SRCS} $
{pfrac_MOC_SRCS}

TARGET_LINK_LIBRARIES( pfrac ${QT_LIBRARIES} )
```

Platform includes

- `CONFIGURE_FILE(InputFile OutputFile [COPYONLY] [ESCAPE_QUOTES] [@ONLY])`
  - Your source may need to set some options depending on the platform, build type, etc
  - Create a `wakeup.h.cmake` and:
    - `#cmakedefine VAR` will be replaced with `#define VAR` if VAR is true, else with `/* #undef VAR */`
    - `@VAR@` will be replaced with the value of VAR
  - Also useful for .conf files

Platform includes (II)

- CHECK_TYPE_SIZE (needs INCLUDE(CheckTypeSize))
- TEST_BIG_ENDIAN (needs INCLUDE(CheckBigEndian))
- CHECK_INCLUDE_FILES (needs INCLUDE(CheckIncludeFiles))

Platform Includes (III)

CmakeLists.txt

```
...
INCLUDE(CheckIncludeFiles)
CHECK_INCLUDE_FILES (
malloc.h HAVE_MALLOC_H )
...
```

wakeup.cpp

```
#include "wakeup.h"
#include “wakeup2.h”
#ifdef HAVE_MALLOC_H
#include <malloc.h>
#else
#include <stdlib.h>
#endif
void do_something() {
void *buf=malloc(1024);
...
}
```

Part VI
Macros and functions

Macros

-
  ```
  MACRO( <name> [arg1 [arg2 [arg3 ...]]] )
  COMMAND1(ARGS ...)
  COMMAND2(ARGS ...)
  ...
  ENDMACRO( <name> )
  ```
- They perform text substitution, just like `#define` does in C
- Danger! Variable-name clashing is possible if using too generic names. Hint: prefix your varnames with the macro name: MACRO_VARNAME instead of VARNAME

Functions

- New in Cmake 2.6
- Real functions (like C), not just text-replace (a-la C preprocessor)
- Advantages: avoid variable-scope trouble (hopefully)

New targets

- Targets defined with ADD_CUSTOM_TARGET are always considered outdated (i. e. rebuilt)
- Two signatures for ADD_CUSTOM_COMMAND:
  - Same as ADD_CUSTOM_TARGET but do not rebuild if not needed
  - Execute a target before build, after build or before link
- For example, you can create GENERATE_DOCUMENTATION

GENERATE_DOCUMENTATION (I)

```
MACRO(GENERATE_DOCUMENTATION DOXYGEN_CONFIG_FILE)
FIND_PACKAGE(Doxygen)
SET(DOXYFILE_FOUND false)
IF(EXISTS ${PROJECT_SOURCE_DIR}/${DOXYGEN_CONFIG_FILE})
    SET(DOXYFILE_FOUND true)
ENDIF(EXISTS ${PROJECT_SOURCE_DIR}/${DOXYGEN_CONFIG_FILE})

IF( DOXYGEN_FOUND )
   IF( DOXYFILE_FOUND )
        # Add target
        ADD_CUSTOM_TARGET( doc ALL ${DOXYGEN_EXECUTABLE} "$
{PROJECT_SOURCE_DIR}/${DOXYGEN_CONFIG_FILE}" )

        # Add .tag file and generated documentation to the list
of files we must erase when distcleaning

        # Read doxygen configuration file
        FILE( READ ${PROJECT_SOURCE_DIR}/${DOXYGEN_CONFIG_FILE}
DOXYFILE_CONTENTS )
        STRING( REGEX REPLACE "\n" ";" DOXYFILE_LINES $
{DOXYFILE_CONTENTS} )

...
```

GENERATE_DOCUMENTATION (II)

```
        # Parse .tag filename and add to list of files to delete
if it exists
        FOREACH( DOXYLINE ${DOXYFILE_CONTENTS} )
            STRING( REGEX REPLACE ".*GENERATE_TAGFILE *= *([^
^\n]+).*" "\\1" DOXYGEN_TAG_FILE ${DOXYLINE} )
        ENDFOREACH( DOXYLINE )

        ADD_TO_DISTCLEAN( ${PROJECT_BINARY_DIR}/$
{DOXYGEN_TAG_FILE} )

