

Software Process

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Outline

- Communication and Documentation
- Revision Control
- Build Management
- Testing
- Release process

Communication and Documentation

- Mailing lists
- Doxygen
- Issue Tracker

Mailing Lists

- Mailman list manager
- Two lists per project
 - developer - discussion about implementation details
 - user - discussion by users about how to use it\
- Provides a searchable archive
- Dynamic quick exchange of information

Doxygen

- Literate programming concepts
 - combine source and documentation
- Simple makeup for C++/C code
 - <http://www.stack.nl/~dimitri/doxygen/docblocks.html>

```
/** *
```

```
... text ...
```

```
*/
```

```
/*! *
```

```
... text ...
```

```
*/
```

```
/*! \brief Brief description.
```

```
    * Brief description continued.
```

```
*
```

```
* Detailed description starts here. */
```

Issue Tracker

- Web based bug or issue tracker is required to keep track of bugs and fixes
- Tracker of (Kitware) choice:
 - <http://www.mantisbt.org/>
- Requires periodic "triage"
 - usually before a major release

Revision Control

- Two basic types
 - concurrent edit
 - locked edit
- svn
- cvs
- Release time a branch is created
 - One person is in charge of the branch

Build Management

- Often overlooked
- CMake is the Kitware answer

Testing

- Smoke test
 - does it compile
 - does it run and not crash
- Regression testing
 - If something fails track , find the change and fix it
 - harder to implement

Dashboards -

“If it’s not tested it doesn’t work”

- Code Dashboards 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

VTK Quality Dashboard

- <http://public.kitware.com/VTK/Testing/Dashboard/MostRecentResults-Nightly/Dashboard.html>

| Site | Build Name | Update | Build | | | Test | | | Build Date | Submission Date |
|-------------------------|--------------------------------|--------|--------|----------|--------|--------|--------|-----|------------------------------|------------------------------|
| | | | Errors | Warnings | NotRun | Failed | Passed | NA | | |
| TRANTRON KITWARE | CygenShared | 41 | 0 | 0 | 0 | 1 | 311 | 125 | Wed Feb 19 23:25:26 EST 2003 | Thu Feb 20 00:17:24 EST 2003 |
| KALGAN KITWARE | CygenStatic | | | | | | | | | No submission |
| krondor.kitware | Darwin-6.3-c++-carbon | 30 | 0 | 0 | 0 | 1 | 419 | 17 | Thu Feb 20 01:33:20 EST 2003 | Thu Feb 20 06:28:54 EST 2003 |
| atamai.us.roberts.ca | Darwin-6.3-c++-Carbon | 30 | 0 | 0 | 0 | 7 | 412 | 18 | Thu Feb 20 02:15:29 EST 2003 | Thu Feb 20 05:25:33 EST 2003 |
| krondor.kitware | Darwin-6.3-c++-cocoa | 0 | 0 | 0 | 0 | 2 | 414 | 21 | Thu Feb 20 03:34:45 EST 2003 | Thu Feb 20 07:55:50 EST 2003 |
| atamai.us.roberts.ca | Darwin-6.3-c++-Cocoa | | | | | 14 | 401 | 22 | Thu Feb 20 05:26:19 EST 2003 | Thu Feb 20 08:28:16 EST 2003 |
| destiny.kitware | HP-UX-aCC-shared | 30 | 0 | 0 | 0 | 0 | 49 | 49 | Thu Feb 20 01:37:45 EST 2003 | Thu Feb 20 02:27:53 EST 2003 |
| destiny.kitware | HP-UX-CMake-Release | 0 | 0 | 0 | 0 | 0 | 49 | 49 | Thu Feb 20 02:55:47 EST 2003 | Thu Feb 20 03:38:44 EST 2003 |
| cd02_oc.crd | IRIS4-6.5-CC-a32 | 30 | 0 | 0 | 0 | 0 | 130 | 27 | Thu Feb 20 01:07:03 EST 2003 | Thu Feb 20 01:57:00 EST 2003 |
| manifold | IRIS4-6.5-CC-a32 | | | | | 336 | 74 | 27 | Thu Feb 20 03:44:13 EST 2003 | Thu Feb 20 04:03:33 EST 2003 |
| kulu.crd | IRIS4-6.5-CC-a32 | | | | | 0 | 106 | 37 | Thu Feb 20 01:09:41 EST 2003 | Thu Feb 20 02:13:24 EST 2003 |
| hythoth.kitware | Linux-2.4.18-gcc321 | 30 | 0 | 0 | 0 | 0 | 133 | 13 | Wed Feb 19 23:31:07 EST 2003 | Thu Feb 20 00:26:17 EST 2003 |
| caemlyn.kitware | Linux-2.4.6-26mdk-smp-g++3.0.1 | 31 | 0 | 0 | 0 | 0 | 100 | 34 | Thu Feb 20 01:47:14 EST 2003 | Thu Feb 20 03:42:23 EST 2003 |
| ringworld.kitwarein.com | Linux-MangledMesa | 30 | 0 | 0 | 0 | 8 | 32 | 397 | Thu Feb 20 03:02:11 EST 2003 | Thu Feb 20 03:03:57 EST 2003 |
| amber4.kitware | Mandrake6_1_with_CVS_Mesa | 30 | 0 | 0 | 0 | 0 | 111 | 26 | Thu Feb 20 00:11:47 EST 2003 | Thu Feb 20 01:49:43 EST 2003 |
| a62.lue.tuwinen.ac.at | OSF1-VS.1-cxx | 1 | 0 | 0 | 0 | 0 | 20 | 44 | Thu Feb 20 06:39:45 CET 2003 | Thu Feb 20 03:09:15 EST 2003 |
| a62.lue.tuwinen.ac.at | OSF1-VS.1-gcc | | | | | | | | | No submission |
| shannara.kitware | SunOS-5.7-CC | | | | | | | | | No submission |
| caleb.crd | SunOS-5.7-g++-Coverage | 31 | 0 | 0 | 0 | 0 | 116 | 27 | Thu Feb 20 01:08:27 EST 2003 | Thu Feb 20 03:40:03 EST 2003 |
| hythoth.kitware | VTK4.0-CMake-Nightly | 0 | 0 | 2 | 0 | 28 | 282 | 127 | Thu Feb 20 01:00:34 EST 2003 | Thu Feb 20 01:39:17 EST 2003 |
| KALGAN KITWARE | WinNT-bcc32 | | | | | | | | | No submission |
| TRANTRON KITWARE | WinNT-bcc32 | | | | | | | | | No submission |
| valhalla.kitware | WinNT-thvc32 | 0 | 0 | 0 | 0 | 0 | 65 | 174 | Thu Feb 20 04:05:15 EST 2003 | Thu Feb 20 04:44:36 EST 2003 |



