Introduction to Kitware, CMake, and Dashboards

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Outline

- Nothing better to do than create useful and interesting tools
- CMake Change the way ALL programmers build software
- Dashboards If its not tested it doesn't work







Kitware History

- Began writing VTK textbook in December 1993 while at GE
- Kitware Founded in 1998
 - To provide VTK support
 - Headquarters in Clifton Park NY.
- Founders: 5 previous employees of GE Corporate R&D
- Currently 37 employees; growing rapidly
 - Exceptional staff: 14 PhD, 19 MS
 - 10 new employees in the past year
 - Recently established Chapel Hill, NC office in early 2006 led by Dr. Stephen Aylward and Julien Jomier





Kitware Notable Events

- ITK Consortium 1999
 - Insight Segmentation & Registration Toolkit
 - CMake
- Tri-Lab Consortium
 - Sandia, Los Alamos, Livermore
 - ParaView, VTK for supercomputing
- National Center for Biomedical Computing
 - National Alliance for Medical Imaging Computing - NAMIC (na-mic.org)
 - One of seven, five-year, \$20 million, strategic NIH roadmap sites
- Established Chapel Hill office 2006



Kitware Core Technologies



Useful and Interesting Open Source Tools from Kitware

- VTK The Visualization Toolkit
 - Wrapped C++ into TCL, Python, Java
- ParaView
 - ParaView3 code name ParaQ in Qt
- ITK Insight Toolkit
- CMake, CTest, and CPack
- GCC_XML
- KWStyle
- IGSTK: Image-Guided Surgery Toolkit
- Insight Journal http://www.insight-journal.org/



Commercial Products

- Services: books, training, support, consulting
- <u>VolView</u>: medical / scientific volume visualization
- <u>ParaView</u>: enterprise-wide visualization solutions
- ActiViz: COM/C# bundled visualization classes
- MeshViz: higher order interpolation adapters



CMake - changing the way ALL programmers compile code

- 1999 Start of the ITK project
- Kitware tasked with build environment
 - VTK current build system
 - autoconf on UNIX
 - pcmaker on Windows
 - Very specific to VTK and hard to maintain, no system introspection on windows
 - CMake born out of necessity



Kitware CMake Team





Bill Hoffman

Ken Martin



Brad King



Andy Cedilnik



CMake Requirements

- Support UNIX/LINUX/Windows/MAC
- Simple easy to use
- Support code generation at build time (c++ wrapper support)
- Do not require any software other than CMake to be installed.
 - Need only a C++ compiler (same as ITK itself)
- Use Native Build tools like KDevelop, Visual Studio and Xcode





CMake GUI (ccmake CMakeSetup) Process Flow



CMake Language

Easy for smaller projects to use larger projects

project(SampleProject)
find_package(VTK REQUIRED)
include(\${VTK_USE_FILE})

set(SOURCES mySource1.cxx mySource2.cxx)
add_executable(myExecutable \${SOURCES})
target_link_libraries(myExecutable vtkRendering)



CMake Architecture 00 C++

- Commands are C++ objects
- Generators are C++ objects
 - Makefile, KDevelop, Xcode, MS VS, NMake, Borland Make,
- Complicated stuff should happen in the C++





Software Process Dashboards



Dashboards -

- "If it's not tested it doesn't work"
 - Code Dasboards and our Software Process
 - Roots in GE Six Sigma initiative
 - Nightly regression testing (see VTK Dashboard)
 - Memory (Purify/ValGrind) testing
 - Coverage testing
 - Documentation evaluation
 - Cross platform testing
 - Nightly, Experimental, and Continuous



VTK Quality Dashboard

 http://public.kitware.com/VTK/Testing/Dashbo ard/ MostRecentResults-Nightly/Dashboard.html

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caemlyn.kitware	Linux-2.4.8-26mdksmp-g++-3.0.1	31	0	Q	0	Q	403	34	Thu Feb 20 01:47:14 EST 2003	Thu Feb 20 03:42:23 EST 2003
ringworld, kitwarein, com	Linux-MangledMesa	30	<u>0</u>	<u>0</u>	<u>0</u>	<u>8</u>	32	<u>397</u>	Thu Feb 20 03:02:11 EST 2003	Thu Feb 20 03:03:57 EST 2003
amber4.kitware	Mandrake8_1_with_CVS_Mesa	30	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	411	<u>26</u>	Thu Feb 20 00:11:47 EST 2003	Thu Feb 20 01:49:43 EST 2003
a62.iue.tuwien.ac.at	OSF1-V5.1-cxx	1	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	393	44	Thu Feb 20 06:39:45 CET 2003	Thu Feb 20 03:09:15 EST 2003
a62.iue.tuwien.ac.at	OSF1-V5.1-gcc									No submission
shannara.kitware	SunOS-5.7-CC									No submission
caleb.crd	SunOS-5.7-g++-Coverage	31	<u>0</u>	<u>0</u>	Q	Q	410	27	Thu Feb 20 01:08:27 EST 2003	Thu Feb 20 03:40:03 EST 2003
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Regression Testing

- Compare generated image against standard "correct" image
 - pixel-by-pixel comparison
 - can use a threshold metric
 - adjusted for effects like dithering
 - OpenGL is rather loose about image quality







Can search for the checkin that caused the problem

CMake	CMake Friday, September 22 206:16:15 EDT 2006										
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									<u>Kitware</u>		

Why Test Daily?

- Large code base too large for any single developer to understand
- Developers distributed around the world
- Identify problems as they occur
- Insure that object API remains unchanged
- Provide feedback to developers as they experiment with new implementations



Add testing to your CMake project

- ENABLE_TESTING()
- INCLUDE(CTest)
- ADD_TEST(name command)
- ctest -D Experimental
- Shows up on Kitware public dashboard
- See DART docs for setting up your own dashboard.



KDELIBS Dashboard http://public.kitware.com/dashboard.php?n ame=kde

Kitware Inc - Leaders in Visualization Technology Sear												
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You too can submit! Get script from Notes												

ctest -S script

Summary

 Kitware is a rapidly growing company with a strong commitment to open source software and to CMake

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Scribus	Scribus Developer Blog Open Source Desktop Publishing				
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Sat 20 Cmake Rocks Posted by mrdocs @ Kudos	Archived Entry				
2006	Post Date :				
Repeat after me:	Saturday, May 20th, 2006 at 11:37 am				
Cmake Rocks	Category :				
Cmake Rocks	Kudos Do More :				
Cmake Rocks	You can leave a response, or trackback from your own site.				

- Dashboards keep software building everywhere
 Thanks to Alexander Nounderfl
- Thanks to Alexander Neundorf!