        # Parse doxygen output doc dir and add to list of files
to delete if it exists
        FOREACH( DOXYLINE ${DOXYFILE_CONTENTS} )
            STRING( REGEX REPLACE ".*OUTPUT_DIRECTORY *= *([^
^\n]+).*" "\\1" DOXYGEN_DOC_DIR ${DOXYLINE} )
        ENDFOREACH( DOXYLINE )
        ADD_TO_DISTCLEAN( ${PROJECT_BINARY_DIR}/$
{DOXYGEN_DOC_DIR} )
        ADD_TO_DISTCLEAN( ${PROJECT_BINARY_DIR}/$
{DOXYGEN_DOC_DIR}.dir )
...
```

GENERATE_DOCUMENTATION (III)

```
    ELSE( DOXYFILE_FOUND )
        MESSAGE( STATUS "Doxygen configuration file not found -
Documentation will not be generated" )
 ENDIF( DOXYFILE_FOUND )
ELSE(DOXYGEN_FOUND)
        MESSAGE(STATUS "Doxygen not found - Documentation will
not be generated")
ENDIF(DOXYGEN_FOUND)
ENDMACRO(GENERATE_DOCUMENTATION)
```

Calling the outside world

- EXECUTE_PROCESS
- Execute and get output from a command, copy files, remove files, etc
- Cross-platform: avoid calling /bin/sh or cmd.exe if EXECUTE_PROCESS suffices

Part VII

Creating your own finders

What is a finder

- When compiling a piece of software which links to third-party libraries, we need to know:
  - Where to find the .h files (`-I` in gcc)
  - Where to find the libraries (.so/.dll/.lib/.dylib/...) (`-L` in gcc)
  - The filenames of the libraries we want to link to (`-l` in gcc)
- That's the basic information a finder needs to return

MESSAGE

- Show status information, warnings or errors

```
MESSAGE( [SEND_ERROR | STATUS | FATAL_ERROR]
                   "message to display" ... )
```

STRING

- Manipulate strings or regular expressions
- Many signatures

Files and Windows registry

- GET_FILENAME_COMPONENT interacts with the outside world
  - Sets a Cmake variable to the value of an environment variable
  - Gets a value from a Windows registry key
  - Gets basename, extension, absolute path for a filename

FILE

- Read from / write to files
- Remove files and directories
- Translate paths between native and Cmake: \ ↔ /

Find libraries

- FIND_LIBRARY and the CMAKE_LIBRARY_PATH variable
-
- (this slide is only a stub)

Find header files

- FIND_FILE
- (this slide is only a stub)

Find generic files

- FIND_PATH and the CMAKE_INCLUDE_PATH variable
- (this slide is only a stub)

PkgConfig support

- PkgConfig is a helper tool used when compiling applications and libraries
- PkgConfig provides the `-L`, `-l` and `-I` parameters
- Try to avoid it, as it's not always installed
- Mostly Unix, available for Win32 but seldomly used
- Cmake provides two paths to use PkgConfig: UsePkgConfig.cmake and FindPkgConfig.cmake

- FIND_PROGRAM
- (this slide is only a stub)

- TRY_COMPILE
- (this slide is only a stub)

- TRY_RUN
- (this slide is only a stub)

Part VIII
Properties

- CMAKE_MINIMUM_REQUIRED
- (this slide is only a stub)

- OPTION
- (this slide is only a stub)

- GET_CMAKE_PROPERTY
- (this slide is only a stub)

- GET_TARGET_PROPERTY
- (this slide is only a stub)

- SET_TARGET_PROPERTIES
- (this slide is only a stub)

- SET_SOURCE_FILES_PROPERTIES
- (this slide is only a stub)

Part IX
Useful variables

- CMAKE_BINARY_DIR/CMAKE_SOURCE_DIR
- (this slide is only a stub)

- CMAKE_CURRENT_BINARY_DIR /CMAKE_CURRENT_SOURCE_DIR
- (this slide is only a stub)

- PROJECT_BINARY_DIR/PROJECT_SOURCE_DIR
- (this slide is only a stub)

- EXECUTABLE_OUTPUT_PATH/LIBRARY_OUTPUT_PATH
- (this slide is only a stub)

- ENV ($ENV{name})
- (this slide is only a stub)

- CMAKE_SKIP_RPATH (important in Debian and Debian-derivatives) (follow http://www.cmake.org/Wiki/CMake_RPATH_han)
- (this slide is only a stub)

More variables

- Use this snippet to list all variables and their values:

```
get_cmake_property( P VARIABLES )
    foreach( VAR in ${P} )
       message( STATUS
             "  ${VAR}=${${VAR}}" )
    endforeach()
```

Part X
CPack

Features

- CPack generates installing packages:
  - RPM, DEB, GZip and Bzip2 distributions of both binaries and source code
  - NSIS installers (for Microsoft Windows)
  - Mac OS X packages (.dmg)
- In Cmake 2.4, .rpm and .deb support works but is not good
- It can be used without Cmake
- If used with Cmake, takes advantage of the INSTALL declarations

Variables in CPack

- There are bundle-specific variables: NSIS needs some vars a ZIP does not need
- Important: set variable values BEFORE you INCLUDE(CPack)

Example

```
INCLUDE(InstallRequiredSystemLibraries)

SET(CPACK_PACKAGE_DESCRIPTION_SUMMARY "Alarm clock")
SET(CPACK_PACKAGE_VENDOR "Pau Garcia i Quiles")
SET(CPACK_PACKAGE_DESCRIPTION_FILE
"$CMAKE_CURRENT_SOURCE_DIR}/ReadMe.txt")
SET(CPACK_RESOURCE_FILE_LICENSE
"$CMAKE_CURRENT_SOURCE_DIR}/Copyright.txt")
SET(CPACK_PACKAGE_VERSION_MAJOR "0")
SET(CPACK_PACKAGE_VERSION_MINOR "0")
SET(CPACK_PACKAGE_VERSION_PATCH "1")
SET(CPACK_PACKAGE_INSTALL_DIRECTORY "CMake $
{Cmake_VERSION_MAJOR}.${CMake_VERSION_MINOR}")
...
```

Example (cont.)

```
IF(WIN32 AND NOT UNIX)
SET(CPACK_PACKAGE_ICON "$
{Cmake_SOURCE_DIR}/Utilities/Release\\\\InstallIcon.bmp")
SET(CPACK_NSIS_INSTALLED_ICON_NAME
"bin\\\\MyExecutable.exe")
SET(CPACK_NSIS_DISPLAY_NAME "$
{CPACK_PACKAGE_INSTALL_DIRECTORY} My Famous Project")
SET(CPACK_NSIS_HELP_LINK "http:\\\\\\\\elpauer.org")
SET(CPACK_NSIS_URL_INFO_ABOUT "http:\\\\\\\\elpauer.org")
SET(CPACK_NSIS_CONTACT "pgquiles@elpauer.org")
...