Dashboard - Fri Sep 22 06:16:15 EDT 2006

Friday, September 22 2006

[Dashboard](#) | [Date](#) | [Updates](#) | [Tests](#) | [Build](#) | [CVS](#) | [Doxygen](#) | [Bugs](#) | [Home](#) | [Rollup](#)

[19 Files Changed](#) by 2 Authors as of 2006-09-22 01:00 GMT

Nightly Builds

| Site | Build Name | Update | Cfg | Build | | | Test | | | | Build Date | Submit Date | |
|----------------------|----------------|--------|-----|-------|------|------|--------|------|------|----|------------|------------------|------------------------------|
| | | | | Error | Warn | Min | NotRun | Fail | Pass | NA | | | Min |
| r36n11.pbm.ihost.com | AIX53-xIC | 19 | 0 | 0 | 0 | 2.7 | 0 | 0 | 68 | 14 | 13.1 | Sep 22 01:03 EDT | Fri Sep 22 01:19:33 EDT 2006 |
| G5.Nfsnet.Org | Darwin8.3-gcc4 | 19 | 0 | 0 | 0 | 4.2 | 0 | 0 | 65 | 11 | 12.5 | Sep 22 04:04 CDT | Fri Sep 22 05:21:34 EDT 2006 |
| salmon.nlm.nih.gov | Darwin8.7-gcc4 | 19 | 0 | 0 | 0 | 13.4 | 0 | 0 | 70 | 12 | 17.1 | Sep 22 02:56 EDT | Fri Sep 22 03:27:12 EDT 2006 |

Files changed r36n11.pbm.ihost.com -- AIX53-xIC as of Sep 22 01:00 EDT

[\[Expand all\]](#) | [\[Collapse all\]](#)

Updated files (19)

(1)

[bootstrap Rev. 1.90](#) by [king](#)

ENH: Added System component of kwsys.

Source (10)

[cmGlobalVisualStudio8Generator.cxx Rev. 1.13](#) by [king](#)

BUG: Centralized generation of command line arguments in escaped form. This addresses bug#3786 for se

Site Name: r36n11.pbm.ihost.com

[cmGlobalXCod](#)

BUG: Enabled u **Build Name:** AIX53-xIC

[BootstrapTest](#) Passed

Execution Time 159

Completion Status Completed

Test output

```
Internal cmake changing into directory: /bench1/noibm34/ben
-----
CMake 2.5-20060921, Copyright (c) 2006 Kitware, Inc., Insid
C compiler on this system is: xlc
C++ compiler on this system is: xlc
Makefile processor on this system is: make
```

Site Name: r36n11.pbm.ihost.com

Build Name: AIX53-xIC

68 passed, 0 failed, 0 not run

Name (sort by)

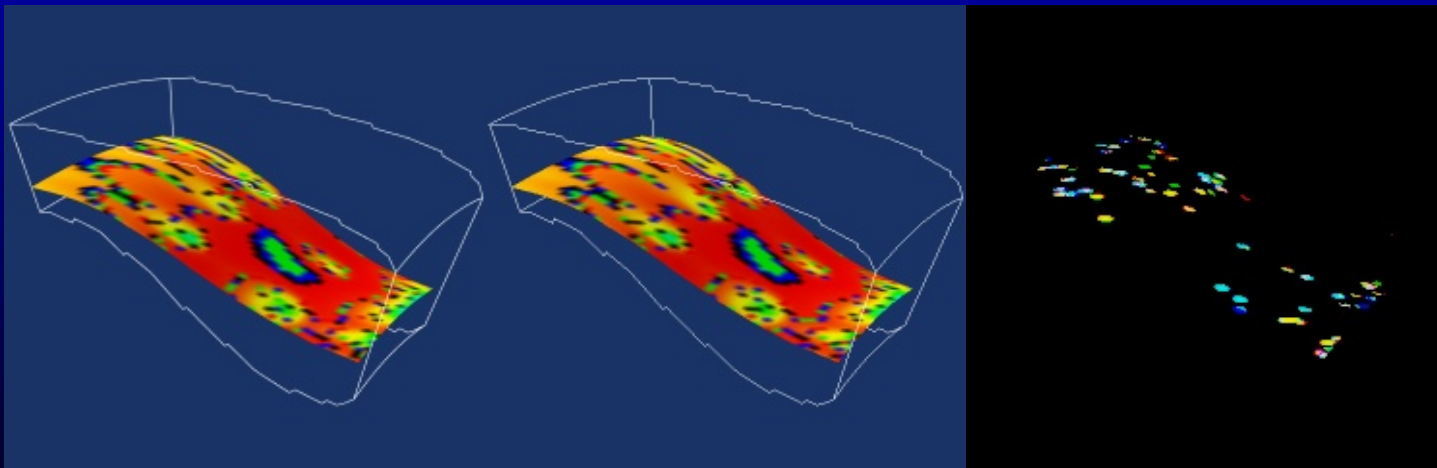
Status

Time (sort by)


| | | |
|-------------------------------|--------|-----|
| bootstrapTest | Passed | 159 |
| make.List | Passed | 0 |
| cmGlobalXCod | Passed | 8 |
| Complex | Passed | 28 |

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



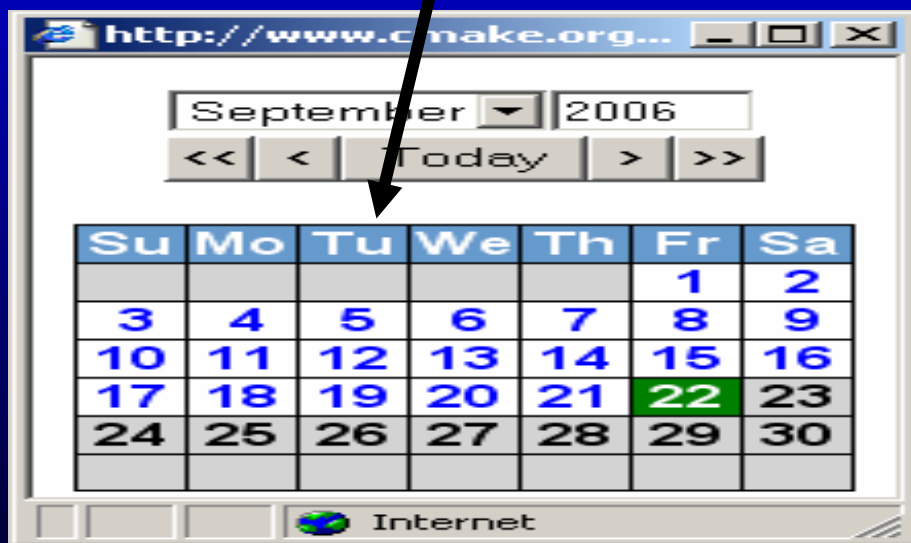
Can search for the checkin that caused the problem



CMake

Dashboard - Fri Sep 22 06:16:15 EDT 2006
Friday, September 22 2006

Dashboard | Date | ◀ T ▶ | Updates | Tests | Build | CVS | Doxygen | Bugs | Home | Rollup



http://www.cmake.org...

September 2006

<< < Today > >>

| Su | Mo | Tu | We | Th | Fr | Sa |
|----|----|----|----|----|----|----|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

Internet

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

Release Process

- One person maintains the release branch
- Two types of release
 - Binary
 - Source
- CPack - tool to create release packages
 - NSIS - windows
 - .tar.gz liunx
 - .tar.Z UNIX

Software Process Tools Summary

- CMake - cross platform building
- Dashboards - continuous testing
- Mailman Mailing List - Developer communication
- Wiki - Stored developer communication
- Mantis Bug Tracker - keep track of bugs and feature requests
- Revision control - cvs, svn
- CPack - release management