INCLUDE(CPack)
```

Part XI

CTest

Features

- Cross-platform testing system which:
  - Retrieves source from CVS, Subversion or Perforce (git support currently being worked on)
  - Configures and build the project
  - Configures, build and runs a set of predefined runtime tests
  - Sends the results to a Dart/CDash dashboard
- Other tests:
  - code coverage: using BullsEye ($$$) or gcov (free)

    (note to self: show rbxspf code coverage)
  - memory checking

Example

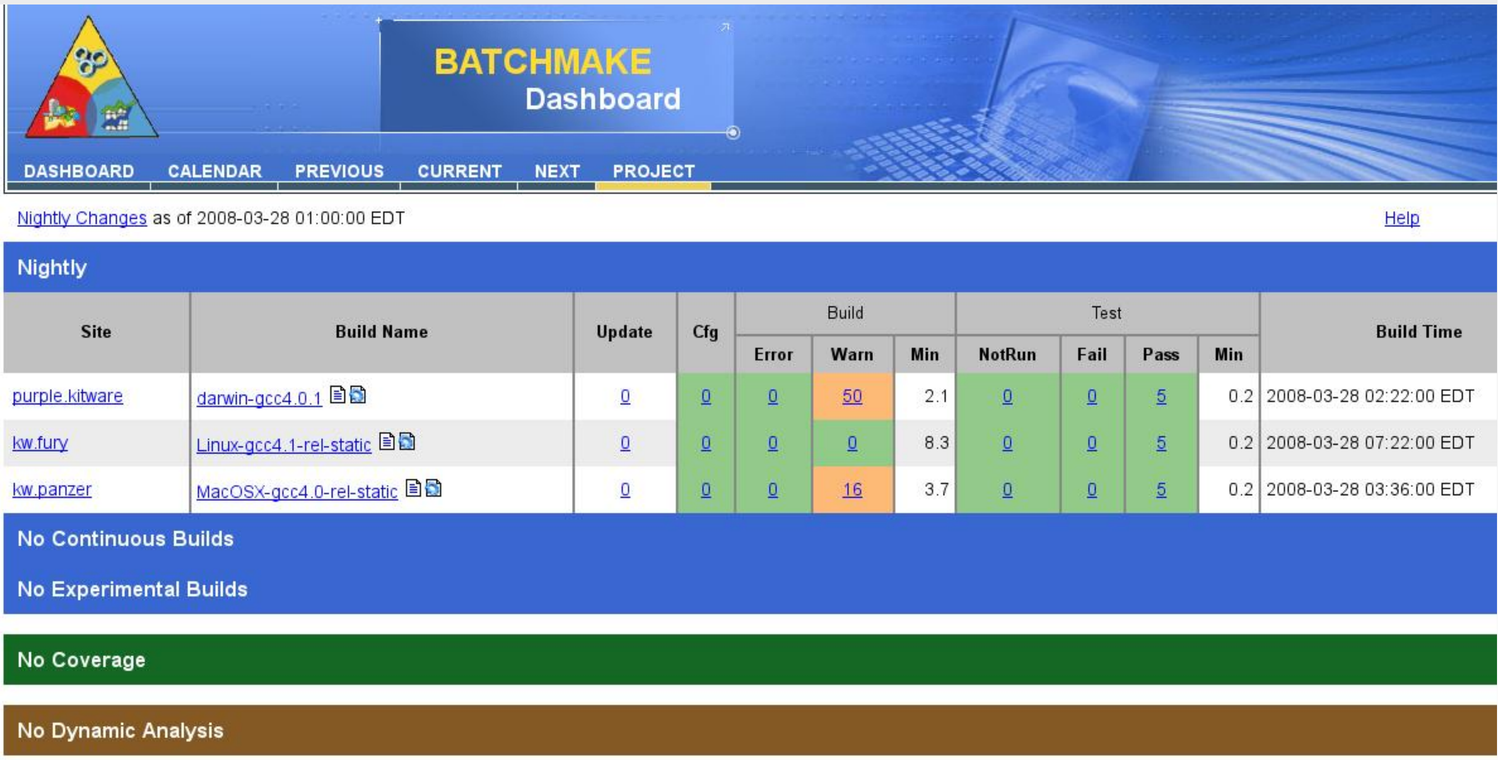
- Very easy!
  - `ENABLE_TESTING()`
  - `ADD_TEST( testname testexecutable args )`
- Some scripting needed to:
  - Download sources from a VC system (CVS, SVN and Perforce templates available, git in progress)
  - Upload to Dart/CDash dashboard (templates available for HTTP, FTP, SCP and XML-RPC)
- It can be used with non-CMake projects

Part XII
CDash

Features

- CDash aggregates, analyzes and displays the results of software testing processes submitted from clients.
- Replaces Dart
- For example, build a piece of software on Linux, Windows, Mac OS X, Solaris and AIX
- Usually, you want two kinds of information:
  - Build results on all platforms
  - Test (Ctest) results on all platforms
- Customizable using XSL

Example



Nightly Changes as of 2008-03-28 01:00:00 EDT

Nightly

Site	Build Name	Update	Cfg	Build			Test				Build Time
				Error	Warn	Min	NotRun	Fail	Pass	Min	
purple.kitware	darwin-gcc4.0.1	0	0	0	50	2.1	0	0	5	0.2	2008-03-28 02:22:00 EDT
kw.fury	Linux-gcc4.1-rel-static	0	0	0	0	8.3	0	0	5	0.2	2008-03-28 07:22:00 EDT
kw.panzer	MacOSX-gcc4.0-rel-static	0	0	0	16	3.7	0	0	5	0.2	2008-03-28 03:36:00 EDT

No Continuous Builds

No Experimental Builds

No Coverage

No Dynamic Analysis